RIR's IN:- 77594/76277

RIR OUT:- 77594

PARTS HISTORY LOG

Radiation Testing

PROGRAMME:- XMM

PART TYPE:- LM111

RADIATION REPORT:- RD 236

IGG TASK NUMBER:- 1500

SUMMARY OF TEST RESULTS

All samples failed I_{IB1}, I_{IB2} and V_{OL1} after 10KRad(Si). 7 samples also failed I_{IO3} at this test stage. After the subsequent radiation exposures various failures of I_{IO1}, I_{IO3}, I_O, V_{IO1}, V_{IO2} and V_{IO3} occurred (see failure list for full details).

Radiation Report Number:- RD 236

Project:- XMM

Part Type:- LM111 Date Code:- 9649

Manufacturer:- NSC/U IGG Task No:- 1500

Project Approval of Lot Traveller:-

Signed.....Date.10-11-97.

Position..Component Engineer

Serial Number Range:-

01 through 11 (inclusive)

I certify that the subject component has been tested in accordance with the following radiation specifications:-

Test Method - ESA/SCC22900	ISSUE- 4	DATE- Jan '95
Irradiation Test Plan- XM-PL-IGG-0026	ISSUE- 2	DATE- Nov '96

Closed/Approved NCR No:- N N/A

Approved Waiver No:- WAR N/A

Signed..... Date.6/11/97.

Upscreening Engineer

Signed..... Date.6/11/97.

Upscreening Manager

RADIATION REPORT NUMBER:- RD 236 DATE:- 28.10.97

PROJECT:- XMM RIR's IN:- 72957 (RAD Samples)/76277 (Flight Die)

PART NUMBER:- LM111 MANUFACTURER:- NSC/U

PROCUREMENT LEVEL:- Die Procurement DATE CODE:- 9649

TEST METHOD:- ESA/SCC22900 ISSUE- 4 DATE- Jan '95

TEST PLAN:- XM-PL-IGG-0026 ISSUE- 2 DATE- Nov '96

START QUANTITY:- 11

No.	Test (Sample Size)	XM-PL-IGG-0026 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
1	Serialisation and Selection of Control Sample (100%)	Control Sample= SN 01	13/9/97	11	13/9/97	10 + CONTROL SAMPLE	IGG 16 CT
2	Initial Electrical Measurements (100% read and record)	Table A Testing at IGG	13/9/97	10	13/9/97	10	IGG 16 CT
3	Initial Electrical Measurements (100% read and record)	Table A Testing at ERA	17/9/97	10	17/9/97	10	IGG 16 CT
4	Set-up and apply Bias per Figure 1	Verify Bias Circuit and conditions (in-situ) for all 10 test samples	18/9/97	10	18/9/97	10	IGG 16 CT
5	Irradiation 1 (10 samples)	Dose= 10kRAD(Si) Rate= 10RAD(Si) per second Time= 1000secs	18/9/97	10	18/9/97	10	IGG 16 CT
6	Interim 1 Electrical Measurements (100% read and record)	Table A. Bias to be maintained until testing is performed. Tdwell=10mins maximum	18/9/97	10	18/9/97	0	IGG 16 CT

Report No: RD 236	Part Type: LM111	Date: 28.10.97

No.	Test (Sample Size)	XM-PL-IGG-0026 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
7	Irradiation 2 (10 samples)	As Test 5	18/9/97	10	18/9/97	10	IGG 16 CT
8	Interim 2 Electrical Measurements (100% read and record)	As Test 6	18/9/97	10	18/9/97	0	IGG 16 CT
9	Irradiation 3 (10 samples)	As Test 5	18/9/97	10	18/9/97	10	IGG 16 CT
10	Interim 3 Electrical Measurements (100% read and record)	As Test 6	18/9/97	10	18/9/97	0	IGG 16 CT
11	Irradiation 4 (10 samples)	Dose= 20kRAD(Si) Rate= 10RAD(Si) per second Time=2000secs	18/9/97	10	18/9/97	10	IGG 16 CT
12	Interim 4 Electrical Measurements (100% read and record)	As Test 6	18/9/97	10	18/9/97	0	IGG 16 CT
13	Irradiation 5 (10 samples)	Dose= 25kRAD(Si) Rate= 10RAD(Si) per second Time=2500secs	18/9/97	10	18/9/97	10	IGG 16 CT
14	Interim 5 Electrical Measurements (100% read and record)	As Test 6	18/9/97	10	18/9/97	0	IGG 16 CT
15	Irradiation 6 (10 samples)	As Test 13	18/9/97	10	18/9/97	10	IGG 16 CT

Report No: RD 236	Part Type: LM111	Date: 28.10.97

No.	Test (Sample Size)	XM-PL-IGG-0026 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
16	Final Electrical Measurements (100% read and record)	As Test 6 At ERA	18/9/97	10	18/9/97	0	IGG 16 CT
17	Annealing Test (10 samples)	Bias for 24hrs min at +25°C (record exact time)	18/9/97	10	19/9/97	10	IGG 16 CT
18	Post Annealing Electrical Measurements (100% read and record)	Table A	19/9/97	10	19/9/97	0	IGG 16 CT
19	Accelerated Aging under bias (4 samples)	168 hours bias at +100±5°C	24/9/97	10	1/10/97	10	IGG 16 CT
20	Post Aging Electrical Measurements (100% read and record)	Table A	2/10/97	10	2/10/97	0	IGG 16 CT
21	Test Report Collation	[redacted]	[redacted]	[redacted]	6/11/97	[redacted]	IGG 2 CT
22	Test Report Approval	[redacted]	[redacted]	[redacted]	6/11/97	[redacted]	IGG 2 CT
23	NOTES:-						

Report No: RD 236 Part Type: LM111 Date: 28.10.97

FAILURE LIST AND APPLICABLE NCR

Test No.	Serial Number(s)	Failed Parameter and Failure Mode	Applicable NCR
6	3,4,5,6,8,9,10	FAIL I_{IB1}, I_{IB2}, I_{IO3} AND V_{OL1}.	
	2,7,11	FAIL I_{IB1}, I_{IB2} AND V_{OL1}.	
8	3,4,6	FAIL I_{IO1}.	
8	11	FAILS I_{IO3}.	
10	2	FAILS I_{IO3}.	
	5	FAILS I_{IO1}.	
	7	FAILS I_{IO1} AND I_{IO3}.	
12	2,10	FAIL I_{IO1}.	
	3,4,6,7	FAIL I_O.	
12	2,4,9	FAIL V_{IO2}.	
	7	FAILS V_{IO2} AND V_{IO3}.	
14	2,4	FAIL V_{IO1} AND V_{IO3}.	
	3,5,6,11	FAIL V_{IO2}.	
	10	FAILS V_{IO2} AND V_{IO3}.	
	2,5,8,9,10	FAIL I_O.	
16	11	FAILS I_O.	
18	9	FAILS V_{IO1}, V_{IO3} AND I_{IO1}.	

Report No: RD 236 Part Type: LM111 Date: 28.10.97

TEST EQUIPMENT LIST

Item, Type Number and Serial Number	CT Inventory Number	Function	Calibration Due
Item: Radiation Source Type No: Cobalt 60 Serial No: N/A	ERA's Facility	Irradiation	1 / 1 /1998
Item: SZ Type No: M3000 Serial No: 884769	CT339	ATE	28 / 3 /1998
Item: THURLBY Type No: PL320 Serial No: 2GP0363	CT288	PSU	22 / 11 /1997
Item: THURLBY Type No: 1503 Serial No: B9773	CT209	DMM	/ /199
Item: KEITHLEY Type No: 225 Serial No: 100706	CT034	CURRENT SOURCE	2 / 1 /1998
Item: DANBRIDGE Type No: DR5 Serial No: 45095	CT010	DECADE RESISTANCE BOX	8 / 10 /1997
Item: DANBRIDGE Type No: DR5 Serial No: 46455	CT011	DECADE RESISTANCE BOX	8 / 10 /1997
Item: THURLBY Type No: PL320 Serial No: 2GP0246	CT296	PSU	18 / 9 /1997
Item: THURLBY Type No: PL320 Serial No: 2GP0621	CT287	PSU	24 / 10 /1997
Item: HP Type No: 8082A Serial No: 1822G02983	CT308	PULSE GENERATOR	23 / 3 /1998
Item: YOKOGAWA Type No: DL1540 Serial No: 27WY0060	CT413	OSCILLOSCOPE	20 / 2 /1998
Item: Type No: Serial No:			/ /199

RADIATION TEST SUMMARY

PART TYPE : LM111

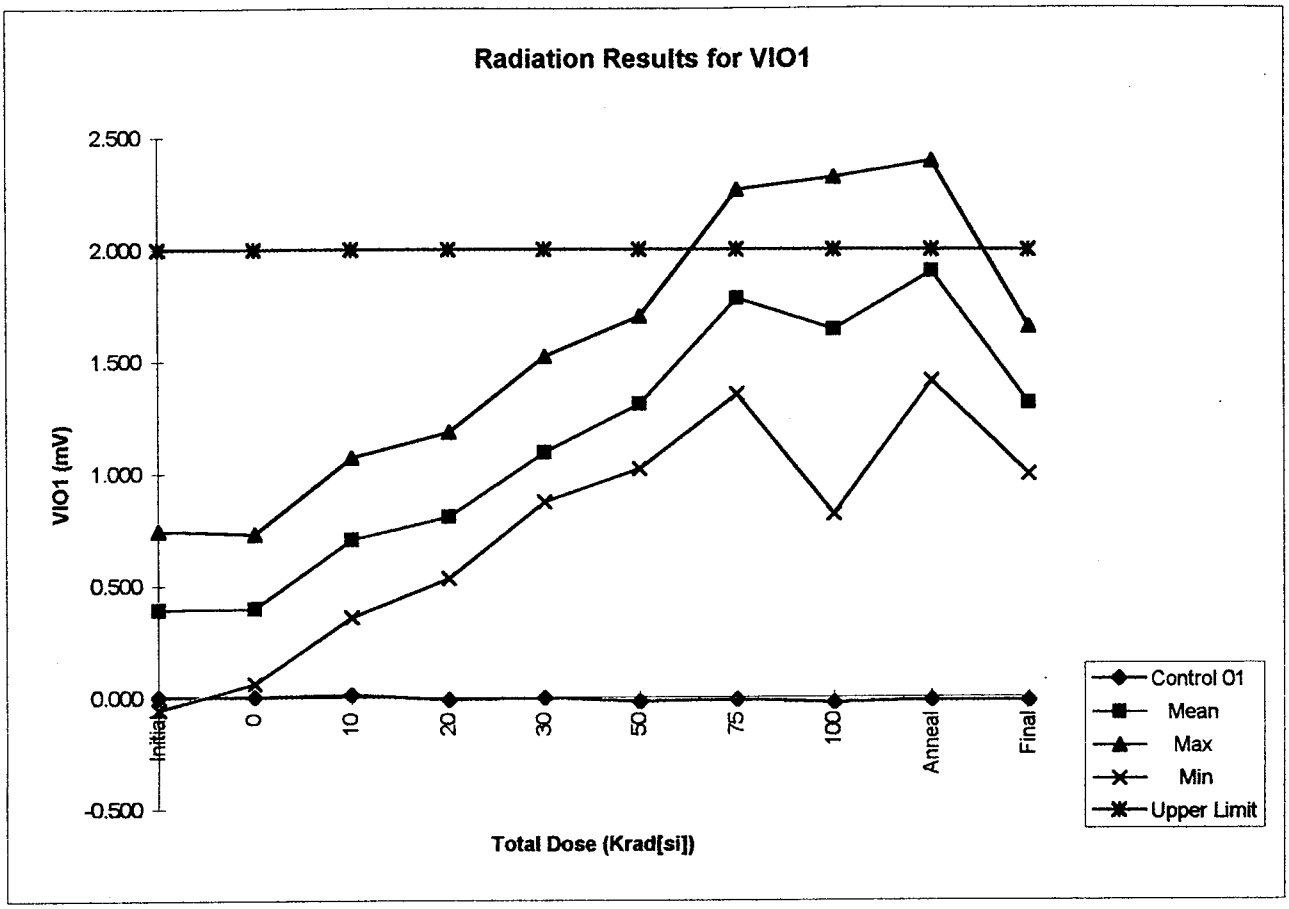
DESCRIPTION : VOLTAGE COMPARATOR

REPORT NO. : RD 236

PARAMETERS PLOTTED :

VIO1
VIO2
VIO3
I-IB1+
I-IB1-
I-IB2+
I-IB2-
I-IO1
I-IO3
AVD
VOL1
CMRR
Io
Ii

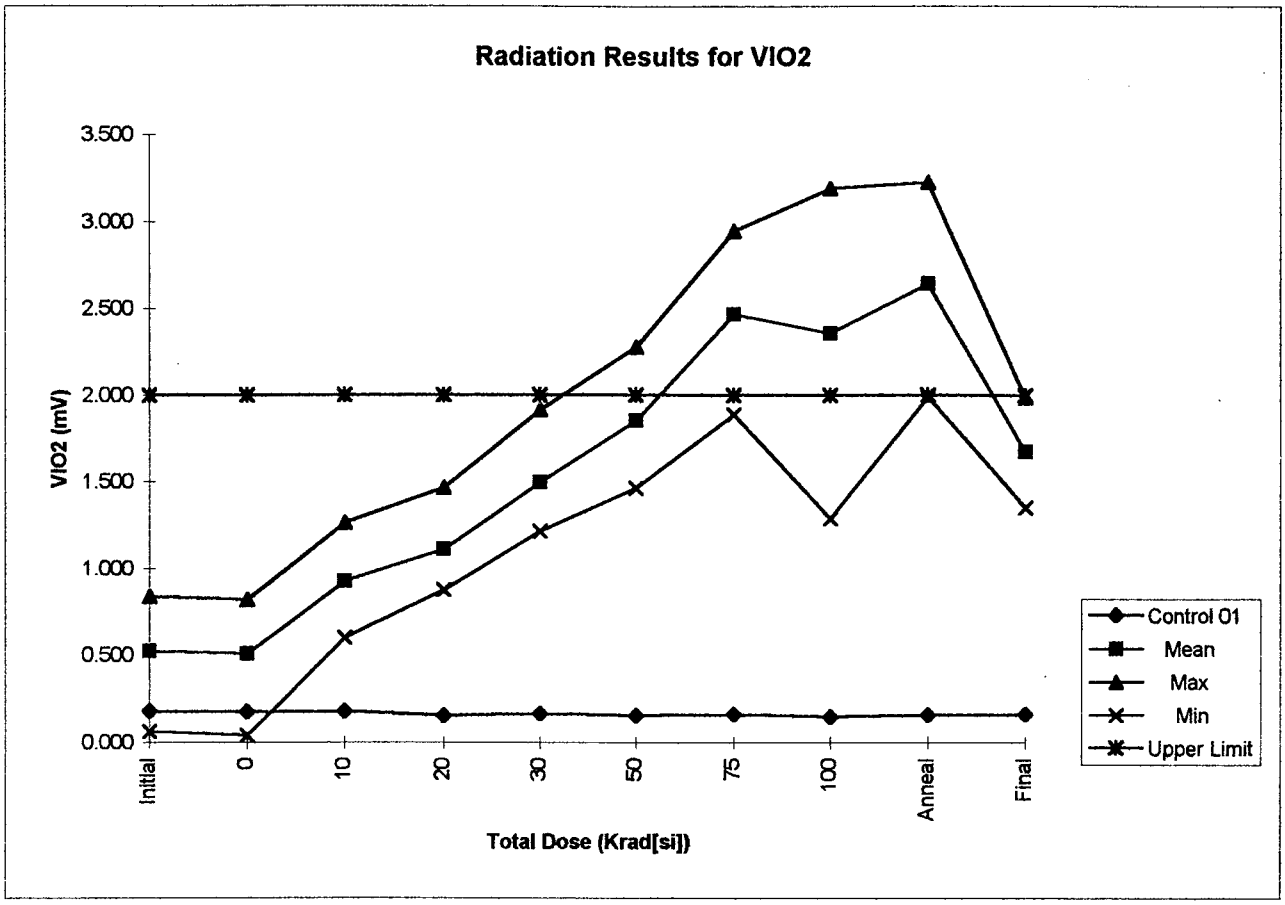
NOTE : The results for the remaining parameters showed no significant change and hence plots were not considered necessary.



