



Component No 520101905FR		Component Designation: SOC5551HRB	Irradiation Spec. No.: ESCC 22900 Issue 4
Gen. Spec.: ESCC 5000 Det. Spec.: ESCC 5201/019 Amend.: --		Evaluation: X- Acceptance Wafer: - Acceptance Lot: -	Project/Programme: LDT (ESA) AO / 1-6172 / 09 / F / WE
Family: 12	Group: 01	Functional Assignment: Transistors, High Voltage, NPN	Package: CCP (3 Terminal)
Manuf.Name: ST MICROELECTRONICS Address: FRANCE		Test House: ATN Address: SEVILLA (SPAIN)	Orig.house: ATN Address: SEVILLA (SPAIN)
Radiation Test Plan No.: ATGSP-RP-79 Iss1		Sample Size: 22 Irradiation Devices: 20 Control Devices: 2	Date Code: 0910A Diffussion Run: W724JJ4 Wafer Lot: 15
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@25°C, 168h@100°C Biased: X (10 samples) Unbiased: X (10 samples) Test Circuit: Figure 1
Electrical Measurements. Parameters Tested: I _{CBO} , I _{EBO} , V _{CE(sat)1} , V _{CE(sat)2} , V _{BE(sat)1} , V _{BE(sat)2} , h _{FE1} , h _{FE2} , h _{FE3} .			
Prepared by.: Antonio Romero Mallén Date: 2012/11/12 Signature: 		Approved by.: Eugenio Muñoz Plaza Date: 2012/11/12 Signature: 	



**TOTAL DOSE RADIATION
TEST REPORT
No. ATN-RR-001/2012**

Issue: 2/Rev:

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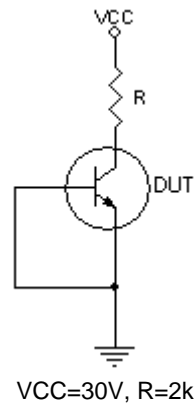
Date: 2012/11/12

R.L: 2011902966 / 2011902967

DOCUMENT CHANGE CONTROL

Edition / Revision	Date	Affected Edition / Revision	Affected Paragraph / Modification
ATN-RR-001/2012 Iss.1	2012/07/27	--	First edition of this document.
ATN-RR-001/2012 Iss.2	2012/11/12	ATN-RR-001/2012 Iss.1	Footer on the pages updated with new issue of document format. Company's logo updated. Test house name updated.

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.
3. The samples were soldered in a PCB in order to adapt the package to the test fixture socket.

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 a high voltage NPN transistor, manufactured by ST Microelectronics, France. 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	1013	Control device	ELDR
R2	1014	ON	
R3	1015		
R4	1017		
R5	1018		
R6	1019		
R7	1020	OFF	
R8	1021		
R9	1022		
R10	1023		
R11	1024		
R1	1002	Control device	LDR
R2	1003	ON	
R3	1004		
R4	1005		
R5	1006		
R6	1007		
R7	1008	OFF	
R8	1009		
R9	1010		
R10	1011		
R11	1012		

RESULTS

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

ELDR									
	0Krad	6Krad	13Krad	20Krad	30Krad	50Krad	100Krad	ANN24	ANN168
I _{CBO}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
I _{EBO}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{CE(sat)1}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{CE(sat)2}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{BE(sat)1}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{BE(sat)2}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
h _{FE1}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
h _{FE2}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
h _{FE3}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
LDR									
	0Krad	6Krad	13Krad	20Krad	30Krad	50Krad	100Krad	ANN24	ANN168
I _{CBO}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
I _{EBO}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{CE(sat)1}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{CE(sat)2}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{BE(sat)1}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
V _{BE(sat)2}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
h _{FE1}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
h _{FE2}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS
h _{FE3}	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS

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 ICBO, VCE(SAT)1,2 and hFE's but they remain within specification limits. The samples tend to recover their initial values during the annealing process.

-ICBO: The results show a higher degradation in the samples tested at LDR than the samples tested at ELDR.

-VCE(SAT)1,2: The results show a higher degradation in the samples biased OFF than the samples biased ON. The degradation in the samples biased OFF at LDR is similar to the degradation in the samples biased ON at ELDR in the 50krad and 100krad steps.

For the rest of the parameters, it is not observed a clear differentiate behaviour between ELDR, LDR, On and Off biased parts

SCHEDULE

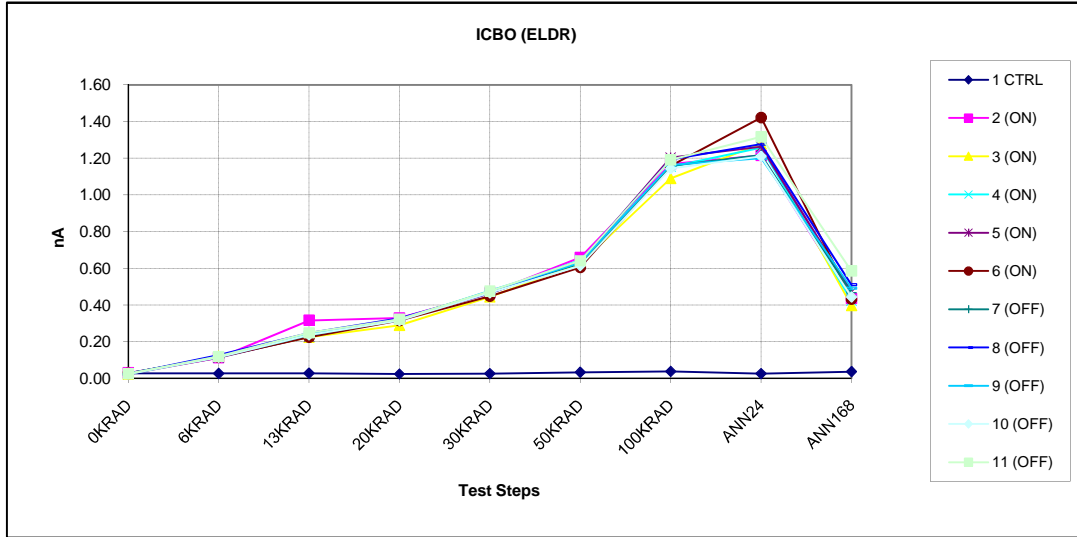
ELDR Average Dose Rate (1) rad(Si)/h	LDR Average Dose Rate (2) rad(Si)/h	Cummulative ELDR Total Dose krad(Si)	ELDR Measurement date	Cummulative LDR Total Dose krad(Si)	LDR Measurement date	Step Deviation ELDR vs LDR (%)
--	--	0	2012/02/15	0	2012/06/04	--
35.41	323.7	5240	2012/02/21	5707	2012/06/05	8.9
		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 @25°C	24	--	2012/06/19	--	2012/06/19	
ann168h @100°C	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
LE0304.000	UNIVERSAL TEST SYSTEM	SZ	M-3000	2012/08/15	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0389.002	TEST ADAPTER	SZ	FRONT ADAPTER	--	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0389.003	TEST ADAPTER	SZ	TA07B	--	0,6,13,20,35,50,100Krad, ANN24, ANN168
LE0400.000	HIGH RESISTANCE METER	AGILENT	4339B	2012/09/21	0,6,13,20,35,50,100Krad, ANN24, ANN168

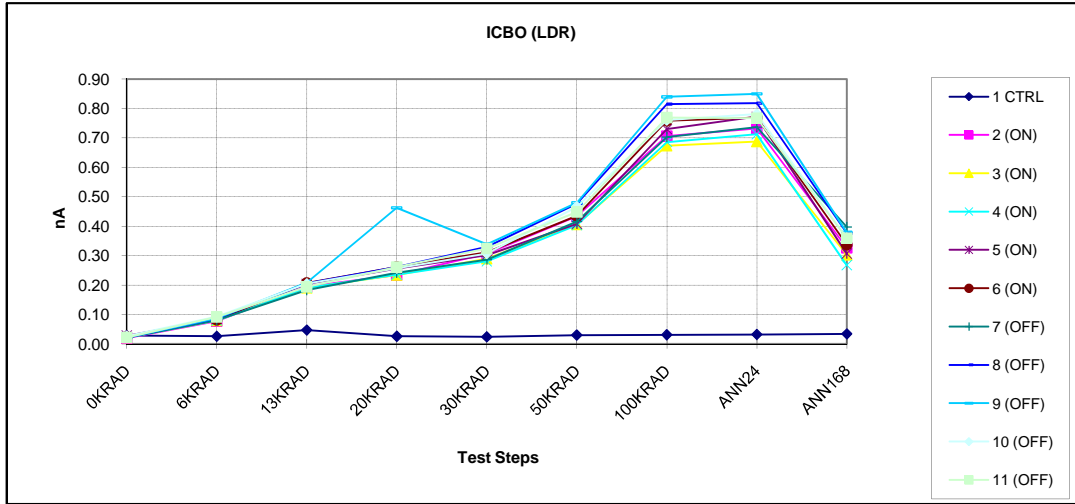
ANNEX I ELECTRICAL MEASUREMENTS GRAPHS



ICBO (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	50	50	50	50	50	50	50	50	50
Unit	nA	nA	nA	nA	nA	nA	nA	nA	nA
Control Results									
1 CTRL	0.026	0.026	0.027	0.023	0.025	0.032	0.037	0.025	0.036

Bias on results									
2 (ON)	0.029	0.111	0.316	0.329	0.466	0.659	1.169	1.216	0.435
3 (ON)	0.022	0.120	0.224	0.288	0.444	0.626	1.090	1.279	0.396
4 (ON)	0.027	0.114	0.228	0.319	0.468	0.645	1.153	1.257	0.423
5 (ON)	0.023	0.113	0.228	0.321	0.463	0.637	1.203	1.263	0.470
6 (ON)	0.026	0.116	0.223	0.314	0.448	0.604	1.158	1.422	0.431
Statistics bias on									
min result	0.022	0.111	0.223	0.288	0.444	0.604	1.090	1.216	0.396
max result	0.029	0.120	0.316	0.329	0.468	0.659	1.203	1.422	0.470
average	0.026	0.115	0.244	0.314	0.458	0.634	1.155	1.287	0.431
sigma	0.003	0.003	0.040	0.016	0.011	0.021	0.041	0.079	0.027

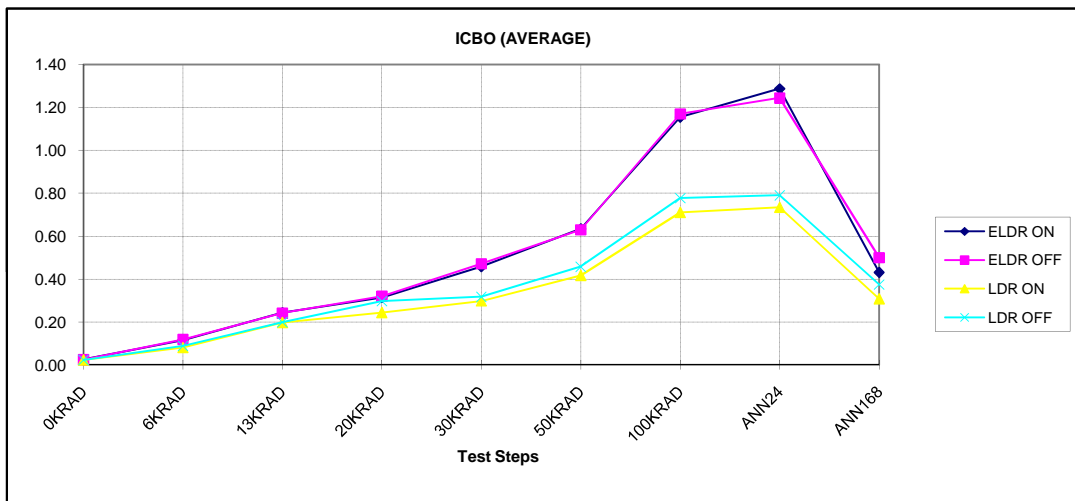
Bias off results									
7 (OFF)	0.026	0.116	0.234	0.320	0.474	0.625	1.158	1.217	0.467
8 (OFF)	0.024	0.127	0.247	0.327	0.465	0.638	1.194	1.277	0.511
9 (OFF)	0.022	0.116	0.241	0.316	0.477	0.630	1.162	1.199	0.491
10 (OFF)	0.023	0.114	0.236	0.314	0.466	0.614	1.143	1.210	0.443
11 (OFF)	0.024	0.118	0.247	0.321	0.475	0.640	1.191	1.317	0.585
Statistics bias off									
min result	0.022	0.114	0.234	0.314	0.465	0.614	1.143	1.199	0.443
max result	0.026	0.127	0.247	0.327	0.477	0.640	1.194	1.317	0.585
average	0.024	0.118	0.241	0.320	0.471	0.629	1.170	1.244	0.499
sigma	0.001	0.005	0.006	0.005	0.006	0.011	0.022	0.051	0.054



