Component No 5962R8551401VGA	**Component Designation:** REF02AJQMLR	**Irradiation Spec. No.:** ESCC 22900 Issue 4
Gen. Spec.: MIL-PRF-38535 **Det. Spec.:** 5962-85514 **Amend.:** --	**Evaluation:** X **Acceptance Wafer:** - **Acceptance Lot:** -	**Project/Programme:** LDT (ESA) AO / 1-6172 / 09 / F / WE
Family: 08 / **Group:** 10	**Functional Assignment:** +5V Adjustable Precision Voltage Reference.	**Package:** CAN-8
Manuf.Name: ANALOG DEVICES **Address:** USA	**Test House:** ATN **Address:** SEVILLA (SPAIN)	**Orig.house:** ATN **Address:** SEVILLA (SPAIN)
Radiation Test Plan No.: ATGSP-RP-73 Iss1	**Sample Size:** 22 **Irradiation Devices:** 20 **Control Devices:** 2	**Date Code:** 0218A **Wafer Lot:** F46683
Radiation Source: Cobalt-60 **Facility Name:** ESA (ESTEC) **Address:** NOORDWIJK (HOLLAND)	**Energy:** 1.33/1.17 MeV **Dose Rate:** 35.4 & 323.7 rad(Si)/h	**Interest level**: 100krad(Si) **Maximum Test Level:** 100krad(Si)
Irradiation Conditions: **Biased:** X (10 samples) **Unbiased:** X (10 samples) **Test Circuit:** Figure 1	**Irradiation Measurements** **Interval:** **Remote test:** X **In situ Test:** --	**Annealing Tests:** 24h@25ºC, 168h@100ºC **Biased:** X (10 samples) **Unbiased:**X (10 samples) **Test Circuit:** Figure 1

Electrical Measurements. Parameters Tested:

I_{SY}, V_O, I_{OS}, LD reg, LN reg.

Prepared by.: Antonio Romero Mallén **Date:** 2012/11/12 **Signature:**	**Approved by.:** Eugenio Muñoz Plaza **Date:** 2012/11/12 **Signature:**

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DOCUMENT CHANGE CONTROL

Edition / Revision	Date	Affected Edition / Revision	Affected Paragraph / Modification
ATN-RR-007/2012 Iss.1	2012/07/27	--	First edition of this document.
ATN-RR-007/2012 Iss.2	2012/11/12	ATN-RR-007/2012 Iss.1	Footer on the pages updated with new issue of document format. Company's logo updated. Test house name updated.

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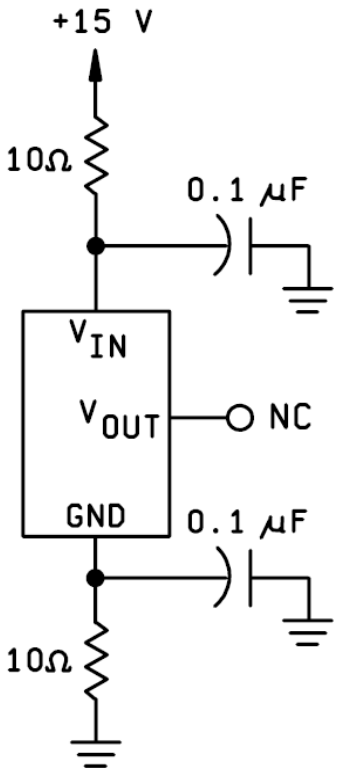
FIGURE 1.-RADIATION BIAS CIRCUITS



Notes:

1. Ten parts(5 ELDR+5 LDR) were irradiated biased ON, in accordance with the radiation bias circuit shown in Figure 1.
2. Ten parts(5 ELDR+ 5 LDR) were irradiated biased OFF: the pins are short circuited and connected to ground.

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SUMMARY

In order to evaluate the behaviour of the samples between ELDR, LDR, ON and OFF biased, a total dose steady-state irradiation test has been carried out on an Adjustable Precision Voltage Reference, manufactured by Analog Devices, USA. The test was performed using two dose rate (35.4 rad(Si)/h and 323.7rad (Si)/h) until a total accumulated dose of 100krad(Si). The irradiated parts were labelled as follows:

Serial Number		Bias condition	Dose rate
R1	573	Control device	ELDR
R2	574	ON	
R3	575		
R4	576		
R5	579		
R6	580		
R7	581	OFF	
R8	583		
R9	584		
R10	585		
R11	586		
R1	561	Control device	LDR
R2	562	ON	
R3	563		
R4	564		
R5	565		
R6	566		
R7	567	OFF	
R8	569		
R9	570		
R10	571		
R11	572		

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RESULTS

The next table shows a resume of the irradiation test results.

ELDR									
	0Krad	6Krad	13Krad	20Krad	30Krad	50Krad	100Krad	ANN24	ANN168
I_{SY}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V_O	PASS	PASS	PASS	PASS	PASS	PASS	(1)	(1)	PASS
I_{OS}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
LD reg	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	(1)
LN reg	PASS	PASS	PASS	PASS	(1)	(1)	(1)	(1)	PASS
LDR									
	0Krad	6Krad	13Krad	20Krad	30Krad	50Krad	100Krad	ANN24	ANN168
I_{SY}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V_O	PASS	PASS	(1)	(1)	(1)	(1)	(1)	(1)	(1)
I_{OS}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
LD reg	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
LN reg	PASS	PASS	PASS	(1)	(1)	(1)	(1)	(1)	PASS

(1) Parameter out of limits.

The values measured and graphs with the evolution of the previous parameters during the irradiation test and annealing sequence are available in ANNEX I.

CONCLUSION

The results obtained during the irradiation test, show that this lot is sensitive to the cumulative radiation dose when tested at dose rates of 35.4 rad(Si)/h and 323.7 rad(Si)/h up to a cumulative dose of 100krad(Si).

The most affected parameters are the Vo and VRLINE. The Vo parameter starts to be out of limits at the 13krad step and VRLINE parameter, at the 20krad step. The VRLOAD doesn't show a high deviation vs total dose, although the serial number R2 is out of limits at the ANN168 step. The samples tend to recover their initial values during the annealing process.

In general, the samples show a higher degradation in the samples biased OFF that the samples biased ON.

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SCHEDULE

ELDR Average Dose Rate (1)	LDR Average Dose Rate (2)	Cummulative ELDR Total Dose	ELDR Measurement date	Cummulative LDR Total Dose	LDR Measurement date	Step Deviation ELDR vs LDR (%)
rad(Si)/h	rad(Si)/h	krad(Si)	--	krad(Si)	--	
--	--	0	2012/02/15	0	2012/06/04	--
35.41	323.7	5240	2012/02/21	5707	2012/06/05	8.9
		12168	2012/02/29	13362	2012/06/06	9.8
		19201	2012/03/08	20644	2012/06/07	7.5
		28612	2012/03/19	28167	2012/06/08	-1.5
		48417	2012/04/11	48498	2012/06/11	0.1
		106074	2012/06/18	102360	2012/06/18	-3.7
Annealing						
ann24h @25ºC	24	--	2012/06/19	--	2012/06/19	
ann168h @100ºC	168	--	2012/06/26	--	2012/06/26	

(1) The minimum and maximum dose rate registered were 18.6rad (Si)/h and 38.9rad (Si)/h respectively.
(2) The minimum and maximum dose rate registered were 271.2 rad(Si)/h and 360.6 rad(Si)/h respectively.

ELECTRICAL MEASUREMENTS EQUIPMENT LIST

REF INVENT	DESCRIPTION	MFR	MODEL	CALIBRATION DUE	USAGE
LE0124.000	UNIVERSAL TEST SYSTEM	SZ	M-3000	2012/08/15	0,6,13,20,35,50,100Krad, ANN24, ANN168
N/A	TEST ADAPTER	SZ	UNIVERSAL FRONT ADAPTER	--	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0080.015	MATRIX	SZ	SMX32B	--	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0351.000	MULTIMETER	KEITHLEY	2001	2012/09/26	0,6,13,20,35,50,100Krad, ANN24, ANN168

Note 1: This part type was measured with a Universal Test Adapter with serial number 913842 propriety of ESA.

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ANNEX I
ELECTRICAL MEASUREMENTS GRAPHS

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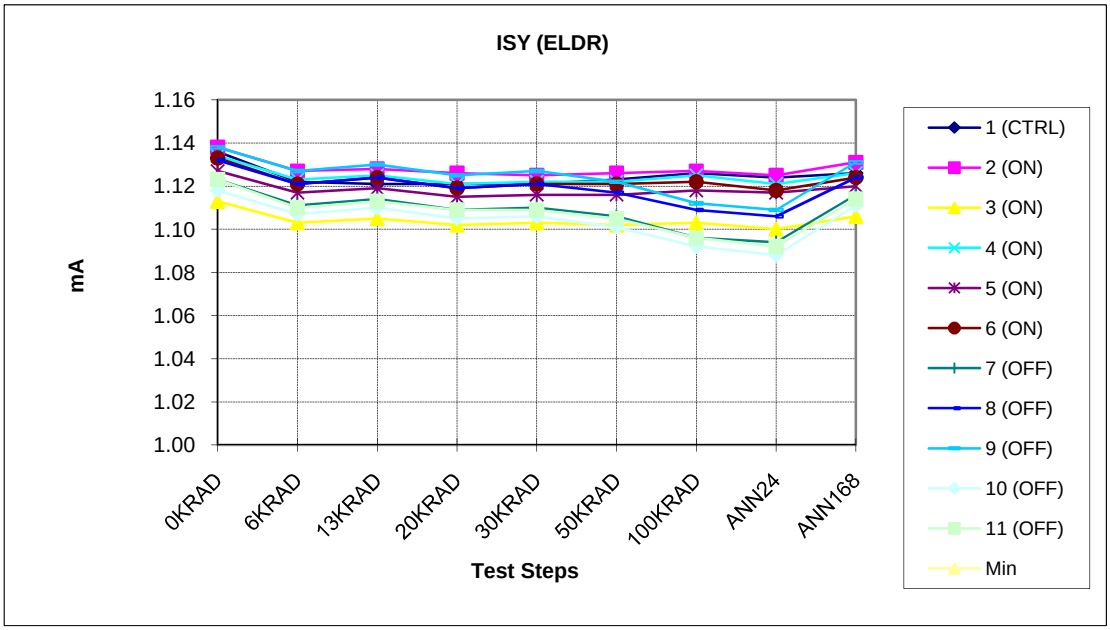
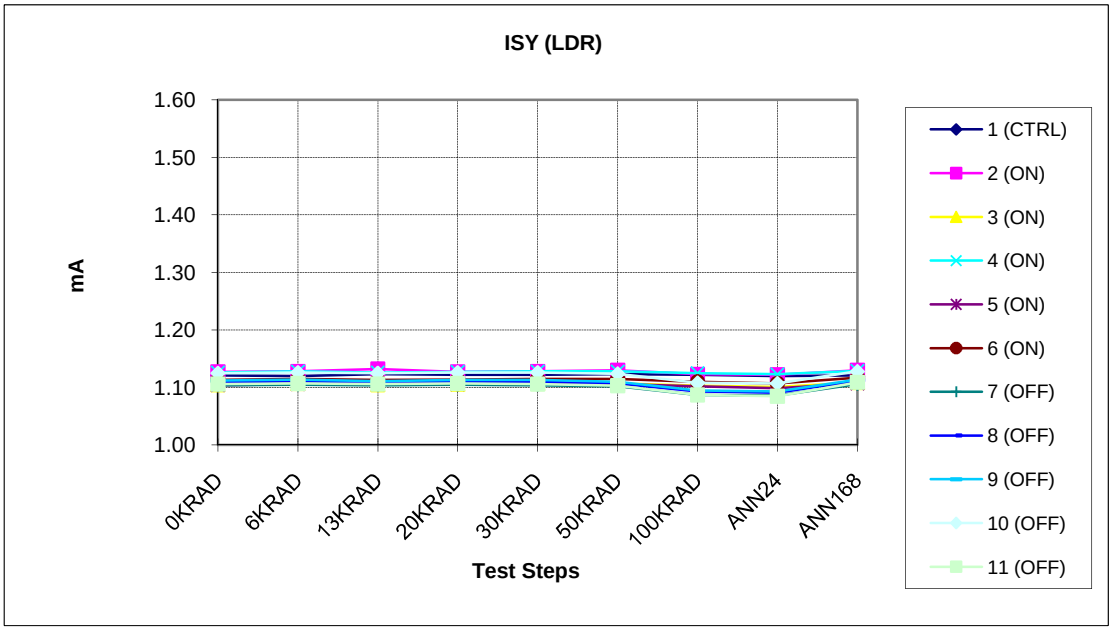


