


ESA-QCA0097T-C

	TOTAL DOSE RADIATION TEST REPORT No. MO-RR-TLG-PM-009	Issue: 1 Rev.: Date: 29/022000 Page: 1/5
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SCC Component No SIL0801801B	Component Designation: UC1834J LCC	Irradiation Spec. No.: SCC.22900 Iss.4
Gen. Spec.: SCC 9000 9C Det. Spec.: TL-SIL-08-018 1 A Amend.: TL-AM-0813 1	Evaluation: - Acceptance Diffusion: - Acceptance Lot: X	Project/Programme: METOP
Family: 08 Group: 06	Functional Assignment: LINEAR REGULATOR	Package: LCC-20
MFR. Name: HARRIS SEMICON. Address: USA	Test House: TECNOLOGICA Address: MADRID (SPAIN)	Orig. house: TECNOLOGICA Address: SEVILLA (SPAIN)
Radiation Test Plan No.: MO-RP-TLG-PM-009	Sample Size: 6 Irradiation Devices: 5 Control Devices: 1	Date Code: 7D9911A Diffusion LOT: -- Wafer No.: --
Radiation Source: Cobalt-60 Facility Name: CIEMAT Address: MADRID (SPAIN)	Energy: 1.33/1.17 MeV Dose Rate: 310 rad(Si)/h	Date of Test: 15/02/2000
Irradiation Conditions: Biased: X Unbiased: -- Test Circuit: Figure 1	Irradiation Measurements Interval: Remote test: -- In situ Test: X	Annealing Tests: 72h/25°C Biased: X Unbiased: - Test Circuit: Figure 1

Electrical Measurements. Parameters Tested:

I_{CC} , V_{REF1} , V_{RLINE1} , V_{RLINE1} , V_{RLOAD} , V_{REF2} , V_{RLINE2} , V_{IO} , I_{IB} , I_{IO} , A_{VOL} , $PSRR$, I_O , V_{SAT} , I_{OLC} , V_{SHUTD} , $V_{TH(FAULT)}$, CMS ,
 PSS , I_{FAULT} , $V_{SAT(FAULT)}$, I_{OV} , V_{OV} , $V_{OVRESET}$, I_{CROW} , I_{LCROW} , $V_{THSENSE}$, S_{STH} , I_{IN} , I_{IBENSE}

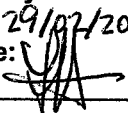
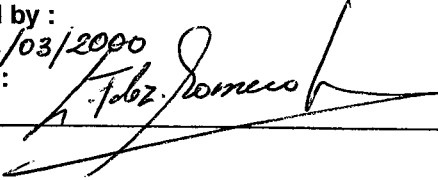
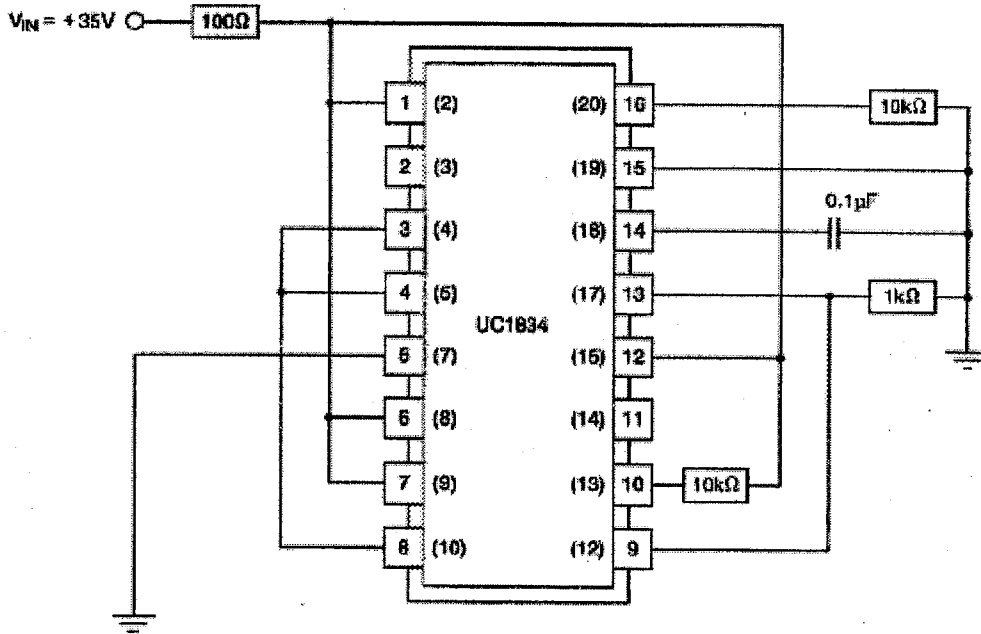
Prepared by.: José M. Valverde Date: 29/02/2000 Signature: 	Approved by : Date: 02/03/2000 Signature: 
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FIGURE 1.-TEST CIRCUIT





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SUMMARY

Total dose steady-state irradiation test has been carried out on a LINEAR REGULATOR from UNITRODE INTEGRATED CIRCUITS with date code 7D9911A. The irradiated parts were labelled as follows: irradiated devices R2,...,R6= S/N 95 to 99 and R1= S/N 94 as control device.

DESVIATION TO THE PLAN

No included parameters in this report: CMRR, I_{SHUTD} , $t_{DEFAULT}$.

RESULTS

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

	0 KRAD	6 KRAD	12 KRAD	15 KRAD	20 KRAD	ANN
I_{CC}	PASS	PASS	PASS	PASS	PASS	PASS
+ 1.5 VOLTAGE REFERENCE						
V_{REF1}	PASS	PASS	PASS	FAIL 1	FAIL 2	PASS
V_{RLINE1}	PASS	PASS	PASS	PASS	PASS	PASS
V_{RLOAD}	PASS	PASS	PASS	PASS	PASS	PASS
-2.0 VOLTAGE REFERENCE						
V_{REF2}	PASS	PASS	PASS	PASS	PASS	PASS
V_{RLINE2}	PASS	PASS	PASS	PASS	PASS	PASS
ERROR AMPLIFIER SECTION						
V_{IO}	PASS	PASS	PASS	PASS	PASS	PASS
I_{IB+}	PASS	PASS	PASS	PASS	PASS	PASS
I_{IB-}	PASS	PASS	PASS	PASS	PASS	PASS
I_{IO}	PASS	PASS	PASS	PASS	PASS	PASS
A_{VOL}	PASS	PASS	PASS	PASS	PASS	PASS
PSRR	PASS	PASS	PASS	PASS	PASS	PASS
DRIVER SECTION						
I_{OMAX}	PASS	PASS	PASS	PASS	PASS	PASS
V_{SAT}	PASS	PASS	PASS	PASS	PASS	PASS
I_{OLEAK}	PASS	PASS	PASS	PASS	PASS	PASS
V_{SHUTD}	PASS	PASS	PASS	PASS	PASS	PASS
FAULT AMPLIFIER SECTION						
V_{TH}	PASS	PASS	PASS	PASS	PASS	PASS

	0 KRAD	6 KRAD	12 KRAD	15 KRAD	20 KRAD	ANN
CMS	PASS	PASS	PASS	PASS	PASS	PASS
PSS	PASS	PASS	PASS	PASS	PASS	PASS
IO	PASS	PASS	PASS	PASS	PASS	PASS
VSAT	PASS	PASS	PASS	PASS	PASS	PASS
IOV	PASS	PASS	PASS	PASS	PASS	PASS
VOV	PASS	PASS	PASS	PASS	PASS	PASS
VOVRST	PASS	PASS	PASS	PASS	PASS	PASS
ICROW	PASS	PASS	PASS	PASS	PASS	PASS
ILCROW	PASS	PASS	PASS	PASS	PASS	PASS
CURRENT SENSE AMPLIFIER SECTION						
VTH1_1	PASS	PASS	PASS	PASS	PASS	PASS
VTH1_2	PASS	PASS	PASS	PASS	PASS	PASS
VTH2_1	PASS	PASS	PASS	PASS	PASS	PASS
VTH2_2	PASS	PASS	PASS	PASS	PASS	PASS
SSTH	PASS	PASS	PASS	PASS	PASS	PASS
IADJ	PASS	PASS	PASS	PASS	PASS	PASS
IIB_1	PASS	PASS	PASS	PASS	PASS	PASS
IIB_2	PASS	PASS	PASS	PASS	PASS	PASS

CONCLUSION

The results indicate that:

Only the 1.5V voltage reference falls lightly under lower limits at 15Krad and 20Krad but recovers after annealing. The other parameter pass according the irradiation plan.



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SCHEDULE

Test Step	Description	Result or Actual Test Condition	Time In	Time Out	Exposure
1	Sample serialization	CONTROL R1 IRR. DEVICES R2 to R6			
2	Initial Electrical Measurements	See 0 krad(Si) values in respective Parameter Data Tables	13:00 15/02	13:30 15/02	30m
3	Set-up of Test	Bias circuit verified according to Fig. 1			
4	Irradiation Exposure	Total Dose: 6 Krad(Si) Cumulative Dose: 6 Krad(Si) Dose Rate: 310 Rad(Si)/h	14:20 15/02	09:48 16/02	19h-28m
5	Intermediate Electrical Measurements	See 6 krad(Si) values in respective Parameter Data Tables	10:00 16/02	11:00 16/02	60min.
6	Set-up of Test	Bias circuit verified according to Fig. 1			
7	Irradiation Exposure	Total Dose: 6 Krad(Si) Cumulative Dose: 12 Krad(Si) Dose Rate: 310 Rad(Si)/h	11:42 16/02	07:30 17/02	19h 48m
8	Intermediate Electrical Measurements	See 12 krad(Si) values in respective Parameter Data Tables	07:45 17/02	08:15 17/02	30m
9	Set-up of Test	Bias circuit verified according to Fig. 1			
10	Irradiation Exposure	Total Dose: 2 Krad(Si) Cumulative Dose: 14 Krad(Si) Dose Rate: 310 Rad(Si)/h	08:30 17/02	14:52 17/02	6h-22m
11	Intermediate Electrical Measurements	See 14 krad(Si) values in respective Parameter Data Tables	15:00 17/02	15:30 17/02	30m
12	Set-up of Test	Bias circuit verified according to Fig. 1			
13	Irradiation Exposure	Total Dose: 6 Krad(Si) Cumulative Dose: 20 Krad(Si) Dose Rate: 310 Rad(Si)/h	15:40 17/02	10:42 18/02	19h- 2m
14	Intermediate Electrical Measurements	See 20 krad(Si) values in respective Parameter Data Tables	11:00 18/02	11:30 18/02	30min.



