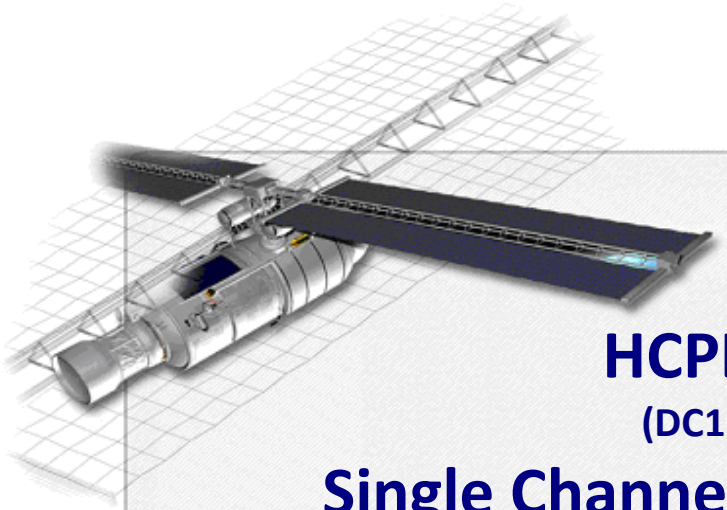
TOTAL IONIZING DOSE TEST REPORT



HCPL5501

(DC1105)

Single Channel Optocoupler

From

AVAGO

TRAD/TE/HCPL5501/XXX1/ESA/YP/1104		Labège, April 19th, 2012
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Issue : 0		
To: Marc POIZAT	Project/Program:	ESA Contract N°4000102571/10/NL/AF-Radiation Characterization of Laplace RH optocouplers, sensors and detectors

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1 INTRODUCTION

This report includes the test results of HCPL5501, a Single Channel Optocoupler from AVAGO to evaluate Total Ionizing Dose (TID) effects under ^{60}Co irradiation. Between November 2011 and February 2012, TRAD characterized this device for TID sensitivity at the UCL Facility, Belgium using their Gamma irradiation Facility.
The objectives of the test are:

- to detect and measure the degradation of device parameters as a function of TID,
- to determine if device parameters are within specified limits after exposure to final TID level.

2 DOCUMENTS

2.1 Applicable Documents

AD	1.	ESA contract	N°4000102571/10/NL/AF-Radiation Characterization of Laplace RH optocouplers, sensors and detectors
AD	2.	Irradiation Test Plan	ITP-TE-HCPL5501-AVA-ESA-1115 Issue 2 of 16/06/2011

2.2 Reference Documents

RD	1.	Datasheet HCPL5501 Datasheet	Hermetically Sealed, Transistor Output Optocouplers for Analog and Digital Applications HCPL-5501 n° 5989-1659EN - June 13, 2007 by Avago
RD	2.	AVAGO certificate of conformance dated 09/05/2011	

3 DEVICE INFORMATION

3.1 Device description

The HCPL5501 is a Single Channel hermetically sealed transistor output Optocoupler with a GaAsP light emitting diode for Analog and Digital Applications.

Type	HCPL5501 – 5962-9085401HPC
Manufacturer	AVAGO
Function	Optocoupler
Package	DIP8
Date Code	1105
Inspection Lot	HS110403
LPN	DS10742240
Sample size	16 parts (15 + 1 control sample)

3.2 Procurement information

75 parts HCPL5501 were procured from AVAGO (through ACAL BFI, Germany) with full MIL-PRF-38534 Class Level H testing. Parts were delivered with a certificate of conformance [RD2].
The class H is identifiable by the digit 1 at the end of the part reference.

3.3 External view

Figure 1: package marking

Figure 2: package back side

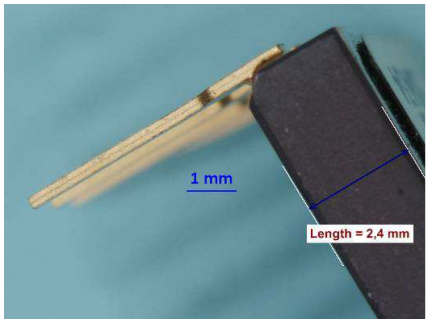
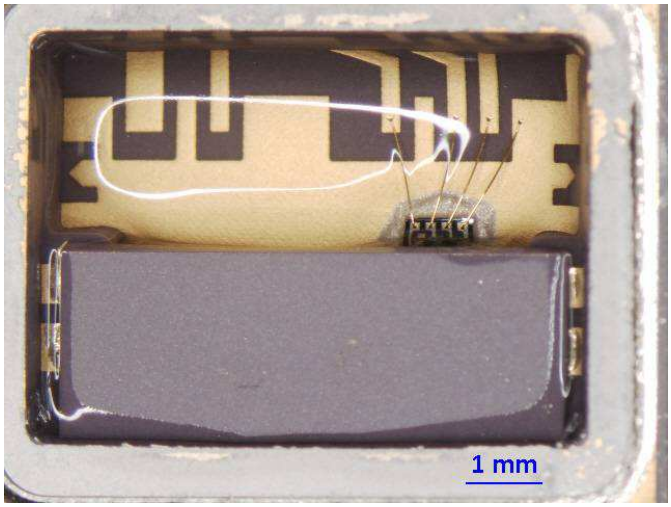


Figure 3: package view

3.4 Internal view



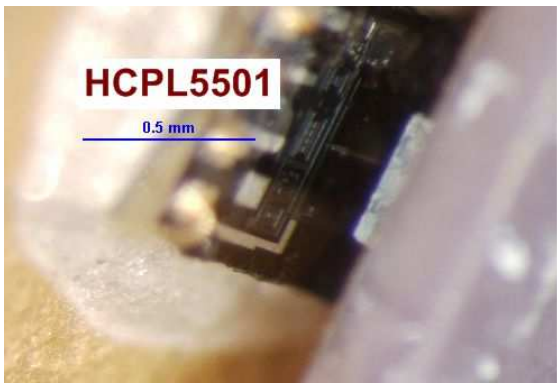


Figure 4: Internal overall view

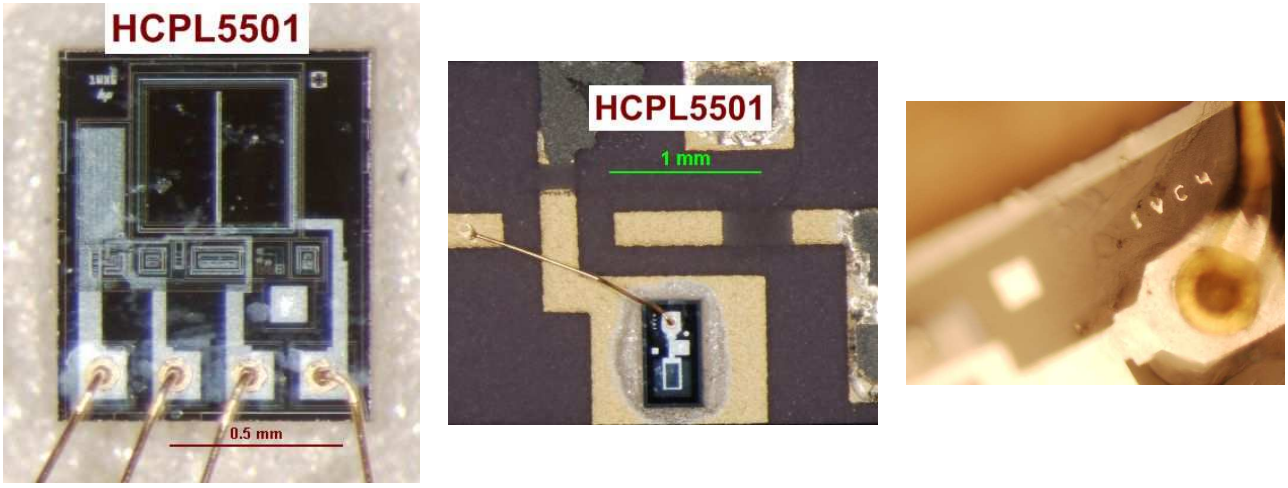


Figure 5: detail views of dice and LED marking

3.5 Serialization

Each part is serialized to enable pre and post test identification and comparison.

Serial Number	Control sample	Test samples														
Serialization	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	Ref	Bias1	Bias1	Bias1	Bias1	Bias1	Bias2	Bias2	Bias2	Bias2	Bias2	OFF	OFF	OFF	OFF	OFF

4 IRRADIATION MEANS AND CONDITIONS

4.1 UCL irradiation facility (Belgium)

Gamma irradiations are performed with Cobalt 60 source.
Gamma emitted radiation energies are 1.17 and 1.33 MeV.
Dose rates is equal 15 kRad(Si) / h at the source centre .
Moreover the irradiation chamber is a cylindrical room with a radius of 2m.
Then dose rate usable vary from 1.8 kRad(Si) / h to 80 Rad(Si) / h for normal irradiation positions and direct field.

4.2 Dose measurement

Alanine dosimeters are used for each test set up to control Total Ionizing Dose.

4.3 Experimental conditions

An Accumulated dose of 200 krad(Si) of ^{60}Co is required [AD2] for this TID (Total Ionizing Dose) evaluation test.

Following steps were planned to determine the component degradation under ^{60}Co irradiation and devices were exposed to the following dose rates:

	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
Accumulated dose krad(Si)	10	20	50	74	102	123	152	203
Dose rate (Si)/h	36	36	36	36	310	310	310	310

Two annealing steps are performed after Co60 irradiation:

Duration (h)	24	168
Temperature (°C)	25	100

5 ELECTRICAL TESTS

Electrical parameters to be measured in pre and post exposure tests are described in the following table. Electrical tests are performed on each part using the test set-up hereunder. All required data are recorded for each device. Test conditions and limits are given in the applicable irradiation test plan [AD2] and shown hereafter.

5.1 Test set-up

TEST BOARD	TRAD/CT1/E/OPTO/ZIP14/BR/1108
TEST PROGRAM	HCPL5501_TE_XXX1_B1_V10.llb

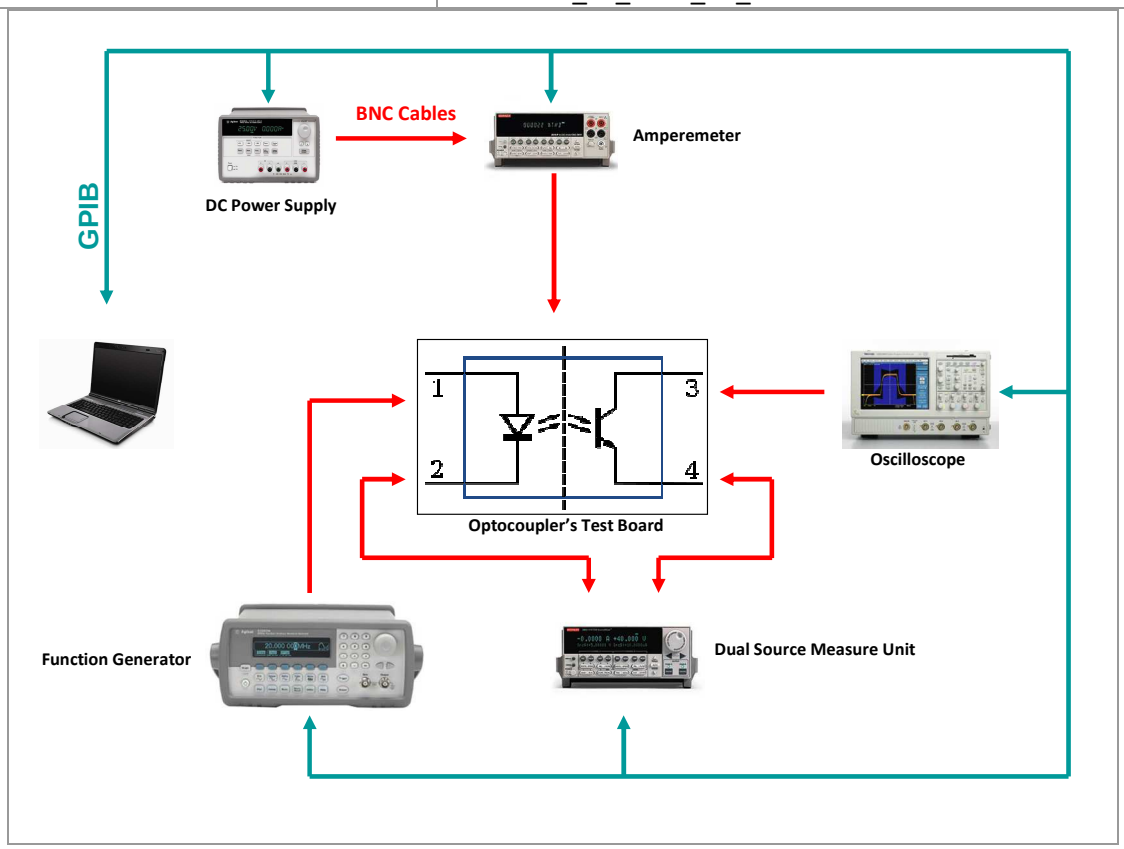


Figure 6: test principle

5.2 Test configuration

Samples were exposed to irradiation in three different modes - two on-modes (Figure 7 and Figure 8) and one in off-mode (all terminal leads short-circuited) –

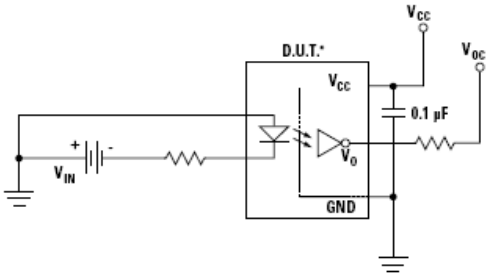


Figure 7: ON bias1

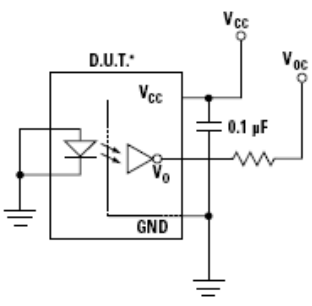


Figure 8: ON bias2

5.3 Electrical parameters

PARAMETER	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Logic High Output Current	I_{OH}	I_F = 0, V_O = V_{CC} = 18 V		100	µA
Output Leakage Current	I_{OLeak}	I_F = 250 µA, V_O = V_{CC} = 18 V		250	µA
Input Forward Voltage	V_F	I_F = 20 mA		1.8	V
Reverse Breakdown Voltage	BV_R	I_R = 10 µA	5		V
Logic High Supply Current	I_{CCH}	V_{CC} = 18 V, I_F = 0 mA		10	µA
Logic Low Supply Current	I_{CCL}	V_{CC} = 18 V, I_F = 20 mA		200	µA
Propagation Delay Time to Logic High at Output	t_{PLH*}	R_L=8.2kΩ,C_L=50pF, I_F=16 mA,V_{CC}=5 V *		6	µs
Propagation Delay Time to Logic Low at Output	t_{PHL}*	R_L=8.2kΩ,C_L=50pF, I_F=16 mA,V_{CC}=5 V		2	µs
Current Transfer Ratio	CTR1	V_O=0.4V, I_F=2 mA,V_{CC}=5V			%
	CTR2	V_O=0.4V, I_F=4 mA,V_{CC}=5V			%
	CTR3	V_O=0.4V, I_F=16 mA,V_{CC}=4.5V	9		%
	CTR4	V_O=0.4V, I_F=20 mA,V_{CC}=5V			
	CTR5	V_O=0.4V, I_F=40 mA,V_{CC}=5V			%
	CTR6	V_O=0.4V, I_F=20 mA,V_{CC}=18V			%

(*)t_{PHL} propagation delay is measured from the 50% point on the rising edge of the input current pulse to the 1.5 V point on the falling edge of the output pulse. The t_{PLH} propagation delay is measured from the 50% point on the falling edge of the input current pulse to the 1.5 V point on the rising edge of the output pulse.

Min/ Max values are those specified in the reference data-sheet [RD1].
Test measurements are performed at 25°C ± 10°C.

6 TEST HISTORY

Initially, 7 steps were planned for this test sequence [AD2], as described hereunder:

	Step1	Step2	Step3	Step4	Step5	Step6	Step7
Accumulated dose krad(Si)	10	20	50	100	120	150	200
Dose rate (Si)/h	36	36	36	36	310	310	310

Due to irradiation facility maintenance, tests were stopped for 48 hours between Step 3 and Step 4 (50 krad(Si) and 100 krad(Si). Total Ionizing Dose was estimated at this step to 74 krad(Si).
During this time period, parts were stocked in a cold chamber at -30°C.

7 SUMMARY RESULTS

Only parameters with applicable test limits are shown hereunder.

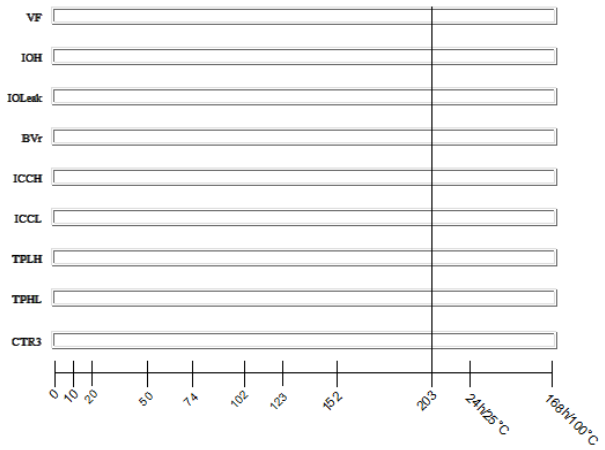


Figure 9: ON Bias 1

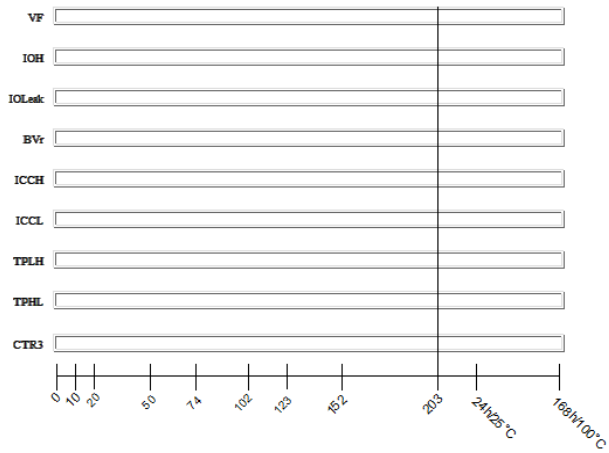


Figure 10 : ON Bias 2

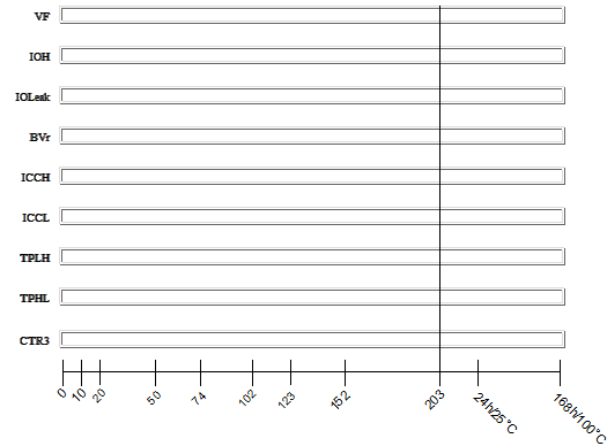
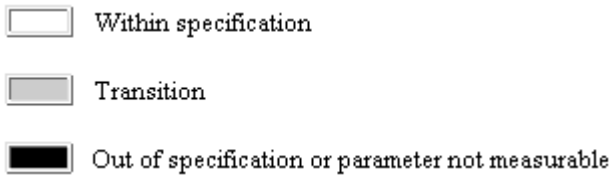


Figure 11 : OFF Bias



All defined parameters [RD1] are within the specified values up to 203 kRad(Si).

8 CONCLUSION

Total Ionizing Dose steady-state irradiation test using Gamma ray was performed on HCPL5501,Single Channel Optocoupler from AVAGO,up to 200krad(Si)under three bias conditions.

The results indicate that:

- All parameters are within specified values at total dose level.
- Average drift current transfer ratio function of the Bias condition and CTR configuration are described in the next figure.

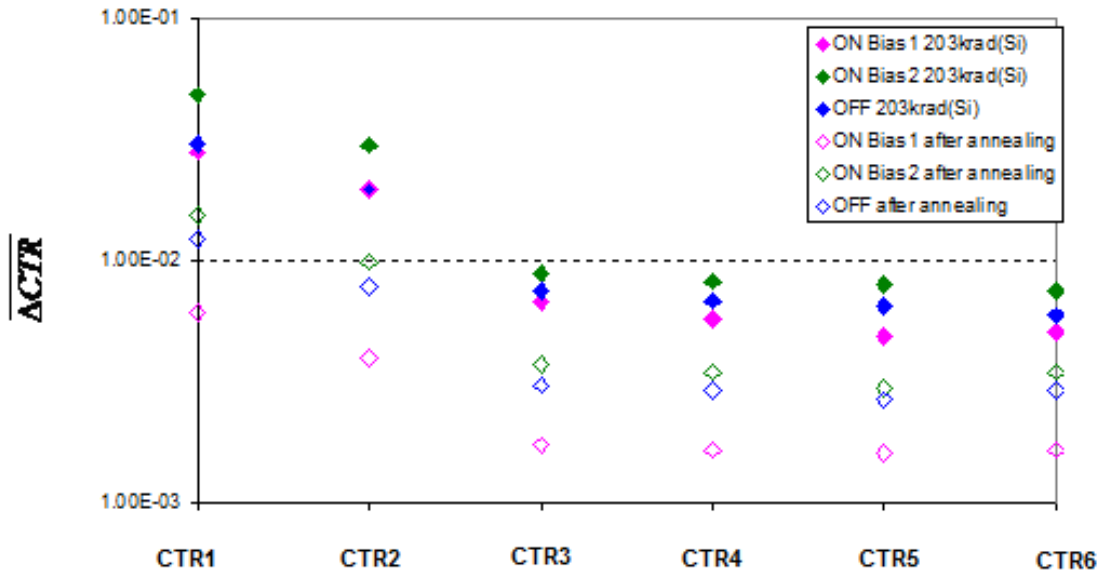


Figure 12: Average drift current transfer ratio function of the Bias condition and CTR configuration

- CTR6 configuration (V_O =0.4V, IF=20 mA,VCC=18V) exhibits the smallest average parameter drift at the final step.
- Conversely, CRT1 configuration (V_O =0.4V, IF=2 mA,VCC=5V) exhibits the greatest parameter degradation up to 203krad (Si) total dose.
- ON Bias1 mode provides the smallest average parameter drift up to the final irradiation step for all CTR configurations.
- Conversely, ON Bias 2 mode provides the greatest parameter degradation at all steps.
- Moreover CTR3 (V_O=0.4V, I_F=16 mA, V_{CC}=4.5V), which is the only CTR configuration for which specification limits are indicated in the data-sheet, is within the specified limit at total dose level.

As shown in previous figure, after annealing, average drift Current Transfer Ratio decrease.

9 DETAILED TESTS RESULTS

The pre and post radiation test results are shown graphically in the following pages (9-2 to 9-29). The data is displayed in the following tables and graphs.

These graphs show parameter's shifts observed during the total ionizing dose sequence. The Control sample results are shown on each graph (black curve).

When available in the device data-sheet/specification, the maximum/minimum/typical values are also shown (red dotted line).

The tables include drift calculation between each measurement step and the "0" kRad(Si) step.