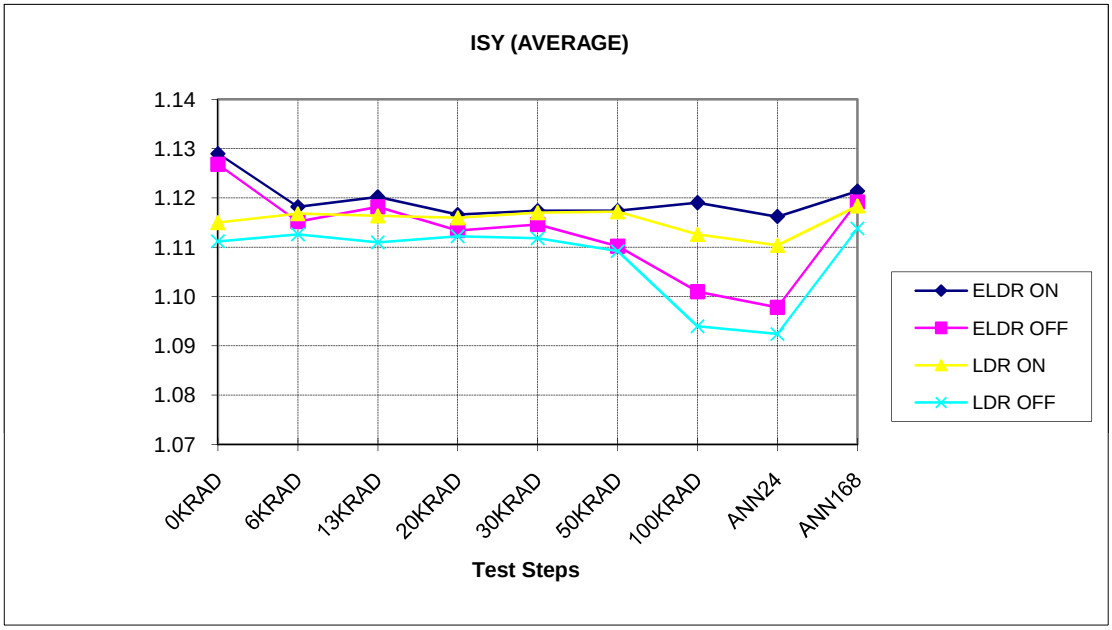
ISY (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Max	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**
Unit	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**
Control Results									
1 (CTRL)	1.136	1.122	1.121	1.121	1.121	1.123	1.126	1.124	1.126
Bias on results									
2 (ON)	1.138	1.127	1.128	1.126	1.125	1.126	1.127	1.125	1.131
3 (ON)	1.113	1.103	1.105	1.102	1.103	1.102	1.103	1.1	1.106
4 (ON)	1.134	1.123	1.125	1.121	1.122	1.122	1.125	1.121	1.126
5 (ON)	1.127	1.117	1.119	1.115	1.116	1.116	1.118	1.117	1.12
6 (ON)	1.133	1.121	1.124	1.119	1.121	1.121	1.122	1.118	1.124
Statistics bias on									
min result	1.113	1.103	1.105	1.102	1.103	1.102	1.103	1.100	1.106
max result	1.138	1.127	1.128	1.126	1.125	1.126	1.127	1.125	1.131
average	1.129	1.118	1.120	1.117	1.117	1.117	1.119	1.116	1.121
sigma	0.010	0.009	0.009	0.009	0.009	0.009	0.010	0.010	0.009
Bias off results									
7 (OFF)	1.123	1.111	1.114	1.109	1.11	1.106	1.096	1.094	1.116
8 (OFF)	1.132	1.121	1.124	1.119	1.121	1.117	1.109	1.106	1.124
9 (OFF)	1.138	1.127	1.13	1.125	1.127	1.122	1.112	1.109	1.131
10 (OFF)	1.118	1.107	1.11	1.105	1.106	1.101	1.092	1.088	1.111
11 (OFF)	1.123	1.11	1.113	1.109	1.109	1.105	1.096	1.092	1.114
Statistics bias off									
min result	1.118	1.107	1.110	1.105	1.106	1.101	1.092	1.088	1.111
max result	1.138	1.127	1.130	1.125	1.127	1.122	1.112	1.109	1.131
average	1.127	1.115	1.118	1.113	1.115	1.110	1.101	1.098	1.119
sigma	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.008



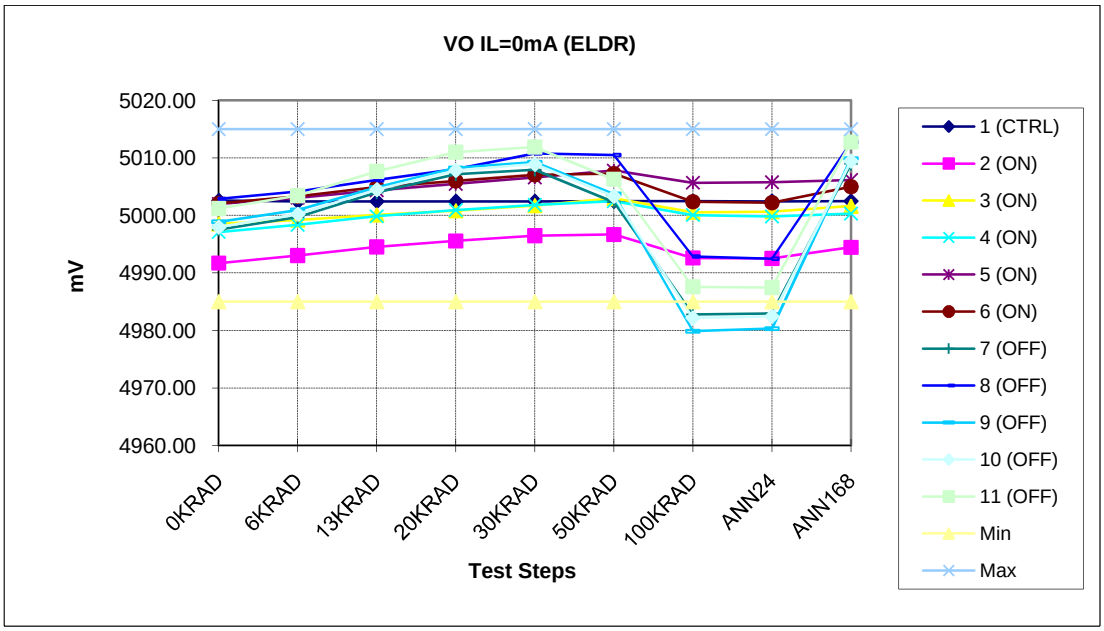
ISY (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Max	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**	**1.4**
Unit	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**
Control Results									
1 (CTRL)	1.121	1.12	1.123	1.122	1.122	1.123	1.122	1.12	1.121

Bias on results									
2 (ON)	1.127	1.128	1.132	1.127	1.128	1.13	1.123	1.122	1.13
3 (ON)	1.105	1.107	1.105	1.106	1.107	1.107	1.103	1.101	1.109
4 (ON)	1.126	1.128	1.126	1.127	1.128	1.128	1.125	1.123	1.129
5 (ON)	1.104	1.106	1.106	1.106	1.107	1.106	1.102	1.099	1.107
6 (ON)	1.113	1.115	1.113	1.114	1.115	1.115	1.11	1.107	1.117
Statistics bias on									
min result	1.104	1.106	1.105	1.106	1.107	1.106	1.102	1.099	1.107
max result	1.127	1.128	1.132	1.127	1.128	1.130	1.125	1.123	1.130
average	1.115	1.117	1.116	1.116	1.117	1.117	1.113	1.110	1.118
sigma	0.011	0.011	0.012	0.011	0.011	0.011	0.011	0.011	0.011

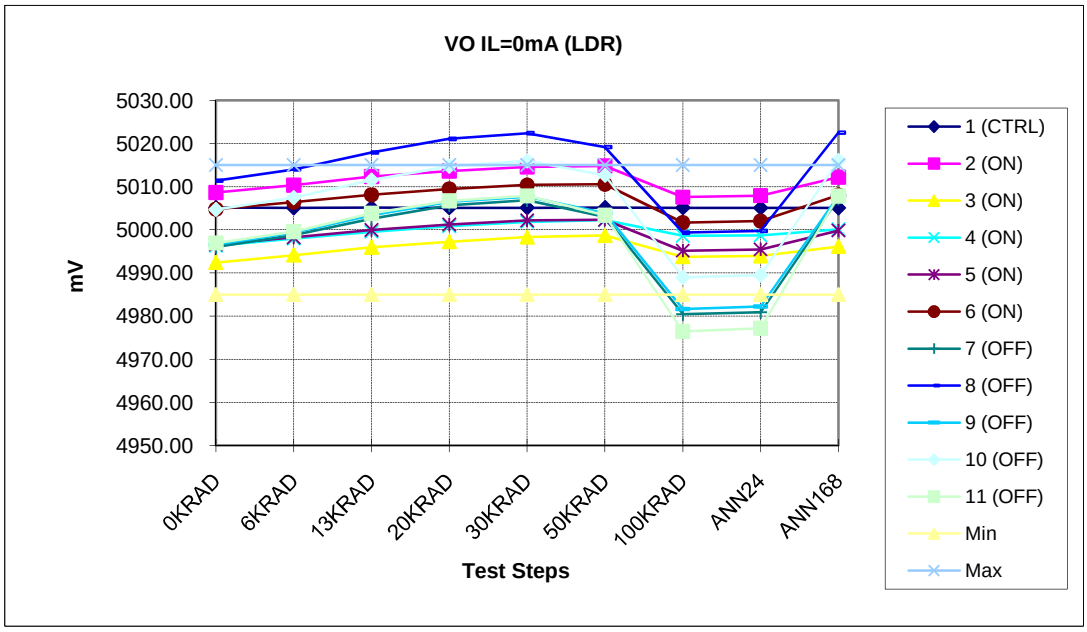
Bias off results									
7 (OFF)	1.104	1.105	1.104	1.105	1.104	1.102	1.087	1.086	1.106
8 (OFF)	1.109	1.111	1.109	1.11	1.11	1.107	1.093	1.091	1.112
9 (OFF)	1.112	1.114	1.111	1.113	1.113	1.11	1.095	1.093	1.114
10 (OFF)	1.125	1.126	1.125	1.126	1.126	1.124	1.108	1.107	1.128
11 (OFF)	1.106	1.107	1.106	1.107	1.106	1.103	1.087	1.085	1.109
Statistics bias off									
min result	1.104	1.105	1.104	1.105	1.104	1.102	1.087	1.085	1.106
max result	1.125	1.126	1.125	1.126	1.126	1.124	1.108	1.107	1.128
average	1.111	1.113	1.111	1.112	1.112	1.109	1.094	1.092	1.114
sigma	0.008	0.008	0.008	0.008	0.009	0.009	0.009	0.009	0.008



