

TOTAL DOSE RADIATION TEST REPORT

ESA study: "Survey of Critical Components for 150 kRad Power Systems"

ESTEC Contract N° 22831/09/NL/AF refers




Contract extension up to 400 kRad as per CCN: ATGSP-CN-0004 IS. 3

Final Report

<p>Part Type : LM124AJRQMLV</p> <p>Package : DIP-14</p> <p>Description : Low Power Quad Bipolar Operational Amplifier</p> <p>Manufacturer : National Semiconductors</p>

Alter Technology Purchase Order N° ATGSP-TL-09-JC-CO-9 dated 11/27/2009

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Hirex reference :	HRX/TID/1019	Issue : 02	Date :	April 23 th , 2012
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Hirex Engineering	Total Dose Radiation Test Report		Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors	Issue:	02

CHANGE RECORD

ISSUE	DATE	PAGE	DESCRIPTION OF CHANGES
01	January 24th, 2012	All	Original Issue
02	April 23th, 2012	5	Serial numbers updated

Hirex Engineering	Total Dose Radiation Test Report		Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors	Issue:	02

TOTAL DOSE RADIATION TEST REPORT
on
National Semiconductors
LM124AJRQMLV
Low Power Quad Bipolar Operational Amplifier

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1 Introduction

In the scope of the ESA study: "Survey of Critical Components for 150 kRad Power Systems", a total dose characterization test of the National Semiconductors LM124AJRQMLV, Low Power Quad Bipolar Operational Amplifier has been performed with an accumulated dose of about 442kRad(Si) at different dose rates of 36,100 & 300 rad(Si)/hour, in response to Alter Technology purchase order reference ATGSP-TL-09-JC-CO-9.

An Interim report, HRX/TID/0935 Issue 01, corresponding to the irradiation up to 163 Krad(Si) has been already provided.

The purpose of this test was to evaluate total dose withstanding of this component, to investigate its suitability for being used in space applications. This test was conducted on samples provided by Alter Technology.

Test has been performed in accordance with Hirex Engineering Radiation Test Plan HRX/SPE/0238 issue 2 dated 09/13/2010.

A complete set of electrical measurements together with graphical representation of measured parameters with respect to total dose received, are provided for all samples.

2 Applicable and Reference Documents

2.1 Applicable Documents

- Hirex Engineering Radiation Test plan: HRX/SPE/0238 issue 2 dated 09/13/2010
- Alter Technology Proposal: ATGSP-OF-648/2009 Issue 1
- Minutes of Meeting: MM-SRP-ATG-0001 dated 29/10/2009
- Hirex internal specification: Total Ionizing dose test general procedure.
- SMD detail specification: 5962-99504

2.2 Reference Documents

- National Semiconductors datasheet: dated June 2006

3 Test Samples

13 samples of the LM124AJRQMLV device were tested (6 ON + 6 OFF + 1 control sample).

12 samples (including the 6 samples already submitted to protons test: see report HRX/TID/0934) have been biased according to the flow diagram given in Figure 1.

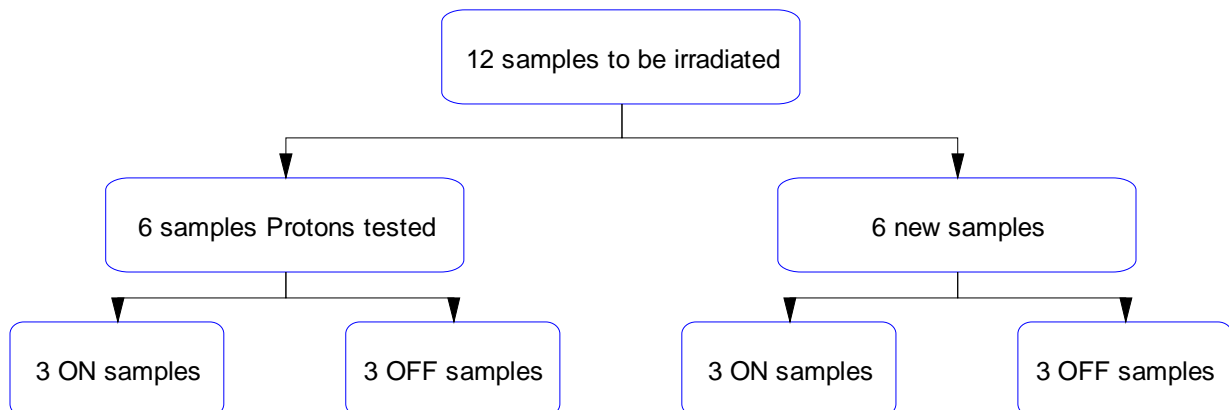


Figure 1 : Samples bias flow diagram

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Samples were allocated into the bias conditions during exposures and annealing as provided in the following table. The different samples groups are also identified for an easier plots reading.

SN attributed by Hirex	Samples Allocation	Samples Group Naming
26	Control sample	REF
27	Biased ON	ON_PROTON
28	Biased ON	ON_PROTON
29	Biased ON	ON_PROTON
30	Biased OFF	OFF_PROTON
32	Biased OFF	OFF_PROTON
39	Biased OFF	OFF_PROTON
33	Biased ON	ON_TID
34	Biased ON	ON_TID
35	Biased ON	ON_TID
36	Biased OFF	OFF_TID
37	Biased OFF	OFF_TID
38	Biased OFF	OFF_TID

Identification of the LM124AJRQMLV is given below:

Part Number: LM124AJRQMLV

Top Marking: logo H5A0517Z delta RM124AJRQMLV JM05911 82 WAFER14 serial

Bottom Marking: -

Date Code: -

4 Experimental Conditions

4.1 Radiation Source Dose Rate and Annealing

The dose exposures were performed at UCL in Louvain (Belgium). In this irradiation facility, a Cobalt 60 source is used with the possibility to vary the dose rate by simply adjusting the distance to the source. During the dose exposures, devices under test have been irradiated in an ambient temperature of 24°C ±6°C.

The dose received by the devices has been controlled by the measurement of one Alanine pellet dosimeter placed onto the bias board.

Resulting test conditions are provided below.

Irradiation Steps requested	Pellet dosimetry data	Dose rate	Annealing steps	Temperature
kRad	kRad	Rad/h	Hours	°C
0	0			
10	8.1	36		Room
20	22.5	36		Room
50	54	36		Room
100	108.9	36		Room
150	162.9	100 [1]		Room
200	198	300 [1]		Room
250	238.5	300 [1]		Room
300	279.9	300 [1]		Room
350	351	300 [1]		Room
400	441	300 [1]		Room
			24	Room
			168	100

Note [1]: Due to the maintenance period planned at UCL at the end of December and in order to perform subsequent requested exposures steps up to 400 Krad(Si), the dose rates of several steps have been changed, in agreement with ESA, from 36 rad(Si)/h to 100 rad(Si)/h and from 100 rad(Si)/h to 300 rad(Si)/h as indicated.

4.2 Bias during Dose Exposures and Measurements conditions

4.2.1 Bias conditions

During exposures test board allowed to bias 6 samples in accordance with the electrical circuit provided in Figure 2. 6 other samples were biased OFF with all pins connected to ground.

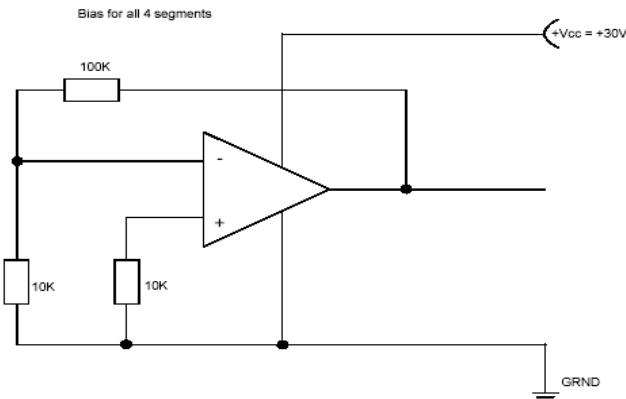


Figure 2 : Bias Conditions during Irradiation Exposures

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4.2.2 Electrical Measurements

Electrical parameters test program principle for LM124AJRQMLV is provided in Figure 3.

A HP4142 DC tester was used to perform required measurements.

A dedicated test fixture was designed to ensure proper measurement conditions. In addition a faraday cage was used to ensure optimum conditions for low level measurements.

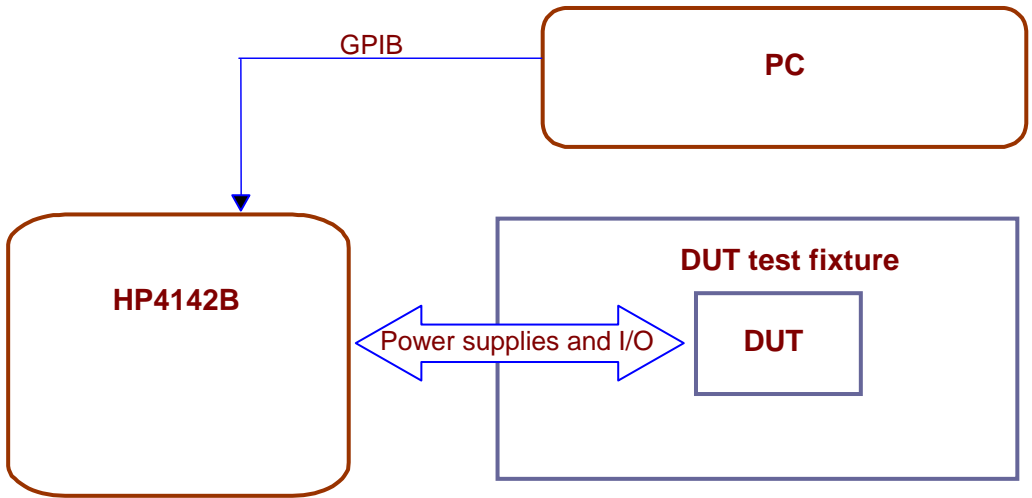


Figure 3 : LM124AJRQMLV test program principle

Hirex Engineering	Total Dose Radiation Test Report		Ref.:	HRX/TID/1019
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Electrical parameters test conditions and limits used for performing this test are given in Table 1.

PARAMETERS	SYMBOLS	TEST CONDITIONS	MIN	MAX	UNITS
Input Offset Voltage	VIO1	+VCC=30V. -VCC=GND. VCM=-15V	-2.0	2.0	mV
Input Offset Voltage	VIO2	+VCC=2V. -VCC=-28V. VCM=13V	-2.0	2.0	mV
Input Offset Voltage	VIO3	+VCC=5V. -VCC=GND. VCM=-1.4V	-2.0	2.0	mV
Input Offset Voltage	VIO4	+VCC=2.5V. -VCC=-2.5V. VCM=-1.1V	-2.0	2.0	mV
Input Offset Current	IIO1	+VCC=30V. -VCC=GND. VCM=-15V	-10.0	10.0	nA
Input Offset Current	IIO2	+VCC=2V. -VCC=-28V. VCM=13V	-10.0	10.0	nA
Input Offset Current	IIO3	+VCC=5V. -VCC=GND. VCM=-1.4V	-10.0	10.0	nA
Input Offset Current	IIO4	+VCC=2.5V. -VCC=-2.5V. VCM=-1.1V	-10.0	10.0	nA
Input Bias Current	IIBP1	+VCC=30V. -VCC=GND.VCM=-15V	-50.0	0.1	nA
Input Bias Current	IIBP2	+VCC=2V. -VCC=-28V. VCM=13V	-50.0	0.1	nA
Input Bias Current	IIBP3	+VCC=5V. -VCC=GND.VCM=-1.4V	-50.0	0.1	nA
Input Bias Current	IIBP4	+VCC=2.5V. -VCC=-2.5V. VCM=-1.1V	-50.0	0.1	nA
Input Bias Current	IIBM1	+VCC=30V. -VCC=GND.VCM=-15V	-50.0	0.1	nA
Input Bias Current	IIBM2	+VCC=2V. -VCC=-28V. VCM=13V	-50.0	0.1	nA
Input Bias Current	IIBM3	+VCC=5V. -VCC=GND. VCM=-1.4V	-50.0	0.1	nA
Input Bias Current	IIBM4	+VCC=2.5V. -VCC=-2.5V. VCM=-1.1V	-50.0	0.1	nA
Power Supply Rejection Ratio	PSRR	-VCC=GND. VCM=-1.4V. 5V<+VCC<30V	-100.00	100.00	μV/V
Common Mode Rejection Ratio	CMRR	+VCC=30V. -VCC=GND. VCM=-15V to +VCC=2V. -VCC=-28V. VCM=13V	76.00		dB
Power Supply Current	<u>ICC</u>	+VCC=30V. -VCC=GND		3.0	mA
Voltage Gain	AVS1_1	+VCC=30V. -VCC=GND. 1V<Vout<26V. RL=10K	50.0		V/mV
Voltage Gain	AVS1_2	+VCC=30V. -VCC=GND. 5V<Vout<20V. RL=2K	50.0		V/mV
Voltage Gain	AVS2_1	+VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=10K	10.0		V/mV
Voltage Gain	AVS2_2	+VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=2K	10.0		V/mV
Logical "0" output voltage	VOL1	+VCC=30V. -VCC=GND. RL=10 kΩ		35.0	mV
Logical "0" output voltage	VOL2	+VCC=30V. -VCC=GND. IOL=5mA		1.5	V
Logical "0" output voltage	VOL3	+VCC=4.5V. -VCC=GND. IOL=2μA		400.0	mV
Logical "1" output voltage	VOH1	+VCC=30 V. -VCC=GND. IOH=-10mA	27.00		V
Logical "1" output voltage	VOH2	+VCC=4.5V. -VCC=GND. IOH=-10mA	2.40		V
Maximum Output Voltage Swing	VOP1	+VCC=30V. -VCC=GND. Vout=30V. RL=10K	27.00		V
Maximum Output Voltage Swing	VOP2	+VCC=30V. -VCC=GND.Vout=30V. RL=2K	26.00		V

Table 1 : Measured electrical parameters

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5 Conclusion

A Total Ionizing Dose characterization test was carried out by Hirex Engineering under Alter Technology contract on the National Semiconductors LM124AJRQMLV Low Power Quad Bipolar Operational Amplifier in DIP-14 package.

12 samples plus one control sample were used during testing. They were exposed to radiation using a dose rate of 36,100 & 300 rad(Si)/hour at room temperature.

A summary of failed parameters is provided in the following table. The behavior of each parameter is recorded for both biased On and biased Off samples.

Parameters not listed remained within specification limits all along testing or had no limits specified. Detail test results are presented in next section.

Parameters	Failure Level between :		Annealing Recovery [Note 1]					Comments
			NA	No	Partial	Complete	Rebound	
VIO1	ON_PROTON samples	279.9 & 351 kRad(Si)				X		
	ON_TID samples	No Failure	X					
	OFF_PROTON samples	108.9 & 162.9 kRad(Si)			X			
	OFF_TID samples	198 & 238.5 kRad(Si)				X		
VIO2	ON_PROTON samples	No Failure	X					
	ON_TID samples	No Failure	X					
	OFF_PROTON samples	162.9 & 198 kRad(Si)				X		
	OFF_TID samples	198 & 238.5 kRad(Si)				X		
VIO3	ON_PROTON samples	238.5 & 279.9 kRad(Si)				X		
	ON_TID samples	No Failure	X					
	OFF_PROTON samples	108.9 & 162.9 kRad(Si)		X				
	OFF_TID samples	162.9 & 198 kRad(Si)			X			
VIO4	ON_PROTON samples	279.9 & 351 kRad(Si)				X		
	ON_TID samples	No Failure	X					
	OFF_PROTON samples	108.9 & 162.9 kRad(Si)		X				
	OFF_TID samples	162.9 & 198 kRad(Si)			X			
IIBP1	ON_PROTON samples	-		X				Note 2
	ON_TID samples	54 & 108.9 kRad(Si)		X				
	OFF_PROTON samples	-		X				Note 2
	OFF_TID samples	54 & 108.9 kRad(Si)		X				
IIBP2	ON_PROTON samples	54 & 108.9 kRad(Si)		X				
	ON_TID samples	198 & 238.5 kRad(Si)				X		
	OFF_PROTON samples	54 & 108.9 kRad(Si)		X				
	OFF_TID samples	238.5 & 279.9 kRad(Si)			X			

Parameters	Failure Level between :		Annealing Recovery [Note 1]					Comments
			NA	No	Partial	Complete	Rebound	
IIBP3	ON_PROTON samples	-		X				Note 2
	ON_TID samples	162.9 & 198 kRad(Si)		X				
	OFF_PROTON samples	-		X				Note 2
	OFF_TID samples	162.9 & 198 kRad(Si)		X				
IIBP4	ON_PROTON samples	-		X				Note 2
	ON_TID samples	198 & 238.5 kRad(Si)				X		
	OFF_PROTON samples	-		X				Note 2
	OFF_TID samples	198 & 238.5 kRad(Si)		X				
IIBM1	ON_PROTON samples	-		X				Note 2
	ON_TID samples	54 & 108.9 kRad(Si)		X				
	OFF_PROTON samples	-		X				Note 2
	OFF_TID samples	54 & 108.9 kRad(Si)		X				
IIBM2	ON_PROTON samples	22.5 & 54 kRad(Si)		X				
	ON_TID samples	198 & 238.5 kRad(Si)				X		
	OFF_PROTON samples	22.5 & 54 kRad(Si)		X				
	OFF_TID samples	238.5 & 279.9 kRad(Si)				X		
IIBM3	ON_PROTON samples	-		X				Note 2
	ON_TID samples	162.9 & 198 kRad(Si)		X				
	OFF_PROTON samples	-		X				Note 2
	OFF_TID samples	162.9 & 198 kRad(Si)		X				
IIBM4	ON_PROTON samples	-		X				Note 2
	ON_TID samples	198 & 238.5 kRad(Si)			X			
	OFF_PROTON samples	-		X				Note 2
	OFF_TID samples	162.9 & 198 kRad(Si)			X			

[Note 1]: **NA**: Not applicable, **No**: means no sample has recovered, **Partial**: means at least one sample has recovered, **Complete**: means all samples have recovered, **Rebound**: means rebound has been observed on at least one sample.

[Note 2]: Samples failed after protons exposures were still failed at initial measurements of TID testing.

Table 2 : Summary of parameters failure levels

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6 Test Results

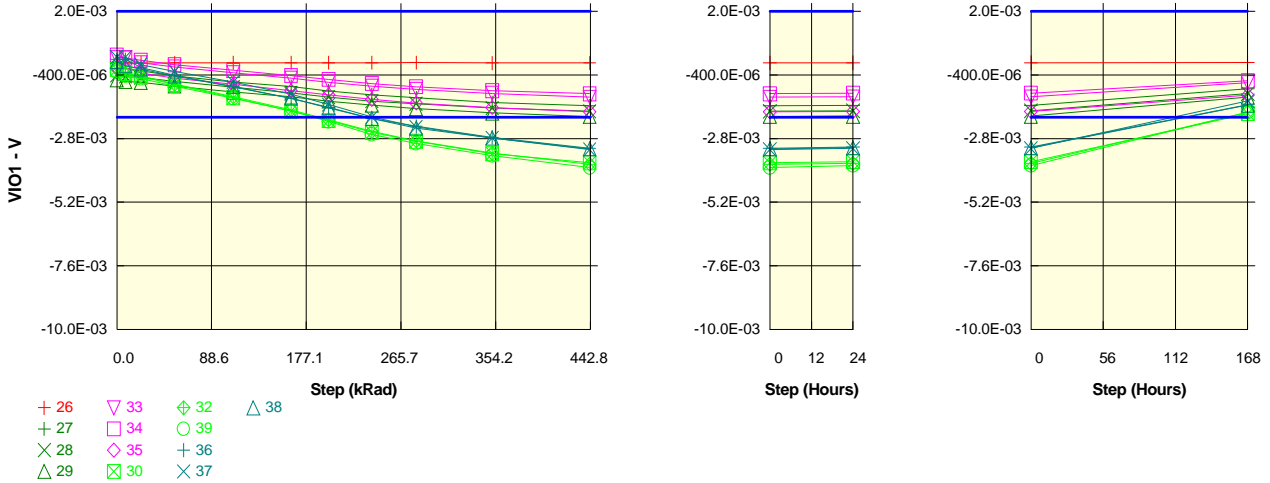
Test results including tables and graphics are provided in this section for each measured parameter.

Statistics are provided separately for biased ON & biased OFF samples of each group.

For each parameter, a drift calculation table is provided computing the drift between a given exposure step with respect to initial readings:

$$\Delta(\text{Parameter value}) = (\text{Parameter value}_{\text{POSTRAD}}) - (\text{Parameter value}_{\text{PRERAD}})$$

Parameter : Input Offset Voltage : VIO1DUTA
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	63.5E-06	53.7E-06	42.1E-06	45.3E-06	53.9E-06	61.0E-06	57.1E-06	57.5E-06	64.5E-06	47.1E-06	48.3E-06	50.5E-06	65.0E-06
ON_PROTON samples													
27	-155.2E-06	-163.8E-06	-245.9E-06	-437.2E-06	-665.7E-06	-839.3E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.5E-03	-930.3E-06
28	-415.6E-06	-458.7E-06	-507.1E-06	-644.8E-06	-865.7E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
29	-584.6E-06	-651.8E-06	-684.8E-06	-823.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.0E-03	-1.2E-03
Statistics													
Min	-584.6E-06	-651.8E-06	-684.8E-06	-823.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.0E-03	-1.2E-03
Max	-155.2E-06	-163.8E-06	-245.9E-06	-437.2E-06	-665.7E-06	-839.3E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.5E-03	-930.3E-06
Average	-385.1E-06	-424.8E-06	-479.3E-06	-635.1E-06	-860.8E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
Sigma	176.6E-06	200.7E-06	180.3E-06	157.7E-06	157.3E-06	161.6E-06	160.8E-06	160.9E-06	166.0E-06	160.7E-06	163.3E-06	167.6E-06	126.2E-06

Drift Calculation

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-8.6E-06	-90.8E-06	-282.1E-06	-510.6E-06	-684.1E-06	-848.3E-06	-998.8E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-775.2E-06
28	-	-43.1E-06	-91.6E-06	-229.2E-06	-450.2E-06	-662.0E-06	-822.8E-06	-978.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.3E-03	-688.4E-06
29	-	-67.2E-06	-100.2E-06	-238.7E-06	-466.4E-06	-647.5E-06	-810.1E-06	-960.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-653.9E-06
Average	-	-39.7E-06	-94.2E-06	-250.0E-06	-475.7E-06	-664.5E-06	-827.1E-06	-979.0E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-705.8E-06
Sigma	-	24.1E-06	4.3E-06	23.0E-06	25.5E-06	15.1E-06	15.9E-06	15.8E-06	14.8E-06	21.8E-06	23.4E-06	23.1E-06	51.0E-06

Measurements

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	63.5E-06	53.7E-06	42.1E-06	45.3E-06	53.9E-06	61.0E-06	57.1E-06	57.5E-06	64.5E-06	47.1E-06	48.3E-06	50.5E-06	65.0E-06
ON_TID samples													
33	251.2E-06	251.2E-06	51.4E-06	-105.4E-06	-320.2E-06	-519.5E-06	-673.3E-06	-829.5E-06	-942.9E-06	-1.1E-03	-1.2E-03	-1.2E-03	-691.4E-06
34	349.1E-06	232.5E-06	154.0E-06	-17.6E-06	-229.5E-06	-423.9E-06	-571.1E-06	-726.5E-06	-850.8E-06	-994.1E-06	-1.1E-03	-1.1E-03	-618.0E-06
35	-123.8E-06	-123.8E-06	-334.9E-06	-522.0E-06	-756.4E-06	-998.8E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.2E-03
Statistics													
Min	-123.8E-06	-123.8E-06	-334.9E-06	-522.0E-06	-756.4E-06	-998.8E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.2E-03
Max	349.1E-06	251.2E-06	154.0E-06	-17.6E-06	-229.5E-06	-423.9E-06	-571.1E-06	-726.5E-06	-850.8E-06	-994.1E-06	-1.1E-03	-1.1E-03	-618.0E-06
Average	158.8E-06	119.9E-06	-43.2E-06	-215.0E-06	-435.4E-06	-647.4E-06	-800.0E-06	-961.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.4E-03	-826.4E-06
Sigma	203.8E-06	172.6E-06	210.5E-06	220.0E-06	230.0E-06	251.5E-06	254.8E-06	262.3E-06	268.9E-06	281.1E-06	295.9E-06	297.3E-06	244.7E-06

Drift Calculation

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-199.8E-06	-356.6E-06	-571.4E-06	-770.6E-06	-924.5E-06	-1.1E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.5E-03	-942.6E-06
34	-	-116.6E-06	-195.1E-06	-366.7E-06	-578.6E-06	-773.0E-06	-920.2E-06	-1.1E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.4E-03	-967.1E-06
35	-	0.0E+00	-211.1E-06	-398.2E-06	-632.5E-06	-874.9E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Average	-	-38.9E-06	-202.0E-06	-373.8E-06	-594.2E-06	-806.2E-06	-958.8E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-985.2E-06
Sigma	-	55.0E-06	6.7E-06	17.7E-06	27.3E-06	48.6E-06	51.5E-06	59.1E-06	66.5E-06	78.0E-06	92.2E-06	93.5E-06	44.1E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02

Measurements

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	63.5E-06	53.7E-06	42.1E-06	45.3E-06	53.9E-06	61.0E-06	57.1E-06	57.5E-06	64.5E-06	47.1E-06	48.3E-06	50.5E-06	65.0E-06
OFF_PROTON samples													
30	-194.2E-06	-347.0E-06	-466.3E-06	-765.3E-06	-1.3E-03	-1.8E-03	-2.1E-03	-2.6E-03	-2.9E-03	-3.4E-03	-3.7E-03	-3.7E-03	-1.9E-03
32	-184.6E-06	-335.2E-06	-443.7E-06	-750.8E-06	-1.2E-03	-1.7E-03	-2.1E-03	-2.5E-03	-2.9E-03	-3.4E-03	-3.8E-03	-3.7E-03	-1.8E-03
39	-294.2E-06	-432.2E-06	-535.4E-06	-824.2E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.6E-03	-3.0E-03	-3.5E-03	-3.9E-03	-3.8E-03	-1.8E-03
Statistics													
Min	-294.2E-06	-432.2E-06	-535.4E-06	-824.2E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.6E-03	-3.0E-03	-3.5E-03	-3.9E-03	-3.8E-03	-1.9E-03
Max	-184.6E-06	-335.2E-06	-443.7E-06	-750.8E-06	-1.2E-03	-1.7E-03	-2.1E-03	-2.5E-03	-2.9E-03	-3.4E-03	-3.7E-03	-3.7E-03	-1.8E-03
Average	-224.4E-06	-371.5E-06	-481.8E-06	-780.1E-06	-1.3E-03	-1.8E-03	-2.1E-03	-2.6E-03	-2.9E-03	-3.4E-03	-3.8E-03	-3.7E-03	-1.8E-03
Sigma	49.5E-06	43.2E-06	39.0E-06	31.8E-06	23.1E-06	21.1E-06	24.5E-06	44.9E-06	45.6E-06	40.3E-06	74.7E-06	60.1E-06	21.9E-06

Drift Calculation

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-152.8E-06	-272.1E-06	-571.1E-06	-1.1E-03	-1.6E-03	-1.9E-03	-2.4E-03	-2.7E-03	-3.2E-03	-3.5E-03	-3.5E-03	-1.7E-03
32	-	-150.5E-06	-259.1E-06	-566.2E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.7E-03	-3.2E-03	-3.6E-03	-3.6E-03	-1.6E-03
39	-	-138.0E-06	-241.2E-06	-530.0E-06	-988.1E-06	-1.5E-03	-1.9E-03	-2.3E-03	-2.7E-03	-3.2E-03	-3.6E-03	-3.5E-03	-1.5E-03
Average	-	-147.1E-06	-257.5E-06	-555.8E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.7E-03	-3.2E-03	-3.6E-03	-3.5E-03	-1.6E-03
Sigma	-	6.5E-06	12.6E-06	18.3E-06	32.6E-06	45.0E-06	26.8E-06	9.5E-06	5.3E-06	10.1E-06	33.1E-06	31.8E-06	63.2E-06

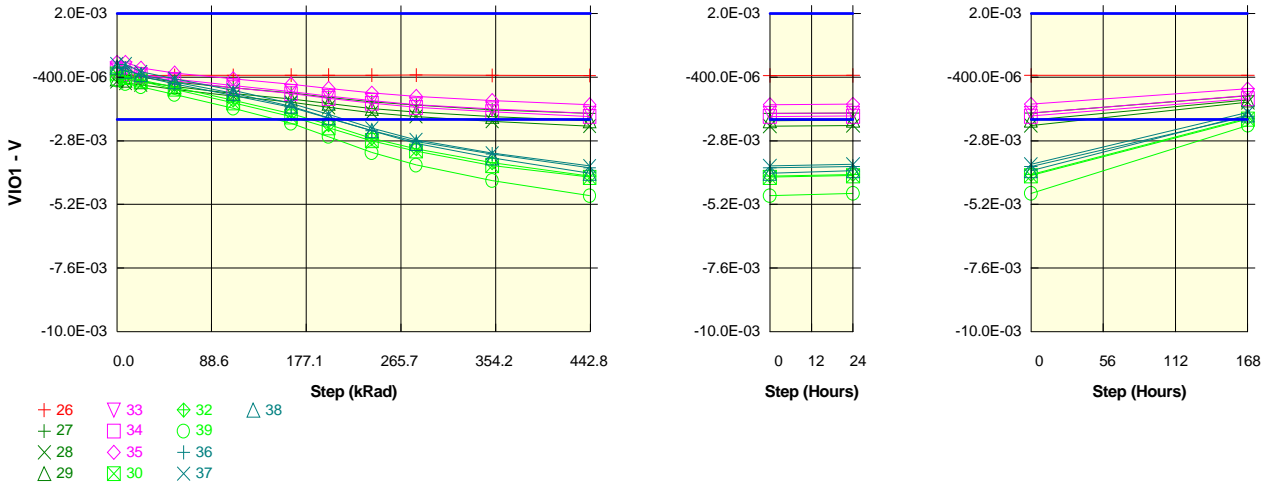
Measurements

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	63.5E-06	53.7E-06	42.1E-06	45.3E-06	53.9E-06	61.0E-06	57.1E-06	57.5E-06	64.5E-06	47.1E-06	48.3E-06	50.5E-06	65.0E-06
OFF_TID samples													
36	185.2E-06	185.2E-06	-123.9E-06	-416.2E-06	-841.6E-06	-1.3E-03	-1.6E-03	-2.0E-03	-2.3E-03	-2.8E-03	-3.2E-03	-3.1E-03	-1.5E-03
37	268.2E-06	268.2E-06	-14.6E-06	-266.9E-06	-668.9E-06	-1.1E-03	-1.5E-03	-2.0E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.2E-03	-1.4E-03
38	97.4E-06	-58.0E-06	-181.6E-06	-445.7E-06	-850.1E-06	-1.3E-03	-1.6E-03	-2.0E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.2E-03	-1.5E-03
Statistics													
Min	97.4E-06	-58.0E-06	-181.6E-06	-445.7E-06	-850.1E-06	-1.3E-03	-1.6E-03	-2.0E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.2E-03	-1.5E-03
Max	268.2E-06	268.2E-06	-14.6E-06	-266.9E-06	-668.9E-06	-1.1E-03	-1.5E-03	-2.0E-03	-2.3E-03	-2.8E-03	-3.2E-03	-3.1E-03	-1.4E-03
Average	183.6E-06	131.8E-06	-106.7E-06	-376.3E-06	-786.9E-06	-1.2E-03	-1.6E-03	-2.0E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.2E-03	-1.5E-03
Sigma	69.7E-06	138.4E-06	69.3E-06	78.3E-06	83.5E-06	72.3E-06	56.3E-06	26.3E-06	28.0E-06	11.6E-06	20.3E-06	20.5E-06	72.3E-06

Drift Calculation

VIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-309.1E-06	-601.4E-06	-1.0E-03	-1.5E-03	-1.8E-03	-2.2E-03	-2.5E-03	-2.9E-03	-3.4E-03	-3.3E-03	-1.7E-03
37	-	0.0E+00	-282.7E-06	-535.0E-06	-937.1E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.6E-03	-3.1E-03	-3.5E-03	-3.4E-03	-1.6E-03
38	-	-155.4E-06	-279.0E-06	-543.1E-06	-947.5E-06	-1.4E-03	-1.7E-03	-2.1E-03	-2.5E-03	-2.9E-03	-3.3E-03	-3.2E-03	-1.6E-03
Average	-	-51.8E-06	-290.3E-06	-559.8E-06	-970.4E-06	-1.4E-03	-1.8E-03	-2.2E-03	-2.6E-03	-3.0E-03	-3.4E-03	-3.3E-03	-1.7E-03
Sigma	-	73.3E-06	13.4E-06	29.6E-06	40.0E-06	38.1E-06	28.2E-06	48.0E-06	55.3E-06	70.7E-06	82.7E-06	81.9E-06	30.8E-06

Parameter : Input Offset Voltage : VIO1DUTB
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-325.1E-06	-327.6E-06	-337.4E-06	-335.6E-06	-332.5E-06	-328.9E-06	-330.1E-06	-328.7E-06	-325.9E-06	-335.9E-06	-336.1E-06	-333.4E-06	-327.7E-06
ON PROTON samples													
27	-316.4E-06	-322.3E-06	-411.8E-06	-583.1E-06	-810.2E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
28	-573.0E-06	-627.0E-06	-691.2E-06	-856.1E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.2E-03	-1.3E-03
29	-467.9E-06	-514.7E-06	-577.8E-06	-753.5E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.3E-03
Statistics													
Min	-573.0E-06	-627.0E-06	-691.2E-06	-856.1E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.2E-03	-1.3E-03
Max	-316.4E-06	-322.3E-06	-411.8E-06	-583.1E-06	-810.2E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
Average	-452.4E-06	-488.0E-06	-560.3E-06	-730.9E-06	-979.8E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.2E-03
Sigma	105.3E-06	125.8E-06	114.7E-06	112.6E-06	126.7E-06	146.4E-06	155.8E-06	168.8E-06	176.8E-06	175.4E-06	198.7E-06	191.9E-06	100.7E-06

Drift Calculation

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-5.9E-06	-95.4E-06	-266.8E-06	-493.8E-06	-684.5E-06	-844.2E-06	-1.0E-03	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-788.5E-06
28	-	-54.0E-06	-118.2E-06	-283.1E-06	-541.8E-06	-781.6E-06	-965.5E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-775.8E-06
29	-	-46.8E-06	-109.8E-06	-285.6E-06	-546.3E-06	-761.3E-06	-926.5E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-791.5E-06
Average	-	-35.6E-06	-107.8E-06	-278.5E-06	-527.3E-06	-742.5E-06	-912.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-785.3E-06
Sigma	-	21.2E-06	9.4E-06	8.4E-06	23.8E-06	41.8E-06	50.6E-06	63.5E-06	71.6E-06	70.1E-06	93.4E-06	86.6E-06	6.8E-06

Measurements

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-325.1E-06	-327.6E-06	-337.4E-06	-335.6E-06	-332.5E-06	-328.9E-06	-330.1E-06	-328.7E-06	-325.9E-06	-335.9E-06	-336.1E-06	-333.4E-06	-327.7E-06
ON TID samples													
33	-94.5E-06	-94.5E-06	-301.4E-06	-481.1E-06	-724.8E-06	-947.9E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
34	-138.0E-06	-264.3E-06	-357.5E-06	-535.3E-06	-797.9E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.2E-03
35	158.6E-06	158.6E-06	-56.4E-06	-246.8E-06	-457.4E-06	-671.7E-06	-824.9E-06	-996.8E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-842.2E-06
Statistics													
Min	-138.0E-06	-264.3E-06	-357.5E-06	-535.3E-06	-797.9E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.2E-03
Max	158.6E-06	158.6E-06	-56.4E-06	-246.8E-06	-457.4E-06	-671.7E-06	-824.9E-06	-996.8E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-842.2E-06
Average	-24.6E-06	-66.7E-06	-238.4E-06	-421.1E-06	-660.0E-06	-881.4E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Sigma	130.8E-06	173.7E-06	130.7E-06	125.2E-06	146.4E-06	151.5E-06	161.6E-06	165.0E-06	177.3E-06	180.5E-06	187.4E-06	191.3E-06	155.0E-06

Drift Calculation

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-206.9E-06	-386.6E-06	-630.4E-06	-853.5E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-997.2E-06
34	-	-126.3E-06	-219.5E-06	-397.3E-06	-659.9E-06	-886.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
35	-	0.0E+00	-215.0E-06	-405.4E-06	-615.9E-06	-830.3E-06	-983.5E-06	-1.2E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-1.0E-03
Average	-	-42.1E-06	-213.8E-06	-396.5E-06	-635.4E-06	-856.7E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Sigma	-	59.5E-06	5.2E-06	7.7E-06	18.3E-06	23.1E-06	32.7E-06	38.0E-06	49.0E-06	53.4E-06	59.5E-06	63.0E-06	36.7E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors							Issue:	02	

Measurements

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-325.1E-06	-327.6E-06	-337.4E-06	-335.6E-06	-332.5E-06	-328.9E-06	-330.1E-06	-328.7E-06	-325.9E-06	-335.9E-06	-336.1E-06	-333.4E-06	-327.7E-06
OFF PROTON samples													
30	-276.2E-06	-419.2E-06	-550.4E-06	-859.8E-06	-1.4E-03	-1.9E-03	-2.3E-03	-2.8E-03	-3.2E-03	-3.7E-03	-4.2E-03	-4.1E-03	-2.0E-03
32	-239.9E-06	-379.2E-06	-514.6E-06	-783.9E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.7E-03	-3.1E-03	-3.6E-03	-4.1E-03	-4.1E-03	-1.9E-03
39	-520.1E-06	-650.6E-06	-761.4E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.9E-03	-4.8E-03	-2.2E-03
Statistics													
Min	-520.1E-06	-650.6E-06	-761.4E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.9E-03	-4.8E-03	-2.2E-03
Max	-239.9E-06	-379.2E-06	-514.6E-06	-783.9E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.7E-03	-3.1E-03	-3.6E-03	-4.1E-03	-4.1E-03	-1.9E-03
Average	-345.4E-06	-483.0E-06	-608.8E-06	-899.3E-06	-1.4E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.3E-03	-3.9E-03	-4.4E-03	-4.3E-03	-2.1E-03
Sigma	124.4E-06	119.7E-06	108.9E-06	113.8E-06	124.8E-06	150.3E-06	192.0E-06	235.9E-06	273.1E-06	295.1E-06	340.1E-06	328.0E-06	121.3E-06

Drift Calculation

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-143.0E-06	-274.2E-06	-583.6E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-2.9E-03	-3.5E-03	-3.9E-03	-3.8E-03	-1.7E-03
32	-	-139.3E-06	-274.7E-06	-544.0E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.5E-03	-2.9E-03	-3.4E-03	-3.9E-03	-3.8E-03	-1.7E-03
39	-	-130.5E-06	-241.2E-06	-534.1E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.7E-03
Average	-	-137.6E-06	-263.4E-06	-553.9E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.0E-03	-3.5E-03	-4.1E-03	-4.0E-03	-1.7E-03
Sigma	-	5.2E-06	15.7E-06	21.4E-06	25.8E-06	38.8E-06	70.9E-06	111.7E-06	148.7E-06	170.8E-06	216.1E-06	203.9E-06	4.1E-06

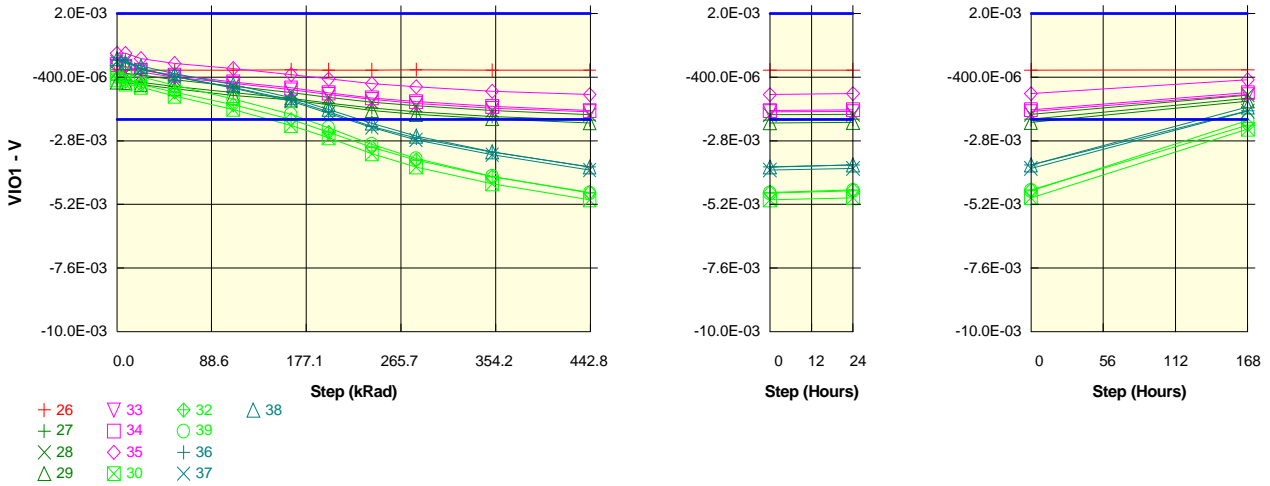
Measurements

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-325.1E-06	-327.6E-06	-337.4E-06	-335.6E-06	-332.5E-06	-328.9E-06	-330.1E-06	-328.7E-06	-325.9E-06	-335.9E-06	-336.1E-06	-333.4E-06	-327.7E-06
OFF TID samples													
36	-57.1E-06	-57.1E-06	-367.3E-06	-656.6E-06	-1.1E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.8E-03	-3.8E-03	-1.9E-03
37	84.3E-06	84.3E-06	-201.4E-06	-457.9E-06	-900.0E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.8E-03	-3.7E-03	-1.7E-03
38	-24.3E-06	-173.2E-06	-301.6E-06	-579.9E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.8E-03
Statistics													
Min	-57.1E-06	-173.2E-06	-367.3E-06	-656.6E-06	-1.1E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.9E-03
Max	84.3E-06	84.3E-06	-201.4E-06	-457.9E-06	-900.0E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.8E-03	-3.7E-03	-1.7E-03
Average	988.0E-09	-48.7E-06	-290.1E-06	-564.8E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.8E-03
Sigma	60.4E-06	105.3E-06	68.2E-06	81.8E-06	79.2E-06	65.0E-06	63.5E-06	43.5E-06	55.0E-06	79.0E-06	113.3E-06	100.2E-06	61.7E-06

Drift Calculation

VIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-310.2E-06	-599.5E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.8E-03	-3.7E-03	-1.8E-03
37	-	0.0E+00	-285.7E-06	-542.3E-06	-984.3E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-3.8E-03	-3.8E-03	-1.8E-03
38	-	-149.0E-06	-277.3E-06	-555.7E-06	-984.9E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-4.0E-03	-3.9E-03	-1.8E-03
Average	-	-49.7E-06	-291.1E-06	-565.8E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.8E-03
Sigma	-	70.2E-06	13.9E-06	24.5E-06	24.4E-06	6.6E-06	12.7E-06	19.3E-06	44.4E-06	75.0E-06	96.4E-06	82.8E-06	2.7E-06

Parameter : Input Offset Voltage : VIO1DUTC
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-124.8E-06	-133.0E-06	-145.8E-06	-143.5E-06	-136.1E-06	-127.2E-06	-130.0E-06	-131.6E-06	-124.2E-06	-143.7E-06	-143.4E-06	-138.5E-06	-124.0E-06
ON PROTON samples													
27	-509.0E-06	-513.5E-06	-596.8E-06	-758.7E-06	-986.0E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.2E-03
28	-222.4E-06	-255.6E-06	-326.9E-06	-497.9E-06	-737.6E-06	-980.1E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
29	-584.2E-06	-607.8E-06	-681.3E-06	-838.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.1E-03	-2.1E-03	-1.3E-03
Statistics													
Min	-584.2E-06	-607.8E-06	-681.3E-06	-838.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.1E-03	-2.1E-03	-1.3E-03
Max	-222.4E-06	-255.6E-06	-326.9E-06	-497.9E-06	-737.6E-06	-980.1E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Average	-438.5E-06	-458.9E-06	-535.0E-06	-698.3E-06	-939.5E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.0E-03	-1.2E-03
Sigma	155.9E-06	148.9E-06	151.1E-06	145.3E-06	149.6E-06	122.1E-06	118.8E-06	130.4E-06	135.4E-06	132.3E-06	125.9E-06	124.9E-06	96.0E-06

Drift Calculation

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-4.5E-06	-87.8E-06	-249.7E-06	-477.0E-06	-686.5E-06	-865.7E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-695.6E-06
28	-	-33.2E-06	-104.5E-06	-275.5E-06	-515.2E-06	-757.7E-06	-937.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-848.3E-06
29	-	-23.6E-06	-97.0E-06	-253.9E-06	-510.7E-06	-683.2E-06	-852.7E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-721.0E-06
Average	-	-20.4E-06	-96.4E-06	-259.7E-06	-501.0E-06	-709.1E-06	-885.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-755.0E-06
Sigma	-	11.9E-06	6.8E-06	11.3E-06	17.0E-06	34.3E-06	37.2E-06	31.3E-06	25.3E-06	26.7E-06	39.2E-06	41.1E-06	66.8E-06

Measurements

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-124.8E-06	-133.0E-06	-145.8E-06	-143.5E-06	-136.1E-06	-127.2E-06	-130.0E-06	-131.6E-06	-124.2E-06	-143.7E-06	-143.4E-06	-138.5E-06	-124.0E-06
ON TID samples													
33	7.9E-06	7.9E-06	-206.8E-06	-402.7E-06	-636.9E-06	-875.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
34	73.7E-06	-47.4E-06	-144.5E-06	-324.9E-06	-583.3E-06	-809.8E-06	-994.3E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-987.6E-06
35	496.2E-06	496.2E-06	293.4E-06	116.4E-06	-74.0E-06	-308.9E-06	-473.1E-06	-648.9E-06	-768.7E-06	-932.8E-06	-1.1E-03	-1.0E-03	-499.6E-06
Statistics													
Min	7.9E-06	-47.4E-06	-206.8E-06	-402.7E-06	-636.9E-06	-875.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Max	496.2E-06	496.2E-06	293.4E-06	116.4E-06	-74.0E-06	-308.9E-06	-473.1E-06	-648.9E-06	-768.7E-06	-932.8E-06	-1.1E-03	-1.0E-03	-499.6E-06
Average	192.6E-06	152.2E-06	-19.3E-06	-203.7E-06	-431.4E-06	-664.8E-06	-840.3E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.5E-03	-848.7E-06
Sigma	216.3E-06	244.3E-06	222.6E-06	228.6E-06	253.7E-06	253.0E-06	260.7E-06	267.0E-06	279.8E-06	289.4E-06	296.4E-06	302.4E-06	248.6E-06

Drift Calculation

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-214.7E-06	-410.6E-06	-644.8E-06	-883.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
34	-	-121.1E+00	-218.2E-06	-398.6E-06	-657.0E-06	-883.5E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
35	-	0.0E+00	-202.8E-06	-379.8E-06	-570.2E-06	-805.1E-06	-969.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.5E-03	-995.8E-06
Average	-	-40.4E-06	-211.9E-06	-396.3E-06	-624.0E-06	-857.4E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.6E-03	-1.0E-03
Sigma	-	57.1E-06	6.6E-06	12.7E-06	38.4E-06	36.9E-06	45.0E-06	51.3E-06	64.0E-06	73.3E-06	81.5E-06	86.6E-06	32.3E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-124.8E-06	-133.0E-06	-145.8E-06	-143.5E-06	-136.1E-06	-127.2E-06	-130.0E-06	-131.6E-06	-124.2E-06	-143.7E-06	-143.4E-06	-138.5E-06	-124.0E-06
OFF PROTON samples													
30	-511.2E-06	-656.5E-06	-780.4E-06	-1.1E-03	-1.6E-03	-2.2E-03	-2.7E-03	-3.3E-03	-3.8E-03	-4.4E-03	-5.0E-03	-5.0E-03	-2.4E-03
32	-423.8E-06	-561.3E-06	-676.2E-06	-971.4E-06	-1.5E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.5E-03	-4.2E-03	-4.8E-03	-4.7E-03	-2.2E-03
39	-147.9E-06	-280.8E-06	-391.1E-06	-707.2E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.0E-03
Statistics													
Min	-511.2E-06	-656.5E-06	-780.4E-06	-1.1E-03	-1.6E-03	-2.2E-03	-2.7E-03	-3.3E-03	-3.8E-03	-4.4E-03	-5.0E-03	-5.0E-03	-2.4E-03
Max	-147.9E-06	-280.8E-06	-391.1E-06	-707.2E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.0E-03
Average	-361.0E-06	-499.5E-06	-615.9E-06	-931.3E-06	-1.4E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.9E-03	-4.8E-03	-2.2E-03
Sigma	154.9E-06	159.5E-06	164.6E-06	168.9E-06	163.7E-06	172.7E-06	156.1E-06	148.9E-06	139.5E-06	128.9E-06	127.6E-06	132.6E-06	136.4E-06

Drift Calculation

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-145.2E-06	-269.2E-06	-603.9E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.9E-03
32	-	-137.5E-06	-252.4E-06	-547.7E-06	-1.0E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.3E-03	-4.2E-03	-1.8E-03
39	-	-132.9E-06	-243.2E-06	-559.4E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-4.0E-03	-4.6E-03	-4.5E-03	-1.9E-03
Average	-	-138.6E-06	-255.0E-06	-570.3E-06	-1.1E-03	-1.7E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.8E-03
Sigma	-	5.1E-06	10.8E-06	24.2E-06	33.6E-06	57.5E-06	53.6E-06	74.7E-06	98.3E-06	108.0E-06	123.3E-06	125.3E-06	40.0E-06

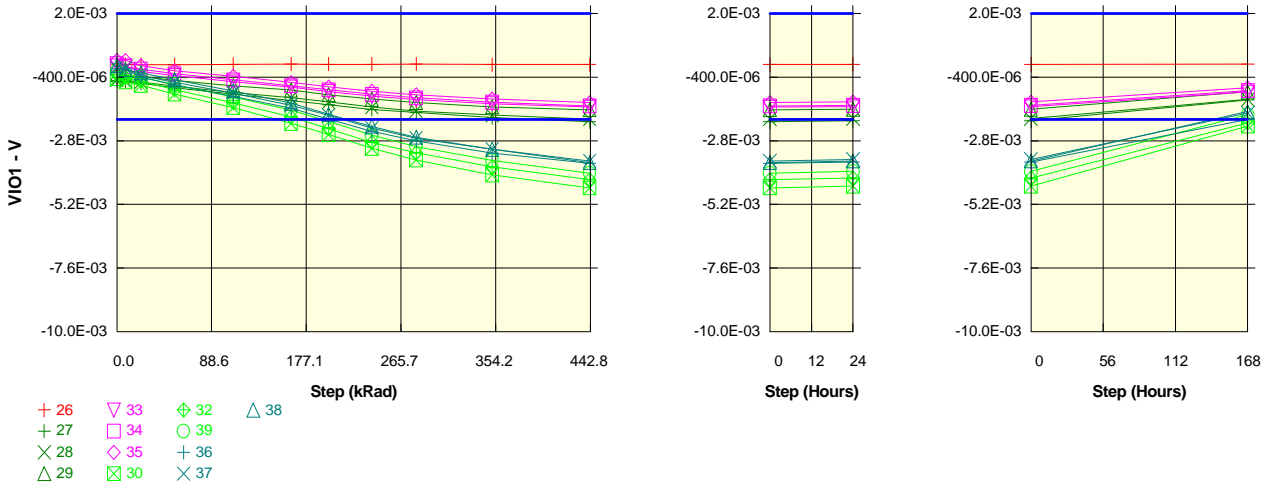
Measurements

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-124.8E-06	-133.0E-06	-145.8E-06	-143.5E-06	-136.1E-06	-127.2E-06	-130.0E-06	-131.6E-06	-124.2E-06	-143.7E-06	-143.4E-06	-138.5E-06	-124.0E-06
OFF TID samples													
36	232.0E-06	232.0E-06	-68.3E-06	-370.8E-06	-793.3E-06	-1.3E-03	-1.7E-03	-2.3E-03	-2.7E-03	-3.2E-03	-3.8E-03	-3.7E-03	-1.7E-03
37	178.0E-06	178.0E-06	-108.1E-06	-376.5E-06	-815.9E-06	-1.3E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.7E-03
38	291.4E-06	144.4E-06	10.9E-06	-272.7E-06	-682.6E-06	-1.2E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.8E-03	-3.7E-03	-1.5E-03
Statistics													
Min	178.0E-06	144.4E-06	-108.1E-06	-376.5E-06	-815.9E-06	-1.3E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.7E-03
Max	291.4E-06	232.0E-06	10.9E-06	-272.7E-06	-682.6E-06	-1.2E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.8E-03	-3.7E-03	-1.5E-03
Average	233.8E-06	184.8E-06	-55.1E-06	-340.0E-06	-763.9E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.7E-03	-3.3E-03	-3.8E-03	-3.8E-03	-1.6E-03
Sigma	46.3E-06	36.1E-06	49.5E-06	47.6E-06	58.2E-06	56.0E-06	59.7E-06	68.9E-06	60.2E-06	45.8E-06	54.8E-06	61.2E-06	71.8E-06

Drift Calculation

VIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-300.2E-06	-602.8E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.5E-03	-2.9E-03	-3.5E-03	-4.0E-03	-4.0E-03	-1.9E-03
37	-	0.0E+00	-286.1E-06	-554.5E-06	-993.9E-06	-1.5E-03	-1.9E-03	-2.5E-03	-3.0E-03	-3.5E-03	-4.1E-03	-4.0E-03	-1.9E-03
38	-	-147.0E-06	-280.4E-06	-564.1E-06	-974.0E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.0E-03	-1.8E-03
Average	-	-49.0E-06	-288.9E-06	-573.8E-06	-997.7E-06	-1.5E-03	-1.9E-03	-2.5E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.0E-03	-1.9E-03
Sigma	-	69.3E-06	8.3E-06	20.9E-06	21.1E-06	12.7E-06	13.9E-06	27.4E-06	13.9E-06	20.9E-06	30.5E-06	31.8E-06	36.1E-06

Parameter : Input Offset Voltage : VIO1DUTD
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	88.8E-06	82.4E-06	68.4E-06	68.5E-06	79.4E-06	87.5E-06	85.3E-06	85.3E-06	90.9E-06	71.9E-06	71.7E-06	76.5E-06	90.7E-06
ON PROTON samples													
27	-529.8E-06	-553.2E-06	-632.9E-06	-808.6E-06	-1.0E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.1E-03	-1.3E-03
28	-508.4E-06	-525.1E-06	-585.6E-06	-746.6E-06	-982.7E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.0E-03	-1.2E-03
29	-310.9E-06	-338.2E-06	-380.9E-06	-524.4E-06	-726.6E-06	-887.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.6E-03	-1.6E-03	-957.9E-06
Statistics													
Min	-529.8E-06	-553.2E-06	-632.9E-06	-808.6E-06	-1.0E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.1E-03	-1.3E-03
Max	-310.9E-06	-338.2E-06	-380.9E-06	-524.4E-06	-726.6E-06	-887.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.6E-03	-1.6E-03	-957.9E-06
Average	-449.7E-06	-472.2E-06	-533.1E-06	-693.2E-06	-918.2E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.9E-03	-1.9E-03	-1.2E-03
Sigma	98.5E-06	95.4E-06	109.4E-06	122.0E-06	137.9E-06	167.0E-06	159.6E-06	164.6E-06	166.1E-06	175.2E-06	191.3E-06	188.7E-06	140.1E-06

Drift Calculation

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-23.4E-06	-103.1E-06	-278.8E-06	-515.6E-06	-750.6E-06	-912.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-738.1E-06
28	-	-16.7E-06	-77.1E-06	-238.2E-06	-474.3E-06	-672.8E-06	-828.6E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.5E-03	-732.0E-06
29	-	-27.4E-06	-70.0E-06	-213.5E-06	-415.7E-06	-576.2E-06	-752.4E-06	-923.4E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.3E-03	-647.0E-06
Average	-	-22.5E-06	-83.4E-06	-243.5E-06	-468.5E-06	-666.6E-06	-831.0E-06	-1.0E-03	-1.1E-03	-1.3E-03	-1.5E-03	-1.4E-03	-705.7E-06
Sigma	-	4.4E-06	14.2E-06	26.9E-06	41.0E-06	71.3E-06	65.2E-06	67.9E-06	68.0E-06	78.4E-06	94.4E-06	91.3E-06	41.6E-06

Measurements

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	88.8E-06	82.4E-06	68.4E-06	68.5E-06	79.4E-06	87.5E-06	85.3E-06	85.3E-06	90.9E-06	71.9E-06	71.7E-06	76.5E-06	90.7E-06
ON TID samples													
33	22.3E-06	22.3E-06	-185.5E-06	-347.5E-06	-573.3E-06	-779.6E-06	-951.4E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.5E-03	-1.5E-03	-963.7E-06
34	107.2E-06	-7.7E-06	-97.9E-06	-271.8E-06	-505.8E-06	-725.4E-06	-878.9E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.5E-03	-907.5E-06
35	227.4E-06	227.4E-06	29.3E-06	-160.8E-06	-369.1E-06	-603.8E-06	-776.0E-06	-933.8E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.3E-03	-804.1E-06
Statistics													
Min	22.3E-06	-7.7E-06	-185.5E-06	-347.5E-06	-573.3E-06	-779.6E-06	-951.4E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.5E-03	-1.5E-03	-963.7E-06
Max	227.4E-06	227.4E-06	29.3E-06	-160.8E-06	-369.1E-06	-603.8E-06	-776.0E-06	-933.8E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.3E-03	-804.1E-06
Average	119.0E-06	80.7E-06	-84.7E-06	-260.0E-06	-482.8E-06	-702.9E-06	-868.8E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.4E-03	-891.7E-06
Sigma	84.2E-06	104.5E-06	88.2E-06	76.7E-06	84.9E-06	73.5E-06	72.0E-06	75.9E-06	77.3E-06	73.9E-06	71.6E-06	76.4E-06	66.1E-06

Drift Calculation

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-207.8E-06	-369.8E-06	-595.6E-06	-801.9E-06	-973.7E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.5E-03	-986.0E-06
34	-	-114.9E-06	-205.1E-06	-379.0E-06	-613.0E-06	-832.6E-06	-986.1E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-1.0E-03
35	-	0.0E+00	-198.1E-06	-388.2E-06	-596.6E-06	-831.3E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-1.0E-03
Average	-	-38.3E-06	-203.7E-06	-379.0E-06	-601.7E-06	-821.9E-06	-987.7E-06	-1.2E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-1.0E-03
Sigma	-	54.2E-06	4.1E-06	7.5E-06	8.0E-06	14.2E-06	12.2E-06	9.0E-06	7.3E-06	13.4E-06	18.1E-06	15.2E-06	18.8E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	88.8E-06	82.4E-06	68.4E-06	68.5E-06	79.4E-06	87.5E-06	85.3E-06	85.3E-06	90.9E-06	71.9E-06	71.7E-06	76.5E-06	90.7E-06
OFF_PROTON samples													
30	-456.8E-06	-580.8E-06	-712.0E-06	-1.0E-03	-1.5E-03	-2.2E-03	-2.6E-03	-3.1E-03	-3.5E-03	-4.1E-03	-4.6E-03	-4.5E-03	-2.2E-03
32	-293.6E-06	-423.8E-06	-556.8E-06	-874.6E-06	-1.4E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.2E-03	-3.8E-03	-4.3E-03	-4.2E-03	-2.1E-03
39	-160.2E-06	-294.1E-06	-401.5E-06	-681.0E-06	-1.2E-03	-1.7E-03	-2.1E-03	-2.6E-03	-3.0E-03	-3.5E-03	-4.0E-03	-4.0E-03	-1.8E-03
Statistics													
Min	-456.8E-06	-580.8E-06	-712.0E-06	-1.0E-03	-1.5E-03	-2.2E-03	-2.6E-03	-3.1E-03	-3.5E-03	-4.1E-03	-4.6E-03	-4.5E-03	-2.2E-03
Max	-160.2E-06	-294.1E-06	-401.5E-06	-681.0E-06	-1.2E-03	-1.7E-03	-2.1E-03	-2.6E-03	-3.0E-03	-3.5E-03	-4.0E-03	-4.0E-03	-1.8E-03
Average	-303.5E-06	-432.9E-06	-556.8E-06	-865.0E-06	-1.4E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.3E-03	-3.8E-03	-4.3E-03	-4.2E-03	-2.1E-03
Sigma	121.3E-06	117.2E-06	126.8E-06	146.4E-06	161.1E-06	202.6E-06	204.4E-06	200.4E-06	209.2E-06	221.2E-06	228.4E-06	224.1E-06	180.0E-06

Drift Calculation

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-124.0E-06	-255.2E-06	-582.5E-06	-1.1E-03	-1.7E-03	-2.1E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.1E-03	-4.1E-03	-1.8E-03
32	-	-130.2E-06	-263.2E-06	-581.0E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.0E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.8E-03
39	-	-134.0E-06	-241.3E-06	-520.8E-06	-992.0E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-3.9E-03	-3.8E-03	-1.7E-03
Average	-	-129.4E-06	-253.2E-06	-561.4E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.8E-03
Sigma	-	4.1E-06	9.0E-06	28.7E-06	42.6E-06	82.0E-06	85.0E-06	80.5E-06	87.9E-06	99.9E-06	107.1E-06	102.8E-06	73.8E-06

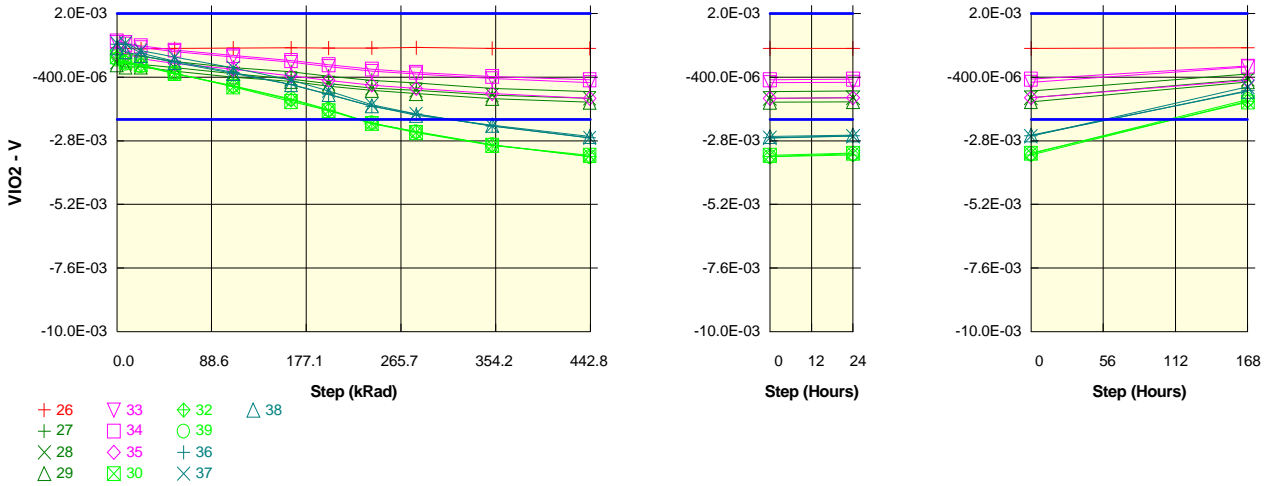
Measurements

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	88.8E-06	82.4E-06	68.4E-06	68.5E-06	79.4E-06	87.5E-06	85.3E-06	85.3E-06	90.9E-06	71.9E-06	71.7E-06	76.5E-06	90.7E-06
OFF_TID samples													
36	-91.3E-06	-91.3E-06	-396.6E-06	-695.2E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-2.8E-03	-3.3E-03	-3.7E-03	-3.6E-03	-2.0E-03
37	-62.9E-06	-62.9E-06	-337.8E-06	-602.8E-06	-1.0E-03	-1.5E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.1E-03	-3.6E-03	-3.5E-03	-1.8E-03
38	40.8E-06	-111.8E-06	-238.6E-06	-501.9E-06	-920.2E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.1E-03	-3.6E-03	-3.6E-03	-1.7E-03
Statistics													
Min	-91.3E-06	-111.8E-06	-396.6E-06	-695.2E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-2.8E-03	-3.3E-03	-3.7E-03	-3.6E-03	-2.0E-03
Max	40.8E-06	-62.9E-06	-238.6E-06	-501.9E-06	-920.2E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.1E-03	-3.6E-03	-3.5E-03	-1.7E-03
Average	-37.8E-06	-88.7E-06	-324.3E-06	-600.0E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.3E-03	-2.7E-03	-3.2E-03	-3.6E-03	-3.6E-03	-1.8E-03
Sigma	56.8E-06	20.0E-06	65.2E-06	78.9E-06	85.1E-06	81.2E-06	78.3E-06	80.1E-06	56.5E-06	70.2E-06	38.1E-06	42.3E-06	127.8E-06

Drift Calculation

VIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-305.3E-06	-603.9E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.7E-03	-3.2E-03	-3.6E-03	-3.5E-03	-1.9E-03
37	-	0.0E+00	-274.8E-06	-539.9E-06	-943.2E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.6E-03	-3.1E-03	-3.5E-03	-3.4E-03	-1.7E-03
38	-	-152.6E-06	-279.4E-06	-542.7E-06	-961.1E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.2E-03	-3.7E-03	-3.6E-03	-1.7E-03
Average	-	-50.9E-06	-286.5E-06	-562.2E-06	-980.2E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.1E-03	-3.6E-03	-3.5E-03	-1.8E-03
Sigma	-	72.0E-06	13.4E-06	29.5E-06	40.4E-06	37.8E-06	47.7E-06	39.5E-06	32.2E-06	53.2E-06	66.8E-06	65.8E-06	89.6E-06

Parameter : Input Offset Voltage : VIO2DUTA
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	704.6E-06	682.6E-06	671.3E-06	675.2E-06	692.5E-06	705.3E-06	695.4E-06	698.4E-06	711.3E-06	681.1E-06	682.6E-06	686.5E-06	709.5E-06
ON PROTON samples													
27	469.8E-06	474.7E-06	390.7E-06	190.3E-06	-34.7E-06	-192.5E-06	-367.9E-06	-521.7E-06	-628.3E-06	-827.9E-06	-952.7E-06	-929.3E-06	-286.8E-06
28	160.0E-06	113.2E-06	82.0E-06	-47.0E-06	-268.1E-06	-479.9E-06	-647.7E-06	-818.1E-06	-904.2E-06	-1.1E-03	-1.2E-03	-1.2E-03	-485.4E-06
29	65.8E-06	-16.7E-06	-23.8E-06	-172.6E-06	-398.3E-06	-566.1E-06	-741.1E-06	-901.5E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.3E-03	-581.5E-06
Statistics													
Min	65.8E-06	-16.7E-06	-23.8E-06	-172.6E-06	-398.3E-06	-566.1E-06	-741.1E-06	-901.5E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.3E-03	-581.5E-06
Max	469.8E-06	474.7E-06	390.7E-06	190.3E-06	-34.7E-06	-192.5E-06	-367.9E-06	-521.7E-06	-628.3E-06	-827.9E-06	-952.7E-06	-929.3E-06	-286.8E-06
Average	231.9E-06	190.4E-06	149.6E-06	-9.8E-06	-233.7E-06	-412.8E-06	-585.6E-06	-747.1E-06	-849.4E-06	-1.0E-03	-1.2E-03	-1.1E-03	-451.2E-06
Sigma	172.6E-06	207.9E-06	175.8E-06	150.4E-06	150.4E-06	159.7E-06	158.6E-06	163.0E-06	162.9E-06	159.9E-06	163.4E-06	166.6E-06	122.7E-06

Drift Calculation

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	4.9E-06	-79.1E-06	-279.5E-06	-504.5E-06	-662.3E-06	-837.7E-06	-991.5E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-756.6E-06
28	-	-46.8E-06	-78.0E-06	-207.0E-06	-428.1E-06	-639.9E-06	-807.7E-06	-978.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.3E-03	-645.4E-06
29	-	-82.5E-06	-89.6E-06	-238.3E-06	-464.1E-06	-631.9E-06	-806.9E-06	-967.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-647.3E-06
Average	-	-41.5E-06	-82.2E-06	-241.6E-06	-465.5E-06	-644.7E-06	-817.4E-06	-979.0E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-683.1E-06
Sigma	-	35.9E-06	5.2E-06	29.7E-06	31.2E-06	12.9E-06	14.4E-06	9.9E-06	13.9E-06	23.0E-06	23.8E-06	27.3E-06	52.0E-06

Measurements

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	704.6E-06	682.6E-06	671.3E-06	675.2E-06	692.5E-06	705.3E-06	695.4E-06	698.4E-06	711.3E-06	681.1E-06	682.6E-06	686.5E-06	709.5E-06
ON TID samples													
33	898.3E-06	898.3E-06	713.2E-06	560.2E-06	353.9E-06	159.0E-06	-1.9E-06	-175.8E-06	-284.3E-06	-454.2E-06	-607.5E-06	-597.9E-06	-12.8E-06
34	959.2E-06	839.2E-06	781.2E-06	619.2E-06	412.1E-06	224.9E-06	68.9E-06	-97.7E-06	-220.4E-06	-375.6E-06	-502.6E-06	-476.2E-06	14.8E-06
35	485.7E-06	485.7E-06	292.6E-06	104.9E-06	-102.9E-06	-361.0E-06	-521.6E-06	-703.8E-06	-832.5E-06	-1.0E-03	-1.2E-03	-1.2E-03	-532.8E-06
Statistics													
Min	485.7E-06	485.7E-06	292.6E-06	104.9E-06	-102.9E-06	-361.0E-06	-521.6E-06	-703.8E-06	-832.5E-06	-1.0E-03	-1.2E-03	-1.2E-03	-532.8E-06
Max	959.2E-06	898.3E-06	781.2E-06	619.2E-06	412.1E-06	224.9E-06	68.9E-06	-97.7E-06	-220.4E-06	-375.6E-06	-502.6E-06	-476.2E-06	14.8E-06
Average	781.1E-06	741.1E-06	595.7E-06	428.1E-06	221.0E-06	7.6E-06	-151.5E-06	-325.8E-06	-445.7E-06	-618.0E-06	-769.4E-06	-751.6E-06	-176.9E-06
Sigma	210.3E-06	182.2E-06	216.1E-06	229.8E-06	230.3E-06	262.0E-06	263.3E-06	269.2E-06	274.7E-06	289.0E-06	306.2E-06	307.3E-06	251.9E-06

Drift Calculation

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-185.1E-06	-338.1E-06	-544.4E-06	-739.3E-06	-900.2E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-911.2E-06
34	-	-120.0E-06	-178.0E-06	-340.0E-06	-547.0E-06	-734.3E-06	-890.2E-06	-1.1E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.4E-03	-944.3E-06
35	-	0.0E+00	-193.2E-06	-380.8E-06	-588.6E-06	-846.7E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Average	-	-40.0E-06	-185.4E-06	-353.0E-06	-560.0E-06	-773.4E-06	-932.6E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-958.0E-06
Sigma	-	56.6E-06	6.2E-06	19.7E-06	20.3E-06	51.8E-06	53.0E-06	58.9E-06	64.7E-06	78.7E-06	96.1E-06	97.7E-06	44.9E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	704.6E-06	682.6E-06	671.3E-06	675.2E-06	692.5E-06	705.3E-06	695.4E-06	698.4E-06	711.3E-06	681.1E-06	682.6E-06	686.5E-06	709.5E-06
OFF PROTON samples													
30	359.3E-06	176.1E-06	59.0E-06	-262.5E-06	-765.5E-06	-1.3E-03	-1.7E-03	-2.2E-03	-2.5E-03	-3.0E-03	-3.3E-03	-3.3E-03	-1.3E-03
32	347.0E-06	175.7E-06	68.4E-06	-260.0E-06	-749.1E-06	-1.3E-03	-1.7E-03	-2.1E-03	-2.5E-03	-3.0E-03	-3.4E-03	-3.3E-03	-1.3E-03
39	273.9E-06	120.0E-06	18.5E-06	-275.4E-06	-731.4E-06	-1.2E-03	-1.6E-03	-2.1E-03	-2.5E-03	-3.0E-03	-3.4E-03	-3.3E-03	-1.3E-03
Statistics													
Min	273.9E-06	120.0E-06	18.5E-06	-275.4E-06	-765.5E-06	-1.3E-03	-1.7E-03	-2.2E-03	-2.5E-03	-3.0E-03	-3.4E-03	-3.3E-03	-1.3E-03
Max	359.3E-06	176.1E-06	68.4E-06	-260.0E-06	-731.4E-06	-1.2E-03	-1.6E-03	-2.1E-03	-2.5E-03	-3.0E-03	-3.3E-03	-3.3E-03	-1.3E-03
Average	326.7E-06	157.3E-06	48.6E-06	-266.0E-06	-748.7E-06	-1.3E-03	-1.6E-03	-2.1E-03	-2.5E-03	-3.0E-03	-3.4E-03	-3.3E-03	-1.3E-03
Sigma	37.7E-06	26.4E-06	21.7E-06	6.7E-06	13.9E-06	43.0E-06	17.7E-06	10.8E-06	14.4E-06	10.1E-06	24.0E-06	28.7E-06	36.8E-06

Drift Calculation

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-183.2E-06	-300.3E-06	-621.8E-06	-1.1E-03	-1.7E-03	-2.0E-03	-2.5E-03	-2.9E-03	-3.3E-03	-3.7E-03	-3.6E-03	-1.7E-03
32	-	-171.3E-06	-278.7E-06	-607.1E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-2.8E-03	-3.3E-03	-3.7E-03	-3.7E-03	-1.7E-03
39	-	-153.9E-06	-255.4E-06	-549.3E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.7E-03	-3.2E-03	-3.7E-03	-3.6E-03	-1.5E-03
Average	-	-169.5E-06	-278.1E-06	-592.7E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-2.8E-03	-3.3E-03	-3.7E-03	-3.6E-03	-1.6E-03
Sigma	-	12.0E-06	18.3E-06	31.3E-06	50.9E-06	78.3E-06	55.4E-06	43.7E-06	51.2E-06	47.3E-06	31.7E-06	47.0E-06	74.2E-06

Measurements

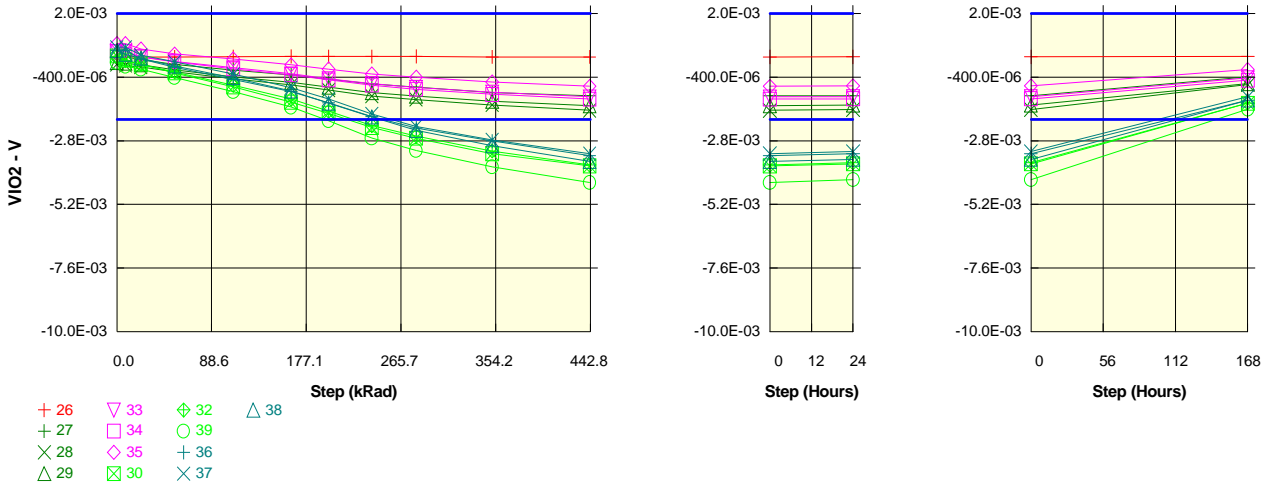
VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	704.6E-06	682.6E-06	671.3E-06	675.2E-06	692.5E-06	705.3E-06	695.4E-06	698.4E-06	711.3E-06	681.1E-06	682.6E-06	686.5E-06	709.5E-06
OFF TID samples													
36	838.4E-06	838.4E-06	509.7E-06	199.1E-06	-229.1E-06	-679.2E-06	-1.0E-03	-1.5E-03	-1.8E-03	-2.2E-03	-2.7E-03	-2.6E-03	-911.2E-06
37	886.1E-06	886.1E-06	595.4E-06	350.9E-06	-51.6E-06	-515.8E-06	-918.1E-06	-1.4E-03	-1.8E-03	-2.2E-03	-2.7E-03	-2.6E-03	-767.5E-06
38	703.8E-06	550.1E-06	413.4E-06	148.6E-06	-258.8E-06	-680.9E-06	-1.1E-03	-1.5E-03	-1.8E-03	-2.2E-03	-2.6E-03	-2.6E-03	-940.4E-06
Statistics													
Min	703.8E-06	550.1E-06	413.4E-06	148.6E-06	-258.8E-06	-680.9E-06	-1.1E-03	-1.5E-03	-1.8E-03	-2.2E-03	-2.7E-03	-2.6E-03	-940.4E-06
Max	886.1E-06	886.1E-06	595.4E-06	350.9E-06	-51.6E-06	-515.8E-06	-918.1E-06	-1.4E-03	-1.8E-03	-2.2E-03	-2.6E-03	-2.6E-03	-767.5E-06
Average	809.4E-06	758.2E-06	506.2E-06	232.8E-06	-179.8E-06	-625.3E-06	-1.0E-03	-1.5E-03	-1.8E-03	-2.2E-03	-2.7E-03	-2.6E-03	-873.0E-06
Sigma	77.2E-06	148.4E-06	74.4E-06	86.0E-06	91.5E-06	77.5E-06	64.4E-06	29.3E-06	26.4E-06	13.5E-06	22.8E-06	20.8E-06	75.6E-06

Drift Calculation

VIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-328.7E-06	-639.3E-06	-1.1E-03	-1.5E-03	-1.9E-03	-2.3E-03	-2.6E-03	-3.1E-03	-3.5E-03	-3.5E-03	-1.7E-03
37	-	0.0E+00	-290.7E-06	-535.2E-06	-937.7E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.1E-03	-3.6E-03	-3.5E-03	-1.7E-03
38	-	-153.7E-06	-290.4E-06	-555.2E-06	-962.6E-06	-1.4E-03	-1.8E-03	-2.2E-03	-2.6E-03	-2.9E-03	-3.3E-03	-3.3E-03	-1.6E-03
Average	-	-51.2E-06	-303.3E-06	-576.6E-06	-989.3E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.6E-03	-3.0E-03	-3.5E-03	-3.4E-03	-1.7E-03
Sigma	-	72.5E-06	18.0E-06	45.1E-06	56.2E-06	59.0E-06	50.3E-06	68.9E-06	52.4E-06	89.1E-06	100.0E-06	97.9E-06	47.6E-06

Parameter : Input Offset Voltage : VIO2DUTB
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	380.0E-06	372.5E-06	354.4E-06	356.9E-06	369.6E-06	378.7E-06	374.8E-06	376.9E-06	383.4E-06	360.8E-06	362.0E-06	366.3E-06	383.2E-06
ON PROTON samples													
27	336.1E-06	351.4E-06	260.6E-06	84.0E-06	-131.0E-06	-311.6E-06	-478.3E-06	-662.8E-06	-778.6E-06	-979.6E-06	-1.1E-03	-1.1E-03	-390.4E-06
28	78.7E-06	34.8E-06	-23.4E-06	-196.6E-06	-458.7E-06	-698.8E-06	-892.2E-06	-1.1E-03	-1.2E-03	-1.5E-03	-1.7E-03	-1.6E-03	-688.5E-06
29	145.9E-06	119.2E-06	64.0E-06	-123.9E-06	-389.3E-06	-603.1E-06	-779.5E-06	-986.2E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.5E-03	-647.9E-06
Statistics													
Min	78.7E-06	34.8E-06	-23.4E-06	-196.6E-06	-458.7E-06	-698.8E-06	-892.2E-06	-1.1E-03	-1.2E-03	-1.5E-03	-1.7E-03	-1.6E-03	-688.5E-06
Max	336.1E-06	351.4E-06	260.6E-06	84.0E-06	-131.0E-06	-311.6E-06	-478.3E-06	-662.8E-06	-778.6E-06	-979.6E-06	-1.1E-03	-1.1E-03	-390.4E-06
Average	186.9E-06	168.5E-06	100.4E-06	-78.8E-06	-326.3E-06	-537.8E-06	-716.7E-06	-921.7E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.4E-03	-575.6E-06
Sigma	109.0E-06	133.9E-06	118.8E-06	118.9E-06	141.0E-06	164.7E-06	174.7E-06	190.6E-06	197.7E-06	198.6E-06	227.8E-06	218.1E-06	132.0E-06

Drift Calculation

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	15.3E-06	-75.5E-06	-252.1E-06	-467.1E-06	-647.7E-06	-814.4E-06	-998.9E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-726.5E-06
28	-	-43.9E-06	-102.1E-06	-275.3E-06	-537.4E-06	-777.5E-06	-971.0E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-767.2E-06
29	-	-26.7E-06	-81.9E-06	-269.8E-06	-535.2E-06	-749.0E-06	-925.3E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-793.8E-06
Average	-	-18.4E-06	-86.5E-06	-265.7E-06	-513.2E-06	-724.7E-06	-903.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-762.5E-06
Sigma	-	24.9E-06	11.4E-06	9.9E-06	32.6E-06	55.7E-06	65.8E-06	81.7E-06	88.7E-06	89.9E-06	119.3E-06	109.5E-06	27.7E-06

Measurements

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	380.0E-06	372.5E-06	354.4E-06	356.9E-06	369.6E-06	378.7E-06	374.8E-06	376.9E-06	383.4E-06	360.8E-06	362.0E-06	366.3E-06	383.2E-06
ON TID samples													
33	561.2E-06	561.2E-06	370.8E-06	187.9E-06	-48.1E-06	-274.9E-06	-458.2E-06	-640.6E-06	-792.8E-06	-966.9E-06	-1.1E-03	-1.1E-03	-424.0E-06
34	558.6E-06	441.6E-06	352.7E-06	179.1E-06	-85.4E-06	-313.0E-06	-504.0E-06	-699.2E-06	-859.4E-06	-1.1E-03	-1.2E-03	-1.2E-03	-516.8E-06
35	865.5E-06	865.5E-06	662.1E-06	468.4E-06	283.9E-06	63.6E-06	-96.1E-06	-282.5E-06	-407.9E-06	-579.2E-06	-745.8E-06	-726.3E-06	-112.5E-06
Statistics													
Min	558.6E-06	441.6E-06	352.7E-06	179.1E-06	-85.4E-06	-313.0E-06	-504.0E-06	-699.2E-06	-859.4E-06	-1.1E-03	-1.2E-03	-1.2E-03	-516.8E-06
Max	865.5E-06	865.5E-06	662.1E-06	468.4E-06	283.9E-06	63.6E-06	-96.1E-06	-282.5E-06	-407.9E-06	-579.2E-06	-745.8E-06	-726.3E-06	-112.5E-06
Average	661.7E-06	622.7E-06	461.9E-06	278.5E-06	50.2E-06	-174.8E-06	-352.8E-06	-540.8E-06	-686.7E-06	-865.5E-06	-1.0E-03	-1.0E-03	-351.1E-06
Sigma	144.1E-06	178.5E-06	141.8E-06	134.4E-06	166.0E-06	169.3E-06	182.5E-06	184.2E-06	199.0E-06	205.3E-06	211.9E-06	215.7E-06	172.9E-06

Drift Calculation

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-190.4E-06	-373.2E-06	-609.2E-06	-836.1E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-985.1E-06
34	-	-117.0E-06	-205.9E-06	-379.5E-06	-643.9E-06	-871.5E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
35	-	0.0E+00	-203.4E-06	-397.0E-06	-581.5E-06	-801.9E-06	-961.6E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-978.0E-06
Average	-	-39.0E-06	-199.9E-06	-383.3E-06	-611.6E-06	-836.5E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Sigma	-	55.2E-06	6.8E-06	10.1E-06	25.5E-06	28.4E-06	41.4E-06	44.8E-06	59.2E-06	67.0E-06	73.1E-06	76.2E-06	44.3E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	380.0E-06	372.5E-06	354.4E-06	356.9E-06	369.6E-06	378.7E-06	374.8E-06	376.9E-06	383.4E-06	360.8E-06	362.0E-06	366.3E-06	383.2E-06
OFF PROTON samples													
30	400.3E-06	238.5E-06	92.9E-06	-242.2E-06	-769.0E-06	-1.3E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.3E-03	-3.8E-03	-3.7E-03	-1.4E-03
32	382.6E-06	221.8E-06	81.4E-06	-211.6E-06	-704.6E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.6E-03	-3.2E-03	-3.7E-03	-3.6E-03	-1.4E-03
39	149.7E-06	10.5E-06	-107.3E-06	-417.7E-06	-953.0E-06	-1.5E-03	-2.0E-03	-2.0E-03	-2.7E-03	-3.2E-03	-3.8E-03	-4.4E-03	-1.6E-03
Statistics													
Min	149.7E-06	10.5E-06	-107.3E-06	-417.7E-06	-953.0E-06	-1.5E-03	-2.0E-03	-2.7E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.6E-03
Max	400.3E-06	238.5E-06	92.9E-06	-211.6E-06	-704.6E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.6E-03	-3.2E-03	-3.7E-03	-3.6E-03	-1.4E-03
Average	310.9E-06	156.9E-06	22.3E-06	-290.5E-06	-808.9E-06	-1.4E-03	-1.8E-03	-2.4E-03	-2.8E-03	-3.4E-03	-4.0E-03	-3.9E-03	-1.5E-03
Sigma	114.2E-06	103.8E-06	91.8E-06	90.8E-06	105.2E-06	124.0E-06	155.9E-06	209.4E-06	240.5E-06	260.3E-06	303.4E-06	291.5E-06	106.4E-06

Drift Calculation

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-161.8E-06	-307.4E-06	-642.5E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.7E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.1E-03	-1.8E-03
32	-	-160.8E-06	-301.2E-06	-594.3E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.0E-03	-3.6E-03	-4.1E-03	-4.0E-03	-1.8E-03
39	-	-139.2E-06	-256.9E-06	-567.4E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.3E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.8E-03
Average	-	-154.0E-06	-288.5E-06	-601.4E-06	-1.1E-03	-1.7E-03	-2.1E-03	-2.7E-03	-3.1E-03	-3.7E-03	-4.3E-03	-4.2E-03	-1.8E-03
Sigma	-	10.4E-06	22.5E-06	31.1E-06	35.6E-06	53.4E-06	54.5E-06	100.3E-06	130.8E-06	151.1E-06	190.2E-06	178.6E-06	15.7E-06

Measurements

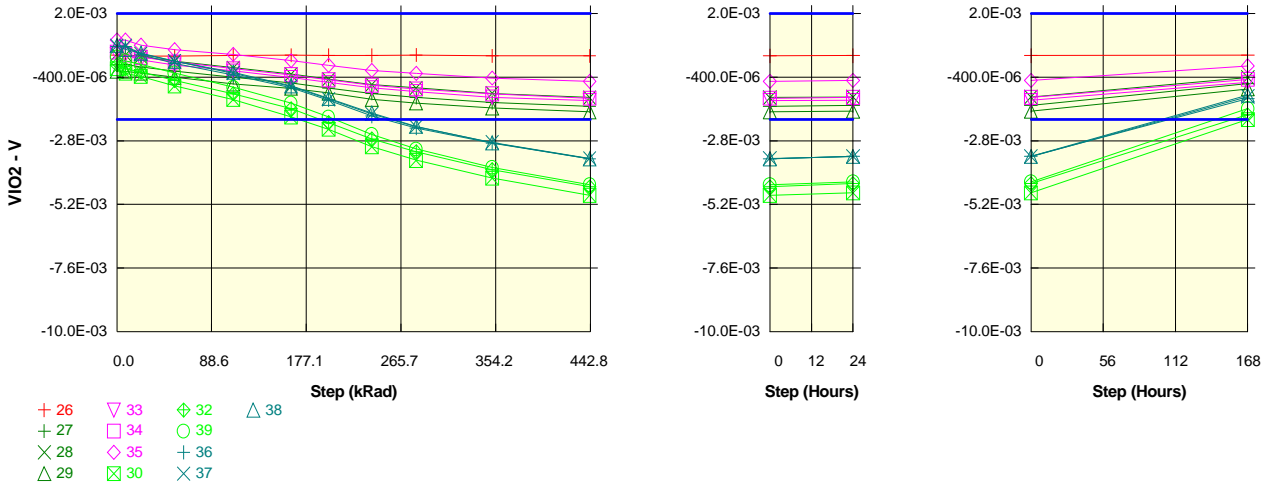
VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	380.0E-06	372.5E-06	354.4E-06	356.9E-06	369.6E-06	378.7E-06	374.8E-06	376.9E-06	383.4E-06	360.8E-06	362.0E-06	366.3E-06	383.2E-06
OFF TID samples													
36	610.7E-06	610.7E-06	278.9E-06	-29.7E-06	-483.7E-06	-950.0E-06	-1.4E-03	-1.9E-03	-2.3E-03	-2.8E-03	-3.4E-03	-3.3E-03	-1.3E-03
37	730.2E-06	730.2E-06	429.0E-06	167.5E-06	-289.7E-06	-799.8E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.2E-03	-1.1E-03
38	606.1E-06	454.1E-06	311.1E-06	19.8E-06	-423.8E-06	-927.5E-06	-1.4E-03	-1.9E-03	-2.4E-03	-3.0E-03	-3.6E-03	-3.5E-03	-1.3E-03
Statistics													
Min	606.1E-06	454.1E-06	278.9E-06	-29.7E-06	-483.7E-06	-950.0E-06	-1.4E-03	-1.9E-03	-2.4E-03	-3.0E-03	-3.6E-03	-3.5E-03	-1.3E-03
Max	730.2E-06	730.2E-06	429.0E-06	167.5E-06	-289.7E-06	-799.8E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.2E-03	-1.1E-03
Average	649.0E-06	598.3E-06	339.6E-06	52.5E-06	-399.1E-06	-892.4E-06	-1.3E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.4E-03	-3.3E-03	-1.2E-03
Sigma	57.4E-06	113.0E-06	64.5E-06	83.8E-06	81.1E-06	66.1E-06	70.9E-06	50.3E-06	64.5E-06	93.4E-06	124.9E-06	120.3E-06	63.1E-06

Drift Calculation

VIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-331.8E-06	-640.4E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-2.9E-03	-3.4E-03	-4.0E-03	-3.9E-03	-1.9E-03
37	-	0.0E+00	-301.2E-06	-562.6E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.9E-03
38	-	-152.0E-06	-295.0E-06	-586.2E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.6E-03	-4.2E-03	-4.1E-03	-1.9E-03
Average	-	-50.7E-06	-309.3E-06	-596.4E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.5E-03	-4.1E-03	-4.0E-03	-1.9E-03
Sigma	-	71.6E-06	16.1E-06	32.6E-06	33.1E-06	13.7E-06	14.0E-06	7.9E-06	35.8E-06	69.0E-06	92.1E-06	85.7E-06	7.2E-06

Parameter : Input Offset Voltage : VIO2DUTC
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	426.7E-06	411.8E-06	394.1E-06	397.8E-06	412.7E-06	425.1E-06	421.3E-06	418.5E-06	430.1E-06	400.8E-06	400.9E-06	408.5E-06	430.4E-06
ON PROTON samples													
27	69.3E-06	75.2E-06	-15.3E-06	-180.1E-06	-410.8E-06	-617.9E-06	-814.6E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-642.9E-06
28	454.8E-06	435.6E-06	366.8E-06	193.9E-06	-49.3E-06	-290.1E-06	-478.1E-06	-679.6E-06	-809.1E-06	-1.0E-03	-1.2E-03	-1.2E-03	-414.5E-06
29	-171.2E-06	-183.5E-06	-249.1E-06	-403.9E-06	-658.4E-06	-821.5E-06	-998.9E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-849.1E-06
Statistics													
Min	-171.2E-06	-183.5E-06	-249.1E-06	-403.9E-06	-658.4E-06	-821.5E-06	-998.9E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-849.1E-06
Max	454.8E-06	435.6E-06	366.8E-06	193.9E-06	-49.3E-06	-290.1E-06	-478.1E-06	-679.6E-06	-809.1E-06	-1.0E-03	-1.2E-03	-1.2E-03	-414.5E-06
Average	117.6E-06	109.1E-06	34.1E-06	-130.0E-06	-372.8E-06	-576.5E-06	-763.9E-06	-976.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-635.5E-06
Sigma	257.9E-06	253.9E-06	253.9E-06	246.6E-06	250.1E-06	218.9E-06	215.6E-06	228.7E-06	233.4E-06	228.8E-06	221.8E-06	219.5E-06	177.5E-06

Drift Calculation

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	6.0E-06	-84.6E-06	-249.3E-06	-480.0E-06	-687.1E-06	-883.9E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-712.1E-06
28	-	-19.2E-06	-88.0E-06	-261.0E-06	-504.1E-06	-745.0E-06	-933.0E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-869.3E-06
29	-	-12.3E-06	-77.9E-06	-232.6E-06	-487.2E-06	-650.3E-06	-827.7E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-677.9E-06
Average	-	-8.5E-06	-83.5E-06	-247.7E-06	-490.5E-06	-694.1E-06	-881.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-753.1E-06
Sigma	-	10.6E-06	4.2E-06	11.6E-06	10.1E-06	39.0E-06	43.0E-06	29.6E-06	24.9E-06	29.1E-06	36.3E-06	39.5E-06	83.4E-06

Measurements

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	426.7E-06	411.8E-06	394.1E-06	397.8E-06	412.7E-06	425.1E-06	421.3E-06	418.5E-06	430.1E-06	400.8E-06	400.9E-06	408.5E-06	430.4E-06
ON TID samples													
33	446.2E-06	446.2E-06	250.0E-06	50.8E-06	-169.2E-06	-414.3E-06	-599.0E-06	-801.8E-06	-952.6E-06	-1.2E-03	-1.3E-03	-1.3E-03	-597.7E-06
34	547.6E-06	431.8E-06	348.0E-06	169.6E-06	-84.4E-06	-311.2E-06	-502.4E-06	-706.7E-06	-850.9E-06	-1.0E-03	-1.2E-03	-1.2E-03	-485.2E-06
35	1.0E-03	1.0E-03	809.9E-06	634.2E-06	457.3E-06	218.7E-06	43.7E-06	-148.4E-06	-255.1E-06	-434.3E-06	-562.7E-06	-524.5E-06	24.2E-06
Statistics													
Min	446.2E-06	431.8E-06	250.0E-06	50.8E-06	-169.2E-06	-414.3E-06	-599.0E-06	-801.8E-06	-952.6E-06	-1.2E-03	-1.3E-03	-1.3E-03	-597.7E-06
Max	1.0E-03	1.0E-03	809.9E-06	634.2E-06	457.3E-06	218.7E-06	43.7E-06	-148.4E-06	-255.1E-06	-434.3E-06	-562.7E-06	-524.5E-06	24.2E-06
Average	665.1E-06	626.5E-06	469.3E-06	284.9E-06	67.9E-06	-168.9E-06	-352.6E-06	-552.3E-06	-686.2E-06	-876.3E-06	-1.0E-03	-988.5E-06	-352.9E-06
Sigma	241.5E-06	265.2E-06	244.1E-06	251.7E-06	277.5E-06	277.3E-06	283.0E-06	288.2E-06	307.7E-06	316.6E-06	322.7E-06	331.3E-06	270.6E-06

Drift Calculation

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-196.2E-06	-395.4E-06	-615.4E-06	-860.5E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.0E-03
34	-	-115.8E-06	-199.6E-06	-378.0E-06	-632.0E-06	-858.8E-06	-1.0E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.0E-03
35	-	0.0E+00	-191.7E-06	-367.4E-06	-544.3E-06	-782.8E-06	-957.9E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.5E-03	-977.4E-06
Average	-	-38.6E-06	-195.8E-06	-380.3E-06	-597.2E-06	-834.1E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Sigma	-	54.6E-06	3.2E-06	11.6E-06	38.0E-06	36.2E-06	42.4E-06	47.8E-06	67.0E-06	75.2E-06	82.6E-06	90.3E-06	29.1E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02

Measurements

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	426.7E-06	411.8E-06	394.1E-06	397.8E-06	412.7E-06	425.1E-06	421.3E-06	418.5E-06	430.1E-06	400.8E-06	400.9E-06	408.5E-06	430.4E-06
OFF PROTON samples													
30	-83.3E-06	-252.7E-06	-374.2E-06	-733.5E-06	-1.2E-03	-1.9E-03	-2.4E-03	-3.0E-03	-3.5E-03	-4.2E-03	-4.9E-03	-4.8E-03	-2.0E-03
32	56.8E-06	-93.6E-06	-212.9E-06	-530.6E-06	-1.0E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.8E-03
39	359.0E-06	208.9E-06	80.7E-06	-246.0E-06	-780.1E-06	-1.4E-03	-1.9E-03	-2.6E-03	-3.1E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.6E-03
Statistics													
Min	-83.3E-06	-252.7E-06	-374.2E-06	-733.5E-06	-1.2E-03	-1.9E-03	-2.4E-03	-3.0E-03	-3.5E-03	-4.2E-03	-4.9E-03	-4.8E-03	-2.0E-03
Max	359.0E-06	208.9E-06	80.7E-06	-246.0E-06	-780.1E-06	-1.4E-03	-1.9E-03	-2.6E-03	-3.1E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.6E-03
Average	110.8E-06	-45.8E-06	-168.8E-06	-503.3E-06	-1.0E-03	-1.6E-03	-2.1E-03	-2.8E-03	-3.3E-03	-4.0E-03	-4.6E-03	-4.5E-03	-1.8E-03
Sigma	184.6E-06	191.4E-06	188.3E-06	200.0E-06	191.0E-06	216.7E-06	190.8E-06	191.5E-06	180.9E-06	174.1E-06	174.3E-06	178.8E-06	168.1E-06

Drift Calculation

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-169.3E-06	-290.8E-06	-650.2E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.8E-03	-4.7E-03	-1.9E-03
32	-	-150.4E-06	-269.7E-06	-587.4E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-4.0E-03	-4.6E-03	-4.5E-03	-1.9E-03
39	-	-150.1E-06	-278.3E-06	-605.0E-06	-1.1E-03	-1.7E-03	-2.3E-03	-2.9E-03	-3.5E-03	-4.2E-03	-4.8E-03	-4.7E-03	-1.9E-03
Average	-	-156.6E-06	-279.6E-06	-614.2E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.4E-03	-4.1E-03	-4.7E-03	-4.6E-03	-1.9E-03
Sigma	-	9.0E-06	8.7E-06	26.5E-06	32.8E-06	68.7E-06	49.4E-06	69.4E-06	88.3E-06	91.7E-06	94.9E-06	104.1E-06	29.3E-06

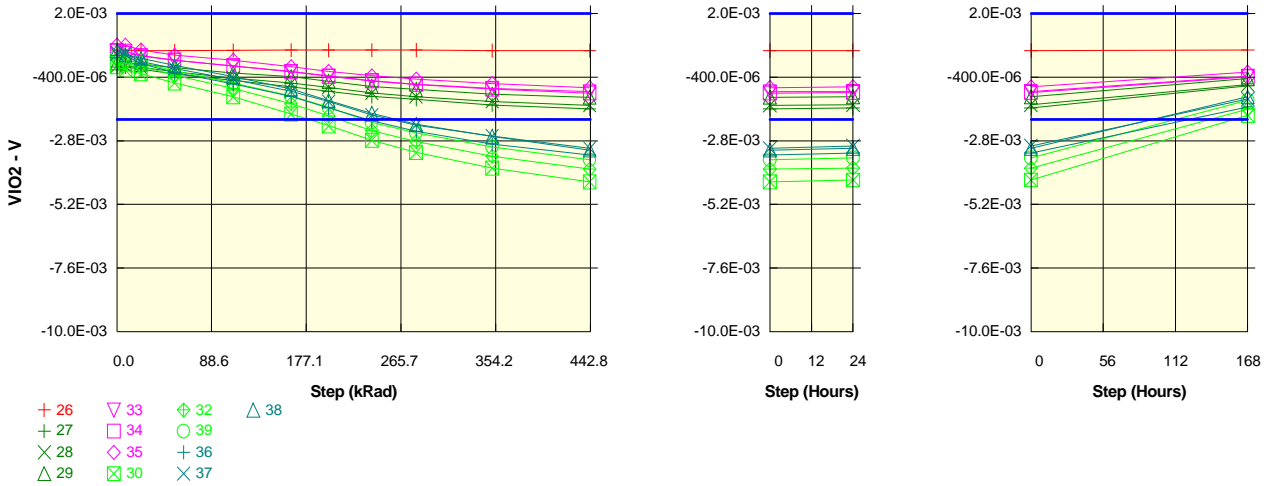
Measurements

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	426.7E-06	411.8E-06	394.1E-06	397.8E-06	412.7E-06	425.1E-06	421.3E-06	418.5E-06	430.1E-06	400.8E-06	400.9E-06	408.5E-06	430.4E-06
OFF TID samples													
36	756.3E-06	756.3E-06	438.4E-06	113.6E-06	-316.7E-06	-806.9E-06	-1.3E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.5E-03	-3.4E-03	-1.2E-03
37	778.4E-06	778.4E-06	475.5E-06	198.1E-06	-250.4E-06	-732.6E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-3.4E-03	-1.1E-03
38	796.0E-06	643.7E-06	500.6E-06	202.5E-06	-219.9E-06	-732.6E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-3.4E-03	-1.1E-03
Statistics													
Min	756.3E-06	643.7E-06	438.4E-06	113.6E-06	-316.7E-06	-806.9E-06	-1.3E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.5E-03	-3.4E-03	-1.2E-03
Max	796.0E-06	778.4E-06	500.6E-06	202.5E-06	-219.9E-06	-732.6E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-3.4E-03	-1.1E-03
Average	776.9E-06	726.1E-06	471.5E-06	171.4E-06	-262.3E-06	-764.4E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.5E-03	-3.4E-03	-1.1E-03
Sigma	16.2E-06	59.0E-06	25.5E-06	40.9E-06	40.4E-06	31.3E-06	26.9E-06	49.6E-06	28.0E-06	14.8E-06	8.1E-06	2.9E-06	56.2E-06

Drift Calculation

VIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-317.9E-06	-642.7E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.1E-03	-2.0E-03
37	-	0.0E+00	-302.8E-06	-580.2E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.2E-03	-1.9E-03
38	-	-152.3E-06	-295.4E-06	-593.5E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.3E-03	-4.2E-03	-1.9E-03
Average	-	-50.8E-06	-305.4E-06	-605.5E-06	-1.0E-03	-1.5E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.3E-03	-4.2E-03	-1.9E-03
Sigma	-	71.8E-06	9.4E-06	26.9E-06	24.5E-06	15.6E-06	10.6E-06	33.7E-06	12.8E-06	14.3E-06	18.3E-06	16.1E-06	40.1E-06

Parameter : Input Offset Voltage : VIO2DUTD
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	619.3E-06	609.5E-06	588.8E-06	589.7E-06	607.4E-06	620.0E-06	616.0E-06	616.4E-06	624.3E-06	596.1E-06	597.1E-06	604.1E-06	623.9E-06
ON PROTON samples													
27	-21.1E-06	-19.8E-06	-108.3E-06	-292.8E-06	-528.4E-06	-764.7E-06	-937.4E-06	-1.1E-03	-1.2E-03	-1.5E-03	-1.6E-03	-1.6E-03	-731.3E-06
28	19.0E-06	16.2E-06	-31.8E-06	-196.7E-06	-435.3E-06	-626.2E-06	-787.6E-06	-994.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.4E-03	-687.5E-06
29	134.7E-06	125.2E-06	87.9E-06	-50.8E-06	-241.3E-06	-387.7E-06	-567.6E-06	-753.2E-06	-870.0E-06	-1.1E-03	-1.2E-03	-1.1E-03	-449.0E-06
Statistics													
Min	-21.1E-06	-19.8E-06	-108.3E-06	-292.8E-06	-528.4E-06	-764.7E-06	-937.4E-06	-1.1E-03	-1.2E-03	-1.5E-03	-1.6E-03	-1.6E-03	-731.3E-06
Max	134.7E-06	125.2E-06	87.9E-06	-50.8E-06	-241.3E-06	-387.7E-06	-567.6E-06	-753.2E-06	-870.0E-06	-1.1E-03	-1.2E-03	-1.1E-03	-449.0E-06
Average	44.2E-06	40.6E-06	-17.4E-06	-180.1E-06	-401.6E-06	-592.9E-06	-764.2E-06	-959.0E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-622.6E-06
Sigma	66.1E-06	61.6E-06	80.7E-06	99.5E-06	119.6E-06	155.7E-06	151.9E-06	155.4E-06	155.6E-06	166.9E-06	184.1E-06	181.5E-06	124.1E-06

Drift Calculation

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	1.4E-06	-87.2E-06	-271.6E-06	-507.2E-06	-743.6E-06	-916.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-710.2E-06
28	-	-2.8E-06	-50.8E-06	-215.7E-06	-454.3E-06	-645.2E-06	-806.7E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.5E-03	-706.6E-06
29	-	-9.4E-06	-46.8E-06	-185.4E-06	-376.0E-06	-522.4E-06	-702.3E-06	-887.9E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.4E-03	-583.6E-06
Average	-	-3.6E-06	-61.6E-06	-224.3E-06	-445.8E-06	-637.1E-06	-808.4E-06	-1.0E-03	-1.1E-03	-1.3E-03	-1.5E-03	-1.4E-03	-666.8E-06
Sigma	-	4.4E-06	18.2E-06	35.7E-06	53.9E-06	90.5E-06	87.4E-06	90.1E-06	89.6E-06	101.4E-06	118.3E-06	115.5E-06	58.8E-06

Measurements

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	619.3E-06	609.5E-06	588.8E-06	589.7E-06	607.4E-06	620.0E-06	616.0E-06	616.4E-06	624.3E-06	596.1E-06	597.1E-06	604.1E-06	623.9E-06
ON TID samples													
33	584.7E-06	584.7E-06	394.8E-06	235.5E-06	23.8E-06	-182.6E-06	-360.6E-06	-535.3E-06	-666.3E-06	-830.8E-06	-957.4E-06	-945.7E-06	-368.0E-06
34	596.7E-06	492.4E-06	409.9E-06	241.2E-06	10.9E-06	-204.9E-06	-368.6E-06	-547.9E-06	-673.4E-06	-853.9E-06	-1.0E-03	-979.7E-06	-387.9E-06
35	802.9E-06	802.9E-06	623.7E-06	431.1E-06	233.2E-06	-2.3E-06	-183.4E-06	-351.1E-06	-475.5E-06	-650.2E-06	-797.1E-06	-766.5E-06	-206.6E-06
Statistics													
Min	584.7E-06	492.4E-06	394.8E-06	235.5E-06	10.9E-06	-204.9E-06	-368.6E-06	-547.9E-06	-673.4E-06	-853.9E-06	-1.0E-03	-979.7E-06	-387.9E-06
Max	802.9E-06	802.9E-06	623.7E-06	431.1E-06	233.2E-06	-2.3E-06	-183.4E-06	-351.1E-06	-475.5E-06	-650.2E-06	-797.1E-06	-766.5E-06	-206.6E-06
Average	661.4E-06	626.7E-06	476.2E-06	302.6E-06	89.3E-06	-129.9E-06	-304.2E-06	-478.1E-06	-605.0E-06	-778.3E-06	-919.4E-06	-897.3E-06	-320.9E-06
Sigma	100.1E-06	130.2E-06	104.5E-06	90.9E-06	101.9E-06	90.7E-06	85.5E-06	89.9E-06	91.7E-06	91.1E-06	88.5E-06	93.5E-06	81.2E-06

Drift Calculation

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-189.9E-06	-349.2E-06	-560.9E-06	-767.3E-06	-945.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.5E-03	-1.5E-03	-952.7E-06
34	-	-104.3E-06	-186.8E-06	-355.5E-06	-585.8E-06	-801.7E-06	-965.3E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-984.7E-06
35	-	0.0E+00	-179.2E-06	-371.8E-06	-569.7E-06	-805.2E-06	-986.2E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-1.0E-03
Average	-	-34.8E-06	-185.3E-06	-358.8E-06	-572.1E-06	-791.4E-06	-965.6E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-982.3E-06
Sigma	-	49.2E-06	4.5E-06	9.5E-06	10.3E-06	17.1E-06	16.7E-06	14.3E-06	11.5E-06	17.2E-06	27.4E-06	20.3E-06	23.2E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	619.3E-06	609.5E-06	588.8E-06	589.7E-06	607.4E-06	620.0E-06	616.0E-06	616.4E-06	624.3E-06	596.1E-06	597.1E-06	604.1E-06	623.9E-06
OFF PROTON samples													
30	-4.4E-06	-139.5E-06	-275.0E-06	-619.4E-06	-1.1E-03	-1.8E-03	-2.2E-03	-2.8E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.8E-03
32	300.2E-06	152.4E-06	13.2E-06	-331.0E-06	-830.4E-06	-1.4E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.4E-03	-3.9E-03	-3.8E-03	-1.6E-03
39	383.0E-06	238.0E-06	131.9E-06	-158.5E-06	-618.2E-06	-1.1E-03	-1.5E-03	-2.1E-03	-2.5E-03	-3.0E-03	-3.5E-03	-3.4E-03	-1.3E-03
Statistics													
Min	-4.4E-06	-139.5E-06	-275.0E-06	-619.4E-06	-1.1E-03	-1.8E-03	-2.2E-03	-2.8E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.8E-03
Max	383.0E-06	238.0E-06	131.9E-06	-158.5E-06	-618.2E-06	-1.1E-03	-1.5E-03	-2.1E-03	-2.5E-03	-3.0E-03	-3.5E-03	-3.4E-03	-1.3E-03
Average	226.3E-06	83.6E-06	-43.3E-06	-369.6E-06	-864.4E-06	-1.4E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-3.9E-03	-3.9E-03	-1.6E-03
Sigma	166.6E-06	161.6E-06	170.9E-06	190.1E-06	216.3E-06	276.8E-06	283.3E-06	279.0E-06	304.7E-06	327.7E-06	342.1E-06	340.2E-06	236.8E-06

Drift Calculation

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-135.1E-06	-270.7E-06	-615.0E-06	-1.1E-03	-1.8E-03	-2.2E-03	-2.8E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.8E-03
32	-	-147.8E-06	-287.0E-06	-631.2E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.7E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.1E-03	-1.9E-03
39	-	-145.0E-06	-251.1E-06	-541.5E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.5E-03	-2.9E-03	-3.4E-03	-3.9E-03	-3.8E-03	-1.7E-03
Average	-	-142.6E-06	-269.6E-06	-595.9E-06	-1.1E-03	-1.7E-03	-2.1E-03	-2.7E-03	-3.1E-03	-3.6E-03	-4.1E-03	-4.1E-03	-1.8E-03
Sigma	-	5.4E-06	14.7E-06	39.0E-06	63.4E-06	120.7E-06	130.6E-06	128.5E-06	149.4E-06	171.4E-06	184.1E-06	184.9E-06	108.8E-06

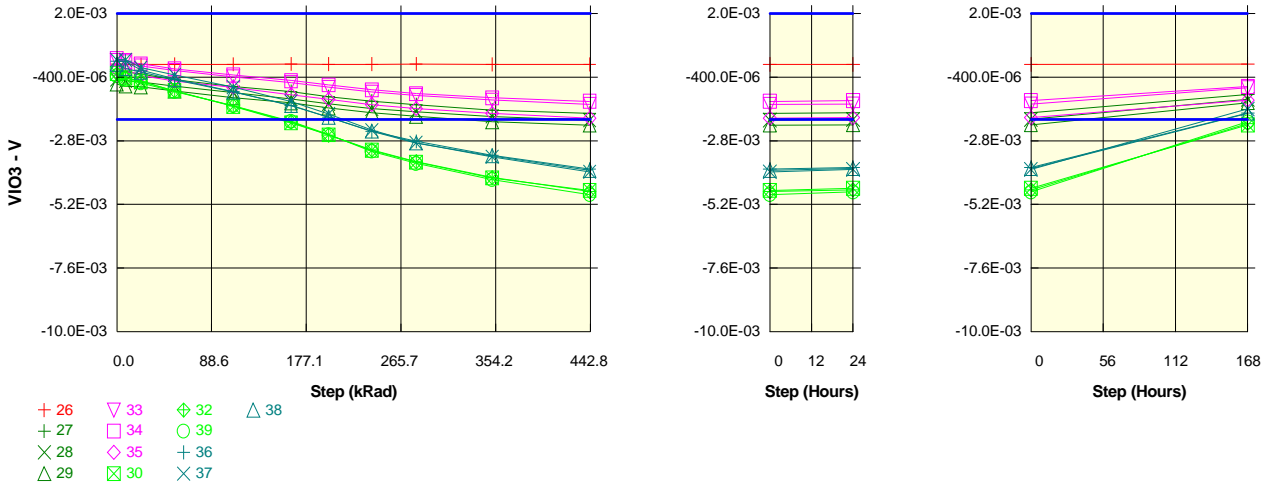
Measurements

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	619.3E-06	609.5E-06	588.8E-06	589.7E-06	607.4E-06	620.0E-06	616.0E-06	616.4E-06	624.3E-06	596.1E-06	597.1E-06	604.1E-06	623.9E-06
OFF TID samples													
36	414.3E-06	414.3E-06	96.7E-06	-222.2E-06	-660.2E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.4E-03	-2.9E-03	-3.3E-03	-3.3E-03	-1.5E-03
37	474.7E-06	474.7E-06	190.6E-06	-73.0E-06	-484.0E-06	-935.7E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.6E-03	-3.1E-03	-3.0E-03	-1.2E-03
38	599.4E-06	440.2E-06	307.3E-06	40.2E-06	-379.3E-06	-850.2E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.6E-03	-3.2E-03	-3.1E-03	-1.1E-03
Statistics													
Min	414.3E-06	414.3E-06	96.7E-06	-222.2E-06	-660.2E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.4E-03	-2.9E-03	-3.3E-03	-3.3E-03	-1.5E-03
Max	599.4E-06	474.7E-06	307.3E-06	40.2E-06	-379.3E-06	-850.2E-06	-1.3E-03	-1.8E-03	-2.2E-03	-2.6E-03	-3.1E-03	-3.0E-03	-1.1E-03
Average	496.1E-06	443.1E-06	198.2E-06	-85.0E-06	-507.8E-06	-971.9E-06	-1.4E-03	-1.9E-03	-2.3E-03	-2.7E-03	-3.2E-03	-3.1E-03	-1.3E-03
Sigma	77.1E-06	24.7E-06	86.1E-06	107.5E-06	115.9E-06	117.1E-06	122.8E-06	122.1E-06	113.3E-06	143.3E-06	104.9E-06	114.6E-06	165.6E-06

Drift Calculation

VIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-317.6E-06	-636.5E-06	-1.1E-03	-1.5E-03	-2.0E-03	-2.5E-03	-2.9E-03	-3.4E-03	-3.8E-03	-3.7E-03	-1.9E-03
37	-	0.0E+00	-284.1E-06	-547.7E-06	-958.7E-06	-1.4E-03	-1.8E-03	-2.3E-03	-2.7E-03	-3.1E-03	-3.6E-03	-3.5E-03	-1.7E-03
38	-	-159.2E-06	-292.1E-06	-559.2E-06	-978.8E-06	-1.4E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.8E-03	-3.7E-03	-1.7E-03
Average	-	-53.1E-06	-297.9E-06	-581.1E-06	-1.0E-03	-1.5E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.2E-03	-3.7E-03	-3.6E-03	-1.8E-03
Sigma	-	75.0E-06	14.3E-06	39.4E-06	50.5E-06	56.2E-06	71.7E-06	64.4E-06	65.3E-06	100.9E-06	88.7E-06	101.0E-06	105.6E-06

Parameter : Input Offset Voltage : VIO3DUTA
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	94.5E-06	85.3E-06	72.2E-06	75.7E-06	82.6E-06	91.7E-06	86.4E-06	86.1E-06	95.9E-06	77.6E-06	77.4E-06	80.2E-06	94.3E-06
ON PROTON samples													
27	-192.1E-06	-195.7E-06	-280.0E-06	-496.0E-06	-752.1E-06	-946.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.1E-03
28	-492.8E-06	-541.6E-06	-592.1E-06	-739.2E-06	-986.7E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.2E-03
29	-663.5E-06	-737.8E-06	-765.3E-06	-921.4E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.2E-03	-2.2E-03	-1.4E-03
Statistics													
Min	-663.5E-06	-737.8E-06	-765.3E-06	-921.4E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.2E-03	-2.2E-03	-1.4E-03
Max	-192.1E-06	-195.7E-06	-280.0E-06	-496.0E-06	-752.1E-06	-946.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.1E-03
Average	-449.5E-06	-491.7E-06	-545.8E-06	-718.9E-06	-971.4E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.2E-03
Sigma	194.9E-06	224.1E-06	200.8E-06	174.3E-06	173.2E-06	176.9E-06	177.5E-06	179.9E-06	182.7E-06	179.1E-06	180.3E-06	184.4E-06	127.6E-06

Drift Calculation

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-3.6E-06	-87.9E-06	-303.9E-06	-560.0E-06	-754.1E-06	-946.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-866.4E-06
28	-	-48.8E-06	-99.3E-06	-246.4E-06	-493.9E-06	-735.1E-06	-916.7E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-750.0E-06
29	-	-74.3E-06	-101.8E-06	-257.9E-06	-512.1E-06	-708.6E-06	-904.7E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-705.8E-06
Average	-	-42.3E-06	-96.3E-06	-269.4E-06	-522.0E-06	-732.6E-06	-922.6E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-774.1E-06
Sigma	-	29.2E-06	6.0E-06	24.8E-06	27.9E-06	18.6E-06	17.5E-06	16.5E-06	14.4E-06	22.5E-06	21.9E-06	21.3E-06	67.7E-06

Measurements

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	94.5E-06	85.3E-06	72.2E-06	75.7E-06	82.6E-06	91.7E-06	86.4E-06	86.1E-06	95.9E-06	77.6E-06	77.4E-06	80.2E-06	94.3E-06
ON TID samples													
33	224.0E-06	224.0E-06	15.3E-06	-151.6E-06	-387.8E-06	-610.4E-06	-780.4E-06	-965.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-800.8E-06
34	303.1E-06	179.4E-06	98.0E-06	-89.2E-06	-316.1E-06	-532.1E-06	-695.7E-06	-876.9E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.3E-03	-752.9E-06
35	-121.0E-06	-121.0E-06	-343.2E-06	-545.4E-06	-787.2E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-2.0E-03	-1.9E-03	-1.3E-03
Statistics													
Min	-121.0E-06	-121.0E-06	-343.2E-06	-545.4E-06	-787.2E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-2.0E-03	-1.9E-03	-1.3E-03
Max	303.1E-06	224.0E-06	98.0E-06	-89.2E-06	-316.1E-06	-532.1E-06	-695.7E-06	-876.9E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.3E-03	-752.9E-06
Average	135.4E-06	94.1E-06	-76.6E-06	-262.1E-06	-497.0E-06	-736.3E-06	-906.0E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-941.8E-06
Sigma	184.1E-06	153.2E-06	191.5E-06	202.0E-06	207.2E-06	235.7E-06	240.0E-06	244.9E-06	249.4E-06	263.0E-06	276.3E-06	280.5E-06	234.0E-06

Drift Calculation

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-208.7E-06	-375.6E-06	-611.8E-06	-834.4E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-1.0E-03
34	-	-123.7E-06	-205.0E-06	-392.3E-06	-619.2E-06	-835.1E-06	-998.8E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-1.1E-03
35	-	0.0E+00	-222.2E-06	-424.4E-06	-666.2E-06	-945.6E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.2E-03
Average	-	-41.2E-06	-212.0E-06	-397.4E-06	-632.4E-06	-871.7E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.1E-03
Sigma	-	58.3E-06	7.4E-06	20.3E-06	24.1E-06	52.2E-06	56.3E-06	61.1E-06	66.6E-06	79.4E-06	92.2E-06	96.4E-06	53.5E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	94.5E-06	85.3E-06	72.2E-06	75.7E-06	82.6E-06	91.7E-06	86.4E-06	86.1E-06	95.9E-06	77.6E-06	77.4E-06	80.2E-06	94.3E-06
OFF PROTON samples													
30	-258.6E-06	-430.6E-06	-565.5E-06	-915.4E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.6E-03	-4.2E-03	-4.7E-03	-4.6E-03	-2.2E-03
32	-269.0E-06	-431.6E-06	-560.8E-06	-917.7E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.6E-03	-4.2E-03	-4.7E-03	-4.7E-03	-2.2E-03
39	-350.3E-06	-500.1E-06	-624.2E-06	-942.5E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.8E-03	-4.7E-03	-2.1E-03
Statistics													
Min	-350.3E-06	-500.1E-06	-624.2E-06	-942.5E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.8E-03	-4.7E-03	-2.2E-03
Max	-258.6E-06	-430.6E-06	-560.8E-06	-915.4E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.6E-03	-4.2E-03	-4.7E-03	-4.6E-03	-2.1E-03
Average	-292.6E-06	-454.1E-06	-583.5E-06	-925.2E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.6E-03	-4.2E-03	-4.7E-03	-4.7E-03	-2.2E-03
Sigma	41.0E-06	32.5E-06	28.8E-06	12.3E-06	11.7E-06	23.2E-06	8.9E-06	20.5E-06	29.5E-06	35.8E-06	67.3E-06	55.8E-06	46.7E-06

Drift Calculation

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-172.0E-06	-307.0E-06	-656.8E-06	-1.3E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.3E-03	-3.9E-03	-4.4E-03	-4.3E-03	-1.9E-03
32	-	-162.7E-06	-291.9E-06	-648.8E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.3E-03	-3.9E-03	-4.4E-03	-4.4E-03	-1.9E-03
39	-	-149.8E-06	-274.0E-06	-592.2E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.7E-03
Average	-	-161.5E-06	-290.9E-06	-632.6E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.3E-03	-3.9E-03	-4.4E-03	-4.4E-03	-1.9E-03
Sigma	-	9.1E-06	13.5E-06	28.7E-06	51.1E-06	62.4E-06	47.2E-06	23.1E-06	16.0E-06	11.4E-06	27.5E-06	21.2E-06	86.7E-06

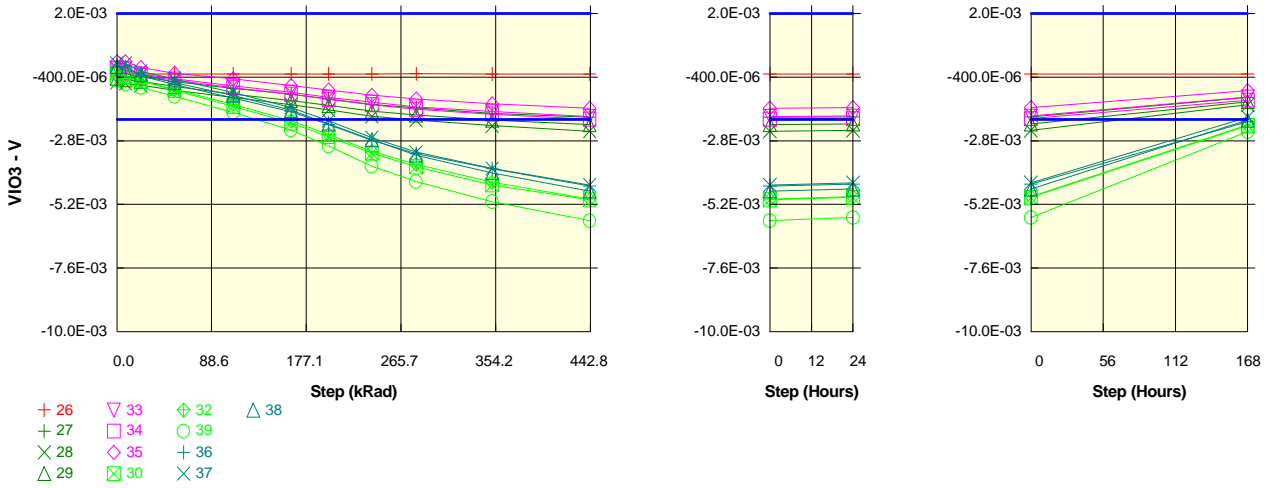
Measurements

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	94.5E-06	85.3E-06	72.2E-06	75.7E-06	82.6E-06	91.7E-06	86.4E-06	86.1E-06	95.9E-06	77.6E-06	77.4E-06	80.2E-06	94.3E-06
OFF TID samples													
36	199.5E-06	199.5E-06	-134.0E-06	-463.5E-06	-951.6E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.8E-03
37	252.5E-06	252.5E-06	-46.5E-06	-321.9E-06	-779.8E-06	-1.3E-03	-1.8E-03	-2.4E-03	-2.9E-03	-3.4E-03	-4.0E-03	-3.9E-03	-1.6E-03
38	83.3E-06	-74.8E-06	-213.0E-06	-502.2E-06	-963.9E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-3.9E-03	-3.8E-03	-1.8E-03
Statistics													
Min	83.3E-06	-74.8E-06	-213.0E-06	-502.2E-06	-963.9E-06	-1.5E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-4.0E-03	-3.9E-03	-1.8E-03
Max	252.5E-06	252.5E-06	-46.5E-06	-321.9E-06	-779.8E-06	-1.3E-03	-1.8E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.6E-03
Average	178.4E-06	125.7E-06	-131.2E-06	-429.2E-06	-898.4E-06	-1.4E-03	-1.9E-03	-2.4E-03	-2.9E-03	-3.4E-03	-3.9E-03	-3.8E-03	-1.7E-03
Sigma	70.7E-06	143.5E-06	68.0E-06	77.5E-06	84.0E-06	74.1E-06	57.4E-06	20.6E-06	30.9E-06	24.1E-06	39.2E-06	28.0E-06	73.0E-06

Drift Calculation

VIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-333.5E-06	-663.0E-06	-1.2E-03	-1.7E-03	-2.1E-03	-2.6E-03	-3.0E-03	-3.5E-03	-4.1E-03	-4.0E-03	-2.0E-03
37	-	0.0E+00	-299.0E-06	-574.4E-06	-1.0E-03	-1.6E-03	-2.0E-03	-2.7E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.1E-03	-1.9E-03
38	-	-158.1E-06	-296.3E-06	-585.4E-06	-1.0E-03	-1.6E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.8E-03
Average	-	-52.7E-06	-309.6E-06	-607.6E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.0E-03	-3.6E-03	-4.1E-03	-4.0E-03	-1.9E-03
Sigma	-	74.5E-06	16.9E-06	39.4E-06	52.8E-06	54.6E-06	45.3E-06	59.1E-06	66.6E-06	84.1E-06	92.3E-06	84.5E-06	48.4E-06

Parameter : Input Offset Voltage : VIO3DUTB
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-274.6E-06	-278.6E-06	-287.8E-06	-287.5E-06	-283.3E-06	-278.7E-06	-280.0E-06	-279.7E-06	-274.4E-06	-287.2E-06	-287.2E-06	-284.0E-06	-276.7E-06
ON PROTON samples													
27	-287.1E-06	-291.4E-06	-382.9E-06	-573.6E-06	-826.8E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-1.9E-03	-1.2E-03
28	-595.0E-06	-643.7E-06	-715.8E-06	-897.9E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.9E-03	-2.0E-03	-2.2E-03	-2.4E-03	-2.4E-03	-1.4E-03
29	-452.1E-06	-498.6E-06	-564.7E-06	-759.1E-06	-1.0E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.2E-03	-2.2E-03	-1.3E-03
Statistics													
Min	-595.0E-06	-643.7E-06	-715.8E-06	-897.9E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.9E-03	-2.0E-03	-2.2E-03	-2.4E-03	-2.4E-03	-1.4E-03
Max	-287.1E-06	-291.4E-06	-382.9E-06	-573.6E-06	-826.8E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-1.9E-03	-1.2E-03
Average	-444.7E-06	-477.9E-06	-554.5E-06	-743.5E-06	-1.0E-03	-1.3E-03	-1.4E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.2E-03	-2.2E-03	-1.3E-03
Sigma	125.8E-06	144.5E-06	136.1E-06	132.9E-06	142.9E-06	162.5E-06	171.7E-06	185.4E-06	191.1E-06	188.6E-06	213.5E-06	205.9E-06	112.6E-06

Drift Calculation

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-4.4E-06	-95.8E-06	-286.5E-06	-539.7E-06	-756.3E-06	-934.6E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-878.3E-06
28	-	-48.7E-06	-120.8E-06	-302.9E-06	-578.0E-06	-843.6E-06	-1.0E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.8E-03	-844.1E-06
29	-	-46.5E-06	-112.6E-06	-307.0E-06	-592.3E-06	-830.0E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-879.0E-06
Average	-	-33.2E-06	-109.7E-06	-298.8E-06	-570.0E-06	-810.0E-06	-998.9E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-867.1E-06
Sigma	-	20.4E-06	10.4E-06	8.9E-06	22.2E-06	38.3E-06	46.9E-06	60.0E-06	65.9E-06	62.8E-06	87.6E-06	80.1E-06	16.3E-06

Measurements

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-274.6E-06	-278.6E-06	-287.8E-06	-287.5E-06	-283.3E-06	-278.7E-06	-280.0E-06	-279.7E-06	-274.4E-06	-287.2E-06	-287.2E-06	-284.0E-06	-276.7E-06
ON TID samples													
33	-58.8E-06	-58.8E-06	-278.6E-06	-470.3E-06	-727.9E-06	-972.2E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.1E-03
34	-95.2E-06	-230.3E-06	-327.6E-06	-514.9E-06	-797.5E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-2.0E-03	-2.0E-03	-1.3E-03
35	183.3E-06	183.3E-06	-44.8E-06	-250.9E-06	-468.0E-06	-716.9E-06	-887.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-911.9E-06
Statistics													
Min	-95.2E-06	-230.3E-06	-327.6E-06	-514.9E-06	-797.5E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-2.0E-03	-2.0E-03	-1.3E-03
Max	183.3E-06	183.3E-06	-44.8E-06	-250.9E-06	-468.0E-06	-716.9E-06	-887.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-911.9E-06
Average	9.8E-06	-35.3E-06	-217.0E-06	-412.0E-06	-664.5E-06	-910.4E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
Sigma	123.6E-06	169.7E-06	123.4E-06	115.4E-06	141.8E-06	139.7E-06	150.0E-06	152.4E-06	164.3E-06	167.8E-06	174.7E-06	177.0E-06	148.6E-06

Drift Calculation

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-219.8E-06	-411.5E-06	-669.1E-06	-913.4E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
34	-	-135.1E-06	-232.3E-06	-419.7E-06	-702.2E-06	-946.8E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.2E-03
35	-	0.0E+00	-228.1E-06	-434.2E-06	-651.3E-06	-900.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.1E-03
Average	-	-45.0E-06	-226.7E-06	-421.8E-06	-674.2E-06	-920.1E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
Sigma	-	63.7E-06	5.2E-06	9.4E-06	21.1E-06	19.6E-06	28.5E-06	33.8E-06	43.2E-06	47.8E-06	53.4E-06	55.4E-06	38.4E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-274.6E-06	-278.6E-06	-287.8E-06	-287.5E-06	-283.3E-06	-278.7E-06	-280.0E-06	-279.7E-06	-274.4E-06	-287.2E-06	-287.2E-06	-284.0E-06	-276.7E-06
OFF PROTON samples													
30	-232.3E-06	-389.0E-06	-535.6E-06	-904.9E-06	-1.5E-03	-2.1E-03	-2.6E-03	-3.3E-03	-3.8E-03	-4.5E-03	-5.0E-03	-4.9E-03	-2.2E-03
32	-236.0E-06	-385.6E-06	-542.4E-06	-863.6E-06	-1.4E-03	-2.0E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.4E-03	-5.0E-03	-4.9E-03	-2.2E-03
39	-521.6E-06	-666.3E-06	-789.5E-06	-1.1E-03	-1.7E-03	-2.4E-03	-3.0E-03	-3.8E-03	-4.3E-03	-5.1E-03	-5.8E-03	-5.7E-03	-2.5E-03
Statistics													
Min	-521.6E-06	-666.3E-06	-789.5E-06	-1.1E-03	-1.7E-03	-2.4E-03	-3.0E-03	-3.8E-03	-4.3E-03	-5.1E-03	-5.8E-03	-5.7E-03	-2.5E-03
Max	-232.3E-06	-385.6E-06	-535.6E-06	-863.6E-06	-1.4E-03	-2.0E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.4E-03	-5.0E-03	-4.9E-03	-2.2E-03
Average	-329.9E-06	-480.3E-06	-622.5E-06	-964.1E-06	-1.6E-03	-2.2E-03	-2.7E-03	-3.4E-03	-3.9E-03	-4.6E-03	-5.3E-03	-5.2E-03	-2.3E-03
Sigma	135.5E-06	131.5E-06	118.1E-06	114.1E-06	127.8E-06	150.9E-06	188.5E-06	248.5E-06	286.6E-06	323.9E-06	378.3E-06	364.1E-06	113.6E-06

Drift Calculation

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-156.7E-06	-303.3E-06	-672.6E-06	-1.3E-03	-1.9E-03	-2.4E-03	-3.0E-03	-3.6E-03	-4.2E-03	-4.8E-03	-4.7E-03	-2.0E-03
32	-	-149.6E-06	-306.5E-06	-627.7E-06	-1.2E-03	-1.8E-03	-2.3E-03	-3.0E-03	-3.5E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.0E-03
39	-	-144.7E-06	-267.9E-06	-602.2E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.2E-03	-3.8E-03	-4.6E-03	-5.3E-03	-5.2E-03	-1.9E-03
Average	-	-150.3E-06	-292.6E-06	-634.2E-06	-1.2E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.3E-03	-5.0E-03	-4.9E-03	-2.0E-03
Sigma	-	4.9E-06	17.5E-06	29.1E-06	38.0E-06	39.1E-06	60.1E-06	114.9E-06	153.6E-06	190.6E-06	242.9E-06	228.7E-06	24.6E-06

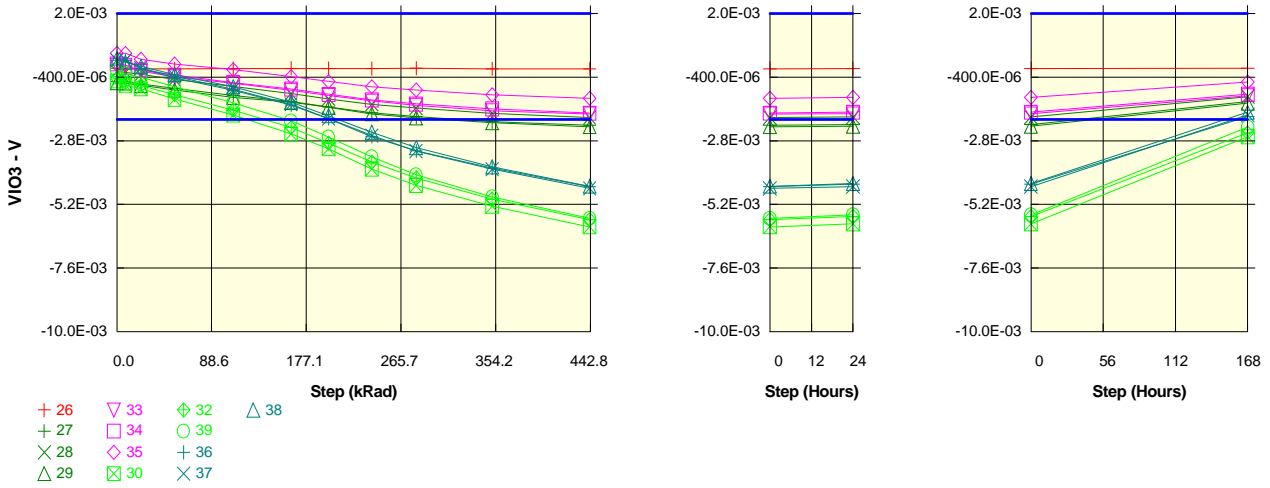
Measurements

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-274.6E-06	-278.6E-06	-287.8E-06	-287.5E-06	-283.3E-06	-278.7E-06	-280.0E-06	-279.7E-06	-274.4E-06	-287.2E-06	-287.2E-06	-284.0E-06	-276.7E-06
OFF TID samples													
36	-20.4E-06	-20.4E-06	-357.5E-06	-679.6E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.5E-03	-4.4E-03	-2.1E-03
37	119.2E-06	119.2E-06	-185.4E-06	-476.0E-06	-978.1E-06	-1.6E-03	-2.0E-03	-2.7E-03	-3.2E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.9E-03
38	3.5E-06	-150.0E-06	-292.4E-06	-604.2E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-4.0E-03	-4.7E-03	-4.6E-03	-2.0E-03
Statistics													
Min	-20.4E-06	-150.0E-06	-357.5E-06	-679.6E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-4.0E-03	-4.7E-03	-4.6E-03	-2.1E-03
Max	119.2E-06	119.2E-06	-185.4E-06	-476.0E-06	-978.1E-06	-1.6E-03	-2.0E-03	-2.7E-03	-3.2E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.9E-03
Average	34.1E-06	-17.1E-06	-278.4E-06	-586.6E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.3E-03	-3.9E-03	-4.6E-03	-4.5E-03	-2.0E-03
Sigma	61.0E-06	109.9E-06	70.9E-06	84.1E-06	84.0E-06	69.0E-06	64.5E-06	42.5E-06	45.8E-06	74.5E-06	102.1E-06	99.3E-06	69.5E-06

Drift Calculation

VIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-337.1E-06	-659.1E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.8E-03	-4.5E-03	-4.4E-03	-2.1E-03
37	-	0.0E+00	-304.6E-06	-595.2E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.0E-03	-4.6E-03	-4.5E-03	-2.0E-03
38	-	-153.5E-06	-295.8E-06	-607.7E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.0E-03	-4.7E-03	-4.6E-03	-2.0E-03
Average	-	-51.2E-06	-312.5E-06	-620.7E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.6E-03	-4.5E-03	-2.0E-03
Sigma	-	72.3E-06	17.7E-06	27.7E-06	31.4E-06	16.1E-06	3.7E-06	18.6E-06	41.1E-06	76.4E-06	90.9E-06	84.0E-06	16.3E-06

Parameter : Input Offset Voltage : VIO3DUTC
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-66.8E-06	-77.7E-06	-90.1E-06	-87.6E-06	-79.6E-06	-69.4E-06	-72.8E-06	-75.2E-06	-66.7E-06	-87.5E-06	-87.2E-06	-82.3E-06	-67.0E-06
ON PROTON samples													
27	-569.4E-06	-570.0E-06	-662.5E-06	-836.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.2E-03	-2.2E-03	-1.3E-03
28	-187.7E-06	-222.7E-06	-301.4E-06	-489.7E-06	-755.0E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-1.9E-03	-1.1E-03
29	-611.8E-06	-634.1E-06	-713.3E-06	-889.2E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.3E-03	-1.4E-03
Statistics													
Min	-611.8E-06	-634.1E-06	-713.3E-06	-889.2E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.3E-03	-1.4E-03
Max	-187.7E-06	-222.7E-06	-301.4E-06	-489.7E-06	-755.0E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-1.9E-03	-1.1E-03
Average	-456.3E-06	-475.6E-06	-559.1E-06	-738.5E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.1E-03	-2.1E-03	-1.3E-03
Sigma	190.7E-06	180.7E-06	183.4E-06	177.3E-06	178.6E-06	150.5E-06	150.0E-06	160.6E-06	167.0E-06	160.8E-06	153.3E-06	151.1E-06	108.3E-06

Drift Calculation

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-600.0E-09	-93.0E-06	-267.3E-06	-521.3E-06	-755.6E-06	-963.3E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-755.8E-06
28	-	-35.0E-06	-113.7E-06	-302.0E-06	-567.3E-06	-832.8E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-944.2E-06
29	-	-22.3E-06	-101.5E-06	-277.4E-06	-554.0E-06	-741.0E-06	-931.1E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-774.2E-06
Average	-	-19.3E-06	-102.7E-06	-282.2E-06	-547.5E-06	-776.4E-06	-975.4E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-824.7E-06
Sigma	-	14.2E-06	8.5E-06	14.6E-06	19.3E-06	40.3E-06	42.1E-06	30.8E-06	23.8E-06	30.0E-06	38.8E-06	41.7E-06	84.8E-06

Measurements

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-66.8E-06	-77.7E-06	-90.1E-06	-87.6E-06	-79.6E-06	-69.4E-06	-72.8E-06	-75.2E-06	-66.7E-06	-87.5E-06	-87.2E-06	-82.3E-06	-67.0E-06
ON TID samples													
33	47.6E-06	47.6E-06	-180.1E-06	-389.3E-06	-632.3E-06	-899.1E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
34	99.0E-06	-32.2E-06	-131.8E-06	-326.1E-06	-604.1E-06	-852.9E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.0E-03
35	494.7E-06	494.7E-06	275.9E-06	90.4E-06	-117.5E-06	-380.2E-06	-564.2E-06	-759.7E-06	-891.9E-06	-1.1E-03	-1.2E-03	-1.2E-03	-589.3E-06
Statistics													
Min	47.6E-06	-32.2E-06	-180.1E-06	-389.3E-06	-632.3E-06	-899.1E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Max	494.7E-06	494.7E-06	275.9E-06	90.4E-06	-117.5E-06	-380.2E-06	-564.2E-06	-759.7E-06	-891.9E-06	-1.1E-03	-1.2E-03	-1.2E-03	-589.3E-06
Average	213.8E-06	170.0E-06	-12.0E-06	-208.3E-06	-451.3E-06	-710.7E-06	-903.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-911.6E-06
Sigma	199.8E-06	231.9E-06	204.5E-06	212.8E-06	236.3E-06	234.5E-06	240.4E-06	246.6E-06	258.3E-06	266.9E-06	271.3E-06	277.8E-06	229.2E-06

Drift Calculation

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-227.7E-06	-436.9E-06	-679.9E-06	-946.7E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.2E-03
34	-	-131.2E-06	-230.8E-06	-425.1E-06	-703.1E-06	-951.9E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.8E-03	-1.1E-03
35	-	0.0E+00	-218.8E-06	-404.3E-06	-612.3E-06	-874.9E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Average	-	-43.7E-06	-225.8E-06	-422.1E-06	-665.1E-06	-924.5E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Sigma	-	61.8E-06	5.1E-06	13.5E-06	38.5E-06	35.1E-06	41.2E-06	47.4E-06	59.0E-06	67.1E-06	72.4E-06	78.1E-06	29.5E-06

Measurements

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-66.8E-06	-77.7E-06	-90.1E-06	-87.6E-06	-79.6E-06	-69.4E-06	-72.8E-06	-75.2E-06	-66.7E-06	-87.5E-06	-87.2E-06	-82.3E-06	-67.0E-06
OFF PROTON samples													
30	-544.5E-06	-705.4E-06	-840.5E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.1E-03	-3.9E-03	-4.5E-03	-5.3E-03	-6.1E-03	-5.9E-03	-2.7E-03
32	-440.9E-06	-592.2E-06	-717.9E-06	-1.1E-03	-1.6E-03	-2.3E-03	-2.9E-03	-3.6E-03	-4.2E-03	-5.0E-03	-5.8E-03	-5.7E-03	-2.5E-03
39	-136.8E-06	-276.1E-06	-410.0E-06	-769.6E-06	-1.4E-03	-2.1E-03	-2.7E-03	-3.4E-03	-4.1E-03	-4.9E-03	-5.7E-03	-5.6E-03	-2.3E-03
Statistics													
Min	-544.5E-06	-705.4E-06	-840.5E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.1E-03	-3.9E-03	-4.5E-03	-5.3E-03	-6.1E-03	-5.9E-03	-2.7E-03
Max	-136.8E-06	-276.1E-06	-410.0E-06	-769.6E-06	-1.4E-03	-2.1E-03	-2.7E-03	-3.4E-03	-4.1E-03	-4.9E-03	-5.7E-03	-5.6E-03	-2.3E-03
Average	-374.1E-06	-524.6E-06	-656.1E-06	-1.0E-03	-1.6E-03	-2.3E-03	-2.9E-03	-3.6E-03	-4.3E-03	-5.1E-03	-5.9E-03	-5.7E-03	-2.5E-03
Sigma	173.0E-06	181.7E-06	181.1E-06	192.0E-06	189.1E-06	201.9E-06	180.8E-06	185.8E-06	166.9E-06	151.0E-06	142.0E-06	148.7E-06	150.8E-06

Drift Calculation

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-161.0E-06	-296.0E-06	-689.4E-06	-1.3E-03	-2.0E-03	-2.6E-03	-3.3E-03	-3.9E-03	-4.7E-03	-5.5E-03	-5.4E-03	-2.1E-03
32	-	-151.3E-06	-277.0E-06	-625.6E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.2E-03	-3.8E-03	-4.6E-03	-5.3E-03	-5.2E-03	-2.1E-03
39	-	-139.3E-06	-273.2E-06	-632.8E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.3E-03	-4.0E-03	-4.8E-03	-5.6E-03	-5.5E-03	-2.1E-03
Average	-	-150.5E-06	-282.1E-06	-649.3E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.3E-03	-3.9E-03	-4.7E-03	-5.5E-03	-5.4E-03	-2.1E-03
Sigma	-	8.9E-06	10.0E-06	28.6E-06	35.1E-06	57.7E-06	46.3E-06	66.5E-06	88.0E-06	95.2E-06	107.5E-06	104.8E-06	35.0E-06

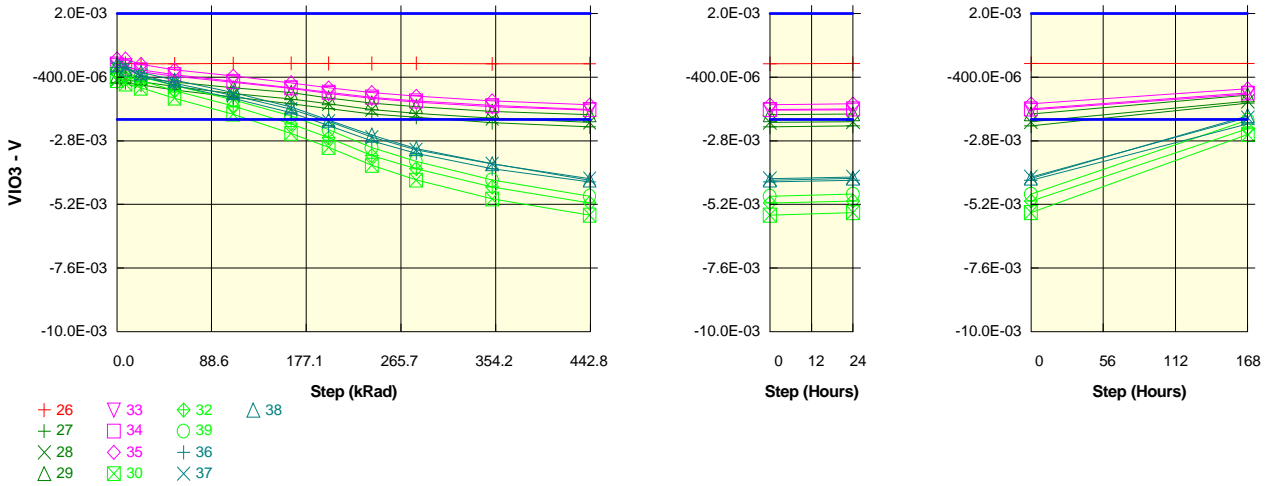
Measurements

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-66.8E-06	-77.7E-06	-90.1E-06	-87.6E-06	-79.6E-06	-69.4E-06	-72.8E-06	-75.2E-06	-66.7E-06	-87.5E-06	-87.2E-06	-82.3E-06	-67.0E-06
OFF TID samples													
36	241.2E-06	241.2E-06	-81.2E-06	-423.5E-06	-902.4E-06	-1.5E-03	-2.0E-03	-2.6E-03	-3.2E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.9E-03
37	237.0E-06	237.0E-06	-67.0E-06	-367.8E-06	-861.7E-06	-1.4E-03	-2.0E-03	-2.6E-03	-3.2E-03	-3.9E-03	-4.6E-03	-4.5E-03	-1.8E-03
38	308.0E-06	158.1E-06	9.0E-06	-301.8E-06	-770.5E-06	-1.3E-03	-1.9E-03	-2.5E-03	-3.1E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.7E-03
Statistics													
Min	237.0E-06	158.1E-06	-81.2E-06	-423.5E-06	-902.4E-06	-1.5E-03	-2.0E-03	-2.6E-03	-3.2E-03	-3.9E-03	-4.6E-03	-4.5E-03	-1.9E-03
Max	308.0E-06	241.2E-06	9.0E-06	-301.8E-06	-770.5E-06	-1.3E-03	-1.9E-03	-2.5E-03	-3.1E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.7E-03
Average	262.1E-06	212.1E-06	-46.4E-06	-364.3E-06	-844.8E-06	-1.4E-03	-1.9E-03	-2.6E-03	-3.1E-03	-3.8E-03	-4.6E-03	-4.5E-03	-1.8E-03
Sigma	32.6E-06	38.2E-06	39.6E-06	49.8E-06	55.1E-06	49.0E-06	52.2E-06	69.5E-06	61.3E-06	36.7E-06	35.7E-06	50.3E-06	70.3E-06

Drift Calculation

VIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-322.4E-06	-664.7E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.4E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.1E-03
37	-	0.0E+00	-304.0E-06	-604.7E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.1E-03	-4.8E-03	-4.8E-03	-2.1E-03
38	-	-149.9E-06	-299.0E-06	-609.8E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.0E-03
Average	-	-50.0E-06	-308.5E-06	-626.4E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.1E-03
Sigma	-	70.7E-06	10.1E-06	27.1E-06	27.2E-06	20.4E-06	19.8E-06	39.1E-06	28.7E-06	12.6E-06	29.2E-06	37.8E-06	42.2E-06

Parameter : Input Offset Voltage : VIO3DUTD
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	118.6E-06	113.0E-06	98.0E-06	98.1E-06	109.0E-06	118.7E-06	115.5E-06	115.4E-06	122.0E-06	101.4E-06	102.0E-06	107.1E-06	120.4E-06
ON PROTON samples													
27	-596.2E-06	-611.2E-06	-698.4E-06	-893.5E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.2E-03	-1.4E-03
28	-499.3E-06	-513.2E-06	-576.4E-06	-756.8E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-2.0E-03	-2.1E-03	-2.1E-03	-1.3E-03
29	-369.2E-06	-391.2E-06	-435.0E-06	-590.4E-06	-811.2E-06	-987.0E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Statistics													
Min	-596.2E-06	-611.2E-06	-698.4E-06	-893.5E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.2E-03	-1.4E-03
Max	-369.2E-06	-391.2E-06	-435.0E-06	-590.4E-06	-811.2E-06	-987.0E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Average	-488.2E-06	-505.2E-06	-569.9E-06	-746.9E-06	-993.8E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.0E-03	-1.3E-03
Sigma	93.0E-06	90.0E-06	107.6E-06	123.9E-06	139.9E-06	174.5E-06	169.0E-06	170.3E-06	166.1E-06	176.5E-06	191.3E-06	188.8E-06	133.2E-06

Drift Calculation

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-15.0E-06	-102.2E-06	-297.3E-06	-554.8E-06	-816.6E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-787.5E-06
28	-	-13.9E-06	-77.1E-06	-257.6E-06	-520.0E-06	-732.2E-06	-910.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-810.9E-06
29	-	-21.9E-06	-65.7E-06	-221.1E-06	-442.0E-06	-617.7E-06	-815.2E-06	-1.0E-03	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-702.3E-06
Average	-	-16.9E-06	-81.7E-06	-258.7E-06	-505.6E-06	-722.2E-06	-909.2E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-766.9E-06
Sigma	-	3.6E-06	15.2E-06	31.1E-06	47.2E-06	81.5E-06	76.1E-06	77.5E-06	74.1E-06	83.7E-06	98.7E-06	96.7E-06	46.6E-06

Measurements

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	118.6E-06	113.0E-06	98.0E-06	98.1E-06	109.0E-06	118.7E-06	115.5E-06	115.4E-06	122.0E-06	101.4E-06	102.0E-06	107.1E-06	120.4E-06
ON TID samples													
33	28.2E-06	28.2E-06	-192.7E-06	-364.1E-06	-596.3E-06	-833.7E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.6E-03	-1.0E-03
34	91.8E-06	-26.6E-06	-125.2E-06	-309.4E-06	-562.5E-06	-800.1E-06	-972.8E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-999.7E-06
35	284.4E-06	284.4E-06	77.5E-06	-127.3E-06	-357.8E-06	-615.6E-06	-806.7E-06	-982.7E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-837.5E-06
Statistics													
Min	28.2E-06	-26.6E-06	-192.7E-06	-364.1E-06	-596.3E-06	-833.7E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.6E-03	-1.0E-03
Max	284.4E-06	284.4E-06	77.5E-06	-127.3E-06	-357.8E-06	-615.6E-06	-806.7E-06	-982.7E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-837.5E-06
Average	134.8E-06	95.3E-06	-80.1E-06	-266.9E-06	-505.5E-06	-749.8E-06	-932.9E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-958.5E-06
Sigma	108.9E-06	135.5E-06	114.8E-06	101.2E-06	105.4E-06	95.9E-06	91.2E-06	95.2E-06	98.1E-06	96.0E-06	91.1E-06	97.1E-06	87.0E-06

Drift Calculation

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-221.0E-06	-392.3E-06	-624.5E-06	-862.0E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.1E-03
34	-	-118.4E-06	-216.9E-06	-401.1E-06	-654.3E-06	-891.9E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
35	-	0.0E+00	-206.8E-06	-411.6E-06	-642.1E-06	-900.0E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Average	-	-39.5E-06	-214.9E-06	-401.7E-06	-640.3E-06	-884.6E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Sigma	-	55.8E-06	5.9E-06	7.9E-06	12.2E-06	16.4E-06	17.9E-06	14.4E-06	10.9E-06	13.8E-06	21.1E-06	14.3E-06	22.6E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	118.6E-06	113.0E-06	98.0E-06	98.1E-06	109.0E-06	118.7E-06	115.5E-06	115.4E-06	122.0E-06	101.4E-06	102.0E-06	107.1E-06	120.4E-06
OFF PROTON samples													
30	-523.6E-06	-661.9E-06	-810.5E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.0E-03	-3.7E-03	-4.3E-03	-5.0E-03	-5.6E-03	-5.5E-03	-2.6E-03
32	-240.0E-06	-391.8E-06	-542.3E-06	-911.5E-06	-1.5E-03	-2.2E-03	-2.7E-03	-3.4E-03	-3.9E-03	-4.5E-03	-5.1E-03	-5.1E-03	-2.4E-03
39	-130.5E-06	-274.0E-06	-392.6E-06	-722.4E-06	-1.3E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.3E-03	-4.9E-03	-4.8E-03	-2.0E-03
Statistics													
Min	-523.6E-06	-661.9E-06	-810.5E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.0E-03	-3.7E-03	-4.3E-03	-5.0E-03	-5.6E-03	-5.5E-03	-2.6E-03
Max	-130.5E-06	-274.0E-06	-392.6E-06	-722.4E-06	-1.3E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.3E-03	-4.9E-03	-4.8E-03	-2.0E-03
Average	-298.0E-06	-442.6E-06	-581.8E-06	-942.5E-06	-1.5E-03	-2.2E-03	-2.7E-03	-3.4E-03	-3.9E-03	-4.6E-03	-5.2E-03	-5.1E-03	-2.3E-03
Sigma	165.6E-06	162.4E-06	172.9E-06	193.5E-06	219.5E-06	268.8E-06	272.4E-06	269.9E-06	289.4E-06	297.6E-06	295.4E-06	285.9E-06	224.0E-06

Drift Calculation

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-138.4E-06	-286.9E-06	-669.9E-06	-1.3E-03	-2.0E-03	-2.5E-03	-3.2E-03	-3.8E-03	-4.5E-03	-5.1E-03	-5.0E-03	-2.0E-03
32	-	-151.8E-06	-302.3E-06	-671.5E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.3E-03	-4.9E-03	-4.8E-03	-2.1E-03
39	-	-143.4E-06	-262.1E-06	-591.9E-06	-1.1E-03	-1.7E-03	-2.3E-03	-2.9E-03	-3.4E-03	-4.1E-03	-4.8E-03	-4.7E-03	-1.9E-03
Average	-	-144.5E-06	-283.8E-06	-644.5E-06	-1.2E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.3E-03	-4.9E-03	-4.8E-03	-2.0E-03
Sigma	-	5.6E-06	16.6E-06	37.2E-06	61.9E-06	110.9E-06	115.9E-06	112.1E-06	126.8E-06	134.1E-06	131.1E-06	122.2E-06	91.1E-06

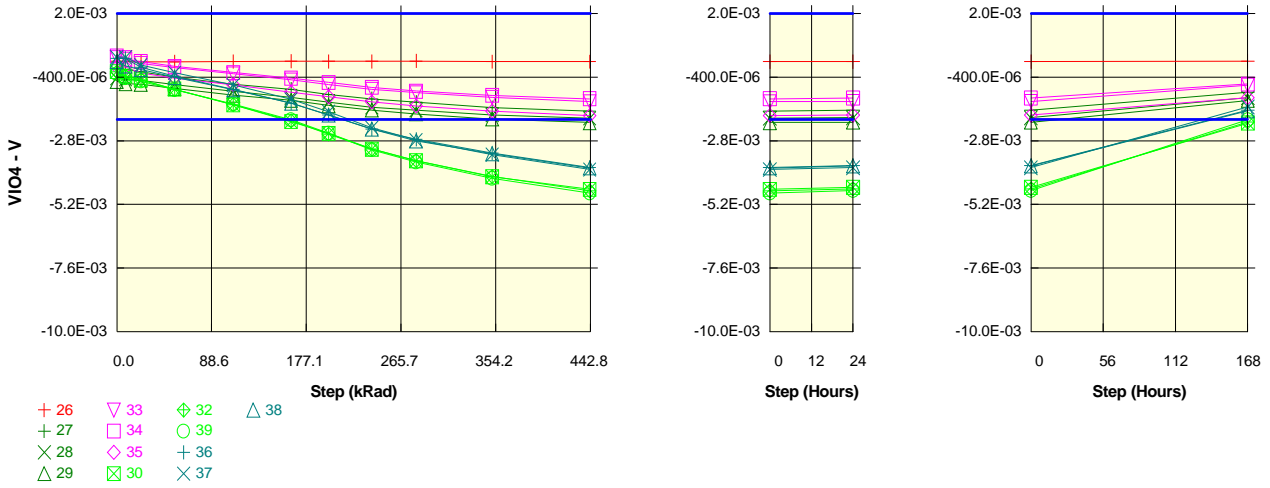
Measurements

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	118.6E-06	113.0E-06	98.0E-06	98.1E-06	109.0E-06	118.7E-06	115.5E-06	115.4E-06	122.0E-06	101.4E-06	102.0E-06	107.1E-06	120.4E-06
OFF TID samples													
36	-43.4E-06	-43.4E-06	-367.6E-06	-703.9E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.4E-03	-4.3E-03	-2.2E-03
37	-44.7E-06	-44.7E-06	-334.9E-06	-631.4E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.2E-03	-1.9E-03
38	69.1E-06	-91.5E-06	-229.6E-06	-515.6E-06	-986.7E-06	-1.5E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.2E-03	-1.9E-03
Statistics													
Min	-44.7E-06	-91.5E-06	-367.6E-06	-703.9E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.4E-03	-4.3E-03	-2.2E-03
Max	69.1E-06	-43.4E-06	-229.6E-06	-515.6E-06	-986.7E-06	-1.5E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.2E-03	-1.9E-03
Average	-6.4E-06	-59.9E-06	-310.7E-06	-616.9E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.2E-03	-2.0E-03
Sigma	53.4E-06	22.4E-06	58.9E-06	77.6E-06	85.0E-06	85.1E-06	88.2E-06	87.3E-06	75.9E-06	86.6E-06	47.0E-06	49.8E-06	129.3E-06

Drift Calculation

VIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-324.2E-06	-660.5E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.2E-03	-3.8E-03	-4.3E-03	-4.2E-03	-2.1E-03
37	-	0.0E+00	-290.1E-06	-586.7E-06	-1.0E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.1E-03	-1.9E-03
38	-	-160.6E-06	-298.7E-06	-584.7E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.7E-03	-4.4E-03	-4.3E-03	-1.9E-03
Average	-	-53.5E-06	-304.4E-06	-610.6E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.2E-03	-2.0E-03
Sigma	-	75.7E-06	14.4E-06	35.3E-06	48.2E-06	54.0E-06	67.0E-06	58.0E-06	55.5E-06	75.1E-06	68.9E-06	68.5E-06	100.8E-06

Parameter : Input Offset Voltage : VIO4DUTA
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	202.0E-06	187.6E-06	176.2E-06	180.0E-06	190.6E-06	200.0E-06	193.8E-06	193.4E-06	205.3E-06	183.3E-06	183.3E-06	187.2E-06	201.7E-06
ON PROTON samples													
27	-104.0E-06	-112.7E-06	-192.7E-06	-409.5E-06	-665.8E-06	-857.2E-06	-1.1E-03	-1.2E-03	-1.3E-03	-1.6E-03	-1.7E-03	-1.7E-03	-969.6E-06
28	-440.7E-06	-488.0E-06	-532.3E-06	-682.4E-06	-934.0E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.6E-03	-1.8E-03	-2.0E-03	-1.9E-03	-1.2E-03
29	-564.6E-06	-651.2E-06	-672.4E-06	-832.0E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-2.0E-03	-2.1E-03	-2.1E-03	-1.3E-03
Statistics													
Min	-564.6E-06	-651.2E-06	-672.4E-06	-832.0E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-2.0E-03	-2.1E-03	-2.1E-03	-1.3E-03
Max	-104.0E-06	-112.7E-06	-192.7E-06	-409.5E-06	-665.8E-06	-857.2E-06	-1.1E-03	-1.2E-03	-1.3E-03	-1.6E-03	-1.7E-03	-1.7E-03	-969.6E-06
Average	-369.8E-06	-417.3E-06	-465.8E-06	-641.3E-06	-894.1E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.9E-03	-1.9E-03	-1.1E-03
Sigma	194.6E-06	225.5E-06	201.4E-06	174.9E-06	172.4E-06	178.2E-06	176.8E-06	180.7E-06	183.9E-06	178.9E-06	178.8E-06	184.5E-06	129.0E-06

Drift Calculation

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-8.7E-06	-88.6E-06	-305.4E-06	-561.7E-06	-753.2E-06	-950.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.6E-03	-865.6E-06
28	-	-47.3E-06	-91.6E-06	-241.7E-06	-493.4E-06	-731.1E-06	-914.1E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-742.1E-06
29	-	-86.6E-06	-107.8E-06	-267.3E-06	-517.7E-06	-712.0E-06	-910.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-713.6E-06
Average	-	-47.5E-06	-96.0E-06	-271.5E-06	-524.3E-06	-732.1E-06	-925.0E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-773.7E-06
Sigma	-	31.8E-06	8.4E-06	26.2E-06	28.3E-06	16.8E-06	18.1E-06	14.3E-06	14.5E-06	22.7E-06	25.5E-06	24.9E-06	66.0E-06

Measurements

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	202.0E-06	187.6E-06	176.2E-06	180.0E-06	190.6E-06	200.0E-06	193.8E-06	193.4E-06	205.3E-06	183.3E-06	183.3E-06	187.2E-06	201.7E-06
ON TID samples													
33	331.4E-06	331.4E-06	118.4E-06	-50.3E-06	-275.1E-06	-506.0E-06	-678.9E-06	-861.8E-06	-990.1E-06	-1.2E-03	-1.3E-03	-1.3E-03	-699.2E-06
34	399.0E-06	269.3E-06	190.8E-06	4.5E-06	-227.3E-06	-441.6E-06	-602.9E-06	-786.1E-06	-930.0E-06	-1.1E-03	-1.2E-03	-1.2E-03	-664.4E-06
35	-18.5E-06	-18.5E-06	-241.6E-06	-447.0E-06	-691.0E-06	-969.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.8E-03	-1.2E-03
Statistics													
Min	-18.5E-06	-18.5E-06	-241.6E-06	-447.0E-06	-691.0E-06	-969.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.8E-03	-1.2E-03
Max	399.0E-06	331.4E-06	190.8E-06	4.5E-06	-227.3E-06	-441.6E-06	-602.9E-06	-786.1E-06	-930.0E-06	-1.1E-03	-1.2E-03	-1.2E-03	-664.4E-06
Average	237.3E-06	194.1E-06	22.6E-06	-164.3E-06	-397.8E-06	-639.1E-06	-809.1E-06	-995.4E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.4E-03	-847.0E-06
Sigma	182.9E-06	152.4E-06	189.1E-06	201.2E-06	208.2E-06	235.3E-06	239.9E-06	244.4E-06	249.5E-06	263.6E-06	276.0E-06	280.4E-06	234.1E-06

Drift Calculation

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-213.0E-06	-381.7E-06	-606.5E-06	-837.4E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-1.0E-03
34	-	-129.6E-06	-208.1E-06	-394.4E-06	-626.3E-06	-840.5E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-1.1E-03
35	-	0.0E+00	-223.1E-06	-428.6E-06	-672.6E-06	-951.2E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.2E-03
Average	-	-43.2E-06	-214.8E-06	-401.6E-06	-635.1E-06	-876.4E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.1E-03
Sigma	-	61.1E-06	6.2E-06	19.8E-06	27.7E-06	52.9E-06	57.1E-06	61.7E-06	67.5E-06	81.0E-06	93.1E-06	97.8E-06	54.4E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors				Issue:	02

Measurements

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	202.0E-06	187.6E-06	176.2E-06	180.0E-06	190.6E-06	200.0E-06	193.8E-06	193.4E-06	205.3E-06	183.3E-06	183.3E-06	187.2E-06	201.7E-06
OFF_PROTON samples													
30	-193.4E-06	-360.5E-06	-497.4E-06	-856.5E-06	-1.4E-03	-2.1E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.6E-03	-4.6E-03	-2.1E-03
32	-202.0E-06	-369.2E-06	-491.8E-06	-864.2E-06	-1.4E-03	-2.1E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.7E-03	-4.6E-03	-2.1E-03
39	-272.8E-06	-428.6E-06	-554.8E-06	-874.4E-06	-1.4E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.8E-03	-4.7E-03	-2.0E-03
Statistics													
Min	-272.8E-06	-428.6E-06	-554.8E-06	-874.4E-06	-1.4E-03	-2.1E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.8E-03	-4.7E-03	-2.1E-03
Max	-193.4E-06	-360.5E-06	-491.8E-06	-856.5E-06	-1.4E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.6E-03	-4.6E-03	-2.0E-03
Average	-222.7E-06	-386.1E-06	-514.7E-06	-865.0E-06	-1.4E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.7E-03	-4.6E-03	-2.1E-03
Sigma	35.6E-06	30.3E-06	28.4E-06	7.4E-06	12.8E-06	27.9E-06	16.5E-06	11.0E-06	22.8E-06	28.6E-06	56.6E-06	47.8E-06	51.6E-06

Drift Calculation

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-167.1E-06	-304.1E-06	-663.1E-06	-1.3E-03	-1.9E-03	-2.3E-03	-2.9E-03	-3.4E-03	-4.0E-03	-4.4E-03	-4.4E-03	-1.9E-03
32	-	-167.2E-06	-289.8E-06	-662.2E-06	-1.2E-03	-1.8E-03	-2.4E-03	-2.9E-03	-3.4E-03	-4.0E-03	-4.5E-03	-4.4E-03	-1.9E-03
39	-	-155.8E-06	-281.9E-06	-601.6E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.3E-03	-3.9E-03	-4.5E-03	-4.4E-03	-1.7E-03
Average	-	-163.4E-06	-291.9E-06	-642.3E-06	-1.2E-03	-1.8E-03	-2.3E-03	-2.9E-03	-3.3E-03	-4.0E-03	-4.5E-03	-4.4E-03	-1.9E-03
Sigma	-	5.3E-06	9.2E-06	28.8E-06	48.0E-06	62.8E-06	46.3E-06	24.6E-06	13.8E-06	10.8E-06	24.5E-06	21.0E-06	86.8E-06

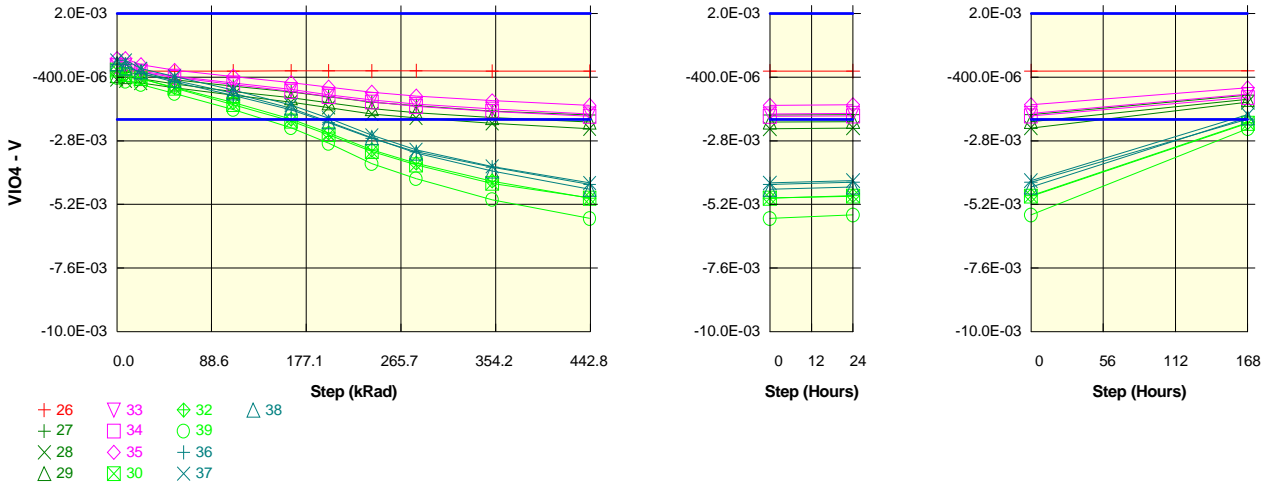
Measurements

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	202.0E-06	187.6E-06	176.2E-06	180.0E-06	190.6E-06	200.0E-06	193.8E-06	193.4E-06	205.3E-06	183.3E-06	183.3E-06	187.2E-06	201.7E-06
OFF_TID samples													
36	311.5E-06	311.5E-06	-28.3E-06	-367.4E-06	-856.6E-06	-1.4E-03	-1.8E-03	-2.4E-03	-2.7E-03	-3.3E-03	-3.8E-03	-3.7E-03	-1.7E-03
37	348.6E-06	348.6E-06	44.4E-06	-239.1E-06	-696.5E-06	-1.2E-03	-1.7E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.5E-03
38	182.4E-06	19.8E-06	-116.0E-06	-412.3E-06	-874.8E-06	-1.4E-03	-1.8E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.7E-03
Min	182.4E-06	19.8E-06	-116.0E-06	-412.3E-06	-874.8E-06	-1.4E-03	-1.8E-03	-2.4E-03	-2.8E-03	-3.3E-03	-3.9E-03	-3.8E-03	-1.7E-03
Max	348.6E-06	348.6E-06	44.4E-06	-239.1E-06	-696.5E-06	-1.2E-03	-1.7E-03	-2.3E-03	-2.7E-03	-3.3E-03	-3.8E-03	-3.7E-03	-1.5E-03
Average	280.8E-06	226.6E-06	-33.3E-06	-339.6E-06	-809.3E-06	-1.3E-03	-1.8E-03	-2.3E-03	-2.8E-03	-3.3E-03	-3.8E-03	-3.8E-03	-1.6E-03
Sigma	71.2E-06	147.0E-06	65.6E-06	73.4E-06	80.1E-06	68.7E-06	58.2E-06	23.3E-06	25.8E-06	22.2E-06	31.8E-06	36.4E-06	63.7E-06

Drift Calculation

VIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-339.8E-06	-679.0E-06	-1.2E-03	-1.7E-03	-2.1E-03	-2.7E-03	-3.1E-03	-3.6E-03	-4.1E-03	-4.0E-03	-2.0E-03
37	-	0.0E+00	-304.2E-06	-587.7E-06	-1.0E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.1E-03	-3.7E-03	-4.2E-03	-4.2E-03	-1.9E-03
38	-	-162.6E-06	-298.4E-06	-594.7E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.5E-03	-4.0E-03	-3.9E-03	-1.9E-03
Average	-	-54.2E-06	-314.1E-06	-620.4E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.1E-03	-4.0E-03	-1.9E-03
Sigma	-	76.6E-06	18.3E-06	41.5E-06	55.4E-06	58.5E-06	49.9E-06	60.0E-06	56.1E-06	81.3E-06	90.4E-06	96.5E-06	47.8E-06

Parameter : Input Offset Voltage : VIO4DUTB
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-164.0E-06	-168.3E-06	-180.2E-06	-179.2E-06	-173.7E-06	-167.8E-06	-169.1E-06	-169.3E-06	-163.3E-06	-177.8E-06	-177.9E-06	-174.3E-06	-165.0E-06
ON PROTON samples													
27	-206.3E-06	-211.0E-06	-301.3E-06	-494.8E-06	-746.8E-06	-961.1E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
28	-496.4E-06	-548.8E-06	-619.7E-06	-804.8E-06	-1.1E-03	-1.3E-03	-1.6E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.3E-03	-1.3E-03
29	-345.5E-06	-392.9E-06	-460.2E-06	-657.5E-06	-946.7E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.1E-03	-1.2E-03
Statistics													
Min	-496.4E-06	-548.8E-06	-619.7E-06	-804.8E-06	-1.1E-03	-1.3E-03	-1.6E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.3E-03	-1.3E-03
Max	-206.3E-06	-211.0E-06	-301.3E-06	-494.8E-06	-746.8E-06	-961.1E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Average	-349.4E-06	-384.2E-06	-460.4E-06	-652.4E-06	-924.9E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.1E-03	-1.2E-03
Sigma	118.5E-06	138.0E-06	130.0E-06	126.6E-06	137.4E-06	158.0E-06	167.3E-06	181.6E-06	187.6E-06	184.9E-06	210.1E-06	202.3E-06	111.5E-06

Drift Calculation

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-4.7E-06	-95.0E-06	-288.6E-06	-540.5E-06	-754.8E-06	-935.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.6E-03	-868.9E-06
28	-	-52.4E-06	-123.3E-06	-308.4E-06	-584.7E-06	-850.3E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.9E-03	-1.8E-03	-850.3E-06
29	-	-47.4E-06	-114.7E-06	-312.0E-06	-601.2E-06	-837.1E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-891.7E-06
Average	-	-34.8E-06	-111.0E-06	-303.0E-06	-575.5E-06	-814.1E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-870.3E-06
Sigma	-	21.4E-06	11.8E-06	10.3E-06	25.6E-06	42.2E-06	50.6E-06	64.4E-06	70.8E-06	66.9E-06	91.8E-06	84.0E-06	16.9E-06

Measurements

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-164.0E-06	-168.3E-06	-180.2E-06	-179.2E-06	-173.7E-06	-167.8E-06	-169.1E-06	-169.3E-06	-163.3E-06	-177.8E-06	-177.9E-06	-174.3E-06	-165.0E-06
ON TID samples													
33	47.8E-06	47.8E-06	-174.0E-06	-369.6E-06	-619.2E-06	-871.8E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
34	17.9E-06	-118.8E-06	-217.0E-06	-408.9E-06	-690.0E-06	-934.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.2E-03
35	299.3E-06	299.3E-06	68.5E-06	-141.4E-06	-371.3E-06	-605.4E-06	-777.6E-06	-972.5E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.4E-03	-804.5E-06
Statistics													
Min	17.9E-06	-118.8E-06	-217.0E-06	-408.9E-06	-690.0E-06	-934.7E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.2E-03
Max	299.3E-06	299.3E-06	68.5E-06	-141.4E-06	-371.3E-06	-605.4E-06	-777.6E-06	-972.5E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.4E-03	-804.5E-06
Average	121.7E-06	76.1E-06	-107.5E-06	-306.6E-06	-560.2E-06	-804.0E-06	-990.1E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.0E-03
Sigma	126.2E-06	171.9E-06	125.7E-06	117.9E-06	136.7E-06	142.8E-06	152.8E-06	156.0E-06	167.1E-06	171.4E-06	177.9E-06	181.8E-06	152.0E-06

Drift Calculation

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-221.8E-06	-417.3E-06	-667.0E-06	-919.6E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.8E-03	-1.1E-03
34	-	-136.6E-06	-234.9E-06	-426.7E-06	-707.9E-06	-952.6E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.9E-03	-1.2E-03
35	-	0.0E+00	-230.8E-06	-440.7E-06	-670.6E-06	-904.7E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.1E-03
Average	-	-45.5E-06	-229.2E-06	-428.3E-06	-681.8E-06	-925.6E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Sigma	-	64.4E-06	5.5E-06	9.6E-06	18.5E-06	20.0E-06	29.2E-06	34.7E-06	43.4E-06	48.8E-06	53.9E-06	58.0E-06	40.4E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-164.0E-06	-168.3E-06	-180.2E-06	-179.2E-06	-173.7E-06	-167.8E-06	-169.1E-06	-169.3E-06	-163.3E-06	-177.8E-06	-177.9E-06	-174.3E-06	-165.0E-06
OFF PROTON samples													
30	-132.4E-06	-298.5E-06	-452.3E-06	-819.6E-06	-1.4E-03	-2.1E-03	-2.6E-03	-3.2E-03	-3.7E-03	-4.4E-03	-5.0E-03	-4.9E-03	-2.1E-03
32	-146.3E-06	-299.4E-06	-461.7E-06	-792.8E-06	-1.4E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.3E-03	-5.0E-03	-4.9E-03	-2.1E-03
39	-415.3E-06	-558.5E-06	-684.9E-06	-1.0E-03	-1.6E-03	-2.3E-03	-2.9E-03	-3.7E-03	-4.2E-03	-5.0E-03	-5.7E-03	-5.6E-03	-2.4E-03
Statistics													
Min	-415.3E-06	-558.5E-06	-684.9E-06	-1.0E-03	-1.6E-03	-2.3E-03	-2.9E-03	-3.7E-03	-4.2E-03	-5.0E-03	-5.7E-03	-5.6E-03	-2.4E-03
Max	-132.4E-06	-298.5E-06	-452.3E-06	-792.8E-06	-1.4E-03	-2.0E-03	-2.5E-03	-3.1E-03	-3.6E-03	-4.3E-03	-5.0E-03	-4.9E-03	-2.1E-03
Average	-231.3E-06	-385.5E-06	-532.9E-06	-877.9E-06	-1.5E-03	-2.1E-03	-2.7E-03	-3.3E-03	-3.9E-03	-4.6E-03	-5.2E-03	-5.1E-03	-2.2E-03
Sigma	130.2E-06	122.4E-06	107.5E-06	101.9E-06	111.4E-06	138.8E-06	171.7E-06	234.2E-06	263.6E-06	312.2E-06	361.1E-06	342.3E-06	103.7E-06

Drift Calculation

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-166.1E-06	-319.9E-06	-687.3E-06	-1.3E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.3E-03	-4.8E-03	-4.8E-03	-2.0E-03
32	-	-153.2E-06	-315.4E-06	-646.6E-06	-1.2E-03	-1.8E-03	-2.4E-03	-3.0E-03	-3.5E-03	-4.2E-03	-4.8E-03	-4.7E-03	-2.0E-03
39	-	-143.2E-06	-269.6E-06	-605.8E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.3E-03	-3.8E-03	-4.6E-03	-5.3E-03	-5.2E-03	-1.9E-03
Average	-	-154.2E-06	-301.6E-06	-646.5E-06	-1.2E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.4E-03	-5.0E-03	-4.9E-03	-2.0E-03
Sigma	-	9.4E-06	22.7E-06	33.3E-06	41.8E-06	35.6E-06	51.8E-06	107.1E-06	136.3E-06	184.9E-06	231.0E-06	212.6E-06	30.1E-06

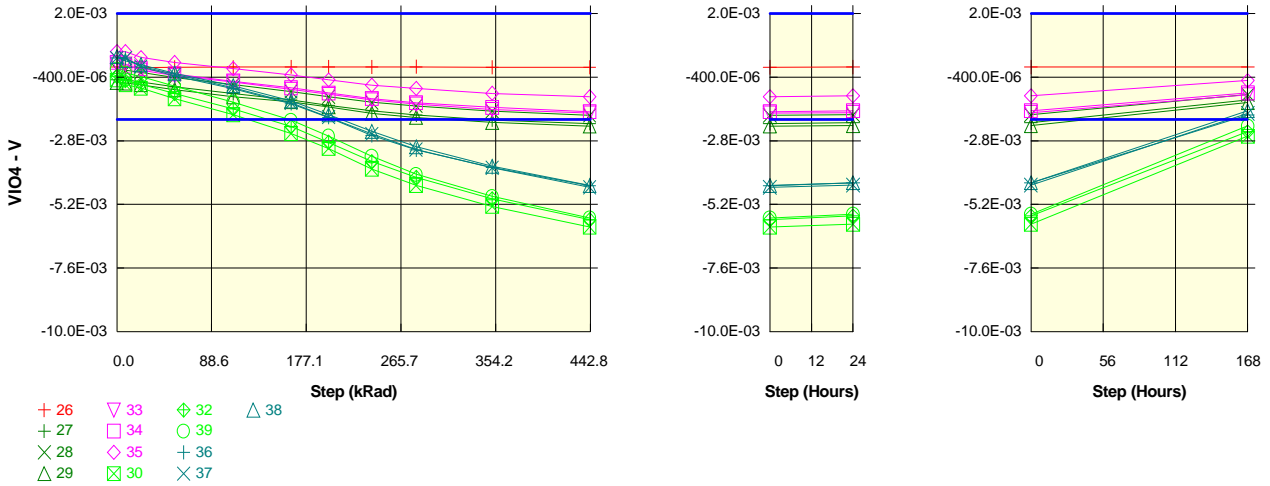
Measurements

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-164.0E-06	-168.3E-06	-180.2E-06	-179.2E-06	-173.7E-06	-167.8E-06	-169.1E-06	-169.3E-06	-163.3E-06	-177.8E-06	-177.9E-06	-174.3E-06	-165.0E-06
OFF TID samples													
36	85.2E-06	85.2E-06	-260.0E-06	-585.0E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.4E-03	-2.0E-03
37	230.3E-06	230.3E-06	-83.4E-06	-378.6E-06	-882.2E-06	-1.5E-03	-1.9E-03	-2.6E-03	-3.1E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.8E-03
38	105.0E-06	-50.6E-06	-196.7E-06	-517.8E-06	-1.0E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.3E-03	-3.9E-03	-4.6E-03	-4.5E-03	-1.9E-03
Statistics													
Min	85.2E-06	-50.6E-06	-260.0E-06	-585.0E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.3E-03	-3.9E-03	-4.6E-03	-4.5E-03	-2.0E-03
Max	230.3E-06	230.3E-06	-83.4E-06	-378.6E-06	-882.2E-06	-1.5E-03	-1.9E-03	-2.6E-03	-3.1E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.8E-03
Average	140.1E-06	88.3E-06	-180.0E-06	-493.8E-06	-994.8E-06	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.9E-03
Sigma	64.3E-06	114.7E-06	73.1E-06	86.0E-06	87.5E-06	73.0E-06	73.4E-06	48.7E-06	51.1E-06	77.8E-06	101.2E-06	102.0E-06	72.8E-06

Drift Calculation

VIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-345.2E-06	-670.1E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.9E-03	-4.5E-03	-4.5E-03	-2.1E-03
37	-	0.0E+00	-313.7E-06	-608.8E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.0E-03	-4.6E-03	-4.5E-03	-2.0E-03
38	-	-155.6E-06	-301.7E-06	-622.7E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.1E-03	-4.7E-03	-4.7E-03	-2.0E-03
Average	-	-51.9E-06	-320.2E-06	-633.9E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-4.0E-03	-4.6E-03	-4.5E-03	-2.1E-03
Sigma	-	73.4E-06	18.3E-06	26.2E-06	32.4E-06	17.0E-06	9.5E-06	15.9E-06	35.9E-06	72.1E-06	84.9E-06	80.2E-06	17.2E-06

Parameter : Input Offset Voltage : VIO4DUTC
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.3E-06	-21.3E-06	-33.7E-06	-32.0E-06	-23.1E-06	-12.4E-06	-14.6E-06	-18.6E-06	-8.7E-06	-30.5E-06	-31.4E-06	-24.7E-06	-9.6E-06
ON PROTON samples													
27	-496.0E-06	-497.2E-06	-589.3E-06	-766.4E-06	-1.0E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-2.0E-03	-2.2E-03	-2.1E-03	-1.3E-03
28	-105.4E-06	-143.1E-06	-223.8E-06	-414.0E-06	-676.7E-06	-946.3E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
29	-594.7E-06	-618.6E-06	-692.6E-06	-871.9E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.2E-03	-1.4E-03
Statistics													
Min	-594.7E-06	-618.6E-06	-692.6E-06	-871.9E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.3E-03	-2.2E-03	-1.4E-03
Max	-105.4E-06	-143.1E-06	-223.8E-06	-414.0E-06	-676.7E-06	-946.3E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Average	-398.7E-06	-419.6E-06	-501.9E-06	-684.1E-06	-948.5E-06	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.1E-03	-2.1E-03	-1.2E-03
Sigma	211.3E-06	201.7E-06	201.1E-06	195.8E-06	198.4E-06	167.7E-06	168.1E-06	177.1E-06	186.1E-06	179.8E-06	173.6E-06	171.1E-06	126.4E-06

Drift Calculation

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-1.1E-06	-93.2E-06	-270.3E-06	-528.3E-06	-761.4E-06	-969.7E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-765.1E-06
28	-	-37.7E-06	-118.3E-06	-308.6E-06	-571.3E-06	-840.9E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-953.2E-06
29	-	-24.0E-06	-97.9E-06	-277.2E-06	-550.0E-06	-739.6E-06	-928.5E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-767.9E-06
Average	-	-20.9E-06	-103.2E-06	-285.4E-06	-549.8E-06	-780.6E-06	-978.0E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.7E-03	-828.7E-06
Sigma	-	15.1E-06	10.9E-06	16.7E-06	17.6E-06	43.5E-06	44.2E-06	34.5E-06	25.1E-06	31.6E-06	38.4E-06	41.9E-06	88.0E-06