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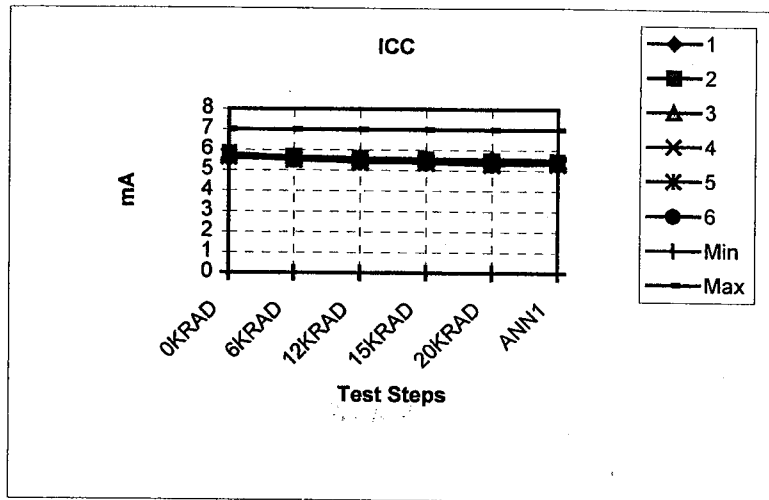
Test Step	Description	Result or Actual Test Condition	Time In	Time Out	Exposure
12	Set-up of Test	Bias circuit verified according to Fig. 1			
17	Annealing 72h	Bias circuit verified according to Fig. 1. Temperature: 25 °C	11:30 18/02	11:30 21/02	72h
18	Electrical Measurements	See ANN values in respective parameter Data Tables	11:30 21/02	12:00 21/02	30min



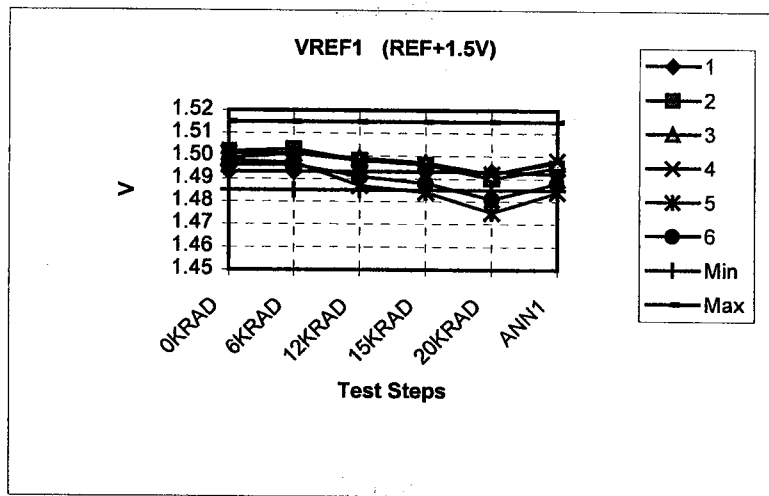
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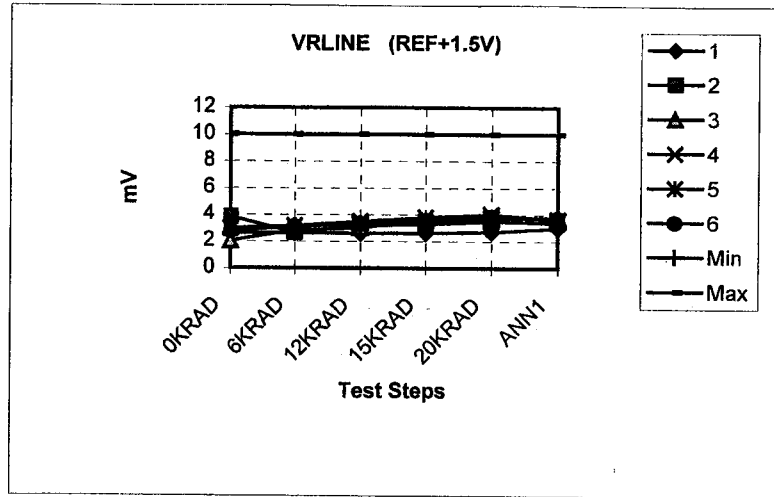
ELECTRICAL MEASUREMENT RESULTS



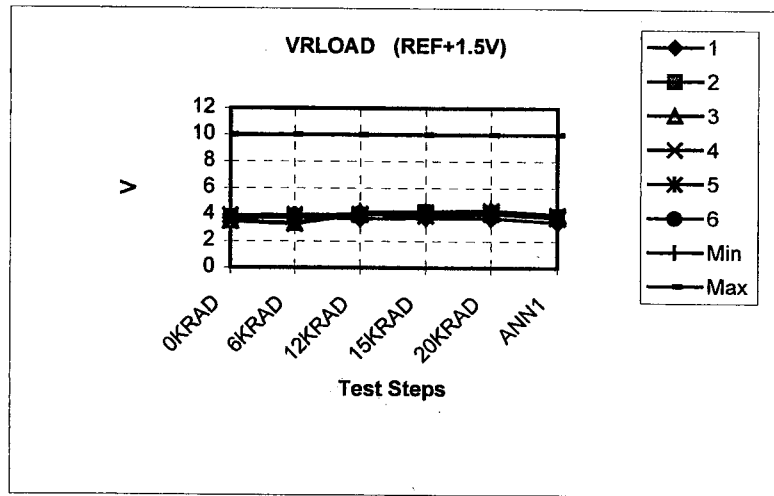
ICC	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	5.58	5.57	5.58	5.56	5.57	5.52
2	5.81	5.66	5.58	5.54	5.47	5.45
3	5.81	5.68	5.61	5.58	5.53	5.51
4	5.66	5.51	5.43	5.40	5.34	5.35
5	5.64	5.50	5.40	5.36	5.28	5.31
6	5.66	5.51	5.42	5.37	5.31	5.33
Min	0	0	0	0	0	0
Max	7	7	7	7	7	7
Unit	mA	mA	mA	mA	mA	mA



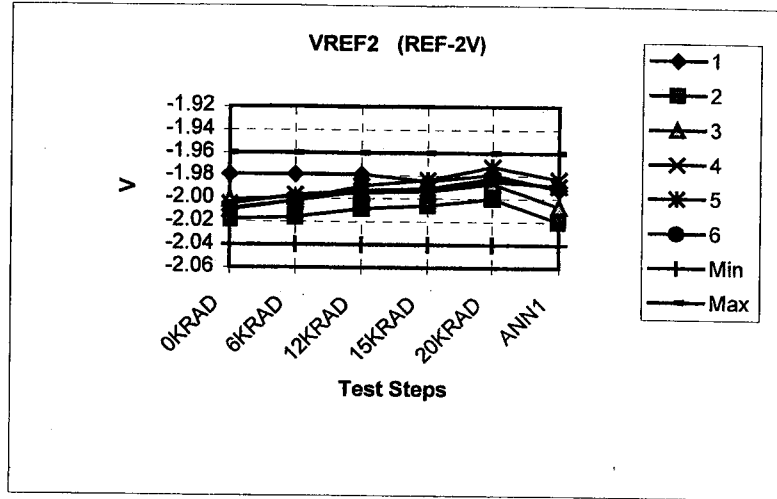
VREF1	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	1.493	1.493	1.493	1.493	1.493	1.492
2	1.502	1.503	1.498	1.496	1.490	1.495
3	1.499	1.501	1.499	1.497	1.492	1.497
4	1.501	1.501	1.498	1.496	1.492	1.498
5	1.498	1.497	1.487	1.484	1.475	1.484
6	1.496	1.496	1.491	1.488	1.481	1.488
Min	1.485	1.485	1.485	1.485	1.485	1.485
Max	1.515	1.515	1.515	1.515	1.515	1.515
Unit	V	V	V	V	V	V



