ISSUE 1

TOP - REL

Radiation Verification Test

Report

on

CMP05BJ

from Analog Devices

Doc. N° TPR/RPT/083

Issue/ Revision	Date	Prepared	Checked	Approved
1	Dec. 97	D. Gammone	V. Thomai	G. Cucinella
			V. Thomai	G. Cucinella

CADM RELEASE
13/12/97

ISSUE	ISSUE DATE	PAGE AFFECTED	COMMENTS
1	Dec. 97	All	Initial Issue

Abstract

This report contains the following parts:

* Radiation Verification Test Plan
* Certificate of Irradiation
* Certificate of Dosimetry
* Radiation Verification Test Results including :
  - ⇒ Tables measurements
  - ⇒ Graphs

RVT Plan

RVT Plan includes all test conditions and the parameters to be measured. Parameter limits refer to Electrical Measurements Table of Detail specification ST-BAS-PS-0961 based on SMD-5962-95632.

RVT Results

Irradiation steps have been 10-20-30-50-75-100 kRads.

Dose Rate has been around 9,5Rad/s.

Test temperature has been 25°C.

Two parts have been tested and another has been used as control sample.

After irradiation (100kRad accumulated) the devices have been annealed for 24 hours at 25°C.

Lot Date Code is 9138.

All parameters measured during this test stay within specification limits up to 100kRads.

Top·Rel	RADIATION VERIFICATION TEST **PLAN** **TPR/RPT/080**	ISSUE N°. 1 REV. A DATE: 19/11/97 PAGE: 1/2

Component Number	Component Designation	Irradiation Spec n°. SCC/22900
ST-096101B	CMP05BJ	Issue 2 Rev.

Specification	Acceptance	Sample Size	Project / Programme:
Generic: SCC/9000 Iss. 9B	Diffusion [ ]	2	LABEN REQUEST
Detail : ST-BAS-PS-0961 Iss. 3	Lot [X]	Control Devices 1	

Family:	Group:	Package:
MICROCIRCUITS	COMPARATOR	TO-99

Manufacturer:	Test House:	Originator: TOP-REL
Analog Devices	TOP-REL	Name: V. THOMAI
Address: Santa Clara, CA USA	Address: Via Dei Berio,91-00155 ROMA ITALY	Telephone: +39(6)2282279

	Irradiation:	Irradiation Measurement Interval	Level of Interest:
Facility: ENEA	Single [ ]	Biased [ ] Circuit Ref.: N/A	50 kRad
Source: CO60	Multiple [X]	Unbiased [X] Supply Volt.: N/A	
		T (°C): Room Duration: 1H max	

Single Irradiation	Multiple Irradiation Steps	1	2	3	4	5	6	7	8
Dose (kRad(Si)):	Dose (kRad(Si))	0	10	20	30	50	75	100	
Dose Rate (Rad(Si)/s):	Dose Rate (Rad(Si)/s)		10	10	10	10	10	10	
Exposure Time (H):	Exposure Time (min)		16	16	16	32	40	40	

Irradiation Conditions:				Anneal Test:			
Biased (Remote Test)	[X]	Bias Circuit Ref:	see figure	Biased	[X]	Bias Circuit Ref:	
Unbiased (Remote Test)	[ ]	Supply Voltages:	see figure	Unbiased	[ ]	Supply Volt.:	
In Situ Test	[ ]	T (°C):	Room	T (°C)	[25]	Duration: 24H	

Test Step	Description	Requirement
1	Samples Serialisation	To be assigned to all devices
2	Initial Electrical Measurements	Per electrical measurement table here attached (equipment name)
3	Set Up of Irradiation	As required in this plan
4	Radiation Exposures	As described above
5	Intermediate, End point, Annealing measurements	Tests per el. meas. table here attached and accept. limits as specified in that table
6	Annealing	24H at room temperature (25°C)
7	Test Report	

