RIR's IN:- 78453

RIR OUT:-

PARTS HISTORY LOG

Radiation Testing

PROGRAMME:- XMM

PART TYPE:- LM111

RADIATION REPORT:- RD 256

IGG TASK NUMBER:- 1500

SUMMARY OF TEST RESULTS

3 samples failed I_{IB2} after 2.5KRad(Si), one of which also failed V_{OL1}. 9 samples failed a combination of I_{IB1}, I_{IB2}, and V_{OL1} after 5KRads(Si) with the remaining sample failing I_{IB2} after 7.5KRad(Si). 2 samples failed I_{IO3} after 7.5KRad(Si) and an additional 2 failures of this parameter occurred after 10KRad(Si) (See the failure list for full details).

Radiation Report Number:- RD 256

Project:- XMM

Part Type:- LM111 Date Code:- 9648

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

Project Approval of Lot Traveller:-

Signed...[signature]..... Date.20/1/98...

Position..Component Engineer

Serial Number Range:-

01 through 13 (not 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

Test Amendment - Stock request No. 19989

Closed/Approved NCR No:- N N/A

Approved Waiver No:- WAR N/A

Signed....[signature]..... Date.19/12/97

Upscreening Engineer

Signed....[signature].... Date.19/12/97

Upscreening Manager

RADIATION REPORT NUMBER:- RD 256 DATE:- 18.12.97

PROJECT:- XMM RIR IN:- 78453
RIR OUT:-

PART NUMBER:- LM111 MANUFACTURER:- NSC/U

PROCUREMENT LEVEL:- Die Procurement DATE CODE:- 9648

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

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

TEST AMENDMENT:- Stock request No. 19989
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	8/12/97	11	8/12/97	10 + CONTROL SAMPLE	IGG 16 CT
2	Initial Electrical Measurements (100% read and record)	Table A Testing at IGG	8/12/97	10	8/12/97	10	IGG 16 CT
3	Initial Electrical Measurements (100% read and record)	Table A Testing at ERA	9/12/97	10	9/12/97	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	9/12/97	10	9/12/97	10	IGG 16 CT
5	Irradiation 1 (10 samples)	Dose= 1kRAD(Si) Rate= 10RAD(Si) per second Time= 100secs	9/12/97	10	9/12/97	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	9/12/97	10	9/12/97	10	IGG 16 CT

Report No: RD 256	Part Type: LM111	Date: 18.12.97

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)	Dose=1.5kRAD(Si) Rate= 10RAD(Si) per second Time= 150secs	9/12/97	10	9/12/97	10	IGG 16 CT
8	Interim 2 Electrical Measurements (100% read and record)	As Test 6	9/12/97	10	9/12/97	7	IGG 16 CT
9	Irradiation 3 (10 samples)	Dose=2.5kRAD(Si) Rate= 10RAD(Si) per second Time= 250secs	9/12/97	10	9/12/97	10	IGG 16 CT
10	Interim 3 Electrical Measurements (100% read and record)	As Test 6	9/12/97	10	9/12/97	1	IGG 16 CT
11	Irradiation 4 (10 samples)	As Test 9	9/12/97	10	9/12/97	10	IGG 16 CT
12	Interim 4 Electrical Measurements (100% read and record)	As Test 6	9/12/97	10	9/12/97	0	IGG 16 CT
13	Irradiation 5 (10 samples)	As Test 9	9/12/97	10	9/12/97	10	IGG 16 CT
14	Final Electrical Measurements (100% read and record)	As Test 6 At ERA	9/12/97	10	9/12/97	0	IGG 16 CT
15	Annealing Test (10 samples)	Bias for 24hrs min at +25°C (record exact time)	9/12/97	10	10/12/97	10	IGG 16 CT

Report No: RD 256	Part Type: LM111	Date: 18.12.97

No.	Test (Sample Size)	XM-PL-IGG-0026 Test Method and Conditions	Date in	Qty in	Date out	Qty out	SIGNED Op/QA
16	Post Annealing Electrical Measurements (100% read and record)	Table A	10/12/97	10	10/12/97	0	IGG 18 CT
17	Accelerated Aging under bias (4 samples)	168 hours bias at +100±5°C	10/12/97	10	17/12/97	10	IGG 18 CT
18	Post Aging Electrical Measurements (100% read and record)	Table A	17/12/97	10	17/12/97	0	IGG 18 CT
19	Test Report Collation	[redacted]	[redacted]	[redacted]	19/12/97	[redacted]	IGG 2 CT
20	Test Report Approval	[redacted]	[redacted]	[redacted]	19/12/97	[redacted]	IGG 2 CT
21	NOTES:-						

Report No: RD 256 Part Type: LM111 Date: 18.12.97

FAILURE LIST AND APPLICABLE NCR

Test No.	Serial Number(s)	Failed Parameter and Failure Mode	Applicable NCR
8	8, 11, 12	FAILED I_{IB2}. S/No 8 ALSO FAILED V_{OL1}	
10	4, 9 5 6, 10 8 11, 12 13	FAILED I_{IB2} FAILED I_{IB1} AND I_{IB2} FAILED I_{IB2} AND V_{OL1} FAILED I_{IB1} FAILED I_{IB1} AND V_{OL1} FAILED I_{IB1}, I_{IB2} AND V_{OL1}.	
12	4, 5, 6, 8, 9, 10, 11, 12, 13 7	FAILED I_{IB1}, I_{IB2} AND V_{OL1}. S/Nos 5 AND 11 ALSO FAILED I-103. FAILED I_{IB2}.	
14	4, 8 7	FAILED I_{103}. FAILED I_{IB1}.	

Report No: RD 256 Part Type: LM111 Date: 18.12.97

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: 2GP0246	CT296	PSU	30 / 3 /1998
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199
Item: Type No: Serial No:			/ /199

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_INIT_EMS_@_IGG / V1.0 JKJ/IR 01AUG97

Results file : RD256_LM111_INIT_EMS_@_IGG from: 09.12.97 / 12:00:56
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D/C 9648
Vendor : NSC/U
: CONTROL 01 ; RAD 04-13
: 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	4	5	6	7	8
1.1 [mV]	0.380	0.736	0.589	0.234	1.020	0.666
2.1 [mV]	0.566	0.381	0.769	0.446	1.178	0.873
3.1 [mV]	0.102	1.140	0.630	-0.404	1.123	0.592
4.1 [mA]	3.142	3.162	3.213	3.021	2.997	3.222
5.1 [mA]	3.143	3.193	3.255	3.021	2.998	3.223
6.1 [nA]	37.45	38.91	41.62	37.34	36.75	40.01
7.1 [nA]	37.06	38.79	41.77	35.98	36.96	39.73
8.1 [nA]	48.59	50.15	53.62	48.57	47.39	51.89
9.1 [nA]	47.61	49.38	53.40	46.17	47.00	50.94
10.1 [nA]	0.701	0.439	0.192	1.722	0.254	0.552
11.1 [nA]	1.222	1.917	1.272	5.136	1.224	1.945
12.1 [dB]	108.51	109.34	109.31	110.33	111.68	108.07
13.1 [V]	-14.367	-14.389	-14.395	-14.380	-14.403	-14.375
14.1 [V]	0.395	0.372	0.364	0.374	0.364	0.378
15.1 [dB]	107.54	125.17	122.04	116.31	111.25	124.22
16.1 [dB]	103.72	117.01	108.81	107.17	107.02	110.05
17.1 [mA]	-1.19	-1.18	-1.19	-1.18	-1.19	-1.18

	9	10	11	12	13
1.1 [mV]	0.347	0.358	0.225	0.643	1.071
2.1 [mV]	0.540	0.581	0.433	0.796	1.187
3.1 [mV]	0.330	0.254	0.100	1.767	1.700
4.1 [mA]	2.943	3.161	3.194	3.243	3.209
5.1 [mA]	2.944	3.162	3.195	3.244	3.210
6.1 [nA]	36.56	36.99	38.79	39.10	39.01
7.1 [nA]	36.39	36.68	37.49	39.21	38.81
8.1 [nA]	47.02	47.76	50.42	50.75	50.31
9.1 [nA]	46.09	46.82	48.20	50.39	49.58
10.1 [nA]	0.603	0.664	1.567	0.193	0.517
11.1 [nA]	1.948	3.313	5.679	4.411	1.515
12.1 [dB]	111.76	109.32	108.45	108.47	108.99
13.1 [V]	-14.411	-14.394	-14.384	-14.409	-14.389
14.1 [V]	0.358	0.385	0.377	0.369	0.379
15.1 [dB]	114.27	113.83	111.44	106.65	107.98
16.1 [dB]	109.75	105.54	106.29	104.92	107.12
17.1 [mA]	-1.18	-1.19	-1.18	-1.18	-1.18

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_INIT_EMS_@_ERA V1.0 JKJ/IR 01AUG97

