ESA-QCA9962T-C

EVAL-RAD-238

MOTOROLA

Motorola Semiconductors S.A.
Discrete & Analog Products Division

TOTAL DOSE EFFECTS CHARACTERIZATION

RESULTS FOR LM108AH

ORIGINAL
EN ROUGE

Ref : MOT/RAD.0042

DATE CODE : 9504	**DIFFUSION LOT : 1A220929** **WAFER N° : N15**

Total Quality Six Sigma for Total Customer Satisfaction

MOTOROLA

Motorola Semiconductors S.A.

Discrete & Analog Products Division

	TOTAL DOSE TEST PLAN No. **N° MOT/RAD.0042**	ISSUE No : 0 DATE : 07/03/95 PAGE : 1/2
SCC COMPONENT No **9101 005 07B**	COMPONENT DESIGNATION **LM108AH**	IRRADIATION SPEC : ISSUE :

SPECIFICATIONS GENERIC : **9000** ISSUE REV. DETAIL ISSUE REV. **9101 005**	ACCEPTANCE DIFFUSION ☐ LOT ☐	SAMPLE SIZE **10 (Sn° 1 to 10)** CONTROL DEVICES **1 (Sn° 11)**	PROJECT
FAMILY **LINEAR**	GROUP **IC'S**		PACKAGE **TO99**
MANUFACTURER NAME **MOTOROLA** ADDRESS : AVENUE GENERAL EISENHOWER 31023 TOULOUSE CEDEX - FRANCE	TEST HOUSE NAME **MOTOROLA** ADDRESS : AVENUE GENERAL EISENHOWER 31023 TOULOUSE CEDEX - FRANCE		ORIGINATOR NAME **ALCATEL BELL** TELEPHONE :
FACILITY SOURCE **C060** **DERTS** AVENUE E. BELIN 31055 TOULOUSE CEDEX - FRANCE IRRADIATION SINGLE ☐ MULTIPLE ☒	IRRADIATION MEASUREMENT INTERVAL BIASED ☐ CIRCUIT REF UNBIASED ☒ SUPPLY VOLTAGE TEMP °C DURATION		LEVEL OF INTEREST

SINGLE IRRADIATION	MULTIPLE IRRADIATION STEPS	1	2	3	4	5	6	7	8	
DOSE (KRAD) (Si)	DOSE KRADS (Si)	10	20	30	50					
DOSE RATE (RAD) (Si)	DOSE RATE (KRADS) (Si)	5,7	5,7	5,7	5,7					
EXPOSURE TIME	EXPOSURE TIME (mn)	105'	105'	105'	210'					

IRRADIATION CONDITIONS		ANNEAL TEST ? YES	
BIASED (REMOTE TEST)	☒ BIAS CIRCUIT REF **(SEE P 5)**	BIASED	☒ BIAS CIRCUIT REF **(SEE P 5)**
UNBIASED (REMOTE TEST)	☐ SUPPLY VOLTAGE **±15V**	UNBIASED	☐ SUPPLY VOLTAGES **±15 V**
IN-SITU TEST	☐ TEMP °C : **25**	TEMP °C : **25°**	DURATION : **168 h**

ELECTRICAL PARAMETERS TO BE TESTED : **TABLE 2A OF ESA / SCC DETAIL SPECIFICATION N° 9101 005**

	TOTAL DOSE TEST PLAN No. **N° MOT/RAD.0042**	ISSUE No : 0 REV : DATE : **07/03/95** DATE : PAGE : 2/2

IRRADIATION TEST SEQUENCE (**SEE PAGE 6**)

TEST STEP	DESCRIPTION	REQUIREMENTS

REMARKS

1 - TOTAL DOSE EFFECTS CHARACTERIZATION SUMMARY

NUMBER OF IRRADIATED DEVICES	10
IRRADIATION STEPS (KRADS [Si])	10 - 20 - 30 - 50
1ST PARAMETERS OUT OF SPECIFICATION	After an irradiation of 30Krads, drifts on VIO, IIB and IIO parameters are found on several parts. Worst case values are at this level 3mV for VIO, 9,8nA for IIB and 5,8nA for IIO parameter.
2ND PARAMETER OUT OF SPECIFICATION	No other parameters go out of the specified limits.
LOST OF FUNCTIONALITY	The more severe degradations are found at 30 Krads, after this irradiation level, the drifts found decrease.

2 - DEVICES IDENTIFICATION

DEVICE IDENTIFICATION NUMBER : **LM108AH**

MANUFACTURER : **MOTOROLA**

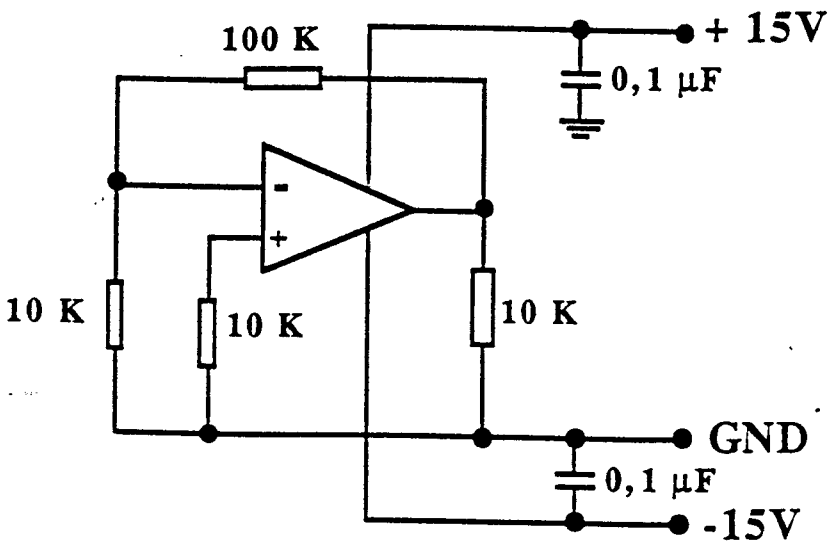
DATE CODE : **9504**

SERIAL NUMBERS : **1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10**

CORRELATION PART : **N° 11**

3 - IRRADIATION CONDITIONS

3.1) POLARIZATION CONDITIONS



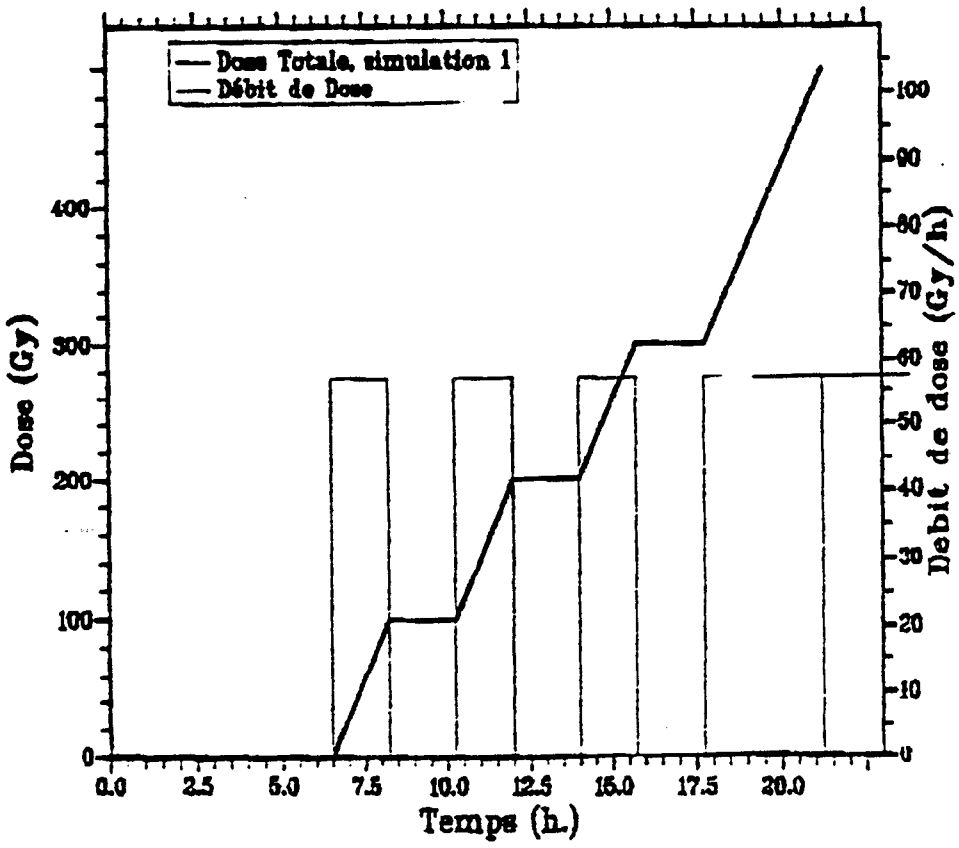
3.2) IRRADIATION PLAN

DATE	TIME	TOTAL DOSE (KRADS)	DOSE RATE (KRADS / H)
21.02.95	105'	10	5,7
21.02.95	105'	20	5,7
21.02.95	105'	30	5,7
21.02.95	210'	50	5,7

NOTE

Between two irradiation steps a read and record measurement was performed at MOTOROLA plant.
The time interval between exposure and re-exposure was 2H. The measurements were performed in a time interval of 1H after the exposure.

3.3) IRRADIATION PROFILE



3.4) IRRADIATION EQUIPMENT

Irradiations were performed with the CERT-DERT CO60 source (Gammacell 220) in TOULOUSE (31). The dose rate was 5,7 Krads / h. The exposure was done at ambient temperature

4 - MEASUREMENT CONDITIONS

Measurements were done according ESA / SCC 9101/005 detail specification table 2 on a LTX equipment.

5 - RESULTS

5.1) DATALOGS

ESA / SCC table 2A datalogs including measurement conditions are shown in appendix 1. Part number 11 is the correlation component.

5.2) DIAGRAMS

Diagrams corresponding to ESA / SCC 9101 / 005 detail specification table 4 are shown in appendix 2. Specification limits and statistical information are given.

5.3) TOTAL DOSE HARDNESS

The following table sums up the radiation hardness results of the 10 irradiated parts.

TOTAL DOSE (KRADS)	0	10	20	30	50	annealing
NUMBER OF IN SPECIFICATION DEVICE	10/10	10/10	10/10	4/10	4/10	5/10
NUMBER OF IN SPECIFICATION PARAMETERS FOR ALL DEVICES	22/22	22/22	22/22	14/22	14/22	14/22

NOTE

The 22 parameters of ESA/SCC table2A detail specification have been measured.

5.4) COMMENTS

Up to an irradiation level of 20Krads, the tested parts show values within the specified limits. At 30Krads level, several parts present a rather strong increase of the input parameter degradations since VIO, IIB and IIO parameters show respectively the following worst case values: 3mV, 9,8nA & 5,8nA.

After an irradiation of 50Krads, these worst case values decrease since they become 0,63mV for VIO, 4,75nA for IIB and 3,45nA for IIO parameter.

Finally, we have to notice that the 25°C annealing phase performed in a biased mode during 168 hours shows recovery effects on input parameters since the worst case values found are 0,58mV for VIO, 3,3nA for IIB and at least 0,55nA for IIO parameter.

5.5) SYNTHESIS SUMMARY :

Up to 20Krads, the tested parts have shown a rather good behaviour under irradiation. In the other hand, beetwen 20 & 30Krads a strong degradation increase is found. These degradations decrease during the remaining irradiation phases and during the annealing one.