Measurements

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.3E-06	-21.3E-06	-33.7E-06	-32.0E-06	-23.1E-06	-12.4E-06	-14.6E-06	-18.6E-06	-8.7E-06	-30.5E-06	-31.4E-06	-24.7E-06	-9.6E-06
ON TID samples													
33	95.7E-06	95.7E-06	-134.3E-06	-346.1E-06	-581.1E-06	-858.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.1E-03
34	152.2E-06	20.1E-06	-79.4E-06	-277.0E-06	-554.6E-06	-803.2E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-994.3E-06
35	562.1E-06	562.1E-06	339.0E-06	153.0E-06	-78.8E-06	-316.9E-06	-505.6E-06	-702.1E-06	-831.7E-06	-1.0E-03	-1.1E-03	-1.1E-03	-533.7E-06
Statistics													
Min	95.7E-06	20.1E-06	-134.3E-06	-346.1E-06	-581.1E-06	-858.2E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.1E-03
Max	562.1E-06	562.1E-06	339.0E-06	153.0E-06	-78.8E-06	-316.9E-06	-505.6E-06	-702.1E-06	-831.7E-06	-1.0E-03	-1.1E-03	-1.1E-03	-533.7E-06
Average	270.0E-06	226.0E-06	41.8E-06	-156.7E-06	-404.8E-06	-659.4E-06	-853.3E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-863.6E-06
Sigma	207.8E-06	239.7E-06	211.4E-06	220.8E-06	230.8E-06	243.2E-06	246.8E-06	252.0E-06	265.4E-06	272.4E-06	277.3E-06	283.7E-06	234.9E-06

Drift Calculation

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-230.0E-06	-441.8E-06	-676.8E-06	-953.9E-06	-1.1E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.8E-03	-1.2E-03
34	-	-132.1E-06	-231.6E-06	-429.2E-06	-706.8E-06	-955.5E-06	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.9E-03	-1.8E-03	-1.1E-03
35	-	0.0E+00	-223.1E-06	-409.1E-06	-640.9E-06	-879.0E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Average	-	-44.0E-06	-228.3E-06	-426.7E-06	-674.9E-06	-929.5E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.8E-03	-1.8E-03	-1.1E-03
Sigma	-	62.3E-06	3.7E-06	13.5E-06	26.9E-06	35.7E-06	39.4E-06	44.8E-06	57.9E-06	64.6E-06	70.0E-06	75.9E-06	27.2E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.3E-06	-21.3E-06	-33.7E-06	-32.0E-06	-23.1E-06	-12.4E-06	-14.6E-06	-18.6E-06	-8.7E-06	-30.5E-06	-31.4E-06	-24.7E-06	-9.6E-06
OFF_PROTON samples													
30	-513.0E-06	-681.4E-06	-819.3E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.1E-03	-3.9E-03	-4.5E-03	-5.3E-03	-6.1E-03	-5.9E-03	-2.6E-03
32	-381.4E-06	-539.9E-06	-667.7E-06	-1.0E-03	-1.6E-03	-2.3E-03	-2.9E-03	-3.6E-03	-4.2E-03	-5.0E-03	-5.8E-03	-5.6E-03	-2.5E-03
39	-98.8E-06	-241.2E-06	-375.7E-06	-738.5E-06	-1.3E-03	-2.0E-03	-2.6E-03	-3.4E-03	-4.1E-03	-4.9E-03	-5.7E-03	-5.6E-03	-2.2E-03
Statistics													
Min	-513.0E-06	-681.4E-06	-819.3E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.1E-03	-3.9E-03	-4.5E-03	-5.3E-03	-6.1E-03	-5.9E-03	-2.6E-03
Max	-98.8E-06	-241.2E-06	-375.7E-06	-738.5E-06	-1.3E-03	-2.0E-03	-2.6E-03	-3.4E-03	-4.1E-03	-4.9E-03	-5.7E-03	-5.6E-03	-2.2E-03
Average	-331.1E-06	-487.5E-06	-620.9E-06	-993.5E-06	-1.6E-03	-2.3E-03	-2.9E-03	-3.6E-03	-4.2E-03	-5.1E-03	-5.8E-03	-5.7E-03	-2.4E-03
Sigma	172.8E-06	183.5E-06	184.1E-06	196.8E-06	194.1E-06	205.9E-06	190.5E-06	197.3E-06	177.0E-06	162.0E-06	151.2E-06	163.0E-06	159.5E-06

Drift Calculation

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-168.4E-06	-306.3E-06	-704.5E-06	-1.3E-03	-2.0E-03	-2.6E-03	-3.4E-03	-4.0E-03	-4.8E-03	-5.5E-03	-5.4E-03	-2.1E-03
32	-	-158.4E-06	-286.3E-06	-643.1E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.2E-03	-3.8E-03	-4.6E-03	-5.4E-03	-5.3E-03	-2.1E-03
39	-	-142.4E-06	-277.0E-06	-639.7E-06	-1.2E-03	-1.9E-03	-2.5E-03	-3.3E-03	-4.0E-03	-4.8E-03	-5.6E-03	-5.5E-03	-2.1E-03
Average	-	-156.4E-06	-289.9E-06	-662.4E-06	-1.3E-03	-1.9E-03	-2.5E-03	-3.3E-03	-3.9E-03	-4.7E-03	-5.5E-03	-5.4E-03	-2.1E-03
Sigma	-	10.7E-06	12.2E-06	29.8E-06	35.6E-06	56.1E-06	41.3E-06	63.5E-06	81.3E-06	85.7E-06	92.6E-06	96.2E-06	27.0E-06

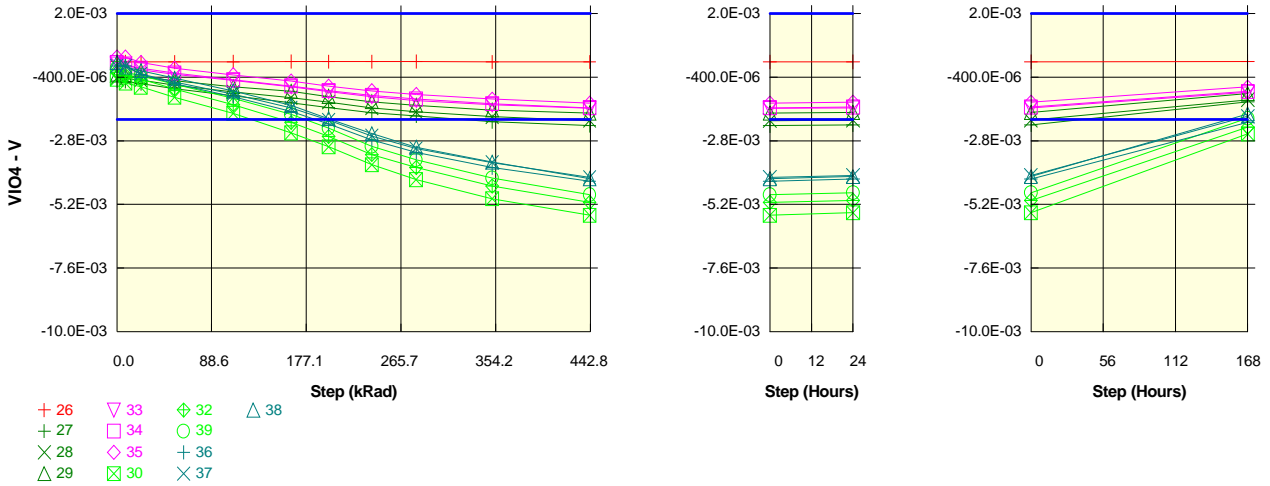
Measurements

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.3E-06	-21.3E-06	-33.7E-06	-32.0E-06	-23.1E-06	-12.4E-06	-14.6E-06	-18.6E-06	-8.7E-06	-30.5E-06	-31.4E-06	-24.7E-06	-9.6E-06
OFF_TID samples													
36	317.0E-06	317.0E-06	-13.1E-06	-359.9E-06	-842.3E-06	-1.4E-03	-1.9E-03	-2.6E-03	-3.2E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.8E-03
37	316.8E-06	316.8E-06	4.5E-06	-300.8E-06	-796.5E-06	-1.4E-03	-1.9E-03	-2.5E-03	-3.1E-03	-3.8E-03	-4.6E-03	-4.5E-03	-1.8E-03
38	371.8E-06	214.4E-06	67.3E-06	-252.0E-06	-726.9E-06	-1.3E-03	-1.8E-03	-2.4E-03	-3.0E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.7E-03
Statistics													
Min	316.8E-06	214.4E-06	-13.1E-06	-359.9E-06	-842.3E-06	-1.4E-03	-1.9E-03	-2.6E-03	-3.2E-03	-3.8E-03	-4.6E-03	-4.5E-03	-1.8E-03
Max	371.8E-06	317.0E-06	67.3E-06	-252.0E-06	-726.9E-06	-1.3E-03	-1.8E-03	-2.4E-03	-3.0E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.7E-03
Average	335.2E-06	282.7E-06	19.6E-06	-304.2E-06	-788.6E-06	-1.4E-03	-1.9E-03	-2.5E-03	-3.1E-03	-3.8E-03	-4.5E-03	-4.4E-03	-1.8E-03
Sigma	25.9E-06	48.3E-06	34.5E-06	44.1E-06	47.5E-06	44.6E-06	45.3E-06	63.8E-06	53.2E-06	25.0E-06	31.4E-06	40.6E-06	66.3E-06

Drift Calculation

VIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-330.2E-06	-677.0E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.8E-03	-4.7E-03	-2.1E-03
37	-	0.0E+00	-312.2E-06	-617.5E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.9E-03	-4.8E-03	-2.1E-03
38	-	-157.4E-06	-304.5E-06	-623.7E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.4E-03	-4.1E-03	-4.9E-03	-4.8E-03	-2.0E-03
Average	-	-52.5E-06	-315.6E-06	-639.4E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.9E-03	-3.4E-03	-4.1E-03	-4.9E-03	-4.8E-03	-2.1E-03
Sigma	-	74.2E-06	10.7E-06	26.7E-06	25.9E-06	21.4E-06	19.7E-06	40.9E-06	27.7E-06	4.2E-06	26.6E-06	32.9E-06	43.8E-06

Parameter : Input Offset Voltage : VIO4DUTD
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : V
 Spec Limit Min : -2.0E-03
 Spec Limit Max : 2.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	188.7E-06	181.4E-06	166.2E-06	165.7E-06	177.5E-06	190.1E-06	185.3E-06	184.0E-06	191.0E-06	170.0E-06	170.2E-06	176.0E-06	189.8E-06
ON PROTON samples													
27	-546.8E-06	-563.0E-06	-649.8E-06	-845.9E-06	-1.1E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.2E-03	-2.2E-03	-1.3E-03
28	-448.1E-06	-456.2E-06	-515.2E-06	-700.7E-06	-961.2E-06	-1.2E-03	-1.3E-03	-1.6E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.3E-03
29	-320.5E-06	-344.7E-06	-389.8E-06	-542.8E-06	-760.9E-06	-937.0E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.0E-03
Statistics													
Min	-546.8E-06	-563.0E-06	-649.8E-06	-845.9E-06	-1.1E-03	-1.4E-03	-1.6E-03	-1.8E-03	-1.9E-03	-2.1E-03	-2.2E-03	-2.2E-03	-1.3E-03
Max	-320.5E-06	-344.7E-06	-389.8E-06	-542.8E-06	-760.9E-06	-937.0E-06	-1.1E-03	-1.3E-03	-1.5E-03	-1.6E-03	-1.8E-03	-1.7E-03	-1.0E-03
Average	-438.5E-06	-454.6E-06	-518.3E-06	-696.5E-06	-943.1E-06	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.9E-03	-2.0E-03	-2.0E-03	-1.2E-03
Sigma	92.6E-06	89.2E-06	106.2E-06	123.8E-06	141.9E-06	177.0E-06	171.7E-06	172.4E-06	168.1E-06	178.8E-06	195.1E-06	190.0E-06	133.9E-06

Drift Calculation

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-16.2E-06	-103.0E-06	-299.1E-06	-560.3E-06	-822.8E-06	-1.0E-03	-1.2E-03	-1.3E-03	-1.5E-03	-1.7E-03	-1.6E-03	-787.9E-06
28	-	-8.0E-06	-67.1E-06	-252.6E-06	-513.1E-06	-728.7E-06	-899.8E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-805.3E-06
29	-	-24.2E-06	-69.3E-06	-222.3E-06	-440.4E-06	-616.5E-06	-811.6E-06	-1.0E-03	-1.1E-03	-1.3E-03	-1.4E-03	-1.4E-03	-698.3E-06
Average	-	-16.1E-06	-79.8E-06	-258.0E-06	-504.6E-06	-722.7E-06	-905.8E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-763.8E-06
Sigma	-	6.6E-06	16.4E-06	31.6E-06	49.3E-06	84.3E-06	79.4E-06	79.8E-06	75.9E-06	86.2E-06	102.6E-06	97.9E-06	46.9E-06

Measurements

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	188.7E-06	181.4E-06	166.2E-06	165.7E-06	177.5E-06	190.1E-06	185.3E-06	184.0E-06	191.0E-06	170.0E-06	170.2E-06	176.0E-06	189.8E-06
ON TID samples													
33	100.0E-06	100.0E-06	-123.2E-06	-295.2E-06	-528.1E-06	-760.9E-06	-949.1E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-973.1E-06
34	159.2E-06	38.6E-06	-60.7E-06	-246.5E-06	-499.9E-06	-735.3E-06	-907.5E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.6E-03	-1.5E-03	-938.3E-06
35	357.3E-06	357.3E-06	148.4E-06	-59.6E-06	-310.6E-06	-550.7E-06	-865.7E-06	-916.0E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.3E-03	-773.1E-06
Statistics													
Min	100.0E-06	38.6E-06	-123.2E-06	-295.2E-06	-528.1E-06	-760.9E-06	-949.1E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.6E-03	-973.1E-06
Max	357.3E-06	357.3E-06	148.4E-06	-59.6E-06	-310.6E-06	-550.7E-06	-740.6E-06	-916.0E-06	-1.1E-03	-1.2E-03	-1.4E-03	-1.3E-03	-773.1E-06
Average	205.5E-06	165.3E-06	-11.8E-06	-200.4E-06	-446.2E-06	-682.3E-06	-865.7E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.5E-03	-894.8E-06
Sigma	110.0E-06	138.1E-06	116.1E-06	101.6E-06	96.6E-06	93.6E-06	90.1E-06	95.0E-06	96.7E-06	93.1E-06	89.5E-06	95.8E-06	87.2E-06

Drift Calculation

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-223.2E-06	-395.3E-06	-628.1E-06	-860.9E-06	-1.0E-03	-1.2E-03	-1.4E-03	-1.5E-03	-1.7E-03	-1.7E-03	-1.1E-03
34	-	-120.7E-06	-219.9E-06	-405.7E-06	-659.2E-06	-894.5E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
35	-	0.0E+00	-208.9E-06	-416.9E-06	-667.9E-06	-908.0E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Average	-	-40.2E-06	-217.3E-06	-406.0E-06	-651.7E-06	-887.8E-06	-1.1E-03	-1.3E-03	-1.4E-03	-1.6E-03	-1.7E-03	-1.7E-03	-1.1E-03
Sigma	-	56.9E-06	6.1E-06	8.8E-06	17.1E-06	19.8E-06	20.2E-06	15.5E-06	13.3E-06	17.4E-06	23.7E-06	16.5E-06	23.5E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	188.7E-06	181.4E-06	166.2E-06	165.7E-06	177.5E-06	190.1E-06	185.3E-06	184.0E-06	191.0E-06	170.0E-06	170.2E-06	176.0E-06	189.8E-06
OFF PROTON samples													
30	-481.8E-06	-624.6E-06	-776.3E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.0E-03	-3.7E-03	-4.3E-03	-5.0E-03	-5.6E-03	-5.5E-03	-2.5E-03
32	-170.4E-06	-322.1E-06	-476.0E-06	-848.2E-06	-1.4E-03	-2.1E-03	-2.6E-03	-3.3E-03	-3.8E-03	-4.5E-03	-5.1E-03	-5.0E-03	-2.3E-03
39	-65.3E-06	-215.9E-06	-337.3E-06	-668.8E-06	-1.2E-03	-1.8E-03	-2.3E-03	-3.0E-03	-3.5E-03	-4.2E-03	-4.8E-03	-4.8E-03	-2.0E-03
Statistics													
Min	-481.8E-06	-624.6E-06	-776.3E-06	-1.2E-03	-1.8E-03	-2.5E-03	-3.0E-03	-3.7E-03	-4.3E-03	-5.0E-03	-5.6E-03	-5.5E-03	-2.5E-03
Max	-65.3E-06	-215.9E-06	-337.3E-06	-668.8E-06	-1.2E-03	-1.8E-03	-2.3E-03	-3.0E-03	-3.5E-03	-4.2E-03	-4.8E-03	-4.8E-03	-2.0E-03
Average	-239.2E-06	-387.5E-06	-529.9E-06	-893.1E-06	-1.5E-03	-2.1E-03	-2.7E-03	-3.3E-03	-3.9E-03	-4.6E-03	-5.2E-03	-5.1E-03	-2.3E-03
Sigma	176.8E-06	173.2E-06	183.2E-06	203.9E-06	232.8E-06	285.8E-06	287.6E-06	285.4E-06	307.9E-06	323.3E-06	318.6E-06	311.7E-06	240.6E-06

Drift Calculation

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-142.9E-06	-294.6E-06	-680.5E-06	-1.3E-03	-2.0E-03	-2.5E-03	-3.2E-03	-3.8E-03	-4.5E-03	-5.1E-03	-5.0E-03	-2.1E-03
32	-	-151.7E-06	-305.6E-06	-677.7E-06	-1.3E-03	-1.9E-03	-2.5E-03	-3.2E-03	-3.6E-03	-4.3E-03	-5.0E-03	-4.9E-03	-2.1E-03
39	-	-150.6E-06	-272.0E-06	-603.4E-06	-1.1E-03	-1.7E-03	-2.3E-03	-2.9E-03	-3.5E-03	-4.1E-03	-4.8E-03	-4.7E-03	-1.9E-03
Average	-	-148.4E-06	-290.7E-06	-653.9E-06	-1.2E-03	-1.9E-03	-2.4E-03	-3.1E-03	-3.6E-03	-4.3E-03	-5.0E-03	-4.9E-03	-2.0E-03
Sigma	-	3.9E-06	14.0E-06	35.7E-06	66.0E-06	118.6E-06	121.4E-06	119.3E-06	135.6E-06	151.1E-06	145.1E-06	138.6E-06	97.6E-06

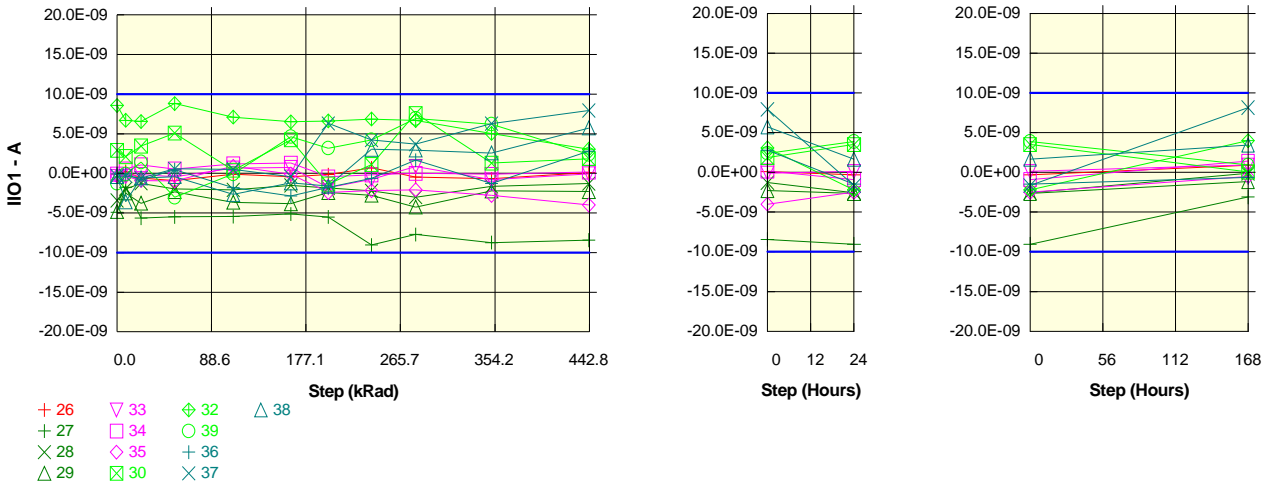
Measurements

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	188.7E-06	181.4E-06	166.2E-06	165.7E-06	177.5E-06	190.1E-06	185.3E-06	184.0E-06	191.0E-06	170.0E-06	170.2E-06	176.0E-06	189.8E-06
OFF TID samples													
36	21.1E-06	21.1E-06	-307.8E-06	-647.8E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.2E-03	-3.8E-03	-4.3E-03	-4.2E-03	-2.1E-03
37	17.5E-06	17.5E-06	-278.7E-06	-578.5E-06	-1.0E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.1E-03	-1.9E-03
38	145.6E-06	-18.9E-06	-157.9E-06	-447.4E-06	-924.4E-06	-1.5E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.6E-03	-4.2E-03	-4.2E-03	-1.8E-03
Statistics													
Min	17.5E-06	-18.9E-06	-307.8E-06	-647.8E-06	-1.1E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.2E-03	-3.8E-03	-4.3E-03	-4.2E-03	-2.1E-03
Max	145.6E-06	21.1E-06	-157.9E-06	-447.4E-06	-924.4E-06	-1.5E-03	-2.0E-03	-2.5E-03	-3.0E-03	-3.6E-03	-4.2E-03	-4.1E-03	-1.8E-03
Average	61.4E-06	6.6E-06	-248.1E-06	-557.9E-06	-1.0E-03	-1.6E-03	-2.1E-03	-2.6E-03	-3.1E-03	-3.7E-03	-4.3E-03	-4.2E-03	-1.9E-03
Sigma	59.5E-06	18.1E-06	64.9E-06	83.1E-06	89.5E-06	91.9E-06	86.2E-06	95.1E-06	86.0E-06	95.2E-06	62.6E-06	58.1E-06	135.5E-06

Drift Calculation

VIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-328.8E-06	-668.9E-06	-1.2E-03	-1.7E-03	-2.2E-03	-2.8E-03	-3.3E-03	-3.8E-03	-4.4E-03	-4.3E-03	-2.1E-03
37	-	0.0E+00	-296.2E-06	-596.0E-06	-1.1E-03	-1.6E-03	-2.0E-03	-2.6E-03	-3.1E-03	-3.6E-03	-4.2E-03	-4.1E-03	-1.9E-03
38	-	-164.5E-06	-303.5E-06	-593.0E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.8E-03	-4.4E-03	-4.3E-03	-1.9E-03
Average	-	-54.8E-06	-309.5E-06	-619.3E-06	-1.1E-03	-1.6E-03	-2.1E-03	-2.7E-03	-3.2E-03	-3.7E-03	-4.3E-03	-4.2E-03	-2.0E-03
Sigma	-	77.5E-06	14.0E-06	35.1E-06	48.5E-06	58.0E-06	62.7E-06	63.0E-06	64.2E-06	81.5E-06	78.9E-06	73.6E-06	103.3E-06

Parameter : Input Offset Current : IIO1DUTA
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-112.0E-12	227.3E-12	-603.4E-12	-890.9E-12	-121.8E-12	-410.2E-12	-166.0E-12	682.6E-12	-479.7E-12	-682.6E-12	110.7E-12	-313.6E-12	904.0E-12
ON PROTON samples													
27	-4.9E-09	-1.7E-09	-5.6E-09	-5.5E-09	-5.4E-09	-5.1E-09	-5.5E-09	-9.1E-09	-7.7E-09	-8.7E-09	-8.4E-09	-9.0E-09	-3.1E-09
28	-3.4E-09	-2.0E-09	-1.3E-09	-2.0E-09	-2.1E-09	-1.5E-09	-1.9E-09	-2.2E-09	-3.0E-09	-1.6E-09	-1.3E-09	-2.5E-09	-110.7E-12
29	-4.8E-09	-2.5E-09	-3.8E-09	-2.3E-09	-3.7E-09	-3.8E-09	-2.4E-09	-2.7E-09	-4.2E-09	-2.2E-09	-2.3E-09	-2.6E-09	-1.2E-09
Statistics													
Min	-4.9E-09	-2.5E-09	-5.6E-09	-5.5E-09	-5.4E-09	-5.1E-09	-5.5E-09	-9.1E-09	-7.7E-09	-8.7E-09	-8.4E-09	-9.0E-09	-3.1E-09
Max	-3.4E-09	-1.7E-09	-1.3E-09	-2.0E-09	-2.1E-09	-1.5E-09	-1.9E-09	-2.2E-09	-3.0E-09	-1.6E-09	-1.3E-09	-2.5E-09	-110.7E-12
Average	-4.4E-09	-2.1E-09	-3.6E-09	-3.3E-09	-3.7E-09	-3.5E-09	-3.3E-09	-4.7E-09	-5.0E-09	-4.2E-09	-4.0E-09	-4.7E-09	-1.5E-09
Sigma	674.1E-12	313.2E-12	1.8E-09	1.6E-09	1.4E-09	1.5E-09	1.6E-09	3.1E-09	2.0E-09	3.2E-09	3.2E-09	3.0E-09	1.2E-09

Drift Calculation

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	3.1E-09	-753.9E-12	-586.7E-12	-551.9E-12	-231.5E-12	-620.5E-12	-4.2E-09	-2.8E-09	-3.8E-09	-3.5E-09	-4.1E-09	1.8E-09
28	-	1.5E-09	2.2E-09	1.5E-09	1.3E-09	1.9E-09	1.6E-09	1.2E-09	419.4E-12	1.8E-09	2.1E-09	880.6E-12	3.3E-09
29	-	2.3E-09	1.1E-09	2.5E-09	1.2E-09	968.4E-12	2.4E-09	2.1E-09	570.6E-12	2.6E-09	2.5E-09	2.2E-09	3.7E-09
Average	-	2.3E-09	818.5E-12	1.1E-09	650.8E-12	885.8E-12	1.1E-09	-288.9E-12	-614.8E-12	184.6E-12	369.2E-12	-362.7E-12	2.9E-09
Sigma	-	685.2E-12	1.2E-09	1.3E-09	853.7E-12	880.5E-12	1.3E-09	2.8E-09	1.6E-09	2.9E-09	2.8E-09	2.7E-09	807.2E-12

Measurements

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-112.0E-12	227.3E-12	-603.4E-12	-890.9E-12	-121.8E-12	-410.2E-12	-166.0E-12	682.6E-12	-479.7E-12	-682.6E-12	110.7E-12	-313.6E-12	904.0E-12
ON TID samples													
33	-367.7E-12	-367.7E-12	-142.1E-12	-424.6E-12	666.6E-12	769.1E-12	-1.8E-09	-756.4E-12	885.6E-12	-811.8E-12	-73.8E-12	129.2E-12	940.9E-12
34	-100.3E-12	568.3E-12	1.1E-09	549.9E-12	1.2E-09	1.3E-09	-442.8E-12	-184.5E-12	0.0E+00	-110.7E-12	166.1E-12	-885.6E-12	1.4E-09
35	-342.7E-12	-342.7E-12	-885.9E-12	-969.5E-12	897.3E-12	-96.2E-12	-2.4E-09	-2.2E-09	-2.1E-09	-2.8E-09	-4.0E-09	-2.5E-09	-516.6E-12
Statistics													
Min	-367.7E-12	-367.7E-12	-885.9E-12	-969.5E-12	666.6E-12	-96.2E-12	-2.4E-09	-2.2E-09	-2.1E-09	-2.8E-09	-4.0E-09	-2.5E-09	-516.6E-12
Max	-100.3E-12	568.3E-12	1.1E-09	549.9E-12	1.2E-09	1.3E-09	-442.8E-12	-184.5E-12	885.6E-12	-110.7E-12	166.1E-12	129.2E-12	1.4E-09
Average	-270.2E-12	-47.4E-12	20.1E-12	-281.4E-12	917.6E-12	651.6E-12	-1.5E-09	-1.0E-09	-393.6E-12	-1.2E-09	-1.3E-09	-1.1E-09	608.8E-12
Sigma	120.6E-12	435.5E-12	814.0E-12	628.5E-12	213.7E-12	568.7E-12	823.6E-12	837.7E-12	1.2E-09	1.1E-09	1.9E-09	1.1E-09	817.8E-12

Drift Calculation

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	225.7E-12	-56.8E-12	1.0E-09	1.1E-09	-1.4E-09	-388.7E-12	1.3E-09	-444.0E-12	294.0E-12	496.9E-12	1.3E-09
34	-	668.6E-12	1.2E-09	650.2E-12	1.3E-09	1.4E-09	-342.5E-12	-84.2E-12	100.3E-12	-10.4E-12	266.3E-12	-785.3E-12	1.5E-09
35	-	0.0E+00	-543.3E-12	-626.8E-12	1.2E-09	246.5E-12	-2.1E-09	-1.8E-09	-1.7E-09	-2.4E-09	-3.7E-09	-2.1E-09	-173.9E-12
Average	-	222.9E-12	290.3E-12	-11.1E-12	1.2E-09	921.8E-12	-1.3E-09	-769.1E-12	-123.4E-12	-965.9E-12	-1.0E-09	-812.1E-12	879.1E-12
Sigma	-	315.2E-12	708.4E-12	522.4E-12	110.4E-12	487.9E-12	714.1E-12	763.5E-12	1.2E-09	1.1E-09	1.9E-09	1.1E-09	748.8E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019		
	LM124AJRQMLV					National Semiconductors				Issue:	02		

Measurements

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-112.0E-12	227.3E-12	-603.4E-12	-890.9E-12	-121.8E-12	-410.2E-12	-166.0E-12	682.6E-12	-479.7E-12	-682.6E-12	110.7E-12	-313.6E-12	904.0E-12
OFF PROTON samples													
30	2.9E-09	2.1E-09	3.5E-09	5.1E-09	384.5E-12	4.2E-09	-1.4E-09	1.1E-09	7.6E-09	1.3E-09	1.8E-09	3.5E-09	55.4E-12
32	8.6E-09	6.7E-09	6.6E-09	8.8E-09	7.1E-09	6.5E-09	6.6E-09	6.9E-09	6.7E-09	5.0E-09	3.1E-09	-2.2E-09	4.0E-09
39	-1.3E-09	-100.3E-12	1.4E-09	-3.0E-09	-64.1E-12	4.6E-09	3.2E-09	4.2E-09	6.9E-09	6.2E-09	2.4E-09	3.9E-09	922.5E-12
Statistics													
Min	-1.3E-09	-100.3E-12	1.4E-09	-3.0E-09	-64.1E-12	4.2E-09	-1.4E-09	1.1E-09	6.7E-09	1.3E-09	1.8E-09	-2.2E-09	55.4E-12
Max	8.6E-09	6.7E-09	6.6E-09	8.8E-09	7.1E-09	6.5E-09	6.6E-09	6.9E-09	7.6E-09	6.2E-09	3.1E-09	3.9E-09	4.0E-09
Average	3.4E-09	2.9E-09	3.8E-09	3.6E-09	2.5E-09	5.1E-09	2.8E-09	4.1E-09	7.1E-09	4.2E-09	2.4E-09	1.7E-09	1.7E-09
Sigma	4.0E-09	2.8E-09	2.1E-09	4.9E-09	3.3E-09	991.2E-12	3.3E-09	2.4E-09	374.8E-12	2.1E-09	500.9E-12	2.8E-09	1.7E-09

Drift Calculation

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-772.2E-12	565.0E-12	2.2E-09	-2.5E-09	1.3E-09	-4.3E-09	-1.8E-09	4.7E-09	-1.6E-09	-1.1E-09	610.4E-12	-2.8E-09
32	-	-1.9E-09	-2.0E-09	240.7E-12	-1.5E-09	-2.1E-09	-1.9E-09	-1.7E-09	-1.9E-09	-3.5E-09	-5.5E-09	-10.8E-09	-4.6E-09
39	-	1.2E-09	2.7E-09	-1.8E-09	1.2E-09	5.9E-09	4.4E-09	5.5E-09	8.2E-09	7.5E-09	3.7E-09	5.1E-09	2.2E-09
Average	-	-494.8E-12	407.9E-12	212.8E-12	-925.0E-12	1.7E-09	-591.5E-12	665.5E-12	3.7E-09	772.5E-12	-965.5E-12	-1.7E-09	-1.7E-09
Sigma	-	1.2E-09	1.9E-09	1.6E-09	1.6E-09	3.3E-09	3.7E-09	3.4E-09	4.2E-09	4.8E-09	3.7E-09	6.7E-09	2.9E-09

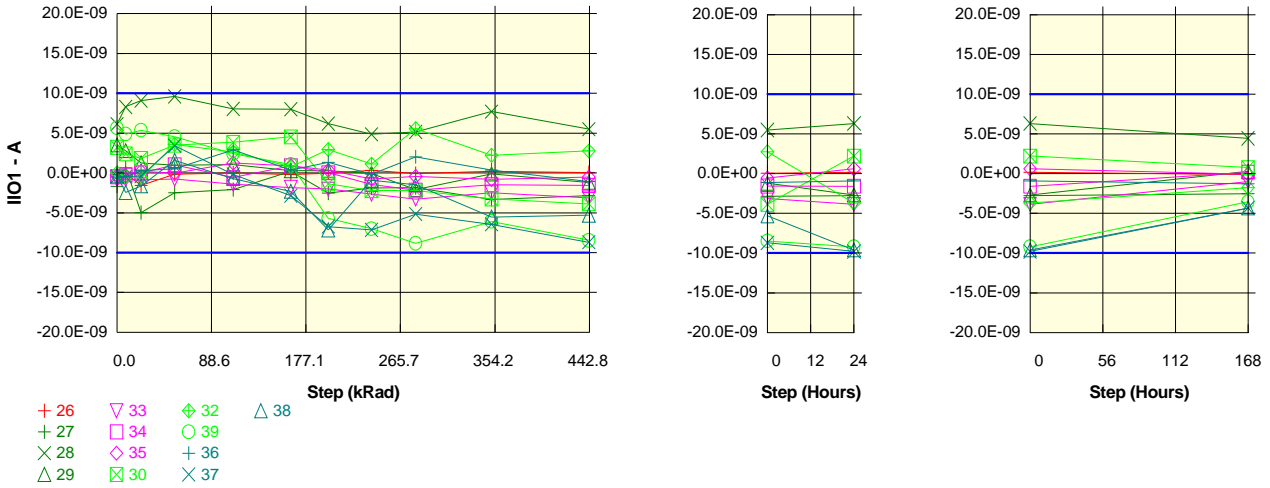
Measurements

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-112.0E-12	227.3E-12	-603.4E-12	-890.9E-12	-121.8E-12	-410.2E-12	-166.0E-12	682.6E-12	-479.7E-12	-682.6E-12	110.7E-12	-313.6E-12	904.0E-12
OFF TID samples													
36	-75.2E-12	-75.2E-12	-859.2E-12	451.3E-12	-1.8E-09	-2.8E-09	-1.8E-09	-627.3E-12	1.7E-09	-1.3E-09	2.8E-09	-1.5E-09	-645.7E-12
37	-351.0E-12	-351.0E-12	-605.1E-12	585.0E-12	512.7E-12	-405.9E-12	6.3E-09	4.2E-09	3.7E-09	6.3E-09	7.9E-09	-1.7E-09	8.2E-09
38	-391.1E-12	-3.6E-09	-580.0E-12	-401.2E-12	-2.7E-09	-1.2E-09	-1.6E-09	3.0E-09	3.0E-09	2.6E-09	5.7E-09	1.7E-09	3.4E-09
Statistics													
Min	-391.1E-12	-3.6E-09	-859.2E-12	-401.2E-12	-2.7E-09	-2.8E-09	-1.8E-09	-627.3E-12	1.7E-09	-1.3E-09	2.8E-09	-1.7E-09	-645.7E-12
Max	-75.2E-12	-75.2E-12	-580.0E-12	585.0E-12	512.7E-12	-405.9E-12	6.3E-09	4.2E-09	3.7E-09	6.3E-09	7.9E-09	1.7E-09	8.2E-09
Average	-272.5E-12	-1.3E-09	-681.4E-12	211.7E-12	-1.3E-09	-1.5E-09	976.6E-12	2.2E-09	2.8E-09	2.5E-09	5.5E-09	-492.0E-12	3.7E-09
Sigma	140.4E-12	1.6E-09	126.1E-12	436.8E-12	1.3E-09	1.0E-09	3.8E-09	2.1E-09	838.7E-12	3.1E-09	2.1E-09	1.5E-09	3.6E-09

Drift Calculation

IIO1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-783.9E-12	526.5E-12	-1.7E-09	-2.8E-09	-1.7E-09	-552.1E-12	1.7E-09	-1.2E-09	2.9E-09	-1.4E-09	-570.5E-12
37	-	0.0E+00	-254.1E-12	936.1E-12	863.8E-12	-54.9E-12	6.7E-09	4.6E-09	4.0E-09	6.6E-09	8.3E-09	-1.3E-09	8.5E-09
38	-	-3.2E-09	-188.9E-12	-10.0E-12	-2.3E-09	-808.1E-12	-1.2E-09	3.4E-09	3.3E-09	3.0E-09	6.1E-09	2.1E-09	3.8E-09
Average	-	-1.1E-09	-409.0E-12	484.2E-12	-1.0E-09	-1.2E-09	1.2E-09	2.5E-09	3.0E-09	2.8E-09	5.8E-09	-219.5E-12	3.9E-09
Sigma	-	1.5E-09	266.5E-12	387.4E-12	1.4E-09	1.1E-09	3.8E-09	2.2E-09	965.2E-12	3.2E-09	2.2E-09	1.6E-09	3.7E-09

Parameter : Input Offset Current : IIO1DUTB
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-183.9E-12	-16.7E-12	-1.6E-09	-150.4E-12	-6.4E-12	-185.9E-12	-18.5E-12	313.6E-12	-73.8E-12	184.5E-12	55.3E-12	184.5E-12	-110.7E-12
ON_PROTON samples													
27	-1.7E-09	651.9E-12	-5.0E-09	-2.5E-09	-2.1E-09	192.3E-12	-2.5E-09	-1.9E-09	-1.9E-09	-3.3E-09	-2.8E-09	-2.7E-09	-2.5E-09
28	6.1E-09	8.3E-09	9.1E-09	9.6E-09	8.0E-09	8.0E-09	6.2E-09	4.9E-09	5.1E-09	7.7E-09	5.5E-09	6.3E-09	4.4E-09
29	3.5E-09	2.8E-09	1.2E-09	969.5E-12	1.0E-09	288.4E-12	276.7E-12	-55.3E-12	-2.1E-09	-110.7E-12	-1.2E-09	-2.7E-09	313.6E-12
Statistics													
Min	-1.7E-09	651.9E-12	-5.0E-09	-2.5E-09	-2.1E-09	192.3E-12	-2.5E-09	-1.9E-09	-2.1E-09	-3.3E-09	-2.8E-09	-2.7E-09	-2.5E-09
Max	6.1E-09	8.3E-09	9.1E-09	9.6E-09	8.0E-09	8.0E-09	6.2E-09	4.9E-09	5.1E-09	7.7E-09	5.5E-09	6.3E-09	4.4E-09
Average	2.7E-09	3.9E-09	1.8E-09	2.7E-09	2.3E-09	2.8E-09	1.3E-09	965.5E-12	399.8E-12	1.4E-09	485.8E-12	301.4E-12	744.1E-12
Sigma	3.2E-09	3.2E-09	5.8E-09	5.1E-09	4.2E-09	3.7E-09	3.6E-09	2.8E-09	3.4E-09	4.6E-09	3.6E-09	4.3E-09	2.9E-09

Drift Calculation

IIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.3E-09	-3.3E-09	-835.8E-12	-411.5E-12	1.9E-09	-858.1E-12	-228.8E-12	-191.9E-12	-1.7E-09	-1.2E-09	-1.1E-09	-856.1E-12
28	-	2.2E-09	3.0E-09	3.5E-09	1.9E-09	1.9E-09	64.5E-12	-1.3E-09	-987.1E-12	1.6E-09	-636.6E-12	193.7E-12	-1.7E-09
29	-	-735.5E-12	-2.3E-09	-2.6E-09	-2.5E-09	-3.2E-09	-3.2E-09	-3.6E-09	-5.6E-09	-3.6E-09	-4.7E-09	-6.2E-09	-3.2E-09
Average	-	1.2E-09	-880.3E-12	27.9E-12	-334.6E-12	167.4E-12	-1.3E-09	-1.7E-09	-2.3E-09	-1.2E-09	-2.2E-09	-2.4E-09	-1.9E-09
Sigma	-	1.4E-09	2.7E-09	2.5E-09	1.8E-09	2.4E-09	1.4E-09	1.4E-09	2.4E-09	2.2E-09	1.8E-09	2.8E-09	976.1E-12

Measurements

IIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-183.9E-12	-16.7E-12	-1.6E-09	-150.4E-12	-6.4E-12	-185.9E-12	-18.5E-12	313.6E-12	-73.8E-12	184.5E-12	55.3E-12	184.5E-12	-110.7E-12
ON_TID samples													
33	-809.0E-12	-809.0E-12	-869.2E-12	-752.2E-12	-1.4E-09	-1.8E-09	-2.0E-09	-2.7E-09	-3.3E-09	-2.5E-09	-3.1E-09	-3.9E-09	-996.3E-12
34	-483.1E-12	-250.7E-12	0.0E+00	1.0E-09	-576.9E-12	865.3E-12	18.5E-12	-1.4E-09	-2.2E-09	-1.5E-09	-1.5E-09	-1.6E-09	202.9E-12
35	-325.9E-12	-325.9E-12	212.3E-12	-16.7E-12	1.2E-09	865.3E-12	350.6E-12	-756.4E-12	-442.8E-12	-811.8E-12	-535.1E-12	627.3E-12	-55.3E-12
Statistics													
Min	-809.0E-12	-809.0E-12	-869.2E-12	-752.2E-12	-1.4E-09	-1.8E-09	-2.0E-09	-2.7E-09	-3.3E-09	-2.5E-09	-3.1E-09	-3.9E-09	-996.3E-12
Max	-325.9E-12	-250.7E-12	212.3E-12	1.0E-09	1.2E-09	865.3E-12	350.6E-12	-756.4E-12	-442.8E-12	-811.8E-12	-535.1E-12	627.3E-12	202.9E-12
Average	-539.4E-12	-461.9E-12	-219.0E-12	83.6E-12	-245.7E-12	-32.0E-12	-553.5E-12	-1.6E-09	-2.0E-09	-1.6E-09	-1.7E-09	-1.6E-09	-282.9E-12
Sigma	201.2E-12	247.4E-12	467.9E-12	726.8E-12	1.1E-09	1.3E-09	1.1E-09	786.0E-12	1.2E-09	690.4E-12	1.1E-09	1.8E-09	515.3E-12

Drift Calculation

IIO1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-60.2E-12	56.8E-12	-601.0E-12	-1.0E-09	-1.2E-09	-1.8E-09	-2.5E-09	-1.7E-09	-2.3E-09	-3.0E-09	-187.3E-12
34	-	232.3E-12	483.1E-12	1.5E-09	-93.8E-12	1.3E-09	501.5E-12	-956.0E-12	-1.7E-09	-992.9E-12	-1.1E-09	-1.1E-09	686.0E-12
35	-	0.0E+00	538.2E-12	309.2E-12	1.6E-09	1.2E-09	676.5E-12	-430.5E-12	-116.8E-12	-485.8E-12	-209.1E-12	953.2E-12	270.6E-12
Average	-	77.4E-12	320.4E-12	622.9E-12	293.7E-12	507.3E-12	-14.1E-12	-1.1E-09	-1.4E-09	-1.1E-09	-1.2E-09	-1.1E-09	256.5E-12
Sigma	-	109.5E-12	270.0E-12	630.6E-12	929.9E-12	1.1E-09	856.0E-12	585.0E-12	979.2E-12	490.1E-12	862.0E-12	1.6E-09	356.7E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

I/O1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-183.9E-12	-16.7E-12	-1.6E-09	-150.4E-12	-6.4E-12	-185.9E-12	-18.5E-12	313.6E-12	-73.8E-12	184.5E-12	55.3E-12	184.5E-12	-110.7E-12
OFF PROTON samples													
30	3.2E-09	2.4E-09	1.8E-09	3.5E-09	3.8E-09	4.5E-09	-1.4E-09	-2.2E-09	-2.2E-09	-3.3E-09	-3.9E-09	2.2E-09	774.9E-12
32	0.0E+00	-518.2E-12	-568.3E-12	3.6E-09	2.6E-09	793.3E-12	3.0E-09	1.1E-09	5.5E-09	2.2E-09	2.8E-09	-3.7E-09	-1.8E-09
39	5.6E-09	4.9E-09	5.4E-09	4.6E-09	2.4E-09	1.1E-09	-5.7E-09	-7.0E-09	-8.9E-09	-6.1E-09	-8.5E-09	-9.2E-09	-3.5E-09
Statistics													
Min	0.0E+00	-518.2E-12	-568.3E-12	3.5E-09	2.4E-09	793.3E-12	-5.7E-09	-7.0E-09	-8.9E-09	-6.1E-09	-8.5E-09	-9.2E-09	-3.5E-09
Max	5.6E-09	4.9E-09	5.4E-09	4.6E-09	3.8E-09	4.5E-09	3.0E-09	1.1E-09	5.5E-09	2.2E-09	2.8E-09	2.2E-09	774.9E-12
Average	3.0E-09	2.3E-09	2.2E-09	3.9E-09	2.9E-09	2.1E-09	-1.4E-09	-2.7E-09	-1.8E-09	-2.4E-09	-3.2E-09	-3.6E-09	-1.5E-09
Sigma	2.3E-09	2.2E-09	2.4E-09	487.4E-12	639.3E-12	1.7E-09	3.5E-09	3.3E-09	5.9E-09	3.4E-09	4.6E-09	4.7E-09	1.8E-09

Drift Calculation

I/O1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-819.1E-12	-1.4E-09	284.2E-12	636.2E-12	1.3E-09	-4.6E-09	-5.4E-09	-5.4E-09	-6.5E-09	-7.1E-09	-995.5E-12	-2.4E-09
32	-	-518.2E-12	-568.3E-12	3.6E-09	2.6E-09	793.3E-12	3.0E-09	1.1E-09	5.5E-09	2.2E-09	2.8E-09	-3.7E-09	-1.8E-09
39	-	-768.9E-12	-284.1E-12	-1.1E-09	-3.2E-09	-4.6E-09	-11.4E-09	-12.7E-09	-14.5E-09	-11.7E-09	-14.1E-09	-14.9E-09	-9.2E-09
Average	-	-702.0E-12	-746.6E-12	922.3E-12	-4.8E-12	-825.2E-12	-4.3E-09	-5.7E-09	-4.8E-09	-5.3E-09	-6.1E-09	-6.5E-09	-4.5E-09
Sigma	-	131.6E-12	467.7E-12	2.0E-09	2.4E-09	2.7E-09	5.8E-09	5.6E-09	8.2E-09	5.8E-09	6.9E-09	6.0E-09	3.4E-09

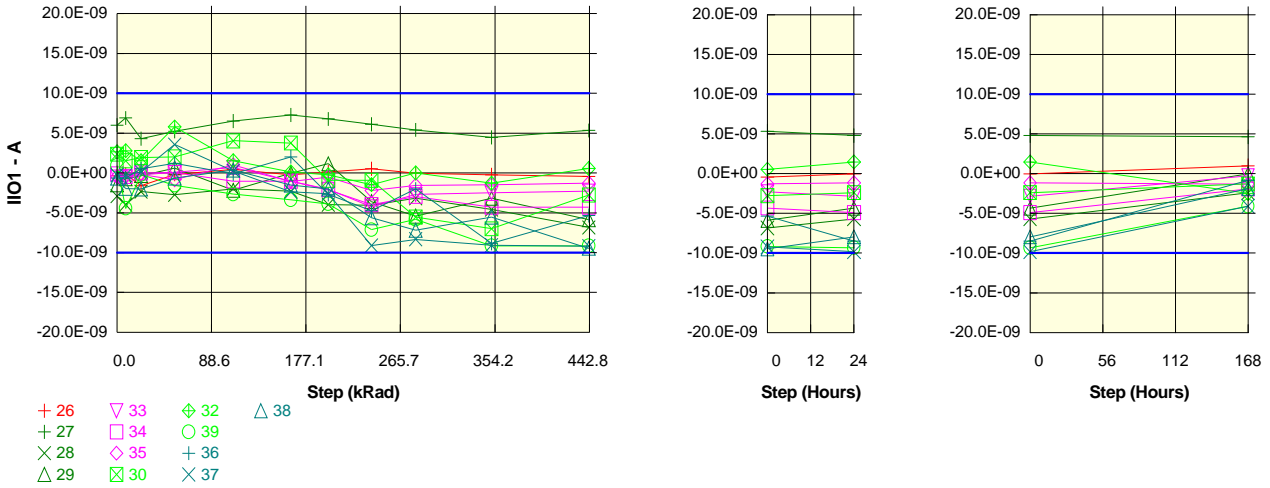
Measurements

I/O1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-183.9E-12	-16.7E-12	-1.6E-09	-150.4E-12	-6.4E-12	-185.9E-12	-18.5E-12	313.6E-12	-73.8E-12	184.5E-12	55.3E-12	184.5E-12	-110.7E-12
OFF TID samples													
36	-528.2E-12	-528.2E-12	300.9E-12	534.9E-12	2.9E-09	368.9E-12	1.3E-09	-165.9E-12	2.0E-09	369.1E-12	-1.1E-09	-922.5E-12	-1.3E-09
37	-454.7E-12	-454.7E-12	-414.5E-12	3.4E-09	-192.3E-12	-2.9E-09	-6.7E-09	-7.1E-09	-5.2E-09	-6.5E-09	-8.7E-09	-9.8E-09	-4.3E-09
38	-354.4E-12	-2.5E-09	-1.6E-09	1.6E-09	-705.0E-12	-2.3E-09	-7.1E-09	-940.9E-12	-1.5E-09	-5.5E-09	-5.3E-09	-9.6E-09	-4.3E-09
Statistics													
Min	-528.2E-12	-2.5E-09	-1.6E-09	534.9E-12	-705.0E-12	-2.9E-09	-7.1E-09	-7.1E-09	-5.2E-09	-6.5E-09	-8.7E-09	-9.8E-09	-4.3E-09
Max	-354.4E-12	-454.7E-12	300.9E-12	3.4E-09	2.9E-09	368.9E-12	1.3E-09	-165.9E-12	2.0E-09	369.1E-12	-1.1E-09	-922.5E-12	-1.3E-09
Average	-445.7E-12	-1.1E-09	-578.4E-12	1.8E-09	662.3E-12	-1.6E-09	-4.2E-09	-2.7E-09	-1.5E-09	-3.9E-09	-5.0E-09	-6.8E-09	-3.3E-09
Sigma	71.2E-12	924.0E-12	793.3E-12	1.2E-09	1.6E-09	1.4E-09	3.9E-09	3.1E-09	2.9E-09	3.0E-09	3.1E-09	4.1E-09	1.4E-09

Drift Calculation

I/O1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	829.1E-12	1.1E-09	3.4E-09	897.2E-12	1.8E-09	362.3E-12	2.6E-09	897.3E-12	-578.8E-12	-394.3E-12	-763.3E-12
37	-	0.0E+00	40.1E-12	3.9E-09	262.4E-12	-2.4E-09	-6.3E-09	-6.7E-09	-4.7E-09	-6.0E-09	-8.2E-09	-9.3E-09	-3.9E-09
38	-	-2.1E-09	-1.3E-09	1.9E-09	-350.7E-12	-2.0E-09	-6.8E-09	-586.5E-12	-1.1E-09	-5.2E-09	-5.0E-09	-9.2E-09	-4.0E-09
Average	-	-698.7E-12	-132.6E-12	2.3E-09	1.1E-09	-1.2E-09	-3.7E-09	-2.3E-09	-1.1E-09	-3.4E-09	-4.6E-09	-6.3E-09	-2.9E-09
Sigma	-	988.1E-12	864.4E-12	1.2E-09	1.6E-09	1.5E-09	4.0E-09	3.1E-09	3.0E-09	3.1E-09	3.1E-09	4.2E-09	1.5E-09

Parameter : Input Offset Current : IIO1DUTC
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-347.7E-12	-163.8E-12	-1.6E-09	-188.9E-12	451.9E-12	-221.1E-12	110.7E-12	535.0E-12	-36.9E-12	-239.8E-12	-424.3E-12	-36.9E-12	996.3E-12
ON_PROTON samples													
27	6.0E-09	6.9E-09	4.3E-09	5.2E-09	6.5E-09	7.3E-09	6.8E-09	6.1E-09	5.4E-09	4.5E-09	5.3E-09	4.8E-09	4.6E-09
28	-2.9E-09	-4.0E-09	-2.3E-09	-2.7E-09	-2.0E-09	-2.3E-09	-4.0E-09	-4.1E-09	-3.2E-09	-4.6E-09	-6.8E-09	-5.7E-09	-2.4E-09
29	-1.5E-09	-735.5E-12	-351.0E-12	618.5E-12	-2.2E-09	-32.1E-12	1.1E-09	-3.6E-09	-5.4E-09	-3.2E-09	-5.9E-09	-4.4E-09	-18.5E-12
Statistics													
Min	-2.9E-09	-4.0E-09	-2.3E-09	-2.7E-09	-2.2E-09	-2.3E-09	-4.0E-09	-4.1E-09	-5.4E-09	-4.6E-09	-6.8E-09	-5.7E-09	-2.4E-09
Max	6.0E-09	6.9E-09	4.3E-09	5.2E-09	6.5E-09	7.3E-09	6.8E-09	6.1E-09	5.4E-09	4.5E-09	5.3E-09	4.8E-09	4.6E-09
Average	529.3E-12	729.9E-12	534.9E-12	1.0E-09	779.8E-12	1.6E-09	1.3E-09	-522.8E-12	-1.1E-09	-1.1E-09	-2.5E-09	-1.7E-09	738.0E-12
Sigma	3.9E-09	4.6E-09	2.8E-09	3.3E-09	4.0E-09	4.1E-09	4.4E-09	4.7E-09	4.7E-09	4.0E-09	5.5E-09	4.7E-09	2.9E-09

Drift Calculation

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	902.6E-12	-1.7E-09	-768.9E-12	504.6E-12	1.3E-09	788.6E-12	124.5E-12	-595.1E-12	-1.5E-09	-668.9E-12	-1.2E-09	-1.4E-09
28	-	-1.1E-09	585.0E-12	183.9E-12	938.3E-12	617.9E-12	-1.0E-09	-1.2E-09	-248.2E-12	-1.7E-09	-3.9E-09	-2.8E-09	508.3E-12
29	-	752.2E-12	1.1E-09	2.1E-09	-691.5E-12	1.5E-09	2.6E-09	-2.1E-09	-3.9E-09	-1.7E-09	-4.4E-09	-2.9E-09	1.5E-09
Average	-	200.6E-12	5.6E-12	507.0E-12	250.5E-12	1.1E-09	792.9E-12	-1.1E-09	-1.6E-09	-1.6E-09	-3.0E-09	-2.3E-09	208.7E-12
Sigma	-	888.6E-12	1.2E-09	1.2E-09	689.2E-12	359.8E-12	1.5E-09	922.5E-12	1.7E-09	72.4E-12	1.7E-09	759.3E-12	1.2E-09

Measurements

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-347.7E-12	-163.8E-12	-1.6E-09	-188.9E-12	451.9E-12	-221.1E-12	110.7E-12	535.0E-12	-36.9E-12	-239.8E-12	-424.3E-12	-36.9E-12	996.3E-12
ON_TID samples													
33	-519.8E-12	-519.8E-12	-250.7E-12	66.9E-12	673.0E-12	-1.0E-09	-2.0E-09	-4.3E-09	-2.7E-09	-2.5E-09	-2.3E-09	-2.9E-09	-276.7E-12
34	-115.3E-12	-451.3E-12	-5.0E-12	50.1E-12	-1.0E-09	-1.1E-09	-2.1E-09	-4.0E-09	-3.0E-09	-4.3E-09	-4.3E-09	-4.9E-09	-1.9E-09
35	-468.0E-12	-468.0E-12	-183.9E-12	-857.5E-12	1.0E-09	-1.1E-09	-498.1E-12	-2.2E-09	-1.5E-09	-1.5E-09	-1.3E-09	-1.1E-09	-1.3E-09
Statistics													
Min	-519.8E-12	-519.8E-12	-250.7E-12	-857.5E-12	-1.0E-09	-1.1E-09	-2.1E-09	-4.3E-09	-3.0E-09	-4.3E-09	-4.3E-09	-4.9E-09	-1.9E-09
Max	-115.3E-12	-451.3E-12	-5.0E-12	66.9E-12	1.0E-09	-1.0E-09	-498.1E-12	-2.2E-09	-1.5E-09	-1.5E-09	-1.3E-09	-1.1E-09	-276.7E-12
Average	-367.7E-12	-479.7E-12	-146.5E-12	-246.8E-12	220.8E-12	-1.1E-09	-1.5E-09	-3.5E-09	-2.4E-09	-2.4E-09	-2.8E-09	-3.0E-09	-1.2E-09
Sigma	179.7E-12	29.2E-12	103.7E-12	431.9E-12	892.3E-12	30.2E-12	744.0E-12	912.5E-12	617.9E-12	1.2E-09	1.3E-09	1.5E-09	677.8E-12

Drift Calculation

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	269.1E-12	586.7E-12	1.2E-09	-505.7E-12	-1.5E-09	-3.7E-09	-2.2E-09	-2.0E-09	-1.7E-09	-2.3E-09	243.1E-12
34	-	-336.0E-12	110.3E-12	165.5E-12	-910.1E-12	-942.2E-12	-2.0E-09	-3.9E-09	-2.9E-09	-4.2E-09	-4.2E-09	-4.8E-09	-1.8E-09
35	-	0.0E+00	284.2E-12	-389.5E-12	1.5E-09	-631.2E-12	-30.1E-12	-1.7E-09	-1.1E-09	-1.0E-09	-823.4E-12	-675.8E-12	-841.9E-12
Average	-	-112.0E-12	221.2E-12	120.9E-12	588.6E-12	-693.0E-12	-1.2E-09	-3.1E-09	-2.0E-09	-2.4E-09	-2.3E-09	-2.6E-09	-800.7E-12
Sigma	-	158.4E-12	78.6E-12	399.8E-12	1.1E-09	183.5E-12	835.9E-12	976.4E-12	731.6E-12	1.3E-09	1.4E-09	1.7E-09	836.0E-12

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-347.7E-12	-163.8E-12	-1.6E-09	-188.9E-12	451.9E-12	-221.1E-12	110.7E-12	535.0E-12	-36.9E-12	-239.8E-12	-424.3E-12	-36.9E-12	996.3E-12
OFF_PROTON samples													
30	2.3E-09	1.5E-09	1.9E-09	2.0E-09	4.0E-09	3.7E-09	-922.4E-12	-922.4E-12	-5.5E-09	-7.0E-09	-2.8E-09	-2.4E-09	-1.3E-09
32	2.6E-09	2.8E-09	1.5E-09	5.8E-09	1.5E-09	129.2E-12	-239.8E-12	-1.5E-09	0.0E+00	-1.3E-09	553.4E-12	1.5E-09	-2.5E-09
39	932.7E-12	-4.4E-09	-200.6E-12	-1.6E-09	-2.7E-09	-3.4E-09	-3.9E-09	-7.1E-09	-5.8E-09	-9.2E-09	-9.2E-09	-9.3E-09	-4.1E-09
Statistics													
Min	932.7E-12	-4.4E-09	-200.6E-12	-1.6E-09	-2.7E-09	-3.4E-09	-3.9E-09	-7.1E-09	-5.8E-09	-9.2E-09	-9.2E-09	-9.3E-09	-4.1E-09
Max	2.6E-09	2.8E-09	1.9E-09	5.8E-09	4.0E-09	3.7E-09	-239.8E-12	-922.4E-12	0.0E+00	-1.3E-09	553.4E-12	1.5E-09	-1.3E-09
Average	2.0E-09	-44.6E-12	1.1E-09	2.1E-09	972.1E-12	166.1E-12	-1.7E-09	-3.2E-09	-3.8E-09	-5.8E-09	-3.8E-09	-3.4E-09	-2.6E-09
Sigma	744.6E-12	3.2E-09	926.0E-12	3.0E-09	2.8E-09	2.9E-09	1.6E-09	2.8E-09	2.7E-09	3.3E-09	4.0E-09	4.5E-09	1.1E-09

Drift Calculation

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-819.0E-12	-401.2E-12	-317.6E-12	1.7E-09	1.4E-09	-3.3E-09	-3.3E-09	-7.9E-09	-9.4E-09	-5.1E-09	-4.7E-09	-3.6E-09
32	-	150.4E-12	-1.1E-09	3.1E-09	-1.1E-09	-2.5E-09	-2.9E-09	-4.1E-09	-2.6E-09	-3.9E-09	-2.1E-09	-1.2E-09	-5.1E-09
39	-	-5.4E-09	-1.1E-09	-2.5E-09	-3.6E-09	-4.3E-09	-4.8E-09	-8.1E-09	-6.8E-09	-10.1E-09	-10.1E-09	-10.3E-09	-5.0E-09
Average	-	-2.0E-09	-884.8E-12	107.0E-12	-999.2E-12	-1.8E-09	-3.7E-09	-5.1E-09	-5.8E-09	-7.8E-09	-5.8E-09	-5.4E-09	-4.6E-09
Sigma	-	2.4E-09	342.0E-12	2.3E-09	2.2E-09	2.4E-09	832.8E-12	2.1E-09	2.3E-09	2.7E-09	3.3E-09	3.7E-09	679.4E-12

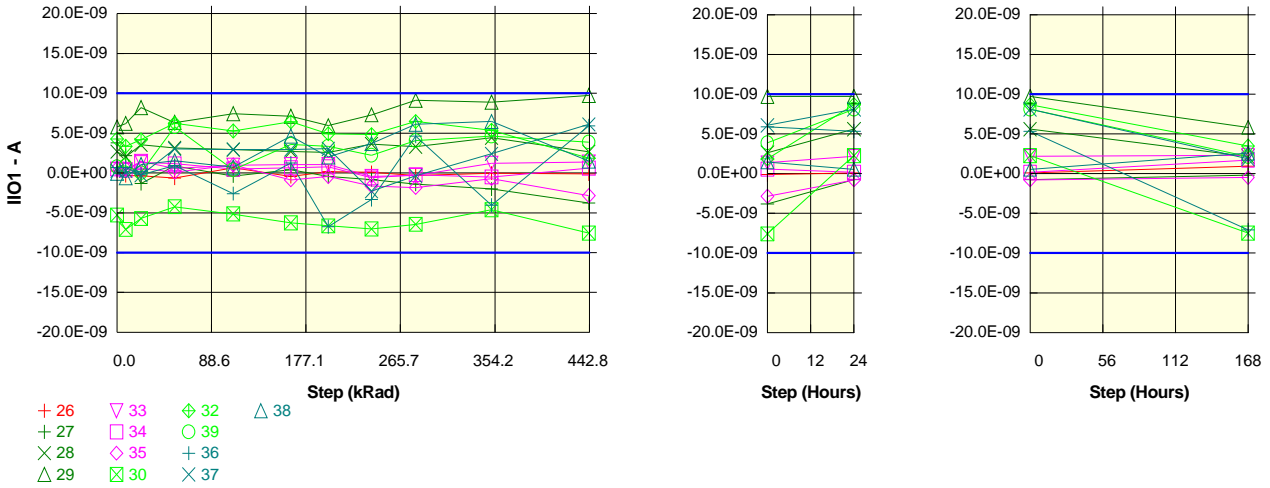
Measurements

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-347.7E-12	-163.8E-12	-1.6E-09	-188.9E-12	451.9E-12	-221.1E-12	110.7E-12	535.0E-12	-36.9E-12	-239.8E-12	-424.3E-12	-36.9E-12	996.3E-12
OFF_TID samples													
36	-635.2E-12	-635.2E-12	514.8E-12	1.2E-09	-128.2E-12	2.0E-09	-2.7E-09	-4.7E-09	-2.0E-09	-8.9E-09	-5.4E-09	-8.5E-09	-830.2E-12
37	-265.8E-12	-265.8E-12	132.1E-12	3.6E-09	256.4E-12	-2.4E-09	-2.6E-09	-9.1E-09	-8.3E-09	-9.1E-09	-9.2E-09	-9.8E-09	-4.1E-09
38	-668.6E-12	-2.0E-09	-2.0E-09	-635.2E-12	352.5E-12	-1.5E-09	-2.0E-09	-5.6E-09	-7.2E-09	-5.5E-09	-9.5E-09	-7.9E-09	-1.9E-09
Statistics													
Min	-668.6E-12	-2.0E-09	-2.0E-09	-635.2E-12	-128.2E-12	-2.4E-09	-2.7E-09	-9.1E-09	-8.3E-09	-9.1E-09	-9.5E-09	-9.8E-09	-4.1E-09
Max	-265.8E-12	-265.8E-12	514.8E-12	3.6E-09	352.5E-12	2.0E-09	-2.0E-09	-4.7E-09	-2.0E-09	-5.5E-09	-5.4E-09	-7.9E-09	-830.2E-12
Average	-523.2E-12	-952.2E-12	-457.4E-12	1.4E-09	160.2E-12	-621.1E-12	-2.4E-09	-6.5E-09	-5.9E-09	-7.8E-09	-8.0E-09	-8.8E-09	-2.3E-09
Sigma	182.5E-12	725.4E-12	1.1E-09	1.7E-09	207.7E-12	1.9E-09	299.1E-12	1.9E-09	2.7E-09	1.6E-09	1.9E-09	799.6E-12	1.4E-09

Drift Calculation

IIO1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	1.2E-09	1.9E-09	507.0E-12	2.7E-09	-2.1E-09	-4.1E-09	-1.4E-09	-8.2E-09	-4.7E-09	-7.9E-09	-195.0E-12
37	-	0.0E+00	397.8E-12	3.8E-09	522.2E-12	-2.1E-09	-2.3E-09	-8.9E-09	-8.1E-09	-8.8E-09	-8.9E-09	-9.6E-09	-3.8E-09
38	-	-1.3E-09	-1.4E-09	33.4E-12	1.0E-09	-862.7E-12	-1.4E-09	-5.0E-09	-6.5E-09	-4.9E-09	-8.8E-09	-7.3E-09	-1.2E-09
Average	-	-429.0E-12	65.7E-12	1.9E-09	683.4E-12	-97.9E-12	-1.9E-09	-6.0E-09	-5.3E-09	-7.3E-09	-7.5E-09	-8.2E-09	-1.7E-09
Sigma	-	606.7E-12	1.0E-09	1.5E-09	238.9E-12	2.0E-09	412.3E-12	2.1E-09	2.9E-09	1.7E-09	2.0E-09	978.8E-12	1.5E-09

Parameter : Input Offset Current : IIO1DUTD
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	254.1E-12	-319.3E-12	-371.1E-12	-638.5E-12	637.7E-12	-451.9E-12	166.0E-12	73.8E-12	-313.6E-12	-18.5E-12	-110.7E-12	110.7E-12	922.5E-12
ON_PROTON samples													
27	3.8E-09	2.2E-09	-1.3E-09	885.9E-12	-384.6E-12	384.5E-12	-461.3E-12	-848.7E-12	-1.4E-09	-2.0E-09	-3.8E-09	-719.5E-12	-166.1E-12
28	2.7E-09	2.0E-09	3.5E-09	3.1E-09	2.9E-09	2.7E-09	2.6E-09	3.6E-09	3.3E-09	4.4E-09	2.6E-09	5.6E-09	2.2E-09
29	5.8E-09	6.2E-09	8.2E-09	6.3E-09	7.4E-09	7.1E-09	5.9E-09	7.3E-09	9.1E-09	8.9E-09	9.7E-09	9.7E-09	5.8E-09
Statistics													
Min	2.7E-09	2.0E-09	-1.3E-09	885.9E-12	-384.6E-12	384.5E-12	-461.3E-12	-848.7E-12	-1.4E-09	-2.0E-09	-3.8E-09	-719.5E-12	-166.1E-12
Max	5.8E-09	6.2E-09	8.2E-09	6.3E-09	7.4E-09	7.1E-09	5.9E-09	7.3E-09	9.1E-09	8.9E-09	9.7E-09	9.7E-09	5.8E-09
Average	4.1E-09	3.5E-09	3.5E-09	3.4E-09	3.3E-09	3.4E-09	2.7E-09	3.4E-09	3.7E-09	3.8E-09	2.9E-09	4.9E-09	2.6E-09
Sigma	1.3E-09	1.9E-09	3.9E-09	2.2E-09	3.2E-09	2.8E-09	2.6E-09	3.3E-09	4.3E-09	4.5E-09	5.5E-09	4.3E-09	2.5E-09

Drift Calculation

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-1.6E-09	-5.1E-09	-2.9E-09	-4.2E-09	-3.4E-09	-4.3E-09	-4.6E-09	-5.2E-09	-5.8E-09	-7.6E-09	-4.5E-09	-4.0E-09
28	-	-651.9E-12	852.5E-12	451.3E-12	241.8E-12	17.4E-12	-91.5E-12	960.1E-12	628.1E-12	1.7E-09	-36.2E-12	2.9E-09	-515.9E-12
29	-	451.3E-12	2.4E-09	568.3E-12	1.7E-09	1.3E-09	174.0E-12	1.5E-09	3.3E-09	3.1E-09	4.0E-09	4.0E-09	81.7E-12
Average	-	-612.9E-12	-612.9E-12	-629.6E-12	-756.4E-12	-681.6E-12	-1.4E-09	-720.7E-12	-413.2E-12	-321.0E-12	-1.2E-09	798.3E-12	-1.5E-09
Sigma	-	853.5E-12	3.3E-09	1.6E-09	2.5E-09	2.0E-09	2.0E-09	2.8E-09	3.6E-09	3.9E-09	4.8E-09	3.8E-09	1.8E-09

Measurements

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	254.1E-12	-319.3E-12	-371.1E-12	-638.5E-12	637.7E-12	-451.9E-12	166.0E-12	73.8E-12	-313.6E-12	-18.5E-12	-110.7E-12	110.7E-12	922.5E-12
ON_TID samples													
33	402.8E-12	402.8E-12	1.4E-09	585.0E-12	961.4E-12	1.0E-09	1.0E-09	-442.8E-12	-313.6E-12	1.2E-09	1.4E-09	2.2E-09	2.3E-09
34	503.1E-12	344.3E-12	1.3E-09	1.2E-09	480.7E-12	640.9E-12	756.4E-12	-608.8E-12	-221.4E-12	-498.2E-12	590.4E-12	166.1E-12	1.7E-09
35	585.0E-12	585.0E-12	620.1E-12	95.3E-12	1.0E-09	-865.3E-12	-442.8E-12	-1.6E-09	-1.8E-09	-701.1E-12	-2.8E-09	-774.9E-12	-479.7E-12
Statistics													
Min	402.8E-12	344.3E-12	620.1E-12	95.3E-12	480.7E-12	-865.3E-12	-442.8E-12	-1.6E-09	-1.8E-09	-701.1E-12	-2.8E-09	-774.9E-12	-479.7E-12
Max	585.0E-12	585.0E-12	1.4E-09	1.2E-09	1.0E-09	1.0E-09	1.0E-09	-442.8E-12	-221.4E-12	1.2E-09	1.4E-09	2.2E-09	2.3E-09
Average	497.0E-12	444.1E-12	1.1E-09	611.2E-12	817.9E-12	267.0E-12	448.9E-12	-891.7E-12	-787.2E-12	6.1E-12	-295.2E-12	522.7E-12	1.2E-09
Sigma	74.5E-12	102.5E-12	363.8E-12	432.4E-12	239.4E-12	815.9E-12	640.6E-12	521.9E-12	735.9E-12	860.7E-12	1.8E-09	1.2E-09	1.2E-09

Drift Calculation

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.0E-09	182.2E-12	558.5E-12	622.6E-12	630.3E-12	-845.6E-12	-716.5E-12	814.8E-12	962.4E-12	1.8E-09	1.9E-09
34	-	-158.8E-12	817.4E-12	650.2E-12	-22.5E-12	137.8E-12	253.3E-12	-1.1E-09	-724.5E-12	-1.0E-09	87.3E-12	-337.1E-12	1.2E-09
35	-	0.0E+00	35.1E-12	-489.8E-12	426.7E-12	-1.5E-09	-1.0E-09	-2.2E-09	-2.4E-09	-1.3E-09	-3.4E-09	-1.4E-09	-1.1E-09
Average	-	-52.9E-12	632.4E-12	114.2E-12	320.9E-12	-230.0E-12	-48.1E-12	-1.4E-09	-1.3E-09	-490.9E-12	-792.2E-12	25.7E-12	683.8E-12
Sigma	-	74.9E-12	432.4E-12	467.9E-12	248.7E-12	885.3E-12	709.7E-12	589.8E-12	797.2E-12	930.6E-12	1.9E-09	1.3E-09	1.3E-09

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	254.1E-12	-319.3E-12	-371.1E-12	-638.5E-12	637.7E-12	-451.9E-12	166.0E-12	73.8E-12	-313.6E-12	-18.5E-12	-110.7E-12	110.7E-12	922.5E-12
OFF_PROTON samples													
30	-5.3E-09	-7.1E-09	-5.7E-09	-4.2E-09	-5.2E-09	-6.3E-09	-6.6E-09	-7.0E-09	-6.5E-09	-4.6E-09	-7.6E-09	2.3E-09	-7.5E-09
32	4.3E-09	3.3E-09	4.2E-09	6.2E-09	5.3E-09	6.4E-09	4.9E-09	4.8E-09	6.5E-09	5.4E-09	1.8E-09	8.7E-09	3.5E-09
39	755.5E-12	885.9E-12	33.4E-12	5.8E-09	384.5E-12	3.6E-09	3.3E-09	2.2E-09	4.1E-09	4.6E-09	3.9E-09	8.1E-09	2.1E-09
Statistics													
Min	-5.3E-09	-7.1E-09	-5.7E-09	-4.2E-09	-5.2E-09	-6.3E-09	-6.6E-09	-7.0E-09	-6.5E-09	-4.6E-09	-7.6E-09	2.3E-09	-7.5E-09
Max	4.3E-09	3.3E-09	4.2E-09	6.2E-09	5.3E-09	6.4E-09	4.9E-09	4.8E-09	6.5E-09	5.4E-09	3.9E-09	8.7E-09	3.5E-09
Average	-82.5E-12	-963.9E-12	-507.0E-12	2.6E-09	160.2E-12	1.2E-09	544.5E-12	-7.5E-12	1.4E-09	1.8E-09	-614.5E-12	6.4E-09	-621.1E-12
Sigma	3.9E-09	4.5E-09	4.1E-09	4.8E-09	4.3E-09	5.4E-09	5.1E-09	5.1E-09	5.6E-09	4.5E-09	5.0E-09	2.9E-09	4.9E-09

Drift Calculation

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-1.8E-09	-434.6E-12	1.0E-09	122.6E-12	-990.8E-12	-1.4E-09	-1.8E-09	-1.2E-09	669.7E-12	-2.3E-09	7.6E-09	-2.2E-09
32	-	-952.8E-12	-117.0E-12	2.0E-09	976.5E-12	2.1E-09	646.9E-12	517.7E-12	2.2E-09	1.1E-09	-2.4E-09	4.4E-09	-792.2E-12
39	-	130.4E-12	-722.1E-12	5.0E-09	-371.0E-12	2.8E-09	2.6E-09	1.5E-09	3.3E-09	3.9E-09	3.1E-09	7.4E-09	1.4E-09
Average	-	-881.5E-12	-424.6E-12	2.7E-09	242.7E-12	1.3E-09	626.9E-12	75.0E-12	1.4E-09	1.9E-09	-532.0E-12	6.4E-09	-538.7E-12
Sigma	-	798.6E-12	247.1E-12	1.7E-09	556.6E-12	1.7E-09	1.6E-09	1.3E-09	1.9E-09	1.4E-09	2.6E-09	1.4E-09	1.5E-09

Measurements

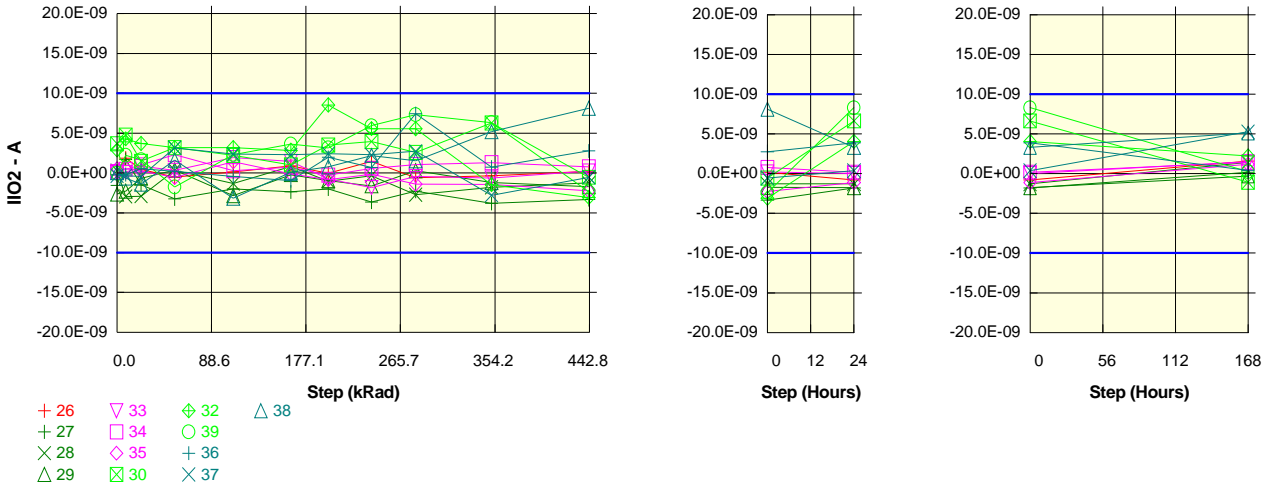
IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	254.1E-12	-319.3E-12	-371.1E-12	-638.5E-12	637.7E-12	-451.9E-12	166.0E-12	73.8E-12	-313.6E-12	-18.5E-12	-110.7E-12	110.7E-12	922.5E-12
OFF_TID samples													
36	695.4E-12	695.4E-12	-217.3E-12	919.3E-12	-2.6E-09	1.2E-09	-6.8E-09	-3.4E-09	4.6E-09	-4.1E-09	5.9E-09	5.4E-09	-7.1E-09
37	257.4E-12	257.4E-12	-300.9E-12	3.0E-09	2.9E-09	2.9E-09	3.0E-09	-2.3E-09	-369.1E-12	2.4E-09	6.1E-09	8.1E-09	1.8E-09
38	-40.1E-12	-628.5E-12	1.1E-09	1.5E-09	705.0E-12	4.6E-09	2.0E-09	3.7E-09	6.1E-09	6.5E-09	1.5E-09	553.6E-12	2.6E-09
Statistics													
Min	-40.1E-12	-628.5E-12	-300.9E-12	919.3E-12	-2.6E-09	1.2E-09	-6.8E-09	-3.4E-09	-369.1E-12	-4.1E-09	1.5E-09	553.6E-12	-7.1E-09
Max	695.4E-12	695.4E-12	1.1E-09	3.0E-09	2.9E-09	4.6E-09	3.0E-09	3.7E-09	6.1E-09	6.5E-09	6.1E-09	8.1E-09	2.6E-09
Average	304.2E-12	108.1E-12	183.9E-12	1.8E-09	352.5E-12	2.9E-09	-578.1E-12	-664.1E-12	3.4E-09	1.6E-09	4.5E-09	4.7E-09	-885.6E-12
Sigma	302.1E-12	550.7E-12	627.4E-12	878.2E-12	2.3E-09	1.4E-09	4.4E-09	3.1E-09	2.8E-09	4.3E-09	2.1E-09	3.1E-09	4.4E-09

Drift Calculation

IIO1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-912.7E-12	224.0E-12	-3.3E-09	540.7E-12	-7.4E-09	-4.1E-09	3.9E-09	-4.8E-09	5.2E-09	4.7E-09	-7.8E-09
37	-	0.0E+00	-558.3E-12	2.8E-09	2.7E-09	2.7E-09	2.8E-09	-2.6E-09	-626.5E-12	2.1E-09	5.8E-09	7.9E-09	1.6E-09
38	-	-588.4E-12	1.1E-09	1.6E-09	745.1E-12	4.7E-09	2.0E-09	3.7E-09	6.1E-09	6.5E-09	1.5E-09	593.7E-12	2.6E-09
Average	-	-196.1E-12	-120.3E-12	1.5E-09	48.3E-12	2.6E-09	-882.3E-12	-968.4E-12	3.1E-09	1.3E-09	4.2E-09	4.4E-09	-1.2E-09
Sigma	-	277.4E-12	881.9E-12	1.0E-09	2.5E-09	1.7E-09	4.7E-09	3.4E-09	2.8E-09	4.6E-09	1.9E-09	3.0E-09	4.7E-09

Parameter : Input Offset Current : IIO2DUTA
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-217.3E-12	1.9E-09	451.3E-12	-501.5E-12	128.2E-12	897.3E-12	-36.9E-12	1.4E-09	-608.8E-12	-332.1E-12	184.5E-12	-774.9E-12	1.6E-09
ON_PROTON samples													
27	-1.6E-09	1.7E-09	-1.5E-09	-3.2E-09	-2.0E-09	-2.4E-09	-2.0E-09	-3.7E-09	-2.3E-09	-3.8E-09	-3.3E-09	-1.8E-09	184.5E-12
28	285.8E-12	-3.0E-09	-2.9E-09	324.3E-12	-1.3E-09	801.2E-12	-1.1E-09	-332.1E-12	-2.7E-09	-1.8E-09	-1.3E-09	-1.3E-09	1.4E-09
29	-2.7E-09	-2.3E-09	-656.9E-12	361.1E-12	-2.9E-09	-224.3E-12	-959.4E-12	-1.6E-09	276.7E-12	-1.2E-09	-1.7E-09	-1.8E-09	-295.2E-12
Statistics													
Min	-2.7E-09	-3.0E-09	-2.9E-09	-3.2E-09	-2.9E-09	-2.4E-09	-2.0E-09	-3.7E-09	-2.7E-09	-3.8E-09	-3.3E-09	-1.8E-09	-295.2E-12
Max	285.8E-12	1.7E-09	-656.9E-12	361.1E-12	-1.3E-09	801.2E-12	-959.4E-12	-332.1E-12	276.7E-12	-1.2E-09	-1.3E-09	-1.3E-09	1.4E-09
Average	-1.3E-09	-1.2E-09	-1.7E-09	-854.7E-12	-2.1E-09	-601.4E-12	-1.3E-09	-1.9E-09	-1.6E-09	-2.3E-09	-2.1E-09	-1.6E-09	442.8E-12
Sigma	1.2E-09	2.1E-09	930.9E-12	1.7E-09	626.0E-12	1.3E-09	484.2E-12	1.4E-09	1.3E-09	1.1E-09	888.3E-12	235.3E-12	731.2E-12

Drift Calculation

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	3.3E-09	117.0E-12	-1.7E-09	-440.6E-12	-793.1E-12	-441.5E-12	-2.1E-09	-718.2E-12	-2.2E-09	-1.8E-09	-220.1E-12	1.8E-09
28	-	-3.2E-09	-3.2E-09	38.4E-12	-1.6E-09	515.3E-12	-1.3E-09	-617.9E-12	-3.0E-09	-2.1E-09	-1.6E-09	-1.6E-09	1.2E-09
29	-	367.7E-12	2.0E-09	3.0E-09	-191.0E-12	2.4E-09	1.7E-09	1.0E-09	2.9E-09	1.4E-09	945.3E-12	889.9E-12	2.4E-09
Average	-	138.7E-12	-357.7E-12	466.4E-12	-745.9E-12	719.7E-12	-25.8E-12	-548.5E-12	-265.6E-12	-966.7E-12	-788.4E-12	-302.5E-12	1.8E-09
Sigma	-	2.7E-09	2.1E-09	1.9E-09	616.7E-12	1.3E-09	1.3E-09	1.3E-09	2.5E-09	1.7E-09	1.2E-09	1.0E-09	495.1E-12

Measurements

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-217.3E-12	1.9E-09	451.3E-12	-501.5E-12	128.2E-12	897.3E-12	-36.9E-12	1.4E-09	-608.8E-12	-332.1E-12	184.5E-12	-774.9E-12	1.6E-09
ON_TID samples													
33	66.9E-12	66.9E-12	835.8E-12	317.6E-12	1.9E-09	1.5E-09	-774.9E-12	-1.8E-09	-424.3E-12	-645.7E-12	221.4E-12	36.9E-12	1.5E-09
34	183.9E-12	468.0E-12	1.0E-09	2.3E-09	288.4E-12	727.5E-12	-276.7E-12	571.9E-12	1.0E-09	1.3E-09	793.3E-12	202.9E-12	1.4E-09
35	534.9E-12	534.9E-12	250.7E-12	-576.7E-12	1.4E-09	-137.8E-12	-830.2E-12	-166.1E-12	-1.4E-09	-1.4E-09	-2.3E-09	-1.1E-09	1.2E-09
Statistics													
Min	66.9E-12	66.9E-12	250.7E-12	-576.7E-12	288.4E-12	-137.8E-12	-830.2E-12	-1.8E-09	-1.4E-09	-1.4E-09	-2.3E-09	-1.1E-09	1.2E-09
Max	534.9E-12	534.9E-12	1.0E-09	2.3E-09	1.9E-09	1.5E-09	-276.7E-12	571.9E-12	1.0E-09	1.3E-09	793.3E-12	202.9E-12	1.5E-09
Average	261.9E-12	356.6E-12	696.5E-12	682.5E-12	1.2E-09	681.5E-12	-627.3E-12	-479.7E-12	-264.4E-12	-412.0E-12	-295.2E-12	-557.1E-12	1.4E-09
Sigma	198.9E-12	206.7E-12	322.5E-12	1.2E-09	684.8E-12	651.0E-12	248.9E-12	1.0E-09	1.0E-09	1.1E-09	1.3E-09	591.0E-12	138.1E-12

Drift Calculation

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	768.9E-12	250.7E-12	1.9E-09	1.4E-09	-841.8E-12	-1.9E-09	-491.2E-12	-712.6E-12	154.5E-12	-30.0E-12	1.4E-09
34	-	284.1E-12	819.0E-12	2.1E-09	104.5E-12	543.6E-12	-460.6E-12	388.1E-12	849.3E-12	1.1E-09	609.5E-12	19.1E-12	1.2E-09
35	-	0.0E+00	-284.2E-12	-1.1E-09	864.5E-12	-672.7E-12	-1.4E-09	-701.0E-12	-1.9E-09	-2.0E-09	-2.8E-09	-1.7E-09	645.9E-12
Average	-	94.7E-12	434.6E-12	420.7E-12	944.8E-12	419.6E-12	-889.2E-12	-741.6E-12	-526.3E-12	-526.3E-12	-673.9E-12	-557.1E-12	1.1E-09
Sigma	-	133.9E-12	508.6E-12	1.3E-09	721.2E-12	845.8E-12	370.8E-12	939.4E-12	1.1E-09	1.3E-09	1.5E-09	780.4E-12	336.6E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-217.3E-12	1.9E-09	451.3E-12	-501.5E-12	128.2E-12	897.3E-12	-36.9E-12	1.4E-09	-608.8E-12	-332.1E-12	184.5E-12	-774.9E-12	1.6E-09
OFF PROTON samples													
30	3.7E-09	4.8E-09	1.5E-09	3.2E-09	2.2E-09	1.0E-09	3.5E-09	3.9E-09	2.6E-09	6.3E-09	-553.5E-12	6.6E-09	-1.1E-09
32	2.9E-09	4.3E-09	3.7E-09	3.2E-09	3.2E-09	2.8E-09	8.5E-09	5.6E-09	5.5E-09	-1.5E-09	-3.1E-09	4.1E-09	2.3E-09
39	-50.1E-12	2.2E-09	1.7E-09	-1.8E-09	2.3E-09	3.6E-09	3.2E-09	5.9E-09	7.3E-09	6.3E-09	-2.4E-09	8.3E-09	258.3E-12
Statistics													
Min	-50.1E-12	2.2E-09	1.5E-09	-1.8E-09	2.2E-09	1.0E-09	3.2E-09	3.9E-09	2.6E-09	-1.5E-09	-3.1E-09	4.1E-09	-1.1E-09
Max	3.7E-09	4.8E-09	3.7E-09	3.2E-09	3.2E-09	3.6E-09	8.5E-09	5.9E-09	7.3E-09	6.3E-09	-553.5E-12	8.3E-09	2.3E-09
Average	2.2E-09	3.8E-09	2.3E-09	1.5E-09	2.6E-09	2.5E-09	5.1E-09	5.1E-09	5.1E-09	3.7E-09	-2.0E-09	6.3E-09	479.7E-12
Sigma	1.6E-09	1.1E-09	1.0E-09	2.3E-09	432.3E-12	1.1E-09	2.5E-09	868.6E-12	1.9E-09	3.7E-09	1.1E-09	1.7E-09	1.4E-09

Drift Calculation

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	1.1E-09	-2.2E-09	-484.7E-12	-1.4E-09	-2.6E-09	-173.7E-12	269.1E-12	-1.1E-09	2.6E-09	-4.2E-09	3.0E-09	-4.7E-09
32	-	1.4E-09	829.1E-12	295.9E-12	297.5E-12	-33.8E-12	5.7E-09	2.7E-09	2.7E-09	-4.4E-09	-5.9E-09	1.2E-09	-624.2E-12
39	-	2.3E-09	1.7E-09	-1.7E-09	2.4E-09	3.7E-09	3.2E-09	6.0E-09	7.4E-09	6.4E-09	-2.3E-09	8.4E-09	308.4E-12
Average	-	1.6E-09	118.1E-12	-636.9E-12	401.8E-12	328.9E-12	2.9E-09	3.0E-09	3.0E-09	1.5E-09	-4.2E-09	4.2E-09	-1.7E-09
Sigma	-	491.8E-12	1.7E-09	830.7E-12	1.6E-09	2.6E-09	2.4E-09	2.3E-09	3.4E-09	4.4E-09	1.5E-09	3.0E-09	2.2E-09

Measurements

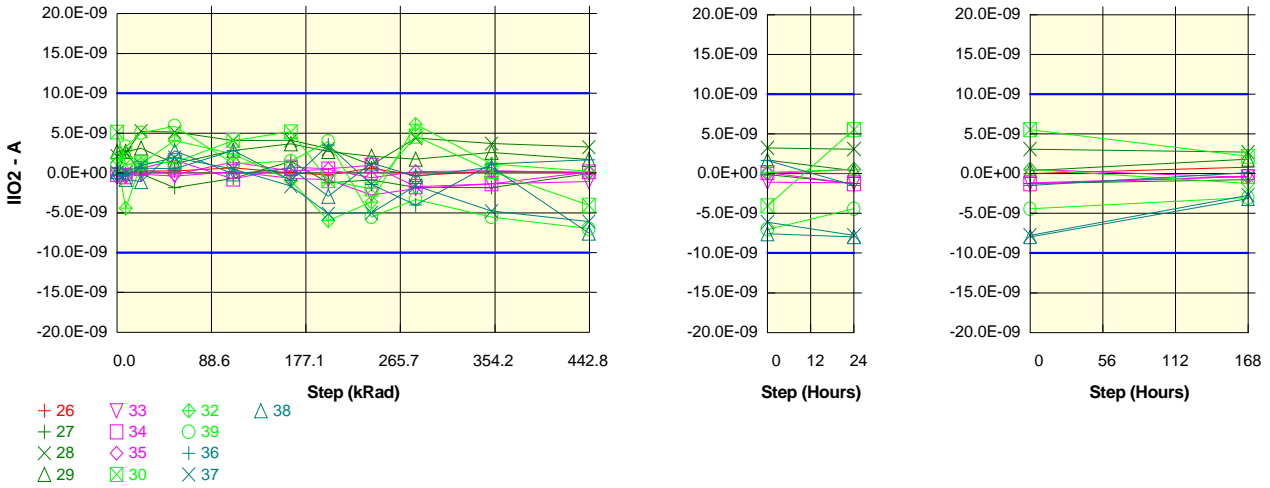
IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-217.3E-12	1.9E-09	451.3E-12	-501.5E-12	128.2E-12	897.3E-12	-36.9E-12	1.4E-09	-608.8E-12	-332.1E-12	184.5E-12	-774.9E-12	1.6E-09
OFF TID samples													
36	-217.3E-12	-217.3E-12	501.5E-12	190.6E-12	-445.4E-12	-959.4E-12	2.0E-09	682.7E-12	7.4E-09	738.0E-12	2.8E-09	3.9E-09	424.3E-12
37	-367.7E-12	-367.7E-12	-451.3E-12	3.1E-09	2.4E-09	2.3E-09	2.4E-09	2.3E-09	2.7E-09	-2.8E-09	-553.5E-12	368.9E-12	5.3E-09
38	33.4E-12	-635.2E-12	-1.4E-09	1.6E-09	-3.2E-09	73.8E-12	756.4E-12	2.2E-09	1.5E-09	5.2E-09	8.1E-09	3.3E-09	5.1E-09
Statistics													
Min	-367.7E-12	-635.2E-12	-1.4E-09	190.6E-12	-3.2E-09	-959.4E-12	756.4E-12	682.7E-12	1.5E-09	-2.8E-09	-553.5E-12	368.9E-12	424.3E-12
Max	33.4E-12	-217.3E-12	501.5E-12	3.1E-09	2.4E-09	2.3E-09	2.4E-09	2.3E-09	7.4E-09	5.2E-09	8.1E-09	3.9E-09	5.3E-09
Average	-183.9E-12	-406.7E-12	-451.3E-12	1.6E-09	-414.5E-12	467.4E-12	1.7E-09	1.7E-09	3.9E-09	1.0E-09	3.4E-09	2.5E-09	3.6E-09
Sigma	165.5E-12	172.8E-12	777.9E-12	1.2E-09	2.3E-09	1.4E-09	697.3E-12	726.8E-12	2.6E-09	3.3E-09	3.6E-09	1.5E-09	2.3E-09

Drift Calculation

IIO2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	718.7E-12	407.8E-12	-228.2E-12	-742.1E-12	2.2E-09	900.0E-12	7.7E-09	955.3E-12	3.0E-09	4.1E-09	641.6E-12
37	-	0.0E+00	-83.6E-12	3.5E-09	2.7E-09	2.7E-09	2.8E-09	2.6E-09	3.1E-09	-2.4E-09	-185.8E-12	736.7E-12	5.7E-09
38	-	-668.6E-12	-1.4E-09	1.6E-09	-3.2E-09	40.4E-12	723.0E-12	2.1E-09	1.5E-09	5.1E-09	8.1E-09	3.3E-09	5.1E-09
Average	-	-222.9E-12	-267.5E-12	1.8E-09	-230.6E-12	651.2E-12	1.9E-09	1.9E-09	4.1E-09	1.2E-09	3.6E-09	2.7E-09	3.8E-09
Sigma	-	315.2E-12	889.8E-12	1.3E-09	2.4E-09	1.5E-09	862.0E-12	730.4E-12	2.6E-09	3.1E-09	3.4E-09	1.4E-09	2.2E-09

Parameter : Input Offset Current : IIO2DUTB
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-284.2E-12	-150.4E-12	250.7E-12	234.0E-12	637.7E-12	-3.2E-12	-221.4E-12	627.3E-12	-313.7E-12	202.9E-12	92.3E-12	36.9E-12	848.7E-12
ON_PROTON samples													
27	-351.0E-12	2.8E-09	-117.0E-12	-1.8E-09	-666.6E-12	1.4E-09	-1.2E-09	-904.1E-12	-1.8E-09	-1.8E-09	-73.8E-12	-1.2E-09	-738.0E-12
28	2.1E-09	2.5E-09	5.2E-09	5.1E-09	4.1E-09	4.1E-09	3.0E-09	996.3E-12	4.4E-09	3.7E-09	3.2E-09	3.1E-09	2.7E-09
29	2.7E-09	2.7E-09	3.1E-09	1.2E-09	2.8E-09	3.7E-09	2.7E-09	2.1E-09	1.7E-09	2.6E-09	1.7E-09	387.5E-12	1.8E-09
Statistics													
Min	-351.0E-12	2.5E-09	-117.0E-12	-1.8E-09	-666.6E-12	1.4E-09	-1.2E-09	-904.1E-12	-1.8E-09	-1.8E-09	-73.8E-12	-1.2E-09	-738.0E-12
Max	2.7E-09	2.8E-09	5.2E-09	5.1E-09	4.1E-09	4.1E-09	3.0E-09	2.1E-09	4.4E-09	3.7E-09	3.2E-09	3.1E-09	2.7E-09
Average	1.5E-09	2.6E-09	2.7E-09	1.5E-09	2.1E-09	3.1E-09	1.5E-09	731.8E-12	1.4E-09	1.5E-09	1.6E-09	750.3E-12	1.3E-09
Sigma	1.3E-09	123.0E-12	2.2E-09	2.9E-09	2.0E-09	1.2E-09	1.9E-09	1.2E-09	2.5E-09	2.4E-09	1.4E-09	1.8E-09	1.5E-09

Drift Calculation

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	3.1E-09	234.0E-12	-1.5E-09	-315.5E-12	1.8E-09	-885.1E-12	-553.0E-12	-1.4E-09	-1.5E-09	277.2E-12	-885.1E-12	-387.0E-12
28	-	391.1E-12	3.2E-09	3.0E-09	2.0E-09	2.0E-09	956.5E-12	-1.1E-09	2.3E-09	1.6E-09	1.2E-09	1.0E-09	624.3E-12
29	-	-5.1E-15	424.6E-12	-1.5E-09	143.9E-12	977.2E-12	17.5E-12	-572.9E-12	-960.3E-12	-111.7E-12	-997.2E-12	-2.3E-09	-849.6E-12
Average	-	1.2E-09	1.3E-09	13.4E-12	603.5E-12	1.6E-09	29.6E-12	-739.1E-12	-38.0E-12	-7.3E-12	146.5E-12	-720.7E-12	-204.1E-12
Sigma	-	1.4E-09	1.3E-09	2.1E-09	992.7E-12	443.7E-12	751.9E-12	249.3E-12	1.7E-09	1.3E-09	885.3E-12	1.4E-09	615.5E-12

Measurements

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-284.2E-12	-150.4E-12	250.7E-12	234.0E-12	637.7E-12	-3.2E-12	-221.4E-12	627.3E-12	-313.7E-12	202.9E-12	92.3E-12	36.9E-12	848.7E-12
ON_TID samples													
33	-317.6E-12	-317.6E-12	-150.4E-12	-409.5E-12	153.8E-12	-676.2E-12	-848.7E-12	-2.8E-09	-2.0E-09	-1.3E-09	-1.1E-09	-1.1E-09	-350.5E-12
34	-217.3E-12	-468.0E-12	551.6E-12	1.6E-09	-759.5E-12	705.0E-12	516.6E-12	959.4E-12	-1.7E-09	-1.4E-09	147.6E-12	-1.3E-09	-369.0E-12
35	-451.3E-12	-451.3E-12	434.6E-12	-183.9E-12	1.4E-09	227.5E-12	461.2E-12	-590.4E-12	166.0E-12	276.7E-12	18.4E-12	553.5E-12	-442.8E-12
Statistics													
Min	-451.3E-12	-468.0E-12	-150.4E-12	-409.5E-12	-759.5E-12	-676.2E-12	-848.7E-12	-2.8E-09	-2.0E-09	-1.4E-09	-1.1E-09	-1.3E-09	-442.8E-12
Max	-217.3E-12	-317.6E-12	551.6E-12	1.6E-09	1.4E-09	705.0E-12	516.6E-12	959.4E-12	166.0E-12	276.7E-12	147.6E-12	553.5E-12	-350.5E-12
Average	-328.7E-12	-412.3E-12	278.6E-12	330.4E-12	260.4E-12	85.5E-12	43.1E-12	-805.6E-12	-1.2E-09	-817.9E-12	-301.4E-12	-627.3E-12	-387.4E-12
Sigma	95.9E-12	67.3E-12	307.1E-12	891.6E-12	879.5E-12	572.8E-12	631.0E-12	1.5E-09	957.4E-12	774.2E-12	546.1E-12	837.1E-12	39.9E-12

Drift Calculation

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	167.2E-12	-91.9E-12	471.4E-12	-358.6E-12	-531.1E-12	-2.5E-09	-1.7E-09	-1.0E-09	-752.5E-12	-826.2E-12	-32.9E-12
34	-	-250.7E-12	768.9E-12	1.8E-09	-542.2E-12	922.3E-12	733.9E-12	1.2E-09	-1.5E-09	-1.2E-09	364.9E-12	-1.1E-09	-151.7E-12
35	-	0.0E+00	885.9E-12	267.4E-12	1.8E-09	678.8E-12	912.5E-12	-139.1E-12	617.3E-12	728.0E-12	469.7E-12	1.0E-09	8.5E-12
Average	-	-83.6E-12	607.3E-12	659.1E-12	589.1E-12	414.2E-12	371.8E-12	-476.9E-12	-852.1E-12	-489.2E-12	27.4E-12	-298.5E-12	-58.7E-12
Sigma	-	118.2E-12	314.9E-12	821.3E-12	975.3E-12	555.4E-12	642.6E-12	1.5E-09	1.0E-09	862.5E-12	553.1E-12	927.1E-12	67.9E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019		
	LM124AJRQMLV					National Semiconductors				Issue:	02		

Measurements

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-284.2E-12	-150.4E-12	250.7E-12	234.0E-12	637.7E-12	-3.2E-12	-221.4E-12	627.3E-12	-313.7E-12	202.9E-12	92.3E-12	36.9E-12	848.7E-12
OFF_PROTON samples													
30	5.1E-09	1.0E-09	1.3E-09	1.3E-09	4.1E-09	5.2E-09	-959.4E-12	-2.0E-09	4.6E-09	184.5E-12	-4.1E-09	5.5E-09	2.2E-09
32	1.8E-09	-4.4E-09	1.1E-09	4.0E-09	2.4E-09	-959.4E-12	-6.0E-09	-3.7E-09	6.1E-09	1.1E-09	184.5E-12	553.5E-12	-1.2E-09
39	924.4E-12	3.3E-09	5.0E-09	5.9E-09	1.2E-09	1.5E-09	3.9E-09	-5.5E-09	-3.3E-09	-5.5E-09	-7.0E-09	-4.4E-09	-3.0E-09
Statistics													
Min	924.4E-12	-4.4E-09	1.1E-09	1.3E-09	1.2E-09	-959.4E-12	-6.0E-09	-5.5E-09	-3.3E-09	-5.5E-09	-7.0E-09	-4.4E-09	-3.0E-09
Max	5.1E-09	3.3E-09	5.0E-09	5.9E-09	4.1E-09	5.2E-09	3.9E-09	-2.0E-09	6.1E-09	1.1E-09	184.5E-12	5.5E-09	2.2E-09
Average	2.6E-09	-46.2E-12	2.5E-09	3.8E-09	2.5E-09	1.9E-09	-1.0E-09	-3.7E-09	2.5E-09	-1.4E-09	-3.6E-09	553.5E-12	-682.6E-12
Sigma	1.8E-09	3.2E-09	1.8E-09	1.9E-09	1.2E-09	2.5E-09	4.1E-09	1.4E-09	4.1E-09	2.9E-09	3.0E-09	4.1E-09	2.2E-09

Drift Calculation

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-4.1E-09	-3.9E-09	-3.8E-09	-1.1E-09	34.3E-12	-6.1E-09	-7.2E-09	-519.2E-12	-4.9E-09	-9.2E-09	403.3E-12	-3.0E-09
32	-	-6.3E-09	-700.4E-12	2.2E-09	532.7E-12	-2.8E-09	-7.8E-09	-5.5E-09	4.2E-09	-731.8E-12	-1.7E-09	-1.3E-09	-3.1E-09
39	-	2.3E-09	4.1E-09	5.0E-09	229.3E-12	551.6E-12	3.0E-09	-6.5E-09	-4.2E-09	-6.5E-09	-7.9E-09	-5.4E-09	-3.9E-09
Average	-	-2.7E-09	-156.0E-12	1.1E-09	-99.9E-12	-737.4E-12	-3.6E-09	-6.4E-09	-171.6E-12	-4.0E-09	-6.3E-09	-2.1E-09	-3.3E-09
Sigma	-	3.7E-09	3.3E-09	3.7E-09	691.3E-12	1.5E-09	4.8E-09	676.5E-12	3.5E-09	2.4E-09	3.3E-09	2.4E-09	438.6E-12

Measurements

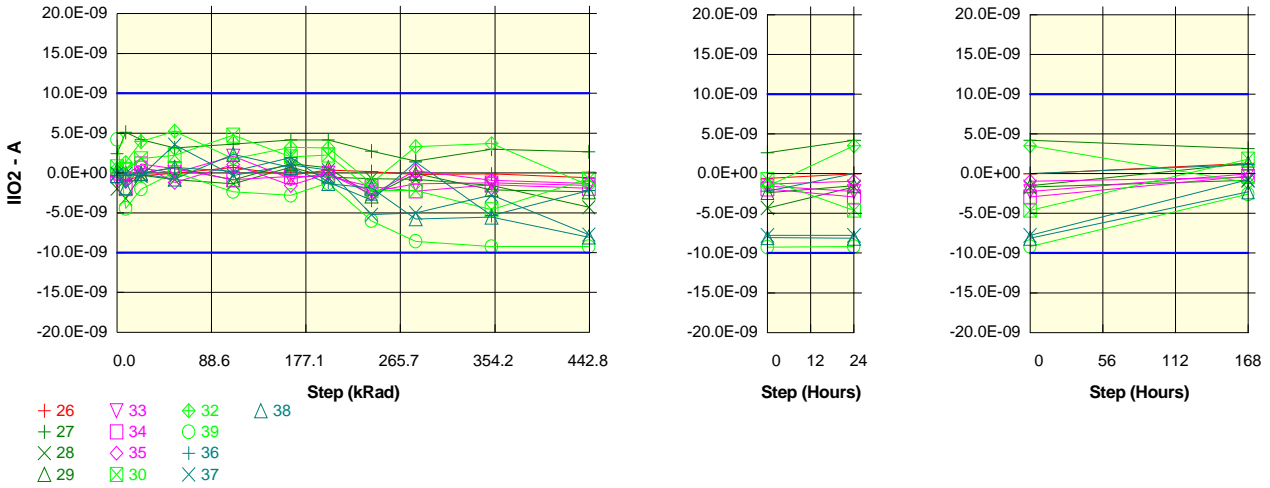
IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-284.2E-12	-150.4E-12	250.7E-12	234.0E-12	637.7E-12	-3.2E-12	-221.4E-12	627.3E-12	-313.7E-12	202.9E-12	92.3E-12	36.9E-12	848.7E-12
OFF_TID samples													
36	-167.1E-12	-167.1E-12	618.5E-12	504.8E-12	2.8E-09	-922.5E-12	3.5E-09	-1.4E-09	-4.0E-09	1.1E-09	1.7E-09	-1.5E-09	147.6E-12
37	66.9E-12	66.9E-12	952.8E-12	1.9E-09	477.5E-12	-1.7E-09	-5.1E-09	-5.0E-09	-1.6E-09	-4.8E-09	-6.1E-09	-7.7E-09	-2.7E-09
38	167.2E-12	-819.1E-12	-1.1E-09	2.8E-09	-128.2E-12	553.5E-12	-2.9E-09	1.2E-09	-461.2E-12	738.0E-12	-7.6E-09	-7.9E-09	-3.1E-09
Statistics													
Min	-167.1E-12	-819.1E-12	-1.1E-09	504.8E-12	-128.2E-12	-1.7E-09	-5.1E-09	-5.0E-09	-4.0E-09	-4.8E-09	-7.6E-09	-7.9E-09	-3.1E-09
Max	167.2E-12	66.9E-12	952.8E-12	2.8E-09	2.8E-09	553.5E-12	3.5E-09	1.2E-09	-461.2E-12	1.1E-09	1.7E-09	-1.5E-09	147.6E-12
Average	22.3E-12	-306.4E-12	156.0E-12	1.7E-09	1.1E-09	-674.0E-12	-1.5E-09	-1.7E-09	-2.0E-09	-984.0E-12	-4.0E-09	-5.7E-09	-1.9E-09
Sigma	140.1E-12	374.8E-12	900.8E-12	935.7E-12	1.3E-09	917.8E-12	3.7E-09	2.6E-09	1.5E-09	2.7E-09	4.1E-09	3.0E-09	1.5E-09

Drift Calculation

IIO2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	785.6E-12	671.9E-12	3.0E-09	-755.3E-12	3.7E-09	-1.3E-09	-3.9E-09	1.3E-09	1.8E-09	-1.3E-09	314.7E-12
37	-	0.0E+00	885.9E-12	1.9E-09	410.6E-12	-1.7E-09	-5.2E-09	-5.1E-09	-1.7E-09	-4.9E-09	-6.2E-09	-7.8E-09	-2.8E-09
38	-	-986.2E-12	-1.3E-09	2.6E-09	-295.3E-12	386.3E-12	-3.1E-09	1.1E-09	-628.4E-12	570.8E-12	-7.7E-09	-8.1E-09	-3.3E-09
Average	-	-328.7E-12	133.7E-12	1.7E-09	1.0E-09	-696.3E-12	-1.5E-09	-1.8E-09	-2.1E-09	-1.0E-09	-4.0E-09	-5.7E-09	-1.9E-09
Sigma	-	464.9E-12	993.7E-12	796.1E-12	1.4E-09	860.9E-12	3.8E-09	2.5E-09	1.3E-09	2.7E-09	4.2E-09	3.1E-09	1.6E-09

Parameter : Input Offset Current : IIO2DUTC
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	83.6E-12	-952.8E-12	-367.7E-12	-16.7E-12	685.8E-12	-282.0E-12	350.6E-12	166.0E-12	-184.5E-12	-129.2E-12	-590.4E-12	-18.5E-12	1.3E-09
ON_PROTON samples													
27	2.4E-09	5.1E-09	4.2E-09	3.1E-09	3.6E-09	4.1E-09	4.1E-09	2.7E-09	1.5E-09	3.0E-09	2.6E-09	4.2E-09	3.2E-09
28	-2.0E-09	-3.2E-09	-284.2E-12	-847.5E-12	-1.4E-09	705.0E-12	-516.6E-12	-719.6E-12	-811.8E-12	-1.5E-09	-4.3E-09	-1.7E-09	-811.8E-12
29	337.7E-12	-36.8E-12	-50.1E-12	702.1E-12	-865.3E-12	1.2E-09	645.7E-12	-2.9E-09	-92.3E-12	-2.1E-09	-2.4E-09	-1.5E-09	1.3E-09
Statistics													
Min	-2.0E-09	-3.2E-09	-284.2E-12	-847.5E-12	-1.4E-09	705.0E-12	-516.6E-12	-2.9E-09	-811.8E-12	-2.1E-09	-4.3E-09	-1.7E-09	-811.8E-12
Max	2.4E-09	5.1E-09	4.2E-09	3.1E-09	3.6E-09	4.1E-09	4.1E-09	2.7E-09	1.5E-09	3.0E-09	2.6E-09	4.2E-09	3.2E-09
Average	250.2E-12	618.5E-12	1.3E-09	996.2E-12	468.9E-12	2.0E-09	1.4E-09	-295.2E-12	196.8E-12	-227.6E-12	-1.4E-09	344.4E-12	1.2E-09
Sigma	1.8E-09	3.4E-09	2.0E-09	1.6E-09	2.2E-09	1.5E-09	2.0E-09	2.3E-09	963.4E-12	2.3E-09	2.9E-09	2.7E-09	1.6E-09

Drift Calculation

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.7E-09	1.8E-09	732.1E-12	1.2E-09	1.7E-09	1.7E-09	328.6E-12	-907.6E-12	586.8E-12	236.3E-12	1.8E-09	771.3E-12
28	-	-1.2E-09	1.7E-09	1.1E-09	627.2E-12	2.7E-09	1.5E-09	1.3E-09	1.2E-09	439.4E-12	-2.3E-09	310.3E-12	1.2E-09
29	-	-374.4E-12	-387.8E-12	364.4E-12	-1.2E-09	848.1E-12	308.1E-12	-3.2E-09	-429.9E-12	-2.5E-09	-2.7E-09	-1.9E-09	990.7E-12
Average	-	368.3E-12	1.0E-09	746.1E-12	218.8E-12	1.8E-09	1.2E-09	-545.4E-12	-53.4E-12	-477.7E-12	-1.6E-09	94.2E-12	979.8E-12
Sigma	-	1.7E-09	997.8E-12	317.5E-12	1.0E-09	753.9E-12	618.8E-12	1.9E-09	891.8E-12	1.4E-09	1.3E-09	1.5E-09	165.9E-12

Measurements

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	83.6E-12	-952.8E-12	-367.7E-12	-16.7E-12	685.8E-12	-282.0E-12	350.6E-12	166.0E-12	-184.5E-12	-129.2E-12	-590.4E-12	-18.5E-12	1.3E-09
ON_TID samples													
33	-869.2E-12	-869.2E-12	601.8E-12	-6.7E-12	2.1E-09	-714.6E-12	-55.4E-12	-2.4E-09	-1.4E-09	-1.3E-09	-1.5E-09	-2.3E-09	-36.9E-12
34	-367.7E-12	-2.0E-09	1.1E-09	536.6E-12	-855.6E-12	-432.6E-12	-461.2E-12	-1.7E-09	-2.3E-09	-1.5E-09	-1.9E-09	-2.9E-09	-313.6E-12
35	-234.0E-12	-234.0E-12	1.1E-09	-1.2E-09	1.0E-09	-1.6E-09	-73.8E-12	-2.7E-09	276.8E-12	-940.9E-12	-1.3E-09	-959.4E-12	-479.7E-12
Statistics													
Min	-869.2E-12	-2.0E-09	601.8E-12	-1.2E-09	-855.6E-12	-1.6E-09	-461.2E-12	-2.7E-09	-2.3E-09	-1.5E-09	-1.9E-09	-2.9E-09	-479.7E-12
Max	-234.0E-12	-234.0E-12	1.1E-09	536.6E-12	2.1E-09	-432.6E-12	-55.4E-12	-1.7E-09	276.8E-12	-940.9E-12	-1.3E-09	-959.4E-12	-36.9E-12
Average	-490.3E-12	-1.0E-09	924.9E-12	-219.0E-12	760.2E-12	-913.3E-12	-196.8E-12	-2.3E-09	-1.1E-09	-1.2E-09	-1.6E-09	-2.0E-09	-276.7E-12
Sigma	273.4E-12	718.2E-12	230.1E-12	719.4E-12	1.2E-09	494.0E-12	187.1E-12	399.4E-12	1.1E-09	226.6E-12	243.5E-12	812.0E-12	182.6E-12

Drift Calculation

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.5E-09	862.5E-12	3.0E-09	154.6E-12	813.8E-12	-1.5E-09	-496.1E-12	-385.4E-12	-680.6E-12	-1.4E-09	832.3E-12
34	-	-1.6E-09	1.5E-09	904.3E-12	-487.9E-12	-64.9E-12	-93.5E-12	-1.4E-09	-1.9E-09	-1.1E-09	-1.6E-09	-2.5E-09	54.1E-12
35	-	0.0E+00	1.3E-09	-952.8E-12	1.3E-09	-1.4E-09	160.2E-12	-2.5E-09	510.8E-12	-706.9E-12	-1.1E-09	-725.4E-12	-245.7E-12
Average	-	-534.9E-12	1.4E-09	271.3E-12	1.3E-09	-423.0E-12	293.5E-12	-1.8E-09	-629.0E-12	-739.7E-12	-1.1E-09	-1.6E-09	213.6E-12
Sigma	-	756.5E-12	90.9E-12	865.8E-12	1.4E-09	667.7E-12	382.2E-12	484.9E-12	989.3E-12	303.5E-12	355.5E-12	753.4E-12	454.3E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019	
	LM124AJRQMLV			National Semiconductors						Issue:	02	

Measurements

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	83.6E-12	-952.8E-12	-367.7E-12	-16.7E-12	685.8E-12	-282.0E-12	350.6E-12	166.0E-12	-184.5E-12	-129.2E-12	-590.4E-12	-18.5E-12	1.3E-09
OFF PROTON samples													
30	770.6E-12	351.0E-12	1.8E-09	2.2E-09	4.7E-09	2.0E-09	2.3E-09	-2.2E-09	-2.2E-09	-4.6E-09	-737.9E-12	-4.6E-09	1.8E-09
32	566.7E-12	1.3E-09	3.9E-09	5.2E-09	1.8E-09	3.2E-09	3.1E-09	-1.3E-09	3.3E-09	3.7E-09	-1.6E-09	3.5E-09	-1.1E-09
39	4.2E-09	-4.5E-09	-2.0E-09	66.9E-12	-2.4E-09	-2.8E-09	-1.3E-09	-6.0E-09	-8.6E-09	-9.3E-09	-9.3E-09	-9.2E-09	-2.6E-09
Statistics													
Min	566.7E-12	-4.5E-09	-2.0E-09	66.9E-12	-2.4E-09	-2.8E-09	-1.3E-09	-6.0E-09	-8.6E-09	-9.3E-09	-9.3E-09	-9.2E-09	-2.6E-09
Max	4.2E-09	1.3E-09	3.9E-09	5.2E-09	4.7E-09	3.2E-09	3.1E-09	-1.3E-09	3.3E-09	3.7E-09	-737.9E-12	3.5E-09	1.8E-09
Average	1.8E-09	-936.1E-12	1.2E-09	2.5E-09	1.4E-09	800.7E-12	1.4E-09	-3.2E-09	-2.5E-09	-3.4E-09	-3.9E-09	-3.4E-09	-621.1E-12
Sigma	1.7E-09	2.5E-09	2.5E-09	2.1E-09	2.9E-09	2.6E-09	1.9E-09	2.0E-09	4.9E-09	5.4E-09	3.8E-09	5.2E-09	1.8E-09

Drift Calculation

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-419.5E-12	1.0E-09	1.4E-09	4.0E-09	1.3E-09	1.5E-09	-3.0E-09	-3.0E-09	-5.4E-09	-1.5E-09	-5.4E-09	1.1E-09
32	-	743.8E-12	3.4E-09	4.7E-09	1.2E-09	2.6E-09	2.6E-09	-1.9E-09	2.8E-09	3.1E-09	-2.1E-09	2.9E-09	-1.7E-09
39	-	-8.6E-09	-6.2E-09	-4.1E-09	-6.6E-09	-7.0E-09	-5.5E-09	-10.2E-09	-12.8E-09	-13.4E-09	-13.4E-09	-13.4E-09	-6.7E-09
Average	-	-2.8E-09	-611.2E-12	668.6E-12	-460.7E-12	-1.0E-09	-473.4E-12	-5.0E-09	-4.3E-09	-5.2E-09	-5.7E-09	-5.3E-09	-2.5E-09
Sigma	-	4.2E-09	4.1E-09	3.6E-09	4.5E-09	4.3E-09	3.5E-09	3.7E-09	6.4E-09	6.8E-09	5.5E-09	6.7E-09	3.2E-09

Measurements

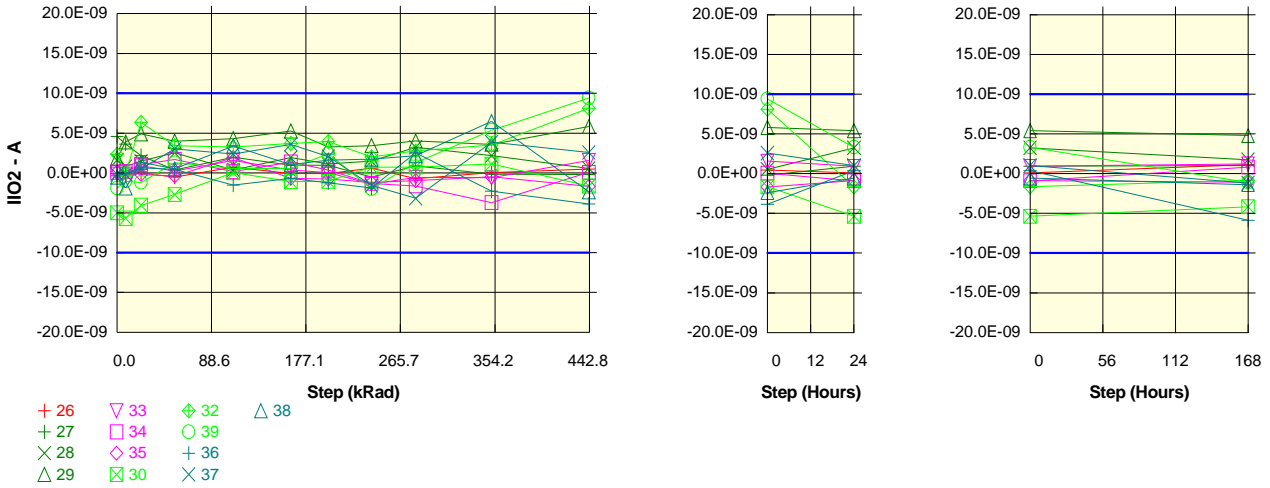
IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	83.6E-12	-952.8E-12	-367.7E-12	-16.7E-12	685.8E-12	-282.0E-12	350.6E-12	166.0E-12	-184.5E-12	-129.2E-12	-590.4E-12	-18.5E-12	1.3E-09
OFF TID samples													
36	-317.6E-12	-317.6E-12	-66.9E-12	700.4E-12	205.1E-12	1.9E-09	-1.1E-09	-3.4E-09	1.4E-09	-5.4E-09	-2.2E-09	0.0E+00	1.1E-09
37	-117.0E-12	-117.0E-12	-384.5E-12	3.5E-09	-323.7E-12	1.0E-09	350.5E-12	-5.2E-09	-5.0E-09	-2.8E-09	-7.7E-09	-7.7E-09	-756.4E-12
38	-334.3E-12	-1.9E-09	-117.0E-12	-768.9E-12	2.3E-09	664.2E-12	-1.3E-09	-1.9E-09	-5.8E-09	-5.5E-09	-8.1E-09	-8.1E-09	-2.3E-09
Statistics													
Min	-334.3E-12	-1.9E-09	-384.5E-12	-768.9E-12	-323.7E-12	664.2E-12	-1.3E-09	-5.2E-09	-5.8E-09	-5.5E-09	-8.1E-09	-8.1E-09	-2.3E-09
Max	-117.0E-12	-117.0E-12	-66.9E-12	3.5E-09	2.3E-09	1.9E-09	350.5E-12	-1.9E-09	1.4E-09	-2.8E-09	-2.2E-09	0.0E+00	1.1E-09
Average	-256.3E-12	-763.3E-12	-189.4E-12	1.2E-09	734.9E-12	1.2E-09	-713.4E-12	-3.5E-09	-3.1E-09	-4.6E-09	-6.0E-09	-5.3E-09	-633.4E-12
Sigma	98.7E-12	776.5E-12	139.4E-12	1.8E-09	1.1E-09	536.9E-12	756.8E-12	1.4E-09	3.2E-09	1.3E-09	2.7E-09	3.7E-09	1.4E-09

Drift Calculation

IIO2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	250.7E-12	1.0E-09	522.7E-12	2.3E-09	-826.3E-12	-3.1E-09	1.7E-09	-5.0E-09	-1.9E-09	317.6E-12	1.5E-09
37	-	0.0E+00	-267.5E-12	3.6E-09	-206.7E-12	1.1E-09	467.5E-12	-5.1E-09	-4.9E-09	-2.7E-09	-7.6E-09	-7.6E-09	-639.4E-12
38	-	-1.5E-09	217.3E-12	-434.6E-12	2.7E-09	998.5E-12	-1.0E-09	-1.5E-09	-5.4E-09	-5.2E-09	-7.7E-09	-7.8E-09	-2.0E-09
Average	-	-507.0E-12	66.9E-12	1.4E-09	991.2E-12	1.5E-09	-457.1E-12	-3.3E-09	-2.9E-09	-4.3E-09	-5.8E-09	-5.0E-09	-377.1E-12
Sigma	-	717.1E-12	236.8E-12	1.7E-09	1.2E-09	563.5E-12	658.2E-12	1.5E-09	3.2E-09	1.2E-09	2.7E-09	3.8E-09	1.4E-09

Parameter : Input Offset Current : IIO2DUTD
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-334.3E-12	-250.7E-12	0.0E+00	-534.9E-12	737.1E-12	-64.1E-12	-73.8E-12	608.8E-12	-738.0E-12	18.4E-12	479.7E-12	110.7E-12	1.1E-09
ON_PROTON samples													
27	4.6E-09	3.6E-09	2.2E-09	351.0E-12	2.0E-09	961.4E-12	959.4E-12	-516.6E-12	904.0E-12	-147.6E-12	-202.9E-12	922.5E-12	1.0E-09
28	1.6E-09	807.4E-12	1.5E-09	2.5E-09	358.9E-12	1.9E-09	1.1E-09	1.5E-09	3.2E-09	2.2E-09	571.9E-12	3.2E-09	1.8E-09
29	1.8E-09	3.9E-09	4.9E-09	4.0E-09	4.3E-09	5.3E-09	3.2E-09	3.4E-09	4.0E-09	3.6E-09	5.8E-09	5.4E-09	4.8E-09
Statistics													
Min	1.6E-09	807.4E-12	1.5E-09	351.0E-12	358.9E-12	961.4E-12	959.4E-12	-516.6E-12	904.0E-12	-147.6E-12	-202.9E-12	922.5E-12	1.0E-09
Max	4.6E-09	3.9E-09	4.9E-09	4.0E-09	4.3E-09	5.3E-09	3.2E-09	3.4E-09	4.0E-09	3.6E-09	5.8E-09	5.4E-09	4.8E-09
Average	2.7E-09	2.8E-09	2.9E-09	2.3E-09	2.2E-09	2.7E-09	1.8E-09	1.5E-09	2.7E-09	1.9E-09	2.1E-09	3.2E-09	2.5E-09
Sigma	1.3E-09	1.4E-09	1.5E-09	1.5E-09	1.6E-09	1.8E-09	1.0E-09	1.6E-09	1.3E-09	1.5E-09	2.7E-09	1.8E-09	1.6E-09

Drift Calculation

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-937.7E-12	-2.4E-09	-4.2E-09	-2.6E-09	-3.6E-09	-3.6E-09	-5.1E-09	-3.7E-09	-4.7E-09	-4.8E-09	-3.7E-09	-3.5E-09
28	-	-812.4E-12	-150.4E-12	921.0E-12	-1.3E-09	303.1E-12	-512.7E-12	-143.8E-12	1.6E-09	538.9E-12	-1.0E-09	1.6E-09	133.0E-12
29	-	2.0E-09	3.1E-09	2.1E-09	2.5E-09	3.4E-09	1.4E-09	1.6E-09	2.2E-09	1.8E-09	4.0E-09	3.6E-09	3.0E-09
Average	-	99.2E-12	172.2E-12	-390.6E-12	-462.4E-12	34.3E-12	-907.7E-12	-1.2E-09	33.2E-12	-809.4E-12	-618.7E-12	519.0E-12	-151.3E-12
Sigma	-	1.4E-09	2.2E-09	2.8E-09	2.1E-09	2.9E-09	2.1E-09	2.8E-09	2.6E-09	2.8E-09	3.6E-09	3.1E-09	2.7E-09

Measurements

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-334.3E-12	-250.7E-12	0.0E+00	-534.9E-12	737.1E-12	-64.1E-12	-73.8E-12	608.8E-12	-738.0E-12	18.4E-12	479.7E-12	110.7E-12	1.1E-09
ON_TID samples													
33	-133.7E-12	-133.7E-12	869.2E-12	250.7E-12	1.6E-09	358.9E-12	18.4E-12	-1.4E-09	-553.5E-12	-627.3E-12	1.6E-09	922.5E-12	1.2E-09
34	83.6E-12	183.9E-12	1.1E-09	1.7E-09	169.8E-12	1.4E-09	350.5E-12	-1.3E-09	-1.6E-09	-3.7E-09	73.8E-12	-885.6E-12	830.2E-12
35	117.0E-12	117.0E-12	-183.9E-12	-384.5E-12	1.9E-09	-657.0E-12	-774.9E-12	-1.2E-09	-959.4E-12	-479.7E-12	-1.7E-09	-867.1E-12	-1.1E-09
Statistics													
Min	-133.7E-12	-133.7E-12	-183.9E-12	-384.5E-12	169.8E-12	-657.0E-12	-774.9E-12	-1.4E-09	-1.6E-09	-3.7E-09	-1.7E-09	-885.6E-12	-1.1E-09
Max	117.0E-12	183.9E-12	1.1E-09	1.7E-09	1.9E-09	1.4E-09	350.5E-12	-1.2E-09	-553.5E-12	-479.7E-12	1.6E-09	922.5E-12	1.2E-09
Average	22.3E-12	55.7E-12	585.0E-12	518.2E-12	1.2E-09	363.2E-12	-135.3E-12	-1.3E-09	-1.0E-09	-1.6E-09	-12.3E-12	-276.7E-12	338.2E-12
Sigma	111.2E-12	136.7E-12	549.8E-12	867.1E-12	751.8E-12	834.7E-12	472.1E-12	75.3E-12	441.1E-12	1.5E-09	1.3E-09	848.0E-12	996.7E-12

Drift Calculation

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.0E-09	384.5E-12	1.7E-09	492.6E-12	152.2E-12	-1.3E-09	-419.8E-12	-493.6E-12	1.7E-09	1.1E-09	1.4E-09
34	-	100.3E-12	986.2E-12	1.6E-09	86.3E-12	1.3E-09	267.0E-12	-1.4E-09	-1.7E-09	-3.8E-09	-9.8E-12	-969.1E-12	746.7E-12
35	-	0.0E+00	-300.9E-12	-501.5E-12	1.8E-09	-774.0E-12	-891.9E-12	-1.3E-09	-1.1E-09	-596.7E-12	-1.8E-09	-984.1E-12	-1.2E-09
Average	-	33.4E-12	562.8E-12	495.9E-12	1.2E-09	340.9E-12	-157.6E-12	-1.3E-09	-1.1E-09	-1.6E-09	-34.6E-12	-299.0E-12	316.0E-12
Sigma	-	47.3E-12	610.7E-12	863.4E-12	782.2E-12	855.1E-12	521.3E-12	51.1E-12	525.6E-12	1.5E-09	1.4E-09	958.3E-12	1.1E-09

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-334.3E-12	-250.7E-12	0.0E+00	-534.9E-12	737.1E-12	-64.1E-12	-73.8E-12	608.8E-12	-738.0E-12	18.4E-12	479.7E-12	110.7E-12	1.1E-09
OFF_PROTON samples													
30	-5.0E-09	-5.7E-09	-4.1E-09	-2.7E-09	32.1E-12	-1.1E-09	-1.0E-09	738.0E-12	738.0E-12	1.1E-09	-1.7E-09	-5.4E-09	-4.2E-09
32	2.3E-09	-41.8E-12	6.4E-09	3.4E-09	3.3E-09	3.7E-09	3.9E-09	2.0E-09	2.8E-09	3.5E-09	8.1E-09	-1.7E-09	-848.7E-12
39	-1.9E-09	-1.0E-09	-1.2E-09	1.3E-09	576.8E-12	571.9E-12	2.4E-09	-2.0E-09	1.3E-09	5.4E-09	9.4E-09	3.3E-09	-1.1E-09
Statistics													
Min	-5.0E-09	-5.7E-09	-4.1E-09	-2.7E-09	32.1E-12	-1.1E-09	-1.0E-09	-2.0E-09	738.0E-12	1.1E-09	-1.7E-09	-5.4E-09	-4.2E-09
Max	2.3E-09	-41.8E-12	6.4E-09	3.4E-09	3.3E-09	3.7E-09	3.9E-09	2.0E-09	2.8E-09	5.4E-09	9.4E-09	3.3E-09	-848.7E-12
Average	-1.5E-09	-2.3E-09	366.1E-12	660.8E-12	1.3E-09	1.1E-09	1.8E-09	258.3E-12	1.6E-09	3.3E-09	5.3E-09	-1.2E-09	-2.0E-09
Sigma	3.0E-09	2.5E-09	4.4E-09	2.5E-09	1.4E-09	2.0E-09	2.1E-09	1.7E-09	856.6E-12	1.7E-09	4.9E-09	3.6E-09	1.5E-09

Drift Calculation

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-682.0E-12	926.0E-12	2.3E-09	5.0E-09	3.9E-09	4.0E-09	5.7E-09	5.7E-09	6.1E-09	3.3E-09	-345.8E-12	835.0E-12
32	-	-2.4E-09	4.0E-09	1.1E-09	928.6E-12	1.4E-09	1.6E-09	-310.7E-12	427.3E-12	1.2E-09	5.8E-09	-4.0E-09	-3.2E-09
39	-	869.2E-12	712.1E-12	3.2E-09	2.5E-09	2.5E-09	4.3E-09	-87.0E-12	3.2E-09	7.3E-09	11.3E-09	5.2E-09	798.6E-12
Average	-	-731.6E-12	1.9E-09	2.2E-09	2.8E-09	2.6E-09	3.3E-09	1.8E-09	3.1E-09	4.8E-09	6.8E-09	293.3E-12	-518.4E-12
Sigma	-	1.3E-09	1.5E-09	854.0E-12	1.7E-09	1.0E-09	1.2E-09	2.8E-09	2.2E-09	2.6E-09	3.3E-09	3.8E-09	1.9E-09

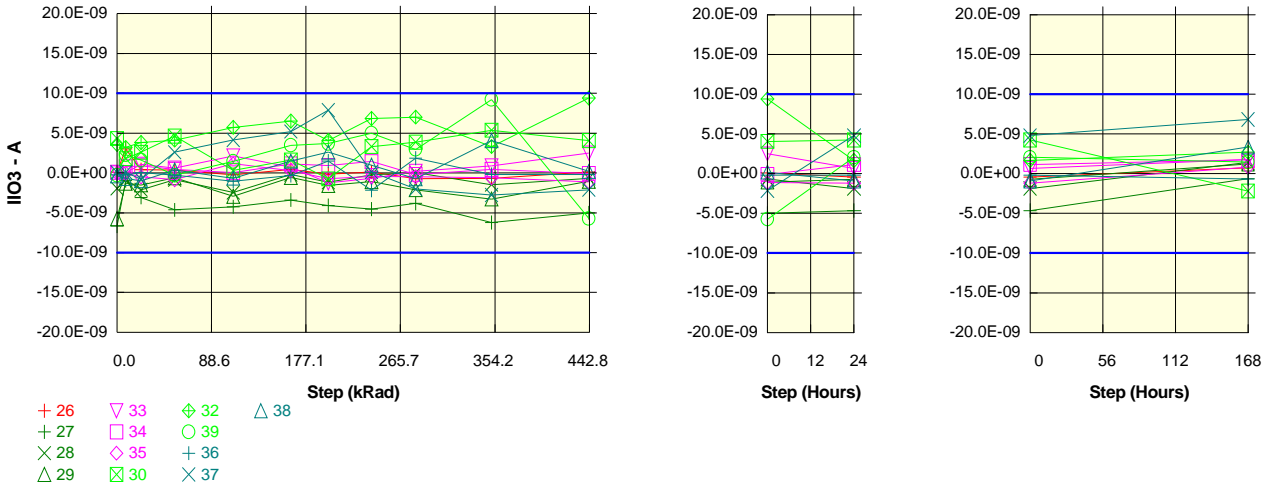
Measurements

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-334.3E-12	-250.7E-12	0.0E+00	-534.9E-12	737.1E-12	-64.1E-12	-73.8E-12	608.8E-12	-738.0E-12	18.4E-12	479.7E-12	110.7E-12	1.1E-09
OFF_TID samples													
36	-100.3E-12	-100.3E-12	641.9E-12	431.3E-12	-1.5E-09	-682.6E-12	-1.2E-09	-1.9E-09	2.5E-09	-2.3E-09	-3.9E-09	379.9E-12	-5.8E-09
37	-183.9E-12	-183.9E-12	534.9E-12	3.0E-09	2.4E-09	3.6E-09	2.0E-09	-1.6E-09	-3.2E-09	3.9E-09	2.6E-09	1.0E-09	-1.2E-09
38	-551.6E-12	-1.9E-09	1.3E-09	498.1E-12	3.4E-09	1.0E-09	1.6E-09	1.7E-09	2.2E-09	6.5E-09	-2.4E-09	-553.5E-12	-1.4E-09
Statistics													
Min	-551.6E-12	-1.9E-09	534.9E-12	431.3E-12	-1.5E-09	-682.6E-12	-1.2E-09	-1.9E-09	-3.2E-09	-2.3E-09	-3.9E-09	-553.5E-12	-5.8E-09
Max	-100.3E-12	-100.3E-12	1.3E-09	3.0E-09	3.4E-09	3.6E-09	2.0E-09	1.7E-09	3.0E-09	6.5E-09	2.6E-09	1.0E-09	-1.2E-09
Average	-278.6E-12	-729.9E-12	832.4E-12	1.3E-09	1.4E-09	1.3E-09	802.0E-12	-590.4E-12	501.8E-12	2.7E-09	-1.2E-09	280.4E-12	-2.8E-09
Sigma	196.0E-12	832.0E-12	347.9E-12	1.2E-09	2.1E-09	1.8E-09	1.5E-09	1.6E-09	2.6E-09	3.7E-09	2.8E-09	644.1E-12	2.2E-09

Drift Calculation

IIO2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	742.2E-12	531.5E-12	-1.4E-09	-582.3E-12	-1.1E-09	-1.8E-09	2.6E-09	-2.2E-09	-3.8E-09	480.2E-12	-5.7E-09
37	-	0.0E+00	718.8E-12	3.2E-09	2.6E-09	3.8E-09	2.2E-09	-1.4E-09	-3.0E-09	4.1E-09	2.8E-09	1.2E-09	-996.9E-12
38	-	-1.4E-09	1.9E-09	1.0E-09	3.9E-09	1.6E-09	2.2E-09	2.3E-09	2.7E-09	7.0E-09	-1.8E-09	-1.9E-12	-832.1E-12
Average	-	-451.3E-12	1.1E-09	1.6E-09	1.7E-09	1.6E-09	1.1E-09	-311.8E-12	780.4E-12	3.0E-09	-951.4E-12	559.0E-12	-2.5E-09
Sigma	-	638.3E-12	538.3E-12	1.2E-09	2.3E-09	1.8E-09	1.6E-09	1.8E-09	2.7E-09	3.8E-09	2.7E-09	493.3E-12	2.3E-09

Parameter : Input Offset Current : IIO3DUTA
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	73.5E-12	3.0E-09	396.2E-12	366.1E-12	-259.6E-12	461.5E-12	-166.0E-12	110.7E-12	-719.5E-12	-664.2E-12	110.7E-12	-405.9E-12	738.0E-12
ON_PROTON samples													
27	-6.7E-09	-962.8E-12	-3.1E-09	-4.6E-09	-4.3E-09	-3.4E-09	-4.1E-09	-4.5E-09	-3.8E-09	-6.2E-09	-5.0E-09	-4.6E-09	-608.8E-12
28	-2.0E-09	-835.8E-12	-2.1E-09	-835.8E-12	-2.5E-09	-192.3E-12	-1.2E-09	-239.8E-12	55.4E-12	-1.5E-09	-682.6E-12	-1.9E-09	1.4E-09
29	-5.8E-09	-1.3E-09	-1.5E-09	-618.5E-12	-2.9E-09	-576.8E-12	-1.5E-09	-1.1E-09	-2.1E-09	-3.3E-09	-1.1E-09	-701.1E-12	1.2E-09
Statistics													
Min	-6.7E-09	-1.3E-09	-3.1E-09	-4.6E-09	-4.3E-09	-3.4E-09	-4.1E-09	-4.5E-09	-3.8E-09	-6.2E-09	-5.0E-09	-4.6E-09	-608.8E-12
Max	-2.0E-09	-835.8E-12	-1.5E-09	-618.5E-12	-2.5E-09	-192.3E-12	-1.2E-09	-239.8E-12	55.4E-12	-1.5E-09	-682.6E-12	-701.1E-12	1.4E-09
Average	-4.8E-09	-1.0E-09	-2.2E-09	-2.0E-09	-3.2E-09	-1.4E-09	-2.3E-09	-2.0E-09	-2.0E-09	-3.7E-09	-2.2E-09	-2.4E-09	676.5E-12
Sigma	2.0E-09	190.0E-12	641.1E-12	1.8E-09	758.5E-12	1.4E-09	1.3E-09	1.9E-09	1.6E-09	2.0E-09	2.0E-09	1.7E-09	912.6E-12

Drift Calculation

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	5.7E-09	3.6E-09	2.0E-09	2.4E-09	3.3E-09	2.6E-09	2.1E-09	2.9E-09	465.2E-12	1.7E-09	2.0E-09	6.1E-09
28	-	1.1E-09	-150.4E-12	1.1E-09	-511.9E-12	1.8E-09	793.4E-12	1.7E-09	2.0E-09	479.8E-12	1.3E-09	92.3E-12	3.4E-09
29	-	4.5E-09	4.2E-09	5.1E-09	2.8E-09	5.2E-09	4.2E-09	4.6E-09	3.6E-09	2.5E-09	4.7E-09	5.0E-09	7.0E-09
Average	-	3.8E-09	2.6E-09	2.8E-09	1.6E-09	3.4E-09	2.5E-09	2.8E-09	2.8E-09	1.1E-09	2.6E-09	2.4E-09	5.5E-09
Sigma	-	1.9E-09	1.9E-09	1.7E-09	1.5E-09	1.4E-09	1.4E-09	1.3E-09	668.0E-12	939.8E-12	1.5E-09	2.0E-09	1.5E-09

Measurements

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	73.5E-12	3.0E-09	396.2E-12	366.1E-12	-259.6E-12	461.5E-12	-166.0E-12	110.7E-12	-719.5E-12	-664.2E-12	110.7E-12	-405.9E-12	738.0E-12
ON_TID samples													
33	0.0E+00	0.0E+00	1.1E-09	610.1E-12	2.1E-09	737.1E-12	-1.2E-09	-664.2E-12	202.9E-12	867.2E-12	2.5E-09	664.2E-12	1.8E-09
34	83.6E-12	782.3E-12	897.6E-12	468.0E-12	16.0E-12	1.1E-09	922.5E-12	1.4E-09	-184.5E-12	442.8E-12	-73.8E-12	1.2E-09	1.7E-09
35	-43.5E-12	-43.5E-12	-484.7E-12	-852.5E-12	1.2E-09	288.4E-12	-719.6E-12	-461.3E-12	-479.7E-12	-608.8E-12	-1.1E-09	-1.2E-09	848.7E-12
Statistics													
Min	-43.5E-12	-43.5E-12	-484.7E-12	-852.5E-12	16.0E-12	288.4E-12	-1.2E-09	-664.2E-12	-479.7E-12	-608.8E-12	-1.1E-09	-1.2E-09	848.7E-12
Max	83.6E-12	782.3E-12	1.1E-09	610.1E-12	2.1E-09	1.1E-09	922.5E-12	1.4E-09	202.9E-12	867.2E-12	2.5E-09	1.2E-09	1.8E-09
Average	13.4E-12	246.3E-12	498.1E-12	75.2E-12	1.1E-09	715.7E-12	-344.4E-12	98.4E-12	-153.7E-12	233.7E-12	430.5E-12	215.3E-12	1.5E-09
Sigma	52.7E-12	379.4E-12	699.0E-12	658.5E-12	870.7E-12	340.5E-12	920.3E-12	938.6E-12	279.5E-12	620.4E-12	1.5E-09	1.0E-09	435.9E-12

Drift Calculation

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.1E-09	610.1E-12	2.1E-09	737.1E-12	-1.2E-09	-664.2E-12	202.9E-12	867.2E-12	2.5E-09	664.2E-12	1.8E-09
34	-	698.7E-12	814.0E-12	384.5E-12	-67.6E-12	1.0E-09	838.9E-12	1.3E-09	-268.1E-12	359.2E-12	-157.4E-12	1.1E-09	1.7E-09
35	-	0.0E+00	-441.3E-12	-809.0E-12	1.2E-09	331.9E-12	-676.1E-12	-417.8E-12	-436.2E-12	-565.4E-12	-1.1E-09	-1.1E-09	892.1E-12
Average	-	232.9E-12	484.7E-12	61.8E-12	1.1E-09	702.3E-12	-357.8E-12	85.0E-12	-167.1E-12	220.3E-12	417.1E-12	201.9E-12	1.5E-09
Sigma	-	329.4E-12	663.8E-12	622.7E-12	907.1E-12	289.3E-12	876.5E-12	891.0E-12	270.5E-12	593.0E-12	1.5E-09	962.0E-12	399.9E-12

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02

Measurements

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	73.5E-12	3.0E-09	396.2E-12	366.1E-12	-259.6E-12	461.5E-12	-166.0E-12	110.7E-12	-719.5E-12	-664.2E-12	110.7E-12	-405.9E-12	738.0E-12
OFF PROTON samples													
30	4.3E-09	1.8E-09	2.6E-09	4.6E-09	320.5E-12	1.6E-09	-738.0E-12	3.3E-09	3.9E-09	5.4E-09	4.1E-09	4.2E-09	-2.2E-09
32	3.6E-09	3.2E-09	3.8E-09	4.1E-09	5.7E-09	6.5E-09	4.1E-09	6.8E-09	7.0E-09	3.3E-09	9.4E-09	1.7E-09	2.7E-09
39	-300.9E-12	2.3E-09	1.6E-09	-300.9E-12	1.4E-09	3.5E-09	3.7E-09	5.0E-09	3.0E-09	9.2E-09	-5.7E-09	2.1E-09	1.5E-09
Statistics													
Min	-300.9E-12	1.8E-09	1.6E-09	-300.9E-12	320.5E-12	1.6E-09	-738.0E-12	3.3E-09	3.0E-09	3.3E-09	-5.7E-09	1.7E-09	-2.2E-09
Max	4.3E-09	3.2E-09	3.8E-09	4.6E-09	5.7E-09	6.5E-09	4.1E-09	6.8E-09	7.0E-09	9.2E-09	9.4E-09	4.2E-09	2.7E-09
Average	2.5E-09	2.4E-09	2.7E-09	2.8E-09	2.5E-09	3.9E-09	2.3E-09	5.0E-09	4.6E-09	6.0E-09	2.6E-09	2.7E-09	664.2E-12
Sigma	2.0E-09	578.8E-12	902.5E-12	2.2E-09	2.3E-09	2.0E-09	2.2E-09	1.4E-09	1.7E-09	2.4E-09	6.3E-09	1.1E-09	2.1E-09

Drift Calculation

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-2.5E-09	-1.7E-09	300.9E-12	-4.0E-09	-2.7E-09	-5.1E-09	-1.0E-09	-454.8E-12	1.0E-09	-270.3E-12	-85.8E-12	-6.5E-09
32	-	-375.7E-12	234.0E-12	532.8E-12	2.2E-09	2.9E-09	481.8E-12	3.2E-09	3.4E-09	-256.2E-12	5.8E-09	-1.9E-09	-883.4E-12
39	-	2.6E-09	1.9E-09	-10.0E-15	1.7E-09	3.8E-09	4.0E-09	5.3E-09	3.3E-09	9.5E-09	-5.4E-09	2.4E-09	1.8E-09
Average	-	-102.9E-12	133.7E-12	277.9E-12	-35.5E-12	1.3E-09	-198.2E-12	2.5E-09	2.1E-09	3.4E-09	47.8E-12	122.8E-12	-1.9E-09
Sigma	-	2.1E-09	1.5E-09	218.1E-12	2.8E-09	2.9E-09	3.7E-09	2.6E-09	1.8E-09	4.3E-09	4.6E-09	1.8E-09	3.5E-09

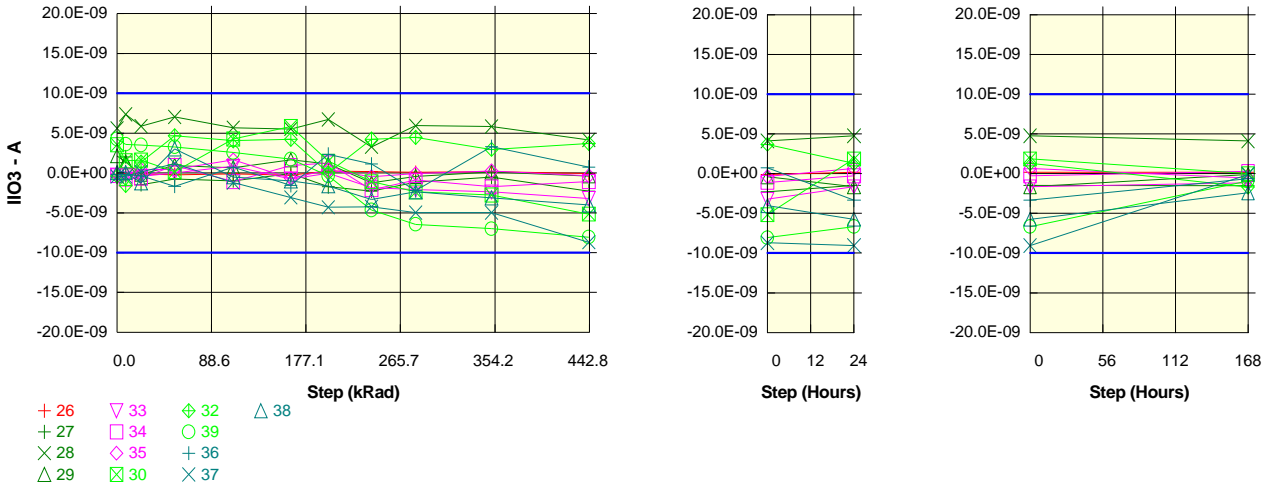
Measurements

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	73.5E-12	3.0E-09	396.2E-12	366.1E-12	-259.6E-12	461.5E-12	-166.0E-12	110.7E-12	-719.5E-12	-664.2E-12	110.7E-12	-405.9E-12	738.0E-12
OFF TID samples													
36	-247.4E-12	-247.4E-12	28.4E-12	-267.5E-12	-1.1E-09	-313.6E-12	1.5E-09	-2.2E-09	1.8E-09	-184.5E-12	-184.4E-12	-184.4E-12	-682.6E-12
37	83.6E-12	83.6E-12	-805.7E-12	2.6E-09	4.1E-09	5.2E-09	7.9E-09	110.7E-12	-2.0E-09	-2.8E-09	-2.1E-09	4.8E-09	6.8E-09
38	-354.4E-12	-687.0E-12	-986.2E-12	367.7E-12	-673.0E-12	1.5E-09	2.6E-09	977.8E-12	-738.0E-12	4.1E-09	184.5E-12	-922.4E-12	3.3E-09
Statistics													
Min	-354.4E-12	-687.0E-12	-986.2E-12	-267.5E-12	-1.1E-09	-313.6E-12	1.5E-09	-2.2E-09	-2.0E-09	-2.8E-09	-2.1E-09	-922.4E-12	-682.6E-12
Max	83.6E-12	83.6E-12	28.4E-12	2.6E-09	4.1E-09	5.2E-09	7.9E-09	977.8E-12	1.8E-09	4.1E-09	184.5E-12	4.8E-09	6.8E-09
Average	-172.7E-12	-283.6E-12	-587.8E-12	897.1E-12	801.2E-12	2.1E-09	4.0E-09	-362.8E-12	-307.5E-12	369.0E-12	-705.9E-12	1.2E-09	3.2E-09
Sigma	186.4E-12	315.6E-12	441.9E-12	1.2E-09	2.4E-09	2.3E-09	2.8E-09	1.3E-09	1.6E-09	2.8E-09	1.0E-09	2.5E-09	3.1E-09

Drift Calculation

IIO3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	275.8E-12	-20.1E-12	-810.2E-12	-66.2E-12	1.7E-09	-1.9E-09	2.1E-09	62.9E-12	63.0E-12	63.0E-12	-435.2E-12
37	-	0.0E+00	-889.3E-12	2.5E-09	4.1E-09	5.1E-09	7.8E-09	27.2E-12	-2.1E-09	-2.9E-09	-2.2E-09	4.7E-09	6.7E-09
38	-	-332.6E-12	-631.8E-12	722.1E-12	-318.6E-12	1.8E-09	3.0E-09	1.3E-09	-383.6E-12	4.4E-09	538.9E-12	-568.1E-12	3.7E-09
Average	-	-110.9E-12	-415.1E-12	1.1E-09	973.9E-12	2.3E-09	4.2E-09	-190.1E-12	-134.8E-12	541.7E-12	-533.2E-12	1.4E-09	3.3E-09
Sigma	-	156.8E-12	499.7E-12	1.1E-09	2.2E-09	2.1E-09	2.6E-09	1.3E-09	1.7E-09	3.0E-09	1.2E-09	2.4E-09	2.9E-09

Parameter : Input Offset Current : IIO3DUTB
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-150.4E-12	-66.9E-12	-133.7E-12	-217.3E-12	-112.2E-12	-304.4E-12	258.3E-12	166.1E-12	73.8E-12	166.1E-12	-92.3E-12	166.1E-12	166.1E-12
ON_PROTON samples													
27	-518.2E-12	2.0E-09	-1.5E-09	-785.6E-12	-993.4E-12	-96.2E-12	-1.7E-09	-2.3E-09	-1.1E-09	-535.1E-12	-2.3E-09	-1.5E-09	-1.5E-09
28	5.6E-09	7.4E-09	5.9E-09	7.0E-09	5.7E-09	5.5E-09	6.7E-09	3.3E-09	5.9E-09	5.8E-09	4.1E-09	4.8E-09	4.1E-09
29	2.1E-09	1.4E-09	-167.2E-12	936.1E-12	640.9E-12	1.6E-09	1.1E-09	-1.3E-09	-442.8E-12	129.2E-12	-387.5E-12	-1.6E-09	-73.8E-12
Statistics													
Min	-518.2E-12	1.4E-09	-1.5E-09	-785.6E-12	-993.4E-12	-96.2E-12	-1.7E-09	-2.3E-09	-1.1E-09	-535.1E-12	-2.3E-09	-1.6E-09	-1.5E-09
Max	5.6E-09	7.4E-09	5.9E-09	7.0E-09	5.7E-09	5.5E-09	6.7E-09	3.3E-09	5.9E-09	5.8E-09	4.1E-09	4.8E-09	4.1E-09
Average	2.4E-09	3.6E-09	1.4E-09	5.4E-09	1.8E-09	2.4E-09	2.0E-09	-104.5E-12	1.4E-09	1.8E-09	485.8E-12	559.6E-12	842.5E-12
Sigma	2.5E-09	2.7E-09	3.2E-09	3.4E-09	2.8E-09	2.3E-09	3.5E-09	2.4E-09	3.2E-09	2.9E-09	2.7E-09	3.0E-09	2.4E-09

Drift Calculation

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.5E-09	-952.8E-12	-267.4E-12	-475.2E-12	422.0E-12	-1.2E-09	-1.8E-09	-625.7E-12	-16.9E-12	-1.8E-09	-957.8E-12	-994.7E-12
28	-	1.8E-09	284.1E-12	1.5E-09	89.2E-12	-71.0E-12	1.1E-09	-2.3E-09	339.4E-12	247.1E-12	-1.5E-09	-804.5E-12	-1.5E-09
29	-	-752.2E-12	-2.3E-09	-1.2E-09	-1.5E-09	-505.2E-12	-1.0E-09	-3.4E-09	-2.6E-09	-2.0E-09	-2.5E-09	-3.8E-09	-2.2E-09
Average	-	1.2E-09	-991.8E-12	-5.6E-12	-628.2E-12	-51.4E-12	-365.8E-12	-2.5E-09	-956.2E-12	-593.4E-12	-1.9E-09	-1.8E-09	-1.6E-09
Sigma	-	1.4E-09	1.1E-09	1.1E-09	657.2E-12	378.8E-12	1.1E-09	676.5E-12	1.2E-09	1.0E-09	451.6E-12	1.4E-09	501.6E-12

Measurements

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-150.4E-12	-66.9E-12	-133.7E-12	-217.3E-12	-112.2E-12	-304.4E-12	258.3E-12	166.1E-12	73.8E-12	166.1E-12	-92.3E-12	166.1E-12	166.1E-12
ON_TID samples													
33	-262.4E-12	-262.4E-12	-434.6E-12	0.0E+00	833.2E-12	-769.1E-12	-18.5E-12	-1.8E-09	-2.1E-09	-2.4E-09	-3.2E-09	-1.6E-09	-1.1E-09
34	-344.3E-12	-768.9E-12	-635.2E-12	952.8E-12	-1.1E-09	929.3E-12	1.3E-09	-2.1E-09	-885.6E-12	-1.8E-09	-1.1E-09	-276.7E-12	276.7E-12
35	-177.2E-12	-177.2E-12	391.1E-12	468.0E-12	1.6E-09	-673.0E-12	387.4E-12	-479.7E-12	-92.2E-12	221.4E-12	-369.0E-12	664.2E-12	-553.5E-12
Statistics													
Min	-344.3E-12	-768.9E-12	-635.2E-12	0.0E+00	-1.1E-09	-769.1E-12	-18.5E-12	-2.1E-09	-2.1E-09	-2.4E-09	-3.2E-09	-1.6E-09	-1.1E-09
Max	-177.2E-12	-177.2E-12	391.1E-12	952.8E-12	1.6E-09	929.3E-12	1.3E-09	-479.7E-12	-92.2E-12	221.4E-12	-369.0E-12	664.2E-12	276.7E-12
Average	-261.3E-12	-402.8E-12	-226.2E-12	473.6E-12	461.3E-12	-170.9E-12	541.2E-12	-1.5E-09	-1.0E-09	-1.3E-09	-1.6E-09	-418.2E-12	-473.6E-12
Sigma	68.2E-12	261.2E-12	444.1E-12	389.0E-12	1.1E-09	779.0E-12	531.0E-12	714.7E-12	819.1E-12	1.1E-09	1.2E-09	946.8E-12	582.7E-12

Drift Calculation

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-172.2E-12	262.4E-12	1.1E-09	-506.7E-12	244.0E-12	-1.6E-09	-1.8E-09	-2.1E-09	-2.9E-09	-1.4E-09	-881.5E-12
34	-	-424.6E-12	-290.8E-12	1.3E-09	-745.2E-12	1.3E-09	1.6E-09	-1.8E-09	-541.2E-12	-1.4E-09	-744.2E-12	67.6E-12	621.1E-12
35	-	0.0E+00	568.3E-12	645.2E-12	1.8E-09	-495.8E-12	564.6E-12	-302.5E-12	85.0E-12	398.6E-12	-191.8E-12	841.3E-12	-376.3E-12
Average	-	-141.5E-12	35.1E-12	734.9E-12	722.6E-12	90.4E-12	802.5E-12	-1.2E-09	-759.6E-12	-1.0E-09	-1.3E-09	-156.9E-12	-212.2E-12
Sigma	-	200.1E-12	380.1E-12	427.1E-12	1.1E-09	836.7E-12	578.2E-12	650.8E-12	793.8E-12	1.1E-09	1.2E-09	920.5E-12	624.3E-12

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02

Measurements

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-150.4E-12	-66.9E-12	-133.7E-12	-217.3E-12	-112.2E-12	-304.4E-12	258.3E-12	166.1E-12	73.8E-12	166.1E-12	-92.3E-12	166.1E-12	166.1E-12
OFF_PROTON samples													
30	3.5E-09	1.5E-09	1.6E-09	167.1E-12	4.3E-09	5.8E-09	1.5E-09	-1.1E-09	-2.4E-09	-2.8E-09	-5.2E-09	1.8E-09	0.0E+00
32	-417.9E-12	-1.6E-09	1.4E-09	4.7E-09	4.0E-09	4.2E-09	0.0E+00	4.2E-09	4.5E-09	3.0E-09	3.7E-09	1.3E-09	-1.7E-09
39	4.2E-09	3.6E-09	3.5E-09	3.3E-09	2.6E-09	1.7E-09	-368.9E-12	-4.7E-09	-6.5E-09	-7.0E-09	-8.1E-09	-6.6E-09	-922.5E-12
Statistics													
Min	-417.9E-12	-1.6E-09	1.4E-09	167.1E-12	2.6E-09	1.7E-09	-368.9E-12	-4.7E-09	-6.5E-09	-7.0E-09	-8.1E-09	-6.6E-09	-1.7E-09
Max	4.2E-09	3.6E-09	3.5E-09	4.7E-09	4.3E-09	5.8E-09	1.5E-09	4.2E-09	4.5E-09	3.0E-09	3.7E-09	1.8E-09	0.0E+00
Average	2.5E-09	1.2E-09	2.2E-09	2.7E-09	3.6E-09	3.9E-09	369.0E-12	-511.6E-12	-1.5E-09	-2.3E-09	-3.2E-09	-1.2E-09	-867.2E-12
Sigma	2.1E-09	2.1E-09	948.1E-12	1.9E-09	753.4E-12	1.7E-09	797.1E-12	3.7E-09	4.5E-09	4.1E-09	5.0E-09	3.9E-09	686.5E-12

Drift Calculation

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-2.0E-09	-1.9E-09	-3.4E-09	718.5E-12	2.3E-09	-2.1E-09	-4.7E-09	-5.9E-09	-6.3E-09	-8.7E-09	-1.7E-09	-3.5E-09
32	-	-1.2E-09	1.8E-09	5.1E-09	4.5E-09	4.6E-09	417.9E-12	4.7E-09	4.9E-09	3.4E-09	4.1E-09	1.7E-09	-1.3E-09
39	-	-651.9E-12	-752.2E-12	-969.5E-12	-1.7E-09	-2.5E-09	-4.6E-09	-8.9E-09	-10.7E-09	-11.3E-09	-12.3E-09	-10.9E-09	-5.2E-09
Average	-	-1.3E-09	-297.0E-12	250.7E-12	1.2E-09	1.5E-09	-2.1E-09	-3.0E-09	-3.9E-09	-4.7E-09	-5.6E-09	-3.6E-09	-3.3E-09
Sigma	-	566.3E-12	1.6E-09	3.6E-09	2.5E-09	3.0E-09	2.1E-09	5.7E-09	6.5E-09	6.1E-09	7.0E-09	5.3E-09	1.6E-09

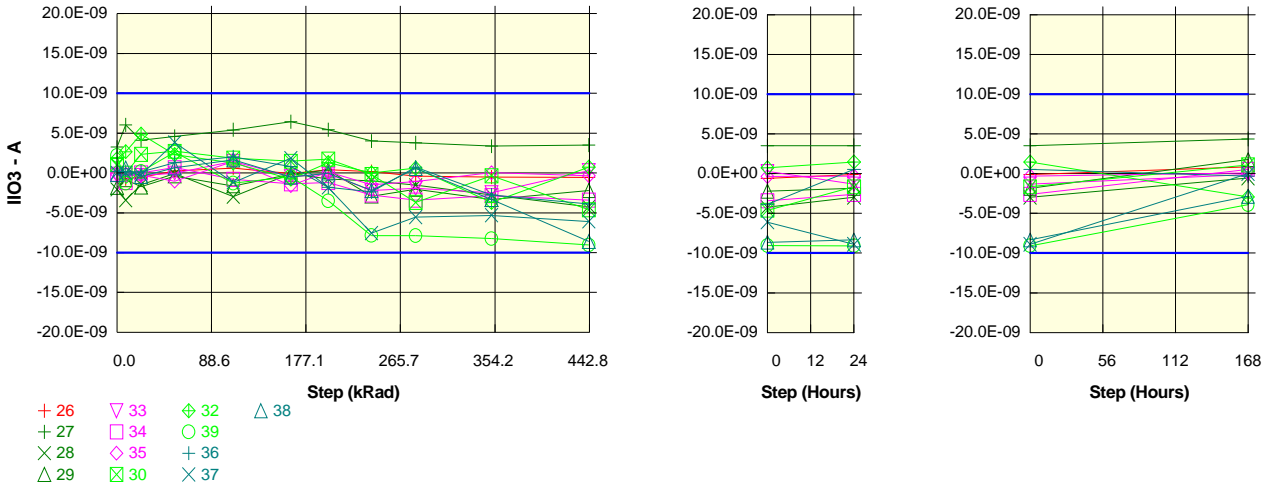
Measurements

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-150.4E-12	-66.9E-12	-133.7E-12	-217.3E-12	-112.2E-12	-304.4E-12	258.3E-12	166.1E-12	73.8E-12	166.1E-12	-92.3E-12	166.1E-12	166.1E-12
OFF_TID samples													
36	-195.6E-12	-195.6E-12	-367.7E-12	-1.7E-09	705.0E-12	-1.6E-09	2.3E-09	1.1E-09	-2.2E-09	3.3E-09	737.9E-12	-3.3E-09	-645.7E-12
37	-466.4E-12	-466.4E-12	145.4E-12	1.2E-09	-1.2E-09	-3.1E-09	-4.3E-09	-4.2E-09	-5.0E-09	-5.0E-09	-8.7E-09	-9.0E-09	-92.3E-12
38	41.8E-12	70.2E-12	-1.2E-09	3.0E-09	-512.8E-12	-1.0E-09	-1.6E-09	-3.3E-09	-2.4E-09	-3.1E-09	-4.0E-09	-5.7E-09	-2.4E-09
Statistics													
Min	-466.4E-12	-466.4E-12	-1.2E-09	-1.7E-09	-1.2E-09	-3.1E-09	-4.3E-09	-4.2E-09	-5.0E-09	-5.0E-09	-8.7E-09	-9.0E-09	-2.4E-09
Max	41.8E-12	70.2E-12	145.4E-12	3.0E-09	705.0E-12	-1.0E-09	2.3E-09	1.1E-09	-2.2E-09	3.3E-09	737.9E-12	-3.3E-09	-92.3E-12
Average	-206.7E-12	-197.2E-12	-486.4E-12	835.8E-12	-341.8E-12	-1.9E-09	-1.2E-09	-2.2E-09	-3.2E-09	-1.6E-09	-4.0E-09	-6.0E-09	-1.1E-09
Sigma	207.6E-12	219.1E-12	570.6E-12	1.9E-09	794.2E-12	873.4E-12	2.7E-09	2.3E-09	1.3E-09	3.6E-09	3.9E-09	2.3E-09	991.5E-12

Drift Calculation

IIO3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-172.2E-12	-1.5E-09	900.6E-12	-1.4E-09	2.5E-09	1.3E-09	-2.0E-09	3.5E-09	933.5E-12	-3.1E-09	-450.2E-12
37	-	0.0E+00	611.8E-12	1.6E-09	-751.4E-12	-2.6E-09	-3.9E-09	-3.8E-09	-4.5E-09	-4.5E-09	-8.2E-09	-8.6E-09	374.1E-12
38	-	28.4E-12	-1.3E-09	3.0E-09	-554.5E-12	-1.1E-09	-1.7E-09	-3.4E-09	-2.4E-09	-3.2E-09	-4.1E-09	-5.8E-09	-2.5E-09
Average	-	9.5E-12	-279.7E-12	1.0E-09	-135.1E-12	-1.7E-09	-998.7E-12	-1.9E-09	-3.0E-09	-1.4E-09	-3.8E-09	-5.8E-09	-844.9E-12
Sigma	-	13.4E-12	775.5E-12	1.9E-09	736.8E-12	672.5E-12	2.6E-09	2.3E-09	1.1E-09	3.5E-09	3.7E-09	2.2E-09	1.2E-09

Parameter : Input Offset Current : IIO3DUTC
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	11.7E-12	-723.8E-12	-539.9E-12	254.1E-12	628.1E-12	-64.1E-12	387.4E-12	166.0E-12	-387.4E-12	-516.6E-12	-571.9E-12	-73.8E-12	885.6E-12
ON_PROTON samples													
27	3.2E-09	6.0E-09	4.1E-09	4.6E-09	5.4E-09	6.4E-09	5.4E-09	4.0E-09	3.8E-09	3.4E-09	3.5E-09	3.5E-09	4.4E-09
28	-2.1E-09	-3.4E-09	-1.5E-09	-83.6E-12	-3.0E-09	-64.1E-12	-756.4E-12	-1.0E-09	-1.5E-09	-2.7E-09	-4.2E-09	-3.0E-09	-553.5E-12
29	-1.8E-09	-835.8E-12	-1.8E-09	-384.5E-12	-1.6E-09	-160.3E-12	369.0E-12	-2.9E-09	-2.1E-09	-3.3E-09	-2.2E-09	-1.8E-09	1.8E-09
Statistics													
Min	-2.1E-09	-3.4E-09	-1.8E-09	-384.5E-12	-3.0E-09	-160.3E-12	-756.4E-12	-2.9E-09	-2.1E-09	-3.3E-09	-4.2E-09	-3.0E-09	-553.5E-12
Max	3.2E-09	6.0E-09	4.1E-09	4.6E-09	5.4E-09	6.4E-09	5.4E-09	4.0E-09	3.8E-09	3.4E-09	3.5E-09	3.5E-09	4.4E-09
Average	-212.8E-12	590.6E-12	295.3E-12	1.4E-09	267.1E-12	2.1E-09	1.7E-09	24.6E-12	55.4E-12	-904.0E-12	-984.0E-12	-430.5E-12	1.9E-09
Sigma	2.4E-09	4.0E-09	2.7E-09	2.3E-09	3.7E-09	3.1E-09	2.7E-09	2.9E-09	2.6E-09	3.0E-09	3.3E-09	2.8E-09	2.0E-09

Drift Calculation

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.8E-09	885.9E-12	1.3E-09	2.2E-09	3.2E-09	2.2E-09	760.8E-12	521.0E-12	115.0E-12	262.7E-12	281.1E-12	1.1E-09
28	-	-1.4E-09	588.4E-12	2.0E-09	-904.3E-12	2.0E-09	1.3E-09	1.1E-09	544.7E-12	-672.9E-12	-2.2E-09	-894.3E-12	1.5E-09
29	-	969.5E-12	50.1E-12	1.4E-09	170.9E-12	1.6E-09	2.2E-09	-1.1E-09	-261.1E-12	-1.5E-09	-408.7E-12	-39.8E-12	3.6E-09
Average	-	803.5E-12	508.1E-12	1.6E-09	479.9E-12	2.3E-09	1.9E-09	237.4E-12	268.2E-12	-691.2E-12	-771.1E-12	-217.7E-12	2.1E-09
Sigma	-	1.7E-09	345.9E-12	291.2E-12	1.3E-09	663.0E-12	404.6E-12	960.5E-12	374.4E-12	665.9E-12	1.0E-09	496.1E-12	1.1E-09

Measurements

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	11.7E-12	-723.8E-12	-539.9E-12	254.1E-12	628.1E-12	-64.1E-12	387.4E-12	166.0E-12	-387.4E-12	-516.6E-12	-571.9E-12	-73.8E-12	885.6E-12
ON_TID samples													
33	-320.9E-12	-320.9E-12	-322.6E-12	-16.7E-12	1.4E-09	-480.7E-12	-129.2E-12	-2.2E-09	-1.9E-09	-2.5E-09	276.7E-12	-1.3E-09	-110.7E-12
34	-168.8E-12	-1.2E-09	-6.7E-12	668.6E-12	-801.2E-12	-1.4E-09	-1.2E-09	-2.8E-09	-3.4E-09	-2.8E-09	-3.4E-09	-2.6E-09	535.0E-12
35	-167.2E-12	-167.2E-12	-284.2E-12	-1.0E-09	1.4E-09	-1.6E-09	147.6E-12	-1.5E-09	-1.1E-09	18.4E-12	-350.5E-12	-295.2E-12	110.7E-12
Statistics													
Min	-320.9E-12	-1.2E-09	-322.6E-12	-1.0E-09	-801.2E-12	-1.6E-09	-1.2E-09	-2.8E-09	-3.4E-09	-2.8E-09	-3.4E-09	-2.6E-09	-110.7E-12
Max	-167.2E-12	-167.2E-12	-6.7E-12	668.6E-12	1.4E-09	-480.7E-12	147.6E-12	-1.5E-09	-1.1E-09	18.4E-12	276.7E-12	-295.2E-12	535.0E-12
Average	-219.0E-12	-563.9E-12	-204.5E-12	-124.2E-12	691.5E-12	-1.1E-09	-399.7E-12	-2.2E-09	-2.1E-09	-1.8E-09	-1.2E-09	-1.4E-09	178.3E-12
Sigma	72.1E-12	456.6E-12	140.7E-12	695.4E-12	1.1E-09	472.0E-12	589.3E-12	536.9E-12	961.8E-12	1.3E-09	1.6E-09	943.7E-12	267.9E-12

Drift Calculation

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-1.7E-12	304.2E-12	1.8E-09	-159.8E-12	191.8E-12	-1.9E-09	-1.6E-09	-2.2E-09	597.7E-12	-989.0E-12	210.2E-12
34	-	-1.0E-09	162.1E-12	837.4E-12	-632.3E-12	-1.2E-09	-1.0E-09	-2.6E-09	-3.2E-09	-2.7E-09	-3.2E-09	-2.4E-09	703.9E-12
35	-	0.0E+00	-117.0E-12	-857.5E-12	1.6E-09	-1.4E-09	314.8E-12	-1.3E-09	-921.4E-12	185.6E-12	-183.4E-12	-128.0E-12	277.9E-12
Average	-	-344.9E-12	14.5E-12	94.7E-12	910.5E-12	-920.8E-12	-180.8E-12	-1.9E-09	-1.9E-09	-1.5E-09	-943.4E-12	-1.2E-09	397.3E-12
Sigma	-	487.8E-12	114.5E-12	707.6E-12	1.1E-09	543.4E-12	615.9E-12	534.6E-12	975.5E-12	1.2E-09	1.7E-09	950.8E-12	218.5E-12

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	11.7E-12	-723.8E-12	-539.9E-12	254.1E-12	628.1E-12	-64.1E-12	387.4E-12	166.0E-12	-387.4E-12	-516.6E-12	-571.9E-12	-73.8E-12	885.6E-12
OFF PROTON samples													
30	1.0E-09	-16.7E-12	2.3E-09	2.7E-09	1.9E-09	1.5E-09	1.7E-09	-184.5E-12	-3.7E-09	-368.8E-12	-4.6E-09	-1.7E-09	1.1E-09
32	1.8E-09	2.7E-09	4.9E-09	2.3E-09	1.2E-09	-774.8E-12	1.3E-09	0.0E+00	612.4E-12	-3.7E-09	738.1E-12	1.5E-09	-2.9E-09
39	2.2E-09	-1.3E-09	167.2E-12	2.6E-09	-1.3E-09	-479.7E-12	-3.5E-09	-7.9E-09	-7.9E-09	-8.3E-09	-9.1E-09	-9.1E-09	-3.9E-09
Statistics													
Min	1.0E-09	-1.3E-09	167.2E-12	2.3E-09	-1.3E-09	-774.8E-12	-3.5E-09	-7.9E-09	-7.9E-09	-8.3E-09	-9.1E-09	-9.1E-09	-3.9E-09
Max	2.2E-09	2.7E-09	4.9E-09	2.7E-09	1.9E-09	1.5E-09	1.7E-09	0.0E+00	612.4E-12	-368.8E-12	738.1E-12	1.5E-09	1.1E-09
Average	1.7E-09	451.3E-12	2.5E-09	2.5E-09	608.9E-12	73.8E-12	-164.8E-12	-2.7E-09	-3.7E-09	-4.1E-09	-4.3E-09	-3.1E-09	-1.9E-09
Sigma	475.9E-12	1.7E-09	1.9E-09	170.7E-12	1.4E-09	998.8E-12	2.4E-09	3.7E-09	3.5E-09	3.2E-09	4.0E-09	4.4E-09	2.2E-09

Drift Calculation

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-1.1E-09	1.3E-09	1.7E-09	822.3E-12	439.6E-12	683.1E-12	-1.2E-09	-4.7E-09	-1.4E-09	-5.6E-09	-2.7E-09	70.6E-12
32	-	869.2E-12	3.1E-09	496.5E-12	-555.5E-12	-2.6E-09	-513.8E-12	-1.8E-09	-1.2E-09	-5.5E-09	-1.1E-09	-329.3E-12	-4.7E-09
39	-	-3.5E-09	-2.0E-09	411.2E-12	-3.5E-09	-2.7E-09	-5.7E-09	-10.0E-09	-10.1E-09	-10.4E-09	-11.2E-09	-11.2E-09	-6.1E-09
Average	-	-1.2E-09	783.4E-12	859.7E-12	-1.1E-09	-1.6E-09	-1.8E-09	-4.4E-09	-5.3E-09	-5.8E-09	-6.0E-09	-4.8E-09	-3.6E-09
Sigma	-	1.8E-09	2.1E-09	575.1E-12	1.8E-09	1.4E-09	2.8E-09	4.0E-09	3.6E-09	3.7E-09	4.2E-09	4.7E-09	2.6E-09

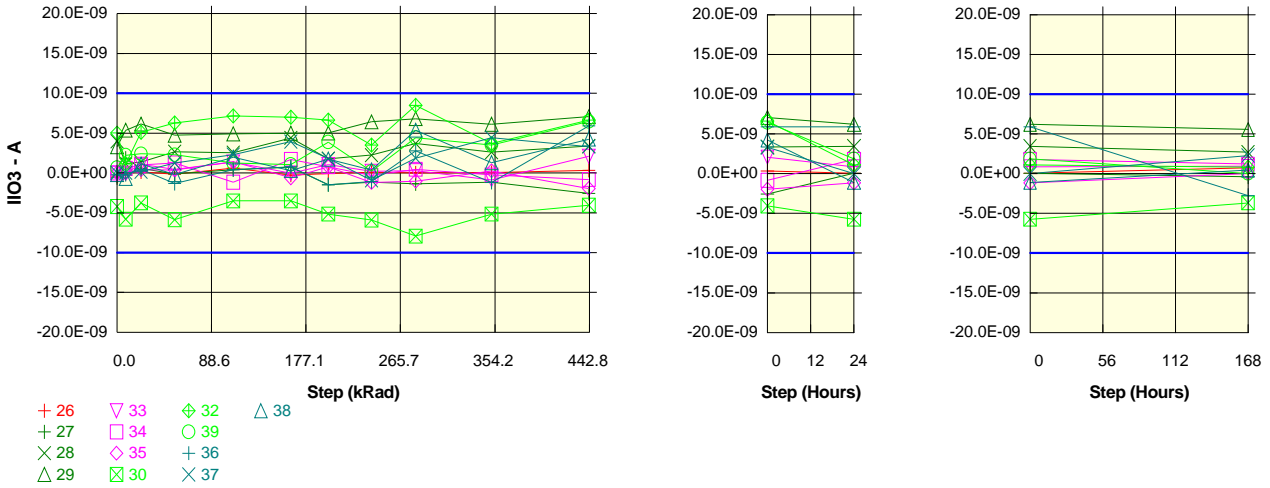
Measurements

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	11.7E-12	-723.8E-12	-539.9E-12	254.1E-12	628.1E-12	-64.1E-12	387.4E-12	166.0E-12	-387.4E-12	-516.6E-12	-571.9E-12	-73.8E-12	885.6E-12
OFF TID samples													
36	167.2E-12	167.2E-12	118.7E-12	1.3E-09	2.0E-09	811.8E-12	-1.8E-09	-2.4E-09	737.9E-12	-2.8E-09	-3.9E-09	553.4E-12	-295.2E-12
37	33.4E-12	33.4E-12	-250.7E-12	3.8E-09	-1.2E-09	1.8E-09	-1.8E-09	-7.6E-09	-5.5E-09	-5.3E-09	-6.1E-09	-8.9E-09	0.0E+00
38	-200.6E-12	626.8E-12	-446.3E-12	635.2E-12	1.6E-09	-535.1E-12	-18.4E-12	-2.2E-09	553.5E-12	-3.3E-09	-8.6E-09	-8.3E-09	-2.9E-09
Statistics													
Min	-200.6E-12	33.4E-12	-446.3E-12	635.2E-12	-1.2E-09	-535.1E-12	-1.8E-09	-7.6E-09	-5.5E-09	-5.3E-09	-8.6E-09	-8.9E-09	-2.9E-09
Max	167.2E-12	626.8E-12	118.7E-12	3.8E-09	2.0E-09	1.8E-09	-18.4E-12	-2.2E-09	737.9E-12	-2.8E-09	-3.9E-09	553.4E-12	0.0E+00
Average	-1.2E-18	275.8E-12	-192.8E-12	1.9E-09	822.5E-12	707.2E-12	-1.2E-09	-4.1E-09	-1.4E-09	-3.8E-09	-6.2E-09	-5.6E-09	-1.1E-09
Sigma	152.0E-12	254.1E-12	234.3E-12	1.4E-09	1.4E-09	974.4E-12	848.3E-12	2.5E-09	2.9E-09	1.1E-09	1.9E-09	4.3E-09	1.3E-09

Drift Calculation

IIO3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-48.5E-12	1.1E-09	1.9E-09	644.6E-12	-2.0E-09	-2.6E-09	570.7E-12	-2.9E-09	-4.0E-09	386.2E-12	-462.4E-12
37	-	0.0E+00	-284.2E-12	3.8E-09	-1.2E-09	1.8E-09	-1.9E-09	-7.6E-09	-5.6E-09	-5.4E-09	-6.1E-09	-8.9E-09	-33.4E-12
38	-	827.4E-12	-245.7E-12	835.8E-12	1.8E-09	-334.5E-12	182.2E-12	-2.0E-09	754.1E-12	-3.1E-09	-8.4E-09	-8.1E-09	-2.7E-09
Average	-	275.8E-12	-192.8E-12	1.9E-09	822.5E-12	707.2E-12	-1.2E-09	-4.1E-09	-1.4E-09	-3.8E-09	-6.2E-09	-5.6E-09	-1.1E-09
Sigma	-	390.0E-12	103.2E-12	1.3E-09	1.4E-09	877.2E-12	990.4E-12	2.5E-09	2.9E-09	1.1E-09	1.8E-09	4.2E-09	1.2E-09

Parameter : Input Offset Current : IIO3DUTD
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-381.1E-12	-58.5E-12	107.0E-12	-162.1E-12	589.7E-12	-294.8E-12	-55.3E-12	92.3E-12	0.0E+00	36.9E-12	332.1E-12	73.8E-12	738.0E-12
ON_PROTON samples													
27	-601.8E-12	1.9E-09	585.0E-12	-117.0E-12	384.5E-12	737.0E-12	-1.5E-09	-1.1E-09	-1.4E-09	-1.2E-09	-2.6E-09	73.8E-12	-387.4E-12
28	4.0E-09	1.2E-09	1.4E-09	2.6E-09	2.5E-09	4.4E-09	1.8E-09	2.2E-09	3.7E-09	2.6E-09	3.4E-09	3.4E-09	2.7E-09
29	3.3E-09	5.3E-09	6.1E-09	4.7E-09	4.9E-09	5.0E-09	5.0E-09	6.4E-09	6.8E-09	6.1E-09	7.1E-09	6.2E-09	5.6E-09
Statistics													
Min	-601.8E-12	1.2E-09	585.0E-12	-117.0E-12	384.5E-12	737.0E-12	-1.5E-09	-1.1E-09	-1.4E-09	-1.2E-09	-2.6E-09	73.8E-12	-387.4E-12
Max	4.0E-09	5.3E-09	6.1E-09	4.7E-09	4.9E-09	5.0E-09	5.0E-09	6.4E-09	6.8E-09	6.1E-09	7.1E-09	6.2E-09	5.6E-09
Average	2.2E-09	2.8E-09	2.7E-09	2.4E-09	2.6E-09	3.4E-09	1.8E-09	2.5E-09	3.1E-09	2.5E-09	3.2E-09	2.6E-09	2.6E-09
Sigma	2.0E-09	1.8E-09	2.5E-09	2.0E-09	1.8E-09	1.9E-09	2.7E-09	3.1E-09	3.4E-09	3.0E-09	4.0E-09	2.5E-09	2.4E-09

Drift Calculation

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.5E-09	1.2E-09	484.7E-12	986.3E-12	1.3E-09	-892.7E-12	-542.1E-12	-763.6E-12	-579.0E-12	-2.0E-09	675.5E-12	214.3E-12
28	-	-2.8E-09	-2.6E-09	-1.3E-09	-1.4E-09	412.1E-12	-2.2E-09	-1.7E-09	-269.9E-12	-1.4E-09	-601.9E-12	-546.6E-12	-1.3E-09
29	-	2.1E-09	2.8E-09	1.5E-09	1.6E-09	1.7E-09	1.7E-09	3.1E-09	3.5E-09	2.8E-09	3.8E-09	2.9E-09	2.3E-09
Average	-	573.9E-12	473.6E-12	200.6E-12	383.3E-12	1.1E-09	-458.1E-12	279.9E-12	827.2E-12	292.2E-12	402.9E-12	1.0E-09	409.0E-12
Sigma	-	2.4E-09	2.3E-09	1.2E-09	1.3E-09	540.1E-12	1.6E-09	2.1E-09	1.9E-09	1.8E-09	2.4E-09	1.4E-09	1.5E-09

Measurements

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-381.1E-12	-58.5E-12	107.0E-12	-162.1E-12	589.7E-12	-294.8E-12	-55.3E-12	92.3E-12	0.0E+00	36.9E-12	332.1E-12	73.8E-12	738.0E-12
ON_TID samples													
33	-33.4E-12	-33.4E-12	1.1E-09	468.0E-12	1.4E-09	-32.1E-12	1.0E-09	202.9E-12	276.7E-12	-867.2E-12	2.1E-09	867.1E-12	940.9E-12
34	-6.7E-12	551.6E-12	996.2E-12	1.3E-09	-1.2E-09	1.7E-09	774.9E-12	-313.6E-12	461.3E-12	-258.3E-12	-830.3E-12	1.8E-09	1.2E-09
35	0.0E+00	0.0E+00	414.5E-12	376.1E-12	1.4E-09	-608.9E-12	793.3E-12	-1.2E-09	-1.0E-09	258.3E-12	-2.0E-09	-1.2E-09	18.5E-12
Statistics													
Min	-33.4E-12	-33.4E-12	414.5E-12	376.1E-12	-1.2E-09	-608.9E-12	774.9E-12	-1.2E-09	-1.0E-09	-867.2E-12	-2.0E-09	-1.2E-09	18.5E-12
Max	0.0E+00	551.6E-12	1.1E-09	1.3E-09	1.4E-09	1.7E-09	1.0E-09	202.9E-12	461.3E-12	258.3E-12	2.1E-09	1.8E-09	1.2E-09
Average	-13.4E-12	172.7E-12	829.6E-12	699.3E-12	527.3E-12	352.5E-12	867.1E-12	-436.6E-12	-98.4E-12	-289.0E-12	-233.7E-12	498.1E-12	725.7E-12
Sigma	14.4E-12	268.3E-12	295.4E-12	393.8E-12	1.2E-09	980.4E-12	117.7E-12	579.0E-12	665.3E-12	460.0E-12	1.7E-09	1.2E-09	512.7E-12

