TOTAL DOSE RADIATION TEST REPORT

Part Type : BA06

Package : TO-39

Description : Transistors - Low power NPN

Manufacturer : STMicroelectronics

Date Code: 30945A

Alter Italy Purchase Order N° 5503571 dated 03/26/2010

Alter Italy Technical Responsible: Alessandro Cavagnoli

Hirex reference :	HRX/TID/0770	Issue : 01	Date :	March 29th, 2010
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CHANGE RECORD

ISSUE	DATE	PAGE	DESCRIPTION OF CHANGES
01	March 29th, 2010	All	Original Issue

TOTAL DOSE RADIATION TEST REPORT
on BA06
STMicroelectronics
Transistors - Low power NPN

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1 Introduction

A total dose radiation verification test of the STMicroelectronics BA06, Transistors - Low power NPN has been performed with an accumulated dose of about 107 Krad(Si) at a dose rate of 275 rad(Si)/hour, in response to Alter Italy purchase order reference 5503571.

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 Italy.
Test has been performed in accordance with Hirex Engineering proposal reference HRX/PRO/2906 Issue 01 dated 12/09/2009.

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 proposal: HRX/PRO/2906 Issue 01 dated 12/09/2009
- Alter Italy specification: TPR/PL/STM/1152 issue 01 dated 12/17/2009.

2.2 Reference Documents

- NA

3 Test Samples

6 samples of the BA06 device were tested (5 ON + 1 control sample).

Samples were allocated into the bias conditions during exposures and annealing as provided in the following table.

Serial Number	Allocation
1	Control
2	Biased ON
3	Biased ON
4	Biased ON
5	Biased ON
6	Biased ON

Identification of the BA06 is given below:

Part Number: BA06

Top Marking: BA06 logo 30945A FR serial

Diffusion Lot:

Date Code: 30945A

4 Experimental Conditions

4.1 Radiation Source Dose Rate and Annealing

The dose exposures were performed at ENEA in the Calliope plant located at the CASACCIA research centre in ROME (Italy).
The γ irradiation plant is a pool-type irradiation facility equipped with a ^{60}Co gamma source in a large shielded panoramic room. The storage water pool, that houses the source, has dimensions of 2x4.4x8 m^3.
The emitted radiation has two photons of 1.173 and 1.332 MeV working in coincidence with a mean photon's energy of 1.25 MeV.
It is possible to vary the dose rate by simply adjusting the distance of devices under test to the source in a range of a few rad/H up to 2 Mrad/H.
The main Calliope features are reported in the table and Figure 1 below.

Source:	^{60}Co
Geometry:	Cylindrical rack with radioisotope pencils placed on two levels of external rack surface
Emitted radiation:	2 γ photons emitted in coincidence
Photons Energy:	1.173 and 1.332 MeV (average 1.25 MeV)
Max licensed activity:	$3.7x10^{15}$ Bq (100 kCi)
Dose rate range:	Few rad/h up to 2 Mrad/h

Table 1 : Calliope main features

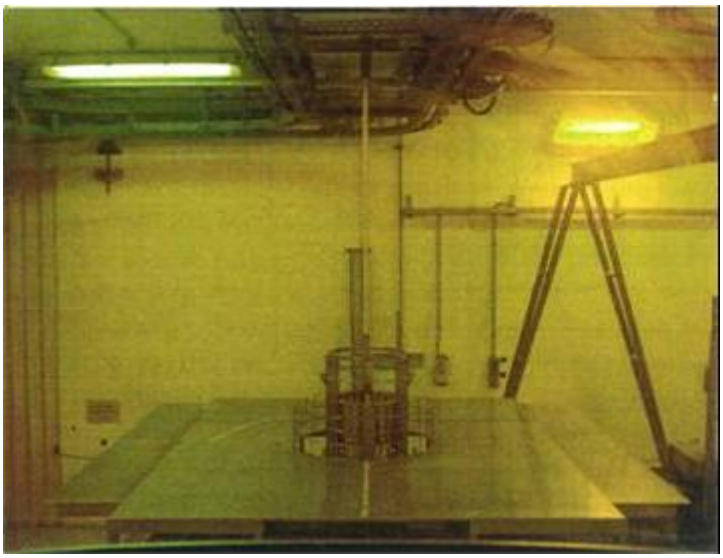


Figure 1 : View of the ^{60}Co γ source through the yellow lead window of the control room

The irradiation conditions used for this test are provided in the following table:

Irradiation Steps rads	Dose rate krads/h	Annealing steps Hours	Temperature °C
0			
25.9	0.275		Room
51.7	0.275		Room
77.5	0.275		Room
107.9	0.275		Room
		24	Room
		168	100

4.2 Bias during Dose Exposures and Measurements conditions

4.2.1 Bias conditions

During exposures test board allowed to bias 5 samples in accordance with the electrical circuit provided in Figure 1.
During annealing steps the same stress conditions were applied at 25°C and 100°C temperatures.

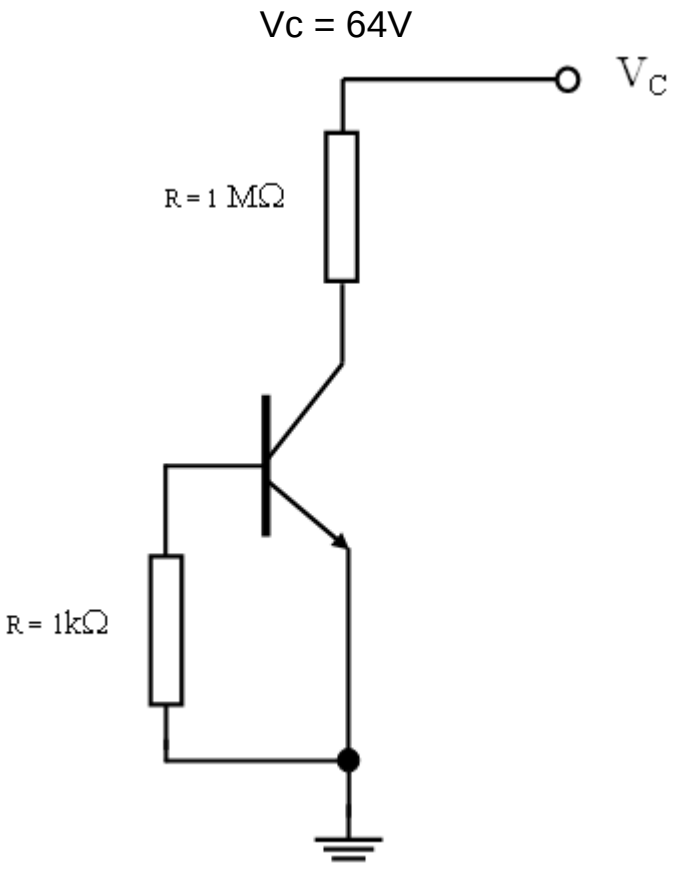


Figure 2 : Bias Conditions during Irradiation Exposures and Annealing

4.2.2 Electrical Measurements

Electrical parameters test program principle for BA06 is provided in Figure 2.

One 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.

Test results were automatically loaded in an Excel worksheet and compared in real time to specification limits.

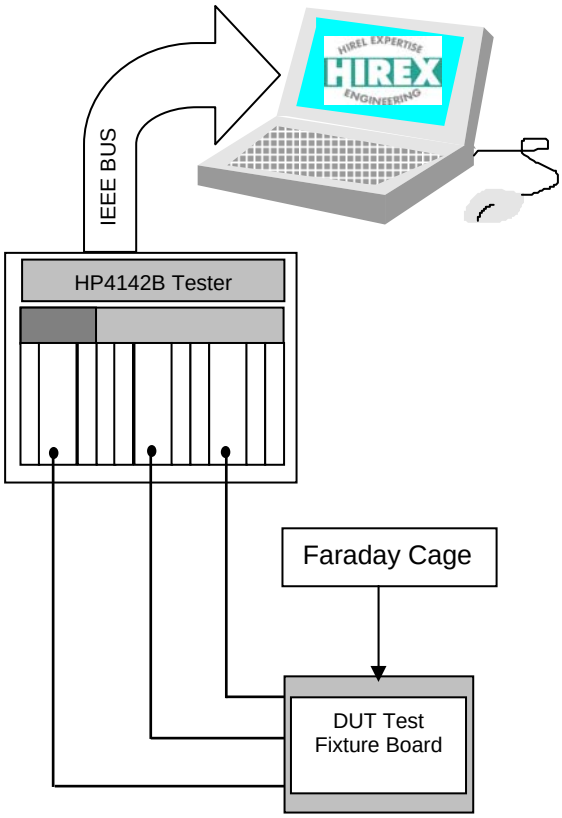


Figure 3 : BA06 test program principle

Electrical parameters test conditions and limits used for performing this test are given in the following table.

PARAMETERS	SYMBOLS	TEST CONDITIONS	MIN	MAX	UNITS
Collector emitter voltage base open	Vceo	Ic = 100mA	60	-	V
Collector base cut off current	Icbo	Vcb = 80V	-	100.0E-09	A
Emitter base cut off current	Iebo	Veb = 6V	-	100.0E-09	A
Forward current transfer ratio 1	hFE1	Vce = 2V Ic = 100nA	10	-	-
Forward current transfer ratio 2	hFE2	Vce = 2V Ic = 1µA	10	-	-
Forward current transfer ratio 3	hFE3	Vce = 2V Ic = 100µA	10	-	-
Forward current transfer ratio 4	hFE4	Vce = 2V Ic = 1mA	10	-	-
Forward current transfer ratio 5	hFE5	Vce = 2V Ic = 10mA	10	-	-
Forward current transfer ratio 6	hFE6	Vce = 2V Ic = 100mA	80	-	-
Forward current transfer ratio 7	hFE7	Vce = 2V Ic = 500mA	10	-	-
Forward current transfer ratio 8	hFE8	Vce = 2V Ic = 1A	160	400	-
Forward current transfer ratio 9	hFE9	Vce = 2V Ic = 2A	10	-	-
Collector emitter saturation voltage	Vce(sat)1	Ic = 2A Ib = 100mA	-	0.4	V
Collector emitter saturation voltage	Vce(sat)2	Ic = 3A Ib = 150mA	-	0.5	V
Base emitter saturation voltage	Vbe(sat)	Ic = 2A Ib = 100mA	-	1.2	V
Base emitter voltage	Vbe1	Ic = 100nA Vce = 2V	-	1.5	V
Base emitter voltage	Vbe2	Ic = 1µA Vce = 2V	-	1.5	V
Base emitter voltage	Vbe3	Ic = 100µA Vce = 2V	-	1.5	V
Base emitter voltage	Vbe4	Ic = 1mA Vce = 2V	-	1.5	V
Base emitter voltage	Vbe5	Ic = 10mA Vce = 2V	-	1.5	V
Base emitter voltage	Vbe6	Ic = 100mA Vce = 2V	0.63	0.73	V
Base emitter voltage	Vbe7	Ic = 500mA Vce = 2V	-	1.5	V
Base emitter voltage	Vbe8	Ic = 1A Vce = 2V	-	1.5	V
Base emitter voltage	Vbe9	Ic = 2A Vce = 2V	-	1.5	V

Table 2 : Measured electrical parameters

5 Conclusion

A Total Ionizing Dose verification test was carried out by Hirex Engineering under Alter Italy contract on the STMicroelectronics BA06 Transistors - Low power NPN in TO-39 package.
5 samples plus one control sample were used during testing. They were exposed to radiation using a dose rate of 275 rad(Si)/hour at room temperature.

A summary of the failure levels for each concerned parameter is provided in the following table.
Parameters not listed remained within specification limits all along testing.
Detail test results are presented in the following section.

Parameters	Failure Level between :		Annealing Recovery [Note 1]					Comments
			NA	No	Partial	Complete	Rebound	
HFE1	ON samples	25.9 & 51.7 kRad(Si)			X			
HFE2	ON samples	51.7 & 77.5 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.

Table 3 : Summary of parameters failure levels

Notes :
[1]: Complete recovery for HFE2 means that samples have been found within specification limits, but initial values obtained at initial readings have not been recovered.
[2]: SN 6 was send back to Alter Italy on his demand after 107 kRad(Si) exposure step. Consequently, there is no data on this sample after 24h and 168h annealing steps.

6 Test Results

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

Failed values with respect to specified limits are highlighted in bold red font in the tables.

Post irradiation values are calculated using 3σ approach.

- For positive variation $(X)_{LOT+} = \text{mean}(X) + 3 \times \boldsymbol{\sigma}(X)$
- For negative variation $(X)_{LOT-} = \text{mean}(X) - 3 \times \boldsymbol{\sigma}(X)$
- $(X)_{LOT\ WORST\ CASE} = Worstcase((X)_{LOT+}, (X)_{LOT-})$

Post irradiation parameters drifts (noted $\boldsymbol{\Delta}X$) are defined as follows:

$$\boldsymbol{\Delta}X = X_{post\ rad} - X_{initial}$$

Where $X_{post\ rad}$ stands for the value of X after irradiation (at 50krads (Si), 70krads (Si) or 100krads (Si)) and $X_{initial}$ stands for the pre-irradiation value of X.

Post irradiation drift values are calculated using 3σ approach.

- For positive variation $\boldsymbol{\Delta}(X)_{LOT+} = \text{mean}(\boldsymbol{\Delta}X) + 3 \times \boldsymbol{\sigma}(\boldsymbol{\Delta}X)$
- For negative variation $\boldsymbol{\Delta}(X)_{LOT-} = \text{mean}(\boldsymbol{\Delta}X) - 3 \times \boldsymbol{\sigma}(\boldsymbol{\Delta}X)$
- $\boldsymbol{\Delta}(X)_{LOT\ WORST\ CASE} = Worstcase(\boldsymbol{\Delta}(X)_{LOT+}, \boldsymbol{\Delta}(X)_{LOT-})$

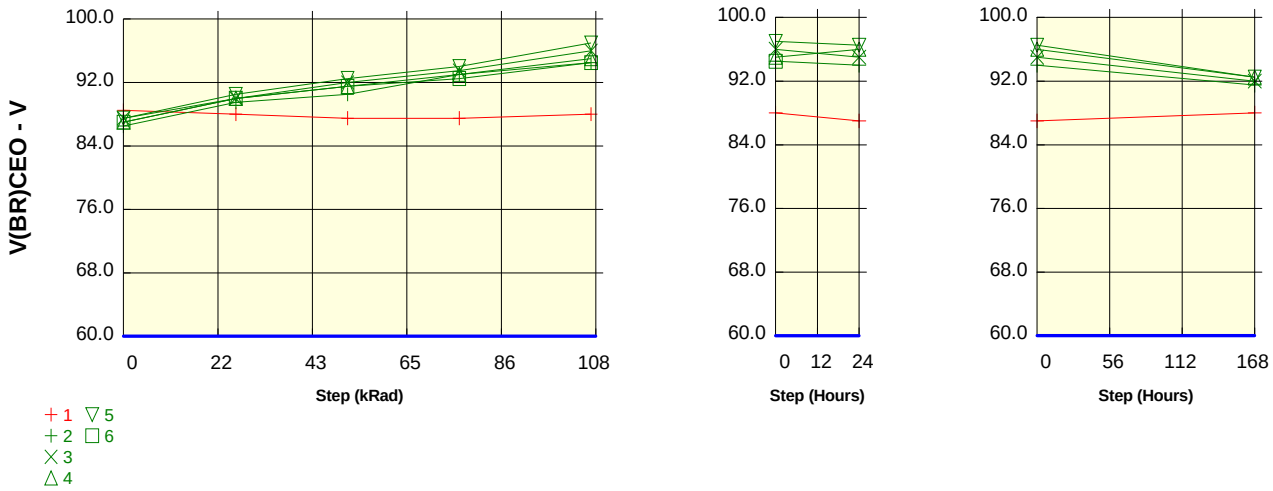
For bipolar transistors, drifts on forward current transfer ratio are calculated as follows:

$$\boldsymbol{\Delta}\left(\frac{1}{h_{FE}}\right)_{LOT} = \text{mean}\left(\boldsymbol{\Delta}\frac{1}{h_{FE}}\right) + 3 \times \boldsymbol{\sigma}\left(\boldsymbol{\Delta}\frac{1}{h_{FE}}\right)$$

$$[h_{FE}]_{POST\ RAD} = \frac{1}{\boldsymbol{\Delta}\left(\frac{1}{h_{FE}}\right)_{LOT} + \frac{1}{h_{FE(min)}}}$$

Where σ stands for standard deviation and $h_{FE(min)}$ stands for the pre-irradiation spec minimum h_{FE} limit available in table 2.

