



Radiation Lot Acceptance Testing (RLAT) of the RH1014MW Quad Precision Operational Amplifier for Linear Technology

Customer: Linear Technology, PO# 5555F

RAD Job Number: 09-298

Part Type Tested: Linear Technology RH1014MW Quad Precision Operational Amplifier

Commercial Part Number: RH1014MW

Traceability Information: Lot Date Code: 0834A, Fab # W10722836.1 Wafer 8, Assy Lot #463812.1. Information obtained from Linear Technology PO#5555F

Quantity of Units: 12 units total, 5 units for biased irradiation, 5 units for unbiased irradiation (all pins tied to ground) and 2 control units. Serial numbers 1115-1119 were biased during irradiation, serial numbers 1120-1124 were unbiased during irradiation (all pins tied to ground) and serial numbers 1125 and 1126 were used as controls.

External Traveler: None required

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

TID Dose Rate and Test Increments: 50-300rad(Si)/s with readings at pre-irradiation, 20, 50, 100, and 200krad(Si).

TID Overtest and Post-Irradiation Anneal: No overttest or anneal.

TID Test Standard: MIL-STD-883G, Method 1019.7, Condition A

TID Electrical Test Conditions: Pre-irradiation, and within one hour following each radiation exposure.

Test Hardware and Software: LTS2020 Tester, 2101 Family Board, 0600 Fixture and RH1014 DUT Board (BGSS-970312B) and RH1014L3.SRC test program.

Facility and Radiation Source: Radiation Assured Devices Longmire Laboratories, Colorado Springs, CO using the JLSA 81-24 high dose rate Co60 source. Dosimetry performed by CaF TLDs traceable to NIST. RAD's dosimetry has been audited by DSCC and RAD has been awarded Laboratory Suitability for MIL-STD-750 TM 1019.5.

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

RLAT Result: PASSED. Units passed to 200krad(Si) with all parameters remaining within specification including after application of 90/90 KTL statistics.



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-883 TM1019.7 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-883 TM1019.7 Condition A.

2.0. Radiation Test Apparatus

The total ionizing dose testing described in this final report was performed using the facilities at Radiation Assured Devices' Longmire Laboratories in Colorado Springs, CO. The high dose rate total ionizing dose (TID) source is a JLSA 84-21 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 <1rad(Si)/s to a maximum of approximately 120rad(Si)/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 Radiation Assured Devices Longmire Laboratories using thermoluminescent dosimeters (TLDs) traceable to the National Institute of Standards and Technology (NIST). Figure 2.1 shows a photograph of the JLSA 81-24 Co-60 irradiator at RAD's Longmire Laboratory facility.

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



Figure 2.1. Radiation Assured Devices' 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 120rad(Si)/s close to the rods down to 1rad(Si)/s at a distance of approximately 2-feet.



3.0. Radiation Test Conditions

The RH1014 quad operational amplifiers described in this final report were irradiated using a split 15V supply and with all pins tied to ground, that is biased and unbiased. See the TID Bias Table in Appendix A for the full bias circuits. These bias circuits satisfy the requirements of MIL-STD-883G TM1019.7 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 200krad(Si) with incremental readings at 20, 50, 100 and 200krad(Si) for all electrical tests using the $\pm 15V$ supply and with incremental readings at 20, 50 and 100krad(Si) for all electrical tests using the +5V and 0V supply conditions (See LINEAR TECHNOLOGY CORPORATION RH1014M Quad Precision Operational Amplifier Datasheet Page 3, Note 2). Electrical testing occurred within one hour following the end of each irradiation segment. For intermediate irradiations, the parts were tested and returned to total dose exposure within two hours from the end of the previous radiation increment.

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-883G TM1019.7 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 lead-aluminum enclosure was determined based on TLD dosimetry measurements (see previous section). The final dose rate for this work was 62.5rad(Si)/s with a precision of $\pm 5\%$.



4.0. Tested Parameters

During the radiation lot acceptance testing the pre- and post-irradiation electrical parameters measured were:

±15V Tests

1. Positive Supply Current (ICC+)
2. Negative Supply Current (IEE-)
3. Input Offset Voltage (VOS1-VOS4)
4. Input Offset Current (IOS1-IOS4)
5. + Input Bias Current (IB+1-IB+4)
6. - Input Bias Current (IB-1-IB-4)
7. Common Mode Rejection Ratio (CMRR1-CMRR4)
8. Power Supply Rejection Ratio (PSRR1-PSRR4)
9. Large Signal Voltage Gain (AVOL9-AVOL12)
10. Positive Output Voltage Swing (VOUT+1-VOUT+4)
11. Negative Output Voltage Swing (VOUT-1-VOUT-4)
12. Positive Slew Rate (SlewRate+1-SlewRate+4)
13. Negative Slew Rate (SlewRate-1-SlewRate-4)

+5V Tests

14. Positive Supply Current (ICC+2)
15. Negative Supply Current (IEE-2)
16. Input Offset Voltage (VOS5-VOS8)
17. Input Offset Current (IOS5-IOS8)
18. + Input Bias Current (IB+5-IB+8)
19. -Input Bias Current (IB-5-IB-8)
20. Positive Output Voltage Swing (VOUT+5-VOUT+8)
21. Positive Output Voltage Swing (VOUT+9-VOUT+12)
22. Output Voltage Low (VOUT-5-VOUT-8)
23. Output Voltage Low (VOUT-9-VOUT-12)
24. Output Voltage Low (VOUT-13-VOUT-16)

The parametric data was obtained as read and record and all the raw data plus an attributes summary are contained 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 is 2.742 per MIL HDBK 814 using one sided tolerance limits of 90/90 and a 5-piece sample size. Note that the following criteria must be met for a device to pass the RLAT: following the radiation exposure each of the 5 pieces shall pass the specification value and the average value for the ten-piece sample must pass the specification value



when the KTL limits are applied. If either of these conditions is not satisfied following the radiation exposure, then the lot could be logged as a failure.

5.0. Total Ionizing Dose Test Results

The RH1014 operational amplifiers passed the RLAT to the maximum tested level of 200krad(Si) (for the $\pm 15V$ supply conditions) and 100krad(Si) (for the +5V and 0V supply conditions) with all measured parameters remaining within specification, including after application of the KTL statistics. Input offset voltage, open loop gain (AVOL), input bias current, slew rate and select output voltage low suffered from some measure of radiation-induced degradation, however, as noted above, it was not sufficient to cause any of the parameters to go out of specification even after application of the KTL statistics.

Figures 5.1 and 5.83 show plots of all the measured parameters versus total ionizing dose while Tables 5.1 – 5.83 show the corresponding raw data for each of these parameters. Appendix D lists all the figures in this section. 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 average of the data points after application of the KTL statistics on the sample irradiated in the biased condition while the shaded lines (solid or dashed) are the average of the data points after application of the 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 throughout the test.

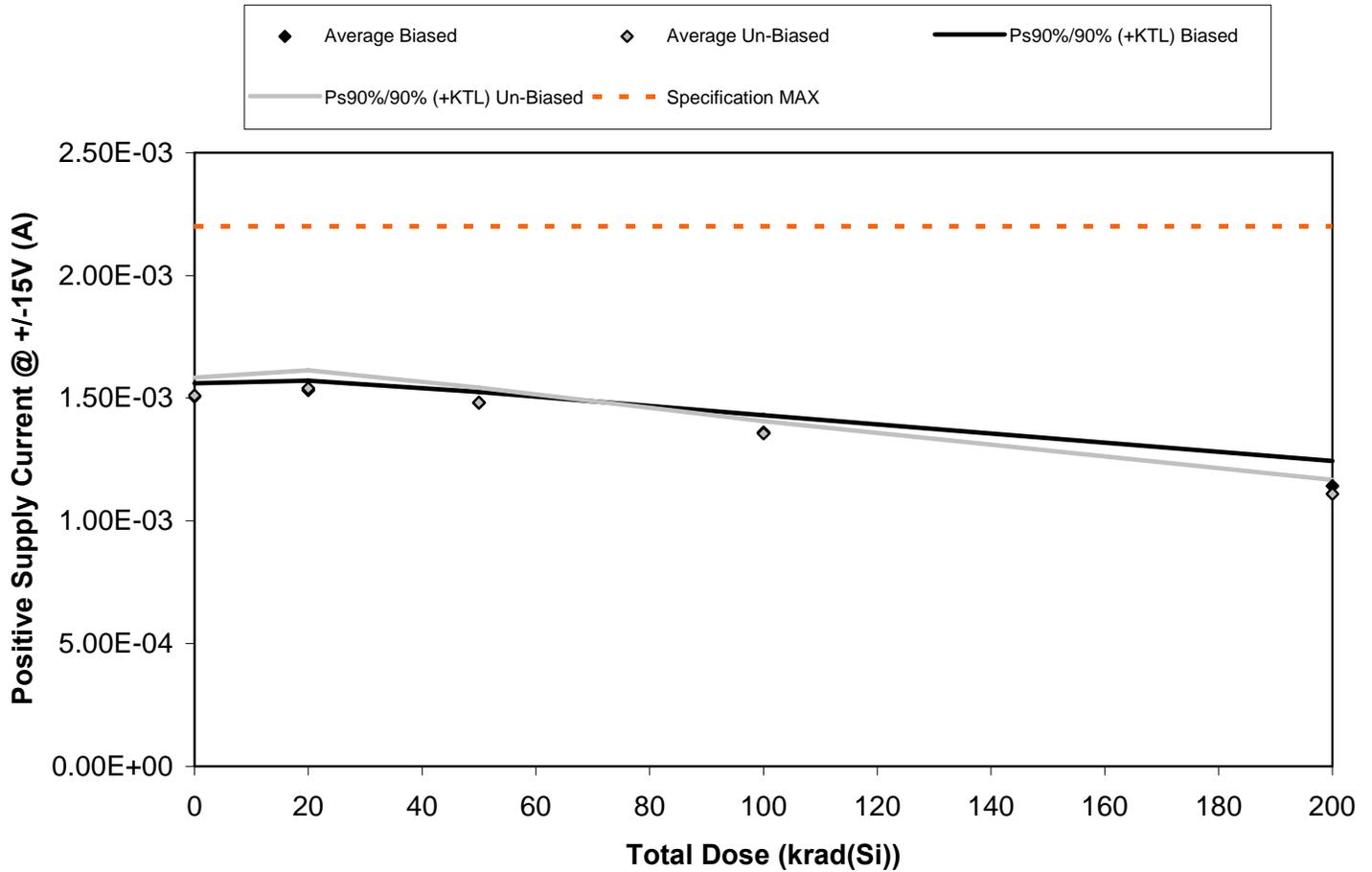


Figure 5.1. Plot of Positive Supply Current @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.1. Raw data for Positive Supply Current @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Supply Current @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.48E-03	1.52E-03	1.46E-03	1.33E-03	1.09E-03
1116	1.53E-03	1.55E-03	1.51E-03	1.39E-03	1.18E-03
1117	1.49E-03	1.52E-03	1.48E-03	1.37E-03	1.16E-03
1118	1.51E-03	1.53E-03	1.48E-03	1.37E-03	1.16E-03
1119	1.52E-03	1.54E-03	1.48E-03	1.35E-03	1.12E-03
1120	1.49E-03	1.52E-03	1.47E-03	1.35E-03	1.10E-03
1121	1.48E-03	1.52E-03	1.46E-03	1.33E-03	1.08E-03
1122	1.55E-03	1.58E-03	1.52E-03	1.38E-03	1.13E-03
1123	1.52E-03	1.54E-03	1.48E-03	1.36E-03	1.13E-03
1124	1.51E-03	1.54E-03	1.48E-03	1.36E-03	1.11E-03
1125	1.49E-03	1.50E-03	1.50E-03	1.50E-03	1.48E-03
1126	1.55E-03	1.57E-03	1.57E-03	1.56E-03	1.55E-03
Biased Statistics					
Average Biased	1.51E-03	1.53E-03	1.48E-03	1.36E-03	1.14E-03
Std Dev Biased	2.00E-05	1.43E-05	1.64E-05	2.52E-05	3.72E-05
Ps90%/90% (+KTL) Biased	1.56E-03	1.57E-03	1.53E-03	1.43E-03	1.24E-03
Ps90%/90% (-KTL) Biased	1.45E-03	1.49E-03	1.44E-03	1.29E-03	1.04E-03
Un-Biased Statistics					
Average Un-Biased	1.51E-03	1.54E-03	1.48E-03	1.36E-03	1.11E-03
Std Dev Un-Biased	2.68E-05	2.68E-05	2.19E-05	1.86E-05	2.08E-05
Ps90%/90% (+KTL) Un-Biased	1.58E-03	1.61E-03	1.54E-03	1.41E-03	1.17E-03
Ps90%/90% (-KTL) Un-Biased	1.44E-03	1.47E-03	1.42E-03	1.30E-03	1.05E-03
Specification MAX	2.20E-03	2.20E-03	2.20E-03	2.20E-03	2.20E-03
Status	PASS	PASS	PASS	PASS	PASS

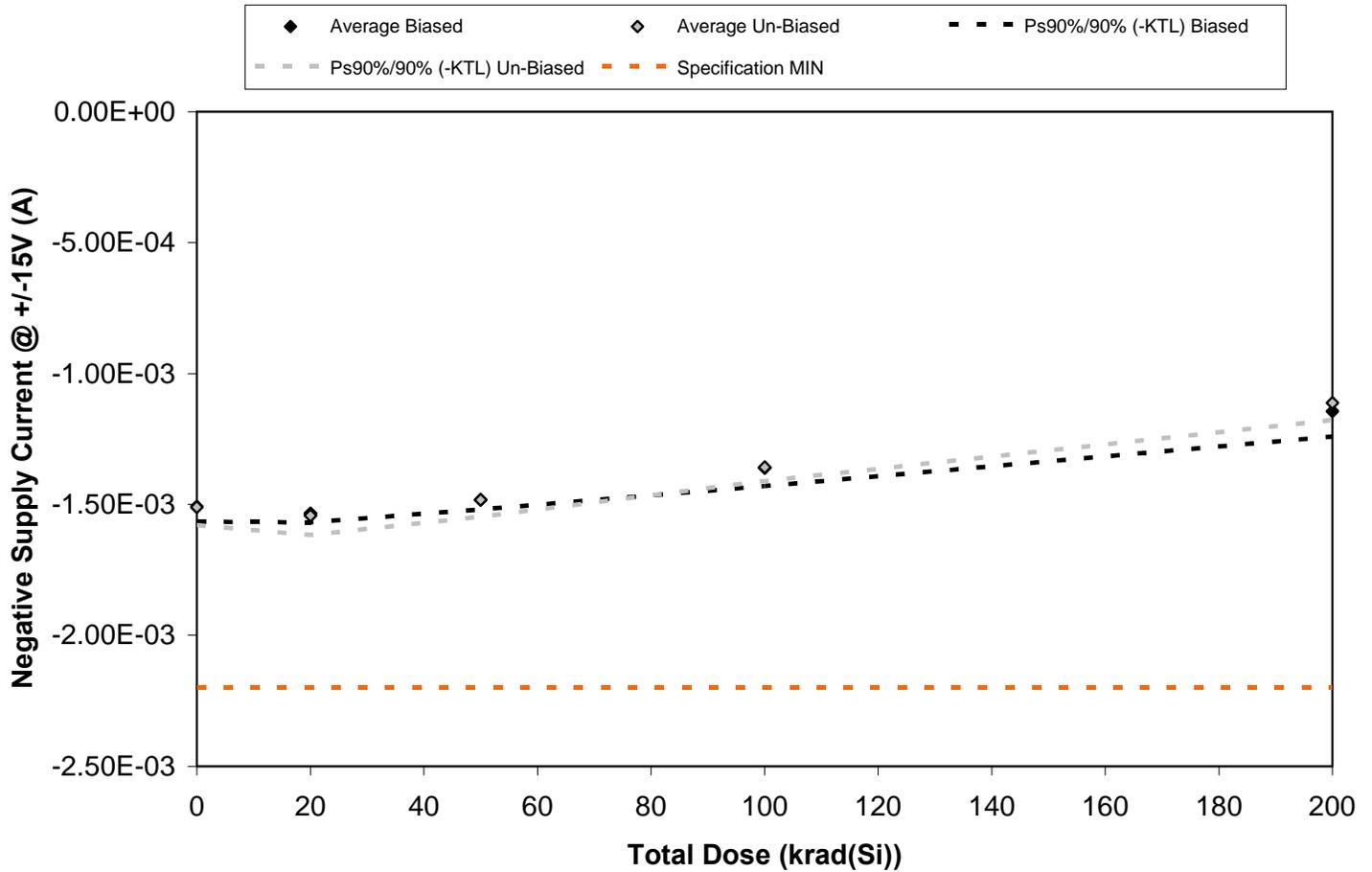


Figure 5.2. Plot of Negative Supply Current @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.2. Raw data for Negative Supply Current @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Supply Current @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.49E-03	-1.52E-03	-1.47E-03	-1.33E-03	-1.09E-03
1116	-1.53E-03	-1.55E-03	-1.50E-03	-1.39E-03	-1.18E-03
1117	-1.49E-03	-1.52E-03	-1.48E-03	-1.37E-03	-1.17E-03
1118	-1.51E-03	-1.53E-03	-1.48E-03	-1.37E-03	-1.16E-03
1119	-1.52E-03	-1.54E-03	-1.48E-03	-1.35E-03	-1.13E-03
1120	-1.50E-03	-1.53E-03	-1.47E-03	-1.35E-03	-1.09E-03
1121	-1.48E-03	-1.52E-03	-1.46E-03	-1.33E-03	-1.09E-03
1122	-1.54E-03	-1.59E-03	-1.52E-03	-1.39E-03	-1.14E-03
1123	-1.52E-03	-1.54E-03	-1.48E-03	-1.36E-03	-1.13E-03
1124	-1.51E-03	-1.54E-03	-1.48E-03	-1.36E-03	-1.11E-03
1125	-1.49E-03	-1.50E-03	-1.50E-03	-1.50E-03	-1.49E-03
1126	-1.56E-03	-1.56E-03	-1.57E-03	-1.56E-03	-1.56E-03
Biased Statistics					
Average Biased	-1.51E-03	-1.53E-03	-1.48E-03	-1.36E-03	-1.14E-03
Std Dev Biased	2.10E-05	1.25E-05	1.33E-05	2.51E-05	3.50E-05
Ps90%/90% (+KTL) Biased	-1.45E-03	-1.50E-03	-1.45E-03	-1.29E-03	-1.05E-03
Ps90%/90% (-KTL) Biased	-1.57E-03	-1.57E-03	-1.52E-03	-1.43E-03	-1.24E-03
Un-Biased Statistics					
Average Un-Biased	-1.51E-03	-1.54E-03	-1.48E-03	-1.36E-03	-1.11E-03
Std Dev Un-Biased	2.52E-05	2.72E-05	2.33E-05	1.94E-05	2.39E-05
Ps90%/90% (+KTL) Un-Biased	-1.44E-03	-1.47E-03	-1.42E-03	-1.30E-03	-1.05E-03
Ps90%/90% (-KTL) Un-Biased	-1.58E-03	-1.62E-03	-1.55E-03	-1.41E-03	-1.18E-03
Specification MIN	-2.20E-03	-2.20E-03	-2.20E-03	-2.20E-03	-2.20E-03
Status	PASS	PASS	PASS	PASS	PASS

