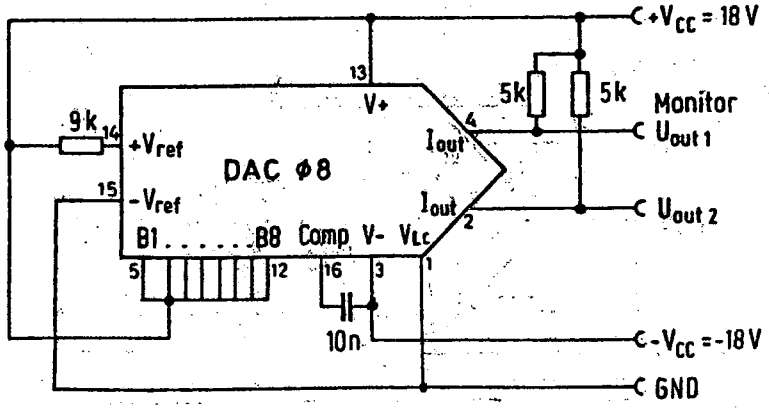
Thorlogica	**TOTAL DOSE RADIATION TEST REPORT No. HM-MT-ITR-002**	Issue 1 Rev.: Date: 16.03.92 Date: Page: 1/8

SCC Component No.: J38510/11302SEA	**Component Designation:** DAC-08AQ	**Irradiation Spec. No.:** TL/MTP/RP/001 Iss. 2A
Gen. Spec.: MIL-S-38510 H 5 **Det. Spec.:** M-M-38510/113 6 **Amend.:**	**Evaluation:** - **Acceptance Difussion:** - **Acceptance Lot:** X	**Project/Programme:** MTP
Family: 08 **Group:** 04	**Functional Assignment:** D/A CONVERTER	**Package:** DIL-16
Manuf.Name: AD **Address:** Santa Clara (USA)	**Irradiation Facility:** H.M.I. **Address:** Berlin (GERMANY)	**Test House:** H.M.I **Address:** Berlin (GERMANY)
Radiation Test Plan No.: RAD-MTP-HM-002 Iss. 1	**Sample Size:** 4 **Irradiation Devices:** 3 **Control Devices:** 1	**Date Code:** 8925 **Mask No.:** N/A
Radiation Source: Cobalt-60	**Energy:** 1,3 MeV **Dose Rate:** 10 Rad(Si)/s	**Date of Test:** 16.03.92

Electrical Measurements. Parameters Tested:
Nonlinearity (NL); Differential Nonlinearity (DNL); Gain Error (GE); Pos.Full Scale Voltage (VFS+); Neg.Full Scale Voltaje (VFS-); Output Voltage at Bit Value N (VN); Pos.Zero Scale Current (IZS+); Neg.Zero Scale Current (IZS-); Pos.Full Scale Current (IFS+); Neg.Full Scale Current (IFS-); Logic Input Current Low Level (IlogL); Login Input Current High Level (IlogH).

Irradiation Conditions: **Biased:** Y **Unbiased:** N **Test Circuit:** Figure 1	**Irradiation Measurements Interval:** **Biased:** N **Unbiased:** Y **Test Circuit:** N/A	**Annealing Tests:** YES **Biased:** Y **Duration:** 24 h. **Unbiased:** N **Temp.°C:**25±3 **Test Circuit:** Figure 1

Figure 1:

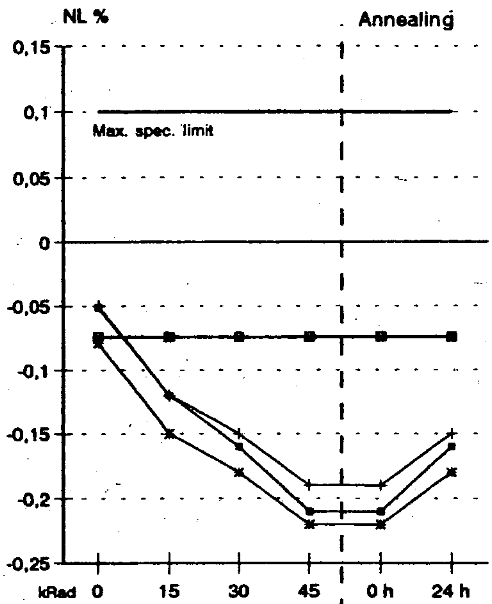


Irradiat. Respons.: H.M.I. **Date:** 16/03/92	**Electr. Test Resp.:** H.M.I. **Date:** 16/03/92	

Test Step	Description	Result or Actual Test Condition	Time In	Time Out	Exposure
1	Sample serialization	CONTROL R4, R1, R2, R3			
2	Initial Electrical Measurements	See 0 krad(Si) values in respective Parameter Data Tables	11:24	11:31	7 min.
3	Set-up of Test	Bias circuit verified according to Fig. 1			
4	Irradiation Exposure	Cumulative Dose: 15 krad(Si) Dose Rate: 10 rad(Si)/s Temperature: 25°C	11:41	12:06	25 min.
5	Intermediate Electrical Measurements	See 15 krad(Si) values in respective Parameter Data Tables	12:10	12:16	6 min.
6	Set-up of Test	Bias circuit verified according to Fig. 1			
7	Irradiation Exposure	Cumulative Dose: 30 krad(Si) Dose Rate: 10 rad(Si)/s Temperature: 25°C	13:05	13:30	25 min.
8	Intermediate Electrical Measurements	See 30 krad(Si) values in respective Parameter Data Tables	13:33	13:41	8 min.
9	Set-up of Test	Bias circuit verified according to Fig. 1			
10	Irradiation Exposure	Cumulative Dose: 45 krad(Si) Dose Rate: 10 rad(Si)/s Temperature: 25°C	13:45	14:10	25 min.
11	Intermediate Electrical Measurements	See 45 krad(Si) values in respective Parameter Data Tables	14:16	14:23	7 min.
12	Annealing	Bias circuit verified according to Fig. 1. Temperature: 25°C (average)	14:25 16/03	14:15 17/03	23h. 50 min.

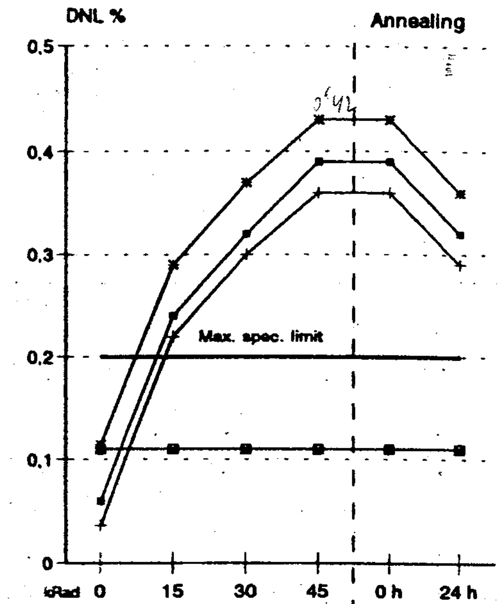
Test Step	Description	Result or Actual Test Condition	Time In	Time Out	Exposure
13	Electrical Measurements	See 24 h values in respective Parameter Data Tables	14:20	14:27	7 min.