Test conditions : TID
Parameter : Collector to Emitter Breakdown Voltage : V(BR)CEO
Ic = 100mA
Unit : V
Spec Limit Min : 60.0
Spec limits are represented in bold lines on the graphic.



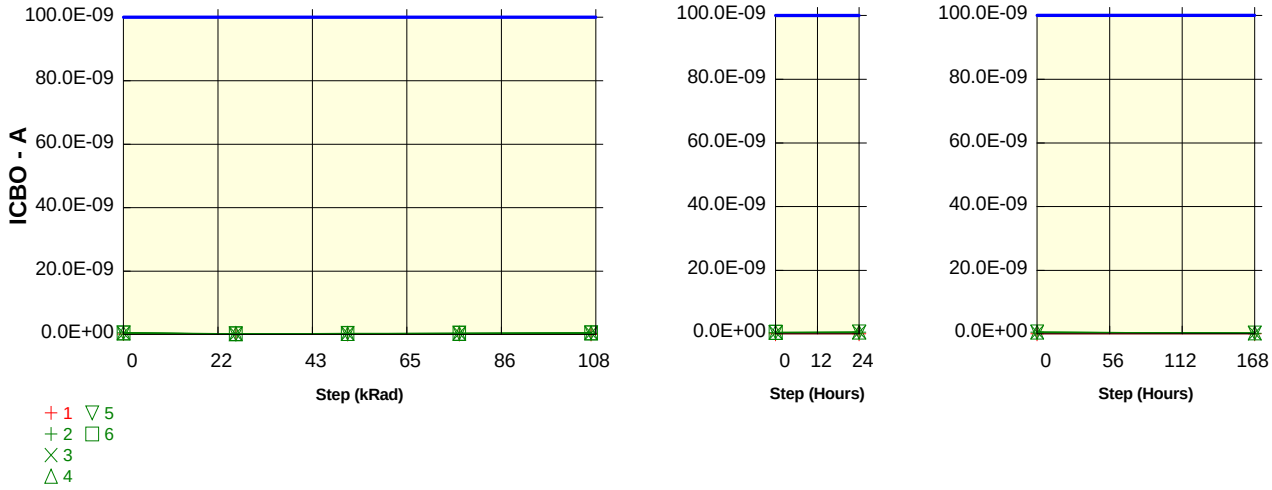
Measurements

V(BR)CEO	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	88.5	88.0	87.5	87.5	88.0	87.0	88.0
ON samples							
2	86.5	89.5	90.5	93.0	94.5	94.0	91.5
3	87.5	90.0	92.0	93.5	96.0	95.0	92.0
4	87.0	90.0	91.5	93.0	95.0	96.0	92.5
5	87.5	90.5	92.5	94.0	97.0	96.5	92.5
6	87.0	90.0	91.5	92.5	94.5		
Statistics							
Min	86.5	89.5	90.5	92.5	94.5	94.0	91.5
Max	87.5	90.5	92.5	94.0	97.0	96.5	92.5
Average	87.1	90.0	91.6	93.2	95.4	95.4	92.1
Sigma	0.4	0.3	0.7	0.5	1.0	1.0	0.4
(V(B) Lot WorstCase	86.0	89.1	89.6	91.7	92.5	92.5	90.9

Drift Calculation

V(BR)CEO	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	3.00E+00	4.00E+00	6.50E+00	8.00E+00	7.50E+00	5.00E+00
3	-	2.50E+00	4.50E+00	6.00E+00	8.50E+00	7.50E+00	4.50E+00
4	-	3.00E+00	4.50E+00	6.00E+00	8.00E+00	9.00E+00	5.50E+00
5	-	3.00E+00	5.00E+00	6.50E+00	9.50E+00	9.00E+00	5.00E+00
6	-	3.00E+00	4.50E+00	5.50E+00	7.50E+00		
Average	-	2.90E+00	4.50E+00	6.10E+00	8.30E+00	8.25E+00	5.00E+00
Sigma	-	200.00E-03	316.23E-03	374.17E-03	678.23E-03	750.00E-03	353.55E-03
d(V(B) Lot WorstCase	-	2.30E+00	3.55E+00	4.98E+00	6.27E+00	6.00E+00	3.94E+00

Test conditions : TID
Parameter : Collector Base cut-off current : ICBO
Vcb = 80V
Unit : A
Spec Limit Max : 100.0E-09
Spec limits are represented in bold lines on the graphic.



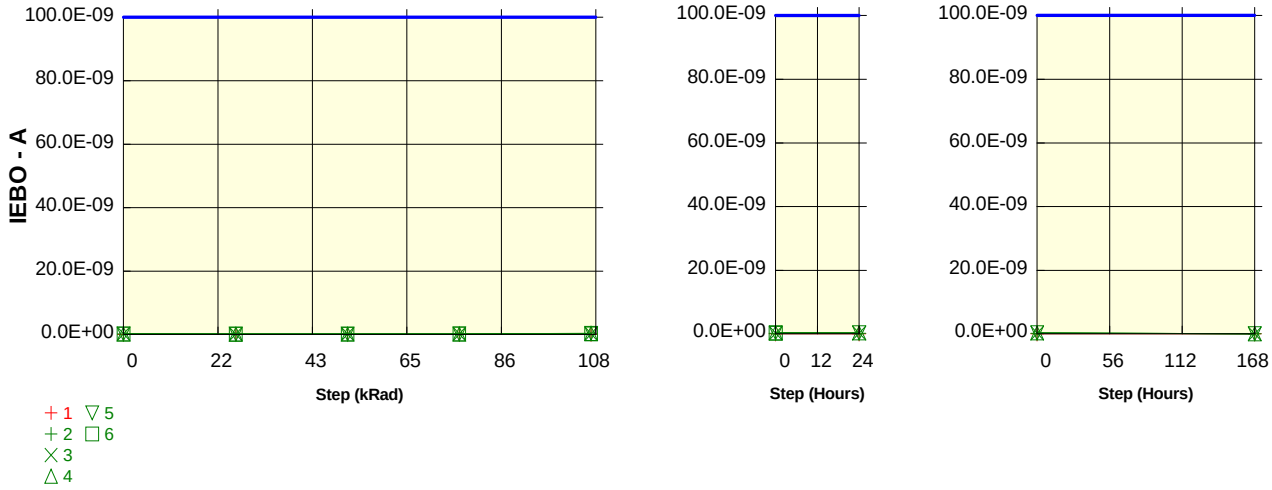
Measurements

ICBO	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	164.8E-12	164.5E-12	63.1E-12	35.9E-12	38.2E-12	46.9E-12	56.1E-12
ON samples							
2	523.7E-12	216.7E-12	284.4E-12	328.4E-12	392.3E-12	542.9E-12	220.0E-12
3	430.6E-12	250.6E-12	331.5E-12	385.0E-12	471.9E-12	562.8E-12	259.4E-12
4	484.8E-12	263.2E-12	317.0E-12	358.5E-12	499.8E-12	555.7E-12	302.3E-12
5	581.5E-12	225.2E-12	377.5E-12	410.5E-12	543.5E-12	592.3E-12	311.8E-12
6	470.4E-12	294.2E-12	292.5E-12	371.7E-12	508.9E-12		
Statistics							
Min	430.6E-12	216.7E-12	284.4E-12	328.4E-12	392.3E-12	542.9E-12	220.0E-12
Max	581.5E-12	294.2E-12	377.5E-12	410.5E-12	543.5E-12	592.3E-12	311.8E-12
Average	498.2E-12	250.0E-12	320.6E-12	370.8E-12	483.3E-12	563.4E-12	273.4E-12
Sigma	51.2E-12	27.7E-12	33.1E-12	27.3E-12	50.9E-12	18.1E-12	36.6E-12
(ICB) Lot WorstCase	651.8E-12	333.2E-12	419.7E-12	452.7E-12	636.1E-12	617.8E-12	383.2E-12

Drift Calculation

ICBO	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-307.02E-12	-239.32E-12	-195.35E-12	-131.43E-12	19.15E-12	-303.79E-12
3	-	-180.02E-12	-99.16E-12	-45.60E-12	41.32E-12	132.16E-12	-171.20E-12
4	-	-221.60E-12	-167.76E-12	-126.28E-12	14.96E-12	70.86E-12	-182.48E-12
5	-	-356.26E-12	-204.04E-12	-171.00E-12	-37.96E-12	10.76E-12	-269.68E-12
6	-	-176.20E-12	-177.94E-12	-98.68E-12	38.54E-12		
Average	-	-248.22E-12	-177.64E-12	-127.38E-12	-14.91E-12	58.23E-12	-231.79E-12
Sigma	-	71.66E-12	46.39E-12	52.98E-12	64.84E-12	48.49E-12	56.40E-12
d(ICB) Lot WorstCase	-	-33.24E-12	-38.49E-12	31.56E-12	179.60E-12	203.71E-12	-62.60E-12

Test conditions : TID
Parameter : Emitter Base cut-off current : IEBO
Veb = 6V
Unit : A
Spec Limit Max : 100.0E-09
Spec limits are represented in bold lines on the graphic.



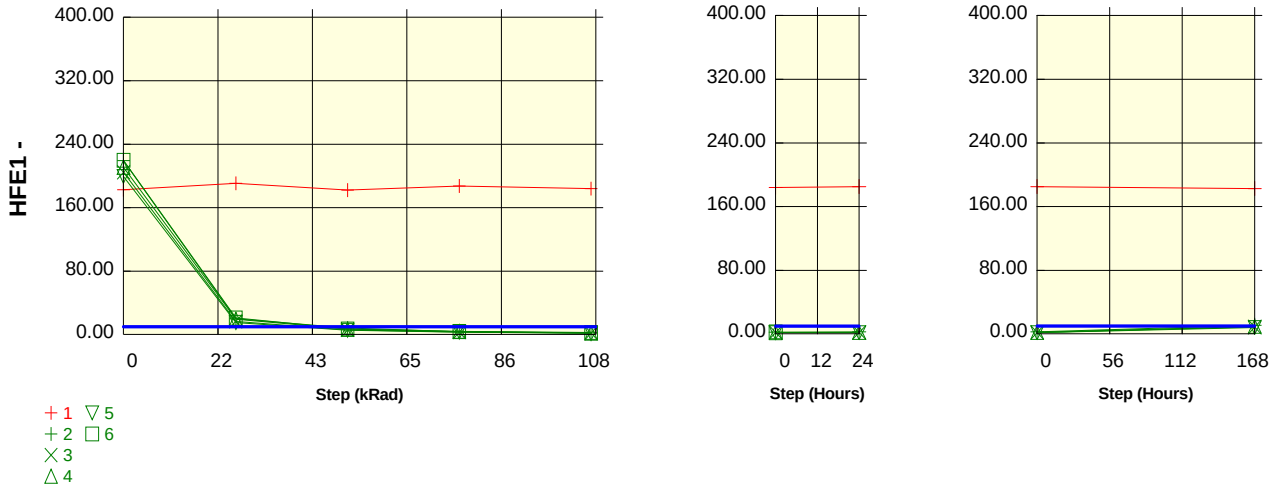
Measurements

IEBO	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	9.1E-12	9.8E-12	28.0E-12	5.1E-12	2.5E-12	4.7E-12	5.5E-12
ON samples							
2	245.7E-12	114.0E-12	126.4E-12	158.1E-12	215.4E-12	254.6E-12	46.6E-12
3	236.5E-12	101.8E-12	140.1E-12	166.8E-12	255.8E-12	273.0E-12	56.6E-12
4	180.0E-12	132.1E-12	117.0E-12	153.9E-12	325.8E-12	299.4E-12	49.4E-12
5	205.5E-12	120.9E-12	139.1E-12	175.5E-12	364.4E-12	326.6E-12	73.4E-12
6	148.1E-12	95.5E-12	118.9E-12	149.9E-12	227.2E-12		
Statistics							
Min	148.1E-12	95.5E-12	117.0E-12	149.9E-12	215.4E-12	254.6E-12	46.6E-12
Max	245.7E-12	132.1E-12	140.1E-12	175.5E-12	364.4E-12	326.6E-12	73.4E-12
Average	203.2E-12	112.8E-12	128.3E-12	160.8E-12	277.7E-12	288.4E-12	56.5E-12
Sigma	36.0E-12	13.1E-12	9.7E-12	9.2E-12	57.9E-12	27.2E-12	10.4E-12
(IEB) Lot WorstCase	311.3E-12	152.1E-12	157.5E-12	188.6E-12	451.3E-12	370.0E-12	87.7E-12

Drift Calculation

IEBO	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-131.70E-12	-119.28E-12	-87.58E-12	-30.26E-12	8.94E-12	-199.06E-12
3	-	-134.72E-12	-96.44E-12	-69.72E-12	19.32E-12	36.44E-12	-179.90E-12
4	-	-47.93E-12	-62.96E-12	-26.10E-12	145.84E-12	119.46E-12	-130.54E-12
5	-	-84.63E-12	-66.44E-12	-29.98E-12	158.88E-12	121.10E-12	-132.14E-12
6	-	-52.60E-12	-29.18E-12	1.80E-12	79.08E-12		
Average	-	-90.32E-12	-74.86E-12	-42.32E-12	74.57E-12	71.48E-12	-160.41E-12
Sigma	-	37.25E-12	30.78E-12	32.13E-12	72.46E-12	49.76E-12	29.85E-12
d(IEB) Lot WorstCase	-	21.42E-12	17.49E-12	54.07E-12	291.94E-12	220.76E-12	-70.85E-12