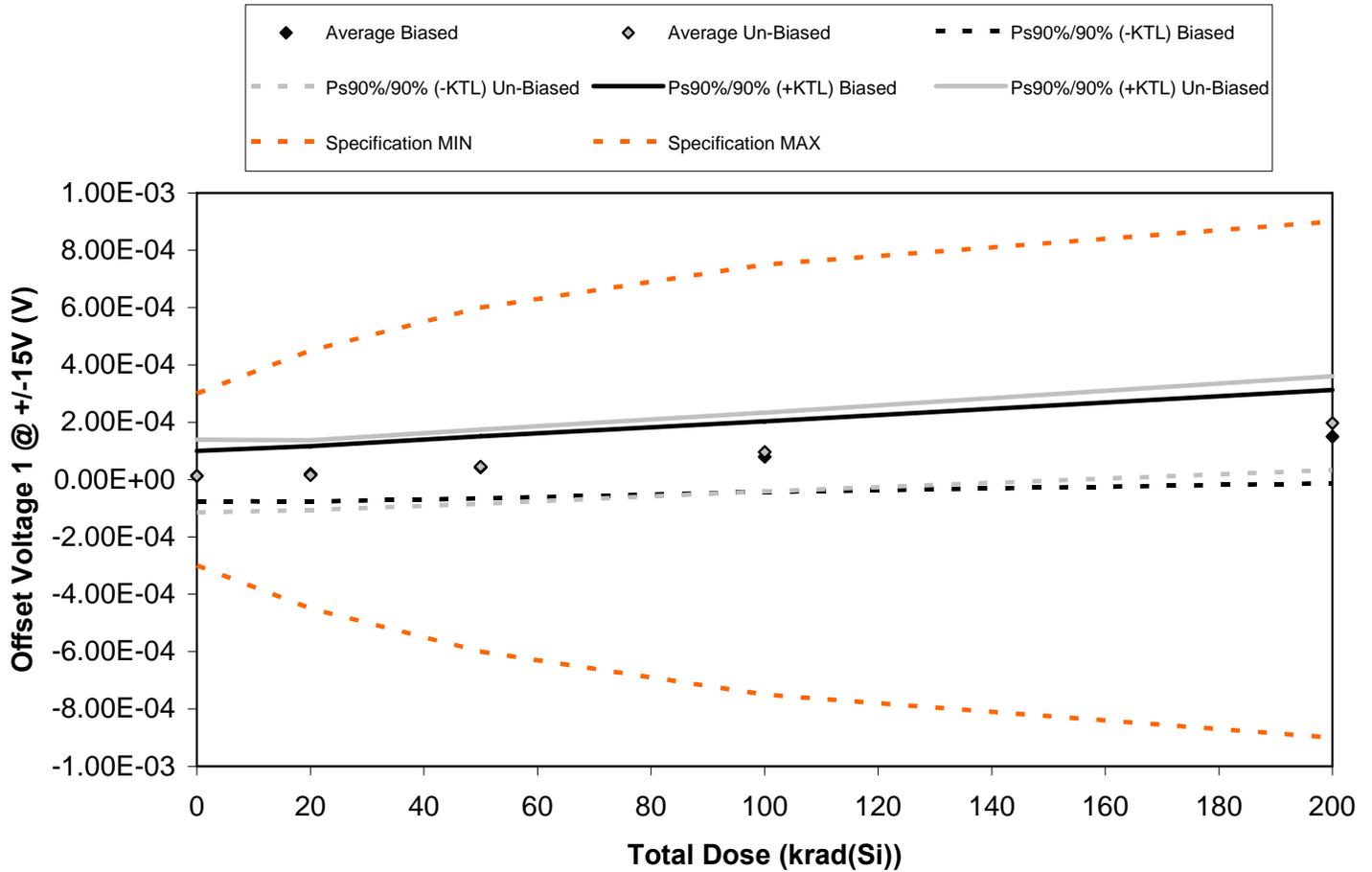


Figure 5.3. Plot of Offset Voltage 1 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.3. Raw data for Offset Voltage 1 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 1 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.67E-05	-2.11E-05	-1.17E-05	1.83E-05	7.14E-05
1116	5.00E-05	6.14E-05	8.75E-05	1.37E-04	2.33E-04
1117	1.78E-05	2.44E-05	5.48E-05	9.49E-05	1.72E-04
1118	-2.40E-05	-1.03E-05	1.74E-05	5.52E-05	1.28E-04
1119	3.50E-05	4.55E-05	6.46E-05	9.35E-05	1.46E-04
1120	-7.85E-06	-1.68E-06	2.01E-05	6.62E-05	1.52E-04
1121	7.97E-06	-2.77E-06	1.91E-05	6.12E-05	1.45E-04
1122	7.96E-05	7.53E-05	1.13E-04	1.63E-04	2.66E-04
1123	2.78E-05	4.43E-05	7.37E-05	1.37E-04	2.57E-04
1124	-4.58E-05	-3.73E-05	-1.56E-06	5.30E-05	1.64E-04
1125	2.33E-05	2.62E-05	2.62E-05	2.63E-05	2.65E-05
1126	1.79E-05	2.14E-05	2.07E-05	2.09E-05	2.08E-05
Biased Statistics					
Average Biased	1.24E-05	2.00E-05	4.25E-05	7.98E-05	1.50E-04
Std Dev Biased	3.21E-05	3.53E-05	3.95E-05	4.50E-05	5.93E-05
Ps90%/90% (+KTL) Biased	1.00E-04	1.17E-04	1.51E-04	2.03E-04	3.13E-04
Ps90%/90% (-KTL) Biased	-7.56E-05	-7.68E-05	-6.57E-05	-4.35E-05	-1.27E-05
Un-Biased Statistics					
Average Un-Biased	1.23E-05	1.56E-05	4.49E-05	9.60E-05	1.97E-04
Std Dev Un-Biased	4.63E-05	4.42E-05	4.72E-05	5.02E-05	5.96E-05
Ps90%/90% (+KTL) Un-Biased	1.39E-04	1.37E-04	1.74E-04	2.34E-04	3.60E-04
Ps90%/90% (-KTL) Un-Biased	-1.15E-04	-1.06E-04	-8.46E-05	-4.16E-05	3.36E-05
Specification MIN	-3.00E-04	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-04	4.50E-04	6.00E-04	7.50E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

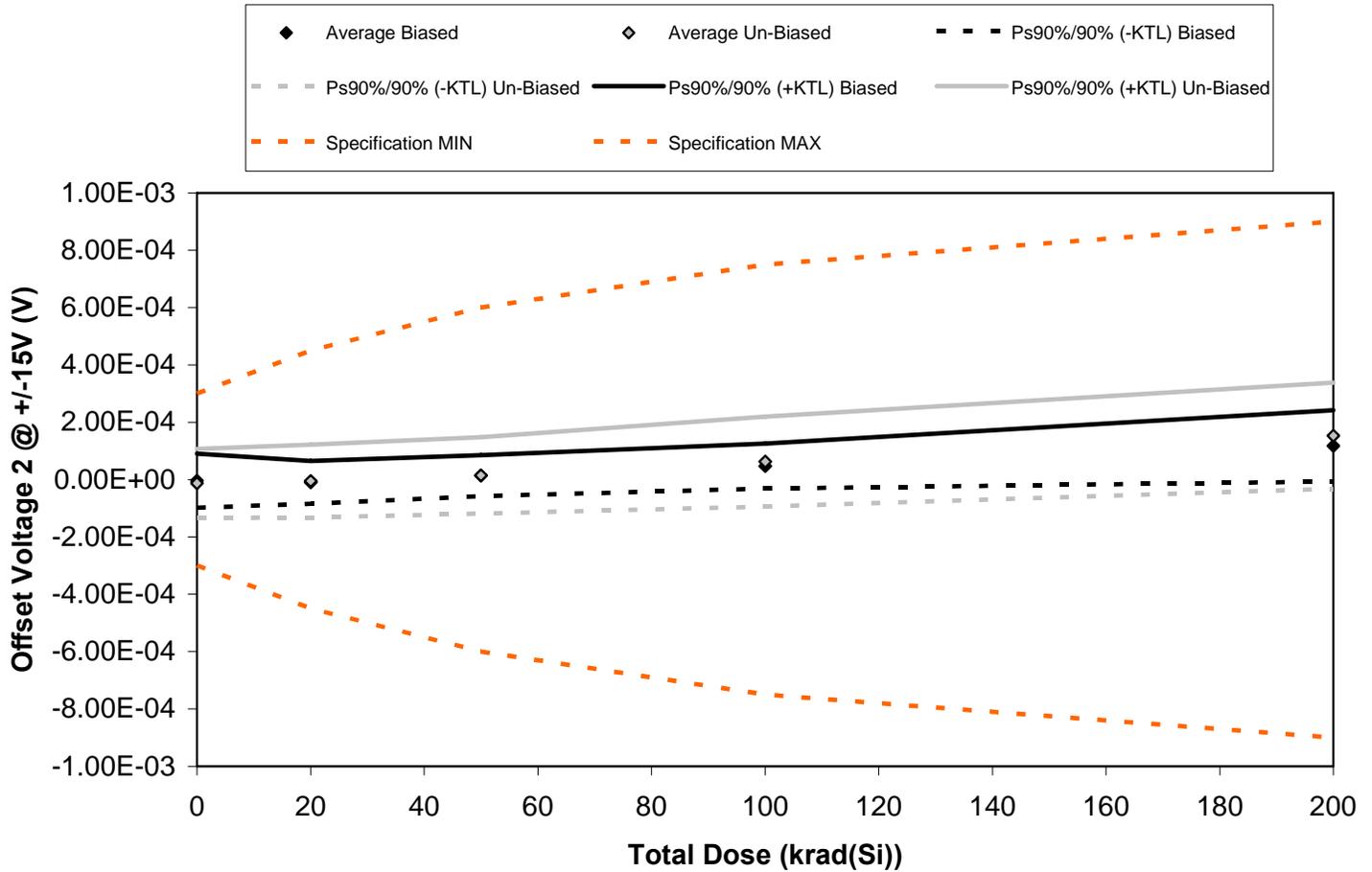


Figure 5.4. Plot of Offset Voltage 2 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.4. Raw data for Offset Voltage 2 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 2 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.42E-05	4.84E-06	2.65E-05	5.36E-05	1.25E-04
1116	-2.81E-05	-2.43E-05	8.34E-06	6.17E-05	1.61E-04
1117	-4.57E-05	-4.26E-05	-2.69E-05	-3.73E-06	4.36E-05
1118	-6.64E-06	-1.45E-05	1.67E-05	5.76E-05	1.47E-04
1119	3.58E-05	2.76E-05	4.37E-05	6.58E-05	1.13E-04
1120	-8.69E-06	2.91E-06	2.04E-05	7.86E-05	1.75E-04
1121	-6.38E-05	-6.33E-05	-4.83E-05	-1.52E-05	6.39E-05
1122	5.63E-05	6.25E-05	8.41E-05	1.40E-04	2.46E-04
1123	-1.96E-05	1.30E-07	2.53E-05	7.33E-05	1.61E-04
1124	-2.89E-05	-2.87E-05	-8.68E-06	3.58E-05	1.19E-04
1125	9.67E-06	7.74E-06	9.19E-06	7.98E-06	8.70E-06
1126	-7.97E-06	-9.77E-06	-1.04E-05	-9.65E-06	-8.81E-06
Biased Statistics					
Average Biased	-4.10E-06	-9.79E-06	1.37E-05	4.70E-05	1.18E-04
Std Dev Biased	3.43E-05	2.70E-05	2.62E-05	2.87E-05	4.55E-05
Ps90%/90% (+KTL) Biased	8.99E-05	6.43E-05	8.56E-05	1.26E-04	2.42E-04
Ps90%/90% (-KTL) Biased	-9.81E-05	-8.38E-05	-5.83E-05	-3.18E-05	-6.97E-06
Un-Biased Statistics					
Average Un-Biased	-1.29E-05	-5.30E-06	1.46E-05	6.24E-05	1.53E-04
Std Dev Un-Biased	4.38E-05	4.64E-05	4.87E-05	5.72E-05	6.77E-05
Ps90%/90% (+KTL) Un-Biased	1.07E-04	1.22E-04	1.48E-04	2.19E-04	3.38E-04
Ps90%/90% (-KTL) Un-Biased	-1.33E-04	-1.32E-04	-1.19E-04	-9.45E-05	-3.26E-05
Specification MIN	-3.00E-04	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-04	4.50E-04	6.00E-04	7.50E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