DAC 08
NONLINEARITY



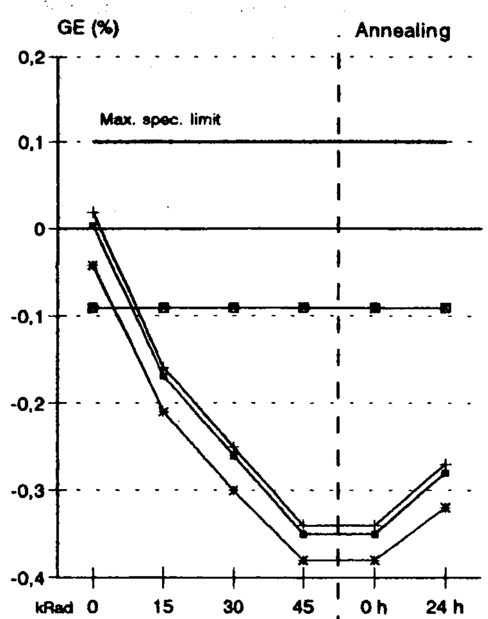
	0	15	30	45	0 h	24 h
CONTROL	-0,074	-0,074	-0,074	-0,074	-0,074	-0,074
R1	-0,05	-0,12	-0,15	-0,19	-0,19	-0,15
R2	-0,079	-0,15	-0,18	-0,22	-0,22	-0,18
R3	-0,051	-0,12	-0,16	-0,21	-0,21	-0,16

DAC 08
DIFFERENTIAL NONLINEARITY



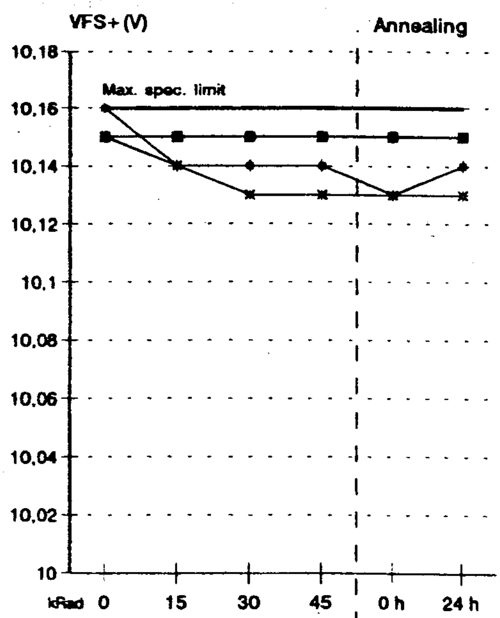
	0	15	30	45	0 h	24 h
CONTROL	0,11	0,11	0,11	0,11	0,11	0,11
R1	0,037	0,22	0,3	0,36	0,36	0,29
R2	0,114	0,29	0,37	0,43	0,43	0,36
R3	0,06	0,24	0,32	0,39	0,39	0,32

DAC 08
GAIN ERROR



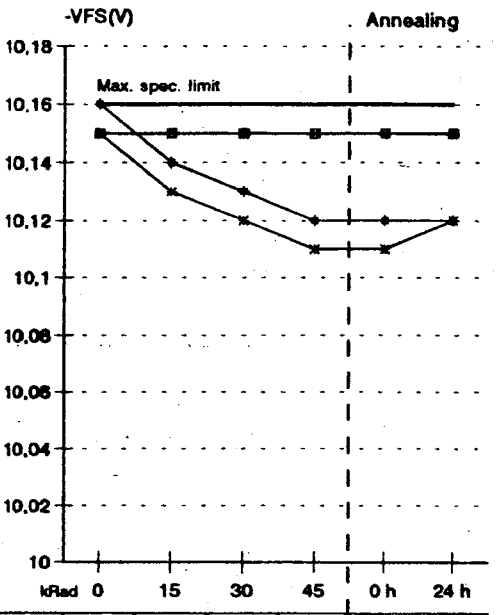
	0	15	30	45	0 h	24 h
CONTROL	-0,091	-0,091	-0,091	-0,091	-0,091	-0,091
R1	0,019	-0,16	-0,25	-0,34	-0,34	-0,27
R2	-0,042	-0,21	-0,3	-0,38	-0,38	-0,32
R3	0,0037	-0,17	-0,26	-0,35	-0,35	-0,28