Test conditions : TID
Parameter : Forward current transfer ratio 1 : HFE1
Vce = 2V ; Ic = 100nA
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



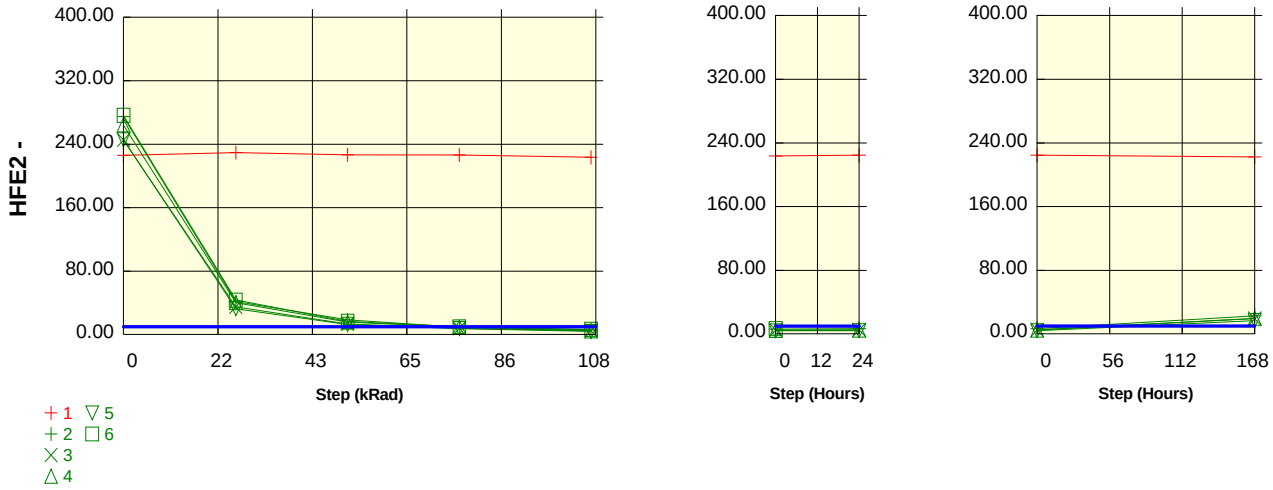
Measurements

HFE1	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	182.63	190.64	182.14	187.27	184.02	185.14	182.78
ON samples							
2	219.31	19.75	**8.14**	**3.79**	**2.39**	**2.62**	11.03
3	204.67	16.43	**5.75**	**3.13**	**1.83**	**1.97**	**8.66**
4	210.93	19.14	**6.63**	**3.72**	**1.72**	**1.88**	**9.45**
5	199.27	15.19	**5.36**	**3.02**	**1.43**	**1.56**	**8.12**
6	219.68	20.82	**7.06**	**3.96**	**2.57**		
Statistics							
Min	199.27	15.19	5.36	3.02	1.43	1.56	8.12
Max	219.68	20.82	8.14	3.96	2.57	2.62	11.03
Average	210.77	18.27	6.59	3.52	1.99	2.01	9.32
Sigma	8.02	2.11	0.99	0.38	0.43	0.39	1.10
(HFE) Lot WorstCase	186.70	11.93	3.63	2.39	0.71	0.85	6.02

Drift Calculation

HFE1	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	46.07E-03	118.22E-03	259.49E-03	414.19E-03	376.79E-03	86.07E-03
3	-	55.98E-03	169.09E-03	315.02E-03	542.34E-03	502.55E-03	110.52E-03
4	-	47.51E-03	146.10E-03	263.72E-03	576.90E-03	526.01E-03	101.04E-03
5	-	60.82E-03	181.43E-03	326.39E-03	695.63E-03	636.62E-03	118.14E-03
6	-	43.48E-03	137.13E-03	247.67E-03	384.39E-03		
Average	-	50.77E-03	150.39E-03	282.46E-03	522.69E-03	510.49E-03	103.94E-03
Sigma	-	6.54E-03	22.55E-03	31.87E-03	113.25E-03	92.32E-03	11.97E-03
d(1/HFE) Lot WorstCase	-	70.39E-03	218.04E-03	378.08E-03	862.46E-03	787.44E-03	139.85E-03

Test conditions : TID
Parameter : Forward current transfer ratio 2 : HFE2
Vce = 2V ; Ic = 1µA
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



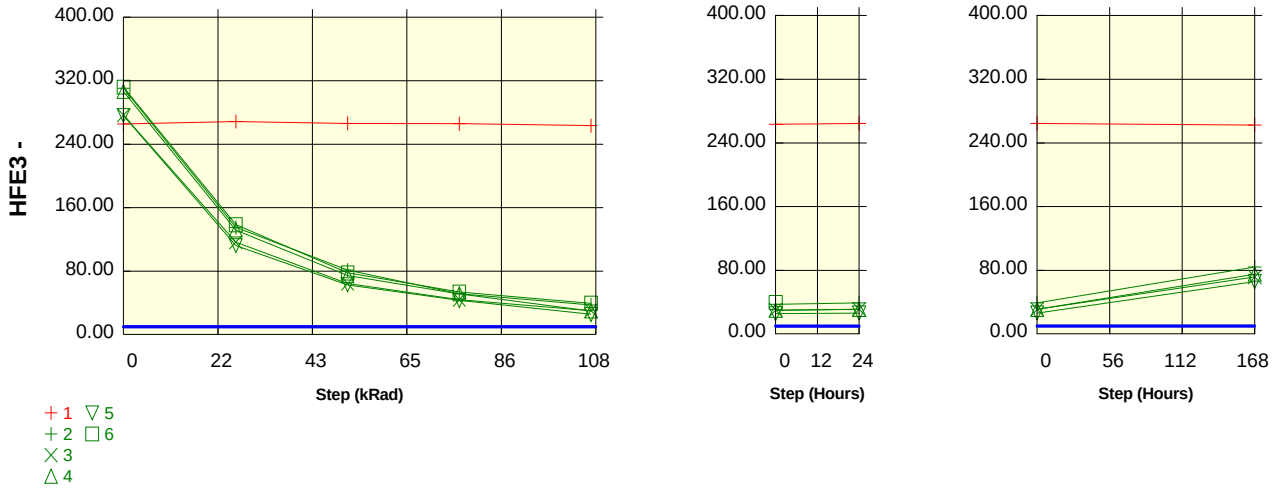
Measurements

HFE2	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	226.10	229.48	226.73	226.27	223.44	224.76	222.36
ON samples							
2	274.79	41.45	18.57	**9.34**	**6.10**	**6.59**	22.79
3	245.33	34.80	13.49	**7.79**	**4.76**	**5.04**	19.06
4	264.08	39.98	15.63	**9.23**	**4.51**	**4.88**	19.60
5	245.58	32.51	12.81	**7.56**	**3.81**	**4.07**	16.94
6	276.43	43.39	16.59	**9.77**	**6.49**		
Statistics							
Min	245.33	32.51	12.81	7.56	3.81	4.07	16.94
Max	276.43	43.39	18.57	9.77	6.49	6.59	22.79
Average	261.24	38.43	15.42	8.74	5.13	5.14	19.60
Sigma	13.57	4.11	2.09	0.89	1.01	0.91	2.09
(HFE) Lot WorstCase	220.54	26.10	9.14	6.06	2.11	2.42	13.32

Drift Calculation

HFE2	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	20.48E-03	50.21E-03	103.46E-03	160.27E-03	148.22E-03	40.24E-03
3	-	24.66E-03	70.08E-03	124.37E-03	205.98E-03	194.28E-03	48.38E-03
4	-	21.22E-03	60.20E-03	104.61E-03	218.14E-03	201.17E-03	47.25E-03
5	-	26.69E-03	74.00E-03	128.23E-03	258.60E-03	241.40E-03	54.94E-03
6	-	19.43E-03	56.65E-03	98.71E-03	150.38E-03		
Average	-	22.50E-03	62.23E-03	111.87E-03	198.68E-03	196.27E-03	47.70E-03
Sigma	-	2.73E-03	8.72E-03	12.00E-03	39.57E-03	33.07E-03	5.22E-03
d(1/HFE) Lot WorstCase	-	30.69E-03	88.38E-03	147.89E-03	317.39E-03	295.47E-03	63.35E-03

Test conditions : TID
Parameter : Forward current transfer ratio 3 : HFE3
Vce = 2V ; Ic = 100µA
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



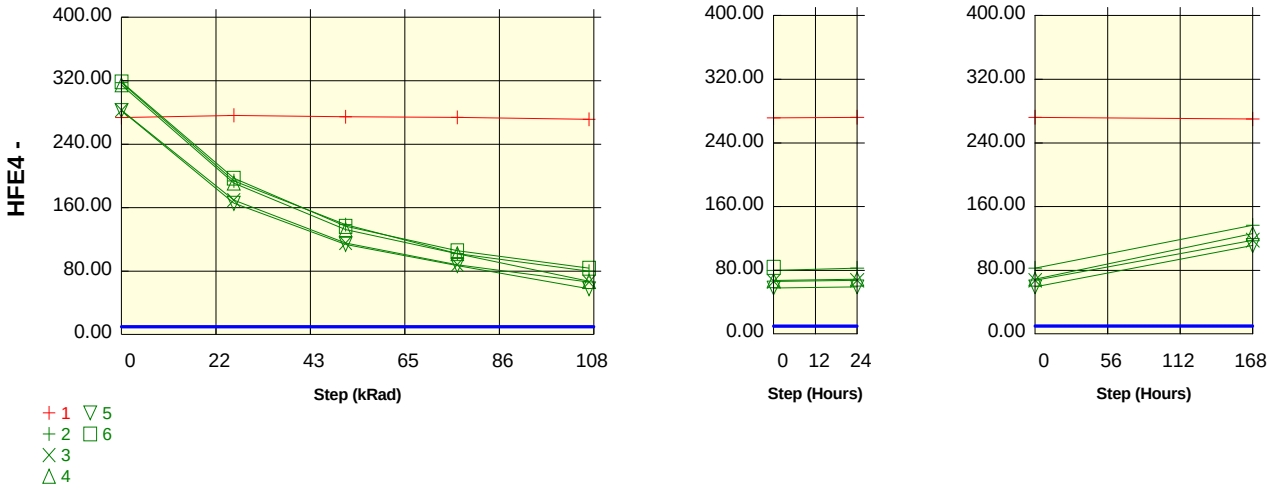
Measurements

HFE3	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	265.65	268.59	266.37	265.75	263.30	264.53	262.39
ON samples							
2	310.73	134.93	81.27	51.59	37.24	38.95	83.98
3	276.62	116.36	64.38	43.85	30.09	30.99	71.55
4	306.55	131.79	74.23	51.25	29.76	30.89	75.15
5	276.31	112.25	62.75	43.07	25.34	26.29	65.86
6	311.96	138.44	77.75	53.60	39.46		
Statistics							
Min	276.31	112.25	62.75	43.07	25.34	26.29	65.86
Max	311.96	138.44	81.27	53.60	39.46	38.95	83.98
Average	296.43	126.75	72.08	48.67	32.38	31.78	74.13
Sigma	16.40	10.46	7.31	4.34	5.21	4.55	6.58
(HFE) Lot WorstCase	247.22	95.37	50.13	35.66	16.76	18.13	54.40

Drift Calculation

HFE3	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	4.19E-03	9.09E-03	16.16E-03	23.64E-03	22.46E-03	8.69E-03
3	-	4.98E-03	11.92E-03	19.19E-03	29.62E-03	28.65E-03	10.36E-03
4	-	4.33E-03	10.21E-03	16.25E-03	30.34E-03	29.11E-03	10.05E-03
5	-	5.29E-03	12.32E-03	19.60E-03	35.84E-03	34.42E-03	11.56E-03
6	-	4.02E-03	9.66E-03	15.45E-03	22.13E-03		
Average	-	4.56E-03	10.64E-03	17.33E-03	28.32E-03	28.66E-03	10.17E-03
Sigma	-	488.10E-06	1.27E-03	1.71E-03	4.95E-03	4.24E-03	1.02E-03
d(1/HFE) Lot WorstCase	-	6.03E-03	14.43E-03	22.47E-03	43.17E-03	41.37E-03	13.24E-03

Test conditions : TID
Parameter : Forward current transfer ratio 4 : HFE4
Vce = 2V ; Ic = 1mA
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



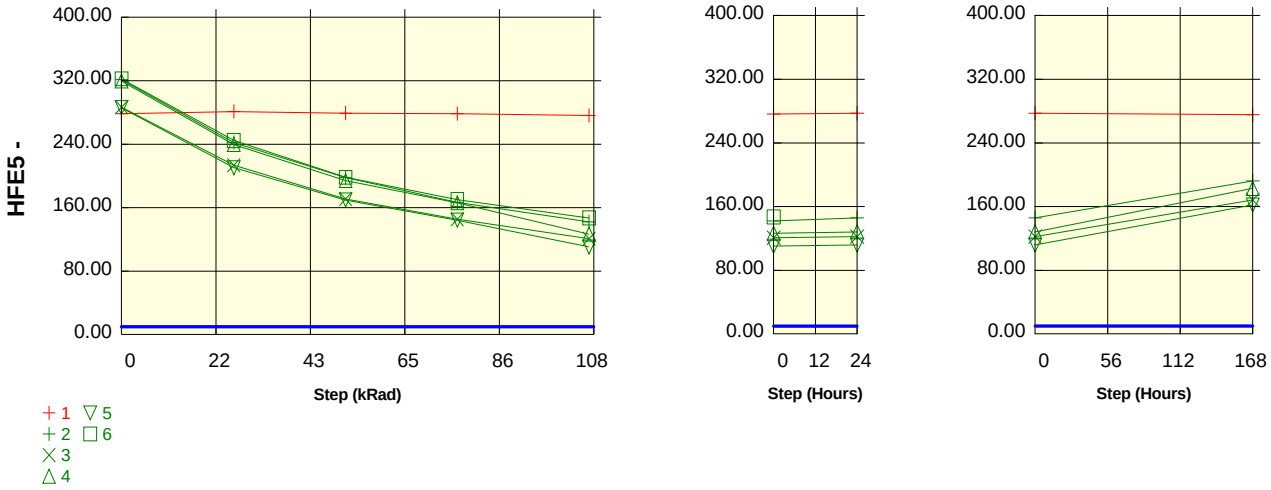
Measurements

HFE4	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	273.62	276.41	274.46	273.80	271.41	272.25	270.02
ON samples							
2	317.49	193.85	138.60	102.22	79.91	82.64	136.42
3	282.79	169.48	115.25	88.08	66.19	67.44	117.86
4	314.86	191.00	132.26	101.76	67.00	68.82	125.96
5	282.35	165.51	113.75	87.03	57.82	59.21	111.06
6	318.54	197.14	136.38	105.64	83.61		
Statistics							
Min	282.35	165.51	113.75	87.03	57.82	59.21	111.06
Max	318.54	197.14	138.60	105.64	83.61	82.64	136.42
Average	303.21	183.40	127.25	96.95	70.91	69.53	122.83
Sigma	16.89	13.19	10.61	7.79	9.50	8.42	9.46
(HFE) Lot WorstCase	252.52	143.83	95.41	73.57	42.40	44.28	94.45