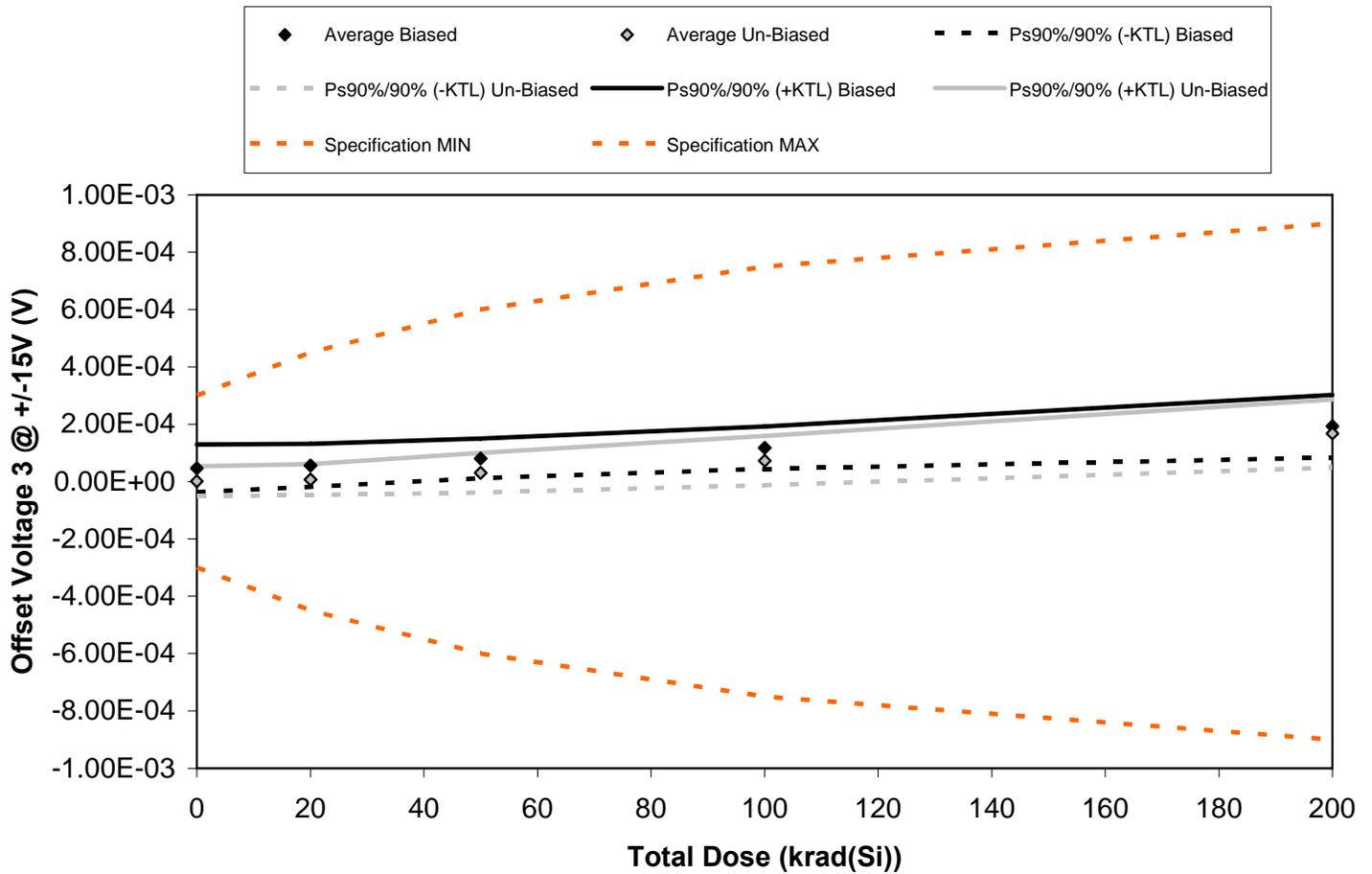


Figure 5.5. Plot of Offset Voltage 3 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.5. Raw data for Offset Voltage 3 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 3 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.48E-05	3.06E-05	5.24E-05	8.58E-05	1.44E-04
1116	6.32E-05	8.23E-05	1.03E-04	1.49E-04	2.37E-04
1117	2.13E-05	3.35E-05	5.88E-05	9.34E-05	1.61E-04
1118	3.03E-05	4.68E-05	8.19E-05	1.29E-04	2.25E-04
1119	9.14E-05	8.88E-05	1.08E-04	1.33E-04	1.97E-04
1120	-3.62E-06	8.46E-06	3.31E-05	8.04E-05	1.85E-04
1121	-1.99E-05	-1.52E-05	5.32E-06	4.18E-05	1.28E-04
1122	2.67E-05	2.86E-05	6.31E-05	1.14E-04	2.20E-04
1123	1.38E-05	2.25E-05	4.58E-05	8.70E-05	1.87E-04
1124	-1.26E-05	-1.16E-05	6.29E-06	4.13E-05	1.16E-04
1125	1.53E-05	1.97E-05	1.50E-05	1.63E-05	1.67E-05
1126	-2.81E-05	-2.50E-05	-2.57E-05	-2.46E-05	-2.70E-05
Biased Statistics					
Average Biased	4.62E-05	5.64E-05	8.08E-05	1.18E-04	1.93E-04
Std Dev Biased	3.03E-05	2.74E-05	2.51E-05	2.70E-05	3.99E-05
Ps90%/90% (+KTL) Biased	1.29E-04	1.32E-04	1.50E-04	1.92E-04	3.02E-04
Ps90%/90% (-KTL) Biased	-3.68E-05	-1.88E-05	1.21E-05	4.38E-05	8.32E-05
Un-Biased Statistics					
Average Un-Biased	8.72E-07	6.55E-06	3.07E-05	7.30E-05	1.67E-04
Std Dev Un-Biased	1.91E-05	1.97E-05	2.51E-05	3.13E-05	4.35E-05
Ps90%/90% (+KTL) Un-Biased	5.34E-05	6.05E-05	9.95E-05	1.59E-04	2.87E-04
Ps90%/90% (-KTL) Un-Biased	-5.16E-05	-4.74E-05	-3.81E-05	-1.30E-05	4.79E-05
Specification MIN	-3.00E-04	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-04	4.50E-04	6.00E-04	7.50E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

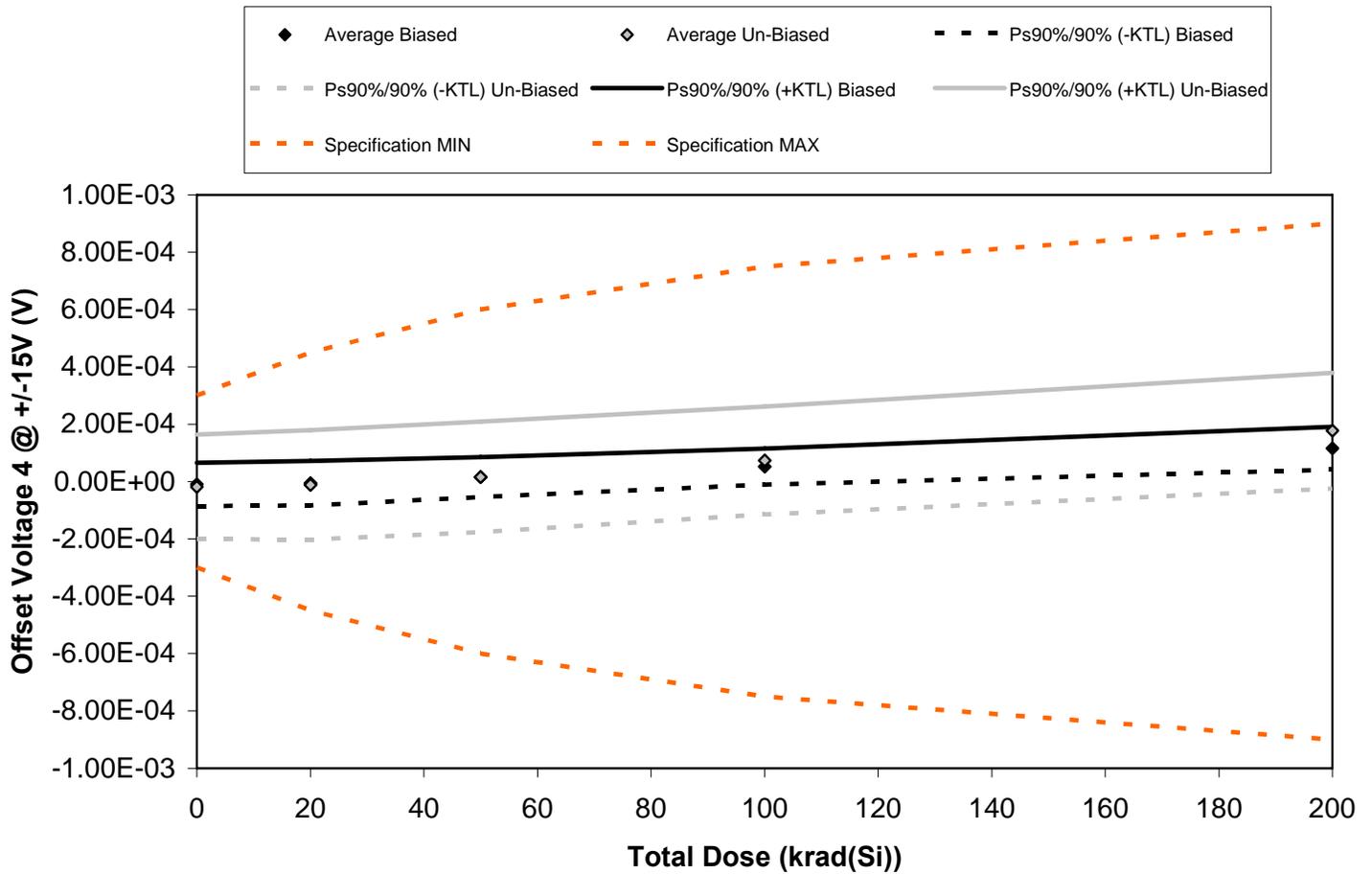


Figure 5.6. Plot of Offset Voltage 4 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.6. Raw data for Offset Voltage 4 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 4 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.01E-05	2.02E-05	3.64E-05	6.31E-05	1.20E-04
1116	-1.44E-05	-3.85E-06	1.93E-05	6.00E-05	1.41E-04
1117	8.58E-06	1.81E-05	4.02E-05	8.01E-05	1.40E-04
1118	-5.18E-05	-4.89E-05	-2.25E-05	2.47E-05	1.04E-04
1119	-1.04E-05	-1.42E-05	5.45E-06	3.29E-05	7.57E-05
1120	9.54E-06	2.14E-05	4.71E-05	9.97E-05	2.00E-04
1121	-1.80E-05	-2.06E-05	-3.50E-07	5.09E-05	1.37E-04
1122	-1.15E-04	-1.12E-04	-8.41E-05	-2.11E-05	8.26E-05
1123	-3.72E-05	-2.29E-05	1.03E-05	7.14E-05	1.89E-04
1124	6.62E-05	7.74E-05	1.08E-04	1.66E-04	2.79E-04
1125	4.42E-05	4.29E-05	4.69E-05	4.59E-05	4.52E-05
1126	2.56E-05	2.49E-05	2.37E-05	2.32E-05	2.72E-05
Biased Statistics					
Average Biased	-9.59E-06	-5.74E-06	1.58E-05	5.21E-05	1.16E-04
Std Dev Biased	2.75E-05	2.82E-05	2.55E-05	2.29E-05	2.72E-05
Ps90%/90% (+KTL) Biased	6.57E-05	7.16E-05	8.57E-05	1.15E-04	1.91E-04
Ps90%/90% (-KTL) Biased	-8.49E-05	-8.31E-05	-5.42E-05	-1.05E-05	4.13E-05
Un-Biased Statistics					
Average Un-Biased	-1.90E-05	-1.14E-05	1.61E-05	7.34E-05	1.78E-04
Std Dev Un-Biased	6.65E-05	6.96E-05	7.01E-05	6.85E-05	7.35E-05
Ps90%/90% (+KTL) Un-Biased	1.63E-04	1.79E-04	2.08E-04	2.61E-04	3.79E-04
Ps90%/90% (-KTL) Un-Biased	-2.01E-04	-2.02E-04	-1.76E-04	-1.14E-04	-2.41E-05
Specification MIN	-3.00E-04	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-04	4.50E-04	6.00E-04	7.50E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

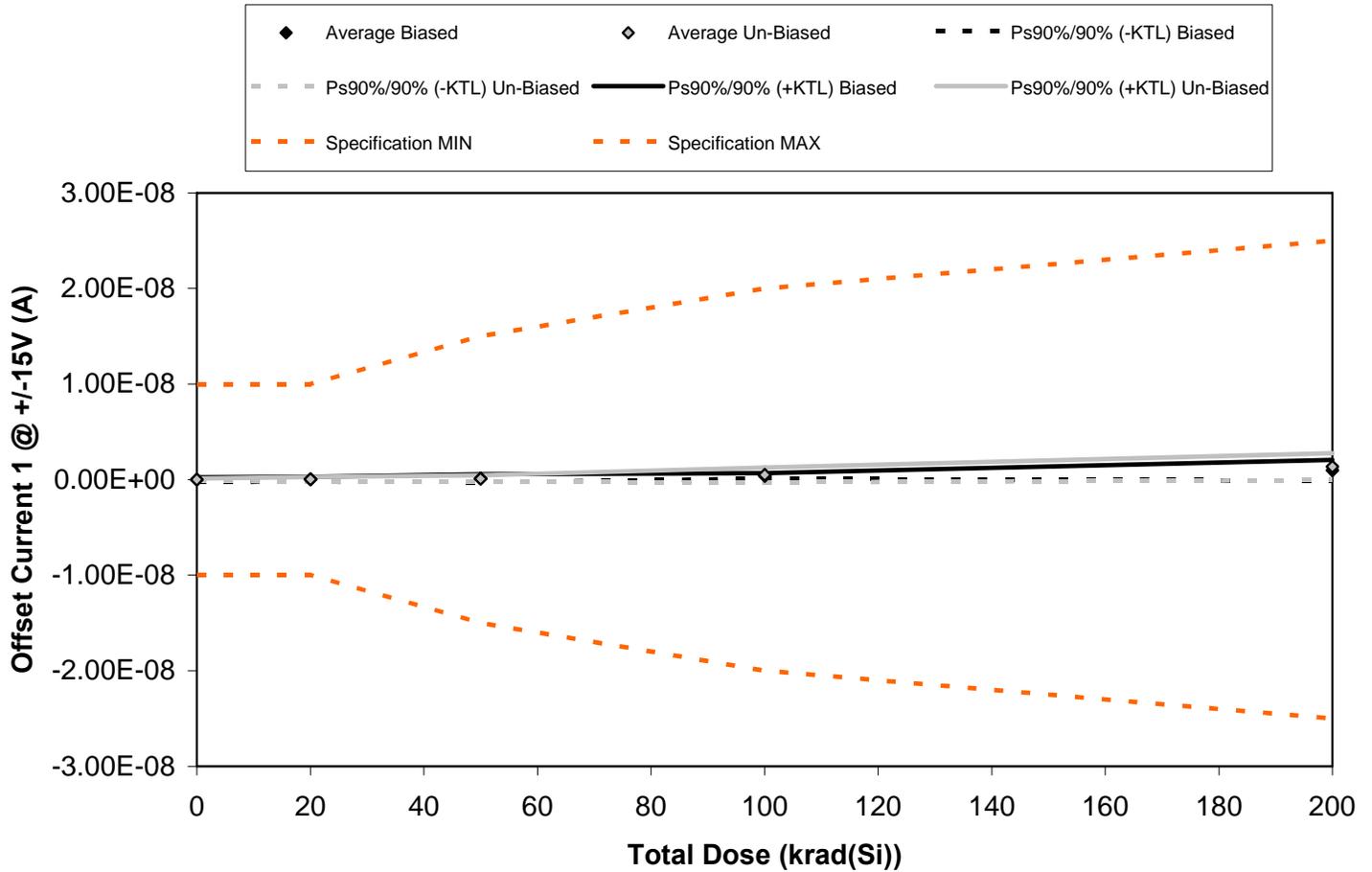


Figure 5.7. Plot of Offset Current 1 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.7. Raw data for Offset Current 1 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 1 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.04E-10	-7.50E-11	3.59E-10	4.30E-10	1.38E-09
1116	-4.10E-11	-1.50E-11	-7.90E-11	1.99E-10	6.47E-10
1117	-7.00E-12	7.80E-11	9.10E-11	3.33E-10	9.32E-10
1118	1.31E-10	1.54E-10	1.25E-10	4.33E-10	5.57E-10
1119	1.40E-11	5.30E-11	1.31E-10	4.58E-10	1.41E-09
1120	8.00E-12	4.60E-11	1.79E-10	5.78E-10	1.67E-09
1121	-1.20E-11	-7.20E-11	1.26E-10	7.79E-10	2.08E-09
1122	2.00E-11	2.50E-11	7.20E-11	3.62E-10	9.05E-10
1123	6.20E-11	1.47E-10	1.72E-10	6.54E-10	1.29E-09
1124	-4.90E-11	-4.60E-11	-1.37E-10	6.10E-11	8.65E-10
1125	-7.90E-11	-8.00E-11	-4.50E-11	-2.90E-11	-4.00E-11
1126	-1.42E-10	-1.81E-10	-2.13E-10	-2.10E-10	-1.64E-10
Biased Statistics					
Average Biased	-1.40E-12	3.90E-11	1.25E-10	3.71E-10	9.84E-10
Std Dev Biased	8.64E-11	8.78E-11	1.56E-10	1.07E-10	3.97E-10
Ps90%/90% (+KTL) Biased	2.36E-10	2.80E-10	5.54E-10	6.64E-10	2.07E-09
Ps90%/90% (-KTL) Biased	-2.38E-10	-2.02E-10	-3.03E-10	7.68E-11	-1.05E-10
Un-Biased Statistics					
Average Un-Biased	5.80E-12	2.00E-11	8.24E-11	4.87E-10	1.36E-09
Std Dev Un-Biased	4.09E-11	8.61E-11	1.30E-10	2.82E-10	5.17E-10
Ps90%/90% (+KTL) Un-Biased	1.18E-10	2.56E-10	4.39E-10	1.26E-09	2.78E-09
Ps90%/90% (-KTL) Un-Biased	-1.06E-10	-2.16E-10	-2.74E-10	-2.87E-10	-5.74E-11
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.50E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.50E-08
Status	PASS	PASS	PASS	PASS	PASS