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(mV)	(mV)	(mV)	(mV)	(mV)	(mV)	
Initial	0.003	0.397	0.749	-0.050	2.0	-	0.23
0	0.003	0.402	0.736	0.067	2.0	-	0.21
10	0.011	0.710	1.076	0.364	2.0	-	0.22
20	-0.011	0.811	1.190	0.536	2.0	-	0.21
30	-0.003	1.097	1.527	0.877	2.0	-	0.22
50	-0.019	1.314	1.706	1.025	2.0	-	0.24
75	-0.013	1.785	2.269	1.356	2.0	-	0.29
100	-0.026	1.646	2.327	0.821	2.0	-	0.47
Anneal	-0.014	1.907	2.398	1.415	2.0	-	0.31
Final	-0.017	1.317	1.661	1.000	2.0	-	0.22

Lot size for statistics :10 devices

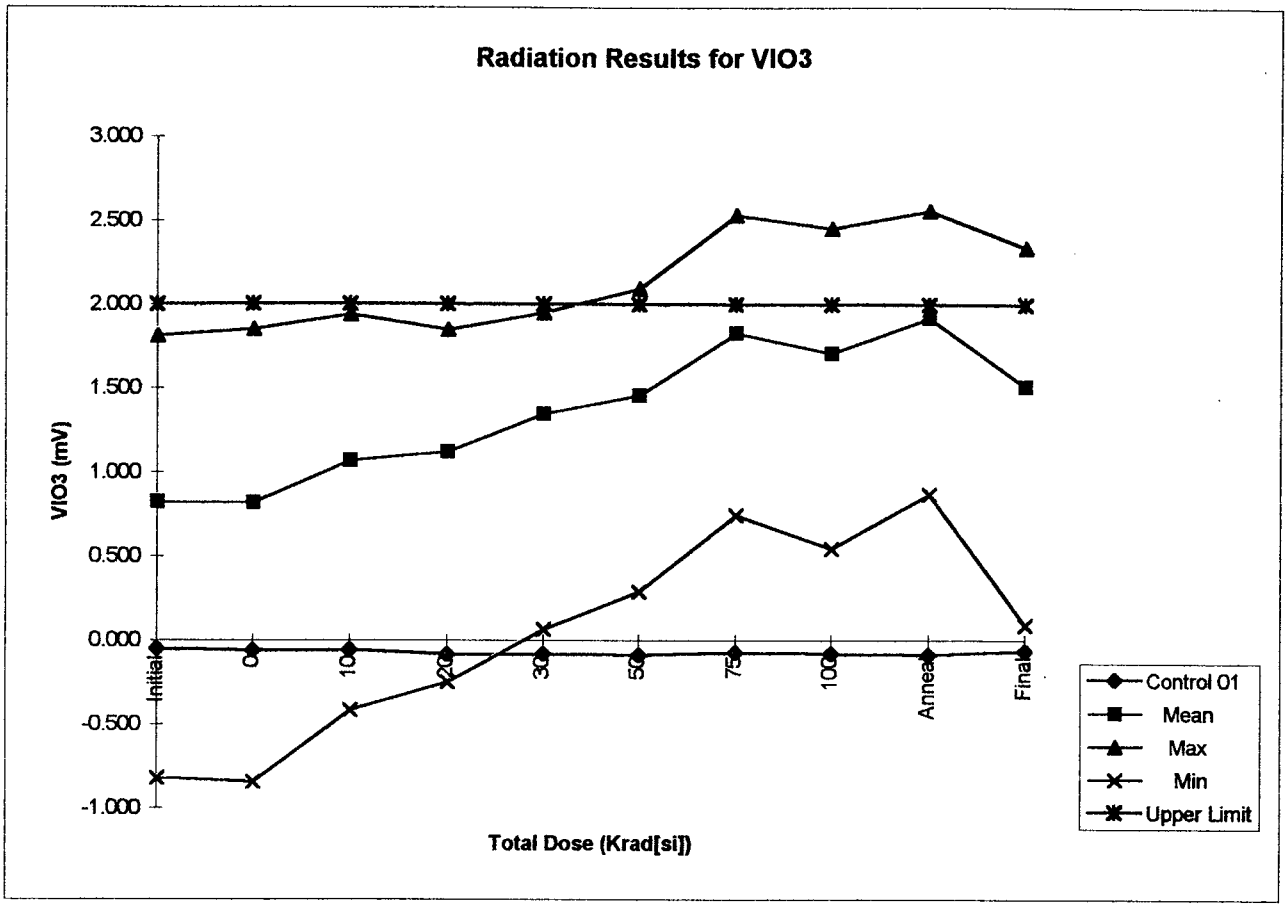
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(mV)	(mV)	(mV)	(mV)	(mV)	(mV)	
Initial	0.179	0.530	0.847	0.069	2.0	-	0.23
0	0.176	0.517	0.829	0.048	2.0	-	0.23
10	0.180	0.935	1.270	0.609	2.0	-	0.21
20	0.155	1.117	1.471	0.883	2.0	-	0.21
30	0.164	1.501	1.917	1.220	2.0	-	0.24
50	0.152	1.856	2.280	1.469	2.0	-	0.29
75	0.160	2.472	2.950	1.891	2.0	-	0.35
100	0.147	2.362	3.195	1.292	2.0	-	0.58
Anneal	0.159	2.651	3.234	1.995	2.0	-	0.38
Final	0.161	1.678	1.990	1.356	2.0	-	0.22

Lot size for statistics :10 devices

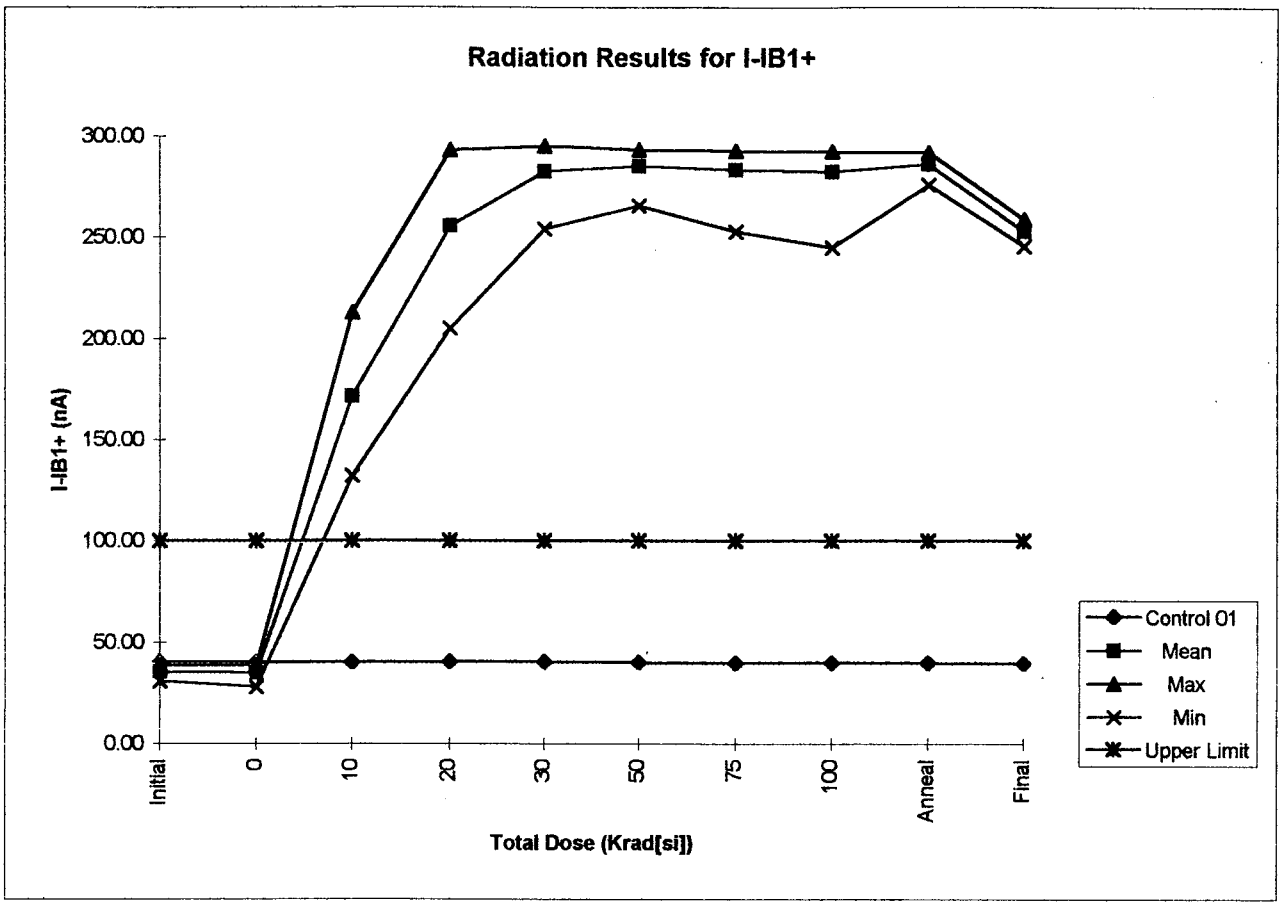
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(mV)	(mV)	(mV)	(mV)	(mV)	(mV)	
Initial	-0.051	0.826	1.820	-0.814	2.0	-	0.74
0	-0.062	0.823	1.856	-0.837	2.0	-	0.76
10	-0.058	1.073	1.944	-0.410	2.0	-	0.69
20	-0.085	1.128	1.855	-0.245	2.0	-	0.65
30	-0.079	1.354	1.956	0.072	2.0	-	0.61
50	-0.087	1.462	2.101	0.295	2.0	-	0.58
75	-0.072	1.836	2.538	0.749	2.0	-	0.57
100	-0.080	1.714	2.460	0.548	2.0	-	0.64
Anneal	-0.087	1.925	2.565	0.875	2.0	-	0.56
Final	-0.067	1.515	2.344	0.093	2.0	-	0.66

Lot size for statistics :10 devices

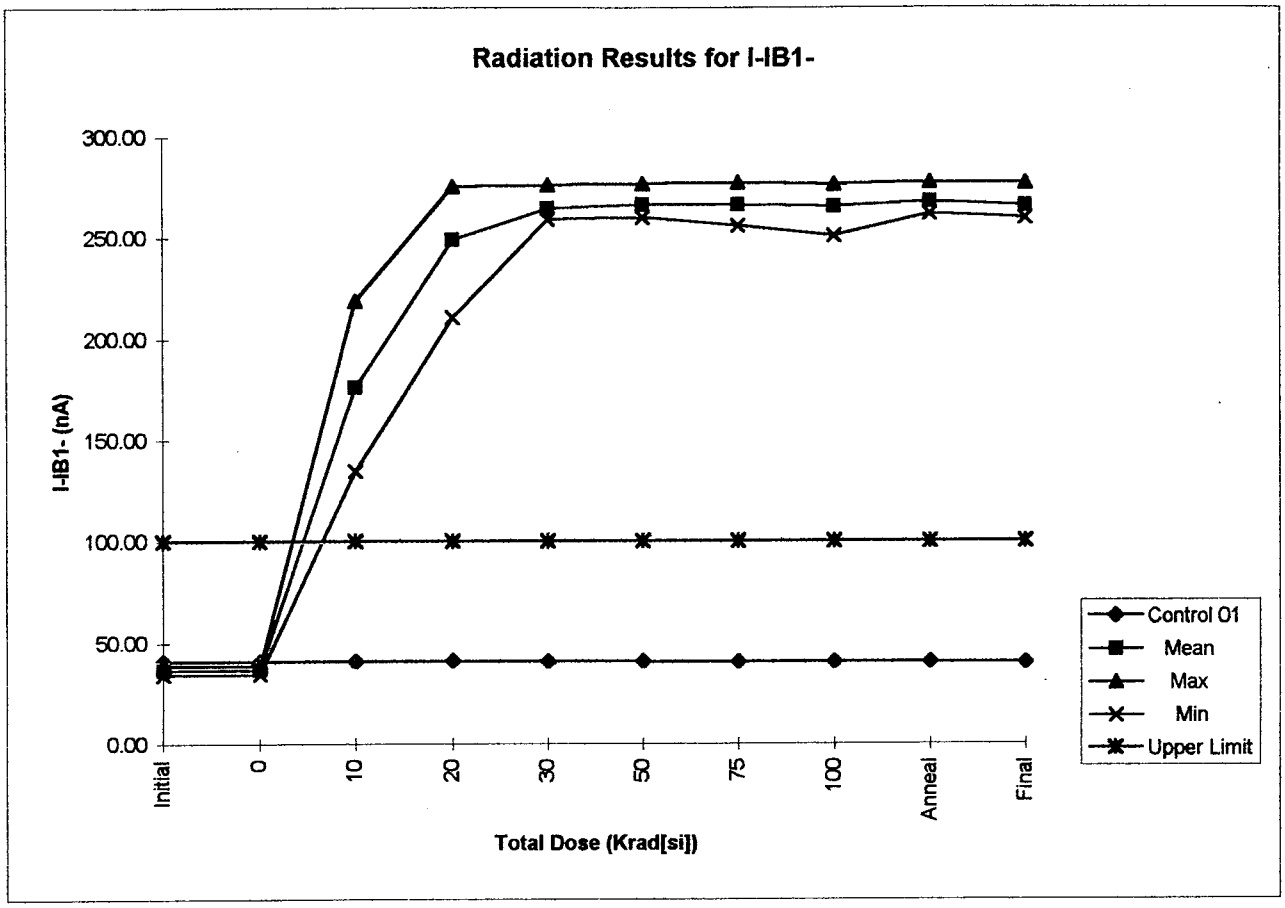
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	40.10	36.00	39.32	31.45	100.0	-	2.20
0	40.25	35.40	39.50	28.55	100.0	-	3.25
10	40.28	172.10	213.54	132.86	100.0	-	27.21
20	40.41	255.97	293.52	205.45	100.0	-	33.34
30	40.37	282.81	295.15	254.39	100.0	-	13.77
50	40.13	285.71	293.84	266.22	100.0	-	8.31
75	39.94	283.77	292.94	253.21	100.0	-	11.64
100	39.92	282.81	292.77	245.55	100.0	-	13.84
Anneal	39.93	286.53	292.41	276.62	100.0	-	4.63
Final	39.62	253.68	259.52	246.43	100.0	-	4.25

Lot size for statistics :10 devices

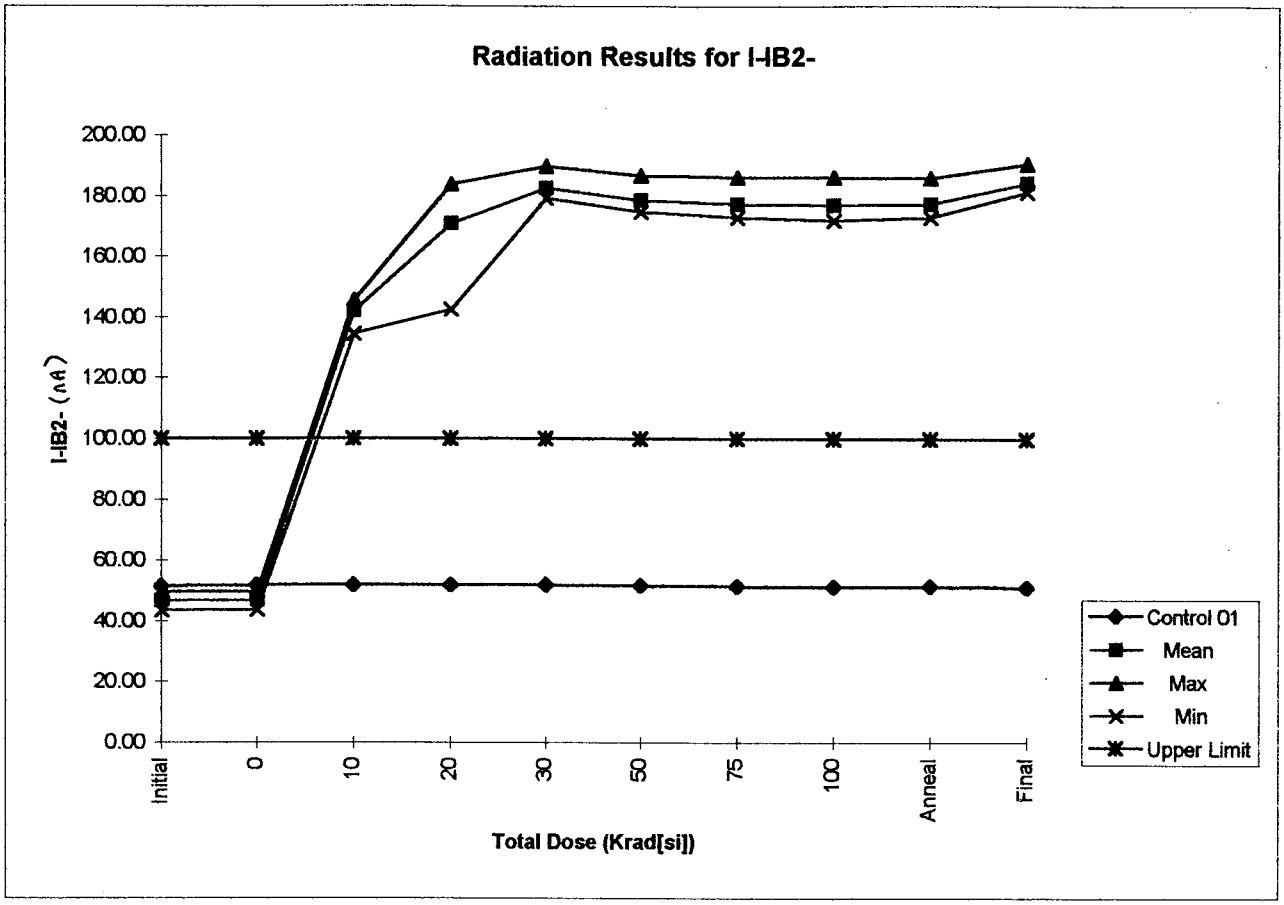
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	40.64	37.16	39.19	34.86	100.0	-	1.29
0	40.83	37.37	39.37	35.01	100.0	-	1.28
10	40.92	176.68	219.38	135.34	100.0	-	28.15
20	41.00	249.57	275.99	211.10	100.0	-	22.86
30	40.93	265.01	276.50	259.52	100.0	-	5.18
50	40.68	266.68	276.99	260.53	100.0	-	4.73
75	40.52	266.65	277.58	256.44	100.0	-	5.75
100	40.42	265.88	276.86	251.50	100.0	-	6.74
Anneal	40.47	268.25	278.12	262.34	100.0	-	4.62
Final	40.12	266.56	277.57	260.46	100.0	-	5.23

