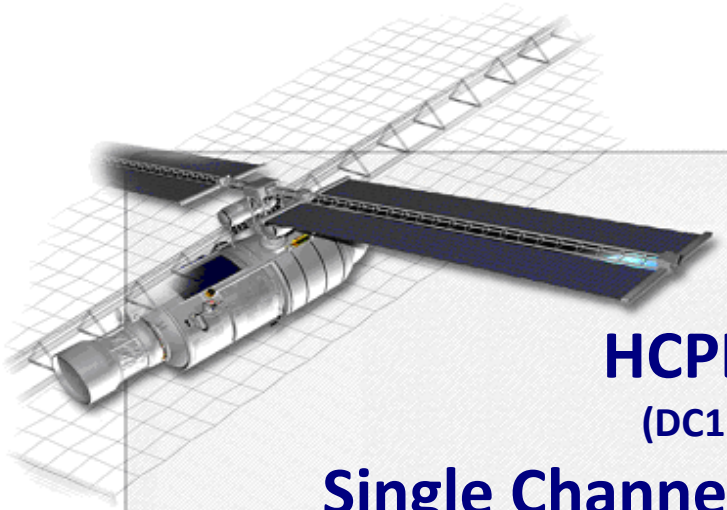
# TOTAL IONIZING DOSE TEST REPORT



## HCPL5701

**(DC1116)**

## Single Channel Optocoupler

## From

## AVAGO

| | | |
|---|---|---|
| TRAD/TE/HCPL5701/XXX1/ESA/YP/1104 | | Labège, April 19th, 2012 |
| TRAD Tests & radiations — afaq ISO 9001 Qualité AFNOR CERTIFICATION | | TRAD, Bât Gallium<br>907, Voie l'Occitane - 31670 LABEGE France<br>☏ : 05 61 00 95 60 Fax : 05 61 00 95 61<br>Email : trad@trad.fr Web Site: www.trad.fr<br><br>SIRET 397 862 038 00056 - TVA FR59397862038 |
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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 HCPL5701, 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-HCPL5701-AVA-ESA-1115-Issue 3 of 23/09/2011 |

## 2.2 Reference Documents

| | | | |
|---|---|---|---|
| RD | 1. | Datasheet HCPL5701 | Hermetically Sealed, Low IF, Wide VCC, High Gain Optocouplers, Datasheet HCPL-5701 n°AV02-1766EN of february 26th, 2009 by Avago |
| RD | 2. | Manufacturer's certificate of conformance dated 11/05/2011 | |

# 3 DEVICE INFORMATION

## 3.1 Device description

The HCPL5701 is a Single Channel hermetically High Gain Optocoupler containing a GaAsP light emitting diode which is optically coupled to an integrated high gain photon detector. The high gain output stage features an open collector output providing both lower saturation voltage and higher signaling speed than possible with conventional photo-Darlington optocouplers.

| | |
|---|---|
| Type | HCPL5701 – 5962-8981001PC |
| Manufacturer | AVAGO |
| Function | Optocoupler |
| Package | DIP8 |
| Date Code | 1116 |
| Lot : | HS111603D |
| LPN : | DS10741861 |
| Sample size | 16 parts (15 + 1 control sample) |

## 3.2 Procurement information

75 parts HCPL5701 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

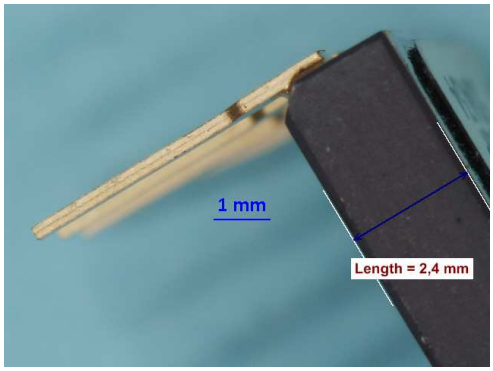



Figure 3: package view

## 3.4 Internal view

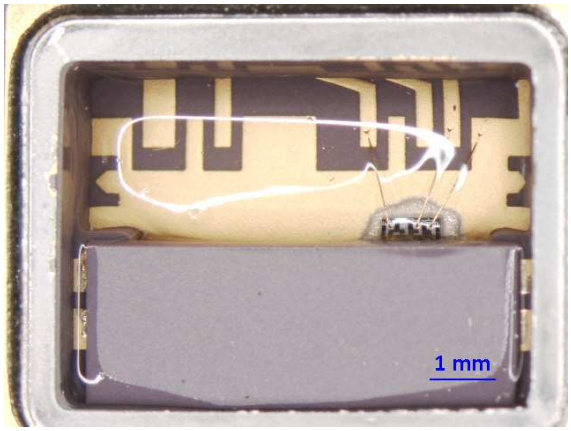



Figure 4: Internal overall view

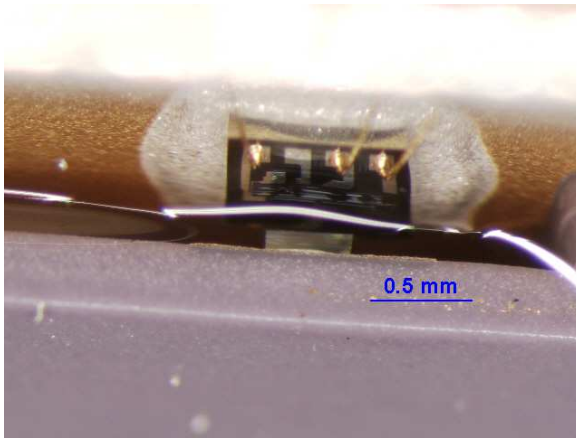



Figure 5: Internal view

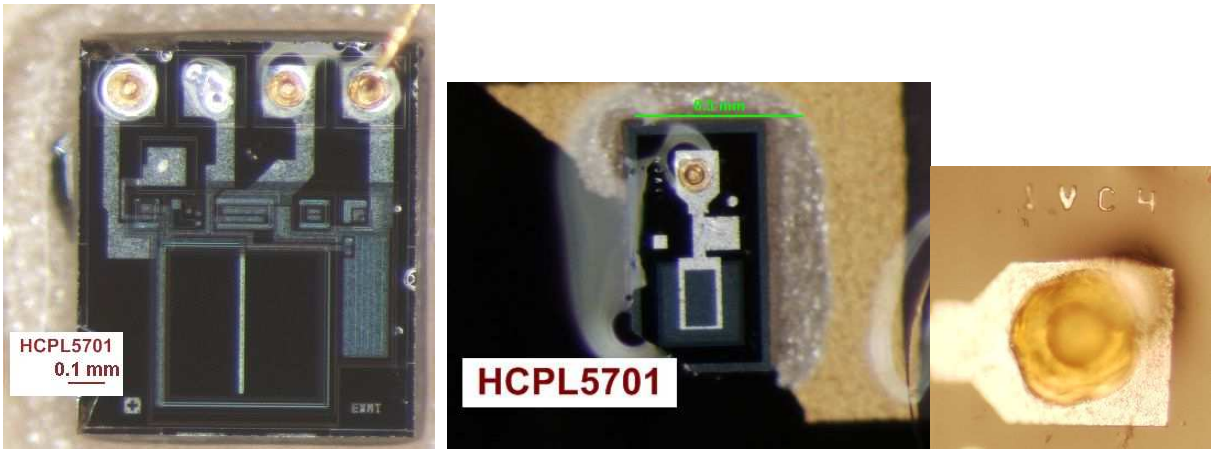



**Figure 6: detail view of photodetector and LED**

## 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.

The devices were exposed to the following dose rates:

| | Step1 | Step2 | Step3 | Step4 | Step5 | Step6 | Step7 | Step8 |
|---|---|---|---|---|---|---|---|---|
| Accumulated dose krad(Si) | 10 | 19 | 49 | 65 | 101 | 130 | 152 | 203 |
| Dose rate (Si)/h | 36 | 36 | 36 | 36 | 310 | 310 | 310 | 310 |

Two annealing steps are performed after $^{60}$Co 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 | HCPL5701_TE_XXX1_B1_V10.llb |

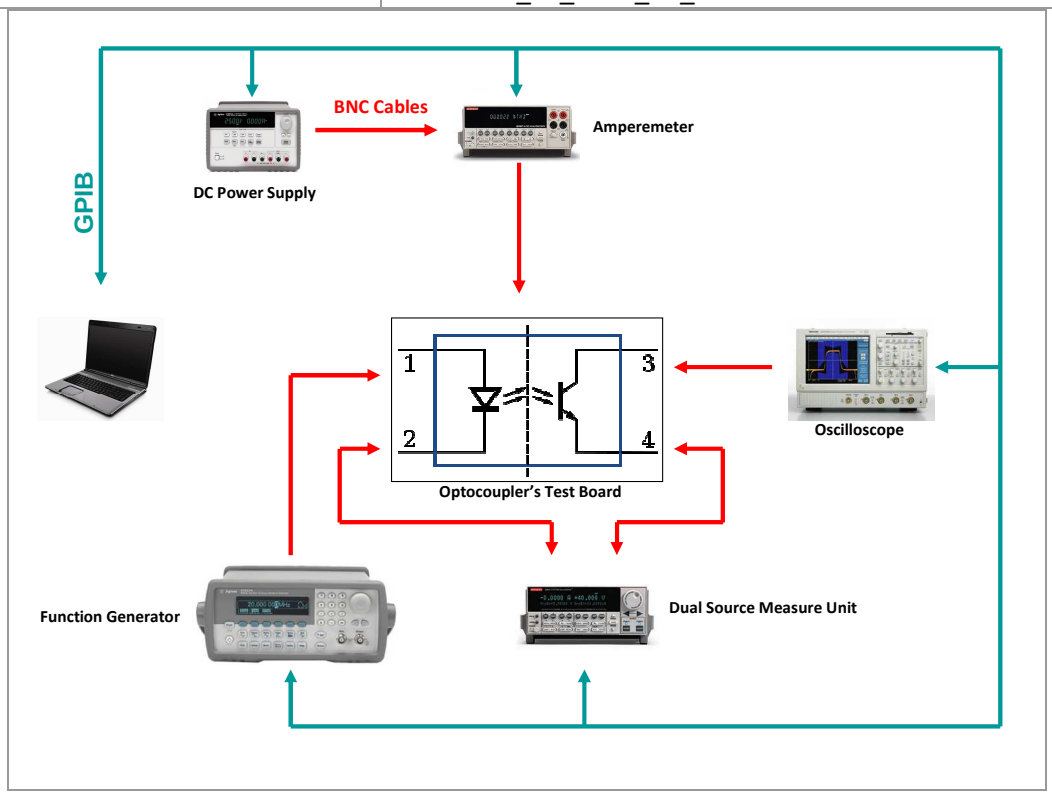



**Figure 7: test principle**

## 5.2 Test configuration

Samples were exposed to irradiation in three different modes - two on-modes (Figure 8 and Figure 9) and one in off-mode (all terminal leads short-circuited) –

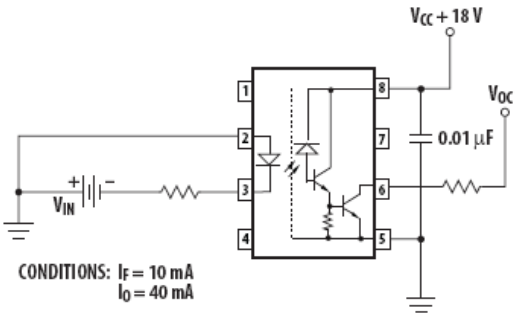



**Figure 8: ON bias1**

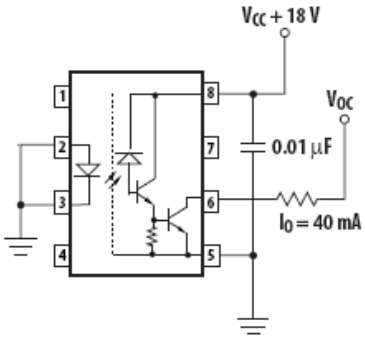



**Figure 9: ON bias2**

**Conditions:**
**If = 0 mA**
**Io = 0mA**
**Vcc = Voc=+5V**

### 5.3 Electrical parameters

| PARAMETER | SYMBOL | TEST CONDITION | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| Logic Low Output Voltage | $V_{OL1}$ | $I_F$=0.5mA, $I_{OL}$=1.5mA, $V_{CC}$=4.5 V | | 0.4 | V |
| | $V_{OL2}$ | $I_F$=1.6mA, $I_{OL}$=4.8mA, $V_{CC}$=4.5 V | | 0.4 | V |
| | $V_{OL3}$ | $I_F$=5mA, $I_{OL}$=10mA, $V_{CC}$=4.5 V | | 0.4 | V |
| Logic High Output Current | $I_{OH}$ | $I_F$=2µA, $V_O$=18V, $V_{CC}$=18V | | 250 | µA |
| Logic Low Supply Current | $I_{CCL}$ | $I_F$=1.6mA, $V_{CC}$=18V | | 2 | mA |
| Logic High Supply Current | $I_{CCH}$ | $I_F$=0mA, $V_{CC}$=18 V | | 20 | µA |
| Input Forward Voltage | $V_F$ | $I_F$=1.6 mA | 1 | 1.7 | V |
| Input Reverse Breakdown Voltage | $B_{VR}$ | $I_R$=10µA | 5 | | V |
| Propagation Delay Time to Logic Low at Output | $t_{PHL1}$ | $I_F$=0.5mA, $R_L$=4.7kΩ, $V_{CC}$=5 V | | 100 | µs |
| | $t_{PHL2}$ | $I_F$=1.6mA, $R_L$=1.5kΩ, $V_{CC}$=5 V | | 30 | µs |
| | $t_{PHL3}$ | $I_F$=5mA, $R_L$=680Ω, $V_{CC}$=5 V | | 10 | µs |
| Propagation Delay Time to Logic Low at Output | $t_{PLH1}$ | $I_F$=0.5mA, $R_L$=4.7kΩ, $V_{CC}$=5 V | | 60 | µs |
| | $t_{PLH2}$ | $I_F$=1.6mA, $R_L$=1.5kΩ, $V_{CC}$=5 V | | 50 | µs |
| | $t_{PLH3}$ | $I_F$=5mA, $R_L$=680Ω, $V_{CC}$=5 V | | 30 | µs |
| Current Transfer Ratio | CTR1 | $I_F$=5mA, $V_O$=0.4V, $V_{CC}$=4.5V | 200 | | % |
| | CTR2 | $I_F$=0.5mA, $V_O$=0.4V, $V_{CC}$=5V | | | % |
| | CTR3 | $I_F$=1mA, $V_O$=0.4V, $V_{CC}$=5V | | | % |
| | CTR4 | $I_F$=5mA, $V_O$=0.4V, $V_{CC}$=5V | | | % |
| | CTR5 | $I_F$=10mA, $V_O$=0.4V, $V_{CC}$=5V | | | % |
| | CTR6 | $I_F$=5mA, $V_O$=0.4V, $V_{CC}$=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 20°C ± 10°C.

## 6 TEST HISTORY

Seven steps were defined [AD2] to determine the component degradation under $^{60}$Co irradiation.

| | 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, between Step 3 and Step 4 (50 krad(Si) and 100 krad(Si)), tests were stopped for 48 hours. Total Ionizing Dose was estimated at 65 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.

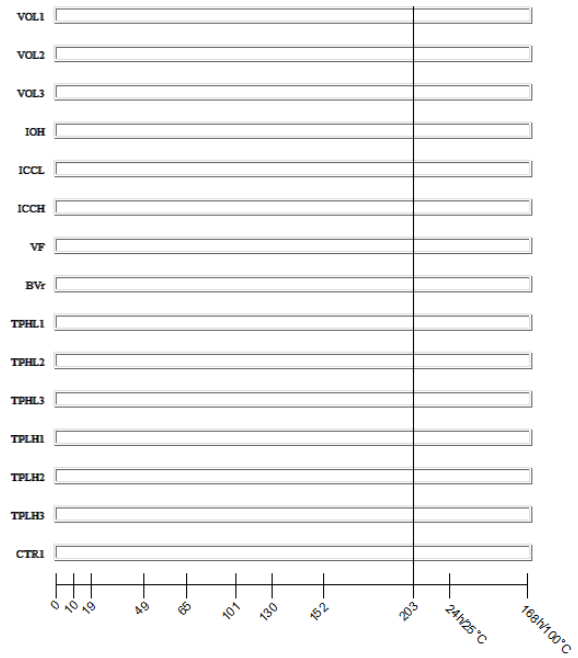



**Figure 10: ON Bias 1**

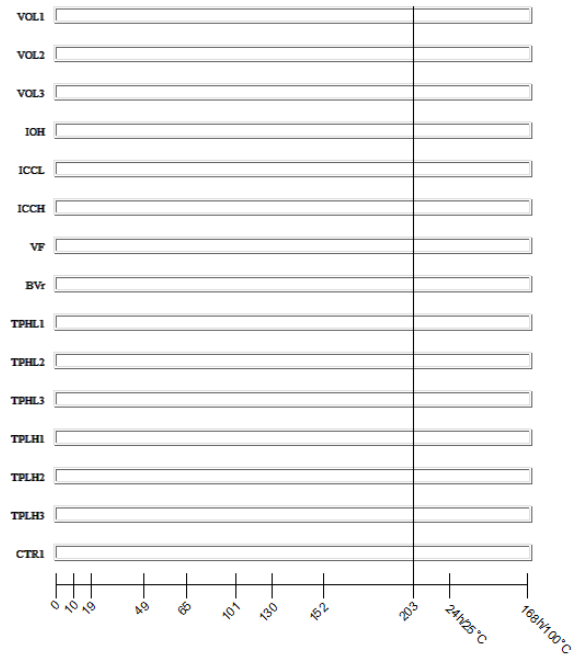



**Figure 11: ON Bias 2**

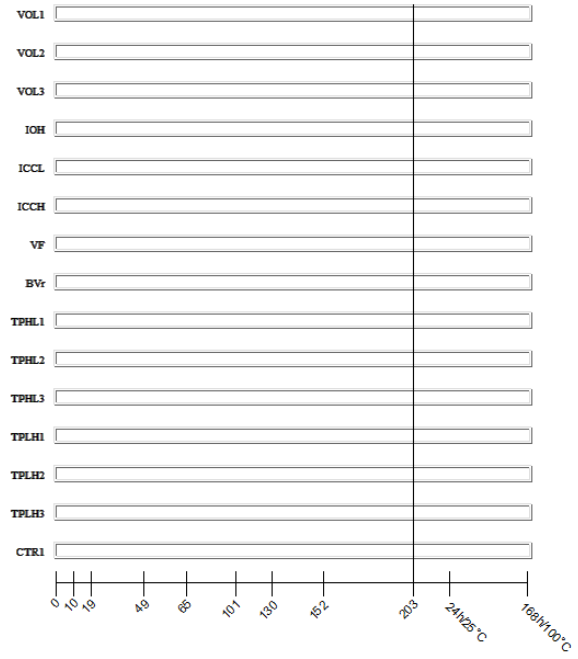
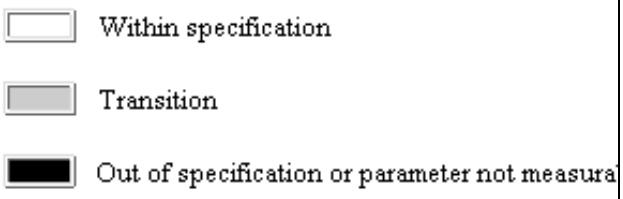



**Figure 12: OFF Bias**




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

# 8 CONCLUSION

Total Ionizing Dose steady-state irradiation test using Gamma ray was applied on HCPL5701, a High Gain Optocoupler from Avago up to 200krad(Si) TID 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 next Figure.

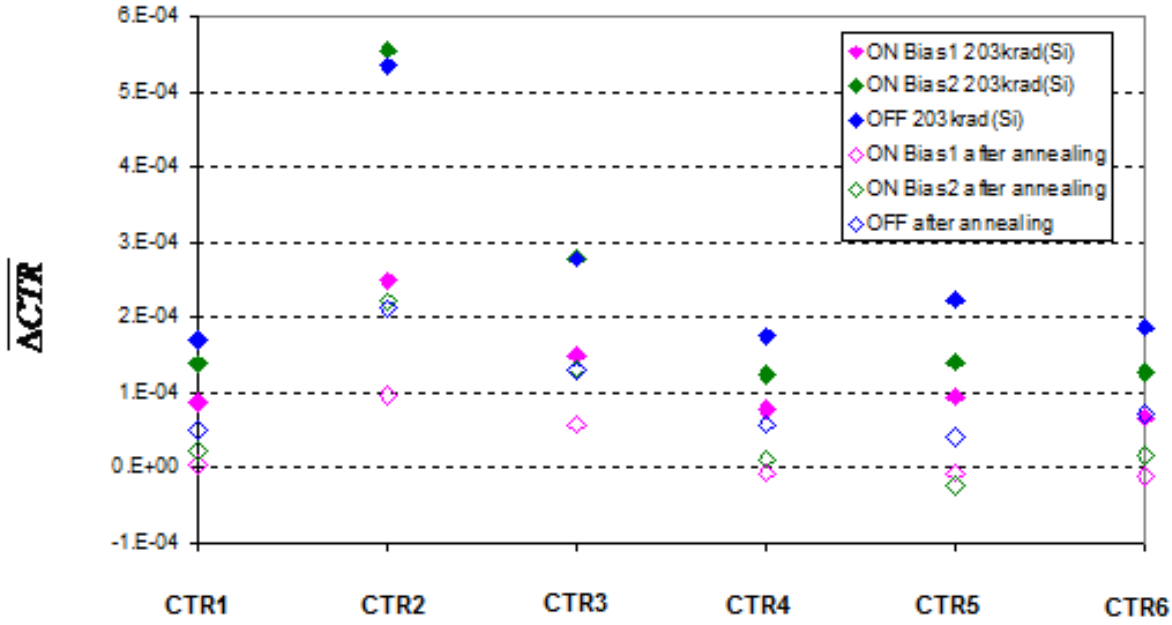



**Figure 13: Average drift current transfer ratio function of the Bias condition and CTR configuration**

- CTR6 configuration ($I_F$ =5mA, $V_O$=0.4V, $V_{CC}$=18V) is the least sensitive configuration at the final step 203 krad(Si).
- Conversely, CRT2 configuration ($I_F$=0.5mA, $V_O$ =0.4V, $V_{CC}$ =5V) exhibits the greatest parameter degradation up to 203krad (Si) total dose.
- ON Bias1 configuration is the least sensitive configuration for all CTR configurations.
- OFF mode is the most sensitive configuration except for CTR2 condition
- ON Bias 2 mode is the most sensitive configuration for CTR2 condition.
- Moreover CTR1 ($I_F$=5mA, $V_O$=0.4V, $V_{CC}$=4.5V), which specification limit is indicated in the data-sheet, remains within this 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 9-41). 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:

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

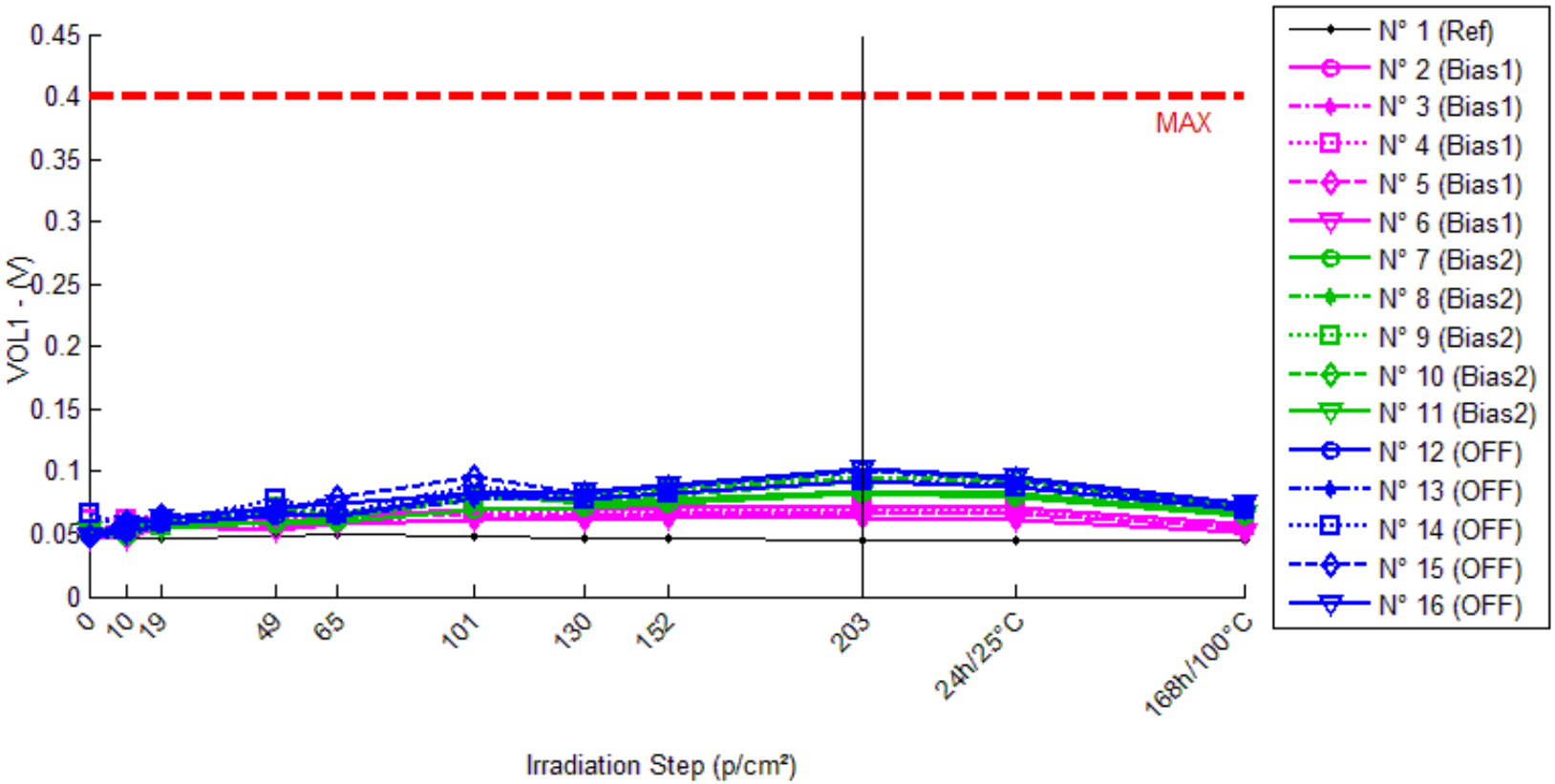
For other parameters, the formula used is:

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

## CONTENTS

## 1. VOL1

**Ta=25°C; If = 0.5 mA; Iol = 1.5 mA; Vcc = 4.5 V**



**VOL1 . (V)** **Max = 0.4**

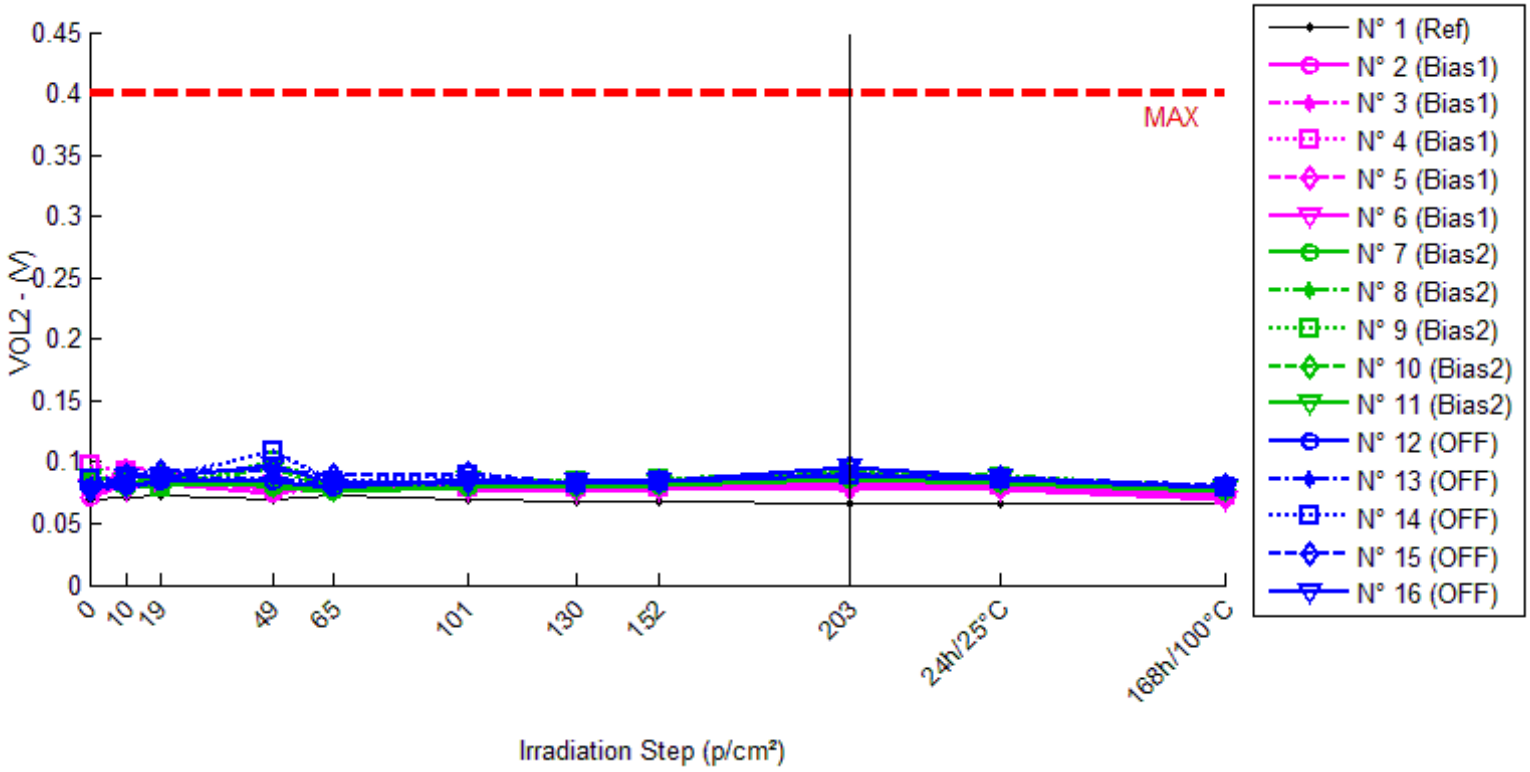
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 0.046 | 0.046 | 0.047 | 0.048 | 0.050 | 0.048 | 0.047 | 0.047 | 0.045 | 0.045 | 0.045 |
| N° 2 (Bias1) | 0.051 | 0.055 | 0.058 | 0.058 | 0.065 | 0.069 | 0.069 | 0.071 | 0.072 | 0.071 | 0.058 |
| N° 3 (Bias1) | 0.050 | 0.061 | 0.064 | 0.056 | 0.060 | 0.062 | 0.064 | 0.066 | 0.067 | 0.066 | 0.055 |
| N° 4 (Bias1) | 0.062 | 0.061 | 0.056 | 0.062 | 0.064 | 0.067 | 0.068 | 0.070 | 0.071 | 0.070 | 0.057 |
| N° 5 (Bias1) | 0.053 | 0.056 | 0.062 | 0.060 | 0.065 | 0.065 | 0.065 | 0.067 | 0.068 | 0.067 | 0.055 |
| N° 6 (Bias1) | 0.047 | 0.046 | 0.056 | 0.053 | 0.058 | 0.062 | 0.061 | 0.063 | 0.063 | 0.062 | 0.052 |
| N° 7 (Bias2) | 0.048 | 0.048 | 0.058 | 0.058 | 0.059 | 0.070 | 0.072 | 0.075 | 0.083 | 0.080 | 0.064 |
| N° 8 (Bias2) | 0.053 | 0.053 | 0.057 | 0.070 | 0.065 | 0.081 | 0.082 | 0.086 | 0.096 | 0.092 | 0.071 |
| N° 9 (Bias2) | 0.054 | 0.055 | 0.056 | 0.072 | 0.066 | 0.080 | 0.082 | 0.086 | 0.101 | 0.094 | 0.071 |
| N° 10 (Bias2) | 0.054 | 0.055 | 0.061 | 0.066 | 0.063 | 0.078 | 0.077 | 0.081 | 0.092 | 0.088 | 0.068 |
| N° 11 (Bias2) | 0.054 | 0.054 | 0.055 | 0.060 | 0.061 | 0.083 | 0.074 | 0.078 | 0.084 | 0.083 | 0.066 |
| N° 12 (OFF) | 0.048 | 0.051 | 0.058 | 0.064 | 0.064 | 0.082 | 0.078 | 0.082 | 0.092 | 0.088 | 0.069 |
| N° 13 (OFF) | 0.047 | 0.049 | 0.060 | 0.068 | 0.064 | 0.077 | 0.079 | 0.083 | 0.093 | 0.089 | 0.069 |
| N° 14 (OFF) | 0.066 | 0.055 | 0.059 | 0.078 | 0.067 | 0.089 | 0.078 | 0.082 | 0.092 | 0.087 | 0.069 |
| N° 15 (OFF) | 0.048 | 0.059 | 0.065 | 0.070 | 0.079 | 0.095 | 0.083 | 0.087 | 0.100 | 0.094 | 0.072 |
| N° 16 (OFF) | 0.049 | 0.058 | 0.063 | 0.071 | 0.075 | 0.082 | 0.085 | 0.089 | 0.102 | 0.095 | 0.074 |

**Delta [VOL1]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 6.359E-4 | 1.512E-3 | 2.364E-3 | 3.920E-3 | 2.089E-3 | 1.503E-3 | 1.520E-3 | -3.282E-4 | -7.130E-4 | -8.969E-4 |
| N° 2 (Bias1) | --- | 4.317E-3 | 7.022E-3 | 7.640E-3 | 1.478E-2 | 1.889E-2 | 1.848E-2 | 2.029E-2 | 2.141E-2 | 2.023E-2 | 7.632E-3 |
| N° 3 (Bias1) | --- | 1.104E-2 | 1.427E-2 | 5.678E-3 | 1.052E-2 | 1.254E-2 | 1.430E-2 | 1.596E-2 | 1.697E-2 | 1.584E-2 | 4.868E-3 |
| N° 4 (Bias1) | --- | -1.637E-3 | -6.153E-3 | -1.338E-4 | 2.314E-3 | 4.358E-3 | 5.903E-3 | 7.723E-3 | 8.953E-3 | 8.113E-3 | -4.911E-3 |
| N° 5 (Bias1) | --- | 3.550E-3 | 8.971E-3 | 7.862E-3 | 1.254E-2 | 1.262E-2 | 1.263E-2 | 1.424E-2 | 1.549E-2 | 1.451E-2 | 2.173E-3 |
| N° 6 (Bias1) | --- | -8.704E-4 | 8.783E-3 | 6.111E-3 | 1.072E-2 | 1.417E-2 | 1.361E-2 | 1.519E-2 | 1.614E-2 | 1.490E-2 | 4.347E-3 |
| N° 7 (Bias2) | --- | 1.609E-4 | 1.018E-2 | 1.041E-2 | 1.122E-2 | 2.149E-2 | 2.426E-2 | 2.707E-2 | 3.469E-2 | 3.171E-2 | 1.550E-2 |
| N° 8 (Bias2) | --- | 2.578E-4 | 4.440E-3 | 1.727E-2 | 1.243E-2 | 2.798E-2 | 2.928E-2 | 3.287E-2 | 4.345E-2 | 3.957E-2 | 1.853E-2 |
| N° 9 (Bias2) | --- | 1.266E-3 | 2.771E-3 | 1.807E-2 | 1.244E-2 | 2.609E-2 | 2.884E-2 | 3.278E-2 | 4.730E-2 | 3.992E-2 | 1.786E-2 |
| N° 10 (Bias2) | --- | 1.355E-3 | 6.848E-3 | 1.269E-2 | 9.449E-3 | 2.460E-2 | 2.374E-2 | 2.759E-2 | 3.801E-2 | 3.387E-2 | 1.471E-2 |
| N° 11 (Bias2) | --- | -3.108E-4 | 1.123E-3 | 5.548E-3 | 6.691E-3 | 2.826E-2 | 2.024E-2 | 2.352E-2 | 3.002E-2 | 2.877E-2 | 1.136E-2 |
| N° 12 (OFF) | --- | 3.807E-3 | 1.021E-2 | 1.687E-2 | 1.626E-2 | 3.452E-2 | 3.078E-2 | 3.405E-2 | 4.423E-2 | 4.008E-2 | 2.114E-2 |
| N° 13 (OFF) | --- | 2.386E-3 | 1.374E-2 | 2.152E-2 | 1.780E-2 | 3.035E-2 | 3.238E-2 | 3.604E-2 | 4.645E-2 | 4.192E-2 | 2.247E-2 |
| N° 14 (OFF) | --- | -1.083E-2 | -7.098E-3 | 1.220E-2 | 1.036E-3 | 2.247E-2 | 1.190E-2 | 1.534E-2 | 2.538E-2 | 2.081E-2 | 2.245E-3 |
| N° 15 (OFF) | --- | 1.041E-2 | 1.682E-2 | 2.128E-2 | 3.067E-2 | 4.665E-2 | 3.501E-2 | 3.880E-2 | 5.159E-2 | 4.598E-2 | 2.395E-2 |
| N° 16 (OFF) | --- | 9.491E-3 | 1.472E-2 | 2.215E-2 | 2.594E-2 | 3.364E-2 | 3.660E-2 | 4.041E-2 | 5.298E-2 | 4.653E-2 | 2.488E-2 |
| Average (Bias1) | --- | 3.279E-3 | 6.579E-3 | 5.432E-3 | 1.017E-2 | 1.252E-2 | 1.299E-2 | 1.468E-2 | 1.579E-2 | 1.472E-2 | 2.822E-3 |
| σ (Bias1) | --- | 5.068E-3 | 7.617E-3 | 3.251E-3 | 4.717E-3 | 5.242E-3 | 4.544E-3 | 4.526E-3 | 4.469E-3 | 4.341E-3 | 4.740E-3 |
| Average+3σ (Bias1) | --- | 1.848E-2 | 2.943E-2 | 1.518E-2 | 2.432E-2 | 2.824E-2 | 2.662E-2 | 2.826E-2 | 2.920E-2 | 2.774E-2 | 1.704E-2 |
| Average-3σ (Bias1) | --- | -1.192E-2 | -1.627E-2 | -4.322E-3 | -3.976E-3 | -3.209E-3 | -6.459E-4 | 1.099E-3 | 2.385E-3 | 1.697E-3 | -1.140E-2 |
| Average (Bias2) | --- | 5.458E-4 | 5.073E-3 | 1.280E-2 | 1.045E-2 | 2.569E-2 | 2.527E-2 | 2.876E-2 | 3.870E-2 | 3.477E-2 | 1.559E-2 |
| σ (Bias2) | --- | 7.312E-4 | 3.555E-3 | 5.150E-3 | 2.428E-3 | 2.778E-3 | 3.791E-3 | 4.023E-3 | 6.864E-3 | 4.893E-3 | 2.849E-3 |
| Average+3σ (Bias2) | --- | 2.739E-3 | 1.574E-2 | 2.825E-2 | 1.773E-2 | 3.402E-2 | 3.664E-2 | 4.083E-2 | 5.929E-2 | 4.945E-2 | 2.414E-2 |
| Average-3σ (Bias2) | --- | -1.648E-3 | -5.593E-3 | -2.651E-3 | 3.160E-3 | 1.735E-2 | 1.390E-2 | 1.670E-2 | 1.810E-2 | 2.009E-2 | 7.044E-3 |
| Average (OFF) | --- | 3.053E-3 | 9.680E-3 | 1.881E-2 | 1.834E-2 | 3.353E-2 | 2.933E-2 | 3.293E-2 | 4.413E-2 | 3.906E-2 | 1.894E-2 |
| σ (OFF) | --- | 8.503E-3 | 9.678E-3 | 4.245E-3 | 1.133E-2 | 8.739E-3 | 1.000E-2 | 1.013E-2 | 1.108E-2 | 1.056E-2 | 9.439E-3 |
| Average+3σ (OFF) | --- | 2.856E-2 | 3.871E-2 | 3.154E-2 | 5.235E-2 | 5.974E-2 | 5.934E-2 | 6.333E-2 | 7.736E-2 | 7.074E-2 | 4.726E-2 |
| Average-3σ (OFF) | --- | -2.246E-2 | -1.936E-2 | 6.071E-3 | -1.566E-2 | 7.309E-3 | -6.715E-4 | 2.525E-3 | 1.089E-2 | 7.386E-3 | -9.381E-3 |

