



High Dose Rate (HDR) Radiation Testing of the RT2378IMS-20 20-Bit, 1MSPS, Low Power SAR ADC with 0.5ppm INL for Linear Technology

RAD Job Number: 17-0074

Part Type Tested: RT2378IMS-20 20-Bit, 1MSPS, Low Power SAR ADC with 0.5ppm INL. Linear Technology LTC2378-20 Datasheet Revision B

Quantity of Units: 30 units received, 10 units for Bias 1 irradiation, 10 units for Bias 2 irradiation and 10 units for unbiased irradiation. Bias 1 serial numbers 1, 2, 3, 4, 5, 420, 421, 422, 423 and 424. Bias 2 serial numbers 6, 7, 8, 9, 10, 425, 426, 427, 428 and 194. Serial numbers 11, 12, 13, 14, 15, 48, 49, 50, 191 and 193 were unbiased during irradiation. See Appendix B for the radiation bias schematic.

Radiation and Electrical Test Increments: 50-300rad(Si)/s ionizing radiation with electrical test increments as follows:

SNs 1-15: pre-irradiation, 5krad(Si) and 10krad(Si)

SNs 48-50, 191-193 and 420-428: pre-irradiation and 20krad(Si).

All units were shipped to customer in dry ice for electrical testing after each irradiation dose level.

Pre-Irradiation Burn-In: Burn-In performed by Linear Technology prior to receipt by RAD

Overtest and Post-Irradiation Anneal: No overtest. No anneal.

Radiation Test Standard: MIL-STD-883 TM1019 Condition A.

Test Hardware and Software: All units were shipped to customer in dry ice for electrical testing after each irradiation dose level.

Facility and Radiation Source: Aeroflex RAD's, Colorado Springs, CO. Gamma rays provided by JLSA 81-24 Co60 source. Dosimetry performed by Air Ionization Chamber (AIC) traceable to NIST. Aeroflex RAD's dosimetry has been audited by DLA and Aeroflex RAD has been awarded Laboratory Suitability for MIL-STD-750 and MIL-STD-883 TM 1019.

Irradiation and Test Temperature: Room temperature controlled to 24°C±6°C per MIL-STD-883.

Test Result: The units were irradiated to customer's requirements and no Pass/Fail criteria were applied. The results of the testing are shown in Section 5.



1.0. Overview and Background

It is well known that total dose ionizing radiation can cause parametric degradation and ultimately functional failure in electronic devices. The damage occurs via electron-hole pair production, transport and trapping in the dielectric and interface regions. In discrete devices the bulk of the damage is frequently manifested as a reduction in the gain and/or breakdown voltage of the device. The damage will usually anneal with time following the end of the radiation exposure. Due to this annealing, and to ensure a worst-case test condition MIL-STD-883H TM1019 calls out a dose rate of 50 to 300rad(Si)/s as Condition A and further specifies that the time from the end of an incremental radiation exposure and electrical testing shall be 1-hour or less and the total time from the end of one incremental irradiation to the beginning of the next incremental radiation step should be 2-hours or less. The work described in this report was performed to meet MIL-STD-883H TM1019 Condition A.

2.0. Radiation Test Apparatus

The total ionizing dose testing described in this final report was performed using the facilities at Aeroflex RAD's Longmire Laboratories in Colorado Springs, CO. The high dose rate total ionizing dose (TID) source is a JLSA 81-24 irradiator modified to provide a panoramic exposure. The Co-60 rods are held in the base of the irradiator heavily shielded by lead. During the radiation exposures the rod is raised by an electronic timer/controller and the exposure is performed in air. The dose rate for this irradiator in this configuration ranges from $<1\text{rad}(\text{Si})/\text{s}$ to a maximum of approximately $300\text{rad}(\text{Si})/\text{s}$, determined by the distance from the source. For high-dose rate experiments the bias boards are placed in a radial fashion equidistant from the raised Co-60 rods with the distance adjusted to provide the required dose rate. The irradiator calibration is maintained by Aeroflex RAD Longmire Laboratories using air ionization chamber (AIC) equipment calibrated with traceability to the National Institute of Standards and Technology (NIST). Figure 2.1 shows a photograph of the JLSA 81-24 Co-60 irradiator at Aeroflex RAD's Longmire Laboratory facility.

Aeroflex RAD is currently certified by the Defense Logistics Agency (DLA) for Laboratory Suitability under MIL STD 750 and MIL-STD-883H. Additional details regarding Aeroflex RAD dosimetry for TM1019 Condition A testing are available in Aeroflex RAD's report to DLA entitled: "Dose Rate Mapping of the J.L. Shepherd and Associates Model 81 Irradiator Installed by Radiation Assured Devices".



Figure 2.1. Aeroflex RAD's high dose rate Co-60 irradiator. The dose rate is obtained by positioning the device-under-test at a fixed distance from the gamma cell. The dose rate for this irradiator varies from approximately 300rad(Si)/s close to the rods down to 1rad(Si)/s at a distance of approximately 2-feet.



3.0. Radiation Test Conditions

The RT2378IMS-20 (RT2378-20) 20-Bit, 1Msps, Low Power SAR ADC with 0.5ppm INL described in this final report were irradiated using three different bias conditions - Bias 1 at 5V supply potential, Bias 2 at 2.5V supply potential and unbiased, where all pins were tied to ground. See the TID Bias Table in Appendix B for the full bias circuits. In our opinion, this bias circuit satisfies the requirements of MIL-STD-883H TM1019 Section 3.9.3 Bias and Loading Conditions which states "The bias applied to the test devices shall be selected to produce the greatest radiation induced damage or the worst-case damage for the intended application, if known. While maximum voltage is often worst case some bipolar linear device parameters (e.g. input bias current or maximum output load current) exhibit more degradation with 0 V bias."

The devices were irradiated to a maximum total ionizing dose level of 20krad(Si) with incremental readings at 5krad(Si) and 10krad(Si). The TID bias board was positioned in the Co-60 cell to provide the required minimum of 50rad(Si)/s and was located inside a lead-aluminum enclosure. The lead-aluminum enclosure is required under MIL-STD-883H TM1019 Section 3.4 that reads as follows: "Lead/Aluminum (Pb/Al) container. Test specimens shall be enclosed in a Pb/Al container to minimize dose enhancement effects caused by low-energy, scattered radiation. A minimum of 1.5 mm Pb, surrounding an inner shield of at least 0.7 mm Al, is required. This Pb/Al container produces an approximate charged particle equilibrium for Si and for TLDs such as CaF₂. The radiation field intensity shall be measured inside the Pb/Al container (1) initially, (2) when the source is changed, or (3) when the orientation or configuration of the source, container, or test-fixture is changed. This measurement shall be performed by placing a dosimeter (e.g., a TLD) in the device-irradiation container at the approximate test-device position. If it can be demonstrated that low energy scattered radiation is small enough that it will not cause dosimetry errors due to dose enhancement, the Pb/Al container may be omitted."

The final dose rate within the high dose rate lead-aluminum enclosure was determined using calibration calculations based on air ionization chamber (AIC) dosimetry performed just prior to beginning the total dose irradiations. The final dose rate for this work was 61rad(Si)/s with a precision of $\pm 5\%$.



4.0. Tested Parameters

During the total ionizing dose characterization testing the following electrical parameters were measured pre- and post-irradiation:

1. Digital Input Current CNV I_{IH}
2. Digital Input Current RDL I_{IH}
3. Digital Input Current SCK I_{IH}
4. Digital Input Current CHAIN I_{IH}
5. Digital Input Current DGC I_{IH}
6. Digital Input Current CNV I_{IL}
7. Digital Input Current RDL I_{IL}
8. Digital Input Current SCK I_{IL}
9. Digital Input Current CHAIN I_{IL}
10. Digital Input Current DGC I_{IL}
11. Analog Input Current INP I_{IH}
12. Analog Input Current INN I_{IH}
13. Analog Input Current INP I_{IL}
14. Analog Input Current INN I_{IL}
15. Hi-Z Output Leakage Current 5.25V
16. Hi-Z Output Leakage Current 0V
17. Low Level Output Voltage 5.25V
18. High Level Output Voltage 5.25V
19. Low Level Output Voltage 1.71V
20. High Level Output Voltage 1.71V
21. OFFSET/1M \leftrightarrow T_Offset_Gain
22. PFS_ERROR/1M \leftrightarrow T_Offset_Gain
23. NFS_ERROR/1M \leftrightarrow T_Offset_Gain
24. Integral Linearity Error Max
25. Integral Linearity Error Min
26. Integral Linearity Error Max DGC=GND
27. Integral Linearity Error Min DGC=GND
28. SNR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
29. THD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
30. SFDR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
31. SINAD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
32. SNR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ DGC=GND
33. THD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ DGC=GND
34. SNR $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$
35. THD $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$
36. Supply Current IREF
37. Supply Current IVDD



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- 38. Supply Current IOVDD
- 39. Power Down Mode IPD
- 40. tCONV 5.25V
- 41. tDSDOBUSYL 5.25V
- 42. tDSDO 5.25V
- 43. tEN 5.25V
- 44. tDIS 5.25V
- 45. tCONV 2.5V
- 46. tDSDOBUSYL 2.5V
- 47. tDSDO 2.5V
- 48. tEN 2.5V
- 49. tDIS 2.5V
- 50. tCONV 1.7V
- 51. tDSDOBUSYL 1.7V
- 52. tDSDO 1.7V
- 53. tEN 1.7V
- 54. tDIS 1.7V

The parametric data was obtained as "read and record" and all the raw data plus an attributes summary are contained in this report as well as in a separate Excel file. The attributes data contains the average, standard deviation and the average with the KTL values applied. The KTL value used in this work is 2.742 per MIL-HDBK-814 using one sided tolerance limits of 90/90 and a 10-piece sample size.



5.0. Total Ionizing Dose Test Results

The RT2378IMS-20 (RT2378-20) 20-Bit, 1Msps, Low Power SAR ADC with 0.5ppm INL (from the lot traceability information provided on the first page of this test report) units were irradiated to customer's requirements and no Pass/Fail criteria were applied. The customer shall review the test results and disposition the part lot.

Figures 5.1 through 5.54 show plots of all the measured parameters versus total ionizing dose while Tables 5.1 - 5.54 show the corresponding raw data for each of these parameters. In the data plots the solid diamonds are the average of the measured data points for the sample irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the units irradiated with all pins tied to ground. The black lines (solid or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the sample irradiated in the biased condition while the shaded lines (solid or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the sample irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.

The control units, as expected, show no significant changes to any of the parameters. Therefore we can conclude that the electrical testing remained in control throughout the duration of the tests and the observed degradation was due to the radiation exposure. Appendix C lists the figures used in this section to facilitate the location of a particular parameter.

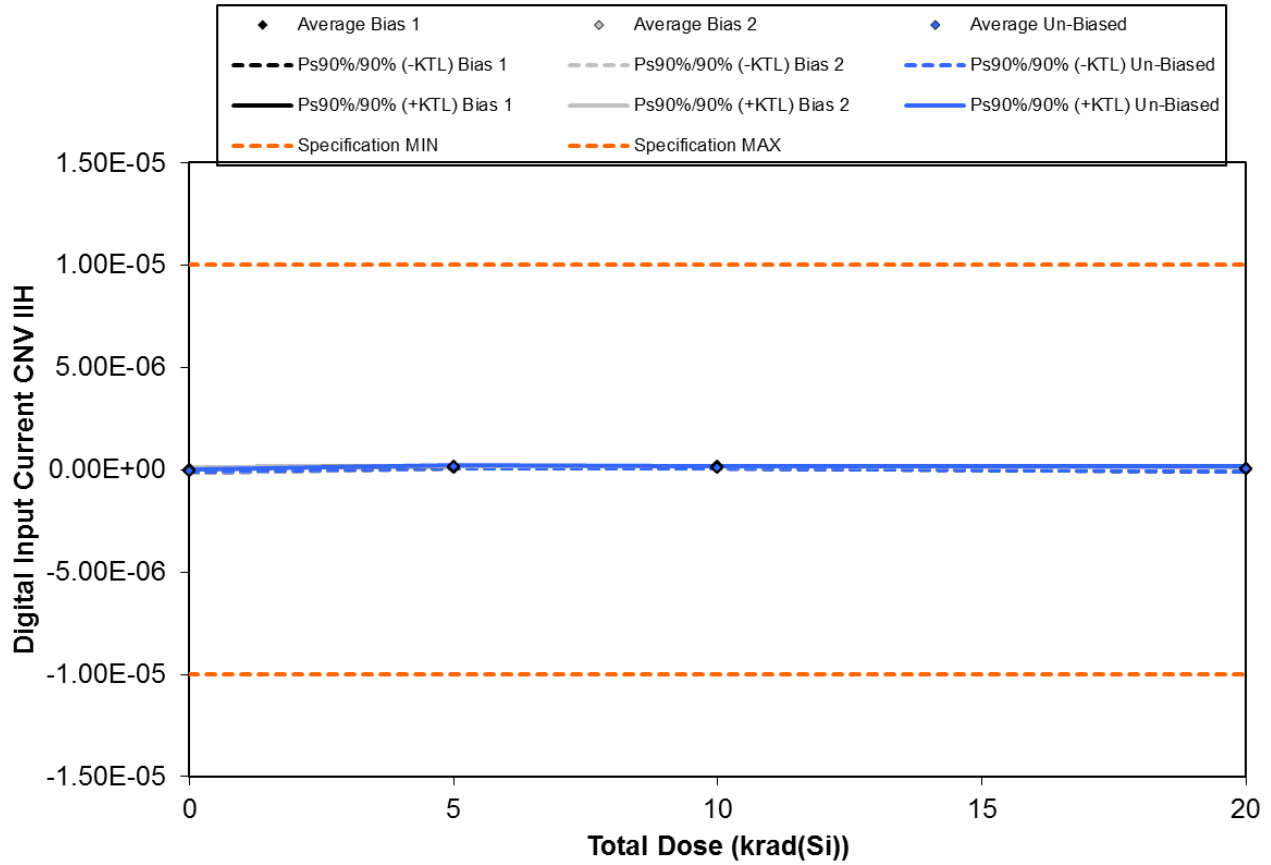


Figure 5.1. Plot of Digital Input Current CNV IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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5030 Centennial Blvd.
Colorado Springs, CO 80919
(719) 531-0800

Table 5.1. Raw data for Digital Input Current CNV IIH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current CNV IIH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-1.10E-07	7.63E-08	1.50E-07	
2	-8.56E-08	1.25E-07	1.50E-07	
3	-3.68E-08	1.25E-07	1.25E-07	
4	-1.10E-07	1.01E-07	1.25E-07	
5	-1.23E-08	1.01E-07	1.01E-07	
420	4.48E-08			6.92E-08
421	4.48E-08			-4.19E-09
422	-2.86E-08			4.47E-08
423	4.48E-08			-2.87E-08
424	2.03E-08			6.92E-08
6	-6.12E-08	1.25E-07	1.50E-07	
7	-6.12E-08	7.63E-08	1.74E-07	
8	-1.10E-07	1.25E-07	1.50E-07	
9	-3.68E-08	1.25E-07	1.50E-07	
10	-6.12E-08	1.50E-07	1.50E-07	
425	6.92E-08			4.47E-08
426	4.48E-08			2.03E-08
427	4.48E-08			4.47E-08
428	6.92E-08			9.37E-08
194	-8.56E-08			-4.19E-09
11	-3.68E-08	1.25E-07	1.25E-07	
12	-6.12E-08	1.25E-07	1.25E-07	
13	-3.68E-08	1.01E-07	7.63E-08	
14	-8.56E-08	1.74E-07	1.01E-07	
15	-6.12E-08	1.25E-07	1.50E-07	
48	-6.12E-08			-4.19E-09
49	-6.12E-08			6.92E-08
50	-8.56E-08			1.18E-07
191	-6.12E-08			2.03E-08
193	-1.23E-08			2.03E-08
Bias 1 Statistics				
Average Bias 1	-2.29E-08	1.06E-07	1.30E-07	3.01E-08
Std Dev Bias 1	6.24E-08	2.04E-08	2.04E-08	4.44E-08
Ps90%/90% (+KTL) Bias 1	1.06E-07	1.62E-07	1.86E-07	1.52E-07
Ps90%/90% (-KTL) Bias 1	-1.52E-07	4.96E-08	7.40E-08	-9.18E-08
Bias 2 Statistics				
Average Bias 2	-1.88E-08	1.20E-07	1.54E-07	3.98E-08
Std Dev Bias 2	6.84E-08	2.67E-08	1.09E-08	3.63E-08
Ps90%/90% (+KTL) Bias 2	1.22E-07	1.94E-07	1.84E-07	1.39E-07
Ps90%/90% (-KTL) Bias 2	-1.60E-07	4.70E-08	1.24E-07	-5.97E-08
Un-Biased Statistics				
Average Un-Biased	-5.63E-08	1.30E-07	1.15E-07	4.47E-08
Std Dev Un-Biased	2.24E-08	2.67E-08	2.78E-08	4.89E-08
Ps90%/90% (+KTL) Un-Biased	-9.95E-09	2.03E-07	1.92E-07	1.79E-07
Ps90%/90% (-KTL) Un-Biased	-1.03E-07	5.67E-08	3.91E-08	-8.94E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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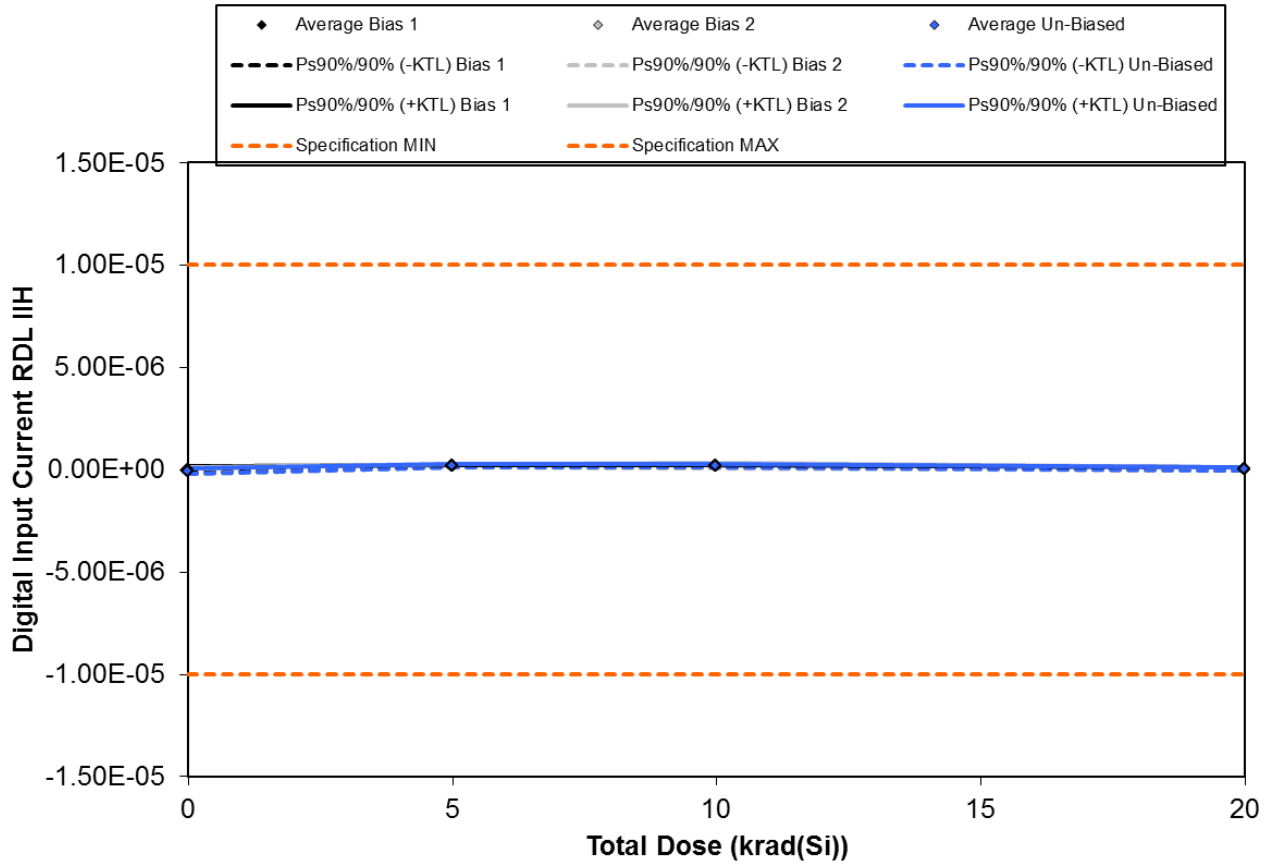


Figure 5.2. Plot of Digital Input Current RDL IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Aeroflex RAD
5030 Centennial Blvd.
Colorado Springs, CO 80919
(719) 531-0800

Table 5.2. Raw data for Digital Input Current RDL IIH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current RDL IIH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-3.34E-08	1.61E-07	1.86E-07	
2	-1.31E-07	1.86E-07	1.86E-07	
3	-8.22E-08	1.86E-07	1.86E-07	
4	-3.34E-08	1.86E-07	1.86E-07	
5	-5.78E-08	1.86E-07	1.61E-07	
420	2.95E-08			2.95E-08
421	7.83E-08			2.95E-08
422	5.39E-08			2.95E-08
423	7.83E-08			7.83E-08
424	5.39E-08			-1.93E-08
6	-5.78E-08	1.37E-07	1.61E-07	
7	-8.22E-08	1.86E-07	1.86E-07	
8	-8.94E-09	1.86E-07	2.59E-07	
9	-1.07E-07	2.10E-07	2.10E-07	
10	-1.07E-07	1.86E-07	1.61E-07	
425	2.95E-08			2.95E-08
426	5.39E-08			-1.93E-08
427	7.83E-08			2.95E-08
428	2.95E-08			2.95E-08
194	-1.07E-07			7.83E-08
11	-8.22E-08	1.86E-07	1.86E-07	
12	-8.22E-08	1.86E-07	2.10E-07	
13	3.99E-08	1.86E-07	1.37E-07	
14	-8.22E-08	2.34E-07	2.10E-07	
15	-8.22E-08	1.61E-07	2.10E-07	
48	-8.22E-08			2.95E-08
49	-3.34E-08			5.12E-09
50	-8.94E-09			5.12E-09
191	-1.07E-07			-1.93E-08
193	-1.56E-07			5.39E-08
Bias 1 Statistics				
Average Bias 1	-4.42E-09	1.81E-07	1.81E-07	2.95E-08
Std Dev Bias 1	7.32E-08	1.09E-08	1.09E-08	3.45E-08
Ps90%/90% (+KTL) Bias 1	1.47E-07	2.11E-07	2.11E-07	1.24E-07
Ps90%/90% (-KTL) Bias 1	-1.56E-07	1.51E-07	1.51E-07	-6.50E-08
Bias 2 Statistics				
Average Bias 2	-2.78E-08	1.81E-07	1.95E-07	2.95E-08
Std Dev Bias 2	7.26E-08	2.67E-08	4.07E-08	3.45E-08
Ps90%/90% (+KTL) Bias 2	1.22E-07	2.54E-07	3.07E-07	1.24E-07
Ps90%/90% (-KTL) Bias 2	-1.78E-07	1.08E-07	8.38E-08	-6.50E-08
Un-Biased Statistics				
Average Un-Biased	-6.76E-08	1.91E-07	1.91E-07	1.49E-08
Std Dev Un-Biased	5.43E-08	2.67E-08	3.17E-08	2.78E-08
Ps90%/90% (+KTL) Un-Biased	4.45E-08	2.64E-07	2.78E-07	9.11E-08
Ps90%/90% (-KTL) Un-Biased	-1.80E-07	1.17E-07	1.04E-07	-6.14E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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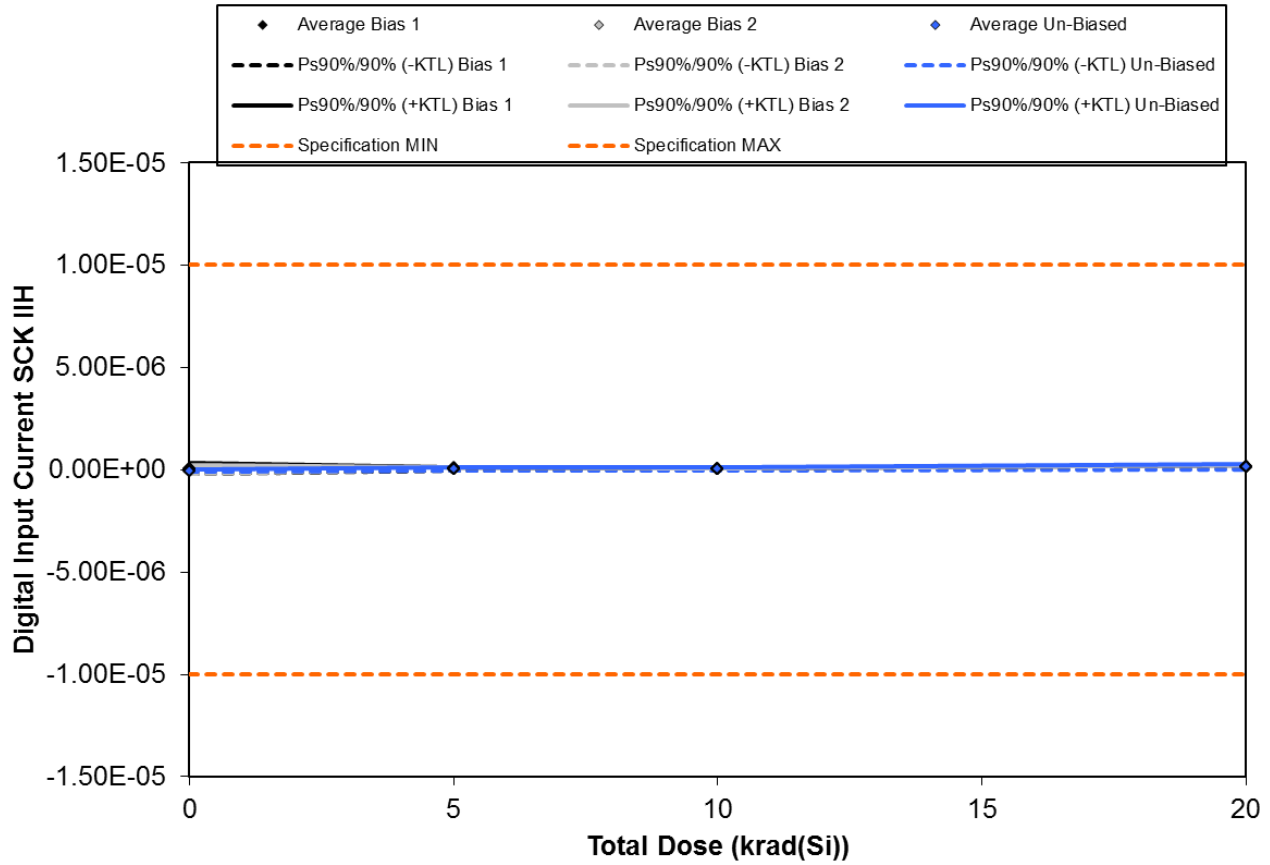


Figure 5.3. Plot of Digital Input Current SCK IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.3. Raw data for Digital Input Current SCK IIH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current SCK IIH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-9.77E-08	2.76E-08	2.76E-08	
2	-4.88E-08	5.20E-08	2.76E-08	
3	-7.32E-08	2.76E-08	2.76E-08	
4	-4.88E-08	7.64E-08	3.12E-09	
5	-4.88E-08	2.76E-08	2.76E-08	
420	1.53E-07			1.78E-07
421	1.53E-07			1.29E-07
422	1.78E-07			1.53E-07
423	2.02E-07			1.53E-07
424	1.78E-07			2.02E-07
6	-7.32E-08	5.20E-08	5.20E-08	
7	-9.77E-08	1.01E-07	5.20E-08	
8	-2.44E-08	7.64E-08	5.20E-08	
9	-9.77E-08	2.76E-08	2.76E-08	
10	-7.32E-08	7.64E-08	5.20E-08	
425	1.53E-07			1.29E-07
426	1.29E-07			1.78E-07
427	1.53E-07			1.29E-07
428	1.05E-07			1.53E-07
194	2.45E-08			1.05E-07
11	-7.32E-08	7.64E-08	2.76E-08	
12	-7.32E-08	3.12E-09	3.12E-09	
13	-9.77E-08	2.76E-08	7.64E-08	
14	-2.44E-08	5.20E-08	3.12E-09	
15	-2.44E-08	2.76E-08	2.76E-08	
48	-9.77E-08			8.04E-08
49	-2.44E-08			1.78E-07
50	-4.88E-08			1.78E-07
191	-7.32E-08			1.53E-07
193	-7.32E-08			1.05E-07
Bias 1 Statistics				
Average Bias 1	5.47E-08	4.22E-08	2.27E-08	1.63E-07
Std Dev Bias 1	1.26E-07	2.19E-08	1.09E-08	2.78E-08
Ps90%/90% (+KTL) Bias 1	3.15E-07	1.02E-07	5.26E-08	2.39E-07
Ps90%/90% (-KTL) Bias 1	-2.06E-07	-1.77E-08	-7.29E-09	8.71E-08
Bias 2 Statistics				
Average Bias 2	1.99E-08	6.67E-08	4.71E-08	1.39E-07
Std Dev Bias 2	1.06E-07	2.79E-08	1.09E-08	2.78E-08
Ps90%/90% (+KTL) Bias 2	2.40E-07	1.43E-07	7.71E-08	2.15E-07
Ps90%/90% (-KTL) Bias 2	-2.00E-07	-9.74E-09	1.71E-08	6.27E-08
Un-Biased Statistics				
Average Un-Biased	-6.10E-08	3.73E-08	2.76E-08	1.39E-07
Std Dev Un-Biased	2.88E-08	2.79E-08	2.99E-08	4.42E-08
Ps90%/90% (+KTL) Un-Biased	-1.54E-09	1.14E-07	1.10E-07	2.60E-07
Ps90%/90% (-KTL) Un-Biased	-1.20E-07	-3.91E-08	-5.45E-08	1.76E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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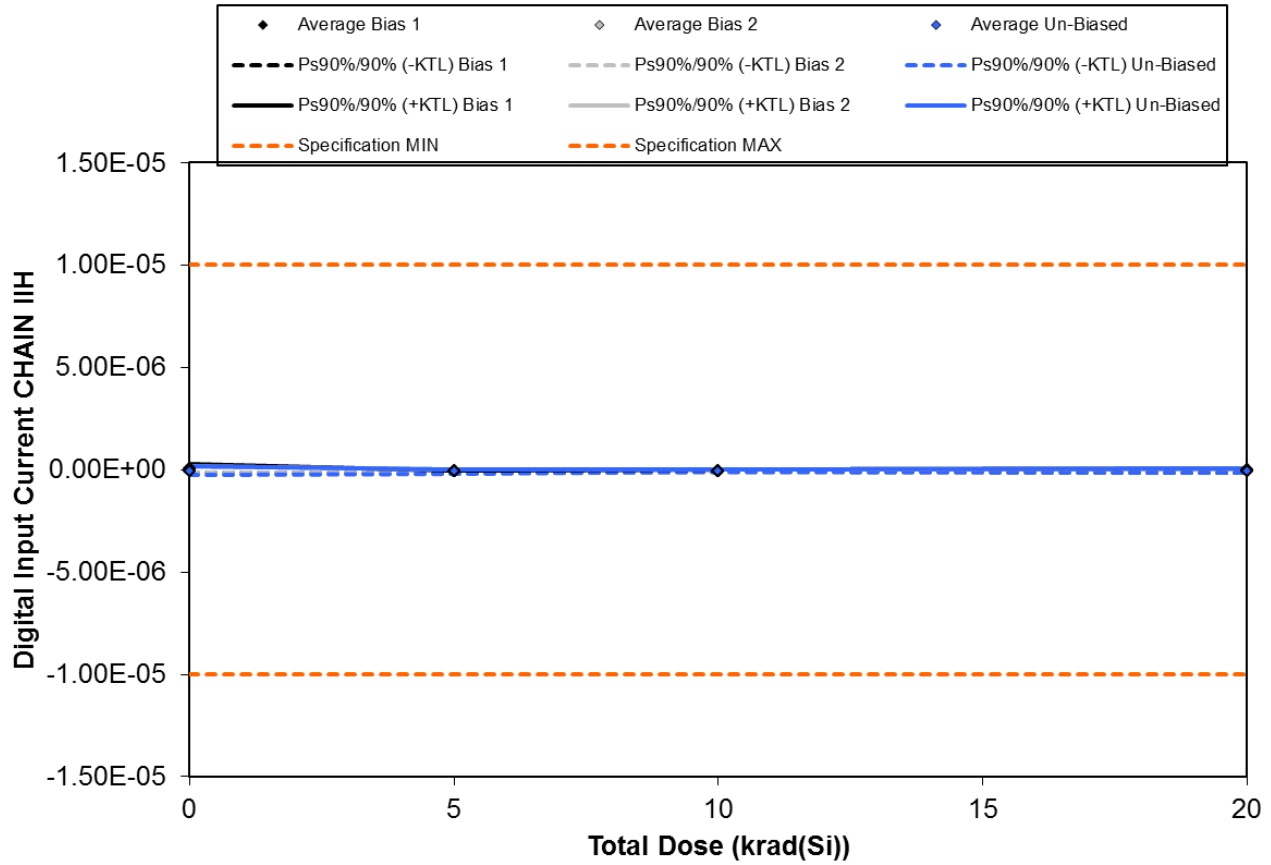


Figure 5.4. Plot of Digital Input Current CHAIN IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.4. Raw data for Digital Input Current CHAIN IIH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current CHAIN IIH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	6.12E-08	-8.00E-08	-5.55E-08	
2	-1.84E-07	-8.00E-08	-3.11E-08	
3	8.57E-08	-1.29E-07	-8.00E-08	
4	-6.12E-08	-8.00E-08	-5.55E-08	
5	1.10E-07	-8.00E-08	-3.11E-08	
420	4.25E-08			-6.31E-09
421	6.69E-08			-3.07E-08
422	1.64E-07			-5.51E-08
423	9.13E-08			-7.95E-08
424	1.64E-07			-6.31E-09
6	-8.57E-08	-8.00E-08	-8.00E-08	
7	-1.22E-08	-1.04E-07	-3.11E-08	
8	3.67E-08	-3.11E-08	-1.04E-07	
9	6.12E-08	-8.00E-08	-8.00E-08	
10	1.35E-07	-5.55E-08	-8.00E-08	
425	1.16E-07			-3.07E-08
426	-5.51E-08			1.81E-08
427	-6.32E-09			-5.51E-08
428	4.25E-08			-3.07E-08
194	-8.57E-08			-5.51E-08
11	8.57E-08	-8.00E-08	-5.55E-08	
12	-1.35E-07	-5.55E-08	-3.11E-08	
13	-1.35E-07	-1.04E-07	-3.11E-08	
14	-3.67E-08	-1.29E-07	-8.00E-08	
15	3.67E-08	-3.11E-08	-5.55E-08	
48	3.67E-08			-3.07E-08
49	1.35E-07			1.81E-08
50	-1.10E-07			-5.51E-08
191	-1.84E-07			-5.51E-08
193	-1.35E-07			-1.04E-07
Bias 1 Statistics				
Average Bias 1	5.42E-08	-8.98E-08	-5.06E-08	-3.56E-08
Std Dev Bias 1	1.05E-07	2.19E-08	2.05E-08	3.18E-08
Ps90%/90% (+KTL) Bias 1	2.72E-07	-2.98E-08	5.50E-09	5.16E-08
Ps90%/90% (-KTL) Bias 1	-1.64E-07	-1.50E-07	-1.07E-07	-1.23E-07
Bias 2 Statistics				
Average Bias 2	1.46E-08	-7.02E-08	-7.51E-08	-3.07E-08
Std Dev Bias 2	7.76E-08	2.79E-08	2.68E-08	2.99E-08
Ps90%/90% (+KTL) Bias 2	1.75E-07	6.29E-09	-1.61E-09	5.12E-08
Ps90%/90% (-KTL) Bias 2	-1.46E-07	-1.47E-07	-1.49E-07	-1.13E-07
Un-Biased Statistics				
Average Un-Biased	-4.40E-08	-8.00E-08	-5.06E-08	-4.54E-08
Std Dev Un-Biased	1.11E-07	3.87E-08	2.05E-08	4.43E-08
Ps90%/90% (+KTL) Un-Biased	1.85E-07	2.61E-08	5.50E-09	7.62E-08
Ps90%/90% (-KTL) Un-Biased	-2.73E-07	-1.86E-07	-1.07E-07	-1.67E-07
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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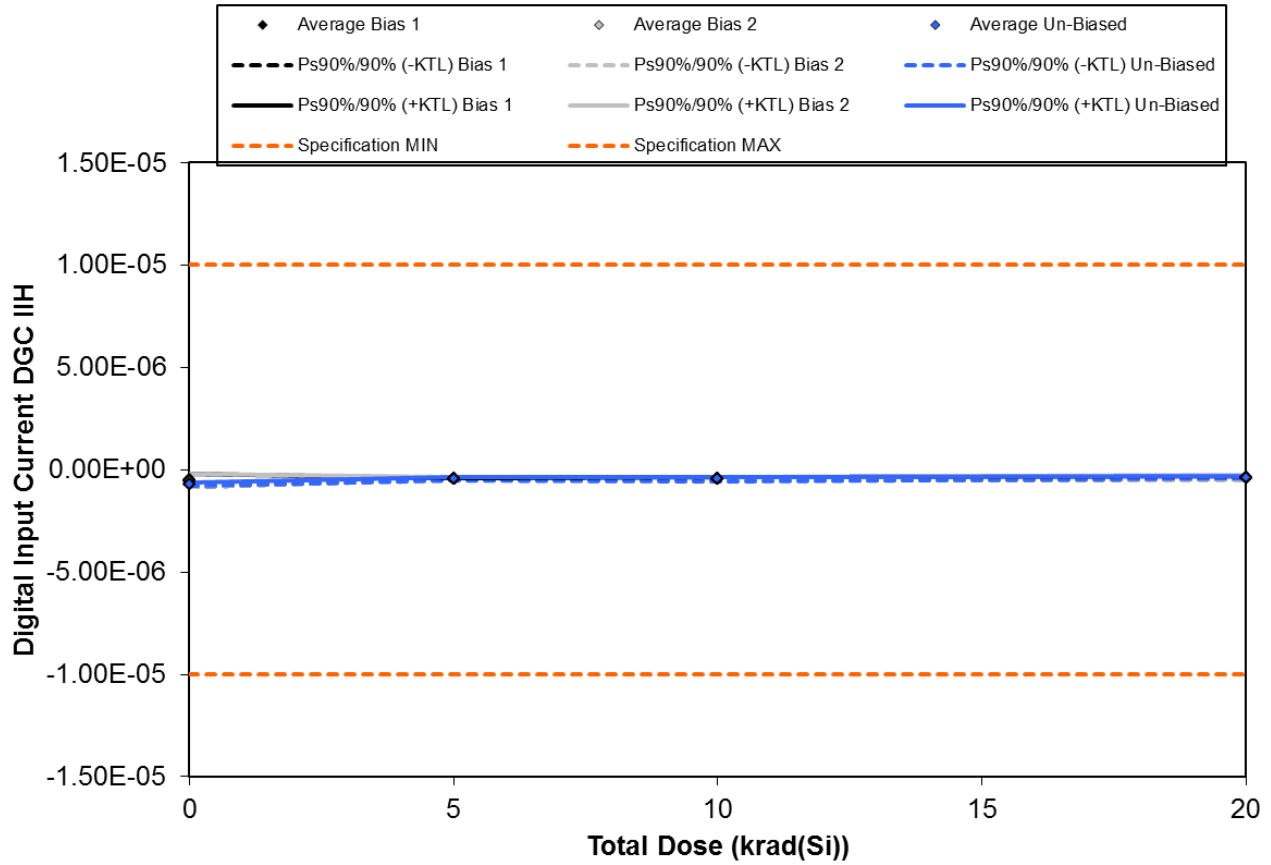


Figure 5.5. Plot of Digital Input Current DGC IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.5. Raw data for Digital Input Current DGC IIH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current DGC IIH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-6.81E-07	-4.61E-07	-4.61E-07	
2	-6.56E-07	-4.36E-07	-4.36E-07	
3	-6.81E-07	-4.36E-07	-4.36E-07	
4	-6.56E-07	-4.36E-07	-4.12E-07	
5	-6.81E-07	-4.61E-07	-4.85E-07	
420	-4.12E-07			-3.39E-07
421	-3.63E-07			-3.88E-07
422	-3.63E-07			-3.63E-07
423	-3.39E-07			-4.12E-07
424	-3.63E-07			-3.88E-07
6	-6.56E-07	-4.12E-07	-4.12E-07	
7	-7.05E-07	-4.12E-07	-4.61E-07	
8	-7.05E-07	-4.61E-07	-4.36E-07	
9	-6.07E-07	-4.12E-07	-4.61E-07	
10	-6.32E-07	-4.36E-07	-4.61E-07	
425	-3.88E-07			-4.12E-07
426	-3.88E-07			-3.39E-07
427	-3.14E-07			-3.88E-07
428	-3.88E-07			-3.39E-07
194	-6.56E-07			-4.12E-07
11	-6.56E-07	-4.12E-07	-4.36E-07	
12	-7.05E-07	-4.36E-07	-4.12E-07	
13	-7.05E-07	-4.12E-07	-4.61E-07	
14	-7.05E-07	-3.88E-07	-5.10E-07	
15	-7.05E-07	-4.61E-07	-4.36E-07	
48	-6.32E-07			-3.63E-07
49	-6.81E-07			-3.88E-07
50	-7.54E-07			-3.63E-07
191	-7.05E-07			-3.88E-07
193	-6.32E-07			-4.12E-07
Bias 1 Statistics				
Average Bias 1	-5.19E-07	-4.46E-07	-4.46E-07	-3.78E-07
Std Dev Bias 1	1.61E-07	1.34E-08	2.78E-08	2.78E-08
Ps90%/90% (+KTL) Bias 1	-1.87E-07	-4.10E-07	-3.70E-07	-3.01E-07
Ps90%/90% (-KTL) Bias 1	-8.51E-07	-4.83E-07	-5.23E-07	-4.54E-07
Bias 2 Statistics				
Average Bias 2	-5.44E-07	-4.27E-07	-4.46E-07	-3.78E-07
Std Dev Bias 2	1.54E-07	2.18E-08	2.18E-08	3.70E-08
Ps90%/90% (+KTL) Bias 2	-2.25E-07	-3.67E-07	-3.86E-07	-2.76E-07
Ps90%/90% (-KTL) Bias 2	-8.63E-07	-4.87E-07	-5.06E-07	-4.79E-07
Un-Biased Statistics				
Average Un-Biased	-6.88E-07	-4.22E-07	-4.51E-07	-3.83E-07
Std Dev Un-Biased	3.83E-08	2.78E-08	3.70E-08	2.04E-08
Ps90%/90% (+KTL) Un-Biased	-6.09E-07	-3.45E-07	-3.50E-07	-3.27E-07
Ps90%/90% (-KTL) Un-Biased	-7.67E-07	-4.98E-07	-5.53E-07	-4.39E-07
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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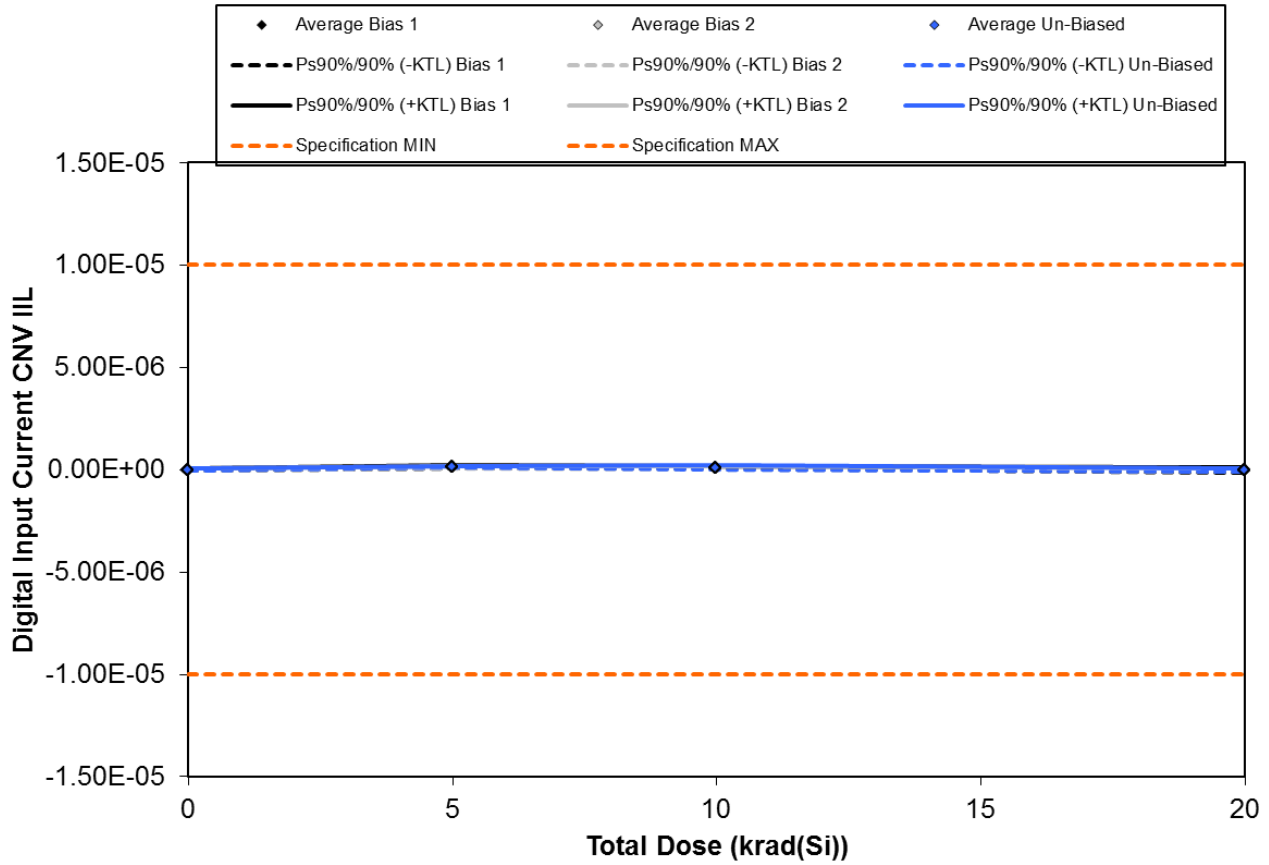