MOTOROLA

Motorola Semiconductors S.A.
Discrete & Analog Products Division

APPENDIX 1

TABLE 2 (A) RESULTS AFTER

0 Krad, 10 Krads,

20 Krads, 30 Krads and 50 Krads

AND AFTER 168 h of annealing

ELECTRICAL MEASUREMENTS

BEFORE RADIATION

DC AT 25 °C

MOTOROLA

Motorola Semiconducteurs S.A.
Centre Electronique de Toulouse

MOTOROLA Semiconductors

HIGH RELIABILITY DIVISION

TRACEABILITY INFORMATION

PROCESS LOT NUMBER	**NTTA0108AH**
DEVICE	**TY30433H**
SOURCE TYPE	**LM108AH**
DATE CODE	**9504**
CUSTOMER	**VARIOUS**
CUSTOMER PART NUMBER	**SCC 9101 005 07B**
LOT SIZE	**11**
SERIAL NUMBER RANGE	**1-11**
MEASUREMENT TYPE	**25 C RADIATION TESTING**
DATE	**03-MAR-95**

COMMENTS

TABLE 2A DC PARAMETERS
ELECTRICAL RECORDS BEFORE RADIATION TESTING

PARAMETERS TEST CONDITIONS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
VCC	20.000 V	20.000 V	20.000 V	20.000 V	15.000 V	15.000 V	20.000 V	20.000 V	20.000 V	20.000 V
VEE	-20.000 V	-20.000 V	-20.000 V	-20.000 V	-15.000 V	-15.000 V	-20.000 V	-20.000 V	-20.000 V	-20.000 V
RL			10.000 K	10.000 K						

LIMITS

MIN	0.000 A	-600.000 uA	16.000 V	-20.000 V	-15.000 mA	2.000 mA	-500.000 uV	-2.000 nA	0.000 A	-200.000 pA
MAX	600.000 uA	0.000 A	20.000 V	-16.000 V	-2.000 mA	15.000 mA	500.000 uV	0.000 A	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
Unit	uA	uA	V	V	mA	mA	uV	nA	nA	pA
1	328.000	-330.000	18.709	-18.824	-7.966	10.074	398.000	-0.837	0.736	101.303
2	328.000	-395.000	18.712	-18.824	-7.787	9.889	-233.000	-0.834	0.666	168.593
3	330.000	-345.000	18.708	-18.823	-8.223	9.957	105.000	-0.864	0.703	160.762
4	329.000	-325.000	18.709	-18.823	-7.988	9.958	438.000	-0.860	0.704	156.359
5	328.000	-337.000	18.708	-18.821	-7.957	9.985	19.000	-0.791	0.744	46.981
6	332.000	-327.000	18.709	-18.816	-7.294	9.929	424.000	-0.750	0.626	124.792
7	328.000	-333.000	18.716	-18.822	-8.125	10.000	486.000	-0.664	0.636	27.406
8	326.000	-371.000	18.717	-18.826	-8.673	9.919	315.000	-0.649	0.541	107.909
9	325.000	-332.000	18.713	-18.811	-6.980	9.908	468.000	-0.734	0.665	69.248
10	329.000	-338.000	18.709	-18.824	-8.256	10.047	341.000	-0.824	0.785	38.661
11	341.000	-354.000	18.715	-18.838	-8.804	10.232	143.000	-1.206	1.097	108.399
MEAN	329.455uA	-344.273uA	18.711 V	-18.823 V	-8.005mA	9.991mA	264.000uV	-819.474pA	718.527pA	100.947pA
SIGMA	4.251uA	21.509uA	3.384mV	6.594mV	530.786uA	98.381uA	228.083uV	148.228pA	142.126pA	50.102pA
MIN	325.000uA	-395.000uA	18.708 V	-18.838 V	-8.804mA	9.889mA	-233.000uV	-1.206nA	541.014pA	27.406pA
MAX	341.000uA	-325.000uA	18.717 V	-18.811 V	-6.980mA	10.232mA	486.000uV	-648.924pA	1.097nA	168.593pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

PARAMETERS TEST CONDITIONS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
VCC	20.000 V	20.000 V	5.000 V	5.000 V	20.000 V	20.000 V	5.000 V	35.000 V	5.000 V	5.000 V
VEE	-20.000 V	-20.000 V	-5.000 V	-5.000 V	-20.000 V	-20.000 V	-35.000 V	-5.000 V	-5.000 V	-5.000 V
VCC'					10.000 V					
VEE'						-10.000 V				

LIMITS

MIN	80.000	80.000	20.000	20.000	80.000 DB	80.000 DB	96.000 DB	96.000 DB	-500.000 uV	-2.000 nA
MAX	8.000 K	8.000 K	8.000 K	8.000 K	200.000 DB	200.000 DB	200.000 DB	200.000 DB	500.000 uV	0.000 A

DATA RECORDS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
Unit	KV/MV	KV/MV	KV/MV	V/MV	DB	DB	DB	DB	uV	nA
1	0.369	0.431	0.241	688.595	113.070	117.123	108.732	122.960	418.000	-0.760
2	2.657	0.932	0.576	476.320	120.342	116.183	106.788	131.461	-265.000	-0.734
3	0.498	0.531	0.237	691.536	117.417	116.820	109.959	116.497	113.000	-0.753
4	0.933	0.681	0.828	234.043	113.434	115.837	107.662	118.771	386.000	-0.758
5	0.438	0.757	0.239	538.973	116.481	116.299	108.239	123.297	23.000	-0.718
6	4.771	1.225	0.479	666.615	120.981	116.799	106.589	130.897	391.000	-0.657
7	1.407	4.703	1.430	637.096	134.213	118.972	108.561	129.207	465.000	-0.666
8	1.343	3.925	0.961	438.567	131.809	118.096	107.598	127.566	297.000	-0.570
9	0.748	0.515	0.465	254.165	112.576	116.331	108.903	122.218	417.000	-0.627
10	1.726	0.890	1.186	256.990	116.980	116.706	108.663	124.203	312.000	-0.780
11	1.637	4.088	0.351	326.942	122.238	116.265	110.992	116.475	122.000	-1.122
MEAN	1.502K	1.698K	635.632	473.622	119.958 DB	116.857 DB	108.426 DB	123.959 DB	243.545uV	-740.438pA
SIGMA	1.282K	1.657K	410.718	183.625	7.225 DB	0.924 DB	1.292 DB	5.368 DB	223.208uV	142.453pA
MIN	369.252	431.471	237.074	234.043	112.576 DB	115.837 DB	106.589 DB	116.475 DB	-265.000uV	-1.122nA
MAX	4.771K	4.703K	1.430K	691.536	134.213 DB	118.972 DB	110.992 DB	131.461 DB	465.000uV	-570.377pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

PARAMETERS TEST CONDITIONS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
VCC	5.000 V	5.000 V
VEE	-5.000 V	-5.000 V

LIMITS

MIN	0.000 A	-200.000 pA
MAX	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	**15.1**	**16.0**
Test	**I-IB2**	**IIO2**
Unit	**nA**	**pA**
1	0.803	-43.066
2	0.735	-1.713
3	0.794	-40.619
4	0.768	-9.788
5	0.787	-69.492
6	0.691	-33.768
7	0.669	-2.447
8	0.569	1.468
9	0.731	-104.238
10	0.792	-11.990
11	1.132	-10.277
MEAN	770.068pA	-29.630pA
SIGMA	139.091pA	33.224pA
MIN	568.909pA	-104.238pA
MAX	1.132nA	1.468pA
QTY	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

REJECTED UNITS :

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0

ELECTRICAL MEASUREMENTS

AFTER 10 KRad

DC AT 25 °C

MOTOROLA

Motorola Semiconducteurs S.A.

Centre Electronique de Toulouse

MOTOROLA Semiconductors

HIGH RELIABILITY DIVISION

TRACEABILITY INFORMATION

PROCESS LOT NUMBER	**NTTA0108AH**
DEVICE	**TY30433H**
SOURCE TYPE	**LM108AH**
DATE CODE	**9504**
CUSTOMER	**VARIOUS**
CUSTOMER PART NUMBER	**SCC 9101 005 07B**
LOT SIZE	**11**
SERIAL NUMBER RANGE	**1-11**
MEASUREMENT TYPE	**25 C RADIATION TESTING**
DATE	**03-MAR-95**

COMMENTS

TABLE 2A DC PARAMETERS
ELECTRICAL RECORDS AFTER 10 Krad

PARAMETERS TEST CONDITIONS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
VCC	20.000 V	20.000 V	20.000 V	20.000 V	15.000 V	15.000 V	20.000 V	20.000 V	20.000 V	20.000 V
VEE	-20.000 V	-20.000 V	-20.000 V	-20.000 V	-15.000 V	-15.000 V	-20.000 V	-20.000 V	-20.000 V	-20.000 V
RL			10.000 K	10.000 K						

LIMITS

MIN	0.000 A	-600.000 uA	16.000 V	-20.000 V	-15.000 mA	2.000 mA	-500.000 uV	-2.000 nA	0.000 A	-200.000 pA
MAX	600.000 uA	0.000 A	20.000 V	-16.000 V	-2.000 mA	15.000 mA	500.000 uV	0.000 A	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
Unit	uA	uA	V	V	mA	mA	uV	nA	nA	pA
1	325.000	-326.000	18.704	-18.812	-6.182	10.047	391.000	-1.221	1.326	-105.158
2	321.000	-323.000	18.703	-18.809	-6.178	10.009	-185.000	-1.164	1.186	-21.521
3	325.000	-319.000	18.703	-18.811	-6.445	9.944	99.000	-0.876	0.990	-113.962
4	325.000	-323.000	18.703	-18.811	-6.421	9.993	460.000	-1.197	1.129	67.986
5	328.000	-332.000	18.703	-18.809	-5.979	9.908	27.000	-1.156	1.168	-12.717
6	327.000	-327.000	18.706	-18.807	-6.199	9.930	424.000	-0.972	0.949	22.988
7	323.000	-324.000	18.714	-18.816	-7.032	9.991	454.000	-0.750	0.778	-28.368
8	321.000	-325.000	18.713	-18.813	-6.729	9.920	314.000	-0.661	0.581	80.213
9	317.000	-332.000	18.707	-18.799	-5.536	9.907	488.000	-1.077	0.960	116.407
10	325.000	-328.000	18.707	-18.818	-7.327	9.960	333.000	-0.933	0.784	149.177
11	342.000	-340.000	18.714	-18.837	-8.756	10.255	142.000	-1.144	1.107	36.683
MEAN	325.364uA	-327.182uA	18.707 V	-18.813 V	-6.617mA	9.988mA	267.909uV	-1.014nA	0.996nA	17.430pA
SIGMA	6.329uA	5.741uA	4.561mV	9.396mV	863.971uA	99.455uA	217.576uV	190.099pA	217.479pA	84.183pA
MIN	317.000uA	-340.000uA	18.703 V	-18.837 V	-8.756mA	9.907mA	-185.000uV	-1.221nA	580.571pA	-113.962pA
MAX	342.000uA	-319.000uA	18.714 V	-18.799 V	-5.536mA	10.255mA	488.000uV	-660.784pA	1.326nA	149.177pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

PARAMETERS TEST CONDITIONS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
VCC	20.000 V	20.000 V	5.000 V	5.000 V	20.000 V	20.000 V	5.000 V	35.000 V	5.000 V	5.000 V
VEE	-20.000 V	-20.000 V	-5.000 V	-5.000 V	-20.000 V	-20.000 V	-35.000 V	-5.000 V	-5.000 V	-5.000 V
VCC'					10.000 V					
VEE'						-10.000 V				

LIMITS

MIN	80.000	80.000	20.000	20.000	80.000 DB	80.000 DB	96.000 DB	96.000 DB	-500.000 uV	-2.000 nA
MAX	8.000 K	8.000 K	8.000 K	8.000 K	200.000 DB	200.000 DB	200.000 DB	200.000 DB	500.000 uV	0.000 A

DATA RECORDS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
Unit	KV/MV	KV/MV	V/MV	KV/MV	DB	DB	DB	DB	uV	nA
1	0.359	0.455	278.703	0.392	112.216	119.781	108.366	127.408	420.000	-1.180
2	5.483	0.998	421.957	1.077	124.409	117.992	106.730	142.834	-204.000	-1.107
3	0.344	0.514	145.421	0.446	113.083	116.090	109.506	117.548	137.000	-0.887
4	1.185	0.727	413.077	0.386	116.849	117.416	107.188	126.291	429.000	-1.109
5	0.416	0.784	467.656	0.395	114.719	118.470	107.777	129.788	38.000	-1.093
6	4.192	1.064	329.957	0.695	123.079	119.093	106.604	124.448	398.000	-0.973
7	2.688	4.335	366.556	1.011	123.747	120.356	108.620	153.545	439.000	-0.761
8	2.201	1.618	595.862	0.714	134.617	117.486	107.515	135.663	296.000	-0.599
9	0.970	0.519	414.133	0.504	115.653	119.135	108.705	128.623	452.000	-1.033
10	1.444	0.750	411.763	0.313	117.654	118.777	108.514	127.710	306.000	-0.818
11	1.586	2.947	378.111	0.361	125.146	116.313	111.087	116.893	127.000	-1.081
MEAN	1.897K	1.337K	383.927	572.295	120.107 DB	118.264 DB	108.237 DB	130.068 DB	258.000uV	-0.967nA
SIGMA	1.658K	1.225K	112.746	267.142	6.735 DB	1.355 DB	1.302 DB	10.660 DB	210.446uV	180.304pA
MIN	343.625	455.170	145.421	313.449	112.216 DB	116.090 DB	106.604 DB	116.893 DB	-204.000uV	-1.180nA
MAX	5.483K	4.335K	595.862	1.077K	134.617 DB	120.356 DB	111.087 DB	153.545 DB	452.000uV	-599.157pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

PARAMETERS TEST CONDITIONS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
VCC	5.000 V	5.000 V
VEE	-5.000 V	-5.000 V