For CTR values, the formula used is:

$$\text{Drift} = \frac{1}{\text{measurement (X kRad(Si))}} - \frac{1}{\text{measurement (0 kRad(Si))}}$$

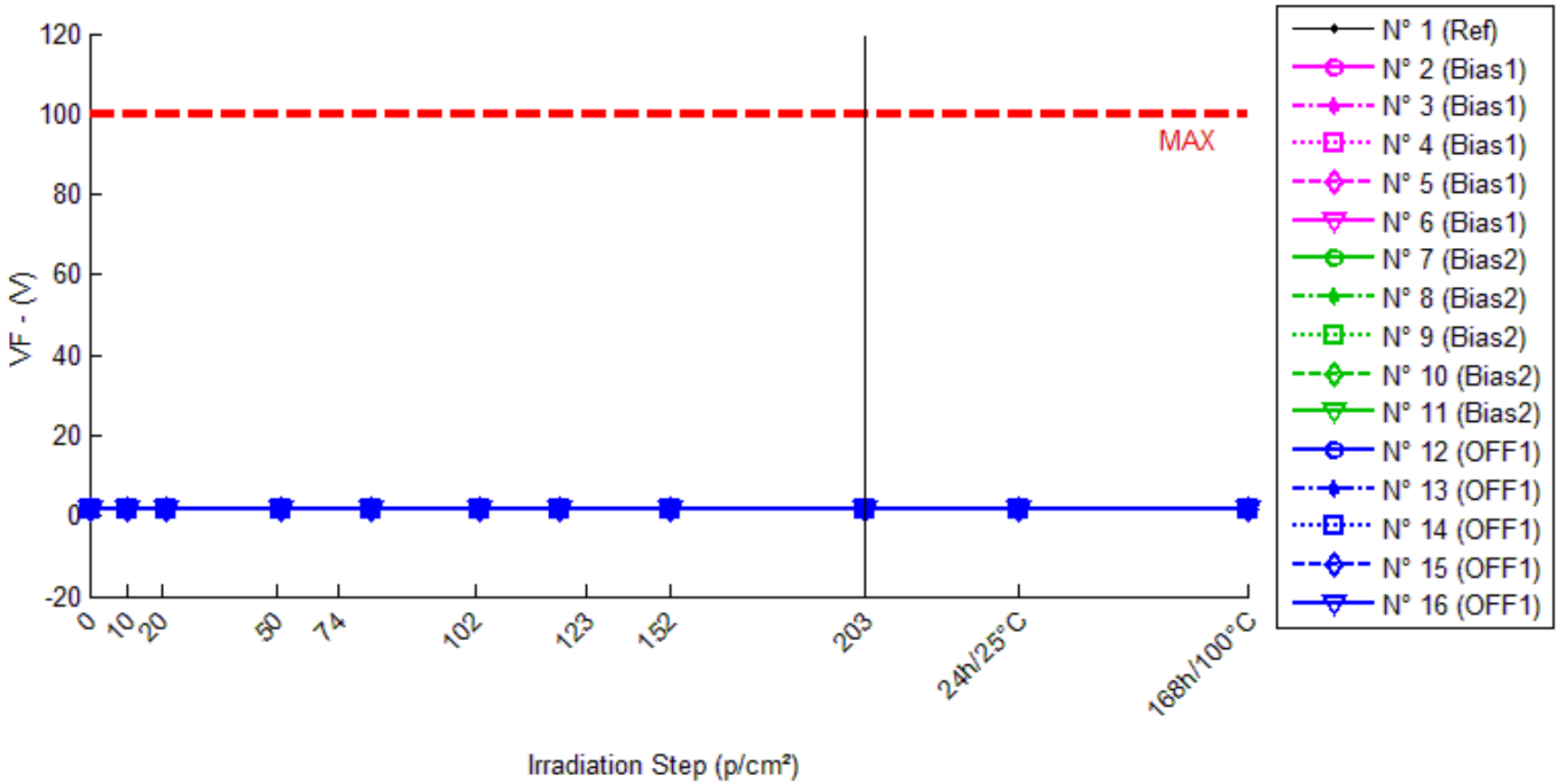
For other parameters, the formula used is:

Drift value= measurement (X kRad(Si)) - measurement (0 kRad(Si))

CONTENTS

1. VF

Ta = 25°C; If = 20 mA



VF . (V) **Max = 1.8**

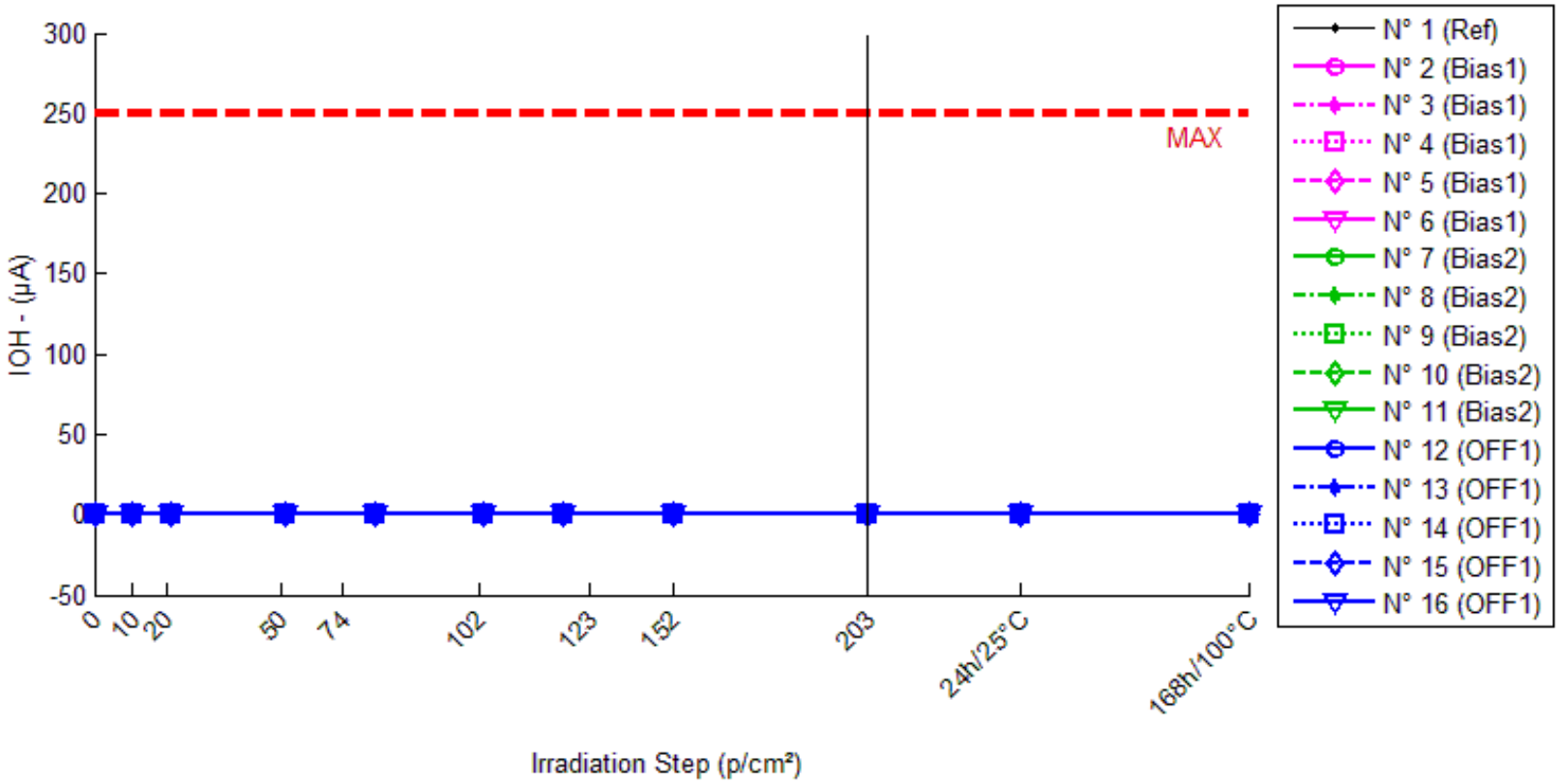
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	1.529	1.526	1.528	1.527	1.530	1.532	1.530	1.527	1.531	1.528	1.531
N° 2 (Bias1)	1.528	1.525	1.527	1.525	1.529	1.532	1.529	1.526	1.533	1.527	1.531
N° 3 (Bias1)	1.528	1.525	1.527	1.527	1.529	1.532	1.529	1.526	1.533	1.526	1.530
N° 4 (Bias1)	1.524	1.522	1.523	1.524	1.526	1.530	1.529	1.523	1.529	1.524	1.528
N° 5 (Bias1)	1.524	1.522	1.524	1.524	1.527	1.530	1.529	1.524	1.531	1.526	1.529
N° 6 (Bias1)	1.526	1.524	1.525	1.526	1.527	1.531	1.530	1.525	1.531	1.526	1.529
N° 7 (Bias2)	1.527	1.524	1.526	1.526	1.528	1.532	1.530	1.526	1.532	1.528	1.531
N° 8 (Bias2)	1.525	1.522	1.524	1.524	1.526	1.530	1.528	1.525	1.530	1.526	1.528
N° 9 (Bias2)	1.526	1.523	1.525	1.526	1.527	1.531	1.529	1.526	1.531	1.527	1.530
N° 10 (Bias2)	1.524	1.522	1.523	1.524	1.525	1.529	1.527	1.523	1.529	1.525	1.527
N° 11 (Bias2)	1.524	1.523	1.525	1.525	1.526	1.531	1.528	1.526	1.531	1.527	1.529
N° 12 (OFF1)	1.521	1.520	1.522	1.523	1.524	1.527	1.525	1.522	1.528	1.524	1.526
N° 13 (OFF1)	1.527	1.525	1.528	1.527	1.528	1.532	1.530	1.527	1.532	1.529	1.530
N° 14 (OFF1)	1.523	1.521	1.524	1.523	1.525	1.529	1.526	1.524	1.529	1.526	1.526
N° 15 (OFF1)	1.523	1.522	1.524	1.524	1.525	1.529	1.527	1.524	1.529	1.526	1.526
N° 16 (OFF1)	1.523	1.522	1.524	1.524	1.526	1.529	1.527	1.524	1.529	1.526	1.527

Delta [VF]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	-2.911E-3	-8.560E-4	-1.306E-3	1.185E-3	3.935E-3	1.686E-3	-1.398E-3	2.044E-3	-7.620E-4	2.328E-3
N° 2 (Bias1)	---	-2.467E-3	-3.920E-4	-2.157E-3	1.757E-3	4.590E-3	1.829E-3	-1.290E-3	5.069E-3	-1.104E-3	3.009E-3
N° 3 (Bias1)	---	-2.658E-3	-7.940E-4	-3.120E-4	1.164E-3	4.672E-3	1.738E-3	-1.716E-3	5.006E-3	-1.260E-3	2.678E-3
N° 4 (Bias1)	---	-2.000E-3	-5.350E-4	4.330E-4	1.712E-3	5.573E-3	5.400E-3	-7.920E-4	5.252E-3	2.540E-4	3.546E-3
N° 5 (Bias1)	---	-1.948E-3	7.100E-5	-1.680E-4	2.278E-3	5.198E-3	4.834E-3	-1.200E-4	6.183E-3	1.813E-3	4.169E-3
N° 6 (Bias1)	---	-1.806E-3	-5.640E-4	5.220E-4	1.049E-3	5.142E-3	3.984E-3	-6.790E-4	5.860E-3	2.580E-4	3.669E-3
N° 7 (Bias2)	---	-2.408E-3	-9.310E-4	-1.131E-3	9.010E-4	4.836E-3	3.204E-3	-4.670E-4	5.545E-3	1.504E-3	3.772E-3
N° 8 (Bias2)	---	-2.874E-3	-1.211E-3	-8.090E-4	1.220E-3	5.018E-3	2.809E-3	-9.000E-5	5.354E-3	1.386E-3	3.500E-3
N° 9 (Bias2)	---	-2.689E-3	-3.740E-4	1.420E-4	1.781E-3	5.677E-3	3.689E-3	4.090E-4	5.787E-3	1.606E-3	3.931E-3
N° 10 (Bias2)	---	-2.197E-3	-3.260E-4	1.210E-4	1.316E-3	5.377E-3	3.083E-3	-4.740E-4	5.576E-3	1.384E-3	3.367E-3
N° 11 (Bias2)	---	-7.360E-4	9.890E-4	1.429E-3	2.248E-3	6.668E-3	4.199E-3	1.715E-3	6.685E-3	3.092E-3	4.759E-3
N° 12 (OFF1)	---	-1.309E-3	7.280E-4	1.391E-3	2.218E-3	5.922E-3	3.744E-3	6.730E-4	6.236E-3	2.956E-3	4.112E-3
N° 13 (OFF1)	---	-1.429E-3	1.065E-3	8.790E-4	1.702E-3	5.799E-3	3.111E-3	4.780E-4	5.921E-3	2.763E-3	3.251E-3
N° 14 (OFF1)	---	-1.379E-3	1.122E-3	4.180E-4	2.247E-3	5.985E-3	3.480E-3	1.243E-3	5.991E-3	3.601E-3	3.472E-3
N° 15 (OFF1)	---	-1.258E-3	6.970E-4	7.670E-4	2.126E-3	5.960E-3	3.531E-3	7.100E-4	5.721E-3	3.041E-3	2.867E-3
N° 16 (OFF1)	---	-1.238E-3	5.370E-4	3.650E-4	2.183E-3	6.009E-3	3.641E-3	9.680E-4	5.726E-3	2.855E-3	3.560E-3
Average (OFF1)	---	-2.176E-3	-4.428E-4	-3.364E-4	1.592E-3	5.035E-3	3.557E-3	-9.194E-4	5.474E-3	-7.800E-6	3.414E-3
σ (OFF1)	---	3.664E-4	3.214E-4	1.081E-3	4.976E-4	4.054E-4	1.696E-3	6.093E-4	5.206E-4	1.247E-3	5.827E-4
Average+3σ (OFF1)	---	-1.077E-3	5.213E-4	2.906E-3	3.085E-3	6.251E-3	8.645E-3	9.085E-4	7.036E-3	3.734E-3	5.162E-3
Average-3σ (OFF1)	---	-3.275E-3	-1.407E-3	-3.579E-3	9.933E-5	3.819E-3	-1.531E-3	-2.747E-3	3.912E-3	-3.750E-3	1.666E-3
Average (Bias1)	---	-2.181E-3	-3.706E-4	-4.960E-5	1.493E-3	5.515E-3	3.397E-3	2.186E-4	5.789E-3	1.794E-3	3.866E-3
σ (Bias1)	---	8.483E-4	8.472E-4	9.998E-4	5.266E-4	7.216E-4	5.500E-4	9.111E-4	5.237E-4	7.312E-4	5.462E-4
Average+3σ (Bias1)	---	3.640E-4	2.171E-3	2.950E-3	3.073E-3	7.680E-3	5.047E-3	2.952E-3	7.360E-3	3.988E-3	5.504E-3
Average-3σ (Bias1)	---	-4.726E-3	-2.912E-3	-3.049E-3	-8.664E-5	3.350E-3	1.747E-3	-2.515E-3	4.218E-3	-3.993E-4	2.227E-3
Average (Bias2)	---	-1.323E-3	8.298E-4	7.640E-4	2.095E-3	5.935E-3	3.501E-3	8.144E-4	5.919E-3	3.043E-3	3.452E-3
σ (Bias2)	---	8.065E-5	2.522E-4	4.139E-4	2.244E-4	8.256E-5	2.409E-4	2.964E-4	2.134E-4	3.289E-4	4.556E-4
Average+3σ (Bias2)	---	-1.081E-3	1.586E-3	2.006E-3	2.768E-3	6.183E-3	4.224E-3	1.704E-3	6.559E-3	4.030E-3	4.819E-3
Average-3σ (Bias2)	---	-1.565E-3	7.318E-5	-4.777E-4	1.422E-3	5.687E-3	2.779E-3	-7.472E-5	5.279E-3	2.057E-3	2.086E-3

2. IOH

Ta = 25°C; If = 0; Vo = Vcc = 18 V



IOH . (µA) **Max = 100.0**

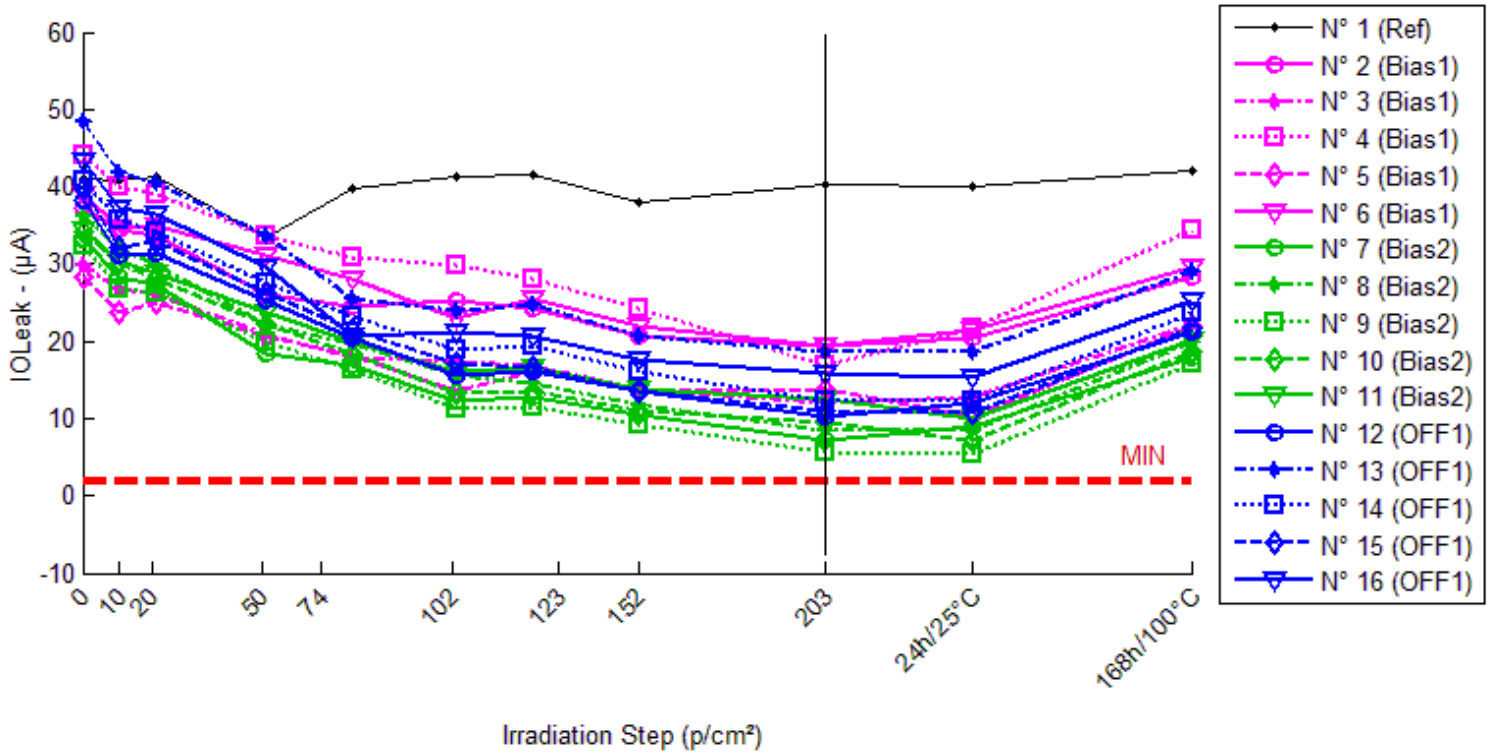
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	3.645E-4	5.693E-4	7.555E-4	4.780E-4	4.422E-4	3.880E-4	4.338E-4	7.139E-4	4.591E-4	4.439E-4	3.930E-4
N° 2 (Bias1)	4.462E-4	9.790E-4	8.905E-4	9.380E-4	8.368E-4	7.055E-4	6.374E-4	1.227E-3	7.972E-4	1.183E-3	6.115E-4
N° 3 (Bias1)	4.404E-4	6.687E-4	8.494E-4	7.188E-4	7.144E-4	5.594E-4	5.431E-4	1.040E-3	6.392E-4	8.804E-4	6.122E-4
N° 4 (Bias1)	5.479E-4	7.401E-4	8.818E-4	8.364E-4	8.959E-4	7.181E-4	6.977E-4	1.238E-3	8.290E-4	1.106E-3	6.670E-4
N° 5 (Bias1)	4.523E-4	6.640E-4	8.043E-4	7.314E-4	7.067E-4	5.922E-4	5.982E-4	1.028E-3	6.203E-4	7.652E-4	6.060E-4
N° 6 (Bias1)	5.196E-4	7.573E-4	8.956E-4	9.131E-4	1.024E-3	7.738E-4	8.728E-4	1.445E-3	9.075E-4	1.289E-3	6.602E-4
N° 7 (Bias2)	5.073E-4	6.576E-4	7.706E-4	5.495E-4	4.306E-4	3.385E-4	3.541E-4	6.935E-4	3.381E-4	3.511E-4	3.346E-4
N° 8 (Bias2)	4.886E-4	6.578E-4	8.021E-4	5.716E-4	4.810E-4	3.459E-4	3.698E-4	7.086E-4	3.428E-4	3.581E-4	3.296E-4
N° 9 (Bias2)	4.682E-4	1.104E-3	7.663E-4	4.771E-4	4.117E-4	3.147E-4	3.436E-4	6.854E-4	3.270E-4	3.307E-4	3.033E-4
N° 10 (Bias2)	4.834E-4	6.513E-4	7.423E-4	5.272E-4	4.559E-4	3.396E-4	3.584E-4	7.121E-4	3.344E-4	3.549E-4	3.336E-4
N° 11 (Bias2)	5.023E-4	6.622E-4	7.678E-4	5.925E-4	5.735E-4	4.139E-4	4.580E-4	8.080E-4	3.971E-4	4.333E-4	3.645E-4
N° 12 (OFF1)	5.570E-4	7.082E-4	7.993E-4	5.551E-4	4.897E-4	3.686E-4	3.852E-4	7.355E-4	3.297E-4	3.511E-4	3.944E-4
N° 13 (OFF1)	5.076E-4	6.918E-4	8.114E-4	6.494E-4	6.213E-4	4.464E-4	4.827E-4	8.207E-4	3.804E-4	4.199E-4	4.853E-4
N° 14 (OFF1)	6.004E-4	8.325E-4	9.322E-4	7.008E-4	5.939E-4	4.249E-4	4.645E-4	7.926E-4	3.634E-4	3.957E-4	4.663E-4
N° 15 (OFF1)	5.333E-4	7.058E-4	8.009E-4	5.965E-4	5.113E-4	3.577E-4	3.811E-4	7.281E-4	3.280E-4	3.420E-4	4.165E-4
N° 16 (OFF1)	5.772E-4	7.219E-4	8.356E-4	6.637E-4	6.150E-4	4.396E-4	4.608E-4	8.041E-4	3.724E-4	4.132E-4	4.690E-4