Results file : RD256_LM111_INIT_EMS_@_ERA from: 09.12.97 / 10:02:46
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D/C 9841
Vendor : NSC/U
: CONTROL 01 ; 04-13
: 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	4	5	6	7	8
1.1 [mV]	0.399	0.757	0.632	0.237	1.037	0.675
2.1 [mV]	0.577	0.881	0.768	0.423	1.181	0.772
3.1 [mV]	0.114	1.183	0.667	-0.410	1.179	0.614
4.1 [mA]	3.222	3.271	3.336	3.093	3.078	3.310
5.1 [mA]	3.227	3.282	3.335	3.093	3.078	3.310
6.1 [nA]	38.65	39.77	42.71	38.22	37.58	41.10
7.1 [nA]	38.25	40.17	38.09	36.93	38.06	40.88
8.1 [nA]	50.13	52.76	55.02	49.72	48.71	53.34
9.1 [nA]	49.00	51.28	54.80	47.26	48.19	52.27
10.1 [nA]	0.765	0.116	4.902	1.747	0.174	0.559
11.1 [nA]	1.414	1.795	3.534	5.253	1.229	2.105
12.1 [dB]	108.81	109.42	109.36	110.53	112.05	108.29
13.1 [V]	-14.371	-14.393	-14.400	-14.387	-14.408	-14.379
14.1 [V]	0.390	0.367	0.363	0.367	0.354	0.374
15.1 [dB]	108.02	129.51	124.04	117.08	112.18	125.87
16.1 [dB]	103.81	116.64	108.77	106.69	107.33	111.47
17.1 [mA]	-1.18	-1.19	-1.18	-1.19	-1.19	-1.20

	9	10	11	12	13
1.1 [mV]	0.388	0.364	0.240	0.666	1.088
2.1 [mV]	0.542	0.568	0.426	0.798	1.185
3.1 [mV]	0.374	0.246	0.131	1.822	1.765
4.1 [mA]	3.018	3.253	3.284	3.341	3.303
5.1 [mA]	3.018	3.253	3.285	3.338	3.300
6.1 [nA]	37.88	38.17	39.90	35.94	40.15
7.1 [nA]	37.54	37.93	38.69	40.46	39.99
8.1 [nA]	48.97	49.30	51.93	52.30	51.77
9.1 [nA]	47.39	48.25	49.59	51.82	50.97
10.1 [nA]	0.823	0.894	1.588	0.242	0.589
11.1 [nA]	2.310	3.573	5.906	4.944	1.780
12.1 [dB]	111.88	109.65	108.72	108.77	109.20
13.1 [V]	-14.416	-14.399	-14.391	-14.416	-14.396
14.1 [V]	0.354	0.372	0.367	0.365	0.377
15.1 [dB]	114.98	113.97	112.09	107.30	108.88
16.1 [dB]	108.19	105.23	106.19	105.19	107.39
17.1 [mA]	-1.19	-1.19	-1.19	-1.19	-1.20

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_EMS_@_1_KRAD / V1.0 JKJ/IR 01AUG97

Results file : RD256_LM111_EMS_@_1_KRAD from: 09.12.97 / 10:12:47
Operator : PAUL RUSSELL
Lot number : RD256
Order number : D/C 9648
Vendor :
:
: EMS @ 1 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	4	5	6	7	8
1.1 [mV]	0.398	0.783	0.637	0.276	1.052	0.715
2.1 [mV]	0.579	0.938	0.809	0.496	1.208	0.923
3.1 [mV]	0.103	1.203	0.682	-0.360	1.172	0.644
4.1 [mA]	3.214	2.595	1.873	2.390	2.429	2.566
5.1 [mA]	3.215	3.242	3.310	2.951	3.042	2.602
6.1 [nA]	38.32	49.07	53.17	48.87	43.35	55.99
7.1 [nA]	37.80	48.52	37.12	48.20	43.61	55.84
8.1 [nA]	49.92	62.34	68.68	63.31	55.85	72.43
9.1 [nA]	48.74	61.30	67.21	61.83	52.2	70.32
10.1 [nA]	0.856	0.084	15.499F	1.021	0.233	0.501
11.1 [nA]	1.495	0.957	11.796F	2.678	1.572	1.098
12.1 [dB]	108.76	109.07	109.08	109.99	111.61	107.89
13.1 [V]	-14.368	-14.390	-14.398	-14.381	-14.406	-14.375
14.1 [V]	0.391	0.378	0.371	0.385	0.364	0.385
15.1 [dB]	107.95	126.66	121.21	116.52	111.69	122.67
16.1 [dB]	103.70	115.30	108.04	106.23	106.91	108.62
17.1 [mA]	-1.18	-1.19	-1.18	-1.19	-1.18	-1.19

	9	10	11	12	13	5
1.1 [mV]	0.386	0.409	0.288	0.701	1.127	0.622
2.1 [mV]	0.577	0.627	0.495	0.851	1.234	0.800
3.1 [mV]	0.377	0.300	0.171	1.837	1.778	0.672
4.1 [mA]	2.352	2.510	2.578	2.614	2.577	2.461
5.1 [mA]	2.751	2.835	2.585	2.899	2.591	2.518
6.1 [nA]	49.83	49.82	55.60	54.92	53.04	54.52
7.1 [nA]	49.22	50.04	54.91	55.46	53.00	53.72
8.1 [nA]	64.56	64.16	71.34	70.57	68.24	70.12
9.1 [nA]	62.24	63.54	70.00	70.64	67.21	70.17
10.1 [nA]	0.829	0.194	0.924	0.217	0.443	1.024
11.1 [nA]	0.874	1.817	3.069	3.870	1.009	1.934
12.1 [dB]	111.31	109.23	108.28	108.16	108.66	109.20
13.1 [V]	-14.412	-14.394	-14.385	-14.410	-14.390	-14.395
14.1 [V]	0.366	0.390	0.380	0.377	0.388	0.373
15.1 [dB]	114.10	114.49	111.28	106.88	108.46	121.61
16.1 [dB]	109.84	104.88	105.17	104.60	106.66	108.37
17.1 [mA]	-1.18	-1.20	-1.18	-1.18	-1.19	-1.18

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_EMS_@_2.5_KRAD / V1.0 JKJ/IR 01AUG97

Results file : RD256_LM111_EMS_@_2.5_KRAD from: 09.12.97 / 10:28:40
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D/C 9648
Vendor :
:
: EMS @ 2.5 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	4	5	6	7	3
1.1 [mV]	0.398	0.338	0.698	0.345	1.085	0.739
2.1 [mV]	0.579	1.006	0.891	0.580	1.246	0.970
3.1 [mV]	0.104	1.242	0.723	-0.306	1.197	0.695
4.1 [mA]	3.214	2.594	1.946	2.392	2.390	2.563
5.1 [mA]	3.215	2.596	1.951	2.389	2.408	2.562
6.1 [nA]	38.26	63.24	73.28	68.61	53.35	80.75
7.1 [nA]	37.67	64.98	65.28	68.96	54.25	80.79
8.1 [nA]	49.82	82.55	94.30	88.65	68.92	104.42 F
9.1 [nA]	48.72	81.19	92.50	86.14	68.52	98.49
10.1 [nA]	0.949	1.142	7.821	0.063	0.336	0.313
11.1 [nA]	1.572	1.950	1.570	1.536	3.585	0.615
12.1 [dB]	108.73	108.85	108.65	109.51	111.35	107.38
13.1 [V]	-14.367	-14.386	-14.390	-14.379	-14.402	-14.369
14.1 [V]	0.395	0.388	0.386	0.398	0.370	0.399
15.1 [dB]	107.88	123.56	118.96	115.46	111.56	121.58
16.1 [dB]	103.69	113.36	106.76	105.30	106.56	107.78
17.1 [mA]	-1.19	-1.19	-1.18	-1.18	-1.19	-1.18

	9	10	11	12	13	8
1.1 [mV]	0.463	0.432	0.325	0.750	1.193	0.731
2.1 [mV]	0.647	0.670	0.561	0.920	1.310	0.955
3.1 [mV]	0.417	0.321	0.188	1.846	1.803	0.646
4.1 [mA]	2.377	2.482	2.537	2.608	2.593	2.595
5.1 [mA]	2.369	2.477	2.537	2.608	2.584	2.593
6.1 [nA]	72.64	69.20	81.83	80.25	75.58	82.52
7.1 [nA]	69.59	69.86	81.75	81.86	75.72	82.27
8.1 [nA]	95.89	89.00	105.87 F	103.55 F	97.14	105.65 F
9.1 [nA]	86.12	87.04	99.96	100.09 F	93.08	98.93
10.1 [nA]	2.799	0.361	0.327	1.352	0.191	0.635
11.1 [nA]	1.092	0.113	0.176	1.685	0.504	0.755
12.1 [dB]	110.18	108.91	107.55	107.54	108.20	107.29
13.1 [V]	-14.408	-14.391	-14.378	-14.407	-14.387	-14.372
14.1 [V]	0.375	0.396	0.401F	0.388	0.397	0.402F
15.1 [dB]	114.22	113.95	110.67	106.43	107.88	121.69
16.1 [dB]	108.53	104.75	104.55	103.70	105.75	107.88
17.1 [mA]	-1.19	-1.19	-1.20	-1.18	-1.19	-1.19