Figure 5.6. Plot of Digital Input Current CNV IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.6. Raw data for Digital Input Current CNV IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current CNV IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	1.21E-08	1.50E-07	1.25E-07	
2	1.21E-08	1.25E-07	1.01E-07	
3	3.65E-08	1.74E-07	1.01E-07	
4	-3.68E-08	1.01E-07	1.01E-07	
5	-1.23E-08	1.01E-07	1.25E-07	
420	2.03E-08			-7.76E-08
421	4.48E-08			4.47E-08
422	-2.86E-08			2.03E-08
423	4.48E-08			-2.87E-08
424	-4.17E-09			2.03E-08
6	-1.23E-08	1.50E-07	1.01E-07	
7	-1.23E-08	1.01E-07	7.63E-08	
8	3.65E-08	1.50E-07	7.63E-08	
9	1.21E-08	1.25E-07	1.25E-07	
10	6.09E-08	1.01E-07	1.50E-07	
425	2.03E-08			-5.31E-08
426	-2.86E-08			2.03E-08
427	2.03E-08			-2.87E-08
428	-4.17E-09			-4.19E-09
194	1.21E-08			2.03E-08
11	1.21E-08	1.25E-07	1.01E-07	
12	3.65E-08	1.50E-07	1.50E-07	
13	-1.23E-08	1.25E-07	1.01E-07	
14	-6.12E-08	1.50E-07	5.19E-08	
15	-1.23E-08	1.25E-07	1.25E-07	
48	1.21E-08			4.47E-08
49	1.21E-08			-4.19E-09
50	1.21E-08			-4.19E-09
191	-1.23E-08			-2.87E-08
193	-1.23E-08			2.03E-08
Bias 1 Statistics				
Average Bias 1	8.87E-09	1.30E-07	1.10E-07	-4.19E-09
Std Dev Bias 1	2.91E-08	3.18E-08	1.34E-08	4.89E-08
Ps90%/90% (+KTL) Bias 1	6.89E-08	2.17E-07	1.47E-07	1.30E-07
Ps90%/90% (-KTL) Bias 1	-5.11E-08	4.28E-08	7.38E-08	-1.38E-07
Bias 2 Statistics				
Average Bias 2	1.05E-08	1.25E-07	1.06E-07	-9.08E-09
Std Dev Bias 2	2.63E-08	2.44E-08	3.18E-08	3.19E-08
Ps90%/90% (+KTL) Bias 2	6.47E-08	1.92E-07	1.93E-07	7.84E-08
Ps90%/90% (-KTL) Bias 2	-4.38E-08	5.82E-08	1.84E-08	-9.65E-08
Un-Biased Statistics				
Average Un-Biased	-2.56E-09	1.35E-07	1.06E-07	5.60E-09
Std Dev Un-Biased	2.63E-08	1.34E-08	3.62E-08	2.79E-08
Ps90%/90% (+KTL) Un-Biased	5.17E-08	1.72E-07	2.05E-07	8.21E-08
Ps90%/90% (-KTL) Un-Biased	-5.68E-08	9.82E-08	6.38E-09	-7.09E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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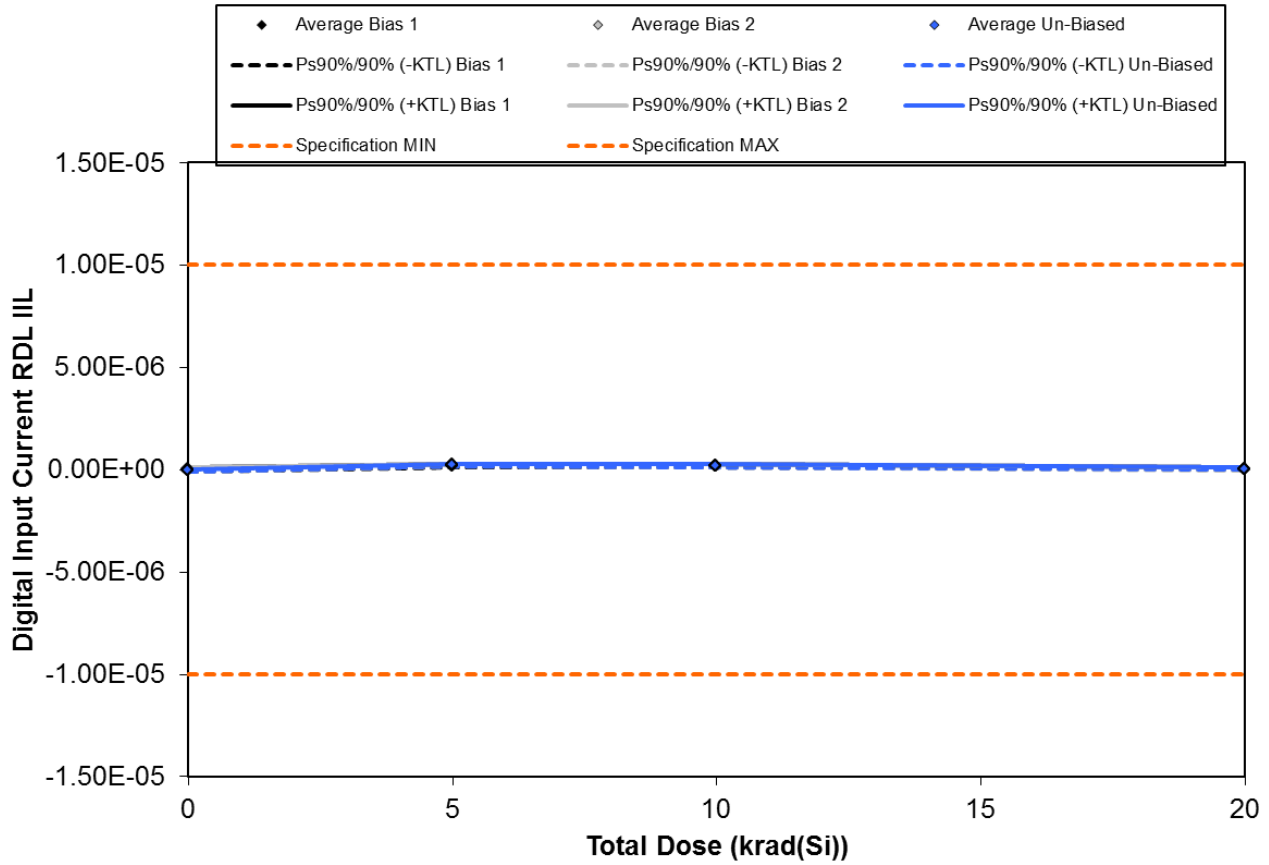


Figure 5.7. Plot of Digital Input Current RDL IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.7. Raw data for Digital Input Current RDL IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current RDL IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	3.99E-08	2.34E-07	2.34E-07	
2	-3.34E-08	1.61E-07	1.86E-07	
3	-5.78E-08	2.10E-07	1.61E-07	
4	-3.34E-08	2.34E-07	1.61E-07	
5	-3.34E-08	2.34E-07	2.10E-07	
420	5.39E-08			2.95E-08
421	5.39E-08			2.95E-08
422	7.83E-08			5.39E-08
423	5.39E-08			7.83E-08
424	7.83E-08			5.39E-08
6	-3.34E-08	2.34E-07	2.34E-07	
7	-3.34E-08	2.10E-07	2.34E-07	
8	-8.22E-08	2.59E-07	2.10E-07	
9	-5.78E-08	2.34E-07	1.61E-07	
10	-8.94E-09	1.86E-07	2.10E-07	
425	7.83E-08			2.95E-08
426	5.39E-08			5.39E-08
427	5.39E-08			5.39E-08
428	5.11E-09			-1.93E-08
194	-3.34E-08			5.39E-08
11	-8.22E-08	2.10E-07	2.10E-07	
12	-5.78E-08	2.34E-07	1.86E-07	
13	-8.94E-09	2.59E-07	1.61E-07	
14	-5.78E-08	2.34E-07	2.34E-07	
15	1.55E-08	2.10E-07	2.10E-07	
48	-8.94E-09			5.39E-08
49	-8.94E-09			7.83E-08
50	-5.78E-08			7.83E-08
191	-8.94E-09			5.39E-08
193	-3.34E-08			5.39E-08
Bias 1 Statistics				
Average Bias 1	2.00E-08	2.15E-07	1.91E-07	4.90E-08
Std Dev Bias 1	5.29E-08	3.17E-08	3.17E-08	2.04E-08
Ps90%/90% (+KTL) Bias 1	1.29E-07	3.02E-07	2.78E-07	1.05E-07
Ps90%/90% (-KTL) Bias 1	-8.93E-08	1.28E-07	1.04E-07	-6.93E-09
Bias 2 Statistics				
Average Bias 2	-5.80E-09	2.25E-07	2.10E-07	3.44E-08
Std Dev Bias 2	5.29E-08	2.77E-08	2.98E-08	3.18E-08
Ps90%/90% (+KTL) Bias 2	1.03E-07	3.01E-07	2.92E-07	1.22E-07
Ps90%/90% (-KTL) Bias 2	-1.15E-07	1.49E-07	1.28E-07	-5.28E-08
Un-Biased Statistics				
Average Un-Biased	-3.09E-08	2.29E-07	2.00E-07	6.36E-08
Std Dev Un-Biased	3.14E-08	2.04E-08	2.77E-08	1.34E-08
Ps90%/90% (+KTL) Un-Biased	3.40E-08	2.85E-07	2.76E-07	1.00E-07
Ps90%/90% (-KTL) Un-Biased	-9.59E-08	1.74E-07	1.24E-07	2.70E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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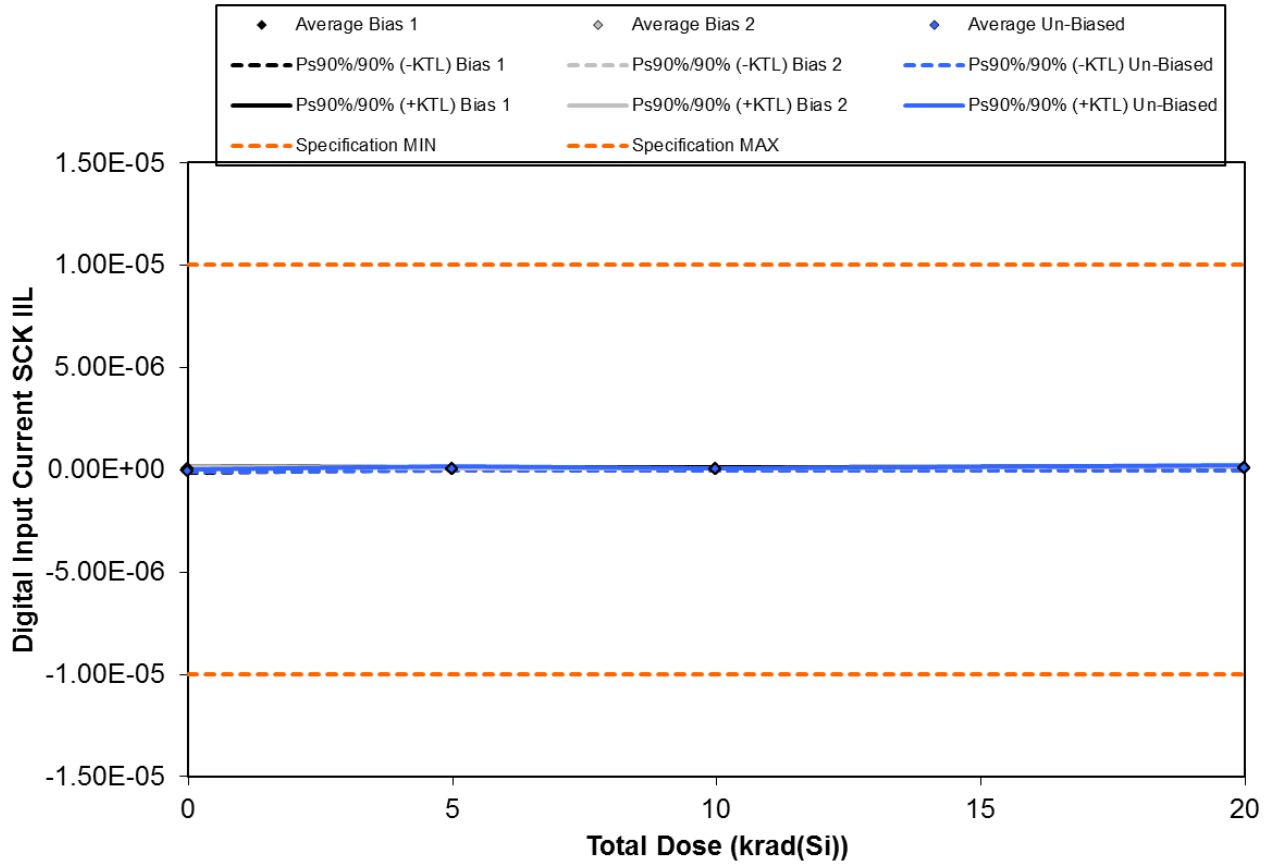


Figure 5.8. Plot of Digital Input Current SCK IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.8. Raw data for Digital Input Current SCK IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current SCK IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	8.33E-11	2.76E-08	5.20E-08	
2	-9.77E-08	5.20E-08	2.76E-08	
3	-4.88E-08	7.64E-08	2.76E-08	
4	-2.44E-08	2.76E-08	3.12E-09	
5	-2.44E-08	5.20E-08	7.64E-08	
420	8.04E-08			1.29E-07
421	1.29E-07			5.61E-08
422	5.61E-08			1.29E-07
423	8.04E-08			1.05E-07
424	1.05E-07			8.04E-08
6	8.33E-11	7.64E-08	5.20E-08	
7	-2.44E-08	5.20E-08	3.12E-09	
8	-2.44E-08	5.20E-08	2.76E-08	
9	-4.88E-08	5.20E-08	3.12E-09	
10	-2.44E-08	5.20E-08	3.12E-09	
425	5.61E-08			1.05E-07
426	1.05E-07			8.04E-08
427	1.29E-07			1.29E-07
428	1.05E-07			1.05E-07
194	-2.44E-08			8.04E-08
11	-7.32E-08	1.01E-07	3.12E-09	
12	8.33E-11	5.20E-08	2.76E-08	
13	-4.88E-08	5.20E-08	3.12E-09	
14	-4.88E-08	7.64E-08	3.12E-09	
15	-2.44E-08	3.12E-09	5.20E-08	
48	-2.44E-08			7.35E-09
49	-7.32E-08			1.05E-07
50	-9.77E-08			1.29E-07
191	-2.44E-08			1.29E-07
193	-9.77E-08			1.05E-07
Bias 1 Statistics				
Average Bias 1	2.56E-08	4.71E-08	3.73E-08	9.99E-08
Std Dev Bias 1	7.48E-08	2.04E-08	2.79E-08	3.18E-08
Ps90%/90% (+KTL) Bias 1	1.80E-07	1.03E-07	1.14E-07	1.87E-07
Ps90%/90% (-KTL) Bias 1	-1.29E-07	-8.95E-09	-3.91E-08	1.28E-08
Bias 2 Statistics				
Average Bias 2	2.49E-08	5.69E-08	1.78E-08	9.99E-08
Std Dev Bias 2	6.70E-08	1.09E-08	2.19E-08	2.04E-08
Ps90%/90% (+KTL) Bias 2	1.63E-07	8.68E-08	7.77E-08	1.56E-07
Ps90%/90% (-KTL) Bias 2	-1.13E-07	2.69E-08	-4.21E-08	4.40E-08
Un-Biased Statistics				
Average Un-Biased	-5.12E-08	5.69E-08	1.78E-08	9.50E-08
Std Dev Un-Biased	3.35E-08	3.62E-08	2.19E-08	5.05E-08
Ps90%/90% (+KTL) Un-Biased	1.79E-08	1.56E-07	7.77E-08	2.34E-07
Ps90%/90% (-KTL) Un-Biased	-1.20E-07	-4.25E-08	-4.21E-08	-4.34E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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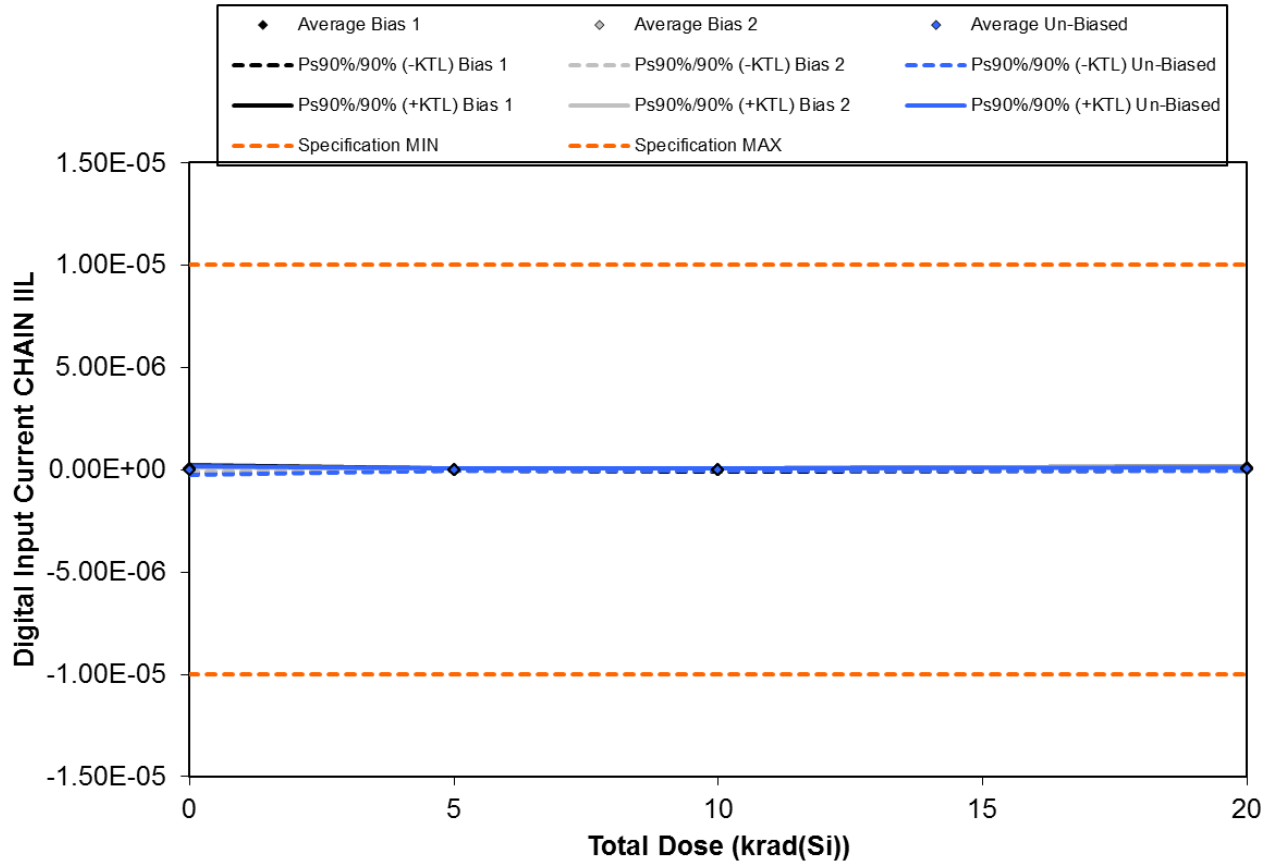


Figure 5.9. Plot of Digital Input Current CHAIN IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.9. Raw data for Digital Input Current CHAIN IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current CHAIN IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	3.67E-08	-6.59E-09	1.79E-08	
2	-6.12E-08	-6.59E-09	-3.11E-08	
3	-6.12E-08	4.24E-08	1.79E-08	
4	1.59E-07	1.79E-08	-5.55E-08	
5	8.57E-08	-6.59E-09	-6.59E-09	
420	-6.32E-09			6.69E-08
421	2.13E-07			4.25E-08
422	6.69E-08			-6.31E-09
423	-6.32E-09			6.69E-08
424	4.25E-08			1.16E-07
6	3.67E-08	1.79E-08	1.79E-08	
7	-1.22E-08	-6.59E-09	1.79E-08	
8	-3.67E-08	1.79E-08	1.79E-08	
9	6.12E-08	-6.59E-09	-3.11E-08	
10	3.67E-08	1.79E-08	-6.59E-09	
425	-6.32E-09			6.69E-08
426	-6.32E-09			4.25E-08
427	-5.51E-08			1.81E-08
428	1.16E-07			1.40E-07
194	6.12E-08			6.69E-08
11	1.23E-08	-6.59E-09	-6.59E-09	
12	1.23E-08	-6.59E-09	-6.59E-09	
13	6.12E-08	-6.59E-09	-6.59E-09	
14	1.23E-08	1.79E-08	1.79E-08	
15	-1.35E-07	1.79E-08	1.79E-08	
48	-3.67E-08			6.69E-08
49	3.67E-08			6.69E-08
50	1.23E-08			6.69E-08
191	-3.67E-08			-6.31E-09
193	-2.57E-07			6.69E-08
Bias 1 Statistics				
Average Bias 1	4.69E-08	8.09E-09	-1.15E-08	5.71E-08
Std Dev Bias 1	8.90E-08	2.19E-08	3.19E-08	4.43E-08
Ps90%/90% (+KTL) Bias 1	2.31E-07	6.81E-08	7.60E-08	1.79E-07
Ps90%/90% (-KTL) Bias 1	-1.37E-07	-5.19E-08	-9.90E-08	-6.44E-08
Bias 2 Statistics				
Average Bias 2	1.95E-08	8.09E-09	3.20E-09	6.69E-08
Std Dev Bias 2	5.21E-08	1.34E-08	2.19E-08	4.56E-08
Ps90%/90% (+KTL) Bias 2	1.27E-07	4.48E-08	6.32E-08	1.92E-07
Ps90%/90% (-KTL) Bias 2	-8.80E-08	-2.87E-08	-5.68E-08	-5.83E-08
Un-Biased Statistics				
Average Un-Biased	-3.18E-08	3.20E-09	3.20E-09	5.22E-08
Std Dev Un-Biased	9.57E-08	1.34E-08	1.34E-08	3.27E-08
Ps90%/90% (+KTL) Un-Biased	1.66E-07	4.00E-08	4.00E-08	1.42E-07
Ps90%/90% (-KTL) Un-Biased	-2.29E-07	-3.36E-08	-3.36E-08	-3.75E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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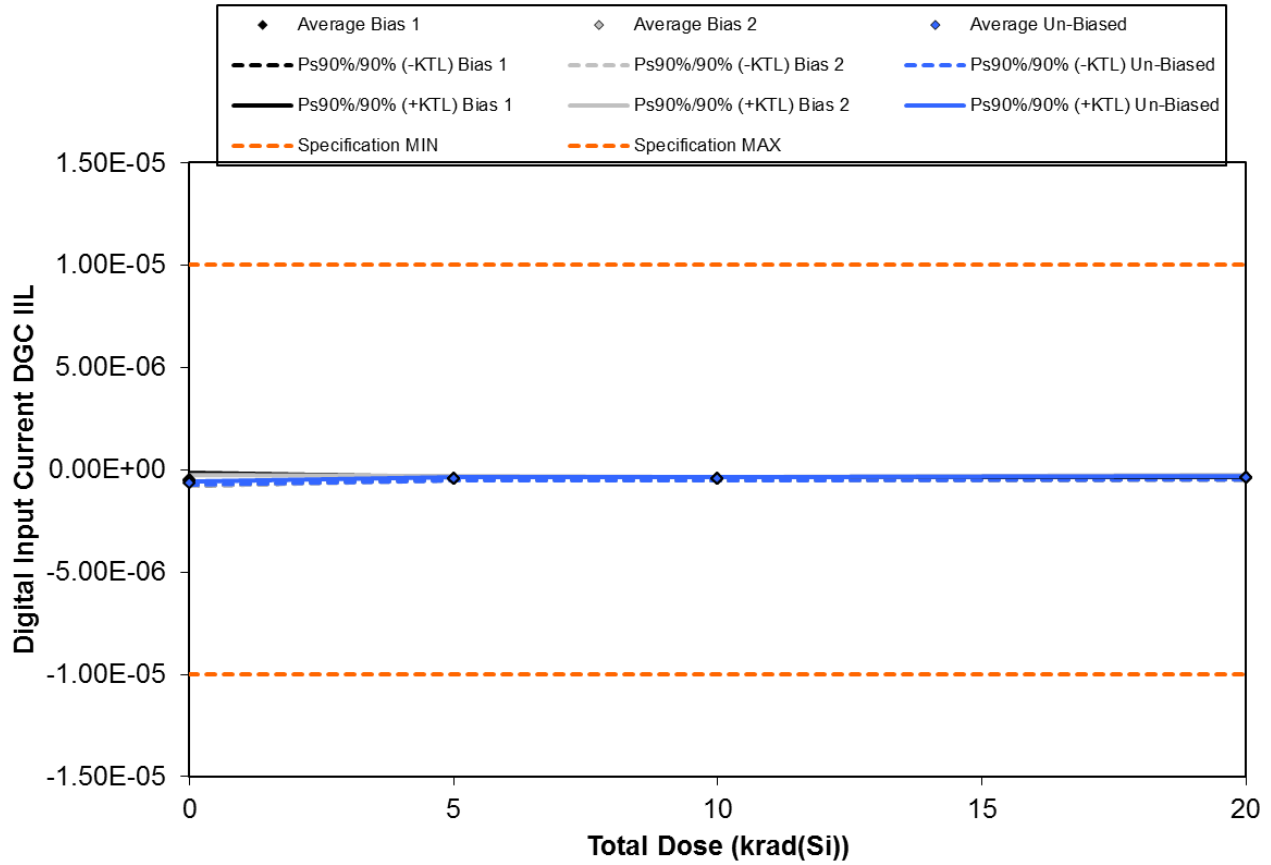


Figure 5.10. Plot of Digital Input Current DGC IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.10. Raw data for Digital Input Current DGC IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Digital Input Current DGC IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-6.56E-07	-4.36E-07	-4.12E-07	
2	-6.32E-07	-4.12E-07	-4.61E-07	
3	-5.58E-07	-4.12E-07	-4.36E-07	
4	-6.56E-07	-4.61E-07	-4.36E-07	
5	-6.32E-07	-4.36E-07	-4.61E-07	
420	-3.39E-07			-3.63E-07
421	-3.39E-07			-3.88E-07
422	-3.39E-07			-4.12E-07
423	-3.63E-07			-3.88E-07
424	-2.66E-07			-4.12E-07
6	-6.56E-07	-4.12E-07	-4.12E-07	
7	-6.56E-07	-4.36E-07	-4.61E-07	
8	-6.07E-07	-3.88E-07	-4.36E-07	
9	-6.07E-07	-4.85E-07	-4.61E-07	
10	-6.07E-07	-4.61E-07	-4.12E-07	
425	-3.39E-07			-3.63E-07
426	-3.39E-07			-3.63E-07
427	-3.88E-07			-3.88E-07
428	-4.12E-07			-3.88E-07
194	-6.56E-07			-3.14E-07
11	-6.56E-07	-4.61E-07	-4.36E-07	
12	-6.32E-07	-4.36E-07	-4.12E-07	
13	-6.56E-07	-4.36E-07	-4.36E-07	
14	-6.56E-07	-4.12E-07	-4.12E-07	
15	-5.83E-07	-3.88E-07	-4.85E-07	
48	-7.05E-07			-4.36E-07
49	-6.32E-07			-3.39E-07
50	-6.81E-07			-3.63E-07
191	-6.07E-07			-3.88E-07
193	-6.32E-07			-3.88E-07
Bias 1 Statistics				
Average Bias 1	-4.78E-07	-4.32E-07	-4.41E-07	-3.92E-07
Std Dev Bias 1	1.61E-07	2.04E-08	2.04E-08	2.04E-08
Ps90%/90% (+KTL) Bias 1	-1.45E-07	-3.76E-07	-3.85E-07	-3.36E-07
Ps90%/90% (-KTL) Bias 1	-8.11E-07	-4.88E-07	-4.97E-07	-4.48E-07
Bias 2 Statistics				
Average Bias 2	-5.27E-07	-4.36E-07	-4.36E-07	-3.63E-07
Std Dev Bias 2	1.39E-07	3.86E-08	2.44E-08	2.99E-08
Ps90%/90% (+KTL) Bias 2	-2.41E-07	-3.31E-07	-3.69E-07	-2.81E-07
Ps90%/90% (-KTL) Bias 2	-8.13E-07	-5.42E-07	-5.03E-07	-4.45E-07
Un-Biased Statistics				
Average Un-Biased	-6.44E-07	-4.27E-07	-4.36E-07	-3.83E-07
Std Dev Un-Biased	3.50E-08	2.78E-08	2.99E-08	3.62E-08
Ps90%/90% (+KTL) Un-Biased	-5.72E-07	-3.50E-07	-3.54E-07	-2.83E-07
Ps90%/90% (-KTL) Un-Biased	-7.16E-07	-5.03E-07	-5.18E-07	-4.82E-07
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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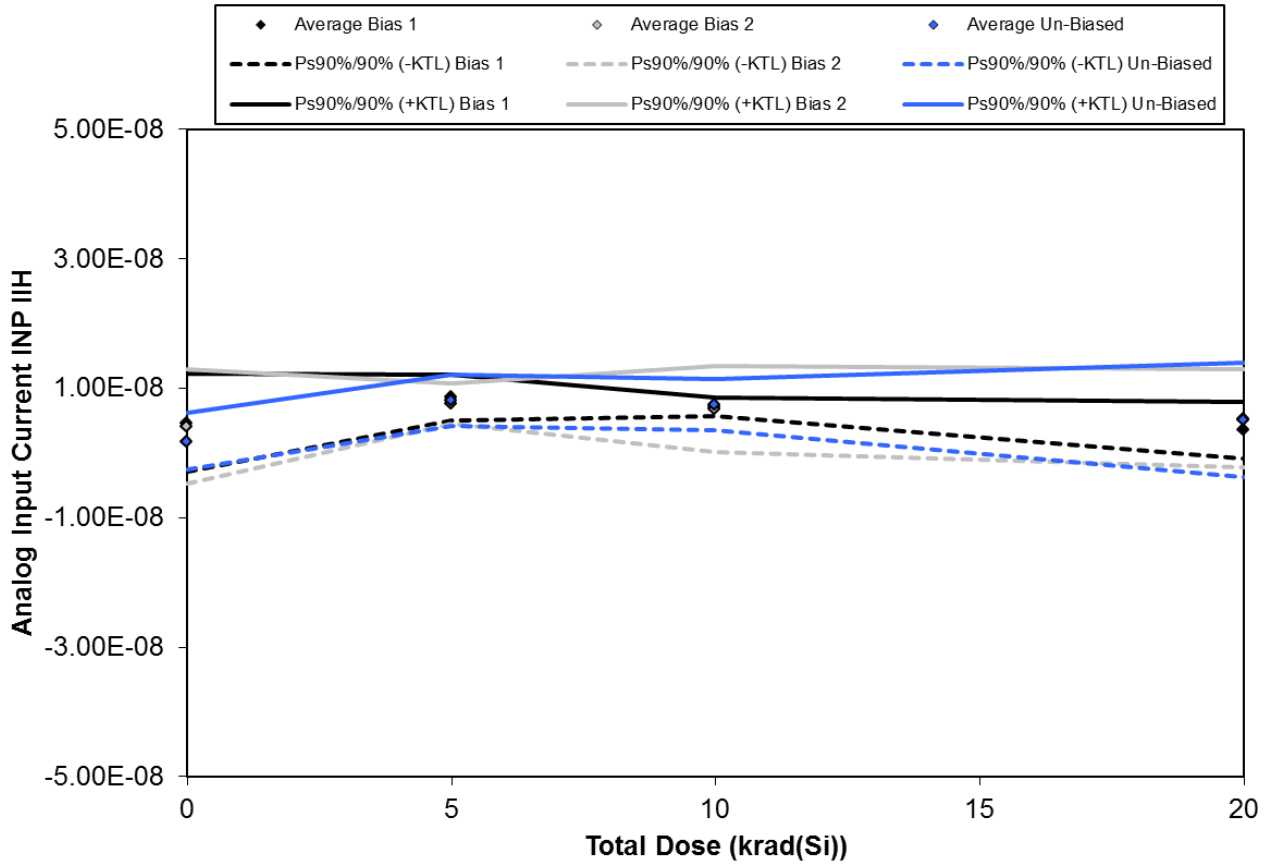


Figure 5.11. Plot of Analog Input Current INP IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.11. Raw data for Analog Input Current INP IIH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Analog Input Current INP IIH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	2.16E-09	7.63E-09	6.69E-09	
2	3.20E-09	9.97E-09	7.47E-09	
3	1.11E-09	6.85E-09	6.43E-09	
4	1.89E-09	8.93E-09	7.47E-09	
5	3.98E-09	9.45E-09	7.47E-09	
420	8.12E-09			5.00E-09
421	1.31E-08			1.62E-09
422	2.92E-09			4.48E-09
423	6.56E-09			1.88E-09
424	2.92E-09			4.48E-09
6	-4.48E-10	6.59E-09	7.99E-09	
7	1.11E-09	8.93E-09	6.17E-09	
8	1.63E-09	6.33E-09	3.57E-09	
9	4.50E-09	8.41E-09	6.17E-09	
10	-1.75E-09	7.89E-09	1.01E-08	
425	9.42E-09			6.82E-09
426	8.90E-09			3.96E-09
427	1.02E-08			7.34E-09
428	1.88E-09			7.34E-09
194	5.02E-09			1.10E-09
11	5.93E-10	9.45E-09	9.81E-09	
12	3.20E-09	9.45E-09	7.73E-09	
13	5.80E-09	6.07E-09	5.91E-09	
14	-2.01E-09	7.37E-09	6.95E-09	
15	3.20E-09	7.89E-09	7.21E-09	
48	1.11E-09			4.74E-09
49	2.16E-09			8.42E-10
50	2.16E-09			7.08E-09
191	7.28E-11			9.16E-09
193	1.37E-09			3.44E-09
Bias 1 Statistics				
Average Bias 1	4.59E-09	8.57E-09	7.10E-09	3.49E-09
Std Dev Bias 1	3.67E-09	1.29E-09	5.06E-10	1.61E-09
Ps90%/90% (+KTL) Bias 1	1.22E-08	1.21E-08	8.49E-09	7.90E-09
Ps90%/90% (-KTL) Bias 1	-2.99E-09	5.02E-09	5.72E-09	-9.12E-10
Bias 2 Statistics				
Average Bias 2	4.05E-09	7.63E-09	6.79E-09	5.31E-09
Std Dev Bias 2	4.27E-09	1.13E-09	2.42E-09	2.74E-09
Ps90%/90% (+KTL) Bias 2	1.29E-08	1.07E-08	1.34E-08	1.28E-08
Ps90%/90% (-KTL) Bias 2	-4.78E-09	4.53E-09	1.69E-10	-2.20E-09
Un-Biased Statistics				
Average Un-Biased	1.76E-09	8.05E-09	7.52E-09	5.05E-09
Std Dev Un-Biased	2.10E-09	1.44E-09	1.44E-09	3.22E-09
Ps90%/90% (+KTL) Un-Biased	6.10E-09	1.20E-08	1.15E-08	1.39E-08
Ps90%/90% (-KTL) Un-Biased	-2.57E-09	4.09E-09	3.57E-09	-3.77E-09

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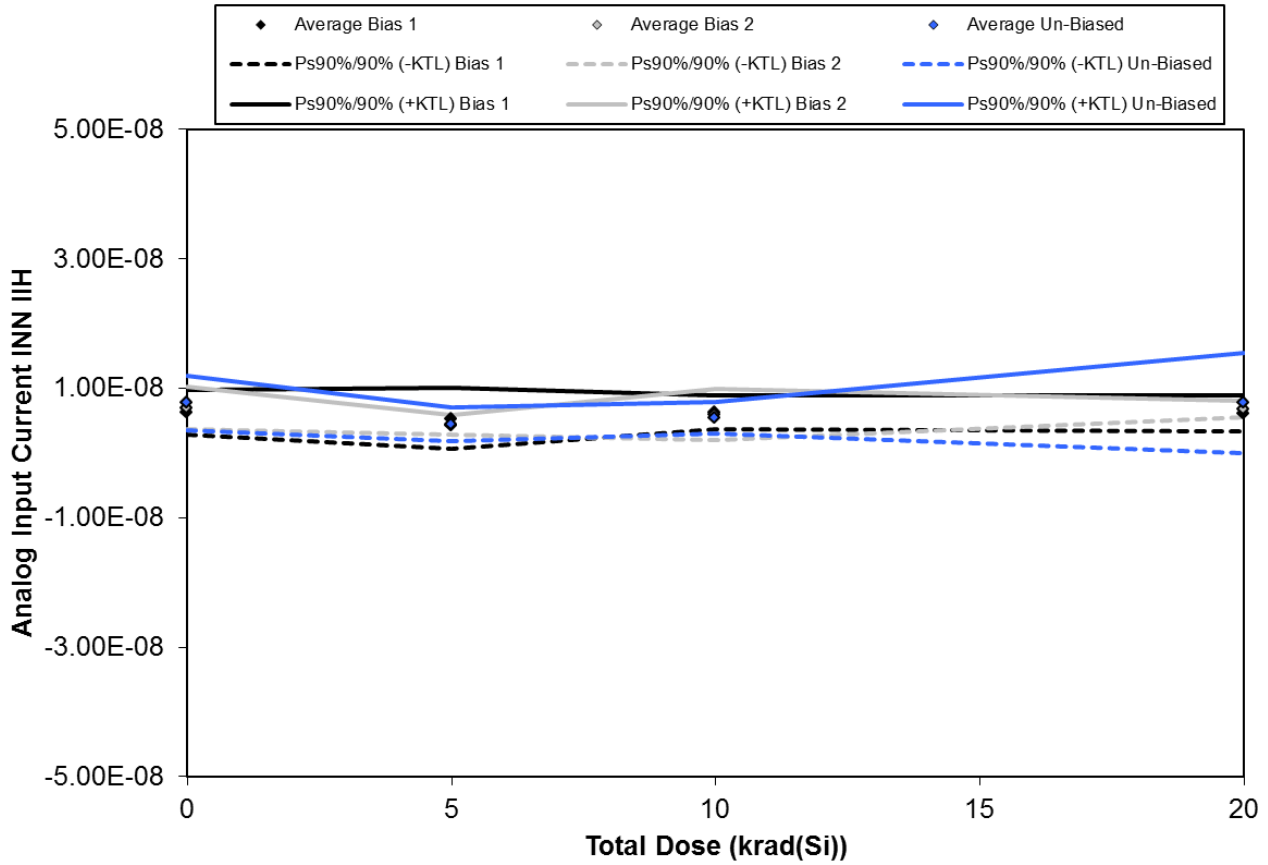


Figure 5.12. Plot of Analog Input Current INN IIH versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.12. Raw data for Analog Input Current INN IHH versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Analog Input Current INN IHH	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	8.75E-09	8.11E-09	5.24E-09	
2	6.15E-09	4.99E-09	7.83E-09	
3	7.97E-09	3.44E-09	6.02E-09	
4	5.63E-09	4.73E-09	6.02E-09	
5	8.75E-09	5.25E-09	6.02E-09	
420	5.76E-09			6.66E-09
421	5.76E-09			7.44E-09
422	3.69E-09			6.14E-09
423	5.50E-09			5.11E-09
424	4.98E-09			5.11E-09
6	9.01E-09	3.70E-09	5.76E-09	
7	6.15E-09	4.73E-09	4.46E-09	
8	8.75E-09	3.70E-09	5.24E-09	
9	8.75E-09	4.73E-09	5.76E-09	
10	7.71E-09	4.73E-09	8.35E-09	
425	6.54E-09			6.92E-09
426	5.24E-09			6.40E-09
427	5.76E-09			6.66E-09
428	4.46E-09			7.44E-09
194	7.45E-09			6.40E-09
11	5.89E-09	2.92E-09	4.98E-09	
12	5.38E-09	4.99E-09	4.20E-09	
13	8.75E-09	4.73E-09	6.54E-09	
14	9.27E-09	3.95E-09	5.50E-09	
15	1.08E-08	5.25E-09	5.76E-09	
48	8.75E-09			4.59E-09
49	5.38E-09			5.62E-09
50	9.01E-09			6.92E-09
191	9.01E-09			1.05E-08
193	5.38E-09			1.08E-08
Bias 1 Statistics				
Average Bias 1	6.29E-09	5.30E-09	6.23E-09	6.09E-09
Std Dev Bias 1	1.67E-09	1.72E-09	9.61E-10	1.01E-09
Ps90%/90% (+KTL) Bias 1	9.74E-09	1.00E-08	8.86E-09	8.86E-09
Ps90%/90% (-KTL) Bias 1	2.85E-09	6.01E-10	3.59E-09	3.32E-09
Bias 2 Statistics				
Average Bias 2	6.98E-09	4.32E-09	5.91E-09	6.76E-09
Std Dev Bias 2	1.59E-09	5.68E-10	1.46E-09	4.33E-10
Ps90%/90% (+KTL) Bias 2	1.03E-08	5.88E-09	9.93E-09	7.95E-09
Ps90%/90% (-KTL) Bias 2	3.69E-09	2.76E-09	1.90E-09	5.58E-09
Un-Biased Statistics				
Average Un-Biased	7.76E-09	4.37E-09	5.39E-09	7.70E-09
Std Dev Un-Biased	2.03E-09	9.46E-10	8.73E-10	2.84E-09
Ps90%/90% (+KTL) Un-Biased	1.20E-08	6.96E-09	7.79E-09	1.55E-08
Ps90%/90% (-KTL) Un-Biased	3.56E-09	1.78E-09	3.00E-09	-9.72E-11

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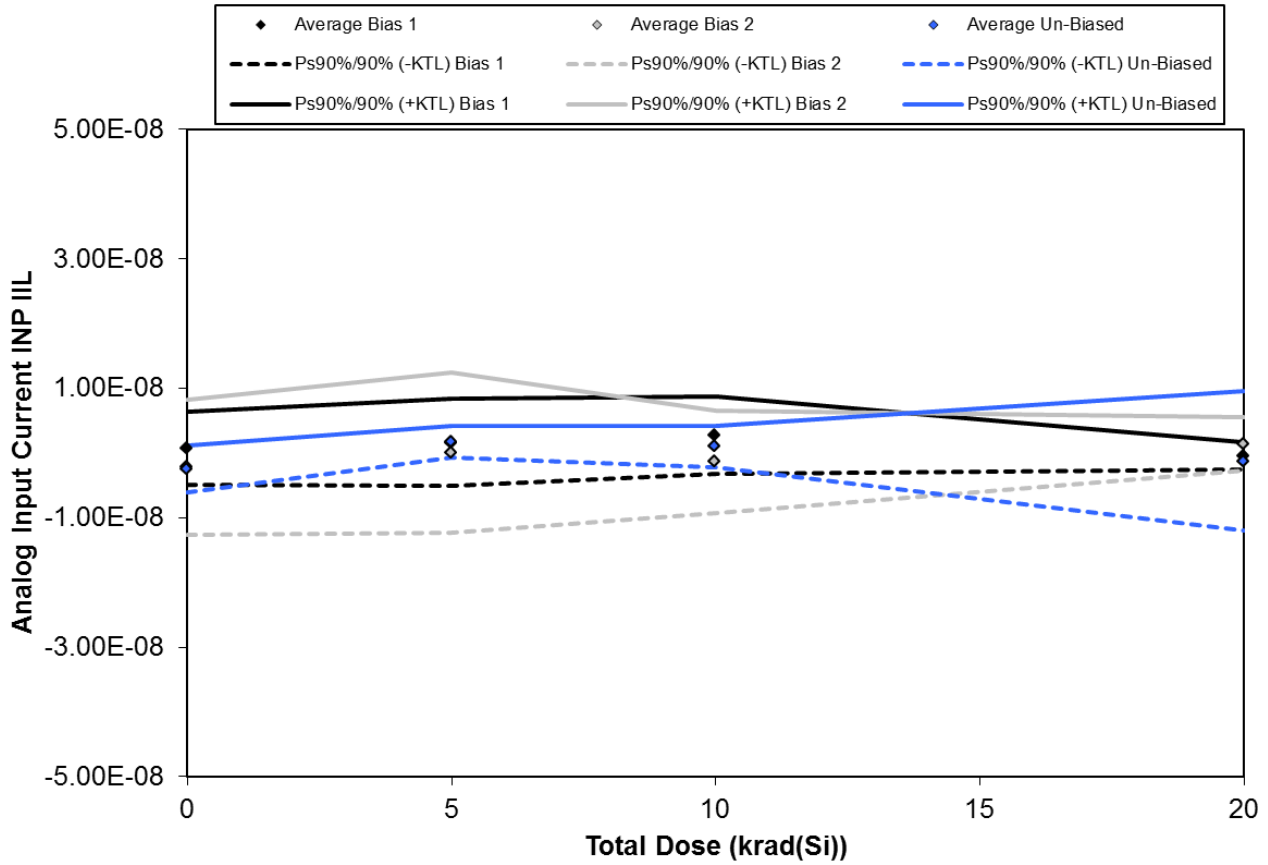


Figure 5.13. Plot of Analog Input Current INP IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.13. Raw data for Analog Input Current INP IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Analog Input Current INP IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-3.05E-09	1.65E-09	2.27E-09	
2	-1.75E-09	5.55E-09	2.79E-09	
3	-7.08E-10	-4.26E-10	1.75E-09	
4	-1.88E-10	-4.26E-10	6.43E-09	
5	-2.27E-09	1.65E-09	7.07E-10	
420	3.18E-09			-1.24E-09
421	2.40E-09			6.25E-11
422	5.82E-10			-9.77E-10
423	4.48E-09			-7.17E-10
424	4.22E-09			5.82E-10
6	-2.01E-09	3.21E-09	1.88E-10	
7	-3.83E-09	1.13E-09	-2.67E-09	
8	-4.09E-09	2.17E-09	1.23E-09	
9	-8.52E-09	-7.97E-09	-5.79E-09	
10	-4.35E-09	1.39E-09	1.88E-10	
425	8.42E-10			3.44E-09
426	5.00E-09			8.42E-10
427	4.74E-09			1.62E-09
428	6.25E-11			1.62E-09
194	-1.01E-08			-7.17E-10
11	-1.88E-10	1.65E-09	1.88E-10	
12	-1.23E-09	2.95E-09	2.27E-09	
13	-4.09E-09	2.17E-09	-5.92E-10	
14	-2.53E-09	6.14E-10	1.49E-09	
15	-5.65E-09	1.39E-09	1.49E-09	
48	-9.68E-10			1.88E-09
49	-2.79E-09			-8.00E-09
50	-4.48E-10			8.42E-10
191	-3.57E-09			-7.17E-10
193	-3.05E-09			-1.97E-10
Bias 1 Statistics				
Average Bias 1	6.90E-10	1.60E-09	2.79E-09	-4.57E-10
Std Dev Bias 1	2.74E-09	2.44E-09	2.18E-09	7.58E-10
Ps90%/90% (+KTL) Bias 1	6.34E-09	8.30E-09	8.75E-09	1.62E-09
Ps90%/90% (-KTL) Bias 1	-4.96E-09	-5.09E-09	-3.18E-09	-2.54E-09
Bias 2 Statistics				
Average Bias 2	-2.22E-09	-1.02E-11	-1.37E-09	1.36E-09
Std Dev Bias 2	5.03E-09	4.52E-09	2.87E-09	1.50E-09
Ps90%/90% (+KTL) Bias 2	8.15E-09	1.24E-08	6.49E-09	5.49E-09
Ps90%/90% (-KTL) Bias 2	-1.26E-08	-1.24E-08	-9.23E-09	-2.76E-09
Un-Biased Statistics				
Average Un-Biased	-2.45E-09	1.76E-09	9.67E-10	-1.24E-09
Std Dev Un-Biased	1.75E-09	8.74E-10	1.15E-09	3.91E-09
Ps90%/90% (+KTL) Un-Biased	1.16E-09	4.15E-09	4.12E-09	9.48E-09
Ps90%/90% (-KTL) Un-Biased	-6.06E-09	-6.39E-10	-2.18E-09	-1.20E-08