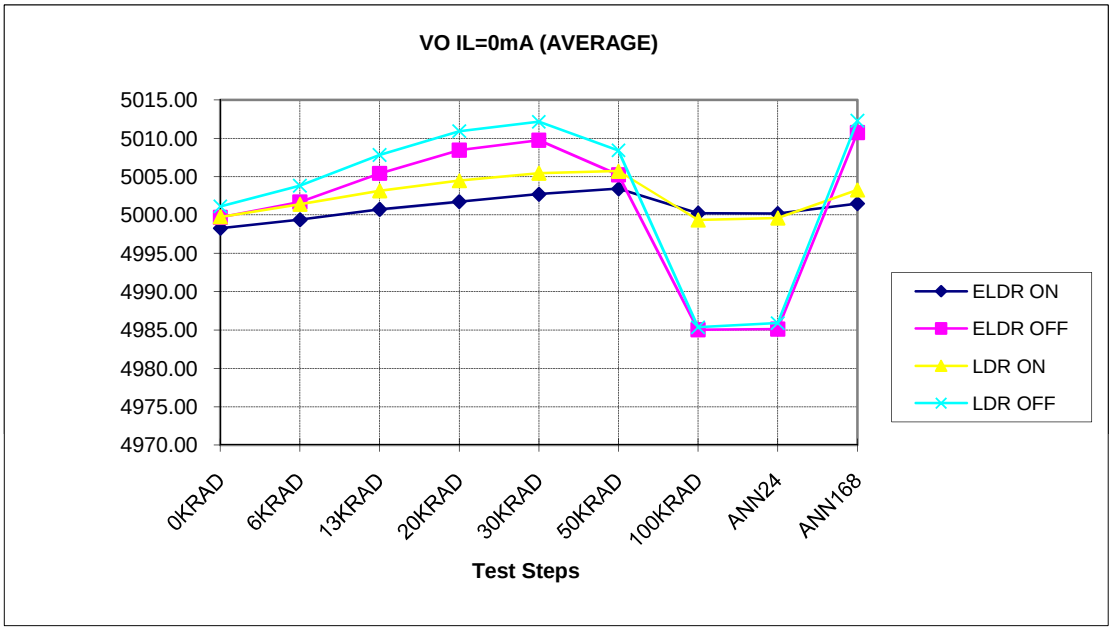
ISY (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	1.129	1.118	1.120	1.117	1.117	1.117	1.119	1.116	1.121
ELDR OFF	1.127	1.115	1.118	1.113	1.115	1.110	1.101	1.098	1.119
LDR ON	1.115	1.117	1.116	1.116	1.117	1.117	1.113	1.110	1.118
LDR OFF	1.111	1.113	1.111	1.112	1.112	1.109	1.094	1.092	1.114



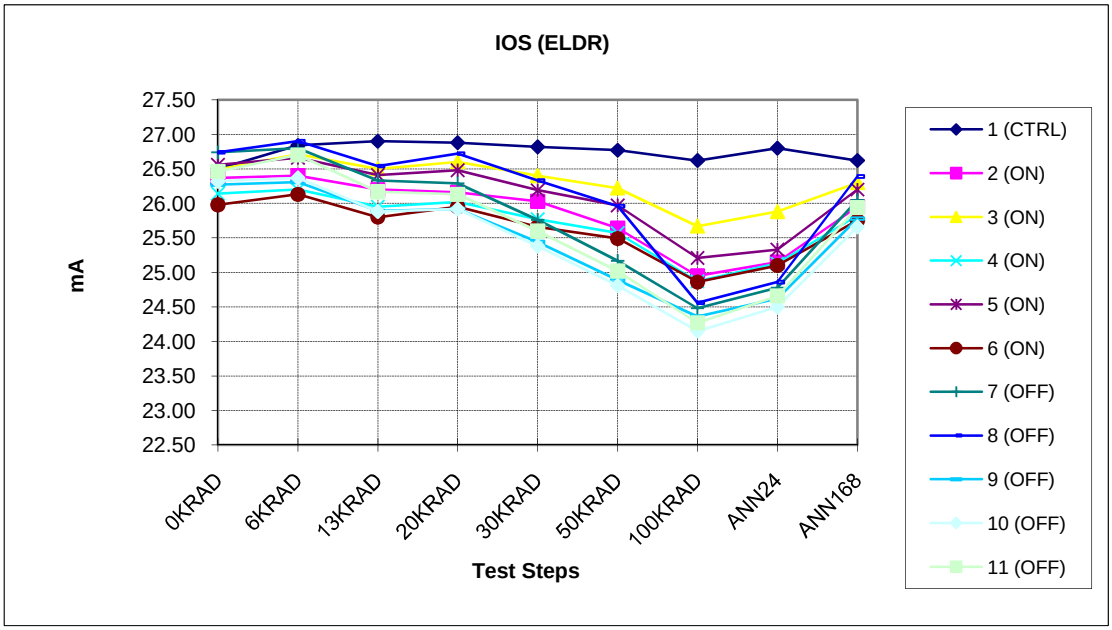
VO IL=0mA (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**
Max	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**
Unit	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**
Control Results									
1 (CTRL)	5002.58	5002.42	5002.4	5002.42	5002.42	5002.47	5002.45	5002.44	5002.46
Bias on results									
2 (ON)	4991.7	4993.02	4994.5	4995.55	4996.46	4996.66	4992.59	4992.5	4994.44
3 (ON)	4998.52	4999.19	5000.09	5000.82	5001.71	5002.95	5000.5	5000.66	5001.61
4 (ON)	4997.1	4998.35	4999.83	5000.91	5001.81	5002.48	5000.05	4999.81	5000.3
5 (ON)	5001.96	5003.05	5004.37	5005.45	5006.59	5007.79	5005.67	5005.76	5006.15
6 (ON)	5002.07	5003.3	5004.9	5005.96	5007.01	5007.24	5002.35	5002.19	5004.98
Statistics bias on									
min result	4991.700	4993.020	4994.500	4995.550	4996.460	4996.660	4992.590	4992.500	4994.440
max result	5002.070	5003.300	5004.900	5005.960	5007.010	5007.790	5005.670	5005.760	5006.150
average	4998.270	4999.382	5000.738	5001.738	5002.716	5003.424	5000.232	5000.184	5001.496
sigma	4.262	4.195	4.203	4.226	4.313	4.486	4.810	4.861	4.611
Bias off results									
7 (OFF)	4997.5	4999.7	5003.97	5007.15	5007.93	5002.33	4982.76	4982.97	5008.99
8 (OFF)	5002.87	5004.13	5006.12	5008.03	5010.76	5010.49	4992.85	4992.47	5012.72
9 (OFF)	4998.88	5000.94	5004.88	5008.24	5009.24	5003.72	4979.86	4980.31	5009.87
10 (OFF)	4997.94	5000.2	5004.49	5007.83	5008.9	5003.32	4982.14	4982.43	5009.45
11 (OFF)	5001.21	5003.4	5007.63	5011	5011.87	5006.28	4987.59	4987.47	5012.74
Statistics bias off									
min result	4997.500	4999.700	5003.970	5007.150	5007.930	5002.330	4979.860	4980.310	5008.990
max result	5002.870	5004.130	5007.630	5011.000	5011.870	5010.490	4992.850	4992.470	5012.740
average	4999.680	5001.674	5005.418	5008.450	5009.740	5005.228	4985.040	4985.130	5010.754
sigma	2.288	1.976	1.469	1.483	1.566	3.283	5.195	4.862	1.830



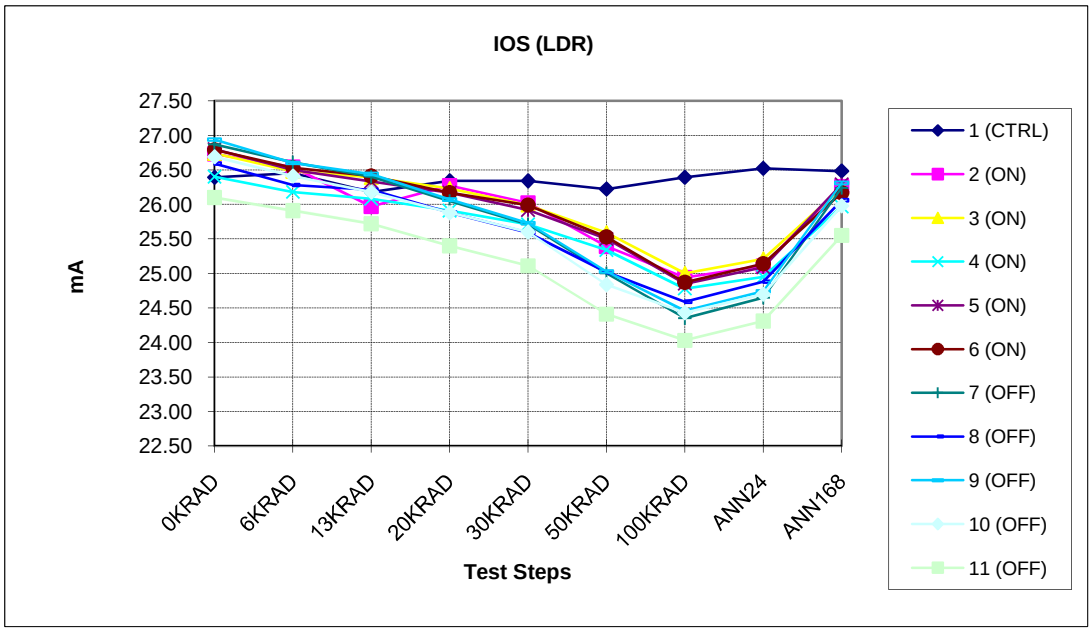
VO IL=0mA (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**	**4985**
Max	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**	**5015**
Unit	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**	**mV**
Control Results									
1 (CTRL)	5005.11	5005.08	5005.13	5005.09	5005.09	5005.12	5005.09	5005.04	5005.06
Bias on results									
2 (ON)	5008.62	5010.32	5012.32	5013.59	5014.54	5014.8	5007.56	5007.92	5012.2
3 (ON)	4992.42	4994.12	4995.94	4997.23	4998.3	4998.67	4993.73	4993.91	4996.1
4 (ON)	4996.34	4997.94	4999.54	5000.85	5001.84	5002.22	4998.62	4998.7	5000.09
5 (ON)	4996.59	4998.22	4999.93	5001.22	5002.2	5002.35	4995.16	4995.46	4999.84
6 (ON)	5004.75	5006.38	5008.09	5009.44	5010.38	5010.54	5001.64	5002.01	5008.03
Statistics bias on									
min result	4992.420	4994.120	4995.940	4997.230	4998.300	4998.670	4993.730	4993.910	4996.100
max result	5008.620	5010.320	5012.320	5013.590	5014.540	5014.800	5007.560	5007.920	5012.200
average	4999.744	5001.396	5003.164	5004.466	5005.452	5005.716	4999.342	4999.600	5003.252
sigma	6.690	6.698	6.780	6.782	6.739	6.689	5.530	5.598	6.627
Bias off results									
7 (OFF)	4996.04	4998.76	5002.57	5005.65	5006.87	5003.03	4980.43	4980.9	5007.21
8 (OFF)	5011.39	5014	5017.88	5021.06	5022.39	5019.15	4999.33	4999.73	5022.48
9 (OFF)	4996.56	4999.37	5003.34	5006.47	5007.65	5003.86	4981.61	4982.22	5007.87
10 (OFF)	5004.68	5007.45	5011.52	5014.73	5015.95	5012.67	4988.95	4989.48	5016.08
11 (OFF)	4996.94	4999.56	5003.83	5006.72	5007.86	5003.39	4976.46	4977.18	5007.82
Statistics bias off									
min result	4996.040	4998.760	5002.570	5005.650	5006.870	5003.030	4976.460	4977.180	5007.210
max result	5011.390	5014.000	5017.880	5021.060	5022.390	5019.150	4999.330	4999.730	5022.480
average	5001.122	5003.828	5007.828	5010.926	5012.144	5008.420	4985.356	4985.902	5012.292
sigma	6.749	6.715	6.679	6.756	6.816	7.217	9.023	8.926	6.774