## 2. VOL2

**Ta=25°C; If = 1.6 mA; Iol = 4.8 mA; Vcc = 4.5 V**



**VOL2 . (V)** **Max = 0.4**

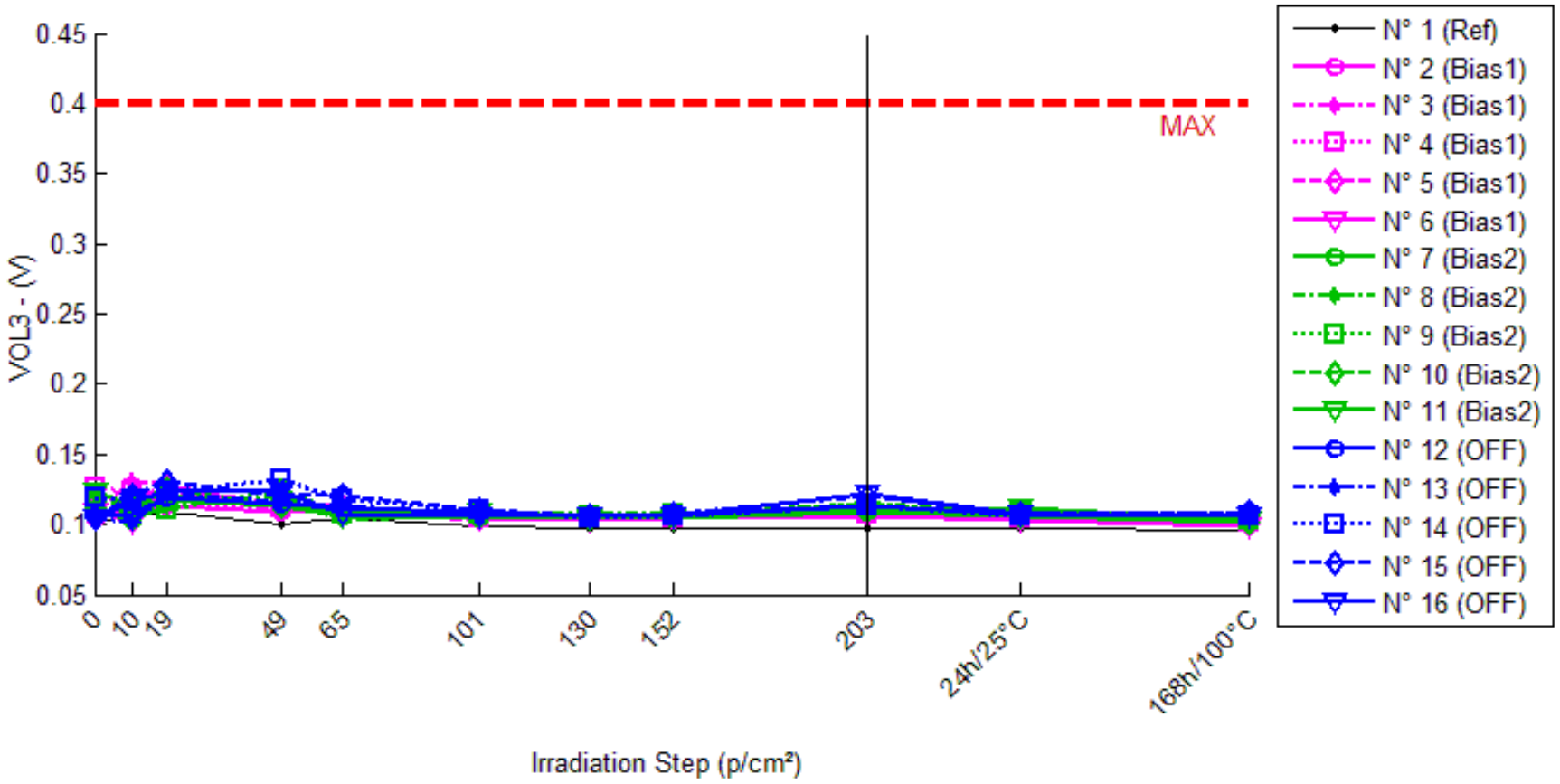
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 0.069 | 0.071 | 0.073 | 0.070 | 0.073 | 0.069 | 0.068 | 0.068 | 0.067 | 0.067 | 0.066 |
| N° 2 (Bias1) | 0.072 | 0.083 | 0.082 | 0.075 | 0.082 | 0.081 | 0.080 | 0.081 | 0.082 | 0.081 | 0.074 |
| N° 3 (Bias1) | 0.081 | 0.095 | 0.092 | 0.074 | 0.079 | 0.077 | 0.077 | 0.078 | 0.079 | 0.078 | 0.072 |
| N° 4 (Bias1) | 0.097 | 0.092 | 0.082 | 0.081 | 0.080 | 0.079 | 0.079 | 0.080 | 0.082 | 0.081 | 0.073 |
| N° 5 (Bias1) | 0.085 | 0.088 | 0.090 | 0.081 | 0.083 | 0.079 | 0.078 | 0.079 | 0.081 | 0.079 | 0.072 |
| N° 6 (Bias1) | 0.080 | 0.078 | 0.087 | 0.077 | 0.077 | 0.077 | 0.076 | 0.077 | 0.078 | 0.077 | 0.070 |
| N° 7 (Bias2) | 0.080 | 0.079 | 0.091 | 0.079 | 0.076 | 0.079 | 0.080 | 0.081 | 0.086 | 0.083 | 0.076 |
| N° 8 (Bias2) | 0.083 | 0.080 | 0.080 | 0.095 | 0.078 | 0.085 | 0.085 | 0.086 | 0.092 | 0.089 | 0.080 |
| N° 9 (Bias2) | 0.084 | 0.083 | 0.079 | 0.100 | 0.079 | 0.084 | 0.084 | 0.086 | 0.094 | 0.088 | 0.079 |
| N° 10 (Bias2) | 0.086 | 0.085 | 0.088 | 0.083 | 0.078 | 0.083 | 0.082 | 0.083 | 0.089 | 0.085 | 0.077 |
| N° 11 (Bias2) | 0.088 | 0.085 | 0.083 | 0.081 | 0.077 | 0.086 | 0.080 | 0.082 | 0.087 | 0.086 | 0.077 |
| N° 12 (OFF) | 0.079 | 0.081 | 0.084 | 0.085 | 0.080 | 0.086 | 0.082 | 0.084 | 0.090 | 0.086 | 0.079 |
| N° 13 (OFF) | 0.078 | 0.078 | 0.086 | 0.088 | 0.081 | 0.083 | 0.083 | 0.084 | 0.091 | 0.086 | 0.080 |
| N° 14 (OFF) | 0.086 | 0.087 | 0.087 | 0.109 | 0.084 | 0.090 | 0.082 | 0.084 | 0.090 | 0.086 | 0.079 |
| N° 15 (OFF) | 0.078 | 0.089 | 0.093 | 0.094 | 0.090 | 0.091 | 0.083 | 0.085 | 0.095 | 0.087 | 0.081 |
| N° 16 (OFF) | 0.078 | 0.087 | 0.087 | 0.098 | 0.082 | 0.083 | 0.084 | 0.085 | 0.096 | 0.087 | 0.080 |

**Delta [VOL2]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 2.061E-3 | 3.516E-3 | 1.158E-3 | 3.684E-3 | -6.854E-5 | -7.600E-4 | -7.235E-4 | -1.944E-3 | -2.227E-3 | -2.752E-3 |
| N° 2 (Bias1) | --- | 1.065E-2 | 9.635E-3 | 3.253E-3 | 1.017E-2 | 8.936E-3 | 7.700E-3 | 8.783E-3 | 9.924E-3 | 8.785E-3 | 1.998E-3 |
| N° 3 (Bias1) | --- | 1.406E-2 | 1.104E-2 | -7.379E-3 | -2.647E-3 | -4.802E-3 | -4.360E-3 | -3.361E-3 | -2.299E-3 | -3.363E-3 | -9.486E-3 |
| N° 4 (Bias1) | --- | -4.899E-3 | -1.550E-2 | -1.635E-2 | -1.732E-2 | -1.802E-2 | -1.789E-2 | -1.690E-2 | -1.527E-2 | -1.647E-2 | -2.369E-2 |
| N° 5 (Bias1) | --- | 3.308E-3 | 5.487E-3 | -3.754E-3 | -1.558E-3 | -5.749E-3 | -6.643E-3 | -5.685E-3 | -3.978E-3 | -5.438E-3 | -1.246E-2 |
| N° 6 (Bias1) | --- | -2.343E-3 | 6.357E-3 | -2.815E-3 | -3.477E-3 | -2.981E-3 | -4.348E-3 | -3.398E-3 | -1.839E-3 | -3.512E-3 | -9.773E-3 |
| N° 7 (Bias2) | --- | -1.708E-3 | 1.076E-2 | -9.193E-4 | -4.315E-3 | -1.332E-3 | -4.405E-4 | 9.193E-4 | 5.308E-3 | 2.750E-3 | -4.745E-3 |
| N° 8 (Bias2) | --- | -2.113E-3 | -2.189E-3 | 1.236E-2 | -5.026E-3 | 2.543E-3 | 2.117E-3 | 3.632E-3 | 9.899E-3 | 6.208E-3 | -2.791E-3 |
| N° 9 (Bias2) | --- | -1.092E-3 | -4.240E-3 | 1.682E-2 | -4.467E-3 | 1.823E-4 | 4.679E-4 | 2.122E-3 | 1.034E-2 | 4.718E-3 | -4.277E-3 |
| N° 10 (Bias2) | --- | -6.729E-4 | 2.379E-3 | -2.350E-3 | -7.476E-3 | -2.295E-3 | -4.083E-3 | -2.353E-3 | 3.860E-3 | -3.195E-4 | -8.297E-3 |
| N° 11 (Bias2) | --- | -3.253E-3 | -5.475E-3 | -6.628E-3 | -1.116E-2 | -1.630E-3 | -7.837E-3 | -6.272E-3 | -1.468E-3 | -1.796E-3 | -1.132E-2 |
| N° 12 (OFF) | --- | 2.583E-3 | 5.343E-3 | 6.125E-3 | 1.486E-3 | 7.235E-3 | 3.769E-3 | 5.231E-3 | 1.165E-2 | 7.462E-3 | 5.649E-4 |
| N° 13 (OFF) | --- | 6.278E-4 | 8.558E-3 | 1.001E-2 | 3.528E-3 | 4.929E-3 | 4.931E-3 | 6.457E-3 | 1.309E-2 | 8.668E-3 | 2.198E-3 |
| N° 14 (OFF) | --- | 1.515E-3 | 6.771E-4 | 2.346E-2 | -1.939E-3 | 4.155E-3 | -3.672E-3 | -2.202E-3 | 4.331E-3 | -1.722E-4 | -6.723E-3 |
| N° 15 (OFF) | --- | 1.192E-2 | 1.506E-2 | 1.640E-2 | 1.254E-2 | 1.340E-2 | 5.808E-3 | 7.161E-3 | 1.704E-2 | 9.669E-3 | 3.517E-3 |
| N° 16 (OFF) | --- | 9.713E-3 | 9.485E-3 | 2.003E-2 | 4.855E-3 | 5.858E-3 | 6.329E-3 | 7.692E-3 | 1.819E-2 | 9.802E-3 | 2.836E-3 |
| Average (Bias1) | --- | 4.157E-3 | 3.402E-3 | -5.409E-3 | -2.966E-3 | -4.524E-3 | -5.108E-3 | -4.112E-3 | -2.692E-3 | -3.999E-3 | -1.068E-2 |
| σ (Bias1) | --- | 8.144E-3 | 1.081E-2 | 7.212E-3 | 9.759E-3 | 9.583E-3 | 9.095E-3 | 9.129E-3 | 8.942E-3 | 8.966E-3 | 9.157E-3 |
| Average+3σ (Bias1) | --- | 2.859E-2 | 3.584E-2 | 1.623E-2 | 2.631E-2 | 2.423E-2 | 2.218E-2 | 2.327E-2 | 2.413E-2 | 2.290E-2 | 1.679E-2 |
| Average-3σ (Bias1) | --- | -2.028E-2 | -2.903E-2 | -2.705E-2 | -3.224E-2 | -3.327E-2 | -3.239E-2 | -3.150E-2 | -2.952E-2 | -3.090E-2 | -3.815E-2 |
| Average (Bias2) | --- | -1.768E-3 | 2.467E-4 | 3.855E-3 | -6.489E-3 | -5.061E-4 | -1.955E-3 | -3.905E-4 | 5.588E-3 | 2.312E-3 | -6.285E-3 |
| σ (Bias2) | --- | 9.981E-4 | 6.592E-3 | 1.014E-2 | 2.904E-3 | 1.931E-3 | 3.996E-3 | 3.958E-3 | 4.848E-3 | 3.353E-3 | 3.464E-3 |
| Average+3σ (Bias2) | --- | 1.226E-3 | 2.002E-2 | 3.428E-2 | 2.225E-3 | 5.286E-3 | 1.003E-2 | 1.148E-2 | 2.013E-2 | 1.237E-2 | 4.106E-3 |
| Average-3σ (Bias2) | --- | -4.762E-3 | -1.953E-2 | -2.657E-2 | -1.520E-2 | -6.299E-3 | -1.394E-2 | -1.226E-2 | -8.955E-3 | -7.746E-3 | -1.668E-2 |
| Average (OFF) | --- | 5.272E-3 | 7.825E-3 | 1.520E-2 | 4.093E-3 | 7.114E-3 | 3.433E-3 | 4.868E-3 | 1.286E-2 | 7.086E-3 | 4.785E-4 |
| σ (OFF) | --- | 5.169E-3 | 5.312E-3 | 7.111E-3 | 5.371E-3 | 3.694E-3 | 4.088E-3 | 4.058E-3 | 5.481E-3 | 4.165E-3 | 4.172E-3 |
| Average+3σ (OFF) | --- | 2.078E-2 | 2.376E-2 | 3.654E-2 | 2.021E-2 | 1.820E-2 | 1.570E-2 | 1.704E-2 | 2.930E-2 | 1.958E-2 | 1.299E-2 |
| Average-3σ (OFF) | --- | -1.023E-2 | -8.112E-3 | -6.130E-3 | -1.202E-2 | -3.968E-3 | -8.832E-3 | -7.307E-3 | -3.583E-3 | -5.408E-3 | -1.204E-2 |

## 3. VOL3

**Ta=25°C; If = 5 mA; Iol = 10 mA; Vcc = 4.5 V**



**VOL3 . (V)** **Max = 0.4**

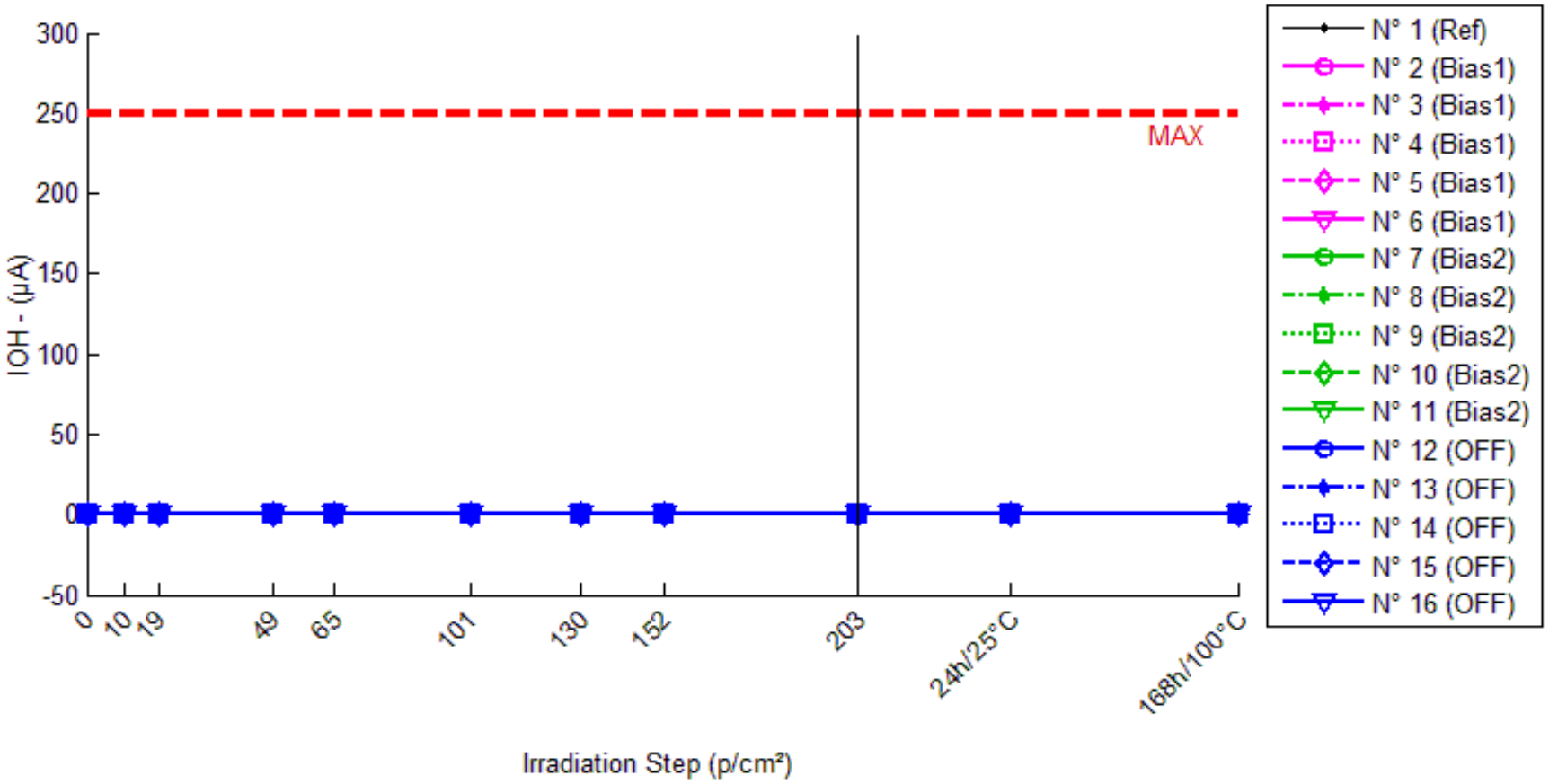
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 0.102 | 0.106 | 0.109 | 0.100 | 0.105 | 0.099 | 0.098 | 0.098 | 0.097 | 0.097 | 0.096 |
| N° 2 (Bias1) | 0.105 | 0.111 | 0.113 | 0.109 | 0.112 | 0.106 | 0.105 | 0.106 | 0.107 | 0.105 | 0.101 |
| N° 3 (Bias1) | 0.111 | 0.131 | 0.130 | 0.109 | 0.109 | 0.103 | 0.103 | 0.104 | 0.105 | 0.104 | 0.100 |
| N° 4 (Bias1) | 0.127 | 0.124 | 0.115 | 0.112 | 0.107 | 0.105 | 0.105 | 0.105 | 0.108 | 0.105 | 0.101 |
| N° 5 (Bias1) | 0.116 | 0.118 | 0.128 | 0.113 | 0.113 | 0.105 | 0.104 | 0.105 | 0.107 | 0.104 | 0.100 |
| N° 6 (Bias1) | 0.109 | 0.102 | 0.125 | 0.113 | 0.106 | 0.105 | 0.103 | 0.104 | 0.106 | 0.103 | 0.099 |
| N° 7 (Bias2) | 0.110 | 0.103 | 0.120 | 0.113 | 0.106 | 0.104 | 0.104 | 0.105 | 0.109 | 0.106 | 0.101 |
| N° 8 (Bias2) | 0.112 | 0.105 | 0.113 | 0.121 | 0.103 | 0.108 | 0.107 | 0.108 | 0.115 | 0.109 | 0.104 |
| N° 9 (Bias2) | 0.114 | 0.108 | 0.111 | 0.125 | 0.107 | 0.107 | 0.106 | 0.107 | 0.115 | 0.108 | 0.103 |
| N° 10 (Bias2) | 0.118 | 0.113 | 0.125 | 0.113 | 0.108 | 0.107 | 0.105 | 0.106 | 0.113 | 0.106 | 0.102 |
| N° 11 (Bias2) | 0.123 | 0.113 | 0.118 | 0.114 | 0.107 | 0.109 | 0.104 | 0.105 | 0.111 | 0.112 | 0.103 |
| N° 12 (OFF) | 0.106 | 0.107 | 0.119 | 0.115 | 0.112 | 0.109 | 0.106 | 0.107 | 0.114 | 0.107 | 0.106 |
| N° 13 (OFF) | 0.105 | 0.102 | 0.122 | 0.116 | 0.114 | 0.107 | 0.106 | 0.106 | 0.114 | 0.107 | 0.107 |
| N° 14 (OFF) | 0.119 | 0.117 | 0.124 | 0.132 | 0.117 | 0.111 | 0.105 | 0.106 | 0.114 | 0.106 | 0.106 |
| N° 15 (OFF) | 0.104 | 0.120 | 0.131 | 0.121 | 0.120 | 0.111 | 0.106 | 0.107 | 0.121 | 0.107 | 0.109 |
| N° 16 (OFF) | 0.104 | 0.116 | 0.123 | 0.124 | 0.107 | 0.106 | 0.106 | 0.106 | 0.122 | 0.107 | 0.106 |

**Delta [VOL3]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 4.315E-3 | 6.818E-3 | -1.593E-3 | 2.570E-3 | -3.145E-3 | -3.883E-3 | -3.774E-3 | -4.791E-3 | -5.180E-3 | -6.085E-3 |
| N° 2 (Bias1) | --- | 5.300E-3 | 7.870E-3 | 3.933E-3 | 6.837E-3 | 9.633E-4 | -2.274E-4 | 5.757E-4 | 1.711E-3 | -1.302E-5 | -4.408E-3 |
| N° 3 (Bias1) | --- | 2.014E-2 | 1.927E-2 | -1.688E-3 | -1.605E-3 | -7.480E-3 | -7.646E-3 | -6.903E-3 | -5.841E-3 | -7.295E-3 | -1.126E-2 |
| N° 4 (Bias1) | --- | -2.914E-3 | -1.189E-2 | -1.536E-2 | -2.051E-2 | -2.207E-2 | -2.254E-2 | -2.184E-2 | -1.971E-2 | -2.185E-2 | -2.674E-2 |
| N° 5 (Bias1) | --- | 1.865E-3 | 1.172E-2 | -3.593E-3 | -3.062E-3 | -1.114E-2 | -1.212E-2 | -1.141E-2 | -8.938E-3 | -1.163E-2 | -1.635E-2 |
| N° 6 (Bias1) | --- | -6.998E-3 | 1.515E-2 | 3.193E-3 | -3.902E-3 | -4.852E-3 | -6.405E-3 | -5.662E-3 | -3.285E-3 | -6.134E-3 | -1.048E-2 |
| N° 7 (Bias2) | --- | -6.188E-3 | 1.094E-2 | 3.324E-3 | -3.509E-3 | -5.097E-3 | -5.051E-3 | -4.167E-3 | -1.309E-5 | -3.771E-3 | -8.092E-3 |
| N° 8 (Bias2) | --- | -6.899E-3 | 9.218E-4 | 8.965E-3 | -8.698E-3 | -3.697E-3 | -4.681E-3 | -3.803E-3 | 2.936E-3 | -3.074E-3 | -7.956E-3 |
| N° 9 (Bias2) | --- | -5.541E-3 | -2.356E-3 | 1.102E-2 | -6.902E-3 | -6.736E-3 | -7.358E-3 | -6.352E-3 | 1.722E-3 | -5.704E-3 | -1.052E-2 |
| N° 10 (Bias2) | --- | -5.070E-3 | 7.532E-3 | -4.887E-3 | -1.031E-2 | -1.126E-2 | -1.309E-2 | -1.204E-2 | -4.786E-3 | -1.184E-2 | -1.610E-2 |
| N° 11 (Bias2) | --- | -9.843E-3 | -4.736E-3 | -8.479E-3 | -1.574E-2 | -1.395E-2 | -1.862E-2 | -1.759E-2 | -1.143E-2 | -1.114E-2 | -1.992E-2 |
| N° 12 (OFF) | --- | 6.077E-4 | 1.295E-2 | 8.610E-3 | 5.553E-3 | 2.661E-3 | -3.014E-4 | 5.062E-4 | 7.770E-3 | 1.041E-3 | -3.919E-4 |
| N° 13 (OFF) | --- | -2.655E-3 | 1.751E-2 | 1.077E-2 | 9.012E-3 | 1.698E-3 | 8.638E-4 | 1.680E-3 | 9.367E-3 | 2.156E-3 | 2.089E-3 |
| N° 14 (OFF) | --- | -2.357E-3 | 4.259E-3 | 1.243E-2 | -2.808E-3 | -8.037E-3 | -1.404E-2 | -1.319E-2 | -5.603E-3 | -1.302E-2 | -1.366E-2 |
| N° 15 (OFF) | --- | 1.596E-2 | 2.674E-2 | 1.662E-2 | 1.575E-2 | 6.970E-3 | 1.784E-3 | 2.242E-3 | 1.649E-2 | 2.897E-3 | 4.244E-3 |
| N° 16 (OFF) | --- | 1.208E-2 | 1.921E-2 | 1.954E-2 | 2.546E-3 | 2.082E-3 | 1.584E-3 | 2.207E-3 | 1.795E-2 | 2.436E-3 | 1.918E-3 |
| Average (Bias1) | --- | 3.479E-3 | 8.423E-3 | -2.703E-3 | -4.449E-3 | -8.916E-3 | -9.786E-3 | -9.048E-3 | -7.213E-3 | -9.386E-3 | -1.385E-2 |
| σ (Bias1) | --- | 1.042E-2 | 1.211E-2 | 7.761E-3 | 9.947E-3 | 8.574E-3 | 8.298E-3 | 8.336E-3 | 8.003E-3 | 8.114E-3 | 8.361E-3 |
| Average+3σ (Bias1) | --- | 3.474E-2 | 4.476E-2 | 2.058E-2 | 2.539E-2 | 1.681E-2 | 1.511E-2 | 1.596E-2 | 1.680E-2 | 1.495E-2 | 1.123E-2 |
| Average-3σ (Bias1) | --- | -2.778E-2 | -2.791E-2 | -2.599E-2 | -3.429E-2 | -3.464E-2 | -3.468E-2 | -3.406E-2 | -3.122E-2 | -3.373E-2 | -3.893E-2 |
| Average (Bias2) | --- | -6.708E-3 | 2.461E-3 | 1.988E-3 | -9.033E-3 | -8.149E-3 | -9.760E-3 | -8.791E-3 | -2.314E-3 | -7.105E-3 | -1.252E-2 |
| σ (Bias2) | --- | 1.883E-3 | 6.615E-3 | 8.498E-3 | 4.523E-3 | 4.316E-3 | 5.986E-3 | 5.921E-3 | 5.880E-3 | 4.123E-3 | 5.291E-3 |
| Average+3σ (Bias2) | --- | -1.059E-3 | 2.231E-2 | 2.748E-2 | 4.535E-3 | 4.800E-3 | 8.198E-3 | 8.973E-3 | 1.533E-2 | 5.265E-3 | 3.356E-3 |
| Average-3σ (Bias2) | --- | -1.236E-2 | -1.738E-2 | -2.351E-2 | -2.260E-2 | -2.110E-2 | -2.772E-2 | -2.655E-2 | -1.995E-2 | -1.947E-2 | -2.839E-2 |
| Average (OFF) | --- | 4.728E-3 | 1.613E-2 | 1.360E-2 | 6.010E-3 | 1.075E-3 | -2.021E-3 | -1.311E-3 | 9.195E-3 | -8.979E-4 | -1.160E-3 |
| σ (OFF) | --- | 8.688E-3 | 8.292E-3 | 4.437E-3 | 6.960E-3 | 5.516E-3 | 6.766E-3 | 6.678E-3 | 9.366E-3 | 6.810E-3 | 7.178E-3 |
| Average+3σ (OFF) | --- | 3.079E-2 | 4.101E-2 | 2.690E-2 | 2.689E-2 | 1.762E-2 | 1.828E-2 | 1.872E-2 | 3.729E-2 | 1.953E-2 | 2.037E-2 |
| Average-3σ (OFF) | --- | -2.134E-2 | -8.742E-3 | 2.852E-4 | -1.487E-2 | -1.547E-2 | -2.232E-2 | -2.134E-2 | -1.890E-2 | -2.133E-2 | -2.269E-2 |

## 4. IOH

**Ta=25°C; If = 2 µA; Vo = Vcc = 18 V**



**IOH . (µA)** **Max = 250.0**

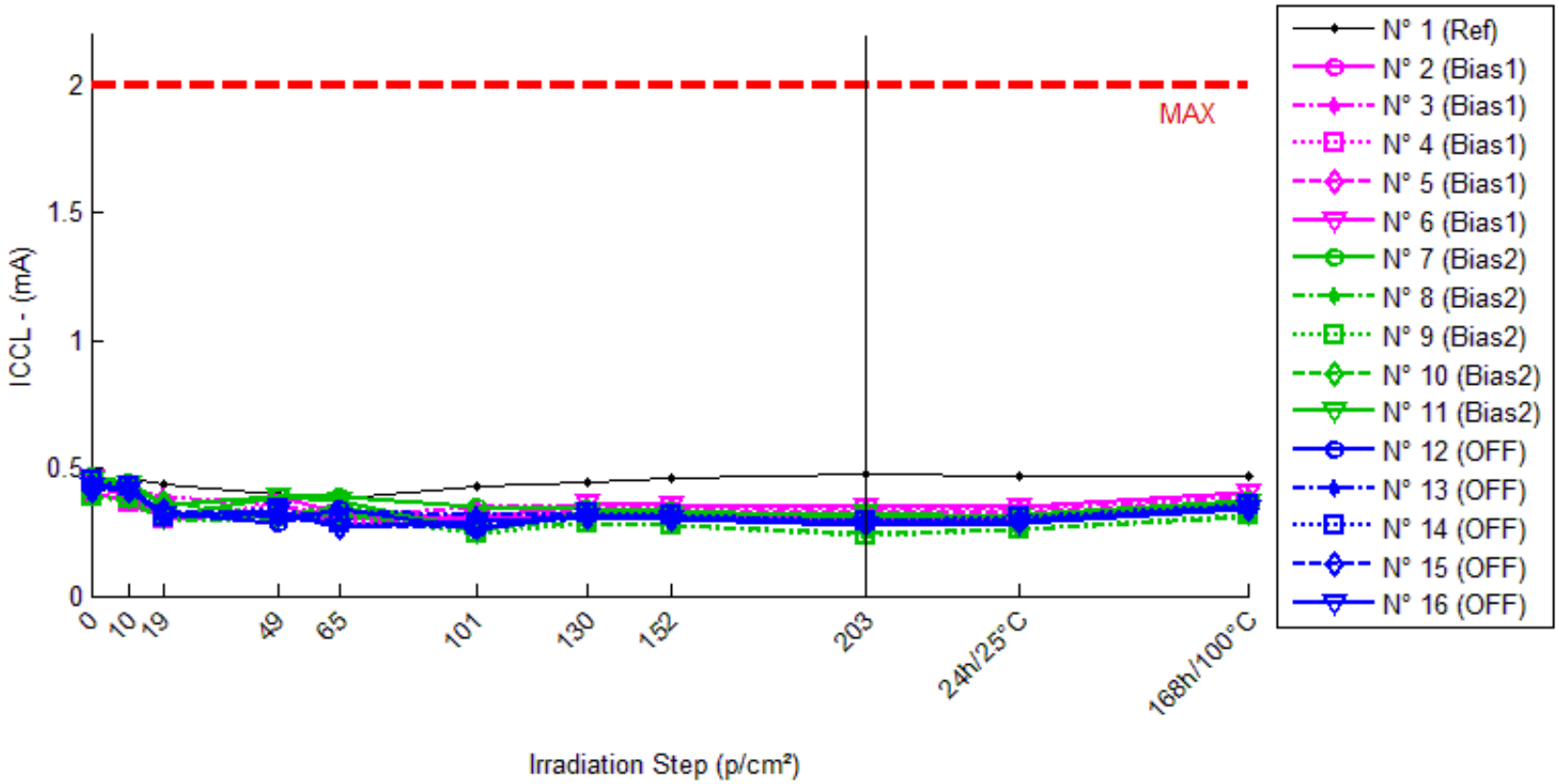
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N° 2 (Bias1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| N° 3 (Bias1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.012 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 4 (Bias1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.010 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 5 (Bias1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.006 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 6 (Bias1) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 7 (Bias2) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.004 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 8 (Bias2) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 9 (Bias2) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 10 (Bias2) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.000 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 11 (Bias2) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 12 (OFF) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 13 (OFF) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 14 (OFF) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 15 (OFF) | 0.020 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |
| N° 16 (OFF) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.002 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 |