Drift Calculation

HFE4	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	2.01E-03	4.07E-03	6.63E-03	9.37E-03	8.95E-03	4.18E-03
3	-	2.36E-03	5.14E-03	7.82E-03	11.57E-03	11.29E-03	4.95E-03
4	-	2.06E-03	4.38E-03	6.65E-03	11.75E-03	11.35E-03	4.76E-03
5	-	2.50E-03	5.25E-03	7.95E-03	13.75E-03	13.35E-03	5.46E-03
6	-	1.93E-03	4.19E-03	6.33E-03	8.82E-03		
Average	-	2.17E-03	4.61E-03	7.08E-03	11.05E-03	11.24E-03	4.84E-03
Sigma	-	219.50E-06	492.11E-06	670.61E-06	1.78E-03	1.56E-03	458.36E-06
d(1/HFE) Lot WorstCase	-	2.83E-03	6.08E-03	9.09E-03	16.40E-03	15.91E-03	6.21E-03

Test conditions : TID
Parameter : Forward current transfer ratio 5 : HFE5
Vce = 2V ; Ic = 10mA
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



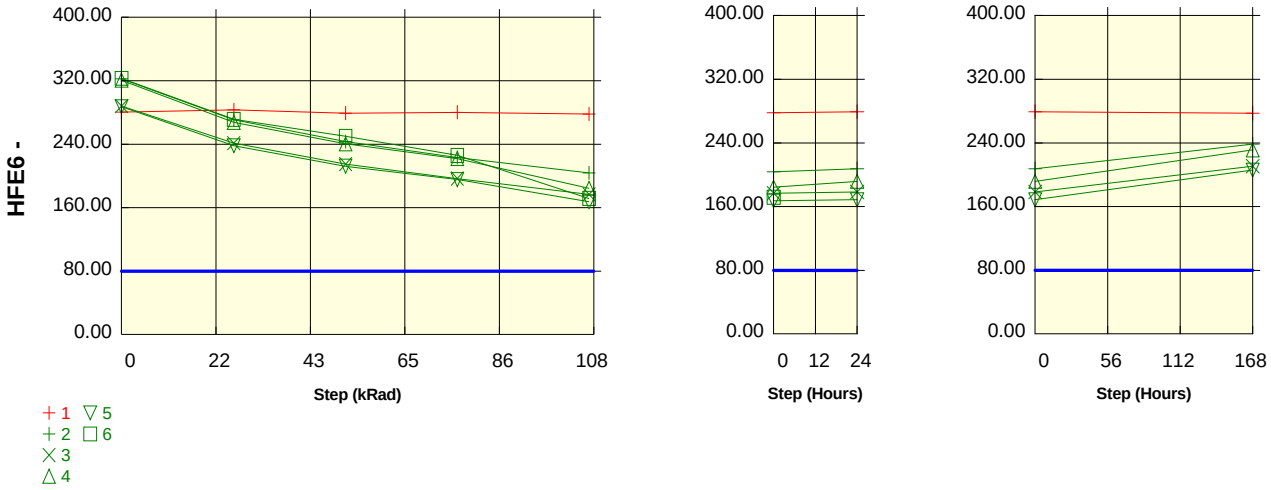
Measurements

HFE5	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	278.48	281.30	279.19	278.52	276.25	277.39	275.41
ON samples							
2	321.43	242.04	197.93	166.56	142.18	145.68	192.41
3	286.72	213.51	170.75	145.47	120.89	122.25	168.37
4	319.67	239.64	194.14	165.99	126.53	128.31	182.81
5	286.16	210.21	169.55	144.27	110.34	111.73	162.08
6	322.40	244.56	198.15	170.23	147.04		
Statistics							
Min	286.16	210.21	169.55	144.27	110.34	111.73	162.08
Max	322.40	244.56	198.15	170.23	147.04	145.68	192.41
Average	307.28	229.99	186.11	158.51	129.40	126.99	176.42
Sigma	17.04	14.92	13.11	11.23	13.55	12.31	11.91
(HFE) Lot WorstCase	256.17	185.23	146.78	124.81	88.74	90.05	140.70

Drift Calculation

HFE5	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	1.02E-03	1.94E-03	2.89E-03	3.92E-03	3.75E-03	2.09E-03
3	-	1.20E-03	2.37E-03	3.39E-03	4.78E-03	4.69E-03	2.45E-03
4	-	1.04E-03	2.02E-03	2.90E-03	4.78E-03	4.67E-03	2.34E-03
5	-	1.26E-03	2.40E-03	3.44E-03	5.57E-03	5.46E-03	2.68E-03
6	-	987.17E-06	1.95E-03	2.77E-03	3.70E-03		
Average	-	1.10E-03	2.14E-03	3.08E-03	4.55E-03	4.64E-03	2.39E-03
Sigma	-	107.41E-06	206.31E-06	277.27E-06	672.34E-06	603.11E-06	212.00E-06
d(1/HFE) Lot WorstCase	-	1.42E-03	2.76E-03	3.91E-03	6.57E-03	6.45E-03	3.02E-03

Test conditions : TID
Parameter : Forward current transfer ratio 6 : HFE6
Vce = 2V ; Ic = 100mA
Unit :
Spec Limit Min : 80.00
Spec limits are represented in bold lines on the graphic.



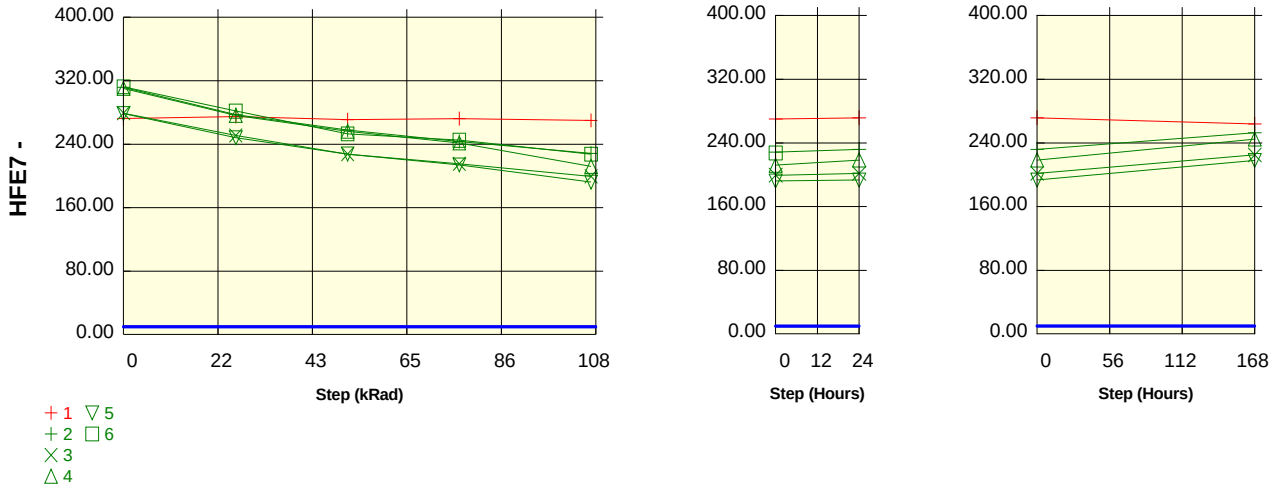
Measurements

HFE6	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	280.31	283.07	279.19	280.21	278.06	279.21	277.36
ON samples							
2	322.33	270.87	243.29	223.16	203.81	207.62	238.35
3	288.04	241.25	214.92	196.62	176.63	178.35	210.73
4	320.82	267.50	240.43	221.95	184.39	191.61	231.19
5	287.44	238.15	212.23	195.33	167.28	168.57	205.84
6	323.17	271.25	249.85	225.84	171.68		
Statistics							
Min	287.44	238.15	212.23	195.33	167.28	168.57	205.84
Max	323.17	271.25	249.85	225.84	203.81	207.62	238.35
Average	308.36	257.80	232.14	212.58	180.76	186.54	221.52
Sigma	16.85	14.87	15.49	13.62	12.85	14.66	13.59
(HFE) Lot WorstCase	257.80	213.18	185.67	171.71	142.21	142.55	180.74

Drift Calculation

HFE6	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	589.40E-06	1.01E-03	1.38E-03	1.80E-03	1.71E-03	1.09E-03
3	-	673.44E-06	1.18E-03	1.61E-03	2.19E-03	2.14E-03	1.27E-03
4	-	621.39E-06	1.04E-03	1.39E-03	2.31E-03	2.10E-03	1.21E-03
5	-	720.11E-06	1.23E-03	1.64E-03	2.50E-03	2.45E-03	1.38E-03
6	-	592.28E-06	908.06E-06	1.33E-03	2.73E-03		
Average	-	639.32E-06	1.07E-03	1.47E-03	2.31E-03	2.10E-03	1.24E-03
Sigma	-	50.43E-06	118.03E-06	129.21E-06	310.73E-06	262.16E-06	103.77E-06
d(1/HFE) Lot WorstCase	-	790.62E-06	1.43E-03	1.86E-03	3.24E-03	2.89E-03	1.55E-03

Test conditions : TID
Parameter : Forward current transfer ratio 7 : HFE7
Vce = 2V ; Ic = 500mA
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



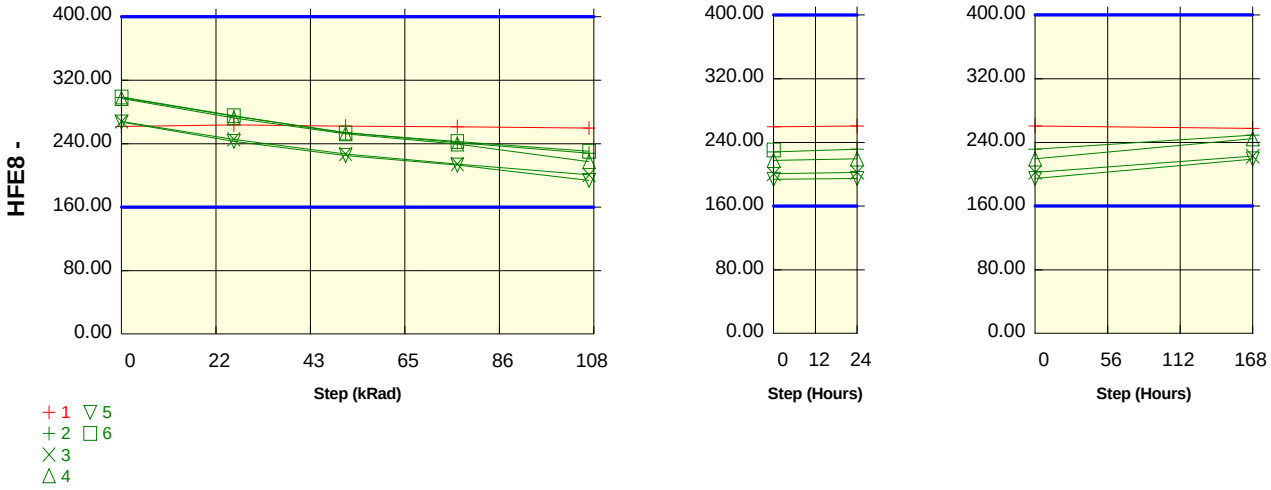
Measurements

HFE7	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	272.30	274.87	271.05	272.22	270.12	271.52	263.84
ON samples							
2	311.49	277.44	257.92	243.44	228.50	232.04	252.79
3	279.21	251.03	227.48	215.21	199.39	201.62	224.87
4	310.30	276.33	256.17	241.56	211.99	218.51	244.77
5	278.59	248.22	227.53	213.86	192.21	193.38	217.97
6	312.25	281.70	253.08	244.88	227.37		
Statistics							
Min	278.59	248.22	227.48	213.86	192.21	193.38	217.97
Max	312.25	281.70	257.92	244.88	228.50	232.04	252.79
Average	298.37	266.94	244.44	231.79	211.89	211.39	235.10
Sigma	15.91	14.28	13.91	14.13	14.55	14.98	14.18
(HFE) Lot WorstCase	250.64	224.10	202.70	189.39	168.23	166.46	192.55

Drift Calculation

HFE7	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	394.03E-06	666.81E-06	897.46E-06	1.17E-03	1.10E-03	745.46E-06
3	-	402.16E-06	814.51E-06	1.07E-03	1.43E-03	1.38E-03	865.44E-06
4	-	396.18E-06	680.96E-06	917.08E-06	1.49E-03	1.35E-03	862.77E-06
5	-	439.07E-06	805.46E-06	1.09E-03	1.61E-03	1.58E-03	998.32E-06
6	-	347.33E-06	748.87E-06	881.13E-06	1.20E-03		
Average	-	395.75E-06	743.32E-06	969.43E-06	1.38E-03	1.35E-03	868.00E-06
Sigma	-	29.21E-06	61.16E-06	87.81E-06	173.25E-06	171.28E-06	89.49E-06
d(1/HFE) Lot WorstCase	-	483.38E-06	926.80E-06	1.23E-03	1.90E-03	1.87E-03	1.14E-03

Test conditions : TID
Parameter : Forward current transfer ratio 8 : HFE8
Vce = 2V ; Ic = 1A
Unit :
Spec Limit Min : 160.00
Spec Limit Max : 400.00
Spec limits are represented in bold lines on the graphic.