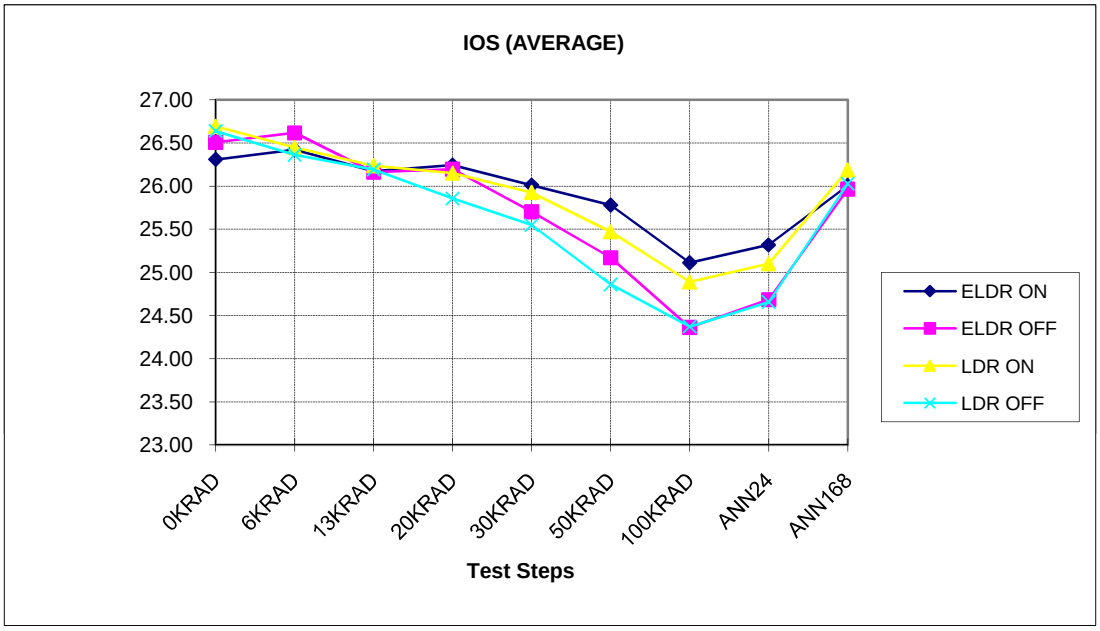
VO IL=0mA (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	4998.270	4999.382	5000.738	5001.738	5002.716	5003.424	5000.232	5000.184	5001.496
ELDR OFF	4999.680	5001.674	5005.418	5008.450	5009.740	5005.228	4985.040	4985.130	5010.754
LDR ON	4999.744	5001.396	5003.164	5004.466	5005.452	5005.716	4999.342	4999.600	5003.252
LDR OFF	5001.122	5003.828	5007.828	5010.926	5012.144	5008.420	4985.356	4985.902	5012.292



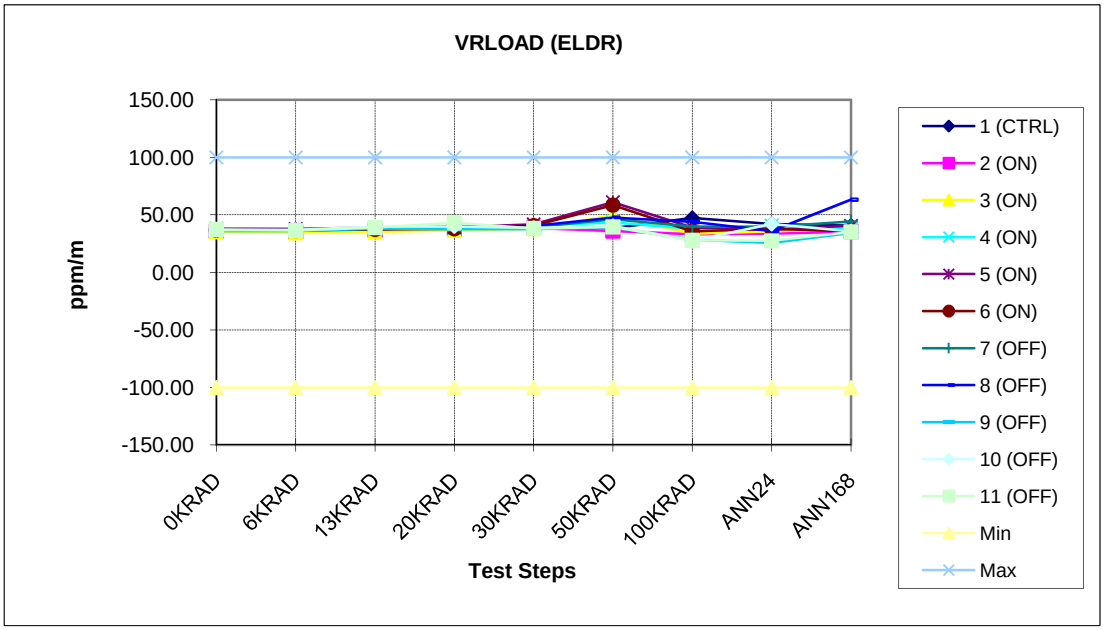
IOS (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
Max	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**
Unit	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**
Control Results									
1 (CTRL)	26.5	26.84	26.9	26.88	26.82	26.77	26.62	26.8	26.62
Bias on results									
2 (ON)	26.37	26.4	26.2	26.16	26.03	25.64	24.95	25.15	25.95
3 (ON)	26.49	26.71	26.5	26.6	26.4	26.22	25.67	25.88	26.3
4 (ON)	26.14	26.2	25.95	26.02	25.77	25.57	24.87	25.13	25.82
5 (ON)	26.56	26.66	26.41	26.48	26.19	25.97	25.21	25.33	26.2
6 (ON)	25.98	26.13	25.8	25.95	25.66	25.49	24.86	25.1	25.75
Statistics bias on									
min result	25.980	26.130	25.800	25.950	25.660	25.490	24.860	25.100	25.750
max result	26.560	26.710	26.500	26.600	26.400	26.220	25.670	25.880	26.300
average	26.308	26.420	26.172	26.242	26.010	25.778	25.112	25.318	26.004
sigma	0.243	0.262	0.297	0.286	0.302	0.307	0.343	0.327	0.238
Bias off results									
7 (OFF)	26.74	26.8	26.33	26.29	25.76	25.17	24.48	24.78	26.05
8 (OFF)	26.74	26.9	26.54	26.72	26.33	25.96	24.56	24.86	26.39
9 (OFF)	26.27	26.31	25.89	25.92	25.44	24.89	24.36	24.62	25.78
10 (OFF)	26.32	26.37	25.88	25.92	25.38	24.81	24.15	24.5	25.66
11 (OFF)	26.46	26.7	26.17	26.13	25.6	25.02	24.27	24.66	25.94
Statistics bias off									
min result	26.270	26.310	25.880	25.920	25.380	24.810	24.150	24.500	25.660
max result	26.740	26.900	26.540	26.720	26.330	25.960	24.560	24.860	26.390
average	26.506	26.616	26.162	26.196	25.702	25.170	24.364	24.684	25.964
sigma	0.225	0.263	0.285	0.332	0.381	0.462	0.163	0.140	0.281



IOS (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**	**15**
Max	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**	**60**
Unit	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**	**mA**
Control Results									
1 (CTRL)	26.39	26.45	26.18	26.34	26.34	26.22	26.39	26.52	26.48
Bias on results									
2 (ON)	26.73	26.54	25.97	26.27	26.02	25.39	24.94	25.11	26.26
3 (ON)	26.74	26.48	26.39	26.23	25.99	25.59	25	25.21	26.24
4 (ON)	26.4	26.18	26.08	25.91	25.71	25.34	24.78	24.95	25.97
5 (ON)	26.8	26.5	26.33	26.17	25.92	25.5	24.85	25.09	26.29
6 (ON)	26.79	26.53	26.41	26.17	25.99	25.53	24.87	25.14	26.17
Statistics bias on									
min result	26.400	26.180	25.970	25.910	25.710	25.340	24.780	24.950	25.970
max result	26.800	26.540	26.410	26.270	26.020	25.590	25.000	25.210	26.290
average	26.692	26.446	26.236	26.150	25.926	25.470	24.888	25.100	26.186
sigma	0.166	0.151	0.199	0.141	0.126	0.103	0.085	0.095	0.129
Bias off results									
7 (OFF)	26.87	26.61	26.4	26.05	25.71	25	24.35	24.65	26.24
8 (OFF)	26.59	26.28	26.21	25.88	25.59	25.02	24.59	24.88	26.06
9 (OFF)	26.94	26.6	26.44	26.07	25.73	25.03	24.46	24.74	26.31
10 (OFF)	26.69	26.41	26.18	25.88	25.6	24.84	24.43	24.7	25.98
11 (OFF)	26.1	25.91	25.72	25.4	25.11	24.41	24.03	24.31	25.55
Statistics bias off									
min result	26.100	25.910	25.720	25.400	25.110	24.410	24.030	24.310	25.550
max result	26.940	26.610	26.440	26.070	25.730	25.030	24.590	24.880	26.310
average	26.638	26.362	26.190	25.856	25.548	24.860	24.372	24.656	26.028
sigma	0.331	0.288	0.286	0.270	0.253	0.263	0.210	0.211	0.298