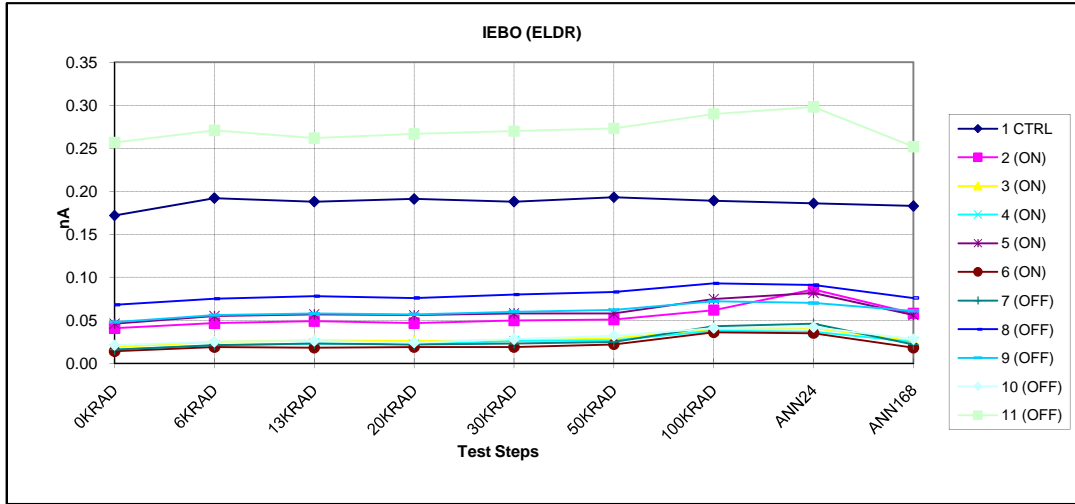
ICBO (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	50	50	50	50	50	50	50	50	50
Unit	nA	nA	nA	nA	nA	nA	nA	nA	nA
Control Results									
1 CTRL	0.028	0.026	0.047	0.026	0.024	0.030	0.031	0.032	0.034

Bias on results									
2 (ON)	0.020	0.078	0.195	0.234	0.307	0.434	0.706	0.732	0.326
3 (ON)	0.022	0.080	0.191	0.234	0.290	0.406	0.674	0.688	0.303
4 (ON)	0.022	0.080	0.191	0.235	0.281	0.404	0.686	0.713	0.268
5 (ON)	0.028	0.085	0.204	0.256	0.302	0.408	0.730	0.772	0.307
6 (ON)	0.023	0.082	0.207	0.261	0.311	0.435	0.758	0.769	0.337
Statistics bias on									
min result	0.020	0.078	0.191	0.234	0.281	0.404	0.674	0.688	0.268
max result	0.028	0.085	0.207	0.261	0.311	0.435	0.758	0.772	0.337
average	0.023	0.081	0.198	0.244	0.298	0.417	0.711	0.735	0.308
sigma	0.003	0.003	0.007	0.013	0.012	0.016	0.034	0.036	0.026

Bias off results									
7 (OFF)	0.021	0.081	0.183	0.242	0.287	0.416	0.703	0.737	0.398
8 (OFF)	0.022	0.086	0.206	0.261	0.330	0.477	0.815	0.818	0.376
9 (OFF)	0.022	0.087	0.208	0.463	0.339	0.480	0.840	0.850	0.380
10 (OFF)	0.026	0.092	0.204	0.257	0.307	0.466	0.760	0.781	0.360
11 (OFF)	0.022	0.092	0.194	0.261	0.324	0.448	0.769	0.767	0.359
Statistics bias off									
min result	0.021	0.081	0.183	0.242	0.287	0.416	0.703	0.737	0.359
max result	0.026	0.092	0.208	0.463	0.339	0.480	0.840	0.850	0.398
average	0.023	0.088	0.199	0.297	0.317	0.457	0.777	0.791	0.375
sigma	0.002	0.005	0.010	0.093	0.021	0.026	0.053	0.044	0.016



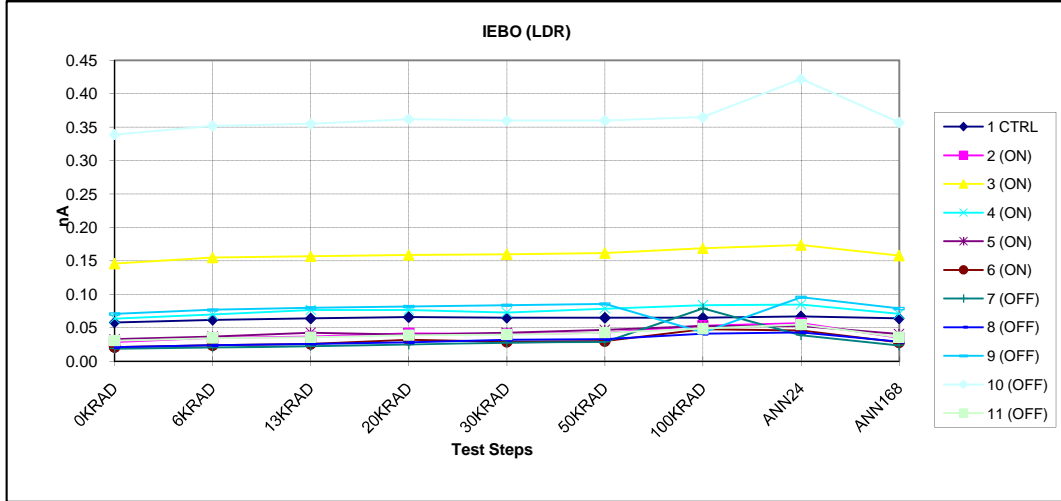
ICBO (AVERAGE)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	0.026	0.115	0.244	0.314	0.458	0.634	1.155	1.287	0.431
ELDR OFF	0.024	0.118	0.241	0.320	0.471	0.629	1.170	1.244	0.499
LDR ON	0.023	0.081	0.198	0.244	0.298	0.417	0.711	0.735	0.308
LDR OFF	0.023	0.088	0.199	0.297	0.317	0.457	0.777	0.791	0.375



IEBO (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	50	50	50	50	50	50	50	50	50
Unit	nA	nA	nA	nA	nA	nA	nA	nA	nA
Control Results									
1 CTRL	0.172	0.192	0.188	0.191	0.188	0.193	0.189	0.186	0.183

Bias on results									
2 (ON)	0.041	0.047	0.049	0.047	0.05	0.051	0.062	0.086	0.058
3 (ON)	0.019	0.025	0.027	0.026	0.027	0.029	0.04	0.041	0.026
4 (ON)	0.016	0.021	0.023	0.022	0.026	0.027	0.038	0.037	0.025
5 (ON)	0.046	0.055	0.057	0.056	0.058	0.058	0.075	0.082	0.056
6 (ON)	0.014	0.019	0.018	0.019	0.019	0.022	0.036	0.035	0.018
Statistics bias on									
min result	0.014	0.019	0.018	0.019	0.019	0.022	0.036	0.035	0.018
max result	0.046	0.055	0.057	0.056	0.058	0.058	0.075	0.086	0.058
average	0.027	0.033	0.035	0.034	0.036	0.037	0.050	0.056	0.037
sigma	0.015	0.016	0.017	0.016	0.017	0.016	0.017	0.026	0.019

Bias off results									
7 (OFF)	0.016	0.021	0.023	0.022	0.023	0.025	0.043	0.046	0.022
8 (OFF)	0.068	0.075	0.078	0.076	0.08	0.083	0.093	0.091	0.076
9 (OFF)	0.048	0.056	0.058	0.057	0.06	0.062	0.072	0.07	0.061
10 (OFF)	0.021	0.025	0.026	0.024	0.028	0.032	0.041	0.042	0.028
11 (OFF)	0.257	0.271	0.262	0.267	0.27	0.273	0.29	0.298	0.252
Statistics bias off									
min result	0.016	0.021	0.023	0.022	0.023	0.025	0.041	0.042	0.022
max result	0.257	0.271	0.262	0.267	0.270	0.273	0.290	0.298	0.252
average	0.082	0.090	0.089	0.089	0.092	0.095	0.108	0.109	0.088
sigma	0.100	0.104	0.099	0.102	0.102	0.102	0.104	0.107	0.095



IEBO (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	50	50	50	50	50	50	50	50	50
Unit	nA	nA	nA	nA	nA	nA	nA	nA	nA

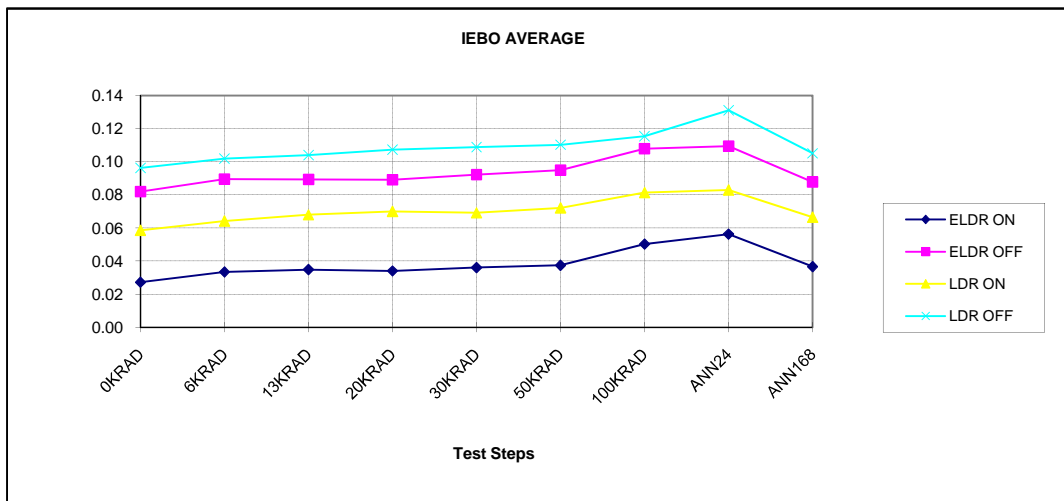
Control Results									
1 CTRL	0.058	0.062	0.064	0.066	0.065	0.065	0.065	0.067	0.064

Bias on results									
2 (ON)	0.029	0.035	0.037	0.042	0.041	0.043	0.053	0.057	0.035
3 (ON)	0.146	0.155	0.157	0.159	0.160	0.162	0.169	0.174	0.158
4 (ON)	0.064	0.070	0.077	0.077	0.073	0.079	0.084	0.085	0.071
5 (ON)	0.033	0.037	0.043	0.040	0.043	0.047	0.053	0.053	0.041
6 (ON)	0.021	0.024	0.026	0.032	0.029	0.030	0.048	0.046	0.028