**Delta [IOH]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 1.153E-4 | -4.142E-5 | -2.616E-5 | -5.267E-5 | 1.737E-4 | 1.084E-4 | 9.943E-5 | -9.643E-5 | -1.057E-4 | 1.526E-4 |
| N° 2 (Bias1) | --- | 1.101E-4 | -4.356E-5 | -1.350E-5 | -2.711E-5 | 1.956E-4 | 1.849E-4 | 2.014E-4 | -4.009E-5 | -5.286E-5 | 6.673E-5 |
| N° 3 (Bias1) | --- | 3.415E-5 | -1.188E-4 | -1.008E-4 | -1.047E-4 | 1.179E-2 | 1.134E-4 | 1.623E-4 | -1.169E-4 | -1.366E-4 | -1.030E-4 |
| N° 4 (Bias1) | --- | 1.138E-4 | -1.820E-6 | -1.298E-5 | -2.508E-5 | 1.011E-2 | 2.064E-4 | 2.526E-4 | -3.865E-5 | -5.248E-5 | -4.673E-5 |
| N° 5 (Bias1) | --- | 9.433E-5 | -4.567E-5 | -4.056E-5 | -5.164E-5 | 6.046E-3 | 1.579E-4 | 2.216E-4 | -6.183E-5 | -7.828E-5 | -8.673E-5 |
| N° 6 (Bias1) | --- | 1.206E-4 | -2.292E-5 | -1.180E-5 | -2.466E-5 | 4.623E-3 | 2.274E-4 | 2.388E-4 | -3.979E-5 | -5.349E-5 | -6.114E-5 |
| N° 7 (Bias2) | --- | 1.187E-4 | -2.774E-5 | -1.450E-5 | -2.457E-5 | 3.796E-3 | 2.021E-4 | 2.580E-4 | -2.672E-5 | -3.716E-5 | -6.993E-5 |
| N° 8 (Bias2) | --- | 1.311E-4 | -8.815E-6 | 2.051E-6 | -1.178E-5 | 2.701E-3 | 1.959E-4 | 2.957E-4 | -1.924E-6 | -2.319E-5 | -5.770E-5 |
| N° 9 (Bias2) | --- | 1.096E-4 | -3.229E-5 | -1.749E-5 | -3.233E-5 | 2.682E-3 | 2.089E-4 | 2.873E-4 | -2.578E-5 | -4.645E-5 | -8.100E-5 |
| N° 10 (Bias2) | --- | 1.277E-4 | -1.228E-5 | 1.338E-6 | -1.655E-5 | 2.213E-3 | 2.041E-4 | 2.867E-4 | -5.935E-6 | -2.610E-5 | -6.099E-5 |
| N° 11 (Bias2) | --- | 1.264E-4 | -1.777E-5 | 5.360E-6 | -1.532E-5 | 2.097E-3 | 2.308E-4 | 3.048E-4 | -2.090E-5 | -2.927E-5 | -5.608E-5 |
| N° 12 (OFF) | --- | 1.323E-4 | -1.325E-5 | 2.825E-7 | -1.646E-5 | 1.869E-3 | 2.365E-4 | 3.294E-4 | -2.217E-5 | -3.160E-5 | -4.534E-5 |
| N° 13 (OFF) | --- | 7.027E-5 | -7.658E-5 | -6.077E-5 | -7.853E-5 | 1.667E-3 | 1.818E-4 | 2.788E-4 | -8.149E-5 | -9.345E-5 | -1.203E-4 |
| N° 14 (OFF) | --- | 1.410E-4 | 3.233E-6 | 9.492E-7 | -8.142E-6 | 1.660E-3 | 2.544E-4 | 3.670E-4 | -8.819E-6 | -2.066E-5 | -5.334E-5 |
| N° 15 (OFF) | --- | -1.947E-2 | -1.962E-2 | -1.961E-2 | -1.962E-2 | -1.809E-2 | -1.936E-2 | -1.924E-2 | -1.962E-2 | -1.964E-2 | -1.966E-2 |
| N° 16 (OFF) | --- | 1.479E-4 | -1.765E-6 | 1.084E-5 | 5.718E-6 | 1.522E-3 | 2.618E-4 | 3.546E-4 | 4.577E-6 | -1.695E-5 | -5.268E-5 |
| Average (Bias1) | --- | 9.461E-5 | -4.654E-5 | -3.592E-5 | -4.663E-5 | 6.554E-3 | 1.780E-4 | 2.153E-4 | -5.945E-5 | -7.474E-5 | -4.618E-5 |
| σ (Bias1) | --- | 3.515E-5 | 4.411E-5 | 3.821E-5 | 3.436E-5 | 4.596E-3 | 4.436E-5 | 3.531E-5 | 3.354E-5 | 3.628E-5 | 6.680E-5 |
| Average+3σ (Bias1) | --- | 2.001E-4 | 8.578E-5 | 7.870E-5 | 5.645E-5 | 2.034E-2 | 3.111E-4 | 3.213E-4 | 4.116E-5 | 3.409E-5 | 1.542E-4 |
| Average-3σ (Bias1) | --- | -1.084E-5 | -1.789E-4 | -1.505E-4 | -1.497E-4 | -7.236E-3 | 4.490E-5 | 1.094E-4 | -1.601E-4 | -1.836E-4 | -2.466E-4 |
| Average (Bias2) | --- | 1.227E-4 | -1.978E-5 | -4.648E-6 | -2.011E-5 | 2.698E-3 | 2.084E-4 | 2.865E-4 | -1.625E-5 | -3.244E-5 | -6.514E-5 |
| σ (Bias2) | --- | 8.615E-6 | 1.000E-5 | 1.052E-5 | 8.281E-6 | 6.712E-4 | 1.337E-5 | 1.755E-5 | 1.155E-5 | 9.413E-6 | 1.036E-5 |
| Average+3σ (Bias2) | --- | 1.486E-4 | 1.023E-5 | 2.692E-5 | 4.736E-6 | 4.711E-3 | 2.485E-4 | 3.391E-4 | 1.840E-5 | -4.197E-6 | -3.406E-5 |
| Average-3σ (Bias2) | --- | 9.688E-5 | -4.979E-5 | -3.621E-5 | -4.495E-5 | 6.843E-4 | 1.683E-4 | 2.338E-4 | -5.090E-5 | -6.068E-5 | -9.622E-5 |
| Average (OFF) | --- | -3.796E-3 | -3.941E-3 | -3.932E-3 | -3.944E-3 | -2.275E-3 | -3.684E-3 | -3.582E-3 | -3.946E-3 | -3.960E-3 | -3.987E-3 |
| σ (OFF) | --- | 8.762E-3 | 8.764E-3 | 8.765E-3 | 8.764E-3 | 8.844E-3 | 8.761E-3 | 8.753E-3 | 8.762E-3 | 8.764E-3 | 8.762E-3 |
| Average+3σ (OFF) | --- | 2.249E-2 | 2.235E-2 | 2.236E-2 | 2.235E-2 | 2.426E-2 | 2.260E-2 | 2.268E-2 | 2.234E-2 | 2.233E-2 | 2.230E-2 |
| Average-3σ (OFF) | --- | -3.008E-2 | -3.023E-2 | -3.023E-2 | -3.024E-2 | -2.881E-2 | -2.997E-2 | -2.984E-2 | -3.023E-2 | -3.025E-2 | -3.027E-2 |

## 5. ICCL

**Ta=25°C; Vcc = 18 V; If = 1.6 mA**



**ICCL . (mA)** **Max = 2.0**

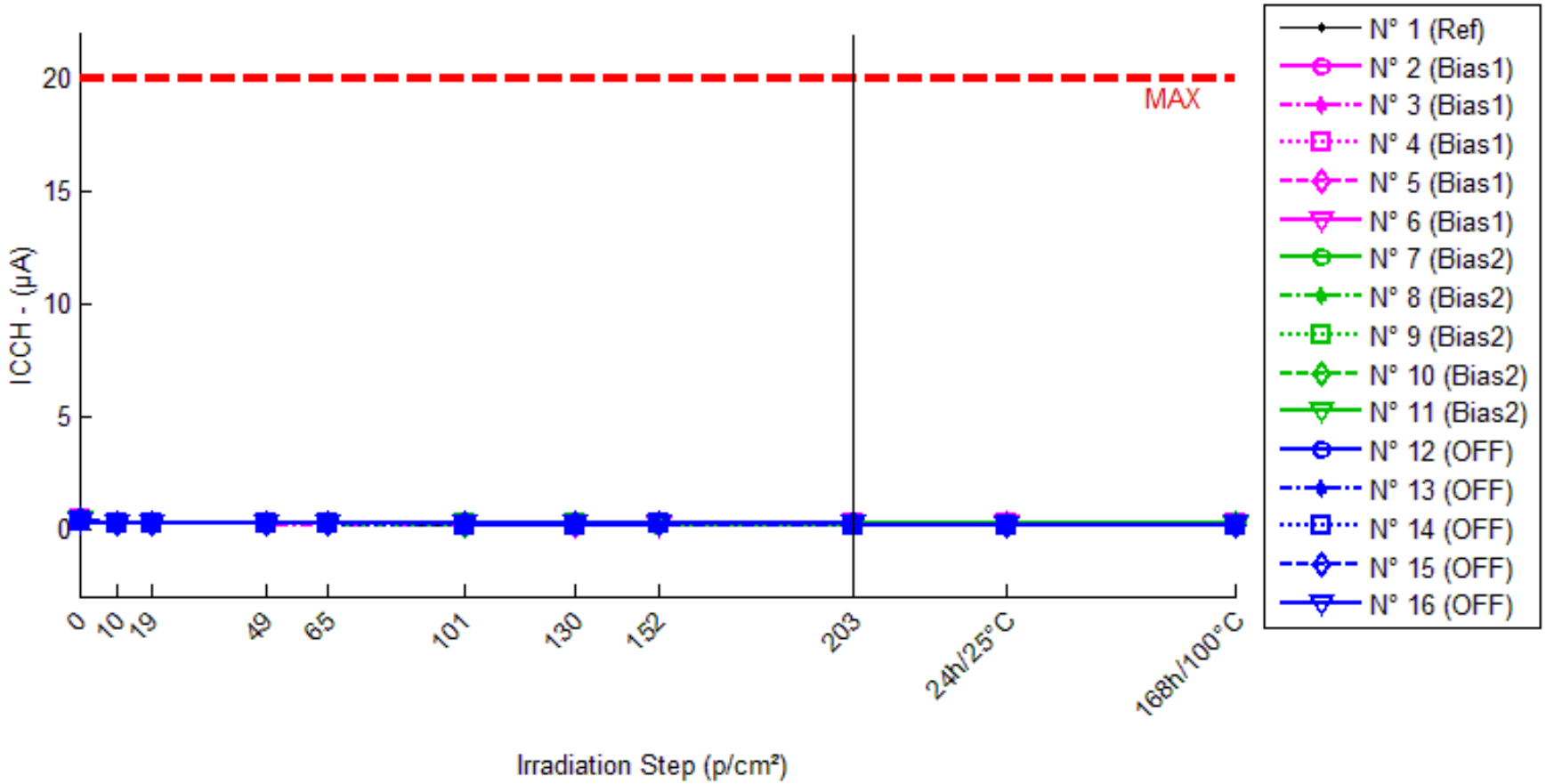
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 0.392 | 0.460 | 0.440 | 0.399 | 0.379 | 0.432 | 0.446 | 0.457 | 0.474 | 0.470 | 0.468 |
| N° 2 (Bias1) | 0.400 | 0.383 | 0.299 | 0.325 | 0.297 | 0.303 | 0.315 | 0.310 | 0.301 | 0.305 | 0.345 |
| N° 3 (Bias1) | 0.443 | 0.422 | 0.391 | 0.359 | 0.311 | 0.347 | 0.351 | 0.347 | 0.337 | 0.342 | 0.387 |
| N° 4 (Bias1) | 0.399 | 0.368 | 0.303 | 0.357 | 0.283 | 0.292 | 0.315 | 0.311 | 0.302 | 0.304 | 0.350 |
| N° 5 (Bias1) | 0.418 | 0.399 | 0.312 | 0.320 | 0.311 | 0.314 | 0.335 | 0.330 | 0.321 | 0.323 | 0.372 |
| N° 6 (Bias1) | 0.459 | 0.436 | 0.355 | 0.392 | 0.322 | 0.299 | 0.362 | 0.357 | 0.346 | 0.351 | 0.401 |
| N° 7 (Bias2) | 0.466 | 0.447 | 0.357 | 0.387 | 0.388 | 0.349 | 0.341 | 0.333 | 0.308 | 0.318 | 0.374 |
| N° 8 (Bias2) | 0.389 | 0.371 | 0.293 | 0.295 | 0.322 | 0.270 | 0.281 | 0.274 | 0.247 | 0.260 | 0.310 |
| N° 9 (Bias2) | 0.392 | 0.378 | 0.309 | 0.320 | 0.315 | 0.246 | 0.282 | 0.274 | 0.233 | 0.260 | 0.313 |
| N° 10 (Bias2) | 0.431 | 0.417 | 0.365 | 0.318 | 0.352 | 0.266 | 0.315 | 0.305 | 0.284 | 0.292 | 0.346 |
| N° 11 (Bias2) | 0.450 | 0.439 | 0.311 | 0.391 | 0.375 | 0.253 | 0.330 | 0.320 | 0.321 | 0.308 | 0.363 |
| N° 12 (OFF) | 0.436 | 0.418 | 0.326 | 0.286 | 0.343 | 0.257 | 0.316 | 0.308 | 0.286 | 0.294 | 0.348 |
| N° 13 (OFF) | 0.446 | 0.423 | 0.313 | 0.312 | 0.335 | 0.317 | 0.318 | 0.310 | 0.289 | 0.297 | 0.352 |
| N° 14 (OFF) | 0.456 | 0.432 | 0.311 | 0.337 | 0.283 | 0.277 | 0.326 | 0.318 | 0.296 | 0.305 | 0.360 |
| N° 15 (OFF) | 0.416 | 0.414 | 0.336 | 0.318 | 0.266 | 0.271 | 0.310 | 0.303 | 0.281 | 0.289 | 0.344 |
| N° 16 (OFF) | 0.429 | 0.411 | 0.314 | 0.336 | 0.266 | 0.291 | 0.307 | 0.299 | 0.279 | 0.288 | 0.341 |

**Delta [ICCL]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 6.859E-2 | 4.826E-2 | 7.508E-3 | -1.246E-2 | 3.990E-2 | 5.412E-2 | 6.520E-2 | 8.256E-2 | 7.836E-2 | 7.622E-2 |
| N° 2 (Bias1) | --- | -1.732E-2 | -1.013E-1 | -7.527E-2 | -1.032E-1 | -9.708E-2 | -8.529E-2 | -9.069E-2 | -9.898E-2 | -9.549E-2 | -5.497E-2 |
| N° 3 (Bias1) | --- | -2.136E-2 | -5.204E-2 | -8.423E-2 | -1.316E-1 | -9.640E-2 | -9.180E-2 | -9.622E-2 | -1.061E-1 | -1.014E-1 | -5.588E-2 |
| N° 4 (Bias1) | --- | -3.073E-2 | -9.607E-2 | -4.194E-2 | -1.153E-1 | -1.067E-1 | -8.349E-2 | -8.792E-2 | -9.660E-2 | -9.470E-2 | -4.906E-2 |
| N° 5 (Bias1) | --- | -1.852E-2 | -1.054E-1 | -9.758E-2 | -1.067E-1 | -1.034E-1 | -8.278E-2 | -8.741E-2 | -9.682E-2 | -9.429E-2 | -4.604E-2 |
| N° 6 (Bias1) | --- | -2.309E-2 | -1.032E-1 | -6.635E-2 | -1.366E-1 | -1.600E-1 | -9.666E-2 | -1.021E-1 | -1.127E-1 | -1.075E-1 | -5.714E-2 |
| N° 7 (Bias2) | --- | -1.956E-2 | -1.092E-1 | -7.971E-2 | -7.814E-2 | -1.172E-1 | -1.253E-1 | -1.333E-1 | -1.582E-1 | -1.486E-1 | -9.218E-2 |
| N° 8 (Bias2) | --- | -1.733E-2 | -9.542E-2 | -9.344E-2 | -6.632E-2 | -1.185E-1 | -1.075E-1 | -1.150E-1 | -1.413E-1 | -1.287E-1 | -7.814E-2 |
| N° 9 (Bias2) | --- | -1.327E-2 | -8.238E-2 | -7.140E-2 | -7.624E-2 | -1.455E-1 | -1.092E-1 | -1.173E-1 | -1.586E-1 | -1.318E-1 | -7.892E-2 |
| N° 10 (Bias2) | --- | -1.429E-2 | -6.574E-2 | -1.130E-1 | -7.922E-2 | -1.651E-1 | -1.162E-1 | -1.259E-1 | -1.467E-1 | -1.389E-1 | -8.550E-2 |
| N° 11 (Bias2) | --- | -1.085E-2 | -1.386E-1 | -5.912E-2 | -7.494E-2 | -1.968E-1 | -1.199E-1 | -1.296E-1 | -1.292E-1 | -1.421E-1 | -8.685E-2 |
| N° 12 (OFF) | --- | -1.799E-2 | -1.096E-1 | -1.501E-1 | -9.308E-2 | -1.790E-1 | -1.202E-1 | -1.282E-1 | -1.495E-1 | -1.414E-1 | -8.821E-2 |
| N° 13 (OFF) | --- | -2.260E-2 | -1.331E-1 | -1.343E-1 | -1.112E-1 | -1.289E-1 | -1.275E-1 | -1.360E-1 | -1.571E-1 | -1.491E-1 | -9.406E-2 |
| N° 14 (OFF) | --- | -2.404E-2 | -1.449E-1 | -1.193E-1 | -1.736E-1 | -1.796E-1 | -1.303E-1 | -1.380E-1 | -1.597E-1 | -1.515E-1 | -9.605E-2 |
| N° 15 (OFF) | --- | -2.525E-3 | -7.997E-2 | -9.886E-2 | -1.504E-1 | -1.457E-1 | -1.063E-1 | -1.137E-1 | -1.356E-1 | -1.273E-1 | -7.255E-2 |
| N° 16 (OFF) | --- | -1.785E-2 | -1.156E-1 | -9.370E-2 | -1.630E-1 | -1.383E-1 | -1.226E-1 | -1.299E-1 | -1.500E-1 | -1.414E-1 | -8.809E-2 |
| Average (Bias1) | --- | -2.220E-2 | -9.160E-2 | -7.307E-2 | -1.187E-1 | -1.127E-1 | -8.800E-2 | -9.286E-2 | -1.022E-1 | -9.868E-2 | -5.262E-2 |
| σ (Bias1) | --- | 5.282E-3 | 2.238E-2 | 2.088E-2 | 1.485E-2 | 2.677E-2 | 6.007E-3 | 6.220E-3 | 7.006E-3 | 5.724E-3 | 4.806E-3 |
| Average+3σ (Bias1) | --- | -6.357E-3 | -2.445E-2 | -1.042E-2 | -7.414E-2 | -3.240E-2 | -6.998E-2 | -7.420E-2 | -8.122E-2 | -8.151E-2 | -3.820E-2 |
| Average-3σ (Bias1) | --- | -3.805E-2 | -1.587E-1 | -1.357E-1 | -1.632E-1 | -1.930E-1 | -1.060E-1 | -1.115E-1 | -1.233E-1 | -1.159E-1 | -6.704E-2 |
| Average (Bias2) | --- | -1.506E-2 | -9.827E-2 | -8.334E-2 | -7.497E-2 | -1.486E-1 | -1.156E-1 | -1.242E-1 | -1.468E-1 | -1.380E-1 | -8.432E-2 |
| σ (Bias2) | --- | 3.425E-3 | 2.768E-2 | 2.077E-2 | 5.112E-3 | 3.355E-2 | 7.404E-3 | 7.858E-3 | 1.233E-2 | 8.001E-3 | 5.849E-3 |
| Average+3σ (Bias2) | --- | -4.786E-3 | -1.524E-2 | -2.103E-2 | -5.964E-2 | -4.795E-2 | -9.343E-2 | -1.006E-1 | -1.098E-1 | -1.140E-1 | -6.677E-2 |
| Average-3σ (Bias2) | --- | -2.534E-2 | -1.813E-1 | -1.456E-1 | -9.031E-2 | -2.493E-1 | -1.378E-1 | -1.478E-1 | -1.838E-1 | -1.620E-1 | -1.019E-1 |
| Average (OFF) | --- | -1.700E-2 | -1.166E-1 | -1.193E-1 | -1.382E-1 | -1.543E-1 | -1.214E-1 | -1.292E-1 | -1.504E-1 | -1.422E-1 | -8.779E-2 |
| σ (OFF) | --- | 8.546E-3 | 2.482E-2 | 2.371E-2 | 3.457E-2 | 2.361E-2 | 9.301E-3 | 9.564E-3 | 9.389E-3 | 9.467E-3 | 9.222E-3 |
| Average+3σ (OFF) | --- | 8.636E-3 | -4.217E-2 | -4.814E-2 | -3.454E-2 | -8.346E-2 | -9.349E-2 | -1.005E-1 | -1.222E-1 | -1.137E-1 | -6.013E-2 |
| Average-3σ (OFF) | --- | -4.264E-2 | -1.911E-1 | -1.904E-1 | -2.420E-1 | -2.251E-1 | -1.493E-1 | -1.579E-1 | -1.786E-1 | -1.706E-1 | -1.155E-1 |

## 6. ICCH

**Ta=25°C; Vcc = 18 V; If = 0**



**ICCH . (µA)** **Max = 20.0**

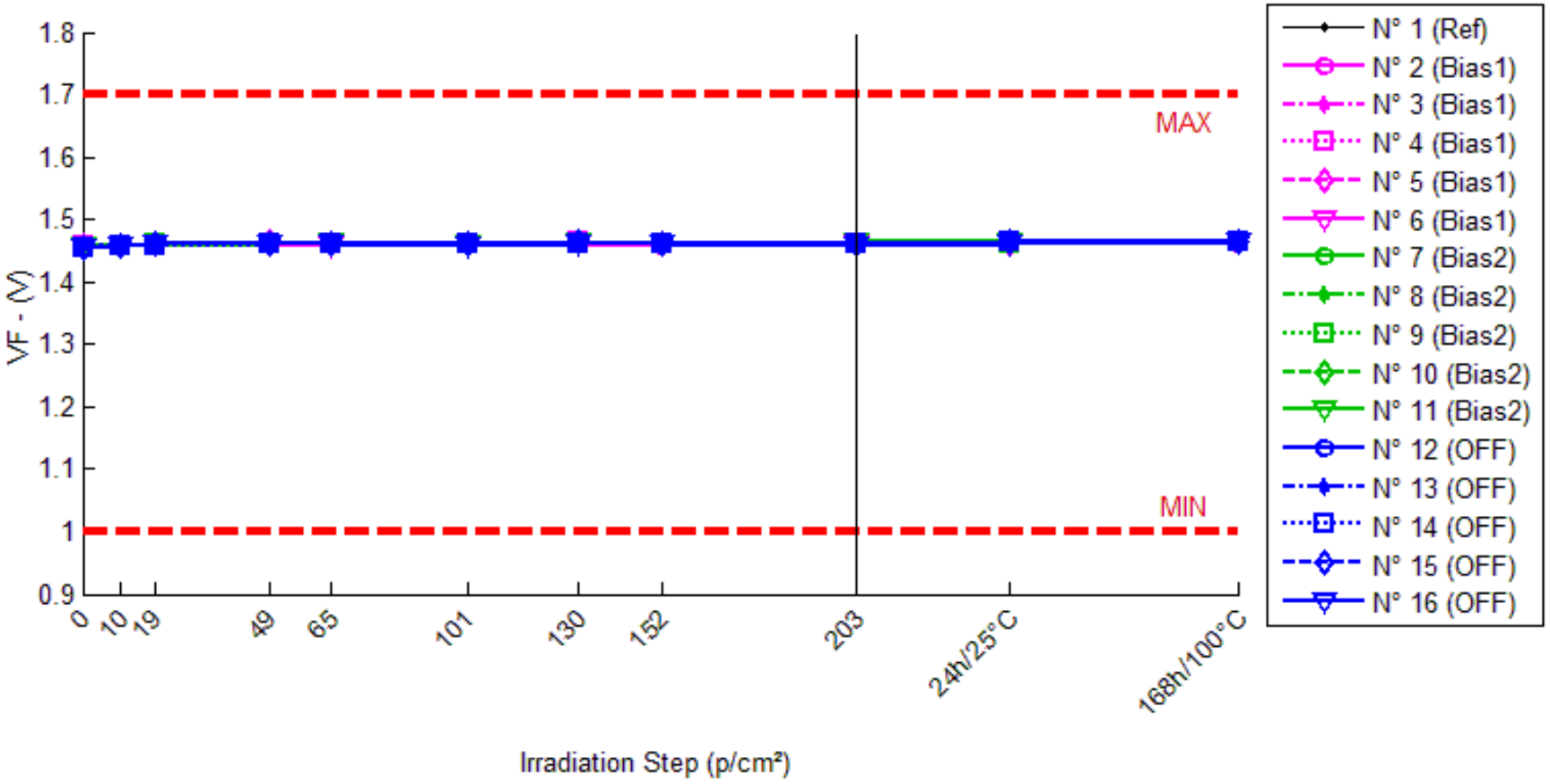
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 0.377 | 0.235 | 0.225 | 0.202 | 0.195 | 0.175 | 0.174 | 0.172 | 0.227 | 0.227 | 0.244 |
| N° 2 (Bias1) | 0.372 | 0.238 | 0.225 | 0.202 | 0.198 | 0.206 | 0.167 | 0.155 | 0.207 | 0.211 | 0.184 |
| N° 3 (Bias1) | 0.371 | 0.231 | 0.222 | 0.190 | 0.176 | 0.188 | 0.182 | 0.180 | 0.186 | 0.204 | 0.209 |
| N° 4 (Bias1) | 0.372 | 0.206 | 0.209 | 0.195 | 0.209 | 0.195 | 0.175 | 0.194 | 0.203 | 0.183 | 0.188 |
| N° 5 (Bias1) | 0.377 | 0.212 | 0.209 | 0.193 | 0.199 | 0.181 | 0.174 | 0.185 | 0.199 | 0.204 | 0.199 |
| N° 6 (Bias1) | 0.379 | 0.226 | 0.207 | 0.208 | 0.206 | 0.185 | 0.186 | 0.176 | 0.182 | 0.185 | 0.196 |
| N° 7 (Bias2) | 0.375 | 0.216 | 0.233 | 0.188 | 0.207 | 0.199 | 0.181 | 0.179 | 0.182 | 0.185 | 0.187 |
| N° 8 (Bias2) | 0.361 | 0.221 | 0.216 | 0.198 | 0.194 | 0.198 | 0.161 | 0.198 | 0.195 | 0.165 | 0.175 |
| N° 9 (Bias2) | 0.358 | 0.219 | 0.212 | 0.195 | 0.217 | 0.189 | 0.192 | 0.198 | 0.152 | 0.180 | 0.168 |
| N° 10 (Bias2) | 0.380 | 0.221 | 0.211 | 0.206 | 0.195 | 0.177 | 0.193 | 0.210 | 0.184 | 0.181 | 0.183 |
| N° 11 (Bias2) | 0.391 | 0.209 | 0.218 | 0.207 | 0.211 | 0.184 | 0.182 | 0.199 | 0.219 | 0.180 | 0.157 |
| N° 12 (OFF) | 0.374 | 0.208 | 0.213 | 0.203 | 0.191 | 0.192 | 0.172 | 0.200 | 0.216 | 0.167 | 0.155 |
| N° 13 (OFF) | 0.387 | 0.230 | 0.215 | 0.197 | 0.205 | 0.189 | 0.179 | 0.181 | 0.227 | 0.159 | 0.177 |
| N° 14 (OFF) | 0.341 | 0.206 | 0.220 | 0.209 | 0.202 | 0.180 | 0.175 | 0.193 | 0.176 | 0.165 | 0.158 |
| N° 15 (OFF) | 0.382 | 0.210 | 0.204 | 0.212 | 0.207 | 0.198 | 0.182 | 0.188 | 0.201 | 0.163 | 0.158 |
| N° 16 (OFF) | 0.338 | 0.205 | 0.205 | 0.203 | 0.210 | 0.214 | 0.184 | 0.204 | 0.201 | 0.179 | 0.195 |

**Delta [ICCH]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | -1.419E-1 | -1.514E-1 | -1.743E-1 | -1.813E-1 | -2.017E-1 | -2.022E-1 | -2.052E-1 | -1.499E-1 | -1.494E-1 | -1.329E-1 |
| N° 2 (Bias1) | --- | -1.345E-1 | -1.469E-1 | -1.699E-1 | -1.743E-1 | -1.659E-1 | -2.057E-1 | -2.177E-1 | -1.649E-1 | -1.614E-1 | -1.883E-1 |
| N° 3 (Bias1) | --- | -1.398E-1 | -1.488E-1 | -1.812E-1 | -1.946E-1 | -1.832E-1 | -1.892E-1 | -1.907E-1 | -1.852E-1 | -1.667E-1 | -1.622E-1 |
| N° 4 (Bias1) | --- | -1.658E-1 | -1.628E-1 | -1.768E-1 | -1.628E-1 | -1.763E-1 | -1.962E-1 | -1.778E-1 | -1.688E-1 | -1.882E-1 | -1.832E-1 |
| N° 5 (Bias1) | --- | -1.654E-1 | -1.684E-1 | -1.843E-1 | -1.784E-1 | -1.963E-1 | -2.028E-1 | -1.918E-1 | -1.779E-1 | -1.734E-1 | -1.778E-1 |
| N° 6 (Bias1) | --- | -1.537E-1 | -1.726E-1 | -1.711E-1 | -1.731E-1 | -1.940E-1 | -1.930E-1 | -2.030E-1 | -1.970E-1 | -1.940E-1 | -1.831E-1 |
| N° 7 (Bias2) | --- | -1.587E-1 | -1.422E-1 | -1.866E-1 | -1.682E-1 | -1.756E-1 | -1.941E-1 | -1.961E-1 | -1.926E-1 | -1.901E-1 | -1.876E-1 |
| N° 8 (Bias2) | --- | -1.403E-1 | -1.452E-1 | -1.632E-1 | -1.667E-1 | -1.632E-1 | -2.000E-1 | -1.632E-1 | -1.662E-1 | -1.966E-1 | -1.856E-1 |
| N° 9 (Bias2) | --- | -1.395E-1 | -1.464E-1 | -1.629E-1 | -1.415E-1 | -1.689E-1 | -1.659E-1 | -1.604E-1 | -2.062E-1 | -1.778E-1 | -1.903E-1 |
| N° 10 (Bias2) | --- | -1.587E-1 | -1.692E-1 | -1.737E-1 | -1.851E-1 | -2.026E-1 | -1.866E-1 | -1.702E-1 | -1.961E-1 | -1.986E-1 | -1.966E-1 |
| N° 11 (Bias2) | --- | -1.818E-1 | -1.734E-1 | -1.838E-1 | -1.798E-1 | -2.067E-1 | -2.087E-1 | -1.923E-1 | -1.719E-1 | -2.107E-1 | -2.346E-1 |
| N° 12 (OFF) | --- | -1.660E-1 | -1.606E-1 | -1.710E-1 | -1.825E-1 | -1.815E-1 | -2.019E-1 | -1.740E-1 | -1.576E-1 | -2.069E-1 | -2.193E-1 |
| N° 13 (OFF) | --- | -1.575E-1 | -1.724E-1 | -1.904E-1 | -1.824E-1 | -1.984E-1 | -2.083E-1 | -2.063E-1 | -1.600E-1 | -2.287E-1 | -2.098E-1 |
| N° 14 (OFF) | --- | -1.346E-1 | -1.212E-1 | -1.317E-1 | -1.391E-1 | -1.606E-1 | -1.655E-1 | -1.476E-1 | -1.645E-1 | -1.760E-1 | -1.835E-1 |
| N° 15 (OFF) | --- | -1.714E-1 | -1.773E-1 | -1.694E-1 | -1.743E-1 | -1.838E-1 | -1.993E-1 | -1.933E-1 | -1.808E-1 | -2.187E-1 | -2.242E-1 |
| N° 16 (OFF) | --- | -1.328E-1 | -1.323E-1 | -1.343E-1 | -1.278E-1 | -1.238E-1 | -1.532E-1 | -1.338E-1 | -1.368E-1 | -1.582E-1 | -1.427E-1 |
| Average (Bias1) | --- | -1.518E-1 | -1.599E-1 | -1.767E-1 | -1.767E-1 | -1.831E-1 | -1.974E-1 | -1.962E-1 | -1.787E-1 | -1.767E-1 | -1.789E-1 |
| σ (Bias1) | --- | 1.438E-2 | 1.155E-2 | 6.254E-3 | 1.158E-2 | 1.262E-2 | 6.826E-3 | 1.498E-2 | 1.292E-2 | 1.395E-2 | 1.003E-2 |
| Average+3σ (Bias1) | --- | -1.087E-1 | -1.253E-1 | -1.579E-1 | -1.419E-1 | -1.453E-1 | -1.769E-1 | -1.512E-1 | -1.400E-1 | -1.349E-1 | -1.488E-1 |
| Average-3σ (Bias1) | --- | -1.950E-1 | -1.945E-1 | -1.954E-1 | -2.114E-1 | -2.210E-1 | -2.179E-1 | -2.411E-1 | -2.175E-1 | -2.186E-1 | -2.090E-1 |
| Average (Bias2) | --- | -1.558E-1 | -1.553E-1 | -1.740E-1 | -1.683E-1 | -1.834E-1 | -1.911E-1 | -1.764E-1 | -1.866E-1 | -1.947E-1 | -1.989E-1 |
| σ (Bias2) | --- | 1.734E-2 | 1.474E-2 | 1.113E-2 | 1.688E-2 | 1.995E-2 | 1.625E-2 | 1.665E-2 | 1.692E-2 | 1.205E-2 | 2.038E-2 |
| Average+3σ (Bias2) | --- | -1.038E-1 | -1.111E-1 | -1.406E-1 | -1.176E-1 | -1.235E-1 | -1.423E-1 | -1.265E-1 | -1.358E-1 | -1.586E-1 | -1.378E-1 |
| Average-3σ (Bias2) | --- | -2.078E-1 | -1.995E-1 | -2.074E-1 | -2.189E-1 | -2.433E-1 | -2.398E-1 | -2.264E-1 | -2.373E-1 | -2.309E-1 | -2.601E-1 |
| Average (OFF) | --- | -1.525E-1 | -1.528E-1 | -1.593E-1 | -1.612E-1 | -1.696E-1 | -1.856E-1 | -1.710E-1 | -1.599E-1 | -1.977E-1 | -1.959E-1 |
| σ (OFF) | --- | 1.782E-2 | 2.484E-2 | 2.547E-2 | 2.587E-2 | 2.893E-2 | 2.459E-2 | 3.035E-2 | 1.580E-2 | 2.966E-2 | 3.362E-2 |
| Average+3σ (OFF) | --- | -9.900E-2 | -7.825E-2 | -8.294E-2 | -8.362E-2 | -8.283E-2 | -1.119E-1 | -7.994E-2 | -1.125E-1 | -1.087E-1 | -9.505E-2 |
| Average-3σ (OFF) | --- | -2.059E-1 | -2.273E-1 | -2.357E-1 | -2.389E-1 | -2.564E-1 | -2.594E-1 | -2.621E-1 | -2.074E-1 | -2.867E-1 | -2.968E-1 |

## 7. VF

**Ta=25°C; If = 1.6 mA**



**VF . (V)** **Min = 1.0 Max = 1.7**

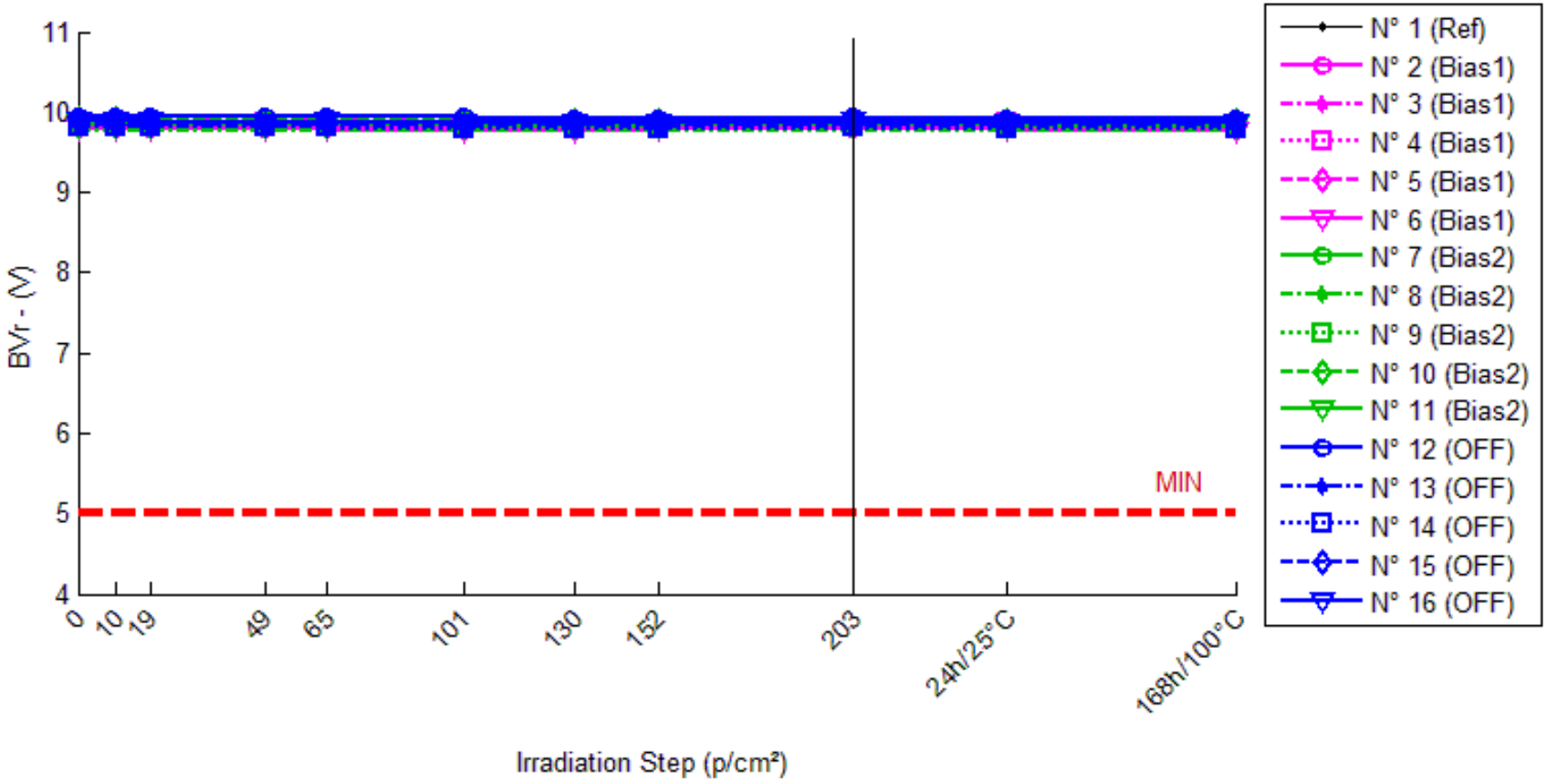
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 1.461 | 1.459 | 1.463 | 1.464 | 1.463 | 1.463 | 1.466 | 1.460 | 1.464 | 1.465 | 1.466 |
| N° 2 (Bias1) | 1.456 | 1.457 | 1.460 | 1.462 | 1.460 | 1.462 | 1.462 | 1.459 | 1.461 | 1.462 | 1.461 |
| N° 3 (Bias1) | 1.457 | 1.459 | 1.461 | 1.463 | 1.461 | 1.462 | 1.463 | 1.461 | 1.462 | 1.463 | 1.463 |
| N° 4 (Bias1) | 1.458 | 1.459 | 1.461 | 1.461 | 1.462 | 1.462 | 1.463 | 1.461 | 1.462 | 1.460 | 1.466 |
| N° 5 (Bias1) | 1.458 | 1.459 | 1.460 | 1.463 | 1.461 | 1.462 | 1.463 | 1.461 | 1.462 | 1.461 | 1.466 |
| N° 6 (Bias1) | 1.457 | 1.458 | 1.461 | 1.462 | 1.459 | 1.461 | 1.462 | 1.461 | 1.461 | 1.462 | 1.465 |
| N° 7 (Bias2) | 1.457 | 1.458 | 1.459 | 1.462 | 1.460 | 1.460 | 1.462 | 1.461 | 1.461 | 1.461 | 1.465 |
| N° 8 (Bias2) | 1.458 | 1.459 | 1.461 | 1.463 | 1.462 | 1.460 | 1.464 | 1.462 | 1.462 | 1.463 | 1.467 |
| N° 9 (Bias2) | 1.456 | 1.458 | 1.460 | 1.462 | 1.460 | 1.460 | 1.462 | 1.461 | 1.461 | 1.461 | 1.466 |
| N° 10 (Bias2) | 1.455 | 1.458 | 1.460 | 1.462 | 1.462 | 1.461 | 1.463 | 1.461 | 1.460 | 1.463 | 1.465 |
| N° 11 (Bias2) | 1.458 | 1.459 | 1.461 | 1.461 | 1.463 | 1.461 | 1.463 | 1.461 | 1.463 | 1.464 | 1.465 |
| N° 12 (OFF) | 1.456 | 1.459 | 1.461 | 1.462 | 1.462 | 1.461 | 1.463 | 1.462 | 1.462 | 1.463 | 1.465 |
| N° 13 (OFF) | 1.457 | 1.459 | 1.461 | 1.462 | 1.462 | 1.461 | 1.462 | 1.462 | 1.462 | 1.463 | 1.466 |
| N° 14 (OFF) | 1.456 | 1.459 | 1.459 | 1.461 | 1.462 | 1.461 | 1.462 | 1.461 | 1.462 | 1.463 | 1.465 |
| N° 15 (OFF) | 1.455 | 1.459 | 1.461 | 1.462 | 1.462 | 1.461 | 1.463 | 1.462 | 1.461 | 1.464 | 1.466 |
| N° 16 (OFF) | 1.455 | 1.457 | 1.460 | 1.461 | 1.460 | 1.459 | 1.461 | 1.460 | 1.459 | 1.462 | 1.464 |