LIMITS

MIN	0.000 A	-200.000 pA
MAX	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
Unit	nA	pA
1	1.360	-179.991
2	1.191	-84.127
3	0.935	-48.422
4	1.158	-48.422
5	1.255	-161.895
6	0.939	33.749
7	0.773	-12.227
8	0.685	-86.082
9	1.176	-142.819
10	0.912	-93.909
11	1.160	-78.257
MEAN	1.049nA	-82.037pA
SIGMA	212.544pA	63.547pA
MIN	685.239pA	-179.991pA
MAX	1.360nA	33.749pA
QTY	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

REJECTED UNITS :

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0

ELECTRICAL MEASUREMENTS

AFTER 20 KRad

DC AT 25 °C

MOTOROLA
Motorola Semiconducteurs S.A.
Centre Electronique de Toulouse

MOTOROLA Semiconductors

HIGH RELIABILITY DIVISION

TRACEABILITY INFORMATION

PROCESS LOT NUMBER	**NTTA0108AH**
DEVICE	**TY30433H**
SOURCE TYPE	**LM108AH**
DATE CODE	**9504**
CUSTOMER	**VARIOUS**
CUSTOMER PART NUMBER	**SCC 9101 005 07B**
LOT SIZE	**11**
SERIAL NUMBER RANGE	**1-11**
MEASUREMENT TYPE	**25 C RADIATION TESTING**
DATE	**03-MAR-95**

COMMENTS

TABLE 2A DC PARAMETERS
ELECTRICAL RECORDS AFTER 20 Krad

PARAMETERS TEST CONDITIONS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
VCC	20.000 V	20.000 V	20.000 V	20.000 V	15.000 V	15.000 V	20.000 V	20.000 V	20.000 V	20.000 V
VEE	-20.000 V	-20.000 V	-20.000 V	-20.000 V	-15.000 V	-15.000 V	-20.000 V	-20.000 V	-20.000 V	-20.000 V
RL			10.000 K	10.000 K						

LIMITS

MIN	0.000 A	-600.000 uA	16.000 V	-20.000 V	-15.000 mA	2.000 mA	-500.000 uV	-2.000 nA	0.000 A	-200.000 pA
MAX	600.000 uA	0.000 A	20.000 V	-16.000 V	-2.000 mA	15.000 mA	500.000 uV	0.000 A	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
Unit	uA	uA	V	V	mA	mA	uV	nA	nA	pA
1	321.000	-325.000	18.704	-18.811	-5.735	9.925	398.000	-1.795	1.955	-160.916
2	327.000	-339.000	18.707	-18.811	-5.934	9.849	-186.000	-1.608	1.580	28.368
3	323.000	-332.000	18.708	-18.813	-6.223	9.739	404.000	-1.024	0.976	47.933
4	321.000	-334.000	18.711	-18.814	-6.185	9.776	483.000	-1.481	1.649	-167.764
5	324.000	-326.000	18.704	-18.806	-5.399	9.805	48.000	-1.697	1.689	7.826
6	326.000	-346.000	18.706	-18.807	-5.930	9.877	407.000	-1.136	1.195	-59.182
7	323.000	-332.000	18.713	-18.814	-6.731	9.958	445.000	-0.826	0.832	-5.869
8	323.000	-328.000	18.718	-18.814	-6.370	9.787	295.000	-0.702	0.629	73.856
9	317.000	-344.000	18.711	-18.799	-5.222	9.723	491.000	-1.489	1.547	-57.715
10	327.000	-335.000	18.710	-18.817	-7.054	9.913	326.000	-0.831	0.952	-120.321
11	338.000	-338.000	18.714	-18.838	-8.789	10.235	149.000	-1.183	1.069	113.962
MEAN	324.545uA	-334.455uA	18.710 V	-18.813 V	-6.325mA	9.872mA	296.364uV	-1.252nA	1.279nA	-27.257pA
SIGMA	5.336uA	6.876uA	4.365mV	9.659mV	0.976mA	143.187uA	211.168uV	381.935pA	424.040pA	94.243pA
MIN	317.000uA	-346.000uA	18.704 V	-18.838 V	-8.789mA	9.723mA	-186.000uV	-1.795nA	628.502pA	-167.764pA
MAX	338.000uA	-325.000uA	18.718 V	-18.799 V	-5.222mA	10.235mA	491.000uV	-702.358pA	1.955nA	113.962pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

PARAMETERS TEST CONDITIONS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
VCC	20.000 V	20.000 V	5.000 V	5.000 V	20.000 V	20.000 V	5.000 V	35.000 V	5.000 V	5.000 V
VEE	-20.000 V	-20.000 V	-5.000 V	-5.000 V	-20.000 V	-20.000 V	-35.000 V	-5.000 V	-5.000 V	-5.000 V
VCC'					10.000 V					
VEE'						-10.000 V				

LIMITS

MIN	80.000	80.000	20.000	20.000	80.000 DB	80.000 DB	96.000 DB	96.000 DB	-500.000 uV	-2.000 nA
MAX	8.000 K	8.000 K	8.000 K	8.000 K	200.000 DB	200.000 DB	200.000 DB	200.000 DB	500.000 uV	0.000 A

DATA RECORDS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
Unit	KV/MV	KV/MV	V/MV	KV/MV	DB	DB	DB	DB	uV	nA
1	0.303	0.411	355.686	0.254	112.034	119.709	108.278	128.784	428.000	-1.777
2	3.951	1.142	329.789	0.982	124.775	118.380	106.721	146.613	-205.000	-1.655
3	0.117	0.159	67.986	0.099	102.444	116.635	109.641	120.548	492.000	-0.954
4	1.626	0.816	380.555	0.719	116.432	117.064	107.042	129.628	461.000	-1.488
5	0.379	0.668	625.798	0.321	113.931	118.753	107.837	131.904	64.000	-1.624
6	3.256	0.783	214.189	0.686	119.628	119.079	106.435	123.673	376.000	-1.085
7	4.445	2.185	335.772	0.878	127.787	120.017	108.542	157.083	426.000	-0.822
8	3.476	1.156	290.973	1.274	125.571	118.201	107.561	151.336	275.000	-0.707
9	1.193	0.608	271.347	0.568	116.425	119.979	108.401	130.837	478.000	-1.423
10	1.023	0.691	337.346	0.336	116.877	117.495	108.541	127.008	297.000	-1.013
11	1.535	2.941	471.743	0.394	124.365	116.536	111.066	116.542	135.000	-1.121
MEAN	1.937K	1.051K	334.653	591.924	118.206 DB	118.350 DB	108.188 DB	133.087 DB	293.364uV	-1.243nA
SIGMA	1.566K	817.542	140.598	354.989	7.362 DB	1.289 DB	1.332 DB	12.982 DB	216.933uV	365.164pA
MIN	117.022	159.224	67.986	99.397	102.444 DB	116.536 DB	106.435 DB	116.542 DB	-205.000uV	-1.777nA
MAX	4.445K	2.941K	625.798	1.274K	127.787 DB	120.017 DB	111.066 DB	157.083 DB	492.000uV	-707.250pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

PARAMETERS TEST CONDITIONS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
VCC	5.000 V	5.000 V
VEE	-5.000 V	-5.000 V

LIMITS

MIN	0.000 A	-200.000 pA
MAX	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
Unit	nA	pA
1	1.948	-170.699
2	1.498	157.493
3	0.978	-24.455
4	1.617	-129.124
5	1.766	-142.330
6	1.238	-153.580
7	0.854	-31.792
8	0.680	27.390
9	1.607	-183.905
10	0.833	180.480
11	1.108	12.228
MEAN	1.284nA	-41.663pA
SIGMA	425.948pA	128.167pA
MIN	679.859pA	-183.905pA
MAX	1.948nA	180.480pA
QTY	11	11

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0
NO REJECTED UNITS.

REJECTED UNITS :

TOTAL PASSED DEVICES : 11
TOTAL FAILED DEVICES : 0

ELECTRICAL MEASUREMENTS

AFTER 30 KRad

DC AT 25 °C

MOTOROLA
Motorola Semiconducteurs S.A.
Centre Electronique de Toulouse

MOTOROLA Semiconductors

HIGH RELIABILITY DIVISION

TRACEABILITY INFORMATION

PROCESS LOT NUMBER	**NTTA0108AH**
DEVICE	**TY30433H**
SOURCE TYPE	**LM108AH**
DATE CODE	**9504**
CUSTOMER	**VARIOUS**
CUSTOMER PART NUMBER	**SCC 9101 005 07B**
LOT SIZE	**11**
SERIAL NUMBER RANGE	**1-11**
MEASUREMENT TYPE	**25 C RADIATION TESTING**
DATE	**03-MAR-95**

COMMENTS

TABLE 2A DC PARAMETERS
ELECTRICAL RECORDS AFTER 30 Krad

PARAMETERS TEST CONDITIONS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
VCC	20.000 V	20.000 V	20.000 V	20.000 V	15.000 V	15.000 V	20.000 V	20.000 V	20.000 V	20.000 V
VEE	-20.000 V	-20.000 V	-20.000 V	-20.000 V	-15.000 V	-15.000 V	-20.000 V	-20.000 V	-20.000 V	-20.000 V
RL			10.000 K	10.000 K						

LIMITS

MIN	0.000 A	-600.000 uA	16.000 V	-20.000 V	-15.000 mA	2.000 mA	-500.000 uV	-2.000 nA	0.000 A	-200.000 pA
MAX	600.000 uA	0.000 A	20.000 V	-16.000 V	-2.000 mA	15.000 mA	500.000 uV	0.000 A	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
Unit	uA	uA	V	V	mA	mA	uV	nA	nA	nA
1 F	319.000	-328.000	18.703	-18.808	-5.497	9.894	416.000	-2.420 *	2.618 *	-0.199
2	322.000	-332.000	18.706	-18.807	-5.696	9.853	-146.000	-1.882	1.997	-0.115
3 F	321.000	-343.000	18.703	-18.807	-5.923	9.853	526.000 *	-1.023	1.046	-0.022
4 F	327.000	-331.000	18.706	-18.811	-5.908	9.823	539.000 *	-2.690 *	2.048 *	0.641 *
5 F	318.000	-331.000	18.701	-18.802	-5.196	9.796	62.000	-3.091 *	2.310 *	0.781 *
6 F	323.000	-332.000	18.711	-18.808	-5.812	9.749	394.000	-2.170 *	1.110	1.059 *
7 F	326.000	-334.000	18.718	-18.815	-6.577	9.854	448.000	-1.854	0.668	1.187 *
8 F	318.000	-327.000	18.715	-18.811	-6.092	9.812	290.000	-1.624	0.643	0.981 *
9 F	315.000	-459.000	18.711	-18.799	-5.024	9.695	542.000 *	-2.770 *	1.980	0.789 *
10 F	325.000	-335.000	18.708	-18.816	-6.782	9.927	316.000	-1.815	0.838	0.976 *
11	341.000	-337.000	18.720	-18.843	-9.002	10.076	145.000	-1.172	1.014	0.158
MEAN	323.182uA	-344.455uA	18.709 V	-18.812 V	-6.137mA	9.848mA	321.091uV	-2.046nA	1.479nA	566.964pA
SIGMA	6.983uA	38.242uA	6.326mV	11.562mV	1.084mA	99.127uA	220.455uV	654.909pA	716.919pA	512.944pA
MIN	315.000uA	-459.000uA	18.701 V	-18.843 V	-9.002mA	9.695mA	-146.000uV	-3.091nA	643.176pA	-198.578pA
MAX	341.000uA	-327.000uA	18.720 V	-18.799 V	-5.024mA	10.076mA	542.000uV	-1.023nA	2.618nA	1.187nA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 2
TOTAL FAILED DEVICES : 9
REJECTED UNITS:

1,3,4,5,6,7,8,9,10

PARAMETERS TEST CONDITIONS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
VCC	20.000 V	20.000 V	5.000 V	5.000 V	20.000 V	20.000 V	5.000 V	35.000 V	5.000 V	5.000 V
VEE	-20.000 V	-20.000 V	-5.000 V	-5.000 V	-20.000 V	-20.000 V	-35.000 V	-5.000 V	-5.000 V	-5.000 V
VCC'					10.000 V					
VEE'						-10.000 V				

LIMITS

MIN	80.000	80.000	20.000	20.000	80.000 DB	80.000 DB	96.000 DB	96.000 DB	-500.000 uV	-2.000 nA
MAX	8.000 K	8.000 K	8.000 K	8.000 K	200.000 DB	200.000 DB	200.000 DB	200.000 DB	500.000 uV	0.000 A