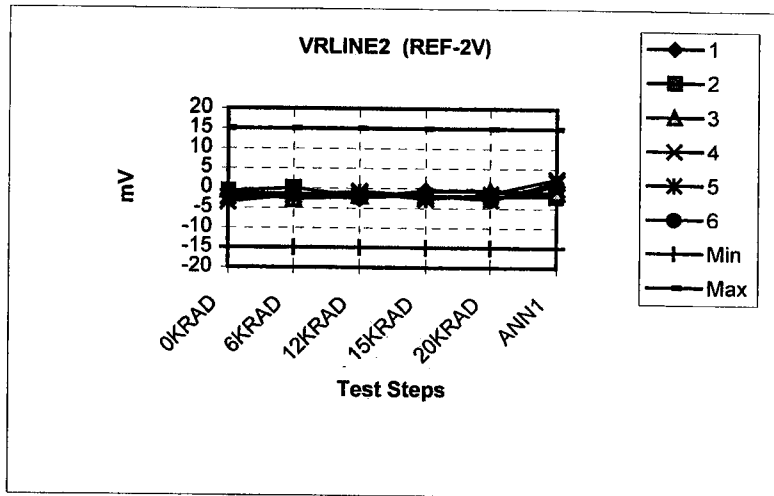
VRLINE1	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	2.617	2.633	2.600	2.617	2.717	3.000
2	3.833	2.667	3.183	3.283	3.500	3.383
3	2.033	2.833	3.000	3.617	3.750	3.817
4	3.000	3.167	3.517	3.817	4.067	3.600
5	2.950	3.150	3.367	3.517	3.783	3.667
6	2.800	3.100	3.317	3.517	3.867	3.717
Min	-10	-10	-10	-10	-10	-10
Max	10	10	10	10	10	10
Unit	mV	mV	mV	mV	mV	mV



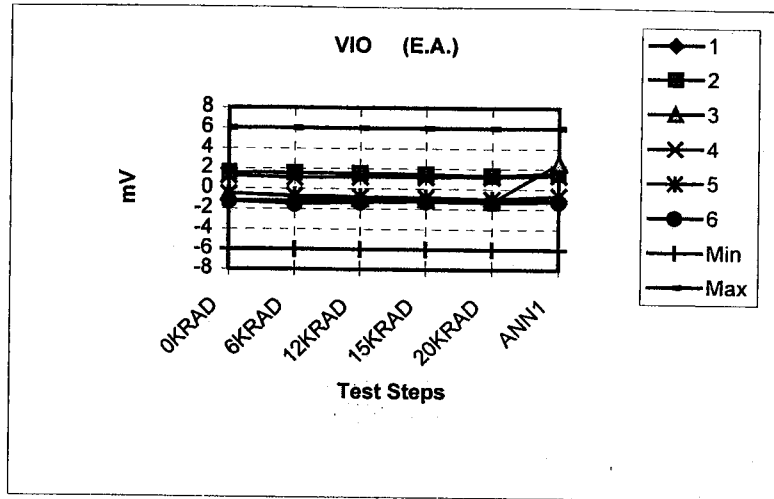
VRLOAD1	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	3.733	3.783	3.683	3.733	3.750	3.417
2	3.683	3.833	3.967	4.200	4.183	3.900
3	3.533	3.367	4.183	4.250	4.333	4.033
4	3.483	3.283	4.050	3.933	4.067	3.767
5	3.933	3.967	4.033	4.133	4.300	3.967
6	3.833	3.917	4.083	4.133	4.200	3.917
Min	-10	-10	-10	-10	-10	-10
Max	10	10	10	10	10	10
Unit	mV	mV	mV	mV	mV	mV



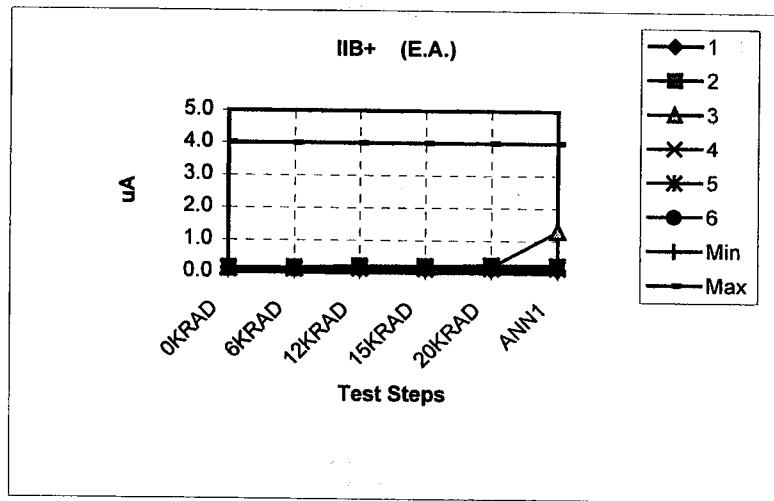
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1	-1.979	-1.979	-1.979	-1.985	-1.979	-1.992
2	-2.018	-2.016	-2.009	-2.006	-2.000	-2.020
3	-2.001	-1.999	-1.995	-1.994	-1.987	-1.989
4	-2.005	-1.997	-1.993	-1.991	-1.985	-1.989
5	-2.010	-2.002	-1.989	-1.984	-1.972	-1.983
6	-2.009	-2.002	-1.994	-1.991	-1.982	-1.990
Min	-2.04	-2.04	-2.04	-2.04	-2.04	-2.04
Max	-1.96	-1.96	-1.96	-1.96	-1.96	-1.96
Unit	V	V	V	V	V	V



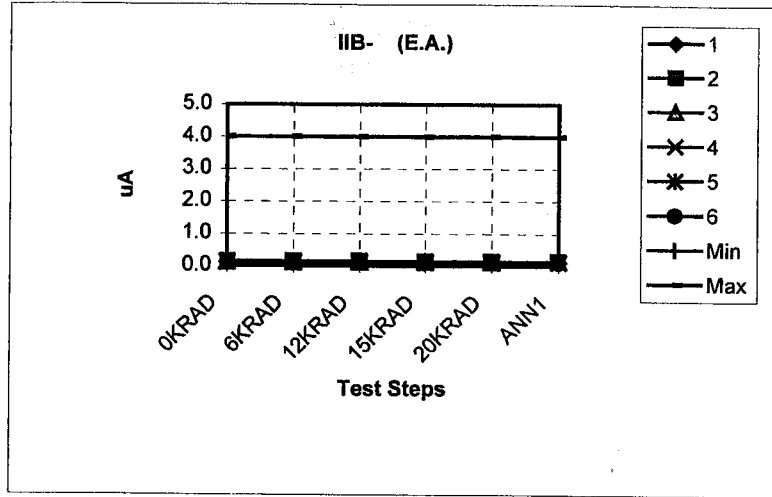
VRLINE2	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	-1.833	-1.833	-2.500	-0.500	-0.833	-1.667
2	-0.833	0.000	-2.000	-2.000	-2.000	-2.000
3	-0.667	-2.833	-2.000	-0.833	-0.500	-1.000
4	-3.500	-1.833	-0.833	-1.833	-2.833	1.667
5	-2.333	-2.000	-1.000	-2.667	-1.333	2.500
6	-1.333	-1.333	-2.333	-1.667	-2.833	0.833
Min	-15	-15	-15	-15	-15	-15
Max	15	15	15	15	15	15
Unit	mV	mV	mV	mV	mV	mV



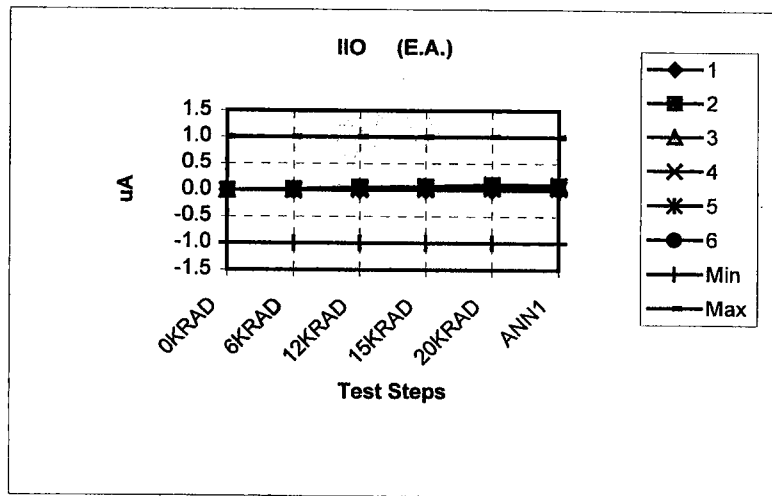
vio	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	-1.199	-1.203	-1.203	-1.208	-1.198	-1.081
2	1.590	1.552	1.516	1.471	1.325	1.587
3	-0.490	-0.796	-0.975	-1.078	-1.260	2.528
4	1.273	1.065	1.174	1.175	1.221	1.332
5	-0.518	-0.684	-0.802	-0.858	-0.972	-0.664
6	-1.264	-1.531	-1.334	-1.257	-1.319	-1.268
Min	-6	-6	-6	-6	-6	-6
Max	6	6	6	6	6	6
Unit	mV	mV	mV	mV	mV	mV



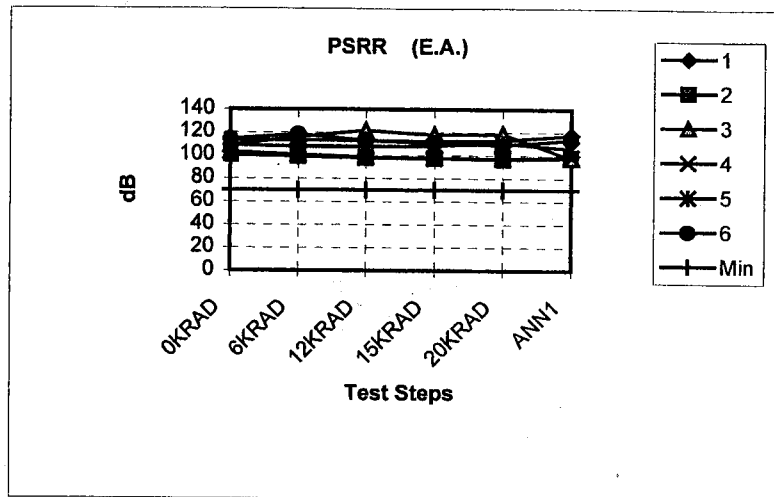
IIB+	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0.116	0.116	0.116	0.116	0.116	0.116
2	0.144	0.156	0.202	0.209	0.236	0.230
3	0.124	0.136	0.172	0.173	0.200	1.287
4	0.140	0.141	0.185	0.207	0.250	0.241
5	0.122	0.122	0.138	0.137	0.154	0.163
6	0.116	0.120	0.153	0.169	0.189	0.184
Min	-4	-4	-4	-4	-4	-4
Max	4	4	4	4	4	4
Unit	uA	uA	uA	uA	uA	uA