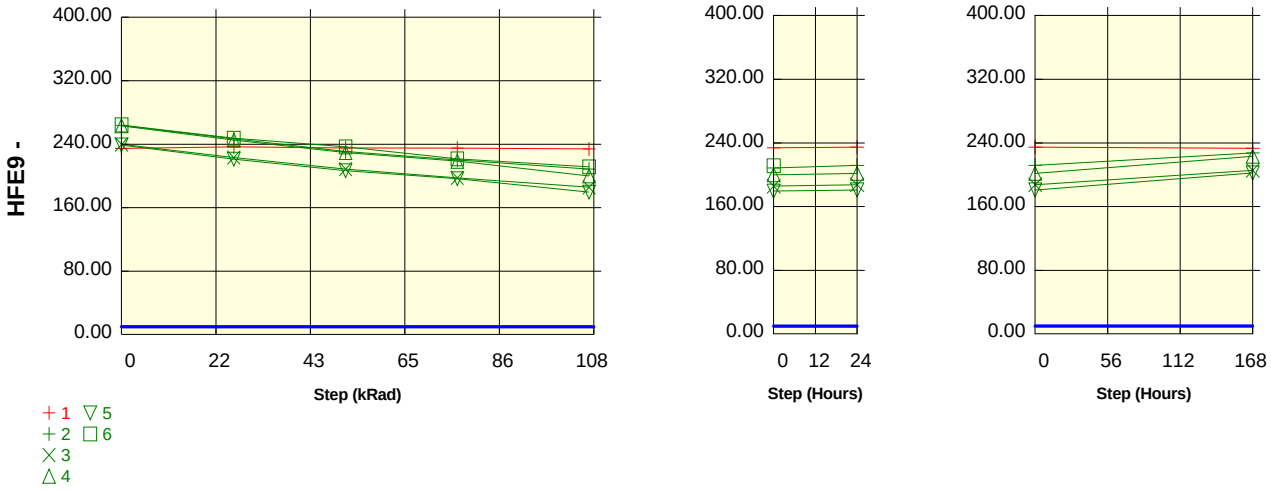
Measurements

HFE8	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	261.58	263.95	262.17	261.45	259.64	260.78	257.61
ON samples							
2	298.06	274.51	253.97	241.24	228.09	231.53	249.36
3	267.90	245.53	227.06	214.30	200.48	202.32	222.73
4	296.97	272.52	252.36	239.55	217.46	219.27	244.58
5	267.29	242.89	225.03	212.98	193.64	194.79	219.17
6	298.72	275.21	253.32	242.61	230.52		
Statistics							
Min	267.29	242.89	225.03	212.98	193.64	194.79	219.17
Max	298.72	275.21	253.97	242.61	230.52	231.53	249.36
Average	285.79	262.13	242.35	230.14	214.04	211.98	233.96
Sigma	14.87	14.68	13.34	13.51	14.70	14.36	13.18
(HFE) Lot WorstCase	241.19	218.08	202.34	189.61	169.93	168.91	194.42

Drift Calculation

HFE8	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	287.85E-06	582.46E-06	790.20E-06	1.03E-03	963.98E-06	655.21E-06
3	-	340.08E-06	671.44E-06	933.60E-06	1.26E-03	1.21E-03	757.03E-06
4	-	302.05E-06	595.32E-06	807.09E-06	1.23E-03	1.19E-03	721.33E-06
5	-	375.91E-06	702.67E-06	954.05E-06	1.42E-03	1.39E-03	821.44E-06
6	-	286.04E-06	600.07E-06	774.26E-06	990.45E-06		
Average	-	318.39E-06	630.39E-06	851.84E-06	1.19E-03	1.19E-03	738.75E-06
Sigma	-	34.71E-06	47.66E-06	76.10E-06	158.64E-06	152.11E-06	60.11E-06
d(1/HFE) Lot WorstCase	-	422.53E-06	773.36E-06	1.08E-03	1.66E-03	1.65E-03	919.09E-06

Test conditions : TID
Parameter : Forward current transfer ratio 9 : HFE9
Vce = 2V ; Ic = 2A
Unit :
Spec Limit Min : 10.00
Spec limits are represented in bold lines on the graphic.



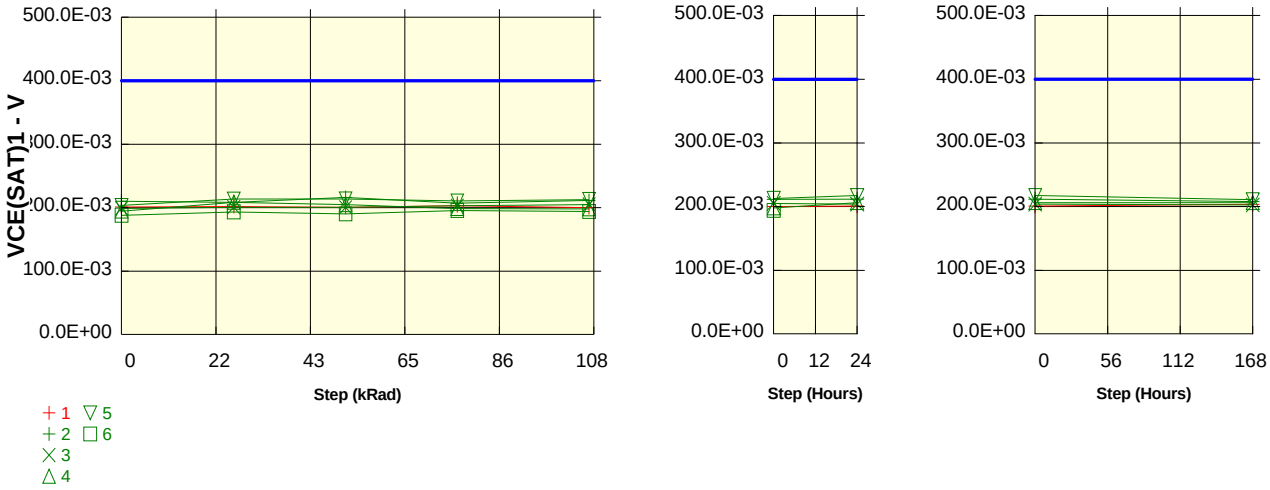
Measurements

HFE9	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	234.65	236.57	235.47	235.16	233.91	234.65	233.19
ON samples							
2	263.64	246.79	230.70	219.91	208.62	211.82	227.30
3	239.71	223.23	208.58	197.47	185.62	187.51	205.56
4	263.02	245.05	229.36	218.56	199.97	201.67	223.20
5	238.93	221.10	206.52	196.45	179.42	181.04	202.22
6	264.25	247.45	236.59	221.42	211.32		
Statistics							
Min	238.93	221.10	206.52	196.45	179.42	181.04	202.22
Max	264.25	247.45	236.59	221.42	211.32	211.82	227.30
Average	253.91	236.73	222.35	210.76	196.99	195.51	214.57
Sigma	11.92	11.93	12.34	11.31	12.55	12.01	10.84
(HFE) Lot WorstCase	218.15	200.93	185.32	176.82	159.34	159.47	182.05

Drift Calculation

HFE9	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	258.86E-06	541.50E-06	754.17E-06	1.00E-03	927.95E-06	606.47E-06
3	-	307.94E-06	622.69E-06	892.47E-06	1.22E-03	1.16E-03	693.03E-06
4	-	278.73E-06	557.87E-06	773.31E-06	1.20E-03	1.16E-03	678.20E-06
5	-	337.52E-06	656.72E-06	905.10E-06	1.39E-03	1.34E-03	759.66E-06
6	-	256.92E-06	442.49E-06	732.07E-06	947.94E-06		
Average	-	287.99E-06	564.25E-06	811.42E-06	1.15E-03	1.15E-03	684.34E-06
Sigma	-	30.82E-06	73.96E-06	72.62E-06	159.15E-06	145.64E-06	54.43E-06
d(1/HFE) Lot WorstCase	-	380.47E-06	786.13E-06	1.03E-03	1.63E-03	1.58E-03	847.62E-06

Test conditions : TID
Parameter : Collector emitter saturation voltage 1 : VCE(SAT)1
Ic = 2A ; Ib = 100mA
Unit : V
Spec Limit Max : 400.0E-03
Spec limits are represented in bold lines on the graphic.



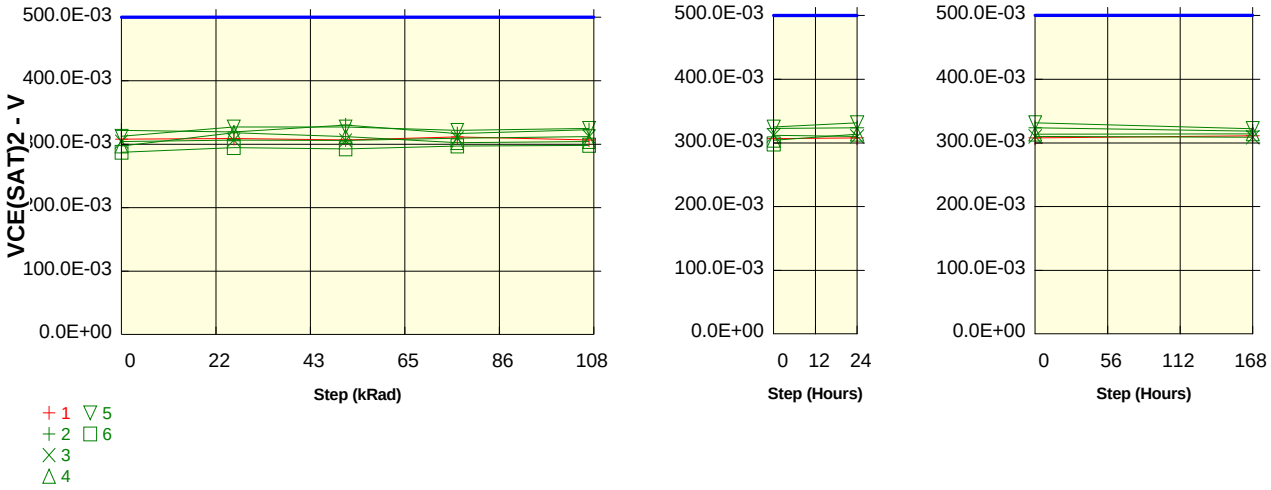
Measurements

VCE(SAT)1	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	201.1E-03	201.8E-03	200.4E-03	203.2E-03	200.3E-03	201.1E-03	203.4E-03
ON samples							
2	210.0E-03	208.2E-03	216.0E-03	206.9E-03	211.2E-03	211.8E-03	208.1E-03
3	199.0E-03	200.7E-03	200.6E-03	203.0E-03	205.0E-03	203.8E-03	202.8E-03
4	194.4E-03	208.5E-03	204.6E-03	198.4E-03	197.8E-03	206.4E-03	206.3E-03
5	203.6E-03	213.6E-03	213.7E-03	210.4E-03	212.8E-03	217.3E-03	210.8E-03
6	188.1E-03	193.4E-03	190.2E-03	195.5E-03	194.0E-03		
Statistics							
Min	188.1E-03	193.4E-03	190.2E-03	195.5E-03	194.0E-03	203.8E-03	202.8E-03
Max	210.0E-03	213.6E-03	216.0E-03	210.4E-03	212.8E-03	217.3E-03	210.8E-03
Average	199.0E-03	204.9E-03	205.0E-03	202.8E-03	204.2E-03	209.8E-03	207.0E-03
Sigma	7.5E-03	7.1E-03	9.3E-03	5.4E-03	7.3E-03	5.2E-03	2.9E-03
(VCE) Lot WorstCase	221.6E-03	226.1E-03	233.0E-03	219.1E-03	226.2E-03	225.5E-03	215.8E-03

Drift Calculation

VCE(SAT)1	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-1.84E-03	5.96E-03	-3.16E-03	1.16E-03	1.80E-03	-1.96E-03
3	-	1.72E-03	1.60E-03	4.08E-03	6.04E-03	4.84E-03	3.84E-03
4	-	14.04E-03	10.20E-03	3.96E-03	3.36E-03	11.92E-03	11.88E-03
5	-	10.00E-03	10.08E-03	6.76E-03	9.24E-03	13.72E-03	7.24E-03
6	-	5.28E-03	2.08E-03	7.44E-03	5.92E-03		
Average	-	5.84E-03	5.98E-03	3.82E-03	5.14E-03	8.07E-03	5.25E-03
Sigma	-	5.67E-03	3.72E-03	3.76E-03	2.73E-03	4.91E-03	5.05E-03
d(VCE) Lot WorstCase	-	22.85E-03	17.13E-03	15.09E-03	13.33E-03	22.80E-03	20.39E-03

Test conditions : TID
Parameter : Collector emitter saturation voltage 2 : VCE(SAT)2
Ic = 3A ; Ib = 150mA
Unit : V
Spec Limit Max : 500.0E-03
Spec limits are represented in bold lines on the graphic.



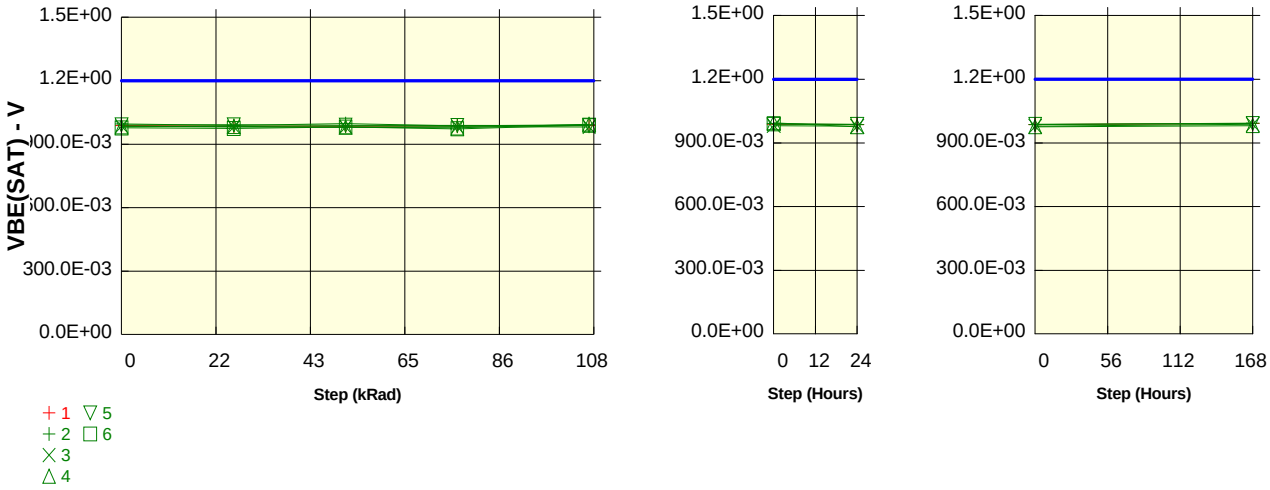
Measurements

VCE(SAT)2	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	307.9E-03	309.1E-03	306.9E-03	311.3E-03	306.7E-03	308.0E-03	311.2E-03
ON samples							
2	322.1E-03	319.2E-03	330.4E-03	316.6E-03	322.8E-03	323.8E-03	318.3E-03
3	304.2E-03	306.2E-03	305.9E-03	309.4E-03	312.0E-03	310.2E-03	309.0E-03
4	297.3E-03	317.9E-03	311.9E-03	302.4E-03	304.2E-03	313.8E-03	314.1E-03
5	312.4E-03	327.1E-03	327.2E-03	321.7E-03	325.0E-03	331.7E-03	322.6E-03
6	287.2E-03	294.5E-03	292.6E-03	297.4E-03	298.2E-03		
Statistics							
Min	287.2E-03	294.5E-03	292.6E-03	297.4E-03	298.2E-03	310.2E-03	309.0E-03
Max	322.1E-03	327.1E-03	330.4E-03	321.7E-03	325.0E-03	331.7E-03	322.6E-03
Average	304.6E-03	313.0E-03	313.6E-03	309.5E-03	312.5E-03	319.9E-03	316.0E-03
Sigma	12.0E-03	11.4E-03	13.9E-03	8.9E-03	10.3E-03	8.4E-03	5.0E-03
(VCE) Lot WorstCase	340.7E-03	347.2E-03	355.4E-03	336.2E-03	343.5E-03	345.2E-03	331.1E-03

Drift Calculation

VCE(SAT)2	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-2.92E-03	8.24E-03	-5.52E-03	719.99E-06	1.72E-03	-3.80E-03
3	-	2.00E-03	1.64E-03	5.16E-03	7.80E-03	5.96E-03	4.76E-03
4	-	20.64E-03	14.60E-03	5.12E-03	6.96E-03	16.56E-03	16.80E-03
5	-	14.76E-03	14.88E-03	9.36E-03	12.60E-03	19.32E-03	10.20E-03
6	-	7.32E-03	5.36E-03	10.20E-03	11.04E-03		
Average	-	8.36E-03	8.94E-03	4.86E-03	7.82E-03	10.89E-03	6.99E-03
Sigma	-	8.49E-03	5.18E-03	5.60E-03	4.11E-03	7.27E-03	7.55E-03
d(VCE) Lot WorstCase	-	33.83E-03	24.47E-03	21.66E-03	20.15E-03	32.71E-03	29.64E-03

Test conditions : TID
Parameter : Base emitter saturation voltage : VBE(SAT)
Ic = 2A ; Ib = 100mA
Unit : V
Spec Limit Max : 1.2E+00
Spec limits are represented in bold lines on the graphic.