DAC 08
POS. FULL SCALE VOLTAGE



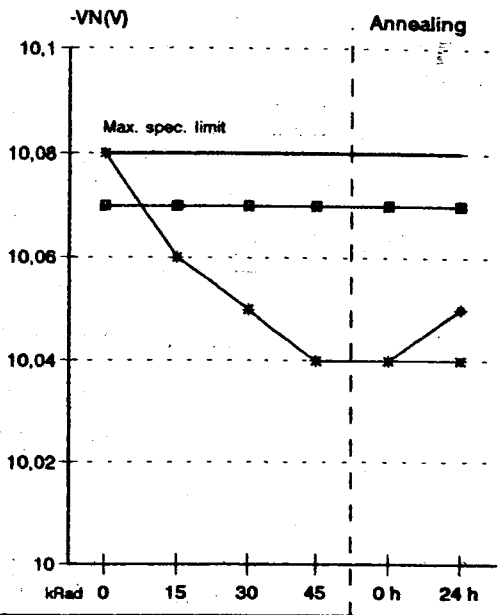
	0	15	30	45	0 h	24 h
CONTROL	10,15	10,15	10,15	10,15	10,15	10,15
R1	10,16	10,14	10,14	10,14	10,13	10,14
R2	10,15	10,14	10,13	10,13	10,13	10,13
R3	10,16	10,14	10,14	10,14	10,13	10,14

DAC 08
NEG. FULL SCALE VOLTAGE



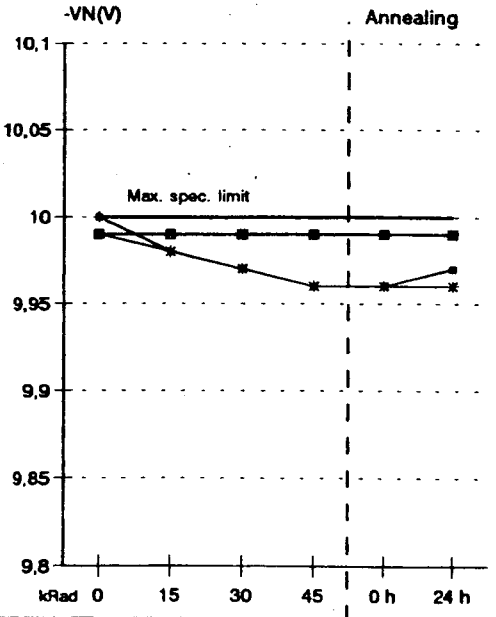
CONTROL	10,15	10,15	10,15	10,15	10,15	10,15
R1	10,16	10,14	10,13	10,12	10,12	10,12
R2	10,15	10,13	10,12	10,11	10,11	10,12
R3	10,16	10,14	10,13	10,12	10,12	10,12

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 1



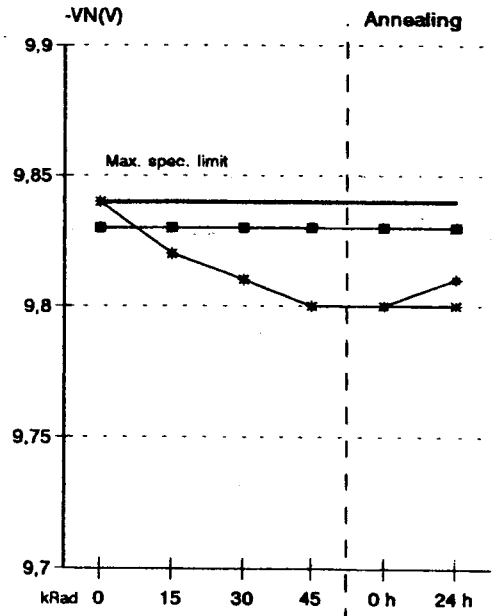
CONTROL	10,07	10,07	10,07	10,07	10,07	10,07
R1	10,06	10,06	10,05	10,04	10,04	10,05
R2	10,06	10,06	10,05	10,04	10,04	10,04
R3	10,06	10,06	10,05	10,04	10,04	10,05