Delta [IOH]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	2.048E-4	3.910E-4	1.134E-4	7.768E-5	2.352E-5	6.926E-5	3.494E-4	9.455E-5	7.941E-5	2.850E-5
N° 2 (Bias1)	---	5.328E-4	4.443E-4	4.918E-4	3.906E-4	2.593E-4	1.912E-4	7.807E-4	3.510E-4	7.364E-4	1.653E-4
N° 3 (Bias1)	---	2.283E-4	4.090E-4	2.785E-4	2.740E-4	1.190E-4	1.027E-4	5.996E-4	1.988E-4	4.400E-4	1.719E-4
N° 4 (Bias1)	---	1.922E-4	3.339E-4	2.885E-4	3.480E-4	1.702E-4	1.498E-4	6.898E-4	2.811E-4	5.585E-4	1.191E-4
N° 5 (Bias1)	---	2.117E-4	3.519E-4	2.790E-4	2.543E-4	1.399E-4	1.459E-4	5.760E-4	1.680E-4	3.128E-4	1.537E-4
N° 6 (Bias1)	---	2.377E-4	3.760E-4	3.935E-4	5.043E-4	2.542E-4	3.531E-4	9.256E-4	3.878E-4	7.689E-4	1.406E-4
N° 7 (Bias2)	---	1.504E-4	2.634E-4	4.220E-5	-7.670E-5	-1.688E-4	-1.532E-4	1.862E-4	-1.692E-4	-1.562E-4	-1.727E-4
N° 8 (Bias2)	---	1.692E-4	3.136E-4	8.306E-5	-7.510E-6	-1.426E-4	-1.187E-4	2.200E-4	-1.458E-4	-1.304E-4	-1.589E-4
N° 9 (Bias2)	---	6.358E-4	2.981E-4	8.947E-6	-5.646E-5	-1.535E-4	-1.246E-4	2.172E-4	-1.412E-4	-1.375E-4	-1.649E-4
N° 10 (Bias2)	---	1.679E-4	2.589E-4	4.377E-5	-2.748E-5	-1.438E-4	-1.250E-4	2.287E-4	-1.490E-4	-1.285E-4	-1.498E-4
N° 11 (Bias2)	---	1.599E-4	2.655E-4	9.023E-5	7.116E-5	-8.842E-5	-4.432E-5	3.057E-4	-1.052E-4	-6.901E-5	-1.378E-4
N° 12 (OFF1)	---	1.513E-4	2.424E-4	-1.831E-6	-6.724E-5	-1.883E-4	-1.717E-4	1.785E-4	-2.272E-4	-2.059E-4	-1.625E-4
N° 13 (OFF1)	---	1.842E-4	3.039E-4	1.418E-4	1.137E-4	-6.114E-5	-2.486E-5	3.131E-4	-1.271E-4	-8.765E-5	-2.228E-5
N° 14 (OFF1)	---	2.322E-4	3.319E-4	1.005E-4	-6.456E-6	-1.755E-4	-1.359E-4	1.923E-4	-2.370E-4	-2.046E-4	-1.340E-4
N° 15 (OFF1)	---	1.725E-4	2.676E-4	6.317E-5	-2.203E-5	-1.756E-4	-1.522E-4	1.948E-4	-2.053E-4	-1.914E-4	-1.169E-4
N° 16 (OFF1)	---	1.448E-4	2.584E-4	8.653E-5	3.787E-5	-1.376E-4	-1.163E-4	2.269E-4	-2.048E-4	-1.640E-4	-1.081E-4
Average (OFF1)	---	2.805E-4	3.830E-4	3.463E-4	3.542E-4	1.885E-4	1.885E-4	7.143E-4	2.773E-4	5.633E-4	1.501E-4
σ (OFF1)	---	1.421E-4	4.432E-5	9.471E-5	1.004E-4	6.491E-5	9.719E-5	1.431E-4	9.455E-5	1.938E-4	2.103E-5
Average+3σ (OFF1)	---	7.068E-4	5.160E-4	6.304E-4	6.553E-4	3.832E-4	4.801E-4	1.144E-3	5.610E-4	1.145E-3	2.132E-4
Average-3σ (OFF1)	---	-1.457E-4	2.501E-4	6.213E-5	5.316E-5	-6.235E-6	-1.030E-4	2.850E-4	-6.318E-6	-1.798E-5	8.700E-5
Average (Bias1)	---	2.566E-4	2.799E-4	5.364E-5	-1.940E-5	-1.394E-4	-1.132E-4	2.316E-4	-1.421E-4	-1.243E-4	-1.568E-4
σ (Bias1)	---	2.121E-4	2.442E-5	3.328E-5	5.715E-5	3.039E-5	4.075E-5	4.442E-5	2.321E-5	3.280E-5	1.355E-5
Average+3σ (Bias1)	---	8.930E-4	3.531E-4	1.535E-4	1.521E-4	-4.828E-5	9.076E-6	3.649E-4	-7.244E-5	-2.592E-5	-1.162E-4
Average-3σ (Bias1)	---	-3.797E-4	2.066E-4	-4.620E-5	-1.909E-4	-2.306E-4	-2.354E-4	9.831E-5	-2.117E-4	-2.227E-4	-1.975E-4
Average (Bias2)	---	1.770E-4	2.808E-4	7.803E-5	1.118E-5	-1.476E-4	-1.202E-4	2.211E-4	-2.003E-4	-1.707E-4	-1.088E-4
σ (Bias2)	---	3.471E-5	3.637E-5	5.302E-5	6.855E-5	5.196E-5	5.708E-5	5.440E-5	4.320E-5	4.940E-5	5.261E-5
Average+3σ (Bias2)	---	2.811E-4	3.899E-4	2.371E-4	2.168E-4	8.249E-6	5.102E-5	3.843E-4	-7.069E-5	-2.253E-5	4.907E-5
Average-3σ (Bias2)	---	7.284E-5	1.717E-4	-8.102E-5	-1.945E-4	-3.035E-4	-2.914E-4	5.790E-5	-3.299E-4	-3.189E-4	-2.666E-4

3. IOLeak

Ta = 25°C; If = 250 µA; Vo = Vcc =18 V



IOLeak . (µA) **Max = 250.0**

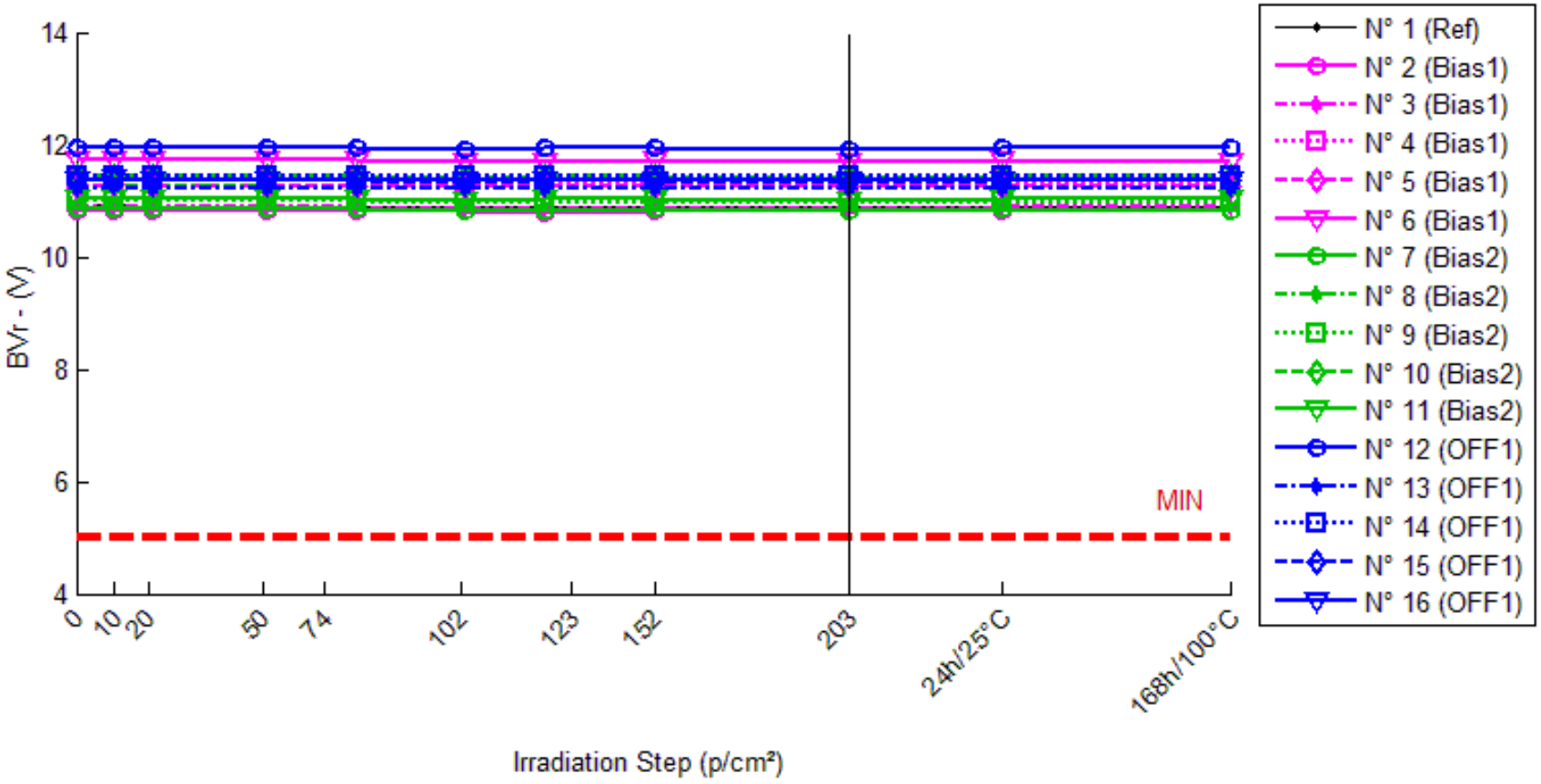
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	40.911	40.798	41.393	33.447	39.657	41.326	41.528	38.081	40.272	39.912	42.005
N° 2 (Bias1)	37.140	34.489	33.540	25.980	24.618	25.311	24.361	20.687	19.379	20.488	28.433
N° 3 (Bias1)	29.918	26.754	26.135	20.916	17.992	17.284	16.765	13.920	11.934	12.844	22.310
N° 4 (Bias1)	44.137	40.110	39.127	33.592	30.854	29.956	28.139	24.237	16.775	21.736	34.292
N° 5 (Bias1)	28.320	23.842	24.937	20.643	18.059	13.565	16.111	13.644	13.738	10.144	21.996
N° 6 (Bias1)	39.119	34.599	35.018	31.174	28.123	23.020	25.495	21.879	19.460	21.332	29.640
N° 7 (Bias2)	33.265	28.262	27.192	18.268	16.894	12.282	12.822	10.402	7.139	8.905	17.942
N° 8 (Bias2)	36.284	32.149	29.840	22.326	19.724	15.535	14.437	11.827	8.510	8.477	19.826
N° 9 (Bias2)	32.312	26.824	26.335	20.005	16.323	11.214	11.514	9.200	5.560	5.284	17.014
N° 10 (Bias2)	34.128	30.013	28.065	22.309	18.336	13.259	13.602	11.086	9.365	7.161	18.667
N° 11 (Bias2)	34.464	30.357	28.936	23.657	20.027	16.188	16.611	13.912	12.530	10.070	20.226
N° 12 (OFF1)	38.118	31.190	31.291	25.223	20.414	15.523	16.200	13.429	10.285	12.040	21.128
N° 13 (OFF1)	48.479	41.732	40.532	33.711	25.587	23.941	24.645	20.752	18.613	18.546	29.065
N° 14 (OFF1)	40.742	35.785	34.264	27.581	23.202	18.852	19.282	16.064	12.214	12.309	23.643
N° 15 (OFF1)	39.794	32.014	32.925	26.168	21.361	17.068	16.568	13.532	10.904	10.779	21.774
N° 16 (OFF1)	43.338	37.316	36.349	29.691	20.752	21.120	20.746	17.535	15.956	15.359	25.298

Delta [IOLeak]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	-1.129E-1	4.816E-1	-7.465E+0	-1.255E+0	4.150E-1	6.163E-1	-2.831E+0	-6.390E-1	-9.989E-1	1.093E+0
N° 2 (Bias1)	---	-2.652E+0	-3.600E+0	-1.116E+1	-1.252E+1	-1.183E+1	-1.278E+1	-1.645E+1	-1.776E+1	-1.665E+1	-8.708E+0
N° 3 (Bias1)	---	-3.164E+0	-3.783E+0	-9.002E+0	-1.193E+1	-1.263E+1	-1.315E+1	-1.600E+1	-1.798E+1	-1.707E+1	-7.608E+0
N° 4 (Bias1)	---	-4.026E+0	-5.009E+0	-1.054E+1	-1.328E+1	-1.418E+1	-1.600E+1	-1.990E+1	-2.736E+1	-2.240E+1	-9.845E+0
N° 5 (Bias1)	---	-4.478E+0	-3.384E+0	-7.677E+0	-1.026E+1	-1.476E+1	-1.221E+1	-1.468E+1	-1.458E+1	-1.818E+1	-6.325E+0
N° 6 (Bias1)	---	-4.520E+0	-4.101E+0	-7.945E+0	-1.100E+1	-1.610E+1	-1.362E+1	-1.724E+1	-1.966E+1	-1.779E+1	-9.480E+0
N° 7 (Bias2)	---	-5.003E+0	-6.073E+0	-1.500E+1	-1.637E+1	-2.098E+1	-2.044E+1	-2.286E+1	-2.613E+1	-2.436E+1	-1.532E+1
N° 8 (Bias2)	---	-4.135E+0	-6.445E+0	-1.396E+1	-1.656E+1	-2.075E+1	-2.185E+1	-2.446E+1	-2.777E+1	-2.781E+1	-1.646E+1
N° 9 (Bias2)	---	-5.488E+0	-5.976E+0	-1.231E+1	-1.599E+1	-2.110E+1	-2.080E+1	-2.311E+1	-2.675E+1	-2.703E+1	-1.530E+1
N° 10 (Bias2)	---	-4.115E+0	-6.063E+0	-1.182E+1	-1.579E+1	-2.087E+1	-2.053E+1	-2.304E+1	-2.476E+1	-2.697E+1	-1.546E+1
N° 11 (Bias2)	---	-4.107E+0	-5.528E+0	-1.081E+1	-1.444E+1	-1.828E+1	-1.785E+1	-2.055E+1	-2.193E+1	-2.439E+1	-1.424E+1
N° 12 (OFF1)	---	-6.928E+0	-6.827E+0	-1.290E+1	-1.770E+1	-2.259E+1	-2.192E+1	-2.469E+1	-2.783E+1	-2.608E+1	-1.699E+1
N° 13 (OFF1)	---	-6.747E+0	-7.947E+0	-1.477E+1	-2.289E+1	-2.454E+1	-2.383E+1	-2.773E+1	-2.987E+1	-2.993E+1	-1.941E+1
N° 14 (OFF1)	---	-4.957E+0	-6.478E+0	-1.316E+1	-1.754E+1	-2.189E+1	-2.146E+1	-2.468E+1	-2.853E+1	-2.843E+1	-1.710E+1
N° 15 (OFF1)	---	-7.780E+0	-6.869E+0	-1.363E+1	-1.843E+1	-2.273E+1	-2.323E+1	-2.626E+1	-2.889E+1	-2.901E+1	-1.802E+1
N° 16 (OFF1)	---	-6.021E+0	-6.989E+0	-1.365E+1	-2.259E+1	-2.222E+1	-2.259E+1	-2.580E+1	-2.738E+1	-2.798E+1	-1.804E+1
Average (OFF1)	---	-3.768E+0	-3.975E+0	-9.266E+0	-1.180E+1	-1.390E+1	-1.355E+1	-1.685E+1	-1.947E+1	-1.842E+1	-8.393E+0
σ (OFF1)	---	8.289E-1	6.349E-1	1.546E+0	1.199E+0	1.698E+0	1.461E+0	1.940E+0	4.778E+0	2.305E+0	1.439E+0
Average+3σ (OFF1)	---	-1.281E+0	-2.071E+0	-4.627E+0	-8.201E+0	-8.804E+0	-9.168E+0	-1.103E+1	-5.135E+0	-1.150E+1	-4.076E+0
Average-3σ (OFF1)	---	-6.255E+0	-5.880E+0	-1.390E+1	-1.539E+1	-1.899E+1	-1.794E+1	-2.267E+1	-3.380E+1	-2.533E+1	-1.271E+1
Average (Bias1)	---	-4.570E+0	-6.017E+0	-1.278E+1	-1.583E+1	-2.039E+1	-2.029E+1	-2.281E+1	-2.547E+1	-2.611E+1	-1.536E+1
σ (Bias1)	---	6.405E-1	3.275E-1	1.684E+0	8.355E-1	1.191E+0	1.475E+0	1.411E+0	2.257E+0	1.617E+0	7.878E-1
Average+3σ (Bias1)	---	-2.648E+0	-5.035E+0	-7.726E+0	-1.332E+1	-1.682E+1	-1.587E+1	-1.857E+1	-1.870E+1	-2.126E+1	-1.299E+1
Average-3σ (Bias1)	---	-6.491E+0	-7.000E+0	-1.783E+1	-1.834E+1	-2.397E+1	-2.472E+1	-2.704E+1	-3.224E+1	-3.096E+1	-1.772E+1
Average (Bias2)	---	-6.487E+0	-7.022E+0	-1.362E+1	-1.983E+1	-2.279E+1	-2.261E+1	-2.583E+1	-2.850E+1	-2.829E+1	-1.791E+1
σ (Bias2)	---	1.060E+0	5.508E-1	7.168E-1	2.678E+0	1.029E+0	9.593E-1	1.266E+0	9.637E-1	1.435E+0	9.742E-1
Average+3σ (Bias2)	---	-3.307E+0	-5.370E+0	-1.147E+1	-1.180E+1	-1.971E+1	-1.973E+1	-2.203E+1	-2.561E+1	-2.398E+1	-1.499E+1
Average-3σ (Bias2)	---	-9.666E+0	-8.674E+0	-1.577E+1	-2.786E+1	-2.588E+1	-2.548E+1	-2.963E+1	-3.139E+1	-3.259E+1	-2.084E+1

4. BVr

Ta=25°C; Ir = 10 µA



BVr . (V) **Min = 5.0**

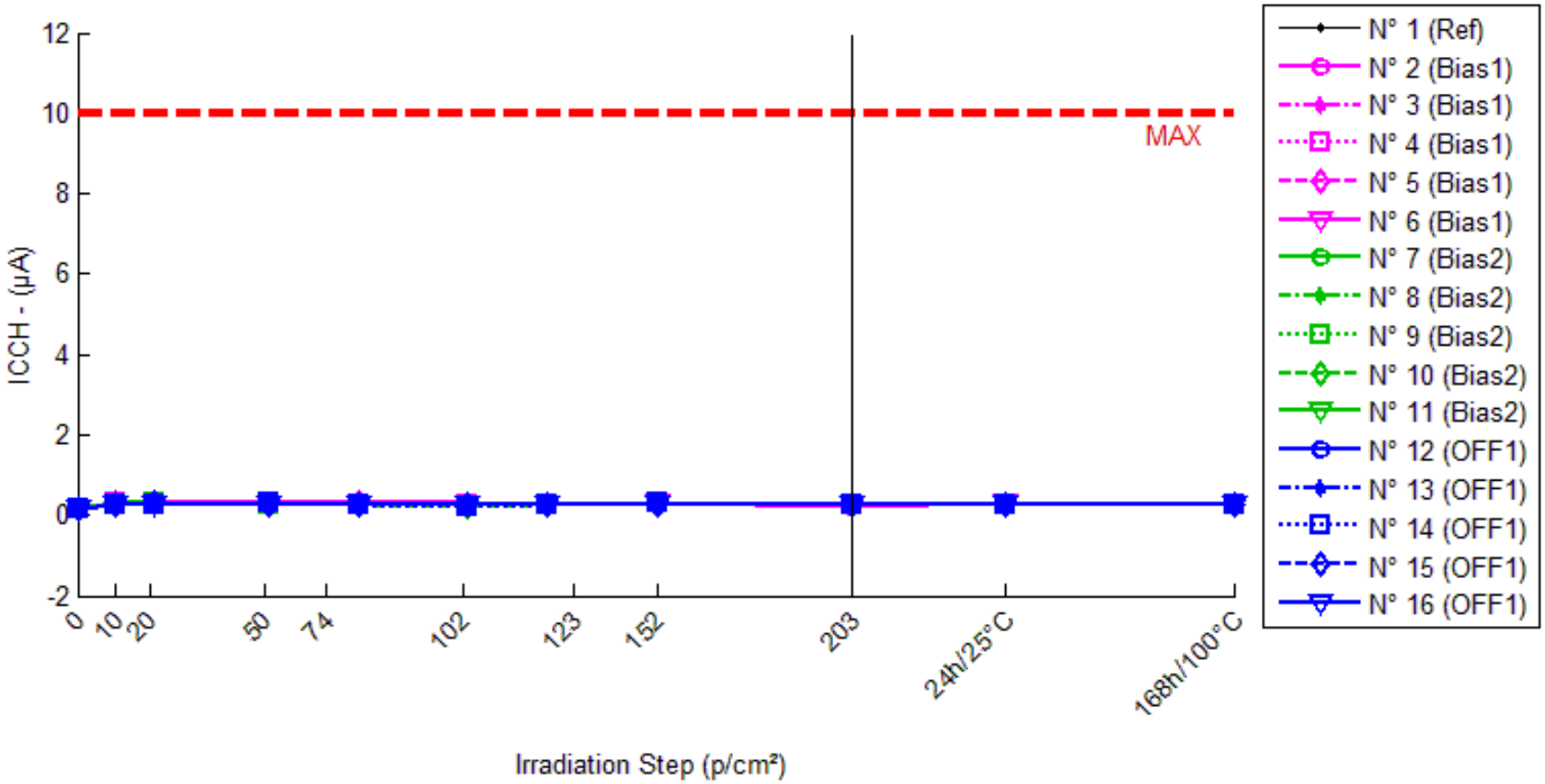
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	10.894	10.910	10.902	10.903	10.895	10.880	10.888	10.896	10.887	10.900	10.890
N° 2 (Bias1)	10.817	10.831	10.823	10.829	10.816	10.800	10.793	10.818	10.802	10.824	10.809
N° 3 (Bias1)	10.882	10.896	10.889	10.887	10.882	10.864	10.860	10.883	10.865	10.887	10.874
N° 4 (Bias1)	11.349	11.361	11.355	11.351	11.346	11.328	11.325	11.348	11.330	11.351	11.337
N° 5 (Bias1)	11.264	11.275	11.268	11.268	11.260	11.243	11.243	11.260	11.242	11.260	11.250
N° 6 (Bias1)	11.722	11.734	11.728	11.724	11.721	11.700	11.705	11.720	11.699	11.722	11.708
N° 7 (Bias2)	10.841	10.853	10.847	10.848	10.841	10.823	10.829	10.839	10.823	10.838	10.830
N° 8 (Bias2)	11.231	11.245	11.240	11.238	11.231	11.212	11.221	11.229	11.214	11.230	11.221
N° 9 (Bias2)	10.986	11.000	10.991	10.989	10.984	10.966	10.974	10.982	10.968	10.983	10.975
N° 10 (Bias2)	11.435	11.447	11.440	11.438	11.433	11.414	11.423	11.433	11.416	11.433	11.424
N° 11 (Bias2)	11.037	11.043	11.037	11.035	11.032	11.011	11.022	11.028	11.016	11.029	11.022
N° 12 (OFF1)	11.947	11.956	11.948	11.945	11.942	11.922	11.932	11.941	11.925	11.940	11.933
N° 13 (OFF1)	11.233	11.241	11.233	11.233	11.230	11.211	11.222	11.228	11.214	11.226	11.223
N° 14 (OFF1)	11.444	11.453	11.444	11.446	11.439	11.420	11.432	11.437	11.424	11.435	11.432
N° 15 (OFF1)	11.359	11.368	11.361	11.361	11.355	11.336	11.346	11.354	11.341	11.353	11.350
N° 16 (OFF1)	11.379	11.387	11.381	11.381	11.374	11.355	11.366	11.372	11.360	11.372	11.366