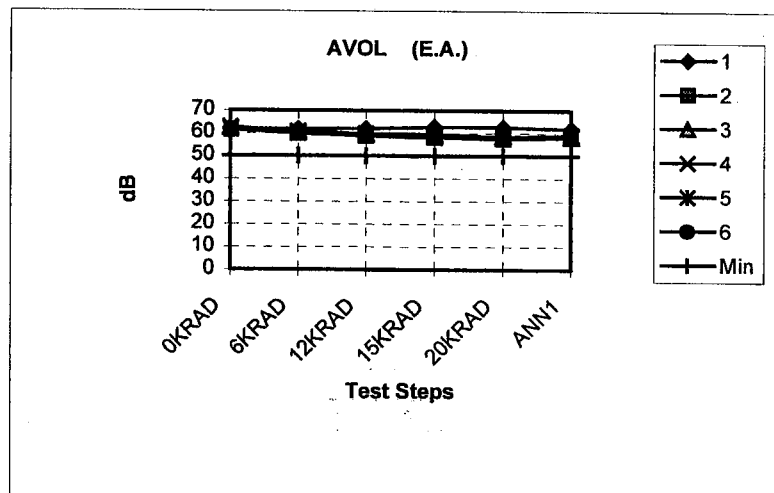
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1	0.117	0.117	0.117	0.117	0.117	0.118
2	0.144	0.144	0.144	0.143	0.142	0.144
3	0.124	0.121	0.119	0.118	0.116	0.154
4	0.141	0.139	0.140	0.141	0.141	0.142
5	0.123	0.122	0.121	0.120	0.119	0.122
6	0.116	0.113	0.115	0.116	0.116	0.116
Min	-4	-4	-4	-4	-4	-4
Max	4	4	4	4	4	4
Unit	uA	uA	uA	uA	uA	uA



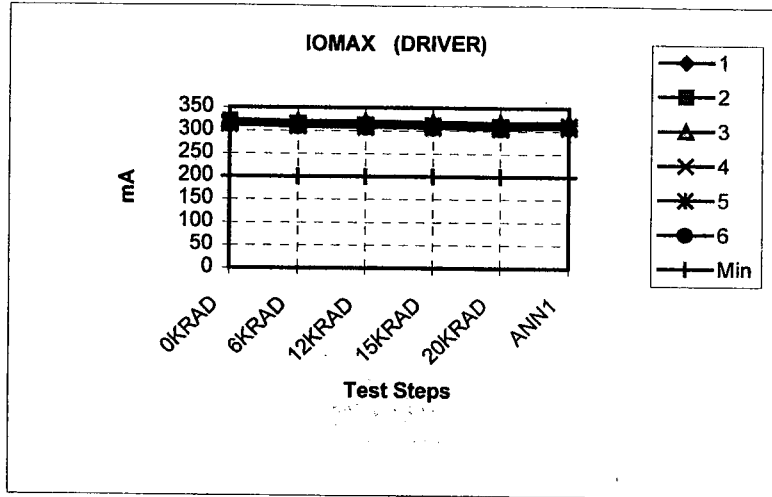
IIO	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	-0.001	-0.001	-0.001	-0.001	-0.001	-0.002
2	0.000	0.012	0.058	0.066	0.094	0.086
3	0.000	0.015	0.053	0.055	0.084	0.072
4	-0.001	0.002	0.045	0.066	0.109	0.099
5	-0.001	0.000	0.017	0.017	0.035	0.041
6	0.000	0.007	0.038	0.053	0.073	0.068
Min	-1	-1	-1	-1	-1	-1
Max	1	1	1	1	1	1
Unit	uA	uA	uA	uA	uA	uA



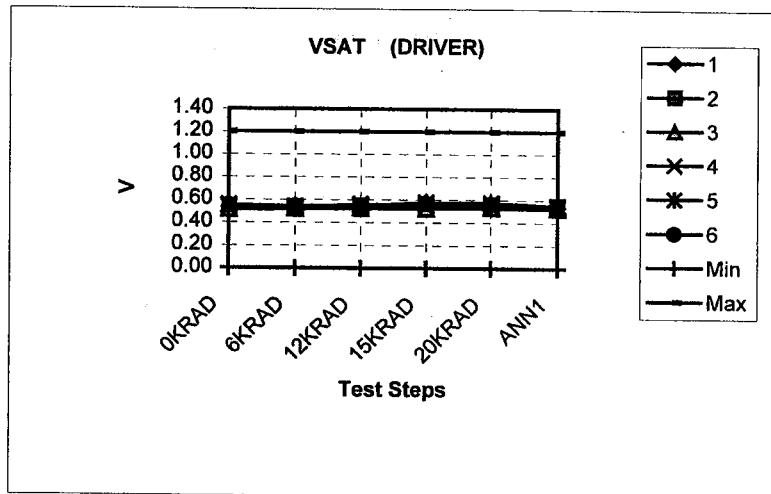
PSRR	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	113.3	113.0	112.8	112.1	113.1	117.4
2	100.4	99.2	97.6	97.4	96.6	97.8
3	108.8	115.8	121.6	117.8	118.6	97.4
4	103.0	100.7	98.4	97.9	97.1	98.5
5	108.8	107.6	107.6	108.4	110.6	105.9
6	114.3	118.2	112.7	110.8	108.9	113.7
Min	70	70	70	70	70	70
Unit	dB	dB	dB	dB	dB	dB



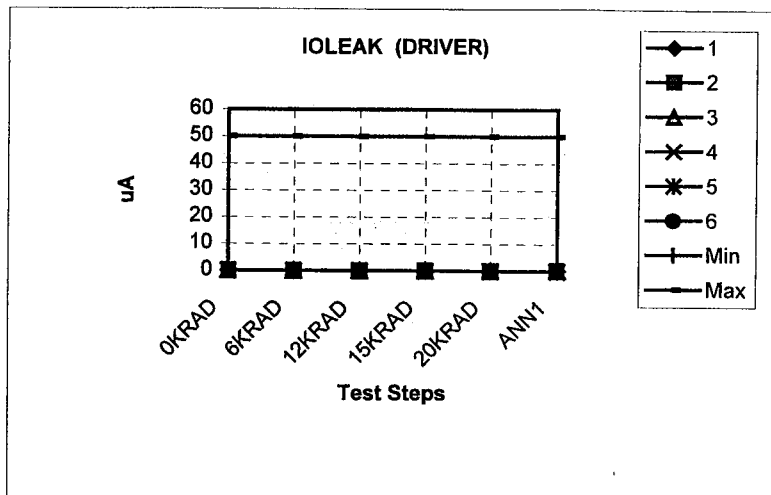
AVOL	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	62.0	61.8	61.9	62.8	62.6	61.9
2	61.6	59.9	58.7	58.1	57.5	58.0
3	62.3	60.3	59.5	58.9	58.6	58.3
4	62.6	60.7	59.7	59.6	58.5	59.2
5	62.3	60.5	59.6	59.2	58.6	58.4
6	61.6	60.8	59.2	58.7	58.2	58.3
Min	50	50	50	50	50	50
Unit	dB	dB	dB	dB	dB	dB



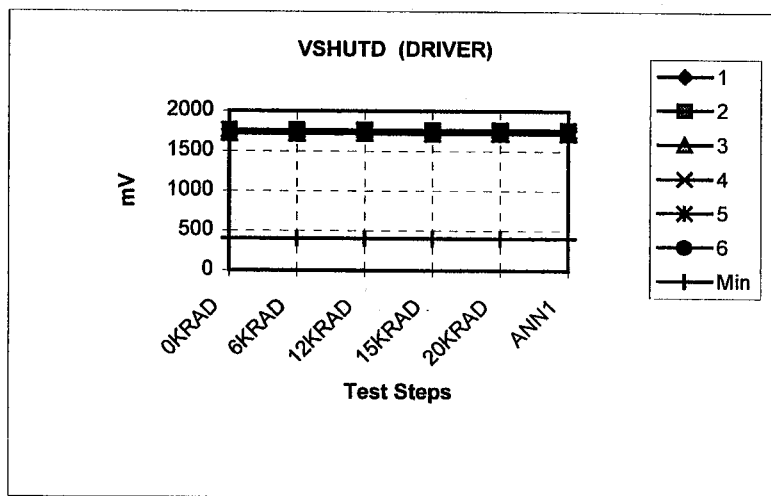
IOMAX	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	315.06	313.14	314.08	312.86	313.27	315.48
2	320.26	315.53	313.15	311.49	309.41	309.60
3	323.79	321.08	320.72	319.22	318.20	319.21
4	317.46	313.02	312.50	311.25	309.43	312.16
5	312.85	309.39	307.47	306.86	304.85	307.04
6	312.48	309.19	307.70	306.04	304.20	307.30
Min	200	200	200	200	200	200
Unit	mA	mA	mA	mA	mA	mA