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 2



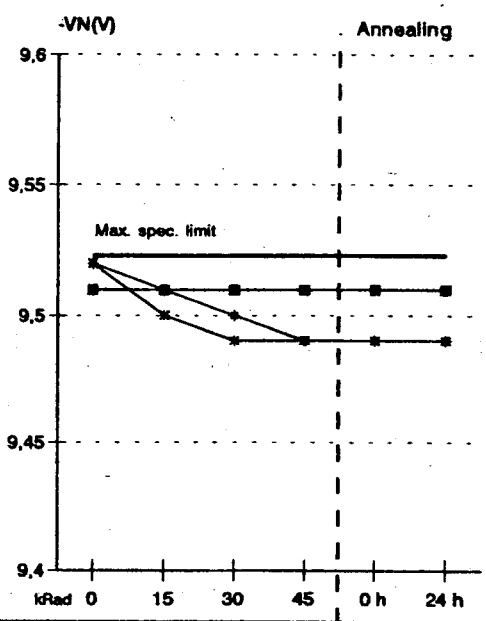
CONTROL	9,99	9,99	9,99	9,99	9,99	9,99
R1	10	9,98	9,97	9,96	9,96	9,96
R2	9,99	9,98	9,97	9,96	9,96	9,96
R3	10	9,98	9,97	9,96	9,96	9,97

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 4



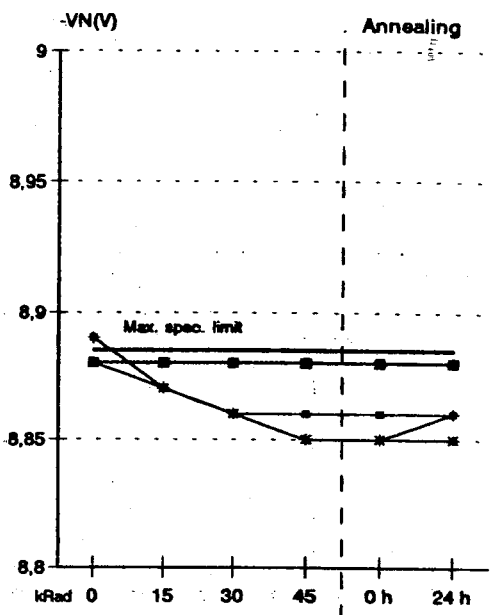
CONTROL	9,83	9,83	9,83	9,83	9,83	9,83
R1	9,84	9,82	9,81	9,8	9,8	9,81
R2	9,84	9,82	9,81	9,8	9,8	9,8
R3	9,84	9,82	9,81	9,8	9,8	9,81

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 8



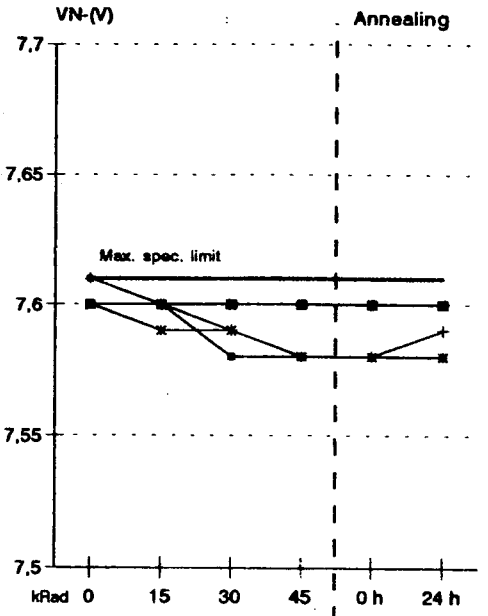
CONTROL	●	9,51	9,51	9,51	9,51	9,51	9,51
R1	+	9,52	9,51	9,5	9,49	9,49	9,49
R2	*	9,52	9,5	9,49	9,49	9,49	9,49
R3	◆	9,52	9,51	9,5	9,49	9,49	9,49