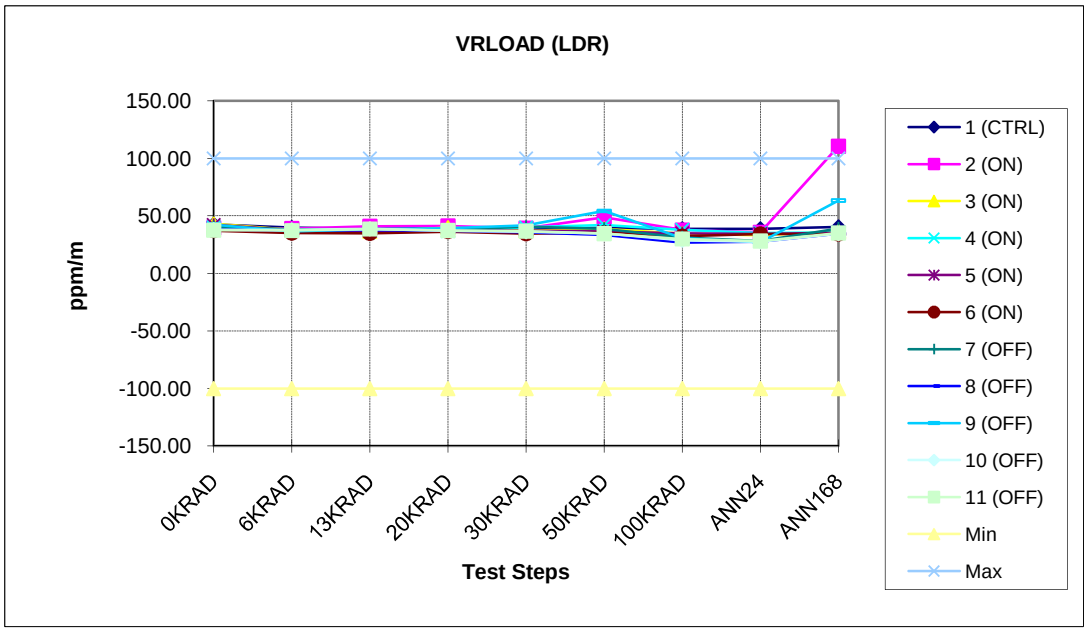
IOS (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	26.308	26.420	26.172	26.242	26.010	25.778	25.112	25.318	26.004
ELDR OFF	26.506	26.616	26.162	26.196	25.702	25.170	24.364	24.684	25.964
LDR ON	26.692	26.446	26.236	26.150	25.926	25.470	24.888	25.100	26.186
LDR OFF	26.638	26.362	26.190	25.856	25.548	24.860	24.372	24.656	26.028



VRLOAD (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	-100	-100	-100	-100	-100	-100	-100	-100	-100
Max	100	100	100	100	100	100	100	100	100
Unit	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA
Control Results									
1 (CTRL)	37.381	37.182	37.382	38.981	39.781	38.381	47.377	41.98	40.58

Bias on results									
2 (ON)	35.859	35.449	36.64	37.233	38.628	35.824	33.049	33.65	35.439
3 (ON)	35.21	34.406	35.399	36.594	37.987	49.571	33.597	35.795	38.188
4 (ON)	38.022	37.412	37.601	38.593	40.785	43.379	37.8	40.801	37.798
5 (ON)	37.985	37.777	38.966	39.157	41.745	61.105	38.956	37.157	40.55
6 (ON)	36.585	36.376	37.363	37.755	40.743	58.515	35.583	37.983	35.565
Statistics bias on									
min result	35.210	34.406	35.399	36.594	37.987	35.824	33.049	33.650	35.439
max result	38.022	37.777	38.966	39.157	41.745	61.105	38.956	40.801	40.550
average	36.732	36.284	37.194	37.866	39.978	49.679	35.797	37.077	37.508
sigma	1.258	1.391	1.310	1.028	1.593	10.492	2.570	2.650	2.113

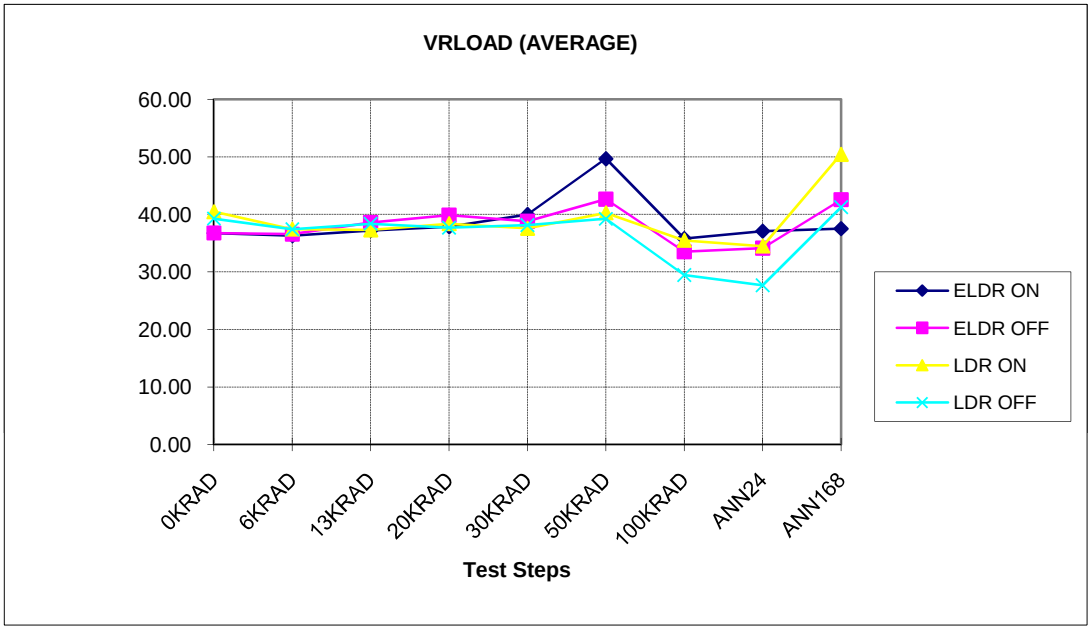
Bias off results									
7 (OFF)	36.818	36.602	37.771	40.343	39.138	46.179	39.737	39.534	44.32
8 (OFF)	36.779	36.77	38.353	38.139	40.513	47.701	43.863	35.853	63.239
9 (OFF)	36.008	35.993	38.163	37.738	37.531	39.371	28.313	25.701	34.332
10 (OFF)	36.815	36.999	39.765	39.938	38.732	40.374	27.699	42.147	35.732
11 (OFF)	37.391	36.375	38.941	43.106	38.11	39.551	27.869	27.468	35.11
Statistics bias off									
min result	36.008	35.993	37.771	37.738	37.531	39.371	27.699	25.701	34.332
max result	37.391	36.999	39.765	43.106	40.513	47.701	43.863	42.147	63.239
average	36.762	36.548	38.599	39.853	38.805	42.635	33.496	34.141	42.547
sigma	0.493	0.385	0.777	2.135	1.134	3.984	7.723	7.278	12.253



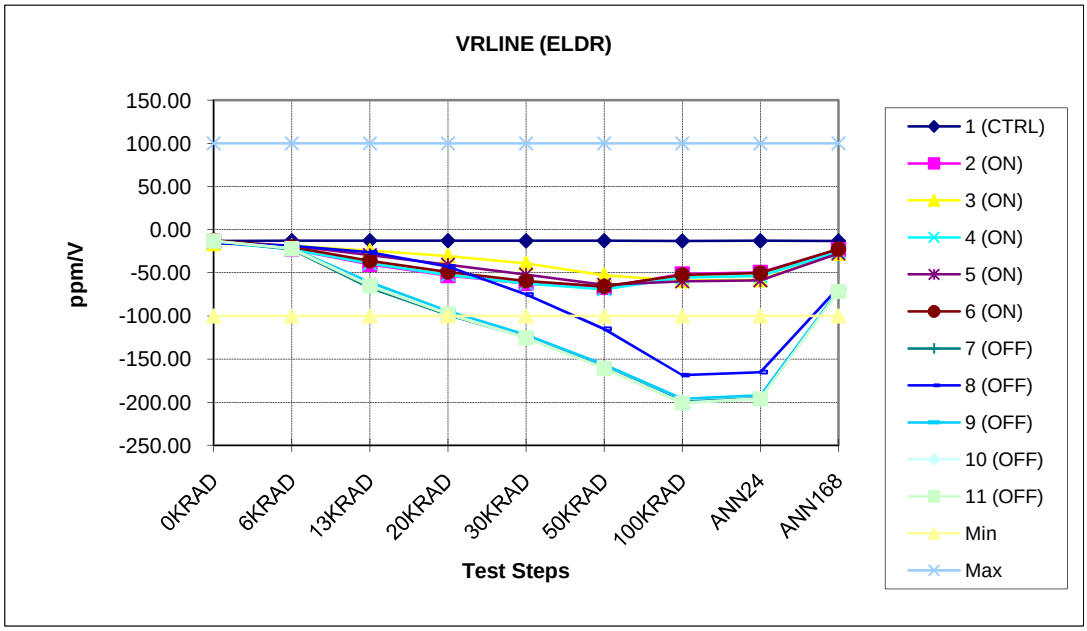
VRLOAD (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	-100	-100	-100	-100	-100	-100	-100	-100	-100
Max	100	100	100	100	100	100	100	100	100
Unit	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA	ppm/mA
Control Results									
1 (CTRL)	42.556	39.76	38.76	39.56	38.96	39.559	38.761	38.761	40.359

Bias on results									
2 (ON)	39.532	39.119	40.899	41.288	39.286	48.656	37.743	35.743	110.531
3 (ON)	43.065	37.845	36.63	39.822	37.013	38.81	34.643	33.04	36.628
4 (ON)	40.23	37.415	37.203	36.794	39.985	41.981	37.81	35.209	35.599
5 (ON)	42.229	37.613	37.001	37.591	36.984	36.583	34.834	34.231	35.401
6 (ON)	37.165	35.155	34.744	36.331	34.528	35.325	32.389	34.186	34.145
Statistics bias on									
min result	37.165	35.155	34.744	36.331	34.528	35.325	32.389	33.040	34.145
max result	43.065	39.119	40.899	41.288	39.985	48.656	37.810	35.743	110.531
average	40.444	37.429	37.295	38.365	37.559	40.271	35.484	34.482	50.461
sigma	2.328	1.435	2.238	2.114	2.161	5.325	2.303	1.043	33.592