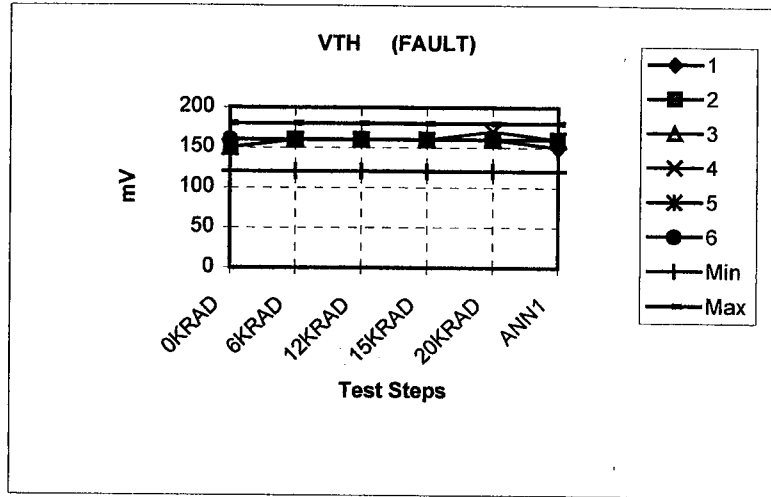
VSAT	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0.54	0.55	0.55	0.55	0.54	0.54
2	0.53	0.54	0.55	0.55	0.56	0.55
3	0.51	0.52	0.52	0.52	0.53	0.52
4	0.55	0.53	0.56	0.55	0.54	0.54
5	0.54	0.54	0.55	0.58	0.57	0.55
6	0.55	0.54	0.55	0.57	0.56	0.55
Min	0	0	0	0	0	0
Max	1.2	1.2	1.2	1.2	1.2	1.2
Unit	V	V	V	V	V	V



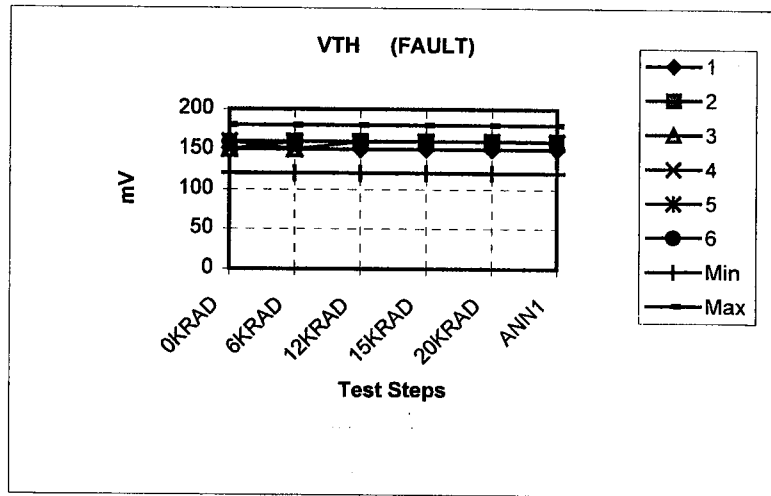
IOLEAK	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0.020	0.013	0.008	0.010	0.008	0.123
2	0.020	0.008	0.012	0.015	0.018	0.128
3	0.017	0.017	0.012	0.018	0.020	0.130
4	0.023	0.017	0.010	0.017	0.020	0.020
5	0.018	0.010	0.012	0.012	0.017	0.020
6	0.018	0.010	0.015	0.018	0.015	0.015
Min	-50	-50	-50	-50	-50	-50
Max	50	50	50	50	50	50
Unit	uA	uA	uA	uA	uA	uA



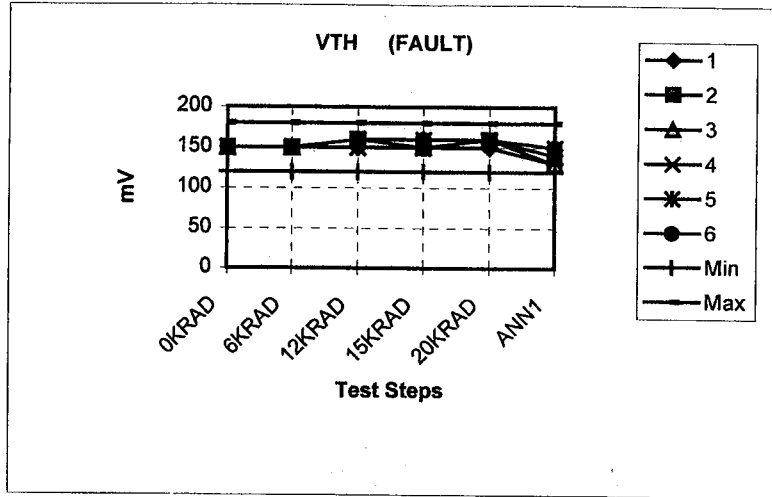
VSHUTD	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	1760	1720	1760	1760	1720	1760
2	1760	1760	1760	1760	1760	1760
3	1720	1720	1720	1720	1720	1720
4	1760	1720	1760	1720	1720	1720
5	1760	1760	1760	1760	1760	1760
6	1760	1760	1760	1760	1760	1760
Min	400	400	400	400	400	400
Unit	mV	mV	mV	mV	mV	mV



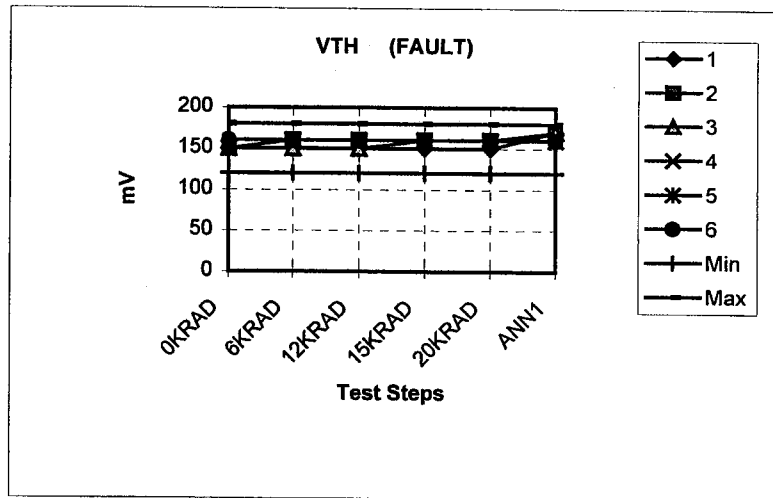
VTH	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	160	160	160	160	160	150
2	150	160	160	160	160	160
3	150	160	160	160	160	160
4	150	160	160	160	170	160
5	150	160	160	160	160	160
6	160	160	160	160	160	160
Min	120	120	120	120	120	120
Max	180	180	180	180	180	180
Unit	mV	mV	mV	mV	mV	mV



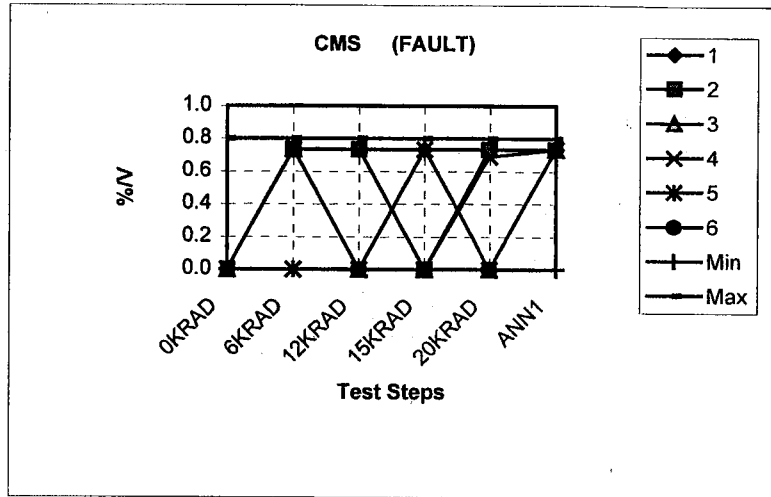
VTH	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	160	150	150	150	150	150
2	150	160	160	160	160	160
3	150	150	160	160	160	160
4	150	150	160	160	160	160
5	160	160	160	160	160	160
6	160	160	160	160	160	160
Min	120	120	120	120	120	120
Max	180	180	180	180	180	180
Unit	mV	mV	mV	mV	mV	mV



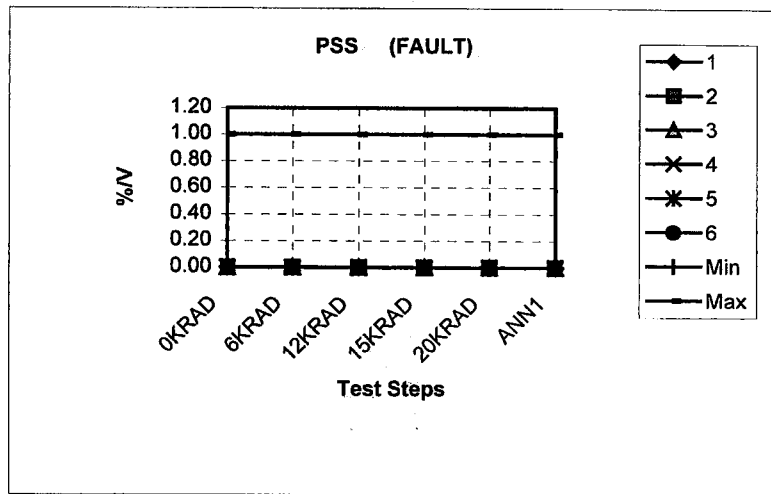
VTH	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	150	150	150	150	150	130
2	150	150	160	150	160	130
3	150	150	160	160	160	130
4	150	150	160	160	160	150
5	150	150	150	150	160	140
6	150	150	160	160	160	150
Min	120	120	120	120	120	120
Max	180	180	180	180	180	180
Unit	mV	mV	mV	mV	mV	mV