DATA RECORDS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
Unit	KV/MV	KV/MV	V/MV	KV/MV	DB	DB	DB	DB	mV	nA
1 F	0.262	0.389	171.760	0.165	109.146	119.183	108.193	127.427	0.459	-2.381 *
2	2.044	1.200	796.679	0.730	130.723	117.894	106.641	142.385	-0.163	-1.737
3 F	0.090	0.118	55.488	0.073	99.988	117.575	109.957	121.217	0.685 *	-1.048
4 F	5.620	0.919	676.097	1.023	120.110	117.056	107.264	132.573	0.526 *	-1.893
5 F	0.305	0.592	265.889	0.239	112.238	120.530	107.538	113.661	3.029 *	-9.844 *
6	2.220	0.759	189.665	0.685	119.727	118.159	106.459	125.266	0.356	-1.321
7	4.459	1.357	279.907	1.047	123.428	120.411	108.487	140.697	0.423	-1.073
8	5.261	1.267	323.529	0.798	122.847	118.274	107.689	142.323	0.265	-0.934
9 F	3.115	0.679	802.602	0.691	119.983	119.351	108.517	133.858	0.514 *	-2.038 *
10	1.105	0.623	326.300	0.321	115.566	118.328	108.691	129.252	0.286	-1.129
11	1.538	2.815	681.792	0.448	124.463	116.575	110.933	116.884	0.130	-1.085
MEAN	2.365K	0.974K	415.428	565.500	118.020 DB	118.485 DB	108.215 DB	129.595 DB	591.818uV	-2.226nA
SIGMA	2.004K	717.817	270.402	336.982	8.426 DB	1.272 DB	1.342 DB	9.925 DB	839.288uV	2.572nA
MIN	89.851	118.005	55.488	73.184	99.988 DB	116.575 DB	106.459 DB	113.661 DB	-163.000uV	-9.844nA
MAX	5.620K	2.815K	802.602	1.047K	130.723 DB	120.530 DB	110.933 DB	142.385 DB	3.029mV	-0.934nA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 6
TOTAL FAILED DEVICES : 5
REJECTED UNITS:

1,3,4,5,9

PARAMETERS TEST CONDITIONS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
VCC	5.000 V	5.000 V
VEE	-5.000 V	-5.000 V

LIMITS

MIN	0.000 A	-200.000 pA
MAX	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
Unit	nA	nA
1 F	2.618 *	-0.237 *
2 F	2.008 *	-0.271 *
3	0.978	0.070
4	1.996	-0.103
5 F	-4.051 *	5.793 *
6	1.237	0.084
7 F	0.785	0.289 *
8 F	0.659	0.275 *
9 F	2.076 *	-0.038
10 F	0.870	0.260 *
11	1.114	-0.029
MEAN	0.935nA	553.847pA
SIGMA	1.775nA	1.748nA
MIN	-4.051nA	-270.966pA
MAX	2.618nA	5.793nA
QTY	11	11

TOTAL PASSED DEVICES : 4
TOTAL FAILED DEVICES : 7
REJECTED UNITS:

1,2,5,7,8,9,10

REJECTED UNITS :

1,2,3,4,5,6,7,8,9,10

TOTAL PASSED DEVICES : 1
TOTAL FAILED DEVICES : 10

ELECTRICAL MEASUREMENTS

AFTER 50 KRad

DC AT 25 °C

MOTOROLA
Motorola Semiconducteurs S.A.
Centre Electronique de Toulouse

MOTOROLA Semiconductors

HIGH RELIABILITY DIVISION

TRACEABILITY INFORMATION

PROCESS LOT NUMBER	**NTTA0108AH**
DEVICE	**TY30433H**
SOURCE TYPE	**LM108AH**
DATE CODE	**9504**
CUSTOMER	**VARIOUS**
CUSTOMER PART NUMBER	**SCC 9101 005 07B**
LOT SIZE	**11**
SERIAL NUMBER RANGE	**1-11**
MEASUREMENT TYPE	**25 C RADIATION TESTING**
DATE	**03-MAR-95**

COMMENTS

TABLE 2A DC PARAMETERS
ELECTRICAL RECORDS AFTER 50 Krad

PARAMETERS TEST CONDITIONS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
VCC	20.000 V	20.000 V	20.000 V	20.000 V	15.000 V	15.000 V	20.000 V	20.000 V	20.000 V	20.000 V
VEE	-20.000 V	-20.000 V	-20.000 V	-20.000 V	-15.000 V	-15.000 V	-20.000 V	-20.000 V	-20.000 V	-20.000 V
RL			10.000 K	10.000 K						

LIMITS

MIN	0.000 A	-600.000 uA	16.000 V	-20.000 V	-15.000 mA	2.000 mA	-500.000 uV	-2.000 nA	0.000 A	-200.000 pA
MAX	600.000 uA	0.000 A	20.000 V	-16.000 V	-2.000 mA	15.000 mA	500.000 uV	0.000 A	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
Unit	uA	uA	V	V	mA	mA	uV	nA	nA	nA
1 F	320.000	-322.000	18.704	-18.807	-5.284	9.762	523.000 *	-3.636 *	4.049 *	-0.414 *
2 F	321.000	-321.000	18.708	-18.807	-5.470	9.739	-118.000	-4.758 *	1.369	3.389 *
3	323.000	-322.000	18.708	-18.808	-5.643	9.639	153.000	-1.107	1.126	-0.019
4 F	326.000	-330.000	18.711	-18.811	-5.677	9.686	635.000 *	-1.950	2.710 *	-0.760 *
5 F	321.000	-321.000	18.706	-18.805	-5.041	9.583	109.000	-3.370 *	3.664 *	-0.294 *
6	327.000	-325.000	18.711	-18.806	-5.495	9.700	392.000	-1.432	1.272	0.159
7	325.000	-333.000	18.717	-18.814	-6.205	9.791	426.000	-1.058	0.871	0.187
8 F	321.000	-323.000	18.721	-18.816	-6.262	9.596	235.000	-1.039	0.539	0.500 *
9 F	315.000	-321.000	18.708	-18.794	-4.816	9.630	634.000 *	-3.058 *	3.290 *	-0.232 *
10	325.000	-339.000	18.713	-18.818	-6.553	9.724	310.000	-1.071	1.006	0.066
11	344.000	-343.000	18.713	-18.837	-8.773	10.250	138.000	-1.112	1.133	-0.021
MEAN	324.364uA	-327.273uA	18.711 V	-18.811 V	-5.929mA	9.736mA	312.455uV	-2.145nA	1.912nA	232.859pA
SIGMA	7.339uA	7.888uA	4.949mV	10.722mV	1.079mA	183.166uA	236.543uV	1.328nA	1.261nA	1.100nA
MIN	315.000uA	-343.000uA	18.704 V	-18.837 V	-8.773mA	9.583mA	-118.000uV	-4.758nA	538.996pA	-759.584pA
MAX	344.000uA	-321.000uA	18.721 V	-18.794 V	-4.816mA	10.250mA	635.000uV	-1.039nA	4.049nA	3.389nA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 5
TOTAL FAILED DEVICES : 6
REJECTED UNITS:

1,2,4,5,8,9

PARAMETERS TEST CONDITIONS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
VCC	20.000 V	20.000 V	5.000 V	5.000 V	20.000 V	20.000 V	5.000 V	35.000 V	5.000 V	5.000 V
VEE	-20.000 V	-20.000 V	-5.000 V	-5.000 V	-20.000 V	-20.000 V	-35.000 V	-5.000 V	-5.000 V	-5.000 V
VCC'					10.000 V					
VEE'						-10.000 V				

LIMITS

MIN	80.000	80.000	20.000	20.000	80.000 DB	80.000 DB	96.000 DB	96.000 DB	-500.000 uV	-2.000 nA
MAX	8.000 K	8.000 K	8.000 K	8.000 K	200.000 DB	200.000 DB	200.000 DB	200.000 DB	500.000 uV	0.000 A

DATA RECORDS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
Unit	KV/MV	KV/MV	KV/MV	KV/MV	DB	DB	DB	DB	uV	nA
1 F	0.154	0.236	0.088	0.082	105.100	117.144	107.887	126.011	612.000 *	-3.562 *
2 F	1.325	1.028	1.341	0.475	137.530	119.591	106.400	144.857	-153.000	-4.683 *
3	0.215	0.309	0.156	0.178	107.809	119.226	109.537	119.812	202.000	-1.127
4 F	0.869	3.393	0.344	0.233	131.646	117.134	106.975	129.627	635.000 *	-1.963
5 F	0.196	0.351	0.126	0.088	107.543	121.005	107.030	145.020	170.000	-3.472 *
6	1.852	0.742	0.198	0.533	118.228	118.500	106.381	123.637	353.000	-1.317
7	4.508	1.506	0.267	1.183	124.056	120.087	108.385	139.924	402.000	-0.969
8	4.860	0.915	0.280	0.500	122.161	119.014	107.247	136.115	215.000	-0.895
9 F	0.630	1.284	0.297	0.135	129.009	118.256	108.241	129.662	636.000 *	-3.061 *
10	1.014	0.647	0.265	0.483	117.075	118.611	108.336	129.770	275.000	-1.033
11	1.586	3.465	0.367	0.304	124.582	117.416	110.762	117.505	128.000	-1.083
MEAN	1.564K	1.261K	338.975	381.242	120.431 DB	118.726 DB	107.926 DB	131.085 DB	315.909uV	-2.106nA
SIGMA	1.643K	1.143K	343.868	317.066	10.496 DB	1.231 DB	1.342 DB	9.412 DB	245.365uV	1.345nA
MIN	153.561	236.062	87.872	81.819	105.100 DB	117.134 DB	106.381 DB	117.505 DB	-153.000uV	-4.683nA
MAX	4.860K	3.465K	1.341K	1.183K	137.530 DB	121.005 DB	110.762 DB	145.020 DB	636.000uV	-895.066pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 6
TOTAL FAILED DEVICES : 5
REJECTED UNITS:

1,2,4,5,9

PARAMETERS TEST CONDITIONS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
VCC	5.000 V	5.000 V
VEE	-5.000 V	-5.000 V

LIMITS

MIN	0.000 A	-200.000 pA
MAX	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
Unit	nA	nA
1 F	4.083 *	-0.520 *
2 F	1.230	3.453 *
3	1.090	0.037
4 F	2.556 *	-0.593 *
5 F	3.604 *	-0.133
6	1.349	-0.033
7	0.950	0.019
8 F	0.637	0.258 *
9 F	3.301 *	-0.240 *
10	1.033	0.000
11	1.120	-0.037
MEAN	1.905nA	201.023pA
SIGMA	1.238nA	1.107nA
MIN	636.817pA	-593.287pA
MAX	4.083nA	3.453nA
QTY	11	11

TOTAL PASSED DEVICES : 5
TOTAL FAILED DEVICES : 6
REJECTED UNITS:

1,2,4,5,8,9

REJECTED UNITS :

1,2,4,5,8,9

TOTAL PASSED DEVICES : 5
TOTAL FAILED DEVICES : 6

ELECTRICAL MEASUREMENTS

AFTER 168 H ANNEALING

DC AT 25 °C

MOTOROLA
Motorola Semiconducteurs S.A.
Centre Electronique de Toulouse

MOTOROLA Semiconductors

HIGH RELIABILITY DIVISION

TRACEABILITY INFORMATION

PROCESS LOT NUMBER	**NTTA0108AH**
DEVICE	**TY30433H**
SOURCE TYPE	**LM108AH**
DATE CODE	**9504**
CUSTOMER	**VARIOUS**
CUSTOMER PART NUMBER	**SCC 9101 005 07B**
LOT SIZE	**11**
SERIAL NUMBER RANGE	**1-11**
MEASUREMENT TYPE	**25 C RADIATION TESTING**
DATE	**03-MAR-95**

COMMENTS

TABLE 2A DC PARAMETERS
ELECTRICAL RECORDS AFTER 168H ANNEALING

PARAMETERS TEST CONDITIONS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
VCC	20.000 V	20.000 V	20.000 V	20.000 V	15.000 V	15.000 V	20.000 V	20.000 V	20.000 V	20.000 V
VEE	-20.000 V	-20.000 V	-20.000 V	-20.000 V	-15.000 V	-15.000 V	-20.000 V	-20.000 V	-20.000 V	-20.000 V
RL			10.000 K	10.000 K						