Drift Calculation

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.1E-09	501.5E-12	1.4E-09	1.4E-12	1.1E-09	236.4E-12	310.2E-12	-833.7E-12	2.1E-09	900.5E-12	974.4E-12
34	-	558.3E-12	1.0E-09	1.3E-09	-1.2E-09	1.7E-09	781.6E-12	-306.9E-12	467.9E-12	-251.6E-12	-823.6E-12	1.8E-09	1.2E-09
35	-	0.0E+00	414.5E-12	376.1E-12	1.4E-09	-608.9E-12	793.3E-12	-1.2E-09	-1.0E-09	258.3E-12	-2.0E-09	-1.2E-09	18.5E-12
Average	-	186.1E-12	843.0E-12	712.6E-12	540.7E-12	365.9E-12	880.5E-12	-423.3E-12	-85.0E-12	-275.7E-12	-220.3E-12	511.5E-12	739.1E-12
Sigma	-	263.2E-12	306.2E-12	390.7E-12	1.2E-09	979.2E-12	131.7E-12	591.8E-12	673.6E-12	446.2E-12	1.7E-09	1.2E-09	519.7E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-381.1E-12	-58.5E-12	107.0E-12	-162.1E-12	589.7E-12	-294.8E-12	-55.3E-12	92.3E-12	0.0E+00	36.9E-12	332.1E-12	73.8E-12	738.0E-12
OFF PROTON samples													
30	-4.2E-09	-5.8E-09	-3.8E-09	-5.9E-09	-3.5E-09	-3.5E-09	-5.2E-09	-5.9E-09	-7.9E-09	-5.2E-09	-4.1E-09	-5.7E-09	-3.7E-09
32	5.0E-09	1.1E-09	5.1E-09	6.3E-09	7.1E-09	7.0E-09	6.6E-09	3.5E-09	8.5E-09	3.7E-09	6.6E-09	1.1E-09	811.8E-12
39	650.2E-12	2.2E-09	2.4E-09	2.3E-09	1.2E-09	1.1E-09	3.9E-09	184.4E-12	4.4E-09	3.5E-09	6.5E-09	1.8E-09	18.5E-12
Statistics													
Min	-4.2E-09	-5.8E-09	-3.8E-09	-5.9E-09	-3.5E-09	-3.5E-09	-5.2E-09	-5.9E-09	-7.9E-09	-5.2E-09	-4.1E-09	-5.7E-09	-3.7E-09
Max	5.0E-09	2.2E-09	5.1E-09	6.3E-09	7.1E-09	7.0E-09	6.6E-09	3.5E-09	8.5E-09	3.7E-09	6.6E-09	1.8E-09	811.8E-12
Average	478.6E-12	-830.2E-12	1.2E-09	897.1E-12	1.6E-09	1.5E-09	1.8E-09	-738.0E-12	1.7E-09	676.5E-12	3.0E-09	-922.5E-12	-953.2E-12
Sigma	3.8E-09	3.6E-09	3.7E-09	5.1E-09	4.4E-09	4.3E-09	5.0E-09	3.9E-09	7.0E-09	4.1E-09	5.0E-09	3.4E-09	2.0E-09

Drift Calculation

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-1.6E-09	468.0E-12	-1.6E-09	703.9E-12	723.5E-12	-936.9E-12	-1.7E-09	-3.7E-09	-936.9E-12	170.1E-12	-1.5E-09	539.1E-12
32	-	-3.9E-09	83.6E-12	1.3E-09	2.1E-09	2.0E-09	1.6E-09	-1.5E-09	3.5E-09	-1.3E-09	1.6E-09	-3.9E-09	-4.2E-09
39	-	1.6E-09	1.7E-09	1.6E-09	599.6E-12	401.4E-12	3.2E-09	-465.8E-12	3.8E-09	2.9E-09	5.8E-09	1.2E-09	-631.8E-12
Average	-	-1.3E-09	763.9E-12	418.4E-12	1.1E-09	1.0E-09	1.3E-09	-1.2E-09	1.2E-09	197.9E-12	2.5E-09	-1.4E-09	-1.4E-09
Sigma	-	2.2E-09	707.9E-12	1.5E-09	699.0E-12	680.0E-12	1.7E-09	535.2E-12	3.5E-09	1.9E-09	2.4E-09	2.1E-09	2.0E-09

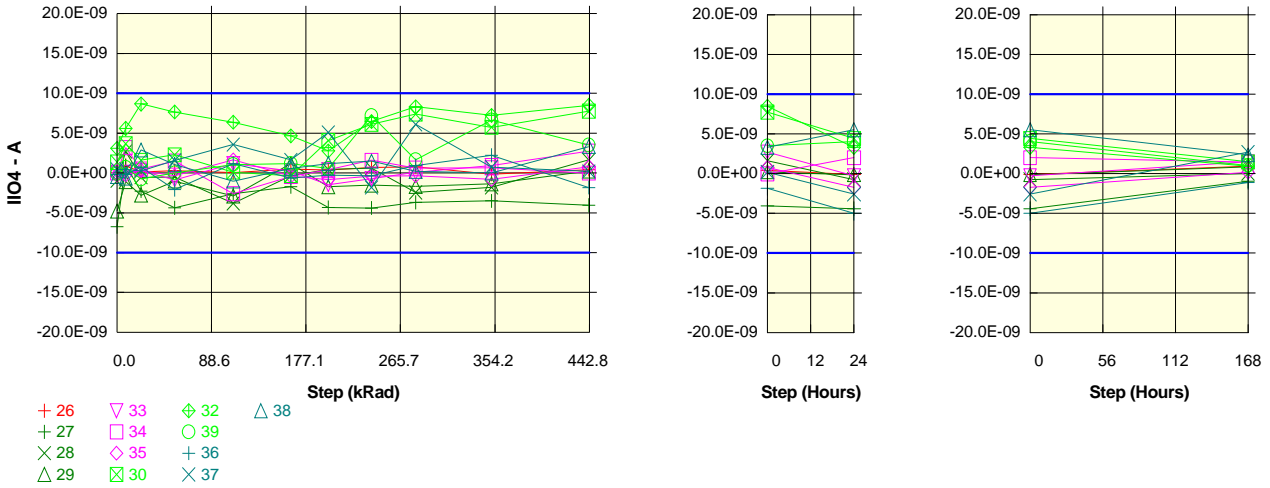
Measurements

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-381.1E-12	-58.5E-12	107.0E-12	-162.1E-12	589.7E-12	-294.8E-12	-55.3E-12	92.3E-12	0.0E+00	36.9E-12	332.1E-12	73.8E-12	738.0E-12
OFF TID samples													
36	-220.6E-12	-220.6E-12	451.3E-12	-1.3E-09	384.6E-12	756.4E-12	-1.5E-09	-1.1E-09	2.8E-09	-1.2E-09	5.9E-09	5.9E-09	-2.7E-09
37	26.7E-12	26.7E-12	167.2E-12	1.3E-09	2.3E-09	3.9E-09	1.8E-09	-922.5E-12	1.8E-09	4.4E-09	3.3E-09	0.0E+00	2.3E-09
38	-235.7E-12	-703.7E-12	1.1E-09	-200.6E-12	2.0E-09	295.2E-12	1.7E-09	368.9E-12	5.4E-09	1.3E-09	4.2E-09	-1.1E-09	442.8E-12
Statistics													
Min	-235.7E-12	-703.7E-12	167.2E-12	-1.3E-09	384.6E-12	295.2E-12	-1.5E-09	-1.1E-09	1.8E-09	-1.2E-09	3.3E-09	-1.1E-09	-2.7E-09
Max	26.7E-12	26.7E-12	1.1E-09	1.3E-09	2.3E-09	3.9E-09	1.8E-09	368.9E-12	5.4E-09	4.4E-09	5.9E-09	5.9E-09	2.3E-09
Average	-143.2E-12	-299.2E-12	573.9E-12	-89.2E-12	1.6E-09	1.7E-09	676.5E-12	-547.4E-12	3.3E-09	1.5E-09	4.5E-09	1.6E-09	-6.1E-12
Sigma	120.3E-12	303.3E-12	391.9E-12	1.1E-09	841.1E-12	1.6E-09	1.5E-09	651.5E-12	1.5E-09	2.3E-09	1.1E-09	3.1E-09	2.1E-09

Drift Calculation

IIO3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	672.0E-12	-1.1E-09	605.2E-12	977.1E-12	-1.3E-09	-867.9E-12	3.0E-09	-974.8E-12	6.1E-09	6.1E-09	-2.5E-09
37	-	0.0E+00	140.4E-12	1.2E-09	2.3E-09	3.9E-09	1.8E-09	-949.3E-12	1.8E-09	4.4E-09	3.3E-09	-26.7E-12	2.3E-09
38	-	-468.0E-12	1.3E-09	35.1E-12	2.2E-09	530.9E-12	2.0E-09	604.6E-12	5.6E-09	1.5E-09	4.5E-09	-871.3E-12	678.5E-12
Average	-	-156.0E-12	717.1E-12	54.0E-12	1.7E-09	1.8E-09	819.7E-12	-404.2E-12	3.5E-09	1.7E-09	4.6E-09	1.7E-09	137.1E-12
Sigma	-	220.6E-12	490.3E-12	950.0E-12	776.5E-12	1.5E-09	1.5E-09	714.1E-12	1.6E-09	2.2E-09	1.2E-09	3.1E-09	2.0E-09

Parameter : Input Offset Current : IIO4DUTA
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	48.5E-12	889.3E-12	148.8E-12	299.2E-12	35.3E-12	474.3E-12	369.0E-12	664.2E-12	774.9E-12	-166.0E-12	424.3E-12	-73.8E-12	959.4E-12
ON_PROTON samples													
27	-6.8E-09	916.0E-12	-2.3E-09	-4.4E-09	-2.6E-09	-1.7E-09	-4.3E-09	-4.4E-09	-3.7E-09	-3.5E-09	-4.1E-09	-4.4E-09	-940.9E-12
28	-986.2E-12	2.7E-09	-551.6E-12	-501.4E-12	-3.8E-09	-352.5E-12	442.8E-12	608.8E-12	-2.5E-09	-1.8E-09	1.6E-09	-756.5E-12	36.9E-12
29	-4.8E-09	-1.1E-09	-2.8E-09	-1.0E-09	-2.9E-09	1.2E-09	-1.8E-09	-1.5E-09	-1.7E-09	-1.4E-09	239.8E-12	-129.2E-12	885.6E-12
Statistics													
Min	-6.8E-09	-1.1E-09	-2.8E-09	-4.4E-09	-3.8E-09	-1.7E-09	-4.3E-09	-4.4E-09	-3.7E-09	-3.5E-09	-4.1E-09	-4.4E-09	-940.9E-12
Max	-986.2E-12	2.7E-09	-551.6E-12	-501.4E-12	-2.6E-09	1.2E-09	442.8E-12	608.8E-12	-1.7E-09	-1.4E-09	1.6E-09	-129.2E-12	885.6E-12
Average	-4.2E-09	834.7E-12	-1.9E-09	-2.0E-09	-3.1E-09	-309.8E-12	-1.9E-09	-1.8E-09	-2.6E-09	-2.2E-09	-738.0E-12	-1.8E-09	-6.2E-12
Sigma	2.4E-09	1.6E-09	958.6E-12	1.7E-09	509.4E-12	1.2E-09	2.0E-09	2.1E-09	821.3E-12	925.2E-12	2.4E-09	1.9E-09	746.3E-12

Drift Calculation

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	7.7E-09	4.5E-09	2.4E-09	4.1E-09	5.0E-09	2.4E-09	2.4E-09	3.1E-09	3.2E-09	2.7E-09	2.4E-09	5.8E-09
28	-	3.7E-09	434.6E-12	484.7E-12	-2.8E-09	633.7E-12	1.4E-09	1.6E-09	-1.5E-09	-821.9E-12	2.6E-09	229.7E-12	1.0E-09
29	-	3.7E-09	2.0E-09	3.8E-09	1.9E-09	6.0E-09	3.0E-09	3.3E-09	3.1E-09	3.4E-09	5.0E-09	4.7E-09	5.7E-09
Average	-	5.0E-09	2.3E-09	2.2E-09	1.1E-09	3.9E-09	2.3E-09	2.4E-09	1.6E-09	1.9E-09	3.4E-09	2.4E-09	4.2E-09
Sigma	-	1.9E-09	1.7E-09	1.3E-09	2.9E-09	2.3E-09	665.4E-12	683.2E-12	2.1E-09	2.0E-09	1.1E-09	1.8E-09	2.2E-09

Measurements

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	48.5E-12	889.3E-12	148.8E-12	299.2E-12	35.3E-12	474.3E-12	369.0E-12	664.2E-12	774.9E-12	-166.0E-12	424.3E-12	-73.8E-12	959.4E-12
ON_TID samples													
33	100.3E-12	100.3E-12	297.5E-12	-869.2E-12	1.2E-09	224.3E-12	-1.5E-09	-719.5E-12	73.8E-12	922.5E-12	2.7E-09	-276.8E-12	1.5E-09
34	-16.7E-12	3.2E-09	474.7E-12	1.5E-09	-2.6E-09	-448.6E-12	405.9E-12	1.6E-09	608.8E-12	645.7E-12	-18.4E-12	2.0E-09	1.5E-09
35	-239.0E-12	-239.0E-12	317.6E-12	-367.7E-12	1.6E-09	-416.6E-12	-848.7E-12	-387.4E-12	-332.1E-12	-793.4E-12	793.3E-12	-1.7E-09	202.9E-12
Statistics													
Min	-239.0E-12	-239.0E-12	297.5E-12	-869.2E-12	-2.6E-09	-448.6E-12	-1.5E-09	-719.5E-12	-332.1E-12	-793.4E-12	-18.4E-12	-1.7E-09	202.9E-12
Max	100.3E-12	3.2E-09	474.7E-12	1.5E-09	1.6E-09	224.3E-12	405.9E-12	1.6E-09	608.8E-12	922.5E-12	2.7E-09	2.0E-09	1.5E-09
Average	-51.8E-12	1.0E-09	363.3E-12	83.0E-12	60.4E-12	-213.6E-12	-639.6E-12	159.9E-12	116.9E-12	258.3E-12	1.2E-09	6.1E-12	1.1E-09
Sigma	140.7E-12	1.5E-09	79.2E-12	1.0E-09	1.9E-09	310.0E-12	782.4E-12	1.0E-09	385.3E-12	752.2E-12	1.2E-09	1.5E-09	600.3E-12

Drift Calculation

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	197.2E-12	-969.5E-12	1.1E-09	124.0E-12	-1.6E-09	-819.8E-12	-26.5E-12	822.2E-12	2.6E-09	-377.1E-12	1.4E-09
34	-	3.2E-09	491.4E-12	1.5E-09	-2.6E-09	-431.9E-12	422.6E-12	1.6E-09	625.6E-12	662.5E-12	-1.7E-12	2.0E-09	1.5E-09
35	-	0.0E+00	556.6E-12	-128.7E-12	1.9E-09	-177.6E-12	-609.7E-12	-148.4E-12	-93.0E-12	-554.3E-12	1.0E-09	-1.5E-09	442.0E-12
Average	-	1.1E-09	415.1E-12	134.8E-12	112.3E-12	-161.8E-12	-587.8E-12	211.7E-12	168.7E-12	310.1E-12	1.2E-09	57.9E-12	1.1E-09
Sigma	-	1.5E-09	156.3E-12	1.0E-09	1.9E-09	227.2E-12	816.2E-12	1.0E-09	324.2E-12	614.7E-12	1.1E-09	1.5E-09	468.9E-12

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	48.5E-12	889.3E-12	148.8E-12	299.2E-12	35.3E-12	474.3E-12	369.0E-12	664.2E-12	774.9E-12	-166.0E-12	424.3E-12	-73.8E-12	959.4E-12
OFF PROTON samples													
30	1.3E-09	3.7E-09	1.6E-09	2.3E-09	96.2E-12	-332.1E-12	4.1E-09	6.1E-09	7.4E-09	5.7E-09	7.7E-09	4.4E-09	1.5E-09
32	3.1E-09	5.6E-09	8.7E-09	7.7E-09	6.4E-09	4.6E-09	2.8E-09	6.5E-09	8.3E-09	7.2E-09	8.5E-09	3.3E-09	940.9E-12
39	-100.3E-12	694.1E-12	-768.9E-12	0.0E+00	1.1E-09	1.2E-09	553.5E-12	7.2E-09	1.7E-09	6.6E-09	3.5E-09	4.1E-09	1.0E-09
Statistics													
Min	-100.3E-12	694.1E-12	-768.9E-12	0.0E+00	96.2E-12	-332.1E-12	553.5E-12	6.1E-09	1.7E-09	5.7E-09	3.5E-09	3.3E-09	940.9E-12
Max	3.1E-09	5.6E-09	8.7E-09	7.7E-09	6.4E-09	4.6E-09	4.1E-09	7.2E-09	8.3E-09	7.2E-09	8.5E-09	4.4E-09	1.5E-09
Average	1.4E-09	3.3E-09	3.2E-09	3.3E-09	2.5E-09	1.8E-09	2.5E-09	6.6E-09	5.8E-09	6.5E-09	6.6E-09	3.9E-09	1.2E-09
Sigma	1.3E-09	2.0E-09	4.0E-09	3.2E-09	2.8E-09	2.1E-09	1.4E-09	460.2E-12	2.9E-09	619.9E-12	2.2E-09	460.3E-12	242.1E-12

Drift Calculation

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	2.3E-09	240.7E-12	926.0E-12	-1.3E-09	-1.7E-09	2.7E-09	4.7E-09	6.0E-09	4.4E-09	6.4E-09	3.1E-09	147.2E-12
32	-	2.5E-09	5.6E-09	4.6E-09	3.3E-09	1.6E-09	-308.2E-12	3.4E-09	5.2E-09	4.1E-09	5.4E-09	245.2E-12	-2.1E-09
39	-	794.4E-12	-668.6E-12	100.3E-12	1.2E-09	1.3E-09	653.8E-12	7.3E-09	1.8E-09	6.7E-09	3.6E-09	4.2E-09	1.1E-09
Average	-	1.9E-09	1.7E-09	1.9E-09	1.1E-09	391.8E-12	1.0E-09	5.1E-09	4.3E-09	5.1E-09	5.1E-09	2.5E-09	-284.7E-12
Sigma	-	765.9E-12	2.8E-09	1.9E-09	1.9E-09	1.5E-09	1.3E-09	1.6E-09	1.9E-09	1.2E-09	1.2E-09	1.7E-09	1.4E-09

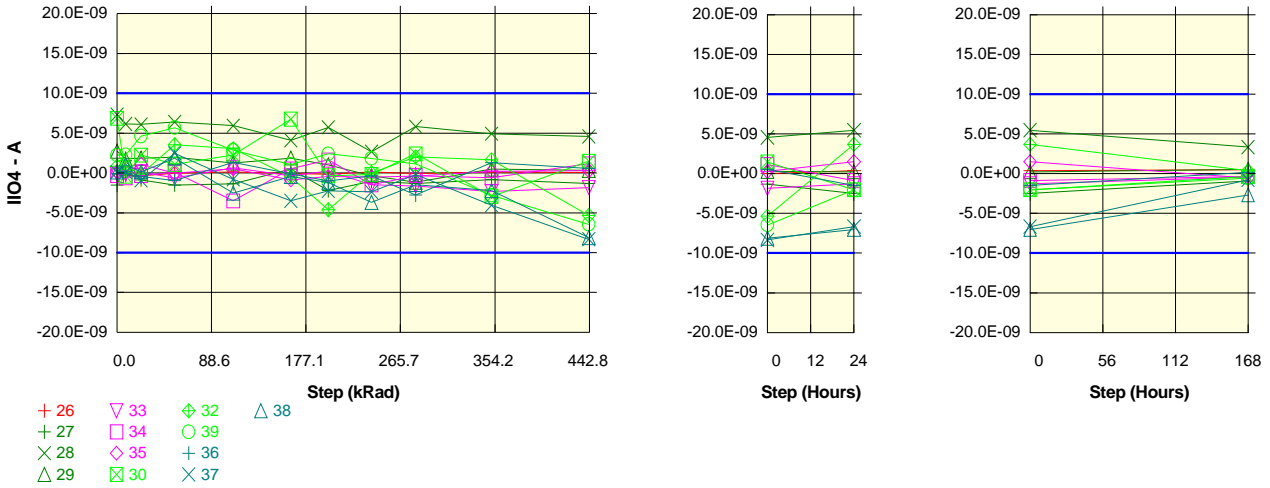
Measurements

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	48.5E-12	889.3E-12	148.8E-12	299.2E-12	35.3E-12	474.3E-12	369.0E-12	664.2E-12	774.9E-12	-166.0E-12	424.3E-12	-73.8E-12	959.4E-12
OFF TID samples													
36	-200.6E-12	-200.6E-12	727.1E-12	-2.1E-09	1.2E-09	-645.7E-12	-295.2E-12	-368.9E-12	922.4E-12	2.2E-09	-1.8E-09	-5.0E-09	-1.1E-09
37	434.6E-12	434.6E-12	249.1E-12	1.6E-09	3.6E-09	1.6E-09	5.1E-09	-1.8E-09	6.1E-09	738.0E-12	184.5E-12	-2.6E-09	2.7E-09
38	-444.6E-12	-646.9E-12	2.9E-09	1.1E-09	-1.0E-09	571.9E-12	1.2E-09	1.5E-09	184.5E-12	0.0E+00	3.3E-09	5.5E-09	2.4E-09
Statistics													
Min	-444.6E-12	-646.9E-12	249.1E-12	-2.1E-09	-1.0E-09	-645.7E-12	-295.2E-12	-1.8E-09	184.5E-12	0.0E+00	-1.8E-09	-5.0E-09	-1.1E-09
Max	434.6E-12	434.6E-12	2.9E-09	1.6E-09	3.6E-09	1.6E-09	5.1E-09	1.5E-09	6.1E-09	2.2E-09	3.3E-09	5.5E-09	2.7E-09
Average	-70.2E-12	-137.6E-12	1.3E-09	1.78.3E-12	1.2E-09	516.6E-12	2.0E-09	-246.0E-12	2.4E-09	984.0E-12	553.5E-12	-676.5E-12	1.3E-09
Sigma	370.6E-12	443.8E-12	1.1E-09	1.6E-09	1.9E-09	927.3E-12	2.3E-09	1.4E-09	2.6E-09	920.4E-12	2.1E-09	4.5E-09	1.7E-09

Drift Calculation

IIO4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	927.7E-12	-1.9E-09	1.4E-09	-445.2E-12	-94.6E-12	-168.4E-12	1.1E-09	2.4E-09	-1.6E-09	-4.8E-09	-906.4E-12
37	-	0.0E+00	-185.5E-12	1.1E-09	3.1E-09	1.2E-09	4.7E-09	-2.3E-09	5.7E-09	303.4E-12	-250.1E-12	-3.0E-09	2.3E-09
38	-	-202.3E-12	3.3E-09	1.5E-09	-580.8E-12	1.0E-09	1.6E-09	1.9E-09	629.2E-12	444.6E-12	3.8E-09	6.0E-09	2.8E-09
Average	-	-67.4E-12	1.4E-09	248.5E-12	1.3E-09	586.8E-12	2.1E-09	-175.8E-12	2.5E-09	1.1E-09	623.7E-12	-606.3E-12	1.4E-09
Sigma	-	95.3E-12	1.5E-09	1.5E-09	1.5E-09	733.1E-12	2.0E-09	1.7E-09	2.3E-09	963.6E-12	2.3E-09	4.7E-09	1.6E-09

Parameter : Input Offset Current : IIO4DUTB
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-130.4E-12	-312.6E-12	-352.7E-12	-43.5E-12	115.4E-12	-57.7E-12	-166.0E-12	129.2E-12	-92.3E-12	129.1E-12	36.9E-12	387.4E-12	516.6E-12
ON_PROTON samples													
27	-1.5E-09	1.5E-09	-869.2E-12	-1.5E-09	-1.3E-09	480.7E-12	-2.2E-09	-1.1E-09	-1.3E-09	-848.7E-12	-1.3E-09	-2.5E-09	-904.1E-12
28	7.3E-09	6.2E-09	6.1E-09	6.4E-09	5.9E-09	4.1E-09	5.7E-09	2.7E-09	5.8E-09	4.9E-09	4.6E-09	5.5E-09	3.3E-09
29	2.7E-09	1.7E-09	1.8E-09	2.0E-09	1.2E-09	1.9E-09	1.0E-09	-332.1E-12	-1.2E-09	479.7E-12	313.6E-12	239.9E-12	571.9E-12
Statistics													
Min	-1.5E-09	1.5E-09	-869.2E-12	-1.5E-09	-1.3E-09	480.7E-12	-2.2E-09	-1.1E-09	-1.3E-09	-848.7E-12	-1.3E-09	-2.5E-09	-904.1E-12
Max	7.3E-09	6.2E-09	6.1E-09	6.4E-09	5.9E-09	4.1E-09	5.7E-09	2.7E-09	5.8E-09	4.9E-09	4.6E-09	5.5E-09	3.3E-09
Average	2.8E-09	3.1E-09	2.4E-09	2.3E-09	1.9E-09	2.1E-09	1.5E-09	430.5E-12	1.1E-09	1.5E-09	1.2E-09	1.1E-09	1.0E-09
Sigma	3.6E-09	2.1E-09	2.9E-09	3.2E-09	3.0E-09	1.5E-09	3.3E-09	1.6E-09	3.3E-09	2.5E-09	2.5E-09	3.3E-09	1.8E-09

Drift Calculation

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	3.1E-09	673.6E-12	38.4E-12	196.9E-12	2.0E-09	-671.1E-12	491.2E-12	214.4E-12	694.2E-12	214.5E-12	-947.8E-12	638.8E-12
28	-	-1.2E-09	-1.2E-09	-936.1E-12	-1.4E-09	-3.2E-09	-1.6E-09	-4.6E-09	-1.5E-09	-2.4E-09	-2.7E-09	-1.9E-09	-4.0E-09
29	-	-1.0E-09	-902.6E-12	-785.6E-12	-1.5E-09	-882.6E-12	-1.7E-09	-3.1E-09	-3.9E-09	-2.3E-09	-2.4E-09	-2.5E-09	-2.2E-09
Average	-	302.0E-12	-488.6E-12	-561.1E-12	-895.8E-12	-692.8E-12	-1.3E-09	-2.4E-09	-1.7E-09	-1.3E-09	-1.7E-09	-1.8E-09	-1.8E-09
Sigma	-	2.0E-09	833.1E-12	428.4E-12	773.7E-12	2.1E-09	470.9E-12	2.1E-09	1.7E-09	1.4E-09	1.3E-09	637.5E-12	1.9E-09

Measurements

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-130.4E-12	-312.6E-12	-352.7E-12	-43.5E-12	115.4E-12	-57.7E-12	-166.0E-12	129.2E-12	-92.3E-12	129.1E-12	36.9E-12	387.4E-12	516.6E-12
ON_TID samples													
33	-170.5E-12	-170.5E-12	133.7E-12	-635.2E-12	646.7E-12	-352.5E-12	221.4E-12	-1.5E-09	-1.6E-09	-2.3E-09	-1.8E-09	-1.3E-09	-405.9E-12
34	-339.3E-12	-591.7E-12	-326.0E-12	83.6E-12	-3.5E-09	512.8E-12	1.6E-09	-1.5E-09	-332.1E-12	-608.8E-12	1.1E-09	-867.2E-12	-369.0E-12
35	150.4E-12	150.4E-12	1.1E-09	-55.2E-12	525.6E-12	-865.2E-12	-461.2E-12	-516.6E-12	-387.5E-12	184.5E-12	276.8E-12	1.5E-09	-535.0E-12
Statistics													
Min	-339.3E-12	-591.7E-12	-326.0E-12	-635.2E-12	-3.5E-09	-865.2E-12	-461.2E-12	-1.5E-09	-1.6E-09	-2.3E-09	-1.8E-09	-1.3E-09	-535.0E-12
Max	150.4E-12	150.4E-12	1.1E-09	83.6E-12	646.7E-12	512.8E-12	1.6E-09	-516.6E-12	-332.1E-12	184.5E-12	1.1E-09	1.5E-09	-369.0E-12
Average	-119.8E-12	-203.9E-12	294.2E-12	-202.3E-12	-784.3E-12	-235.0E-12	461.2E-12	-1.2E-09	-787.2E-12	-916.4E-12	-141.4E-12	-203.0E-12	-436.6E-12
Sigma	203.1E-12	303.9E-12	583.0E-12	311.3E-12	1.9E-09	568.7E-12	867.9E-12	456.7E-12	604.9E-12	1.0E-09	1.3E-09	1.2E-09	71.2E-12

Drift Calculation

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	304.2E-12	-464.7E-12	817.2E-12	-182.0E-12	391.9E-12	-1.3E-09	-1.5E-09	-2.2E-09	-1.7E-09	-1.1E-09	-235.4E-12
34	-	-252.4E-12	13.4E-12	422.9E-12	-3.2E-09	852.1E-12	2.0E-09	-1.2E-09	7.2E-12	-269.5E-12	1.5E-09	-527.8E-12	-29.7E-12
35	-	0.0E+00	924.4E-12	-205.6E-12	375.1E-12	-1.0E-09	-611.7E-12	-667.0E-12	-537.9E-12	34.0E-12	126.3E-12	1.4E-09	-685.5E-12
Average	-	-84.1E-12	414.0E-12	-82.5E-12	-664.5E-12	-115.2E-12	581.0E-12	-1.0E-09	-667.4E-12	-796.6E-12	-21.6E-12	-83.2E-12	-316.8E-12
Sigma	-	119.0E-12	379.9E-12	372.7E-12	1.8E-09	764.0E-12	1.1E-09	272.5E-12	610.6E-12	968.0E-12	1.3E-09	1.0E-09	273.9E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-130.4E-12	-312.6E-12	-352.7E-12	-43.5E-12	115.4E-12	-57.7E-12	-166.0E-12	129.2E-12	-92.3E-12	129.1E-12	36.9E-12	387.4E-12	516.6E-12
OFF PROTON samples													
30	6.8E-09	-401.2E-12	2.2E-09	1.1E-09	2.2E-09	6.8E-09	-368.9E-12	-184.4E-12	2.4E-09	-3.0E-09	1.5E-09	-2.0E-09	-332.1E-12
32	854.2E-12	869.2E-12	-150.4E-12	3.5E-09	3.0E-09	-516.6E-12	-4.6E-09	0.0E+00	2.0E-09	1.7E-09	-5.4E-09	3.7E-09	405.8E-12
39	2.2E-09	2.3E-09	4.6E-09	5.7E-09	2.9E-09	1.1E-09	2.4E-09	1.8E-09	1.1E-09	-2.8E-09	-6.5E-09	-2.0E-09	-535.1E-12
Statistics													
Min	854.2E-12	-401.2E-12	-150.4E-12	1.1E-09	2.2E-09	-516.6E-12	-4.6E-09	-184.4E-12	1.1E-09	-3.0E-09	-6.5E-09	-2.0E-09	-535.1E-12
Max	6.8E-09	2.3E-09	4.6E-09	5.7E-09	3.0E-09	6.8E-09	2.4E-09	1.8E-09	2.4E-09	1.7E-09	1.5E-09	3.7E-09	405.8E-12
Average	3.3E-09	908.2E-12	2.2E-09	3.4E-09	2.7E-09	2.4E-09	-861.0E-12	547.3E-12	1.8E-09	-1.4E-09	-3.4E-09	-123.1E-12	-153.8E-12
Sigma	2.6E-09	1.1E-09	1.9E-09	1.9E-09	341.5E-12	3.1E-09	2.9E-09	907.6E-12	543.1E-12	2.1E-09	3.5E-09	2.7E-09	404.3E-12

Drift Calculation

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-7.2E-09	-4.6E-09	-5.8E-09	-4.6E-09	-90.7E-12	-7.2E-09	-7.0E-09	-4.4E-09	-9.8E-09	-5.4E-09	-8.9E-09	-7.2E-09
32	-	15.0E-12	-1.0E-09	2.7E-09	2.2E-09	-1.4E-09	-5.5E-09	-854.2E-12	1.2E-09	806.4E-12	-6.2E-09	2.8E-09	-448.3E-12
39	-	33.5E-12	2.4E-09	3.5E-09	629.0E-12	-1.2E-09	175.3E-12	-396.7E-12	-1.1E-09	-5.0E-09	-8.7E-09	-4.3E-09	-2.8E-09
Average	-	-2.4E-09	-1.1E-09	130.9E-12	-593.6E-12	-877.7E-12	-4.2E-09	-2.8E-09	-1.5E-09	-4.7E-09	-6.8E-09	-3.4E-09	-3.5E-09
Sigma	-	3.4E-09	2.9E-09	4.2E-09	2.9E-09	562.4E-12	3.2E-09	3.0E-09	2.3E-09	4.3E-09	1.4E-09	4.8E-09	2.8E-09

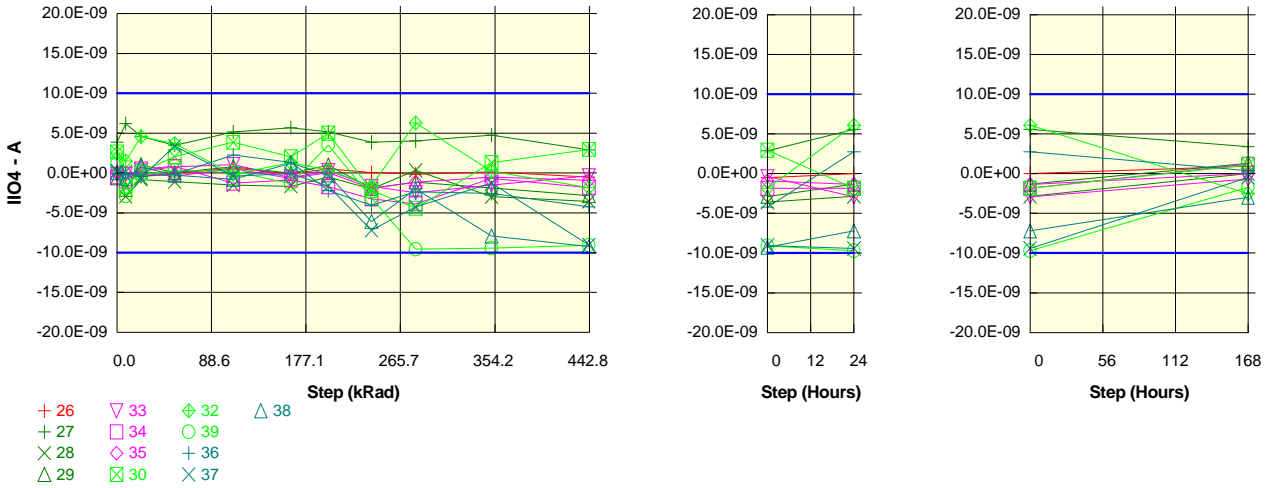
Measurements

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-130.4E-12	-312.6E-12	-352.7E-12	-43.5E-12	115.4E-12	-57.7E-12	-166.0E-12	129.2E-12	-92.3E-12	129.1E-12	36.9E-12	387.4E-12	516.6E-12
OFF TID samples													
36	-56.8E-12	-56.8E-12	-468.0E-12	-969.5E-12	1.3E-09	-110.7E-12	-996.3E-12	-369.1E-12	-2.8E-09	1.3E-09	553.6E-12	-1.5E-09	202.9E-12
37	100.3E-12	100.3E-12	-942.7E-12	2.5E-09	-801.2E-12	-3.5E-09	-2.3E-09	-2.4E-09	-184.5E-12	-4.1E-09	-8.3E-09	-6.6E-09	-774.9E-12
38	127.0E-12	1.0E-09	140.4E-12	1.9E-09	-2.5E-09	-442.8E-12	-1.2E-09	-3.7E-09	-1.5E-09	-2.2E-09	-8.1E-09	-7.0E-09	-2.7E-09
Statistics													
Min	-56.8E-12	-56.8E-12	-942.7E-12	-969.5E-12	-2.5E-09	-3.5E-09	-2.3E-09	-3.7E-09	-2.8E-09	-4.1E-09	-8.3E-09	-7.0E-09	-2.7E-09
Max	127.0E-12	1.0E-09	140.4E-12	2.5E-09	1.3E-09	-110.7E-12	-996.3E-12	-369.1E-12	-184.5E-12	1.3E-09	553.6E-12	-1.5E-09	202.9E-12
Average	56.8E-12	359.9E-12	-423.5E-12	1.1E-09	-673.0E-12	-1.3E-09	-1.5E-09	-2.2E-09	-1.5E-09	-1.7E-09	-5.3E-09	-5.0E-09	-1.1E-09
Sigma	81.1E-12	482.6E-12	443.3E-12	1.5E-09	1.6E-09	1.5E-09	549.9E-12	1.4E-09	1.1E-09	2.2E-09	4.1E-09	2.5E-09	1.2E-09

Drift Calculation

IIO4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-411.2E-12	-912.7E-12	1.4E-09	-53.9E-12	-939.4E-12	-312.2E-12	-2.7E-09	1.3E-09	610.4E-12	-1.4E-09	259.8E-12
37	-	0.0E+00	-1.0E-09	2.4E-09	-901.5E-12	-3.6E-09	-2.4E-09	-2.5E-09	-284.8E-12	-4.2E-09	-8.4E-09	-6.7E-09	-875.2E-12
38	-	909.3E-12	13.4E-12	1.7E-09	-2.7E-09	-569.8E-12	-1.3E-09	-3.8E-09	-1.6E-09	-2.3E-09	-8.2E-09	-7.1E-09	-2.8E-09
Average	-	303.1E-12	-480.3E-12	1.1E-09	-729.8E-12	-1.4E-09	-1.5E-09	-2.2E-09	-1.5E-09	-1.7E-09	-5.4E-09	-5.1E-09	-1.1E-09
Sigma	-	428.7E-12	434.0E-12	1.4E-09	1.6E-09	1.6E-09	595.6E-12	1.4E-09	991.6E-12	2.3E-09	4.2E-09	2.6E-09	1.3E-09

Parameter : Input Offset Current : IIO4DUTC
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-96.9E-12	-80.2E-12	-421.2E-12	-76.9E-12	615.3E-12	-125.0E-12	516.6E-12	55.3E-12	-166.0E-12	129.1E-12	-516.6E-12	18.4E-12	922.5E-12
ON_PROTON samples													
27	3.9E-09	6.2E-09	4.6E-09	3.5E-09	5.2E-09	5.7E-09	5.1E-09	3.9E-09	4.0E-09	4.7E-09	2.9E-09	5.6E-09	3.4E-09
28	264.1E-12	-3.0E-09	-819.1E-12	-1.1E-09	-1.5E-09	-1.7E-09	-498.2E-12	-2.0E-09	313.6E-12	-3.0E-09	-3.6E-09	-2.8E-09	18.4E-12
29	-601.8E-12	-2.1E-09	1.0E-09	33.4E-12	769.1E-12	-32.1E-12	977.8E-12	-1.9E-09	-1.1E-09	-1.9E-09	-2.9E-09	-1.3E-09	1.3E-09
Statistics													
Min	-601.8E-12	-3.0E-09	-819.1E-12	-1.1E-09	-1.5E-09	-1.7E-09	-498.2E-12	-2.0E-09	-1.1E-09	-3.0E-09	-3.6E-09	-2.8E-09	18.4E-12
Max	3.9E-09	6.2E-09	4.6E-09	3.5E-09	5.2E-09	5.7E-09	5.1E-09	3.9E-09	4.0E-09	4.7E-09	2.9E-09	5.6E-09	3.4E-09
Average	1.2E-09	387.2E-12	1.6E-09	802.3E-12	1.5E-09	1.3E-09	1.9E-09	-24.6E-12	1.1E-09	-49.2E-12	-1.2E-09	461.2E-12	1.6E-09
Sigma	1.9E-09	4.1E-09	2.2E-09	1.9E-09	2.8E-09	3.1E-09	2.4E-09	2.8E-09	2.2E-09	3.4E-09	2.9E-09	3.7E-09	1.4E-09

Drift Calculation

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.3E-09	735.5E-12	-384.5E-12	1.3E-09	1.8E-09	1.3E-09	13.2E-12	142.3E-12	880.3E-12	-983.1E-12	1.7E-09	-448.1E-12
28	-	-3.2E-09	-1.1E-09	-1.4E-09	-1.8E-09	-1.9E-09	-762.3E-12	-2.3E-09	49.5E-12	-3.3E-09	-3.8E-09	-3.1E-09	-245.7E-12
29	-	-1.5E-09	1.6E-09	635.2E-12	1.4E-09	569.7E-12	1.6E-09	-1.3E-09	-542.1E-12	-1.3E-09	-2.3E-09	-726.7E-12	1.9E-09
Average	-	-787.3E-12	424.6E-12	-372.2E-12	288.9E-12	150.1E-12	701.2E-12	-1.2E-09	-116.8E-12	-1.2E-09	-2.4E-09	-713.3E-12	406.0E-12
Sigma	-	2.3E-09	1.1E-09	817.6E-12	1.5E-09	1.6E-09	1.0E-09	945.4E-12	303.2E-12	1.7E-09	1.2E-09	2.0E-09	1.1E-09

Measurements

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-96.9E-12	-80.2E-12	-421.2E-12	-76.9E-12	615.3E-12	-125.0E-12	516.6E-12	55.3E-12	-166.0E-12	129.1E-12	-516.6E-12	18.4E-12	922.5E-12
ON_TID samples													
33	-142.1E-12	-142.1E-12	240.7E-12	752.2E-12	1.0E-09	-608.9E-12	276.8E-12	-1.7E-09	-2.5E-09	-1.5E-09	-369.0E-12	-3.0E-09	-682.7E-12
34	-508.1E-12	-1.0E-09	503.1E-12	802.3E-12	-1.3E-09	-897.3E-12	-1.7E-09	-3.3E-09	-3.9E-09	-664.2E-12	-1.8E-09	-1.8E-09	1.2E-09
35	16.7E-12	16.7E-12	-66.9E-12	-394.5E-12	496.7E-12	-669.8E-12	36.9E-12	-1.9E-09	-1.2E-09	-498.2E-12	-922.5E-12	-1.3E-09	0.0E+00
Statistics													
Min	-508.1E-12	-1.0E-09	-66.9E-12	-394.5E-12	-1.3E-09	-897.3E-12	-1.7E-09	-3.3E-09	-3.9E-09	-1.5E-09	-1.8E-09	-3.0E-09	-682.7E-12
Max	16.7E-12	16.7E-12	503.1E-12	802.3E-12	1.0E-09	-608.9E-12	276.8E-12	-1.7E-09	-1.2E-09	-498.2E-12	-369.0E-12	-1.3E-09	1.2E-09
Average	-	-211.2E-12	-378.3E-12	225.7E-12	386.7E-12	82.0E-12	-725.3E-12	-467.4E-12	-2.3E-09	-2.5E-09	-897.9E-12	-1.0E-09	-2.0E-09
Sigma	-	219.8E-12	451.1E-12	232.9E-12	552.7E-12	988.2E-12	124.1E-12	888.2E-12	698.3E-12	1.1E-09	453.0E-12	600.7E-12	670.8E-12

Drift Calculation

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	382.8E-12	894.3E-12	1.2E-09	-466.8E-12	418.8E-12	-1.5E-09	-2.3E-09	-1.4E-09	-226.9E-12	-2.8E-09	-540.6E-12
34	-	-501.5E-12	1.0E-09	1.3E-09	-773.0E-12	-389.1E-12	-1.2E-09	-2.8E-09	-3.4E-09	-156.1E-12	-1.3E-09	-1.3E-09	1.7E-09
35	-	0.0E+00	-83.6E-12	-411.2E-12	480.0E-12	-686.5E-12	20.2E-12	-1.9E-09	-1.2E-09	-514.9E-12	-939.2E-12	-1.4E-09	-16.7E-12
Average	-	-167.2E-12	436.8E-12	597.9E-12	293.2E-12	-514.1E-12	-256.2E-12	-2.1E-09	-2.3E-09	-686.7E-12	-828.1E-12	-1.8E-09	389.5E-12
Sigma	-	236.4E-12	448.6E-12	733.5E-12	805.2E-12	125.9E-12	692.2E-12	508.2E-12	893.3E-12	517.9E-12	452.4E-12	688.2E-12	968.8E-12

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-96.9E-12	-80.2E-12	-421.2E-12	-76.9E-12	615.3E-12	-125.0E-12	516.6E-12	55.3E-12	-166.0E-12	129.1E-12	-516.6E-12	18.4E-12	922.5E-12
OFF PROTON samples													
30	2.6E-09	-1.7E-09	117.0E-12	2.1E-09	3.8E-09	2.0E-09	5.0E-09	-2.2E-09	-4.4E-09	1.3E-09	3.0E-09	-1.8E-09	1.1E-09
32	2.5E-09	1.5E-09	4.5E-09	3.7E-09	-160.2E-12	1.3E-09	369.1E-12	-1.7E-09	6.3E-09	184.3E-12	-1.8E-09	6.1E-09	-2.5E-09
39	1.2E-09	-2.9E-09	-183.9E-12	267.5E-12	224.3E-12	-1.3E-09	3.5E-09	-3.1E-09	-9.6E-09	-9.4E-09	-9.1E-09	-9.7E-09	-1.7E-09
Statistics													
Min	1.2E-09	-2.9E-09	-183.9E-12	267.5E-12	-160.2E-12	-1.3E-09	369.1E-12	-3.1E-09	-9.6E-09	-9.4E-09	-9.1E-09	-9.7E-09	-2.5E-09
Max	2.6E-09	1.5E-09	4.5E-09	3.7E-09	3.8E-09	2.0E-09	5.0E-09	-1.7E-09	6.3E-09	1.3E-09	3.0E-09	6.1E-09	1.1E-09
Average	2.1E-09	-1.0E-09	1.5E-09	2.0E-09	1.3E-09	658.0E-12	3.0E-09	-2.3E-09	-2.6E-09	-2.7E-09	-2.6E-09	-1.8E-09	-1.0E-09
Sigma	664.4E-12	1.8E-09	2.2E-09	1.4E-09	1.8E-09	1.4E-09	1.9E-09	608.8E-12	6.6E-09	4.8E-09	4.9E-09	6.4E-09	1.6E-09

Drift Calculation

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-4.3E-09	-2.5E-09	-568.3E-12	1.2E-09	-595.0E-12	2.4E-09	-4.8E-09	-7.1E-09	-1.3E-09	327.5E-12	-4.5E-09	-1.5E-09
32	-	-1.0E-09	2.0E-09	1.2E-09	-2.7E-09	-1.2E-09	-2.1E-09	-4.2E-09	3.8E-09	-2.3E-09	-4.3E-09	3.6E-09	-5.0E-09
39	-	-4.1E-09	-1.3E-09	-892.6E-12	-935.7E-12	-2.5E-09	2.3E-09	-4.3E-09	-10.8E-09	-10.6E-09	-10.2E-09	-10.9E-09	-2.9E-09
Average	-	-3.1E-09	-604.0E-12	-96.9E-12	-794.0E-12	-1.4E-09	854.7E-12	-4.4E-09	-4.7E-09	-4.8E-09	-4.7E-09	-3.9E-09	-3.1E-09
Sigma	-	1.5E-09	1.9E-09	905.7E-12	1.6E-09	796.4E-12	2.1E-09	290.5E-12	6.2E-09	4.2E-09	4.3E-09	5.9E-09	1.4E-09

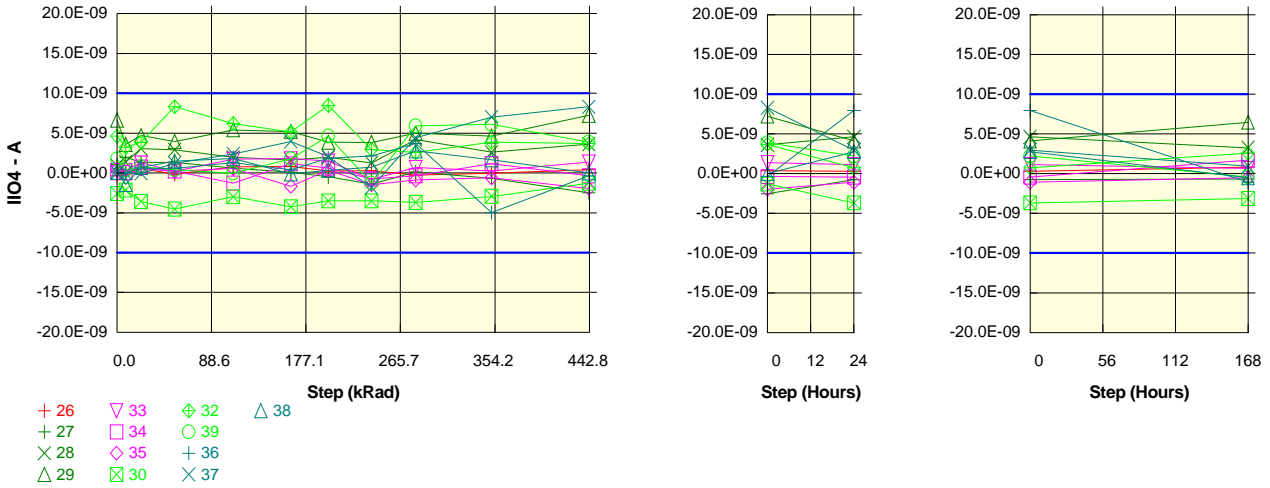
Measurements

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-96.9E-12	-80.2E-12	-421.2E-12	-76.9E-12	615.3E-12	-125.0E-12	516.6E-12	55.3E-12	-166.0E-12	129.1E-12	-516.6E-12	18.4E-12	922.5E-12
OFF TID samples													
36	-66.9E-12	-66.9E-12	-449.6E-12	-150.4E-12	2.2E-09	1.3E-09	-2.2E-09	-4.1E-09	-2.4E-09	-2.6E-09	-4.2E-09	2.8E-09	387.5E-12
37	133.7E-12	133.7E-12	-605.1E-12	3.4E-09	-384.5E-12	-92.3E-12	-1.7E-09	-7.2E-09	-4.2E-09	-1.3E-09	-9.0E-09	-9.4E-09	-461.2E-12
38	50.2E-12	-735.5E-12	755.5E-12	-284.2E-12	-801.2E-12	1.2E-09	-258.3E-12	-6.1E-09	-2.0E-09	-7.9E-09	-9.3E-09	-7.2E-09	-3.0E-09
Statistics													
Min	-66.9E-12	-735.5E-12	-605.1E-12	-284.2E-12	-801.2E-12	-92.3E-12	-2.2E-09	-7.2E-09	-4.2E-09	-7.9E-09	-9.3E-09	-9.4E-09	-3.0E-09
Max	133.7E-12	133.7E-12	755.5E-12	3.4E-09	2.2E-09	1.3E-09	-258.3E-12	-4.1E-09	-2.0E-09	-1.3E-09	-4.2E-09	2.8E-09	387.5E-12
Average	39.0E-12	-222.9E-12	-99.7E-12	986.2E-12	352.5E-12	817.9E-12	-1.4E-09	-5.8E-09	-2.9E-09	-3.9E-09	-7.5E-09	-4.6E-09	-1.0E-09
Sigma	82.3E-12	371.6E-12	608.1E-12	1.7E-09	1.3E-09	645.2E-12	816.8E-12	1.3E-09	968.5E-12	2.9E-09	2.3E-09	5.3E-09	1.4E-09

Drift Calculation

IIO4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-382.8E-12	-83.6E-12	2.3E-09	1.4E-09	-2.1E-09	-4.0E-09	-2.3E-09	-2.5E-09	-4.2E-09	2.8E-09	454.3E-12
37	-	0.0E+00	-738.8E-12	3.3E-09	-518.3E-12	-226.0E-12	-1.8E-09	-7.3E-09	-4.4E-09	-1.4E-09	-9.2E-09	-9.5E-09	-594.9E-12
38	-	-785.6E-12	705.4E-12	-334.3E-12	-851.3E-12	1.2E-09	-308.5E-12	-6.1E-09	-2.1E-09	-8.0E-09	-9.3E-09	-7.2E-09	-3.0E-09
Average	-	-261.9E-12	-138.7E-12	947.2E-12	313.5E-12	778.9E-12	-1.4E-09	-5.8E-09	-2.9E-09	-4.0E-09	-7.6E-09	-4.7E-09	-1.1E-09
Sigma	-	370.4E-12	614.3E-12	1.6E-09	1.4E-09	716.6E-12	791.1E-12	1.4E-09	1.0E-09	2.9E-09	2.4E-09	5.4E-09	1.5E-09

Parameter : Input Offset Current : IIO4DUTD
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -10.0E-09
 Spec Limit Max : 10.0E-09
 Spec limits are represented in bold lines on the graphic.



Measurements

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-362.7E-12	-120.4E-12	558.3E-12	-168.8E-12	772.3E-12	810.8E-12	221.4E-12	295.2E-12	-276.7E-12	-36.9E-12	405.9E-12	276.8E-12	848.7E-12
ON_PROTON samples													
27	1.1E-09	2.0E-09	1.3E-09	1.3E-09	608.9E-12	64.1E-12	-479.7E-12	-1.4E-09	110.7E-12	-664.2E-12	-2.5E-09	-738.0E-12	-664.2E-12
28	902.6E-12	1.4E-09	3.0E-09	2.9E-09	2.0E-09	1.6E-09	2.0E-09	1.2E-09	4.2E-09	2.6E-09	3.6E-09	4.6E-09	3.3E-09
29	6.6E-09	3.6E-09	4.7E-09	3.9E-09	5.4E-09	5.2E-09	3.8E-09	3.8E-09	5.0E-09	4.6E-09	7.2E-09	4.1E-09	6.5E-09
Statistics													
Min	902.6E-12	1.4E-09	1.3E-09	1.3E-09	608.9E-12	64.1E-12	-479.7E-12	-1.4E-09	110.7E-12	-664.2E-12	-2.5E-09	-738.0E-12	-664.2E-12
Max	6.6E-09	3.6E-09	4.7E-09	3.9E-09	5.4E-09	5.2E-09	3.8E-09	3.8E-09	5.0E-09	4.6E-09	7.2E-09	4.6E-09	6.5E-09
Average	2.9E-09	2.3E-09	3.0E-09	2.7E-09	2.7E-09	2.3E-09	1.8E-09	1.8E-09	3.1E-09	2.2E-09	2.8E-09	2.7E-09	3.0E-09
Sigma	2.7E-09	938.9E-12	1.4E-09	1.1E-09	2.0E-09	2.1E-09	1.8E-09	2.1E-09	2.1E-09	2.2E-09	4.0E-09	2.4E-09	2.9E-09

Drift Calculation

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	885.9E-12	250.7E-12	234.0E-12	-460.9E-12	-1.0E-09	-1.5E-09	-2.5E-09	-959.0E-12	-1.7E-09	-3.6E-09	-1.8E-09	-1.7E-09
28	-	451.3E-12	2.1E-09	2.0E-09	1.1E-09	699.7E-12	1.1E-09	333.5E-12	3.3E-09	1.7E-09	2.7E-09	3.7E-09	2.4E-09
29	-	-3.1E-09	-1.9E-09	-2.7E-09	-1.2E-09	-1.4E-09	-2.8E-09	-2.8E-09	-1.7E-09	-2.0E-09	596.2E-12	-2.5E-09	-141.7E-12
Average	-	-573.9E-12	150.4E-12	-150.5E-12	-209.6E-12	-583.5E-12	-1.1E-09	-1.7E-09	217.8E-12	-680.1E-12	-89.7E-12	-194.3E-12	162.4E-12
Sigma	-	1.8E-09	1.7E-09	1.9E-09	944.6E-12	924.9E-12	1.6E-09	1.4E-09	2.2E-09	1.7E-09	2.6E-09	2.8E-09	1.7E-09

Measurements

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-362.7E-12	-120.4E-12	558.3E-12	-168.8E-12	772.3E-12	810.8E-12	221.4E-12	295.2E-12	-276.7E-12	-36.9E-12	405.9E-12	276.8E-12	848.7E-12
ON_TID samples													
33	285.8E-12	285.8E-12	1.3E-09	200.6E-12	1.7E-09	1.8E-09	1.5E-09	-793.4E-12	701.1E-12	239.8E-12	1.4E-09	1.1E-09	682.6E-12
34	51.8E-12	41.8E-12	745.5E-12	234.0E-12	-1.3E-09	1.2E-09	608.8E-12	-756.4E-12	-369.0E-12	1.2E-09	-369.0E-12	-424.3E-12	1.7E-09
35	401.2E-12	401.2E-12	531.5E-12	192.2E-12	564.0E-12	-1.7E-09	369.0E-12	-1.5E-09	-885.6E-12	-608.8E-12	-2.0E-09	-1.1E-09	-498.1E-12
Statistics													
Min	51.8E-12	41.8E-12	531.5E-12	192.2E-12	-1.3E-09	-1.7E-09	369.0E-12	-1.5E-09	-885.6E-12	-608.8E-12	-2.0E-09	-1.1E-09	-498.1E-12
Max	401.2E-12	401.2E-12	1.3E-09	234.0E-12	1.7E-09	1.8E-09	1.5E-09	-756.4E-12	701.1E-12	1.2E-09	1.4E-09	1.1E-09	1.7E-09
Average	246.3E-12	242.9E-12	844.7E-12	208.9E-12	335.4E-12	427.3E-12	824.1E-12	-1.0E-09	-184.5E-12	270.6E-12	-313.6E-12	-116.8E-12	627.3E-12
Sigma	145.3E-12	149.8E-12	304.4E-12	18.1E-12	1.2E-09	1.5E-09	484.0E-12	330.8E-12	660.7E-12	730.9E-12	1.4E-09	929.6E-12	897.2E-12

Drift Calculation

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	971.2E-12	-85.2E-12	1.4E-09	1.5E-09	1.2E-09	-1.1E-09	415.2E-12	-46.0E-12	1.1E-09	858.1E-12	396.8E-12
34	-	-10.0E-12	693.7E-12	182.2E-12	-1.3E-09	1.1E-09	557.0E-12	-808.3E-12	-420.8E-12	1.1E-09	-420.8E-12	-476.1E-12	1.6E-09
35	-	0.0E+00	130.4E-12	-208.9E-12	162.9E-12	-2.1E-09	-32.2E-12	-1.9E-09	-1.3E-09	-1.0E-09	-2.4E-09	-1.5E-09	-899.3E-12
Average	-	-3.3E-12	598.4E-12	-37.3E-12	89.1E-12	181.0E-12	577.8E-12	-1.3E-09	-430.8E-12	24.3E-12	-559.9E-12	-363.1E-12	381.0E-12
Sigma	-	4.7E-12	349.8E-12	163.2E-12	1.1E-09	1.6E-09	506.8E-12	453.7E-12	694.9E-12	874.7E-12	1.4E-09	954.3E-12	1.0E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-362.7E-12	-120.4E-12	558.3E-12	-168.8E-12	772.3E-12	810.8E-12	221.4E-12	295.2E-12	-276.7E-12	-36.9E-12	405.9E-12	276.8E-12	848.7E-12
OFF_PROTON samples													
30	-2.6E-09	-2.2E-09	-3.6E-09	-4.5E-09	-3.0E-09	-4.2E-09	-3.5E-09	-3.5E-09	-3.7E-09	-3.0E-09	-1.3E-09	-3.7E-09	-3.1E-09
32	4.6E-09	3.2E-09	3.8E-09	8.3E-09	6.2E-09	5.1E-09	8.5E-09	3.0E-09	2.5E-09	3.9E-09	3.7E-09	737.9E-12	2.6E-09
39	1.8E-09	334.3E-12	752.2E-12	401.2E-12	-32.1E-12	1.8E-09	4.6E-09	-1.3E-09	5.9E-09	6.1E-09	3.9E-09	2.2E-09	-424.4E-12
Statistics													
Min	-2.6E-09	-2.2E-09	-3.6E-09	-4.5E-09	-3.0E-09	-4.2E-09	-3.5E-09	-3.5E-09	-3.7E-09	-3.0E-09	-1.3E-09	-3.7E-09	-3.1E-09
Max	4.6E-09	3.2E-09	3.8E-09	8.3E-09	6.2E-09	5.1E-09	8.5E-09	3.0E-09	5.9E-09	6.1E-09	3.9E-09	2.2E-09	2.6E-09
Average	1.3E-09	464.1E-12	334.3E-12	1.4E-09	1.1E-09	885.6E-12	3.2E-09	-615.0E-12	1.6E-09	2.3E-09	2.1E-09	-246.0E-12	-325.9E-12
Sigma	3.0E-09	2.2E-09	3.1E-09	5.3E-09	3.8E-09	3.9E-09	5.0E-09	2.7E-09	4.0E-09	3.8E-09	2.4E-09	2.5E-09	2.3E-09

Drift Calculation

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	422.9E-12	-1.0E-09	-2.0E-09	-389.4E-12	-1.7E-09	-914.6E-12	-914.6E-12	-1.1E-09	-361.1E-12	1.3E-09	-1.1E-09	-545.5E-12
32	-	-1.4E-09	-787.3E-12	3.7E-09	1.6E-09	497.2E-12	3.9E-09	-1.7E-09	-2.1E-09	-757.4E-12	-942.0E-12	-3.9E-09	-2.0E-09
39	-	-1.4E-09	-1.0E-09	-1.4E-09	-1.8E-09	12.7E-12	2.9E-09	-3.0E-09	4.1E-09	4.3E-09	2.1E-09	455.6E-12	-2.2E-09
Average	-	-802.3E-12	-932.2E-12	120.9E-12	-198.3E-12	-380.9E-12	1.9E-09	-1.9E-09	319.5E-12	1.1E-09	824.5E-12	-1.5E-09	-1.6E-09
Sigma	-	866.4E-12	102.4E-12	2.5E-09	1.4E-09	920.7E-12	2.1E-09	883.3E-12	2.7E-09	2.3E-09	1.3E-09	1.8E-09	742.3E-12

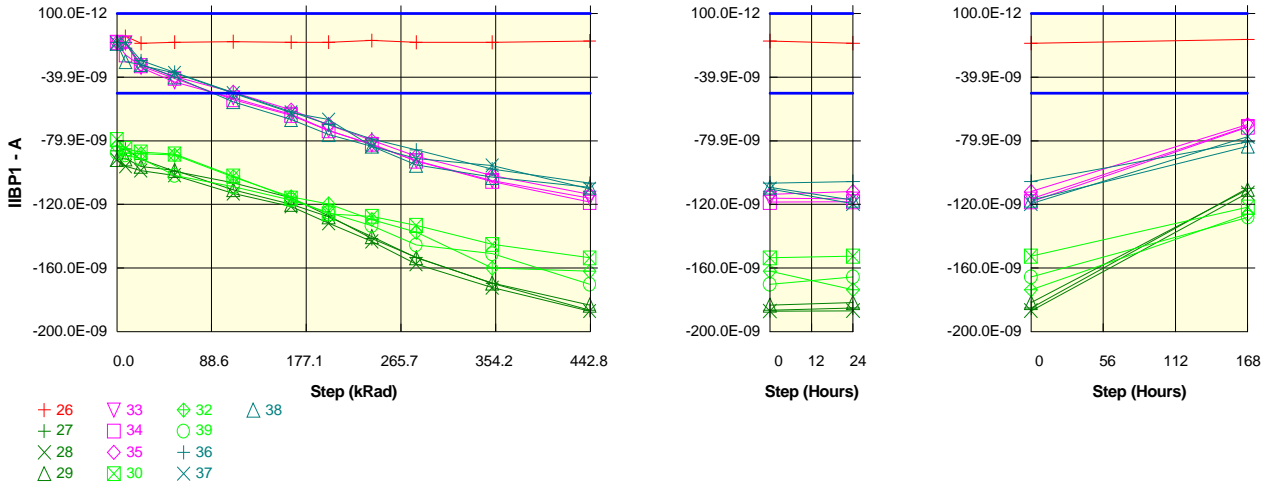
Measurements

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-362.7E-12	-120.4E-12	558.3E-12	-168.8E-12	772.3E-12	810.8E-12	221.4E-12	295.2E-12	-276.7E-12	-36.9E-12	405.9E-12	276.8E-12	848.7E-12
OFF_TID samples													
36	-6.7E-12	-6.7E-12	601.8E-12	568.3E-12	1.3E-09	387.5E-12	1.8E-09	2.1E-09	3.7E-09	-5.0E-09	-368.9E-12	7.9E-09	-1.1E-09
37	-8.4E-12	-8.4E-12	-66.9E-12	1.2E-09	2.4E-09	4.0E-09	2.0E-09	-1.8E-09	4.4E-09	7.0E-09	8.3E-09	3.0E-09	959.4E-12
38	63.5E-12	-1.4E-09	698.7E-12	1.5E-09	1.8E-09	-110.7E-12	313.6E-12	737.9E-12	2.8E-09	1.7E-09	0.0E+00	2.8E-09	-516.6E-12
Statistics													
Min	-8.4E-12	-1.4E-09	-66.9E-12	568.3E-12	1.3E-09	-110.7E-12	313.6E-12	-1.8E-09	2.8E-09	-5.0E-09	-368.9E-12	2.8E-09	-1.1E-09
Max	63.5E-12	-6.7E-12	698.7E-12	1.5E-09	2.4E-09	4.0E-09	2.0E-09	2.1E-09	4.4E-09	7.0E-09	8.3E-09	7.9E-09	959.4E-12
Average	16.2E-12	-483.6E-12	411.2E-12	1.1E-09	1.8E-09	1.4E-09	1.4E-09	345.6E-12	3.6E-09	1.2E-09	2.6E-09	4.6E-09	-202.9E-12
Sigma	33.5E-12	673.3E-12	340.3E-12	390.2E-12	444.8E-12	1.8E-09	774.2E-12	1.7E-09	679.3E-12	4.9E-09	4.0E-09	2.4E-09	850.4E-12

Drift Calculation

IIO4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	608.4E-12	575.0E-12	1.3E-09	394.2E-12	1.9E-09	2.2E-09	3.7E-09	-5.0E-09	-362.3E-12	7.9E-09	-1.0E-09
37	-	0.0E+00	-58.5E-12	1.2E-09	2.4E-09	4.0E-09	2.1E-09	-1.8E-09	4.4E-09	7.0E-09	8.3E-09	3.0E-09	967.7E-12
38	-	-1.5E-09	635.2E-12	1.4E-09	1.8E-09	-174.2E-12	250.1E-12	674.4E-12	2.7E-09	1.6E-09	-63.5E-12	2.7E-09	-580.1E-12
Average	-	-499.8E-12	395.0E-12	1.1E-09	1.8E-09	1.4E-09	1.4E-09	329.4E-12	3.6E-09	1.2E-09	2.6E-09	4.5E-09	-219.1E-12
Sigma	-	706.8E-12	320.9E-12	366.3E-12	446.8E-12	1.8E-09	807.5E-12	1.6E-09	709.7E-12	4.9E-09	4.0E-09	2.4E-09	860.4E-12

Parameter : Input Bias Current : IIBP1DUTA
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.9E-09	-14.3E-09	-18.7E-09	-18.0E-09	-17.7E-09	-18.0E-09	-18.0E-09	-16.9E-09	-18.1E-09	-18.1E-09	-17.3E-09	-18.6E-09	-16.3E-09
ON_PROTON samples													
27	-86.3E-09	-85.2E-09	-91.8E-09	-99.1E-09	-106.5E-09	-116.1E-09	-127.2E-09	-141.5E-09	-153.4E-09	-169.6E-09	-186.7E-09	-185.2E-09	-110.0E-09
28	-91.9E-09	-96.0E-09	-98.7E-09	-101.7E-09	-113.1E-09	-121.4E-09	-131.9E-09	-143.3E-09	-157.6E-09	-172.4E-09	-187.2E-09	-186.9E-09	-112.9E-09
29	-91.7E-09	-91.3E-09	-96.1E-09	-98.6E-09	-110.8E-09	-119.9E-09	-127.9E-09	-140.3E-09	-153.7E-09	-169.5E-09	-183.4E-09	-181.8E-09	-110.7E-09
Statistics													
Min	-91.9E-09	-96.0E-09	-98.7E-09	-101.7E-09	-113.1E-09	-121.4E-09	-131.9E-09	-143.3E-09	-157.6E-09	-172.4E-09	-187.2E-09	-186.9E-09	-112.9E-09
Max	-86.3E-09	-85.2E-09	-91.8E-09	-98.6E-09	-106.5E-09	-116.1E-09	-127.2E-09	-140.3E-09	-153.4E-09	-169.5E-09	-183.4E-09	-181.8E-09	-110.0E-09
Average	-90.0E-09	-90.8E-09	-95.6E-09	-99.8E-09	-110.1E-09	-119.1E-09	-129.0E-09	-141.7E-09	-154.9E-09	-170.5E-09	-185.7E-09	-184.6E-09	-111.2E-09
Sigma	2.6E-09	4.4E-09	2.8E-09	1.4E-09	2.7E-09	2.2E-09	2.1E-09	1.2E-09	1.9E-09	1.3E-09	1.7E-09	2.1E-09	1.2E-09

Drift Calculation

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	1.1E-09	-5.5E-09	-12.8E-09	-20.2E-09	-29.8E-09	-40.9E-09	-55.2E-09	-67.0E-09	-83.3E-09	-100.3E-09	-98.9E-09	-23.7E-09
28	-	-4.1E-09	-6.8E-09	-9.8E-09	-21.2E-09	-29.5E-09	-40.0E-09	-51.4E-09	-65.7E-09	-80.5E-09	-95.3E-09	-95.0E-09	-21.0E-09
29	-	417.9E-12	-4.4E-09	-6.9E-09	-19.1E-09	-28.2E-09	-36.2E-09	-48.6E-09	-62.0E-09	-77.8E-09	-91.7E-09	-90.1E-09	-19.0E-09
Average	-	-853.6E-12	-5.6E-09	-9.9E-09	-20.2E-09	-29.2E-09	-39.0E-09	-51.8E-09	-64.9E-09	-80.5E-09	-95.8E-09	-94.7E-09	-21.2E-09
Sigma	-	2.3E-09	1.0E-09	2.4E-09	852.9E-12	656.7E-12	2.0E-09	2.7E-09	2.1E-09	2.2E-09	3.5E-09	3.6E-09	1.9E-09

Measurements

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.9E-09	-14.3E-09	-18.7E-09	-18.0E-09	-17.7E-09	-18.0E-09	-18.0E-09	-16.9E-09	-18.1E-09	-18.1E-09	-17.3E-09	-18.6E-09	-16.3E-09
ON_TID samples													
33	-18.4E-09	-18.4E-09	-33.9E-09	-42.9E-09	-53.1E-09	-63.4E-09	-73.4E-09	-82.6E-09	-92.6E-09	-105.0E-09	-116.1E-09	-116.6E-09	-70.9E-09
34	-18.1E-09	-26.0E-09	-32.8E-09	-40.8E-09	-54.1E-09	-64.0E-09	-73.7E-09	-82.2E-09	-92.7E-09	-105.6E-09	-118.7E-09	-118.4E-09	-71.5E-09
35	-18.1E-09	-18.1E-09	-31.9E-09	-39.5E-09	-49.4E-09	-60.5E-09	-69.9E-09	-79.8E-09	-89.7E-09	-101.8E-09	-113.7E-09	-111.9E-09	-69.7E-09
Statistics													
Min	-18.4E-09	-26.0E-09	-33.9E-09	-42.9E-09	-54.1E-09	-64.0E-09	-73.7E-09	-82.6E-09	-92.7E-09	-105.6E-09	-118.7E-09	-118.4E-09	-71.5E-09
Max	-18.1E-09	-18.1E-09	-31.9E-09	-39.5E-09	-49.4E-09	-60.5E-09	-69.9E-09	-79.8E-09	-89.7E-09	-101.8E-09	-113.7E-09	-111.9E-09	-69.7E-09
Average	-18.2E-09	-20.8E-09	-32.9E-09	-41.1E-09	-52.2E-09	-62.6E-09	-72.3E-09	-81.5E-09	-91.7E-09	-104.2E-09	-116.2E-09	-115.6E-09	-70.7E-09
Sigma	112.3E-12	3.7E-09	821.0E-12	1.4E-09	2.0E-09	1.5E-09	1.7E-09	1.2E-09	1.4E-09	1.7E-09	2.0E-09	2.8E-09	738.1E-12

Drift Calculation

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-15.5E-09	-24.6E-09	-34.7E-09	-45.1E-09	-55.0E-09	-64.2E-09	-74.2E-09	-86.7E-09	-97.8E-09	-98.2E-09	-52.6E-09
34	-	-7.9E-09	-14.7E-09	-22.7E-09	-36.0E-09	-45.9E-09	-55.6E-09	-64.0E-09	-74.6E-09	-87.5E-09	-100.5E-09	-100.3E-09	-53.4E-09
35	-	0.0E+00	-13.8E-09	-21.4E-09	-31.3E-09	-42.4E-09	-51.8E-09	-61.6E-09	-71.6E-09	-83.7E-09	-95.6E-09	-93.7E-09	-51.6E-09
Average	-	-2.6E-09	-14.7E-09	-22.9E-09	-34.0E-09	-44.4E-09	-54.1E-09	-63.3E-09	-73.5E-09	-86.0E-09	-98.0E-09	-97.4E-09	-52.5E-09
Sigma	-	3.7E-09	721.5E-12	1.3E-09	2.0E-09	1.5E-09	1.7E-09	1.2E-09	1.3E-09	1.6E-09	2.0E-09	2.7E-09	720.6E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.9E-09	-14.3E-09	-18.7E-09	-18.0E-09	-17.7E-09	-18.0E-09	-18.0E-09	-16.9E-09	-18.1E-09	-18.1E-09	-17.3E-09	-18.6E-09	-16.3E-09
OFF PROTON samples													
30	-79.2E-09	-85.0E-09	-87.1E-09	-88.3E-09	-102.2E-09	-116.1E-09	-125.9E-09	-127.5E-09	-133.2E-09	-145.2E-09	-153.7E-09	-152.6E-09	-121.8E-09
32	-83.2E-09	-87.6E-09	-88.1E-09	-89.0E-09	-102.7E-09	-115.3E-09	-119.7E-09	-129.5E-09	-137.5E-09	-160.1E-09	-162.2E-09	-173.8E-09	-126.2E-09
39	-87.4E-09	-89.1E-09	-91.2E-09	-101.8E-09	-108.9E-09	-117.3E-09	-125.1E-09	-133.4E-09	-145.6E-09	-151.1E-09	-170.3E-09	-165.7E-09	-128.1E-09
Statistics													
Min	-87.4E-09	-89.1E-09	-91.2E-09	-101.8E-09	-108.9E-09	-117.3E-09	-125.9E-09	-133.4E-09	-145.6E-09	-160.1E-09	-170.3E-09	-173.8E-09	-128.1E-09
Max	-79.2E-09	-85.0E-09	-87.1E-09	-88.3E-09	-102.2E-09	-115.3E-09	-119.7E-09	-127.5E-09	-133.2E-09	-145.2E-09	-153.7E-09	-152.6E-09	-121.8E-09
Average	-83.3E-09	-87.2E-09	-88.8E-09	-93.0E-09	-104.6E-09	-116.2E-09	-123.6E-09	-130.1E-09	-138.7E-09	-152.1E-09	-162.0E-09	-164.0E-09	-125.4E-09
Sigma	3.3E-09	1.7E-09	1.7E-09	6.2E-09	3.0E-09	832.2E-12	2.7E-09	2.4E-09	5.1E-09	6.1E-09	6.8E-09	8.7E-09	2.7E-09

Drift Calculation

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-5.7E-09	-7.9E-09	-9.1E-09	-23.0E-09	-36.9E-09	-46.7E-09	-48.3E-09	-54.0E-09	-66.0E-09	-74.5E-09	-73.3E-09	-42.5E-09
32	-	-4.4E-09	-4.8E-09	-5.7E-09	-19.5E-09	-32.0E-09	-36.5E-09	-46.3E-09	-54.2E-09	-76.9E-09	-78.9E-09	-90.6E-09	-42.9E-09
39	-	-1.7E-09	-3.8E-09	-14.4E-09	-21.6E-09	-29.9E-09	-37.7E-09	-46.0E-09	-58.2E-09	-63.7E-09	-82.9E-09	-78.3E-09	-40.8E-09
Average	-	-3.9E-09	-5.5E-09	-9.7E-09	-21.4E-09	-33.0E-09	-40.3E-09	-46.9E-09	-55.5E-09	-68.9E-09	-78.8E-09	-80.7E-09	-42.1E-09
Sigma	-	1.7E-09	1.7E-09	3.6E-09	1.4E-09	2.9E-09	4.6E-09	997.9E-12	1.9E-09	5.8E-09	3.5E-09	7.2E-09	939.1E-12

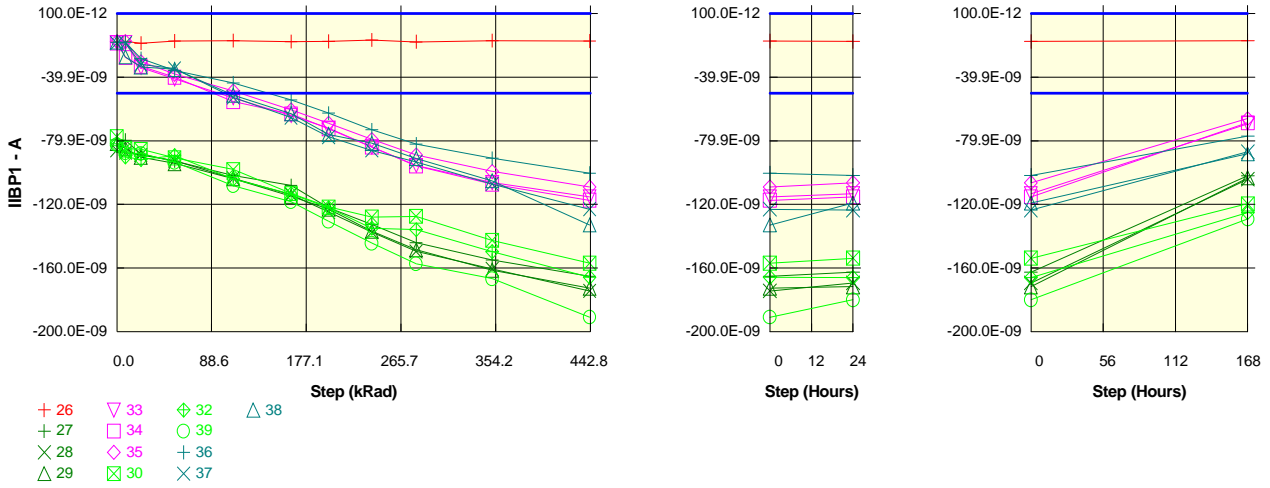
Measurements

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.9E-09	-14.3E-09	-18.7E-09	-18.0E-09	-17.7E-09	-18.0E-09	-18.0E-09	-16.9E-09	-18.1E-09	-18.1E-09	-17.3E-09	-18.6E-09	-16.3E-09
OFF TID samples													
36	-18.1E-09	-18.1E-09	-29.6E-09	-36.9E-09	-49.7E-09	-61.8E-09	-69.8E-09	-78.8E-09	-85.8E-09	-97.8E-09	-106.6E-09	-105.7E-09	-80.8E-09
37	-18.5E-09	-18.5E-09	-32.5E-09	-37.3E-09	-50.1E-09	-62.2E-09	-66.6E-09	-83.4E-09	-91.2E-09	-95.6E-09	-110.3E-09	-119.6E-09	-77.4E-09
38	-18.7E-09	-30.3E-09	-32.0E-09	-39.8E-09	-55.5E-09	-66.6E-09	-76.1E-09	-83.4E-09	-95.3E-09	-102.9E-09	-109.2E-09	-117.3E-09	-83.5E-09
Statistics													
Min	-18.7E-09	-30.3E-09	-32.5E-09	-39.8E-09	-55.5E-09	-66.6E-09	-76.1E-09	-83.4E-09	-95.3E-09	-102.9E-09	-110.3E-09	-119.6E-09	-83.5E-09
Max	-18.1E-09	-18.1E-09	-29.6E-09	-36.9E-09	-49.7E-09	-61.8E-09	-66.6E-09	-78.8E-09	-85.8E-09	-95.6E-09	-106.6E-09	-105.7E-09	-77.4E-09
Average	-18.4E-09	-22.3E-09	-31.4E-09	-38.0E-09	-51.8E-09	-63.6E-09	-70.8E-09	-81.9E-09	-90.8E-09	-98.8E-09	-108.7E-09	-114.2E-09	-80.5E-09
Sigma	240.9E-12	5.6E-09	1.3E-09	1.3E-09	2.6E-09	2.1E-09	3.9E-09	2.2E-09	3.9E-09	3.1E-09	1.5E-09	6.1E-09	2.5E-09

Drift Calculation

IIBP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-11.5E-09	-18.8E-09	-31.6E-09	-43.7E-09	-51.7E-09	-60.7E-09	-67.7E-09	-79.6E-09	-88.5E-09	-87.6E-09	-62.6E-09
37	-	0.0E+00	-14.1E-09	-18.8E-09	-31.6E-09	-43.8E-09	-48.1E-09	-65.0E-09	-72.8E-09	-77.1E-09	-91.9E-09	-101.1E-09	-58.9E-09
38	-	-11.6E-09	-13.2E-09	-21.1E-09	-36.8E-09	-47.9E-09	-57.3E-09	-64.7E-09	-76.6E-09	-84.2E-09	-90.5E-09	-98.6E-09	-64.7E-09
Average	-	-3.9E-09	-12.9E-09	-19.6E-09	-33.3E-09	-45.1E-09	-52.4E-09	-63.5E-09	-72.3E-09	-80.3E-09	-90.3E-09	-95.8E-09	-62.1E-09
Sigma	-	5.4E-09	1.1E-09	1.1E-09	2.4E-09	1.9E-09	3.8E-09	2.0E-09	3.6E-09	2.9E-09	1.4E-09	5.9E-09	2.4E-09

Parameter : Input Bias Current : IIBP1DUTB
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.8E-09	-17.4E-09	-18.5E-09	-17.2E-09	-17.0E-09	-17.5E-09	-17.4E-09	-16.5E-09	-17.7E-09	-17.0E-09	-17.2E-09	-17.4E-09	-17.1E-09
ON_PROTON samples													
27	-79.6E-09	-79.7E-09	-88.3E-09	-92.7E-09	-101.9E-09	-108.1E-09	-122.3E-09	-132.6E-09	-144.1E-09	-155.1E-09	-165.3E-09	-162.7E-09	-102.0E-09
28	-86.0E-09	-87.4E-09	-88.9E-09	-92.5E-09	-103.7E-09	-113.9E-09	-124.8E-09	-137.5E-09	-149.7E-09	-160.6E-09	-174.5E-09	-169.5E-09	-104.2E-09
29	-81.6E-09	-84.8E-09	-90.3E-09	-94.3E-09	-103.9E-09	-115.0E-09	-123.0E-09	-136.9E-09	-148.6E-09	-161.5E-09	-172.7E-09	-171.8E-09	-103.3E-09
Statistics													
Min	-86.0E-09	-87.4E-09	-90.3E-09	-94.3E-09	-103.9E-09	-115.0E-09	-124.8E-09	-137.5E-09	-149.7E-09	-161.5E-09	-174.5E-09	-171.8E-09	-104.2E-09
Max	-79.6E-09	-79.7E-09	-88.3E-09	-92.5E-09	-101.9E-09	-108.1E-09	-122.3E-09	-132.6E-09	-144.1E-09	-155.1E-09	-165.3E-09	-162.7E-09	-102.0E-09
Average	-82.4E-09	-84.0E-09	-89.2E-09	-93.2E-09	-103.1E-09	-112.4E-09	-123.4E-09	-135.7E-09	-147.4E-09	-159.1E-09	-170.8E-09	-168.0E-09	-103.2E-09
Sigma	2.7E-09	3.2E-09	849.7E-12	807.9E-12	903.5E-12	3.0E-09	1.1E-09	2.2E-09	2.4E-09	2.8E-09	4.0E-09	3.9E-09	908.0E-12

Drift Calculation

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-127.0E-12	-8.8E-09	-13.1E-09	-22.3E-09	-28.6E-09	-42.7E-09	-53.0E-09	-64.5E-09	-75.5E-09	-85.7E-09	-83.2E-09	-22.4E-09
28	-	-1.4E-09	-2.9E-09	-6.5E-09	-17.7E-09	-27.9E-09	-38.8E-09	-51.5E-09	-63.6E-09	-74.6E-09	-88.5E-09	-83.5E-09	-18.2E-09
29	-	-3.2E-09	-8.7E-09	-12.7E-09	-22.3E-09	-33.4E-09	-41.4E-09	-55.2E-09	-67.0E-09	-79.8E-09	-91.1E-09	-90.2E-09	-21.7E-09
Average	-	-1.6E-09	-6.8E-09	-10.7E-09	-20.7E-09	-29.9E-09	-40.9E-09	-53.3E-09	-65.0E-09	-76.7E-09	-88.4E-09	-85.6E-09	-20.8E-09
Sigma	-	1.3E-09	2.7E-09	3.0E-09	2.2E-09	2.4E-09	1.6E-09	1.5E-09	1.4E-09	2.3E-09	2.2E-09	3.2E-09	1.8E-09

Measurements

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.8E-09	-17.4E-09	-18.5E-09	-17.2E-09	-17.0E-09	-17.5E-09	-17.4E-09	-16.5E-09	-17.7E-09	-17.0E-09	-17.2E-09	-17.4E-09	-17.1E-09
ON_TID samples													
33	-18.3E-09	-18.3E-09	-33.9E-09	-41.1E-09	-53.0E-09	-64.2E-09	-72.0E-09	-83.9E-09	-95.5E-09	-106.3E-09	-115.2E-09	-113.3E-09	-69.3E-09
34	-18.4E-09	-27.6E-09	-33.2E-09	-40.0E-09	-55.3E-09	-63.1E-09	-72.5E-09	-83.9E-09	-95.9E-09	-107.3E-09	-117.4E-09	-115.2E-09	-68.7E-09
35	-17.5E-09	-17.5E-09	-30.2E-09	-38.1E-09	-48.6E-09	-60.5E-09	-68.9E-09	-79.2E-09	-88.9E-09	-99.4E-09	-109.0E-09	-106.3E-09	-66.0E-09
Statistics													
Min	-18.4E-09	-27.6E-09	-33.9E-09	-41.1E-09	-55.3E-09	-64.2E-09	-72.5E-09	-83.9E-09	-95.9E-09	-107.3E-09	-117.4E-09	-115.2E-09	-69.3E-09
Max	-17.5E-09	-17.5E-09	-30.2E-09	-38.1E-09	-48.6E-09	-60.5E-09	-68.9E-09	-79.2E-09	-88.9E-09	-99.4E-09	-109.0E-09	-106.3E-09	-66.0E-09
Average	-18.1E-09	-21.1E-09	-32.4E-09	-39.7E-09	-52.3E-09	-62.6E-09	-71.1E-09	-82.3E-09	-93.4E-09	-104.3E-09	-113.9E-09	-111.6E-09	-68.0E-09
Sigma	380.8E-12	4.6E-09	1.6E-09	1.2E-09	2.8E-09	1.5E-09	1.6E-09	2.2E-09	3.2E-09	3.5E-09	3.6E-09	3.8E-09	1.4E-09

Drift Calculation

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-15.6E-09	-22.8E-09	-34.7E-09	-45.9E-09	-53.8E-09	-65.6E-09	-77.3E-09	-88.0E-09	-97.0E-09	-95.1E-09	-51.0E-09
34	-	-9.2E-09	-14.8E-09	-21.6E-09	-36.9E-09	-44.7E-09	-54.1E-09	-65.5E-09	-77.5E-09	-88.9E-09	-99.1E-09	-96.9E-09	-50.3E-09
35	-	0.0E+00	-12.6E-09	-20.6E-09	-31.0E-09	-42.9E-09	-51.4E-09	-61.7E-09	-71.3E-09	-81.8E-09	-91.5E-09	-88.8E-09	-48.5E-09
Average	-	-3.1E-09	-14.4E-09	-21.7E-09	-34.2E-09	-44.5E-09	-53.1E-09	-64.3E-09	-75.4E-09	-86.2E-09	-95.8E-09	-93.6E-09	-49.9E-09
Sigma	-	4.3E-09	1.3E-09	886.6E-12	2.4E-09	1.2E-09	1.2E-09	1.9E-09	2.8E-09	3.1E-09	3.2E-09	3.4E-09	1.0E-09

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.8E-09	-17.4E-09	-18.5E-09	-17.2E-09	-17.0E-09	-17.5E-09	-17.4E-09	-16.5E-09	-17.7E-09	-17.0E-09	-17.2E-09	-17.4E-09	-17.1E-09
OFF PROTON samples													
30	-77.5E-09	-84.9E-09	-85.4E-09	-90.7E-09	-98.0E-09	-113.2E-09	-121.7E-09	-128.0E-09	-127.5E-09	-142.6E-09	-157.0E-09	-153.9E-09	-119.7E-09
32	-83.2E-09	-90.1E-09	-91.8E-09	-89.3E-09	-104.0E-09	-113.4E-09	-122.1E-09	-135.1E-09	-136.0E-09	-149.8E-09	-165.9E-09	-166.0E-09	-125.3E-09
39	-82.5E-09	-87.6E-09	-88.0E-09	-93.4E-09	-108.2E-09	-118.3E-09	-130.7E-09	-144.5E-09	-157.4E-09	-166.8E-09	-191.0E-09	-180.1E-09	-129.3E-09
Statistics													
Min	-83.2E-09	-90.1E-09	-91.8E-09	-93.4E-09	-108.2E-09	-118.3E-09	-130.7E-09	-144.5E-09	-157.4E-09	-166.8E-09	-191.0E-09	-180.1E-09	-129.3E-09
Max	-77.5E-09	-84.9E-09	-85.4E-09	-89.3E-09	-98.0E-09	-113.2E-09	-121.7E-09	-128.0E-09	-127.5E-09	-142.6E-09	-157.0E-09	-153.9E-09	-119.7E-09
Average	-81.0E-09	-87.5E-09	-88.4E-09	-91.2E-09	-103.4E-09	-114.9E-09	-124.8E-09	-135.9E-09	-140.3E-09	-153.1E-09	-171.3E-09	-166.7E-09	-124.8E-09
Sigma	2.5E-09	2.1E-09	2.6E-09	1.7E-09	4.2E-09	2.4E-09	4.2E-09	6.7E-09	12.6E-09	10.1E-09	14.4E-09	10.7E-09	3.9E-09

Drift Calculation

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-7.4E-09	-7.9E-09	-13.2E-09	-20.5E-09	-35.7E-09	-44.2E-09	-50.5E-09	-50.0E-09	-65.1E-09	-79.5E-09	-76.4E-09	-42.2E-09
32	-	-7.0E-09	-8.6E-09	-6.2E-09	-20.9E-09	-30.2E-09	-38.9E-09	-51.9E-09	-52.8E-09	-66.6E-09	-82.7E-09	-82.9E-09	-42.1E-09
39	-	-5.1E-09	-5.5E-09	-11.0E-09	-25.7E-09	-35.8E-09	-48.2E-09	-62.0E-09	-74.9E-09	-84.3E-09	-108.5E-09	-97.6E-09	-46.8E-09
Average	-	-6.5E-09	-7.3E-09	-10.1E-09	-22.4E-09	-33.9E-09	-43.8E-09	-54.8E-09	-59.2E-09	-72.0E-09	-90.2E-09	-85.6E-09	-43.7E-09
Sigma	-	973.7E-12	1.3E-09	2.9E-09	2.4E-09	2.6E-09	3.8E-09	5.1E-09	11.1E-09	8.7E-09	13.0E-09	8.9E-09	2.2E-09

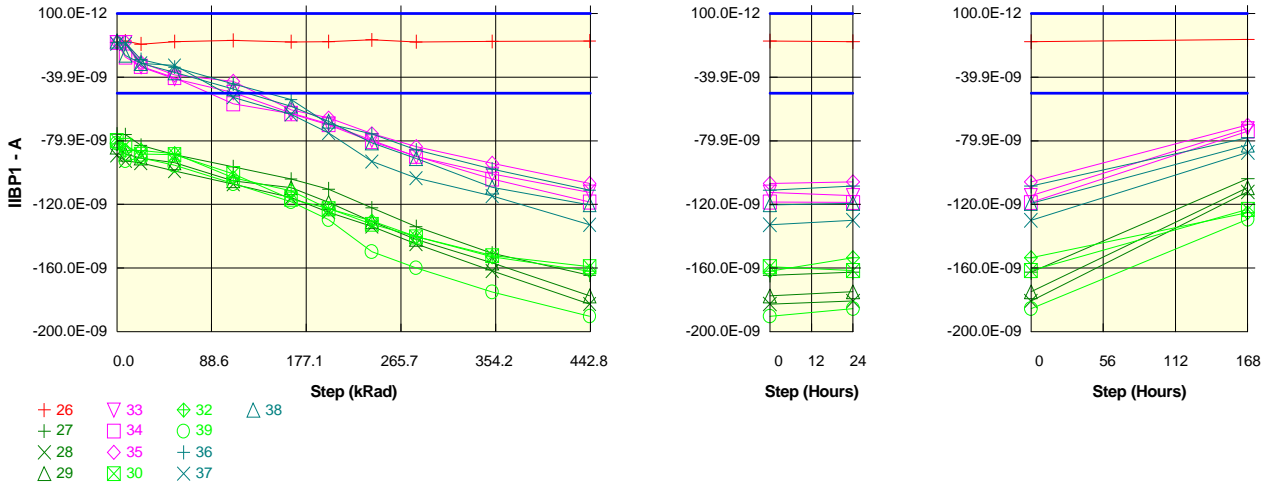
Measurements

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.8E-09	-17.4E-09	-18.5E-09	-17.2E-09	-17.0E-09	-17.5E-09	-17.4E-09	-16.5E-09	-17.7E-09	-17.0E-09	-17.2E-09	-17.4E-09	-17.1E-09
OFF TID samples													
36	-18.1E-09	-18.1E-09	-28.3E-09	-35.8E-09	-43.6E-09	-54.3E-09	-62.6E-09	-73.1E-09	-82.1E-09	-91.0E-09	-100.4E-09	-101.8E-09	-77.0E-09
37	-18.5E-09	-18.5E-09	-32.0E-09	-34.5E-09	-52.7E-09	-65.4E-09	-77.6E-09	-86.0E-09	-93.4E-09	-107.2E-09	-123.1E-09	-123.6E-09	-87.0E-09
38	-18.0E-09	-27.2E-09	-33.6E-09	-35.1E-09	-51.3E-09	-63.0E-09	-76.0E-09	-81.6E-09	-91.1E-09	-105.2E-09	-133.0E-09	-119.2E-09	-88.2E-09
Statistics													
Min	-18.5E-09	-27.2E-09	-33.6E-09	-35.8E-09	-52.7E-09	-65.4E-09	-77.6E-09	-86.0E-09	-93.4E-09	-107.2E-09	-133.0E-09	-123.6E-09	-88.2E-09
Max	-18.0E-09	-18.1E-09	-28.3E-09	-34.5E-09	-43.6E-09	-54.3E-09	-62.6E-09	-73.1E-09	-82.1E-09	-91.0E-09	-100.4E-09	-101.8E-09	-77.0E-09
Average	-18.2E-09	-21.3E-09	-31.3E-09	-35.1E-09	-49.2E-09	-60.9E-09	-72.1E-09	-80.2E-09	-88.9E-09	-101.1E-09	-118.8E-09	-114.9E-09	-84.1E-09
Sigma	215.1E-12	4.2E-09	2.2E-09	525.8E-12	4.0E-09	4.8E-09	6.8E-09	5.4E-09	4.9E-09	7.2E-09	13.7E-09	9.4E-09	5.0E-09

Drift Calculation

IIBP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-10.2E-09	-17.7E-09	-25.6E-09	-36.2E-09	-44.5E-09	-55.0E-09	-64.0E-09	-72.9E-09	-82.3E-09	-83.7E-09	-58.9E-09
37	-	0.0E+00	-13.5E-09	-16.0E-09	-34.2E-09	-46.9E-09	-59.1E-09	-67.5E-09	-74.9E-09	-88.7E-09	-104.6E-09	-105.1E-09	-68.5E-09
38	-	-9.2E-09	-15.6E-09	-17.1E-09	-33.3E-09	-45.0E-09	-58.0E-09	-63.6E-09	-73.1E-09	-87.2E-09	-115.0E-09	-101.2E-09	-70.2E-09
Average	-	-3.1E-09	-13.1E-09	-16.9E-09	-31.0E-09	-42.7E-09	-53.9E-09	-62.0E-09	-70.7E-09	-82.9E-09	-100.6E-09	-96.7E-09	-65.9E-09
Sigma	-	4.3E-09	2.2E-09	700.6E-12	3.9E-09	4.7E-09	6.7E-09	5.2E-09	4.8E-09	7.1E-09	13.7E-09	9.3E-09	5.0E-09

Parameter : Input Bias Current : IIBP1DUTC
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.7E-09	-17.1E-09	-19.2E-09	-17.6E-09	-16.8E-09	-17.7E-09	-17.5E-09	-16.5E-09	-17.7E-09	-17.5E-09	-17.3E-09	-17.7E-09	-16.3E-09
ON_PROTON samples													
27	-75.8E-09	-76.2E-09	-82.8E-09	-88.7E-09	-96.4E-09	-104.1E-09	-110.3E-09	-122.2E-09	-134.0E-09	-150.8E-09	-164.5E-09	-162.7E-09	-104.0E-09
28	-89.1E-09	-92.6E-09	-94.0E-09	-99.1E-09	-107.3E-09	-115.7E-09	-125.0E-09	-133.9E-09	-144.9E-09	-161.9E-09	-182.7E-09	-180.9E-09	-112.2E-09
29	-84.0E-09	-88.3E-09	-91.0E-09	-93.8E-09	-105.1E-09	-109.6E-09	-118.8E-09	-130.9E-09	-142.1E-09	-156.9E-09	-177.6E-09	-175.0E-09	-109.5E-09
Statistics													
Min	-89.1E-09	-92.6E-09	-94.0E-09	-99.1E-09	-107.3E-09	-115.7E-09	-125.0E-09	-133.9E-09	-144.9E-09	-161.9E-09	-182.7E-09	-180.9E-09	-112.2E-09
Max	-75.8E-09	-76.2E-09	-82.8E-09	-88.7E-09	-96.4E-09	-104.1E-09	-110.3E-09	-122.2E-09	-134.0E-09	-150.8E-09	-164.5E-09	-162.7E-09	-104.0E-09
Average	-83.0E-09	-85.7E-09	-89.3E-09	-93.9E-09	-102.9E-09	-109.8E-09	-118.0E-09	-129.0E-09	-140.3E-09	-156.5E-09	-175.0E-09	-172.9E-09	-108.5E-09
Sigma	5.5E-09	7.0E-09	4.7E-09	4.2E-09	4.7E-09	4.7E-09	6.0E-09	5.0E-09	4.6E-09	4.5E-09	7.7E-09	7.5E-09	3.4E-09

Drift Calculation

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-317.6E-12	-7.0E-09	-12.9E-09	-20.6E-09	-28.2E-09	-34.5E-09	-46.4E-09	-58.2E-09	-75.0E-09	-88.7E-09	-86.9E-09	-28.1E-09
28	-	-3.5E-09	-4.9E-09	-10.0E-09	-18.2E-09	-26.6E-09	-35.8E-09	-44.8E-09	-55.7E-09	-72.7E-09	-93.6E-09	-91.7E-09	-23.0E-09
29	-	-4.4E-09	-7.0E-09	-9.9E-09	-21.2E-09	-25.6E-09	-34.8E-09	-46.9E-09	-58.1E-09	-72.9E-09	-93.6E-09	-91.0E-09	-25.5E-09
Average	-	-2.7E-09	-6.3E-09	-10.9E-09	-20.0E-09	-26.8E-09	-35.0E-09	-46.0E-09	-57.3E-09	-73.5E-09	-92.0E-09	-89.9E-09	-25.6E-09
Sigma	-	1.7E-09	1.0E-09	1.4E-09	1.3E-09	1.1E-09	565.0E-12	916.5E-12	1.1E-09	1.0E-09	2.3E-09	2.1E-09	2.1E-09

Measurements

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.7E-09	-17.1E-09	-19.2E-09	-17.6E-09	-16.8E-09	-17.7E-09	-17.5E-09	-16.5E-09	-17.7E-09	-17.5E-09	-17.3E-09	-17.7E-09	-16.3E-09
ON_TID samples													
33	-18.3E-09	-18.3E-09	-33.4E-09	-40.9E-09	-49.6E-09	-62.6E-09	-69.4E-09	-79.7E-09	-90.0E-09	-100.9E-09	-112.4E-09	-114.5E-09	-72.2E-09
34	-18.2E-09	-27.4E-09	-33.1E-09	-40.4E-09	-56.7E-09	-63.0E-09	-69.9E-09	-80.6E-09	-89.7E-09	-104.1E-09	-118.6E-09	-118.8E-09	-73.9E-09
35	-18.1E-09	-18.1E-09	-30.7E-09	-38.6E-09	-42.6E-09	-60.5E-09	-65.6E-09	-75.5E-09	-83.6E-09	-94.1E-09	-106.7E-09	-105.8E-09	-70.0E-09
Statistics													
Min	-18.3E-09	-27.4E-09	-33.4E-09	-40.9E-09	-56.7E-09	-63.0E-09	-69.9E-09	-80.6E-09	-90.0E-09	-104.1E-09	-118.6E-09	-118.8E-09	-73.9E-09
Max	-18.1E-09	-18.1E-09	-30.7E-09	-38.6E-09	-42.6E-09	-60.5E-09	-65.6E-09	-75.5E-09	-83.6E-09	-94.1E-09	-106.7E-09	-105.8E-09	-70.0E-09
Average	-18.2E-09	-21.2E-09	-32.4E-09	-40.0E-09	-49.6E-09	-62.0E-09	-68.3E-09	-78.6E-09	-87.8E-09	-99.7E-09	-112.6E-09	-113.0E-09	-72.1E-09
Sigma	75.8E-12	4.3E-09	1.2E-09	996.7E-12	5.8E-09	1.1E-09	1.9E-09	2.2E-09	2.9E-09	4.1E-09	4.8E-09	5.4E-09	1.6E-09

Drift Calculation

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-15.1E-09	-22.7E-09	-31.4E-09	-44.3E-09	-51.1E-09	-61.5E-09	-71.7E-09	-82.6E-09	-94.1E-09	-96.2E-09	-53.9E-09
34	-	-9.2E-09	-15.0E-09	-22.2E-09	-38.6E-09	-44.8E-09	-51.8E-09	-62.4E-09	-71.5E-09	-85.9E-09	-100.4E-09	-100.7E-09	-55.8E-09
35	-	0.0E+00	-12.7E-09	-20.5E-09	-24.5E-09	-42.4E-09	-47.5E-09	-57.4E-09	-65.5E-09	-76.1E-09	-88.7E-09	-87.7E-09	-51.9E-09
Average	-	-3.1E-09	-14.2E-09	-21.8E-09	-31.5E-09	-43.9E-09	-50.1E-09	-60.4E-09	-69.6E-09	-81.5E-09	-94.4E-09	-94.9E-09	-53.9E-09
Sigma	-	4.3E-09	1.1E-09	927.9E-12	5.7E-09	1.0E-09	1.9E-09	2.2E-09	2.9E-09	4.1E-09	4.8E-09	5.4E-09	1.6E-09

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.7E-09	-17.1E-09	-19.2E-09	-17.6E-09	-16.8E-09	-17.7E-09	-17.5E-09	-16.5E-09	-17.7E-09	-17.5E-09	-17.3E-09	-17.7E-09	-16.3E-09
OFF PROTON samples													
30	-79.8E-09	-82.8E-09	-88.4E-09	-88.8E-09	-100.7E-09	-116.7E-09	-122.7E-09	-132.5E-09	-140.4E-09	-152.2E-09	-159.2E-09	-161.6E-09	-123.2E-09
32	-81.8E-09	-86.0E-09	-86.0E-09	-88.1E-09	-103.2E-09	-111.5E-09	-122.9E-09	-130.4E-09	-140.4E-09	-152.9E-09	-162.0E-09	-153.5E-09	-125.3E-09
39	-81.5E-09	-92.5E-09	-90.7E-09	-95.5E-09	-107.0E-09	-118.4E-09	-129.6E-09	-149.8E-09	-160.0E-09	-175.1E-09	-190.4E-09	-185.6E-09	-129.4E-09
Statistics													
Min	-81.8E-09	-92.5E-09	-90.7E-09	-95.5E-09	-107.0E-09	-118.4E-09	-129.6E-09	-149.8E-09	-160.0E-09	-175.1E-09	-190.4E-09	-185.6E-09	-129.4E-09
Max	-79.8E-09	-82.8E-09	-86.0E-09	-88.1E-09	-100.7E-09	-111.5E-09	-122.7E-09	-130.4E-09	-140.4E-09	-152.2E-09	-159.2E-09	-153.5E-09	-123.2E-09
Average	-81.1E-09	-87.1E-09	-88.4E-09	-90.8E-09	-103.6E-09	-115.5E-09	-125.0E-09	-137.6E-09	-146.9E-09	-160.1E-09	-170.5E-09	-166.9E-09	-126.0E-09
Sigma	890.7E-12	4.0E-09	1.9E-09	3.3E-09	2.6E-09	2.9E-09	3.2E-09	8.7E-09	9.2E-09	10.6E-09	14.1E-09	13.6E-09	2.6E-09

Drift Calculation

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.0E-09	-8.6E-09	-8.9E-09	-20.9E-09	-36.9E-09	-42.9E-09	-52.7E-09	-60.6E-09	-72.4E-09	-79.4E-09	-81.8E-09	-43.4E-09
32	-	-4.1E-09	-4.1E-09	-6.3E-09	-21.4E-09	-29.7E-09	-41.0E-09	-48.6E-09	-58.6E-09	-71.1E-09	-80.1E-09	-71.7E-09	-43.4E-09
39	-	-10.9E-09	-9.2E-09	-13.9E-09	-25.5E-09	-36.9E-09	-48.0E-09	-68.3E-09	-78.4E-09	-93.6E-09	-108.9E-09	-104.1E-09	-47.9E-09
Average	-	-6.0E-09	-7.3E-09	-9.7E-09	-22.6E-09	-34.5E-09	-44.0E-09	-65.5E-09	-65.9E-09	-79.0E-09	-89.5E-09	-85.8E-09	-44.9E-09
Sigma	-	3.5E-09	2.2E-09	3.2E-09	2.1E-09	3.4E-09	3.0E-09	8.5E-09	8.9E-09	10.3E-09	13.7E-09	13.5E-09	2.1E-09

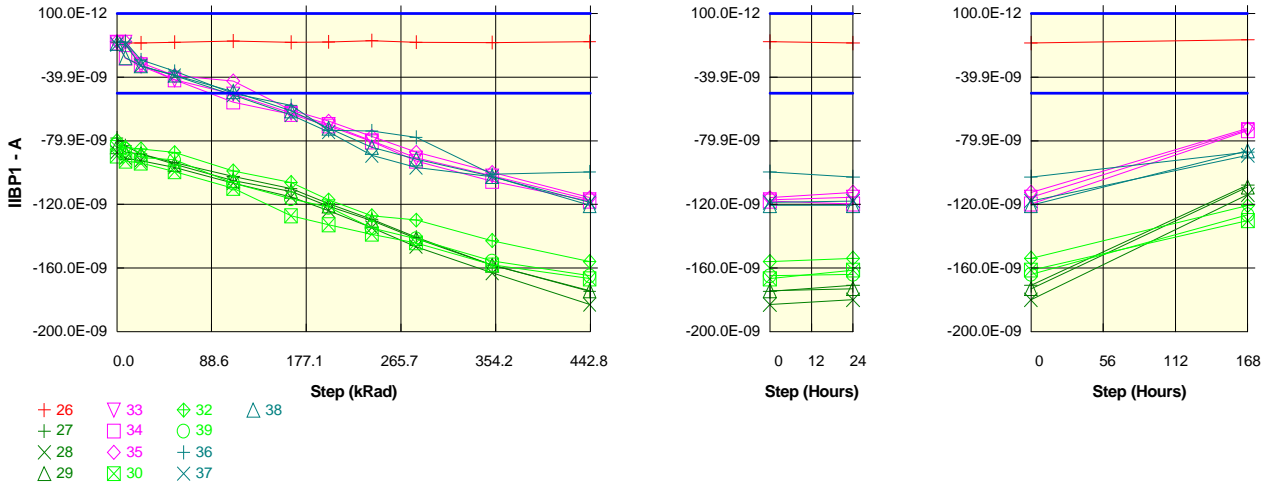
Measurements

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.7E-09	-17.1E-09	-19.2E-09	-17.6E-09	-16.8E-09	-17.7E-09	-17.5E-09	-16.5E-09	-17.7E-09	-17.5E-09	-17.3E-09	-17.7E-09	-16.3E-09
OFF TID samples													
36	-18.2E-09	-18.2E-09	-29.0E-09	-33.7E-09	-44.3E-09	-54.1E-09	-69.5E-09	-75.7E-09	-85.8E-09	-97.8E-09	-111.1E-09	-108.5E-09	-77.9E-09
37	-19.0E-09	-19.0E-09	-31.4E-09	-32.6E-09	-52.6E-09	-63.3E-09	-75.1E-09	-93.0E-09	-103.5E-09	-114.8E-09	-132.8E-09	-130.1E-09	-87.3E-09
38	-17.3E-09	-26.3E-09	-31.3E-09	-37.1E-09	-47.4E-09	-58.2E-09	-67.7E-09	-81.3E-09	-91.1E-09	-109.2E-09	-120.3E-09	-119.4E-09	-82.7E-09
Statistics													
Min	-19.0E-09	-26.3E-09	-31.4E-09	-37.1E-09	-52.6E-09	-63.3E-09	-75.1E-09	-93.0E-09	-103.5E-09	-114.8E-09	-132.8E-09	-130.1E-09	-87.3E-09
Max	-17.3E-09	-18.2E-09	-29.0E-09	-32.6E-09	-44.3E-09	-54.1E-09	-67.7E-09	-75.7E-09	-85.8E-09	-97.8E-09	-111.1E-09	-108.5E-09	-77.9E-09
Average	-18.2E-09	-21.2E-09	-30.6E-09	-34.5E-09	-48.1E-09	-58.5E-09	-70.8E-09	-83.3E-09	-93.5E-09	-107.3E-09	-121.4E-09	-119.3E-09	-82.7E-09
Sigma	705.2E-12	3.6E-09	1.1E-09	1.9E-09	3.4E-09	3.8E-09	3.2E-09	7.2E-09	7.4E-09	7.1E-09	8.9E-09	8.8E-09	3.8E-09

Drift Calculation

IIBP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-10.8E-09	-15.5E-09	-26.1E-09	-35.9E-09	-51.3E-09	-57.5E-09	-67.6E-09	-79.6E-09	-92.9E-09	-90.3E-09	-59.7E-09
37	-	0.0E+00	-12.4E-09	-13.6E-09	-33.6E-09	-44.3E-09	-56.1E-09	-74.0E-09	-84.5E-09	-95.7E-09	-113.8E-09	-111.1E-09	-68.3E-09
38	-	-9.0E-09	-14.0E-09	-19.8E-09	-30.1E-09	-40.9E-09	-50.4E-09	-64.0E-09	-73.9E-09	-91.9E-09	-103.0E-09	-102.1E-09	-65.4E-09
Average	-	-3.0E-09	-12.4E-09	-16.3E-09	-29.9E-09	-40.4E-09	-52.6E-09	-65.2E-09	-75.3E-09	-89.1E-09	-103.2E-09	-101.1E-09	-64.5E-09
Sigma	-	4.2E-09	1.3E-09	2.6E-09	3.1E-09	3.5E-09	2.5E-09	6.8E-09	7.0E-09	6.9E-09	8.6E-09	8.5E-09	3.6E-09

Parameter : Input Bias Current : IIBP1DUTD
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-18.0E-09	-18.5E-09	-18.4E-09	-18.0E-09	-17.2E-09	-18.1E-09	-17.7E-09	-17.0E-09	-18.0E-09	-18.2E-09	-17.6E-09	-18.5E-09	-16.5E-09
ON_PROTON samples													
27	-78.2E-09	-83.1E-09	-88.3E-09	-93.7E-09	-102.3E-09	-110.1E-09	-119.6E-09	-129.4E-09	-140.7E-09	-158.2E-09	-174.7E-09	-170.9E-09	-108.0E-09
28	-87.1E-09	-90.9E-09	-92.5E-09	-96.6E-09	-106.6E-09	-115.4E-09	-124.0E-09	-134.6E-09	-146.7E-09	-163.2E-09	-183.1E-09	-180.1E-09	-113.9E-09
29	-83.7E-09	-87.2E-09	-88.3E-09	-94.8E-09	-105.0E-09	-111.8E-09	-121.0E-09	-130.2E-09	-141.6E-09	-158.3E-09	-174.3E-09	-173.0E-09	-109.0E-09
Statistics													
Min	-87.1E-09	-90.9E-09	-92.5E-09	-96.6E-09	-106.6E-09	-115.4E-09	-124.0E-09	-134.6E-09	-146.7E-09	-163.2E-09	-183.1E-09	-180.1E-09	-113.9E-09
Max	-78.2E-09	-83.1E-09	-88.3E-09	-93.7E-09	-102.3E-09	-110.1E-09	-119.6E-09	-129.4E-09	-140.7E-09	-158.2E-09	-174.3E-09	-170.9E-09	-108.0E-09
Average	-83.0E-09	-87.1E-09	-89.7E-09	-95.0E-09	-104.6E-09	-112.4E-09	-121.6E-09	-131.4E-09	-143.0E-09	-159.9E-09	-177.3E-09	-174.7E-09	-110.3E-09
Sigma	3.6E-09	3.2E-09	2.0E-09	1.2E-09	1.8E-09	2.2E-09	1.8E-09	2.3E-09	2.6E-09	2.3E-09	4.0E-09	3.9E-09	2.6E-09

Drift Calculation

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-4.9E-09	-10.1E-09	-15.5E-09	-24.1E-09	-31.9E-09	-41.4E-09	-51.2E-09	-62.5E-09	-80.0E-09	-96.5E-09	-92.7E-09	-29.8E-09
28	-	-3.9E-09	-5.4E-09	-9.6E-09	-19.5E-09	-28.3E-09	-36.9E-09	-47.5E-09	-59.6E-09	-76.1E-09	-96.0E-09	-93.0E-09	-26.9E-09
29	-	-3.6E-09	-4.7E-09	-11.1E-09	-21.4E-09	-28.2E-09	-37.4E-09	-46.5E-09	-57.9E-09	-74.7E-09	-90.6E-09	-89.4E-09	-25.4E-09
Average	-	-4.1E-09	-6.7E-09	-12.1E-09	-21.7E-09	-29.5E-09	-38.6E-09	-48.4E-09	-60.0E-09	-76.9E-09	-94.4E-09	-91.7E-09	-27.3E-09
Sigma	-	554.7E-12	2.4E-09	2.5E-09	1.9E-09	1.7E-09	2.0E-09	2.0E-09	1.9E-09	2.3E-09	2.6E-09	1.6E-09	1.8E-09

Measurements

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-18.0E-09	-18.5E-09	-18.4E-09	-18.0E-09	-17.2E-09	-18.1E-09	-17.7E-09	-17.0E-09	-18.0E-09	-18.2E-09	-17.6E-09	-18.5E-09	-16.5E-09
ON_TID samples													
33	-18.1E-09	-18.1E-09	-33.0E-09	-41.6E-09	-50.6E-09	-62.6E-09	-69.6E-09	-80.1E-09	-90.8E-09	-102.0E-09	-117.1E-09	-115.4E-09	-73.0E-09
34	-18.4E-09	-28.1E-09	-32.1E-09	-41.7E-09	-55.6E-09	-63.4E-09	-70.7E-09	-80.6E-09	-92.8E-09	-105.5E-09	-117.9E-09	-119.7E-09	-73.6E-09
35	-17.6E-09	-17.6E-09	-31.0E-09	-39.0E-09	-42.4E-09	-60.7E-09	-67.6E-09	-77.2E-09	-87.2E-09	-99.9E-09	-115.8E-09	-112.4E-09	-72.2E-09
Statistics													
Min	-18.4E-09	-28.1E-09	-33.0E-09	-41.7E-09	-55.6E-09	-63.4E-09	-70.7E-09	-80.6E-09	-92.8E-09	-105.5E-09	-117.9E-09	-119.7E-09	-73.6E-09
Max	-17.6E-09	-17.6E-09	-31.0E-09	-39.0E-09	-42.4E-09	-60.7E-09	-67.6E-09	-77.2E-09	-87.2E-09	-99.9E-09	-115.8E-09	-112.4E-09	-72.2E-09
Average	-18.0E-09	-21.3E-09	-32.0E-09	-40.8E-09	-49.5E-09	-62.2E-09	-69.3E-09	-79.3E-09	-90.3E-09	-102.5E-09	-116.9E-09	-115.8E-09	-73.0E-09
Sigma	331.6E-12	4.8E-09	808.5E-12	1.2E-09	5.4E-09	1.1E-09	1.3E-09	1.5E-09	2.3E-09	2.3E-09	899.6E-12	3.0E-09	574.8E-12

Drift Calculation

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-14.9E-09	-23.5E-09	-32.5E-09	-44.5E-09	-51.5E-09	-62.0E-09	-72.7E-09	-83.9E-09	-99.1E-09	-97.4E-09	-54.9E-09
34	-	-9.7E-09	-13.6E-09	-23.3E-09	-37.2E-09	-44.9E-09	-52.3E-09	-62.2E-09	-74.4E-09	-87.0E-09	-99.5E-09	-101.3E-09	-55.2E-09
35	-	0.0E+00	-13.4E-09	-21.4E-09	-24.8E-09	-43.0E-09	-50.0E-09	-59.6E-09	-69.6E-09	-82.3E-09	-98.1E-09	-94.8E-09	-54.6E-09
Average	-	-3.2E-09	-14.0E-09	-22.7E-09	-31.5E-09	-44.1E-09	-51.3E-09	-61.3E-09	-72.3E-09	-84.4E-09	-98.9E-09	-97.8E-09	-54.9E-09
Sigma	-	4.6E-09	663.1E-12	940.4E-12	5.1E-09	801.7E-12	955.6E-12	1.2E-09	2.0E-09	2.0E-09	569.2E-12	2.7E-09	243.3E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-18.0E-09	-18.5E-09	-18.4E-09	-18.0E-09	-17.2E-09	-18.1E-09	-17.7E-09	-17.0E-09	-18.0E-09	-18.2E-09	-17.6E-09	-18.5E-09	-16.5E-09
OFF PROTON samples													
30	-89.5E-09	-92.7E-09	-94.0E-09	-99.4E-09	-110.0E-09	-127.2E-09	-132.8E-09	-138.7E-09	-144.3E-09	-158.1E-09	-166.8E-09	-161.4E-09	-130.2E-09
32	-79.9E-09	-84.3E-09	-85.2E-09	-87.3E-09	-99.0E-09	-106.3E-09	-117.2E-09	-127.1E-09	-129.9E-09	-142.8E-09	-155.9E-09	-153.9E-09	-120.8E-09
39	-82.3E-09	-85.4E-09	-90.5E-09	-92.0E-09	-106.6E-09	-116.6E-09	-121.8E-09	-134.9E-09	-141.7E-09	-155.7E-09	-164.9E-09	-164.0E-09	-126.6E-09
Statistics													
Min	-89.5E-09	-92.7E-09	-94.0E-09	-99.4E-09	-110.0E-09	-127.2E-09	-132.8E-09	-138.7E-09	-144.3E-09	-158.1E-09	-166.8E-09	-164.0E-09	-130.2E-09
Max	-79.9E-09	-84.3E-09	-85.2E-09	-87.3E-09	-99.0E-09	-106.3E-09	-117.2E-09	-127.1E-09	-129.9E-09	-142.8E-09	-155.9E-09	-153.9E-09	-120.8E-09
Average	-83.9E-09	-87.5E-09	-89.9E-09	-92.9E-09	-105.2E-09	-116.7E-09	-124.0E-09	-133.6E-09	-138.6E-09	-152.2E-09	-162.5E-09	-159.8E-09	-125.9E-09
Sigma	4.1E-09	3.8E-09	3.7E-09	5.0E-09	4.6E-09	8.6E-09	6.5E-09	4.8E-09	6.3E-09	6.7E-09	4.8E-09	4.3E-09	3.9E-09

Drift Calculation

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.2E-09	-4.5E-09	-9.9E-09	-20.5E-09	-37.7E-09	-43.3E-09	-49.2E-09	-54.7E-09	-68.6E-09	-77.3E-09	-71.9E-09	-40.7E-09
32	-	-4.4E-09	-5.3E-09	-7.5E-09	-19.1E-09	-26.4E-09	-37.4E-09	-47.2E-09	-50.0E-09	-62.9E-09	-76.0E-09	-74.0E-09	-40.9E-09
39	-	-3.1E-09	-8.2E-09	-9.7E-09	-24.3E-09	-34.2E-09	-39.5E-09	-52.5E-09	-59.4E-09	-73.4E-09	-82.6E-09	-81.7E-09	-44.3E-09
Average	-	-3.5E-09	-6.0E-09	-9.0E-09	-21.3E-09	-32.8E-09	-40.1E-09	-49.7E-09	-54.7E-09	-68.3E-09	-78.6E-09	-75.9E-09	-42.0E-09
Sigma	-	598.7E-12	1.6E-09	1.1E-09	2.2E-09	4.7E-09	2.4E-09	2.2E-09	3.8E-09	4.3E-09	2.9E-09	4.2E-09	1.6E-09

Measurements

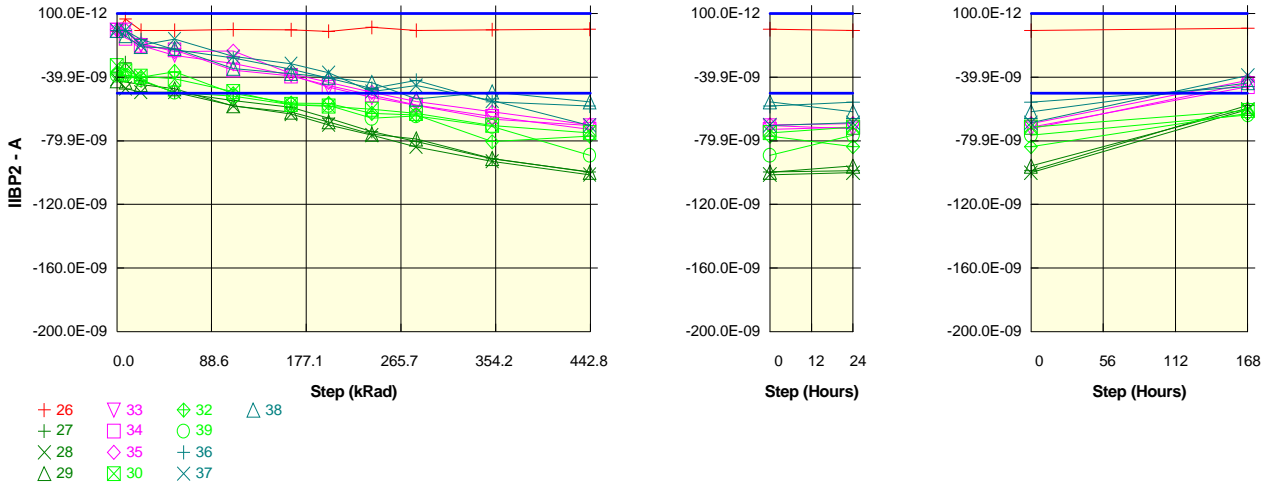
IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-18.0E-09	-18.5E-09	-18.4E-09	-18.0E-09	-17.2E-09	-18.1E-09	-17.7E-09	-17.0E-09	-18.0E-09	-18.2E-09	-17.6E-09	-18.5E-09	-16.5E-09
OFF TID samples													
36	-17.8E-09	-17.8E-09	-29.1E-09	-36.2E-09	-50.2E-09	-57.8E-09	-73.4E-09	-73.8E-09	-77.9E-09	-101.1E-09	-99.6E-09	-102.8E-09	-87.1E-09
37	-19.4E-09	-19.4E-09	-32.8E-09	-39.0E-09	-51.3E-09	-63.8E-09	-74.5E-09	-89.3E-09	-96.9E-09	-102.6E-09	-118.8E-09	-117.9E-09	-89.2E-09
38	-18.7E-09	-27.7E-09	-32.9E-09	-38.8E-09	-49.0E-09	-61.2E-09	-72.1E-09	-84.1E-09	-91.5E-09	-102.4E-09	-120.7E-09	-120.7E-09	-86.3E-09
Statistics													
Min	-19.4E-09	-27.7E-09	-32.9E-09	-39.0E-09	-51.3E-09	-63.8E-09	-74.5E-09	-89.3E-09	-96.9E-09	-102.6E-09	-120.7E-09	-120.7E-09	-89.2E-09
Max	-17.8E-09	-17.8E-09	-29.1E-09	-36.2E-09	-49.0E-09	-57.8E-09	-72.1E-09	-73.8E-09	-77.9E-09	-101.1E-09	-99.6E-09	-102.8E-09	-86.3E-09
Average	-18.6E-09	-21.6E-09	-31.6E-09	-38.0E-09	-50.2E-09	-60.9E-09	-73.4E-09	-82.4E-09	-88.7E-09	-102.0E-09	-113.0E-09	-113.8E-09	-87.5E-09
Sigma	671.2E-12	4.3E-09	1.8E-09	1.3E-09	916.9E-12	2.4E-09	996.1E-12	6.4E-09	8.0E-09	656.6E-12	9.5E-09	7.9E-09	1.2E-09

Drift Calculation

IIBP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-11.3E-09	-18.4E-09	-32.5E-09	-40.1E-09	-55.7E-09	-56.0E-09	-60.1E-09	-83.3E-09	-81.8E-09	-85.0E-09	-69.3E-09
37	-	0.0E+00	-13.4E-09	-19.6E-09	-31.8E-09	-44.4E-09	-55.1E-09	-69.8E-09	-77.4E-09	-83.2E-09	-99.4E-09	-98.5E-09	-69.7E-09
38	-	-9.1E-09	-14.2E-09	-20.1E-09	-30.4E-09	-42.5E-09	-53.4E-09	-65.4E-09	-72.9E-09	-83.7E-09	-102.0E-09	-102.0E-09	-67.6E-09
Average	-	-3.0E-09	-13.0E-09	-19.4E-09	-31.6E-09	-42.3E-09	-54.7E-09	-63.8E-09	-70.1E-09	-83.4E-09	-94.4E-09	-95.1E-09	-68.9E-09
Sigma	-	4.3E-09	1.2E-09	706.3E-12	876.1E-12	1.8E-09	942.3E-12	5.8E-09	7.3E-09	247.3E-12	9.0E-09	7.3E-09	904.0E-12

Parameter : Input Bias Current : IIBP2DUTA
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.1E-09	-3.4E-09	-10.5E-09	-10.5E-09	-10.0E-09	-10.1E-09	-11.1E-09	-8.7E-09	-10.6E-09	-10.1E-09	-9.8E-09	-10.7E-09	-9.3E-09
ON PROTON samples													
27	-36.8E-09	-30.9E-09	-42.3E-09	-49.5E-09	-54.7E-09	-58.9E-09	-65.9E-09	-74.2E-09	-80.4E-09	-91.4E-09	-99.6E-09	-98.8E-09	-57.9E-09
28	-41.2E-09	-47.1E-09	-49.4E-09	-49.5E-09	-58.0E-09	-63.2E-09	-69.9E-09	-76.4E-09	-83.9E-09	-92.9E-09	-101.3E-09	-100.1E-09	-60.4E-09
29	-42.2E-09	-43.0E-09	-44.6E-09	-47.3E-09	-58.1E-09	-61.9E-09	-68.1E-09	-75.9E-09	-78.9E-09	-91.2E-09	-99.8E-09	-95.9E-09	-59.6E-09
Statistics													
Min	-42.2E-09	-47.1E-09	-49.4E-09	-49.5E-09	-58.1E-09	-63.2E-09	-69.9E-09	-76.4E-09	-83.9E-09	-92.9E-09	-101.3E-09	-100.1E-09	-60.4E-09
Max	-36.8E-09	-30.9E-09	-42.3E-09	-47.3E-09	-54.7E-09	-58.9E-09	-65.9E-09	-74.2E-09	-78.9E-09	-91.2E-09	-99.6E-09	-95.9E-09	-57.9E-09
Average	-40.1E-09	-40.3E-09	-45.4E-09	-48.7E-09	-56.9E-09	-61.3E-09	-68.0E-09	-75.5E-09	-81.0E-09	-91.8E-09	-100.2E-09	-98.3E-09	-59.3E-09
Sigma	2.3E-09	6.9E-09	3.0E-09	1.0E-09	1.6E-09	1.8E-09	1.6E-09	966.1E-12	2.1E-09	750.0E-12	748.2E-12	1.8E-09	1.0E-09

Drift Calculation

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	5.9E-09	-5.5E-09	-12.6E-09	-17.9E-09	-22.1E-09	-29.1E-09	-37.4E-09	-43.6E-09	-54.6E-09	-62.8E-09	-62.0E-09	-21.1E-09
28	-	-5.9E-09	-8.2E-09	-8.3E-09	-16.8E-09	-22.0E-09	-28.7E-09	-35.2E-09	-42.7E-09	-51.7E-09	-60.1E-09	-58.9E-09	-19.2E-09
29	-	-857.5E-12	-2.4E-09	-5.2E-09	-15.9E-09	-19.8E-09	-26.0E-09	-33.7E-09	-36.7E-09	-49.0E-09	-57.6E-09	-53.7E-09	-17.4E-09
Average	-	-297.5E-12	-5.4E-09	-8.7E-09	-16.9E-09	-21.3E-09	-27.9E-09	-35.4E-09	-41.0E-09	-51.8E-09	-60.2E-09	-58.2E-09	-19.2E-09
Sigma	-	4.8E-09	2.4E-09	3.1E-09	817.8E-12	1.1E-09	1.4E-09	1.5E-09	3.0E-09	2.3E-09	2.1E-09	3.4E-09	1.5E-09

Measurements

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.1E-09	-3.4E-09	-10.5E-09	-10.5E-09	-10.0E-09	-10.1E-09	-11.1E-09	-8.7E-09	-10.6E-09	-10.1E-09	-9.8E-09	-10.7E-09	-9.3E-09
ON TID samples													
33	-10.3E-09	-10.3E-09	-20.1E-09	-26.2E-09	-31.3E-09	-38.8E-09	-46.3E-09	-52.7E-09	-57.7E-09	-66.5E-09	-70.5E-09	-72.5E-09	-43.9E-09
34	-10.5E-09	-15.3E-09	-19.9E-09	-22.8E-09	-35.5E-09	-39.2E-09	-45.2E-09	-51.2E-09	-57.5E-09	-64.7E-09	-72.8E-09	-71.5E-09	-46.0E-09
35	-10.2E-09	-10.2E-09	-18.9E-09	-23.8E-09	-23.6E-09	-37.8E-09	-43.3E-09	-49.5E-09	-55.2E-09	-61.9E-09	-70.0E-09	-69.1E-09	-42.0E-09
Statistics													
Min	-10.5E-09	-15.3E-09	-20.1E-09	-26.2E-09	-35.5E-09	-39.2E-09	-46.3E-09	-52.7E-09	-57.7E-09	-66.5E-09	-72.8E-09	-72.5E-09	-46.0E-09
Max	-10.2E-09	-10.2E-09	-18.9E-09	-22.8E-09	-23.6E-09	-37.8E-09	-43.3E-09	-49.5E-09	-55.2E-09	-61.9E-09	-70.0E-09	-69.1E-09	-42.0E-09
Average	-10.3E-09	-11.9E-09	-19.6E-09	-24.3E-09	-30.1E-09	-38.6E-09	-45.0E-09	-51.1E-09	-56.8E-09	-64.4E-09	-71.1E-09	-71.1E-09	-44.0E-09
Sigma	138.5E-12	2.4E-09	532.3E-12	1.4E-09	4.9E-09	590.8E-12	1.2E-09	1.3E-09	1.1E-09	1.9E-09	1.2E-09	1.4E-09	1.6E-09

Drift Calculation

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-9.8E-09	-15.9E-09	-21.0E-09	-28.5E-09	-36.0E-09	-42.4E-09	-47.4E-09	-56.2E-09	-60.2E-09	-62.2E-09	-33.6E-09
34	-	-4.8E-09	-9.4E-09	-12.3E-09	-25.0E-09	-28.7E-09	-34.7E-09	-40.6E-09	-47.0E-09	-54.2E-09	-62.3E-09	-61.0E-09	-35.5E-09
35	-	0.0E+00	-8.7E-09	-13.6E-09	-13.4E-09	-27.6E-09	-33.1E-09	-39.3E-09	-45.0E-09	-51.7E-09	-59.8E-09	-59.0E-09	-31.8E-09
Average	-	-1.6E-09	-9.3E-09	-14.0E-09	-19.8E-09	-28.2E-09	-34.6E-09	-40.8E-09	-46.5E-09	-54.0E-09	-60.8E-09	-60.7E-09	-33.6E-09
Sigma	-	2.3E-09	449.8E-12	1.5E-09	4.8E-09	468.2E-12	1.2E-09	1.3E-09	1.0E-09	1.8E-09	1.1E-09	1.4E-09	1.5E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.1E-09	-3.4E-09	-10.5E-09	-10.5E-09	-10.0E-09	-10.1E-09	-11.1E-09	-8.7E-09	-10.6E-09	-10.1E-09	-9.8E-09	-10.7E-09	-9.3E-09
OFF PROTON samples													
30	-32.8E-09	-36.0E-09	-39.4E-09	-41.1E-09	-49.1E-09	-57.2E-09	-58.2E-09	-60.1E-09	-62.7E-09	-70.3E-09	-74.9E-09	-71.4E-09	-60.9E-09
32	-38.0E-09	-38.7E-09	-39.9E-09	-36.5E-09	-50.3E-09	-56.3E-09	-56.5E-09	-62.8E-09	-63.8E-09	-80.6E-09	-77.1E-09	-83.8E-09	-62.9E-09
39	-38.8E-09	-38.8E-09	-41.6E-09	-49.5E-09	-51.9E-09	-57.4E-09	-57.8E-09	-65.9E-09	-64.4E-09	-71.0E-09	-89.1E-09	-76.6E-09	-63.7E-09
Statistics													
Min	-38.8E-09	-38.8E-09	-41.6E-09	-49.5E-09	-51.9E-09	-57.4E-09	-58.2E-09	-65.9E-09	-64.4E-09	-80.6E-09	-89.1E-09	-83.8E-09	-63.7E-09
Max	-32.8E-09	-36.0E-09	-39.4E-09	-36.5E-09	-49.1E-09	-56.3E-09	-56.5E-09	-60.1E-09	-62.7E-09	-70.3E-09	-74.9E-09	-71.4E-09	-60.9E-09
Average	-36.6E-09	-37.8E-09	-40.3E-09	-42.4E-09	-50.5E-09	-57.0E-09	-57.5E-09	-62.9E-09	-63.7E-09	-74.0E-09	-80.4E-09	-77.2E-09	-62.5E-09
Sigma	2.7E-09	1.3E-09	962.2E-12	5.4E-09	1.2E-09	461.6E-12	726.3E-12	2.4E-09	690.3E-12	4.7E-09	6.2E-09	5.1E-09	1.2E-09

Drift Calculation

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.2E-09	-6.5E-09	-8.3E-09	-16.3E-09	-24.4E-09	-25.3E-09	-27.3E-09	-29.9E-09	-37.5E-09	-42.1E-09	-38.6E-09	-28.1E-09
32	-	-715.4E-12	-1.9E-09	1.5E-09	-12.4E-09	-18.3E-09	-18.5E-09	-24.8E-09	-25.8E-09	-42.6E-09	-39.1E-09	-45.8E-09	-24.9E-09
39	-	13.4E-12	-2.8E-09	-10.7E-09	-13.1E-09	-18.5E-09	-18.9E-09	-27.1E-09	-25.5E-09	-32.2E-09	-50.3E-09	-37.7E-09	-24.8E-09
Average	-	-1.3E-09	-3.8E-09	-5.8E-09	-13.9E-09	-20.4E-09	-20.9E-09	-26.4E-09	-27.1E-09	-37.4E-09	-43.8E-09	-40.7E-09	-25.9E-09
Sigma	-	1.4E-09	2.0E-09	5.3E-09	1.7E-09	2.8E-09	3.1E-09	1.1E-09	2.0E-09	4.3E-09	4.7E-09	3.6E-09	1.5E-09

Measurements

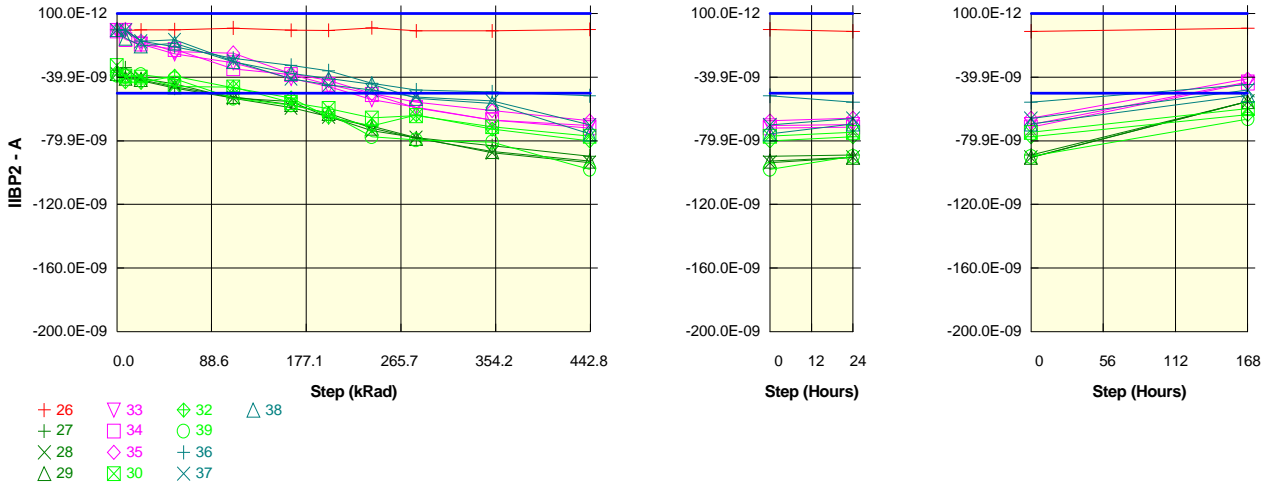
IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.1E-09	-3.4E-09	-10.5E-09	-10.5E-09	-10.0E-09	-10.1E-09	-11.1E-09	-8.7E-09	-10.6E-09	-10.1E-09	-9.8E-09	-10.7E-09	-9.3E-09
OFF TID samples													
36	-10.7E-09	-10.7E-09	-16.3E-09	-22.6E-09	-28.0E-09	-34.9E-09	-40.6E-09	-47.0E-09	-42.0E-09	-55.5E-09	-58.1E-09	-55.7E-09	-45.8E-09
37	-10.4E-09	-10.4E-09	-19.9E-09	-15.9E-09	-27.0E-09	-31.5E-09	-37.2E-09	-49.0E-09	-45.2E-09	-54.8E-09	-70.3E-09	-68.6E-09	-38.9E-09
38	-10.6E-09	-14.0E-09	-20.7E-09	-21.9E-09	-34.4E-09	-37.7E-09	-40.0E-09	-43.4E-09	-53.7E-09	-49.3E-09	-55.5E-09	-61.6E-09	-43.5E-09
Statistics													
Min	-10.7E-09	-14.0E-09	-20.7E-09	-22.6E-09	-34.4E-09	-37.7E-09	-40.6E-09	-49.0E-09	-53.7E-09	-55.5E-09	-70.3E-09	-68.6E-09	-45.8E-09
Max	-10.4E-09	-10.4E-09	-16.3E-09	-15.9E-09	-27.0E-09	-31.5E-09	-37.2E-09	-43.4E-09	-42.0E-09	-49.3E-09	-55.5E-09	-55.7E-09	-38.9E-09
Average	-10.5E-09	-11.7E-09	-19.0E-09	-20.1E-09	-29.8E-09	-34.7E-09	-39.2E-09	-46.5E-09	-47.0E-09	-53.2E-09	-61.3E-09	-62.0E-09	-42.7E-09
Sigma	116.6E-12	1.6E-09	1.9E-09	3.0E-09	3.3E-09	2.5E-09	1.5E-09	2.3E-09	4.9E-09	2.8E-09	6.4E-09	5.3E-09	2.9E-09

Drift Calculation

IIBP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-5.6E-09	-11.9E-09	-17.3E-09	-24.2E-09	-29.9E-09	-36.4E-09	-31.4E-09	-44.8E-09	-47.4E-09	-45.0E-09	-35.1E-09
37	-	0.0E+00	-9.5E-09	-5.5E-09	-16.6E-09	-21.1E-09	-26.8E-09	-38.6E-09	-34.8E-09	-44.4E-09	-59.9E-09	-58.2E-09	-28.5E-09
38	-	-3.4E-09	-10.1E-09	-11.3E-09	-23.8E-09	-27.2E-09	-29.4E-09	-32.8E-09	-43.1E-09	-38.7E-09	-45.0E-09	-51.1E-09	-32.9E-09
Average	-	-1.1E-09	-8.4E-09	-9.6E-09	-19.3E-09	-24.2E-09	-28.7E-09	-35.9E-09	-36.4E-09	-42.6E-09	-50.8E-09	-51.4E-09	-32.2E-09
Sigma	-	1.6E-09	2.0E-09	2.9E-09	3.2E-09	2.5E-09	1.4E-09	2.4E-09	4.9E-09	2.8E-09	6.5E-09	5.4E-09	2.7E-09

Parameter : Input Bias Current : IIBP2DUTB
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.3E-09	-10.6E-09	-10.3E-09	-10.1E-09	-9.1E-09	-10.5E-09	-10.5E-09	-8.9E-09	-10.8E-09	-10.8E-09	-9.9E-09	-11.1E-09	-9.1E-09
ON PROTON samples													
27	-35.5E-09	-34.1E-09	-42.2E-09	-46.9E-09	-53.0E-09	-55.2E-09	-65.4E-09	-70.8E-09	-78.2E-09	-83.1E-09	-89.6E-09	-89.0E-09	-55.1E-09
28	-37.8E-09	-40.5E-09	-40.8E-09	-44.3E-09	-53.2E-09	-59.2E-09	-64.9E-09	-73.7E-09	-78.0E-09	-87.4E-09	-93.7E-09	-90.5E-09	-55.3E-09
29	-37.5E-09	-40.8E-09	-41.4E-09	-46.0E-09	-52.2E-09	-57.2E-09	-62.8E-09	-72.0E-09	-78.6E-09	-86.7E-09	-92.8E-09	-90.3E-09	-55.4E-09
Statistics													
Min	-37.8E-09	-40.8E-09	-42.2E-09	-46.9E-09	-53.2E-09	-59.2E-09	-65.4E-09	-73.7E-09	-78.6E-09	-87.4E-09	-93.7E-09	-90.5E-09	-55.4E-09
Max	-35.5E-09	-34.1E-09	-40.8E-09	-44.3E-09	-52.2E-09	-55.2E-09	-62.8E-09	-70.8E-09	-78.0E-09	-83.1E-09	-89.6E-09	-89.0E-09	-55.1E-09
Average	-36.9E-09	-38.4E-09	-41.5E-09	-45.7E-09	-52.8E-09	-57.2E-09	-64.4E-09	-72.2E-09	-78.2E-09	-85.7E-09	-92.0E-09	-89.9E-09	-55.3E-09
Sigma	1.0E-09	3.1E-09	590.1E-12	1.1E-09	436.8E-12	1.6E-09	1.1E-09	1.2E-09	238.3E-12	1.9E-09	1.8E-09	673.9E-12	100.3E-12

Drift Calculation

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	1.5E-09	-6.7E-09	-11.4E-09	-17.5E-09	-19.7E-09	-29.9E-09	-35.3E-09	-42.7E-09	-47.6E-09	-54.1E-09	-53.5E-09	-19.6E-09
28	-	-2.7E-09	-3.0E-09	-6.5E-09	-15.4E-09	-21.4E-09	-27.1E-09	-35.9E-09	-40.2E-09	-49.7E-09	-55.9E-09	-52.7E-09	-17.5E-09
29	-	-3.3E-09	-3.9E-09	-8.5E-09	-14.6E-09	-19.7E-09	-25.3E-09	-34.5E-09	-41.0E-09	-49.2E-09	-55.2E-09	-52.8E-09	-17.9E-09
Average	-	-1.5E-09	-4.5E-09	-8.8E-09	-15.8E-09	-20.2E-09	-27.4E-09	-35.2E-09	-41.3E-09	-48.8E-09	-55.1E-09	-53.0E-09	-18.3E-09
Sigma	-	2.1E-09	1.6E-09	2.0E-09	1.2E-09	818.3E-12	1.9E-09	601.4E-12	1.0E-09	895.3E-12	771.6E-12	331.3E-12	913.7E-12

Measurements

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.3E-09	-10.6E-09	-10.3E-09	-10.1E-09	-9.1E-09	-10.5E-09	-10.5E-09	-8.9E-09	-10.8E-09	-10.8E-09	-9.9E-09	-11.1E-09	-9.1E-09
ON TID samples													
33	-10.4E-09	-10.4E-09	-19.4E-09	-25.4E-09	-30.9E-09	-40.8E-09	-45.8E-09	-54.1E-09	-59.0E-09	-66.9E-09	-70.6E-09	-69.7E-09	-43.1E-09
34	-10.7E-09	-16.3E-09	-19.2E-09	-22.5E-09	-34.8E-09	-38.3E-09	-44.6E-09	-50.8E-09	-59.4E-09	-66.9E-09	-71.9E-09	-71.4E-09	-43.7E-09
35	-10.0E-09	-10.0E-09	-17.4E-09	-23.8E-09	-24.8E-09	-37.7E-09	-42.1E-09	-50.3E-09	-55.6E-09	-61.0E-09	-67.5E-09	-65.8E-09	-41.1E-09
Statistics													
Min	-10.7E-09	-16.3E-09	-19.4E-09	-25.4E-09	-34.8E-09	-40.8E-09	-45.8E-09	-54.1E-09	-59.4E-09	-66.9E-09	-71.9E-09	-71.4E-09	-43.7E-09
Max	-10.0E-09	-10.0E-09	-17.4E-09	-22.5E-09	-24.8E-09	-37.7E-09	-42.1E-09	-50.3E-09	-55.6E-09	-61.0E-09	-67.5E-09	-65.8E-09	-41.1E-09
Average	-10.4E-09	-12.2E-09	-18.6E-09	-23.9E-09	-30.1E-09	-39.0E-09	-44.1E-09	-51.7E-09	-58.0E-09	-64.9E-09	-70.0E-09	-69.0E-09	-42.6E-09
Sigma	279.8E-12	2.9E-09	906.6E-12	1.2E-09	4.1E-09	1.3E-09	1.5E-09	1.7E-09	1.7E-09	2.8E-09	1.8E-09	2.4E-09	1.1E-09

Drift Calculation

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-9.0E-09	-15.0E-09	-20.5E-09	-30.4E-09	-35.4E-09	-43.7E-09	-48.6E-09	-56.5E-09	-60.2E-09	-59.3E-09	-32.7E-09
34	-	-5.6E-09	-8.4E-09	-11.8E-09	-24.0E-09	-27.6E-09	-33.8E-09	-40.1E-09	-48.6E-09	-56.1E-09	-61.1E-09	-60.7E-09	-32.9E-09
35	-	0.0E+00	-7.3E-09	-13.7E-09	-14.7E-09	-27.7E-09	-32.0E-09	-40.2E-09	-45.6E-09	-50.9E-09	-57.4E-09	-55.7E-09	-31.0E-09
Average	-	-1.9E-09	-8.2E-09	-13.5E-09	-19.7E-09	-28.6E-09	-33.7E-09	-41.3E-09	-47.6E-09	-54.5E-09	-59.6E-09	-58.6E-09	-32.2E-09
Sigma	-	2.6E-09	701.4E-12	1.3E-09	3.8E-09	1.3E-09	1.4E-09	1.7E-09	1.4E-09	2.5E-09	1.6E-09	2.1E-09	852.4E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.3E-09	-10.6E-09	-10.3E-09	-10.1E-09	-9.1E-09	-10.5E-09	-10.5E-09	-8.9E-09	-10.8E-09	-10.8E-09	-9.9E-09	-11.1E-09	-9.1E-09
OFF PROTON samples													
30	-32.6E-09	-39.3E-09	-39.9E-09	-45.8E-09	-46.2E-09	-55.9E-09	-59.6E-09	-65.6E-09	-64.2E-09	-71.2E-09	-77.1E-09	-74.7E-09	-59.7E-09
32	-38.7E-09	-43.0E-09	-43.2E-09	-39.4E-09	-46.5E-09	-53.0E-09	-64.9E-09	-70.6E-09	-63.7E-09	-72.7E-09	-80.1E-09	-77.5E-09	-63.5E-09
39	-38.8E-09	-39.5E-09	-38.4E-09	-40.9E-09	-53.3E-09	-57.5E-09	-62.7E-09	-77.5E-09	-79.5E-09	-80.8E-09	-98.0E-09	-89.9E-09	-66.3E-09
Statistics													
Min	-38.8E-09	-43.0E-09	-43.2E-09	-45.8E-09	-53.3E-09	-57.5E-09	-64.9E-09	-77.5E-09	-79.5E-09	-80.8E-09	-98.0E-09	-89.9E-09	-66.3E-09
Max	-32.6E-09	-39.3E-09	-38.4E-09	-39.4E-09	-46.2E-09	-53.0E-09	-59.6E-09	-65.6E-09	-63.7E-09	-71.2E-09	-77.1E-09	-74.7E-09	-59.7E-09
Average	-36.7E-09	-40.6E-09	-40.5E-09	-42.0E-09	-48.7E-09	-55.4E-09	-62.4E-09	-71.2E-09	-69.1E-09	-74.9E-09	-85.1E-09	-80.7E-09	-63.2E-09
Sigma	2.9E-09	1.7E-09	2.0E-09	2.7E-09	3.3E-09	1.9E-09	2.2E-09	4.9E-09	7.4E-09	4.2E-09	9.2E-09	6.6E-09	2.7E-09

Drift Calculation

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-6.7E-09	-7.3E-09	-13.2E-09	-13.6E-09	-23.3E-09	-27.1E-09	-33.0E-09	-31.6E-09	-38.6E-09	-44.5E-09	-42.1E-09	-27.2E-09
32	-	-4.3E-09	-4.5E-09	-725.5E-12	-7.8E-09	-14.3E-09	-26.2E-09	-31.9E-09	-25.0E-09	-34.0E-09	-41.4E-09	-38.8E-09	-24.8E-09
39	-	-767.2E-12	402.8E-12	-2.1E-09	-14.5E-09	-18.7E-09	-23.9E-09	-38.7E-09	-40.7E-09	-42.0E-09	-59.2E-09	-51.1E-09	-27.5E-09
Average	-	-3.9E-09	-3.8E-09	-5.4E-09	-12.0E-09	-18.8E-09	-25.7E-09	-34.5E-09	-32.4E-09	-38.2E-09	-48.4E-09	-44.0E-09	-26.5E-09
Sigma	-	2.4E-09	3.2E-09	5.6E-09	3.0E-09	3.7E-09	1.3E-09	3.0E-09	6.5E-09	3.3E-09	7.8E-09	5.2E-09	1.2E-09

Measurements

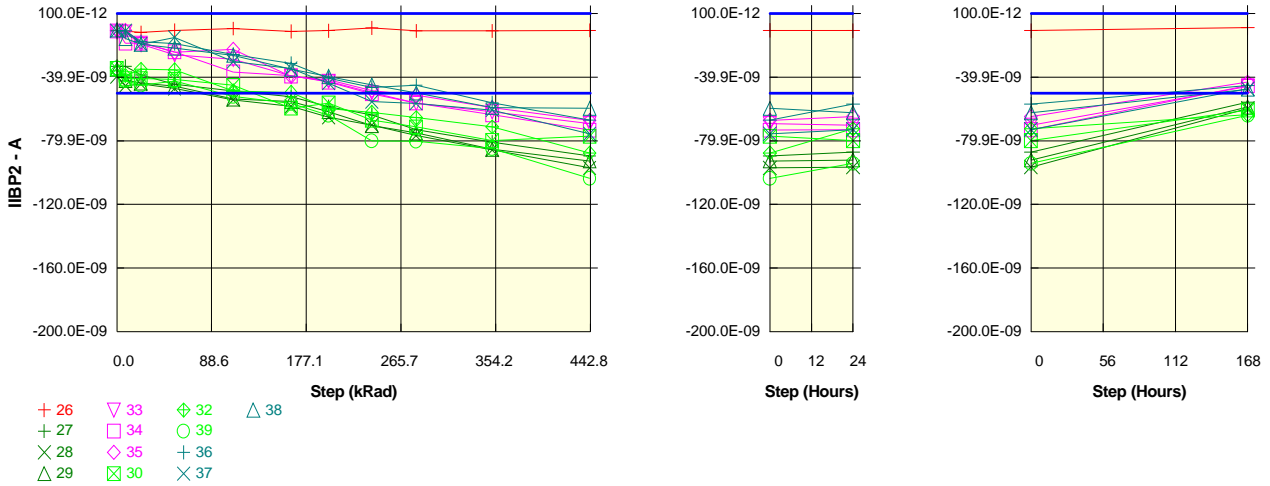
IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.3E-09	-10.6E-09	-10.3E-09	-10.1E-09	-9.1E-09	-10.5E-09	-10.5E-09	-8.9E-09	-10.8E-09	-10.8E-09	-9.9E-09	-11.1E-09	-9.1E-09
OFF TID samples													
36	-10.2E-09	-10.2E-09	-17.1E-09	-20.7E-09	-28.1E-09	-32.5E-09	-35.9E-09	-43.8E-09	-48.0E-09	-49.3E-09	-51.7E-09	-55.7E-09	-44.6E-09
37	-10.4E-09	-10.4E-09	-17.4E-09	-16.5E-09	-29.9E-09	-40.9E-09	-44.9E-09	-48.2E-09	-52.5E-09	-55.0E-09	-70.1E-09	-66.0E-09	-48.1E-09
38	-10.1E-09	-15.5E-09	-20.3E-09	-18.5E-09	-30.2E-09	-37.6E-09	-40.8E-09	-44.4E-09	-53.3E-09	-56.5E-09	-75.6E-09	-69.4E-09	-51.4E-09
Statistics													
Min	-10.4E-09	-15.5E-09	-20.3E-09	-20.7E-09	-30.2E-09	-40.9E-09	-44.9E-09	-48.2E-09	-53.3E-09	-56.5E-09	-75.6E-09	-69.4E-09	-51.4E-09
Max	-10.1E-09	-10.2E-09	-17.1E-09	-16.5E-09	-28.1E-09	-32.5E-09	-35.9E-09	-43.8E-09	-48.0E-09	-49.3E-09	-51.7E-09	-55.7E-09	-44.6E-09
Average	-10.2E-09	-12.0E-09	-18.3E-09	-18.6E-09	-29.4E-09	-37.0E-09	-40.6E-09	-45.4E-09	-51.3E-09	-53.6E-09	-65.8E-09	-63.7E-09	-48.0E-09
Sigma	119.2E-12	2.4E-09	1.4E-09	1.7E-09	937.2E-12	3.4E-09	3.7E-09	2.0E-09	2.3E-09	3.1E-09	10.3E-09	5.8E-09	2.8E-09

Drift Calculation

IIBP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.9E-09	-10.5E-09	-17.9E-09	-22.3E-09	-25.7E-09	-33.6E-09	-37.8E-09	-39.1E-09	-41.5E-09	-45.5E-09	-34.5E-09
37	-	0.0E+00	-7.0E-09	-6.1E-09	-19.5E-09	-30.5E-09	-34.5E-09	-37.8E-09	-42.1E-09	-44.6E-09	-59.7E-09	-55.7E-09	-37.7E-09
38	-	-5.4E-09	-10.2E-09	-8.4E-09	-20.1E-09	-27.5E-09	-30.7E-09	-34.2E-09	-43.2E-09	-46.3E-09	-65.5E-09	-59.3E-09	-41.3E-09
Average	-	-1.8E-09	-8.0E-09	-8.3E-09	-19.2E-09	-26.8E-09	-30.3E-09	-35.2E-09	-41.0E-09	-43.3E-09	-55.6E-09	-53.5E-09	-37.8E-09
Sigma	-	2.5E-09	1.5E-09	1.8E-09	932.6E-12	3.4E-09	3.6E-09	1.8E-09	2.3E-09	3.1E-09	10.3E-09	5.8E-09	2.8E-09

Parameter : Input Bias Current : IIBP2DUTC
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.6E-09	-11.0E-09	-11.9E-09	-10.5E-09	-9.4E-09	-11.2E-09	-10.7E-09	-9.0E-09	-10.8E-09	-10.8E-09	-10.5E-09	-10.7E-09	-8.9E-09
ON PROTON samples													
27	-33.1E-09	-33.1E-09	-38.6E-09	-44.4E-09	-48.7E-09	-52.4E-09	-58.5E-09	-63.8E-09	-73.1E-09	-80.9E-09	-89.6E-09	-87.2E-09	-55.8E-09
28	-39.5E-09	-45.3E-09	-44.2E-09	-47.0E-09	-54.2E-09	-58.3E-09	-65.2E-09	-70.2E-09	-76.7E-09	-85.8E-09	-97.0E-09	-96.6E-09	-59.8E-09
29	-35.0E-09	-42.1E-09	-43.7E-09	-45.6E-09	-53.7E-09	-55.3E-09	-61.7E-09	-70.5E-09	-75.1E-09	-85.3E-09	-92.6E-09	-92.1E-09	-58.8E-09
Statistics													
Min	-39.5E-09	-45.3E-09	-44.2E-09	-47.0E-09	-54.2E-09	-58.3E-09	-65.2E-09	-70.5E-09	-76.7E-09	-85.8E-09	-97.0E-09	-96.6E-09	-59.8E-09
Max	-33.1E-09	-33.1E-09	-38.6E-09	-44.4E-09	-48.7E-09	-52.4E-09	-58.5E-09	-63.8E-09	-73.1E-09	-80.9E-09	-89.6E-09	-87.2E-09	-55.8E-09
Average	-35.9E-09	-40.2E-09	-42.2E-09	-45.7E-09	-52.2E-09	-55.3E-09	-61.8E-09	-68.2E-09	-75.0E-09	-84.0E-09	-93.1E-09	-92.0E-09	-58.1E-09
Sigma	2.7E-09	5.2E-09	2.5E-09	1.1E-09	2.5E-09	2.4E-09	2.7E-09	3.1E-09	1.5E-09	2.2E-09	3.1E-09	3.8E-09	1.7E-09

Drift Calculation

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	40.1E-12	-5.5E-09	-11.3E-09	-15.6E-09	-19.2E-09	-25.3E-09	-30.7E-09	-40.0E-09	-47.8E-09	-56.4E-09	-54.1E-09	-22.7E-09
28	-	-5.8E-09	-4.7E-09	-7.5E-09	-14.7E-09	-18.7E-09	-25.7E-09	-30.7E-09	-37.2E-09	-46.3E-09	-57.5E-09	-57.1E-09	-20.2E-09
29	-	-7.0E-09	-8.7E-09	-10.5E-09	-18.7E-09	-20.3E-09	-26.6E-09	-35.5E-09	-40.1E-09	-50.3E-09	-57.6E-09	-57.1E-09	-23.7E-09
Average	-	-4.3E-09	-6.3E-09	-9.8E-09	-16.3E-09	-19.4E-09	-25.9E-09	-32.3E-09	-39.1E-09	-48.1E-09	-57.2E-09	-56.1E-09	-22.2E-09
Sigma	-	3.1E-09	1.7E-09	1.6E-09	1.7E-09	641.2E-12	545.3E-12	2.3E-09	1.3E-09	1.7E-09	520.6E-12	1.4E-09	1.5E-09

Measurements

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.6E-09	-11.0E-09	-11.9E-09	-10.5E-09	-9.4E-09	-11.2E-09	-10.7E-09	-9.0E-09	-10.8E-09	-10.8E-09	-10.5E-09	-10.7E-09	-8.9E-09
ON TID samples													
33	-11.5E-09	-11.5E-09	-19.4E-09	-25.9E-09	-28.7E-09	-39.2E-09	-42.5E-09	-49.7E-09	-56.4E-09	-61.8E-09	-69.2E-09	-70.2E-09	-45.8E-09
34	-10.8E-09	-18.6E-09	-18.5E-09	-24.0E-09	-36.8E-09	-39.1E-09	-43.0E-09	-50.5E-09	-56.2E-09	-63.6E-09	-73.3E-09	-73.0E-09	-45.3E-09
35	-10.5E-09	-10.5E-09	-18.0E-09	-24.3E-09	-22.4E-09	-39.6E-09	-41.7E-09	-48.4E-09	-51.3E-09	-59.1E-09	-67.2E-09	-64.7E-09	-43.1E-09
Statistics													
Min	-11.5E-09	-18.6E-09	-19.4E-09	-25.9E-09	-36.8E-09	-39.6E-09	-43.0E-09	-50.5E-09	-56.4E-09	-63.6E-09	-73.3E-09	-73.0E-09	-45.8E-09
Max	-10.5E-09	-10.5E-09	-18.0E-09	-24.0E-09	-22.4E-09	-39.1E-09	-41.7E-09	-48.4E-09	-51.3E-09	-59.1E-09	-67.2E-09	-64.7E-09	-43.1E-09
Average	-11.0E-09	-13.6E-09	-18.6E-09	-24.7E-09	-29.3E-09	-39.3E-09	-42.4E-09	-49.5E-09	-54.6E-09	-61.5E-09	-69.9E-09	-69.3E-09	-44.7E-09
Sigma	411.0E-12	3.6E-09	566.2E-12	849.3E-12	5.9E-09	187.9E-12	534.4E-12	832.0E-12	2.3E-09	1.8E-09	2.5E-09	3.4E-09	1.2E-09

Drift Calculation

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-7.9E-09	-14.4E-09	-17.2E-09	-27.7E-09	-31.0E-09	-38.2E-09	-44.9E-09	-50.3E-09	-57.7E-09	-58.7E-09	-34.3E-09
34	-	-7.8E-09	-7.7E-09	-13.2E-09	-25.9E-09	-28.3E-09	-32.2E-09	-39.6E-09	-45.3E-09	-52.7E-09	-62.4E-09	-62.1E-09	-34.4E-09
35	-	0.0E+00	-7.5E-09	-13.7E-09	-11.9E-09	-29.0E-09	-31.2E-09	-37.9E-09	-40.8E-09	-48.6E-09	-56.7E-09	-54.2E-09	-32.6E-09
Average	-	-2.6E-09	-7.7E-09	-13.8E-09	-18.4E-09	-28.3E-09	-31.5E-09	-38.6E-09	-43.7E-09	-50.5E-09	-58.9E-09	-58.3E-09	-33.8E-09
Sigma	-	3.7E-09	157.0E-12	502.7E-12	5.8E-09	545.5E-12	499.9E-12	737.0E-12	2.0E-09	1.7E-09	2.5E-09	3.3E-09	834.3E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.6E-09	-11.0E-09	-11.9E-09	-10.5E-09	-9.4E-09	-11.2E-09	-10.7E-09	-9.0E-09	-10.8E-09	-10.8E-09	-10.5E-09	-10.7E-09	-8.9E-09
OFF_PROTON samples													
30	-34.5E-09	-41.0E-09	-40.8E-09	-41.4E-09	-45.1E-09	-59.5E-09	-56.3E-09	-67.0E-09	-71.2E-09	-79.9E-09	-77.1E-09	-79.9E-09	-60.7E-09
32	-35.9E-09	-38.9E-09	-35.1E-09	-35.3E-09	-48.7E-09	-49.5E-09	-59.8E-09	-62.2E-09	-65.5E-09	-71.2E-09	-87.6E-09	-72.5E-09	-63.5E-09
39	-34.1E-09	-42.2E-09	-45.1E-09	-42.3E-09	-52.1E-09	-56.6E-09	-64.0E-09	-80.1E-09	-80.3E-09	-84.9E-09	-103.7E-09	-94.3E-09	-64.0E-09
Statistics													
Min	-35.9E-09	-42.2E-09	-45.1E-09	-42.3E-09	-52.1E-09	-59.5E-09	-64.0E-09	-80.1E-09	-80.3E-09	-84.9E-09	-103.7E-09	-94.3E-09	-64.0E-09
Max	-34.1E-09	-38.9E-09	-35.1E-09	-35.3E-09	-45.1E-09	-49.5E-09	-56.3E-09	-62.2E-09	-65.5E-09	-71.2E-09	-77.1E-09	-72.5E-09	-60.7E-09
Average	-34.8E-09	-40.7E-09	-40.3E-09	-39.7E-09	-48.6E-09	-55.2E-09	-60.0E-09	-69.7E-09	-72.3E-09	-78.7E-09	-89.5E-09	-82.2E-09	-62.7E-09
Sigma	762.7E-12	1.4E-09	4.1E-09	3.1E-09	2.8E-09	4.2E-09	3.1E-09	7.6E-09	6.1E-09	5.6E-09	10.9E-09	9.0E-09	1.5E-09

Drift Calculation

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-6.6E-09	-6.3E-09	-6.9E-09	-10.6E-09	-25.0E-09	-21.8E-09	-32.5E-09	-36.7E-09	-45.4E-09	-42.6E-09	-45.4E-09	-26.2E-09
32	-	-3.0E-09	789.0E-12	603.4E-12	-12.8E-09	-13.6E-09	-23.9E-09	-26.3E-09	-29.6E-09	-35.3E-09	-51.7E-09	-36.6E-09	-27.6E-09
39	-	-8.1E-09	-11.0E-09	-8.2E-09	-18.0E-09	-22.5E-09	-29.9E-09	-46.0E-09	-46.1E-09	-50.8E-09	-69.6E-09	-60.2E-09	-29.9E-09
Average	-	-5.9E-09	-5.5E-09	-4.8E-09	-13.8E-09	-20.3E-09	-25.2E-09	-34.9E-09	-37.5E-09	-43.8E-09	-54.6E-09	-47.4E-09	-27.9E-09
Sigma	-	2.1E-09	4.9E-09	3.9E-09	3.1E-09	4.9E-09	3.4E-09	8.2E-09	6.8E-09	6.4E-09	11.2E-09	9.7E-09	1.5E-09

Measurements

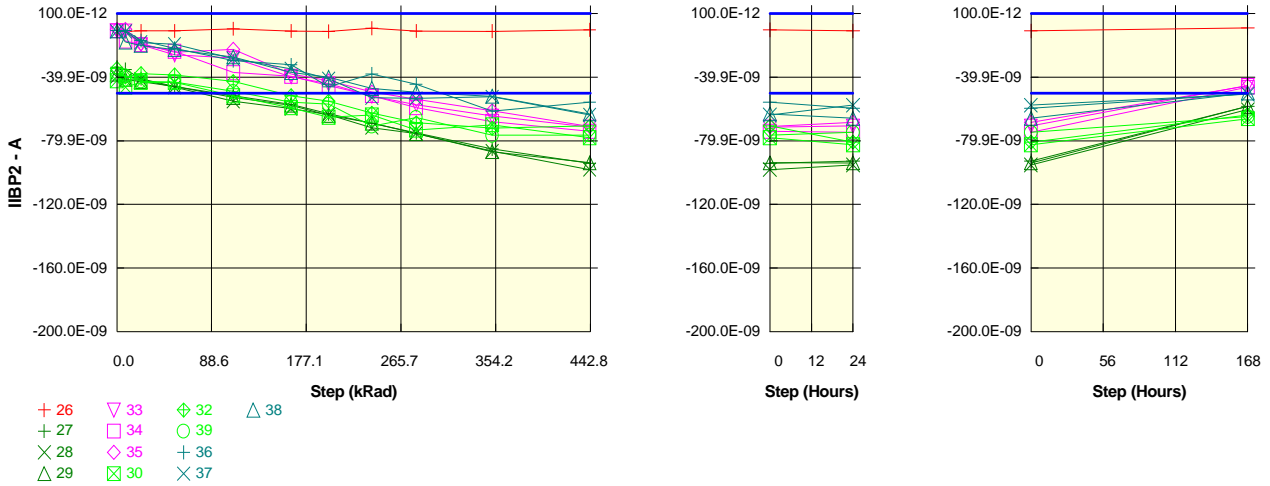
IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.6E-09	-11.0E-09	-11.9E-09	-10.5E-09	-9.4E-09	-11.2E-09	-10.7E-09	-9.0E-09	-10.8E-09	-10.8E-09	-10.5E-09	-10.7E-09	-8.9E-09
OFF_TID samples													
36	-10.8E-09	-10.8E-09	-17.7E-09	-18.9E-09	-25.6E-09	-31.2E-09	-40.6E-09	-46.5E-09	-45.1E-09	-56.1E-09	-67.0E-09	-57.0E-09	-45.2E-09
37	-10.8E-09	-10.8E-09	-19.2E-09	-15.0E-09	-30.1E-09	-34.6E-09	-43.8E-09	-55.4E-09	-56.5E-09	-60.7E-09	-75.6E-09	-72.9E-09	-47.3E-09
38	-10.1E-09	-15.7E-09	-19.2E-09	-21.7E-09	-26.2E-09	-34.9E-09	-39.6E-09	-44.9E-09	-49.9E-09	-59.0E-09	-59.6E-09	-62.4E-09	-47.5E-09
Statistics													
Min	-10.8E-09	-15.7E-09	-19.2E-09	-21.7E-09	-30.1E-09	-34.9E-09	-43.8E-09	-55.4E-09	-56.5E-09	-60.7E-09	-75.6E-09	-72.9E-09	-47.5E-09
Max	-10.1E-09	-10.8E-09	-17.7E-09	-15.0E-09	-25.6E-09	-31.2E-09	-39.6E-09	-44.9E-09	-45.1E-09	-56.1E-09	-59.6E-09	-57.0E-09	-45.2E-09
Average	-10.6E-09	-12.4E-09	-18.7E-09	-18.5E-09	-27.3E-09	-33.6E-09	-41.3E-09	-48.9E-09	-50.5E-09	-58.6E-09	-67.4E-09	-64.1E-09	-46.7E-09
Sigma	316.4E-12	2.3E-09	740.8E-12	2.7E-09	2.0E-09	1.7E-09	1.8E-09	4.6E-09	4.7E-09	1.9E-09	6.6E-09	6.6E-09	1.0E-09

Drift Calculation

IIBP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-6.8E-09	-8.0E-09	-14.8E-09	-20.4E-09	-29.7E-09	-35.6E-09	-34.3E-09	-45.2E-09	-56.1E-09	-46.2E-09	-34.4E-09
37	-	0.0E+00	-8.5E-09	-4.2E-09	-19.3E-09	-23.8E-09	-33.0E-09	-44.6E-09	-45.7E-09	-49.9E-09	-64.9E-09	-62.1E-09	-36.5E-09
38	-	-5.6E-09	-9.1E-09	-11.5E-09	-16.0E-09	-24.8E-09	-29.4E-09	-34.7E-09	-39.7E-09	-48.9E-09	-49.4E-09	-52.2E-09	-37.4E-09
Average	-	-1.9E-09	-8.1E-09	-7.9E-09	-16.7E-09	-23.0E-09	-30.7E-09	-38.3E-09	-39.9E-09	-48.0E-09	-56.8E-09	-53.5E-09	-36.1E-09
Sigma	-	2.6E-09	954.1E-12	3.0E-09	1.9E-09	1.9E-09	1.6E-09	4.5E-09	4.7E-09	2.0E-09	6.3E-09	6.6E-09	1.3E-09

Parameter : Input Bias Current : IIBP2DUTD
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.7E-09	-11.3E-09	-10.8E-09	-10.9E-09	-9.5E-09	-11.0E-09	-11.2E-09	-9.1E-09	-10.9E-09	-11.1E-09	-10.1E-09	-10.8E-09	-8.9E-09
ON PROTON samples													
27	-33.8E-09	-35.2E-09	-40.9E-09	-45.8E-09	-51.8E-09	-57.1E-09	-63.0E-09	-69.1E-09	-74.9E-09	-85.2E-09	-94.1E-09	-92.6E-09	-58.2E-09
28	-39.7E-09	-41.8E-09	-41.5E-09	-46.3E-09	-55.1E-09	-59.7E-09	-63.5E-09	-71.8E-09	-75.3E-09	-86.5E-09	-98.1E-09	-95.2E-09	-60.4E-09
29	-38.0E-09	-41.4E-09	-42.8E-09	-45.9E-09	-52.7E-09	-57.6E-09	-64.0E-09	-68.8E-09	-75.5E-09	-86.8E-09	-93.8E-09	-93.9E-09	-58.3E-09
Statistics													
Min	-39.7E-09	-41.8E-09	-42.8E-09	-46.3E-09	-55.1E-09	-59.7E-09	-64.0E-09	-71.8E-09	-75.5E-09	-86.8E-09	-98.1E-09	-95.2E-09	-60.4E-09
Max	-33.8E-09	-35.2E-09	-40.9E-09	-45.8E-09	-51.8E-09	-57.1E-09	-63.0E-09	-68.8E-09	-74.9E-09	-85.2E-09	-93.8E-09	-92.6E-09	-58.2E-09
Average	-37.2E-09	-39.4E-09	-41.7E-09	-46.0E-09	-53.2E-09	-58.2E-09	-63.5E-09	-69.9E-09	-75.3E-09	-86.2E-09	-95.4E-09	-93.9E-09	-59.0E-09
Sigma	2.5E-09	3.0E-09	788.7E-12	214.4E-12	1.4E-09	1.1E-09	376.6E-12	1.3E-09	261.3E-12	711.7E-12	2.0E-09	1.1E-09	1.0E-09

Drift Calculation

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-1.4E-09	-7.1E-09	-12.0E-09	-18.0E-09	-23.4E-09	-29.3E-09	-35.3E-09	-41.1E-09	-51.4E-09	-60.3E-09	-58.9E-09	-24.4E-09
28	-	-2.1E-09	-1.8E-09	-6.6E-09	-15.4E-09	-20.0E-09	-23.8E-09	-32.1E-09	-35.6E-09	-46.8E-09	-58.4E-09	-55.5E-09	-20.7E-09
29	-	-3.4E-09	-4.7E-09	-7.9E-09	-14.6E-09	-19.6E-09	-25.9E-09	-30.8E-09	-37.5E-09	-48.8E-09	-55.8E-09	-55.9E-09	-20.3E-09
Average	-	-2.3E-09	-4.5E-09	-8.8E-09	-16.0E-09	-21.0E-09	-26.3E-09	-32.7E-09	-38.1E-09	-49.0E-09	-58.2E-09	-56.8E-09	-21.8E-09
Sigma	-	822.0E-12	2.2E-09	2.3E-09	1.4E-09	1.7E-09	2.3E-09	1.9E-09	2.3E-09	1.9E-09	1.8E-09	1.5E-09	1.9E-09

Measurements

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.7E-09	-11.3E-09	-10.8E-09	-10.9E-09	-9.5E-09	-11.0E-09	-11.2E-09	-9.1E-09	-10.9E-09	-11.1E-09	-10.1E-09	-10.8E-09	-8.9E-09
ON TID samples													
33	-10.9E-09	-10.9E-09	-19.6E-09	-25.8E-09	-28.0E-09	-39.8E-09	-44.2E-09	-51.9E-09	-57.2E-09	-64.4E-09	-71.5E-09	-70.7E-09	-45.2E-09
34	-10.7E-09	-17.3E-09	-19.5E-09	-23.7E-09	-37.1E-09	-39.4E-09	-45.2E-09	-51.6E-09	-59.2E-09	-67.8E-09	-74.1E-09	-74.7E-09	-46.3E-09
35	-9.8E-09	-9.8E-09	-18.9E-09	-24.3E-09	-22.4E-09	-38.1E-09	-42.3E-09	-49.4E-09	-53.9E-09	-61.2E-09	-70.8E-09	-68.4E-09	-45.5E-09
Statistics													
Min	-10.9E-09	-17.3E-09	-19.6E-09	-25.8E-09	-37.1E-09	-39.8E-09	-45.2E-09	-51.9E-09	-59.2E-09	-67.8E-09	-74.1E-09	-74.7E-09	-46.3E-09
Max	-9.8E-09	-9.8E-09	-18.9E-09	-23.7E-09	-22.4E-09	-38.1E-09	-42.3E-09	-49.4E-09	-53.9E-09	-61.2E-09	-70.8E-09	-68.4E-09	-45.2E-09
Average	-10.5E-09	-12.7E-09	-19.3E-09	-24.6E-09	-29.2E-09	-39.1E-09	-43.9E-09	-51.0E-09	-56.8E-09	-64.5E-09	-72.1E-09	-71.3E-09	-45.7E-09
Sigma	464.3E-12	3.3E-09	338.3E-12	908.5E-12	6.0E-09	734.5E-12	1.2E-09	1.1E-09	2.2E-09	2.7E-09	1.4E-09	2.6E-09	458.5E-12

Drift Calculation

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-8.7E-09	-15.0E-09	-17.2E-09	-28.9E-09	-33.3E-09	-41.0E-09	-46.3E-09	-53.6E-09	-60.6E-09	-59.8E-09	-34.3E-09
34	-	-6.6E-09	-8.8E-09	-13.0E-09	-26.4E-09	-28.7E-09	-34.5E-09	-40.9E-09	-48.5E-09	-57.1E-09	-63.4E-09	-64.0E-09	-35.6E-09
35	-	0.0E+00	-9.0E-09	-14.5E-09	-12.6E-09	-28.3E-09	-32.5E-09	-39.5E-09	-44.1E-09	-51.3E-09	-61.0E-09	-58.6E-09	-35.6E-09
Average	-	-2.2E-09	-8.9E-09	-14.1E-09	-18.7E-09	-28.6E-09	-33.4E-09	-40.5E-09	-46.3E-09	-54.0E-09	-61.7E-09	-60.8E-09	-35.2E-09
Sigma	-	3.1E-09	126.8E-12	831.6E-12	5.7E-09	272.2E-12	835.3E-12	683.4E-12	1.8E-09	2.4E-09	1.2E-09	2.3E-09	608.4E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.7E-09	-11.3E-09	-10.8E-09	-10.9E-09	-9.5E-09	-11.0E-09	-11.2E-09	-9.1E-09	-10.9E-09	-11.1E-09	-10.1E-09	-10.8E-09	-8.9E-09
OFF PROTON samples													
30	-42.1E-09	-46.2E-09	-43.4E-09	-43.3E-09	-51.7E-09	-59.2E-09	-65.2E-09	-63.8E-09	-73.2E-09	-69.9E-09	-78.0E-09	-82.5E-09	-66.1E-09
32	-34.5E-09	-39.9E-09	-37.7E-09	-38.5E-09	-42.7E-09	-51.6E-09	-55.1E-09	-62.5E-09	-68.6E-09	-72.1E-09	-70.7E-09	-80.8E-09	-63.8E-09
39	-37.7E-09	-39.1E-09	-42.5E-09	-43.0E-09	-48.9E-09	-55.6E-09	-57.0E-09	-70.8E-09	-65.3E-09	-76.6E-09	-76.4E-09	-74.7E-09	-64.8E-09
Statistics													
Min	-42.1E-09	-46.2E-09	-43.4E-09	-43.3E-09	-51.7E-09	-59.2E-09	-65.2E-09	-70.8E-09	-73.2E-09	-76.6E-09	-78.0E-09	-82.5E-09	-66.1E-09
Max	-34.5E-09	-39.1E-09	-37.7E-09	-38.5E-09	-42.7E-09	-51.6E-09	-55.1E-09	-62.5E-09	-65.3E-09	-69.9E-09	-70.7E-09	-74.7E-09	-63.8E-09
Average	-38.1E-09	-41.7E-09	-41.2E-09	-41.6E-09	-47.8E-09	-55.5E-09	-59.1E-09	-65.7E-09	-69.1E-09	-72.9E-09	-75.0E-09	-79.3E-09	-64.9E-09
Sigma	3.1E-09	3.2E-09	2.5E-09	2.2E-09	3.8E-09	3.1E-09	4.4E-09	3.6E-09	3.3E-09	2.8E-09	3.2E-09	3.3E-09	937.3E-12

Drift Calculation

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-4.1E-09	-1.3E-09	-1.2E-09	-9.6E-09	-17.1E-09	-23.1E-09	-21.7E-09	-31.1E-09	-27.8E-09	-35.9E-09	-40.4E-09	-24.0E-09
32	-	-5.5E-09	-3.2E-09	-4.0E-09	-8.3E-09	-17.1E-09	-20.6E-09	-28.1E-09	-34.2E-09	-37.7E-09	-36.2E-09	-46.3E-09	-29.4E-09
39	-	-1.4E-09	-4.8E-09	-5.3E-09	-11.2E-09	-17.9E-09	-19.3E-09	-33.1E-09	-27.6E-09	-38.8E-09	-38.6E-09	-37.0E-09	-27.1E-09
Average	-	-3.6E-09	-3.1E-09	-3.5E-09	-9.7E-09	-17.4E-09	-21.0E-09	-27.6E-09	-31.0E-09	-34.8E-09	-36.9E-09	-41.2E-09	-26.8E-09
Sigma	-	1.7E-09	1.4E-09	1.7E-09	1.2E-09	364.2E-12	1.6E-09	4.6E-09	2.7E-09	4.9E-09	1.2E-09	3.9E-09	2.2E-09

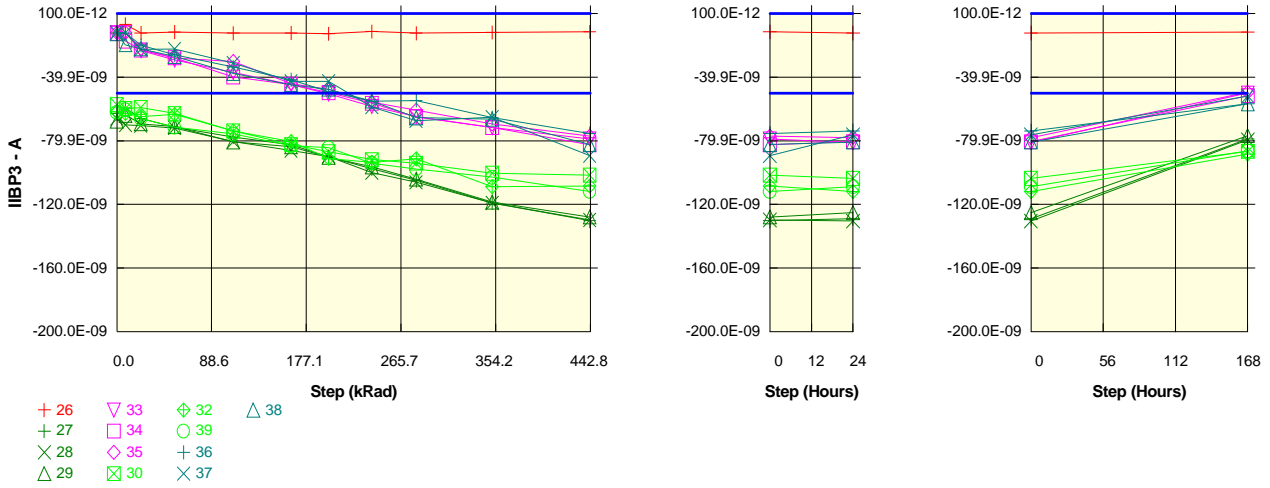
Measurements

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.7E-09	-11.3E-09	-10.8E-09	-10.9E-09	-9.5E-09	-11.0E-09	-11.2E-09	-9.1E-09	-10.9E-09	-11.1E-09	-10.1E-09	-10.8E-09	-8.9E-09
OFF TID samples													
36	-10.6E-09	-10.6E-09	-16.9E-09	-21.8E-09	-29.5E-09	-32.2E-09	-46.1E-09	-38.0E-09	-44.4E-09	-61.3E-09	-55.7E-09	-59.6E-09	-50.5E-09
37	-11.1E-09	-11.1E-09	-18.1E-09	-19.2E-09	-28.3E-09	-34.7E-09	-41.0E-09	-52.9E-09	-53.3E-09	-52.4E-09	-63.8E-09	-57.6E-09	-50.7E-09
38	-10.9E-09	-17.8E-09	-20.0E-09	-22.6E-09	-27.2E-09	-37.0E-09	-40.1E-09	-47.1E-09	-49.4E-09	-52.0E-09	-63.1E-09	-65.9E-09	-49.8E-09
Statistics													
Min	-11.1E-09	-17.8E-09	-20.0E-09	-22.6E-09	-29.5E-09	-37.0E-09	-46.1E-09	-52.9E-09	-53.3E-09	-61.3E-09	-63.8E-09	-65.9E-09	-50.7E-09
Max	-10.6E-09	-10.6E-09	-16.9E-09	-19.2E-09	-27.2E-09	-32.2E-09	-40.1E-09	-38.0E-09	-44.4E-09	-52.0E-09	-55.7E-09	-57.6E-09	-49.8E-09
Average	-10.9E-09	-13.2E-09	-18.4E-09	-21.2E-09	-28.4E-09	-34.6E-09	-42.4E-09	-46.0E-09	-49.1E-09	-55.2E-09	-60.9E-09	-61.0E-09	-50.3E-09
Sigma	235.3E-12	3.3E-09	1.3E-09	1.4E-09	939.1E-12	1.9E-09	2.6E-09	6.1E-09	3.7E-09	4.3E-09	3.7E-09	3.5E-09	374.0E-12

Drift Calculation

IIBP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.3E-09	-11.2E-09	-19.0E-09	-21.6E-09	-35.5E-09	-27.4E-09	-33.8E-09	-50.7E-09	-45.1E-09	-49.0E-09	-39.9E-09
37	-	0.0E+00	-7.0E-09	-8.1E-09	-17.2E-09	-23.5E-09	-29.9E-09	-41.7E-09	-42.2E-09	-41.2E-09	-52.7E-09	-46.4E-09	-39.6E-09
38	-	-6.9E-09	-9.1E-09	-11.6E-09	-16.3E-09	-26.0E-09	-29.1E-09	-36.2E-09	-38.5E-09	-41.1E-09	-52.1E-09	-54.9E-09	-38.9E-09
Average	-	-2.3E-09	-7.5E-09	-10.3E-09	-17.5E-09	-23.7E-09	-31.5E-09	-35.1E-09	-38.2E-09	-44.3E-09	-50.0E-09	-50.1E-09	-39.4E-09
Sigma	-	3.2E-09	1.2E-09	1.6E-09	1.1E-09	1.8E-09	2.8E-09	5.9E-09	3.4E-09	4.5E-09	3.4E-09	3.6E-09	422.2E-12