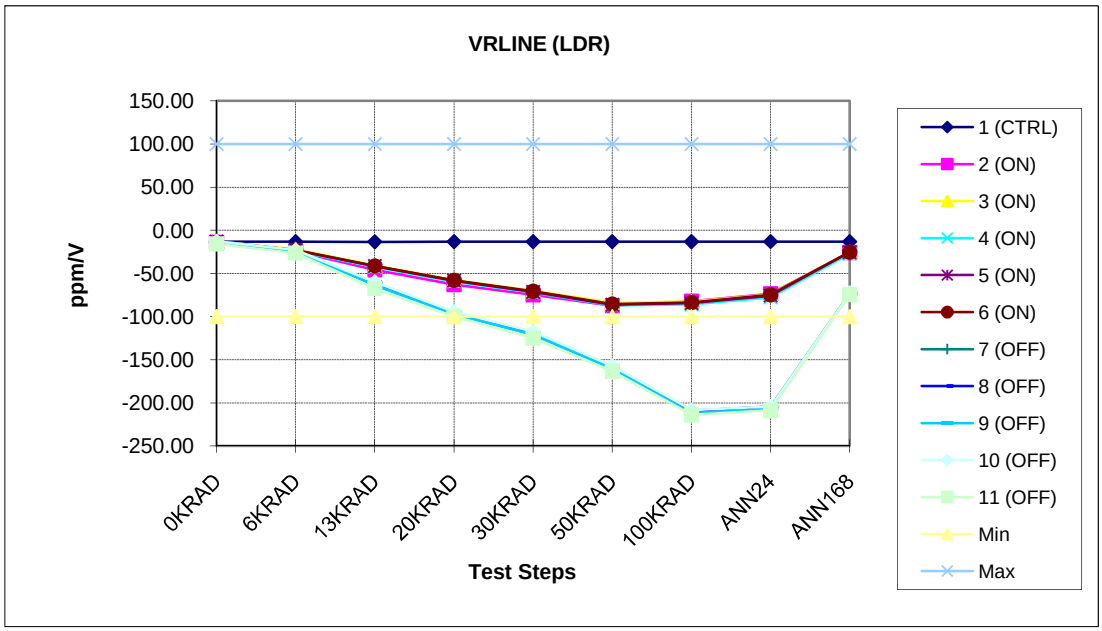
Bias off results									
7 (OFF)	40.232	38.41	38.381	37.758	40.545	38.777	31.121	28.107	38.944
8 (OFF)	38.113	37.296	37.666	37.044	35.641	33.472	26.803	27.601	34.445
9 (OFF)	42.429	36.405	38.575	39.15	41.736	54.358	30.712	27.096	63.3
10 (OFF)	37.964	37.744	38.711	37.091	36.085	34.911	28.662	27.457	34.489
11 (OFF)	37.623	37.203	38.571	37.35	36.742	34.577	29.94	28.128	35.145
Statistics bias off									
min result	37.623	36.405	37.666	37.044	35.641	33.472	26.803	27.096	34.445
max result	42.429	38.410	38.711	39.150	41.736	54.358	31.121	28.128	63.300
average	39.272	37.412	38.381	37.679	38.150	39.219	29.448	27.678	41.265
sigma	2.041	0.738	0.416	0.870	2.790	8.697	1.750	0.442	12.458



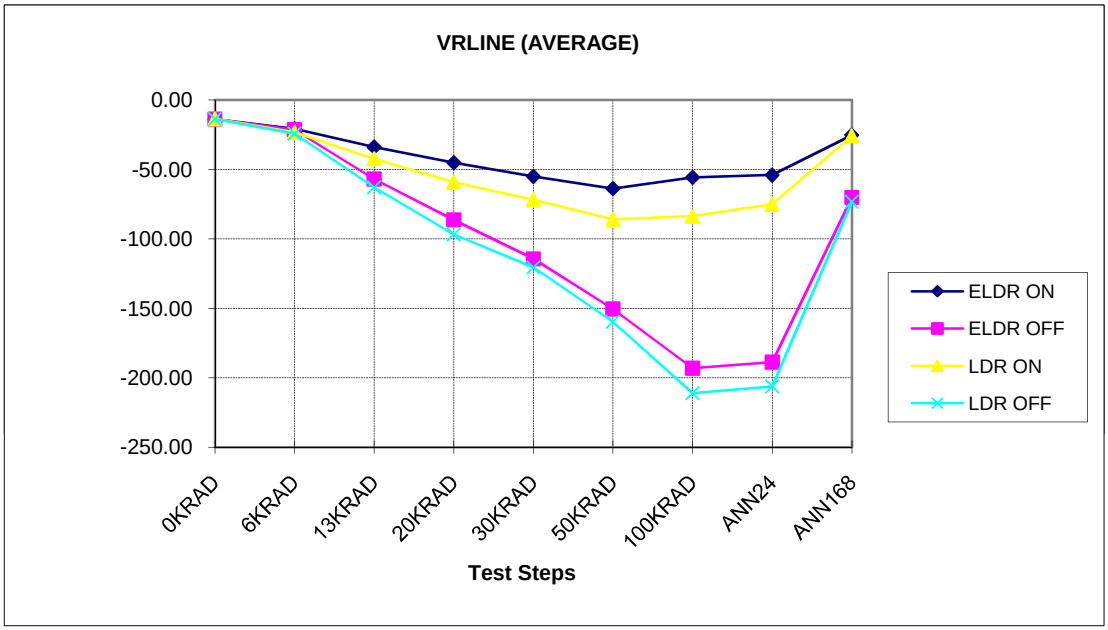
VRLOAD (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	36.732	36.284	37.194	37.866	39.978	49.679	35.797	37.077	37.508
ELDR OFF	36.762	36.548	38.599	39.853	38.805	42.635	33.496	34.141	42.547
LDR ON	40.444	37.429	37.295	38.365	37.559	40.271	35.484	34.482	50.461
LDR OFF	39.272	37.412	38.381	37.679	38.150	39.219	29.448	27.678	41.265



VRLINE (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	-100	-100	-100	-100	-100	-100	-100	-100	-100
Max	100	100	100	100	100	100	100	100	100
Unit	ppm/V	ppm/V	ppm/V	ppm/V	ppm/V	ppm/V	ppm/V	ppm/V	ppm/V
Control Results									
1 (CTRL)	-13.113	-12.954	-12.874	-12.794	-12.954	-12.874	-13.114	-12.954	-13.034
Bias on results									
2 (ON)	-13.462	-22.672	-40.204	-53.167	-62.364	-67.165	-51.436	-49.434	-23.226
3 (ON)	-16.085	-18.803	-24.32	-30.475	-39.107	-52.769	-59.274	-58.232	-27.511
4 (ON)	-14.488	-22.808	-39.281	-52.39	-62.537	-69.166	-55.599	-53.522	-25.678
5 (ON)	-13.195	-18.789	-29.654	-40.596	-52.011	-64.14	-59.932	-58.812	-27.646
6 (ON)	-12.475	-20.307	-36.125	-49.221	-59.437	-65.905	-52.375	-50.218	-22.538
Statistics bias on									
min result	-16.085	-22.808	-40.204	-53.167	-62.537	-69.166	-59.932	-58.812	-27.646
max result	-12.475	-18.789	-24.320	-30.475	-39.107	-52.769	-51.436	-49.434	-22.538
average	-13.941	-20.676	-33.917	-45.170	-55.091	-63.829	-55.723	-54.044	-25.320
sigma	1.399	1.983	6.772	9.609	9.902	6.449	3.871	4.371	2.370
Bias off results									
7 (OFF)	-13.367	-22.961	-67.227	-98.978	-124.762	-159.606	-199.408	-195.225	-70.593
8 (OFF)	-15.991	-18.784	-26.368	-42.731	-75.039	-115.039	-168.481	-165.129	-67.508
9 (OFF)	-13.603	-21.756	-61.22	-94.564	-121.775	-156.444	-196.23	-191.876	-69.862
10 (OFF)	-13.045	-21.919	-64.902	-97.767	-125.457	-160.613	-200.476	-195.648	-71.305
11 (OFF)	-13.277	-22.145	-65.101	-97.705	-125.143	-160.918	-201.059	-196.091	-71.657
Statistics bias off									
min result	-15.991	-22.961	-67.227	-98.978	-125.457	-160.918	-201.059	-196.091	-71.657
max result	-13.045	-18.784	-26.368	-42.731	-75.039	-115.039	-168.481	-165.129	-67.508
average	-13.857	-21.513	-56.964	-86.349	-114.435	-150.524	-193.131	-188.794	-70.185
sigma	1.210	1.594	17.239	24.438	22.072	19.916	13.905	13.333	1.648



VRLINE (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	**-100**	**-100**	**-100**	**-100**	**-100**	**-100**	**-100**	**-100**	**-100**
Max	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Unit	**ppm/V**	**ppm/V**	**ppm/V**	**ppm/V**	**ppm/V**	**ppm/V**	**ppm/V**	**ppm/V**	**ppm/V**
Control Results									
1 (CTRL)	-13.266	-13.187	-13.426	-13.266	-13.346	-13.346	-13.346	-13.187	-13.267
Bias on results									
2 (ON)	-14.056	-24.43	-45.807	-62.789	-74.902	-87.341	-82.196	-73.563	-25.937
3 (ON)	-12.9	-22.266	-40.753	-57.632	-70.024	-84.102	-82.664	-74.331	-25.46
4 (ON)	-14.411	-23.85	-42.484	-59.43	-72.293	-87.001	-85.944	-77.78	-27.44
5 (ON)	-13.129	-22.888	-41.521	-58.306	-71.329	-86.359	-84.562	-75.749	-25.361
6 (ON)	-13.747	-23.25	-41.213	-58.13	-70.733	-85.42	-83.573	-74.85	-25.479
Statistics bias on									
min result	-14.411	-24.430	-45.807	-62.789	-74.902	-87.341	-85.944	-77.780	-27.440
max result	-12.900	-22.266	-40.753	-57.632	-70.024	-84.102	-82.196	-73.563	-25.361
average	-13.649	-23.337	-42.356	-59.257	-71.856	-86.045	-83.788	-75.255	-25.935
sigma	0.630	0.839	2.031	2.081	1.895	1.309	1.508	1.620	0.870
Bias off results									
7 (OFF)	-13.13	-23.766	-62.848	-96.611	-120.714	-159.263	-212.351	-207.432	-72.855
8 (OFF)	-13.729	-23.694	-60.902	-95.279	-119.385	-158.354	-208.908	-204.171	-73.111
9 (OFF)	-13.289	-23.923	-63.478	-97.394	-120.935	-160.516	-212.14	-207.297	-73.325
10 (OFF)	-12.948	-23.006	-60.102	-94.442	-117.545	-157.281	-208.461	-204.27	-72.806
11 (OFF)	-15.69	-26.402	-67.548	-100.105	-124.764	-163.409	-213.887	-208.632	-74.603
Statistics bias off									
min result	-15.690	-26.402	-67.548	-100.105	-124.764	-163.409	-213.887	-208.632	-74.603
max result	-12.948	-23.006	-60.102	-94.442	-117.545	-157.281	-208.461	-204.171	-72.806
average	-13.757	-24.158	-62.976	-96.766	-120.669	-159.765	-211.149	-206.360	-73.340
sigma	1.118	1.303	2.904	2.190	2.658	2.359	2.354	2.022	0.736



VRLINE2 (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	-13.941	-20.676	-33.917	-45.170	-55.091	-63.829	-55.723	-54.044	-25.320
ELDR OFF	-13.857	-21.513	-56.964	-86.349	-114.435	-150.524	-193.131	-188.794	-70.185
LDR ON	-13.649	-23.337	-42.356	-59.257	-71.856	-86.045	-83.788	-75.255	-25.935
LDR OFF	-13.757	-24.158	-62.976	-96.766	-120.669	-159.765	-211.149	-206.360	-73.340

ANNEX II
DOSIMETRY

ALTER TECHNOLOGY - TÜV NORD S.A.U. CIF: A41990490. Tomas Alba Edison 4, Parque Científico y Tecnológico Cartuja 93. 41092 Sevilla, ESPAÑA. T: 34-95-446 70 50, Fax: 34-95-446 73 39, E-Mail: info@altertechnology.com

ESTEC ^{60}Co Facility

Keplerlaan, 1 2200AG Noordwijk Zh (NL)