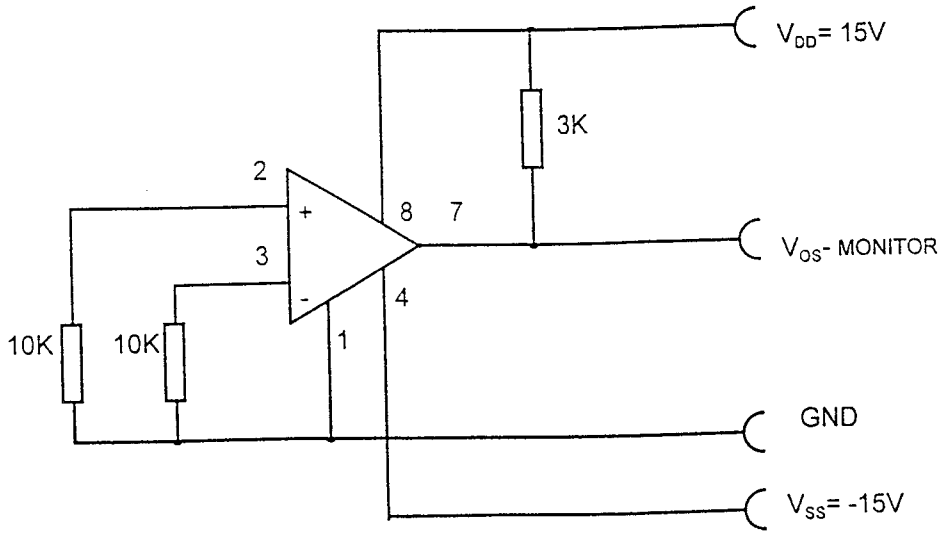
Flow	Name	Signatures	Company	Date
PREPARED	V. THOMAI	V. Thomai	TOP-REL	19/11/97
APPROVED	G. CUCINELLA	G. Cucinella	TOP-REL	19/11/97
APPROVED				
APPROVED				

Top·Rel	RADIATION VERIFICATION TEST **PLAN** **TPR/RPT/080**	ISSUE N°. 1 REV. A DATE: **19/11/97** PAGE: **2/2**
Component Number **ST-096101B**	Component Designation **CMP05BJ**	Irradiation Spec n°. **SCC/22900** Issue **2** Rev.

TABLE 1: ELECTRICAL MEASUREMENTS AFTER EACH IRRADIATION STEP

N°	CHARACTERISTIC	SYMBOL	TEST METHOD MIL-STD-883	TEST CONDITIONS	LIMITS		UNIT
					MIN	MAX	
1	Input Offset Voltage	V_{IO}	4001	V_{DD}= +5V V_{SS}= -5V R_S= 50 Ω	-	1.0	mV
2	Input Offset Current	I_{IO}	4001	V_{DD}= +5V V_{SS}= -5V	-	150	nA
3	Input Bias Current	I_{IB}	4001	V_{DD}= +5V V_{SS}= -5V	-	1.8	µA
4	Positive Supply Current	I_{CD}	3005	V_{DD}= +5V V_{SS}= -5V $V_0 \leq 0.4V$	-	16	mA
5	Negative Supply Current	I_{SS}	3005	V_{DD}= +5V V_{SS}= -5V $V_0 \leq 0.4V$	-	18	mA

FIGURE 1: IRRADIATION BIAS CIRCUIT



ENEA INNOVAZIONE SERVIZI TECNOLOGICI IMPIANTO IRRAGGIAMENTO CALLIOPE	*Sigla di identificazione :*	*Data:* 1/12/97	*Pag./ di pag.* 1/2
	Commessa n°:	*Num.:* 5/97	*Firma Operatore:* Pasquali Angela

CERTIFICATO DI IRRAGGIAMENTO

Descrizione campione: IRRAGGIAMENTO DI COMPONENTI ELETTRONICI

Numero ident.: 3C91C e CMP05BJ

Richiedente: TOP-REL

Documenti di riferimento: FAX TPR/3021-97 DEL 13/11/97

RIFERIMENTI DOSIMETRICI

Certificato di dosimetria : NUM. 3/97 DEL 19/11/97

Inizio irraggiamento : ORE 08.30 DEL 28/11/97

Fine irraggiamento : ORE 14.30 DEL 28/11/97

Condizioni ambientali :

temperatura : 20.9 (°C) **pressione:** 1 (atm)

tipo di atmosfera : ARIA **um.rel. :** 33.7 (%)

Note: E'STATO UTILIZZATO LA MEDIA DEI PUNTI DOSIMETRICI TROVATI.
IL RATEO UTILIZZATO E' COMPRENSIVO DEL DECADIMENTO NATURALE DELLA SORGENTE.
LE DOSIASSORBITE S'INTENDONO CUMULATE SUI SINGOLI COMPONENTI.