Parameter : Input Bias Current : IIBP3DUTA
 Test conditions : +VCC=5V. -VCC=GND.VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.2E-09	-6.7E-09	-12.2E-09	-11.6E-09	-12.3E-09	-12.2E-09	-12.7E-09	-11.3E-09	-12.3E-09	-11.9E-09	-11.4E-09	-12.2E-09	-11.5E-09
ON PROTON samples													
27	-62.9E-09	-59.3E-09	-66.0E-09	-71.5E-09	-77.7E-09	-82.5E-09	-90.2E-09	-97.6E-09	-105.0E-09	-119.0E-09	-130.3E-09	-129.0E-09	-78.9E-09
28	-66.0E-09	-70.0E-09	-70.5E-09	-71.9E-09	-80.5E-09	-86.2E-09	-89.9E-09	-100.1E-09	-106.1E-09	-119.1E-09	-129.8E-09	-130.5E-09	-79.5E-09
29	-67.5E-09	-63.9E-09	-69.3E-09	-71.0E-09	-80.8E-09	-83.6E-09	-90.4E-09	-96.4E-09	-104.2E-09	-118.6E-09	-128.0E-09	-125.2E-09	-76.8E-09
Statistics													
Min	-67.5E-09	-70.0E-09	-70.5E-09	-71.9E-09	-80.8E-09	-86.2E-09	-90.4E-09	-100.1E-09	-106.1E-09	-119.1E-09	-130.3E-09	-130.5E-09	-79.5E-09
Max	-62.9E-09	-59.3E-09	-66.0E-09	-71.0E-09	-77.7E-09	-82.5E-09	-89.9E-09	-96.4E-09	-104.2E-09	-118.6E-09	-128.0E-09	-125.2E-09	-76.8E-09
Average	-65.5E-09	-64.4E-09	-68.6E-09	-71.5E-09	-79.7E-09	-84.1E-09	-90.2E-09	-98.0E-09	-105.1E-09	-118.9E-09	-129.4E-09	-128.2E-09	-78.4E-09
Sigma	1.9E-09	4.4E-09	1.9E-09	369.3E-12	1.4E-09	1.5E-09	211.1E-12	1.5E-09	795.1E-12	228.1E-12	1.0E-09	2.2E-09	1.2E-09

Drift Calculation

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	3.6E-09	-3.1E-09	-8.6E-09	-14.8E-09	-19.6E-09	-27.3E-09	-34.7E-09	-42.1E-09	-56.1E-09	-67.4E-09	-66.1E-09	-16.0E-09
28	-	-4.0E-09	-4.4E-09	-5.9E-09	-14.5E-09	-20.1E-09	-23.9E-09	-34.0E-09	-40.1E-09	-53.1E-09	-63.8E-09	-64.4E-09	-13.5E-09
29	-	3.6E-09	-1.8E-09	-3.5E-09	-13.2E-09	-16.1E-09	-22.9E-09	-28.9E-09	-36.6E-09	-51.0E-09	-60.4E-09	-57.7E-09	-9.3E-09
Average	-	1.1E-09	-3.1E-09	-6.0E-09	-14.2E-09	-18.6E-09	-24.7E-09	-32.5E-09	-39.6E-09	-53.4E-09	-63.9E-09	-62.7E-09	-12.9E-09
Sigma	-	3.6E-09	1.1E-09	2.1E-09	682.8E-12	1.8E-09	1.9E-09	2.6E-09	2.2E-09	2.1E-09	2.9E-09	3.6E-09	2.8E-09

Measurements

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.2E-09	-6.7E-09	-12.2E-09	-11.6E-09	-12.3E-09	-12.2E-09	-12.7E-09	-11.3E-09	-12.3E-09	-11.9E-09	-11.4E-09	-12.2E-09	-11.5E-09
ON TID samples													
33	-11.9E-09	-11.9E-09	-23.3E-09	-29.1E-09	-37.0E-09	-44.5E-09	-50.5E-09	-58.4E-09	-65.0E-09	-71.7E-09	-82.5E-09	-81.2E-09	-49.9E-09
34	-12.4E-09	-17.2E-09	-22.8E-09	-27.8E-09	-39.8E-09	-44.6E-09	-49.7E-09	-56.4E-09	-65.0E-09	-71.7E-09	-82.5E-09	-80.6E-09	-51.6E-09
35	-12.0E-09	-12.0E-09	-22.0E-09	-27.8E-09	-30.1E-09	-43.9E-09	-47.8E-09	-55.7E-09	-60.6E-09	-69.4E-09	-77.0E-09	-77.9E-09	-49.5E-09
Statistics													
Min	-12.4E-09	-17.2E-09	-23.3E-09	-29.1E-09	-39.8E-09	-44.6E-09	-50.5E-09	-58.4E-09	-65.0E-09	-71.7E-09	-82.5E-09	-81.2E-09	-51.6E-09
Max	-11.9E-09	-11.9E-09	-22.0E-09	-27.8E-09	-30.1E-09	-43.9E-09	-47.8E-09	-55.7E-09	-60.6E-09	-69.4E-09	-77.0E-09	-77.9E-09	-49.5E-09
Average	-12.1E-09	-13.7E-09	-22.7E-09	-28.2E-09	-35.6E-09	-44.3E-09	-49.3E-09	-56.8E-09	-63.4E-09	-70.9E-09	-79.5E-09	-79.9E-09	-50.3E-09
Sigma	195.2E-12	2.5E-09	534.5E-12	610.9E-12	4.1E-09	290.0E-12	1.1E-09	1.1E-09	2.0E-09	1.1E-09	2.3E-09	1.4E-09	905.4E-12

Drift Calculation

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-11.4E-09	-17.1E-09	-25.0E-09	-32.5E-09	-38.6E-09	-46.4E-09	-52.8E-09	-59.8E-09	-66.9E-09	-69.2E-09	-38.0E-09
34	-	-4.8E-09	-10.4E-09	-15.4E-09	-27.5E-09	-32.2E-09	-37.3E-09	-44.0E-09	-52.6E-09	-59.3E-09	-70.1E-09	-68.2E-09	-39.2E-09
35	-	0.0E+00	-10.0E-09	-15.8E-09	-18.1E-09	-31.9E-09	-35.8E-09	-43.7E-09	-48.6E-09	-57.3E-09	-65.0E-09	-65.9E-09	-37.5E-09
Average	-	-1.6E-09	-10.6E-09	-16.1E-09	-23.5E-09	-32.2E-09	-37.2E-09	-44.7E-09	-51.3E-09	-58.8E-09	-67.4E-09	-67.8E-09	-38.2E-09
Sigma	-	2.3E-09	581.7E-12	756.0E-12	4.0E-09	272.6E-12	1.2E-09	1.2E-09	1.9E-09	1.0E-09	2.1E-09	1.4E-09	728.3E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.2E-09	-6.7E-09	-12.2E-09	-11.6E-09	-12.3E-09	-12.2E-09	-12.7E-09	-11.3E-09	-12.3E-09	-11.9E-09	-11.4E-09	-12.2E-09	-11.5E-09
OFF PROTON samples													
30	-57.3E-09	-59.7E-09	-59.1E-09	-62.9E-09	-73.8E-09	-82.3E-09	-87.0E-09	-91.9E-09	-94.1E-09	-100.4E-09	-101.7E-09	-103.7E-09	-86.6E-09
32	-61.8E-09	-62.8E-09	-64.7E-09	-63.4E-09	-73.9E-09	-80.5E-09	-91.1E-09	-93.5E-09	-91.3E-09	-108.9E-09	-108.5E-09	-112.0E-09	-88.4E-09
39	-62.2E-09	-60.5E-09	-66.0E-09	-71.5E-09	-75.7E-09	-83.2E-09	-84.4E-09	-94.1E-09	-97.8E-09	-102.9E-09	-112.0E-09	-108.9E-09	-86.3E-09
Statistics													
Min	-62.2E-09	-62.8E-09	-66.0E-09	-71.5E-09	-75.7E-09	-83.2E-09	-91.1E-09	-94.1E-09	-97.8E-09	-108.9E-09	-112.0E-09	-112.0E-09	-88.4E-09
Max	-57.3E-09	-59.7E-09	-59.1E-09	-62.9E-09	-73.8E-09	-80.5E-09	-84.4E-09	-91.9E-09	-91.3E-09	-100.4E-09	-101.7E-09	-103.7E-09	-86.3E-09
Average	-60.5E-09	-61.0E-09	-63.3E-09	-65.9E-09	-74.5E-09	-82.0E-09	-87.5E-09	-93.2E-09	-94.4E-09	-104.1E-09	-107.4E-09	-108.2E-09	-87.1E-09
Sigma	2.2E-09	1.3E-09	3.0E-09	4.0E-09	883.8E-12	1.1E-09	2.8E-09	940.8E-12	2.6E-09	3.6E-09	4.3E-09	3.4E-09	917.8E-12

Drift Calculation

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-2.4E-09	-1.8E-09	-5.5E-09	-16.5E-09	-25.0E-09	-29.6E-09	-34.6E-09	-36.8E-09	-43.0E-09	-44.3E-09	-46.4E-09	-29.3E-09
32	-	-924.4E-12	-2.8E-09	-1.6E-09	-12.0E-09	-18.7E-09	-29.2E-09	-31.7E-09	-29.5E-09	-47.0E-09	-46.6E-09	-50.1E-09	-26.6E-09
39	-	1.7E-09	-3.8E-09	-9.3E-09	-13.5E-09	-21.0E-09	-22.1E-09	-31.9E-09	-35.6E-09	-40.7E-09	-49.8E-09	-46.6E-09	-24.1E-09
Average	-	-528.8E-12	-2.8E-09	-5.5E-09	-14.0E-09	-21.5E-09	-27.0E-09	-32.7E-09	-33.9E-09	-43.6E-09	-46.9E-09	-47.7E-09	-26.7E-09
Sigma	-	1.7E-09	835.5E-12	3.1E-09	1.9E-09	2.6E-09	3.4E-09	1.3E-09	3.2E-09	2.6E-09	2.2E-09	1.7E-09	2.1E-09

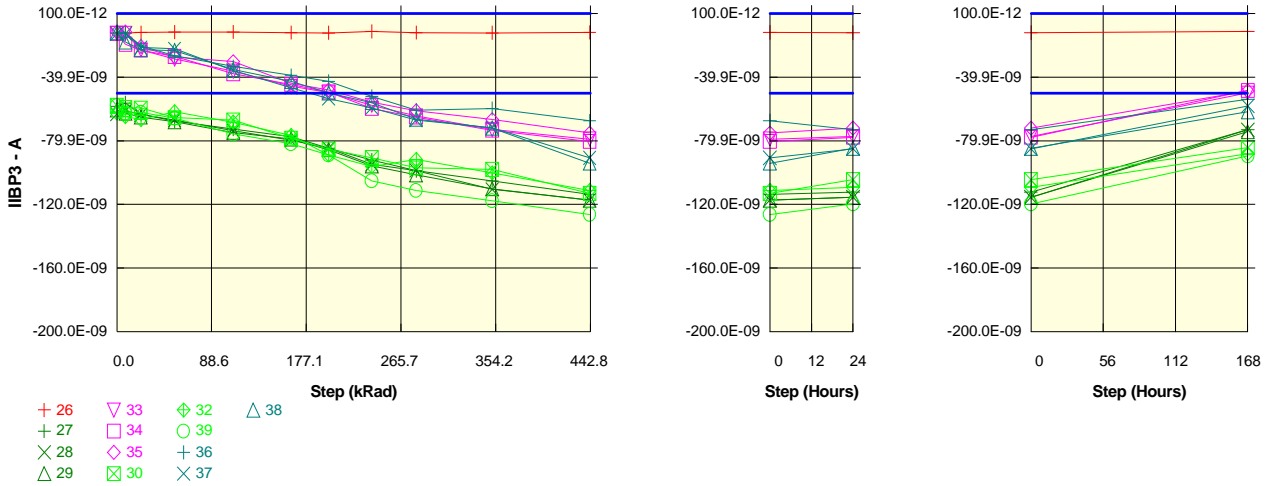
Measurements

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.2E-09	-6.7E-09	-12.2E-09	-11.6E-09	-12.3E-09	-12.2E-09	-12.7E-09	-11.3E-09	-12.3E-09	-11.9E-09	-11.4E-09	-12.2E-09	-11.5E-09
OFF TID samples													
36	-12.3E-09	-12.3E-09	-19.9E-09	-25.9E-09	-33.6E-09	-41.6E-09	-49.1E-09	-55.1E-09	-54.6E-09	-65.5E-09	-75.5E-09	-73.8E-09	-56.7E-09
37	-12.0E-09	-12.0E-09	-22.5E-09	-22.3E-09	-31.1E-09	-42.6E-09	-42.5E-09	-58.8E-09	-67.3E-09	-65.1E-09	-89.3E-09	-76.2E-09	-51.8E-09
38	-12.6E-09	-19.6E-09	-22.2E-09	-27.0E-09	-37.5E-09	-44.8E-09	-47.5E-09	-55.0E-09	-65.5E-09	-66.4E-09	-82.3E-09	-80.8E-09	-56.7E-09
Statistics													
Min	-12.6E-09	-19.6E-09	-22.5E-09	-27.0E-09	-37.5E-09	-44.8E-09	-49.1E-09	-58.8E-09	-67.3E-09	-66.4E-09	-89.3E-09	-80.8E-09	-56.7E-09
Max	-12.0E-09	-12.0E-09	-19.9E-09	-22.3E-09	-31.1E-09	-41.6E-09	-42.5E-09	-55.0E-09	-54.6E-09	-65.1E-09	-75.5E-09	-73.8E-09	-51.8E-09
Average	-12.3E-09	-14.7E-09	-21.5E-09	-25.1E-09	-34.1E-09	-43.0E-09	-46.4E-09	-56.3E-09	-62.5E-09	-65.7E-09	-82.3E-09	-76.9E-09	-55.1E-09
Sigma	244.3E-12	3.5E-09	1.1E-09	2.0E-09	2.6E-09	1.3E-09	2.8E-09	1.8E-09	5.6E-09	543.1E-12	5.6E-09	2.9E-09	2.3E-09

Drift Calculation

IIBP3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-7.6E-09	-13.6E-09	-21.3E-09	-29.3E-09	-36.8E-09	-42.8E-09	-42.3E-09	-53.2E-09	-63.1E-09	-61.5E-09	-44.4E-09
37	-	0.0E+00	-10.5E-09	-10.3E-09	-19.1E-09	-30.6E-09	-30.5E-09	-46.8E-09	-55.3E-09	-53.1E-09	-77.3E-09	-64.2E-09	-39.8E-09
38	-	-7.0E-09	-9.6E-09	-14.4E-09	-24.9E-09	-32.2E-09	-34.9E-09	-42.4E-09	-52.9E-09	-53.8E-09	-69.7E-09	-68.2E-09	-44.1E-09
Average	-	-2.3E-09	-9.2E-09	-12.8E-09	-21.8E-09	-30.7E-09	-34.1E-09	-44.0E-09	-50.2E-09	-53.4E-09	-70.0E-09	-64.6E-09	-42.7E-09
Sigma	-	3.3E-09	1.2E-09	1.8E-09	2.4E-09	1.2E-09	2.6E-09	2.0E-09	5.7E-09	311.9E-12	5.8E-09	2.8E-09	2.1E-09

Parameter : Input Bias Current : IIBP3DUTB
 Test conditions : +VCC=5V. -VCC=GND.VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-12.1E-09	-12.2E-09	-11.8E-09	-11.7E-09	-11.5E-09	-12.0E-09	-12.1E-09	-11.2E-09	-12.0E-09	-12.1E-09	-11.8E-09	-12.0E-09	-11.3E-09
ON_PROTON samples													
27	-58.3E-09	-56.2E-09	-63.4E-09	-67.7E-09	-72.6E-09	-77.5E-09	-84.8E-09	-92.1E-09	-98.8E-09	-105.2E-09	-113.7E-09	-112.3E-09	-73.0E-09
28	-63.2E-09	-61.2E-09	-63.5E-09	-66.8E-09	-73.6E-09	-79.7E-09	-84.7E-09	-94.9E-09	-98.7E-09	-110.6E-09	-117.4E-09	-115.6E-09	-73.1E-09
29	-60.6E-09	-62.6E-09	-65.1E-09	-68.0E-09	-74.8E-09	-78.9E-09	-85.6E-09	-95.8E-09	-101.4E-09	-110.2E-09	-117.4E-09	-115.5E-09	-74.3E-09
Statistics													
Min	-63.2E-09	-62.6E-09	-65.1E-09	-68.0E-09	-74.8E-09	-79.7E-09	-85.6E-09	-95.8E-09	-101.4E-09	-110.6E-09	-117.4E-09	-115.6E-09	-74.3E-09
Max	-58.3E-09	-56.2E-09	-63.4E-09	-66.8E-09	-72.6E-09	-77.5E-09	-84.7E-09	-92.1E-09	-98.7E-09	-105.2E-09	-113.7E-09	-112.3E-09	-73.0E-09
Average	-60.7E-09	-60.0E-09	-64.0E-09	-67.5E-09	-73.7E-09	-78.7E-09	-85.0E-09	-94.3E-09	-99.6E-09	-108.7E-09	-116.1E-09	-114.4E-09	-73.5E-09
Sigma	2.0E-09	2.8E-09	789.0E-12	484.5E-12	877.4E-12	925.9E-12	392.5E-12	1.6E-09	1.3E-09	2.5E-09	1.7E-09	1.5E-09	587.6E-12

Drift Calculation

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.2E-09	-5.0E-09	-9.3E-09	-14.3E-09	-19.1E-09	-26.4E-09	-33.7E-09	-40.5E-09	-46.8E-09	-55.3E-09	-53.9E-09	-14.6E-09
28	-	2.0E-09	-267.5E-12	-3.6E-09	-10.4E-09	-16.5E-09	-21.5E-09	-31.7E-09	-35.5E-09	-47.4E-09	-54.2E-09	-52.3E-09	-9.9E-09
29	-	-2.0E-09	-4.4E-09	-7.4E-09	-14.2E-09	-18.3E-09	-24.9E-09	-35.2E-09	-40.8E-09	-49.6E-09	-56.7E-09	-54.9E-09	-13.6E-09
Average	-	739.9E-12	-3.2E-09	-6.8E-09	-13.0E-09	-18.0E-09	-24.3E-09	-33.5E-09	-38.9E-09	-47.9E-09	-55.4E-09	-53.7E-09	-12.7E-09
Sigma	-	1.9E-09	2.1E-09	2.4E-09	1.8E-09	1.1E-09	2.1E-09	1.4E-09	2.4E-09	1.2E-09	1.0E-09	1.0E-09	2.0E-09

Measurements

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-12.1E-09	-12.2E-09	-11.8E-09	-11.7E-09	-11.5E-09	-12.0E-09	-12.1E-09	-11.2E-09	-12.0E-09	-12.1E-09	-11.8E-09	-12.0E-09	-11.3E-09
ON_TID samples													
33	-12.3E-09	-12.3E-09	-22.8E-09	-28.5E-09	-36.1E-09	-45.7E-09	-49.7E-09	-57.7E-09	-64.4E-09	-72.8E-09	-79.0E-09	-77.3E-09	-49.9E-09
34	-12.4E-09	-19.3E-09	-23.1E-09	-26.9E-09	-37.8E-09	-44.5E-09	-49.2E-09	-59.6E-09	-65.2E-09	-73.3E-09	-80.4E-09	-77.8E-09	-48.3E-09
35	-11.6E-09	-11.6E-09	-20.7E-09	-27.2E-09	-30.2E-09	-43.8E-09	-48.0E-09	-55.8E-09	-61.1E-09	-66.7E-09	-75.1E-09	-72.0E-09	-48.6E-09
Statistics													
Min	-12.4E-09	-19.3E-09	-23.1E-09	-28.5E-09	-37.8E-09	-45.7E-09	-49.7E-09	-59.6E-09	-65.2E-09	-73.3E-09	-80.4E-09	-77.8E-09	-49.9E-09
Max	-11.6E-09	-11.6E-09	-20.7E-09	-26.9E-09	-30.2E-09	-43.8E-09	-48.0E-09	-55.8E-09	-61.1E-09	-66.7E-09	-75.1E-09	-72.0E-09	-48.3E-09
Average	-12.1E-09	-14.4E-09	-22.2E-09	-27.5E-09	-34.7E-09	-44.7E-09	-49.0E-09	-57.7E-09	-63.5E-09	-70.9E-09	-78.1E-09	-75.7E-09	-48.9E-09
Sigma	324.8E-12	3.5E-09	1.1E-09	703.7E-12	3.3E-09	792.1E-12	754.2E-12	1.6E-09	1.7E-09	3.0E-09	2.2E-09	2.6E-09	707.0E-12

Drift Calculation

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-10.5E-09	-16.2E-09	-23.8E-09	-33.4E-09	-37.4E-09	-45.3E-09	-52.0E-09	-60.5E-09	-66.7E-09	-65.0E-09	-37.6E-09
34	-	-6.9E-09	-10.7E-09	-14.6E-09	-25.5E-09	-32.2E-09	-36.9E-09	-47.3E-09	-52.8E-09	-61.0E-09	-68.0E-09	-65.5E-09	-36.0E-09
35	-	0.0E+00	-9.1E-09	-15.5E-09	-18.5E-09	-32.2E-09	-36.3E-09	-44.1E-09	-49.5E-09	-55.0E-09	-63.5E-09	-60.3E-09	-36.9E-09
Average	-	-2.3E-09	-10.1E-09	-15.5E-09	-22.6E-09	-32.6E-09	-36.9E-09	-45.6E-09	-51.4E-09	-58.8E-09	-66.0E-09	-63.6E-09	-36.8E-09
Sigma	-	3.3E-09	731.8E-12	676.9E-12	2.9E-09	586.6E-12	459.1E-12	1.3E-09	1.4E-09	2.7E-09	1.9E-09	2.3E-09	676.3E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.1E-09	-12.2E-09	-11.8E-09	-11.7E-09	-11.5E-09	-12.0E-09	-12.1E-09	-11.2E-09	-12.0E-09	-12.1E-09	-11.8E-09	-12.0E-09	-11.3E-09
OFF PROTON samples													
30	-57.8E-09	-59.1E-09	-59.4E-09	-65.4E-09	-67.0E-09	-78.4E-09	-85.3E-09	-90.6E-09	-97.0E-09	-98.0E-09	-113.1E-09	-104.4E-09	-84.4E-09
32	-62.7E-09	-64.9E-09	-66.6E-09	-61.8E-09	-68.3E-09	-76.6E-09	-88.9E-09	-96.1E-09	-91.7E-09	-100.2E-09	-111.3E-09	-109.2E-09	-88.2E-09
39	-57.8E-09	-62.5E-09	-62.1E-09	-65.8E-09	-75.7E-09	-81.9E-09	-88.9E-09	-105.2E-09	-111.3E-09	-117.7E-09	-126.4E-09	-119.7E-09	-89.5E-09
Statistics													
Min	-62.7E-09	-64.9E-09	-66.6E-09	-65.8E-09	-75.7E-09	-81.9E-09	-88.9E-09	-105.2E-09	-111.3E-09	-117.7E-09	-126.4E-09	-119.7E-09	-89.5E-09
Max	-57.8E-09	-59.1E-09	-59.4E-09	-61.8E-09	-67.0E-09	-76.6E-09	-85.3E-09	-90.6E-09	-91.7E-09	-98.0E-09	-111.3E-09	-104.4E-09	-84.4E-09
Average	-59.4E-09	-62.2E-09	-62.7E-09	-64.3E-09	-70.3E-09	-79.0E-09	-87.7E-09	-97.3E-09	-100.0E-09	-105.3E-09	-116.9E-09	-111.1E-09	-87.4E-09
Sigma	2.3E-09	2.4E-09	2.9E-09	1.8E-09	3.9E-09	2.2E-09	1.7E-09	6.0E-09	8.3E-09	8.8E-09	6.7E-09	6.4E-09	2.2E-09

Drift Calculation

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-1.4E-09	-1.7E-09	-7.7E-09	-9.2E-09	-20.6E-09	-27.5E-09	-32.8E-09	-39.3E-09	-40.2E-09	-55.3E-09	-46.7E-09	-26.6E-09
32	-	-2.2E-09	-3.9E-09	877.6E-12	-5.6E-09	-14.0E-09	-26.3E-09	-33.5E-09	-29.0E-09	-37.5E-09	-48.6E-09	-46.6E-09	-25.6E-09
39	-	-4.7E-09	-4.4E-09	-8.0E-09	-17.9E-09	-24.1E-09	-31.1E-09	-47.4E-09	-53.5E-09	-59.9E-09	-68.6E-09	-62.0E-09	-31.8E-09
Average	-	-2.8E-09	-3.3E-09	-4.9E-09	-10.9E-09	-19.6E-09	-28.3E-09	-37.9E-09	-40.6E-09	-45.9E-09	-67.5E-09	-51.7E-09	-28.0E-09
Sigma	-	1.4E-09	1.2E-09	4.1E-09	5.2E-09	4.2E-09	2.1E-09	6.7E-09	10.0E-09	10.0E-09	8.3E-09	7.2E-09	2.7E-09

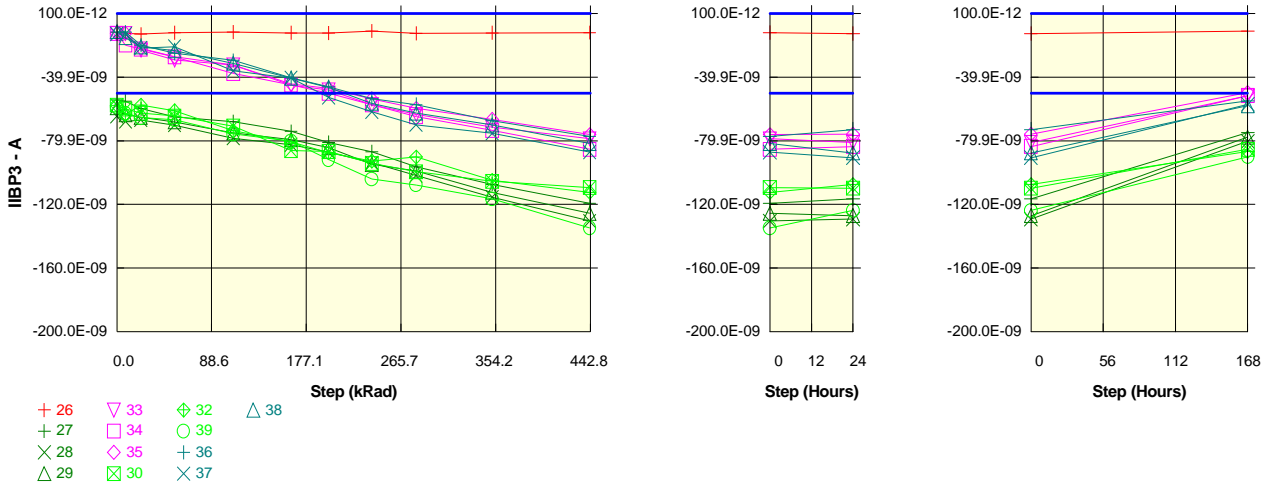
Measurements

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.1E-09	-12.2E-09	-11.8E-09	-11.7E-09	-11.5E-09	-12.0E-09	-12.1E-09	-11.2E-09	-12.0E-09	-12.1E-09	-11.8E-09	-12.0E-09	-11.3E-09
OFF TID samples													
36	-12.1E-09	-12.1E-09	-20.3E-09	-26.5E-09	-33.2E-09	-38.8E-09	-42.6E-09	-52.0E-09	-60.7E-09	-59.8E-09	-67.5E-09	-72.9E-09	-53.9E-09
37	-12.6E-09	-12.6E-09	-21.4E-09	-22.1E-09	-35.7E-09	-46.5E-09	-53.4E-09	-59.2E-09	-67.0E-09	-71.8E-09	-90.8E-09	-85.1E-09	-58.1E-09
38	-12.1E-09	-17.8E-09	-22.6E-09	-23.2E-09	-35.2E-09	-42.7E-09	-49.9E-09	-56.1E-09	-66.4E-09	-72.0E-09	-94.1E-09	-84.7E-09	-61.8E-09
Statistics													
Min	-12.6E-09	-17.8E-09	-22.6E-09	-26.5E-09	-35.7E-09	-46.5E-09	-53.4E-09	-59.2E-09	-67.0E-09	-72.0E-09	-94.1E-09	-85.1E-09	-61.8E-09
Max	-12.1E-09	-12.1E-09	-20.3E-09	-22.1E-09	-33.2E-09	-38.8E-09	-42.6E-09	-52.0E-09	-60.7E-09	-59.8E-09	-67.5E-09	-72.9E-09	-53.9E-09
Average	-12.3E-09	-14.2E-09	-21.4E-09	-24.0E-09	-34.7E-09	-42.7E-09	-48.6E-09	-55.8E-09	-64.7E-09	-67.8E-09	-84.1E-09	-80.9E-09	-58.0E-09
Sigma	251.5E-12	2.6E-09	948.6E-12	1.9E-09	1.1E-09	3.2E-09	4.5E-09	2.9E-09	2.8E-09	5.7E-09	11.8E-09	5.7E-09	3.2E-09

Drift Calculation

IIBP3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.1E-09	-14.4E-09	-21.1E-09	-26.7E-09	-30.4E-09	-39.9E-09	-48.6E-09	-47.6E-09	-55.4E-09	-60.7E-09	-41.8E-09
37	-	0.0E+00	-8.8E-09	-9.5E-09	-23.1E-09	-33.9E-09	-40.8E-09	-46.6E-09	-54.3E-09	-59.1E-09	-78.1E-09	-72.4E-09	-45.5E-09
38	-	-5.7E-09	-10.5E-09	-11.2E-09	-23.1E-09	-30.7E-09	-37.9E-09	-44.0E-09	-54.4E-09	-59.9E-09	-82.0E-09	-72.6E-09	-49.8E-09
Average	-	-1.9E-09	-9.2E-09	-11.7E-09	-22.4E-09	-30.4E-09	-36.4E-09	-43.5E-09	-52.4E-09	-55.6E-09	-71.9E-09	-68.6E-09	-45.7E-09
Sigma	-	2.7E-09	1.0E-09	2.0E-09	954.5E-12	3.0E-09	4.4E-09	2.8E-09	2.7E-09	5.6E-09	11.7E-09	5.6E-09	3.2E-09

Parameter : Input Bias Current : IIBP3DUTC
 Test conditions : +VCC=5V. -VCC=GND.VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.9E-09	-12.4E-09	-12.9E-09	-12.0E-09	-11.6E-09	-12.1E-09	-12.2E-09	-10.9E-09	-12.4E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.0E-09
ON_PROTON samples													
27	-54.2E-09	-55.0E-09	-59.9E-09	-64.9E-09	-68.0E-09	-74.1E-09	-81.1E-09	-87.0E-09	-96.5E-09	-107.3E-09	-119.4E-09	-116.4E-09	-74.7E-09
28	-64.5E-09	-67.8E-09	-66.8E-09	-70.2E-09	-78.4E-09	-82.5E-09	-87.1E-09	-93.9E-09	-101.8E-09	-115.5E-09	-130.4E-09	-129.3E-09	-80.3E-09
29	-59.2E-09	-63.5E-09	-65.2E-09	-68.2E-09	-75.0E-09	-79.3E-09	-84.4E-09	-94.8E-09	-99.0E-09	-112.4E-09	-125.7E-09	-127.1E-09	-77.7E-09
Statistics													
Min	-64.5E-09	-67.8E-09	-66.8E-09	-70.2E-09	-78.4E-09	-82.5E-09	-87.1E-09	-94.8E-09	-101.8E-09	-115.5E-09	-130.4E-09	-129.3E-09	-80.3E-09
Max	-54.2E-09	-55.0E-09	-59.9E-09	-64.9E-09	-68.0E-09	-74.1E-09	-81.1E-09	-87.0E-09	-96.5E-09	-107.3E-09	-119.4E-09	-116.4E-09	-74.7E-09
Average	-59.3E-09	-62.1E-09	-64.0E-09	-67.8E-09	-73.8E-09	-78.6E-09	-84.2E-09	-91.9E-09	-99.1E-09	-111.7E-09	-125.2E-09	-124.3E-09	-77.6E-09
Sigma	4.2E-09	5.3E-09	3.0E-09	2.2E-09	4.3E-09	3.5E-09	2.5E-09	3.5E-09	2.2E-09	3.3E-09	4.5E-09	5.6E-09	2.3E-09

Drift Calculation

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-768.9E-12	-5.6E-09	-10.7E-09	-13.7E-09	-19.9E-09	-26.9E-09	-32.7E-09	-42.2E-09	-53.1E-09	-65.1E-09	-62.2E-09	-20.5E-09
28	-	-3.3E-09	-2.3E-09	-5.6E-09	-13.8E-09	-18.0E-09	-22.6E-09	-29.3E-09	-37.3E-09	-50.9E-09	-65.9E-09	-64.8E-09	-15.8E-09
29	-	-4.3E-09	-6.0E-09	-9.0E-09	-15.8E-09	-20.1E-09	-25.2E-09	-35.6E-09	-39.8E-09	-53.2E-09	-66.5E-09	-67.9E-09	-18.5E-09
Average	-	-2.8E-09	-4.7E-09	-8.4E-09	-14.5E-09	-19.3E-09	-24.9E-09	-32.6E-09	-39.8E-09	-52.4E-09	-65.8E-09	-64.9E-09	-18.3E-09
Sigma	-	1.5E-09	1.7E-09	2.1E-09	956.0E-12	950.2E-12	1.8E-09	2.6E-09	2.0E-09	1.0E-09	552.7E-12	2.3E-09	1.9E-09

Measurements

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.9E-09	-12.4E-09	-12.9E-09	-12.0E-09	-11.6E-09	-12.1E-09	-12.2E-09	-10.9E-09	-12.4E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.0E-09
ON_TID samples													
33	-12.6E-09	-12.6E-09	-23.1E-09	-29.1E-09	-32.4E-09	-45.2E-09	-48.0E-09	-57.3E-09	-63.4E-09	-71.5E-09	-78.7E-09	-81.1E-09	-51.8E-09
34	-12.3E-09	-19.7E-09	-22.3E-09	-27.2E-09	-37.6E-09	-44.9E-09	-50.1E-09	-57.3E-09	-64.7E-09	-73.5E-09	-85.4E-09	-83.5E-09	-51.5E-09
35	-12.4E-09	-12.4E-09	-21.7E-09	-27.2E-09	-32.4E-09	-44.3E-09	-47.1E-09	-53.7E-09	-59.6E-09	-66.6E-09	-76.2E-09	-75.8E-09	-49.6E-09
Statistics													
Min	-12.6E-09	-19.7E-09	-23.1E-09	-29.1E-09	-37.6E-09	-45.2E-09	-50.1E-09	-57.3E-09	-64.7E-09	-73.5E-09	-85.4E-09	-83.5E-09	-51.8E-09
Max	-12.3E-09	-12.4E-09	-21.7E-09	-27.2E-09	-32.4E-09	-44.3E-09	-47.1E-09	-53.7E-09	-59.6E-09	-66.6E-09	-76.2E-09	-75.8E-09	-49.6E-09
Average	-12.4E-09	-14.9E-09	-22.4E-09	-27.8E-09	-34.1E-09	-44.8E-09	-48.4E-09	-56.1E-09	-62.6E-09	-70.5E-09	-80.1E-09	-80.1E-09	-51.0E-09
Sigma	97.1E-12	3.4E-09	557.2E-12	878.8E-12	2.5E-09	347.0E-12	1.2E-09	1.7E-09	2.2E-09	2.9E-09	3.9E-09	3.3E-09	952.3E-12

Drift Calculation

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-10.5E-09	-16.5E-09	-19.8E-09	-32.6E-09	-35.5E-09	-44.7E-09	-50.9E-09	-59.0E-09	-66.1E-09	-68.5E-09	-39.2E-09
34	-	-7.4E-09	-10.0E-09	-14.9E-09	-25.3E-09	-32.6E-09	-37.8E-09	-45.0E-09	-52.4E-09	-61.2E-09	-73.0E-09	-71.2E-09	-39.2E-09
35	-	0.0E+00	-9.3E-09	-14.8E-09	-20.0E-09	-31.9E-09	-34.7E-09	-41.3E-09	-47.2E-09	-54.2E-09	-63.8E-09	-63.4E-09	-37.3E-09
Average	-	-2.5E-09	-9.9E-09	-15.4E-09	-21.7E-09	-32.4E-09	-36.0E-09	-43.7E-09	-50.2E-09	-58.1E-09	-67.7E-09	-67.7E-09	-38.6E-09
Sigma	-	3.5E-09	486.5E-12	785.7E-12	2.5E-09	304.7E-12	1.3E-09	1.7E-09	2.2E-09	2.9E-09	3.9E-09	3.3E-09	921.6E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors				Issue:	02

Measurements

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.9E-09	-12.4E-09	-12.9E-09	-12.0E-09	-11.6E-09	-12.1E-09	-12.2E-09	-10.9E-09	-12.4E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.0E-09
OFF PROTON samples													
30	-57.5E-09	-60.0E-09	-62.6E-09	-64.5E-09	-70.8E-09	-86.1E-09	-86.7E-09	-94.3E-09	-99.4E-09	-105.5E-09	-109.4E-09	-109.8E-09	-85.3E-09
32	-57.8E-09	-63.4E-09	-57.6E-09	-61.1E-09	-73.7E-09	-80.8E-09	-87.5E-09	-92.8E-09	-90.2E-09	-105.0E-09	-112.4E-09	-107.6E-09	-86.8E-09
39	-58.6E-09	-62.7E-09	-65.5E-09	-66.7E-09	-75.7E-09	-80.3E-09	-91.9E-09	-104.1E-09	-107.7E-09	-116.6E-09	-134.9E-09	-123.8E-09	-90.0E-09
Statistics													
Min	-58.6E-09	-63.4E-09	-65.5E-09	-66.7E-09	-75.7E-09	-86.1E-09	-91.9E-09	-104.1E-09	-107.7E-09	-116.6E-09	-134.9E-09	-123.8E-09	-90.0E-09
Max	-57.5E-09	-60.0E-09	-57.6E-09	-61.1E-09	-70.8E-09	-80.3E-09	-86.7E-09	-92.8E-09	-90.2E-09	-105.0E-09	-109.4E-09	-107.6E-09	-85.3E-09
Average	-58.0E-09	-62.0E-09	-61.9E-09	-64.1E-09	-73.4E-09	-82.4E-09	-88.7E-09	-97.0E-09	-99.1E-09	-109.0E-09	-118.9E-09	-113.7E-09	-87.4E-09
Sigma	460.8E-12	1.5E-09	3.3E-09	2.3E-09	2.0E-09	2.6E-09	2.3E-09	5.0E-09	7.2E-09	5.4E-09	11.4E-09	7.2E-09	2.0E-09

Drift Calculation

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-2.5E-09	-5.1E-09	-7.0E-09	-13.3E-09	-28.6E-09	-29.2E-09	-36.8E-09	-41.9E-09	-48.0E-09	-51.9E-09	-52.3E-09	-27.8E-09
32	-	-5.6E-09	217.3E-12	-3.4E-09	-15.9E-09	-23.0E-09	-29.7E-09	-35.0E-09	-32.4E-09	-47.2E-09	-54.6E-09	-49.8E-09	-29.0E-09
39	-	-4.1E-09	-6.9E-09	-8.1E-09	-17.1E-09	-21.7E-09	-33.3E-09	-45.5E-09	-49.2E-09	-58.0E-09	-76.3E-09	-65.2E-09	-31.4E-09
Average	-	-4.1E-09	-3.9E-09	-6.2E-09	-15.4E-09	-24.4E-09	-30.7E-09	-39.1E-09	-41.2E-09	-51.1E-09	-60.9E-09	-55.8E-09	-29.4E-09
Sigma	-	1.3E-09	3.0E-09	2.0E-09	1.6E-09	3.0E-09	1.8E-09	4.6E-09	6.8E-09	4.9E-09	10.9E-09	6.8E-09	1.5E-09

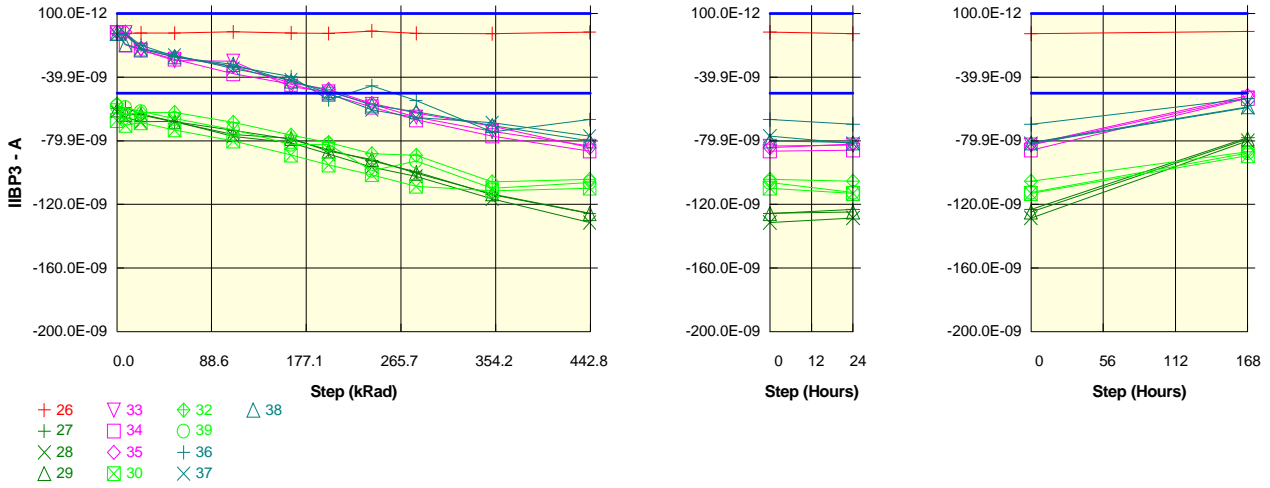
Measurements

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.9E-09	-12.4E-09	-12.9E-09	-12.0E-09	-11.6E-09	-12.1E-09	-12.2E-09	-10.9E-09	-12.4E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.0E-09
OFF TID samples													
36	-11.6E-09	-11.6E-09	-19.9E-09	-24.9E-09	-29.5E-09	-40.4E-09	-46.0E-09	-53.5E-09	-57.2E-09	-67.5E-09	-77.3E-09	-72.9E-09	-54.9E-09
37	-12.8E-09	-12.8E-09	-21.7E-09	-20.7E-09	-36.0E-09	-40.5E-09	-52.7E-09	-61.8E-09	-69.9E-09	-75.3E-09	-87.1E-09	-90.6E-09	-57.0E-09
38	-11.3E-09	-15.1E-09	-20.8E-09	-23.3E-09	-31.2E-09	-40.6E-09	-46.4E-09	-56.5E-09	-62.5E-09	-70.1E-09	-81.7E-09	-87.6E-09	-57.9E-09
Statistics													
Min	-12.8E-09	-15.1E-09	-21.7E-09	-24.9E-09	-36.0E-09	-40.6E-09	-52.7E-09	-61.8E-09	-69.9E-09	-75.3E-09	-87.1E-09	-90.6E-09	-57.9E-09
Max	-11.3E-09	-11.6E-09	-19.9E-09	-20.7E-09	-29.5E-09	-40.4E-09	-46.0E-09	-53.5E-09	-57.2E-09	-67.5E-09	-77.3E-09	-72.9E-09	-54.9E-09
Average	-11.9E-09	-13.1E-09	-20.8E-09	-23.0E-09	-32.2E-09	-40.5E-09	-48.4E-09	-57.3E-09	-63.2E-09	-71.0E-09	-82.0E-09	-83.7E-09	-56.6E-09
Sigma	657.7E-12	1.5E-09	744.3E-12	1.7E-09	2.8E-09	75.3E-12	3.1E-09	3.4E-09	5.2E-09	3.2E-09	4.0E-09	7.7E-09	1.3E-09

Drift Calculation

IIBP3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.3E-09	-13.4E-09	-17.9E-09	-28.8E-09	-34.4E-09	-41.9E-09	-45.6E-09	-56.0E-09	-65.7E-09	-61.3E-09	-43.3E-09
37	-	0.0E+00	-8.9E-09	-8.0E-09	-23.2E-09	-27.7E-09	-39.9E-09	-49.0E-09	-57.1E-09	-62.5E-09	-74.3E-09	-77.8E-09	-44.3E-09
38	-	-3.8E-09	-9.6E-09	-12.0E-09	-20.0E-09	-29.3E-09	-35.1E-09	-45.2E-09	-51.3E-09	-58.8E-09	-70.5E-09	-76.4E-09	-46.7E-09
Average	-	-1.3E-09	-8.9E-09	-11.1E-09	-20.4E-09	-28.6E-09	-36.5E-09	-45.4E-09	-51.3E-09	-59.1E-09	-70.2E-09	-71.8E-09	-44.7E-09
Sigma	-	1.8E-09	518.2E-12	2.3E-09	2.2E-09	675.8E-12	2.4E-09	2.9E-09	4.7E-09	2.7E-09	3.5E-09	7.5E-09	1.4E-09

Parameter : Input Bias Current : IIBP3DUTD
 Test conditions : +VCC=5V. -VCC=GND.VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.6E-09	-12.4E-09	-12.2E-09	-12.3E-09	-11.5E-09	-12.2E-09	-12.4E-09	-11.0E-09	-12.4E-09	-12.6E-09	-11.7E-09	-12.6E-09	-11.2E-09
ON PROTON samples													
27	-59.5E-09	-59.1E-09	-63.1E-09	-68.0E-09	-73.4E-09	-79.0E-09	-85.7E-09	-92.6E-09	-99.7E-09	-113.9E-09	-125.9E-09	-123.2E-09	-78.1E-09
28	-61.6E-09	-65.4E-09	-68.0E-09	-67.8E-09	-77.3E-09	-81.2E-09	-88.3E-09	-96.5E-09	-102.4E-09	-116.5E-09	-131.4E-09	-128.6E-09	-80.1E-09
29	-60.6E-09	-63.4E-09	-63.7E-09	-68.2E-09	-76.1E-09	-78.5E-09	-86.5E-09	-91.7E-09	-100.4E-09	-113.4E-09	-125.7E-09	-124.9E-09	-78.9E-09
Statistics													
Min	-61.6E-09	-65.4E-09	-68.0E-09	-68.2E-09	-77.3E-09	-81.2E-09	-88.3E-09	-96.5E-09	-102.4E-09	-116.5E-09	-131.4E-09	-128.6E-09	-80.1E-09
Max	-59.5E-09	-59.1E-09	-63.1E-09	-67.8E-09	-73.4E-09	-78.5E-09	-85.7E-09	-91.7E-09	-99.7E-09	-113.4E-09	-125.7E-09	-123.2E-09	-78.1E-09
Average	-60.5E-09	-62.6E-09	-64.9E-09	-68.0E-09	-75.6E-09	-79.6E-09	-86.8E-09	-93.6E-09	-100.8E-09	-114.6E-09	-127.7E-09	-125.6E-09	-79.0E-09
Sigma	866.9E-12	2.6E-09	2.2E-09	153.4E-12	1.6E-09	1.2E-09	1.1E-09	2.1E-09	1.2E-09	1.4E-09	2.7E-09	2.2E-09	810.2E-12

Drift Calculation

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	334.3E-12	-3.6E-09	-8.6E-09	-13.9E-09	-19.5E-09	-26.2E-09	-33.1E-09	-40.2E-09	-54.5E-09	-66.4E-09	-63.8E-09	-18.6E-09
28	-	-3.8E-09	-6.4E-09	-6.2E-09	-15.7E-09	-19.6E-09	-26.7E-09	-34.9E-09	-40.8E-09	-54.9E-09	-69.8E-09	-67.0E-09	-18.5E-09
29	-	-2.8E-09	-3.1E-09	-7.6E-09	-15.6E-09	-18.0E-09	-25.9E-09	-31.2E-09	-39.8E-09	-52.9E-09	-65.1E-09	-64.3E-09	-18.3E-09
Average	-	-2.1E-09	-4.4E-09	-7.5E-09	-15.0E-09	-19.0E-09	-26.3E-09	-33.1E-09	-40.3E-09	-54.1E-09	-67.1E-09	-65.0E-09	-18.5E-09
Sigma	-	1.8E-09	1.5E-09	973.6E-12	804.2E-12	755.0E-12	348.5E-12	1.5E-09	431.1E-12	892.0E-12	2.0E-09	1.4E-09	119.0E-12

Measurements

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.6E-09	-12.4E-09	-12.2E-09	-12.3E-09	-11.5E-09	-12.2E-09	-12.4E-09	-11.0E-09	-12.4E-09	-12.6E-09	-11.7E-09	-12.6E-09	-11.2E-09
ON TID samples													
33	-12.1E-09	-12.1E-09	-22.9E-09	-29.6E-09	-29.9E-09	-46.1E-09	-49.2E-09	-58.7E-09	-66.8E-09	-76.9E-09	-86.4E-09	-85.9E-09	-53.4E-09
34	-12.2E-09	-19.7E-09	-23.0E-09	-28.7E-09	-37.8E-09	-44.4E-09	-50.6E-09	-58.7E-09	-66.8E-09	-76.9E-09	-86.4E-09	-85.9E-09	-53.4E-09
35	-11.7E-09	-11.7E-09	-21.8E-09	-27.3E-09	-33.3E-09	-43.6E-09	-47.6E-09	-56.5E-09	-62.6E-09	-70.8E-09	-84.3E-09	-82.2E-09	-51.6E-09
Statistics													
Min	-12.2E-09	-19.7E-09	-23.0E-09	-29.6E-09	-37.8E-09	-46.1E-09	-50.6E-09	-58.7E-09	-66.8E-09	-76.9E-09	-86.4E-09	-85.9E-09	-53.4E-09
Max	-11.7E-09	-11.7E-09	-21.8E-09	-27.3E-09	-29.9E-09	-43.6E-09	-47.6E-09	-56.5E-09	-62.6E-09	-70.8E-09	-83.3E-09	-82.2E-09	-51.6E-09
Average	-12.0E-09	-14.5E-09	-22.5E-09	-28.5E-09	-33.7E-09	-44.7E-09	-49.1E-09	-57.4E-09	-64.8E-09	-73.9E-09	-84.7E-09	-83.6E-09	-52.6E-09
Sigma	249.9E-12	3.7E-09	561.2E-12	941.5E-12	3.2E-09	1.0E-09	1.2E-09	959.5E-12	1.7E-09	2.5E-09	1.3E-09	1.6E-09	767.1E-12

Drift Calculation

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-10.8E-09	-17.5E-09	-17.8E-09	-34.0E-09	-37.1E-09	-44.9E-09	-53.0E-09	-61.9E-09	-71.2E-09	-70.6E-09	-40.8E-09
34	-	-7.4E-09	-10.7E-09	-16.4E-09	-25.6E-09	-32.2E-09	-38.4E-09	-46.5E-09	-54.6E-09	-64.7E-09	-74.2E-09	-73.6E-09	-41.2E-09
35	-	0.0E+00	-10.1E-09	-15.6E-09	-21.7E-09	-31.9E-09	-35.9E-09	-44.8E-09	-50.9E-09	-59.2E-09	-72.7E-09	-70.5E-09	-39.9E-09
Average	-	-2.5E-09	-10.6E-09	-16.5E-09	-21.7E-09	-32.7E-09	-37.1E-09	-45.4E-09	-52.8E-09	-61.9E-09	-72.7E-09	-71.6E-09	-40.6E-09
Sigma	-	3.5E-09	319.4E-12	758.2E-12	3.2E-09	919.4E-12	1.0E-09	767.7E-12	1.5E-09	2.2E-09	1.2E-09	1.5E-09	517.2E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.6E-09	-12.4E-09	-12.2E-09	-12.3E-09	-11.5E-09	-12.2E-09	-12.4E-09	-11.0E-09	-12.4E-09	-12.6E-09	-11.7E-09	-12.6E-09	-11.2E-09
OFF PROTON samples													
30	-67.3E-09	-70.2E-09	-68.6E-09	-73.2E-09	-80.1E-09	-89.0E-09	-95.2E-09	-101.3E-09	-108.7E-09	-111.4E-09	-109.8E-09	-113.1E-09	-89.4E-09
32	-56.8E-09	-63.4E-09	-62.1E-09	-62.1E-09	-68.4E-09	-76.4E-09	-81.0E-09	-88.0E-09	-89.1E-09	-105.9E-09	-104.2E-09	-105.3E-09	-86.8E-09
39	-58.3E-09	-59.1E-09	-61.6E-09	-66.0E-09	-72.9E-09	-82.2E-09	-82.3E-09	-98.7E-09	-92.8E-09	-109.8E-09	-106.3E-09	-112.5E-09	-87.6E-09
Statistics													
Min	-67.3E-09	-70.2E-09	-68.6E-09	-73.2E-09	-80.1E-09	-89.0E-09	-95.2E-09	-101.3E-09	-108.7E-09	-111.4E-09	-109.8E-09	-113.1E-09	-89.4E-09
Max	-56.8E-09	-59.1E-09	-61.6E-09	-62.1E-09	-68.4E-09	-76.4E-09	-81.0E-09	-88.0E-09	-89.1E-09	-105.9E-09	-104.2E-09	-105.3E-09	-86.8E-09
Average	-60.8E-09	-64.2E-09	-64.1E-09	-67.1E-09	-73.8E-09	-82.5E-09	-86.2E-09	-96.0E-09	-96.9E-09	-109.0E-09	-106.8E-09	-110.3E-09	-87.9E-09
Sigma	4.6E-09	4.6E-09	3.2E-09	4.6E-09	4.8E-09	5.1E-09	6.4E-09	5.8E-09	8.5E-09	2.3E-09	2.3E-09	3.5E-09	1.1E-09

Drift Calculation

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.0E-09	-1.3E-09	-6.0E-09	-12.8E-09	-21.7E-09	-27.9E-09	-34.0E-09	-41.4E-09	-44.2E-09	-42.5E-09	-45.8E-09	-22.1E-09
32	-	-6.5E-09	-5.3E-09	-5.3E-09	-11.6E-09	-19.5E-09	-24.2E-09	-31.2E-09	-32.3E-09	-49.1E-09	-47.4E-09	-48.5E-09	-30.0E-09
39	-	-787.3E-12	-3.3E-09	-7.7E-09	-14.6E-09	-24.0E-09	-24.0E-09	-40.4E-09	-34.5E-09	-51.5E-09	-48.0E-09	-54.3E-09	-29.3E-09
Average	-	-3.4E-09	-3.3E-09	-6.3E-09	-13.0E-09	-21.7E-09	-25.4E-09	-35.2E-09	-36.1E-09	-48.2E-09	-46.0E-09	-49.5E-09	-27.1E-09
Sigma	-	2.4E-09	1.6E-09	1.0E-09	1.2E-09	1.8E-09	1.8E-09	3.9E-09	3.9E-09	3.0E-09	2.5E-09	3.5E-09	3.6E-09

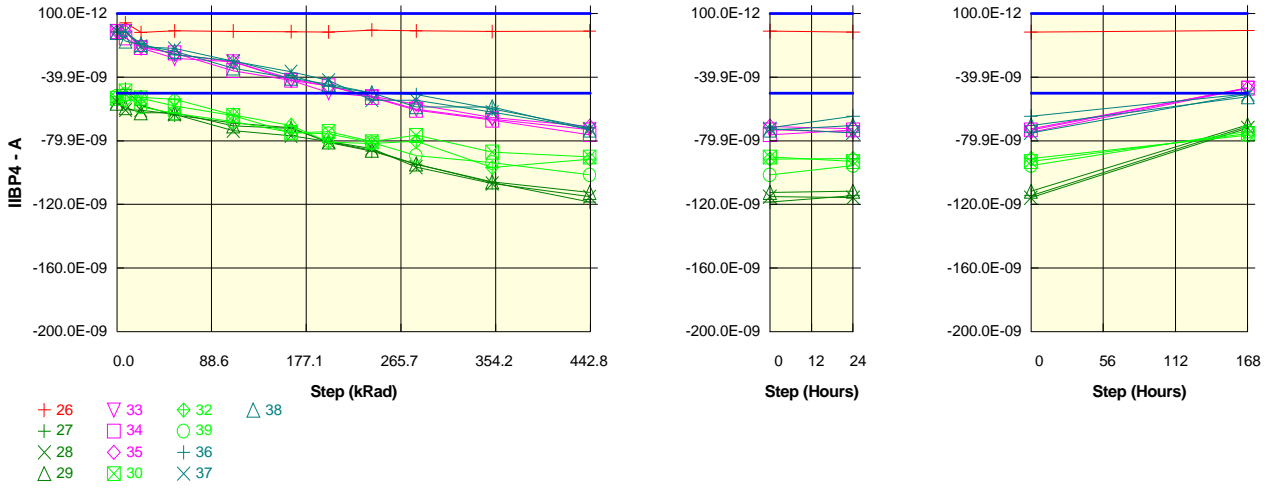
Measurements

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.6E-09	-12.4E-09	-12.2E-09	-12.3E-09	-11.5E-09	-12.2E-09	-12.4E-09	-11.0E-09	-12.4E-09	-12.6E-09	-11.7E-09	-12.6E-09	-11.2E-09
OFF TID samples													
36	-12.7E-09	-12.7E-09	-19.9E-09	-26.9E-09	-33.2E-09	-39.7E-09	-54.2E-09	-45.4E-09	-54.8E-09	-74.4E-09	-66.6E-09	-69.6E-09	-53.5E-09
37	-12.9E-09	-12.9E-09	-21.8E-09	-26.1E-09	-34.5E-09	-41.8E-09	-50.2E-09	-60.5E-09	-65.3E-09	-68.6E-09	-77.1E-09	-81.7E-09	-59.1E-09
38	-12.3E-09	-19.4E-09	-22.3E-09	-27.3E-09	-31.9E-09	-42.5E-09	-48.6E-09	-57.6E-09	-61.8E-09	-70.5E-09	-80.1E-09	-81.2E-09	-58.7E-09
Statistics													
Min	-12.9E-09	-19.4E-09	-22.3E-09	-27.3E-09	-34.5E-09	-42.5E-09	-54.2E-09	-60.5E-09	-65.3E-09	-74.4E-09	-80.1E-09	-81.7E-09	-59.1E-09
Max	-12.3E-09	-12.7E-09	-19.9E-09	-26.1E-09	-31.9E-09	-39.7E-09	-48.6E-09	-45.4E-09	-54.8E-09	-68.6E-09	-66.6E-09	-69.6E-09	-53.5E-09
Average	-12.7E-09	-15.0E-09	-21.4E-09	-26.8E-09	-33.2E-09	-41.3E-09	-51.0E-09	-54.5E-09	-60.6E-09	-71.2E-09	-74.6E-09	-77.5E-09	-57.1E-09
Sigma	256.2E-12	3.1E-09	1.0E-09	482.7E-12	1.1E-09	1.2E-09	2.3E-09	6.5E-09	4.4E-09	2.4E-09	5.8E-09	5.6E-09	2.5E-09

Drift Calculation

IIBP3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-7.2E-09	-14.2E-09	-20.5E-09	-26.9E-09	-41.4E-09	-32.7E-09	-42.1E-09	-61.6E-09	-53.9E-09	-56.8E-09	-40.8E-09
37	-	0.0E+00	-8.9E-09	-13.2E-09	-21.6E-09	-28.8E-09	-37.3E-09	-47.6E-09	-52.4E-09	-55.7E-09	-64.2E-09	-68.8E-09	-46.1E-09
38	-	-7.0E-09	-10.0E-09	-15.0E-09	-19.6E-09	-30.2E-09	-36.3E-09	-45.3E-09	-49.5E-09	-58.2E-09	-67.8E-09	-68.9E-09	-46.3E-09
Average	-	-2.3E-09	-8.7E-09	-14.1E-09	-20.6E-09	-28.7E-09	-38.3E-09	-41.8E-09	-48.0E-09	-58.5E-09	-61.9E-09	-64.8E-09	-44.4E-09
Sigma	-	3.3E-09	1.2E-09	723.2E-12	836.7E-12	1.3E-09	2.2E-09	6.6E-09	4.3E-09	2.4E-09	5.9E-09	5.7E-09	2.6E-09

Parameter : Input Bias Current : IIBP4DUTA
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.4E-09	-5.8E-09	-11.9E-09	-10.9E-09	-11.1E-09	-11.3E-09	-11.5E-09	-10.4E-09	-10.9E-09	-11.3E-09	-11.0E-09	-11.7E-09	-10.6E-09
ON PROTON samples													
27	-55.6E-09	-47.6E-09	-57.7E-09	-63.9E-09	-68.7E-09	-71.8E-09	-81.1E-09	-86.5E-09	-94.6E-09	-106.3E-09	-118.4E-09	-114.6E-09	-71.0E-09
28	-55.3E-09	-60.6E-09	-60.7E-09	-63.3E-09	-73.6E-09	-76.8E-09	-80.6E-09	-84.9E-09	-96.6E-09	-106.8E-09	-115.2E-09	-115.7E-09	-72.0E-09
29	-56.5E-09	-59.1E-09	-62.4E-09	-62.5E-09	-70.6E-09	-72.3E-09	-80.7E-09	-85.9E-09	-94.6E-09	-105.8E-09	-112.5E-09	-111.7E-09	-70.0E-09
Statistics													
Min	-56.5E-09	-60.6E-09	-62.4E-09	-63.9E-09	-73.6E-09	-76.8E-09	-81.1E-09	-86.5E-09	-96.6E-09	-106.8E-09	-118.4E-09	-115.7E-09	-72.0E-09
Max	-55.3E-09	-47.6E-09	-57.7E-09	-62.5E-09	-68.7E-09	-71.8E-09	-80.6E-09	-84.9E-09	-94.6E-09	-105.8E-09	-112.5E-09	-111.7E-09	-70.0E-09
Average	-55.8E-09	-55.8E-09	-60.3E-09	-63.2E-09	-71.0E-09	-73.6E-09	-80.8E-09	-85.8E-09	-95.3E-09	-106.3E-09	-115.4E-09	-114.0E-09	-71.0E-09
Sigma	531.5E-12	5.8E-09	1.9E-09	577.6E-12	2.0E-09	2.3E-09	236.8E-12	664.2E-12	939.3E-12	407.6E-12	2.4E-09	1.7E-09	821.0E-12

Drift Calculation

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	8.0E-09	-2.2E-09	-8.3E-09	-13.2E-09	-16.2E-09	-25.6E-09	-30.9E-09	-39.1E-09	-50.7E-09	-62.8E-09	-59.0E-09	-15.4E-09
28	-	-5.3E-09	-5.4E-09	-8.1E-09	-18.4E-09	-21.6E-09	-25.3E-09	-29.6E-09	-41.4E-09	-51.6E-09	-59.9E-09	-60.5E-09	-16.7E-09
29	-	-2.6E-09	-5.9E-09	-6.0E-09	-14.1E-09	-15.7E-09	-24.2E-09	-29.4E-09	-38.1E-09	-49.3E-09	-56.0E-09	-55.2E-09	-13.4E-09
Average	-	12.8E-12	-4.5E-09	-7.4E-09	-15.2E-09	-17.8E-09	-25.0E-09	-30.0E-09	-39.5E-09	-50.5E-09	-59.6E-09	-58.2E-09	-15.2E-09
Sigma	-	5.7E-09	1.7E-09	1.1E-09	2.3E-09	2.7E-09	612.4E-12	662.7E-12	1.4E-09	926.0E-12	2.8E-09	2.2E-09	1.3E-09

Measurements

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.4E-09	-5.8E-09	-11.9E-09	-10.9E-09	-11.1E-09	-11.3E-09	-11.5E-09	-10.4E-09	-10.9E-09	-11.3E-09	-11.0E-09	-11.7E-09	-10.6E-09
ON TID samples													
33	-11.2E-09	-11.2E-09	-21.7E-09	-28.2E-09	-30.4E-09	-42.0E-09	-49.7E-09	-52.2E-09	-60.2E-09	-66.3E-09	-73.1E-09	-74.7E-09	-47.0E-09
34	-11.3E-09	-15.3E-09	-21.4E-09	-24.7E-09	-35.9E-09	-41.9E-09	-45.4E-09	-52.7E-09	-60.8E-09	-67.0E-09	-76.2E-09	-73.2E-09	-46.7E-09
35	-11.2E-09	-11.2E-09	-20.2E-09	-25.5E-09	-30.5E-09	-41.0E-09	-45.6E-09	-51.9E-09	-57.0E-09	-65.5E-09	-70.9E-09	-72.4E-09	-46.9E-09
Statistics													
Min	-11.3E-09	-15.3E-09	-21.7E-09	-28.2E-09	-35.9E-09	-42.0E-09	-49.7E-09	-52.7E-09	-60.8E-09	-67.0E-09	-76.2E-09	-74.7E-09	-47.0E-09
Max	-11.2E-09	-11.2E-09	-20.2E-09	-24.7E-09	-30.4E-09	-41.0E-09	-45.4E-09	-51.9E-09	-57.0E-09	-65.5E-09	-70.9E-09	-72.4E-09	-46.7E-09
Average	-11.3E-09	-12.6E-09	-21.1E-09	-26.1E-09	-32.2E-09	-41.6E-09	-46.9E-09	-52.3E-09	-59.3E-09	-66.3E-09	-73.4E-09	-73.4E-09	-46.9E-09
Sigma	44.5E-12	1.9E-09	639.6E-12	1.5E-09	2.6E-09	459.9E-12	2.0E-09	365.3E-12	1.6E-09	647.7E-12	2.2E-09	946.9E-12	128.1E-12

Drift Calculation

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-10.5E-09	-16.9E-09	-19.2E-09	-30.8E-09	-38.4E-09	-41.0E-09	-48.9E-09	-55.0E-09	-61.9E-09	-63.5E-09	-35.8E-09
34	-	-4.0E-09	-10.0E-09	-13.4E-09	-24.5E-09	-30.6E-09	-34.1E-09	-41.4E-09	-49.5E-09	-55.7E-09	-64.8E-09	-61.8E-09	-35.4E-09
35	-	0.0E+00	-9.0E-09	-14.3E-09	-19.2E-09	-29.7E-09	-34.4E-09	-40.6E-09	-45.8E-09	-54.2E-09	-59.6E-09	-61.2E-09	-35.7E-09
Average	-	-1.3E-09	-9.8E-09	-14.9E-09	-21.0E-09	-30.4E-09	-35.6E-09	-41.0E-09	-48.1E-09	-55.0E-09	-62.1E-09	-62.2E-09	-35.6E-09
Sigma	-	1.9E-09	632.9E-12	1.5E-09	2.5E-09	448.6E-12	2.0E-09	327.0E-12	1.6E-09	612.8E-12	2.1E-09	962.3E-12	170.4E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.4E-09	-5.8E-09	-11.9E-09	-10.9E-09	-11.1E-09	-11.3E-09	-11.5E-09	-10.4E-09	-10.9E-09	-11.3E-09	-11.0E-09	-11.7E-09	-10.6E-09
OFF PROTON samples													
30	-53.5E-09	-48.6E-09	-53.1E-09	-58.0E-09	-64.1E-09	-75.0E-09	-74.2E-09	-80.6E-09	-76.6E-09	-87.1E-09	-90.2E-09	-93.0E-09	-75.6E-09
32	-52.3E-09	-54.6E-09	-52.7E-09	-54.0E-09	-63.8E-09	-70.3E-09	-80.8E-09	-81.7E-09	-80.3E-09	-96.9E-09	-91.5E-09	-91.1E-09	-76.6E-09
39	-52.0E-09	-51.1E-09	-58.7E-09	-62.8E-09	-67.8E-09	-74.8E-09	-75.6E-09	-81.2E-09	-89.3E-09	-93.7E-09	-101.5E-09	-95.6E-09	-74.0E-09
Statistics													
Min	-53.5E-09	-54.6E-09	-58.7E-09	-62.8E-09	-67.8E-09	-75.0E-09	-80.8E-09	-81.7E-09	-89.3E-09	-96.9E-09	-101.5E-09	-95.6E-09	-76.6E-09
Max	-52.0E-09	-48.6E-09	-52.7E-09	-54.0E-09	-63.8E-09	-70.3E-09	-74.2E-09	-80.6E-09	-76.6E-09	-87.1E-09	-90.2E-09	-91.1E-09	-74.0E-09
Average	-52.6E-09	-51.4E-09	-54.9E-09	-58.3E-09	-65.3E-09	-73.4E-09	-76.9E-09	-81.2E-09	-82.0E-09	-92.6E-09	-94.4E-09	-93.2E-09	-75.4E-09
Sigma	623.6E-12	2.5E-09	2.7E-09	3.6E-09	1.8E-09	2.2E-09	2.9E-09	451.9E-12	5.3E-09	4.1E-09	5.0E-09	1.8E-09	1.1E-09

Drift Calculation

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	4.9E-09	325.9E-12	-4.6E-09	-10.6E-09	-21.5E-09	-20.7E-09	-27.2E-09	-23.1E-09	-33.6E-09	-36.8E-09	-39.5E-09	-22.1E-09
32	-	-2.3E-09	-387.8E-12	-1.6E-09	-11.5E-09	-18.0E-09	-28.5E-09	-29.4E-09	-27.9E-09	-44.5E-09	-39.2E-09	-38.8E-09	-24.3E-09
39	-	927.7E-12	-6.7E-09	-10.8E-09	-15.8E-09	-22.8E-09	-23.6E-09	-29.2E-09	-37.3E-09	-41.7E-09	-49.5E-09	-43.6E-09	-22.0E-09
Average	-	1.2E-09	-2.3E-09	-5.7E-09	-12.7E-09	-20.8E-09	-24.3E-09	-28.6E-09	-29.4E-09	-40.0E-09	-41.8E-09	-40.6E-09	-22.8E-09
Sigma	-	2.9E-09	3.2E-09	3.8E-09	2.3E-09	2.0E-09	3.2E-09	1.0E-09	5.9E-09	4.6E-09	5.5E-09	2.1E-09	1.0E-09

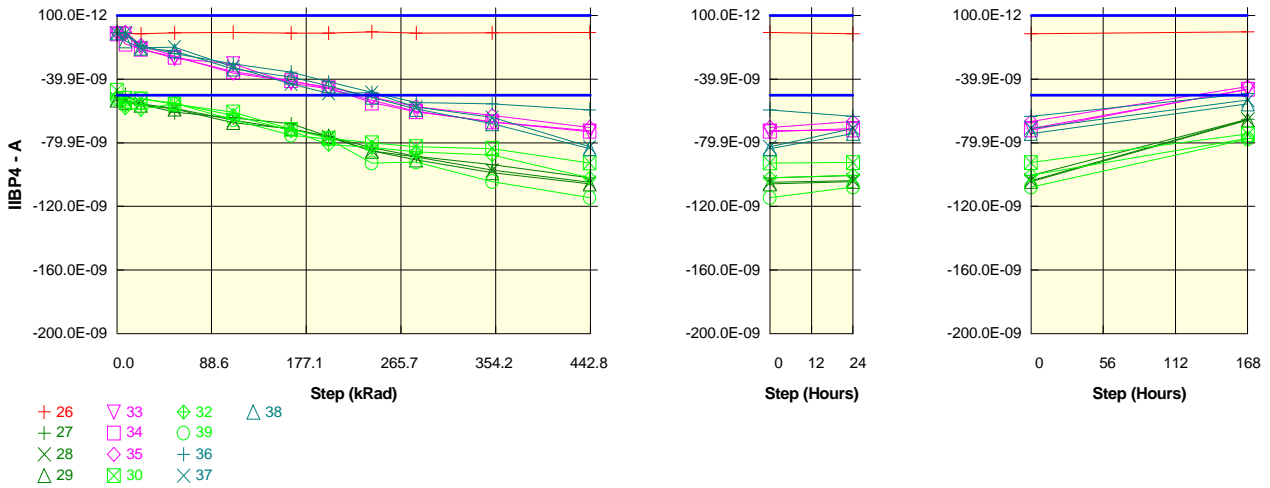
Measurements

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.4E-09	-5.8E-09	-11.9E-09	-10.9E-09	-11.1E-09	-11.3E-09	-11.5E-09	-10.4E-09	-10.9E-09	-11.3E-09	-11.0E-09	-11.7E-09	-10.6E-09
OFF TID samples													
36	-11.5E-09	-11.5E-09	-18.7E-09	-25.8E-09	-29.8E-09	-38.9E-09	-45.7E-09	-49.8E-09	-50.9E-09	-60.0E-09	-71.8E-09	-64.6E-09	-50.4E-09
37	-11.0E-09	-11.0E-09	-20.7E-09	-22.0E-09	-29.9E-09	-36.5E-09	-42.0E-09	-54.5E-09	-54.4E-09	-62.0E-09	-72.5E-09	-74.9E-09	-50.7E-09
38	-11.8E-09	-17.3E-09	-19.5E-09	-23.7E-09	-34.3E-09	-40.6E-09	-44.4E-09	-49.8E-09	-58.7E-09	-58.7E-09	-73.2E-09	-70.3E-09	-52.3E-09
Statistics													
Min	-11.8E-09	-17.3E-09	-20.7E-09	-25.8E-09	-34.3E-09	-40.6E-09	-45.7E-09	-54.5E-09	-58.7E-09	-62.0E-09	-73.2E-09	-74.9E-09	-52.3E-09
Max	-11.0E-09	-11.0E-09	-18.7E-09	-22.0E-09	-29.8E-09	-36.5E-09	-42.0E-09	-49.8E-09	-50.9E-09	-58.7E-09	-71.8E-09	-64.6E-09	-50.4E-09
Average	-11.4E-09	-13.3E-09	-19.7E-09	-23.8E-09	-31.3E-09	-38.7E-09	-44.1E-09	-51.4E-09	-54.7E-09	-60.2E-09	-72.5E-09	-69.9E-09	-51.1E-09
Sigma	348.2E-12	2.8E-09	828.1E-12	1.6E-09	2.1E-09	1.7E-09	1.5E-09	2.2E-09	3.2E-09	1.4E-09	602.6E-12	4.2E-09	814.6E-12

Drift Calculation

IIBP4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-7.2E-09	-14.3E-09	-18.2E-09	-27.4E-09	-34.1E-09	-38.3E-09	-39.4E-09	-48.4E-09	-60.2E-09	-53.0E-09	-38.9E-09
37	-	0.0E+00	-9.8E-09	-11.0E-09	-18.9E-09	-25.5E-09	-31.1E-09	-43.5E-09	-43.4E-09	-51.0E-09	-61.5E-09	-63.9E-09	-39.7E-09
38	-	-5.5E-09	-7.7E-09	-11.9E-09	-22.4E-09	-28.8E-09	-32.6E-09	-38.0E-09	-46.8E-09	-46.8E-09	-61.4E-09	-58.5E-09	-40.4E-09
Average	-	-1.8E-09	-8.2E-09	-12.4E-09	-19.9E-09	-27.2E-09	-32.6E-09	-39.9E-09	-43.2E-09	-48.8E-09	-61.1E-09	-58.5E-09	-39.7E-09
Sigma	-	2.6E-09	1.1E-09	1.4E-09	1.8E-09	1.3E-09	1.3E-09	2.5E-09	3.0E-09	1.7E-09	585.6E-12	4.4E-09	644.4E-12

Parameter : Input Bias Current : IIBP4DUTB
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.8E-09	-11.1E-09	-11.4E-09	-10.8E-09	-10.6E-09	-11.0E-09	-11.0E-09	-10.1E-09	-11.0E-09	-10.8E-09	-10.5E-09	-11.4E-09	-10.0E-09
ON_PROTON samples													
27	-50.3E-09	-49.7E-09	-55.7E-09	-60.9E-09	-64.4E-09	-68.1E-09	-75.9E-09	-83.2E-09	-88.4E-09	-93.9E-09	-102.0E-09	-100.6E-09	-65.2E-09
28	-52.3E-09	-53.3E-09	-55.5E-09	-58.4E-09	-65.9E-09	-71.4E-09	-76.4E-09	-85.1E-09	-88.9E-09	-97.4E-09	-105.0E-09	-103.8E-09	-65.4E-09
29	-53.1E-09	-54.5E-09	-56.3E-09	-58.8E-09	-67.3E-09	-71.2E-09	-76.0E-09	-85.2E-09	-90.7E-09	-98.8E-09	-105.9E-09	-104.3E-09	-65.7E-09
Statistics													
Min	-53.1E-09	-54.5E-09	-56.3E-09	-60.9E-09	-67.3E-09	-71.4E-09	-76.4E-09	-85.2E-09	-90.7E-09	-98.8E-09	-105.9E-09	-104.3E-09	-65.7E-09
Max	-50.3E-09	-49.7E-09	-55.5E-09	-58.4E-09	-64.4E-09	-68.1E-09	-75.9E-09	-83.2E-09	-88.4E-09	-93.9E-09	-102.0E-09	-100.6E-09	-65.2E-09
Average	-51.9E-09	-52.5E-09	-55.8E-09	-59.4E-09	-65.9E-09	-70.2E-09	-76.1E-09	-84.5E-09	-89.4E-09	-96.7E-09	-104.3E-09	-102.9E-09	-65.4E-09
Sigma	1.2E-09	2.1E-09	348.6E-12	1.1E-09	1.2E-09	1.5E-09	216.4E-12	920.1E-12	985.0E-12	2.1E-09	1.7E-09	1.6E-09	184.1E-12

Drift Calculation

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	633.5E-12	-5.4E-09	-10.6E-09	-14.2E-09	-17.8E-09	-25.6E-09	-32.9E-09	-38.1E-09	-43.6E-09	-51.7E-09	-50.3E-09	-14.9E-09
28	-	-936.0E-12	-3.1E-09	-6.1E-09	-13.5E-09	-19.1E-09	-24.1E-09	-32.7E-09	-36.6E-09	-45.0E-09	-52.7E-09	-51.5E-09	-13.0E-09
29	-	-1.4E-09	-3.2E-09	-5.6E-09	-14.2E-09	-18.1E-09	-22.9E-09	-32.1E-09	-37.6E-09	-45.7E-09	-52.8E-09	-51.2E-09	-12.6E-09
Average	-	-580.0E-12	-3.9E-09	-7.4E-09	-14.0E-09	-18.3E-09	-24.2E-09	-32.6E-09	-37.4E-09	-44.8E-09	-52.4E-09	-51.0E-09	-13.5E-09
Sigma	-	882.2E-12	1.1E-09	2.2E-09	309.9E-12	543.0E-12	1.1E-09	338.5E-12	643.9E-12	886.4E-12	478.4E-12	505.8E-12	1.0E-09

Measurements

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.8E-09	-11.1E-09	-11.4E-09	-10.8E-09	-10.6E-09	-11.0E-09	-11.0E-09	-10.1E-09	-11.0E-09	-10.8E-09	-10.5E-09	-11.4E-09	-10.0E-09
ON_TID samples													
33	-11.5E-09	-11.5E-09	-20.8E-09	-26.9E-09	-30.3E-09	-42.5E-09	-46.1E-09	-53.3E-09	-60.1E-09	-67.0E-09	-73.0E-09	-71.0E-09	-46.4E-09
34	-11.5E-09	-17.9E-09	-21.1E-09	-26.1E-09	-35.2E-09	-41.0E-09	-45.5E-09	-54.8E-09	-60.6E-09	-66.8E-09	-72.5E-09	-71.9E-09	-46.3E-09
35	-10.4E-09	-10.4E-09	-18.5E-09	-25.6E-09	-36.2E-09	-41.3E-09	-45.1E-09	-51.1E-09	-57.2E-09	-62.9E-09	-70.3E-09	-66.6E-09	-44.7E-09
Statistics													
Min	-11.5E-09	-17.9E-09	-21.1E-09	-26.9E-09	-36.2E-09	-42.5E-09	-46.1E-09	-54.8E-09	-60.6E-09	-67.0E-09	-73.0E-09	-71.9E-09	-46.4E-09
Max	-10.4E-09	-10.4E-09	-18.5E-09	-25.6E-09	-30.3E-09	-41.0E-09	-45.1E-09	-51.1E-09	-57.2E-09	-62.9E-09	-70.3E-09	-66.6E-09	-44.7E-09
Average	-11.1E-09	-13.3E-09	-20.1E-09	-26.2E-09	-33.9E-09	-41.6E-09	-45.6E-09	-53.1E-09	-59.3E-09	-65.6E-09	-72.0E-09	-69.8E-09	-45.8E-09
Sigma	516.5E-12	3.3E-09	1.1E-09	563.5E-12	2.6E-09	653.6E-12	422.6E-12	1.5E-09	1.5E-09	1.9E-09	1.2E-09	2.3E-09	783.3E-12

Drift Calculation

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-9.3E-09	-15.4E-09	-18.8E-09	-31.0E-09	-34.6E-09	-41.8E-09	-48.6E-09	-55.5E-09	-61.5E-09	-59.5E-09	-34.9E-09
34	-	-6.4E-09	-9.6E-09	-14.7E-09	-23.7E-09	-29.5E-09	-34.0E-09	-43.3E-09	-49.1E-09	-55.3E-09	-61.0E-09	-60.4E-09	-34.8E-09
35	-	0.0E+00	-8.1E-09	-15.2E-09	-25.8E-09	-30.9E-09	-34.7E-09	-40.7E-09	-46.8E-09	-52.5E-09	-59.9E-09	-56.2E-09	-34.3E-09
Average	-	-2.1E-09	-9.0E-09	-15.1E-09	-22.8E-09	-30.5E-09	-34.4E-09	-41.9E-09	-48.1E-09	-54.4E-09	-60.8E-09	-58.7E-09	-34.7E-09
Sigma	-	3.0E-09	621.5E-12	324.4E-12	3.0E-09	711.3E-12	284.9E-12	1.1E-09	996.1E-12	1.4E-09	675.7E-12	1.8E-09	267.9E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.8E-09	-11.1E-09	-11.4E-09	-10.8E-09	-10.6E-09	-11.0E-09	-11.0E-09	-10.1E-09	-11.0E-09	-10.8E-09	-10.5E-09	-11.4E-09	-10.0E-09
OFF PROTON samples													
30	-47.0E-09	-52.1E-09	-52.3E-09	-55.6E-09	-60.7E-09	-71.5E-09	-77.1E-09	-80.1E-09	-82.5E-09	-83.6E-09	-92.6E-09	-92.4E-09	-74.6E-09
32	-52.2E-09	-58.1E-09	-59.0E-09	-55.3E-09	-62.9E-09	-72.3E-09	-81.0E-09	-82.8E-09	-85.6E-09	-87.6E-09	-102.0E-09	-100.4E-09	-77.3E-09
39	-52.6E-09	-55.8E-09	-52.4E-09	-55.0E-09	-65.5E-09	-75.2E-09	-77.7E-09	-92.8E-09	-92.2E-09	-104.4E-09	-114.6E-09	-107.9E-09	-77.7E-09
Statistics													
Min	-52.6E-09	-58.1E-09	-59.0E-09	-55.6E-09	-65.5E-09	-75.2E-09	-81.0E-09	-92.8E-09	-92.2E-09	-104.4E-09	-114.6E-09	-107.9E-09	-77.7E-09
Max	-47.0E-09	-52.1E-09	-52.3E-09	-55.0E-09	-60.7E-09	-71.5E-09	-77.1E-09	-80.1E-09	-82.5E-09	-83.6E-09	-92.6E-09	-92.4E-09	-74.6E-09
Average	-50.6E-09	-55.3E-09	-54.5E-09	-55.3E-09	-63.0E-09	-73.0E-09	-78.6E-09	-85.2E-09	-86.8E-09	-91.9E-09	-103.1E-09	-100.2E-09	-76.5E-09
Sigma	2.6E-09	2.5E-09	3.1E-09	253.2E-12	2.0E-09	1.6E-09	1.7E-09	5.5E-09	4.1E-09	9.0E-09	9.0E-09	6.3E-09	1.4E-09

Drift Calculation

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-5.1E-09	-5.3E-09	-8.7E-09	-13.7E-09	-24.5E-09	-30.1E-09	-33.1E-09	-35.5E-09	-36.6E-09	-45.6E-09	-45.5E-09	-27.6E-09
32	-	-5.9E-09	-6.8E-09	-3.1E-09	-10.7E-09	-20.2E-09	-28.8E-09	-30.7E-09	-33.5E-09	-35.5E-09	-49.9E-09	-48.2E-09	-25.2E-09
39	-	-3.2E-09	267.4E-12	-2.4E-09	-12.9E-09	-22.6E-09	-25.1E-09	-40.2E-09	-39.6E-09	-51.8E-09	-62.0E-09	-55.3E-09	-25.0E-09
Average	-	-4.7E-09	-4.0E-09	-4.7E-09	-12.5E-09	-22.4E-09	-28.0E-09	-34.7E-09	-36.2E-09	-41.3E-09	-52.5E-09	-49.7E-09	-25.9E-09
Sigma	-	1.1E-09	3.0E-09	2.8E-09	1.3E-09	1.8E-09	2.2E-09	4.0E-09	2.6E-09	7.4E-09	6.9E-09	4.2E-09	1.2E-09

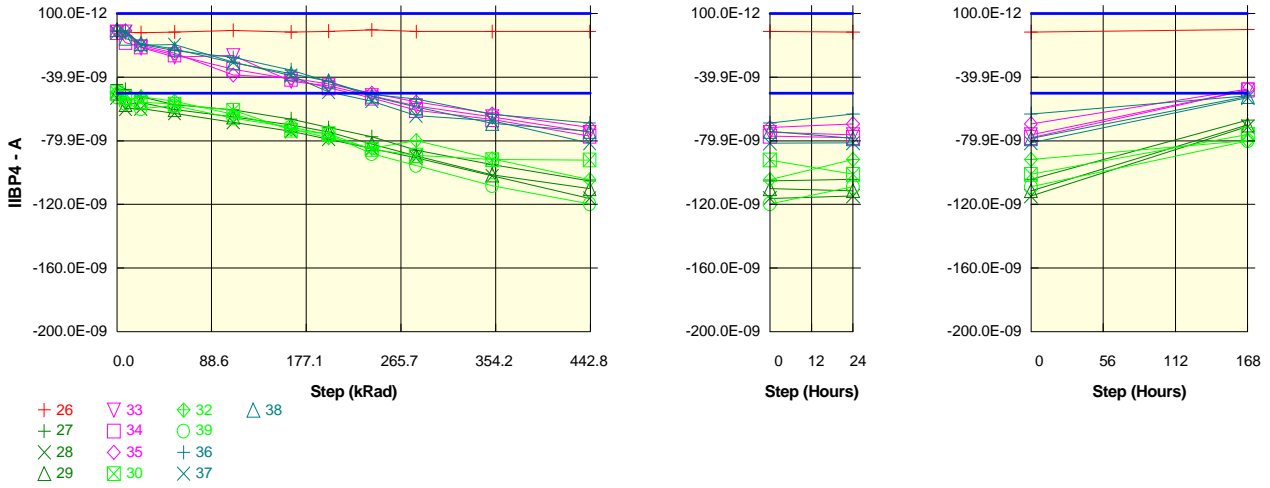
Measurements

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.8E-09	-11.1E-09	-11.4E-09	-10.8E-09	-10.6E-09	-11.0E-09	-11.0E-09	-10.1E-09	-11.0E-09	-10.8E-09	-10.5E-09	-11.4E-09	-10.0E-09
OFF TID samples													
36	-10.8E-09	-10.8E-09	-18.8E-09	-24.0E-09	-30.3E-09	-35.5E-09	-41.7E-09	-48.3E-09	-54.6E-09	-55.5E-09	-59.2E-09	-63.3E-09	-49.1E-09
37	-11.0E-09	-11.0E-09	-20.3E-09	-19.7E-09	-32.3E-09	-42.9E-09	-48.8E-09	-48.4E-09	-57.6E-09	-64.0E-09	-82.7E-09	-70.8E-09	-53.1E-09
38	-10.9E-09	-16.0E-09	-20.5E-09	-22.2E-09	-33.6E-09	-38.6E-09	-44.2E-09	-51.5E-09	-58.9E-09	-68.1E-09	-83.8E-09	-74.2E-09	-55.6E-09
Statistics													
Min	-11.0E-09	-16.0E-09	-20.5E-09	-24.0E-09	-33.6E-09	-42.9E-09	-48.8E-09	-51.5E-09	-58.9E-09	-68.1E-09	-83.8E-09	-74.2E-09	-55.6E-09
Max	-10.8E-09	-10.8E-09	-18.8E-09	-19.7E-09	-30.3E-09	-35.5E-09	-41.7E-09	-48.3E-09	-54.6E-09	-55.5E-09	-59.2E-09	-63.3E-09	-49.1E-09
Average	-10.9E-09	-12.6E-09	-19.9E-09	-22.0E-09	-32.1E-09	-39.0E-09	-44.9E-09	-49.4E-09	-57.0E-09	-62.5E-09	-75.2E-09	-69.4E-09	-52.6E-09
Sigma	73.6E-12	2.4E-09	741.0E-12	1.7E-09	1.3E-09	3.1E-09	2.9E-09	1.5E-09	1.8E-09	5.2E-09	11.3E-09	4.6E-09	2.7E-09

Drift Calculation

IIBP4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.0E-09	-13.1E-09	-19.5E-09	-24.7E-09	-30.9E-09	-37.5E-09	-43.8E-09	-44.7E-09	-48.4E-09	-52.4E-09	-38.2E-09
37	-	0.0E+00	-9.3E-09	-8.7E-09	-21.3E-09	-31.9E-09	-37.8E-09	-37.4E-09	-46.5E-09	-53.0E-09	-71.6E-09	-59.8E-09	-42.1E-09
38	-	-5.1E-09	-9.6E-09	-11.3E-09	-22.7E-09	-27.7E-09	-33.3E-09	-40.6E-09	-48.0E-09	-57.2E-09	-72.9E-09	-63.3E-09	-44.7E-09
Average	-	-1.7E-09	-8.9E-09	-11.0E-09	-21.2E-09	-28.1E-09	-34.0E-09	-38.5E-09	-46.1E-09	-51.6E-09	-64.3E-09	-58.5E-09	-41.6E-09
Sigma	-	2.4E-09	693.7E-12	1.8E-09	1.3E-09	3.0E-09	2.9E-09	1.5E-09	1.7E-09	5.2E-09	11.3E-09	4.5E-09	2.6E-09

Parameter : Input Bias Current : IIBP4DUTC
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.2E-09	-11.7E-09	-12.0E-09	-11.5E-09	-10.5E-09	-11.5E-09	-11.1E-09	-10.3E-09	-11.3E-09	-11.3E-09	-11.3E-09	-11.6E-09	-10.0E-09
ON PROTON samples													
27	-44.7E-09	-47.7E-09	-52.1E-09	-57.2E-09	-60.6E-09	-66.2E-09	-71.6E-09	-77.3E-09	-85.9E-09	-95.0E-09	-105.2E-09	-104.3E-09	-67.0E-09
28	-52.8E-09	-59.8E-09	-59.8E-09	-62.6E-09	-68.3E-09	-74.1E-09	-79.0E-09	-85.0E-09	-90.8E-09	-102.0E-09	-116.3E-09	-114.8E-09	-71.1E-09
29	-49.9E-09	-57.2E-09	-55.9E-09	-60.4E-09	-65.1E-09	-70.1E-09	-74.4E-09	-82.0E-09	-89.5E-09	-101.4E-09	-110.2E-09	-111.4E-09	-70.0E-09
Statistics													
Min	-52.8E-09	-59.8E-09	-59.8E-09	-62.6E-09	-68.3E-09	-74.1E-09	-79.0E-09	-85.0E-09	-90.8E-09	-102.0E-09	-116.3E-09	-114.8E-09	-71.1E-09
Max	-44.7E-09	-47.7E-09	-52.1E-09	-57.2E-09	-60.6E-09	-66.2E-09	-71.6E-09	-77.3E-09	-85.9E-09	-95.0E-09	-105.2E-09	-104.3E-09	-67.0E-09
Average	-49.2E-09	-54.9E-09	-56.0E-09	-60.1E-09	-64.6E-09	-70.1E-09	-75.0E-09	-81.4E-09	-88.7E-09	-99.5E-09	-110.6E-09	-110.1E-09	-69.3E-09
Sigma	3.4E-09	5.2E-09	3.1E-09	2.2E-09	3.2E-09	3.2E-09	3.0E-09	3.1E-09	2.0E-09	3.2E-09	4.5E-09	4.4E-09	1.8E-09

Drift Calculation

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-3.0E-09	-7.4E-09	-12.5E-09	-15.9E-09	-21.5E-09	-26.9E-09	-32.6E-09	-41.2E-09	-50.3E-09	-60.5E-09	-59.6E-09	-22.3E-09
28	-	-7.0E-09	-7.0E-09	-9.8E-09	-15.5E-09	-21.3E-09	-26.1E-09	-32.1E-09	-37.9E-09	-49.2E-09	-63.5E-09	-61.9E-09	-18.3E-09
29	-	-7.3E-09	-6.0E-09	-10.5E-09	-15.1E-09	-20.1E-09	-24.5E-09	-32.1E-09	-39.5E-09	-51.5E-09	-60.2E-09	-61.5E-09	-20.0E-09
Average	-	-5.8E-09	-6.8E-09	-10.9E-09	-15.5E-09	-21.0E-09	-25.9E-09	-32.3E-09	-39.6E-09	-50.3E-09	-61.4E-09	-61.0E-09	-20.2E-09
Sigma	-	2.0E-09	601.3E-12	1.1E-09	311.2E-12	604.9E-12	1.0E-09	260.8E-12	1.3E-09	924.5E-12	1.5E-09	1.0E-09	1.6E-09

Measurements

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.2E-09	-11.7E-09	-12.0E-09	-11.5E-09	-10.5E-09	-11.5E-09	-11.1E-09	-10.3E-09	-11.3E-09	-11.3E-09	-11.3E-09	-11.6E-09	-10.0E-09
ON TID samples													
33	-11.5E-09	-11.5E-09	-21.4E-09	-27.2E-09	-26.4E-09	-42.5E-09	-45.4E-09	-51.7E-09	-58.1E-09	-65.0E-09	-74.7E-09	-76.2E-09	-48.0E-09
34	-11.8E-09	-18.1E-09	-20.8E-09	-25.9E-09	-35.0E-09	-41.2E-09	-46.6E-09	-53.1E-09	-60.9E-09	-66.6E-09	-77.1E-09	-77.9E-09	-48.0E-09
35	-10.7E-09	-10.7E-09	-19.8E-09	-24.8E-09	-38.6E-09	-40.5E-09	-44.3E-09	-50.0E-09	-55.6E-09	-63.1E-09	-71.7E-09	-69.3E-09	-47.4E-09
Statistics													
Min	-11.8E-09	-18.1E-09	-21.4E-09	-27.2E-09	-38.6E-09	-42.5E-09	-46.6E-09	-53.1E-09	-60.9E-09	-66.6E-09	-77.1E-09	-77.9E-09	-48.0E-09
Max	-10.7E-09	-10.7E-09	-19.8E-09	-24.8E-09	-26.4E-09	-40.5E-09	-44.3E-09	-50.0E-09	-55.6E-09	-63.1E-09	-71.7E-09	-69.3E-09	-47.4E-09
Average	-11.3E-09	-13.4E-09	-20.7E-09	-26.0E-09	-33.3E-09	-41.4E-09	-45.4E-09	-51.6E-09	-58.2E-09	-64.9E-09	-74.5E-09	-74.5E-09	-47.8E-09
Sigma	478.1E-12	3.3E-09	657.9E-12	977.8E-12	5.1E-09	834.2E-12	949.2E-12	1.3E-09	2.2E-09	1.4E-09	2.2E-09	3.7E-09	282.8E-12

Drift Calculation

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-9.9E-09	-15.7E-09	-14.9E-09	-31.0E-09	-33.9E-09	-40.2E-09	-46.6E-09	-53.5E-09	-63.2E-09	-64.7E-09	-36.5E-09
34	-	-6.3E-09	-9.0E-09	-14.1E-09	-23.1E-09	-29.4E-09	-34.8E-09	-41.3E-09	-49.0E-09	-54.8E-09	-65.2E-09	-66.1E-09	-36.2E-09
35	-	0.0E+00	-9.1E-09	-14.1E-09	-27.9E-09	-29.8E-09	-33.6E-09	-39.3E-09	-44.9E-09	-52.4E-09	-61.0E-09	-58.6E-09	-36.7E-09
Average	-	-2.1E-09	-9.3E-09	-14.6E-09	-22.0E-09	-30.1E-09	-34.1E-09	-40.3E-09	-46.8E-09	-53.5E-09	-63.1E-09	-63.1E-09	-36.5E-09
Sigma	-	3.0E-09	398.6E-12	756.3E-12	5.4E-09	682.7E-12	502.8E-12	811.0E-12	1.7E-09	983.2E-12	1.7E-09	3.3E-09	216.4E-12

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.2E-09	-11.7E-09	-12.0E-09	-11.5E-09	-10.5E-09	-11.5E-09	-11.1E-09	-10.3E-09	-11.3E-09	-11.3E-09	-11.3E-09	-11.6E-09	-10.0E-09
OFF PROTON samples													
30	-49.7E-09	-52.8E-09	-55.7E-09	-57.0E-09	-60.9E-09	-73.2E-09	-75.6E-09	-85.4E-09	-89.1E-09	-91.9E-09	-92.1E-09	-101.1E-09	-76.0E-09
32	-49.7E-09	-54.7E-09	-52.4E-09	-55.0E-09	-63.5E-09	-72.6E-09	-78.2E-09	-84.7E-09	-79.9E-09	-91.3E-09	-104.4E-09	-91.7E-09	-79.8E-09
39	-52.5E-09	-56.6E-09	-59.9E-09	-58.0E-09	-65.7E-09	-71.3E-09	-76.0E-09	-88.2E-09	-95.6E-09	-108.3E-09	-119.7E-09	-108.9E-09	-80.1E-09
Statistics													
Min	-52.5E-09	-56.6E-09	-59.9E-09	-58.0E-09	-65.7E-09	-73.2E-09	-78.2E-09	-88.2E-09	-95.6E-09	-108.3E-09	-119.7E-09	-108.9E-09	-80.1E-09
Max	-49.7E-09	-52.8E-09	-52.4E-09	-55.0E-09	-60.9E-09	-71.3E-09	-75.6E-09	-84.7E-09	-79.9E-09	-91.3E-09	-92.1E-09	-91.7E-09	-76.0E-09
Average	-50.6E-09	-54.7E-09	-56.0E-09	-56.7E-09	-63.4E-09	-72.4E-09	-76.6E-09	-86.1E-09	-88.2E-09	-97.2E-09	-105.4E-09	-100.6E-09	-78.7E-09
Sigma	1.3E-09	1.6E-09	3.1E-09	1.2E-09	2.0E-09	794.1E-12	1.1E-09	1.5E-09	6.4E-09	7.9E-09	11.3E-09	7.0E-09	1.9E-09

Drift Calculation

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.0E-09	-6.0E-09	-7.2E-09	-11.1E-09	-23.5E-09	-25.9E-09	-35.7E-09	-39.4E-09	-42.1E-09	-42.3E-09	-51.4E-09	-26.3E-09
32	-	-5.1E-09	-2.7E-09	-5.3E-09	-13.8E-09	-22.9E-09	-28.5E-09	-35.0E-09	-30.2E-09	-41.6E-09	-54.7E-09	-42.0E-09	-30.2E-09
39	-	-4.2E-09	-7.4E-09	-5.5E-09	-13.2E-09	-18.9E-09	-23.5E-09	-35.7E-09	-43.1E-09	-55.8E-09	-67.3E-09	-56.4E-09	-27.6E-09
Average	-	-4.1E-09	-5.4E-09	-6.0E-09	-12.7E-09	-21.7E-09	-26.0E-09	-35.5E-09	-37.6E-09	-46.5E-09	-54.8E-09	-49.9E-09	-28.0E-09
Sigma	-	834.1E-12	2.0E-09	847.4E-12	1.1E-09	2.1E-09	2.0E-09	326.5E-12	5.4E-09	6.6E-09	10.2E-09	6.0E-09	1.6E-09

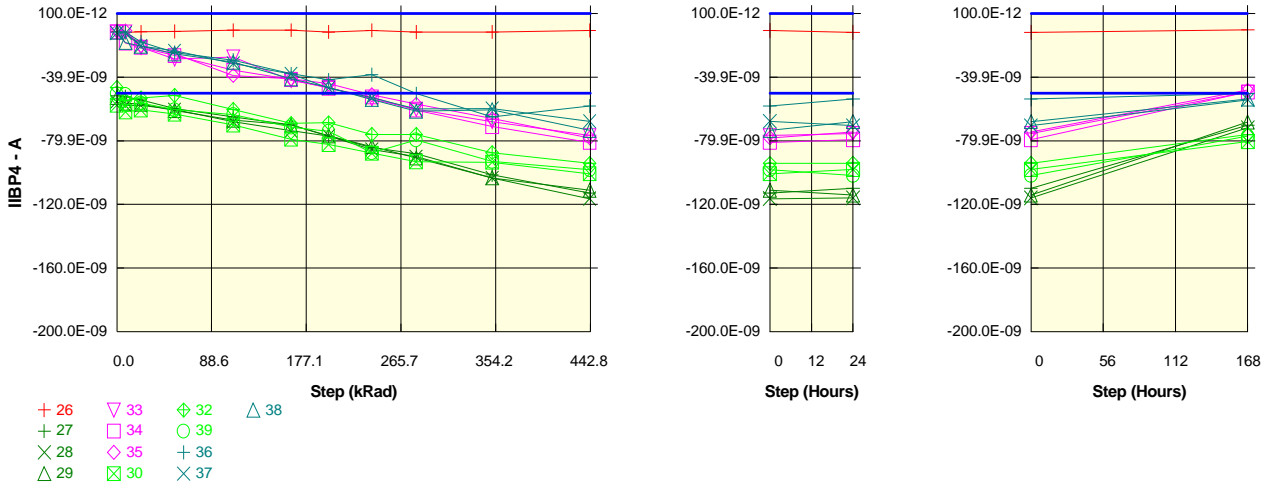
Measurements

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.2E-09	-11.7E-09	-12.0E-09	-11.5E-09	-10.5E-09	-11.5E-09	-11.1E-09	-10.3E-09	-11.3E-09	-11.3E-09	-11.3E-09	-11.6E-09	-10.0E-09
OFF TID samples													
36	-10.8E-09	-10.8E-09	-19.2E-09	-23.4E-09	-27.5E-09	-35.4E-09	-42.8E-09	-50.9E-09	-53.7E-09	-63.3E-09	-68.8E-09	-63.1E-09	-51.7E-09
37	-11.7E-09	-11.7E-09	-20.0E-09	-19.5E-09	-30.6E-09	-38.9E-09	-49.2E-09	-55.1E-09	-64.2E-09	-67.5E-09	-81.5E-09	-81.4E-09	-52.9E-09
38	-10.1E-09	-15.5E-09	-18.8E-09	-22.3E-09	-31.0E-09	-37.8E-09	-42.5E-09	-52.0E-09	-58.9E-09	-69.0E-09	-74.0E-09	-78.6E-09	-52.1E-09
Statistics													
Min	-11.7E-09	-15.5E-09	-20.0E-09	-23.4E-09	-31.0E-09	-38.9E-09	-49.2E-09	-55.1E-09	-64.2E-09	-69.0E-09	-81.5E-09	-81.4E-09	-52.9E-09
Max	-10.1E-09	-10.8E-09	-18.8E-09	-19.5E-09	-27.5E-09	-35.4E-09	-42.5E-09	-50.9E-09	-53.7E-09	-63.3E-09	-68.8E-09	-63.1E-09	-51.7E-09
Average	-10.9E-09	-12.7E-09	-19.3E-09	-21.7E-09	-29.7E-09	-37.4E-09	-44.8E-09	-52.7E-09	-58.9E-09	-66.6E-09	-74.8E-09	-74.4E-09	-52.2E-09
Sigma	662.5E-12	2.0E-09	457.4E-12	1.6E-09	1.5E-09	1.4E-09	3.1E-09	1.7E-09	4.3E-09	2.4E-09	5.2E-09	8.0E-09	491.5E-12

Drift Calculation

IIBP4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.4E-09	-12.6E-09	-16.7E-09	-24.6E-09	-31.9E-09	-40.1E-09	-42.8E-09	-52.4E-09	-58.0E-09	-52.2E-09	-40.8E-09
37	-	0.0E+00	-8.2E-09	-7.8E-09	-18.9E-09	-27.2E-09	-37.5E-09	-43.3E-09	-52.5E-09	-55.8E-09	-69.8E-09	-69.6E-09	-41.2E-09
38	-	-5.4E-09	-8.8E-09	-12.2E-09	-20.9E-09	-27.7E-09	-32.4E-09	-41.9E-09	-48.8E-09	-58.9E-09	-63.9E-09	-68.5E-09	-42.0E-09
Average	-	-1.8E-09	-8.5E-09	-10.8E-09	-18.8E-09	-26.5E-09	-34.0E-09	-41.8E-09	-48.0E-09	-55.7E-09	-63.9E-09	-63.5E-09	-41.3E-09
Sigma	-	2.6E-09	214.8E-12	2.2E-09	1.7E-09	1.4E-09	2.5E-09	1.3E-09	4.0E-09	2.6E-09	4.8E-09	7.9E-09	480.9E-12

Parameter : Input Bias Current : IIBP4DUTD
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.3E-09	-11.8E-09	-11.5E-09	-11.2E-09	-10.5E-09	-10.4E-09	-11.5E-09	-10.5E-09	-11.6E-09	-11.5E-09	-10.6E-09	-11.8E-09	-10.3E-09
ON PROTON samples													
27	-51.7E-09	-52.2E-09	-54.2E-09	-59.7E-09	-65.0E-09	-70.0E-09	-77.0E-09	-84.3E-09	-88.2E-09	-101.5E-09	-112.8E-09	-109.9E-09	-70.2E-09
28	-55.4E-09	-57.8E-09	-57.7E-09	-60.4E-09	-68.1E-09	-73.7E-09	-76.9E-09	-85.4E-09	-89.9E-09	-103.4E-09	-116.4E-09	-115.9E-09	-71.8E-09
29	-52.7E-09	-56.2E-09	-57.0E-09	-60.9E-09	-66.9E-09	-70.1E-09	-76.9E-09	-83.6E-09	-90.8E-09	-103.3E-09	-111.1E-09	-114.2E-09	-68.2E-09
Statistics													
Min	-55.4E-09	-57.8E-09	-57.7E-09	-60.9E-09	-68.1E-09	-73.7E-09	-77.0E-09	-85.4E-09	-90.8E-09	-103.4E-09	-116.4E-09	-115.9E-09	-71.8E-09
Max	-51.7E-09	-52.2E-09	-54.2E-09	-59.7E-09	-65.0E-09	-70.0E-09	-76.9E-09	-83.6E-09	-88.2E-09	-101.5E-09	-111.1E-09	-109.9E-09	-68.2E-09
Average	-53.3E-09	-55.4E-09	-56.3E-09	-60.3E-09	-66.7E-09	-71.3E-09	-76.9E-09	-84.5E-09	-89.6E-09	-102.7E-09	-113.5E-09	-113.3E-09	-70.1E-09
Sigma	1.6E-09	2.4E-09	1.5E-09	529.7E-12	1.3E-09	1.7E-09	74.3E-12	751.2E-12	1.1E-09	852.4E-12	2.2E-09	2.5E-09	1.5E-09

Drift Calculation

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-468.0E-12	-2.5E-09	-7.9E-09	-13.2E-09	-18.3E-09	-25.3E-09	-32.6E-09	-36.4E-09	-49.8E-09	-61.1E-09	-58.2E-09	-18.5E-09
28	-	-2.3E-09	-2.3E-09	-5.0E-09	-12.7E-09	-18.3E-09	-21.5E-09	-30.0E-09	-34.5E-09	-47.9E-09	-61.0E-09	-60.5E-09	-16.4E-09
29	-	-3.6E-09	-4.3E-09	-8.2E-09	-14.2E-09	-17.4E-09	-24.2E-09	-30.9E-09	-38.1E-09	-50.6E-09	-58.4E-09	-61.5E-09	-15.5E-09
Average	-	-2.1E-09	-3.0E-09	-7.1E-09	-13.4E-09	-18.0E-09	-23.7E-09	-31.2E-09	-36.3E-09	-49.4E-09	-60.2E-09	-60.1E-09	-16.8E-09
Sigma	-	1.3E-09	904.1E-12	1.5E-09	659.1E-12	421.2E-12	1.6E-09	1.1E-09	1.5E-09	1.1E-09	1.3E-09	1.4E-09	1.2E-09

Measurements

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.3E-09	-11.8E-09	-11.5E-09	-11.2E-09	-10.5E-09	-10.4E-09	-11.5E-09	-10.5E-09	-11.6E-09	-11.5E-09	-10.6E-09	-11.8E-09	-10.3E-09
ON TID samples													
33	-11.4E-09	-11.4E-09	-21.2E-09	-28.6E-09	-27.3E-09	-42.1E-09	-46.4E-09	-53.7E-09	-60.1E-09	-67.9E-09	-76.7E-09	-75.4E-09	-49.4E-09
34	-11.5E-09	-18.4E-09	-21.2E-09	-26.4E-09	-35.7E-09	-41.4E-09	-46.8E-09	-52.4E-09	-60.6E-09	-71.0E-09	-81.0E-09	-79.3E-09	-49.3E-09
35	-10.8E-09	-10.8E-09	-20.1E-09	-25.4E-09	-38.9E-09	-41.0E-09	-44.1E-09	-51.1E-09	-56.9E-09	-66.1E-09	-78.2E-09	-74.4E-09	-48.1E-09
Statistics													
Min	-11.5E-09	-18.4E-09	-21.2E-09	-28.6E-09	-38.9E-09	-42.1E-09	-46.8E-09	-53.7E-09	-60.6E-09	-71.0E-09	-81.0E-09	-79.3E-09	-49.4E-09
Max	-10.8E-09	-10.8E-09	-20.1E-09	-25.4E-09	-27.3E-09	-41.0E-09	-44.1E-09	-51.1E-09	-56.9E-09	-66.1E-09	-76.7E-09	-74.4E-09	-48.1E-09
Average	-11.2E-09	-13.6E-09	-20.9E-09	-26.8E-09	-34.0E-09	-41.5E-09	-45.8E-09	-52.4E-09	-59.2E-09	-68.3E-09	-78.6E-09	-76.4E-09	-48.9E-09
Sigma	304.8E-12	3.4E-09	506.4E-12	1.3E-09	4.9E-09	437.1E-12	1.2E-09	1.1E-09	1.6E-09	2.0E-09	1.8E-09	2.1E-09	569.7E-12

Drift Calculation

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-9.8E-09	-17.2E-09	-15.9E-09	-30.6E-09	-35.0E-09	-42.2E-09	-48.7E-09	-56.5E-09	-65.3E-09	-64.0E-09	-37.9E-09
34	-	-6.9E-09	-9.7E-09	-14.9E-09	-24.2E-09	-29.9E-09	-35.4E-09	-41.0E-09	-49.2E-09	-59.5E-09	-69.5E-09	-67.8E-09	-37.9E-09
35	-	0.0E+00	-9.3E-09	-14.6E-09	-28.1E-09	-30.2E-09	-33.3E-09	-40.3E-09	-46.1E-09	-55.3E-09	-67.4E-09	-63.6E-09	-37.3E-09
Average	-	-2.3E-09	-9.6E-09	-15.6E-09	-22.7E-09	-30.3E-09	-34.6E-09	-41.1E-09	-48.0E-09	-57.1E-09	-67.4E-09	-65.1E-09	-37.7E-09
Sigma	-	3.3E-09	206.1E-12	1.1E-09	5.1E-09	296.0E-12	890.8E-12	811.7E-12	1.3E-09	1.8E-09	1.7E-09	1.9E-09	266.8E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.3E-09	-11.8E-09	-11.5E-09	-11.2E-09	-10.5E-09	-10.4E-09	-11.5E-09	-10.5E-09	-11.6E-09	-11.5E-09	-10.6E-09	-11.8E-09	-10.3E-09
OFF PROTON samples													
30	-57.6E-09	-61.8E-09	-60.6E-09	-63.2E-09	-70.1E-09	-79.0E-09	-82.3E-09	-87.8E-09	-93.2E-09	-93.5E-09	-100.7E-09	-98.0E-09	-80.6E-09
32	-46.4E-09	-54.7E-09	-53.0E-09	-51.5E-09	-60.3E-09	-69.1E-09	-68.6E-09	-76.0E-09	-76.0E-09	-87.5E-09	-94.3E-09	-94.1E-09	-75.9E-09
39	-50.4E-09	-50.8E-09	-56.3E-09	-60.4E-09	-63.5E-09	-71.4E-09	-74.0E-09	-87.5E-09	-79.5E-09	-93.0E-09	-98.2E-09	-101.8E-09	-77.0E-09
Statistics													
Min	-57.6E-09	-61.8E-09	-60.6E-09	-63.2E-09	-70.1E-09	-79.0E-09	-82.3E-09	-87.8E-09	-93.2E-09	-93.5E-09	-100.7E-09	-101.8E-09	-80.6E-09
Max	-46.4E-09	-50.8E-09	-53.0E-09	-51.5E-09	-60.3E-09	-69.1E-09	-68.6E-09	-76.0E-09	-76.0E-09	-87.5E-09	-94.3E-09	-94.1E-09	-75.9E-09
Average	-51.5E-09	-55.8E-09	-56.6E-09	-58.4E-09	-64.7E-09	-73.2E-09	-75.0E-09	-83.8E-09	-82.9E-09	-91.3E-09	-97.7E-09	-98.0E-09	-77.9E-09
Sigma	4.6E-09	4.5E-09	3.1E-09	5.0E-09	4.1E-09	4.2E-09	5.6E-09	5.5E-09	7.4E-09	2.7E-09	2.7E-09	3.2E-09	2.0E-09

Drift Calculation

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-4.2E-09	-3.0E-09	-5.6E-09	-12.5E-09	-21.4E-09	-24.7E-09	-30.2E-09	-35.6E-09	-35.9E-09	-43.1E-09	-40.4E-09	-23.0E-09
32	-	-8.3E-09	-6.6E-09	-5.1E-09	-13.9E-09	-22.7E-09	-22.2E-09	-29.6E-09	-29.6E-09	-41.1E-09	-47.9E-09	-47.7E-09	-29.6E-09
39	-	-461.3E-12	-6.0E-09	-10.1E-09	-13.2E-09	-21.1E-09	-23.7E-09	-37.1E-09	-29.1E-09	-42.6E-09	-47.8E-09	-51.5E-09	-26.7E-09
Average	-	-4.3E-09	-5.2E-09	-6.9E-09	-13.2E-09	-21.7E-09	-23.5E-09	-32.3E-09	-31.4E-09	-39.9E-09	-46.3E-09	-46.5E-09	-26.4E-09
Sigma	-	3.2E-09	1.6E-09	2.2E-09	574.5E-12	718.5E-12	1.0E-09	3.4E-09	2.9E-09	2.9E-09	2.2E-09	4.6E-09	2.7E-09

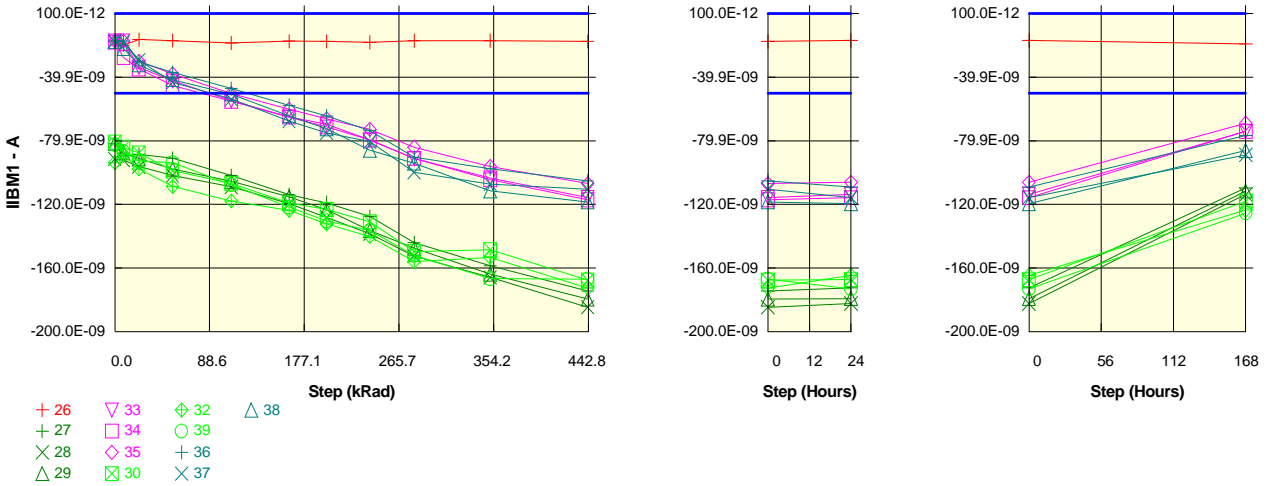
Measurements

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.3E-09	-11.8E-09	-11.5E-09	-11.2E-09	-10.5E-09	-10.4E-09	-11.5E-09	-10.5E-09	-11.6E-09	-11.5E-09	-10.6E-09	-11.8E-09	-10.3E-09
OFF TID samples													
36	-11.6E-09	-11.6E-09	-17.8E-09	-24.5E-09	-29.3E-09	-37.8E-09	-41.7E-09	-38.4E-09	-50.4E-09	-64.9E-09	-58.1E-09	-53.7E-09	-50.1E-09
37	-12.2E-09	-12.2E-09	-20.4E-09	-23.4E-09	-31.4E-09	-37.9E-09	-46.8E-09	-53.0E-09	-60.0E-09	-59.8E-09	-67.7E-09	-70.5E-09	-54.2E-09
38	-11.6E-09	-18.2E-09	-20.5E-09	-25.3E-09	-30.6E-09	-41.0E-09	-46.4E-09	-54.1E-09	-61.4E-09	-60.5E-09	-73.4E-09	-67.9E-09	-53.7E-09
Statistics													
Min	-12.2E-09	-18.2E-09	-20.5E-09	-25.3E-09	-31.4E-09	-41.0E-09	-46.8E-09	-54.1E-09	-61.4E-09	-64.9E-09	-73.4E-09	-70.5E-09	-54.2E-09
Max	-11.6E-09	-11.6E-09	-17.8E-09	-23.4E-09	-29.3E-09	-37.8E-09	-41.7E-09	-38.4E-09	-50.4E-09	-59.8E-09	-58.1E-09	-53.7E-09	-50.1E-09
Average	-11.8E-09	-14.0E-09	-19.6E-09	-24.4E-09	-30.4E-09	-38.9E-09	-45.0E-09	-48.5E-09	-57.3E-09	-61.7E-09	-66.4E-09	-64.0E-09	-52.7E-09
Sigma	298.4E-12	3.0E-09	1.3E-09	800.0E-12	857.9E-12	1.5E-09	2.3E-09	7.1E-09	4.9E-09	2.3E-09	6.3E-09	7.4E-09	1.8E-09

Drift Calculation

IIBP4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.2E-09	-12.9E-09	-17.7E-09	-26.2E-09	-30.2E-09	-26.8E-09	-38.8E-09	-53.4E-09	-46.6E-09	-42.1E-09	-38.6E-09
37	-	0.0E+00	-8.2E-09	-11.2E-09	-19.2E-09	-25.7E-09	-34.6E-09	-40.7E-09	-47.8E-09	-47.6E-09	-55.5E-09	-58.3E-09	-42.0E-09
38	-	-6.6E-09	-8.9E-09	-13.7E-09	-19.0E-09	-29.4E-09	-34.8E-09	-42.5E-09	-49.9E-09	-48.9E-09	-61.8E-09	-56.3E-09	-42.1E-09
Average	-	-2.2E-09	-7.8E-09	-12.6E-09	-18.6E-09	-27.1E-09	-33.2E-09	-36.7E-09	-45.5E-09	-50.0E-09	-54.6E-09	-52.2E-09	-40.9E-09
Sigma	-	3.1E-09	1.1E-09	1.1E-09	639.4E-12	1.7E-09	2.1E-09	7.0E-09	4.8E-09	2.5E-09	6.3E-09	7.2E-09	1.6E-09

Parameter : Input Bias Current : IIBM1DUTA
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.1E-09	-19.7E-09	-16.4E-09	-17.0E-09	-18.4E-09	-17.4E-09	-17.4E-09	-18.1E-09	-17.1E-09	-17.1E-09	-17.5E-09	-16.9E-09	-19.0E-09
ON_PROTON samples													
27	-81.9E-09	-89.4E-09	-88.5E-09	-90.9E-09	-101.9E-09	-113.8E-09	-119.0E-09	-127.8E-09	-144.1E-09	-158.6E-09	-174.5E-09	-172.5E-09	-109.7E-09
28	-91.5E-09	-92.2E-09	-96.3E-09	-101.9E-09	-109.0E-09	-119.7E-09	-128.2E-09	-138.5E-09	-152.5E-09	-165.9E-09	-184.8E-09	-182.4E-09	-113.7E-09
29	-81.6E-09	-87.6E-09	-91.3E-09	-97.8E-09	-105.5E-09	-115.3E-09	-123.4E-09	-136.4E-09	-147.5E-09	-163.9E-09	-179.6E-09	-179.2E-09	-111.7E-09
Statistics													
Min	-91.5E-09	-92.2E-09	-96.3E-09	-101.9E-09	-109.0E-09	-119.7E-09	-128.2E-09	-138.5E-09	-152.5E-09	-165.9E-09	-184.8E-09	-182.4E-09	-113.7E-09
Max	-81.6E-09	-87.6E-09	-88.5E-09	-90.9E-09	-101.9E-09	-113.8E-09	-119.0E-09	-127.8E-09	-144.1E-09	-158.6E-09	-174.5E-09	-172.5E-09	-109.7E-09
Average	-85.0E-09	-89.7E-09	-92.0E-09	-96.9E-09	-105.5E-09	-116.2E-09	-123.5E-09	-134.2E-09	-148.0E-09	-162.8E-09	-179.6E-09	-178.1E-09	-111.7E-09
Sigma	4.6E-09	1.9E-09	3.2E-09	4.5E-09	2.9E-09	2.5E-09	3.8E-09	4.6E-09	3.5E-09	3.1E-09	4.2E-09	4.1E-09	1.6E-09

Drift Calculation

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-7.6E-09	-6.6E-09	-9.1E-09	-20.1E-09	-31.9E-09	-37.2E-09	-45.9E-09	-62.2E-09	-76.7E-09	-92.7E-09	-90.7E-09	-27.8E-09
28	-	-668.6E-12	-4.8E-09	-10.4E-09	-17.5E-09	-28.2E-09	-36.7E-09	-47.0E-09	-61.0E-09	-74.4E-09	-93.3E-09	-90.9E-09	-22.2E-09
29	-	-6.0E-09	-9.7E-09	-16.2E-09	-23.9E-09	-33.7E-09	-41.8E-09	-54.8E-09	-65.9E-09	-82.3E-09	-98.1E-09	-97.7E-09	-30.1E-09
Average	-	-4.7E-09	-7.0E-09	-11.9E-09	-20.5E-09	-31.3E-09	-38.6E-09	-49.2E-09	-63.0E-09	-77.8E-09	-94.7E-09	-93.1E-09	-26.7E-09
Sigma	-	3.0E-09	2.0E-09	3.1E-09	2.7E-09	2.3E-09	2.3E-09	4.0E-09	2.1E-09	3.3E-09	2.4E-09	3.2E-09	3.3E-09

Measurements

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.1E-09	-19.7E-09	-16.4E-09	-17.0E-09	-18.4E-09	-17.4E-09	-17.4E-09	-18.1E-09	-17.1E-09	-17.1E-09	-17.5E-09	-16.9E-09	-19.0E-09
ON_TID samples													
33	-17.2E-09	-17.2E-09	-33.9E-09	-42.3E-09	-54.8E-09	-65.0E-09	-69.6E-09	-79.5E-09	-91.2E-09	-103.3E-09	-115.7E-09	-113.7E-09	-74.0E-09
34	-17.9E-09	-27.5E-09	-34.8E-09	-45.2E-09	-55.1E-09	-65.1E-09	-71.2E-09	-79.5E-09	-91.1E-09	-104.5E-09	-117.1E-09	-115.7E-09	-74.1E-09
35	-17.3E-09	-17.3E-09	-30.1E-09	-38.0E-09	-50.3E-09	-60.1E-09	-66.1E-09	-72.8E-09	-84.1E-09	-96.1E-09	-107.0E-09	-106.1E-09	-69.0E-09
Statistics													
Min	-17.9E-09	-27.5E-09	-34.8E-09	-45.2E-09	-55.1E-09	-65.1E-09	-71.2E-09	-79.5E-09	-91.2E-09	-104.5E-09	-117.1E-09	-115.7E-09	-74.1E-09
Max	-17.2E-09	-17.2E-09	-30.1E-09	-38.0E-09	-50.3E-09	-60.1E-09	-66.1E-09	-72.8E-09	-84.1E-09	-96.1E-09	-107.0E-09	-106.1E-09	-69.0E-09
Average	-17.5E-09	-20.7E-09	-32.9E-09	-41.8E-09	-53.4E-09	-63.4E-09	-69.0E-09	-77.3E-09	-88.8E-09	-101.3E-09	-113.3E-09	-111.9E-09	-72.3E-09
Sigma	307.4E-12	4.8E-09	2.0E-09	3.0E-09	2.2E-09	2.3E-09	2.1E-09	3.2E-09	3.3E-09	3.7E-09	4.5E-09	4.1E-09	2.4E-09

Drift Calculation

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-16.7E-09	-25.1E-09	-37.6E-09	-47.8E-09	-52.4E-09	-62.3E-09	-74.1E-09	-86.2E-09	-98.5E-09	-96.5E-09	-56.8E-09
34	-	-9.6E-09	-16.9E-09	-27.3E-09	-37.2E-09	-47.2E-09	-53.3E-09	-61.6E-09	-73.2E-09	-86.7E-09	-99.2E-09	-97.8E-09	-56.2E-09
35	-	0.0E+00	-12.7E-09	-20.7E-09	-33.0E-09	-42.8E-09	-48.8E-09	-55.5E-09	-66.8E-09	-78.8E-09	-89.7E-09	-88.8E-09	-51.7E-09
Average	-	-3.2E-09	-15.4E-09	-24.4E-09	-35.9E-09	-46.0E-09	-51.5E-09	-59.8E-09	-71.4E-09	-83.9E-09	-95.8E-09	-94.4E-09	-54.9E-09
Sigma	-	4.5E-09	1.9E-09	2.8E-09	2.1E-09	2.2E-09	1.9E-09	3.1E-09	3.2E-09	3.6E-09	4.3E-09	4.0E-09	2.3E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.1E-09	-19.7E-09	-16.4E-09	-17.0E-09	-18.4E-09	-17.4E-09	-17.4E-09	-18.1E-09	-17.1E-09	-17.1E-09	-17.5E-09	-16.9E-09	-19.0E-09
OFF PROTON samples													
30	-80.9E-09	-84.1E-09	-87.7E-09	-98.9E-09	-106.8E-09	-119.1E-09	-123.1E-09	-131.0E-09	-149.8E-09	-148.5E-09	-167.7E-09	-167.3E-09	-118.0E-09
32	-93.7E-09	-88.8E-09	-97.7E-09	-108.7E-09	-117.9E-09	-123.9E-09	-132.3E-09	-140.2E-09	-155.9E-09	-153.3E-09	-172.7E-09	-164.6E-09	-123.7E-09
39	-82.4E-09	-86.7E-09	-92.8E-09	-93.8E-09	-107.7E-09	-121.8E-09	-130.4E-09	-136.5E-09	-152.2E-09	-166.8E-09	-167.0E-09	-173.1E-09	-125.5E-09
Statistics													
Min	-93.7E-09	-88.8E-09	-97.7E-09	-108.7E-09	-117.9E-09	-123.9E-09	-132.3E-09	-140.2E-09	-155.9E-09	-166.8E-09	-172.7E-09	-173.1E-09	-125.5E-09
Max	-80.9E-09	-84.1E-09	-87.7E-09	-93.8E-09	-106.8E-09	-119.1E-09	-123.1E-09	-131.0E-09	-149.8E-09	-148.5E-09	-167.0E-09	-164.6E-09	-118.0E-09
Average	-85.7E-09	-86.5E-09	-92.7E-09	-100.5E-09	-110.8E-09	-121.6E-09	-128.6E-09	-135.9E-09	-152.6E-09	-156.2E-09	-169.1E-09	-168.3E-09	-122.4E-09
Sigma	5.7E-09	1.9E-09	4.1E-09	6.2E-09	5.0E-09	1.9E-09	3.9E-09	3.8E-09	2.5E-09	7.7E-09	2.5E-09	3.5E-09	3.2E-09

Drift Calculation

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.2E-09	-6.8E-09	-18.0E-09	-25.9E-09	-38.2E-09	-42.2E-09	-50.1E-09	-68.9E-09	-67.6E-09	-86.8E-09	-86.4E-09	-37.1E-09
32	-	4.9E-09	-4.0E-09	-15.0E-09	-24.2E-09	-30.2E-09	-38.6E-09	-46.5E-09	-62.2E-09	-59.6E-09	-79.0E-09	-70.9E-09	-30.0E-09
39	-	-4.3E-09	-10.3E-09	-11.4E-09	-25.3E-09	-39.4E-09	-48.0E-09	-54.1E-09	-69.8E-09	-84.4E-09	-84.6E-09	-90.7E-09	-43.1E-09
Average	-	-854.7E-12	-7.0E-09	-14.8E-09	-25.1E-09	-35.9E-09	-42.9E-09	-50.2E-09	-67.0E-09	-70.5E-09	-83.4E-09	-82.6E-09	-36.7E-09
Sigma	-	4.1E-09	2.6E-09	2.7E-09	697.3E-12	4.1E-09	3.9E-09	3.1E-09	3.4E-09	10.3E-09	3.3E-09	8.5E-09	5.3E-09

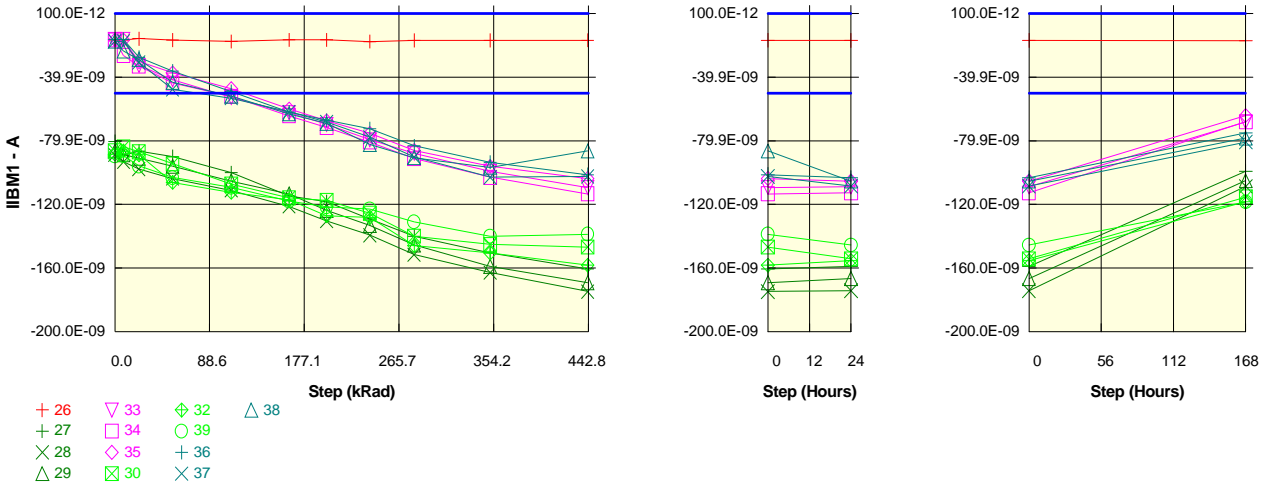
Measurements

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.1E-09	-19.7E-09	-16.4E-09	-17.0E-09	-18.4E-09	-17.4E-09	-17.4E-09	-18.1E-09	-17.1E-09	-17.1E-09	-17.5E-09	-16.9E-09	-19.0E-09
OFF TID samples													
36	-17.2E-09	-17.2E-09	-30.3E-09	-37.1E-09	-47.2E-09	-57.7E-09	-64.3E-09	-73.6E-09	-90.4E-09	-97.6E-09	-105.2E-09	-109.0E-09	-76.7E-09
37	-17.4E-09	-17.4E-09	-29.2E-09	-43.2E-09	-53.8E-09	-67.5E-09	-75.1E-09	-80.6E-09	-99.8E-09	-107.2E-09	-110.5E-09	-115.7E-09	-88.9E-09
38	-17.4E-09	-22.0E-09	-32.3E-09	-41.5E-09	-50.5E-09	-64.3E-09	-72.5E-09	-85.9E-09	-94.1E-09	-111.6E-09	-118.4E-09	-119.6E-09	-86.1E-09
Statistics													
Min	-17.4E-09	-22.0E-09	-32.3E-09	-43.2E-09	-53.8E-09	-67.5E-09	-75.1E-09	-85.9E-09	-99.8E-09	-111.6E-09	-118.4E-09	-119.6E-09	-88.9E-09
Max	-17.2E-09	-17.2E-09	-29.2E-09	-37.1E-09	-47.2E-09	-57.7E-09	-64.3E-09	-73.6E-09	-90.4E-09	-97.6E-09	-105.2E-09	-109.0E-09	-76.7E-09
Average	-17.3E-09	-18.9E-09	-30.6E-09	-40.6E-09	-50.5E-09	-63.2E-09	-70.6E-09	-80.1E-09	-94.8E-09	-105.5E-09	-111.4E-09	-114.8E-09	-83.9E-09
Sigma	91.9E-12	2.2E-09	1.3E-09	2.6E-09	2.7E-09	4.1E-09	4.6E-09	5.0E-09	3.9E-09	5.9E-09	5.5E-09	4.3E-09	5.2E-09

Drift Calculation

IIBM1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-13.1E-09	-19.9E-09	-30.0E-09	-40.5E-09	-47.1E-09	-56.4E-09	-73.2E-09	-80.4E-09	-88.0E-09	-91.8E-09	-59.5E-09
37	-	0.0E+00	-11.8E-09	-25.8E-09	-36.4E-09	-50.1E-09	-57.7E-09	-63.2E-09	-82.4E-09	-89.8E-09	-93.1E-09	-98.3E-09	-71.5E-09
38	-	-4.6E-09	-14.9E-09	-24.1E-09	-33.2E-09	-46.9E-09	-55.1E-09	-68.6E-09	-76.7E-09	-94.2E-09	-101.1E-09	-102.2E-09	-68.7E-09
Average	-	-1.5E-09	-13.3E-09	-23.3E-09	-33.2E-09	-45.9E-09	-53.3E-09	-62.7E-09	-77.4E-09	-88.1E-09	-94.0E-09	-97.4E-09	-66.5E-09
Sigma	-	2.2E-09	1.3E-09	2.5E-09	2.6E-09	4.0E-09	4.5E-09	5.0E-09	3.8E-09	5.8E-09	5.4E-09	4.3E-09	5.1E-09

Parameter : Input Bias Current : IIBM1DUTB
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-16.6E-09	-16.6E-09	-15.8E-09	-16.6E-09	-17.4E-09	-16.5E-09	-16.5E-09	-17.5E-09	-16.8E-09	-16.8E-09	-16.7E-09	-16.8E-09	-17.1E-09
ON_PROTON samples													
27	-80.5E-09	-89.1E-09	-86.5E-09	-89.9E-09	-100.0E-09	-114.7E-09	-118.3E-09	-129.3E-09	-140.1E-09	-150.7E-09	-160.5E-09	-159.1E-09	-99.1E-09
28	-88.8E-09	-93.3E-09	-97.8E-09	-103.8E-09	-111.2E-09	-121.4E-09	-130.5E-09	-139.4E-09	-151.7E-09	-162.9E-09	-174.9E-09	-174.3E-09	-108.7E-09
29	-86.4E-09	-88.8E-09	-91.0E-09	-96.0E-09	-105.3E-09	-113.4E-09	-123.9E-09	-133.3E-09	-145.6E-09	-159.1E-09	-169.2E-09	-166.7E-09	-105.1E-09
Statistics													
Min	-88.8E-09	-93.3E-09	-97.8E-09	-103.8E-09	-111.2E-09	-121.4E-09	-130.5E-09	-139.4E-09	-151.7E-09	-162.9E-09	-174.9E-09	-174.3E-09	-108.7E-09
Max	-80.5E-09	-88.8E-09	-86.5E-09	-89.9E-09	-100.0E-09	-113.4E-09	-118.3E-09	-129.3E-09	-140.1E-09	-150.7E-09	-160.5E-09	-159.1E-09	-99.1E-09
Average	-85.2E-09	-90.4E-09	-91.8E-09	-96.5E-09	-105.5E-09	-116.5E-09	-124.2E-09	-134.0E-09	-145.8E-09	-157.5E-09	-168.2E-09	-166.7E-09	-104.3E-09
Sigma	3.5E-09	2.0E-09	4.6E-09	5.7E-09	4.6E-09	3.5E-09	5.0E-09	4.2E-09	4.7E-09	5.1E-09	5.9E-09	6.2E-09	3.9E-09

Drift Calculation

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-8.6E-09	-6.1E-09	-9.4E-09	-19.5E-09	-34.3E-09	-37.8E-09	-48.8E-09	-59.6E-09	-70.2E-09	-80.0E-09	-78.7E-09	-18.7E-09
28	-	-4.4E-09	-8.9E-09	-14.9E-09	-22.4E-09	-32.6E-09	-41.7E-09	-50.6E-09	-62.8E-09	-74.1E-09	-86.1E-09	-85.5E-09	-19.9E-09
29	-	-2.4E-09	-4.6E-09	-9.6E-09	-18.9E-09	-27.0E-09	-37.4E-09	-46.8E-09	-59.2E-09	-72.6E-09	-82.8E-09	-80.3E-09	-18.7E-09
Average	-	-5.2E-09	-6.5E-09	-11.3E-09	-20.3E-09	-31.3E-09	-39.0E-09	-48.7E-09	-60.6E-09	-72.3E-09	-83.0E-09	-81.5E-09	-19.1E-09
Sigma	-	2.6E-09	1.8E-09	2.6E-09	1.5E-09	3.1E-09	1.9E-09	1.5E-09	1.6E-09	1.6E-09	2.5E-09	2.9E-09	558.2E-12

Measurements

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-16.6E-09	-16.6E-09	-15.8E-09	-16.6E-09	-17.4E-09	-16.5E-09	-16.5E-09	-17.5E-09	-16.8E-09	-16.8E-09	-16.7E-09	-16.8E-09	-17.1E-09
ON_TID samples													
33	-16.2E-09	-16.2E-09	-32.6E-09	-41.7E-09	-52.7E-09	-62.4E-09	-69.7E-09	-79.3E-09	-87.9E-09	-99.1E-09	-109.4E-09	-109.0E-09	-68.2E-09
34	-16.5E-09	-26.3E-09	-32.9E-09	-43.7E-09	-52.0E-09	-64.2E-09	-71.7E-09	-80.9E-09	-91.2E-09	-103.0E-09	-113.4E-09	-112.7E-09	-68.1E-09
35	-16.5E-09	-16.5E-09	-30.1E-09	-37.2E-09	-47.2E-09	-60.0E-09	-67.5E-09	-75.3E-09	-86.2E-09	-96.0E-09	-103.7E-09	-105.3E-09	-64.1E-09
Statistics													
Min	-16.5E-09	-26.3E-09	-32.9E-09	-43.7E-09	-52.7E-09	-64.2E-09	-71.7E-09	-80.9E-09	-91.2E-09	-103.0E-09	-113.4E-09	-112.7E-09	-68.2E-09
Max	-16.2E-09	-16.2E-09	-30.1E-09	-37.2E-09	-47.2E-09	-60.0E-09	-67.5E-09	-75.3E-09	-86.2E-09	-96.0E-09	-103.7E-09	-105.3E-09	-64.1E-09
Average	-16.4E-09	-19.7E-09	-31.9E-09	-40.9E-09	-50.6E-09	-62.2E-09	-69.6E-09	-78.5E-09	-88.4E-09	-99.4E-09	-108.8E-09	-109.0E-09	-66.8E-09
Sigma	117.5E-12	4.7E-09	1.3E-09	2.7E-09	2.4E-09	1.7E-09	1.7E-09	2.3E-09	2.1E-09	2.8E-09	4.0E-09	3.0E-09	1.9E-09

Drift Calculation

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-16.4E-09	-25.5E-09	-36.4E-09	-46.1E-09	-53.4E-09	-63.1E-09	-71.7E-09	-82.9E-09	-93.2E-09	-92.8E-09	-51.9E-09
34	-	-9.8E-09	-16.4E-09	-27.3E-09	-35.6E-09	-47.8E-09	-55.2E-09	-64.4E-09	-74.8E-09	-86.5E-09	-96.9E-09	-96.2E-09	-51.6E-09
35	-	0.0E+00	-13.6E-09	-20.8E-09	-30.8E-09	-43.5E-09	-51.0E-09	-58.8E-09	-69.7E-09	-79.6E-09	-87.3E-09	-88.9E-09	-47.7E-09
Average	-	-3.3E-09	-15.5E-09	-24.5E-09	-34.3E-09	-45.8E-09	-53.2E-09	-62.1E-09	-72.1E-09	-83.0E-09	-92.5E-09	-92.6E-09	-50.4E-09
Sigma	-	4.6E-09	1.3E-09	2.8E-09	2.5E-09	1.8E-09	1.7E-09	2.4E-09	2.1E-09	2.8E-09	4.0E-09	3.0E-09	1.9E-09

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-16.6E-09	-16.6E-09	-15.8E-09	-16.6E-09	-17.4E-09	-16.5E-09	-16.5E-09	-17.5E-09	-16.8E-09	-16.8E-09	-16.7E-09	-16.8E-09	-17.1E-09
OFF PROTON samples													
30	-86.2E-09	-83.8E-09	-87.0E-09	-94.4E-09	-107.3E-09	-115.9E-09	-117.5E-09	-125.6E-09	-140.0E-09	-145.2E-09	-146.9E-09	-154.2E-09	-115.4E-09
32	-88.5E-09	-86.4E-09	-88.7E-09	-106.2E-09	-112.4E-09	-117.1E-09	-127.1E-09	-128.2E-09	-145.9E-09	-150.5E-09	-158.3E-09	-155.3E-09	-118.4E-09
39	-89.5E-09	-89.3E-09	-95.9E-09	-103.1E-09	-109.2E-09	-117.9E-09	-121.6E-09	-122.9E-09	-131.0E-09	-140.0E-09	-138.7E-09	-145.6E-09	-118.5E-09
Statistics													
Min	-89.5E-09	-89.3E-09	-95.9E-09	-106.2E-09	-112.4E-09	-117.9E-09	-127.1E-09	-128.2E-09	-145.9E-09	-150.5E-09	-158.3E-09	-155.3E-09	-118.5E-09
Max	-86.2E-09	-83.8E-09	-87.0E-09	-94.4E-09	-107.3E-09	-115.9E-09	-117.5E-09	-122.9E-09	-131.0E-09	-140.0E-09	-138.7E-09	-145.6E-09	-115.4E-09
Average	-88.1E-09	-86.5E-09	-90.5E-09	-101.2E-09	-109.6E-09	-117.0E-09	-122.1E-09	-125.6E-09	-139.0E-09	-145.3E-09	-148.0E-09	-151.7E-09	-117.4E-09
Sigma	1.4E-09	2.3E-09	3.9E-09	5.0E-09	2.1E-09	788.1E-12	3.9E-09	2.2E-09	6.1E-09	4.3E-09	8.0E-09	4.4E-09	1.4E-09

Drift Calculation

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	2.5E-09	-735.5E-12	-8.2E-09	-21.1E-09	-29.7E-09	-31.3E-09	-39.4E-09	-53.8E-09	-59.0E-09	-60.6E-09	-68.0E-09	-29.2E-09
32	-	2.1E-09	-234.0E-12	-17.7E-09	-23.9E-09	-28.6E-09	-38.6E-09	-39.7E-09	-57.4E-09	-62.0E-09	-69.8E-09	-66.8E-09	-29.9E-09
39	-	234.0E-12	-6.4E-09	-13.6E-09	-19.7E-09	-28.3E-09	-32.1E-09	-33.3E-09	-41.5E-09	-50.5E-09	-49.2E-09	-56.0E-09	-28.9E-09
Average	-	1.6E-09	-2.4E-09	-13.1E-09	-21.5E-09	-28.9E-09	-34.0E-09	-37.5E-09	-50.9E-09	-57.2E-09	-59.9E-09	-63.6E-09	-29.3E-09
Sigma	-	973.0E-12	2.8E-09	3.9E-09	1.8E-09	606.3E-12	3.3E-09	2.9E-09	6.8E-09	4.9E-09	8.4E-09	5.4E-09	394.5E-12

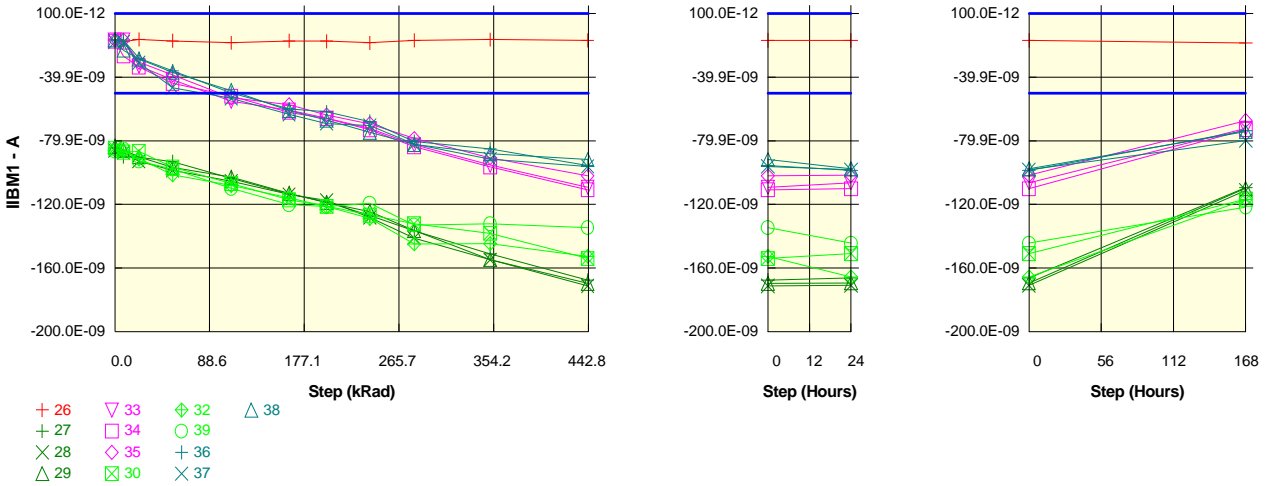
Measurements

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-16.6E-09	-16.6E-09	-15.8E-09	-16.6E-09	-17.4E-09	-16.5E-09	-16.5E-09	-17.5E-09	-16.8E-09	-16.8E-09	-16.7E-09	-16.8E-09	-17.1E-09
OFF TID samples													
36	-16.2E-09	-16.2E-09	-27.5E-09	-36.2E-09	-49.1E-09	-61.9E-09	-67.0E-09	-72.4E-09	-83.2E-09	-93.5E-09	-101.3E-09	-103.1E-09	-75.1E-09
37	-17.4E-09	-17.4E-09	-30.8E-09	-47.6E-09	-53.1E-09	-61.9E-09	-68.2E-09	-77.7E-09	-90.2E-09	-102.9E-09	-102.4E-09	-108.5E-09	-80.8E-09
38	-17.2E-09	-23.5E-09	-28.8E-09	-43.2E-09	-51.9E-09	-63.1E-09	-69.1E-09	-82.3E-09	-90.6E-09	-96.7E-09	-86.3E-09	-105.3E-09	-78.3E-09
Statistics													
Min	-17.4E-09	-23.5E-09	-30.8E-09	-47.6E-09	-53.1E-09	-63.1E-09	-69.1E-09	-82.3E-09	-90.6E-09	-102.9E-09	-102.4E-09	-108.5E-09	-80.8E-09
Max	-16.2E-09	-16.2E-09	-27.5E-09	-36.2E-09	-49.1E-09	-61.9E-09	-67.0E-09	-72.4E-09	-83.2E-09	-93.5E-09	-86.3E-09	-103.1E-09	-75.1E-09
Average	-16.9E-09	-19.0E-09	-29.0E-09	-42.3E-09	-51.4E-09	-62.3E-09	-68.1E-09	-77.5E-09	-88.0E-09	-97.7E-09	-96.7E-09	-105.7E-09	-78.1E-09
Sigma	533.3E-12	3.2E-09	1.3E-09	4.7E-09	1.7E-09	582.9E-12	847.2E-12	4.1E-09	3.4E-09	3.9E-09	7.3E-09	2.2E-09	2.3E-09

Drift Calculation

IIBM1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-11.3E-09	-20.0E-09	-32.9E-09	-45.7E-09	-50.9E-09	-56.2E-09	-67.0E-09	-77.4E-09	-85.1E-09	-87.0E-09	-59.0E-09
37	-	0.0E+00	-13.4E-09	-30.3E-09	-35.8E-09	-44.5E-09	-50.9E-09	-60.3E-09	-72.8E-09	-85.6E-09	-85.0E-09	-91.1E-09	-63.5E-09
38	-	-6.3E-09	-11.6E-09	-26.0E-09	-34.7E-09	-45.9E-09	-51.9E-09	-65.1E-09	-73.4E-09	-79.5E-09	-69.1E-09	-88.2E-09	-61.1E-09
Average	-	-2.1E-09	-12.1E-09	-25.4E-09	-34.4E-09	-45.4E-09	-51.2E-09	-60.5E-09	-71.1E-09	-80.8E-09	-79.8E-09	-88.7E-09	-61.2E-09
Sigma	-	3.0E-09	908.1E-12	4.2E-09	1.2E-09	638.1E-12	492.5E-12	3.6E-09	2.9E-09	3.5E-09	7.5E-09	1.7E-09	1.8E-09

Parameter : Input Bias Current : IIBM1DUTC
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-16.5E-09	-17.5E-09	-16.2E-09	-17.1E-09	-18.3E-09	-17.1E-09	-17.4E-09	-18.3E-09	-16.8E-09	-16.3E-09	-16.8E-09	-16.8E-09	-18.4E-09
ON PROTON samples													
27	-84.4E-09	-90.1E-09	-90.4E-09	-93.2E-09	-103.6E-09	-113.6E-09	-118.5E-09	-127.0E-09	-136.7E-09	-151.3E-09	-167.7E-09	-166.3E-09	-109.6E-09
28	-86.1E-09	-87.3E-09	-93.0E-09	-98.6E-09	-105.4E-09	-113.7E-09	-117.5E-09	-128.2E-09	-141.2E-09	-154.8E-09	-171.3E-09	-170.9E-09	-111.2E-09
29	-83.5E-09	-85.8E-09	-90.0E-09	-96.8E-09	-102.9E-09	-113.1E-09	-118.9E-09	-124.5E-09	-136.5E-09	-154.8E-09	-169.7E-09	-169.5E-09	-110.0E-09
Statistics													
Min	-86.1E-09	-90.1E-09	-93.0E-09	-98.6E-09	-105.4E-09	-113.7E-09	-118.9E-09	-128.2E-09	-141.2E-09	-154.8E-09	-171.3E-09	-170.9E-09	-111.2E-09
Max	-83.5E-09	-85.8E-09	-90.0E-09	-93.2E-09	-102.9E-09	-113.1E-09	-117.5E-09	-124.5E-09	-136.5E-09	-151.3E-09	-167.7E-09	-166.3E-09	-109.6E-09
Average	-84.7E-09	-87.7E-09	-91.1E-09	-96.2E-09	-104.0E-09	-113.4E-09	-118.3E-09	-126.6E-09	-138.1E-09	-153.6E-09	-169.6E-09	-168.9E-09	-110.3E-09
Sigma	1.1E-09	1.8E-09	1.3E-09	2.2E-09	1.1E-09	251.4E-12	585.2E-12	1.5E-09	2.2E-09	1.7E-09	1.5E-09	2.0E-09	685.3E-12

Drift Calculation

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-5.7E-09	-6.0E-09	-8.8E-09	-19.2E-09	-29.1E-09	-34.1E-09	-42.6E-09	-52.3E-09	-66.9E-09	-83.3E-09	-81.9E-09	-25.2E-09
28	-	-1.2E-09	-6.9E-09	-12.5E-09	-19.3E-09	-27.6E-09	-31.4E-09	-42.1E-09	-55.1E-09	-68.7E-09	-85.2E-09	-84.8E-09	-25.1E-09
29	-	-2.3E-09	-6.5E-09	-13.3E-09	-19.5E-09	-29.6E-09	-35.4E-09	-41.1E-09	-53.0E-09	-71.3E-09	-86.2E-09	-86.0E-09	-26.6E-09
Average	-	-3.1E-09	-6.5E-09	-11.5E-09	-19.3E-09	-28.8E-09	-33.6E-09	-41.9E-09	-53.5E-09	-69.0E-09	-84.9E-09	-84.2E-09	-25.6E-09
Sigma	-	1.9E-09	366.5E-12	2.0E-09	100.6E-12	852.5E-12	1.7E-09	636.8E-12	1.2E-09	1.8E-09	1.2E-09	1.7E-09	662.1E-12

Measurements

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-16.5E-09	-17.5E-09	-16.2E-09	-17.1E-09	-18.3E-09	-17.1E-09	-17.4E-09	-18.3E-09	-16.8E-09	-16.3E-09	-16.8E-09	-16.8E-09	-18.4E-09
ON TID samples													
33	-16.7E-09	-16.7E-09	-33.0E-09	-41.6E-09	-55.1E-09	-60.8E-09	-65.8E-09	-72.2E-09	-82.6E-09	-95.3E-09	-109.2E-09	-106.4E-09	-72.2E-09
34	-17.3E-09	-26.7E-09	-33.6E-09	-43.8E-09	-51.9E-09	-62.1E-09	-66.1E-09	-73.0E-09	-83.8E-09	-96.4E-09	-110.8E-09	-110.2E-09	-72.9E-09
35	-16.6E-09	-16.6E-09	-30.5E-09	-38.5E-09	-52.9E-09	-57.3E-09	-63.7E-09	-69.3E-09	-78.6E-09	-90.6E-09	-102.1E-09	-101.7E-09	-67.2E-09
Statistics													
Min	-17.3E-09	-26.7E-09	-33.6E-09	-43.8E-09	-55.1E-09	-62.1E-09	-66.1E-09	-73.0E-09	-83.8E-09	-96.4E-09	-110.8E-09	-110.2E-09	-72.9E-09
Max	-16.6E-09	-16.6E-09	-30.5E-09	-38.5E-09	-51.9E-09	-57.3E-09	-63.7E-09	-69.3E-09	-78.6E-09	-90.6E-09	-102.1E-09	-101.7E-09	-67.2E-09
Average	-16.9E-09	-20.0E-09	-32.4E-09	-41.3E-09	-53.3E-09	-60.1E-09	-65.2E-09	-71.5E-09	-81.6E-09	-94.1E-09	-107.4E-09	-106.1E-09	-70.8E-09
Sigma	330.7E-12	4.7E-09	1.3E-09	2.2E-09	1.3E-09	2.0E-09	1.0E-09	1.6E-09	2.2E-09	2.5E-09	3.8E-09	3.5E-09	2.5E-09

Drift Calculation

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-16.4E-09	-24.9E-09	-38.5E-09	-44.1E-09	-49.1E-09	-55.6E-09	-65.9E-09	-78.6E-09	-92.6E-09	-89.7E-09	-55.5E-09
34	-	-9.3E-09	-16.2E-09	-26.5E-09	-34.6E-09	-44.8E-09	-48.8E-09	-55.7E-09	-66.5E-09	-79.1E-09	-93.5E-09	-92.8E-09	-55.6E-09
35	-	0.0E+00	-13.9E-09	-21.9E-09	-36.3E-09	-40.7E-09	-47.1E-09	-52.7E-09	-62.0E-09	-74.0E-09	-85.5E-09	-85.1E-09	-50.7E-09
Average	-	-3.1E-09	-15.5E-09	-24.5E-09	-36.5E-09	-43.2E-09	-48.3E-09	-54.7E-09	-64.8E-09	-77.2E-09	-90.5E-09	-89.2E-09	-53.9E-09
Sigma	-	4.4E-09	1.1E-09	1.9E-09	1.6E-09	1.8E-09	857.5E-12	1.4E-09	2.0E-09	2.3E-09	3.6E-09	3.2E-09	2.3E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-16.5E-09	-17.5E-09	-16.2E-09	-17.1E-09	-18.3E-09	-17.1E-09	-17.4E-09	-18.3E-09	-16.8E-09	-16.3E-09	-16.8E-09	-16.8E-09	-18.4E-09
OFF PROTON samples													
30	-84.6E-09	-87.1E-09	-86.6E-09	-96.5E-09	-106.8E-09	-117.2E-09	-121.2E-09	-126.7E-09	-132.3E-09	-138.2E-09	-154.1E-09	-150.9E-09	-116.7E-09
32	-85.9E-09	-86.5E-09	-91.3E-09	-101.5E-09	-108.0E-09	-115.9E-09	-121.4E-09	-128.8E-09	-144.8E-09	-144.6E-09	-152.8E-09	-165.7E-09	-116.8E-09
39	-86.5E-09	-85.1E-09	-92.8E-09	-97.8E-09	-110.0E-09	-120.2E-09	-121.4E-09	-119.4E-09	-133.0E-09	-132.3E-09	-134.7E-09	-144.5E-09	-121.7E-09
Statistics													
Min	-86.5E-09	-87.1E-09	-92.8E-09	-101.5E-09	-110.0E-09	-120.2E-09	-121.4E-09	-128.8E-09	-144.8E-09	-144.6E-09	-154.1E-09	-165.7E-09	-121.7E-09
Max	-84.6E-09	-85.1E-09	-86.6E-09	-96.5E-09	-106.8E-09	-115.9E-09	-121.2E-09	-119.4E-09	-132.3E-09	-132.3E-09	-134.7E-09	-144.5E-09	-116.7E-09
Average	-85.7E-09	-86.2E-09	-90.2E-09	-98.6E-09	-108.3E-09	-117.8E-09	-121.3E-09	-125.0E-09	-136.7E-09	-138.4E-09	-147.2E-09	-153.7E-09	-118.4E-09
Sigma	772.2E-12	842.3E-12	2.6E-09	2.1E-09	1.3E-09	1.8E-09	86.9E-12	4.0E-09	5.7E-09	5.0E-09	8.8E-09	8.9E-09	2.4E-09

Drift Calculation

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-2.5E-09	-2.0E-09	-11.9E-09	-22.2E-09	-32.5E-09	-36.6E-09	-42.1E-09	-47.7E-09	-53.6E-09	-69.4E-09	-66.3E-09	-32.1E-09
32	-	-635.2E-12	-5.4E-09	-15.6E-09	-22.1E-09	-30.0E-09	-35.5E-09	-42.9E-09	-58.9E-09	-58.8E-09	-66.9E-09	-79.8E-09	-31.0E-09
39	-	1.4E-09	-6.4E-09	-11.4E-09	-23.6E-09	-33.8E-09	-34.9E-09	-32.9E-09	-46.6E-09	-45.8E-09	-48.2E-09	-58.0E-09	-35.3E-09
Average	-	-587.3E-12	-4.6E-09	-13.0E-09	-22.6E-09	-32.1E-09	-35.7E-09	-39.3E-09	-51.1E-09	-52.7E-09	-61.5E-09	-68.0E-09	-32.8E-09
Sigma	-	1.6E-09	1.9E-09	1.9E-09	645.0E-12	1.6E-09	689.9E-12	4.5E-09	5.6E-09	5.3E-09	9.5E-09	9.0E-09	1.8E-09

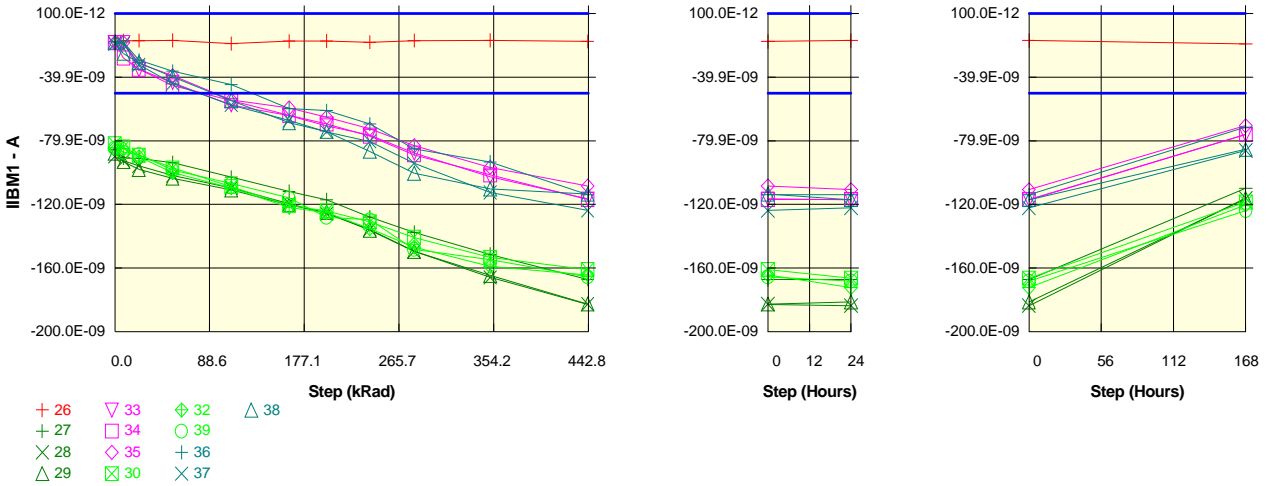
Measurements

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-16.5E-09	-17.5E-09	-16.2E-09	-17.1E-09	-18.3E-09	-17.1E-09	-17.4E-09	-18.3E-09	-16.8E-09	-16.3E-09	-16.8E-09	-16.8E-09	-18.4E-09
OFF TID samples													
36	-16.6E-09	-16.6E-09	-28.1E-09	-36.1E-09	-49.9E-09	-60.0E-09	-61.9E-09	-67.9E-09	-80.4E-09	-85.2E-09	-95.6E-09	-98.5E-09	-73.7E-09
37	-17.8E-09	-17.8E-09	-30.9E-09	-46.6E-09	-53.4E-09	-63.3E-09	-69.1E-09	-70.4E-09	-82.1E-09	-91.5E-09	-96.1E-09	-98.3E-09	-79.9E-09
38	-16.4E-09	-23.1E-09	-28.6E-09	-36.8E-09	-48.5E-09	-60.9E-09	-67.0E-09	-74.7E-09	-82.3E-09	-88.2E-09	-91.9E-09	-97.6E-09	-74.2E-09
Statistics													
Min	-17.8E-09	-23.1E-09	-30.9E-09	-46.6E-09	-53.4E-09	-63.3E-09	-69.1E-09	-74.7E-09	-82.3E-09	-91.5E-09	-96.1E-09	-98.5E-09	-79.9E-09
Max	-16.4E-09	-16.6E-09	-28.1E-09	-36.1E-09	-48.5E-09	-60.0E-09	-61.9E-09	-67.9E-09	-80.4E-09	-85.2E-09	-91.9E-09	-97.6E-09	-73.7E-09
Average	-16.9E-09	-19.1E-09	-29.2E-09	-39.8E-09	-50.6E-09	-61.4E-09	-66.0E-09	-71.0E-09	-81.6E-09	-88.3E-09	-94.5E-09	-98.2E-09	-75.9E-09
Sigma	604.5E-12	2.8E-09	1.2E-09	4.8E-09	2.1E-09	1.4E-09	3.1E-09	2.8E-09	829.6E-12	2.6E-09	1.9E-09	398.6E-12	2.8E-09

Drift Calculation

IIBM1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-11.5E-09	-19.5E-09	-33.3E-09	-43.4E-09	-45.3E-09	-51.3E-09	-63.9E-09	-68.7E-09	-79.0E-09	-81.9E-09	-57.1E-09
37	-	0.0E+00	-13.2E-09	-28.8E-09	-35.6E-09	-45.5E-09	-51.4E-09	-52.7E-09	-64.3E-09	-73.7E-09	-78.4E-09	-80.6E-09	-62.1E-09
38	-	-6.6E-09	-12.2E-09	-20.4E-09	-32.0E-09	-44.5E-09	-50.6E-09	-58.3E-09	-65.9E-09	-71.8E-09	-75.5E-09	-81.2E-09	-57.8E-09
Average	-	-2.2E-09	-12.3E-09	-22.9E-09	-33.6E-09	-44.5E-09	-49.1E-09	-54.1E-09	-64.7E-09	-71.4E-09	-77.6E-09	-81.2E-09	-59.0E-09
Sigma	-	3.1E-09	666.8E-12	4.2E-09	1.5E-09	868.6E-12	2.7E-09	3.0E-09	857.6E-12	2.1E-09	1.5E-09	563.6E-12	2.2E-09

Parameter : Input Bias Current : IIBM1DUTD
 Test conditions : +VCC=30V. -VCC=GND.VCM=-15V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.4E-09	-17.1E-09	-17.0E-09	-16.8E-09	-18.8E-09	-17.3E-09	-17.2E-09	-18.0E-09	-17.0E-09	-16.8E-09	-17.5E-09	-16.9E-09	-19.0E-09
ON_PROTON samples													
27	-85.3E-09	-90.8E-09	-91.0E-09	-93.8E-09	-102.9E-09	-111.8E-09	-117.1E-09	-128.0E-09	-137.6E-09	-151.4E-09	-167.2E-09	-167.2E-09	-109.9E-09
28	-89.9E-09	-92.5E-09	-95.7E-09	-101.9E-09	-109.7E-09	-119.5E-09	-125.8E-09	-135.7E-09	-149.6E-09	-165.9E-09	-182.8E-09	-183.7E-09	-116.2E-09
29	-87.8E-09	-93.1E-09	-98.0E-09	-103.6E-09	-110.9E-09	-120.3E-09	-125.0E-09	-136.3E-09	-149.5E-09	-164.7E-09	-182.7E-09	-181.3E-09	-116.4E-09
Statistics													
Min	-89.9E-09	-93.1E-09	-98.0E-09	-103.6E-09	-110.9E-09	-120.3E-09	-125.8E-09	-136.3E-09	-149.6E-09	-165.9E-09	-182.8E-09	-183.7E-09	-116.4E-09
Max	-85.3E-09	-90.8E-09	-91.0E-09	-93.8E-09	-102.9E-09	-111.8E-09	-117.1E-09	-128.0E-09	-137.6E-09	-151.4E-09	-167.2E-09	-167.2E-09	-109.9E-09
Average	-87.7E-09	-92.1E-09	-94.9E-09	-99.8E-09	-107.8E-09	-117.2E-09	-122.6E-09	-133.3E-09	-145.6E-09	-160.7E-09	-177.4E-09	-177.4E-09	-114.2E-09
Sigma	1.9E-09	960.5E-12	2.9E-09	4.3E-09	3.5E-09	3.8E-09	3.9E-09	3.8E-09	5.6E-09	6.6E-09	7.4E-09	7.3E-09	3.0E-09

Drift Calculation

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-5.5E-09	-5.7E-09	-8.5E-09	-17.6E-09	-26.5E-09	-31.7E-09	-42.6E-09	-52.3E-09	-66.1E-09	-81.8E-09	-81.9E-09	-24.6E-09
28	-	-2.6E-09	-5.8E-09	-12.0E-09	-19.8E-09	-29.6E-09	-35.9E-09	-45.8E-09	-59.7E-09	-76.0E-09	-92.9E-09	-93.8E-09	-26.2E-09
29	-	-5.2E-09	-10.2E-09	-15.8E-09	-23.0E-09	-32.5E-09	-37.2E-09	-48.4E-09	-61.7E-09	-76.8E-09	-94.9E-09	-93.5E-09	-28.6E-09
Average	-	-4.4E-09	-7.2E-09	-12.1E-09	-20.1E-09	-29.5E-09	-34.9E-09	-45.6E-09	-57.9E-09	-73.0E-09	-89.9E-09	-89.7E-09	-26.5E-09
Sigma	-	1.3E-09	2.1E-09	3.0E-09	2.2E-09	2.4E-09	2.3E-09	2.4E-09	4.1E-09	4.9E-09	5.7E-09	5.5E-09	1.6E-09

Measurements

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-17.4E-09	-17.1E-09	-17.0E-09	-16.8E-09	-18.8E-09	-17.3E-09	-17.2E-09	-18.0E-09	-17.0E-09	-16.8E-09	-17.5E-09	-16.9E-09	-19.0E-09
ON_TID samples													
33	-18.2E-09	-18.2E-09	-35.1E-09	-43.3E-09	-57.5E-09	-64.1E-09	-70.6E-09	-76.5E-09	-87.7E-09	-102.6E-09	-116.6E-09	-117.1E-09	-76.1E-09
34	-18.3E-09	-27.9E-09	-35.0E-09	-45.2E-09	-54.8E-09	-64.1E-09	-69.4E-09	-77.1E-09	-88.9E-09	-101.5E-09	-116.9E-09	-116.9E-09	-76.1E-09
35	-18.2E-09	-18.2E-09	-31.3E-09	-38.9E-09	-54.2E-09	-59.3E-09	-65.2E-09	-72.5E-09	-83.1E-09	-96.7E-09	-108.4E-09	-110.7E-09	-70.5E-09
Statistics													
Min	-18.3E-09	-27.9E-09	-35.1E-09	-45.2E-09	-57.5E-09	-64.1E-09	-70.6E-09	-77.1E-09	-88.9E-09	-102.6E-09	-116.9E-09	-117.1E-09	-76.1E-09
Max	-18.2E-09	-18.2E-09	-31.3E-09	-38.9E-09	-54.2E-09	-59.3E-09	-65.2E-09	-72.5E-09	-83.1E-09	-96.7E-09	-108.4E-09	-110.7E-09	-70.5E-09
Average	-18.2E-09	-21.4E-09	-33.8E-09	-42.5E-09	-55.5E-09	-62.5E-09	-68.4E-09	-75.4E-09	-86.6E-09	-100.3E-09	-114.0E-09	-114.9E-09	-74.3E-09
Sigma	24.1E-12	4.5E-09	1.8E-09	2.7E-09	1.4E-09	2.3E-09	2.3E-09	2.1E-09	2.5E-09	2.6E-09	4.0E-09	3.0E-09	2.6E-09

Drift Calculation

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-16.9E-09	-25.1E-09	-39.3E-09	-45.9E-09	-52.4E-09	-58.3E-09	-69.5E-09	-84.4E-09	-98.4E-09	-98.9E-09	-57.9E-09
34	-	-9.6E-09	-16.7E-09	-27.0E-09	-36.6E-09	-45.8E-09	-51.1E-09	-58.9E-09	-70.7E-09	-83.3E-09	-98.7E-09	-98.6E-09	-57.8E-09
35	-	0.0E+00	-13.1E-09	-20.7E-09	-36.0E-09	-41.1E-09	-47.0E-09	-54.3E-09	-64.9E-09	-78.4E-09	-90.2E-09	-92.5E-09	-52.3E-09
Average	-	-3.2E-09	-15.6E-09	-24.3E-09	-37.3E-09	-44.3E-09	-50.1E-09	-57.2E-09	-68.3E-09	-82.0E-09	-95.7E-09	-96.7E-09	-56.0E-09
Sigma	-	4.5E-09	1.7E-09	2.6E-09	1.5E-09	2.3E-09	2.3E-09	2.0E-09	2.5E-09	2.6E-09	3.9E-09	3.0E-09	2.6E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.4E-09	-17.1E-09	-17.0E-09	-16.8E-09	-18.8E-09	-17.3E-09	-17.2E-09	-18.0E-09	-17.0E-09	-16.8E-09	-17.5E-09	-16.9E-09	-19.0E-09
OFF PROTON samples													
30	-81.9E-09	-84.0E-09	-89.2E-09	-97.0E-09	-108.8E-09	-120.6E-09	-124.2E-09	-131.0E-09	-140.8E-09	-153.3E-09	-161.1E-09	-166.4E-09	-118.5E-09
32	-84.3E-09	-84.9E-09	-90.2E-09	-100.1E-09	-109.7E-09	-121.9E-09	-125.3E-09	-135.2E-09	-146.9E-09	-159.0E-09	-164.4E-09	-172.3E-09	-120.4E-09
39	-84.7E-09	-87.3E-09	-88.6E-09	-98.4E-09	-107.0E-09	-116.0E-09	-128.2E-09	-129.7E-09	-148.3E-09	-154.8E-09	-165.7E-09	-168.3E-09	-123.9E-09
Statistics													
Min	-84.7E-09	-87.3E-09	-90.2E-09	-100.1E-09	-109.7E-09	-121.9E-09	-128.2E-09	-135.2E-09	-148.3E-09	-159.0E-09	-165.7E-09	-172.3E-09	-123.9E-09
Max	-81.9E-09	-84.0E-09	-88.6E-09	-97.0E-09	-107.0E-09	-116.0E-09	-124.2E-09	-129.7E-09	-140.8E-09	-153.3E-09	-161.1E-09	-166.4E-09	-118.5E-09
Average	-83.6E-09	-85.4E-09	-89.3E-09	-98.5E-09	-108.5E-09	-119.5E-09	-125.9E-09	-132.0E-09	-145.3E-09	-155.7E-09	-163.7E-09	-169.0E-09	-120.9E-09
Sigma	1.2E-09	1.4E-09	646.3E-12	1.2E-09	1.1E-09	2.5E-09	1.7E-09	2.4E-09	3.3E-09	2.4E-09	1.9E-09	2.5E-09	2.2E-09

Drift Calculation

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-2.1E-09	-7.3E-09	-15.1E-09	-26.9E-09	-38.7E-09	-42.3E-09	-49.1E-09	-58.9E-09	-71.4E-09	-79.2E-09	-84.5E-09	-36.6E-09
32	-	-601.8E-12	-5.9E-09	-15.7E-09	-25.4E-09	-37.6E-09	-41.0E-09	-50.9E-09	-62.5E-09	-74.7E-09	-80.1E-09	-88.0E-09	-36.1E-09
39	-	-2.6E-09	-3.9E-09	-13.7E-09	-22.3E-09	-31.3E-09	-43.4E-09	-45.0E-09	-63.6E-09	-70.1E-09	-81.0E-09	-83.5E-09	-39.2E-09
Average	-	-1.7E-09	-5.7E-09	-14.9E-09	-24.8E-09	-35.9E-09	-42.2E-09	-48.3E-09	-61.7E-09	-72.1E-09	-80.1E-09	-85.4E-09	-37.3E-09
Sigma	-	829.9E-12	1.4E-09	853.0E-12	1.9E-09	3.3E-09	997.1E-12	2.5E-09	2.0E-09	2.0E-09	737.3E-12	1.9E-09	1.4E-09

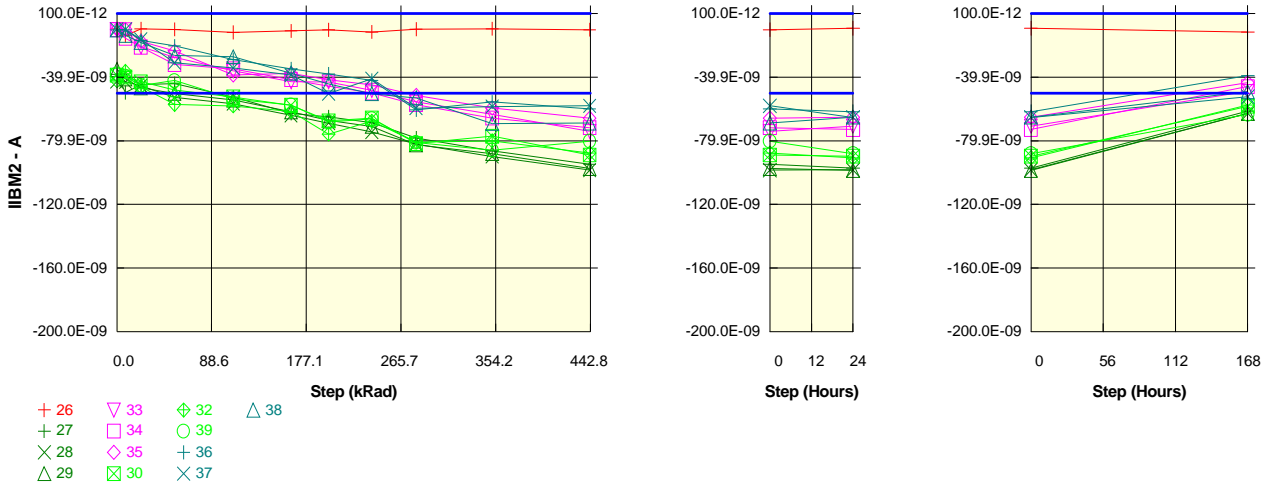
Measurements

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-17.4E-09	-17.1E-09	-17.0E-09	-16.8E-09	-18.8E-09	-17.3E-09	-17.2E-09	-18.0E-09	-17.0E-09	-16.8E-09	-17.5E-09	-16.9E-09	-19.0E-09
OFF TID samples													
36	-17.9E-09	-17.9E-09	-29.3E-09	-36.2E-09	-44.5E-09	-59.8E-09	-61.0E-09	-69.5E-09	-85.1E-09	-93.4E-09	-113.8E-09	-114.0E-09	-71.3E-09
37	-18.9E-09	-18.9E-09	-32.2E-09	-43.9E-09	-57.5E-09	-67.2E-09	-74.3E-09	-80.4E-09	-94.3E-09	-112.5E-09	-123.8E-09	-122.1E-09	-86.1E-09
38	-17.9E-09	-25.1E-09	-30.8E-09	-39.8E-09	-54.6E-09	-68.6E-09	-74.2E-09	-86.6E-09	-100.4E-09	-110.3E-09	-113.5E-09	-117.0E-09	-85.4E-09
Statistics													
Min	-18.9E-09	-25.1E-09	-32.2E-09	-43.9E-09	-57.5E-09	-68.6E-09	-74.3E-09	-86.6E-09	-100.4E-09	-112.5E-09	-123.8E-09	-122.1E-09	-86.1E-09
Max	-17.9E-09	-17.9E-09	-29.3E-09	-36.2E-09	-44.5E-09	-59.8E-09	-61.0E-09	-69.5E-09	-85.1E-09	-93.4E-09	-113.5E-09	-114.0E-09	-71.3E-09
Average	-18.3E-09	-20.7E-09	-30.8E-09	-40.0E-09	-52.2E-09	-65.2E-09	-69.8E-09	-78.8E-09	-93.2E-09	-105.4E-09	-117.0E-09	-117.7E-09	-81.0E-09
Sigma	481.5E-12	3.2E-09	1.2E-09	3.2E-09	5.6E-09	3.8E-09	6.3E-09	7.1E-09	6.3E-09	8.6E-09	4.8E-09	3.4E-09	6.8E-09

Drift Calculation

IIBM1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-11.4E-09	-18.2E-09	-26.6E-09	-41.9E-09	-43.0E-09	-51.5E-09	-67.1E-09	-75.4E-09	-95.9E-09	-96.1E-09	-53.4E-09
37	-	0.0E+00	-13.3E-09	-25.0E-09	-38.5E-09	-48.3E-09	-55.4E-09	-61.4E-09	-75.3E-09	-93.6E-09	-104.9E-09	-103.2E-09	-67.2E-09
38	-	-7.2E-09	-12.9E-09	-21.9E-09	-36.7E-09	-50.7E-09	-56.3E-09	-68.7E-09	-82.5E-09	-92.4E-09	-95.6E-09	-99.1E-09	-67.5E-09
Average	-	-2.4E-09	-12.5E-09	-21.7E-09	-34.0E-09	-46.9E-09	-51.6E-09	-60.5E-09	-75.0E-09	-87.1E-09	-98.8E-09	-99.4E-09	-62.7E-09
Sigma	-	3.4E-09	828.2E-12	2.8E-09	5.3E-09	3.7E-09	6.1E-09	7.0E-09	6.3E-09	8.3E-09	4.3E-09	2.9E-09	6.6E-09

Parameter : Input Bias Current : IIBM2DUTA
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-9.6E-09	-13.9E-09	-9.6E-09	-9.9E-09	-11.8E-09	-10.8E-09	-10.1E-09	-11.5E-09	-9.8E-09	-9.5E-09	-10.1E-09	-9.2E-09	-11.5E-09
ON PROTON samples													
27	-38.3E-09	-49.6E-09	-44.7E-09	-44.1E-09	-52.5E-09	-62.8E-09	-64.9E-09	-68.7E-09	-78.2E-09	-86.3E-09	-94.9E-09	-97.2E-09	-61.3E-09
28	-42.8E-09	-42.8E-09	-45.4E-09	-52.7E-09	-56.6E-09	-64.1E-09	-68.9E-09	-74.5E-09	-82.1E-09	-89.9E-09	-98.4E-09	-98.4E-09	-62.7E-09
29	-35.1E-09	-41.1E-09	-46.7E-09	-50.1E-09	-54.4E-09	-61.8E-09	-67.2E-09	-70.9E-09	-82.5E-09	-88.0E-09	-97.4E-09	-98.6E-09	-62.8E-09
Statistics													
Min	-42.8E-09	-49.6E-09	-46.7E-09	-52.7E-09	-56.6E-09	-64.1E-09	-68.9E-09	-74.5E-09	-82.5E-09	-89.9E-09	-98.4E-09	-98.6E-09	-62.8E-09
Max	-35.1E-09	-41.1E-09	-44.7E-09	-44.1E-09	-52.5E-09	-61.8E-09	-64.9E-09	-68.7E-09	-78.2E-09	-86.3E-09	-94.9E-09	-97.2E-09	-61.3E-09
Average	-38.7E-09	-44.5E-09	-45.6E-09	-49.0E-09	-54.5E-09	-62.9E-09	-67.0E-09	-71.4E-09	-81.0E-09	-88.1E-09	-96.9E-09	-98.0E-09	-62.3E-09
Sigma	3.2E-09	3.7E-09	814.8E-12	3.6E-09	1.7E-09	942.7E-12	1.6E-09	2.4E-09	1.9E-09	1.5E-09	1.5E-09	626.5E-12	717.9E-12

Drift Calculation

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-11.4E-09	-6.4E-09	-5.8E-09	-14.2E-09	-24.6E-09	-26.7E-09	-30.4E-09	-40.0E-09	-48.0E-09	-56.6E-09	-58.9E-09	-23.0E-09
28	-	-28.4E-12	-2.6E-09	-9.9E-09	-13.8E-09	-21.3E-09	-26.0E-09	-31.7E-09	-39.3E-09	-47.1E-09	-55.6E-09	-55.5E-09	-19.9E-09
29	-	-6.0E-09	-11.6E-09	-15.0E-09	-19.3E-09	-26.7E-09	-32.1E-09	-35.8E-09	-47.4E-09	-52.9E-09	-62.3E-09	-63.5E-09	-27.7E-09
Average	-	-5.8E-09	-6.9E-09	-10.2E-09	-15.8E-09	-24.2E-09	-28.3E-09	-32.6E-09	-42.2E-09	-49.3E-09	-58.2E-09	-59.3E-09	-23.5E-09
Sigma	-	4.6E-09	3.7E-09	3.8E-09	2.5E-09	2.2E-09	2.7E-09	2.3E-09	3.7E-09	2.5E-09	3.0E-09	3.3E-09	3.2E-09

Measurements

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-9.6E-09	-13.9E-09	-9.6E-09	-9.9E-09	-11.8E-09	-10.8E-09	-10.1E-09	-11.5E-09	-9.8E-09	-9.5E-09	-10.1E-09	-9.2E-09	-11.5E-09
ON TID samples													
33	-10.1E-09	-10.1E-09	-20.9E-09	-27.5E-09	-36.0E-09	-42.9E-09	-42.9E-09	-48.2E-09	-55.5E-09	-63.4E-09	-74.1E-09	-70.8E-09	-48.9E-09
34	-10.0E-09	-15.5E-09	-21.1E-09	-31.9E-09	-34.8E-09	-41.5E-09	-45.5E-09	-49.8E-09	-57.2E-09	-65.7E-09	-71.8E-09	-72.9E-09	-45.9E-09
35	-9.8E-09	-9.8E-09	-17.4E-09	-23.6E-09	-38.5E-09	-37.7E-09	-41.7E-09	-44.8E-09	-51.5E-09	-59.3E-09	-65.7E-09	-65.2E-09	-43.4E-09
Statistics													
Min	-10.1E-09	-15.5E-09	-21.1E-09	-31.9E-09	-38.5E-09	-42.9E-09	-45.5E-09	-49.8E-09	-57.2E-09	-65.7E-09	-74.1E-09	-72.9E-09	-48.9E-09
Max	-9.8E-09	-9.8E-09	-17.4E-09	-23.6E-09	-34.8E-09	-37.7E-09	-41.7E-09	-44.8E-09	-51.5E-09	-59.3E-09	-65.7E-09	-65.2E-09	-43.4E-09
Average	-10.0E-09	-11.8E-09	-19.8E-09	-27.7E-09	-36.5E-09	-40.7E-09	-43.4E-09	-47.6E-09	-54.7E-09	-62.8E-09	-70.5E-09	-69.6E-09	-46.0E-09
Sigma	130.2E-12	2.6E-09	1.7E-09	3.4E-09	1.6E-09	2.2E-09	1.6E-09	2.1E-09	2.4E-09	2.7E-09	3.5E-09	3.2E-09	2.2E-09

Drift Calculation

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-10.8E-09	-17.4E-09	-25.9E-09	-32.7E-09	-32.8E-09	-38.1E-09	-45.4E-09	-53.3E-09	-64.0E-09	-60.6E-09	-38.7E-09
34	-	-5.5E-09	-11.1E-09	-21.9E-09	-24.8E-09	-31.5E-09	-35.5E-09	-39.8E-09	-47.2E-09	-55.7E-09	-61.8E-09	-62.8E-09	-35.9E-09
35	-	0.0E+00	-7.6E-09	-13.7E-09	-28.7E-09	-27.9E-09	-31.9E-09	-35.0E-09	-41.7E-09	-49.5E-09	-55.9E-09	-55.4E-09	-33.6E-09
Average	-	-1.8E-09	-9.8E-09	-17.7E-09	-26.5E-09	-30.7E-09	-33.4E-09	-37.6E-09	-44.7E-09	-52.8E-09	-60.5E-09	-59.6E-09	-36.0E-09
Sigma	-	2.6E-09	1.6E-09	3.3E-09	1.6E-09	2.1E-09	1.5E-09	2.0E-09	2.3E-09	2.6E-09	3.4E-09	3.1E-09	2.1E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors						Issue:	02