**Delta [VF]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | -2.507E-3 | 1.700E-3 | 3.102E-3 | 2.166E-3 | 1.290E-3 | 4.546E-3 | -1.560E-3 | 2.994E-3 | 3.893E-3 | 4.907E-3 |
| N° 2 (Bias1) | --- | 1.460E-3 | 4.642E-3 | 5.817E-3 | 4.367E-3 | 6.397E-3 | 6.350E-3 | 3.551E-3 | 5.650E-3 | 6.184E-3 | 5.507E-3 |
| N° 3 (Bias1) | --- | 1.218E-3 | 4.021E-3 | 5.139E-3 | 3.887E-3 | 5.034E-3 | 5.895E-3 | 3.756E-3 | 4.424E-3 | 5.653E-3 | 5.134E-3 |
| N° 4 (Bias1) | --- | 5.930E-4 | 2.943E-3 | 2.449E-3 | 3.342E-3 | 3.956E-3 | 4.751E-3 | 2.754E-3 | 3.380E-3 | 2.014E-3 | 7.462E-3 |
| N° 5 (Bias1) | --- | 8.890E-4 | 2.807E-3 | 4.903E-3 | 3.698E-3 | 4.045E-3 | 5.167E-3 | 3.454E-3 | 4.159E-3 | 3.757E-3 | 7.861E-3 |
| N° 6 (Bias1) | --- | 1.047E-3 | 3.585E-3 | 4.882E-3 | 2.473E-3 | 3.604E-3 | 4.985E-3 | 3.578E-3 | 4.001E-3 | 5.258E-3 | 7.636E-3 |
| N° 7 (Bias2) | --- | 1.289E-3 | 2.666E-3 | 5.283E-3 | 3.665E-3 | 3.846E-3 | 5.462E-3 | 4.187E-3 | 4.167E-3 | 4.307E-3 | 8.665E-3 |
| N° 8 (Bias2) | --- | 9.690E-4 | 2.880E-3 | 4.714E-3 | 4.088E-3 | 1.614E-3 | 5.274E-3 | 4.033E-3 | 4.188E-3 | 4.866E-3 | 8.706E-3 |
| N° 9 (Bias2) | --- | 1.213E-3 | 3.771E-3 | 5.524E-3 | 3.786E-3 | 4.075E-3 | 5.887E-3 | 4.497E-3 | 4.805E-3 | 4.819E-3 | 9.700E-3 |
| N° 10 (Bias2) | --- | 2.927E-3 | 4.737E-3 | 6.760E-3 | 6.897E-3 | 5.464E-3 | 7.347E-3 | 6.011E-3 | 5.335E-3 | 7.391E-3 | 9.355E-3 |
| N° 11 (Bias2) | --- | 1.358E-3 | 3.510E-3 | 3.443E-3 | 4.741E-3 | 3.629E-3 | 5.390E-3 | 3.038E-3 | 5.026E-3 | 5.650E-3 | 7.353E-3 |
| N° 12 (OFF) | --- | 2.627E-3 | 4.545E-3 | 5.417E-3 | 5.399E-3 | 4.409E-3 | 6.502E-3 | 5.344E-3 | 5.602E-3 | 6.943E-3 | 8.924E-3 |
| N° 13 (OFF) | --- | 2.195E-3 | 4.108E-3 | 5.160E-3 | 5.122E-3 | 4.131E-3 | 5.411E-3 | 4.672E-3 | 5.012E-3 | 6.131E-3 | 8.632E-3 |
| N° 14 (OFF) | --- | 2.304E-3 | 3.146E-3 | 5.091E-3 | 5.959E-3 | 4.299E-3 | 5.958E-3 | 4.776E-3 | 5.302E-3 | 6.429E-3 | 8.501E-3 |
| N° 15 (OFF) | --- | 3.969E-3 | 5.825E-3 | 7.479E-3 | 7.016E-3 | 5.834E-3 | 8.203E-3 | 6.787E-3 | 6.438E-3 | 8.652E-3 | 1.102E-2 |
| N° 16 (OFF) | --- | 2.450E-3 | 4.939E-3 | 5.808E-3 | 5.102E-3 | 4.052E-3 | 6.264E-3 | 4.766E-3 | 4.431E-3 | 7.092E-3 | 9.466E-3 |
| Average (Bias1) | --- | 1.041E-3 | 3.600E-3 | 4.638E-3 | 3.553E-3 | 4.607E-3 | 5.430E-3 | 3.419E-3 | 4.323E-3 | 4.573E-3 | 6.720E-3 |
| σ (Bias1) | --- | 3.282E-4 | 7.622E-4 | 1.281E-3 | 7.082E-4 | 1.133E-3 | 6.691E-4 | 3.872E-4 | 8.353E-4 | 1.692E-3 | 1.292E-3 |
| Average+3σ (Bias1) | --- | 2.026E-3 | 5.886E-3 | 8.481E-3 | 5.678E-3 | 8.005E-3 | 7.437E-3 | 4.580E-3 | 6.829E-3 | 9.648E-3 | 1.060E-2 |
| Average-3σ (Bias1) | --- | 5.695E-5 | 1.313E-3 | 7.954E-4 | 1.429E-3 | 1.209E-3 | 3.422E-3 | 2.257E-3 | 1.817E-3 | -5.014E-4 | 2.844E-3 |
| Average (Bias2) | --- | 1.551E-3 | 3.513E-3 | 5.145E-3 | 4.635E-3 | 3.726E-3 | 5.872E-3 | 4.353E-3 | 4.704E-3 | 5.407E-3 | 8.756E-3 |
| σ (Bias2) | --- | 7.830E-4 | 8.190E-4 | 1.210E-3 | 1.331E-3 | 1.381E-3 | 8.564E-4 | 1.076E-3 | 5.164E-4 | 1.209E-3 | 8.985E-4 |
| Average+3σ (Bias2) | --- | 3.900E-3 | 5.970E-3 | 8.774E-3 | 8.629E-3 | 7.868E-3 | 8.441E-3 | 7.580E-3 | 6.253E-3 | 9.033E-3 | 1.145E-2 |
| Average-3σ (Bias2) | --- | -7.977E-4 | 1.056E-3 | 1.516E-3 | 6.417E-4 | -4.169E-4 | 3.303E-3 | 1.126E-3 | 3.155E-3 | 1.781E-3 | 6.060E-3 |
| Average (OFF) | --- | 2.709E-3 | 4.513E-3 | 5.791E-3 | 5.720E-3 | 4.545E-3 | 6.468E-3 | 5.269E-3 | 5.357E-3 | 7.049E-3 | 9.308E-3 |
| σ (OFF) | --- | 7.228E-4 | 9.920E-4 | 9.846E-4 | 8.030E-4 | 7.340E-4 | 1.052E-3 | 8.892E-4 | 7.430E-4 | 9.759E-4 | 1.026E-3 |
| Average+3σ (OFF) | --- | 4.877E-3 | 7.489E-3 | 8.745E-3 | 8.129E-3 | 6.747E-3 | 9.625E-3 | 7.936E-3 | 7.586E-3 | 9.977E-3 | 1.239E-2 |
| Average-3σ (OFF) | --- | 5.407E-4 | 1.536E-3 | 2.837E-3 | 3.311E-3 | 2.343E-3 | 3.310E-3 | 2.602E-3 | 3.128E-3 | 4.122E-3 | 6.231E-3 |

## 8. BVr

**Ta=25°C; Ir = 10 µA**



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

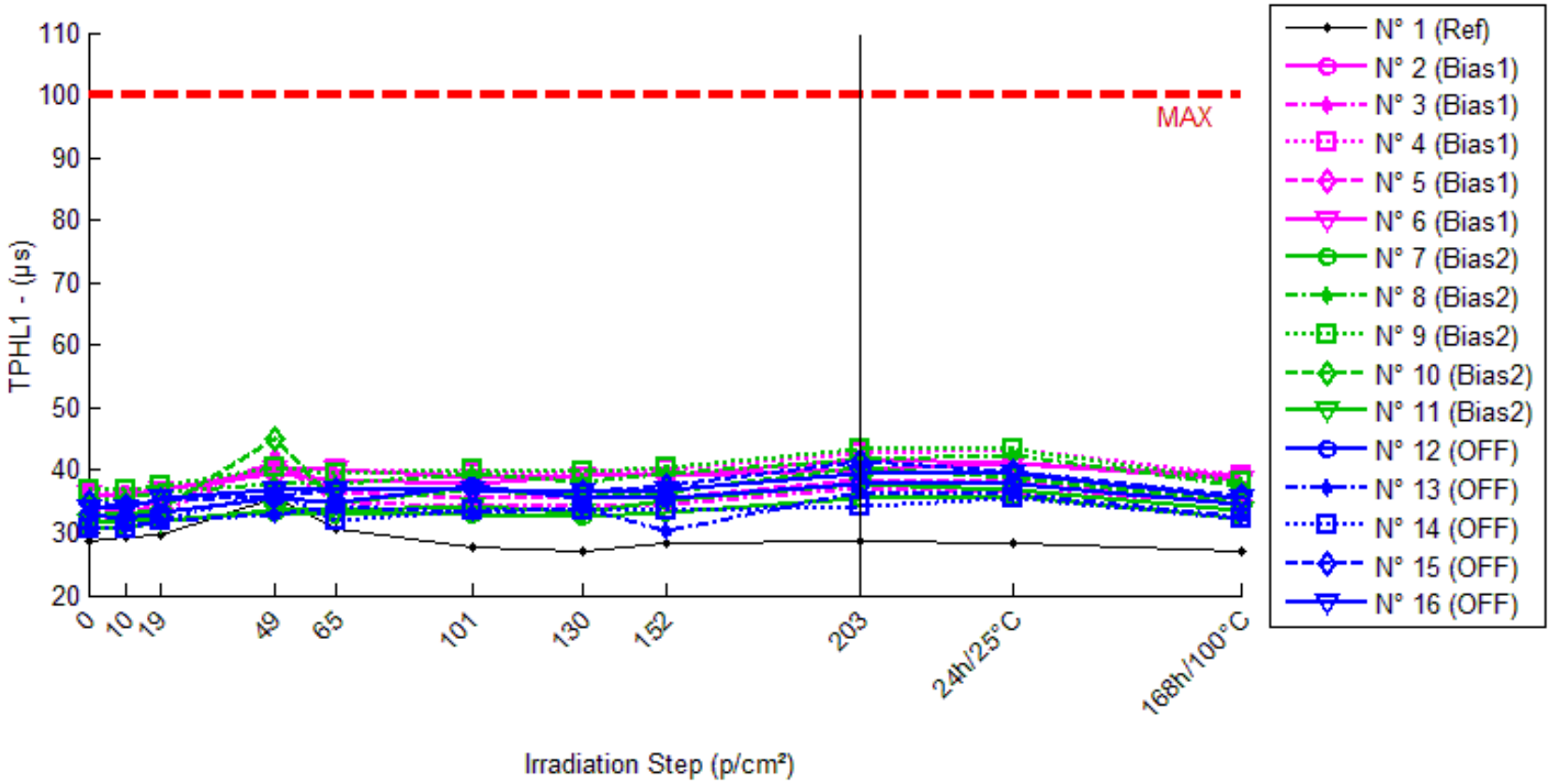
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 9.863 | 9.869 | 9.856 | 9.855 | 9.859 | 9.855 | 9.848 | 9.864 | 9.855 | 9.853 | 9.848 |
| N° 2 (Bias1) | 9.814 | 9.813 | 9.802 | 9.802 | 9.805 | 9.795 | 9.794 | 9.803 | 9.800 | 9.798 | 9.797 |
| N° 3 (Bias1) | 9.908 | 9.908 | 9.898 | 9.897 | 9.901 | 9.897 | 9.892 | 9.900 | 9.900 | 9.897 | 9.898 |
| N° 4 (Bias1) | 9.862 | 9.863 | 9.853 | 9.856 | 9.857 | 9.850 | 9.847 | 9.854 | 9.854 | 9.856 | 9.843 |
| N° 5 (Bias1) | 9.901 | 9.902 | 9.894 | 9.892 | 9.892 | 9.890 | 9.887 | 9.894 | 9.894 | 9.894 | 9.887 |
| N° 6 (Bias1) | 9.794 | 9.793 | 9.783 | 9.781 | 9.782 | 9.778 | 9.775 | 9.780 | 9.782 | 9.779 | 9.772 |
| N° 7 (Bias2) | 9.844 | 9.843 | 9.836 | 9.833 | 9.836 | 9.831 | 9.827 | 9.832 | 9.834 | 9.833 | 9.824 |
| N° 8 (Bias2) | 9.777 | 9.776 | 9.769 | 9.767 | 9.768 | 9.768 | 9.760 | 9.765 | 9.768 | 9.766 | 9.756 |
| N° 9 (Bias2) | 9.839 | 9.837 | 9.829 | 9.827 | 9.831 | 9.826 | 9.820 | 9.826 | 9.828 | 9.827 | 9.817 |
| N° 10 (Bias2) | 9.915 | 9.910 | 9.903 | 9.900 | 9.901 | 9.898 | 9.893 | 9.898 | 9.903 | 9.898 | 9.892 |
| N° 11 (Bias2) | 9.863 | 9.862 | 9.854 | 9.855 | 9.853 | 9.850 | 9.844 | 9.852 | 9.851 | 9.850 | 9.844 |
| N° 12 (OFF) | 9.945 | 9.941 | 9.934 | 9.933 | 9.933 | 9.931 | 9.925 | 9.930 | 9.932 | 9.929 | 9.923 |
| N° 13 (OFF) | 9.831 | 9.827 | 9.821 | 9.819 | 9.819 | 9.817 | 9.813 | 9.817 | 9.818 | 9.816 | 9.810 |
| N° 14 (OFF) | 9.817 | 9.813 | 9.808 | 9.805 | 9.804 | 9.803 | 9.797 | 9.803 | 9.804 | 9.802 | 9.795 |
| N° 15 (OFF) | 9.856 | 9.850 | 9.844 | 9.841 | 9.841 | 9.840 | 9.833 | 9.839 | 9.842 | 9.838 | 9.831 |
| N° 16 (OFF) | 9.892 | 9.888 | 9.881 | 9.879 | 9.881 | 9.879 | 9.873 | 9.878 | 9.882 | 9.877 | 9.869 |

**Delta [BVr]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 6.466E-3 | -6.844E-3 | -7.315E-3 | -3.924E-3 | -7.237E-3 | -1.500E-2 | 9.080E-4 | -7.173E-3 | -9.679E-3 | -1.454E-2 |
| N° 2 (Bias1) | --- | -6.730E-4 | -1.178E-2 | -1.230E-2 | -9.276E-3 | -1.892E-2 | -2.045E-2 | -1.059E-2 | -1.363E-2 | -1.554E-2 | -1.725E-2 |
| N° 3 (Bias1) | --- | -5.700E-5 | -1.041E-2 | -1.073E-2 | -7.304E-3 | -1.125E-2 | -1.606E-2 | -8.396E-3 | -8.445E-3 | -1.128E-2 | -1.066E-2 |
| N° 4 (Bias1) | --- | 3.190E-4 | -9.300E-3 | -5.872E-3 | -5.343E-3 | -1.240E-2 | -1.546E-2 | -8.121E-3 | -8.112E-3 | -6.629E-3 | -1.914E-2 |
| N° 5 (Bias1) | --- | 4.690E-4 | -7.529E-3 | -9.546E-3 | -9.680E-3 | -1.170E-2 | -1.434E-2 | -7.492E-3 | -7.059E-3 | -7.246E-3 | -1.415E-2 |
| N° 6 (Bias1) | --- | -1.090E-3 | -1.064E-2 | -1.289E-2 | -1.203E-2 | -1.610E-2 | -1.925E-2 | -1.376E-2 | -1.212E-2 | -1.499E-2 | -2.245E-2 |
| N° 7 (Bias2) | --- | -1.396E-3 | -7.871E-3 | -1.168E-2 | -8.600E-3 | -1.323E-2 | -1.752E-2 | -1.214E-2 | -1.026E-2 | -1.100E-2 | -2.069E-2 |
| N° 8 (Bias2) | --- | -9.790E-4 | -8.337E-3 | -1.071E-2 | -9.080E-3 | -9.121E-3 | -1.779E-2 | -1.230E-2 | -9.507E-3 | -1.160E-2 | -2.180E-2 |
| N° 9 (Bias2) | --- | -1.310E-3 | -9.307E-3 | -1.194E-2 | -8.052E-3 | -1.319E-2 | -1.846E-2 | -1.313E-2 | -1.052E-2 | -1.200E-2 | -2.214E-2 |
| N° 10 (Bias2) | --- | -4.177E-3 | -1.133E-2 | -1.483E-2 | -1.407E-2 | -1.626E-2 | -2.201E-2 | -1.650E-2 | -1.205E-2 | -1.677E-2 | -2.244E-2 |
| N° 11 (Bias2) | --- | -1.408E-3 | -9.126E-3 | -8.731E-3 | -1.082E-2 | -1.332E-2 | -1.901E-2 | -1.167E-2 | -1.233E-2 | -1.369E-2 | -1.927E-2 |
| N° 12 (OFF) | --- | -4.023E-3 | -1.091E-2 | -1.217E-2 | -1.195E-2 | -1.399E-2 | -2.018E-2 | -1.516E-2 | -1.316E-2 | -1.571E-2 | -2.168E-2 |
| N° 13 (OFF) | --- | -3.481E-3 | -9.974E-3 | -1.181E-2 | -1.134E-2 | -1.333E-2 | -1.783E-2 | -1.418E-2 | -1.259E-2 | -1.447E-2 | -2.089E-2 |
| N° 14 (OFF) | --- | -4.111E-3 | -8.468E-3 | -1.204E-2 | -1.302E-2 | -1.401E-2 | -1.928E-2 | -1.410E-2 | -1.319E-2 | -1.490E-2 | -2.162E-2 |
| N° 15 (OFF) | --- | -6.223E-3 | -1.222E-2 | -1.529E-2 | -1.440E-2 | -1.577E-2 | -2.253E-2 | -1.707E-2 | -1.349E-2 | -1.824E-2 | -2.517E-2 |
| N° 16 (OFF) | --- | -4.103E-3 | -1.102E-2 | -1.334E-2 | -1.124E-2 | -1.286E-2 | -1.929E-2 | -1.385E-2 | -9.888E-3 | -1.549E-2 | -2.309E-2 |
| Average (Bias1) | --- | -2.064E-4 | -9.931E-3 | -1.027E-2 | -8.726E-3 | -1.407E-2 | -1.711E-2 | -9.671E-3 | -9.874E-3 | -1.114E-2 | -1.673E-2 |
| σ (Bias1) | --- | 6.620E-4 | 1.606E-3 | 2.787E-3 | 2.529E-3 | 3.318E-3 | 2.608E-3 | 2.565E-3 | 2.840E-3 | 4.174E-3 | 4.535E-3 |
| Average+3σ (Bias1) | --- | 1.780E-3 | -5.114E-3 | -1.907E-3 | -1.140E-3 | -4.120E-3 | -9.288E-3 | -1.975E-3 | -1.355E-3 | 1.385E-3 | -3.123E-3 |
| Average-3σ (Bias1) | --- | -2.192E-3 | -1.475E-2 | -1.863E-2 | -1.631E-2 | -2.403E-2 | -2.494E-2 | -1.737E-2 | -1.839E-2 | -2.366E-2 | -3.034E-2 |
| Average (Bias2) | --- | -1.854E-3 | -9.194E-3 | -1.158E-2 | -1.012E-2 | -1.302E-2 | -1.896E-2 | -1.315E-2 | -1.093E-2 | -1.301E-2 | -2.127E-2 |
| σ (Bias2) | --- | 1.310E-3 | 1.328E-3 | 2.211E-3 | 2.437E-3 | 2.543E-3 | 1.800E-3 | 1.947E-3 | 1.209E-3 | 2.327E-3 | 1.301E-3 |
| Average+3σ (Bias2) | --- | 2.077E-3 | -5.209E-3 | -4.945E-3 | -2.814E-3 | -5.395E-3 | -1.356E-2 | -7.308E-3 | -7.306E-3 | -6.032E-3 | -1.736E-2 |
| Average-3σ (Bias2) | --- | -5.785E-3 | -1.318E-2 | -1.821E-2 | -1.743E-2 | -2.065E-2 | -2.436E-2 | -1.899E-2 | -1.456E-2 | -2.000E-2 | -2.517E-2 |
| Average (OFF) | --- | -4.388E-3 | -1.052E-2 | -1.293E-2 | -1.239E-2 | -1.399E-2 | -1.982E-2 | -1.487E-2 | -1.246E-2 | -1.576E-2 | -2.249E-2 |
| σ (OFF) | --- | 1.058E-3 | 1.395E-3 | 1.446E-3 | 1.326E-3 | 1.103E-3 | 1.729E-3 | 1.324E-3 | 1.475E-3 | 1.469E-3 | 1.698E-3 |
| Average+3σ (OFF) | --- | -1.213E-3 | -6.332E-3 | -8.594E-3 | -8.410E-3 | -1.068E-2 | -1.464E-2 | -1.090E-2 | -8.036E-3 | -1.135E-2 | -1.739E-2 |
| Average-3σ (OFF) | --- | -7.563E-3 | -1.470E-2 | -1.727E-2 | -1.637E-2 | -1.730E-2 | -2.501E-2 | -1.885E-2 | -1.689E-2 | -2.017E-2 | -2.758E-2 |

## 9. TPHL 1

**Ta=25°C; If = 0.5 mA; RL = 4.7 kOhms; Vcc = 5 V**



**TPHL1 . (µs)** **Max = 100.0**

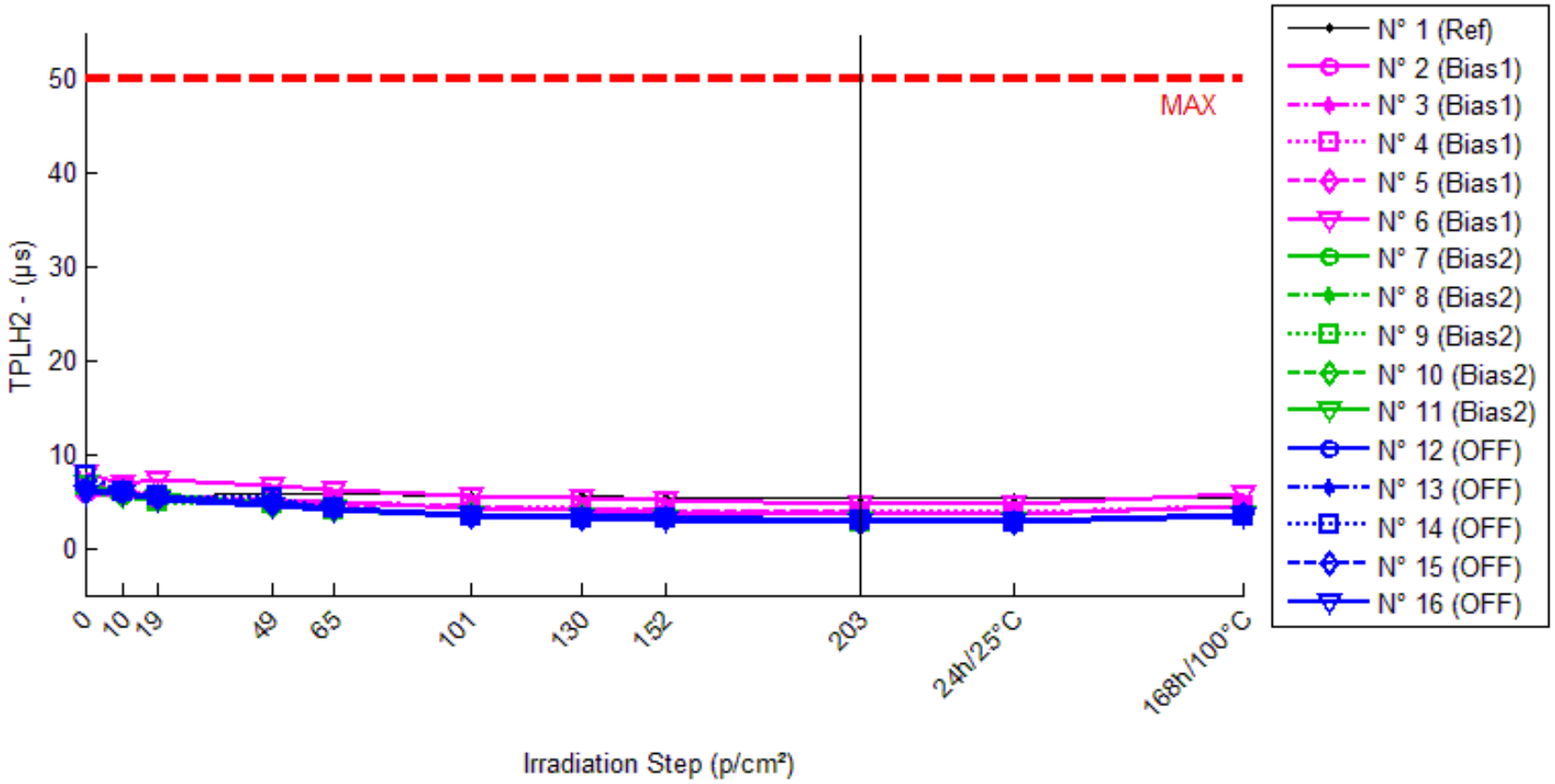
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 28.8 | 29.2 | 29.6 | 35.4 | 30.6 | 27.8 | 27.0 | 28.2 | 28.6 | 28.3 | 27.1 |
| N° 2 (Bias1) | 36.0 | 36.2 | 36.8 | 39.6 | 38.6 | 38.0 | 39.0 | 39.1 | 40.1 | 41.1 | 39.0 |
| N° 3 (Bias1) | 32.2 | 32.4 | 33.2 | 41.4 | 35.0 | 34.2 | 34.4 | 34.5 | 37.1 | 36.5 | 35.1 |
| N° 4 (Bias1) | 36.4 | 37.0 | 37.6 | 40.4 | 40.2 | 39.5 | 39.8 | 40.0 | 42.6 | 43.3 | 39.0 |
| N° 5 (Bias1) | 33.2 | 33.4 | 34.6 | 41.6 | 36.4 | 35.4 | 35.6 | 35.6 | 38.4 | 38.2 | 35.3 |
| N° 6 (Bias1) | 36.2 | 36.0 | 37.0 | 40.0 | 40.0 | 38.8 | 39.2 | 39.0 | 41.7 | 41.2 | 38.4 |
| N° 7 (Bias2) | 30.8 | 30.8 | 31.8 | 33.4 | 32.8 | 33.0 | 32.7 | 33.4 | 35.4 | 36.0 | 32.2 |
| N° 8 (Bias2) | 35.2 | 35.4 | 36.6 | 38.0 | 38.0 | 39.4 | 38.3 | 39.4 | 41.8 | 42.4 | 37.6 |
| N° 9 (Bias2) | 36.8 | 36.8 | 37.4 | 40.4 | 39.4 | 40.0 | 39.9 | 40.6 | 43.4 | 43.3 | 38.1 |
| N° 10 (Bias2) | 33.4 | 33.0 | 33.8 | 45.0 | 34.8 | 37.0 | 35.8 | 36.6 | 40.3 | 38.8 | 35.0 |
| N° 11 (Bias2) | 31.6 | 31.8 | 32.0 | 33.6 | 33.6 | 34.2 | 33.2 | 35.3 | 37.9 | 36.8 | 33.6 |
| N° 12 (OFF) | 32.8 | 32.4 | 33.2 | 35.4 | 35.0 | 37.4 | 35.4 | 35.6 | 38.0 | 37.9 | 34.6 |
| N° 13 (OFF) | 30.6 | 31.0 | 31.8 | 33.0 | 34.2 | 33.4 | 34.0 | 30.3 | 36.6 | 36.1 | 32.5 |
| N° 14 (OFF) | 30.8 | 30.8 | 32.0 | 36.4 | 32.0 | 33.6 | 33.5 | 33.6 | 34.4 | 35.6 | 32.4 |
| N° 15 (OFF) | 35.0 | 34.4 | 35.2 | 36.0 | 36.8 | 37.0 | 36.6 | 37.5 | 41.6 | 39.8 | 36.0 |
| N° 16 (OFF) | 34.0 | 34.0 | 35.4 | 36.8 | 37.0 | 37.0 | 36.6 | 36.7 | 39.4 | 39.4 | 35.7 |

**Delta [TPHL1]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 4.000E-1 | 8.000E-1 | 6.600E+0 | 1.800E+0 | -1.000E+0 | -1.800E+0 | -6.000E-1 | -2.000E-1 | -5.000E-1 | -1.700E+0 |
| N° 2 (Bias1) | --- | 2.000E-1 | 8.000E-1 | 3.600E+0 | 2.600E+0 | 2.000E+0 | 3.000E+0 | 3.150E+0 | 4.100E+0 | 5.100E+0 | 3.000E+0 |
| N° 3 (Bias1) | --- | 2.000E-1 | 1.000E+0 | 9.200E+0 | 2.800E+0 | 2.000E+0 | 2.200E+0 | 2.300E+0 | 4.900E+0 | 4.300E+0 | 2.900E+0 |
| N° 4 (Bias1) | --- | 6.000E-1 | 1.200E+0 | 4.000E+0 | 3.800E+0 | 3.100E+0 | 3.400E+0 | 3.600E+0 | 6.250E+0 | 6.900E+0 | 2.600E+0 |
| N° 5 (Bias1) | --- | 2.000E-1 | 1.400E+0 | 8.400E+0 | 3.200E+0 | 2.200E+0 | 2.400E+0 | 2.400E+0 | 5.200E+0 | 5.000E+0 | 2.100E+0 |
| N° 6 (Bias1) | --- | -2.000E-1 | 8.000E-1 | 3.800E+0 | 3.800E+0 | 2.600E+0 | 3.000E+0 | 2.800E+0 | 5.500E+0 | 5.000E+0 | 2.200E+0 |
| N° 7 (Bias2) | --- | 0.000E+0 | 1.000E+0 | 2.600E+0 | 2.000E+0 | 2.200E+0 | 1.900E+0 | 2.550E+0 | 4.550E+0 | 5.200E+0 | 1.400E+0 |
| N° 8 (Bias2) | --- | 2.000E-1 | 1.400E+0 | 2.800E+0 | 2.800E+0 | 4.200E+0 | 3.100E+0 | 4.200E+0 | 6.600E+0 | 7.200E+0 | 2.400E+0 |
| N° 9 (Bias2) | --- | 0.000E+0 | 6.000E-1 | 3.600E+0 | 2.600E+0 | 3.200E+0 | 3.100E+0 | 3.800E+0 | 6.600E+0 | 6.500E+0 | 1.350E+0 |
| N° 10 (Bias2) | --- | -4.000E-1 | 4.000E-1 | 1.160E+1 | 1.400E+0 | 3.600E+0 | 2.400E+0 | 3.200E+0 | 6.900E+0 | 5.400E+0 | 1.600E+0 |
| N° 11 (Bias2) | --- | 2.000E-1 | 4.000E-1 | 2.000E+0 | 2.000E+0 | 2.600E+0 | 1.600E+0 | 3.700E+0 | 6.250E+0 | 5.200E+0 | 2.000E+0 |
| N° 12 (OFF) | --- | -4.000E-1 | 4.000E-1 | 2.600E+0 | 2.200E+0 | 4.600E+0 | 2.600E+0 | 2.800E+0 | 5.200E+0 | 5.100E+0 | 1.850E+0 |
| N° 13 (OFF) | --- | 4.000E-1 | 1.200E+0 | 2.400E+0 | 3.600E+0 | 2.800E+0 | 3.400E+0 | -3.000E-1 | 6.000E+0 | 5.500E+0 | 1.900E+0 |
| N° 14 (OFF) | --- | 0.000E+0 | 1.200E+0 | 5.600E+0 | 1.200E+0 | 2.800E+0 | 2.700E+0 | 2.800E+0 | 3.600E+0 | 4.800E+0 | 1.600E+0 |
| N° 15 (OFF) | --- | -6.000E-1 | 2.000E-1 | 1.000E+0 | 1.800E+0 | 2.000E+0 | 1.650E+0 | 2.450E+0 | 6.650E+0 | 4.750E+0 | 1.000E+0 |
| N° 16 (OFF) | --- | 0.000E+0 | 1.400E+0 | 2.800E+0 | 3.000E+0 | 3.000E+0 | 2.600E+0 | 2.700E+0 | 5.400E+0 | 5.400E+0 | 1.700E+0 |
| Average (Bias1) | --- | 2.000E-1 | 1.040E+0 | 5.800E+0 | 3.240E+0 | 2.380E+0 | 2.800E+0 | 2.850E+0 | 5.190E+0 | 5.260E+0 | 2.560E+0 |
| σ (Bias1) | --- | 2.828E-1 | 2.608E-1 | 2.757E+0 | 5.550E-1 | 4.712E-1 | 4.899E-1 | 5.385E-1 | 7.893E-1 | 9.711E-1 | 4.037E-1 |
| Average+3σ (Bias1) | --- | 1.049E+0 | 1.822E+0 | 1.407E+1 | 4.905E+0 | 3.794E+0 | 4.270E+0 | 4.466E+0 | 7.558E+0 | 8.173E+0 | 3.771E+0 |
| Average-3σ (Bias1) | --- | -6.485E-1 | 2.577E-1 | -2.470E+0 | 1.575E+0 | 9.665E-1 | 1.330E+0 | 1.234E+0 | 2.822E+0 | 2.347E+0 | 1.349E+0 |
| Average (Bias2) | --- | -7.105E-16 | 7.600E-1 | 4.520E+0 | 2.160E+0 | 3.160E+0 | 2.420E+0 | 3.490E+0 | 6.180E+0 | 5.900E+0 | 1.750E+0 |
| σ (Bias2) | --- | 2.449E-1 | 4.336E-1 | 3.999E+0 | 5.550E-1 | 7.925E-1 | 6.834E-1 | 6.348E-1 | 9.398E-1 | 9.055E-1 | 4.444E-1 |
| Average+3σ (Bias2) | --- | 7.348E-1 | 2.061E+0 | 1.652E+1 | 3.825E+0 | 5.537E+0 | 4.470E+0 | 5.394E+0 | 8.999E+0 | 8.617E+0 | 3.083E+0 |
| Average-3σ (Bias2) | --- | -7.348E-1 | -5.408E-1 | -7.477E+0 | 4.951E-1 | 7.826E-1 | 3.699E-1 | 1.586E+0 | 3.361E+0 | 3.183E+0 | 4.168E-1 |
| Average (OFF) | --- | -1.200E-1 | 8.800E-1 | 2.880E+0 | 2.360E+0 | 3.040E+0 | 2.590E+0 | 2.090E+0 | 5.370E+0 | 5.110E+0 | 1.610E+0 |
| σ (OFF) | --- | 3.899E-1 | 5.404E-1 | 1.677E+0 | 9.529E-1 | 9.529E-1 | 6.229E-1 | 1.344E+0 | 1.140E+0 | 3.399E-1 | 3.612E-1 |
| Average+3σ (OFF) | --- | 1.050E+0 | 2.501E+0 | 7.911E+0 | 5.219E+0 | 5.899E+0 | 4.459E+0 | 6.121E+0 | 8.790E+0 | 6.130E+0 | 2.694E+0 |
| Average-3σ (OFF) | --- | -1.290E+0 | -7.411E-1 | -2.151E+0 | -4.987E-1 | 1.813E-1 | 7.213E-1 | -1.941E+0 | 1.950E+0 | 4.090E+0 | 5.263E-1 |