Delta [BVr]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	1.545E-2	7.440E-3	8.950E-3	4.600E-4	-1.421E-2	-5.750E-3	1.580E-3	-6.680E-3	5.520E-3	-4.500E-3
N° 2 (Bias1)	---	1.336E-2	5.530E-3	1.171E-2	-1.850E-3	-1.777E-2	-2.471E-2	8.600E-4	-1.589E-2	6.850E-3	-8.540E-3
N° 3 (Bias1)	---	1.373E-2	6.970E-3	5.070E-3	-3.900E-4	-1.811E-2	-2.186E-2	1.310E-3	-1.674E-2	5.330E-3	-7.900E-3
N° 4 (Bias1)	---	1.187E-2	5.760E-3	2.220E-3	-2.920E-3	-2.048E-2	-2.383E-2	-1.120E-3	-1.919E-2	2.060E-3	-1.196E-2
N° 5 (Bias1)	---	1.140E-2	3.890E-3	4.290E-3	-3.830E-3	-2.075E-2	-2.075E-2	-3.620E-3	-2.181E-2	-3.980E-3	-1.424E-2
N° 6 (Bias1)	---	1.172E-2	6.060E-3	2.210E-3	-1.490E-3	-2.242E-2	-1.764E-2	-2.480E-3	-2.279E-2	-7.000E-5	-1.446E-2
N° 7 (Bias2)	---	1.229E-2	6.520E-3	7.160E-3	2.200E-4	-1.747E-2	-1.195E-2	-1.210E-3	-1.718E-2	-2.310E-3	-1.053E-2
N° 8 (Bias2)	---	1.438E-2	8.790E-3	6.460E-3	2.000E-4	-1.910E-2	-1.013E-2	-1.880E-3	-1.750E-2	-1.510E-3	-1.037E-2
N° 9 (Bias2)	---	1.338E-2	5.020E-3	2.990E-3	-2.520E-3	-2.076E-2	-1.211E-2	-4.120E-3	-1.846E-2	-3.030E-3	-1.165E-2
N° 10 (Bias2)	---	1.244E-2	5.380E-3	3.190E-3	-1.670E-3	-2.111E-2	-1.186E-2	-1.460E-3	-1.892E-2	-1.380E-3	-1.057E-2
N° 11 (Bias2)	---	6.180E-3	-2.600E-4	-1.820E-3	-4.890E-3	-2.528E-2	-1.480E-2	-8.800E-3	-2.097E-2	-7.720E-3	-1.501E-2
N° 12 (OFF1)	---	9.120E-3	1.230E-3	-1.710E-3	-4.850E-3	-2.488E-2	-1.478E-2	-5.580E-3	-2.159E-2	-7.350E-3	-1.431E-2
N° 13 (OFF1)	---	8.630E-3	0.000E+0	-5.000E-5	-3.190E-3	-2.209E-2	-1.039E-2	-4.850E-3	-1.869E-2	-6.380E-3	-1.002E-2
N° 14 (OFF1)	---	9.250E-3	7.000E-5	1.950E-3	-4.860E-3	-2.384E-2	-1.188E-2	-6.960E-3	-1.914E-2	-8.510E-3	-1.124E-2
N° 15 (OFF1)	---	8.340E-3	1.250E-3	1.660E-3	-4.510E-3	-2.379E-2	-1.304E-2	-5.820E-3	-1.867E-2	-6.440E-3	-9.090E-3
N° 16 (OFF1)	---	7.800E-3	1.860E-3	2.010E-3	-4.650E-3	-2.357E-2	-1.294E-2	-6.540E-3	-1.847E-2	-6.270E-3	-1.229E-2
Average (OFF1)	---	1.242E-2	5.642E-3	5.100E-3	-2.096E-3	-1.991E-2	-2.176E-2	-1.010E-3	-1.928E-2	2.038E-3	-1.142E-2
σ (OFF1)	---	1.053E-3	1.122E-3	3.905E-3	1.325E-3	1.946E-3	2.784E-3	2.113E-3	3.028E-3	4.320E-3	3.089E-3
Average+3σ (OFF1)	---	1.557E-2	9.008E-3	1.681E-2	1.879E-3	-1.407E-2	-1.341E-2	5.330E-3	-1.020E-2	1.500E-2	-2.153E-3
Average-3σ (OFF1)	---	9.258E-3	2.276E-3	-6.615E-3	-6.071E-3	-2.574E-2	-3.011E-2	-7.350E-3	-2.837E-2	-1.092E-2	-2.069E-2
Average (Bias1)	---	1.173E-2	5.090E-3	3.596E-3	-1.732E-3	-2.074E-2	-1.217E-2	-3.494E-3	-1.861E-2	-3.190E-3	-1.163E-2
σ (Bias1)	---	3.216E-3	3.333E-3	3.563E-3	2.130E-3	2.921E-3	1.675E-3	3.182E-3	1.497E-3	2.618E-3	1.959E-3
Average+3σ (Bias1)	---	2.138E-2	1.509E-2	1.428E-2	4.657E-3	-1.198E-2	-7.144E-3	6.052E-3	-1.411E-2	4.665E-3	-5.750E-3
Average-3σ (Bias1)	---	2.087E-3	-4.910E-3	-7.092E-3	-8.121E-3	-2.951E-2	-1.720E-2	-1.304E-2	-2.310E-2	-1.104E-2	-1.750E-2
Average (Bias2)	---	8.628E-3	8.820E-4	7.720E-4	-4.412E-3	-2.363E-2	-1.261E-2	-5.950E-3	-1.931E-2	-6.990E-3	-1.139E-2
σ (Bias2)	---	5.911E-4	8.140E-4	1.624E-3	6.986E-4	1.001E-3	1.617E-3	8.264E-4	1.297E-3	9.530E-4	2.033E-3
Average+3σ (Bias2)	---	1.040E-2	3.324E-3	5.643E-3	-2.316E-3	-2.063E-2	-7.754E-3	-3.471E-3	-1.542E-2	-4.131E-3	-5.292E-3
Average-3σ (Bias2)	---	6.855E-3	-1.560E-3	-4.099E-3	-6.508E-3	-2.664E-2	-1.746E-2	-8.429E-3	-2.320E-2	-9.849E-3	-1.749E-2

5. ICCH

Ta=25°C; Vcc = 18 V; If = 0



ICCH . (µA) **Max = 10.0**

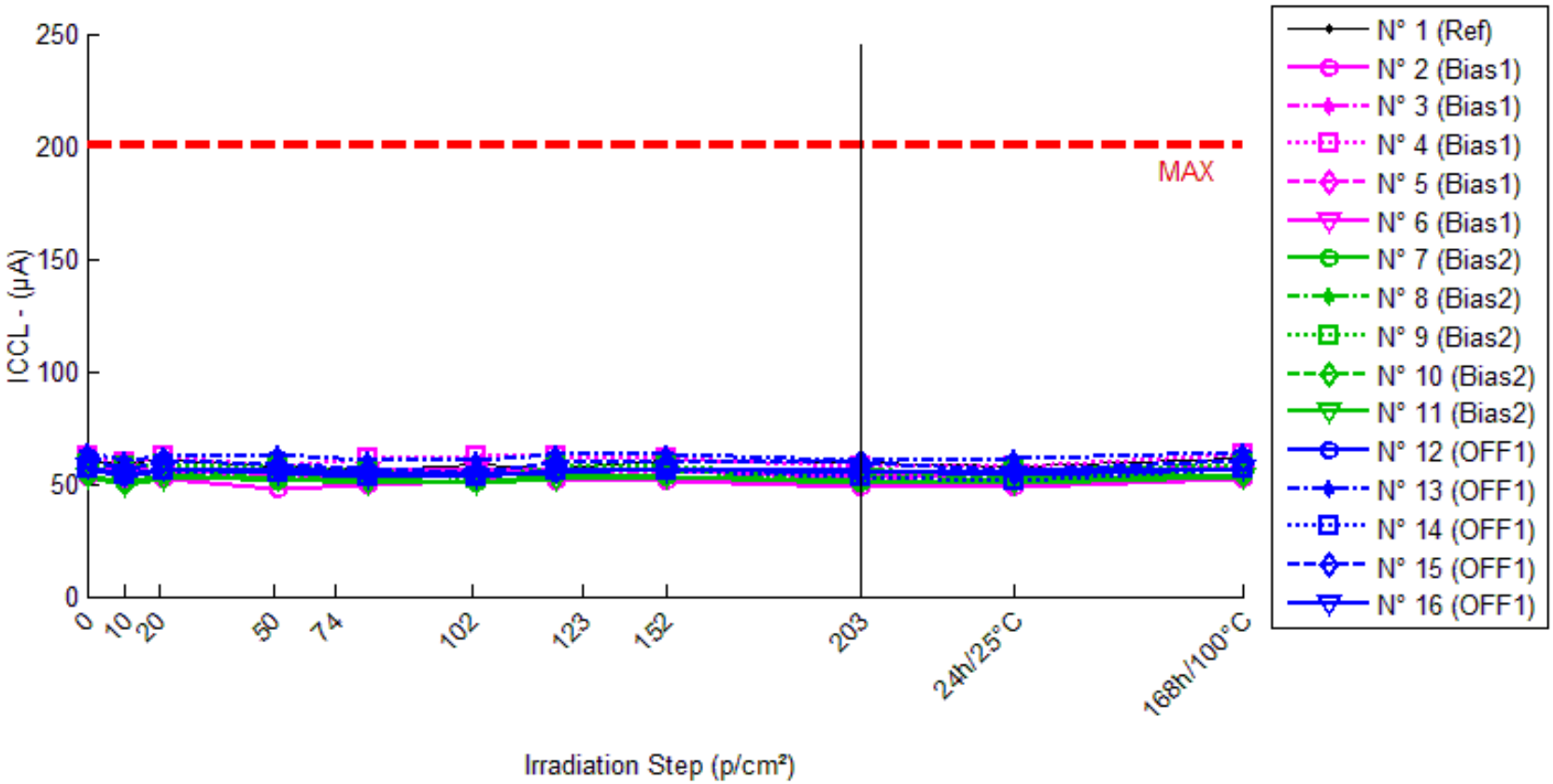
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	0.187	0.320	0.323	0.294	0.339	0.273	0.286	0.338	0.274	0.340	0.285
N° 2 (Bias1)	0.186	0.312	0.307	0.293	0.313	0.310	0.273	0.314	0.229	0.300	0.290
N° 3 (Bias1)	0.186	0.321	0.302	0.296	0.279	0.298	0.249	0.310	0.260	0.280	0.293
N° 4 (Bias1)	0.174	0.301	0.305	0.284	0.274	0.280	0.263	0.293	0.249	0.270	0.273
N° 5 (Bias1)	0.172	0.310	0.308	0.282	0.294	0.253	0.274	0.263	0.247	0.285	0.280
N° 6 (Bias1)	0.161	0.290	0.284	0.272	0.286	0.252	0.254	0.304	0.260	0.299	0.281
N° 7 (Bias2)	0.169	0.297	0.307	0.282	0.278	0.254	0.275	0.302	0.266	0.271	0.252
N° 8 (Bias2)	0.165	0.291	0.294	0.278	0.284	0.264	0.267	0.292	0.261	0.283	0.287
N° 9 (Bias2)	0.176	0.277	0.291	0.286	0.274	0.237	0.249	0.298	0.259	0.278	0.267
N° 10 (Bias2)	0.180	0.286	0.296	0.279	0.274	0.238	0.256	0.274	0.268	0.269	0.279
N° 11 (Bias2)	0.182	0.273	0.279	0.282	0.249	0.274	0.268	0.262	0.260	0.290	0.248
N° 12 (OFF1)	0.181	0.284	0.297	0.283	0.270	0.282	0.250	0.265	0.260	0.281	0.247
N° 13 (OFF1)	0.183	0.286	0.291	0.275	0.261	0.273	0.264	0.262	0.254	0.257	0.268
N° 14 (OFF1)	0.180	0.289	0.288	0.296	0.289	0.239	0.265	0.303	0.278	0.279	0.279
N° 15 (OFF1)	0.185	0.290	0.303	0.263	0.288	0.271	0.282	0.277	0.270	0.289	0.281
N° 16 (OFF1)	0.167	0.284	0.261	0.277	0.290	0.267	0.272	0.270	0.270	0.256	0.268

Delta [ICCH]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	1.329E-1	1.359E-1	1.070E-1	1.523E-1	8.605E-2	9.850E-2	1.508E-1	8.654E-2	1.533E-1	9.800E-2
N° 2 (Bias1)	---	1.268E-1	1.213E-1	1.068E-1	1.278E-1	1.238E-1	8.742E-2	1.283E-1	4.357E-2	1.138E-1	1.039E-1
N° 3 (Bias1)	---	1.348E-1	1.159E-1	1.094E-1	9.244E-2	1.119E-1	6.305E-2	1.233E-1	7.401E-2	9.394E-2	1.064E-1
N° 4 (Bias1)	---	1.268E-1	1.303E-1	1.098E-1	9.986E-2	1.054E-1	8.890E-2	1.188E-1	7.446E-2	9.588E-2	9.887E-2
N° 5 (Bias1)	---	1.376E-1	1.356E-1	1.097E-1	1.211E-1	8.078E-2	1.017E-1	9.024E-2	7.430E-2	1.122E-1	1.072E-1
N° 6 (Bias1)	---	1.286E-1	1.222E-1	1.107E-1	1.241E-1	9.027E-2	9.276E-2	1.426E-1	9.824E-2	1.376E-1	1.192E-1
N° 7 (Bias2)	---	1.273E-1	1.373E-1	1.129E-1	1.084E-1	8.448E-2	1.054E-1	1.328E-1	9.693E-2	1.019E-1	8.298E-2
N° 8 (Bias2)	---	1.255E-1	1.290E-1	1.125E-1	1.185E-1	9.857E-2	1.020E-1	1.270E-1	9.607E-2	1.175E-1	1.220E-1
N° 9 (Bias2)	---	1.010E-1	1.145E-1	1.095E-1	9.754E-2	6.117E-2	7.262E-2	1.219E-1	8.309E-2	1.020E-1	9.056E-2
N° 10 (Bias2)	---	1.058E-1	1.158E-1	9.935E-2	9.387E-2	5.800E-2	7.643E-2	9.437E-2	8.839E-2	8.939E-2	9.935E-2
N° 11 (Bias2)	---	9.058E-2	9.657E-2	1.000E-1	6.717E-2	9.209E-2	8.610E-2	7.962E-2	7.763E-2	1.080E-1	6.568E-2
N° 12 (OFF1)	---	1.025E-1	1.159E-1	1.020E-1	8.901E-2	1.010E-1	6.908E-2	8.353E-2	7.904E-2	9.997E-2	6.559E-2
N° 13 (OFF1)	---	1.031E-1	1.081E-1	9.212E-2	7.867E-2	9.063E-2	8.116E-2	7.966E-2	7.169E-2	7.468E-2	8.564E-2
N° 14 (OFF1)	---	1.084E-1	1.079E-1	1.158E-1	1.084E-1	5.904E-2	8.445E-2	1.223E-1	9.790E-2	9.840E-2	9.839E-2
N° 15 (OFF1)	---	1.048E-1	1.177E-1	7.837E-2	1.033E-1	8.635E-2	9.730E-2	9.232E-2	8.485E-2	1.038E-1	9.581E-2
N° 16 (OFF1)	---	1.167E-1	9.374E-2	1.097E-1	1.231E-1	9.973E-2	1.052E-1	1.032E-1	1.027E-1	8.926E-2	1.012E-1
Average (OFF1)	---	1.309E-1	1.250E-1	1.093E-1	1.131E-1	1.024E-1	8.676E-2	1.206E-1	7.291E-2	1.107E-1	1.071E-1
σ (OFF1)	---	4.971E-3	7.825E-3	1.447E-3	1.584E-2	1.711E-2	1.437E-2	1.920E-2	1.941E-2	1.758E-2	7.488E-3
Average+3σ (OFF1)	---	1.458E-1	1.485E-1	1.136E-1	1.606E-1	1.537E-1	1.299E-1	1.782E-1	1.312E-1	1.634E-1	1.296E-1
Average-3σ (OFF1)	---	1.160E-1	1.016E-1	1.049E-1	6.554E-2	5.109E-2	4.364E-2	6.304E-2	1.467E-2	5.794E-2	8.463E-2
Average (Bias1)	---	1.100E-1	1.186E-1	1.069E-1	9.709E-2	7.886E-2	8.852E-2	1.111E-1	8.842E-2	1.038E-1	9.211E-2
σ (Bias1)	---	1.592E-2	1.555E-2	6.666E-3	1.931E-2	1.832E-2	1.477E-2	2.297E-2	8.304E-3	1.024E-2	2.079E-2
Average+3σ (Bias1)	---	1.578E-1	1.653E-1	1.268E-1	1.550E-1	1.338E-1	1.328E-1	1.801E-1	1.133E-1	1.345E-1	1.545E-1
Average-3σ (Bias1)	---	6.227E-2	7.198E-2	8.685E-2	3.916E-2	2.390E-2	4.421E-2	4.222E-2	6.351E-2	7.304E-2	2.974E-2
Average (Bias2)	---	1.071E-1	1.087E-1	9.959E-2	1.005E-1	8.734E-2	8.744E-2	9.620E-2	8.724E-2	9.322E-2	8.933E-2
σ (Bias2)	---	5.831E-3	9.467E-3	1.481E-2	1.725E-2	1.697E-2	1.413E-2	1.717E-2	1.292E-2	1.165E-2	1.451E-2
Average+3σ (Bias2)	---	1.246E-1	1.371E-1	1.440E-1	1.522E-1	1.383E-1	1.298E-1	1.477E-1	1.260E-1	1.282E-1	1.329E-1
Average-3σ (Bias2)	---	8.957E-2	8.026E-2	5.516E-2	4.873E-2	3.643E-2	4.506E-2	4.468E-2	4.849E-2	5.826E-2	4.579E-2

6. ICCL

Ta=25°C; Vcc = 18 V; If = 20 mA



ICCL . (µA) **Max = 200.0**

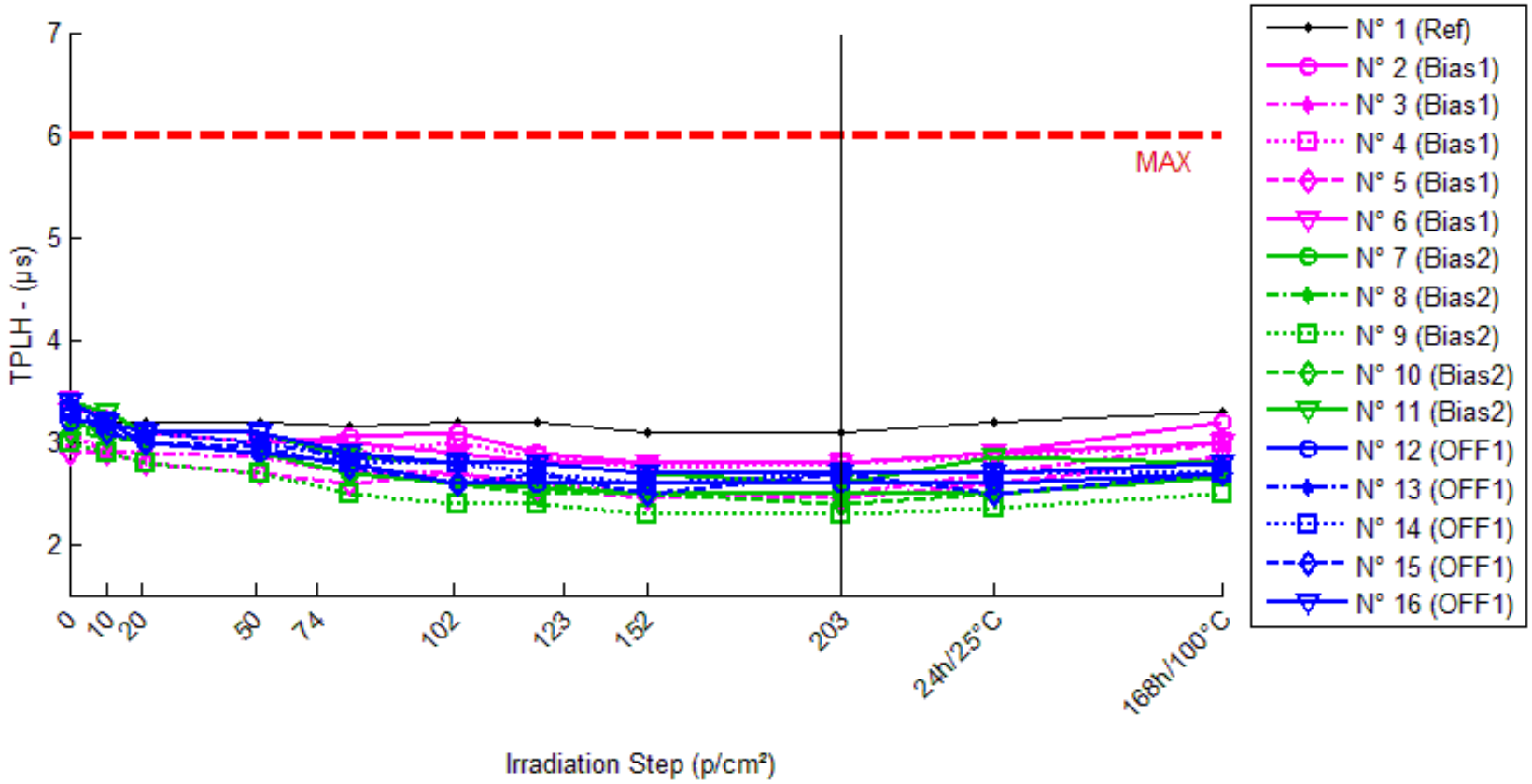
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	59.346	59.591	60.504	57.591	56.240	58.658	56.447	60.690	59.801	58.181	61.029
N° 2 (Bias1)	53.035	51.579	52.537	47.293	49.769	51.776	51.058	51.176	48.590	48.681	52.340
N° 3 (Bias1)	57.088	55.698	56.696	53.213	52.699	54.948	53.741	55.506	52.380	52.757	56.532
N° 4 (Bias1)	62.429	59.145	62.318	57.461	61.781	62.341	62.344	61.514	57.801	57.584	62.885
N° 5 (Bias1)	57.638	53.187	57.158	53.275	55.119	55.199	56.538	56.216	51.897	54.823	57.339
N° 6 (Bias1)	57.326	55.157	56.081	54.665	55.798	56.177	56.409	55.573	53.304	54.894	56.923
N° 7 (Bias2)	54.186	50.776	53.784	51.780	52.524	50.754	53.949	53.518	50.215	51.999	54.348
N° 8 (Bias2)	56.839	54.483	55.906	52.677	54.368	54.536	55.660	55.655	52.494	53.587	56.401
N° 9 (Bias2)	58.993	58.037	58.318	57.304	55.701	51.913	57.686	57.554	54.525	55.484	58.372
N° 10 (Bias2)	57.123	54.169	56.095	56.071	53.271	53.107	55.665	56.063	56.615	52.317	56.869
N° 11 (Bias2)	53.252	49.892	52.448	52.420	50.907	50.294	52.270	52.821	51.813	50.211	53.389
N° 12 (OFF1)	57.159	53.028	56.140	56.552	55.138	53.882	55.014	56.394	55.138	55.765	57.101
N° 13 (OFF1)	63.908	60.748	62.641	63.093	60.560	60.032	63.083	63.128	60.494	61.374	63.710
N° 14 (OFF1)	56.416	53.921	56.047	54.778	53.082	53.423	55.668	55.978	53.235	51.572	56.482
N° 15 (OFF1)	61.072	55.773	60.469	59.005	56.538	54.656	59.100	59.738	59.942	55.543	60.324
N° 16 (OFF1)	57.498	54.126	56.376	54.631	52.953	53.297	56.159	56.095	56.083	54.222	56.723