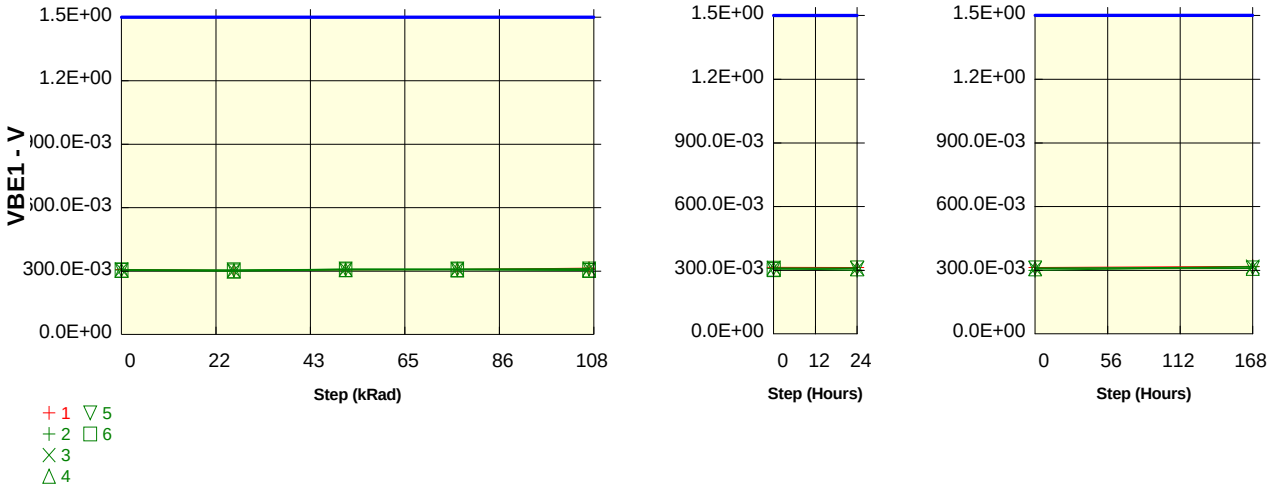
Measurements

VBE(SAT)	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	988.4E-03	984.9E-03	985.1E-03	986.1E-03	988.1E-03	986.2E-03	991.2E-03
ON samples							
2	995.6E-03	989.2E-03	996.7E-03	986.5E-03	991.2E-03	987.0E-03	992.6E-03
3	985.1E-03	982.0E-03	981.4E-03	983.2E-03	981.9E-03	978.2E-03	987.5E-03
4	982.2E-03	983.6E-03	980.5E-03	977.1E-03	994.2E-03	975.8E-03	982.0E-03
5	991.1E-03	991.7E-03	989.8E-03	989.0E-03	987.9E-03	987.8E-03	992.1E-03
6	977.0E-03	974.3E-03	981.5E-03	972.7E-03	990.1E-03		
Statistics							
Min	977.0E-03	974.3E-03	980.5E-03	972.7E-03	981.9E-03	975.8E-03	982.0E-03
Max	995.6E-03	991.7E-03	996.7E-03	989.0E-03	994.2E-03	987.8E-03	992.6E-03
Average	986.2E-03	984.1E-03	986.0E-03	981.7E-03	989.1E-03	982.2E-03	988.5E-03
Sigma	6.5E-03	6.1E-03	6.3E-03	6.0E-03	4.1E-03	5.3E-03	4.3E-03
(VBE) Lot WorstCase	1.0E+00	1.0E+00	1.0E+00	999.7E-03	1.0E+00	998.0E-03	1.0E+00

Drift Calculation

VBE(SAT)	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-6.36E-03	1.08E-03	-9.12E-03	-4.36E-03	-8.56E-03	-3.00E-03
3	-	-3.12E-03	-3.72E-03	-1.88E-03	-3.20E-03	-6.88E-03	2.44E-03
4	-	1.32E-03	-1.76E-03	-5.16E-03	11.96E-03	-6.40E-03	-279.94E-06
5	-	560.06E-06	-1.36E-03	-2.16E-03	-3.20E-03	-3.32E-03	960.01E-06
6	-	-2.72E-03	4.52E-03	-4.28E-03	13.08E-03		
Average	-	-2.06E-03	-247.95E-06	-4.52E-03	2.86E-03	-6.29E-03	30.03E-06
Sigma	-	2.77E-03	2.83E-03	2.61E-03	7.91E-03	1.89E-03	2.00E-03
d(VBE) Lot WorstCase	-	6.24E-03	8.25E-03	3.32E-03	26.59E-03	-610.91E-06	6.02E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE1
Vce = 2V ; Ic = 100nA
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



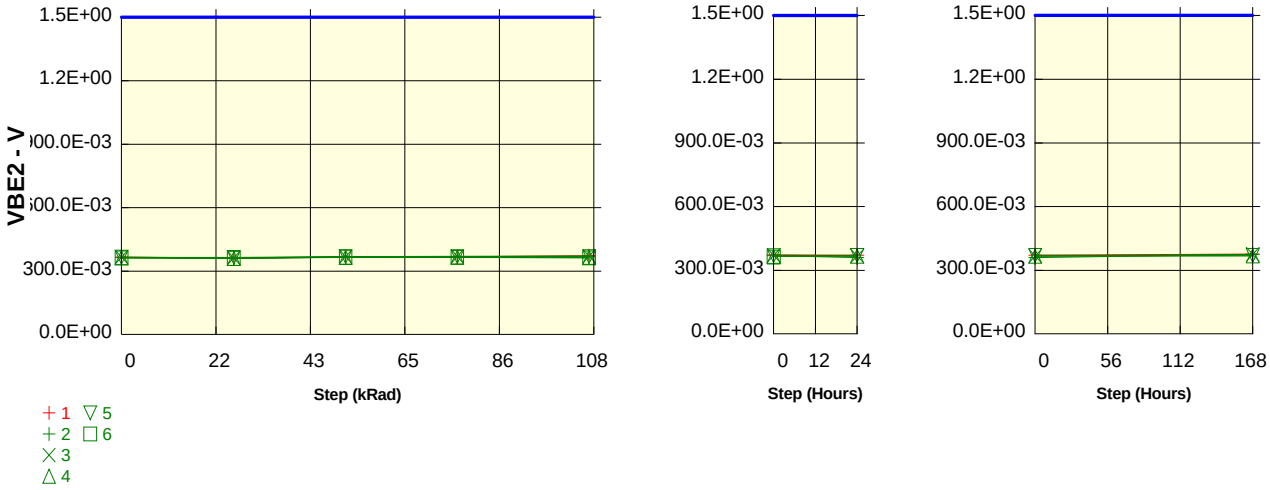
Measurements

VBE1	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	307.4E-03	301.9E-03	306.7E-03	307.9E-03	313.6E-03	312.5E-03	317.6E-03
ON samples							
2	304.9E-03	302.3E-03	306.5E-03	306.2E-03	309.3E-03	299.5E-03	316.8E-03
3	306.8E-03	302.8E-03	309.9E-03	310.2E-03	311.8E-03	308.2E-03	316.9E-03
4	303.3E-03	300.2E-03	306.4E-03	307.2E-03	305.4E-03	306.8E-03	308.5E-03
5	305.8E-03	305.7E-03	309.3E-03	309.5E-03	309.4E-03	311.2E-03	311.2E-03
6	302.8E-03	300.9E-03	306.2E-03	305.7E-03	302.9E-03		
Statistics							
Min	302.8E-03	300.2E-03	306.2E-03	305.7E-03	302.9E-03	299.5E-03	308.5E-03
Max	306.8E-03	305.7E-03	309.9E-03	310.2E-03	311.8E-03	311.2E-03	316.9E-03
Average	304.7E-03	302.4E-03	307.7E-03	307.7E-03	307.7E-03	306.4E-03	313.4E-03
Sigma	1.5E-03	1.9E-03	1.6E-03	1.8E-03	3.2E-03	4.3E-03	3.6E-03
(VBE) Lot WorstCase	309.2E-03	308.1E-03	312.5E-03	313.2E-03	317.3E-03	319.3E-03	324.3E-03

Drift Calculation

VBE1	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-2.58E-03	1.66E-03	1.33E-03	4.42E-03	-5.32E-03	11.99E-03
3	-	-4.02E-03	3.09E-03	3.39E-03	4.94E-03	1.31E-03	10.08E-03
4	-	-3.18E-03	3.04E-03	3.84E-03	2.10E-03	3.47E-03	5.18E-03
5	-	-86.55E-06	3.53E-03	3.69E-03	3.57E-03	5.42E-03	5.40E-03
6	-	-1.90E-03	3.41E-03	2.87E-03	100.28E-06		
Average	-	-2.35E-03	2.95E-03	3.02E-03	3.02E-03	1.22E-03	8.16E-03
Sigma	-	1.33E-03	667.81E-06	907.65E-06	1.75E-03	4.04E-03	2.95E-03
d(VBE) Lot WorstCase	-	1.64E-03	4.95E-03	5.75E-03	8.27E-03	13.35E-03	17.02E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE2
Vce = 2V ; Ic = 1µA
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



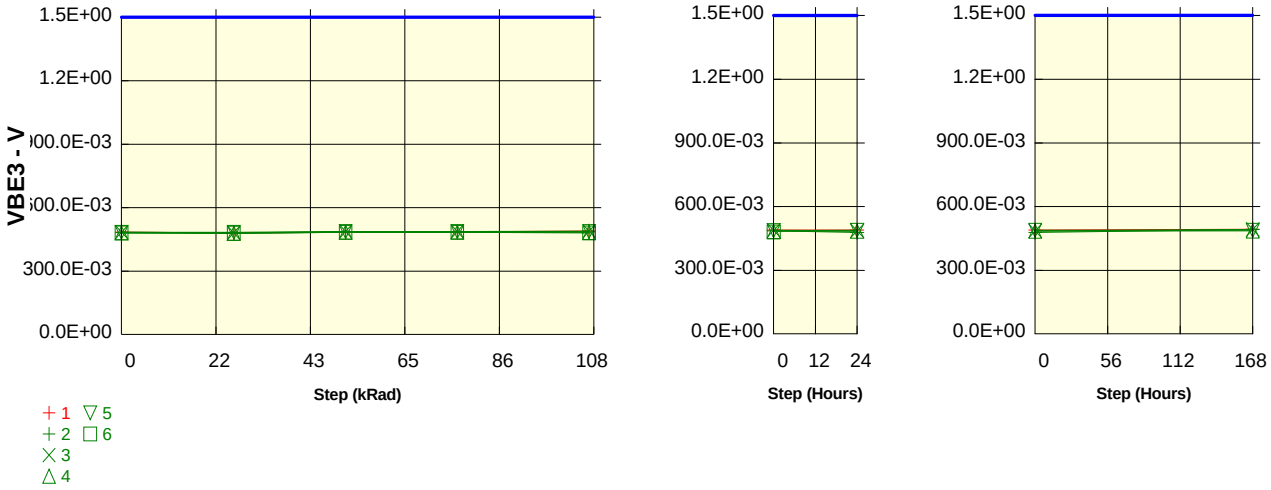
Measurements

VBE2	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	366.7E-03	361.4E-03	366.2E-03	367.3E-03	372.6E-03	371.4E-03	376.1E-03
ON samples							
2	364.0E-03	361.5E-03	365.6E-03	365.4E-03	368.4E-03	359.1E-03	375.1E-03
3	366.1E-03	362.3E-03	369.1E-03	369.5E-03	370.9E-03	367.3E-03	375.4E-03
4	362.6E-03	359.5E-03	365.5E-03	366.4E-03	364.8E-03	365.9E-03	367.4E-03
5	365.2E-03	365.0E-03	368.5E-03	368.8E-03	368.7E-03	370.2E-03	370.1E-03
6	362.1E-03	360.3E-03	365.4E-03	365.0E-03	362.4E-03		
Statistics							
Min	362.1E-03	359.5E-03	365.4E-03	365.0E-03	362.4E-03	359.1E-03	367.4E-03
Max	366.1E-03	365.0E-03	369.1E-03	369.5E-03	370.9E-03	370.2E-03	375.4E-03
Average	364.0E-03	361.7E-03	366.8E-03	367.0E-03	367.0E-03	365.6E-03	372.0E-03
Sigma	1.5E-03	1.9E-03	1.6E-03	1.8E-03	3.0E-03	4.1E-03	3.4E-03
(VBE) Lot WorstCase	368.5E-03	367.4E-03	371.6E-03	372.4E-03	376.1E-03	377.9E-03	382.2E-03

Drift Calculation

VBE2	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-2.49E-03	1.60E-03	1.39E-03	4.39E-03	-4.98E-03	11.10E-03
3	-	-3.84E-03	2.93E-03	3.35E-03	4.75E-03	1.18E-03	9.32E-03
4	-	-3.08E-03	2.91E-03	3.80E-03	2.15E-03	3.26E-03	4.81E-03
5	-	-161.11E-06	3.31E-03	3.57E-03	3.49E-03	5.00E-03	4.91E-03
6	-	-1.88E-03	3.22E-03	2.83E-03	296.50E-06		
Average	-	-2.29E-03	2.80E-03	2.99E-03	3.02E-03	1.12E-03	7.54E-03
Sigma	-	1.25E-03	616.31E-06	861.88E-06	1.63E-03	3.77E-03	2.75E-03
d(VBE) Lot WorstCase	-	1.45E-03	4.64E-03	5.57E-03	7.90E-03	12.42E-03	15.77E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE3
Vce = 2V ; Ic = 100µA
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