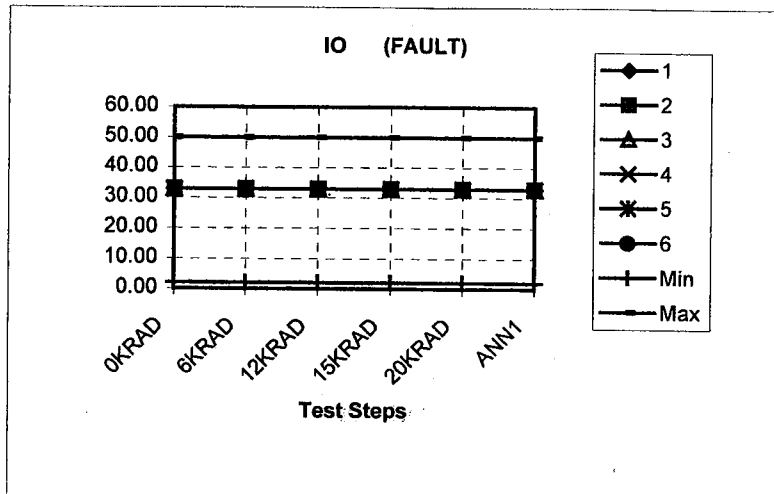
VTH	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	150	150	150	150	150	170
2	150	160	160	160	160	170
3	150	150	150	160	160	170
4	150	160	160	160	160	160
5	150	160	160	160	160	160
6	160	160	160	160	160	160
Min	120	120	120	120	120	120
Max	180	180	180	180	180	180
Unit	mV	mV	mV	mV	mV	mV



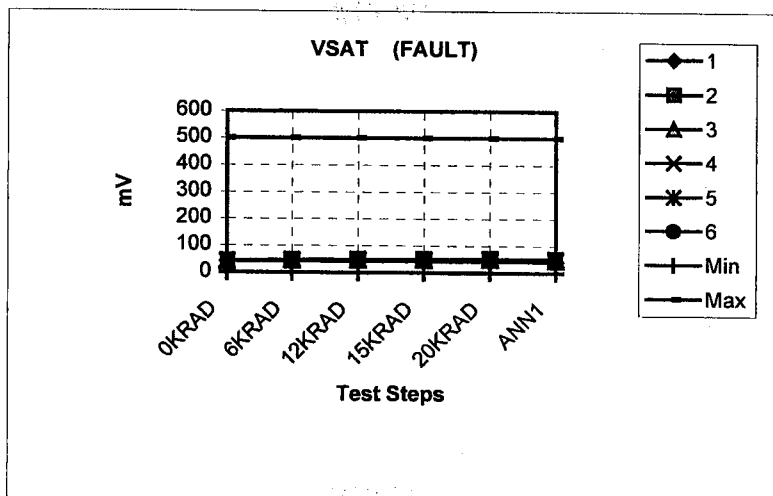
CMS	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0.0	0.7	0.7	0.7	0.7	0.7
2	0.0	0.7	0.7	0.0	0.7	0.7
3	0.0	0.7	0.0	0.0	0.0	0.7
4	0.0	0.0	0.0	0.0	0.7	0.7
5	0.0	0.7	0.0	0.7	0.0	0.7
6	0.0	0.7	0.0	0.0	0.0	0.7
Min	0	0	0	0	0	0
Max	0.8	0.8	0.8	0.8	0.8	0.8
Unit	%IV	%IV	%IV	%IV	%IV	%IV



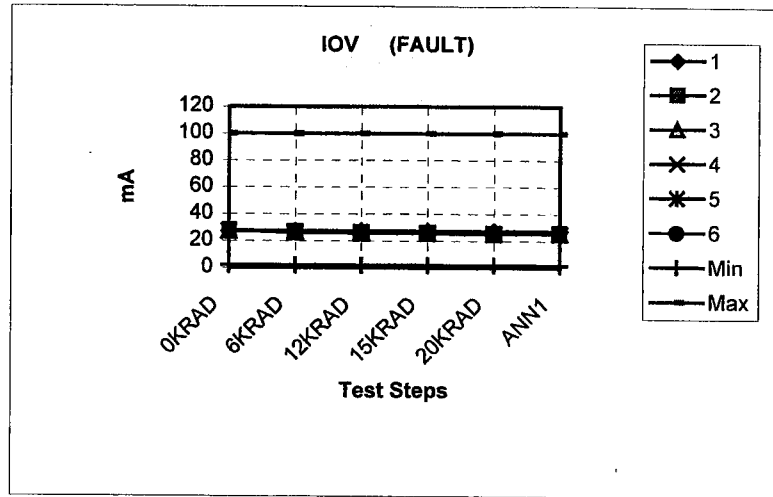
PSS	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
Min	0	0	0	0	0	0
Max	1	1	1	1	1	1
Unit	%IV	%IV	%IV	%IV	%IV	%IV



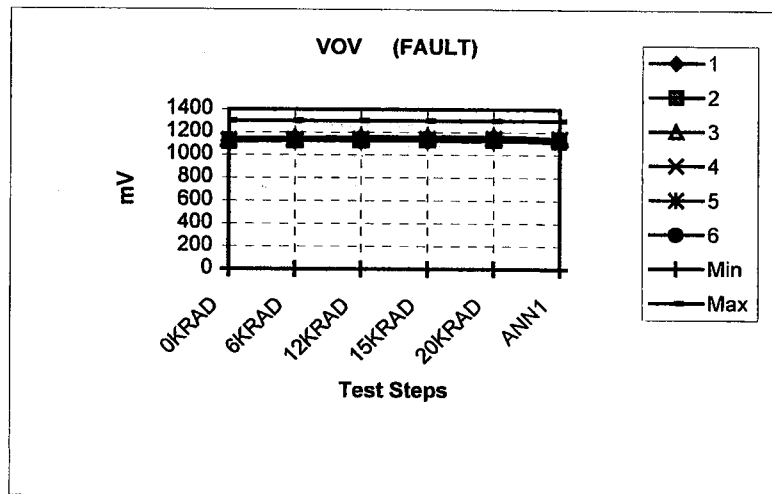
IO	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	32.8	32.8	32.8	32.8	32.8	32.8
2	32.8	32.8	32.8	32.8	32.8	32.8
3	32.8	32.8	32.8	32.8	32.8	32.8
4	32.8	32.8	32.8	32.8	32.8	32.8
5	32.8	32.8	32.8	32.8	32.8	32.8
6	32.8	32.8	32.8	32.8	32.8	32.8
Min	2	2	2	2	2	2
Max	50	50	50	50	50	50
Unit	mA	mA	mA	mA	mA	mA



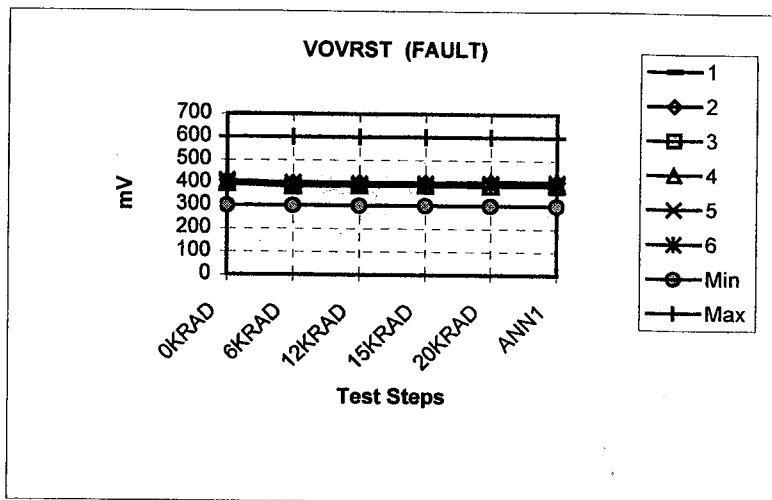
VSAT	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	42.13	42.35	42.20	42.18	42.14	40.84
2	42.88	46.62	49.66	50.30	52.20	50.92
3	40.41	43.53	45.57	46.05	47.68	45.04
4	41.07	44.38	46.62	47.27	49.11	48.58
5	42.81	46.37	48.92	49.53	51.46	51.17
6	42.67	46.33	49.08	49.80	51.82	51.10
Min	0	0	0	0	0	0
Max	500	500	500	500	500	500
Unit	mV	mV	mV	mV	mV	mV



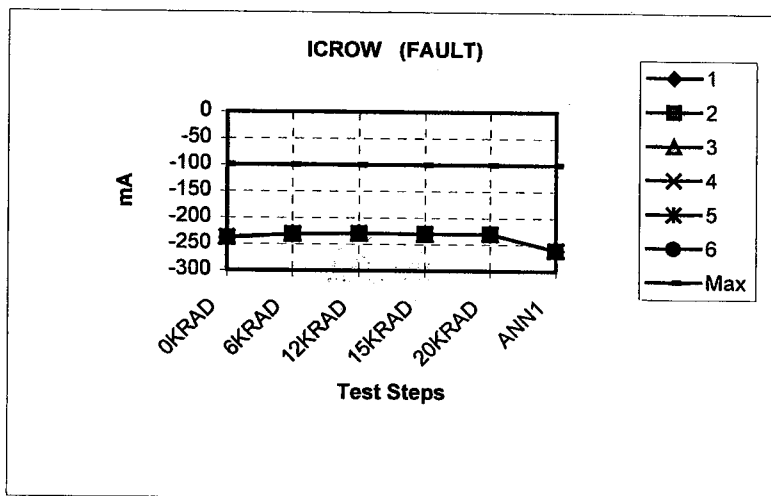
IOV	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	27.48	27.46	27.47	27.47	27.46	27.69
2	27.76	26.73	26.13	26.01	25.58	25.92
3	27.35	26.36	25.83	25.72	25.36	25.65
4	27.32	26.30	25.75	25.64	25.25	25.39
5	27.43	26.42	25.84	25.73	25.32	25.46
6	27.58	26.56	26.00	25.87	25.46	25.61
Min	2	2	2	2	2	2
Max	100	100	100	100	100	100
Unit	mA	mA	mA	mA	mA	mA