Delta [ICCL]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	2.446E-1	1.158E+0	-1.756E+0	-3.106E+0	-6.887E-1	-2.899E+0	1.344E+0	4.545E-1	-1.165E+0	1.683E+0
N° 2 (Bias1)	---	-1.456E+0	-4.983E-1	-5.742E+0	-3.266E+0	-1.259E+0	-1.977E+0	-1.859E+0	-4.446E+0	-4.354E+0	-6.955E-1
N° 3 (Bias1)	---	-1.390E+0	-3.924E-1	-3.875E+0	-4.389E+0	-2.140E+0	-3.347E+0	-1.582E+0	-4.709E+0	-4.331E+0	-5.558E-1
N° 4 (Bias1)	---	-3.285E+0	-1.111E-1	-4.968E+0	-6.487E-1	-8.790E-2	-8.528E-2	-9.149E-1	-4.628E+0	-4.845E+0	4.558E-1
N° 5 (Bias1)	---	-4.450E+0	-4.794E-1	-4.362E+0	-2.519E+0	-2.438E+0	-1.099E+0	-1.421E+0	-5.740E+0	-2.814E+0	-2.981E-1
N° 6 (Bias1)	---	-2.170E+0	-1.245E+0	-2.662E+0	-1.529E+0	-1.150E+0	-9.171E-1	-1.754E+0	-4.023E+0	-2.432E+0	-4.032E-1
N° 7 (Bias2)	---	-3.409E+0	-4.014E-1	-2.405E+0	-1.662E+0	-3.432E+0	-2.366E-1	-6.680E-1	-3.970E+0	-2.187E+0	1.623E-1
N° 8 (Bias2)	---	-2.356E+0	-9.335E-1	-4.162E+0	-2.471E+0	-2.303E+0	-1.179E+0	-1.184E+0	-4.345E+0	-3.252E+0	-4.381E-1
N° 9 (Bias2)	---	-9.558E-1	-6.752E-1	-1.689E+0	-3.292E+0	-7.079E+0	-1.307E+0	-1.439E+0	-4.468E+0	-3.508E+0	-6.203E-1
N° 10 (Bias2)	---	-2.953E+0	-1.027E+0	-1.051E+0	-3.852E+0	-4.015E+0	-1.458E+0	-1.059E+0	-5.075E-1	-4.805E+0	-2.538E-1
N° 11 (Bias2)	---	-3.359E+0	-8.038E-1	-8.316E-1	-2.344E+0	-2.957E+0	-9.814E-1	-4.308E-1	-1.439E+0	-3.041E+0	1.375E-1
N° 12 (OFF1)	---	-4.131E+0	-1.018E+0	-6.067E-1	-2.021E+0	-3.276E+0	-2.145E+0	-7.649E-1	-2.021E+0	-1.394E+0	-5.775E-2
N° 13 (OFF1)	---	-3.160E+0	-1.267E+0	-8.149E-1	-3.349E+0	-3.876E+0	-8.251E-1	-7.800E-1	-3.414E+0	-2.534E+0	-1.987E-1
N° 14 (OFF1)	---	-2.495E+0	-3.697E-1	-1.638E+0	-3.335E+0	-2.993E+0	-7.483E-1	-4.381E-1	-3.181E+0	-4.844E+0	6.524E-2
N° 15 (OFF1)	---	-5.299E+0	-6.030E-1	-2.067E+0	-4.534E+0	-6.415E+0	-1.972E+0	-1.334E+0	-1.130E+0	-5.529E+0	-7.474E-1
N° 16 (OFF1)	---	-3.372E+0	-1.122E+0	-2.867E+0	-4.545E+0	-4.201E+0	-1.339E+0	-1.403E+0	-1.415E+0	-3.276E+0	-7.747E-1
Average (OFF1)	---	-2.550E+0	-5.453E-1	-4.322E+0	-2.470E+0	-1.415E+0	-1.485E+0	-1.506E+0	-4.709E+0	-3.755E+0	-2.994E-1
σ (OFF1)	---	1.307E+0	4.209E-1	1.161E+0	1.460E+0	9.259E-1	1.239E+0	3.702E-1	6.346E-1	1.062E+0	4.483E-1
Average+3σ (OFF1)	---	1.372E+0	7.173E-1	-8.384E-1	1.908E+0	1.363E+0	2.232E+0	-3.955E-1	-2.805E+0	-5.689E-1	1.045E+0
Average-3σ (OFF1)	---	-6.472E+0	-1.808E+0	-7.805E+0	-6.849E+0	-4.193E+0	-5.203E+0	-2.617E+0	-6.613E+0	-6.942E+0	-1.644E+0
Average (Bias1)	---	-2.607E+0	-7.682E-1	-2.028E+0	-2.724E+0	-3.957E+0	-1.032E+0	-9.562E-1	-2.946E+0	-3.359E+0	-2.025E-1
σ (Bias1)	---	1.015E+0	2.443E-1	1.341E+0	8.560E-1	1.855E+0	4.779E-1	4.046E-1	1.840E+0	9.488E-1	3.469E-1
Average+3σ (Bias1)	---	4.376E-1	-3.521E-2	1.996E+0	-1.565E-1	1.608E+0	4.015E-1	2.575E-1	2.573E+0	-5.120E-1	8.381E-1
Average-3σ (Bias1)	---	-5.651E+0	-1.501E+0	-6.052E+0	-5.292E+0	-9.523E+0	-2.466E+0	-2.170E+0	-8.465E+0	-6.205E+0	-1.243E+0
Average (Bias2)	---	-3.691E+0	-8.760E-1	-1.599E+0	-3.556E+0	-4.152E+0	-1.406E+0	-9.439E-1	-2.232E+0	-3.516E+0	-3.427E-1
σ (Bias2)	---	1.071E+0	3.756E-1	9.257E-1	1.047E+0	1.352E+0	6.404E-1	4.115E-1	1.028E+0	1.684E+0	3.933E-1
Average+3σ (Bias2)	---	-4.773E-1	2.509E-1	1.178E+0	-4.164E-1	-9.658E-2	5.154E-1	2.907E-1	8.508E-1	1.536E+0	8.372E-1
Average-3σ (Bias2)	---	-6.906E+0	-2.003E+0	-4.376E+0	-6.697E+0	-8.208E+0	-3.327E+0	-2.179E+0	-5.315E+0	-8.567E+0	-1.523E+0

7. TPLH

Ta=25°C; RL = 8.2 kOhms; Cl = 50 pF; If = 16 mA; Vcc = 5 V



TPLH . (µs) **Max = 6.0**

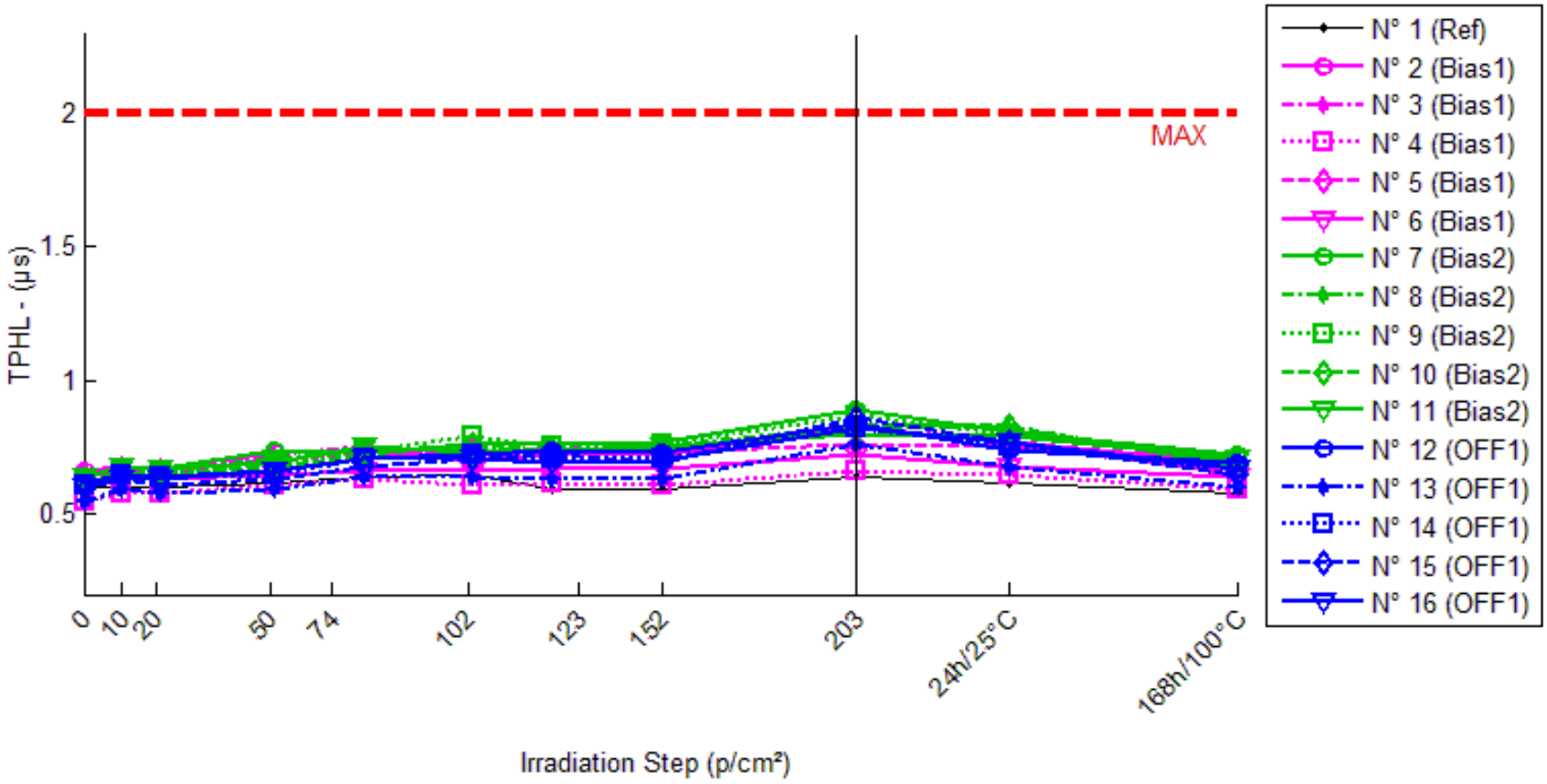
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	3.20	3.20	3.20	3.20	3.15	3.20	3.20	3.10	3.10	3.20	3.30
N° 2 (Bias1)	3.20	3.20	3.10	3.00	3.05	3.10	2.90	2.80	2.80	2.90	3.20
N° 3 (Bias1)	3.10	2.90	2.90	2.85	2.70	2.70	2.60	2.50	2.50	2.70	3.00
N° 4 (Bias1)	3.40	3.20	3.10	3.10	2.90	3.00	2.85	2.75	2.80	2.85	3.00
N° 5 (Bias1)	2.90	2.90	2.80	2.70	2.60	2.70	2.55	2.45	2.45	2.60	2.85
N° 6 (Bias1)	3.30	3.30	3.10	3.00	3.00	2.90	2.80	2.80	2.80	2.90	3.00
N° 7 (Bias2)	3.20	3.10	3.00	2.90	2.70	2.60	2.55	2.50	2.50	2.50	2.65
N° 8 (Bias2)	3.15	3.10	3.00	2.90	2.70	2.60	2.60	2.50	2.50	2.50	2.70
N° 9 (Bias2)	3.00	2.90	2.80	2.70	2.50	2.40	2.40	2.30	2.30	2.35	2.50
N° 10 (Bias2)	3.10	3.05	3.00	2.90	2.70	2.60	2.50	2.50	2.40	2.50	2.70
N° 11 (Bias2)	3.40	3.30	3.10	3.10	2.85	2.80	2.80	2.70	2.60	2.85	2.80
N° 12 (OFF1)	3.20	3.20	3.00	2.90	2.80	2.60	2.60	2.60	2.60	2.60	2.70
N° 13 (OFF1)	3.40	3.20	3.10	3.00	2.85	2.80	2.80	2.70	2.70	2.70	2.80
N° 14 (OFF1)	3.30	3.20	3.10	3.10	2.80	2.80	2.70	2.60	2.70	2.70	2.70
N° 15 (OFF1)	3.30	3.10	3.00	2.95	2.75	2.60	2.70	2.50	2.70	2.50	2.70
N° 16 (OFF1)	3.40	3.20	3.10	3.10	2.90	2.80	2.80	2.70	2.70	2.70	2.80

Delta [TPLH]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	0.000E+0	0.000E+0	0.000E+0	-5.000E-2	0.000E+0	0.000E+0	-1.000E-1	-1.000E-1	0.000E+0	1.000E-1
N° 2 (Bias1)	---	0.000E+0	-1.000E-1	-2.000E-1	-1.500E-1	-1.000E-1	-3.000E-1	-4.000E-1	-4.000E-1	-3.000E-1	0.000E+0
N° 3 (Bias1)	---	-2.000E-1	-2.000E-1	-2.500E-1	-4.000E-1	-4.000E-1	-5.000E-1	-6.000E-1	-6.000E-1	-4.000E-1	-1.000E-1
N° 4 (Bias1)	---	-2.000E-1	-3.000E-1	-3.000E-1	-5.000E-1	-4.000E-1	-5.500E-1	-6.500E-1	-6.000E-1	-5.500E-1	-4.000E-1
N° 5 (Bias1)	---	0.000E+0	-1.000E-1	-2.000E-1	-3.000E-1	-2.000E-1	-3.500E-1	-4.500E-1	-4.500E-1	-3.000E-1	-5.000E-2
N° 6 (Bias1)	---	0.000E+0	-2.000E-1	-3.000E-1	-3.000E-1	-4.000E-1	-5.000E-1	-5.000E-1	-5.000E-1	-4.000E-1	-3.000E-1
N° 7 (Bias2)	---	-1.000E-1	-2.000E-1	-3.000E-1	-5.000E-1	-6.000E-1	-6.500E-1	-7.000E-1	-7.000E-1	-7.000E-1	-5.500E-1
N° 8 (Bias2)	---	-5.000E-2	-1.500E-1	-2.500E-1	-4.500E-1	-5.500E-1	-5.500E-1	-6.500E-1	-6.500E-1	-6.500E-1	-4.500E-1
N° 9 (Bias2)	---	-1.000E-1	-2.000E-1	-3.000E-1	-5.000E-1	-6.000E-1	-6.000E-1	-7.000E-1	-7.000E-1	-6.500E-1	-5.000E-1
N° 10 (Bias2)	---	-5.000E-2	-1.000E-1	-2.000E-1	-4.000E-1	-5.000E-1	-6.000E-1	-6.000E-1	-7.000E-1	-6.000E-1	-4.000E-1
N° 11 (Bias2)	---	-1.000E-1	-3.000E-1	-3.000E-1	-5.500E-1	-6.000E-1	-6.000E-1	-7.000E-1	-8.000E-1	-5.500E-1	-6.000E-1
N° 12 (OFF1)	---	0.000E+0	-2.000E-1	-3.000E-1	-4.000E-1	-6.000E-1	-6.000E-1	-6.000E-1	-6.000E-1	-6.000E-1	-5.000E-1
N° 13 (OFF1)	---	-2.000E-1	-3.000E-1	-4.000E-1	-5.500E-1	-6.000E-1	-6.000E-1	-7.000E-1	-7.000E-1	-7.000E-1	-6.000E-1
N° 14 (OFF1)	---	-1.000E-1	-2.000E-1	-2.000E-1	-5.000E-1	-5.000E-1	-6.000E-1	-7.000E-1	-6.000E-1	-6.000E-1	-6.000E-1
N° 15 (OFF1)	---	-2.000E-1	-3.000E-1	-3.500E-1	-5.500E-1	-7.000E-1	-6.000E-1	-8.000E-1	-6.000E-1	-8.000E-1	-6.000E-1
N° 16 (OFF1)	---	-2.000E-1	-3.000E-1	-3.000E-1	-5.000E-1	-6.000E-1	-6.000E-1	-7.000E-1	-7.000E-1	-7.000E-1	-6.000E-1
Average (OFF1)	---	-8.000E-2	-1.800E-1	-2.500E-1	-3.300E-1	-3.000E-1	-4.400E-1	-5.200E-1	-5.100E-1	-3.900E-1	-1.700E-1
σ (OFF1)	---	1.095E-1	8.367E-2	5.000E-2	1.304E-1	1.414E-1	1.084E-1	1.037E-1	8.944E-2	1.025E-1	1.718E-1
Average+3σ (OFF1)	---	2.486E-1	7.100E-2	-1.000E-1	6.115E-2	1.243E-1	-1.148E-1	-2.090E-1	-2.417E-1	-8.259E-2	3.453E-1
Average-3σ (OFF1)	---	-4.086E-1	-4.310E-1	-4.000E-1	-7.212E-1	-7.243E-1	-7.652E-1	-8.310E-1	-7.783E-1	-6.974E-1	-6.853E-1
Average (Bias1)	---	-8.000E-2	-1.900E-1	-2.700E-1	-4.800E-1	-5.700E-1	-6.000E-1	-6.700E-1	-7.100E-1	-6.300E-1	-5.000E-1
σ (Bias1)	---	2.739E-2	7.416E-2	4.472E-2	5.701E-2	4.472E-2	3.536E-2	4.472E-2	5.477E-2	5.701E-2	7.906E-2
Average+3σ (Bias1)	---	2.158E-3	3.249E-2	-1.358E-1	-3.090E-1	-4.358E-1	-4.939E-1	-5.358E-1	-5.457E-1	-4.590E-1	-2.628E-1
Average-3σ (Bias1)	---	-1.622E-1	-4.125E-1	-4.042E-1	-6.510E-1	-7.042E-1	-7.061E-1	-8.042E-1	-8.743E-1	-8.010E-1	-7.372E-1
Average (Bias2)	---	-1.400E-1	-2.600E-1	-3.100E-1	-5.000E-1	-6.000E-1	-6.000E-1	-7.000E-1	-6.400E-1	-6.800E-1	-5.800E-1
σ (Bias2)	---	8.944E-2	5.477E-2	7.416E-2	6.124E-2	7.071E-2	2.483E-16	7.071E-2	5.477E-2	8.367E-2	4.472E-2
Average+3σ (Bias2)	---	1.283E-1	-9.568E-2	-8.751E-2	-3.163E-1	-3.879E-1	-6.000E-1	-4.879E-1	-4.757E-1	-4.290E-1	-4.458E-1
Average-3σ (Bias2)	---	-4.083E-1	-4.243E-1	-5.325E-1	-6.837E-1	-8.121E-1	-6.000E-1	-9.121E-1	-8.043E-1	-9.310E-1	-7.142E-1

8. TPHL

Ta=25°C; RL = 8.2 kOhms; Cl = 50 pF; If = 16 mA; Vcc = 5V



TPHL . (µs) **Max = 2.0**

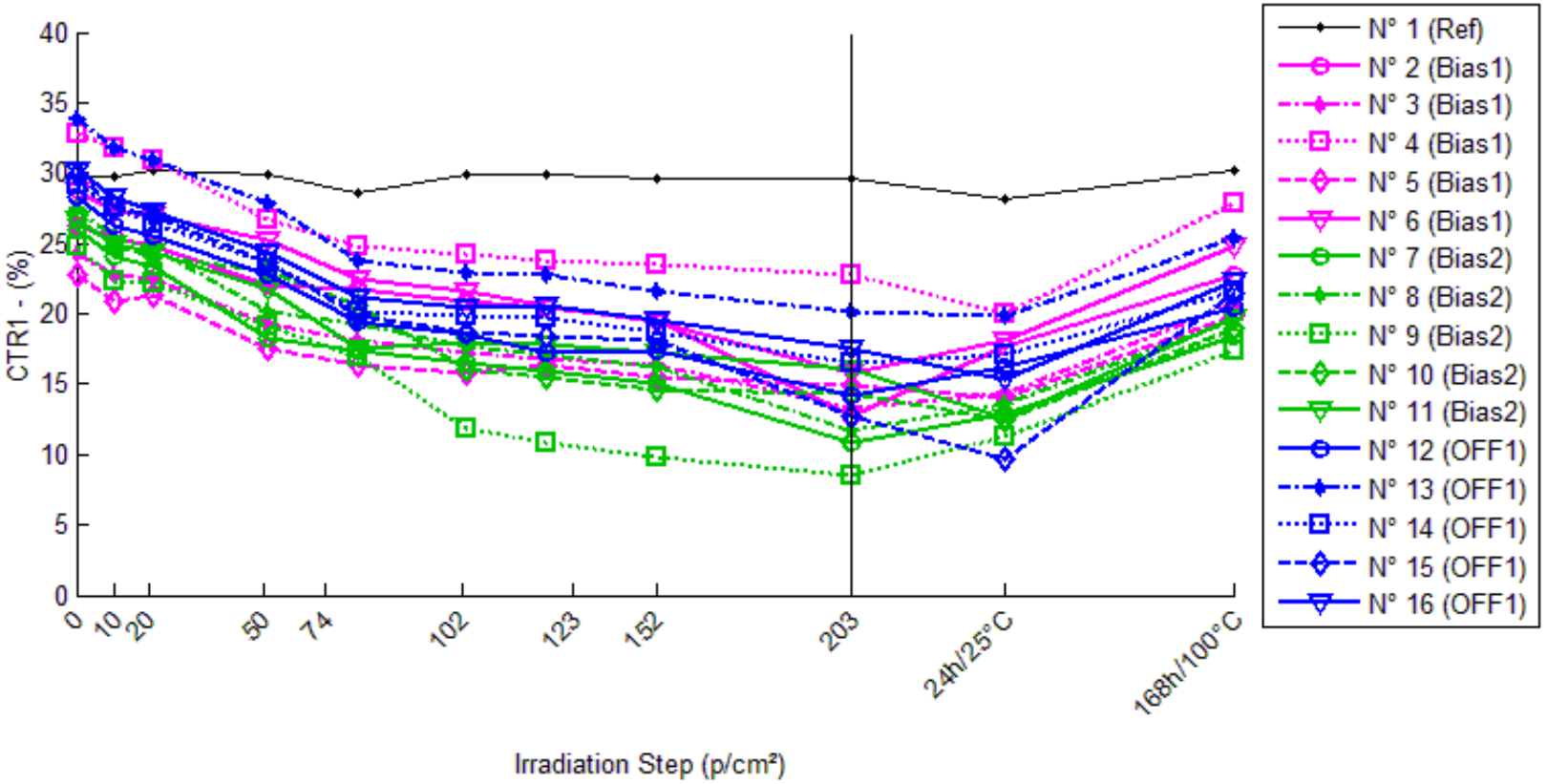
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	0.60	0.60	0.60	0.62	0.64	0.65	0.59	0.59	0.64	0.62	0.58
N° 2 (Bias1)	0.66	0.68	0.67	0.73	0.74	0.70	0.72	0.73	0.82	0.77	0.69
N° 3 (Bias1)	0.63	0.66	0.65	0.72	0.75	0.71	0.75	0.72	0.82	0.78	0.65
N° 4 (Bias1)	0.55	0.58	0.58	0.61	0.63	0.61	0.62	0.61	0.66	0.65	0.59
N° 5 (Bias1)	0.64	0.67	0.66	0.70	0.73	0.74	0.72	0.73	0.76	0.75	0.66
N° 6 (Bias1)	0.60	0.63	0.63	0.65	0.66	0.66	0.67	0.67	0.72	0.68	0.64
N° 7 (Bias2)	0.64	0.68	0.67	0.74	0.73	0.76	0.76	0.77	0.89	0.81	0.72
N° 8 (Bias2)	0.63	0.65	0.66	0.71	0.74	0.74	0.74	0.75	0.83	0.82	0.69
N° 9 (Bias2)	0.62	0.66	0.65	0.69	0.74	0.79	0.75	0.76	0.87	0.80	0.70
N° 10 (Bias2)	0.63	0.65	0.65	0.68	0.72	0.76	0.74	0.74	0.83	0.83	0.68
N° 11 (Bias2)	0.64	0.68	0.67	0.69	0.75	0.73	0.74	0.75	0.80	0.79	0.71
N° 12 (OFF1)	0.62	0.65	0.64	0.66	0.71	0.72	0.74	0.73	0.84	0.74	0.69
N° 13 (OFF1)	0.55	0.59	0.58	0.59	0.64	0.64	0.63	0.63	0.76	0.68	0.60
N° 14 (OFF1)	0.61	0.65	0.64	0.65	0.71	0.72	0.71	0.71	0.82	0.75	0.67
N° 15 (OFF1)	0.59	0.63	0.61	0.63	0.68	0.71	0.72	0.69	0.86	0.77	0.65
N° 16 (OFF1)	0.60	0.63	0.63	0.66	0.71	0.71	0.69	0.70	0.82	0.77	0.67