Lot size for statistics :10 devices

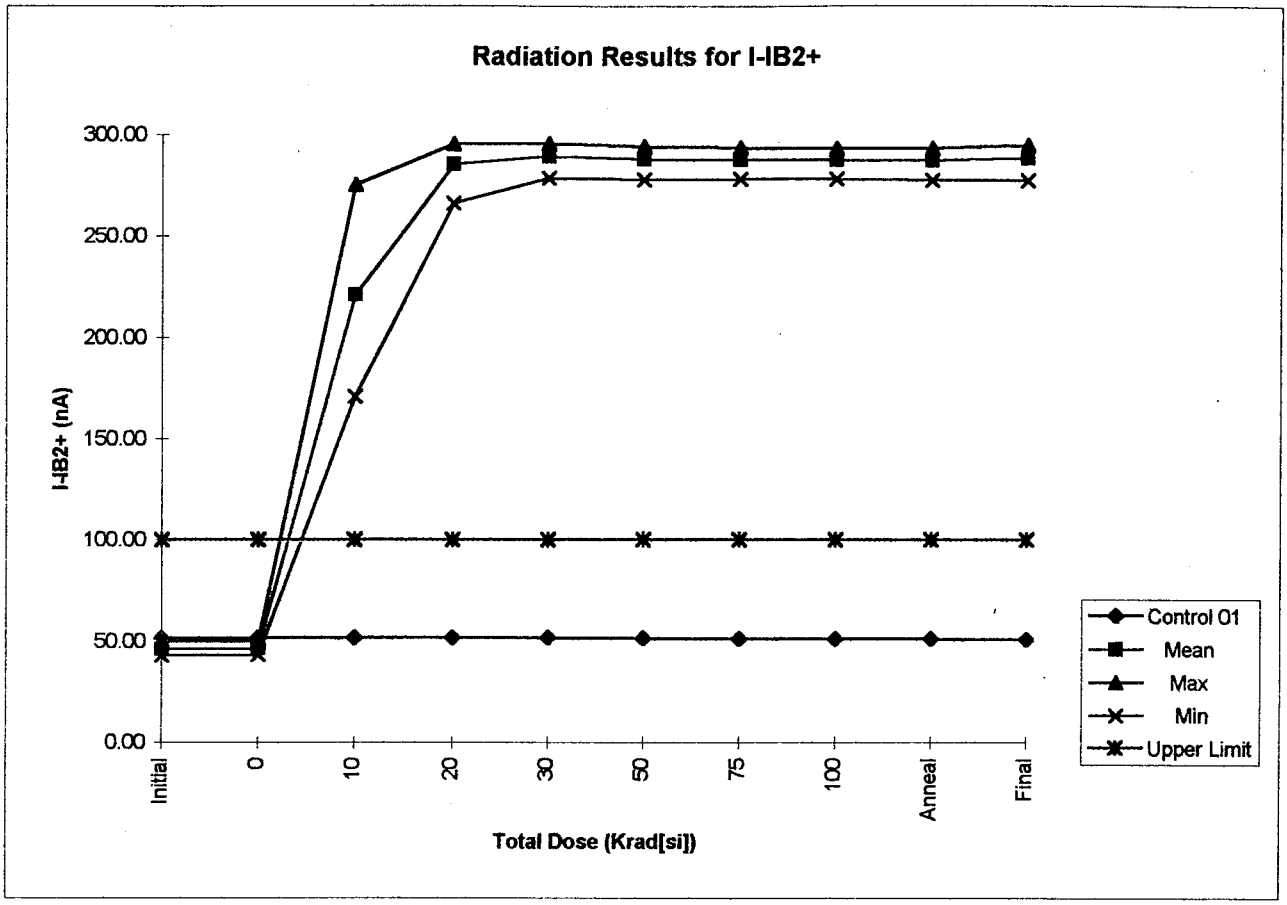
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	51.56	47.08	49.93	43.93	100.0	-	1.61
0	51.80	47.34	50.15	44.15	100.0	-	1.60
10	51.89	142.57	146.09	135.03	100.0	-	3.14
20	51.97	171.15	184.10	142.86	100.0	-	17.58
30	51.92	182.84	189.95	179.59	100.0	-	3.23
50	51.63	178.94	187.07	175.03	100.0	-	3.63
75	51.43	177.69	186.39	173.32	100.0	-	3.83
100	51.31	177.10	186.31	172.25	100.0	-	4.10
Anneal	51.38	177.62	186.16	173.24	100.0	-	3.88
Final	51.10	184.55	190.75	181.66	100.0	-	2.91

Lot size for statistics :10 devices

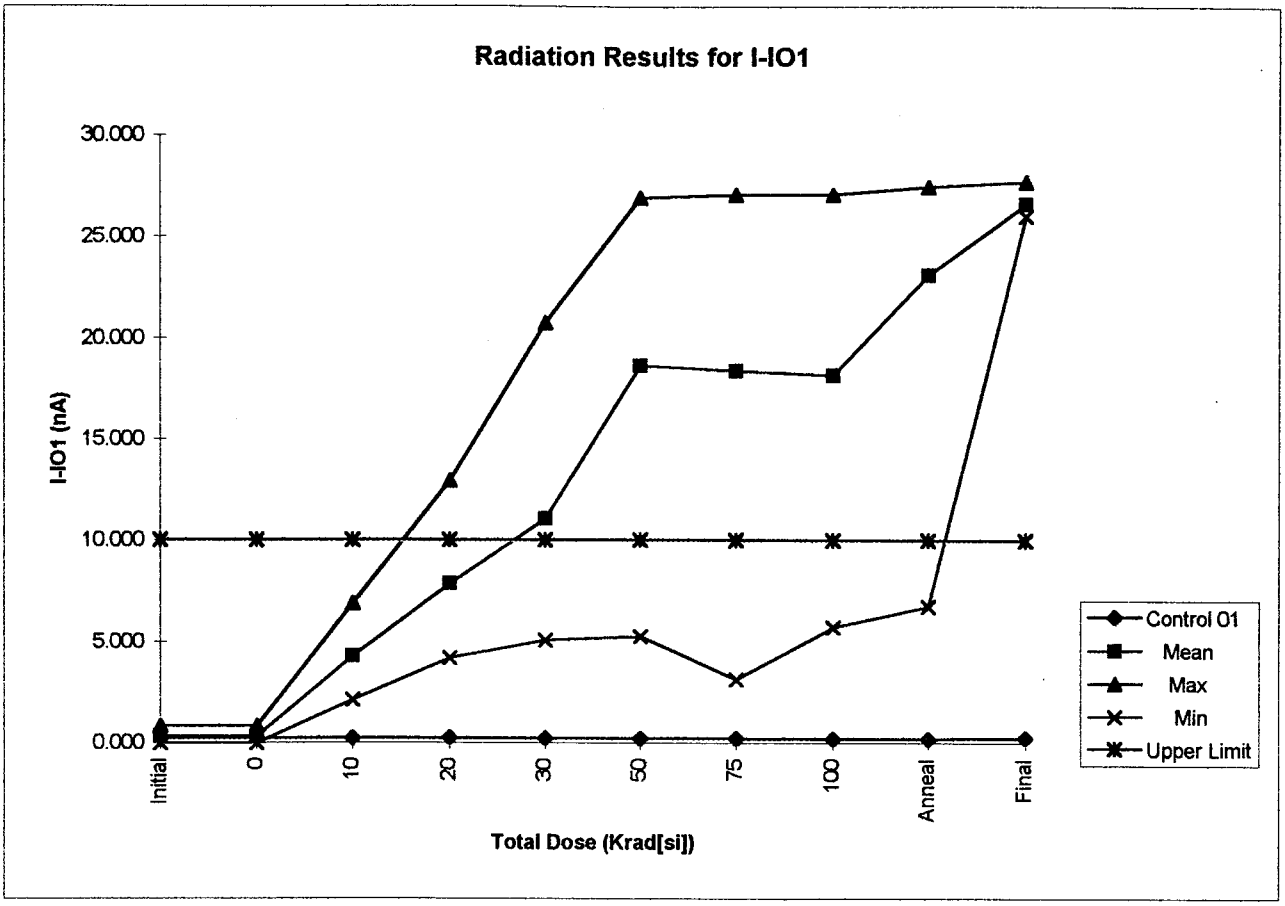
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	51.46	46.90	50.66	43.66	100.0	-	1.87
0	51.70	47.17	50.91	43.92	100.0	-	1.87
10	51.74	221.66	275.70	171.48	100.0	-	35.19
20	51.86	285.80	296.05	266.80	100.0	-	10.16
30	51.80	289.62	296.06	279.08	100.0	-	4.88
50	51.55	288.49	294.77	278.25	100.0	-	4.69
75	51.30	288.07	294.11	278.52	100.0	-	4.47
100	51.23	287.92	293.87	278.52	100.0	-	4.46
Anneal	51.26	287.68	293.67	277.89	100.0	-	4.57
Final	50.93	289.12	295.40	278.12	100.0	-	5.18

Lot size for statistics :10 devices

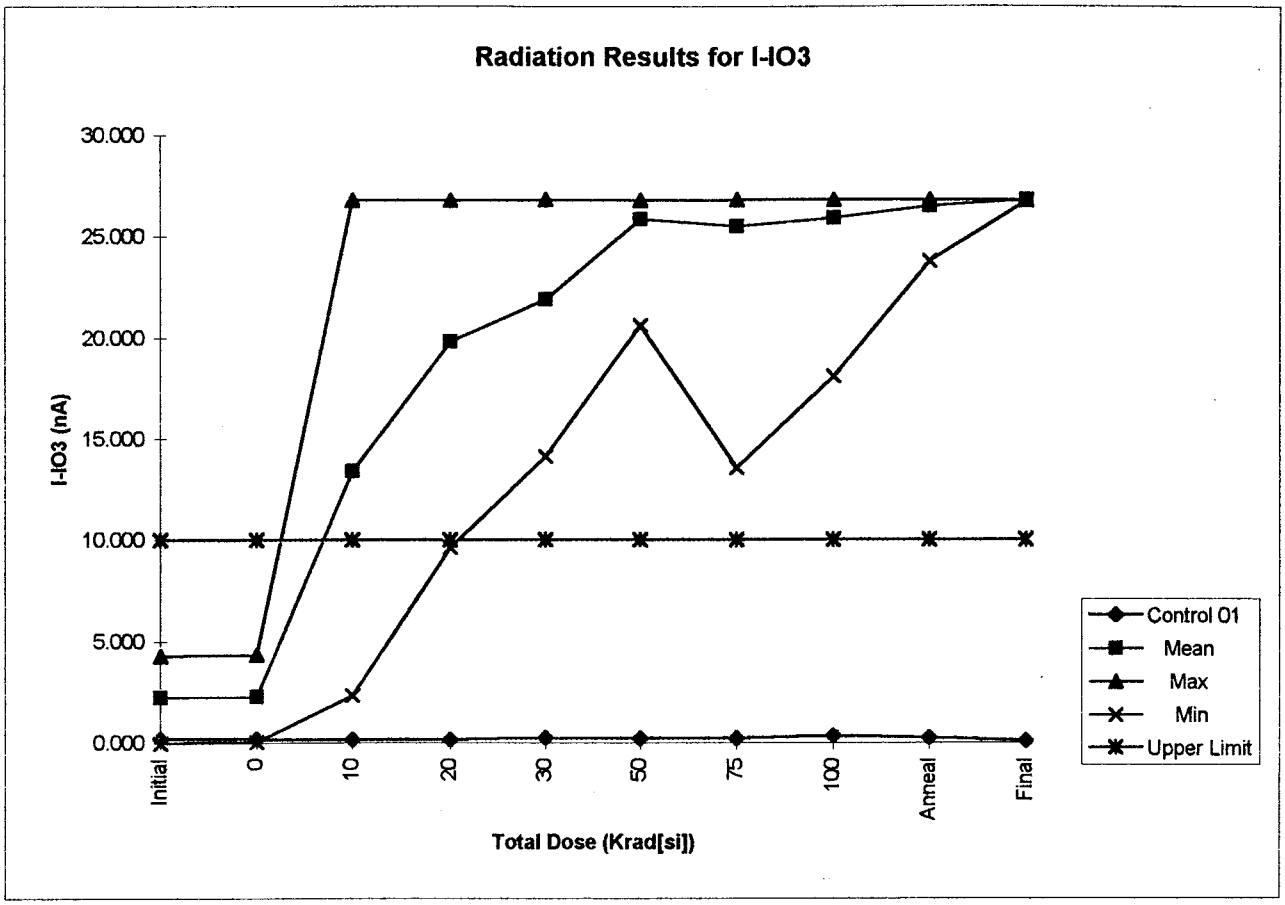
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	0.235	0.362	0.886	0.039	10.0	-	0.27
0	0.228	0.362	0.893	0.047	10.0	-	0.27
10	0.235	4.322	6.931	2.160	10.0	-	1.52
20	0.237	7.908	12.977	4.224	10.0	-	3.06
30	0.215	11.106	20.772	5.110	10.0	-	5.45
50	0.212	18.686	26.957	5.301	10.0	-	8.24
75	0.220	18.412	27.104	3.158	10.0	-	8.79
100	0.191	18.206	27.099	5.738	10.0	-	7.83
Anneal	0.192	23.113	27.497	6.793	10.0	-	6.76
Final	0.259	26.654	27.756	26.044	10.0	-	0.52

Lot size for statistics :10 devices

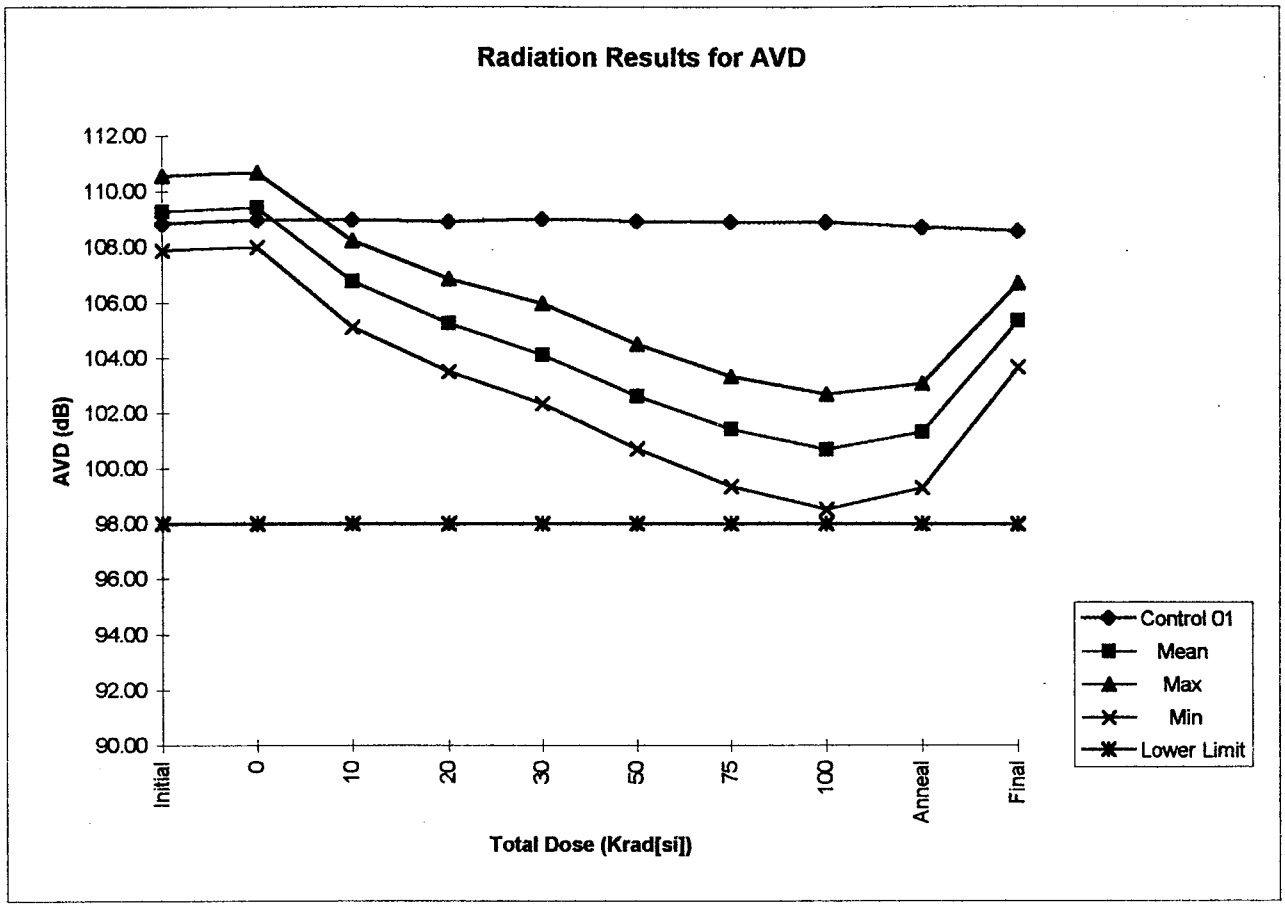
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	0.182	2.299	4.341	0.018	10.0	-	1.49
0	0.180	2.338	4.391	0.083	10.0	-	1.52
10	0.146	13.475	26.843	2.377	10.0	-	7.48
20	0.153	19.854	26.818	9.690	10.0	-	6.80
30	0.245	21.949	26.857	14.189	10.0	-	4.94
50	0.217	25.887	26.838	20.651	10.0	-	2.10
75	0.229	25.532	26.872	13.619	10.0	-	4.19
100	0.346	25.963	26.851	18.143	10.0	-	2.75
Anneal	0.237	26.553	26.875	23.841	10.0	-	0.95
Final	0.088	26.851	26.855	26.845	10.0	-	0.00