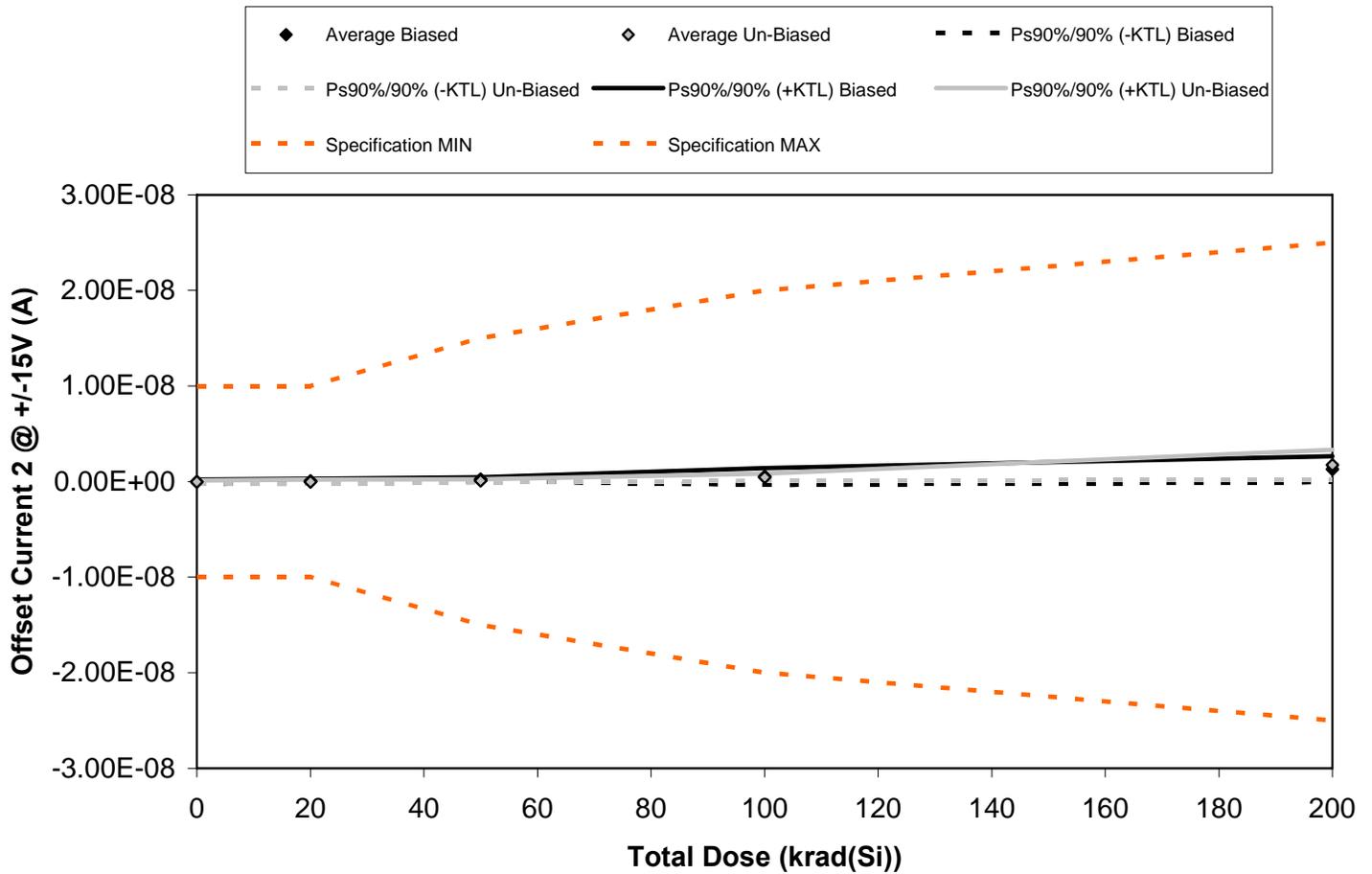


Figure 5.8. Plot of Offset Current 2 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.8. Raw data for Offset Current 2 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 2 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-6.40E-11	5.10E-11	2.98E-10	7.19E-10	1.74E-09
1116	-5.40E-11	4.00E-12	1.63E-10	-4.40E-11	5.73E-10
1117	1.21E-10	2.03E-10	2.23E-10	6.16E-10	1.41E-09
1118	-4.20E-11	-1.00E-11	1.74E-10	5.93E-10	1.07E-09
1119	-7.90E-11	4.10E-11	3.25E-10	7.29E-10	1.72E-09
1120	-9.20E-11	-1.59E-10	1.04E-10	2.50E-10	1.58E-09
1121	-1.40E-11	-7.20E-11	2.90E-11	5.02E-10	1.73E-09
1122	5.40E-11	4.00E-11	1.30E-11	3.91E-10	8.96E-10
1123	-4.50E-11	5.30E-11	1.29E-10	5.80E-10	2.18E-09
1124	-8.70E-11	-3.90E-11	1.43E-10	5.42E-10	2.35E-09
1125	7.90E-11	9.60E-11	4.90E-11	8.30E-11	6.70E-11
1126	-1.70E-11	-3.60E-11	-2.70E-11	-1.50E-11	-1.20E-11
Biased Statistics					
Average Biased	-2.36E-11	5.78E-11	2.37E-10	5.23E-10	1.30E-09
Std Dev Biased	8.20E-11	8.50E-11	7.26E-11	3.22E-10	4.91E-10
Ps90%/90% (+KTL) Biased	2.01E-10	2.91E-10	4.36E-10	1.41E-09	2.65E-09
Ps90%/90% (-KTL) Biased	-2.48E-10	-1.75E-10	3.74E-11	-3.62E-10	-4.50E-11
Un-Biased Statistics					
Average Un-Biased	-3.68E-11	-3.54E-11	8.36E-11	4.53E-10	1.75E-09
Std Dev Un-Biased	6.00E-11	8.68E-11	5.91E-11	1.34E-10	5.70E-10
Ps90%/90% (+KTL) Un-Biased	1.28E-10	2.03E-10	2.46E-10	8.20E-10	3.31E-09
Ps90%/90% (-KTL) Un-Biased	-2.01E-10	-2.73E-10	-7.85E-11	8.64E-11	1.84E-10
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.50E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.50E-08
Status	PASS	PASS	PASS	PASS	PASS

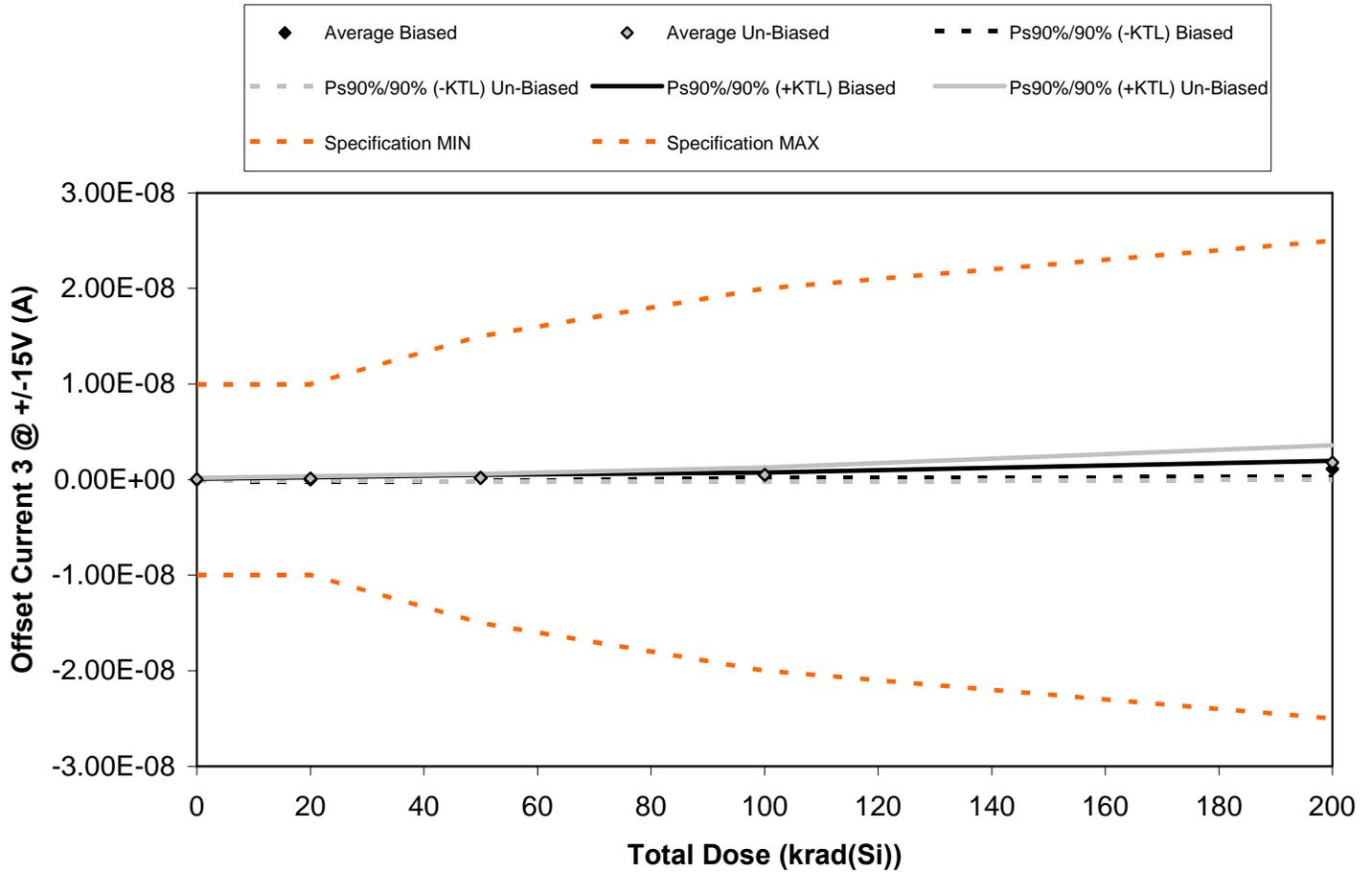


Figure 5.9. Plot of Offset Current 3 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.9. Raw data for Offset Current 3 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 3 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-6.30E-11	3.40E-11	3.43E-10	5.85E-10	1.46E-09
1116	-2.30E-11	-4.10E-11	1.10E-10	4.11E-10	6.81E-10
1117	1.30E-11	-1.08E-10	1.59E-10	5.39E-10	1.22E-09
1118	2.70E-11	1.17E-10	1.88E-10	4.63E-10	9.69E-10
1119	-6.00E-12	-4.90E-11	1.00E-11	3.25E-10	1.30E-09
1120	-4.50E-11	1.02E-10	2.27E-10	4.39E-10	1.63E-09
1121	9.90E-11	2.13E-10	3.48E-10	6.20E-10	1.96E-09
1122	1.80E-11	4.40E-11	-5.30E-11	8.80E-11	7.49E-10
1123	4.30E-11	2.23E-10	2.09E-10	5.47E-10	2.06E-09
1124	2.80E-11	7.80E-11	2.01E-10	8.37E-10	2.53E-09
1125	1.21E-10	9.30E-11	5.80E-11	8.20E-11	5.10E-11
1126	-1.37E-10	-1.08E-10	-8.70E-11	-5.20E-11	-1.07E-10
Biased Statistics					
Average Biased	-1.04E-11	-9.40E-12	1.62E-10	4.65E-10	1.13E-09
Std Dev Biased	3.50E-11	8.68E-11	1.22E-10	1.03E-10	3.05E-10
Ps90%/90% (+KTL) Biased	8.55E-11	2.29E-10	4.96E-10	7.47E-10	1.96E-09
Ps90%/90% (-KTL) Biased	-1.06E-10	-2.47E-10	-1.72E-10	1.82E-10	2.89E-10
Un-Biased Statistics					
Average Un-Biased	2.86E-11	1.32E-10	1.86E-10	5.06E-10	1.79E-09
Std Dev Un-Biased	5.17E-11	8.12E-11	1.46E-10	2.75E-10	6.62E-10
Ps90%/90% (+KTL) Un-Biased	1.70E-10	3.55E-10	5.88E-10	1.26E-09	3.60E-09
Ps90%/90% (-KTL) Un-Biased	-1.13E-10	-9.08E-11	-2.15E-10	-2.49E-10	-3.01E-11
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.50E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.50E-08
Status	PASS	PASS	PASS	PASS	PASS

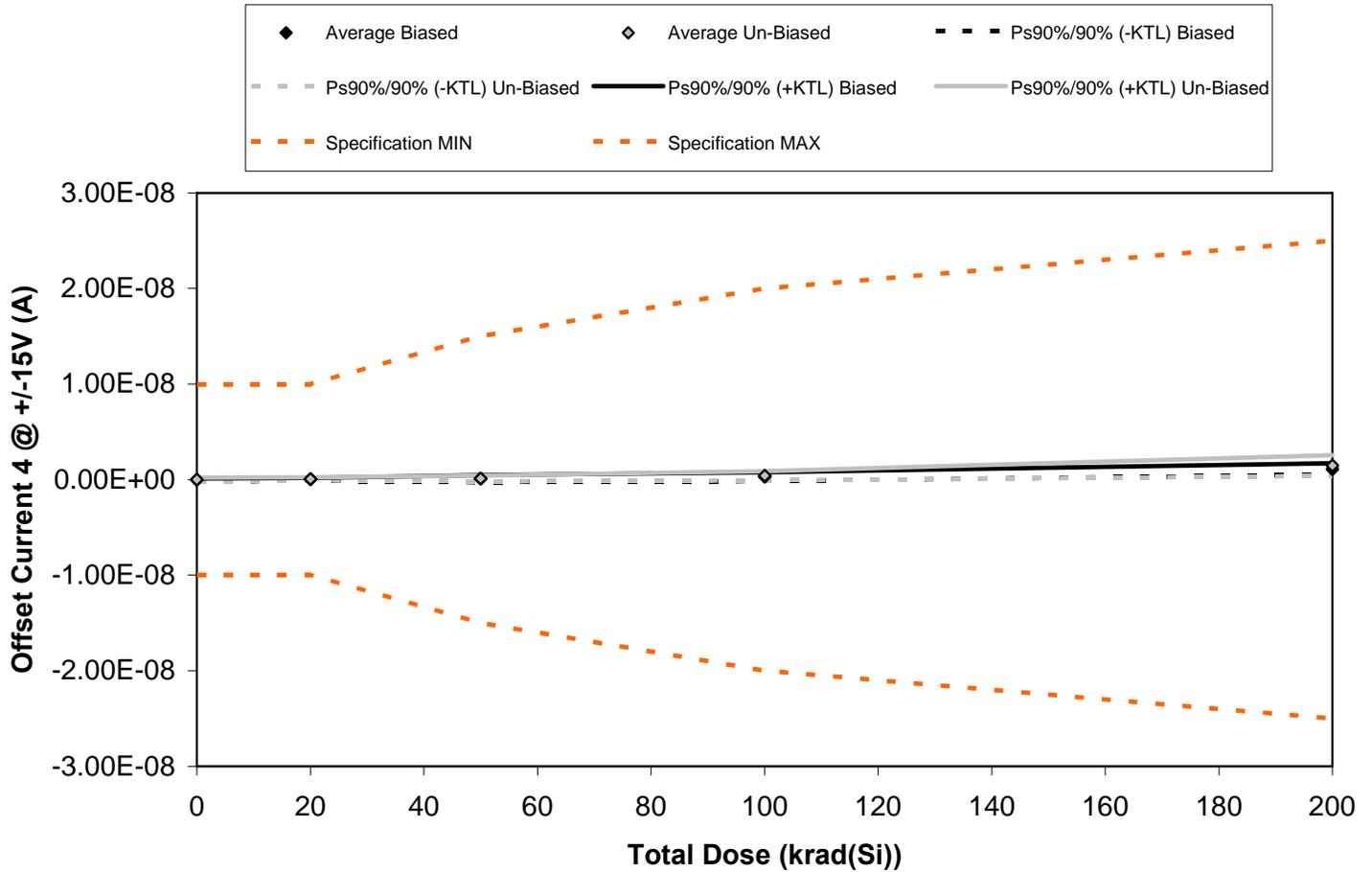


Figure 5.10. Plot of Offset Current 4 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.10. Raw data for Offset Current 4 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 4 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.02E-10	-2.90E-11	2.76E-10	4.69E-10	1.36E-09
1116	-9.70E-11	1.00E-11	-2.50E-11	3.69E-10	1.20E-09
1117	0.00E+00	1.08E-10	2.01E-10	4.46E-10	1.17E-09
1118	1.40E-11	2.40E-11	2.00E-11	1.36E-10	7.87E-10
1119	3.00E-12	1.80E-11	-2.20E-11	1.20E-10	9.70E-10
1120	-7.40E-11	2.70E-11	1.90E-10	4.39E-10	1.73E-09
1121	2.00E-12	2.90E-11	7.60E-11	4.87E-10	1.90E-09
1122	4.10E-11	2.30E-11	4.90E-11	9.90E-11	8.97E-10
1123	1.14E-10	1.36E-10	-1.00E-12	4.03E-10	1.27E-09
1124	-5.90E-11	1.39E-10	2.70E-10	5.72E-10	1.54E-09
1125	1.10E-10	9.60E-11	4.50E-11	5.40E-11	4.50E-11
1126	-8.20E-11	-9.90E-11	-1.24E-10	-1.16E-10	-7.50E-11
Biased Statistics					
Average Biased	-3.64E-11	2.62E-11	9.00E-11	3.08E-10	1.10E-09
Std Dev Biased	5.79E-11	5.02E-11	1.39E-10	1.69E-10	2.20E-10
Ps90%/90% (+KTL) Biased	1.22E-10	1.64E-10	4.72E-10	7.70E-10	1.70E-09
Ps90%/90% (-KTL) Biased	-1.95E-10	-1.11E-10	-2.92E-10	-1.54E-10	4.92E-10
Un-Biased Statistics					
Average Un-Biased	4.80E-12	7.08E-11	1.17E-10	4.00E-10	1.47E-09
Std Dev Un-Biased	7.67E-11	6.09E-11	1.11E-10	1.80E-10	3.95E-10
Ps90%/90% (+KTL) Un-Biased	2.15E-10	2.38E-10	4.20E-10	8.93E-10	2.55E-09
Ps90%/90% (-KTL) Un-Biased	-2.05E-10	-9.63E-11	-1.87E-10	-9.30E-11	3.83E-10
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.50E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.50E-08
Status	PASS	PASS	PASS	PASS	PASS