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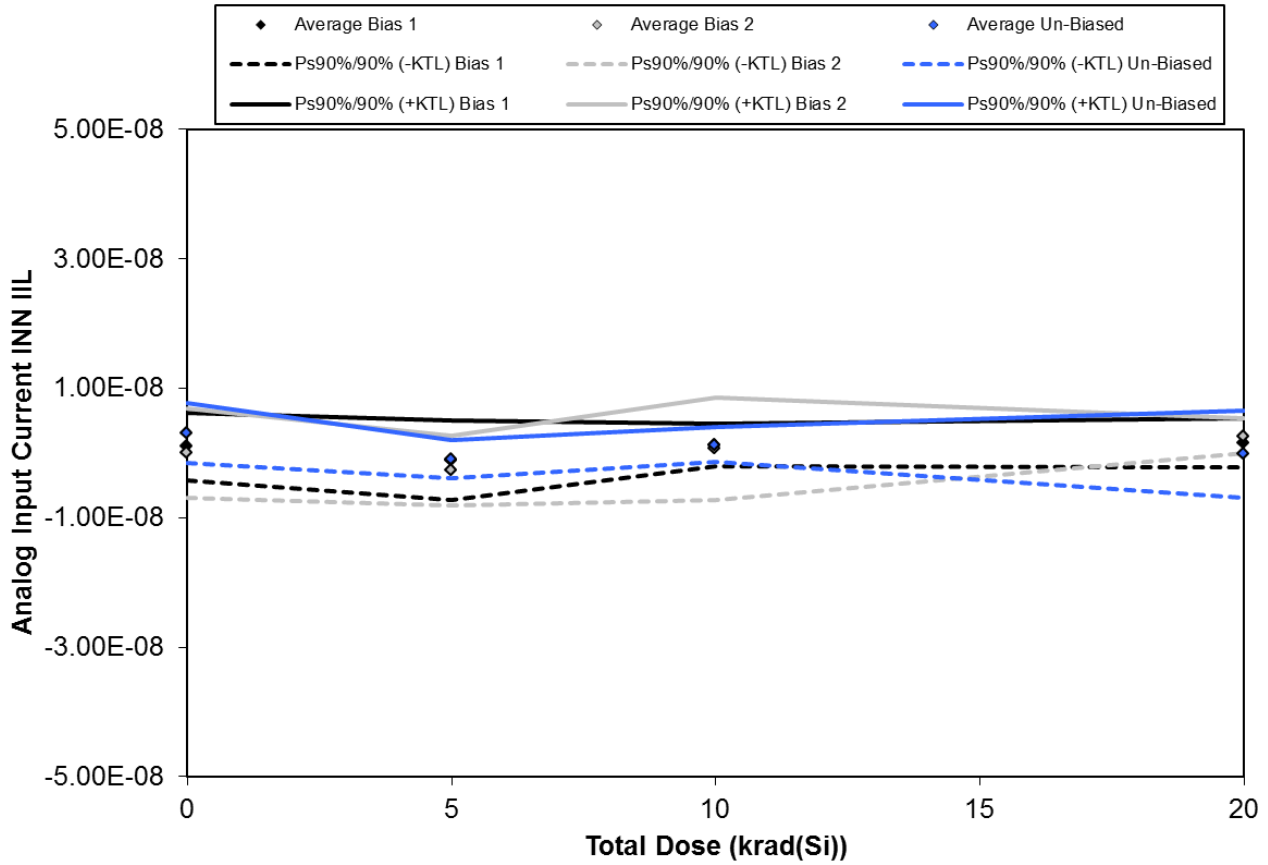


Figure 5.14. Plot of Analog Input Current INN IIL versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



Table 5.14. Raw data for Analog Input Current INN IIL versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Analog Input Current INN IIL	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	3.56E-09	-9.75E-10	1.09E-09	
2	5.38E-09	-1.97E-10	-4.72E-10	
3	-2.67E-09	-3.05E-09	2.64E-09	
4	2.26E-09	2.14E-09	1.09E-09	
5	3.04E-09	-3.31E-09	2.12E-09	
420	1.10E-09			3.81E-09
421	3.21E-10			2.00E-09
422	-4.55E-10			7.05E-10
423	-4.55E-10			9.64E-10
424	-1.75E-09			4.46E-10
6	-1.89E-09	-2.01E-09	4.46E-09	
7	1.48E-09	-1.75E-09	5.66E-10	
8	-7.19E-11	-1.49E-09	5.66E-10	
9	-5.78E-09	-6.16E-09	-3.59E-09	
10	5.38E-09	-2.01E-09	1.34E-09	
425	-1.96E-10			2.52E-09
426	-3.04E-09			1.22E-09
427	1.87E-09			2.26E-09
428	-2.01E-09			3.55E-09
194	3.82E-09			3.55E-09
11	4.60E-09	-1.49E-09	8.26E-10	
12	-2.41E-09	-2.53E-09	2.12E-09	
13	3.82E-09	-9.75E-10	1.09E-09	
14	3.04E-09	3.22E-10	2.38E-09	
15	3.82E-09	-4.56E-10	4.69E-11	
48	6.15E-09			-3.18E-09
49	3.30E-09			-1.88E-09
50	4.08E-09			2.52E-09
191	2.26E-09			-3.30E-10
193	2.00E-09			2.00E-09
Bias 1 Statistics				
Average Bias 1	1.03E-09	-1.08E-09	1.29E-09	1.59E-09
Std Dev Bias 1	2.52E-09	2.24E-09	1.20E-09	1.38E-09
Ps90%/90% (+KTL) Bias 1	6.24E-09	5.05E-09	4.57E-09	5.36E-09
Ps90%/90% (-KTL) Bias 1	-4.17E-09	-7.21E-09	-1.98E-09	-2.19E-09
Bias 2 Statistics				
Average Bias 2	-4.34E-11	-2.69E-09	6.70E-10	2.62E-09
Std Dev Bias 2	3.32E-09	1.96E-09	2.87E-09	9.79E-10
Ps90%/90% (+KTL) Bias 2	6.82E-09	2.67E-09	8.54E-09	5.31E-09
Ps90%/90% (-KTL) Bias 2	-6.91E-09	-8.05E-09	-7.20E-09	-6.34E-11
Un-Biased Statistics				
Average Un-Biased	3.07E-09	-1.03E-09	1.29E-09	-1.75E-10
Std Dev Un-Biased	2.26E-09	1.08E-09	9.61E-10	2.45E-09
Ps90%/90% (+KTL) Un-Biased	7.73E-09	1.92E-09	3.93E-09	6.53E-09
Ps90%/90% (-KTL) Un-Biased	-1.59E-09	-3.98E-09	-1.34E-09	-6.88E-09

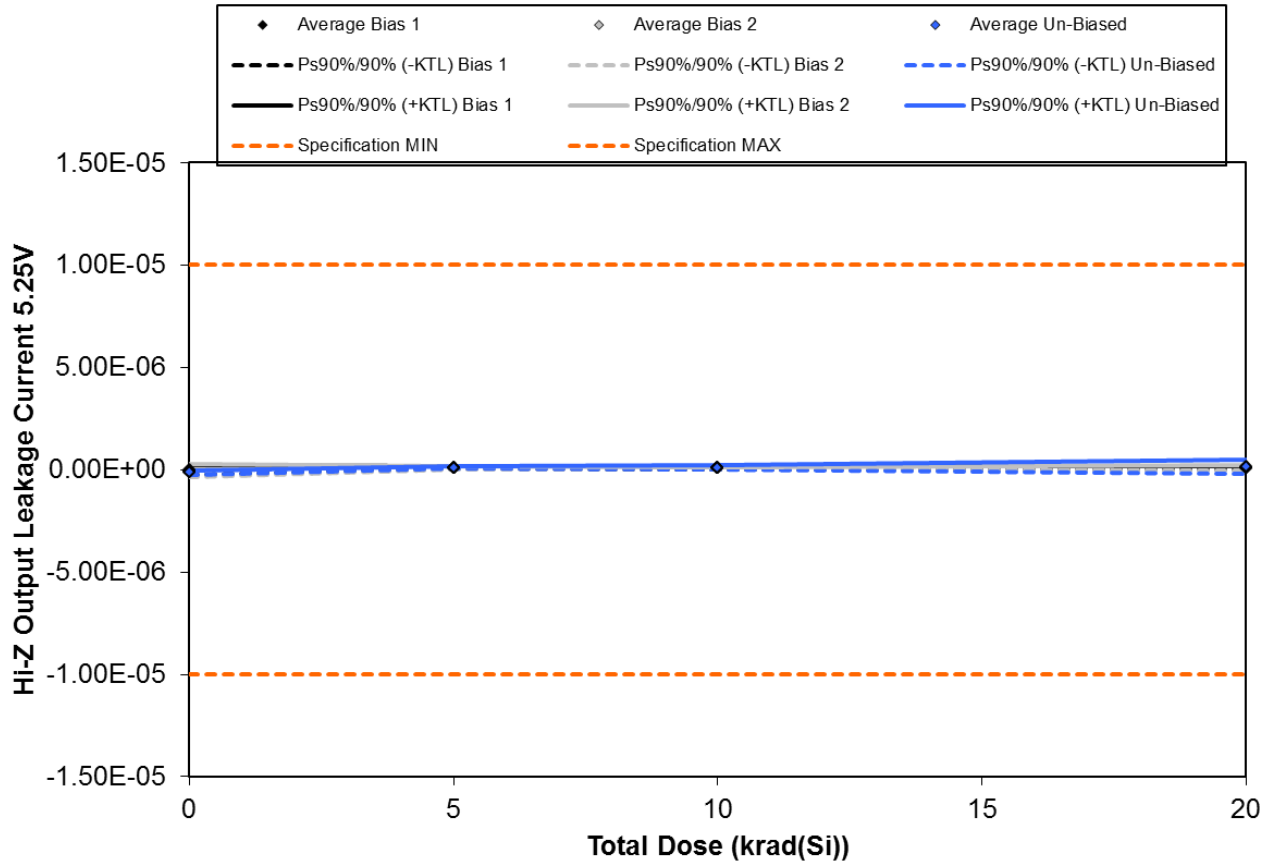


Figure 5.15. Plot of Hi-Z Output Leakage Current 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.15. Raw data for Hi-Z Output Leakage Current 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Hi-Z Output Leakage Current 5.25V Device	Total Dose (krad(Si))			
	0	5	10	20
1	-1.29E-07	1.16E-07	1.16E-07	
2	-1.05E-07	9.16E-08	6.72E-08	
3	-1.05E-07	1.16E-07	1.16E-07	
4	-1.78E-07	6.72E-08	1.16E-07	
5	-1.29E-07	9.16E-08	6.72E-08	
420	7.77E-08			1.02E-07
421	1.02E-07			5.34E-08
422	7.77E-08			5.34E-08
423	1.26E-07			1.26E-07
424	7.77E-08			1.26E-07
6	-1.54E-07	9.16E-08	1.16E-07	
7	-1.78E-07	6.72E-08	1.16E-07	
8	-1.54E-07	9.16E-08	9.16E-08	
9	-1.54E-07	1.40E-07	1.16E-07	
10	-1.54E-07	1.16E-07	9.16E-08	
425	1.02E-07			7.77E-08
426	1.26E-07			1.51E-07
427	1.26E-07			1.02E-07
428	1.26E-07			5.34E-08
194	-2.02E-07			5.34E-08
11	-1.05E-07	1.16E-07	1.16E-07	
12	-2.27E-07	1.40E-07	4.28E-08	
13	-1.29E-07	9.16E-08	9.16E-08	
14	-1.54E-07	1.16E-07	1.16E-07	
15	-5.61E-08	1.16E-07	1.40E-07	
48	-1.78E-07			5.34E-08
49	-1.29E-07			7.77E-08
50	-1.29E-07			3.70E-07
191	-1.05E-07			1.02E-07
193	-1.54E-07			1.02E-07
Bias 1 Statistics				
Average Bias 1	-1.85E-08	9.65E-08	9.65E-08	9.24E-08
Std Dev Bias 1	1.19E-07	2.04E-08	2.67E-08	3.70E-08
Ps90%/90% (+KTL) Bias 1	2.28E-07	1.52E-07	1.70E-07	1.94E-07
Ps90%/90% (-KTL) Bias 1	-2.65E-07	4.06E-08	2.33E-08	-8.97E-09
Bias 2 Statistics				
Average Bias 2	-5.14E-08	1.01E-07	1.06E-07	8.75E-08
Std Dev Bias 2	1.49E-07	2.78E-08	1.34E-08	4.08E-08
Ps90%/90% (+KTL) Bias 2	2.56E-07	1.78E-07	1.43E-07	1.99E-07
Ps90%/90% (-KTL) Bias 2	-3.59E-07	2.51E-08	6.96E-08	-2.43E-08
Un-Biased Statistics				
Average Un-Biased	-1.37E-07	1.16E-07	1.01E-07	1.41E-07
Std Dev Un-Biased	4.61E-08	1.72E-08	3.70E-08	1.30E-07
Ps90%/90% (+KTL) Un-Biased	-4.14E-08	1.63E-07	2.03E-07	4.96E-07
Ps90%/90% (-KTL) Un-Biased	-2.32E-07	6.87E-08	-2.33E-11	-2.14E-07
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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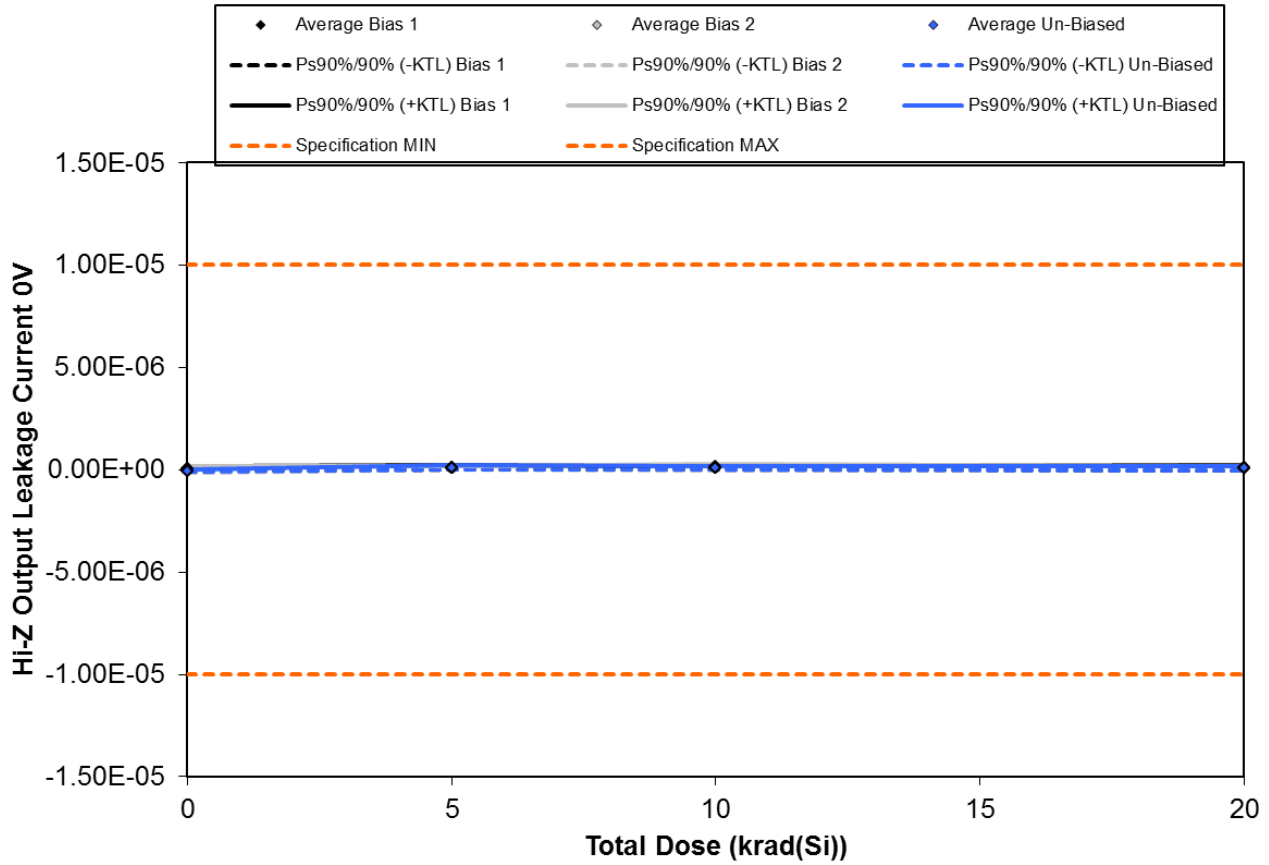


Figure 5.16. Plot of Hi-Z Output Leakage Current 0V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.16. Raw data for Hi-Z Output Leakage Current 0V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Hi-Z Output Leakage Current 0V Device	Total Dose (krad(Si))			
	0	5	10	20
1	-7.28E-09	1.16E-07	9.16E-08	
2	-5.61E-08	1.16E-07	6.72E-08	
3	4.15E-08	1.65E-07	1.16E-07	
4	-3.17E-08	9.16E-08	1.40E-07	
5	-8.05E-08	6.72E-08	1.16E-07	
420	1.26E-07			1.26E-07
421	2.90E-08			2.90E-08
422	7.77E-08			1.51E-07
423	7.77E-08			5.34E-08
424	1.02E-07			7.77E-08
6	-3.17E-08	6.72E-08	1.40E-07	
7	-3.17E-08	1.16E-07	1.65E-07	
8	-3.17E-08	6.72E-08	9.16E-08	
9	-3.17E-08	4.28E-08	1.65E-07	
10	-7.28E-09	9.16E-08	4.28E-08	
425	1.51E-07			1.51E-07
426	7.77E-08			1.02E-07
427	1.02E-07			7.77E-08
428	1.26E-07			1.02E-07
194	-8.05E-08			1.02E-07
11	-3.17E-08	9.16E-08	4.28E-08	
12	-3.17E-08	1.40E-07	9.16E-08	
13	-5.61E-08	6.72E-08	9.16E-08	
14	-8.05E-08	1.40E-07	9.16E-08	
15	-8.05E-08	1.16E-07	1.16E-07	
48	-7.28E-09			5.34E-08
49	-5.61E-08			1.02E-07
50	-3.17E-08			2.90E-08
191	-7.28E-09			5.34E-08
193	-8.05E-08			1.02E-07
Bias 1 Statistics				
Average Bias 1	2.79E-08	1.11E-07	1.06E-07	8.75E-08
Std Dev Bias 1	6.99E-08	3.62E-08	2.78E-08	5.05E-08
Ps90%/90% (+KTL) Bias 1	1.72E-07	2.10E-07	1.82E-07	2.26E-07
Ps90%/90% (-KTL) Bias 1	-1.16E-07	1.20E-08	3.00E-08	-5.11E-08
Bias 2 Statistics				
Average Bias 2	2.43E-08	7.70E-08	1.21E-07	1.07E-07
Std Dev Bias 2	8.16E-08	2.78E-08	5.29E-08	2.67E-08
Ps90%/90% (+KTL) Bias 2	1.93E-07	1.53E-07	2.66E-07	1.80E-07
Ps90%/90% (-KTL) Bias 2	-1.44E-07	7.59E-10	-2.41E-08	3.38E-08
Un-Biased Statistics				
Average Un-Biased	-4.63E-08	1.11E-07	8.67E-08	6.80E-08
Std Dev Un-Biased	2.86E-08	3.18E-08	2.67E-08	3.27E-08
Ps90%/90% (+KTL) Un-Biased	1.28E-08	1.98E-07	1.60E-07	1.58E-07
Ps90%/90% (-KTL) Un-Biased	-1.05E-07	2.40E-08	1.35E-08	-2.16E-08
Specification MIN	-1.00E-05	-1.00E-05	-1.00E-05	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.00E-05	1.00E-05	1.00E-05	
Status	PASS	PASS	PASS	Info Only

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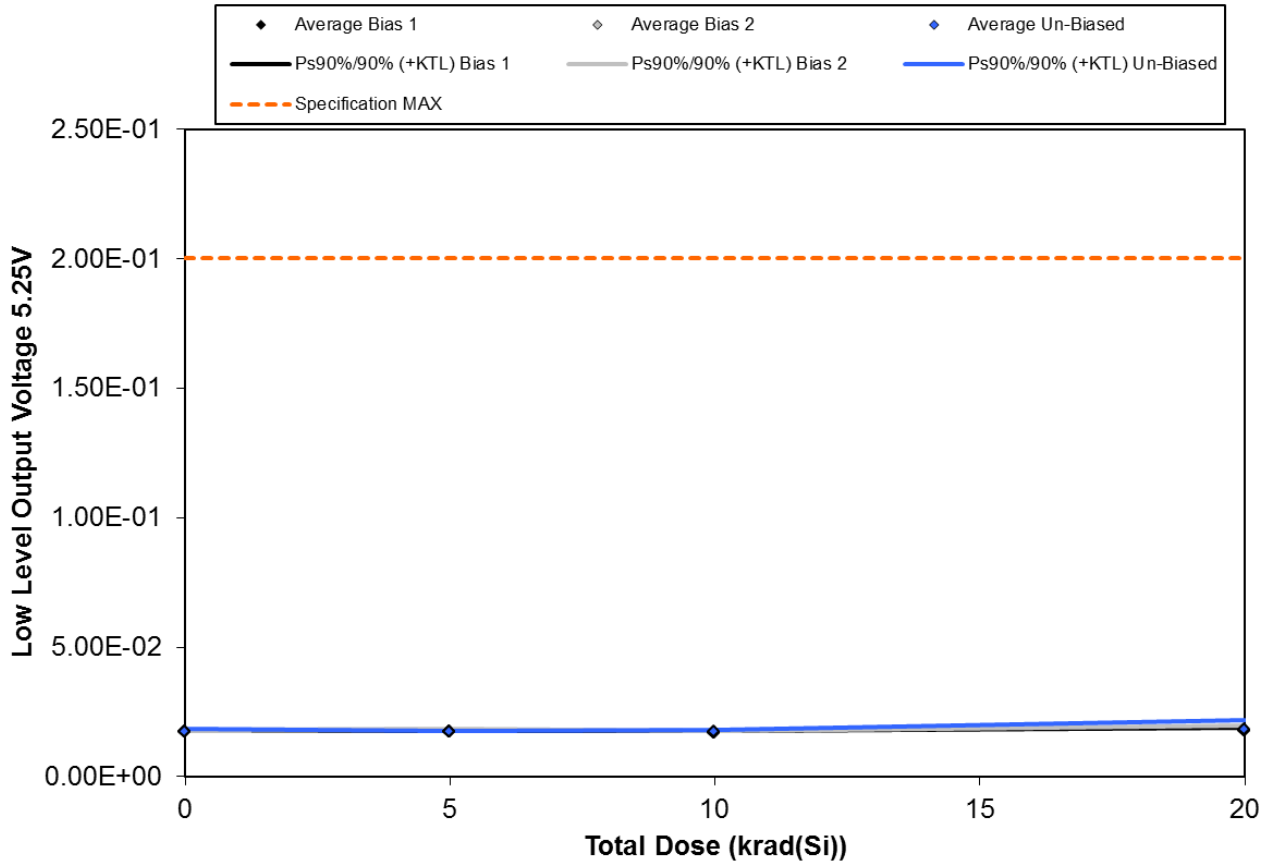


Figure 5.17. Plot of Low Level Output Voltage 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Colorado Springs, CO 80919
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Table 5.17. Raw data for Low Level Output Voltage 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Low Level Output Voltage 5.25V	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	1.73E-02	1.75E-02	1.70E-02	
2	1.76E-02	1.75E-02	1.72E-02	
3	1.80E-02	1.72E-02	1.72E-02	
4	1.73E-02	1.72E-02	1.72E-02	
5	1.76E-02	1.72E-02	1.69E-02	
420	1.76E-02			1.79E-02
421	1.70E-02			1.85E-02
422	1.67E-02			1.82E-02
423	1.70E-02			1.76E-02
424	1.73E-02			1.76E-02
6	1.70E-02	1.69E-02	1.72E-02	
7	1.73E-02	1.75E-02	1.69E-02	
8	1.73E-02	1.75E-02	1.72E-02	
9	1.73E-02	1.78E-02	1.72E-02	
10	1.83E-02	1.69E-02	1.66E-02	
425	1.73E-02			1.79E-02
426	1.73E-02			1.64E-02
427	1.70E-02			1.82E-02
428	1.76E-02			1.82E-02
194	1.70E-02			1.79E-02
11	1.64E-02	1.72E-02	1.75E-02	
12	1.67E-02	1.72E-02	1.69E-02	
13	1.64E-02	1.75E-02	1.69E-02	
14	1.73E-02	1.75E-02	1.72E-02	
15	1.76E-02	1.72E-02	1.75E-02	
48	1.76E-02			1.73E-02
49	1.76E-02			1.79E-02
50	1.73E-02			1.82E-02
191	1.73E-02			1.73E-02
193	1.80E-02			2.04E-02
Bias 1 Statistics				
Average Bias 1	1.74E-02	1.74E-02	1.71E-02	1.80E-02
Std Dev Bias 1	3.74E-04	1.67E-04	1.49E-04	3.98E-04
Ps90%/90% (+KTL) Bias 1	1.81E-02	1.78E-02	1.75E-02	1.91E-02
Ps90%/90% (-KTL) Bias 1	1.66E-02	1.69E-02	1.67E-02	1.69E-02
Bias 2 Statistics				
Average Bias 2	1.74E-02	1.74E-02	1.70E-02	1.77E-02
Std Dev Bias 2	3.66E-04	4.09E-04	2.73E-04	7.66E-04
Ps90%/90% (+KTL) Bias 2	1.81E-02	1.85E-02	1.78E-02	1.98E-02
Ps90%/90% (-KTL) Bias 2	1.66E-02	1.62E-02	1.63E-02	1.56E-02
Un-Biased Statistics				
Average Un-Biased	1.73E-02	1.74E-02	1.72E-02	1.82E-02
Std Dev Un-Biased	5.39E-04	1.67E-04	3.05E-04	1.26E-03
Ps90%/90% (+KTL) Un-Biased	1.84E-02	1.78E-02	1.81E-02	2.17E-02
Ps90%/90% (-KTL) Un-Biased	1.61E-02	1.69E-02	1.64E-02	1.48E-02
Specification MAX	2.00E-01	2.00E-01	2.00E-01	
Status	PASS	PASS	PASS	Info Only

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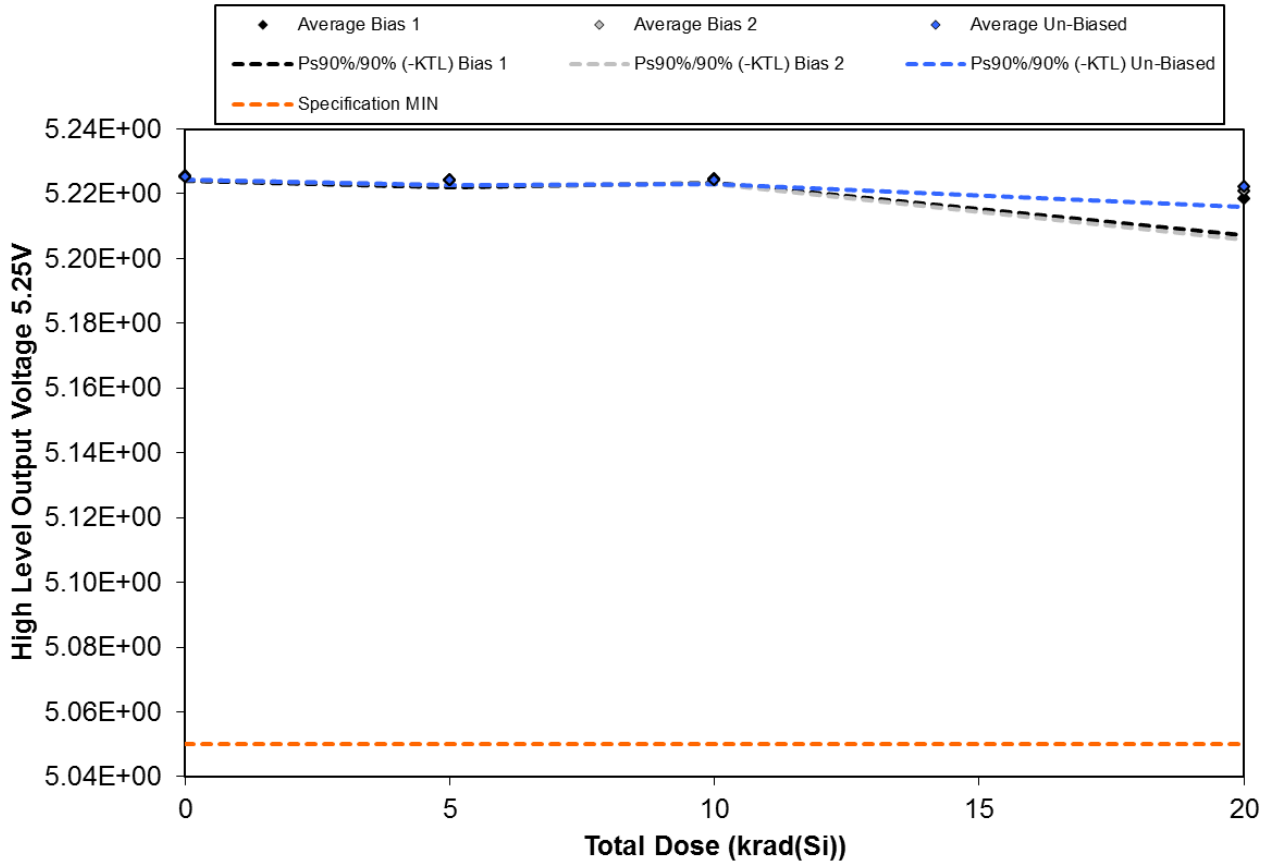


Figure 5.18. Plot of High Level Output Voltage 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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5030 Centennial Blvd.
Colorado Springs, CO 80919
(719) 531-0800

Table 5.18. Raw data for High Level Output Voltage 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

High Level Output Voltage 5.25V Device	Total Dose (krad(Si))			
	0	5	10	20
1	5.23E+00	5.22E+00	5.22E+00	
2	5.23E+00	5.22E+00	5.22E+00	
3	5.23E+00	5.23E+00	5.22E+00	
4	5.23E+00	5.22E+00	5.23E+00	
5	5.23E+00	5.22E+00	5.22E+00	
420	5.22E+00			5.22E+00
421	5.22E+00			5.22E+00
422	5.22E+00			5.21E+00
423	5.23E+00			5.22E+00
424	5.23E+00			5.22E+00
6	5.23E+00	5.22E+00	5.22E+00	
7	5.23E+00	5.22E+00	5.22E+00	
8	5.23E+00	5.22E+00	5.22E+00	
9	5.23E+00	5.22E+00	5.22E+00	
10	5.23E+00	5.22E+00	5.22E+00	
425	5.23E+00			5.21E+00
426	5.23E+00			5.23E+00
427	5.22E+00			5.22E+00
428	5.23E+00			5.22E+00
194	5.22E+00			5.22E+00
11	5.23E+00	5.23E+00	5.22E+00	
12	5.23E+00	5.22E+00	5.22E+00	
13	5.23E+00	5.22E+00	5.22E+00	
14	5.23E+00	5.22E+00	5.22E+00	
15	5.23E+00	5.22E+00	5.22E+00	
48	5.23E+00			5.22E+00
49	5.22E+00			5.22E+00
50	5.22E+00			5.22E+00
191	5.23E+00			5.22E+00
193	5.23E+00			5.22E+00
Bias 1 Statistics				
Average Bias 1	5.23E+00	5.22E+00	5.22E+00	5.22E+00
Std Dev Bias 1	4.87E-04	7.47E-04	4.04E-04	4.09E-03
Ps90%/90% (+KTL) Bias 1	5.23E+00	5.23E+00	5.23E+00	5.23E+00
Ps90%/90% (-KTL) Bias 1	5.22E+00	5.22E+00	5.22E+00	5.21E+00
Bias 2 Statistics				
Average Bias 2	5.23E+00	5.22E+00	5.22E+00	5.22E+00
Std Dev Bias 2	5.27E-04	4.83E-04	5.02E-04	5.46E-03
Ps90%/90% (+KTL) Bias 2	5.23E+00	5.23E+00	5.23E+00	5.24E+00
Ps90%/90% (-KTL) Bias 2	5.22E+00	5.22E+00	5.22E+00	5.21E+00
Un-Biased Statistics				
Average Un-Biased	5.23E+00	5.22E+00	5.22E+00	5.22E+00
Std Dev Un-Biased	4.87E-04	5.87E-04	4.53E-04	2.19E-03
Ps90%/90% (+KTL) Un-Biased	5.23E+00	5.23E+00	5.23E+00	5.23E+00
Ps90%/90% (-KTL) Un-Biased	5.22E+00	5.22E+00	5.22E+00	5.22E+00
Specification MIN	5.05E+00	5.05E+00	5.05E+00	
Status	PASS	PASS	PASS	Info Only

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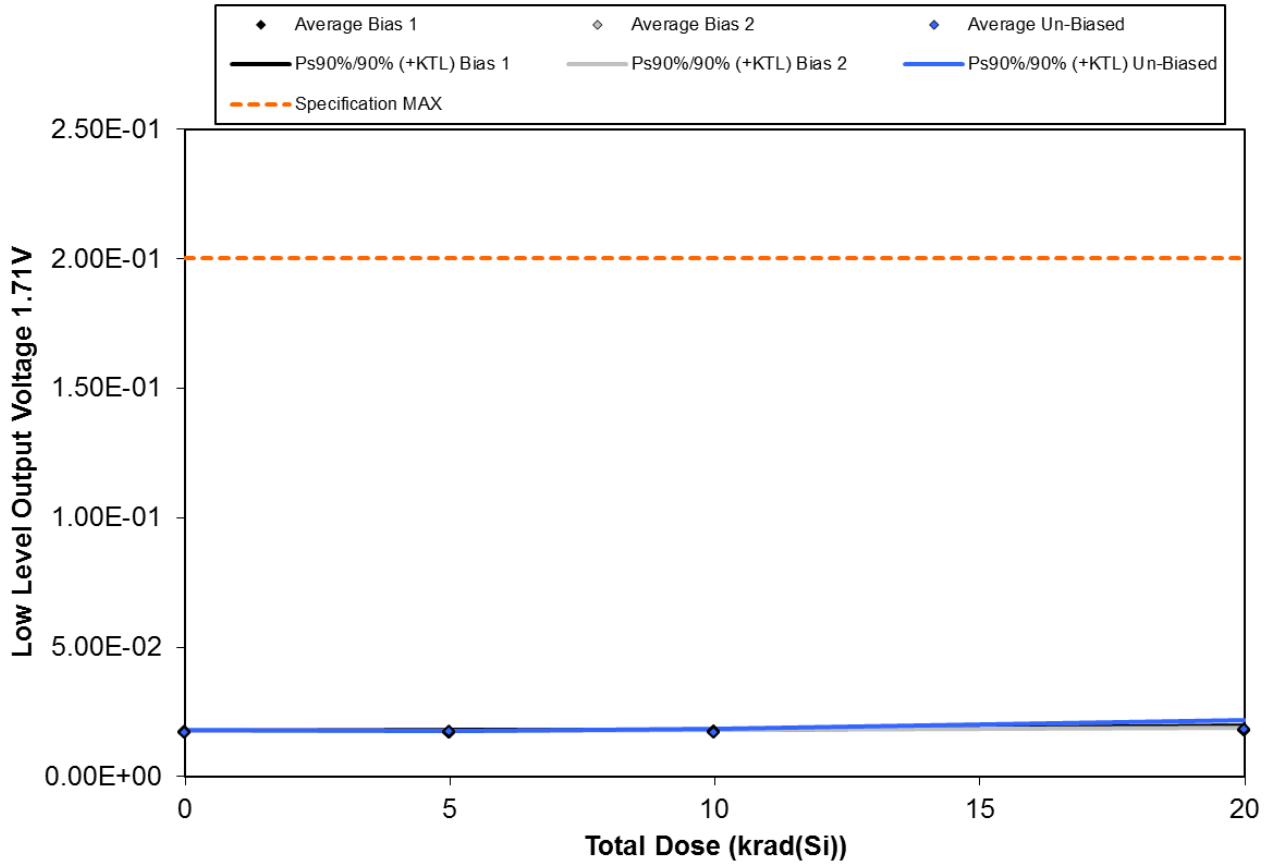


Figure 5.19. Plot of Low Level Output Voltage 1.71V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.19. Raw data for Low Level Output Voltage 1.71V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Low Level Output Voltage 1.71V Device	Total Dose (krad(Si))			
	0	5	10	20
1	1.67E-02	1.69E-02	1.70E-02	
2	1.70E-02	1.69E-02	1.72E-02	
3	1.70E-02	1.69E-02	1.75E-02	
4	1.73E-02	1.72E-02	1.72E-02	
5	1.73E-02	1.75E-02	1.75E-02	
420	1.70E-02			1.79E-02
421	1.73E-02			1.92E-02
422	1.73E-02			1.76E-02
423	1.73E-02			1.76E-02
424	1.64E-02			1.76E-02
6	1.73E-02	1.72E-02	1.75E-02	
7	1.73E-02	1.72E-02	1.72E-02	
8	1.70E-02	1.72E-02	1.72E-02	
9	1.70E-02	1.72E-02	1.78E-02	
10	1.76E-02	1.69E-02	1.75E-02	
425	1.73E-02			1.79E-02
426	1.70E-02			1.70E-02
427	1.73E-02			1.82E-02
428	1.73E-02			1.79E-02
194	1.70E-02			1.76E-02
11	1.73E-02	1.72E-02	1.75E-02	
12	1.64E-02	1.72E-02	1.66E-02	
13	1.67E-02	1.75E-02	1.69E-02	
14	1.73E-02	1.72E-02	1.78E-02	
15	1.70E-02	1.72E-02	1.69E-02	
48	1.73E-02			1.76E-02
49	1.76E-02			1.85E-02
50	1.67E-02			1.82E-02
191	1.80E-02			1.70E-02
193	1.73E-02			2.04E-02
Bias 1 Statistics				
Average Bias 1	1.71E-02	1.71E-02	1.73E-02	1.80E-02
Std Dev Bias 1	3.15E-04	2.73E-04	2.30E-04	6.62E-04
Ps90%/90% (+KTL) Bias 1	1.77E-02	1.79E-02	1.79E-02	1.98E-02
Ps90%/90% (-KTL) Bias 1	1.64E-02	1.64E-02	1.67E-02	1.62E-02
Bias 2 Statistics				
Average Bias 2	1.72E-02	1.72E-02	1.75E-02	1.77E-02
Std Dev Bias 2	2.06E-04	1.36E-04	2.55E-04	4.63E-04
Ps90%/90% (+KTL) Bias 2	1.77E-02	1.75E-02	1.82E-02	1.90E-02
Ps90%/90% (-KTL) Bias 2	1.68E-02	1.68E-02	1.68E-02	1.65E-02
Un-Biased Statistics				
Average Un-Biased	1.72E-02	1.73E-02	1.72E-02	1.84E-02
Std Dev Un-Biased	4.61E-04	1.36E-04	5.01E-04	1.27E-03
Ps90%/90% (+KTL) Un-Biased	1.81E-02	1.77E-02	1.85E-02	2.18E-02
Ps90%/90% (-KTL) Un-Biased	1.62E-02	1.69E-02	1.58E-02	1.49E-02
Specification MAX	2.00E-01	2.00E-01	2.00E-01	
Status	PASS	PASS	PASS	Info Only

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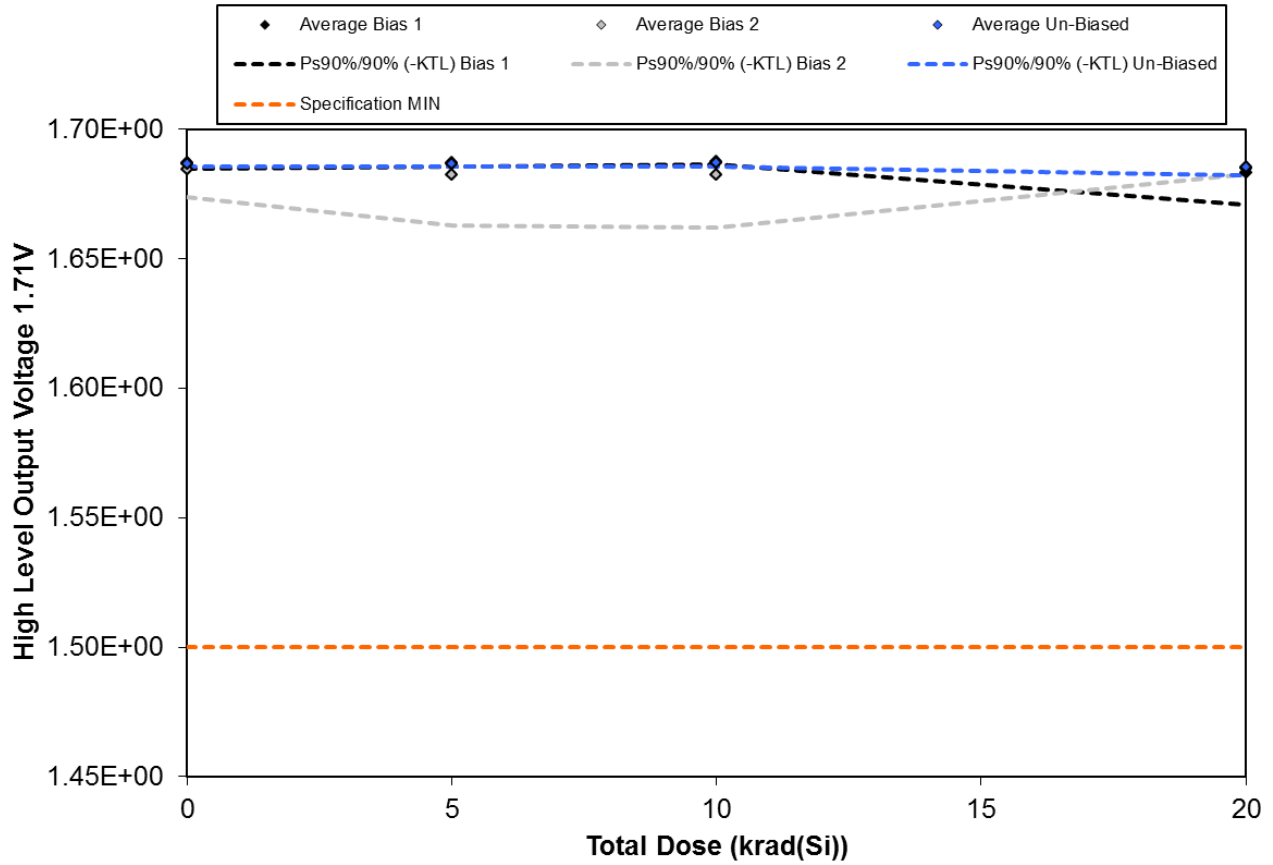


Figure 5.20. Plot of High Level Output Voltage 1.71V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.20. Raw data for High Level Output Voltage 1.71V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

High Level Output Voltage 1.71V Device	Total Dose (krad(Si))			
	0	5	10	20
1	1.69E+00	1.69E+00	1.69E+00	
2	1.69E+00	1.69E+00	1.69E+00	
3	1.69E+00	1.69E+00	1.69E+00	
4	1.69E+00	1.69E+00	1.69E+00	
5	1.69E+00	1.69E+00	1.69E+00	
420	1.69E+00			1.69E+00
421	1.69E+00			1.68E+00
422	1.69E+00			1.68E+00
423	1.69E+00			1.68E+00
424	1.69E+00			1.68E+00
6	1.69E+00	1.69E+00	1.69E+00	
7	1.69E+00	1.68E+00	1.69E+00	
8	1.68E+00	1.69E+00	1.68E+00	
9	1.67E+00	1.67E+00	1.67E+00	
10	1.68E+00	1.69E+00	1.69E+00	
425	1.69E+00			1.69E+00
426	1.69E+00			1.68E+00
427	1.69E+00			1.68E+00
428	1.69E+00			1.69E+00
194	1.69E+00			1.69E+00
11	1.69E+00	1.69E+00	1.69E+00	
12	1.69E+00	1.69E+00	1.69E+00	
13	1.69E+00	1.69E+00	1.69E+00	
14	1.69E+00	1.69E+00	1.69E+00	
15	1.69E+00	1.69E+00	1.69E+00	
48	1.69E+00			1.69E+00
49	1.69E+00			1.69E+00
50	1.69E+00			1.68E+00
191	1.69E+00			1.69E+00
193	1.69E+00			1.68E+00
Bias 1 Statistics				
Average Bias 1	1.69E+00	1.69E+00	1.69E+00	1.68E+00
Std Dev Bias 1	1.07E-03	5.11E-04	4.24E-04	4.50E-03
Ps90%/90% (+KTL) Bias 1	1.69E+00	1.69E+00	1.69E+00	1.70E+00
Ps90%/90% (-KTL) Bias 1	1.68E+00	1.69E+00	1.69E+00	1.67E+00
Bias 2 Statistics				
Average Bias 2	1.68E+00	1.68E+00	1.68E+00	1.68E+00
Std Dev Bias 2	5.19E-03	7.15E-03	7.42E-03	8.25E-04
Ps90%/90% (+KTL) Bias 2	1.70E+00	1.70E+00	1.70E+00	1.69E+00
Ps90%/90% (-KTL) Bias 2	1.67E+00	1.66E+00	1.66E+00	1.68E+00
Un-Biased Statistics				
Average Un-Biased	1.69E+00	1.69E+00	1.69E+00	1.69E+00
Std Dev Un-Biased	5.43E-04	5.10E-04	5.95E-04	1.24E-03
Ps90%/90% (+KTL) Un-Biased	1.69E+00	1.69E+00	1.69E+00	1.69E+00
Ps90%/90% (-KTL) Un-Biased	1.69E+00	1.69E+00	1.69E+00	1.68E+00
Specification MIN	1.50E+00	1.50E+00	1.50E+00	
Status	PASS	PASS	PASS	Info Only