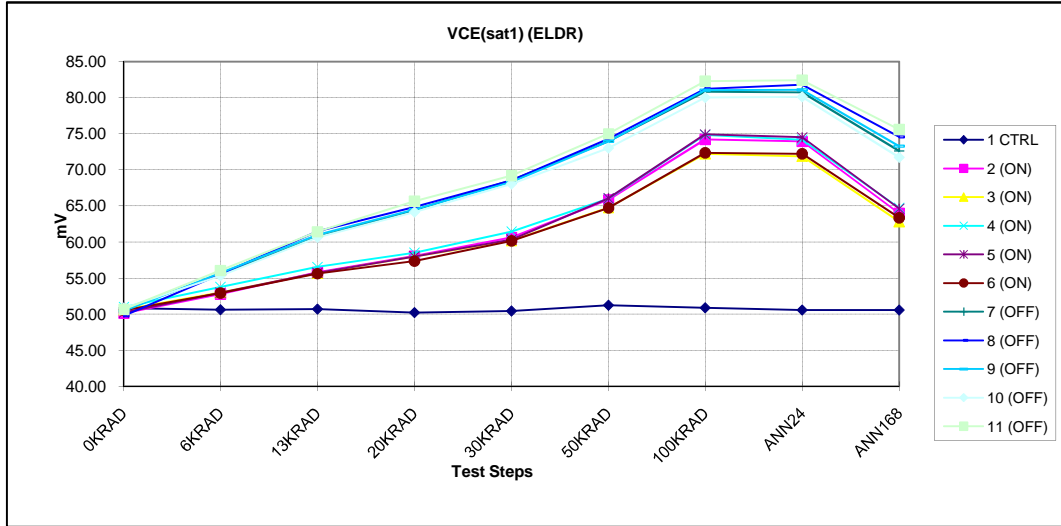
Statistics bias on									
min result	0.021	0.024	0.026	0.032	0.029	0.030	0.048	0.046	0.028
max result	0.146	0.155	0.157	0.159	0.160	0.162	0.169	0.174	0.158
average	0.059	0.064	0.068	0.070	0.069	0.072	0.081	0.083	0.067
sigma	0.052	0.054	0.053	0.053	0.053	0.053	0.051	0.053	0.054

Bias off results									
7 (OFF)	0.019	0.021	0.023	0.025	0.028	0.029	0.079	0.039	0.024
8 (OFF)	0.021	0.024	0.026	0.028	0.032	0.033	0.041	0.043	0.029
9 (OFF)	0.071	0.077	0.080	0.082	0.084	0.086	0.043	0.096	0.079
10 (OFF)	0.339	0.352	0.355	0.362	0.360	0.360	0.365	0.422	0.357
11 (OFF)	0.031	0.035	0.036	0.039	0.040	0.043	0.049	0.055	0.036

Statistics bias off									
min result	0.019	0.021	0.023	0.025	0.028	0.029	0.041	0.039	0.024
max result	0.339	0.352	0.355	0.362	0.360	0.360	0.365	0.422	0.357
average	0.096	0.102	0.104	0.107	0.109	0.110	0.115	0.131	0.105
sigma	0.137	0.142	0.142	0.144	0.142	0.141	0.140	0.164	0.143



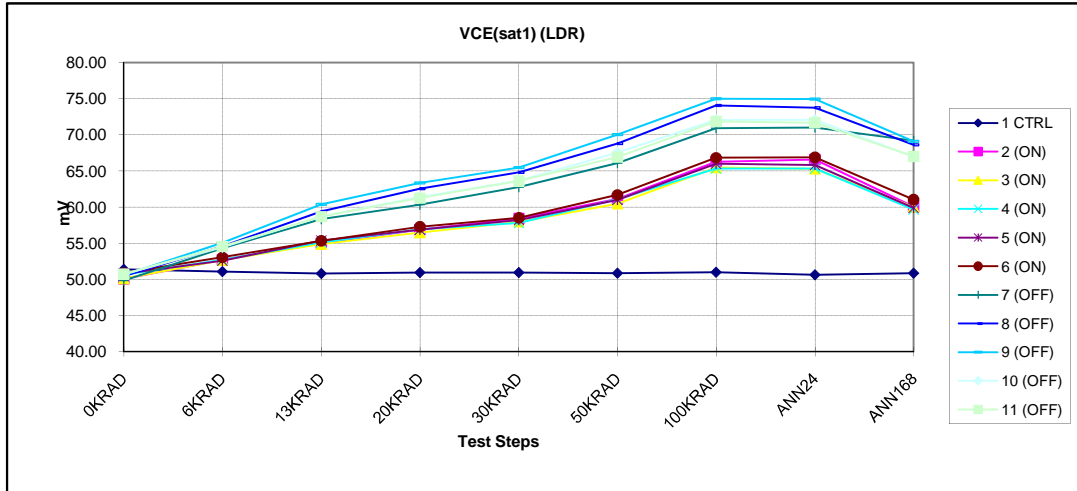
IEBO AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	0.027	0.033	0.035	0.034	0.036	0.037	0.050	0.056	0.037
ELDR OFF	0.082	0.090	0.089	0.089	0.092	0.095	0.108	0.109	0.088
LDR ON	0.059	0.064	0.068	0.070	0.069	0.072	0.081	0.083	0.067
LDR OFF	0.096	0.102	0.104	0.107	0.109	0.110	0.115	0.131	0.105



VCE(sat1) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	150	150	150	150	150	150	150	150	150
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	50.819	50.619	50.713	50.231	50.444	51.225	50.881	50.588	50.575

Bias on results									
2 (ON)	50.138	52.775	55.819	58.088	60.663	65.888	74.219	73.969	63.950
3 (ON)	50.606	53.019	55.669	57.975	60.181	64.775	72.200	71.881	62.813
4 (ON)	50.956	53.750	56.575	58.513	61.444	66.013	74.819	74.169	64.719
5 (ON)	50.219	52.969	55.700	57.981	60.319	66.056	74.944	74.544	64.656
6 (ON)	50.538	52.925	55.638	57.381	60.156	64.713	72.344	72.225	63.344
Statistics bias on									
min result	50.138	52.775	55.638	57.381	60.156	64.713	72.200	71.881	62.813
max result	50.956	53.750	56.575	58.513	61.444	66.056	74.944	74.544	64.719
average	50.491	53.088	55.880	57.988	60.553	65.489	73.705	73.358	63.896
sigma	0.328	0.381	0.394	0.404	0.538	0.683	1.338	1.215	0.827

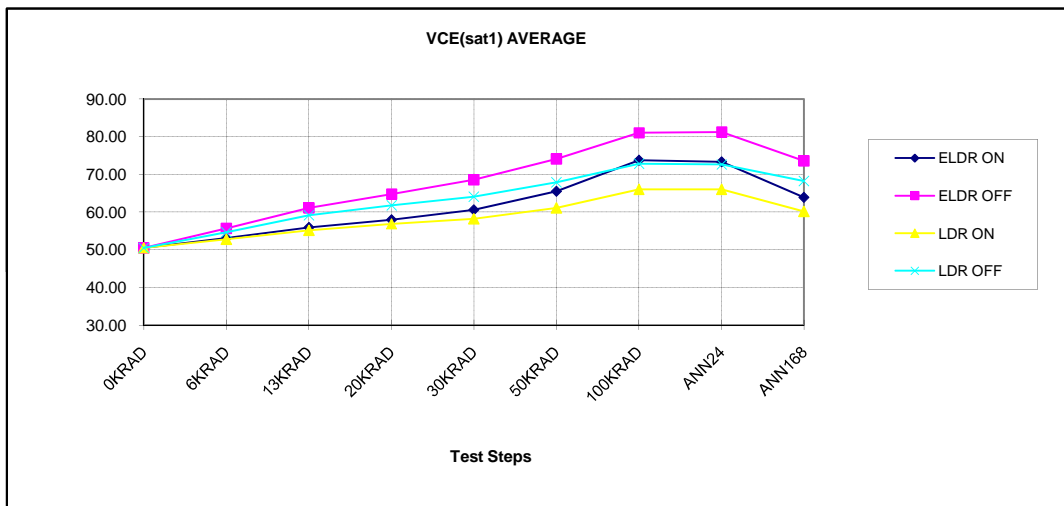
Bias off results									
7 (OFF)	50.688	55.513	60.719	64.431	68.569	73.962	80.838	80.731	72.619
8 (OFF)	49.756	55.525	61.469	64.869	68.519	74.306	81.219	81.788	74.588
9 (OFF)	50.431	55.700	61.013	64.481	68.325	73.962	81.063	81.075	73.288
10 (OFF)	50.844	55.300	60.663	64.125	68.031	73.031	80.044	80.131	71.738
11 (OFF)	50.650	56.094	61.456	65.638	69.194	75.031	82.269	82.425	75.581
Statistics bias off									
min result	49.756	55.300	60.663	64.125	68.031	73.031	80.044	80.131	71.738
max result	50.844	56.094	61.469	65.638	69.194	75.031	82.269	82.425	75.581
average	50.474	55.626	61.064	64.709	68.528	74.058	81.087	81.230	73.563
sigma	0.428	0.297	0.387	0.583	0.428	0.721	0.801	0.897	1.535



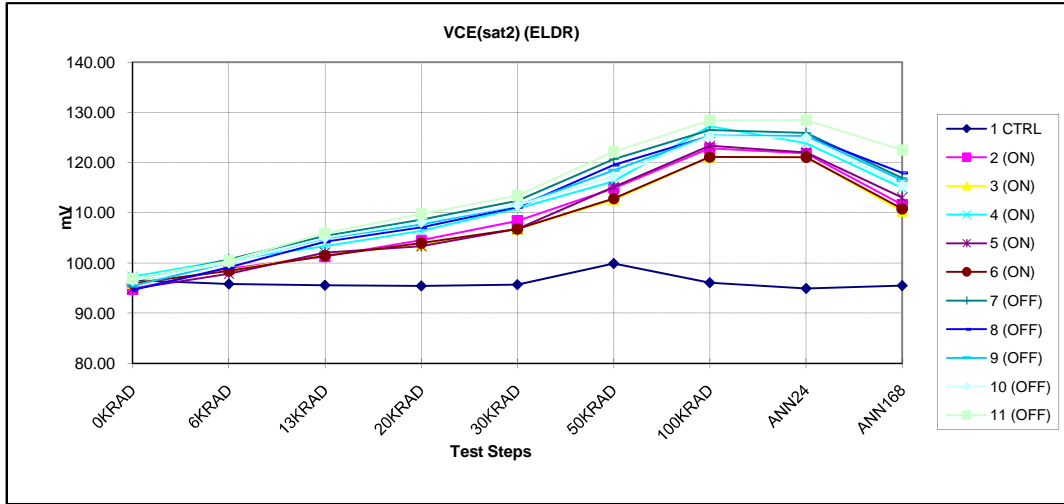
VCE(sat1) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	150	150	150	150	150	150	150	150	150
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	51.381	51.063	50.825	50.950	50.944	50.869	50.994	50.644	50.875

Bias on results									
2 (ON)	50.044	52.725	54.969	56.888	58.425	61.113	66.263	66.581	60.056
3 (ON)	50.113	52.675	54.881	56.481	57.956	60.463	65.475	65.294	60.031
4 (ON)	50.663	52.731	55.125	56.913	57.831	61.106	65.356	65.338	59.656
5 (ON)	50.781	52.594	55.369	56.900	58.194	61.019	65.988	65.806	59.881
6 (ON)	50.919	53.094	55.338	57.263	58.506	61.725	66.856	66.875	61.050
Statistics bias on									
min result	50.044	52.594	54.881	56.481	57.831	60.463	65.356	65.294	59.656
max result	50.919	53.094	55.369	57.263	58.506	61.725	66.856	66.875	61.050
average	50.504	52.764	55.136	56.889	58.182	61.085	65.988	65.979	60.135
sigma	0.400	0.193	0.217	0.277	0.291	0.448	0.611	0.720	0.536

Bias off results									
7 (OFF)	49.863	54.294	58.338	60.350	62.769	66.106	70.925	71.006	69.200
8 (OFF)	50.469	54.581	59.419	62.531	64.831	68.775	74.075	73.756	68.600
9 (OFF)	50.619	55.069	60.375	63.344	65.469	70.025	75.000	74.938	69.125
10 (OFF)	50.731	54.450	58.713	61.400	63.656	67.575	72.075	72.050	66.988
11 (OFF)	50.719	54.594	58.713	61.281	63.594	66.950	71.850	71.663	67.044
Statistics bias off									
min result	49.863	54.294	58.338	60.350	62.769	66.106	70.925	71.006	66.988
max result	50.731	55.069	60.375	63.344	65.469	70.025	75.000	74.938	69.200
average	50.480	54.598	59.112	61.781	64.064	67.886	72.785	72.683	68.191
sigma	0.361	0.290	0.807	1.167	1.075	1.542	1.689	1.619	1.098