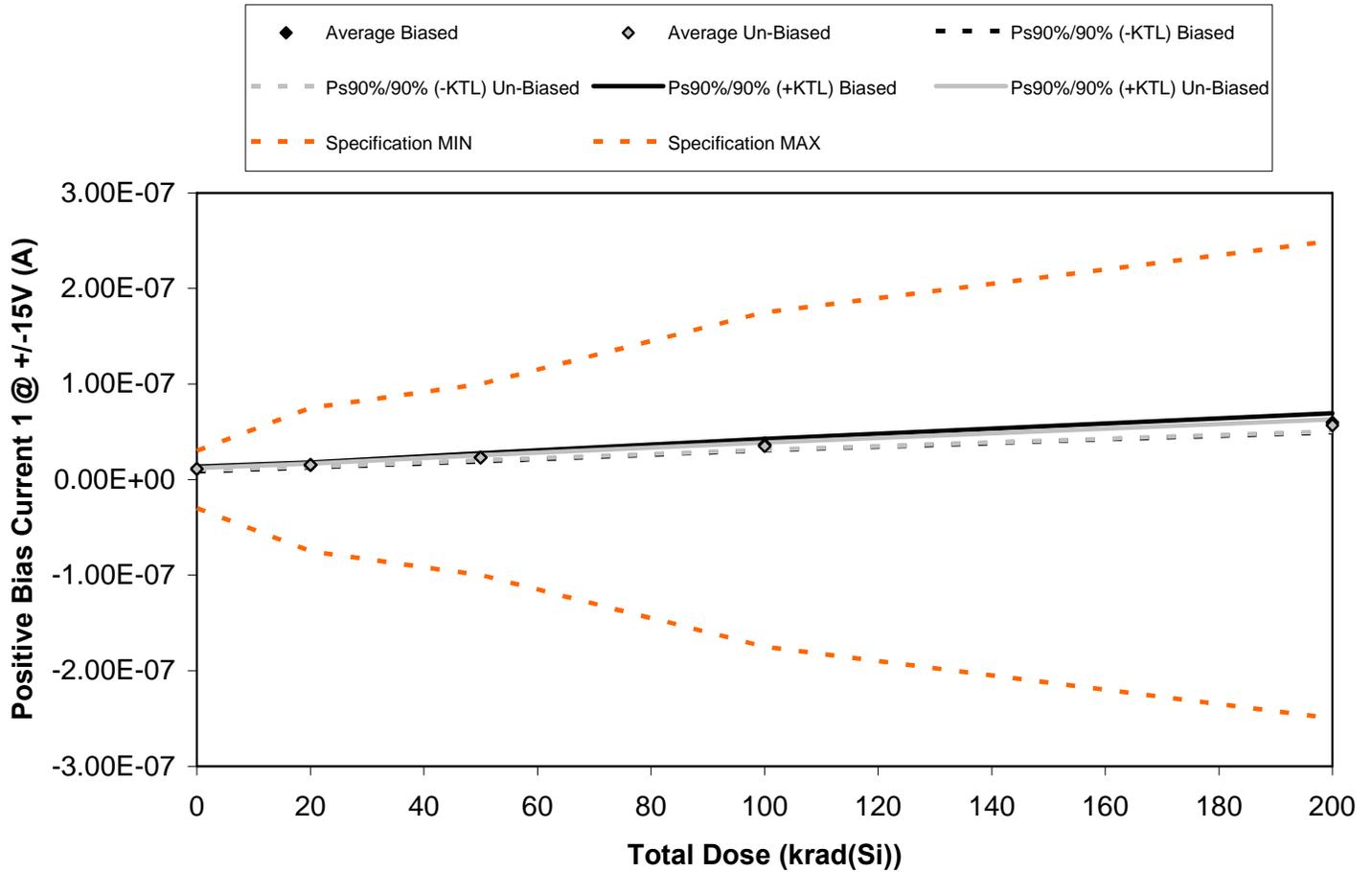


Figure 5.11. Plot of Positive Bias Current 1 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.11. Raw data for Positive Bias Current 1 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 1 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.74E-09	1.37E-08	2.08E-08	3.33E-08	5.54E-08
1116	1.21E-08	1.61E-08	2.44E-08	3.76E-08	6.17E-08
1117	1.18E-08	1.57E-08	2.35E-08	3.64E-08	5.85E-08
1118	1.10E-08	1.52E-08	2.31E-08	3.59E-08	5.80E-08
1119	1.09E-08	1.57E-08	2.48E-08	3.92E-08	6.47E-08
1120	1.09E-08	1.46E-08	2.20E-08	3.36E-08	5.48E-08
1121	1.09E-08	1.52E-08	2.31E-08	3.51E-08	5.78E-08
1122	1.11E-08	1.51E-08	2.25E-08	3.48E-08	5.62E-08
1123	1.12E-08	1.52E-08	2.24E-08	3.43E-08	5.46E-08
1124	1.18E-08	1.62E-08	2.45E-08	3.73E-08	6.00E-08
1125	1.16E-08	1.17E-08	1.16E-08	1.17E-08	1.16E-08
1126	1.06E-08	1.07E-08	1.07E-08	1.06E-08	1.06E-08
Biased Statistics					
Average Biased	1.11E-08	1.53E-08	2.33E-08	3.65E-08	5.96E-08
Std Dev Biased	9.21E-10	9.49E-10	1.54E-09	2.20E-09	3.61E-09
Ps90%/90% (+KTL) Biased	1.36E-08	1.79E-08	2.75E-08	4.25E-08	6.95E-08
Ps90%/90% (-KTL) Biased	8.59E-09	1.27E-08	1.91E-08	3.05E-08	4.98E-08
Un-Biased Statistics					
Average Un-Biased	1.12E-08	1.52E-08	2.29E-08	3.50E-08	5.67E-08
Std Dev Un-Biased	3.67E-10	5.89E-10	9.93E-10	1.40E-09	2.24E-09
Ps90%/90% (+KTL) Un-Biased	1.22E-08	1.69E-08	2.56E-08	3.89E-08	6.28E-08
Ps90%/90% (-KTL) Un-Biased	1.02E-08	1.36E-08	2.02E-08	3.12E-08	5.06E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

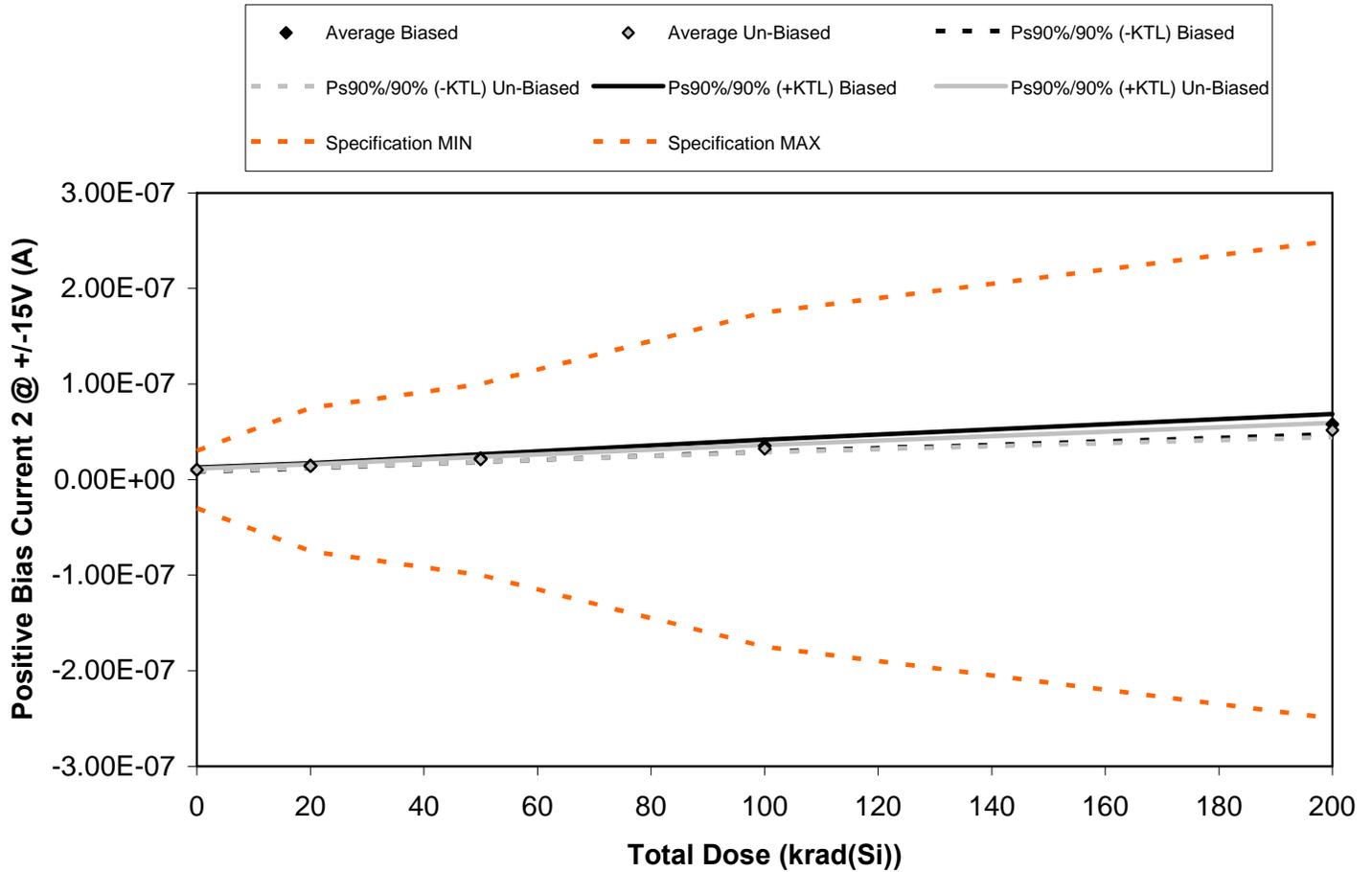


Figure 5.12. Plot of Positive Bias Current 2 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.12. Raw data for Positive Bias Current 2 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 2 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.51E-09	1.34E-08	2.06E-08	3.28E-08	5.46E-08
1116	1.16E-08	1.57E-08	2.39E-08	3.73E-08	6.09E-08
1117	1.01E-08	1.39E-08	2.12E-08	3.32E-08	5.34E-08
1118	1.08E-08	1.52E-08	2.31E-08	3.62E-08	5.85E-08
1119	9.97E-09	1.48E-08	2.34E-08	3.76E-08	6.21E-08
1120	1.08E-08	1.46E-08	2.17E-08	3.30E-08	5.31E-08
1121	1.01E-08	1.42E-08	2.16E-08	3.28E-08	5.37E-08
1122	1.07E-08	1.47E-08	2.20E-08	3.37E-08	5.43E-08
1123	9.66E-09	1.32E-08	1.97E-08	3.02E-08	4.78E-08
1124	9.91E-09	1.38E-08	2.07E-08	3.17E-08	5.07E-08
1125	1.09E-08	1.10E-08	1.09E-08	1.09E-08	1.09E-08
1126	1.05E-08	1.06E-08	1.06E-08	1.05E-08	1.06E-08
Biased Statistics					
Average Biased	1.04E-08	1.46E-08	2.24E-08	3.54E-08	5.79E-08
Std Dev Biased	8.34E-10	9.42E-10	1.44E-09	2.27E-09	3.82E-09
Ps90%/90% (+KTL) Biased	1.27E-08	1.72E-08	2.64E-08	4.16E-08	6.84E-08
Ps90%/90% (-KTL) Biased	8.12E-09	1.20E-08	1.85E-08	2.92E-08	4.74E-08
Un-Biased Statistics					
Average Un-Biased	1.02E-08	1.41E-08	2.11E-08	3.23E-08	5.19E-08
Std Dev Un-Biased	4.94E-10	6.30E-10	9.64E-10	1.39E-09	2.69E-09
Ps90%/90% (+KTL) Un-Biased	1.16E-08	1.58E-08	2.38E-08	3.61E-08	5.93E-08
Ps90%/90% (-KTL) Un-Biased	8.87E-09	1.24E-08	1.85E-08	2.85E-08	4.45E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

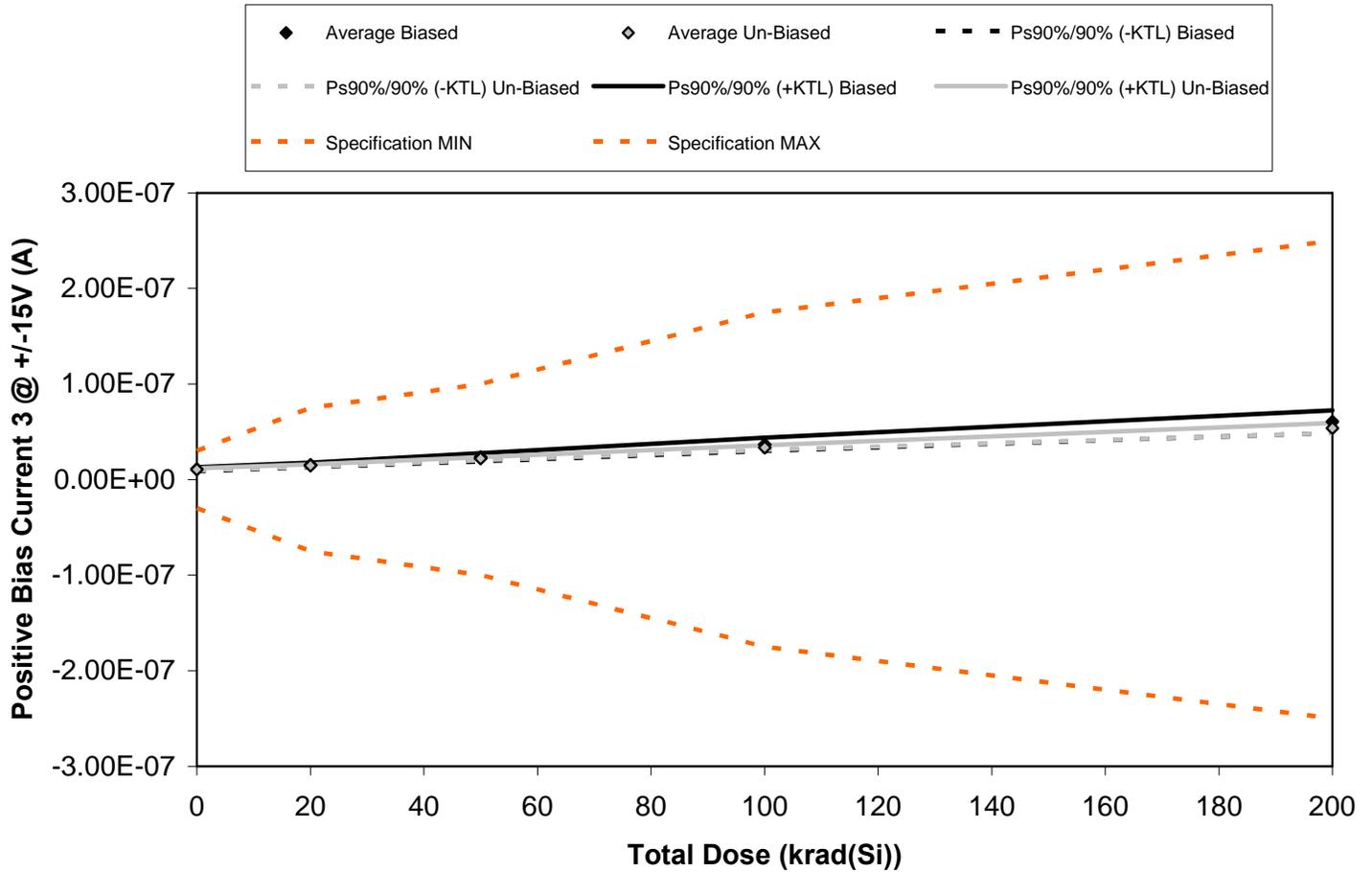


Figure 5.13. Plot of Positive Bias Current 3 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.13. Raw data for Positive Bias Current 3 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 3 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.88E-09	1.38E-08	2.13E-08	3.36E-08	5.59E-08
1116	1.19E-08	1.60E-08	2.46E-08	3.81E-08	6.30E-08
1117	1.10E-08	1.51E-08	2.28E-08	3.54E-08	5.72E-08
1118	1.12E-08	1.54E-08	2.36E-08	3.70E-08	5.97E-08
1119	1.07E-08	1.58E-08	2.52E-08	4.02E-08	6.65E-08
1120	1.12E-08	1.51E-08	2.26E-08	3.45E-08	5.56E-08
1121	1.04E-08	1.47E-08	2.21E-08	3.38E-08	5.50E-08
1122	1.09E-08	1.50E-08	2.24E-08	3.43E-08	5.50E-08
1123	1.05E-08	1.43E-08	2.12E-08	3.24E-08	5.11E-08
1124	1.03E-08	1.42E-08	2.14E-08	3.29E-08	5.25E-08
1125	1.17E-08	1.19E-08	1.18E-08	1.18E-08	1.17E-08
1126	1.09E-08	1.09E-08	1.09E-08	1.09E-08	1.10E-08
Biased Statistics					
Average Biased	1.09E-08	1.53E-08	2.35E-08	3.69E-08	6.05E-08
Std Dev Biased	7.40E-10	8.71E-10	1.55E-09	2.52E-09	4.32E-09
Ps90%/90% (+KTL) Biased	1.30E-08	1.77E-08	2.77E-08	4.38E-08	7.23E-08
Ps90%/90% (-KTL) Biased	8.90E-09	1.29E-08	1.93E-08	3.00E-08	4.86E-08
Un-Biased Statistics					
Average Un-Biased	1.07E-08	1.47E-08	2.19E-08	3.36E-08	5.39E-08
Std Dev Un-Biased	3.77E-10	3.99E-10	6.25E-10	8.81E-10	1.94E-09
Ps90%/90% (+KTL) Un-Biased	1.17E-08	1.57E-08	2.37E-08	3.60E-08	5.92E-08
Ps90%/90% (-KTL) Un-Biased	9.64E-09	1.36E-08	2.02E-08	3.11E-08	4.85E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