	11	12
1.1 [mV]	0.321	0.744
2.1 [mV]	0.551	0.911
3.1 [mV]	0.188	1.844
4.1 [mA]	2.556	2.600
5.1 [mA]	2.556	2.599
6.1 [nA]	82.66	80.41
7.1 [nA]	82.45	81.77
8.1 [nA]	106.90 F	103.83 F
9.1 [nA]	100.58 F	99.98
10.1 [nA]	0.462	1.044
11.1 [nA]	0.536	2.767
12.1 [dB]	107.70	107.66
13.1 [V]	-14.381	-14.406
14.1 [V]	0.394	0.391
15.1 [dB]	110.68	106.51
16.1 [dB]	105.23	103.90

	1	4	5	6	7	8
1.1 [mV]	0.398	0.838	0.588	0.345	1.085	0.725
2.1 [mV]	0.579	1.006	0.381	0.580	1.248	2.972
3.1 [mV]	0.104	1.242	0.723	-0.306	1.187	0.595
4.1 [mA]	3.214	2.594	1.946	2.382	2.390	2.582
5.1 [mA]	3.215	2.596	1.951	2.389	2.408	2.582
6.1 [nA]	38.26	63.24	73.29	68.91	53.35	90.75
7.1 [nA]	37.67	64.98	65.28	68.96	54.25	80.73
8.1 [nA]	49.82	82.55	94.30	88.65	68.92	104.42 F
9.1 [nA]	48.72	81.19	92.50	86.14	66.52	98.43
10.1 [nA]	0.949	1.142	7.821	0.063	0.335	0.310
11.1 [nA]	1.572	1.950	1.570	1.636	3.585	0.616
12.1 [dB]	108.73	108.85	108.65	109.51	111.35	107.38
13.1 [V]	-14.367	-14.386	-14.390	-14.379	-14.402	-14.369
14.1 [V]	0.395	0.386	0.386	0.398	0.370	0.399
15.1 [dB]	107.88	123.56	118.96	115.46	111.56	121.53
16.1 [dB]	103.69	113.36	106.76	105.30	106.56	107.78
17.1 [mA]	-1.19	-1.19	-1.18	-1.18	-1.19	-1.18

	9	10	11	12	13	5
1.1 [mV]	0.463	0.432	0.325	0.750	1.183	0.72
2.1 [mV]	0.647	0.670	0.561	0.920	1.310	0.955
3.1 [mV]	0.417	0.321	0.188	1.846	1.803	0.548
4.1 [mA]	2.377	2.482	2.537	2.608	2.593	2.588
5.1 [mA]	2.369	2.477	2.537	2.608	2.584	2.587
6.1 [nA]	72.64	69.20	81.83	80.25	75.68	92.52
7.1 [nA]	69.59	69.86	81.75	81.86	75.72	82.27
8.1 [nA]	95.89	89.00	105.87 F	103.55 F	97.14	108.88 F
9.1 [nA]	86.12	87.04	99.98	100.09 F	92.09	98.93
10.1 [nA]	2.799	0.361	0.327	1.352	0.191	0.609
11.1 [nA]	1.092	0.113	0.176	1.685	0.504	0.788
12.1 [dB]	110.18	108.91	107.55	107.64	108.20	107.29
13.1 [V]	-14.408	-14.391	-14.378	-14.407	-14.387	-14.372
14.1 [V]	0.375	0.396	0.401F	0.388	0.397	0.402F
15.1 [dB]	114.22	113.95	110.67	106.43	107.88	121.59
16.1 [dB]	108.53	104.75	104.65	103.70	105.75	107.88
17.1 [mA]	-1.19	-1.19	-1.20	-1.18	-1.19	-1.18

	11	12
1.1 [mV]	0.321	0.744
2.1 [mV]	0.551	0.911
3.1 [mV]	0.188	1.844
4.1 [mA]	2.556	2.600
5.1 [mA]	2.556	2.599
6.1 [nA]	82.66	80.41
7.1 [nA]	82.45	81.77
8.1 [nA]	106.90 F	103.83 F
9.1 [nA]	100.58 F	99.98
10.1 [nA]	0.462	1.044
11.1 [nA]	0.536	2.767
12.1 [dB]	107.70	107.66
13.1 [V]	-14.381	-14.406
14.1 [V]	0.394	0.391
15.1 [dB]	110.68	106.51
16.1 [dB]	105.23	103.90

17.1 [mA]		-1.19		-1.19

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_EMS_@_5_KRAD / V1.0 JKJ/IR 01AUG97

Results file : RD256_LM111_EMS_@_5_KRAD from: 09.10.97 / 10:42:19
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D/C 9648
Vendor :
:
: EMS @ 5 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	4	5	6	7	8
1.1 [mV]	0.364	0.906	0.773	0.443	1.121	0.858
2.1 [mV]	0.576	1.098	0.966	0.706	1.299	1.118
3.1 [mV]	0.103	1.272	0.761	-0.224	1.200	0.733
4.1 [mA]	3.209	2.551	2.113	2.383	2.367	2.580
5.1 [mA]	3.209	2.559	2.147	2.378	2.363	2.577
6.1 [nA]	38.19	86.78	101.88 F	95.22	69.15	116.90 F
7.1 [nA]	37.64	89.00	98.46	95.62	70.03	118.08 F
8.1 [nA]	49.70	111.91 F	130.86 F	122.85 F	88.95	151.22 F
9.1 [nA]	48.92	105.56 F	119.21 F	112.16 F	86.74	127.94 F
10.1 [nA]	0.937	1.806	3.383	0.025	0.273	0.855
11.1 [nA]	1.567	5.471	6.290	3.469	4.991	6.043
12.1 [dB]	108.68	108.28	107.99	108.78	111.18	108.75
13.1 [V]	-14.370	-14.382	-14.385	-14.370	-14.398	-14.363
14.1 [V]	0.393	0.396	0.399	0.424F	0.380	0.425F
15.1 [dB]	107.96	120.62	116.75	114.51	110.86	118.04
16.1 [dB]	103.56	111.02	107.61	104.51	105.94	106.10
17.1 [mA]	-1.19	-1.18	-1.18	-1.18	-1.20	-1.19

	9	10	11	12	13
1.1 [mV]	0.509	0.533	0.454	0.880	1.279
2.1 [mV]	0.743	0.789	0.754	1.077	1.443
3.1 [mV]	0.449	0.398	0.265	1.907	1.843
4.1 [mA]	2.332	2.487	2.434	2.607	2.585
5.1 [mA]	2.325	2.474	2.434	2.605	2.558
6.1 [nA]	95.29	98.07	117.06 F	113.57 F	104.93 F
7.1 [nA]	94.89	99.28	118.22 F	116.66 F	105.41 F
8.1 [nA]	122.56 F	125.84 F	151.46 F	148.84 F	134.69 F
9.1 [nA]	110.85 F	115.39 F	130.01 F	128.50 F	119.27 F
10.1 [nA]	0.523	0.900	0.963	2.803	0.260
11.1 [nA]	3.810	3.344	6.177	2.338	2.989
12.1 [dB]	110.27	108.14	106.57	106.85	107.76
13.1 [V]	-14.400	-14.387	-14.368	-14.400	-14.379
14.1 [V]	0.396	0.434F	0.447F	0.409F	0.422F
15.1 [dB]	112.61	113.23	109.49	106.12	107.12
16.1 [dB]	105.69	104.31	103.34	102.85	104.29
17.1 [mA]	-1.19	-1.19	-1.19	-1.19	-1.19

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_EMS_@_7.5_KRAD / V1.0 JR3/IR 01AUG97

Results file : RD256_LM111_EMS_@_7.5_KRAD from: 09.12.97 / 10:52:20
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D/C 9648
Vendor :
:
: EMS @ 7.5 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

	4	5	6	7	8
1.1 [mV]	0.382	0.363	0.571	1.173	0.870
2.1 [mV]	1.185	1.117	0.862	1.362	1.259
3.1 [mV]	1.329	0.331	-0.135	229	0.815
4.1 [mA]	2.571	2.557	2.388	2.377	2.586
5.1 [mA]	2.568	2.548	2.382	2.369	2.583
6.1 [nA]	110.13 F	129.27 F	120.19 F	85.24	150.88 F
7.1 [nA]	112.70 F	130.94 F	121.84 F	86.03	152.51 F
8.1 [nA]	142.39 F	166.96 F	155.22 F	109.56 F	195.95 F
9.1 [nA]	124.07 F	136.69 F	130.14 F	103.01 F	141.32 F
10.1 [nA]	2.214	1.458	0.504	0.204	1.339
11.1 [nA]	7.695	14.924F	6.285	5.265	8.979
12.1 [dB]	107.84	107.39	108.36	110.77	106.09
13.1 [V]	-14.377	-14.380	-14.368	-14.398	-14.356
14.1 [V]	0.413F	0.419F	0.450F	0.384	0.455F
15.1 [dB]	118.15	115.45	112.81	110.25	115.56
16.1 [dB]	108.97	105.74	102.68	104.93	104.73
17.1 [mA]	-1.19	-1.19	-1.19	-1.20	-1.19