LIMITS

MIN	0.000 A	-600.000 uA	16.000 V	-20.000 V	-15.000 mA	2.000 mA	-500.000 uV	-2.000 nA	0.000 A	-200.000 pA
MAX	600.000 uA	0.000 A	20.000 V	-16.000 V	-2.000 mA	15.000 mA	500.000 uV	0.000 A	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	1.1	1.2	2.0	2.1	3.0	3.1	4.0	5.0	5.1	6.0
Test	ICC(+)2	ICC(-)2	VOUT(+)	VOUT(-)	IOS(-)	IOS(+)	VIO1	I+IB1	I-IB1	IIO1
Unit	uA	uA	V	V	mA	mA	uV	nA	nA	pA
1 F	322.000	-319.000	18.709	-18.811	-5.480	9.711	459.000	-3.059 *	3.299 *	-239.633 *
2 F	323.000	-321.000	18.707	-18.808	-5.582	9.797	-167.000	-1.871	2.018 *	-146.714
3	325.000	-324.000	18.708	-18.810	-5.926	9.699	370.000	-1.047	1.009	37.656
4 F	322.000	-318.000	18.708	-18.809	-5.811	9.778	588.000 *	-1.686	2.222 *	-535.996 *
5 F	319.000	-320.000	18.704	-18.803	-5.154	9.727	63.000	-2.851 *	3.013 *	-161.875
6	325.000	-328.000	18.708	-18.805	-5.567	9.793	392.000	-1.258	1.239	18.584
7	324.000	-327.000	18.716	-18.814	-6.301	9.845	438.000	-0.923	0.855	67.977
8	320.000	-358.000	18.718	-18.811	-6.097	9.727	239.000	-0.756	0.767	-11.737
9 F	316.000	-315.000	18.708	-18.794	-4.917	9.710	567.000 *	-2.554 *	2.634 *	-79.714
10	332.000	-323.000	18.712	-18.817	-6.678	9.786	316.000	-1.030	0.988	42.547
11	342.000	-337.000	18.716	-18.840	-8.816	10.218	127.000	-1.116	1.096	20.051
MEAN	324.545uA	-326.364uA	18.710 V	-18.811 V	-6.030mA	9.799mA	308.364uV	-1.650nA	1.740nA	-89.896pA
SIGMA	7.076uA	12.069uA	4.478mV	11.353mV	1.051mA	146.410uA	227.885uV	825.328pA	0.930nA	178.505pA
MIN	316.000uA	-358.000uA	18.704 V	-18.840 V	-8.816mA	9.699mA	-167.000uV	-3.059nA	767.314pA	-535.996pA
MAX	342.000uA	-315.000uA	18.718 V	-18.794 V	-4.917mA	10.218mA	588.000uV	-755.578pA	3.299nA	67.977pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 6
TOTAL FAILED DEVICES : 5
REJECTED UNITS:

1,2,4,5,9

PARAMETERS TEST CONDITIONS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
VCC	20.000 V	20.000 V	5.000 V	5.000 V	20.000 V	20.000 V	5.000 V	35.000 V	5.000 V	5.000 V
VEE	-20.000 V	-20.000 V	-5.000 V	-5.000 V	-20.000 V	-20.000 V	-35.000 V	-5.000 V	-5.000 V	-5.000 V
VCC'					10.000 V					
VEE'						-10.000 V				

LIMITS

MIN	80.000	80.000	20.000	20.000	80.000 DB	80.000 DB	96.000 DB	96.000 DB	-500.000 uV	-2.000 nA
MAX	8.000 K	8.000 K	8.000 K	8.000 K	200.000 DB	200.000 DB	200.000 DB	200.000 DB	500.000 uV	0.000 A

DATA RECORDS

Test Nb	7.0	7.1	8.0	8.1	9.0	9.1	10.0	10.1	14.0	15.0
Test	+AVS1	-AVS1	+AVS2	-AVS2	+PSRR	-PSRR	CMRR+	CMRR-	VIO2	I+IB2
Unit	KV/MV	KV/MV	KV/MV	V/MV	DB	DB	DB	DB	uV	nA
1 F	0.179	0.279	0.121	78.090	107.079	117.958	108.146	127.652	528.000 *	-3.036 *
2	2.449	1.211	1.510	326.267	133.045	118.023	106.411	151.331	-183.000	-1.778
3 F	0.094	0.124	0.056	70.554	99.845	119.968	109.841	121.096	525.000 *	-1.001
4 F	1.260	1.819	1.338	286.701	136.309	118.116	106.935	133.347	579.000 *	-1.696
5 F	0.224	0.439	0.147	94.108	109.032	119.073	107.367	146.363	111.000	-2.820 *
6	1.985	0.826	0.180	460.256	119.214	119.644	106.273	122.892	352.000	-1.236
7	4.996	1.231	0.278	736.582	125.408	120.919	108.527	138.798	410.000	-0.945
8	1.772	0.839	0.211	712.285	118.622	118.849	107.222	147.249	209.000	-0.767
9 F	1.887	0.728	0.425	171.579	123.485	121.098	108.198	137.723	552.000 *	-2.523 *
10	1.282	0.748	0.269	662.054	117.893	118.647	108.227	129.789	286.000	-0.988
11	1.531	2.967	0.579	396.334	124.995	117.205	110.801	116.309	107.000	-1.054
MEAN	1.605K	1.019K	464.866	363.165	119.539 DB	119.045 DB	107.995 DB	133.868 DB	316.000uV	-1.622nA
SIGMA	1.375K	801.938	497.480	253.847	10.957 DB	1.249 DB	1.388 DB	11.519 DB	238.889uV	820.080pA
MIN	93.826	123.978	56.144	70.554	99.845 DB	117.205 DB	106.273 DB	116.309 DB	-183.000uV	-3.036nA
MAX	4.996K	2.967K	1.510K	736.582	136.309 DB	121.098 DB	110.801 DB	151.331 DB	579.000uV	-766.826pA
QTY	11	11	11	11	11	11	11	11	11	11

TOTAL PASSED DEVICES : 6
TOTAL FAILED DEVICES : 5
REJECTED UNITS:

1,3,4,5,9

PARAMETERS TEST CONDITIONS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
VCC	5.000 V	5.000 V
VEE	-5.000 V	-5.000 V

LIMITS

MIN	0.000 A	-200.000 pA
MAX	2.000 nA	200.000 pA

DATA RECORDS

Test Nb	15.1	16.0
Test	I-IB2	IIO2
Unit	nA	pA
1 F	3.336 *	-299.787 *
2 F	2.052 *	-273.866 *
3	1.012	-11.249
4 F	2.255 *	-559.470 *
5 F	3.054 *	-233.764 *
6	1.255	-19.562
7	0.873	72.379
8	0.817	-49.883
9 F	2.699 *	-176.546
10	1.021	-33.255
11	1.175	-120.795
MEAN	1.777nA	-155.073pA
SIGMA	0.935nA	179.752pA
MIN	816.708pA	-559.470pA
MAX	3.336nA	72.379pA
QTY	11	11

TOTAL PASSED DEVICES : 6
TOTAL FAILED DEVICES : 5
REJECTED UNITS:

1,2,4,5,9

REJECTED UNITS :

1,2,3,4,5,9

TOTAL PASSED DEVICES : 5
TOTAL FAILED DEVICES : 6

MOTOROLA

Motorola Semiconductors S.A.
Discrete & Analog Products Division

APPENDIX 2

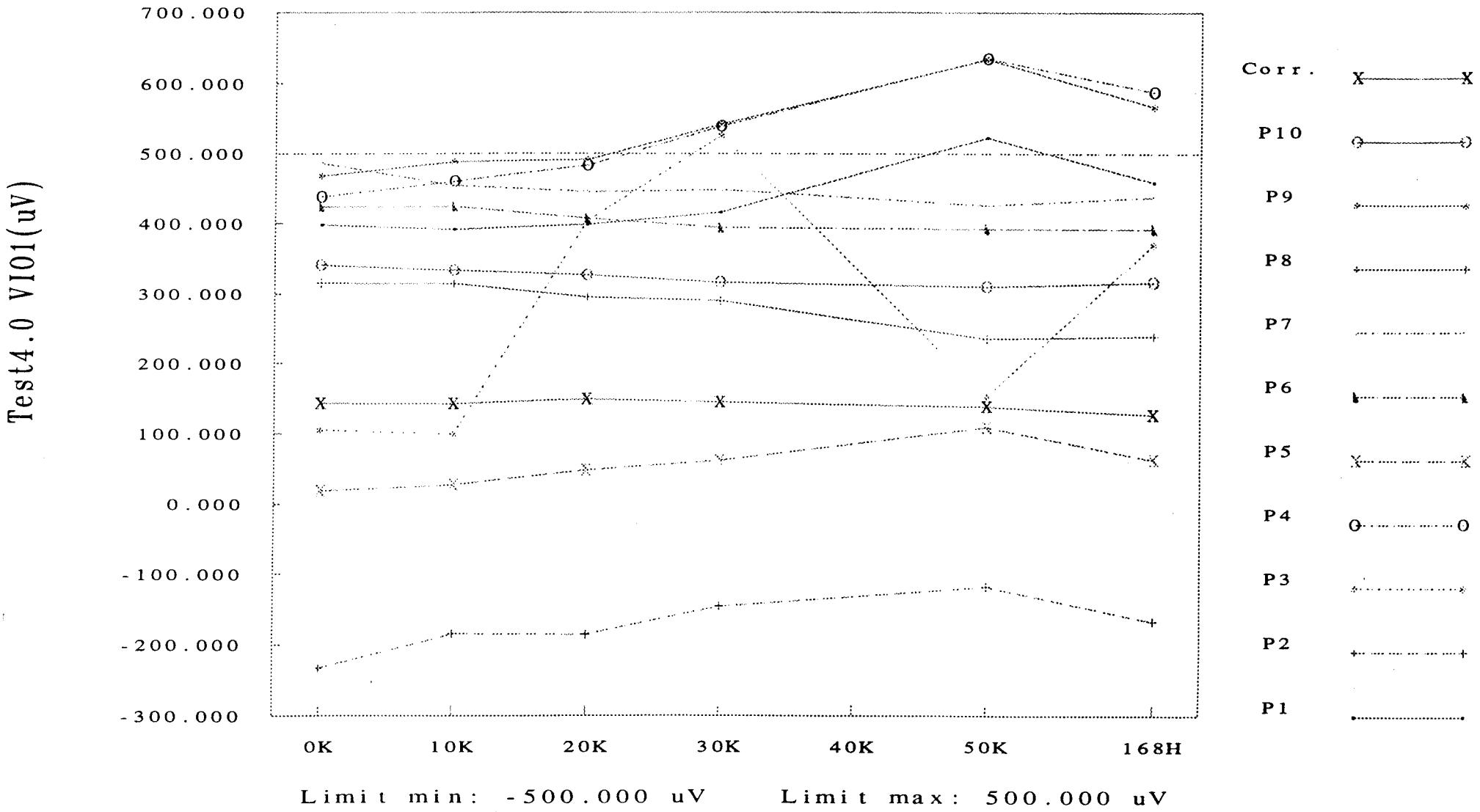
DIAGRAMS FOR TABLE 4 PARAMETERS

Total Quality Six Sigma for Total Customer Satisfaction

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=4.0 Test =VIO1 VCC =20.000 V
VEE =-20.000 V