Measurements

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.6E-09	-13.9E-09	-9.6E-09	-9.9E-09	-11.8E-09	-10.8E-09	-10.1E-09	-11.5E-09	-9.8E-09	-9.5E-09	-10.1E-09	-9.2E-09	-11.5E-09
OFF PROTON samples													
30	-38.7E-09	-39.9E-09	-42.9E-09	-48.0E-09	-52.5E-09	-57.7E-09	-67.5E-09	-65.8E-09	-81.7E-09	-77.1E-09	-88.9E-09	-89.7E-09	-58.2E-09
32	-42.2E-09	-36.4E-09	-46.0E-09	-57.1E-09	-58.1E-09	-61.5E-09	-75.8E-09	-67.6E-09	-80.8E-09	-80.1E-09	-87.6E-09	-90.6E-09	-57.6E-09
39	-37.9E-09	-39.5E-09	-45.2E-09	-42.1E-09	-53.7E-09	-57.5E-09	-68.2E-09	-66.1E-09	-81.0E-09	-86.0E-09	-80.3E-09	-88.0E-09	-63.3E-09
Statistics													
Min	-42.2E-09	-39.9E-09	-46.0E-09	-57.1E-09	-58.1E-09	-61.5E-09	-75.8E-09	-67.6E-09	-81.7E-09	-86.0E-09	-88.9E-09	-90.6E-09	-63.3E-09
Max	-37.9E-09	-36.4E-09	-42.9E-09	-42.1E-09	-52.5E-09	-57.5E-09	-67.5E-09	-65.8E-09	-80.8E-09	-77.1E-09	-80.3E-09	-88.0E-09	-57.6E-09
Average	-39.6E-09	-38.6E-09	-44.7E-09	-49.1E-09	-54.8E-09	-58.9E-09	-70.5E-09	-66.5E-09	-81.2E-09	-81.1E-09	-85.6E-09	-89.4E-09	-59.7E-09
Sigma	1.9E-09	1.6E-09	1.3E-09	6.2E-09	2.4E-09	1.9E-09	3.7E-09	780.3E-12	398.6E-12	3.7E-09	3.8E-09	1.1E-09	2.6E-09

Drift Calculation

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-1.1E-09	-4.1E-09	-9.3E-09	-13.8E-09	-19.0E-09	-28.7E-09	-27.1E-09	-43.0E-09	-38.4E-09	-50.2E-09	-50.9E-09	-19.5E-09
32	-	5.8E-09	-3.8E-09	-14.9E-09	-15.9E-09	-19.3E-09	-33.6E-09	-25.4E-09	-38.6E-09	-37.9E-09	-45.4E-09	-48.4E-09	-15.4E-09
39	-	-1.5E-09	-7.3E-09	-4.2E-09	-15.8E-09	-19.5E-09	-30.3E-09	-28.2E-09	-43.1E-09	-48.0E-09	-42.3E-09	-50.1E-09	-25.4E-09
Average	-	1.0E-09	-5.1E-09	-9.5E-09	-15.2E-09	-19.3E-09	-30.9E-09	-26.9E-09	-41.6E-09	-41.4E-09	-46.0E-09	-49.8E-09	-20.1E-09
Sigma	-	3.4E-09	1.6E-09	4.4E-09	972.0E-12	215.1E-12	2.0E-09	1.2E-09	2.1E-09	4.7E-09	3.2E-09	1.1E-09	4.1E-09

Measurements

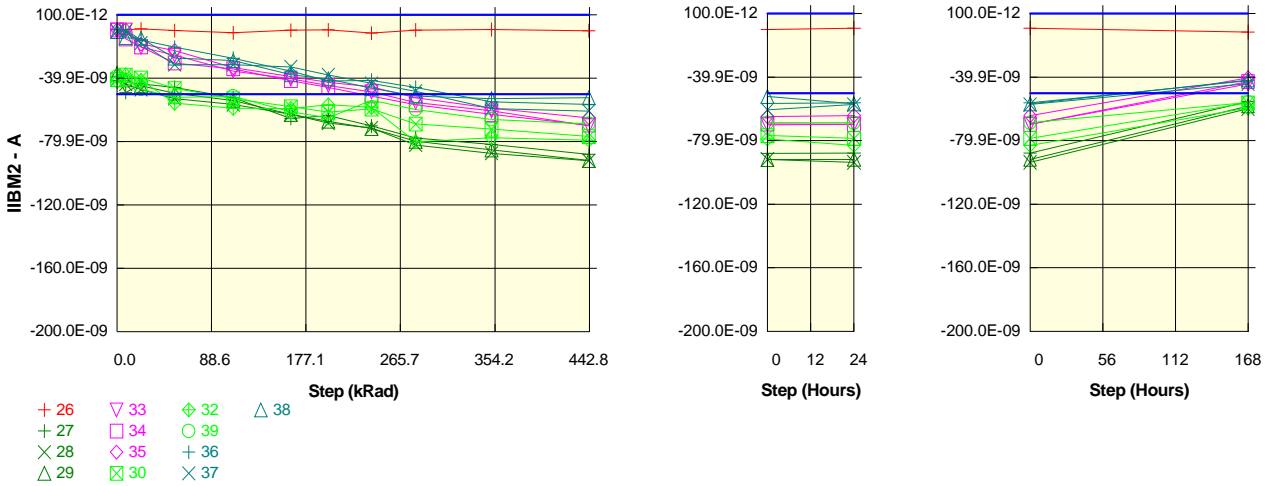
IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.6E-09	-13.9E-09	-9.6E-09	-9.9E-09	-11.8E-09	-10.8E-09	-10.1E-09	-11.5E-09	-9.8E-09	-9.5E-09	-10.1E-09	-9.2E-09	-11.5E-09
OFF TID samples													
36	-10.2E-09	-10.2E-09	-16.8E-09	-20.4E-09	-28.9E-09	-34.8E-09	-37.9E-09	-42.1E-09	-60.6E-09	-55.5E-09	-60.0E-09	-61.8E-09	-39.1E-09
37	-10.0E-09	-10.0E-09	-16.2E-09	-30.8E-09	-34.2E-09	-38.6E-09	-50.3E-09	-40.9E-09	-59.5E-09	-58.5E-09	-57.9E-09	-65.3E-09	-52.2E-09
38	-10.3E-09	-13.7E-09	-18.1E-09	-26.4E-09	-27.1E-09	-37.4E-09	-44.2E-09	-50.5E-09	-53.0E-09	-69.2E-09	-68.8E-09	-65.1E-09	-49.1E-09
Statistics													
Min	-10.3E-09	-13.7E-09	-18.1E-09	-30.8E-09	-34.2E-09	-38.6E-09	-50.3E-09	-50.5E-09	-60.6E-09	-69.2E-09	-68.8E-09	-65.3E-09	-52.2E-09
Max	-10.0E-09	-10.0E-09	-16.2E-09	-20.4E-09	-27.1E-09	-34.8E-09	-37.9E-09	-40.9E-09	-53.0E-09	-55.5E-09	-57.9E-09	-61.8E-09	-39.1E-09
Average	-10.2E-09	-11.3E-09	-17.0E-09	-25.9E-09	-30.1E-09	-37.0E-09	-44.2E-09	-44.5E-09	-57.7E-09	-61.1E-09	-62.2E-09	-64.1E-09	-46.8E-09
Sigma	147.2E-12	1.7E-09	796.8E-12	4.3E-09	3.0E-09	1.6E-09	5.1E-09	4.3E-09	3.3E-09	5.9E-09	4.7E-09	1.6E-09	5.6E-09

Drift Calculation

IIBM2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.6E-09	-10.1E-09	-18.7E-09	-24.6E-09	-27.7E-09	-31.8E-09	-50.4E-09	-45.3E-09	-49.7E-09	-51.6E-09	-28.9E-09
37	-	0.0E+00	-6.2E-09	-20.9E-09	-24.2E-09	-28.7E-09	-40.3E-09	-30.9E-09	-49.5E-09	-48.5E-09	-48.0E-09	-55.3E-09	-42.3E-09
38	-	-3.4E-09	-7.8E-09	-16.1E-09	-16.8E-09	-27.1E-09	-33.9E-09	-40.2E-09	-42.7E-09	-58.9E-09	-58.5E-09	-54.8E-09	-38.8E-09
Average	-	-1.1E-09	-6.9E-09	-15.7E-09	-19.9E-09	-26.8E-09	-34.0E-09	-34.3E-09	-47.5E-09	-50.9E-09	-52.1E-09	-53.9E-09	-36.7E-09
Sigma	-	1.6E-09	676.4E-12	4.4E-09	3.1E-09	1.7E-09	5.2E-09	4.2E-09	3.4E-09	5.8E-09	4.6E-09	1.7E-09	5.7E-09

Parameter : Input Bias Current : IIBM2DUTB
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.1E-09	-9.2E-09	-8.7E-09	-9.8E-09	-11.1E-09	-9.5E-09	-9.3E-09	-11.4E-09	-9.5E-09	-9.1E-09	-9.9E-09	-9.1E-09	-11.6E-09
ON PROTON samples													
27	-39.0E-09	-48.9E-09	-43.5E-09	-45.6E-09	-52.1E-09	-65.2E-09	-63.5E-09	-70.1E-09	-77.6E-09	-81.7E-09	-88.0E-09	-87.9E-09	-55.4E-09
28	-40.5E-09	-43.5E-09	-47.0E-09	-52.7E-09	-56.5E-09	-62.7E-09	-68.2E-09	-71.3E-09	-82.0E-09	-87.3E-09	-91.9E-09	-93.5E-09	-59.8E-09
29	-36.9E-09	-40.9E-09	-44.6E-09	-49.2E-09	-53.9E-09	-62.7E-09	-67.0E-09	-71.6E-09	-79.7E-09	-85.1E-09	-91.8E-09	-91.7E-09	-58.0E-09
Statistics													
Min	-40.5E-09	-48.9E-09	-47.0E-09	-52.7E-09	-56.5E-09	-65.2E-09	-68.2E-09	-71.6E-09	-82.0E-09	-87.3E-09	-91.9E-09	-93.5E-09	-59.8E-09
Max	-36.9E-09	-40.9E-09	-43.5E-09	-45.6E-09	-52.1E-09	-62.7E-09	-63.5E-09	-70.1E-09	-77.6E-09	-81.7E-09	-88.0E-09	-87.9E-09	-55.4E-09
Average	-38.8E-09	-44.4E-09	-45.0E-09	-49.2E-09	-54.2E-09	-63.5E-09	-66.3E-09	-71.0E-09	-79.8E-09	-84.7E-09	-90.6E-09	-91.0E-09	-57.8E-09
Sigma	1.5E-09	3.3E-09	1.5E-09	2.9E-09	1.8E-09	1.2E-09	2.0E-09	683.5E-12	1.8E-09	2.3E-09	1.8E-09	2.4E-09	1.8E-09

Drift Calculation

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-9.9E-09	-4.5E-09	-6.6E-09	-13.1E-09	-26.2E-09	-24.5E-09	-31.1E-09	-38.6E-09	-42.7E-09	-49.0E-09	-48.9E-09	-16.4E-09
28	-	-3.1E-09	-6.6E-09	-12.2E-09	-16.0E-09	-22.2E-09	-27.8E-09	-30.9E-09	-41.5E-09	-46.8E-09	-51.4E-09	-53.1E-09	-19.4E-09
29	-	-4.0E-09	-7.8E-09	-12.3E-09	-17.0E-09	-25.8E-09	-30.2E-09	-34.8E-09	-42.8E-09	-48.2E-09	-55.0E-09	-54.9E-09	-21.2E-09
Average	-	-5.7E-09	-6.3E-09	-10.4E-09	-15.4E-09	-24.8E-09	-27.5E-09	-32.2E-09	-41.0E-09	-45.9E-09	-51.8E-09	-52.3E-09	-19.0E-09
Sigma	-	3.0E-09	1.3E-09	2.7E-09	1.7E-09	1.8E-09	2.3E-09	1.8E-09	1.8E-09	2.4E-09	2.4E-09	2.5E-09	2.0E-09

Measurements

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.1E-09	-9.2E-09	-8.7E-09	-9.8E-09	-11.1E-09	-9.5E-09	-9.3E-09	-11.4E-09	-9.5E-09	-9.1E-09	-9.9E-09	-9.1E-09	-11.6E-09
ON TID samples													
33	-9.4E-09	-9.4E-09	-20.2E-09	-25.3E-09	-35.5E-09	-40.2E-09	-44.4E-09	-48.6E-09	-55.1E-09	-60.5E-09	-69.9E-09	-69.6E-09	-44.3E-09
34	-9.3E-09	-14.9E-09	-20.0E-09	-30.2E-09	-33.9E-09	-41.4E-09	-45.6E-09	-51.1E-09	-56.6E-09	-62.7E-09	-69.5E-09	-69.6E-09	-42.7E-09
35	-9.4E-09	-9.4E-09	-18.3E-09	-22.4E-09	-33.2E-09	-38.8E-09	-42.4E-09	-45.2E-09	-52.2E-09	-58.9E-09	-64.9E-09	-64.2E-09	-40.4E-09
Statistics													
Min	-9.4E-09	-14.9E-09	-20.2E-09	-30.2E-09	-35.5E-09	-41.4E-09	-45.6E-09	-51.1E-09	-56.6E-09	-62.7E-09	-69.9E-09	-69.6E-09	-44.3E-09
Max	-9.3E-09	-9.4E-09	-18.3E-09	-22.4E-09	-33.2E-09	-38.8E-09	-42.4E-09	-45.2E-09	-52.2E-09	-58.9E-09	-64.9E-09	-64.2E-09	-40.4E-09
Average	-9.4E-09	-11.2E-09	-19.5E-09	-26.0E-09	-34.2E-09	-40.2E-09	-44.1E-09	-48.3E-09	-54.6E-09	-60.7E-09	-68.1E-09	-67.8E-09	-42.5E-09
Sigma	27.3E-12	2.6E-09	858.2E-12	3.2E-09	944.2E-12	1.1E-09	1.3E-09	2.4E-09	1.8E-09	1.6E-09	2.3E-09	2.6E-09	1.6E-09

Drift Calculation

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-10.8E-09	-15.9E-09	-26.1E-09	-30.9E-09	-35.0E-09	-39.2E-09	-45.7E-09	-51.1E-09	-60.5E-09	-60.2E-09	-34.9E-09
34	-	-5.6E-09	-10.7E-09	-20.9E-09	-24.6E-09	-32.1E-09	-36.3E-09	-41.8E-09	-47.3E-09	-53.3E-09	-60.1E-09	-60.3E-09	-33.4E-09
35	-	0.0E+00	-8.9E-09	-13.1E-09	-23.8E-09	-29.5E-09	-33.0E-09	-35.8E-09	-42.9E-09	-49.5E-09	-55.5E-09	-54.8E-09	-31.0E-09
Average	-	-1.9E-09	-10.2E-09	-16.6E-09	-24.8E-09	-30.8E-09	-34.8E-09	-38.9E-09	-45.3E-09	-51.3E-09	-58.7E-09	-58.4E-09	-33.1E-09
Sigma	-	2.6E-09	856.3E-12	3.2E-09	926.3E-12	1.1E-09	1.3E-09	2.4E-09	1.8E-09	1.6E-09	2.3E-09	2.6E-09	1.6E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors				Issue:	02

Measurements

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.1E-09	-9.2E-09	-8.7E-09	-9.8E-09	-11.1E-09	-9.5E-09	-9.3E-09	-11.4E-09	-9.5E-09	-9.1E-09	-9.9E-09	-9.1E-09	-11.6E-09
OFF PROTON samples													
30	-40.7E-09	-38.0E-09	-39.7E-09	-46.4E-09	-52.8E-09	-57.9E-09	-61.3E-09	-59.3E-09	-68.8E-09	-72.0E-09	-76.8E-09	-78.6E-09	-56.3E-09
32	-41.9E-09	-37.7E-09	-41.0E-09	-55.6E-09	-58.9E-09	-59.0E-09	-56.7E-09	-58.3E-09	-80.1E-09	-77.5E-09	-79.0E-09	-82.8E-09	-59.5E-09
39	-38.7E-09	-40.9E-09	-46.7E-09	-52.0E-09	-51.3E-09	-61.1E-09	-64.9E-09	-53.9E-09	-59.6E-09	-65.9E-09	-68.6E-09	-68.6E-09	-55.9E-09
Statistics													
Min	-41.9E-09	-40.9E-09	-46.7E-09	-55.6E-09	-58.9E-09	-61.1E-09	-64.9E-09	-59.3E-09	-80.1E-09	-77.5E-09	-79.0E-09	-82.8E-09	-59.5E-09
Max	-38.7E-09	-37.7E-09	-39.7E-09	-46.4E-09	-51.3E-09	-57.9E-09	-56.7E-09	-53.9E-09	-59.6E-09	-65.9E-09	-68.6E-09	-68.6E-09	-55.9E-09
Average	-40.4E-09	-38.9E-09	-42.5E-09	-51.3E-09	-54.3E-09	-59.3E-09	-61.0E-09	-57.2E-09	-69.5E-09	-71.8E-09	-74.8E-09	-76.7E-09	-57.2E-09
Sigma	1.3E-09	1.5E-09	3.0E-09	3.8E-09	3.3E-09	1.3E-09	3.4E-09	2.4E-09	8.4E-09	4.7E-09	4.4E-09	6.0E-09	1.6E-09

Drift Calculation

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	2.6E-09	957.8E-12	-5.7E-09	-12.2E-09	-17.2E-09	-20.7E-09	-18.6E-09	-28.2E-09	-31.3E-09	-36.1E-09	-37.9E-09	-15.6E-09
32	-	4.2E-09	857.5E-12	-13.7E-09	-17.0E-09	-17.1E-09	-14.8E-09	-16.4E-09	-38.2E-09	-35.6E-09	-37.1E-09	-41.0E-09	-17.6E-09
39	-	-2.3E-09	-8.0E-09	-13.3E-09	-12.6E-09	-22.4E-09	-26.2E-09	-15.2E-09	-20.9E-09	-27.2E-09	-29.9E-09	-29.9E-09	-17.2E-09
Average	-	1.5E-09	-2.1E-09	-10.9E-09	-13.9E-09	-18.9E-09	-20.6E-09	-16.7E-09	-29.1E-09	-31.4E-09	-34.4E-09	-36.3E-09	-16.8E-09
Sigma	-	2.8E-09	4.2E-09	3.7E-09	2.2E-09	2.5E-09	4.7E-09	1.4E-09	7.1E-09	3.4E-09	3.2E-09	4.6E-09	862.6E-12

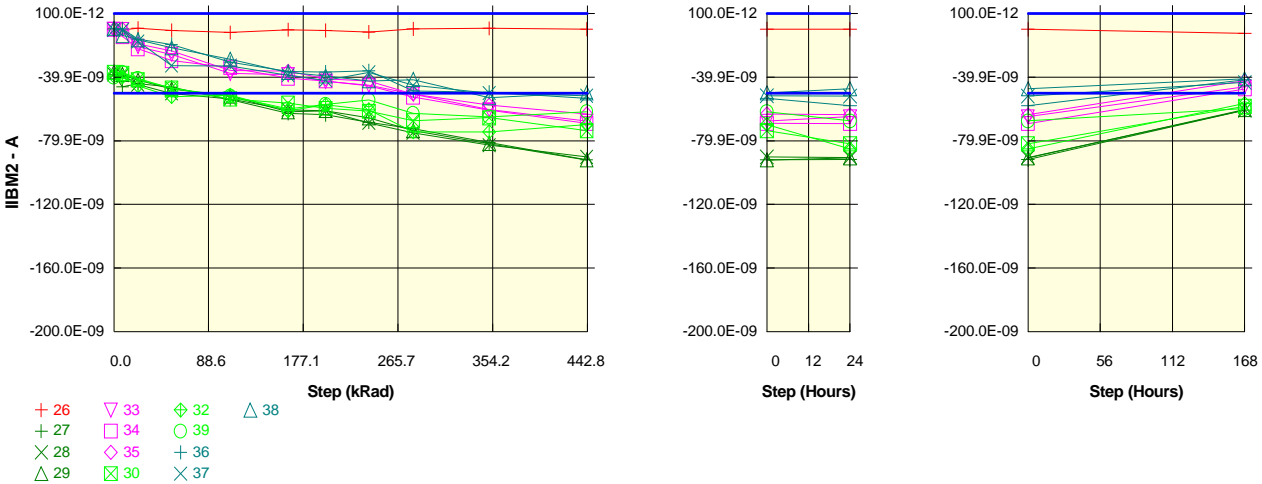
Measurements

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.1E-09	-9.2E-09	-8.7E-09	-9.8E-09	-11.1E-09	-9.5E-09	-9.3E-09	-11.4E-09	-9.5E-09	-9.1E-09	-9.9E-09	-9.1E-09	-11.6E-09
OFF TID samples													
36	-9.3E-09	-9.3E-09	-15.8E-09	-20.3E-09	-27.2E-09	-35.4E-09	-41.6E-09	-41.1E-09	-45.6E-09	-54.8E-09	-56.5E-09	-56.1E-09	-42.2E-09
37	-10.1E-09	-10.1E-09	-17.7E-09	-31.3E-09	-31.3E-09	-32.7E-09	-37.8E-09	-43.1E-09	-48.1E-09	-59.0E-09	-60.6E-09	-57.2E-09	-44.0E-09
38	-10.3E-09	-14.3E-09	-14.7E-09	-27.1E-09	-28.8E-09	-37.6E-09	-40.3E-09	-46.1E-09	-51.1E-09	-52.8E-09	-52.2E-09	-56.8E-09	-41.8E-09
Statistics													
Min	-10.3E-09	-14.3E-09	-17.7E-09	-31.3E-09	-31.3E-09	-37.6E-09	-41.6E-09	-46.1E-09	-51.1E-09	-59.0E-09	-60.6E-09	-57.2E-09	-44.0E-09
Max	-9.3E-09	-9.3E-09	-14.7E-09	-20.3E-09	-27.2E-09	-32.7E-09	-37.8E-09	-41.1E-09	-45.6E-09	-52.8E-09	-52.2E-09	-56.1E-09	-41.8E-09
Average	-9.9E-09	-11.2E-09	-16.1E-09	-26.2E-09	-29.1E-09	-35.2E-09	-39.9E-09	-43.5E-09	-48.3E-09	-55.5E-09	-56.4E-09	-56.7E-09	-42.7E-09
Sigma	431.7E-12	2.2E-09	1.2E-09	4.6E-09	1.7E-09	2.0E-09	1.6E-09	2.1E-09	2.2E-09	2.6E-09	3.4E-09	460.2E-12	979.3E-12

Drift Calculation

IIBM2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.5E-09	-11.0E-09	-17.9E-09	-26.1E-09	-32.3E-09	-31.8E-09	-36.3E-09	-45.5E-09	-47.2E-09	-46.8E-09	-32.9E-09
37	-	0.0E+00	-7.6E-09	-21.3E-09	-21.2E-09	-22.6E-09	-27.7E-09	-33.0E-09	-38.1E-09	-49.0E-09	-50.6E-09	-47.1E-09	-34.0E-09
38	-	-3.9E-09	-4.4E-09	-16.8E-09	-18.5E-09	-27.2E-09	-30.0E-09	-35.8E-09	-40.7E-09	-42.4E-09	-41.9E-09	-46.5E-09	-31.4E-09
Average	-	-1.3E-09	-6.2E-09	-16.3E-09	-19.2E-09	-25.3E-09	-30.0E-09	-33.6E-09	-38.4E-09	-45.6E-09	-46.5E-09	-46.8E-09	-32.8E-09
Sigma	-	1.9E-09	1.3E-09	4.2E-09	1.4E-09	2.0E-09	1.9E-09	1.7E-09	1.8E-09	2.7E-09	3.6E-09	260.4E-12	1.0E-09

Parameter : Input Bias Current : IIBM2DUTC
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-9.5E-09	-10.1E-09	-9.1E-09	-10.6E-09	-11.9E-09	-10.1E-09	-10.6E-09	-11.5E-09	-9.6E-09	-9.2E-09	-9.8E-09	-9.8E-09	-12.4E-09
ON PROTON samples													
27	-38.3E-09	-46.0E-09	-44.0E-09	-46.2E-09	-54.1E-09	-62.7E-09	-63.6E-09	-68.3E-09	-72.5E-09	-81.2E-09	-91.9E-09	-91.8E-09	-60.8E-09
28	-38.1E-09	-38.6E-09	-44.7E-09	-50.1E-09	-53.6E-09	-60.5E-09	-61.1E-09	-68.8E-09	-74.9E-09	-82.8E-09	-90.2E-09	-90.5E-09	-60.7E-09
29	-36.8E-09	-38.2E-09	-41.8E-09	-47.4E-09	-51.9E-09	-61.8E-09	-61.1E-09	-65.6E-09	-73.7E-09	-81.8E-09	-92.1E-09	-90.8E-09	-60.3E-09
Statistics													
Min	-38.3E-09	-46.0E-09	-44.7E-09	-50.1E-09	-54.1E-09	-62.7E-09	-63.6E-09	-68.8E-09	-74.9E-09	-82.8E-09	-92.1E-09	-91.8E-09	-60.8E-09
Max	-36.8E-09	-38.2E-09	-41.8E-09	-46.2E-09	-51.9E-09	-60.5E-09	-61.1E-09	-65.6E-09	-72.5E-09	-81.2E-09	-90.2E-09	-90.5E-09	-60.3E-09
Average	-37.7E-09	-40.9E-09	-43.5E-09	-47.9E-09	-53.2E-09	-61.7E-09	-61.9E-09	-67.5E-09	-73.7E-09	-81.9E-09	-91.4E-09	-91.0E-09	-60.6E-09
Sigma	696.9E-12	3.6E-09	1.2E-09	1.6E-09	901.9E-12	923.0E-12	1.2E-09	1.4E-09	964.1E-12	638.7E-12	842.0E-12	535.6E-12	239.1E-12

Drift Calculation

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-7.7E-09	-5.6E-09	-7.9E-09	-15.7E-09	-24.4E-09	-25.2E-09	-30.0E-09	-34.2E-09	-42.9E-09	-53.6E-09	-53.5E-09	-22.5E-09
28	-	-501.5E-12	-6.6E-09	-12.0E-09	-15.4E-09	-22.3E-09	-22.9E-09	-30.6E-09	-36.8E-09	-44.6E-09	-52.1E-09	-52.4E-09	-22.6E-09
29	-	-1.4E-09	-5.0E-09	-10.6E-09	-15.2E-09	-25.0E-09	-24.3E-09	-28.8E-09	-37.0E-09	-45.0E-09	-55.3E-09	-54.1E-09	-23.5E-09
Average	-	-3.2E-09	-5.8E-09	-10.2E-09	-15.5E-09	-23.9E-09	-24.2E-09	-29.8E-09	-36.0E-09	-44.2E-09	-53.6E-09	-53.3E-09	-22.9E-09
Sigma	-	3.2E-09	640.8E-12	1.7E-09	226.2E-12	1.1E-09	963.3E-12	748.4E-12	1.2E-09	927.9E-12	1.3E-09	695.8E-12	459.2E-12

Measurements

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-9.5E-09	-10.1E-09	-9.1E-09	-10.6E-09	-11.9E-09	-10.1E-09	-10.6E-09	-11.5E-09	-9.6E-09	-9.2E-09	-9.8E-09	-9.8E-09	-12.4E-09
ON TID samples													
33	-9.8E-09	-9.8E-09	-20.7E-09	-25.6E-09	-37.6E-09	-38.4E-09	-42.7E-09	-45.1E-09	-50.7E-09	-60.5E-09	-67.6E-09	-64.9E-09	-46.1E-09
34	-9.7E-09	-14.3E-09	-22.1E-09	-29.5E-09	-33.8E-09	-40.7E-09	-42.4E-09	-45.3E-09	-52.5E-09	-60.9E-09	-69.1E-09	-69.2E-09	-47.4E-09
35	-9.7E-09	-9.7E-09	-19.0E-09	-23.4E-09	-35.8E-09	-36.3E-09	-41.0E-09	-42.3E-09	-50.5E-09	-57.5E-09	-63.1E-09	-63.6E-09	-42.3E-09
Statistics													
Min	-9.8E-09	-14.3E-09	-22.1E-09	-29.5E-09	-37.6E-09	-40.7E-09	-42.7E-09	-45.3E-09	-52.5E-09	-60.9E-09	-69.1E-09	-69.2E-09	-47.4E-09
Max	-9.7E-09	-9.7E-09	-19.0E-09	-23.4E-09	-33.8E-09	-36.3E-09	-41.0E-09	-42.3E-09	-50.5E-09	-57.5E-09	-63.1E-09	-63.6E-09	-42.3E-09
Average	-9.8E-09	-11.3E-09	-20.6E-09	-26.2E-09	-35.7E-09	-38.4E-09	-42.0E-09	-44.2E-09	-51.3E-09	-59.6E-09	-66.6E-09	-65.9E-09	-45.3E-09
Sigma	56.8E-12	2.1E-09	1.3E-09	2.5E-09	1.5E-09	1.8E-09	725.9E-12	1.4E-09	899.0E-12	1.5E-09	2.5E-09	2.4E-09	2.2E-09

Drift Calculation

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-10.9E-09	-15.8E-09	-27.7E-09	-28.5E-09	-32.9E-09	-35.2E-09	-40.9E-09	-50.6E-09	-57.8E-09	-55.1E-09	-36.3E-09
34	-	-4.6E-09	-12.4E-09	-19.8E-09	-24.1E-09	-31.0E-09	-32.7E-09	-35.6E-09	-42.8E-09	-51.2E-09	-59.4E-09	-59.5E-09	-37.7E-09
35	-	0.0E+00	-9.2E-09	-13.7E-09	-26.1E-09	-26.5E-09	-31.3E-09	-32.6E-09	-40.8E-09	-47.8E-09	-53.4E-09	-53.8E-09	-32.5E-09
Average	-	-1.5E-09	-10.8E-09	-16.4E-09	-26.0E-09	-28.7E-09	-32.3E-09	-34.5E-09	-41.5E-09	-49.9E-09	-56.9E-09	-56.1E-09	-35.5E-09
Sigma	-	2.2E-09	1.3E-09	2.5E-09	1.5E-09	1.8E-09	702.1E-12	1.4E-09	935.9E-12	1.5E-09	2.5E-09	2.4E-09	2.2E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.5E-09	-10.1E-09	-9.1E-09	-10.6E-09	-11.9E-09	-10.1E-09	-10.6E-09	-11.5E-09	-9.6E-09	-9.2E-09	-9.8E-09	-9.8E-09	-12.4E-09
OFF PROTON samples													
30	-36.9E-09	-37.5E-09	-41.5E-09	-46.8E-09	-53.7E-09	-56.3E-09	-59.5E-09	-61.4E-09	-67.3E-09	-65.5E-09	-73.6E-09	-81.9E-09	-58.3E-09
32	-39.3E-09	-40.0E-09	-45.4E-09	-52.1E-09	-51.3E-09	-61.1E-09	-57.4E-09	-60.5E-09	-74.4E-09	-74.4E-09	-69.7E-09	-85.2E-09	-56.5E-09
39	-40.0E-09	-36.9E-09	-40.7E-09	-47.1E-09	-51.9E-09	-59.9E-09	-57.1E-09	-54.2E-09	-62.7E-09	-64.9E-09	-61.6E-09	-67.5E-09	-59.8E-09
Statistics													
Min	-40.0E-09	-40.0E-09	-45.4E-09	-52.1E-09	-53.7E-09	-61.1E-09	-59.5E-09	-61.4E-09	-74.4E-09	-74.4E-09	-73.6E-09	-85.2E-09	-59.8E-09
Max	-36.9E-09	-36.9E-09	-40.7E-09	-46.8E-09	-51.3E-09	-56.3E-09	-57.1E-09	-54.2E-09	-62.7E-09	-64.9E-09	-61.6E-09	-67.5E-09	-56.5E-09
Average	-38.8E-09	-38.1E-09	-42.6E-09	-48.7E-09	-52.3E-09	-59.1E-09	-58.0E-09	-58.7E-09	-68.1E-09	-68.3E-09	-68.3E-09	-78.2E-09	-58.2E-09
Sigma	1.3E-09	1.3E-09	2.0E-09	2.5E-09	1.0E-09	2.1E-09	1.1E-09	3.2E-09	4.8E-09	4.3E-09	5.0E-09	7.7E-09	1.3E-09

Drift Calculation

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-613.5E-12	-4.6E-09	-9.8E-09	-16.8E-09	-19.3E-09	-22.6E-09	-24.5E-09	-30.4E-09	-28.6E-09	-36.7E-09	-45.0E-09	-21.3E-09
32	-	-618.5E-12	-6.1E-09	-12.8E-09	-12.0E-09	-21.8E-09	-18.1E-09	-21.2E-09	-35.0E-09	-35.0E-09	-30.4E-09	-45.9E-09	-17.2E-09
39	-	3.1E-09	-725.5E-12	-7.1E-09	-11.8E-09	-19.9E-09	-17.1E-09	-14.2E-09	-22.7E-09	-24.9E-09	-21.6E-09	-27.5E-09	-19.8E-09
Average	-	628.5E-12	-3.8E-09	-9.9E-09	-13.5E-09	-20.4E-09	-19.2E-09	-20.0E-09	-29.4E-09	-29.5E-09	-29.6E-09	-39.5E-09	-19.4E-09
Sigma	-	1.8E-09	2.3E-09	2.3E-09	2.3E-09	1.1E-09	2.4E-09	4.3E-09	5.1E-09	4.2E-09	6.2E-09	8.5E-09	1.7E-09

Measurements

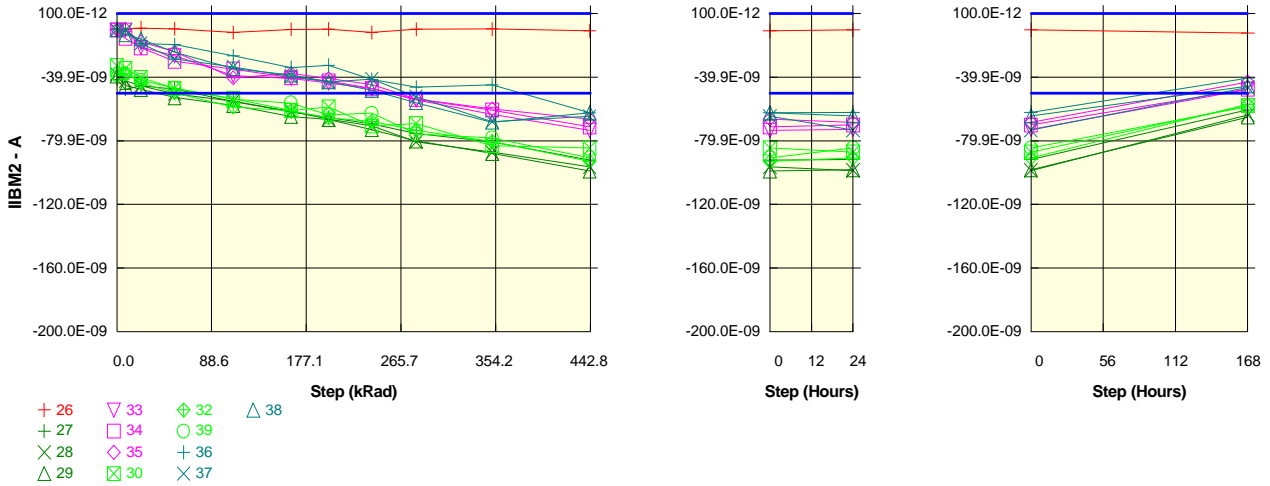
IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.5E-09	-10.1E-09	-9.1E-09	-10.6E-09	-11.9E-09	-10.1E-09	-10.6E-09	-11.5E-09	-9.6E-09	-9.2E-09	-9.8E-09	-9.8E-09	-12.4E-09
OFF TID samples													
36	-9.6E-09	-9.6E-09	-16.1E-09	-19.4E-09	-30.6E-09	-36.3E-09	-36.8E-09	-35.9E-09	-48.7E-09	-49.4E-09	-53.1E-09	-57.9E-09	-41.5E-09
37	-10.1E-09	-10.1E-09	-17.5E-09	-32.7E-09	-32.8E-09	-38.8E-09	-41.9E-09	-37.0E-09	-45.2E-09	-50.0E-09	-51.7E-09	-51.8E-09	-43.3E-09
38	-9.4E-09	-13.7E-09	-16.5E-09	-21.5E-09	-28.7E-09	-36.9E-09	-39.2E-09	-42.3E-09	-41.5E-09	-53.0E-09	-49.8E-09	-47.2E-09	-41.0E-09
Statistics													
Min	-10.1E-09	-13.7E-09	-17.5E-09	-32.7E-09	-32.8E-09	-38.8E-09	-41.9E-09	-42.3E-09	-48.7E-09	-53.0E-09	-53.1E-09	-57.9E-09	-43.3E-09
Max	-9.4E-09	-9.6E-09	-16.1E-09	-19.4E-09	-28.7E-09	-36.3E-09	-36.8E-09	-35.9E-09	-41.5E-09	-49.4E-09	-49.8E-09	-47.2E-09	-41.0E-09
Average	-9.7E-09	-11.2E-09	-16.7E-09	-24.6E-09	-30.7E-09	-37.3E-09	-39.3E-09	-38.4E-09	-45.1E-09	-50.8E-09	-51.5E-09	-52.3E-09	-41.9E-09
Sigma	324.8E-12	1.8E-09	611.3E-12	5.8E-09	1.7E-09	1.0E-09	2.1E-09	2.8E-09	3.0E-09	1.5E-09	1.4E-09	4.4E-09	970.8E-12

Drift Calculation

IIBM2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.4E-09	-9.8E-09	-20.9E-09	-26.6E-09	-27.1E-09	-26.3E-09	-39.1E-09	-39.8E-09	-43.5E-09	-48.3E-09	-31.8E-09
37	-	0.0E+00	-7.4E-09	-22.6E-09	-22.7E-09	-28.6E-09	-31.8E-09	-26.8E-09	-35.0E-09	-39.9E-09	-41.5E-09	-41.7E-09	-33.1E-09
38	-	-4.4E-09	-7.1E-09	-12.2E-09	-19.3E-09	-27.6E-09	-29.9E-09	-33.0E-09	-32.1E-09	-43.6E-09	-40.5E-09	-37.9E-09	-31.7E-09
Average	-	-1.5E-09	-7.0E-09	-14.8E-09	-21.0E-09	-27.6E-09	-29.6E-09	-28.7E-09	-35.4E-09	-41.1E-09	-41.8E-09	-42.6E-09	-32.2E-09
Sigma	-	2.1E-09	403.3E-12	5.6E-09	1.4E-09	805.0E-12	1.9E-09	3.0E-09	2.8E-09	1.8E-09	1.3E-09	4.3E-09	653.0E-12

Parameter : Input Bias Current : IIBM2DUTD
 Test conditions : +VCC=2V. -VCC=-28V. VCM=13V

Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.5E-09	-9.5E-09	-9.0E-09	-9.5E-09	-11.8E-09	-9.9E-09	-9.8E-09	-11.9E-09	-9.8E-09	-9.7E-09	-10.8E-09	-10.1E-09	-12.1E-09
ON PROTON samples													
27	-41.4E-09	-47.5E-09	-45.5E-09	-47.4E-09	-55.2E-09	-61.8E-09	-65.3E-09	-69.3E-09	-75.5E-09	-80.7E-09	-92.1E-09	-91.7E-09	-60.5E-09
28	-38.1E-09	-42.3E-09	-45.4E-09	-50.5E-09	-55.1E-09	-61.5E-09	-66.5E-09	-70.7E-09	-80.8E-09	-87.3E-09	-96.4E-09	-98.7E-09	-63.7E-09
29	-39.2E-09	-45.2E-09	-47.6E-09	-52.8E-09	-57.8E-09	-64.7E-09	-66.7E-09	-72.9E-09	-80.0E-09	-87.9E-09	-99.0E-09	-98.3E-09	-65.1E-09
Statistics													
Min	-41.4E-09	-47.5E-09	-47.6E-09	-52.8E-09	-57.8E-09	-64.7E-09	-66.7E-09	-72.9E-09	-80.8E-09	-87.9E-09	-99.0E-09	-98.7E-09	-65.1E-09
Max	-38.1E-09	-42.3E-09	-45.4E-09	-47.4E-09	-55.1E-09	-61.5E-09	-65.3E-09	-69.3E-09	-75.5E-09	-80.7E-09	-92.1E-09	-91.7E-09	-60.5E-09
Average	-39.6E-09	-45.0E-09	-46.2E-09	-50.2E-09	-56.0E-09	-62.7E-09	-66.1E-09	-70.9E-09	-78.8E-09	-85.3E-09	-95.8E-09	-96.2E-09	-63.1E-09
Sigma	1.3E-09	2.1E-09	1.0E-09	2.2E-09	1.2E-09	1.5E-09	608.2E-12	1.5E-09	2.3E-09	3.3E-09	2.8E-09	3.2E-09	1.9E-09

Drift Calculation

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-6.2E-09	-4.1E-09	-6.0E-09	-13.8E-09	-20.4E-09	-23.9E-09	-27.9E-09	-34.2E-09	-39.3E-09	-50.8E-09	-50.3E-09	-19.1E-09
28	-	-4.2E-09	-7.2E-09	-12.3E-09	-17.0E-09	-23.4E-09	-28.4E-09	-32.5E-09	-42.6E-09	-49.1E-09	-58.3E-09	-60.6E-09	-25.6E-09
29	-	-6.1E-09	-8.5E-09	-13.7E-09	-18.6E-09	-25.5E-09	-27.5E-09	-33.7E-09	-40.9E-09	-48.8E-09	-59.9E-09	-59.1E-09	-25.9E-09
Average	-	-5.5E-09	-6.6E-09	-10.7E-09	-16.5E-09	-23.1E-09	-26.6E-09	-31.4E-09	-39.2E-09	-45.7E-09	-56.3E-09	-56.7E-09	-23.5E-09
Sigma	-	923.8E-12	1.8E-09	3.3E-09	2.0E-09	2.1E-09	1.9E-09	2.5E-09	3.7E-09	4.5E-09	4.0E-09	4.5E-09	3.1E-09

Measurements

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.5E-09	-9.5E-09	-9.0E-09	-9.5E-09	-11.8E-09	-9.9E-09	-9.8E-09	-11.9E-09	-9.8E-09	-9.7E-09	-10.8E-09	-10.1E-09	-12.1E-09
ON TID samples													
33	-10.3E-09	-10.3E-09	-21.1E-09	-26.5E-09	-38.9E-09	-40.8E-09	-43.7E-09	-47.2E-09	-54.4E-09	-63.3E-09	-73.4E-09	-72.9E-09	-47.7E-09
34	-10.2E-09	-15.5E-09	-21.4E-09	-30.0E-09	-35.0E-09	-40.2E-09	-42.4E-09	-47.2E-09	-53.9E-09	-60.7E-09	-71.3E-09	-70.1E-09	-47.5E-09
35	-10.0E-09	-10.0E-09	-17.9E-09	-24.0E-09	-40.3E-09	-37.5E-09	-40.8E-09	-44.6E-09	-53.6E-09	-60.0E-09	-66.3E-09	-68.5E-09	-43.1E-09
Statistics													
Min	-10.3E-09	-15.5E-09	-21.4E-09	-30.0E-09	-40.3E-09	-40.8E-09	-43.7E-09	-47.2E-09	-54.4E-09	-63.3E-09	-73.4E-09	-72.9E-09	-47.7E-09
Max	-10.0E-09	-10.0E-09	-17.9E-09	-24.0E-09	-35.0E-09	-37.5E-09	-40.8E-09	-44.6E-09	-53.6E-09	-60.0E-09	-66.3E-09	-68.5E-09	-43.1E-09
Average	-10.2E-09	-11.9E-09	-20.1E-09	-26.8E-09	-38.1E-09	-39.5E-09	-42.3E-09	-46.3E-09	-53.9E-09	-61.4E-09	-70.3E-09	-70.5E-09	-46.1E-09
Sigma	130.2E-12	2.6E-09	1.6E-09	2.5E-09	2.3E-09	1.5E-09	1.2E-09	1.2E-09	305.8E-12	1.4E-09	3.0E-09	1.8E-09	2.1E-09

Drift Calculation

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-10.8E-09	-16.2E-09	-28.6E-09	-30.5E-09	-33.4E-09	-37.0E-09	-44.1E-09	-53.1E-09	-63.1E-09	-62.6E-09	-37.4E-09
34	-	-5.3E-09	-11.2E-09	-19.7E-09	-24.7E-09	-30.0E-09	-32.2E-09	-36.9E-09	-43.6E-09	-50.4E-09	-61.0E-09	-59.9E-09	-37.2E-09
35	-	0.0E+00	-7.9E-09	-14.0E-09	-30.4E-09	-27.5E-09	-30.8E-09	-34.6E-09	-43.6E-09	-50.1E-09	-56.3E-09	-58.5E-09	-33.1E-09
Average	-	-1.8E-09	-10.0E-09	-16.6E-09	-27.9E-09	-29.3E-09	-32.1E-09	-36.2E-09	-43.8E-09	-51.2E-09	-60.2E-09	-60.3E-09	-35.9E-09
Sigma	-	2.5E-09	1.5E-09	2.4E-09	2.4E-09	1.3E-09	1.1E-09	1.1E-09	216.1E-12	1.3E-09	2.9E-09	1.7E-09	2.0E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.5E-09	-9.5E-09	-9.0E-09	-9.5E-09	-11.8E-09	-9.9E-09	-9.8E-09	-11.9E-09	-9.8E-09	-9.7E-09	-10.8E-09	-10.1E-09	-12.1E-09
OFF PROTON samples													
30	-32.8E-09	-34.5E-09	-40.2E-09	-47.0E-09	-53.4E-09	-60.9E-09	-58.6E-09	-70.7E-09	-69.2E-09	-83.0E-09	-84.5E-09	-87.1E-09	-57.8E-09
32	-39.0E-09	-37.6E-09	-43.4E-09	-49.9E-09	-58.7E-09	-61.2E-09	-65.5E-09	-67.7E-09	-73.4E-09	-80.4E-09	-93.0E-09	-90.8E-09	-57.1E-09
39	-38.2E-09	-37.8E-09	-42.0E-09	-46.9E-09	-53.9E-09	-56.2E-09	-63.8E-09	-62.6E-09	-75.6E-09	-78.2E-09	-90.8E-09	-84.5E-09	-58.5E-09
Statistics													
Min	-39.0E-09	-37.8E-09	-43.4E-09	-49.9E-09	-58.7E-09	-61.2E-09	-65.5E-09	-70.7E-09	-75.6E-09	-83.0E-09	-93.0E-09	-90.8E-09	-58.5E-09
Max	-32.8E-09	-34.5E-09	-40.2E-09	-46.9E-09	-53.4E-09	-56.2E-09	-58.6E-09	-62.6E-09	-69.2E-09	-78.2E-09	-84.5E-09	-84.5E-09	-57.1E-09
Average	-36.7E-09	-36.7E-09	-41.8E-09	-47.9E-09	-55.4E-09	-59.4E-09	-62.7E-09	-67.0E-09	-72.8E-09	-80.6E-09	-89.4E-09	-87.5E-09	-57.8E-09
Sigma	2.7E-09	1.5E-09	1.3E-09	1.4E-09	2.4E-09	2.3E-09	2.9E-09	3.3E-09	2.7E-09	2.0E-09	3.6E-09	2.6E-09	580.4E-12

Drift Calculation

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-1.7E-09	-7.4E-09	-14.2E-09	-20.6E-09	-28.1E-09	-25.8E-09	-37.8E-09	-36.4E-09	-50.2E-09	-51.7E-09	-54.2E-09	-24.9E-09
32	-	1.4E-09	-4.4E-09	-10.9E-09	-19.7E-09	-22.2E-09	-26.5E-09	-28.7E-09	-34.4E-09	-41.4E-09	-54.0E-09	-51.8E-09	-18.1E-09
39	-	396.2E-12	-3.7E-09	-8.7E-09	-15.7E-09	-17.9E-09	-25.6E-09	-24.3E-09	-37.4E-09	-40.0E-09	-52.5E-09	-46.3E-09	-20.3E-09
Average	-	32.9E-12	-5.2E-09	-11.2E-09	-18.7E-09	-22.7E-09	-26.0E-09	-30.3E-09	-36.1E-09	-43.9E-09	-52.7E-09	-50.8E-09	-21.1E-09
Sigma	-	1.3E-09	1.6E-09	2.3E-09	2.1E-09	4.2E-09	398.8E-12	5.6E-09	1.2E-09	4.5E-09	953.2E-12	3.3E-09	2.9E-09

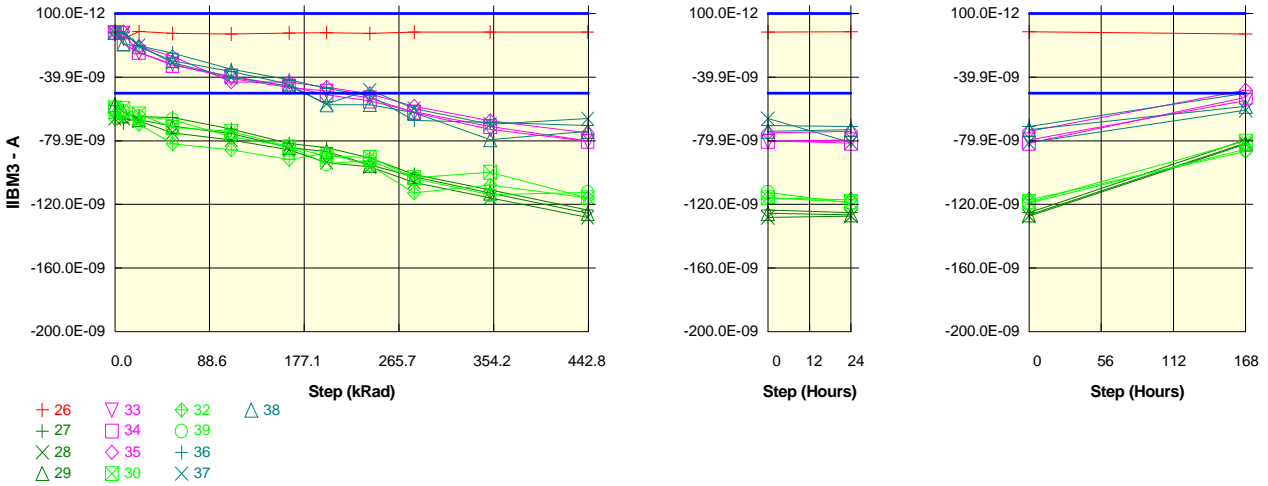
Measurements

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-9.5E-09	-9.5E-09	-9.0E-09	-9.5E-09	-11.8E-09	-9.9E-09	-9.8E-09	-11.9E-09	-9.8E-09	-9.7E-09	-10.8E-09	-10.1E-09	-12.1E-09
OFF TID samples													
36	-10.0E-09	-10.0E-09	-18.9E-09	-19.5E-09	-26.5E-09	-33.9E-09	-32.5E-09	-41.4E-09	-46.3E-09	-44.8E-09	-62.4E-09	-62.2E-09	-40.6E-09
37	-10.3E-09	-10.3E-09	-18.8E-09	-28.6E-09	-33.5E-09	-39.5E-09	-43.1E-09	-41.2E-09	-52.2E-09	-67.9E-09	-64.6E-09	-73.2E-09	-46.5E-09
38	-10.0E-09	-13.3E-09	-16.0E-09	-24.2E-09	-34.7E-09	-38.6E-09	-42.9E-09	-48.3E-09	-56.0E-09	-68.3E-09	-62.4E-09	-64.4E-09	-45.5E-09
Statistics													
Min	-10.3E-09	-13.3E-09	-18.9E-09	-28.6E-09	-34.7E-09	-39.5E-09	-43.1E-09	-48.3E-09	-56.0E-09	-68.3E-09	-64.6E-09	-73.2E-09	-46.5E-09
Max	-10.0E-09	-10.0E-09	-16.0E-09	-19.5E-09	-26.5E-09	-33.9E-09	-32.5E-09	-41.2E-09	-46.3E-09	-44.8E-09	-62.4E-09	-62.2E-09	-40.6E-09
Average	-10.1E-09	-11.2E-09	-17.9E-09	-24.1E-09	-31.6E-09	-37.3E-09	-39.5E-09	-43.6E-09	-51.5E-09	-60.3E-09	-63.1E-09	-66.6E-09	-44.2E-09
Sigma	155.0E-12	1.5E-09	1.4E-09	3.7E-09	3.6E-09	2.4E-09	4.9E-09	3.3E-09	4.0E-09	11.0E-09	1.0E-09	4.8E-09	2.6E-09

Drift Calculation

IIBM2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.9E-09	-9.5E-09	-16.5E-09	-24.0E-09	-22.5E-09	-31.4E-09	-36.3E-09	-34.8E-09	-52.4E-09	-52.2E-09	-30.6E-09
37	-	0.0E+00	-8.5E-09	-18.2E-09	-23.1E-09	-29.1E-09	-32.8E-09	-30.9E-09	-41.9E-09	-57.5E-09	-54.2E-09	-62.9E-09	-36.1E-09
38	-	-3.2E-09	-6.0E-09	-14.2E-09	-24.6E-09	-28.6E-09	-32.8E-09	-38.3E-09	-46.0E-09	-58.2E-09	-52.3E-09	-54.3E-09	-35.5E-09
Average	-	-1.1E-09	-7.8E-09	-14.0E-09	-21.4E-09	-27.2E-09	-29.4E-09	-33.5E-09	-41.4E-09	-50.2E-09	-53.0E-09	-56.5E-09	-34.1E-09
Sigma	-	1.5E-09	1.3E-09	3.6E-09	3.5E-09	2.3E-09	4.8E-09	3.4E-09	4.0E-09	10.9E-09	890.3E-12	4.6E-09	2.4E-09

Parameter : Input Bias Current : IIBM3DUTA
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-12.0E-09	-15.9E-09	-11.2E-09	-12.4E-09	-12.8E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.6E-09	-11.5E-09	-11.5E-09	-11.4E-09	-12.8E-09
ON_PROTON samples													
27	-57.6E-09	-68.8E-09	-64.9E-09	-65.5E-09	-72.7E-09	-81.8E-09	-84.4E-09	-80.8E-09	-101.2E-09	-110.8E-09	-123.5E-09	-125.3E-09	-79.6E-09
28	-66.0E-09	-65.8E-09	-67.6E-09	-74.9E-09	-79.6E-09	-85.8E-09	-93.7E-09	-96.5E-09	-106.2E-09	-115.9E-09	-128.2E-09	-127.3E-09	-82.0E-09
29	-57.4E-09	-62.0E-09	-66.7E-09	-70.8E-09	-75.6E-09	-84.3E-09	-86.7E-09	-95.3E-09	-102.7E-09	-112.9E-09	-125.7E-09	-126.6E-09	-81.6E-09
Statistics													
Min	-66.0E-09	-68.8E-09	-67.6E-09	-74.9E-09	-79.6E-09	-85.8E-09	-93.7E-09	-96.5E-09	-106.2E-09	-115.9E-09	-128.2E-09	-127.3E-09	-82.0E-09
Max	-57.4E-09	-62.0E-09	-64.9E-09	-65.5E-09	-72.7E-09	-81.8E-09	-84.4E-09	-90.8E-09	-101.2E-09	-110.8E-09	-123.5E-09	-125.3E-09	-79.6E-09
Average	-60.4E-09	-65.5E-09	-66.4E-09	-70.4E-09	-75.9E-09	-83.9E-09	-88.2E-09	-94.2E-09	-103.4E-09	-113.2E-09	-125.8E-09	-126.4E-09	-81.0E-09
Sigma	4.0E-09	2.8E-09	1.1E-09	3.9E-09	2.8E-09	1.6E-09	3.9E-09	2.4E-09	2.1E-09	2.1E-09	1.9E-09	840.1E-12	1.0E-09

Drift Calculation

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-11.2E-09	-7.3E-09	-7.9E-09	-15.1E-09	-24.2E-09	-26.8E-09	-33.2E-09	-43.6E-09	-53.2E-09	-65.9E-09	-67.7E-09	-22.0E-09
28	-	284.2E-12	-1.5E-09	-8.9E-09	-13.5E-09	-19.7E-09	-27.6E-09	-30.4E-09	-40.2E-09	-49.9E-09	-62.1E-09	-61.3E-09	-15.9E-09
29	-	-4.6E-09	-9.3E-09	-13.4E-09	-18.1E-09	-26.8E-09	-29.2E-09	-37.9E-09	-45.3E-09	-55.5E-09	-68.3E-09	-69.2E-09	-24.1E-09
Average	-	-5.1E-09	-6.0E-09	-10.0E-09	-15.6E-09	-23.6E-09	-27.9E-09	-33.9E-09	-43.0E-09	-52.9E-09	-65.4E-09	-66.1E-09	-20.7E-09
Sigma	-	4.7E-09	3.3E-09	2.4E-09	1.9E-09	2.9E-09	1.0E-09	3.1E-09	2.1E-09	2.3E-09	2.5E-09	3.4E-09	3.5E-09

Measurements

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-12.0E-09	-15.9E-09	-11.2E-09	-12.4E-09	-12.8E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.6E-09	-11.5E-09	-11.5E-09	-11.4E-09	-12.8E-09
ON_TID samples													
33	-12.4E-09	-12.4E-09	-24.5E-09	-31.7E-09	-40.7E-09	-46.4E-09	-48.7E-09	-53.0E-09	-62.3E-09	-72.8E-09	-80.3E-09	-79.5E-09	-54.6E-09
34	-11.9E-09	-19.1E-09	-24.3E-09	-32.5E-09	-39.4E-09	-45.6E-09	-51.0E-09	-54.9E-09	-61.9E-09	-71.0E-09	-80.2E-09	-81.5E-09	-52.6E-09
35	-11.4E-09	-11.4E-09	-20.7E-09	-27.0E-09	-42.9E-09	-43.1E-09	-46.3E-09	-50.5E-09	-58.4E-09	-67.5E-09	-74.9E-09	-73.9E-09	-48.2E-09
Statistics													
Min	-12.4E-09	-19.1E-09	-24.5E-09	-32.5E-09	-42.9E-09	-46.4E-09	-51.0E-09	-54.9E-09	-62.3E-09	-72.8E-09	-80.3E-09	-81.5E-09	-54.6E-09
Max	-11.4E-09	-11.4E-09	-20.7E-09	-27.0E-09	-39.4E-09	-43.1E-09	-46.3E-09	-50.5E-09	-58.4E-09	-67.5E-09	-74.9E-09	-73.9E-09	-48.2E-09
Average	-11.9E-09	-14.3E-09	-23.1E-09	-30.4E-09	-41.0E-09	-45.0E-09	-48.7E-09	-52.8E-09	-60.9E-09	-70.4E-09	-78.5E-09	-78.3E-09	-51.8E-09
Sigma	391.5E-12	3.4E-09	1.7E-09	2.5E-09	1.5E-09	1.4E-09	1.9E-09	1.8E-09	1.8E-09	2.2E-09	2.5E-09	3.2E-09	2.7E-09

Drift Calculation

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-12.1E-09	-19.4E-09	-28.4E-09	-34.0E-09	-36.4E-09	-40.6E-09	-50.0E-09	-60.5E-09	-67.9E-09	-67.1E-09	-42.3E-09
34	-	-7.2E-09	-12.3E-09	-20.6E-09	-27.5E-09	-33.7E-09	-39.1E-09	-43.0E-09	-50.0E-09	-59.1E-09	-68.2E-09	-69.6E-09	-40.7E-09
35	-	0.0E+00	-9.3E-09	-15.6E-09	-31.5E-09	-31.7E-09	-34.9E-09	-39.1E-09	-47.0E-09	-56.1E-09	-63.5E-09	-62.5E-09	-36.8E-09
Average	-	-2.4E-09	-11.3E-09	-18.5E-09	-29.1E-09	-33.1E-09	-36.8E-09	-40.9E-09	-49.0E-09	-58.6E-09	-66.6E-09	-66.4E-09	-39.9E-09
Sigma	-	3.4E-09	1.4E-09	2.1E-09	1.7E-09	1.0E-09	1.7E-09	1.6E-09	1.4E-09	1.8E-09	2.1E-09	2.9E-09	2.3E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors				Issue:	02

Measurements

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.0E-09	-15.9E-09	-11.2E-09	-12.4E-09	-12.8E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.6E-09	-11.5E-09	-11.5E-09	-11.4E-09	-12.8E-09
OFF_PROTON samples													
30	-59.3E-09	-59.6E-09	-63.2E-09	-71.6E-09	-74.1E-09	-83.7E-09	-89.7E-09	-90.4E-09	-103.1E-09	-99.8E-09	-115.9E-09	-118.4E-09	-80.2E-09
32	-66.0E-09	-63.7E-09	-69.6E-09	-81.9E-09	-85.6E-09	-91.7E-09	-87.8E-09	-95.6E-09	-112.7E-09	-107.9E-09	-116.0E-09	-117.0E-09	-86.6E-09
39	-59.4E-09	-61.5E-09	-64.8E-09	-66.7E-09	-77.6E-09	-83.7E-09	-94.5E-09	-92.4E-09	-103.9E-09	-114.0E-09	-112.5E-09	-119.2E-09	-85.4E-09
Statistics													
Min	-66.0E-09	-63.7E-09	-69.6E-09	-81.9E-09	-85.6E-09	-91.7E-09	-94.5E-09	-95.6E-09	-112.7E-09	-114.0E-09	-116.0E-09	-119.2E-09	-86.6E-09
Max	-59.3E-09	-59.6E-09	-63.2E-09	-66.7E-09	-74.1E-09	-83.7E-09	-87.8E-09	-90.4E-09	-103.1E-09	-99.8E-09	-112.5E-09	-117.0E-09	-80.2E-09
Average	-61.6E-09	-61.6E-09	-65.9E-09	-73.4E-09	-79.1E-09	-86.4E-09	-90.6E-09	-92.8E-09	-106.6E-09	-107.3E-09	-114.8E-09	-118.2E-09	-84.0E-09
Sigma	3.1E-09	1.7E-09	2.7E-09	6.3E-09	4.8E-09	3.8E-09	2.8E-09	2.1E-09	4.4E-09	5.8E-09	1.6E-09	920.5E-12	2.8E-09

Drift Calculation

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-300.9E-12	-3.9E-09	-12.3E-09	-14.7E-09	-24.4E-09	-30.3E-09	-31.1E-09	-43.8E-09	-40.5E-09	-56.5E-09	-59.1E-09	-20.8E-09
32	-	2.3E-09	-3.5E-09	-15.9E-09	-19.6E-09	-25.7E-09	-21.8E-09	-29.6E-09	-46.7E-09	-41.9E-09	-50.0E-09	-51.0E-09	-20.6E-09
39	-	-2.1E-09	-5.4E-09	-7.3E-09	-18.1E-09	-24.3E-09	-35.0E-09	-33.0E-09	-44.4E-09	-54.6E-09	-53.1E-09	-59.7E-09	-25.9E-09
Average	-	-22.3E-12	-4.3E-09	-11.8E-09	-17.5E-09	-24.8E-09	-29.1E-09	-31.2E-09	-45.0E-09	-45.7E-09	-53.2E-09	-56.6E-09	-22.4E-09
Sigma	-	1.8E-09	789.3E-12	3.5E-09	2.0E-09	633.4E-12	5.5E-09	1.4E-09	1.3E-09	6.3E-09	2.6E-09	4.0E-09	2.5E-09

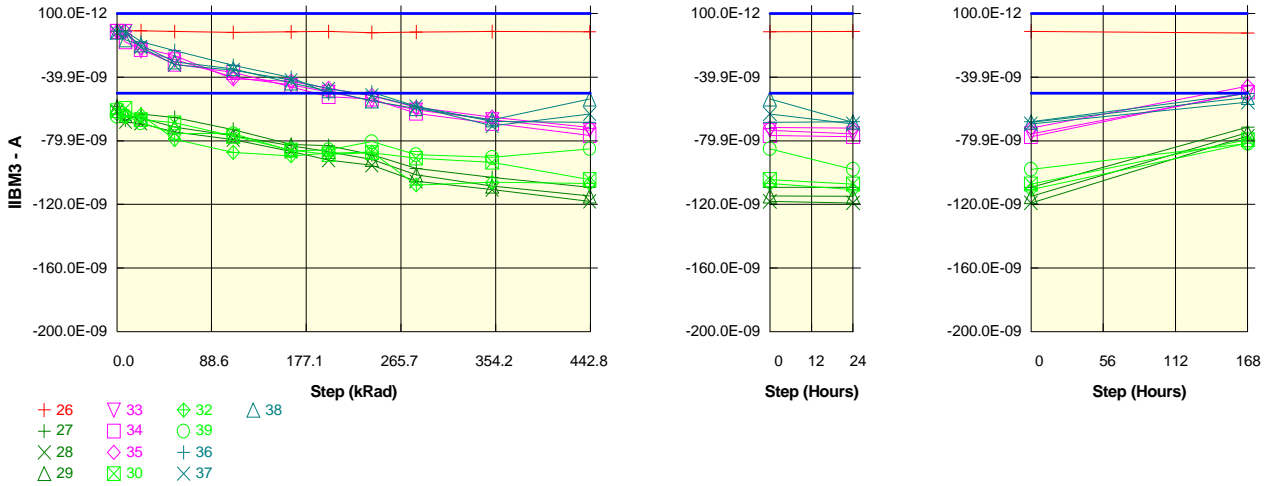
Measurements

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-12.0E-09	-15.9E-09	-11.2E-09	-12.4E-09	-12.8E-09	-12.1E-09	-11.9E-09	-12.5E-09	-11.6E-09	-11.5E-09	-11.5E-09	-11.4E-09	-12.8E-09
OFF_TID samples													
36	-11.7E-09	-11.7E-09	-20.1E-09	-24.8E-09	-35.1E-09	-41.6E-09	-47.2E-09	-51.7E-09	-67.2E-09	-68.3E-09	-70.5E-09	-70.8E-09	-50.0E-09
37	-12.0E-09	-12.0E-09	-20.2E-09	-30.8E-09	-40.1E-09	-45.6E-09	-56.8E-09	-48.2E-09	-59.8E-09	-69.6E-09	-66.0E-09	-81.2E-09	-60.7E-09
38	-11.6E-09	-18.9E-09	-21.0E-09	-29.7E-09	-36.3E-09	-44.3E-09	-57.4E-09	-57.2E-09	-62.4E-09	-79.3E-09	-74.0E-09	-72.9E-09	-58.4E-09
Statistics													
Min	-12.0E-09	-18.9E-09	-21.0E-09	-30.8E-09	-40.1E-09	-45.6E-09	-57.4E-09	-57.2E-09	-67.2E-09	-79.3E-09	-74.0E-09	-81.2E-09	-60.7E-09
Max	-11.6E-09	-11.7E-09	-20.1E-09	-24.8E-09	-35.1E-09	-41.6E-09	-47.2E-09	-48.2E-09	-59.8E-09	-68.3E-09	-66.0E-09	-70.8E-09	-50.0E-09
Average	-11.8E-09	-14.2E-09	-20.4E-09	-28.4E-09	-37.2E-09	-43.8E-09	-53.8E-09	-52.4E-09	-63.1E-09	-72.4E-09	-70.2E-09	-75.0E-09	-56.4E-09
Sigma	154.7E-12	3.3E-09	378.8E-12	2.6E-09	2.2E-09	1.7E-09	4.7E-09	3.7E-09	3.1E-09	4.9E-09	3.2E-09	4.5E-09	4.6E-09

Drift Calculation

IIBM3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-8.4E-09	-13.0E-09	-23.3E-09	-29.8E-09	-35.5E-09	-40.0E-09	-55.4E-09	-56.5E-09	-58.7E-09	-59.1E-09	-38.3E-09
37	-	0.0E+00	-8.2E-09	-18.8E-09	-28.1E-09	-33.6E-09	-44.7E-09	-36.2E-09	-47.8E-09	-57.6E-09	-54.0E-09	-69.2E-09	-48.7E-09
38	-	-7.3E-09	-9.3E-09	-18.1E-09	-24.7E-09	-32.7E-09	-45.7E-09	-45.6E-09	-50.7E-09	-67.7E-09	-62.4E-09	-61.2E-09	-46.7E-09
Average	-	-2.4E-09	-8.6E-09	-16.6E-09	-25.4E-09	-32.0E-09	-42.0E-09	-40.6E-09	-51.3E-09	-60.6E-09	-58.4E-09	-63.2E-09	-44.6E-09
Sigma	-	3.4E-09	501.1E-12	2.6E-09	2.0E-09	1.6E-09	4.6E-09	3.9E-09	3.1E-09	5.0E-09	3.4E-09	4.3E-09	4.5E-09

Parameter : Input Bias Current : IIBM3DUTB
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.0E-09	-10.8E-09	-10.8E-09	-11.3E-09	-11.9E-09	-11.5E-09	-11.3E-09	-11.9E-09	-11.6E-09	-11.3E-09	-11.4E-09	-11.1E-09	-12.3E-09
ON_PROTON samples													
27	-58.2E-09	-66.9E-09	-63.2E-09	-65.4E-09	-72.9E-09	-82.3E-09	-83.0E-09	-88.9E-09	-97.5E-09	-103.1E-09	-109.2E-09	-109.3E-09	-71.5E-09
28	-61.7E-09	-68.1E-09	-69.2E-09	-74.6E-09	-79.2E-09	-86.7E-09	-92.1E-09	-95.5E-09	-105.6E-09	-110.8E-09	-118.1E-09	-119.1E-09	-77.2E-09
29	-58.8E-09	-64.2E-09	-65.5E-09	-71.3E-09	-76.8E-09	-83.0E-09	-86.9E-09	-91.8E-09	-101.4E-09	-108.6E-09	-114.7E-09	-115.0E-09	-74.7E-09
Statistics													
Min	-61.7E-09	-68.1E-09	-69.2E-09	-74.6E-09	-79.2E-09	-86.7E-09	-92.1E-09	-95.5E-09	-105.6E-09	-110.8E-09	-118.1E-09	-119.1E-09	-77.2E-09
Max	-58.2E-09	-64.2E-09	-63.2E-09	-65.4E-09	-72.9E-09	-82.3E-09	-83.0E-09	-88.9E-09	-97.5E-09	-103.1E-09	-109.2E-09	-109.3E-09	-71.5E-09
Average	-59.6E-09	-66.4E-09	-66.0E-09	-70.4E-09	-76.3E-09	-84.0E-09	-87.3E-09	-92.0E-09	-101.5E-09	-107.5E-09	-114.0E-09	-114.4E-09	-74.5E-09
Sigma	1.5E-09	1.7E-09	2.5E-09	3.8E-09	2.6E-09	1.9E-09	3.7E-09	2.7E-09	3.3E-09	3.2E-09	3.7E-09	4.0E-09	2.3E-09

Drift Calculation

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-8.7E-09	-5.0E-09	-7.2E-09	-14.7E-09	-24.1E-09	-24.8E-09	-30.7E-09	-39.3E-09	-44.9E-09	-51.1E-09	-51.1E-09	-13.3E-09
28	-	-6.5E-09	-7.5E-09	-12.9E-09	-17.5E-09	-25.0E-09	-30.4E-09	-33.8E-09	-43.9E-09	-49.1E-09	-56.4E-09	-57.4E-09	-15.5E-09
29	-	-5.4E-09	-6.7E-09	-12.5E-09	-18.0E-09	-24.2E-09	-28.1E-09	-33.0E-09	-42.6E-09	-49.8E-09	-55.9E-09	-56.2E-09	-15.9E-09
Average	-	-6.8E-09	-6.4E-09	-10.9E-09	-16.8E-09	-24.4E-09	-27.8E-09	-32.5E-09	-41.9E-09	-47.9E-09	-54.4E-09	-54.9E-09	-14.9E-09
Sigma	-	1.4E-09	1.1E-09	2.6E-09	1.5E-09	3.94.3E-12	2.3E-09	1.3E-09	1.9E-09	2.1E-09	2.4E-09	2.7E-09	1.1E-09

Measurements

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.0E-09	-10.8E-09	-10.8E-09	-11.3E-09	-11.9E-09	-11.5E-09	-11.3E-09	-11.9E-09	-11.6E-09	-11.3E-09	-11.4E-09	-11.1E-09	-12.3E-09
ON_TID samples													
33	-11.2E-09	-11.2E-09	-23.3E-09	-29.0E-09	-40.0E-09	-44.9E-09	-49.4E-09	-54.7E-09	-60.6E-09	-66.7E-09	-73.3E-09	-75.6E-09	-49.9E-09
34	-11.2E-09	-17.7E-09	-22.5E-09	-31.8E-09	-37.0E-09	-46.0E-09	-52.1E-09	-53.8E-09	-62.7E-09	-69.0E-09	-76.6E-09	-77.4E-09	-49.4E-09
35	-11.2E-09	-11.2E-09	-21.3E-09	-26.6E-09	-41.1E-09	-42.5E-09	-47.1E-09	-51.6E-09	-59.0E-09	-65.1E-09	-71.6E-09	-72.1E-09	-45.6E-09
Statistics													
Min	-11.2E-09	-17.7E-09	-23.3E-09	-31.8E-09	-41.1E-09	-46.0E-09	-52.1E-09	-54.7E-09	-62.7E-09	-69.0E-09	-76.6E-09	-77.4E-09	-49.9E-09
Max	-11.2E-09	-11.2E-09	-21.3E-09	-26.6E-09	-37.0E-09	-42.5E-09	-47.1E-09	-51.6E-09	-59.0E-09	-65.1E-09	-71.6E-09	-72.1E-09	-45.6E-09
Average	-11.2E-09	-13.4E-09	-22.4E-09	-29.1E-09	-39.3E-09	-44.5E-09	-49.5E-09	-53.3E-09	-60.7E-09	-66.9E-09	-73.9E-09	-75.1E-09	-48.3E-09
Sigma	20.2E-12	3.1E-09	809.8E-12	2.1E-09	1.7E-09	1.5E-09	2.1E-09	1.3E-09	1.5E-09	1.6E-09	2.1E-09	2.2E-09	1.9E-09

Drift Calculation

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-12.1E-09	-17.8E-09	-28.8E-09	-33.7E-09	-38.2E-09	-43.5E-09	-49.4E-09	-55.5E-09	-62.1E-09	-64.4E-09	-38.6E-09
34	-	-6.5E-09	-11.3E-09	-20.6E-09	-25.9E-09	-34.8E-09	-41.0E-09	-42.6E-09	-51.5E-09	-57.8E-09	-65.5E-09	-66.2E-09	-38.2E-09
35	-	0.0E+00	-10.2E-09	-15.4E-09	-29.9E-09	-31.3E-09	-35.9E-09	-40.4E-09	-47.8E-09	-53.9E-09	-60.5E-09	-61.0E-09	-34.5E-09
Average	-	-2.2E-09	-11.2E-09	-17.9E-09	-28.2E-09	-33.3E-09	-38.4E-09	-42.2E-09	-49.6E-09	-55.8E-09	-62.7E-09	-63.9E-09	-37.1E-09
Sigma	-	3.1E-09	792.2E-12	2.1E-09	1.7E-09	1.5E-09	2.1E-09	1.3E-09	1.5E-09	1.6E-09	2.1E-09	2.2E-09	1.9E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors				Issue:	02

Measurements

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.0E-09	-10.8E-09	-10.8E-09	-11.3E-09	-11.9E-09	-11.5E-09	-11.3E-09	-11.9E-09	-11.6E-09	-11.3E-09	-11.4E-09	-11.1E-09	-12.3E-09
OFF PROTON samples													
30	-61.1E-09	-59.6E-09	-66.6E-09	-68.7E-09	-77.0E-09	-85.9E-09	-88.6E-09	-87.5E-09	-91.0E-09	-93.5E-09	-104.4E-09	-107.2E-09	-79.3E-09
32	-63.0E-09	-65.1E-09	-63.8E-09	-79.2E-09	-87.3E-09	-89.5E-09	-87.6E-09	-87.1E-09	-107.7E-09	-106.1E-09	-106.8E-09	-110.7E-09	-81.6E-09
39	-64.5E-09	-64.2E-09	-68.7E-09	-75.5E-09	-75.6E-09	-86.3E-09	-85.6E-09	-80.6E-09	-88.7E-09	-90.4E-09	-85.1E-09	-98.0E-09	-81.7E-09
Statistics													
Min	-64.5E-09	-65.1E-09	-68.7E-09	-79.2E-09	-87.3E-09	-89.5E-09	-88.6E-09	-87.5E-09	-107.7E-09	-106.1E-09	-106.8E-09	-110.7E-09	-81.7E-09
Max	-61.1E-09	-59.6E-09	-63.8E-09	-68.7E-09	-75.6E-09	-85.9E-09	-85.6E-09	-80.6E-09	-88.7E-09	-90.4E-09	-85.1E-09	-98.0E-09	-79.3E-09
Average	-62.8E-09	-63.0E-09	-66.4E-09	-74.4E-09	-80.0E-09	-87.2E-09	-87.3E-09	-85.1E-09	-95.8E-09	-96.7E-09	-98.8E-09	-105.3E-09	-80.9E-09
Sigma	1.4E-09	2.4E-09	2.0E-09	4.4E-09	5.2E-09	1.6E-09	1.2E-09	3.1E-09	8.5E-09	6.8E-09	9.7E-09	5.4E-09	1.1E-09

Drift Calculation

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	1.5E-09	-5.5E-09	-7.6E-09	-15.9E-09	-24.8E-09	-27.5E-09	-26.4E-09	-29.9E-09	-32.4E-09	-43.3E-09	-46.1E-09	-18.2E-09
32	-	-2.2E-09	-852.5E-12	-16.2E-09	-24.4E-09	-26.6E-09	-24.7E-09	-24.1E-09	-44.8E-09	-43.1E-09	-43.9E-09	-47.7E-09	-18.6E-09
39	-	334.3E-12	-4.2E-09	-11.0E-09	-11.1E-09	-21.8E-09	-21.1E-09	-16.1E-09	-24.3E-09	-25.9E-09	-20.6E-09	-33.5E-09	-17.2E-09
Average	-	-111.4E-12	-3.5E-09	-11.6E-09	-17.1E-09	-24.4E-09	-24.4E-09	-22.2E-09	-33.0E-09	-33.8E-09	-35.9E-09	-42.4E-09	-18.0E-09
Sigma	-	1.5E-09	2.0E-09	3.6E-09	5.5E-09	2.0E-09	2.6E-09	4.4E-09	8.7E-09	7.1E-09	10.9E-09	6.4E-09	593.8E-12

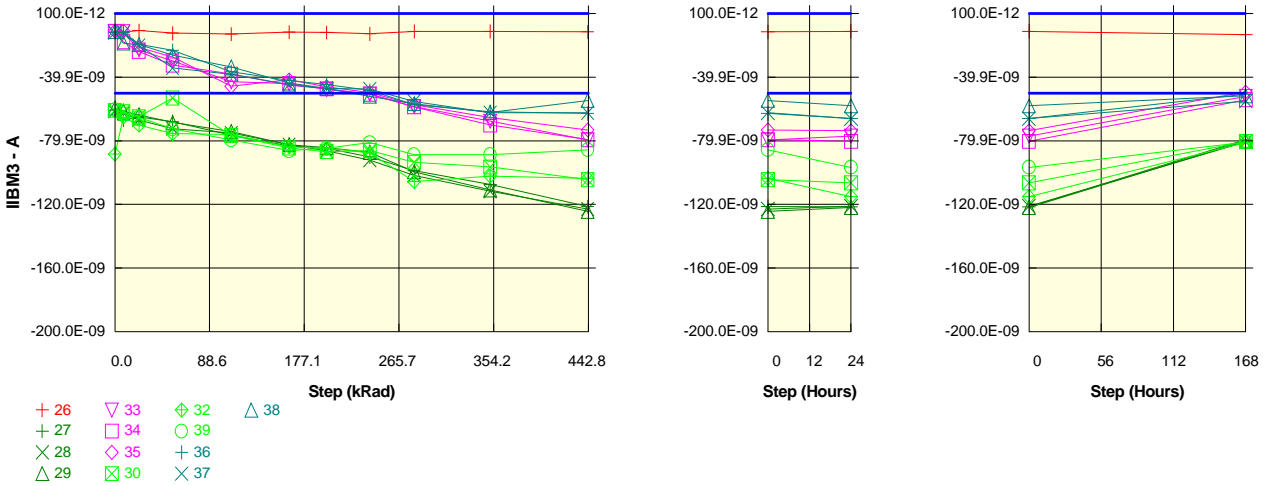
Measurements

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.0E-09	-10.8E-09	-10.8E-09	-11.3E-09	-11.9E-09	-11.5E-09	-11.3E-09	-11.9E-09	-11.6E-09	-11.3E-09	-11.4E-09	-11.1E-09	-12.3E-09
OFF TID samples													
36	-10.9E-09	-10.9E-09	-17.6E-09	-23.3E-09	-32.6E-09	-40.2E-09	-50.3E-09	-49.4E-09	-58.3E-09	-67.7E-09	-68.4E-09	-67.9E-09	-50.2E-09
37	-11.7E-09	-11.7E-09	-21.0E-09	-32.1E-09	-35.5E-09	-41.9E-09	-47.3E-09	-51.5E-09	-58.5E-09	-70.7E-09	-63.1E-09	-69.4E-09	-55.7E-09
38	-11.6E-09	-16.5E-09	-19.7E-09	-30.4E-09	-34.7E-09	-43.7E-09	-48.5E-09	-55.0E-09	-59.8E-09	-66.8E-09	-53.7E-09	-68.3E-09	-52.6E-09
Statistics													
Min	-11.7E-09	-16.5E-09	-21.0E-09	-32.1E-09	-35.5E-09	-43.7E-09	-50.3E-09	-55.0E-09	-59.8E-09	-70.7E-09	-68.4E-09	-69.4E-09	-55.7E-09
Max	-10.9E-09	-10.9E-09	-17.6E-09	-23.3E-09	-32.6E-09	-40.2E-09	-47.3E-09	-49.4E-09	-58.3E-09	-66.8E-09	-53.7E-09	-67.9E-09	-50.2E-09
Average	-11.4E-09	-13.0E-09	-19.4E-09	-28.6E-09	-34.3E-09	-41.9E-09	-48.7E-09	-52.0E-09	-58.9E-09	-68.4E-09	-61.7E-09	-68.5E-09	-52.8E-09
Sigma	369.6E-12	2.5E-09	1.4E-09	3.8E-09	1.2E-09	1.4E-09	1.2E-09	2.3E-09	656.6E-12	1.7E-09	6.1E-09	627.2E-12	2.3E-09

Drift Calculation

IIBM3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.7E-09	-12.4E-09	-21.7E-09	-29.3E-09	-39.4E-09	-38.5E-09	-47.4E-09	-56.8E-09	-57.5E-09	-57.0E-09	-39.3E-09
37	-	0.0E+00	-9.3E-09	-20.4E-09	-23.8E-09	-30.1E-09	-35.6E-09	-39.7E-09	-46.8E-09	-58.9E-09	-51.4E-09	-57.6E-09	-44.0E-09
38	-	-4.8E-09	-8.1E-09	-18.8E-09	-23.1E-09	-32.1E-09	-36.9E-09	-43.3E-09	-48.1E-09	-55.2E-09	-42.1E-09	-56.6E-09	-41.0E-09
Average	-	-1.6E-09	-8.0E-09	-17.2E-09	-22.9E-09	-30.5E-09	-37.3E-09	-40.5E-09	-47.4E-09	-57.0E-09	-50.3E-09	-57.1E-09	-41.4E-09
Sigma	-	2.3E-09	1.1E-09	3.4E-09	870.5E-12	1.2E-09	1.6E-09	2.0E-09	566.6E-12	1.5E-09	6.4E-09	418.5E-12	1.9E-09

Parameter : Input Bias Current : IIBM3DUTC
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.5E-09	-11.5E-09	-10.7E-09	-12.3E-09	-12.9E-09	-11.7E-09	-11.8E-09	-12.8E-09	-11.2E-09	-11.2E-09	-11.4E-09	-11.1E-09	-13.1E-09
ON PROTON samples													
27	-60.7E-09	-66.9E-09	-65.1E-09	-68.0E-09	-76.5E-09	-83.3E-09	-84.8E-09	-90.1E-09	-98.9E-09	-107.5E-09	-121.4E-09	-121.5E-09	-79.3E-09
28	-61.6E-09	-62.6E-09	-66.8E-09	-72.3E-09	-75.1E-09	-82.5E-09	-86.4E-09	-92.2E-09	-101.8E-09	-111.8E-09	-122.9E-09	-121.2E-09	-80.7E-09
29	-59.5E-09	-61.3E-09	-63.7E-09	-68.5E-09	-74.2E-09	-82.4E-09	-84.3E-09	-87.3E-09	-99.6E-09	-111.0E-09	-124.4E-09	-122.0E-09	-80.1E-09
Statistics													
Min	-61.6E-09	-66.9E-09	-66.8E-09	-72.3E-09	-76.5E-09	-83.3E-09	-86.4E-09	-92.2E-09	-101.8E-09	-111.8E-09	-124.4E-09	-122.0E-09	-80.7E-09
Max	-59.5E-09	-61.3E-09	-63.7E-09	-68.0E-09	-74.2E-09	-82.4E-09	-84.3E-09	-87.3E-09	-98.9E-09	-107.5E-09	-121.4E-09	-121.2E-09	-79.3E-09
Average	-60.6E-09	-63.6E-09	-65.2E-09	-69.6E-09	-75.2E-09	-82.7E-09	-85.1E-09	-89.9E-09	-100.1E-09	-110.1E-09	-122.9E-09	-121.5E-09	-80.0E-09
Sigma	851.1E-12	2.4E-09	1.3E-09	1.9E-09	935.8E-12	417.3E-12	886.5E-12	2.0E-09	1.2E-09	1.8E-09	1.2E-09	319.3E-12	582.7E-12

Drift Calculation

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-6.3E-09	-4.4E-09	-7.3E-09	-15.8E-09	-22.6E-09	-24.1E-09	-29.5E-09	-38.3E-09	-46.8E-09	-60.7E-09	-60.8E-09	-18.6E-09
28	-	-997.9E-12	-5.2E-09	-10.7E-09	-13.5E-09	-20.9E-09	-24.8E-09	-30.6E-09	-40.3E-09	-50.2E-09	-61.3E-09	-59.6E-09	-19.1E-09
29	-	-1.8E-09	-4.2E-09	-9.0E-09	-14.7E-09	-22.9E-09	-24.8E-09	-27.8E-09	-40.1E-09	-51.5E-09	-64.9E-09	-62.5E-09	-20.6E-09
Average	-	-3.0E-09	-4.6E-09	-9.0E-09	-14.7E-09	-22.2E-09	-24.6E-09	-29.3E-09	-39.5E-09	-49.5E-09	-62.3E-09	-61.0E-09	-19.4E-09
Sigma	-	2.3E-09	464.6E-12	1.4E-09	926.5E-12	879.8E-12	317.6E-12	1.2E-09	895.0E-12	2.0E-09	1.9E-09	1.2E-09	853.8E-12

Measurements

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.5E-09	-11.5E-09	-10.7E-09	-12.3E-09	-12.9E-09	-11.7E-09	-11.8E-09	-12.8E-09	-11.2E-09	-11.2E-09	-11.4E-09	-11.1E-09	-13.1E-09
ON TID samples													
33	-11.3E-09	-11.3E-09	-22.8E-09	-29.7E-09	-42.9E-09	-44.0E-09	-47.7E-09	-50.7E-09	-58.5E-09	-67.6E-09	-79.4E-09	-77.0E-09	-52.1E-09
34	-11.2E-09	-17.7E-09	-23.8E-09	-32.4E-09	-38.1E-09	-45.0E-09	-47.3E-09	-50.7E-09	-58.6E-09	-70.0E-09	-79.3E-09	-80.3E-09	-54.1E-09
35	-11.0E-09	-11.0E-09	-21.4E-09	-27.3E-09	-45.8E-09	-41.7E-09	-46.0E-09	-49.7E-09	-57.3E-09	-65.4E-09	-73.2E-09	-73.7E-09	-49.4E-09
Statistics													
Min	-11.3E-09	-17.7E-09	-23.8E-09	-32.4E-09	-45.8E-09	-45.0E-09	-47.7E-09	-50.7E-09	-58.6E-09	-70.0E-09	-79.4E-09	-80.3E-09	-54.1E-09
Max	-11.0E-09	-11.0E-09	-21.4E-09	-27.3E-09	-38.1E-09	-41.7E-09	-46.0E-09	-49.7E-09	-57.3E-09	-65.4E-09	-73.2E-09	-73.7E-09	-49.4E-09
Average	-11.2E-09	-13.3E-09	-22.6E-09	-29.8E-09	-42.2E-09	-43.6E-09	-47.0E-09	-50.4E-09	-58.1E-09	-67.6E-09	-77.3E-09	-77.0E-09	-51.9E-09
Sigma	122.6E-12	3.1E-09	975.3E-12	2.1E-09	3.2E-09	1.4E-09	737.4E-12	457.2E-12	606.8E-12	1.9E-09	2.9E-09	2.7E-09	2.0E-09

Drift Calculation

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-11.5E-09	-18.4E-09	-31.5E-09	-32.7E-09	-36.3E-09	-39.4E-09	-47.2E-09	-56.3E-09	-68.1E-09	-65.7E-09	-40.8E-09
34	-	-6.5E-09	-12.5E-09	-21.2E-09	-26.9E-09	-33.8E-09	-36.1E-09	-39.5E-09	-47.4E-09	-58.8E-09	-68.1E-09	-69.1E-09	-42.9E-09
35	-	0.0E+00	-10.3E-09	-16.3E-09	-34.7E-09	-30.6E-09	-34.9E-09	-38.7E-09	-46.2E-09	-54.3E-09	-62.2E-09	-62.7E-09	-38.3E-09
Average	-	-2.2E-09	-11.5E-09	-18.6E-09	-31.1E-09	-32.4E-09	-35.8E-09	-39.2E-09	-46.9E-09	-56.5E-09	-66.1E-09	-65.8E-09	-40.7E-09
Sigma	-	3.0E-09	899.4E-12	2.0E-09	3.2E-09	1.3E-09	619.8E-12	346.7E-12	504.3E-12	1.8E-09	2.8E-09	2.6E-09	1.9E-09

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.5E-09	-11.5E-09	-10.7E-09	-12.3E-09	-12.9E-09	-11.7E-09	-11.8E-09	-12.8E-09	-11.2E-09	-11.2E-09	-11.4E-09	-11.1E-09	-13.1E-09
OFF PROTON samples													
30	-60.8E-09	-61.6E-09	-64.9E-09	-53.1E-09	-76.7E-09	-84.5E-09	-86.9E-09	-86.2E-09	-93.5E-09	-96.5E-09	-104.4E-09	-106.5E-09	-80.4E-09
32	-88.4E-09	-65.1E-09	-70.2E-09	-75.4E-09	-76.2E-09	-83.8E-09	-84.5E-09	-87.8E-09	-105.7E-09	-102.2E-09	-103.7E-09	-115.1E-09	-80.9E-09
39	-60.5E-09	-62.9E-09	-65.4E-09	-72.6E-09	-79.4E-09	-86.2E-09	-84.7E-09	-81.2E-09	-88.7E-09	-88.7E-09	-85.6E-09	-96.7E-09	-80.9E-09
Statistics													
Min	-88.4E-09	-65.1E-09	-70.2E-09	-75.4E-09	-79.4E-09	-86.2E-09	-86.9E-09	-87.8E-09	-105.7E-09	-102.2E-09	-104.4E-09	-115.1E-09	-80.9E-09
Max	-60.5E-09	-61.6E-09	-64.9E-09	-53.1E-09	-76.2E-09	-83.8E-09	-84.5E-09	-81.2E-09	-88.7E-09	-88.7E-09	-85.6E-09	-96.7E-09	-80.4E-09
Average	-69.9E-09	-63.2E-09	-66.8E-09	-67.0E-09	-77.4E-09	-84.8E-09	-85.4E-09	-85.1E-09	-96.0E-09	-95.8E-09	-97.9E-09	-106.1E-09	-80.8E-09
Sigma	13.1E-09	1.4E-09	2.4E-09	9.9E-09	1.4E-09	1.0E-09	1.1E-09	2.8E-09	7.1E-09	5.5E-09	8.7E-09	7.5E-09	226.6E-12

Drift Calculation

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-785.6E-12	-4.1E-09	7.7E-09	-15.8E-09	-23.7E-09	-26.1E-09	-25.3E-09	-32.7E-09	-35.6E-09	-43.6E-09	-45.6E-09	-19.6E-09
32	-	23.3E-09	18.2E-09	12.9E-09	12.2E-09	4.6E-09	3.9E-09	553.8E-12	-17.3E-09	-13.8E-09	-15.3E-09	-26.8E-09	7.4E-09
39	-	-2.4E-09	-4.9E-09	-12.1E-09	-18.9E-09	-25.7E-09	-24.2E-09	-20.7E-09	-28.2E-09	-28.2E-09	-25.1E-09	-36.2E-09	-20.4E-09
Average	-	6.7E-09	3.1E-09	2.9E-09	-7.5E-09	-14.9E-09	-15.5E-09	-15.1E-09	-26.1E-09	-25.9E-09	-28.0E-09	-36.2E-09	-10.9E-09
Sigma	-	11.7E-09	10.7E-09	10.8E-09	14.0E-09	13.8E-09	13.7E-09	11.3E-09	6.4E-09	9.1E-09	11.7E-09	7.7E-09	12.9E-09

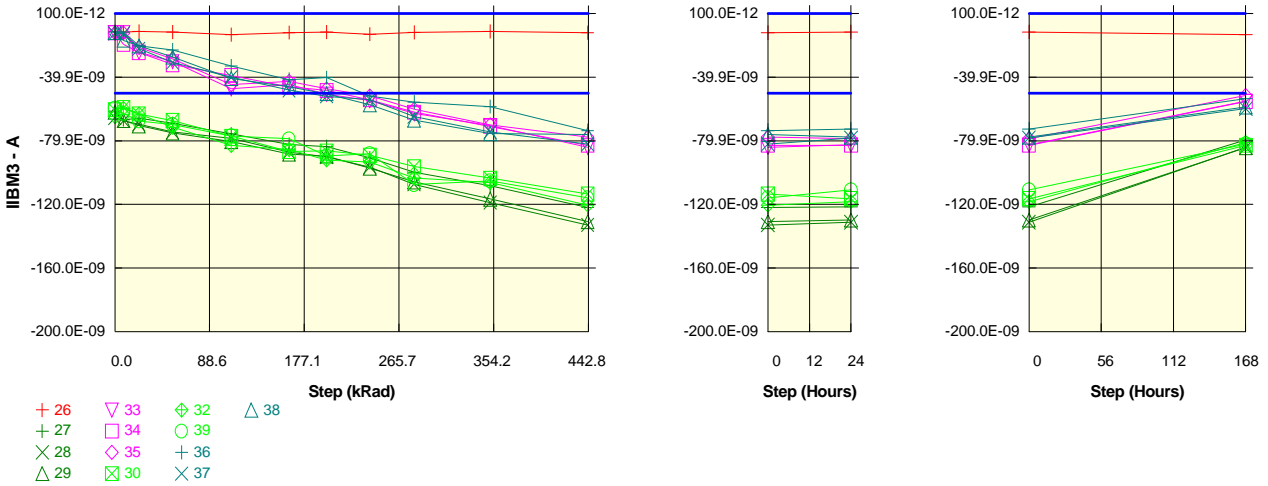
Measurements

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.5E-09	-11.5E-09	-10.7E-09	-12.3E-09	-12.9E-09	-11.7E-09	-11.8E-09	-12.8E-09	-11.2E-09	-11.2E-09	-11.4E-09	-11.1E-09	-13.1E-09
OFF TID samples													
36	-11.9E-09	-11.9E-09	-19.2E-09	-23.1E-09	-36.6E-09	-42.1E-09	-44.5E-09	-48.3E-09	-57.4E-09	-61.6E-09	-62.9E-09	-66.0E-09	-50.7E-09
37	-12.1E-09	-12.1E-09	-20.0E-09	-34.2E-09	-38.3E-09	-44.6E-09	-47.0E-09	-47.4E-09	-55.2E-09	-62.4E-09	-62.4E-09	-66.1E-09	-55.0E-09
38	-11.2E-09	-18.6E-09	-19.4E-09	-26.1E-09	-33.5E-09	-43.7E-09	-47.1E-09	-52.0E-09	-56.6E-09	-62.2E-09	-54.6E-09	-57.9E-09	-51.7E-09
Statistics													
Min	-12.1E-09	-18.6E-09	-20.0E-09	-34.2E-09	-38.3E-09	-44.6E-09	-47.1E-09	-52.0E-09	-57.4E-09	-62.4E-09	-62.9E-09	-66.1E-09	-55.0E-09
Max	-11.2E-09	-11.9E-09	-19.2E-09	-23.1E-09	-33.5E-09	-42.1E-09	-44.5E-09	-47.4E-09	-55.2E-09	-61.6E-09	-54.6E-09	-57.9E-09	-50.7E-09
Average	-11.7E-09	-14.2E-09	-19.5E-09	-27.8E-09	-36.1E-09	-43.5E-09	-46.2E-09	-49.3E-09	-56.4E-09	-62.1E-09	-60.0E-09	-63.3E-09	-52.5E-09
Sigma	361.8E-12	3.1E-09	321.5E-12	4.7E-09	2.0E-09	1.0E-09	1.2E-09	2.0E-09	920.4E-12	313.6E-12	3.8E-09	3.8E-09	1.9E-09

Drift Calculation

IIBM3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-7.4E-09	-11.2E-09	-24.7E-09	-30.2E-09	-32.6E-09	-36.5E-09	-45.5E-09	-49.7E-09	-51.0E-09	-54.2E-09	-38.8E-09
37	-	0.0E+00	-7.9E-09	-22.1E-09	-26.2E-09	-32.5E-09	-34.9E-09	-35.3E-09	-43.1E-09	-50.3E-09	-50.3E-09	-54.0E-09	-42.9E-09
38	-	-7.4E-09	-8.2E-09	-14.9E-09	-22.3E-09	-32.5E-09	-35.9E-09	-40.8E-09	-45.4E-09	-50.9E-09	-43.4E-09	-46.7E-09	-40.4E-09
Average	-	-2.5E-09	-7.8E-09	-16.1E-09	-24.4E-09	-31.7E-09	-34.5E-09	-37.5E-09	-44.7E-09	-50.3E-09	-48.2E-09	-51.6E-09	-40.7E-09
Sigma	-	3.5E-09	338.3E-12	4.5E-09	1.6E-09	1.1E-09	1.3E-09	2.4E-09	1.1E-09	488.4E-12	3.4E-09	3.5E-09	1.7E-09

Parameter : Input Bias Current : IIBM3DUTD
 Test conditions : +VCC=5V. -VCC=GND. VCM=-1.4V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.3E-09	-11.7E-09	-11.2E-09	-11.6E-09	-13.2E-09	-11.9E-09	-11.6E-09	-12.9E-09	-11.8E-09	-11.2E-09	-12.0E-09	-11.5E-09	-13.1E-09
ON_PROTON samples													
27	-61.3E-09	-66.7E-09	-65.8E-09	-69.1E-09	-75.7E-09	-82.2E-09	-83.6E-09	-90.8E-09	-99.8E-09	-108.2E-09	-121.9E-09	-121.7E-09	-79.6E-09
28	-65.5E-09	-67.4E-09	-69.6E-09	-74.5E-09	-78.5E-09	-87.1E-09	-90.1E-09	-96.5E-09	-107.3E-09	-118.8E-09	-133.0E-09	-131.3E-09	-84.2E-09
29	-62.0E-09	-67.2E-09	-70.5E-09	-75.2E-09	-80.5E-09	-88.4E-09	-89.6E-09	-97.2E-09	-105.9E-09	-116.6E-09	-130.9E-09	-129.9E-09	-84.3E-09
Statistics													
Min	-65.5E-09	-67.4E-09	-70.5E-09	-75.2E-09	-80.5E-09	-88.4E-09	-90.1E-09	-97.2E-09	-107.3E-09	-118.8E-09	-133.0E-09	-131.3E-09	-84.3E-09
Max	-61.3E-09	-66.7E-09	-65.8E-09	-69.1E-09	-75.7E-09	-82.2E-09	-83.6E-09	-90.8E-09	-99.8E-09	-108.2E-09	-121.9E-09	-121.7E-09	-79.6E-09
Average	-62.9E-09	-67.1E-09	-68.6E-09	-72.9E-09	-78.2E-09	-85.9E-09	-87.8E-09	-94.9E-09	-104.3E-09	-114.5E-09	-128.6E-09	-127.6E-09	-82.7E-09
Sigma	1.8E-09	284.4E-12	2.0E-09	2.7E-09	2.0E-09	2.6E-09	3.0E-09	2.9E-09	3.3E-09	4.6E-09	4.8E-09	4.2E-09	2.2E-09

Drift Calculation

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-5.4E-09	-4.5E-09	-7.8E-09	-14.3E-09	-20.9E-09	-22.3E-09	-29.5E-09	-38.5E-09	-46.9E-09	-60.6E-09	-60.3E-09	-18.3E-09
28	-	-2.0E-09	-4.1E-09	-9.0E-09	-13.0E-09	-21.7E-09	-24.7E-09	-31.1E-09	-41.8E-09	-53.4E-09	-67.5E-09	-65.8E-09	-18.7E-09
29	-	-5.1E-09	-8.5E-09	-13.1E-09	-18.5E-09	-26.3E-09	-27.6E-09	-35.2E-09	-43.9E-09	-54.6E-09	-68.9E-09	-67.9E-09	-22.2E-09
Average	-	-4.2E-09	-5.7E-09	-10.0E-09	-15.3E-09	-23.0E-09	-24.8E-09	-31.9E-09	-41.4E-09	-51.6E-09	-65.7E-09	-64.7E-09	-19.8E-09
Sigma	-	1.6E-09	2.0E-09	2.3E-09	2.3E-09	2.4E-09	2.2E-09	2.4E-09	2.2E-09	3.4E-09	3.6E-09	3.2E-09	1.8E-09

Measurements

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.3E-09	-11.7E-09	-11.2E-09	-11.6E-09	-13.2E-09	-11.9E-09	-11.6E-09	-12.9E-09	-11.8E-09	-11.2E-09	-12.0E-09	-11.5E-09	-13.1E-09
ON_TID samples													
33	-12.0E-09	-12.0E-09	-24.3E-09	-30.2E-09	-47.2E-09	-44.5E-09	-50.7E-09	-54.7E-09	-62.9E-09	-70.4E-09	-84.1E-09	-82.6E-09	-55.0E-09
34	-12.0E-09	-19.3E-09	-24.6E-09	-32.0E-09	-38.9E-09	-46.2E-09	-48.3E-09	-54.1E-09	-62.0E-09	-70.9E-09	-82.9E-09	-82.9E-09	-55.2E-09
35	-12.1E-09	-12.1E-09	-21.3E-09	-28.5E-09	-44.6E-09	-42.6E-09	-47.3E-09	-51.7E-09	-60.1E-09	-70.0E-09	-77.7E-09	-78.7E-09	-51.5E-09
Statistics													
Min	-12.1E-09	-19.3E-09	-24.6E-09	-32.0E-09	-47.2E-09	-46.2E-09	-50.7E-09	-54.7E-09	-62.9E-09	-70.9E-09	-84.1E-09	-82.9E-09	-55.2E-09
Max	-12.0E-09	-12.0E-09	-21.3E-09	-28.5E-09	-38.9E-09	-42.6E-09	-47.3E-09	-51.7E-09	-60.1E-09	-70.0E-09	-77.7E-09	-78.7E-09	-51.5E-09
Average	-12.1E-09	-14.5E-09	-23.4E-09	-30.3E-09	-43.6E-09	-44.4E-09	-48.8E-09	-53.5E-09	-61.7E-09	-70.4E-09	-81.6E-09	-81.4E-09	-53.9E-09
Sigma	47.5E-12	3.4E-09	1.5E-09	1.4E-09	3.5E-09	1.5E-09	1.4E-09	1.3E-09	1.2E-09	361.6E-12	2.8E-09	1.9E-09	1.7E-09

Drift Calculation

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-12.3E-09	-18.2E-09	-35.2E-09	-32.5E-09	-38.7E-09	-42.7E-09	-50.9E-09	-58.4E-09	-72.1E-09	-70.6E-09	-43.0E-09
34	-	-7.2E-09	-12.5E-09	-20.0E-09	-26.9E-09	-34.2E-09	-36.3E-09	-42.1E-09	-50.0E-09	-58.9E-09	-70.8E-09	-70.9E-09	-43.2E-09
35	-	0.0E+00	-9.2E-09	-16.4E-09	-32.4E-09	-30.5E-09	-35.1E-09	-39.6E-09	-48.0E-09	-57.9E-09	-65.6E-09	-66.6E-09	-39.3E-09
Average	-	-2.4E-09	-11.4E-09	-18.2E-09	-31.5E-09	-32.4E-09	-36.7E-09	-41.5E-09	-49.6E-09	-58.4E-09	-69.5E-09	-69.4E-09	-41.9E-09
Sigma	-	3.4E-09	1.5E-09	1.5E-09	3.5E-09	1.5E-09	1.5E-09	1.3E-09	1.2E-09	399.5E-12	2.8E-09	2.0E-09	1.8E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.3E-09	-11.7E-09	-11.2E-09	-11.6E-09	-13.2E-09	-11.9E-09	-11.6E-09	-12.9E-09	-11.8E-09	-11.2E-09	-12.0E-09	-11.5E-09	-13.1E-09
OFF PROTON samples													
30	-60.4E-09	-59.0E-09	-63.1E-09	-67.3E-09	-77.2E-09	-86.7E-09	-86.3E-09	-89.1E-09	-96.3E-09	-103.5E-09	-113.5E-09	-116.4E-09	-82.8E-09
32	-64.8E-09	-59.7E-09	-63.2E-09	-71.4E-09	-82.9E-09	-85.5E-09	-92.1E-09	-93.4E-09	-103.3E-09	-106.3E-09	-120.5E-09	-118.3E-09	-81.1E-09
39	-59.5E-09	-62.7E-09	-67.5E-09	-69.7E-09	-76.9E-09	-78.8E-09	-89.5E-09	-88.2E-09	-107.6E-09	-105.2E-09	-115.9E-09	-110.9E-09	-82.0E-09
Statistics													
Min	-64.8E-09	-62.7E-09	-67.5E-09	-71.4E-09	-82.9E-09	-86.7E-09	-92.1E-09	-93.4E-09	-107.6E-09	-106.3E-09	-120.5E-09	-118.3E-09	-82.8E-09
Max	-59.5E-09	-59.0E-09	-63.1E-09	-67.3E-09	-76.9E-09	-78.8E-09	-86.3E-09	-88.2E-09	-96.3E-09	-103.5E-09	-113.5E-09	-110.9E-09	-81.1E-09
Average	-61.6E-09	-60.5E-09	-64.6E-09	-69.5E-09	-79.0E-09	-83.7E-09	-89.3E-09	-90.2E-09	-102.4E-09	-105.0E-09	-116.6E-09	-115.2E-09	-82.0E-09
Sigma	2.3E-09	1.6E-09	2.1E-09	1.7E-09	2.8E-09	3.5E-09	2.3E-09	2.2E-09	4.6E-09	1.1E-09	2.9E-09	3.1E-09	708.0E-12

Drift Calculation

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	1.5E-09	-2.7E-09	-6.8E-09	-16.7E-09	-26.3E-09	-25.9E-09	-28.7E-09	-35.9E-09	-43.1E-09	-53.0E-09	-56.0E-09	-22.4E-09
32	-	5.1E-09	1.6E-09	-6.7E-09	-18.1E-09	-20.7E-09	-27.3E-09	-28.6E-09	-38.5E-09	-41.5E-09	-55.7E-09	-53.5E-09	-16.3E-09
39	-	-3.3E-09	-8.1E-09	-10.3E-09	-17.5E-09	-19.3E-09	-30.0E-09	-28.7E-09	-48.1E-09	-45.7E-09	-56.4E-09	-51.4E-09	-22.5E-09
Average	-	1.1E-09	-3.0E-09	-7.9E-09	-17.4E-09	-22.1E-09	-27.7E-09	-28.7E-09	-40.8E-09	-43.4E-09	-55.0E-09	-53.6E-09	-20.4E-09
Sigma	-	3.4E-09	4.0E-09	1.7E-09	574.5E-12	3.0E-09	1.7E-09	61.9E-12	5.3E-09	1.7E-09	1.5E-09	1.9E-09	2.9E-09

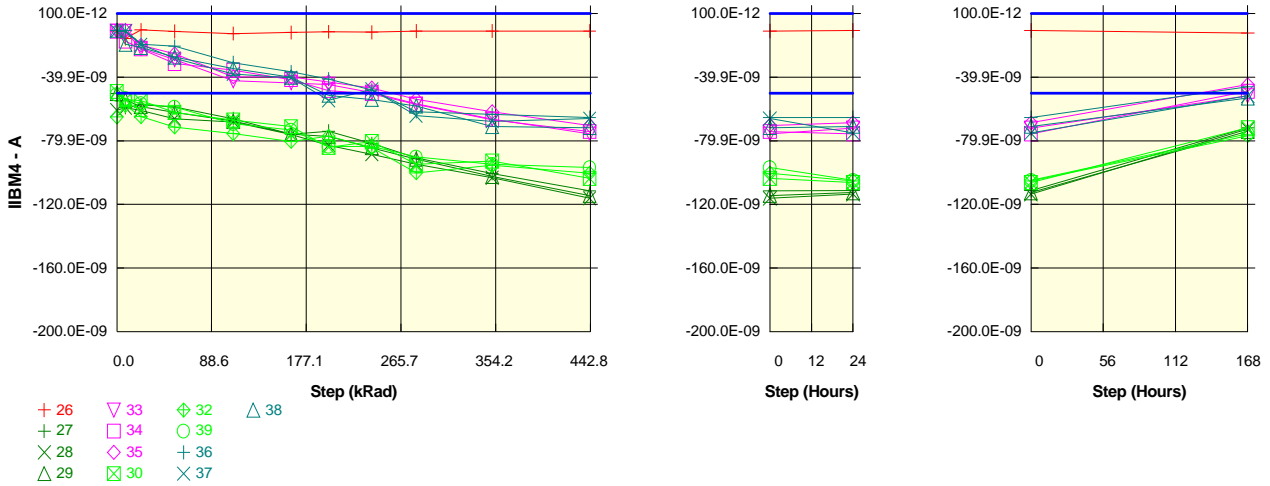
Measurements

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.3E-09	-11.7E-09	-11.2E-09	-11.6E-09	-13.2E-09	-11.9E-09	-11.6E-09	-12.9E-09	-11.8E-09	-11.2E-09	-12.0E-09	-11.5E-09	-13.1E-09
OFF TID samples													
36	-11.6E-09	-11.6E-09	-20.2E-09	-22.9E-09	-32.9E-09	-41.5E-09	-40.3E-09	-51.8E-09	-55.7E-09	-58.5E-09	-73.6E-09	-72.7E-09	-53.5E-09
37	-12.5E-09	-12.5E-09	-22.1E-09	-30.8E-09	-40.1E-09	-48.2E-09	-52.0E-09	-54.1E-09	-64.8E-09	-74.4E-09	-82.1E-09	-78.2E-09	-59.8E-09
38	-11.8E-09	-16.7E-09	-20.3E-09	-27.3E-09	-40.8E-09	-46.0E-09	-50.4E-09	-57.4E-09	-67.0E-09	-75.5E-09	-76.0E-09	-77.7E-09	-58.7E-09
Statistics													
Min	-12.5E-09	-16.7E-09	-22.1E-09	-30.8E-09	-40.8E-09	-48.2E-09	-52.0E-09	-57.4E-09	-67.0E-09	-75.5E-09	-82.1E-09	-78.2E-09	-59.8E-09
Max	-11.6E-09	-11.6E-09	-20.2E-09	-22.9E-09	-32.9E-09	-41.5E-09	-40.3E-09	-51.8E-09	-55.7E-09	-58.5E-09	-73.6E-09	-72.7E-09	-53.5E-09
Average	-12.0E-09	-13.6E-09	-20.9E-09	-27.0E-09	-37.9E-09	-45.2E-09	-47.6E-09	-54.4E-09	-62.5E-09	-69.4E-09	-77.2E-09	-76.2E-09	-57.4E-09
Sigma	396.3E-12	2.2E-09	873.9E-12	3.2E-09	3.6E-09	2.8E-09	5.2E-09	2.3E-09	4.9E-09	7.8E-09	3.6E-09	2.5E-09	2.7E-09

Drift Calculation

IIBM3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.6E-09	-11.3E-09	-21.3E-09	-29.9E-09	-28.7E-09	-40.2E-09	-44.1E-09	-46.9E-09	-62.0E-09	-61.1E-09	-41.9E-09
37	-	0.0E+00	-9.6E-09	-18.3E-09	-27.5E-09	-35.7E-09	-39.5E-09	-41.5E-09	-52.2E-09	-61.8E-09	-69.6E-09	-65.7E-09	-47.3E-09
38	-	-4.9E-09	-8.5E-09	-15.5E-09	-29.0E-09	-34.2E-09	-38.6E-09	-45.6E-09	-55.2E-09	-63.7E-09	-64.2E-09	-65.9E-09	-46.9E-09
Average	-	-1.6E-09	-8.9E-09	-15.0E-09	-26.0E-09	-33.2E-09	-35.6E-09	-42.5E-09	-50.5E-09	-57.5E-09	-65.3E-09	-64.2E-09	-45.4E-09
Sigma	-	2.3E-09	483.5E-12	2.9E-09	3.3E-09	2.4E-09	4.9E-09	2.3E-09	4.7E-09	7.5E-09	3.2E-09	2.2E-09	2.4E-09

Parameter : Input Bias Current : IIBM4DUTA
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.0E-09	-15.6E-09	-10.3E-09	-11.2E-09	-12.6E-09	-11.8E-09	-11.4E-09	-11.7E-09	-11.0E-09	-10.9E-09	-10.9E-09	-10.6E-09	-12.1E-09
ON_PROTON samples													
27	-50.4E-09	-59.1E-09	-57.4E-09	-58.8E-09	-66.1E-09	-75.8E-09	-74.1E-09	-81.7E-09	-90.8E-09	-100.6E-09	-111.6E-09	-111.2E-09	-71.8E-09
28	-60.7E-09	-59.2E-09	-60.9E-09	-66.1E-09	-68.1E-09	-76.1E-09	-82.9E-09	-88.4E-09	-94.6E-09	-103.2E-09	-116.2E-09	-113.5E-09	-72.6E-09
29	-50.2E-09	-54.3E-09	-58.5E-09	-62.1E-09	-67.7E-09	-75.8E-09	-77.3E-09	-84.4E-09	-91.5E-09	-102.4E-09	-114.4E-09	-112.6E-09	-74.1E-09
Statistics													
Min	-60.7E-09	-59.2E-09	-60.9E-09	-66.1E-09	-68.1E-09	-76.1E-09	-82.9E-09	-88.4E-09	-94.6E-09	-103.2E-09	-116.2E-09	-113.5E-09	-74.1E-09
Max	-50.2E-09	-54.3E-09	-57.4E-09	-58.8E-09	-66.1E-09	-75.8E-09	-74.1E-09	-81.7E-09	-90.8E-09	-100.6E-09	-111.6E-09	-111.2E-09	-71.8E-09
Average	-53.8E-09	-57.5E-09	-59.0E-09	-62.4E-09	-67.3E-09	-75.9E-09	-78.1E-09	-84.9E-09	-92.3E-09	-102.1E-09	-114.1E-09	-112.5E-09	-72.8E-09
Sigma	4.9E-09	2.3E-09	1.5E-09	3.0E-09	846.4E-12	159.2E-12	3.6E-09	2.8E-09	1.7E-09	1.1E-09	1.9E-09	941.9E-12	952.4E-12

Drift Calculation

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-8.7E-09	-7.0E-09	-8.4E-09	-15.8E-09	-25.4E-09	-23.7E-09	-31.3E-09	-40.5E-09	-50.2E-09	-61.2E-09	-60.9E-09	-21.4E-09
28	-	1.6E-09	-234.0E-12	-5.4E-09	-7.4E-09	-15.4E-09	-22.2E-09	-27.7E-09	-33.9E-09	-42.5E-09	-55.5E-09	-52.8E-09	-11.9E-09
29	-	-4.1E-09	-8.3E-09	-11.9E-09	-17.4E-09	-25.6E-09	-27.1E-09	-34.2E-09	-41.3E-09	-52.2E-09	-64.2E-09	-62.4E-09	-23.8E-09
Average	-	-3.8E-09	-5.2E-09	-8.6E-09	-13.5E-09	-22.2E-09	-24.3E-09	-31.1E-09	-38.6E-09	-48.3E-09	-60.3E-09	-58.7E-09	-19.0E-09
Sigma	-	4.2E-09	3.5E-09	2.6E-09	4.4E-09	4.8E-09	2.1E-09	2.7E-09	3.3E-09	4.2E-09	3.6E-09	4.2E-09	5.2E-09

Measurements

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-11.0E-09	-15.6E-09	-10.3E-09	-11.2E-09	-12.6E-09	-11.8E-09	-11.4E-09	-11.7E-09	-11.0E-09	-10.9E-09	-10.9E-09	-10.6E-09	-12.1E-09
ON_TID samples													
33	-11.1E-09	-11.1E-09	-21.8E-09	-29.0E-09	-42.3E-09	-43.5E-09	-44.5E-09	-49.6E-09	-56.9E-09	-66.3E-09	-75.7E-09	-72.0E-09	-51.7E-09
34	-11.0E-09	-17.3E-09	-22.2E-09	-31.4E-09	-35.6E-09	-41.5E-09	-48.4E-09	-50.4E-09	-57.1E-09	-66.8E-09	-74.2E-09	-75.6E-09	-48.8E-09
35	-10.6E-09	-10.6E-09	-19.9E-09	-25.2E-09	-39.8E-09	-39.8E-09	-43.0E-09	-46.8E-09	-53.9E-09	-61.8E-09	-70.3E-09	-68.7E-09	-44.7E-09
Statistics													
Min	-11.1E-09	-17.3E-09	-22.2E-09	-31.4E-09	-42.3E-09	-43.5E-09	-48.4E-09	-50.4E-09	-57.1E-09	-66.8E-09	-75.7E-09	-75.6E-09	-51.7E-09
Max	-10.6E-09	-10.6E-09	-19.9E-09	-25.2E-09	-35.6E-09	-39.8E-09	-43.0E-09	-46.8E-09	-53.9E-09	-61.8E-09	-70.3E-09	-68.7E-09	-44.7E-09
Average	-10.9E-09	-13.0E-09	-21.3E-09	-28.5E-09	-39.2E-09	-41.6E-09	-45.3E-09	-48.9E-09	-56.0E-09	-64.9E-09	-73.4E-09	-72.1E-09	-48.4E-09
Sigma	229.8E-12	3.0E-09	997.1E-12	2.6E-09	2.8E-09	1.5E-09	2.3E-09	1.5E-09	1.5E-09	2.3E-09	2.3E-09	2.8E-09	2.9E-09

Drift Calculation

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-10.7E-09	-17.9E-09	-31.2E-09	-32.4E-09	-33.4E-09	-38.4E-09	-45.7E-09	-55.2E-09	-64.6E-09	-60.9E-09	-40.5E-09
34	-	-6.2E-09	-11.1E-09	-20.4E-09	-24.6E-09	-30.5E-09	-37.4E-09	-39.4E-09	-46.1E-09	-55.7E-09	-63.2E-09	-64.6E-09	-37.8E-09
35	-	0.0E+00	-9.3E-09	-14.6E-09	-29.2E-09	-29.2E-09	-32.5E-09	-36.2E-09	-43.3E-09	-51.2E-09	-59.7E-09	-58.1E-09	-34.1E-09
Average	-	-2.1E-09	-10.4E-09	-17.6E-09	-28.3E-09	-30.7E-09	-34.4E-09	-38.0E-09	-45.0E-09	-54.0E-09	-62.5E-09	-61.2E-09	-37.5E-09
Sigma	-	2.9E-09	782.7E-12	2.4E-09	2.8E-09	1.3E-09	2.1E-09	1.3E-09	1.3E-09	2.0E-09	2.0E-09	2.7E-09	2.6E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors						Issue:	02

Measurements

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.0E-09	-15.6E-09	-10.3E-09	-11.2E-09	-12.6E-09	-11.8E-09	-11.4E-09	-11.7E-09	-11.0E-09	-10.9E-09	-10.9E-09	-10.6E-09	-12.1E-09
OFF PROTON samples													
30	-49.0E-09	-54.1E-09	-54.8E-09	-62.1E-09	-67.0E-09	-71.0E-09	-84.1E-09	-80.4E-09	-94.8E-09	-92.8E-09	-103.7E-09	-106.3E-09	-71.8E-09
32	-65.0E-09	-57.7E-09	-64.8E-09	-71.4E-09	-75.4E-09	-80.4E-09	-77.1E-09	-84.3E-09	-100.2E-09	-95.4E-09	-100.4E-09	-105.2E-09	-76.8E-09
39	-50.9E-09	-53.5E-09	-56.6E-09	-58.9E-09	-69.3E-09	-73.2E-09	-83.6E-09	-83.4E-09	-90.2E-09	-94.8E-09	-96.9E-09	-105.0E-09	-75.6E-09
Statistics													
Min	-65.0E-09	-57.7E-09	-64.8E-09	-71.4E-09	-75.4E-09	-80.4E-09	-84.1E-09	-84.3E-09	-100.2E-09	-95.4E-09	-103.7E-09	-106.3E-09	-76.8E-09
Max	-49.0E-09	-53.5E-09	-54.8E-09	-58.9E-09	-67.0E-09	-71.0E-09	-77.1E-09	-80.4E-09	-90.2E-09	-92.8E-09	-96.9E-09	-105.0E-09	-71.8E-09
Average	-54.9E-09	-55.1E-09	-58.7E-09	-64.1E-09	-70.5E-09	-74.9E-09	-81.6E-09	-82.7E-09	-95.1E-09	-94.3E-09	-100.3E-09	-105.5E-09	-74.8E-09
Sigma	7.1E-09	1.9E-09	4.4E-09	5.3E-09	3.6E-09	4.0E-09	3.2E-09	1.7E-09	4.1E-09	1.1E-09	2.8E-09	570.3E-12	2.1E-09

Drift Calculation

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-5.2E-09	-5.8E-09	-13.2E-09	-18.0E-09	-22.1E-09	-35.2E-09	-31.5E-09	-45.9E-09	-43.8E-09	-54.7E-09	-57.3E-09	-22.9E-09
32	-	7.3E-09	150.4E-12	-6.4E-09	-10.4E-09	-15.4E-09	-12.2E-09	-19.4E-09	-35.2E-09	-30.4E-09	-35.4E-09	-40.2E-09	-11.8E-09
39	-	-2.6E-09	-5.7E-09	-8.0E-09	-18.4E-09	-22.3E-09	-32.7E-09	-32.5E-09	-39.3E-09	-43.9E-09	-46.0E-09	-54.1E-09	-24.7E-09
Average	-	-160.5E-12	-3.8E-09	-9.2E-09	-15.6E-09	-19.9E-09	-26.7E-09	-27.8E-09	-40.1E-09	-39.4E-09	-45.4E-09	-50.5E-09	-19.8E-09
Sigma	-	5.3E-09	2.8E-09	2.9E-09	3.6E-09	3.2E-09	10.3E-09	6.0E-09	4.4E-09	6.3E-09	7.9E-09	7.4E-09	5.7E-09

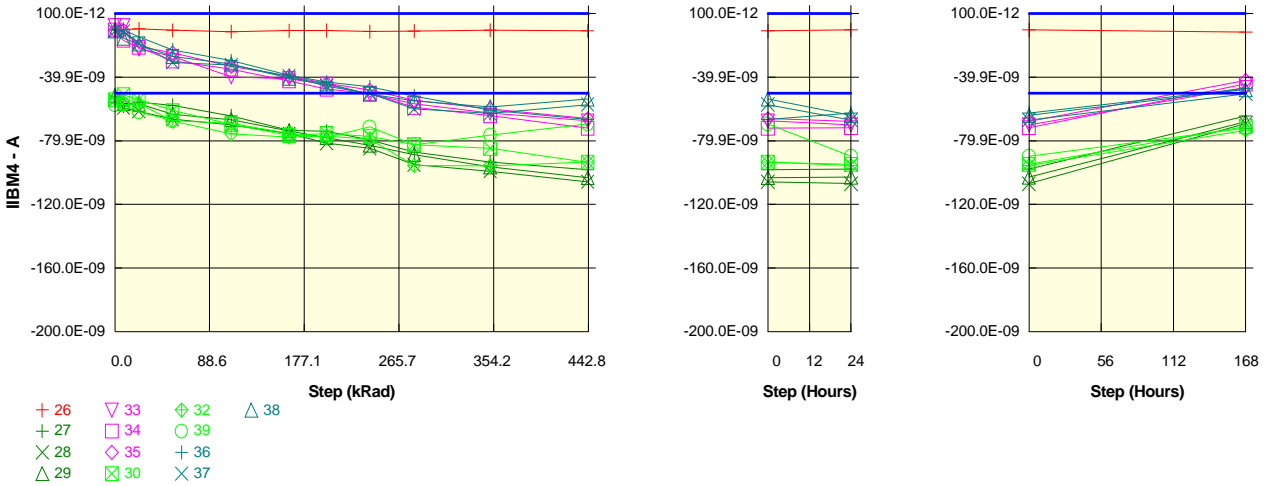
Measurements

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-11.0E-09	-15.6E-09	-10.3E-09	-11.2E-09	-12.6E-09	-11.8E-09	-11.4E-09	-11.7E-09	-11.0E-09	-10.9E-09	-10.9E-09	-10.6E-09	-12.1E-09
OFF TID samples													
36	-10.5E-09	-10.5E-09	-19.1E-09	-20.5E-09	-31.0E-09	-36.7E-09	-41.2E-09	-48.2E-09	-61.6E-09	-63.5E-09	-65.3E-09	-65.5E-09	-46.0E-09
37	-11.1E-09	-11.1E-09	-19.5E-09	-28.1E-09	-37.9E-09	-40.4E-09	-54.6E-09	-47.6E-09	-64.2E-09	-67.7E-09	-66.0E-09	-75.1E-09	-51.6E-09
38	-10.5E-09	-19.3E-09	-21.3E-09	-27.4E-09	-34.5E-09	-40.0E-09	-51.4E-09	-54.1E-09	-58.1E-09	-71.0E-09	-71.8E-09	-70.8E-09	-53.1E-09
Statistics													
Min	-11.1E-09	-19.3E-09	-21.3E-09	-28.1E-09	-37.9E-09	-40.4E-09	-54.6E-09	-54.1E-09	-64.2E-09	-71.0E-09	-71.8E-09	-75.1E-09	-53.1E-09
Max	-10.5E-09	-10.5E-09	-19.1E-09	-20.5E-09	-31.0E-09	-36.7E-09	-41.2E-09	-47.6E-09	-58.1E-09	-63.5E-09	-65.3E-09	-65.5E-09	-46.0E-09
Average	-10.7E-09	-13.6E-09	-20.0E-09	-25.3E-09	-34.4E-09	-39.0E-09	-49.1E-09	-49.9E-09	-61.3E-09	-67.4E-09	-67.7E-09	-70.5E-09	-50.3E-09
Sigma	254.7E-12	4.0E-09	957.1E-12	3.4E-09	2.8E-09	1.7E-09	5.7E-09	2.9E-09	2.5E-09	3.1E-09	2.9E-09	3.9E-09	3.1E-09

Drift Calculation

IIBM4DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.6E-09	-10.0E-09	-20.4E-09	-26.2E-09	-30.7E-09	-37.6E-09	-51.1E-09	-53.0E-09	-54.8E-09	-55.0E-09	-35.5E-09
37	-	0.0E+00	-8.4E-09	-17.0E-09	-26.8E-09	-29.4E-09	-43.5E-09	-36.5E-09	-53.1E-09	-56.6E-09	-55.0E-09	-64.0E-09	-40.6E-09
38	-	-8.8E-09	-10.8E-09	-16.8E-09	-23.9E-09	-29.4E-09	-40.9E-09	-43.5E-09	-47.6E-09	-60.5E-09	-61.2E-09	-60.3E-09	-42.6E-09
Average	-	-2.9E-09	-9.3E-09	-14.6E-09	-23.7E-09	-28.3E-09	-38.3E-09	-39.2E-09	-50.6E-09	-56.7E-09	-57.0E-09	-59.8E-09	-39.6E-09
Sigma	-	4.1E-09	1.1E-09	3.3E-09	2.6E-09	1.5E-09	5.5E-09	3.1E-09	2.3E-09	3.1E-09	3.0E-09	3.7E-09	3.0E-09

Parameter : Input Bias Current : IIBM4DUTB
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.2E-09	-10.0E-09	-9.5E-09	-10.4E-09	-11.4E-09	-10.7E-09	-10.6E-09	-11.3E-09	-10.9E-09	-10.4E-09	-10.8E-09	-10.3E-09	-11.7E-09
ON_PROTON samples													
27	-51.9E-09	-58.1E-09	-55.7E-09	-57.7E-09	-64.3E-09	-73.4E-09	-74.0E-09	-79.4E-09	-87.0E-09	-93.4E-09	-98.2E-09	-97.9E-09	-64.4E-09
28	-54.4E-09	-59.2E-09	-61.5E-09	-66.4E-09	-69.9E-09	-75.6E-09	-81.5E-09	-84.8E-09	-95.0E-09	-99.1E-09	-105.7E-09	-107.0E-09	-69.2E-09
29	-51.7E-09	-56.5E-09	-56.8E-09	-63.3E-09	-66.7E-09	-73.7E-09	-77.9E-09	-82.8E-09	-88.6E-09	-96.5E-09	-103.2E-09	-102.9E-09	-68.0E-09
Statistics													
Min	-54.4E-09	-59.2E-09	-61.5E-09	-66.4E-09	-69.9E-09	-75.6E-09	-81.5E-09	-84.8E-09	-95.0E-09	-99.1E-09	-105.7E-09	-107.0E-09	-69.2E-09
Max	-51.7E-09	-56.5E-09	-55.7E-09	-57.7E-09	-64.3E-09	-73.4E-09	-74.0E-09	-79.4E-09	-87.0E-09	-93.4E-09	-98.2E-09	-97.9E-09	-64.4E-09
Average	-52.7E-09	-58.0E-09	-58.0E-09	-62.4E-09	-67.0E-09	-74.2E-09	-77.8E-09	-82.4E-09	-90.2E-09	-96.3E-09	-102.4E-09	-102.6E-09	-67.2E-09
Sigma	1.2E-09	1.1E-09	2.5E-09	3.6E-09	2.3E-09	955.1E-12	3.1E-09	2.2E-09	3.5E-09	2.3E-09	3.1E-09	3.7E-09	2.0E-09

Drift Calculation

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-6.2E-09	-3.8E-09	-5.8E-09	-12.4E-09	-21.5E-09	-22.1E-09	-27.5E-09	-35.1E-09	-41.5E-09	-46.3E-09	-46.0E-09	-12.5E-09
28	-	-4.9E-09	-7.1E-09	-12.0E-09	-15.5E-09	-21.2E-09	-27.1E-09	-30.4E-09	-40.6E-09	-44.7E-09	-51.4E-09	-52.6E-09	-14.8E-09
29	-	-4.8E-09	-5.1E-09	-11.6E-09	-15.0E-09	-22.1E-09	-26.2E-09	-31.1E-09	-36.9E-09	-44.8E-09	-51.5E-09	-51.2E-09	-16.3E-09
Average	-	-5.3E-09	-5.3E-09	-9.8E-09	-14.3E-09	-21.6E-09	-25.1E-09	-29.7E-09	-37.6E-09	-43.7E-09	-49.7E-09	-49.9E-09	-14.5E-09
Sigma	-	643.8E-12	1.4E-09	2.9E-09	1.4E-09	358.7E-12	2.2E-09	1.6E-09	2.3E-09	1.6E-09	2.4E-09	2.8E-09	1.5E-09

Measurements

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.2E-09	-10.0E-09	-9.5E-09	-10.4E-09	-11.4E-09	-10.7E-09	-10.6E-09	-11.3E-09	-10.9E-09	-10.4E-09	-10.8E-09	-10.3E-09	-11.7E-09
ON_TID samples													
33	-7.6E-09	-7.6E-09	-22.1E-09	-26.9E-09	-39.7E-09	-40.9E-09	-44.5E-09	-50.6E-09	-56.7E-09	-62.6E-09	-67.5E-09	-69.9E-09	-46.4E-09
34	-10.3E-09	-16.7E-09	-21.2E-09	-29.8E-09	-34.9E-09	-42.3E-09	-47.5E-09	-50.1E-09	-59.0E-09	-64.2E-09	-72.1E-09	-71.7E-09	-44.2E-09
35	-10.5E-09	-10.5E-09	-20.7E-09	-24.7E-09	-33.2E-09	-39.4E-09	-43.8E-09	-48.2E-09	-54.5E-09	-60.0E-09	-66.0E-09	-67.7E-09	-42.0E-09
Statistics													
Min	-10.5E-09	-16.7E-09	-22.1E-09	-29.8E-09	-39.7E-09	-42.3E-09	-47.5E-09	-50.6E-09	-59.0E-09	-64.2E-09	-72.1E-09	-71.7E-09	-46.4E-09
Max	-7.6E-09	-7.6E-09	-20.7E-09	-24.7E-09	-33.2E-09	-39.4E-09	-43.8E-09	-48.2E-09	-54.5E-09	-60.0E-09	-66.0E-09	-67.7E-09	-42.0E-09
Average	-9.5E-09	-11.6E-09	-21.3E-09	-27.1E-09	-35.9E-09	-40.9E-09	-45.3E-09	-49.7E-09	-56.7E-09	-62.2E-09	-68.5E-09	-69.8E-09	-44.2E-09
Sigma	1.3E-09	3.8E-09	590.1E-12	2.1E-09	2.8E-09	1.2E-09	1.8E-09	1.0E-09	1.8E-09	1.7E-09	2.6E-09	1.6E-09	1.8E-09

Drift Calculation

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-14.5E-09	-19.2E-09	-32.1E-09	-33.3E-09	-36.9E-09	-43.0E-09	-49.1E-09	-54.9E-09	-59.9E-09	-62.3E-09	-38.8E-09
34	-	-6.4E-09	-10.8E-09	-19.4E-09	-24.6E-09	-32.0E-09	-37.2E-09	-39.8E-09	-48.7E-09	-53.8E-09	-61.8E-09	-61.4E-09	-33.9E-09
35	-	0.0E+00	-10.1E-09	-14.2E-09	-22.7E-09	-28.8E-09	-33.3E-09	-37.7E-09	-44.0E-09	-49.4E-09	-55.5E-09	-57.2E-09	-31.5E-09
Average	-	-2.1E-09	-11.8E-09	-17.6E-09	-26.5E-09	-31.4E-09	-35.8E-09	-40.2E-09	-47.2E-09	-52.7E-09	-59.0E-09	-60.3E-09	-34.7E-09
Sigma	-	3.0E-09	1.9E-09	2.4E-09	4.1E-09	1.9E-09	1.8E-09	2.2E-09	2.3E-09	2.4E-09	2.6E-09	2.2E-09	3.0E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.2E-09	-10.0E-09	-9.5E-09	-10.4E-09	-11.4E-09	-10.7E-09	-10.6E-09	-11.3E-09	-10.9E-09	-10.4E-09	-10.8E-09	-10.3E-09	-11.7E-09
OFF PROTON samples													
30	-54.2E-09	-51.0E-09	-54.1E-09	-61.0E-09	-69.6E-09	-76.8E-09	-75.5E-09	-77.3E-09	-82.5E-09	-84.7E-09	-93.5E-09	-94.8E-09	-70.9E-09
32	-53.4E-09	-57.2E-09	-56.5E-09	-67.6E-09	-75.6E-09	-77.7E-09	-76.9E-09	-79.0E-09	-95.6E-09	-95.8E-09	-93.4E-09	-95.6E-09	-73.3E-09
39	-57.3E-09	-57.1E-09	-61.8E-09	-67.4E-09	-69.1E-09	-75.4E-09	-77.9E-09	-71.2E-09	-82.7E-09	-76.4E-09	-69.4E-09	-89.7E-09	-72.0E-09
Statistics													
Min	-57.3E-09	-57.2E-09	-61.8E-09	-67.6E-09	-75.6E-09	-77.7E-09	-77.9E-09	-79.0E-09	-95.6E-09	-95.8E-09	-93.5E-09	-95.6E-09	-73.3E-09
Max	-53.4E-09	-51.0E-09	-54.1E-09	-61.0E-09	-69.1E-09	-75.4E-09	-75.5E-09	-71.2E-09	-82.5E-09	-76.4E-09	-69.4E-09	-89.7E-09	-70.9E-09
Average	-54.9E-09	-55.1E-09	-57.5E-09	-65.3E-09	-71.4E-09	-76.6E-09	-76.8E-09	-75.8E-09	-86.9E-09	-85.6E-09	-85.4E-09	-93.4E-09	-72.1E-09
Sigma	1.7E-09	2.9E-09	3.2E-09	3.1E-09	3.0E-09	939.8E-12	987.8E-12	3.3E-09	6.1E-09	7.9E-09	11.4E-09	2.6E-09	988.3E-12

Drift Calculation

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	3.2E-09	128.7E-12	-6.8E-09	-15.4E-09	-22.5E-09	-21.3E-09	-23.1E-09	-28.3E-09	-30.5E-09	-39.3E-09	-40.6E-09	-16.7E-09
32	-	-3.8E-09	-3.1E-09	-14.2E-09	-22.3E-09	-24.3E-09	-23.6E-09	-25.6E-09	-42.2E-09	-42.4E-09	-40.0E-09	-42.2E-09	-20.0E-09
39	-	150.4E-12	-4.5E-09	-10.1E-09	-11.8E-09	-18.1E-09	-20.6E-09	-13.9E-09	-25.4E-09	-19.1E-09	-12.1E-09	-32.4E-09	-14.7E-09
Average	-	-163.3E-12	-2.5E-09	-10.4E-09	-16.5E-09	-21.7E-09	-21.8E-09	-20.9E-09	-32.0E-09	-30.7E-09	-30.5E-09	-38.4E-09	-17.1E-09
Sigma	-	2.9E-09	2.0E-09	3.0E-09	4.4E-09	2.6E-09	1.3E-09	5.0E-09	7.4E-09	9.5E-09	13.0E-09	4.3E-09	2.2E-09

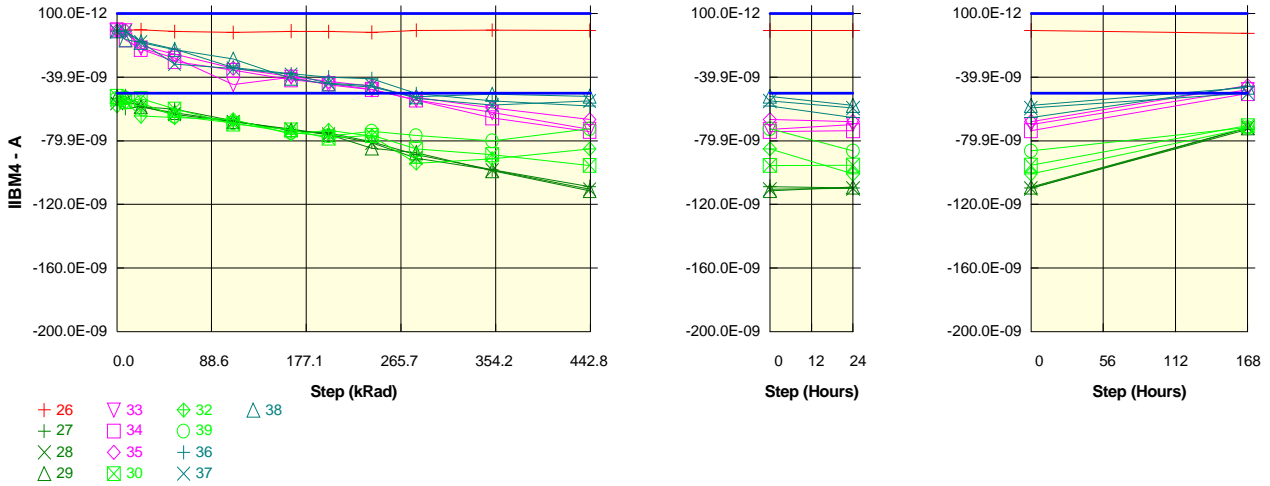
Measurements

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.2E-09	-10.0E-09	-9.5E-09	-10.4E-09	-11.4E-09	-10.7E-09	-10.6E-09	-11.3E-09	-10.9E-09	-10.4E-09	-10.8E-09	-10.3E-09	-11.7E-09
OFF TID samples													
36	-10.1E-09	-10.1E-09	-14.8E-09	-22.8E-09	-29.5E-09	-38.7E-09	-43.1E-09	-46.1E-09	-51.8E-09	-60.9E-09	-66.6E-09	-62.5E-09	-47.0E-09
37	-11.1E-09	-11.1E-09	-19.0E-09	-30.7E-09	-32.3E-09	-39.4E-09	-45.6E-09	-50.2E-09	-60.0E-09	-62.9E-09	-57.2E-09	-67.0E-09	-50.5E-09
38	-10.9E-09	-15.4E-09	-19.2E-09	-27.0E-09	-31.8E-09	-40.6E-09	-44.2E-09	-50.7E-09	-55.0E-09	-58.7E-09	-53.7E-09	-64.0E-09	-47.8E-09
Statistics													
Min	-11.1E-09	-15.4E-09	-19.2E-09	-30.7E-09	-32.3E-09	-40.6E-09	-45.6E-09	-50.7E-09	-60.0E-09	-62.9E-09	-66.6E-09	-67.0E-09	-50.5E-09
Max	-10.1E-09	-10.1E-09	-14.8E-09	-22.8E-09	-29.5E-09	-38.7E-09	-43.1E-09	-46.1E-09	-51.8E-09	-58.7E-09	-53.7E-09	-62.5E-09	-47.0E-09
Average	-10.7E-09	-12.2E-09	-17.6E-09	-26.8E-09	-31.2E-09	-39.6E-09	-44.3E-09	-49.0E-09	-55.6E-09	-60.8E-09	-59.2E-09	-64.5E-09	-48.4E-09
Sigma	417.7E-12	2.3E-09	2.0E-09	3.2E-09	1.2E-09	798.8E-12	1.0E-09	2.1E-09	3.3E-09	1.7E-09	5.5E-09	1.8E-09	1.5E-09

Drift Calculation

IIBM4DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-4.6E-09	-12.6E-09	-19.4E-09	-28.6E-09	-33.0E-09	-36.0E-09	-41.7E-09	-50.7E-09	-56.5E-09	-52.4E-09	-36.8E-09
37	-	0.0E+00	-7.9E-09	-19.6E-09	-21.2E-09	-28.3E-09	-34.5E-09	-39.1E-09	-48.9E-09	-51.8E-09	-46.1E-09	-55.9E-09	-39.4E-09
38	-	-4.5E-09	-8.2E-09	-16.0E-09	-20.9E-09	-29.7E-09	-33.2E-09	-39.8E-09	-44.1E-09	-47.7E-09	-42.8E-09	-53.1E-09	-36.8E-09
Average	-	-1.5E-09	-6.9E-09	-16.1E-09	-20.5E-09	-28.9E-09	-33.6E-09	-38.3E-09	-44.9E-09	-50.1E-09	-48.4E-09	-53.8E-09	-37.7E-09
Sigma	-	2.1E-09	1.6E-09	2.9E-09	789.0E-12	626.5E-12	662.8E-12	1.7E-09	3.0E-09	1.7E-09	5.8E-09	1.5E-09	1.2E-09

Parameter : Input Bias Current : IIBM4DUTC
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.4E-09	-10.5E-09	-10.2E-09	-11.3E-09	-11.9E-09	-11.0E-09	-11.3E-09	-11.8E-09	-10.5E-09	-10.4E-09	-10.6E-09	-10.6E-09	-12.4E-09
ON_PROTON samples													
27	-53.4E-09	-59.7E-09	-58.6E-09	-60.1E-09	-67.5E-09	-73.6E-09	-74.9E-09	-80.7E-09	-88.7E-09	-98.3E-09	-108.8E-09	-109.7E-09	-72.9E-09
28	-56.4E-09	-54.9E-09	-58.4E-09	-63.2E-09	-68.1E-09	-72.7E-09	-76.0E-09	-81.3E-09	-90.9E-09	-98.5E-09	-110.6E-09	-110.0E-09	-71.8E-09
29	-52.4E-09	-52.2E-09	-58.6E-09	-62.2E-09	-67.8E-09	-73.2E-09	-76.1E-09	-84.6E-09	-87.5E-09	-98.8E-09	-111.3E-09	-109.1E-09	-71.8E-09
Statistics													
Min	-56.4E-09	-59.7E-09	-58.6E-09	-63.2E-09	-68.1E-09	-73.6E-09	-76.1E-09	-84.6E-09	-90.9E-09	-98.8E-09	-111.3E-09	-110.0E-09	-72.9E-09
Max	-52.4E-09	-52.2E-09	-58.4E-09	-60.1E-09	-67.5E-09	-72.7E-09	-74.9E-09	-80.7E-09	-87.5E-09	-98.3E-09	-108.8E-09	-109.1E-09	-71.8E-09
Average	-54.1E-09	-55.6E-09	-58.5E-09	-61.8E-09	-67.8E-09	-73.2E-09	-75.7E-09	-82.2E-09	-89.1E-09	-98.5E-09	-110.2E-09	-109.6E-09	-72.2E-09
Sigma	1.7E-09	3.1E-09	108.3E-12	1.3E-09	236.0E-12	380.1E-12	522.7E-12	1.7E-09	1.4E-09	220.5E-12	1.1E-09	355.2E-12	478.3E-12

Drift Calculation

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-6.2E-09	-5.1E-09	-6.6E-09	-14.1E-09	-20.2E-09	-21.5E-09	-27.3E-09	-35.3E-09	-44.9E-09	-55.4E-09	-56.3E-09	-19.4E-09
28	-	1.5E-09	-2.0E-09	-6.8E-09	-11.7E-09	-16.3E-09	-19.6E-09	-24.9E-09	-34.5E-09	-42.1E-09	-54.2E-09	-53.6E-09	-15.5E-09
29	-	117.0E-12	-6.3E-09	-9.9E-09	-15.5E-09	-20.8E-09	-23.7E-09	-32.2E-09	-35.2E-09	-46.5E-09	-59.0E-09	-56.8E-09	-19.5E-09
Average	-	-1.5E-09	-4.5E-09	-7.8E-09	-13.7E-09	-19.1E-09	-21.6E-09	-28.1E-09	-35.0E-09	-44.5E-09	-56.2E-09	-55.6E-09	-18.1E-09
Sigma	-	3.4E-09	1.8E-09	1.5E-09	1.6E-09	2.0E-09	1.7E-09	3.1E-09	339.8E-12	1.8E-09	2.0E-09	1.4E-09	1.9E-09

Measurements

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.4E-09	-10.5E-09	-10.2E-09	-11.3E-09	-11.9E-09	-11.0E-09	-11.3E-09	-11.8E-09	-10.5E-09	-10.4E-09	-10.6E-09	-10.6E-09	-12.4E-09
ON_TID samples													
33	-10.7E-09	-10.7E-09	-21.7E-09	-28.0E-09	-44.6E-09	-40.0E-09	-44.8E-09	-47.8E-09	-54.4E-09	-62.2E-09	-72.8E-09	-69.7E-09	-47.8E-09
34	-10.2E-09	-16.4E-09	-22.4E-09	-30.1E-09	-35.6E-09	-41.6E-09	-44.0E-09	-47.7E-09	-54.4E-09	-65.5E-09	-74.2E-09	-73.6E-09	-50.2E-09
35	-10.7E-09	-10.7E-09	-20.3E-09	-25.5E-09	-34.4E-09	-39.4E-09	-42.7E-09	-45.5E-09	-52.6E-09	-59.3E-09	-66.7E-09	-67.8E-09	-45.3E-09
Statistics													
Min	-10.7E-09	-16.4E-09	-22.4E-09	-30.1E-09	-44.6E-09	-41.6E-09	-44.8E-09	-47.8E-09	-54.4E-09	-65.5E-09	-74.2E-09	-73.6E-09	-50.2E-09
Max	-10.2E-09	-10.7E-09	-20.3E-09	-25.5E-09	-34.4E-09	-39.4E-09	-42.7E-09	-45.5E-09	-52.6E-09	-59.3E-09	-66.7E-09	-67.8E-09	-45.3E-09
Average	-10.5E-09	-12.6E-09	-21.5E-09	-27.9E-09	-38.2E-09	-40.4E-09	-43.8E-09	-47.0E-09	-53.8E-09	-62.4E-09	-71.2E-09	-70.4E-09	-47.8E-09
Sigma	239.3E-12	2.7E-09	880.7E-12	1.9E-09	4.6E-09	913.7E-12	867.3E-12	1.1E-09	826.8E-12	2.5E-09	3.3E-09	2.4E-09	2.0E-09

Drift Calculation

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-11.0E-09	-17.3E-09	-34.0E-09	-29.3E-09	-34.1E-09	-37.1E-09	-43.7E-09	-51.5E-09	-62.1E-09	-59.1E-09	-37.1E-09
34	-	-6.3E-09	-12.3E-09	-19.9E-09	-25.5E-09	-31.4E-09	-33.8E-09	-37.5E-09	-44.3E-09	-55.4E-09	-64.0E-09	-63.5E-09	-40.1E-09
35	-	0.0E+00	-9.6E-09	-14.9E-09	-23.7E-09	-28.8E-09	-32.0E-09	-34.9E-09	-42.0E-09	-48.7E-09	-56.0E-09	-57.2E-09	-34.6E-09
Average	-	-2.1E-09	-11.0E-09	-17.4E-09	-27.7E-09	-29.8E-09	-33.3E-09	-36.5E-09	-43.3E-09	-51.8E-09	-60.7E-09	-59.9E-09	-37.3E-09
Sigma	-	3.0E-09	1.1E-09	2.1E-09	4.5E-09	1.1E-09	924.5E-12	1.2E-09	969.7E-12	2.7E-09	3.4E-09	2.6E-09	2.2E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors				Issue:	02

Measurements

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.4E-09	-10.5E-09	-10.2E-09	-11.3E-09	-11.9E-09	-11.0E-09	-11.3E-09	-11.8E-09	-10.5E-09	-10.4E-09	-10.6E-09	-10.6E-09	-12.4E-09
OFF PROTON samples													
30	-52.1E-09	-55.3E-09	-53.5E-09	-60.0E-09	-69.4E-09	-73.1E-09	-78.4E-09	-76.6E-09	-85.2E-09	-88.7E-09	-95.6E-09	-95.4E-09	-70.5E-09
32	-57.9E-09	-55.8E-09	-64.5E-09	-65.4E-09	-66.6E-09	-75.8E-09	-73.4E-09	-76.9E-09	-94.1E-09	-91.3E-09	-85.1E-09	-100.9E-09	-72.0E-09
39	-53.4E-09	-53.1E-09	-56.1E-09	-64.5E-09	-68.7E-09	-74.9E-09	-76.9E-09	-74.0E-09	-76.8E-09	-80.1E-09	-72.5E-09	-86.3E-09	-71.6E-09
Statistics													
Min	-57.9E-09	-55.8E-09	-64.5E-09	-65.4E-09	-69.4E-09	-75.8E-09	-78.4E-09	-76.9E-09	-94.1E-09	-91.3E-09	-95.6E-09	-100.9E-09	-72.0E-09
Max	-52.1E-09	-53.1E-09	-53.5E-09	-60.0E-09	-66.6E-09	-73.1E-09	-73.4E-09	-74.0E-09	-76.8E-09	-80.1E-09	-72.5E-09	-86.3E-09	-70.5E-09
Average	-54.5E-09	-54.8E-09	-58.0E-09	-63.3E-09	-68.2E-09	-74.6E-09	-76.3E-09	-75.8E-09	-85.4E-09	-86.7E-09	-84.4E-09	-94.2E-09	-71.4E-09
Sigma	2.5E-09	1.2E-09	4.7E-09	2.4E-09	1.2E-09	1.1E-09	2.1E-09	1.3E-09	7.1E-09	4.8E-09	9.4E-09	6.0E-09	650.1E-12

Drift Calculation

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.2E-09	-1.4E-09	-7.9E-09	-17.3E-09	-20.9E-09	-26.3E-09	-24.4E-09	-33.1E-09	-36.6E-09	-43.5E-09	-43.3E-09	-18.4E-09
32	-	2.1E-09	-6.5E-09	-7.5E-09	-8.7E-09	-17.9E-09	-15.5E-09	-19.0E-09	-36.2E-09	-33.4E-09	-27.1E-09	-43.0E-09	-14.1E-09
39	-	250.7E-12	-2.7E-09	-11.1E-09	-15.4E-09	-21.5E-09	-23.6E-09	-20.6E-09	-23.4E-09	-26.7E-09	-19.1E-09	-33.0E-09	-18.2E-09
Average	-	-284.2E-12	-3.5E-09	-8.8E-09	-13.8E-09	-20.1E-09	-21.8E-09	-21.4E-09	-30.9E-09	-32.2E-09	-29.9E-09	-39.7E-09	-16.9E-09
Sigma	-	2.2E-09	2.2E-09	1.6E-09	3.7E-09	1.6E-09	4.6E-09	2.3E-09	5.5E-09	4.1E-09	10.1E-09	4.8E-09	2.0E-09

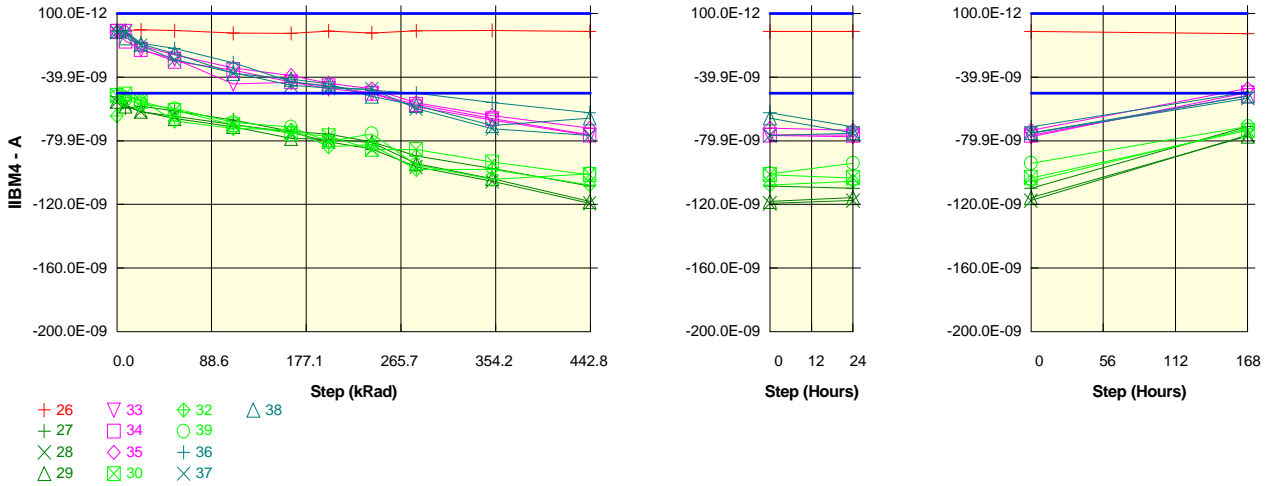
Measurements

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.4E-09	-10.5E-09	-10.2E-09	-11.3E-09	-11.9E-09	-11.0E-09	-11.3E-09	-11.8E-09	-10.5E-09	-10.4E-09	-10.6E-09	-10.6E-09	-12.4E-09
OFF TID samples													
36	-10.9E-09	-10.9E-09	-17.4E-09	-22.2E-09	-33.8E-09	-37.8E-09	-39.9E-09	-41.0E-09	-50.4E-09	-55.0E-09	-58.1E-09	-65.5E-09	-45.7E-09
37	-11.2E-09	-11.2E-09	-18.0E-09	-31.7E-09	-34.6E-09	-38.2E-09	-43.8E-09	-45.2E-09	-53.1E-09	-57.6E-09	-55.0E-09	-59.4E-09	-50.1E-09
38	-10.9E-09	-16.3E-09	-18.1E-09	-22.6E-09	-28.6E-09	-40.8E-09	-44.2E-09	-46.3E-09	-52.4E-09	-50.7E-09	-52.0E-09	-57.7E-09	-46.4E-09
Statistics													
Min	-11.2E-09	-16.3E-09	-18.1E-09	-31.7E-09	-34.6E-09	-40.8E-09	-44.2E-09	-46.3E-09	-53.1E-09	-57.6E-09	-58.1E-09	-65.5E-09	-50.1E-09
Max	-10.9E-09	-10.9E-09	-17.4E-09	-22.2E-09	-28.6E-09	-37.8E-09	-39.9E-09	-41.0E-09	-50.4E-09	-50.7E-09	-52.0E-09	-57.7E-09	-45.7E-09
Average	-11.0E-09	-12.8E-09	-17.8E-09	-25.5E-09	-32.3E-09	-39.0E-09	-42.6E-09	-44.2E-09	-52.0E-09	-54.4E-09	-55.0E-09	-60.9E-09	-47.4E-09
Sigma	142.5E-12	2.5E-09	297.5E-12	4.4E-09	2.7E-09	1.3E-09	1.9E-09	2.3E-09	1.2E-09	2.8E-09	2.5E-09	3.3E-09	1.9E-09

Drift Calculation

IIBM4DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-6.5E-09	-11.3E-09	-22.9E-09	-26.9E-09	-29.0E-09	-30.0E-09	-39.4E-09	-44.0E-09	-47.2E-09	-54.6E-09	-34.8E-09
37	-	0.0E+00	-6.7E-09	-20.5E-09	-23.4E-09	-27.0E-09	-32.6E-09	-34.0E-09	-41.9E-09	-46.3E-09	-43.8E-09	-48.2E-09	-38.9E-09
38	-	-5.4E-09	-7.2E-09	-11.7E-09	-17.7E-09	-29.9E-09	-33.3E-09	-35.4E-09	-41.5E-09	-39.8E-09	-41.1E-09	-46.8E-09	-35.5E-09
Average	-	-1.8E-09	-6.8E-09	-14.5E-09	-21.3E-09	-27.9E-09	-31.6E-09	-33.1E-09	-41.0E-09	-43.4E-09	-44.0E-09	-49.9E-09	-36.4E-09
Sigma	-	2.6E-09	305.4E-12	4.2E-09	2.6E-09	1.4E-09	1.9E-09	2.3E-09	1.1E-09	2.7E-09	2.5E-09	3.4E-09	1.8E-09

Parameter : Input Bias Current : IIBM4DUTD
 Test conditions : +VCC=2.5V. -VCC=-2.5V. VCM=-1.1V
 Unit : A
 Spec Limit Min : -50.0E-09
 Spec Limit Max : 100.0E-12
 Spec limits are represented in bold lines on the graphic.



Measurements

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.6E-09	-10.6E-09	-10.3E-09	-10.7E-09	-12.3E-09	-12.4E-09	-10.9E-09	-12.1E-09	-10.8E-09	-10.6E-09	-11.3E-09	-11.2E-09	-12.5E-09
ON_PROTON samples													
27	-52.1E-09	-59.4E-09	-58.4E-09	-61.1E-09	-67.0E-09	-74.0E-09	-75.8E-09	-80.7E-09	-89.5E-09	-97.4E-09	-108.4E-09	-109.9E-09	-71.0E-09
28	-55.4E-09	-57.5E-09	-61.7E-09	-64.6E-09	-69.8E-09	-74.6E-09	-80.7E-09	-85.2E-09	-96.4E-09	-105.5E-09	-119.4E-09	-117.6E-09	-76.4E-09
29	-55.2E-09	-58.2E-09	-61.6E-09	-66.0E-09	-71.2E-09	-78.4E-09	-79.2E-09	-81.2E-09	-94.5E-09	-103.8E-09	-118.2E-09	-115.8E-09	-77.0E-09
Statistics													
Min	-55.4E-09	-59.4E-09	-61.7E-09	-66.0E-09	-71.2E-09	-78.4E-09	-80.7E-09	-85.2E-09	-96.4E-09	-105.5E-09	-119.4E-09	-117.6E-09	-77.0E-09
Max	-52.1E-09	-57.5E-09	-58.4E-09	-61.1E-09	-67.0E-09	-74.0E-09	-75.8E-09	-80.7E-09	-89.5E-09	-97.4E-09	-108.4E-09	-109.9E-09	-71.0E-09
Average	-54.2E-09	-58.4E-09	-60.5E-09	-63.9E-09	-69.3E-09	-75.7E-09	-78.6E-09	-82.4E-09	-93.4E-09	-102.2E-09	-115.3E-09	-114.4E-09	-74.8E-09
Sigma	1.5E-09	807.7E-12	1.5E-09	2.1E-09	1.8E-09	2.0E-09	2.1E-09	2.0E-09	2.9E-09	3.5E-09	4.9E-09	3.3E-09	2.7E-09

Drift Calculation

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-7.3E-09	-6.3E-09	-9.0E-09	-14.9E-09	-21.9E-09	-23.7E-09	-28.6E-09	-37.3E-09	-45.3E-09	-56.3E-09	-57.8E-09	-18.9E-09
28	-	-2.1E-09	-6.3E-09	-9.2E-09	-14.4E-09	-19.2E-09	-25.3E-09	-29.8E-09	-41.0E-09	-50.1E-09	-64.0E-09	-62.2E-09	-21.0E-09
29	-	-3.0E-09	-6.4E-09	-10.8E-09	-16.0E-09	-23.3E-09	-24.0E-09	-26.0E-09	-39.3E-09	-48.6E-09	-63.1E-09	-60.6E-09	-21.9E-09
Average	-	-4.1E-09	-6.3E-09	-9.7E-09	-15.1E-09	-21.5E-09	-24.3E-09	-28.1E-09	-39.2E-09	-48.0E-09	-61.1E-09	-60.2E-09	-20.6E-09
Sigma	-	2.3E-09	67.3E-12	817.2E-12	709.6E-12	1.7E-09	695.9E-12	1.6E-09	1.5E-09	2.0E-09	3.4E-09	1.8E-09	1.3E-09

Measurements

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	-10.6E-09	-10.6E-09	-10.3E-09	-10.7E-09	-12.3E-09	-12.4E-09	-10.9E-09	-12.1E-09	-10.8E-09	-10.6E-09	-11.3E-09	-11.2E-09	-12.5E-09
ON_TID samples													
33	-11.1E-09	-11.1E-09	-22.7E-09	-28.6E-09	-44.3E-09	-43.2E-09	-47.2E-09	-50.4E-09	-58.6E-09	-66.9E-09	-76.6E-09	-77.6E-09	-49.8E-09
34	-11.2E-09	-17.3E-09	-22.4E-09	-30.0E-09	-35.4E-09	-43.0E-09	-45.3E-09	-50.1E-09	-57.1E-09	-66.0E-09	-76.3E-09	-76.4E-09	-51.5E-09
35	-11.3E-09	-11.3E-09	-20.2E-09	-25.9E-09	-34.1E-09	-38.9E-09	-43.8E-09	-47.3E-09	-56.1E-09	-64.1E-09	-72.1E-09	-73.4E-09	-47.2E-09
Statistics													
Min	-11.3E-09	-17.3E-09	-22.7E-09	-30.0E-09	-44.3E-09	-43.2E-09	-47.2E-09	-50.4E-09	-58.6E-09	-66.9E-09	-76.6E-09	-77.6E-09	-51.5E-09
Max	-11.1E-09	-11.1E-09	-20.2E-09	-25.9E-09	-34.1E-09	-38.9E-09	-43.8E-09	-47.3E-09	-56.1E-09	-64.1E-09	-72.1E-09	-73.4E-09	-47.2E-09
Average	-11.2E-09	-13.3E-09	-21.8E-09	-28.1E-09	-37.9E-09	-41.7E-09	-45.4E-09	-49.3E-09	-57.3E-09	-65.7E-09	-75.0E-09	-75.8E-09	-49.5E-09
Sigma	97.2E-12	2.9E-09	1.1E-09	1.7E-09	4.5E-09	2.0E-09	1.4E-09	1.4E-09	1.0E-09	1.2E-09	2.1E-09	1.8E-09	1.8E-09

Drift Calculation

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-11.6E-09	-17.5E-09	-33.2E-09	-32.1E-09	-36.1E-09	-39.3E-09	-47.5E-09	-55.8E-09	-65.5E-09	-66.5E-09	-38.7E-09
34	-	-6.1E-09	-11.2E-09	-18.8E-09	-24.2E-09	-31.8E-09	-34.1E-09	-38.9E-09	-45.9E-09	-54.8E-09	-65.1E-09	-65.2E-09	-40.3E-09
35	-	0.0E+00	-8.8E-09	-14.5E-09	-22.7E-09	-27.6E-09	-32.4E-09	-36.0E-09	-44.8E-09	-52.7E-09	-60.7E-09	-62.1E-09	-35.8E-09
Average	-	-2.0E-09	-10.5E-09	-16.9E-09	-26.7E-09	-30.5E-09	-34.2E-09	-38.0E-09	-46.0E-09	-54.5E-09	-63.8E-09	-64.6E-09	-38.2E-09
Sigma	-	2.9E-09	1.2E-09	1.8E-09	4.6E-09	2.1E-09	1.5E-09	1.5E-09	1.1E-09	1.3E-09	2.2E-09	1.9E-09	1.8E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019	
	LM124AJRQMLV					National Semiconductors				Issue:	02	

Measurements

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.6E-09	-10.6E-09	-10.3E-09	-10.7E-09	-12.3E-09	-12.4E-09	-10.9E-09	-12.1E-09	-10.8E-09	-10.6E-09	-11.3E-09	-11.2E-09	-12.5E-09
OFF PROTON samples													
30	-51.6E-09	-50.6E-09	-55.2E-09	-60.9E-09	-69.9E-09	-75.3E-09	-76.9E-09	-85.4E-09	-85.4E-09	-93.4E-09	-101.3E-09	-103.3E-09	-73.4E-09
32	-64.2E-09	-52.7E-09	-54.4E-09	-67.6E-09	-72.2E-09	-73.1E-09	-83.8E-09	-82.5E-09	-98.0E-09	-98.0E-09	-107.7E-09	-105.3E-09	-72.5E-09
39	-52.3E-09	-54.0E-09	-56.9E-09	-59.8E-09	-68.5E-09	-71.4E-09	-80.6E-09	-75.6E-09	-95.2E-09	-104.2E-09	-100.7E-09	-94.1E-09	-71.0E-09
Statistics													
Min	-64.2E-09	-54.0E-09	-56.9E-09	-67.6E-09	-72.2E-09	-75.3E-09	-83.8E-09	-85.4E-09	-98.0E-09	-104.2E-09	-107.7E-09	-105.3E-09	-73.4E-09
Max	-51.6E-09	-50.6E-09	-54.4E-09	-59.8E-09	-68.5E-09	-71.4E-09	-76.9E-09	-75.6E-09	-85.4E-09	-93.4E-09	-100.7E-09	-94.1E-09	-71.0E-09
Average	-56.0E-09	-52.4E-09	-55.5E-09	-62.8E-09	-70.2E-09	-73.3E-09	-80.4E-09	-81.2E-09	-92.9E-09	-98.5E-09	-103.3E-09	-100.9E-09	-72.3E-09
Sigma	5.8E-09	1.4E-09	1.0E-09	3.4E-09	1.6E-09	1.6E-09	2.8E-09	4.1E-09	5.4E-09	4.5E-09	3.2E-09	4.9E-09	1.0E-09

Drift Calculation

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	969.5E-12	-3.6E-09	-9.3E-09	-18.4E-09	-23.7E-09	-25.4E-09	-33.9E-09	-33.9E-09	-41.8E-09	-49.7E-09	-51.8E-09	-21.9E-09
32	-	11.6E-09	9.9E-09	-3.3E-09	-8.0E-09	-8.9E-09	-19.5E-09	-18.2E-09	-33.7E-09	-33.7E-09	-43.5E-09	-41.1E-09	-8.3E-09
39	-	-1.7E-09	-4.6E-09	-7.6E-09	-16.2E-09	-19.1E-09	-28.4E-09	-23.4E-09	-42.9E-09	-52.0E-09	-48.5E-09	-41.8E-09	-18.7E-09
Average	-	3.6E-09	555.5E-12	-6.7E-09	-14.2E-09	-17.2E-09	-24.4E-09	-25.2E-09	-36.8E-09	-42.5E-09	-47.2E-09	-44.9E-09	-16.3E-09
Sigma	-	5.7E-09	6.6E-09	2.5E-09	4.5E-09	6.2E-09	3.7E-09	6.5E-09	4.3E-09	7.5E-09	2.7E-09	4.9E-09	5.8E-09

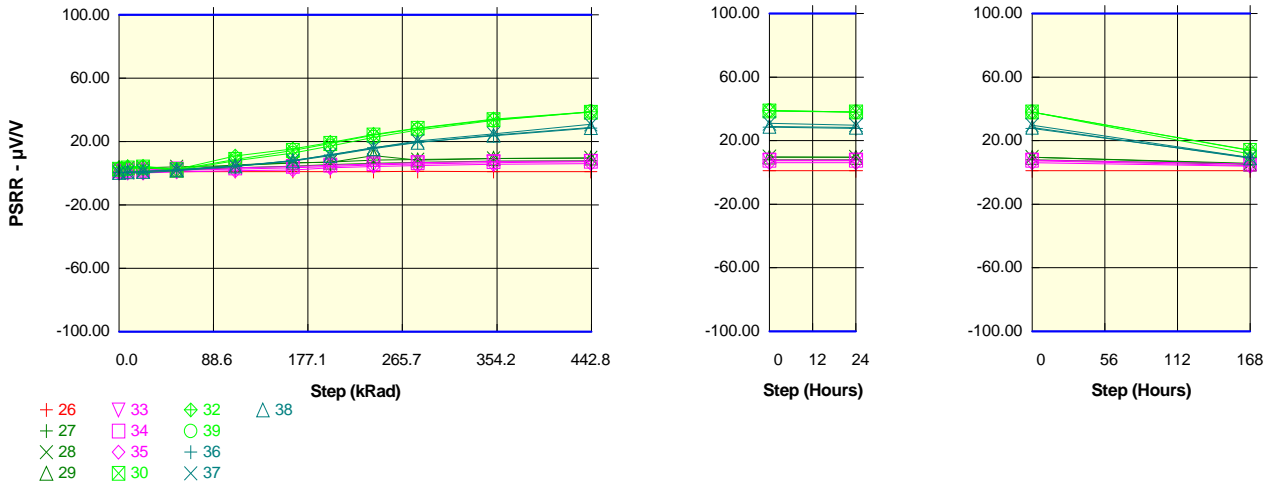
Measurements

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	-10.6E-09	-10.6E-09	-10.3E-09	-10.7E-09	-12.3E-09	-12.4E-09	-10.9E-09	-12.1E-09	-10.8E-09	-10.6E-09	-11.3E-09	-11.2E-09	-12.5E-09
OFF TID samples													
36	-11.0E-09	-11.0E-09	-18.6E-09	-22.0E-09	-30.9E-09	-42.8E-09	-45.8E-09	-48.3E-09	-50.0E-09	-55.9E-09	-62.4E-09	-71.2E-09	-49.5E-09
37	-11.7E-09	-11.7E-09	-20.1E-09	-29.0E-09	-37.2E-09	-45.0E-09	-46.8E-09	-47.4E-09	-59.8E-09	-72.3E-09	-76.8E-09	-75.3E-09	-53.2E-09
38	-10.9E-09	-15.2E-09	-19.2E-09	-25.0E-09	-37.6E-09	-41.2E-09	-44.2E-09	-52.0E-09	-57.7E-09	-70.5E-09	-65.7E-09	-74.9E-09	-51.9E-09
Statistics													
Min	-11.7E-09	-15.2E-09	-20.1E-09	-29.0E-09	-37.6E-09	-45.0E-09	-46.8E-09	-52.0E-09	-59.8E-09	-72.3E-09	-76.8E-09	-75.3E-09	-53.2E-09
Max	-10.9E-09	-11.0E-09	-18.6E-09	-22.0E-09	-30.9E-09	-41.2E-09	-44.2E-09	-47.4E-09	-50.0E-09	-55.9E-09	-62.4E-09	-71.2E-09	-49.5E-09
Average	-11.2E-09	-12.6E-09	-19.3E-09	-25.3E-09	-35.2E-09	-43.0E-09	-45.6E-09	-49.3E-09	-55.8E-09	-66.2E-09	-68.3E-09	-73.8E-09	-51.5E-09
Sigma	341.2E-12	1.8E-09	640.1E-12	2.9E-09	3.1E-09	1.6E-09	1.1E-09	2.0E-09	4.2E-09	7.3E-09	6.2E-09	1.8E-09	1.5E-09

Drift Calculation

IIBM4DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-7.6E-09	-11.0E-09	-19.9E-09	-31.8E-09	-34.8E-09	-37.3E-09	-39.0E-09	-44.9E-09	-51.4E-09	-60.2E-09	-38.5E-09
37	-	0.0E+00	-8.5E-09	-17.3E-09	-25.6E-09	-33.3E-09	-35.1E-09	-35.8E-09	-48.1E-09	-60.7E-09	-65.1E-09	-63.6E-09	-41.5E-09
38	-	-4.3E-09	-8.3E-09	-14.1E-09	-26.7E-09	-30.3E-09	-33.3E-09	-41.1E-09	-46.9E-09	-59.6E-09	-54.8E-09	-64.0E-09	-41.0E-09
Average	-	-1.4E-09	-8.1E-09	-14.1E-09	-24.1E-09	-31.8E-09	-34.4E-09	-38.1E-09	-44.7E-09	-55.0E-09	-57.1E-09	-62.6E-09	-40.3E-09
Sigma	-	2.0E-09	383.3E-12	2.6E-09	3.0E-09	1.2E-09	788.8E-12	2.3E-09	4.0E-09	7.2E-09	5.8E-09	1.7E-09	1.3E-09

Parameter : Power Supply Rejection Ratio : PSRRDUTA
 Test conditions : -VCC=GND. VCM=-1.4V. 5V<+VCC<30V
 Unit : $\mu\text{V/V}$
 Spec Limit Min : -100.00
 Spec Limit Max : 100.00
 Spec limits are represented in bold lines on the graphic.



Measurements

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	1.24	1.10	1.17	1.17	1.21	1.21	1.20	1.21	1.23	1.20	1.18	1.19	1.25
ON PROTON samples													
27	1.34	1.08	1.46	2.23	3.52	4.45	5.52	6.31	6.94	7.77	8.02	7.96	5.11
28	2.80	3.27	3.40	4.10	4.96	6.41	7.21	8.26	8.79	9.42	9.78	9.56	5.63
29	3.26	3.76	3.48	1.93	5.24	6.68	7.04	11.27	8.36	9.46	9.66	9.44	5.37
Statistics													
Min	1.34	1.08	1.46	1.93	3.52	4.45	5.52	6.31	6.94	7.77	8.02	7.96	5.11
Max	3.26	3.76	3.48	4.10	5.24	6.68	7.21	11.27	8.79	9.46	9.78	9.56	5.63
Average	2.47	2.70	2.78	2.76	4.57	5.85	6.59	8.61	8.03	8.88	9.15	8.99	5.37
Sigma	0.82	1.17	0.93	0.96	0.76	0.99	0.76	2.04	0.79	0.79	0.80	0.72	0.21

Drift Calculation

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-259.2E-03	125.9E-03	897.1E-03	2.2E+00	3.1E+00	4.2E+00	5.0E+00	5.6E+00	6.4E+00	6.7E+00	6.6E+00	3.8E+00
28	-	467.2E-03	601.6E-03	1.3E+00	2.2E+00	3.6E+00	4.4E+00	5.5E+00	6.0E+00	6.6E+00	7.0E+00	6.8E+00	2.8E+00
29	-	500.8E-03	222.4E-03	-1.3E+00	2.0E+00	3.4E+00	3.8E+00	8.0E+00	5.1E+00	6.2E+00	6.4E+00	6.2E+00	2.1E+00
Average	-	236.3E-03	316.6E-03	291.0E-03	2.1E+00	3.4E+00	4.1E+00	6.1E+00	5.6E+00	6.4E+00	6.7E+00	6.5E+00	2.9E+00
Sigma	-	350.6E-03	205.3E-03	1.2E+00	87.7E-03	203.9E-03	260.3E-03	1.3E+00	364.6E-03	168.3E-03	233.8E-03	249.0E-03	680.3E-03

Measurements

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	1.24	1.10	1.17	1.17	1.21	1.21	1.20	1.21	1.23	1.20	1.18	1.19	1.25
ON TID samples													
33	0.97	0.97	1.40	1.93	2.75	3.60	4.29	5.28	5.95	6.74	7.42	7.40	4.43
34	1.67	2.06	2.07	2.85	3.44	4.35	5.17	6.03	6.76	7.43	7.75	7.73	5.31
35	0.15	0.15	0.26	0.96	1.67	2.21	3.49	4.34	4.96	5.64	6.19	5.99	3.98
Statistics													
Min	0.15	0.15	0.26	0.96	1.67	2.21	3.49	4.34	4.96	5.64	6.19	5.99	3.98
Max	1.67	2.06	2.07	2.85	3.44	4.35	5.17	6.03	6.76	7.43	7.75	7.73	5.31
Average	0.93	1.06	1.24	1.91	2.62	3.39	4.32	5.22	5.89	6.60	7.12	7.04	4.58
Sigma	0.62	0.78	0.75	0.77	0.73	0.89	0.69	0.69	0.74	0.74	0.67	0.76	0.55

Drift Calculation

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	422.6E-03	960.0E-03	1.8E+00	2.6E+00	3.3E+00	4.3E+00	5.0E+00	5.8E+00	6.4E+00	6.4E+00	3.5E+00
34	-	393.0E-03	400.8E-03	1.2E+00	1.8E+00	2.7E+00	3.5E+00	4.4E+00	5.1E+00	5.8E+00	6.1E+00	6.1E+00	3.6E+00
35	-	0.0E+00	107.7E-03	805.3E-03	1.5E+00	2.1E+00	3.3E+00	4.2E+00	4.8E+00	5.5E+00	6.0E+00	5.8E+00	3.8E+00
Average	-	131.0E-03	310.3E-03	981.4E-03	1.7E+00	2.5E+00	3.4E+00	4.3E+00	5.0E+00	5.7E+00	6.2E+00	6.1E+00	3.6E+00
Sigma	-	185.2E-03	143.6E-03	153.3E-03	120.5E-03	283.2E-03	84.0E-03	73.3E-03	118.0E-03	126.9E-03	184.3E-03	245.5E-03	152.2E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.24	1.10	1.17	1.17	1.21	1.21	1.20	1.21	1.23	1.20	1.18	1.19	1.25
OFF_PROTON samples													
30	2.64	3.46	4.01	2.32	8.91	14.51	18.83	24.12	28.42	33.87	38.64	38.09	13.78
32	3.63	4.20	4.49	2.46	10.89	15.36	19.57	24.64	28.61	34.21	39.01	38.02	14.03
39	2.32	2.85	3.68	1.98	8.08	12.79	17.23	22.80	27.32	33.34	38.83	37.93	11.57
Statistics													
Min	2.32	2.85	3.68	1.98	8.08	12.79	17.23	22.80	27.32	33.34	38.64	37.93	11.57
Max	3.63	4.20	4.49	2.46	10.89	15.36	19.57	24.64	28.61	34.21	39.01	38.09	14.03
Average	2.86	3.50	4.06	2.25	9.29	14.22	18.54	23.85	28.11	33.81	38.83	38.02	13.13
Sigma	0.56	0.55	0.33	0.20	1.18	1.07	0.98	0.77	0.57	0.36	0.15	0.07	1.11

Drift Calculation

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	814.4E-03	1.4E+00	-324.8E-03	6.3E+00	11.9E+00	16.2E+00	21.5E+00	25.8E+00	31.2E+00	36.0E+00	35.4E+00	11.1E+00
32	-	573.3E-03	862.9E-03	-1.2E+00	7.3E+00	11.7E+00	15.9E+00	21.0E+00	25.0E+00	30.6E+00	35.4E+00	34.4E+00	10.4E+00
39	-	537.6E-03	1.4E+00	-340.8E-03	5.8E+00	10.5E+00	14.9E+00	20.5E+00	25.0E+00	31.0E+00	36.5E+00	35.6E+00	9.3E+00
Average	-	641.8E-03	1.2E+00	-608.9E-03	6.4E+00	11.4E+00	15.7E+00	21.0E+00	25.3E+00	30.9E+00	36.0E+00	35.2E+00	10.3E+00
Sigma	-	122.9E-03	237.4E-03	390.5E-03	623.7E-03	626.6E-03	552.9E-03	407.1E-03	366.1E-03	269.3E-03	462.5E-03	539.7E-03	775.2E-03

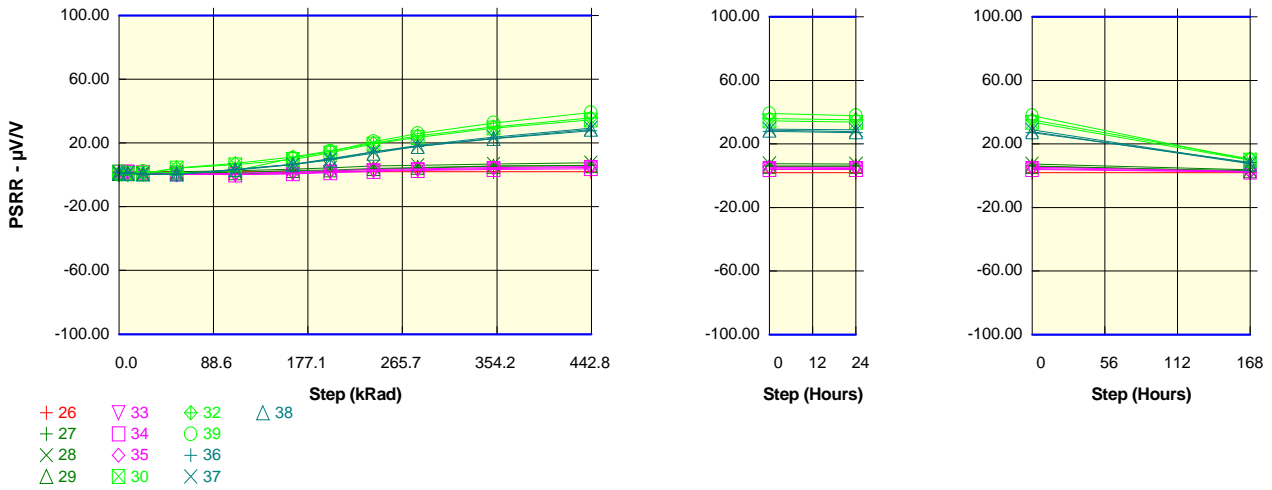
Measurements

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.24	1.10	1.17	1.17	1.21	1.21	1.20	1.21	1.23	1.20	1.18	1.19	1.25
OFF_TID samples													
36	0.62	0.62	0.33	1.78	4.36	8.20	11.61	16.22	19.67	23.72	28.52	27.69	9.22
37	0.56	0.56	1.24	2.27	4.73	7.94	11.71	16.07	20.47	24.94	30.91	29.77	9.24
38	0.54	0.89	1.17	2.23	4.65	7.88	11.30	15.65	19.57	24.02	29.00	28.38	9.02
Statistics													
Min	0.54	0.56	0.33	1.78	4.36	7.88	11.30	15.65	19.57	23.72	28.52	27.69	9.02
Max	0.62	0.89	1.24	2.27	4.73	8.20	11.71	16.22	20.47	24.94	30.91	29.77	9.24
Average	0.57	0.69	0.91	2.09	4.58	8.01	11.54	15.98	19.90	24.22	29.47	28.62	9.16
Sigma	0.03	0.15	0.41	0.22	0.16	0.14	0.18	0.24	0.40	0.52	1.03	0.87	0.10

Drift Calculation

PSRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-283.4E-03	1.2E+00	3.7E+00	7.6E+00	11.0E+00	15.6E+00	19.1E+00	23.1E+00	27.9E+00	27.1E+00	8.6E+00
37	-	0.0E+00	688.6E-03	1.7E+00	4.2E+00	7.4E+00	11.2E+00	15.5E+00	19.9E+00	24.4E+00	30.3E+00	29.2E+00	8.7E+00
38	-	350.4E-03	625.6E-03	1.7E+00	4.1E+00	7.3E+00	10.8E+00	15.1E+00	19.0E+00	23.5E+00	28.5E+00	27.8E+00	8.5E+00
Average	-	116.8E-03	343.6E-03	1.5E+00	4.0E+00	7.4E+00	11.0E+00	15.4E+00	19.3E+00	23.7E+00	28.9E+00	28.0E+00	8.6E+00
Sigma	-	165.2E-03	444.1E-03	251.9E-03	189.0E-03	109.5E-03	163.6E-03	218.4E-03	410.7E-03	536.7E-03	1.0E+00	887.3E-03	82.8E-03

Parameter : Power Supply Rejection Ratio : PSRRDUTB
 Test conditions : -VCC=GND. VCM=-1.4V. 5V<+VCC<30V
 Unit : $\mu\text{V/V}$
 Spec Limit Min : -100.00
 Spec Limit Max : 100.00
 Spec limits are represented in bold lines on the graphic.