## 10.TPHL2

**Ta=25°C; If = 1.6 mA; RL = 1.5 kOhms; Vcc = 5 V**



**TPHL2 . (µs)** **Max = 30.0**

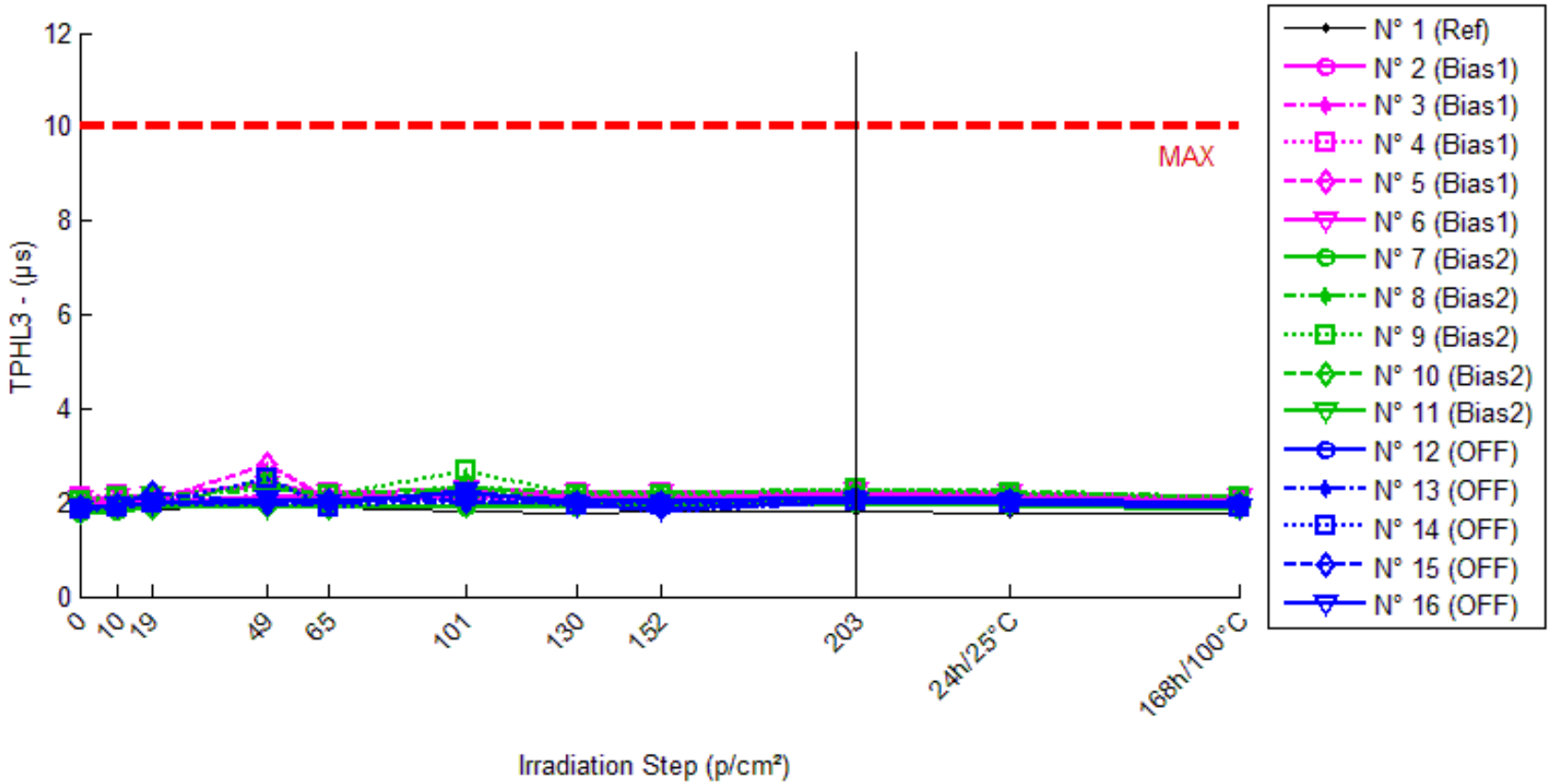
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 7.4 | 7.5 | 7.4 | 7.7 | 7.7 | 7.3 | 7.2 | 7.3 | 7.4 | 7.3 | 7.2 |
| N° 2 (Bias1) | 8.7 | 8.9 | 8.8 | 9.0 | 9.3 | 9.0 | 9.1 | 7.6 | 9.4 | 9.3 | 9.1 |
| N° 3 (Bias1) | 8.1 | 8.3 | 8.2 | 8.5 | 8.5 | 8.4 | 8.3 | 8.4 | 8.6 | 8.5 | 8.3 |
| N° 4 (Bias1) | 9.1 | 9.4 | 9.1 | 9.8 | 9.5 | 9.4 | 9.4 | 9.4 | 9.7 | 9.8 | 9.1 |
| N° 5 (Bias1) | 8.5 | 8.6 | 8.7 | 8.8 | 8.8 | 8.7 | 8.8 | 8.8 | 9.1 | 9.0 | 8.5 |
| N° 6 (Bias1) | 9.0 | 8.9 | 9.4 | 9.5 | 9.5 | 9.4 | 9.4 | 9.4 | 9.6 | 9.6 | 9.2 |
| N° 7 (Bias2) | 7.7 | 7.7 | 8.1 | 8.1 | 8.0 | 8.0 | 8.0 | 8.0 | 8.4 | 8.3 | 7.8 |
| N° 8 (Bias2) | 8.9 | 8.8 | 9.2 | 9.4 | 9.2 | 9.4 | 9.2 | 9.3 | 9.9 | 9.6 | 9.0 |
| N° 9 (Bias2) | 9.1 | 9.4 | 9.1 | 9.5 | 9.3 | 9.4 | 9.3 | 9.3 | 10.0 | 9.7 | 9.0 |
| N° 10 (Bias2) | 8.4 | 8.4 | 8.2 | 8.8 | 8.3 | 8.7 | 8.3 | 8.4 | 8.9 | 8.7 | 8.1 |
| N° 11 (Bias2) | 8.0 | 8.1 | 8.0 | 8.2 | 8.1 | 8.2 | 8.2 | 8.2 | 8.6 | 8.5 | 8.0 |
| N° 12 (OFF) | 8.2 | 8.3 | 8.5 | 8.6 | 8.5 | 9.0 | 8.6 | 8.6 | 9.0 | 8.9 | 8.4 |
| N° 13 (OFF) | 7.8 | 8.1 | 8.2 | 8.2 | 8.2 | 8.2 | 8.3 | 6.8 | 8.6 | 8.5 | 8.0 |
| N° 14 (OFF) | 8.3 | 8.1 | 8.2 | 8.8 | 8.1 | 8.2 | 8.2 | 8.2 | 8.4 | 8.4 | 8.0 |
| N° 15 (OFF) | 8.2 | 8.5 | 8.5 | 8.7 | 8.6 | 8.6 | 8.5 | 8.6 | 9.1 | 8.8 | 8.3 |
| N° 16 (OFF) | 8.0 | 8.4 | 8.4 | 8.6 | 8.4 | 8.6 | 8.4 | 7.0 | 8.9 | 8.7 | 8.2 |

**Delta [TPHL2]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 8.000E-2 | 0.000E+0 | 2.800E-1 | 2.600E-1 | -1.400E-1 | -2.400E-1 | -1.200E-1 | -4.000E-2 | -1.200E-1 | -2.400E-1 |
| N° 2 (Bias1) | --- | 2.200E-1 | 1.400E-1 | 3.800E-1 | 6.400E-1 | 3.400E-1 | 4.400E-1 | -1.020E+0 | 7.800E-1 | 6.800E-1 | 4.200E-1 |
| N° 3 (Bias1) | --- | 2.000E-1 | 8.000E-2 | 4.000E-1 | 3.800E-1 | 2.800E-1 | 1.800E-1 | 2.400E-1 | 5.200E-1 | 3.800E-1 | 1.600E-1 |
| N° 4 (Bias1) | --- | 3.600E-1 | 6.000E-2 | 7.200E-1 | 4.200E-1 | 3.200E-1 | 3.200E-1 | 3.400E-1 | 6.400E-1 | 6.800E-1 | 4.000E-2 |
| N° 5 (Bias1) | --- | 1.600E-1 | 2.000E-1 | 3.600E-1 | 3.200E-1 | 2.200E-1 | 2.700E-1 | 3.200E-1 | 6.200E-1 | 5.400E-1 | 6.000E-2 |
| N° 6 (Bias1) | --- | -8.000E-2 | 3.400E-1 | 5.000E-1 | 4.800E-1 | 3.800E-1 | 3.800E-1 | 3.800E-1 | 5.800E-1 | 5.800E-1 | 1.800E-1 |
| N° 7 (Bias2) | --- | -4.000E-2 | 4.200E-1 | 3.400E-1 | 2.800E-1 | 2.800E-1 | 3.200E-1 | 3.200E-1 | 6.600E-1 | 6.000E-1 | 1.000E-1 |
| N° 8 (Bias2) | --- | -8.000E-2 | 2.400E-1 | 4.800E-1 | 2.800E-1 | 4.800E-1 | 2.800E-1 | 4.000E-1 | 9.600E-1 | 7.200E-1 | 8.000E-2 |
| N° 9 (Bias2) | --- | 2.200E-1 | -4.000E-2 | 3.600E-1 | 1.600E-1 | 2.600E-1 | 1.600E-1 | 1.800E-1 | 8.200E-1 | 5.400E-1 | -1.200E-1 |
| N° 10 (Bias2) | --- | 0.000E+0 | -2.000E-1 | 4.500E-1 | -1.000E-1 | 2.500E-1 | -8.000E-2 | 0.000E+0 | 5.000E-1 | 2.600E-1 | -2.600E-1 |
| N° 11 (Bias2) | --- | 6.000E-2 | 2.000E-2 | 2.000E-1 | 1.000E-1 | 2.500E-1 | 1.800E-1 | 2.400E-1 | 6.000E-1 | 4.800E-1 | 2.000E-2 |
| N° 12 (OFF) | --- | 8.000E-2 | 2.600E-1 | 4.000E-1 | 3.000E-1 | 8.000E-1 | 3.800E-1 | 3.800E-1 | 7.800E-1 | 6.600E-1 | 2.000E-1 |
| N° 13 (OFF) | --- | 3.800E-1 | 4.000E-1 | 4.400E-1 | 4.400E-1 | 4.400E-1 | 5.200E-1 | -1.000E+0 | 8.000E-1 | 7.200E-1 | 2.000E-1 |
| N° 14 (OFF) | --- | -2.000E-1 | -8.000E-2 | 4.800E-1 | -2.200E-1 | -1.200E-1 | -1.200E-1 | -1.200E-1 | 1.200E-1 | 1.200E-1 | -3.600E-1 |
| N° 15 (OFF) | --- | 3.000E-1 | 3.400E-1 | 5.000E-1 | 4.000E-1 | 4.000E-1 | 3.200E-1 | 4.000E-1 | 9.200E-1 | 6.200E-1 | 1.200E-1 |
| N° 16 (OFF) | --- | 4.200E-1 | 3.600E-1 | 5.500E-1 | 4.500E-1 | 6.000E-1 | 4.400E-1 | -1.000E+0 | 8.800E-1 | 6.800E-1 | 2.200E-1 |
| Average (Bias1) | --- | 1.720E-1 | 1.640E-1 | 4.720E-1 | 4.480E-1 | 3.080E-1 | 3.180E-1 | 5.200E-2 | 6.280E-1 | 5.720E-1 | 1.720E-1 |
| σ (Bias1) | --- | 1.597E-1 | 1.126E-1 | 1.487E-1 | 1.221E-1 | 6.099E-2 | 1.001E-1 | 6.014E-1 | 9.654E-2 | 1.238E-1 | 1.514E-1 |
| Average+3σ (Bias1) | --- | 6.512E-1 | 5.018E-1 | 9.182E-1 | 8.144E-1 | 4.910E-1 | 6.183E-1 | 1.856E+0 | 9.176E-1 | 9.433E-1 | 6.262E-1 |
| Average-3σ (Bias1) | --- | -3.072E-1 | -1.738E-1 | 2.582E-2 | 8.156E-2 | 1.250E-1 | 1.770E-2 | -1.752E+0 | 3.384E-1 | 2.007E-1 | -2.822E-1 |
| Average (Bias2) | --- | 3.200E-2 | 8.800E-2 | 3.660E-1 | 1.440E-1 | 3.040E-1 | 1.720E-1 | 2.280E-1 | 7.080E-1 | 5.200E-1 | -3.600E-2 |
| σ (Bias2) | --- | 1.171E-1 | 2.436E-1 | 1.099E-1 | 1.571E-1 | 9.915E-2 | 1.559E-1 | 1.521E-1 | 1.825E-1 | 1.703E-1 | 1.519E-1 |
| Average+3σ (Bias2) | --- | 3.834E-1 | 8.187E-1 | 6.957E-1 | 6.153E-1 | 6.014E-1 | 6.398E-1 | 6.842E-1 | 1.256E+0 | 1.031E+0 | 4.198E-1 |
| Average-3σ (Bias2) | --- | -3.194E-1 | -6.427E-1 | 3.627E-2 | -3.273E-1 | 6.561E-3 | -2.958E-1 | -2.282E-1 | 1.604E-1 | 9.118E-3 | -4.918E-1 |
| Average (OFF) | --- | 1.960E-1 | 2.560E-1 | 4.740E-1 | 2.740E-1 | 4.240E-1 | 3.080E-1 | -2.680E-1 | 7.000E-1 | 5.600E-1 | 7.600E-2 |
| σ (OFF) | --- | 2.574E-1 | 1.946E-1 | 5.727E-2 | 2.825E-1 | 3.425E-1 | 2.504E-1 | 6.999E-1 | 3.292E-1 | 2.486E-1 | 2.467E-1 |
| Average+3σ (OFF) | --- | 9.683E-1 | 8.399E-1 | 6.458E-1 | 1.121E+0 | 1.451E+0 | 1.059E+0 | 1.832E+0 | 1.688E+0 | 1.306E+0 | 8.162E-1 |
| Average-3σ (OFF) | --- | -5.763E-1 | -3.279E-1 | 3.022E-1 | -5.734E-1 | -6.034E-1 | -4.433E-1 | -2.368E+0 | -2.877E-1 | -1.858E-1 | -6.642E-1 |

## 11.TPHL3

**Ta=25°C; If = 5 mA; RL = 680 Ohms; Vcc = 5 V**



**TPHL3 . (µs)** **Max = 10.0**

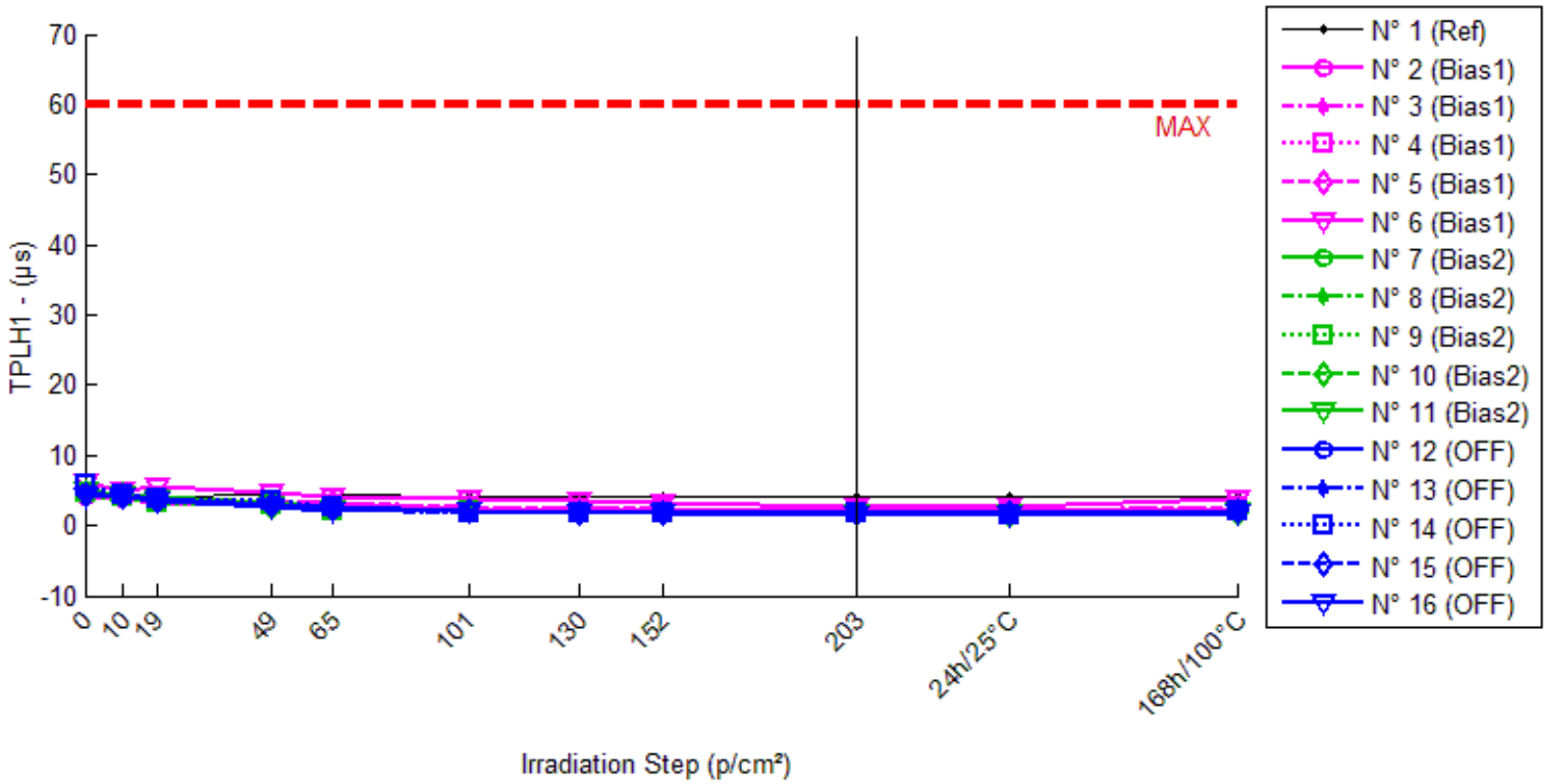
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 1.80 | 1.82 | 1.84 | 1.94 | 1.88 | 1.80 | 1.78 | 1.80 | 1.80 | 1.77 | 1.77 |
| N° 2 (Bias1) | 1.99 | 2.02 | 2.05 | 2.11 | 2.12 | 2.12 | 2.12 | 2.13 | 2.16 | 2.13 | 2.08 |
| N° 3 (Bias1) | 1.88 | 1.94 | 1.93 | 2.14 | 2.08 | 2.00 | 1.96 | 1.98 | 2.01 | 1.98 | 1.93 |
| N° 4 (Bias1) | 2.12 | 2.16 | 2.11 | 2.41 | 2.20 | 2.30 | 2.20 | 2.19 | 2.23 | 2.21 | 2.11 |
| N° 5 (Bias1) | 1.98 | 2.03 | 2.04 | 2.82 | 2.08 | 2.08 | 2.08 | 2.08 | 2.12 | 2.09 | 2.01 |
| N° 6 (Bias1) | 2.07 | 2.11 | 2.17 | 2.36 | 2.20 | 2.28 | 2.20 | 2.20 | 2.23 | 2.20 | 2.13 |
| N° 7 (Bias2) | 1.78 | 1.82 | 1.88 | 1.94 | 1.88 | 1.92 | 1.92 | 1.92 | 2.00 | 1.95 | 1.85 |
| N° 8 (Bias2) | 2.09 | 2.09 | 2.12 | 2.30 | 2.16 | 2.32 | 2.20 | 2.21 | 2.29 | 2.24 | 2.13 |
| N° 9 (Bias2) | 2.05 | 2.12 | 2.11 | 2.40 | 2.16 | 2.68 | 2.18 | 2.18 | 2.29 | 2.22 | 2.10 |
| N° 10 (Bias2) | 1.84 | 1.90 | 1.90 | 2.52 | 1.92 | 2.40 | 1.95 | 1.96 | 2.01 | 1.98 | 1.90 |
| N° 11 (Bias2) | 1.83 | 1.89 | 1.89 | 1.92 | 1.92 | 1.96 | 1.93 | 1.96 | 2.00 | 1.98 | 1.89 |
| N° 12 (OFF) | 1.90 | 1.96 | 1.99 | 2.04 | 2.04 | 2.20 | 2.04 | 2.05 | 2.10 | 2.07 | 1.98 |
| N° 13 (OFF) | 1.83 | 1.92 | 1.97 | 1.96 | 2.00 | 2.04 | 1.98 | 1.81 | 2.02 | 2.00 | 1.91 |
| N° 14 (OFF) | 1.87 | 1.91 | 1.97 | 2.52 | 1.92 | 2.12 | 1.96 | 1.96 | 2.01 | 1.99 | 1.90 |
| N° 15 (OFF) | 1.88 | 1.95 | 2.19 | 2.00 | 2.02 | 2.04 | 2.00 | 1.97 | 2.07 | 2.03 | 1.94 |
| N° 16 (OFF) | 1.84 | 1.93 | 1.99 | 2.08 | 2.00 | 2.24 | 1.96 | 1.84 | 2.03 | 1.99 | 1.90 |

**Delta [TPHL3]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 2.000E-2 | 4.000E-2 | 1.400E-1 | 8.000E-2 | 0.000E+0 | -2.000E-2 | 0.000E+0 | 0.000E+0 | -3.000E-2 | -3.000E-2 |
| N° 2 (Bias1) | --- | 3.000E-2 | 6.000E-2 | 1.200E-1 | 1.300E-1 | 1.300E-1 | 1.300E-1 | 1.400E-1 | 1.700E-1 | 1.400E-1 | 9.000E-2 |
| N° 3 (Bias1) | --- | 6.000E-2 | 5.000E-2 | 2.600E-1 | 2.000E-1 | 1.200E-1 | 8.000E-2 | 1.000E-1 | 1.300E-1 | 1.000E-1 | 5.000E-2 |
| N° 4 (Bias1) | --- | 4.000E-2 | -1.000E-2 | 2.900E-1 | 8.000E-2 | 1.800E-1 | 8.000E-2 | 7.000E-2 | 1.100E-1 | 9.000E-2 | -1.000E-2 |
| N° 5 (Bias1) | --- | 5.000E-2 | 6.000E-2 | 8.400E-1 | 1.000E-1 | 1.000E-1 | 1.000E-1 | 1.000E-1 | 1.400E-1 | 1.100E-1 | 3.000E-2 |
| N° 6 (Bias1) | --- | 4.000E-2 | 1.000E-1 | 2.900E-1 | 1.300E-1 | 2.100E-1 | 1.300E-1 | 1.300E-1 | 1.600E-1 | 1.300E-1 | 6.000E-2 |
| N° 7 (Bias2) | --- | 4.000E-2 | 1.000E-1 | 1.600E-1 | 1.000E-1 | 1.400E-1 | 1.400E-1 | 1.400E-1 | 2.200E-1 | 1.700E-1 | 7.000E-2 |
| N° 8 (Bias2) | --- | 0.000E+0 | 3.000E-2 | 2.100E-1 | 7.000E-2 | 2.300E-1 | 1.100E-1 | 1.200E-1 | 2.000E-1 | 1.500E-1 | 4.000E-2 |
| N° 9 (Bias2) | --- | 7.000E-2 | 6.000E-2 | 3.500E-1 | 1.100E-1 | 6.300E-1 | 1.300E-1 | 1.300E-1 | 2.400E-1 | 1.700E-1 | 5.000E-2 |
| N° 10 (Bias2) | --- | 6.000E-2 | 6.000E-2 | 6.800E-1 | 8.000E-2 | 5.600E-1 | 1.100E-1 | 1.200E-1 | 1.700E-1 | 1.400E-1 | 6.000E-2 |
| N° 11 (Bias2) | --- | 6.000E-2 | 6.000E-2 | 9.000E-2 | 9.000E-2 | 1.300E-1 | 1.000E-1 | 1.300E-1 | 1.700E-1 | 1.500E-1 | 6.000E-2 |
| N° 12 (OFF) | --- | 6.000E-2 | 9.000E-2 | 1.400E-1 | 1.400E-1 | 3.000E-1 | 1.400E-1 | 1.500E-1 | 2.000E-1 | 1.700E-1 | 8.000E-2 |
| N° 13 (OFF) | --- | 9.000E-2 | 1.400E-1 | 1.300E-1 | 1.700E-1 | 2.100E-1 | 1.500E-1 | -2.000E-2 | 1.900E-1 | 1.700E-1 | 8.000E-2 |
| N° 14 (OFF) | --- | 4.000E-2 | 1.000E-1 | 6.500E-1 | 5.000E-2 | 2.500E-1 | 9.000E-2 | 9.000E-2 | 1.400E-1 | 1.200E-1 | 3.000E-2 |
| N° 15 (OFF) | --- | 7.000E-2 | 3.100E-1 | 1.200E-1 | 1.400E-1 | 1.600E-1 | 1.200E-1 | 9.000E-2 | 1.900E-1 | 1.500E-1 | 6.000E-2 |
| N° 16 (OFF) | --- | 9.000E-2 | 1.500E-1 | 2.400E-1 | 1.600E-1 | 4.000E-1 | 1.200E-1 | 0.000E+0 | 1.900E-1 | 1.500E-1 | 6.000E-2 |
| Average (Bias1) | --- | 4.400E-2 | 5.200E-2 | 3.600E-1 | 1.280E-1 | 1.480E-1 | 1.040E-1 | 1.080E-1 | 1.420E-1 | 1.140E-1 | 4.400E-2 |
| σ (Bias1) | --- | 1.140E-2 | 3.962E-2 | 2.774E-1 | 4.550E-2 | 4.550E-2 | 2.510E-2 | 2.775E-2 | 2.387E-2 | 2.074E-2 | 3.715E-2 |
| Average+3σ (Bias1) | --- | 7.821E-2 | 1.709E-1 | 1.192E+0 | 2.645E-1 | 2.845E-1 | 1.793E-1 | 1.912E-1 | 2.136E-1 | 1.762E-1 | 1.554E-1 |
| Average-3σ (Bias1) | --- | 9.795E-3 | -6.687E-2 | -4.722E-1 | -8.492E-3 | 1.151E-2 | 2.870E-2 | 2.475E-2 | 7.038E-2 | 5.179E-2 | -6.745E-2 |
| Average (Bias2) | --- | 4.600E-2 | 6.200E-2 | 2.980E-1 | 9.000E-2 | 3.380E-1 | 1.180E-1 | 1.280E-1 | 2.000E-1 | 1.560E-1 | 5.600E-2 |
| σ (Bias2) | --- | 2.793E-2 | 2.490E-2 | 2.338E-1 | 1.581E-2 | 2.391E-1 | 1.643E-2 | 8.367E-3 | 3.082E-2 | 1.342E-2 | 1.140E-2 |
| Average+3σ (Bias2) | --- | 1.298E-1 | 1.367E-1 | 9.994E-1 | 1.374E-1 | 1.055E+0 | 1.673E-1 | 1.531E-1 | 2.925E-1 | 1.962E-1 | 9.021E-2 |
| Average-3σ (Bias2) | --- | -3.779E-2 | -1.270E-2 | -4.034E-1 | 4.257E-2 | -3.793E-1 | 6.870E-2 | 1.029E-1 | 1.075E-1 | 1.158E-1 | 2.179E-2 |
| Average (OFF) | --- | 7.000E-2 | 1.580E-1 | 2.560E-1 | 1.320E-1 | 2.640E-1 | 1.240E-1 | 6.200E-2 | 1.820E-1 | 1.520E-1 | 6.200E-2 |
| σ (OFF) | --- | 2.121E-2 | 8.871E-2 | 2.255E-1 | 4.764E-2 | 9.182E-2 | 2.302E-2 | 7.050E-2 | 2.387E-2 | 2.049E-2 | 2.049E-2 |
| Average+3σ (OFF) | --- | 1.336E-1 | 4.241E-1 | 9.324E-1 | 2.749E-1 | 5.394E-1 | 1.931E-1 | 2.735E-1 | 2.536E-1 | 2.135E-1 | 1.235E-1 |
| Average-3σ (OFF) | --- | 6.360E-3 | -1.081E-1 | -4.204E-1 | -1.093E-2 | -1.145E-2 | 5.493E-2 | -1.495E-1 | 1.104E-1 | 9.052E-2 | 5.183E-4 |

## 12.TPLH1

**Ta=25°C; If = 0.5 mA; RL = 4.7 kOhms; Vcc = 5 V**



**TPLH1 . (µs)** **Max = 60.0**

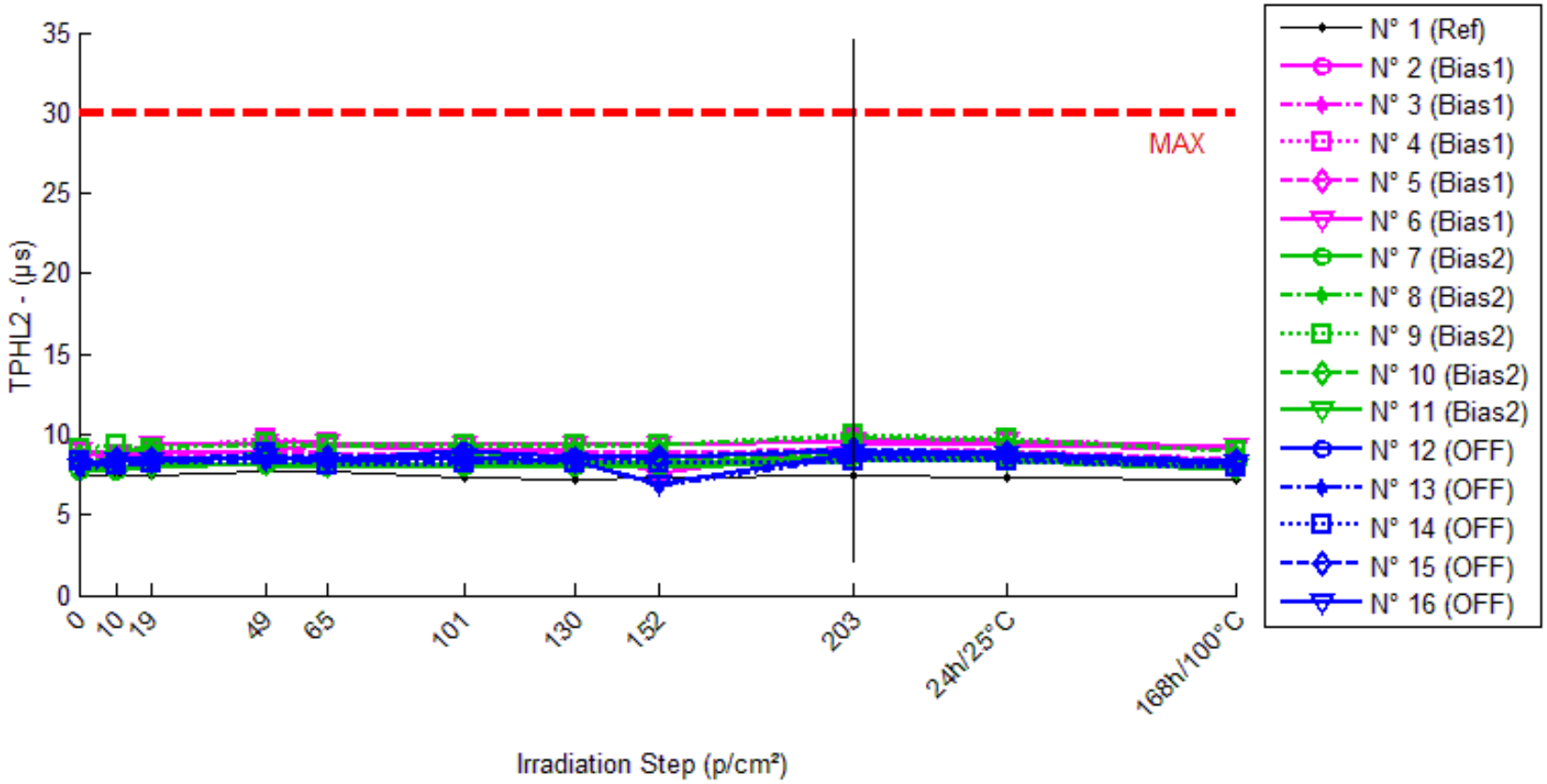
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 4.5 | 4.3 | 4.0 | 4.3 | 4.4 | 4.2 | 4.2 | 4.1 | 4.1 | 4.0 | 4.0 |
| N° 2 (Bias1) | 4.0 | 3.8 | 3.2 | 3.0 | 3.0 | 2.4 | 2.2 | 2.2 | 2.1 | 2.1 | 2.5 |
| N° 3 (Bias1) | 4.7 | 4.4 | 3.7 | 3.3 | 3.2 | 2.6 | 2.4 | 2.3 | 2.1 | 2.1 | 2.8 |
| N° 4 (Bias1) | 4.6 | 4.6 | 3.6 | 3.3 | 3.0 | 2.6 | 2.4 | 2.3 | 2.2 | 2.2 | 2.7 |
| N° 5 (Bias1) | 4.7 | 4.4 | 3.8 | 3.3 | 3.2 | 2.6 | 2.4 | 2.3 | 2.1 | 2.1 | 2.8 |
| N° 6 (Bias1) | 6.1 | 5.1 | 5.5 | 4.7 | 4.2 | 3.7 | 3.4 | 3.2 | 2.8 | 2.8 | 3.8 |
| N° 7 (Bias2) | 4.9 | 4.0 | 4.2 | 3.1 | 2.6 | 2.0 | 1.9 | 1.8 | 1.7 | 1.7 | 2.1 |
| N° 8 (Bias2) | 4.4 | 3.4 | 3.4 | 2.8 | 2.2 | 2.0 | 1.9 | 1.8 | 1.7 | 1.6 | 1.9 |
| N° 9 (Bias2) | 4.7 | 4.1 | 3.2 | 3.0 | 2.2 | 2.0 | 1.8 | 1.8 | 1.8 | 1.6 | 2.0 |
| N° 10 (Bias2) | 4.7 | 4.3 | 3.4 | 2.6 | 2.4 | 2.0 | 1.8 | 1.8 | 1.7 | 1.6 | 1.9 |
| N° 11 (Bias2) | 5.1 | 4.3 | 3.7 | 3.0 | 2.4 | 2.0 | 1.8 | 1.8 | 1.7 | 1.7 | 2.0 |
| N° 12 (OFF) | 4.7 | 4.1 | 3.9 | 3.0 | 2.6 | 2.0 | 1.9 | 1.9 | 1.8 | 1.7 | 2.0 |
| N° 13 (OFF) | 4.4 | 4.3 | 3.7 | 2.8 | 2.4 | 1.8 | 1.8 | 1.7 | 1.6 | 1.6 | 1.9 |
| N° 14 (OFF) | 6.0 | 4.5 | 3.8 | 3.6 | 2.8 | 1.9 | 1.8 | 1.8 | 1.7 | 1.6 | 2.0 |
| N° 15 (OFF) | 4.3 | 4.2 | 3.5 | 3.0 | 2.4 | 2.0 | 1.9 | 1.8 | 1.7 | 1.7 | 2.0 |
| N° 16 (OFF) | 4.1 | 4.0 | 3.4 | 2.8 | 2.2 | 2.0 | 1.8 | 1.8 | 1.6 | 1.6 | 1.9 |