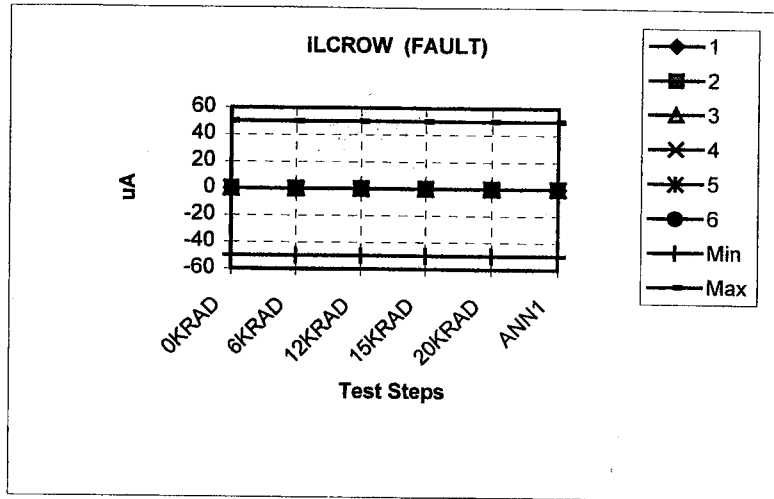
vov	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	1120.7	1121.6	1121.4	1121.5	1121.6	1109.5
2	1115.2	1121.1	1126.2	1127.6	1130.4	1119.7
3	1147.9	1153.7	1158.5	1160.5	1163.4	1146.7
4	1127.4	1134.7	1139.8	1141.2	1144.6	1143.5
5	1125.9	1132.1	1137.1	1138.6	1142.0	1141.2
6	1131.4	1138.2	1143.2	1145.0	1148.3	1146.7
Min	0	0	0	0	0	0
Max	1300	1300	1300	1300	1300	1300
Unit	mV	mV	mV	mV	mV	mV



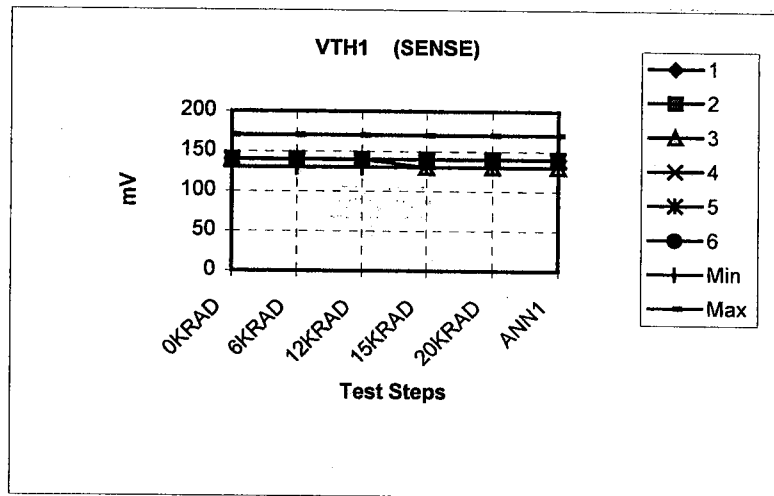
VOVRST	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	404.2	402.7	402.0	402.8	402.3	401.9
2	410.8	399.0	402.3	402.0	406.0	406.6
3	394.4	382.8	386.7	387.0	388.6	385.8
4	394.5	383.3	385.7	386.3	386.1	391.7
5	408.7	398.8	396.3	398.5	399.7	403.4
6	398.0	385.9	388.7	391.2	393.1	393.8
Min	300	300	300	300	300	300
Max	600	600	600	600	600	600
Unit	mV	mV	mV	mV	mV	mV



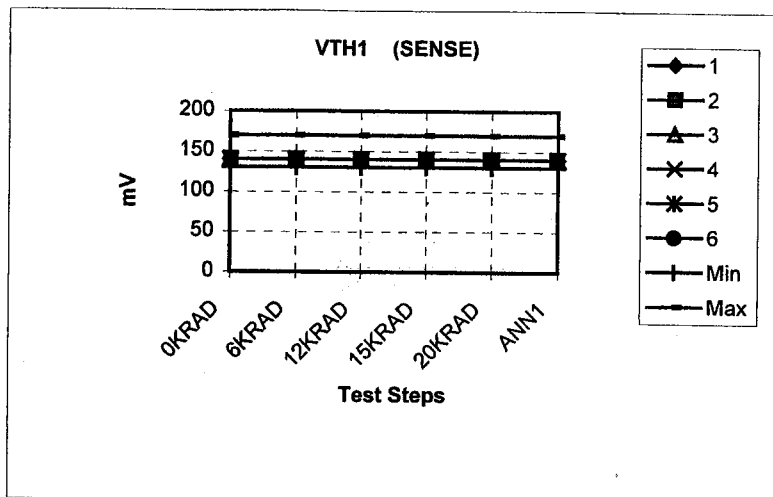
ICROW	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	-238.9	-231.0	-229.7	-230.6	-230.1	-261.5
2	-238.1	-231.0	-229.6	-230.6	-230.0	-261.1
3	-237.6	-231.0	-229.5	-230.5	-230.0	-260.6
4	-237.3	-230.9	-229.5	-230.5	-229.9	-260.8
5	-236.9	-230.9	-229.4	-230.4	-229.9	-260.8
6	-236.7	-230.9	-229.4	-230.4	-229.9	-260.8
Max	-100	-100	-100	-100	-100	-100
Unit	mA	mA	mA	mA	mA	mA



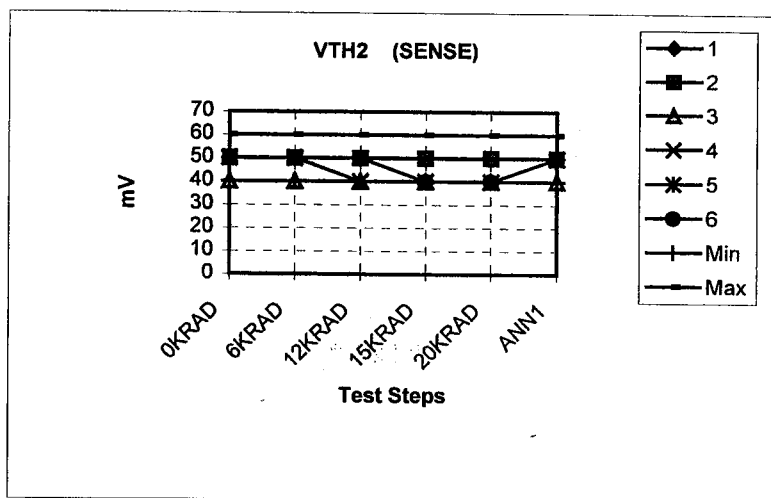
ILCROW	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0.002	-0.015	0.007	0.018	0.008	0.102
2	0.005	-0.022	0.000	0.045	-0.030	0.107
3	-0.033	-0.028	-0.005	0.028	0.053	0.110
4	-0.030	0.045	-0.005	0.052	0.043	0.002
5	0.012	0.005	0.050	-0.035	0.005	0.005
6	0.053	0.048	0.027	0.005	0.003	-0.002
Min	-50	-50	-50	-50	-50	-50
Max	50	50	50	50	50	50
Unit	uA	uA	uA	uA	uA	uA



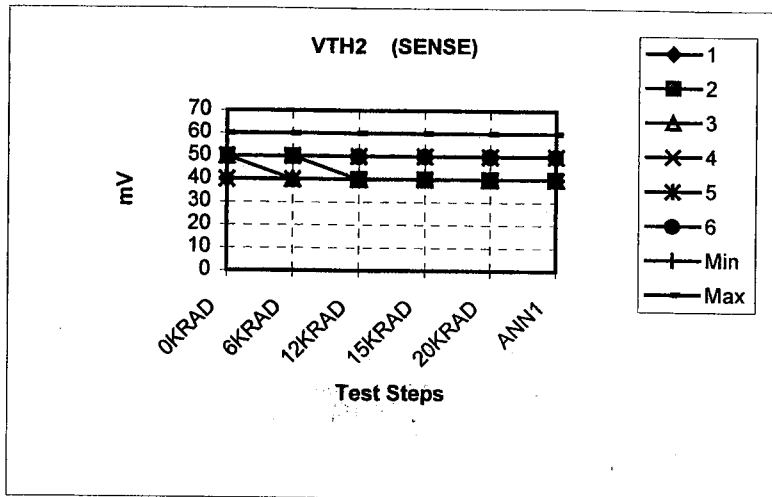
VTH1	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	140	140	140	140	140	140
2	140	140	140	140	140	140
3	140	140	140	130	130	130
4	140	140	140	140	140	140
5	140	140	140	140	140	140
6	140	140	140	140	140	140
Min	130	130	130	130	130	130
Max	170	170	170	170	170	170
Unit	mV	mV	mV	mV	mV	mV