Measurements

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	2.02	2.02	1.95	1.94	1.99	2.03	2.01	1.99	2.06	1.99	1.98	1.99	2.01
ON_PROTON samples													
27	1.14	1.25	1.16	0.93	0.71	1.68	2.67	3.72	4.23	5.45	6.02	6.05	2.66
28	0.60	0.64	1.60	1.92	2.50	3.56	4.42	5.52	6.09	6.83	7.57	7.39	3.75
29	0.96	0.92	1.04	1.72	1.42	2.73	3.11	4.05	4.74	5.48	5.82	5.75	3.03
Statistics													
Min	0.60	0.64	1.04	0.93	0.71	1.68	2.67	3.72	4.23	5.45	5.82	5.75	2.66
Max	1.14	1.25	1.60	1.92	2.50	3.56	4.42	5.52	6.09	6.83	7.57	7.39	3.75
Average	0.90	0.94	1.26	1.52	1.54	2.66	3.40	4.43	5.02	5.92	6.47	6.40	3.15
Sigma	0.22	0.25	0.24	0.43	0.74	0.77	0.74	0.78	0.79	0.64	0.78	0.71	0.45

Drift Calculation

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	113.6E-03	14.4E-03	-214.4E-03	-432.2E-03	537.1E-03	1.5E+00	2.6E+00	3.1E+00	4.3E+00	4.9E+00	4.9E+00	1.5E+00
28	-	36.8E-03	993.6E-03	1.3E+00	1.9E+00	3.0E+00	3.8E+00	4.9E+00	5.5E+00	6.2E+00	7.0E+00	6.8E+00	3.2E+00
29	-	-36.8E-03	86.4E-03	768.0E-03	460.4E-03	1.8E+00	2.1E+00	3.1E+00	3.8E+00	4.5E+00	4.9E+00	4.8E+00	2.1E+00
Average	-	37.9E-03	364.8E-03	622.4E-03	641.2E-03	1.8E+00	2.5E+00	3.5E+00	4.1E+00	5.0E+00	5.6E+00	5.5E+00	2.3E+00
Sigma	-	61.4E-03	445.6E-03	632.2E-03	958.8E-03	987.9E-03	966.5E-03	1.0E+00	1.0E+00	856.6E-03	989.2E-03	913.4E-03	675.5E-03

Measurements

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	2.02	2.02	1.95	1.94	1.99	2.03	2.01	1.99	2.06	1.99	1.98	1.99	2.01
ON_TID samples													
33	1.41	1.41	0.89	0.39	0.26	0.99	1.80	2.60	3.27	4.00	4.63	4.58	2.40
34	1.69	1.79	1.25	0.88	0.07	0.70	1.40	2.16	2.75	3.31	3.92	3.80	2.25
35	0.98	0.98	0.43	0.21	0.88	1.73	2.52	3.49	3.96	4.65	5.27	5.24	2.79
Statistics													
Min	0.98	0.98	0.43	0.21	0.07	0.70	1.40	2.16	2.75	3.31	3.92	3.80	2.25
Max	1.69	1.79	1.25	0.88	0.88	1.73	2.52	3.49	3.96	4.65	5.27	5.24	2.79
Average	1.36	1.39	0.86	0.49	0.40	1.14	1.91	2.75	3.33	3.99	4.61	4.54	2.48
Sigma	0.29	0.33	0.34	0.28	0.34	0.44	0.46	0.55	0.50	0.55	0.55	0.59	0.23

Drift Calculation

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-524.3E-03	-1.0E+00	-1.2E+00	-419.9E-03	394.1E-03	1.2E+00	1.9E+00	2.6E+00	3.2E+00	3.2E+00	985.7E-03
34	-	98.4E-03	-439.2E-03	-816.8E-03	-1.6E+00	-992.6E-03	-293.3E-03	466.1E-03	1.1E+00	1.6E+00	2.2E+00	2.1E+00	561.4E-03
35	-	0.0E+00	-547.2E-03	-767.8E-03	-100.1E-03	755.7E-03	1.5E+00	2.5E+00	3.0E+00	3.7E+00	4.3E+00	4.3E+00	1.8E+00
Average	-	32.8E-03	-503.6E-03	-868.9E-03	-958.2E-03	-218.9E-03	547.8E-03	1.4E+00	2.0E+00	2.6E+00	3.2E+00	3.2E+00	1.1E+00
Sigma	-	46.4E-03	46.5E-03	110.1E-03	636.2E-03	727.8E-03	757.4E-03	847.0E-03	790.5E-03	841.5E-03	840.6E-03	882.2E-03	518.9E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors							Issue:	02	

Measurements

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.02	2.02	1.95	1.94	1.99	2.03	2.01	1.99	2.06	1.99	1.98	1.99	2.01
OFF_PROTON samples													
30	1.84	1.00	0.75	4.31	6.33	9.68	13.85	19.43	23.42	29.46	34.53	33.68	9.77
32	0.19	0.21	0.83	4.35	7.15	11.14	15.11	19.94	24.57	30.20	35.83	35.14	10.64
39	0.22	0.86	2.15	1.29	2.70	10.58	14.78	20.96	26.01	32.65	39.13	37.76	9.89
Statistics													
Min	0.19	0.21	0.75	1.29	2.70	9.68	13.85	19.43	23.42	29.46	34.53	33.68	9.77
Max	1.84	1.00	2.15	4.35	7.15	11.14	15.11	20.96	26.01	32.65	39.13	37.76	10.64
Average	0.75	0.69	1.25	3.32	5.39	10.47	14.58	20.11	24.67	30.77	36.50	35.53	10.10
Sigma	0.77	0.34	0.64	1.43	1.93	0.60	0.53	0.64	1.06	1.37	1.94	1.69	0.39

Drift Calculation

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-841.6E-03	-1.1E+00	2.5E+00	4.5E+00	7.8E+00	12.0E+00	17.6E+00	21.6E+00	27.6E+00	32.7E+00	31.8E+00	7.9E+00
32	-	25.6E-03	641.6E-03	4.2E+00	7.0E+00	11.0E+00	14.9E+00	19.8E+00	24.4E+00	30.0E+00	35.6E+00	35.0E+00	10.5E+00
39	-	638.4E-03	1.9E+00	1.1E+00	2.5E+00	10.4E+00	14.6E+00	20.7E+00	25.8E+00	32.4E+00	38.9E+00	37.5E+00	9.7E+00
Average	-	-59.2E-03	493.9E-03	2.6E+00	4.6E+00	9.7E+00	13.8E+00	19.4E+00	23.9E+00	30.0E+00	35.7E+00	34.8E+00	9.3E+00
Sigma	-	607.2E-03	1.2E+00	1.3E+00	1.8E+00	1.4E+00	1.3E+00	1.3E+00	1.8E+00	2.0E+00	2.5E+00	2.3E+00	1.1E+00

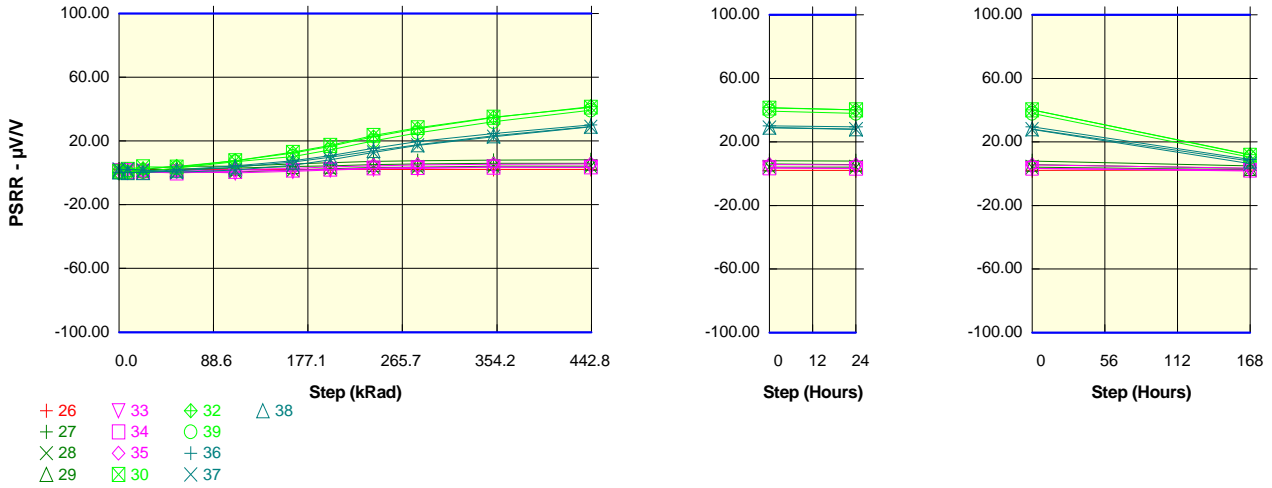
Measurements

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.02	2.02	1.95	1.94	1.99	2.03	2.01	1.99	2.06	1.99	1.98	1.99	2.01
OFF_TID samples													
36	1.46	1.46	0.52	0.52	3.45	6.63	10.21	14.35	17.98	22.75	27.85	27.09	8.38
37	1.40	1.40	0.67	0.50	2.99	6.32	9.64	14.37	18.51	23.66	29.35	28.82	7.69
38	1.13	0.83	0.43	0.51	3.37	6.52	9.46	13.69	17.84	22.89	28.63	27.69	7.50
Statistics													
Min	1.13	0.83	0.43	0.50	2.99	6.32	9.46	13.69	17.84	22.75	27.85	27.09	7.50
Max	1.46	1.46	0.67	0.52	3.45	6.63	10.21	14.37	18.51	23.66	29.35	28.82	8.38
Average	1.33	1.23	0.54	0.51	3.27	6.49	9.77	14.14	18.11	23.10	28.61	27.87	7.86
Sigma	0.14	0.28	0.10	0.01	0.20	0.13	0.32	0.31	0.29	0.40	0.61	0.72	0.38

Drift Calculation

PSRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-942.9E-03	-946.1E-03	2.0E+00	5.2E+00	8.7E+00	12.9E+00	16.5E+00	21.3E+00	26.4E+00	25.6E+00	6.9E+00
37	-	0.0E+00	-728.0E-03	-897.0E-03	1.6E+00	4.9E+00	8.2E+00	13.0E+00	17.1E+00	22.3E+00	28.0E+00	27.4E+00	6.3E+00
38	-	-301.3E-03	-701.3E-03	-622.9E-03	2.2E+00	5.4E+00	8.3E+00	12.6E+00	16.7E+00	21.8E+00	27.5E+00	26.6E+00	6.4E+00
Average	-	-100.4E-03	-790.7E-03	-822.0E-03	1.9E+00	5.2E+00	8.4E+00	12.8E+00	16.8E+00	21.8E+00	27.3E+00	26.5E+00	6.5E+00
Sigma	-	142.0E-03	108.1E-03	142.2E-03	261.8E-03	189.6E-03	218.8E-03	177.9E-03	247.7E-03	401.0E-03	656.6E-03	732.6E-03	282.6E-03

Parameter : Power Supply Rejection Ratio : PSRRDUTC
 Test conditions : -VCC=GND. VCM=-1.4V. 5V<+VCC<30V
 Unit : $\mu\text{V/V}$
 Spec Limit Min : -100.00
 Spec Limit Max : 100.00
 Spec limits are represented in bold lines on the graphic.



Measurements

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.18	2.18	2.10	2.16	2.20	2.20	2.20	2.17	2.20	2.14	2.16	2.15	2.20
ON_PROTON samples													
27	2.46	2.07	2.29	4.15	4.24	5.63	6.46	7.30	7.69	7.98	8.24	7.99	4.88
28	1.26	1.22	0.81	0.40	0.69	1.72	2.70	3.37	3.59	4.18	4.22	4.03	2.47
29	0.92	0.76	1.79	2.42	3.06	4.07	4.32	5.36	5.66	5.97	6.01	5.85	3.31
Statistics													
Min	0.92	0.76	0.81	0.40	0.69	1.72	2.70	3.37	3.59	4.18	4.22	4.03	2.47
Max	2.46	2.07	2.29	4.15	4.24	5.63	6.46	7.30	7.69	7.98	8.24	7.99	4.88
Average	1.55	1.35	1.63	2.32	2.66	3.80	4.49	5.34	5.65	6.04	6.16	5.95	3.55
Sigma	0.66	0.54	0.61	1.53	1.48	1.61	1.54	1.60	1.67	1.55	1.65	1.62	1.00

Drift Calculation

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-395.2E-03	-172.8E-03	1.7E+00	1.8E+00	3.2E+00	4.0E+00	4.8E+00	5.2E+00	5.5E+00	5.8E+00	5.5E+00	2.4E+00
28	-	-41.8E-03	-449.8E-03	-859.4E-03	-572.2E-03	458.4E-03	1.4E+00	2.1E+00	2.3E+00	2.9E+00	3.0E+00	2.8E+00	1.2E+00
29	-	-158.4E-03	862.4E-03	1.5E+00	2.1E+00	3.1E+00	3.4E+00	4.4E+00	4.7E+00	5.0E+00	5.1E+00	4.9E+00	2.4E+00
Average	-	-198.5E-03	79.9E-03	775.4E-03	1.1E+00	2.3E+00	2.9E+00	3.8E+00	4.1E+00	4.5E+00	4.6E+00	4.4E+00	2.0E+00
Sigma	-	147.0E-03	564.7E-03	1.2E+00	1.2E+00	1.3E+00	1.1E+00	1.2E+00	1.3E+00	1.1E+00	1.2E+00	1.2E+00	563.0E-03

Measurements

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.18	2.18	2.10	2.16	2.20	2.20	2.20	2.17	2.20	2.14	2.16	2.15	2.20
ON_TID samples													
33	1.43	1.43	1.07	0.96	0.06	1.00	1.78	2.52	2.89	3.56	3.46	3.32	1.70
34	0.88	0.69	0.53	0.03	0.93	1.75	2.34	3.12	3.39	3.57	3.68	3.43	2.25
35	0.10	0.10	0.67	1.02	2.02	2.89	3.77	4.47	5.07	5.41	5.65	5.52	3.65
Statistics													
Min	0.10	0.10	0.53	0.03	0.06	1.00	1.78	2.52	2.89	3.56	3.46	3.32	1.70
Max	1.43	1.43	1.07	1.02	2.02	2.89	3.77	4.47	5.07	5.41	5.65	5.52	3.65
Average	0.80	0.74	0.76	0.67	1.00	1.88	2.63	3.37	3.78	4.18	4.26	4.09	2.53
Sigma	0.55	0.55	0.23	0.45	0.80	0.78	0.84	0.81	0.93	0.87	0.99	1.01	0.82

Drift Calculation

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-359.2E-03	-469.3E-03	-1.4E+00	-435.6E-03	347.7E-03	1.1E+00	1.5E+00	2.1E+00	2.0E+00	1.9E+00	269.9E-03
34	-	-191.5E-03	-350.9E-03	-853.4E-03	48.8E-03	864.8E-03	1.5E+00	2.2E+00	2.5E+00	2.7E+00	2.8E+00	2.5E+00	1.4E+00
35	-	0.0E+00	572.8E-03	917.4E-03	1.9E+00	2.8E+00	3.7E+00	4.4E+00	5.0E+00	5.3E+00	5.6E+00	5.4E+00	3.6E+00
Average	-	-63.8E-03	-45.8E-03	-135.1E-03	200.6E-03	1.1E+00	1.8E+00	2.6E+00	3.0E+00	3.4E+00	3.5E+00	3.3E+00	1.7E+00
Sigma	-	90.3E-03	437.4E-03	760.6E-03	1.3E+00	1.3E+00	1.4E+00	1.4E+00	1.5E+00	1.4E+00	1.5E+00	1.5E+00	1.4E+00

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors							Issue:	02	

Measurements

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.18	2.18	2.10	2.16	2.20	2.20	2.20	2.17	2.20	2.14	2.16	2.15	2.20
OFF_PROTON samples													
30	0.99	2.18	3.93	3.71	7.65	13.03	17.24	23.59	28.45	35.00	41.32	40.16	11.70
32	0.03	0.64	2.60	4.08	7.75	12.43	16.70	22.62	27.76	34.72	41.61	40.23	11.93
39	0.28	0.32	0.78	3.17	6.99	10.26	14.43	20.15	25.20	32.09	39.35	37.99	10.30
Statistics													
Min	0.03	0.32	0.78	3.17	6.99	10.26	14.43	20.15	25.20	32.09	39.35	37.99	10.30
Max	0.99	2.18	3.93	4.08	7.75	13.03	17.24	23.59	28.45	35.00	41.61	40.23	11.93
Average	0.43	1.05	2.43	3.65	7.46	11.91	16.12	22.12	27.14	33.94	40.76	39.46	11.31
Sigma	0.40	0.81	1.29	0.37	0.34	1.19	1.22	1.45	1.40	1.31	1.01	1.04	0.72

Drift Calculation

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	1.2E+00	2.9E+00	2.7E+00	6.7E+00	12.0E+00	16.2E+00	22.6E+00	27.5E+00	34.0E+00	40.3E+00	39.2E+00	10.7E+00
32	-	608.0E-03	2.6E+00	4.0E+00	7.7E+00	12.4E+00	16.7E+00	22.6E+00	27.7E+00	34.7E+00	41.6E+00	40.2E+00	11.9E+00
39	-	37.3E-03	493.3E-03	2.9E+00	6.7E+00	10.0E+00	14.1E+00	19.9E+00	24.9E+00	31.8E+00	39.1E+00	37.7E+00	10.0E+00
Average	-	611.4E-03	2.0E+00	3.2E+00	7.0E+00	11.5E+00	15.7E+00	21.7E+00	26.7E+00	33.5E+00	40.3E+00	39.0E+00	10.9E+00
Sigma	-	470.1E-03	1.1E+00	588.7E-03	488.9E-03	1.1E+00	1.1E+00	1.3E+00	1.3E+00	1.2E+00	1.0E+00	1.0E+00	774.8E-03

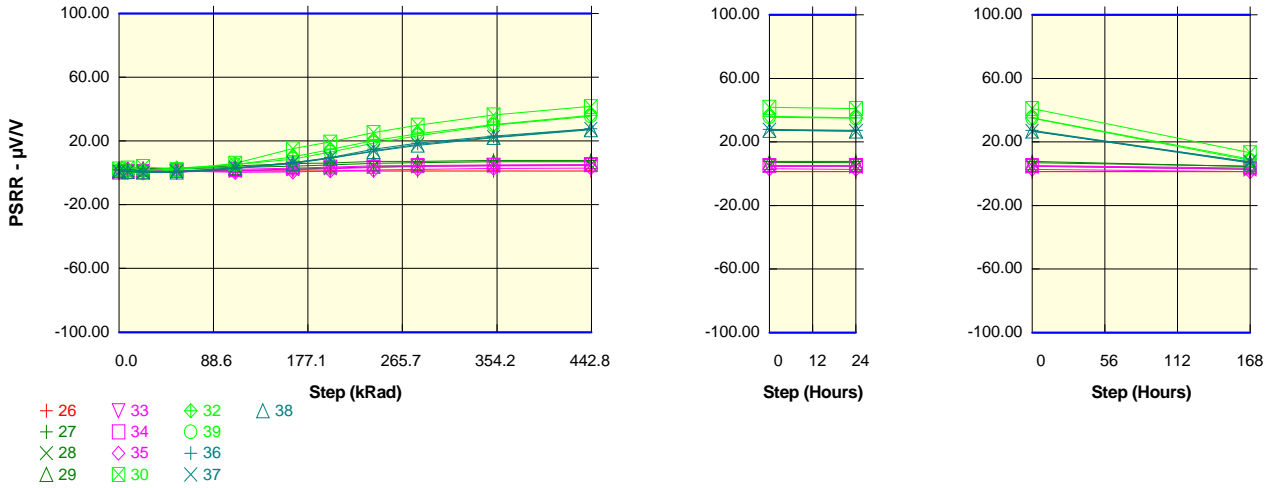
Measurements

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.18	2.18	2.10	2.16	2.20	2.20	2.20	2.17	2.20	2.14	2.16	2.15	2.20
OFF_TID samples													
36	0.18	0.18	0.47	1.93	4.43	7.56	10.83	15.46	19.73	24.71	30.16	29.40	8.87
37	2.23	2.23	1.72	0.51	1.79	4.84	8.30	12.86	17.24	22.71	28.93	27.97	6.30
38	0.62	0.24	0.08	1.28	3.65	6.78	9.77	13.89	17.55	23.38	29.17	28.15	7.90
Statistics													
Min	0.18	0.18	0.08	0.51	1.79	4.84	8.30	12.86	17.24	22.71	28.93	27.97	6.30
Max	2.23	2.23	1.72	1.93	4.43	7.56	10.83	15.46	19.73	24.71	30.16	29.40	8.87
Average	1.01	0.89	0.76	1.24	3.29	6.40	9.63	14.07	18.17	23.60	29.42	28.51	7.69
Sigma	0.88	0.95	0.70	0.58	1.11	1.14	1.03	1.07	1.11	0.83	0.53	0.64	1.06

Drift Calculation

PSRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	286.1E-03	1.7E+00	4.2E+00	7.4E+00	10.6E+00	15.3E+00	19.5E+00	24.5E+00	30.0E+00	29.2E+00	8.7E+00
37	-	0.0E+00	-513.3E-03	-1.7E+00	-441.7E-03	2.6E+00	6.1E+00	10.6E+00	15.0E+00	20.5E+00	26.7E+00	25.7E+00	4.1E+00
38	-	-380.2E-03	-541.9E-03	660.8E-03	3.0E+00	6.2E+00	9.1E+00	13.3E+00	16.9E+00	22.8E+00	28.6E+00	27.5E+00	7.3E+00
Average	-	-126.7E-03	-256.4E-03	231.0E-03	2.3E+00	5.4E+00	8.6E+00	13.1E+00	17.2E+00	22.6E+00	28.4E+00	27.5E+00	6.7E+00
Sigma	-	179.2E-03	383.8E-03	1.4E+00	2.0E+00	2.0E+00	1.9E+00	1.9E+00	1.9E+00	1.7E+00	1.3E+00	1.4E+00	1.9E+00

Parameter : Power Supply Rejection Ratio : PSRRDUTD
 Test conditions : -VCC=GND. VCM=-1.4V. 5V<+VCC<30V
 Unit : $\mu\text{V/V}$
 Spec Limit Min : -100.00
 Spec Limit Max : 100.00
 Spec limits are represented in bold lines on the graphic.



Measurements

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.40	1.34	1.32	1.28	1.31	1.32	1.32	1.32	1.31	1.28	1.30	1.29	1.33
ON_PROTON samples													
27	2.19	2.00	2.76	3.06	4.36	5.82	6.27	7.10	7.22	7.84	7.79	7.68	4.54
28	0.37	0.76	0.85	1.62	1.45	2.38	2.95	3.87	4.27	4.78	5.01	4.74	2.89
29	2.42	2.31	2.18	2.55	3.41	4.18	4.97	5.95	6.28	7.00	7.03	6.88	4.61
Statistics													
Min	0.37	0.76	0.85	1.62	1.45	2.38	2.95	3.87	4.27	4.78	5.01	4.74	2.89
Max	2.42	2.31	2.76	3.06	4.36	5.82	6.27	7.10	7.22	7.84	7.79	7.68	4.61
Average	1.66	1.69	1.93	2.41	3.07	4.13	4.73	5.64	5.92	6.54	6.61	6.43	4.01
Sigma	0.92	0.67	0.80	0.60	1.21	1.40	1.37	1.34	1.23	1.29	1.17	1.24	0.79

Drift Calculation

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-185.6E-03	574.4E-03	876.8E-03	2.2E+00	3.6E+00	4.1E+00	4.9E+00	5.0E+00	5.7E+00	5.6E+00	5.5E+00	2.4E+00
28	-	390.4E-03	481.6E-03	1.2E+00	1.1E+00	2.0E+00	2.6E+00	3.5E+00	3.9E+00	4.4E+00	4.6E+00	4.4E+00	2.5E+00
29	-	-116.8E-03	-241.6E-03	124.8E-03	984.0E-03	1.8E+00	2.5E+00	3.5E+00	3.9E+00	4.6E+00	4.6E+00	4.5E+00	2.2E+00
Average	-	29.3E-03	271.5E-03	750.4E-03	1.4E+00	2.5E+00	3.1E+00	4.0E+00	4.3E+00	4.9E+00	4.9E+00	4.8E+00	2.4E+00
Sigma	-	256.9E-03	364.8E-03	467.8E-03	537.0E-03	828.2E-03	720.9E-03	659.3E-03	547.9E-03	551.3E-03	464.6E-03	512.5E-03	137.3E-03

Measurements

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.40	1.34	1.32	1.28	1.31	1.32	1.32	1.32	1.31	1.28	1.30	1.29	1.33
ON_TID samples													
33	0.39	0.39	0.23	0.57	1.39	2.10	2.71	3.46	4.05	4.45	4.58	4.67	2.81
34	0.47	0.76	0.97	1.51	2.21	3.07	3.73	4.33	4.69	4.93	5.16	5.10	3.65
35	2.43	2.43	2.04	1.32	0.31	0.59	1.31	1.86	2.32	2.86	3.08	2.84	1.27
Statistics													
Min	0.39	0.39	0.23	0.57	0.31	0.59	1.31	1.86	2.32	2.86	3.08	2.84	1.27
Max	2.43	2.43	2.04	1.51	2.21	3.07	3.73	4.33	4.69	4.93	5.16	5.10	3.65
Average	1.09	1.19	1.08	1.13	1.30	1.92	2.58	3.21	3.69	4.08	4.28	4.20	2.57
Sigma	0.94	0.89	0.74	0.40	0.78	1.02	0.99	1.02	1.00	0.88	0.88	0.98	0.99

Drift Calculation

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-158.7E-03	184.3E-03	1.0E+00	1.7E+00	2.3E+00	3.1E+00	3.7E+00	4.1E+00	4.2E+00	4.3E+00	2.4E+00
34	-	289.4E-03	501.4E-03	1.0E+00	1.7E+00	2.6E+00	3.3E+00	3.9E+00	4.2E+00	4.5E+00	4.7E+00	4.6E+00	3.2E+00
35	-	0.0E+00	-389.0E-03	-1.1E+00	-2.1E+00	-1.8E+00	-1.1E+00	-571.1E-03	-110.2E-03	430.2E-03	654.5E-03	416.1E-03	-1.2E+00
Average	-	96.5E-03	-15.4E-03	40.3E-03	211.0E-03	826.6E-03	1.5E+00	2.1E+00	2.6E+00	3.0E+00	3.2E+00	3.1E+00	1.5E+00
Sigma	-	136.4E-03	377.4E-03	881.3E-03	1.7E+00	1.9E+00	1.9E+00	1.9E+00	1.9E+00	1.8E+00	1.8E+00	1.9E+00	1.9E+00

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors							Issue:	02	

Measurements

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.40	1.34	1.32	1.28	1.31	1.32	1.32	1.32	1.31	1.28	1.30	1.29	1.33
OFF_PROTON samples													
30	2.52	2.94	4.06	2.05	5.97	15.15	19.39	25.38	29.95	36.29	41.77	40.99	13.18
32	1.94	1.36	1.24	3.09	5.28	10.05	14.59	20.27	24.49	30.39	36.10	35.23	9.09
39	1.31	0.39	0.01	2.21	5.15	8.67	13.03	18.79	23.40	30.02	35.62	34.97	8.35
Statistics													
Min	1.31	0.39	0.01	2.05	5.15	8.67	13.03	18.79	23.40	30.02	35.62	34.97	8.35
Max	2.52	2.94	4.06	3.09	5.97	15.15	19.39	25.38	29.95	36.29	41.77	40.99	13.18
Average	1.92	1.56	1.77	2.45	5.47	11.29	15.67	21.48	25.95	32.24	37.83	37.06	10.21
Sigma	0.49	1.05	1.69	0.46	0.36	2.79	2.71	2.82	2.87	2.87	2.79	2.78	2.13

Drift Calculation

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	419.2E-03	1.5E+00	-468.8E-03	3.5E+00	12.6E+00	16.9E+00	22.9E+00	27.4E+00	33.8E+00	39.2E+00	38.5E+00	10.7E+00
32	-	-582.4E-03	-696.0E-03	1.2E+00	3.3E+00	8.1E+00	12.6E+00	18.3E+00	22.6E+00	28.5E+00	34.2E+00	33.3E+00	7.2E+00
39	-	-919.4E-03	-1.3E+00	896.6E-03	3.8E+00	7.4E+00	11.7E+00	17.5E+00	22.1E+00	28.7E+00	34.3E+00	33.7E+00	7.0E+00
Average	-	-360.9E-03	-152.9E-03	527.1E-03	3.5E+00	9.4E+00	13.7E+00	19.6E+00	24.0E+00	30.3E+00	35.9E+00	35.1E+00	8.3E+00
Sigma	-	568.5E-03	1.2E+00	712.0E-03	211.3E-03	2.3E+00	2.2E+00	2.4E+00	2.4E+00	2.4E+00	2.4E+00	2.4E+00	1.7E+00

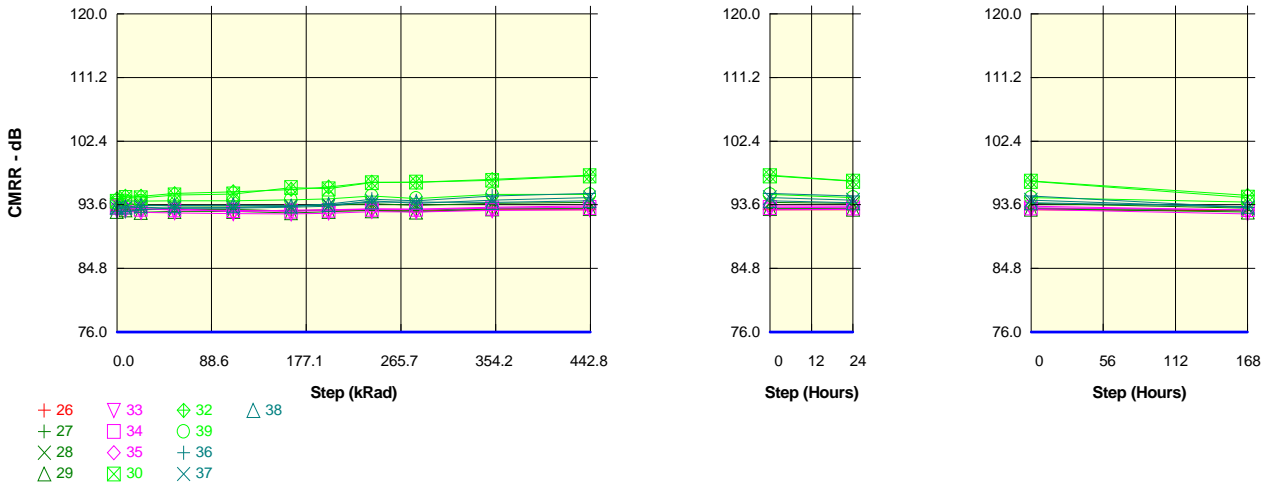
Measurements

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.40	1.34	1.32	1.28	1.31	1.32	1.32	1.32	1.31	1.28	1.30	1.29	1.33
OFF_TID samples													
36	2.02	2.02	1.16	0.39	2.98	6.40	9.72	14.89	18.63	23.13	27.87	27.30	7.39
37	0.89	0.89	0.13	0.96	3.24	6.30	9.36	13.90	17.94	22.55	27.58	26.67	7.30
38	1.26	0.90	0.43	0.47	2.77	5.89	9.17	13.42	17.34	22.25	27.20	26.88	6.69
Statistics													
Min	0.89	0.89	0.13	0.39	2.77	5.89	9.17	13.42	17.34	22.25	27.20	26.67	6.69
Max	2.02	2.02	1.16	0.96	3.24	6.40	9.72	14.89	18.63	23.13	27.87	27.30	7.39
Average	1.39	1.27	0.57	0.61	3.00	6.20	9.42	14.07	17.97	22.65	27.55	26.95	7.13
Sigma	0.47	0.53	0.44	0.25	0.19	0.22	0.23	0.61	0.53	0.37	0.28	0.26	0.31

Drift Calculation

PSRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-857.8E-03	-1.6E+00	963.7E-03	4.4E+00	7.7E+00	12.9E+00	16.6E+00	21.1E+00	25.8E+00	25.3E+00	5.4E+00
37	-	0.0E+00	-766.9E-03	66.7E-03	2.3E+00	5.4E+00	8.5E+00	13.0E+00	17.0E+00	21.7E+00	26.7E+00	25.8E+00	6.4E+00
38	-	-359.7E-03	-831.8E-03	-788.3E-03	1.5E+00	4.6E+00	7.9E+00	12.2E+00	16.1E+00	21.0E+00	25.9E+00	25.6E+00	5.4E+00
Average	-	-119.9E-03	-818.8E-03	-785.7E-03	1.6E+00	4.8E+00	8.0E+00	12.7E+00	16.6E+00	21.3E+00	26.2E+00	25.6E+00	5.7E+00
Sigma	-	169.6E-03	38.2E-03	694.9E-03	568.8E-03	437.9E-03	324.6E-03	372.1E-03	394.2E-03	288.8E-03	378.0E-03	204.9E-03	472.2E-03

Parameter : Common Mode Rejection Ratio : CMRRDUTA
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V to +VCC=2V. -VCC=-28V. VCM=13V
 Unit : dB
 Spec Limit Min : 76.0
 Spec limits are represented in bold lines on the graphic.



Measurements

CMRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.8	93.0	93.0	93.0	92.8	92.8	92.8	92.8	92.7	92.9	92.9	92.9	92.8
ON_PROTON samples													
27	93.0	92.8	92.9	93.0	92.9	92.7	92.9	92.9	92.8	93.1	93.1	93.1	92.8
28	93.7	93.8	93.5	93.4	93.4	93.4	93.5	93.7	93.5	93.8	93.9	93.8	93.1
29	92.7	92.9	92.5	92.7	92.6	92.5	92.6	92.8	92.6	93.0	93.0	93.0	92.6
Statistics													
Min	92.7	92.8	92.5	92.7	92.6	92.5	92.6	92.8	92.6	93.0	93.0	93.0	92.6
Max	93.7	93.8	93.5	93.4	93.4	93.4	93.5	93.7	93.5	93.8	93.9	93.8	93.1
Average	93.1	93.2	93.0	93.0	93.0	92.9	93.0	93.1	93.0	93.3	93.4	93.3	92.8
Sigma	0.4	0.4	0.4	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.4	0.3	0.2

Drift Calculation

CMRRDUT A	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-186.3E-03	-160.2E-03	-35.1E-03	-84.3E-03	-297.7E-03	-145.8E-03	-100.4E-03	-217.9E-03	100.9E-03	95.9E-03	66.2E-03	-254.3E-03
28	-	55.8E-03	-202.4E-03	-329.0E-03	-327.0E-03	-225.5E-03	45.8E-06	-212.5E-03	59.5E-03	145.9E-03	36.1E-03	-626.4E-03	-
29	-	206.2E-03	-141.4E-03	-4.8E-03	-30.8E-03	-205.6E-03	-42.4E-03	94.8E-03	-114.9E-03	331.1E-03	367.9E-03	323.1E-03	-88.0E-03
Average	-	25.2E-03	-168.0E-03	-122.9E-03	-147.4E-03	-276.8E-03	-137.9E-03	-1.8E-03	-181.8E-03	163.8E-03	203.2E-03	141.8E-03	-322.9E-03
Sigma	-	161.7E-03	25.5E-03	146.2E-03	129.0E-03	51.7E-03	75.0E-03	79.7E-03	47.4E-03	119.5E-03	118.2E-03	128.8E-03	225.1E-03

Measurements

CMRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.8	93.0	93.0	93.0	92.8	92.8	92.8	92.8	92.7	92.9	92.9	92.9	92.8
ON_TID samples													
33	92.7	92.7	92.5	92.5	92.4	92.3	92.4	92.6	92.6	92.8	92.9	92.9	92.3
34	93.2	93.3	93.0	92.9	92.8	92.7	92.8	93.0	93.0	93.1	93.2	93.2	92.9
35	93.2	93.2	93.0	93.0	92.6	92.8	92.9	93.0	93.0	93.2	93.4	93.4	92.9
Statistics													
Min	92.7	92.7	92.5	92.5	92.4	92.3	92.4	92.6	92.6	92.8	92.9	92.9	92.3
Max	93.2	93.3	93.0	93.0	92.8	92.8	92.9	93.0	93.0	93.2	93.4	93.4	92.9
Average	93.1	93.1	92.8	92.8	92.6	92.6	92.7	92.9	92.8	93.0	93.2	93.2	92.7
Sigma	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3

Drift Calculation

CMRRDUT A	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-194.2E-03	-245.0E-03	-354.4E-03	-410.1E-03	-320.4E-03	-88.3E-03	-152.0E-03	47.6E-03	158.0E-03	208.8E-03	-411.9E-03
34	-	48.5E-03	-241.3E-03	-372.4E-03	-438.7E-03	-535.3E-03	-417.0E-03	-262.9E-03	-285.4E-03	-119.6E-03	-13.6E-03	-80.5E-03	-318.2E-03
35	-	0.0E+00	-251.7E-03	-244.6E-03	-603.8E-03	-393.4E-03	-340.2E-03	-194.4E-03	-275.8E-03	-23.5E-03	170.6E-03	141.1E-03	-383.0E-03
Average	-	16.2E-03	-229.0E-03	-287.3E-03	-465.6E-03	-446.3E-03	-359.2E-03	-181.9E-03	-237.8E-03	-31.8E-03	105.0E-03	89.8E-03	-371.0E-03
Sigma	-	22.9E-03	25.0E-03	60.2E-03	103.6E-03	63.3E-03	41.7E-03	71.8E-03	60.7E-03	68.5E-03	84.0E-03	123.5E-03	39.2E-03

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

CMRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.8	93.0	93.0	93.0	92.8	92.8	92.8	92.8	92.7	92.9	92.9	92.9	92.8
OFF PROTON samples													
30	94.1	94.6	94.5	94.9	95.1	96.0	95.8	96.6	96.7	97.0	97.6	96.8	94.6
32	94.4	94.8	94.8	95.1	95.4	95.7	96.0	96.7	96.7	97.1	97.7	96.9	94.9
39	93.9	94.1	94.1	94.2	94.1	94.3	94.4	94.8	94.4	95.0	95.0	94.6	94.0
Statistics													
Min	93.9	94.1	94.1	94.2	94.1	94.3	94.4	94.8	94.4	95.0	95.0	94.6	94.0
Max	94.4	94.8	94.8	95.1	95.4	96.0	96.0	96.7	96.7	97.1	97.7	96.9	94.9
Average	94.1	94.5	94.5	94.7	94.8	95.3	95.4	96.0	96.0	96.4	96.7	96.1	94.5
Sigma	0.2	0.3	0.3	0.4	0.5	0.7	0.7	0.9	1.1	1.0	1.2	1.1	0.4

Drift Calculation

CMRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	491.0E-03	454.8E-03	834.8E-03	971.6E-03	1.9E+00	1.7E+00	2.6E+00	2.6E+00	2.9E+00	3.5E+00	2.8E+00	525.7E-03
32	-	346.1E-03	326.5E-03	695.2E-03	941.0E-03	1.3E+00	1.6E+00	2.3E+00	2.3E+00	2.7E+00	3.2E+00	2.5E+00	457.6E-03
39	-	247.0E-03	219.6E-03	299.3E-03	267.6E-03	409.8E-03	531.7E-03	934.9E-03	591.5E-03	1.2E+00	1.1E+00	729.9E-03	106.0E-03
Average	-	361.4E-03	333.7E-03	609.8E-03	726.7E-03	1.2E+00	1.3E+00	1.9E+00	1.8E+00	2.2E+00	2.6E+00	2.0E+00	363.1E-03
Sigma	-	100.2E-03	96.2E-03	226.8E-03	324.9E-03	601.5E-03	528.0E-03	711.8E-03	889.1E-03	770.1E-03	1.1E+00	891.8E-03	183.9E-03

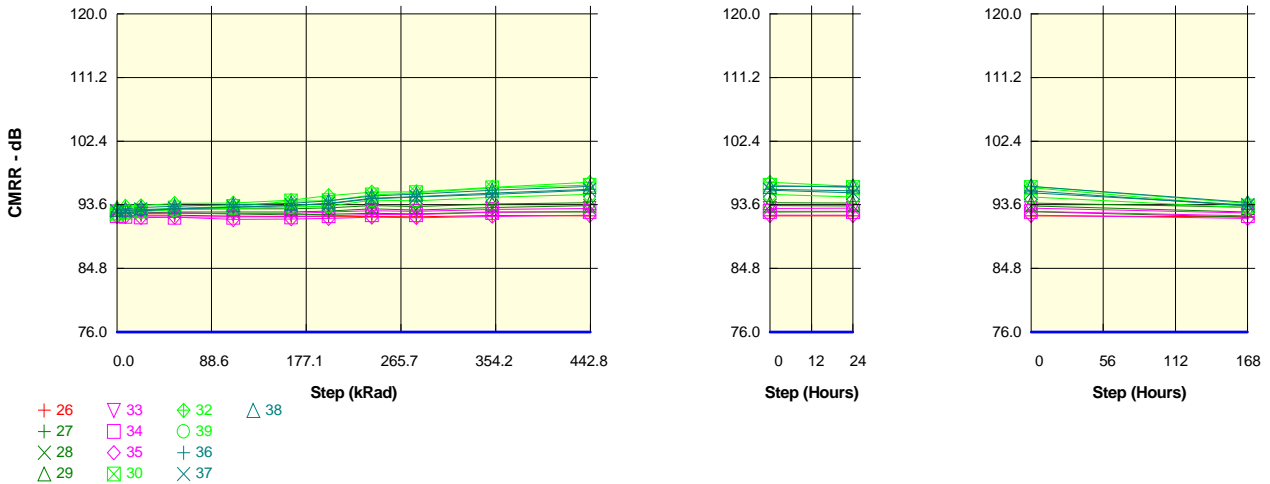
Measurements

CMRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.8	93.0	93.0	93.0	92.8	92.8	92.8	92.8	92.7	92.9	92.9	92.9	92.8
OFF TID samples													
36	92.6	92.6	92.9	93.2	93.2	93.4	93.7	94.4	94.1	94.8	95.2	94.8	93.2
37	93.1	93.1	93.2	93.1	93.1	93.2	93.4	94.1	93.8	94.3	94.6	94.2	93.2
38	93.3	93.3	93.5	93.5	93.5	93.4	93.6	94.0	94.0	93.9	94.2	93.9	93.4
Statistics													
Min	92.6	92.6	92.9	93.1	93.1	93.2	93.4	94.0	93.8	93.9	94.2	93.9	93.2
Max	93.3	93.3	93.5	93.5	93.5	93.4	93.7	94.4	94.1	94.8	95.2	94.8	93.4
Average	93.0	93.0	93.2	93.3	93.3	93.3	93.6	94.1	94.0	94.3	94.6	94.3	93.3
Sigma	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.4	0.4	0.4	0.1

Drift Calculation

CMRRDUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	263.8E-03	519.1E-03	558.7E-03	735.5E-03	1.1E+00	1.7E+00	1.5E+00	2.2E+00	2.5E+00	2.2E+00	560.2E-03
37	-	0.0E+00	112.5E-03	2.8E-03	8.5E-03	112.9E-03	272.2E-03	982.4E-03	688.6E-03	1.1E+00	1.5E+00	1.1E+00	74.0E-03
38	-	-24.5E-03	165.8E-03	175.8E-03	220.0E-03	119.1E-03	328.7E-03	675.7E-03	683.3E-03	612.4E-03	874.2E-03	571.8E-03	68.6E-03
Average	-	-8.2E-03	180.7E-03	232.6E-03	262.4E-03	322.5E-03	553.5E-03	1.1E+00	954.4E-03	1.3E+00	1.6E+00	1.3E+00	234.3E-03
Sigma	-	11.5E-03	62.6E-03	214.5E-03	226.6E-03	292.0E-03	358.6E-03	438.0E-03	379.7E-03	648.9E-03	680.5E-03	658.0E-03	230.5E-03

Parameter : Common Mode Rejection Ratio : CMRRDUTB
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V to +VCC=2V. -VCC=-28V. VCM=13V
 Unit : dB
 Spec Limit Min : 76.0
 Spec limits are represented in bold lines on the graphic.



Measurements

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.0	92.0	92.1	92.1	92.0	91.9	92.0	92.0	91.9	92.1	92.1	92.0	91.9
ON_PROTON samples													
27	92.7	92.4	92.4	92.5	92.3	92.2	92.3	92.4	92.3	92.6	92.6	92.6	91.9
28	92.7	92.5	92.5	92.6	92.6	92.6	92.7	93.0	92.8	93.2	93.4	93.4	92.5
29	93.2	92.9	92.8	93.0	93.0	93.0	93.2	93.4	93.4	93.7	93.9	93.8	93.2
Statistics													
Min	92.7	92.4	92.4	92.5	92.3	92.2	92.3	92.4	92.3	92.6	92.6	92.6	91.9
Max	93.2	92.9	92.8	93.0	93.0	93.0	93.2	93.4	93.4	93.7	93.9	93.8	93.2
Average	92.8	92.6	92.5	92.7	92.6	92.6	92.7	93.0	92.8	93.2	93.3	93.3	92.5
Sigma	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6

Drift Calculation

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
27	-	-278.3E-03	-261.7E-03	-193.5E-03	-349.1E-03	-476.9E-03	-388.1E-03	-233.3E-03	-329.4E-03	-92.5E-03	-67.5E-03	-12.5E-03	-789.5E-03
28	-	-134.2E-03	-212.3E-03	-103.1E-03	-59.1E-03	-55.1E-03	72.5E-03	333.9E-03	175.7E-03	532.4E-03	779.9E-03	742.7E-03	-113.6E-03
29	-	-280.5E-03	-387.3E-03	-220.8E-03	-156.3E-03	-172.3E-03	-16.8E-03	262.7E-03	178.7E-03	537.4E-03	681.5E-03	635.0E-03	33.2E-03
Average	-	-231.0E-03	-287.1E-03	-172.5E-03	-188.2E-03	-234.7E-03	-110.8E-03	121.1E-03	8.3E-03	325.8E-03	464.7E-03	455.1E-03	-290.0E-03
Sigma	-	68.5E-03	73.6E-03	50.3E-03	120.5E-03	177.8E-03	199.4E-03	252.2E-03	238.8E-03	295.8E-03	378.4E-03	333.5E-03	358.3E-03

Measurements

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.0	92.0	92.1	92.1	92.0	91.9	92.0	92.0	91.9	92.1	92.1	92.0	91.9
ON_TID samples													
33	92.6	92.6	92.4	92.4	92.3	92.4	92.5	92.7	92.7	92.9	93.1	93.1	92.5
34	92.1	92.0	91.9	91.9	91.9	91.9	92.1	92.2	92.2	92.5	92.7	92.7	92.1
35	92.0	92.0	91.8	91.9	91.5	91.6	91.7	91.9	91.8	92.0	92.1	92.1	91.7
Statistics													
Min	92.0	92.0	91.8	91.9	91.5	91.6	91.7	91.9	91.8	92.0	92.1	92.1	91.7
Max	92.6	92.6	92.4	92.4	92.3	92.4	92.5	92.7	92.7	92.9	93.1	93.1	92.5
Average	92.2	92.2	92.0	92.1	91.9	92.0	92.1	92.3	92.2	92.5	92.6	92.6	92.1
Sigma	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.3

Drift Calculation

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-217.0E-03	-175.4E-03	-276.0E-03	-227.4E-03	-60.8E-03	130.7E-03	83.3E-03	327.0E-03	470.3E-03	491.3E-03	-158.4E-03
34	-	-115.1E-03	-168.1E-03	-219.7E-03	-197.2E-03	-184.4E-03	-13.8E-03	125.3E-03	155.5E-03	433.4E-03	581.1E-03	569.3E-03	-18.2E-03
35	-	0.0E+00	-141.6E-03	-102.3E-03	-412.7E-03	-342.2E-03	-265.8E-03	-89.9E-03	-149.8E-03	4.0E-03	149.6E-03	153.5E-03	-275.3E-03
Average	-	-38.4E-03	-175.5E-03	-165.8E-03	-295.3E-03	-251.3E-03	-113.5E-03	55.3E-03	29.6E-03	254.8E-03	400.3E-03	404.7E-03	-150.6E-03
Sigma	-	54.2E-03	31.2E-03	48.4E-03	89.0E-03	66.6E-03	109.4E-03	102.7E-03	130.3E-03	182.6E-03	183.0E-03	180.5E-03	105.1E-03

Hirex Engineering	Total Dose Radiation Test Report							Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors					Issue:	02	

Measurements

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.0	92.0	92.1	92.1	92.0	91.9	92.0	92.0	91.9	92.1	92.1	92.0	91.9
OFF_PROTON samples													
30	92.3	92.6	92.8	93.1	93.3	94.1	94.1	94.9	95.2	95.9	96.3	95.9	93.4
32	93.1	93.4	93.4	93.8	93.8	94.2	94.8	95.3	95.4	96.0	96.7	96.1	93.8
39	92.4	92.5	92.6	92.9	93.1	93.3	93.4	94.2	94.1	94.6	95.0	94.6	93.2
Statistics													
Min	92.3	92.5	92.6	92.9	93.1	93.3	93.4	94.2	94.1	94.6	95.0	94.6	93.2
Max	93.1	93.4	93.4	93.8	93.8	94.2	94.8	95.3	95.4	96.0	96.7	96.1	93.8
Average	92.6	92.8	92.9	93.3	93.4	93.9	94.1	94.8	94.9	95.5	96.0	95.6	93.4
Sigma	0.3	0.4	0.4	0.4	0.3	0.4	0.6	0.5	0.6	0.6	0.7	0.7	0.3

Drift Calculation

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	245.3E-03	437.1E-03	790.9E-03	991.7E-03	1.8E+00	1.8E+00	2.6E+00	2.9E+00	3.6E+00	4.0E+00	3.6E+00	1.1E+00
32	-	306.1E-03	378.3E-03	730.9E-03	767.7E-03	1.1E+00	1.8E+00	2.3E+00	2.3E+00	2.9E+00	3.6E+00	3.1E+00	718.3E-03
39	-	113.1E-03	205.8E-03	442.3E-03	654.4E-03	859.5E-03	978.6E-03	1.8E+00	1.7E+00	2.2E+00	2.6E+00	2.2E+00	734.0E-03
Average	-	221.5E-03	340.4E-03	654.7E-03	804.6E-03	1.3E+00	1.5E+00	2.2E+00	2.3E+00	2.9E+00	3.4E+00	3.0E+00	835.7E-03
Sigma	-	80.5E-03	98.1E-03	152.2E-03	140.1E-03	375.5E-03	383.1E-03	327.0E-03	484.3E-03	564.2E-03	580.7E-03	570.7E-03	155.0E-03

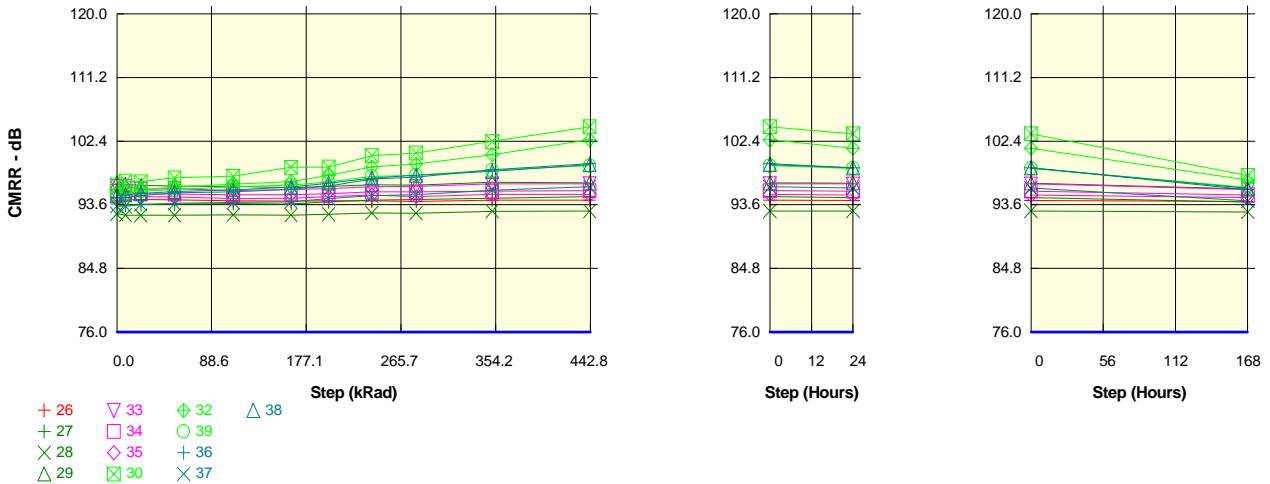
Measurements

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	92.0	92.0	92.1	92.1	92.0	91.9	92.0	92.0	91.9	92.1	92.1	92.0	91.9
OFF_TID samples													
36	92.4	92.4	92.7	93.0	93.2	93.4	93.8	94.5	94.7	95.2	95.7	95.5	93.4
37	92.7	92.7	93.0	93.0	93.2	93.5	93.7	94.4	94.7	95.0	95.6	95.2	93.5
38	93.0	93.0	93.2	93.4	93.6	93.8	94.1	94.8	95.1	95.6	96.1	96.2	93.9
Statistics													
Min	92.4	92.4	92.7	93.0	93.2	93.4	93.7	94.4	94.7	95.0	95.6	95.2	93.4
Max	93.0	93.0	93.2	93.4	93.6	93.8	94.1	94.8	95.1	95.6	96.1	96.2	93.9
Average	92.7	92.7	93.0	93.1	93.4	93.6	93.9	94.6	94.8	95.3	95.8	95.6	93.6
Sigma	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2

Drift Calculation

CMRRDUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	286.6E-03	549.2E-03	790.6E-03	993.9E-03	1.4E+00	2.0E+00	2.3E+00	2.7E+00	3.3E+00	3.1E+00	964.4E-03
37	-	0.0E+00	210.5E-03	278.6E-03	491.1E-03	775.8E-03	982.1E-03	1.7E+00	1.9E+00	2.2E+00	2.8E+00	2.5E+00	808.3E-03
38	-	41.2E-03	247.3E-03	431.7E-03	643.4E-03	855.4E-03	1.2E+00	1.8E+00	2.1E+00	2.7E+00	3.2E+00	3.2E+00	952.6E-03
Average	-	13.7E-03	248.1E-03	419.8E-03	641.7E-03	875.1E-03	1.2E+00	1.8E+00	2.1E+00	2.6E+00	3.1E+00	2.9E+00	908.4E-03
Sigma	-	19.4E-03	31.1E-03	110.8E-03	122.3E-03	90.1E-03	154.8E-03	156.8E-03	135.9E-03	215.0E-03	182.5E-03	301.6E-03	70.9E-03

Parameter : Common Mode Rejection Ratio : CMRRDUTC
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V to +VCC=2V. -VCC=-28V. VCM=13V
 Unit : dB
 Spec Limit Min : 76.0
 Spec limits are represented in bold lines on the graphic.



Measurements

CMRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.1	94.2	94.3	94.3	94.2	94.1	94.1	94.1	94.1	94.2	94.2	94.2	94.1
ON_PROTON samples													
27	93.7	93.5	93.7	93.7	93.7	93.7	94.0	94.2	94.3	94.5	94.7	94.6	94.0
28	92.3	92.2	92.1	92.1	92.2	92.2	92.3	92.4	92.4	92.7	92.7	92.7	92.6
29	96.6	96.4	96.2	96.2	96.1	96.0	96.1	96.4	96.3	96.7	96.6	96.6	95.8
Statistics													
Min	92.3	92.2	92.1	92.1	92.2	92.2	92.3	92.4	92.4	92.7	92.7	92.7	92.6
Max	96.6	96.4	96.2	96.2	96.1	96.0	96.1	96.4	96.3	96.7	96.6	96.6	95.8
Average	94.2	94.0	94.0	94.0	94.0	93.9	94.1	94.3	94.3	94.6	94.7	94.6	94.1
Sigma	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.3

Drift Calculation

CMRRDUT C	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-155.5E-03	-47.1E-03	-5.7E-03	44.9E-03	10.0E-03	276.9E-03	496.0E-03	619.0E-03	798.9E-03	987.8E-03	884.4E-03	252.3E-03
28	-	-177.2E-03	-208.8E-03	-184.4E-03	-140.6E-03	-161.3E-03	-55.6E-03	115.4E-03	83.9E-03	376.4E-03	380.5E-03	399.5E-03	273.5E-03
29	-	-233.6E-03	-393.8E-03	-436.3E-03	-480.7E-03	-666.4E-03	-510.7E-03	-245.8E-03	-326.6E-03	95.7E-03	-8.8E-03	-37.5E-03	-862.4E-03
Average	-	-188.8E-03	-216.6E-03	-208.8E-03	-192.1E-03	-272.5E-03	-96.5E-03	121.9E-03	125.4E-03	423.7E-03	453.2E-03	415.4E-03	-112.2E-03
Sigma	-	32.9E-03	141.6E-03	176.6E-03	217.6E-03	287.1E-03	322.8E-03	302.8E-03	387.2E-03	289.0E-03	410.1E-03	376.5E-03	530.5E-03

Measurements

CMRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.1	94.2	94.3	94.3	94.2	94.1	94.1	94.1	94.1	94.2	94.2	94.2	94.1
ON_TID samples													
33	96.1	96.1	95.7	95.8	95.5	95.7	95.8	96.1	96.1	96.5	96.5	96.5	95.7
34	95.4	95.3	95.1	95.1	95.0	95.0	95.1	95.4	95.4	95.5	95.5	95.5	94.9
35	94.9	94.9	94.7	94.7	94.4	94.5	94.7	95.0	94.7	95.0	95.0	94.9	94.6
Statistics													
Min	94.9	94.9	94.7	94.7	94.4	94.5	94.7	95.0	94.7	95.0	95.0	94.9	94.6
Max	96.1	96.1	95.7	95.8	95.5	95.7	95.8	96.1	96.1	96.5	96.5	96.5	95.7
Average	95.5	95.4	95.2	95.2	95.0	95.0	95.2	95.5	95.4	95.6	95.7	95.6	95.0
Sigma	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.5

Drift Calculation

CMRRDUT C	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-359.5E-03	-295.6E-03	-563.6E-03	-443.6E-03	-311.2E-03	-37.7E-03	6.9E-03	358.0E-03	363.5E-03	346.1E-03	-442.7E-03
34	-	-98.1E-03	-334.6E-03	-369.0E-03	-446.9E-03	-441.4E-03	-324.5E-03	-60.9E-03	-77.0E-03	39.3E-03	116.1E-03	64.6E-03	-508.0E-03
35	-	0.0E+00	-189.0E-03	-212.0E-03	-434.0E-03	-375.1E-03	-194.8E-03	85.0E-03	-140.4E-03	118.0E-03	158.1E-03	49.0E-03	-310.5E-03
Average	-	-32.7E-03	-294.4E-03	-292.2E-03	-481.5E-03	-420.0E-03	-276.8E-03	-4.5E-03	-70.2E-03	171.8E-03	212.5E-03	153.2E-03	-420.4E-03
Sigma	-	46.3E-03	75.2E-03	64.1E-03	58.3E-03	31.8E-03	58.3E-03	64.0E-03	60.3E-03	135.5E-03	108.1E-03	136.6E-03	82.2E-03

Hirex Engineering	Total Dose Radiation Test Report							Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors					Issue:	02	

Measurements

CMRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.1	94.2	94.3	94.3	94.2	94.1	94.1	94.1	94.1	94.2	94.2	94.2	94.1
OFF PROTON samples													
30	96.3	96.8	96.8	97.3	97.5	98.8	98.8	100.4	100.7	102.3	104.4	103.4	97.6
32	95.3	95.5	95.6	96.1	96.4	96.8	97.6	98.8	99.2	100.5	102.6	101.4	97.0
39	94.8	95.1	95.5	95.7	96.1	96.3	96.8	97.5	97.7	98.3	99.0	98.6	96.0
Statistics													
Min	94.8	95.1	95.5	95.7	96.1	96.3	96.8	97.5	97.7	98.3	99.0	98.6	96.0
Max	96.3	96.8	96.8	97.3	97.5	98.8	98.8	100.4	100.7	102.3	104.4	103.4	97.6
Average	95.5	95.8	96.0	96.3	96.7	97.3	97.7	98.9	99.2	100.4	102.0	101.1	96.9
Sigma	0.6	0.7	0.6	0.7	0.6	1.1	0.8	1.2	1.3	1.6	2.2	2.0	0.7

Drift Calculation

CMRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	503.4E-03	450.2E-03	993.6E-03	1.2E+00	2.4E+00	2.5E+00	4.1E+00	4.4E+00	6.0E+00	8.1E+00	7.1E+00	1.3E+00
32	-	236.0E-03	318.1E-03	748.8E-03	1.1E+00	1.5E+00	2.3E+00	3.5E+00	3.9E+00	5.2E+00	7.3E+00	6.1E+00	1.7E+00
39	-	299.4E-03	623.2E-03	818.4E-03	1.2E+00	1.5E+00	1.9E+00	2.7E+00	2.8E+00	3.5E+00	4.1E+00	3.8E+00	1.1E+00
Average	-	346.3E-03	463.8E-03	853.6E-03	1.2E+00	1.8E+00	2.2E+00	3.4E+00	3.7E+00	4.9E+00	6.5E+00	5.7E+00	1.4E+00
Sigma	-	114.1E-03	124.9E-03	103.0E-03	38.2E-03	452.8E-03	236.7E-03	585.7E-03	666.0E-03	1.1E+00	1.7E+00	1.4E+00	244.2E-03

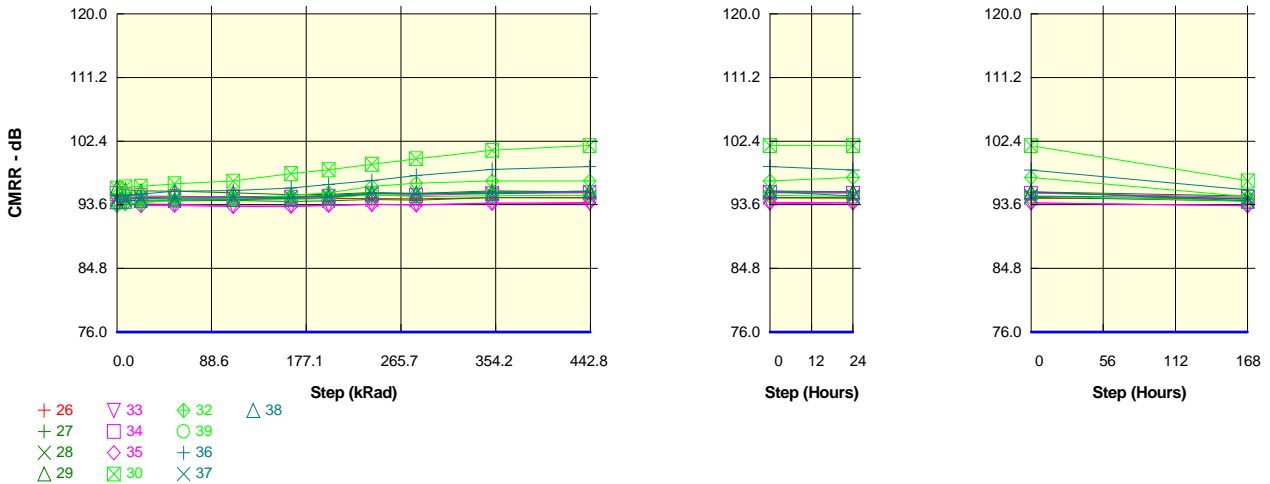
Measurements

CMRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.1	94.2	94.3	94.3	94.2	94.1	94.1	94.1	94.1	94.2	94.2	94.2	94.1
OFF TID samples													
36	94.6	94.6	94.8	95.2	95.4	95.7	96.2	97.2	97.4	98.4	99.3	98.7	95.7
37	93.4	93.4	93.6	93.8	93.9	94.0	94.4	94.8	95.0	95.6	96.1	95.9	94.1
38	94.9	95.0	95.1	95.4	95.6	96.0	96.6	97.3	97.7	98.2	99.2	98.7	95.9
Statistics													
Min	93.4	93.4	93.6	93.8	93.9	94.0	94.4	94.8	95.0	95.6	96.1	95.9	94.1
Max	94.9	95.0	95.1	95.4	95.6	96.0	96.6	97.3	97.7	98.4	99.3	98.7	95.9
Average	94.3	94.3	94.5	94.8	95.0	95.3	95.7	96.4	96.7	97.4	98.2	97.8	95.2
Sigma	0.6	0.7	0.7	0.7	0.8	0.9	0.9	1.1	1.2	1.3	1.5	1.3	0.8

Drift Calculation

CMRRDUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	297.1E-03	688.9E-03	831.1E-03	1.2E+00	1.6E+00	2.6E+00	2.9E+00	3.9E+00	4.7E+00	4.1E+00	1.1E+00
37	-	0.0E+00	246.0E-03	379.8E-03	519.4E-03	661.4E-03	1.0E+00	1.5E+00	1.6E+00	2.2E+00	2.7E+00	2.5E+00	741.0E-03
38	-	92.0E-03	260.6E-03	521.8E-03	752.8E-03	1.1E+00	1.7E+00	2.4E+00	2.8E+00	3.3E+00	4.3E+00	3.8E+00	987.5E-03
Average	-	30.7E-03	267.9E-03	530.2E-03	701.1E-03	992.5E-03	1.5E+00	2.2E+00	2.4E+00	3.1E+00	3.9E+00	3.5E+00	948.4E-03
Sigma	-	43.4E-03	21.5E-03	126.3E-03	132.4E-03	234.7E-03	292.8E-03	501.4E-03	570.6E-03	673.1E-03	863.1E-03	697.7E-03	155.8E-03

Parameter : Common Mode Rejection Ratio : CMRRDUTD
 Test conditions : +VCC=30V. -VCC=GND. VCM=-15V to +VCC=2V. -VCC=-28V. VCM=13V
 Unit : dB
 Spec Limit Min : 76.0
 Spec limits are represented in bold lines on the graphic.



Measurements

CMRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.5	94.5	94.6	94.6	94.5	94.4	94.4	94.4	94.4	94.6	94.5	94.5	94.4
ON_PROTON samples													
27	94.8	94.4	94.5	94.7	94.7	94.7	94.9	95.2	95.0	95.4	95.3	95.3	94.4
28	94.5	94.3	94.1	94.1	94.2	94.1	94.1	94.3	94.2	94.6	94.6	94.6	94.1
29	96.0	95.6	95.5	95.4	95.2	95.0	95.0	95.3	95.2	95.5	95.4	95.4	94.8
Statistics													
Min	94.5	94.3	94.1	94.1	94.2	94.1	94.1	94.3	94.2	94.6	94.6	94.6	94.1
Max	96.0	95.6	95.5	95.4	95.2	95.0	95.0	95.3	95.2	95.5	95.4	95.4	94.8
Average	95.1	94.8	94.7	94.8	94.7	94.6	94.7	94.9	94.8	95.1	95.1	95.1	94.4
Sigma	0.6	0.6	0.6	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3

Drift Calculation

CMRRDUT D	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-412.8E-03	-267.6E-03	-122.3E-03	-140.9E-03	-119.0E-03	71.5E-03	343.3E-03	228.0E-03	566.5E-03	492.0E-03	499.2E-03	-462.9E-03
28	-	-225.8E-03	-422.9E-03	-363.0E-03	-323.2E-03	-444.3E-03	-353.4E-03	-189.9E-03	-272.1E-03	59.0E-03	92.7E-03	119.2E-03	-409.8E-03
29	-	-342.4E-03	-440.8E-03	-530.2E-03	-742.7E-03	-990.7E-03	-926.6E-03	-665.9E-03	-787.1E-03	-466.8E-03	-565.7E-03	-572.2E-03	-1.2E+00
Average	-	-327.0E-03	-377.1E-03	-338.5E-03	-402.3E-03	-518.0E-03	-402.9E-03	-170.9E-03	-277.0E-03	52.9E-03	6.3E-03	15.4E-03	-676.1E-03
Sigma	-	77.1E-03	77.8E-03	167.4E-03	252.0E-03	359.7E-03	409.0E-03	412.2E-03	414.4E-03	421.9E-03	436.1E-03	443.5E-03	339.8E-03

Measurements

CMRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.5	94.5	94.6	94.6	94.5	94.4	94.4	94.4	94.4	94.6	94.5	94.5	94.4
ON_TID samples													
33	93.9	93.9	93.7	93.6	93.4	93.4	93.5	93.6	93.6	93.8	93.7	93.8	93.4
34	95.1	95.0	94.8	94.7	94.7	94.6	94.8	94.9	94.9	95.1	95.2	95.2	94.6
35	93.7	93.7	93.5	93.5	93.3	93.4	93.5	93.6	93.6	93.8	93.9	93.9	93.4
Statistics													
Min	93.7	93.7	93.5	93.5	93.3	93.4	93.5	93.6	93.6	93.8	93.7	93.8	93.4
Max	95.1	95.0	94.8	94.7	94.7	94.6	94.8	94.9	94.9	95.1	95.2	95.2	94.6
Average	94.3	94.2	94.0	94.0	93.8	93.8	93.9	94.1	94.0	94.2	94.3	94.3	93.8
Sigma	0.6	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6

Drift Calculation

CMRRDUT D	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-273.0E-03	-312.9E-03	-520.4E-03	-518.9E-03	-428.0E-03	-306.4E-03	-337.3E-03	-120.2E-03	-194.5E-03	-114.8E-03	-499.1E-03
34	-	-186.4E-03	-318.8E-03	-408.3E-03	-470.0E-03	-532.1E-03	-361.6E-03	-202.4E-03	-274.8E-03	-25.3E-03	90.3E-03	37.4E-03	-516.5E-03
35	-	0.0E+00	-281.3E-03	-244.7E-03	-396.3E-03	-385.4E-03	-255.6E-03	-109.5E-03	-184.2E-03	25.8E-03	139.5E-03	107.1E-03	-325.9E-03
Average	-	-62.1E-03	-291.0E-03	-322.0E-03	-462.2E-03	-478.8E-03	-348.4E-03	-206.1E-03	-265.4E-03	-39.9E-03	11.8E-03	9.9E-03	-447.2E-03
Sigma	-	87.9E-03	19.9E-03	67.1E-03	51.0E-03	66.3E-03	71.0E-03	80.5E-03	62.9E-03	60.5E-03	147.2E-03	92.6E-03	86.1E-03

Hirex Engineering	Total Dose Radiation Test Report							Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors					Issue:	02	

Measurements

CMRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.5	94.5	94.6	94.6	94.5	94.4	94.4	94.4	94.4	94.6	94.5	94.5	94.4
OFF PROTON samples													
30	95.8	96.0	96.1	96.5	96.9	97.9	98.4	99.2	99.9	101.1	101.8	101.8	96.9
32	93.5	93.7	93.8	94.2	94.4	94.9	95.2	96.1	96.5	96.9	96.9	97.4	94.7
39	94.2	94.4	94.4	94.6	94.4	94.4	94.5	95.0	94.7	94.9	94.9	94.7	94.1
Statistics													
Min	93.5	93.7	93.8	94.2	94.4	94.4	94.5	95.0	94.7	94.9	94.9	94.7	94.1
Max	95.8	96.0	96.1	96.5	96.9	97.9	98.4	99.2	99.9	101.1	101.8	101.8	96.9
Average	94.5	94.7	94.8	95.1	95.2	95.7	96.1	96.8	97.1	97.6	97.8	98.0	95.2
Sigma	1.0	1.0	1.0	1.0	1.2	1.6	1.7	1.8	2.2	2.6	2.9	2.9	1.2

Drift Calculation

CMRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	216.4E-03	302.2E-03	647.7E-03	1.0E+00	2.1E+00	2.6E+00	3.3E+00	4.1E+00	5.3E+00	5.9E+00	5.9E+00	1.1E+00
32	-	261.2E-03	355.2E-03	767.9E-03	885.1E-03	1.4E+00	1.8E+00	2.7E+00	3.1E+00	3.4E+00	3.4E+00	3.9E+00	1.2E+00
39	-	178.4E-03	157.7E-03	337.1E-03	148.9E-03	124.1E-03	240.9E-03	715.3E-03	466.7E-03	616.9E-03	639.7E-03	496.5E-03	-100.0E-03
Average	-	218.7E-03	271.7E-03	584.2E-03	691.0E-03	1.2E+00	1.5E+00	2.2E+00	2.6E+00	3.1E+00	3.3E+00	3.4E+00	726.3E-03
Sigma	-	33.8E-03	83.5E-03	181.5E-03	388.5E-03	809.9E-03	977.9E-03	1.1E+00	1.5E+00	1.9E+00	2.2E+00	2.2E+00	587.2E-03

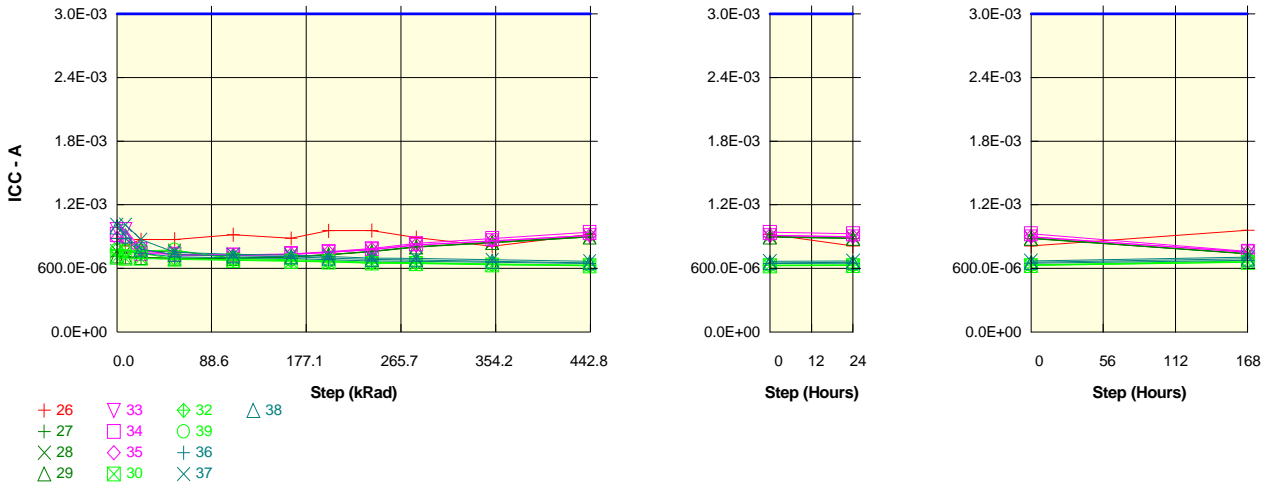
Measurements

CMRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	94.5	94.5	94.6	94.6	94.5	94.4	94.4	94.4	94.4	94.6	94.5	94.5	94.4
OFF TID samples													
36	94.9	94.9	95.1	95.4	95.5	95.9	96.4	96.9	97.6	98.5	98.9	98.4	95.6
37	94.3	94.3	94.5	94.5	94.6	94.5	94.7	95.1	95.1	95.1	95.4	94.8	94.5
38	94.0	94.1	94.2	94.3	94.3	94.5	94.6	95.1	95.1	95.2	95.5	95.4	94.1
Statistics													
Min	94.0	94.1	94.2	94.3	94.3	94.5	94.6	95.1	95.1	95.1	95.4	94.8	94.1
Max	94.9	94.9	95.1	95.4	95.5	95.9	96.4	96.9	97.6	98.5	98.9	98.4	95.6
Average	94.4	94.4	94.6	94.7	94.8	95.0	95.2	95.7	96.0	96.3	96.6	96.2	94.7
Sigma	0.4	0.3	0.4	0.5	0.5	0.7	0.8	0.9	1.2	1.6	1.6	1.6	0.7

Drift Calculation

CMRRDUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	213.6E-03	578.4E-03	680.2E-03	1.0E+00	1.5E+00	2.1E+00	2.8E+00	3.6E+00	4.0E+00	3.5E+00	773.8E-03
37	-	0.0E+00	150.6E-03	127.3E-03	253.3E-03	212.2E-03	389.5E-03	807.4E-03	809.8E-03	757.5E-03	1.1E+00	481.7E-03	157.6E-03
38	-	102.7E-03	199.9E-03	261.3E-03	280.0E-03	455.1E-03	600.3E-03	1.1E+00	1.1E+00	1.2E+00	1.5E+00	1.4E+00	102.1E-03
Average	-	34.2E-03	188.0E-03	322.3E-03	404.5E-03	572.2E-03	845.5E-03	1.3E+00	1.6E+00	1.9E+00	2.2E+00	1.8E+00	344.5E-03
Sigma	-	48.4E-03	27.1E-03	189.2E-03	195.2E-03	351.6E-03	503.3E-03	542.7E-03	859.8E-03	1.2E+00	1.3E+00	1.3E+00	304.4E-03

Parameter : Power Supply Current : ICC
 Test conditions : +VCC=30V. -VCC=GND
 Unit : A
 Spec Limit Max : 3.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	883.0E-06	811.7E-06	870.0E-06	873.2E-06	916.3E-06	882.3E-06	953.4E-06	956.2E-06	889.1E-06	806.8E-06	919.0E-06	809.5E-06	959.4E-06
ON PROTON samples													
27	714.6E-06	711.2E-06	702.5E-06	693.9E-06	693.0E-06	710.2E-06	730.0E-06	759.5E-06	802.2E-06	840.9E-06	893.2E-06	881.5E-06	737.6E-06
28	760.6E-06	752.5E-06	748.7E-06	766.0E-06	694.4E-06	708.6E-06	728.9E-06	758.2E-06	802.0E-06	845.8E-06	900.3E-06	887.9E-06	738.1E-06
29	714.6E-06	705.9E-06	702.4E-06	696.8E-06	691.4E-06	706.7E-06	726.4E-06	754.6E-06	798.6E-06	842.0E-06	894.7E-06	882.2E-06	736.4E-06
Statistics													
Min	714.6E-06	705.9E-06	702.4E-06	693.9E-06	691.4E-06	706.7E-06	726.4E-06	754.6E-06	798.6E-06	840.9E-06	893.2E-06	881.5E-06	736.4E-06
Max	760.6E-06	752.5E-06	748.7E-06	766.0E-06	694.4E-06	710.2E-06	730.0E-06	759.5E-06	802.2E-06	845.8E-06	900.3E-06	887.9E-06	738.1E-06
Average	729.9E-06	723.2E-06	717.9E-06	718.9E-06	693.0E-06	708.5E-06	728.4E-06	757.4E-06	800.9E-06	842.9E-06	896.1E-06	883.9E-06	737.4E-06
Sigma	21.7E-06	20.8E-06	21.8E-06	33.3E-06	1.2E-06	1.4E-06	1.5E-06	2.1E-06	1.7E-06	2.1E-06	3.1E-06	2.9E-06	715.6E-09

Drift Calculation

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-3.4E-06	-12.1E-06	-20.7E-06	-21.6E-06	-4.4E-06	15.4E-06	44.9E-06	87.6E-06	126.3E-06	178.6E-06	166.9E-06	23.0E-06
28	-	-8.1E-06	-11.9E-06	5.4E-06	-66.2E-06	-52.0E-06	-31.7E-06	-2.4E-06	41.4E-06	85.2E-06	139.7E-06	127.4E-06	-22.5E-06
29	-	-8.7E-06	-12.2E-06	-17.8E-06	-23.2E-06	-7.9E-06	11.8E-06	40.0E-06	84.0E-06	127.4E-06	180.1E-06	167.6E-06	21.8E-06
Average	-	-6.7E-06	-12.1E-06	-11.0E-06	-37.0E-06	-21.4E-06	-1.5E-06	27.5E-06	71.0E-06	113.0E-06	166.1E-06	154.0E-06	7.5E-06
Sigma	-	2.4E-06	114.7E-09	11.7E-06	20.7E-06	21.6E-06	21.4E-06	21.2E-06	21.0E-06	19.6E-06	18.7E-06	18.8E-06	21.2E-06

Measurements

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	883.0E-06	811.7E-06	870.0E-06	873.2E-06	916.3E-06	882.3E-06	953.4E-06	956.2E-06	889.1E-06	806.8E-06	919.0E-06	809.5E-06	959.4E-06
ON TID samples													
33	967.1E-06	967.1E-06	776.9E-06	727.0E-06	722.3E-06	732.4E-06	749.8E-06	775.5E-06	817.3E-06	857.6E-06	908.9E-06	896.0E-06	753.0E-06
34	918.7E-06	822.7E-06	739.6E-06	732.3E-06	724.3E-06	736.8E-06	756.6E-06	786.1E-06	832.8E-06	879.5E-06	938.3E-06	925.6E-06	760.2E-06
35	881.1E-06	881.1E-06	770.2E-06	722.2E-06	719.9E-06	730.7E-06	750.3E-06	776.3E-06	819.8E-06	860.4E-06	908.9E-06	898.6E-06	751.8E-06
Statistics													
Min	881.1E-06	822.7E-06	739.6E-06	722.2E-06	719.9E-06	730.7E-06	749.8E-06	775.5E-06	817.3E-06	857.6E-06	908.9E-06	896.0E-06	751.8E-06
Max	967.1E-06	967.1E-06	776.9E-06	732.3E-06	724.3E-06	736.8E-06	756.6E-06	786.1E-06	832.8E-06	879.5E-06	938.3E-06	925.6E-06	760.2E-06
Average	922.3E-06	890.3E-06	762.2E-06	727.2E-06	722.2E-06	733.3E-06	752.3E-06	779.3E-06	823.3E-06	865.8E-06	918.7E-06	906.7E-06	755.0E-06
Sigma	35.2E-06	59.3E-06	16.2E-06	4.1E-06	1.8E-06	2.6E-06	3.1E-06	4.8E-06	6.8E-06	9.7E-06	13.9E-06	13.4E-06	3.7E-06

Drift Calculation

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	-190.3E-06	-240.2E-06	-244.8E-06	-234.8E-06	-217.3E-06	-191.6E-06	-149.8E-06	-109.6E-06	-58.2E-06	-71.1E-06	-214.1E-06
34	-	-96.0E-06	-179.1E-06	-186.3E-06	-194.4E-06	-181.8E-06	-162.0E-06	-132.6E-06	-85.9E-06	-39.2E-06	19.7E-06	7.0E-06	-158.5E-06
35	-	0.0E+00	-110.9E-06	-158.9E-06	-161.2E-06	-150.4E-06	-130.8E-06	-104.8E-06	-61.2E-06	-20.7E-06	27.8E-06	17.5E-06	-129.2E-06
Average	-	-32.0E-06	-160.1E-06	-195.1E-06	-200.1E-06	-189.0E-06	-170.0E-06	-143.0E-06	-99.0E-06	-56.5E-06	-3.6E-06	-15.5E-06	-167.3E-06
Sigma	-	45.2E-06	35.1E-06	33.8E-06	34.4E-06	34.8E-06	35.8E-06	36.2E-06	37.3E-06	38.3E-06	38.8E-06	39.5E-06	35.2E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02		

Measurements

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	883.0E-06	811.7E-06	870.0E-06	873.2E-06	916.3E-06	882.3E-06	953.4E-06	956.2E-06	889.1E-06	806.8E-06	919.0E-06	809.5E-06	959.4E-06
OFF PROTON samples													
30	703.7E-06	696.7E-06	693.3E-06	684.1E-06	674.2E-06	665.6E-06	658.8E-06	647.4E-06	644.7E-06	631.5E-06	623.1E-06	626.1E-06	655.9E-06
32	776.4E-06	770.6E-06	741.9E-06	688.7E-06	681.3E-06	671.8E-06	663.4E-06	651.3E-06	649.6E-06	636.2E-06	626.3E-06	629.3E-06	659.6E-06
39	772.9E-06	764.1E-06	763.3E-06	771.3E-06	689.5E-06	680.6E-06	671.1E-06	656.9E-06	654.1E-06	640.6E-06	629.3E-06	633.0E-06	669.4E-06
Statistics													
Min	703.7E-06	696.7E-06	693.3E-06	684.1E-06	674.2E-06	665.6E-06	658.8E-06	647.4E-06	644.7E-06	631.5E-06	623.1E-06	626.1E-06	655.9E-06
Max	776.4E-06	770.6E-06	763.3E-06	771.3E-06	689.5E-06	680.6E-06	671.1E-06	656.9E-06	654.1E-06	640.6E-06	629.3E-06	633.0E-06	669.4E-06
Average	751.0E-06	743.8E-06	732.9E-06	714.7E-06	681.7E-06	672.7E-06	664.4E-06	651.9E-06	649.5E-06	636.1E-06	626.2E-06	629.4E-06	661.6E-06
Sigma	33.5E-06	33.4E-06	29.3E-06	40.1E-06	6.3E-06	6.2E-06	5.0E-06	3.9E-06	3.8E-06	3.7E-06	2.6E-06	2.8E-06	5.7E-06

Drift Calculation

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-7.0E-06	-10.4E-06	-19.6E-06	-29.5E-06	-38.1E-06	-44.9E-06	-56.3E-06	-59.0E-06	-72.2E-06	-80.6E-06	-77.6E-06	-47.8E-06
32	-	-5.8E-06	-34.5E-06	-87.7E-06	-95.1E-06	-104.6E-06	-113.0E-06	-125.2E-06	-126.8E-06	-140.3E-06	-150.2E-06	-147.1E-06	-116.8E-06
39	-	-8.8E-06	-9.7E-06	-1.6E-06	-83.4E-06	-92.3E-06	-101.9E-06	-116.0E-06	-118.8E-06	-132.3E-06	-143.6E-06	-140.0E-06	-103.5E-06
Average	-	-7.2E-06	-18.2E-06	-36.3E-06	-69.3E-06	-78.3E-06	-86.6E-06	-99.2E-06	-101.5E-06	-114.9E-06	-124.8E-06	-121.6E-06	-89.4E-06
Sigma	-	1.2E-06	11.5E-06	37.1E-06	28.5E-06	28.9E-06	29.8E-06	30.5E-06	30.3E-06	30.4E-06	31.3E-06	31.2E-06	29.9E-06

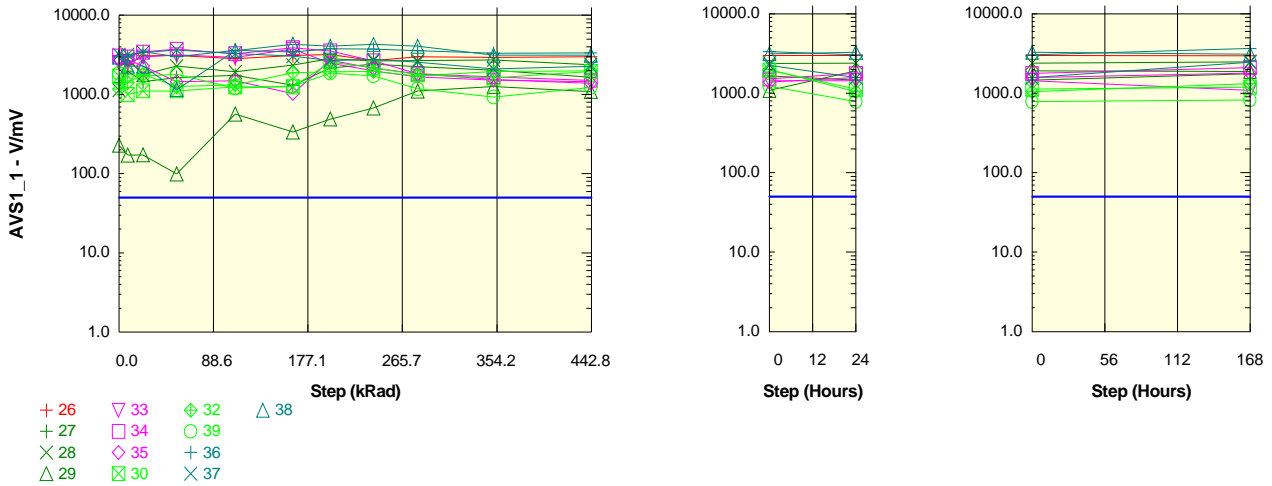
Measurements

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	883.0E-06	811.7E-06	870.0E-06	873.2E-06	916.3E-06	882.3E-06	953.4E-06	956.2E-06	889.1E-06	806.8E-06	919.0E-06	809.5E-06	959.4E-06
OFF TID samples													
36	877.8E-06	877.8E-06	741.6E-06	707.3E-06	698.8E-06	692.2E-06	682.9E-06	669.8E-06	667.5E-06	655.5E-06	643.5E-06	647.0E-06	673.3E-06
37	1.0E-03	1.0E-03	869.1E-06	749.8E-06	731.6E-06	722.7E-06	711.3E-06	696.2E-06	692.2E-06	679.8E-06	666.1E-06	669.8E-06	702.8E-06
38	987.4E-06	903.8E-06	780.2E-06	729.4E-06	716.4E-06	707.2E-06	696.3E-06	683.5E-06	678.3E-06	666.2E-06	652.8E-06	656.0E-06	687.7E-06
Statistics													
Min	877.8E-06	877.8E-06	741.6E-06	707.3E-06	698.8E-06	692.2E-06	682.9E-06	669.8E-06	667.5E-06	655.5E-06	643.5E-06	647.0E-06	673.3E-06
Max	1.0E-03	1.0E-03	869.1E-06	749.8E-06	731.6E-06	722.7E-06	711.3E-06	696.2E-06	692.2E-06	679.8E-06	666.1E-06	669.8E-06	702.8E-06
Average	958.1E-06	930.2E-06	797.0E-06	728.9E-06	715.6E-06	707.4E-06	696.8E-06	683.2E-06	679.4E-06	667.2E-06	654.1E-06	657.6E-06	687.9E-06
Sigma	57.4E-06	56.7E-06	53.4E-06	17.3E-06	13.4E-06	12.5E-06	11.6E-06	10.8E-06	10.1E-06	10.0E-06	9.2E-06	9.4E-06	12.1E-06

Drift Calculation

ICC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-136.2E-06	-170.4E-06	-179.0E-06	-185.6E-06	-194.9E-06	-208.0E-06	-210.2E-06	-222.3E-06	-234.3E-06	-230.8E-06	-204.5E-06
37	-	0.0E+00	-139.9E-06	-259.2E-06	-277.4E-06	-286.3E-06	-297.7E-06	-312.8E-06	-316.8E-06	-329.2E-06	-342.9E-06	-339.2E-06	-306.2E-06
38	-	-83.6E-06	-207.2E-06	-257.9E-06	-270.9E-06	-280.2E-06	-291.1E-06	-303.8E-06	-309.0E-06	-321.2E-06	-334.6E-06	-331.4E-06	-299.7E-06
Average	-	-27.9E-06	-161.1E-06	-229.2E-06	-242.4E-06	-250.7E-06	-261.2E-06	-274.9E-06	-278.7E-06	-290.9E-06	-303.9E-06	-300.5E-06	-270.1E-06
Sigma	-	39.4E-06	32.6E-06	41.5E-06	45.0E-06	46.1E-06	47.0E-06	47.4E-06	48.5E-06	48.6E-06	49.4E-06	49.3E-06	46.5E-06

Parameter : Voltage Gain : AVS1_1DUTA
 Test conditions : +VCC=30V. -VCC=GND. 1V<Vout<26V. RL=10K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	3121.9	2391.9	3074.3	3126.6	2825.0	3104.8	3199.2	2696.4	2996.0	2933.9	3012.0	2996.0	2980.3
ON_PROTON samples													
27	1416.5	1968.1	1453.0	1636.1	1757.7	1314.3	2167.7	2411.2	2254.3	2030.3	1650.9	1470.8	1758.4
28	1138.4	2815.3	1785.7	2281.9	1927.2	2345.3	2822.1	2662.6	2677.0	2735.5	2381.2	2409.6	2497.6
29	229.3	173.1	173.6	100.5	567.3	337.8	490.8	676.9	1106.7	1262.2	1090.6	1926.0	1881.5
Statistics													
Min	229.3	173.1	173.6	100.5	567.3	337.8	490.8	676.9	1106.7	1262.2	1090.6	1470.8	1758.4
Max	1416.5	2815.3	1785.7	2281.9	1927.2	2345.3	2822.1	2662.6	2677.0	2735.5	2381.2	2409.6	2497.6
Average	928.1	1652.2	1137.4	1339.5	1417.4	1332.5	1826.9	1916.9	2012.7	2009.3	1707.6	1935.5	2045.8
Sigma	507.0	1101.6	695.0	914.9	605.1	819.7	981.8	882.8	663.4	601.7	528.4	383.3	323.4

Drift Calculation

AVS1_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	551.6E+00	36.6E+00	219.6E+00	341.3E+00	-102.1E+00	751.2E+00	994.7E+00	837.8E+00	613.8E+00	234.4E+00	54.3E+00	341.9E+00
28	-	1.7E+03	647.3E+00	1.1E+03	788.8E+00	1.2E+03	1.7E+03	1.5E+03	1.6E+03	1.6E+03	1.2E+03	1.3E+03	1.4E+03
29	-	-56.1E+00	-55.7E+00	-128.8E+00	338.0E+00	108.5E+00	261.5E+00	447.7E+00	877.4E+00	1.0E+03	861.3E+00	1.7E+03	1.7E+03
Average	-	724.1E+00	209.4E+00	411.4E+00	489.4E+00	404.4E+00	898.8E+00	988.8E+00	1.1E+03	1.1E+03	779.5E+00	1.0E+03	1.1E+03
Sigma	-	717.9E+00	311.9E+00	536.8E+00	211.7E+00	573.9E+00	589.9E+00	439.5E+00	321.4E+00	402.9E+00	415.7E+00	696.0E+00	561.5E+00

Measurements

AVS1_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	3121.9	2391.9	3074.3	3126.6	2825.0	3104.8	3199.2	2696.4	2996.0	2933.9	3012.0	2996.0	2980.3
ON_TID samples													
33	2520.2	2520.2	2980.4	3171.0	2942.2	3747.1	2494.5	1993.8	1670.4	1518.1	1448.2	1440.8	1094.3
34	3063.7	2976.2	3434.1	3734.4	3276.4	3905.4	3539.1	2671.0	1826.6	1675.3	1514.0	1775.1	2111.3
35	2748.5	2748.5	2281.0	1453.5	1490.8	1034.9	2709.4	2144.9	1844.5	1542.9	1384.5	1581.7	1803.2
Statistics													
Min	2520.2	2520.2	2281.0	1453.5	1490.8	1034.9	2494.5	1993.8	1670.4	1518.1	1384.5	1440.8	1094.3
Max	3063.7	2976.2	3434.1	3734.4	3276.4	3905.4	3539.1	2671.0	1844.5	1675.3	1514.0	1775.1	2111.3
Average	2777.4	2748.3	2898.5	2786.3	2569.8	2895.8	2914.3	2269.9	1780.5	1578.8	1448.9	1599.2	1669.6
Sigma	222.9	186.2	474.3	970.1	775.1	1317.4	450.4	290.2	78.2	69.0	52.9	137.0	425.8

Drift Calculation

AVS1_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	460.3E+00	650.8E+00	422.1E+00	1.2E+03	-25.7E+00	-526.3E+00	-849.8E+00	-1.0E+03	-1.1E+03	-1.1E+03	-1.4E+03
34	-	-87.5E+00	370.3E+00	670.7E+00	212.7E+00	841.7E+00	475.3E+00	-392.7E+00	-1.2E+03	-1.4E+03	-1.5E+03	-1.3E+03	-952.5E+00
35	-	0.0E+00	-467.4E+00	-1.3E+03	-1.3E+03	-1.7E+03	-39.1E+00	-603.6E+00	-904.0E+00	-1.2E+03	-1.4E+03	-1.2E+03	-945.2E+00
Average	-	-29.2E+00	121.1E+00	8.8E+00	-207.6E+00	118.4E+00	136.9E+00	-507.5E+00	-997.0E+00	-1.2E+03	-1.3E+03	-1.2E+03	-1.1E+03
Sigma	-	41.3E+00	417.7E+00	922.0E+00	747.4E+00	1.3E+03	239.4E+00	87.1E+00	171.2E+00	157.8E+00	196.6E+00	85.8E+00	224.9E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS1_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	3121.9	2391.9	3074.3	3126.6	2825.0	3104.8	3199.2	2696.4	2996.0	2933.9	3012.0	2996.0	2980.3
OFF_PROTON samples													
30	1704.2	1001.6	1111.8	1112.6	1253.9	1253.7	2566.6	2177.9	1769.5	1617.9	1959.8	1132.5	1194.4
32	1169.8	1414.0	1790.8	1254.5	1329.0	1875.6	1944.7	1961.9	1715.9	1952.6	1993.4	1048.6	1322.5
39	1847.9	1801.2	1716.7	1806.5	1206.5	1273.1	1859.9	1715.9	1179.7	928.3	1226.0	786.5	826.0
Statistics													
Min	1169.8	1001.6	1111.8	1112.6	1206.5	1253.7	1859.9	1715.9	1179.7	928.3	1226.0	786.5	826.0
Max	1847.9	1801.2	1790.8	1806.5	1329.0	1875.6	2566.6	2177.9	1769.5	1952.6	1993.4	1132.5	1322.5
Average	1573.9	1405.6	1539.8	1391.2	1263.1	1467.5	2123.7	1951.9	1555.0	1499.6	1726.4	989.2	1114.3
Sigma	291.7	326.5	304.1	299.3	50.4	288.7	315.1	188.7	266.3	426.5	354.1	147.4	210.5

Drift Calculation

AVS1_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-702.6E+00	-592.3E+00	-591.5E+00	-450.3E+00	-450.4E+00	862.4E+00	473.7E+00	65.4E+00	-86.3E+00	255.6E+00	-571.7E+00	-509.8E+00
32	-	244.2E+00	621.0E+00	84.7E+00	159.2E+00	705.8E+00	774.9E+00	792.1E+00	546.1E+00	782.8E+00	823.6E+00	-121.2E+00	152.7E+00
39	-	-46.7E+00	-131.1E+00	-41.3E+00	-641.4E+00	-574.8E+00	12.0E+00	-132.0E+00	-668.2E+00	-919.6E+00	-621.9E+00	-1.1E+03	-1.0E+03
Average	-	-168.3E+00	-34.1E+00	-182.7E+00	-310.8E+00	-106.4E+00	549.8E+00	378.0E+00	-18.9E+00	-74.4E+00	152.4E+00	-584.8E+00	-459.7E+00
Sigma	-	396.0E+00	500.1E+00	293.6E+00	341.4E+00	576.6E+00	381.9E+00	383.3E+00	499.3E+00	695.1E+00	594.6E+00	384.0E+00	480.8E+00

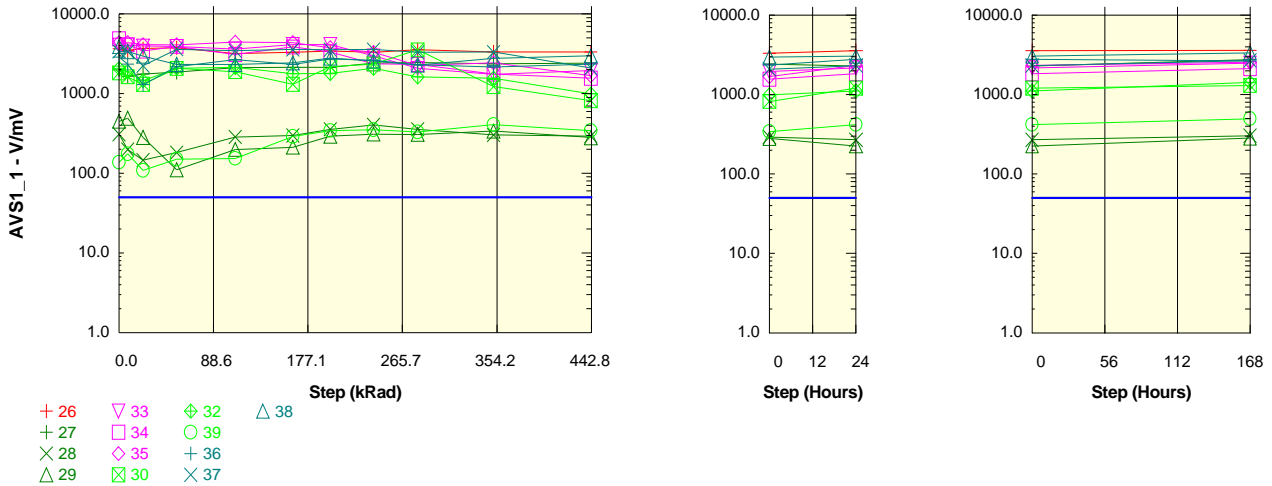
Measurements

AVS1_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	3121.9	2391.9	3074.3	3126.6	2825.0	3104.8	3199.2	2696.4	2996.0	2933.9	3012.0	2996.0	2980.3
OFF_TID samples													
36	2999.0	2999.0	3475.8	3006.4	3622.2	3459.8	3782.9	3743.0	3578.0	3307.8	3359.3	3044.7	3679.7
37	3188.8	3188.8	3398.6	3655.0	3292.9	3060.8	2683.6	2782.9	2573.9	2097.2	2258.3	1572.9	2462.0
38	2953.7	2292.1	2290.2	1153.1	3582.4	4322.5	4078.3	4292.1	4078.0	3145.8	3145.8	3265.0	3102.8
Statistics													
Min	2953.7	2292.1	2290.2	1153.1	3292.9	3060.8	2683.6	2782.9	2573.9	2097.2	2258.3	1572.9	2462.0
Max	3188.8	3188.8	3475.8	3655.0	3622.2	4322.5	4078.3	4292.1	4078.0	3307.8	3359.3	3265.0	3679.7
Average	3047.2	2826.6	3054.9	2604.9	3499.2	3614.4	3514.9	3606.0	3410.0	2850.3	2921.2	2627.5	3081.5
Sigma	101.8	385.8	541.6	1060.1	146.7	526.6	600.1	623.7	625.5	536.6	476.7	751.1	497.4

Drift Calculation

AVS1_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	476.8E+00	7.4E+00	623.2E+00	460.7E+00	783.8E+00	744.0E+00	579.0E+00	308.8E+00	360.3E+00	45.6E+00	680.7E+00
37	-	0.0E+00	209.8E+00	466.2E+00	104.2E+00	-128.0E+00	-505.1E+00	-405.9E+00	-614.9E+00	-1.1E+03	-930.4E+00	-1.6E+03	-726.8E+00
38	-	-661.6E+00	-663.5E+00	-1.8E+03	628.7E+00	1.4E+03	1.1E+03	1.3E+03	1.1E+03	192.1E+00	192.1E+00	311.3E+00	149.1E+00
Average	-	-220.5E+00	7.7E+00	-442.3E+00	452.0E+00	567.2E+00	467.8E+00	558.8E+00	362.8E+00	-196.9E+00	-126.0E+00	-419.6E+00	34.3E+00
Sigma	-	311.9E+00	487.0E+00	978.5E+00	246.0E+00	615.7E+00	701.9E+00	724.0E+00	726.3E+00	634.4E+00	572.9E+00	852.8E+00	580.3E+00

Parameter : Voltage Gain : AVS1_1DUTB
 Test conditions : +VCC=30V. -VCC=GND. 1V<Vout<26V. RL=10K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	3655.0	3491.6	3676.5	3765.1	3171.2	3316.4	3431.8	3311.4	3561.3	3350.6	3330.9	3583.9	3606.7
ON_PROTON samples													
27	1991.2	1653.4	1767.4	1855.5	2126.6	2130.7	2141.3	2405.6	2467.1	2374.4	2418.8	2292.2	2756.8
28	309.4	199.2	147.6	183.0	285.9	299.1	356.8	405.2	357.5	303.3	294.3	270.6	304.2
29	450.1	492.9	283.6	111.6	200.0	212.9	292.7	311.0	308.7	339.3	281.2	226.1	283.9
Statistics													
Min	309.4	199.2	147.6	111.6	200.0	212.9	292.7	311.0	308.7	303.3	281.2	226.1	283.9
Max	1991.2	1653.4	1767.4	1855.5	2126.6	2130.7	2141.3	2405.6	2467.1	2374.4	2418.8	2292.2	2756.8
Average	916.9	781.9	732.9	716.7	870.8	880.9	930.3	1040.6	1044.4	1005.6	998.1	929.6	1115.0
Sigma	761.8	627.9	733.7	805.8	888.7	884.4	856.7	966.0	1006.2	968.0	1004.6	963.7	1161.0

Drift Calculation

AVS1_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-337.7E+00	-223.7E+00	-135.7E+00	135.4E+00	139.5E+00	150.1E+00	414.5E+00	475.9E+00	383.2E+00	427.6E+00	301.0E+00	765.6E+00
28	-	-110.2E+00	-161.8E+00	-126.4E+00	-23.5E+00	-10.3E+00	47.4E+00	95.8E+00	48.1E+00	-6.1E+00	-15.1E+00	-38.8E+00	-5.2E+00
29	-	42.8E+00	-166.5E+00	-338.5E+00	-250.1E+00	-237.2E+00	-157.4E+00	-139.1E+00	-141.4E+00	-110.9E+00	-168.9E+00	-224.1E+00	-166.2E+00
Average	-	-135.0E+00	-184.0E+00	-200.2E+00	-46.1E+00	-36.0E+00	13.4E+00	123.7E+00	127.5E+00	88.7E+00	81.2E+00	12.7E+00	198.1E+00
Sigma	-	156.3E+00	28.1E+00	97.9E+00	158.2E+00	154.9E+00	127.8E+00	226.9E+00	258.2E+00	212.6E+00	252.9E+00	217.4E+00	406.7E+00

Measurements

AVS1_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	3655.0	3491.6	3676.5	3765.1	3171.2	3316.4	3431.8	3311.4	3561.3	3350.6	3330.9	3583.9	3606.7
ON_TID samples													
33	4047.9	4047.9	3955.7	3911.4	3622.2	4131.9	4133.2	2980.3	2074.2	1758.5	1952.6	2161.3	2497.6
34	4879.0	4111.9	3414.0	3928.3	3104.8	3852.3	3350.6	2369.2	2320.7	1764.0	1564.2	1832.5	2133.2
35	4364.5	4364.5	4122.7	4094.6	4439.4	4392.1	3750.0	3292.2	2274.1	2440.7	1685.3	2349.6	2551.5
Statistics													
Min	4047.9	4047.9	3414.0	3911.4	3104.8	3852.3	3350.6	2369.2	2074.2	1758.5	1564.2	1832.5	2133.2
Max	4879.0	4364.5	4122.7	4094.6	4439.4	4392.1	4133.2	3292.2	2320.7	2440.7	1952.6	2349.6	2551.5
Average	4430.5	4174.8	3830.8	3978.1	3722.1	4125.5	3744.6	2880.6	2223.0	1987.8	1734.0	2114.5	2394.1
Sigma	342.5	136.7	302.5	82.6	549.4	220.4	319.5	383.3	106.9	320.3	162.3	213.7	185.8

Drift Calculation

AVS1_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-92.2E+00	-136.5E+00	-425.7E+00	84.0E+00	85.2E+00	-1.1E+03	-2.0E+03	-2.3E+03	-2.1E+03	-1.9E+03	-1.6E+03
34	-	-767.1E+00	-1.5E+03	-950.6E+00	-1.8E+03	-1.0E+03	-1.5E+03	-2.5E+03	-2.6E+03	-3.1E+03	-3.3E+03	-3.0E+03	-2.7E+03
35	-	0.0E+00	-241.8E+00	-270.0E+00	74.9E+00	27.6E+00	-614.6E+00	-1.1E+03	-2.1E+03	-1.9E+03	-2.7E+03	-2.0E+03	-1.8E+03
Average	-	-255.7E+00	-599.7E+00	-452.4E+00	-708.3E+00	-305.0E+00	-685.9E+00	-1.5E+03	-2.2E+03	-2.4E+03	-2.7E+03	-2.3E+03	-2.0E+03
Sigma	-	361.6E+00	614.9E+00	356.5E+00	780.9E+00	510.8E+00	660.7E+00	678.7E+00	252.6E+00	498.2E+00	498.0E+00	519.1E+00	513.0E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS1_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	3655.0	3491.6	3676.5	3765.1	3171.2	3316.4	3431.8	3311.4	3561.3	3350.6	3330.9	3583.9	3606.7
OFF_PROTON samples													
30	1823.7	1630.0	1310.5	2080.2	1891.6	1310.3	2179.6	2359.4	3539.0	1231.0	820.7	1204.8	1304.2
32	2082.5	1876.9	1456.9	2094.6	2140.9	1778.1	1791.7	2073.9	1617.9	1572.9	993.4	1110.3	1423.9
39	138.5	176.7	109.6	151.4	154.8	291.7	344.7	352.6	330.4	410.3	343.7	420.6	498.5
Statistics													
Min	138.5	176.7	109.6	151.4	154.8	291.7	344.7	352.6	330.4	410.3	343.7	420.6	498.5
Max	2082.5	1876.9	1456.9	2094.6	2140.9	1778.1	2179.6	2359.4	3539.0	1572.9	993.4	1204.8	1423.9
Average	1348.2	1227.8	959.0	1442.1	1395.8	1126.7	1438.6	1595.3	1829.1	1071.4	719.3	911.9	1075.5
Sigma	861.9	750.1	603.6	912.7	883.4	620.6	789.6	886.4	1318.4	487.9	274.7	349.5	411.0

Drift Calculation

AVS1_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-193.7E+00	-513.2E+00	256.5E+00	67.9E+00	-513.4E+00	355.9E+00	535.7E+00	1.7E+03	-592.7E+00	-1.0E+03	-618.9E+00	-519.4E+00
32	-	-205.6E+00	-625.6E+00	12.2E+00	58.5E+00	-304.3E+00	-290.8E+00	-8.6E+00	-464.6E+00	-509.5E+00	-1.1E+03	-972.2E+00	-658.6E+00
39	-	38.2E+00	-28.8E+00	12.9E+00	16.4E+00	153.2E+00	206.2E+00	214.1E+00	191.9E+00	271.8E+00	205.3E+00	282.2E+00	360.0E+00
Average	-	-120.3E+00	-389.2E+00	93.9E+00	47.6E+00	-221.5E+00	90.5E+00	247.1E+00	480.9E+00	-276.8E+00	-628.9E+00	-436.3E+00	-272.7E+00
Sigma	-	112.2E+00	258.9E+00	115.0E+00	22.4E+00	278.4E+00	276.4E+00	223.4E+00	913.1E+00	389.4E+00	590.9E+00	528.1E+00	451.0E+00

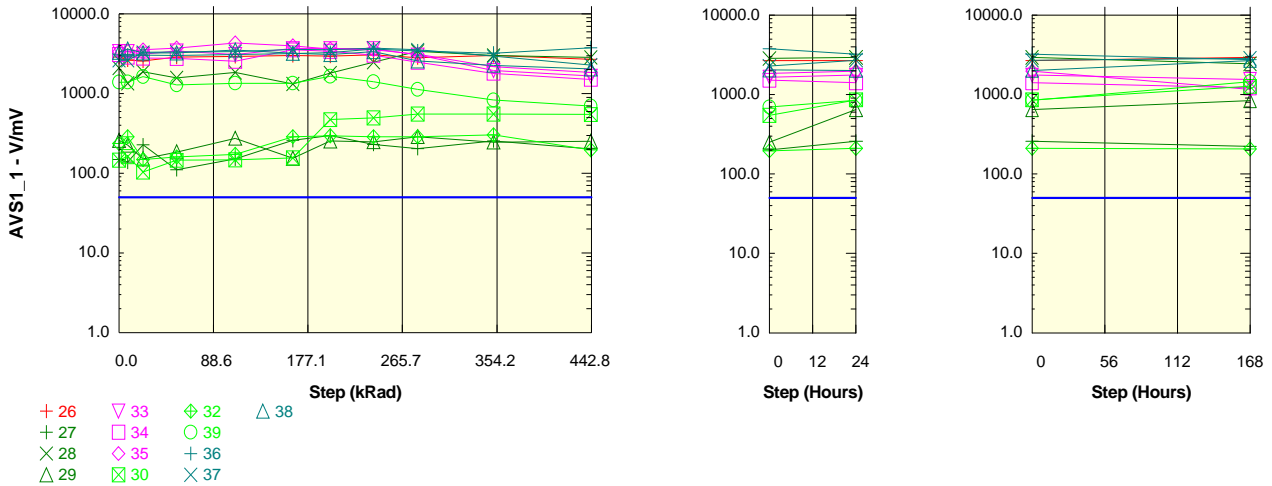
Measurements

AVS1_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	3655.0	3491.6	3676.5	3765.1	3171.2	3316.4	3431.8	3311.4	3561.3	3350.6	3330.9	3583.9	3606.7
OFF_TID samples													
36	2863.0	2363.0	1296.7	2180.7	2672.1	2327.2	2723.7	2618.0	2307.8	2156.0	2359.4	2775.1	2662.6
37	3383.9	3383.9	2240.9	3612.7	3461.9	3584.3	3555.9	3582.9	3291.9	3325.8	2097.2	2324.5	2696.0
38	3879.6	3363.8	2962.1	2324.2	2319.8	2434.6	2791.7	2579.5	2283.1	2775.1	2980.2	3044.7	3362.5
Statistics													
Min	2863.0	2363.0	1296.7	2180.7	2319.8	2327.2	2723.7	2579.5	2283.1	2156.0	2097.2	2324.5	2662.6
Max	3879.6	3383.9	2962.1	3612.7	3461.9	3584.3	3555.9	3582.9	3291.9	3325.8	2980.2	3044.7	3362.5
Average	3375.5	3036.9	2166.6	2705.9	2818.0	2782.0	3023.8	2926.8	2627.6	2752.3	2479.0	2714.8	2907.0
Sigma	415.0	476.6	681.9	643.9	477.5	569.0	377.3	464.2	469.8	477.8	370.3	297.1	322.3

Drift Calculation

AVS1_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	-500.0E+00	-1.6E+03	-682.3E+00	-190.9E+00	-535.8E+00	-139.3E+00	-245.0E+00	-555.2E+00	-707.0E+00	-503.6E+00	-87.9E+00	-200.5E+00
37	-	0.0E+00	-1.1E+03	228.8E+00	78.0E+00	200.4E+00	172.0E+00	199.0E+00	-92.0E+00	-58.0E+00	-1.3E+03	-1.1E+03	-687.9E+00
38	-	-515.7E+00	-917.5E+00	-1.6E+03	-1.6E+03	-1.4E+03	-1.1E+03	-1.3E+03	-1.6E+03	-1.1E+03	-899.3E+00	-834.9E+00	-517.1E+00
Average	-	-338.6E+00	-1.2E+03	-669.6E+00	-557.5E+00	-593.5E+00	-351.7E+00	-448.7E+00	-747.9E+00	-623.2E+00	-896.5E+00	-660.7E+00	-468.5E+00
Sigma	-	239.5E+00	269.0E+00	728.5E+00	717.1E+00	672.9E+00	535.9E+00	628.7E+00	629.1E+00	431.3E+00	319.7E+00	415.3E+00	201.9E+00

Parameter : Voltage Gain : AVS1_1DUTC
 Test conditions : +VCC=30V. -VCC=GND. 1V<Vout<26V. RL=10K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2865.7	2655.1	2568.8	2864.3	2926.4	3012.9	2964.7	3077.4	2831.2	3012.0	2696.4	2696.4	2933.9
ON_PROTON samples													
27	149.8	139.1	227.7	112.2	153.4	259.8	299.1	232.5	205.6	256.7	203.0	258.4	224.0
28	2104.4	1347.0	1890.8	1578.7	1850.0	1325.2	1810.3	2488.2	3392.9	3028.1	2859.4	2945.9	2444.7
29	260.6	227.3	153.2	186.4	276.4	155.7	255.2	250.2	289.6	247.7	253.0	646.0	839.7
Statistics													
Min	149.8	139.1	153.2	112.2	153.4	155.7	255.2	232.5	205.6	247.7	203.0	258.4	224.0
Max	2104.4	1347.0	1890.8	1578.7	1850.0	1325.2	1810.3	2488.2	3392.9	3028.1	2859.4	2945.9	2444.7
Average	838.3	571.1	757.2	625.7	759.9	580.2	788.2	990.3	1296.0	1177.5	1105.1	1283.5	1169.4
Sigma	896.4	549.8	802.1	674.5	772.4	528.5	723.0	1059.2	1483.1	1308.6	1240.6	1186.1	936.1

Drift Calculation

AVS1_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-10.7E+00	77.9E+00	-37.6E+00	3.6E+00	110.0E+00	149.3E+00	82.7E+00	55.8E+00	106.9E+00	53.1E+00	108.6E+00	74.2E+00
28	-	-757.4E+00	-213.6E+00	-525.7E+00	-254.4E+00	-779.2E+00	-294.1E+00	383.8E+00	1.3E+03	923.7E+00	755.0E+00	841.5E+00	340.3E+00
29	-	-33.4E+00	-107.4E+00	-74.3E+00	15.8E+00	-105.0E+00	-5.5E+00	-10.4E+00	28.9E+00	-12.9E+00	-7.6E+00	385.4E+00	579.1E+00
Average	-	-267.1E+00	-81.1E+00	-212.5E+00	-78.3E+00	-258.1E+00	-50.1E+00	152.1E+00	457.7E+00	339.2E+00	266.8E+00	445.2E+00	331.2E+00
Sigma	-	346.8E+00	120.5E+00	221.9E+00	124.6E+00	378.8E+00	183.7E+00	168.2E+00	587.5E+00	416.2E+00	346.1E+00	302.2E+00	206.2E+00

Measurements

AVS1_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2865.7	2655.1	2568.8	2864.3	2926.4	3012.9	2964.7	3077.4	2831.2	3012.0	2696.4	2696.4	2933.9
ON_TID samples													
33	3378.4	3378.4	3144.3	3428.1	3101.4	3689.1	3676.9	3653.2	3060.8	1952.6	1660.6	1758.5	1561.3
34	3111.0	2877.5	2793.9	2787.0	2559.8	3543.5	3392.8	3044.4	2472.7	1803.4	1514.0	1408.6	1217.3
35	3360.2	3360.2	3551.1	3738.0	4335.1	3995.1	3647.7	3573.8	3128.5	2194.8	1844.5	1979.9	1163.4
Statistics													
Min	3111.0	2877.5	2793.9	2787.0	2559.8	3543.5	3392.8	3044.4	2472.7	1803.4	1514.0	1408.6	1163.4
Max	3378.4	3378.4	3551.1	3738.0	4335.1	3995.1	3676.9	3653.2	3128.5	2194.8	1844.5	1979.9	1561.3
Average	3283.2	3205.4	3163.1	3317.7	3332.1	3742.6	3572.5	3423.8	2887.3	1983.6	1673.0	1715.7	1314.0
Sigma	122.0	231.9	309.4	396.0	742.9	188.2	127.6	270.2	294.5	161.3	135.2	235.2	176.3

Drift Calculation

AVS1_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-234.1E+00	49.7E+00	-277.0E+00	310.7E+00	298.6E+00	274.8E+00	-317.6E+00	-1.4E+03	-1.7E+03	-1.6E+03	-1.8E+03
34	-	-233.5E+00	-317.1E+00	-324.0E+00	-551.2E+00	432.5E+00	281.8E+00	-66.6E+00	-638.3E+00	-1.3E+03	-1.6E+03	-1.7E+03	-1.9E+03
35	-	0.0E+00	190.9E+00	377.8E+00	974.9E+00	634.9E+00	287.5E+00	213.6E+00	-231.7E+00	-1.2E+03	-1.5E+03	-1.4E+03	-2.2E+03
Average	-	-77.8E+00	-120.1E+00	34.5E+00	48.9E+00	459.4E+00	289.3E+00	140.6E+00	-395.9E+00	-1.3E+03	-1.6E+03	-1.6E+03	-2.0E+03
Sigma	-	110.1E+00	222.5E+00	286.7E+00	664.3E+00	133.7E+00	7.0E+00	148.6E+00	175.0E+00	106.4E+00	83.0E+00	136.6E+00	164.0E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS1_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2865.7	2655.1	2568.8	2864.3	2926.4	3012.9	2964.7	3077.4	2831.2	3012.0	2696.4	2696.4	2933.9
OFF_PROTON samples													
30	147.4	163.4	104.6	146.8	148.7	157.1	473.9	497.2	555.6	555.6	548.6	858.0	1273.1
32	237.2	287.8	149.6	161.1	173.6	289.8	296.4	287.5	288.9	304.8	197.5	211.2	208.7
39	1389.5	1398.2	1637.1	1283.1	1352.9	1355.7	1645.8	1415.6	1132.5	832.7	699.1	845.1	1452.8
Statistics													
Min	147.4	163.4	104.6	146.8	148.7	157.1	296.4	287.5	288.9	304.8	197.5	211.2	208.7
Max	1389.5	1398.2	1637.1	1283.1	1352.9	1355.7	1645.8	1415.6	1132.5	832.7	699.1	858.0	1452.8
Average	591.4	616.5	630.4	530.3	558.4	600.9	805.4	733.4	659.0	564.4	481.7	638.1	978.2
Sigma	565.6	555.1	712.1	532.3	561.9	536.5	598.7	489.9	352.1	215.6	210.1	301.9	549.0

Drift Calculation

AVS1_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	16.1E+00	-42.8E+00	-603.5E-03	1.3E+00	9.7E+00	326.5E+00	349.8E+00	408.2E+00	408.2E+00	401.2E+00	710.6E+00	1.1E+03
32	-	50.6E+00	-87.6E+00	-76.1E+00	-63.6E+00	52.6E+00	59.2E+00	50.3E+00	51.8E+00	67.6E+00	-39.7E+00	-26.0E+00	-28.5E+00
39	-	8.7E+00	247.6E+00	-106.4E+00	-36.6E+00	-33.8E+00	256.3E+00	26.1E+00	-257.0E+00	-556.8E+00	-690.4E+00	-544.4E+00	63.3E+00
Average	-	25.1E+00	39.1E+00	-61.0E+00	-33.0E+00	9.5E+00	214.0E+00	142.1E+00	67.7E+00	-27.0E+00	-109.6E+00	46.7E+00	386.8E+00
Sigma	-	18.2E+00	148.6E+00	44.5E+00	26.6E+00	35.2E+00	113.2E+00	147.2E+00	271.8E+00	399.6E+00	448.4E+00	514.9E+00	523.8E+00

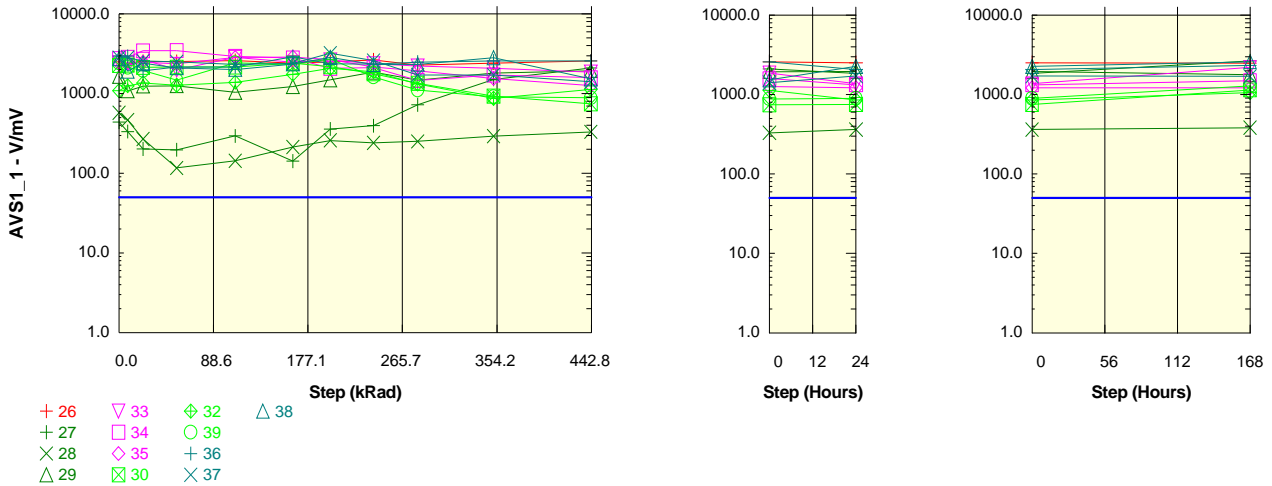
Measurements

AVS1_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2865.7	2655.1	2568.8	2864.3	2926.4	3012.9	2964.7	3077.4	2831.2	3012.0	2696.4	2696.4	2933.9
OFF_TID samples													
36	3063.7	3063.7	3038.3	3028.0	3090.7	3195.0	3277.9	3651.6	3437.8	3215.9	3775.0	3231.0	2757.1
37	2624.9	2624.9	3296.4	3334.8	3360.8	3584.3	3549.9	3738.5	3544.5	2951.9	2286.9	2715.9	2864.6
38	3306.9	3614.8	3243.4	3235.2	3520.0	3205.4	3102.8	3355.7	2578.5	2269.5	2044.7	2022.3	2683.9
Statistics													
Min	2624.9	2624.9	3038.3	3028.0	3090.7	3195.0	3102.8	3355.7	2578.5	2269.5	2044.7	2022.3	2683.9
Max	3306.9	3614.8	3296.4	3334.8	3520.0	3584.3	3549.9	3738.5	3544.5	3215.9	3775.0	3231.0	2864.6
Average	2998.5	3101.2	3192.7	3199.3	3323.8	3328.2	3310.2	3582.0	3186.9	2812.5	2702.2	2656.4	2768.5
Sigma	282.2	405.0	111.3	127.8	177.2	181.1	184.0	163.9	432.4	398.7	765.0	495.2	74.2

Drift Calculation

AVS1_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-25.5E+00	-35.8E+00	27.0E+00	131.3E+00	214.2E+00	587.9E+00	374.1E+00	152.2E+00	711.2E+00	167.3E+00	-306.6E+00
37	-	0.0E+00	671.5E+00	709.8E+00	735.9E+00	959.3E+00	925.0E+00	1.1E+03	919.5E+00	327.0E+00	-338.0E+00	91.0E+00	239.7E+00
38	-	307.9E+00	-63.5E+00	-71.7E+00	213.1E+00	-101.5E+00	-204.1E+00	48.9E+00	-728.3E+00	-1.0E+03	-1.3E+03	-1.3E+03	-623.0E+00
Average	-	102.6E+00	194.2E+00	200.8E+00	325.3E+00	329.7E+00	311.7E+00	583.5E+00	188.4E+00	-186.1E+00	-296.3E+00	-342.1E+00	-230.0E+00
Sigma	-	145.2E+00	337.9E+00	360.2E+00	300.1E+00	455.2E+00	466.1E+00	434.7E+00	685.4E+00	606.2E+00	806.2E+00	667.1E+00	356.3E+00

Parameter : Voltage Gain : AVS1_1DUTD
 Test conditions : +VCC=30V. -VCC=GND. 1V<Vout<26V. RL=10K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2496.0	2362.1	2533.4	2528.3	2603.8	2429.2	2516.7	2646.0	2283.3	2419.9	2573.9	2516.7	2483.6
ON_PROTON samples													
27	441.7	335.5	202.7	197.8	295.9	142.6	361.8	397.6	725.4	1512.0	2112.9	1844.5	2641.3
28	576.6	468.2	270.7	117.8	144.5	214.7	259.7	241.9	252.0	294.5	331.8	364.0	383.9
29	1649.1	1085.1	1242.5	1258.7	1037.0	1234.0	1488.0	1862.4	1479.7	1818.8	1944.2	1959.3	1789.8
Statistics													
Min	441.7	335.5	202.7	117.8	144.5	142.6	259.7	241.9	252.0	294.5	331.8	364.0	383.9
Max	1649.1	1085.1	1242.5	1258.7	1037.0	1234.0	1488.0	1862.4	1479.7	1818.8	2112.9	1959.3	2641.3
Average	889.1	629.6	572.0	524.7	492.5	530.4	703.2	834.0	819.1	1208.4	1463.0	1389.3	1605.0
Sigma	540.2	326.6	475.0	520.0	390.0	498.4	556.5	730.0	505.6	658.3	802.8	726.5	930.8

Drift Calculation

AVS1_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-106.2E+00	-239.0E+00	-243.9E+00	-145.8E+00	-299.1E+00	-79.9E+00	-44.1E+00	283.7E+00	1.1E+03	1.7E+03	1.4E+03	2.2E+03
28	-	-108.4E+00	-305.9E+00	-458.8E+00	-432.1E+00	-361.9E+00	-316.8E+00	-334.6E+00	-324.5E+00	-282.1E+00	-244.7E+00	-212.6E+00	-192.7E+00
29	-	-564.0E+00	-406.5E+00	-390.4E+00	-612.0E+00	-415.0E+00	-161.1E+00	213.3E+00	-169.3E+00	169.7E+00	295.1E+00	310.3E+00	140.7E+00
Average	-	-259.5E+00	-317.1E+00	-364.4E+00	-396.7E+00	-358.7E+00	-185.9E+00	-55.1E+00	-70.1E+00	319.3E+00	573.9E+00	500.2E+00	715.9E+00
Sigma	-	215.3E+00	68.9E+00	89.6E+00	192.0E+00	47.4E+00	98.3E+00	223.8E+00	258.0E+00	562.1E+00	806.6E+00	673.0E+00	1.1E+03

Measurements

AVS1_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2496.0	2362.1	2533.4	2528.3	2603.8	2429.2	2516.7	2646.0	2283.3	2419.9	2573.9	2516.7	2483.6
ON_TID samples													
33	2433.8	2433.8	2708.0	1988.9	2859.7	2469.7	2646.0	2369.2	2229.3	2095.1	1867.8	1374.4	2194.8
34	2766.7	2851.3	3447.3	3477.5	2936.9	2810.4	2073.8	2128.5	1463.2	1715.9	1590.6	1329.2	1494.5
35	2413.1	2413.1	2492.0	2375.7	2837.2	2884.9	2683.6	2169.5	1926.0	1555.6	1263.9	1217.7	1220.6
Statistics													
Min	2413.1	2413.1	2492.0	1988.9	2837.2	2469.7	2073.8	2128.5	1463.2	1555.6	1263.9	1217.7	1220.6
Max	2766.7	2851.3	3447.3	3477.5	2936.9	2884.9	2683.6	2369.2	2229.3	2095.1	1867.8	1374.4	2194.8
Average	2537.9	2566.1	2882.4	2614.1	2877.9	2721.7	2467.8	2222.4	1872.8	1788.9	1574.1	1307.1	1636.6
Sigma	162.0	201.8	409.0	630.7	42.7	180.8	279.1	105.2	315.0	226.2	246.8	65.8	410.2

Drift Calculation

AVS1_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	274.2E+00	-444.9E+00	425.9E+00	35.9E+00	212.2E+00	-64.6E+00	-204.5E+00	-338.7E+00	-566.0E+00	-1.1E+03	-239.0E+00
34	-	84.6E+00	680.6E+00	710.8E+00	170.2E+00	43.6E+00	-693.0E+00	-638.3E+00	-1.3E+03	-1.1E+03	-1.2E+03	-1.4E+03	-1.3E+03
35	-	0.0E+00	78.9E+00	-37.4E+00	424.1E+00	471.8E+00	270.5E+00	-243.6E+00	-487.1E+00	-857.5E+00	-1.1E+03	-1.2E+03	-1.2E+03
Average	-	28.2E+00	344.6E+00	76.2E+00	340.1E+00	183.8E+00	-70.1E+00	-315.5E+00	-665.0E+00	-749.0E+00	-963.8E+00	-1.2E+03	-901.3E+00
Sigma	-	39.9E+00	250.6E+00	478.6E+00	120.1E+00	203.7E+00	441.1E+00	239.7E+00	466.0E+00	300.7E+00	281.5E+00	156.4E+00	469.4E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS1_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2496.0	2362.1	2533.4	2528.3	2603.8	2429.2	2516.7	2646.0	2283.3	2419.9	2573.9	2516.7	2483.6
OFF_PROTON samples													
30	2267.4	2289.2	2135.5	2153.8	2156.2	2411.2	2177.9	1769.5	1348.2	928.3	745.1	755.0	1145.8
32	1088.8	1255.2	1361.1	1278.1	1392.8	1759.0	2073.8	1887.5	1316.9	871.2	1132.5	858.0	1055.8
39	2418.7	2130.2	1953.1	1470.6	2451.5	2330.3	2725.3	1617.8	1110.3	913.3	884.8	898.8	1292.1
Statistics													
Min	1088.8	1255.2	1361.1	1278.1	1392.8	1759.0	2073.8	1617.8	1110.3	871.2	745.1	755.0	1055.8
Max	2418.7	2289.2	2135.5	2153.8	2451.5	2411.2	2725.3	1887.5	1348.2	928.3	1132.5	898.8	1292.1
Average	1925.0	1891.5	1816.5	1634.2	2000.2	2166.8	2325.7	1758.3	1258.5	904.2	920.8	837.3	1164.6
Sigma	594.5	454.6	330.6	375.8	446.1	290.2	285.8	110.4	105.5	24.2	160.2	60.5	97.4

Drift Calculation

AVS1_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	21.8E+00	-132.0E+00	-113.6E+00	-111.2E+00	143.7E+00	-89.5E+00	-497.9E+00	-919.2E+00	-1.3E+03	-1.5E+03	-1.5E+03	-1.1E+03
32	-	166.3E+00	272.2E+00	189.2E+00	304.0E+00	670.2E+00	984.9E+00	798.6E+00	228.0E+00	-217.7E+00	43.7E+00	-230.9E+00	-33.1E+00
39	-	-288.5E+00	-465.6E+00	-948.1E+00	32.8E+00	-88.5E+00	306.6E+00	-800.9E+00	-1.3E+03	-1.5E+03	-1.5E+03	-1.5E+03	-1.1E+03
Average	-	-33.5E+00	-108.5E+00	-290.8E+00	75.2E+00	241.8E+00	400.7E+00	-166.7E+00	-666.6E+00	-1.0E+03	-1.0E+03	-1.1E+03	-760.4E+00
Sigma	-	189.8E+00	301.7E+00	480.9E+00	172.1E+00	317.4E+00	443.7E+00	693.7E+00	652.2E+00	571.9E+00	741.0E+00	605.9E+00	514.3E+00

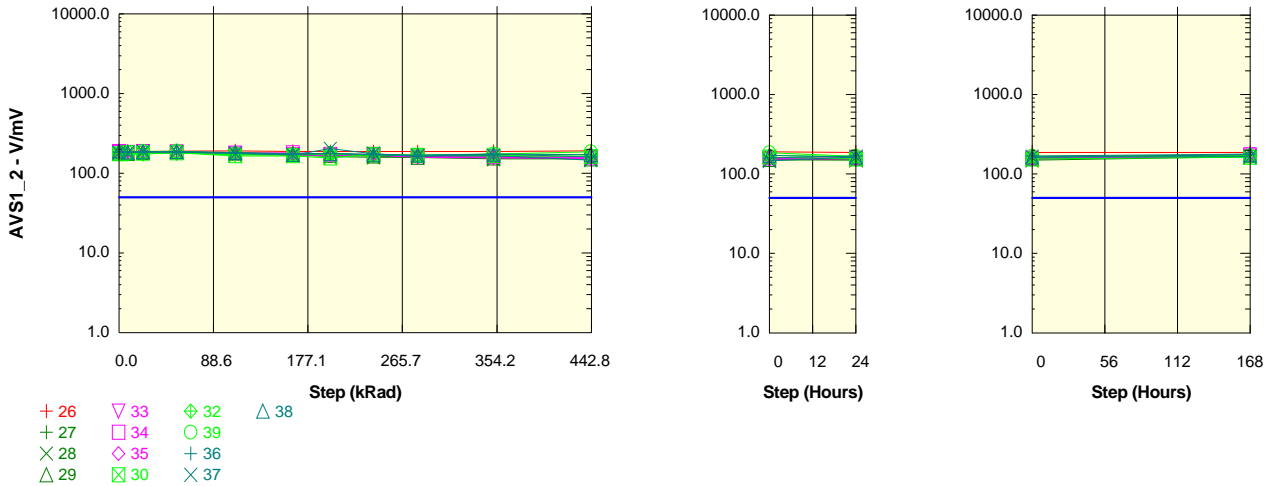
Measurements

AVS1_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2496.0	2362.1	2533.4	2528.3	2603.8	2429.2	2516.7	2646.0	2283.3	2419.9	2573.9	2516.7	2483.6
OFF_TID samples													
36	2943.9	2943.9	1935.6	2163.3	2168.5	2905.2	2378.0	2351.3	2489.3	2573.9	2573.9	2068.4	2325.1
37	2825.5	2825.5	2572.0	2499.5	2319.8	2389.6	3222.4	2597.0	1718.9	1715.9	1415.6	1715.9	1694.4
38	2753.3	1917.2	2419.0	2117.0	2015.6	2362.5	2847.6	2325.8	2330.9	2831.2	1530.4	2265.0	2597.0
Statistics													
Min	2753.3	1917.2	1935.6	2117.0	2015.6	2362.5	2378.0	2325.8	1718.9	1715.9	1415.6	1715.9	1694.4
Max	2943.9	2943.9	2572.0	2499.5	2319.8	2905.2	3222.4	2597.0	2489.3	2831.2	2573.9	2265.0	2597.0
Average	2840.9	2562.2	2308.9	2259.9	2168.0	2552.4	2816.0	2424.7	2179.7	2373.7	1840.0	2016.4	2205.5
Sigma	78.6	458.7	271.2	170.4	124.2	249.7	345.5	122.3	332.2	476.8	521.1	227.2	378.1

Drift Calculation

AVS1_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-1.0E+03	-780.7E+00	-775.5E+00	-38.8E+00	-565.9E+00	-592.7E+00	-454.6E+00	-370.1E+00	-370.0E+00	-875.5E+00	-618.8E+00
37	-	0.0E+00	-253.5E+00	-326.0E+00	-505.7E+00	-435.9E+00	396.9E+00	-228.5E+00	-1.1E+03	-1.1E+03	-1.4E+03	-1.1E+03	-1.1E+03
38	-	-836.1E+00	-334.3E+00	-636.3E+00	-737.7E+00	-390.8E+00	94.3E+00	-427.5E+00	-422.4E+00	77.9E+00	-1.2E+03	-488.3E+00	-156.3E+00
Average	-	-278.7E+00	-532.0E+00	-581.0E+00	-673.0E+00	-288.5E+00	-24.9E+00	-416.2E+00	-661.2E+00	-467.3E+00	-1.0E+03	-824.5E+00	-635.4E+00
Sigma	-	394.2E+00	338.4E+00	189.7E+00	119.3E+00	177.6E+00	402.0E+00	148.9E+00	315.2E+00	489.6E+00	452.6E+00	256.2E+00	398.2E+00

Parameter : Voltage Gain : AVS1_2DUTA
 Test conditions : +VCC=30V. -VCC=GND. 5V<Vout<20V. RL=2K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.6	188.3	189.3	190.0	191.8	188.5	187.7	187.7	187.6	189.3	191.8	188.5	187.0
ON_PROTON samples													
27	181.9	181.9	189.2	185.7	181.4	178.0	175.9	171.2	163.3	164.8	152.8	154.6	173.6
28	180.8	174.1	183.0	180.7	172.2	171.6	163.2	159.4	160.5	151.8	152.7	150.6	166.1
29	180.1	177.9	183.1	187.8	179.3	173.7	168.8	165.2	158.5	156.1	153.1	157.4	170.5
Statistics													
Min	180.1	174.1	183.0	180.7	172.2	171.6	163.2	159.4	158.5	151.8	152.7	150.6	166.1
Max	181.9	181.9	189.2	187.8	181.4	178.0	175.9	171.2	163.3	164.8	153.1	157.4	173.6
Average	180.9	178.0	185.1	184.7	177.6	174.4	169.3	165.3	160.8	157.5	152.9	154.2	170.1
Sigma	0.7	3.2	2.9	3.0	4.0	2.7	5.2	4.8	2.0	5.4	0.2	2.8	3.1

Drift Calculation

AVS1_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-17.6E-03	7.3E+00	3.8E+00	-485.7E-03	-4.0E+00	-6.1E+00	-10.8E+00	-18.6E+00	-17.2E+00	-29.1E+00	-27.3E+00	-8.3E+00
28	-	-6.7E+00	2.2E+00	-78.5E-03	-8.6E+00	-9.2E+00	-17.6E+00	-21.4E+00	-20.3E+00	-29.0E+00	-28.1E+00	-30.2E+00	-14.7E+00
29	-	-2.2E+00	3.0E+00	7.7E+00	-830.2E-03	-6.4E+00	-11.3E+00	-14.9E+00	-21.6E+00	-24.1E+00	-27.0E+00	-22.8E+00	-9.6E+00
Average	-	-3.0E+00	4.2E+00	3.8E+00	-3.3E+00	-6.5E+00	-11.7E+00	-15.7E+00	-20.2E+00	-23.4E+00	-28.1E+00	-26.7E+00	-10.9E+00
Sigma	-	2.8E+00	2.2E+00	3.2E+00	3.8E+00	2.2E+00	4.7E+00	4.4E+00	1.3E+00	4.8E+00	854.8E-03	3.1E+00	2.7E+00

Measurements

AVS1_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.6	188.3	189.3	190.0	191.8	188.5	187.7	187.7	187.6	189.3	191.8	188.5	187.0
ON_TID samples													
33	184.4	184.4	179.0	180.8	176.1	171.3	168.8	168.1	160.6	157.0	153.9	155.5	169.8
34	189.3	184.2	188.9	186.9	180.4	181.8	174.4	173.3	167.0	163.8	160.2	160.2	176.6
35	177.5	177.5	181.0	180.9	180.1	171.3	171.4	167.9	165.6	159.7	157.3	157.1	169.8
Statistics													
Min	177.5	177.5	179.0	180.8	176.1	171.3	168.8	167.9	160.6	157.0	153.9	155.5	169.8
Max	189.3	184.4	188.9	186.9	180.4	181.8	174.4	173.3	167.0	163.8	160.2	160.2	176.6
Average	183.7	182.0	183.0	182.8	178.9	175.0	171.5	169.8	164.4	160.2	157.1	157.6	172.1
Sigma	4.8	3.2	4.3	2.8	1.9	4.8	2.3	2.5	2.8	2.8	2.6	1.9	3.2

Drift Calculation

AVS1_2DUT A	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-5.4E+00	-3.6E+00	-8.2E+00	-12.4E+00	-15.6E+00	-16.3E+00	-23.8E+00	-27.4E+00	-30.4E+00	-28.9E+00	-14.6E+00
34	-	-5.1E+00	-381.5E-03	-2.4E+00	-8.9E+00	-7.5E+00	-14.9E+00	-16.0E+00	-22.3E+00	-25.5E+00	-29.1E+00	-29.1E+00	-12.7E+00
35	-	0.0E+00	3.5E+00	3.4E+00	2.6E+00	-6.2E+00	-6.1E+00	-9.6E+00	-11.9E+00	-17.9E+00	-20.2E+00	-20.4E+00	-7.7E+00
Average	-	-1.7E+00	-765.6E-03	-880.4E-03	-4.8E+00	-8.7E+00	-12.2E+00	-13.9E+00	-19.3E+00	-23.6E+00	-26.6E+00	-26.1E+00	-11.7E+00
Sigma	-	2.4E+00	3.6E+00	3.1E+00	5.3E+00	2.7E+00	4.3E+00	3.1E+00	5.3E+00	4.1E+00	4.5E+00	4.0E+00	2.9E+00

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors					Issue:	02

Measurements

AVS1_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.6	188.3	189.3	190.0	191.8	188.5	187.7	187.7	187.6	189.3	191.8	188.5	187.0
OFF_PROTON samples													
30	176.3	182.3	180.3	182.3	166.8	166.4	157.0	173.3	169.0	166.5	164.1	155.8	162.9
32	178.4	174.9	174.6	181.6	172.5	170.4	174.5	167.4	170.7	169.0	172.5	166.5	168.2
39	178.2	181.2	187.9	190.6	177.5	172.3	177.9	169.9	169.0	174.2	186.7	167.4	171.8
Statistics													
Min	176.3	174.9	174.6	181.6	166.8	166.4	157.0	167.4	169.0	166.5	164.1	155.8	162.9
Max	178.4	182.3	187.9	190.6	177.5	172.3	177.9	173.3	170.7	174.2	186.7	167.4	171.8
Average	177.6	179.5	180.9	184.8	172.2	169.7	169.8	170.2	169.6	169.9	174.4	163.3	167.6
Sigma	0.9	3.3	5.4	4.1	4.4	2.5	9.2	2.5	0.8	3.2	9.3	5.2	3.6

Drift Calculation

AVS1_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	6.0E+00	4.0E+00	6.0E+00	-9.5E+00	-9.9E+00	-19.3E+00	-2.9E+00	-7.2E+00	-9.7E+00	-12.1E+00	-20.4E+00	-13.3E+00
32	-	-3.5E+00	-3.8E+00	3.2E+00	-5.9E+00	-8.0E+00	-3.9E+00	-11.0E+00	-7.6E+00	-9.3E+00	-5.9E+00	-11.8E+00	-10.2E+00
39	-	3.0E+00	9.7E+00	12.5E+00	-685.5E-03	-5.9E+00	-301.6E-03	-8.3E+00	-9.2E+00	-3.9E+00	8.5E+00	-10.8E+00	-6.4E+00
Average	-	1.8E+00	3.3E+00	7.2E+00	-5.4E+00	-7.9E+00	-7.8E+00	-7.4E+00	-8.0E+00	-7.7E+00	-3.2E+00	-14.4E+00	-10.0E+00
Sigma	-	4.0E+00	5.5E+00	3.9E+00	3.6E+00	1.6E+00	8.2E+00	3.4E+00	818.8E-03	2.6E+00	8.6E+00	4.3E+00	2.8E+00

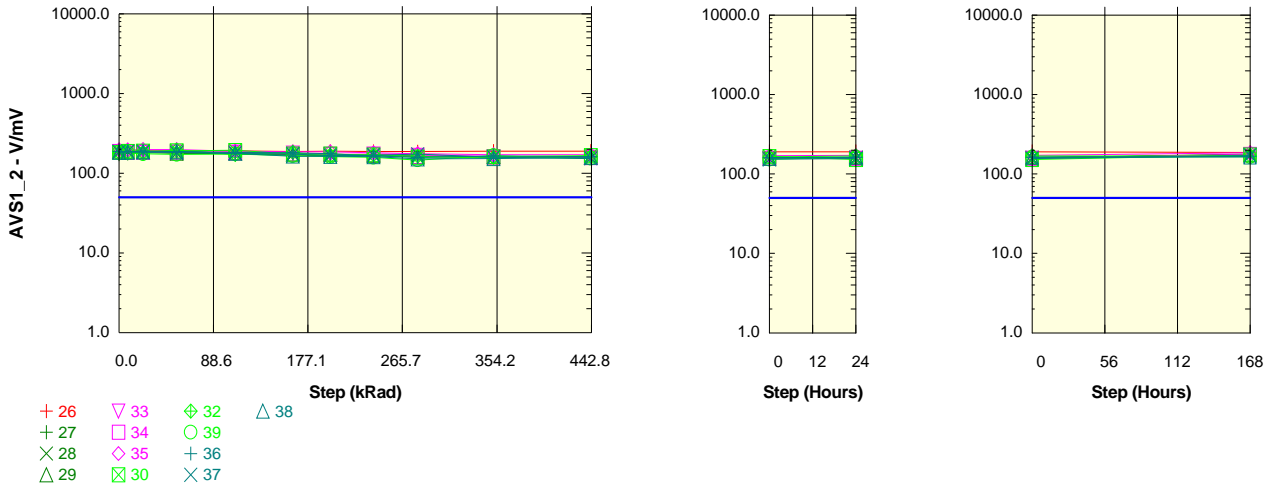
Measurements

AVS1_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.6	188.3	189.3	190.0	191.8	188.5	187.7	187.7	187.6	189.3	191.8	188.5	187.0
OFF_TID samples													
36	185.6	185.6	185.7	185.0	180.6	177.2	177.8	173.4	163.9	175.1	161.0	169.9	178.6
37	181.7	181.7	189.4	185.8	178.6	170.4	204.3	177.6	165.8	167.4	147.7	164.9	166.1
38	190.5	185.3	186.4	189.2	182.6	172.3	178.3	171.2	170.0	174.2	172.5	164.1	175.6
Statistics													
Min	181.7	181.7	185.7	185.0	178.6	170.4	177.8	171.2	163.9	167.4	147.7	164.1	166.1
Max	190.5	185.6	189.4	189.2	182.6	177.2	204.3	177.6	170.0	175.1	172.5	169.9	178.6
Average	185.9	184.2	187.2	186.7	180.6	173.3	186.8	174.1	166.6	172.2	160.4	166.3	173.4
Sigma	3.6	1.8	1.6	1.8	1.6	2.9	12.4	2.6	2.6	3.5	10.1	2.5	5.4

Drift Calculation

AVS1_2DUT A	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	174.6E-03	-594.9E-03	-4.9E+00	-8.3E+00	-7.8E+00	-12.1E+00	-21.7E+00	-10.4E+00	-24.5E+00	-15.7E+00	-6.9E+00
37	-	0.0E+00	7.7E+00	4.2E+00	-3.1E+00	-11.3E+00	22.6E+00	-4.1E+00	-15.9E+00	-14.3E+00	-34.0E+00	-16.8E+00	-15.6E+00
38	-	-5.1E+00	-4.0E+00	-1.2E+00	-7.8E+00	-18.2E+00	-12.1E+00	-19.2E+00	-20.4E+00	-16.2E+00	-18.0E+00	-26.3E+00	-14.9E+00
Average	-	-1.7E+00	1.3E+00	772.0E-03	-5.3E+00	-12.6E+00	914.4E-03	-11.8E+00	-19.3E+00	-13.7E+00	-25.5E+00	-19.6E+00	-12.5E+00
Sigma	-	2.4E+00	4.9E+00	2.4E+00	2.0E+00	4.1E+00	15.4E+00	6.2E+00	2.5E+00	2.4E+00	6.6E+00	4.8E+00	3.9E+00

Parameter : Voltage Gain : AVS1_2DUTB
 Test conditions : +VCC=30V. -VCC=GND. 5V<Vout<20V. RL=2K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.9	190.1	192.1	193.0	191.4	188.0	189.6	189.3	187.7	191.2	191.2	191.6	187.9
ON_PROTON samples													
27	175.3	177.8	182.4	182.8	175.7	172.0	167.4	170.1	164.8	160.9	158.6	161.3	174.1
28	183.9	188.3	190.7	180.5	182.0	172.8	168.8	172.6	165.4	159.7	159.3	160.6	178.5
29	189.5	186.8	186.1	179.6	180.9	174.8	172.4	169.5	163.1	162.0	159.1	161.3	174.7
Statistics													
Min	175.3	177.8	182.4	179.6	175.7	172.0	167.4	169.5	163.1	159.7	158.6	160.6	174.1
Max	189.5	188.3	190.7	182.8	182.0	174.8	172.4	172.6	165.4	162.0	159.3	161.3	178.5
Average	182.9	184.3	186.4	181.0	179.5	173.2	169.5	170.7	164.5	160.8	159.0	161.1	175.8
Sigma	5.8	4.7	3.4	1.4	2.7	1.2	2.1	1.4	1.0	1.0	0.3	0.4	2.0

Drift Calculation

AVS1_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.5E+00	7.1E+00	7.5E+00	409.3E-03	-3.3E+00	-7.9E+00	-5.2E+00	-10.5E+00	-14.5E+00	-16.7E+00	-14.0E+00	-1.3E+00
28	-	4.4E+00	6.8E+00	-3.4E+00	-2.0E+00	-11.1E+00	-15.1E+00	-11.3E+00	-18.5E+00	-24.3E+00	-24.6E+00	-23.4E+00	-5.4E+00
29	-	-2.6E+00	-3.4E+00	-9.9E+00	-8.5E+00	-14.7E+00	-17.1E+00	-20.0E+00	-26.4E+00	-27.5E+00	-30.4E+00	-28.2E+00	-14.8E+00
Average	-	1.4E+00	3.5E+00	-1.9E+00	-3.4E+00	-9.7E+00	-13.4E+00	-12.2E+00	-18.5E+00	-22.1E+00	-23.9E+00	-21.8E+00	-7.2E+00
Sigma	-	3.0E+00	4.9E+00	7.2E+00	3.8E+00	4.8E+00	4.0E+00	6.1E+00	6.5E+00	5.5E+00	5.6E+00	5.9E+00	5.7E+00

Measurements

AVS1_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.9	190.1	192.1	193.0	191.4	188.0	189.6	189.3	187.7	191.2	191.2	191.6	187.9
ON_TID samples													
33	189.5	189.5	185.2	186.0	185.9	179.9	174.0	174.9	170.2	163.6	160.3	158.8	177.5
34	188.3	184.8	185.2	185.6	181.8	174.5	173.7	171.4	162.5	160.6	157.9	158.4	175.8
35	198.4	198.4	199.5	198.8	190.9	187.2	186.7	181.8	177.6	172.0	171.5	171.8	186.6
Statistics													
Min	188.3	184.8	185.2	185.6	181.8	174.5	173.7	171.4	162.5	160.6	157.9	158.4	175.8
Max	198.4	198.4	199.5	198.8	190.9	187.2	186.7	181.8	177.6	172.0	171.5	171.8	186.6
Average	192.1	190.9	190.0	190.1	186.2	180.5	178.1	176.0	170.1	165.4	163.3	163.0	179.9
Sigma	4.5	5.6	6.8	6.2	3.7	5.2	6.1	4.3	6.2	4.8	5.9	6.2	4.7

Drift Calculation

AVS1_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-4.3E+00	-3.5E+00	-3.6E+00	-9.6E+00	-15.5E+00	-14.6E+00	-19.3E+00	-25.9E+00	-29.2E+00	-30.7E+00	-12.0E+00
34	-	-3.5E+00	-3.2E+00	-2.8E+00	-6.6E+00	-13.9E+00	-14.6E+00	-16.9E+00	-25.9E+00	-27.7E+00	-30.4E+00	-29.9E+00	-12.6E+00
35	-	0.0E+00	1.1E+00	410.3E-03	-7.5E+00	-11.2E+00	-11.7E+00	-16.6E+00	-20.8E+00	-26.4E+00	-26.9E+00	-26.6E+00	-11.8E+00
Average	-	-1.2E+00	-2.1E+00	-2.0E+00	-5.9E+00	-11.6E+00	-14.0E+00	-16.0E+00	-22.0E+00	-26.7E+00	-28.8E+00	-29.1E+00	-12.1E+00
Sigma	-	1.6E+00	2.3E+00	1.7E+00	1.7E+00	1.8E+00	1.6E+00	1.1E+00	2.8E+00	749.6E-03	1.4E+00	1.8E+00	315.7E-03

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors				Issue:	02			

Measurements

AVS1_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.9	190.1	192.1	193.0	191.4	188.0	189.6	189.3	187.7	191.2	191.2	191.6	187.9
OFF_PROTON samples													
30	183.9	190.2	190.5	191.4	194.8	175.7	175.6	170.7	159.5	161.8	167.4	153.0	175.0
32	184.4	186.3	183.0	195.5	173.9	184.0	165.1	171.6	164.9	158.8	164.9	170.7	170.3
39	183.5	183.2	176.4	173.9	175.1	167.0	161.8	159.5	147.7	167.4	154.4	164.1	166.0
Statistics													
Min	183.5	183.2	176.4	173.9	173.9	167.0	161.8	159.5	147.7	158.8	154.4	153.0	166.0
Max	184.4	190.2	190.5	195.5	194.8	184.0	175.6	171.6	164.9	167.4	167.4	170.7	175.0
Average	183.9	186.6	183.3	186.9	181.3	175.6	167.5	167.3	157.4	162.6	162.2	162.6	170.4
Sigma	0.4	2.9	5.8	9.4	9.6	6.9	5.9	5.5	7.2	3.6	5.6	7.3	3.7

Drift Calculation

AVS1_2DUT B	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	6.3E+00	6.6E+00	7.5E+00	10.9E+00	-8.3E+00	-8.4E+00	-13.2E+00	-24.4E+00	-22.1E+00	-16.6E+00	-30.9E+00	-8.9E+00
32	-	1.9E+00	-1.4E+00	11.1E+00	-10.6E+00	-373.6E-03	-19.3E+00	-12.8E+00	-19.5E+00	-25.7E+00	-19.5E+00	-13.7E+00	-14.1E+00
39	-	-268.9E-03	-7.1E+00	-9.6E+00	-8.4E+00	-16.4E+00	-21.7E+00	-24.0E+00	-35.7E+00	-16.1E+00	-29.0E+00	-19.3E+00	-17.5E+00
Average	-	2.6E+00	-621.1E-03	3.0E+00	-2.7E+00	-8.4E+00	-16.5E+00	-16.7E+00	-26.6E+00	-21.3E+00	-21.7E+00	-21.3E+00	-13.5E+00
Sigma	-	2.7E+00	5.6E+00	9.0E+00	9.6E+00	6.6E+00	5.8E+00	5.2E+00	6.8E+00	3.9E+00	5.3E+00	7.2E+00	3.5E+00

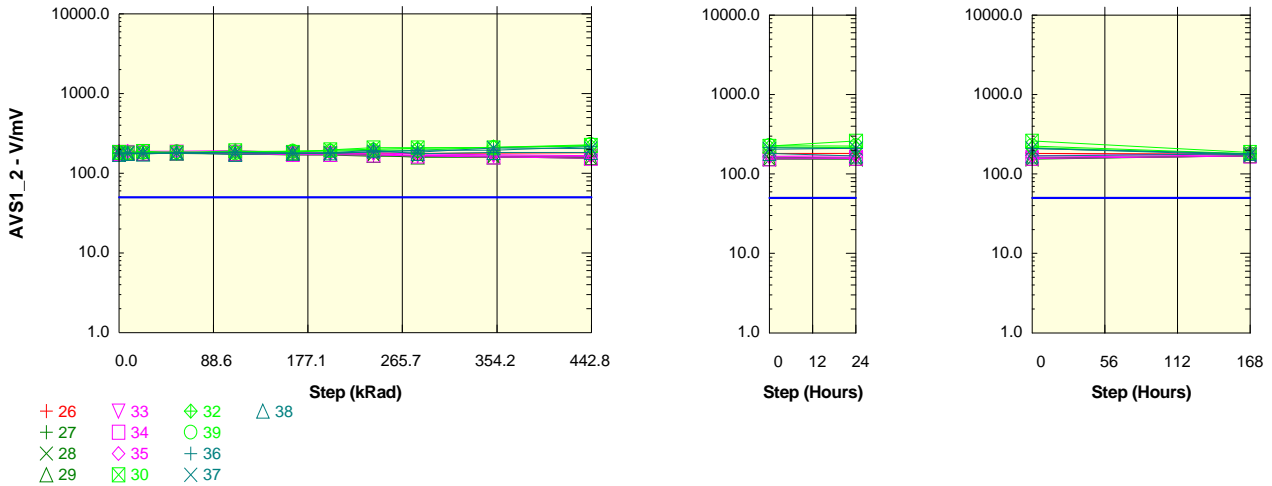
Measurements

AVS1_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	188.9	190.1	192.1	193.0	191.4	188.0	189.6	189.3	187.7	191.2	191.2	191.6	187.9
OFF_TID samples													
36	187.7	187.7	190.8	188.9	184.4	182.5	176.1	165.4	160.3	166.5	161.8	164.1	167.6
37	188.0	188.0	185.0	182.8	178.3	174.3	167.2	169.5	174.9	160.3	154.4	158.0	171.5
38	183.6	184.7	186.0	187.4	179.1	164.5	164.1	162.9	152.4	153.7	158.8	164.1	165.1
Statistics													
Min	183.6	184.7	185.0	182.8	178.3	164.5	164.1	162.9	152.4	153.7	154.4	158.0	165.1
Max	188.0	188.0	190.8	188.9	184.4	182.5	176.1	169.5	174.9	166.5	161.8	164.1	171.5
Average	186.4	186.8	187.3	186.4	180.6	173.8	169.1	165.9	162.5	160.2	158.3	162.1	168.1
Sigma	2.0	1.5	2.5	2.6	2.7	7.3	5.1	2.7	9.3	5.2	3.0	2.9	2.6

Drift Calculation

AVS1_2DUT B	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	3.1E+00	1.2E+00	-3.4E+00	-5.3E+00	-11.6E+00	-22.3E+00	-27.5E+00	-21.2E+00	-25.9E+00	-23.6E+00	-20.1E+00
37	-	0.0E+00	-3.0E+00	-5.1E+00	-9.7E+00	-13.6E+00	-20.8E+00	-18.5E+00	-13.1E+00	-27.7E+00	-33.5E+00	-29.9E+00	-16.5E+00
38	-	1.1E+00	2.4E+00	3.8E+00	-4.5E+00	-19.1E+00	-19.6E+00	-20.8E+00	-31.3E+00	-29.9E+00	-24.9E+00	-19.5E+00	-18.5E+00
Average	-	367.8E-03	828.1E-03	-50.1E-03	-5.8E+00	-12.7E+00	-17.3E+00	-20.5E+00	-23.9E+00	-26.3E+00	-28.1E+00	-24.3E+00	-18.4E+00
Sigma	-	520.2E-03	2.7E+00	3.7E+00	2.7E+00	5.7E+00	4.1E+00	1.6E+00	7.8E+00	3.7E+00	3.9E+00	4.3E+00	1.5E+00

Parameter : Voltage Gain : AVS1_2DUTC
 Test conditions : +VCC=30V. -VCC=GND. 5V<Vout<20V. RL=2K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	178.6	180.5	183.4	183.8	180.7	180.4	179.4	179.7	178.8	180.1	182.2	182.8	178.5
ON_PROTON samples													
27	177.7	176.8	179.3	184.8	177.5	170.7	170.8	164.4	167.4	164.4	164.1	159.7	170.1
28	185.7	177.3	178.2	178.8	175.4	175.6	179.7	172.2	164.7	161.9	154.9	154.6	171.5
29	182.5	183.8	178.7	180.6	177.3	179.9	173.7	169.2	160.7	160.6	157.8	158.2	170.0
Statistics													
Min	177.7	176.8	178.2	178.8	175.4	170.7	170.8	164.4	160.7	160.6	154.9	154.6	170.0
Max	185.7	183.8	179.3	184.8	177.5	179.9	179.7	172.2	167.4	164.4	164.1	159.7	171.5
Average	182.0	179.3	178.7	181.4	176.8	175.4	174.7	168.6	164.3	162.3	158.9	157.5	170.6
Sigma	3.3	3.2	0.5	2.5	0.9	3.8	3.7	3.2	2.8	1.5	3.8	2.1	0.7

Drift Calculation

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-921.7E-03	1.6E+00	7.1E+00	-229.7E-03	-7.0E+00	-6.9E+00	-13.3E+00	-10.3E+00	-13.4E+00	-13.7E+00	-18.1E+00	-7.6E+00
28	-	-8.4E+00	-7.5E+00	-6.9E+00	-10.3E+00	-10.1E+00	-6.0E+00	-13.5E+00	-21.0E+00	-23.8E+00	-30.8E+00	-31.1E+00	-14.2E+00
29	-	1.3E+00	-3.8E+00	-1.8E+00	-5.1E+00	-2.5E+00	-8.8E+00	-13.3E+00	-21.8E+00	-21.8E+00	-24.7E+00	-24.2E+00	-12.4E+00
Average	-	-2.7E+00	-3.3E+00	-544.0E-03	-5.2E+00	-6.6E+00	-7.2E+00	-13.4E+00	-17.7E+00	-19.7E+00	-23.0E+00	-24.5E+00	-11.4E+00
Sigma	-	4.2E+00	3.8E+00	5.8E+00	4.1E+00	3.1E+00	1.1E+00	107.5E-03	5.2E+00	4.5E+00	7.1E+00	5.3E+00	2.8E+00

Measurements

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	178.6	180.5	183.4	183.8	180.7	180.4	179.4	179.7	178.8	180.1	182.2	182.8	178.5
ON_TID samples													
33	184.1	184.1	185.1	185.6	182.1	177.3	176.1	177.7	168.8	166.8	164.8	163.1	175.6
34	178.7	178.2	179.0	179.7	176.6	172.5	172.7	170.4	165.4	161.0	155.6	158.2	169.1
35	189.4	189.4	189.8	190.2	193.8	183.2	181.6	181.4	175.2	172.5	167.5	170.9	182.1
Statistics													
Min	178.7	178.2	179.0	179.7	176.6	172.5	172.7	170.4	165.4	161.0	155.6	158.2	169.1
Max	189.4	189.4	189.8	190.2	193.8	183.2	181.6	181.4	175.2	172.5	167.5	170.9	182.1
Average	184.0	183.9	184.6	185.2	184.2	177.7	176.8	176.5	169.8	166.8	162.6	164.1	175.6
Sigma	4.4	4.6	4.4	4.3	7.2	4.4	3.7	4.6	4.1	4.7	5.1	5.2	5.3

Drift Calculation

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	999.4E-03	1.5E+00	-2.0E+00	-6.8E+00	-8.0E+00	-6.4E+00	-15.3E+00	-17.3E+00	-19.3E+00	-21.0E+00	-8.5E+00
34	-	-500.7E-03	315.5E-03	1.0E+00	-2.1E+00	-6.2E+00	-5.9E+00	-8.3E+00	-13.2E+00	-17.6E+00	-23.1E+00	-20.4E+00	-9.5E+00
35	-	0.0E+00	383.3E-03	768.3E-03	4.4E+00	-6.2E+00	-7.8E+00	-8.0E+00	-14.2E+00	-16.9E+00	-21.9E+00	-18.5E+00	-7.3E+00
Average	-	-166.9E-03	566.1E-03	1.1E+00	127.7E-03	-6.4E+00	-7.2E+00	-7.6E+00	-14.2E+00	-17.3E+00	-21.4E+00	-20.0E+00	-8.5E+00
Sigma	-	236.0E-03	307.7E-03	319.9E-03	3.0E+00	260.7E-03	921.6E-03	829.3E-03	842.3E-03	288.0E-03	1.6E+00	1.1E+00	908.0E-03

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	178.6	180.5	183.4	183.8	180.7	180.4	179.4	179.7	178.8	180.1	182.2	182.8	178.5
OFF PROTON samples													
30	184.1	180.6	190.0	182.0	191.8	183.8	198.3	209.7	209.7	209.7	225.0	261.3	188.3
32	183.3	178.3	186.4	179.7	189.2	191.0	196.2	201.0	207.2	213.7	220.6	216.4	178.8
39	179.7	175.1	182.0	186.9	180.6	190.3	190.9	195.3	195.3	212.3	229.6	226.5	181.7
Statistics													
Min	179.7	175.1	182.0	179.7	180.6	183.8	190.9	195.3	195.3	209.7	220.6	216.4	178.8
Max	184.1	180.6	190.0	186.9	191.8	191.0	198.3	209.7	209.7	213.7	229.6	261.3	188.3
Average	182.4	178.0	186.1	182.9	187.2	188.4	195.1	202.0	204.0	211.9	225.1	234.7	182.9
Sigma	1.9	2.3	3.3	3.0	4.8	3.2	3.1	5.9	6.3	1.6	3.7	19.3	4.0

Drift Calculation

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-3.5E+00	5.9E+00	-2.1E+00	7.7E+00	-246.9E-03	14.2E+00	25.6E+00	25.6E+00	25.6E+00	40.9E+00	77.3E+00	4.2E+00
32	-	-4.9E+00	3.1E+00	-3.6E+00	5.9E+00	7.7E+00	12.9E+00	17.8E+00	23.9E+00	30.4E+00	37.4E+00	33.1E+00	-4.5E+00
39	-	-4.6E+00	2.3E+00	7.2E+00	865.4E-03	10.6E+00	11.1E+00	15.5E+00	15.5E+00	32.6E+00	49.8E+00	46.8E+00	1.9E+00
Average	-	-4.3E+00	3.8E+00	519.0E-03	4.8E+00	6.0E+00	12.8E+00	19.6E+00	21.7E+00	29.5E+00	42.7E+00	52.4E+00	575.7E-03
Sigma	-	641.6E-03	1.5E+00	4.8E+00	2.9E+00	4.6E+00	1.3E+00	4.3E+00	4.4E+00	2.9E+00	5.2E+00	18.4E+00	3.7E+00

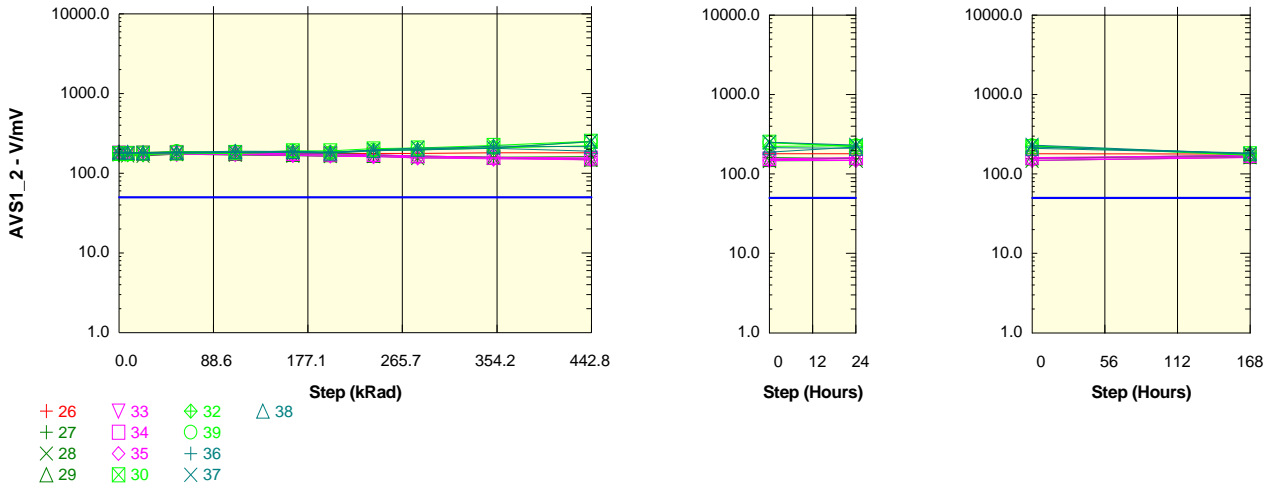
Measurements

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	178.6	180.5	183.4	183.8	180.7	180.4	179.4	179.7	178.8	180.1	182.2	182.8	178.5
OFF TID samples													
36	179.7	179.7	179.8	182.2	185.9	176.8	179.7	186.9	196.4	195.3	216.4	209.7	180.6
37	179.0	179.0	179.4	179.2	180.8	181.6	178.4	186.5	185.7	208.4	205.9	211.0	175.0
38	173.5	178.3	174.6	181.3	173.6	179.1	180.7	196.3	177.0	182.7	182.7	169.9	181.9
Statistics													
Min	173.5	178.3	174.6	179.2	173.6	176.8	178.4	186.5	177.0	182.7	182.7	169.9	175.0
Max	179.7	179.7	179.8	182.2	185.9	181.6	180.7	196.3	196.4	208.4	216.4	211.0	181.9
Average	177.4	179.0	178.0	180.9	180.1	179.2	179.6	189.9	186.3	195.5	201.7	196.9	179.2
Sigma	2.8	0.6	2.4	1.2	5.1	2.0	0.9	4.5	7.9	10.5	14.1	19.1	3.0

Drift Calculation

AVS1_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	155.2E-03	2.5E+00	6.2E+00	-2.9E+00	-16.8E-03	7.2E+00	16.7E+00	15.6E+00	36.7E+00	30.0E+00	938.3E-03
37	-	0.0E+00	411.0E-03	213.8E-03	1.8E+00	2.6E+00	-557.4E-03	7.5E+00	6.7E+00	29.4E+00	26.9E+00	32.0E+00	-4.0E+00
38	-	4.8E+00	1.1E+00	7.8E+00	27.3E-03	5.6E+00	7.2E+00	22.7E+00	3.4E+00	9.1E+00	9.1E+00	-3.7E+00	8.3E+00
Average	-	1.6E+00	557.8E-03	3.5E+00	2.7E+00	1.7E+00	2.2E+00	12.5E+00	8.9E+00	18.0E+00	24.3E+00	19.5E+00	1.8E+00
Sigma	-	2.3E+00	402.3E-03	3.2E+00	2.6E+00	3.5E+00	3.5E+00	7.3E+00	5.7E+00	8.5E+00	11.4E+00	16.4E+00	5.1E+00

Parameter : Voltage Gain : AVS1_2DUTD
 Test conditions : +VCC=30V. -VCC=GND. 5V<Vout<20V. RL=2K
 Unit : V/mV
 Spec Limit Min : 50.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS1_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	180.9	179.8	177.5	179.0	180.1	180.7	178.8	179.1	177.9	180.7	180.8	180.7	179.1
ON_PROTON samples													
27	181.4	181.4	182.6	188.7	182.3	178.8	179.0	172.1	164.4	159.4	161.7	157.1	174.0
28	174.0	168.9	166.1	175.8	171.1	167.0	164.8	164.4	156.3	155.9	148.0	148.8	163.8
29	180.5	179.4	179.1	181.2	177.5	173.4	171.2	169.1	166.1	159.2	152.8	160.0	168.0
Statistics													
Min	174.0	168.9	166.1	175.8	171.1	167.0	164.8	164.4	156.3	155.9	148.0	148.8	163.8
Max	181.4	181.4	182.6	188.7	182.3	178.8	179.0	172.1	166.1	159.4	161.7	160.0	174.0
Average	178.7	176.6	175.9	181.9	177.0	173.1	171.6	168.6	162.2	158.2	154.1	155.3	168.6
Sigma	3.3	5.5	7.1	5.3	4.6	4.8	5.8	3.2	4.3	1.6	5.7	4.8	4.2

Drift Calculation

AVS1_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	45.8E-06	1.1E+00	7.3E+00	870.2E-03	-2.6E+00	-2.4E+00	-9.3E+00	-17.1E+00	-22.0E+00	-19.7E+00	-24.3E+00	-7.5E+00
28	-	-5.1E+00	-7.9E+00	1.8E+00	-2.9E+00	-7.0E+00	-9.2E+00	-9.6E+00	-17.7E+00	-18.1E+00	-26.0E+00	-25.2E+00	-10.2E+00
29	-	-1.2E+00	-1.4E+00	724.2E-03	-3.0E+00	-7.1E+00	-9.4E+00	-11.4E+00	-14.5E+00	-21.3E+00	-27.8E+00	-20.5E+00	-12.5E+00
Average	-	-2.1E+00	-2.7E+00	3.3E+00	-1.7E+00	-5.6E+00	-7.0E+00	-10.1E+00	-16.4E+00	-20.5E+00	-24.5E+00	-23.3E+00	-10.1E+00
Sigma	-	2.2E+00	3.8E+00	2.9E+00	1.8E+00	2.1E+00	3.2E+00	935.0E-03	1.4E+00	1.7E+00	3.5E+00	2.0E+00	2.1E+00

Measurements

AVS1_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	180.9	179.8	177.5	179.0	180.1	180.7	178.8	179.1	177.9	180.7	180.8	180.7	179.1
ON_TID samples													
33	175.9	175.9	176.9	176.9	175.5	169.8	172.2	167.5	160.9	156.3	152.5	156.4	165.7
34	180.6	179.2	181.0	183.8	181.9	177.7	174.9	172.5	166.6	159.2	156.4	162.3	172.5
35	172.8	172.8	170.8	173.8	172.9	167.9	164.8	162.9	157.1	151.8	149.0	148.5	162.6
Statistics													
Min	172.8	172.8	170.8	173.8	172.9	167.9	164.8	162.9	157.1	151.8	149.0	148.5	162.6
Max	180.6	179.2	181.0	183.8	181.9	177.7	174.9	172.5	166.6	159.2	156.4	162.3	172.5
Average	176.4	176.0	176.2	178.2	176.8	171.8	170.6	167.7	161.5	155.8	152.6	155.7	166.9
Sigma	3.2	2.6	4.2	4.2	3.8	4.2	4.3	3.9	3.9	3.0	3.0	5.7	4.1

Drift Calculation

AVS1_2DUT D	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.1E+00	1.0E+00	-338.5E-03	-6.1E+00	-3.7E+00	-8.3E+00	-15.0E+00	-19.6E+00	-23.4E+00	-19.5E+00	-10.1E+00
34	-	-1.5E+00	409.9E-03	3.1E+00	1.3E+00	-3.0E+00	-5.7E+00	-8.1E+00	-14.0E+00	-21.4E+00	-24.3E+00	-18.3E+00	-8.2E+00
35	-	0.0E+00	-2.0E+00	1.0E+00	133.3E-03	-5.0E+00	-8.0E+00	-9.9E+00	-15.7E+00	-21.0E+00	-23.8E+00	-24.3E+00	-10.2E+00
Average	-	-483.4E-03	-191.3E-03	1.7E+00	359.5E-03	-4.7E+00	-5.8E+00	-8.8E+00	-14.9E+00	-20.7E+00	-23.8E+00	-20.7E+00	-9.5E+00
Sigma	-	683.6E-03	1.3E+00	996.5E-03	681.3E-03	1.3E+00	1.8E+00	782.9E-03	708.0E-03	782.6E-03	368.4E-03	2.6E+00	935.5E-03

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS1_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	180.9	179.8	177.5	179.0	180.1	180.7	178.8	179.1	177.9	180.7	180.8	180.7	179.1
OFF_PROTON samples													
30	178.0	178.0	180.8	181.5	184.4	191.7	191.7	204.7	208.4	225.0	253.5	222.1	181.6
32	172.1	172.1	171.7	177.1	179.6	186.9	185.0	194.1	197.5	208.4	223.5	229.6	173.4
39	179.6	179.2	179.1	188.4	184.5	190.4	179.8	195.3	205.9	209.7	248.0	226.5	177.3
Statistics													
Min	172.1	172.1	171.7	177.1	179.6	186.9	179.8	194.1	197.5	208.4	223.5	222.1	173.4
Max	179.6	179.2	180.8	188.4	184.5	191.7	191.7	204.7	208.4	225.0	253.5	229.6	181.6
Average	176.6	176.4	177.2	182.4	182.8	189.7	185.5	198.0	204.0	214.4	241.7	226.0	177.4
Sigma	3.3	3.1	3.9	4.7	2.3	2.1	4.9	4.7	4.7	7.5	13.0	3.1	3.3

Drift Calculation

AVS1_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-16.9E-03	2.8E+00	3.5E+00	6.4E+00	13.7E+00	13.7E+00	26.7E+00	30.4E+00	47.0E+00	75.5E+00	44.1E+00	3.6E+00
32	-	7.9E-03	-362.4E-03	5.1E+00	7.5E+00	14.8E+00	13.0E+00	22.1E+00	25.5E+00	36.4E+00	51.5E+00	57.5E+00	1.4E+00
39	-	-394.9E-03	-566.1E-03	8.8E+00	4.9E+00	10.8E+00	129.7E-03	15.6E+00	26.3E+00	30.1E+00	68.4E+00	46.9E+00	-2.3E+00
Average	-	-134.6E-03	628.8E-03	5.8E+00	6.3E+00	13.1E+00	9.0E+00	21.5E+00	27.4E+00	37.8E+00	65.1E+00	49.5E+00	882.5E-03
Sigma	-	184.3E-03	1.5E+00	2.2E+00	1.1E+00	1.7E+00	6.2E+00	4.5E+00	2.2E+00	7.0E+00	10.1E+00	5.8E+00	2.4E+00

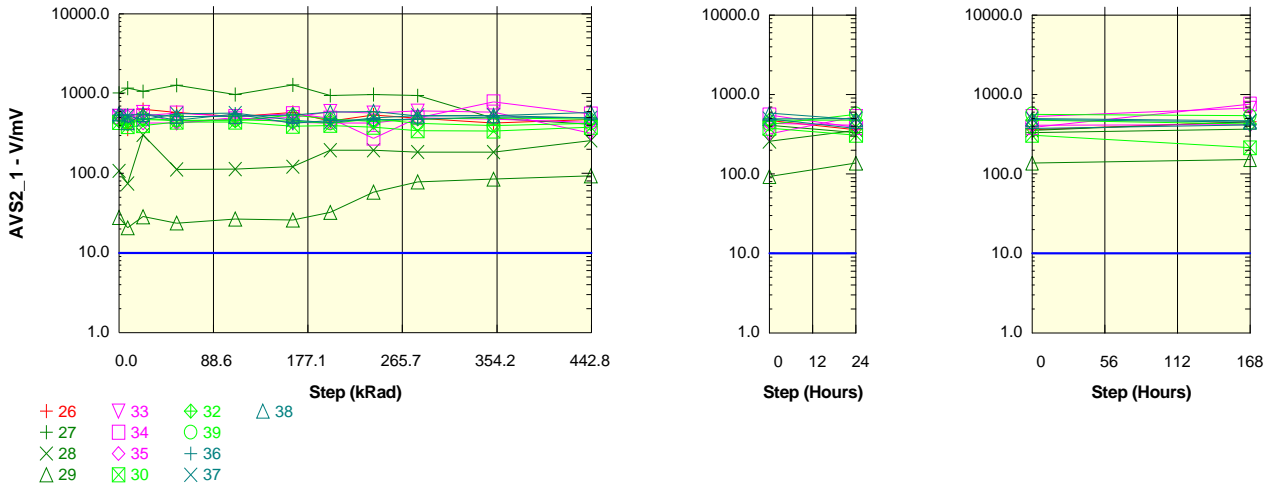
Measurements

AVS1_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	180.9	179.8	177.5	179.0	180.1	180.7	178.8	179.1	177.9	180.7	180.8	180.7	179.1
OFF_TID samples													
36	181.4	181.4	181.0	185.7	183.7	189.6	186.0	195.9	197.5	207.2	189.8	220.6	184.5
37	178.9	178.9	180.5	180.4	183.5	184.0	182.5	197.2	208.4	208.4	251.7	232.7	178.3
38	185.7	183.5	182.1	184.4	190.1	188.0	180.0	193.3	199.9	220.6	216.4	211.0	183.5
Statistics													
Min	178.9	178.9	180.5	180.4	183.5	184.0	180.0	193.3	197.5	207.2	189.8	211.0	178.3
Max	185.7	183.5	182.1	185.7	190.1	189.6	186.0	197.2	208.4	220.6	251.7	232.7	184.5
Average	182.0	181.3	181.2	183.5	185.7	187.2	182.8	195.5	201.9	212.1	219.3	221.4	182.1
Sigma	2.8	1.9	0.7	2.3	3.1	2.3	2.4	1.6	4.7	6.1	25.3	8.9	2.7

Drift Calculation

AVS1_2DUT D	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-420.2E-03	4.3E+00	2.3E+00	8.2E+00	4.6E+00	14.5E+00	16.1E+00	25.8E+00	8.4E+00	39.2E+00	3.1E+00
37	-	0.0E+00	1.6E+00	1.4E+00	4.5E+00	5.1E+00	3.5E+00	18.2E+00	29.5E+00	29.5E+00	72.7E+00	53.8E+00	-693.3E-03
38	-	-2.1E+00	-3.5E+00	-1.3E+00	4.4E+00	2.4E+00	-5.6E+00	7.6E+00	14.2E+00	35.0E+00	30.7E+00	25.4E+00	-2.2E+00
Average	-	-705.7E-03	-781.0E-03	1.5E+00	3.7E+00	5.2E+00	823.1E-03	13.5E+00	19.9E+00	30.1E+00	37.3E+00	39.4E+00	82.0E-03
Sigma	-	998.0E-03	2.1E+00	2.3E+00	1.1E+00	2.4E+00	4.6E+00	4.4E+00	6.8E+00	3.8E+00	26.7E+00	11.6E+00	2.2E+00

Parameter : Voltage Gain : AVS2_1DUTA
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=10K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	501.3	360.2	634.5	580.5	514.7	580.4	453.0	539.3	492.4	430.1	471.9	361.4	459.1
ON_PROTON samples													
27	1016.3	1171.9	1068.7	1275.5	978.0	1287.6	943.7	974.0	943.8	492.4	414.3	333.1	369.3
28	108.1	75.3	304.9	112.8	113.7	122.1	196.1	196.1	185.8	185.4	259.4	357.6	459.1
29	28.9	21.6	29.5	24.7	27.7	26.9	33.3	58.9	79.1	85.6	93.9	138.0	153.0
Statistics													
Min	28.9	21.6	29.5	24.7	27.7	26.9	33.3	58.9	79.1	85.6	93.9	138.0	153.0
Max	1016.3	1171.9	1068.7	1275.5	978.0	1287.6	943.7	974.0	943.8	492.4	414.3	357.6	459.1
Average	384.4	422.9	467.7	471.0	373.1	478.9	391.0	409.7	402.9	254.5	255.9	276.2	327.1
Sigma	448.0	530.0	439.6	570.0	429.1	573.2	396.4	403.0	384.9	173.1	130.8	98.3	128.5

Drift Calculation

AVS2_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	155.6E+00	52.5E+00	259.3E+00	-38.3E+00	271.4E+00	-72.5E+00	-42.3E+00	-72.5E+00	-523.9E+00	-601.9E+00	-683.2E+00	-647.0E+00
28	-	-32.8E+00	196.8E+00	4.8E+00	5.7E+00	14.0E+00	88.0E+00	88.0E+00	77.7E+00	151.3E+00	249.6E+00	351.1E+00	
29	-	-7.3E+00	569.5E-03	-4.2E+00	-1.2E+00	-2.0E+00	4.4E+00	30.0E+00	50.2E+00	56.7E+00	65.0E+00	109.1E+00	124.1E+00
Average	-	38.5E+00	83.3E+00	86.6E+00	-11.3E+00	94.4E+00	6.6E+00	25.3E+00	18.5E+00	-129.9E+00	-128.5E+00	-108.2E+00	-57.3E+00
Sigma	-	83.4E+00	83.0E+00	122.1E+00	19.3E+00	125.3E+00	65.6E+00	53.3E+00	65.3E+00	278.7E+00	336.6E+00	410.6E+00	427.1E+00

Measurements

AVS2_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	501.3	360.2	634.5	580.5	514.7	580.4	453.0	539.3	492.4	430.1	471.9	361.4	459.1
ON_TID samples													
33	520.1	520.1	579.9	429.1	482.4	504.0	598.4	571.1	606.7	585.8	320.5	532.4	679.5
34	513.7	518.2	531.5	570.8	513.5	564.0	492.4	276.2	499.6	788.6	557.0	386.1	761.7
35	517.2	517.2	431.0	431.0	500.9	437.8	429.5	429.5	497.9	479.5	436.4	414.3	419.4
Statistics													
Min	513.7	517.2	431.0	429.1	482.4	437.8	429.5	276.2	497.9	479.5	320.5	386.1	419.4
Max	520.1	520.1	579.9	570.8	513.5	564.0	598.4	571.1	606.7	788.6	557.0	532.4	761.7
Average	517.0	518.5	514.1	477.0	499.0	501.9	506.8	425.6	534.8	618.0	438.0	444.3	620.2
Sigma	2.6	1.2	62.0	66.3	12.8	51.5	69.7	120.4	50.9	128.2	96.5	63.4	145.9

Drift Calculation

AVS2_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	59.8E+00	-91.0E+00	-37.7E+00	-16.1E+00	78.3E+00	51.0E+00	86.6E+00	65.7E+00	-199.6E+00	12.3E+00	159.4E+00
34	-	4.5E+00	17.8E+00	57.1E+00	-168.0E-03	50.3E+00	-21.3E+00	-237.5E+00	-14.1E+00	274.9E+00	43.3E+00	-127.6E+00	248.0E+00
35	-	0.0E+00	-86.2E+00	-86.2E+00	-16.3E+00	-79.5E+00	-87.7E+00	-87.7E+00	-19.3E+00	-37.7E+00	-80.9E+00	-102.9E+00	-97.8E+00
Average	-	1.5E+00	-2.9E+00	-40.1E+00	-18.1E+00	-15.1E+00	-10.2E+00	-91.4E+00	17.7E+00	100.9E+00	-79.1E+00	-72.7E+00	103.2E+00
Sigma	-	2.1E+00	61.4E+00	68.7E+00	15.4E+00	53.0E+00	68.2E+00	117.8E+00	48.7E+00	130.1E+00	99.2E+00	61.0E+00	146.7E+00