	9	10	11	12	13
1.1 [mV]	0.604	0.680	0.626	1.005	1.382
2.1 [mV]	0.862	0.971	0.926	1.240	1.577
3.1 [mV]	0.521	0.530	0.410	1.987	1.904
4.1 [mA]	2.332	2.479	2.558	2.602	2.561
5.1 [mA]	2.321	2.464	2.555	2.601	2.552
6.1 [nA]	118.95 F	125.18 F	150.84 F	142.71 F	132.40 F
7.1 [nA]	119.10 F	126.74 F	153.57 F	147.21 F	133.52 F
8.1 [nA]	152.41 F	161.06 F	195.77 F	184.89 F	170.58 F
9.1 [nA]	128.35 F	133.85 F	143.80 F	142.38 F	135.44 F
10.1 [nA]	0.304	1.223	2.461	4.145	0.802
11.1 [nA]	5.592	4.293	13.089F	6.209	6.111
12.1 [dB]	109.59	107.57	106.17	106.13	107.03
13.1 [V]	-14.397	-14.383	-14.366	-14.395	-14.375
14.1 [V]	0.428F	0.471F	0.468F	0.443F	0.445F
15.1 [dB]	111.37	111.68	108.45	105.47	106.62
16.1 [dB]	103.39	102.36	101.50	101.52	103.21
17.1 [mA]	-1.19	-1.18	-1.19	-1.17	-1.20

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_EMS_@_10_KRAD / V1.0 IKJ/IR 01AUG87

Results file : RD256_LM111_EMS_@_10_KRAD from: 09.12.87 / 11:05:39
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D.C 8648
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		88.00	... (	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	4	5	6	7	8
1.1 [mV]	0.400	1.059	0.963	0.682	1.233	1.087
2.1 [mV]	0.579	1.298	1.238	1.015	1.436	1.426
3.1 [mV]	0.057	1.385	0.673	-0.025	1.241	0.774
4.1 [mA]	3.217	2.581	2.595	2.391	2.381	2.586
5.1 [mA]	3.217	2.579	2.587	2.381	2.372	2.583
6.1 [nA]	38.25	132.80 F	157.15 F	145.65 F	101.09 F	186.70 F
7.1 [nA]	37.77	137.06 F	161.05 F	146.40 F	102.18 F	187.82 F
8.1 [nA]	49.83	173.69 F	203.59 F	188.54 F	129.75 F	243.49 F
9.1 [nA]	48.75	136.46 F	145.03 F	140.98 F	116.82 F	144.16 F
10.1 [nA]	0.858	3.576	3.626	0.499	0.593	0.959
11.1 [nA]	1.290	10.446F	19.943F	7.969	8.153	18.034F
12.1 [dB]	108.68	107.41	106.96	107.66	110.31	105.50
13.1 [V]	-14.365	-14.372	-14.376	-14.363	-14.394	-14.347
14.1 [V]	0.390	0.425F	0.453F	0.547F	0.398	0.519F
15.1 [dB]	107.88	116.08	113.37	111.09	109.81	113.66
16.1 [dB]	103.24	107.21	102.56	101.29	106.08	103.29
17.1 [mA]	-1.18	-1.18	-1.18	-1.19	-1.19	-1.18

	9	10	11	12	13
1.1 [mV]	0.694	0.830	0.758	1.098	1.490
2.1 [mV]	0.979	1.155	1.097	1.365	1.718
3.1 [mV]	0.589	0.673	0.536	2.061F	2.002F
4.1 [mA]	2.334	2.452	2.559	2.596	2.561
5.1 [mA]	2.319	2.438	2.557	2.593	2.547
6.1 [nA]	145.46 F	153.46 F	183.76 F	174.05 F	162.32 F
7.1 [nA]	143.96 F	154.48 F	186.74 F	178.88 F	163.59 F
8.1 [nA]	187.54 F	197.98 F	239.18 F	225.97 F	209.70 F
9.1 [nA]	140.02 F	144.22 F	146.79 F	147.63 F	143.01 F
10.1 [nA]	1.585	0.751	2.744	4.461	0.857
11.1 [nA]	4.034	3.769	15.250F	5.799	7.111
12.1 [dB]	108.94	107.18	105.52	105.54	106.45
13.1 [V]	-14.394	-14.378	-14.382	-14.389	-14.371
14.1 [V]	0.481F	0.597F	0.659F	0.499F	0.491F
15.1 [dB]	109.88	110.08	107.38	104.88	105.97
16.1 [dB]	102.79	101.32	100.60	100.69	101.91
17.1 [mA]	-1.18	-1.18	-1.19	-1.19	-1.18

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SZ-TESTSYSTEME  Statistics 03   Vers. 2.15  for TA09
RD256_LM111_POST_ANNEAL_EMS        V1.0 JKJ/IR 01AUG97
================================================================================
Results file    : RD256_LM111_POST_ANNEAL_EMS   from: 10.12.97 / 13:28:58
Operator        : PAUL RUSSELL
Part number     : LM111
Lot number      : RD256
Order number    : D/C 9648
Vendor          : NSC/U
                : CONTROL 01 ; RAD 04-13
                : POST 24HRS 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
--------------------------------------------------------------------------------
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	4	5	6	7	8
1.1 [mV]	0.384	0.953	0.833	0.540	1.126	0.987
2.1 [mV]	0.530	1.186	1.114	0.863	1.341	1.293
3.1 [mV]	0.104	1.287	0.812	-0.087	1.171	0.819
4.1 [mA]	3.102	2.487	2.502	2.303	2.281	2.491
5.1 [mA]	3.103	2.486	2.500	2.300	2.278	2.490
6.1 [nA]	36.88	121.60 F	143.28 F	131.48 F	91.03	166.58 F
7.1 [nA]	36.47	123.84 F	146.83 F	132.05 F	91.27	168.27 F
8.1 [nA]	47.88	156.85 F	184.93 F	170.26 F	116.35 F	217.01 F
9.1 [nA]	46.92	131.55 F	143.01 F	136.96 F	108.26 F	145.36 F
10.1 [nA]	0.680	1.960	3.127	0.336	0.183	1.542
11.1 [nA]	1.243	8.171	16.690F	6.676	6.069	11.180F
12.1 [dB]	108.39	107.73	107.31	108.09	110.53	105.89
13.1 [V]	-14.363	-14.375	-14.377	-14.363	-14.394	-14.354
14.1 [V]	0.399	0.420F	0.438F	0.494F	0.400	0.478F
15.1 [dB]	107.69	117.10	114.12	112.26	109.83	114.57
16.1 [dB]	103.53	108.73	105.13	103.20	104.79	104.51
17.1 [mA]	-1.18	-1.19	-1.18	-1.19	-1.18	-1.19

	9	10	11	12	13
1.1 [mV]	0.573	0.683	0.579	0.957	1.373
2.1 [mV]	0.865	1.012	0.918	1.223	1.596
3.1 [mV]	0.502	0.586	0.398	1.950	1.903
4.1 [mA]	2.247	2.390	2.464	2.505	2.460
5.1 [mA]	2.241	2.379	2.463	2.504	2.455
6.1 [nA]	129.45 F	138.99 F	166.35 F	159.70 F	147.00 F
7.1 [nA]	130.31 F	140.41 F	170.65 F	163.89 F	147.00 F
8.1 [nA]	164.97 F	178.69 F	216.58 F	207.39 F	189.95 F
9.1 [nA]	135.47 F	141.23 F	147.80 F	147.91 F	141.63 F
10.1 [nA]	0.604	1.179	4.077	3.945	0.267
11.1 [nA]	5.755	5.268	18.021F	5.078	4.909
12.1 [dB]	109.59	107.48	105.97	106.14	106.99
13.1 [V]	-14.383	-14.380	-14.364	-14.390	-14.374
14.1 [V]	0.455F	0.600F	0.602F	0.481F	0.475F
15.1 [dB]	109.03	111.31	108.30	105.02	105.75
16.1 [dB]	103.35	102.45	101.88	101.60	102.88
17.1 [mA]	-1.20	-1.19	-1.18	-1.18	-1.18

SZ-TESTSYSTEME Statistics 03 Vers. 2.15 for TA09
RD256_LM111_FINAL_EMS V1.0 JKJ/IR 01AUG97

Results file : RD256_LM111_FINAL_EMS from: 17.12.97 10:22:56
Operator : PAUL RUSSELL
Part number : LM111
Lot number : RD256
Order number : D/C 9648
Vendor : NSC/U
: CONTROL 01 ; RAD 04-13
: FINAL EMS
: LM111N XM-PL-I66-0026 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			88.00	... (	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.	Iso			-200.00	...	0.00	mA