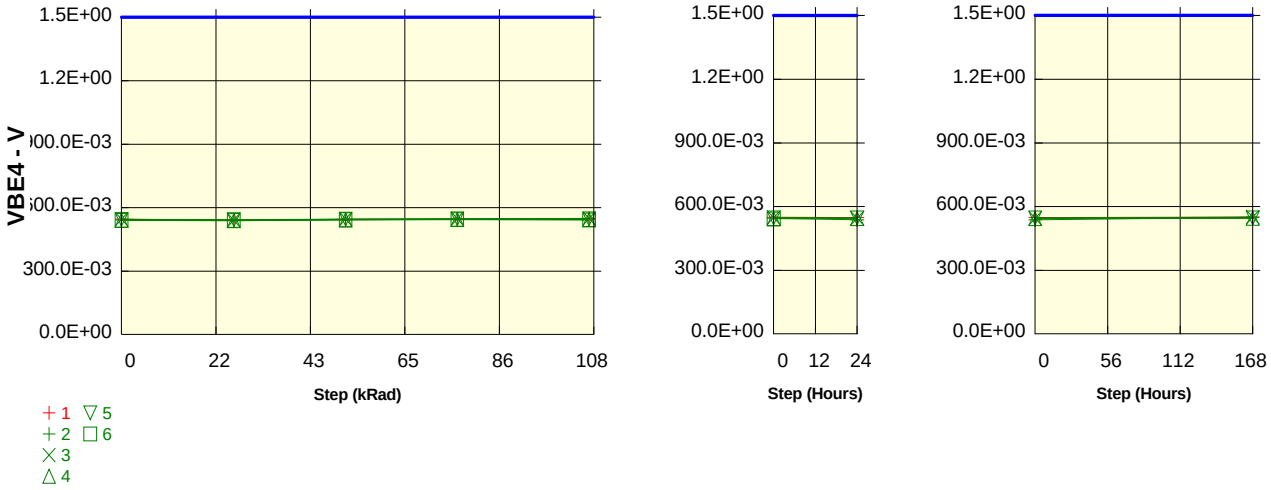
Measurements

VBE3	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	484.8E-03	480.5E-03	484.5E-03	485.6E-03	490.1E-03	489.1E-03	493.2E-03
ON samples							
2	482.0E-03	480.1E-03	483.7E-03	483.4E-03	486.0E-03	478.1E-03	491.9E-03
3	484.2E-03	481.0E-03	487.1E-03	487.3E-03	488.4E-03	485.6E-03	492.5E-03
4	480.8E-03	478.4E-03	483.6E-03	484.3E-03	482.8E-03	483.9E-03	485.2E-03
5	483.4E-03	483.5E-03	486.6E-03	486.7E-03	486.5E-03	488.0E-03	487.9E-03
6	480.4E-03	478.9E-03	483.4E-03	483.0E-03	480.9E-03		
Statistics							
Min	480.4E-03	478.4E-03	483.4E-03	483.0E-03	480.9E-03	478.1E-03	485.2E-03
Max	484.2E-03	483.5E-03	487.1E-03	487.3E-03	488.4E-03	488.0E-03	492.5E-03
Average	482.2E-03	480.4E-03	484.9E-03	484.9E-03	484.9E-03	483.9E-03	489.4E-03
Sigma	1.5E-03	1.8E-03	1.6E-03	1.7E-03	2.7E-03	3.7E-03	3.0E-03
(VBE) Lot WorstCase	486.6E-03	485.8E-03	489.7E-03	490.1E-03	493.1E-03	494.9E-03	498.3E-03

Drift Calculation

VBE3	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-1.95E-03	1.63E-03	1.41E-03	3.96E-03	-3.97E-03	9.82E-03
3	-	-3.20E-03	2.81E-03	3.06E-03	4.20E-03	1.33E-03	8.25E-03
4	-	-2.44E-03	2.76E-03	3.43E-03	1.98E-03	3.05E-03	4.42E-03
5	-	141.38E-06	3.17E-03	3.30E-03	3.15E-03	4.64E-03	4.52E-03
6	-	-1.50E-03	3.03E-03	2.63E-03	484.17E-06		
Average	-	-1.79E-03	2.68E-03	2.77E-03	2.76E-03	1.26E-03	6.75E-03
Sigma	-	1.12E-03	545.81E-06	731.81E-06	1.38E-03	3.24E-03	2.35E-03
d(VBE) Lot WorstCase	-	1.56E-03	4.32E-03	4.96E-03	6.88E-03	10.99E-03	13.80E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE4
Vce = 2V ; Ic = 1mA
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



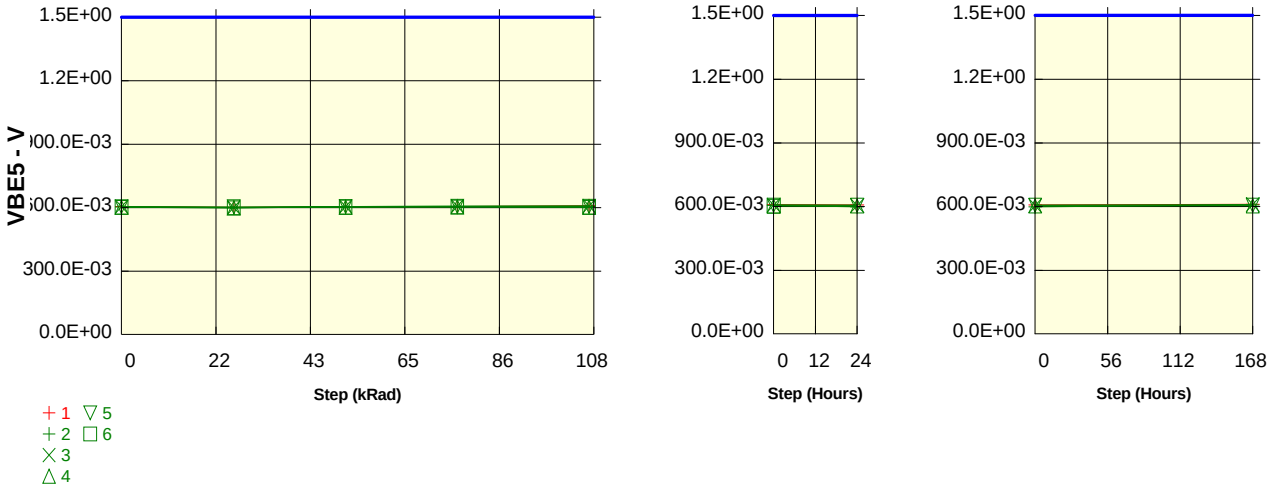
Measurements

VBE4	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	545.6E-03	540.8E-03	544.4E-03	545.8E-03	549.6E-03	547.8E-03	551.2E-03
ON samples							
2	541.4E-03	539.8E-03	542.6E-03	544.0E-03	546.0E-03	538.4E-03	549.5E-03
3	544.8E-03	540.9E-03	546.2E-03	547.4E-03	548.0E-03	545.1E-03	550.8E-03
4	540.6E-03	538.4E-03	542.5E-03	544.2E-03	542.8E-03	543.2E-03	544.0E-03
5	544.2E-03	543.3E-03	545.7E-03	546.8E-03	546.6E-03	547.1E-03	546.7E-03
6	540.0E-03	538.8E-03	542.3E-03	543.2E-03	541.5E-03		
Statistics							
Min	540.0E-03	538.4E-03	542.3E-03	543.2E-03	541.5E-03	538.4E-03	544.0E-03
Max	544.8E-03	543.3E-03	546.2E-03	547.4E-03	548.0E-03	547.1E-03	550.8E-03
Average	542.2E-03	540.2E-03	543.9E-03	545.1E-03	545.0E-03	543.4E-03	547.7E-03
Sigma	1.9E-03	1.8E-03	1.7E-03	1.6E-03	2.5E-03	3.2E-03	2.6E-03
(VBE) Lot WorstCase	548.0E-03	545.6E-03	549.0E-03	550.0E-03	552.3E-03	553.1E-03	555.6E-03

Drift Calculation

VBE4	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-1.60E-03	1.28E-03	2.68E-03	4.60E-03	-2.92E-03	8.16E-03
3	-	-3.88E-03	1.36E-03	2.56E-03	3.24E-03	280.02E-06	5.96E-03
4	-	-2.20E-03	1.92E-03	3.60E-03	2.16E-03	2.56E-03	3.44E-03
5	-	-840.01E-06	1.56E-03	2.60E-03	2.44E-03	2.96E-03	2.52E-03
6	-	-1.24E-03	2.32E-03	3.16E-03	1.48E-03		
Average	-	-1.95E-03	1.69E-03	2.92E-03	2.78E-03	719.99E-06	5.02E-03
Sigma	-	1.06E-03	385.67E-06	402.39E-06	1.07E-03	2.34E-03	2.21E-03
d(VBE) Lot WorstCase	-	1.24E-03	2.84E-03	4.13E-03	5.99E-03	7.73E-03	11.64E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE5
Vce = 2V ; Ic = 10mA
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



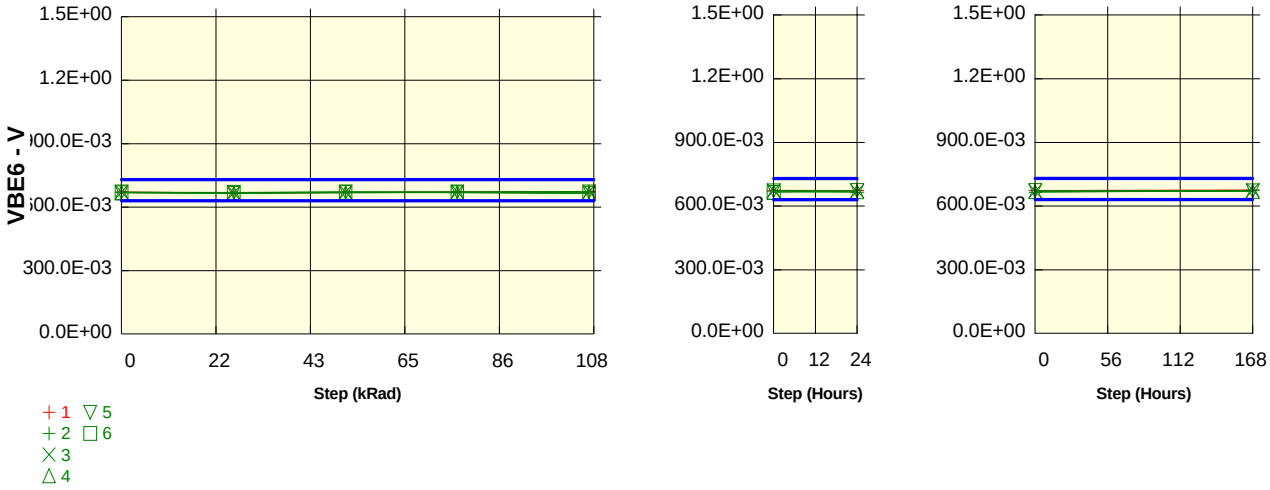
Measurements

VBE5	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	605.5E-03	601.1E-03	604.4E-03	605.7E-03	609.1E-03	607.4E-03	610.5E-03
ON samples							
2	602.4E-03	599.7E-03	602.4E-03	603.6E-03	605.5E-03	598.6E-03	608.6E-03
3	604.8E-03	601.0E-03	605.8E-03	606.8E-03	607.6E-03	604.8E-03	610.0E-03
4	601.6E-03	598.5E-03	602.2E-03	603.8E-03	602.4E-03	602.8E-03	603.6E-03
5	604.2E-03	603.3E-03	605.4E-03	606.4E-03	606.2E-03	606.7E-03	606.3E-03
6	601.2E-03	598.7E-03	602.2E-03	602.8E-03	601.4E-03		
Statistics							
Min	601.2E-03	598.5E-03	602.2E-03	602.8E-03	601.4E-03	598.6E-03	603.6E-03
Max	604.8E-03	603.3E-03	605.8E-03	606.8E-03	607.6E-03	606.7E-03	610.0E-03
Average	602.8E-03	600.2E-03	603.6E-03	604.7E-03	604.6E-03	603.2E-03	607.1E-03
Sigma	1.4E-03	1.8E-03	1.6E-03	1.6E-03	2.3E-03	3.0E-03	2.4E-03
(VBE) Lot WorstCase	607.1E-03	605.5E-03	608.5E-03	609.5E-03	611.6E-03	612.3E-03	614.3E-03

Drift Calculation

VBE5	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-2.72E-03	0.00E+00	1.20E-03	3.08E-03	-3.80E-03	6.16E-03
3	-	-3.84E-03	999.99E-06	2.04E-03	2.76E-03	0.00E+00	5.16E-03
4	-	-3.04E-03	639.98E-06	2.20E-03	880.00E-06	1.28E-03	2.04E-03
5	-	-920.00E-06	1.16E-03	2.16E-03	2.04E-03	2.52E-03	2.12E-03
6	-	-2.52E-03	959.99E-06	1.60E-03	120.04E-06		
Average	-	-2.61E-03	751.98E-06	1.84E-03	1.78E-03	-14.90E-09	3.87E-03
Sigma	-	956.46E-06	412.13E-06	384.50E-06	1.12E-03	2.37E-03	1.82E-03
d(VBE) Lot WorstCase	-	261.38E-06	1.99E-03	2.99E-03	5.14E-03	7.10E-03	9.34E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE6
Vce = 2V ; Ic = 100mA
Unit : V
Spec Limit Min : 630.0E-03
Spec Limit Max : 730.0E-03
Spec limits are represented in bold lines on the graphic.