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

AVS2_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	501.3	360.2	634.5	580.5	514.7	580.4	453.0	539.3	492.4	430.1	471.9	361.4	459.1
OFF_PROTON samples													
30	436.0	384.1	396.4	441.2	438.7	390.4	399.0	379.5	342.7	339.8	378.8	308.8	215.0
32	457.3	413.5	474.4	461.7	455.9	543.8	478.8	449.4	479.5	496.9	479.5	479.5	427.1
39	474.7	425.4	493.3	463.1	470.6	453.9	424.7	483.1	424.7	398.5	424.7	566.2	543.8
Statistics													
Min	436.0	384.1	396.4	441.2	438.7	390.4	399.0	379.5	342.7	339.8	378.8	308.8	215.0
Max	474.7	425.4	493.3	463.1	470.6	543.8	478.8	483.1	479.5	496.9	479.5	566.2	543.8
Average	456.0	407.7	454.7	455.3	455.1	462.7	434.2	437.3	415.6	411.7	427.7	451.5	395.3
Sigma	15.8	17.4	41.9	10.0	13.1	62.9	33.3	43.2	56.2	64.8	41.2	106.9	136.1

Drift Calculation

AVS2_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-52.0E+00	-39.6E+00	5.1E+00	2.6E+00	-45.7E+00	-37.1E+00	-56.6E+00	-93.4E+00	-96.3E+00	-57.2E+00	-127.2E+00	-221.0E+00
32	-	-43.8E+00	17.1E+00	4.3E+00	-1.4E+00	86.5E+00	21.5E+00	-8.0E+00	22.2E+00	39.6E+00	22.2E+00	22.2E+00	-30.2E+00
39	-	-49.3E+00	18.6E+00	-11.5E+00	-4.0E+00	-20.8E+00	-50.0E+00	8.5E+00	-50.0E+00	-76.2E+00	-50.0E+00	91.5E+00	69.1E+00
Average	-	-48.3E+00	-1.3E+00	-693.8E-03	-930.8E-03	6.7E+00	-21.9E+00	-18.7E+00	-40.4E+00	-44.3E+00	-28.3E+00	-4.5E+00	-60.7E+00
Sigma	-	3.4E+00	27.1E+00	7.7E+00	2.7E+00	57.3E+00	31.1E+00	27.6E+00	47.6E+00	59.9E+00	35.9E+00	91.3E+00	120.4E+00

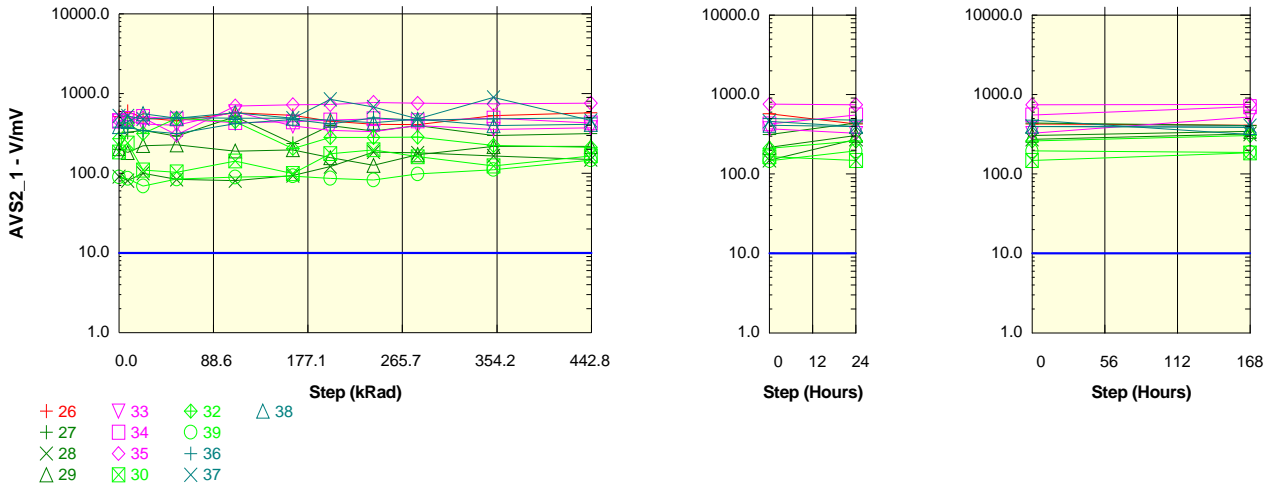
Measurements

AVS2_1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	501.3	360.2	634.5	580.5	514.7	580.4	453.0	539.3	492.4	430.1	471.9	361.4	459.1
OFF_TID samples													
36	538.8	538.8	549.4	468.7	555.6	425.9	463.2	470.7	479.5	508.5	499.0	377.5	415.6
37	528.2	528.2	470.5	559.7	573.3	465.4	435.6	497.9	532.5	532.5	499.0	499.8	467.5
38	560.5	430.5	550.7	518.3	519.8	538.9	588.6	596.1	524.7	532.5	583.1	485.4	453.0
Statistics													
Min	528.2	430.5	470.5	468.7	519.8	425.9	435.6	470.7	479.5	508.5	499.0	377.5	415.6
Max	560.5	538.8	550.7	559.7	573.3	538.9	588.6	596.1	532.5	532.5	583.1	499.8	467.5
Average	542.5	499.2	523.5	515.6	549.6	476.7	495.8	521.6	512.2	524.5	527.0	454.2	445.4
Sigma	13.5	48.7	37.5	37.2	22.3	46.8	66.6	53.8	23.4	11.3	39.7	54.6	21.9

Drift Calculation

AVS2_1DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	10.6E+00	-70.0E+00	16.8E+00	-112.9E+00	-75.5E+00	-68.1E+00	-59.3E+00	-30.2E+00	-39.8E+00	-161.3E+00	-123.2E+00
37	-	0.0E+00	-57.7E+00	31.5E+00	45.1E+00	-62.8E+00	-92.6E+00	-30.3E+00	4.4E+00	4.4E+00	-29.2E+00	-28.3E+00	-60.6E+00
38	-	-130.0E+00	-9.9E+00	-42.2E+00	-40.8E+00	-21.6E+00	28.1E+00	35.5E+00	-35.9E+00	-28.0E+00	22.6E+00	-75.2E+00	-107.5E+00
Average	-	-43.3E+00	-19.0E+00	-26.9E+00	7.1E+00	-65.8E+00	-46.7E+00	-20.9E+00	-30.3E+00	-18.0E+00	-15.5E+00	-88.3E+00	-97.1E+00
Sigma	-	61.3E+00	28.6E+00	42.9E+00	35.7E+00	37.3E+00	53.3E+00	42.8E+00	26.3E+00	15.8E+00	27.3E+00	55.1E+00	26.6E+00

Parameter : Voltage Gain : AVS2_1DUTB
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=10K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	513.7	595.2	498.9	457.3	575.3	537.4	453.0	414.3	409.3	530.9	575.9	430.1	414.3
ON_PROTON samples													
27	201.6	326.1	347.2	293.1	514.7	238.5	399.6	341.2	398.7	300.7	314.8	441.2	406.7
28	91.9	82.2	100.9	84.7	81.5	94.5	122.9	185.8	180.8	165.4	149.8	276.2	320.5
29	204.8	183.0	223.2	228.2	190.5	198.2	157.6	126.7	171.8	217.5	217.5	307.8	346.7
Statistics													
Min	91.9	82.2	100.9	84.7	81.5	94.5	122.9	126.7	171.8	165.4	149.8	276.2	320.5
Max	204.8	326.1	347.2	293.1	514.7	238.5	399.6	341.2	398.7	300.7	314.8	441.2	406.7
Average	166.1	197.1	223.8	202.0	262.2	177.1	226.7	217.9	250.4	227.9	227.4	341.8	358.0
Sigma	52.5	100.1	100.6	87.1	184.0	60.7	123.1	90.5	104.9	55.7	67.7	71.5	36.1

Drift Calculation

AVS2_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	124.5E+00	145.6E+00	91.5E+00	313.1E+00	36.9E+00	198.0E+00	139.6E+00	197.1E+00	99.0E+00	113.2E+00	239.6E+00	205.1E+00
28	-	-9.8E+00	9.0E+00	-7.3E+00	-10.4E+00	2.5E+00	31.0E+00	93.9E+00	88.9E+00	73.5E+00	57.9E+00	184.3E+00	228.6E+00
29	-	-21.9E+00	18.4E+00	23.4E+00	-14.4E+00	-6.6E+00	-47.2E+00	-78.2E+00	-33.0E+00	12.7E+00	12.7E+00	103.0E+00	141.8E+00
Average	-	30.9E+00	57.7E+00	35.9E+00	96.1E+00	11.0E+00	60.6E+00	51.8E+00	84.3E+00	61.7E+00	61.2E+00	175.6E+00	191.8E+00
Sigma	-	66.3E+00	62.3E+00	41.3E+00	153.5E+00	18.7E+00	102.3E+00	93.8E+00	94.0E+00	36.2E+00	41.1E+00	56.1E+00	36.6E+00

Measurements

AVS2_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	513.7	595.2	498.9	457.3	575.3	537.4	453.0	414.3	409.3	530.9	575.9	430.1	414.3
ON_TID samples													
33	459.6	459.6	416.7	403.2	592.7	393.1	346.7	335.6	398.0	357.0	373.3	326.7	522.7
34	452.4	487.1	513.7	480.3	434.7	444.5	466.2	486.1	459.4	493.4	430.1	557.0	707.8
35	455.7	455.7	498.0	304.9	698.6	724.4	730.1	772.2	757.0	747.0	759.1	746.7	753.0
Statistics													
Min	452.4	455.7	416.7	304.9	434.7	393.1	346.7	335.6	398.0	357.0	373.3	326.7	522.7
Max	459.6	487.1	513.7	480.3	698.6	724.4	730.1	772.2	757.0	747.0	759.1	746.7	753.0
Average	455.9	467.4	476.1	396.1	575.3	520.7	514.3	531.3	538.1	532.5	520.8	543.4	661.2
Sigma	2.9	14.0	42.5	71.8	108.4	145.6	160.2	181.1	156.8	161.6	170.1	171.7	99.6

Drift Calculation

AVS2_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-42.9E+00	-56.3E+00	133.2E+00	-66.4E+00	-112.9E+00	-124.0E+00	-61.5E+00	-102.6E+00	-86.2E+00	-132.9E+00	63.1E+00
34	-	34.8E+00	61.3E+00	27.9E+00	-17.7E+00	-7.8E+00	13.8E+00	33.7E+00	7.0E+00	41.0E+00	-22.3E+00	104.6E+00	255.5E+00
35	-	0.0E+00	42.4E+00	-150.8E+00	242.9E+00	268.8E+00	274.4E+00	316.5E+00	301.3E+00	291.4E+00	303.5E+00	291.0E+00	297.3E+00
Average	-	11.6E+00	20.3E+00	-59.7E+00	119.5E+00	64.9E+00	58.4E+00	75.4E+00	82.3E+00	76.6E+00	65.0E+00	87.6E+00	205.3E+00
Sigma	-	16.4E+00	45.3E+00	73.0E+00	106.8E+00	146.2E+00	161.2E+00	182.2E+00	157.4E+00	162.8E+00	170.6E+00	173.5E+00	102.0E+00

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

AVS2_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	513.7	595.2	498.9	457.3	575.3	537.4	453.0	414.3	409.3	530.9	575.9	430.1	414.3
OFF_PROTON samples													
30	185.6	240.4	110.3	104.5	143.7	99.9	177.5	198.5	161.8	124.7	166.3	149.2	185.7
32	273.7	431.0	315.7	490.7	446.7	205.9	283.1	283.1	285.4	224.7	213.2	261.3	306.7
39	91.0	86.8	70.2	85.5	90.4	93.6	87.5	83.1	99.0	112.3	147.9	196.9	188.0
Statistics													
Min	91.0	86.8	70.2	85.5	90.4	93.6	87.5	83.1	99.0	112.3	147.9	149.2	185.7
Max	273.7	431.0	315.7	490.7	446.7	205.9	283.1	283.1	285.4	224.7	213.2	261.3	306.7
Average	183.5	252.8	165.4	226.9	226.9	133.1	182.7	188.2	182.0	153.9	175.8	202.5	226.8
Sigma	74.6	140.8	107.6	186.7	156.9	51.5	80.0	82.0	77.4	50.3	27.5	45.9	56.5

Drift Calculation

AVS2_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	54.7E+00	-75.3E+00	-81.1E+00	-41.9E+00	-85.7E+00	-8.2E+00	12.8E+00	-23.9E+00	-61.0E+00	-19.4E+00	-36.4E+00	14.1E-03
32	-	157.3E+00	42.0E+00	217.0E+00	173.0E+00	-67.8E+00	9.4E+00	9.4E+00	11.6E+00	-49.0E+00	-60.5E+00	-12.4E+00	33.0E+00
39	-	-4.2E+00	-20.9E+00	-5.5E+00	-586.0E-03	2.5E+00	-3.5E+00	-7.9E+00	7.9E+00	21.3E+00	56.8E+00	105.9E+00	97.0E+00
Average	-	69.3E+00	-18.1E+00	43.4E+00	43.5E+00	-50.3E+00	-763.8E-03	4.8E+00	-1.4E+00	-29.6E+00	-7.7E+00	19.0E+00	43.3E+00
Sigma	-	66.7E+00	48.0E+00	126.5E+00	93.1E+00	38.1E+00	7.4E+00	9.1E+00	15.9E+00	36.3E+00	48.6E+00	62.2E+00	40.2E+00

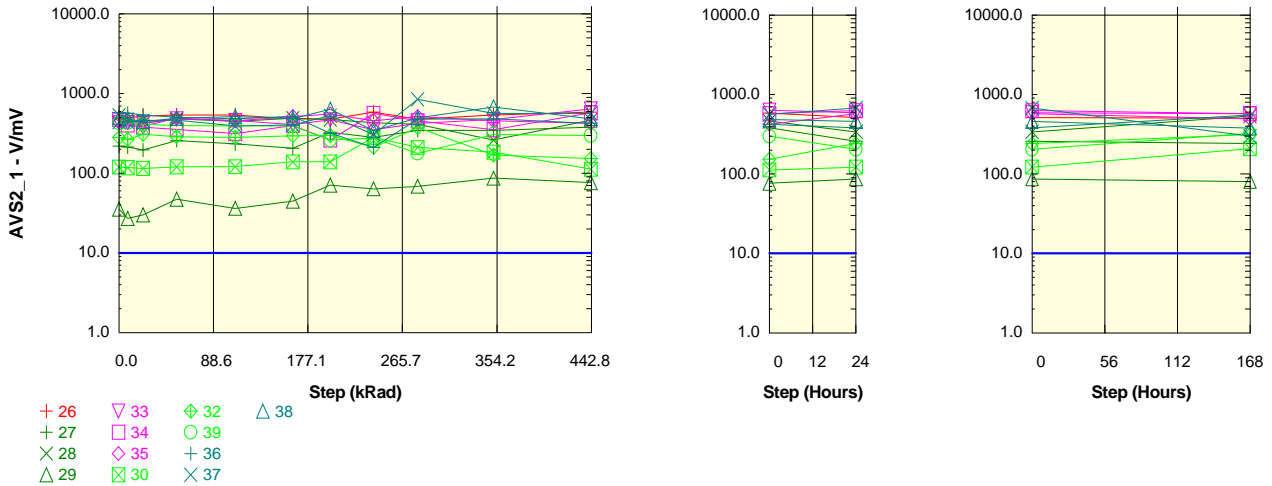
Measurements

AVS2_1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	513.7	595.2	498.9	457.3	575.3	537.4	453.0	414.3	409.3	530.9	575.9	430.1	414.3
OFF_TID samples													
36	381.5	381.5	344.0	315.8	420.8	475.9	417.7	498.5	466.3	485.4	499.8	477.5	314.6
37	525.9	525.9	479.6	502.7	490.6	492.4	849.4	679.5	485.4	896.9	461.8	396.9	404.5
38	385.0	445.9	559.7	490.8	577.4	490.1	465.4	432.5	477.5	396.9	412.3	398.5	385.8
Statistics													
Min	381.5	381.5	344.0	315.8	420.8	475.9	417.7	432.5	466.3	396.9	412.3	396.9	314.6
Max	525.9	525.9	559.7	502.7	577.4	492.4	849.4	679.5	485.4	896.9	499.8	477.5	404.5
Average	430.8	451.1	461.1	436.4	496.3	486.1	577.5	536.8	476.4	593.1	458.0	424.3	368.3
Sigma	67.3	59.1	89.0	85.5	64.1	7.3	193.2	104.4	7.8	217.9	35.8	37.6	38.7

Drift Calculation

AVS2_1DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-37.4E+00	-65.7E+00	39.3E+00	94.4E+00	36.2E+00	117.0E+00	84.8E+00	103.9E+00	118.4E+00	96.0E+00	-66.9E+00
37	-	0.0E+00	-46.4E+00	-23.2E+00	-35.4E+00	-33.6E+00	323.4E+00	153.5E+00	-40.6E+00	371.0E+00	-64.2E+00	-129.0E+00	-121.5E+00
38	-	60.9E+00	174.7E+00	105.8E+00	192.4E+00	105.1E+00	80.4E+00	47.5E+00	92.5E+00	11.9E+00	27.3E+00	13.5E+00	752.7E-03
Average	-	20.3E+00	30.3E+00	5.6E+00	65.5E+00	55.3E+00	146.7E+00	106.0E+00	45.6E+00	162.3E+00	27.2E+00	-6.5E+00	-62.5E+00
Sigma	-	28.7E+00	102.2E+00	72.9E+00	94.8E+00	63.0E+00	126.3E+00	44.0E+00	61.0E+00	152.3E+00	74.5E+00	92.9E+00	50.0E+00

Parameter : Voltage Gain : AVS2_1DUTC
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=10K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	486.4	495.2	525.2	540.3	538.8	486.6	478.5	585.8	478.5	539.3	585.8	514.8	507.1
ON_PROTON samples													
27	220.3	214.3	196.6	259.2	234.9	206.6	326.7	283.1	346.7	346.7	381.7	259.4	244.4
28	538.0	473.7	423.2	485.6	449.3	493.6	476.2	435.6	413.4	261.4	465.4	339.7	539.3
29	36.4	28.1	31.1	48.2	37.1	45.8	71.8	64.8	69.6	87.9	77.5	87.9	81.7
Statistics													
Min	36.4	28.1	31.1	48.2	37.1	45.8	71.8	64.8	69.6	87.9	77.5	87.9	81.7
Max	538.0	473.7	423.2	485.6	449.3	493.6	476.2	435.6	413.4	346.7	465.4	339.7	539.3
Average	264.9	238.7	217.0	264.3	240.4	248.7	291.6	261.2	276.6	232.0	308.2	229.0	288.5
Sigma	207.2	182.7	160.7	178.6	168.3	185.2	167.0	152.2	148.8	107.7	166.7	105.0	189.4

Drift Calculation

AVS2_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-6.0E+00	-23.8E+00	38.8E+00	14.6E+00	-13.7E+00	106.4E+00	62.8E+00	126.3E+00	126.4E+00	161.4E+00	39.0E+00	24.1E+00
28	-	-64.3E+00	-114.8E+00	-52.4E+00	-88.7E+00	-44.4E+00	-61.8E+00	-102.5E+00	-124.6E+00	-276.7E+00	-72.6E+00	-198.3E+00	1.3E+00
29	-	-8.3E+00	-5.3E+00	11.7E+00	685.9E-03	9.4E+00	35.4E+00	28.3E+00	33.2E+00	51.5E+00	41.0E+00	51.5E+00	45.3E+00
Average	-	-26.2E+00	-48.0E+00	-610.3E-03	-24.5E+00	-16.3E+00	26.6E+00	-3.8E+00	11.7E+00	-32.9E+00	43.3E+00	-35.9E+00	23.6E+00
Sigma	-	26.9E+00	47.9E+00	38.3E+00	45.8E+00	22.0E+00	68.9E+00	71.2E+00	103.6E+00	175.0E+00	95.6E+00	114.9E+00	18.0E+00

Measurements

AVS2_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	486.4	495.2	525.2	540.3	538.8	486.6	478.5	585.8	478.5	539.3	585.8	514.8	507.1
ON_TID samples													
33	434.0	434.0	430.5	482.0	462.2	410.3	471.2	353.9	424.7	474.0	641.0	595.1	575.9
34	474.1	404.7	381.1	357.1	315.5	398.6	261.3	566.3	459.1	353.9	575.9	629.2	575.9
35	441.2	441.2	390.6	490.2	455.2	518.4	555.0	459.1	514.8	459.1	424.7	575.9	499.6
Statistics													
Min	434.0	404.7	381.1	357.1	315.5	398.6	261.3	353.9	424.7	353.9	424.7	575.9	499.6
Max	474.1	441.2	430.5	490.2	462.2	518.4	555.0	566.3	514.8	474.0	641.0	629.2	575.9
Average	449.8	426.6	400.8	443.1	411.0	442.4	429.2	459.8	466.2	429.0	547.2	600.0	550.4
Sigma	17.4	15.8	21.4	60.9	67.6	53.9	123.5	86.7	37.1	53.4	90.6	22.1	35.9

Drift Calculation

AVS2_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-3.5E+00	48.0E+00	28.2E+00	-23.7E+00	37.1E+00	-80.1E+00	-9.3E+00	40.0E+00	207.0E+00	161.0E+00	141.8E+00
34	-	-69.4E+00	-93.0E+00	-116.9E+00	-158.6E+00	-75.5E+00	-212.7E+00	92.2E+00	-15.0E+00	-120.2E+00	101.8E+00	155.1E+00	101.8E+00
35	-	0.0E+00	-50.6E+00	49.0E+00	14.0E+00	77.2E+00	113.8E+00	17.9E+00	73.6E+00	17.9E+00	-16.5E+00	134.7E+00	58.5E+00
Average	-	-23.1E+00	-49.0E+00	-6.6E+00	-38.8E+00	-7.3E+00	-20.6E+00	10.0E+00	16.4E+00	-20.8E+00	97.4E+00	150.3E+00	100.7E+00
Sigma	-	32.7E+00	36.6E+00	78.0E+00	84.9E+00	63.4E+00	139.4E+00	70.6E+00	40.5E+00	70.9E+00	91.3E+00	11.3E+00	34.0E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS2_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	486.4	495.2	525.2	540.3	538.8	486.6	478.5	585.8	478.5	539.3	585.8	514.8	507.1
OFF_PROTON samples													
30	121.0	118.6	115.8	121.1	122.1	139.8	139.7	283.1	212.3	184.9	113.5	123.4	208.9
32	282.0	268.2	310.2	289.2	282.7	297.6	298.5	212.3	377.5	169.9	154.4	242.7	314.6
39	425.7	430.1	414.3	397.4	395.7	393.1	261.3	279.5	178.8	308.9	299.5	206.2	326.7
Statistics													
Min	121.0	118.6	115.8	121.1	122.1	139.8	139.7	212.3	178.8	169.9	113.5	123.4	208.9
Max	425.7	430.1	414.3	397.4	395.7	393.1	298.5	283.1	377.5	308.9	299.5	242.7	326.7
Average	276.2	272.3	280.1	269.3	266.8	276.8	233.2	258.3	256.2	221.2	189.1	190.8	283.4
Sigma	124.5	127.2	123.7	113.7	112.3	104.5	67.8	32.5	86.8	62.3	79.8	49.9	52.9

Drift Calculation

AVS2_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-2.4E+00	-5.1E+00	170.9E-03	1.1E+00	18.8E+00	18.8E+00	162.2E+00	91.4E+00	64.0E+00	-7.4E+00	2.5E+00	87.9E+00
32	-	-13.8E+00	28.3E+00	7.3E+00	743.6E-03	15.6E+00	16.5E+00	-69.6E+00	95.5E+00	-112.1E+00	-127.5E+00	-39.3E+00	32.6E+00
39	-	4.4E+00	-11.4E+00	-28.2E+00	-30.0E+00	-32.6E+00	-164.3E+00	-146.2E+00	-246.8E+00	-116.8E+00	-126.2E+00	-219.5E+00	-99.0E+00
Average	-	-3.9E+00	3.9E+00	-6.9E+00	-9.4E+00	604.6E-03	-43.0E+00	-17.9E+00	-20.0E+00	-55.0E+00	-87.0E+00	-85.4E+00	7.2E+00
Sigma	-	7.5E+00	17.4E+00	15.3E+00	14.6E+00	23.5E+00	85.8E+00	131.1E+00	160.4E+00	84.1E+00	56.3E+00	96.3E+00	78.4E+00

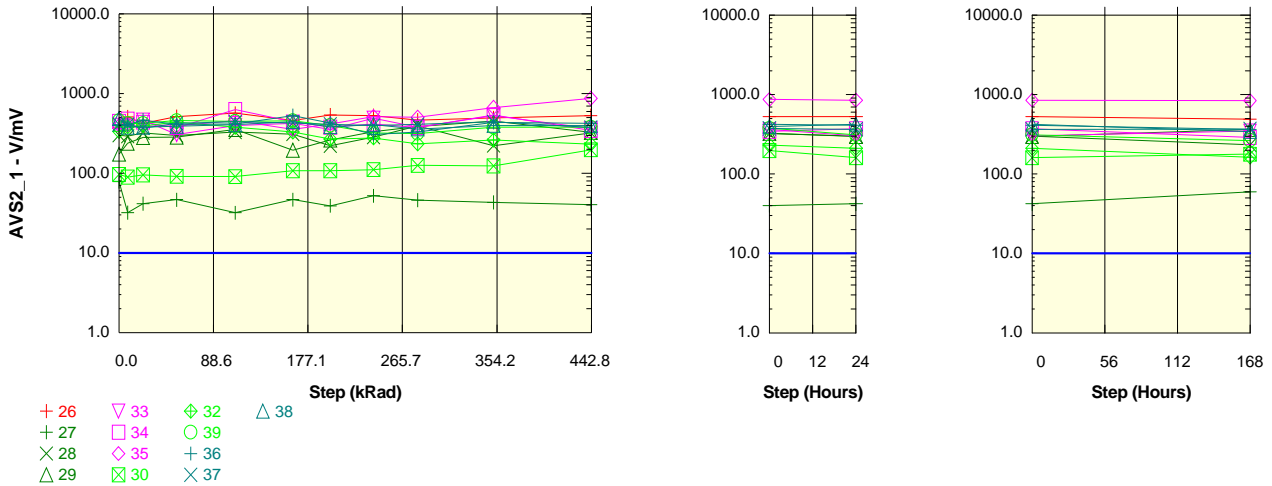
Measurements

AVS2_1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	486.4	495.2	525.2	540.3	538.8	486.6	478.5	585.8	478.5	539.3	585.8	514.8	507.1
OFF_TID samples													
36	568.2	568.2	542.7	506.8	484.5	522.9	320.5	212.3	479.5	485.4	424.7	383.1	557.0
37	441.2	441.2	459.6	467.6	393.5	405.3	530.9	308.9	849.4	566.3	566.3	679.5	300.7
38	500.0	482.0	445.6	493.0	514.7	488.3	638.6	342.7	499.0	679.5	485.4	461.3	377.5
Statistics													
Min	441.2	441.2	445.6	467.6	393.5	405.3	320.5	212.3	479.5	485.4	424.7	383.1	300.7
Max	568.2	568.2	542.7	506.8	514.7	522.9	638.6	342.7	849.4	679.5	566.3	679.5	557.0
Average	503.1	497.1	482.6	489.1	464.3	472.2	496.7	288.0	609.3	577.0	492.1	508.0	411.7
Sigma	51.9	52.9	42.9	16.2	51.5	49.3	132.1	55.2	170.0	79.6	58.0	125.4	107.4

Drift Calculation

AVS2_1DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-25.4E+00	-61.4E+00	-83.7E+00	-45.3E+00	-247.7E+00	-355.8E+00	-88.7E+00	-82.8E+00	-143.5E+00	-185.0E+00	-11.2E+00
37	-	0.0E+00	18.4E+00	26.5E+00	-47.6E+00	-35.9E+00	89.7E+00	-132.3E+00	408.2E+00	125.1E+00	125.1E+00	238.4E+00	-140.5E+00
38	-	-18.0E+00	-54.4E+00	-7.0E+00	14.7E+00	-11.7E+00	138.6E+00	-157.3E+00	-1.0E+00	179.5E+00	-14.6E+00	-38.7E+00	-122.5E+00
Average	-	-6.0E+00	-20.5E+00	-14.0E+00	-38.9E+00	-31.0E+00	-6.5E+00	-215.2E+00	106.1E+00	73.9E+00	-11.0E+00	4.9E+00	-91.4E+00
Sigma	-	8.5E+00	29.9E+00	36.2E+00	40.6E+00	14.1E+00	171.7E+00	100.0E+00	216.6E+00	113.0E+00	109.7E+00	175.6E+00	57.2E+00

Parameter : Voltage Gain : AVS2_1DUTD
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=10K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	375.4	511.6	426.1	517.2	568.6	462.4	539.3	530.9	465.4	499.6	530.9	530.9	492.4
ON_PROTON samples													
27	79.4	33.1	42.5	47.6	32.9	47.7	40.1	53.1	46.9	44.1	41.2	43.2	60.5
28	302.4	292.4	323.3	298.3	329.5	311.5	222.1	285.5	395.1	223.5	323.6	300.7	234.3
29	174.4	238.9	281.8	284.7	355.6	195.4	261.3	333.1	386.1	453.0	326.7	298.7	365.3
Statistics													
Min	79.4	33.1	42.5	47.6	32.9	47.7	40.1	53.1	46.9	44.1	41.2	43.2	60.5
Max	302.4	292.4	323.3	298.3	355.6	311.5	261.3	333.1	395.1	453.0	326.7	300.7	365.3
Average	185.4	188.1	215.9	210.2	239.4	184.9	174.5	223.9	276.0	240.2	230.5	214.2	220.1
Sigma	91.4	111.8	123.8	115.1	146.4	108.0	96.4	122.3	162.1	167.4	133.8	120.9	124.8

Drift Calculation

AVS2_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-46.4E+00	-37.0E+00	-31.9E+00	-46.5E+00	-31.8E+00	-39.4E+00	-26.4E+00	-32.6E+00	-35.4E+00	-38.2E+00	-36.3E+00	-18.9E+00
28	-	-10.1E+00	20.9E+00	-4.1E+00	27.1E+00	9.1E+00	-80.4E+00	-16.9E+00	92.6E+00	-78.9E+00	21.2E+00	-1.8E+00	-68.1E+00
29	-	64.4E+00	107.4E+00	110.2E+00	181.2E+00	21.0E+00	86.9E+00	158.7E+00	211.7E+00	278.6E+00	152.3E+00	124.3E+00	190.9E+00
Average	-	2.7E+00	30.4E+00	24.7E+00	53.9E+00	-575.2E-03	-10.9E+00	38.5E+00	90.6E+00	54.8E+00	45.1E+00	28.7E+00	34.6E+00
Sigma	-	46.1E+00	59.3E+00	61.5E+00	94.9E+00	22.6E+00	71.2E+00	85.1E+00	99.7E+00	159.2E+00	79.6E+00	69.0E+00	112.3E+00

Measurements

AVS2_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	375.4	511.6	426.1	517.2	568.6	462.4	539.3	530.9	465.4	499.6	530.9	530.9	492.4
ON_TID samples													
33	403.2	403.2	467.6	307.4	399.2	425.2	357.6	492.4	381.7	530.9	365.3	303.3	350.3
34	449.6	480.2	440.1	375.0	631.0	444.5	381.7	417.7	377.5	539.3	346.7	373.3	290.4
35	398.9	398.9	391.4	396.0	461.3	355.6	419.4	513.4	507.1	671.8	871.1	849.8	835.6
Statistics													
Min	398.9	398.9	391.4	307.4	399.2	355.6	357.6	417.7	377.5	530.9	346.7	303.3	290.4
Max	449.6	480.2	467.6	396.0	631.0	444.5	419.4	513.4	507.1	671.8	871.1	849.8	835.6
Average	417.3	427.4	433.1	359.5	497.2	408.5	386.3	474.5	422.1	580.6	527.7	508.8	492.1
Sigma	23.0	37.3	31.5	37.8	98.0	38.2	25.4	41.1	60.1	64.5	242.9	242.8	244.1

Drift Calculation

AVS2_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	64.4E+00	-95.8E+00	-4.0E+00	22.0E+00	-45.6E+00	89.2E+00	-21.5E+00	127.6E+00	-37.9E+00	-99.9E+00	-53.0E+00
34	-	30.5E+00	-9.5E+00	-74.6E+00	181.3E+00	-5.1E+00	-67.9E+00	-31.9E+00	-72.1E+00	89.7E+00	-103.0E+00	-76.3E+00	-159.3E+00
35	-	0.0E+00	-7.5E+00	-2.9E+00	62.4E+00	-43.3E+00	20.5E+00	114.5E+00	108.2E+00	272.9E+00	472.2E+00	450.9E+00	436.6E+00
Average	-	10.2E+00	15.8E+00	-57.8E+00	79.9E+00	-8.8E+00	-31.0E+00	57.3E+00	4.8E+00	163.4E+00	110.4E+00	91.6E+00	74.8E+00
Sigma	-	14.4E+00	34.4E+00	39.7E+00	76.7E+00	26.8E+00	37.5E+00	63.9E+00	75.9E+00	79.0E+00	257.2E+00	254.3E+00	259.5E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS2_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	375.4	511.6	426.1	517.2	568.6	462.4	539.3	530.9	465.4	499.6	530.9	530.9	492.4
OFF_PROTON samples													
30	97.9	90.5	96.6	92.3	92.1	108.9	108.7	112.3	126.5	124.7	198.5	161.8	178.8
32	337.8	384.1	394.2	441.0	378.0	329.5	269.9	278.8	235.9	261.4	232.8	212.3	164.1
39	459.1	421.3	423.2	459.9	449.4	459.1	399.9	321.3	317.2	379.5	378.8	312.3	265.4
Statistics													
Min	97.9	90.5	96.6	92.3	92.1	108.9	108.7	112.3	126.5	124.7	198.5	161.8	164.1
Max	459.1	421.3	423.2	459.9	449.4	459.1	399.9	321.3	317.2	379.5	378.8	312.3	265.4
Average	298.3	298.6	304.7	331.0	306.5	299.2	259.5	237.5	226.5	255.2	270.0	228.8	202.8
Sigma	150.1	148.0	147.6	169.0	154.3	144.6	119.1	90.2	78.1	104.1	78.2	62.6	44.7

Drift Calculation

AVS2_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-7.5E+00	-1.4E+00	-5.6E+00	-5.8E+00	11.0E+00	10.8E+00	14.4E+00	28.6E+00	26.8E+00	100.6E+00	63.9E+00	80.9E+00
32	-	46.3E+00	56.4E+00	103.1E+00	40.1E+00	-8.3E+00	-68.0E+00	-59.0E+00	-101.9E+00	-76.5E+00	-105.1E+00	-125.5E+00	-173.7E+00
39	-	-37.7E+00	-35.8E+00	825.4E-03	-9.7E+00	54.8E-03	-59.2E+00	-137.7E+00	-141.9E+00	-79.6E+00	-80.2E+00	-146.7E+00	-193.6E+00
Average	-	365.3E-03	6.4E+00	32.8E+00	8.2E+00	903.4E-03	-38.8E+00	-60.8E+00	-71.7E+00	-43.1E+00	-28.3E+00	-69.4E+00	-95.5E+00
Sigma	-	34.7E+00	38.0E+00	49.8E+00	22.6E+00	7.9E+00	35.3E+00	62.1E+00	72.8E+00	49.5E+00	91.6E+00	94.7E+00	125.0E+00

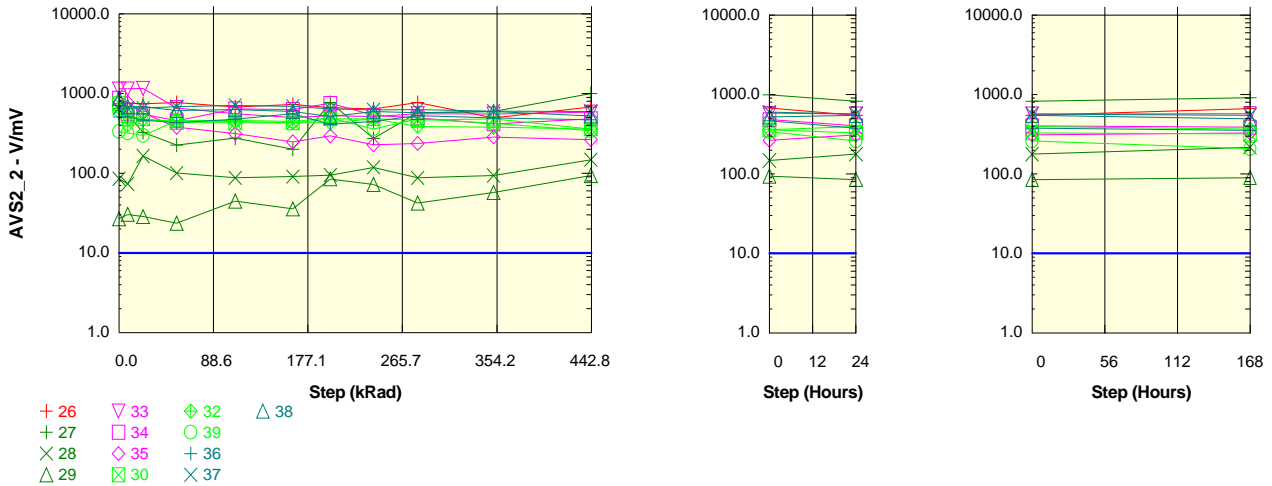
Measurements

AVS2_1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	375.4	511.6	426.1	517.2	568.6	462.4	539.3	530.9	465.4	499.6	530.9	530.9	492.4
OFF_TID samples													
36	410.7	410.7	468.7	413.0	418.1	530.9	430.1	308.9	332.5	435.9	424.7	412.3	367.5
37	410.3	410.3	371.3	425.2	442.8	429.6	414.3	399.9	412.3	442.7	377.2	366.3	369.3
38	488.3	381.9	381.1	391.0	407.5	447.0	385.5	408.9	361.4	399.8	399.9	424.7	343.2
Statistics													
Min	410.3	381.9	371.3	391.0	407.5	429.6	385.5	308.9	332.5	399.8	377.2	366.3	343.2
Max	488.3	410.7	468.7	425.2	442.8	530.9	430.1	408.9	412.3	442.7	424.7	424.7	369.3
Average	436.4	401.0	407.0	409.7	422.8	469.2	410.0	372.5	368.7	426.1	400.6	401.1	360.0
Sigma	36.7	13.5	43.8	14.1	14.8	44.2	18.5	45.2	33.0	18.8	19.4	25.1	11.9

Drift Calculation

AVS2_1DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	58.0E+00	2.3E+00	7.3E+00	120.1E+00	19.3E+00	-101.9E+00	-78.2E+00	25.2E+00	13.9E+00	1.6E+00	-43.2E+00
37	-	0.0E+00	-39.0E+00	14.9E+00	32.5E+00	19.3E+00	4.0E+00	-10.4E+00	2.1E+00	32.4E+00	-33.1E+00	-44.0E+00	-41.0E+00
38	-	-106.4E+00	-107.2E+00	-97.3E+00	-80.8E+00	-41.2E+00	-102.8E+00	-79.4E+00	-126.9E+00	-88.4E+00	-88.4E+00	-63.6E+00	-145.1E+00
Average	-	-35.5E+00	-29.4E+00	-26.7E+00	-13.7E+00	32.7E+00	-26.5E+00	-63.9E+00	-67.7E+00	-10.3E+00	-35.8E+00	-35.3E+00	-76.4E+00
Sigma	-	50.2E+00	67.8E+00	50.2E+00	48.6E+00	66.6E+00	54.3E+00	38.9E+00	53.2E+00	55.3E+00	41.8E+00	27.3E+00	48.6E+00

Parameter : Voltage Gain : AVS2_2DUTA
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=2K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	649.9	760.6	744.6	777.6	679.2	732.6	666.2	641.0	772.2	499.6	679.5	548.0	666.2
ON_PROTON samples													
27	745.5	543.5	328.9	227.1	278.0	201.6	772.2	274.0	575.9	596.1	999.3	828.7	913.4
28	86.4	74.7	165.9	101.4	88.5	91.8	96.0	119.4	88.6	95.1	149.4	178.5	218.0
29	27.8	31.3	29.5	24.6	45.7	36.6	86.1	73.3	43.2	58.4	95.1	86.2	91.0
Statistics													
Min	27.8	31.3	29.5	24.6	45.7	36.6	86.1	73.3	43.2	58.4	95.1	86.2	91.0
Max	745.5	543.5	328.9	227.1	278.0	201.6	772.2	274.0	575.9	596.1	999.3	828.7	913.4
Average	286.6	216.5	174.8	117.7	137.4	110.0	318.1	155.6	235.9	249.8	414.6	364.5	407.5
Sigma	325.4	231.9	122.4	83.5	100.9	68.6	321.1	85.8	241.1	245.3	414.1	330.4	361.5

Drift Calculation

AVS2_2DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-202.0E+00	-416.6E+00	-518.4E+00	-467.5E+00	-543.9E+00	26.6E+00	-471.5E+00	-169.7E+00	-149.5E+00	253.8E+00	83.2E+00	167.9E+00
28	-	-11.7E+00	79.5E+00	15.0E+00	2.1E+00	5.4E+00	9.5E+00	33.0E+00	2.2E+00	8.7E+00	63.0E+00	92.1E+00	131.6E+00
29	-	3.5E+00	1.7E+00	-3.2E+00	17.9E+00	8.8E+00	58.3E+00	45.5E+00	15.4E+00	30.6E+00	67.2E+00	58.4E+00	63.2E+00
Average	-	-70.1E+00	-111.8E+00	-168.9E+00	-149.2E+00	-176.6E+00	31.5E+00	-131.0E+00	-50.7E+00	-36.7E+00	128.0E+00	77.9E+00	120.9E+00
Sigma	-	93.5E+00	217.8E+00	247.3E+00	225.2E+00	259.7E+00	20.2E+00	240.9E+00	84.3E+00	80.2E+00	89.0E+00	14.3E+00	43.4E+00

Measurements

AVS2_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	649.9	760.6	744.6	777.6	679.2	732.6	666.2	641.0	772.2	499.6	679.5	548.0	666.2
ON_TID samples													
33	1146.8	1146.8	1158.7	664.9	558.9	501.5	528.7	517.7	559.0	558.3	585.8	572.2	579.5
34	872.1	560.5	553.4	456.2	645.5	631.0	758.4	536.4	496.0	418.0	485.4	404.5	390.5
35	778.0	778.0	568.2	378.8	315.5	248.2	296.0	228.7	238.6	285.8	266.3	313.5	330.1
Statistics													
Min	778.0	560.5	553.4	378.8	315.5	248.2	296.0	228.7	238.6	285.8	266.3	313.5	330.1
Max	1146.8	1146.8	1158.7	664.9	645.5	631.0	758.4	536.4	559.0	558.3	585.8	572.2	579.5
Average	932.3	828.4	760.1	500.0	506.6	460.2	527.7	427.6	431.2	420.7	445.8	430.0	433.4
Sigma	156.5	242.0	281.9	120.8	139.7	159.0	188.8	140.9	138.6	111.3	133.4	107.1	106.2

Drift Calculation

AVS2_2DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	11.9E+00	-481.9E+00	-587.9E+00	-645.3E+00	-618.1E+00	-629.1E+00	-587.8E+00	-588.5E+00	-561.0E+00	-574.6E+00	-567.3E+00
34	-	-311.6E+00	-318.7E+00	-415.9E+00	-226.5E+00	-241.1E+00	-113.7E+00	-335.7E+00	-376.1E+00	-454.1E+00	-386.7E+00	-467.6E+00	-481.6E+00
35	-	0.0E+00	-209.8E+00	-399.2E+00	-462.5E+00	-529.8E+00	-482.1E+00	-549.3E+00	-539.4E+00	-492.2E+00	-511.7E+00	-464.5E+00	-447.9E+00
Average	-	-103.9E+00	-172.2E+00	-432.3E+00	-425.7E+00	-472.1E+00	-404.6E+00	-504.7E+00	-501.1E+00	-511.6E+00	-486.5E+00	-502.3E+00	-498.9E+00
Sigma	-	146.9E+00	137.6E+00	35.7E+00	149.8E+00	170.0E+00	213.1E+00	123.8E+00	90.6E+00	56.5E+00	73.4E+00	51.2E+00	50.3E+00

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

AVS2_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	649.9	760.6	744.6	777.6	679.2	732.6	666.2	641.0	772.2	499.6	679.5	548.0	666.2
OFF_PROTON samples													
30	749.6	528.2	486.8	434.4	431.8	430.1	485.4	485.4	466.2	483.1	361.8	332.3	320.5
32	585.9	403.2	475.0	454.5	447.9	435.6	432.5	485.4	388.7	378.8	361.3	398.5	370.7
39	334.8	321.8	299.5	455.9	459.4	449.4	496.9	361.3	485.4	424.7	342.7	261.4	209.3
Statistics													
Min	334.8	321.8	299.5	434.4	431.8	430.1	432.5	361.3	388.7	378.8	342.7	261.4	209.3
Max	749.6	528.2	486.8	455.9	459.4	449.4	496.9	485.4	485.4	483.1	361.8	398.5	370.7
Average	556.8	417.7	420.4	448.3	446.4	438.3	471.6	444.0	446.8	428.9	355.3	330.7	300.2
Sigma	170.6	84.9	85.7	9.8	11.3	8.1	28.0	58.5	41.8	42.7	8.9	56.0	67.4

Drift Calculation

AVS2_2DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-221.5E+00	-262.8E+00	-315.2E+00	-317.9E+00	-319.6E+00	-264.3E+00	-264.3E+00	-283.4E+00	-266.5E+00	-387.9E+00	-417.3E+00	-429.1E+00
32	-	-182.7E+00	-110.9E+00	-131.4E+00	-138.0E+00	-150.4E+00	-153.4E+00	-100.6E+00	-197.2E+00	-207.1E+00	-224.6E+00	-187.5E+00	-215.2E+00
39	-	-13.1E+00	-35.4E+00	121.0E+00	124.5E+00	114.5E+00	162.1E+00	26.5E+00	150.5E+00	89.9E+00	7.9E+00	-73.5E+00	-125.5E+00
Average	-	-139.1E+00	-136.4E+00	-108.5E+00	-110.4E+00	-118.5E+00	-85.2E+00	-112.8E+00	-110.0E+00	-127.9E+00	-201.5E+00	-226.1E+00	-256.6E+00
Sigma	-	90.5E+00	94.6E+00	178.8E+00	181.7E+00	178.7E+00	180.6E+00	119.0E+00	187.6E+00	155.9E+00	162.4E+00	143.0E+00	127.4E+00

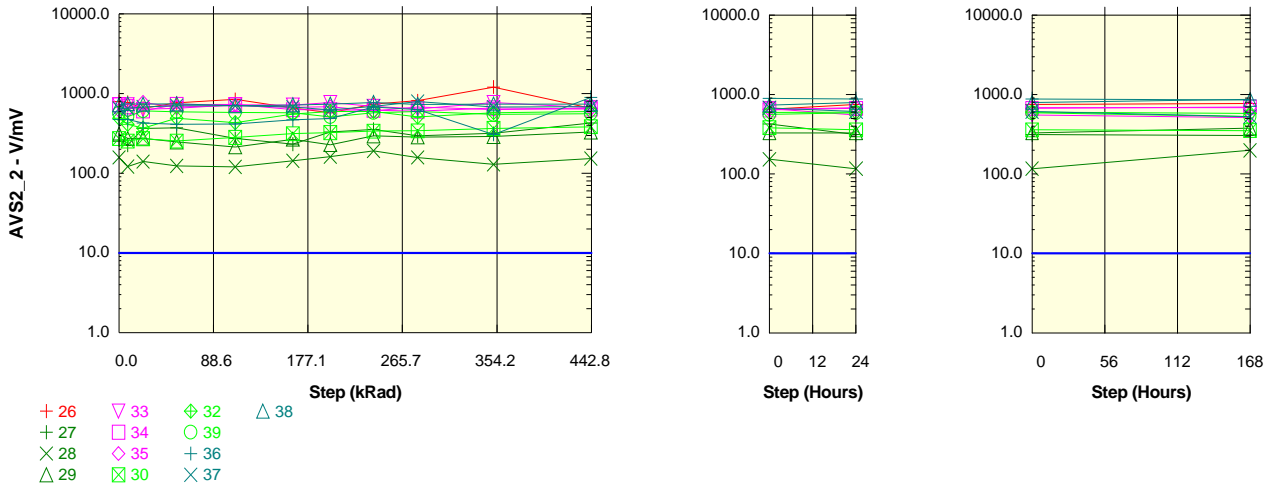
Measurements

AVS2_2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	649.9	760.6	744.6	777.6	679.2	732.6	666.2	641.0	772.2	499.6	679.5	548.0	666.2
OFF_TID samples													
36	511.6	511.6	465.3	435.3	479.4	563.2	414.3	449.4	532.5	499.0	469.9	379.5	357.6
37	657.9	657.9	660.2	688.9	715.0	694.1	644.3	626.5	632.3	603.0	599.9	568.0	548.0
38	866.0	691.9	688.1	616.8	634.0	596.1	514.8	598.5	577.5	599.0	524.7	549.4	495.4
Statistics													
Min	511.6	511.6	465.3	435.3	479.4	563.2	414.3	449.4	532.5	499.0	469.9	379.5	357.6
Max	866.0	691.9	688.1	688.9	715.0	694.1	644.3	626.5	632.3	603.0	599.9	568.0	548.0
Average	678.5	620.5	604.5	580.3	609.5	617.8	524.5	558.1	580.8	567.0	531.5	498.9	467.0
Sigma	145.4	78.2	99.1	106.7	97.7	55.6	94.1	77.7	40.8	48.1	53.3	84.8	80.3

Drift Calculation

AVS2_2DU TA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-46.3E+00	-76.3E+00	-32.1E+00	51.7E+00	-97.3E+00	-62.2E+00	20.9E+00	-12.6E+00	-41.7E+00	-132.1E+00	-154.0E+00
37	-	0.0E+00	2.3E+00	31.0E+00	57.1E+00	36.2E+00	-13.6E+00	-31.4E+00	-25.6E+00	-54.9E+00	-58.0E+00	-89.9E+00	-109.9E+00
38	-	-174.2E+00	-178.0E+00	-249.2E+00	-232.1E+00	-270.0E+00	-351.3E+00	-267.6E+00	-288.5E+00	-267.1E+00	-341.4E+00	-316.7E+00	-370.6E+00
Average	-	-58.1E+00	-74.0E+00	-98.2E+00	-69.0E+00	-60.7E+00	-154.0E+00	-120.4E+00	-97.7E+00	-111.5E+00	-147.0E+00	-179.6E+00	-211.5E+00
Sigma	-	82.1E+00	76.2E+00	115.4E+00	120.9E+00	148.1E+00	143.6E+00	104.8E+00	136.3E+00	111.3E+00	137.6E+00	98.5E+00	113.9E+00

Parameter : Voltage Gain : AVS2_2DUTB
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=2K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	797.9	776.9	657.9	765.3	846.8	663.0	575.8	738.6	813.4	1213.4	653.4	755.0	772.2
ON_PROTON samples													
27	262.5	227.3	367.6	372.1	274.5	232.9	330.1	357.6	296.0	317.7	430.1	314.6	306.7
28	158.9	122.9	141.1	124.7	121.3	144.4	161.8	192.4	158.4	130.1	153.9	117.8	199.3
29	309.9	274.4	276.1	248.1	215.6	268.2	229.9	295.1	285.8	290.5	330.9	330.9	379.5
Statistics													
Min	158.9	122.9	141.1	124.7	121.3	144.4	161.8	192.4	158.4	130.1	153.9	117.8	199.3
Max	309.9	274.4	367.6	372.1	274.5	268.2	330.1	357.6	296.0	317.7	430.1	330.9	379.5
Average	243.8	208.2	261.6	248.3	203.8	215.2	240.6	281.7	246.7	246.1	305.0	254.4	295.2
Sigma	63.1	63.3	93.0	101.0	63.1	52.1	69.1	68.1	62.6	82.8	114.2	96.8	74.0

Drift Calculation

AVS2_2DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-35.2E+00	105.2E+00	109.6E+00	12.0E+00	-29.6E+00	67.6E+00	95.2E+00	33.5E+00	55.3E+00	167.6E+00	52.1E+00	44.2E+00
28	-	-36.0E+00	-17.8E+00	-34.2E+00	-37.6E+00	-14.5E+00	2.9E+00	33.5E+00	-468.4E-03	-28.8E+00	-5.0E+00	-41.1E+00	40.4E+00
29	-	-35.5E+00	-33.9E+00	-61.9E+00	-94.3E+00	-41.7E+00	-80.1E+00	-14.9E+00	-24.2E+00	-19.4E+00	21.0E+00	20.9E+00	69.6E+00
Average	-	-35.6E+00	17.8E+00	4.5E+00	-40.0E+00	-28.6E+00	-3.2E+00	37.9E+00	3.0E+00	2.3E+00	61.2E+00	10.6E+00	51.4E+00
Sigma	-	349.2E-03	62.1E+00	75.2E+00	43.4E+00	11.1E+00	60.4E+00	45.0E+00	23.7E+00	37.6E+00	76.0E+00	38.8E+00	12.9E+00

Measurements

AVS2_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	797.9	776.9	657.9	765.3	846.8	663.0	575.8	738.6	813.4	1213.4	653.4	755.0	772.2
ON_TID samples													
33	729.6	729.6	635.7	657.9	724.4	719.1	771.2	695.1	641.0	772.2	666.2	557.0	514.8
34	723.9	689.4	604.8	731.1	729.4	630.1	626.7	617.7	604.5	661.8	643.2	671.6	698.6
35	620.9	620.9	778.0	678.8	714.7	674.5	686.1	608.9	679.5	628.7	648.0	690.1	685.8
Statistics													
Min	620.9	620.9	604.8	657.9	714.7	630.1	626.7	608.9	604.5	628.7	643.2	557.0	514.8
Max	729.6	729.6	778.0	731.1	729.4	719.1	771.2	695.1	679.5	772.2	666.2	690.1	698.6
Average	691.5	679.9	672.9	689.3	722.9	674.6	694.6	640.6	641.7	687.5	652.5	639.6	633.1
Sigma	50.0	44.9	75.4	30.8	6.1	36.3	59.3	38.7	30.6	61.3	9.9	58.9	83.8

Drift Calculation

AVS2_2DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-93.9E+00	-71.7E+00	-5.1E+00	-10.5E+00	41.6E+00	-34.5E+00	-88.5E+00	42.6E+00	-63.3E+00	-172.6E+00	-214.8E+00
34	-	-34.5E+00	-119.1E+00	7.2E+00	5.5E+00	-93.8E+00	-97.3E+00	-106.2E+00	-119.5E+00	-62.2E+00	-80.8E+00	-52.3E+00	-25.3E+00
35	-	0.0E+00	157.1E+00	57.9E+00	93.9E+00	53.6E+00	65.2E+00	-11.9E+00	58.6E+00	7.8E+00	27.1E+00	69.3E+00	64.9E+00
Average	-	-11.5E+00	-18.6E+00	-2.2E+00	31.4E+00	-16.9E+00	3.2E+00	-50.9E+00	-49.8E+00	-3.9E+00	-39.0E+00	-51.9E+00	-58.4E+00
Sigma	-	16.3E+00	124.7E+00	53.3E+00	44.4E+00	60.4E+00	71.7E+00	40.2E+00	77.7E+00	43.6E+00	47.3E+00	98.7E+00	116.6E+00

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

AVS2_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	797.9	776.9	657.9	765.3	846.8	663.0	575.8	738.6	813.4	1213.4	653.4	755.0	772.2
OFF_PROTON samples													
30	275.0	255.1	273.4	254.5	283.6	314.6	324.7	339.8	342.7	366.3	385.4	361.4	353.9
32	493.8	412.1	371.4	492.6	431.8	557.0	596.9	598.5	512.3	577.5	596.9	598.5	580.8
39	566.5	517.0	609.6	592.5	582.4	578.5	512.3	577.5	599.0	548.9	562.9	589.5	528.6
Statistics													
Min	275.0	255.1	273.4	254.5	283.6	314.6	324.7	339.8	342.7	366.3	385.4	361.4	353.9
Max	566.5	517.0	609.6	592.5	582.4	578.5	596.9	598.5	599.0	577.5	596.9	598.5	580.8
Average	445.1	394.7	418.1	446.6	432.6	483.4	478.0	505.2	484.7	497.5	515.1	516.4	487.8
Sigma	123.9	107.6	141.2	141.8	122.0	119.7	113.8	117.3	106.4	93.6	92.8	109.7	97.0

Drift Calculation

AVS2_2DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-19.9E+00	-1.6E+00	-20.4E+00	8.6E+00	39.6E+00	49.7E+00	64.8E+00	67.7E+00	91.3E+00	110.4E+00	86.4E+00	78.9E+00
32	-	-81.7E+00	-122.3E+00	-1.1E+00	-62.0E+00	63.2E+00	103.2E+00	104.7E+00	18.6E+00	83.7E+00	103.2E+00	104.7E+00	87.0E+00
39	-	-49.5E+00	43.2E+00	26.1E+00	16.0E+00	12.0E+00	-54.1E+00	11.0E+00	32.5E+00	-17.6E+00	-3.5E+00	23.0E+00	-37.8E+00
Average	-	-50.3E+00	-26.9E+00	1.5E+00	-12.5E+00	38.3E+00	32.9E+00	60.2E+00	39.6E+00	52.5E+00	70.0E+00	71.4E+00	42.7E+00
Sigma	-	25.2E+00	69.9E+00	19.1E+00	35.1E+00	20.9E+00	65.3E+00	38.4E+00	20.7E+00	49.6E+00	52.1E+00	35.0E+00	57.1E+00

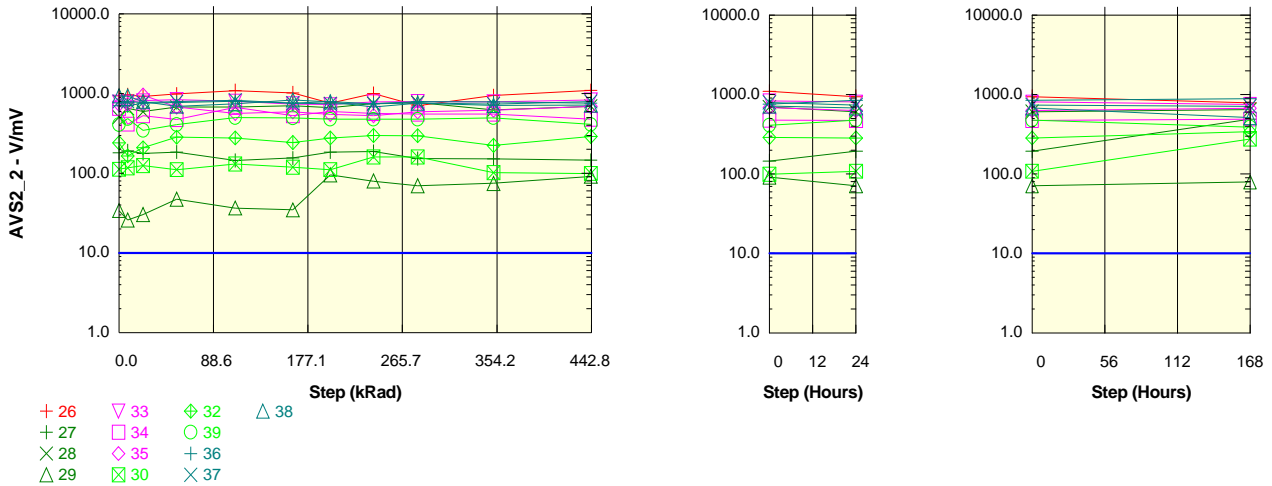
Measurements

AVS2_2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	797.9	776.9	657.9	765.3	846.8	663.0	575.8	738.6	813.4	1213.4	653.4	755.0	772.2
OFF_TID samples													
36	473.5	473.5	431.0	414.9	418.3	471.2	488.3	679.5	632.5	308.9	899.5	885.3	858.3
37	652.2	652.2	680.3	708.3	701.9	678.5	627.1	696.9	796.9	677.5	683.1	613.5	530.9
38	726.7	750.0	736.4	746.5	705.9	723.6	741.2	777.5	732.5	742.7	742.7	798.5	871.5
Statistics													
Min	473.5	473.5	431.0	414.9	418.3	471.2	488.3	679.5	632.5	308.9	683.1	613.5	530.9
Max	726.7	750.0	736.4	746.5	705.9	723.6	741.2	777.5	796.9	742.7	899.5	885.3	871.5
Average	617.5	625.2	615.9	623.2	608.7	624.4	618.9	718.0	720.7	576.4	775.1	765.7	753.6
Sigma	106.3	114.5	132.7	148.1	134.6	109.9	103.4	42.7	67.6	191.0	91.2	113.4	157.6

Drift Calculation

AVS2_2DU TB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-42.5E+00	-58.6E+00	-55.2E+00	-2.3E+00	14.8E+00	206.0E+00	159.1E+00	-164.6E+00	426.0E+00	411.8E+00	384.8E+00
37	-	0.0E+00	28.1E+00	56.1E+00	49.7E+00	26.3E+00	-25.1E+00	44.8E+00	144.8E+00	25.3E+00	31.0E+00	-38.7E+00	-121.3E+00
38	-	23.3E+00	9.6E+00	19.7E+00	-20.8E+00	-3.2E+00	14.5E+00	50.8E+00	5.8E+00	15.9E+00	15.9E+00	71.7E+00	144.8E+00
Average	-	7.8E+00	-1.6E+00	5.8E+00	-8.8E+00	7.0E+00	1.4E+00	100.5E+00	103.2E+00	-41.1E+00	157.6E+00	148.3E+00	136.1E+00
Sigma	-	11.0E+00	29.9E+00	47.8E+00	43.7E+00	13.7E+00	18.7E+00	74.6E+00	69.1E+00	87.4E+00	189.9E+00	191.7E+00	206.7E+00

Parameter : Voltage Gain : AVS2_2DUTC
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=2K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



- + 26 ▽ 33 ◆ 32 △ 38
- + 27 □ 34 ○ 39
- × 28 ◇ 35 + 36
- △ 29 ⊠ 30 × 37

Measurements

AVS2_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	939.8	963.3	927.1	991.1	1092.7	1024.1	755.0	999.3	707.8	943.8	1096.0	943.7	790.1
ON_PROTON samples													
27	181.3	193.3	178.2	185.9	146.0	156.4	185.5	188.6	153.9	153.0	147.0	195.4	490.1
28	510.2	657.9	595.2	676.1	682.4	702.9	666.2	753.9	771.8	626.7	695.1	609.3	646.7
29	34.9	27.0	31.3	48.1	37.5	35.7	96.4	80.9	70.7	75.6	92.4	71.9	80.5
Statistics													
Min	34.9	27.0	31.3	48.1	37.5	35.7	96.4	80.9	70.7	75.6	92.4	71.9	80.5
Max	510.2	657.9	595.2	676.1	682.4	702.9	666.2	753.9	771.8	626.7	695.1	609.3	646.7
Average	242.1	292.7	268.2	303.4	288.6	298.4	316.0	341.1	332.1	285.1	311.5	292.2	405.8
Sigma	198.8	267.0	238.9	269.5	281.9	290.3	250.3	295.2	312.7	243.6	272.2	229.8	238.7

Drift Calculation

AVS2_2DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	12.0E+00	-3.0E+00	4.7E+00	-35.3E+00	-24.8E+00	4.2E+00	7.4E+00	-27.3E+00	-28.3E+00	-34.2E+00	14.2E+00	308.9E+00
28	-	147.7E+00	85.0E+00	165.9E+00	172.2E+00	192.7E+00	156.0E+00	243.7E+00	261.6E+00	116.5E+00	184.9E+00	99.1E+00	136.5E+00
29	-	-8.0E+00	-3.6E+00	13.2E+00	2.6E+00	789.8E-03	61.5E+00	46.0E+00	35.8E+00	40.7E+00	57.4E+00	37.0E+00	45.6E+00
Average	-	50.6E+00	26.1E+00	61.2E+00	46.5E+00	56.2E+00	73.9E+00	99.0E+00	90.0E+00	43.0E+00	69.4E+00	50.1E+00	163.7E+00
Sigma	-	69.1E+00	41.7E+00	74.1E+00	90.2E+00	97.1E+00	62.6E+00	103.5E+00	124.0E+00	59.1E+00	89.8E+00	35.9E+00	109.2E+00

Measurements

AVS2_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	939.8	963.3	927.1	991.1	1092.7	1024.1	755.0	999.3	707.8	943.8	1096.0	943.7	790.1
ON_TID samples													
33	784.5	784.5	814.6	841.5	801.5	742.8	729.2	790.1	799.2	788.0	832.5	806.7	753.4
34	654.5	413.5	527.4	474.7	674.5	529.5	596.1	565.3	553.4	553.0	478.5	472.2	494.1
35	735.3	735.3	961.5	679.3	564.8	592.7	548.0	530.9	590.1	617.7	690.1	629.1	671.5
Statistics													
Min	654.5	413.5	527.4	474.7	564.8	529.5	548.0	530.9	553.4	553.0	478.5	472.2	494.1
Max	784.5	784.5	961.5	841.5	801.5	742.8	729.2	790.1	799.2	788.0	832.5	806.7	753.4
Average	724.8	644.4	767.9	665.2	680.3	621.7	624.4	628.8	647.6	652.9	667.1	636.0	639.6
Sigma	53.6	164.6	180.3	150.1	96.7	89.4	76.6	115.0	108.3	99.1	145.4	136.7	108.2

Drift Calculation

AVS2_2DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	30.1E+00	57.0E+00	17.0E+00	-41.7E+00	-55.4E+00	5.6E+00	14.7E+00	3.5E+00	48.0E+00	22.2E+00	-31.2E+00
34	-	-241.0E+00	-127.1E+00	-179.8E+00	20.0E+00	-125.0E+00	-58.4E+00	-89.1E+00	-101.1E+00	-101.5E+00	-175.9E+00	-182.3E+00	-160.4E+00
35	-	0.0E+00	226.2E+00	-55.9E+00	-170.5E+00	-142.6E+00	-187.3E+00	-204.4E+00	-145.2E+00	-117.6E+00	-45.2E+00	-106.1E+00	-63.8E+00
Average	-	-80.3E+00	43.1E+00	-59.6E+00	-44.5E+00	-103.1E+00	-100.4E+00	-96.0E+00	-77.2E+00	-71.9E+00	-57.7E+00	-88.8E+00	-85.1E+00
Sigma	-	113.6E+00	144.5E+00	96.7E+00	89.1E+00	44.0E+00	61.5E+00	85.9E+00	67.4E+00	53.7E+00	91.9E+00	84.4E+00	54.9E+00

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

AVS2_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	939.8	963.3	927.1	991.1	1092.7	1024.1	755.0	999.3	707.8	943.8	1096.0	943.7	790.1
OFF_PROTON samples													
30	113.3	118.2	125.7	112.1	132.0	120.0	112.3	161.4	161.4	103.0	100.4	109.8	277.5
32	241.9	166.7	210.1	285.0	278.6	244.4	279.5	299.0	296.9	224.7	291.0	285.4	343.2
39	407.2	486.8	347.2	407.3	500.5	496.4	478.8	477.5	477.5	498.5	412.3	478.8	390.5
Statistics													
Min	113.3	118.2	125.7	112.1	132.0	120.0	112.3	161.4	161.4	103.0	100.4	109.8	277.5
Max	407.2	486.8	347.2	407.3	500.5	496.4	478.8	477.5	477.5	498.5	412.3	478.8	390.5
Average	254.1	257.3	227.7	268.1	303.7	286.9	290.2	312.6	311.9	275.4	267.9	291.3	337.1
Sigma	120.3	163.5	91.3	121.1	151.5	156.6	149.8	129.4	129.5	165.4	128.4	150.7	46.3

Drift Calculation

AVS2_2DUT C	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	4.9E+00	12.4E+00	-1.2E+00	18.8E+00	6.7E+00	-952.9E-03	48.1E+00	48.1E+00	-10.3E+00	-12.9E+00	-3.5E+00	164.2E+00
32	-	-75.2E+00	-31.8E+00	43.1E+00	36.6E+00	2.5E+00	37.6E+00	57.0E+00	55.0E+00	-17.3E+00	49.0E+00	43.4E+00	101.3E+00
39	-	79.7E+00	-59.9E+00	123.5E-03	93.3E+00	89.2E+00	71.7E+00	70.3E+00	70.3E+00	91.3E+00	5.2E+00	71.7E+00	-16.6E+00
Average	-	3.1E+00	-26.4E+00	14.0E+00	49.6E+00	32.8E+00	36.1E+00	58.5E+00	57.8E+00	21.2E+00	13.8E+00	37.2E+00	82.9E+00
Sigma	-	63.2E+00	29.8E+00	20.6E+00	31.8E+00	39.9E+00	29.7E+00	9.2E+00	9.3E+00	49.6E+00	26.0E+00	31.0E+00	75.0E+00

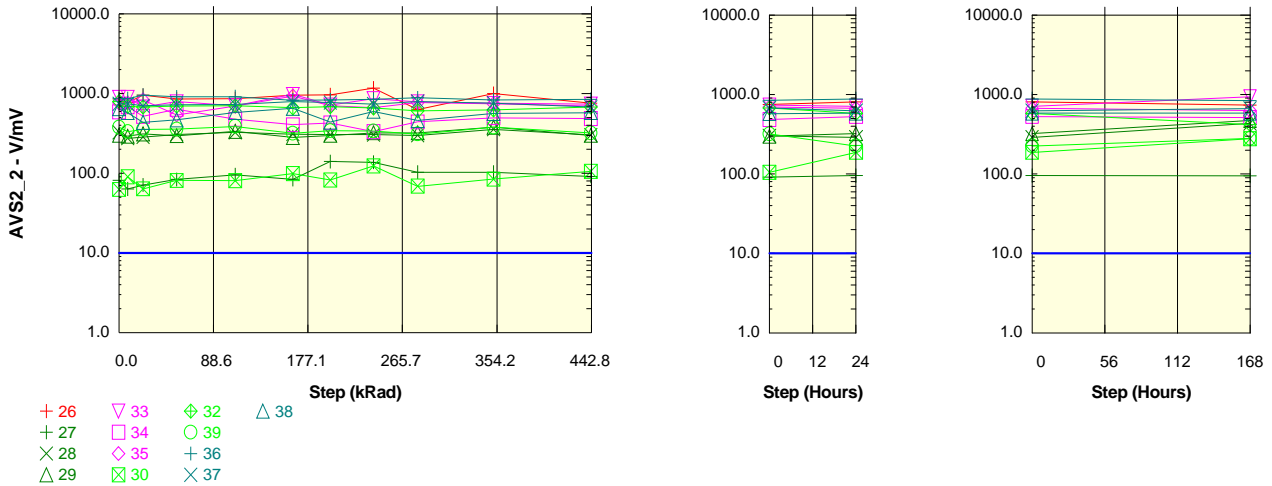
Measurements

AVS2_2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	939.8	963.3	927.1	991.1	1092.7	1024.1	755.0	999.3	707.8	943.8	1096.0	943.7	790.1
OFF_TID samples													
36	707.5	707.5	759.3	771.3	807.5	755.0	798.0	749.5	799.0	785.4	761.4	849.2	894.1
37	797.9	797.9	778.0	793.0	828.6	761.8	744.3	749.5	769.9	739.8	796.9	742.7	715.6
38	937.5	935.2	796.2	694.4	744.5	832.5	790.4	679.5	761.4	712.3	717.2	680.9	514.8
Statistics													
Min	707.5	707.5	759.3	694.4	744.5	755.0	744.3	679.5	761.4	712.3	717.2	680.9	514.8
Max	937.5	935.2	796.2	793.0	828.6	832.5	798.0	749.5	799.0	785.4	796.9	849.2	894.1
Average	814.3	813.5	777.8	752.9	793.6	783.1	777.6	726.1	776.7	745.8	758.5	757.6	708.2
Sigma	94.6	93.6	15.1	42.3	35.7	35.1	23.7	33.0	16.1	30.1	32.6	69.5	154.9

Drift Calculation

AVS2_2DU TC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	51.8E+00	63.7E+00	99.9E+00	47.5E+00	90.5E+00	41.9E+00	91.4E+00	77.8E+00	53.8E+00	141.7E+00	186.5E+00
37	-	0.0E+00	-19.9E+00	-4.9E+00	30.8E+00	-36.1E+00	-53.6E+00	-48.4E+00	-28.0E+00	-58.1E+00	-935.2E-03	-55.2E+00	-82.2E+00
38	-	-2.3E+00	-141.3E+00	-243.1E+00	-192.9E+00	-105.0E+00	-147.1E+00	-258.0E+00	-176.1E+00	-225.2E+00	-220.3E+00	-256.6E+00	-422.7E+00
Average	-	-778.0E-03	-36.5E+00	-61.4E+00	-20.8E+00	-31.2E+00	-36.7E+00	-88.2E+00	-37.6E+00	-68.5E+00	-55.8E+00	-56.7E+00	-106.2E+00
Sigma	-	1.1E+00	79.7E+00	131.5E+00	125.0E+00	62.3E+00	97.7E+00	125.6E+00	109.4E+00	123.9E+00	118.5E+00	162.6E+00	249.3E+00

Parameter : Voltage Gain : AVS2_2DUTD
 Test conditions : +VCC=5V. -VCC=GND. 1V<Vout<2.5V. RL=2K
 Unit : V/mV
 Spec Limit Min : 10.0
 Spec limits are represented in bold lines on the graphic.



Measurements

AVS2_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	854.2	774.5	954.2	857.4	865.5	954.1	970.7	1171.6	629.2	999.3	755.0	808.9	738.6
ON_PROTON samples													
27	82.2	64.5	72.3	84.7	96.8	84.7	141.2	138.6	104.5	104.5	92.4	96.4	96.1
28	328.9	275.9	286.3	308.3	326.2	311.2	306.7	307.1	301.0	357.0	303.3	290.4	435.6
29	302.4	293.0	313.7	296.6	337.2	282.5	300.7	322.7	322.7	381.7	299.6	322.7	471.9
Statistics													
Min	82.2	64.5	72.3	84.7	96.8	84.7	141.2	138.6	104.5	104.5	92.4	96.4	96.1
Max	328.9	293.0	313.7	308.3	337.2	311.2	306.7	322.7	322.7	381.7	303.3	322.7	471.9
Average	237.9	211.1	224.1	229.9	253.4	226.1	249.5	256.1	242.7	281.1	231.8	236.5	334.5
Sigma	110.6	103.9	107.9	102.8	110.9	100.7	76.6	83.4	98.2	125.3	98.6	99.9	169.3

Drift Calculation

AVS2_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-17.8E+00	-9.9E+00	2.5E+00	14.5E+00	2.5E+00	59.0E+00	56.4E+00	22.2E+00	22.2E+00	10.2E+00	14.1E+00	13.8E+00
28	-	-53.0E+00	-42.7E+00	-20.6E+00	-2.8E+00	-17.8E+00	-22.2E+00	-21.8E+00	-27.9E+00	28.0E+00	-25.6E+00	-38.6E+00	106.6E+00
29	-	-9.5E+00	11.3E+00	-5.8E+00	34.8E+00	-19.9E+00	-1.8E+00	20.3E+00	20.3E+00	79.3E+00	-2.8E+00	20.3E+00	169.4E+00
Average	-	-26.8E+00	-13.8E+00	-8.0E+00	15.5E+00	-11.7E+00	11.7E+00	18.3E+00	4.9E+00	43.2E+00	-6.1E+00	-1.4E+00	96.6E+00
Sigma	-	18.9E+00	22.2E+00	9.6E+00	15.4E+00	10.1E+00	34.5E+00	32.0E+00	23.2E+00	25.7E+00	14.8E+00	26.4E+00	63.9E+00

Measurements

AVS2_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	854.2	774.5	954.2	857.4	865.5	954.1	970.7	1171.6	629.2	999.3	755.0	808.9	738.6
ON_TID samples													
33	899.3	899.3	680.6	794.7	704.6	978.4	722.7	863.2	790.1	755.0	741.0	713.5	943.8
34	592.4	687.8	520.5	635.6	478.0	407.5	429.5	333.1	443.7	499.6	488.3	530.9	514.8
35	765.3	765.3	837.6	543.5	697.7	931.4	707.8	666.2	771.5	743.8	698.7	671.5	633.1
Statistics													
Min	592.4	687.8	520.5	543.5	478.0	407.5	429.5	333.1	443.7	499.6	488.3	530.9	514.8
Max	899.3	899.3	837.6	794.7	704.6	978.4	722.7	863.2	790.1	755.0	741.0	713.5	943.8
Average	752.3	784.1	679.6	657.9	626.8	772.4	620.0	620.8	668.5	666.2	642.7	638.6	697.2
Sigma	125.6	87.4	129.5	103.8	105.2	258.8	134.8	218.8	159.1	117.8	110.5	78.1	180.9

Drift Calculation

AVS2_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-218.7E+00	-104.5E+00	-194.7E+00	79.1E+00	-176.6E+00	-36.0E+00	-109.1E+00	-144.3E+00	-158.2E+00	-185.8E+00	44.5E+00
34	-	95.4E+00	-72.0E+00	43.2E+00	-114.4E+00	-184.9E+00	-162.9E+00	-259.3E+00	-148.7E+00	-92.8E+00	-104.2E+00	-61.6E+00	-77.6E+00
35	-	0.0E+00	72.3E+00	-221.8E+00	-67.6E+00	166.1E+00	-57.5E+00	-99.1E+00	6.2E+00	-21.5E+00	-66.6E+00	-93.8E+00	-132.2E+00
Average	-	31.8E+00	-72.8E+00	-94.4E+00	-125.6E+00	20.1E+00	-132.3E+00	-131.5E+00	-83.9E+00	-86.2E+00	-109.7E+00	-113.7E+00	-55.1E+00
Sigma	-	45.0E+00	118.8E+00	108.4E+00	52.5E+00	149.3E+00	53.2E+00	94.0E+00	65.7E+00	50.3E+00	37.6E+00	52.6E+00	73.9E+00

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02

Measurements

AVS2_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	854.2	774.5	954.2	857.4	865.5	954.1	970.7	1171.6	629.2	999.3	755.0	808.9	738.6
OFF_PROTON samples													
30	63.9	91.6	64.9	82.3	82.1	99.9	83.1	124.7	69.9	85.4	106.3	188.8	279.5
32	797.9	693.3	682.1	698.4	703.7	665.1	688.7	661.3	608.9	626.5	677.5	580.5	420.5
39	378.8	335.3	357.1	359.8	388.9	317.7	342.7	339.7	312.3	378.8	321.3	226.5	280.8
Statistics													
Min	63.9	91.6	64.9	82.3	82.1	99.9	83.1	124.7	69.9	85.4	106.3	188.8	279.5
Max	797.9	693.3	682.1	698.4	703.7	665.1	688.7	661.3	608.9	626.5	677.5	580.5	420.5
Average	413.5	373.4	368.0	380.2	391.6	360.9	371.5	375.3	330.4	363.6	368.4	331.9	326.9
Sigma	300.7	247.1	252.1	251.9	253.8	232.8	248.1	220.5	220.4	221.2	235.6	176.5	66.2

Drift Calculation

AVS2_2DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	27.7E+00	1.0E+00	18.4E+00	18.2E+00	36.0E+00	19.3E+00	60.8E+00	6.0E+00	21.5E+00	42.4E+00	124.9E+00	215.6E+00
32	-	-104.6E+00	-115.8E+00	-99.5E+00	-94.2E+00	-132.8E+00	-109.1E+00	-136.5E+00	-189.0E+00	-171.4E+00	-120.3E+00	-217.3E+00	-377.4E+00
39	-	-43.5E+00	-21.6E+00	-19.0E+00	10.1E+00	-61.1E+00	-36.1E+00	-39.1E+00	-66.4E+00	26.4E-03	-57.4E+00	-152.3E+00	-98.0E+00
Average	-	-40.1E+00	-45.5E+00	-33.3E+00	-21.9E+00	-52.6E+00	-42.0E+00	-38.3E+00	-83.2E+00	-50.0E+00	-45.1E+00	-81.6E+00	-86.6E+00
Sigma	-	54.0E+00	50.6E+00	49.2E+00	51.2E+00	69.2E+00	52.6E+00	80.6E+00	80.5E+00	86.3E+00	67.0E+00	148.4E+00	242.2E+00

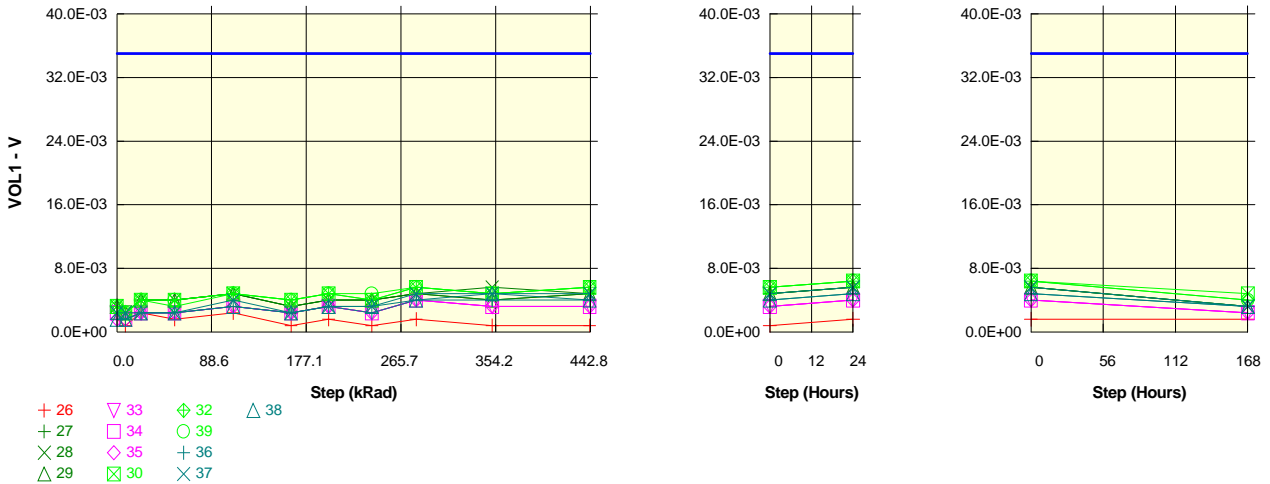
Measurements

AVS2_2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	854.2	774.5	954.2	857.4	865.5	954.1	970.7	1171.6	629.2	999.3	755.0	808.9	738.6
OFF_TID samples													
36	864.1	864.1	961.5	912.5	916.6	830.1	835.6	849.4	885.4	830.7	849.4	885.4	839.8
37	744.0	744.0	703.0	725.0	734.9	795.4	772.2	739.8	799.0	761.8	677.5	626.5	666.2
38	646.6	576.9	436.6	469.4	581.2	653.4	441.2	598.5	461.3	566.3	577.5	588.7	585.5
Statistics													
Min	646.6	576.9	436.6	469.4	581.2	653.4	441.2	598.5	461.3	566.3	577.5	588.7	585.5
Max	864.1	864.1	961.5	912.5	916.6	830.1	835.6	849.4	885.4	830.7	849.4	885.4	839.8
Average	751.6	728.3	700.3	702.3	744.2	759.6	683.0	729.2	715.2	719.6	701.5	700.2	697.1
Sigma	89.0	117.7	214.3	181.6	137.1	76.4	172.9	102.7	183.0	112.0	112.3	131.8	106.1

Drift Calculation

AVS2_2DU TD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	97.5E+00	48.4E+00	52.6E+00	-34.0E+00	-28.5E+00	-14.7E+00	21.3E+00	-33.4E+00	-14.7E+00	21.3E+00	-24.3E+00
37	-	0.0E+00	-41.1E+00	-19.1E+00	-9.2E+00	51.4E+00	28.1E+00	-4.3E+00	54.9E+00	17.7E+00	-66.6E+00	-117.5E+00	-77.9E+00
38	-	-69.6E+00	-210.0E+00	-177.1E+00	-65.4E+00	6.8E+00	-205.3E+00	-48.1E+00	-185.2E+00	-80.3E+00	-69.0E+00	-57.8E+00	-61.0E+00
Average	-	-23.2E+00	-51.2E+00	-49.2E+00	-7.3E+00	8.1E+00	-68.6E+00	-22.4E+00	-36.3E+00	-32.0E+00	-50.1E+00	-51.3E+00	-54.4E+00
Sigma	-	32.8E+00	125.7E+00	94.5E+00	48.2E+00	34.9E+00	99.4E+00	18.7E+00	106.2E+00	40.0E+00	25.1E+00	56.9E+00	22.4E+00

Parameter : Logical "0" output voltage : VOL1DUTA
 Test conditions : +VCC=30V. -VCC=GND. RL=10 kΩ
 Unit : V
 Spec Limit Max : 35.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
ON PROTON samples													
27	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	3.2E-03
28	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	3.2E-03
29	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	3.2E-03
Statistics													
Min	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	3.2E-03
Max	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	3.2E-03
Average	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.5E-03	4.8E-03	5.6E-03	3.2E-03
Sigma	33.6E-12	16.8E-12	0.0E+00	0.0E+00	47.5E-12	33.6E-12	0.0E+00	0.0E+00	47.5E-12	754.2E-06	47.5E-12	0.0E+00	33.6E-12

Drift Calculation

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON PROTON samples													
27	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	2.4E-03	0.0E+00
28	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	2.4E-03	1.6E-03	2.4E-03	0.0E+00
29	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	2.4E-03	0.0E+00
Average	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	1.3E-03	1.6E-03	2.4E-03	0.0E+00
Sigma	-	5.9E-12	5.9E-12	5.9E-12	26.6E-12	0.0E+00	5.9E-12	5.9E-12	26.6E-12	754.2E-06	26.6E-12	23.8E-12	0.0E+00

Measurements

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
ON TID samples													
33	2.4E-03	2.4E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
34	2.4E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
35	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Statistics													
Min	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Max	2.4E-03	2.4E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Average	2.1E-03	1.9E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Sigma	377.1E-06	377.1E-06	16.8E-12	16.8E-12	33.6E-12	16.8E-12	33.6E-12	16.8E-12	0.0E+00	33.6E-12	33.6E-12	0.0E+00	16.8E-12

Drift Calculation

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON TID samples													
33	-	0.0E+00	0.0E+00	0.0E+00	800.0E-06	0.0E+00	800.0E-06	0.0E+00	1.6E-03	800.0E-06	800.0E-06	1.6E-03	0.0E+00
34	-	-800.0E-06	0.0E+00	0.0E+00	800.0E-06	0.0E+00	800.0E-06	0.0E+00	1.6E-03	800.0E-06	800.0E-06	1.6E-03	0.0E+00
35	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06
Average	-	-266.7E-06	266.7E-06	266.7E-06	1.1E-03	266.7E-06	1.1E-03	266.7E-06	1.9E-03	1.1E-03	1.1E-03	1.9E-03	266.7E-06
Sigma	-	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
OFF PROTON samples													
30	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.8E-03
32	3.2E-03	2.4E-03	4.0E-03	3.2E-03	4.8E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
39	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Statistics													
Min	3.2E-03	2.4E-03	4.0E-03	3.2E-03	4.8E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Max	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.8E-03
Average	3.2E-03	2.4E-03	4.0E-03	3.7E-03	4.8E-03	4.0E-03	4.8E-03	4.3E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.3E-03
Sigma	33.6E-12	16.8E-12	0.0E+00	377.1E-06	47.5E-12	0.0E+00	47.5E-12	377.1E-06	0.0E+00	47.5E-12	0.0E+00	67.2E-12	377.1E-06

Drift Calculation

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	3.2E-03	1.6E-03
32	-	-800.0E-06	800.0E-06	0.0E+00	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	3.2E-03	800.0E-06
39	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	800.0E-06
Average	-	-800.0E-06	800.0E-06	533.3E-06	1.6E-03	800.0E-06	1.6E-03	1.1E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	1.1E-03
Sigma	-	5.9E-12	5.9E-12	377.1E-06	26.6E-12	5.9E-12	26.6E-12	377.1E-06	23.8E-12	26.6E-12	23.8E-12	33.6E-12	377.1E-06

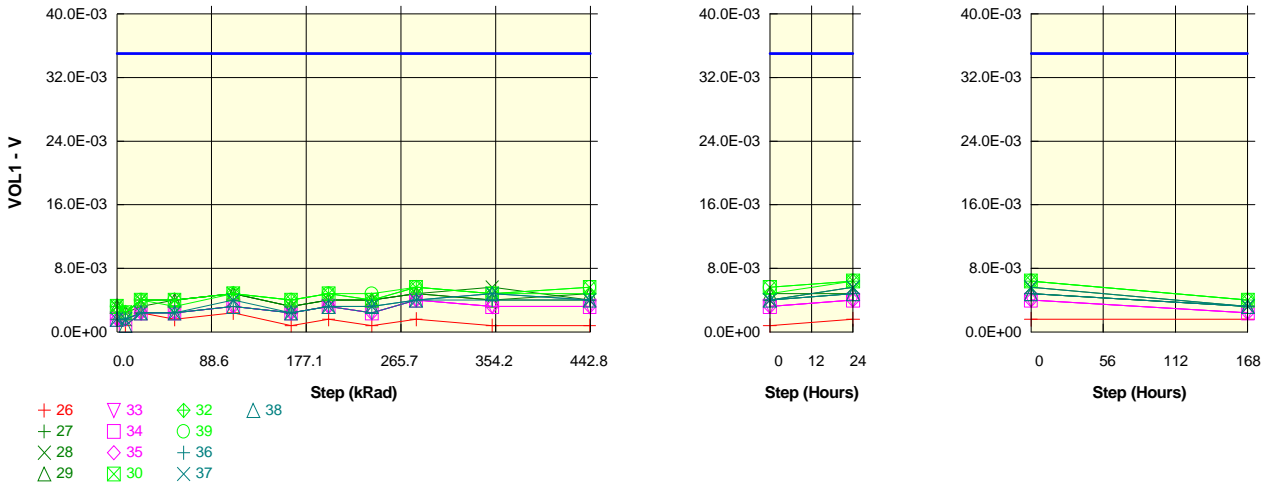
Measurements

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
OFF TID samples													
36	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
37	2.4E-03	2.4E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	4.8E-03	4.8E-03	5.6E-03	3.2E-03
38	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Statistics													
Min	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
Max	2.4E-03	2.4E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	4.8E-03	4.8E-03	5.6E-03	3.2E-03
Average	1.9E-03	1.9E-03	2.4E-03	2.4E-03	3.5E-03	2.4E-03	3.2E-03	2.9E-03	4.3E-03	4.5E-03	4.3E-03	5.1E-03	3.2E-03
Sigma	377.1E-06	377.1E-06	16.8E-12	16.8E-12	377.1E-06	16.8E-12	33.6E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	33.6E-12

Drift Calculation

VOL1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03
37	-	0.0E+00	0.0E+00	0.0E+00	1.6E-03	0.0E+00	800.0E-06	800.0E-06	2.4E-03	2.4E-03	2.4E-03	3.2E-03	800.0E-06
38	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	1.6E-03
Average	-	0.0E+00	533.3E-06	533.3E-06	1.6E-03	533.3E-06	1.3E-03	1.1E-03	2.4E-03	2.7E-03	2.4E-03	3.2E-03	1.3E-03
Sigma	-	0.0E+00	377.1E-06	377.1E-06	54.4E-12	377.1E-06	377.1E-06	377.1E-06	47.5E-12	377.1E-06	47.5E-12	274.1E-12	377.1E-06

Parameter : Logical "0" output voltage : VOL1DUTB
 Test conditions : +VCC=30V. -VCC=GND. RL=10 kΩ
 Unit : V
 Spec Limit Max : 35.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
ON_PROTON samples													
27	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
28	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	5.6E-03	4.0E-03	5.6E-03	3.2E-03
29	3.2E-03	2.4E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	3.2E-03
Statistics													
Min	3.2E-03	2.4E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
Max	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	3.2E-03
Average	3.2E-03	2.4E-03	3.7E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.5E-03	4.3E-03	5.1E-03	3.2E-03
Sigma	33.6E-12	16.8E-12	377.1E-06	0.0E+00	47.5E-12	33.6E-12	0.0E+00	0.0E+00	47.5E-12	754.2E-06	377.1E-06	377.1E-06	33.6E-12

Drift Calculation

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	0.0E+00
28	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	2.4E-03	800.0E-06	2.4E-03	0.0E+00
29	-	-800.0E-06	0.0E+00	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	0.0E+00
Average	-	-800.0E-06	533.3E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	1.3E-03	1.1E-03	1.9E-03	0.0E+00
Sigma	-	5.9E-12	377.1E-06	5.9E-12	26.6E-12	0.0E+00	5.9E-12	5.9E-12	26.6E-12	754.2E-06	377.1E-06	377.1E-06	0.0E+00

Measurements

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
ON_TID samples													
33	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
34	1.6E-03	800.0E-06	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
35	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Statistics													
Min	1.6E-03	800.0E-06	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Max	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Average	1.6E-03	1.3E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	3.2E-03	3.2E-03	4.0E-03	2.4E-03
Sigma	16.8E-12	377.1E-06	16.8E-12	16.8E-12	33.6E-12	16.8E-12	33.6E-12	16.8E-12	0.0E+00	33.6E-12	33.6E-12	0.0E+00	16.8E-12

Drift Calculation

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06
34	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06
35	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06
Average	-	-266.7E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06
Sigma	-	377.1E-06	11.9E-12	11.9E-12	16.8E-12	11.9E-12	16.8E-12	11.9E-12	16.8E-12	16.8E-12	16.8E-12	16.8E-12	11.9E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02		

Measurements

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
OFF PROTON samples													
30	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
32	3.2E-03	2.4E-03	4.0E-03	3.2E-03	4.8E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	4.8E-03	4.8E-03	6.4E-03	4.0E-03
39	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Statistics													
Min	3.2E-03	2.4E-03	4.0E-03	3.2E-03	4.8E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	4.8E-03	4.8E-03	6.4E-03	4.0E-03
Max	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Average	3.2E-03	2.4E-03	4.0E-03	3.7E-03	4.8E-03	4.0E-03	4.8E-03	4.3E-03	5.6E-03	4.8E-03	5.3E-03	6.4E-03	4.0E-03
Sigma	33.6E-12	16.8E-12	0.0E+00	377.1E-06	47.5E-12	0.0E+00	47.5E-12	377.1E-06	0.0E+00	47.5E-12	377.1E-06	67.2E-12	0.0E+00

Drift Calculation

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	3.2E-03	800.0E-06
32	-	-800.0E-06	800.0E-06	0.0E+00	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	1.6E-03	1.6E-03	3.2E-03	800.0E-06
39	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	800.0E-06
Average	-	-800.0E-06	800.0E-06	533.3E-06	1.6E-03	800.0E-06	1.6E-03	1.1E-03	2.4E-03	1.6E-03	2.1E-03	3.2E-03	800.0E-06
Sigma	-	5.9E-12	5.9E-12	377.1E-06	26.6E-12	5.9E-12	26.6E-12	377.1E-06	23.8E-12	26.6E-12	377.1E-06	33.6E-12	5.9E-12

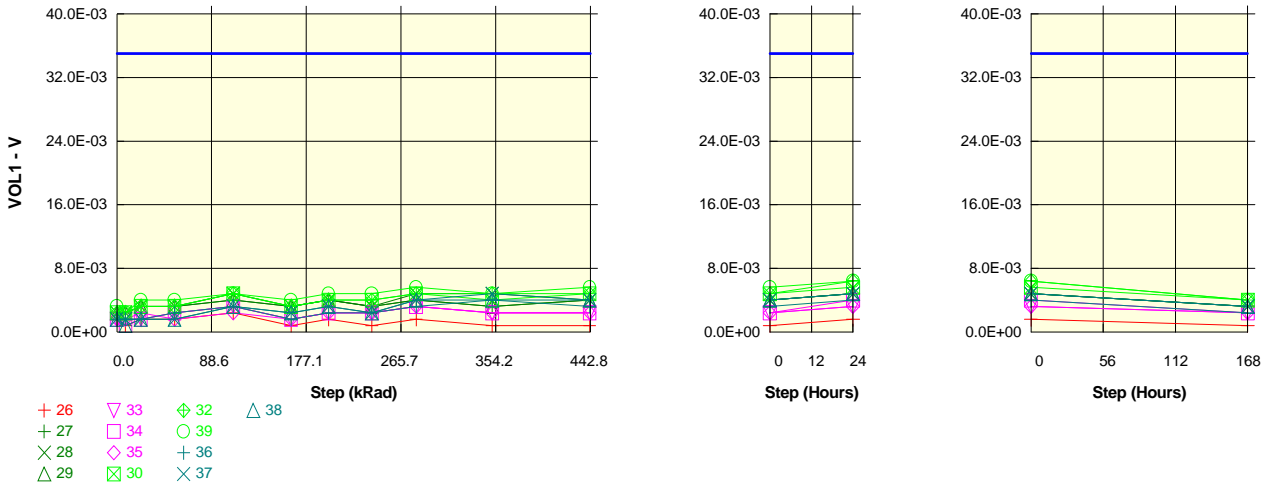
Measurements

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	2.4E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	1.6E-03
OFF TID samples													
36	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
37	1.6E-03	1.6E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	3.2E-03
38	1.6E-03	800.0E-06	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Statistics													
Min	1.6E-03	800.0E-06	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
Max	1.6E-03	1.6E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	4.8E-03	4.0E-03	5.6E-03	3.2E-03
Average	1.6E-03	1.3E-03	2.4E-03	2.4E-03	3.5E-03	2.4E-03	3.2E-03	2.9E-03	4.0E-03	4.5E-03	4.0E-03	5.1E-03	3.2E-03
Sigma	16.8E-12	377.1E-06	16.8E-12	16.8E-12	377.1E-06	16.8E-12	33.6E-12	377.1E-06	0.0E+00	377.1E-06	0.0E+00	377.1E-06	33.6E-12

Drift Calculation

VOL1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03
37	-	0.0E+00	800.0E-06	800.0E-06	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	1.6E-03
38	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	1.6E-03
Average	-	-266.7E-06	800.0E-06	800.0E-06	1.9E-03	800.0E-06	1.6E-03	1.3E-03	2.4E-03	2.9E-03	2.4E-03	3.5E-03	1.6E-03
Sigma	-	377.1E-06	11.9E-12	11.9E-12	377.1E-06	11.9E-12	16.8E-12	377.1E-06	16.8E-12	377.1E-06	16.8E-12	377.1E-06	16.8E-12

Parameter : Logical "0" output voltage : VOL1DUTC
 Test conditions : +VCC=30V. -VCC=GND. RL=10 kΩ
 Unit : V
 Spec Limit Max : 35.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
ON_PROTON samples													
27	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03
28	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	3.2E-03	4.8E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
29	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03
Statistics													
Min	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03
Max	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	3.2E-03	4.8E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Average	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.3E-03	3.2E-03	4.0E-03	3.2E-03	4.3E-03	3.7E-03	4.0E-03	4.8E-03	3.2E-03
Sigma	16.8E-12	16.8E-12	33.6E-12	33.6E-12	377.1E-06	33.6E-12	0.0E+00	33.6E-12	377.1E-06	754.2E-06	0.0E+00	47.5E-12	33.6E-12

Drift Calculation

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
27	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	2.4E-03	800.0E-06
28	-	0.0E+00	800.0E-06	800.0E-06	2.4E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	2.4E-03	1.6E-03	2.4E-03	800.0E-06
29	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	2.4E-03	800.0E-06
Average	-	0.0E+00	800.0E-06	800.0E-06	1.9E-03	800.0E-06	1.6E-03	800.0E-06	1.9E-03	1.3E-03	1.6E-03	2.4E-03	800.0E-06
Sigma	-	0.0E+00	5.9E-12	5.9E-12	377.1E-06	5.9E-12	26.6E-12	5.9E-12	377.1E-06	754.2E-06	26.6E-12	16.8E-12	5.9E-12

Measurements

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
ON_TID samples													
33	1.6E-03	1.6E-03	1.6E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03
34	1.6E-03	800.0E-06	1.6E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03
35	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03
Statistics													
Min	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03
Max	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03
Average	1.6E-03	1.3E-03	1.9E-03	2.1E-03	2.9E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.5E-03	2.4E-03
Sigma	16.8E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	16.8E-12	16.8E-12	16.8E-12	33.6E-12	16.8E-12	16.8E-12	377.1E-06	16.8E-12

Drift Calculation

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	0.0E+00	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
34	-	-800.0E-06	0.0E+00	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	2.4E-03	800.0E-06
35	-	0.0E+00	800.0E-06	0.0E+00	800.0E-06	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
Average	-	-266.7E-06	266.7E-06	533.3E-06	1.3E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.9E-03	800.0E-06
Sigma	-	377.1E-06	377.1E-06	377.1E-06	377.1E-06	0.0E+00	11.9E-12	11.9E-12	16.8E-12	11.9E-12	11.9E-12	377.1E-06	11.9E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02	

Measurements

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
OFF PROTON samples													
30	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	4.0E-03
32	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.8E-03	4.8E-03	6.4E-03	4.0E-03
39	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Statistics													
Min	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	4.0E-03
Max	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	4.8E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Average	2.7E-03	2.4E-03	3.5E-03	3.5E-03	4.8E-03	3.5E-03	4.3E-03	4.3E-03	5.1E-03	4.5E-03	5.1E-03	6.1E-03	4.0E-03
Sigma	377.1E-06	16.8E-12	377.1E-06	377.1E-06	47.5E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	0.0E+00

Drift Calculation

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	0.0E+00	800.0E-06	800.0E-06	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	1.6E-03
32	-	0.0E+00	800.0E-06	800.0E-06	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	2.4E-03	2.4E-03	4.0E-03	1.6E-03
39	-	-800.0E-06	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	800.0E-06
Average	-	-266.7E-06	800.0E-06	800.0E-06	2.1E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.9E-03	2.4E-03	3.5E-03	1.3E-03
Sigma	-	377.1E-06	219.5E-12	219.5E-12	377.1E-06	219.5E-12	108.2E-12	108.2E-12	107.6E-12	377.1E-06	107.6E-12	377.1E-06	377.1E-06

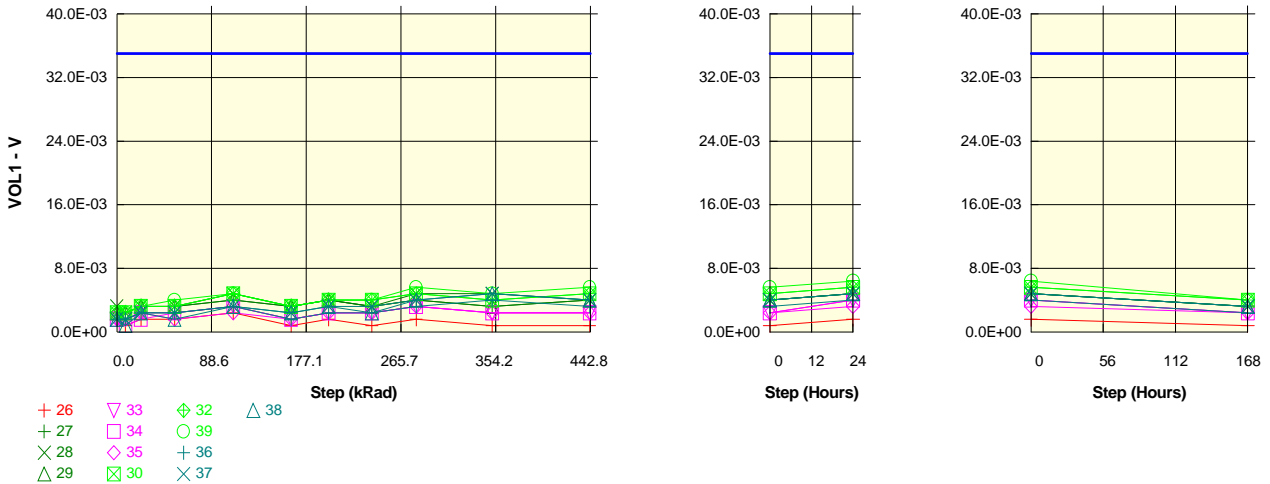
Measurements

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
OFF TID samples													
36	1.6E-03	1.6E-03	1.6E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	2.4E-03
37	1.6E-03	1.6E-03	1.6E-03	1.6E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
38	1.6E-03	800.0E-06	1.6E-03	1.6E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.0E-03	4.0E-03	4.8E-03	3.2E-03
Statistics													
Min	1.6E-03	800.0E-06	1.6E-03	1.6E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	2.4E-03
Max	1.6E-03	1.6E-03	1.6E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Average	1.6E-03	1.3E-03	1.6E-03	1.9E-03	3.2E-03	2.1E-03	2.9E-03	2.4E-03	3.7E-03	4.3E-03	3.7E-03	4.5E-03	2.9E-03
Sigma	16.8E-12	377.1E-06	16.8E-12	377.1E-06	33.6E-12	377.1E-06	377.1E-06	16.8E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Drift Calculation

VOL1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	0.0E+00	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	2.4E-03	1.6E-03	2.4E-03	800.0E-06
37	-	0.0E+00	0.0E+00	0.0E+00	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	3.2E-03	2.4E-03	3.2E-03	1.6E-03
38	-	-800.0E-06	0.0E+00	0.0E+00	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03
Average	-	-266.7E-06	0.0E+00	266.7E-06	1.6E-03	533.3E-06	1.3E-03	800.0E-06	2.1E-03	2.7E-03	2.1E-03	2.9E-03	1.3E-03
Sigma	-	377.1E-06	0.0E+00	377.1E-06	16.8E-12	377.1E-06	377.1E-06	11.9E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Parameter : Logical "0" output voltage : VOL1DUTD
 Test conditions : +VCC=30V. -VCC=GND. RL=10 kΩ
 Unit : V
 Spec Limit Max : 35.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
ON_PROTON samples													
27	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03
28	3.2E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	3.2E-03	4.8E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
29	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03
Statistics													
Min	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03
Max	3.2E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	3.2E-03	4.8E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Average	2.7E-03	2.4E-03	3.2E-03	3.2E-03	4.3E-03	3.2E-03	4.0E-03	3.2E-03	4.3E-03	3.7E-03	4.0E-03	4.8E-03	3.2E-03
Sigma	377.1E-06	16.8E-12	33.6E-12	33.6E-12	377.1E-06	33.6E-12	0.0E+00	33.6E-12	377.1E-06	754.2E-06	0.0E+00	47.5E-12	33.6E-12

Drift Calculation

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	2.4E-03	800.0E-06
28	-	-800.0E-06	0.0E+00	0.0E+00	1.6E-03	0.0E+00	800.0E-06	0.0E+00	1.6E-03	1.6E-03	800.0E-06	1.6E-03	0.0E+00
29	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	2.4E-03	800.0E-06
Average	-	-266.7E-06	533.3E-06	533.3E-06	1.6E-03	533.3E-06	1.3E-03	533.3E-06	1.6E-03	1.1E-03	1.3E-03	2.1E-03	533.3E-06
Sigma	-	377.1E-06	377.1E-06	377.1E-06	110.8E-12	377.1E-06	377.1E-06	377.1E-06	110.8E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Measurements

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
ON_TID samples													
33	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03
34	1.6E-03	800.0E-06	1.6E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03
35	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03
Statistics													
Min	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03
Max	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	4.0E-03	2.4E-03
Average	1.6E-03	1.3E-03	2.1E-03	2.1E-03	2.9E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	2.4E-03	3.7E-03	2.4E-03
Sigma	16.8E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	16.8E-12	16.8E-12	16.8E-12	33.6E-12	16.8E-12	16.8E-12	377.1E-06	16.8E-12

Drift Calculation

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	2.4E-03	800.0E-06
34	-	-800.0E-06	0.0E+00	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	2.4E-03	800.0E-06
35	-	0.0E+00	800.0E-06	800.0E-06	800.0E-06	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
Average	-	-266.7E-06	533.3E-06	533.3E-06	1.3E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	800.0E-06	2.1E-03	800.0E-06
Sigma	-	377.1E-06	377.1E-06	377.1E-06	377.1E-06	0.0E+00	11.9E-12	11.9E-12	16.8E-12	11.9E-12	11.9E-12	377.1E-06	11.9E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
OFF PROTON samples													
30	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	4.0E-03
32	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	4.0E-03
39	2.4E-03	2.4E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Statistics													
Min	2.4E-03	2.4E-03	3.2E-03	3.2E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	5.6E-03	4.0E-03
Max	2.4E-03	2.4E-03	3.2E-03	4.0E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	5.6E-03	4.8E-03	5.6E-03	6.4E-03	4.0E-03
Average	2.4E-03	2.4E-03	3.2E-03	3.5E-03	4.8E-03	3.2E-03	4.0E-03	4.0E-03	5.1E-03	4.3E-03	5.1E-03	5.9E-03	4.0E-03
Sigma	16.8E-12	16.8E-12	33.6E-12	377.1E-06	47.5E-12	33.6E-12	0.0E+00	0.0E+00	377.1E-06	377.1E-06	377.1E-06	377.1E-06	0.0E+00

Drift Calculation

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	0.0E+00	800.0E-06	800.0E-06	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	1.6E-03
32	-	0.0E+00	800.0E-06	800.0E-06	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	1.6E-03	2.4E-03	3.2E-03	1.6E-03
39	-	0.0E+00	800.0E-06	1.6E-03	2.4E-03	800.0E-06	1.6E-03	1.6E-03	3.2E-03	2.4E-03	3.2E-03	4.0E-03	1.6E-03
Average	-	0.0E+00	800.0E-06	1.1E-03	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.7E-03	1.9E-03	2.7E-03	3.5E-03	1.6E-03
Sigma	-	0.0E+00	5.9E-12	377.1E-06	16.8E-12	5.9E-12	26.6E-12	26.6E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	26.6E-12

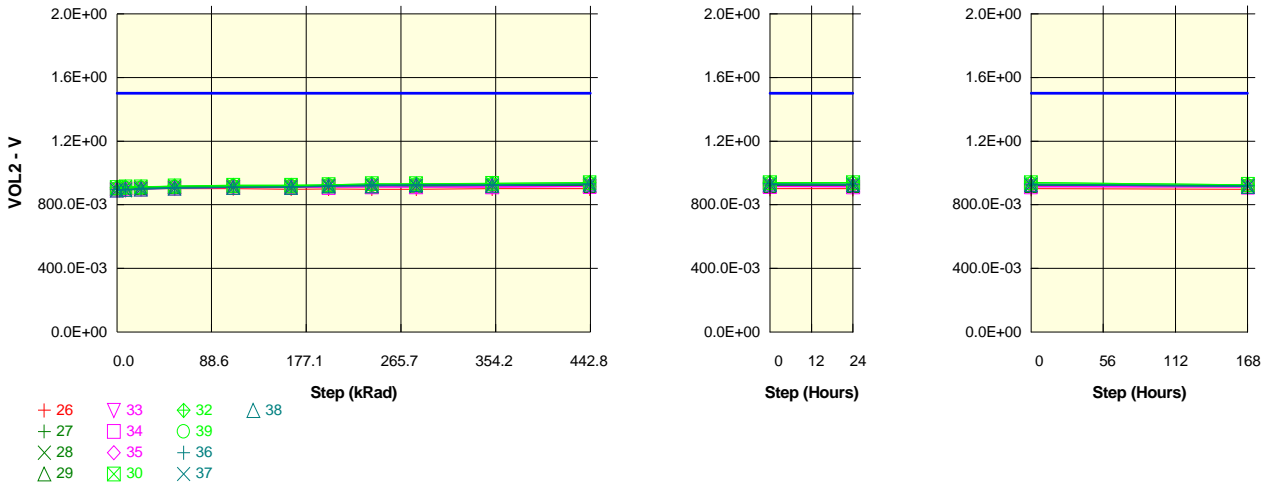
Measurements

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	1.6E-03	800.0E-06
OFF TID samples													
36	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	2.4E-03
37	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
38	1.6E-03	800.0E-06	2.4E-03	1.6E-03	3.2E-03	2.4E-03	3.2E-03	2.4E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Statistics													
Min	1.6E-03	800.0E-06	2.4E-03	1.6E-03	3.2E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	4.0E-03	3.2E-03	4.0E-03	2.4E-03
Max	1.6E-03	1.6E-03	2.4E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	3.2E-03	4.0E-03	4.8E-03	4.0E-03	4.8E-03	3.2E-03
Average	1.6E-03	1.3E-03	2.4E-03	2.1E-03	3.2E-03	2.1E-03	2.9E-03	2.7E-03	3.7E-03	4.5E-03	3.7E-03	4.5E-03	2.9E-03
Sigma	16.8E-12	377.1E-06	16.8E-12	377.1E-06	33.6E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Drift Calculation

VOL1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	0.0E+00	800.0E-06	800.0E-06	1.6E-03	2.4E-03	1.6E-03	2.4E-03	800.0E-06
37	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	800.0E-06	1.6E-03	1.6E-03	2.4E-03	3.2E-03	2.4E-03	3.2E-03	1.6E-03
38	-	-800.0E-06	800.0E-06	0.0E+00	1.6E-03	800.0E-06	1.6E-03	800.0E-06	2.4E-03	3.2E-03	2.4E-03	3.2E-03	1.6E-03
Average	-	-266.7E-06	800.0E-06	533.3E-06	1.6E-03	533.3E-06	1.3E-03	1.1E-03	2.1E-03	2.9E-03	2.1E-03	2.9E-03	1.3E-03
Sigma	-	377.1E-06	11.9E-12	377.1E-06	16.8E-12	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Parameter : Logical "0" output voltage : VOL2DUTA
 Test conditions : +VCC=30V. -VCC=GND. IOL=5mA
 Unit : V
 Spec Limit Max : 1.5E+00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.8E-03	899.2E-03	900.0E-03	900.0E-03	900.8E-03	897.6E-03	898.4E-03	897.6E-03	896.8E-03	899.2E-03	899.2E-03	899.2E-03	896.8E-03
ON_PROTON samples													
27	906.4E-03	908.8E-03	911.2E-03	916.0E-03	919.2E-03	917.6E-03	920.0E-03	920.8E-03	919.2E-03	920.8E-03	920.8E-03	920.8E-03	918.4E-03
28	903.2E-03	906.4E-03	908.0E-03	912.0E-03	916.8E-03	917.6E-03	917.6E-03	919.2E-03	917.6E-03	920.0E-03	920.0E-03	920.0E-03	916.8E-03
29	904.0E-03	908.0E-03	908.8E-03	912.8E-03	917.6E-03	916.0E-03	918.4E-03	919.2E-03	918.4E-03	919.2E-03	920.0E-03	920.8E-03	916.8E-03
Statistics													
Min	903.2E-03	906.4E-03	908.0E-03	912.0E-03	916.8E-03	916.0E-03	917.6E-03	919.2E-03	917.6E-03	919.2E-03	920.0E-03	920.0E-03	916.8E-03
Max	906.4E-03	908.8E-03	911.2E-03	916.0E-03	919.2E-03	917.6E-03	920.0E-03	920.8E-03	919.2E-03	920.8E-03	920.8E-03	920.8E-03	918.4E-03
Average	904.5E-03	907.7E-03	909.3E-03	913.6E-03	917.9E-03	916.5E-03	918.7E-03	919.7E-03	918.4E-03	920.0E-03	920.3E-03	920.5E-03	917.3E-03
Sigma	1.4E-03	997.8E-06	1.4E-03	1.7E-03	997.8E-06	754.2E-06	997.8E-06	754.2E-06	653.2E-06	653.2E-06	377.1E-06	377.1E-06	754.2E-06

Drift Calculation

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.4E-03	4.8E-03	9.6E-03	12.8E-03	11.2E-03	13.6E-03	14.4E-03	12.8E-03	14.4E-03	14.4E-03	14.4E-03	12.0E-03
28	-	3.2E-03	4.8E-03	8.8E-03	13.6E-03	12.8E-03	14.4E-03	16.0E-03	14.4E-03	16.8E-03	16.8E-03	16.8E-03	13.6E-03
29	-	4.0E-03	4.8E-03	8.8E-03	13.6E-03	12.0E-03	14.4E-03	15.2E-03	14.4E-03	16.0E-03	16.0E-03	16.8E-03	12.8E-03
Average	-	3.2E-03	4.8E-03	9.1E-03	13.3E-03	12.0E-03	14.1E-03	15.2E-03	13.9E-03	15.5E-03	15.7E-03	16.0E-03	12.8E-03
Sigma	-	653.2E-06	28.1E-09	377.1E-06	377.1E-06	653.2E-06	377.1E-06	653.2E-06	754.3E-06	997.8E-06	997.8E-06	1.1E-03	653.2E-06

Measurements

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.8E-03	899.2E-03	900.0E-03	900.0E-03	900.8E-03	897.6E-03	898.4E-03	897.6E-03	896.8E-03	899.2E-03	899.2E-03	899.2E-03	896.8E-03
ON_TID samples													
33	892.0E-03	892.0E-03	898.4E-03	904.0E-03	908.0E-03	908.0E-03	910.4E-03	912.0E-03	911.2E-03	912.0E-03	914.4E-03	913.6E-03	911.2E-03
34	891.2E-03	896.8E-03	897.6E-03	903.2E-03	907.2E-03	907.2E-03	909.6E-03	911.2E-03	912.0E-03	911.2E-03	912.8E-03	912.0E-03	910.4E-03
35	894.4E-03	894.4E-03	900.8E-03	906.4E-03	909.6E-03	909.6E-03	911.2E-03	915.2E-03	912.8E-03	912.8E-03	914.4E-03	916.0E-03	912.8E-03
Statistics													
Min	891.2E-03	892.0E-03	897.6E-03	903.2E-03	907.2E-03	907.2E-03	909.6E-03	911.2E-03	911.2E-03	911.2E-03	912.8E-03	912.0E-03	910.4E-03
Max	894.4E-03	896.8E-03	900.8E-03	906.4E-03	909.6E-03	909.6E-03	911.2E-03	915.2E-03	912.8E-03	912.8E-03	914.4E-03	916.0E-03	912.8E-03
Average	892.5E-03	894.4E-03	898.9E-03	904.5E-03	908.3E-03	908.3E-03	910.4E-03	912.8E-03	912.0E-03	912.0E-03	913.9E-03	913.9E-03	911.5E-03
Sigma	1.4E-03	2.0E-03	1.4E-03	1.4E-03	997.8E-06	997.8E-06	653.2E-06	1.7E-03	653.2E-06	653.2E-06	754.2E-06	1.6E-03	997.8E-06

Drift Calculation

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	6.4E-03	12.0E-03	16.0E-03	16.0E-03	18.4E-03	20.0E-03	19.2E-03	20.0E-03	22.4E-03	21.6E-03	19.2E-03
34	-	5.6E-03	6.4E-03	12.0E-03	16.0E-03	16.0E-03	18.4E-03	20.0E-03	20.8E-03	20.0E-03	21.6E-03	20.8E-03	19.2E-03
35	-	0.0E+00	6.4E-03	12.0E-03	15.2E-03	15.2E-03	16.8E-03	20.8E-03	18.4E-03	18.4E-03	20.0E-03	21.6E-03	18.4E-03
Average	-	1.9E-03	6.4E-03	12.0E-03	15.7E-03	15.7E-03	17.9E-03	20.3E-03	19.5E-03	19.5E-03	21.3E-03	21.3E-03	18.9E-03
Sigma	-	2.6E-03	0.0E+00	28.1E-09	377.1E-06	377.1E-06	754.2E-06	377.1E-06	997.8E-06	754.2E-06	997.8E-06	377.1E-06	377.1E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.8E-03	899.2E-03	900.0E-03	900.0E-03	900.8E-03	897.6E-03	898.4E-03	897.6E-03	896.8E-03	899.2E-03	899.2E-03	899.2E-03	896.8E-03
OFF PROTON samples													
30	908.0E-03	912.0E-03	912.8E-03	917.6E-03	922.4E-03	922.4E-03	925.6E-03	932.0E-03	930.4E-03	934.4E-03	938.4E-03	938.4E-03	926.4E-03
32	907.2E-03	912.0E-03	912.0E-03	916.8E-03	920.8E-03	921.6E-03	924.8E-03	932.0E-03	929.6E-03	933.6E-03	939.2E-03	939.2E-03	925.6E-03
39	900.8E-03	904.8E-03	905.6E-03	911.2E-03	915.2E-03	916.0E-03	922.4E-03	924.8E-03	925.6E-03	928.0E-03	933.6E-03	932.0E-03	920.0E-03
Statistics													
Min	900.8E-03	904.8E-03	905.6E-03	911.2E-03	915.2E-03	916.0E-03	922.4E-03	924.8E-03	925.6E-03	928.0E-03	933.6E-03	932.0E-03	920.0E-03
Max	908.0E-03	912.0E-03	912.8E-03	917.6E-03	922.4E-03	922.4E-03	925.6E-03	932.0E-03	930.4E-03	934.4E-03	939.2E-03	939.2E-03	926.4E-03
Average	905.3E-03	909.6E-03	910.1E-03	915.2E-03	919.5E-03	920.0E-03	924.3E-03	929.6E-03	928.5E-03	932.0E-03	937.1E-03	936.5E-03	924.0E-03
Sigma	3.2E-03	3.4E-03	3.2E-03	2.8E-03	3.1E-03	2.8E-03	1.4E-03	3.4E-03	2.1E-03	2.8E-03	2.5E-03	3.2E-03	2.8E-03

Drift Calculation

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	4.0E-03	4.8E-03	9.6E-03	14.4E-03	14.4E-03	17.6E-03	24.0E-03	22.4E-03	26.4E-03	30.4E-03	30.4E-03	18.4E-03
32	-	4.8E-03	4.8E-03	9.6E-03	13.6E-03	14.4E-03	17.6E-03	24.8E-03	22.4E-03	26.4E-03	32.0E-03	32.0E-03	18.4E-03
39	-	4.0E-03	4.8E-03	10.4E-03	14.4E-03	15.2E-03	21.6E-03	24.0E-03	24.8E-03	27.2E-03	32.8E-03	31.2E-03	19.2E-03
Average	-	4.3E-03	4.8E-03	9.9E-03	14.1E-03	14.7E-03	18.9E-03	24.3E-03	23.2E-03	26.7E-03	31.7E-03	31.2E-03	18.7E-03
Sigma	-	377.1E-06	82.3E-12	377.1E-06	377.1E-06	377.1E-06	1.9E-03	377.1E-06	1.1E-03	377.1E-06	997.8E-06	653.2E-06	377.1E-06

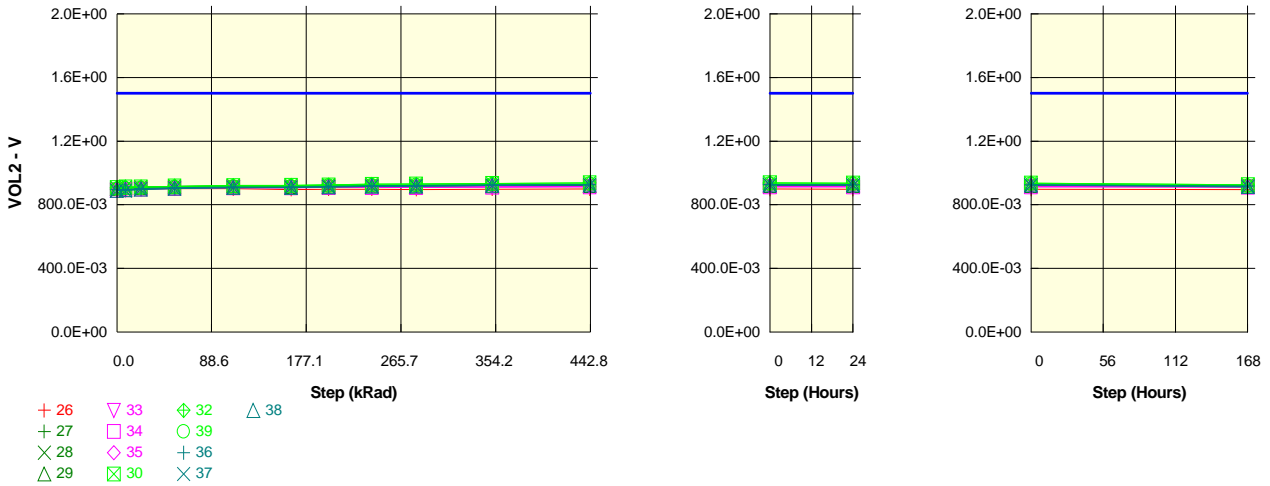
Measurements

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.8E-03	899.2E-03	900.0E-03	900.0E-03	900.8E-03	897.6E-03	898.4E-03	897.6E-03	896.8E-03	899.2E-03	899.2E-03	899.2E-03	896.8E-03
OFF TID samples													
36	896.0E-03	896.0E-03	902.4E-03	908.8E-03	912.0E-03	912.8E-03	917.6E-03	925.6E-03	924.0E-03	925.6E-03	929.6E-03	928.8E-03	919.2E-03
37	890.4E-03	890.4E-03	897.6E-03	902.4E-03	908.0E-03	908.8E-03	915.2E-03	921.6E-03	917.6E-03	921.6E-03	926.4E-03	924.8E-03	915.2E-03
38	891.2E-03	896.0E-03	898.4E-03	904.0E-03	908.8E-03	909.6E-03	918.4E-03	917.6E-03	925.6E-03	922.4E-03	927.2E-03	926.4E-03	914.4E-03
Statistics													
Min	890.4E-03	890.4E-03	897.6E-03	902.4E-03	908.0E-03	908.8E-03	915.2E-03	917.6E-03	917.6E-03	921.6E-03	926.4E-03	924.8E-03	914.4E-03
Max	896.0E-03	896.0E-03	902.4E-03	908.8E-03	912.0E-03	912.8E-03	918.4E-03	925.6E-03	925.6E-03	929.6E-03	929.6E-03	928.8E-03	919.2E-03
Average	892.5E-03	894.1E-03	899.5E-03	905.1E-03	909.6E-03	910.4E-03	917.1E-03	921.6E-03	922.4E-03	923.2E-03	927.7E-03	926.7E-03	916.3E-03
Sigma	2.5E-03	2.6E-03	2.1E-03	2.7E-03	1.7E-03	1.7E-03	1.4E-03	3.3E-03	3.5E-03	1.7E-03	1.4E-03	1.6E-03	2.1E-03

Drift Calculation

VOL2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	6.4E-03	12.8E-03	16.0E-03	16.8E-03	21.6E-03	29.6E-03	28.0E-03	29.6E-03	33.6E-03	32.8E-03	23.2E-03
37	-	0.0E+00	7.2E-03	12.0E-03	17.6E-03	18.4E-03	24.8E-03	31.2E-03	27.2E-03	31.2E-03	36.0E-03	34.4E-03	24.8E-03
38	-	4.8E-03	7.2E-03	12.8E-03	17.6E-03	18.4E-03	27.2E-03	26.4E-03	34.4E-03	31.2E-03	36.0E-03	35.2E-03	23.2E-03
Average	-	1.6E-03	6.9E-03	12.5E-03	17.1E-03	17.9E-03	24.5E-03	29.1E-03	29.9E-03	30.7E-03	35.2E-03	34.1E-03	23.7E-03
Sigma	-	2.3E-03	377.1E-06	377.1E-06	754.3E-06	754.3E-06	2.3E-03	2.0E-03	3.2E-03	754.3E-06	1.1E-03	997.8E-06	754.3E-06

Parameter : Logical "0" output voltage : VOL2DUTB
 Test conditions : +VCC=30V. -VCC=GND. IOL=5mA
 Unit : V
 Spec Limit Max : 1.5E+00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.0E-03	897.6E-03	898.4E-03	899.2E-03	899.2E-03	896.0E-03	896.8E-03	896.8E-03	896.0E-03	897.6E-03	898.4E-03	897.6E-03	896.0E-03
ON_PROTON samples													
27	905.6E-03	908.0E-03	910.4E-03	914.4E-03	918.4E-03	916.8E-03	919.2E-03	920.0E-03	919.2E-03	920.8E-03	922.4E-03	922.4E-03	920.0E-03
28	902.4E-03	905.6E-03	907.2E-03	911.2E-03	916.0E-03	914.4E-03	916.8E-03	917.6E-03	917.6E-03	920.0E-03	920.8E-03	920.0E-03	916.8E-03
29	902.4E-03	906.4E-03	908.0E-03	912.0E-03	916.8E-03	914.4E-03	916.8E-03	917.6E-03	916.8E-03	919.2E-03	920.0E-03	920.0E-03	916.8E-03
Statistics													
Min	902.4E-03	905.6E-03	907.2E-03	911.2E-03	916.0E-03	914.4E-03	916.8E-03	917.6E-03	916.8E-03	919.2E-03	920.0E-03	920.0E-03	916.8E-03
Max	905.6E-03	908.0E-03	910.4E-03	914.4E-03	918.4E-03	916.8E-03	919.2E-03	920.0E-03	919.2E-03	920.8E-03	922.4E-03	922.4E-03	920.0E-03
Average	903.5E-03	906.7E-03	908.5E-03	912.5E-03	917.1E-03	915.2E-03	917.6E-03	918.4E-03	917.9E-03	920.0E-03	921.1E-03	920.8E-03	917.9E-03
Sigma	1.5E-03	997.8E-06	1.4E-03	1.4E-03	997.8E-06	1.1E-03	1.1E-03	1.1E-03	997.8E-06	653.2E-06	997.8E-06	1.1E-03	1.5E-03

Drift Calculation

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.4E-03	4.8E-03	8.8E-03	12.8E-03	11.2E-03	13.6E-03	14.4E-03	13.6E-03	15.2E-03	16.8E-03	16.8E-03	14.4E-03
28	-	3.2E-03	4.8E-03	8.8E-03	13.6E-03	12.0E-03	14.4E-03	15.2E-03	15.2E-03	17.6E-03	18.4E-03	17.6E-03	14.4E-03
29	-	4.0E-03	5.6E-03	9.6E-03	14.4E-03	12.0E-03	14.4E-03	15.2E-03	14.4E-03	16.8E-03	17.6E-03	17.6E-03	14.4E-03
Average	-	3.2E-03	5.1E-03	9.1E-03	13.6E-03	11.7E-03	14.1E-03	14.9E-03	14.4E-03	16.5E-03	17.6E-03	17.3E-03	14.4E-03
Sigma	-	653.2E-06	377.1E-06	377.1E-06	653.2E-06	377.1E-06	377.1E-06	377.1E-06	653.2E-06	997.8E-06	653.2E-06	377.1E-06	95.1E-12

Measurements

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.0E-03	897.6E-03	898.4E-03	899.2E-03	899.2E-03	896.0E-03	896.8E-03	896.8E-03	896.0E-03	897.6E-03	898.4E-03	897.6E-03	896.0E-03
ON_TID samples													
33	891.2E-03	891.2E-03	898.4E-03	904.0E-03	907.2E-03	907.2E-03	909.6E-03	910.4E-03	909.6E-03	912.0E-03	913.6E-03	913.6E-03	911.2E-03
34	889.6E-03	895.2E-03	896.8E-03	901.6E-03	906.4E-03	905.6E-03	908.0E-03	908.8E-03	908.0E-03	910.4E-03	912.0E-03	911.2E-03	910.4E-03
35	894.4E-03	894.4E-03	900.8E-03	906.4E-03	909.6E-03	908.8E-03	910.4E-03	912.0E-03	911.2E-03	912.8E-03	914.4E-03	914.4E-03	913.6E-03
Statistics													
Min	889.6E-03	891.2E-03	896.8E-03	901.6E-03	906.4E-03	905.6E-03	908.0E-03	908.8E-03	908.0E-03	910.4E-03	912.0E-03	911.2E-03	910.4E-03
Max	894.4E-03	895.2E-03	900.8E-03	906.4E-03	909.6E-03	908.8E-03	910.4E-03	912.0E-03	911.2E-03	912.8E-03	914.4E-03	914.4E-03	913.6E-03
Average	891.7E-03	893.6E-03	898.7E-03	904.0E-03	907.7E-03	907.2E-03	909.3E-03	910.4E-03	909.6E-03	911.7E-03	913.3E-03	913.1E-03	911.7E-03
Sigma	2.0E-03	1.7E-03	1.6E-03	2.0E-03	1.4E-03	1.3E-03	997.8E-06	1.3E-03	1.3E-03	997.8E-06	997.8E-06	1.4E-03	1.4E-03

Drift Calculation

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	7.2E-03	12.8E-03	16.0E-03	16.0E-03	18.4E-03	19.2E-03	18.4E-03	20.8E-03	22.4E-03	22.4E-03	20.0E-03
34	-	5.6E-03	7.2E-03	12.0E-03	16.8E-03	16.0E-03	18.4E-03	19.2E-03	18.4E-03	20.8E-03	22.4E-03	21.6E-03	20.8E-03
35	-	0.0E+00	6.4E-03	12.0E-03	15.2E-03	14.4E-03	16.0E-03	17.6E-03	16.8E-03	18.4E-03	20.0E-03	20.0E-03	19.2E-03
Average	-	1.9E-03	6.9E-03	12.3E-03	16.0E-03	15.5E-03	17.6E-03	18.7E-03	17.9E-03	20.0E-03	21.6E-03	21.3E-03	20.0E-03
Sigma	-	2.6E-03	377.1E-06	377.1E-06	653.2E-06	754.2E-06	1.1E-03	754.2E-06	754.3E-06	1.1E-03	1.1E-03	997.8E-06	653.2E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.0E-03	897.6E-03	898.4E-03	899.2E-03	899.2E-03	896.0E-03	896.8E-03	896.8E-03	896.0E-03	897.6E-03	898.4E-03	897.6E-03	896.0E-03
OFF PROTON samples													
30	906.4E-03	910.4E-03	911.2E-03	916.0E-03	920.0E-03	921.6E-03	924.0E-03	928.0E-03	929.6E-03	933.6E-03	936.8E-03	936.0E-03	924.8E-03
32	906.4E-03	910.4E-03	911.2E-03	916.0E-03	920.0E-03	920.8E-03	924.0E-03	928.0E-03	928.8E-03	932.8E-03	936.8E-03	936.0E-03	925.6E-03
39	900.0E-03	904.0E-03	904.8E-03	910.4E-03	914.4E-03	915.2E-03	919.2E-03	922.4E-03	924.0E-03	927.2E-03	932.0E-03	931.2E-03	918.4E-03
Statistics													
Min	900.0E-03	904.0E-03	904.8E-03	910.4E-03	914.4E-03	915.2E-03	919.2E-03	922.4E-03	924.0E-03	927.2E-03	932.0E-03	931.2E-03	918.4E-03
Max	906.4E-03	910.4E-03	911.2E-03	916.0E-03	920.0E-03	921.6E-03	924.0E-03	928.0E-03	929.6E-03	933.6E-03	936.8E-03	936.0E-03	925.6E-03
Average	904.3E-03	908.3E-03	909.1E-03	914.1E-03	918.1E-03	919.2E-03	922.4E-03	926.1E-03	927.5E-03	931.2E-03	935.2E-03	934.4E-03	922.9E-03
Sigma	3.0E-03	3.0E-03	3.0E-03	2.6E-03	2.6E-03	2.8E-03	2.3E-03	2.6E-03	2.5E-03	2.8E-03	2.3E-03	2.3E-03	3.2E-03

Drift Calculation

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	4.0E-03	4.8E-03	9.6E-03	13.6E-03	15.2E-03	17.6E-03	21.6E-03	23.2E-03	27.2E-03	30.4E-03	29.6E-03	18.4E-03
32	-	4.0E-03	4.8E-03	9.6E-03	13.6E-03	14.4E-03	17.6E-03	21.6E-03	22.4E-03	26.4E-03	30.4E-03	29.6E-03	19.2E-03
39	-	4.0E-03	4.8E-03	10.4E-03	14.4E-03	15.2E-03	19.2E-03	22.4E-03	24.0E-03	27.2E-03	32.0E-03	31.2E-03	18.4E-03
Average	-	4.0E-03	4.8E-03	9.9E-03	13.9E-03	14.9E-03	18.1E-03	21.9E-03	23.2E-03	26.9E-03	30.9E-03	30.1E-03	18.7E-03
Sigma	-	28.1E-09	28.1E-09	377.1E-06	377.1E-06	377.1E-06	754.3E-06	377.2E-06	653.2E-06	377.1E-06	754.3E-06	754.3E-06	377.1E-06

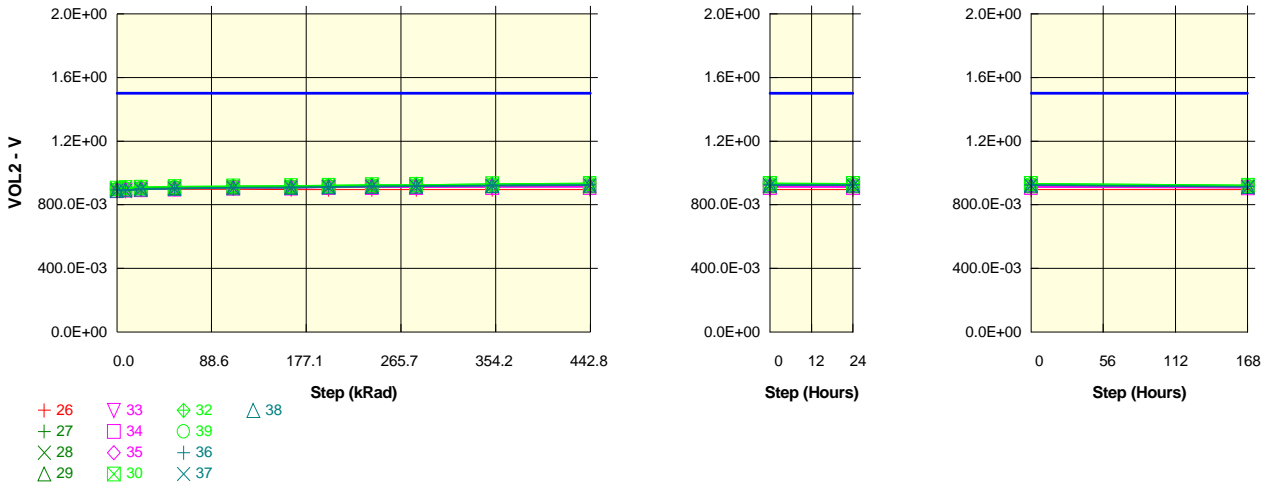
Measurements

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	896.0E-03	897.6E-03	898.4E-03	899.2E-03	899.2E-03	896.0E-03	896.8E-03	896.8E-03	896.0E-03	897.6E-03	898.4E-03	897.6E-03	896.0E-03
OFF TID samples													
36	895.2E-03	895.2E-03	901.6E-03	907.2E-03	910.4E-03	911.2E-03	915.2E-03	919.2E-03	920.0E-03	924.0E-03	927.2E-03	926.4E-03	917.6E-03
37	888.0E-03	888.0E-03	896.0E-03	900.8E-03	906.4E-03	906.4E-03	910.4E-03	914.4E-03	915.2E-03	920.0E-03	923.2E-03	922.4E-03	912.0E-03
38	890.4E-03	894.4E-03	897.6E-03	903.2E-03	907.2E-03	908.0E-03	912.0E-03	916.0E-03	917.6E-03	921.6E-03	924.8E-03	924.0E-03	913.6E-03
Statistics													
Min	888.0E-03	888.0E-03	896.0E-03	900.8E-03	906.4E-03	906.4E-03	910.4E-03	914.4E-03	915.2E-03	920.0E-03	923.2E-03	922.4E-03	912.0E-03
Max	895.2E-03	895.2E-03	901.6E-03	907.2E-03	910.4E-03	911.2E-03	915.2E-03	919.2E-03	920.0E-03	924.0E-03	927.2E-03	926.4E-03	917.6E-03
Average	891.2E-03	892.5E-03	898.4E-03	903.7E-03	908.0E-03	908.5E-03	912.5E-03	916.5E-03	917.6E-03	921.9E-03	925.1E-03	924.3E-03	914.4E-03
Sigma	3.0E-03	3.2E-03	2.4E-03	2.6E-03	1.7E-03	2.0E-03	2.0E-03	2.0E-03	2.0E-03	1.6E-03	1.6E-03	1.6E-03	2.4E-03

Drift Calculation

VOL2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	6.4E-03	12.0E-03	15.2E-03	16.0E-03	20.0E-03	24.0E-03	24.8E-03	28.8E-03	32.0E-03	31.2E-03	22.4E-03
37	-	0.0E+00	8.0E-03	12.8E-03	18.4E-03	18.4E-03	22.4E-03	26.4E-03	27.2E-03	32.0E-03	35.2E-03	34.4E-03	24.0E-03
38	-	4.0E-03	7.2E-03	12.8E-03	16.8E-03	17.6E-03	21.6E-03	25.6E-03	27.2E-03	31.2E-03	34.4E-03	33.6E-03	23.2E-03
Average	-	1.3E-03	7.2E-03	12.5E-03	16.8E-03	17.3E-03	21.3E-03	25.3E-03	26.4E-03	30.7E-03	33.9E-03	33.1E-03	23.2E-03
Sigma	-	1.9E-03	653.2E-06	377.1E-06	1.3E-03	997.8E-06	997.8E-06	997.8E-06	1.1E-03	1.4E-03	1.4E-03	1.4E-03	653.2E-06

Parameter : Logical "0" output voltage : VOL2DUTC
 Test conditions : +VCC=30V. -VCC=GND. IOL=5mA
 Unit : V
 Spec Limit Max : 1.5E+00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	893.6E-03	896.0E-03	896.8E-03	896.8E-03	896.8E-03	894.4E-03	894.4E-03	894.4E-03	893.6E-03	895.2E-03	896.0E-03	895.2E-03	893.6E-03
ON_PROTON samples													
27	903.2E-03	905.6E-03	908.0E-03	912.0E-03	916.0E-03	915.2E-03	918.4E-03	919.2E-03	918.4E-03	920.0E-03	920.0E-03	920.0E-03	915.2E-03
28	900.0E-03	903.2E-03	904.8E-03	909.6E-03	913.6E-03	913.6E-03	916.0E-03	917.6E-03	916.8E-03	918.4E-03	918.4E-03	917.6E-03	912.8E-03
29	900.8E-03	904.0E-03	905.6E-03	909.6E-03	914.4E-03	913.6E-03	916.8E-03	917.6E-03	916.8E-03	917.6E-03	918.4E-03	917.6E-03	912.8E-03
Statistics													
Min	900.0E-03	903.2E-03	904.8E-03	909.6E-03	913.6E-03	913.6E-03	916.0E-03	917.6E-03	916.8E-03	917.6E-03	918.4E-03	917.6E-03	912.8E-03
Max	903.2E-03	905.6E-03	908.0E-03	912.0E-03	916.0E-03	915.2E-03	918.4E-03	919.2E-03	918.4E-03	920.0E-03	920.0E-03	920.0E-03	915.2E-03
Average	901.3E-03	904.3E-03	906.1E-03	910.4E-03	914.7E-03	914.1E-03	917.1E-03	918.1E-03	917.3E-03	918.7E-03	918.9E-03	918.4E-03	913.6E-03
Sigma	1.4E-03	997.8E-06	1.4E-03	1.1E-03	997.8E-06	754.2E-06	997.8E-06	754.3E-06	754.2E-06	997.8E-06	754.3E-06	1.1E-03	1.1E-03

Drift Calculation

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.4E-03	4.8E-03	8.8E-03	12.8E-03	12.0E-03	15.2E-03	16.0E-03	15.2E-03	16.8E-03	16.8E-03	16.8E-03	12.0E-03
28	-	3.2E-03	4.8E-03	9.6E-03	13.6E-03	13.6E-03	16.0E-03	17.6E-03	16.8E-03	18.4E-03	18.4E-03	17.6E-03	12.8E-03
29	-	3.2E-03	4.8E-03	8.8E-03	13.6E-03	12.8E-03	16.0E-03	16.8E-03	16.0E-03	16.8E-03	17.6E-03	16.8E-03	12.0E-03
Average	-	2.9E-03	4.8E-03	9.1E-03	13.3E-03	12.8E-03	15.7E-03	16.8E-03	16.0E-03	17.3E-03	17.6E-03	17.1E-03	12.3E-03
Sigma	-	377.1E-06	0.0E+00	377.1E-06	377.1E-06	653.2E-06	377.1E-06	653.2E-06	653.2E-06	754.2E-06	653.2E-06	377.1E-06	377.1E-06

Measurements

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	893.6E-03	896.0E-03	896.8E-03	896.8E-03	896.8E-03	894.4E-03	894.4E-03	894.4E-03	893.6E-03	895.2E-03	896.0E-03	895.2E-03	893.6E-03
ON_TID samples													
33	888.8E-03	888.8E-03	896.0E-03	900.8E-03	904.8E-03	904.8E-03	908.0E-03	909.6E-03	909.6E-03	911.2E-03	912.0E-03	911.2E-03	907.2E-03
34	887.2E-03	892.0E-03	894.4E-03	899.2E-03	904.0E-03	904.0E-03	907.2E-03	908.8E-03	908.0E-03	909.6E-03	909.6E-03	908.8E-03	905.6E-03
35	892.0E-03	892.0E-03	898.4E-03	904.0E-03	907.2E-03	907.2E-03	910.4E-03	912.0E-03	912.0E-03	912.8E-03	913.6E-03	913.6E-03	910.4E-03
Statistics													
Min	887.2E-03	888.8E-03	894.4E-03	899.2E-03	904.0E-03	904.0E-03	907.2E-03	908.8E-03	908.0E-03	909.6E-03	909.6E-03	908.8E-03	905.6E-03
Max	892.0E-03	892.0E-03	898.4E-03	904.0E-03	907.2E-03	907.2E-03	910.4E-03	912.0E-03	912.0E-03	912.8E-03	913.6E-03	913.6E-03	910.4E-03
Average	889.3E-03	890.9E-03	896.3E-03	901.3E-03	905.3E-03	905.3E-03	908.5E-03	910.1E-03	909.9E-03	911.2E-03	911.7E-03	911.2E-03	907.7E-03
Sigma	2.0E-03	1.5E-03	1.6E-03	2.0E-03	1.4E-03	1.4E-03	1.4E-03	1.4E-03	1.6E-03	1.3E-03	1.6E-03	2.0E-03	2.0E-03

Drift Calculation

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	7.2E-03	12.0E-03	16.0E-03	16.0E-03	19.2E-03	20.8E-03	20.8E-03	22.4E-03	23.2E-03	22.4E-03	18.4E-03
34	-	4.8E-03	7.2E-03	12.0E-03	16.8E-03	16.8E-03	20.0E-03	21.6E-03	20.8E-03	22.4E-03	22.4E-03	21.6E-03	18.4E-03
35	-	0.0E+00	6.4E-03	12.0E-03	15.2E-03	15.2E-03	18.4E-03	20.0E-03	20.0E-03	20.8E-03	21.6E-03	21.6E-03	18.4E-03
Average	-	1.6E-03	6.9E-03	12.0E-03	16.0E-03	16.0E-03	19.2E-03	20.8E-03	20.5E-03	21.9E-03	22.4E-03	21.9E-03	18.4E-03
Sigma	-	2.3E-03	377.1E-06	28.1E-09	653.2E-06	653.2E-06	653.2E-06	653.2E-06	653.2E-06	754.2E-06	653.2E-06	377.1E-06	28.1E-09

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019	
	LM124AJRQMLV				National Semiconductors					Issue:	02	

Measurements

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	893.6E-03	896.0E-03	896.8E-03	896.8E-03	896.8E-03	894.4E-03	894.4E-03	894.4E-03	893.6E-03	895.2E-03	896.0E-03	895.2E-03	893.6E-03
OFF PROTON samples													
30	904.0E-03	908.0E-03	908.8E-03	913.6E-03	917.6E-03	919.2E-03	921.6E-03	925.6E-03	926.4E-03	930.4E-03	934.4E-03	933.6E-03	922.4E-03
32	904.8E-03	908.0E-03	909.6E-03	914.4E-03	917.6E-03	919.2E-03	922.4E-03	925.6E-03	926.4E-03	930.4E-03	934.4E-03	933.6E-03	923.2E-03
39	897.6E-03	901.6E-03	903.2E-03	908.8E-03	912.8E-03	913.6E-03	916.8E-03	920.8E-03	922.4E-03	925.6E-03	929.6E-03	928.8E-03	916.8E-03
Statistics													
Min	897.6E-03	901.6E-03	903.2E-03	908.8E-03	912.8E-03	913.6E-03	916.8E-03	920.8E-03	922.4E-03	925.6E-03	929.6E-03	928.8E-03	916.8E-03
Max	904.8E-03	908.0E-03	909.6E-03	914.4E-03	917.6E-03	919.2E-03	922.4E-03	925.6E-03	926.4E-03	930.4E-03	934.4E-03	933.6E-03	923.2E-03
Average	902.1E-03	905.9E-03	907.2E-03	912.3E-03	916.0E-03	917.3E-03	920.3E-03	924.0E-03	925.1E-03	928.8E-03	932.8E-03	932.0E-03	920.8E-03
Sigma	3.2E-03	3.0E-03	2.8E-03	2.5E-03	2.3E-03	2.6E-03	2.5E-03	2.3E-03	1.9E-03	2.3E-03	2.3E-03	2.3E-03	2.8E-03

Drift Calculation

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	4.0E-03	4.8E-03	9.6E-03	13.6E-03	15.2E-03	17.6E-03	21.6E-03	22.4E-03	26.4E-03	30.4E-03	29.6E-03	18.4E-03
32	-	3.2E-03	4.8E-03	9.6E-03	12.8E-03	14.4E-03	17.6E-03	20.8E-03	21.6E-03	25.6E-03	29.6E-03	28.8E-03	18.4E-03
39	-	4.0E-03	5.6E-03	11.2E-03	15.2E-03	16.0E-03	19.2E-03	23.2E-03	24.8E-03	28.0E-03	32.0E-03	31.2E-03	19.2E-03
Average	-	3.7E-03	5.1E-03	10.1E-03	13.9E-03	15.2E-03	18.1E-03	21.9E-03	22.9E-03	26.7E-03	30.7E-03	29.9E-03	18.7E-03
Sigma	-	377.1E-06	377.1E-06	754.2E-06	997.8E-06	653.2E-06	754.3E-06	997.8E-06	1.4E-03	997.8E-06	997.8E-06	997.8E-06	377.1E-06

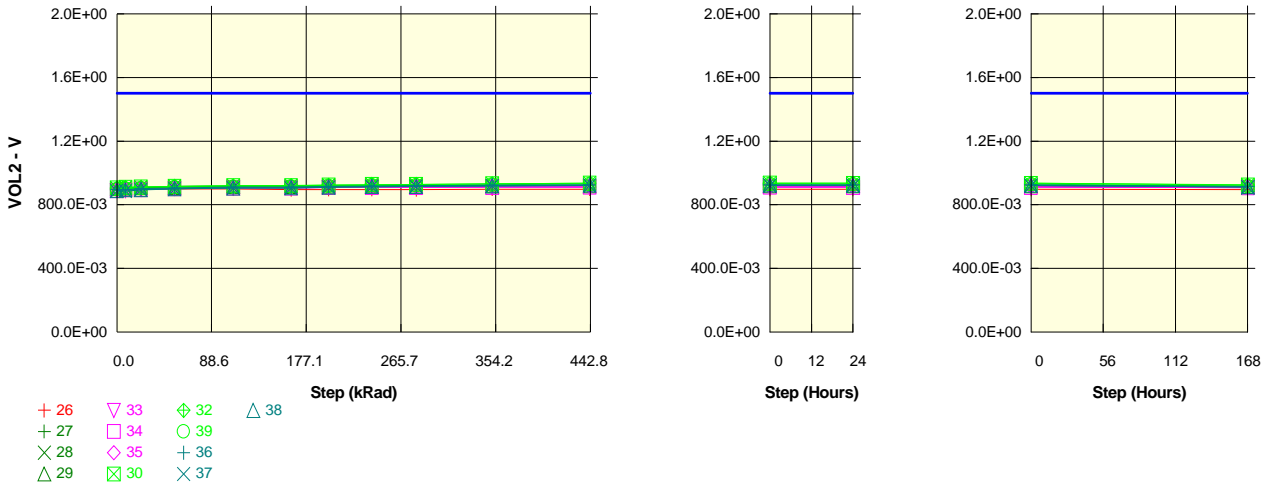
Measurements

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	893.6E-03	896.0E-03	896.8E-03	896.8E-03	896.8E-03	894.4E-03	894.4E-03	894.4E-03	893.6E-03	895.2E-03	896.0E-03	895.2E-03	893.6E-03
OFF TID samples													
36	892.8E-03	892.8E-03	899.2E-03	904.8E-03	908.8E-03	909.6E-03	912.8E-03	916.8E-03	917.6E-03	922.4E-03	925.6E-03	924.0E-03	915.2E-03
37	886.4E-03	886.4E-03	893.6E-03	898.4E-03	904.0E-03	904.8E-03	908.8E-03	912.0E-03	913.6E-03	917.6E-03	920.8E-03	920.0E-03	909.6E-03
38	889.6E-03	893.6E-03	896.8E-03	901.6E-03	906.4E-03	907.2E-03	911.2E-03	915.2E-03	916.8E-03	920.8E-03	924.8E-03	923.2E-03	912.8E-03
Statistics													
Min	886.4E-03	886.4E-03	893.6E-03	898.4E-03	904.0E-03	904.8E-03	908.8E-03	912.0E-03	913.6E-03	917.6E-03	920.8E-03	920.0E-03	909.6E-03
Max	892.8E-03	893.6E-03	899.2E-03	904.8E-03	908.8E-03	909.6E-03	912.8E-03	916.8E-03	917.6E-03	922.4E-03	925.6E-03	924.0E-03	915.2E-03
Average	889.6E-03	890.9E-03	896.5E-03	901.6E-03	906.4E-03	907.2E-03	910.9E-03	914.7E-03	916.0E-03	920.3E-03	923.7E-03	922.4E-03	912.5E-03
Sigma	2.6E-03	3.2E-03	2.3E-03	2.6E-03	2.0E-03	2.0E-03	1.6E-03	2.0E-03	1.7E-03	2.0E-03	2.1E-03	1.7E-03	2.3E-03

Drift Calculation

VOL2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	6.4E-03	12.0E-03	16.0E-03	16.8E-03	20.0E-03	24.0E-03	24.8E-03	29.6E-03	32.8E-03	31.2E-03	22.4E-03
37	-	0.0E+00	7.2E-03	12.0E-03	17.6E-03	18.4E-03	22.4E-03	25.6E-03	27.2E-03	31.2E-03	34.4E-03	33.6E-03	23.2E-03
38	-	4.0E-03	7.2E-03	12.0E-03	16.8E-03	17.6E-03	21.6E-03	25.6E-03	27.2E-03	31.2E-03	35.2E-03	33.6E-03	23.2E-03
Average	-	1.3E-03	6.9E-03	12.0E-03	16.8E-03	17.6E-03	21.3E-03	25.1E-03	26.4E-03	30.7E-03	34.1E-03	32.8E-03	22.9E-03
Sigma	-	1.9E-03	377.1E-06	0.0E+00	653.2E-06	653.2E-06	997.8E-06	754.2E-06	1.1E-03	754.2E-06	997.8E-06	1.1E-03	377.1E-06

Parameter : Logical "0" output voltage : VOL2DUTD
 Test conditions : +VCC=30V. -VCC=GND. IOL=5mA
 Unit : V
 Spec Limit Max : 1.5E+00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	895.2E-03	896.8E-03	898.4E-03	898.4E-03	898.4E-03	895.2E-03	896.0E-03	896.0E-03	894.4E-03	896.8E-03	896.8E-03	896.8E-03	895.2E-03
ON_PROTON samples													
27	904.0E-03	906.4E-03	908.8E-03	913.6E-03	916.8E-03	916.0E-03	919.2E-03	920.0E-03	919.2E-03	920.8E-03	920.8E-03	920.0E-03	916.0E-03
28	900.8E-03	904.0E-03	905.6E-03	909.6E-03	914.4E-03	914.4E-03	916.8E-03	917.6E-03	916.8E-03	918.4E-03	918.4E-03	917.6E-03	913.6E-03
29	900.8E-03	904.0E-03	905.6E-03	909.6E-03	914.4E-03	913.6E-03	916.8E-03	917.6E-03	916.8E-03	917.6E-03	918.4E-03	917.6E-03	913.6E-03
Statistics													
Min	900.8E-03	904.0E-03	905.6E-03	909.6E-03	914.4E-03	913.6E-03	916.8E-03	917.6E-03	916.8E-03	917.6E-03	918.4E-03	917.6E-03	913.6E-03
Max	904.0E-03	906.4E-03	908.8E-03	913.6E-03	916.8E-03	916.0E-03	919.2E-03	920.0E-03	919.2E-03	920.8E-03	920.8E-03	920.0E-03	916.0E-03
Average	901.9E-03	904.8E-03	906.7E-03	910.9E-03	915.2E-03	914.7E-03	917.6E-03	918.4E-03	917.6E-03	918.9E-03	919.2E-03	918.4E-03	914.4E-03
Sigma	1.5E-03	1.1E-03	1.5E-03	1.9E-03	1.1E-03	997.8E-06	1.1E-03	1.1E-03	1.1E-03	1.4E-03	1.1E-03	1.1E-03	1.1E-03

Drift Calculation

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	2.4E-03	4.8E-03	9.6E-03	12.8E-03	12.0E-03	15.2E-03	16.0E-03	15.2E-03	16.8E-03	16.8E-03	16.0E-03	12.0E-03
28	-	3.2E-03	4.8E-03	8.8E-03	13.6E-03	13.6E-03	16.0E-03	16.8E-03	16.0E-03	17.6E-03	17.6E-03	16.8E-03	12.8E-03
29	-	3.2E-03	4.8E-03	8.8E-03	13.6E-03	12.8E-03	16.0E-03	16.8E-03	16.0E-03	16.8E-03	17.6E-03	16.8E-03	12.8E-03
Average	-	2.9E-03	4.8E-03	9.1E-03	13.3E-03	12.8E-03	15.7E-03	16.5E-03	15.7E-03	17.1E-03	17.3E-03	16.5E-03	12.5E-03
Sigma	-	377.1E-06	0.0E+00	377.1E-06	377.1E-06	653.2E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06

Measurements

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	895.2E-03	896.8E-03	898.4E-03	898.4E-03	898.4E-03	895.2E-03	896.0E-03	896.0E-03	894.4E-03	896.8E-03	896.8E-03	896.8E-03	895.2E-03
ON_TID samples													
33	888.8E-03	888.8E-03	896.0E-03	901.6E-03	904.8E-03	905.6E-03	908.0E-03	909.6E-03	909.6E-03	910.4E-03	911.2E-03	910.4E-03	907.2E-03
34	888.0E-03	892.8E-03	895.2E-03	900.0E-03	904.8E-03	904.8E-03	907.2E-03	909.6E-03	908.0E-03	909.6E-03	910.4E-03	909.6E-03	906.4E-03
35	892.0E-03	892.0E-03	898.4E-03	904.0E-03	907.2E-03	908.0E-03	910.4E-03	912.0E-03	910.4E-03	911.2E-03	912.0E-03	911.2E-03	909.6E-03
Statistics													
Min	888.0E-03	888.8E-03	895.2E-03	900.0E-03	904.8E-03	904.8E-03	907.2E-03	909.6E-03	908.0E-03	909.6E-03	910.4E-03	909.6E-03	906.4E-03
Max	892.0E-03	892.8E-03	898.4E-03	904.0E-03	907.2E-03	908.0E-03	910.4E-03	912.0E-03	910.4E-03	911.2E-03	912.0E-03	911.2E-03	909.6E-03
Average	889.6E-03	891.2E-03	896.5E-03	901.9E-03	905.6E-03	906.1E-03	908.5E-03	910.4E-03	909.3E-03	910.4E-03	911.2E-03	910.4E-03	907.7E-03
Sigma	1.7E-03	1.7E-03	1.4E-03	1.6E-03	1.1E-03	1.4E-03	1.4E-03	1.1E-03	997.8E-06	653.2E-06	653.2E-06	653.2E-06	1.4E-03

Drift Calculation

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	7.2E-03	12.8E-03	16.0E-03	16.8E-03	19.2E-03	20.8E-03	20.8E-03	21.6E-03	22.4E-03	21.6E-03	18.4E-03
34	-	4.8E-03	7.2E-03	12.0E-03	16.8E-03	16.8E-03	19.2E-03	21.6E-03	20.0E-03	21.6E-03	22.4E-03	21.6E-03	18.4E-03
35	-	0.0E+00	6.4E-03	12.0E-03	15.2E-03	16.0E-03	18.4E-03	20.0E-03	18.4E-03	19.2E-03	20.0E-03	19.2E-03	17.6E-03
Average	-	1.6E-03	6.9E-03	12.3E-03	16.0E-03	16.5E-03	18.9E-03	20.8E-03	19.7E-03	20.8E-03	21.6E-03	20.8E-03	18.1E-03
Sigma	-	2.3E-03	377.1E-06	377.1E-06	653.2E-06	377.1E-06	377.1E-06	653.2E-06	997.8E-06	1.1E-03	1.1E-03	1.1E-03	377.1E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019	
	LM124AJRQMLV				National Semiconductors					Issue:	02	

Measurements

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	895.2E-03	896.8E-03	898.4E-03	898.4E-03	898.4E-03	895.2E-03	896.0E-03	896.0E-03	894.4E-03	896.8E-03	896.8E-03	896.8E-03	895.2E-03
OFF PROTON samples													
30	905.6E-03	908.8E-03	910.4E-03	915.2E-03	919.2E-03	920.0E-03	923.2E-03	926.4E-03	927.2E-03	931.2E-03	935.2E-03	934.4E-03	924.0E-03
32	904.8E-03	908.0E-03	909.6E-03	915.2E-03	918.4E-03	919.2E-03	922.4E-03	926.4E-03	927.2E-03	930.4E-03	934.4E-03	934.4E-03	923.2E-03
39	897.6E-03	901.6E-03	903.2E-03	908.8E-03	912.8E-03	913.6E-03	917.6E-03	921.6E-03	922.4E-03	925.6E-03	929.6E-03	928.8E-03	916.8E-03
Statistics													
Min	897.6E-03	901.6E-03	903.2E-03	908.8E-03	912.8E-03	913.6E-03	917.6E-03	921.6E-03	922.4E-03	925.6E-03	929.6E-03	928.8E-03	916.8E-03
Max	905.6E-03	908.8E-03	910.4E-03	915.2E-03	919.2E-03	920.0E-03	923.2E-03	926.4E-03	927.2E-03	931.2E-03	935.2E-03	934.4E-03	924.0E-03
Average	902.7E-03	906.1E-03	907.7E-03	913.1E-03	916.8E-03	917.6E-03	921.1E-03	924.8E-03	925.6E-03	929.1E-03	933.1E-03	932.5E-03	921.3E-03
Sigma	3.6E-03	3.2E-03	3.2E-03	3.0E-03	2.8E-03	2.8E-03	2.5E-03	2.3E-03	2.3E-03	2.5E-03	2.5E-03	2.6E-03	3.2E-03

Drift Calculation

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	3.2E-03	4.8E-03	9.6E-03	13.6E-03	14.4E-03	17.6E-03	20.8E-03	21.6E-03	25.6E-03	29.6E-03	28.8E-03	18.4E-03
32	-	3.2E-03	4.8E-03	10.4E-03	13.6E-03	14.4E-03	17.6E-03	21.6E-03	22.4E-03	25.6E-03	29.6E-03	29.6E-03	18.4E-03
39	-	4.0E-03	5.6E-03	11.2E-03	15.2E-03	16.0E-03	20.0E-03	24.0E-03	24.8E-03	28.0E-03	32.0E-03	31.2E-03	19.2E-03
Average	-	3.5E-03	5.1E-03	10.4E-03	14.1E-03	14.9E-03	18.4E-03	22.1E-03	22.9E-03	26.4E-03	30.4E-03	29.9E-03	18.7E-03
Sigma	-	377.1E-06	377.1E-06	653.2E-06	754.3E-06	754.3E-06	1.1E-03	1.4E-03	1.4E-03	1.1E-03	1.1E-03	997.8E-06	377.1E-06

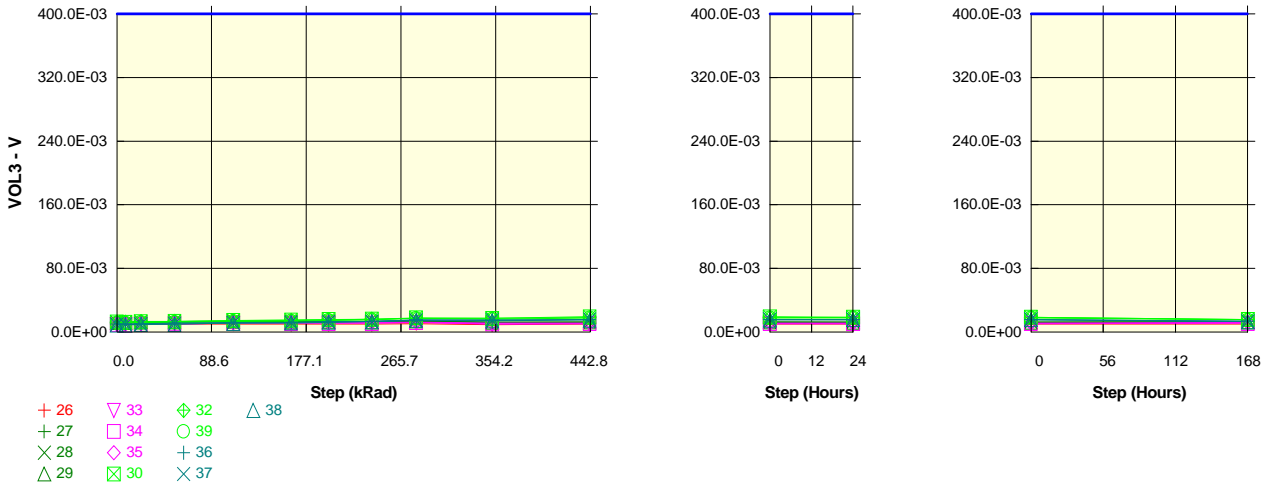
Measurements

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	895.2E-03	896.8E-03	898.4E-03	898.4E-03	898.4E-03	895.2E-03	896.0E-03	896.0E-03	894.4E-03	896.8E-03	896.8E-03	896.8E-03	895.2E-03
OFF TID samples													
36	893.6E-03	893.6E-03	900.0E-03	905.6E-03	909.6E-03	910.4E-03	913.6E-03	917.6E-03	918.4E-03	923.2E-03	925.6E-03	924.8E-03	916.0E-03
37	885.6E-03	885.6E-03	892.8E-03	898.4E-03	904.0E-03	904.0E-03	908.0E-03	912.0E-03	913.6E-03	917.6E-03	920.8E-03	920.0E-03	909.6E-03
38	888.0E-03	892.8E-03	895.2E-03	900.8E-03	904.8E-03	905.6E-03	910.4E-03	913.6E-03	914.4E-03	919.2E-03	923.2E-03	921.6E-03	911.2E-03
Statistics													
Min	885.6E-03	885.6E-03	892.8E-03	898.4E-03	904.0E-03	904.0E-03	908.0E-03	912.0E-03	913.6E-03	917.6E-03	920.8E-03	920.0E-03	909.6E-03
Max	893.6E-03	893.6E-03	900.0E-03	905.6E-03	909.6E-03	910.4E-03	913.6E-03	917.6E-03	918.4E-03	923.2E-03	925.6E-03	924.8E-03	916.0E-03
Average	889.1E-03	890.7E-03	896.0E-03	901.6E-03	906.1E-03	906.7E-03	910.7E-03	914.4E-03	915.5E-03	920.0E-03	923.2E-03	922.1E-03	912.3E-03
Sigma	3.4E-03	3.6E-03	3.0E-03	3.0E-03	2.5E-03	2.7E-03	2.3E-03	2.4E-03	2.1E-03	2.4E-03	2.0E-03	2.0E-03	2.7E-03

Drift Calculation

VOL2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	6.4E-03	12.0E-03	16.0E-03	16.8E-03	20.0E-03	24.0E-03	24.8E-03	29.6E-03	32.0E-03	31.2E-03	22.4E-03
37	-	0.0E+00	7.2E-03	12.8E-03	18.4E-03	18.4E-03	22.4E-03	26.4E-03	28.0E-03	32.0E-03	35.2E-03	34.4E-03	24.0E-03
38	-	4.8E-03	7.2E-03	12.8E-03	16.8E-03	17.6E-03	22.4E-03	25.6E-03	26.4E-03	31.2E-03	35.2E-03	33.6E-03	23.2E-03
Average	-	1.6E-03	6.9E-03	12.5E-03	17.1E-03	17.6E-03	21.6E-03	25.3E-03	26.4E-03	30.9E-03	34.1E-03	33.1E-03	23.2E-03
Sigma	-	2.3E-03	377.1E-06	377.1E-06	997.8E-06	653.2E-06	1.1E-03	997.8E-06	1.3E-03	997.8E-06	1.5E-03	1.4E-03	653.2E-06

Parameter : Logical "0" output voltage : VOL3DUTA
 Test conditions : +VCC=4.5V. -VCC=GND. IOL=2μA
 Unit : V
 Spec Limit Max : 400.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.2E-03	9.6E-03	10.0E-03	10.0E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	10.0E-03
ON_PROTON samples													
27	12.4E-03	12.0E-03	12.8E-03	12.8E-03	13.6E-03	13.6E-03	13.6E-03	13.2E-03	14.0E-03	12.0E-03	12.4E-03	12.4E-03	12.8E-03
28	12.0E-03	11.6E-03	12.0E-03	12.4E-03	13.2E-03	12.8E-03	13.2E-03	12.8E-03	13.6E-03	12.4E-03	12.4E-03	12.4E-03	12.4E-03
29	11.6E-03	11.6E-03	12.4E-03	12.4E-03	13.2E-03	12.8E-03	13.2E-03	12.8E-03	13.6E-03	12.0E-03	12.4E-03	12.0E-03	12.4E-03
Statistics													
Min	11.6E-03	11.6E-03	12.0E-03	12.4E-03	13.2E-03	12.8E-03	13.2E-03	12.8E-03	13.6E-03	12.0E-03	12.4E-03	12.0E-03	12.4E-03
Max	12.4E-03	12.0E-03	12.8E-03	12.8E-03	13.6E-03	13.6E-03	13.6E-03	13.2E-03	14.0E-03	12.4E-03	12.4E-03	12.4E-03	12.8E-03
Average	12.0E-03	11.7E-03	12.4E-03	12.5E-03	13.3E-03	13.1E-03	13.3E-03	12.9E-03	13.7E-03	12.1E-03	12.4E-03	12.3E-03	12.5E-03
Sigma	326.6E-06	188.6E-06	326.6E-06	188.6E-06	188.6E-06	377.1E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	95.1E-12	188.6E-06	188.6E-06

Drift Calculation

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	800.0E-06	1.6E-03	-400.0E-06	0.0E+00	0.0E+00	400.0E-06
28	-	-400.0E-06	0.0E+00	400.0E-06	1.2E-03	800.0E-06	1.2E-03	800.0E-06	1.6E-03	400.0E-06	400.0E-06	400.0E-06	400.0E-06
29	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	1.2E-03	1.6E-03	1.2E-03	2.0E-03	400.0E-06	400.0E-06	400.0E-06	800.0E-06
Average	-	-266.7E-06	400.0E-06	533.3E-06	1.3E-03	1.1E-03	1.3E-03	933.3E-06	1.7E-03	133.3E-06	400.0E-06	266.7E-06	533.3E-06
Sigma	-	188.6E-06	326.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	377.1E-06	326.6E-06	188.6E-06	188.6E-06

Measurements

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.2E-03	9.6E-03	10.0E-03	10.0E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	10.0E-03
ON_TID samples													
33	9.2E-03	9.2E-03	9.6E-03	10.0E-03	10.8E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	10.0E-03	10.4E-03	10.4E-03	10.8E-03
34	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.8E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	10.0E-03	10.4E-03	10.4E-03	10.8E-03
35	9.6E-03	9.6E-03	10.4E-03	10.4E-03	11.2E-03	11.6E-03	11.6E-03	11.6E-03	12.4E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03
Statistics													
Min	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.8E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	10.0E-03	10.4E-03	10.4E-03	10.8E-03
Max	9.6E-03	9.6E-03	10.4E-03	10.4E-03	11.2E-03	11.6E-03	11.6E-03	11.6E-03	12.4E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03
Average	9.3E-03	9.2E-03	9.9E-03	10.1E-03	10.9E-03	11.1E-03	11.1E-03	11.1E-03	11.9E-03	10.3E-03	10.5E-03	10.5E-03	11.1E-03
Sigma	188.6E-06	326.6E-06	377.1E-06	188.6E-06	188.6E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	188.6E-06	188.6E-06	377.1E-06

Drift Calculation

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	400.0E-06	800.0E-06	1.6E-03	1.6E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.2E-03	1.2E-03	1.6E-03
34	-	-400.0E-06	400.0E-06	800.0E-06	1.6E-03	1.6E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.2E-03	1.2E-03	1.6E-03
35	-	0.0E+00	800.0E-06	800.0E-06	1.6E-03	2.0E-03	2.0E-03	2.0E-03	2.8E-03	1.2E-03	1.2E-03	1.2E-03	2.0E-03
Average	-	-133.3E-06	533.3E-06	800.0E-06	1.6E-03	1.7E-03	1.7E-03	1.7E-03	2.5E-03	933.3E-06	1.2E-03	1.2E-03	1.7E-03
Sigma	-	188.6E-06	188.6E-06	5.9E-12	439.0E-12	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	8.4E-12	8.4E-12	188.6E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02	

Measurements

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.2E-03	9.6E-03	10.0E-03	10.0E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	10.0E-03
OFF PROTON samples													
30	12.4E-03	12.0E-03	12.8E-03	13.2E-03	14.4E-03	14.8E-03	15.6E-03	16.0E-03	17.6E-03	16.8E-03	18.8E-03	18.4E-03	15.6E-03
32	12.4E-03	12.0E-03	12.8E-03	13.2E-03	14.0E-03	14.4E-03	15.2E-03	16.0E-03	17.2E-03	16.8E-03	18.0E-03	18.4E-03	15.6E-03
39	11.2E-03	11.2E-03	12.0E-03	12.0E-03	13.2E-03	13.6E-03	14.4E-03	15.2E-03	16.8E-03	16.0E-03	17.6E-03	17.6E-03	14.8E-03
Statistics													
Min	11.2E-03	11.2E-03	12.0E-03	12.0E-03	13.2E-03	13.6E-03	14.4E-03	15.2E-03	16.8E-03	16.0E-03	17.6E-03	17.6E-03	14.8E-03
Max	12.4E-03	12.0E-03	12.8E-03	13.2E-03	14.4E-03	14.8E-03	15.6E-03	16.0E-03	17.6E-03	16.8E-03	18.8E-03	18.4E-03	15.6E-03
Average	12.0E-03	11.7E-03	12.5E-03	12.8E-03	13.9E-03	14.3E-03	15.1E-03	15.7E-03	17.2E-03	16.5E-03	18.1E-03	18.1E-03	15.3E-03
Sigma	565.7E-06	377.1E-06	377.1E-06	565.7E-06	498.9E-06	498.9E-06	498.9E-06	377.1E-06	326.6E-06	377.1E-06	498.9E-06	377.1E-06	377.1E-06

Drift Calculation

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	3.6E-03	5.2E-03	4.4E-03	6.4E-03	6.0E-03	3.2E-03
32	-	-400.0E-06	400.0E-06	800.0E-06	1.6E-03	2.0E-03	2.8E-03	3.6E-03	4.8E-03	4.4E-03	5.6E-03	6.0E-03	3.2E-03
39	-	0.0E+00	800.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	4.0E-03	5.6E-03	4.8E-03	6.4E-03	6.4E-03	3.6E-03
Average	-	-266.7E-06	533.3E-06	800.0E-06	1.9E-03	2.3E-03	3.1E-03	3.7E-03	5.2E-03	4.5E-03	6.1E-03	6.1E-03	3.3E-03
Sigma	-	188.6E-06	188.6E-06	439.1E-12	188.6E-06	188.6E-06	188.6E-06	188.6E-06	326.6E-06	188.6E-06	377.1E-06	188.6E-06	188.6E-06

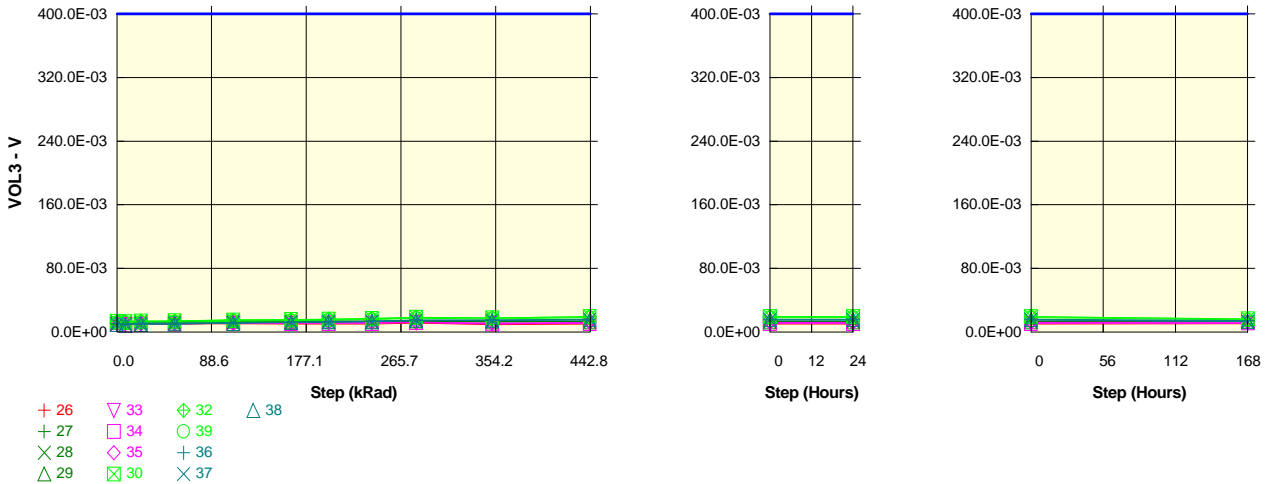
Measurements

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.2E-03	9.6E-03	10.0E-03	10.0E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	10.0E-03
OFF TID samples													
36	10.0E-03	10.0E-03	10.4E-03	10.8E-03	11.6E-03	12.0E-03	12.8E-03	13.2E-03	14.8E-03	14.4E-03	15.6E-03	15.6E-03	13.6E-03
37	9.2E-03	9.2E-03	9.6E-03	10.0E-03	11.2E-03	11.6E-03	12.4E-03	12.8E-03	14.8E-03	14.8E-03	15.6E-03	15.6E-03	13.2E-03
38	8.8E-03	8.8E-03	9.2E-03	9.6E-03	10.8E-03	11.2E-03	12.0E-03	12.8E-03	14.4E-03	14.0E-03	14.8E-03	15.2E-03	12.8E-03
Statistics													
Min	8.8E-03	8.8E-03	9.2E-03	9.6E-03	10.8E-03	11.2E-03	12.0E-03	12.8E-03	14.4E-03	14.0E-03	14.8E-03	15.2E-03	12.8E-03
Max	10.0E-03	10.0E-03	10.4E-03	10.8E-03	11.6E-03	12.0E-03	12.8E-03	13.2E-03	14.8E-03	14.8E-03	15.6E-03	15.6E-03	13.6E-03
Average	9.3E-03	9.3E-03	9.7E-03	10.1E-03	11.2E-03	11.6E-03	12.4E-03	12.9E-03	14.7E-03	14.4E-03	15.3E-03	15.5E-03	13.2E-03
Sigma	498.9E-06	498.9E-06	498.9E-06	498.9E-06	326.6E-06	326.6E-06	326.6E-06	188.6E-06	188.6E-06	326.6E-06	377.1E-06	188.6E-06	326.6E-06

Drift Calculation

VOL3DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	400.0E-06	800.0E-06	1.6E-03	2.0E-03	2.8E-03	3.2E-03	4.8E-03	4.4E-03	5.6E-03	5.6E-03	3.6E-03
37	-	0.0E+00	400.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	3.6E-03	5.6E-03	5.6E-03	6.4E-03	6.4E-03	4.0E-03
38	-	0.0E+00	400.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	4.0E-03	5.6E-03	5.2E-03	6.0E-03	6.4E-03	4.0E-03
Average	-	0.0E+00	400.0E-06	800.0E-06	1.9E-03	2.3E-03	3.1E-03	3.6E-03	5.3E-03	5.1E-03	6.0E-03	6.1E-03	3.9E-03
Sigma	-	0.0E+00	4.2E-12	439.1E-12	188.6E-06	188.6E-06	188.6E-06	326.6E-06	377.1E-06	498.9E-06	326.6E-06	377.1E-06	188.6E-06

Parameter : Logical "0" output voltage : VOL3DUTB
 Test conditions : +VCC=4.5V. -VCC=GND. IOL=2μA
 Unit : V
 Spec Limit Max : 400.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.4E-03
ON_PROTON samples													
27	12.8E-03	12.8E-03	13.2E-03	13.2E-03	14.0E-03	14.0E-03	14.0E-03	13.6E-03	14.4E-03	13.2E-03	13.6E-03	13.6E-03	13.6E-03
28	12.0E-03	11.6E-03	12.4E-03	12.4E-03	13.2E-03	12.8E-03	13.2E-03	12.8E-03	13.6E-03	12.8E-03	12.8E-03	12.8E-03	12.8E-03
29	12.0E-03	12.0E-03	12.4E-03	12.4E-03	13.2E-03	13.2E-03	13.2E-03	13.2E-03	13.6E-03	12.4E-03	12.8E-03	12.8E-03	12.8E-03
Statistics													
Min	12.0E-03	11.6E-03	12.4E-03	12.4E-03	13.2E-03	12.8E-03	13.2E-03	12.8E-03	13.6E-03	12.4E-03	12.8E-03	12.8E-03	12.8E-03
Max	12.8E-03	12.8E-03	13.2E-03	13.2E-03	14.0E-03	14.0E-03	14.0E-03	13.6E-03	14.4E-03	13.2E-03	13.6E-03	13.6E-03	13.6E-03
Average	12.3E-03	12.1E-03	12.7E-03	12.7E-03	13.5E-03	13.3E-03	13.5E-03	13.2E-03	13.9E-03	12.8E-03	13.1E-03	13.1E-03	13.1E-03
Sigma	377.1E-06	498.9E-06	377.1E-06	377.1E-06	377.1E-06	498.9E-06	377.1E-06	326.6E-06	377.1E-06	326.6E-06	377.1E-06	377.1E-06	377.1E-06

Drift Calculation

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	0.0E+00	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	800.0E-06	1.6E-03	400.0E-06	800.0E-06	800.0E-06	800.0E-06
28	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	800.0E-06	1.2E-03	800.0E-06	1.6E-03	800.0E-06	800.0E-06	800.0E-06	800.0E-06
29	-	0.0E+00	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.6E-03	400.0E-06	800.0E-06	800.0E-06	800.0E-06
Average	-	-133.3E-06	400.0E-06	400.0E-06	1.2E-03	1.1E-03	1.2E-03	933.3E-06	1.6E-03	533.3E-06	800.0E-06	800.0E-06	800.0E-06
Sigma	-	188.6E-06	4.2E-12	4.2E-12	439.0E-12	188.6E-06	439.0E-12	188.6E-06	0.0E+00	188.6E-06	438.9E-12	438.9E-12	438.9E-12

Measurements

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.4E-03
ON_TID samples													
33	9.2E-03	9.2E-03	9.6E-03	10.4E-03	10.8E-03	10.8E-03	11.2E-03	10.8E-03	11.6E-03	10.4E-03	10.8E-03	10.8E-03	11.2E-03
34	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.8E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	10.0E-03	10.8E-03	10.8E-03	11.2E-03
35	10.4E-03	10.4E-03	10.8E-03	10.8E-03	10.4E-03	11.6E-03	11.6E-03	11.6E-03	12.4E-03	10.8E-03	11.6E-03	11.6E-03	12.4E-03
Statistics													
Min	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.4E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	10.0E-03	10.8E-03	10.8E-03	11.2E-03
Max	10.4E-03	10.4E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	11.6E-03	11.6E-03	12.4E-03	10.8E-03	11.6E-03	11.6E-03	12.4E-03
Average	9.6E-03	9.5E-03	10.0E-03	10.4E-03	10.7E-03	11.1E-03	11.2E-03	11.1E-03	11.9E-03	10.4E-03	11.1E-03	11.1E-03	11.6E-03
Sigma	565.7E-06	679.9E-06	565.7E-06	326.6E-06	188.6E-06	377.1E-06	326.6E-06	377.1E-06	377.1E-06	326.6E-06	377.1E-06	377.1E-06	565.7E-06

Drift Calculation

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	400.0E-06	1.2E-03	1.6E-03	1.6E-03	2.0E-03	1.6E-03	2.4E-03	1.2E-03	1.6E-03	1.6E-03	2.0E-03
34	-	-400.0E-06	400.0E-06	800.0E-06	1.6E-03	1.6E-03	1.6E-03	1.6E-03	2.4E-03	800.0E-06	1.6E-03	1.6E-03	2.0E-03
35	-	0.0E+00	400.0E-06	400.0E-06	0.0E+00	1.2E-03	1.2E-03	1.2E-03	2.0E-03	400.0E-06	1.2E-03	1.2E-03	2.0E-03
Average	-	-133.3E-06	400.0E-06	800.0E-06	1.1E-03	1.5E-03	1.6E-03	1.5E-03	2.3E-03	800.0E-06	1.5E-03	1.5E-03	2.0E-03
Sigma	-	188.6E-06	3.0E-12	326.6E-06	754.2E-06	188.6E-06	326.6E-06	188.6E-06	188.6E-06	326.6E-06	188.6E-06	188.6E-06	439.8E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.4E-03
OFF PROTON samples													
30	13.2E-03	12.8E-03	13.6E-03	14.0E-03	14.8E-03	15.6E-03	16.0E-03	16.8E-03	18.4E-03	17.6E-03	19.2E-03	19.2E-03	16.4E-03
32	13.2E-03	12.8E-03	13.6E-03	13.6E-03	14.8E-03	15.2E-03	16.0E-03	16.4E-03	18.0E-03	17.6E-03	18.8E-03	18.8E-03	16.0E-03
39	11.6E-03	11.2E-03	12.0E-03	12.4E-03	13.6E-03	14.0E-03	14.8E-03	15.6E-03	17.2E-03	16.4E-03	18.0E-03	18.0E-03	14.8E-03
Statistics													
Min	11.6E-03	11.2E-03	12.0E-03	12.4E-03	13.6E-03	14.0E-03	14.8E-03	15.6E-03	17.2E-03	16.4E-03	18.0E-03	18.0E-03	14.8E-03
Max	13.2E-03	12.8E-03	13.6E-03	14.0E-03	14.8E-03	15.6E-03	16.0E-03	16.8E-03	18.4E-03	17.6E-03	19.2E-03	19.2E-03	16.4E-03
Average	12.7E-03	12.3E-03	13.1E-03	13.3E-03	14.4E-03	14.9E-03	15.6E-03	16.3E-03	17.9E-03	17.2E-03	18.7E-03	18.7E-03	15.7E-03
Sigma	754.2E-06	754.2E-06	754.2E-06	679.9E-06	565.7E-06	679.9E-06	565.7E-06	498.9E-06	498.9E-06	565.7E-06	498.9E-06	498.9E-06	679.9E-06

Drift Calculation

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-400.0E-06	400.0E-06	800.0E-06	1.6E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	4.4E-03	6.0E-03	6.0E-03	3.2E-03
32	-	-400.0E-06	400.0E-06	400.0E-06	1.6E-03	2.0E-03	2.8E-03	3.2E-03	4.8E-03	4.4E-03	5.6E-03	5.6E-03	2.8E-03
39	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	4.0E-03	5.6E-03	4.8E-03	6.4E-03	6.4E-03	3.2E-03
Average	-	-400.0E-06	400.0E-06	666.7E-06	1.7E-03	2.3E-03	2.9E-03	3.6E-03	5.2E-03	4.5E-03	6.0E-03	6.0E-03	3.1E-03
Sigma	-	4.2E-12	3.0E-12	188.6E-06	188.6E-06	188.6E-06	188.6E-06	326.6E-06	326.6E-06	188.6E-06	326.6E-06	326.6E-06	188.6E-06

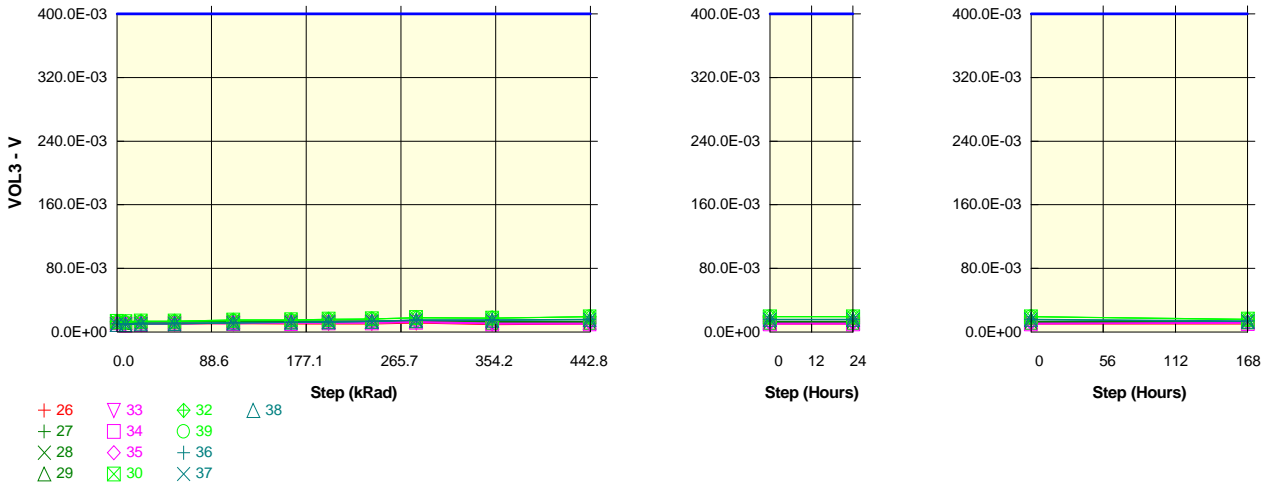
Measurements

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.4E-03
OFF TID samples													
36	10.4E-03	10.4E-03	10.8E-03	11.2E-03	12.0E-03	12.4E-03	13.2E-03	13.6E-03	15.2E-03	15.2E-03	16.0E-03	16.0E-03	14.4E-03
37	9.2E-03	9.2E-03	9.6E-03	10.0E-03	11.2E-03	11.6E-03	12.0E-03	12.8E-03	14.4E-03	14.4E-03	15.2E-03	15.2E-03	12.8E-03
38	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.8E-03	11.6E-03	12.4E-03	12.8E-03	14.4E-03	14.4E-03	15.2E-03	15.2E-03	13.2E-03
Statistics													
Min	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.8E-03	11.6E-03	12.0E-03	12.8E-03	14.4E-03	14.4E-03	15.2E-03	15.2E-03	12.8E-03
Max	10.4E-03	10.4E-03	10.8E-03	11.2E-03	12.0E-03	12.4E-03	13.2E-03	13.6E-03	15.2E-03	15.2E-03	16.0E-03	16.0E-03	14.4E-03
Average	9.6E-03	9.5E-03	10.0E-03	10.4E-03	11.3E-03	11.9E-03	12.5E-03	13.1E-03	14.7E-03	14.7E-03	15.5E-03	15.5E-03	13.5E-03
Sigma	565.7E-06	679.9E-06	565.7E-06	565.7E-06	498.9E-06	377.1E-06	498.9E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	679.9E-06

Drift Calculation

VOL3DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	400.0E-06	800.0E-06	1.6E-03	2.0E-03	2.8E-03	3.2E-03	4.8E-03	4.8E-03	5.6E-03	5.6E-03	4.0E-03
37	-	0.0E+00	400.0E-06	800.0E-06	2.0E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	5.2E-03	6.0E-03	6.0E-03	3.6E-03
38	-	-400.0E-06	400.0E-06	800.0E-06	1.6E-03	2.4E-03	3.2E-03	3.6E-03	5.2E-03	5.2E-03	6.0E-03	6.0E-03	4.0E-03
Average	-	-133.3E-06	400.0E-06	800.0E-06	1.7E-03	2.3E-03	2.9E-03	3.5E-03	5.1E-03	5.1E-03	5.9E-03	5.9E-03	3.9E-03
Sigma	-	188.6E-06	3.0E-12	10.3E-12	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06

Parameter : Logical "0" output voltage : VOL3DUTC
 Test conditions : +VCC=4.5V. -VCC=GND. IOL=2μA
 Unit : V
 Spec Limit Max : 400.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.0E-03
ON_PROTON samples													
27	12.8E-03	12.4E-03	13.2E-03	13.2E-03	14.0E-03	14.0E-03	14.0E-03	14.0E-03	14.4E-03	12.8E-03	12.8E-03	12.8E-03	12.8E-03
28	12.0E-03	11.6E-03	12.4E-03	12.4E-03	13.2E-03	13.2E-03	13.2E-03	13.2E-03	14.0E-03	12.8E-03	12.0E-03	12.0E-03	12.4E-03
29	12.0E-03	11.6E-03	12.4E-03	12.4E-03	13.2E-03	13.2E-03	13.2E-03	13.2E-03	13.6E-03	12.0E-03	12.0E-03	12.0E-03	12.4E-03
Statistics													
Min	12.0E-03	11.6E-03	12.4E-03	12.4E-03	13.2E-03	13.2E-03	13.2E-03	13.2E-03	13.6E-03	12.0E-03	12.0E-03	12.0E-03	12.4E-03
Max	12.8E-03	12.4E-03	13.2E-03	13.2E-03	14.0E-03	14.0E-03	14.0E-03	14.0E-03	14.4E-03	12.8E-03	12.8E-03	12.8E-03	12.8E-03
Average	12.3E-03	11.9E-03	12.7E-03	12.7E-03	13.5E-03	13.5E-03	13.5E-03	13.5E-03	14.0E-03	12.5E-03	12.3E-03	12.3E-03	12.5E-03
Sigma	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	326.6E-06	377.1E-06	377.1E-06	377.1E-06	188.6E-06

Drift Calculation

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.6E-03	0.0E+00	0.0E+00	0.0E+00	0.0E+00
28	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	1.2E-03	2.0E-03	800.0E-06	0.0E+00	0.0E+00	400.0E-06
29	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.6E-03	0.0E+00	0.0E+00	0.0E+00	400.0E-06
Average	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	1.2E-03	1.7E-03	266.7E-06	0.0E+00	0.0E+00	266.7E-06
Sigma	-	439.0E-12	4.2E-12	4.2E-12	439.0E-12	439.0E-12	439.0E-12	439.0E-12	188.6E-06	377.1E-06	0.0E+00	0.0E+00	188.6E-06

Measurements

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.0E-03
ON_TID samples													
33	9.2E-03	9.2E-03	9.6E-03	10.0E-03	10.8E-03	11.2E-03	11.2E-03	11.2E-03	12.0E-03	10.4E-03	10.4E-03	10.4E-03	10.8E-03
34	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.8E-03	10.8E-03	11.2E-03	11.2E-03	12.0E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03
35	10.0E-03	10.0E-03	10.8E-03	10.8E-03	10.0E-03	12.0E-03	12.0E-03	12.0E-03	12.8E-03	11.2E-03	11.2E-03	11.2E-03	11.6E-03
Statistics													
Min	9.2E-03	8.8E-03	9.6E-03	10.0E-03	10.0E-03	10.8E-03	11.2E-03	11.2E-03	12.0E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03
Max	10.0E-03	10.0E-03	10.8E-03	10.8E-03	10.8E-03	12.0E-03	12.0E-03	12.0E-03	12.8E-03	11.2E-03	11.2E-03	11.2E-03	11.6E-03
Average	9.5E-03	9.3E-03	10.0E-03	10.3E-03	10.5E-03	11.3E-03	11.5E-03	11.5E-03	12.3E-03	10.5E-03	10.5E-03	10.5E-03	11.1E-03
Sigma	377.1E-06	498.9E-06	565.7E-06	377.1E-06	377.1E-06	498.9E-06	377.1E-06	377.1E-06	377.1E-06	498.9E-06	498.9E-06	498.9E-06	377.1E-06

Drift Calculation

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	400.0E-06	800.0E-06	1.6E-03	2.0E-03	2.0E-03	2.0E-03	2.8E-03	1.2E-03	1.2E-03	1.2E-03	1.6E-03
34	-	-400.0E-06	400.0E-06	800.0E-06	1.6E-03	1.6E-03	2.0E-03	2.0E-03	2.8E-03	800.0E-06	800.0E-06	800.0E-06	1.6E-03
35	-	0.0E+00	800.0E-06	800.0E-06	0.0E+00	2.0E-03	2.0E-03	2.0E-03	2.8E-03	1.2E-03	1.2E-03	1.2E-03	1.6E-03
Average	-	-133.3E-06	533.3E-06	800.0E-06	1.1E-03	1.9E-03	2.0E-03	2.0E-03	2.8E-03	1.1E-03	1.1E-03	1.1E-03	1.6E-03
Sigma	-	188.6E-06	188.6E-06	439.1E-12	754.2E-06	188.6E-06	439.5E-12	439.5E-12	23.8E-12	188.6E-06	188.6E-06	188.6E-06	16.8E-12

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.0E-03
OFF_PROTON samples													
30	13.2E-03	12.8E-03	13.6E-03	13.6E-03	14.8E-03	15.2E-03	16.0E-03	16.4E-03	18.0E-03	17.2E-03	18.8E-03	18.8E-03	16.0E-03
32	13.2E-03	12.8E-03	13.6E-03	13.6E-03	14.8E-03	15.2E-03	16.0E-03	16.4E-03	18.0E-03	17.6E-03	18.8E-03	18.8E-03	16.0E-03
39	12.0E-03	11.6E-03	12.4E-03	12.8E-03	14.0E-03	14.4E-03	15.2E-03	16.0E-03	17.6E-03	17.2E-03	18.8E-03	18.8E-03	15.2E-03
Statistics													
Min	12.0E-03	11.6E-03	12.4E-03	12.8E-03	14.0E-03	14.4E-03	15.2E-03	16.0E-03	17.6E-03	17.2E-03	18.8E-03	18.8E-03	15.2E-03
Max	13.2E-03	12.8E-03	13.6E-03	13.6E-03	14.8E-03	15.2E-03	16.0E-03	16.4E-03	18.0E-03	17.6E-03	18.8E-03	18.8E-03	16.0E-03
Average	12.8E-03	12.4E-03	13.2E-03	13.3E-03	14.5E-03	14.9E-03	15.7E-03	16.3E-03	17.9E-03	17.3E-03	18.8E-03	18.8E-03	15.7E-03
Sigma	565.7E-06	565.7E-06	565.7E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	188.6E-06	188.6E-06	188.6E-06	0.0E+00	0.0E+00	377.1E-06

Drift Calculation

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-400.0E-06	400.0E-06	400.0E-06	1.6E-03	2.0E-03	2.8E-03	3.2E-03	4.8E-03	4.0E-03	5.6E-03	5.6E-03	2.8E-03
32	-	-400.0E-06	400.0E-06	400.0E-06	1.6E-03	2.0E-03	2.8E-03	3.2E-03	4.8E-03	4.4E-03	5.6E-03	5.6E-03	2.8E-03
39	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	4.0E-03	5.6E-03	5.2E-03	6.8E-03	6.8E-03	3.2E-03
Average	-	-400.0E-06	400.0E-06	533.3E-06	1.7E-03	2.1E-03	2.9E-03	3.5E-03	5.1E-03	4.5E-03	6.0E-03	6.0E-03	2.9E-03
Sigma	-	4.2E-12	3.0E-12	188.6E-06	188.6E-06	188.6E-06	188.6E-06	377.1E-06	377.1E-06	498.9E-06	565.7E-06	565.7E-06	188.6E-06

Measurements

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	10.0E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03	10.0E-03	10.0E-03	10.0E-03	10.8E-03	9.2E-03	10.0E-03	10.0E-03	10.0E-03
OFF_TID samples													
36	10.4E-03	10.4E-03	10.8E-03	11.2E-03	12.0E-03	12.4E-03	13.2E-03	13.6E-03	15.2E-03	15.2E-03	16.0E-03	16.0E-03	14.0E-03
37	9.2E-03	9.2E-03	9.6E-03	9.6E-03	10.8E-03	11.6E-03	12.4E-03	12.8E-03	14.4E-03	14.4E-03	15.2E-03	15.2E-03	13.2E-03
38	9.2E-03	9.2E-03	10.0E-03	10.4E-03	11.2E-03	12.0E-03	12.4E-03	13.2E-03	14.8E-03	14.8E-03	15.6E-03	15.6E-03	13.2E-03
Statistics													
Min	9.2E-03	9.2E-03	9.6E-03	9.6E-03	10.8E-03	11.6E-03	12.0E-03	12.8E-03	14.4E-03	14.4E-03	15.2E-03	15.2E-03	13.2E-03
Max	10.4E-03	10.4E-03	10.8E-03	11.2E-03	12.0E-03	12.4E-03	13.2E-03	13.6E-03	15.2E-03	15.2E-03	16.0E-03	16.0E-03	14.0E-03
Average	9.6E-03	9.6E-03	10.1E-03	10.4E-03	11.3E-03	12.0E-03	12.5E-03	13.2E-03	14.8E-03	14.8E-03	15.6E-03	15.6E-03	13.5E-03
Sigma	565.7E-06	565.7E-06	498.9E-06	653.2E-06	498.9E-06	326.6E-06	498.9E-06	326.6E-06	326.6E-06	326.6E-06	326.6E-06	326.6E-06	377.1E-06

Drift Calculation

VOL3DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	400.0E-06	800.0E-06	1.6E-03	2.0E-03	2.8E-03	3.2E-03	4.8E-03	4.8E-03	5.6E-03	5.6E-03	3.6E-03
37	-	0.0E+00	400.0E-06	400.0E-06	1.6E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	5.2E-03	6.0E-03	6.0E-03	4.0E-03
38	-	0.0E+00	800.0E-06	1.2E-03	2.0E-03	2.8E-03	3.2E-03	4.0E-03	5.6E-03	5.6E-03	6.4E-03	6.4E-03	4.0E-03
Average	-	0.0E+00	533.3E-06	800.0E-06	1.7E-03	2.4E-03	2.9E-03	3.6E-03	5.2E-03	5.2E-03	6.0E-03	6.0E-03	3.9E-03
Sigma	-	0.0E+00	188.6E-06	326.6E-06	188.6E-06	326.6E-06	188.6E-06	326.6E-06	326.6E-06	326.6E-06	326.6E-06	326.6E-06	188.6E-06

Parameter : Logical "0" output voltage : VOL3DUTD
 Test conditions : +VCC=4.5V. -VCC=GND. IOL=2μA
 Unit : V
 Spec Limit Max : 400.0E-03
 Spec limits are represented in bold lines on the graphic.