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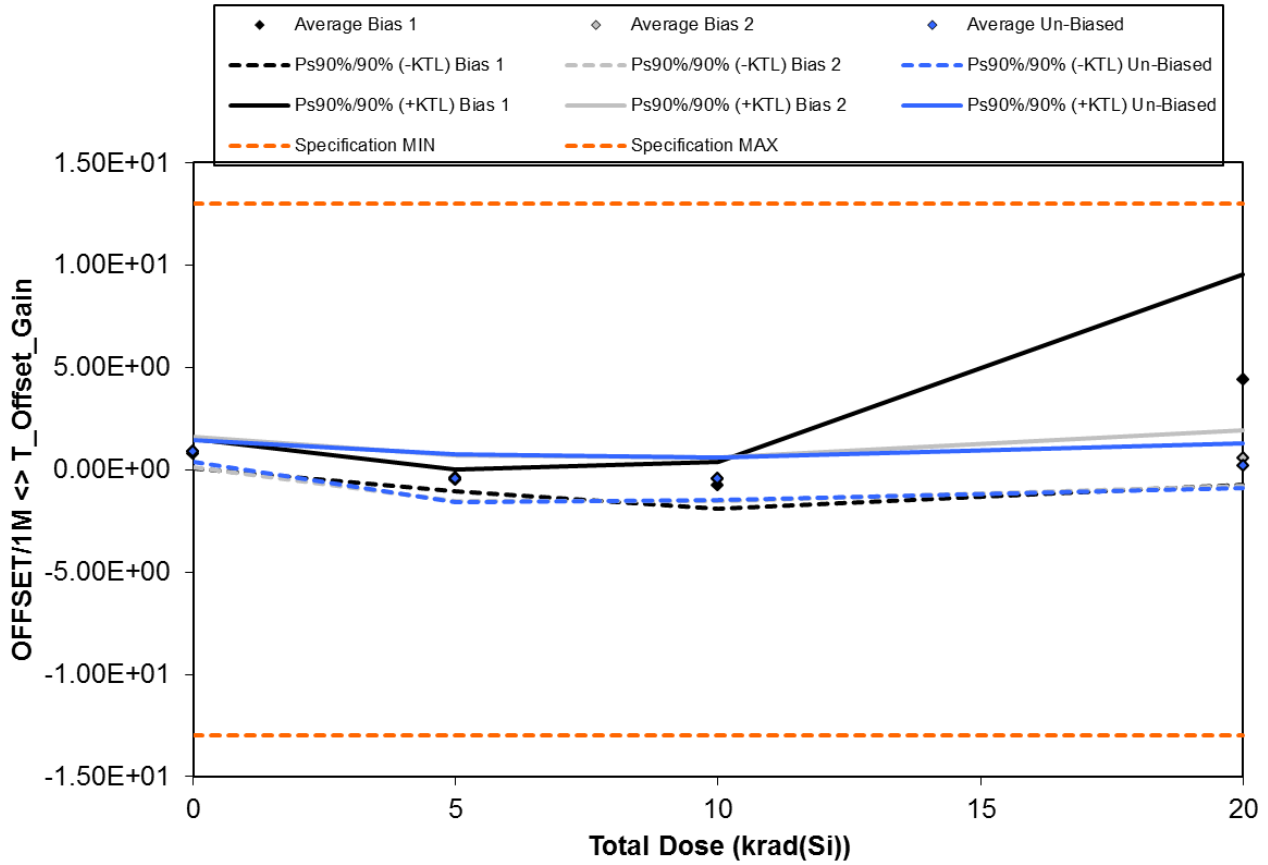


Figure 5.21. Plot of $\text{OFFSET}/1\text{M} \leftrightarrow \text{T_Offset_Gain}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.21. Raw data for OFFSET/1M <> T_Offset_Gain versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

OFFSET/1M <> T_Offset_Gain	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	3.11E-01	-3.40E-01	-8.40E-01	
2	3.14E-01	-4.26E-01	-1.39E+00	
3	8.73E-01	-8.05E-01	-6.50E-01	
4	7.08E-01	-5.99E-01	-7.59E-01	
5	1.07E+00	-3.75E-01	-2.22E-01	
420	7.07E-01			2.56E+00
421	9.19E-01			3.60E+00
422	9.52E-01			3.67E+00
423	1.49E+00			4.72E+00
424	7.15E-01			7.46E+00
6	1.06E+00	-4.22E-01	-4.81E-01	
7	4.37E-01	-4.90E-01	-1.10E+00	
8	1.11E+00	-1.00E+00	-4.17E-01	
9	9.16E-01	-2.77E-01	-2.21E-01	
10	1.36E+00	1.14E-01	-8.80E-02	
425	3.66E-01			2.81E-01
426	1.36E+00			9.38E-01
427	6.15E-01			1.15E+00
428	6.62E-01			4.13E-01
194	8.13E-01			-6.13E-02
11	8.43E-01	-5.52E-01	-8.03E-01	
12	1.25E+00	1.71E-01	-9.98E-02	
13	1.10E+00	-1.28E-01	4.46E-02	
14	8.20E-01	-7.97E-01	-7.16E-01	
15	9.25E-01	-7.99E-01	-5.81E-01	
48	9.37E-01			6.40E-01
49	7.94E-01			-6.34E-02
50	5.78E-01			-3.64E-01
191	1.25E+00			4.45E-01
193	4.55E-01			3.26E-01
Bias 1 Statistics				
Average Bias 1	8.06E-01	-5.09E-01	-7.72E-01	4.40E+00
Std Dev Bias 1	3.48E-01	1.93E-01	4.19E-01	1.87E+00
Ps90%/90% (+KTL) Bias 1	1.52E+00	2.04E-02	3.78E-01	9.54E+00
Ps90%/90% (-KTL) Bias 1	8.81E-02	-1.04E+00	-1.92E+00	-7.32E-01
Bias 2 Statistics				
Average Bias 2	8.69E-01	-4.15E-01	-4.61E-01	5.45E-01
Std Dev Bias 2	3.54E-01	4.02E-01	3.90E-01	4.95E-01
Ps90%/90% (+KTL) Bias 2	1.60E+00	6.88E-01	6.07E-01	1.90E+00
Ps90%/90% (-KTL) Bias 2	1.39E-01	-1.52E+00	-1.53E+00	-8.12E-01
Un-Biased Statistics				
Average Un-Biased	8.95E-01	-4.21E-01	-4.31E-01	1.97E-01
Std Dev Un-Biased	2.60E-01	4.29E-01	3.80E-01	4.05E-01
Ps90%/90% (+KTL) Un-Biased	1.43E+00	7.56E-01	6.11E-01	1.31E+00
Ps90%/90% (-KTL) Un-Biased	3.58E-01	-1.60E+00	-1.47E+00	-9.14E-01
Specification MIN	-1.30E+01	-1.30E+01	-1.30E+01	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.30E+01	1.30E+01	1.30E+01	
Status	PASS	PASS	PASS	Info Only

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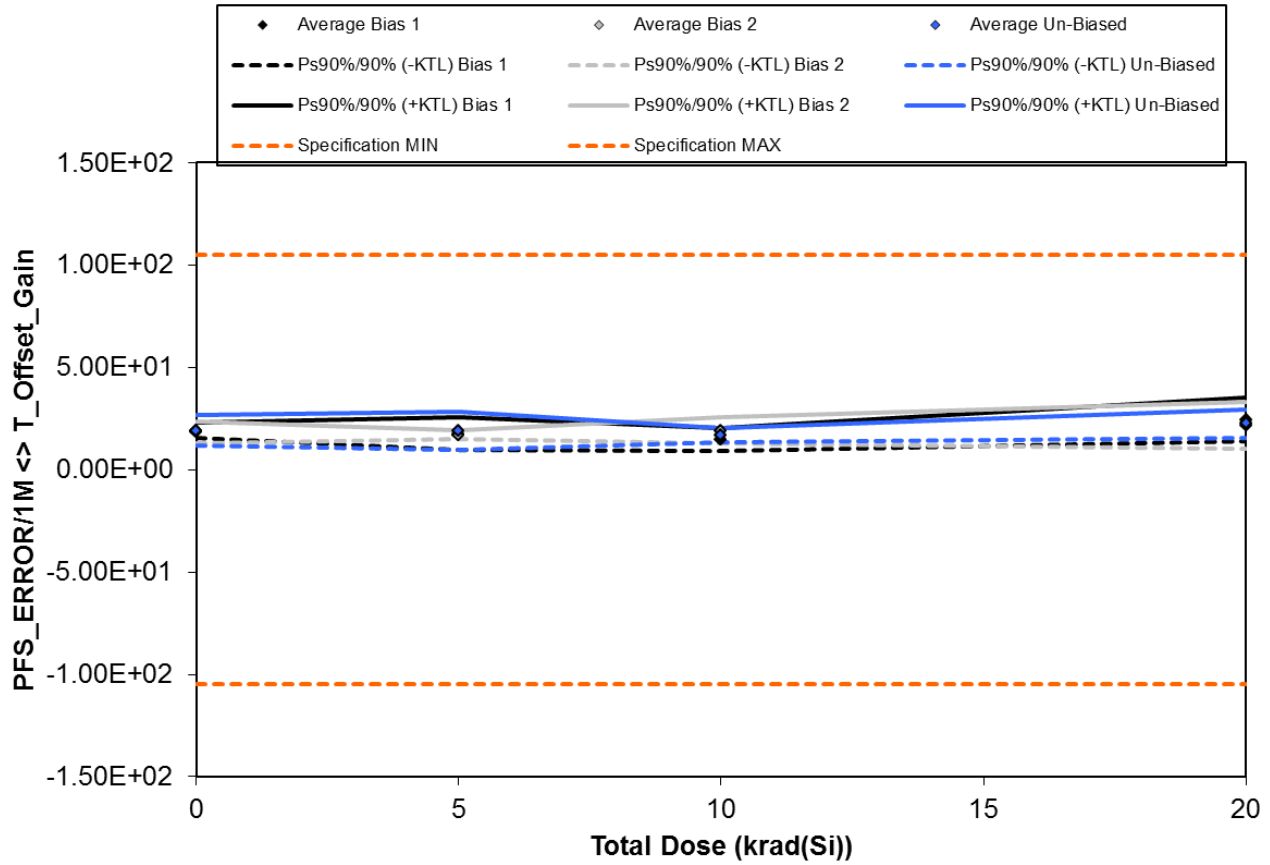


Figure 5.22. Plot of PFS_ERROR/1M \leftrightarrow T_Offset_Gain versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Colorado Springs, CO 80919
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Table 5.22. Raw data for PFS_ERROR/1M <> T_Offset_Gain versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

PFS_ERROR/1M <> T_Offset_Gain	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	2.17E+01	1.98E+01	1.82E+01	
2	1.77E+01	1.70E+01	1.35E+01	
3	1.87E+01	1.27E+01	1.42E+01	
4	1.87E+01	1.98E+01	1.39E+01	
5	1.88E+01	1.87E+01	1.35E+01	
420	1.95E+01			2.09E+01
421	1.70E+01			3.09E+01
422	1.67E+01			2.45E+01
423	2.22E+01			2.33E+01
424	2.05E+01			2.32E+01
6	2.23E+01	1.71E+01	2.11E+01	
7	1.71E+01	1.58E+01	2.07E+01	
8	1.53E+01	1.68E+01	1.73E+01	
9	1.68E+01	1.72E+01	1.61E+01	
10	2.01E+01	1.80E+01	2.11E+01	
425	1.66E+01			2.01E+01
426	1.61E+01			1.59E+01
427	1.81E+01			2.19E+01
428	1.68E+01			2.28E+01
194	2.31E+01			2.73E+01
11	2.76E+01	2.47E+01	1.77E+01	
12	1.91E+01	1.63E+01	1.64E+01	
13	1.70E+01	1.87E+01	1.86E+01	
14	1.92E+01	1.81E+01	1.63E+01	
15	1.74E+01	1.73E+01	1.56E+01	
48	1.93E+01			2.63E+01
49	1.68E+01			2.25E+01
50	1.46E+01			2.20E+01
191	1.88E+01			2.24E+01
193	2.19E+01			1.93E+01
Bias 1 Statistics				
Average Bias 1	1.92E+01	1.76E+01	1.46E+01	2.46E+01
Std Dev Bias 1	1.86E+00	2.97E+00	2.00E+00	3.81E+00
Ps90%/90% (+KTL) Bias 1	2.30E+01	2.58E+01	2.01E+01	3.50E+01
Ps90%/90% (-KTL) Bias 1	1.53E+01	9.45E+00	9.15E+00	1.41E+01
Bias 2 Statistics				
Average Bias 2	1.82E+01	1.70E+01	1.92E+01	2.16E+01
Std Dev Bias 2	2.69E+00	7.77E-01	2.38E+00	4.12E+00
Ps90%/90% (+KTL) Bias 2	2.38E+01	1.91E+01	2.58E+01	3.29E+01
Ps90%/90% (-KTL) Bias 2	1.27E+01	1.49E+01	1.27E+01	1.03E+01
Un-Biased Statistics				
Average Un-Biased	1.92E+01	1.90E+01	1.69E+01	2.25E+01
Std Dev Un-Biased	3.55E+00	3.31E+00	1.24E+00	2.48E+00
Ps90%/90% (+KTL) Un-Biased	2.65E+01	2.81E+01	2.03E+01	2.93E+01
Ps90%/90% (-KTL) Un-Biased	1.18E+01	9.94E+00	1.35E+01	1.57E+01
Specification MIN	-1.05E+02	-1.05E+02	-1.05E+02	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.05E+02	1.05E+02	1.05E+02	
Status	PASS	PASS	PASS	Info Only

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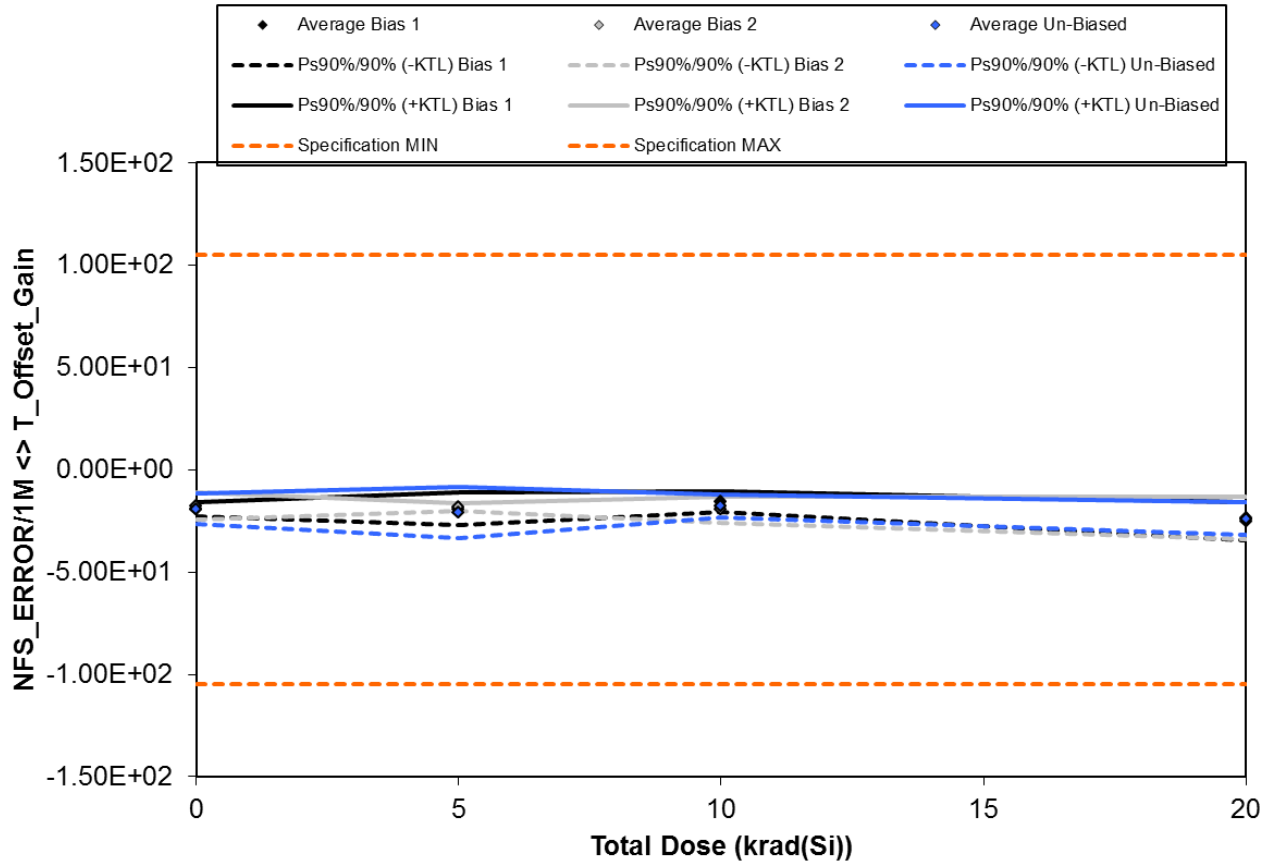


Figure 5.23. Plot of NFS_ERROR/1M \leftrightarrow T_Offset_Gain versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.23. Raw data for NFS_ERROR/1M <> T_Offset_Gain versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

NFS_ERROR/1M <> T_Offset_Gain	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-2.10E+01	-2.07E+01	-1.80E+01	
2	-1.81E+01	-2.00E+01	-1.58E+01	
3	-1.89E+01	-1.40E+01	-1.63E+01	
4	-1.74E+01	-2.13E+01	-1.48E+01	
5	-1.72E+01	-1.97E+01	-1.31E+01	
420	-2.07E+01			-2.04E+01
421	-1.83E+01			-2.98E+01
422	-2.01E+01			-2.47E+01
423	-2.17E+01			-2.39E+01
424	-2.05E+01			-2.58E+01
6	-2.11E+01	-1.83E+01	-2.04E+01	
7	-1.71E+01	-1.78E+01	-2.23E+01	
8	-1.37E+01	-1.91E+01	-1.83E+01	
9	-1.56E+01	-1.86E+01	-1.63E+01	
10	-1.69E+01	-1.73E+01	-2.04E+01	
425	-1.63E+01			-2.21E+01
426	-1.69E+01			-1.95E+01
427	-1.80E+01			-2.38E+01
428	-1.60E+01			-2.25E+01
194	-2.50E+01			-2.98E+01
11	-2.78E+01	-2.77E+01	-1.99E+01	
12	-1.65E+01	-1.50E+01	-1.47E+01	
13	-1.62E+01	-2.02E+01	-1.91E+01	
14	-1.96E+01	-2.14E+01	-1.79E+01	
15	-1.75E+01	-2.05E+01	-1.66E+01	
48	-1.93E+01			-2.50E+01
49	-1.88E+01			-2.71E+01
50	-1.55E+01			-2.46E+01
191	-1.88E+01			-2.38E+01
193	-2.09E+01			-1.93E+01
Bias 1 Statistics				
Average Bias 1	-1.94E+01	-1.91E+01	-1.56E+01	-2.49E+01
Std Dev Bias 1	1.60E+00	2.95E+00	1.82E+00	3.40E+00
Ps90%/90% (+KTL) Bias 1	-1.61E+01	-1.11E+01	-1.06E+01	-1.56E+01
Ps90%/90% (-KTL) Bias 1	-2.27E+01	-2.72E+01	-2.06E+01	-3.43E+01
Bias 2 Statistics				
Average Bias 2	-1.76E+01	-1.82E+01	-1.95E+01	-2.36E+01
Std Dev Bias 2	3.20E+00	6.95E-01	2.32E+00	3.83E+00
Ps90%/90% (+KTL) Bias 2	-1.10E+01	-1.63E+01	-1.32E+01	-1.30E+01
Ps90%/90% (-KTL) Bias 2	-2.43E+01	-2.01E+01	-2.59E+01	-3.41E+01
Un-Biased Statistics				
Average Un-Biased	-1.91E+01	-2.10E+01	-1.77E+01	-2.40E+01
Std Dev Un-Biased	3.50E+00	4.53E+00	2.07E+00	2.89E+00
Ps90%/90% (+KTL) Un-Biased	-1.19E+01	-8.54E+00	-1.20E+01	-1.60E+01
Ps90%/90% (-KTL) Un-Biased	-2.63E+01	-3.34E+01	-2.33E+01	-3.19E+01
Specification MIN	-1.05E+02	-1.05E+02	-1.05E+02	
Status	PASS	PASS	PASS	Info Only
Specification MAX	1.05E+02	1.05E+02	1.05E+02	
Status	PASS	PASS	PASS	Info Only

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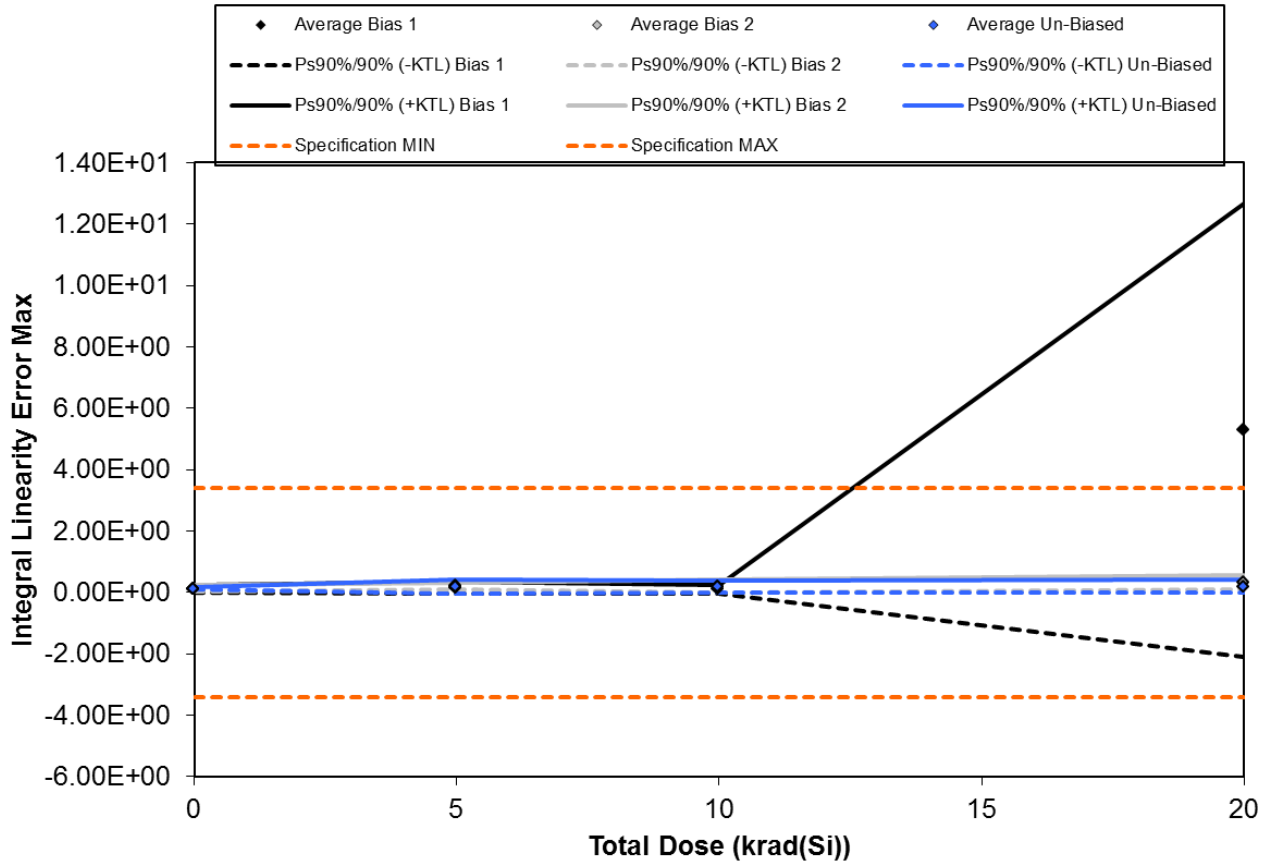


Figure 5.24. Plot of Integral Linearity Error Max versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.24. Raw data for Integral Linearity Error Max versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Integral Linearity Error Max	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	6.55E-02	1.76E-01	1.06E-01	
2	7.72E-02	2.74E-01	1.45E-01	
3	1.39E-01	1.09E-01	1.79E-01	
4	8.00E-03	7.82E-02	9.34E-02	
5	1.90E-01	1.48E-01	4.29E-02	
420	1.91E-01			2.71E+00
421	1.95E-01			3.56E+00
422	1.62E-01			4.80E+00
423	1.21E-01			5.78E+00
424	1.00E-01			9.64E+00
6	2.15E-01	2.13E-01	1.63E-01	
7	7.51E-02	1.86E-01	1.28E-01	
8	1.14E-01	1.92E-01	1.66E-01	
9	1.71E-01	2.42E-01	2.37E-01	
10	1.79E-01	2.80E-01	3.17E-01	
425	1.17E-01			4.02E-01
426	1.29E-01			3.48E-01
427	9.06E-02			3.25E-01
428	6.63E-02			1.90E-01
194	1.56E-01			3.66E-01
11	1.15E-01	2.49E-01	2.03E-01	
12	1.09E-01	2.22E-01	3.04E-01	
13	1.40E-01	1.42E-01	1.22E-01	
14	1.04E-01	6.57E-02	1.40E-01	
15	1.16E-01	2.70E-01	1.73E-01	
48	1.56E-01			1.56E-01
49	1.07E-01			2.92E-01
50	1.45E-01			1.56E-01
191	1.35E-01			2.83E-01
193	1.36E-01			1.21E-01
Bias 1 Statistics				
Average Bias 1	1.25E-01	1.57E-01	1.13E-01	5.30E+00
Std Dev Bias 1	6.25E-02	7.51E-02	5.17E-02	2.69E+00
Ps90%/90% (+KTL) Bias 1	2.54E-01	3.63E-01	2.55E-01	1.27E+01
Ps90%/90% (-KTL) Bias 1	-4.18E-03	-4.90E-02	-2.86E-02	-2.09E+00
Bias 2 Statistics				
Average Bias 2	1.31E-01	2.23E-01	2.02E-01	3.26E-01
Std Dev Bias 2	4.82E-02	3.86E-02	7.57E-02	8.13E-02
Ps90%/90% (+KTL) Bias 2	2.31E-01	3.28E-01	4.10E-01	5.49E-01
Ps90%/90% (-KTL) Bias 2	3.16E-02	1.17E-01	-5.47E-03	1.03E-01
Un-Biased Statistics				
Average Un-Biased	1.26E-01	1.90E-01	1.88E-01	2.01E-01
Std Dev Un-Biased	1.82E-02	8.45E-02	7.16E-02	7.99E-02
Ps90%/90% (+KTL) Un-Biased	1.64E-01	4.21E-01	3.85E-01	4.21E-01
Ps90%/90% (-KTL) Un-Biased	8.88E-02	-4.23E-02	-7.91E-03	-1.77E-02
Specification MIN	-3.40E+00	-3.40E+00	-3.40E+00	
Status	PASS	PASS	PASS	Info Only
Specification MAX	3.40E+00	3.40E+00	3.40E+00	
Status	PASS	PASS	PASS	Info Only

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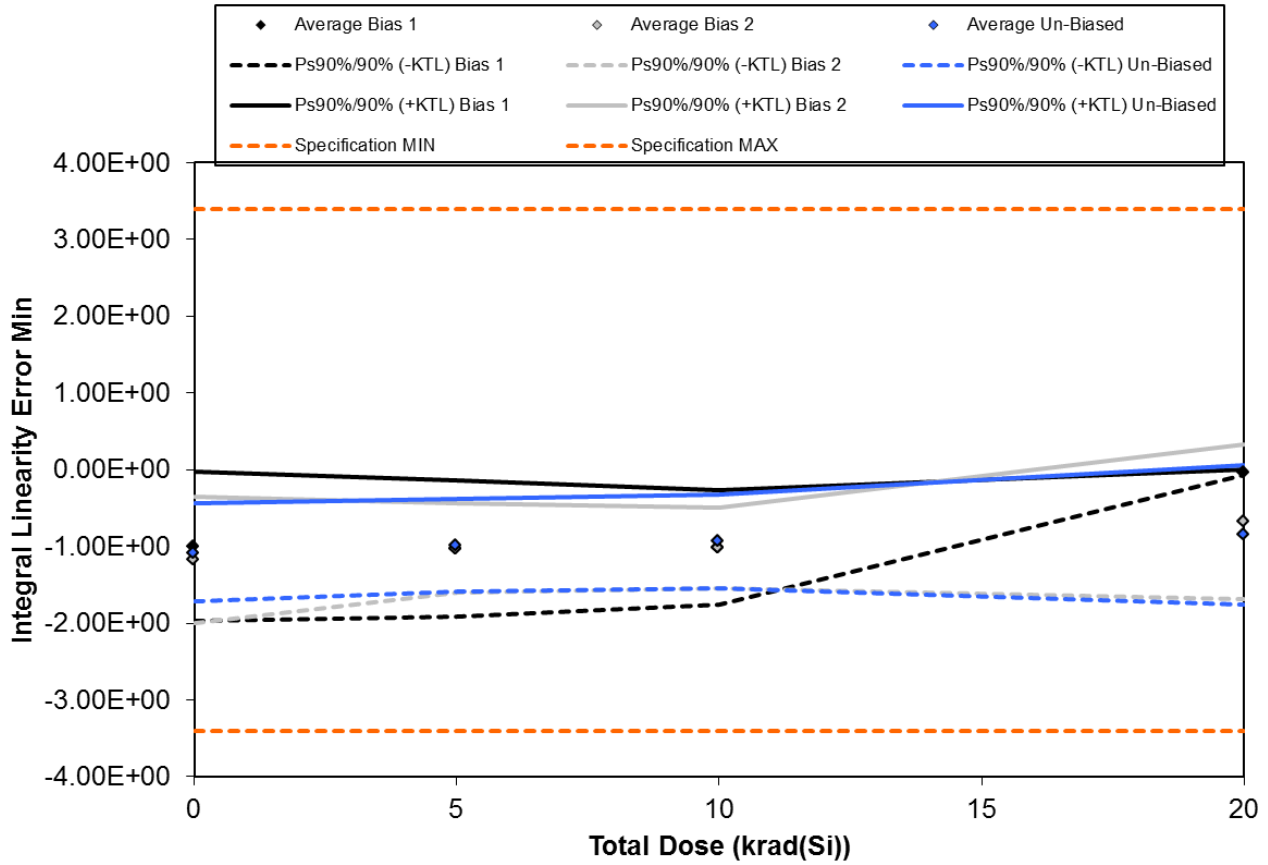


Figure 5.25. Plot of Integral Linearity Error Min versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.25. Raw data for Integral Linearity Error Min versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Integral Linearity Error Min	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-1.54E+00	-1.07E+00	-1.05E+00	
2	-1.46E+00	-4.60E-01	-1.11E+00	
3	-7.68E-01	-1.18E+00	-5.35E-01	
4	-1.50E+00	-1.28E+00	-1.23E+00	
5	-1.33E+00	-1.12E+00	-1.11E+00	
420	-4.22E-01			-4.26E-02
421	-3.90E-01			-4.87E-02
422	-5.20E-01			-1.48E-02
423	-7.73E-01			-1.77E-02
424	-1.27E+00			-3.86E-02
6	-1.46E+00	-1.25E+00	-1.17E+00	
7	-1.52E+00	-9.25E-01	-1.21E+00	
8	-1.16E+00	-1.21E+00	-9.53E-01	
9	-1.31E+00	-9.87E-01	-1.02E+00	
10	-1.11E+00	-7.35E-01	-7.29E-01	
425	-1.52E+00			-5.08E-01
426	-5.22E-01			-4.90E-01
427	-1.37E+00			-6.32E-01
428	-1.37E+00			-1.32E+00
194	-3.98E-01			-4.31E-01
11	-1.28E+00	-1.06E+00	-1.01E+00	
12	-1.46E+00	-1.21E+00	-1.13E+00	
13	-1.33E+00	-1.13E+00	-1.09E+00	
14	-1.16E+00	-8.27E-01	-8.41E-01	
15	-8.36E-01	-6.78E-01	-5.94E-01	
48	-1.10E+00			-1.02E+00
49	-4.74E-01			-4.71E-01
50	-1.07E+00			-9.30E-01
191	-7.23E-01			-5.55E-01
193	-1.34E+00			-1.27E+00
Bias 1 Statistics				
Average Bias 1	-9.97E-01	-1.02E+00	-1.01E+00	-3.25E-02
Std Dev Bias 1	4.68E-01	3.24E-01	2.72E-01	1.53E-02
Ps90%/90% (+KTL) Bias 1	-2.96E-02	-1.34E-01	-2.61E-01	9.39E-03
Ps90%/90% (-KTL) Bias 1	-1.96E+00	-1.91E+00	-1.75E+00	-7.43E-02
Bias 2 Statistics				
Average Bias 2	-1.17E+00	-1.02E+00	-1.02E+00	-6.77E-01
Std Dev Bias 2	4.01E-01	2.11E-01	1.92E-01	3.69E-01
Ps90%/90% (+KTL) Bias 2	-3.45E-01	-4.41E-01	-4.91E-01	3.35E-01
Ps90%/90% (-KTL) Bias 2	-2.00E+00	-1.60E+00	-1.54E+00	-1.69E+00
Un-Biased Statistics				
Average Un-Biased	-1.08E+00	-9.81E-01	-9.34E-01	-8.49E-01
Std Dev Un-Biased	3.12E-01	2.21E-01	2.20E-01	3.32E-01
Ps90%/90% (+KTL) Un-Biased	-4.32E-01	-3.74E-01	-3.29E-01	6.17E-02
Ps90%/90% (-KTL) Un-Biased	-1.72E+00	-1.59E+00	-1.54E+00	-1.76E+00
Specification MIN	-3.40E+00	-3.40E+00	-3.40E+00	
Status	PASS	PASS	PASS	Info Only
Specification MAX	3.40E+00	3.40E+00	3.40E+00	
Status	PASS	PASS	PASS	Info Only

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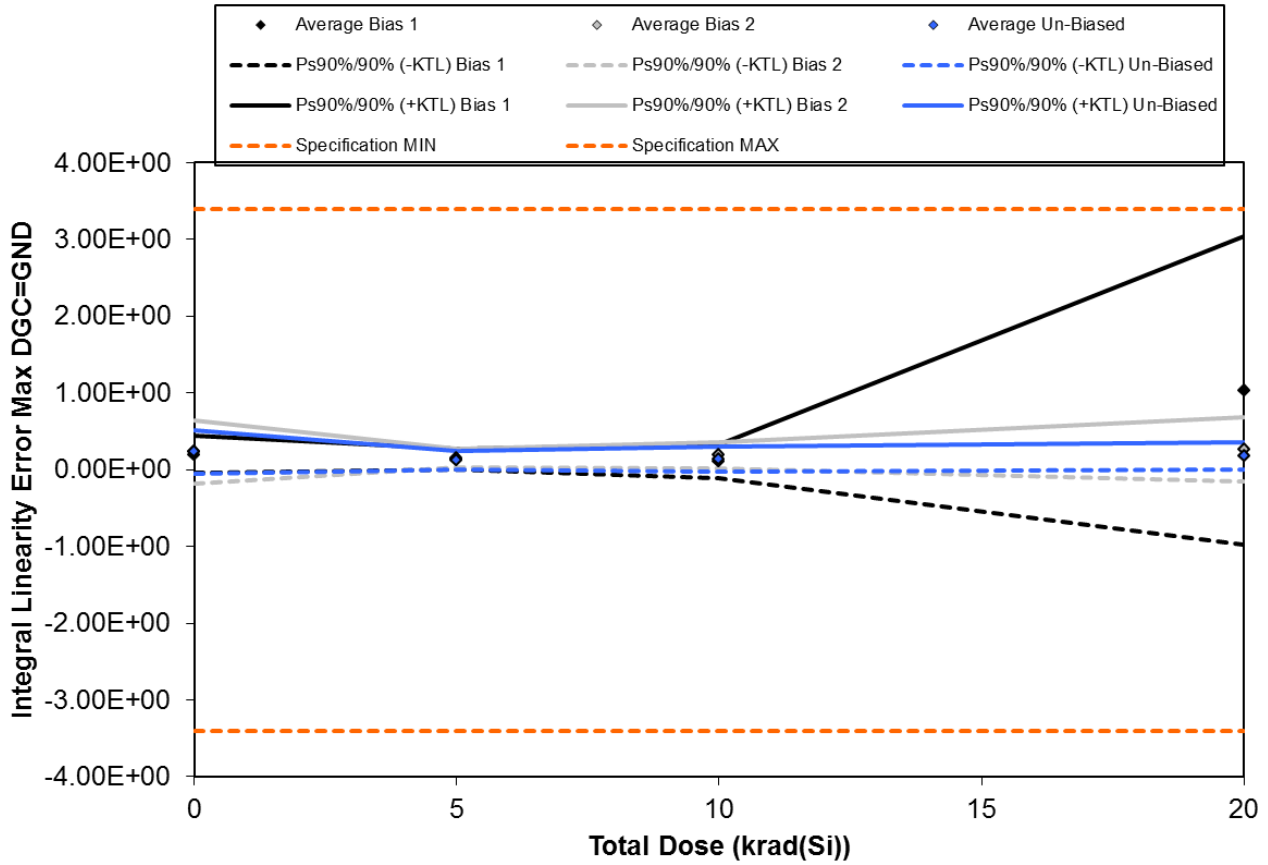


Figure 5.26. Plot of Integral Linearity Error Max DGC=GND versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.26. Raw data for Integral Linearity Error Max DGC=GND versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Integral Linearity Error Max DGC=GND	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	2.48E-01	1.21E-01	3.30E-02	
2	7.40E-02	2.18E-01	2.19E-01	
3	1.79E-01	9.50E-02	1.56E-01	
4	1.22E-01	1.14E-01	3.50E-02	
5	1.73E-01	1.29E-01	9.98E-02	
420	4.54E-01			3.89E-01
421	2.72E-01			6.61E-01
422	2.74E-01			7.82E-01
423	1.26E-01			1.07E+00
424	8.06E-02			2.27E+00
6	8.18E-02	1.99E-01	1.83E-01	
7	2.41E-01	9.81E-02	1.28E-01	
8	2.08E-01	1.19E-01	1.68E-01	
9	2.93E-01	1.69E-01	2.94E-01	
10	2.68E-01	1.91E-01	1.67E-01	
425	1.85E-01			2.90E-01
426	1.37E-01			3.37E-01
427	4.97E-02			1.47E-01
428	1.15E-01			9.61E-02
194	7.53E-01			4.80E-01
11	1.16E-01	1.72E-01	2.22E-01	
12	1.64E-01	5.91E-02	1.89E-01	
13	1.48E-01	1.40E-01	8.66E-02	
14	2.40E-01	1.22E-01	9.81E-02	
15	2.66E-01	1.57E-01	1.12E-01	
48	3.05E-01			1.79E-01
49	5.90E-01			2.91E-01
50	1.79E-01			1.58E-01
191	1.62E-01			1.17E-01
193	1.64E-01			1.64E-01
Bias 1 Statistics				
Average Bias 1	2.00E-01	1.35E-01	1.09E-01	1.03E+00
Std Dev Bias 1	1.16E-01	4.79E-02	8.02E-02	7.32E-01
Ps90%/90% (+KTL) Bias 1	4.39E-01	2.67E-01	3.29E-01	3.04E+00
Ps90%/90% (-KTL) Bias 1	-3.86E-02	3.84E-03	-1.11E-01	-9.73E-01
Bias 2 Statistics				
Average Bias 2	2.33E-01	1.55E-01	1.88E-01	2.70E-01
Std Dev Bias 2	1.99E-01	4.46E-02	6.28E-02	1.54E-01
Ps90%/90% (+KTL) Bias 2	6.45E-01	2.77E-01	3.60E-01	6.91E-01
Ps90%/90% (-KTL) Bias 2	-1.78E-01	3.28E-02	1.58E-02	-1.51E-01
Un-Biased Statistics				
Average Un-Biased	2.33E-01	1.30E-01	1.42E-01	1.82E-01
Std Dev Un-Biased	1.39E-01	4.39E-02	6.02E-02	6.50E-02
Ps90%/90% (+KTL) Un-Biased	5.19E-01	2.51E-01	3.07E-01	3.60E-01
Ps90%/90% (-KTL) Un-Biased	-5.27E-02	9.78E-03	-2.35E-02	3.89E-03
Specification MIN	-3.40E+00	-3.40E+00	-3.40E+00	
Status	PASS	PASS	PASS	Info Only
Specification MAX	3.40E+00	3.40E+00	3.40E+00	
Status	PASS	PASS	PASS	Info Only

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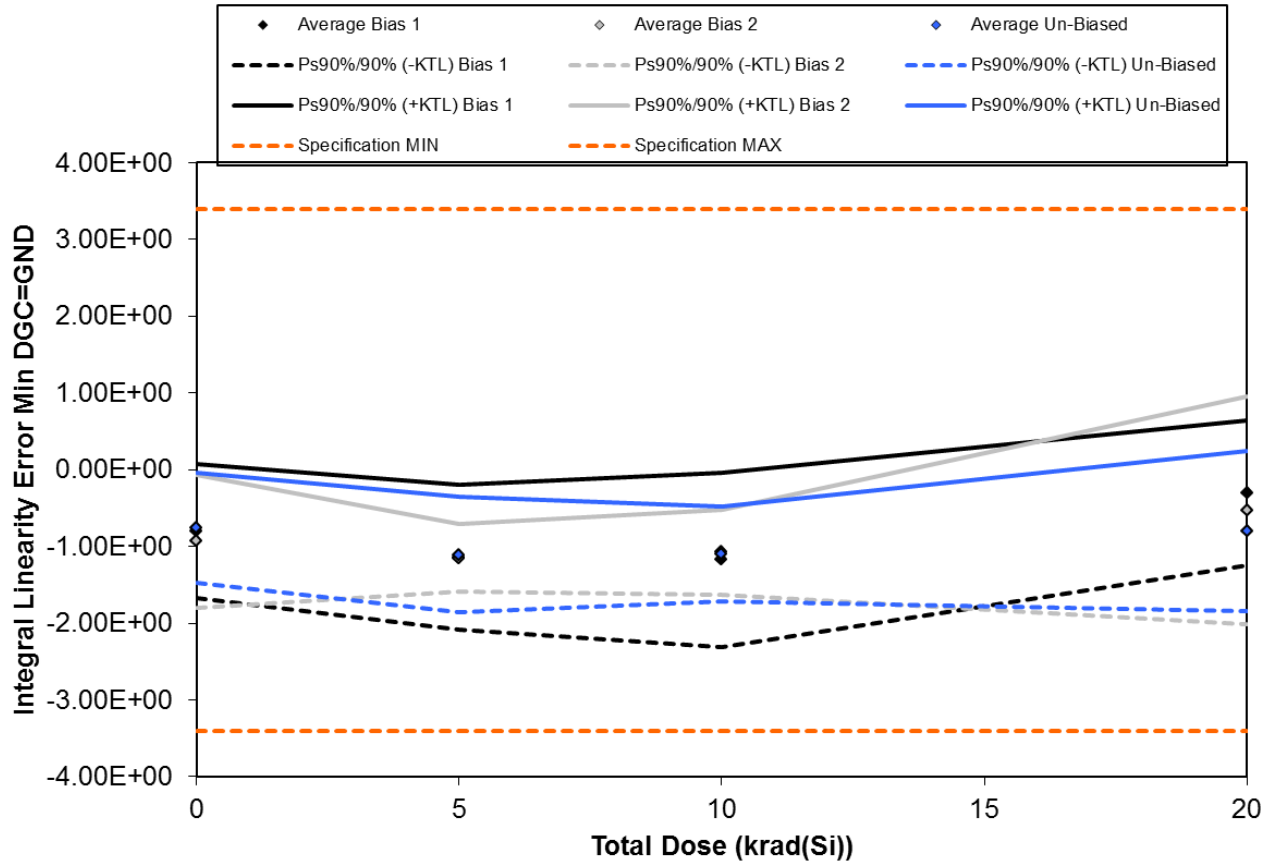


Figure 5.27. Plot of Integral Linearity Error Min DGC=GND versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.27. Raw data for Integral Linearity Error Min DGC=GND versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Integral Linearity Error Min DGC=GND	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-1.00E+00	-1.22E+00	-1.23E+00	
2	-1.22E+00	-5.37E-01	-1.42E+00	
3	-4.80E-01	-1.29E+00	-4.49E-01	
4	-1.28E+00	-1.40E+00	-1.46E+00	
5	-1.07E+00	-1.24E+00	-1.32E+00	
420	-2.41E-01			-8.58E-01
421	-2.82E-01			-2.19E-01
422	-3.39E-01			-3.89E-01
423	-8.24E-01			-2.30E-02
424	-1.27E+00			-2.96E-02
6	-1.16E+00	-1.21E+00	-1.21E+00	
7	-1.24E+00	-1.04E+00	-1.34E+00	
8	-8.09E-01	-1.37E+00	-1.01E+00	
9	-9.09E-01	-1.18E+00	-1.01E+00	
10	-6.45E-01	-9.48E-01	-8.15E-01	
425	-1.38E+00			-2.76E-01
426	-5.39E-01			-3.86E-01
427	-1.26E+00			-3.10E-01
428	-1.31E+00			-1.49E+00
194	-8.02E-02			-1.90E-01
11	-9.97E-01	-1.20E+00	-1.15E+00	
12	-1.20E+00	-1.40E+00	-1.32E+00	
13	-1.11E+00	-1.25E+00	-1.19E+00	
14	-8.32E-01	-9.93E-01	-1.07E+00	
15	-5.29E-01	-6.95E-01	-7.29E-01	
48	-7.01E-01			-1.07E+00
49	-1.03E-01			-2.58E-01
50	-7.64E-01			-8.34E-01
191	-3.70E-01			-6.22E-01
193	-1.02E+00			-1.22E+00
Bias 1 Statistics				
Average Bias 1	-8.00E-01	-1.14E+00	-1.18E+00	-3.04E-01
Std Dev Bias 1	4.26E-01	3.44E-01	4.16E-01	3.45E-01
Ps90%/90% (+KTL) Bias 1	7.91E-02	-1.96E-01	-3.47E-02	6.42E-01
Ps90%/90% (-KTL) Bias 1	-1.68E+00	-2.08E+00	-2.32E+00	-1.25E+00
Bias 2 Statistics				
Average Bias 2	-9.33E-01	-1.15E+00	-1.08E+00	-5.30E-01
Std Dev Bias 2	4.18E-01	1.61E-01	2.01E-01	5.39E-01
Ps90%/90% (+KTL) Bias 2	-6.93E-02	-7.08E-01	-5.23E-01	9.49E-01
Ps90%/90% (-KTL) Bias 2	-1.80E+00	-1.59E+00	-1.63E+00	-2.01E+00
Un-Biased Statistics				
Average Un-Biased	-7.62E-01	-1.11E+00	-1.09E+00	-8.00E-01
Std Dev Un-Biased	3.47E-01	2.73E-01	2.24E-01	3.78E-01
Ps90%/90% (+KTL) Un-Biased	-4.55E-02	-3.59E-01	-4.80E-01	2.37E-01
Ps90%/90% (-KTL) Un-Biased	-1.48E+00	-1.86E+00	-1.71E+00	-1.84E+00
Specification MIN	-3.40E+00	-3.40E+00	-3.40E+00	
Status	PASS	PASS	PASS	Info Only
Specification MAX	3.40E+00	3.40E+00	3.40E+00	
Status	PASS	PASS	PASS	Info Only