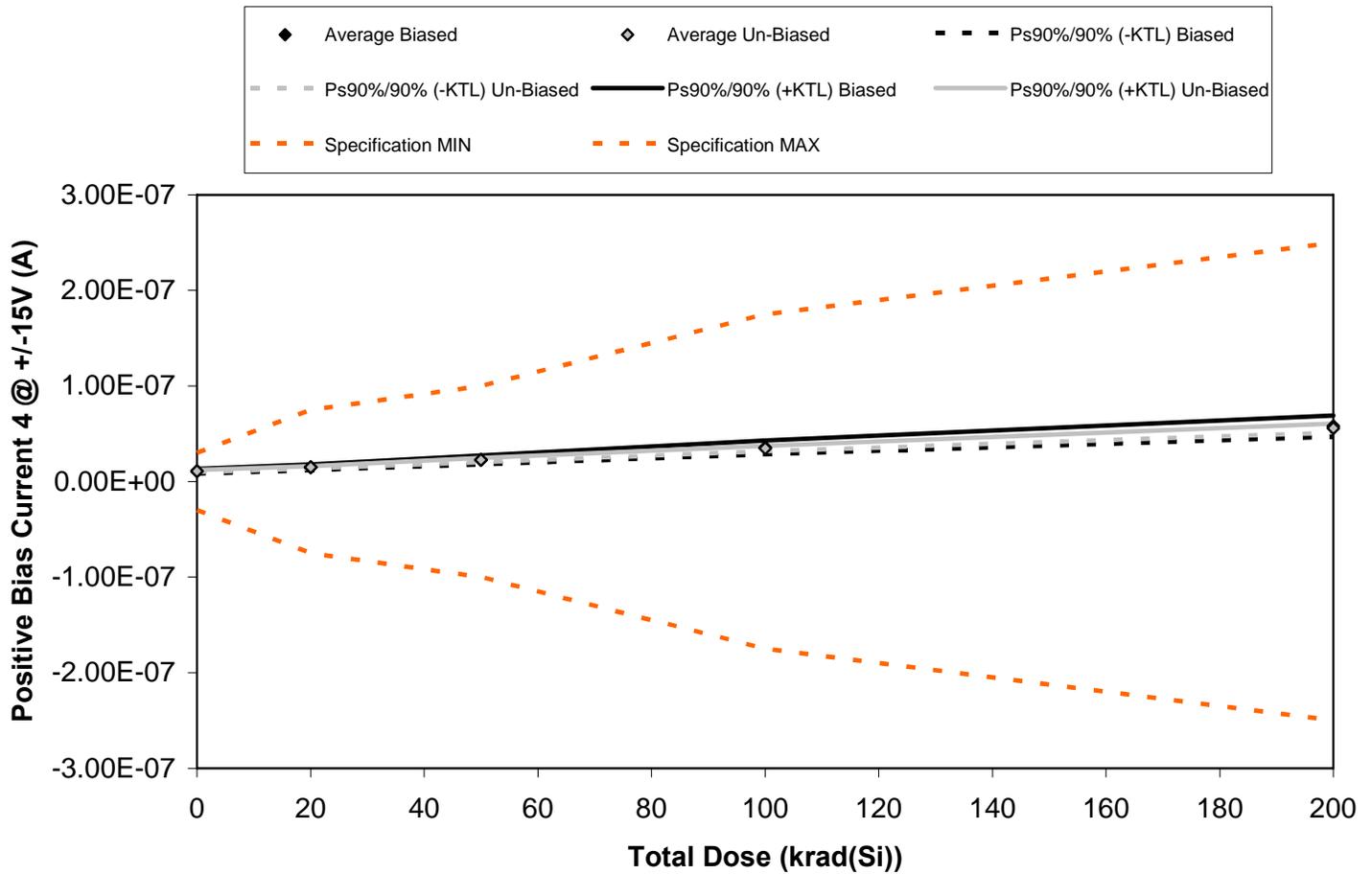


Figure 5.14. Plot of Positive Bias Current 4 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 Positive Bias Current 4 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 4 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.34E-09	1.31E-08	2.01E-08	3.20E-08	5.34E-08
1116	1.18E-08	1.56E-08	2.36E-08	3.66E-08	5.96E-08
1117	1.08E-08	1.46E-08	2.18E-08	3.40E-08	5.47E-08
1118	1.15E-08	1.57E-08	2.37E-08	3.69E-08	5.91E-08
1119	1.06E-08	1.55E-08	2.44E-08	3.87E-08	6.35E-08
1120	1.10E-08	1.47E-08	2.22E-08	3.41E-08	5.52E-08
1121	1.04E-08	1.47E-08	2.24E-08	3.42E-08	5.61E-08
1122	1.08E-08	1.47E-08	2.21E-08	3.43E-08	5.52E-08
1123	1.10E-08	1.49E-08	2.21E-08	3.40E-08	5.41E-08
1124	1.15E-08	1.58E-08	2.39E-08	3.65E-08	5.86E-08
1125	1.12E-08	1.13E-08	1.13E-08	1.13E-08	1.12E-08
1126	1.03E-08	1.03E-08	1.03E-08	1.03E-08	1.02E-08
Biased Statistics					
Average Biased	1.08E-08	1.49E-08	2.27E-08	3.56E-08	5.81E-08
Std Dev Biased	9.36E-10	1.08E-09	1.73E-09	2.64E-09	4.07E-09
Ps90%/90% (+KTL) Biased	1.34E-08	1.79E-08	2.75E-08	4.28E-08	6.93E-08
Ps90%/90% (-KTL) Biased	8.22E-09	1.19E-08	1.80E-08	2.84E-08	4.69E-08
Un-Biased Statistics					
Average Un-Biased	1.10E-08	1.50E-08	2.26E-08	3.46E-08	5.59E-08
Std Dev Un-Biased	3.88E-10	4.59E-10	7.84E-10	1.03E-09	1.71E-09
Ps90%/90% (+KTL) Un-Biased	1.20E-08	1.62E-08	2.47E-08	3.74E-08	6.05E-08
Ps90%/90% (-KTL) Un-Biased	9.89E-09	1.37E-08	2.04E-08	3.18E-08	5.12E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

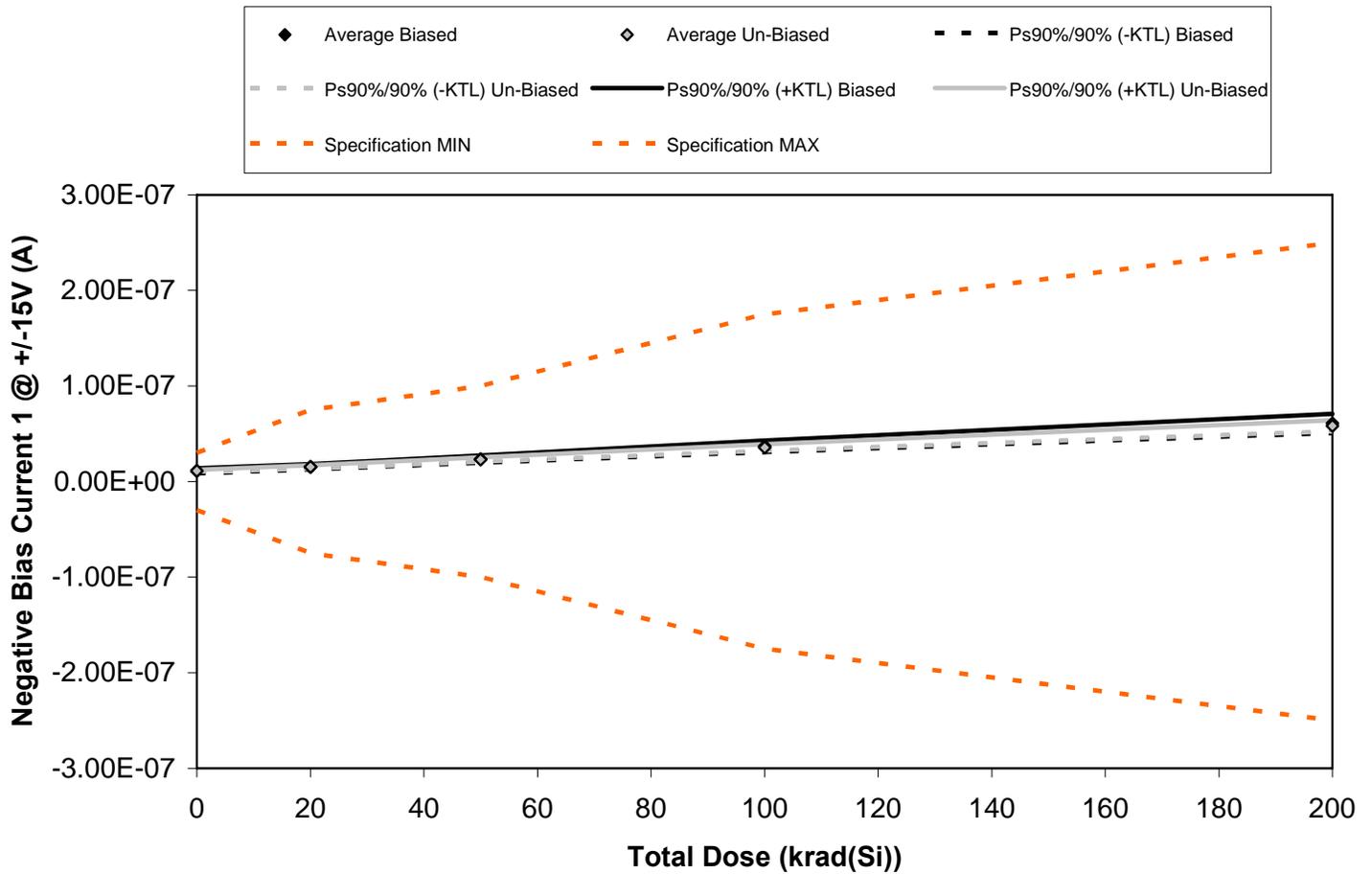


Figure 5.15. Plot of Negative Bias Current 1 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.15. Raw data for Negative Bias Current 1 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 1 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.66E-09	1.36E-08	2.14E-08	3.38E-08	5.69E-08
1116	1.20E-08	1.61E-08	2.44E-08	3.80E-08	6.25E-08
1117	1.18E-08	1.59E-08	2.37E-08	3.69E-08	5.96E-08
1118	1.12E-08	1.54E-08	2.33E-08	3.65E-08	5.88E-08
1119	1.09E-08	1.58E-08	2.50E-08	3.97E-08	6.63E-08
1120	1.09E-08	1.46E-08	2.22E-08	3.42E-08	5.68E-08
1121	1.09E-08	1.52E-08	2.34E-08	3.62E-08	6.00E-08
1122	1.11E-08	1.52E-08	2.26E-08	3.53E-08	5.74E-08
1123	1.14E-08	1.54E-08	2.28E-08	3.51E-08	5.63E-08
1124	1.18E-08	1.63E-08	2.44E-08	3.75E-08	6.11E-08
1125	1.16E-08	1.17E-08	1.16E-08	1.16E-08	1.16E-08
1126	1.04E-08	1.04E-08	1.04E-08	1.04E-08	1.05E-08
Biased Statistics					
Average Biased	1.11E-08	1.54E-08	2.36E-08	3.70E-08	6.08E-08
Std Dev Biased	9.36E-10	1.00E-09	1.40E-09	2.18E-09	3.66E-09
Ps90%/90% (+KTL) Biased	1.37E-08	1.81E-08	2.74E-08	4.30E-08	7.08E-08
Ps90%/90% (-KTL) Biased	8.56E-09	1.26E-08	1.97E-08	3.10E-08	5.08E-08
Un-Biased Statistics					
Average Un-Biased	1.12E-08	1.53E-08	2.31E-08	3.57E-08	5.83E-08
Std Dev Un-Biased	3.93E-10	6.09E-10	8.36E-10	1.22E-09	2.12E-09
Ps90%/90% (+KTL) Un-Biased	1.23E-08	1.70E-08	2.54E-08	3.90E-08	6.42E-08
Ps90%/90% (-KTL) Un-Biased	1.02E-08	1.37E-08	2.08E-08	3.23E-08	5.25E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