RADIATION TEST SUMMARY

Irradiation Test Report Number : **20139** *Date :* **18 June 2012**

Test Requester :	*Name*	**Alter Technology**
	Address	Avd. Tomas Alba Edison, 4 41092 Seville (SPAIN)
	Personnel present :	E Munoz Plaza, J Jimenez Carreira, E Bernabeu Torres
	Project/Cost Code :	TRP
	Devices/Components irradiated :	Linear Devices AD565AT,OP470,AD584,PM139X,REF02,OP27,UC1843
	Device/Component details :	AD565AT,OP470,OP27,AD565AT,OLH249,OLH449 66183-105,AD565AT,PM139X,PM139X,SOC5551,UC1846
(conditions and identification)		

Dosimetry Chain used :	B
Dosimeter :	Farmer model 2680 – s/n 109
Gas Ionisation Chamber :	NE Type 2571 – s/n 3322
Measured Dosimetry :	Total Ionising Dose in [Gy] (water)
Dosimetry Procedure :	ESCC 22900 section 4.1.1 TEC-QEC/PR001 - Appendix D ***(Total Ionising Dose accredited by RvA according to ISO/IEC 17025.2005 Certificate No. L517)***

(With the exception of the above specified dosimetry equipment, ESTEC ^{60}Co Facility does not assume any liability for the calibration status of any other equipment lent to the requester)

Irradiation Test Campaign Details

Source Activity : 79.8 TBq *on date :* 15 February 2012

	units	*Min.*	*Max.*	Time-weighted Average
Temperature	°C	*24.10*	*25.70*	*24.99*
Pressure	mbar	*982.60*	*1036.30*	*1014.74*
Relative Humidity	%	*22.20*	*42.90*	*32.08*

Dosimeter position relative to ^{60}Co source		
X	cm	130
Y	cm	736
Z	cm	62

Run	***Start Date & Time (CET)***	***End Date & Time (CET)***	***Total Ionising Dose [Gy] (water)***	***Dose Rate [mGy/h] (water)***
1	15/02/2012 15:18	15/02/2012 15:54	0.25	0.41
2	15/02/2012 16:16	16/02/2012 09:13	7.02	0.41
3	16/02/2012 09:18	16/02/2012 11:10	0.77	0.41
4	16/02/2012 11:20	17/02/2012 13:28	10.80	0.41

5	17/02/2012 13:33	17/02/2012 15:33	0.82	0.41
6	17/02/2012 15:42	20/02/2012 09:08	27.02	0.41
7	20/02/2012 09:18	20/02/2012 11:11	0.78	0.41
8	20/02/2012 11:23	20/02/2012 13:49	1.00	0.41
9	20/02/2012 13:55	20/02/2012 15:16	0.55	0.41
10	20/02/2012 15:21	21/02/2012 09:36	7.47	0.41
11	21/02/2012 09:43	21/02/2012 10:58	0.52	0.41
12	21/02/2012 11:02	21/02/2012 14:00	1.22	0.41
13	21/02/2012 14:16	21/02/2012 16:14		
14	21/02/2012 16:35	22/02/2012 13:18	8.54	0.41
15	22/02/2012 13:28	22/02/2012 15:09	0.69	0.41
16	22/02/2012 15:17	23/02/2012 09:18	7.43	0.41
17	23/02/2012 09:25	23/02/2012 10:20	0.38	0.41
18	23/02/2012 11:09	24/02/2012 18:31	12.94	0.41
19	24/02/2012 18:33	27/02/2012 08:33	25.58	0.41
20	27/02/2012 08:47	27/02/2012 10:06	0.49	0.37
21	27/02/2012 10:12	27/02/2012 11:09	0.36	0.38
22	27/02/2012 11:11	27/02/2012 13:07	0.73	0.38
23	27/02/2012 13:10	27/02/2012 15:12	0.77	0.38
24	27/02/2012 15:16	27/02/2012 16:28	0.46	0.38
25	27/02/2012 16:31	28/02/2012 13:00	8.44	0.41
26	28/02/2012 13:10	28/02/2012 16:33	1.33	0.39
27	28/02/2012 16:36	28/02/2012 19:40	1.21	0.39
28	28/02/2012 19:42	29/02/2012 08:44	5.13	0.39
29	29/02/2012 08:48	29/02/2012 13:16	1.83	0.41
30	29/02/2012 13:18	29/02/2012 14:53	0.65	0.41
31	29/02/2012 15:06	29/02/2012 16:50		
32	29/02/2012 17:10	01/03/2012 08:36	6.30	0.41
33	01/03/2012 09:08	01/03/2012 14:03	2.01	0.41
34	01/03/2012 14:15	01/03/2012 16:29	0.92	0.41
35	01/03/2012 16:32	02/03/2012 08:50	6.70	0.41
36	02/03/2012 08:58	02/03/2012 17:29	3.53	0.41
37	02/03/2012 17:47	06/03/2012 09:02	37.75	0.43
38	06/03/2012 09:14	06/03/2012 09:15	0.00	0.31
39	06/03/2012 09:18	06/03/2012 10:36	0.51	0.39
40	06/03/2012 10:39	06/03/2012 11:44	0.43	0.40
41	06/03/2012 11:47	06/03/2012 13:56	0.85	0.39
42	06/03/2012 13:59	06/03/2012 14:49	0.33	0.39

43	06/03/2012 14:52	06/03/2012 16:29	0.64	0.39
44	06/03/2012 16:35	06/03/2012 18:30	0.76	0.40
45	06/03/2012 18:33	07/03/2012 08:57	5.68	0.39
46	07/03/2012 09:01	07/03/2012 10:16	0.51	0.41
47	07/03/2012 10:23	08/03/2012 08:56	9.23	0.41
48	08/03/2012 09:06	08/03/2012 14:16	2.00	0.39
49	08/03/2012 14:29	08/03/2012 16:10		
50	08/03/2012 16:27	09/03/2012 09:19	6.90	0.41
51	09/03/2012 09:22	09/03/2012 11:40	0.94	0.41
52	09/03/2012 11:42	12/03/2012 13:22	30.14	0.41
53	12/03/2012 13:25	12/03/2012 15:53	1.01	0.41
54	12/03/2012 15:55	13/03/2012 09:04	7.00	0.41
55	13/03/2012 09:14	14/03/2012 08:49	9.23	0.39
56	14/03/2012 08:56	14/03/2012 11:37	1.05	0.39
57	14/03/2012 11:43	14/03/2012 17:04	2.09	0.39
58	14/03/2012 17:09	15/03/2012 09:02	6.48	0.41
59	15/03/2012 09:08	15/03/2012 09:37	0.19	0.39
60	15/03/2012 09:42	15/03/2012 15:00	2.07	0.39
61	15/03/2012 15:05	15/03/2012 17:14	0.88	0.41
62	15/03/2012 17:21	16/03/2012 10:24	6.68	0.39
63	16/03/2012 10:31	16/03/2012 16:01	2.15	0.39
64	16/03/2012 16:15	19/03/2012 09:08	26.46	0.41
65	19/03/2012 09:33	19/03/2012 09:35	0.01	0.40
66	19/03/2012 09:37	19/03/2012 10:23	0.31	0.41
67*	19/03/2012 11:22	19/03/2012 13:44	0.96	0.41
68	19/03/2012 14:02	19/03/2012 15:39		
69	19/03/2012 15:58	20/03/2012 10:19	7.32	0.41
70	20/03/2012 10:27	20/03/2012 10:47	0.14	0.40
71	20/03/2012 10:50	20/03/2012 11:09	0.13	0.41
72	20/03/2012 11:12	20/03/2012 12:45	0.62	0.40
73	20/03/2012 12:47	20/03/2012 13:39	0.35	0.41
74	20/03/2012 13:42	20/03/2012 16:29	1.10	0.40
75	20/03/2012 16:31	20/03/2012 17:40	0.47	0.41
76	20/03/2012 17:43	21/03/2012 09:08	6.13	0.40
77	21/03/2012 09:11	21/03/2012 10:22	0.49	0.41
78	21/03/2012 10:28	21/03/2012 10:45	0.12	0.40
79	21/03/2012 10:47	21/03/2012 11:27	0.27	0.41
80	21/03/2012 11:30	21/03/2012 11:52	0.15	0.40

81	21/03/2012 11:54	21/03/2012 12:44	0.34	0.41
82	21/03/2012 12:47	21/03/2012 13:40	0.35	0.40
83	21/03/2012 13:42	21/03/2012 14:36	0.37	0.41
84	21/03/2012 14:38	21/03/2012 15:42	0.42	0.40
85	21/03/2012 15:44	21/03/2012 16:19	0.24	0.41
86	21/03/2012 16:21	21/03/2012 17:01	0.26	0.40
87	21/03/2012 17:05	30/03/2012 09:14	84.22	0.41
88	30/03/2012 09:24	30/03/2012 11:16	0.76	0.41
89	30/03/2012 11:20	30/03/2012 11:22	0.01	0.40
90	30/03/2012 11:26	30/03/2012 14:01	1.05	0.41
91	30/03/2012 14:05	30/03/2012 15:52	0.72	0.41
92	30/03/2012 15:56	30/03/2012 19:24	1.42	0.41
93	30/03/2012 20:03	30/03/2012 20:06	0.02	0.39
94	30/03/2012 20:09	30/03/2012 20:24	0.11	0.41
95	30/03/2012 20:27	30/03/2012 20:30	0.03	0.40
96	30/03/2012 20:32	30/03/2012 20:45	0.09	0.41
97	30/03/2012 20:49	30/03/2012 20:57	0.05	0.40
98	30/03/2012 21:21	02/04/2012 08:58	24.41	0.41
99	02/04/2012 09:01	03/04/2012 14:04	11.87	0.41
100	03/04/2012 14:22	03/04/2012 19:59	2.30	0.41
101	03/04/2012 20:05	03/04/2012 20:51	0.32	0.41
102	03/04/2012 20:57	04/04/2012 11:04	5.77	0.41
103	04/04/2012 11:07	04/04/2012 11:57	0.34	0.41
104	04/04/2012 12:02	05/04/2012 10:31	9.19	0.41
105	05/04/2012 10:37	05/04/2012 13:51	1.32	0.41
106	05/04/2012 14:11	05/04/2012 16:02	0.76	0.41
107	05/04/2012 16:04	10/04/2012 16:04	48.96	0.41
108	10/04/2012 17:38	11/04/2012 11:00	7.08	0.41
109	11/04/2012 13:32	11/04/2012 15:31	0.81	0.41
110	11/04/2012 15:34	12/04/2012 09:45	7.40	0.41
111	12/04/2012 11:06	12/04/2012 13:07	0.82	0.41
112	12/04/2012 13:35	12/04/2012 15:36	0.82	0.41
113	12/04/2012 15:52	12/04/2012 17:53	0.82	0.41
114	12/04/2012 18:08	13/04/2012 08:30	5.84	0.41
115	13/04/2012 08:45	13/04/2012 10:45	0.81	0.41
116	13/04/2012 10:57	13/04/2012 12:57	0.81	0.41
117	13/04/2012 13:10	13/04/2012 15:10	0.81	0.41
118	13/04/2012 15:24	13/04/2012 17:27	0.83	0.41