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 16



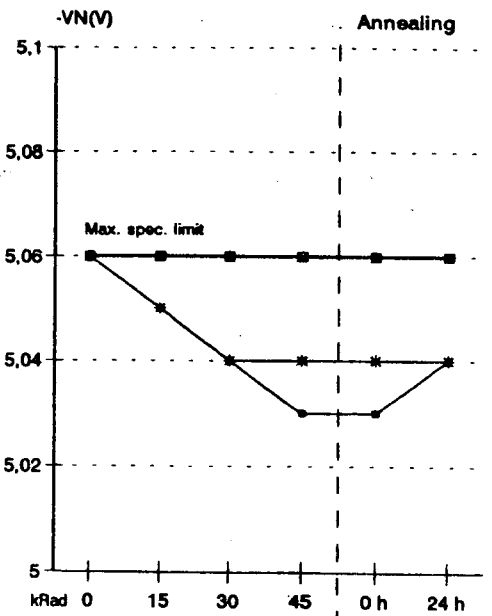
CONTROL	●	8,88	8,88	8,88	8,88	8,88	8,88
R1	+	8,89	8,87	8,86	8,85	8,85	8,86
R2	*	8,88	8,87	8,86	8,85	8,85	8,85
R3	◆	8,89	8,87	8,86	8,86	8,86	8,86

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 32



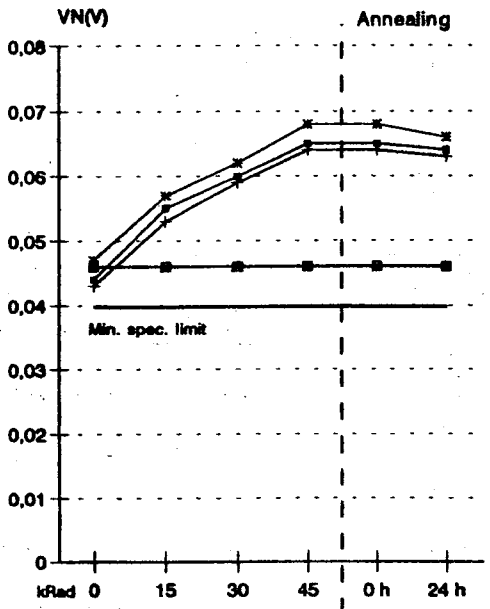
CONTROL	●	7,6	7,6	7,6	7,6	7,6	7,6
R1	+	7,61	7,6	7,59	7,58	7,58	7,59
R2	*	7,6	7,59	7,59	7,58	7,58	7,58
R3	◆	7,61	7,6	7,58	7,58	7,58	7,58

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 64



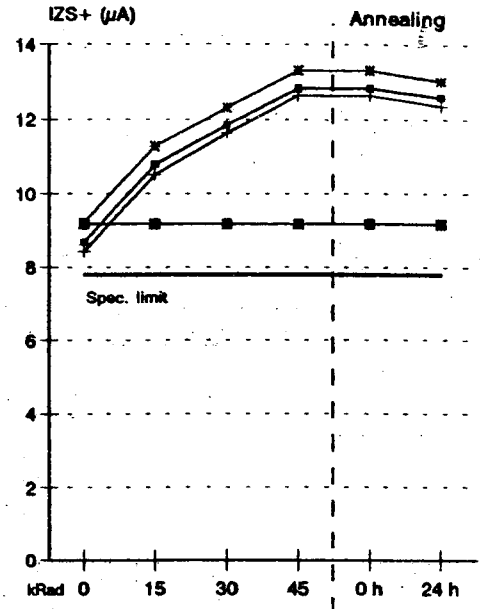
CONTROL	●	5,06	5,06	5,06	5,06	5,06	5,06
R1	+	5,06	5,05	5,04	5,04	5,04	5,04
R2	*	5,06	5,05	5,04	5,04	5,04	5,04
R3	◆	5,06	5,05	5,04	5,03	5,03	5,04