	4	5	6	7	8
1.1 [mV]	0.381	0.739	0.463	1.094	0.951
2.1 [mV]	1.089	0.866	0.735	1.278	1.110
3.1 [mV]	1.301	0.791	-0.122	1.216	0.781
4.1 [mA]	2.524	2.548	2.354	2.325	2.542
5.1 [mA]	105.73 F	120.83 F	111.19 F	84.31	130.77 F
6.1 [nA]	104.76 F	122.20 F	108.53 F	81.09	131.84 F
7.1 [nA]	136.77 F	156.09 F	144.47 F	107.87 F	170.91 F
8.1 [nA]	119.28 F	132.06 F	123.05 F	98.52	136.30 F
9.1 [nA]	1.320	1.160	2.956	3.629	0.770
10.1 [nA]	4.000	7.565	6.445	5.832	4.112
11.1 [dB]	108.60	108.53	109.28	111.24	107.17
12.1 [V]	-14.382	-14.389	-14.377	-14.401	-14.366
13.1 [V]	0.417F	0.427F	0.466F	0.394	0.441F
14.1 [dB]	119.02	117.01	113.08	110.20	119.23
15.1 [dB]	111.37	106.27	104.17	105.32	106.98
16.1 [dB]	-1.18	-1.19	-1.19	-1.20	-1.19
17.1 [mA]					

	9	10	11	12	13
1.1 [mV]	0.555	0.544	0.467	0.898	1.261
2.1 [mV]	0.803	0.820	0.740	1.112	1.423
3.1 [mV]	0.567	0.487	0.350	1.999	1.888
4.1 [mA]	2.294	2.447	2.514	2.536	2.514
5.1 [mA]	2.290	2.440	2.514	2.536	2.511
6.1 [nA]	112.67 F	117.94 F	134.42 F	132.76 F	123.81 F
7.1 [nA]	111.80 F	118.44 F	137.60 F	135.00 F	123.33 F
8.1 [nA]	144.39 F	153.15 F	176.23 F	173.38 F	160.64 F
9.1 [nA]	124.63 F	130.39 F	140.53 F	139.94 F	131.84 F
10.1 [nA]	1.279	0.189	2.992	1.971	0.849
11.1 [nA]	2.621	1.424	9.173	2.783	1.247
12.1 [dB]	110.77	108.54	107.43	107.40	108.12
13.1 [V]	-14.406	-14.390	-14.378	-14.402	-14.385
14.1 [V]	0.448F	0.501F	0.453F	0.447F	0.445F
15.1 [dB]	112.25	112.80	109.58	105.59	106.86
16.1 [dB]	106.60	104.88	103.88	102.81	104.93
17.1 [mA]	-1.19	-1.19	-1.19	-1.19	-1.19

IGG Component Technology Ltd

INTERNAL STOCK REQUEST NOTE

** TO : TOM ENGLER, IGG CORP. FAX No. .....

SRN NUMBER... 19989

RAISED BY.... M. WAKELIN

DATE... 4-12-97

TRANSFER FROM TASK No:..... 1500 ..... (** Held at ~~CORP~~ / CT) TO... RON FIDLER

ITEM	PART TYPE & SPECIFICATION/OPTION	LEVEL	QTY	RIR	D/C	PRE-CAP	DPA	NCR	MFR/C
1	LM111 LIFE TEST SAMPLES. XM-IS-IGG-0097	B	~~10~~ 11 MW	78453	9648	-	-	N51622	NSC/U
COMMENTS SAMPLES TO BE TRANSFERRED TO R. FIDLER FOR A 2nd RADIATION TEST I.A.W XM-PL-IGG-0028 ISS. 2 + THE FOLLOWING AMENDMENTS. 1K, 2.5K, 5K, 7.5K & 10K WITH 24Hr ROOM TEMP AND 168Hr 100°C ANNEAL. IRRADIATION STEPS SHALL BE									
	NEW RIR UPON COMPLETION OF RAD. (RAD REPORT ONLY)								
COMMENTS									
COMMENTS									

QA/4/06/011 Issue 3

** Delete as applicable

	ACTION
SAMPLES @ IGG. (47-2-00-21 -065 -060 + 615-625). SUBJECT THESE TO ELECTRICAL TEST + HIGH TEMP STORAGE + R&A AND REPEAT RESULTS.	
NCR 51618. LM111 DIE. LATEST MAK : XM-6433 REVISED SENT TO LABEN FOR COMMENT. (SENT 12/11/97)	
(a) IGG WILL CHECK EVALUATION SAMPLE STATUS IF AT IGG SO THAT THERE MAY BE THE POSSIBILITY OF USING FOR FURTHER RADIATION.	
(b) ASK LABEN TO SUPPLY A CARRIER AND SAMPLE DIE (5 OFF) MOUNTED SO THAT IGG CAN PERFORM RAD RE-TEST @ IGG FOR FOLLOWING CONDITIONS, 1.0KRAD + 2.5K + 5.0K + 7.5K + 10K. WITH 24 + 168 HR ANNEALS. ROOM TEMP & 100°C	
REVIEW OF CLOSED NCRs - SEE APPENDIX 4 FOR REVIEW.	

RADIATION TEST SUMMARY

PART TYPE : LM111

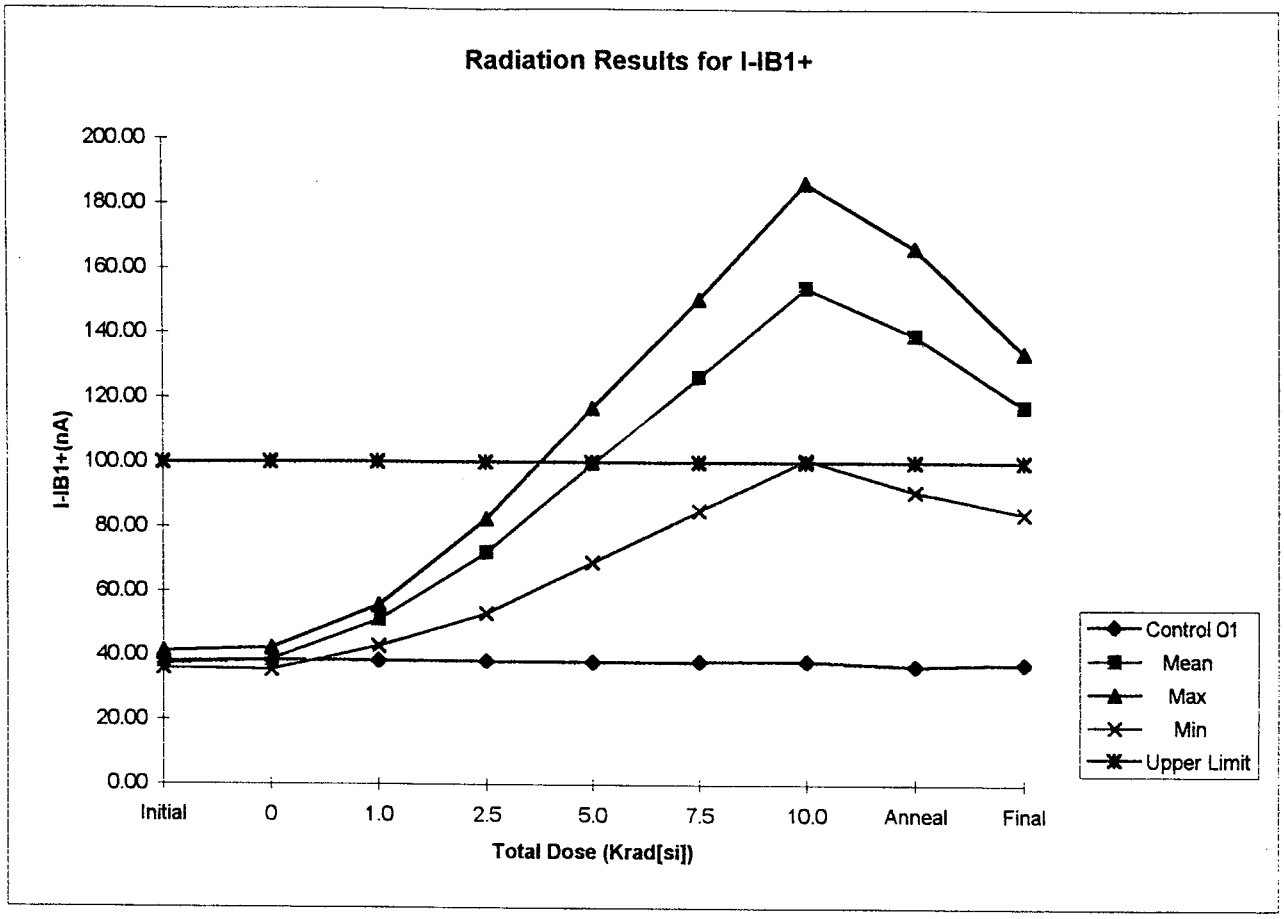
DESCRIPTION : VOLTAGE COMPARATOR

REPORT NO. : RD 256

PARAMETERS PLOTTED :