Lot size for statistics :10 devices

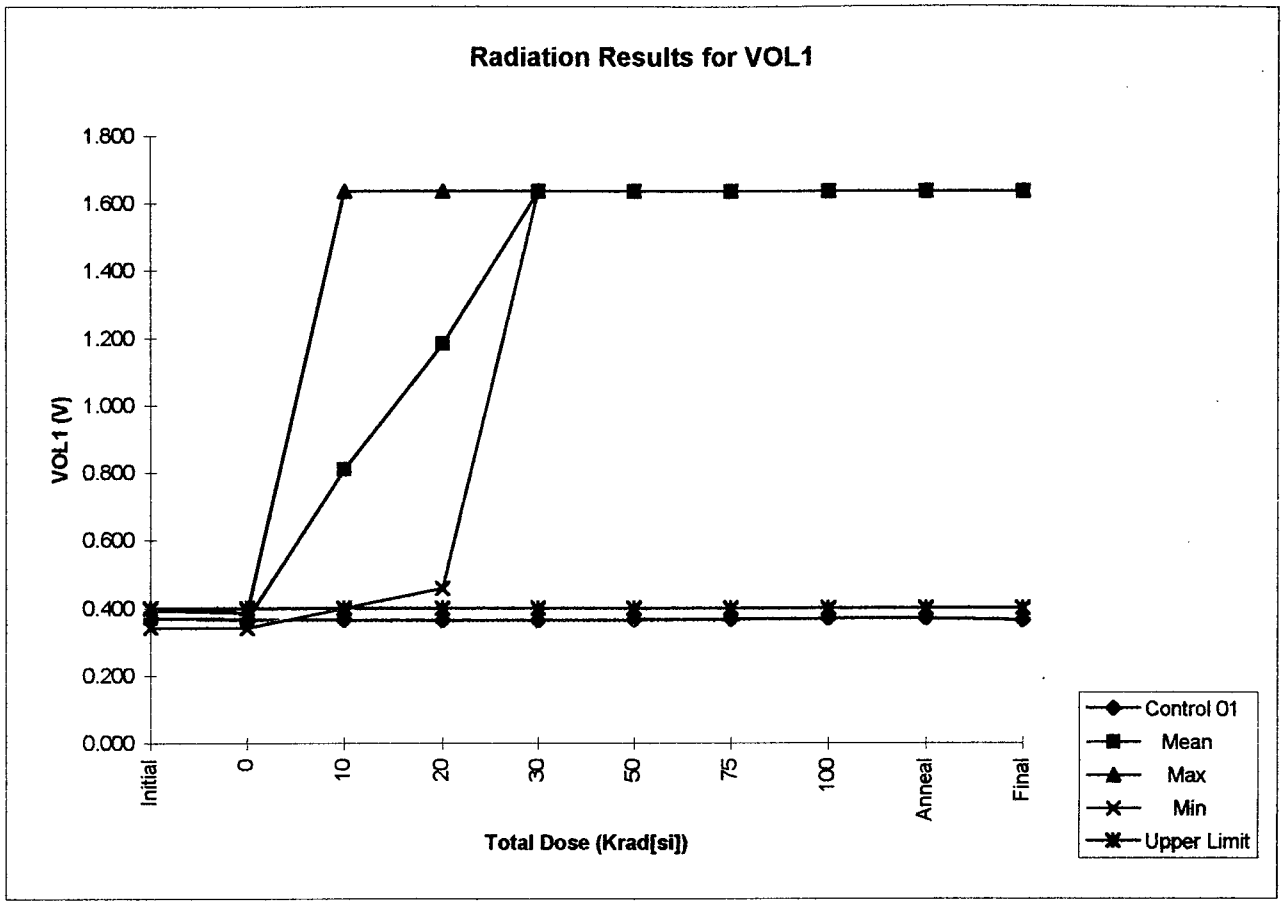
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Lower Limit	Upper Limit	Std.Dev.
	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
Initial	108.83	109.31	110.61	107.91	98.0	-	0.88
0	108.97	109.46	110.71	108.02	98.0	-	0.89
10	108.98	106.79	108.25	105.15	98.0	-	0.96
20	108.90	105.27	106.88	103.53	98.0	-	1.04
30	109.00	104.14	105.98	102.37	98.0	-	1.11
50	108.93	102.64	104.52	100.73	98.0	-	1.15
75	108.90	101.44	103.34	99.39	98.0	-	1.19
100	108.87	100.71	102.71	98.56	98.0	-	1.23
Anneal	108.70	101.35	103.10	99.33	98.0	-	1.12
Final	108.55	105.36	106.73	103.69	98.0	-	0.94

Lot size for statistics :10 devices

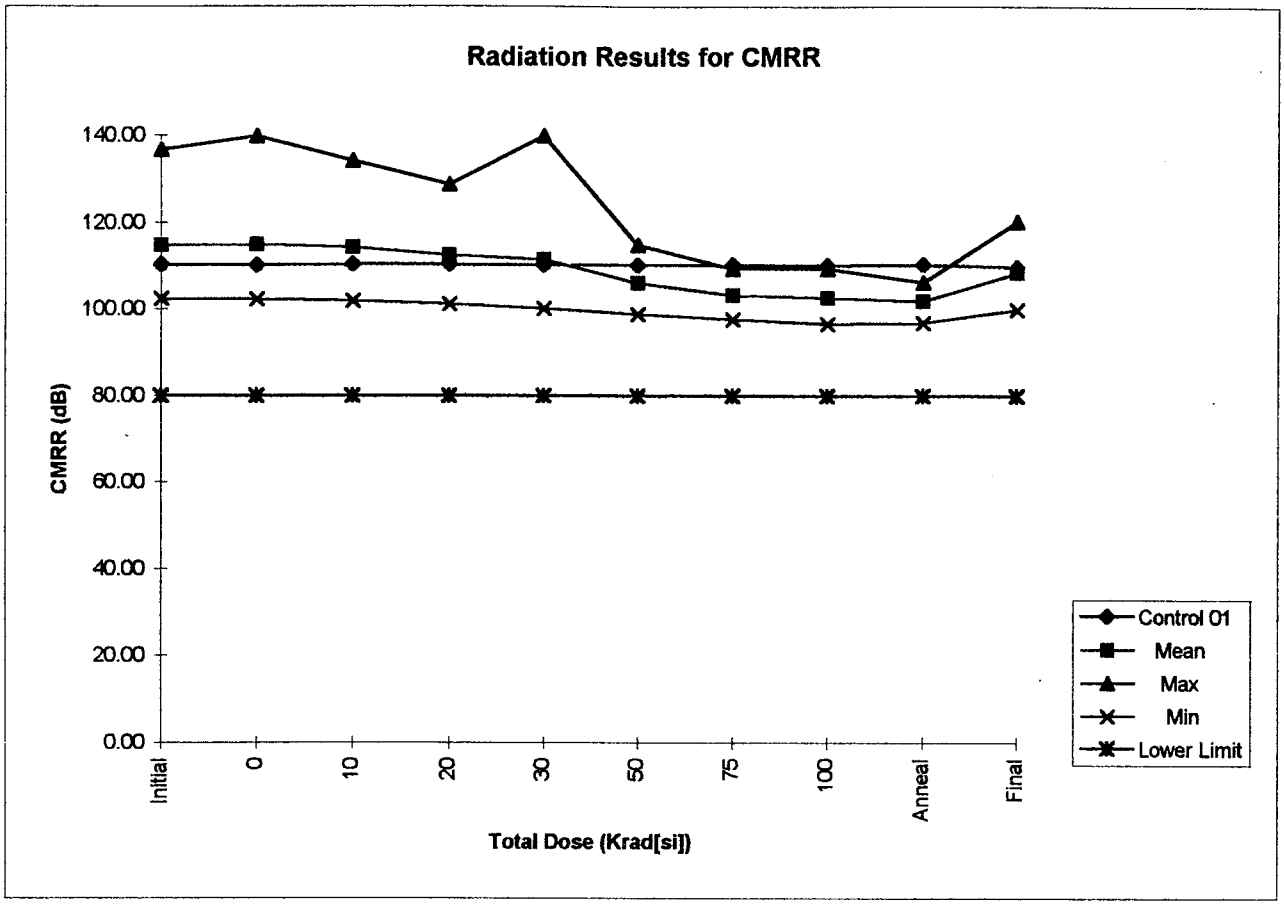
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(V)	(V)	(V)	(V)	(V)	(V)	
Initial	0.371	0.374	0.398	0.347	0.4	-	0.02
0	0.365	0.370	0.390	0.344	0.4	-	0.02
10	0.365	0.813	1.638	0.402	0.4	-	0.57
20	0.363	1.186	1.638	0.462	0.4	-	0.59
30	0.364	1.638	1.638	1.638	0.4	-	0.00
50	0.366	1.638	1.638	1.638	0.4	-	0.00
75	0.368	1.638	1.638	1.638	0.4	-	0.00
100	0.369	1.638	1.638	1.638	0.4	-	0.00
Anneal	0.369	1.638	1.638	1.638	0.4	-	0.00
Final	0.364	1.638	1.638	1.638	0.4	-	0.00

Lot size for statistics :10 devices

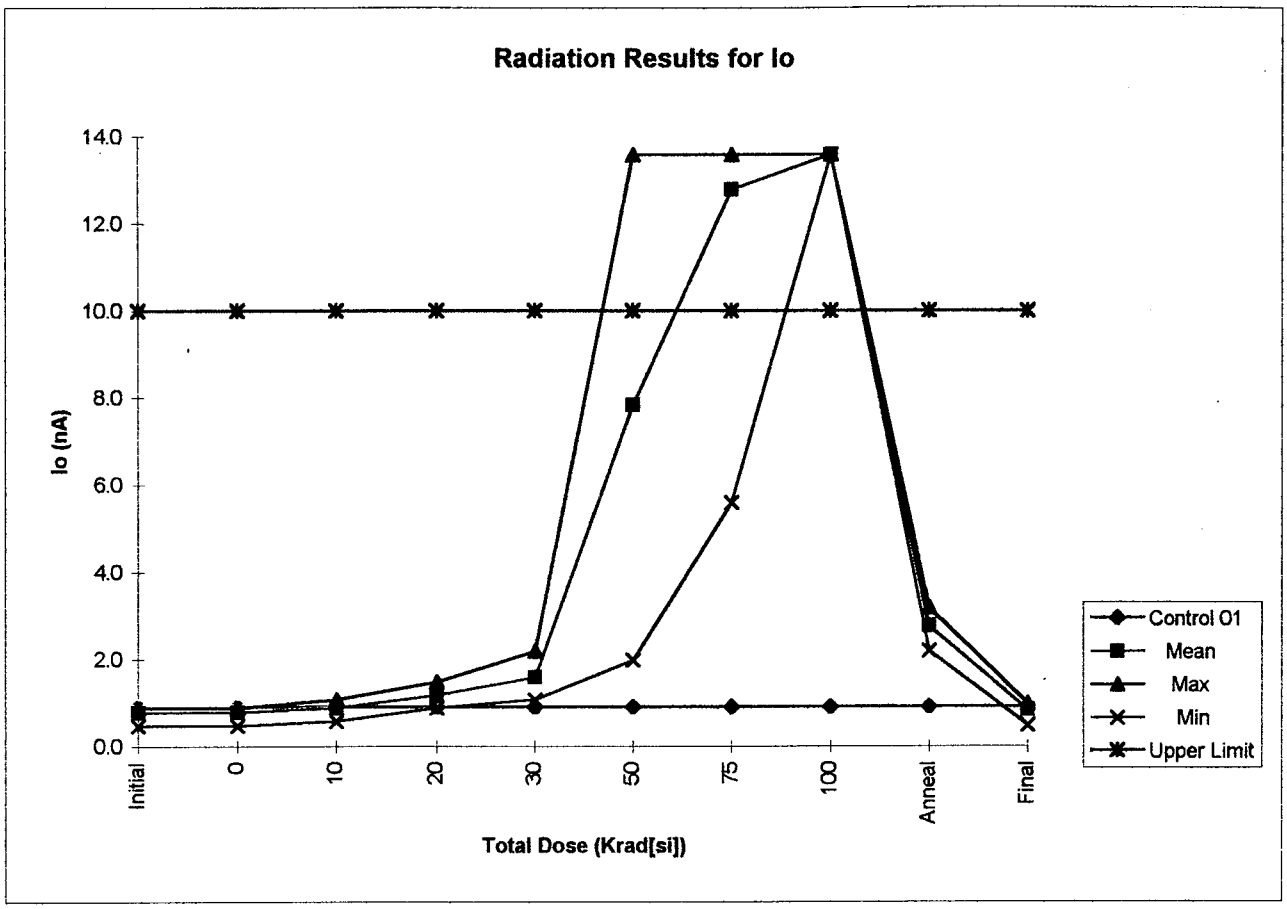
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Lower Limit	Upper Limit	Std.Dev.
	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	
Initial	110.27	114.89	136.93	102.61	80.0	-	9.47
0	110.10	115.16	140.00	102.51	80.0	-	10.29
10	110.24	114.40	134.26	102.10	80.0	-	9.27
20	110.22	112.62	128.90	101.28	80.0	-	8.35
30	110.18	111.55	140.00	100.34	80.0	-	10.91
50	110.17	106.21	115.02	98.99	80.0	-	4.36
75	110.27	103.43	109.58	97.80	80.0	-	3.19
100	110.12	102.83	109.51	96.76	80.0	-	3.58
Anneal	110.35	102.03	106.50	97.07	80.0	-	2.65
Final	109.76	108.64	120.52	100.20	80.0	-	6.08

Lot size for statistics :10 devices

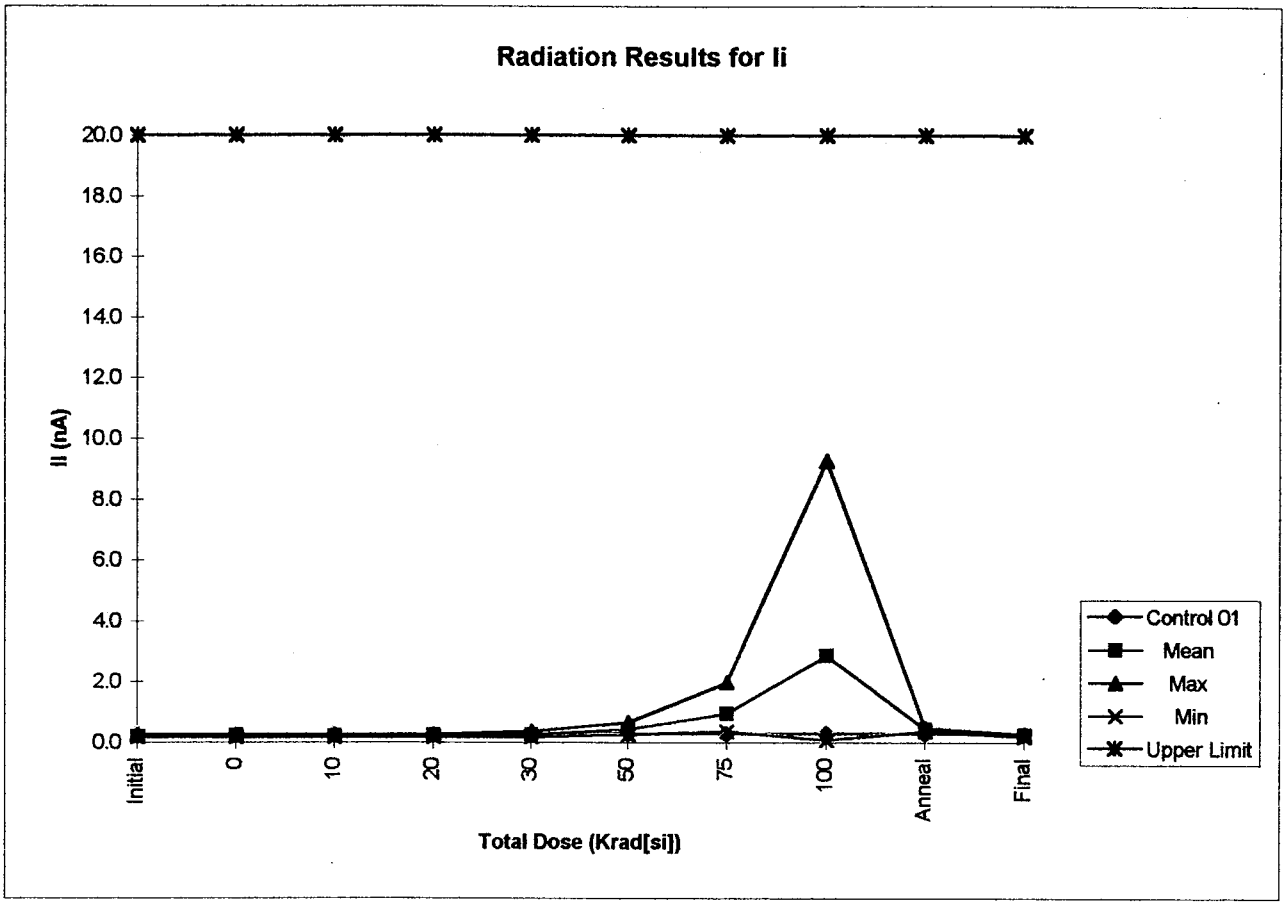
RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	0.9	0.8	0.9	0.5	10.0	-	0.15
0	0.9	0.8	0.9	0.5	10.0	-	0.15
10	0.9	0.9	1.1	0.6	10.0	-	0.18
20	0.9	1.2	1.5	0.9	10.0	-	0.23
30	0.9	1.6	2.2	1.1	10.0	-	0.42
50	0.9	7.9	13.6	2.0	10.0	-	5.21
75	0.9	12.8	13.6	5.6	10.0	-	2.53
100	0.9	13.6	13.6	13.6	10.0	-	0.00
Anneal	0.9	2.8	3.2	2.2	10.0	-	0.40
Final	0.9	0.9	1.0	0.5	10.0	-	0.17