ENEA INNOVAZIONE SERVIZI TECNOLOGICI IMPIANTO IRRAGGIAMENTO CALLIOPE	*Sigla di identificazione :*	*Data:* 1/12/97	*Pag. / di pag.* 1/2
	Commessa n°:	*Num.:* 5/97	*Firma Operatore:*

CERTIFICATO DI IRRAGGIAMENTO

Punto identific.	Intensità di dose Inizio irragg. (Gy/ .)	Intensità di dose Fine irragg. (Gy/ .)	Tempo di irraggiamento (hh:mm:ss)	Dose richiesta (Gy)	Dose assorbita (Gy)	Differenza dalla dose richiesta (%)
1	343.3	343.3	00:17:29	100	100.03	0.03
2	343.3	343.3	00:17:29	100	100.03	0.03
3	343.3	343.3	00:17:29	100	100.03	0.03
4	343.3	343.3	00:34:58	200	200.06	0.03
5	343.3	343.3	00:43:42	250	250.04	0.016
6	343.3	343.3	00:43:42	250	250.04	0.016
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

ENEA INNOVAZIONE SERVIZI TECNOLOGICI IMPIANTO IRRAGGIAMENTO CALLIOPE	Sigla di identificazione:	Data: 1/12/97	Pag. / di pag. 1/2
	Commessa n°:	Num.: 3/97	Firma Operatore: Pasquale Angelo

CERTIFICATO DI DOSIMETRIA

Dosimetria effettuata in data 19/11/97 alle ore: 09.15

Strumentazione utilizzata: Spettrofotometro UV/Vis Beikman DU-6

Tipo di dosimetro usato:

☒ Soluzione Fricke

☐ Red Perspex

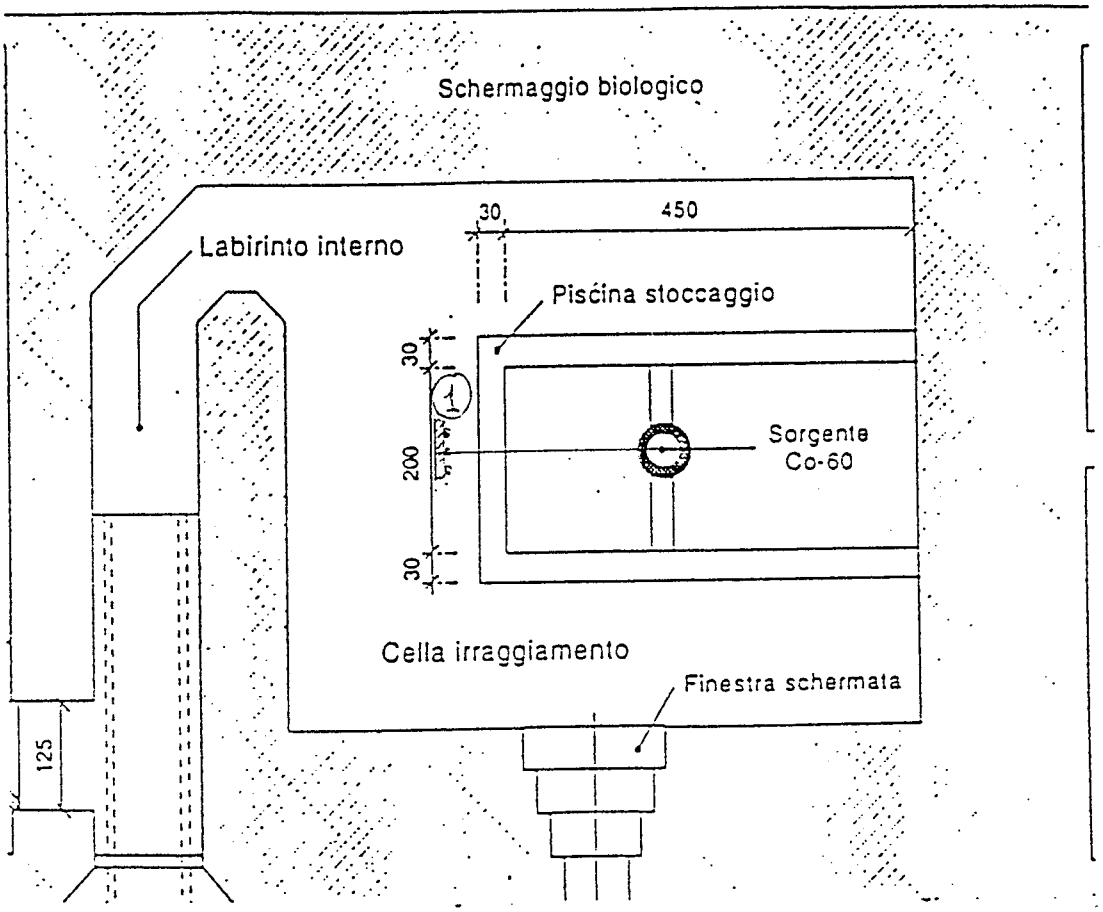
La dosimetria è stata effettuata in conformità alle specifiche riportate nel documento Enea TDI 87011A