I-IB1+
I-IB1-
I-IB2+
I-IB2-
I-IO3
VOL1

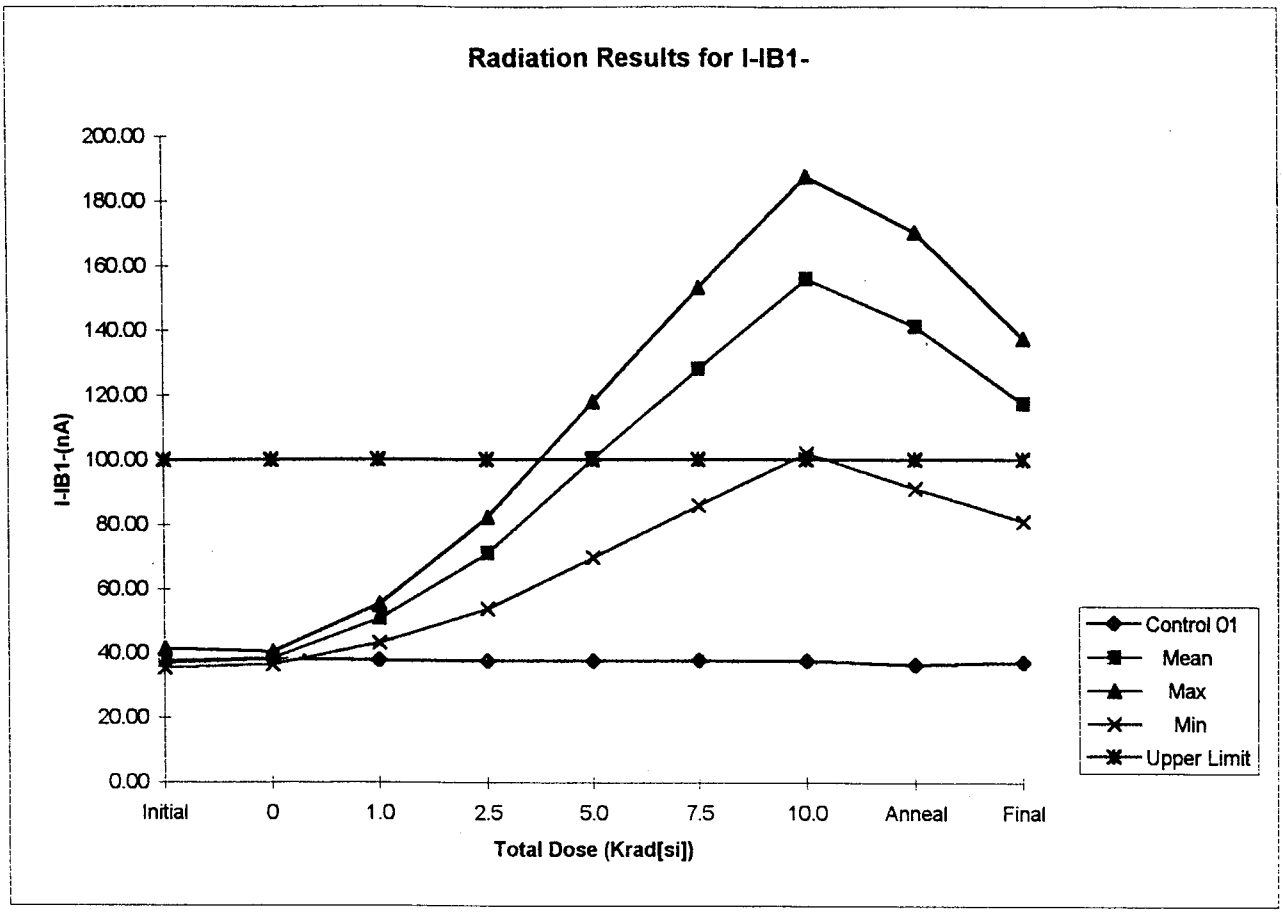
NOTE : The results for the remaining parameters showed no significant change and hence plots were not considered necessary.



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	37.45	38.51	41.62	36.56	100	-	1.61
0	38.65	39.14	42.71	35.94	100	-	1.96
1.0	38.32	51.40	55.99	43.35	100	-	4.09
2.5	38.26	72.15	82.66	53.35	100	-	9.15
5.0	38.19	99.88	117.06	69.15	100	-	14.77
7.5	38.37	126.58	150.88	85.24	100	-	19.89
10.0	38.25	154.24	186.70	101.09	100	-	25.45
Anneal	36.88	139.55	166.58	91.03.	100	-	23.02
Final	37.79	117.42	134.42	84.31	100	-	15.09

Lot size for statistics :10 devices

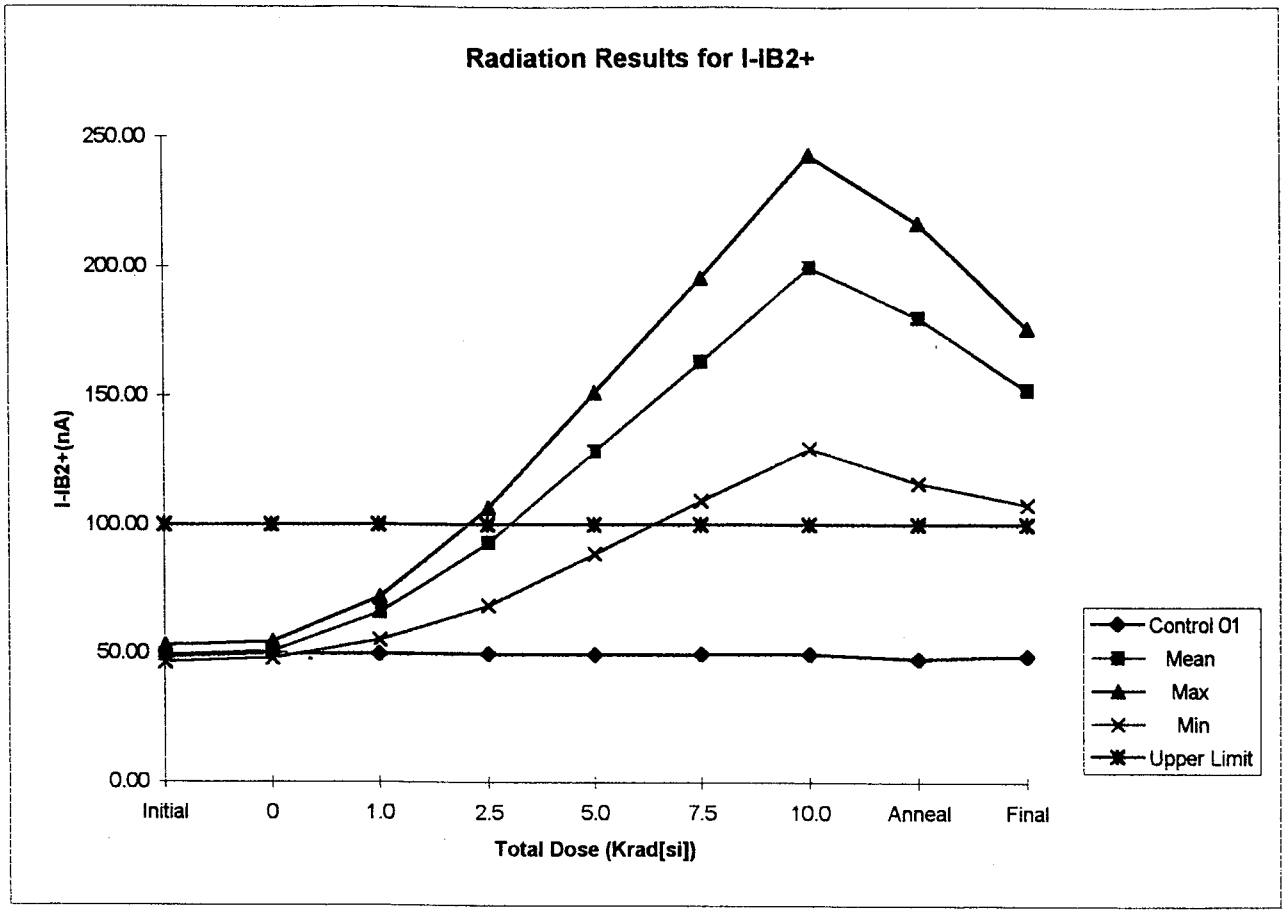
RD 256



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	37.06	38.18	41.77	35.98	100	-	1.81
0	38.25	38.87	40.88	36.93	100	-	1.38
1.0	37.80	51.25	55.84	43.61	100	-	3.97
2.5	37.67	71.51	82.45	54.25	100	-	9.13
5.0	37.64	100.57	118.22	70.03	100	-	15.02
7.5	37.94	128.34	153.57	86.03	100	-	20.51
10.0	37.77	156.22	187.82	102.18	100	-	25.95
Anneal	36.47	141.43	170.65	91.27	100	-	23.98
Final	37.40	117.46	137.60	81.09	100	-	16.91