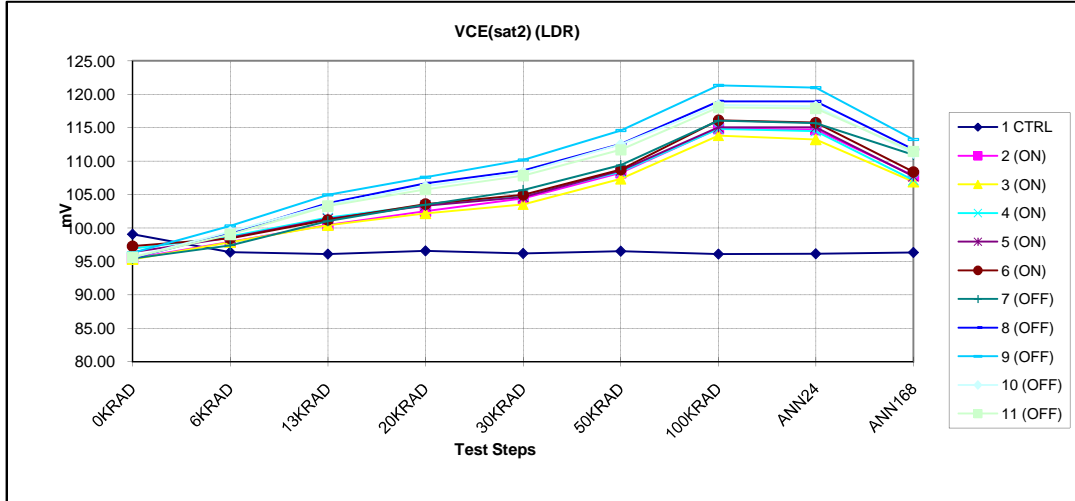
VCE(sat1) AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	50.491	53.088	55.880	57.988	60.553	65.489	73.705	73.358	63.896
ELDR OFF	50.474	55.626	61.064	64.709	68.528	74.058	81.087	81.230	73.563
LDR ON	50.504	52.764	55.136	56.889	58.182	61.085	65.988	65.979	60.135
LDR OFF	50.480	54.598	59.112	61.781	64.064	67.886	72.785	72.683	68.191



VCE(sat2) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	200	200	200	200	200	200	200	200	200
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	96.594	95.837	95.581	95.400	95.706	99.869	96.094	94.950	95.481

Bias on results									
2 (ON)	94.800	98.863	101.325	104.569	108.375	114.906	122.869	121.856	111.638
3 (ON)	96.006	98.513	101.694	103.625	106.781	112.581	121.131	121.225	110.319
4 (ON)	97.275	100.575	103.356	106.406	110.881	116.294	127.269	123.913	114.981
5 (ON)	94.869	97.856	102.038	103.331	106.788	115.131	123.400	122.056	113.031
6 (ON)	95.963	98.413	101.406	103.963	106.794	112.838	121.163	121.050	110.788
Statistics bias on									
min result	94.800	97.856	101.325	103.331	106.781	112.581	121.131	121.050	110.319
max result	97.275	100.575	103.356	106.406	110.881	116.294	127.269	123.913	114.981
average	95.783	98.844	101.964	104.379	107.924	114.350	123.166	122.020	112.151
sigma	1.014	1.033	0.827	1.223	1.790	1.590	2.507	1.138	1.888

Bias off results									
7 (OFF)	96.388	100.706	105.388	108.644	112.406	120.681	126.525	125.900	116.931
8 (OFF)	94.619	99.113	104.231	107.131	111.125	119.550	125.269	125.263	117.956
9 (OFF)	95.419	100.094	104.881	107.663	111.419	118.488	125.438	125.362	116.500
10 (OFF)	96.531	100.006	105.013	108.119	111.531	117.288	125.294	124.994	115.494
11 (OFF)	96.869	100.394	105.969	109.794	113.425	122.131	128.394	128.481	122.556
Statistics bias off									
min result	94.619	99.113	104.231	107.131	111.125	117.288	125.269	124.994	115.494
max result	96.869	100.706	105.969	109.794	113.425	122.131	128.394	128.481	122.556
average	95.965	100.063	105.096	108.270	111.981	119.628	126.184	126.000	117.887
sigma	0.926	0.598	0.642	1.019	0.938	1.881	1.340	1.425	2.755



VCE(sat2) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	200	200	200	200	200	200	200	200	200
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV

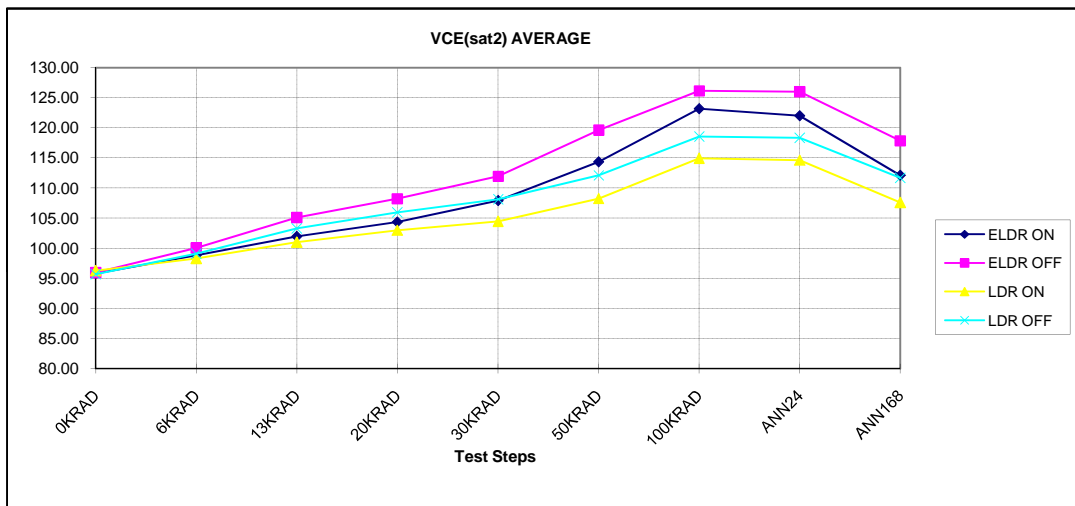
Control Results									
1 CTRL	99.088	96.400	96.094	96.569	96.188	96.519	96.119	96.144	96.344

Bias on results									
2 (ON)	95.444	97.913	100.463	102.494	104.450	108.263	114.863	114.719	107.825
3 (ON)	95.306	97.863	100.400	102.188	103.544	107.344	113.825	113.225	106.925
4 (ON)	96.913	98.719	101.575	103.425	104.838	108.400	114.837	114.494	107.163
5 (ON)	96.375	98.538	101.350	103.313	104.606	108.600	115.038	115.031	107.756
6 (ON)	97.313	98.469	101.238	103.569	104.975	108.738	116.113	115.794	108.425

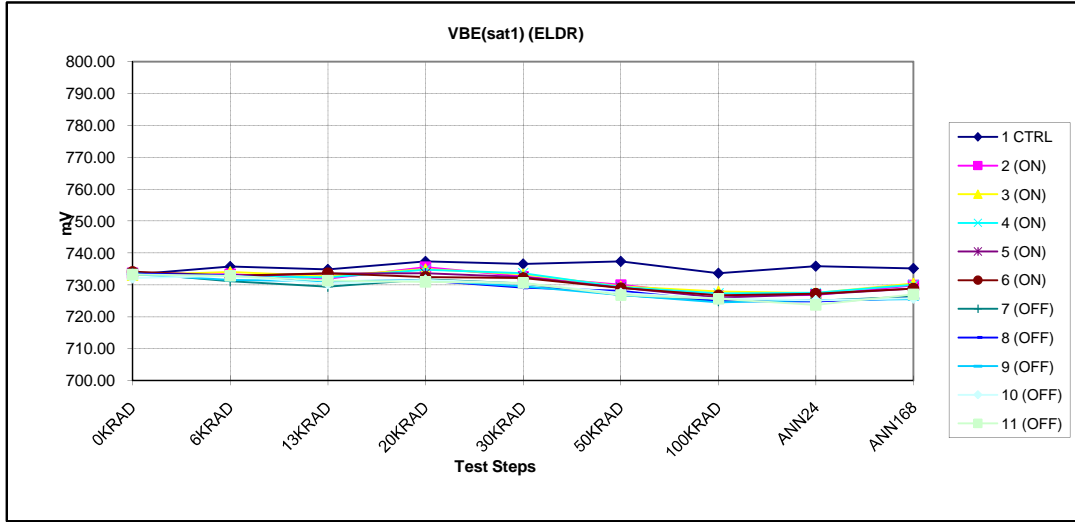
Statistics bias on									
min result	95.306	97.863	100.400	102.188	103.544	107.344	113.825	113.225	106.925
max result	97.313	98.719	101.575	103.569	104.975	108.738	116.113	115.794	108.425
average	96.270	98.300	101.005	102.998	104.483	108.269	114.935	114.653	107.619
sigma	0.884	0.388	0.538	0.616	0.563	0.548	0.813	0.937	0.592

Bias off results									
7 (OFF)	95.425	97.413	101.012	103.481	105.656	109.394	116.075	115.694	110.956
8 (OFF)	95.525	99.225	103.700	106.675	108.600	112.569	118.950	118.913	111.744
9 (OFF)	96.288	100.325	104.963	107.587	110.194	114.563	121.306	120.994	113.213
10 (OFF)	95.650	99.438	103.488	106.231	108.325	112.531	118.394	118.231	111.156
11 (OFF)	95.619	99.031	103.281	105.788	107.831	111.719	118.013	117.894	111.488

Statistics bias off									
min result	95.425	97.413	101.012	103.481	105.656	109.394	116.075	115.694	110.956
max result	96.288	100.325	104.963	107.587	110.194	114.563	121.306	120.994	113.213
average	95.701	99.086	103.289	105.952	108.121	112.155	118.548	118.345	111.711
sigma	0.340	1.058	1.431	1.534	1.638	1.866	1.884	1.909	0.892



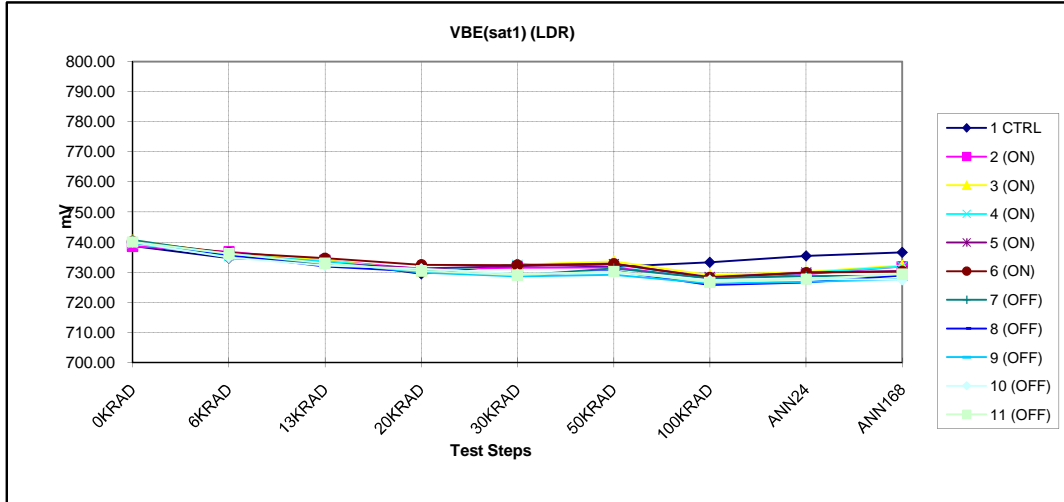
VCE(sat2) AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	95.783	98.844	101.964	104.379	107.924	114.350	123.166	122.020	112.151
ELDR OFF	95.965	100.063	105.096	108.270	111.981	119.628	126.184	126.000	117.887
LDR ON	96.270	98.300	101.005	102.998	104.483	108.269	114.935	114.653	107.619
LDR OFF	95.701	99.086	103.289	105.952	108.121	112.155	118.548	118.345	111.711



VBE(sat1) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	1000	1000	1000	1000	1000	1000	1000	1000	1000
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	733.295	735.720	734.905	737.330	736.534	737.348	733.636	735.871	735.152