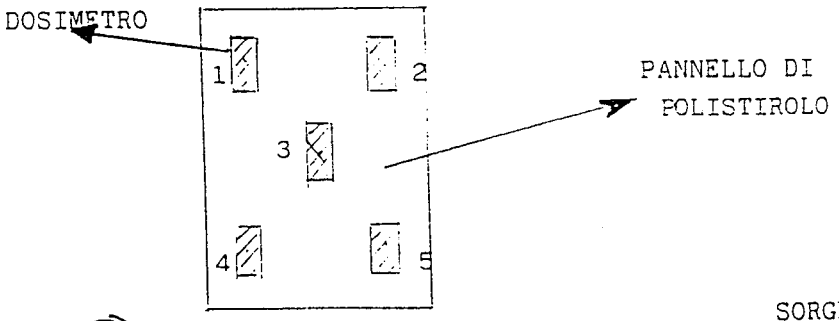
RISULTATI DOSIMETRICI

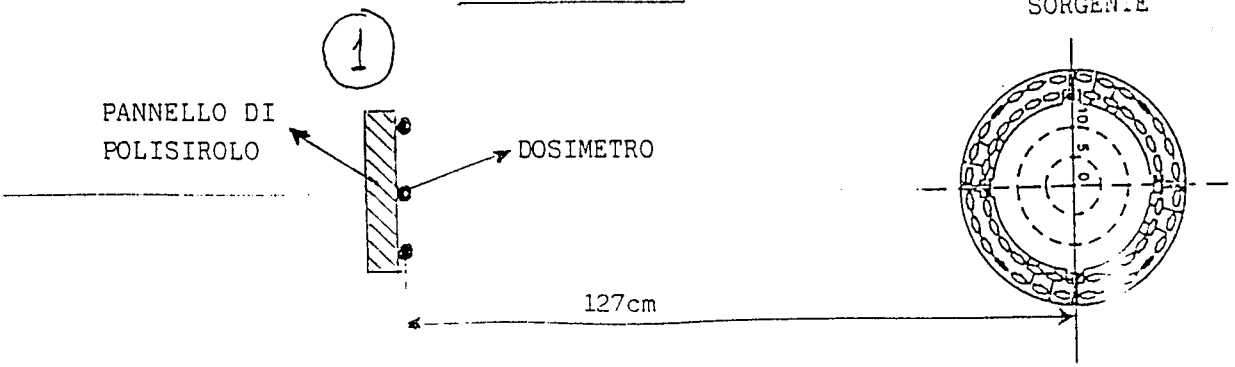
Numero dosimetro	Tempo di irraggiamento (hh:mm:ss)	Dose assorbita (Gy)	Intensità di dose (Gy/h)
1	00 : 30 : 00	170.844	341.688
2	00 : 30 : 00	167.808	335.616
3	00 : 30 : 00	173.604	347.208
4	00 : 30 : 00	175.812	351.624
5	00 : 30 : 00	173.052	346.104
6	: :		
7	: :		
8	: :		
9	: :		
10	: :		

ENEA INNOVAZIONE SERVIZI TECNOLOGICI IMPIANTO IRRAGGIAMENTO CALLIOPE	*Sigla di identificazione:*	*Data:* 1/12/97	*Pag. / di pag.* 2/2
	Commessa n°:	*Num.:* 3/97	*Firma Operatore:*

CERTIFICATO DI DOSIMETRIA







Part Type : **CMP05BJ**
Manufacturer : **AND**
Detail Spec.: **SMD-5962-95632**

Sample size : **3 (2+1)**
Irradiated Samples: **s/n 3, 5**
Control Sample: **s/n 6**
Date Code : **9138**

Equipment(s) : **HP4142B - TF HP16088-OPAMP**
Calibration is : **VALID**
Test Prg. No.: **187**