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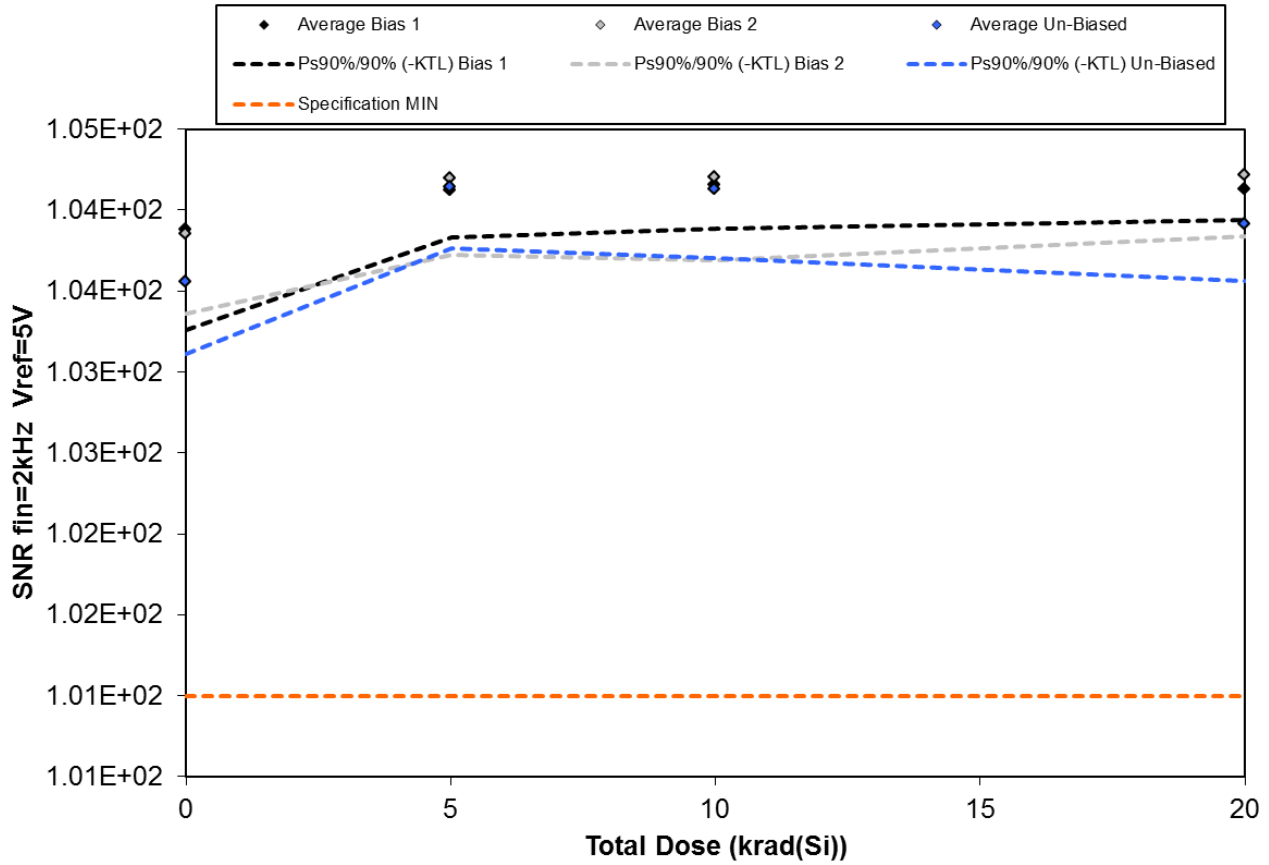


Figure 5.28. Plot of SNR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.28. Raw data for SNR fin=2kHz Vref=5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

SNR fin=2kHz Vref=5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	1.04E+02	1.04E+02	1.04E+02	
2	1.04E+02	1.04E+02	1.04E+02	
3	1.03E+02	1.04E+02	1.04E+02	
4	1.04E+02	1.04E+02	1.04E+02	
5	1.04E+02	1.04E+02	1.04E+02	
420	1.04E+02			1.04E+02
421	1.04E+02			1.04E+02
422	1.04E+02			1.04E+02
423	1.04E+02			1.04E+02
424	1.04E+02			1.04E+02
6	1.04E+02	1.04E+02	1.04E+02	
7	1.04E+02	1.04E+02	1.04E+02	
8	1.04E+02	1.04E+02	1.04E+02	
9	1.04E+02	1.04E+02	1.04E+02	
10	1.04E+02	1.04E+02	1.04E+02	
425	1.04E+02			1.04E+02
426	1.04E+02			1.04E+02
427	1.04E+02			1.04E+02
428	1.04E+02			1.04E+02
194	1.04E+02			1.04E+02
11	1.04E+02	1.04E+02	1.04E+02	
12	1.04E+02	1.04E+02	1.04E+02	
13	1.04E+02	1.04E+02	1.04E+02	
14	1.04E+02	1.04E+02	1.04E+02	
15	1.04E+02	1.04E+02	1.04E+02	
48	1.03E+02			1.04E+02
49	1.03E+02			1.04E+02
50	1.03E+02			1.04E+02
191	1.04E+02			1.04E+02
193	1.04E+02			1.04E+02
Bias 1 Statistics				
Average Bias 1	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Std Dev Bias 1	3.03E-01	1.06E-01	9.72E-02	7.08E-02
Ps90%/90% (+KTL) Bias 1	1.05E+02	1.04E+02	1.04E+02	1.04E+02
Ps90%/90% (-KTL) Bias 1	1.03E+02	1.04E+02	1.04E+02	1.04E+02
Bias 2 Statistics				
Average Bias 2	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Std Dev Bias 2	2.40E-01	1.73E-01	1.88E-01	1.38E-01
Ps90%/90% (+KTL) Bias 2	1.04E+02	1.05E+02	1.05E+02	1.05E+02
Ps90%/90% (-KTL) Bias 2	1.03E+02	1.04E+02	1.04E+02	1.04E+02
Un-Biased Statistics				
Average Un-Biased	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Std Dev Un-Biased	2.15E-01	1.39E-01	1.55E-01	1.28E-01
Ps90%/90% (+KTL) Un-Biased	1.04E+02	1.05E+02	1.05E+02	1.04E+02
Ps90%/90% (-KTL) Un-Biased	1.03E+02	1.04E+02	1.04E+02	1.04E+02
Specification MIN	1.01E+02	1.01E+02	1.01E+02	
Status	PASS	PASS	PASS	Info Only

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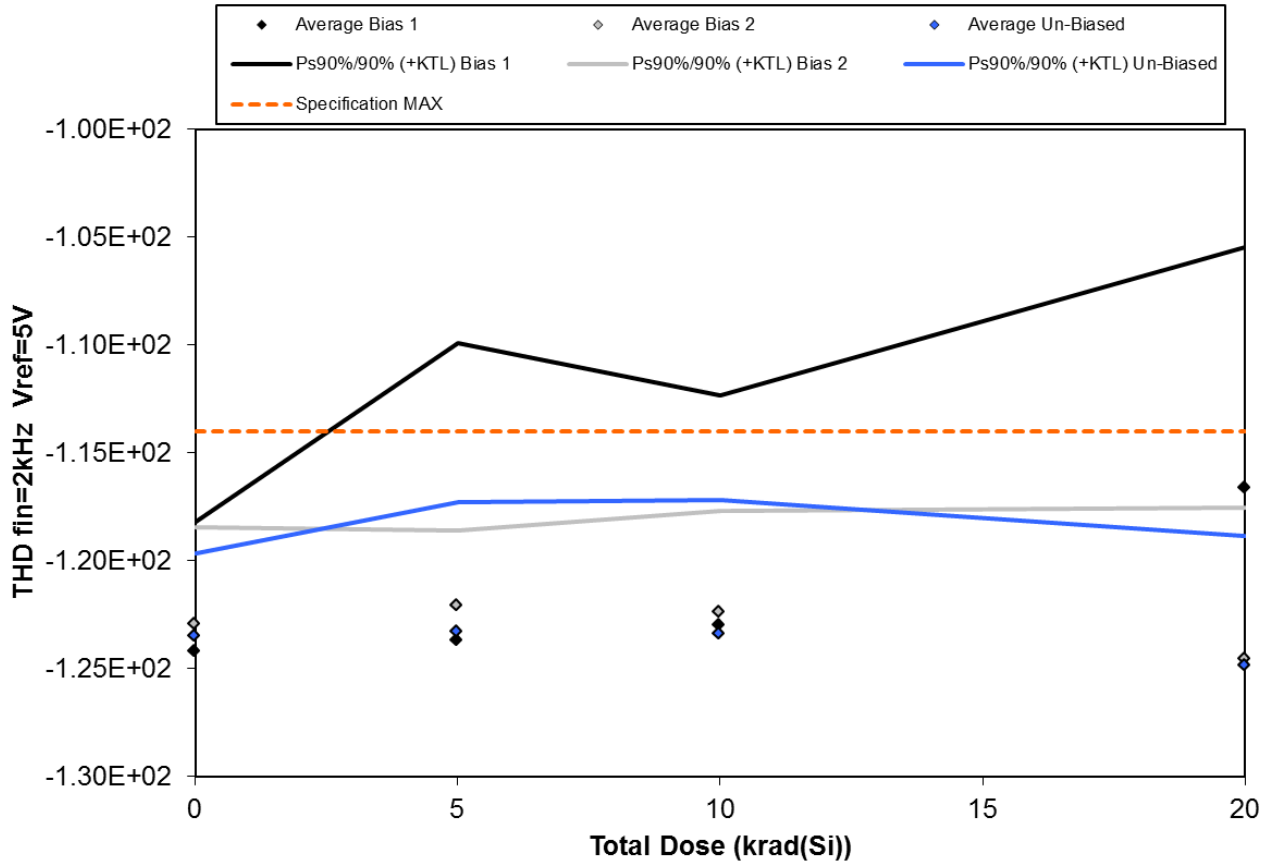


Figure 5.29. Plot of THD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.29. Raw data for THD fin=2kHz Vref=5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

THD fin=2kHz Vref=5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	-1.22E+02	-1.21E+02	-1.21E+02	
2	-1.22E+02	-1.32E+02	-1.21E+02	
3	-1.27E+02	-1.21E+02	-1.30E+02	
4	-1.21E+02	-1.21E+02	-1.21E+02	
5	-1.22E+02	-1.23E+02	-1.22E+02	
420	-1.26E+02			-1.20E+02
421	-1.29E+02			-1.18E+02
422	-1.24E+02			-1.18E+02
423	-1.26E+02			-1.17E+02
424	-1.22E+02			-1.10E+02
6	-1.22E+02	-1.21E+02	-1.21E+02	
7	-1.21E+02	-1.22E+02	-1.21E+02	
8	-1.23E+02	-1.21E+02	-1.23E+02	
9	-1.22E+02	-1.22E+02	-1.23E+02	
10	-1.23E+02	-1.24E+02	-1.25E+02	
425	-1.21E+02			-1.27E+02
426	-1.27E+02			-1.23E+02
427	-1.21E+02			-1.27E+02
428	-1.23E+02			-1.21E+02
194	-1.27E+02			-1.25E+02
11	-1.22E+02	-1.23E+02	-1.23E+02	
12	-1.21E+02	-1.21E+02	-1.21E+02	
13	-1.22E+02	-1.22E+02	-1.22E+02	
14	-1.24E+02	-1.25E+02	-1.24E+02	
15	-1.24E+02	-1.26E+02	-1.27E+02	
48	-1.23E+02			-1.24E+02
49	-1.26E+02			-1.25E+02
50	-1.24E+02			-1.26E+02
191	-1.26E+02			-1.27E+02
193	-1.22E+02			-1.22E+02
Bias 1 Statistics				
Average Bias 1	-1.24E+02	-1.24E+02	-1.23E+02	-1.17E+02
Std Dev Bias 1	2.89E+00	5.02E+00	3.86E+00	4.07E+00
Ps90%/90% (+KTL) Bias 1	-1.18E+02	-1.10E+02	-1.12E+02	-1.05E+02
Ps90%/90% (-KTL) Bias 1	-1.30E+02	-1.37E+02	-1.34E+02	-1.28E+02
Bias 2 Statistics				
Average Bias 2	-1.23E+02	-1.22E+02	-1.22E+02	-1.25E+02
Std Dev Bias 2	2.16E+00	1.27E+00	1.70E+00	2.56E+00
Ps90%/90% (+KTL) Bias 2	-1.18E+02	-1.19E+02	-1.18E+02	-1.18E+02
Ps90%/90% (-KTL) Bias 2	-1.27E+02	-1.26E+02	-1.27E+02	-1.32E+02
Un-Biased Statistics				
Average Un-Biased	-1.23E+02	-1.23E+02	-1.23E+02	-1.25E+02
Std Dev Un-Biased	1.84E+00	2.19E+00	2.25E+00	2.19E+00
Ps90%/90% (+KTL) Un-Biased	-1.20E+02	-1.17E+02	-1.17E+02	-1.19E+02
Ps90%/90% (-KTL) Un-Biased	-1.27E+02	-1.29E+02	-1.30E+02	-1.31E+02
Specification MAX	-1.14E+02	-1.14E+02	-1.14E+02	
Status	PASS	PASS	PASS	Info Only

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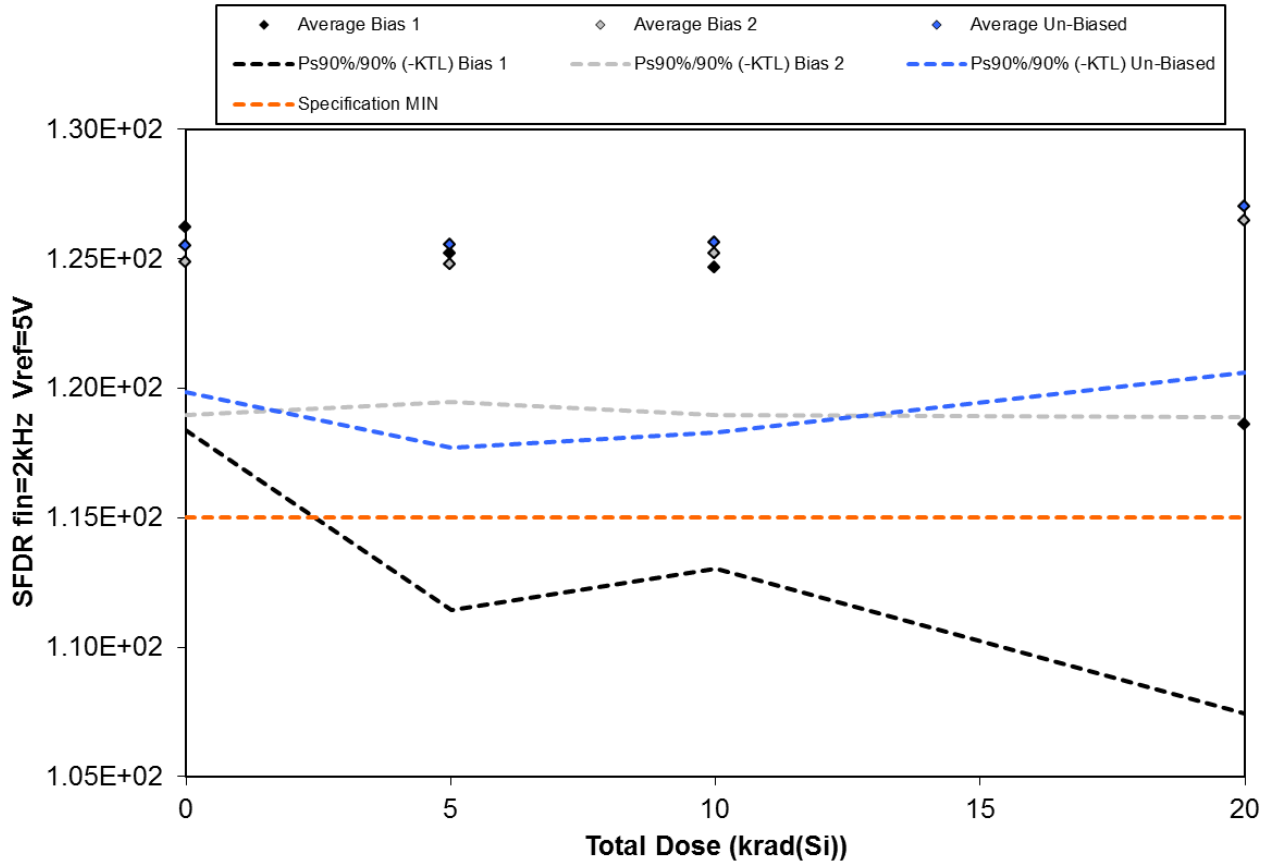


Figure 5.30. Plot of SFDR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.30. Raw data for SFDR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

SFDR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	1.24E+02	1.23E+02	1.22E+02	
2	1.23E+02	1.34E+02	1.23E+02	
3	1.30E+02	1.22E+02	1.32E+02	
4	1.22E+02	1.22E+02	1.23E+02	
5	1.23E+02	1.25E+02	1.23E+02	
420	1.29E+02			1.21E+02
421	1.33E+02			1.21E+02
422	1.26E+02			1.20E+02
423	1.29E+02			1.20E+02
424	1.23E+02			1.11E+02
6	1.23E+02	1.22E+02	1.23E+02	
7	1.23E+02	1.26E+02	1.23E+02	
8	1.25E+02	1.23E+02	1.27E+02	
9	1.25E+02	1.26E+02	1.26E+02	
10	1.25E+02	1.27E+02	1.28E+02	
425	1.22E+02			1.28E+02
426	1.29E+02			1.25E+02
427	1.23E+02			1.29E+02
428	1.25E+02			1.22E+02
194	1.31E+02			1.28E+02
11	1.23E+02	1.24E+02	1.24E+02	
12	1.24E+02	1.23E+02	1.24E+02	
13	1.23E+02	1.23E+02	1.24E+02	
14	1.25E+02	1.27E+02	1.26E+02	
15	1.26E+02	1.30E+02	1.30E+02	
48	1.24E+02			1.26E+02
49	1.31E+02			1.29E+02
50	1.26E+02			1.29E+02
191	1.28E+02			1.28E+02
193	1.23E+02			1.24E+02
Bias 1 Statistics				
Average Bias 1	1.26E+02	1.25E+02	1.25E+02	1.19E+02
Std Dev Bias 1	3.80E+00	5.03E+00	4.24E+00	4.07E+00
Ps90%/90% (+KTL) Bias 1	1.34E+02	1.39E+02	1.36E+02	1.30E+02
Ps90%/90% (-KTL) Bias 1	1.18E+02	1.11E+02	1.13E+02	1.07E+02
Bias 2 Statistics				
Average Bias 2	1.25E+02	1.25E+02	1.25E+02	1.26E+02
Std Dev Bias 2	2.86E+00	1.95E+00	2.28E+00	2.77E+00
Ps90%/90% (+KTL) Bias 2	1.31E+02	1.30E+02	1.31E+02	1.34E+02
Ps90%/90% (-KTL) Bias 2	1.19E+02	1.19E+02	1.19E+02	1.19E+02
Un-Biased Statistics				
Average Un-Biased	1.25E+02	1.26E+02	1.26E+02	1.27E+02
Std Dev Un-Biased	2.73E+00	2.86E+00	2.68E+00	2.34E+00
Ps90%/90% (+KTL) Un-Biased	1.31E+02	1.33E+02	1.33E+02	1.33E+02
Ps90%/90% (-KTL) Un-Biased	1.20E+02	1.18E+02	1.18E+02	1.21E+02
Specification MIN	1.15E+02	1.15E+02	1.15E+02	
Status	PASS	PASS	PASS	Info Only

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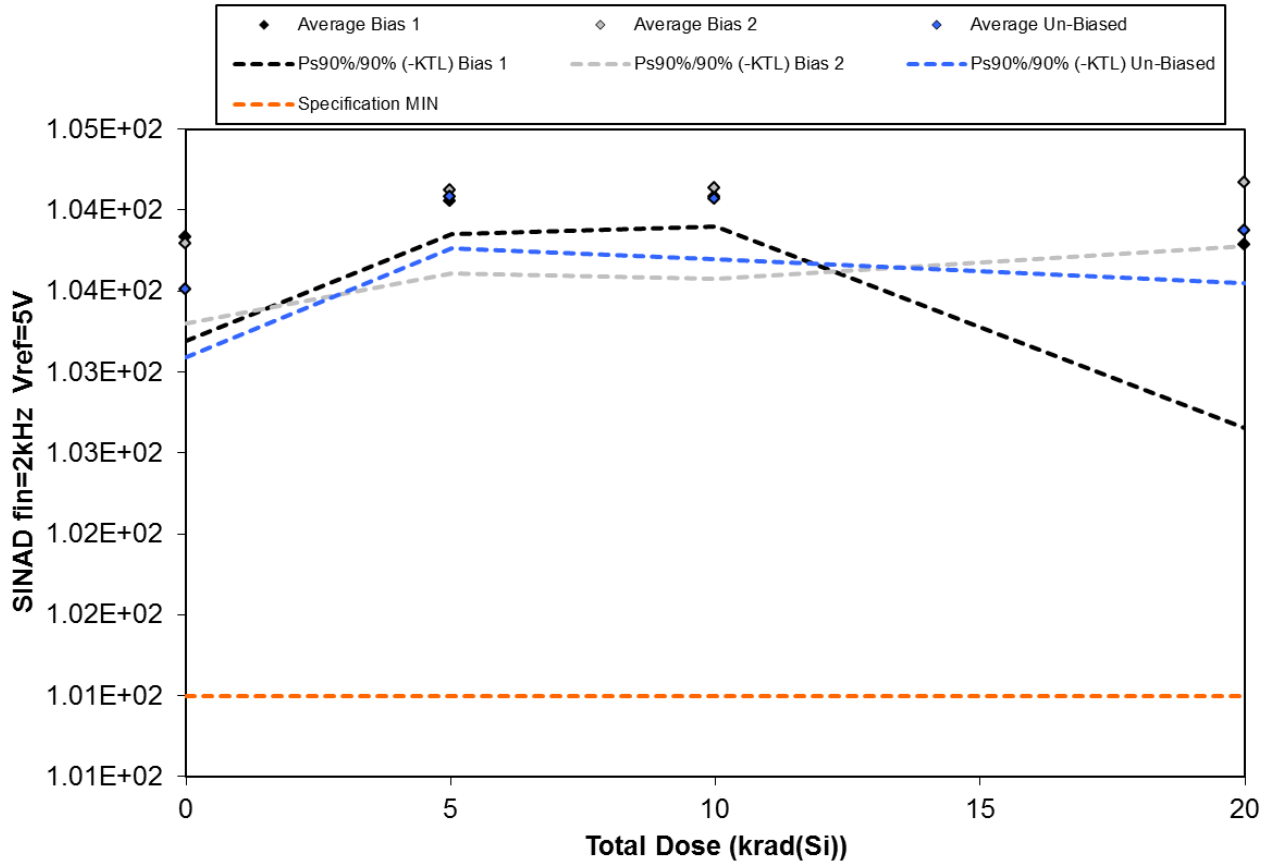


Figure 5.31. Plot of SINAD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.31. Raw data for SINAD fin=2kHz Vref=5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

SINAD fin=2kHz Vref=5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	1.04E+02	1.04E+02	1.04E+02	
2	1.03E+02	1.04E+02	1.04E+02	
3	1.03E+02	1.04E+02	1.04E+02	
4	1.04E+02	1.04E+02	1.04E+02	
5	1.03E+02	1.04E+02	1.04E+02	
420	1.04E+02			1.04E+02
421	1.04E+02			1.04E+02
422	1.04E+02			1.04E+02
423	1.04E+02			1.04E+02
424	1.04E+02			1.03E+02
6	1.03E+02	1.04E+02	1.04E+02	
7	1.03E+02	1.04E+02	1.04E+02	
8	1.04E+02	1.04E+02	1.04E+02	
9	1.04E+02	1.04E+02	1.04E+02	
10	1.04E+02	1.04E+02	1.04E+02	
425	1.04E+02			1.04E+02
426	1.04E+02			1.04E+02
427	1.04E+02			1.04E+02
428	1.04E+02			1.04E+02
194	1.04E+02			1.04E+02
11	1.04E+02	1.04E+02	1.04E+02	
12	1.04E+02	1.04E+02	1.04E+02	
13	1.04E+02	1.04E+02	1.04E+02	
14	1.04E+02	1.04E+02	1.04E+02	
15	1.04E+02	1.04E+02	1.04E+02	
48	1.03E+02			1.04E+02
49	1.03E+02			1.04E+02
50	1.03E+02			1.04E+02
191	1.04E+02			1.04E+02
193	1.04E+02			1.04E+02
Bias 1 Statistics				
Average Bias 1	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Std Dev Bias 1	3.12E-01	7.54E-02	6.87E-02	4.13E-01
Ps90%/90% (+KTL) Bias 1	1.04E+02	1.04E+02	1.04E+02	1.05E+02
Ps90%/90% (-KTL) Bias 1	1.03E+02	1.04E+02	1.04E+02	1.03E+02
Bias 2 Statistics				
Average Bias 2	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Std Dev Bias 2	2.41E-01	1.87E-01	2.04E-01	1.44E-01
Ps90%/90% (+KTL) Bias 2	1.04E+02	1.05E+02	1.05E+02	1.05E+02
Ps90%/90% (-KTL) Bias 2	1.03E+02	1.04E+02	1.04E+02	1.04E+02
Un-Biased Statistics				
Average Un-Biased	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Std Dev Un-Biased	2.02E-01	1.18E-01	1.37E-01	1.17E-01
Ps90%/90% (+KTL) Un-Biased	1.04E+02	1.04E+02	1.04E+02	1.04E+02
Ps90%/90% (-KTL) Un-Biased	1.03E+02	1.04E+02	1.04E+02	1.04E+02
Specification MIN	1.01E+02	1.01E+02	1.01E+02	
Status	PASS	PASS	PASS	Info Only

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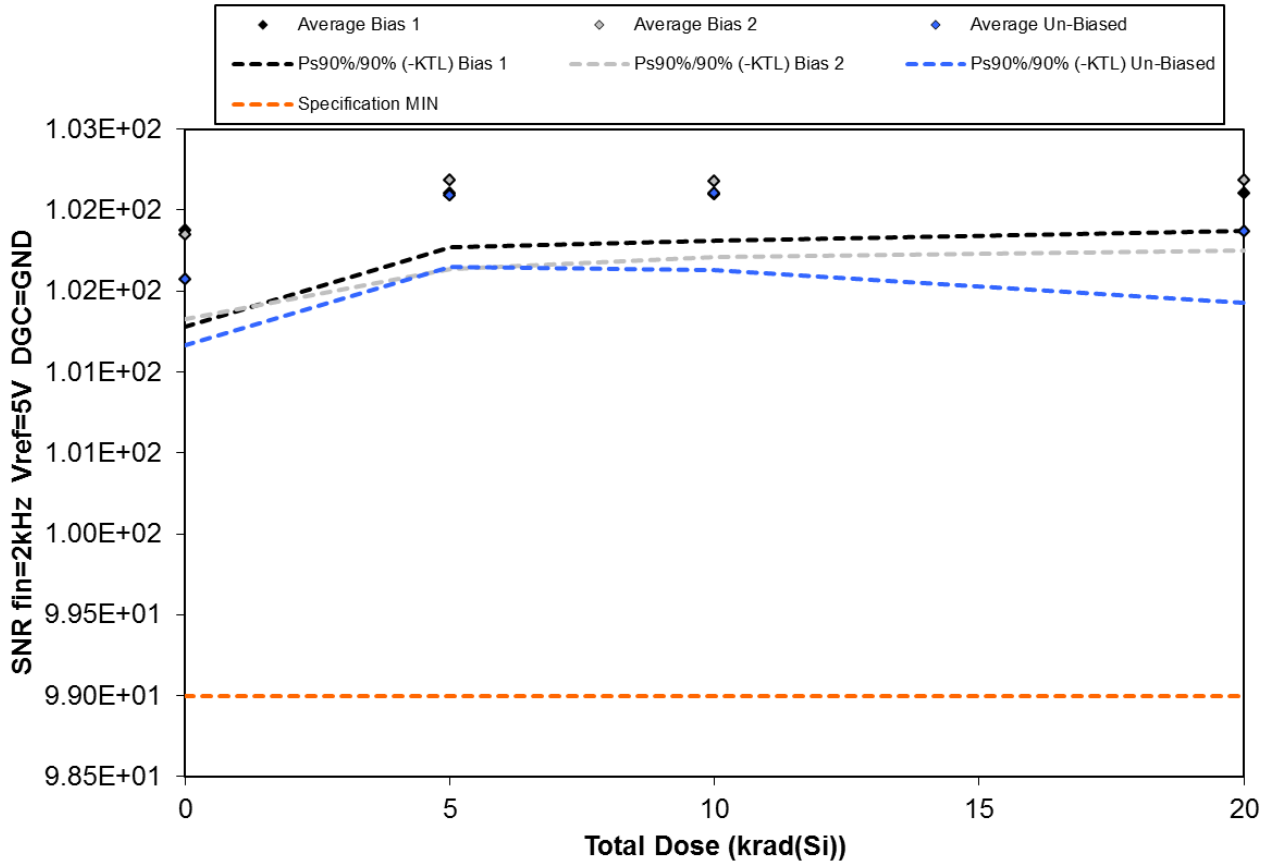


Figure 5.32. Plot of SNR fin=2kHz Vref=5V DGC=GND versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.32. Raw data for SNR fin=2kHz Vref=5V DGC=GND versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

SNR fin=2kHz Vref=5V DGC=GND	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	1.02E+02	1.02E+02	1.02E+02	
2	1.02E+02	1.02E+02	1.02E+02	
3	1.01E+02	1.02E+02	1.02E+02	
4	1.02E+02	1.02E+02	1.02E+02	
5	1.02E+02	1.02E+02	1.02E+02	
420	1.02E+02			1.02E+02
421	1.02E+02			1.02E+02
422	1.02E+02			1.02E+02
423	1.02E+02			1.02E+02
424	1.02E+02			1.02E+02
6	1.02E+02	1.02E+02	1.02E+02	
7	1.02E+02	1.02E+02	1.02E+02	
8	1.02E+02	1.02E+02	1.02E+02	
9	1.02E+02	1.02E+02	1.02E+02	
10	1.02E+02	1.02E+02	1.02E+02	
425	1.02E+02			1.02E+02
426	1.02E+02			1.02E+02
427	1.02E+02			1.02E+02
428	1.02E+02			1.02E+02
194	1.01E+02			1.02E+02
11	1.02E+02	1.02E+02	1.02E+02	
12	1.02E+02	1.02E+02	1.02E+02	
13	1.02E+02	1.02E+02	1.02E+02	
14	1.02E+02	1.02E+02	1.02E+02	
15	1.02E+02	1.02E+02	1.02E+02	
48	1.01E+02			1.02E+02
49	1.02E+02			1.02E+02
50	1.01E+02			1.02E+02
191	1.02E+02			1.02E+02
193	1.02E+02			1.02E+02
Bias 1 Statistics				
Average Bias 1	1.02E+02	1.02E+02	1.02E+02	1.02E+02
Std Dev Bias 1	2.86E-01	1.22E-01	1.06E-01	8.37E-02
Ps90%/90% (+KTL) Bias 1	1.02E+02	1.02E+02	1.02E+02	1.02E+02
Ps90%/90% (-KTL) Bias 1	1.01E+02	1.02E+02	1.02E+02	1.02E+02
Bias 2 Statistics				
Average Bias 2	1.02E+02	1.02E+02	1.02E+02	1.02E+02
Std Dev Bias 2	2.53E-01	1.99E-01	1.71E-01	1.56E-01
Ps90%/90% (+KTL) Bias 2	1.02E+02	1.03E+02	1.03E+02	1.03E+02
Ps90%/90% (-KTL) Bias 2	1.01E+02	1.02E+02	1.02E+02	1.02E+02
Un-Biased Statistics				
Average Un-Biased	1.02E+02	1.02E+02	1.02E+02	1.02E+02
Std Dev Un-Biased	1.99E-01	1.61E-01	1.73E-01	1.59E-01
Ps90%/90% (+KTL) Un-Biased	1.02E+02	1.03E+02	1.03E+02	1.02E+02
Ps90%/90% (-KTL) Un-Biased	1.01E+02	1.02E+02	1.02E+02	1.01E+02
Specification MIN	9.90E+01	9.90E+01	9.90E+01	
Status	PASS	PASS	PASS	Info Only

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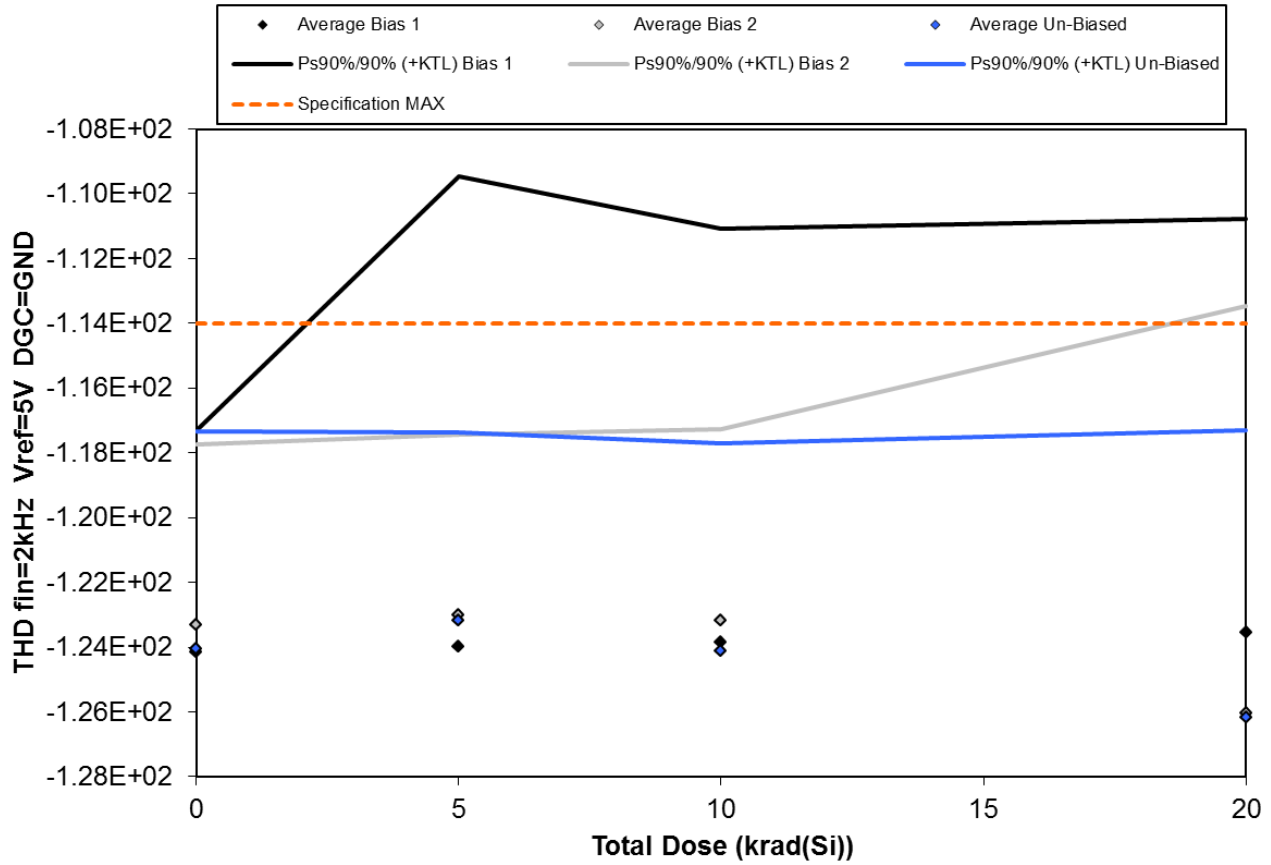


Figure 5.33. Plot of THD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ $DGC=GND$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.33. Raw data for THD fin=2kHz Vref=5V DGC=GND versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

THD fin=2kHz Vref=5V DGC=GND	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-1.20E+02	-1.23E+02	-1.22E+02	
2	-1.22E+02	-1.33E+02	-1.21E+02	
3	-1.29E+02	-1.21E+02	-1.32E+02	
4	-1.20E+02	-1.21E+02	-1.21E+02	
5	-1.22E+02	-1.22E+02	-1.22E+02	
420	-1.25E+02			-1.24E+02
421	-1.25E+02			-1.28E+02
422	-1.27E+02			-1.25E+02
423	-1.28E+02			-1.25E+02
424	-1.22E+02			-1.16E+02
6	-1.22E+02	-1.21E+02	-1.21E+02	
7	-1.21E+02	-1.25E+02	-1.22E+02	
8	-1.23E+02	-1.21E+02	-1.25E+02	
9	-1.22E+02	-1.23E+02	-1.23E+02	
10	-1.25E+02	-1.25E+02	-1.26E+02	
425	-1.21E+02			-1.29E+02
426	-1.29E+02			-1.25E+02
427	-1.23E+02			-1.31E+02
428	-1.21E+02			-1.19E+02
194	-1.25E+02			-1.27E+02
11	-1.20E+02	-1.22E+02	-1.23E+02	
12	-1.22E+02	-1.21E+02	-1.22E+02	
13	-1.22E+02	-1.23E+02	-1.23E+02	
14	-1.23E+02	-1.24E+02	-1.26E+02	
15	-1.28E+02	-1.27E+02	-1.27E+02	
48	-1.23E+02			-1.25E+02
49	-1.27E+02			-1.29E+02
50	-1.25E+02			-1.25E+02
191	-1.30E+02			-1.30E+02
193	-1.22E+02			-1.22E+02
Bias 1 Statistics				
Average Bias 1	-1.24E+02	-1.24E+02	-1.24E+02	-1.24E+02
Std Dev Bias 1	3.30E+00	5.29E+00	4.65E+00	4.65E+00
Ps90%/90% (+KTL) Bias 1	-1.17E+02	-1.09E+02	-1.11E+02	-1.11E+02
Ps90%/90% (-KTL) Bias 1	-1.31E+02	-1.38E+02	-1.37E+02	-1.36E+02
Bias 2 Statistics				
Average Bias 2	-1.23E+02	-1.23E+02	-1.23E+02	-1.26E+02
Std Dev Bias 2	2.70E+00	2.03E+00	2.15E+00	4.59E+00
Ps90%/90% (+KTL) Bias 2	-1.18E+02	-1.17E+02	-1.17E+02	-1.13E+02
Ps90%/90% (-KTL) Bias 2	-1.29E+02	-1.29E+02	-1.29E+02	-1.39E+02
Un-Biased Statistics				
Average Un-Biased	-1.24E+02	-1.23E+02	-1.24E+02	-1.26E+02
Std Dev Un-Biased	3.25E+00	2.12E+00	2.34E+00	3.24E+00
Ps90%/90% (+KTL) Un-Biased	-1.17E+02	-1.17E+02	-1.18E+02	-1.17E+02
Ps90%/90% (-KTL) Un-Biased	-1.31E+02	-1.29E+02	-1.31E+02	-1.35E+02
Specification MAX	-1.14E+02	-1.14E+02	-1.14E+02	
Status	PASS	PASS	PASS	Info Only

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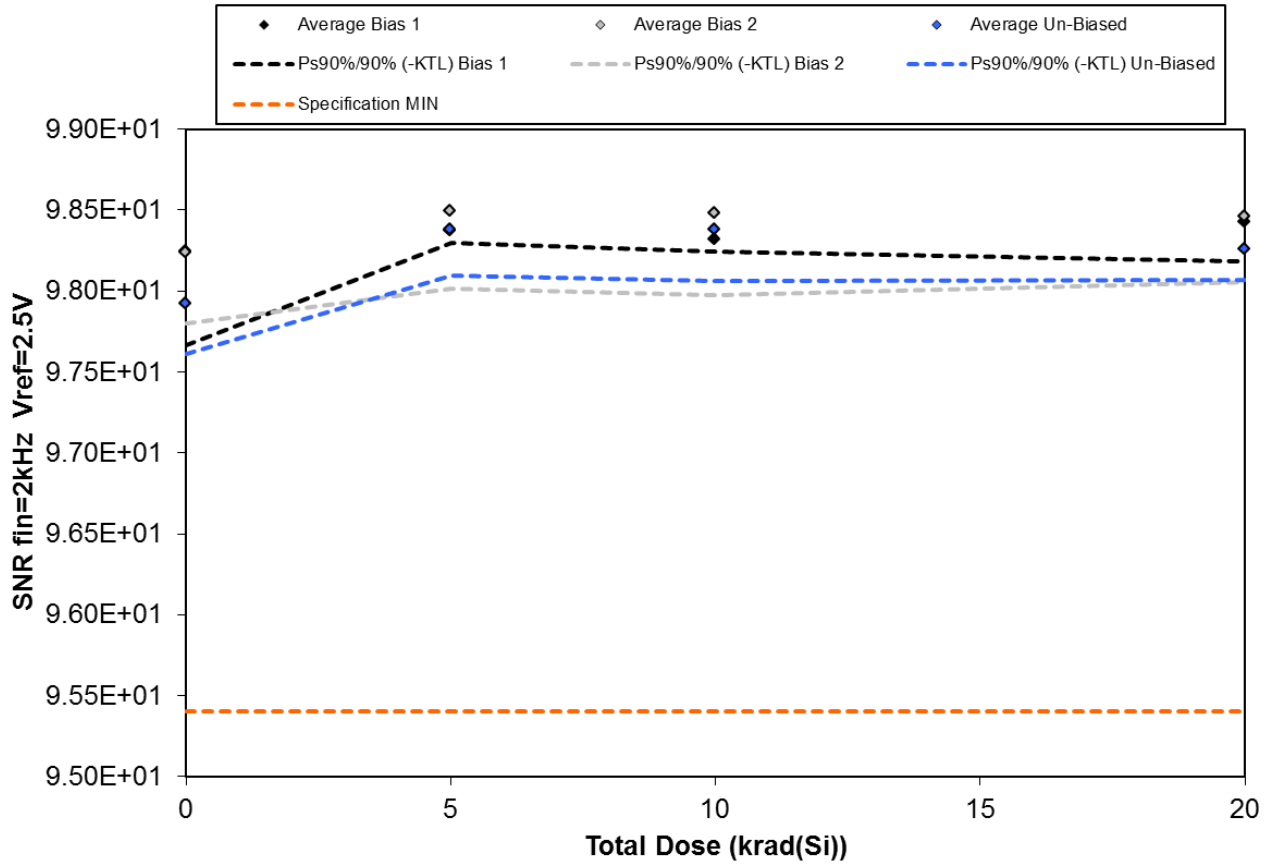


Figure 5.34. Plot of SNR $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.34. Raw data for SNR $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$ versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

SNR $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$ Device	Total Dose (krad(Si))			
	0	5	10	20
1	9.80E+01	9.84E+01	9.83E+01	
2	9.80E+01	9.84E+01	9.83E+01	
3	9.78E+01	9.84E+01	9.84E+01	
4	9.82E+01	9.84E+01	9.83E+01	
5	9.80E+01	9.83E+01	9.83E+01	
420	9.84E+01			9.83E+01
421	9.85E+01			9.84E+01
422	9.86E+01			9.84E+01
423	9.85E+01			9.85E+01
424	9.84E+01			9.85E+01
6	9.80E+01	9.83E+01	9.83E+01	
7	9.80E+01	9.86E+01	9.83E+01	
8	9.82E+01	9.83E+01	9.86E+01	
9	9.81E+01	9.87E+01	9.87E+01	
10	9.82E+01	9.86E+01	9.86E+01	
425	9.83E+01			9.85E+01
426	9.86E+01			9.87E+01
427	9.85E+01			9.85E+01
428	9.85E+01			9.83E+01
194	9.80E+01			9.83E+01
11	9.79E+01	9.83E+01	9.84E+01	
12	9.82E+01	9.85E+01	9.86E+01	
13	9.79E+01	9.84E+01	9.83E+01	
14	9.78E+01	9.83E+01	9.83E+01	
15	9.80E+01	9.83E+01	9.84E+01	
48	9.77E+01			9.82E+01
49	9.78E+01			9.83E+01
50	9.78E+01			9.82E+01
191	9.80E+01			9.83E+01
193	9.80E+01			9.83E+01
Bias 1 Statistics				
Average Bias 1	9.82E+01	9.84E+01	9.83E+01	9.84E+01
Std Dev Bias 1	2.82E-01	2.72E-02	2.96E-02	8.84E-02
Ps90%/90% (+KTL) Bias 1	9.88E+01	9.84E+01	9.84E+01	9.87E+01
Ps90%/90% (-KTL) Bias 1	9.77E+01	9.83E+01	9.82E+01	9.82E+01
Bias 2 Statistics				
Average Bias 2	9.82E+01	9.85E+01	9.85E+01	9.85E+01
Std Dev Bias 2	2.13E-01	1.74E-01	1.87E-01	1.48E-01
Ps90%/90% (+KTL) Bias 2	9.87E+01	9.90E+01	9.90E+01	9.89E+01
Ps90%/90% (-KTL) Bias 2	9.78E+01	9.80E+01	9.80E+01	9.81E+01
Un-Biased Statistics				
Average Un-Biased	9.79E+01	9.84E+01	9.84E+01	9.83E+01
Std Dev Un-Biased	1.52E-01	1.04E-01	1.16E-01	7.01E-02
Ps90%/90% (+KTL) Un-Biased	9.82E+01	9.87E+01	9.87E+01	9.85E+01
Ps90%/90% (-KTL) Un-Biased	9.76E+01	9.81E+01	9.81E+01	9.81E+01
Specification MIN	9.54E+01	9.54E+01	9.54E+01	
Status	PASS	PASS	PASS	Info Only

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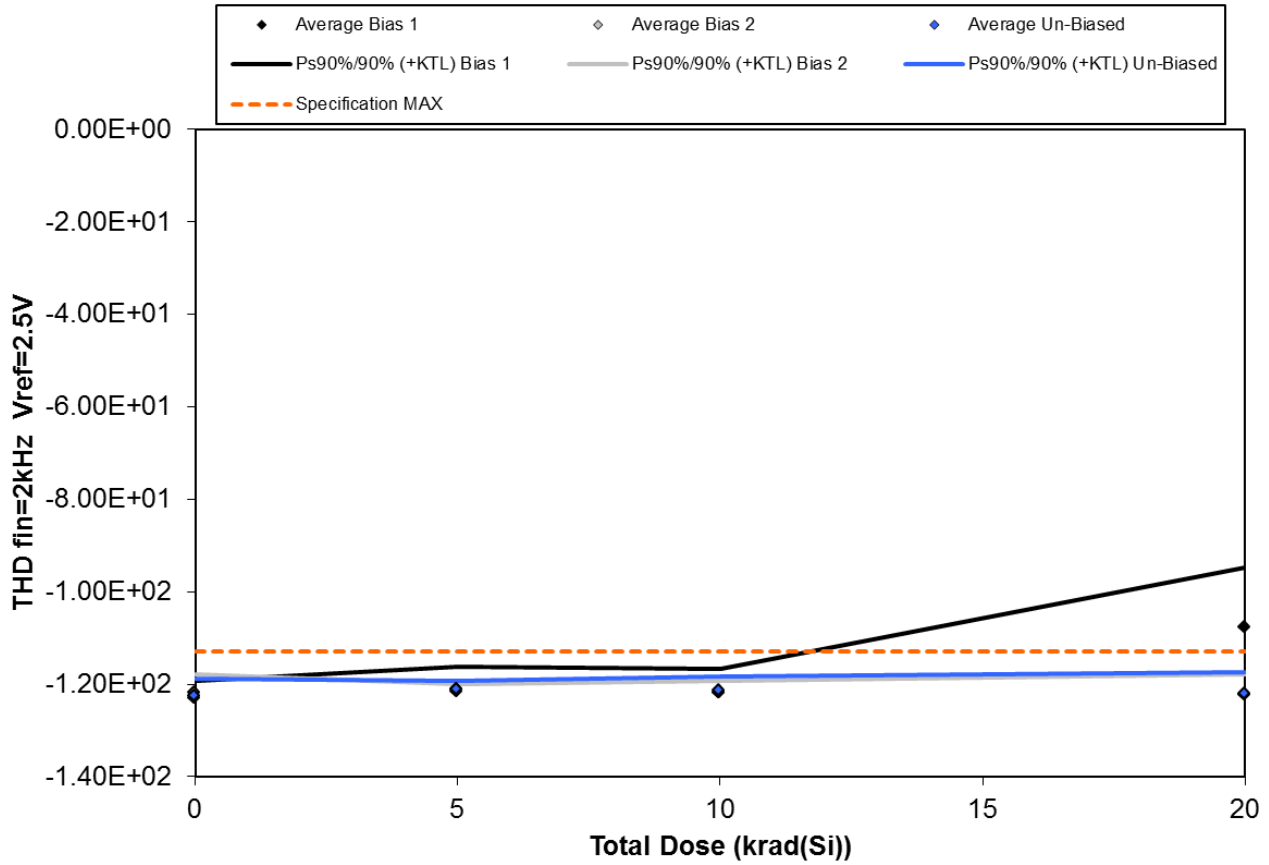