Bias on results									
2 (ON)	733.636	733.314	731.989	735.530	732.689	730.076	726.667	726.780	729.830
3 (ON)	733.049	734.072	732.784	734.981	733.333	729.564	727.936	727.386	730.417
4 (ON)	733.523	732.727	732.311	734.735	733.617	729.356	727.292	727.557	730.038
5 (ON)	733.636	732.784	733.580	733.617	732.424	729.110	726.004	726.989	728.845
6 (ON)	734.205	732.822	733.636	732.462	732.121	729.072	726.686	727.235	728.845
Statistics bias on									
min result	733.049	732.727	731.989	732.462	732.121	729.072	726.004	726.780	728.845
max result	734.205	734.072	733.636	735.530	733.617	730.076	727.936	727.557	730.417
average	733.610	733.144	732.860	734.265	732.837	729.436	726.917	727.189	729.595
sigma	0.412	0.569	0.739	1.225	0.624	0.410	0.729	0.310	0.716

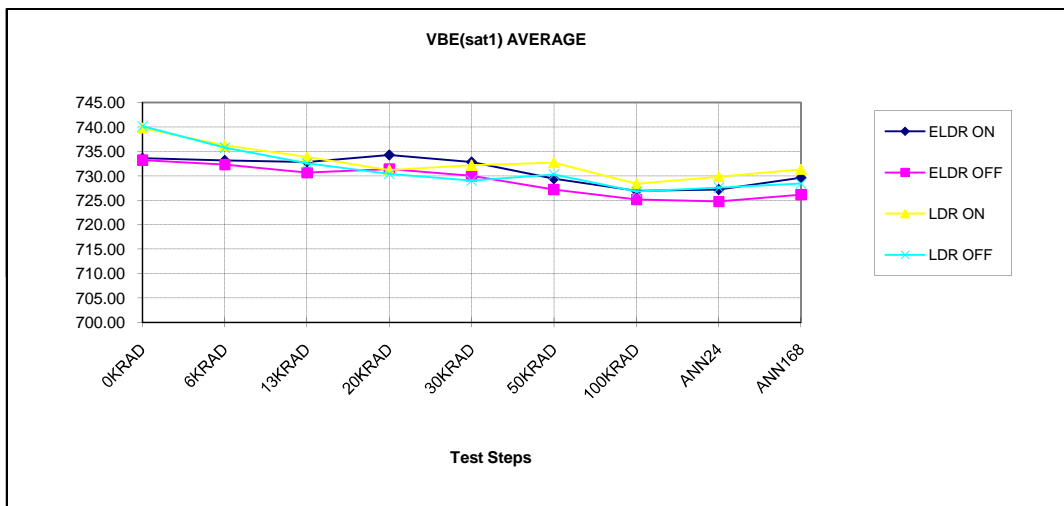
Bias off results									
7 (OFF)	733.788	731.193	729.489	731.723	730.436	726.799	724.962	725.057	726.307
8 (OFF)	733.598	733.030	731.136	731.364	729.129	728.125	724.943	724.867	725.852
9 (OFF)	733.333	731.572	731.174	731.420	729.583	726.780	724.489	725.189	725.568
10 (OFF)	732.140	732.860	730.322	731.553	730.417	727.481	725.739	725.095	725.833
11 (OFF)	733.239	732.841	731.345	730.909	730.644	726.780	725.606	723.712	727.045
Statistics bias off									
min result	732.140	731.193	729.489	730.909	729.129	726.780	724.489	723.712	725.568
max result	733.788	733.030	731.345	731.723	730.644	728.125	725.739	725.189	727.045
average	733.220	732.299	730.693	731.394	730.042	727.193	725.148	724.784	726.121
sigma	0.641	0.851	0.781	0.304	0.652	0.602	0.517	0.611	0.581



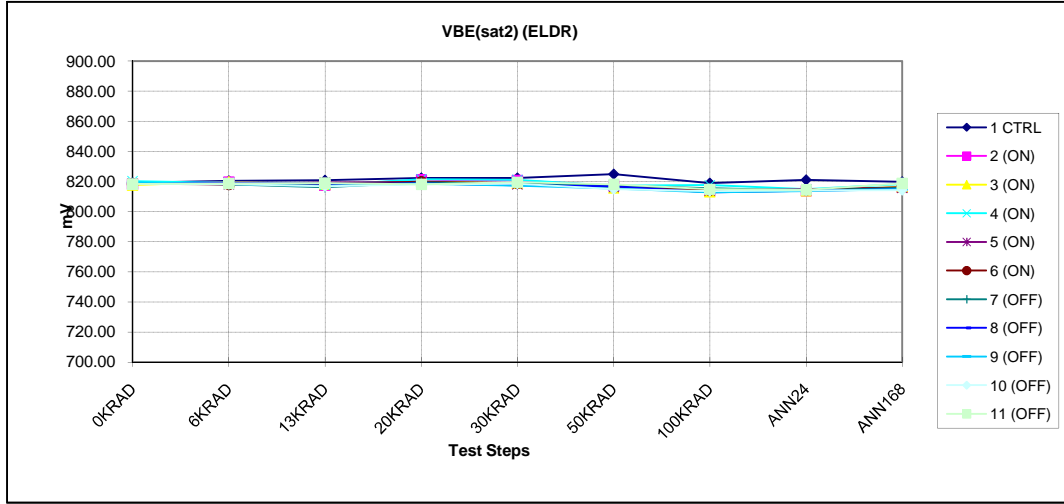
VBE(sat1) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	1000	1000	1000	1000	1000	1000	1000	1000	1000
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	738.788	734.754	733.958	729.508	732.689	731.799	733.295	735.398	736.648

Bias on results									
2 (ON)	738.636	736.837	733.958	731.098	731.515	731.610	728.049	729.394	731.970
3 (ON)	740.663	736.155	734.110	730.549	732.500	733.617	729.091	730.170	732.273
4 (ON)	739.640	735.549	733.769	730.625	732.481	732.633	728.011	729.792	731.932
5 (ON)	739.886	736.042	733.011	731.288	732.008	732.822	728.390	729.867	730.398
6 (ON)	740.246	736.496	734.735	732.462	732.367	732.917	728.182	729.943	730.189
Statistics bias on									
min result	738.636	735.549	733.011	730.549	731.515	731.610	728.011	729.394	730.189
max result	740.663	736.837	734.735	732.462	732.500	733.617	729.091	730.170	732.273
average	739.814	736.216	733.917	731.204	732.174	732.720	728.345	729.833	731.352
sigma	0.763	0.486	0.623	0.769	0.418	0.723	0.443	0.283	0.978

Bias off results									
7 (OFF)	740.814	735.928	732.367	730.341	728.939	731.307	727.992	728.769	728.845
8 (OFF)	740.095	735.777	731.894	730.284	728.977	730.530	725.777	726.667	728.958
9 (OFF)	739.905	736.155	733.352	729.886	728.598	729.167	726.307	726.780	727.670
10 (OFF)	740.038	734.924	732.254	731.212	729.508	730.000	727.330	727.898	727.443
11 (OFF)	740.170	736.174	732.992	730.436	729.034	730.360	726.761	727.841	729.356
Statistics bias off									
min result	739.905	734.924	731.894	729.886	728.598	729.167	725.777	726.667	727.443
max result	740.814	736.174	733.352	731.212	729.508	731.307	727.992	728.769	729.356
average	740.204	735.792	732.572	730.432	729.011	730.273	726.833	727.591	728.454
sigma	0.354	0.512	0.589	0.484	0.326	0.781	0.864	0.874	0.845



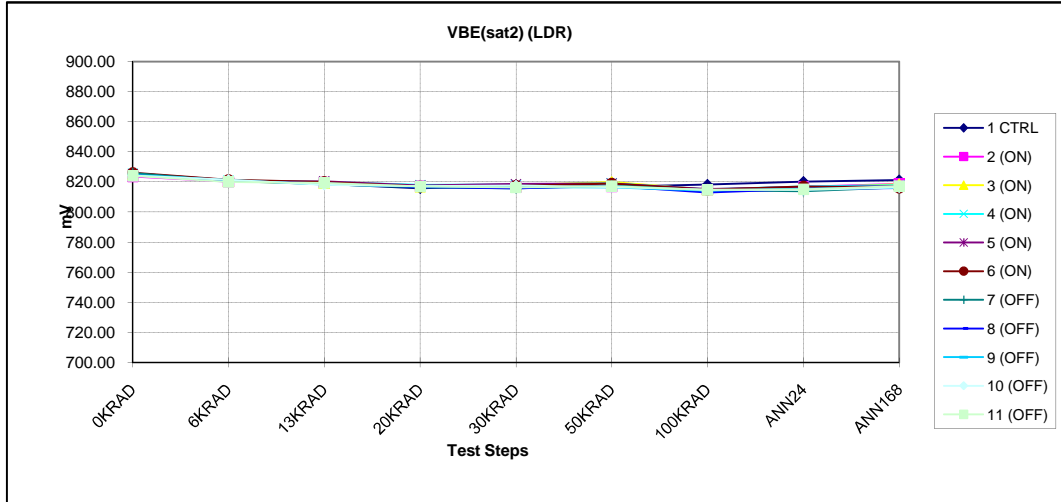
VBE(sat1) AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	733.610	733.144	732.860	734.265	732.837	729.436	726.917	727.189	729.595
ELDR OFF	733.220	732.299	730.693	731.394	730.042	727.193	725.148	724.784	726.121
LDR ON	739.814	736.216	733.917	731.204	732.174	732.720	728.345	729.833	731.352
LDR OFF	740.204	735.792	732.572	730.432	729.011	730.273	726.833	727.591	728.454



VBE(sat2) (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	1000	1000	1000	1000	1000	1000	1000	1000	1000
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	819.015	820.341	820.890	822.292	822.330	824.848	818.939	821.004	819.735

Bias on results									
2 (ON)	818.295	819.489	817.633	821.042	820.587	817.292	814.129	813.788	816.042
3 (ON)	817.595	819.716	817.936	819.886	818.731	815.549	813.125	813.826	816.269
4 (ON)	820.170	819.015	817.576	821.439	821.061	817.159	817.727	814.943	818.314
5 (ON)	818.598	817.973	819.261	819.564	818.106	816.288	814.072	814.811	815.795
6 (ON)	818.580	818.144	818.580	819.697	818.845	816.288	814.167	814.527	816.117
Statistics bias on									
min result	817.595	817.973	817.576	819.564	818.106	815.549	813.125	813.788	815.795
max result	820.170	819.716	819.261	821.439	821.061	817.292	817.727	814.943	818.314
average	818.648	818.867	818.197	820.326	819.466	816.515	814.644	814.379	816.507
sigma	0.943	0.783	0.716	0.855	1.282	0.717	1.777	0.544	1.024

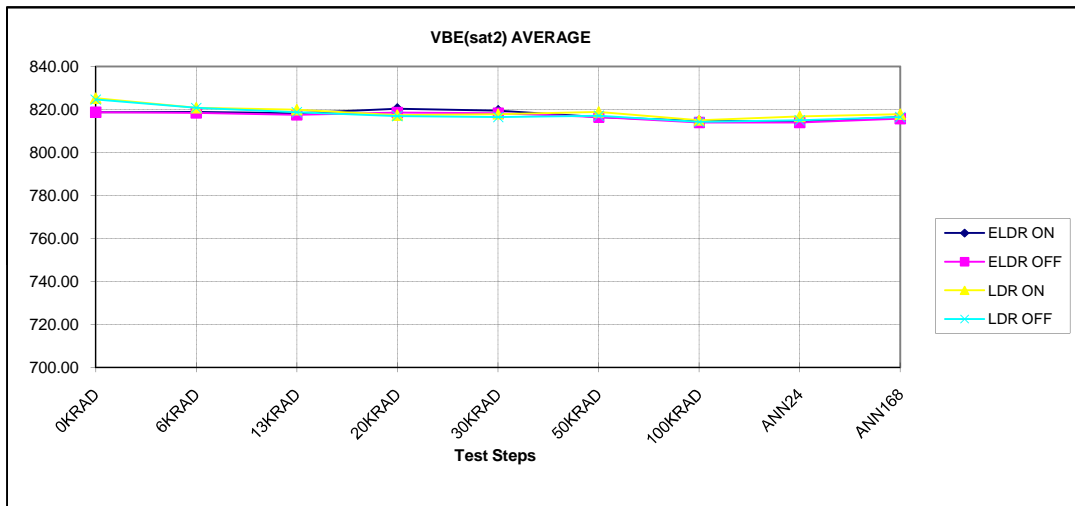
Bias off results									
7 (OFF)	819.072	818.068	816.155	819.337	818.371	817.273	815.436	813.958	815.625
8 (OFF)	818.674	819.242	818.523	818.617	817.462	816.723	812.803	813.712	814.848
9 (OFF)	819.318	818.201	816.970	818.485	817.140	815.303	812.708	813.598	814.924
10 (OFF)	818.182	818.182	816.742	818.011	818.447	814.924	813.655	814.053	814.261
11 (OFF)	818.220	818.617	818.864	817.992	819.621	817.992	814.962	814.375	818.674
Statistics bias off									
min result	818.182	818.068	816.155	817.992	817.140	814.924	812.708	813.598	814.261
max result	819.318	819.242	818.864	819.337	819.621	817.992	815.436	814.375	818.674
average	818.693	818.462	817.451	818.488	818.208	816.443	813.913	813.939	815.666
sigma	0.505	0.483	1.179	0.550	0.972	1.301	1.242	0.305	1.750