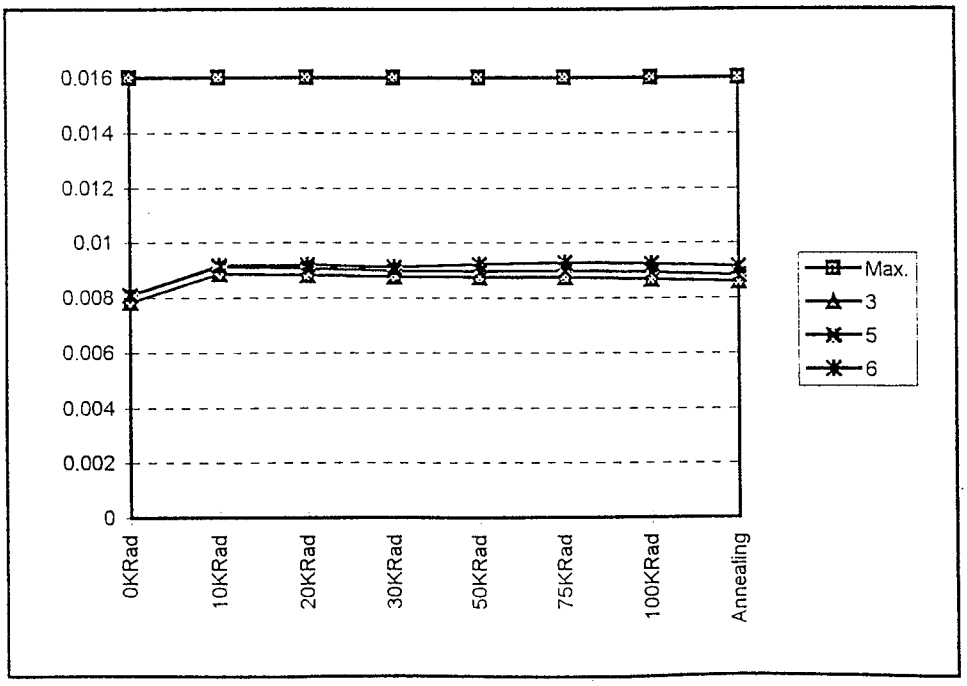
Irradiation steps : **10-20-30-50-75-100 kRad**
Annealing : **24 h**
Dose Rate : **9,5 Rad/s**
Temperature for test : **+25°C**

Operator : **D. GAMMONE**
Date : **28/11/97**

Test House : **TOP-REL**
Test Source : **CO60 Calliope / ENEA, Casaccia**

1- I_{DD}

	0KRad	10KRad	20KRad	30KRad	50KRad	75KRad	100KRad	Annealing
Min.	-	-	-	-	-	-	-	-
Max.	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
3	0.0078294	0.0088702	0.0088236	0.0087698	0.0087446	0.0087348	0.0086742	0.0085774
5	0.0080846	0.00911	0.009043	0.0089754	0.0089558	0.0089864	0.0089332	0.0088112
6	0.0081044	0.009166	0.0091852	0.0091206	0.009215	0.009272	0.0092352	0.0091462



Part Type : CMP05BJ
Manufacturer : AND
Detail Spec.: SMD-5962-95632

Sample size : 3 (2+1)
Irradiated Samples: s/n 3, 5
Control Sample: s/n 6
Date Code : 9138

Equipment(s) : HP4142B - TF HP16088-OPAMP
Calibration is : VALID
Test Prg. No.: 187

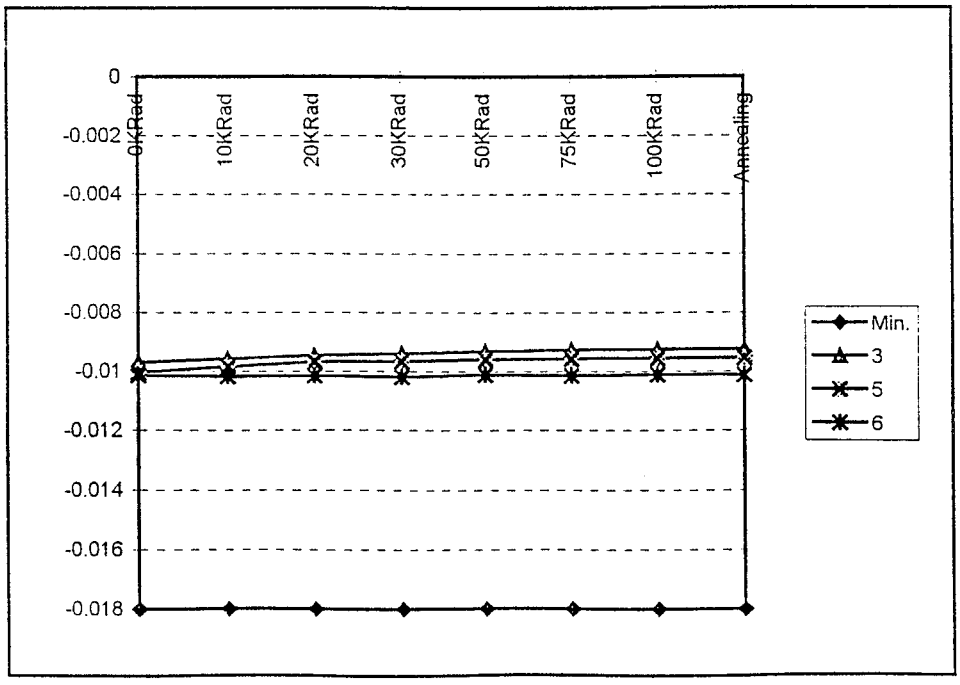
Irradiation steps : 10-20-30-50-75-100 kRad
Annealing : 24 h
Dose Rate : 9,5 Rad/s
Temperature for test : +25°C