Lot size for statistics :10 devices

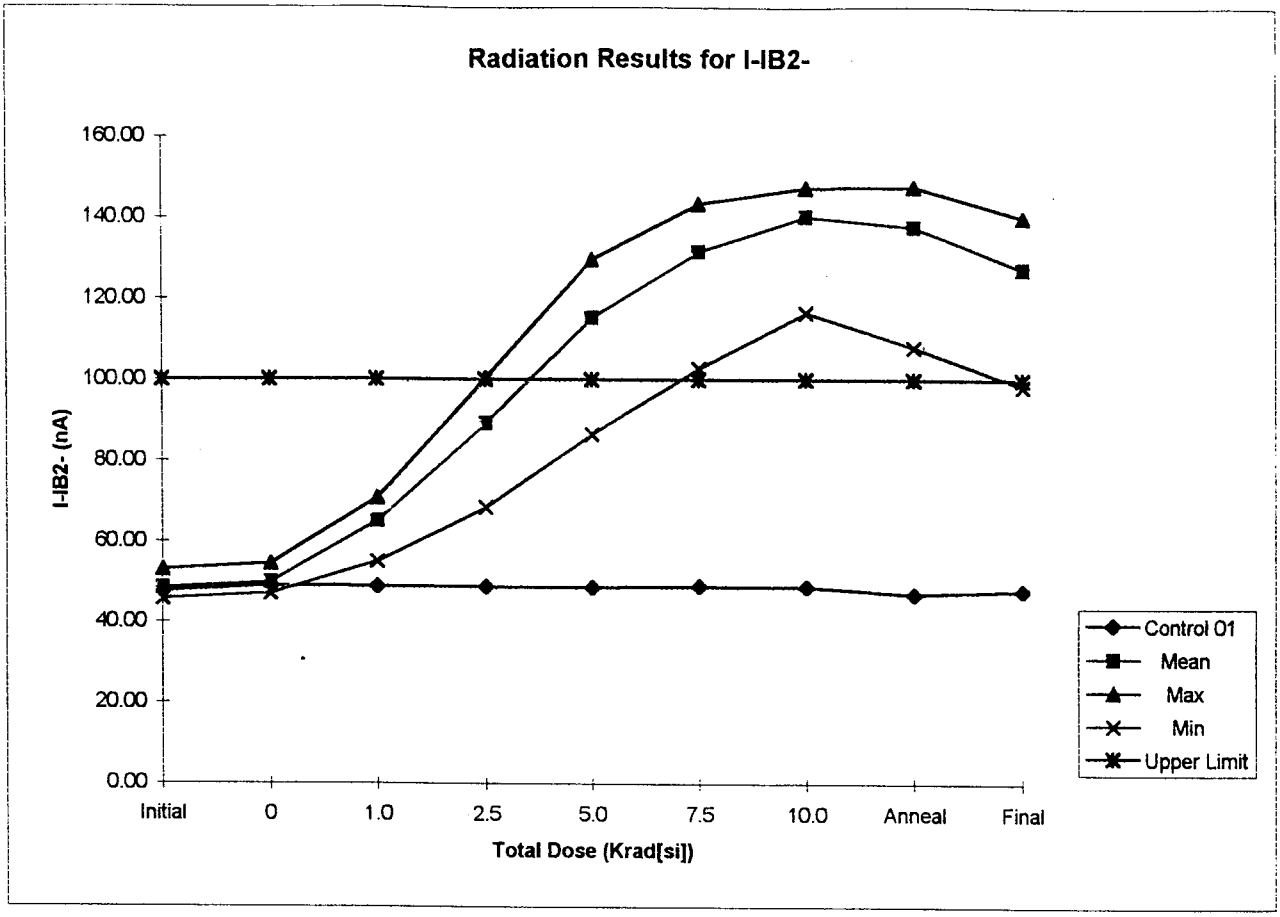
RD 256



Dose (kRad)	Control 01 (nA)	Mean (nA)	Max (nA)	Min (nA)	Upper Limit (nA)	Lower Limit (nA)	Std.Dev.
Initial	48.59	49.79	53.62	47.02	100	-	2.10
0	50.13	51.38	55.02	48.71	100	-	2.12
1.0	49.92	66.39	72.43	55.85	100	-	5.28
2.5	49.82	93.27	106.90	68.92	100	-	11.64
5.0	49.70	128.71	151.46	88.95	100	-	19.23
7.5	49.88	163.46	195.95	109.56	100	-	26.16
10.0	49.83	199.94	243.49	129.75	100	-	33.54
Anneal	47.88	180.40	217.01	116.35	100	-	30.71
Final	49.04	152.39	176.23	107.87	100	-	20.51

Lot size for statistics :10 devices

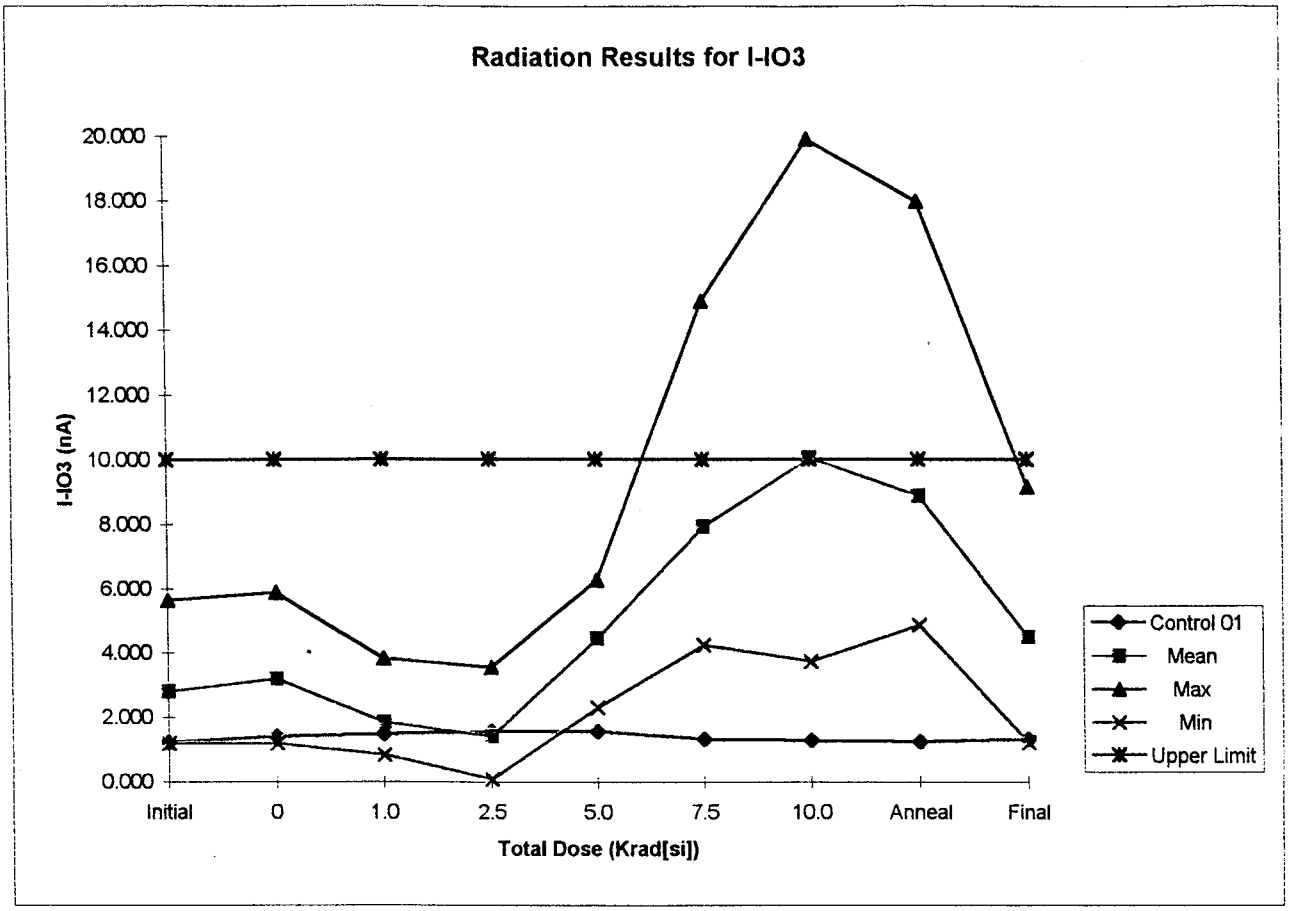
RD 256



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	47.61	48.80	53.40	46.09	100	-	2.38
0	49.00	50.18	54.80	47.26	100	-	2.46
1.0	48.74	65.31	70.93	55.31	100	-	5.27
2.5	48.72	89.41	100.58	68.52	100	-	9.90
5.0	48.62	115.54	130.01	86.74	100	-	13.01
7.5	48.81	131.96	143.80	103.01	100	-	12.03
10.0	48.75	140.51	147.63	116.82	100	-	8.96
Anneal	46.92	137.92	147.91	108.26	100	-	11.69
Final	47.97	127.66	140.53	98.52	100	-	12.41