Limit min: -500.000 uV Limit max: 500.000 uV

Devices Measurements

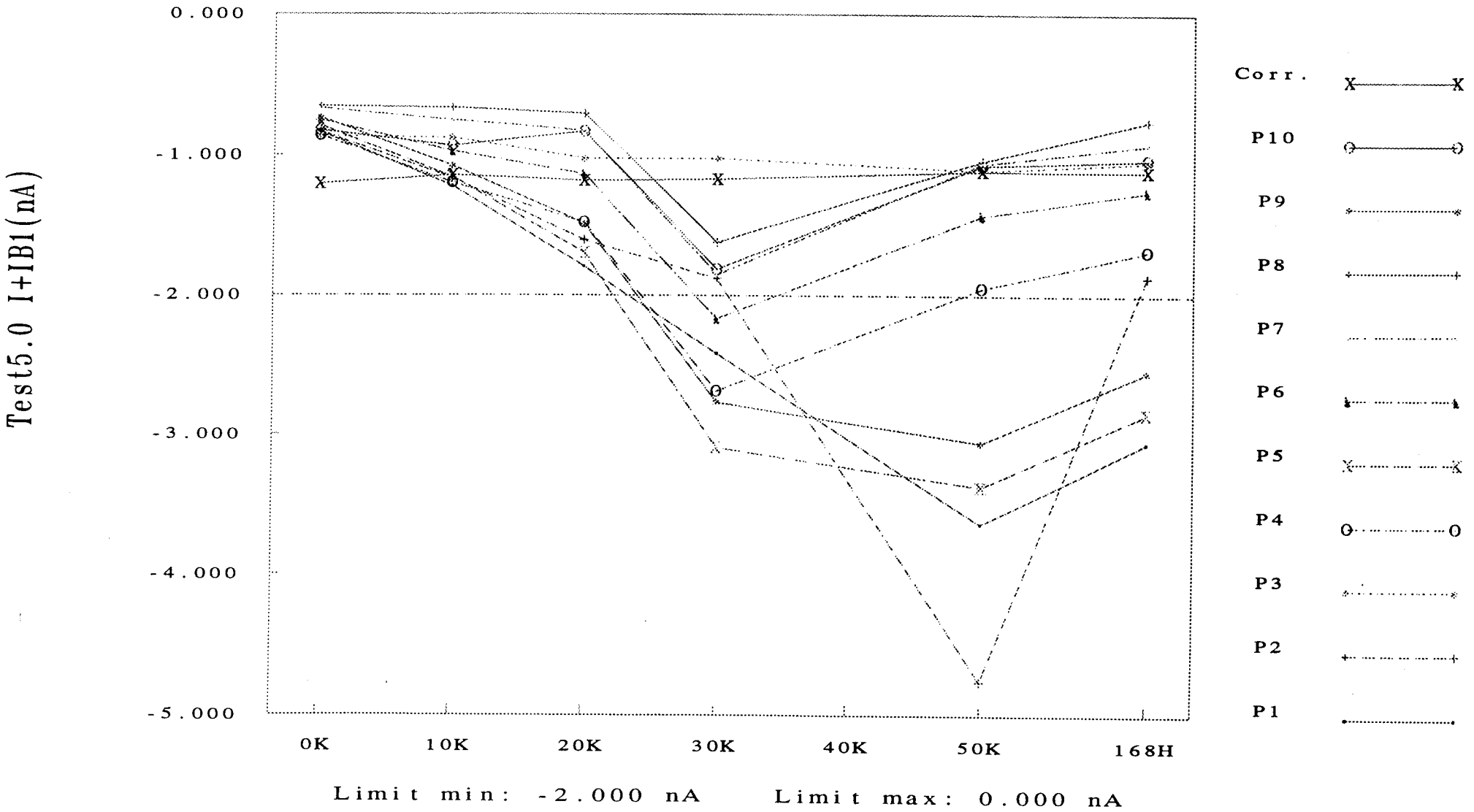
Test4.0 VIO1(uV)

	0K	10K	20K	30K	50K	168H
Correl.	143.000	142.000	149.000	145.000	138.000	127.000
P1	398.000	391.000	398.000	416.000	523.000F	459.000
P2	-233.000	-185.000	-186.000	-146.000	-118.000	-167.000
P3	105.000	99.000	404.000	526.000F	153.000	370.000
P4	438.000	460.000	483.000	539.000F	635.000F	588.000F
P5	19.000	27.000	48.000	62.000	109.000	63.000
P6	424.000	424.000	407.000	394.000	392.000	392.000
P7	486.000	454.000	445.000	448.000	426.000	438.000
P8	315.000	314.000	295.000	290.000	235.000	239.000
P9	468.000	488.000	491.000	542.000F	634.000F	567.000F
P10	341.000	333.000	326.000	316.000	310.000	316.000
MEAN	276.100uV	280.500uV	311.100uV	338.700uV	329.900uV	326.500uV
SIGMA	236.670uV	225.081uV	216.547uV	224.077uV	241.764uV	231.693uV
MIN	-233.000uV	-185.000uV	-186.000uV	-146.000uV	-118.000uV	-167.000uV
MAX	486.000uV	488.000uV	491.000uV	542.000uV	635.000uV	588.000uV
CP	0.7042	0.7405	0.7697	0.7438	0.6894	0.7193
CPK	0.3153	0.3251	0.2908	0.2399	0.2345	0.2496

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=5.0 Test =I+IB1 VCC =20.000 V
VEE =-20.000 V



Limit min: -2.000 nA Limit max: 0.000 nA

Devices Measurements

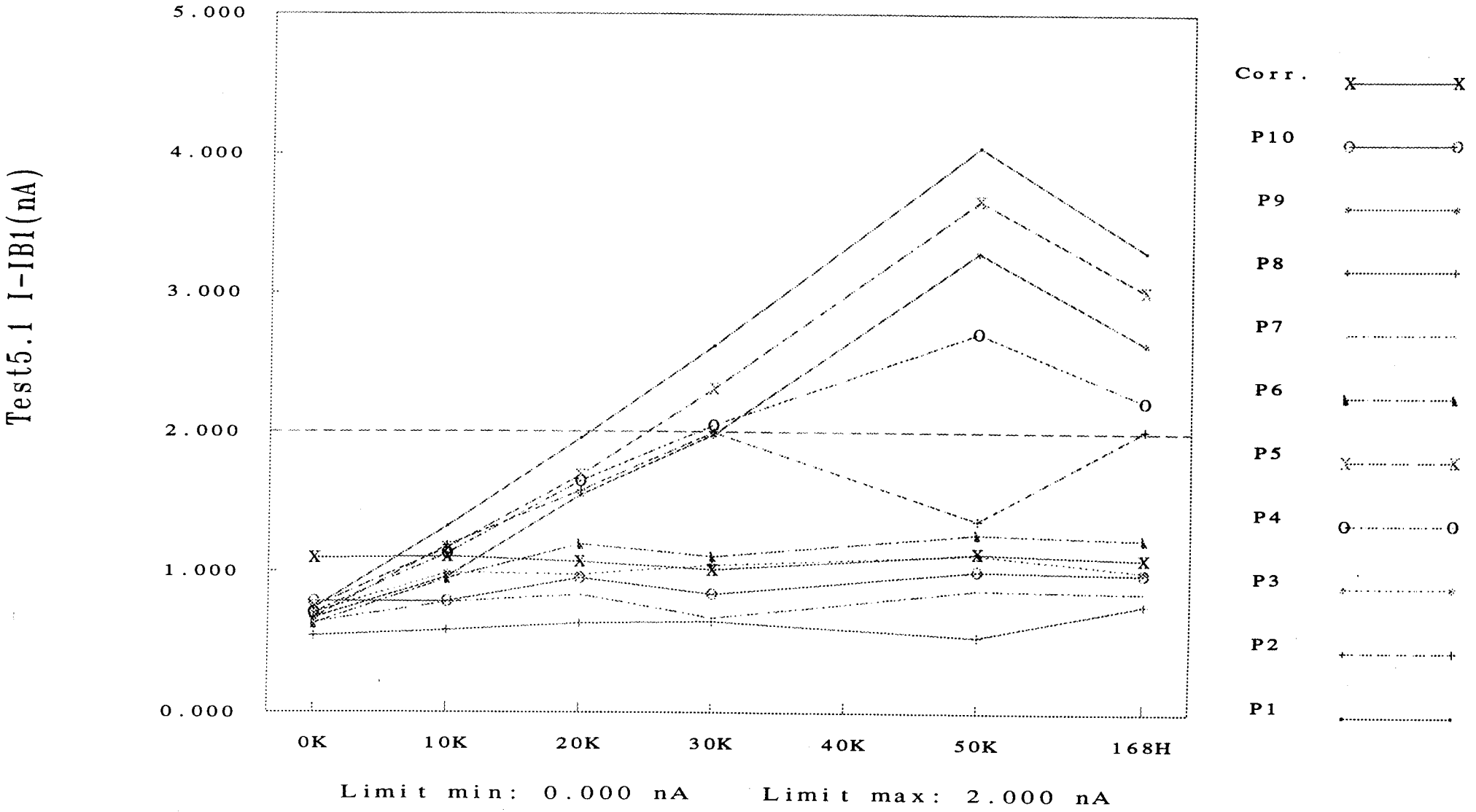
Test5.0 I+IB1(nA)

	0K	10K	20K	30K	50K	168H
Correl.	-1.206	-1.144	-1.183	-1.172	-1.112	-1.116
P1	-0.837	-1.221	-1.795	-2.420F	-3.636F	-3.059F
P2	-0.834	-1.164	-1.608	-1.882	-4.758F	-1.871
P3	-0.864	-0.876	-1.024	-1.023	-1.107	-1.047
P4	-0.860	-1.197	-1.481	-2.690F	-1.950	-1.686
P5	-0.791	-1.156	-1.697	-3.091F	-3.370F	-2.851F
P6	-0.750	-0.972	-1.136	-2.170F	-1.432	-1.258
P7	-0.664	-0.750	-0.826	-1.854	-1.058	-0.923
P8	-0.649	-0.661	-0.702	-1.624	-1.039	-0.756
P9	-0.734	-1.077	-1.489	-2.770F	-3.058F	-2.554F
P10	-0.824	-0.933	-0.831	-1.815	-1.071	-1.030
MEAN	-780.837pA	-1.001nA	-1.259nA	-2.134nA	-2.248nA	-1.703nA
SIGMA	78.532pA	195.166pA	401.865pA	619.041pA	1.352nA	849.699pA
MIN	-864.252pA	-1.221nA	-1.795nA	-3.091nA	-4.758nA	-3.059nA
MAX	-648.924pA	-660.784pA	-702.358pA	-1.023nA	-1.039nA	-755.578pA
CP	4.24458	1.70795	0.8295	0.5385	0.2465	0.3923
CPK	3.31432	1.70689	0.6147	-0.0720	-0.0611	0.1163

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=5.1 Test =I-IB1 VCC =20.000 V
VEE =-20.000 V



Limit min: 0.000 nA Limit max: 2.000 nA

Devices Measurements

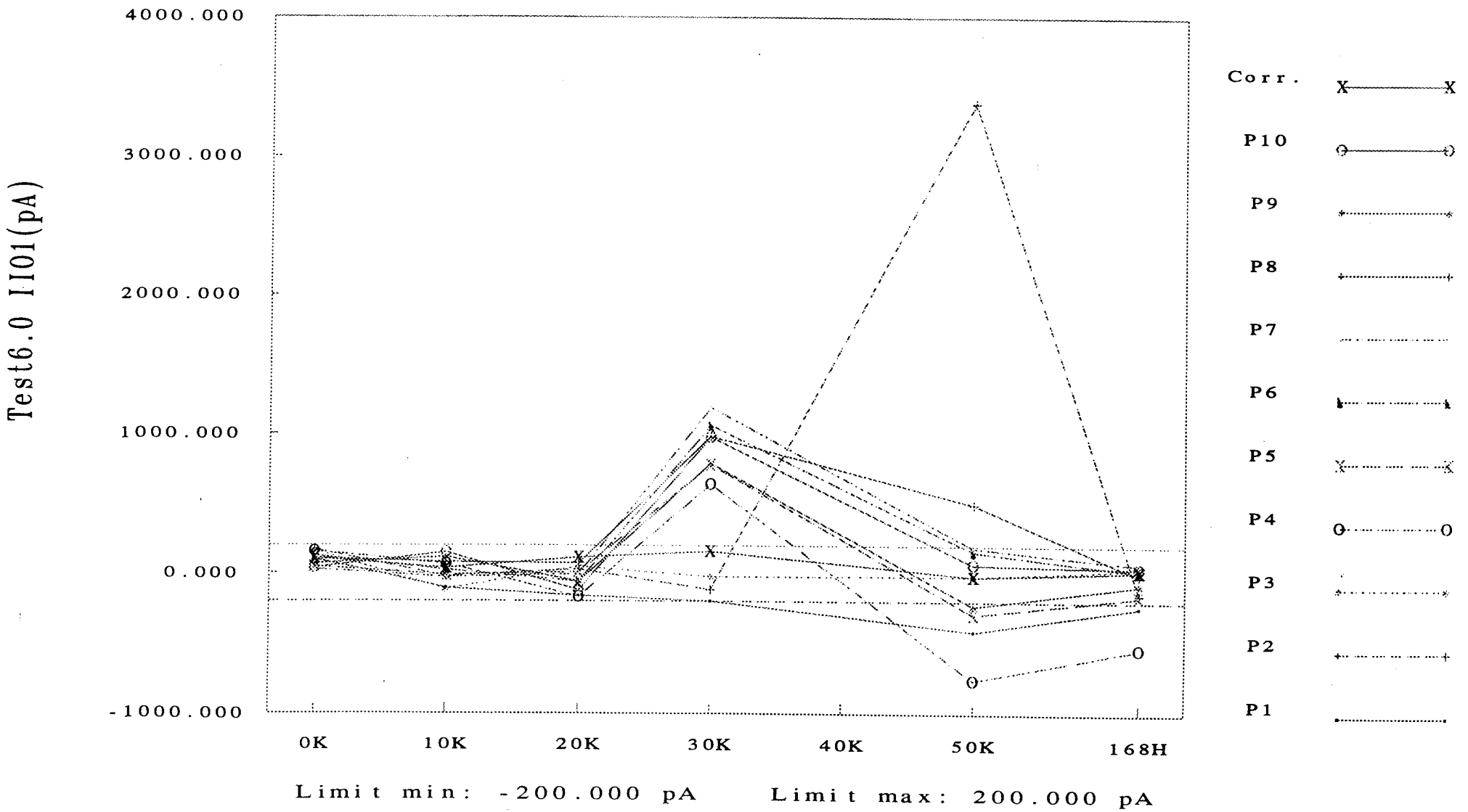
Test5.1 I-IB1(nA)