Operator : D. GAMMONE
Date : 28/11/97

Test House : TOP-REL
Test Source : CO60 Calliope / ENEA, Casaccia

2- I_{SS}

	0KRad	10KRad	20KRad	30KRad	50KRad	75KRad	100KRad	Annealing
Min.	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
Max.	-	-	-	-	-	-	-	-
3	-0.0097144	-0.0095816	-0.0094666	-0.0094156	-0.0093182	-0.009276	-0.009259	-0.009264
5	-0.010046	-0.009847	-0.0097004	-0.0096754	-0.009605	-0.0095874	-0.009567	-0.009569
6	-0.010148	-0.010178	-0.010156	-0.010192	-0.010096	-0.010152	-0.010108	-0.010134



Part Type : CMP05BJ
Manufacturer : AND
Detail Spec.: SMD-5962-95632

Sample size : 3 (2+1)
Irradiated Samples: s/n 3, 5
Control Sample: s/n 6
Date Code : 9138

Equipment(s) : HP4142B - TF HP16088-OPAMP
Calibration is : VALID
Test Prg. No.: 187

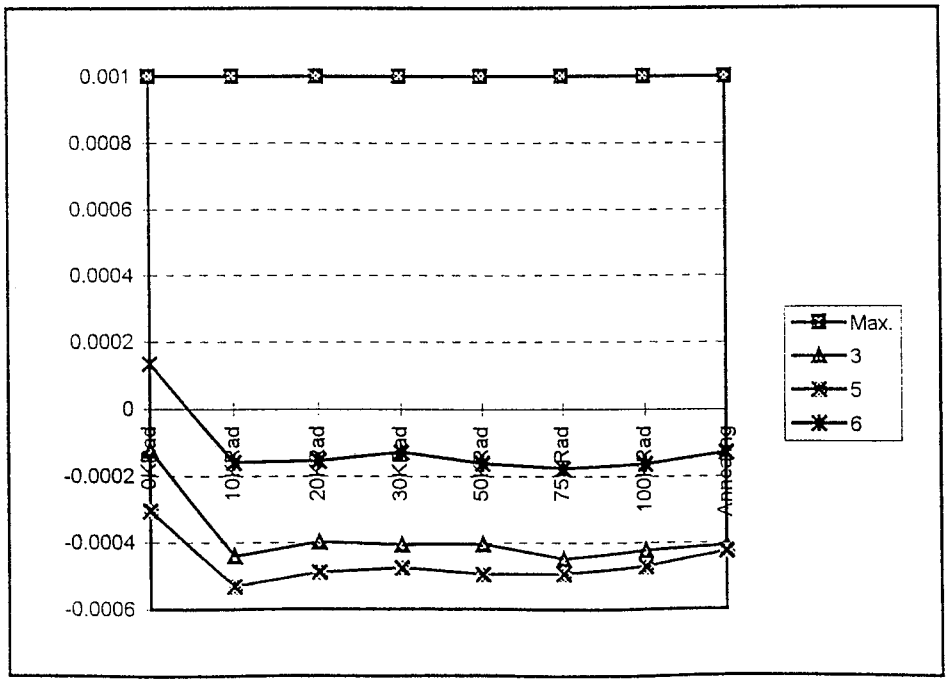
Irradiation steps : 10-20-30-50-75-100 kRad
Annealing : 24 h
Dose Rate : 9,5 Rad/s
Temperature for test : +25°C

Operator : D. GAMMONE
Date : 28/11/97

Test House : TOP-REL
Test Source : CO60 Calliope / ENEA, Casaccia

3- V_{IO}

	0KRad	10KRad	20KRad	30KRad	50KRad	75KRad	100KRad	Annealing
Min.	-	-	-	-	-	-	-	-
Max.	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
3	-0.00012332	-0.00044008	-0.000397	-0.000405	-0.00040384	-0.00044792	-0.000422	-0.000408
5	-0.00030508	-0.00053116	-0.0004886	-0.00047468	-0.00049404	-0.00049124	-0.000471	-0.000424
6	0.00013396	-0.00016116	-0.0001548	-0.00013032	-0.00016156	-0.00017768	-0.000164	-0.000129