**Delta [TPLH1]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | -1.500E-1 | -4.500E-1 | -1.500E-1 | -5.000E-2 | -2.500E-1 | -2.500E-1 | -3.300E-1 | -3.900E-1 | -4.900E-1 | -4.300E-1 |
| N° 2 (Bias1) | --- | -2.000E-1 | -8.000E-1 | -9.500E-1 | -1.000E+0 | -1.600E+0 | -1.800E+0 | -1.760E+0 | -1.880E+0 | -1.940E+0 | -1.480E+0 |
| N° 3 (Bias1) | --- | -3.000E-1 | -1.000E+0 | -1.400E+0 | -1.500E+0 | -2.100E+0 | -2.300E+0 | -2.380E+0 | -2.580E+0 | -2.600E+0 | -1.900E+0 |
| N° 4 (Bias1) | --- | 0.000E+0 | -1.000E+0 | -1.300E+0 | -1.600E+0 | -2.000E+0 | -2.200E+0 | -2.320E+0 | -2.400E+0 | -2.400E+0 | -1.860E+0 |
| N° 5 (Bias1) | --- | -3.000E-1 | -9.000E-1 | -1.400E+0 | -1.500E+0 | -2.100E+0 | -2.300E+0 | -2.400E+0 | -2.580E+0 | -2.580E+0 | -1.900E+0 |
| N° 6 (Bias1) | --- | -1.000E+0 | -6.000E-1 | -1.400E+0 | -1.900E+0 | -2.400E+0 | -2.700E+0 | -2.900E+0 | -3.340E+0 | -3.340E+0 | -2.300E+0 |
| N° 7 (Bias2) | --- | -9.000E-1 | -7.500E-1 | -1.800E+0 | -2.300E+0 | -2.900E+0 | -2.980E+0 | -3.100E+0 | -3.180E+0 | -3.180E+0 | -2.760E+0 |
| N° 8 (Bias2) | --- | -1.000E+0 | -1.000E+0 | -1.600E+0 | -2.200E+0 | -2.400E+0 | -2.500E+0 | -2.560E+0 | -2.680E+0 | -2.760E+0 | -2.480E+0 |
| N° 9 (Bias2) | --- | -6.000E-1 | -1.500E+0 | -1.700E+0 | -2.500E+0 | -2.700E+0 | -2.860E+0 | -2.860E+0 | -2.940E+0 | -3.060E+0 | -2.680E+0 |
| N° 10 (Bias2) | --- | -3.500E-1 | -1.250E+0 | -2.050E+0 | -2.250E+0 | -2.650E+0 | -2.830E+0 | -2.850E+0 | -2.930E+0 | -3.050E+0 | -2.710E+0 |
| N° 11 (Bias2) | --- | -8.000E-1 | -1.400E+0 | -2.100E+0 | -2.700E+0 | -3.100E+0 | -3.340E+0 | -3.260E+0 | -3.420E+0 | -3.420E+0 | -3.080E+0 |
| N° 12 (OFF) | --- | -6.000E-1 | -8.000E-1 | -1.700E+0 | -2.100E+0 | -2.700E+0 | -2.780E+0 | -2.820E+0 | -2.940E+0 | -2.960E+0 | -2.660E+0 |
| N° 13 (OFF) | --- | -1.000E-1 | -7.000E-1 | -1.600E+0 | -2.000E+0 | -2.600E+0 | -2.600E+0 | -2.680E+0 | -2.840E+0 | -2.800E+0 | -2.480E+0 |
| N° 14 (OFF) | --- | -1.500E+0 | -2.200E+0 | -2.400E+0 | -3.200E+0 | -4.100E+0 | -4.200E+0 | -4.200E+0 | -4.280E+0 | -4.360E+0 | -3.960E+0 |
| N° 15 (OFF) | --- | -1.000E-1 | -7.500E-1 | -1.300E+0 | -1.900E+0 | -2.300E+0 | -2.420E+0 | -2.500E+0 | -2.560E+0 | -2.620E+0 | -2.260E+0 |
| N° 16 (OFF) | --- | -1.000E-1 | -7.500E-1 | -1.300E+0 | -1.900E+0 | -2.100E+0 | -2.260E+0 | -2.340E+0 | -2.460E+0 | -2.460E+0 | -2.180E+0 |
| Average (Bias1) | --- | -3.600E-1 | -8.600E-1 | -1.290E+0 | -1.500E+0 | -2.040E+0 | -2.260E+0 | -2.352E+0 | -2.556E+0 | -2.572E+0 | -1.888E+0 |
| σ (Bias1) | --- | 3.782E-1 | 1.673E-1 | 1.949E-1 | 3.240E-1 | 2.881E-1 | 3.209E-1 | 4.046E-1 | 5.237E-1 | 5.049E-1 | 2.904E-1 |
| Average+3σ (Bias1) | --- | 7.745E-1 | -3.580E-1 | -7.052E-1 | -5.279E-1 | -1.176E+0 | -1.297E+0 | -1.138E+0 | -9.848E-1 | -1.057E+0 | -1.017E+0 |
| Average-3σ (Bias1) | --- | -1.494E+0 | -1.362E+0 | -1.875E+0 | -2.472E+0 | -2.904E+0 | -3.223E+0 | -3.566E+0 | -4.127E+0 | -4.087E+0 | -2.759E+0 |
| Average (Bias2) | --- | -7.300E-1 | -1.180E+0 | -1.850E+0 | -2.390E+0 | -2.750E+0 | -2.902E+0 | -2.926E+0 | -3.030E+0 | -3.094E+0 | -2.742E+0 |
| σ (Bias2) | --- | 2.588E-1 | 3.054E-1 | 2.179E-1 | 2.074E-1 | 2.646E-1 | 3.027E-1 | 2.674E-1 | 2.807E-1 | 2.389E-1 | 2.168E-1 |
| Average+3σ (Bias2) | --- | 4.653E-2 | -2.639E-1 | -1.196E+0 | -1.768E+0 | -1.956E+0 | -1.994E+0 | -2.124E+0 | -2.188E+0 | -2.377E+0 | -2.091E+0 |
| Average-3σ (Bias2) | --- | -1.507E+0 | -2.096E+0 | -2.504E+0 | -3.012E+0 | -3.544E+0 | -3.810E+0 | -3.728E+0 | -3.872E+0 | -3.811E+0 | -3.393E+0 |
| Average (OFF) | --- | -4.800E-1 | -1.040E+0 | -1.660E+0 | -2.220E+0 | -2.760E+0 | -2.852E+0 | -2.908E+0 | -3.016E+0 | -3.040E+0 | -2.708E+0 |
| σ (OFF) | --- | 6.099E-1 | 6.494E-1 | 4.506E-1 | 5.541E-1 | 7.861E-1 | 7.783E-1 | 7.447E-1 | 7.334E-1 | 7.614E-1 | 7.248E-1 |
| Average+3σ (OFF) | --- | 1.350E+0 | 9.083E-1 | -3.083E-1 | -5.578E-1 | -4.016E-1 | -5.172E-1 | -6.740E-1 | -8.158E-1 | -7.557E-1 | -5.336E-1 |
| Average-3σ (OFF) | --- | -2.310E+0 | -2.988E+0 | -3.012E+0 | -3.882E+0 | -5.118E+0 | -5.187E+0 | -5.142E+0 | -5.216E+0 | -5.324E+0 | -4.882E+0 |

## 13.TPLH2

**Ta=25°C; If = 1.6 mA; RL = 1.5 kOhms; Vcc = 5 V**



**TPLH2 . (µs)** **Max = 50.0**

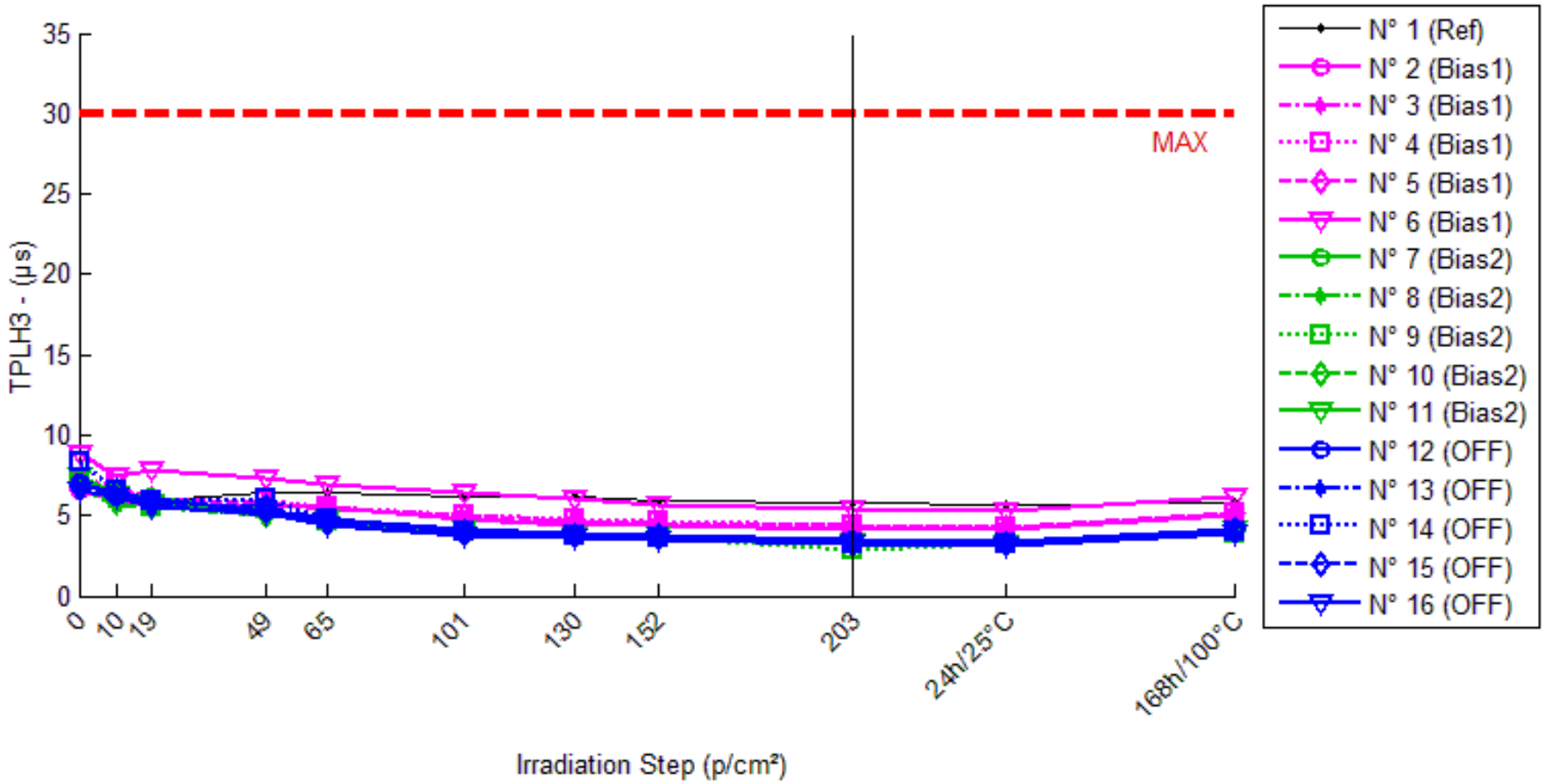
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 6.0 | 5.8 | 5.5 | 5.8 | 5.8 | 5.6 | 5.6 | 5.4 | 5.4 | 5.3 | 5.3 |
| N° 2 (Bias1) | 5.9 | 5.5 | 5.0 | 4.9 | 5.0 | 4.2 | 4.0 | 3.9 | 3.7 | 3.6 | 4.4 |
| N° 3 (Bias1) | 6.4 | 6.0 | 5.3 | 5.0 | 5.0 | 4.4 | 4.1 | 4.0 | 3.8 | 3.7 | 4.6 |
| N° 4 (Bias1) | 6.5 | 6.4 | 5.4 | 5.2 | 5.0 | 4.4 | 4.2 | 4.1 | 3.9 | 3.8 | 4.6 |
| N° 5 (Bias1) | 6.4 | 6.0 | 5.5 | 5.2 | 4.8 | 4.4 | 4.1 | 4.0 | 3.9 | 3.7 | 4.5 |
| N° 6 (Bias1) | 8.0 | 7.0 | 7.3 | 6.7 | 6.2 | 5.6 | 5.4 | 5.1 | 4.8 | 4.7 | 5.7 |
| N° 7 (Bias2) | 6.5 | 5.5 | 5.8 | 4.7 | 4.2 | 3.6 | 3.4 | 3.4 | 3.0 | 3.0 | 3.7 |
| N° 8 (Bias2) | 6.2 | 5.2 | 5.1 | 4.8 | 4.0 | 3.4 | 3.2 | 3.0 | 2.7 | 2.7 | 3.5 |
| N° 9 (Bias2) | 6.6 | 6.0 | 5.0 | 4.8 | 4.0 | 3.4 | 3.2 | 3.1 | 2.7 | 2.7 | 3.5 |
| N° 10 (Bias2) | 6.4 | 6.0 | 5.2 | 4.4 | 4.0 | 3.6 | 3.3 | 3.1 | 2.9 | 2.8 | 3.6 |
| N° 11 (Bias2) | 6.8 | 5.9 | 5.3 | 4.6 | 4.2 | 3.6 | 3.4 | 3.2 | 2.9 | 2.9 | 3.6 |
| N° 12 (OFF) | 6.5 | 5.7 | 5.5 | 4.8 | 4.3 | 3.6 | 3.4 | 3.3 | 3.0 | 2.9 | 3.7 |
| N° 13 (OFF) | 6.0 | 5.8 | 5.2 | 4.4 | 4.0 | 3.4 | 3.2 | 3.1 | 2.7 | 2.7 | 3.5 |
| N° 14 (OFF) | 7.7 | 6.0 | 5.5 | 5.4 | 4.3 | 3.5 | 3.2 | 3.1 | 2.9 | 2.8 | 3.5 |
| N° 15 (OFF) | 6.2 | 6.0 | 5.3 | 5.0 | 4.2 | 3.4 | 3.2 | 3.2 | 2.8 | 2.8 | 3.6 |
| N° 16 (OFF) | 5.9 | 5.7 | 5.1 | 4.6 | 4.0 | 3.4 | 3.1 | 3.0 | 2.8 | 2.7 | 3.4 |

**Delta [TPLH2]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | -2.000E-1 | -5.500E-1 | -1.500E-1 | -2.000E-1 | -4.000E-1 | -4.000E-1 | -5.600E-1 | -5.600E-1 | -7.200E-1 | -6.800E-1 |
| N° 2 (Bias1) | --- | -4.000E-1 | -9.000E-1 | -1.000E+0 | -9.000E-1 | -1.700E+0 | -1.900E+0 | -1.980E+0 | -2.220E+0 | -2.300E+0 | -1.520E+0 |
| N° 3 (Bias1) | --- | -4.000E-1 | -1.100E+0 | -1.400E+0 | -1.400E+0 | -2.000E+0 | -2.300E+0 | -2.440E+0 | -2.640E+0 | -2.680E+0 | -1.760E+0 |
| N° 4 (Bias1) | --- | -1.000E-1 | -1.100E+0 | -1.300E+0 | -1.500E+0 | -2.100E+0 | -2.300E+0 | -2.420E+0 | -2.620E+0 | -2.680E+0 | -1.860E+0 |
| N° 5 (Bias1) | --- | -4.000E-1 | -9.000E-1 | -1.200E+0 | -1.600E+0 | -2.000E+0 | -2.300E+0 | -2.360E+0 | -2.540E+0 | -2.680E+0 | -1.860E+0 |
| N° 6 (Bias1) | --- | -1.000E+0 | -7.000E-1 | -1.300E+0 | -1.800E+0 | -2.400E+0 | -2.600E+0 | -2.880E+0 | -3.160E+0 | -3.320E+0 | -2.260E+0 |
| N° 7 (Bias2) | --- | -1.000E+0 | -7.500E-1 | -1.800E+0 | -2.300E+0 | -2.900E+0 | -3.060E+0 | -3.140E+0 | -3.460E+0 | -3.520E+0 | -2.760E+0 |
| N° 8 (Bias2) | --- | -1.000E+0 | -1.100E+0 | -1.400E+0 | -2.200E+0 | -2.800E+0 | -3.020E+0 | -3.160E+0 | -3.480E+0 | -3.520E+0 | -2.740E+0 |
| N° 9 (Bias2) | --- | -6.500E-1 | -1.600E+0 | -1.800E+0 | -2.600E+0 | -3.200E+0 | -3.400E+0 | -3.520E+0 | -3.880E+0 | -3.880E+0 | -3.140E+0 |
| N° 10 (Bias2) | --- | -4.000E-1 | -1.200E+0 | -2.000E+0 | -2.400E+0 | -2.800E+0 | -3.140E+0 | -3.300E+0 | -3.520E+0 | -3.640E+0 | -2.820E+0 |
| N° 11 (Bias2) | --- | -9.000E-1 | -1.500E+0 | -2.200E+0 | -2.600E+0 | -3.200E+0 | -3.440E+0 | -3.560E+0 | -3.880E+0 | -3.900E+0 | -3.160E+0 |
| N° 12 (OFF) | --- | -8.000E-1 | -1.000E+0 | -1.700E+0 | -2.200E+0 | -2.900E+0 | -3.140E+0 | -3.180E+0 | -3.500E+0 | -3.580E+0 | -2.780E+0 |
| N° 13 (OFF) | --- | -1.500E-1 | -8.000E-1 | -1.600E+0 | -2.000E+0 | -2.600E+0 | -2.840E+0 | -2.940E+0 | -3.280E+0 | -3.280E+0 | -2.520E+0 |
| N° 14 (OFF) | --- | -1.650E+0 | -2.150E+0 | -2.250E+0 | -3.350E+0 | -4.150E+0 | -4.410E+0 | -4.530E+0 | -4.770E+0 | -4.890E+0 | -4.130E+0 |
| N° 15 (OFF) | --- | -2.000E-1 | -9.000E-1 | -1.200E+0 | -2.000E+0 | -2.800E+0 | -2.960E+0 | -3.040E+0 | -3.400E+0 | -3.440E+0 | -2.640E+0 |
| N° 16 (OFF) | --- | -2.000E-1 | -8.000E-1 | -1.300E+0 | -1.900E+0 | -2.500E+0 | -2.760E+0 | -2.900E+0 | -3.140E+0 | -3.220E+0 | -2.520E+0 |
| Average (Bias1) | --- | -4.600E-1 | -9.400E-1 | -1.240E+0 | -1.440E+0 | -2.040E+0 | -2.280E+0 | -2.416E+0 | -2.636E+0 | -2.732E+0 | -1.852E+0 |
| σ (Bias1) | --- | 3.286E-1 | 1.673E-1 | 1.517E-1 | 3.362E-1 | 2.510E-1 | 2.490E-1 | 3.198E-1 | 3.381E-1 | 3.676E-1 | 2.671E-1 |
| Average+3σ (Bias1) | --- | 5.259E-1 | -4.380E-1 | -7.850E-1 | -4.315E-1 | -1.287E+0 | -1.533E+0 | -1.457E+0 | -1.622E+0 | -1.629E+0 | -1.051E+0 |
| Average-3σ (Bias1) | --- | -1.446E+0 | -1.442E+0 | -1.695E+0 | -2.448E+0 | -2.793E+0 | -3.027E+0 | -3.375E+0 | -3.650E+0 | -3.835E+0 | -2.653E+0 |
| Average (Bias2) | --- | -7.900E-1 | -1.230E+0 | -1.840E+0 | -2.420E+0 | -2.980E+0 | -3.212E+0 | -3.336E+0 | -3.644E+0 | -3.692E+0 | -2.924E+0 |
| σ (Bias2) | --- | 2.608E-1 | 3.384E-1 | 2.966E-1 | 1.789E-1 | 2.049E-1 | 1.952E-1 | 1.967E-1 | 2.165E-1 | 1.874E-1 | 2.085E-1 |
| Average+3σ (Bias2) | --- | -7.696E-3 | -2.149E-1 | -9.501E-1 | -1.883E+0 | -2.365E+0 | -2.626E+0 | -2.746E+0 | -2.994E+0 | -3.130E+0 | -2.298E+0 |
| Average-3σ (Bias2) | --- | -1.572E+0 | -2.245E+0 | -2.730E+0 | -2.957E+0 | -3.595E+0 | -3.798E+0 | -3.926E+0 | -4.294E+0 | -4.254E+0 | -3.550E+0 |
| Average (OFF) | --- | -6.000E-1 | -1.130E+0 | -1.610E+0 | -2.290E+0 | -2.990E+0 | -3.222E+0 | -3.318E+0 | -3.618E+0 | -3.682E+0 | -2.918E+0 |
| σ (OFF) | --- | 6.452E-1 | 5.762E-1 | 4.129E-1 | 6.025E-1 | 6.675E-1 | 6.794E-1 | 6.861E-1 | 6.579E-1 | 6.898E-1 | 6.859E-1 |
| Average+3σ (OFF) | --- | 1.336E+0 | 5.986E-1 | -3.713E-1 | -4.825E-1 | -9.876E-1 | -1.184E+0 | -1.260E+0 | -1.644E+0 | -1.613E+0 | -8.602E-1 |
| Average-3σ (OFF) | --- | -2.536E+0 | -2.859E+0 | -2.849E+0 | -4.097E+0 | -4.992E+0 | -5.260E+0 | -5.376E+0 | -5.592E+0 | -5.751E+0 | -4.976E+0 |

## 14.TPLH3

**Ta=25°C; If = 5 mA; RL = 680 Ohms; Vcc = 5 V**



**TPLH3 . (µs)** **Max = 30.0**

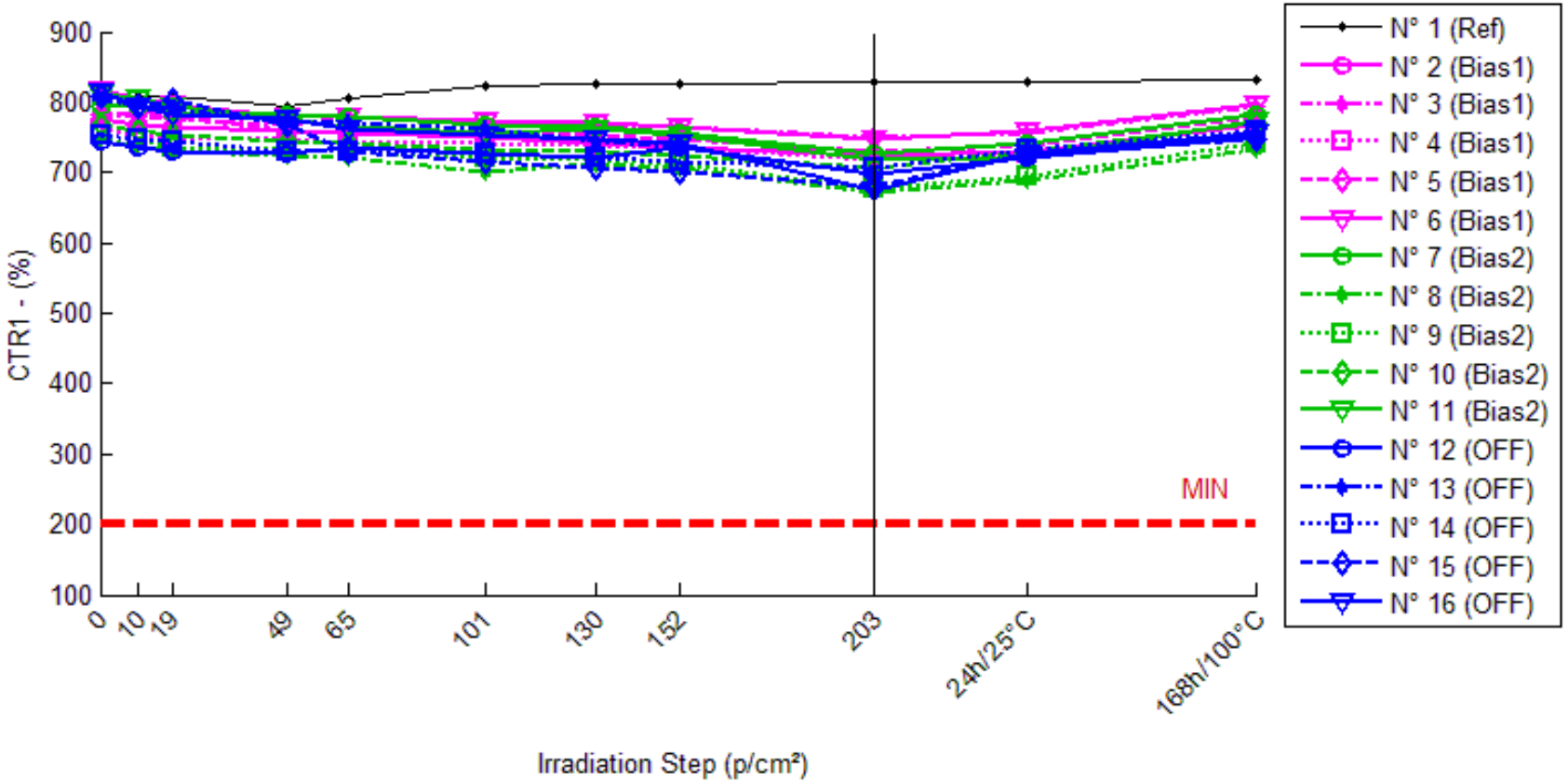
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 6.5 | 6.2 | 5.9 | 6.4 | 6.4 | 6.2 | 6.2 | 5.9 | 5.8 | 5.7 | 5.8 |
| N° 2 (Bias1) | 6.5 | 6.0 | 5.5 | 5.5 | 5.6 | 4.8 | 4.4 | 4.4 | 4.2 | 4.1 | 5.0 |
| N° 3 (Bias1) | 7.0 | 6.5 | 5.8 | 5.6 | 5.6 | 4.8 | 4.6 | 4.5 | 4.2 | 4.2 | 5.0 |
| N° 4 (Bias1) | 7.2 | 6.9 | 5.9 | 5.9 | 5.6 | 5.0 | 4.8 | 4.6 | 4.4 | 4.3 | 5.2 |
| N° 5 (Bias1) | 7.1 | 6.6 | 6.0 | 5.8 | 5.4 | 5.0 | 4.6 | 4.5 | 4.4 | 4.3 | 5.1 |
| N° 6 (Bias1) | 8.8 | 7.5 | 7.8 | 7.3 | 7.0 | 6.4 | 6.0 | 5.7 | 5.4 | 5.3 | 6.2 |
| N° 7 (Bias2) | 7.2 | 6.0 | 6.2 | 5.2 | 4.8 | 4.2 | 3.9 | 3.8 | 3.5 | 3.4 | 4.2 |
| N° 8 (Bias2) | 6.8 | 5.6 | 5.6 | 5.4 | 4.4 | 4.0 | 3.7 | 3.6 | 3.2 | 3.2 | 4.0 |
| N° 9 (Bias2) | 7.3 | 6.4 | 5.6 | 5.4 | 4.6 | 4.0 | 3.7 | 3.6 | 2.9 | 3.2 | 3.9 |
| N° 10 (Bias2) | 7.1 | 6.5 | 5.6 | 5.0 | 4.6 | 4.0 | 3.8 | 3.6 | 3.3 | 3.2 | 4.0 |
| N° 11 (Bias2) | 7.4 | 6.3 | 5.8 | 5.2 | 4.8 | 4.1 | 3.8 | 3.7 | 3.4 | 3.3 | 4.1 |
| N° 12 (OFF) | 7.1 | 6.2 | 6.0 | 5.3 | 4.8 | 4.2 | 3.9 | 3.8 | 3.5 | 3.4 | 4.2 |
| N° 13 (OFF) | 6.5 | 6.3 | 5.7 | 5.0 | 4.6 | 3.9 | 3.6 | 3.5 | 3.2 | 3.1 | 3.9 |
| N° 14 (OFF) | 8.3 | 6.5 | 5.9 | 6.0 | 4.8 | 4.0 | 3.7 | 3.6 | 3.3 | 3.2 | 4.0 |
| N° 15 (OFF) | 6.8 | 6.5 | 5.8 | 5.6 | 4.6 | 4.0 | 3.8 | 3.7 | 3.3 | 3.2 | 4.1 |
| N° 16 (OFF) | 6.5 | 6.2 | 5.5 | 5.2 | 4.4 | 3.8 | 3.6 | 3.5 | 3.2 | 3.1 | 3.9 |

**Delta [TPLH3]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | -3.500E-1 | -6.500E-1 | -1.500E-1 | -1.500E-1 | -3.500E-1 | -3.500E-1 | -6.300E-1 | -7.100E-1 | -8.300E-1 | -7.100E-1 |
| N° 2 (Bias1) | --- | -5.000E-1 | -1.000E+0 | -1.000E+0 | -9.000E-1 | -1.700E+0 | -2.100E+0 | -2.060E+0 | -2.280E+0 | -2.360E+0 | -1.520E+0 |
| N° 3 (Bias1) | --- | -5.000E-1 | -1.200E+0 | -1.400E+0 | -1.400E+0 | -2.200E+0 | -2.400E+0 | -2.480E+0 | -2.760E+0 | -2.780E+0 | -1.960E+0 |
| N° 4 (Bias1) | --- | -2.500E-1 | -1.250E+0 | -1.250E+0 | -1.550E+0 | -2.150E+0 | -2.350E+0 | -2.550E+0 | -2.750E+0 | -2.850E+0 | -1.970E+0 |
| N° 5 (Bias1) | --- | -5.000E-1 | -1.100E+0 | -1.350E+0 | -1.700E+0 | -2.100E+0 | -2.500E+0 | -2.560E+0 | -2.740E+0 | -2.820E+0 | -1.980E+0 |
| N° 6 (Bias1) | --- | -1.300E+0 | -1.000E+0 | -1.500E+0 | -1.800E+0 | -2.400E+0 | -2.800E+0 | -3.140E+0 | -3.440E+0 | -3.460E+0 | -2.600E+0 |
| N° 7 (Bias2) | --- | -1.200E+0 | -1.000E+0 | -2.000E+0 | -2.400E+0 | -3.000E+0 | -3.280E+0 | -3.360E+0 | -3.700E+0 | -3.800E+0 | -2.960E+0 |
| N° 8 (Bias2) | --- | -1.250E+0 | -1.250E+0 | -1.450E+0 | -2.450E+0 | -2.850E+0 | -3.170E+0 | -3.290E+0 | -3.610E+0 | -3.670E+0 | -2.850E+0 |
| N° 9 (Bias2) | --- | -9.000E-1 | -1.700E+0 | -1.900E+0 | -2.700E+0 | -3.300E+0 | -3.580E+0 | -3.700E+0 | -4.420E+0 | -4.080E+0 | -3.380E+0 |
| N° 10 (Bias2) | --- | -6.000E-1 | -1.500E+0 | -2.100E+0 | -2.500E+0 | -3.100E+0 | -3.340E+0 | -3.500E+0 | -3.820E+0 | -3.900E+0 | -3.100E+0 |
| N° 11 (Bias2) | --- | -1.100E+0 | -1.600E+0 | -2.200E+0 | -2.600E+0 | -3.300E+0 | -3.560E+0 | -3.680E+0 | -4.000E+0 | -4.060E+0 | -3.320E+0 |
| N° 12 (OFF) | --- | -9.000E-1 | -1.100E+0 | -1.800E+0 | -2.300E+0 | -2.900E+0 | -3.220E+0 | -3.340E+0 | -3.640E+0 | -3.720E+0 | -2.940E+0 |
| N° 13 (OFF) | --- | -2.500E-1 | -8.500E-1 | -1.550E+0 | -1.950E+0 | -2.650E+0 | -2.910E+0 | -3.030E+0 | -3.390E+0 | -3.410E+0 | -2.630E+0 |
| N° 14 (OFF) | --- | -1.800E+0 | -2.400E+0 | -2.300E+0 | -3.500E+0 | -4.300E+0 | -4.580E+0 | -4.700E+0 | -5.000E+0 | -5.100E+0 | -4.320E+0 |
| N° 15 (OFF) | --- | -3.000E-1 | -1.000E+0 | -1.200E+0 | -2.200E+0 | -2.800E+0 | -3.040E+0 | -3.120E+0 | -3.520E+0 | -3.560E+0 | -2.720E+0 |
| N° 16 (OFF) | --- | -3.000E-1 | -1.000E+0 | -1.300E+0 | -2.100E+0 | -2.700E+0 | -2.880E+0 | -3.020E+0 | -3.300E+0 | -3.380E+0 | -2.580E+0 |
| Average (Bias1) | --- | -6.100E-1 | -1.110E+0 | -1.300E+0 | -1.470E+0 | -2.110E+0 | -2.430E+0 | -2.558E+0 | -2.794E+0 | -2.854E+0 | -2.006E+0 |
| σ (Bias1) | --- | 4.006E-1 | 1.140E-1 | 1.904E-1 | 3.528E-1 | 2.559E-1 | 2.540E-1 | 3.850E-1 | 4.146E-1 | 3.930E-1 | 3.851E-1 |
| Average+3σ (Bias1) | --- | 5.919E-1 | -7.679E-1 | -7.288E-1 | -4.115E-1 | -1.342E+0 | -1.668E+0 | -1.403E+0 | -1.550E+0 | -1.675E+0 | -8.508E-1 |
| Average-3σ (Bias1) | --- | -1.812E+0 | -1.452E+0 | -1.871E+0 | -2.529E+0 | -2.878E+0 | -3.192E+0 | -3.713E+0 | -4.038E+0 | -4.033E+0 | -3.161E+0 |
| Average (Bias2) | --- | -1.010E+0 | -1.410E+0 | -1.930E+0 | -2.530E+0 | -3.110E+0 | -3.386E+0 | -3.506E+0 | -3.910E+0 | -3.902E+0 | -3.122E+0 |
| σ (Bias2) | --- | 2.655E-1 | 2.837E-1 | 2.907E-1 | 1.204E-1 | 1.949E-1 | 1.788E-1 | 1.843E-1 | 3.203E-1 | 1.738E-1 | 2.272E-1 |
| Average+3σ (Bias2) | --- | -2.134E-1 | -5.588E-1 | -1.058E+0 | -2.169E+0 | -2.525E+0 | -2.850E+0 | -2.953E+0 | -2.949E+0 | -3.380E+0 | -2.440E+0 |
| Average-3σ (Bias2) | --- | -1.807E+0 | -2.261E+0 | -2.802E+0 | -2.891E+0 | -3.695E+0 | -3.922E+0 | -4.059E+0 | -4.871E+0 | -4.424E+0 | -3.804E+0 |
| Average (OFF) | --- | -7.100E-1 | -1.270E+0 | -1.630E+0 | -2.410E+0 | -3.070E+0 | -3.326E+0 | -3.442E+0 | -3.770E+0 | -3.834E+0 | -3.038E+0 |
| σ (OFF) | --- | 6.656E-1 | 6.380E-1 | 4.410E-1 | 6.229E-1 | 6.943E-1 | 7.137E-1 | 7.149E-1 | 6.996E-1 | 7.205E-1 | 7.298E-1 |
| Average+3σ (OFF) | --- | 1.287E+0 | 6.439E-1 | -3.069E-1 | -5.413E-1 | -9.872E-1 | -1.185E+0 | -1.297E+0 | -1.671E+0 | -1.672E+0 | -8.486E-1 |
| Average-3σ (OFF) | --- | -2.707E+0 | -3.184E+0 | -2.953E+0 | -4.279E+0 | -5.153E+0 | -5.467E+0 | -5.587E+0 | -5.869E+0 | -5.996E+0 | -5.227E+0 |

## 15.CTR1

**Ta=25°C; If = 5 mA; Vo = 0.4 V; Vcc = 4.5 V**



**CTR1 . (%)** **Min = 200.0**

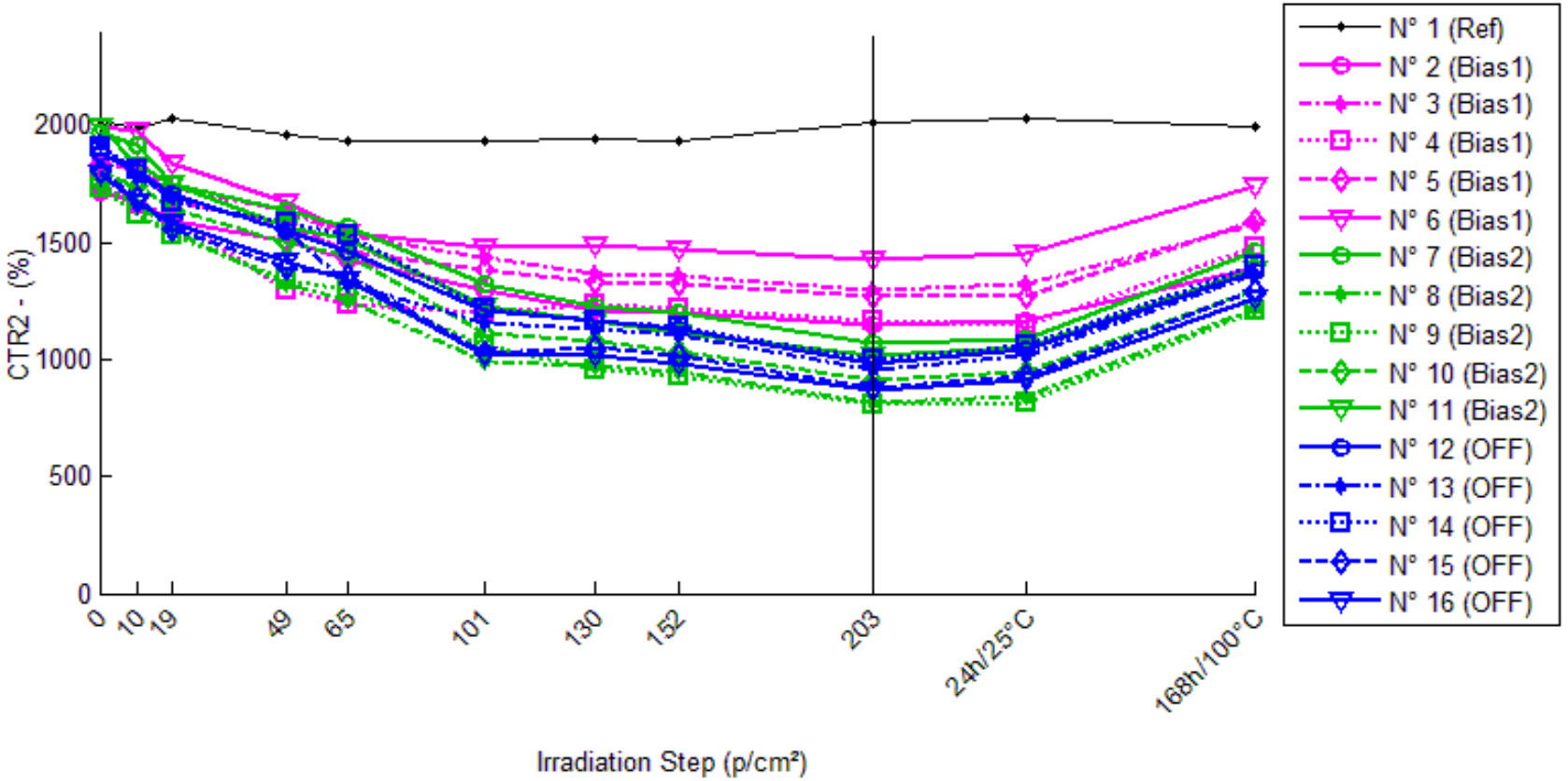
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 802.88 | 807.07 | 807.33 | 795.00 | 804.54 | 822.82 | 824.40 | 825.35 | 828.11 | 828.76 | 832.97 |
| N° 2 (Bias1) | 776.58 | 766.75 | 764.73 | 758.08 | 755.91 | 750.31 | 741.66 | 736.40 | 722.57 | 729.10 | 768.29 |
| N° 3 (Bias1) | 782.77 | 779.15 | 777.45 | 767.81 | 779.14 | 772.08 | 768.22 | 763.32 | 750.42 | 755.82 | 794.03 |
| N° 4 (Bias1) | 762.76 | 753.46 | 749.34 | 747.37 | 741.24 | 742.82 | 739.40 | 734.76 | 718.73 | 725.52 | 767.43 |
| N° 5 (Bias1) | 783.61 | 785.93 | 778.78 | 759.87 | 754.91 | 752.51 | 751.91 | 747.13 | 729.19 | 738.60 | 780.28 |
| N° 6 (Bias1) | 817.16 | 806.57 | 796.90 | 780.08 | 778.14 | 773.07 | 770.87 | 765.79 | 746.58 | 758.49 | 797.79 |
| N° 7 (Bias2) | 794.80 | 793.02 | 784.86 | 782.81 | 779.23 | 768.32 | 763.49 | 756.25 | 727.63 | 742.20 | 782.32 |
| N° 8 (Bias2) | 748.39 | 738.98 | 730.81 | 725.05 | 720.58 | 699.99 | 712.70 | 705.56 | 670.53 | 689.11 | 733.27 |
| N° 9 (Bias2) | 753.05 | 748.01 | 735.50 | 733.68 | 730.80 | 721.48 | 719.22 | 711.01 | 676.78 | 695.03 | 740.69 |
| N° 10 (Bias2) | 768.20 | 757.74 | 754.35 | 744.53 | 742.81 | 733.94 | 730.96 | 722.63 | 706.62 | 728.59 | 770.43 |
| N° 11 (Bias2) | 811.22 | 804.75 | 793.24 | 776.49 | 766.18 | 755.06 | 760.96 | 752.58 | 718.00 | 722.22 | 774.00 |
| N° 12 (OFF) | 744.51 | 736.03 | 730.11 | 727.75 | 735.60 | 725.78 | 722.50 | 735.91 | 699.12 | 721.92 | 751.25 |
| N° 13 (OFF) | 801.75 | 797.91 | 789.57 | 771.59 | 771.30 | 762.35 | 743.92 | 736.47 | 698.33 | 722.47 | 749.58 |
| N° 14 (OFF) | 753.45 | 748.53 | 743.56 | 731.20 | 729.34 | 726.21 | 721.51 | 714.65 | 705.24 | 731.90 | 759.97 |
| N° 15 (OFF) | 809.77 | 795.06 | 803.49 | 768.17 | 730.87 | 714.86 | 705.82 | 699.86 | 680.33 | 725.60 | 748.17 |
| N° 16 (OFF) | 814.08 | 792.63 | 782.52 | 776.04 | 762.28 | 752.52 | 746.71 | 740.10 | 675.47 | 727.26 | 755.40 |