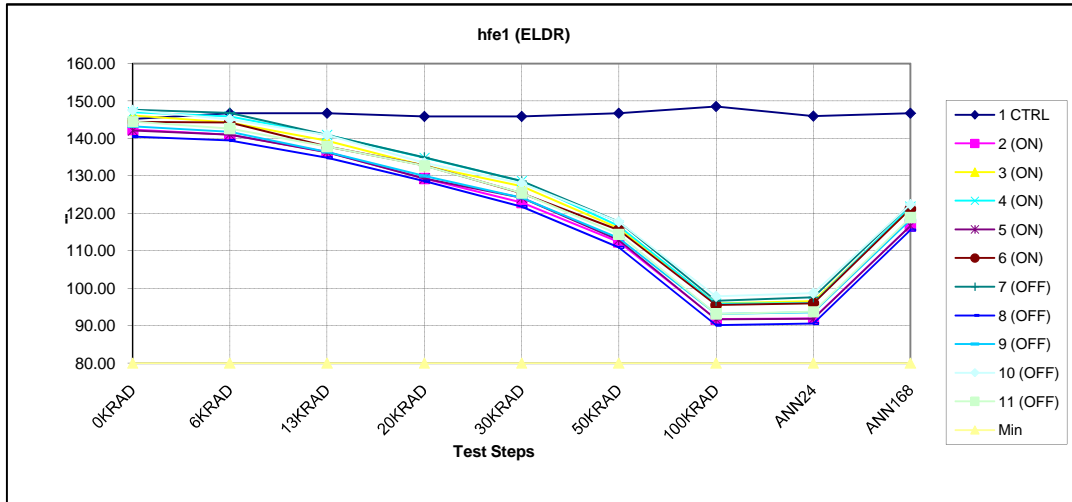
VBE(sat2) (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	--	--	--	--	--	--	--	--	--
Max	1000	1000	1000	1000	1000	1000	1000	1000	1000
Unit	mV	mV	mV	mV	mV	mV	mV	mV	mV
Control Results									
1 CTRL	825.814	821.231	818.845	815.663	818.106	816.742	818.258	820.152	821.307

Bias on results									
2 (ON)	823.598	820.284	819.583	817.216	816.686	817.008	814.962	816.799	818.769
3 (ON)	825.057	820.530	819.110	816.856	817.860	819.981	814.867	816.269	818.504
4 (ON)	825.492	821.174	819.981	818.182	818.390	819.110	815.152	817.083	817.955
5 (ON)	825.436	820.284	820.436	817.614	818.845	818.958	815.341	816.572	817.348
6 (ON)	826.288	821.572	820.038	816.989	817.424	818.939	814.886	817.064	816.098
Statistics bias on									
min result	823.598	820.284	819.110	816.856	816.686	817.008	814.867	816.269	816.098
max result	826.288	821.572	820.436	818.182	818.845	819.981	815.341	817.083	818.769
average	825.174	820.769	819.830	817.371	817.841	818.799	815.042	816.757	817.735
sigma	0.988	0.578	0.503	0.537	0.839	1.089	0.202	0.344	1.065

Bias off results									
7 (OFF)	825.947	820.587	818.523	816.496	815.663	817.670	814.564	813.920	816.402
8 (OFF)	824.564	820.739	819.205	816.667	815.777	817.311	812.898	815.436	815.947
9 (OFF)	824.621	821.250	818.295	817.121	816.705	816.326	814.375	815.511	816.269
10 (OFF)	824.261	821.534	818.144	817.197	817.633	816.515	814.830	814.659	816.420
11 (OFF)	824.053	820.019	819.375	816.951	816.458	817.273	814.678	815.019	817.178
Statistics bias off									
min result	824.053	820.019	818.144	816.496	815.663	816.326	812.898	813.920	815.947
max result	825.947	821.534	819.375	817.197	817.633	817.670	814.830	815.511	817.178
average	824.689	820.826	818.708	816.886	816.447	817.019	814.269	814.909	816.443
sigma	0.740	0.591	0.551	0.298	0.796	0.572	0.784	0.651	0.452



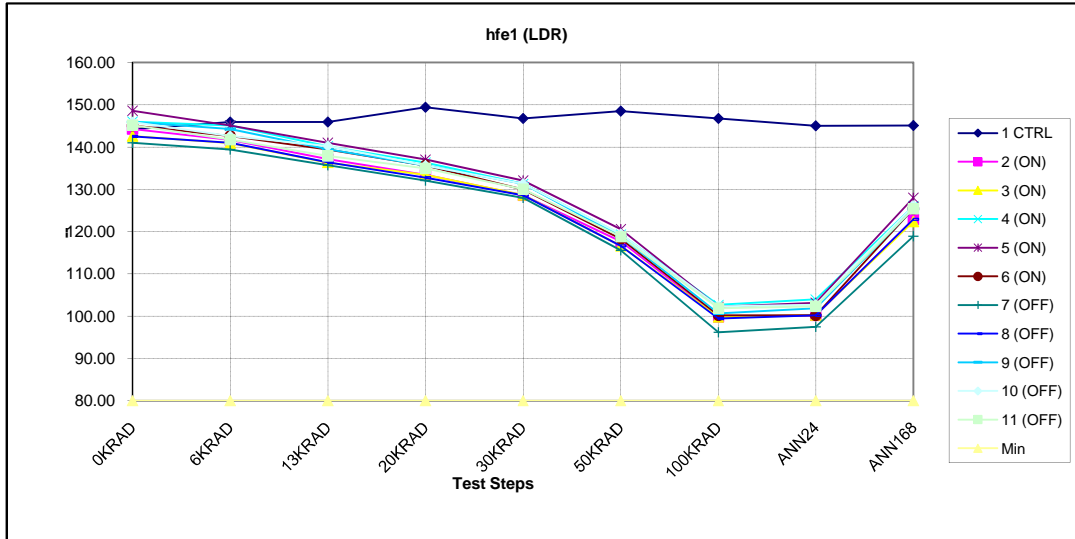
VBE(sat2) AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	818.648	818.867	818.197	820.326	819.466	816.515	814.644	814.379	816.507
ELDR OFF	818.693	818.462	817.451	818.488	818.208	816.443	813.913	813.939	815.666
LDR ON	825.174	820.769	819.830	817.371	817.841	818.799	815.042	816.757	817.735
LDR OFF	824.689	820.826	818.708	816.886	816.447	817.019	814.269	814.909	816.443



hfe1 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	80	80	80	80	80	80	80	80	80
Max	--	--	--	--	--	--	--	--	--
Unit	--	--	--	--	--	--	--	--	--
Control Results									
1 CTRL	145.2	146.8	146.8	145.9	145.9	146.8	148.6	145.9	146.8

Bias on results									
2 (ON)	142.4	141.0	136.4	129.3	122.9	112.4	91.8	92.0	116.6
3 (ON)	146.1	144.3	139.4	132.7	127.3	116.1	95.9	96.6	121.2
4 (ON)	147.0	145.9	140.9	134.9	128.6	116.6	95.8	96.0	121.7
5 (ON)	142.1	141.0	136.3	129.3	124.1	112.9	91.7	91.8	116.6
6 (ON)	144.5	144.3	137.9	132.8	125.4	115.5	95.6	95.9	121.1
Statistics bias on									
min result	142.1	141.0	136.3	129.3	122.9	112.4	91.7	91.8	116.6
max result	147.0	145.9	140.9	134.9	128.6	116.6	95.9	96.6	121.7
average	144.4	143.3	138.2	131.8	125.7	114.7	94.2	94.5	119.5
sigma	2.2	2.2	2.0	2.4	2.3	1.9	2.2	2.4	2.6

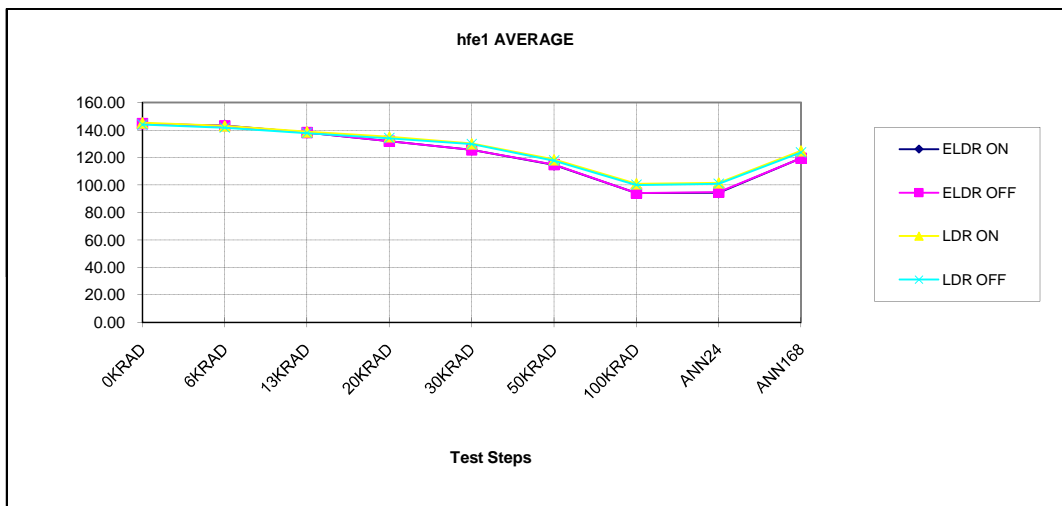
Bias off results									
7 (OFF)	147.7	146.8	140.9	134.9	128.7	117.7	96.6	97.6	122.3
8 (OFF)	140.5	139.4	134.9	128.6	121.7	110.9	90.2	90.6	115.5
9 (OFF)	143.3	141.8	136.4	130.0	124.1	113.4	93.1	93.6	118.3
10 (OFF)	147.5	145.1	140.9	133.5	128.0	117.7	97.8	98.7	122.4
11 (OFF)	144.5	142.6	137.9	132.7	125.5	114.5	93.1	93.8	118.9
Statistics bias off									
min result	140.5	139.4	134.9	128.6	121.7	110.9	90.2	90.6	115.5
max result	147.7	146.8	140.9	134.9	128.7	117.7	97.8	98.7	122.4
average	144.7	143.1	138.2	131.9	125.6	114.8	94.2	94.8	119.5
sigma	3.0	2.9	2.7	2.6	2.8	2.9	3.1	3.3	2.9