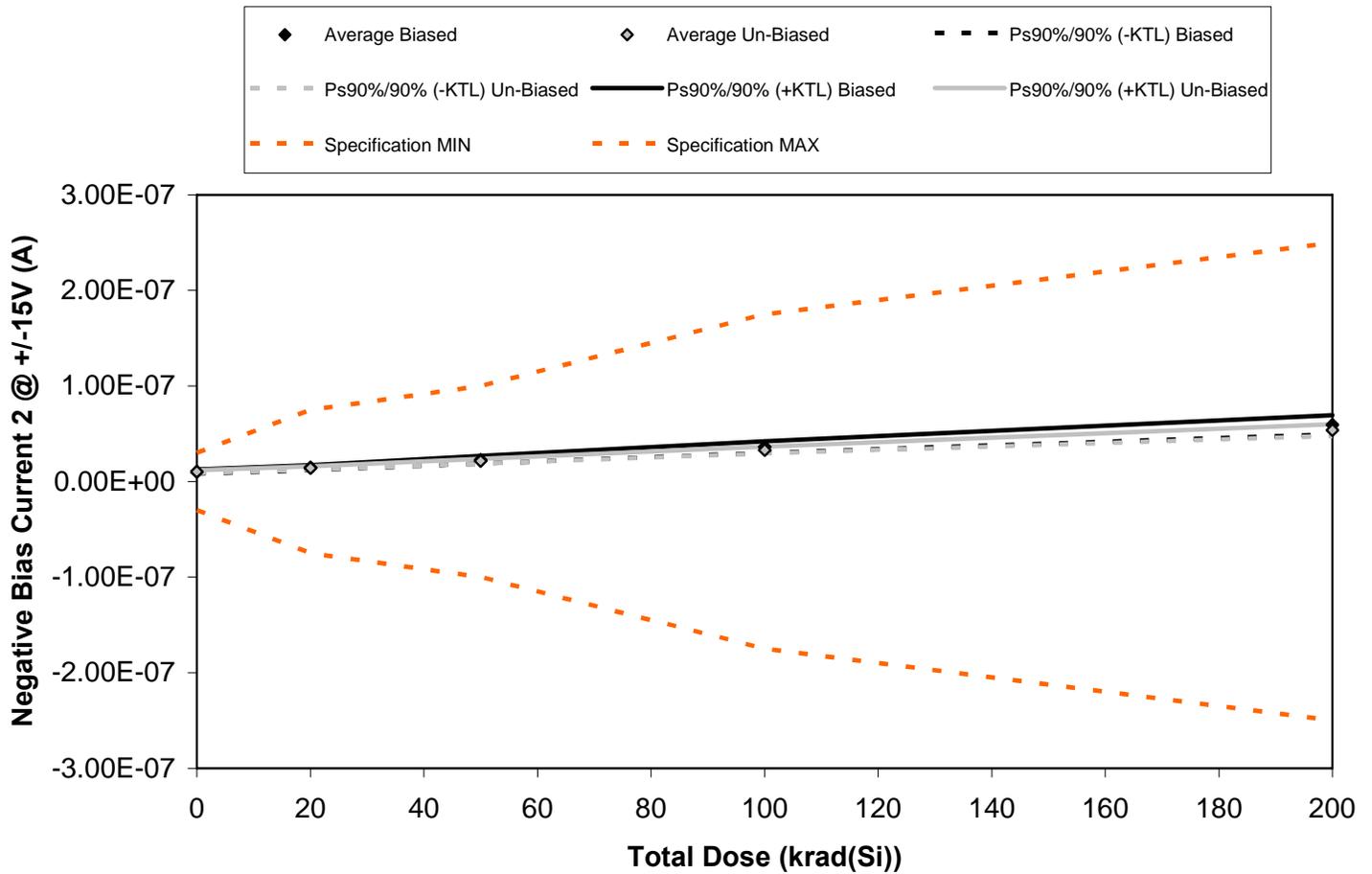


Figure 5.16. Plot of Negative Bias Current 2 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.16. Raw data for Negative Bias Current 2 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 2 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.49E-09	1.35E-08	2.10E-08	3.36E-08	5.65E-08
1116	1.16E-08	1.57E-08	2.41E-08	3.74E-08	6.17E-08
1117	1.02E-08	1.41E-08	2.15E-08	3.38E-08	5.50E-08
1118	1.09E-08	1.52E-08	2.33E-08	3.69E-08	5.99E-08
1119	9.96E-09	1.48E-08	2.38E-08	3.84E-08	6.40E-08
1120	1.07E-08	1.46E-08	2.19E-08	3.35E-08	5.48E-08
1121	1.01E-08	1.42E-08	2.17E-08	3.34E-08	5.56E-08
1122	1.08E-08	1.49E-08	2.22E-08	3.43E-08	5.55E-08
1123	9.66E-09	1.33E-08	1.99E-08	3.09E-08	5.01E-08
1124	9.85E-09	1.37E-08	2.10E-08	3.24E-08	5.33E-08
1125	1.10E-08	1.11E-08	1.11E-08	1.10E-08	1.10E-08
1126	1.06E-08	1.06E-08	1.06E-08	1.06E-08	1.05E-08
Biased Statistics					
Average Biased	1.04E-08	1.47E-08	2.28E-08	3.60E-08	5.94E-08
Std Dev Biased	8.46E-10	9.02E-10	1.41E-09	2.18E-09	3.69E-09
Ps90%/90% (+KTL) Biased	1.28E-08	1.71E-08	2.66E-08	4.20E-08	6.95E-08
Ps90%/90% (-KTL) Biased	8.12E-09	1.22E-08	1.89E-08	3.01E-08	4.93E-08
Un-Biased Statistics					
Average Un-Biased	1.02E-08	1.42E-08	2.13E-08	3.29E-08	5.39E-08
Std Dev Un-Biased	5.17E-10	6.32E-10	8.96E-10	1.31E-09	2.28E-09
Ps90%/90% (+KTL) Un-Biased	1.16E-08	1.59E-08	2.38E-08	3.65E-08	6.01E-08
Ps90%/90% (-KTL) Un-Biased	8.81E-09	1.24E-08	1.89E-08	2.93E-08	4.76E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

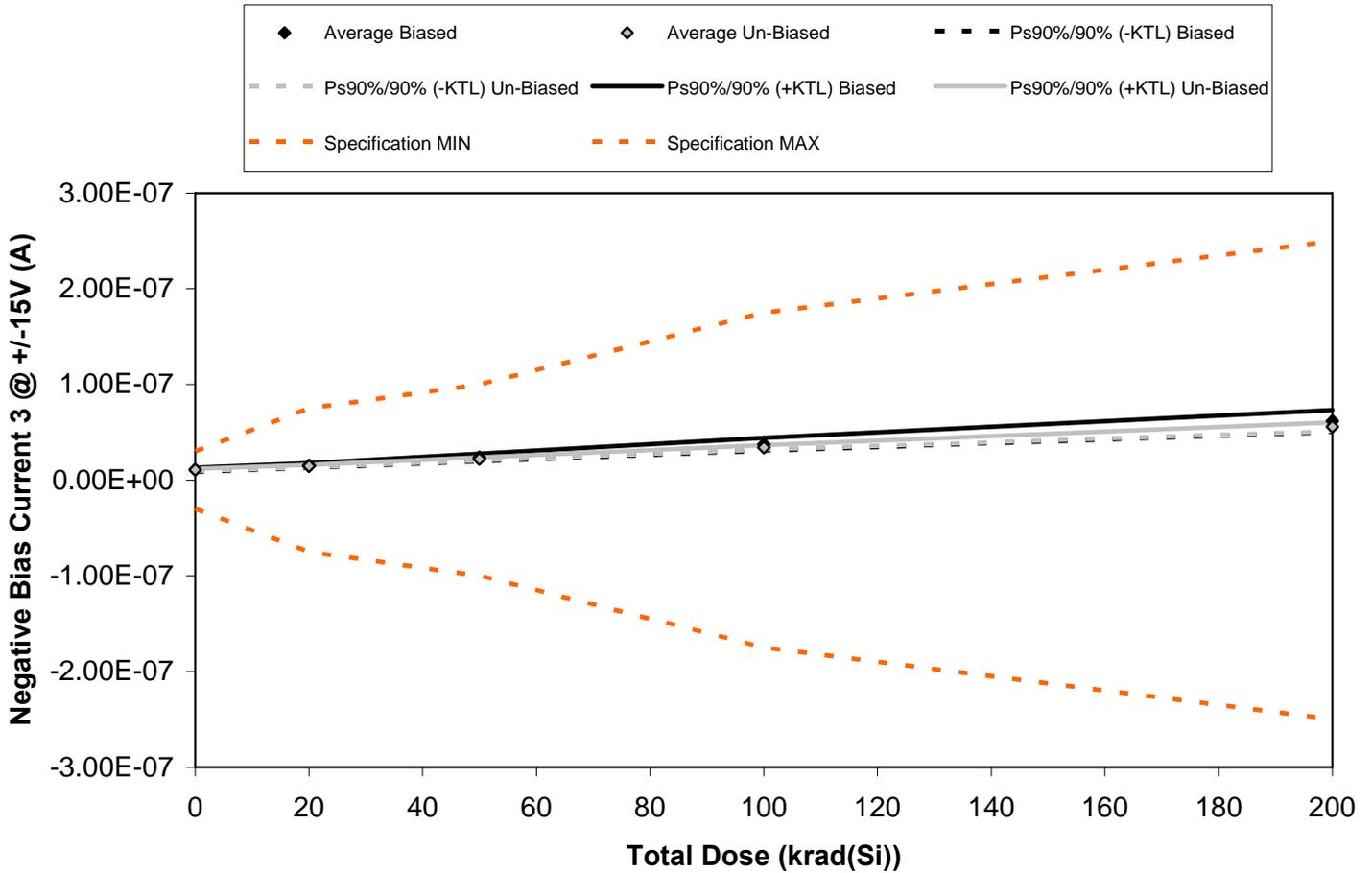


Figure 5.17. Plot of Negative Bias Current 3 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.17. Raw data for Negative Bias Current 3 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 3 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.86E-09	1.40E-08	2.16E-08	3.43E-08	5.76E-08
1116	1.19E-08	1.61E-08	2.46E-08	3.86E-08	6.38E-08
1117	1.10E-08	1.52E-08	2.31E-08	3.61E-08	5.87E-08
1118	1.13E-08	1.56E-08	2.39E-08	3.76E-08	6.08E-08
1119	1.08E-08	1.58E-08	2.53E-08	4.07E-08	6.80E-08
1120	1.13E-08	1.53E-08	2.29E-08	3.51E-08	5.74E-08
1121	1.06E-08	1.49E-08	2.25E-08	3.45E-08	5.72E-08
1122	1.10E-08	1.51E-08	2.24E-08	3.46E-08	5.61E-08
1123	1.06E-08	1.46E-08	2.14E-08	3.30E-08	5.33E-08
1124	1.03E-08	1.43E-08	2.18E-08	3.38E-08	5.52E-08
1125	1.18E-08	1.19E-08	1.20E-08	1.19E-08	1.19E-08
1126	1.08E-08	1.09E-08	1.09E-08	1.09E-08	1.08E-08
Biased Statistics					
Average Biased	1.10E-08	1.53E-08	2.37E-08	3.75E-08	6.18E-08
Std Dev Biased	7.62E-10	8.40E-10	1.41E-09	2.42E-09	4.22E-09
Ps90%/90% (+KTL) Biased	1.31E-08	1.76E-08	2.76E-08	4.41E-08	7.34E-08
Ps90%/90% (-KTL) Biased	8.89E-09	1.30E-08	1.98E-08	3.08E-08	5.02E-08
Un-Biased Statistics					
Average Un-Biased	1.08E-08	1.48E-08	2.22E-08	3.42E-08	5.59E-08
Std Dev Un-Biased	3.82E-10	4.19E-10	5.99E-10	8.04E-10	1.67E-09
Ps90%/90% (+KTL) Un-Biased	1.18E-08	1.60E-08	2.38E-08	3.64E-08	6.04E-08
Ps90%/90% (-KTL) Un-Biased	9.71E-09	1.37E-08	2.06E-08	3.20E-08	5.13E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

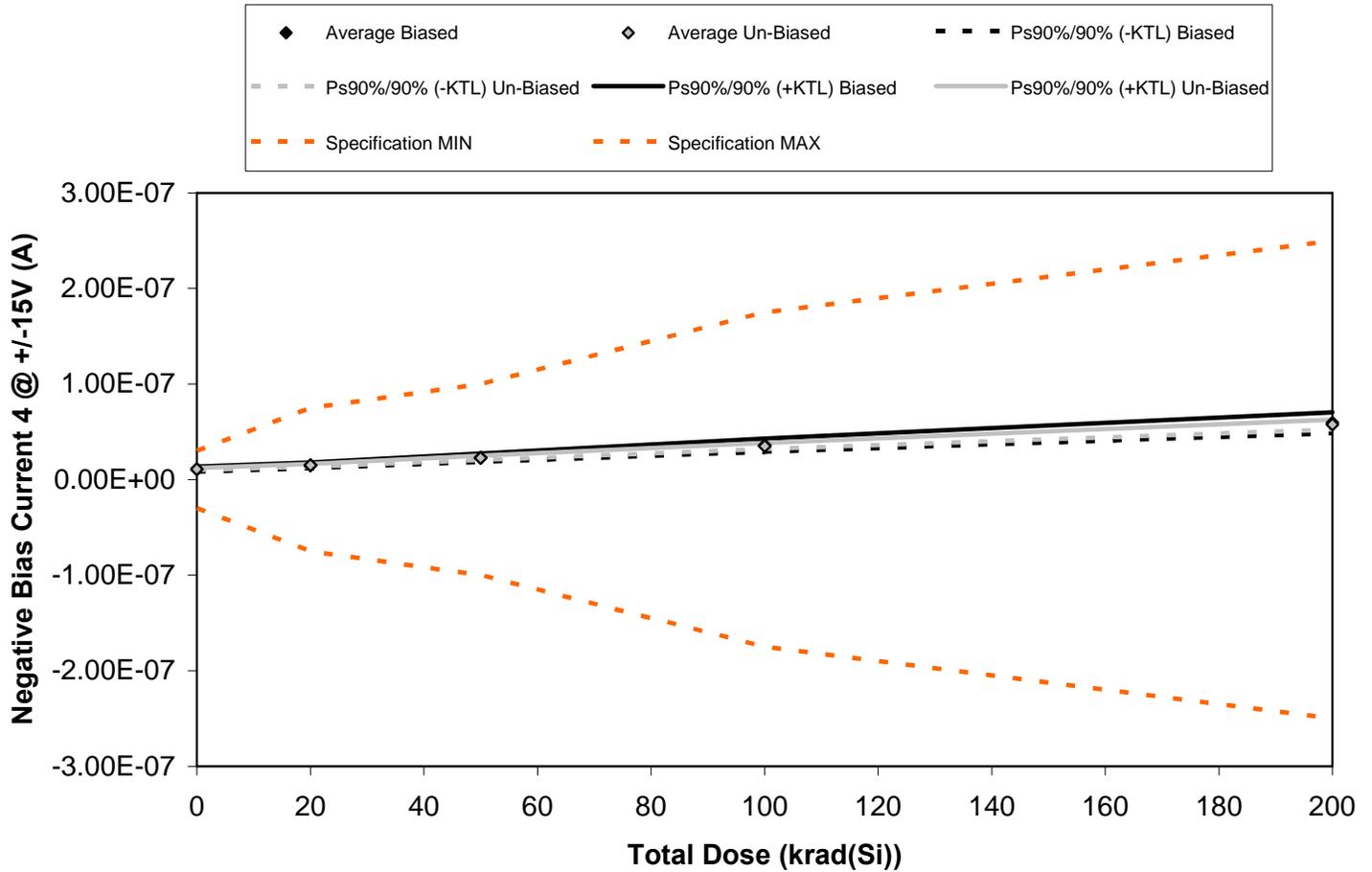


Figure 5.18. Plot of Negative Bias Current 4 @ +/-15V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.18. Raw data for Negative Bias Current 4 @ +/-15V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 4 @ +/-15V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	9.23E-09	1.32E-08	2.05E-08	3.26E-08	5.49E-08
1116	1.17E-08	1.57E-08	2.37E-08	3.70E-08	6.10E-08
1117	1.08E-08	1.46E-08	2.20E-08	3.45E-08	5.61E-08
1118	1.15E-08	1.57E-08	2.37E-08	3.72E-08	6.01E-08
1119	1.07E-08	1.55E-08	2.44E-08	3.89E-08	6.48E-08
1120	1.09E-08	1.48E-08	2.25E-08	3.47E-08	5.72E-08
1121	1.05E-08	1.47E-08	2.26E-08	3.48E-08	5.83E-08
1122	1.09E-08	1.48E-08	2.22E-08	3.45E-08	5.62E-08
1123	1.10E-08	1.51E-08	2.23E-08	3.44E-08	5.56E-08
1124	1.15E-08	1.60E-08	2.43E-08	3.72E-08	6.04E-08
1125	1.13E-08	1.14E-08	1.14E-08	1.14E-08	1.13E-08
1126	1.02E-08	1.02E-08	1.02E-08	1.02E-08	1.02E-08
Biased Statistics					
Average Biased	1.08E-08	1.49E-08	2.29E-08	3.60E-08	5.94E-08
Std Dev Biased	9.75E-10	1.08E-09	1.61E-09	2.50E-09	4.00E-09
Ps90%/90% (+KTL) Biased	1.35E-08	1.79E-08	2.73E-08	4.29E-08	7.04E-08
Ps90%/90% (-KTL) Biased	8.12E-09	1.20E-08	1.85E-08	2.92E-08	4.84E-08
Un-Biased Statistics					
Average Un-Biased	1.10E-08	1.51E-08	2.28E-08	3.51E-08	5.75E-08
Std Dev Un-Biased	3.49E-10	5.35E-10	8.48E-10	1.17E-09	1.91E-09
Ps90%/90% (+KTL) Un-Biased	1.19E-08	1.66E-08	2.51E-08	3.83E-08	6.27E-08
Ps90%/90% (-KTL) Un-Biased	1.00E-08	1.36E-08	2.05E-08	3.19E-08	5.23E-08
Specification MIN	-3.00E-08	-7.50E-08	-1.00E-07	-1.75E-07	-2.50E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	3.00E-08	7.50E-08	1.00E-07	1.75E-07	2.50E-07
Status	PASS	PASS	PASS	PASS	PASS