DAC 08
OUTPUT VOLTAGE AT BIT-VALUE 128



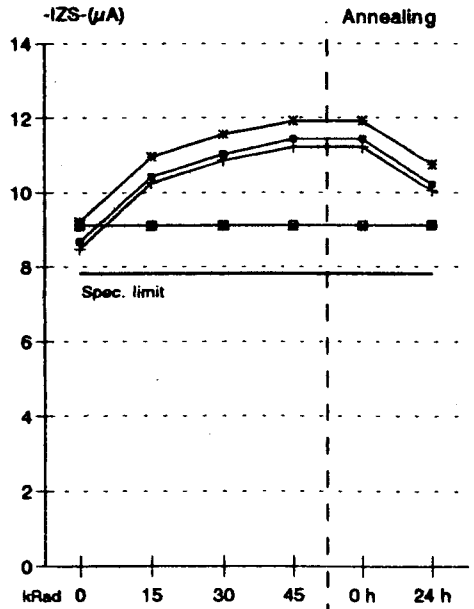
CONTROL	✱	0,046	0,046	0,046	0,046	0,046	0,046
R1	+	0,043	0,053	0,059	0,064	0,064	0,063
R2	✱	0,047	0,057	0,062	0,068	0,068	0,066
R3	●	0,044	0,055	0,06	0,065	0,065	0,064

DAC 08
POS. ZERO SCALE CURRENT



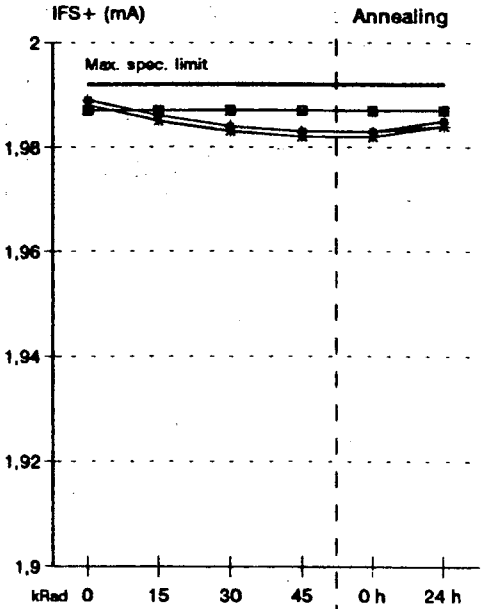
CONTROL	✱	9,18	9,18	9,18	9,18	9,18	9,18
R1	+	8,43	10,52	11,63	12,64	12,64	12,36
R2	✱	9,23	11,28	12,32	13,32	13,32	13,03
R3	●	8,68	10,79	11,85	12,84	12,84	12,59

DAC 08
NEG. ZERO SCALE CURRENT



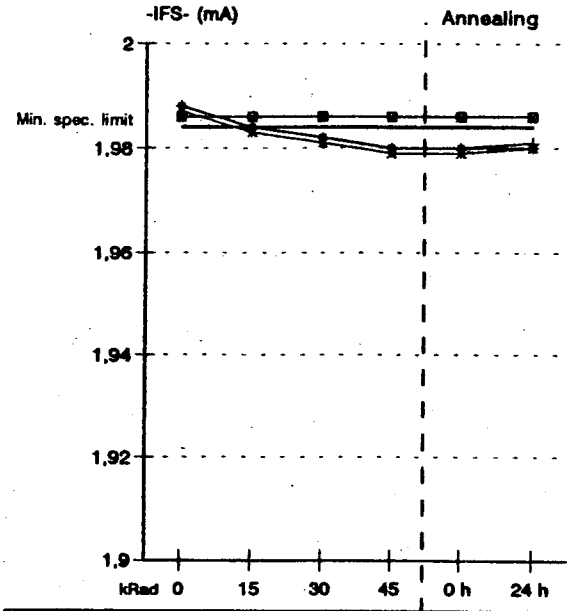
CONTROL	✱	9,112	9,109	9,109	9,109	9,109	9,115
R1	+	8,465	10,26	10,86	11,22	11,22	10,05
R2	✱	9,209	10,96	11,56	11,92	11,92	10,76
R3	●	8,658	10,43	11,03	11,44	11,44	10,23