Delta [TPHL]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	0.000E+0	0.000E+0	2.000E-2	4.000E-2	5.000E-2	-1.000E-2	-1.000E-2	4.000E-2	2.000E-2	-2.000E-2
N° 2 (Bias1)	---	2.000E-2	1.000E-2	7.000E-2	8.000E-2	4.000E-2	6.000E-2	7.000E-2	1.600E-1	1.100E-1	3.000E-2
N° 3 (Bias1)	---	3.000E-2	2.000E-2	9.000E-2	1.200E-1	8.000E-2	1.200E-1	9.000E-2	1.900E-1	1.500E-1	2.000E-2
N° 4 (Bias1)	---	3.000E-2	3.000E-2	6.000E-2	8.000E-2	6.000E-2	7.000E-2	6.000E-2	1.100E-1	1.000E-1	4.000E-2
N° 5 (Bias1)	---	3.000E-2	2.000E-2	6.000E-2	9.000E-2	1.000E-1	8.000E-2	9.000E-2	1.200E-1	1.100E-1	2.000E-2
N° 6 (Bias1)	---	3.000E-2	3.000E-2	5.000E-2	6.000E-2	6.000E-2	7.000E-2	7.000E-2	1.200E-1	8.000E-2	4.000E-2
N° 7 (Bias2)	---	4.000E-2	3.000E-2	1.000E-1	9.000E-2	1.200E-1	1.200E-1	1.300E-1	2.500E-1	1.700E-1	8.000E-2
N° 8 (Bias2)	---	2.000E-2	3.000E-2	8.000E-2	1.100E-1	1.100E-1	1.100E-1	1.200E-1	2.000E-1	1.900E-1	6.000E-2
N° 9 (Bias2)	---	4.000E-2	3.000E-2	7.000E-2	1.200E-1	1.700E-1	1.300E-1	1.400E-1	2.500E-1	1.800E-1	8.000E-2
N° 10 (Bias2)	---	2.000E-2	2.000E-2	5.000E-2	9.000E-2	1.300E-1	1.100E-1	1.100E-1	2.000E-1	2.000E-1	5.000E-2
N° 11 (Bias2)	---	4.000E-2	3.000E-2	5.000E-2	1.100E-1	9.000E-2	1.000E-1	1.100E-1	1.600E-1	1.500E-1	7.000E-2
N° 12 (OFF1)	---	3.000E-2	2.000E-2	4.000E-2	9.000E-2	1.000E-1	1.200E-1	1.100E-1	2.200E-1	1.200E-1	7.000E-2
N° 13 (OFF1)	---	4.000E-2	3.000E-2	4.000E-2	9.000E-2	9.000E-2	8.000E-2	8.000E-2	2.100E-1	1.300E-1	5.000E-2
N° 14 (OFF1)	---	4.000E-2	3.000E-2	4.000E-2	1.000E-1	1.100E-1	1.000E-1	1.000E-1	2.100E-1	1.400E-1	6.000E-2
N° 15 (OFF1)	---	4.000E-2	2.000E-2	4.000E-2	9.000E-2	1.200E-1	1.300E-1	1.000E-1	2.700E-1	1.800E-1	6.000E-2
N° 16 (OFF1)	---	3.000E-2	3.000E-2	6.000E-2	1.100E-1	1.100E-1	9.000E-2	1.000E-1	2.200E-1	1.700E-1	7.000E-2
Average (OFF1)	---	2.800E-2	2.200E-2	6.600E-2	8.600E-2	6.800E-2	8.000E-2	7.600E-2	1.400E-1	1.100E-1	3.000E-2
σ (OFF1)	---	4.472E-3	8.367E-3	1.517E-2	2.191E-2	2.280E-2	2.345E-2	1.342E-2	3.391E-2	2.550E-2	1.000E-2
Average+3σ (OFF1)	---	4.142E-2	4.710E-2	1.115E-1	1.517E-1	1.364E-1	1.504E-1	1.162E-1	2.417E-1	1.865E-1	6.000E-2
Average-3σ (OFF1)	---	1.458E-2	-3.100E-3	2.050E-2	2.027E-2	-4.105E-4	9.644E-3	3.575E-2	3.827E-2	3.351E-2	3.816E-17
Average (Bias1)	---	3.200E-2	2.800E-2	7.000E-2	1.040E-1	1.240E-1	1.140E-1	1.220E-1	2.120E-1	1.780E-1	6.800E-2
σ (Bias1)	---	1.095E-2	4.472E-3	2.121E-2	1.342E-2	2.966E-2	1.140E-2	1.304E-2	3.834E-2	1.924E-2	1.304E-2
Average+3σ (Bias1)	---	6.486E-2	4.142E-2	1.336E-1	1.442E-1	2.130E-1	1.482E-1	1.611E-1	3.270E-1	2.357E-1	1.071E-1
Average-3σ (Bias1)	---	-8.634E-4	1.458E-2	6.360E-3	6.375E-2	3.501E-2	7.979E-2	8.288E-2	9.698E-2	1.203E-1	2.888E-2
Average (Bias2)	---	3.600E-2	2.600E-2	4.400E-2	9.600E-2	1.060E-1	1.040E-1	9.800E-2	2.260E-1	1.480E-1	6.200E-2
σ (Bias2)	---	5.477E-3	5.477E-3	8.944E-3	8.944E-3	1.140E-2	2.074E-2	1.095E-2	2.510E-2	2.588E-2	8.367E-3
Average+3σ (Bias2)	---	5.243E-2	4.243E-2	7.083E-2	1.228E-1	1.402E-1	1.662E-1	1.309E-1	3.013E-1	2.257E-1	8.710E-2
Average-3σ (Bias2)	---	1.957E-2	9.568E-3	1.717E-2	6.917E-2	7.179E-2	4.179E-2	6.514E-2	1.507E-1	7.035E-2	3.690E-2

9. CTR1

Ta=25°C; Vo = 0.4 V; If = 2 mA; Vcc = 5V



CTR1 . (%)

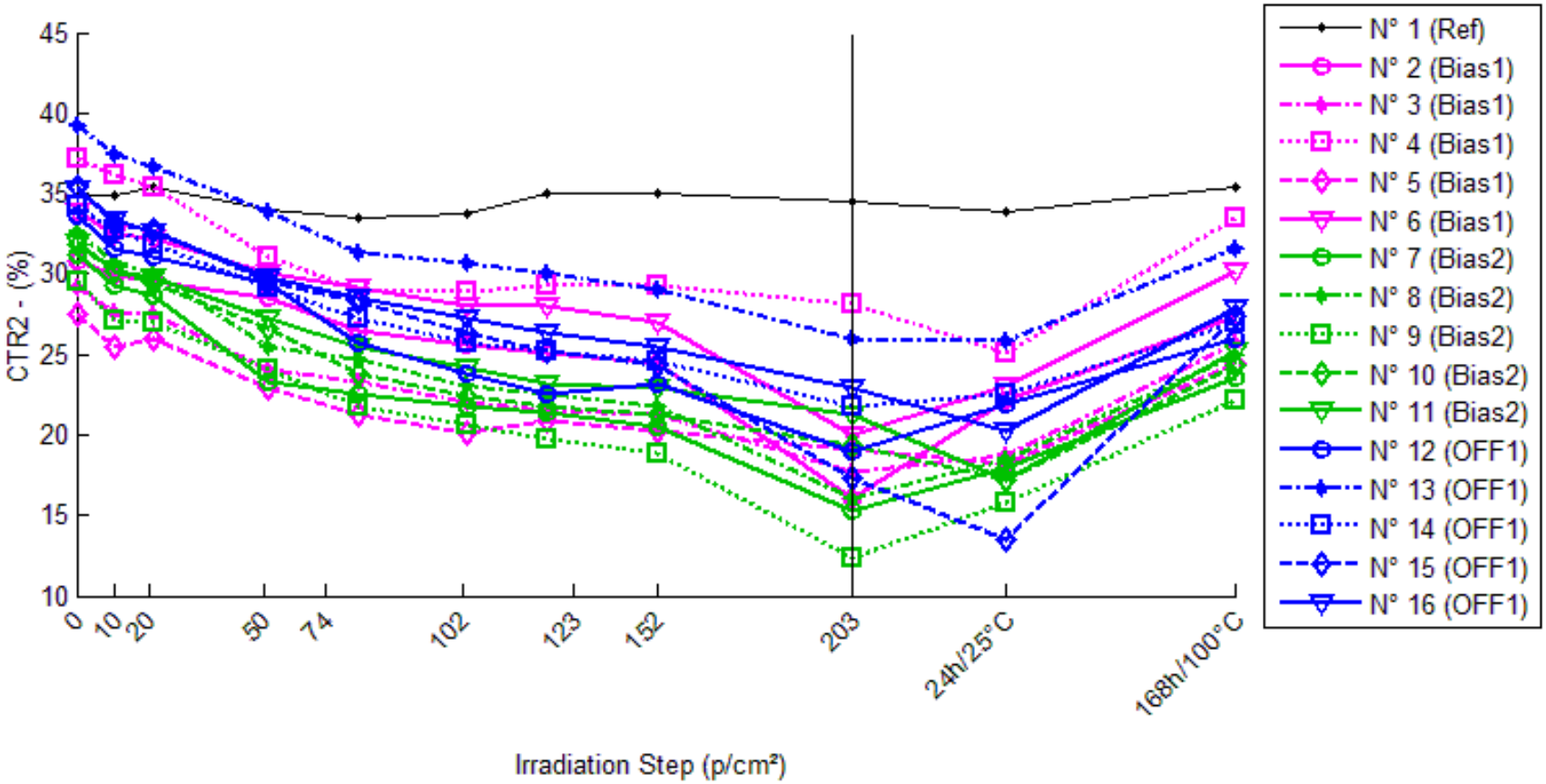
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	29.72	29.70	30.14	29.84	28.56	29.91	29.89	29.53	29.63	28.18	30.25
N° 2 (Bias1)	26.27	25.32	24.85	21.98	21.69	20.87	20.50	19.53	12.72	17.69	22.71
N° 3 (Bias1)	24.21	22.71	22.53	19.26	18.09	17.29	16.80	16.31	13.35	14.28	20.71
N° 4 (Bias1)	32.77	31.74	30.86	26.63	24.82	24.28	23.81	23.45	22.71	19.99	27.82
N° 5 (Bias1)	22.80	20.93	21.28	17.57	16.38	15.77	16.31	15.54	14.86	14.09	19.80
N° 6 (Bias1)	28.72	27.27	26.95	25.24	22.45	21.67	20.58	19.44	15.79	18.18	24.80
N° 7 (Bias2)	26.03	24.10	23.37	18.26	17.41	16.55	15.99	15.00	10.84	12.94	18.35
N° 8 (Bias2)	27.45	25.44	24.65	20.18	19.31	17.66	17.05	16.15	11.66	13.53	19.58
N° 9 (Bias2)	24.80	22.39	22.15	19.09	16.94	11.86	10.83	9.83	8.50	11.31	17.32
N° 10 (Bias2)	26.64	24.85	24.03	23.10	20.56	16.09	15.44	14.67	14.31	12.46	18.96
N° 11 (Bias2)	26.64	24.92	24.33	21.79	17.56	18.02	17.80	17.25	16.01	12.63	19.74
N° 12 (OFF1)	28.36	26.20	25.55	22.72	19.45	18.48	17.20	17.39	14.12	16.26	20.46
N° 13 (OFF1)	33.78	31.78	30.84	27.81	23.78	22.94	22.76	21.56	20.14	19.84	25.42
N° 14 (OFF1)	29.13	27.51	26.47	23.67	20.08	19.81	19.64	18.74	16.54	17.05	21.53
N° 15 (OFF1)	29.96	27.51	26.97	23.70	19.86	18.66	18.47	18.14	12.74	9.63	21.45
N° 16 (OFF1)	30.19	28.25	27.30	24.32	21.12	20.40	20.65	19.61	17.60	15.34	22.34

1/Delta [CTR1]

	krad(Si)	0krad(Si)	0krad(Si)	0krad(Si)	4krad(Si)	02krad(Si)	23krad(Si)	52krad(Si)	03krad(Si)	4h/25°C	68h/100°C
°° 1 (Ref)	--	.781E-5	4.683E-4	.322E-4	.368E-3	2.104E-4	1.947E-4	.228E-4	.942E-5	.838E-3	5.900E-4
°° 2 (Bias1)	--	.425E-3	.179E-3	.422E-3	.034E-3	.843E-3	.071E-2	.314E-2	.055E-2	.847E-2	.963E-3
°° 3 (Bias1)	--	.735E-3	.092E-3	.062E-2	.397E-2	.654E-2	.823E-2	.999E-2	.363E-2	.873E-2	.986E-3
°° 4 (Bias1)	--	.852E-4	.886E-3	.031E-3	.766E-3	.066E-2	.148E-2	.212E-2	.353E-2	.951E-2	.429E-3
°° 5 (Bias1)	--	.922E-3	.151E-3	.305E-2	.718E-2	.954E-2	.746E-2	.048E-2	.342E-2	.712E-2	.649E-3
°° 6 (Bias1)	--	.857E-3	.290E-3	.793E-3	.725E-3	.132E-2	.377E-2	.663E-2	.851E-2	.019E-2	.508E-3
°° 7 (Bias2)	--	.090E-3	.377E-3	.637E-2	.903E-2	.201E-2	.412E-2	.826E-2	.385E-2	.889E-2	.610E-2
°° 8 (Bias2)	--	.868E-3	.128E-3	.312E-2	.535E-2	.017E-2	.222E-2	.547E-2	.935E-2	.748E-2	.463E-2
°° 9 (Bias2)	--	.340E-3	.832E-3	.208E-2	.873E-2	.397E-2	.204E-2	.142E-2	.726E-2	.808E-2	.741E-2
°° 10 (Bias2)	--	.703E-3	.090E-3	.768E-3	.111E-2	.462E-2	.725E-2	.062E-2	.236E-2	.275E-2	.520E-2
°° 11 (Bias2)	--	.595E-3	.567E-3	.362E-3	.940E-2	.797E-2	.864E-2	.042E-2	.491E-2	.165E-2	.311E-2
°° 12 (OFF1)	--	.910E-3	.873E-3	.740E-3	.616E-2	.886E-2	.287E-2	.226E-2	.555E-2	.624E-2	.361E-2
°° 13 (OFF1)	--	.863E-3	.817E-3	.355E-3	.245E-2	.399E-2	.433E-2	.677E-2	.004E-2	.080E-2	.738E-3
°° 14 (OFF1)	--	.030E-3	.447E-3	.925E-3	.548E-2	.616E-2	.659E-2	.903E-2	.614E-2	.431E-2	.211E-2
°° 15 (OFF1)	--	.978E-3	.698E-3	.817E-3	.697E-2	.023E-2	.076E-2	.174E-2	.511E-2	.048E-2	.325E-2
°° 16 (OFF1)	--	.273E-3	.503E-3	.991E-3	.423E-2	.590E-2	.531E-2	.787E-2	.368E-2	.205E-2	.164E-2
verage (OFF1)	--	.185E-3	.520E-3	.584E-3	.174E-2	.358E-2	.433E-2	.647E-2	.793E-2	.280E-2	.107E-3
(OFF1)	--	.167E-3	.693E-4	.250E-3	.752E-3	.240E-3	.409E-3	.824E-3	.025E-2	.748E-3	.905E-4
verage+3σ OFF1)	--	.685E-3	.228E-3	.833E-2	.299E-2	.630E-2	.456E-2	.794E-2	.867E-2	.705E-2	.178E-3
verage-3σ (OFF1)	--	1.315E-3	.117E-4	1.166E-3	.804E-4	.630E-4	.103E-3	.002E-3	2.811E-3	.561E-3	.036E-3
verage (Bias1)	--	.119E-3	.199E-3	.114E-2	.673E-2	.575E-2	.885E-2	.324E-2	.755E-2	.177E-2	.529E-2
(Bias1)	--	.078E-4	.608E-4	.144E-3	.533E-3	.047E-2	.333E-2	.620E-2	.043E-2	.107E-3	.606E-3
verage+3σ Bias1)	--	.242E-3	.581E-3	.357E-2	.732E-2	.717E-2	.884E-2	.185E-2	.088E-1	.409E-2	.011E-2
verage-3σ (Bias1)	--	.956E-4	.817E-3	1.294E-3	.128E-3	5.668E-3	1.114E-2	1.537E-2	1.373E-2	.945E-2	.047E-2
verage (Bias2)	--	.411E-3	.467E-3	.966E-3	.506E-2	.703E-2	.797E-2	.953E-2	.010E-2	.478E-2	.207E-2
(Bias2)	--	.089E-4	.008E-4	.899E-4	.771E-3	.494E-3	.677E-3	.395E-3	.016E-2	.037E-2	.531E-3
verage+3σ Bias2)	--	.937E-3	.670E-3	.094E-2	.037E-2	.451E-2	.900E-2	.672E-2	.060E-2	.589E-2	.666E-2
verage-3σ (Bias2)	--	.841E-4	.265E-3	.996E-3	.746E-3	.544E-3	.943E-3	.235E-2	3.883E-4	2.633E-2	.475E-3

10.CTR2

Ta=25°C; Vo = 0.4 V; If = 4 mA; Vcc = 5 V



CTR2 . (%)

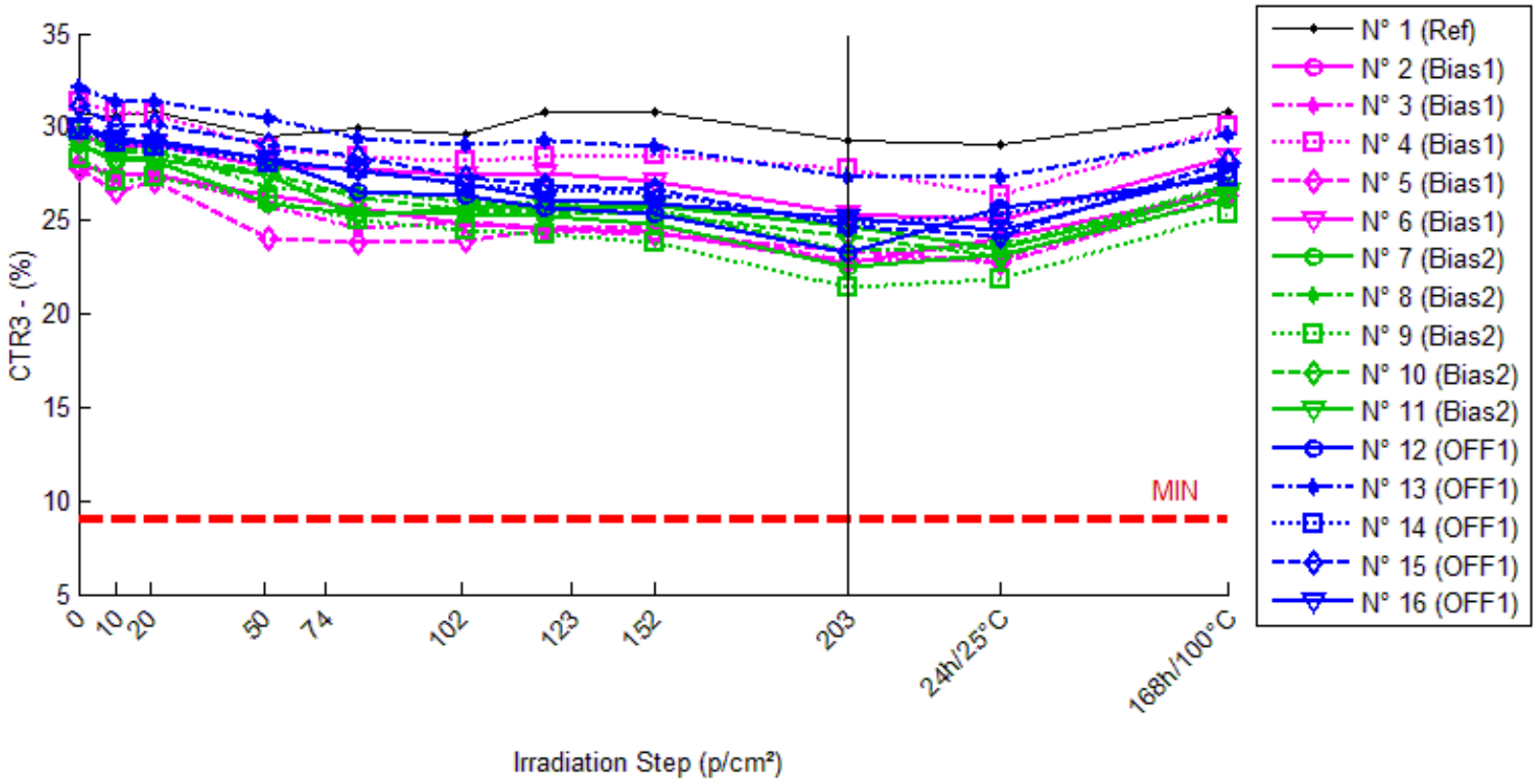
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	34.94	34.92	35.34	34.00	33.49	33.77	35.06	34.97	34.56	33.92	35.37
N° 2 (Bias1)	30.86	29.98	29.53	28.57	26.49	25.56	25.10	24.44	15.99	22.21	27.43
N° 3 (Bias1)	29.13	27.61	27.54	24.08	23.31	21.99	21.46	21.31	17.65	18.72	25.69
N° 4 (Bias1)	37.13	36.19	35.39	31.03	29.04	28.90	29.24	29.34	28.13	25.05	33.42
N° 5 (Bias1)	27.47	25.47	26.00	22.95	21.27	20.07	20.82	20.20	19.15	18.26	24.47
N° 6 (Bias1)	33.89	32.44	32.27	30.08	29.15	27.96	28.00	27.04	19.98	23.03	30.23
N° 7 (Bias2)	31.15	29.27	28.70	23.24	22.49	21.78	21.33	20.47	15.25	17.92	23.59
N° 8 (Bias2)	32.60	30.70	30.05	25.42	24.69	23.01	22.52	21.79	15.99	18.50	24.98
N° 9 (Bias2)	29.50	27.10	27.02	24.06	21.80	20.62	19.78	18.90	12.37	15.78	22.18
N° 10 (Bias2)	31.85	30.17	29.42	26.56	23.84	22.45	21.77	21.25	19.40	17.15	24.34
N° 11 (Bias2)	31.92	30.20	29.75	27.29	25.44	24.20	23.20	22.88	21.22	17.14	25.15
N° 12 (OFF1)	33.60	31.52	31.04	29.35	25.73	23.87	22.51	23.20	18.95	21.94	25.99
N° 13 (OFF1)	39.22	37.41	36.62	33.86	31.33	30.71	30.05	29.06	25.93	25.82	31.51
N° 14 (OFF1)	34.20	32.72	31.77	29.17	27.27	25.74	25.20	24.52	21.72	22.50	27.00
N° 15 (OFF1)	35.43	33.05	32.71	29.57	28.32	26.39	25.26	24.30	17.26	13.50	27.32
N° 16 (OFF1)	35.21	33.41	32.59	29.81	28.50	27.28	26.31	25.45	22.97	20.28	27.85