	0K	10K	20K	30K	50K	168H
Correl.	1.097	1.107	1.069	1.014	1.133	1.096
P1	0.736	1.326	1.955	2.618F	4.049F	3.299F
P2	0.666	1.186	1.580	1.997	1.369	2.018F
P3	0.703	0.990	0.976	1.046	1.126	1.009
P4	0.704	1.129	1.649	2.048F	2.710F	2.222F
P5	0.744	1.168	1.689	2.310F	3.664F	3.013F
P6	0.626	0.949	1.195	1.110	1.272	1.239
P7	0.636	0.778	0.832	0.668	0.871	0.855
P8	0.541	0.581	0.629	0.643	0.539	0.767
P9	0.665	0.960	1.547	1.980	3.290F	2.634F
P10	0.785	0.784	0.952	0.838	1.006	0.988
MEAN	680.635pA	0.985nA	1.300nA	1.526nA	1.990nA	1.804nA
SIGMA	69.970pA	225.955pA	440.875pA	737.972pA	1.301nA	0.954nA
MIN	541.014pA	580.571pA	628.502pA	643.176pA	538.996pA	767.314pA
MAX	785.462pA	1.326nA	1.955nA	2.618nA	4.049nA	3.299nA
CP	4.76394	1.47522	0.7561	0.4517	0.2563	0.3493
CPK	3.2425	1.45326	0.5290	0.2141	0.0027	0.0683

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=6.0 Test =IIO1 VCC =20.000 V
VEE =-20.000 V



Limit min: -200.000 pA Limit max: 200.000 pA

Devices Measurements

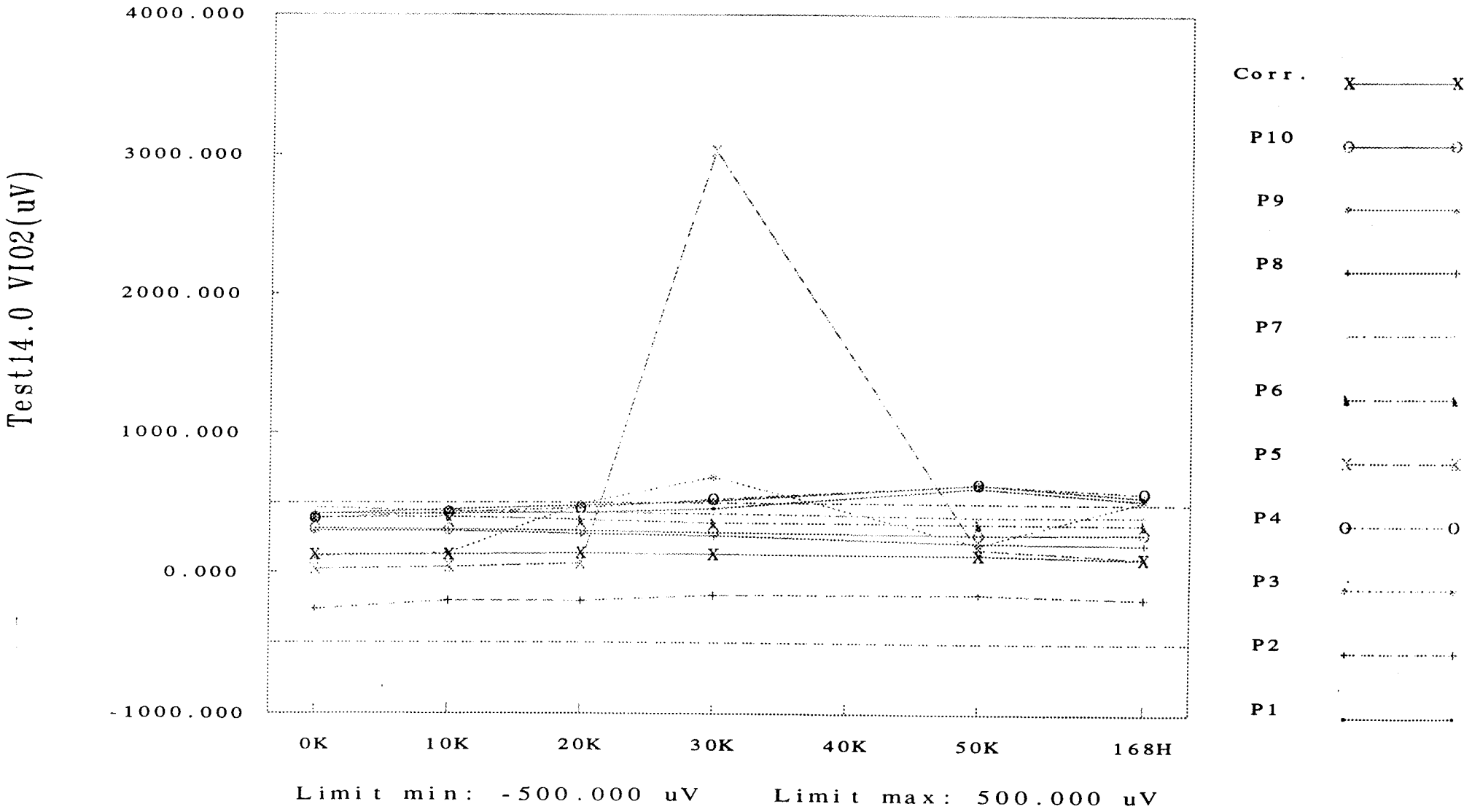
Test6.0 IIO1(pA)

	0K	10K	20K	30K	50K	168H
Correl.	108.399	36.683	113.962	158.471	-21.032	20.051
P1	101.303	-105.158	-160.916	-198.578	-413.785F	-239.633F
P2	168.593	-21.521	28.368	-114.940	3388.533F	-146.714
P3	160.762	-113.962	47.933	-22.499	-19.075	37.656
P4	156.359	67.986	-167.764	641.220F	-759.584F	-535.996F
P5	46.981	-12.717	7.826	780.616F	-293.953F	-161.875
P6	124.792	22.988	-59.182	1059.407F	159.449	18.584
P7	27.406	-28.368	-5.869	1186.574F	187.328	67.977
P8	107.909	80.213	73.856	980.661F	499.867F	-11.737
P9	69.248	116.407	-57.715	789.419F	-231.837F	-79.714
P10	38.661	149.177	-120.321	976.258F	65.541	42.547
MEAN	100.201pA	15.504pA	-41.378pA	607.814pA	258.248pA	-100.890pA
SIGMA	52.748pA	88.481pA	86.204pA	521.489pA	1.156nA	184.192pA
MIN	27.406pA	-113.962pA	-167.764pA	-198.578pA	-759.584pA	-535.996pA
MAX	168.593pA	149.177pA	73.856pA	1.187nA	3.389nA	67.977pA
CP	1.26388	0.7535	0.7734	0.1278	0.0577	0.3619
CPK	0.6307	0.6950	0.6134	-0.2607	-0.0168	0.1794

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=14.0 Test =VIO2 VCC =5.000 V
VEE =-5.000 V



Limit min: -500.000 uV Limit max: 500.000 uV

Devices Measurements

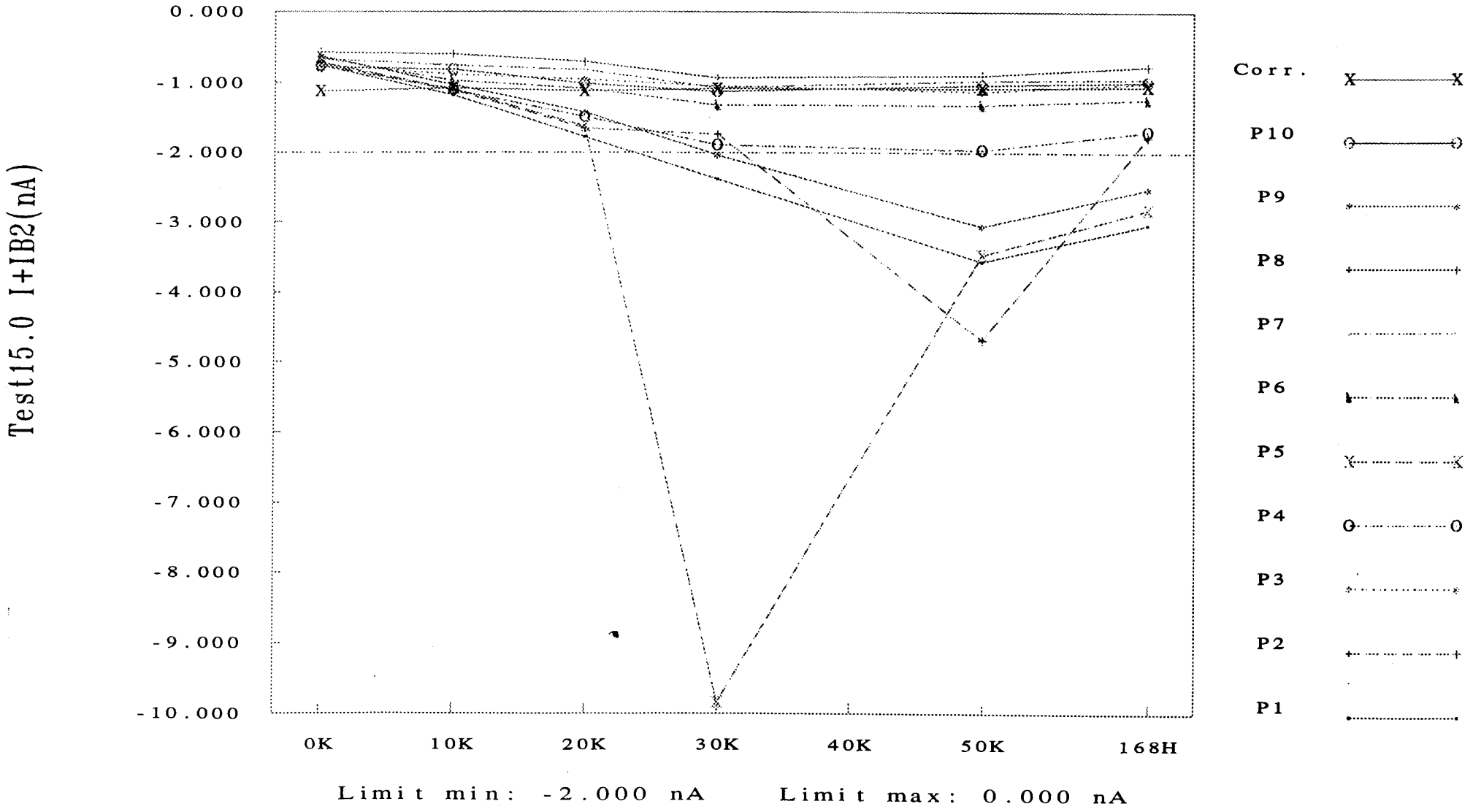
Test14.0 VIO2(uV)

	0K	10K	20K	30K	50K	168H
Correl.	122.000	127.000	135.000	130.000	128.000	107.000
P1	418.000	420.000	428.000	459.000	612.000F	528.000F
P2	-265.000	-204.000	-205.000	-163.000	-153.000	-183.000
P3	113.000	137.000	492.000	685.000F	202.000	525.000F
P4	386.000	429.000	461.000	526.000F	635.000F	579.000F
P5	23.000	38.000	64.000	3029.000F	170.000	111.000
P6	391.000	398.000	376.000	356.000	353.000	352.000
P7	465.000	439.000	426.000	423.000	402.000	410.000
P8	297.000	296.000	275.000	265.000	215.000	209.000
P9	417.000	452.000	478.000	514.000F	636.000F	552.000F
P10	312.000	306.000	297.000	286.000	275.000	286.000
MEAN	255.700uV	271.100uV	309.200uV	638.000uV	334.700uV	336.900uV
SIGMA	231.413uV	217.051uV	221.864uV	869.830uV	250.156uV	240.977uV
MIN	-265.000uV	-204.000uV	-205.000uV	-163.000uV	-153.000uV	-183.000uV
MAX	465.000uV	452.000uV	492.000uV	3.029mV	636.000uV	579.000uV
CP	0.7202	0.7679	0.7512	0.1916	0.6663	0.6916
CPK	0.3519	0.3515	0.2867	-0.0529	0.2203	0.2256

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=15.0 Test =I+IB2 VCC =5.000 V
VEE =-5.000 V