Figure 5.35. Plot of THD $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$ versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.35. Raw data for THD fin=2kHz Vref=2.5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

THD fin=2kHz Vref=2.5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	-1.23E+02	-1.23E+02	-1.22E+02	
2	-1.21E+02	-1.24E+02	-1.20E+02	
3	-1.26E+02	-1.20E+02	-1.25E+02	
4	-1.22E+02	-1.20E+02	-1.21E+02	
5	-1.22E+02	-1.21E+02	-1.21E+02	
420	-1.23E+02			-1.13E+02
421	-1.24E+02			-1.11E+02
422	-1.25E+02			-1.07E+02
423	-1.24E+02			-1.06E+02
424	-1.21E+02			-1.01E+02
6	-1.21E+02	-1.22E+02	-1.22E+02	
7	-1.22E+02	-1.21E+02	-1.20E+02	
8	-1.22E+02	-1.21E+02	-1.22E+02	
9	-1.22E+02	-1.21E+02	-1.22E+02	
10	-1.22E+02	-1.21E+02	-1.22E+02	
425	-1.20E+02			-1.23E+02
426	-1.26E+02			-1.22E+02
427	-1.21E+02			-1.25E+02
428	-1.21E+02			-1.22E+02
194	-1.19E+02			-1.20E+02
11	-1.21E+02	-1.21E+02	-1.20E+02	
12	-1.21E+02	-1.20E+02	-1.21E+02	
13	-1.20E+02	-1.21E+02	-1.21E+02	
14	-1.24E+02	-1.22E+02	-1.21E+02	
15	-1.23E+02	-1.22E+02	-1.23E+02	
48	-1.22E+02			-1.21E+02
49	-1.23E+02			-1.25E+02
50	-1.23E+02			-1.22E+02
191	-1.27E+02			-1.22E+02
193	-1.22E+02			-1.21E+02
Bias 1 Statistics				
Average Bias 1	-1.23E+02	-1.21E+02	-1.22E+02	-1.08E+02
Std Dev Bias 1	1.76E+00	1.96E+00	1.88E+00	4.67E+00
Ps90%/90% (+KTL) Bias 1	-1.19E+02	-1.16E+02	-1.17E+02	-9.47E+01
Ps90%/90% (-KTL) Bias 1	-1.26E+02	-1.27E+02	-1.27E+02	-1.20E+02
Bias 2 Statistics				
Average Bias 2	-1.22E+02	-1.21E+02	-1.22E+02	-1.22E+02
Std Dev Bias 2	1.88E+00	4.32E-01	8.53E-01	1.61E+00
Ps90%/90% (+KTL) Bias 2	-1.18E+02	-1.20E+02	-1.19E+02	-1.18E+02
Ps90%/90% (-KTL) Bias 2	-1.26E+02	-1.22E+02	-1.24E+02	-1.27E+02
Un-Biased Statistics				
Average Un-Biased	-1.23E+02	-1.21E+02	-1.21E+02	-1.22E+02
Std Dev Un-Biased	1.84E+00	6.79E-01	1.04E+00	1.75E+00
Ps90%/90% (+KTL) Un-Biased	-1.19E+02	-1.19E+02	-1.18E+02	-1.17E+02
Ps90%/90% (-KTL) Un-Biased	-1.26E+02	-1.23E+02	-1.24E+02	-1.27E+02
Specification MAX	-1.13E+02	-1.13E+02	-1.13E+02	
Status	PASS	PASS	PASS	Info Only

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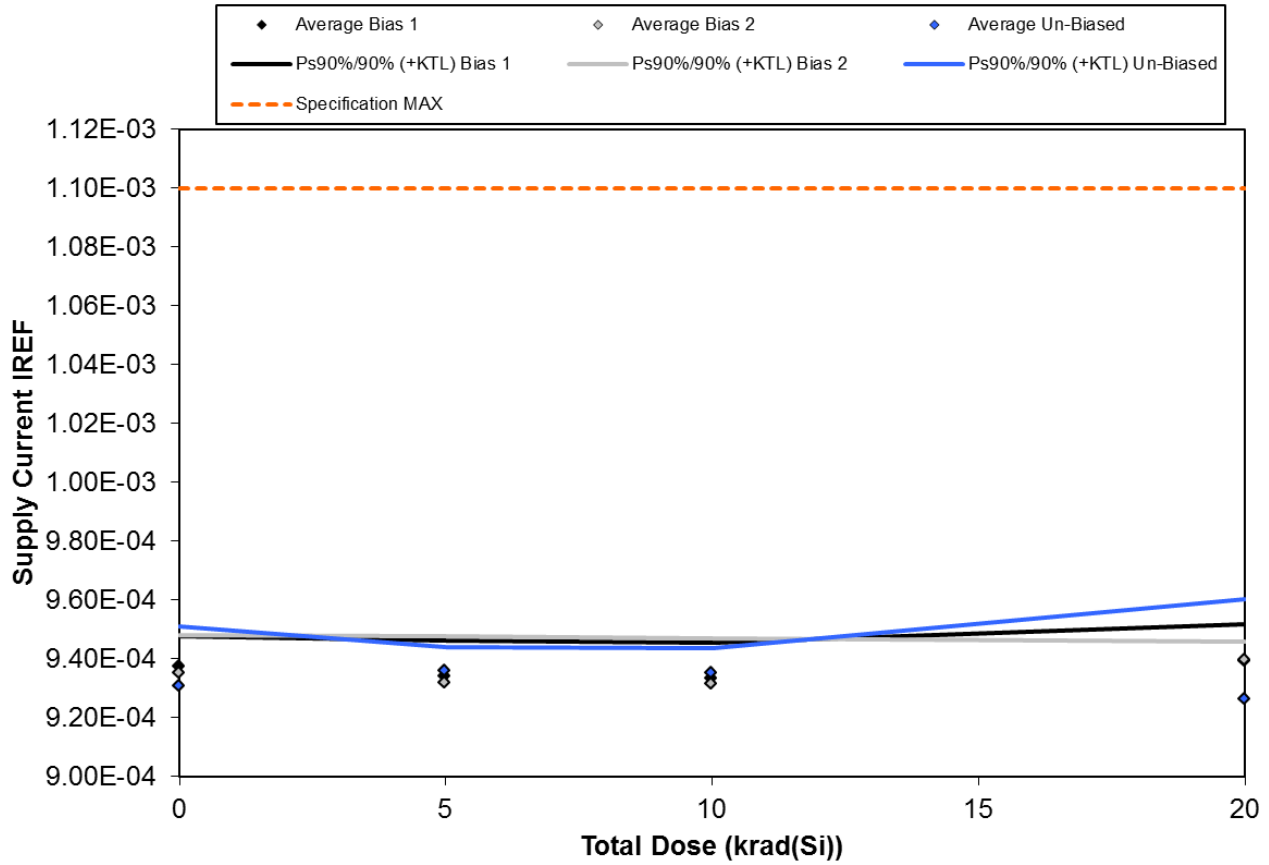


Figure 5.36. Plot of Supply Current IREF versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.36. Raw data for Supply Current IREF versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Supply Current IREF Device	Total Dose (krad(Si))			
	0	5	10	20
1	9.36E-04	9.37E-04	9.36E-04	
2	9.30E-04	9.36E-04	9.30E-04	
3	9.36E-04	9.31E-04	9.36E-04	
4	9.38E-04	9.39E-04	9.38E-04	
5	9.28E-04	9.28E-04	9.28E-04	
420	9.42E-04			9.36E-04
421	9.40E-04			9.37E-04
422	9.43E-04			9.47E-04
423	9.40E-04			9.41E-04
424	9.41E-04			9.36E-04
6	9.28E-04	9.29E-04	9.29E-04	
7	9.31E-04	9.26E-04	9.31E-04	
8	9.25E-04	9.32E-04	9.25E-04	
9	9.34E-04	9.34E-04	9.34E-04	
10	9.40E-04	9.41E-04	9.40E-04	
425	9.36E-04			9.40E-04
426	9.39E-04			9.43E-04
427	9.37E-04			9.39E-04
428	9.47E-04			9.40E-04
194	9.37E-04			9.37E-04
11	9.32E-04	9.33E-04	9.32E-04	
12	9.39E-04	9.40E-04	9.39E-04	
13	9.34E-04	9.35E-04	9.34E-04	
14	9.34E-04	9.35E-04	9.34E-04	
15	9.38E-04	9.39E-04	9.38E-04	
48	9.24E-04			9.24E-04
49	9.14E-04			9.15E-04
50	9.14E-04			9.15E-04
191	9.41E-04			9.41E-04
193	9.37E-04			9.37E-04
Bias 1 Statistics				
Average Bias 1	9.37E-04	9.34E-04	9.34E-04	9.40E-04
Std Dev Bias 1	5.09E-06	4.46E-06	4.30E-06	4.49E-06
Ps90%/90% (+KTL) Bias 1	9.48E-04	9.46E-04	9.45E-04	9.52E-04
Ps90%/90% (-KTL) Bias 1	9.27E-04	9.22E-04	9.22E-04	9.27E-04
Bias 2 Statistics				
Average Bias 2	9.35E-04	9.32E-04	9.32E-04	9.40E-04
Std Dev Bias 2	6.26E-06	5.65E-06	5.64E-06	2.24E-06
Ps90%/90% (+KTL) Bias 2	9.48E-04	9.48E-04	9.47E-04	9.46E-04
Ps90%/90% (-KTL) Bias 2	9.22E-04	9.17E-04	9.16E-04	9.34E-04
Un-Biased Statistics				
Average Un-Biased	9.31E-04	9.36E-04	9.35E-04	9.26E-04
Std Dev Un-Biased	9.85E-06	2.81E-06	3.00E-06	1.23E-05
Ps90%/90% (+KTL) Un-Biased	9.51E-04	9.44E-04	9.44E-04	9.60E-04
Ps90%/90% (-KTL) Un-Biased	9.10E-04	9.29E-04	9.27E-04	8.93E-04
Specification MAX	1.10E-03	1.10E-03	1.10E-03	
Status	PASS	PASS	PASS	Info Only

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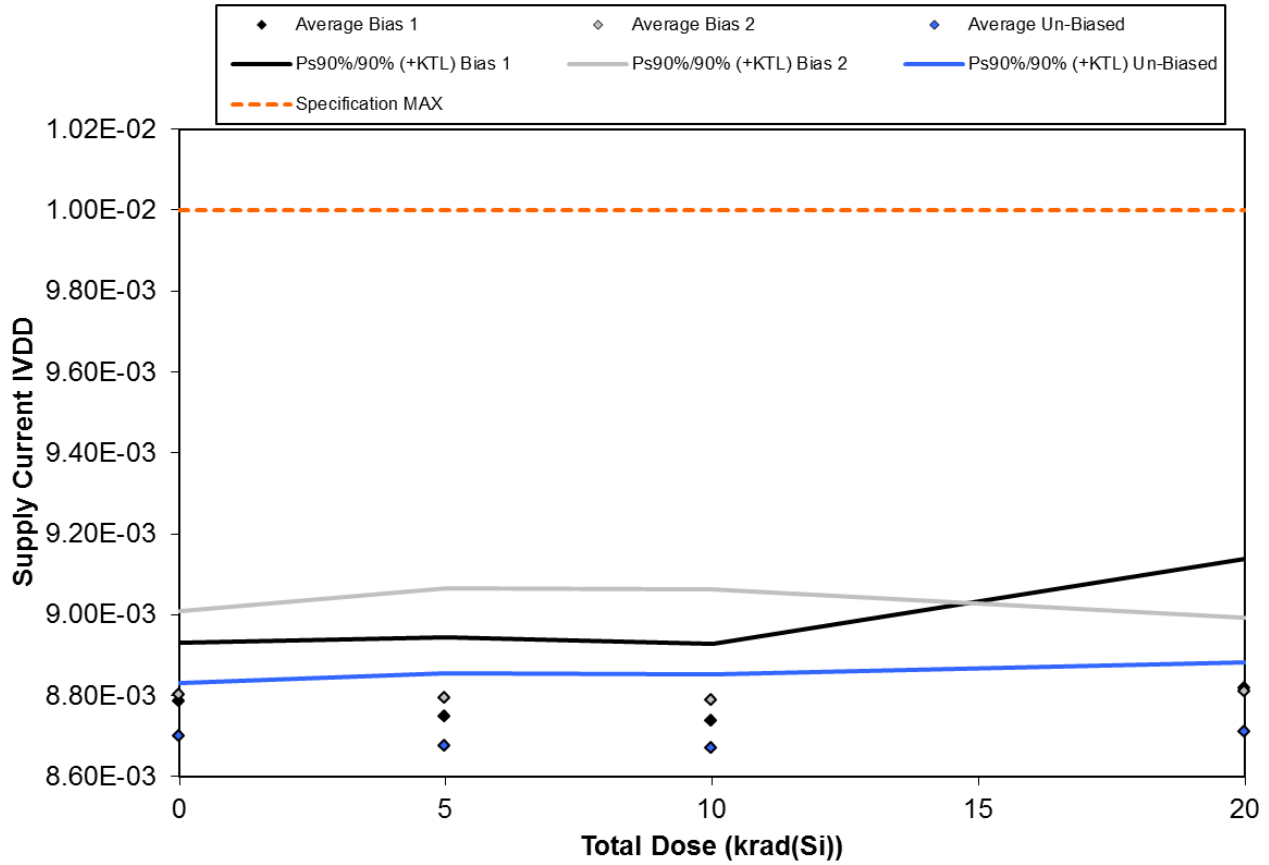


Figure 5.37. Plot of Supply Current IVDD versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.37. Raw data for Supply Current IVDD versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Supply Current IVDD	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	8.85E-03	8.85E-03	8.84E-03	
2	8.65E-03	8.75E-03	8.65E-03	
3	8.75E-03	8.65E-03	8.74E-03	
4	8.75E-03	8.75E-03	8.73E-03	
5	8.75E-03	8.75E-03	8.74E-03	
420	8.79E-03			8.63E-03
421	8.75E-03			8.79E-03
422	8.87E-03			8.86E-03
423	8.89E-03			8.87E-03
424	8.81E-03			8.93E-03
6	8.82E-03	8.82E-03	8.82E-03	
7	8.62E-03	8.86E-03	8.62E-03	
8	8.86E-03	8.62E-03	8.85E-03	
9	8.88E-03	8.87E-03	8.87E-03	
10	8.80E-03	8.80E-03	8.79E-03	
425	8.65E-03			8.74E-03
426	8.94E-03			8.86E-03
427	8.79E-03			8.90E-03
428	8.88E-03			8.80E-03
194	8.78E-03			8.76E-03
11	8.63E-03	8.62E-03	8.61E-03	
12	8.79E-03	8.78E-03	8.78E-03	
13	8.68E-03	8.68E-03	8.67E-03	
14	8.64E-03	8.64E-03	8.62E-03	
15	8.68E-03	8.67E-03	8.66E-03	
48	8.69E-03			8.69E-03
49	8.74E-03			8.72E-03
50	8.65E-03			8.64E-03
191	8.69E-03			8.69E-03
193	8.82E-03			8.81E-03
Bias 1 Statistics				
Average Bias 1	8.79E-03	8.75E-03	8.74E-03	8.82E-03
Std Dev Bias 1	7.05E-05	7.12E-05	6.86E-05	1.17E-04
Ps90%/90% (+KTL) Bias 1	8.93E-03	8.95E-03	8.93E-03	9.14E-03
Ps90%/90% (-KTL) Bias 1	8.64E-03	8.56E-03	8.55E-03	8.50E-03
Bias 2 Statistics				
Average Bias 2	8.80E-03	8.79E-03	8.79E-03	8.81E-03
Std Dev Bias 2	1.01E-04	9.92E-05	9.93E-05	6.55E-05
Ps90%/90% (+KTL) Bias 2	9.01E-03	9.07E-03	9.06E-03	8.99E-03
Ps90%/90% (-KTL) Bias 2	8.59E-03	8.52E-03	8.52E-03	8.63E-03
Un-Biased Statistics				
Average Un-Biased	8.70E-03	8.68E-03	8.67E-03	8.71E-03
Std Dev Un-Biased	6.36E-05	6.45E-05	6.65E-05	6.25E-05
Ps90%/90% (+KTL) Un-Biased	8.83E-03	8.85E-03	8.85E-03	8.88E-03
Ps90%/90% (-KTL) Un-Biased	8.57E-03	8.50E-03	8.49E-03	8.54E-03
Specification MAX	1.00E-02	1.00E-02	1.00E-02	
Status	PASS	PASS	PASS	Info Only

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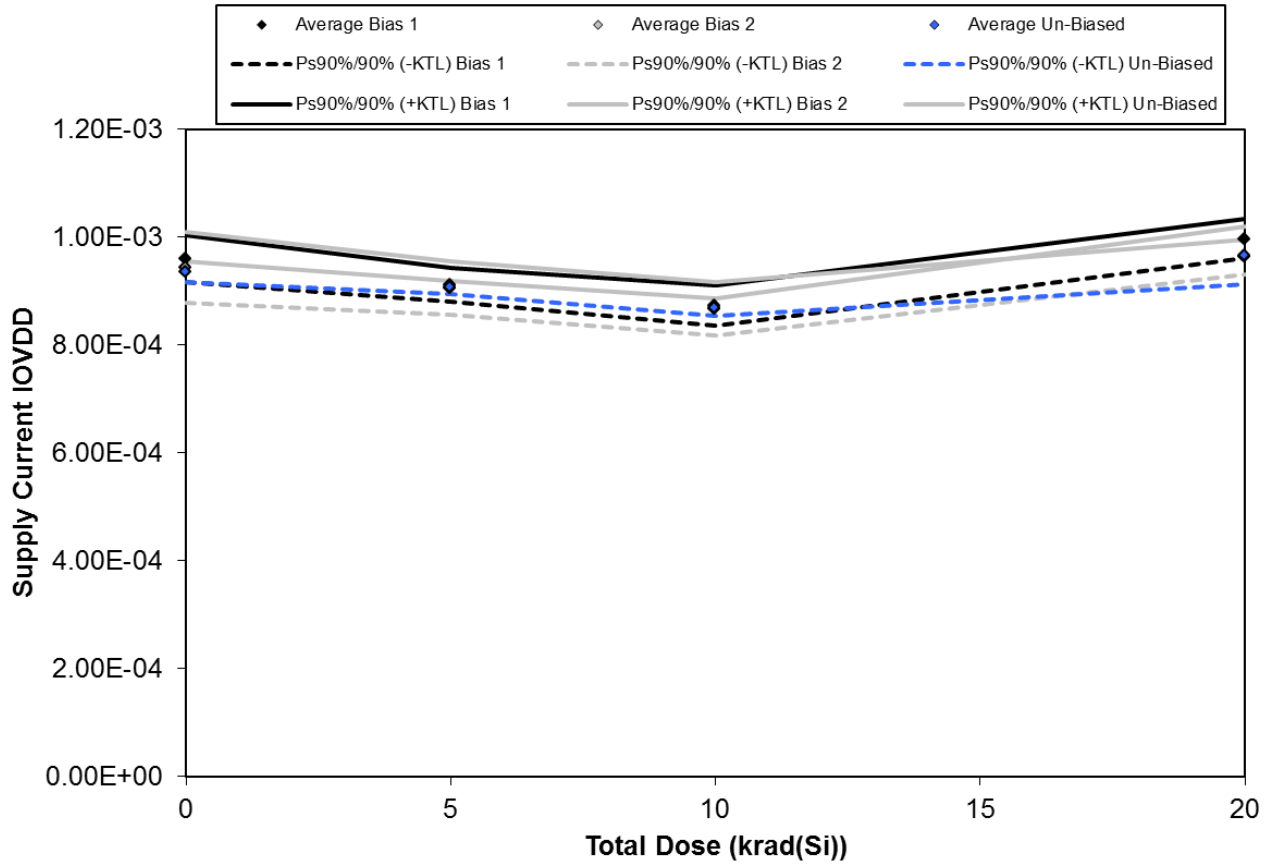


Figure 5.38. Plot of Supply Current IOVDD versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.38. Raw data for Supply Current IOVDD versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Supply Current IOVDD	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	9.33E-04	9.26E-04	8.90E-04	
2	9.54E-04	8.97E-04	8.81E-04	
3	9.39E-04	9.12E-04	8.53E-04	
4	9.50E-04	9.17E-04	8.71E-04	
5	9.36E-04	9.05E-04	8.70E-04	
420	9.91E-04			1.00E-03
421	9.72E-04			9.86E-04
422	9.58E-04			9.92E-04
423	9.80E-04			9.87E-04
424	9.86E-04			1.02E-03
6	9.30E-04	9.27E-04	8.93E-04	
7	9.45E-04	9.03E-04	8.75E-04	
8	9.10E-04	9.17E-04	8.60E-04	
9	9.02E-04	8.80E-04	8.45E-04	
10	9.15E-04	9.00E-04	8.63E-04	
425	9.83E-04			9.47E-04
426	9.68E-04			9.61E-04
427	9.79E-04			9.58E-04
428	9.79E-04			9.78E-04
194	9.25E-04			9.71E-04
11	9.43E-04	9.06E-04	8.75E-04	
12	9.26E-04	9.00E-04	8.63E-04	
13	9.34E-04	9.10E-04	8.66E-04	
14	9.28E-04	9.10E-04	8.76E-04	
15	9.24E-04	9.09E-04	8.67E-04	
48	9.41E-04			9.81E-04
49	9.39E-04			9.62E-04
50	9.53E-04			9.82E-04
191	9.26E-04			9.73E-04
193	9.41E-04			9.35E-04
Bias 1 Statistics				
Average Bias 1	9.60E-04	9.11E-04	8.73E-04	9.97E-04
Std Dev Bias 1	2.13E-05	1.14E-05	1.37E-05	1.32E-05
Ps90%/90% (+KTL) Bias 1	1.00E-03	9.42E-04	9.10E-04	1.03E-03
Ps90%/90% (-KTL) Bias 1	9.16E-04	8.80E-04	8.36E-04	9.61E-04
Bias 2 Statistics				
Average Bias 2	9.44E-04	9.06E-04	8.67E-04	9.63E-04
Std Dev Bias 2	3.14E-05	1.79E-05	1.81E-05	1.20E-05
Ps90%/90% (+KTL) Bias 2	1.01E-03	9.55E-04	9.17E-04	9.96E-04
Ps90%/90% (-KTL) Bias 2	8.79E-04	8.57E-04	8.18E-04	9.30E-04
Un-Biased Statistics				
Average Un-Biased	9.36E-04	9.07E-04	8.69E-04	9.67E-04
Std Dev Un-Biased	9.34E-06	4.27E-06	5.96E-06	1.95E-05
Ps90%/90% (+KTL) Un-Biased	9.55E-04	9.19E-04	8.86E-04	1.02E-03
Ps90%/90% (-KTL) Un-Biased	9.16E-04	8.95E-04	8.53E-04	9.13E-04

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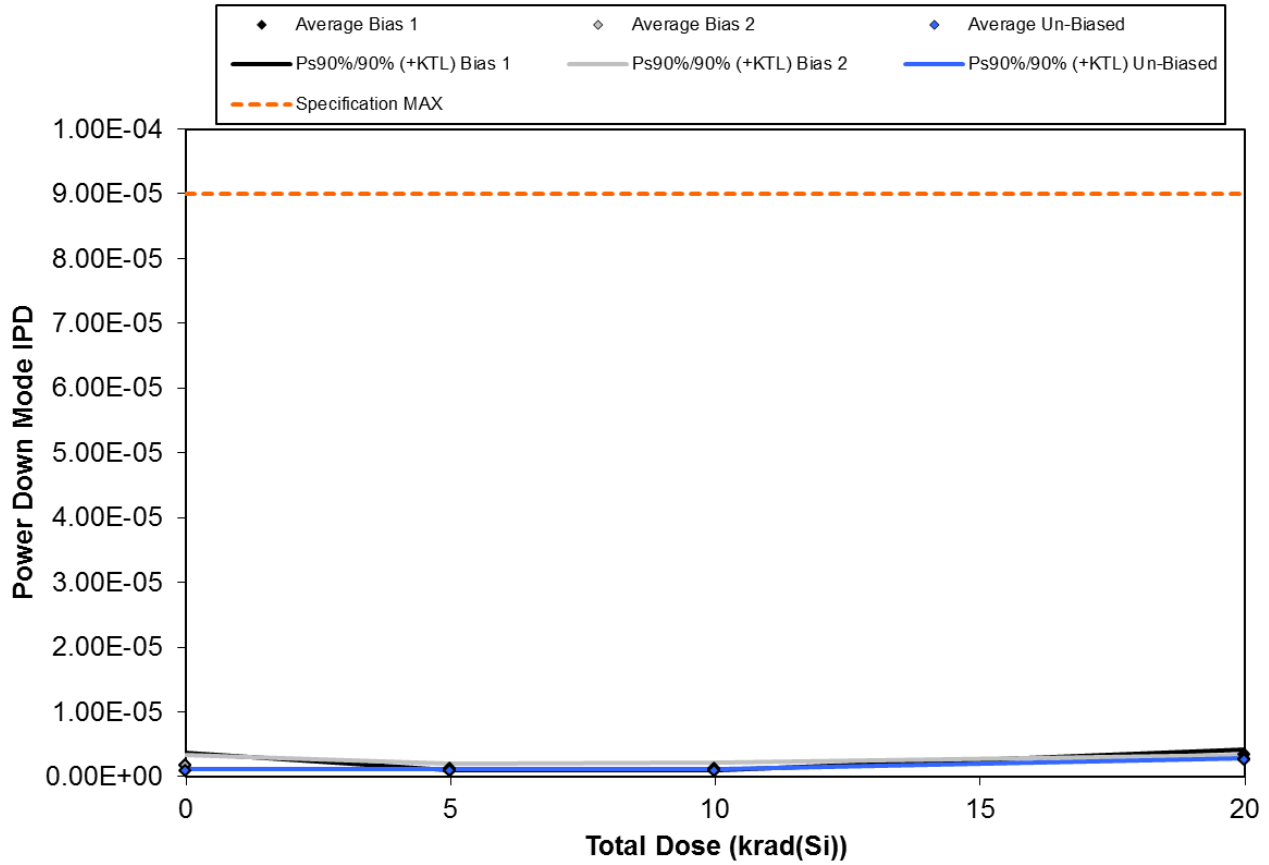


Figure 5.39. Plot of Power Down Mode IPD versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.39. Raw data for Power Down Mode IPD versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Power Down Mode IPD Device	Total Dose (krad(Si))			
	0	5	10	20
1	8.61E-07	8.89E-07	8.70E-07	
2	9.22E-07	9.76E-07	9.10E-07	
3	9.65E-07	8.95E-07	8.54E-07	
4	9.99E-07	8.92E-07	9.26E-07	
5	9.29E-07	9.46E-07	9.07E-07	
420	2.52E-06			3.26E-06
421	2.47E-06			3.36E-06
422	2.89E-06			3.50E-06
423	2.65E-06			3.44E-06
424	2.55E-06			3.87E-06
6	9.47E-07	9.45E-07	9.03E-07	
7	8.90E-07	1.29E-06	8.85E-07	
8	1.22E-06	9.29E-07	1.25E-06	
9	1.71E-06	1.68E-06	1.78E-06	
10	1.19E-06	1.14E-06	1.26E-06	
425	2.51E-06			2.59E-06
426	2.65E-06			3.05E-06
427	2.53E-06			2.87E-06
428	2.68E-06			2.67E-06
194	8.96E-07			2.57E-06
11	8.47E-07	9.07E-07	9.09E-07	
12	1.04E-06	1.10E-06	1.11E-06	
13	9.87E-07	9.51E-07	9.47E-07	
14	9.28E-07	8.53E-07	8.61E-07	
15	8.56E-07	8.86E-07	9.11E-07	
48	8.59E-07			2.47E-06
49	1.05E-06			2.64E-06
50	1.02E-06			2.65E-06
191	8.20E-07			2.50E-06
193	8.92E-07			2.67E-06
Bias 1 Statistics				
Average Bias 1	1.78E-06	9.20E-07	8.93E-07	3.49E-06
Std Dev Bias 1	8.94E-07	3.94E-08	3.01E-08	2.35E-07
Ps90%/90% (+KTL) Bias 1	3.62E-06	1.03E-06	9.76E-07	4.13E-06
Ps90%/90% (-KTL) Bias 1	-6.96E-08	8.11E-07	8.11E-07	2.84E-06
Bias 2 Statistics				
Average Bias 2	1.72E-06	1.20E-06	1.22E-06	2.75E-06
Std Dev Bias 2	7.85E-07	3.08E-07	3.63E-07	2.05E-07
Ps90%/90% (+KTL) Bias 2	3.34E-06	2.04E-06	2.21E-06	3.31E-06
Ps90%/90% (-KTL) Bias 2	9.96E-08	3.51E-07	2.20E-07	2.19E-06
Un-Biased Statistics				
Average Un-Biased	9.30E-07	9.39E-07	9.47E-07	2.59E-06
Std Dev Un-Biased	8.79E-08	9.59E-08	9.55E-08	9.25E-08
Ps90%/90% (+KTL) Un-Biased	1.11E-06	1.20E-06	1.21E-06	2.84E-06
Ps90%/90% (-KTL) Un-Biased	7.49E-07	6.76E-07	6.86E-07	2.33E-06
Specification MAX	9.00E-05	9.00E-05	9.00E-05	
Status	PASS	PASS	PASS	Info Only

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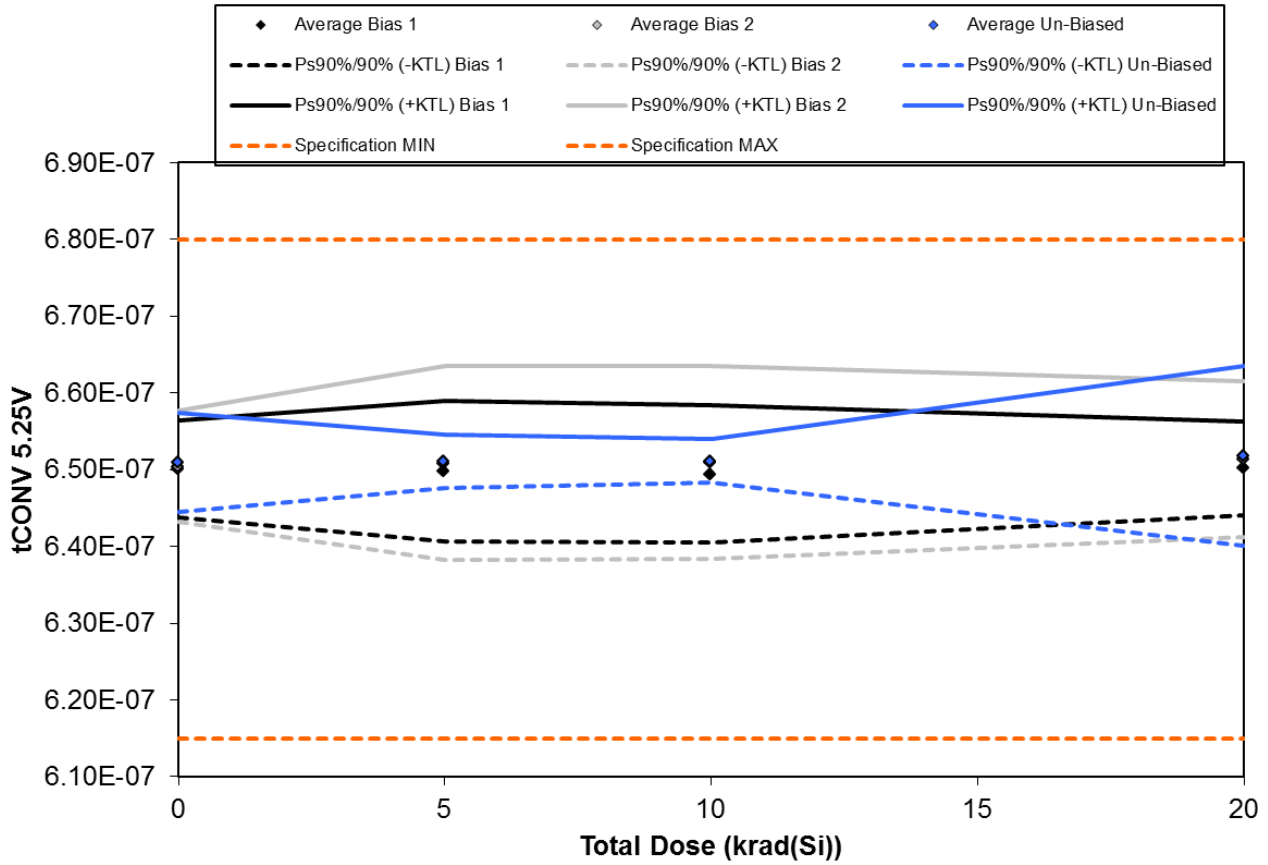


Figure 5.40. Plot of tCONV 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.40. Raw data for tCONV 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tCONV 5.25V Device	Total Dose (krad(Si))			
	0	5	10	20
1	6.55E-07	6.55E-07	6.55E-07	
2	6.47E-07	6.47E-07	6.48E-07	
3	6.47E-07	6.48E-07	6.47E-07	
4	6.49E-07	6.50E-07	6.50E-07	
5	6.47E-07	6.48E-07	6.48E-07	
420	6.50E-07			6.50E-07
421	6.54E-07			6.47E-07
422	6.47E-07			6.51E-07
423	6.51E-07			6.51E-07
424	6.53E-07			6.53E-07
6	6.55E-07	6.56E-07	6.56E-07	
7	6.46E-07	6.54E-07	6.48E-07	
8	6.53E-07	6.47E-07	6.54E-07	
9	6.45E-07	6.45E-07	6.45E-07	
10	6.52E-07	6.53E-07	6.53E-07	
425	6.50E-07			6.54E-07
426	6.54E-07			6.46E-07
427	6.46E-07			6.55E-07
428	6.51E-07			6.53E-07
194	6.51E-07			6.50E-07
11	6.49E-07	6.49E-07	6.49E-07	
12	6.51E-07	6.52E-07	6.52E-07	
13	6.50E-07	6.51E-07	6.51E-07	
14	6.51E-07	6.51E-07	6.51E-07	
15	6.51E-07	6.52E-07	6.52E-07	
48	6.51E-07			6.52E-07
49	6.56E-07			6.56E-07
50	6.47E-07			6.48E-07
191	6.46E-07			6.47E-07
193	6.55E-07			6.55E-07
Bias 1 Statistics				
Average Bias 1	6.50E-07	6.50E-07	6.49E-07	6.50E-07
Std Dev Bias 1	3.06E-09	3.34E-09	3.27E-09	2.24E-09
Ps90%/90% (+KTL) Bias 1	6.56E-07	6.59E-07	6.58E-07	6.56E-07
Ps90%/90% (-KTL) Bias 1	6.44E-07	6.41E-07	6.40E-07	6.44E-07
Bias 2 Statistics				
Average Bias 2	6.50E-07	6.51E-07	6.51E-07	6.51E-07
Std Dev Bias 2	3.48E-09	4.63E-09	4.58E-09	3.70E-09
Ps90%/90% (+KTL) Bias 2	6.58E-07	6.64E-07	6.63E-07	6.62E-07
Ps90%/90% (-KTL) Bias 2	6.43E-07	6.38E-07	6.38E-07	6.41E-07
Un-Biased Statistics				
Average Un-Biased	6.51E-07	6.51E-07	6.51E-07	6.52E-07
Std Dev Un-Biased	3.13E-09	1.29E-09	1.03E-09	4.26E-09
Ps90%/90% (+KTL) Un-Biased	6.57E-07	6.55E-07	6.54E-07	6.63E-07
Ps90%/90% (-KTL) Un-Biased	6.44E-07	6.48E-07	6.48E-07	6.40E-07
Specification MIN	6.15E-07	6.15E-07	6.15E-07	
Status	PASS	PASS	PASS	Info Only
Specification MAX	6.80E-07	6.80E-07	6.80E-07	
Status	PASS	PASS	PASS	Info Only

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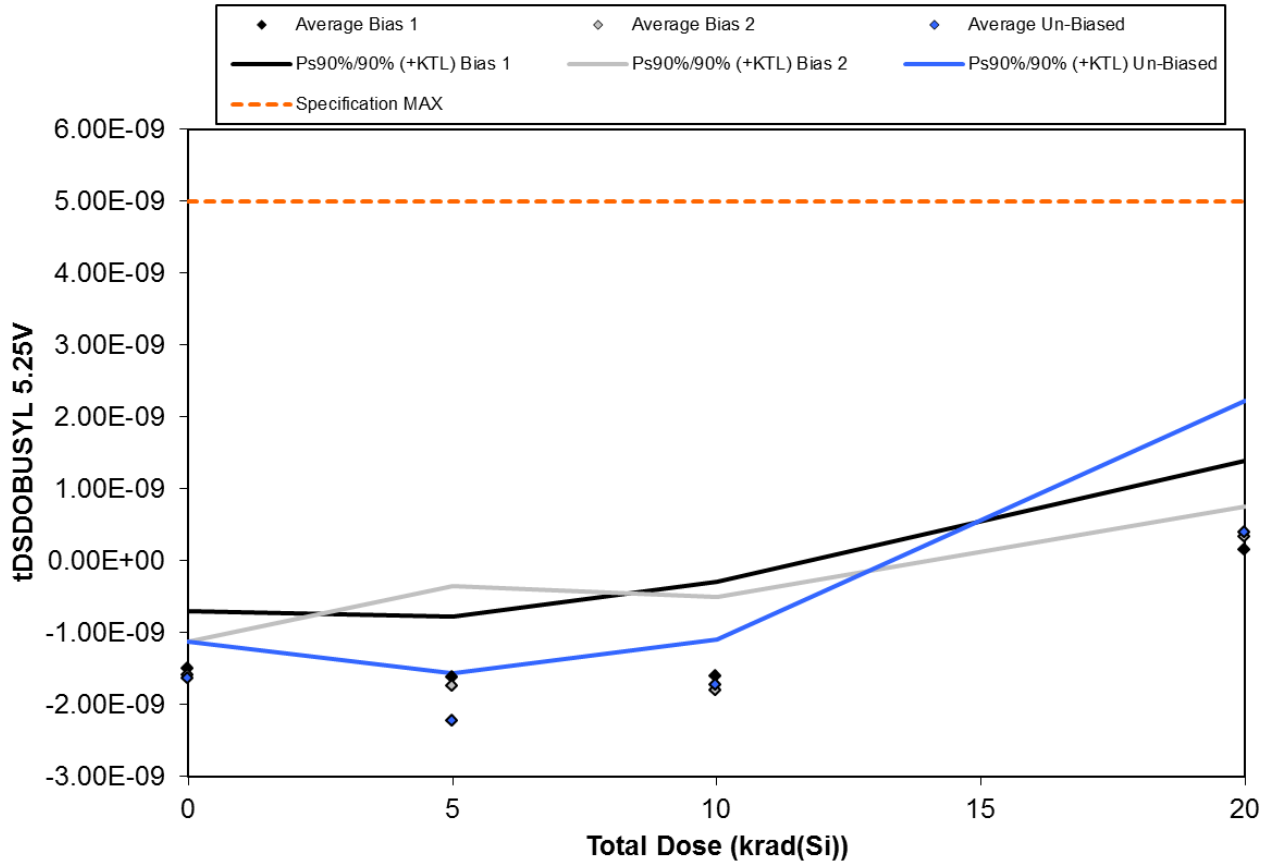


Figure 5.41. Plot of tDSDOBUSYL 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.41. Raw data for tDSDOBUSYL 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDSDOBUSYL 5.25V	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-1.61E-09	-1.33E-09	-1.30E-09	
2	-1.47E-09	-1.26E-09	-2.21E-09	
3	-1.22E-09	-1.73E-09	-1.04E-09	
4	-1.04E-09	-1.94E-09	-1.95E-09	
5	-8.59E-10	-1.85E-09	-1.51E-09	
420	-1.30E-09			2.33E-10
421	-1.83E-09			3.36E-10
422	-2.10E-09			-1.56E-10
423	-1.72E-09			7.70E-10
424	-1.72E-09			-3.89E-10
6	-1.31E-09	-2.00E-09	-2.10E-09	
7	-1.51E-09	-2.27E-09	-2.32E-09	
8	-1.63E-09	-9.36E-10	-1.83E-09	
9	-1.50E-09	-1.65E-09	-1.08E-09	
10	-2.16E-09	-1.79E-09	-1.70E-09	
425	-1.56E-09			2.38E-10
426	-1.43E-09			1.66E-10
427	-1.62E-09			2.99E-10
428	-1.57E-09			5.52E-10
194	-1.53E-09			4.15E-10
11	-2.04E-09	-2.23E-09	-1.91E-09	
12	-1.43E-09	-1.99E-09	-2.04E-09	
13	-1.39E-09	-2.61E-09	-1.63E-09	
14	-1.81E-09	-2.07E-09	-1.56E-09	
15	-1.69E-09	-2.22E-09	-1.50E-09	
48	-1.53E-09			6.43E-10
49	-1.67E-09			1.07E-09
50	-1.82E-09			-6.92E-10
191	-1.22E-09			2.61E-10
193	-1.67E-09			6.77E-10
Bias 1 Statistics				
Average Bias 1	-1.49E-09	-1.62E-09	-1.60E-09	1.59E-10
Std Dev Bias 1	3.82E-10	3.09E-10	4.79E-10	4.50E-10
Ps90%/90% (+KTL) Bias 1	-6.99E-10	-7.72E-10	-2.91E-10	1.39E-09
Ps90%/90% (-KTL) Bias 1	-2.28E-09	-2.47E-09	-2.92E-09	-1.07E-09
Bias 2 Statistics				
Average Bias 2	-1.58E-09	-1.73E-09	-1.80E-09	3.34E-10
Std Dev Bias 2	2.24E-10	5.01E-10	4.73E-10	1.52E-10
Ps90%/90% (+KTL) Bias 2	-1.12E-09	-3.57E-10	-5.07E-10	7.51E-10
Ps90%/90% (-KTL) Bias 2	-2.05E-09	-3.10E-09	-3.10E-09	-8.33E-11
Un-Biased Statistics				
Average Un-Biased	-1.63E-09	-2.22E-09	-1.73E-09	3.91E-10
Std Dev Un-Biased	2.40E-10	2.39E-10	2.33E-10	6.70E-10
Ps90%/90% (+KTL) Un-Biased	-1.13E-09	-1.56E-09	-1.09E-09	2.23E-09
Ps90%/90% (-KTL) Un-Biased	-2.12E-09	-2.88E-09	-2.37E-09	-1.44E-09
Specification MAX	5.00E-09	5.00E-09	5.00E-09	
Status	PASS	PASS	PASS	Info Only

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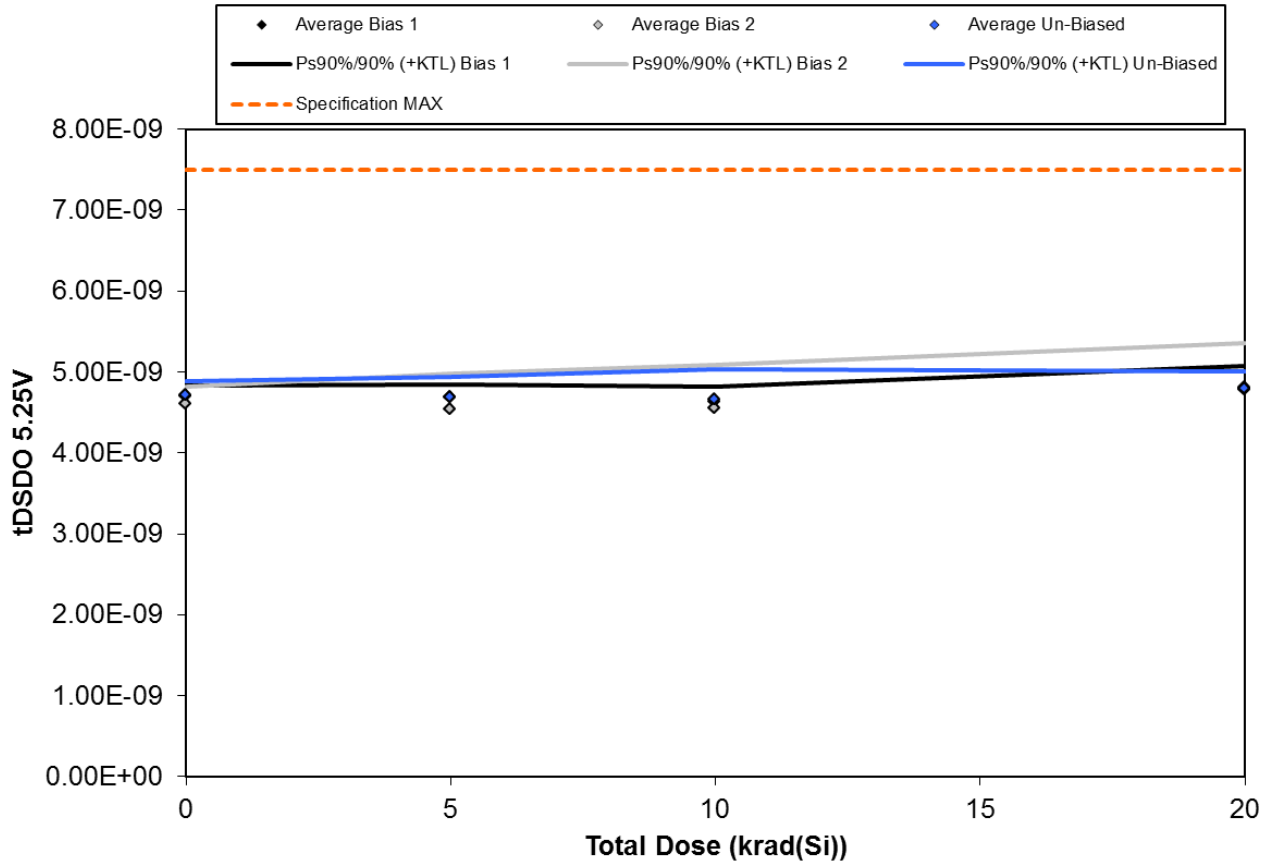