Measurements

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	9.6E-03	9.2E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	9.6E-03
ON_PROTON samples													
27	12.0E-03	12.0E-03	12.4E-03	12.4E-03	13.6E-03	13.6E-03	13.6E-03	13.2E-03	14.0E-03	12.0E-03	12.4E-03	12.4E-03	12.4E-03
28	12.0E-03	11.6E-03	12.0E-03	12.4E-03	13.2E-03	12.8E-03	13.2E-03	12.8E-03	13.6E-03	12.4E-03	11.6E-03	11.6E-03	12.0E-03
29	11.6E-03	11.2E-03	12.0E-03	12.0E-03	12.8E-03	12.8E-03	12.8E-03	12.8E-03	13.2E-03	11.6E-03	12.0E-03	11.6E-03	12.0E-03
Statistics													
Min	11.6E-03	11.2E-03	12.0E-03	12.0E-03	12.8E-03	12.8E-03	12.8E-03	12.8E-03	13.2E-03	11.6E-03	11.6E-03	11.6E-03	12.0E-03
Max	12.0E-03	12.0E-03	12.4E-03	12.4E-03	13.6E-03	13.6E-03	13.6E-03	13.2E-03	14.0E-03	12.4E-03	12.4E-03	12.4E-03	12.4E-03
Average	11.9E-03	11.6E-03	12.1E-03	12.3E-03	13.2E-03	13.1E-03	13.2E-03	12.9E-03	13.6E-03	12.0E-03	12.0E-03	11.9E-03	12.1E-03
Sigma	188.6E-06	326.6E-06	188.6E-06	188.6E-06	326.6E-06	377.1E-06	326.6E-06	188.6E-06	326.6E-06	326.6E-06	326.6E-06	377.1E-06	188.6E-06

Drift Calculation

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	0.0E+00	400.0E-06	400.0E-06	1.6E-03	1.6E-03	1.6E-03	1.2E-03	2.0E-03	0.0E+00	400.0E-06	400.0E-06	400.0E-06
28	-	-400.0E-06	0.0E+00	400.0E-06	1.2E-03	800.0E-06	1.2E-03	800.0E-06	1.6E-03	400.0E-06	-400.0E-06	-400.0E-06	0.0E+00
29	-	-400.0E-06	400.0E-06	400.0E-06	1.2E-03	1.2E-03	1.2E-03	1.6E-03	1.6E-03	0.0E+00	400.0E-06	0.0E+00	400.0E-06
Average	-	-266.7E-06	266.7E-06	400.0E-06	1.3E-03	1.2E-03	1.3E-03	1.1E-03	1.7E-03	133.3E-06	133.3E-06	33.0E-18	266.7E-06
Sigma	-	188.6E-06	188.6E-06	4.2E-12	188.6E-06	326.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	377.1E-06	326.6E-06	188.6E-06

Measurements

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	9.6E-03	9.2E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	9.6E-03
ON_TID samples													
33	8.8E-03	8.8E-03	9.6E-03	10.0E-03	10.4E-03	10.8E-03	10.8E-03	10.8E-03	11.6E-03	9.6E-03	10.0E-03	10.0E-03	10.4E-03
34	8.8E-03	8.8E-03	9.2E-03	9.6E-03	10.4E-03	10.8E-03	10.8E-03	10.8E-03	11.2E-03	9.6E-03	9.6E-03	10.0E-03	10.4E-03
35	9.6E-03	9.6E-03	10.0E-03	10.4E-03	9.6E-03	11.2E-03	11.6E-03	11.2E-03	12.0E-03	10.0E-03	10.4E-03	10.4E-03	10.8E-03
Statistics													
Min	8.8E-03	8.8E-03	9.2E-03	9.6E-03	9.6E-03	10.8E-03	10.8E-03	10.8E-03	11.2E-03	9.6E-03	9.6E-03	10.0E-03	10.4E-03
Max	9.6E-03	9.6E-03	10.0E-03	10.4E-03	10.4E-03	11.2E-03	11.6E-03	11.2E-03	12.0E-03	10.0E-03	10.4E-03	10.4E-03	10.8E-03
Average	9.1E-03	9.1E-03	9.6E-03	10.0E-03	10.1E-03	10.9E-03	11.1E-03	10.9E-03	11.6E-03	9.7E-03	10.0E-03	10.1E-03	10.5E-03
Sigma	377.1E-06	377.1E-06	326.6E-06	326.6E-06	377.1E-06	188.6E-06	377.1E-06	188.6E-06	326.6E-06	188.6E-06	326.6E-06	188.6E-06	188.6E-06

Drift Calculation

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	800.0E-06	1.2E-03	1.6E-03	2.0E-03	2.0E-03	2.0E-03	2.8E-03	800.0E-06	1.2E-03	1.2E-03	1.6E-03
34	-	0.0E+00	400.0E-06	800.0E-06	1.6E-03	2.0E-03	2.0E-03	2.0E-03	2.4E-03	800.0E-06	800.0E-06	1.2E-03	1.6E-03
35	-	0.0E+00	400.0E-06	800.0E-06	0.0E+00	1.6E-03	2.0E-03	1.6E-03	2.4E-03	400.0E-06	800.0E-06	800.0E-06	1.2E-03
Average	-	0.0E+00	533.3E-06	933.3E-06	1.1E-03	1.9E-03	2.0E-03	1.9E-03	2.5E-03	666.7E-06	933.3E-06	1.1E-03	1.5E-03
Sigma	-	0.0E+00	188.6E-06	188.6E-06	754.2E-06	188.6E-06	439.8E-12	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06	188.6E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	9.6E-03	9.2E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	9.6E-03
OFF PROTON samples													
30	12.4E-03	12.0E-03	12.8E-03	13.2E-03	14.4E-03	14.8E-03	15.2E-03	16.0E-03	17.2E-03	16.8E-03	18.4E-03	18.4E-03	15.6E-03
32	12.4E-03	12.0E-03	12.8E-03	13.2E-03	14.4E-03	14.8E-03	15.2E-03	16.0E-03	17.6E-03	16.8E-03	18.4E-03	18.4E-03	15.6E-03
39	11.2E-03	10.8E-03	11.6E-03	12.0E-03	13.2E-03	13.6E-03	14.4E-03	15.2E-03	16.8E-03	16.0E-03	17.6E-03	17.6E-03	14.4E-03
Statistics													
Min	11.2E-03	10.8E-03	11.6E-03	12.0E-03	13.2E-03	13.6E-03	14.4E-03	15.2E-03	16.8E-03	16.0E-03	17.6E-03	17.6E-03	14.4E-03
Max	12.4E-03	12.0E-03	12.8E-03	13.2E-03	14.4E-03	14.8E-03	15.2E-03	16.0E-03	17.6E-03	16.8E-03	18.4E-03	18.4E-03	15.6E-03
Average	12.0E-03	11.6E-03	12.4E-03	12.8E-03	14.0E-03	14.4E-03	14.9E-03	15.7E-03	17.2E-03	16.5E-03	18.1E-03	18.1E-03	15.2E-03
Sigma	565.7E-06	565.7E-06	565.7E-06	565.7E-06	565.7E-06	565.7E-06	377.1E-06	377.1E-06	326.6E-06	377.1E-06	377.1E-06	377.1E-06	565.7E-06

Drift Calculation

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	2.8E-03	3.6E-03	4.8E-03	4.4E-03	6.0E-03	6.0E-03	3.2E-03
32	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	4.4E-03	6.0E-03	6.0E-03	3.2E-03
39	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	3.2E-03	4.0E-03	5.6E-03	4.8E-03	6.4E-03	6.4E-03	3.2E-03
Average	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	2.9E-03	3.7E-03	5.2E-03	4.5E-03	6.1E-03	6.1E-03	3.2E-03
Sigma	-	439.0E-12	439.0E-12	439.1E-12	439.1E-12	437.2E-12	188.6E-06	188.6E-06	326.6E-06	188.6E-06	188.6E-06	188.6E-06	439.5E-12

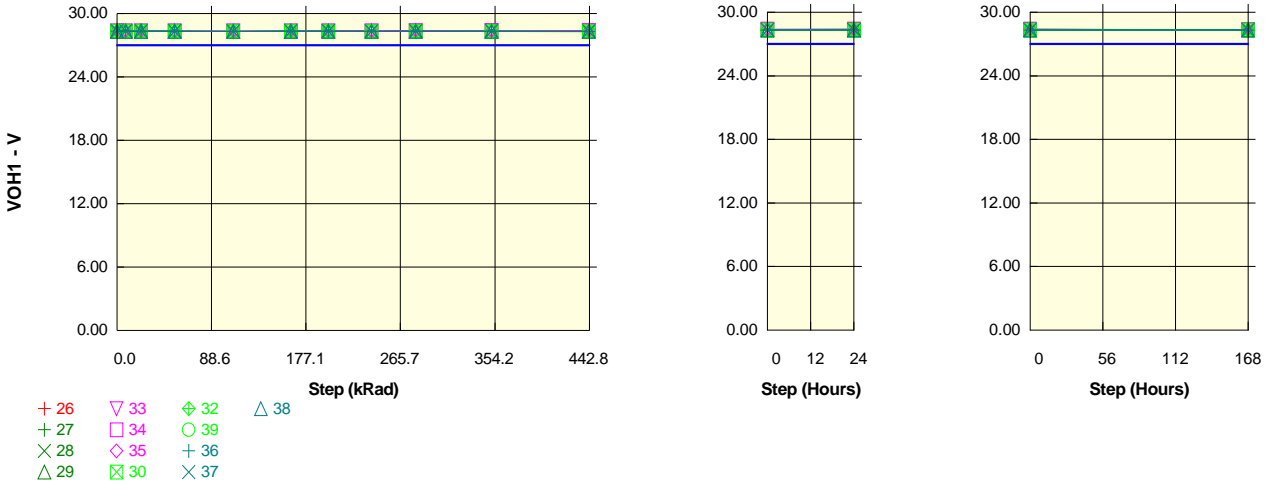
Measurements

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	9.6E-03	9.2E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	9.6E-03	10.4E-03	8.8E-03	9.6E-03	9.6E-03	9.6E-03
OFF TID samples													
36	9.6E-03	9.6E-03	10.4E-03	10.8E-03	11.6E-03	12.0E-03	12.4E-03	13.2E-03	14.8E-03	14.4E-03	15.2E-03	15.2E-03	13.6E-03
37	8.8E-03	8.8E-03	9.2E-03	9.6E-03	10.8E-03	11.2E-03	11.6E-03	12.4E-03	14.0E-03	14.0E-03	14.8E-03	14.8E-03	12.8E-03
38	8.8E-03	8.4E-03	9.2E-03	9.6E-03	10.8E-03	11.2E-03	11.6E-03	12.4E-03	14.0E-03	14.0E-03	14.8E-03	14.8E-03	12.8E-03
Statistics													
Min	8.8E-03	8.4E-03	9.2E-03	9.6E-03	10.8E-03	11.2E-03	11.6E-03	12.4E-03	14.0E-03	14.0E-03	14.8E-03	14.8E-03	12.8E-03
Max	9.6E-03	9.6E-03	10.4E-03	10.8E-03	11.6E-03	12.0E-03	12.4E-03	13.2E-03	14.8E-03	14.4E-03	15.2E-03	15.2E-03	13.6E-03
Average	9.1E-03	8.9E-03	9.6E-03	10.0E-03	11.1E-03	11.5E-03	11.9E-03	12.7E-03	14.3E-03	14.1E-03	14.9E-03	14.9E-03	13.1E-03
Sigma	377.1E-06	498.9E-06	565.7E-06	565.7E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	377.1E-06	188.6E-06	188.6E-06	188.6E-06	377.1E-06

Drift Calculation

VOL3DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	800.0E-06	1.2E-03	2.0E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	4.8E-03	5.6E-03	5.6E-03	4.0E-03
37	-	0.0E+00	400.0E-06	800.0E-06	2.0E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	5.2E-03	6.0E-03	6.0E-03	4.0E-03
38	-	-400.0E-06	400.0E-06	800.0E-06	2.0E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	5.2E-03	6.0E-03	6.0E-03	4.0E-03
Average	-	-133.3E-06	533.3E-06	933.3E-06	2.0E-03	2.4E-03	2.8E-03	3.6E-03	5.2E-03	5.1E-03	5.9E-03	5.9E-03	4.0E-03
Sigma	-	188.6E-06	188.6E-06	188.6E-06	439.1E-12	23.8E-12	23.8E-12	438.2E-12	439.5E-12	188.6E-06	188.6E-06	188.6E-06	58.2E-12

Parameter : Logical "1" output voltage : VOH1DUTA
 Test conditions : +VCC=30 V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	28.34	28.33	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.33	28.33	28.34
ON_PROTON samples													
27	28.34	28.33	28.33	28.33	28.32	28.34	28.34	28.34	28.36	28.36	28.37	28.37	28.34
28	28.35	28.35	28.34	28.34	28.34	28.35	28.36	28.36	28.37	28.38	28.37	28.38	28.35
29	28.35	28.34	28.34	28.34	28.33	28.35	28.36	28.36	28.38	28.39	28.39	28.39	28.34
Statistics													
Min	28.34	28.33	28.33	28.33	28.32	28.34	28.34	28.34	28.36	28.36	28.37	28.37	28.34
Max	28.35	28.35	28.34	28.34	28.34	28.35	28.36	28.36	28.38	28.39	28.39	28.39	28.35
Average	28.35	28.34	28.34	28.33	28.33	28.35	28.35	28.35	28.37	28.38	28.38	28.38	28.34
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-3.2E-03	-6.4E-03	-11.2E-03	-13.6E-03	1.6E-03	7.2E-03	7.2E-03	25.6E-03	28.0E-03	32.0E-03	36.0E-03	-1.6E-03
28	-	-5.6E-03	-7.2E-03	-10.4E-03	-14.4E-03	2.4E-03	8.0E-03	5.6E-03	23.2E-03	24.0E-03	21.6E-03	28.8E-03	-2.4E-03
29	-	-4.8E-03	-5.6E-03	-10.4E-03	-13.6E-03	6.4E-03	14.4E-03	16.0E-03	36.8E-03	39.2E-03	42.4E-03	47.2E-03	-2.4E-03
Average	-	-4.5E-03	-6.4E-03	-10.7E-03	-13.9E-03	3.5E-03	9.9E-03	9.6E-03	28.5E-03	30.4E-03	32.0E-03	37.3E-03	-2.1E-03
Sigma	-	997.6E-06	653.3E-06	376.7E-06	377.2E-06	2.1E-03	3.2E-03	4.6E-03	5.9E-03	6.4E-03	8.5E-03	7.6E-03	376.7E-06

Measurements

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26 REF	28.34	28.33	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.33	28.33	28.34
ON_TID samples													
33	28.36	28.36	28.35	28.34	28.34	28.36	28.37	28.37	28.40	28.40	28.40	28.41	28.35
34	28.36	28.35	28.35	28.34	28.34	28.36	28.36	28.36	28.37	28.38	28.38	28.38	28.35
35	28.35	28.35	28.34	28.33	28.33	28.34	28.35	28.34	28.35	28.36	28.36	28.37	28.34
Statistics													
Min	28.35	28.35	28.34	28.33	28.33	28.34	28.35	28.34	28.35	28.36	28.36	28.37	28.34
Max	28.36	28.36	28.35	28.34	28.34	28.36	28.37	28.37	28.40	28.40	28.40	28.41	28.35
Average	28.35	28.35	28.34	28.34	28.34	28.35	28.36	28.36	28.37	28.38	28.38	28.39	28.35
Sigma	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01

Drift Calculation

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-8.8E-03	-14.4E-03	-14.4E-03	4.0E-03	13.6E-03	15.2E-03	40.8E-03	42.4E-03	44.0E-03	49.6E-03	-4.0E-03
34	-	-10.4E-03	-10.4E-03	-15.2E-03	-17.6E-03	-799.2E-06	4.8E-03	801.1E-06	8.8E-03	19.2E-03	17.6E-03	24.8E-03	-6.4E-03
35	-	0.0E+00	-7.2E-03	-15.2E-03	-14.4E-03	-3.2E-03	1.6E-03	-3.2E-03	7.2E-03	18.4E-03	19.2E-03	20.0E-03	-7.2E-03
Average	-	-3.5E-03	-8.8E-03	-14.9E-03	-15.5E-03	1.2E-15	6.7E-03	4.3E-03	18.9E-03	26.7E-03	26.9E-03	31.5E-03	-5.9E-03
Sigma	-	4.9E-03	1.3E-03	376.7E-06	1.5E-03	3.0E-03	5.1E-03	7.9E-03	15.5E-03	11.1E-03	12.1E-03	13.0E-03	1.4E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.34	28.33	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.33	28.33	28.34
OFF_PROTON samples													
30	28.34	28.32	28.33	28.32	28.31	28.33	28.33	28.32	28.32	28.32	28.31	28.32	28.32
32	28.34	28.32	28.33	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.30	28.31	28.32
39	28.36	28.35	28.35	28.34	28.34	28.35	28.33	28.33	28.33	28.34	28.33	28.34	28.34
Statistics													
Min	28.34	28.32	28.33	28.32	28.31	28.33	28.33	28.32	28.32	28.32	28.30	28.31	28.32
Max	28.36	28.35	28.35	28.34	28.34	28.35	28.33	28.33	28.33	28.34	28.33	28.34	28.34
Average	28.34	28.33	28.34	28.33	28.32	28.33	28.33	28.32	28.33	28.33	28.31	28.32	28.33
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-12.8E-03	-6.4E-03	-14.4E-03	-21.6E-03	-10.4E-03	-10.4E-03	-20.0E-03	-12.0E-03	-18.4E-03	-25.6E-03	-19.2E-03	-17.6E-03
32	-	-17.6E-03	-7.2E-03	-16.0E-03	-16.0E-03	-9.6E-03	-10.4E-03	-21.6E-03	-12.0E-03	-16.0E-03	-35.2E-03	-24.0E-03	-14.4E-03
39	-	-9.6E-03	-8.0E-03	-18.4E-03	-20.0E-03	-9.6E-03	-22.4E-03	-25.6E-03	-21.6E-03	-14.4E-03	-28.8E-03	-16.0E-03	-17.6E-03
Average	-	-13.3E-03	-7.2E-03	-16.3E-03	-19.2E-03	-9.9E-03	-14.4E-03	-22.4E-03	-15.2E-03	-16.3E-03	-29.9E-03	-19.7E-03	-16.5E-03
Sigma	-	3.3E-03	652.5E-06	1.6E-03	2.4E-03	377.6E-06	5.7E-03	2.4E-03	4.5E-03	1.6E-03	4.0E-03	3.3E-03	1.5E-03

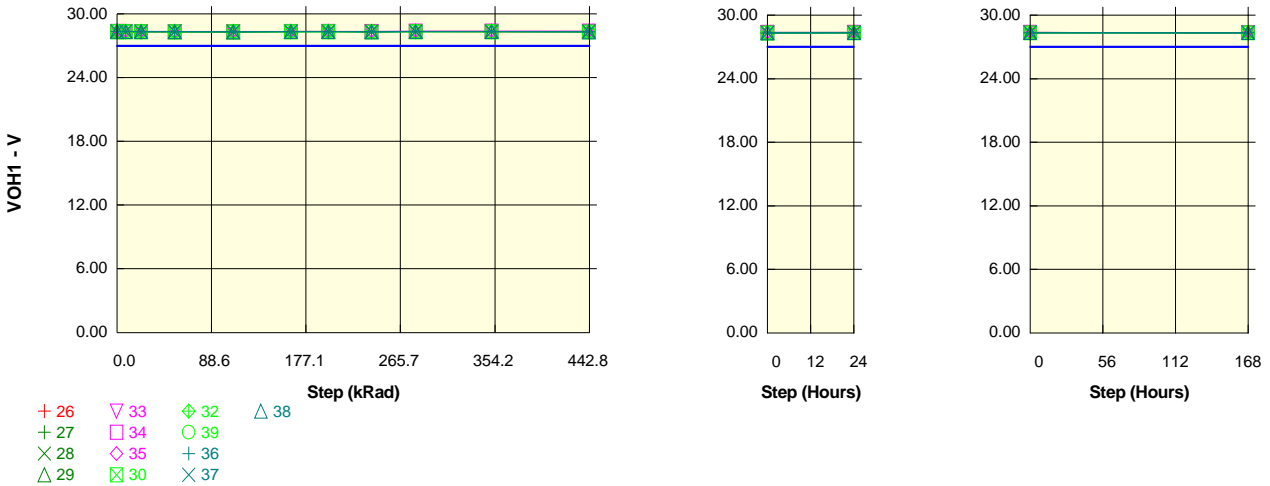
Measurements

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.34	28.33	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.33	28.33	28.34
OFF_TID samples													
36	28.34	28.34	28.33	28.32	28.32	28.33	28.33	28.31	28.31	28.32	28.32	28.32	28.31
37	28.36	28.36	28.35	28.34	28.33	28.35	28.34	28.33	28.34	28.34	28.33	28.34	28.34
38	28.36	28.35	28.35	28.34	28.34	28.35	28.33	28.33	28.34	28.34	28.33	28.34	28.34
Statistics													
Min	28.34	28.34	28.33	28.32	28.32	28.33	28.33	28.31	28.31	28.32	28.32	28.32	28.31
Max	28.36	28.36	28.35	28.34	28.34	28.35	28.34	28.33	28.34	28.34	28.33	28.34	28.34
Average	28.35	28.35	28.34	28.34	28.33	28.34	28.33	28.33	28.33	28.33	28.32	28.33	28.33
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-7.2E-03	-16.8E-03	-19.2E-03	-10.4E-03	-15.2E-03	-26.4E-03	-34.4E-03	-18.4E-03	-25.6E-03	-18.4E-03	-26.4E-03
37	-	0.0E+00	-12.0E-03	-16.8E-03	-24.8E-03	-12.0E-03	-19.2E-03	-28.0E-03	-14.4E-03	-20.0E-03	-30.4E-03	-20.8E-03	-20.0E-03
38	-	-6.4E-03	-10.4E-03	-16.8E-03	-20.8E-03	-9.6E-03	-22.4E-03	-22.4E-03	-17.6E-03	-18.4E-03	-28.0E-03	-18.4E-03	-16.0E-03
Average	-	-2.1E-03	-9.9E-03	-16.8E-03	-21.6E-03	-10.7E-03	-18.9E-03	-25.6E-03	-22.1E-03	-18.9E-03	-28.0E-03	-19.2E-03	-20.8E-03
Sigma	-	3.0E-03	2.0E-03	899.1E-09	2.4E-03	996.9E-06	2.9E-03	2.4E-03	8.8E-03	754.4E-06	2.0E-03	1.1E-03	4.3E-03

Parameter : Logical "1" output voltage : VOH1DUTB
 Test conditions : +VCC=30 V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.34	28.34	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.34	28.33	28.34	28.34
ON_PROTON samples													
27	28.34	28.34	28.33	28.33	28.32	28.34	28.34	28.34	28.35	28.35	28.35	28.35	28.34
28	28.35	28.35	28.34	28.34	28.34	28.35	28.36	28.36	28.37	28.37	28.37	28.37	28.35
29	28.35	28.34	28.34	28.34	28.33	28.35	28.35	28.35	28.37	28.36	28.36	28.37	28.35
Statistics													
Min	28.34	28.34	28.33	28.33	28.32	28.34	28.34	28.34	28.35	28.35	28.35	28.35	28.34
Max	28.35	28.35	28.34	28.34	28.34	28.35	28.36	28.36	28.37	28.37	28.37	28.37	28.35
Average	28.35	28.34	28.34	28.33	28.33	28.35	28.35	28.35	28.36	28.36	28.36	28.37	28.34
Sigma	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-2.4E-03	-6.4E-03	-11.2E-03	-14.4E-03	0.0E+00	3.2E-03	-799.2E-06	11.2E-03	9.6E-03	8.8E-03	12.8E-03	-1.6E-03
28	-	-5.6E-03	-7.2E-03	-10.4E-03	-14.4E-03	2.4E-03	7.2E-03	4.0E-03	19.2E-03	19.2E-03	17.6E-03	23.2E-03	-799.2E-06
29	-	-6.4E-03	-7.2E-03	-12.8E-03	-16.8E-03	1.6E-03	5.6E-03	1.6E-03	16.8E-03	15.2E-03	15.2E-03	20.8E-03	-1.6E-03
Average	-	-4.8E-03	-6.9E-03	-11.5E-03	-15.2E-03	1.3E-03	5.3E-03	1.6E-03	15.7E-03	14.7E-03	13.9E-03	18.9E-03	-1.3E-03
Sigma	-	1.7E-03	377.6E-06	997.6E-06	1.1E-03	997.6E-06	1.6E-03	2.0E-03	3.4E-03	3.9E-03	3.7E-03	4.4E-03	377.6E-06

Measurements

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.34	28.34	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.34	28.33	28.34	28.34
ON_TID samples													
33	28.36	28.36	28.34	28.34	28.34	28.35	28.36	28.35	28.37	28.37	28.37	28.37	28.35
34	28.36	28.35	28.35	28.34	28.34	28.36	28.36	28.36	28.38	28.38	28.38	28.38	28.35
35	28.35	28.35	28.34	28.33	28.33	28.34	28.35	28.34	28.35	28.36	28.35	28.36	28.34
Statistics													
Min	28.35	28.35	28.34	28.33	28.33	28.34	28.35	28.34	28.35	28.36	28.35	28.36	28.34
Max	28.36	28.36	28.35	28.34	28.34	28.36	28.36	28.36	28.38	28.38	28.38	28.38	28.35
Average	28.35	28.35	28.34	28.34	28.34	28.35	28.36	28.35	28.37	28.37	28.37	28.37	28.35
Sigma	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-10.4E-03	-16.0E-03	-16.0E-03	-799.2E-06	3.2E-03	-1.6E-03	15.2E-03	13.6E-03	13.6E-03	17.6E-03	-4.8E-03
34	-	-8.8E-03	-10.4E-03	-14.4E-03	-16.8E-03	0.0E+00	5.6E-03	1.6E-03	20.0E-03	19.2E-03	16.8E-03	24.8E-03	-6.4E-03
35	-	0.0E+00	-8.0E-03	-16.0E-03	-16.0E-03	-3.2E-03	801.1E-06	-5.6E-03	8.0E-03	8.8E-03	6.4E-03	12.0E-03	-8.0E-03
Average	-	-2.9E-03	-9.6E-03	-15.5E-03	-16.3E-03	-1.3E-03	3.2E-03	-1.9E-03	14.4E-03	13.9E-03	12.3E-03	18.1E-03	-6.4E-03
Sigma	-	4.1E-03	1.1E-03	754.8E-06	377.2E-06	1.4E-03	2.0E-03	2.9E-03	4.9E-03	4.3E-03	4.3E-03	5.2E-03	1.3E-03

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.34	28.34	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.34	28.33	28.34	28.34
OFF_PROTON samples													
30	28.34	28.33	28.33	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.32	28.32
32	28.34	28.33	28.33	28.32	28.32	28.33	28.33	28.32	28.33	28.33	28.32	28.32	28.33
39	28.36	28.35	28.35	28.34	28.34	28.35	28.35	28.34	28.35	28.34	28.33	28.34	28.34
Statistics													
Min	28.34	28.33	28.33	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.32	28.32
Max	28.36	28.35	28.35	28.34	28.34	28.35	28.35	28.34	28.35	28.34	28.33	28.34	28.34
Average	28.34	28.34	28.34	28.33	28.33	28.33	28.34	28.33	28.33	28.33	28.32	28.33	28.33
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_PROTON samples													
30	-	-7.2E-03	-7.2E-03	-14.4E-03	-17.6E-03	-9.6E-03	-8.8E-03	-18.4E-03	-12.0E-03	-14.4E-03	-20.8E-03	-14.4E-03	-13.6E-03
32	-	-6.4E-03	-7.2E-03	-16.0E-03	-16.0E-03	-9.6E-03	-8.8E-03	-19.2E-03	-11.2E-03	-13.6E-03	-20.8E-03	-15.2E-03	-13.6E-03
39	-	-8.8E-03	-8.8E-03	-20.8E-03	-20.0E-03	-9.6E-03	-8.8E-03	-20.8E-03	-9.6E-03	-14.4E-03	-22.4E-03	-15.2E-03	-14.4E-03
Average	-	-7.5E-03	-7.7E-03	-17.1E-03	-17.9E-03	-9.6E-03	-8.8E-03	-19.5E-03	-10.9E-03	-14.1E-03	-21.3E-03	-14.9E-03	-13.9E-03
Sigma	-	998.3E-06	754.8E-06	2.7E-03	1.6E-03	899.1E-09	899.1E-09	998.5E-06	996.8E-06	377.6E-06	755.3E-06	377.2E-06	377.6E-06

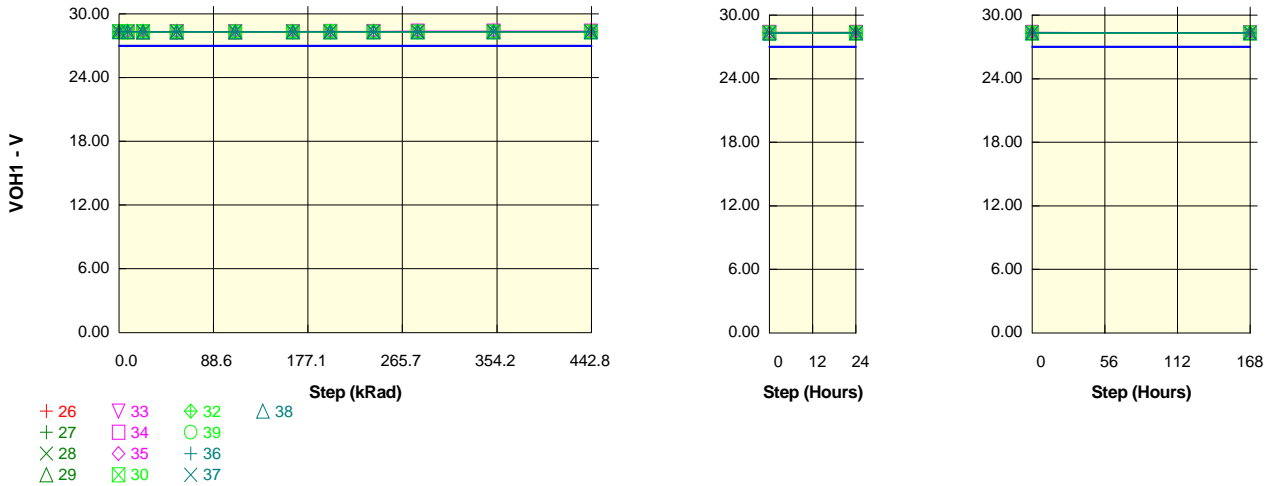
Measurements

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.34	28.34	28.33	28.33	28.33	28.34	28.34	28.33	28.34	28.34	28.33	28.34	28.34
OFF_TID samples													
36	28.35	28.35	28.34	28.33	28.33	28.33	28.33	28.32	28.33	28.33	28.32	28.33	28.33
37	28.36	28.36	28.35	28.34	28.34	28.35	28.35	28.34	28.35	28.34	28.33	28.34	28.34
38	28.36	28.35	28.35	28.34	28.34	28.35	28.35	28.34	28.35	28.34	28.33	28.34	28.34
Statistics													
Min	28.35	28.35	28.34	28.33	28.33	28.33	28.33	28.32	28.33	28.33	28.32	28.33	28.33
Max	28.36	28.36	28.35	28.34	28.34	28.35	28.35	28.34	28.35	28.34	28.33	28.34	28.34
Average	28.35	28.35	28.34	28.34	28.33	28.34	28.34	28.33	28.34	28.34	28.33	28.34	28.34
Sigma	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF_TID samples													
36	-	0.0E+00	-8.8E-03	-17.6E-03	-20.0E-03	-11.2E-03	-11.2E-03	-22.4E-03	-12.8E-03	-19.2E-03	-23.2E-03	-16.8E-03	-16.8E-03
37	-	0.0E+00	-12.0E-03	-17.6E-03	-24.0E-03	-12.0E-03	-12.0E-03	-24.8E-03	-12.8E-03	-20.0E-03	-25.6E-03	-18.4E-03	-18.4E-03
38	-	-5.6E-03	-11.2E-03	-17.6E-03	-21.6E-03	-10.4E-03	-10.4E-03	-21.6E-03	-12.0E-03	-17.6E-03	-24.0E-03	-16.8E-03	-16.0E-03
Average	-	-1.9E-03	-10.7E-03	-17.6E-03	-21.9E-03	-11.2E-03	-11.2E-03	-22.9E-03	-12.5E-03	-18.9E-03	-24.3E-03	-17.3E-03	-17.1E-03
Sigma	-	2.6E-03	1.4E-03	899.1E-09	1.6E-03	654.1E-06	654.1E-06	1.4E-03	377.6E-06	998.3E-06	997.6E-06	754.4E-06	998.3E-06

Parameter : Logical "1" output voltage : VOH1DUTC
 Test conditions : +VCC=30 V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.33	28.33
ON_PROTON samples													
27	28.33	28.33	28.32	28.32	28.32	28.33	28.34	28.34	28.35	28.35	28.35	28.36	28.33
28	28.34	28.34	28.34	28.33	28.33	28.35	28.36	28.35	28.37	28.37	28.37	28.38	28.34
29	28.34	28.33	28.33	28.33	28.32	28.35	28.35	28.35	28.36	28.36	28.36	28.37	28.34
Statistics													
Min	28.33	28.33	28.32	28.32	28.32	28.33	28.34	28.34	28.35	28.35	28.35	28.36	28.33
Max	28.34	28.34	28.34	28.33	28.33	28.35	28.36	28.35	28.37	28.37	28.37	28.38	28.34
Average	28.34	28.33	28.33	28.33	28.32	28.34	28.35	28.35	28.36	28.36	28.36	28.37	28.34
Sigma	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-2.4E-03	-7.2E-03	-12.0E-03	-13.6E-03	4.0E-03	8.8E-03	6.4E-03	20.8E-03	20.0E-03	20.0E-03	24.8E-03	1.6E-03
28	-	-5.6E-03	-7.2E-03	-10.4E-03	-13.6E-03	6.4E-03	12.8E-03	11.2E-03	28.8E-03	30.4E-03	29.6E-03	35.2E-03	1.6E-03
29	-	-6.4E-03	-7.2E-03	-12.8E-03	-16.0E-03	5.6E-03	11.2E-03	8.0E-03	24.8E-03	24.0E-03	24.8E-03	30.4E-03	2.4E-03
Average	-	-4.8E-03	-7.2E-03	-11.7E-03	-14.4E-03	5.3E-03	10.9E-03	8.5E-03	24.8E-03	24.8E-03	24.8E-03	30.1E-03	1.9E-03
Sigma	-	1.7E-03	0.0E+00	998.5E-06	1.1E-03	998.3E-06	1.6E-03	2.0E-03	3.3E-03	4.3E-03	3.9E-03	4.3E-03	376.7E-06

Measurements

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.33	28.33
ON_TID samples													
33	28.35	28.35	28.34	28.33	28.33	28.35	28.36	28.35	28.37	28.37	28.37	28.37	28.35
34	28.35	28.34	28.34	28.33	28.33	28.35	28.36	28.36	28.38	28.38	28.38	28.38	28.35
35	28.34	28.34	28.33	28.32	28.32	28.34	28.34	28.34	28.36	28.36	28.36	28.36	28.33
Statistics													
Min	28.34	28.34	28.33	28.32	28.32	28.34	28.34	28.34	28.36	28.36	28.36	28.36	28.33
Max	28.35	28.35	28.34	28.33	28.33	28.35	28.36	28.36	28.38	28.38	28.38	28.38	28.35
Average	28.34	28.34	28.33	28.33	28.33	28.35	28.35	28.35	28.37	28.37	28.37	28.37	28.34
Sigma	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-9.6E-03	-15.2E-03	-15.2E-03	3.2E-03	8.8E-03	5.6E-03	22.4E-03	21.6E-03	21.6E-03	26.4E-03	-799.2E-06
34	-	-8.0E-03	-9.6E-03	-14.4E-03	-16.0E-03	4.0E-03	12.0E-03	9.6E-03	28.8E-03	29.6E-03	28.0E-03	35.2E-03	-2.4E-03
35	-	0.0E+00	-8.0E-03	-16.0E-03	-14.4E-03	799.2E-06	7.2E-03	4.0E-03	20.0E-03	22.4E-03	21.6E-03	26.4E-03	-4.0E-03
Average	-	-2.7E-03	-9.1E-03	-15.2E-03	-15.2E-03	2.7E-03	9.3E-03	6.4E-03	23.7E-03	24.5E-03	23.7E-03	29.3E-03	-2.4E-03
Sigma	-	3.8E-03	753.9E-06	653.3E-06	653.3E-06	1.4E-03	2.0E-03	2.4E-03	3.7E-03	3.6E-03	3.0E-03	4.1E-03	1.3E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.33	28.33
OFF PROTON samples													
30	28.33	28.32	28.32	28.31	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.31	28.32
32	28.33	28.32	28.32	28.31	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32
39	28.35	28.34	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Statistics													
Min	28.33	28.32	28.32	28.31	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.31	28.32
Max	28.35	28.34	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Average	28.34	28.33	28.33	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.31	28.32	28.32
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-8.0E-03	-8.0E-03	-18.4E-03	-18.4E-03	-10.4E-03	-8.8E-03	-19.2E-03	-11.2E-03	-14.4E-03	-21.6E-03	-15.2E-03	-13.6E-03
32	-	-8.0E-03	-8.8E-03	-17.6E-03	-16.8E-03	-10.4E-03	-8.8E-03	-20.0E-03	-11.2E-03	-14.4E-03	-21.6E-03	-15.2E-03	-14.4E-03
39	-	-8.8E-03	-8.8E-03	-19.2E-03	-20.0E-03	-8.8E-03	-8.0E-03	-20.8E-03	-8.8E-03	-14.4E-03	-22.4E-03	-14.4E-03	-14.4E-03
Average	-	-8.3E-03	-8.5E-03	-18.4E-03	-18.4E-03	-9.9E-03	-8.5E-03	-20.0E-03	-10.4E-03	-14.4E-03	-21.9E-03	-14.9E-03	-14.1E-03
Sigma	-	376.7E-06	377.2E-06	653.3E-06	1.3E-03	754.4E-06	377.2E-06	653.3E-06	1.1E-03	899.1E-09	377.6E-06	377.6E-06	377.2E-06

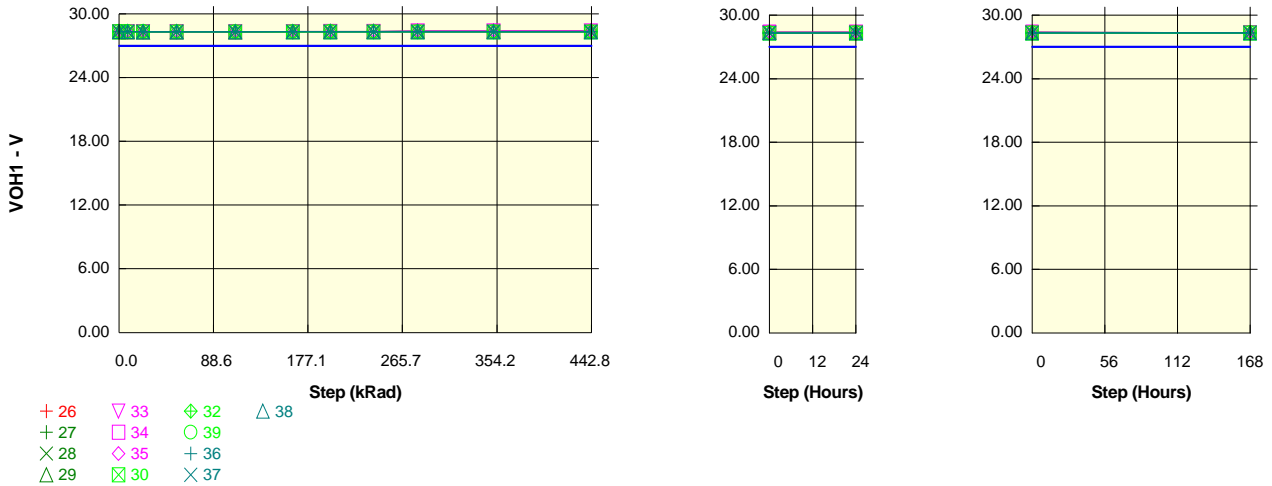
Measurements

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.33	28.33
OFF TID samples													
36	28.34	28.34	28.33	28.32	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32
37	28.35	28.35	28.34	28.33	28.32	28.34	28.34	28.32	28.34	28.33	28.32	28.33	28.33
38	28.35	28.34	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Statistics													
Min	28.34	28.34	28.33	28.32	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32
Max	28.35	28.35	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Average	28.34	28.34	28.33	28.33	28.32	28.33	28.33	28.32	28.33	28.33	28.32	28.33	28.33
Sigma	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.8E-03	-18.4E-03	-20.8E-03	-11.2E-03	-10.4E-03	-22.4E-03	-12.8E-03	-19.2E-03	-23.2E-03	-16.8E-03	-16.0E-03
37	-	0.0E+00	-11.2E-03	-17.6E-03	-24.0E-03	-11.2E-03	-11.2E-03	-24.0E-03	-12.0E-03	-18.4E-03	-24.8E-03	-17.6E-03	-16.8E-03
38	-	-5.6E-03	-11.2E-03	-17.6E-03	-21.6E-03	-9.6E-03	-10.4E-03	-21.6E-03	-12.0E-03	-16.8E-03	-24.8E-03	-16.0E-03	-16.0E-03
Average	-	-1.9E-03	-10.4E-03	-17.9E-03	-22.1E-03	-10.7E-03	-10.7E-03	-22.7E-03	-12.3E-03	-18.1E-03	-24.3E-03	-16.8E-03	-16.3E-03
Sigma	-	2.6E-03	1.1E-03	377.2E-06	1.4E-03	754.4E-06	377.2E-06	997.6E-06	377.2E-06	997.6E-06	754.8E-06	652.5E-06	377.2E-06

Parameter : Logical "1" output voltage : VOH1DUTD
 Test conditions : +VCC=30 V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.32	28.33
ON_PROTON samples													
27	28.33	28.33	28.32	28.32	28.31	28.33	28.34	28.35	28.37	28.37	28.37	28.38	28.33
28	28.34	28.34	28.33	28.33	28.33	28.35	28.36	28.35	28.37	28.38	28.38	28.38	28.34
29	28.34	28.33	28.33	28.33	28.32	28.35	28.36	28.36	28.39	28.39	28.40	28.40	28.34
Statistics													
Min	28.33	28.33	28.32	28.32	28.31	28.33	28.34	28.35	28.37	28.37	28.37	28.38	28.33
Max	28.34	28.34	28.33	28.33	28.33	28.35	28.36	28.36	28.39	28.39	28.40	28.40	28.34
Average	28.34	28.33	28.33	28.32	28.32	28.34	28.35	28.35	28.38	28.38	28.38	28.39	28.34
Sigma	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-2.4E-03	-7.2E-03	-12.0E-03	-13.6E-03	5.6E-03	14.4E-03	17.6E-03	37.6E-03	41.6E-03	46.4E-03	50.4E-03	801.1E-06
28	-	-5.6E-03	-8.0E-03	-11.2E-03	-14.4E-03	6.4E-03	15.2E-03	12.8E-03	33.6E-03	36.0E-03	36.0E-03	42.4E-03	1.6E-03
29	-	-5.6E-03	-6.4E-03	-12.0E-03	-14.4E-03	9.6E-03	20.8E-03	24.8E-03	49.6E-03	52.0E-03	56.8E-03	61.6E-03	2.4E-03
Average	-	-4.5E-03	-7.2E-03	-11.7E-03	-14.1E-03	7.2E-03	16.8E-03	18.4E-03	40.3E-03	43.2E-03	46.4E-03	51.5E-03	1.6E-03
Sigma	-	1.5E-03	653.3E-06	376.7E-06	376.7E-06	1.7E-03	2.8E-03	4.9E-03	6.8E-03	6.6E-03	8.5E-03	7.9E-03	653.3E-06

Measurements

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.32	28.33
ON_TID samples													
33	28.35	28.35	28.34	28.33	28.33	28.35	28.37	28.37	28.40	28.40	28.40	28.41	28.34
34	28.35	28.34	28.34	28.33	28.33	28.35	28.36	28.36	28.38	28.38	28.38	28.39	28.34
35	28.34	28.34	28.33	28.32	28.32	28.34	28.35	28.35	28.37	28.37	28.38	28.38	28.33
Statistics													
Min	28.34	28.34	28.33	28.32	28.32	28.34	28.35	28.35	28.37	28.37	28.38	28.38	28.33
Max	28.35	28.35	28.34	28.33	28.33	28.35	28.37	28.37	28.40	28.40	28.40	28.41	28.34
Average	28.34	28.34	28.33	28.33	28.33	28.35	28.36	28.36	28.38	28.38	28.39	28.39	28.34
Sigma	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-10.4E-03	-16.0E-03	-14.4E-03	7.2E-03	19.2E-03	23.2E-03	50.4E-03	52.8E-03	56.0E-03	60.0E-03	-1.6E-03
34	-	-8.8E-03	-10.4E-03	-14.4E-03	-16.0E-03	4.0E-03	12.0E-03	10.4E-03	32.0E-03	32.0E-03	31.2E-03	39.2E-03	-3.2E-03
35	-	0.0E+00	-8.0E-03	-16.8E-03	-14.4E-03	2.4E-03	11.2E-03	10.4E-03	32.8E-03	37.6E-03	39.2E-03	45.6E-03	-4.0E-03
Average	-	-2.9E-03	-9.6E-03	-15.7E-03	-14.9E-03	4.5E-03	14.1E-03	14.7E-03	38.4E-03	40.8E-03	42.1E-03	48.3E-03	-2.9E-03
Sigma	-	4.1E-03	1.1E-03	997.4E-06	753.9E-06	2.0E-03	3.6E-03	6.0E-03	8.5E-03	8.8E-03	10.3E-03	8.7E-03	998.3E-06

Hirex Engineering	Total Dose Radiation Test Report								Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors				Issue:	02			

Measurements

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.32	28.33
OFF PROTON samples													
30	28.33	28.32	28.32	28.31	28.31	28.32	28.32	28.31	28.32	28.31	28.31	28.31	28.31
32	28.33	28.32	28.32	28.31	28.31	28.32	28.32	28.31	28.32	28.31	28.31	28.31	28.31
39	28.35	28.34	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Statistics													
Min	28.33	28.32	28.32	28.31	28.31	28.32	28.32	28.31	28.32	28.31	28.31	28.31	28.31
Max	28.35	28.34	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Average	28.33	28.33	28.33	28.32	28.32	28.32	28.33	28.31	28.32	28.32	28.31	28.32	28.32
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-8.0E-03	-8.0E-03	-16.8E-03	-18.4E-03	-10.4E-03	-8.8E-03	-19.2E-03	-11.2E-03	-15.2E-03	-21.6E-03	-15.2E-03	-13.6E-03
32	-	-8.0E-03	-8.8E-03	-16.8E-03	-17.6E-03	-10.4E-03	-8.8E-03	-20.0E-03	-11.2E-03	-14.4E-03	-21.6E-03	-15.2E-03	-14.4E-03
39	-	-8.8E-03	-8.8E-03	-19.2E-03	-20.0E-03	-9.6E-03	-8.8E-03	-21.6E-03	-9.6E-03	-14.4E-03	-22.4E-03	-15.2E-03	-15.2E-03
Average	-	-8.3E-03	-8.5E-03	-17.6E-03	-18.7E-03	-10.1E-03	-8.8E-03	-20.3E-03	-10.7E-03	-14.7E-03	-21.9E-03	-15.2E-03	-14.4E-03
Sigma	-	377.6E-06	377.6E-06	1.1E-03	997.8E-06	377.2E-06	899.1E-09	998.3E-06	754.4E-06	376.7E-06	377.2E-06	134.4E-12	653.3E-06

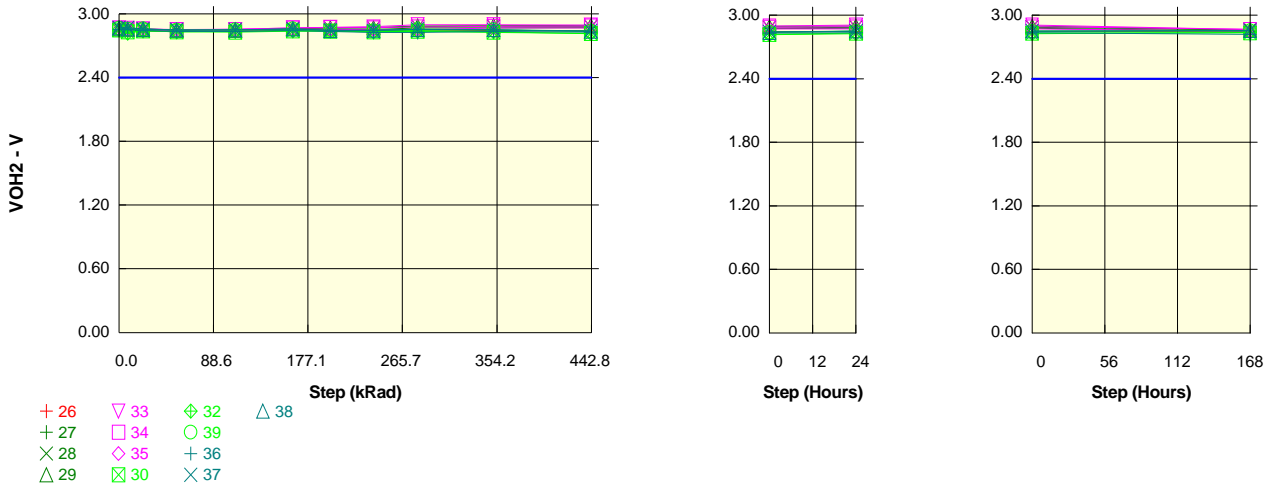
Measurements

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.33	28.33	28.32	28.32	28.32	28.33	28.33	28.32	28.33	28.32	28.32	28.32	28.33
OFF TID samples													
36	28.33	28.33	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32
37	28.35	28.35	28.34	28.33	28.32	28.34	28.34	28.32	28.34	28.33	28.32	28.33	28.33
38	28.35	28.34	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Statistics													
Min	28.33	28.33	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32	28.31	28.32	28.32
Max	28.35	28.35	28.34	28.33	28.33	28.34	28.34	28.33	28.34	28.33	28.32	28.33	28.33
Average	28.34	28.34	28.33	28.33	28.32	28.33	28.33	28.32	28.33	28.33	28.32	28.33	28.33
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-9.6E-03	-18.4E-03	-20.8E-03	-11.2E-03	-11.2E-03	-22.4E-03	-12.8E-03	-19.2E-03	-23.2E-03	-16.8E-03	-16.8E-03
37	-	0.0E+00	-12.0E-03	-17.6E-03	-24.0E-03	-11.2E-03	-12.0E-03	-24.8E-03	-12.0E-03	-19.2E-03	-25.6E-03	-17.6E-03	-17.6E-03
38	-	-5.6E-03	-12.0E-03	-18.4E-03	-21.6E-03	-9.6E-03	-10.4E-03	-21.6E-03	-11.2E-03	-16.8E-03	-24.0E-03	-16.0E-03	-16.0E-03
Average	-	-1.9E-03	-11.2E-03	-18.1E-03	-22.1E-03	-10.7E-03	-11.2E-03	-22.9E-03	-12.0E-03	-18.4E-03	-24.3E-03	-16.8E-03	-16.8E-03
Sigma	-	2.6E-03	1.1E-03	376.7E-06	1.4E-03	753.5E-06	653.3E-06	1.4E-03	653.3E-06	1.1E-03	997.6E-06	653.3E-06	653.3E-06

Parameter : Logical "1" output voltage : VOH2DUTA
 Test conditions : +VCC=4.5V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 2.40
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.85	2.84	2.84	2.85	2.85
ON_PROTON samples													
27	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.87	2.87	2.87	2.88	2.85
28	2.86	2.86	2.86	2.85	2.85	2.86	2.87	2.87	2.88	2.88	2.88	2.89	2.86
29	2.86	2.85	2.85	2.85	2.85	2.86	2.87	2.87	2.89	2.89	2.89	2.90	2.86
Statistics													
Min	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.87	2.87	2.87	2.88	2.85
Max	2.86	2.86	2.86	2.85	2.85	2.86	2.87	2.87	2.89	2.89	2.89	2.90	2.86
Average	2.86	2.85	2.85	2.84	2.85	2.86	2.86	2.86	2.88	2.88	2.88	2.89	2.86
Sigma	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-4.4E-03	-7.2E-03	-13.6E-03	-12.0E-03	-799.9E-06	2.4E-03	3.2E-03	17.6E-03	18.0E-03	22.8E-03	25.6E-03	-1.6E-03
28	-	-6.4E-03	-6.8E-03	-12.0E-03	-11.6E-03	2.4E-03	5.6E-03	5.2E-03	19.6E-03	17.2E-03	17.6E-03	23.6E-03	399.8E-06
29	-	-6.0E-03	-6.0E-03	-12.4E-03	-11.2E-03	5.2E-03	10.4E-03	12.8E-03	29.2E-03	31.2E-03	34.8E-03	37.6E-03	400.1E-06
Average	-	-5.6E-03	-6.7E-03	-12.7E-03	-11.6E-03	2.3E-03	6.1E-03	7.1E-03	22.1E-03	22.1E-03	25.1E-03	28.9E-03	-266.6E-06
Sigma	-	864.1E-06	498.9E-06	679.8E-06	326.6E-06	2.5E-03	3.3E-03	4.1E-03	5.1E-03	6.4E-03	7.2E-03	6.2E-03	942.7E-06

Measurements

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.85	2.84	2.84	2.85	2.85
ON_TID samples													
33	2.87	2.87	2.86	2.85	2.86	2.87	2.88	2.88	2.90	2.90	2.90	2.91	2.86
34	2.87	2.86	2.86	2.85	2.86	2.87	2.87	2.87	2.88	2.89	2.89	2.89	2.87
35	2.86	2.86	2.85	2.84	2.85	2.85	2.86	2.85	2.85	2.87	2.87	2.87	2.85
Statistics													
Min	2.86	2.86	2.85	2.84	2.85	2.85	2.86	2.85	2.85	2.87	2.87	2.87	2.85
Max	2.87	2.87	2.86	2.85	2.86	2.87	2.88	2.88	2.90	2.90	2.90	2.91	2.87
Average	2.87	2.86	2.86	2.85	2.85	2.86	2.87	2.87	2.88	2.88	2.88	2.89	2.86
Sigma	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01

Drift Calculation

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-9.2E-03	-16.8E-03	-12.0E-03	2.4E-03	8.0E-03	11.6E-03	30.8E-03	32.4E-03	29.6E-03	39.6E-03	-2.8E-03
34	-	-11.2E-03	-10.0E-03	-15.6E-03	-14.0E-03	-799.9E-06	2.8E-03	1.6E-03	8.0E-03	15.2E-03	16.0E-03	20.0E-03	-4.0E-03
35	-	0.0E+00	-7.2E-03	-16.8E-03	-12.0E-03	-3.6E-03	-1.2E-03	-6.4E-03	-5.2E-03	10.8E-03	12.4E-03	11.6E-03	-6.8E-03
Average	-	-3.7E-03	-8.8E-03	-16.4E-03	-12.7E-03	-666.6E-06	3.2E-03	2.3E-03	11.2E-03	19.5E-03	19.3E-03	23.7E-03	-4.5E-03
Sigma	-	5.3E-03	1.2E-03	565.7E-06	942.8E-06	2.5E-03	3.8E-03	7.4E-03	14.9E-03	9.3E-03	7.4E-03	11.7E-03	1.7E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.85	2.84	2.84	2.85	2.85
OFF PROTON samples													
30	2.85	2.83	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.82	2.83	2.83
32	2.85	2.82	2.84	2.83	2.84	2.84	2.84	2.83	2.84	2.83	2.82	2.83	2.84
39	2.87	2.86	2.86	2.85	2.85	2.86	2.84	2.84	2.85	2.85	2.84	2.85	2.85
Statistics													
Min	2.85	2.82	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.82	2.83	2.83
Max	2.87	2.86	2.86	2.85	2.85	2.86	2.84	2.84	2.85	2.85	2.84	2.85	2.85
Average	2.86	2.84	2.85	2.84	2.84	2.85	2.84	2.83	2.84	2.84	2.82	2.84	2.84
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-15.6E-03	-7.6E-03	-16.4E-03	-19.2E-03	-9.6E-03	-11.2E-03	-18.0E-03	-11.2E-03	-20.8E-03	-31.2E-03	-18.8E-03	-15.6E-03
32	-	-30.8E-03	-8.4E-03	-18.4E-03	-13.2E-03	-9.2E-03	-10.8E-03	-19.6E-03	-10.4E-03	-17.2E-03	-35.6E-03	-24.4E-03	-12.0E-03
39	-	-10.8E-03	-7.6E-03	-20.4E-03	-16.4E-03	-8.4E-03	-26.8E-03	-23.6E-03	-18.8E-03	-15.2E-03	-26.0E-03	-16.4E-03	-14.0E-03
Average	-	-19.1E-03	-7.9E-03	-18.4E-03	-16.3E-03	-9.1E-03	-16.3E-03	-20.4E-03	-13.5E-03	-17.7E-03	-30.9E-03	-19.9E-03	-13.9E-03
Sigma	-	8.5E-03	377.1E-06	1.6E-03	2.5E-03	498.9E-06	7.4E-03	2.4E-03	3.8E-03	2.3E-03	3.9E-03	3.4E-03	1.5E-03

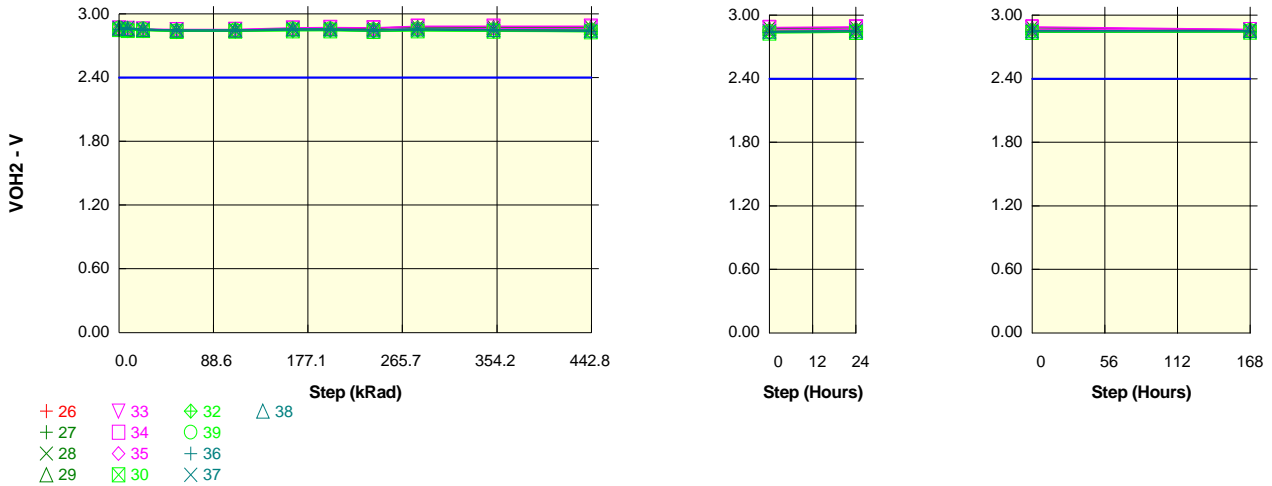
Measurements

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.85	2.84	2.84	2.85	2.85
OFF TID samples													
36	2.85	2.85	2.85	2.84	2.84	2.84	2.84	2.83	2.83	2.84	2.83	2.83	2.82
37	2.87	2.87	2.86	2.85	2.85	2.86	2.85	2.84	2.86	2.85	2.84	2.85	2.85
38	2.87	2.86	2.86	2.85	2.85	2.86	2.84	2.85	2.85	2.85	2.84	2.85	2.85
Statistics													
Min	2.85	2.85	2.85	2.84	2.84	2.84	2.84	2.83	2.83	2.84	2.83	2.83	2.82
Max	2.87	2.87	2.86	2.85	2.85	2.86	2.85	2.85	2.86	2.85	2.84	2.85	2.85
Average	2.86	2.86	2.85	2.85	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.84	2.84
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02

Drift Calculation

VOH2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-8.8E-03	-18.8E-03	-16.8E-03	-10.8E-03	-18.0E-03	-26.4E-03	-28.4E-03	-17.2E-03	-24.8E-03	-20.8E-03	-34.4E-03
37	-	0.0E+00	-12.0E-03	-18.4E-03	-20.8E-03	-10.8E-03	-22.8E-03	-27.6E-03	-12.4E-03	-18.0E-03	-28.0E-03	-20.8E-03	-18.0E-03
38	-	-9.2E-03	-10.4E-03	-18.4E-03	-18.0E-03	-9.2E-03	-24.0E-03	-20.8E-03	-13.6E-03	-16.0E-03	-30.4E-03	-18.0E-03	-14.0E-03
Average	-	-3.1E-03	-10.4E-03	-18.5E-03	-18.5E-03	-10.3E-03	-21.6E-03	-24.9E-03	-18.1E-03	-17.1E-03	-27.7E-03	-19.9E-03	-22.1E-03
Sigma	-	4.3E-03	1.3E-03	188.6E-06	1.7E-03	754.3E-06	2.6E-03	3.0E-03	7.3E-03	821.9E-06	2.3E-03	1.3E-03	8.8E-03

Parameter : Logical "1" output voltage : VOH2DUTB
 Test conditions : +VCC=4.5V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 2.40
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.86	2.85	2.84	2.84	2.85	2.85	2.85	2.85	2.85	2.85	2.84	2.85	2.85
ON_PROTON samples													
27	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.86	2.86	2.86	2.86	2.85
28	2.86	2.86	2.86	2.85	2.85	2.87	2.87	2.87	2.88	2.88	2.88	2.88	2.86
29	2.86	2.85	2.85	2.85	2.85	2.86	2.87	2.86	2.88	2.87	2.88	2.88	2.86
Statistics													
Min	2.85	2.85	2.84	2.84	2.84	2.85	2.85	2.85	2.86	2.86	2.86	2.86	2.85
Max	2.86	2.86	2.86	2.85	2.85	2.87	2.87	2.87	2.88	2.88	2.88	2.88	2.86
Average	2.86	2.85	2.85	2.84	2.85	2.86	2.86	2.86	2.87	2.87	2.87	2.87	2.86
Sigma	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-3.2E-03	-7.2E-03	-13.6E-03	-12.0E-03	399.8E-06	2.0E-03	0.0E+00	10.0E-03	6.8E-03	7.2E-03	10.0E-03	0.0E+00
28	-	-6.4E-03	-7.2E-03	-12.4E-03	-11.6E-03	2.4E-03	5.6E-03	4.8E-03	17.6E-03	14.8E-03	16.4E-03	20.0E-03	800.1E-06
29	-	-7.2E-03	-7.6E-03	-14.0E-03	-13.6E-03	2.0E-03	4.8E-03	3.2E-03	16.4E-03	13.2E-03	14.8E-03	18.4E-03	800.1E-06
Average	-	-5.6E-03	-7.3E-03	-13.3E-03	-12.4E-03	1.6E-03	4.1E-03	2.7E-03	14.7E-03	11.6E-03	12.8E-03	16.1E-03	533.4E-06
Sigma	-	1.7E-03	188.6E-06	679.9E-06	864.1E-06	864.2E-06	1.5E-03	2.0E-03	3.3E-03	3.5E-03	4.0E-03	4.4E-03	377.2E-06

Measurements

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.86	2.85	2.84	2.84	2.85	2.85	2.85	2.85	2.85	2.85	2.84	2.85	2.85
ON_TID samples													
33	2.87	2.87	2.86	2.85	2.85	2.87	2.87	2.87	2.88	2.88	2.88	2.88	2.86
34	2.87	2.86	2.86	2.85	2.86	2.87	2.87	2.87	2.89	2.89	2.89	2.89	2.87
35	2.86	2.86	2.85	2.84	2.85	2.86	2.86	2.85	2.87	2.86	2.86	2.87	2.85
Statistics													
Min	2.86	2.86	2.85	2.84	2.85	2.86	2.86	2.85	2.87	2.86	2.86	2.87	2.85
Max	2.87	2.87	2.86	2.85	2.86	2.87	2.87	2.87	2.89	2.89	2.89	2.89	2.87
Average	2.87	2.86	2.86	2.85	2.85	2.86	2.87	2.86	2.88	2.88	2.88	2.88	2.86
Sigma	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-9.6E-03	-16.8E-03	-12.8E-03	0.0E+00	3.2E-03	1.2E-03	14.8E-03	12.4E-03	13.6E-03	16.4E-03	-1.6E-03
34	-	-8.8E-03	-9.2E-03	-15.2E-03	-13.6E-03	400.1E-06	4.4E-03	2.8E-03	18.8E-03	16.4E-03	16.4E-03	21.6E-03	-3.2E-03
35	-	0.0E+00	-8.0E-03	-18.0E-03	-13.2E-03	-3.2E-03	-399.8E-06	-4.8E-03	6.8E-03	6.0E-03	4.4E-03	8.4E-03	-5.2E-03
Average	-	-2.9E-03	-8.9E-03	-16.7E-03	-13.2E-03	-933.2E-06	2.4E-03	-266.6E-06	13.5E-03	11.6E-03	11.5E-03	15.5E-03	-3.3E-03
Sigma	-	4.1E-03	679.9E-06	1.1E-03	326.6E-06	1.6E-03	2.0E-03	3.3E-03	5.0E-03	4.3E-03	5.1E-03	5.4E-03	1.5E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019		
	LM124AJRQMLV					National Semiconductors				Issue:	02		

Measurements

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.86	2.85	2.84	2.84	2.85	2.85	2.85	2.85	2.85	2.85	2.84	2.85	2.85
OFF PROTON samples													
30	2.85	2.84	2.84	2.84	2.84	2.84	2.84	2.83	2.84	2.84	2.83	2.84	2.84
32	2.85	2.84	2.84	2.83	2.84	2.84	2.84	2.83	2.84	2.84	2.83	2.84	2.84
39	2.87	2.86	2.86	2.84	2.85	2.86	2.86	2.85	2.86	2.85	2.85	2.85	2.86
Statistics													
Min	2.85	2.84	2.84	2.83	2.84	2.84	2.84	2.83	2.84	2.84	2.83	2.84	2.84
Max	2.87	2.86	2.86	2.84	2.85	2.86	2.86	2.85	2.86	2.85	2.85	2.85	2.86
Average	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.84
Sigma	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-8.4E-03	-8.0E-03	-16.4E-03	-15.2E-03	-9.6E-03	-9.2E-03	-16.8E-03	-11.2E-03	-15.6E-03	-20.0E-03	-15.2E-03	-12.0E-03
32	-	-8.0E-03	-8.0E-03	-18.0E-03	-13.2E-03	-9.6E-03	-8.8E-03	-17.2E-03	-9.2E-03	-14.4E-03	-19.6E-03	-15.2E-03	-12.0E-03
39	-	-9.6E-03	-8.8E-03	-24.4E-03	-16.8E-03	-9.2E-03	-8.8E-03	-18.8E-03	-8.4E-03	-15.2E-03	-21.6E-03	-15.6E-03	-12.4E-03
Average	-	-8.7E-03	-8.3E-03	-19.6E-03	-15.1E-03	-9.5E-03	-8.9E-03	-17.6E-03	-9.6E-03	-15.1E-03	-20.4E-03	-15.3E-03	-12.1E-03
Sigma	-	679.9E-06	377.2E-06	3.5E-03	1.5E-03	188.6E-06	188.5E-06	864.1E-06	1.2E-03	498.9E-06	864.1E-06	188.6E-06	188.5E-06

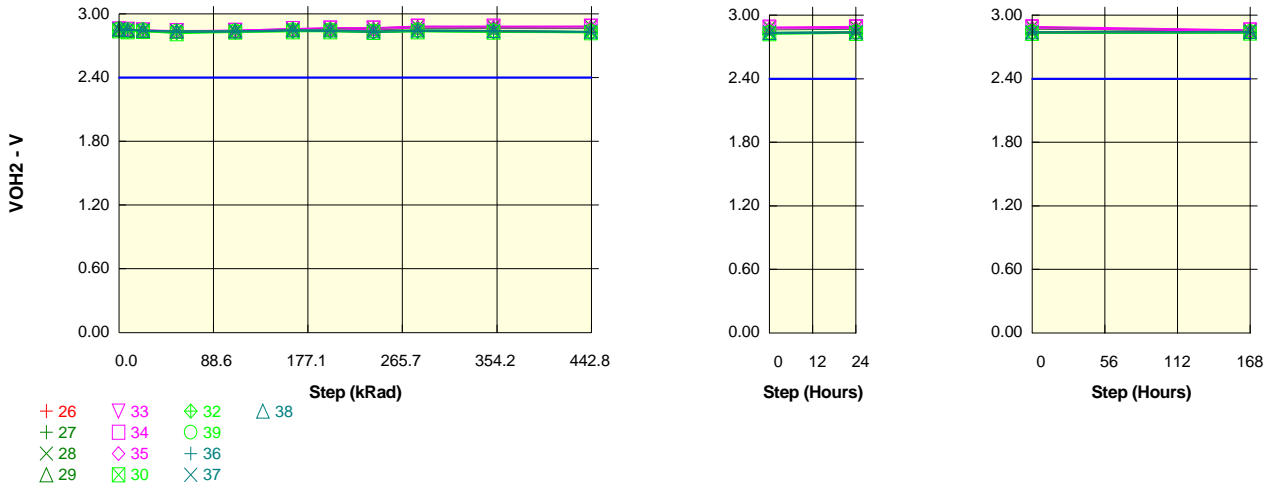
Measurements

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.86	2.85	2.84	2.84	2.85	2.85	2.85	2.85	2.85	2.85	2.84	2.85	2.85
OFF TID samples													
36	2.86	2.86	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.84
37	2.87	2.87	2.86	2.85	2.85	2.86	2.86	2.85	2.86	2.85	2.85	2.85	2.86
38	2.87	2.86	2.86	2.85	2.85	2.86	2.86	2.85	2.86	2.85	2.85	2.85	2.86
Statistics													
Min	2.86	2.86	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.84
Max	2.87	2.87	2.86	2.85	2.85	2.86	2.86	2.85	2.86	2.85	2.85	2.85	2.86
Average	2.87	2.86	2.86	2.85	2.85	2.86	2.85	2.85	2.86	2.85	2.84	2.85	2.85
Sigma	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01

Drift Calculation

VOH2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-9.2E-03	-19.2E-03	-17.6E-03	-10.4E-03	-10.8E-03	-19.6E-03	-10.8E-03	-17.2E-03	-21.6E-03	-16.8E-03	-14.4E-03
37	-	0.0E+00	-11.6E-03	-18.4E-03	-20.4E-03	-10.4E-03	-11.6E-03	-21.2E-03	-10.8E-03	-17.6E-03	-23.6E-03	-17.6E-03	-14.8E-03
38	-	-6.8E-03	-11.2E-03	-19.2E-03	-18.0E-03	-9.2E-03	-10.4E-03	-18.8E-03	-10.0E-03	-15.6E-03	-22.4E-03	-16.4E-03	-13.6E-03
Average	-	-2.3E-03	-10.7E-03	-18.9E-03	-18.7E-03	-10.0E-03	-10.9E-03	-19.9E-03	-10.5E-03	-16.8E-03	-22.5E-03	-16.9E-03	-14.3E-03
Sigma	-	3.2E-03	1.0E-03	377.1E-06	1.2E-03	565.8E-06	498.9E-06	997.7E-06	377.2E-06	864.1E-06	822.0E-06	499.0E-06	499.0E-06

Parameter : Logical "1" output voltage : VOH2DUTC
 Test conditions : +VCC=4.5V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 2.40
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.84	2.83	2.84	2.84
ON_PROTON samples													
27	2.84	2.84	2.84	2.83	2.83	2.85	2.85	2.85	2.86	2.86	2.86	2.87	2.85
28	2.85	2.85	2.85	2.84	2.84	2.86	2.87	2.87	2.88	2.88	2.88	2.89	2.86
29	2.85	2.84	2.84	2.84	2.84	2.86	2.86	2.86	2.88	2.88	2.88	2.88	2.86
Statistics													
Min	2.84	2.84	2.84	2.83	2.83	2.85	2.85	2.85	2.86	2.86	2.86	2.87	2.85
Max	2.85	2.85	2.85	2.84	2.84	2.86	2.87	2.87	2.88	2.88	2.88	2.89	2.86
Average	2.85	2.84	2.84	2.84	2.84	2.86	2.86	2.86	2.87	2.87	2.88	2.88	2.85
Sigma	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00

Drift Calculation

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-3.6E-03	-7.2E-03	-14.0E-03	-10.8E-03	4.4E-03	8.0E-03	8.4E-03	20.8E-03	18.4E-03	20.0E-03	22.8E-03	4.0E-03
28	-	-6.4E-03	-7.6E-03	-12.4E-03	-11.2E-03	6.4E-03	12.0E-03	12.8E-03	28.4E-03	27.2E-03	29.6E-03	32.8E-03	4.0E-03
29	-	-7.2E-03	-8.0E-03	-14.4E-03	-12.8E-03	6.0E-03	10.8E-03	10.4E-03	25.2E-03	23.6E-03	26.0E-03	29.2E-03	4.8E-03
Average	-	-5.7E-03	-7.6E-03	-13.6E-03	-11.6E-03	5.6E-03	10.3E-03	10.5E-03	24.8E-03	23.1E-03	25.2E-03	28.3E-03	4.3E-03
Sigma	-	1.5E-03	326.6E-06	864.1E-06	864.1E-06	864.1E-06	1.7E-03	1.8E-03	3.1E-03	3.6E-03	4.0E-03	4.1E-03	377.1E-06

Measurements

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.84	2.83	2.84	2.84
ON_TID samples													
33	2.86	2.86	2.85	2.84	2.85	2.86	2.87	2.87	2.88	2.88	2.88	2.88	2.86
34	2.86	2.85	2.85	2.84	2.85	2.86	2.87	2.87	2.89	2.89	2.89	2.89	2.86
35	2.85	2.85	2.84	2.83	2.84	2.85	2.85	2.85	2.87	2.87	2.87	2.87	2.85
Statistics													
Min	2.85	2.85	2.84	2.83	2.84	2.85	2.85	2.85	2.87	2.87	2.87	2.87	2.85
Max	2.86	2.86	2.85	2.84	2.85	2.86	2.87	2.87	2.89	2.89	2.89	2.89	2.86
Average	2.86	2.85	2.85	2.84	2.84	2.86	2.86	2.86	2.88	2.88	2.88	2.88	2.86
Sigma	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-9.6E-03	-17.2E-03	-12.4E-03	3.2E-03	8.4E-03	8.0E-03	22.8E-03	21.2E-03	22.8E-03	25.6E-03	1.2E-03
34	-	-9.2E-03	-9.6E-03	-16.0E-03	-13.2E-03	4.0E-03	10.4E-03	10.8E-03	28.0E-03	27.2E-03	27.6E-03	32.8E-03	-400.1E-06
35	-	0.0E+00	-8.4E-03	-18.0E-03	-12.4E-03	400.1E-06	6.0E-03	5.2E-03	19.6E-03	20.0E-03	20.4E-03	24.0E-03	-1.6E-03
Average	-	-3.1E-03	-9.2E-03	-17.1E-03	-12.7E-03	2.5E-03	8.3E-03	8.0E-03	23.5E-03	22.8E-03	23.6E-03	27.5E-03	-266.7E-06
Sigma	-	4.3E-03	565.7E-06	821.9E-06	377.1E-06	1.5E-03	1.8E-03	2.3E-03	3.5E-03	3.1E-03	3.0E-03	3.8E-03	1.1E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019		
	LM124AJRQMLV					National Semiconductors				Issue:	02		

Measurements

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.84	2.83	2.84	2.84
OFF PROTON samples													
30	2.84	2.83	2.83	2.81	2.83	2.83	2.83	2.83	2.83	2.83	2.82	2.83	2.83
32	2.84	2.84	2.84	2.82	2.83	2.83	2.83	2.83	2.83	2.83	2.82	2.83	2.83
39	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
Statistics													
Min	2.84	2.83	2.83	2.81	2.83	2.83	2.83	2.83	2.83	2.83	2.82	2.83	2.83
Max	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
Average	2.85	2.84	2.84	2.82	2.83	2.84	2.84	2.83	2.84	2.83	2.83	2.83	2.84
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-8.4E-03	-8.0E-03	-28.4E-03	-14.8E-03	-9.2E-03	-8.4E-03	-16.4E-03	-9.2E-03	-14.8E-03	-19.2E-03	-14.4E-03	-11.2E-03
32	-	-8.0E-03	-8.0E-03	-20.0E-03	-13.2E-03	-9.2E-03	-8.4E-03	-16.8E-03	-8.8E-03	-14.0E-03	-19.6E-03	-14.8E-03	-11.6E-03
39	-	-9.6E-03	-9.2E-03	-20.8E-03	-17.2E-03	-9.2E-03	-8.4E-03	-18.8E-03	-8.0E-03	-15.2E-03	-21.2E-03	-15.6E-03	-12.4E-03
Average	-	-8.7E-03	-8.4E-03	-23.1E-03	-15.1E-03	-9.2E-03	-8.4E-03	-17.3E-03	-8.7E-03	-14.7E-03	-20.0E-03	-14.9E-03	-11.7E-03
Sigma	-	680.0E-06	565.8E-06	3.8E-03	1.6E-03	112.4E-09	112.4E-09	1.0E-03	498.9E-06	499.0E-06	864.2E-06	499.0E-06	499.0E-06

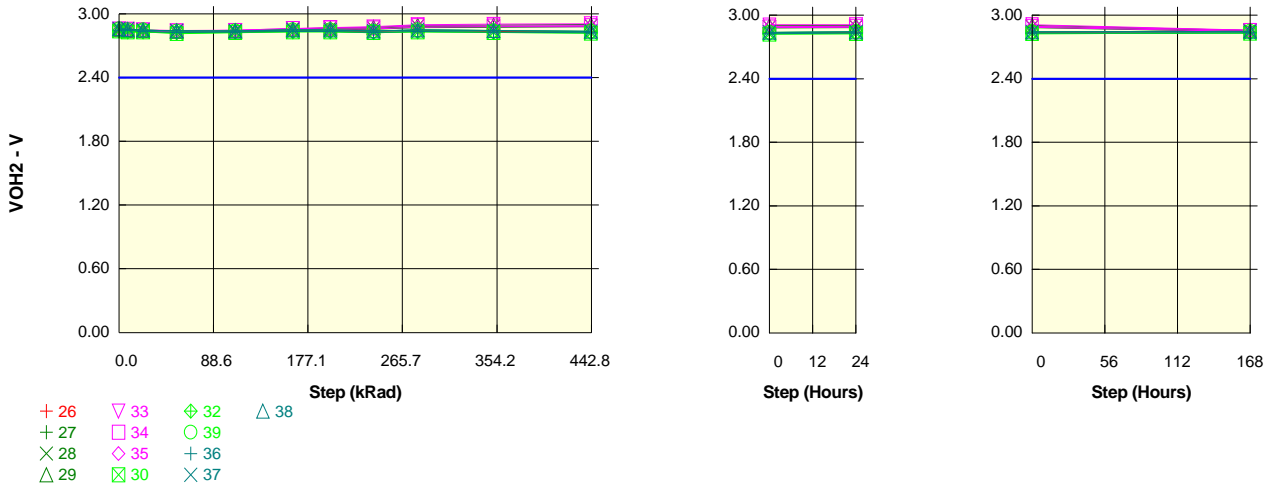
Measurements

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.85	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.84	2.83	2.84	2.84
OFF TID samples													
36	2.85	2.85	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.83	2.83	2.83
37	2.86	2.86	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
38	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
Statistics													
Min	2.85	2.85	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.83	2.83	2.83
Max	2.86	2.86	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
Average	2.86	2.85	2.84	2.84	2.84	2.85	2.84	2.84	2.85	2.84	2.83	2.84	2.84
Sigma	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01

Drift Calculation

VOH2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-9.2E-03	-19.6E-03	-17.6E-03	-10.0E-03	-10.4E-03	-19.2E-03	-10.4E-03	-16.8E-03	-21.6E-03	-16.4E-03	-14.0E-03
37	-	0.0E+00	-11.6E-03	-18.4E-03	-20.4E-03	-10.4E-03	-11.2E-03	-21.2E-03	-10.4E-03	-16.8E-03	-23.2E-03	-17.2E-03	-14.4E-03
38	-	-6.4E-03	-11.2E-03	-18.8E-03	-18.0E-03	-9.2E-03	-10.0E-03	-18.4E-03	-10.0E-03	-15.2E-03	-22.8E-03	-16.0E-03	-13.2E-03
Average	-	-2.1E-03	-10.7E-03	-18.9E-03	-18.7E-03	-9.9E-03	-10.5E-03	-19.6E-03	-10.3E-03	-16.3E-03	-22.5E-03	-16.5E-03	-13.9E-03
Sigma	-	3.0E-03	1.0E-03	498.9E-06	1.2E-03	499.0E-06	498.9E-06	1.2E-03	188.6E-06	754.3E-06	679.9E-06	498.9E-06	498.9E-06

Parameter : Logical "1" output voltage : VOH2DUTD
 Test conditions : +VCC=4.5V. -VCC=GND. IOH=-10mA
 Unit : V
 Spec Limit Min : 2.40
 Spec limits are represented in bold lines on the graphic.



Measurements

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.84	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.83	2.83	2.84	2.84
ON_PROTON samples													
27	2.84	2.84	2.83	2.83	2.83	2.85	2.85	2.86	2.87	2.87	2.88	2.88	2.84
28	2.85	2.85	2.84	2.84	2.84	2.86	2.87	2.87	2.88	2.88	2.89	2.89	2.86
29	2.85	2.84	2.84	2.84	2.84	2.86	2.87	2.87	2.89	2.90	2.90	2.90	2.85
Statistics													
Min	2.84	2.84	2.83	2.83	2.83	2.85	2.85	2.86	2.87	2.87	2.88	2.88	2.84
Max	2.85	2.85	2.84	2.84	2.84	2.86	2.87	2.87	2.89	2.90	2.90	2.90	2.86
Average	2.85	2.84	2.84	2.83	2.84	2.85	2.86	2.86	2.88	2.88	2.89	2.89	2.85
Sigma	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-3.6E-03	-7.2E-03	-14.0E-03	-10.4E-03	4.8E-03	10.8E-03	14.8E-03	31.2E-03	33.6E-03	39.6E-03	41.6E-03	2.4E-03
28	-	-6.4E-03	-7.6E-03	-12.4E-03	-11.2E-03	6.4E-03	12.8E-03	12.8E-03	31.6E-03	31.2E-03	34.4E-03	38.4E-03	3.2E-03
29	-	-7.2E-03	-7.6E-03	-14.0E-03	-12.4E-03	7.6E-03	16.0E-03	22.0E-03	42.4E-03	44.4E-03	50.4E-03	53.2E-03	3.2E-03
Average	-	-5.7E-03	-7.5E-03	-13.5E-03	-11.3E-03	6.3E-03	13.2E-03	16.5E-03	35.1E-03	36.4E-03	41.5E-03	44.4E-03	2.9E-03
Sigma	-	1.5E-03	1.88E-06	754.1E-06	821.9E-06	1.1E-03	2.1E-03	4.0E-03	5.2E-03	5.7E-03	6.7E-03	6.4E-03	377.2E-06

Measurements

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.84	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.83	2.83	2.84	2.84
ON_TID samples													
33	2.86	2.86	2.85	2.84	2.85	2.86	2.87	2.88	2.90	2.90	2.91	2.91	2.86
34	2.86	2.85	2.85	2.84	2.85	2.86	2.87	2.87	2.89	2.89	2.89	2.89	2.86
35	2.85	2.85	2.84	2.83	2.84	2.85	2.86	2.86	2.88	2.88	2.88	2.89	2.85
Statistics													
Min	2.85	2.85	2.84	2.83	2.84	2.85	2.86	2.86	2.88	2.88	2.88	2.89	2.85
Max	2.86	2.86	2.85	2.84	2.85	2.86	2.87	2.88	2.90	2.90	2.91	2.91	2.86
Average	2.86	2.85	2.85	2.84	2.84	2.86	2.87	2.87	2.89	2.89	2.89	2.90	2.85
Sigma	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-9.6E-03	-17.2E-03	-11.6E-03	6.0E-03	15.6E-03	21.2E-03	43.2E-03	45.6E-03	50.8E-03	52.4E-03	0.0E+00
34	-	-9.2E-03	-9.2E-03	-15.6E-03	-13.2E-03	4.0E-03	10.4E-03	11.6E-03	30.0E-03	29.6E-03	30.4E-03	35.6E-03	-1.2E-03
35	-	0.0E+00	-8.4E-03	-18.0E-03	-11.6E-03	1.6E-03	8.4E-03	9.6E-03	27.2E-03	30.0E-03	33.2E-03	37.2E-03	-2.0E-03
Average	-	-3.1E-03	-9.1E-03	-16.9E-03	-12.1E-03	3.9E-03	11.5E-03	14.1E-03	33.5E-03	35.1E-03	38.1E-03	41.7E-03	-1.1E-03
Sigma	-	4.3E-03	498.9E-06	997.7E-06	754.3E-06	1.8E-03	3.0E-03	5.1E-03	7.0E-03	7.4E-03	9.0E-03	7.6E-03	821.9E-06

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02		

Measurements

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.84	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.83	2.83	2.84	2.84
OFF PROTON samples													
30	2.84	2.83	2.83	2.82	2.83	2.83	2.83	2.82	2.83	2.83	2.82	2.83	2.83
32	2.84	2.83	2.83	2.82	2.83	2.83	2.83	2.82	2.83	2.83	2.82	2.83	2.83
39	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
Statistics													
Min	2.84	2.83	2.83	2.82	2.83	2.83	2.83	2.82	2.83	2.83	2.82	2.83	2.83
Max	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
Average	2.85	2.84	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.83	2.83	2.83
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-8.4E-03	-8.0E-03	-24.0E-03	-15.2E-03	-9.2E-03	-8.8E-03	-16.4E-03	-9.2E-03	-14.8E-03	-19.6E-03	-14.4E-03	-11.2E-03
32	-	-8.0E-03	-8.0E-03	-18.4E-03	-13.6E-03	-9.2E-03	-8.8E-03	-16.8E-03	-8.8E-03	-14.0E-03	-19.6E-03	-14.8E-03	-11.6E-03
39	-	-9.6E-03	-8.8E-03	-20.4E-03	-16.8E-03	-9.2E-03	-8.4E-03	-18.8E-03	-8.0E-03	-15.2E-03	-21.6E-03	-15.2E-03	-12.4E-03
Average	-	-8.7E-03	-8.3E-03	-20.9E-03	-15.2E-03	-9.2E-03	-8.7E-03	-17.3E-03	-8.7E-03	-14.7E-03	-20.3E-03	-14.8E-03	-11.7E-03
Sigma	-	679.8E-06	377.1E-06	2.3E-03	1.3E-03	112.4E-09	188.6E-06	1.0E-03	499.0E-06	498.9E-06	942.8E-06	326.6E-06	498.9E-06

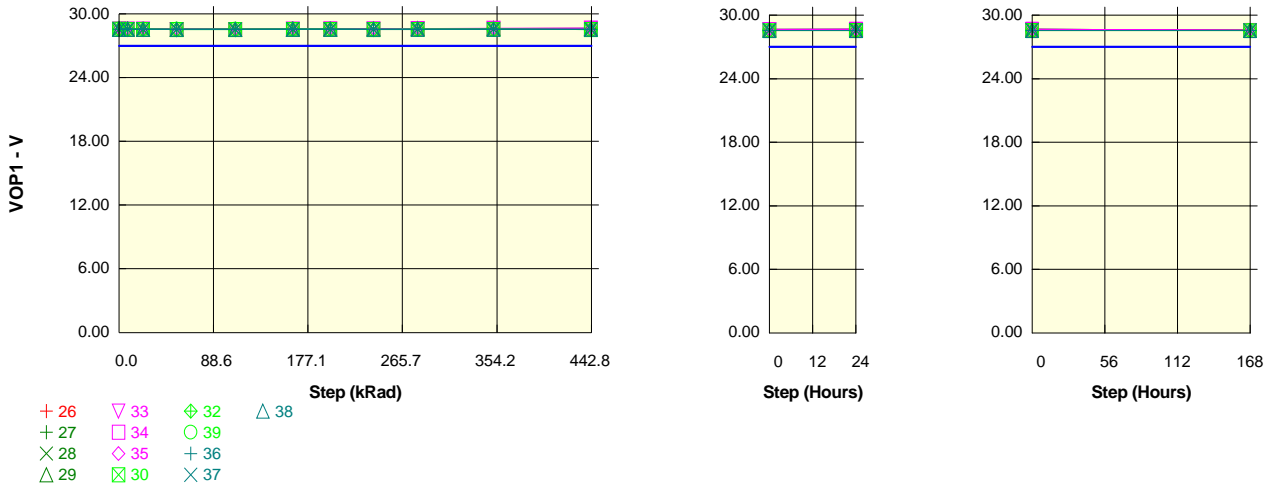
Measurements

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	2.84	2.84	2.83	2.83	2.83	2.84	2.84	2.84	2.84	2.83	2.83	2.84	2.84
OFF TID samples													
36	2.85	2.85	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.82	2.83	2.83
37	2.86	2.86	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.84	2.84	2.84	2.85
38	2.86	2.85	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.85	2.84	2.84	2.85
Statistics													
Min	2.85	2.85	2.84	2.83	2.83	2.84	2.84	2.83	2.84	2.83	2.82	2.83	2.83
Max	2.86	2.86	2.85	2.84	2.84	2.85	2.85	2.84	2.85	2.85	2.84	2.84	2.85
Average	2.86	2.85	2.84	2.84	2.84	2.85	2.84	2.84	2.85	2.84	2.83	2.84	2.84
Sigma	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOH2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-9.2E-03	-19.6E-03	-17.6E-03	-10.4E-03	-10.8E-03	-19.6E-03	-10.4E-03	-16.8E-03	-21.6E-03	-16.4E-03	-14.0E-03
37	-	0.0E+00	-12.0E-03	-18.8E-03	-20.4E-03	-10.4E-03	-11.2E-03	-21.2E-03	-10.4E-03	-17.2E-03	-23.2E-03	-17.6E-03	-14.4E-03
38	-	-6.8E-03	-11.2E-03	-19.2E-03	-18.0E-03	-9.2E-03	-10.0E-03	-18.4E-03	-9.2E-03	-14.8E-03	-22.0E-03	-16.0E-03	-12.8E-03
Average	-	-2.3E-03	-10.8E-03	-19.2E-03	-18.7E-03	-10.0E-03	-10.7E-03	-19.7E-03	-10.0E-03	-16.3E-03	-22.3E-03	-16.7E-03	-13.7E-03
Sigma	-	3.2E-03	1.2E-03	326.7E-06	1.2E-03	565.7E-06	498.9E-06	1.1E-03	565.7E-06	1.0E-03	679.8E-06	679.8E-06	679.9E-06

Parameter : Maximum Output Voltage Swing : VOP1DUTA
 Test conditions : +VCC=30V. -VCC=GND. Vout=30V. RL=10K
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
ON_PROTON samples													
27	28.56	28.56	28.55	28.55	28.55	28.57	28.58	28.58	28.61	28.62	28.63	28.63	28.57
28	28.57	28.56	28.56	28.56	28.55	28.58	28.59	28.59	28.62	28.64	28.65	28.65	28.58
29	28.57	28.56	28.56	28.55	28.55	28.58	28.60	28.60	28.64	28.65	28.66	28.67	28.58
Statistics													
Min	28.56	28.56	28.55	28.55	28.55	28.57	28.58	28.58	28.61	28.62	28.63	28.63	28.57
Max	28.57	28.56	28.56	28.56	28.55	28.58	28.60	28.60	28.64	28.65	28.66	28.67	28.58
Average	28.57	28.56	28.56	28.55	28.55	28.58	28.59	28.59	28.62	28.63	28.65	28.65	28.57
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01

Drift Calculation

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-4.0E-03	-11.2E-03	-17.6E-03	-16.8E-03	8.8E-03	16.8E-03	20.8E-03	48.0E-03	52.8E-03	63.2E-03	68.0E-03	2.4E-03
28	-	-6.4E-03	-9.6E-03	-13.6E-03	-16.0E-03	8.8E-03	18.4E-03	23.2E-03	53.6E-03	66.4E-03	77.6E-03	82.4E-03	7.2E-03
29	-	-6.4E-03	-8.0E-03	-14.4E-03	-16.0E-03	14.4E-03	27.2E-03	36.0E-03	69.6E-03	80.0E-03	95.2E-03	99.2E-03	8.0E-03
Average	-	-5.6E-03	-9.6E-03	-15.2E-03	-16.3E-03	10.7E-03	20.8E-03	26.7E-03	57.1E-03	66.4E-03	78.7E-03	83.2E-03	5.9E-03
Sigma	-	1.1E-03	1.3E-03	1.7E-03	376.7E-06	2.6E-03	4.6E-03	6.7E-03	9.2E-03	11.1E-03	13.1E-03	12.7E-03	2.5E-03

Measurements

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
ON_TID samples													
33	28.57	28.57	28.56	28.56	28.56	28.58	28.60	28.61	28.64	28.65	28.67	28.67	28.58
34	28.58	28.56	28.56	28.56	28.56	28.58	28.59	28.59	28.61	28.64	28.65	28.65	28.58
35	28.57	28.57	28.56	28.55	28.55	28.57	28.58	28.57	28.59	28.61	28.61	28.62	28.56
Statistics													
Min	28.57	28.56	28.56	28.55	28.55	28.57	28.58	28.57	28.59	28.61	28.61	28.62	28.56
Max	28.58	28.57	28.56	28.56	28.56	28.58	28.60	28.61	28.64	28.65	28.67	28.67	28.58
Average	28.57	28.57	28.56	28.55	28.56	28.58	28.59	28.59	28.61	28.63	28.64	28.65	28.57
Sigma	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01

Drift Calculation

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-11.2E-03	-18.4E-03	-14.4E-03	11.2E-03	24.8E-03	34.4E-03	68.8E-03	80.8E-03	92.8E-03	97.6E-03	4.0E-03
34	-	-10.4E-03	-11.2E-03	-16.8E-03	-17.6E-03	4.8E-03	13.6E-03	17.6E-03	39.2E-03	63.2E-03	73.6E-03	79.2E-03	4.0E-03
35	-	0.0E+00	-10.4E-03	-20.8E-03	-16.8E-03	3.2E-03	10.4E-03	6.4E-03	19.2E-03	39.2E-03	46.4E-03	50.4E-03	-3.2E-03
Average	-	-3.5E-03	-10.9E-03	-18.7E-03	-16.3E-03	6.4E-03	16.3E-03	19.5E-03	42.4E-03	61.1E-03	70.9E-03	75.7E-03	1.6E-03
Sigma	-	4.9E-03	377.6E-06	1.6E-03	1.4E-03	3.5E-03	6.2E-03	11.5E-03	20.4E-03	17.0E-03	19.0E-03	19.4E-03	3.4E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
OFF PROTON samples													
30	28.56	28.55	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
32	28.57	28.55	28.55	28.54	28.55	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
39	28.57	28.56	28.56	28.55	28.55	28.57	28.55	28.55	28.56	28.56	28.55	28.56	28.56
Statistics													
Min	28.56	28.55	28.55	28.54	28.54	28.56	28.55	28.54	28.56	28.55	28.54	28.55	28.55
Max	28.57	28.56	28.56	28.55	28.55	28.57	28.56	28.55	28.56	28.56	28.55	28.56	28.56
Average	28.57	28.55	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.55
Sigma	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

Drift Calculation

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-16.0E-03	-11.2E-03	-20.8E-03	-23.2E-03	-9.6E-03	-9.6E-03	-20.8E-03	-8.0E-03	-17.6E-03	-26.4E-03	-15.2E-03	-16.8E-03
32	-	-14.4E-03	-11.2E-03	-23.2E-03	-19.2E-03	-8.8E-03	-8.0E-03	-20.8E-03	-6.4E-03	-15.2E-03	-28.0E-03	-17.6E-03	-14.4E-03
39	-	-10.4E-03	-9.6E-03	-22.4E-03	-21.6E-03	-8.0E-03	-19.2E-03	-24.0E-03	-14.4E-03	-13.6E-03	-28.0E-03	-14.4E-03	-15.2E-03
Average	-	-13.6E-03	-10.7E-03	-22.1E-03	-21.3E-03	-8.8E-03	-12.3E-03	-21.9E-03	-9.6E-03	-15.5E-03	-27.5E-03	-15.7E-03	-15.5E-03
Sigma	-	2.4E-03	753.5E-06	997.6E-06	1.6E-03	652.5E-06	4.9E-03	1.5E-03	3.5E-03	1.6E-03	754.4E-06	1.4E-03	998.1E-06

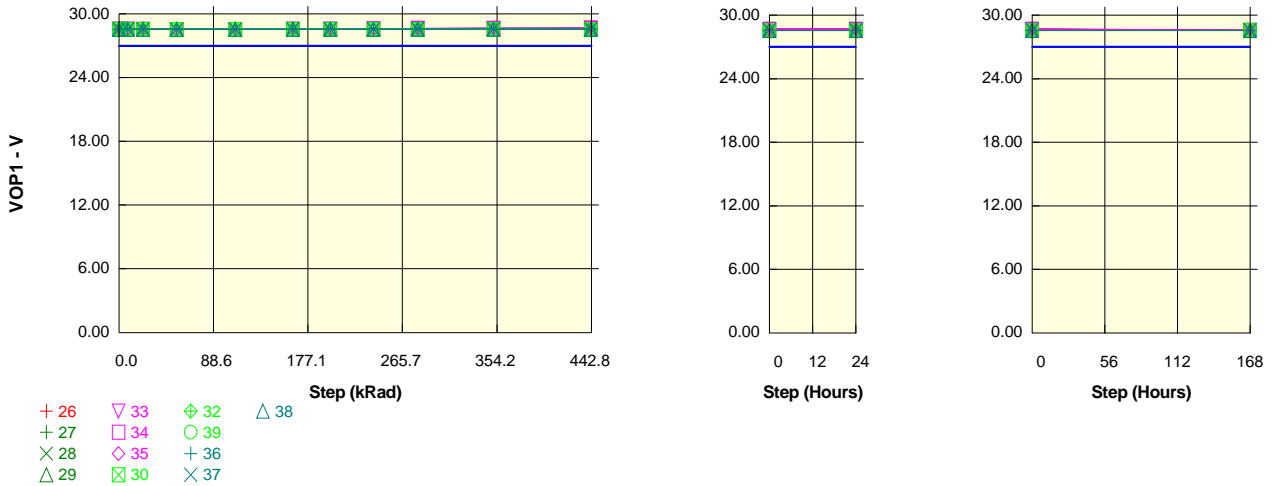
Measurements

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
OFF TID samples													
36	28.57	28.57	28.56	28.54	28.54	28.56	28.55	28.54	28.54	28.55	28.54	28.55	28.55
37	28.58	28.58	28.56	28.56	28.55	28.57	28.56	28.55	28.57	28.56	28.55	28.56	28.56
38	28.57	28.57	28.56	28.55	28.55	28.57	28.55	28.55	28.56	28.56	28.55	28.56	28.56
Statistics													
Min	28.57	28.57	28.56	28.54	28.54	28.56	28.55	28.54	28.54	28.55	28.54	28.55	28.55
Max	28.58	28.58	28.56	28.56	28.55	28.57	28.56	28.55	28.57	28.56	28.55	28.56	28.56
Average	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.56	28.55	28.56	28.55
Sigma	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01

Drift Calculation

VOP1DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-12.0E-03	-23.2E-03	-23.2E-03	-9.6E-03	-12.8E-03	-25.6E-03	-24.0E-03	-17.6E-03	-24.8E-03	-16.0E-03	-20.8E-03
37	-	0.0E+00	-13.6E-03	-19.2E-03	-24.8E-03	-9.6E-03	-15.2E-03	-25.6E-03	-9.6E-03	-17.6E-03	-26.4E-03	-17.6E-03	-17.6E-03
38	-	-7.2E-03	-12.8E-03	-20.0E-03	-22.4E-03	-7.2E-03	-20.8E-03	-20.8E-03	-9.6E-03	-15.2E-03	-24.0E-03	-15.2E-03	-14.4E-03
Average	-	-2.4E-03	-12.8E-03	-20.8E-03	-23.5E-03	-8.8E-03	-16.3E-03	-24.0E-03	-14.4E-03	-16.8E-03	-25.1E-03	-16.3E-03	-17.6E-03
Sigma	-	3.4E-03	653.3E-06	1.7E-03	997.6E-06	1.1E-03	3.4E-03	2.3E-03	6.8E-03	1.1E-03	997.6E-06	998.5E-06	2.6E-03

Parameter : Maximum Output Voltage Swing : VOP1DUTB
 Test conditions : +VCC=30V. -VCC=GND. Vout=30V. RL=10K
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.57	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
ON_PROTON samples													
27	28.57	28.56	28.55	28.55	28.55	28.57	28.58	28.59	28.62	28.64	28.65	28.66	28.58
28	28.57	28.56	28.56	28.56	28.55	28.58	28.59	28.60	28.64	28.65	28.66	28.67	28.58
29	28.57	28.56	28.56	28.55	28.55	28.58	28.59	28.61	28.65	28.67	28.69	28.69	28.59
Statistics													
Min	28.57	28.56	28.55	28.55	28.55	28.57	28.58	28.59	28.62	28.64	28.65	28.66	28.58
Max	28.57	28.56	28.56	28.56	28.55	28.58	28.59	28.61	28.65	28.67	28.69	28.69	28.59
Average	28.57	28.56	28.56	28.55	28.55	28.58	28.59	28.60	28.64	28.65	28.67	28.67	28.59
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-3.2E-03	-11.2E-03	-18.4E-03	-18.4E-03	6.4E-03	15.2E-03	22.4E-03	56.0E-03	70.4E-03	88.0E-03	92.0E-03	16.8E-03
28	-	-7.2E-03	-10.4E-03	-14.4E-03	-16.8E-03	8.0E-03	19.2E-03	28.0E-03	64.0E-03	79.2E-03	93.6E-03	96.8E-03	13.6E-03
29	-	-7.2E-03	-9.6E-03	-16.0E-03	-18.4E-03	9.6E-03	23.2E-03	37.6E-03	79.2E-03	96.0E-03	117.6E-03	120.8E-03	24.8E-03
Average	-	-5.9E-03	-10.4E-03	-16.3E-03	-17.9E-03	8.0E-03	19.2E-03	29.3E-03	66.4E-03	81.9E-03	99.7E-03	103.2E-03	18.4E-03
Sigma	-	1.9E-03	653.3E-06	1.6E-03	753.9E-06	1.3E-03	3.3E-03	6.3E-03	9.6E-03	10.6E-03	12.8E-03	12.6E-03	4.7E-03

Measurements

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.57	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
ON_TID samples													
33	28.57	28.57	28.56	28.55	28.56	28.58	28.59	28.61	28.65	28.67	28.69	28.69	28.60
34	28.58	28.57	28.56	28.56	28.56	28.58	28.59	28.60	28.63	28.65	28.66	28.67	28.58
35	28.57	28.57	28.56	28.55	28.55	28.57	28.58	28.58	28.61	28.62	28.63	28.64	28.57
Statistics													
Min	28.57	28.57	28.56	28.55	28.55	28.57	28.58	28.58	28.61	28.62	28.63	28.64	28.57
Max	28.58	28.57	28.56	28.56	28.56	28.58	28.59	28.61	28.65	28.67	28.69	28.69	28.60
Average	28.57	28.57	28.56	28.55	28.55	28.58	28.59	28.59	28.63	28.65	28.66	28.67	28.58
Sigma	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01

Drift Calculation

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-12.0E-03	-18.4E-03	-16.8E-03	7.2E-03	21.6E-03	36.8E-03	79.2E-03	99.2E-03	119.2E-03	121.6E-03	23.2E-03
34	-	-8.8E-03	-11.2E-03	-16.8E-03	-17.6E-03	5.6E-03	16.0E-03	22.4E-03	57.6E-03	72.8E-03	86.4E-03	92.0E-03	8.0E-03
35	-	0.0E+00	-11.2E-03	-21.6E-03	-17.6E-03	799.2E-06	8.8E-03	8.8E-03	39.2E-03	51.2E-03	63.2E-03	68.0E-03	5.6E-03
Average	-	-2.9E-03	-11.5E-03	-18.9E-03	-17.3E-03	4.5E-03	15.5E-03	22.7E-03	58.7E-03	74.4E-03	89.6E-03	93.9E-03	12.3E-03
Sigma	-	4.1E-03	376.7E-06	2.0E-03	376.7E-06	2.7E-03	5.2E-03	11.4E-03	16.3E-03	19.6E-03	23.0E-03	21.9E-03	7.8E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV			National Semiconductors			Issue:	02			

Measurements

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.57	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
OFF PROTON samples													
30	28.57	28.56	28.56	28.55	28.54	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.55
32	28.57	28.56	28.56	28.54	28.55	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.55
39	28.57	28.56	28.56	28.55	28.55	28.57	28.57	28.55	28.57	28.56	28.55	28.56	28.56
Statistics													
Min	28.57	28.56	28.56	28.54	28.54	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.55
Max	28.57	28.56	28.56	28.55	28.55	28.57	28.57	28.55	28.57	28.56	28.55	28.56	28.56
Average	28.57	28.56	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.56	28.55
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Drift Calculation

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-9.6E-03	-11.2E-03	-20.8E-03	-21.6E-03	-8.8E-03	-7.2E-03	-20.0E-03	-6.4E-03	-15.2E-03	-22.4E-03	-13.6E-03	-14.4E-03
32	-	-9.6E-03	-12.0E-03	-23.2E-03	-20.0E-03	-8.8E-03	-7.2E-03	-20.8E-03	-5.6E-03	-14.4E-03	-22.4E-03	-14.4E-03	-15.2E-03
39	-	-9.6E-03	-10.4E-03	-24.8E-03	-20.8E-03	-8.0E-03	-6.4E-03	-20.8E-03	-5.6E-03	-13.6E-03	-22.4E-03	-14.4E-03	-14.4E-03
Average	-	-9.6E-03	-11.2E-03	-22.9E-03	-20.8E-03	-8.5E-03	-6.9E-03	-20.5E-03	-5.9E-03	-14.4E-03	-22.4E-03	-14.1E-03	-14.7E-03
Sigma	-	116.4E-12	652.5E-06	1.6E-03	653.3E-06	377.6E-06	377.6E-06	376.7E-06	377.6E-06	653.3E-06	190.1E-12	376.7E-06	376.7E-06

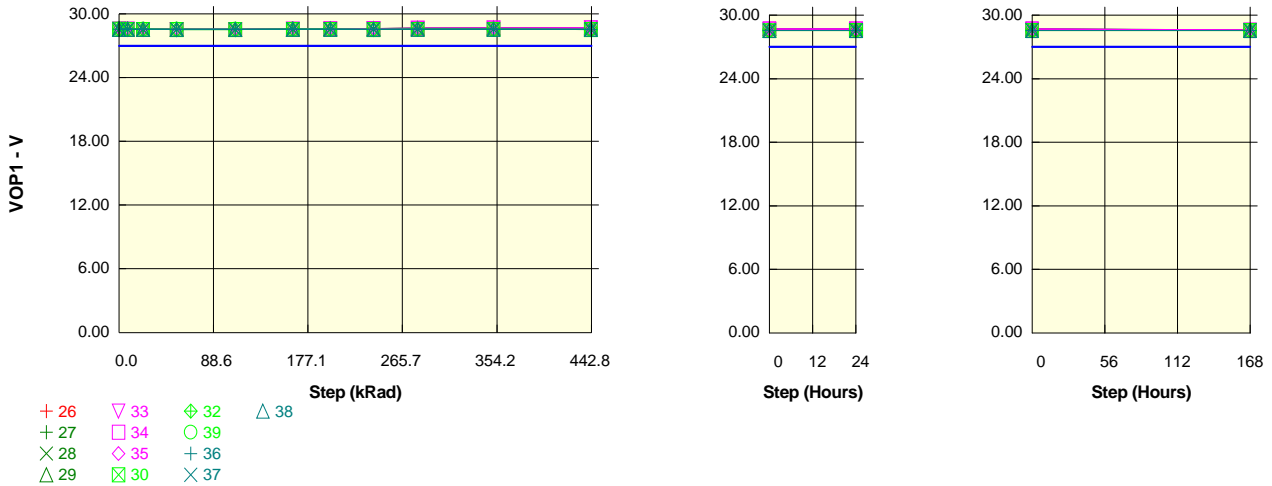
Measurements

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.57	28.56	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
OFF TID samples													
36	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.55
37	28.58	28.58	28.56	28.56	28.55	28.57	28.57	28.55	28.57	28.56	28.55	28.56	28.56
38	28.57	28.57	28.56	28.55	28.55	28.57	28.57	28.55	28.57	28.56	28.55	28.56	28.56
Statistics													
Min	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.55
Max	28.58	28.58	28.56	28.56	28.55	28.57	28.57	28.55	28.57	28.56	28.55	28.56	28.56
Average	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.57	28.56	28.55	28.56	28.56
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Drift Calculation

VOP1DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-12.0E-03	-23.2E-03	-23.2E-03	-9.6E-03	-8.8E-03	-23.2E-03	-7.2E-03	-17.6E-03	-23.2E-03	-15.2E-03	-16.0E-03
37	-	0.0E+00	-13.6E-03	-20.0E-03	-24.0E-03	-9.6E-03	-9.6E-03	-24.0E-03	-8.8E-03	-17.6E-03	-24.0E-03	-16.8E-03	-16.0E-03
38	-	-5.6E-03	-12.8E-03	-20.0E-03	-22.4E-03	-7.2E-03	-7.2E-03	-20.0E-03	-7.2E-03	-14.4E-03	-21.6E-03	-14.4E-03	-13.6E-03
Average	-	-1.9E-03	-12.8E-03	-21.1E-03	-23.2E-03	-8.8E-03	-8.5E-03	-22.4E-03	-7.7E-03	-16.5E-03	-22.9E-03	-15.5E-03	-15.2E-03
Sigma	-	2.6E-03	653.3E-06	1.5E-03	653.3E-06	1.1E-03	997.4E-06	1.7E-03	754.8E-06	1.5E-03	997.4E-06	997.6E-06	1.1E-03

Parameter : Maximum Output Voltage Swing : VOP1DUTC
 Test conditions : +VCC=30V. -VCC=GND. Vout=30V. RL=10K
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
ON_PROTON samples													
27	28.56	28.56	28.55	28.54	28.55	28.57	28.59	28.60	28.64	28.66	28.68	28.68	28.58
28	28.57	28.56	28.56	28.55	28.55	28.58	28.60	28.62	28.66	28.68	28.69	28.69	28.59
29	28.57	28.56	28.56	28.55	28.55	28.58	28.60	28.63	28.67	28.69	28.71	28.72	28.60
Statistics													
Min	28.56	28.56	28.55	28.54	28.55	28.57	28.59	28.60	28.64	28.66	28.68	28.68	28.58
Max	28.57	28.56	28.56	28.55	28.55	28.58	28.60	28.63	28.67	28.69	28.71	28.72	28.60
Average	28.57	28.56	28.56	28.55	28.55	28.58	28.60	28.62	28.66	28.68	28.69	28.70	28.59
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-2.4E-03	-10.4E-03	-17.6E-03	-16.0E-03	12.8E-03	28.0E-03	43.2E-03	83.2E-03	97.6E-03	116.0E-03	119.2E-03	21.6E-03
28	-	-6.4E-03	-10.4E-03	-13.6E-03	-15.2E-03	14.4E-03	32.0E-03	48.0E-03	89.6E-03	107.2E-03	123.2E-03	126.4E-03	18.4E-03
29	-	-8.0E-03	-9.6E-03	-16.0E-03	-17.6E-03	16.0E-03	36.8E-03	59.2E-03	105.6E-03	125.6E-03	145.6E-03	148.0E-03	32.8E-03
Average	-	-5.6E-03	-10.1E-03	-15.7E-03	-16.3E-03	14.4E-03	32.3E-03	50.1E-03	92.8E-03	110.1E-03	128.3E-03	131.2E-03	24.3E-03
Sigma	-	2.4E-03	377.2E-06	1.6E-03	996.9E-06	1.3E-03	3.6E-03	6.7E-03	9.4E-03	11.6E-03	12.6E-03	12.2E-03	6.2E-03

Measurements

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
ON_TID samples													
33	28.57	28.57	28.56	28.55	28.55	28.58	28.60	28.62	28.67	28.69	28.71	28.71	28.60
34	28.57	28.56	28.56	28.56	28.56	28.58	28.60	28.61	28.66	28.67	28.69	28.69	28.58
35	28.57	28.57	28.56	28.54	28.55	28.57	28.59	28.59	28.63	28.65	28.66	28.67	28.57
Statistics													
Min	28.57	28.56	28.56	28.54	28.55	28.57	28.59	28.59	28.63	28.65	28.66	28.67	28.57
Max	28.57	28.57	28.56	28.56	28.56	28.58	28.60	28.62	28.67	28.69	28.71	28.71	28.60
Average	28.57	28.57	28.56	28.55	28.55	28.58	28.60	28.61	28.65	28.67	28.69	28.69	28.59
Sigma	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01

Drift Calculation

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-12.0E-03	-18.4E-03	-16.0E-03	12.0E-03	32.0E-03	54.4E-03	100.8E-03	122.4E-03	142.4E-03	144.0E-03	29.6E-03
34	-	-9.6E-03	-11.2E-03	-16.8E-03	-16.8E-03	11.2E-03	28.0E-03	41.6E-03	83.2E-03	100.8E-03	114.4E-03	120.0E-03	12.8E-03
35	-	0.0E+00	-10.4E-03	-21.6E-03	-16.8E-03	5.6E-03	20.0E-03	28.0E-03	66.4E-03	83.2E-03	98.4E-03	101.6E-03	8.0E-03
Average	-	-3.2E-03	-11.2E-03	-18.9E-03	-16.5E-03	9.6E-03	26.7E-03	41.3E-03	83.5E-03	102.1E-03	118.4E-03	121.9E-03	16.8E-03
Sigma	-	4.5E-03	654.1E-06	2.0E-03	376.7E-06	2.8E-03	5.0E-03	10.8E-03	14.0E-03	16.0E-03	18.2E-03	17.4E-03	9.3E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02	

Measurements

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
OFF PROTON samples													
30	28.56	28.55	28.55	28.54	28.54	28.55	28.56	28.54	28.56	28.55	28.54	28.55	28.55
32	28.56	28.55	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
39	28.57	28.56	28.56	28.55	28.55	28.56	28.56	28.55	28.57	28.56	28.55	28.56	28.56
Statistics													
Min	28.56	28.55	28.55	28.54	28.54	28.55	28.56	28.54	28.56	28.55	28.54	28.55	28.55
Max	28.57	28.56	28.56	28.55	28.55	28.56	28.56	28.55	28.57	28.56	28.55	28.56	28.56
Average	28.57	28.56	28.55	28.54	28.55	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.55
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Drift Calculation

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-9.6E-03	-11.2E-03	-24.8E-03	-20.8E-03	-8.8E-03	-7.2E-03	-20.0E-03	-6.4E-03	-14.4E-03	-21.6E-03	-12.8E-03	-13.6E-03
32	-	-9.6E-03	-12.0E-03	-24.0E-03	-19.2E-03	-8.8E-03	-7.2E-03	-20.8E-03	-5.6E-03	-14.4E-03	-22.4E-03	-14.4E-03	-15.2E-03
39	-	-10.4E-03	-11.2E-03	-23.2E-03	-21.6E-03	-8.8E-03	-7.2E-03	-21.6E-03	-6.4E-03	-14.4E-03	-23.2E-03	-15.2E-03	-14.4E-03
Average	-	-9.9E-03	-11.5E-03	-24.0E-03	-20.5E-03	-8.8E-03	-7.2E-03	-20.8E-03	-6.1E-03	-14.4E-03	-22.4E-03	-14.1E-03	-14.4E-03
Sigma	-	377.2E-06	376.7E-06	653.3E-06	998.5E-06	899.1E-09	899.1E-09	653.3E-06	377.6E-06	899.1E-09	653.3E-06	997.4E-06	652.5E-06

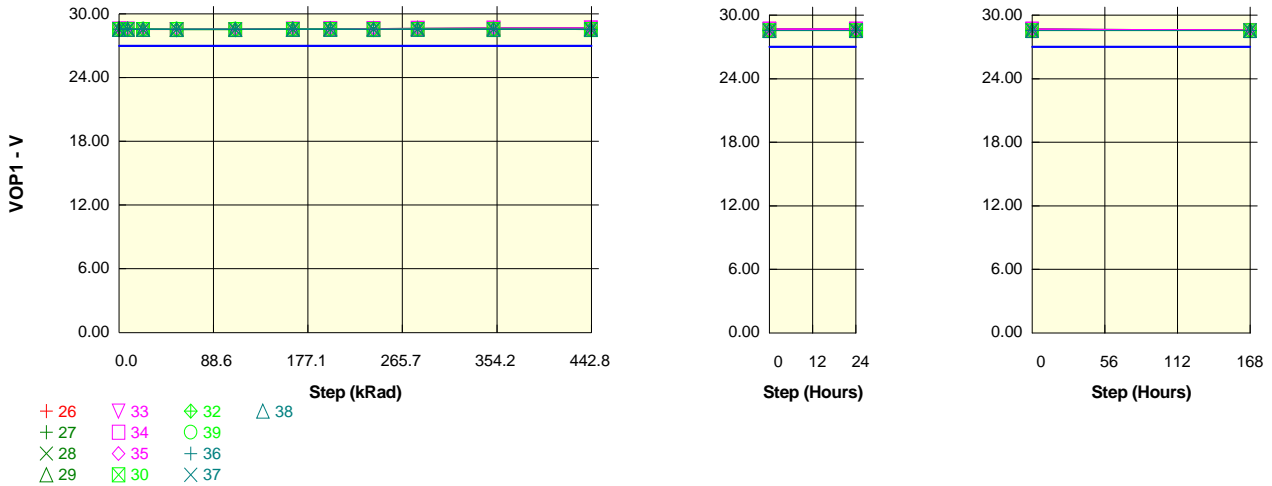
Measurements

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.55	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.56
OFF TID samples													
36	28.57	28.57	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
37	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.56	28.56
38	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.56	28.55	28.56	28.56
Statistics													
Min	28.57	28.57	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
Max	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.56	28.55	28.56	28.56
Average	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.55
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Drift Calculation

VOP1DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-12.0E-03	-23.2E-03	-23.2E-03	-8.8E-03	-8.8E-03	-22.4E-03	-8.0E-03	-17.6E-03	-23.2E-03	-15.2E-03	-16.0E-03
37	-	0.0E+00	-13.6E-03	-20.0E-03	-25.6E-03	-9.6E-03	-9.6E-03	-24.0E-03	-8.0E-03	-17.6E-03	-24.8E-03	-16.8E-03	-16.0E-03
38	-	-5.6E-03	-12.8E-03	-20.0E-03	-21.6E-03	-6.4E-03	-7.2E-03	-20.0E-03	-6.4E-03	-14.4E-03	-22.4E-03	-13.6E-03	-13.6E-03
Average	-	-1.9E-03	-12.8E-03	-21.1E-03	-23.5E-03	-8.3E-03	-8.5E-03	-22.1E-03	-7.5E-03	-16.5E-03	-23.5E-03	-15.2E-03	-15.2E-03
Sigma	-	2.6E-03	654.1E-06	1.5E-03	1.6E-03	1.4E-03	997.4E-06	1.6E-03	754.8E-06	1.5E-03	998.5E-06	1.3E-03	1.1E-03

Parameter : Maximum Output Voltage Swing : VOP1DUTD
 Test conditions : +VCC=30V. -VCC=GND. Vout=30V. RL=10K
 Unit : V
 Spec Limit Min : 27.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.54	28.55	28.54	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.56
ON_PROTON samples													
27	28.56	28.56	28.55	28.54	28.54	28.58	28.59	28.60	28.64	28.65	28.66	28.66	28.57
28	28.57	28.56	28.56	28.55	28.55	28.58	28.60	28.61	28.65	28.66	28.68	28.68	28.58
29	28.57	28.56	28.56	28.55	28.55	28.59	28.60	28.62	28.66	28.67	28.69	28.69	28.58
Statistics													
Min	28.56	28.56	28.55	28.54	28.54	28.58	28.59	28.60	28.64	28.65	28.66	28.66	28.57
Max	28.57	28.56	28.56	28.55	28.55	28.59	28.60	28.62	28.66	28.67	28.69	28.69	28.58
Average	28.56	28.56	28.55	28.55	28.55	28.58	28.60	28.61	28.65	28.66	28.67	28.68	28.57
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-3.2E-03	-11.2E-03	-17.6E-03	-15.2E-03	16.0E-03	30.4E-03	42.4E-03	75.2E-03	85.6E-03	98.4E-03	100.8E-03	7.2E-03
28	-	-7.2E-03	-10.4E-03	-14.4E-03	-15.2E-03	14.4E-03	30.4E-03	40.8E-03	80.0E-03	96.0E-03	109.6E-03	113.6E-03	11.2E-03
29	-	-7.2E-03	-9.6E-03	-15.2E-03	-15.2E-03	19.2E-03	38.4E-03	55.2E-03	93.6E-03	107.2E-03	123.2E-03	126.4E-03	11.2E-03
Average	-	-5.9E-03	-10.4E-03	-15.7E-03	-15.2E-03	16.5E-03	33.1E-03	46.1E-03	82.9E-03	96.3E-03	110.4E-03	113.6E-03	9.9E-03
Sigma	-	1.9E-03	653.3E-06	1.4E-03	134.4E-12	2.0E-03	3.8E-03	6.4E-03	7.8E-03	8.8E-03	10.1E-03	10.5E-03	1.9E-03

Measurements

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.54	28.55	28.54	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.56
ON_TID samples													
33	28.57	28.57	28.56	28.55	28.56	28.59	28.61	28.62	28.66	28.68	28.69	28.69	28.58
34	28.57	28.56	28.56	28.55	28.56	28.58	28.60	28.61	28.65	28.66	28.68	28.68	28.58
35	28.56	28.56	28.55	28.54	28.55	28.57	28.59	28.60	28.63	28.64	28.65	28.66	28.57
Statistics													
Min	28.56	28.56	28.55	28.54	28.55	28.57	28.59	28.60	28.63	28.64	28.65	28.66	28.57
Max	28.57	28.57	28.56	28.55	28.56	28.59	28.61	28.62	28.66	28.68	28.69	28.69	28.58
Average	28.57	28.57	28.56	28.55	28.55	28.58	28.60	28.61	28.65	28.66	28.67	28.68	28.57
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Drift Calculation

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	-11.2E-03	-17.6E-03	-13.6E-03	16.8E-03	36.0E-03	52.0E-03	90.4E-03	105.6E-03	117.6E-03	120.0E-03	7.2E-03
34	-	-8.8E-03	-11.2E-03	-16.8E-03	-16.0E-03	11.2E-03	27.2E-03	39.2E-03	76.8E-03	92.0E-03	104.8E-03	110.4E-03	8.0E-03
35	-	0.0E+00	-11.2E-03	-21.6E-03	-16.0E-03	9.6E-03	24.8E-03	32.0E-03	65.6E-03	78.4E-03	89.6E-03	93.6E-03	799.2E-06
Average	-	-2.9E-03	-11.2E-03	-18.7E-03	-15.2E-03	12.5E-03	29.3E-03	41.1E-03	77.6E-03	92.0E-03	104.0E-03	108.0E-03	5.3E-03
Sigma	-	4.1E-03	95.1E-12	2.1E-03	1.1E-03	3.1E-03	4.8E-03	8.3E-03	10.1E-03	11.1E-03	11.4E-03	10.9E-03	3.2E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV				National Semiconductors				Issue:	02	

Measurements

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.54	28.55	28.54	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.56
OFF PROTON samples													
30	28.56	28.55	28.55	28.54	28.54	28.55	28.55	28.54	28.56	28.55	28.54	28.55	28.55
32	28.56	28.55	28.55	28.54	28.54	28.55	28.56	28.54	28.56	28.55	28.54	28.55	28.55
39	28.57	28.56	28.56	28.55	28.55	28.56	28.56	28.55	28.57	28.56	28.55	28.56	28.56
Statistics													
Min	28.56	28.55	28.55	28.54	28.54	28.55	28.55	28.54	28.56	28.55	28.54	28.55	28.55
Max	28.57	28.56	28.56	28.55	28.55	28.56	28.56	28.55	28.57	28.56	28.55	28.56	28.56
Average	28.56	28.55	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
Sigma	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

Drift Calculation

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-9.6E-03	-10.4E-03	-22.4E-03	-20.8E-03	-8.0E-03	-6.4E-03	-19.2E-03	-5.6E-03	-14.4E-03	-21.6E-03	-12.8E-03	-13.6E-03
32	-	-9.6E-03	-11.2E-03	-23.2E-03	-19.2E-03	-8.0E-03	-6.4E-03	-20.0E-03	-4.8E-03	-13.6E-03	-21.6E-03	-13.6E-03	-14.4E-03
39	-	-10.4E-03	-10.4E-03	-23.2E-03	-21.6E-03	-8.8E-03	-7.2E-03	-21.6E-03	-6.4E-03	-13.6E-03	-22.4E-03	-14.4E-03	-14.4E-03
Average	-	-9.9E-03	-10.7E-03	-22.9E-03	-20.5E-03	-8.3E-03	-6.7E-03	-20.3E-03	-5.6E-03	-13.9E-03	-21.9E-03	-13.6E-03	-14.1E-03
Sigma	-	377.6E-06	376.7E-06	377.2E-06	998.3E-06	377.2E-06	377.2E-06	997.6E-06	654.1E-06	377.2E-06	377.2E-06	653.3E-06	376.7E-06

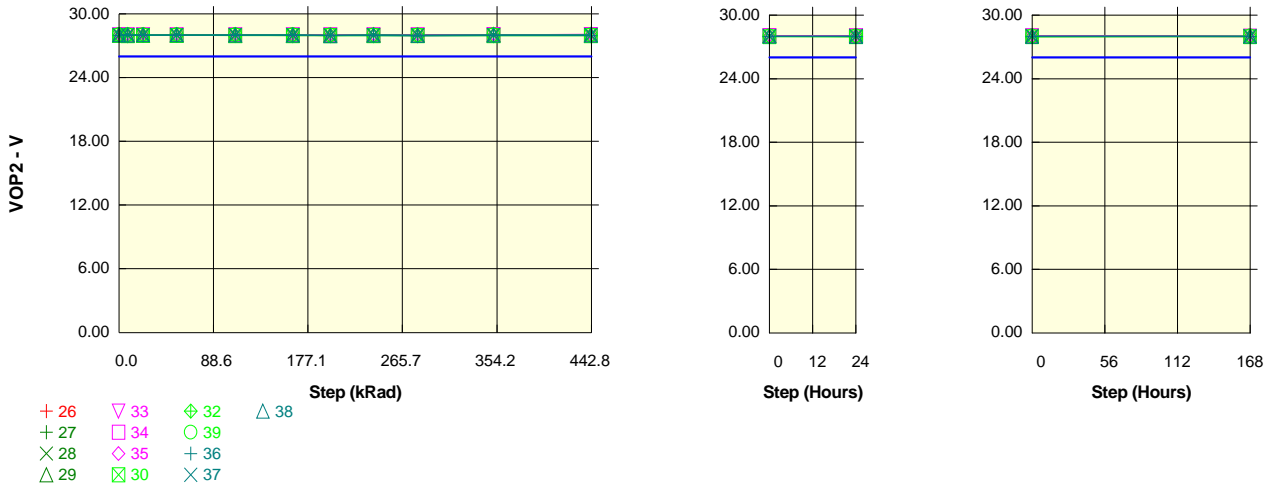
Measurements

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.56	28.55	28.54	28.55	28.54	28.56	28.56	28.55	28.56	28.55	28.54	28.55	28.56
OFF TID samples													
36	28.56	28.56	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
37	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.56	28.55	28.56	28.56
38	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.56	28.55	28.56	28.56
Statistics													
Min	28.56	28.56	28.55	28.54	28.54	28.56	28.56	28.54	28.56	28.55	28.54	28.55	28.55
Max	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.56	28.55	28.56	28.56
Average	28.57	28.57	28.56	28.55	28.55	28.56	28.56	28.55	28.56	28.55	28.55	28.55	28.55
Sigma	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Drift Calculation

VOP1DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	-11.2E-03	-22.4E-03	-22.4E-03	-8.8E-03	-8.0E-03	-22.4E-03	-7.2E-03	-16.8E-03	-23.2E-03	-14.4E-03	-15.2E-03
37	-	0.0E+00	-13.6E-03	-20.0E-03	-24.8E-03	-8.8E-03	-9.6E-03	-24.0E-03	-8.0E-03	-16.8E-03	-24.0E-03	-16.0E-03	-16.0E-03
38	-	-5.6E-03	-12.8E-03	-20.0E-03	-21.6E-03	-7.2E-03	-7.2E-03	-20.0E-03	-6.4E-03	-14.4E-03	-21.6E-03	-13.6E-03	-13.6E-03
Average	-	-1.9E-03	-12.5E-03	-20.8E-03	-22.9E-03	-8.3E-03	-8.3E-03	-22.1E-03	-7.2E-03	-16.0E-03	-22.9E-03	-14.7E-03	-14.9E-03
Sigma	-	2.6E-03	998.3E-06	1.1E-03	1.4E-03	753.9E-06	997.6E-06	1.6E-03	654.1E-06	1.1E-03	998.3E-06	998.5E-06	998.3E-06

Parameter : Maximum Output Voltage Swing : VOP2DUTA
 Test conditions : +VCC=30V. -VCC=GND.Vout=30V. RL=2K
 Unit : V
 Spec Limit Min : 26.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.99	28.00	28.00	27.99	27.99	27.99	27.99	27.98	28.00	28.00	27.99	27.99
ON_PROTON samples													
27	27.98	27.98	27.99	27.99	27.98	27.97	27.97	27.98	27.98	28.00	28.01	28.00	27.98
28	28.03	28.02	28.03	28.03	28.02	28.02	28.02	28.02	28.02	28.04	28.05	28.05	28.02
29	28.02	28.01	28.02	28.02	28.01	28.01	28.01	28.02	28.02	28.05	28.06	28.05	28.01
Statistics													
Min	27.98	27.98	27.99	27.99	27.98	27.97	27.97	27.98	27.98	28.00	28.01	28.00	27.98
Max	28.03	28.02	28.03	28.03	28.02	28.02	28.02	28.02	28.02	28.05	28.06	28.05	28.02
Average	28.01	28.00	28.01	28.02	28.00	28.00	28.00	28.01	28.01	28.03	28.04	28.03	28.00
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-7.2E-03	3.2E-03	7.2E-03	-6.4E-03	-10.4E-03	-10.4E-03	-7.2E-03	-6.4E-03	16.8E-03	24.8E-03	20.0E-03	-9.6E-03
28	-	-5.6E-03	2.4E-03	4.8E-03	-6.4E-03	-8.8E-03	-8.0E-03	-4.8E-03	-4.8E-03	16.0E-03	25.6E-03	20.0E-03	-8.8E-03
29	-	-5.6E-03	4.8E-03	6.4E-03	-5.6E-03	-8.8E-03	-7.2E-03	-7.99.2E-06	1.6E-03	28.0E-03	37.6E-03	32.0E-03	-10.4E-03
Average	-	-6.1E-03	3.5E-03	6.1E-03	-6.1E-03	-9.3E-03	-8.5E-03	-4.3E-03	-3.2E-03	20.3E-03	29.3E-03	24.0E-03	-9.6E-03
Sigma	-	754.4E-06	998.3E-06	997.6E-06	377.2E-06	754.8E-06	1.4E-03	2.6E-03	3.5E-03	5.5E-03	5.9E-03	5.7E-03	652.5E-06

Measurements

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.99	28.00	28.00	27.99	27.99	27.99	27.99	27.98	28.00	28.00	27.99	27.99
ON_TID samples													
33	28.03	28.03	28.03	28.03	28.02	28.02	28.02	28.03	28.03	28.06	28.06	28.06	28.01
34	28.04	28.03	28.04	28.04	28.03	28.03	28.03	28.03	28.03	28.06	28.06	28.06	28.03
35	27.99	27.99	28.00	28.00	27.99	27.98	27.98	27.98	27.97	28.00	28.01	28.00	27.98
Statistics													
Min	27.99	27.99	28.00	28.00	27.99	27.98	27.98	27.98	27.97	28.00	28.01	28.00	27.98
Max	28.04	28.03	28.04	28.04	28.03	28.03	28.03	28.03	28.03	28.06	28.06	28.06	28.03
Average	28.02	28.02	28.02	28.03	28.01	28.01	28.01	28.01	28.01	28.04	28.05	28.04	28.01
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02

Drift Calculation

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.6E-03	4.0E-03	-9.6E-03	-11.2E-03	-10.4E-03	-2.4E-03	3.2E-03	27.2E-03	36.0E-03	31.2E-03	-15.2E-03
34	-	-9.6E-03	1.6E-03	4.0E-03	-6.4E-03	-8.8E-03	-8.0E-03	-4.0E-03	-12.0E-03	19.2E-03	26.4E-03	20.0E-03	-10.4E-03
35	-	0.0E+00	4.0E-03	8.8E-03	-5.6E-03	-12.8E-03	-14.4E-03	-15.2E-03	-20.8E-03	8.0E-03	15.2E-03	4.0E-03	-11.2E-03
Average	-	-3.2E-03	2.4E-03	5.6E-03	-7.2E-03	-10.9E-03	-10.9E-03	-7.2E-03	-9.9E-03	18.1E-03	25.9E-03	18.4E-03	-12.3E-03
Sigma	-	4.5E-03	1.1E-03	2.3E-03	1.7E-03	1.6E-03	2.6E-03	5.7E-03	9.9E-03	7.9E-03	8.5E-03	11.2E-03	2.1E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02		

Measurements

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.99	28.00	28.00	27.99	27.99	27.99	27.99	27.98	28.00	28.00	27.99	27.99
OFF PROTON samples													
30	27.98	27.97	27.98	27.99	27.97	27.98	27.96	27.97	27.96	27.97	27.97	27.96	27.97
32	27.98	27.96	27.99	27.99	27.98	27.98	27.97	27.96	27.96	27.97	27.97	27.96	27.97
39	28.04	28.03	28.04	28.04	28.03	28.03	28.00	28.02	28.00	28.03	28.02	28.02	28.02
Statistics													
Min	27.98	27.96	27.98	27.99	27.97	27.98	27.96	27.96	27.96	27.97	27.97	27.96	27.97
Max	28.04	28.03	28.04	28.04	28.03	28.03	28.00	28.02	28.00	28.03	28.02	28.02	28.02
Average	28.00	27.99	28.00	28.01	27.99	27.99	27.98	27.98	27.97	27.99	27.99	27.98	27.99
Sigma	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.03

Drift Calculation

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-7.2E-03	2.4E-03	5.6E-03	-8.8E-03	-5.6E-03	-16.0E-03	-14.4E-03	-20.0E-03	-9.6E-03	-14.4E-03	-17.6E-03	-13.6E-03
32	-	-17.6E-03	3.2E-03	8.0E-03	-4.0E-03	-4.8E-03	-14.4E-03	-17.6E-03	-21.6E-03	-8.8E-03	-12.8E-03	-22.4E-03	-11.2E-03
39	-	-5.6E-03	2.4E-03	4.8E-03	-6.4E-03	-8.0E-03	-35.2E-03	-18.4E-03	-38.4E-03	-11.2E-03	-14.4E-03	-16.8E-03	-16.0E-03
Average	-	-10.1E-03	2.7E-03	6.1E-03	-6.4E-03	-6.1E-03	-21.9E-03	-16.8E-03	-26.7E-03	-9.9E-03	-13.9E-03	-18.9E-03	-13.6E-03
Sigma	-	5.3E-03	376.7E-06	1.4E-03	2.0E-03	1.4E-03	9.5E-03	1.7E-03	8.3E-03	997.6E-06	754.4E-06	2.5E-03	2.0E-03

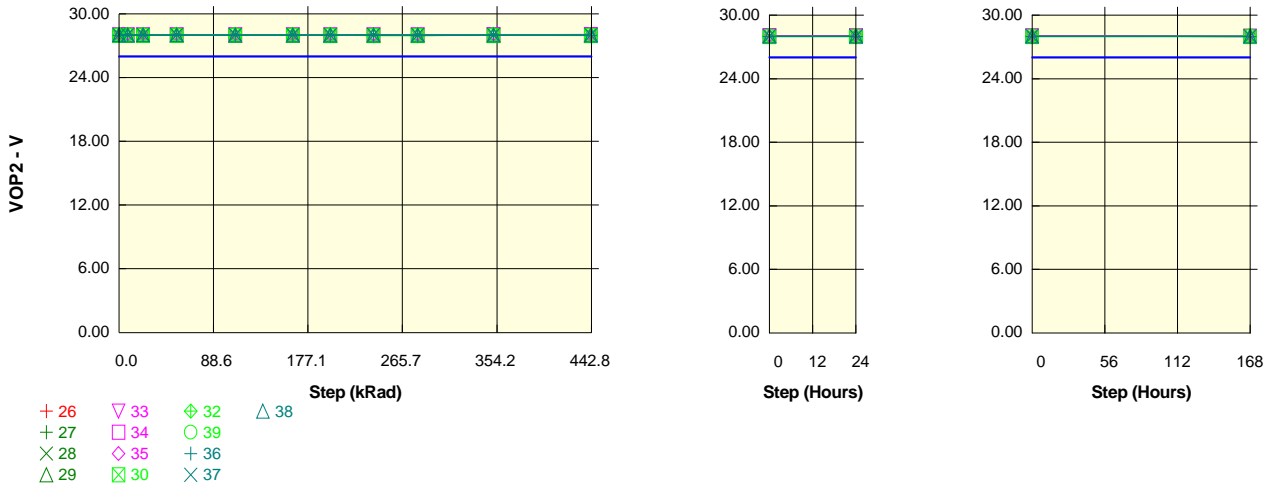
Measurements

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.99	28.00	28.00	27.99	27.99	27.99	27.99	27.98	28.00	28.00	27.99	27.99
OFF TID samples													
36	27.99	27.99	27.99	27.99	27.98	27.98	27.96	27.97	27.93	27.97	27.97	27.97	27.97
37	28.04	28.04	28.04	28.04	28.03	28.03	27.99	28.01	28.01	28.02	28.02	28.02	28.02
38	28.03	28.02	28.04	28.04	28.02	28.02	27.98	28.02	27.99	28.01	28.02	28.01	28.02
Statistics													
Min	27.99	27.99	27.99	27.99	27.98	27.98	27.96	27.97	27.93	27.97	27.97	27.97	27.97
Max	28.04	28.04	28.04	28.04	28.03	28.03	27.99	28.02	28.01	28.02	28.02	28.02	28.02
Average	28.02	28.02	28.02	28.02	28.01	28.01	27.98	28.00	27.98	28.00	28.00	28.00	28.00
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.03	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTA	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	2.4E-03	7.2E-03	-4.0E-03	-7.2E-03	-22.4E-03	-16.0E-03	-53.6E-03	-12.8E-03	-14.4E-03	-18.4E-03	-20.0E-03
37	-	0.0E+00	801.1E-06	2.4E-03	-8.8E-03	-10.4E-03	-49.6E-03	-28.0E-03	-29.6E-03	-17.6E-03	-18.4E-03	-22.4E-03	-19.2E-03
38	-	-9.6E-03	1.6E-03	2.4E-03	-10.4E-03	-12.0E-03	-56.8E-03	-18.4E-03	-46.4E-03	-19.2E-03	-18.4E-03	-22.4E-03	-18.4E-03
Average	-	-3.2E-03	1.6E-03	4.0E-03	-7.7E-03	-9.9E-03	-42.9E-03	-20.8E-03	-43.2E-03	-16.5E-03	-17.1E-03	-21.1E-03	-19.2E-03
Sigma	-	4.5E-03	652.5E-06	2.3E-03	2.7E-03	2.0E-03	14.8E-03	5.2E-03	10.1E-03	2.7E-03	1.9E-03	1.9E-03	653.3E-06

Parameter : Maximum Output Voltage Swing : VOP2DUTB
 Test conditions : +VCC=30V. -VCC=GND.Vout=30V. RL=2K
 Unit : V
 Spec Limit Min : 26.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.00	27.99	28.00	28.00	28.00	28.00	28.00	27.99	27.99	28.00	28.00	28.00	27.99
ON_PROTON samples													
27	27.99	27.98	27.99	28.00	27.99	27.99	27.99	27.99	27.99	28.00	28.00	28.00	27.98
28	28.03	28.02	28.03	28.03	28.02	28.02	28.03	28.03	28.03	28.04	28.05	28.04	28.02
29	28.02	28.02	28.02	28.03	28.02	28.02	28.02	28.02	28.02	28.04	28.04	28.04	28.01
Statistics													
Min	27.99	27.98	27.99	28.00	27.99	27.99	27.99	27.99	27.99	28.00	28.00	28.00	27.98
Max	28.03	28.02	28.03	28.03	28.02	28.02	28.03	28.03	28.03	28.04	28.05	28.04	28.02
Average	28.01	28.01	28.02	28.02	28.01	28.01	28.01	28.01	28.01	28.03	28.03	28.03	28.01
Sigma	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-6.4E-03	3.2E-03	8.0E-03	-1.6E-03	-1.6E-03	-801.1E-06	0.0E+00	-3.2E-03	14.4E-03	14.4E-03	10.4E-03	-6.4E-03
28	-	-5.6E-03	1.6E-03	3.2E-03	-4.8E-03	-4.8E-03	-3.2E-03	-799.2E-06	-1.6E-03	13.6E-03	18.4E-03	14.4E-03	-9.6E-03
29	-	-4.8E-03	3.2E-03	5.6E-03	-2.4E-03	-3.2E-03	-2.4E-03	801.1E-06	0.0E+00	16.8E-03	19.2E-03	14.4E-03	-7.2E-03
Average	-	-5.6E-03	2.7E-03	5.6E-03	-2.9E-03	-3.2E-03	-2.1E-03	635.8E-09	-1.6E-03	14.9E-03	17.3E-03	13.1E-03	-7.7E-03
Sigma	-	654.1E-06	754.4E-06	2.0E-03	1.4E-03	1.3E-03	996.8E-06	653.3E-06	1.3E-03	1.4E-03	2.1E-03	1.9E-03	1.4E-03

Measurements

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.00	27.99	28.00	28.00	28.00	28.00	28.00	27.99	27.99	28.00	28.00	28.00	27.99
ON_TID samples													
33	28.03	28.03	28.03	28.03	28.02	28.02	28.03	28.03	28.03	28.04	28.05	28.04	28.02
34	28.04	28.03	28.04	28.04	28.03	28.03	28.04	28.04	28.04	28.06	28.06	28.06	28.03
35	28.00	28.00	28.00	28.00	27.99	27.99	27.99	28.00	27.99	28.01	28.01	28.00	27.99
Statistics													
Min	28.00	28.00	28.00	28.00	27.99	27.99	27.99	28.00	27.99	28.01	28.01	28.00	27.99
Max	28.04	28.03	28.04	28.04	28.03	28.03	28.04	28.04	28.04	28.06	28.06	28.06	28.03
Average	28.02	28.02	28.02	28.03	28.02	28.02	28.02	28.02	28.02	28.04	28.04	28.04	28.01
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	799.2E-06	4.0E-03	-5.6E-03	-4.8E-03	-3.2E-03	-801.1E-06	-1.6E-03	14.4E-03	16.8E-03	12.8E-03	-11.2E-03
34	-	-4.0E-03	1.6E-03	4.0E-03	-4.8E-03	-4.0E-03	-2.4E-03	2.4E-03	3.2E-03	21.6E-03	26.4E-03	20.8E-03	-12.0E-03
35	-	0.0E+00	3.2E-03	8.0E-03	-4.0E-03	-4.8E-03	-3.2E-03	-1.6E-03	-5.6E-03	11.2E-03	13.6E-03	8.0E-03	-9.6E-03
Average	-	-1.3E-03	1.9E-03	5.3E-03	-4.8E-03	-4.5E-03	-2.9E-03	-635.8E-09	-1.3E-03	15.7E-03	18.9E-03	13.9E-03	-10.9E-03
Sigma	-	1.9E-03	998.3E-06	1.9E-03	653.3E-06	377.2E-06	376.3E-06	1.7E-03	3.6E-03	4.3E-03	5.4E-03	5.3E-03	998.3E-06

Hirex Engineering	Total Dose Radiation Test Report										Ref.:	HRX/TID/1019
	LM124AJRQMLV					National Semiconductors					Issue:	02

Measurements

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.00	27.99	28.00	28.00	28.00	28.00	28.00	27.99	27.99	28.00	28.00	28.00	27.99
OFF PROTON samples													
30	27.99	27.98	27.99	27.99	27.98	27.98	27.98	27.98	27.97	27.98	27.98	27.97	27.97
32	27.99	27.98	27.99	28.00	27.98	27.98	27.98	27.98	27.97	27.98	27.98	27.97	27.98
39	28.04	28.04	28.04	28.04	28.03	28.03	28.03	28.03	28.02	28.03	28.03	28.02	28.03
Statistics													
Min	27.99	27.98	27.99	27.99	27.98	27.98	27.98	27.98	27.97	27.98	27.98	27.97	27.97
Max	28.04	28.04	28.04	28.04	28.03	28.03	28.03	28.03	28.02	28.03	28.03	28.02	28.03
Average	28.01	28.00	28.01	28.01	28.00	28.00	28.00	27.99	27.98	28.00	27.99	27.99	27.99
Sigma	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-4.0E-03	2.4E-03	5.6E-03	-4.0E-03	-5.6E-03	-8.8E-03	-10.4E-03	-20.0E-03	-8.8E-03	-11.2E-03	-13.6E-03	-12.0E-03
32	-	-4.0E-03	2.4E-03	8.0E-03	-4.8E-03	-5.6E-03	-8.8E-03	-11.2E-03	-20.0E-03	-8.8E-03	-10.4E-03	-13.6E-03	-11.2E-03
39	-	-5.6E-03	8.01.1E-06	2.4E-03	-7.2E-03	-8.0E-03	-12.0E-03	-14.4E-03	-22.4E-03	-12.0E-03	-15.2E-03	-17.6E-03	-14.4E-03
Average	-	-4.5E-03	1.9E-03	5.3E-03	-5.3E-03	-6.4E-03	-9.9E-03	-12.0E-03	-20.8E-03	-9.9E-03	-12.3E-03	-14.9E-03	-12.5E-03
Sigma	-	754.4E-06	753.5E-06	2.3E-03	1.4E-03	1.1E-03	1.5E-03	1.7E-03	1.1E-03	1.5E-03	2.1E-03	1.9E-03	1.4E-03

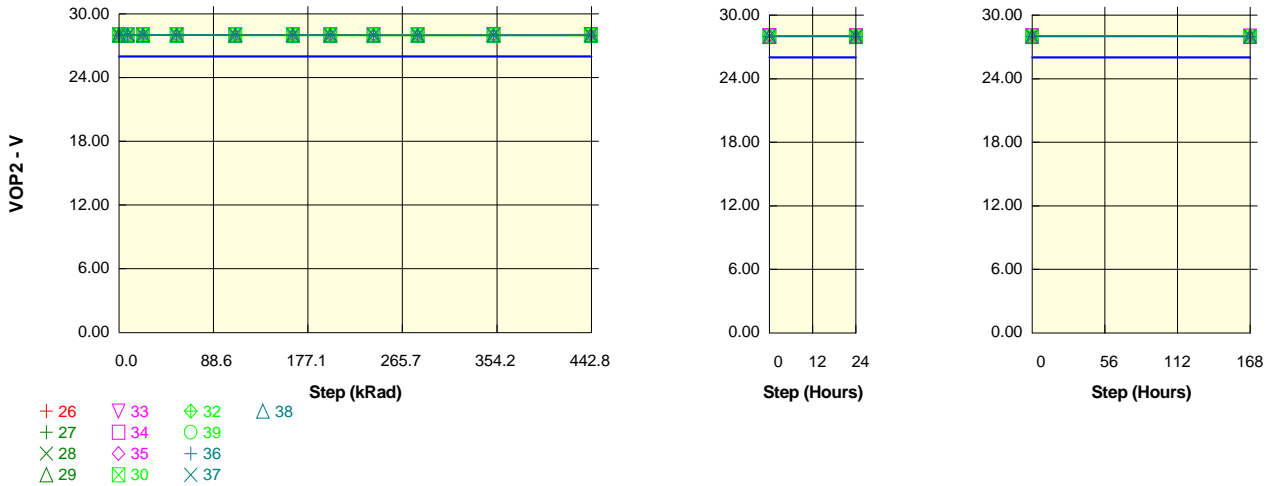
Measurements

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	28.00	27.99	28.00	28.00	28.00	28.00	28.00	27.99	27.99	28.00	28.00	28.00	27.99
OFF TID samples													
36	28.00	28.00	28.00	28.00	27.99	27.99	27.99	27.98	27.98	27.98	27.98	27.98	27.98
37	28.04	28.04	28.04	28.04	28.03	28.03	28.03	28.03	28.02	28.02	28.03	28.02	28.02
38	28.04	28.03	28.04	28.04	28.03	28.02	28.02	28.02	28.01	28.02	28.02	28.02	28.02
Statistics													
Min	28.00	28.00	28.00	28.00	27.99	27.99	27.99	27.98	27.98	27.98	27.98	27.98	27.98
Max	28.04	28.04	28.04	28.04	28.03	28.03	28.03	28.03	28.02	28.02	28.03	28.02	28.02
Average	28.02	28.02	28.03	28.03	28.02	28.02	28.01	28.01	28.00	28.01	28.01	28.01	28.01
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTB	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	2.4E-03	6.4E-03	-4.0E-03	-6.4E-03	-9.6E-03	-11.2E-03	-20.0E-03	-13.6E-03	-11.2E-03	-15.2E-03	-13.6E-03
37	-	0.0E+00	1.6E-03	2.4E-03	-8.0E-03	-9.6E-03	-12.8E-03	-14.4E-03	-23.2E-03	-17.6E-03	-16.0E-03	-18.4E-03	-16.8E-03
38	-	-7.2E-03	1.6E-03	2.4E-03	-8.0E-03	-11.2E-03	-12.8E-03	-16.0E-03	-24.0E-03	-18.4E-03	-16.8E-03	-19.2E-03	-17.6E-03
Average	-	-2.4E-03	1.9E-03	3.7E-03	-6.7E-03	-9.1E-03	-11.7E-03	-13.9E-03	-22.4E-03	-16.5E-03	-14.7E-03	-17.6E-03	-16.0E-03
Sigma	-	3.4E-03	376.7E-06	1.9E-03	1.9E-03	2.0E-03	1.5E-03	2.0E-03	1.7E-03	2.1E-03	2.5E-03	1.7E-03	1.7E-03

Parameter : Maximum Output Voltage Swing : VOP2DUTC
 Test conditions : +VCC=30V. -VCC=GND.Vout=30V. RL=2K
 Unit : V
 Spec Limit Min : 26.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.98	27.99	27.99	27.99	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
ON_PROTON samples													
27	27.98	27.98	27.99	27.99	27.98	27.98	27.99	27.99	27.99	28.01	28.01	28.01	27.98
28	28.02	28.02	28.02	28.03	28.02	28.02	28.02	28.03	28.03	28.05	28.06	28.05	28.02
29	28.01	28.01	28.02	28.02	28.01	28.01	28.02	28.02	28.02	28.04	28.05	28.04	28.01
Statistics													
Min	27.98	27.98	27.99	27.99	27.98	27.98	27.99	27.99	27.99	28.01	28.01	28.01	27.98
Max	28.02	28.02	28.02	28.03	28.02	28.02	28.02	28.03	28.03	28.05	28.06	28.05	28.02
Average	28.01	28.00	28.01	28.01	28.00	28.01	28.01	28.01	28.01	28.03	28.04	28.03	28.01
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-7.2E-03	2.4E-03	7.2E-03	-799.2E-06	799.2E-06	2.4E-03	4.8E-03	4.0E-03	24.0E-03	28.8E-03	24.0E-03	799.2E-06
28	-	-4.8E-03	2.4E-03	4.8E-03	-3.2E-03	-1.6E-03	0.0E+00	4.0E-03	5.6E-03	25.6E-03	35.2E-03	30.4E-03	-1.6E-03
29	-	-4.8E-03	3.2E-03	5.6E-03	-1.6E-03	-801.1E-06	799.2E-06	4.0E-03	4.8E-03	24.8E-03	31.2E-03	27.2E-03	0.0E+00
Average	-	-5.6E-03	2.7E-03	5.9E-03	-1.9E-03	-534.1E-06	1.1E-03	4.3E-03	4.8E-03	24.8E-03	31.7E-03	27.2E-03	-267.0E-06
Sigma	-	1.1E-03	376.7E-06	998.3E-06	998.3E-06	997.6E-06	997.6E-06	377.6E-06	653.3E-06	652.5E-06	2.6E-03	2.6E-03	997.6E-06

Measurements

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.98	27.99	27.99	27.99	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
ON_TID samples													
33	28.02	28.02	28.02	28.03	28.02	28.02	28.02	28.03	28.02	28.04	28.05	28.05	28.02
34	28.03	28.03	28.03	28.04	28.03	28.03	28.03	28.04	28.04	28.06	28.07	28.06	28.03
35	27.99	27.99	27.99	27.99	27.98	27.98	27.99	27.99	27.99	28.01	28.01	28.01	27.98
Statistics													
Min	27.99	27.99	27.99	27.99	27.98	27.98	27.99	27.99	27.99	28.01	28.01	28.01	27.98
Max	28.03	28.03	28.03	28.04	28.03	28.03	28.03	28.04	28.04	28.06	28.07	28.06	28.03
Average	28.01	28.01	28.02	28.02	28.01	28.01	28.01	28.02	28.02	28.04	28.04	28.04	28.01
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	799.2E-06	4.0E-03	-4.8E-03	-2.4E-03	-1.6E-03	1.6E-03	799.2E-06	20.0E-03	25.6E-03	21.6E-03	-5.6E-03
34	-	-4.8E-03	801.1E-06	3.2E-03	-4.8E-03	-2.4E-03	-799.2E-06	3.2E-03	5.6E-03	27.2E-03	37.6E-03	32.0E-03	-5.6E-03
35	-	0.0E+00	3.2E-03	8.0E-03	-2.4E-03	-1.6E-03	0.0E+00	4.0E-03	2.4E-03	21.6E-03	28.0E-03	22.4E-03	-3.2E-03
Average	-	-1.6E-03	1.6E-03	5.1E-03	-4.0E-03	-2.1E-03	-799.8E-06	2.9E-03	2.9E-03	22.9E-03	30.4E-03	25.3E-03	-4.8E-03
Sigma	-	2.3E-03	1.1E-03	2.1E-03	1.1E-03	376.7E-06	653.3E-06	997.6E-06	2.0E-03	3.1E-03	5.2E-03	4.7E-03	1.1E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02		

Measurements

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.98	27.99	27.99	27.99	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
OFF PROTON samples													
30	27.98	27.97	27.98	27.98	27.97	27.97	27.97	27.97	27.96	27.97	27.97	27.96	27.97
32	27.98	27.97	27.98	27.98	27.97	27.97	27.97	27.97	27.96	27.97	27.97	27.96	27.97
39	28.04	28.03	28.04	28.04	28.03	28.03	28.02	28.02	28.01	28.02	28.02	28.02	28.02
Statistics													
Min	27.98	27.97	27.98	27.98	27.97	27.97	27.97	27.97	27.96	27.97	27.97	27.96	27.97
Max	28.04	28.03	28.04	28.04	28.03	28.03	28.02	28.02	28.01	28.02	28.02	28.02	28.02
Average	28.00	27.99	28.00	28.00	27.99	27.99	27.99	27.99	27.98	27.99	27.99	27.98	27.98
Sigma	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03

Drift Calculation

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-4.0E-03	1.6E-03	1.6E-03	-4.0E-03	-5.6E-03	-8.8E-03	-11.2E-03	-19.2E-03	-8.0E-03	-10.4E-03	-13.6E-03	-12.0E-03
32	-	-4.0E-03	2.4E-03	6.4E-03	-4.8E-03	-5.6E-03	-8.8E-03	-10.4E-03	-19.2E-03	-8.0E-03	-10.4E-03	-13.6E-03	-12.0E-03
39	-	-5.6E-03	799.2E-06	4.0E-03	-7.2E-03	-8.0E-03	-12.0E-03	-13.6E-03	-21.6E-03	-12.0E-03	-15.2E-03	-17.6E-03	-14.4E-03
Average	-	-4.5E-03	1.6E-03	4.0E-03	-5.3E-03	-6.4E-03	-9.9E-03	-11.7E-03	-20.0E-03	-9.3E-03	-12.0E-03	-14.9E-03	-12.8E-03
Sigma	-	754.4E-06	654.1E-06	2.0E-03	1.4E-03	1.1E-03	1.5E-03	1.4E-03	1.1E-03	1.9E-03	2.3E-03	1.9E-03	1.1E-03

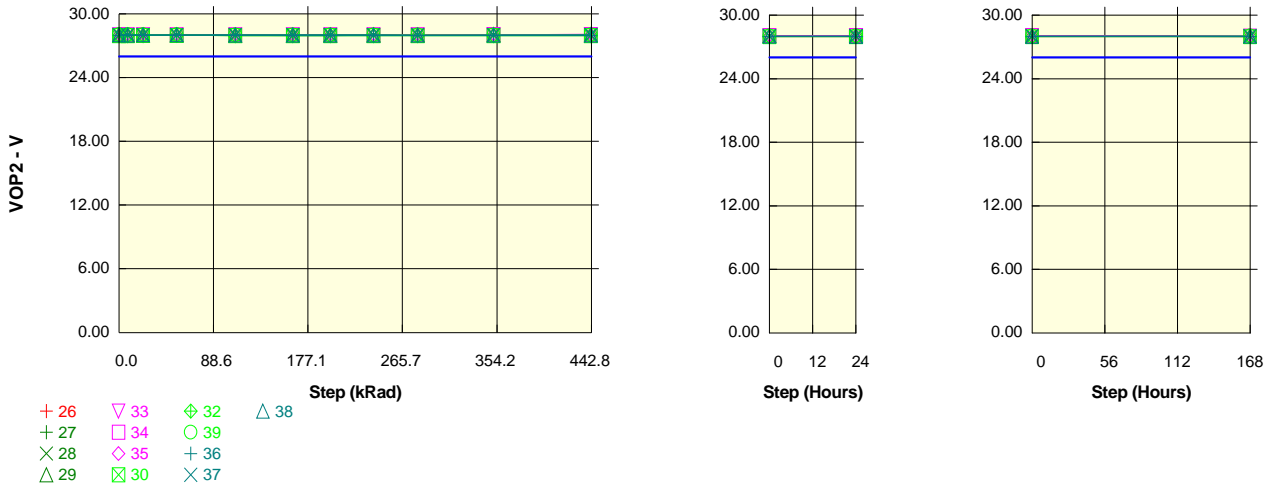
Measurements

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.99	27.98	27.99	27.99	27.99	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
OFF TID samples													
36	27.99	27.99	27.99	27.99	27.98	27.98	27.98	27.98	27.97	27.97	27.98	27.97	27.97
37	28.03	28.03	28.03	28.03	28.02	28.02	28.02	28.02	28.01	28.01	28.02	28.01	28.02
38	28.02	28.02	28.03	28.03	28.02	28.01	28.01	28.01	28.00	28.01	28.01	28.01	28.01
Statistics													
Min	27.99	27.99	27.99	27.99	27.98	27.98	27.98	27.98	27.97	27.97	27.98	27.97	27.97
Max	28.03	28.03	28.03	28.03	28.02	28.02	28.02	28.02	28.01	28.01	28.02	28.01	28.02
Average	28.01	28.01	28.02	28.02	28.01	28.01	28.00	28.00	27.99	28.00	28.00	28.00	28.00
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTC	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	1.6E-03	6.4E-03	-4.8E-03	-6.4E-03	-9.6E-03	-10.4E-03	-19.2E-03	-12.8E-03	-11.2E-03	-14.4E-03	-13.6E-03
37	-	0.0E+00	1.6E-03	1.6E-03	-8.0E-03	-9.6E-03	-12.8E-03	-14.4E-03	-22.4E-03	-17.6E-03	-16.0E-03	-18.4E-03	-16.8E-03
38	-	-7.2E-03	801.1E-06	2.4E-03	-8.0E-03	-10.4E-03	-12.8E-03	-16.0E-03	-24.0E-03	-18.4E-03	-17.6E-03	-18.4E-03	-17.6E-03
Average	-	-2.4E-03	1.3E-03	3.5E-03	-6.9E-03	-8.8E-03	-11.7E-03	-13.6E-03	-21.9E-03	-16.3E-03	-14.9E-03	-17.1E-03	-16.0E-03
Sigma	-	3.4E-03	376.7E-06	2.1E-03	1.5E-03	1.7E-03	1.5E-03	2.4E-03	2.0E-03	2.5E-03	2.7E-03	1.9E-03	1.7E-03

Parameter : Maximum Output Voltage Swing : VOP2DUTD
 Test conditions : +VCC=30V. -VCC=GND.Vout=30V. RL=2K
 Unit : V
 Spec Limit Min : 26.00
 Spec limits are represented in bold lines on the graphic.



Measurements

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.98	27.98	27.99	27.99	27.98	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
ON_PROTON samples													
27	27.98	27.97	27.98	27.99	27.97	27.97	27.97	27.98	27.98	28.01	28.02	28.01	27.97
28	28.02	28.02	28.02	28.02	28.02	28.02	28.02	28.02	28.03	28.05	28.06	28.06	28.02
29	28.01	28.01	28.02	28.02	28.01	28.01	28.01	28.02	28.02	28.05	28.06	28.06	28.01
Statistics													
Min	27.98	27.97	27.98	27.99	27.97	27.97	27.97	27.98	27.98	28.01	28.02	28.01	27.97
Max	28.02	28.02	28.02	28.02	28.02	28.02	28.02	28.02	28.03	28.05	28.06	28.06	28.02
Average	28.00	28.00	28.01	28.01	28.00	28.00	28.00	28.01	28.01	28.04	28.05	28.04	28.00
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_PROTON samples													
27	-	-7.2E-03	2.4E-03	6.4E-03	-5.6E-03	-7.2E-03	-6.4E-03	-1.6E-03	1.6E-03	26.4E-03	36.0E-03	31.2E-03	-7.2E-03
28	-	-5.6E-03	1.6E-03	4.0E-03	-5.6E-03	-4.8E-03	-2.4E-03	1.6E-03	6.4E-03	28.8E-03	40.0E-03	36.0E-03	-4.0E-03
29	-	-4.8E-03	3.2E-03	4.8E-03	-6.4E-03	-7.2E-03	-4.0E-03	5.6E-03	12.0E-03	38.4E-03	49.6E-03	44.8E-03	-7.2E-03
Average	-	-5.9E-03	2.4E-03	5.1E-03	-5.9E-03	-6.4E-03	-4.3E-03	1.9E-03	6.7E-03	31.2E-03	41.9E-03	37.3E-03	-6.1E-03
Sigma	-	997.6E-06	653.3E-06	997.6E-06	377.6E-06	1.1E-03	1.6E-03	2.9E-03	4.2E-03	5.2E-03	5.7E-03	5.6E-03	1.5E-03

Measurements

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.98	27.98	27.99	27.99	27.98	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
ON_TID samples													
33	28.02	28.02	28.02	28.03	28.01	28.01	28.02	28.03	28.03	28.06	28.07	28.07	28.01
34	28.03	28.03	28.03	28.03	28.02	28.03	28.03	28.03	28.04	28.06	28.07	28.07	28.02
35	27.99	27.99	27.99	28.00	27.98	27.98	27.98	27.99	27.99	28.01	28.03	28.02	27.98
Statistics													
Min	27.99	27.99	27.99	28.00	27.98	27.98	27.98	27.99	27.99	28.01	28.03	28.02	27.98
Max	28.03	28.03	28.03	28.03	28.02	28.03	28.03	28.03	28.04	28.06	28.07	28.07	28.02
Average	28.01	28.01	28.02	28.02	28.01	28.01	28.01	28.02	28.02	28.05	28.06	28.05	28.01
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
ON_TID samples													
33	-	0.0E+00	1.6E-03	4.0E-03	-8.0E-03	-7.2E-03	-4.0E-03	5.6E-03	12.8E-03	40.0E-03	51.2E-03	45.6E-03	-9.6E-03
34	-	-4.8E-03	799.2E-06	3.2E-03	-6.4E-03	-4.8E-03	-2.4E-03	3.2E-03	7.2E-03	30.4E-03	41.6E-03	36.0E-03	-6.4E-03
35	-	0.0E+00	3.2E-03	8.0E-03	-4.8E-03	-7.2E-03	-4.8E-03	0.0E+00	2.4E-03	26.4E-03	37.6E-03	32.0E-03	-6.4E-03
Average	-	-1.6E-03	1.9E-03	5.1E-03	-6.4E-03	-6.4E-03	-3.7E-03	2.9E-03	7.5E-03	32.3E-03	43.5E-03	37.9E-03	-7.5E-03
Sigma	-	2.3E-03	997.6E-06	2.1E-03	1.3E-03	1.1E-03	997.6E-06	2.3E-03	4.3E-03	5.7E-03	5.7E-03	5.7E-03	1.5E-03

Hirex Engineering	Total Dose Radiation Test Report									Ref.:	HRX/TID/1019
	LM124AJRQMLV	National Semiconductors						Issue:	02		

Measurements

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.98	27.98	27.99	27.99	27.98	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
OFF PROTON samples													
30	27.98	27.97	27.98	27.98	27.97	27.97	27.97	27.96	27.96	27.97	27.96	27.96	27.96
32	27.98	27.97	27.98	27.98	27.97	27.97	27.97	27.96	27.96	27.97	27.96	27.96	27.96
39	28.03	28.03	28.04	28.04	28.03	28.03	28.02	28.02	28.01	28.02	28.02	28.02	28.02
Statistics													
Min	27.98	27.97	27.98	27.98	27.97	27.97	27.97	27.96	27.96	27.97	27.96	27.96	27.96
Max	28.03	28.03	28.04	28.04	28.03	28.03	28.02	28.02	28.01	28.02	28.02	28.02	28.02
Average	28.00	27.99	28.00	28.00	27.99	27.99	27.99	27.98	27.97	27.99	27.98	27.98	27.98
Sigma	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Drift Calculation

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF PROTON samples													
30	-	-4.0E-03	2.4E-03	4.0E-03	-4.8E-03	-5.6E-03	-8.8E-03	-11.2E-03	-19.2E-03	-8.0E-03	-11.2E-03	-13.6E-03	-12.0E-03
32	-	-4.8E-03	2.4E-03	7.2E-03	-5.6E-03	-6.4E-03	-9.6E-03	-11.2E-03	-20.0E-03	-8.8E-03	-11.2E-03	-14.4E-03	-11.2E-03
39	-	-4.8E-03	1.6E-03	4.0E-03	-7.2E-03	-8.0E-03	-12.0E-03	-14.4E-03	-21.6E-03	-12.0E-03	-15.2E-03	-17.6E-03	-14.4E-03
Average	-	-4.5E-03	2.1E-03	5.1E-03	-5.9E-03	-6.7E-03	-10.1E-03	-12.3E-03	-20.3E-03	-9.6E-03	-12.5E-03	-15.2E-03	-12.5E-03
Sigma	-	377.6E-06	377.6E-06	1.5E-03	998.3E-06	998.3E-06	1.4E-03	1.5E-03	998.3E-06	1.7E-03	1.9E-03	1.7E-03	1.4E-03

Measurements

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
26_REF	27.98	27.98	27.99	27.99	27.98	27.99	27.99	27.98	27.98	27.99	27.99	27.99	27.98
OFF TID samples													
36	27.98	27.98	27.98	27.99	27.98	27.98	27.97	27.97	27.96	27.97	27.97	27.97	27.97
37	28.03	28.03	28.04	28.04	28.03	28.02	28.02	28.02	28.01	28.02	28.02	28.02	28.02
38	28.03	28.02	28.03	28.03	28.02	28.02	28.02	28.01	28.01	28.01	28.01	28.01	28.01
Statistics													
Min	27.98	27.98	27.98	27.99	27.98	27.98	27.97	27.97	27.96	27.97	27.97	27.97	27.97
Max	28.03	28.03	28.04	28.04	28.03	28.02	28.02	28.02	28.01	28.02	28.02	28.02	28.02
Average	28.02	28.01	28.02	28.02	28.01	28.01	28.00	28.00	27.99	28.00	28.00	28.00	28.00
Sigma	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Drift Calculation

VOP2DUTD	0 kRad	8.1 kRad	22.5 kRad	54 kRad	108.9 kRad	162.9 kRad	198 kRad	238.5 kRad	279.9 kRad	351 kRad	442.2 kRad	24 Hours	168 Hours
OFF TID samples													
36	-	0.0E+00	1.6E-03	6.4E-03	-4.8E-03	-7.2E-03	-9.6E-03	-11.2E-03	-20.0E-03	-12.8E-03	-11.2E-03	-14.4E-03	-13.6E-03
37	-	0.0E+00	799.2E-06	799.2E-06	-8.8E-03	-10.4E-03	-13.6E-03	-16.0E-03	-24.0E-03	-18.4E-03	-16.8E-03	-19.2E-03	-17.6E-03
38	-	-7.2E-03	799.2E-06	2.4E-03	-8.8E-03	-11.2E-03	-13.6E-03	-16.0E-03	-24.0E-03	-19.2E-03	-17.6E-03	-19.2E-03	-17.6E-03
Average	-	-2.4E-03	1.1E-03	3.2E-03	-7.5E-03	-9.6E-03	-12.3E-03	-14.4E-03	-22.7E-03	-16.8E-03	-15.2E-03	-17.6E-03	-16.3E-03
Sigma	-	3.4E-03	377.6E-06	2.4E-03	1.9E-03	1.7E-03	1.9E-03	2.3E-03	1.9E-03	2.8E-03	2.8E-03	2.3E-03	1.9E-03