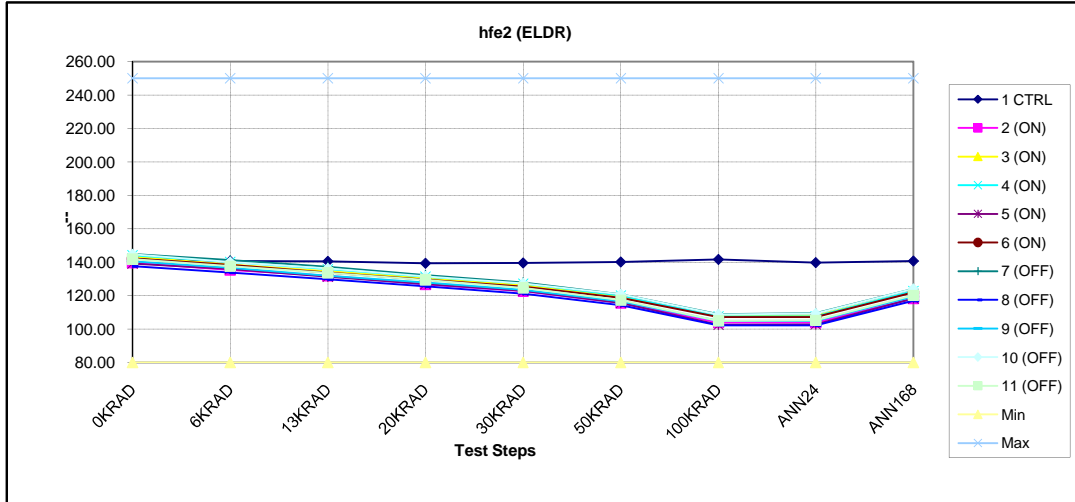
hfe1 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	80	80	80	80	80	80	80	80	80
Max	--	--	--	--	--	--	--	--	--
Unit	--	--	--	--	--	--	--	--	--
Control Results									
1 CTRL	144.2	145.9	145.9	149.5	146.8	148.5	146.8	145.0	145.1

Bias on results									
2 (ON)	144.3	141.7	137.1	133.4	128.6	117.7	99.8	100.2	122.9
3 (ON)	142.6	140.9	136.3	133.4	128.6	116.6	99.8	100.2	122.4
4 (ON)	146.0	145.1	140.2	136.3	131.4	119.4	102.7	104.0	126.0
5 (ON)	148.6	145.1	141.0	137.1	132.1	120.6	102.3	103.1	128.0
6 (ON)	145.1	142.6	139.4	135.6	130.0	118.3	100.2	100.2	125.4
Statistics bias on									
min result	142.6	140.9	136.3	133.4	128.6	116.6	99.8	100.2	122.4
max result	148.6	145.1	141.0	137.1	132.1	120.6	102.7	104.0	128.0
average	145.3	143.1	138.8	135.2	130.1	118.5	101.0	101.6	124.9
sigma	2.2	1.9	2.0	1.7	1.6	1.5	1.4	1.9	2.3

Bias off results									
7 (OFF)	141.0	139.4	135.7	132.0	128.0	115.6	96.2	97.5	118.9
8 (OFF)	142.6	141.0	136.4	132.7	128.6	116.6	99.4	100.2	122.9
9 (OFF)	145.9	144.2	139.5	135.7	131.4	118.8	100.6	101.9	125.4
10 (OFF)	145.9	142.6	140.2	135.6	131.4	119.4	102.3	102.7	126.1
11 (OFF)	145.2	141.8	137.9	134.9	130.0	118.9	101.8	102.3	125.4
Statistics bias off									
min result	141.0	139.4	135.7	132.0	128.0	115.6	96.2	97.5	118.9
max result	145.9	144.2	140.2	135.7	131.4	119.4	102.3	102.7	126.1
average	144.1	141.8	137.9	134.2	129.9	117.9	100.1	100.9	123.7
sigma	2.2	1.8	2.0	1.7	1.5	1.7	2.5	2.1	3.0



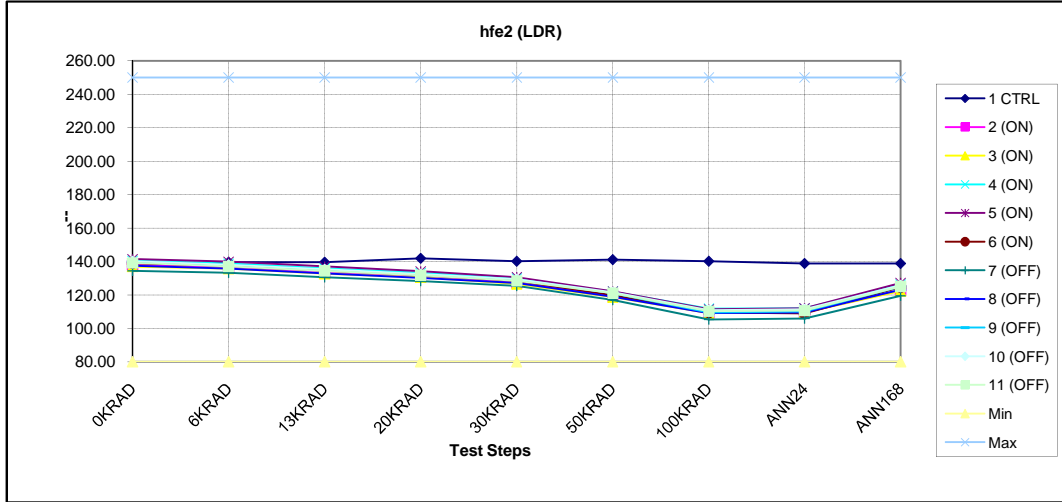
hfe1 AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	144.4	143.3	138.2	131.8	125.7	114.7	94.2	94.5	119.5
ELDR OFF	144.7	143.1	138.2	131.9	125.6	114.8	94.2	94.8	119.5
LDR ON	145.3	143.1	138.8	135.2	130.1	118.5	101.0	101.6	124.9
LDR OFF	144.1	141.8	137.9	134.2	129.9	117.9	100.1	100.9	123.7



hfe2 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	80	80	80	80	80	80	80	80	80
Max	250	250	250	250	250	250	250	250	250
Unit	--	--	--	--	--	--	--	--	--
Control Results									
1 CTRL	142.3	140.6	140.6	139.4	139.7	140.2	141.6	139.8	140.8

Bias on results									
2 (ON)	139.9	135.4	131.9	126.8	122.8	115.6	104.0	104.1	118.4
3 (ON)	143.4	138.7	134.7	130.5	126.3	119.7	107.6	108.1	122.3
4 (ON)	144.1	140.2	136.0	131.3	127.4	120.1	107.6	107.6	122.8
5 (ON)	139.2	135.9	131.4	126.9	123.0	115.7	102.7	102.8	118.3
6 (ON)	142.3	138.4	133.9	129.6	125.4	118.8	107.2	107.2	121.9
Statistics bias on									
min result	139.2	135.4	131.4	126.8	122.8	115.6	102.7	102.8	118.3
max result	144.1	140.2	136.0	131.3	127.4	120.1	107.6	108.1	122.8
average	141.8	137.7	133.6	129.0	125.0	118.0	105.8	106.0	120.7
sigma	2.2	2.0	1.9	2.1	2.0	2.1	2.3	2.4	2.2

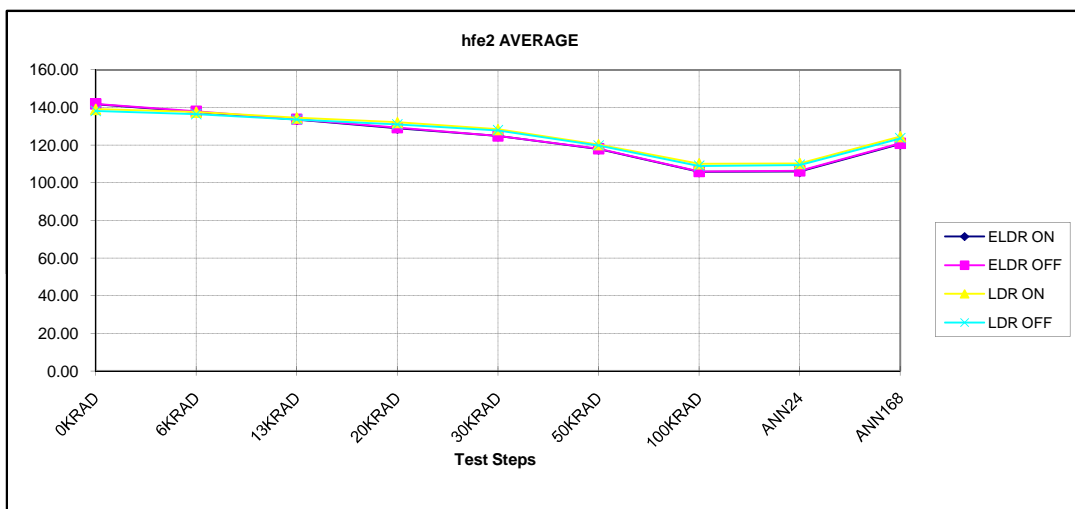
Bias off results									
7 (OFF)	145.0	141.4	137.3	132.3	127.9	120.9	109.1	109.5	124.0
8 (OFF)	137.6	133.8	129.8	125.7	121.3	114.3	102.3	102.4	116.9
9 (OFF)	140.6	136.7	132.0	127.9	123.4	116.7	104.9	104.9	119.5
10 (OFF)	144.7	140.2	136.4	131.6	127.3	120.9	108.8	109.3	124.1
11 (OFF)	141.8	137.7	133.6	129.4	124.6	117.5	104.9	105.4	120.3
Statistics bias off									
min result	137.6	133.8	129.8	125.7	121.3	114.3	102.3	102.4	116.9
max result	145.0	141.4	137.3	132.3	127.9	120.9	109.1	109.5	124.1
average	141.9	138.0	133.8	129.4	124.9	118.1	106.0	106.3	121.0
sigma	3.1	3.0	3.1	2.7	2.7	2.9	2.9	3.1	3.1



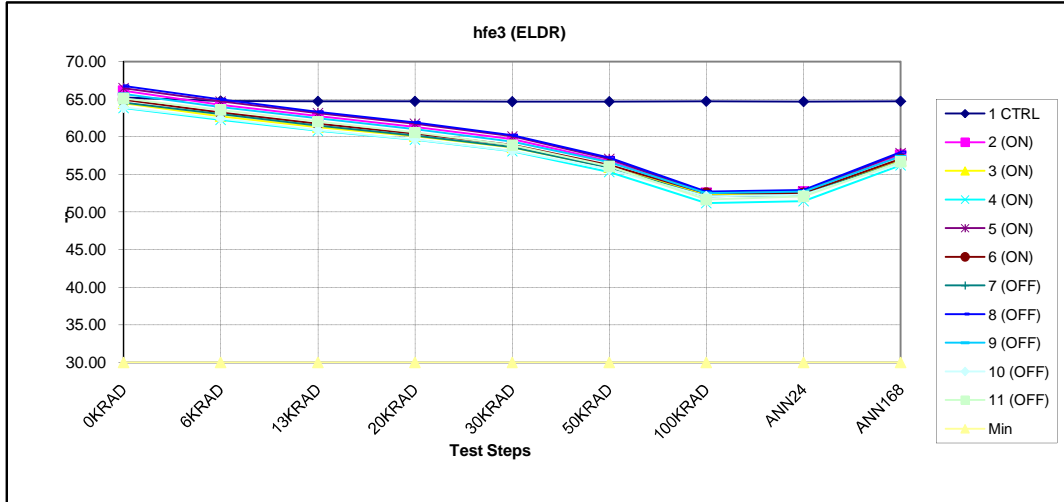
hfe2 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	80	80	80	80	80	80	80	80	80
Max	250	250	250	250	250	250	250	250	250
Unit	--	--	--	--	--	--	--	--	--
Control Results									
1 CTRL	137.3	139.5	139.6	141.9	140.1	141.0	140.1	138.9	138.7

Bias on results									
2 (ON)	137.9	136.4	133.0	130.8	127.2	119.4	109.0	109.5	122.7
3 (ON)	136.9	135.7	132.6	130.5	126.5	118.7	109.0	109.5	122.3
4 (ON)	140.5	138.8	135.8	133.3	129.7	122.0	111.8	112.1	126.1
5 (ON)	141.5	140.0	137.1	134.3	130.5	122.2	111.5	112.0	127.1
6 (ON)	138.9	137.3	134.3	132.0	128.2	119.9	109.5	108.9	124.6
Statistics bias on									
min result	136.9	135.7	132.6	130.5	126.5	118.7	109.0	108.9	122.3
max result	141.5	140.0	137.1	134.3	130.5	122.2	111.8	112.1	127.1
average	139.2	137.6	134.6	132.2	128.4	120.4	110.2	110.4	124.6
sigma	1.9	1.8	1.9	1.6	1.7	1.6	1.3	1.5	2.1