1/Delta [CTR2]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	1.424E-5	-3.253E-4	7.834E-4	1.234E-3	9.891E-4	-9.951E-5	-2.971E-5	3.132E-4	8.597E-4	-3.511E-4
N° 2 (Bias1)	---	9.479E-4	1.460E-3	2.601E-3	5.345E-3	6.724E-3	7.439E-3	8.516E-3	3.012E-2	1.262E-2	4.044E-3
N° 3 (Bias1)	---	1.901E-3	1.986E-3	7.201E-3	8.580E-3	1.115E-2	1.228E-2	1.260E-2	2.233E-2	1.909E-2	4.596E-3
N° 4 (Bias1)	---	6.934E-4	1.324E-3	5.293E-3	7.505E-3	7.672E-3	7.266E-3	7.146E-3	8.612E-3	1.299E-2	2.983E-3
N° 5 (Bias1)	---	2.846E-3	2.054E-3	7.159E-3	1.061E-2	1.341E-2	1.163E-2	1.309E-2	1.581E-2	1.836E-2	4.463E-3
N° 6 (Bias1)	---	1.326E-3	1.487E-3	3.736E-3	4.797E-3	6.265E-3	6.215E-3	7.483E-3	2.056E-2	1.392E-2	3.578E-3
N° 7 (Bias2)	---	2.062E-3	2.745E-3	1.093E-2	1.237E-2	1.382E-2	1.478E-2	1.675E-2	3.349E-2	2.370E-2	1.028E-2
N° 8 (Bias2)	---	1.892E-3	2.604E-3	8.667E-3	9.831E-3	1.278E-2	1.373E-2	1.521E-2	3.185E-2	2.338E-2	9.352E-3
N° 9 (Bias2)	---	3.002E-3	3.104E-3	7.664E-3	1.196E-2	1.460E-2	1.665E-2	1.902E-2	4.692E-2	2.946E-2	1.120E-2
N° 10 (Bias2)	---	1.756E-3	2.591E-3	6.254E-3	1.056E-2	1.314E-2	1.453E-2	1.567E-2	2.015E-2	2.691E-2	9.685E-3
N° 11 (Bias2)	---	1.790E-3	2.295E-3	5.326E-3	7.992E-3	1.000E-2	1.178E-2	1.238E-2	1.581E-2	2.701E-2	8.432E-3
N° 12 (OFF1)	---	1.962E-3	2.453E-3	4.310E-3	9.105E-3	1.213E-2	1.467E-2	1.333E-2	2.300E-2	1.581E-2	8.716E-3
N° 13 (OFF1)	---	1.232E-3	1.810E-3	4.037E-3	6.419E-3	7.058E-3	7.777E-3	8.910E-3	1.307E-2	1.323E-2	6.240E-3
N° 14 (OFF1)	---	1.330E-3	2.236E-3	5.040E-3	7.440E-3	9.616E-3	1.044E-2	1.155E-2	1.679E-2	1.520E-2	7.802E-3
N° 15 (OFF1)	---	2.038E-3	2.353E-3	5.594E-3	7.090E-3	9.666E-3	1.137E-2	1.294E-2	2.971E-2	4.587E-2	8.376E-3
N° 16 (OFF1)	---	1.528E-3	2.277E-3	5.145E-3	6.686E-3	8.257E-3	9.611E-3	1.088E-2	1.514E-2	2.091E-2	7.498E-3
Average (OFF1)	---	1.543E-3	1.662E-3	5.198E-3	7.368E-3	9.046E-3	8.965E-3	9.766E-3	1.949E-2	1.540E-2	3.933E-3
σ (OFF1)	---	8.585E-4	3.333E-4	2.046E-3	2.384E-3	3.104E-3	2.777E-3	2.859E-3	7.969E-3	3.090E-3	6.634E-4
Average+3σ (OFF1)	---	4.118E-3	2.662E-3	1.134E-2	1.452E-2	1.836E-2	1.730E-2	1.834E-2	4.339E-2	2.467E-2	5.923E-3
Average-3σ (OFF1)	---	-1.033E-3	6.624E-4	-9.409E-4	2.174E-4	-2.659E-4	6.331E-4	1.189E-3	-4.423E-3	6.128E-3	1.943E-3
Average (Bias1)	---	2.100E-3	2.668E-3	7.769E-3	1.054E-2	1.287E-2	1.429E-2	1.581E-2	2.964E-2	2.609E-2	9.789E-3
σ (Bias1)	---	5.181E-4	2.936E-4	2.185E-3	1.758E-3	1.747E-3	1.765E-3	2.415E-3	1.225E-2	2.546E-3	1.032E-3
Average+3σ (Bias1)	---	3.655E-3	3.549E-3	1.433E-2	1.582E-2	1.811E-2	1.959E-2	2.305E-2	6.638E-2	3.373E-2	1.289E-2
Average-3σ (Bias1)	---	5.461E-4	1.787E-3	1.213E-3	5.268E-3	7.627E-3	8.999E-3	8.562E-3	-7.092E-3	1.846E-2	6.692E-3
Average (Bias2)	---	1.618E-3	2.226E-3	4.825E-3	7.348E-3	9.346E-3	1.077E-2	1.152E-2	1.954E-2	2.221E-2	7.726E-3
σ (Bias2)	---	3.656E-4	2.469E-4	6.374E-4	1.056E-3	1.895E-3	2.548E-3	1.768E-3	6.787E-3	1.353E-2	9.575E-4
Average+3σ (Bias2)	---	2.715E-3	2.966E-3	6.738E-3	1.052E-2	1.503E-2	1.842E-2	1.683E-2	3.990E-2	6.280E-2	1.060E-2
Average-3σ (Bias2)	---	5.210E-4	1.485E-3	2.913E-3	4.179E-3	3.662E-3	3.128E-3	6.218E-3	-8.182E-4	-1.838E-2	4.854E-3

11.CTR3

Ta=25°C; Vo = 0.4 V; If = 16 mA; Vcc = 4.5 V



CTR3 . (%) **Min = 9.0**

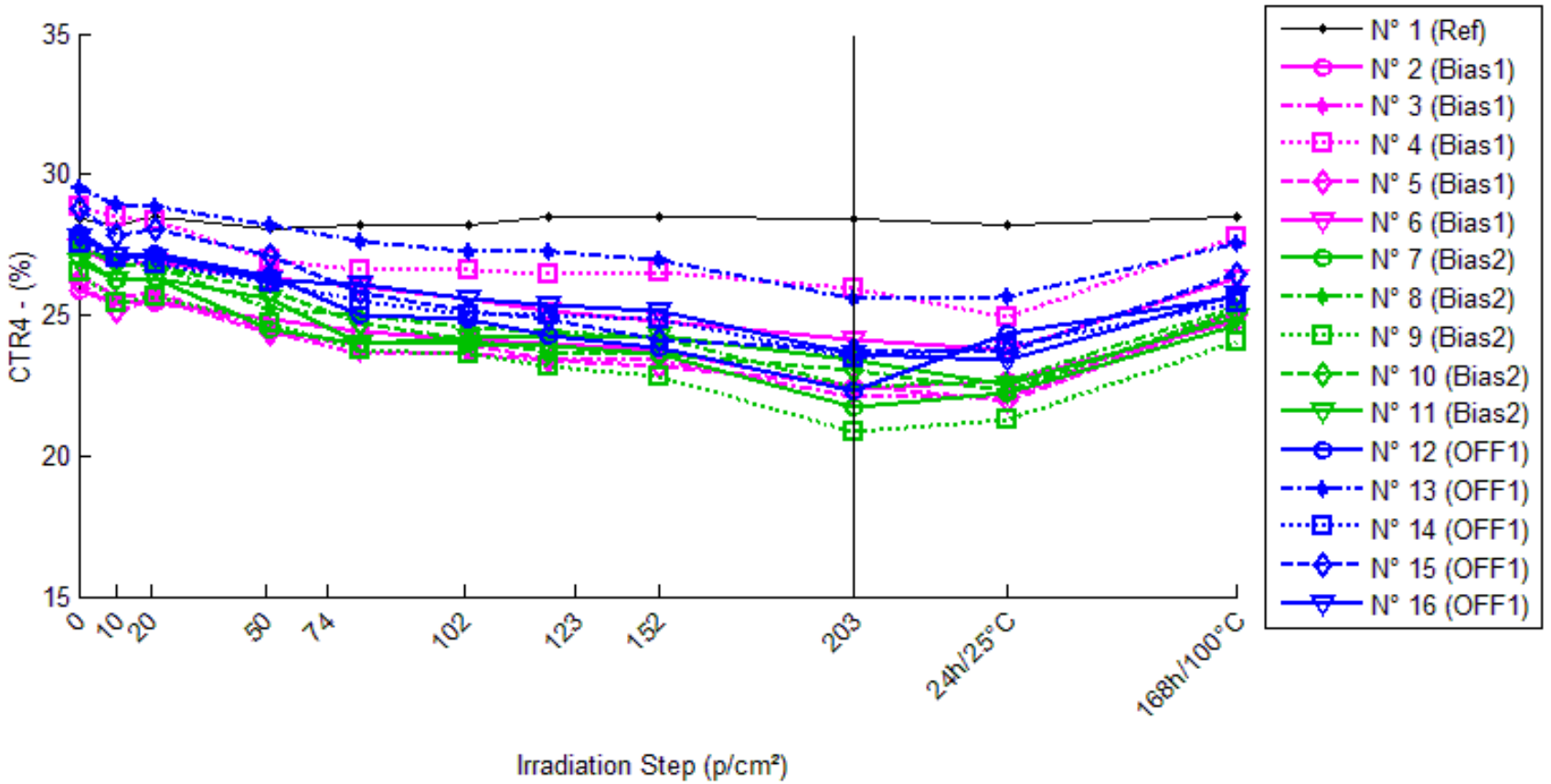
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	30.70	30.53	30.80	29.49	29.88	29.64	30.77	30.78	29.29	29.03	30.85
N° 2 (Bias1)	27.92	27.46	27.38	26.34	25.72	24.83	24.62	24.35	22.74	24.04	26.59
N° 3 (Bias1)	28.23	27.37	27.54	25.81	24.62	24.86	24.59	24.66	22.83	22.99	26.74
N° 4 (Bias1)	31.32	30.85	30.68	28.87	28.36	28.13	28.35	28.52	27.80	26.34	30.03
N° 5 (Bias1)	27.77	26.58	27.11	24.06	23.81	23.89	24.51	24.22	23.34	22.71	26.38
N° 6 (Bias1)	29.65	28.91	29.03	27.85	27.74	27.43	27.55	27.13	25.30	25.07	28.38
N° 7 (Bias2)	29.06	28.16	28.15	25.86	25.34	25.32	25.23	24.83	22.55	23.19	26.14
N° 8 (Bias2)	29.68	28.81	28.74	26.73	26.57	25.98	25.85	25.59	23.40	23.62	26.86
N° 9 (Bias2)	28.33	27.09	27.35	26.14	25.03	24.48	24.27	23.87	21.45	21.86	25.30
N° 10 (Bias2)	29.54	28.77	28.63	27.55	26.21	25.52	25.50	25.39	24.11	23.06	26.65
N° 11 (Bias2)	29.02	28.24	28.26	27.39	25.29	25.62	25.72	25.73	24.71	23.47	26.56
N° 12 (OFF1)	30.09	29.19	29.22	28.25	26.52	26.34	25.65	25.33	23.29	25.70	27.31
N° 13 (OFF1)	32.09	31.40	31.31	30.45	29.37	29.08	29.28	28.95	27.27	27.31	29.65
N° 14 (OFF1)	29.77	29.18	28.97	28.09	27.73	26.87	26.66	26.48	24.83	25.40	27.28
N° 15 (OFF1)	31.08	30.04	30.17	29.02	28.35	27.28	26.90	26.68	24.64	24.17	28.23
N° 16 (OFF1)	30.08	29.35	29.20	28.26	27.59	26.93	26.13	25.85	25.18	24.52	27.59

1/Delta [CTR3]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	1.773E-4	-1.044E-4	1.328E-3	8.961E-4	1.165E-3	-7.208E-5	-8.290E-5	1.569E-3	1.867E-3	-1.652E-4
N° 2 (Bias1)	---	6.071E-4	7.095E-4	2.149E-3	3.066E-3	4.458E-3	4.803E-3	5.249E-3	8.158E-3	5.786E-3	1.786E-3
N° 3 (Bias1)	---	1.110E-3	8.882E-4	3.327E-3	5.200E-3	4.806E-3	5.254E-3	5.136E-3	8.389E-3	8.077E-3	1.973E-3
N° 4 (Bias1)	---	4.888E-4	6.694E-4	2.710E-3	3.330E-3	3.615E-3	3.349E-3	3.135E-3	4.043E-3	6.044E-3	1.375E-3
N° 5 (Bias1)	---	1.608E-3	8.796E-4	5.548E-3	5.983E-3	5.849E-3	4.780E-3	5.277E-3	6.830E-3	8.023E-3	1.896E-3
N° 6 (Bias1)	---	8.660E-4	7.254E-4	2.177E-3	2.316E-3	2.726E-3	2.571E-3	3.140E-3	5.807E-3	6.156E-3	1.515E-3
N° 7 (Bias2)	---	1.101E-3	1.113E-3	4.265E-3	5.053E-3	5.083E-3	5.232E-3	5.866E-3	9.932E-3	8.719E-3	3.843E-3
N° 8 (Bias2)	---	1.009E-3	1.100E-3	3.715E-3	3.933E-3	4.797E-3	4.993E-3	5.388E-3	9.030E-3	8.646E-3	3.529E-3
N° 9 (Bias2)	---	1.612E-3	1.270E-3	2.956E-3	4.663E-3	5.548E-3	5.906E-3	6.592E-3	1.131E-2	1.044E-2	4.224E-3
N° 10 (Bias2)	---	9.035E-4	1.072E-3	2.446E-3	4.294E-3	5.324E-3	5.358E-3	5.537E-3	7.617E-3	9.500E-3	3.669E-3
N° 11 (Bias2)	---	9.520E-4	9.223E-4	2.052E-3	5.078E-3	4.577E-3	4.412E-3	4.399E-3	6.008E-3	8.139E-3	3.196E-3
N° 12 (OFF1)	---	1.027E-3	9.881E-4	2.174E-3	4.484E-3	4.727E-3	5.754E-3	6.253E-3	9.706E-3	5.676E-3	3.383E-3
N° 13 (OFF1)	---	6.845E-4	7.776E-4	1.679E-3	2.881E-3	3.219E-3	2.991E-3	3.379E-3	5.505E-3	5.453E-3	2.556E-3
N° 14 (OFF1)	---	6.789E-4	9.254E-4	2.006E-3	2.461E-3	3.618E-3	3.910E-3	4.167E-3	6.679E-3	5.775E-3	3.056E-3
N° 15 (OFF1)	---	1.110E-3	9.665E-4	2.284E-3	3.095E-3	4.483E-3	4.994E-3	5.299E-3	8.415E-3	9.204E-3	3.243E-3
N° 16 (OFF1)	---	8.183E-4	9.934E-4	2.139E-3	2.992E-3	3.888E-3	5.029E-3	5.432E-3	6.470E-3	7.528E-3	3.000E-3
Average (OFF1)	---	9.360E-4	7.744E-4	3.182E-3	3.979E-3	4.291E-3	4.151E-3	4.387E-3	6.645E-3	6.817E-3	1.709E-3
σ (OFF1)	---	4.458E-4	1.020E-4	1.407E-3	1.543E-3	1.186E-3	1.138E-3	1.142E-3	1.792E-3	1.133E-3	2.550E-4
Average+3σ (OFF1)	---	2.273E-3	1.080E-3	7.404E-3	8.609E-3	7.850E-3	7.564E-3	7.815E-3	1.202E-2	1.022E-2	2.474E-3
Average-3σ (OFF1)	---	-4.014E-4	4.683E-4	-1.039E-3	-6.511E-4	7.321E-4	7.388E-4	9.599E-4	1.270E-3	3.417E-3	9.440E-4
Average (Bias1)	---	1.116E-3	1.095E-3	3.087E-3	4.604E-3	5.066E-3	5.180E-3	5.557E-3	8.780E-3	9.090E-3	3.692E-3
σ (Bias1)	---	2.873E-4	1.237E-4	9.057E-4	4.939E-4	3.909E-4	5.447E-4	7.962E-4	2.052E-3	9.000E-4	3.805E-4
Average+3σ (Bias1)	---	1.978E-3	1.466E-3	5.804E-3	6.086E-3	6.238E-3	6.814E-3	7.945E-3	1.494E-2	1.179E-2	4.834E-3
Average-3σ (Bias1)	---	2.536E-4	7.245E-4	3.698E-4	3.123E-3	3.893E-3	3.546E-3	3.168E-3	2.624E-3	6.390E-3	2.551E-3
Average (Bias2)	---	8.637E-4	9.302E-4	2.056E-3	3.183E-3	3.987E-3	4.536E-3	4.906E-3	7.355E-3	6.727E-3	3.048E-3
σ (Bias2)	---	1.972E-4	8.939E-5	2.329E-4	7.662E-4	6.184E-4	1.086E-3	1.132E-3	1.682E-3	1.613E-3	3.139E-4
Average+3σ (Bias2)	---	1.455E-3	1.198E-3	2.755E-3	5.481E-3	5.842E-3	7.793E-3	8.301E-3	1.240E-2	1.157E-2	3.989E-3
Average-3σ (Bias2)	---	2.722E-4	6.620E-4	1.358E-3	8.840E-4	2.132E-3	1.278E-3	1.511E-3	2.310E-3	1.887E-3	2.106E-3

12.CTR4

Ta=25°C; Vo = 0.4 V; If = 20 mA; Vcc = 5V



CTR4 . (%)

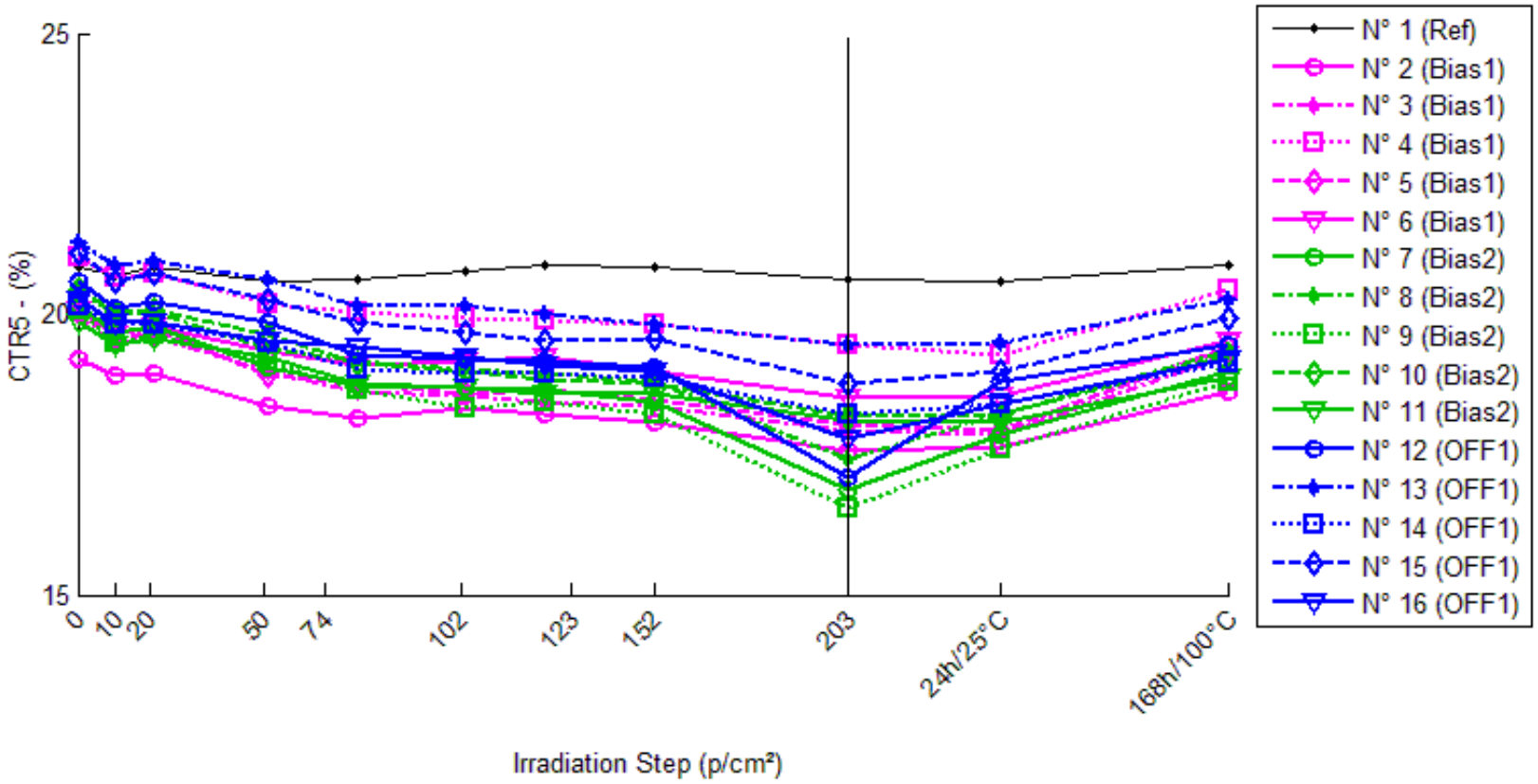
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	28.40	28.23	28.47	28.03	28.22	28.19	28.46	28.46	28.39	28.17	28.52
N° 2 (Bias1)	25.88	25.46	25.42	24.88	24.43	24.15	23.98	23.75	22.39	22.70	24.77
N° 3 (Bias1)	26.39	25.64	25.80	24.40	23.59	23.59	23.37	23.42	22.11	22.10	25.15
N° 4 (Bias1)	28.89	28.46	28.34	26.95	26.58	26.58	26.43	26.56	25.94	24.92	27.79
N° 5 (Bias1)	26.13	25.11	25.58	24.33	24.01	23.95	23.42	23.17	22.53	21.94	24.97
N° 6 (Bias1)	27.40	26.73	26.87	26.33	26.03	25.56	25.17	24.81	24.15	23.77	26.33
N° 7 (Bias2)	27.03	26.26	26.28	24.50	23.99	23.99	23.91	23.59	21.70	22.23	24.65
N° 8 (Bias2)	27.55	26.81	26.78	25.19	24.99	24.54	24.44	24.23	22.45	22.70	25.26
N° 9 (Bias2)	26.50	25.44	25.67	24.71	23.78	23.61	23.19	22.85	20.82	21.31	24.03
N° 10 (Bias2)	27.46	26.81	26.72	25.84	24.73	24.16	23.67	23.59	23.01	22.30	25.12
N° 11 (Bias2)	26.90	26.23	26.28	25.56	24.01	24.17	24.22	24.24	23.37	22.54	24.90
N° 12 (OFF1)	27.88	27.12	27.17	26.38	25.00	24.86	24.29	23.82	22.33	24.31	25.62
N° 13 (OFF1)	29.50	28.92	28.86	28.17	27.59	27.26	27.23	26.96	25.60	25.62	27.51
N° 14 (OFF1)	27.51	27.01	26.85	26.14	25.54	25.02	24.99	24.85	23.50	23.94	25.47
N° 15 (OFF1)	28.76	27.87	28.02	27.08	25.83	25.12	24.86	24.10	23.75	23.72	26.43
N° 16 (OFF1)	27.74	27.12	27.03	26.26	26.07	25.56	25.35	25.13	23.63	23.43	25.70