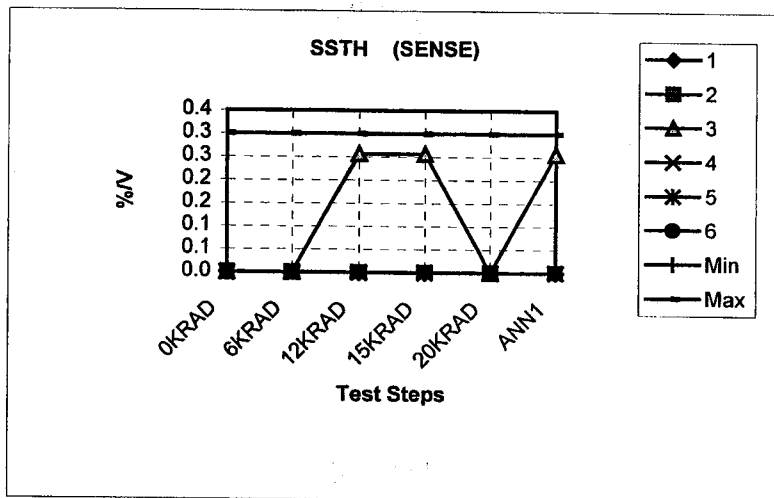
VTH1	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	140	140	140	140	140	140
2	140	140	140	140	140	140
3	140	140	140	140	140	140
4	140	140	140	140	140	140
5	140	140	140	140	140	140
6	140	140	140	140	140	140
Min	130	130	130	130	130	130
Max	170	170	170	170	170	170
Unit	mV	mV	mV	mV	mV	mV



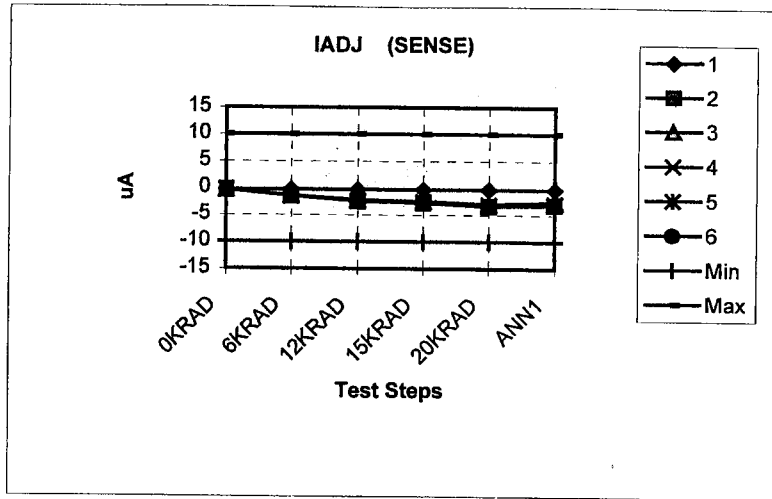
VTH2	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	50	50	50	50	50	50
2	50	50	50	50	50	50
3	40	40	40	40	40	40
4	50	50	40	40	40	50
5	50	50	40	40	40	50
6	50	50	50	40	40	50
Min	40	40	40	40	40	40
Max	60	60	60	60	60	60
Unit	mV	mV	mV	mV	mV	mV



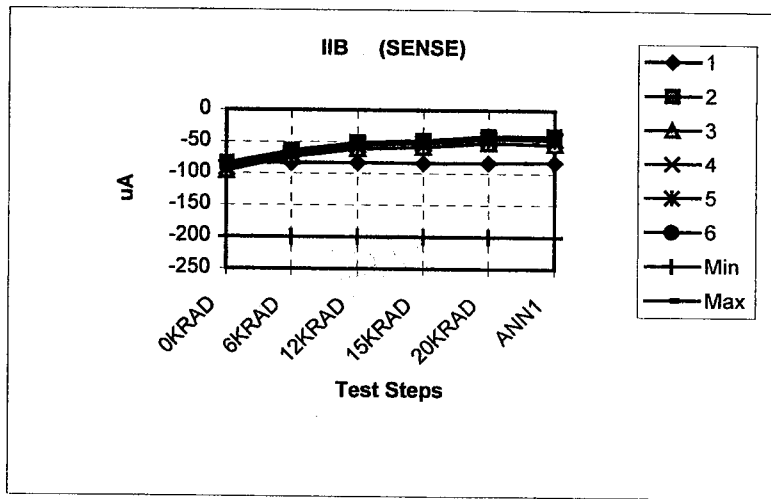
VTH2	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	40	40	40	40	40	40
2	50	50	40	40	40	40
3	50	40	40	40	40	40
4	40	40	40	40	40	40
5	50	50	50	50	50	50
6	50	50	50	50	50	50
Min	40	40	40	40	40	40
Max	60	60	60	60	60	60
Unit	mV	mV	mV	mV	mV	mV



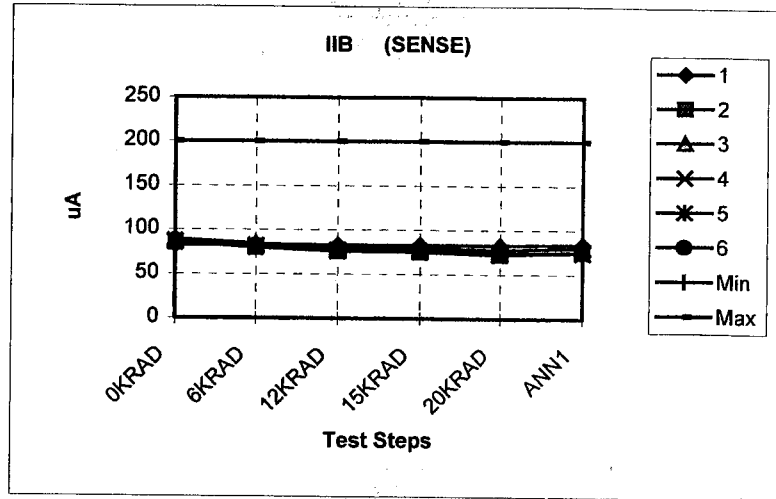
SSTH	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.3	0.3	0.0	0.3
4	0.0	0.0	0.0	0.0	0.0	0.0
5	0.0	0.0	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.0	0.0	0.0
Min	0	0	0	0	0	0
Max	0.3	0.3	0.3	0.3	0.3	0.3
Unit	%I/V	%I/V	%I/V	%I/V	%I/V	%I/V



IADJ	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	-0.33	-0.29	-0.32	-0.27	-0.32	-0.30
2	-0.31	-1.51	-2.49	-2.77	-3.37	-3.17
3	-0.30	-1.39	-2.19	-2.43	-2.95	-2.48
4	-0.33	-1.43	-2.38	-2.57	-3.08	-2.92
5	-0.29	-1.46	-2.34	-2.59	-3.14	-2.98
6	-0.33	-1.51	-2.49	-2.73	-3.30	-3.14
Min	-10	-10	-10	-10	-10	-10
Max	10	10	10	10	10	10
Unit	uA	uA	uA	uA	uA	uA



IIB	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	-83.3	-83.6	-83.4	-83.6	-83.4	-82.2
2	-84.3	-63.9	-50.9	-47.9	-41.2	-40.4
3	-96.5	-74.5	-61.3	-58.5	-51.8	-53.5
4	-92.1	-70.6	-55.3	-52.0	-44.4	-45.5
5	-91.7	-69.9	-55.8	-52.8	-45.5	-46.2
6	-87.4	-66.0	-50.9	-47.8	-40.4	-41.4
Min	-200	-200	-200	-200	-200	-200
Max	200	200	200	200	200	200
Unit	uA	uA	uA	uA	uA	uA



IIB	0KRAD	6KRAD	12KRAD	15KRAD	20KRAD	ANN1
1	82.7	82.8	82.7	82.9	82.8	83.7
2	85.3	79.9	75.8	74.9	72.3	75.0
3	89.2	84.1	80.5	79.6	77.4	80.1
4	85.5	80.4	76.2	75.3	72.9	74.3
5	86.8	81.5	77.1	76.0	73.4	74.8
6	87.5	81.9	77.3	76.2	73.5	75.0
Min	-200	-200	-200	-200	-200	-200
Max	200	200	200	200	200	200
Unit	uA	uA	uA	uA	uA	uA

MetOp

**TOTAL DOSE RADIATION
TEST REPORT
No. MO-RR-TLG-PM-009**

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DOSIMETRY



**TOTAL DOSE RADIATION
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User: Tecnológica S.A.

Ref.: Tecnológica

Date: 15/02/00

REQUIREMENTS

Krad(Si)/h	Rad(Si)/min	R/min
0.280	4.67	5.39

CORRECTIONS

Presion (mm)	714
Temperature (°C)	22.2
Probe Position	0.95
Final Equip. reading (R/min)	4.90
	4.81

FRICKE DOSIMETRY

Irradiation time (h)	18
Spectrometer temp.(°C)	25.0
Molar coefficient.	2181
Conversion factor.	27555.78

Dosimeter	Fricke Reading	Rad (Fricke)	Rad (Fricke)/min	R/min	Rad(Si)/min	Krad(Si)/h
D-1	0.228	6282.72	5.82	6.00	5.19	0.31
D-2	0.228	6282.72	5.82	6.00	5.19	0.31
D-3	0.232	6392.94	5.92	6.10	5.28	0.32
PROBE				5.53	4.78	0.29
D-4	0.230	6337.83	5.87	6.05	5.23	0.31
D-5	0.229	6310.27	5.84	6.02	5.21	0.31
D-6	0.228	6282.72	5.82	6.00	5.19	0.31

DOSE RATE (AVERAGE): D2-D5

Rad(Si)/min	5.14
Rad(Si)/h	0.31
Non Uniformity (%)	9.73