Lot size for statistics :10 devices

RD 236



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	0.3	0.2	0.3	0.2	20.0	-	0.05
0	0.3	0.3	0.3	0.2	20.0	-	0.05
10	0.3	0.3	0.3	0.2	20.0	-	0.05
20	0.3	0.3	0.3	0.2	20.0	-	0.04
30	0.3	0.3	0.4	0.2	20.0	-	0.05
50	0.3	0.5	0.7	0.3	20.0	-	0.13
75	0.3	1.0	2.0	0.4	20.0	-	0.54
100	0.3	2.9	9.3	0.1	20.0	-	3.22
Anneal	0.3	0.5	0.5	0.4	20.0	-	0.05
Final	0.3	0.3	0.3	0.2	20.0	-	0.05

Lot size for statistics :10 devices

RD 236

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD236_LM111_INIT_EMS_@_IGG / V1.0 JKJ/IR 01AUG97

Results file : RD238_LM111_INIT_EMS_@_IGG from: 13.09.97 / 14:53:49
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
: CONTROL 01 ; RAD 02-11
: INITIAL EMS @ IGG
: LM111N XM-PL-IGG-0026 ISS 2 ROOM / V1.0 JKJ/IR 01AUG97

Test steps

1.	Vos		-2.000	...	2.000		mV
2.	Vos		-2.000	...	2.000		mV
3.	Vos		-2.000	...	2.000		mV
4.	+Is		0.500	...	4.000		mA
5.	-Is		0.500	...	4.000		mA
6.	Ib+	(	0.00	)...	100.00		nA
7.	Ib-	(	0.00	)...	100.00		nA
8.	Ib+	(	0.00	)...	100.00		nA
9.	Ib-	(	0.00	)...	100.00		nA
10.	Ios	(	0.000	)...	10.000		nA
11.	Ios	(	0.000	)...	10.000		nA
12.	Avo		98.00	... (	130.00	)	dB
13.	-Vo	(	-15.000	)...	-13.500		V
14.	-Vo	(	0.000	)...	0.400		V
15.	CMRR		80.00	... (	110.00	)	dB
16.	CMRR		80.00	... (	110.00	)	dB
17.	Isc		-200.00	...	0.00		mA

	1	2	3	4	5	6
1.1 [mV]	0.003	0.749	0.287	0.691	0.325	-0.050
2.1 [mV]	0.179	0.847	0.421	0.790	0.470	0.069
3.1 [mV]	-0.051	1.247	0.489	1.820	0.383	-0.814
4.1 [mA]	3.221	3.155	3.195	3.146	3.211	3.181
5.1 [mA]	3.222	3.156	3.196	3.147	3.212	3.182
6.1 [nA]	40.10	36.59	39.32	36.07	37.88	37.25
7.1 [nA]	40.64	37.05	39.19	37.15	38.74	38.24
8.1 [nA]	51.46	47.40	50.66	46.31	48.46	47.37
9.1 [nA]	51.56	47.42	49.93	47.04	48.76	47.86
10.1 [nA]	0.235	0.039	0.414	0.667	0.401	0.521
11.1 [nA]	0.182	1.278	3.165	3.342	1.529	4.341
12.1 [dB]	108.83	108.54	107.91	109.64	109.87	109.71
13.1 [V]	-14.392	-14.381	-14.375	-14.405	-14.386	-14.372
14.1 [V]	0.371	0.386	0.383	0.398	0.378	0.393
15.1 [dB]	110.27	102.61	108.52	121.32	114.24	113.63
16.1 [dB]	105.80	101.65	108.23	109.18	114.50	112.25
17.1 [mA]	-1.19	-1.18	-1.20	-1.20	-1.19	-1.19

	7	8	9	10	11
1.1 [mV]	0.241	0.334	0.533	0.359	0.499
2.1 [mV]	0.417	0.457	0.679	0.481	0.673
3.1 [mV]	1.254	0.408	1.011	1.441	1.024
4.1 [mA]	3.171	3.119	3.136	3.191	3.167
5.1 [mA]	3.172	3.120	3.137	3.192	3.168
6.1 [nA]	36.72	34.10	31.45	36.09	34.53
7.1 [nA]	37.02	34.86	36.00	36.69	36.65
8.1 [nA]	46.97	43.66	45.18	46.14	46.81
9.1 [nA]	46.67	43.93	46.08	46.31	46.83
10.1 [nA]	0.067	0.277	0.886	0.227	0.120
11.1 [nA]	3.750	0.927	3.593	1.050	0.018
12.1 [dB]	109.82	110.61	108.61	110.06	108.37
13.1 [V]	-14.399	-14.406	-14.376	-14.410	-14.383
14.1 [V]	0.364	0.347	0.373	0.350	0.371
15.1 [dB]	136.93	108.16	114.46	109.94	119.06
16.1 [dB]	120.25	106.83	111.58	112.11	112.47
17.1 [mA]	-1.18	-1.19	-1.19	-1.19	-1.20

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD236_LM111_INIT_EMS_@_ERA / V1.0 JKJ/IR 01AUG97

Results file : RD236_LM111_INIT_EMS_@_ERA from: 17.09.97 / 13:03:16
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
: CONTROL 01 ; RAD 02-11
: INITIAL EMS @ ERA
: LM111N XM-PL-IG6-0026 ISS 2 ROOM / V1.0 JKJ/IR 01AUG97

Test steps

1.	Vos			-2.000	...	2.000		mV
2.	Vos			-2.000	...	2.000		mV
3.	Vos			-2.000	...	2.000		mV
4.	+Is			0.500	...	4.000		mA
5.	-Is			0.500	...	4.000		mA
6.	Ib+	(	0.00	) ...		100.00		nA
7.	Ib-	(	0.00	) ...		100.00		nA
8.	Ib+	(	0.00	) ...		100.00		nA
9.	Ib-	(	0.00	) ...		100.00		nA
10.	Ios	(	0.000	) ...		10.000		nA
11.	Ios	(	0.000	) ...		10.000		nA
12.	Avo			98.00	...	(130.00	)	dB
13.	-Vo	(	-15.000	) ...		-13.500		V
14.	-Vo	(	0.000	) ...		0.400		V
15.	CMRR			80.00	...	(110.00	)	dB
16.	CMRR			80.00	...	(110.00	)	dB
17.	Isc			-200.00	...	0.00		mA

	1	2	3	4	5	6
1.1 [mV]	0.003	0.736	0.269	0.698	0.313	-0.067
2.1 [mV]	0.176	0.829	0.399	0.789	0.454	0.048
3.1 [mV]	-0.062	1.230	0.474	1.856	0.368	-0.837
4.1 [mA]	3.241	3.175	3.217	3.170	3.234	3.204
5.1 [mA]	3.241	3.176	3.218	3.171	3.235	3.206
6.1 [nA]	40.25	35.13	39.50	36.26	38.06	37.45
7.1 [nA]	40.83	37.19	39.37	37.39	38.88	38.45
8.1 [nA]	51.70	47.62	50.91	46.60	48.71	47.66
9.1 [nA]	51.80	47.62	50.15	47.30	48.96	48.15
10.1 [nA]	0.228	0.047	0.439	0.689	0.356	0.502
11.1 [nA]	0.180	1.311	3.248	3.374	1.507	4.391
12.1 [dB]	108.97	108.70	108.02	109.93	110.02	109.95
13.1 [V]	-14.386	-14.379	-14.373	-14.405	-14.382	-14.366
14.1 [V]	0.365	0.384	0.379	0.390	0.371	0.386
15.1 [dB]	110.10	102.51	108.41	120.74	114.18	113.47
16.1 [dB]	104.40	101.78	108.13	108.79	115.26	112.45
17.1 [mA]	-1.19	-1.20	-1.18	-1.18	-1.19	-1.20

	7	8	9	10	11
1.1 [mV]	0.235	0.322	0.524	0.358	0.498
2.1 [mV]	0.407	0.441	0.664	0.474	0.666
3.1 [mV]	1.253	0.394	1.006	1.459	1.024
4.1 [mA]	3.194	3.140	3.161	3.216	3.195
5.1 [mA]	3.195	3.141	3.162	3.217	3.196
6.1 [nA]	36.94	34.26	28.55	36.28	31.56
7.1 [nA]	37.27	35.01	36.25	36.96	36.94
8.1 [nA]	47.29	43.92	45.42	46.43	47.10
9.1 [nA]	46.94	44.15	46.34	46.60	47.16
10.1 [nA]	-0.084	0.254	0.893	0.225	0.128
11.1 [nA]	3.879	0.866	3.618	1.098	0.083
12.1 [dB]	109.98	110.71	108.72	110.10	108.49
13.1 [V]	-14.398	-14.400	-14.376	-14.408	-14.382
14.1 [V]	0.358	0.344	0.370	0.351	0.370
15.1 [dB]	140.00	108.04	114.66	110.08	119.47
16.1 [dB]	119.52	106.97	111.63	112.68	113.09
17.1 [mA]	-1.19	-1.19	-1.19	-1.19	-1.19

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD236_LM111_EMS_@_10_KRAD / V1.0 JKJ/IR 01AU697

Results file : RD236_LM111_EMS_@_10_KRAD from: 18.09.97 / 10:42:03
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 10 KRAD
:

Test steps

1.	Vos			-2.000	...	2.000	mV
2.	Vos			-2.000	...	2.000	mV
3.	Vos			-2.000	...	2.000	mV
4.	+Is			0.500	...	4.000	mA
5.	-Is			0.500	...	4.000	mA
6.	Ib+	(	0.00	) ...		100.00	nA
7.	Ib-	(	0.00	) ...		100.00	nA
8.	Ib+	(	0.00	) ...		100.00	nA
9.	Ib-	(	0.00	) ...		100.00	nA
10.	Ios	(	0.000	) ...		10.000	nA
11.	Ios	(	0.000	) ...		10.000	nA
12.	Avo			98.00	... (	130.00	)dB
13.	-Vo	(	-15.000	) ...		-13.500	V
14.	-Vo	(	0.000	) ...		0.400	V
15.	CMRR			80.00	... (	110.00	)dB
16.	CMRR			80.00	... (	110.00	)dB
17.	Isc			-200.00	...	0.00	mA

	1	2	3	4	5	6
1.1 [mV]	0.011	1.076	0.630	1.049	0.614	0.364
2.1 [mV]	0.180	1.270	0.873	1.268	0.844	0.609
3.1 [mV]	-0.058	1.529	0.788	1.944	0.617	-0.410
4.1 [mA]	3.246	2.470	2.520	2.379	2.505	2.282
5.1 [mA]	3.247	2.466	2.520	2.370	2.500	2.283
6.1 [nA]	40.28	177.83 F	195.42 F	213.54 F	170.86 F	198.43 F
7.1 [nA]	40.92	180.16 F	199.89 F	219.38 F	175.87 F	205.72 F
8.1 [nA]	51.74	230.72 F	253.64 F	275.70 F	219.10 F	253.15 F
9.1 [nA]	51.89	142.99 F	143.18 F	146.09 F	144.70 F	145.20 F
10.1 [nA]	0.235	2.160	4.278	5.665	4.755	6.931
11.1 [nA]	0.146	2.377	12.979F	22.181F	17.278F	26.843F
12.1 [dB]	108.98	105.87	105.15	106.47	107.63	106.83
13.1 [V]	-14.391	-14.360	-14.348	-14.375	-14.364	-14.340
14.1 [V]	0.365	1.638F	0.533F	1.638F	0.552F	1.638F
15.1 [dB]	110.24	102.10	107.97	134.26	112.72	111.62
16.1 [dB]	104.50	100.05	105.26	116.36	109.52	106.92
17.1 [mA]	-1.19	-1.19	-1.19	-1.19	-1.19	-1.18

	7	8	9	10	11
1.1 [mV]	0.616	0.586	0.833	0.596	0.737
2.1 [mV]	0.887	0.790	1.059	0.782	0.967
3.1 [mV]	1.576	0.620	1.235	1.605	1.222
4.1 [mA]	2.530	2.492	2.530	2.550	2.544
5.1 [mA]	2.529	2.491	2.530	2.549	2.544
6.1 [nA]	189.09 F	141.71 F	151.48 F	149.80 F	132.86 F
7.1 [nA]	194.45 F	145.68 F	154.88 F	155.39 F	135.34 F
8.1 [nA]	243.07 F	181.29 F	196.23 F	192.17 F	171.48 F
9.1 [nA]	143.22 F	142.13 F	139.96 F	143.15 F	135.03 F
10.1 [nA]	5.111	3.551	3.198	5.251	2.321
11.1 [nA]	4.441	14.045F	14.172F	12.086F	8.366
12.1 [dB]	107.08	108.25	106.13	107.90	106.57
13.1 [V]	-14.377	-14.388	-14.350	-14.392	-14.367
14.1 [V]	0.452F	0.402F	0.441F	0.411F	0.422F
15.1 [dB]	123.52	107.52	117.77	109.25	117.22
16.1 [dB]	109.89	104.54	121.86	108.84	109.58
17.1 [mA]	-1.19	-1.18	-1.19	-1.20	-1.19

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD236_LM111_EMS_@_20_KRAD / V1.0 JKJ/IR 01AUG97

Results file : RD236_LM111_EMS_@_20_KRAD from: 18.09.97 / 11:14:25
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 20 KRAD
:

Test steps

1.	Vos			-2.000	...	2.000		mV
2.	Vos			-2.000	...	2.000		mV
3.	Vos			-2.000	...	2.000		mV
4.	+Is			0.500	...	4.000		mA
5.	-Is			0.500	...	4.000		mA
6.	Ib+	(	0.00	) ...		100.00		nA
7.	Ib-	(	0.00	) ...		100.00		nA
8.	Ib+	(	0.00	) ...		100.00		nA
9.	Ib-	(	0.00	) ...		100.00		nA
10.	Ios	(	0.000	) ...		10.000		nA
11.	Ios	(	0.000	) ...		10.000		nA
12.	Avo		98.00	...	(	130.00	)	dB
13.	-Vo	(	-15.000	) ...		-13.500		V
14.	-Vo	(	0.000	) ...		0.400		V
15.	CMRR		80.00	...	(	110.00	)	dB
16.	CMRR		80.00	...	(	110.00	)	dB
17.	Isc		-200.00	...		0.00		mA

	1	2	3	4	5	6
1.1 [mV]	-0.011	1.190	0.716	1.120	0.673	0.536
2.1 [mV]	0.155	1.471	1.054	1.443	0.976	0.883
3.1 [mV]	-0.085	1.604	0.853	1.855	0.648	-0.245
4.1 [mA]	3.257	2.465	2.518	2.297	2.501	2.197
5.1 [mA]	3.259	2.457	2.515	2.296	2.491	2.198
6.1 [nA]	40.41	273.15 F	287.44 F	293.52 F	263.54 F	278.25 F
7.1 [nA]	41.00	263.91 F	266.72 F	260.73 F	268.41 F	275.99 F
8.1 [nA]	51.86	291.53 F	288.17 F	293.61 F	286.39 F	278.89 F
9.1 [nA]	51.97	180.48 F	180.46 F	183.97 F	184.10 F	182.74 F
10.1 [nA]	0.237	5.029	10.213F	12.977F	9.180	11.255F
11.1 [nA]	0.153	9.690	26.814F	26.816F	26.808F	26.818F
12.1 [dB]	108.90	104.30	103.53	104.64	106.18	105.20
13.1 [V]	-14.388	-14.337	-14.336	-14.362	-14.349	-14.331
14.1 [V]	0.363	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	110.22	101.28	107.22	122.76	110.43	109.12
16.1 [dB]	104.06	98.65	103.39	130.78	108.28	103.58
17.1 [mA]	-1.19	-1.19	-1.19	-1.20	-1.18	-1.18

	7	8	9	10	11
1.1 [mV]	0.773	0.661	0.950	0.657	0.831
2.1 [mV]	1.135	0.932	1.254	0.902	1.120
3.1 [mV]	1.684	0.683	1.299	1.619	1.283
4.1 [mA]	2.521	2.484	2.522	2.545	2.535
5.1 [mA]	2.519	2.483	2.521	2.543	2.533
6.1 [nA]	286.00 F	211.05 F	230.95 F	230.38 F	205.45 F
7.1 [nA]	259.05 F	215.95 F	235.38 F	238.42 F	211.10 F
8.1 [nA]	295.53 F	271.45 F	289.55 F	296.05 F	266.80 F
9.1 [nA]	181.40 F	148.65 F	180.87 F	145.94 F	142.86 F
10.1 [nA]	8.559	4.565	4.224	7.778	5.295
11.1 [nA]	9.900	18.267F	19.419F	17.838F	16.169F
12.1 [dB]	105.37	106.88	104.77	106.54	105.31
13.1 [V]	-14.364	-14.377	-14.337	-14.380	-14.353
14.1 [V]	1.638F	0.462F	0.600F	0.479F	0.488F
15.1 [dB]	117.07	106.33	128.90	108.16	114.94
16.1 [dB]	105.44	103.70	119.62	106.51	106.51
17.1 [mA]	-1.19	-1.19	-1.20	-1.20	-1.20