Bias off results									
7 (OFF)	134.3	133.2	130.6	128.3	125.4	116.9	105.3	105.8	119.4
8 (OFF)	137.5	135.8	132.8	130.2	127.1	118.9	109.0	109.5	123.0
9 (OFF)	139.7	138.0	135.1	132.4	129.1	120.9	109.6	110.1	125.0
10 (OFF)	140.1	138.0	135.4	132.5	129.3	121.6	110.8	111.4	125.8
11 (OFF)	139.2	137.1	134.4	131.7	128.5	121.0	110.3	110.7	124.9
Statistics bias off									
min result	134.3	133.2	130.6	128.3	125.4	116.9	105.3	105.8	119.4
max result	140.1	138.0	135.4	132.5	129.3	121.6	110.8	111.4	125.8
average	138.2	136.4	133.7	131.0	127.9	119.8	109.0	109.5	123.6
sigma	2.4	2.0	2.0	1.7	1.6	1.9	2.2	2.2	2.6



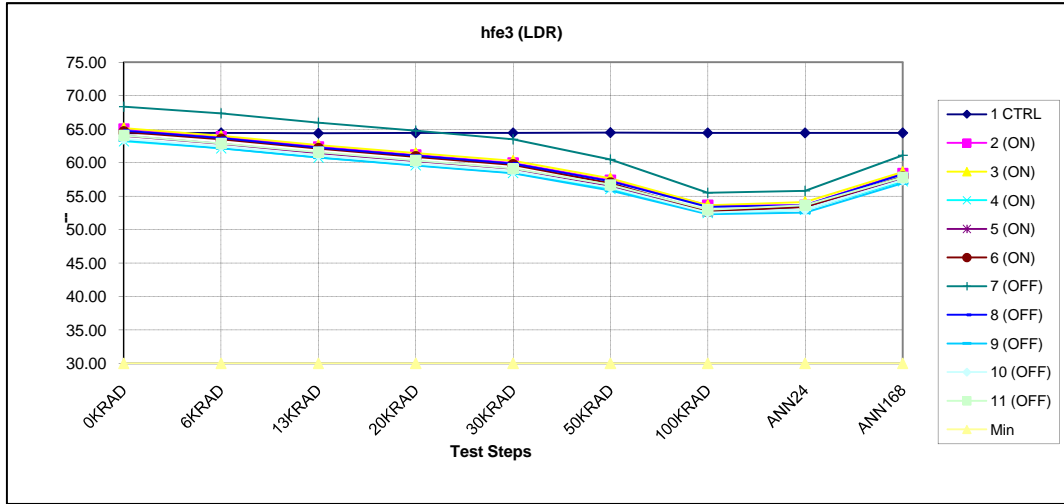
hfe2 AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	141.8	137.7	133.6	129.0	125.0	118.0	105.8	106.0	120.7
ELDR OFF	141.9	138.0	133.8	129.4	124.9	118.1	106.0	106.3	121.0
LDR ON	139.2	137.6	134.6	132.2	128.4	120.4	110.2	110.4	124.6
LDR OFF	138.2	136.4	133.7	131.0	127.9	119.8	109.0	109.5	123.6



hfe3 (ELDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	30	30	30	30	30	30	30	30	30
Max	--	--	--	--	--	--	--	--	--
Unit	--	--	--	--	--	--	--	--	--
Control Results									
1 CTRL	65.2	64.7	64.7	64.7	64.7	64.7	64.7	64.7	64.7

Bias on results									
2 (ON)	66.1	64.3	62.7	61.3	59.7	56.8	52.5	52.7	57.6
3 (ON)	64.5	62.7	61.3	60.1	58.6	56.0	52.3	52.5	56.8
4 (ON)	63.8	62.3	60.8	59.6	58.1	55.3	51.2	51.4	56.2
5 (ON)	66.5	64.7	63.1	61.7	60.1	57.1	52.5	52.7	57.8
6 (ON)	64.9	63.2	61.8	60.4	58.9	56.2	52.5	52.5	57.1
Statistics bias on									
min result	63.8	62.3	60.8	59.6	58.1	55.3	51.2	51.4	56.2
max result	66.5	64.7	63.1	61.7	60.1	57.1	52.5	52.7	57.8
average	65.2	63.4	62.0	60.6	59.1	56.3	52.2	52.4	57.1
sigma	1.1	1.0	1.0	0.9	0.8	0.7	0.6	0.5	0.7

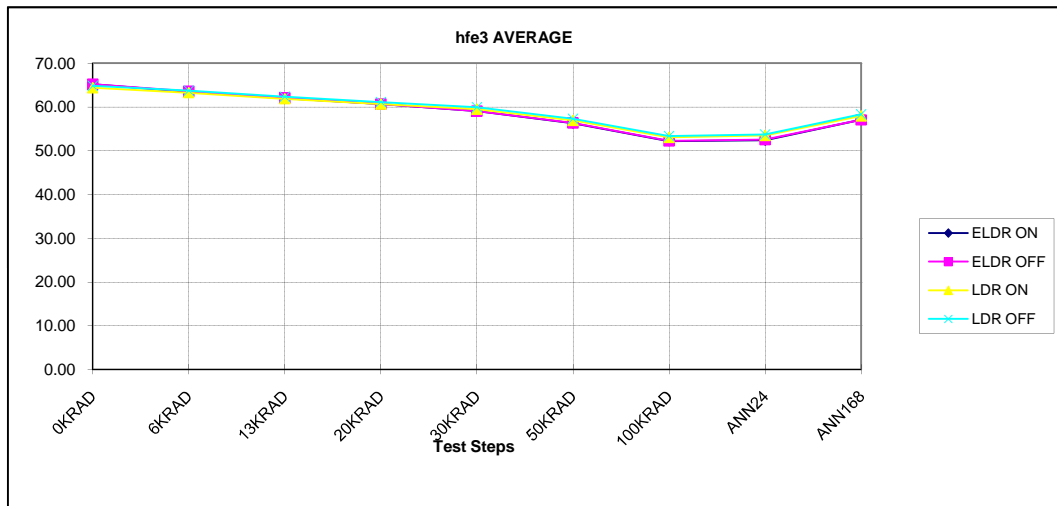
Bias off results									
7 (OFF)	64.6	63.0	61.5	60.2	58.6	55.9	52.1	52.3	56.7
8 (OFF)	66.8	65.0	63.3	61.9	60.2	57.3	52.7	53.0	58.0
9 (OFF)	65.7	63.9	62.4	61.0	59.4	56.6	52.5	52.7	57.4
10 (OFF)	63.9	62.4	60.9	59.6	58.1	55.6	52.1	52.3	56.4
11 (OFF)	65.1	63.6	62.1	60.6	58.9	56.1	51.6	52.1	56.7
Statistics bias off									
min result	63.9	62.4	60.9	59.6	58.1	55.6	51.6	52.1	56.4
max result	66.8	65.0	63.3	61.9	60.2	57.3	52.7	53.0	58.0
average	65.2	63.6	62.0	60.7	59.0	56.3	52.2	52.5	57.0
sigma	1.1	1.0	0.9	0.9	0.8	0.6	0.4	0.4	0.6



hfe3 (LDR)	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
Min	30	30	30	30	30	30	30	30	30
Max	--	--	--	--	--	--	--	--	--
Unit	--	--	--	--	--	--	--	--	--
Control Results									
1 CTRL	64.4	64.4	64.4	64.5	64.5	64.5	64.4	64.4	64.5

Bias on results									
2 (ON)	65.0	63.9	62.4	61.1	59.9	57.3	53.6	53.6	58.4
3 (ON)	65.1	64.0	62.6	61.4	60.3	57.6	53.6	54.1	58.6
4 (ON)	63.2	62.1	60.8	59.6	58.5	56.1	52.5	52.9	57.2
5 (ON)	64.0	62.8	61.5	60.2	59.1	56.5	52.7	53.4	57.7
6 (ON)	64.6	63.5	62.1	60.8	59.7	56.9	52.7	53.4	57.9
Statistics bias on									
min result	63.2	62.1	60.8	59.6	58.5	56.1	52.5	52.9	57.2
max result	65.1	64.0	62.6	61.4	60.3	57.6	53.6	54.1	58.6
average	64.4	63.3	61.9	60.6	59.5	56.9	53.0	53.5	58.0
sigma	0.8	0.8	0.8	0.7	0.7	0.6	0.5	0.4	0.6

Bias off results									
7 (OFF)	68.4	67.4	66.0	64.8	63.5	60.5	55.5	55.8	61.1
8 (OFF)	64.8	63.7	62.3	61.1	59.8	57.2	53.4	53.6	58.3
9 (OFF)	63.3	62.2	60.8	59.6	58.4	55.8	52.3	52.5	56.9
10 (OFF)	63.5	62.4	61.1	59.9	58.7	56.3	52.5	53.0	57.4
11 (OFF)	64.1	62.9	61.6	60.3	59.2	56.7	53.0	53.6	57.8
Statistics bias off									
min result	63.3	62.2	60.8	59.6	58.4	55.8	52.3	52.5	56.9
max result	68.4	67.4	66.0	64.8	63.5	60.5	55.5	55.8	61.1
average	64.8	63.7	62.3	61.1	59.9	57.3	53.3	53.7	58.3
sigma	2.1	2.1	2.1	2.1	2.1	1.8	1.3	1.3	1.6



hfe3 AVERAGE	0KRAD	6KRAD	13KRAD	20KRAD	30KRAD	50KRAD	100KRAD	ANN24	ANN168
ELDR ON	65.2	63.4	62.0	60.6	59.1	56.3	52.2	52.4	57.1
ELDR OFF	65.2	63.6	62.0	60.7	59.0	56.3	52.2	52.5	57.0
LDR ON	64.4	63.3	61.9	60.6	59.5	56.9	53.0	53.5	58.0
LDR OFF	64.8	63.7	62.3	61.1	59.9	57.3	53.3	53.7	58.3

ANNEX II DOSIMETRY



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 ⁶⁰Co 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	Dosimeter position relative to ⁶⁰ Co source		
Temperature	°C	24.10	25.70	24.99	X	cm	130
Pressure	mbar	982.60	1036.30	1014.74	Y	cm	736
Relative Humidity	%	22.20	42.90	32.08	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

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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

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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

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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

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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

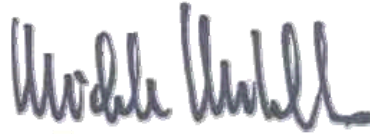
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157	04/06/2012 13:48	04/06/2012 15:27	1.14	0.33
158	04/06/2012 17:08	05/06/2012 08:58	6.04	0.40
159	05/06/2012 09:12	05/06/2012 11:04	0.41	0.40
160	05/06/2012 11:23	05/06/2012 13:45	0.54	0.33
161	05/06/2012 13:47	05/06/2012 17:24	1.04	0.29
162	05/06/2012 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

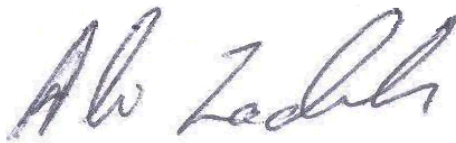
Note: The uncertainty budgets (according to TEC-QEC/PR001 section 12) are: 4.2 % ($k=2$) for absorbed dose to water and 4.4% ($k=2$) for absorbed dose rate to water

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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)

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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 <i>(Total Ionising Dose accredited by RvA according to ISO/IEC 17025.2005 Certificate No. L517)</i>
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(With the exception of the above specified dosimetry equipment, ESTEC ⁶⁰Co 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

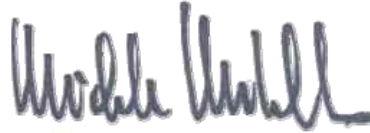
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5	05/06/2012 17:30	06/06/2012 08:45	61.25	4.02
6	06/06/2012 09:00	06/06/2012 10:06		
7	06/06/2012 10:09	06/06/2012 11:12		
8	06/06/2012 11:34	06/06/2012 14:16	9.51	3.52
9	06/06/2012 14:26	07/06/2012 08:44	71.58	3.97
10	07/06/2012 09:01	07/06/2012 11:04		
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

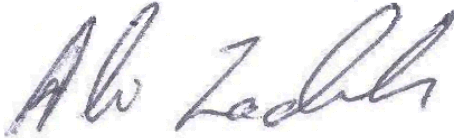
Note: The uncertainty budgets (according to TEC-QEC/PR001 section 12) are: 4.2 % (k=2) for absorbed dose to water and 4.4% (k=2) for absorbed dose rate to water

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

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