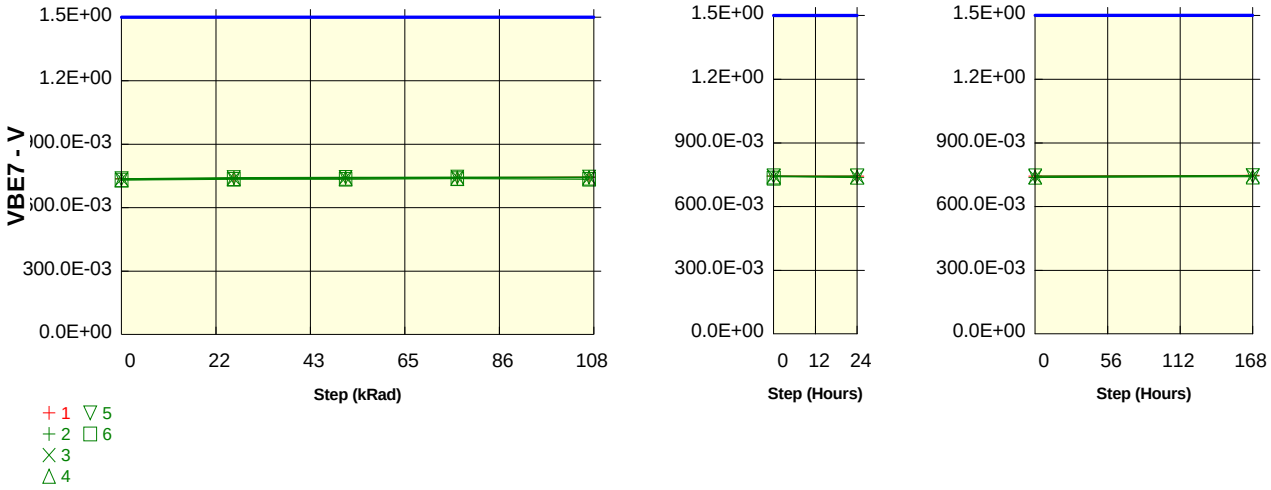
Measurements

VBE6	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	672.0E-03	667.1E-03	668.7E-03	671.2E-03	674.3E-03	672.7E-03	675.6E-03
ON samples							
2	669.2E-03	666.3E-03	668.4E-03	669.2E-03	671.0E-03	664.8E-03	673.6E-03
3	671.1E-03	667.3E-03	671.2E-03	672.2E-03	672.8E-03	670.3E-03	675.0E-03
4	667.8E-03	665.4E-03	667.6E-03	668.9E-03	665.4E-03	668.1E-03	669.0E-03
5	670.9E-03	669.8E-03	671.2E-03	672.1E-03	672.0E-03	672.4E-03	672.1E-03
6	667.3E-03	665.2E-03	670.0E-03	667.9E-03	664.1E-03		
Statistics							
Min	667.3E-03	665.2E-03	667.6E-03	667.9E-03	664.1E-03	664.8E-03	669.0E-03
Max	671.1E-03	669.8E-03	671.2E-03	672.2E-03	672.8E-03	672.4E-03	675.0E-03
Average	669.2E-03	666.8E-03	669.7E-03	670.1E-03	669.1E-03	668.9E-03	672.4E-03
Sigma	1.6E-03	1.7E-03	1.4E-03	1.8E-03	3.6E-03	2.8E-03	2.3E-03
(VBE) Lot WorstCase	664.5E-03	661.7E-03	665.4E-03	664.8E-03	658.3E-03	660.4E-03	665.7E-03

Drift Calculation

VBE6	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-2.84E-03	-720.02E-06	39.99E-06	1.84E-03	-4.40E-03	4.48E-03
3	-	-3.84E-03	79.99E-06	1.12E-03	1.68E-03	-840.01E-06	3.92E-03
4	-	-2.40E-03	-120.04E-06	1.16E-03	-2.32E-03	360.01E-06	1.20E-03
5	-	-1.12E-03	279.96E-06	1.16E-03	1.08E-03	1.44E-03	1.20E-03
6	-	-2.12E-03	2.68E-03	599.98E-06	-3.20E-03		
Average	-	-2.46E-03	439.98E-06	815.99E-06	-184.00E-06	-860.01E-06	2.70E-03
Sigma	-	890.32E-06	1.17E-03	442.25E-06	2.14E-03	2.20E-03	1.51E-03
d(VBE) Lot WorstCase	-	206.94E-06	3.95E-03	2.14E-03	6.23E-03	5.73E-03	7.24E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE7
Vce = 2V ; Ic = 500mA
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



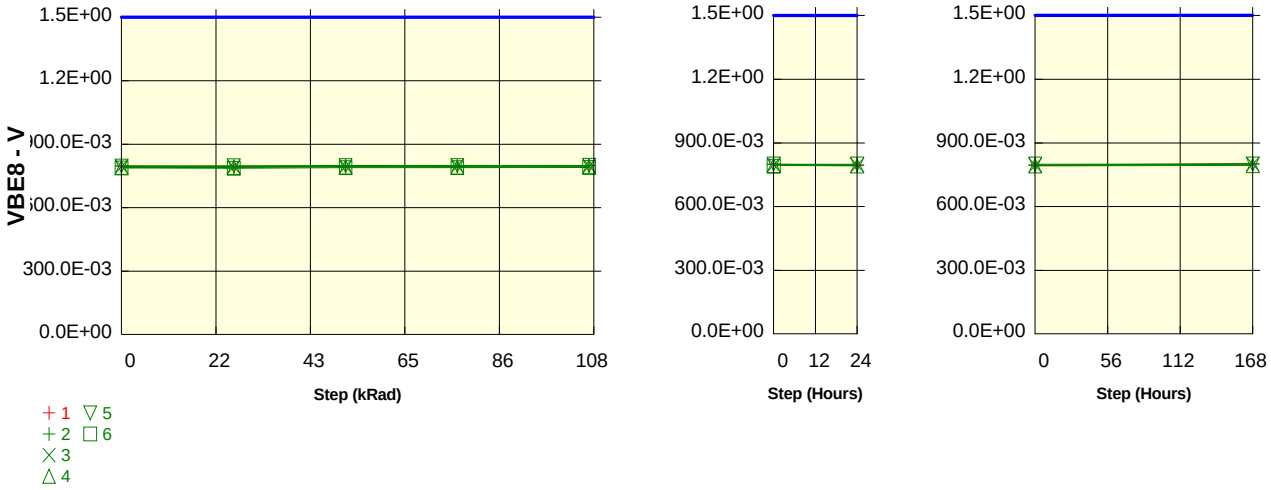
Measurements

VBE7	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	736.9E-03	738.6E-03	741.4E-03	742.0E-03	744.9E-03	743.2E-03	747.7E-03
ON samples							
2	735.2E-03	738.1E-03	741.8E-03	740.4E-03	743.0E-03	737.2E-03	744.8E-03
3	735.5E-03	738.0E-03	742.2E-03	743.0E-03	743.5E-03	740.7E-03	745.7E-03
4	731.7E-03	736.6E-03	738.6E-03	738.4E-03	740.4E-03	738.0E-03	740.2E-03
5	736.4E-03	741.8E-03	743.0E-03	743.8E-03	743.9E-03	744.2E-03	745.3E-03
6	730.3E-03	734.0E-03	734.5E-03	736.8E-03	734.4E-03		
Statistics							
Min	730.3E-03	734.0E-03	734.5E-03	736.8E-03	734.4E-03	737.2E-03	740.2E-03
Max	736.4E-03	741.8E-03	743.0E-03	743.8E-03	743.9E-03	744.2E-03	745.7E-03
Average	733.8E-03	737.7E-03	740.0E-03	740.5E-03	741.0E-03	740.0E-03	744.0E-03
Sigma	2.4E-03	2.5E-03	3.1E-03	2.7E-03	3.6E-03	2.7E-03	2.2E-03
(VBE) Lot WorstCase	740.9E-03	745.3E-03	749.4E-03	748.4E-03	751.7E-03	748.2E-03	750.7E-03

Drift Calculation

VBE7	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	2.92E-03	6.56E-03	5.20E-03	7.80E-03	2.04E-03	9.60E-03
3	-	2.48E-03	6.72E-03	7.52E-03	8.00E-03	5.20E-03	10.24E-03
4	-	4.84E-03	6.84E-03	6.72E-03	8.64E-03	6.32E-03	8.44E-03
5	-	5.40E-03	6.60E-03	7.36E-03	7.52E-03	7.80E-03	8.92E-03
6	-	3.68E-03	4.24E-03	6.48E-03	4.08E-03		
Average	-	3.86E-03	6.19E-03	6.66E-03	7.21E-03	5.34E-03	9.30E-03
Sigma	-	1.11E-03	980.89E-06	824.25E-06	1.61E-03	2.12E-03	681.48E-06
d(VBE) Lot WorstCase	-	7.19E-03	9.13E-03	9.13E-03	12.03E-03	11.69E-03	11.34E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE8
Vce = 2V ; Ic = 1A
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



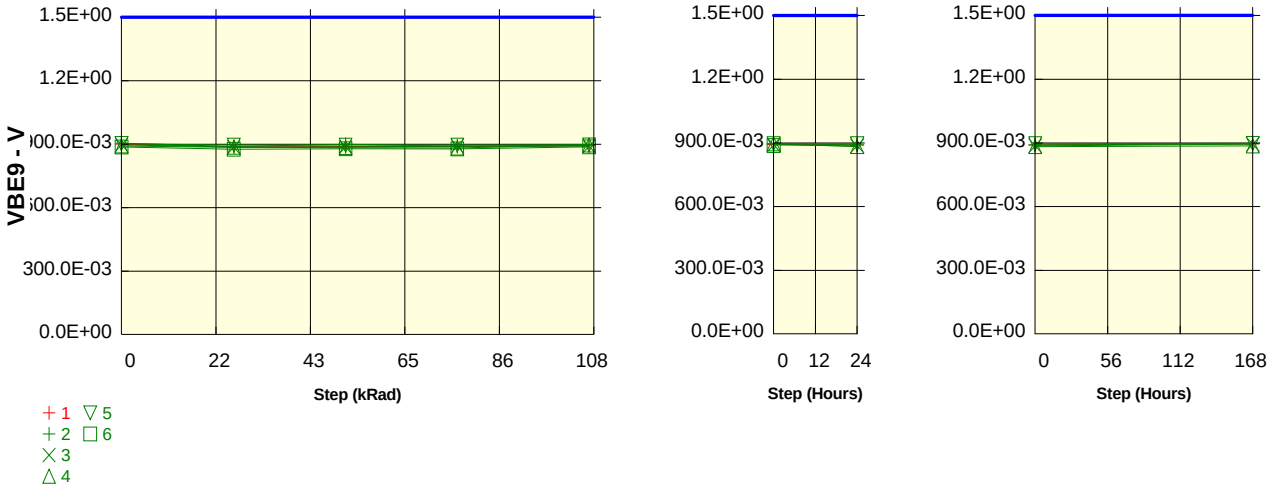
Measurements

VBE8	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	796.5E-03	793.5E-03	795.3E-03	796.4E-03	799.1E-03	797.2E-03	801.2E-03
ON samples							
2	796.4E-03	793.0E-03	799.2E-03	795.4E-03	799.1E-03	793.4E-03	800.1E-03
3	794.3E-03	792.4E-03	795.4E-03	797.2E-03	797.5E-03	794.4E-03	800.1E-03
4	790.0E-03	790.8E-03	792.3E-03	791.4E-03	793.6E-03	791.2E-03	793.4E-03
5	796.7E-03	798.1E-03	798.8E-03	799.4E-03	799.8E-03	799.8E-03	800.6E-03
6	787.3E-03	786.4E-03	788.8E-03	788.8E-03	789.8E-03		
Statistics							
Min	787.3E-03	786.4E-03	788.8E-03	788.8E-03	789.8E-03	791.2E-03	793.4E-03
Max	796.7E-03	798.1E-03	799.2E-03	799.4E-03	799.8E-03	799.8E-03	800.6E-03
Average	792.9E-03	792.1E-03	794.9E-03	794.4E-03	796.0E-03	794.7E-03	798.5E-03
Sigma	3.7E-03	3.8E-03	3.9E-03	3.9E-03	3.7E-03	3.2E-03	3.0E-03
(VBE) Lot WorstCase	804.0E-03	803.5E-03	806.7E-03	806.1E-03	807.2E-03	804.3E-03	807.4E-03

Drift Calculation

VBE8	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-3.40E-03	2.80E-03	-999.98E-06	2.72E-03	-2.92E-03	3.72E-03
3	-	-1.84E-03	1.08E-03	2.96E-03	3.20E-03	159.99E-06	5.84E-03
4	-	759.97E-06	2.28E-03	1.36E-03	3.60E-03	1.16E-03	3.44E-03
5	-	1.44E-03	2.12E-03	2.76E-03	3.12E-03	3.16E-03	3.88E-03
6	-	-919.99E-06	1.52E-03	1.48E-03	2.56E-03		
Average	-	-792.01E-06	1.96E-03	1.51E-03	3.04E-03	389.97E-06	4.22E-03
Sigma	-	1.75E-03	600.25E-06	1.41E-03	368.36E-06	2.20E-03	948.49E-06
d(VBE) Lot WorstCase	-	4.46E-03	3.76E-03	5.75E-03	4.15E-03	6.98E-03	7.07E-03

Test conditions : TID
Parameter : Base-Emitter Voltage : VBE9
Vce = 2V ; Ic = 2A
Unit : V
Spec Limit Max : 1.5E+00
Spec limits are represented in bold lines on the graphic.



Measurements

VBE9	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
1_REF	900.8E-03	887.8E-03	888.4E-03	889.6E-03	892.3E-03	889.9E-03	895.0E-03
ON samples							
2	904.2E-03	889.6E-03	899.0E-03	890.4E-03	896.3E-03	890.5E-03	895.7E-03
3	897.4E-03	885.9E-03	887.7E-03	890.8E-03	890.8E-03	886.5E-03	893.7E-03
4	891.4E-03	885.2E-03	884.1E-03	881.9E-03	895.9E-03	882.2E-03	886.0E-03
5	902.5E-03	895.4E-03	894.9E-03	895.7E-03	896.6E-03	896.0E-03	897.6E-03
6	886.4E-03	876.0E-03	878.5E-03	877.2E-03	887.8E-03		
Statistics							
Min	886.4E-03	876.0E-03	878.5E-03	877.2E-03	887.8E-03	882.2E-03	886.0E-03
Max	904.2E-03	895.4E-03	899.0E-03	895.7E-03	896.6E-03	896.0E-03	897.6E-03
Average	896.4E-03	886.4E-03	888.8E-03	887.2E-03	893.5E-03	888.8E-03	893.3E-03
Sigma	6.7E-03	6.3E-03	7.4E-03	6.7E-03	3.6E-03	5.1E-03	4.4E-03
(VBE) Lot WorstCase	916.4E-03	905.4E-03	910.9E-03	907.2E-03	904.2E-03	904.1E-03	906.5E-03

Drift Calculation

VBE9	0 kRad	25.9 kRad	51.7 kRad	77.5 kRad	107.9 kRad	24 Hours	168 Hours
ON samples							
2	-	-14.52E-03	-5.20E-03	-13.72E-03	-7.84E-03	-13.68E-03	-8.48E-03
3	-	-11.52E-03	-9.72E-03	-6.60E-03	-6.56E-03	-10.88E-03	-3.68E-03
4	-	-6.28E-03	-7.36E-03	-9.52E-03	4.44E-03	-9.20E-03	-5.44E-03
5	-	-7.12E-03	-7.56E-03	-6.80E-03	-5.84E-03	-6.44E-03	-4.84E-03
6	-	-10.36E-03	-7.92E-03	-9.16E-03	1.36E-03		
Average	-	-9.96E-03	-7.55E-03	-9.16E-03	-2.89E-03	-10.05E-03	-5.61E-03
Sigma	-	3.00E-03	1.44E-03	2.57E-03	4.87E-03	2.63E-03	1.77E-03
d(VBE) Lot WorstCase	-	-960.45E-06	-3.22E-03	-1.45E-03	11.71E-03	-2.17E-03	-289.05E-06