119	13/04/2012 17:40	16/04/2012 08:39	25.59	0.41
120	16/04/2012 08:50	17/04/2012 15:26	12.41	0.41
121	17/04/2012 15:45	20/04/2012 10:10	26.90	0.40
122	20/04/2012 10:23	20/04/2012 10:24	0.01	0.38
123	20/04/2012 10:27	20/04/2012 10:37	0.07	0.39
124	20/04/2012 10:40	20/04/2012 10:41	0.01	0.39
125	20/04/2012 10:45	24/04/2012 11:20	39.04	0.40
126	24/04/2012 11:41	24/04/2012 13:39	0.80	0.40
127	24/04/2012 13:42	27/04/2012 11:00	28.03	0.40
128	27/04/2012 11:06	03/05/2012 11:36	58.37	0.40
129	03/05/2012 11:56	03/05/2012 13:20	0.55	0.40
130	03/05/2012 13:27	04/05/2012 10:15	8.38	0.40
131	04/05/2012 10:24	07/05/2012 13:22	30.16	0.40
132	07/05/2012 13:35	07/05/2012 17:30	1.57	0.40
133	07/05/2012 17:53	07/05/2012 18:50	0.38	0.40
134	07/05/2012 18:53	08/05/2012 10:58	6.46	0.40
135	08/05/2012 11:26	08/05/2012 12:46	0.54	0.40
136	08/05/2012 12:50	08/05/2012 17:00	1.67	0.40
137	08/05/2012 17:19	08/05/2012 18:25	0.44	0.40
138	08/05/2012 18:47	09/05/2012 10:51	6.47	0.40
139	09/05/2012 10:53	09/05/2012 12:02	0.46	0.40
140	09/05/2012 12:07	10/05/2012 14:36	10.62	0.40
141	10/05/2012 14:41	10/05/2012 16:12	0.60	0.40
142	10/05/2012 16:15	11/05/2012 14:19	8.86	0.40
143	11/05/2012 14:46	14/05/2012 15:41	29.25	0.40
144	14/05/2012 15:51	14/05/2012 16:15	0.16	0.40
145	14/05/2012 16:19	21/05/2012 12:34	65.65	0.40
146	21/05/2012 12:37	21/05/2012 15:36	1.20	0.40
147*	21/05/2012 16:11	21/05/2012 18:34	0.96	0.40
148	21/05/2012 19:39	23/05/2012 16:53	18.15	0.40
149	23/05/2012 17:14	25/05/2012 11:55	17.18	0.40
150	25/05/2012 11:57	29/05/2012 10:35	38.04	0.40
151	29/05/2012 10:38	29/05/2012 13:27	1.13	0.40
152	29/05/2012 13:34	29/05/2012 14:32	0.39	0.40
153	29/05/2012 14:35	31/05/2012 08:20	16.77	0.40
154	31/05/2012 08:23	04/06/2012 10:18	40.48	0.41
155	04/06/2012 10:31	04/06/2012 11:05	0.19	0.33
156	04/06/2012 11:08	04/06/2012 13:43	2.87	0.40

157	04/06/2012 13:48	04/06/2012 15:27	1.14	0.33
158	04/06/2012 17:08	05/06/2012 08:58	6.04	0.40
159	05/06/2012 09:12	05/06/2012 11:04	0.41	0.40
160	05/06/2012 11:23	05/06/2012 13:45	0.54	0.33
161	05/06/2012 13:47	05/06/2012 17:24	1.04	0.29
162	05/06/2012 17:30	06/06/2012 08:45	3.83	0.25
163	06/06/2012 09:00	06/06/2012 10:06	0.24	0.22
164	06/06/2012 10:09	06/06/2012 11:12	0.24	0.23
165	06/06/2012 11:34	06/06/2012 14:16	0.59	0.22
166	06/06/2012 14:26	07/06/2012 08:44	3.73	0.21
167	07/06/2012 09:01	07/06/2012 11:04	0.78	0.38
168	07/06/2012 11:28	07/06/2012 16:33	1.93	0.38
169	07/06/2012 16:43	07/06/2012 18:23	0.70	0.42
170	07/06/2012 18:29	08/06/2012 11:03	6.40	0.39
171	08/06/2012 11:16	08/06/2012 13:01	0.67	0.38
172	08/06/2012 13:23	08/06/2012 17:54	1.72	0.38
173	08/06/2012 17:59	11/06/2012 08:54	27.18	0.43
174	11/06/2012 09:10	11/06/2012 11:09	0.80	0.40
175	11/06/2012 11:31	11/06/2012 13:21	0.73	0.40
176	11/06/2012 13:24	11/06/2012 14:21	0.38	0.40
177	11/06/2012 14:30	11/06/2012 14:55	0.15	0.37
178	11/06/2012 14:58	12/06/2012 08:45	6.70	0.38
179	12/06/2012 08:49	12/06/2012 09:30	0.25	0.37
180	12/06/2012 09:32	12/06/2012 11:11	0.62	0.38
181	12/06/2012 11:13	12/06/2012 11:53	0.25	0.37
182	12/06/2012 11:55	12/06/2012 13:50	0.72	0.38
183	12/06/2012 13:53	12/06/2012 14:51	0.37	0.38
184	12/06/2012 14:54	12/06/2012 16:40	0.67	0.38
185	12/06/2012 16:43	12/06/2012 17:32	0.32	0.39
186	12/06/2012 17:37	13/06/2012 13:55	8.06	0.40
187	13/06/2012 14:28	14/06/2012 10:15	7.89	0.40
188	14/06/2012 10:23	14/06/2012 11:20	0.38	0.40
189	14/06/2012 11:38	15/06/2012 09:55	8.89	0.40
190	15/06/2012 10:03	15/06/2012 10:53	0.33	0.40
191	15/06/2012 11:06	18/06/2012 09:24	28.04	0.40

Note: *The uncertainty budgets (according to TEC-QEC/PR001 section 12) are: 4.2 % (k=2) for absorbed dose to water and 4.4% (k=2) for absorbed dose rate to water*

Notes:. * Runs 67 & 147 without dosimetry. Dose rate taken from previous run with dosimetry.
Runs 13,31,49 & 68 – no dosimetry – devices out for measurements

Bob Nickson/Michele Muschitiello
(TEC-QEC Radiation Test Engineer)

Ali Zadeh
(TEC-QEC Section Head)

PLEASE REMEMBER TO COMPLETE THE CUSTOMER SATISFACTION SURVEY AT :

http://task.esa.int/sites/WG/CO60Q/Lists/Customer%20Satisfaction/overview.aspx

AND SEND A COPY OF THE FINAL REPORT

ESTEC ^{60}Co Facility

Keplerlaan, 1 2200AG Noordwijk Zh (NL)

RADIATION TEST SUMMARY

Irradiation Test Report Number : **20139b** *Date :* **18 June 2012**

Test Requester :	*Name*	**Alter Technology**
	Address	Avd. Tomas Alba Edison, 4 41092 Seville (SPAIN)
	Personnel present :	E Munoz Plaza, J Jimenez Carreira, E Bernabeu Torres
Project/Cost Code :		TRP
Devices/Components irradiated :		Linear Devices AD565AT,OP470,AD584,PM139X,REF02,OP27,UC1843
Device/Component details :		AD565AT,OP470,OP27,AD565AT,OLH249,OLH449 66183-105,AD565AT,PM139X,PM139X,SOC5551,UC1846
(conditions and identification)		

Dosimetry Chain used :	A
Dosimeter :	Farmer model 2680 – s/n 390
Gas Ionisation Chamber :	NE Type 2571 – s/n 2915
Measured Dosimetry :	Total Ionising Dose in [Gy] (water)
Dosimetry Procedure :	ESCC 22900 section 4.1.1 TEC-QEC/PR001 - Appendix D ***(Total Ionising Dose accredited by RvA according to ISO/IEC 17025.2005 Certificate No. L517)***

(With the exception of the above specified dosimetry equipment, ESTEC ^{60}Co Facility does not assume any liability for the calibration status of any other equipment lent to the requester)

Irradiation Test Campaign Details

Source Activity : 76.7 TBq *on date :* 4 June 2012

	units	*Min.*	*Max.*	Time-weighted Average
Temperature	°C	*25.00*	*25.60*	*25.43*
Pressure	mbar	*996.40*	*1019.10*	*1008.25*
Relative Humidity	%	*31.20*	*40.50*	*35.64*

Dosimeter position relative to ^{60}Co source		
X	cm	-10
Y	cm	231
Z	cm	0

Run	***Start Date & Time (CET)***	***End Date & Time (CET)***	***Total Ionising Dose [Gy] (water)***	***Dose Rate [mGy/h] (water)***
1	04/06/2012 17:08	05/06/2012 08:58	63.56	4.02
2	05/06/2012 09:12	05/06/2012 11:04		
3	05/06/2012 11:23	05/06/2012 13:45	9.47	4.01
4	05/06/2012 13:47	05/06/2012 17:24	14.52	4.02

5	05/06/2012 17:30	06/06/2012 08:45	61.25	4.02
6	06/06/2012 09:00	06/06/2012 10:06		
7	06/06/2012 10:09	06/06/2012 11:12		
8	06/06/2012 11:34	06/06/2012 14:16	9.51	3.52
9	06/06/2012 14:26	07/06/2012 08:44	71.58	3.97
10	07/06/2012 09:01	07/06/2012 11:04		
11	07/06/2012 11:28	07/06/2012 16:33	18.63	3.67
12	07/06/2012 16:43	07/06/2012 18:23	6.15	3.68
13	07/06/2012 18:29	08/06/2012 11:03	59.00	3.56
14	08/06/2012 11:16	08/06/2012 13:01		
15	08/06/2012 13:23	08/06/2012 17:54	13.66	3.02
16	08/06/2012 17:59	11/06/2012 08:54	212.74	3.38
17	11/06/2012 09:10	11/06/2012 11:09		
18	11/06/2012 11:31	11/06/2012 13:21	6.15	3.35
19	11/06/2012 13:24	11/06/2012 14:21	3.42	3.63
20	11/06/2012 14:30	11/06/2012 14:55	1.35	3.29
21	11/06/2012 14:58	12/06/2012 08:45	64.80	3.64
22	12/06/2012 08:49	12/06/2012 09:30	2.27	3.35
23	12/06/2012 09:32	12/06/2012 11:11	5.96	3.64
24	12/06/2012 11:13	12/06/2012 11:53	2.12	3.24
25	12/06/2012 11:55	12/06/2012 13:50	6.95	3.64
26	12/06/2012 13:53	12/06/2012 14:51	3.23	3.33
27	12/06/2012 14:54	12/06/2012 16:40	6.40	3.64
28	12/06/2012 16:43	12/06/2012 17:32	2.74	3.34
29	12/06/2012 17:37	13/06/2012 13:55	73.87	3.64
30	13/06/2012 14:28	14/06/2012 10:15	72.86	3.68
31	14/06/2012 10:23	14/06/2012 11:20	3.48	3.66
32	14/06/2012 11:38	15/06/2012 09:55	81.99	3.68
33	15/06/2012 10:03	15/06/2012 10:53	3.07	3.66
34	15/06/2012 11:06	18/06/2012 09:24	259.13	3.69

Note: *The uncertainty budgets (according to TEC-QEC/PR001 section 12) are: 4.2 % (k=2) for absorbed dose to water and 4.4% (k=2) for absorbed dose rate to water*

Notes: Runs 2,6,7,10,14 & 17 – no dosimetry – devices out for measurements

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