Lot size for statistics :10 devices

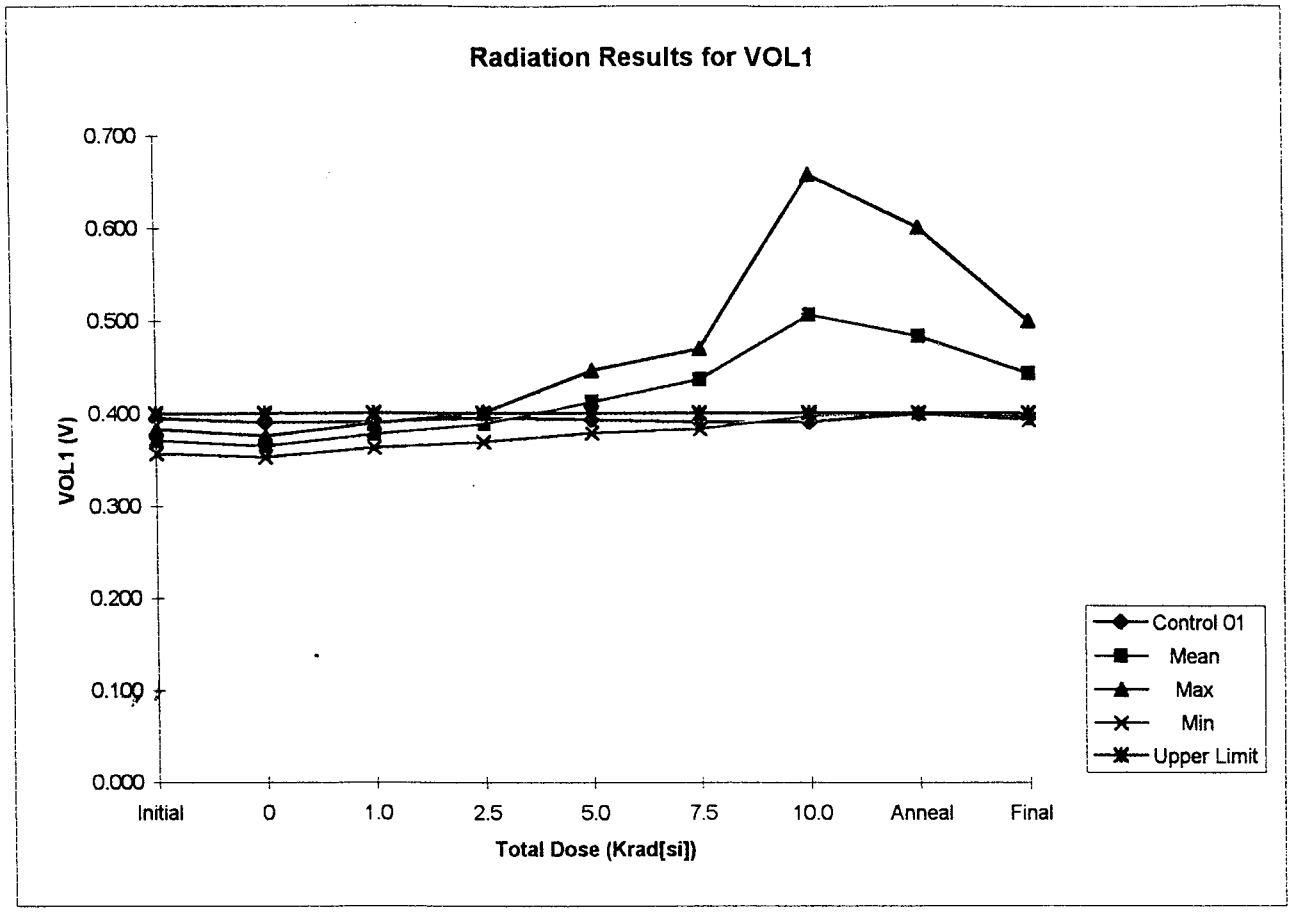
RD 256



Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(nA)	(nA)	(nA)	(nA)	(nA)	(nA)	
Initial	1.222	2.836	5.679	1.224	10	-	1.68
0	1.414	3.243	5.906	1.229	10	-	1.66
1.0	1.495	1.888	3.870	0.874	10	-	1.02
2.5	1.572	1.451	3.585	0.113	10	-	1.09
5.0	1.567	4.492	6.290	2.338	10	-	1.47
7.5	1.330	7.944	14.924	4.293	10	-	3.45
10.0	1.290	10.051	19.943	3.769	10	-	5.76
Anneal	1.243	8.882	18.021	4.909	10	-	4.83
Final	1.333	4.531	9.173	1.247	10	-	2.67

Lot size for statistics :10 devices

RD 256

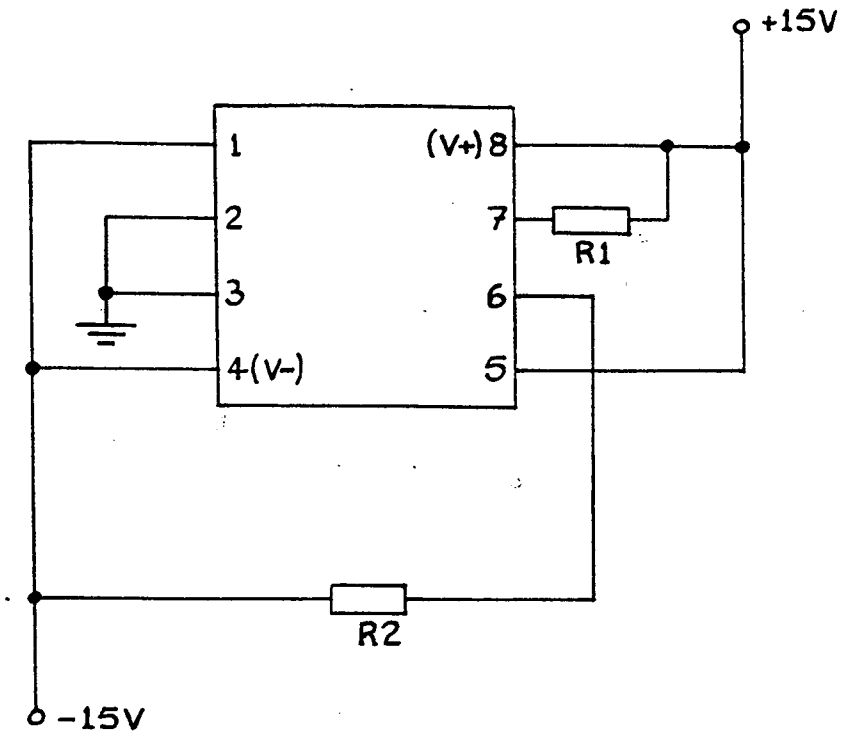


Dose (kRad)	Control 01	Mean	Max	Min	Upper Limit	Lower Limit	Std.Dev.
	(V)	(V)	(V)	(V)	(V)	(V)	
Initial	0.395	0.372	0.385	0.358	0.4	-	0.01
0	0.390	0.366	0.377	0.354	0.4	-	0.01
1.0	0.391	0.379	0.390	0.364	0.4	-	0.01
2.5	0.395	0.390	0.402	0.370	0.4	-	0.01
5.0	0.393	0.413	0.447	0.380	0.4	-	0.02
7.5	0.390	0.438	0.471	0.384	0.4	-	0.03
10.0	0.390	0.507	0.659	0.398.	0.4	-	0.08
Anneal	0.399	0.484	0.602	0.400	0.4	-	0.07
Final	0.395	0.444	0.501	0.394	0.4	-	0.03

Lot size for statistics :10 devices

RD 256

FIGURE 1 - ELECTRICAL CIRCUIT FOR IRRADIATION TESTING



R1 = 10KΩ ¼ watt
R2 = 1MΩ ¼ watt

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		Unit
							Min.	Max.	
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	-	4(m)	-	V_{CC} = ±15V $-V_{OD}$ = -5mV ΔV_{IN} = 100mV	-	300	ns
21	Response time (high to low) (Collector output)	t_f	-	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.

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		Unit
							Min.	Max.	
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
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

Irradiation Test Sequence (Cont.) 21

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 22

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.

XMM RD256	IRRADIATION TEST PLAN NO. XM-PL-IGG-0026 (1)	Issue No. 2 (2) Date: November 1996 Page: 1/6

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

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

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

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

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	
Dose [kRAD(Si)]	1	1·5	2·5	2·5	2·5	
Maximum Dose Rate [RAD(Si)/s]	10	10	10	10	10	
Minimum Exposure Time[s]	100	150	250	250	250	

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).

S.T.C 14.11.96