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for TA09
RD236_LM111_EMS_@_30_KRAD          / V1.0 JKJ/IR 01AUG97
================================================================================
Results file    : RD236_LM111_EMS_@_30_KRAD   from: 18.09.97 / 11:22:53
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                :
                : EMS @ 30 KRAD
                :
--------------------------------------------------------------------------------
Test steps

  1.   Vos                          -2.000  ...       2.000  mV
  2.   Vos                          -2.000  ...       2.000  mV
  3.   Vos                          -2.000  ...       2.000  mV
  4.  +Is                           0.500  ...       4.000  mA
  5.  -Is                           0.500  ...       4.000  mA
  6.   Ib+                  (       0.00  )...     100.00   nA
  7.   Ib-                  (       0.00  )...     100.00   nA
  8.   Ib+                  (       0.00  )...     100.00   nA
  9.   Ib-                  (       0.00  )...     100.00   nA
 10.   Ios                  (      0.000  )...      10.000  nA
 11.   Ios                  (      0.000  )...      10.000  nA
 12.   Avo                        98.00   ... (    130.00  )dB
 13.  -Vo                   (    -15.000  )...     -13.500  V
 14.  -Vo                   (      0.000  )...       0.400  V
 15.   CMRR                       80.00   ... (    110.00  )dB
 16.   CMRR                       80.00   ... (    110.00  )dB
 17.   Isc                     -200.00    ...       0.00   mA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [mV]	-0.003	1.527	1.039	1.403	0.960	0.881
2.1 [mV]	0.164	1.917	1.490	1.847	1.352	1.342
3.1 [mV]	-0.079	1.904	1.114	1.951	0.899	0.072
4.1 [mA]	3.256	2.349	2.445	2.137	2.390	2.074
5.1 [mA]	3.258	2.340	2.441	2.140	2.379	2.075
6.1 [nA]	40.37	290.26 F	287.17 F	292.04 F	285.69 F	278.26 F
7.1 [nA]	40.93	264.57 F	267.67 F	262.87 F	269.04 F	276.50 F
8.1 [nA]	51.80	291.73 F	288.04 F	292.25 F	286.46 F	279.08 F
9.1 [nA]	51.92	180.52 F	179.59 F	183.53 F	183.87 F	182.37 F
10.1 [nA]	0.215	7.174	17.219F	20.772F	12.706F	15.206F
11.1 [nA]	0.245	14.189F	26.857F	26.854F	26.839F	26.843F
12.1 [dB]	109.00	103.02	102.37	103.53	105.10	104.05
13.1 [V]	-14.390	-14.333	-14.324	-14.339	-14.337	-14.319
14.1 [V]	0.364	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	110.18	100.34	105.79	115.38	108.82	107.31
16.1 [dB]	104.27	96.99	101.17	110.83	104.71	100.76
17.1 [mA]	-1.19	-1.19	-1.18	-1.20	-1.19	-1.19

	7	8	9	10	11
1.1 [mV]	1.116	0.877	1.199	0.921	1.045
2.1 [mV]	1.596	1.220	1.592	1.248	1.408
3.1 [mV]	1.956	0.875	1.481	1.817	1.467
4.1 [mA]	2.459	2.437	2.480	2.495	2.493
5.1 [mA]	2.454	2.436	2.480	2.493	2.492
6.1 [nA]	294.65 F	254.39 F	287.58 F	295.15 F	262.94 F
7.1 [nA]	260.12 F	259.87 F	265.64 F	259.52 F	264.27 F
8.1 [nA]	295.13 F	287.21 F	289.25 F	296.06 F	290.95 F
9.1 [nA]	180.49 F	189.95 F	180.08 F	186.22 F	181.75 F
10.1 [nA]	12.675F	5.110	5.805	8.748	5.642
11.1 [nA]	17.337F	20.472F	24.082F	19.506F	16.508F
12.1 [dB]	104.23	105.98	103.47	105.38	104.26
13.1 [V]	-14.352	-14.389	-14.329	-14.373	-14.340
14.1 [V]	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	112.13	105.62	140.00	106.72	113.39
16.1 [dB]	101.63	101.92	111.23	103.84	104.48
17.1 [mA]	-1.19	-1.19	-1.19	-1.20	-1.19

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for TA09
RD236_LM111_EMS_@_50_KRAD          / V1.0 JKJ/IR 01AUG97
================================================================================
Results file    : RD236_LM111_EMS_@_50_KRAD   from: 18.09.97 / 12:20:25
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                :
                : EMS @ 50 KRAD
                :
--------------------------------------------------------------------------------
Test steps

  1.    Vos                                -2.000  ...       2.000  mV
  2.    Vos                                -2.000  ...       2.000  mV
  3.    Vos                                -2.000  ...       2.000  mV
  4.   +Is                                 0.500  ...       4.000  mA
  5.   -Is                                 0.500  ...       4.000  mA
  6.    Ib+                          (      0.00  )...     100.00   nA
  7.    Ib-                          (      0.00  )...     100.00   nA
  8.    Ib+                          (      0.00  )...     100.00   nA
  9.    Ib-                          (      0.00  )...     100.00   nA
 10.    Ios                          (     0.000  )...      10.000  nA
 11.    Ios                          (     0.000  )...      10.000  nA
 12.    Avo                             98.00    ... (    130.00  )dB
 13.   -Vo                           (   -15.000  )...     -13.500  V
 14.   -Vo                           (     0.000  )...       0.400  V
 15.    CMRR                            80.00    ... (    110.00  )dB
 16.    CMRR                            80.00    ... (    110.00  )dB
 17.    Isc                           -200.00    ...       0.00   mA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [mV]	-0.019	1.706	1.274	1.656	1.111	1.178
2.1 [mV]	0.152	2.246F	1.900	2.280F	1.641	1.780
3.1 [mV]	-0.087	1.967	1.241	1.979	0.952	0.295
4.1 [mA]	3.235	2.252	2.359	2.033	2.278	2.012
5.1 [mA]	3.236	2.252	2.358	2.037	2.276	2.014
6.1 [nA]	40.13	288.89 F	285.87 F	289.61 F	284.51 F	277.31 F
7.1 [nA]	40.68	265.34 F	268.49 F	264.84 F	269.73 F	276.99 F
8.1 [nA]	51.55	290.46 F	286.85 F	289.92 F	285.42 F	278.25 F
9.1 [nA]	51.63	175.95 F	175.03 F	178.62 F	179.82 F	178.57 F
10.1 [nA]	0.212	18.746F	26.878F	26.507F	26.957F	21.992F
11.1 [nA]	0.217	26.821F	26.838F	26.838F	26.804F	26.821F
12.1 [dB]	108.93	101.57	100.73	101.88	103.49	102.71
13.1 [V]	-14.388	-14.315	-14.303	-14.329	-14.324	-14.307
14.1 [V]	0.366	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	110.17	98.99	103.03	108.43	105.84	104.28
16.1 [dB]	104.62	95.13	98.14	102.33	100.31	97.81
17.1 [mA]	-1.19	-1.19	-1.19	-1.20	-1.18	-1.19

	7	8	9	10	11
1.1 [mV]	1.387	1.047	1.500	1.025	1.255
2.1 [mV]	2.017F	1.481	2.023F	1.469	1.724
3.1 [mV]	2.101F	1.006	1.669	1.800	1.613
4.1 [mA]	2.364	2.440	2.467	2.477	2.478
5.1 [mA]	2.361	2.440	2.467	2.474	2.475
6.1 [nA]	293.25 F	266.22 F	287.84 F	293.84 F	289.73 F
7.1 [nA]	261.06 F	268.61 F	266.51 F	260.53 F	264.67 F
8.1 [nA]	293.92 F	286.81 F	288.19 F	294.77 F	290.31 F
9.1 [nA]	176.77 F	187.07 F	176.52 F	182.96 F	178.07 F
10.1 [nA]	23.948F	5.301	9.502	18.938F	8.091
11.1 [nA]	26.821F	20.651F	26.822F	26.826F	23.624F
12.1 [dB]	102.73	104.52	102.04	103.99	102.71
13.1 [V]	-14.338	-14.355	-14.310	-14.356	-14.330
14.1 [V]	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	107.59	103.83	115.02	105.15	109.94
16.1 [dB]	98.08	99.35	103.36	100.88	101.47
17.1 [mA]	-1.19	-1.18	-1.20	-1.19	-1.19

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for TA09
RD236_LM111_EMS_@_75_KRAD         / V1.0 JKJ/IR 01AUG97
================================================================================
Results file    : RD236_LM111_EMS_@_75_KRAD   from: 18.09.97 / 12:24:06
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                :
                : EMS @ 75 KRAD
                :
--------------------------------------------------------------------------------
Test steps

  1.    Vos                              -2.000  ...       2.000  mV
  2.    Vos                              -2.000  ...       2.000  mV
  3.    Vos                              -2.000  ...       2.000  mV
  4.   +Is                               0.500  ...       4.000  mA
  5.   -Is                               0.500  ...       4.000  mA
  6.    Ib+                        (      0.00  )...     100.00   nA
  7.    Ib-                        (      0.00  )...     100.00   nA
  8.    Ib+                        (      0.00  )...     100.00   nA
  9.    Ib-                        (      0.00  )...     100.00   nA
 10.    Ios                        (     0.000  )...      10.000  nA
 11.    Ios                        (     0.000  )...      10.000  nA
 12.    Avo                            98.00   ... (    130.00  )dB
 13.   -Vo                         (   -15.000  )...     -13.500  V
 14.   -Vo                         (     0.000  )...       0.400  V
 15.    CMRR                           80.00   ... (    110.00  )dB
 16.    CMRR                           80.00   ... (    110.00  )dB
 17.    Isc                          -200.00   ...       0.00   mA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [mV]	-0.013	2.269F	1.832	2.156F	1.624	1.662
2.1 [mV]	0.160	2.950F	2.642F	2.942F	2.319F	2.396F
3.1 [mV]	-0.072	2.421F	1.672	2.322F	1.344	0.749
4.1 [mA]	3.223	2.078	2.172	1.941	2.089	1.957
5.1 [mA]	3.225	2.080	2.175	1.944	2.090	1.959
6.1 [nA]	39.94	288.25 F	285.03 F	288.44 F	283.66 F	277.31 F
7.1 [nA]	40.52	266.75 F	270.02 F	266.68 F	271.20 F	277.58 F
8.1 [nA]	51.30	290.05 F	286.25 F	288.97 F	284.83 F	278.52 F
9.1 [nA]	51.43	175.02 F	173.32 F	177.42 F	178.49 F	177.46 F
10.1 [nA]	0.220	19.571F	27.032F	26.697F	27.104F	14.517F
11.1 [nA]	0.229	26.861F	26.872F	26.869F	26.835F	26.848F
12.1 [dB]	108.90	100.31	99.39	100.64	102.31	101.66
13.1 [V]	-14.385	-14.298	-14.286	-14.313	-14.308	-14.286
14.1 [V]	0.368	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	110.27	97.80	101.00	104.72	103.79	101.78
16.1 [dB]	105.58	92.84	94.78	97.25	96.65	95.10
17.1 [mA]	-1.19	-1.19	-1.19	-1.18	-1.19	-1.19

	7	8	9	10	11
1.1 [mV]	1.926	1.356	1.873	1.482	1.666
2.1 [mV]	2.721F	1.891	2.520F	2.072F	2.268F
3.1 [mV]	2.538F	1.281	1.960	2.140F	1.933
4.1 [mA]	2.205	2.393	2.417	2.356	2.399
5.1 [mA]	2.205	2.392	2.416	2.350	2.390
6.1 [nA]	292.47 F	253.21 F	287.27 F	292.94 F	289.08 F
7.1 [nA]	262.43 F	256.44 F	267.64 F	261.97 F	265.83 F
8.1 [nA]	293.45 F	286.88 F	287.81 F	294.11 F	289.85 F
9.1 [nA]	175.65 F	186.39 F	174.82 F	181.68 F	176.63 F
10.1 [nA]	22.648F	3.158	7.621	24.699F	11.081F
11.1 [nA]	26.852F	13.619F	26.852F	26.855F	26.852F
12.1 [dB]	101.70	103.34	100.78	102.77	101.50
13.1 [V]	-14.327	-14.341	-14.297	-14.345	-14.316
14.1 [V]	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	103.86	102.32	109.58	102.83	106.60
16.1 [dB]	94.84	97.29	99.82	97.49	98.37
17.1 [mA]	-1.19	-1.19	-1.18	-1.19	-1.19

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for TA09
RD236_LM111_EMS_@_100_KRAD        / V1.0 JKJ/IR 01AUG97
================================================================================
Results file    : RD236_LM111_EMS_@_100_KRAD   from: 18.09.97 / 14:00:55
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                :
                : EMS @ 100 KRAD
                :
--------------------------------------------------------------------------------
Test steps

  1.    Vos                              -2.000  ...       2.000  mV
  2.    Vos                              -2.000  ...       2.000  mV
  3.    Vos                              -2.000  ...       2.000  mV
  4.   +Is                               0.500  ...       4.000  mA
  5.   -Is                               0.500  ...       4.000  mA
  6.    Ib+                        (      0.00  )...     100.00   nA
  7.    Ib-                        (      0.00  )...     100.00   nA
  8.    Ib+                        (      0.00  )...     100.00   nA
  9.    Ib-                        (      0.00  )...     100.00   nA
 10.    Ios                        (     0.000  )...      10.000  nA
 11.    Ios                        (     0.000  )...      10.000  nA
 12.    Avo                            98.00    ... (    130.00  )dB
 13.   -Vo                         (   -15.000  )...     -13.500  V
 14.   -Vo                         (     0.000  )...       0.400  V
 15.    CMRR                           80.00    ... (    110.00  )dB
 16.    CMRR                           80.00    ... (    110.00  )dB
 17.    Isc                          -200.00    ...       0.00   mA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [mV]	-0.026	2.321F	1.972	2.327F	1.708	1.405
2.1 [mV]	0.147	3.101F	2.876F	3.195F	2.481F	2.109F
3.1 [mV]	-0.080	2.450F	1.811	2.460F	1.409	0.548
4.1 [mA]	3.215	2.083	2.152	1.958	2.080	2.023
5.1 [mA]	3.216	2.087	2.154	1.971	2.081	2.053
6.1 [nA]	39.92	287.65 F	284.58 F	287.82 F	283.15 F	277.53 F
7.1 [nA]	40.42	266.68 F	269.85 F	266.73 F	271.16 F	276.86 F
8.1 [nA]	51.23	289.53 F	285.94 F	288.45 F	284.43 F	278.52 F
9.1 [nA]	51.31	173.69 F	172.25 F	176.32 F	177.97 F	176.64 F
10.1 [nA]	0.191	15.755F	27.020F	26.701F	27.099F	15.304F
11.1 [nA]	0.346	26.831F	26.851F	26.843F	26.807F	26.830F
12.1 [dB]	108.87	99.54	98.56	100.01	101.69	100.98
13.1 [V]	-14.383	-14.291	-14.276	-14.301	-14.304	-14.275
14.1 [V]	0.369	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	110.12	96.76	99.03	102.30	101.98	102.10
16.1 [dB]	105.97	91.36	93.00	94.76	94.24	95.05
17.1 [mA]	-1.19	-1.18	-1.19	-1.19	-1.20	-1.20

	7	8	9	10	11
1.1 [mV]	1.608	0.821	1.572	1.293	1.428
2.1 [mV]	2.402F	1.292	2.212F	1.914	2.041F
3.1 [mV]	2.274F	0.835	1.710	1.952	1.693
4.1 [mA]	2.280	2.426	2.431	2.403	2.427
5.1 [mA]	2.289	2.427	2.432	2.396	2.421
6.1 [nA]	292.77 F	245.55 F	287.52 F	292.69 F	288.82 F
7.1 [nA]	261.61 F	251.50 F	266.94 F	261.79 F	265.67 F
8.1 [nA]	293.67 F	287.25 F	288.01 F	293.87 F	289.53 F
9.1 [nA]	174.98 F	186.31 F	174.68 F	181.50 F	176.63 F
10.1 [nA]	18.388F	5.738	8.287	24.050F	13.718F
11.1 [nA]	26.827F	18.143F	26.832F	26.833F	26.831F
12.1 [dB]	100.98	102.71	100.00	101.97	100.71
13.1 [V]	-14.319	-14.336	-14.288	-14.335	-14.309
14.1 [V]	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	103.90	103.79	109.51	102.16	106.74
16.1 [dB]	94.99	100.25	100.69	97.02	98.91
17.1 [mA]	-1.20	-1.19	-1.19	-1.18	-1.19

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for TA09
RD236_LM111_POST_ANNEAL_EMS       / V1.0 JKJ/IR 01AUG97
================================================================================
Results file    : RD236_LM111_POST_ANNEAL_EMS   from: 19.09.97 / 13:08:43
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                : CONTROL 01 ; RAD 02-11
                : POST ANNEAL EMS
                : LM111N XM-PL-IGG-0026 ISS 2 ROOM / V1.0 JKJ/IR 01AUG97
--------------------------------------------------------------------------------
Test steps