Part Type : **CMP05BJ**
Manufacturer : **AND**
Detail Spec.: **SMD-5962-95632**

Sample size : **3 (2+1)**
Irradiated Samples: **s/n 3, 5**
Control Sample: **s/n 6**
Date Code : **9138**

Equipment(s) : **HP4142B - TF HP16088-OPAMP**
Calibration is : **VALID**
Test Prg. No.: **187**

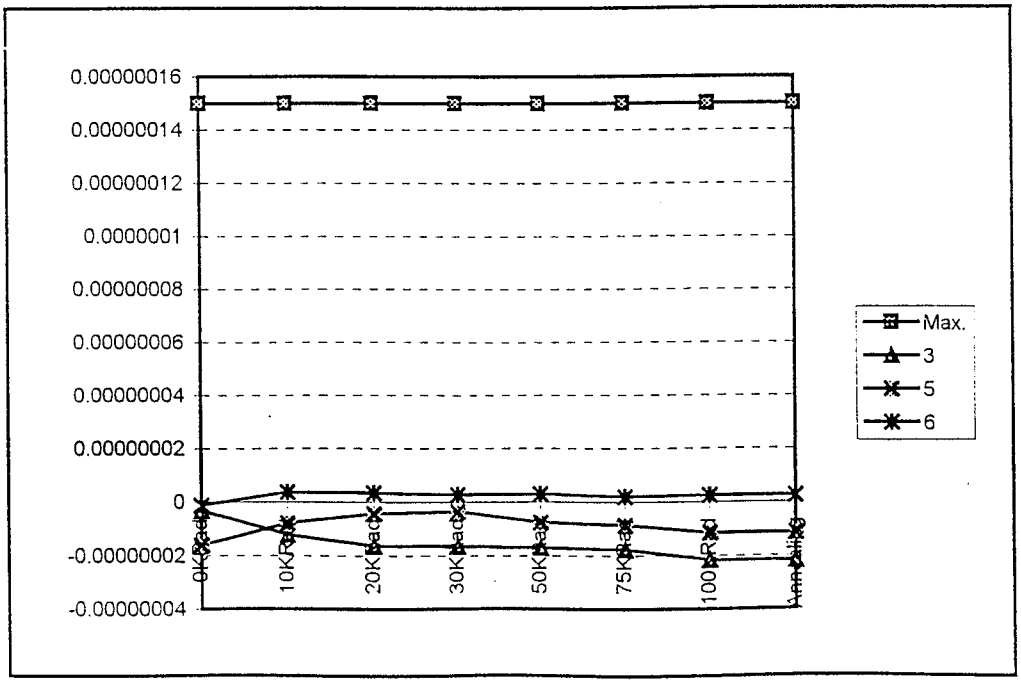
Irradiation steps : **10-20-30-50-75-100 kRad**
Annealing : **24 h**
Dose Rate : **9,5 Rad/s**
Temperature for test : **+25°C**

Operator : **D. GAMMONE**
Date : **28/11/97**

Test House : **TOP-REL**
Test Source : **CO60 Calliope / ENEA, Casaccia**

4- I_{IO}

	0KRad	10KRad	20KRad	30KRad	50KRad	75KRad	100KRad	Annealing
Min.	-	-	-	-	-	-	-	-
Max.	0.00000015	0.00000015	0.00000015	0.00000015	0.00000015	0.00000015	1.5E-07	1.5E-07
3	-3.2884E-09	-1.234E-08	-1.638E-08	-1.67084E-08	-1.70784E-08	-1.78492E-08	-2.16E-08	-2.19E-08
5	-1.61548E-08	-7.8436E-09	-4.4E-09	-3.5216E-09	-7.6112E-09	-8.666E-09	-1.16E-08	-1.16E-08
6	-1.318E-09	3.718E-09	3.2652E-09	2.724E-09	2.8016E-09	1.9664E-09	2.488E-09	2.294E-09



Part Type : CMP05BJ
Manufacturer : AND
Detail Spec.: SMD-5962-95632

Sample size : 3 (2+1)
Irradiated Samples: s/n 3, 5
Control Sample: s/n 6
Date Code : 9138

Equipment(s) : HP4142B - TF HP16088-OPAMP
Calibration is : VALID
Test Prg. No.: 187