**1/Delta [CTR1]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | -6.471E-6 | -6.855E-6 | 1.234E-5 | -2.568E-6 | -3.018E-5 | -3.251E-5 | -3.391E-5 | -3.794E-5 | -3.889E-5 | -4.499E-5 |
| N° 2 (Bias1) | --- | 1.651E-5 | 1.995E-5 | 3.143E-5 | 3.521E-5 | 4.509E-5 | 6.064E-5 | 7.026E-5 | 9.625E-5 | 8.386E-5 | 1.389E-5 |
| N° 3 (Bias1) | --- | 5.933E-6 | 8.751E-6 | 2.490E-5 | 5.955E-6 | 1.768E-5 | 2.420E-5 | 3.256E-5 | 5.508E-5 | 4.555E-5 | -1.810E-5 |
| N° 4 (Bias1) | --- | 1.618E-5 | 2.348E-5 | 2.699E-5 | 3.806E-5 | 3.520E-5 | 4.143E-5 | 4.997E-5 | 8.032E-5 | 6.730E-5 | -7.982E-6 |
| N° 5 (Bias1) | --- | -3.769E-6 | 7.913E-6 | 3.986E-5 | 4.851E-5 | 5.274E-5 | 5.380E-5 | 6.231E-5 | 9.524E-5 | 7.776E-5 | 5.440E-6 |
| N° 6 (Bias1) | --- | 1.606E-5 | 3.111E-5 | 5.816E-5 | 6.137E-5 | 6.979E-5 | 7.349E-5 | 8.209E-5 | 1.157E-4 | 9.465E-5 | 2.971E-5 |
| N° 7 (Bias2) | --- | 2.834E-6 | 1.593E-5 | 1.927E-5 | 2.514E-5 | 4.337E-5 | 5.159E-5 | 6.413E-5 | 1.161E-4 | 8.916E-5 | 2.008E-5 |
| N° 8 (Bias2) | --- | 1.701E-5 | 3.214E-5 | 4.301E-5 | 5.157E-5 | 9.238E-5 | 6.691E-5 | 8.112E-5 | 1.551E-4 | 1.150E-4 | 2.755E-5 |
| N° 9 (Bias2) | --- | 8.942E-6 | 3.168E-5 | 3.506E-5 | 4.042E-5 | 5.811E-5 | 6.247E-5 | 7.852E-5 | 1.496E-4 | 1.109E-4 | 2.215E-5 |
| N° 10 (Bias2) | --- | 1.797E-5 | 2.390E-5 | 4.139E-5 | 4.449E-5 | 6.077E-5 | 6.632E-5 | 8.209E-5 | 1.134E-4 | 7.078E-5 | -3.763E-6 |
| N° 11 (Bias2) | --- | 9.908E-6 | 2.794E-5 | 5.514E-5 | 7.248E-5 | 9.170E-5 | 8.141E-5 | 9.605E-5 | 1.601E-4 | 1.519E-4 | 5.929E-5 |
| N° 12 (OFF) | --- | 1.547E-5 | 2.648E-5 | 3.093E-5 | 1.627E-5 | 3.467E-5 | 4.091E-5 | 1.569E-5 | 8.720E-5 | 4.203E-5 | -1.205E-5 |
| N° 13 (OFF) | --- | 6.001E-6 | 1.923E-5 | 4.875E-5 | 4.923E-5 | 6.445E-5 | 9.696E-5 | 1.106E-4 | 1.847E-4 | 1.369E-4 | 8.681E-5 |
| N° 14 (OFF) | --- | 8.734E-6 | 1.765E-5 | 4.039E-5 | 4.388E-5 | 4.980E-5 | 5.876E-5 | 7.206E-5 | 9.074E-5 | 3.909E-5 | -1.137E-5 |
| N° 15 (OFF) | --- | 2.285E-5 | 9.660E-6 | 6.688E-5 | 1.333E-4 | 1.640E-4 | 1.819E-4 | 1.939E-4 | 2.349E-4 | 1.432E-4 | 1.017E-4 |
| N° 16 (OFF) | --- | 3.325E-5 | 4.953E-5 | 6.022E-5 | 8.348E-5 | 1.005E-4 | 1.108E-4 | 1.228E-4 | 2.521E-4 | 1.466E-4 | 9.541E-5 |
| Average (Bias1) | --- | 1.018E-5 | 1.824E-5 | 3.627E-5 | 3.782E-5 | 4.410E-5 | 5.071E-5 | 5.944E-5 | 8.852E-5 | 7.383E-5 | 4.592E-6 |
| σ (Bias1) | --- | 8.990E-6 | 9.908E-6 | 1.352E-5 | 2.056E-5 | 1.945E-5 | 1.881E-5 | 1.904E-5 | 2.252E-5 | 1.865E-5 | 1.865E-5 |
| Average+3σ (Bias1) | --- | 3.715E-5 | 4.797E-5 | 7.683E-5 | 9.951E-5 | 1.024E-4 | 1.072E-4 | 1.166E-4 | 1.561E-4 | 1.298E-4 | 6.055E-5 |
| Average-3σ (Bias1) | --- | -1.679E-5 | -1.148E-5 | -4.283E-6 | -2.387E-5 | -1.424E-5 | -5.731E-6 | 2.316E-6 | 2.096E-5 | 1.787E-5 | -5.136E-5 |
| Average (Bias2) | --- | 1.133E-5 | 2.632E-5 | 3.877E-5 | 4.682E-5 | 6.927E-5 | 6.574E-5 | 8.038E-5 | 1.389E-4 | 1.075E-4 | 2.506E-5 |
| σ (Bias2) | --- | 6.251E-6 | 6.689E-6 | 1.310E-5 | 1.730E-5 | 2.182E-5 | 1.070E-5 | 1.136E-5 | 2.232E-5 | 3.051E-5 | 2.259E-5 |
| Average+3σ (Bias2) | --- | 3.009E-5 | 4.639E-5 | 7.808E-5 | 9.872E-5 | 1.347E-4 | 9.785E-5 | 1.145E-4 | 2.059E-4 | 1.991E-4 | 9.284E-5 |
| Average-3σ (Bias2) | --- | -7.419E-6 | 6.252E-6 | -5.358E-7 | -5.078E-6 | 3.808E-6 | 3.363E-5 | 4.630E-5 | 7.192E-5 | 1.600E-5 | -4.272E-5 |
| Average (OFF) | --- | 1.726E-5 | 2.451E-5 | 4.943E-5 | 6.523E-5 | 8.267E-5 | 9.787E-5 | 1.030E-4 | 1.699E-4 | 1.016E-4 | 5.210E-5 |
| σ (OFF) | --- | 1.106E-5 | 1.521E-5 | 1.454E-5 | 4.493E-5 | 5.158E-5 | 5.477E-5 | 6.576E-5 | 7.796E-5 | 5.582E-5 | 5.849E-5 |
| Average+3σ (OFF) | --- | 5.045E-5 | 7.014E-5 | 9.304E-5 | 2.000E-4 | 2.374E-4 | 2.622E-4 | 3.003E-4 | 4.038E-4 | 2.690E-4 | 2.276E-4 |
| Average-3σ (OFF) | --- | -1.593E-5 | -2.112E-5 | 5.826E-6 | -6.957E-5 | -7.207E-5 | -6.645E-5 | -9.428E-5 | -6.393E-5 | -6.589E-5 | -1.234E-4 |

## 16.CTR2

**Ta=25°C; If = 0.5 mA; Vo = 0.4 V; Vcc = 5 V**



**CTR2 . (%)**

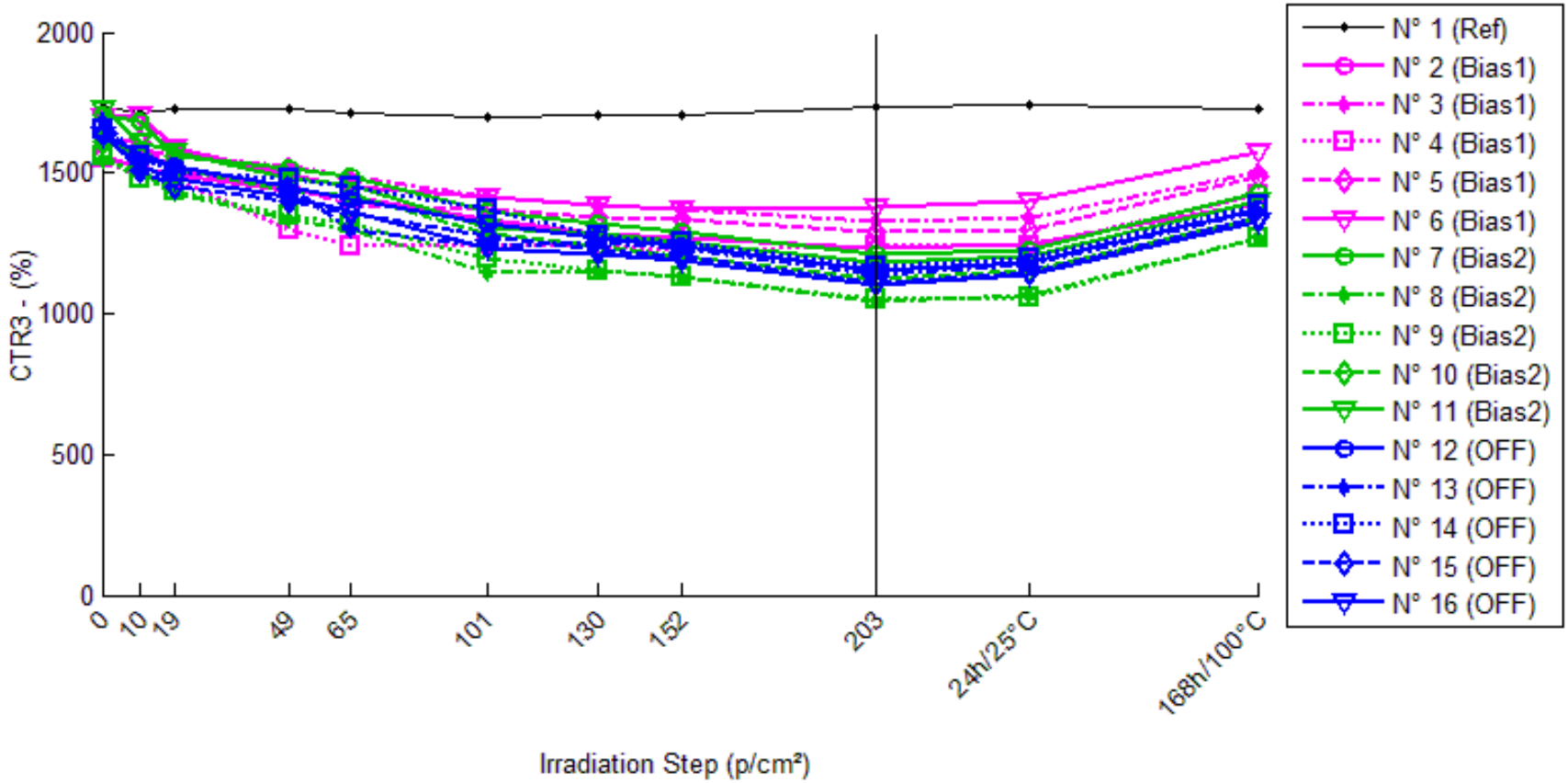
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 2018.03 | 1987.05 | 2025.37 | 1961.18 | 1936.05 | 1932.40 | 1940.17 | 1932.43 | 2014.73 | 2025.92 | 1993.32 |
| N° 2 (Bias1) | 1715.63 | 1668.26 | 1595.62 | 1501.34 | 1423.35 | 1297.97 | 1207.69 | 1197.78 | 1148.40 | 1163.36 | 1395.12 |
| N° 3 (Bias1) | 1844.59 | 1799.66 | 1730.24 | 1639.70 | 1532.26 | 1432.91 | 1368.52 | 1355.71 | 1296.58 | 1324.92 | 1571.00 |
| N° 4 (Bias1) | 1751.40 | 1664.76 | 1610.99 | 1296.04 | 1234.58 | 1195.73 | 1233.15 | 1218.58 | 1166.67 | 1149.44 | 1481.40 |
| N° 5 (Bias1) | 1839.13 | 1817.55 | 1678.56 | 1572.31 | 1464.25 | 1387.34 | 1330.83 | 1325.52 | 1268.44 | 1267.15 | 1593.08 |
| N° 6 (Bias1) | 1990.39 | 1978.43 | 1840.61 | 1667.49 | 1540.69 | 1482.42 | 1484.73 | 1472.73 | 1424.44 | 1453.39 | 1740.47 |
| N° 7 (Bias2) | 1970.51 | 1915.77 | 1750.19 | 1634.78 | 1564.54 | 1318.12 | 1229.59 | 1199.93 | 1067.66 | 1090.79 | 1464.46 |
| N° 8 (Bias2) | 1737.11 | 1658.88 | 1548.47 | 1320.71 | 1252.76 | 988.54 | 969.51 | 949.50 | 816.60 | 843.83 | 1216.66 |
| N° 9 (Bias2) | 1733.15 | 1621.85 | 1531.31 | 1343.72 | 1299.42 | 1060.78 | 958.66 | 927.05 | 806.20 | 812.35 | 1212.67 |
| N° 10 (Bias2) | 1795.97 | 1737.60 | 1648.06 | 1497.96 | 1446.64 | 1110.09 | 1080.68 | 1032.11 | 908.08 | 950.37 | 1293.33 |
| N° 11 (Bias2) | 1990.82 | 1827.82 | 1746.33 | 1564.12 | 1510.36 | 1228.79 | 1161.17 | 1110.41 | 1013.11 | 1049.49 | 1382.34 |
| N° 12 (OFF) | 1884.29 | 1798.01 | 1703.08 | 1548.95 | 1460.68 | 1206.82 | 1162.59 | 1127.87 | 983.53 | 1040.66 | 1378.33 |
| N° 13 (OFF) | 1924.44 | 1777.98 | 1701.53 | 1547.58 | 1323.30 | 1152.55 | 1133.28 | 1108.04 | 956.52 | 1015.40 | 1367.39 |
| N° 14 (OFF) | 1910.92 | 1814.44 | 1668.09 | 1585.01 | 1529.79 | 1219.08 | 1164.87 | 1135.68 | 997.36 | 1058.69 | 1398.42 |
| N° 15 (OFF) | 1804.90 | 1691.85 | 1560.57 | 1392.29 | 1354.88 | 1024.68 | 1053.49 | 1013.71 | 880.17 | 933.49 | 1292.80 |
| N° 16 (OFF) | 1797.81 | 1672.08 | 1584.44 | 1418.69 | 1341.76 | 1019.46 | 1015.72 | 985.50 | 865.99 | 915.99 | 1258.58 |

**1/Delta [CTR2]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 7.727E-6 | -1.797E-6 | 1.436E-5 | 2.098E-5 | 2.196E-5 | 1.989E-5 | 2.195E-5 | 8.121E-7 | -1.930E-6 | 6.142E-6 |
| N° 2 (Bias1) | --- | 1.655E-5 | 4.384E-5 | 8.319E-5 | 1.197E-4 | 1.876E-4 | 2.452E-4 | 2.520E-4 | 2.879E-4 | 2.767E-4 | 1.339E-4 |
| N° 3 (Bias1) | --- | 1.353E-5 | 3.583E-5 | 6.774E-5 | 1.105E-4 | 1.558E-4 | 1.886E-4 | 1.955E-4 | 2.291E-4 | 2.126E-4 | 9.441E-5 |
| N° 4 (Bias1) | --- | 2.972E-5 | 4.977E-5 | 2.006E-4 | 2.390E-4 | 2.653E-4 | 2.400E-4 | 2.497E-4 | 2.862E-4 | 2.990E-4 | 1.041E-4 |
| N° 5 (Bias1) | --- | 6.457E-6 | 5.201E-5 | 9.227E-5 | 1.392E-4 | 1.771E-4 | 2.077E-4 | 2.107E-4 | 2.446E-4 | 2.454E-4 | 8.398E-5 |
| N° 6 (Bias1) | --- | 3.037E-6 | 4.088E-5 | 9.729E-5 | 1.466E-4 | 1.722E-4 | 1.711E-4 | 1.766E-4 | 1.996E-4 | 1.856E-4 | 7.214E-5 |
| N° 7 (Bias2) | --- | 1.450E-5 | 6.389E-5 | 1.042E-4 | 1.317E-4 | 2.512E-4 | 3.058E-4 | 3.259E-4 | 4.291E-4 | 4.093E-4 | 1.754E-4 |
| N° 8 (Bias2) | --- | 2.715E-5 | 7.013E-5 | 1.815E-4 | 2.226E-4 | 4.359E-4 | 4.558E-4 | 4.775E-4 | 6.489E-4 | 6.094E-4 | 2.463E-4 |
| N° 9 (Bias2) | --- | 3.959E-5 | 7.605E-5 | 1.672E-4 | 1.926E-4 | 3.657E-4 | 4.661E-4 | 5.017E-4 | 6.634E-4 | 6.540E-4 | 2.476E-4 |
| N° 10 (Bias2) | --- | 1.870E-5 | 4.997E-5 | 1.108E-4 | 1.345E-4 | 3.440E-4 | 3.685E-4 | 4.121E-4 | 5.444E-4 | 4.954E-4 | 2.164E-4 |
| N° 11 (Bias2) | --- | 4.480E-5 | 7.032E-5 | 1.370E-4 | 1.598E-4 | 3.115E-4 | 3.589E-4 | 3.983E-4 | 4.848E-4 | 4.505E-4 | 2.211E-4 |
| N° 12 (OFF) | --- | 2.547E-5 | 5.647E-5 | 1.149E-4 | 1.539E-4 | 2.979E-4 | 3.294E-4 | 3.559E-4 | 4.860E-4 | 4.302E-4 | 1.948E-4 |
| N° 13 (OFF) | --- | 4.280E-5 | 6.808E-5 | 1.265E-4 | 2.361E-4 | 3.480E-4 | 3.628E-4 | 3.829E-4 | 5.258E-4 | 4.652E-4 | 2.117E-4 |
| N° 14 (OFF) | --- | 2.783E-5 | 7.618E-5 | 1.076E-4 | 1.304E-4 | 2.970E-4 | 3.352E-4 | 3.572E-4 | 4.793E-4 | 4.213E-4 | 1.918E-4 |
| N° 15 (OFF) | --- | 3.702E-5 | 8.675E-5 | 1.642E-4 | 1.840E-4 | 4.219E-4 | 3.952E-4 | 4.324E-4 | 5.821E-4 | 5.172E-4 | 2.195E-4 |
| N° 16 (OFF) | --- | 4.183E-5 | 7.490E-5 | 1.486E-4 | 1.891E-4 | 4.247E-4 | 4.283E-4 | 4.585E-4 | 5.985E-4 | 5.355E-4 | 2.383E-4 |
| Average (Bias1) | --- | 1.386E-5 | 4.447E-5 | 1.082E-4 | 1.510E-4 | 1.916E-4 | 2.105E-4 | 2.169E-4 | 2.495E-4 | 2.439E-4 | 9.770E-5 |
| σ (Bias1) | --- | 1.038E-5 | 6.574E-6 | 5.286E-5 | 5.130E-5 | 4.280E-5 | 3.205E-5 | 3.327E-5 | 3.790E-5 | 4.607E-5 | 2.347E-5 |
| Average+3σ (Bias1) | --- | 4.499E-5 | 6.419E-5 | 2.668E-4 | 3.049E-4 | 3.200E-4 | 3.066E-4 | 3.167E-4 | 3.632E-4 | 3.821E-4 | 1.681E-4 |
| Average-3σ (Bias1) | --- | -1.727E-5 | 2.474E-5 | -5.034E-5 | -2.880E-6 | 6.317E-5 | 1.143E-4 | 1.171E-4 | 1.358E-4 | 1.057E-4 | 2.728E-5 |
| Average (Bias2) | --- | 2.895E-5 | 6.607E-5 | 1.401E-4 | 1.682E-4 | 3.417E-4 | 3.910E-4 | 4.231E-4 | 5.541E-4 | 5.237E-4 | 2.214E-4 |
| σ (Bias2) | --- | 1.305E-5 | 9.977E-6 | 3.393E-5 | 3.903E-5 | 6.813E-5 | 6.826E-5 | 6.951E-5 | 1.018E-4 | 1.044E-4 | 2.937E-5 |
| Average+3σ (Bias2) | --- | 6.810E-5 | 9.600E-5 | 2.419E-4 | 2.853E-4 | 5.461E-4 | 5.958E-4 | 6.316E-4 | 8.595E-4 | 8.368E-4 | 3.095E-4 |
| Average-3σ (Bias2) | --- | -1.021E-5 | 3.614E-5 | 3.835E-5 | 5.112E-5 | 1.373E-4 | 1.863E-4 | 2.146E-4 | 2.487E-4 | 2.106E-4 | 1.332E-4 |
| Average (OFF) | --- | 3.499E-5 | 7.248E-5 | 1.324E-4 | 1.787E-4 | 3.579E-4 | 3.702E-4 | 3.974E-4 | 5.344E-4 | 4.739E-4 | 2.112E-4 |
| σ (OFF) | --- | 7.966E-6 | 1.117E-5 | 2.361E-5 | 3.992E-5 | 6.316E-5 | 4.166E-5 | 4.611E-5 | 5.438E-5 | 5.105E-5 | 1.904E-5 |
| Average+3σ (OFF) | --- | 5.889E-5 | 1.060E-4 | 2.032E-4 | 2.984E-4 | 5.474E-4 | 4.952E-4 | 5.357E-4 | 6.975E-4 | 6.270E-4 | 2.683E-4 |
| Average-3σ (OFF) | --- | 1.109E-5 | 3.897E-5 | 6.153E-5 | 5.892E-5 | 1.684E-4 | 2.452E-4 | 2.591E-4 | 3.712E-4 | 3.207E-4 | 1.541E-4 |

## 17. CTR3

**Ta=25°C; If = 1 mA; Vo = 0.4 V; Vcc = 5 V**



**CTR3 . (%)**

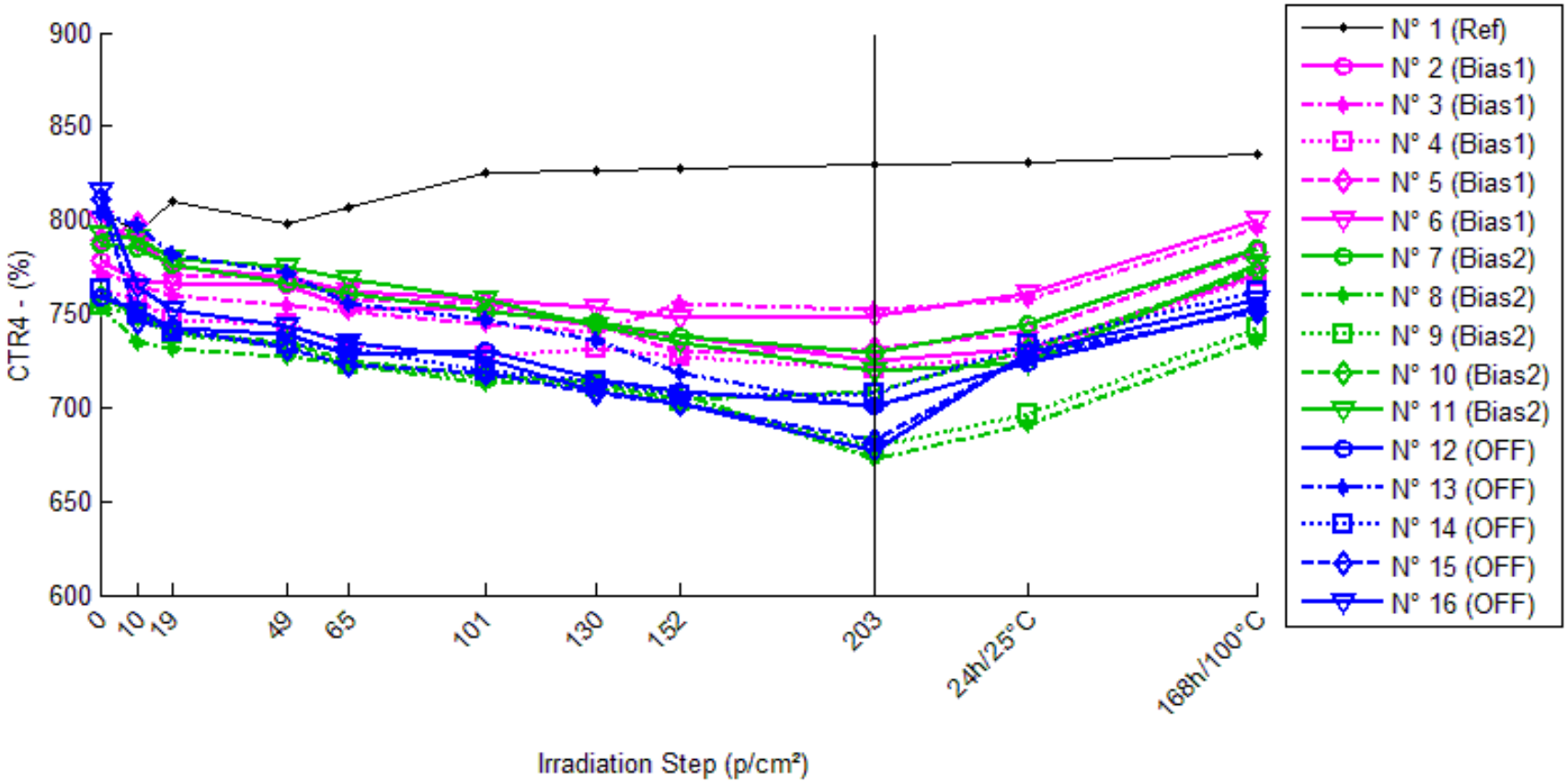
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 1734.56 | 1710.85 | 1728.46 | 1728.04 | 1711.73 | 1696.61 | 1702.18 | 1703.29 | 1737.01 | 1741.46 | 1729.73 |
| N° 2 (Bias1) | 1562.98 | 1514.37 | 1492.70 | 1435.40 | 1413.89 | 1331.96 | 1285.97 | 1272.08 | 1236.27 | 1246.41 | 1391.97 |
| N° 3 (Bias1) | 1619.41 | 1580.44 | 1560.14 | 1521.92 | 1487.63 | 1416.41 | 1384.04 | 1369.63 | 1329.51 | 1344.27 | 1500.20 |
| N° 4 (Bias1) | 1555.74 | 1482.46 | 1479.76 | 1297.70 | 1238.27 | 1246.67 | 1241.30 | 1228.77 | 1239.79 | 1239.00 | 1423.49 |
| N° 5 (Bias1) | 1613.39 | 1611.69 | 1511.35 | 1449.44 | 1384.75 | 1370.93 | 1345.13 | 1334.82 | 1294.25 | 1298.63 | 1485.49 |
| N° 6 (Bias1) | 1696.98 | 1703.19 | 1591.26 | 1493.74 | 1452.45 | 1412.91 | 1383.10 | 1371.55 | 1381.13 | 1398.81 | 1572.67 |
| N° 7 (Bias2) | 1706.30 | 1684.86 | 1559.03 | 1519.12 | 1489.14 | 1362.37 | 1317.62 | 1293.91 | 1211.90 | 1228.29 | 1432.29 |
| N° 8 (Bias2) | 1545.70 | 1507.26 | 1432.25 | 1331.22 | 1300.33 | 1144.73 | 1150.60 | 1130.51 | 1044.76 | 1066.39 | 1267.61 |
| N° 9 (Bias2) | 1558.92 | 1479.89 | 1437.58 | 1345.84 | 1321.99 | 1199.16 | 1152.58 | 1128.16 | 1048.91 | 1060.66 | 1272.45 |
| N° 10 (Bias2) | 1610.10 | 1563.76 | 1516.01 | 1434.53 | 1420.16 | 1280.08 | 1237.82 | 1206.21 | 1126.48 | 1151.26 | 1344.66 |
| N° 11 (Bias2) | 1726.83 | 1609.39 | 1576.69 | 1482.20 | 1460.46 | 1309.03 | 1286.89 | 1253.38 | 1184.62 | 1201.86 | 1396.59 |
| N° 12 (OFF) | 1641.88 | 1569.04 | 1527.09 | 1450.32 | 1404.36 | 1323.33 | 1265.71 | 1240.48 | 1153.58 | 1184.73 | 1370.48 |
| N° 13 (OFF) | 1680.93 | 1546.36 | 1526.26 | 1453.93 | 1299.05 | 1236.79 | 1252.63 | 1229.87 | 1139.26 | 1171.65 | 1364.42 |
| N° 14 (OFF) | 1651.82 | 1563.54 | 1502.20 | 1479.43 | 1452.41 | 1369.04 | 1274.26 | 1251.65 | 1164.61 | 1197.36 | 1388.30 |
| N° 15 (OFF) | 1638.61 | 1509.88 | 1449.70 | 1398.40 | 1358.80 | 1277.95 | 1227.74 | 1200.38 | 1110.88 | 1145.81 | 1340.26 |
| N° 16 (OFF) | 1634.08 | 1521.76 | 1477.28 | 1411.56 | 1365.37 | 1231.46 | 1208.39 | 1186.64 | 1100.70 | 1135.07 | 1324.65 |

**1/Delta [CTR3]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 7.988E-6 | 2.034E-6 | 2.175E-6 | 7.687E-6 | 1.290E-5 | 1.096E-5 | 1.058E-5 | -8.138E-7 | -2.287E-6 | 1.609E-6 |
| N° 2 (Bias1) | --- | 2.054E-5 | 3.012E-5 | 5.687E-5 | 6.747E-5 | 1.110E-4 | 1.378E-4 | 1.463E-4 | 1.691E-4 | 1.625E-4 | 7.860E-5 |
| N° 3 (Bias1) | --- | 1.523E-5 | 2.346E-5 | 3.956E-5 | 5.470E-5 | 8.850E-5 | 1.050E-4 | 1.126E-4 | 1.346E-4 | 1.264E-4 | 4.907E-5 |
| N° 4 (Bias1) | --- | 3.177E-5 | 3.300E-5 | 1.278E-4 | 1.648E-4 | 1.594E-4 | 1.628E-4 | 1.710E-4 | 1.638E-4 | 1.643E-4 | 5.972E-5 |
| N° 5 (Bias1) | --- | 6.530E-7 | 4.185E-5 | 7.011E-5 | 1.023E-4 | 1.096E-4 | 1.236E-4 | 1.294E-4 | 1.528E-4 | 1.502E-4 | 5.337E-5 |
| N° 6 (Bias1) | --- | -2.146E-6 | 3.915E-5 | 8.018E-5 | 9.921E-5 | 1.185E-4 | 1.337E-4 | 1.398E-4 | 1.348E-4 | 1.256E-4 | 4.658E-5 |
| N° 7 (Bias2) | --- | 7.456E-6 | 5.536E-5 | 7.221E-5 | 8.546E-5 | 1.479E-4 | 1.729E-4 | 1.868E-4 | 2.391E-4 | 2.281E-4 | 1.121E-4 |
| N° 8 (Bias2) | --- | 1.650E-5 | 5.125E-5 | 1.042E-4 | 1.221E-4 | 2.266E-4 | 2.222E-4 | 2.376E-4 | 3.102E-4 | 2.908E-4 | 1.419E-4 |
| N° 9 (Bias2) | --- | 3.426E-5 | 5.415E-5 | 1.016E-4 | 1.150E-4 | 1.924E-4 | 2.262E-4 | 2.449E-4 | 3.119E-4 | 3.013E-4 | 1.444E-4 |
| N° 10 (Bias2) | --- | 1.840E-5 | 3.855E-5 | 7.601E-5 | 8.307E-5 | 1.601E-4 | 1.868E-4 | 2.080E-4 | 2.666E-4 | 2.475E-4 | 1.226E-4 |
| N° 11 (Bias2) | --- | 4.226E-5 | 5.515E-5 | 9.558E-5 | 1.056E-4 | 1.848E-4 | 1.980E-4 | 2.187E-4 | 2.651E-4 | 2.529E-4 | 1.369E-4 |
| N° 12 (OFF) | --- | 2.828E-5 | 4.578E-5 | 8.045E-5 | 1.030E-4 | 1.466E-4 | 1.810E-4 | 1.971E-4 | 2.578E-4 | 2.350E-4 | 1.206E-4 |
| N° 13 (OFF) | --- | 5.177E-5 | 6.029E-5 | 9.288E-5 | 1.749E-4 | 2.136E-4 | 2.034E-4 | 2.182E-4 | 2.829E-4 | 2.586E-4 | 1.380E-4 |
| N° 14 (OFF) | --- | 3.418E-5 | 6.030E-5 | 7.054E-5 | 8.311E-5 | 1.250E-4 | 1.794E-4 | 1.936E-4 | 2.533E-4 | 2.298E-4 | 1.149E-4 |
| N° 15 (OFF) | --- | 5.203E-5 | 7.952E-5 | 1.048E-4 | 1.257E-4 | 1.722E-4 | 2.042E-4 | 2.228E-4 | 2.899E-4 | 2.625E-4 | 1.359E-4 |
| N° 16 (OFF) | --- | 4.517E-5 | 6.495E-5 | 9.647E-5 | 1.204E-4 | 2.001E-4 | 2.156E-4 | 2.307E-4 | 2.965E-4 | 2.690E-4 | 1.429E-4 |
| Average (Bias1) | --- | 1.321E-5 | 3.352E-5 | 7.491E-5 | 9.770E-5 | 1.174E-4 | 1.326E-4 | 1.398E-4 | 1.510E-4 | 1.458E-4 | 5.747E-5 |
| σ (Bias1) | --- | 1.411E-5 | 7.317E-6 | 3.326E-5 | 4.269E-5 | 2.597E-5 | 2.112E-5 | 2.160E-5 | 1.601E-5 | 1.888E-5 | 1.282E-5 |
| Average+3σ (Bias1) | --- | 5.553E-5 | 5.547E-5 | 1.747E-4 | 2.258E-4 | 1.953E-4 | 1.960E-4 | 2.046E-4 | 1.991E-4 | 2.024E-4 | 9.594E-5 |
| Average-3σ (Bias1) | --- | -2.911E-5 | 1.157E-5 | -2.488E-5 | -3.036E-5 | 3.946E-5 | 6.924E-5 | 7.502E-5 | 1.030E-4 | 8.917E-5 | 1.900E-5 |
| Average (Bias2) | --- | 2.377E-5 | 5.089E-5 | 8.992E-5 | 1.022E-4 | 1.824E-4 | 2.012E-4 | 2.192E-4 | 2.786E-4 | 2.641E-4 | 1.316E-4 |
| σ (Bias2) | --- | 1.414E-5 | 7.092E-6 | 1.483E-5 | 1.744E-5 | 3.060E-5 | 2.281E-5 | 2.333E-5 | 3.160E-5 | 3.080E-5 | 1.378E-5 |
| Average+3σ (Bias2) | --- | 6.619E-5 | 7.216E-5 | 1.344E-4 | 1.545E-4 | 2.742E-4 | 2.696E-4 | 2.892E-4 | 3.734E-4 | 3.565E-4 | 1.730E-4 |
| Average-3σ (Bias2) | --- | -1.864E-5 | 2.961E-5 | 4.544E-5 | 4.993E-5 | 9.060E-5 | 1.327E-4 | 1.492E-4 | 1.838E-4 | 1.717E-4 | 9.025E-5 |
| Average (OFF) | --- | 4.229E-5 | 6.217E-5 | 8.903E-5 | 1.214E-4 | 1.715E-4 | 1.967E-4 | 2.125E-4 | 2.761E-4 | 2.510E-4 | 1.305E-4 |
| σ (OFF) | --- | 1.067E-5 | 1.209E-5 | 1.356E-5 | 3.422E-5 | 3.664E-5 | 1.585E-5 | 1.634E-5 | 1.943E-5 | 1.747E-5 | 1.205E-5 |
| Average+3σ (OFF) | --- | 7.429E-5 | 9.843E-5 | 1.297E-4 | 2.241E-4 | 2.814E-4 | 2.443E-4 | 2.615E-4 | 3.344E-4 | 3.034E-4 | 1.666E-4 |
| Average-3σ (OFF) | --- | 1.028E-5 | 2.590E-5 | 4.836E-5 | 1.876E-5 | 6.160E-5 | 1.492E-4 | 1.634E-4 | 2.178E-4 | 1.986E-4 | 9.432E-5 |