Limit min: -2.000 nA Limit max: 0.000 nA

Devices Measurements

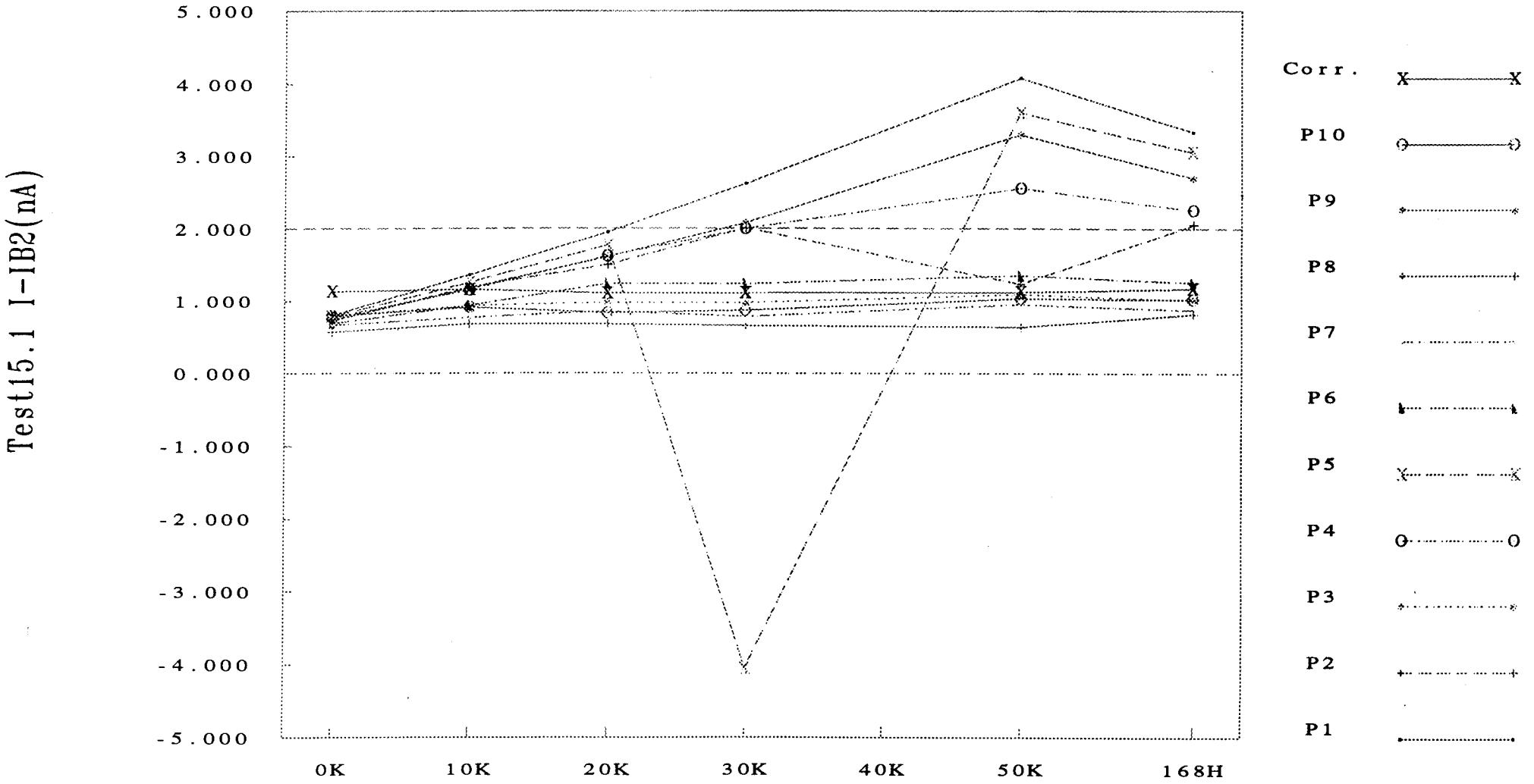
Test15.0 I+IB2(nA)

	0K	10K	20K	30K	50K	168H
Correl.	-1.122	-1.081	-1.121	-1.085	-1.083	-1.054
P1	-0.760	-1.180	-1.777	-2.381F	-3.562F	-3.036F
P2	-0.734	-1.107	-1.655	-1.737	-4.683F	-1.778
P3	-0.753	-0.887	-0.954	-1.048	-1.127	-1.001
P4	-0.758	-1.109	-1.488	-1.893	-1.963	-1.696
P5	-0.718	-1.093	-1.624	-9.844F	-3.472F	-2.820F
P6	-0.657	-0.973	-1.085	-1.321	-1.317	-1.236
P7	-0.666	-0.761	-0.822	-1.073	-0.969	-0.945
P8	-0.570	-0.599	-0.707	-0.934	-0.895	-0.767
P9	-0.627	-1.033	-1.423	-2.038F	-3.061F	-2.523F
P10	-0.780	-0.818	-1.013	-1.129	-1.033	-0.988
MEAN	-702.266pA	-0.956nA	-1.255nA	-2.340nA	-2.208nA	-1.679nA
SIGMA	68.837pA	185.824pA	382.540pA	2.682nA	1.372nA	841.312pA
MIN	-779.834pA	-1.180nA	-1.777nA	-9.844nA	-4.683nA	-3.036nA
MAX	-570.377pA	-599.157pA	-707.250pA	-0.934nA	-895.066pA	-766.826pA
CP	4.84234	1.79381	0.8714	0.1243	0.2429	0.3962
CPK	3.40061	1.71472	0.6493	-0.0422	-0.0505	0.1272

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=15.1 Test =I-IB2 VCC =5.000 V
VEE =-5.000 V



Limit min: 0.000 nA Limit max: 2.000 nA

Devices Measurements

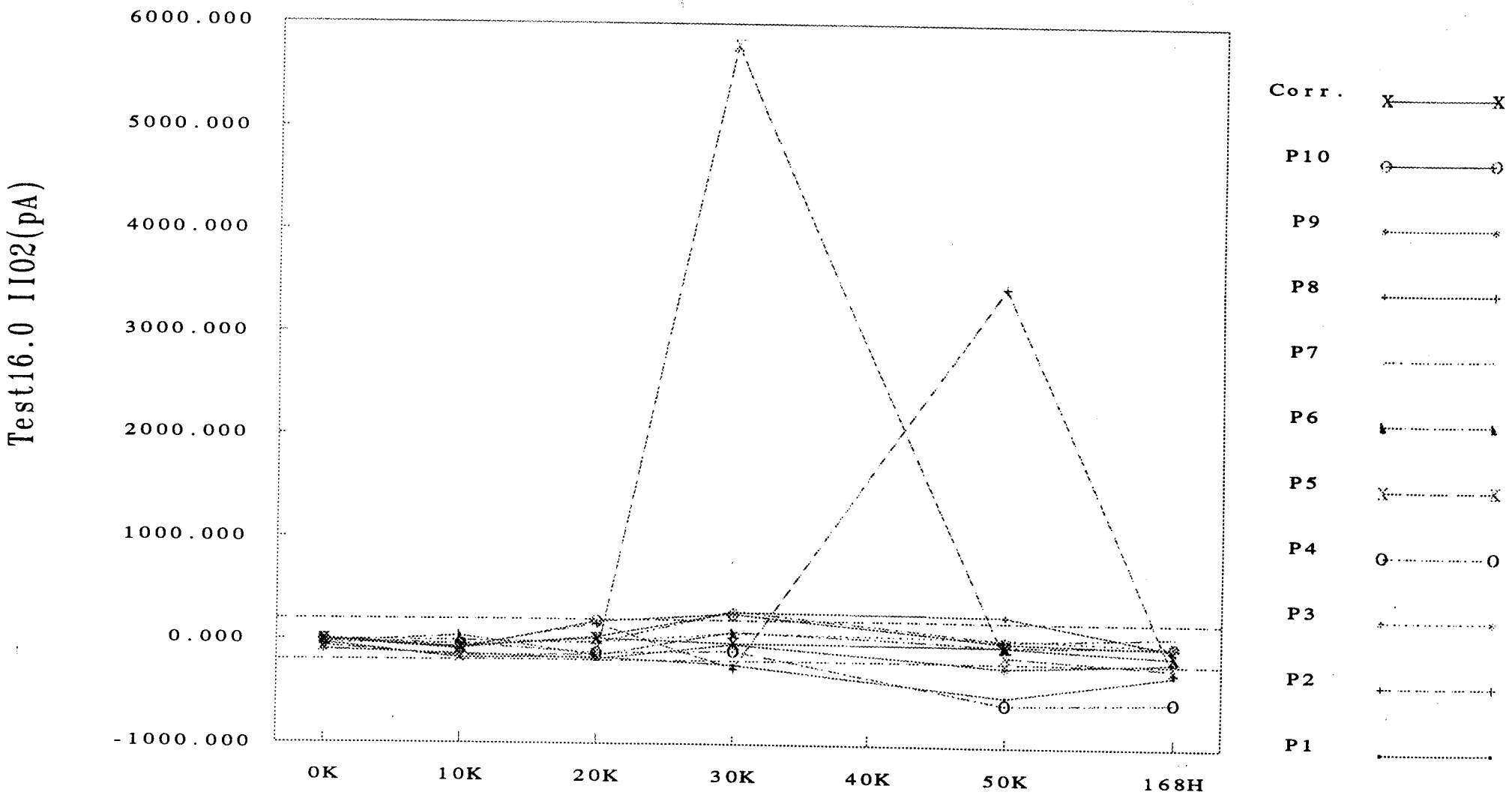
Test15.1 I-IB2(nA)

	0K	10K	20K	30K	50K	168H
Correl.	1.132	1.160	1.108	1.114	1.120	1.175
P1	0.803	1.360	1.948	2.618F	4.083F	3.336F
P2	0.735	1.191	1.498	2.008F	1.230	2.052F
P3	0.794	0.935	0.978	0.978	1.090	1.012
P4	0.768	1.158	1.617	1.996	2.556F	2.255F
P5	0.787	1.255	1.766	-4.051F	3.604F	3.054F
P6	0.691	0.939	1.238	1.237	1.349	1.255
P7	0.669	0.773	0.854	0.785	0.950	0.873
P8	0.569	0.685	0.680	0.659	0.637	0.817
P9	0.731	1.176	1.607	2.076F	3.301F	2.699F
P10	0.792	0.912	0.833	0.870	1.033	1.021
MEAN	733.831pA	1.038nA	1.302nA	0.918nA	1.983nA	1.837nA
SIGMA	73.804pA	220.697pA	444.751pA	1.870nA	1.276nA	0.963nA
MIN	568.909pA	685.239pA	679.859pA	-4.051nA	636.817pA	816.708pA
MAX	802.590pA	1.360nA	1.948nA	2.618nA	4.083nA	3.336nA
CP	4.51646	1.51037	0.7495	0.1783	0.2613	0.3461
CPK	3.31432	1.45248	0.5232	0.1636	0.0044	0.0563

TOTAL DOSE RADIATION TESTING
MOTOROLA FRANCE

Source:LM108AH Lot:NTTA0108AH Date Code:9504 Date:03-MAR-95

Test Nb=16.0 Test =IIO2 VCC =5.000 V
VEE =-5.000 V



Limit min: -200.000 pA Limit max: 200.000 pA

Devices Measurements

Test16.0 IIO2(pA)

	0K	10K	20K	30K	50K	168H
Correl.	-10.277	-78.257	12.228	-28.857	-36.683	-120.795
P1	-43.066	-179.991	-170.699	-237.218F	-520.412F	-299.787F
P2	-1.713	-84.127	157.493	-270.966F	3453.098F	-273.866F
P3	-40.619	-48.422	-24.455	70.431	37.172	-11.249
P4	-9.788	-48.422	-129.124	-102.713	-593.287F	-559.470F
P5	-69.492	-161.895	-142.330	5792.988F	-132.548	-233.764F
P6	-33.768	33.749	-153.580	83.637	-32.770	-19.562
P7	-2.447	-12.227	-31.792	288.573F	18.586	72.379
P8	1.468	-86.082	27.390	274.878F	258.249F	-49.883
P9	-104.238	-142.819	-183.905	-38.151	-240.151F	-176.546
P10	-11.990	-93.909	180.480	259.716F	0.000	-33.255
MEAN	-31.565pA	-82.414pA	-47.052pA	612.117pA	224.794pA	-158.500pA
SIGMA	34.362pA	66.972pA	133.780pA	1.832nA	1.164nA	189.096pA
MIN	-104.238pA	-179.991pA	-183.905pA	-270.966pA	-593.287pA	-559.470pA
MAX	1.468pA	33.749pA	180.480pA	5.793nA	3.453nA	72.379pA
CP	1.94015	0.9954	0.4983	0.0364	0.0573	0.3526
CPK	1.63394	0.5853	0.3811	-0.0750	-0.0071	0.0732

Appendix C

Complete results on LM139