  1.    Vos                                  -2.000  ...       2.000  mV
  2.    Vos                                  -2.000  ...       2.000  mV
  3.    Vos                                  -2.000  ...       2.000  mV
  4.   +Is                                     0.500  ...       4.000  mA
  5.   -Is                                     0.500  ...       4.000  mA
  6.    Ib+                           (        0.00  )...     100.00   nA
  7.    Ib-                           (        0.00  )...     100.00   nA
  8.    Ib+                           (        0.00  )...     100.00   nA
  9.    Ib-                           (        0.00  )...     100.00   nA
 10.    Ios                           (       0.000  )...      10.000  nA
 11.    Ios                           (       0.000  )...      10.000  nA
 12.    Avo                                  98.00   ... (    130.00  )dB
 13.   -Vo                            (     -15.000  )...     -13.500  V
 14.   -Vo                            (       0.000  )...       0.400  V
 15.    CMRR                                 80.00   ... (    110.00  )dB
 16.    CMRR                                 80.00   ... (    110.00  )dB
 17.    Isc                                -200.00   ...       0.00   mA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [mV]	-0.014	2.325F	1.994	2.398F	1.761	1.841
2.1 [mV]	0.159	3.068F	2.863F	3.234F	2.506F	2.631F
3.1 [mV]	-0.087	2.415F	1.784	2.541F	1.419	0.875
4.1 [mA]	3.215	2.065	2.133	1.912	2.058	1.924
5.1 [mA]	3.216	2.066	2.135	1.915	2.058	1.925
6.1 [nA]	39.93	287.45 F	284.38 F	288.12 F	282.87 F	276.62 F
7.1 [nA]	40.47	267.37 F	270.53 F	266.85 F	271.82 F	278.12 F
8.1 [nA]	51.26	289.32 F	285.68 F	288.73 F	284.09 F	277.89 F
9.1 [nA]	51.38	174.41 F	173.24 F	177.09 F	178.59 F	176.87 F
10.1 [nA]	0.192	26.760F	27.089F	26.717F	27.170F	27.497F
11.1 [nA]	0.237	26.862F	26.875F	26.869F	26.834F	26.851F
12.1 [dB]	108.70	100.35	99.33	100.77	102.27	101.32
13.1 [V]	-14.390	-14.301	-14.288	-14.313	-14.312	-14.285
14.1 [V]	0.369	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	110.35	97.07	99.61	103.10	102.27	100.93
16.1 [dB]	104.43	92.03	93.37	95.97	95.64	93.68
17.1 [mA]	-1.19	-1.19	-1.20	-1.18	-1.18	-1.18

	7	8	9	10	11
1.1 [mV]	1.956	1.415	2.049F	1.514	1.820
2.1 [mV]	2.791F	1.995	2.781F	2.155F	2.484F
3.1 [mV]	2.565F	1.356	2.109F	2.136F	2.048F
4.1 [mA]	2.151	2.381	2.384	2.322	2.323
5.1 [mA]	2.152	2.379	2.379	2.319	2.319
6.1 [nA]	292.37 F	285.71 F	286.88 F	292.41 F	288.53 F
7.1 [nA]	262.38 F	269.03 F	267.86 F	262.34 F	266.22 F
8.1 [nA]	293.37 F	287.07 F	287.57 F	293.67 F	289.38 F
9.1 [nA]	175.47 F	186.16 F	175.02 F	182.06 F	177.32 F
10.1 [nA]	26.236F	6.793	17.374F	26.231F	19.259F
11.1 [nA]	26.848F	23.841F	26.848F	26.852F	26.850F
12.1 [dB]	101.58	103.10	100.71	102.60	101.47
13.1 [V]	-14.326	-14.343	-14.298	-14.343	-14.317
14.1 [V]	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	102.78	101.17	106.50	101.82	105.02
16.1 [dB]	94.02	96.31	97.73	96.26	96.91
17.1 [mA]	-1.20	-1.18	-1.20	-1.18	-1.19

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD236_LM111_FINAL_EMS / V1.0 JKJ/IR 01AUG97

Results file : RD236_LM111_FINAL_EMS from: 02.10.97 / 11:02:22
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
: CONTROL 1 ; RAD 2-11
: FINAL EMS
: LM111N XM-PL-IGG-0026 ISS 2 ROOM / V1.0 JKJ/IR 01AUG97

Test steps

1.	Vos			-2.000	...	2.000		mV
2.	Vos			-2.000	...	2.000		mV
3.	Vos			-2.000	...	2.000		mV
4.	+Is			0.500	...	4.000		mA
5.	-Is			0.500	...	4.000		mA
6.	Ib+	(	0.00	) ...		100.00		nA
7.	Ib-	(	0.00	) ...		100.00		nA
8.	Ib+	(	0.00	) ...		100.00		nA
9.	Ib-	(	0.00	) ...		100.00		nA
10.	Ios	(	0.000	) ...		10.000		nA
11.	Ios	(	0.000	) ...		10.000		nA
12.	Avo		98.00	...	(130.00		)	dB
13.	-Vo	(	-15.000	) ...		-13.500		V
14.	-Vo	(	0.000	) ...		0.400		V
15.	CMRR		80.00	...	(110.00		)	dB
16.	CMRR		80.00	...	(110.00		)	dB
17.	Isc		-200.00	...		0.00		mA

	1	2	3	4	5	6
1.1 [mV]	-0.017	1.661	1.335	1.651	1.165	1.000
2.1 [mV]	0.161	1.988	1.716	1.990	1.528	1.356
3.1 [mV]	-0.067	1.978	1.305	2.344F	1.019	0.093
4.1 [mA]	3.192	2.381	2.447	2.186	2.407	2.102
5.1 [mA]	3.194	2.369	2.443	2.186	2.395	2.104
6.1 [nA]	39.62	246.43 F	250.37 F	249.74 F	258.06 F	259.52 F
7.1 [nA]	40.12	265.35 F	268.78 F	261.58 F	270.03 F	277.57 F
8.1 [nA]	50.93	291.06 F	287.11 F	293.67 F	285.59 F	278.12 F
9.1 [nA]	51.10	182.37 F	181.76 F	185.81 F	184.83 F	184.96 F
10.1 [nA]	0.259	26.534F	26.879F	26.156F	26.998F	27.756F
11.1 [nA]	0.088	26.850F	26.850F	26.845F	26.852F	26.851F
12.1 [dB]	108.55	104.52	103.69	105.24	106.15	105.72
13.1 [V]	-14.386	-14.343	-14.335	-14.365	-14.349	-14.328
14.1 [V]	0.364	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	109.76	100.20	103.32	114.48	108.19	107.14
16.1 [dB]	105.61	96.16	98.64	106.83	101.88	100.54
17.1 [mA]	-1.18	-1.18	-1.18	-1.18	-1.18	-1.18

	7	8	9	10	11
1.1 [mV]	1.150	1.178	1.503	1.193	1.334
2.1 [mV]	1.549	1.512	1.885	1.536	1.716
3.1 [mV]	1.958	1.105	1.723	2.004F	1.622
4.1 [mA]	2.454	2.407	2.449	2.463	2.456
5.1 [mA]	2.452	2.407	2.449	2.462	2.456
6.1 [nA]	255.08 F	250.45 F	256.57 F	253.84 F	256.70 F
7.1 [nA]	260.46 F	269.28 F	266.40 F	260.51 F	265.67 F
8.1 [nA]	294.88 F	286.70 F	288.77 F	295.40 F	289.85 F
9.1 [nA]	182.98 F	190.75 F	181.66 F	187.63 F	182.75 F
10.1 [nA]	26.044F	26.929F	26.638F	26.048F	26.564F
11.1 [nA]	26.851F	26.853F	26.855F	26.855F	26.851F
12.1 [dB]	105.75	106.73	104.61	106.30	104.92
13.1 [V]	-14.367	-14.374	-14.336	-14.380	-14.347
14.1 [V]	1.638F	1.638F	1.638F	1.638F	1.638F
15.1 [dB]	113.20	104.15	120.52	105.06	110.11
16.1 [dB]	101.72	99.08	105.57	100.38	101.51
17.1 [mA]	-1.19	-1.18	-1.20	-1.19	-1.19

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_INIT_EMS_@_IGG / V1.2 IR 07AUG97 ROOM TEMP

Results file : RD236_LM111_INIT_EMS_@_IGG from: 13.09.97 / 14:44:54
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
: CONTROL 1 ; RAD 2-11
: INITIAL EMS @ IGG
: LM111H SCD9103/002 ISSUE 3D ROOM / V1.2 IR 07AUG97 ROOMTEMP

Test steps

1.	I - Output Leakage	-10.0	...	10.0	nA
2.	I - Input Leakage	-20.0	...	20.0	nA
3.	Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	0.9	0.9	0.8	0.6	0.5
1.2 [nA]	0.9	0.9	0.9	0.8	0.6	0.5
2.1 [nA]	0.3	0.3	0.3	0.2	0.2	0.2
3.1 [nA]	0.002	0.004	0.003	0.002	0.002	0.003

	7	8	9	10	11
1.1 [nA]	0.9	0.7	0.9	0.9	0.9
1.2 [nA]	0.9	0.7	0.9	0.9	0.9
2.1 [nA]	0.2	0.2	0.2	0.3	0.2
3.1 [nA]	0.003	0.003	0.004	0.004	0.002

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for UTS3
RD236_LM111_INIT_EMS_@_ERA       / V1.2 IR 07AUG97 ROOM TEMP
================================================================================
Results file    : RD236_LM111_INIT_EMS_@_ERA   from: 17.09.97 / 12:58:56
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                : CONTROL 01 ; RAD 02-11
                : INITIAL EMS @ ERA
                : LM111H SCC9103/002 ISSUE 3D ROOM / V1.2 IR 07AUG97 ROOMTEMP
--------------------------------------------------------------------------------
Test steps

  1. I - Output Leakage                  -10.0     ...      10.0     nA
  2. I - Input Leakage                   -20.0     ...      20.0     nA
  3. Ios2                                -10.000   ...      10.000   nA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [nA]	0.9	0.9	1.0	0.8	0.6	0.5
1.2 [nA]	0.9	0.9	0.9	0.8	0.6	0.5
2.1 [nA]	0.3	0.3	0.3	0.3	0.2	0.2
3.1 [nA]	0.003	0.004	0.003	0.003	0.004	0.003

	7	8	9	10	11
1.1 [nA]	1.0	0.7	0.9	0.9	0.9
1.2 [nA]	0.9	0.7	0.9	0.9	0.9
2.1 [nA]	0.3	0.2	0.3	0.3	0.3
3.1 [nA]	0.003	0.003	0.003	0.002	0.003

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_EMS_@_10_KRAD / V1.2 IR 07AU697 ROOM TEMP

Results file : RD236_LM111_EMS_@_10_KRAD from: 18.09.97 / 10:48:48
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 10 KRAD
:

Test steps

1.	I - Output Leakage	-10.0	...	10.0	nA
2.	I - Input Leakage	-20.0	...	20.0	nA
3.	Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	1.0	1.0	1.0	0.6	0.6
1.2 [nA]	0.9	1.0	1.1	1.0	0.6	0.6
2.1 [nA]	0.3	0.3	0.3	0.3	0.2	0.2
3.1 [nA]	0.003	0.003	0.004	0.003	0.003	0.004

	7	8	9	10	11
1.1 [nA]	1.0	0.8	1.0	0.9	0.9
1.2 [nA]	1.1	0.8	1.0	0.9	0.9
2.1 [nA]	0.2	0.2	0.3	0.2	0.3
3.1 [nA]	0.004	0.003	0.004	0.003	0.003

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_EMS_@_20_KRAD / V1.2 IR 07AUG97 ROOM TEMP

Results file : RD236_LM111_EMS_@_20_KRAD from: 18.09.97 / 10:59:15
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 20 KRAD
:

Test steps

1.	I - Output Leakage	-10.0	...	10.0	nA
2.	I - Input Leakage	-20.0	...	20.0	nA
3.	Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	1.3	1.4	1.4	0.8	1.0
1.2 [nA]	0.9	1.3	1.5	1.5	0.9	1.1
2.1 [nA]	0.3	0.3	0.3	0.3	0.2	0.2
3.1 [nA]	0.004	0.004	0.003	0.003	0.002	0.003

	7	8	9	10	11
1.1 [nA]	1.4	0.9	1.2	1.1	1.0
1.2 [nA]	1.4	0.9	1.2	1.1	1.0
2.1 [nA]	0.3	0.3	0.3	0.2	0.3
3.1 [nA]	0.004	0.003	0.003	0.001	0.004

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for UTS3
RD236_LM111_EMS_@_30_KRAD        / V1.2 IR 07AUG97 ROOM TEMP
================================================================================
Results file    : RD236_LM111_EMS_@_30_KRAD   from: 18.09.97 / 11:38:49
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                :
                : EMS @ 30 KRAD
                :
--------------------------------------------------------------------------------
Test steps

  1. I - Output Leakage                  -10.0     ...      10.0     nA
  2. I - Input Leakage                   -20.0     ...      20.0     nA
  3. Ios2                                -10.000   ...      10.000   nA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [nA]	0.9	1.6	1.9	2.0	1.1	1.6
1.2 [nA]	0.9	1.7	2.1	2.2	1.1	1.8
2.1 [nA]	0.3	0.3	0.3	0.4	0.2	0.3
3.1 [nA]	0.003	0.004	0.004	0.004	0.004	0.004

	7	8	9	10	11
1.1 [nA]	1.8	1.1	1.5	1.3	1.2
1.2 [nA]	2.0	1.1	1.6	1.3	1.2
2.1 [nA]	0.3	0.3	0.3	0.3	0.3
3.1 [nA]	0.003	0.004	0.003	0.002	0.002

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_EMS_@_50_KRAD / V1.2 IR 07AUG97 ROOM TEMP

Results file : RD236_LM111_EMS_@_50_KRAD from: 18.09.97 / 11:42:20
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 50 KRAD
:

Test steps

1.	I - Output Leakage	-10.0	...	10.0	nA
2.	I - Input Leakage	-20.0	...	20.0	nA
3.	Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	7.2	13.5 F	13.5 F	2.5	13.5 F
1.2 [nA]	0.9	7.8	13.6 F	13.6 F	2.8	13.6 F
2.1 [nA]	0.3	0.5	0.5	0.7	0.4	0.6
3.1 [nA]	0.004	0.003	0.003	0.003	0.003	0.004

	7	8	9	10	11
1.1 [nA]	13.5 F	3.0	5.2	2.5	1.9
1.2 [nA]	13.6 F	3.2	5.6	2.8	2.0
2.1 [nA]	0.5	0.3	0.4	0.4	0.3
3.1 [nA]	0.004	0.003	0.004	0.004	0.003

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_EMS_@_75_KRAD / V1.2 IR 07AUG97 ROOM TEMP

Results file : RD236_LM111_EMS_@_75_KRAD from: 18.09.97 / 13:10:35
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 75 KRAD
:

Test steps

1. I - Output Leakage	-10.0	...	10.0	nA
2. I - Input Leakage	-20.0	...	20.0	nA
3. Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	13.5 F	13.5 F	13.5 F	13.5 F	13.5 F
1.2 [nA]	0.9	13.6 F	13.6 F	13.6 F	13.6 F	13.6 F
2.1 [nA]	0.3	1.0	0.9	2.0	0.6	1.8
3.1 [nA]	0.003	0.004	0.003	0.004	0.004	0.004

	7	8	9	10	11
1.1 [nA]	13.5 F	13.5 F	13.5 F	13.5 F	5.2
1.2 [nA]	13.6 F	13.6 F	13.6 F	13.6 F	5.6
2.1 [nA]	1.3	0.6	0.7	0.6	0.4
3.1 [nA]	0.004	0.003	0.004	0.003	0.004

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_EMS_@_100_KRAD / V1.2 IR 07AUG97 ROOM TEMP

Results file : RD236_LM111_EMS_@_100_KRAD from: 18.09.97 / 13:25:04
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
:
: EMS @ 100 KRAD
:

Test steps

1.	I - Output Leakage	-10.0	...	10.0	nA
2.	I - Input Leakage	-20.0	...	20.0	nA
3.	Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	13.5 F	13.5 F	13.5 F	13.5 F	13.5 F
1.2 [nA]	0.9	13.6 F	13.6 F	13.6 F	13.6 F	13.6 F
2.1 [nA]	0.3	3.0	2.1	8.3	1.3	9.3
3.1 [nA]	0.004	0.002	0.004	0.002	0.003	0.004

	7	8	9	10	11
1.1 [nA]	13.5 F	13.5 F	13.5 F	13.5 F	13.5 F
1.2 [nA]	13.6 F	13.6 F	13.6 F	13.6 F	13.6 F
2.1 [nA]	0.1	1.4	1.7	1.0	0.7
3.1 [nA]	0.001	0.002	0.003	0.003	0.003

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for UTS3
RD236_LM111_POST_ANNEAL_EMS / V1.2 IR 07AUG97 ROOM TEMP

Results file : RD236_LM111_POST_ANNEAL_EMS from: 19.09.97 / 13:15:13
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD236
Order number :
Vendor :
: CONTROL 01 ; RAD 02-11
: POST ANNEAL EMS
: LM111H SCC9103/002 ISSUE 3D ROOM / V1.2 IR 07AUG97 ROOMTEMP

Test steps

1.	I - Output Leakage	-10.0	...	10.0	nA
2.	I - Input Leakage	-20.0	...	20.0	nA
3.	Ios2	-10.000	...	10.000	nA

	1	2	3	4	5	6
1.1 [nA]	0.9	2.7	2.8	2.8	2.1	2.6
1.2 [nA]	0.9	3.0	3.1	3.2	2.4	3.0
2.1 [nA]	0.3	0.5	0.5	0.5	0.4	0.5
3.1 [nA]	0.003	0.003	0.004	0.002	0.003	0.002