## 18. CTR4

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



**CTR4 . (%)**

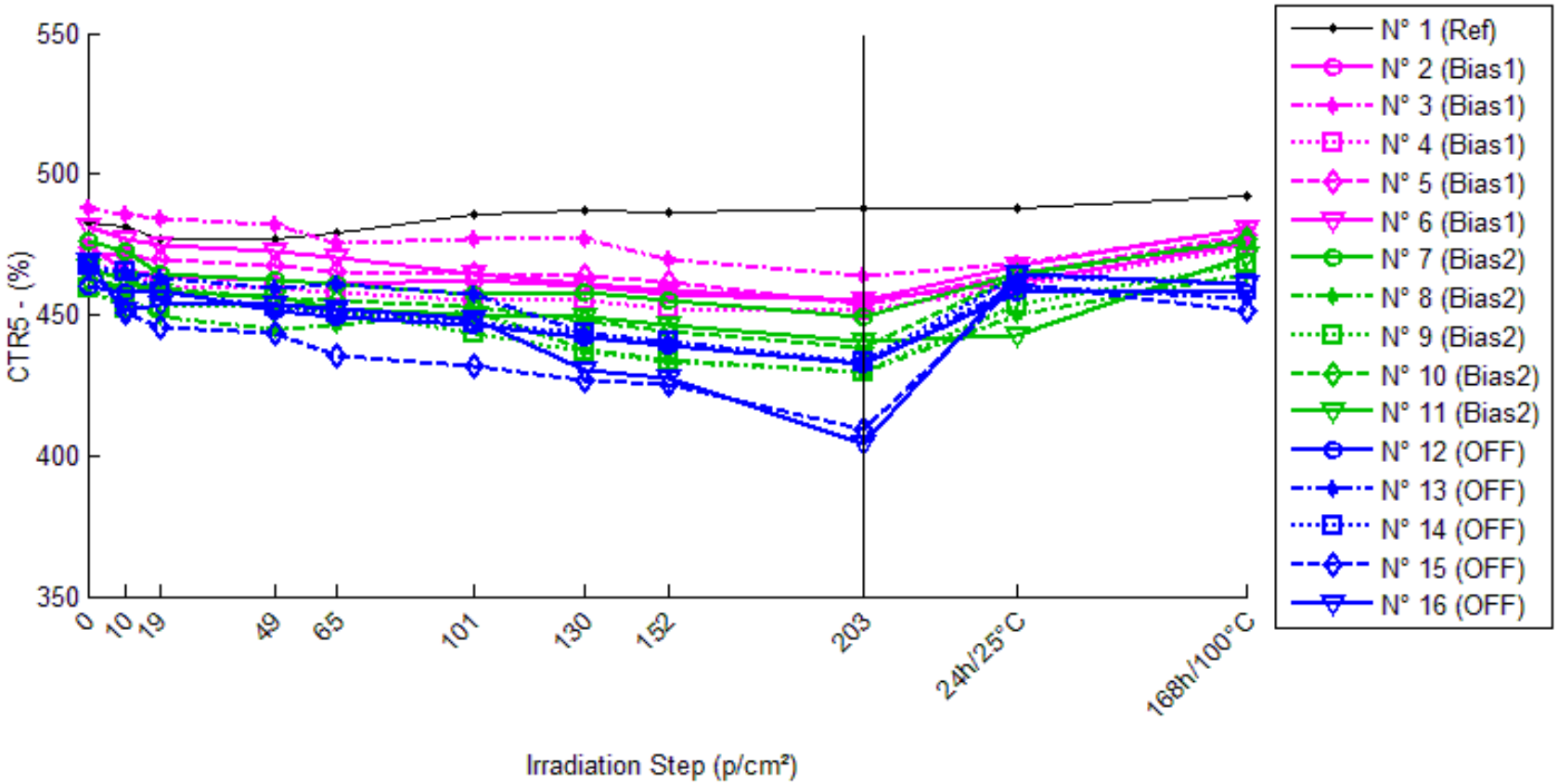
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 804.529 | 794.150 | 809.974 | 797.490 | 806.659 | 824.866 | 826.463 | 827.306 | 830.144 | 830.806 | 835.162 |
| N° 2 (Bias1) | 778.337 | 767.753 | 766.747 | 765.207 | 753.302 | 752.471 | 743.909 | 738.495 | 724.775 | 731.327 | 770.467 |
| N° 3 (Bias1) | 772.271 | 765.292 | 759.304 | 754.466 | 751.361 | 744.111 | 740.426 | 755.315 | 752.511 | 757.980 | 796.165 |
| N° 4 (Bias1) | 763.040 | 757.267 | 746.524 | 744.735 | 733.528 | 726.927 | 731.551 | 726.831 | 720.883 | 727.676 | 769.662 |
| N° 5 (Bias1) | 789.804 | 797.809 | 770.491 | 769.328 | 757.334 | 754.917 | 744.259 | 729.198 | 731.168 | 740.659 | 782.435 |
| N° 6 (Bias1) | 800.630 | 788.613 | 774.953 | 769.761 | 762.540 | 757.213 | 753.222 | 747.977 | 748.766 | 760.763 | 800.068 |
| N° 7 (Bias2) | 787.473 | 784.506 | 776.264 | 765.863 | 761.171 | 750.617 | 745.702 | 738.217 | 729.704 | 744.317 | 784.373 |
| N° 8 (Bias2) | 753.265 | 734.920 | 730.989 | 727.568 | 723.234 | 713.041 | 715.089 | 707.702 | 672.852 | 691.377 | 735.704 |
| N° 9 (Bias2) | 754.503 | 748.453 | 738.724 | 732.683 | 722.914 | 715.864 | 711.247 | 702.981 | 678.755 | 697.072 | 742.866 |
| N° 10 (Bias2) | 758.866 | 749.585 | 740.615 | 734.960 | 724.695 | 716.817 | 713.139 | 704.710 | 708.599 | 730.571 | 772.516 |
| N° 11 (Bias2) | 793.087 | 790.056 | 779.999 | 775.425 | 768.151 | 757.511 | 743.207 | 734.821 | 719.940 | 724.132 | 776.199 |
| N° 12 (OFF) | 758.644 | 752.639 | 742.799 | 738.717 | 727.976 | 730.511 | 714.749 | 708.024 | 701.084 | 724.051 | 753.422 |
| N° 13 (OFF) | 803.493 | 797.137 | 781.378 | 771.726 | 755.293 | 746.402 | 735.935 | 718.479 | 700.306 | 724.526 | 751.843 |
| N° 14 (OFF) | 763.282 | 750.234 | 740.544 | 733.097 | 731.027 | 719.845 | 713.524 | 706.496 | 707.180 | 733.992 | 762.210 |
| N° 15 (OFF) | 811.627 | 745.892 | 742.266 | 731.312 | 723.188 | 718.826 | 707.952 | 702.053 | 682.035 | 727.776 | 750.606 |
| N° 16 (OFF) | 815.860 | 764.230 | 752.358 | 743.797 | 734.460 | 725.992 | 708.800 | 702.194 | 677.133 | 729.236 | 757.859 |

**1/Delta [CTR4]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 1.624E-5 | -8.357E-6 | 1.097E-5 | -3.282E-6 | -3.065E-5 | -3.299E-5 | -3.422E-5 | -3.835E-5 | -3.931E-5 | -4.559E-5 |
| N° 2 (Bias1) | --- | 1.771E-5 | 1.942E-5 | 2.205E-5 | 4.270E-5 | 4.416E-5 | 5.946E-5 | 6.931E-5 | 9.495E-5 | 8.259E-5 | 1.312E-5 |
| N° 3 (Bias1) | --- | 1.181E-5 | 2.211E-5 | 3.056E-5 | 3.604E-5 | 4.900E-5 | 5.569E-5 | 2.907E-5 | 3.400E-5 | 2.441E-5 | -3.886E-5 |
| N° 4 (Bias1) | --- | 9.991E-6 | 2.899E-5 | 3.221E-5 | 5.273E-5 | 6.511E-5 | 5.641E-5 | 6.529E-5 | 7.664E-5 | 6.369E-5 | -1.127E-5 |
| N° 5 (Bias1) | --- | -1.270E-5 | 3.174E-5 | 3.370E-5 | 5.428E-5 | 5.851E-5 | 7.748E-5 | 1.052E-4 | 1.015E-4 | 8.401E-5 | 1.192E-5 |
| N° 6 (Bias1) | --- | 1.903E-5 | 4.139E-5 | 5.009E-5 | 6.239E-5 | 7.162E-5 | 7.861E-5 | 8.792E-5 | 8.651E-5 | 6.545E-5 | 8.783E-7 |
| N° 7 (Bias2) | --- | 4.803E-6 | 1.834E-5 | 3.583E-5 | 4.388E-5 | 6.235E-5 | 7.113E-5 | 8.473E-5 | 1.005E-4 | 7.363E-5 | 5.018E-6 |
| N° 8 (Bias2) | --- | 3.314E-5 | 4.046E-5 | 4.689E-5 | 5.512E-5 | 7.489E-5 | 7.087E-5 | 8.547E-5 | 1.587E-4 | 1.188E-4 | 3.169E-5 |
| N° 9 (Bias2) | --- | 1.071E-5 | 2.831E-5 | 3.947E-5 | 5.792E-5 | 7.154E-5 | 8.061E-5 | 9.714E-5 | 1.479E-4 | 1.092E-4 | 2.076E-5 |
| N° 10 (Bias2) | --- | 1.632E-5 | 3.247E-5 | 4.286E-5 | 6.214E-5 | 7.730E-5 | 8.450E-5 | 1.013E-4 | 9.348E-5 | 5.104E-5 | -2.328E-5 |
| N° 11 (Bias2) | --- | 4.837E-6 | 2.116E-5 | 2.872E-5 | 4.093E-5 | 5.922E-5 | 8.463E-5 | 9.998E-5 | 1.281E-4 | 1.201E-4 | 2.743E-5 |
| N° 12 (OFF) | --- | 1.052E-5 | 2.812E-5 | 3.556E-5 | 5.553E-5 | 5.076E-5 | 8.095E-5 | 9.424E-5 | 1.082E-4 | 6.298E-5 | 9.137E-6 |
| N° 13 (OFF) | --- | 9.923E-6 | 3.522E-5 | 5.123E-5 | 7.942E-5 | 9.520E-5 | 1.142E-4 | 1.473E-4 | 1.834E-4 | 1.356E-4 | 8.550E-5 |
| N° 14 (OFF) | --- | 2.279E-5 | 4.023E-5 | 5.394E-5 | 5.781E-5 | 7.906E-5 | 9.136E-5 | 1.053E-4 | 1.039E-4 | 5.228E-5 | 1.843E-6 |
| N° 15 (OFF) | --- | 1.086E-4 | 1.151E-4 | 1.353E-4 | 1.507E-4 | 1.591E-4 | 1.804E-4 | 1.923E-4 | 2.341E-4 | 1.420E-4 | 1.002E-4 |
| N° 16 (OFF) | --- | 8.281E-5 | 1.035E-4 | 1.188E-4 | 1.358E-4 | 1.517E-4 | 1.851E-4 | 1.984E-4 | 2.511E-4 | 1.456E-4 | 9.381E-5 |
| Average (Bias1) | --- | 9.168E-6 | 2.873E-5 | 3.372E-5 | 4.963E-5 | 5.768E-5 | 6.553E-5 | 7.137E-5 | 7.873E-5 | 6.403E-5 | -4.842E-6 |
| σ (Bias1) | --- | 1.281E-5 | 8.656E-6 | 1.020E-5 | 1.033E-5 | 1.127E-5 | 1.152E-5 | 2.851E-5 | 2.669E-5 | 2.406E-5 | 2.142E-5 |
| Average+3σ (Bias1) | --- | 4.760E-5 | 5.470E-5 | 6.433E-5 | 8.062E-5 | 9.149E-5 | 1.001E-4 | 1.569E-4 | 1.588E-4 | 1.362E-4 | 5.942E-5 |
| Average-3σ (Bias1) | --- | -2.926E-5 | 2.761E-6 | 3.108E-6 | 1.863E-5 | 2.387E-5 | 3.097E-5 | -1.416E-5 | -1.331E-6 | -8.143E-6 | -6.910E-5 |
| Average (Bias2) | --- | 1.396E-5 | 2.815E-5 | 3.875E-5 | 5.200E-5 | 6.906E-5 | 7.835E-5 | 9.372E-5 | 1.257E-4 | 9.455E-5 | 1.232E-5 |
| σ (Bias2) | --- | 1.174E-5 | 8.879E-6 | 6.942E-6 | 9.164E-6 | 7.905E-6 | 6.896E-6 | 8.011E-6 | 2.853E-5 | 3.077E-5 | 2.234E-5 |
| Average+3σ (Bias2) | --- | 4.917E-5 | 5.478E-5 | 5.958E-5 | 7.949E-5 | 9.277E-5 | 9.903E-5 | 1.178E-4 | 2.113E-4 | 1.869E-4 | 7.933E-5 |
| Average-3σ (Bias2) | --- | -2.125E-5 | 1.509E-6 | 1.793E-5 | 2.450E-5 | 4.534E-5 | 5.766E-5 | 6.968E-5 | 4.014E-5 | 2.250E-6 | -5.469E-5 |
| Average (OFF) | --- | 4.692E-5 | 6.443E-5 | 7.896E-5 | 9.586E-5 | 1.072E-4 | 1.304E-4 | 1.475E-4 | 1.762E-4 | 1.077E-4 | 5.809E-5 |
| σ (OFF) | --- | 4.573E-5 | 4.138E-5 | 4.483E-5 | 4.458E-5 | 4.689E-5 | 4.932E-5 | 4.800E-5 | 6.867E-5 | 4.599E-5 | 4.837E-5 |
| Average+3σ (OFF) | --- | 1.841E-4 | 1.886E-4 | 2.134E-4 | 2.296E-4 | 2.478E-4 | 2.784E-4 | 2.915E-4 | 3.821E-4 | 2.457E-4 | 2.032E-4 |
| Average-3σ (OFF) | --- | -9.028E-5 | -5.972E-5 | -5.552E-5 | -3.787E-5 | -3.350E-5 | -1.753E-5 | 3.504E-6 | -2.985E-5 | -3.029E-5 | -8.701E-5 |

## 19. CTR5

**Ta=25°C; If = 10 mA; Vo = 0.4 V; Vcc = 5 V**



**CTR5 . (%)**

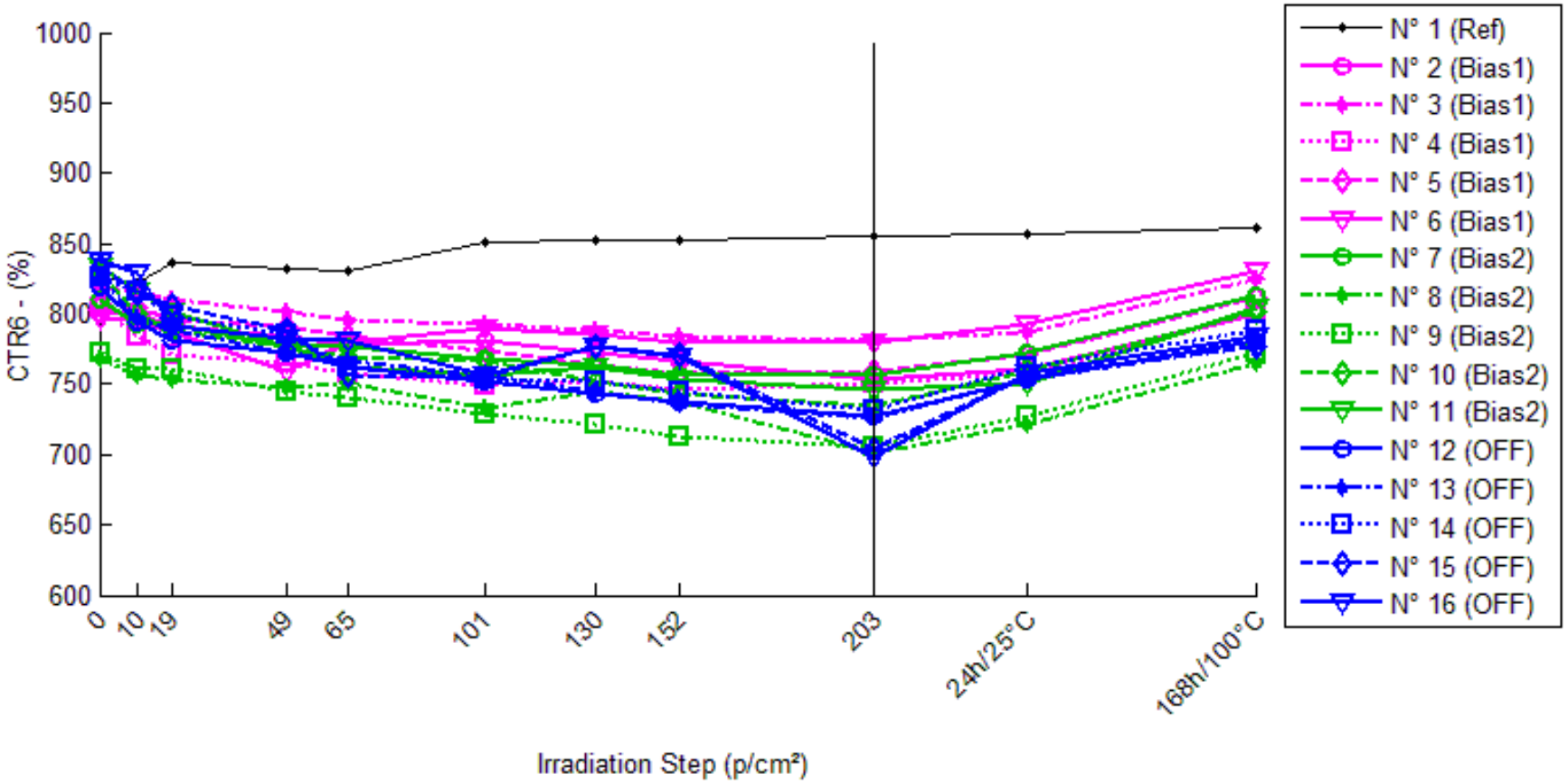
| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 482.382 | 481.362 | 476.997 | 476.861 | 479.096 | 485.668 | 487.138 | 486.534 | 487.493 | 487.461 | 492.439 |
| N° 2 (Bias1) | 474.006 | 466.191 | 463.683 | 462.594 | 460.581 | 462.291 | 460.336 | 457.545 | 455.197 | 461.346 | 475.423 |
| N° 3 (Bias1) | 487.772 | 485.988 | 484.171 | 482.330 | 475.367 | 476.732 | 477.258 | 469.660 | 464.108 | 468.324 | 480.684 |
| N° 4 (Bias1) | 468.307 | 464.965 | 460.464 | 459.539 | 458.068 | 455.349 | 454.965 | 452.489 | 451.789 | 460.034 | 473.971 |
| N° 5 (Bias1) | 471.893 | 471.189 | 469.998 | 467.528 | 464.939 | 464.674 | 463.958 | 461.560 | 453.570 | 464.302 | 478.006 |
| N° 6 (Bias1) | 481.515 | 476.654 | 474.510 | 472.184 | 470.049 | 464.615 | 461.168 | 458.594 | 455.116 | 467.606 | 480.527 |
| N° 7 (Bias2) | 475.858 | 472.826 | 464.451 | 462.384 | 460.912 | 457.234 | 458.012 | 454.887 | 449.017 | 464.286 | 476.388 |
| N° 8 (Bias2) | 467.272 | 455.848 | 449.319 | 445.054 | 446.590 | 451.646 | 437.532 | 434.292 | 429.771 | 450.298 | 464.733 |
| N° 9 (Bias2) | 459.560 | 452.476 | 453.019 | 453.260 | 451.483 | 443.187 | 436.569 | 433.089 | 429.993 | 453.745 | 468.225 |
| N° 10 (Bias2) | 462.688 | 459.858 | 459.447 | 456.131 | 455.052 | 452.554 | 447.490 | 444.013 | 438.709 | 463.761 | 476.981 |
| N° 11 (Bias2) | 466.516 | 462.489 | 457.694 | 456.300 | 452.434 | 450.188 | 449.576 | 446.092 | 440.321 | 443.076 | 470.837 |
| N° 12 (OFF) | 460.095 | 458.086 | 459.006 | 451.366 | 448.925 | 446.487 | 441.717 | 438.782 | 432.278 | 457.937 | 457.887 |
| N° 13 (OFF) | 466.204 | 465.095 | 462.772 | 459.467 | 460.571 | 456.976 | 443.596 | 440.471 | 432.766 | 460.046 | 455.476 |
| N° 14 (OFF) | 467.807 | 465.242 | 458.163 | 452.619 | 450.729 | 447.305 | 443.722 | 440.668 | 433.364 | 463.706 | 460.895 |
| N° 15 (OFF) | 467.655 | 450.687 | 445.321 | 443.213 | 435.452 | 431.885 | 426.951 | 425.620 | 409.342 | 461.013 | 451.344 |
| N° 16 (OFF) | 468.574 | 451.172 | 453.320 | 453.719 | 452.283 | 448.904 | 430.218 | 427.628 | 404.426 | 464.239 | 460.736 |

**1/Delta [CTR5]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 4.394E-6 | 2.341E-5 | 2.400E-5 | 1.422E-5 | -1.402E-5 | -2.024E-5 | -1.769E-5 | -2.173E-5 | -2.160E-5 | -4.234E-5 |
| N° 2 (Bias1) | --- | 3.536E-5 | 4.696E-5 | 5.204E-5 | 6.149E-5 | 5.346E-5 | 6.265E-5 | 7.590E-5 | 8.717E-5 | 5.789E-5 | -6.291E-6 |
| N° 3 (Bias1) | --- | 7.524E-6 | 1.525E-5 | 2.313E-5 | 5.350E-5 | 4.748E-5 | 4.516E-5 | 7.906E-5 | 1.045E-4 | 8.514E-5 | 3.023E-5 |
| N° 4 (Bias1) | --- | 1.535E-5 | 3.637E-5 | 4.074E-5 | 4.773E-5 | 6.077E-5 | 6.262E-5 | 7.465E-5 | 7.807E-5 | 3.840E-5 | -2.552E-5 |
| N° 5 (Bias1) | --- | 3.168E-6 | 8.548E-6 | 1.978E-5 | 3.170E-5 | 3.292E-5 | 3.625E-5 | 4.744E-5 | 8.561E-5 | 3.465E-5 | -2.710E-5 |
| N° 6 (Bias1) | --- | 2.118E-5 | 3.066E-5 | 4.104E-5 | 5.066E-5 | 7.554E-5 | 9.163E-5 | 1.038E-4 | 1.205E-4 | 6.177E-5 | 4.268E-6 |
| N° 7 (Bias2) | --- | 1.348E-5 | 5.161E-5 | 6.124E-5 | 6.814E-5 | 8.559E-5 | 8.188E-5 | 9.688E-5 | 1.256E-4 | 5.238E-5 | -2.341E-6 |
| N° 8 (Bias2) | --- | 5.364E-5 | 8.551E-5 | 1.068E-4 | 9.911E-5 | 7.404E-5 | 1.455E-4 | 1.625E-4 | 1.867E-4 | 8.067E-5 | 1.169E-5 |
| N° 9 (Bias2) | --- | 3.407E-5 | 3.142E-5 | 3.024E-5 | 3.893E-5 | 8.039E-5 | 1.146E-4 | 1.330E-4 | 1.496E-4 | 2.789E-5 | -4.027E-5 |
| N° 10 (Bias2) | --- | 1.330E-5 | 1.524E-5 | 3.107E-5 | 3.627E-5 | 4.840E-5 | 7.340E-5 | 9.090E-5 | 1.181E-4 | -5.001E-6 | -6.477E-5 |
| N° 11 (Bias2) | --- | 1.866E-5 | 4.131E-5 | 4.799E-5 | 6.671E-5 | 7.774E-5 | 8.076E-5 | 9.814E-5 | 1.275E-4 | 1.134E-4 | -1.967E-5 |
| N° 12 (OFF) | --- | 9.532E-6 | 5.158E-6 | 4.203E-5 | 5.408E-5 | 6.624E-5 | 9.043E-5 | 1.056E-4 | 1.399E-4 | 1.024E-5 | 1.048E-5 |
| N° 13 (OFF) | --- | 5.113E-6 | 1.591E-5 | 3.145E-5 | 2.624E-5 | 4.332E-5 | 1.093E-4 | 1.253E-4 | 1.657E-4 | 2.871E-5 | 5.052E-5 |
| N° 14 (OFF) | --- | 1.178E-5 | 4.499E-5 | 7.173E-5 | 8.099E-5 | 9.798E-5 | 1.160E-4 | 1.316E-4 | 1.699E-4 | 1.890E-5 | 3.206E-5 |
| N° 15 (OFF) | --- | 8.051E-5 | 1.072E-4 | 1.179E-4 | 1.581E-4 | 1.771E-4 | 2.039E-4 | 2.112E-4 | 3.046E-4 | 3.081E-5 | 7.727E-5 |
| N° 16 (OFF) | --- | 8.232E-5 | 7.181E-5 | 6.987E-5 | 7.687E-5 | 9.351E-5 | 1.903E-4 | 2.043E-4 | 3.385E-4 | 1.992E-5 | 3.630E-5 |
| Average (Bias1) | --- | 1.652E-5 | 2.756E-5 | 3.535E-5 | 4.901E-5 | 5.403E-5 | 5.966E-5 | 7.617E-5 | 9.517E-5 | 5.557E-5 | -4.882E-6 |
| σ (Bias1) | --- | 1.262E-5 | 1.563E-5 | 1.352E-5 | 1.095E-5 | 1.579E-5 | 2.120E-5 | 2.000E-5 | 1.714E-5 | 2.031E-5 | 2.365E-5 |
| Average+3σ (Bias1) | --- | 5.438E-5 | 7.444E-5 | 7.592E-5 | 8.188E-5 | 1.014E-4 | 1.233E-4 | 1.362E-4 | 1.466E-4 | 1.165E-4 | 6.608E-5 |
| Average-3σ (Bias1) | --- | -2.135E-5 | -1.932E-5 | -5.225E-6 | 1.615E-5 | 6.674E-6 | -3.943E-6 | 1.618E-5 | 4.375E-5 | -5.374E-6 | -7.585E-5 |
| Average (Bias2) | --- | 2.663E-5 | 4.502E-5 | 5.547E-5 | 6.183E-5 | 7.323E-5 | 9.922E-5 | 1.163E-4 | 1.415E-4 | 5.387E-5 | -2.307E-5 |
| σ (Bias2) | --- | 1.731E-5 | 2.631E-5 | 3.146E-5 | 2.565E-5 | 1.451E-5 | 3.034E-5 | 3.069E-5 | 2.787E-5 | 4.584E-5 | 3.035E-5 |
| Average+3σ (Bias2) | --- | 7.856E-5 | 1.239E-4 | 1.499E-4 | 1.388E-4 | 1.168E-4 | 1.903E-4 | 2.083E-4 | 2.251E-4 | 1.914E-4 | 6.797E-5 |
| Average-3σ (Bias2) | --- | -2.531E-5 | -3.390E-5 | -3.892E-5 | -1.512E-5 | 2.971E-5 | 8.187E-6 | 2.423E-5 | 5.792E-5 | -8.365E-5 | -1.141E-4 |
| Average (OFF) | --- | 3.785E-5 | 4.902E-5 | 6.660E-5 | 7.926E-5 | 9.563E-5 | 1.420E-4 | 1.556E-4 | 2.237E-4 | 2.172E-5 | 4.133E-5 |
| σ (OFF) | --- | 3.984E-5 | 4.167E-5 | 3.358E-5 | 4.918E-5 | 5.062E-5 | 5.138E-5 | 4.863E-5 | 9.084E-5 | 8.282E-6 | 2.469E-5 |
| Average+3σ (OFF) | --- | 1.574E-4 | 1.740E-4 | 1.673E-4 | 2.268E-4 | 2.475E-4 | 2.961E-4 | 3.015E-4 | 4.963E-4 | 4.656E-5 | 1.154E-4 |
| Average-3σ (OFF) | --- | -8.168E-5 | -7.599E-5 | -3.414E-5 | -6.828E-5 | -5.622E-5 | -1.215E-5 | 9.723E-6 | -4.881E-5 | -3.126E-6 | -3.276E-5 |

## 20. CTR6

**Ta=25°C; If = 5 mA; Vo = 0.4 V; Vcc = 18 V**



**CTR6 . (%)**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | 826.198 | 821.355 | 835.871 | 832.037 | 831.077 | 850.679 | 852.544 | 852.960 | 855.956 | 856.421 | 861.754 |
| N° 2 (Bias1) | 799.318 | 800.276 | 791.606 | 783.839 | 778.561 | 781.072 | 772.755 | 767.189 | 753.327 | 760.604 | 799.475 |
| N° 3 (Bias1) | 818.866 | 816.446 | 810.893 | 801.761 | 795.862 | 792.097 | 788.863 | 783.543 | 780.702 | 786.607 | 824.035 |
| N° 4 (Bias1) | 804.771 | 783.850 | 770.220 | 765.210 | 757.402 | 749.562 | 751.448 | 746.493 | 749.911 | 757.789 | 799.329 |
| N° 5 (Bias1) | 807.065 | 804.164 | 796.089 | 790.995 | 783.859 | 773.867 | 763.504 | 758.180 | 759.396 | 770.226 | 811.344 |
| N° 6 (Bias1) | 796.843 | 795.591 | 786.940 | 759.587 | 779.781 | 790.324 | 784.776 | 779.350 | 778.939 | 792.727 | 831.007 |
| N° 7 (Bias2) | 809.730 | 793.155 | 792.573 | 776.777 | 776.488 | 768.487 | 763.943 | 756.476 | 756.892 | 773.020 | 812.709 |
| N° 8 (Bias2) | 768.242 | 756.969 | 753.832 | 746.950 | 750.584 | 733.154 | 744.339 | 737.249 | 700.460 | 720.771 | 765.313 |
| N° 9 (Bias2) | 772.501 | 761.184 | 760.752 | 744.179 | 740.611 | 729.143 | 720.784 | 712.418 | 705.937 | 726.676 | 772.722 |
| N° 10 (Bias2) | 829.358 | 799.421 | 788.109 | 776.122 | 769.694 | 766.122 | 751.533 | 743.066 | 734.618 | 759.475 | 801.350 |
| N° 11 (Bias2) | 833.531 | 816.091 | 801.231 | 776.516 | 762.105 | 755.704 | 761.691 | 753.176 | 745.465 | 749.829 | 803.668 |
| N° 12 (OFF) | 819.275 | 794.635 | 781.461 | 772.888 | 762.272 | 751.588 | 743.825 | 736.906 | 727.421 | 753.446 | 780.848 |
| N° 13 (OFF) | 824.181 | 796.667 | 788.429 | 772.584 | 765.905 | 755.911 | 744.248 | 736.716 | 726.006 | 753.235 | 778.047 |
| N° 14 (OFF) | 826.193 | 816.492 | 798.858 | 784.783 | 761.929 | 753.563 | 751.648 | 744.570 | 732.250 | 762.669 | 788.496 |
| N° 15 (OFF) | 833.444 | 814.401 | 806.101 | 788.410 | 756.321 | 755.498 | 776.159 | 770.443 | 704.082 | 756.540 | 776.180 |
| N° 16 (OFF) | 837.673 | 828.689 | 791.629 | 781.975 | 780.958 | 755.962 | 776.857 | 770.111 | 697.789 | 757.750 | 784.054 |

**1/Delta [CTR6]**

| | 0krad(Si) | 10krad(Si) | 19krad(Si) | 49krad(Si) | 65krad(Si) | 101krad(Si) | 130krad(Si) | 152krad(Si) | 203krad(Si) | 24h/25°C | 168h/100°C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N° 1 (Ref) | --- | 7.136E-6 | -1.401E-5 | -8.493E-6 | -7.105E-6 | -3.483E-5 | -3.740E-5 | -3.798E-5 | -4.208E-5 | -4.271E-5 | -4.994E-5 |
| N° 2 (Bias1) | --- | -1.499E-6 | 1.219E-5 | 2.470E-5 | 3.335E-5 | 2.923E-5 | 4.300E-5 | 5.239E-5 | 7.638E-5 | 6.368E-5 | -2.469E-7 |
| N° 3 (Bias1) | --- | 3.621E-6 | 1.201E-5 | 2.605E-5 | 3.530E-5 | 4.127E-5 | 4.645E-5 | 5.505E-5 | 5.970E-5 | 5.008E-5 | -7.661E-6 |
| N° 4 (Bias1) | --- | 3.317E-5 | 5.574E-5 | 6.424E-5 | 7.771E-5 | 9.152E-5 | 8.817E-5 | 9.701E-5 | 9.090E-5 | 7.704E-5 | 8.459E-6 |
| N° 5 (Bias1) | --- | 4.470E-6 | 1.708E-5 | 2.517E-5 | 3.668E-5 | 5.315E-5 | 7.069E-5 | 7.989E-5 | 7.778E-5 | 5.926E-5 | -6.536E-6 |
| N° 6 (Bias1) | --- | 1.975E-6 | 1.579E-5 | 6.155E-5 | 2.746E-5 | 1.035E-5 | 1.930E-5 | 2.817E-5 | 2.885E-5 | 6.515E-6 | -5.159E-5 |
| N° 7 (Bias2) | --- | 2.581E-5 | 2.673E-5 | 5.239E-5 | 5.287E-5 | 6.628E-5 | 7.402E-5 | 8.694E-5 | 8.621E-5 | 5.865E-5 | -4.527E-6 |
| N° 8 (Bias2) | --- | 1.938E-5 | 2.488E-5 | 3.710E-5 | 3.062E-5 | 6.230E-5 | 4.180E-5 | 5.472E-5 | 1.260E-4 | 8.573E-5 | 4.982E-6 |
| N° 9 (Bias2) | --- | 1.925E-5 | 1.999E-5 | 4.927E-5 | 5.574E-5 | 7.698E-5 | 9.288E-5 | 1.092E-4 | 1.221E-4 | 8.163E-5 | -3.689E-7 |
| N° 10 (Bias2) | --- | 4.515E-5 | 6.311E-5 | 8.270E-5 | 9.347E-5 | 9.952E-5 | 1.249E-4 | 1.400E-4 | 1.555E-4 | 1.109E-4 | 4.214E-5 |
| N° 11 (Bias2) | --- | 2.564E-5 | 4.836E-5 | 8.809E-5 | 1.124E-4 | 1.236E-4 | 1.132E-4 | 1.280E-4 | 1.417E-4 | 1.339E-4 | 4.458E-5 |
| N° 12 (OFF) | --- | 3.785E-5 | 5.906E-5 | 7.326E-5 | 9.128E-5 | 1.099E-4 | 1.238E-4 | 1.364E-4 | 1.541E-4 | 1.066E-4 | 6.007E-5 |
| N° 13 (OFF) | --- | 4.190E-5 | 5.502E-5 | 8.103E-5 | 9.232E-5 | 1.096E-4 | 1.303E-4 | 1.440E-4 | 1.641E-4 | 1.143E-4 | 7.194E-5 |
| N° 14 (OFF) | --- | 1.438E-5 | 4.142E-5 | 6.387E-5 | 1.021E-4 | 1.167E-4 | 1.200E-4 | 1.327E-4 | 1.553E-4 | 1.008E-4 | 5.787E-5 |
| N° 15 (OFF) | --- | 2.806E-5 | 4.070E-5 | 6.853E-5 | 1.224E-4 | 1.238E-4 | 8.856E-5 | 9.811E-5 | 2.204E-4 | 1.220E-4 | 8.852E-5 |
| N° 16 (OFF) | --- | 1.294E-5 | 6.944E-5 | 8.503E-5 | 8.670E-5 | 1.290E-4 | 9.346E-5 | 1.047E-4 | 2.393E-4 | 1.259E-4 | 8.164E-5 |
| Average (Bias1) | --- | 8.346E-6 | 2.256E-5 | 4.034E-5 | 4.210E-5 | 4.510E-5 | 5.352E-5 | 6.250E-5 | 6.672E-5 | 5.132E-5 | -1.152E-5 |
| σ (Bias1) | --- | 1.406E-5 | 1.868E-5 | 2.062E-5 | 2.022E-5 | 3.039E-5 | 2.659E-5 | 2.660E-5 | 2.390E-5 | 2.686E-5 | 2.330E-5 |
| Average+3σ (Bias1) | --- | 5.053E-5 | 7.860E-5 | 1.022E-4 | 1.028E-4 | 1.363E-4 | 1.333E-4 | 1.423E-4 | 1.384E-4 | 1.319E-4 | 5.839E-5 |
| Average-3σ (Bias1) | --- | -3.384E-5 | -3.348E-5 | -2.150E-5 | -1.855E-5 | -4.607E-5 | -2.624E-5 | -1.729E-5 | -4.969E-6 | -2.927E-5 | -8.142E-5 |
| Average (Bias2) | --- | 2.705E-5 | 3.662E-5 | 6.191E-5 | 6.903E-5 | 8.573E-5 | 8.934E-5 | 1.038E-4 | 1.263E-4 | 9.418E-5 | 1.736E-5 |
| σ (Bias2) | --- | 1.062E-5 | 1.838E-5 | 2.227E-5 | 3.315E-5 | 2.562E-5 | 3.292E-5 | 3.398E-5 | 2.606E-5 | 2.895E-5 | 2.399E-5 |
| Average+3σ (Bias2) | --- | 5.890E-5 | 9.176E-5 | 1.287E-4 | 1.685E-4 | 1.626E-4 | 1.881E-4 | 2.057E-4 | 2.045E-4 | 1.810E-4 | 8.932E-5 |
| Average-3σ (Bias2) | --- | -4.805E-6 | -1.853E-5 | -4.893E-6 | -3.041E-5 | 8.873E-6 | -9.431E-6 | 1.822E-6 | 4.812E-5 | 7.332E-6 | -5.460E-5 |
| Average (OFF) | --- | 2.703E-5 | 5.313E-5 | 7.434E-5 | 9.895E-5 | 1.178E-4 | 1.112E-4 | 1.232E-4 | 1.866E-4 | 1.139E-4 | 7.201E-5 |
| σ (OFF) | --- | 1.321E-5 | 1.221E-5 | 8.712E-6 | 1.423E-5 | 8.559E-6 | 1.891E-5 | 2.043E-5 | 4.021E-5 | 1.041E-5 | 1.330E-5 |
| Average+3σ (OFF) | --- | 6.665E-5 | 8.976E-5 | 1.005E-4 | 1.416E-4 | 1.435E-4 | 1.680E-4 | 1.845E-4 | 3.073E-4 | 1.452E-4 | 1.119E-4 |
| Average-3σ (OFF) | --- | -1.260E-5 | 1.650E-5 | 4.821E-5 | 5.624E-5 | 9.212E-5 | 5.451E-5 | 6.190E-5 | 6.602E-5 | 8.269E-5 | 3.209E-5 |