Figure 5.42. Plot of tDSDO 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Colorado Springs, CO 80919
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Table 5.42. Raw data for tDSDO 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDSDO 5.25V Device	Total Dose (krad(Si))			
	0	5	10	20
1	4.79E-09	4.63E-09	4.60E-09	
2	4.67E-09	4.66E-09	4.55E-09	
3	4.77E-09	4.77E-09	4.73E-09	
4	4.69E-09	4.74E-09	4.64E-09	
5	4.68E-09	4.66E-09	4.68E-09	
420	4.76E-09			4.84E-09
421	4.73E-09			4.94E-09
422	4.62E-09			4.70E-09
423	4.62E-09			4.72E-09
424	4.73E-09			4.72E-09
6	4.67E-09	4.62E-09	4.62E-09	
7	4.68E-09	4.42E-09	4.84E-09	
8	4.55E-09	4.66E-09	4.41E-09	
9	4.41E-09	4.32E-09	4.34E-09	
10	4.63E-09	4.68E-09	4.57E-09	
425	4.75E-09			4.81E-09
426	4.50E-09			4.55E-09
427	4.56E-09			4.67E-09
428	4.67E-09			4.96E-09
194	4.65E-09			5.04E-09
11	4.71E-09	4.65E-09	4.64E-09	
12	4.70E-09	4.66E-09	4.47E-09	
13	4.64E-09	4.60E-09	4.59E-09	
14	4.85E-09	4.74E-09	4.83E-09	
15	4.74E-09	4.83E-09	4.76E-09	
48	4.80E-09			4.82E-09
49	4.58E-09			4.66E-09
50	4.64E-09			4.87E-09
191	4.79E-09			4.82E-09
193	4.73E-09			4.82E-09
Bias 1 Statistics				
Average Bias 1	4.71E-09	4.69E-09	4.64E-09	4.78E-09
Std Dev Bias 1	5.89E-11	5.88E-11	6.76E-11	1.03E-10
Ps90%/90% (+KTL) Bias 1	4.83E-09	4.85E-09	4.82E-09	5.07E-09
Ps90%/90% (-KTL) Bias 1	4.58E-09	4.53E-09	4.45E-09	4.50E-09
Bias 2 Statistics				
Average Bias 2	4.61E-09	4.54E-09	4.55E-09	4.81E-09
Std Dev Bias 2	1.02E-10	1.62E-10	1.95E-10	2.01E-10
Ps90%/90% (+KTL) Bias 2	4.82E-09	4.98E-09	5.09E-09	5.36E-09
Ps90%/90% (-KTL) Bias 2	4.40E-09	4.10E-09	4.02E-09	4.26E-09
Un-Biased Statistics				
Average Un-Biased	4.72E-09	4.69E-09	4.66E-09	4.80E-09
Std Dev Un-Biased	8.27E-11	9.03E-11	1.38E-10	7.78E-11
Ps90%/90% (+KTL) Un-Biased	4.89E-09	4.94E-09	5.04E-09	5.01E-09
Ps90%/90% (-KTL) Un-Biased	4.55E-09	4.45E-09	4.28E-09	4.59E-09
Specification MAX	7.50E-09	7.50E-09	7.50E-09	
Status	PASS	PASS	PASS	Info Only

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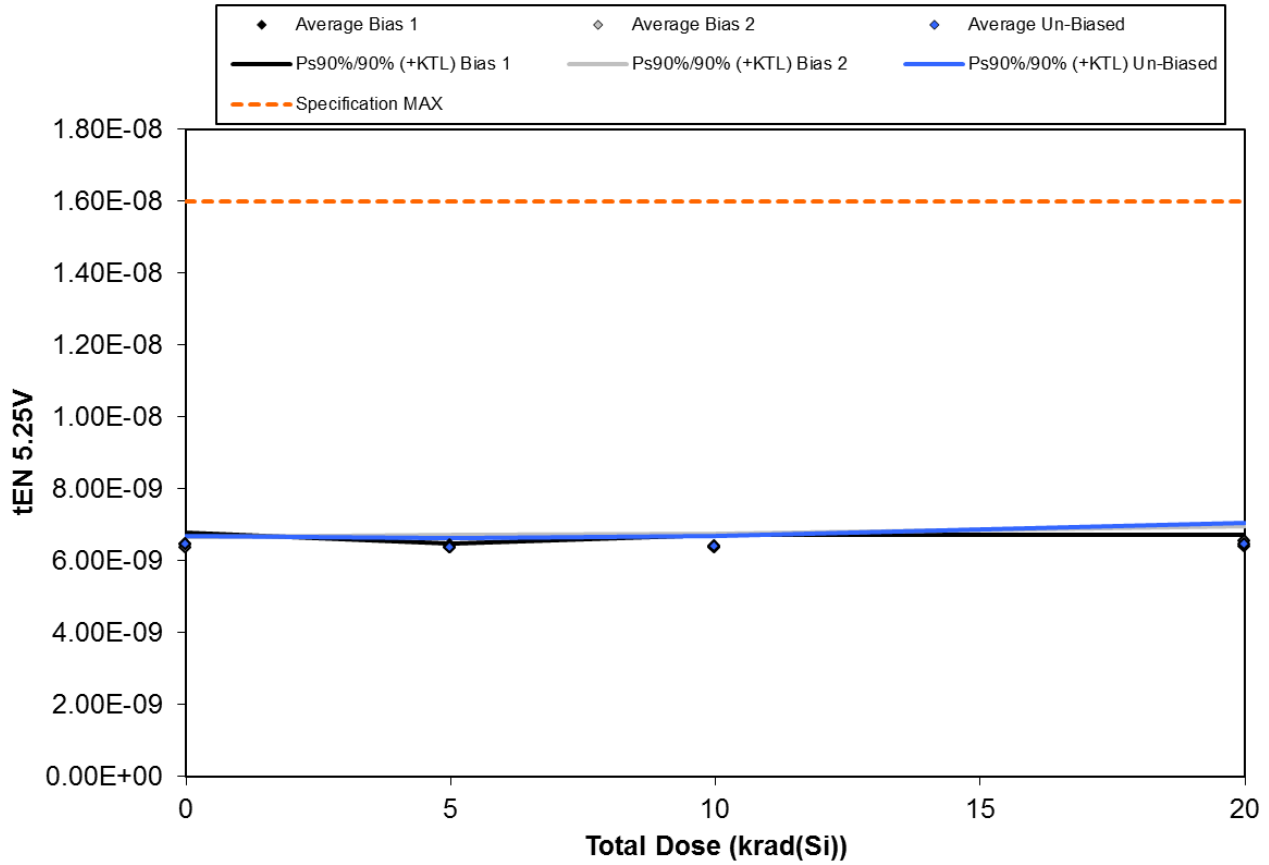


Figure 5.43. Plot of tEN 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.43. Raw data for tEN 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tEN 5.25V Device	Total Dose (krad(Si))			
	0	5	10	20
1	6.28E-09	6.45E-09	6.40E-09	
2	6.53E-09	6.42E-09	6.24E-09	
3	6.47E-09	6.38E-09	6.51E-09	
4	6.66E-09	6.44E-09	6.52E-09	
5	6.54E-09	6.42E-09	6.39E-09	
420	6.66E-09			6.55E-09
421	6.23E-09			6.43E-09
422	6.38E-09			6.26E-09
423	6.33E-09			6.48E-09
424	6.59E-09			6.36E-09
6	6.61E-09	6.49E-09	6.50E-09	
7	6.48E-09	6.27E-09	6.44E-09	
8	6.34E-09	6.53E-09	6.46E-09	
9	6.44E-09	6.27E-09	6.25E-09	
10	6.37E-09	6.26E-09	6.20E-09	
425	6.26E-09			6.52E-09
426	6.39E-09			6.32E-09
427	6.30E-09			6.62E-09
428	6.17E-09			6.70E-09
194	6.50E-09			6.62E-09
11	6.51E-09	6.34E-09	6.46E-09	
12	6.21E-09	6.40E-09	6.47E-09	
13	6.38E-09	6.40E-09	6.50E-09	
14	6.48E-09	6.49E-09	6.41E-09	
15	6.46E-09	6.25E-09	6.24E-09	
48	6.50E-09			6.27E-09
49	6.42E-09			6.65E-09
50	6.50E-09			6.22E-09
191	6.61E-09			6.57E-09
193	6.53E-09			6.67E-09
Bias 1 Statistics				
Average Bias 1	6.47E-09	6.42E-09	6.41E-09	6.42E-09
Std Dev Bias 1	1.54E-10	2.60E-11	1.13E-10	1.14E-10
Ps90%/90% (+KTL) Bias 1	6.79E-09	6.49E-09	6.72E-09	6.73E-09
Ps90%/90% (-KTL) Bias 1	6.15E-09	6.35E-09	6.10E-09	6.10E-09
Bias 2 Statistics				
Average Bias 2	6.39E-09	6.37E-09	6.37E-09	6.55E-09
Std Dev Bias 2	1.29E-10	1.34E-10	1.38E-10	1.47E-10
Ps90%/90% (+KTL) Bias 2	6.65E-09	6.73E-09	6.75E-09	6.96E-09
Ps90%/90% (-KTL) Bias 2	6.12E-09	6.00E-09	5.99E-09	6.15E-09
Un-Biased Statistics				
Average Un-Biased	6.46E-09	6.38E-09	6.41E-09	6.48E-09
Std Dev Un-Biased	1.07E-10	8.69E-11	1.05E-10	2.15E-10
Ps90%/90% (+KTL) Un-Biased	6.68E-09	6.62E-09	6.70E-09	7.06E-09
Ps90%/90% (-KTL) Un-Biased	6.24E-09	6.14E-09	6.13E-09	5.89E-09
Specification MAX	1.60E-08	1.60E-08	1.60E-08	
Status	PASS	PASS	PASS	Info Only

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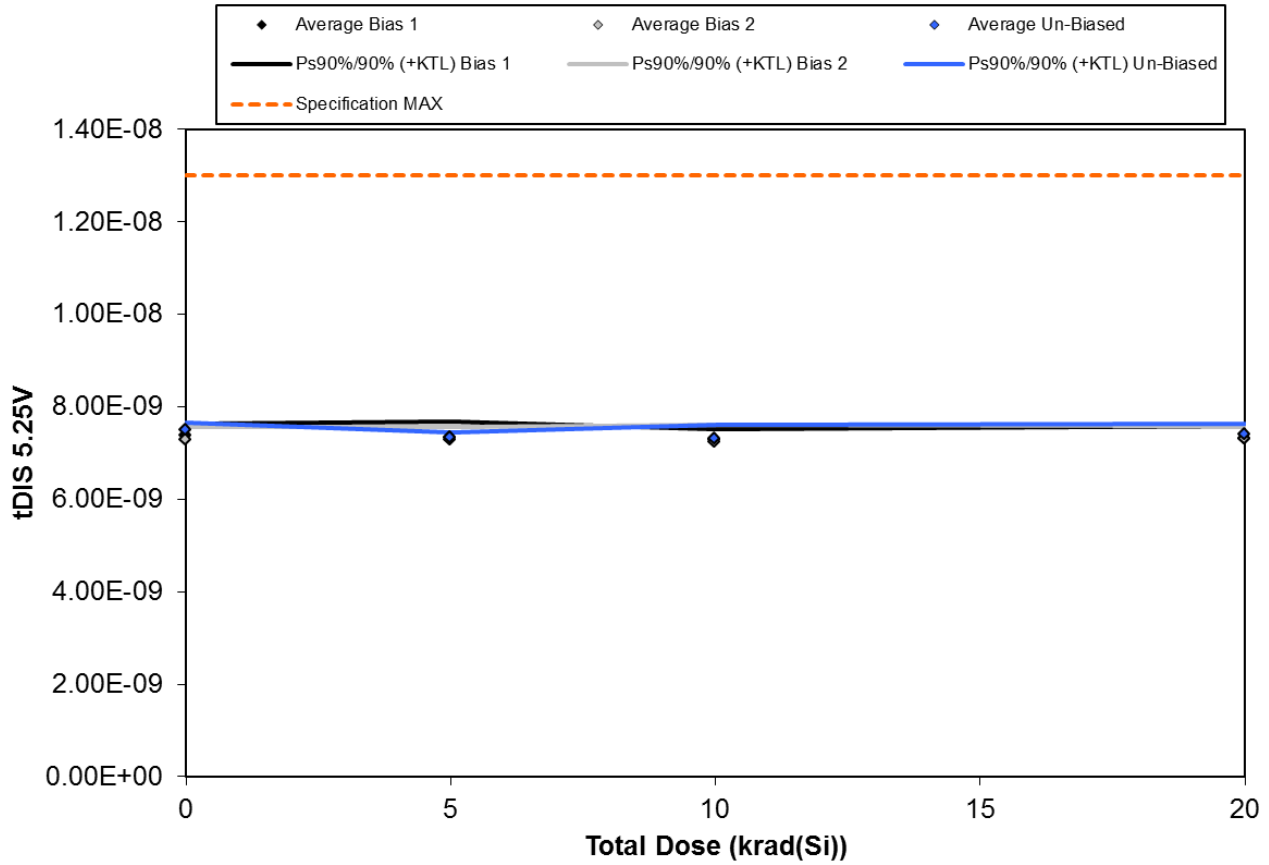


Figure 5.44. Plot of tDIS 5.25V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.44. Raw data for tDIS 5.25V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDIS 5.25V Device	Total Dose (krad(Si))			
	0	5	10	20
1	7.42E-09	7.43E-09	7.40E-09	
2	7.41E-09	7.45E-09	7.31E-09	
3	7.42E-09	7.18E-09	7.24E-09	
4	7.30E-09	7.22E-09	7.31E-09	
5	7.56E-09	7.37E-09	7.19E-09	
420	7.33E-09			7.45E-09
421	7.43E-09			7.26E-09
422	7.10E-09			7.35E-09
423	7.33E-09			7.25E-09
424	7.50E-09			7.20E-09
6	7.44E-09	7.41E-09	7.21E-09	
7	7.28E-09	7.22E-09	7.35E-09	
8	7.39E-09	7.36E-09	7.31E-09	
9	7.20E-09	7.18E-09	7.03E-09	
10	7.44E-09	7.31E-09	7.33E-09	
425	7.38E-09			7.25E-09
426	7.29E-09			7.21E-09
427	7.09E-09			7.37E-09
428	7.11E-09			7.29E-09
194	7.39E-09			7.46E-09
11	7.46E-09	7.39E-09	7.35E-09	
12	7.46E-09	7.32E-09	7.14E-09	
13	7.48E-09	7.33E-09	7.25E-09	
14	7.44E-09	7.32E-09	7.42E-09	
15	7.63E-09	7.28E-09	7.36E-09	
48	7.46E-09			7.50E-09
49	7.58E-09			7.41E-09
50	7.37E-09			7.29E-09
191	7.58E-09			7.46E-09
193	7.54E-09			7.37E-09
Bias 1 Statistics				
Average Bias 1	7.38E-09	7.33E-09	7.29E-09	7.30E-09
Std Dev Bias 1	1.26E-10	1.22E-10	7.97E-11	1.00E-10
Ps90%/90% (+KTL) Bias 1	7.64E-09	7.67E-09	7.51E-09	7.58E-09
Ps90%/90% (-KTL) Bias 1	7.12E-09	7.00E-09	7.07E-09	7.03E-09
Bias 2 Statistics				
Average Bias 2	7.30E-09	7.30E-09	7.25E-09	7.32E-09
Std Dev Bias 2	1.30E-10	9.61E-11	1.32E-10	9.84E-11
Ps90%/90% (+KTL) Bias 2	7.57E-09	7.56E-09	7.61E-09	7.59E-09
Ps90%/90% (-KTL) Bias 2	7.03E-09	7.03E-09	6.88E-09	7.05E-09
Un-Biased Statistics				
Average Un-Biased	7.50E-09	7.33E-09	7.30E-09	7.40E-09
Std Dev Un-Biased	7.96E-11	3.89E-11	1.12E-10	8.13E-11
Ps90%/90% (+KTL) Un-Biased	7.66E-09	7.44E-09	7.61E-09	7.63E-09
Ps90%/90% (-KTL) Un-Biased	7.34E-09	7.22E-09	7.00E-09	7.18E-09
Specification MAX	1.30E-08	1.30E-08	1.30E-08	
Status	PASS	PASS	PASS	Info Only

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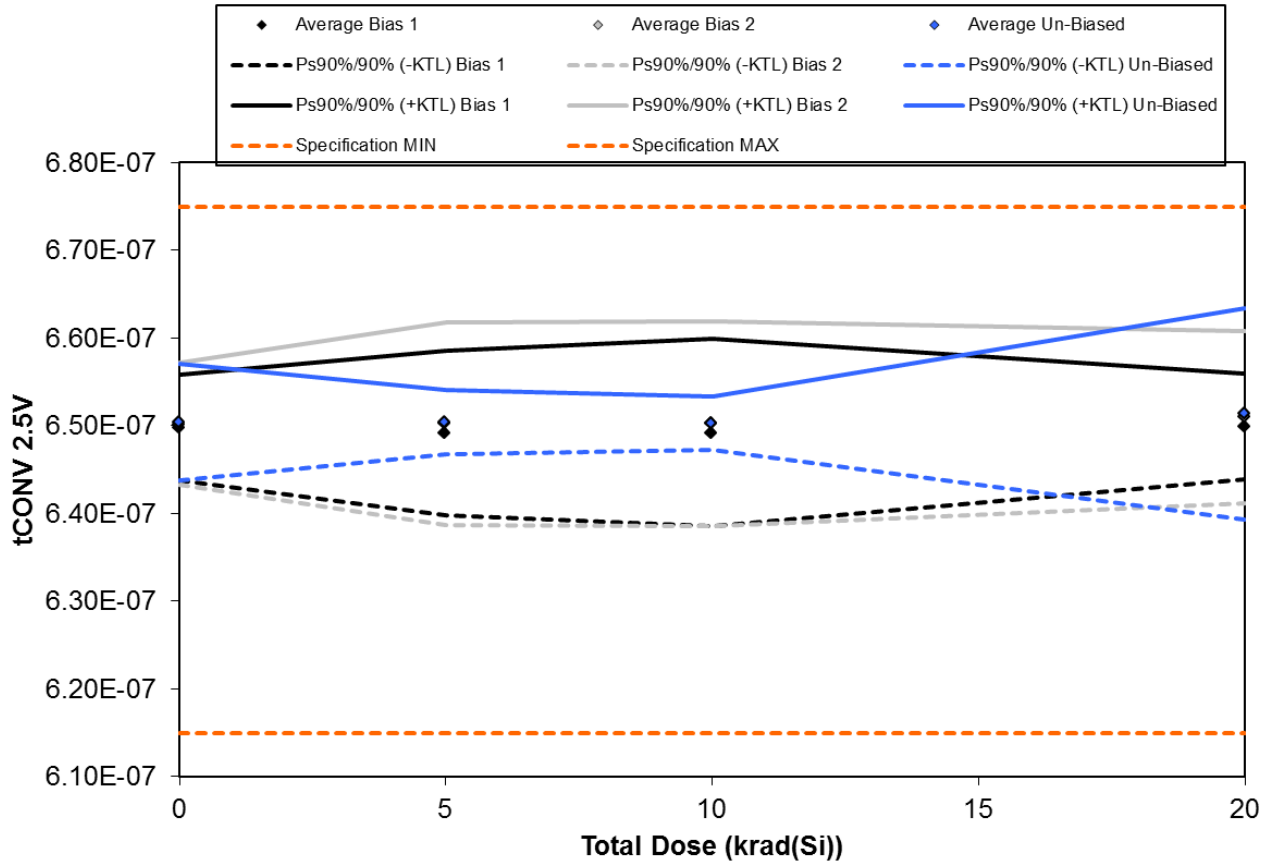


Figure 5.45. Plot of tCONV 2.5V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.45. Raw data for tCONV 2.5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tCONV 2.5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	6.55E-07	6.55E-07	6.56E-07	
2	6.47E-07	6.47E-07	6.46E-07	
3	6.47E-07	6.47E-07	6.47E-07	
4	6.49E-07	6.50E-07	6.49E-07	
5	6.47E-07	6.47E-07	6.48E-07	
420	6.50E-07			6.50E-07
421	6.53E-07			6.46E-07
422	6.47E-07			6.50E-07
423	6.51E-07			6.51E-07
424	6.52E-07			6.52E-07
6	6.55E-07	6.55E-07	6.55E-07	
7	6.46E-07	6.53E-07	6.47E-07	
8	6.53E-07	6.46E-07	6.53E-07	
9	6.45E-07	6.45E-07	6.45E-07	
10	6.52E-07	6.52E-07	6.52E-07	
425	6.50E-07			6.53E-07
426	6.54E-07			6.45E-07
427	6.46E-07			6.55E-07
428	6.51E-07			6.52E-07
194	6.50E-07			6.50E-07
11	6.48E-07	6.48E-07	6.49E-07	
12	6.51E-07	6.51E-07	6.51E-07	
13	6.50E-07	6.50E-07	6.50E-07	
14	6.50E-07	6.51E-07	6.50E-07	
15	6.51E-07	6.52E-07	6.51E-07	
48	6.51E-07			6.51E-07
49	6.56E-07			6.56E-07
50	6.47E-07			6.47E-07
191	6.46E-07			6.47E-07
193	6.55E-07			6.55E-07
Bias 1 Statistics				
Average Bias 1	6.50E-07	6.49E-07	6.49E-07	6.50E-07
Std Dev Bias 1	2.94E-09	3.43E-09	3.90E-09	2.20E-09
Ps90%/90% (+KTL) Bias 1	6.56E-07	6.59E-07	6.60E-07	6.56E-07
Ps90%/90% (-KTL) Bias 1	6.44E-07	6.40E-07	6.39E-07	6.44E-07
Bias 2 Statistics				
Average Bias 2	6.50E-07	6.50E-07	6.50E-07	6.51E-07
Std Dev Bias 2	3.37E-09	4.22E-09	4.26E-09	3.59E-09
Ps90%/90% (+KTL) Bias 2	6.57E-07	6.62E-07	6.62E-07	6.61E-07
Ps90%/90% (-KTL) Bias 2	6.43E-07	6.39E-07	6.39E-07	6.41E-07
Un-Biased Statistics				
Average Un-Biased	6.50E-07	6.50E-07	6.50E-07	6.51E-07
Std Dev Un-Biased	3.23E-09	1.32E-09	1.11E-09	4.40E-09
Ps90%/90% (+KTL) Un-Biased	6.57E-07	6.54E-07	6.53E-07	6.63E-07
Ps90%/90% (-KTL) Un-Biased	6.44E-07	6.47E-07	6.47E-07	6.39E-07
Specification MIN	6.15E-07	6.15E-07	6.15E-07	
Status	PASS	PASS	PASS	Info Only
Specification MAX	6.75E-07	6.75E-07	6.75E-07	
Status	PASS	PASS	PASS	Info Only

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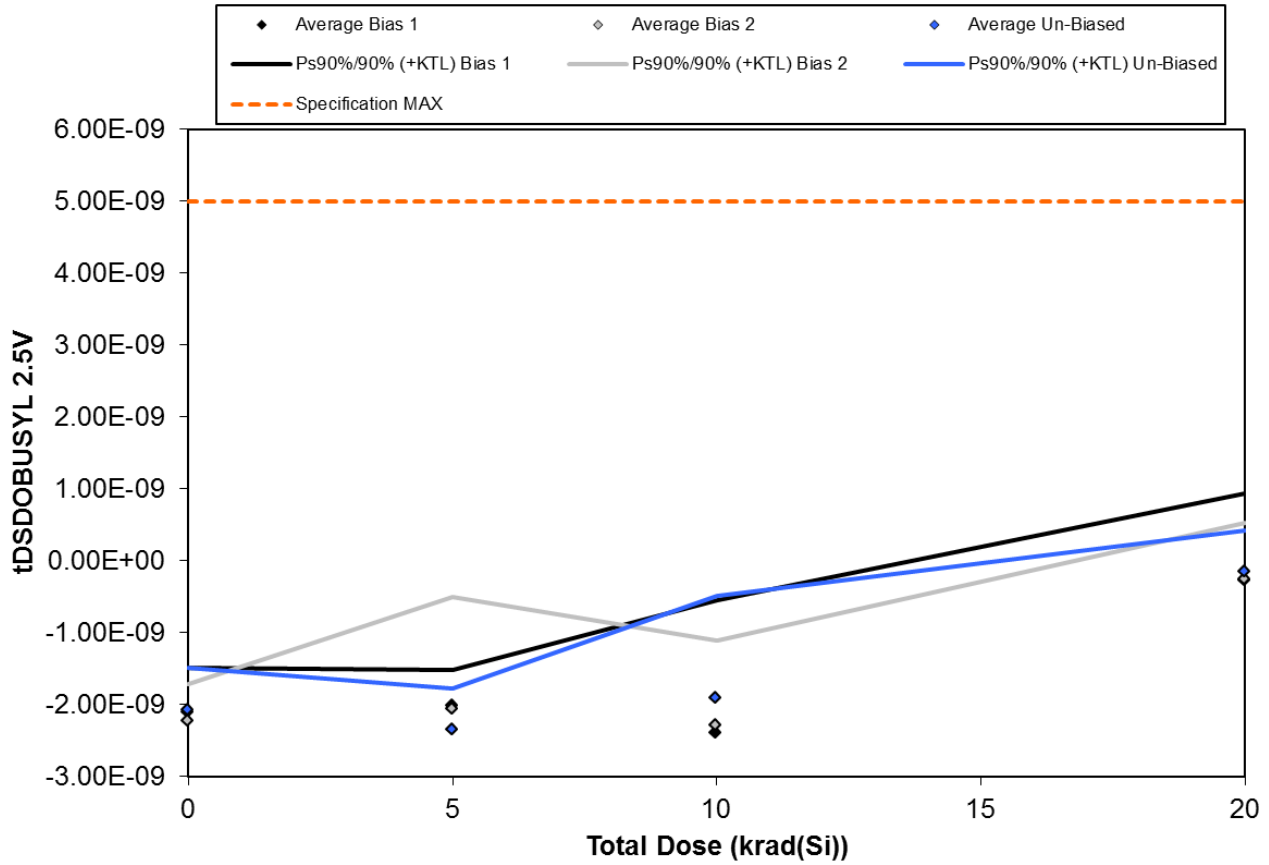


Figure 5.46. Plot of tDSDOBUSYL 2.5V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.46. Raw data for tDSDOBUSYL 2.5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDSDOBUSYL 2.5V	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-2.47E-09	-1.86E-09	-3.40E-09	
2	-2.56E-09	-2.32E-09	-1.62E-09	
3	-1.95E-09	-1.94E-09	-2.50E-09	
4	-2.42E-09	-1.99E-09	-1.96E-09	
5	-1.86E-09	-1.94E-09	-2.47E-09	
420	-2.04E-09			2.98E-10
421	-1.89E-09			-2.05E-10
422	-2.23E-09			-7.62E-11
423	-1.70E-09			-8.64E-10
424	-1.91E-09			-4.83E-10
6	-2.05E-09	-1.85E-09	-1.89E-09	
7	-2.36E-09	-1.30E-09	-2.58E-09	
8	-2.70E-09	-2.14E-09	-2.87E-09	
9	-2.17E-09	-2.86E-09	-2.18E-09	
10	-2.09E-09	-2.12E-09	-1.91E-09	
425	-1.95E-09			7.80E-11
426	-1.95E-09			-1.19E-10
427	-2.46E-09			-4.60E-10
428	-2.12E-09			-6.17E-10
194	-2.37E-09			-1.23E-10
11	-2.00E-09	-2.24E-09	-2.48E-09	
12	-2.05E-09	-2.53E-09	-2.43E-09	
13	-2.10E-09	-2.03E-09	-1.41E-09	
14	-1.57E-09	-2.40E-09	-1.44E-09	
15	-2.34E-09	-2.48E-09	-1.78E-09	
48	-1.94E-09			8.98E-11
49	-2.23E-09			-1.62E-10
50	-1.93E-09			-6.57E-11
191	-1.88E-09			-4.72E-10
193	-2.62E-09			-1.21E-10
Bias 1 Statistics				
Average Bias 1	-2.10E-09	-2.01E-09	-2.39E-09	-2.66E-10
Std Dev Bias 1	2.95E-10	1.80E-10	6.72E-10	4.37E-10
Ps90%/90% (+KTL) Bias 1	-1.49E-09	-1.52E-09	-5.48E-10	9.31E-10
Ps90%/90% (-KTL) Bias 1	-2.71E-09	-2.50E-09	-4.23E-09	-1.46E-09
Bias 2 Statistics				
Average Bias 2	-2.22E-09	-2.05E-09	-2.29E-09	-2.48E-10
Std Dev Bias 2	2.42E-10	5.63E-10	4.27E-10	2.83E-10
Ps90%/90% (+KTL) Bias 2	-1.72E-09	-5.08E-10	-1.11E-09	5.27E-10
Ps90%/90% (-KTL) Bias 2	-2.72E-09	-3.60E-09	-3.46E-09	-1.02E-09
Un-Biased Statistics				
Average Un-Biased	-2.07E-09	-2.34E-09	-1.91E-09	-1.46E-10
Std Dev Un-Biased	2.84E-10	2.04E-10	5.17E-10	2.06E-10
Ps90%/90% (+KTL) Un-Biased	-1.48E-09	-1.78E-09	-4.91E-10	4.18E-10
Ps90%/90% (-KTL) Un-Biased	-2.65E-09	-2.90E-09	-3.33E-09	-7.10E-10
Specification MAX	5.00E-09	5.00E-09	5.00E-09	
Status	PASS	PASS	PASS	Info Only

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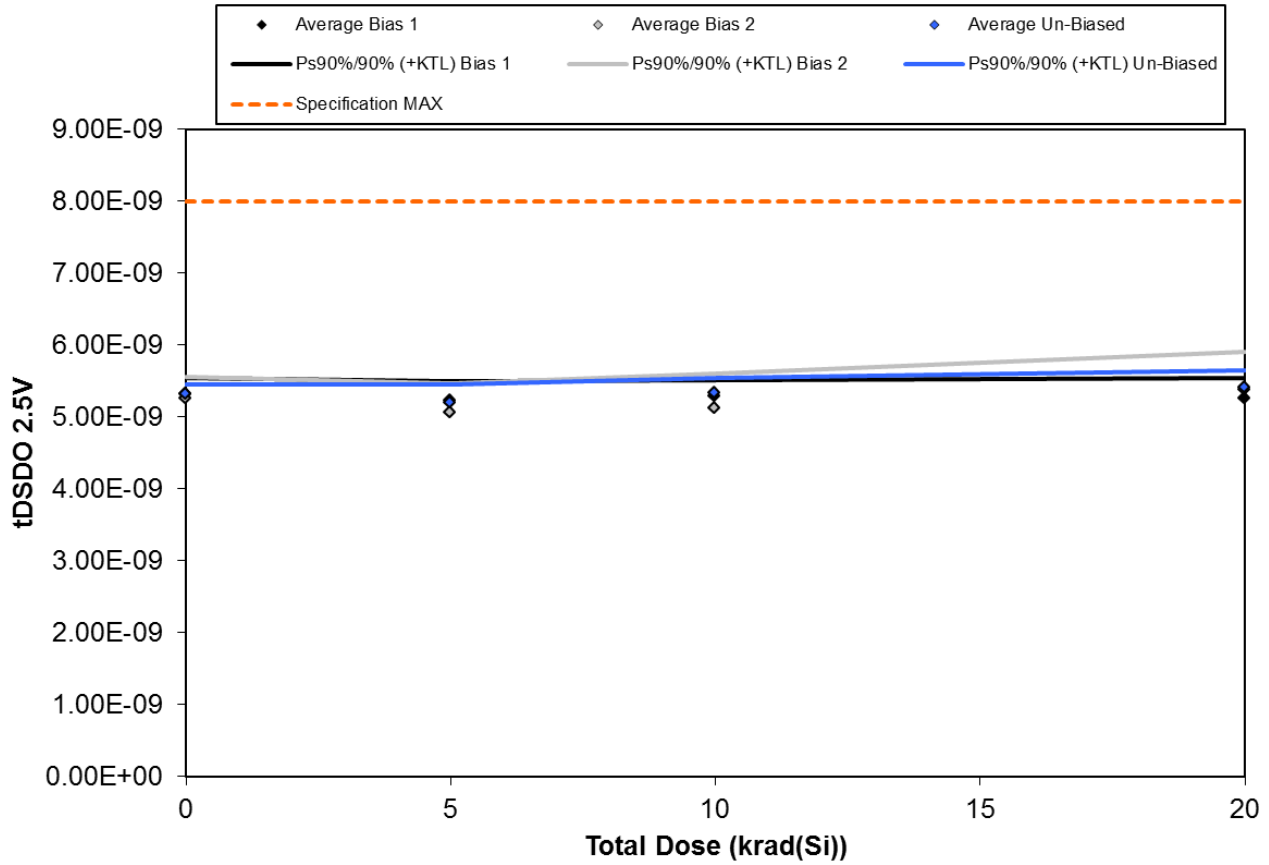


Figure 5.47. Plot of tDSDO 2.5V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.47. Raw data for tDSDO 2.5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDSDO 2.5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	5.45E-09	5.38E-09	5.30E-09	
2	5.29E-09	5.26E-09	5.28E-09	
3	5.46E-09	5.12E-09	5.25E-09	
4	5.31E-09	5.22E-09	5.42E-09	
5	5.29E-09	5.19E-09	5.20E-09	
420	5.36E-09			5.38E-09
421	5.38E-09			5.27E-09
422	5.13E-09			5.24E-09
423	5.15E-09			5.31E-09
424	5.36E-09			5.11E-09
6	5.37E-09	5.23E-09	5.18E-09	
7	5.27E-09	4.97E-09	5.34E-09	
8	5.23E-09	5.18E-09	4.98E-09	
9	5.01E-09	4.87E-09	4.91E-09	
10	5.21E-09	5.08E-09	5.19E-09	
425	5.54E-09			5.56E-09
426	5.22E-09			5.18E-09
427	5.26E-09			5.19E-09
428	5.36E-09			5.50E-09
194	5.18E-09			5.52E-09
11	5.24E-09	5.35E-09	5.36E-09	
12	5.24E-09	5.16E-09	5.25E-09	
13	5.28E-09	5.11E-09	5.33E-09	
14	5.35E-09	5.18E-09	5.44E-09	
15	5.39E-09	5.20E-09	5.33E-09	
48	5.33E-09			5.35E-09
49	5.27E-09			5.29E-09
50	5.27E-09			5.47E-09
191	5.41E-09			5.49E-09
193	5.37E-09			5.44E-09
Bias 1 Statistics				
Average Bias 1	5.32E-09	5.24E-09	5.29E-09	5.26E-09
Std Dev Bias 1	1.10E-10	9.41E-11	8.19E-11	9.86E-11
Ps90%/90% (+KTL) Bias 1	5.55E-09	5.49E-09	5.52E-09	5.53E-09
Ps90%/90% (-KTL) Bias 1	5.09E-09	4.98E-09	5.07E-09	4.99E-09
Bias 2 Statistics				
Average Bias 2	5.26E-09	5.07E-09	5.12E-09	5.39E-09
Std Dev Bias 2	1.40E-10	1.47E-10	1.76E-10	1.88E-10
Ps90%/90% (+KTL) Bias 2	5.55E-09	5.47E-09	5.60E-09	5.90E-09
Ps90%/90% (-KTL) Bias 2	4.98E-09	4.66E-09	4.64E-09	4.87E-09
Un-Biased Statistics				
Average Un-Biased	5.31E-09	5.20E-09	5.34E-09	5.41E-09
Std Dev Un-Biased	6.30E-11	9.06E-11	7.00E-11	8.49E-11
Ps90%/90% (+KTL) Un-Biased	5.45E-09	5.45E-09	5.53E-09	5.64E-09
Ps90%/90% (-KTL) Un-Biased	5.18E-09	4.95E-09	5.15E-09	5.17E-09
Specification MAX	8.00E-09	8.00E-09	8.00E-09	
Status	PASS	PASS	PASS	Info Only

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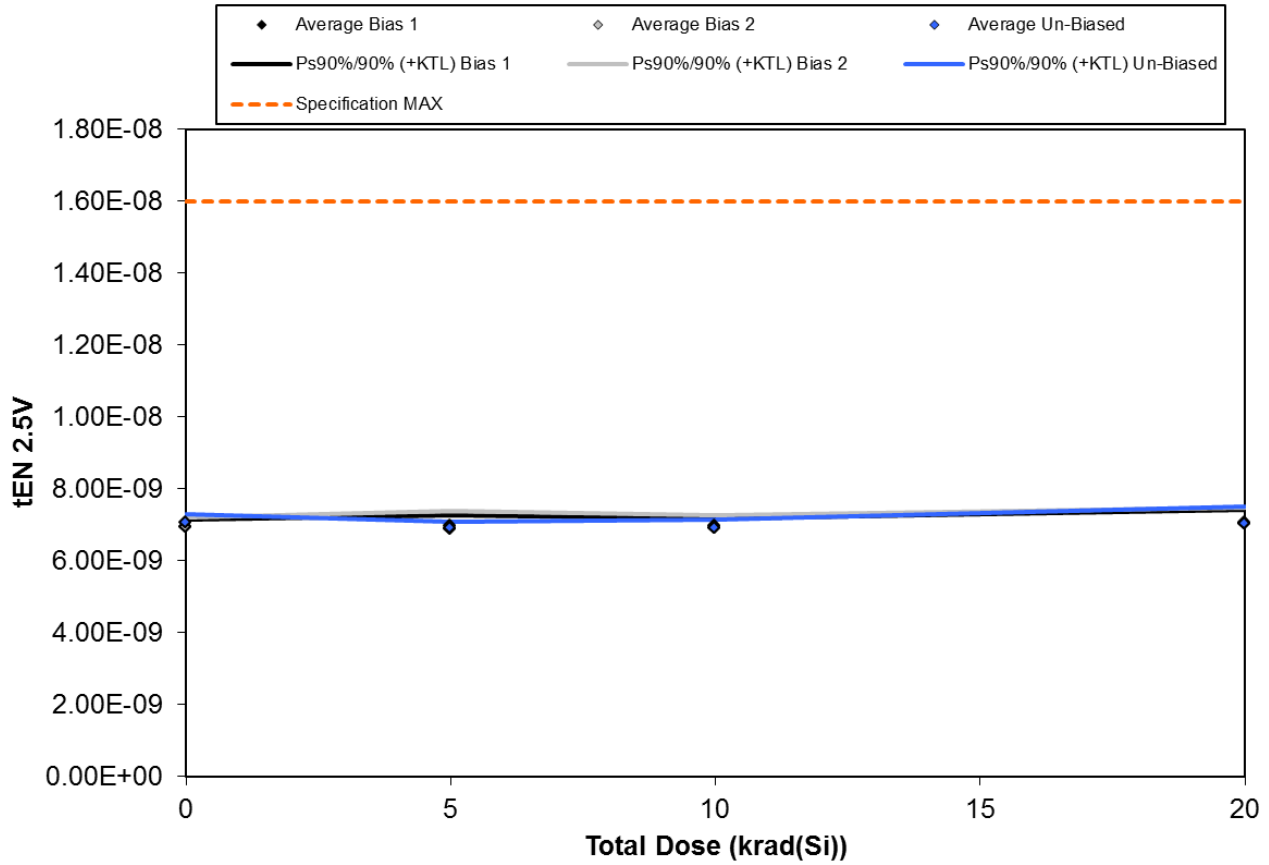


Figure 5.48. Plot of tEN 2.5V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.48. Raw data for tEN 2.5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tEN 2.5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	6.98E-09	6.75E-09	7.10E-09	
2	6.86E-09	6.99E-09	6.95E-09	
3	7.02E-09	6.76E-09	6.97E-09	
4	6.93E-09	6.96E-09	6.95E-09	
5	6.94E-09	7.03E-09	6.97E-09	
420	7.00E-09			7.24E-09
421	6.95E-09			7.03E-09
422	6.86E-09			7.05E-09
423	7.12E-09			7.06E-09
424	6.83E-09			6.85E-09
6	7.14E-09	7.10E-09	7.05E-09	
7	6.97E-09	6.99E-09	6.97E-09	
8	7.06E-09	7.10E-09	6.95E-09	
9	6.68E-09	6.73E-09	6.74E-09	
10	6.98E-09	6.94E-09	6.82E-09	
425	7.00E-09			7.08E-09
426	6.85E-09			6.87E-09
427	6.95E-09			7.18E-09
428	6.89E-09			7.00E-09
194	6.94E-09			7.23E-09
11	6.95E-09	6.96E-09	6.93E-09	
12	6.95E-09	6.96E-09	6.80E-09	
13	6.92E-09	6.86E-09	6.91E-09	
14	7.07E-09	6.83E-09	7.00E-09	
15	7.24E-09	6.97E-09	6.99E-09	
48	6.97E-09			7.09E-09
49	7.21E-09			6.83E-09
50	7.14E-09			6.91E-09
191	7.03E-09			7.12E-09
193	7.13E-09			7.26E-09
Bias 1 Statistics				
Average Bias 1	6.95E-09	6.90E-09	6.99E-09	7.05E-09
Std Dev Bias 1	8.72E-11	1.32E-10	6.33E-11	1.38E-10
Ps90%/90% (+KTL) Bias 1	7.13E-09	7.26E-09	7.16E-09	7.43E-09
Ps90%/90% (-KTL) Bias 1	6.77E-09	6.54E-09	6.81E-09	6.67E-09
Bias 2 Statistics				
Average Bias 2	6.95E-09	6.97E-09	6.91E-09	7.07E-09
Std Dev Bias 2	1.24E-10	1.50E-10	1.27E-10	1.45E-10
Ps90%/90% (+KTL) Bias 2	7.20E-09	7.38E-09	7.25E-09	7.47E-09
Ps90%/90% (-KTL) Bias 2	6.69E-09	6.56E-09	6.56E-09	6.67E-09
Un-Biased Statistics				
Average Un-Biased	7.06E-09	6.92E-09	6.93E-09	7.04E-09
Std Dev Un-Biased	1.16E-10	6.57E-11	8.17E-11	1.69E-10
Ps90%/90% (+KTL) Un-Biased	7.30E-09	7.10E-09	7.15E-09	7.51E-09
Ps90%/90% (-KTL) Un-Biased	6.82E-09	6.74E-09	6.70E-09	6.58E-09
Specification MAX	1.60E-08	1.60E-08	1.60E-08	
Status	PASS	PASS	PASS	Info Only

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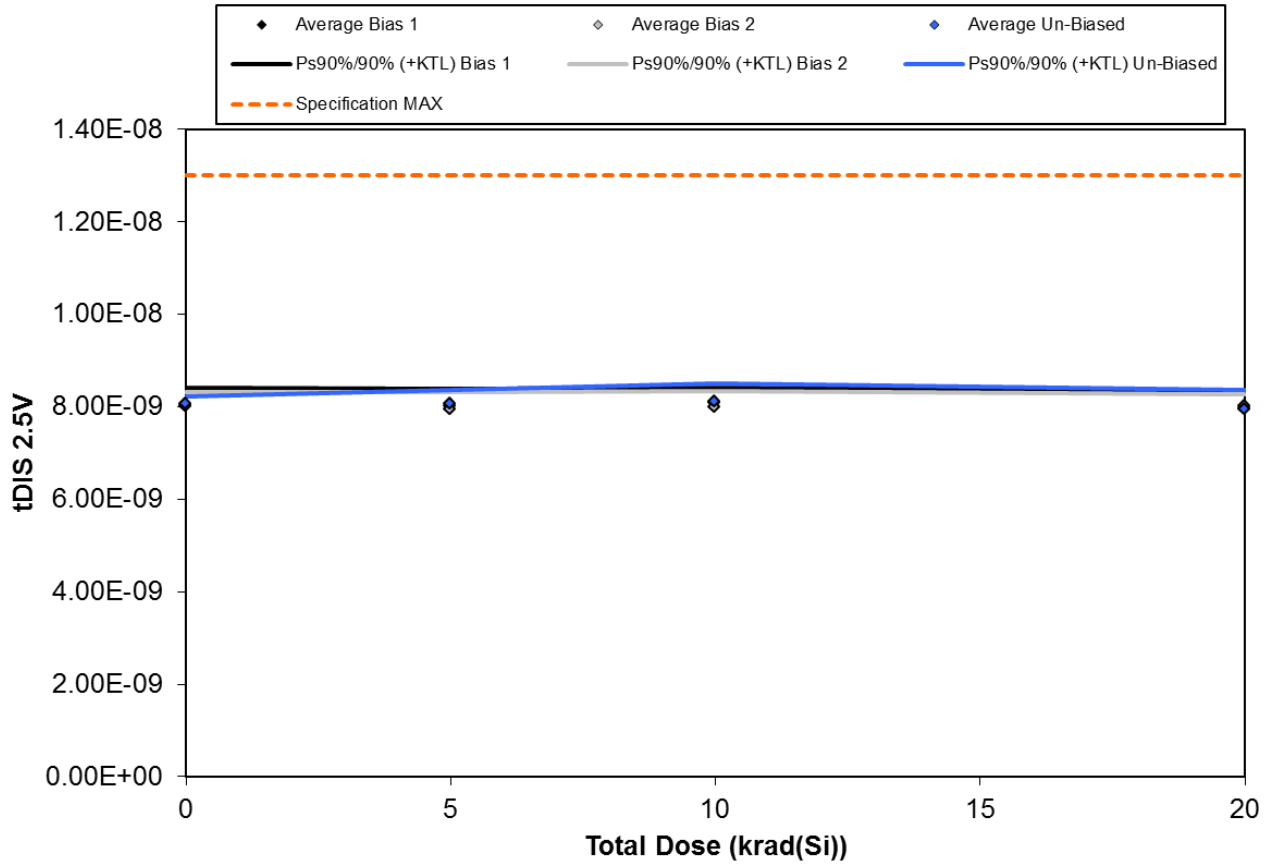


Figure 5.49. Plot of tDIS 2.5V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.49. Raw data for tDIS 2.5V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDIS 2.5V Device	Total Dose (krad(Si))			
	0	5	10	20
1	8.24E-09	8.11E-09	8.20E-09	
2	8.02E-09	8.19E-09	8.08E-09	
3	7.91E-09	7.96E-09	8.23E-09	
4	8.13E-09	7.98E-09	7.94E-09	
5	8.06E-09	7.86E-09	8.06E-09	
420	7.85E-09			8.03E-09
421	8.23E-09			8.13E-09
422	7.75E-09			7.78E-09
423	8.22E-09			8.02E-09
424	7.82E-09			7.93E-09
6	8.19E-09	8.02E-09	8.05E-09	
7	7.96E-09	7.82E-09	8.00E-09	
8	7.89E-09	8.09E-09	8.00E-09	
9	7.98E-09	7.79E-09	7.80E-09	
10	8.03E-09	7.99E-09	8.13E-09	
425	8.18E-09			8.17E-09
426	8.20E-09			7.97E-09
427	7.84E-09			7.96E-09
428	8.13E-09			8.00E-09
194	7.88E-09			8.01E-09
11	8.10E-09	8.15E-09	8.04E-09	
12	7.96E-09	7.90E-09	7.93E-09	
13	8.00E-09	8.14E-09	8.19E-09	
14	8.15E-09	8.06E-09	8.12E-09	
15	8.15E-09	8.12E-09	8.29E-09	
48	8.09E-09			7.84E-09
49	8.14E-09			8.21E-09
50	7.95E-09			7.90E-09
191	8.06E-09			7.90E-09
193	7.98E-09			7.92E-09
Bias 1 Statistics				
Average Bias 1	8.02E-09	8.02E-09	8.10E-09	7.98E-09
Std Dev Bias 1	1.83E-10	1.33E-10	1.15E-10	1.31E-10
Ps90%/90% (+KTL) Bias 1	8.40E-09	8.38E-09	8.42E-09	8.34E-09
Ps90%/90% (-KTL) Bias 1	7.65E-09	7.66E-09	7.79E-09	7.62E-09
Bias 2 Statistics				
Average Bias 2	8.03E-09	7.94E-09	8.00E-09	8.02E-09
Std Dev Bias 2	1.40E-10	1.32E-10	1.20E-10	8.49E-11
Ps90%/90% (+KTL) Bias 2	8.31E-09	8.30E-09	8.33E-09	8.26E-09
Ps90%/90% (-KTL) Bias 2	7.74E-09	7.58E-09	7.67E-09	7.79E-09
Un-Biased Statistics				
Average Un-Biased	8.06E-09	8.07E-09	8.11E-09	7.95E-09
Std Dev Un-Biased	7.93E-11	1.03E-10	1.39E-10	1.45E-10
Ps90%/90% (+KTL) Un-Biased	8.22E-09	8.36E-09	8.49E-09	8.35E-09
Ps90%/90% (-KTL) Un-Biased	7.90E-09	7.79E-09	7.73E-09	7.55E-09
Specification MAX	1.30E-08	1.30E-08	1.30E-08	
Status	PASS	PASS	PASS	Info Only