DAC 08
POS. FULL SCALE CURRENT



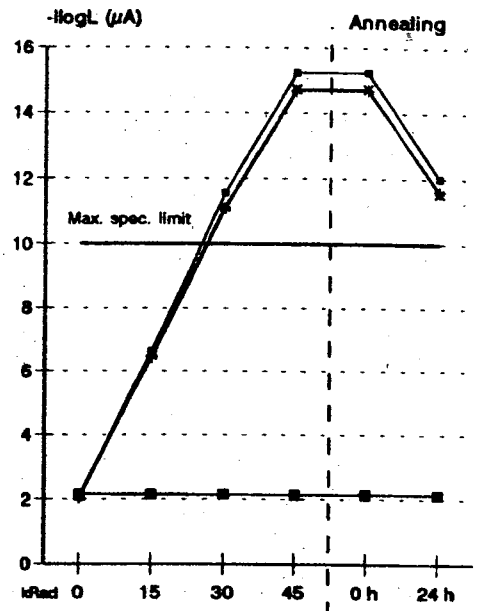
CONTROL	✱	1,987	1,987	1,987	1,987	1,987	1,987
R1	+	1,989	1,986	1,984	1,983	1,983	1,984
R2	✱	1,988	1,985	1,983	1,982	1,982	1,984
R3	●	1,989	1,986	1,984	1,983	1,983	1,985

DAC 08
NEG. FULL SCALE CURRENT



CONTROL	■	1,986	1,986	1,986	1,986	1,986	1,986
R1	+	1,986	1,984	1,982	1,98	1,98	1,981
R2	*	1,987	1,983	1,981	1,979	1,979	1,98
R3	●	1,988	1,984	1,982	1,98	1,98	1,98

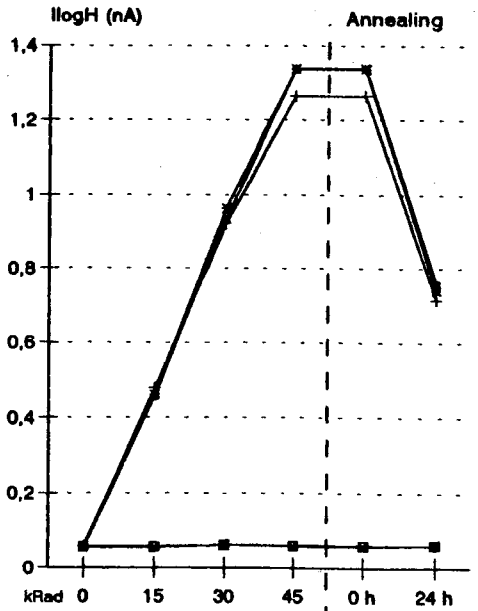
DAC 08
LOGIC INPUT CURRENT LOW LEVEL



CONTROL	■	2,157	2,147	2,144	2,14	2,14	2,135
R1	+	2,052	6,438	11,1	14,68	14,68	11,62
R2	*	2,104	6,493	11,14	14,73	14,73	11,56
R3	●	2,05	6,64	11,57	15,24	15,24	12,02

DAC 08
LOGIC INPUT CURRENT HIGH LEVEL

Max.spec.limit10uA



CONTROL	■	0,056	0,056	0,061	0,059	0,059	0,06
R1	+	0,057	0,478	0,921	1,265	1,265	0,715
R2	*	0,057	0,461	0,962	1,338	1,338	0,74
R3	●	0,056	0,455	0,933	1,339	1,339	0,76