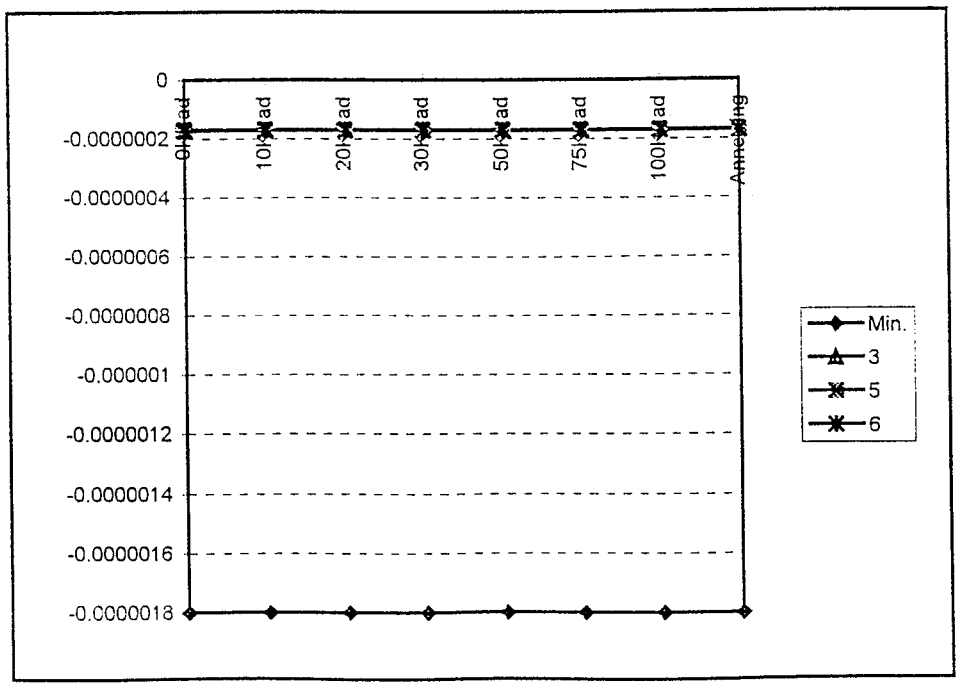
Irradiation steps : 10-20-30-50-75-100 kRad
Annealing : 24 h
Dose Rate : 9,5 Rad/s
Temperature for test : +25°C

Operator : D. GAMMONE
Date : 28/11/97

Test House : TOP-REL
Test Source : CO60 Calliope / ENEA, Casaccia

5- I_{IB-}

	0KRad	10KRad	20KRad	30KRad	50KRad	75KRad	100KRad	Annealing
Min.	-0.0000018	-0.0000018	-0.0000018	-0.0000018	-0.0000018	-0.0000018	-1.8E-06	-1.8E-06
Max.	-	-	-	-	-	-	-	-
3	-1.71859E-07	-1.68771E-07	-1.693E-07	-1.69282E-07	-1.69314E-07	-1.68901E-07	-1.69E-07	-1.69E-07
5	-1.70021E-07	-1.67912E-07	-1.684E-07	-1.68553E-07	-1.6838E-07	-1.68428E-07	-1.69E-07	-1.69E-07
6	-1.74376E-07	-1.71632E-07	-1.716E-07	-1.71945E-07	-1.71652E-07	-1.71503E-07	-1.72E-07	-1.72E-07



Part Type : **CMP05BJ**
Manufacturer : **AND**
Detail Spec.: **SMD-5962-95632**

Sample size : **3 (2+1)**
Irradiated Samples: **s/n 3, 5**
Control Sample: **s/n 6**
Date Code : **9138**

Equipment(s) : **HP4142B - TF HP16088-OPAMP**
Calibration is : **VALID**
Test Prg. No.: **187**

Irradiation steps : **10-20-30-50-75-100 kRad**
Annealing : **24 h**
Dose Rate : **9,5 Rad/s**
Temperature for test : **+25°C**

Operator : **D. GAMMONE**
Date : **28/11/97**

Test House : **TOP-REL**
Test Source : **CO60 Calliope / ENEA, Casaccia**

6- I_{IB+}

	0KRad	10KRad	20KRad	30KRad	50KRad	75KRad	100KRad	Annealing
Min.	-	-	-	-	-	-	-	-
Max.	0.0000018	0.0000018	0.0000018	0.0000018	0.0000018	0.0000018	0.0000018	0.0000018
3	1.92481E-07	1.95605E-07	1.9521E-07	1.95306E-07	1.95306E-07	1.95747E-07	1.954E-07	1.954E-07
5	1.94291E-07	1.96532E-07	1.9614E-07	1.95991E-07	1.96196E-07	1.96164E-07	1.96E-07	1.955E-07
6	1.89884E-07	1.9284E-07	1.9277E-07	1.92527E-07	1.92852E-07	1.93009E-07	1.929E-07	1.926E-07