	7	8	9	10	11
1.1 [nA]	2.9	2.0	2.6	2.3	2.0
1.2 [nA]	3.2	2.2	2.9	2.5	2.2
2.1 [nA]	0.5	0.4	0.5	0.4	0.4
3.1 [nA]	0.004	0.003	0.003	0.004	0.002

```
SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for UTS3
RD236_LM111_FINAL_EMS            / V1.2 IR 07AUG97 ROOM TEMP
================================================================================
Results file    : RD236_LM111_FINAL_EMS   from: 02.10.97 / 10:55:57
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD236
Order number    :
Vendor          :
                : CONTROL 1 ; RAD 2-11
                : FINAL EMS
                : LM111H SCC9103/002 ISSUE 3D ROOM / V1.2 IR 07AUG97 ROOMTEMP
--------------------------------------------------------------------------------
Test steps

  1. I - Output Leakage                    -10.0     ...      10.0     nA
  2. I - Input Leakage                     -20.0     ...      20.0     nA
  3. Ios2                                  -10.000   ...      10.000   nA
--------------------------------------------------------------------------------
```

	1	2	3	4	5	6
1.1 [nA]	0.9	0.9	1.0	0.9	0.6	0.5
1.2 [nA]	0.9	0.9	1.0	0.9	0.6	0.5
2.1 [nA]	0.3	0.3	0.3	0.3	0.2	0.2
3.1 [nA]	0.003	0.005	0.003	0.004	0.002	0.003

	7	8	9	10	11
1.1 [nA]	1.0	0.8	0.9	0.9	0.9
1.2 [nA]	1.0	0.8	1.0	0.9	0.9
2.1 [nA]	0.3	0.2	0.3	0.3	0.3
3.1 [nA]	0.004	0.003	0.003	0.003	0.003

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD 236

PART TYPE LM111 OPTION SHEET 1 OF 1

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-IGG-0026 Table A

INITIAL EMS

Parameter Serial No's	Er (ns)	Ef (ns)	Vo(STB) (V)				
R1	138·5	136·2	14·976				
R2	138·0	125·0	14·976				
R3	140·0	132·4	14·976				
R4	138·5	129·2	14·976				
R5	135·5	127·8	14·976				
R6	139·0	131·8	14·976				
R7	137·8	131·0	14·976				
R8	137·2	135·0	14·976				
R9	136·0	125·2	14·976				
R10	136·8	138·2	14·976				
R11	137·0	129·2	14·976				
Limit							
Condition	VCC = ±15V VOD = −5mV ΔVIN = 100mV	VCC = ±15V VOD = 5mV ΔVIN = 100mV	VCC = ±15V VIN1 = 15V VIN2 = 0V ISTB = −3mA				

Measured by [signature] Date 13/9/97

Test Equipment used:-

EQUIPMENT	CT NUMBER
THURLBY PL320 PSU	CT296
2X FARNELL LT-30-2 PSU	CT210, CT140
KEITHLEY 225 CURRENT SOURCE	CT034
YOKOGAWA DL1540 OSCILLOSCOPE	CT413
HP 8082 PULSE GENERATOR	CT308
KEITHLEY 2000 DMM	CT384

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD236

PART TYPE LM111 OPTION SHEET 1 OF 1

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-166-0026 Table A

POST ANNEAL EMS

Parameter Serial No's	$V_{O(STB)}$ (V)						
R1	14.989						
R2	14.989						
R3	14.988						
R4	14.989						
R5	14.988						
R6	14.989						
R7	14.989						
R8	14.988						
R9	14.988						
R10	14.988						
R11	14.988						
Limit							
Condition							

Measured by [signature] Date 19/9/97

Test Equipment used:-

EQUIPMENT	CT NUMBER
THURLBY PL320 PSU	CT296
KEITHLEY 225 CURRENT SOURCE	CT034
THURLBY 1503 DMM	CT209

I.G.G. COMPONENT TECHNOLOGY LTD.

REPORT NO. RD236

PART TYPE LM111 OPTION SHEET 1 OF 1

ELECTRICAL MEASUREMENTS w.r.t. XM-PL-IGG-0026 Table A

POST AGING ENS

Parameter Serial No's	t_r (ns)	t_f (ns)	$V_{O(STB)}$ (V)				
R1	137	130	14.991				
R2	143	118	14.993				
R3	147	125	14.992				
R4	146	122	14.993				
R5	140	118	14.993				
R6	146	127	14.993				
R7	145	123	14.993				
R8	141	125	14.993				
R9	145	117	14.993				
R10	142	126	14.994				
R11	142	119	14.993				
Limit	≤300ns	≤300ns	≥14V				
Condition	V_{CC} = ±15V V_{OD} = -5mV ΔV_{IN} = 100mV	V_{CC} = ±15V V_{OD} = 5mV ΔV_{IN} = 100mV	V_{CC} = ±15V V_{IN1} = 15V V_{IN2} = 0V I_{STB} = -3mA				

Measured by P.D. Mussell Date 9/10/97

Test Equipment used:-

EQUIPMENT	CT NUMBER
THURLBY 1503 DMM	CT209
KEITHLEY 225 CURRENT SOURCE	CT034
2 x DECADE RESISTANCE BOX	CT010, CT011
THURLBY PL320 PSU	CT296
THURLBY PL320 PSU	CT287
HP 8082A PULSE GENERATOR	CT308

RIR 77594 **XMM** RD236	**IRRADIATION TEST PLAN NO.** XM-PL-IGG-0026 1	Issue No. 2 Date: November 1996 Page: 1/6 2

Component No. LM111 (Screening Samples) 3	Component Designation: Integrated Circuit Voltage Comparator, Type LM111 4	Irradiation Spec No. N/A Iss. Rev. 5

Specification Detail ESA/SCC 9103/002 Iss. 3D 6	Acceptance Evaluation ___ Element Diffusion ___ Lot X 7	Electrical Meas. In-situ ___ Remote X 8	Project/Programme **XMM** 9

Manufacturer: NSC Address: Arlington TX, USA 10	Test Facility: ERA Address: Leatherhead Surrey ENGLAND 11	Originator: IGG CT Name: S. Thacker 12

Radiation Source: COBALT 60 13	Sample Size: 10 Control Devices: 1 14	Exposure: Single ___ Multiple X 15	Annealing Test: YES X NO ___ 16	Radiation Level: 10kRAD(Si), 50kRAD(Si) 20kRAD(Si), 75kRAD(Si) 30kRAD(Si), 100kRAD(Si) 17

Single Exposure:
Dose [kRAD(Si)]
Dose Rate [RAD(Si)/s]
Exposure Time

Not Applicable 18

Multiple Exposure: 19

Irradiation Steps	1	2	3	4	5	6
Dose [kRAD(Si)]	10	10	10	20	25	25
Maximum Dose Rate [RAD(Si)/s]	10	10	10	10	10	10
Minimum Exposure Time[s]	1000	1000	1000	2000	2500	2500

Bias Requirements: During and after Exposure (for remote electrical measurements): YES

Bias Conditions:
Test Circuits: The Electrical Bias circuit is given in Figure 1 herein.

Shielding: Shielding is required to minimize dose enhancement effects caused by low energy, scattered radiation. The test specimens shall be enclosed in a Pb/Al container of Pb 1.5mm minimum, surrounding an inner shield of Al 0.7 to 1.0mm. 20

Irradiation Test Sequence 21

Test Step	Description	Requirements
1	Irradiation Test Samples	Quantity 11 devices shall be selected from the lot delivered to IGG.
2	Serialisation	Serialisation - (if the devices are not serialised). Test units shall be serialised 1 to 10 and the control unit shall be 11.
3	Initial Electrical Measurements (at IGG)	Per Table A herein - (Read and Record) - on all 11 parts at IGG. (See Remarks 1 and 2).
4	Initial Electrical Measurements (at ERA)	Per Table A herein - (Read and Record) - on all 11 parts at ERA. (See Remarks 1 and 2).

Irradiation Test Sequence (Cont.)

Test Step	Description	Requirements
5	Set-up Test	Verify Bias Circuit and Voltages (In-situ) for 10 test units. (See Remark 3).
6	Irradiation Exposure	Verify radiation dose rate and position in the chamber to achieve required dose. Verify and witness duration of exposure to achieve required dose. (See Remark 4).
7	Intermediate Electrical Measurement (at ERA)	Bias to be maintained until test is performed. Test per Table A herein - (Read and Record) - on all 11 parts. Test to be performed immediately upon removal from chamber (less than 10 mins interval). Upon completion of test 10 test units shall be replaced in bias circuit and returned to chamber. Maximum interval between two consecutive exposures to be 30 mins. (See Remark 2).
8 to 22	Repeat Set-up/Exposure/Test sequence up to a Final Total Dose of 100kRAD(Si)	Repeat Steps 5, 6, 7 for a total of 6 cycles as per multiple exposure in Box No. 19. (See Remark 5).
23	Annealing	Bias shall be maintained during Annealing for 10 test units. Annealing shall be at room temperature for 24 hours. (See Remark 3).
24	Post Annealing Electrical Measurements (at IGG)	Per Table A herein - (Read and Record) - on all 11 parts at IGG. (See Remark 2).
25	Accelerated Aging under Bias	Bias shall be maintained during Aging for 10 test units. Aging shall be at T_{amb} = +100±5°C for 168 hours. (See Remark 3).
26	Final Electrical Measurements (at IGG)	Per Table A herein - (Read and Record) - on all 11 parts at IGG (See Remark 2).
27	Total Dose Irradiation Test Report	ESA/SCC No. 22900.

Remarks

1. The initial electrical measurements performed at IGG (Test Step 3) shall be performed within 24 hours of the initial electrical measurements at ERA (Test Step 4).
2. All electrical testing shall be performed on the same set of equipment in order to achieve correlation of results both at IGG and ERA.
3. The control unit shall not be biased during testing.
4. The dose rates and exposure times given above, may be adjusted during irradiation testing to achieve convenient test points but shall not exceed the limits specified in Box No. 19. The dose rates and exposure times used during the testing shall be recorded for each test step.
5. The set up/exposure/test sequence shall be stopped for any device that exhibits repeated functional failure.

TABLE A - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - T_{amb} = +25 ±5°C BEFORE, AT INTERMEDIATE POINTS AND ON COMPLETION OF IRRADIATION

No.	Characteristics	Symbol	MIL-STD-883 Test Method	Test Fig.	Meas'ed Value	Test Conditions	Limits Min.	Limits Max.	Unit
1	Input Offset Voltage	V_{IO1}	4001	4(a)	E_1	V_{CC} = ±15V V_{IC} = 0 R_S = 50Ω	-	2	mV
2		V_{IO2}			E_2	V_{CC} = ±2.5V V_{IC} = 0 R_S = 50Ω	-	2	
3		V_{IO3}			E_3	V_{CC} = ±15V V_{IC} = 0 R_S = 50Ω V_{BAL} = V_{BAL}/STB = $+V_{CC}$	-	2	
4	Input Offset Current	I_{IO1}	4001	4(b)	E_4	V_{CC} = ±15V V_{IC} = 0 R_S = 100KΩ	-	10	nA
5		I_{IO2}			E_5	V_{CC} = ±15V V_{IC} = -14.5V R_S = 100KΩ	-	10	
6		I_{IO3}			E_6	V_{CC} = ±15V V_{IC} = 0 R_S = 100KΩ V_{BAL} = V_{BAL}/STB = $+V_{CC}$	-	10	
7	Input Bias Current	I_{IB1}	4001	4(c)	E_7	V_{CC} = ±15V V_{IN} = Open R_1 = 0 R_2 = 100KΩ	-	100	nA
					E_8	V_{CC} = ±15V V_{IN} = Open R_1 = 100KΩ R_2 = 0			
8		I_{IB2}			E_9	V_{CC} = ±15V V_{IN} = -14.5 R_1 = 0 R_2 = 100KΩ			
					E_{10}	$+V_{CC}$ = 29.5V $-V_{CC}$ = -0.5V V_{IN} = -14.5V R_1 = 100KΩ R_2 = 0			
9	Collector Output Voltage (Strobed)	$V_{O(STB)}$	4001	4(d)	E_{11}	V_{CC} = ±15V V_{IN1} = 15V V_{IN2} = 0V I_{STB} = -3mA	14	-	V

TABLE A - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - T_{amb} = +25 ±5°C BEFORE, AT INTERMEDIATE POINTS AND ON COMPLETION OF IRRADIATION

No.	Characteristics	Symbol	MIL-STD-883 Test Method	Test Fig.	Meas'ed Value	Test Conditions	Limits Min.	Limits Max.	Unit
10	Output Leakage Current	I_O	4001	4(e)	I_O	V_{CC} = ±18V V_{OUT} = 32V V_{ID} = 5mV R_L = 5KΩ	-	10	nA
11	Input Leakage Current	I_I	-	4(f)	E_{12}	V_{CC} = ±18V V_{OUT} = 32V V_{IN1} = 17V V_{IN2} = -12V	-	20	nA
12	Positive Supply Current	I_{CC1}	3005	4(g)	$+I_{CC}$	V_{CC} = ±15V	0.5	4	mA
13	Negative Supply Current	I_{CC2}	3005	4(g)	$-I_{CC}$	V_{CC} = ±15V	-4	-0.5	mA
14	Short Circuit Output Current	I_{OS}	3011	4(h)	E_{13}	V_{CC} = ±15V V_{OUT} = 5V V_{IN1} = 125mV V_{IN2} = 0 Duration: 10ms	0	200	mA
15	Saturation Voltage	V_{OL1}	3007	4(i)	E_{14}	$+V_{CC}$ = 4.5V $-V_{CC}$ = 0 V_{IN1} = 0.506V V_{IN2} = 0.5V I_{OUT} = 8mA	-	0.4	V
16		V_{OL2}				V_{CC} = ±15V V_{IN1} = -14V V_{IN2} = -14.005V I_{OUT} = 50mA	-	1.5	
17	Differential mode voltage gain (Collector output)	A_{VD}	4004	4(j)	E_{16}	V_{CC} = ±15V V_{IN} = -30V R_L = 1KΩ	80	-	V/m V
					E_{17}	V_{CC} = ±15V V_{IN} = 10V R_L = 1KΩ			
18	Differential mode voltage gain (Emitter output)	A_{VD}	4004	4(k)	E_{18}	V_{CC} = ±15V V_{IN} = -10V R_L = 600Ω	10	-	V/m V
					E_{19}	V_{CC} = ±15V V_{IN} = 10V R_L = 600Ω			

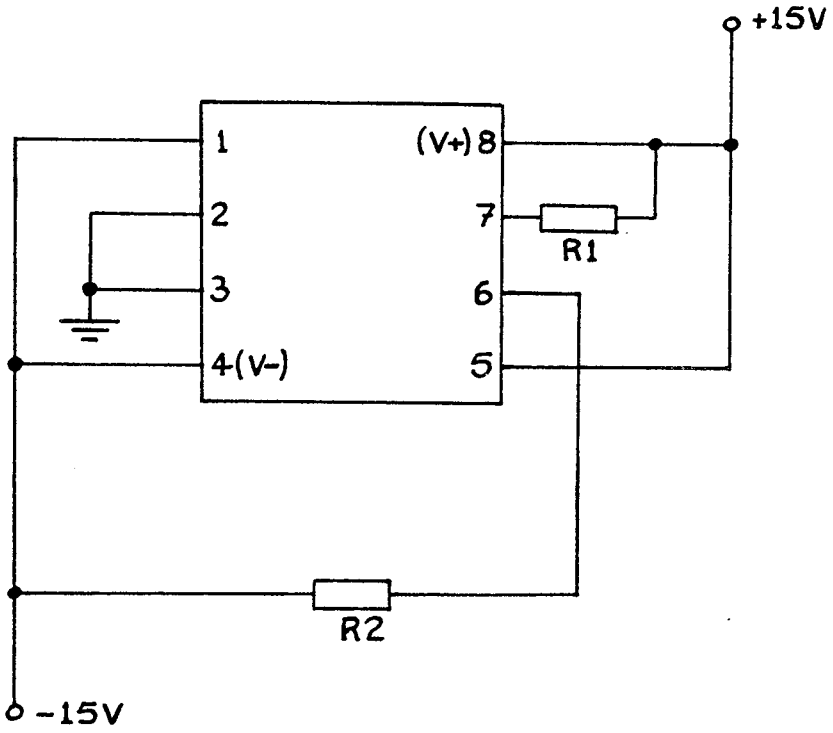
TABLE A - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - T_{amb} = +25 ±5°C BEFORE, AT INTERMEDIATE POINTS AND ON COMPLETION OF IRRADIATION

No.	Characteristics	Symbol	MIL-STD-883 Test Method	Test Fig.	Meas'ed Value	Test Conditions	Limits Min.	Limits Max.	Unit
19	Common mode Rejection Ratio	CMRR	4003	4(l)	E_{20}	$+V_{CC}$ = 29.5V $-V_{CC}$ = -0.5V V_{IN} = -14.5V	80	-	dB
					E_{21}	$+V_{CC}$ = 2V $-V_{CC}$ = -28V V_{IN} = 13V			
20	Response time (low to high) (Collector output)	t_r	2. -	4(m)	-	V_{CC} = ±15V $-V_{OD}$ = -5mV ΔV_{IN} = 100mV	-	300	ns
21	Response time (high to low) (Collector output)	t_f	2. -	4(m)	-	V_{CC} = ±15V V_{OD} = 5mV ΔV_{IN} = 100mV	-	300	ns

NOTES:-

1. All test figures and measured values per Table 2 of ESA/SCC 9103/002 shall apply.

FIGURE 1 - ELECTRICAL CIRCUIT FOR IRRADIATION TESTING



R1 = 10KΩ ¼ watt
R2 = 1MΩ ¼ watt