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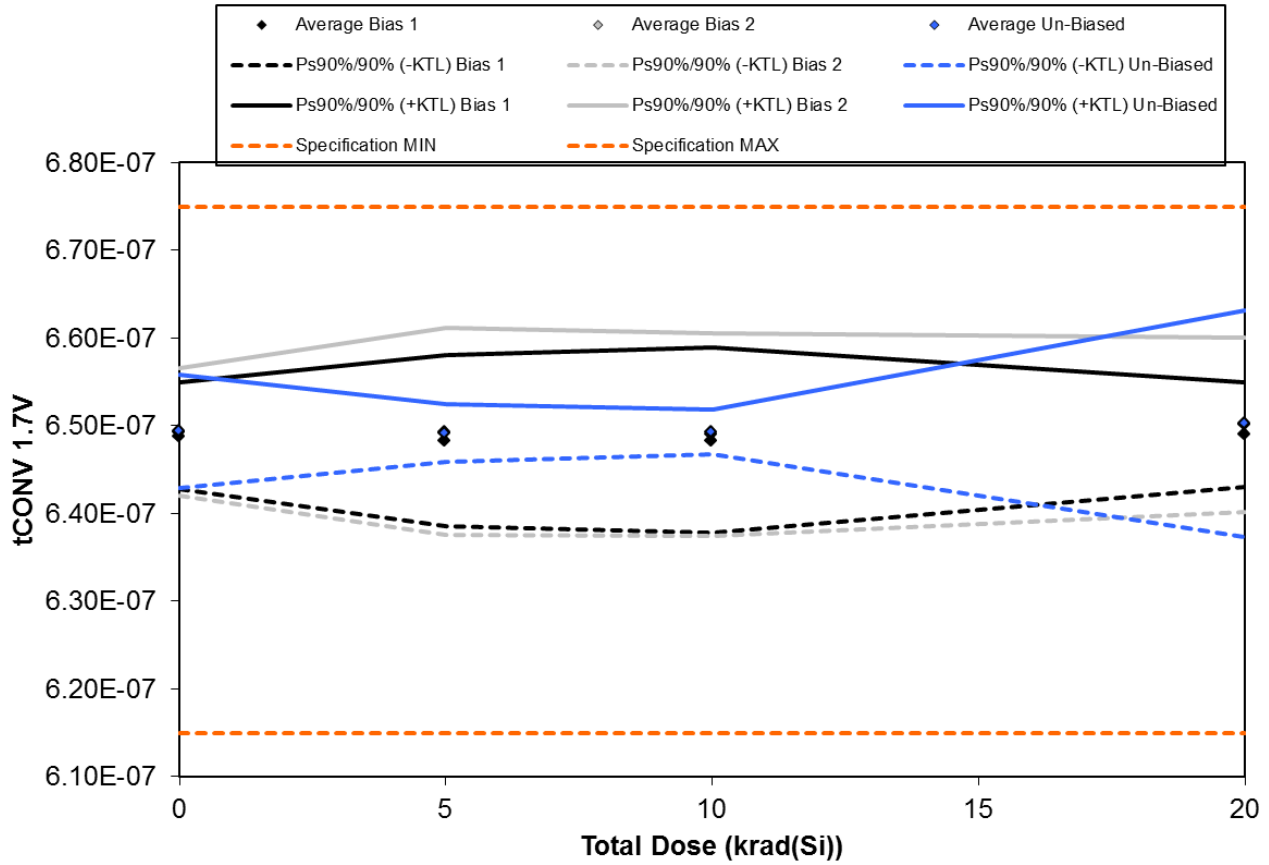


Figure 5.50. Plot of tCONV 1.7V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.50. Raw data for tCONV 1.7V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tCONV 1.7V Device	Total Dose (krad(Si))			
	0	5	10	20
1	6.54E-07	6.54E-07	6.55E-07	
2	6.46E-07	6.47E-07	6.46E-07	
3	6.46E-07	6.46E-07	6.46E-07	
4	6.48E-07	6.48E-07	6.48E-07	
5	6.46E-07	6.47E-07	6.47E-07	
420	6.49E-07			6.49E-07
421	6.52E-07			6.46E-07
422	6.46E-07			6.49E-07
423	6.50E-07			6.49E-07
424	6.51E-07			6.52E-07
6	6.55E-07	6.54E-07	6.54E-07	
7	6.45E-07	6.52E-07	6.46E-07	
8	6.51E-07	6.46E-07	6.51E-07	
9	6.44E-07	6.44E-07	6.44E-07	
10	6.51E-07	6.51E-07	6.51E-07	
425	6.49E-07			6.52E-07
426	6.53E-07			6.45E-07
427	6.45E-07			6.54E-07
428	6.50E-07			6.51E-07
194	6.49E-07			6.49E-07
11	6.47E-07	6.47E-07	6.48E-07	
12	6.49E-07	6.50E-07	6.49E-07	
13	6.49E-07	6.49E-07	6.50E-07	
14	6.49E-07	6.49E-07	6.50E-07	
15	6.50E-07	6.50E-07	6.50E-07	
48	6.50E-07			6.51E-07
49	6.55E-07			6.56E-07
50	6.46E-07			6.46E-07
191	6.45E-07			6.45E-07
193	6.54E-07			6.54E-07
Bias 1 Statistics				
Average Bias 1	6.49E-07	6.48E-07	6.48E-07	6.49E-07
Std Dev Bias 1	2.95E-09	3.55E-09	3.85E-09	2.15E-09
Ps90%/90% (+KTL) Bias 1	6.55E-07	6.58E-07	6.59E-07	6.55E-07
Ps90%/90% (-KTL) Bias 1	6.43E-07	6.39E-07	6.38E-07	6.43E-07
Bias 2 Statistics				
Average Bias 2	6.49E-07	6.49E-07	6.49E-07	6.50E-07
Std Dev Bias 2	3.53E-09	4.31E-09	4.22E-09	3.63E-09
Ps90%/90% (+KTL) Bias 2	6.57E-07	6.61E-07	6.61E-07	6.60E-07
Ps90%/90% (-KTL) Bias 2	6.42E-07	6.38E-07	6.37E-07	6.40E-07
Un-Biased Statistics				
Average Un-Biased	6.49E-07	6.49E-07	6.49E-07	6.50E-07
Std Dev Un-Biased	3.14E-09	1.19E-09	9.28E-10	4.72E-09
Ps90%/90% (+KTL) Un-Biased	6.56E-07	6.52E-07	6.52E-07	6.63E-07
Ps90%/90% (-KTL) Un-Biased	6.43E-07	6.46E-07	6.47E-07	6.37E-07
Specification MIN	6.15E-07	6.15E-07	6.15E-07	
Status	PASS	PASS	PASS	Info Only
Specification MAX	6.75E-07	6.75E-07	6.75E-07	
Status	PASS	PASS	PASS	Info Only

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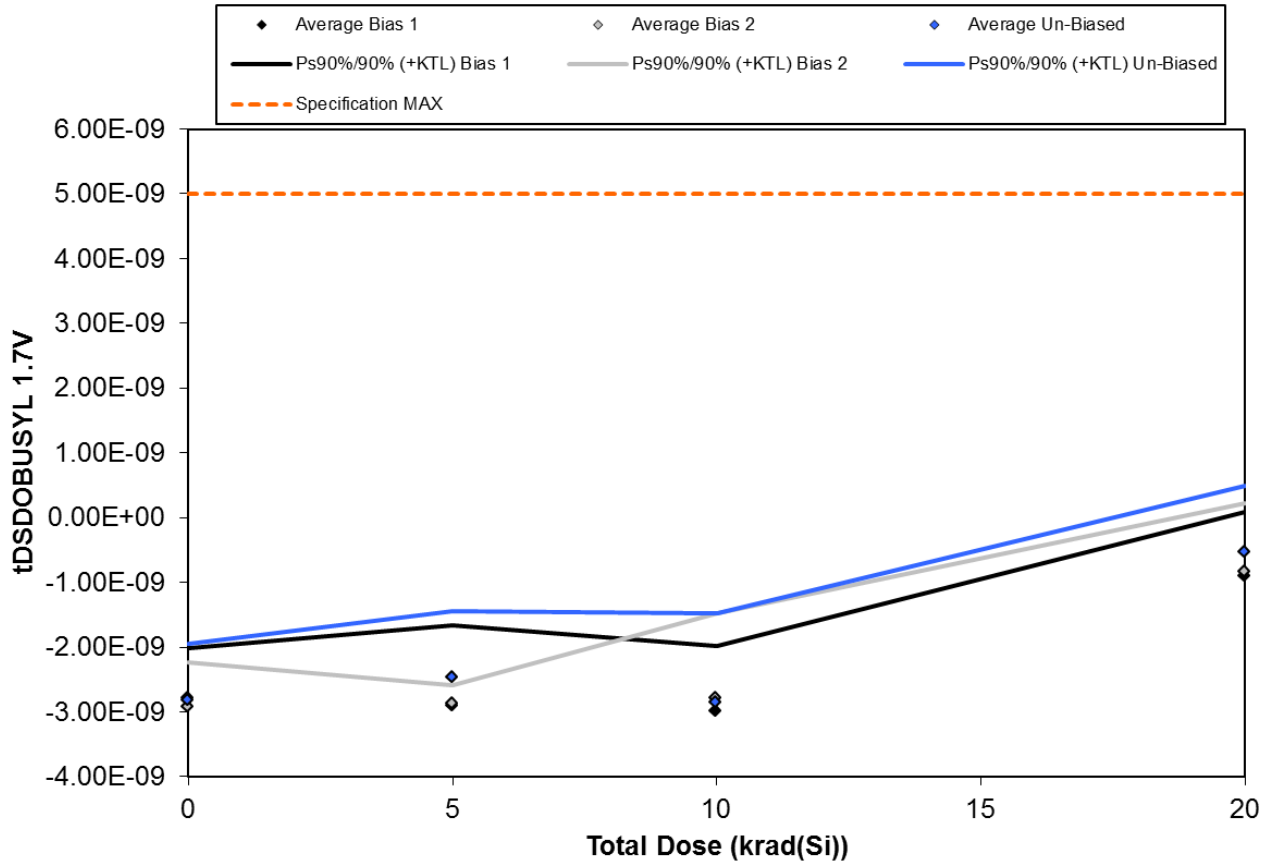


Figure 5.51. Plot of tDSDOBUSYL 1.7V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Table 5.51. Raw data for tDSDOBUSYL 1.7V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDSDOBUSYL 1.7V	Total Dose (krad(Si))			
	0	5	10	20
Device				
1	-3.23E-09	-3.17E-09	-3.50E-09	
2	-2.49E-09	-3.39E-09	-3.22E-09	
3	-2.85E-09	-2.42E-09	-2.83E-09	
4	-3.49E-09	-2.43E-09	-2.57E-09	
5	-2.81E-09	-3.08E-09	-2.82E-09	
420	-2.72E-09			-4.20E-10
421	-2.17E-09			-1.16E-09
422	-2.83E-09			-9.10E-10
423	-2.54E-09			-6.67E-10
424	-2.71E-09			-1.29E-09
6	-3.58E-09	-2.87E-09	-2.85E-09	
7	-2.94E-09	-2.85E-09	-3.39E-09	
8	-3.34E-09	-2.83E-09	-2.12E-09	
9	-2.86E-09	-3.04E-09	-2.96E-09	
10	-2.70E-09	-2.76E-09	-2.56E-09	
425	-2.73E-09			-1.21E-09
426	-2.48E-09			-9.66E-10
427	-2.94E-09			-1.12E-09
428	-2.73E-09			-3.73E-10
194	-2.81E-09			-4.59E-10
11	-2.06E-09	-2.82E-09	-3.04E-09	
12	-2.33E-09	-1.89E-09	-2.16E-09	
13	-3.02E-09	-2.65E-09	-3.52E-09	
14	-2.95E-09	-2.30E-09	-2.80E-09	
15	-3.33E-09	-2.61E-09	-2.71E-09	
48	-3.01E-09			-2.12E-10
49	-3.12E-09			-8.65E-10
50	-3.17E-09			-7.93E-10
191	-2.52E-09			-4.97E-11
193	-2.57E-09			-6.98E-10
Bias 1 Statistics				
Average Bias 1	-2.78E-09	-2.90E-09	-2.99E-09	-8.90E-10
Std Dev Bias 1	3.70E-10	4.48E-10	3.68E-10	3.55E-10
Ps90%/90% (+KTL) Bias 1	-2.02E-09	-1.67E-09	-1.98E-09	8.35E-11
Ps90%/90% (-KTL) Bias 1	-3.55E-09	-4.13E-09	-4.00E-09	-1.86E-09
Bias 2 Statistics				
Average Bias 2	-2.91E-09	-2.87E-09	-2.77E-09	-8.24E-10
Std Dev Bias 2	3.25E-10	1.06E-10	4.72E-10	3.84E-10
Ps90%/90% (+KTL) Bias 2	-2.24E-09	-2.58E-09	-1.48E-09	2.28E-10
Ps90%/90% (-KTL) Bias 2	-3.58E-09	-3.16E-09	-4.07E-09	-1.88E-09
Un-Biased Statistics				
Average Un-Biased	-2.81E-09	-2.45E-09	-2.84E-09	-5.23E-10
Std Dev Un-Biased	4.14E-10	3.67E-10	4.96E-10	3.68E-10
Ps90%/90% (+KTL) Un-Biased	-1.95E-09	-1.45E-09	-1.48E-09	4.85E-10
Ps90%/90% (-KTL) Un-Biased	-3.66E-09	-3.46E-09	-4.21E-09	-1.53E-09
Specification MAX	5.00E-09	5.00E-09	5.00E-09	
Status	PASS	PASS	PASS	Info Only

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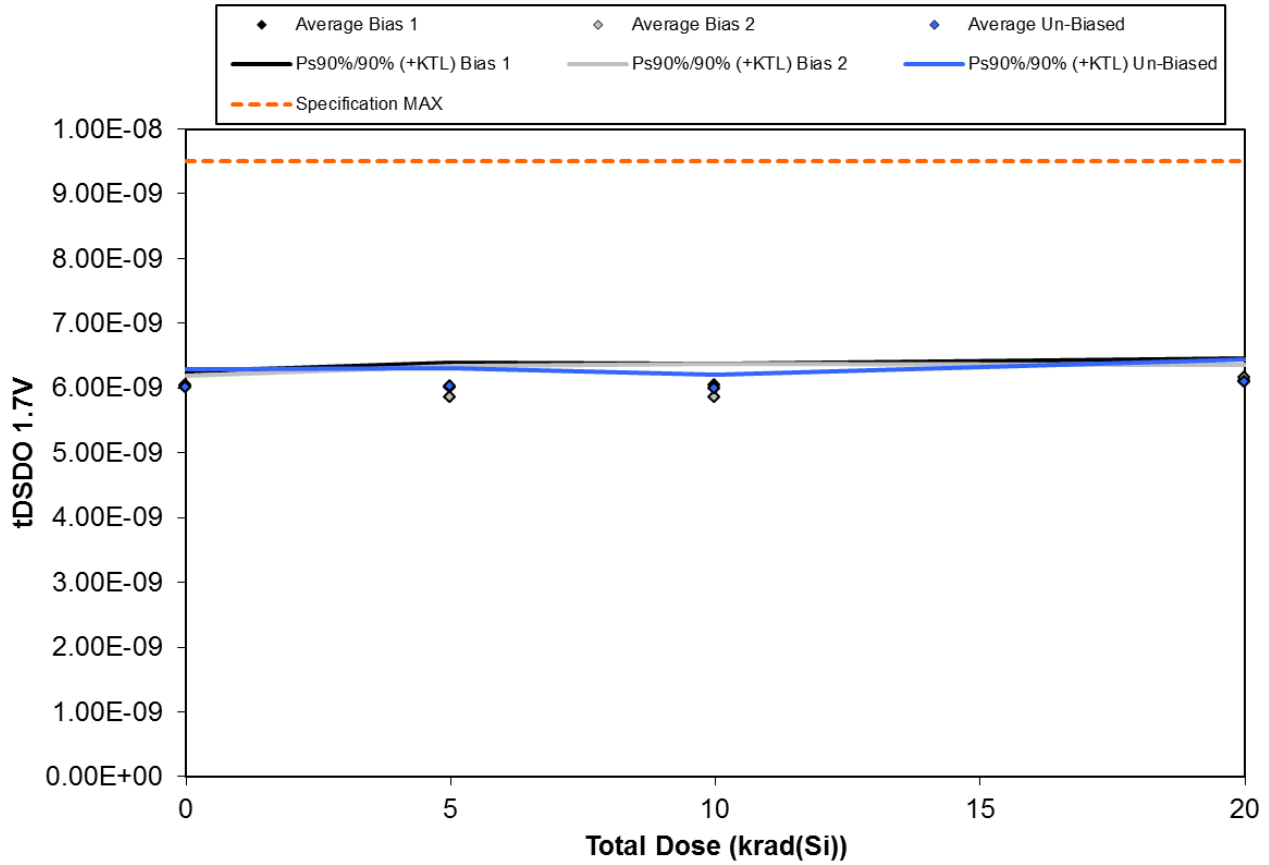


Figure 5.52. Plot of tDSDO 1.7V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Colorado Springs, CO 80919
(719) 531-0800

Table 5.52. Raw data for tDSDO 1.7V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDSDO 1.7V Device	Total Dose (krad(Si))			
	0	5	10	20
1	5.96E-09	6.14E-09	6.20E-09	
2	5.94E-09	6.15E-09	6.05E-09	
3	6.09E-09	5.84E-09	6.10E-09	
4	6.06E-09	6.02E-09	6.03E-09	
5	6.12E-09	5.91E-09	5.88E-09	
420	6.06E-09			6.12E-09
421	6.07E-09			6.26E-09
422	5.88E-09			6.19E-09
423	5.96E-09			5.93E-09
424	6.26E-09			6.08E-09
6	6.12E-09	5.94E-09	6.03E-09	
7	6.09E-09	5.80E-09	6.10E-09	
8	5.99E-09	6.12E-09	5.72E-09	
9	5.93E-09	5.70E-09	5.81E-09	
10	6.06E-09	5.74E-09	5.68E-09	
425	6.06E-09			6.14E-09
426	5.85E-09			6.10E-09
427	6.04E-09			6.12E-09
428	6.07E-09			6.28E-09
194	6.06E-09			6.16E-09
11	6.01E-09	6.19E-09	6.01E-09	
12	5.85E-09	6.00E-09	5.92E-09	
13	5.90E-09	5.95E-09	6.10E-09	
14	6.11E-09	6.07E-09	5.92E-09	
15	6.27E-09	5.98E-09	6.01E-09	
48	6.05E-09			6.05E-09
49	5.86E-09			6.04E-09
50	6.01E-09			6.04E-09
191	6.13E-09			6.07E-09
193	5.96E-09			6.32E-09
Bias 1 Statistics				
Average Bias 1	6.04E-09	6.01E-09	6.05E-09	6.12E-09
Std Dev Bias 1	1.08E-10	1.36E-10	1.18E-10	1.25E-10
Ps90%/90% (+KTL) Bias 1	6.26E-09	6.39E-09	6.37E-09	6.46E-09
Ps90%/90% (-KTL) Bias 1	5.82E-09	5.64E-09	5.73E-09	5.77E-09
Bias 2 Statistics				
Average Bias 2	6.03E-09	5.86E-09	5.87E-09	6.16E-09
Std Dev Bias 2	8.08E-11	1.72E-10	1.87E-10	7.23E-11
Ps90%/90% (+KTL) Bias 2	6.19E-09	6.33E-09	6.38E-09	6.36E-09
Ps90%/90% (-KTL) Bias 2	5.86E-09	5.39E-09	5.36E-09	5.96E-09
Un-Biased Statistics				
Average Un-Biased	6.01E-09	6.04E-09	5.99E-09	6.10E-09
Std Dev Un-Biased	1.31E-10	9.74E-11	7.67E-11	1.21E-10
Ps90%/90% (+KTL) Un-Biased	6.28E-09	6.31E-09	6.20E-09	6.43E-09
Ps90%/90% (-KTL) Un-Biased	5.74E-09	5.77E-09	5.78E-09	5.77E-09
Specification MAX	9.50E-09	9.50E-09	9.50E-09	
Status	PASS	PASS	PASS	Info Only

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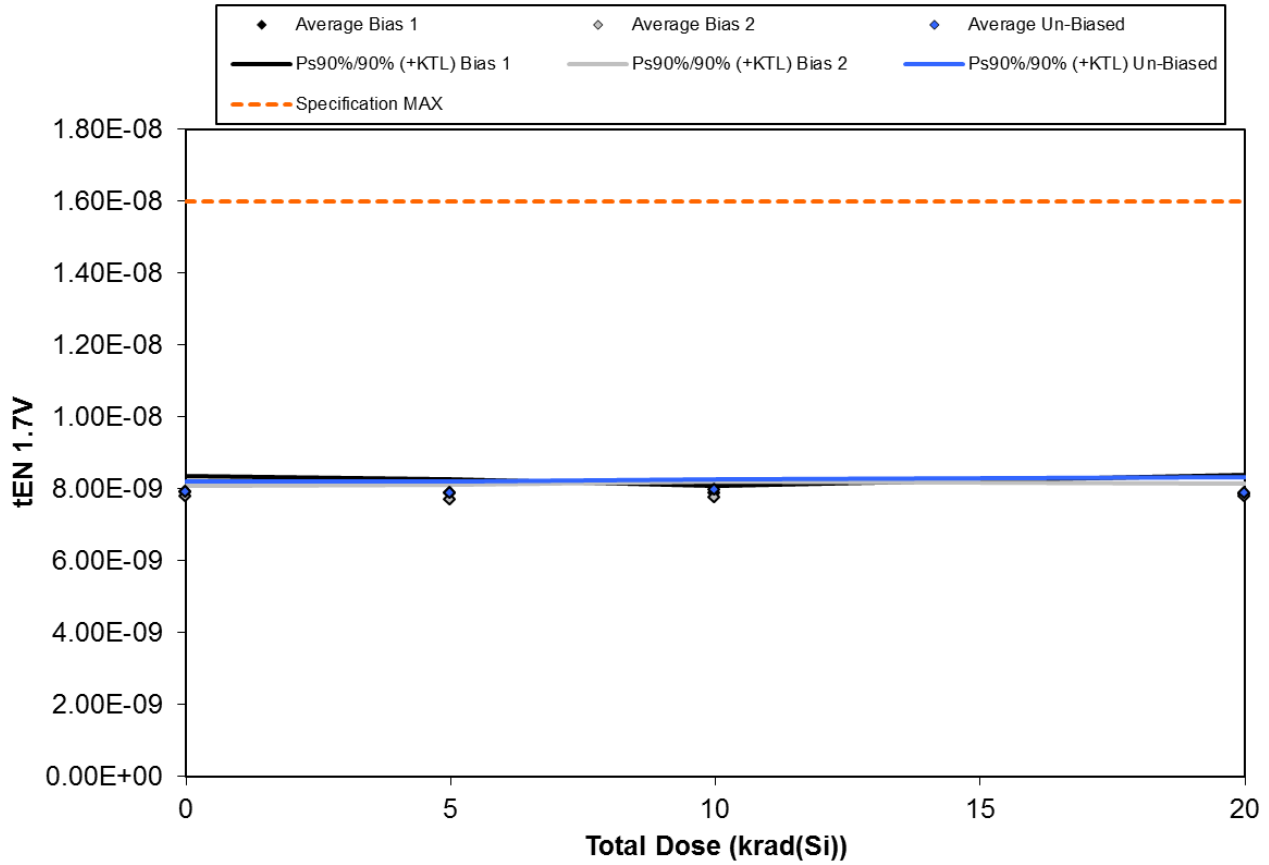


Figure 5.53. Plot of tEN 1.7V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Aeroflex RAD
5030 Centennial Blvd.
Colorado Springs, CO 80919
(719) 531-0800

Table 5.53. Raw data for tEN 1.7V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tEN 1.7V Device	Total Dose (krad(Si))			
	0	5	10	20
1	7.95E-09	7.69E-09	7.90E-09	
2	7.97E-09	7.90E-09	7.95E-09	
3	8.13E-09	8.03E-09	7.86E-09	
4	8.06E-09	7.83E-09	7.80E-09	
5	8.08E-09	7.98E-09	7.97E-09	
420	7.71E-09			7.96E-09
421	8.09E-09			8.02E-09
422	7.52E-09			7.97E-09
423	7.74E-09			7.75E-09
424	8.06E-09			7.56E-09
6	7.94E-09	7.91E-09	8.00E-09	
7	7.86E-09	7.68E-09	7.76E-09	
8	7.90E-09	7.79E-09	7.75E-09	
9	7.52E-09	7.51E-09	7.55E-09	
10	7.74E-09	7.65E-09	7.73E-09	
425	7.88E-09			7.88E-09
426	7.56E-09			7.73E-09
427	7.79E-09			7.68E-09
428	7.85E-09			7.97E-09
194	7.81E-09			7.69E-09
11	7.77E-09	7.85E-09	7.95E-09	
12	7.68E-09	7.82E-09	7.93E-09	
13	8.07E-09	7.77E-09	7.86E-09	
14	8.05E-09	8.06E-09	8.13E-09	
15	8.09E-09	7.97E-09	7.99E-09	
48	7.83E-09			7.84E-09
49	7.77E-09			7.70E-09
50	7.84E-09			7.87E-09
191	8.00E-09			7.94E-09
193	7.92E-09			8.13E-09
Bias 1 Statistics				
Average Bias 1	7.93E-09	7.89E-09	7.90E-09	7.85E-09
Std Dev Bias 1	2.04E-10	1.34E-10	6.95E-11	1.94E-10
Ps90%/90% (+KTL) Bias 1	8.35E-09	8.25E-09	8.09E-09	8.38E-09
Ps90%/90% (-KTL) Bias 1	7.51E-09	7.52E-09	7.71E-09	7.32E-09
Bias 2 Statistics				
Average Bias 2	7.79E-09	7.71E-09	7.76E-09	7.79E-09
Std Dev Bias 2	1.41E-10	1.49E-10	1.59E-10	1.27E-10
Ps90%/90% (+KTL) Bias 2	8.08E-09	8.12E-09	8.19E-09	8.14E-09
Ps90%/90% (-KTL) Bias 2	7.50E-09	7.30E-09	7.32E-09	7.44E-09
Un-Biased Statistics				
Average Un-Biased	7.90E-09	7.89E-09	7.97E-09	7.89E-09
Std Dev Un-Biased	1.45E-10	1.17E-10	1.01E-10	1.57E-10
Ps90%/90% (+KTL) Un-Biased	8.20E-09	8.21E-09	8.25E-09	8.33E-09
Ps90%/90% (-KTL) Un-Biased	7.60E-09	7.57E-09	7.70E-09	7.46E-09
Specification MAX	1.60E-08	1.60E-08	1.60E-08	
Status	PASS	PASS	PASS	Info Only

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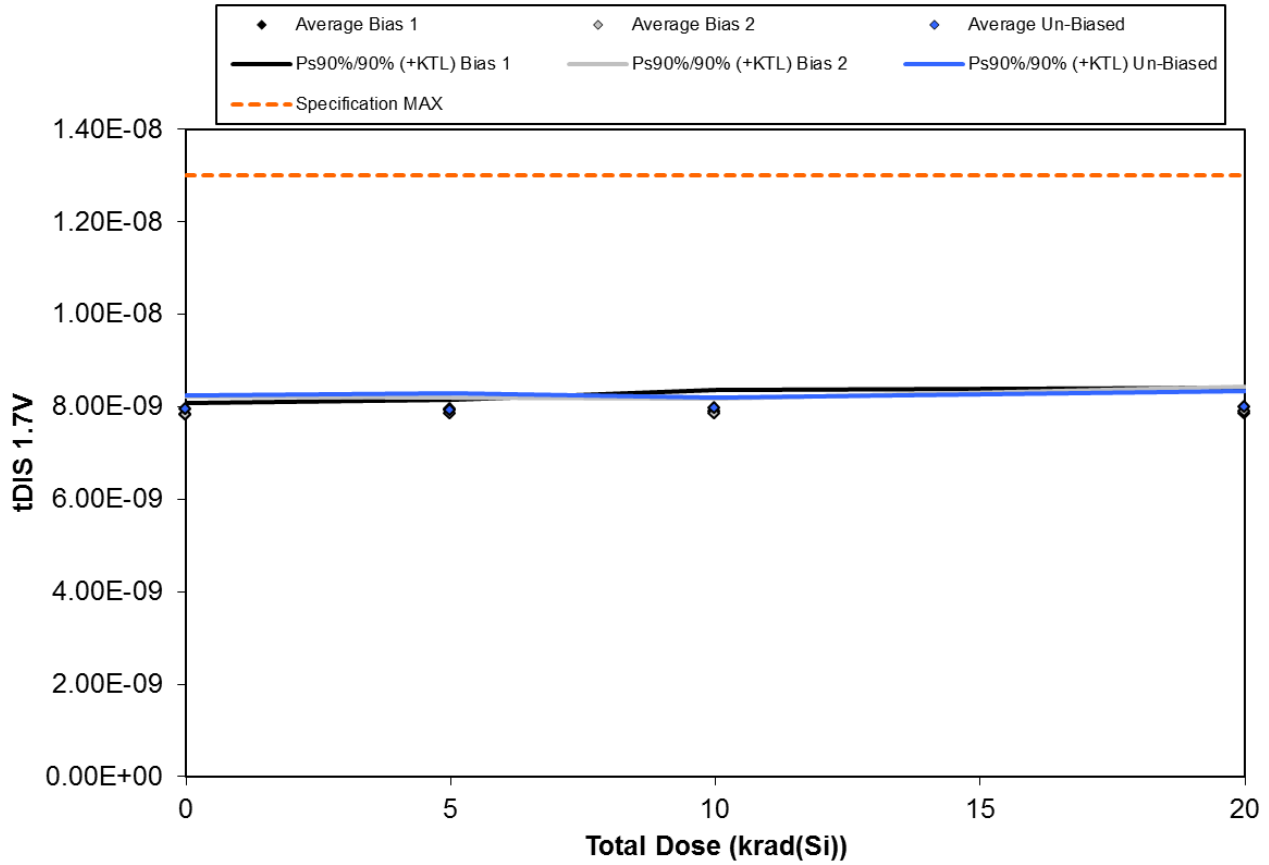


Figure 5.54. Plot of tDIS 1.7V versus total dose. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the upper and/or lower confidence limits, as determined by KTL statistics, on the samples irradiated in the unbiased condition. The red dotted line(s) are the pre- and/or post-irradiation minimum and/or maximum specification value as defined in the datasheet and/or test plan.



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Aeroflex RAD
5030 Centennial Blvd.
Colorado Springs, CO 80919
(719) 531-0800

Table 5.54. Raw data for tDIS 1.7V versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

tDIS 1.7V Device	Total Dose (krad(Si))			
	0	5	10	20
1	7.76E-09	7.97E-09	8.00E-09	
2	7.78E-09	7.94E-09	7.71E-09	
3	7.94E-09	7.85E-09	8.01E-09	
4	7.74E-09	8.05E-09	8.05E-09	
5	7.97E-09	7.97E-09	7.71E-09	
420	7.86E-09			8.16E-09
421	7.80E-09			7.62E-09
422	7.74E-09			7.80E-09
423	8.05E-09			7.76E-09
424	7.77E-09			7.94E-09
6	8.08E-09	7.86E-09	7.96E-09	
7	8.08E-09	7.68E-09	7.84E-09	
8	7.71E-09	8.02E-09	7.96E-09	
9	7.62E-09	7.90E-09	7.74E-09	
10	7.96E-09	7.82E-09	7.72E-09	
425	7.91E-09			7.76E-09
426	7.78E-09			7.60E-09
427	7.63E-09			8.03E-09
428	7.63E-09			8.07E-09
194	7.92E-09			7.98E-09
11	7.97E-09	8.07E-09	7.95E-09	
12	7.78E-09	7.84E-09	7.86E-09	
13	8.01E-09	7.89E-09	7.96E-09	
14	8.09E-09	7.79E-09	8.05E-09	
15	8.19E-09	8.06E-09	8.06E-09	
48	7.74E-09			8.12E-09
49	7.97E-09			8.00E-09
50	8.02E-09			7.79E-09
191	7.88E-09			8.06E-09
193	7.79E-09			7.98E-09
Bias 1 Statistics				
Average Bias 1	7.84E-09	7.95E-09	7.90E-09	7.86E-09
Std Dev Bias 1	1.10E-10	7.25E-11	1.71E-10	2.05E-10
Ps90%/90% (+KTL) Bias 1	8.07E-09	8.15E-09	8.37E-09	8.42E-09
Ps90%/90% (-KTL) Bias 1	7.61E-09	7.76E-09	7.43E-09	7.30E-09
Bias 2 Statistics				
Average Bias 2	7.83E-09	7.86E-09	7.84E-09	7.89E-09
Std Dev Bias 2	1.83E-10	1.22E-10	1.17E-10	2.01E-10
Ps90%/90% (+KTL) Bias 2	8.21E-09	8.19E-09	8.16E-09	8.44E-09
Ps90%/90% (-KTL) Bias 2	7.45E-09	7.52E-09	7.52E-09	7.34E-09
Un-Biased Statistics				
Average Un-Biased	7.94E-09	7.93E-09	7.98E-09	7.99E-09
Std Dev Un-Biased	1.46E-10	1.29E-10	8.21E-11	1.23E-10
Ps90%/90% (+KTL) Un-Biased	8.25E-09	8.28E-09	8.20E-09	8.33E-09
Ps90%/90% (-KTL) Un-Biased	7.64E-09	7.58E-09	7.75E-09	7.65E-09
Specification MAX	1.30E-08	1.30E-08	1.30E-08	
Status	PASS	PASS	PASS	Info Only

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6.0. Summary / Conclusions

The total ionizing dose testing described in this final report was performed using the facilities at Aeroflex RAD's Longmire Laboratories in Colorado Springs, CO. The high dose rate total ionizing dose (TID) source is a JLSA 81-24 irradiator modified to provide a panoramic exposure. The Co-60 rods are held in the base of the irradiator heavily shielded by lead, during the radiation exposures the rod is raised by an electronic timer/controller and the exposure is performed in air. The dose rate for this irradiator in this configuration ranges from $<1\text{rad(Si)/s}$ to a maximum of approximately 300rad(Si)/s , determined by the distance from the source.

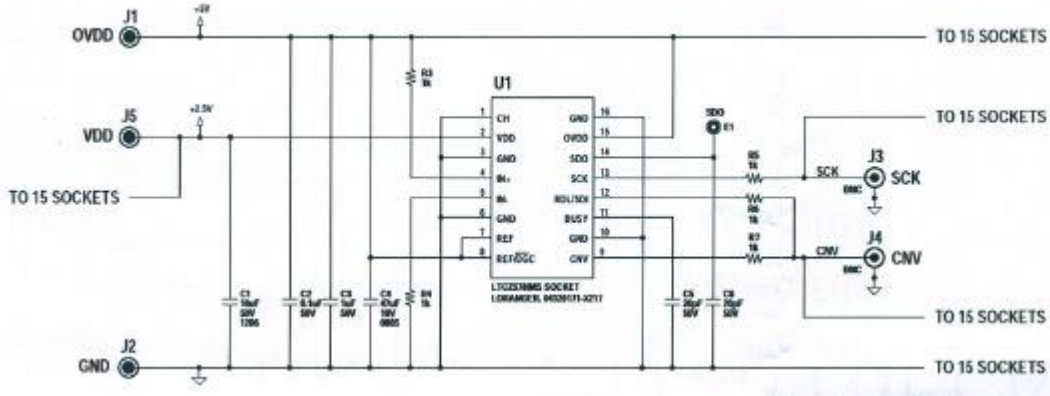
The parametric data was obtained as "read and record" and all the raw data plus an attributes summary are contained in this report as well as in a separate Excel file. The attributes data contains the average, standard deviation and the average with the KTL values applied. The KTL value used in this work is 2.742 per MIL-HDBK-814 using one sided tolerance limits of 90/90 and a 10-piece sample size.

The RT2378IMS-20 (RT2378-20) 20-Bit, 1Msps, Low Power SAR ADC with 0.5ppm INL (from the lot traceability information provided on the first page of this test report) units were irradiated to customer's requirements and no Pass/Fail criteria were applied. The results of the testing are shown in Section 5 and the customer shall review the test results and disposition the part lot.



Appendix B: Radiation Bias Schematic, Bias Set-up and DUT Board.

HDR Radiation Bias 1 Condition: Extracted from RT2378-20 TID Radiation Set-up Rev 1 pdf.



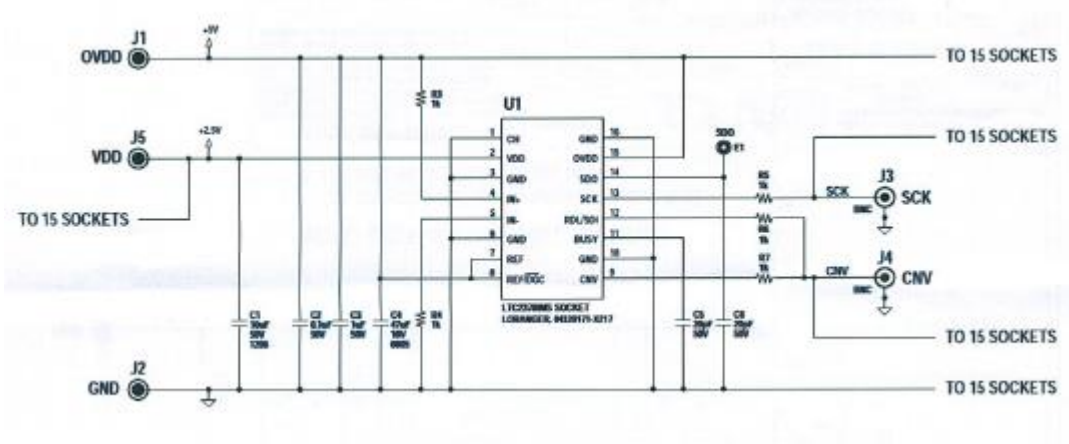
Radiation Bias1 Schematic

1. Connect 5V to J1/OVDD 8.5uA
2. Connect 2.5V to J5/VDD 9.5uA
3. Connect Gnd to J2/GND
4. Connect Gnd to J3/SCK 0mA
5. Connect Gnd to J4/CNV 0mA

LTC2378-20 Bias 1 Set-up



HDR Radiation Bias 2 Conditions: Extracted from RT2378-20 TID Radiation Set-up Rev 1 pdf.



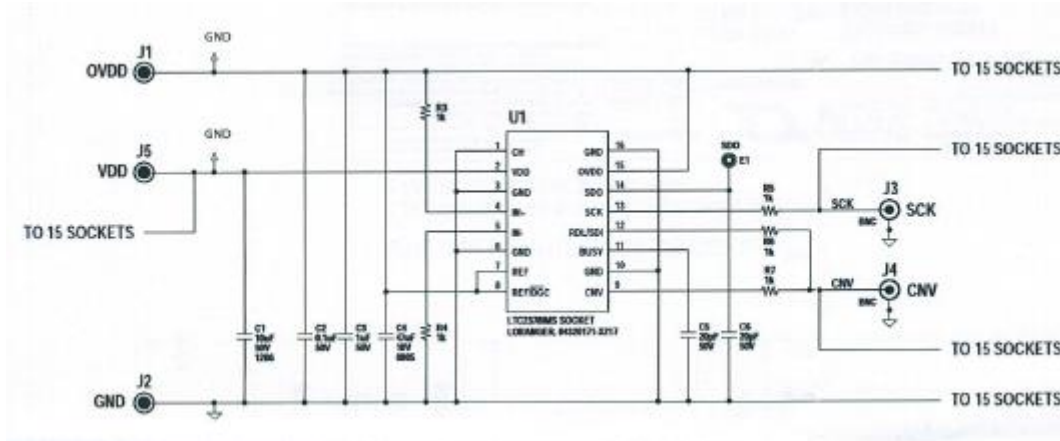
Radiation Bias2 Schematic

1. Connect 2.5V to J1/OVDD 8.5uA
2. Connect 2.5V to J5/VDD 9.5uA
3. Connect Gnd to J2/GND
4. Connect Gnd to J3/SCK 0mA
5. Connect Gnd to J4/CNV 0mA

LTC2378-20 Bias 2 Set-up



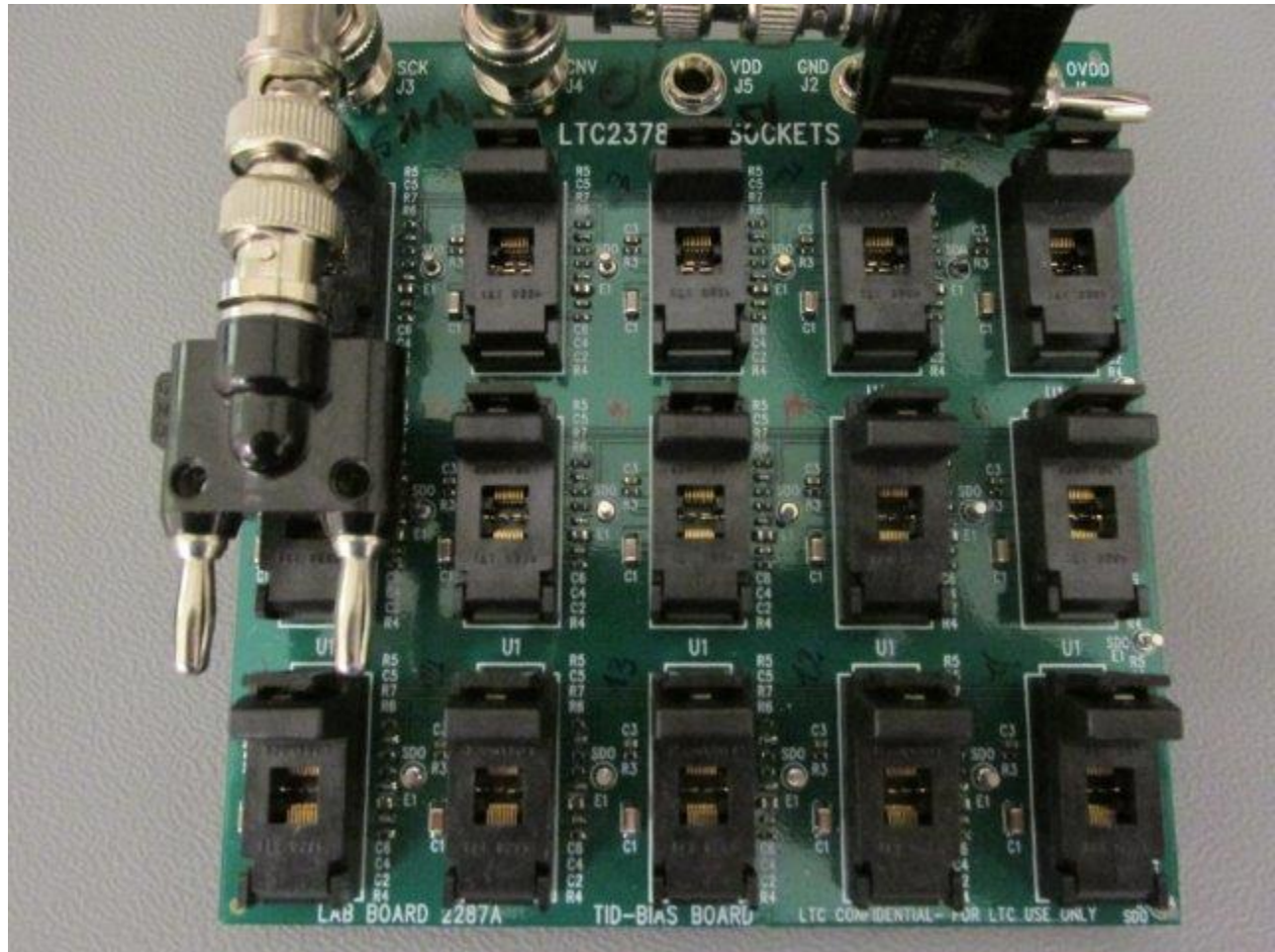
HDR Radiation Un-Biased Condition: Extracted from RT2378-20 TID Radiation Set-up Rev 1 pdf.



Radiation Un-Biased Schematic

1. Connect Gnd to J1/OVDD 0ma
2. Connect Gnd to J5/VDD 0ma
3. Connect Gnd to J2/GND
4. Connect Gnd to J3/SCK 0mA
5. Connect Gnd to J4/CNV 0mA

LTC2378-20 Un-Biased Set-up



DUT Board



Appendix C: List of Figures Used in the Results Section (Section 5)

- 5.1. Digital Input Current CNV I1H
- 5.2. Digital Input Current RDL I1H
- 5.3. Digital Input Current SCK I1H
- 5.4. Digital Input Current CHAIN I1H
- 5.5. Digital Input Current DGC I1H
- 5.6. Digital Input Current CNV I1L
- 5.7. Digital Input Current RDL I1L
- 5.8. Digital Input Current SCK I1L
- 5.9. Digital Input Current CHAIN I1L
- 5.10. Digital Input Current DGC I1L
- 5.11. Analog Input Current INP I1H
- 5.12. Analog Input Current INN I1H
- 5.13. Analog Input Current INP I1L
- 5.14. Analog Input Current INN I1L
- 5.15. Hi-Z Output Leakage Current 5.25V
- 5.16. Hi-Z Output Leakage Current 0V
- 5.17. Low Level Output Voltage 5.25V
- 5.18. High Level Output Voltage 5.25V
- 5.19. Low Level Output Voltage 1.71V
- 5.20. High Level Output Voltage 1.71V
- 5.21. OFFSET/1M \leftrightarrow T_Offset_Gain
- 5.22. PFS_ERROR/1M \leftrightarrow T_Offset_Gain
- 5.23. NFS_ERROR/1M \leftrightarrow T_Offset_Gain
- 5.24. Integral Linearity Error Max
- 5.25. Integral Linearity Error Min
- 5.26. Integral Linearity Error Max DGC=GND
- 5.27. Integral Linearity Error Min DGC=GND
- 5.28. SNR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
- 5.29. THD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
- 5.30. SFDR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
- 5.31. SINAD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$
- 5.32. SNR $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ DGC=GND
- 5.33. THD $f_{in}=2\text{kHz}$ $V_{ref}=5\text{V}$ DGC=GND
- 5.34. SNR $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$
- 5.35. THD $f_{in}=2\text{kHz}$ $V_{ref}=2.5\text{V}$
- 5.36. Supply Current IREF
- 5.37. Supply Current IVDD
- 5.38. Supply Current IOVDD
- 5.39. Power Down Mode IPD
- 5.40. tCONV 5.25V



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Colorado Springs, CO 80919
(719) 531-0800

- 5.41. tDSDOBUSYL 5.25V
- 5.42. tDSDO 5.25V
- 5.43. tEN 5.25V
- 5.44. tDIS 5.25V
- 5.45. tCONV 2.5V
- 5.46. tDSDOBUSYL 2.5V
- 5.47. tDSDO 2.5V
- 5.48. tEN 2.5V
- 5.49. tDIS 2.5V
- 5.50. tCONV 1.7V
- 5.51. tDSDOBUSYL 1.7V
- 5.52. tDSDO 1.7V
- 5.53. tEN 1.7V
- 5.54. tDIS 1.7V