1/Delta [CTR4]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	2.081E-4	-8.597E-5	4.710E-4	2.311E-4	2.595E-4	-6.986E-5	-7.795E-5	1.612E-5	2.855E-4	-1.514E-4
N° 2 (Bias1)	---	6.370E-4	6.947E-4	1.553E-3	2.301E-3	2.763E-3	3.059E-3	3.459E-3	6.023E-3	5.409E-3	1.732E-3
N° 3 (Bias1)	---	1.110E-3	8.678E-4	3.096E-3	4.497E-3	4.494E-3	4.899E-3	4.803E-3	7.342E-3	7.347E-3	1.865E-3
N° 4 (Bias1)	---	5.222E-4	6.659E-4	2.491E-3	3.004E-3	3.004E-3	3.211E-3	3.028E-3	3.930E-3	5.504E-3	1.360E-3
N° 5 (Bias1)	---	1.543E-3	8.266E-4	2.821E-3	3.370E-3	3.471E-3	4.422E-3	4.880E-3	6.121E-3	7.310E-3	1.776E-3
N° 6 (Bias1)	---	9.043E-4	7.172E-4	1.473E-3	1.918E-3	2.626E-3	3.232E-3	3.809E-3	4.904E-3	5.576E-3	1.478E-3
N° 7 (Bias2)	---	1.078E-3	1.043E-3	3.814E-3	4.683E-3	4.677E-3	4.818E-3	5.396E-3	9.091E-3	7.983E-3	3.559E-3
N° 8 (Bias2)	---	9.983E-4	1.050E-3	3.407E-3	3.717E-3	4.452E-3	4.618E-3	4.982E-3	8.251E-3	7.751E-3	3.289E-3
N° 9 (Bias2)	---	1.568E-3	1.211E-3	2.730E-3	4.312E-3	4.623E-3	5.374E-3	6.017E-3	1.030E-2	9.194E-3	3.879E-3
N° 10 (Bias2)	---	8.928E-4	1.013E-3	2.288E-3	4.021E-3	4.977E-3	5.829E-3	5.977E-3	7.056E-3	8.424E-3	3.405E-3
N° 11 (Bias2)	---	9.469E-4	8.739E-4	1.940E-3	4.478E-3	4.202E-3	4.102E-3	4.083E-3	5.613E-3	7.182E-3	2.988E-3
N° 12 (OFF1)	---	1.006E-3	9.373E-4	2.032E-3	4.119E-3	4.358E-3	5.296E-3	6.104E-3	8.912E-3	5.268E-3	3.155E-3
N° 13 (OFF1)	---	6.907E-4	7.569E-4	1.603E-3	2.348E-3	2.797E-3	2.828E-3	3.197E-3	5.172E-3	5.134E-3	2.452E-3
N° 14 (OFF1)	---	6.755E-4	8.918E-4	1.911E-3	2.805E-3	3.615E-3	3.666E-3	3.882E-3	6.208E-3	5.418E-3	2.905E-3
N° 15 (OFF1)	---	1.103E-3	9.203E-4	2.159E-3	3.946E-3	5.043E-3	5.457E-3	6.723E-3	7.336E-3	7.383E-3	3.067E-3
N° 16 (OFF1)	---	8.262E-4	9.573E-4	2.043E-3	2.317E-3	3.072E-3	3.398E-3	3.743E-3	6.267E-3	6.642E-3	2.863E-3
Average (OFF1)	---	9.433E-4	7.544E-4	2.287E-3	3.018E-3	3.272E-3	3.765E-3	3.996E-3	5.664E-3	6.229E-3	1.642E-3
σ (OFF1)	---	4.063E-4	8.783E-5	7.390E-4	1.005E-3	7.551E-4	8.377E-4	8.204E-4	1.298E-3	1.006E-3	2.135E-4
Average+3σ (OFF1)	---	2.162E-3	1.018E-3	4.504E-3	6.032E-3	5.537E-3	6.278E-3	6.457E-3	9.558E-3	9.246E-3	2.283E-3
Average-3σ (OFF1)	---	-2.755E-4	4.910E-4	6.996E-5	4.103E-6	1.006E-3	1.251E-3	1.535E-3	1.770E-3	3.212E-3	1.002E-3
Average (Bias1)	---	1.097E-3	1.038E-3	2.836E-3	4.242E-3	4.586E-3	4.948E-3	5.291E-3	8.063E-3	8.107E-3	3.424E-3
σ (Bias1)	---	2.720E-4	1.201E-4	7.742E-4	3.805E-4	2.865E-4	6.708E-4	8.004E-4	1.811E-3	7.548E-4	3.295E-4
Average+3σ (Bias1)	---	1.913E-3	1.399E-3	5.159E-3	5.384E-3	5.446E-3	6.961E-3	7.692E-3	1.350E-2	1.037E-2	4.412E-3
Average-3σ (Bias1)	---	2.806E-4	6.779E-4	5.131E-4	3.101E-3	3.727E-3	2.936E-3	2.890E-3	2.629E-3	5.843E-3	2.436E-3
Average (Bias2)	---	8.603E-4	8.927E-4	1.949E-3	3.107E-3	3.777E-3	4.129E-3	4.730E-3	6.779E-3	5.969E-3	2.888E-3
σ (Bias2)	---	1.899E-4	7.963E-5	2.125E-4	8.691E-4	9.253E-4	1.179E-3	1.573E-3	1.417E-3	9.930E-4	2.713E-4
Average+3σ (Bias2)	---	1.430E-3	1.132E-3	2.587E-3	5.714E-3	6.553E-3	7.668E-3	9.450E-3	1.103E-2	8.948E-3	3.702E-3
Average-3σ (Bias2)	---	2.907E-4	6.538E-4	1.312E-3	4.999E-4	1.001E-3	5.908E-4	9.545E-6	2.528E-3	2.990E-3	2.075E-3

13.CTR5

Ta=25°C; Vo =0.4 V; If = 40 mA; Vcc = 5 V



CTR5 . (%)

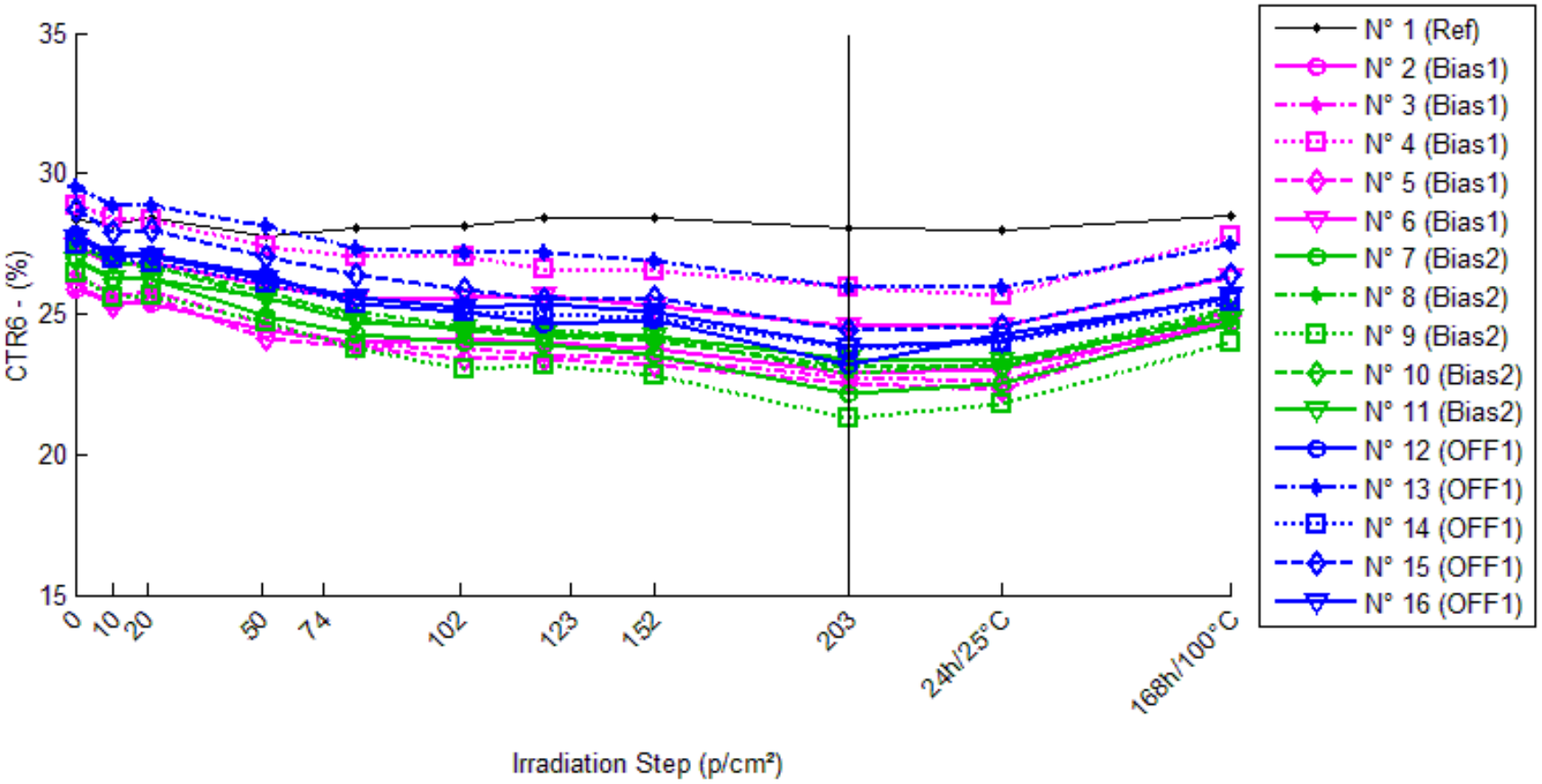
	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	20.85	20.68	20.85	20.57	20.61	20.75	20.89	20.85	20.62	20.58	20.89
N° 2 (Bias1)	19.20	18.90	18.94	18.37	18.16	18.31	18.23	18.06	17.58	17.64	18.60
N° 3 (Bias1)	19.96	19.46	19.61	18.99	18.60	18.56	18.44	18.35	17.93	17.84	19.27
N° 4 (Bias1)	21.01	20.66	20.71	20.20	20.04	19.93	19.88	19.81	19.47	19.29	20.43
N° 5 (Bias1)	20.07	19.50	19.76	18.92	18.77	18.57	18.65	18.47	18.05	17.93	19.43
N° 6 (Bias1)	20.08	19.62	19.78	19.34	19.09	19.17	19.23	18.99	18.50	18.55	19.52
N° 7 (Bias2)	20.16	19.68	19.77	19.07	18.72	18.68	18.64	18.44	16.88	17.84	18.99
N° 8 (Bias2)	20.45	19.99	20.04	19.39	19.16	19.01	18.93	18.80	17.41	18.23	19.33
N° 9 (Bias2)	20.06	19.49	19.63	19.16	18.67	18.31	18.42	18.22	16.56	17.60	18.81
N° 10 (Bias2)	20.45	20.04	20.06	19.64	19.13	18.97	18.84	18.78	18.18	18.23	19.28
N° 11 (Bias2)	19.87	19.46	19.57	19.23	18.76	18.69	18.59	18.57	18.11	18.08	18.88
N° 12 (OFF1)	20.57	20.11	20.21	19.84	19.27	19.21	19.15	19.06	17.08	18.80	19.44
N° 13 (OFF1)	21.26	20.89	20.94	20.62	20.16	20.14	20.01	19.82	19.45	19.50	20.27
N° 14 (OFF1)	20.15	19.83	19.82	19.48	19.03	18.96	18.94	18.86	18.21	18.41	19.11
N° 15 (OFF1)	21.09	20.58	20.72	20.26	19.87	19.66	19.52	19.55	18.75	19.00	19.93
N° 16 (OFF1)	20.25	19.86	19.87	19.51	19.43	19.24	19.10	18.97	17.77	18.40	19.20

1/Delta [CTR5]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	3.990E-4	1.346E-5	6.646E-4	5.743E-4	2.501E-4	-8.149E-5	1.495E-6	5.472E-4	6.398E-4	-9.435E-5
N° 2 (Bias1)	---	8.335E-4	7.342E-4	2.354E-3	3.007E-3	2.534E-3	2.776E-3	3.305E-3	4.816E-3	4.605E-3	1.703E-3
N° 3 (Bias1)	---	1.272E-3	8.822E-4	2.561E-3	3.655E-3	3.755E-3	4.112E-3	4.375E-3	5.671E-3	5.950E-3	1.791E-3
N° 4 (Bias1)	---	8.104E-4	7.097E-4	1.929E-3	2.317E-3	2.601E-3	2.716E-3	2.890E-3	3.787E-3	4.249E-3	1.366E-3
N° 5 (Bias1)	---	1.451E-3	7.973E-4	3.027E-3	3.469E-3	4.028E-3	3.808E-3	4.313E-3	5.587E-3	5.964E-3	1.660E-3
N° 6 (Bias1)	---	1.160E-3	7.541E-4	1.908E-3	2.576E-3	2.376E-3	2.212E-3	2.854E-3	4.254E-3	4.105E-3	1.438E-3
N° 7 (Bias2)	---	1.207E-3	9.671E-4	2.827E-3	3.806E-3	3.928E-3	4.031E-3	4.631E-3	9.632E-3	6.432E-3	3.047E-3
N° 8 (Bias2)	---	1.120E-3	9.852E-4	2.666E-3	3.271E-3	3.708E-3	3.915E-3	4.296E-3	8.524E-3	5.952E-3	2.821E-3
N° 9 (Bias2)	---	1.462E-3	1.098E-3	2.339E-3	3.707E-3	4.767E-3	4.445E-3	5.032E-3	1.054E-2	6.977E-3	3.317E-3
N° 10 (Bias2)	---	1.004E-3	9.380E-4	2.000E-3	3.366E-3	3.812E-3	4.163E-3	4.347E-3	6.093E-3	5.959E-3	2.957E-3
N° 11 (Bias2)	---	1.048E-3	7.787E-4	1.675E-3	2.975E-3	3.170E-3	3.474E-3	3.510E-3	4.895E-3	4.975E-3	2.636E-3
N° 12 (OFF1)	---	1.105E-3	8.590E-4	1.794E-3	3.270E-3	3.452E-3	3.597E-3	3.846E-3	9.916E-3	4.564E-3	2.829E-3
N° 13 (OFF1)	---	8.219E-4	7.082E-4	1.444E-3	2.573E-3	2.620E-3	2.941E-3	3.408E-3	4.380E-3	4.231E-3	2.292E-3
N° 14 (OFF1)	---	7.909E-4	8.203E-4	1.708E-3	2.909E-3	3.115E-3	3.152E-3	3.399E-3	5.280E-3	4.677E-3	2.685E-3
N° 15 (OFF1)	---	1.171E-3	8.488E-4	1.942E-3	2.912E-3	3.444E-3	3.830E-3	3.731E-3	5.929E-3	5.212E-3	2.770E-3
N° 16 (OFF1)	---	9.576E-4	9.473E-4	1.873E-3	2.088E-3	2.586E-3	2.962E-3	3.319E-3	6.898E-3	4.953E-3	2.691E-3
Average (OFF1)	---	1.105E-3	7.755E-4	2.356E-3	3.005E-3	3.059E-3	3.125E-3	3.547E-3	4.823E-3	4.975E-3	1.592E-3
σ (OFF1)	---	2.787E-4	6.773E-5	4.679E-4	5.690E-4	7.706E-4	8.004E-4	7.489E-4	8.216E-4	9.150E-4	1.812E-4
Average+3σ (OFF1)	---	1.941E-3	9.787E-4	3.759E-3	4.712E-3	5.370E-3	5.526E-3	5.794E-3	7.288E-3	7.720E-3	2.135E-3
Average-3σ (OFF1)	---	2.690E-4	5.723E-4	9.518E-4	1.298E-3	7.468E-4	7.236E-4	1.301E-3	2.358E-3	2.230E-3	1.048E-3
Average (Bias1)	---	1.168E-3	9.533E-4	2.301E-3	3.425E-3	3.877E-3	4.005E-3	4.363E-3	7.937E-3	6.059E-3	2.956E-3
σ (Bias1)	---	1.815E-4	1.149E-4	4.729E-4	3.371E-4	5.759E-4	3.566E-4	5.595E-4	2.380E-3	7.380E-4	2.546E-4
Average+3σ (Bias1)	---	1.713E-3	1.298E-3	3.720E-3	4.437E-3	5.605E-3	5.075E-3	6.042E-3	1.508E-2	8.273E-3	3.719E-3
Average-3σ (Bias1)	---	6.238E-4	6.088E-4	8.829E-4	2.414E-3	2.149E-3	2.936E-3	2.685E-3	7.971E-4	3.845E-3	2.192E-3
Average (Bias2)	---	9.693E-4	8.367E-4	1.752E-3	2.750E-3	3.043E-3	3.296E-3	3.541E-3	6.481E-3	4.727E-3	2.653E-3
σ (Bias2)	---	1.679E-4	8.610E-5	1.934E-4	4.450E-4	4.247E-4	3.983E-4	2.328E-4	2.129E-3	3.746E-4	2.105E-4
Average+3σ (Bias2)	---	1.473E-3	1.095E-3	2.332E-3	4.085E-3	4.317E-3	4.491E-3	4.239E-3	1.287E-2	5.851E-3	3.285E-3
Average-3σ (Bias2)	---	4.654E-4	5.784E-4	1.172E-3	1.415E-3	1.769E-3	2.101E-3	2.842E-3	9.299E-5	3.603E-3	2.022E-3

14.CTR6

Ta=25°C; Vo = 0.4 V; If = 20 mA; Vcc = 18 V



CTR6 . (%)

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	28.38	28.20	28.44	27.78	28.03	28.15	28.43	28.43	28.02	27.97	28.49
N° 2 (Bias1)	25.85	25.43	25.39	24.39	24.00	24.13	23.97	23.73	22.92	23.05	24.74
N° 3 (Bias1)	26.36	25.65	25.77	24.66	23.90	23.77	23.54	23.39	22.71	22.58	25.13
N° 4 (Bias1)	28.86	28.42	28.31	27.37	27.02	27.05	26.61	26.53	25.97	25.69	27.77
N° 5 (Bias1)	26.10	25.31	25.55	24.12	23.81	23.37	23.41	23.15	22.51	22.28	24.94
N° 6 (Bias1)	27.37	26.73	26.84	26.04	25.54	25.57	25.64	25.28	24.59	24.54	26.30
N° 7 (Bias2)	27.00	26.25	26.26	24.95	24.28	24.00	23.89	23.55	22.17	22.53	24.63
N° 8 (Bias2)	27.52	26.80	26.76	25.53	25.04	24.59	24.42	24.19	22.89	23.22	25.24
N° 9 (Bias2)	26.47	25.60	25.65	24.70	23.80	23.07	23.17	22.81	21.32	21.77	24.00
N° 10 (Bias2)	27.44	26.79	26.70	25.83	24.89	24.43	24.18	24.06	23.11	23.10	25.09
N° 11 (Bias2)	26.87	26.22	26.26	25.55	24.71	24.47	24.24	24.20	23.40	23.34	24.87
N° 12 (OFF1)	27.85	27.11	27.14	26.37	25.38	25.10	24.66	24.78	23.15	24.27	25.59
N° 13 (OFF1)	29.48	28.89	28.83	28.16	27.33	27.16	27.21	26.92	25.96	25.94	27.49
N° 14 (OFF1)	27.48	26.98	26.83	26.12	25.33	25.07	24.98	24.82	23.78	23.99	25.44
N° 15 (OFF1)	28.73	27.91	27.99	27.07	26.36	25.84	25.52	25.56	24.40	24.56	26.40
N° 16 (OFF1)	27.72	27.10	27.01	26.25	25.56	25.21	25.33	25.10	23.87	24.09	25.68

1/Delta [CTR6]

	0krad(Si)	10krad(Si)	20krad(Si)	50krad(Si)	74krad(Si)	102krad(Si)	123krad(Si)	152krad(Si)	203krad(Si)	24h/25°C	168h/100°C
N° 1 (Ref)	---	2.137E-4	-7.975E-5	7.511E-4	4.374E-4	2.790E-4	-6.448E-5	-6.839E-5	4.510E-4	5.161E-4	-1.448E-4
N° 2 (Bias1)	---	6.441E-4	7.035E-4	2.322E-3	2.996E-3	2.760E-3	3.045E-3	3.469E-3	4.951E-3	4.703E-3	1.740E-3
N° 3 (Bias1)	---	1.053E-3	8.744E-4	2.627E-3	3.914E-3	4.136E-3	4.560E-3	4.816E-3	6.109E-3	6.356E-3	1.866E-3
N° 4 (Bias1)	---	5.267E-4	6.677E-4	1.878E-3	2.347E-3	2.306E-3	2.921E-3	3.033E-3	3.857E-3	4.263E-3	1.359E-3
N° 5 (Bias1)	---	1.203E-3	8.330E-4	3.154E-3	3.695E-3	4.472E-3	4.413E-3	4.889E-3	6.117E-3	6.573E-3	1.781E-3
N° 6 (Bias1)	---	8.700E-4	7.193E-4	1.857E-3	2.613E-3	2.568E-3	2.462E-3	3.022E-3	4.121E-3	4.214E-3	1.483E-3
N° 7 (Bias2)	---	1.050E-3	1.038E-3	3.039E-3	4.147E-3	4.620E-3	4.827E-3	5.423E-3	8.076E-3	7.338E-3	3.562E-3
N° 8 (Bias2)	---	9.756E-4	1.036E-3	2.843E-3	3.609E-3	4.330E-3	4.613E-3	5.008E-3	7.351E-3	6.729E-3	3.290E-3
N° 9 (Bias2)	---	1.291E-3	1.206E-3	2.702E-3	4.236E-3	5.573E-3	5.375E-3	6.057E-3	9.131E-3	8.156E-3	3.882E-3
N° 10 (Bias2)	---	8.835E-4	1.008E-3	2.275E-3	3.732E-3	4.490E-3	4.916E-3	5.124E-3	6.831E-3	6.842E-3	3.411E-3
N° 11 (Bias2)	---	9.197E-4	8.722E-4	1.926E-3	3.258E-3	3.660E-3	4.041E-3	4.104E-3	5.519E-3	5.628E-3	2.990E-3
N° 12 (OFF1)	---	9.725E-4	9.334E-4	2.017E-3	3.490E-3	3.926E-3	4.636E-3	4.440E-3	7.277E-3	5.298E-3	3.166E-3
N° 13 (OFF1)	---	6.822E-4	7.540E-4	1.590E-3	2.667E-3	2.894E-3	2.828E-3	3.217E-3	4.589E-3	4.624E-3	2.447E-3
N° 14 (OFF1)	---	6.746E-4	8.876E-4	1.899E-3	3.098E-3	3.507E-3	3.656E-3	3.911E-3	5.665E-3	5.297E-3	2.920E-3
N° 15 (OFF1)	---	1.030E-3	9.167E-4	2.138E-3	3.133E-3	3.894E-3	4.375E-3	4.317E-3	6.175E-3	5.920E-3	3.075E-3
N° 16 (OFF1)	---	8.163E-4	9.503E-4	2.022E-3	3.038E-3	3.588E-3	3.402E-3	3.761E-3	5.813E-3	5.439E-3	2.865E-3
Average (OFF1)	---	8.592E-4	7.596E-4	2.368E-3	3.113E-3	3.249E-3	3.480E-3	3.846E-3	5.031E-3	5.222E-3	1.646E-3
σ (OFF1)	---	2.794E-4	8.912E-5	5.449E-4	6.766E-4	9.841E-4	9.457E-4	9.370E-4	1.067E-3	1.153E-3	2.145E-4
Average+3σ (OFF1)	---	1.697E-3	1.027E-3	4.002E-3	5.143E-3	6.201E-3	6.317E-3	6.657E-3	8.232E-3	8.680E-3	2.289E-3
Average-3σ (OFF1)	---	2.096E-5	4.922E-4	7.330E-4	1.083E-3	2.963E-4	6.431E-4	1.035E-3	1.830E-3	1.764E-3	1.002E-3
Average (Bias1)	---	1.024E-3	1.032E-3	2.557E-3	3.797E-3	4.535E-3	4.754E-3	5.143E-3	7.381E-3	6.939E-3	3.427E-3
σ (Bias1)	---	1.620E-4	1.188E-4	4.510E-4	4.014E-4	6.880E-4	4.862E-4	7.092E-4	1.352E-3	9.237E-4	3.299E-4
Average+3σ (Bias1)	---	1.510E-3	1.389E-3	3.910E-3	5.001E-3	6.599E-3	6.213E-3	7.271E-3	1.144E-2	9.710E-3	4.417E-3
Average-3σ (Bias1)	---	5.380E-4	6.755E-4	1.204E-3	2.592E-3	2.470E-3	3.295E-3	3.016E-3	3.325E-3	4.168E-3	2.437E-3
Average (Bias2)	---	8.352E-4	8.884E-4	1.933E-3	3.085E-3	3.562E-3	3.779E-3	3.929E-3	5.904E-3	5.316E-3	2.895E-3
σ (Bias2)	---	1.632E-4	7.862E-5	2.096E-4	2.930E-4	4.159E-4	7.334E-4	4.865E-4	9.686E-4	4.635E-4	2.774E-4
Average+3σ (Bias2)	---	1.325E-3	1.124E-3	2.562E-3	3.964E-3	4.809E-3	5.980E-3	5.389E-3	8.810E-3	6.706E-3	3.727E-3
Average-3σ (Bias2)	---	3.455E-4	6.525E-4	1.304E-3	2.206E-3	2.314E-3	1.579E-3	2.470E-3	2.998E-3	3.925E-3	2.062E-3