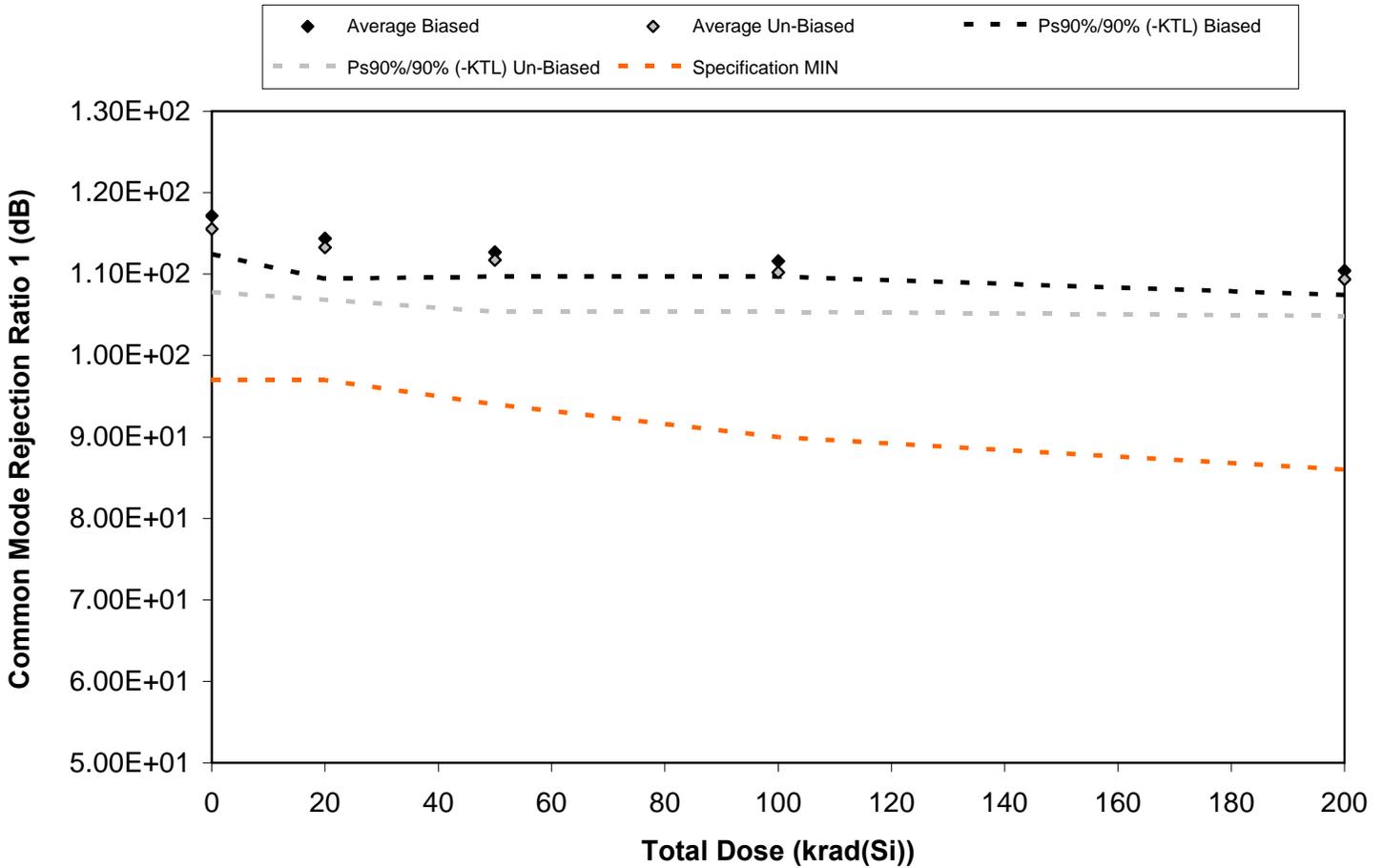


Figure 5.19. Plot of Common Mode Rejection Ratio 1 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.19. Raw data for Common Mode Rejection Ratio 1 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Common Mode Rejection Ratio 1 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.20E+02	1.17E+02	1.14E+02	1.12E+02	1.11E+02
1116	1.17E+02	1.16E+02	1.13E+02	1.12E+02	1.12E+02
1117	1.17E+02	1.14E+02	1.13E+02	1.12E+02	1.10E+02
1118	1.15E+02	1.12E+02	1.11E+02	1.11E+02	1.09E+02
1119	1.17E+02	1.13E+02	1.12E+02	1.11E+02	1.10E+02
1120	1.16E+02	1.14E+02	1.12E+02	1.11E+02	1.10E+02
1121	1.19E+02	1.15E+02	1.14E+02	1.12E+02	1.11E+02
1122	1.12E+02	1.10E+02	1.08E+02	1.08E+02	1.07E+02
1123	1.14E+02	1.12E+02	1.11E+02	1.10E+02	1.09E+02
1124	1.17E+02	1.15E+02	1.13E+02	1.12E+02	1.10E+02
1125	1.15E+02	1.15E+02	1.15E+02	1.15E+02	1.15E+02
1126	1.19E+02	1.19E+02	1.19E+02	1.19E+02	1.18E+02
Biased Statistics					
Average Biased	1.17E+02	1.14E+02	1.13E+02	1.12E+02	1.10E+02
Std Dev Biased	1.72E+00	1.80E+00	1.09E+00	6.88E-01	1.09E+00
Ps90%/90% (+KTL) Biased	1.22E+02	1.19E+02	1.16E+02	1.13E+02	1.13E+02
Ps90%/90% (-KTL) Biased	1.12E+02	1.09E+02	1.10E+02	1.10E+02	1.07E+02
Un-Biased Statistics					
Average Un-Biased	1.16E+02	1.13E+02	1.12E+02	1.10E+02	1.09E+02
Std Dev Un-Biased	2.83E+00	2.35E+00	2.32E+00	1.77E+00	1.64E+00
Ps90%/90% (+KTL) Un-Biased	1.23E+02	1.20E+02	1.18E+02	1.15E+02	1.14E+02
Ps90%/90% (-KTL) Un-Biased	1.08E+02	1.07E+02	1.05E+02	1.05E+02	1.05E+02
Specification MIN	9.70E+01	9.70E+01	9.40E+01	9.00E+01	8.60E+01
Status	PASS	PASS	PASS	PASS	PASS

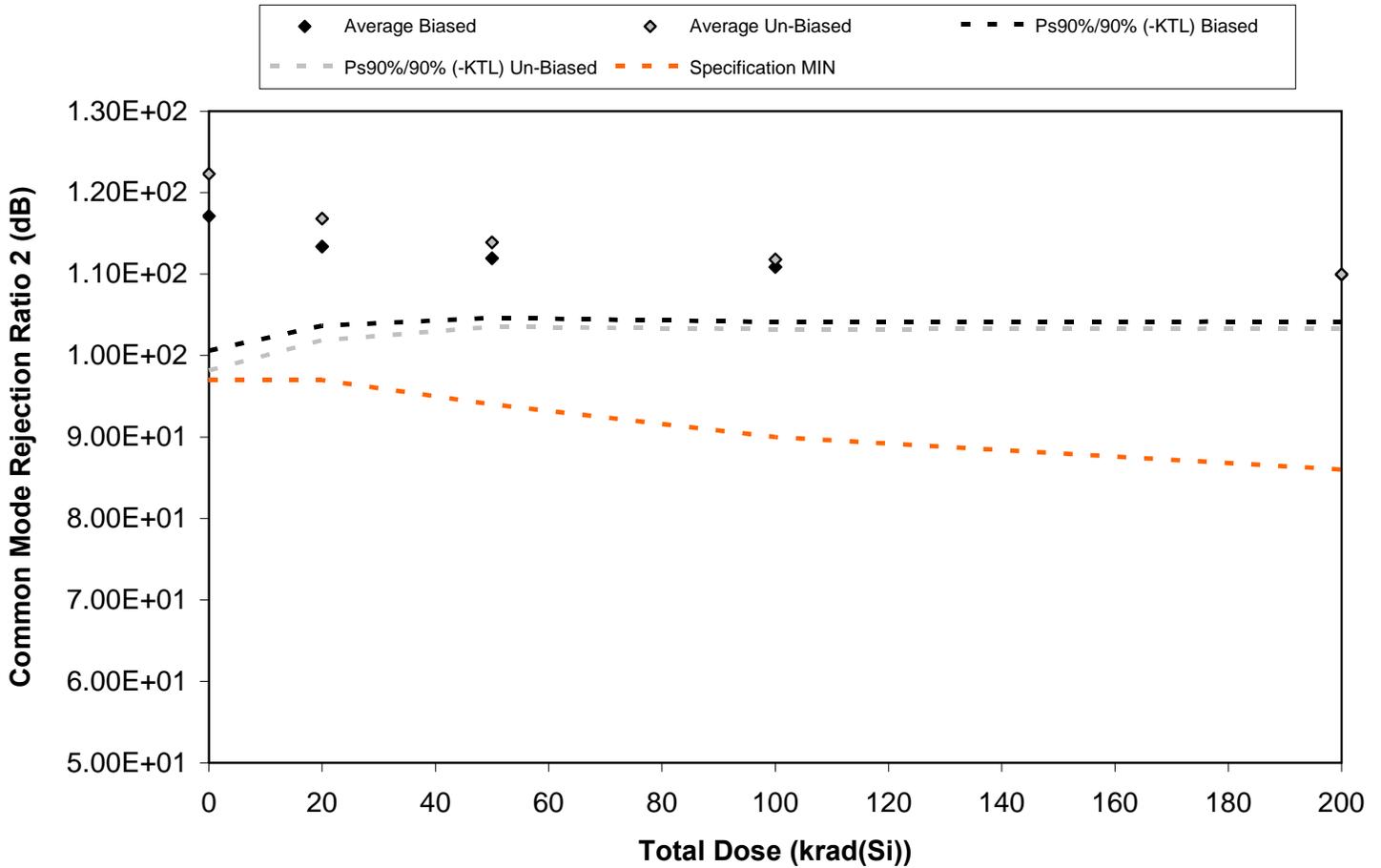


Figure 5.20. Plot of Common Mode Rejection Ratio 2 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.20. Raw data for Common Mode Rejection Ratio 2 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Common Mode Rejection Ratio 2 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.27E+02	1.19E+02	1.16E+02	1.15E+02	1.13E+02
1116	1.20E+02	1.15E+02	1.14E+02	1.12E+02	1.11E+02
1117	1.13E+02	1.11E+02	1.10E+02	1.09E+02	1.09E+02
1118	1.13E+02	1.11E+02	1.10E+02	1.09E+02	1.08E+02
1119	1.13E+02	1.11E+02	1.10E+02	1.09E+02	1.08E+02
1120	1.21E+02	1.17E+02	1.14E+02	1.13E+02	1.11E+02
1121	1.37E+02	1.25E+02	1.19E+02	1.16E+02	1.12E+02
1122	1.15E+02	1.10E+02	1.09E+02	1.07E+02	1.06E+02
1123	1.16E+02	1.14E+02	1.12E+02	1.11E+02	1.10E+02
1124	1.23E+02	1.18E+02	1.15E+02	1.13E+02	1.11E+02
1125	1.15E+02	1.15E+02	1.15E+02	1.15E+02	1.15E+02
1126	1.17E+02	1.18E+02	1.18E+02	1.18E+02	1.17E+02
Biased Statistics					
Average Biased	1.17E+02	1.13E+02	1.12E+02	1.11E+02	1.10E+02
Std Dev Biased	6.02E+00	3.55E+00	2.68E+00	2.46E+00	2.09E+00
Ps90%/90% (+KTL) Biased	1.34E+02	1.23E+02	1.19E+02	1.18E+02	1.16E+02
Ps90%/90% (-KTL) Biased	1.01E+02	1.04E+02	1.05E+02	1.04E+02	1.04E+02
Un-Biased Statistics					
Average Un-Biased	1.22E+02	1.17E+02	1.14E+02	1.12E+02	1.10E+02
Std Dev Un-Biased	8.81E+00	5.45E+00	3.78E+00	3.11E+00	2.43E+00
Ps90%/90% (+KTL) Un-Biased	1.46E+02	1.32E+02	1.24E+02	1.20E+02	1.17E+02
Ps90%/90% (-KTL) Un-Biased	9.82E+01	1.02E+02	1.04E+02	1.03E+02	1.03E+02
Specification MIN	9.70E+01	9.70E+01	9.40E+01	9.00E+01	8.60E+01
Status	PASS	PASS	PASS	PASS	PASS

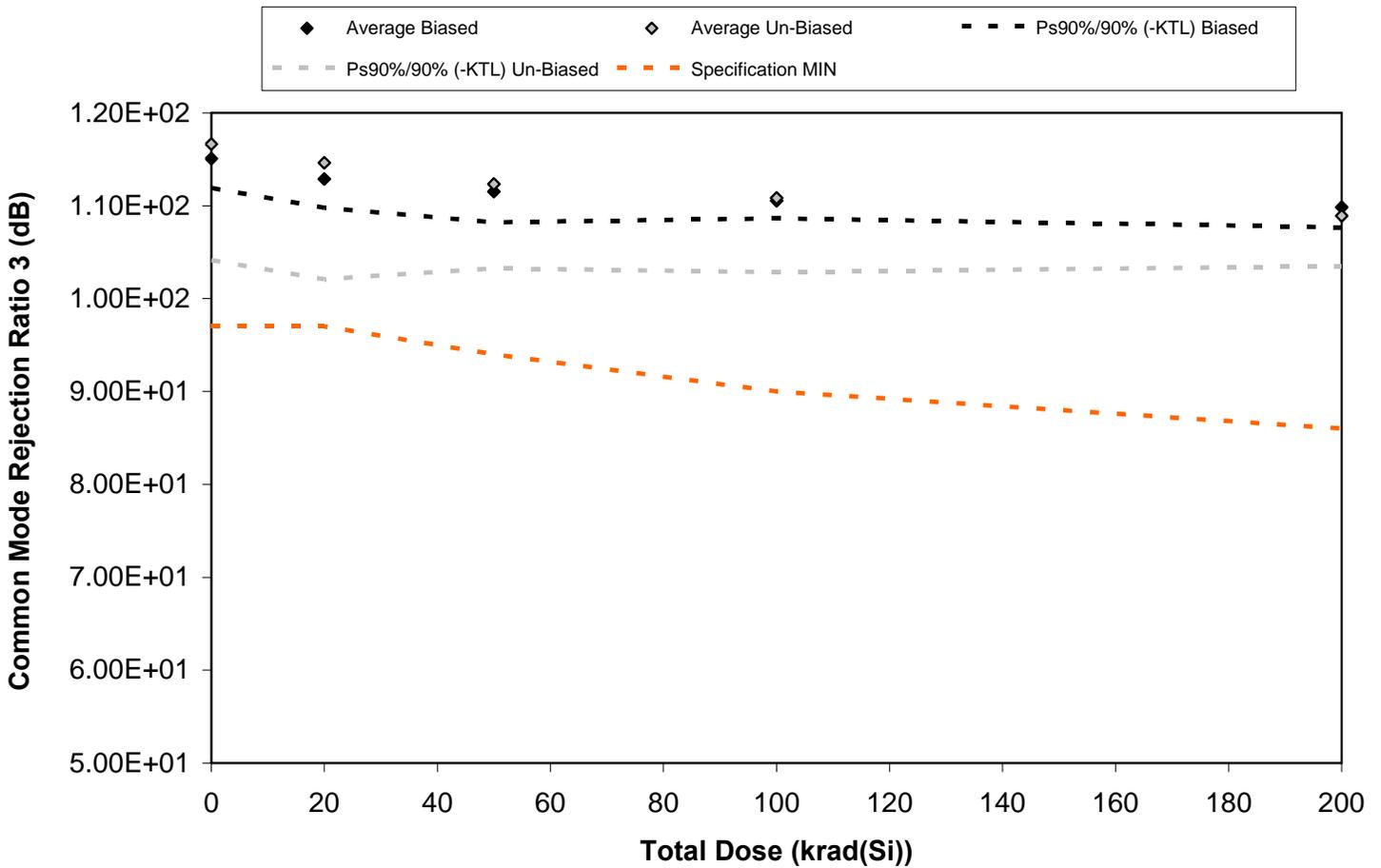


Figure 5.21. Plot of Common Mode Rejection Ratio 3 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.21. Raw data for Common Mode Rejection Ratio 3 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Common Mode Rejection Ratio 3 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.13E+02	1.11E+02	1.10E+02	1.10E+02	1.09E+02
1116	1.16E+02	1.13E+02	1.12E+02	1.11E+02	1.10E+02
1117	1.16E+02	1.14E+02	1.13E+02	1.11E+02	1.11E+02
1118	1.15E+02	1.13E+02	1.11E+02	1.10E+02	1.10E+02
1119	1.16E+02	1.13E+02	1.12E+02	1.11E+02	1.10E+02
1120	1.15E+02	1.13E+02	1.12E+02	1.10E+02	1.09E+02
1121	1.24E+02	1.22E+02	1.18E+02	1.15E+02	1.12E+02
1122	1.11E+02	1.10E+02	1.09E+02	1.07E+02	1.06E+02
1123	1.16E+02	1.13E+02	1.12E+02	1.10E+02	1.08E+02
1124	1.17E+02	1.14E+02	1.12E+02	1.11E+02	1.09E+02
1125	1.14E+02	1.14E+02	1.14E+02	1.14E+02	1.14E+02
1126	1.12E+02	1.12E+02	1.12E+02	1.12E+02	1.12E+02
Biased Statistics					
Average Biased	1.15E+02	1.13E+02	1.12E+02	1.11E+02	1.10E+02
Std Dev Biased	1.14E+00	1.13E+00	1.20E+00	7.00E-01	7.89E-01
Ps90%/90% (+KTL) Biased	1.18E+02	1.16E+02	1.15E+02	1.12E+02	1.12E+02
Ps90%/90% (-KTL) Biased	1.12E+02	1.10E+02	1.08E+02	1.09E+02	1.08E+02
Un-Biased Statistics					
Average Un-Biased	1.17E+02	1.15E+02	1.12E+02	1.11E+02	1.09E+02
Std Dev Un-Biased	4.56E+00	4.57E+00	3.31E+00	2.92E+00	1.97E+00
Ps90%/90% (+KTL) Un-Biased	1.29E+02	1.27E+02	1.21E+02	1.19E+02	1.14E+02
Ps90%/90% (-KTL) Un-Biased	1.04E+02	1.02E+02	1.03E+02	1.03E+02	1.03E+02
Specification MIN	9.70E+01	9.70E+01	9.40E+01	9.00E+01	8.60E+01
Status	PASS	PASS	PASS	PASS	PASS

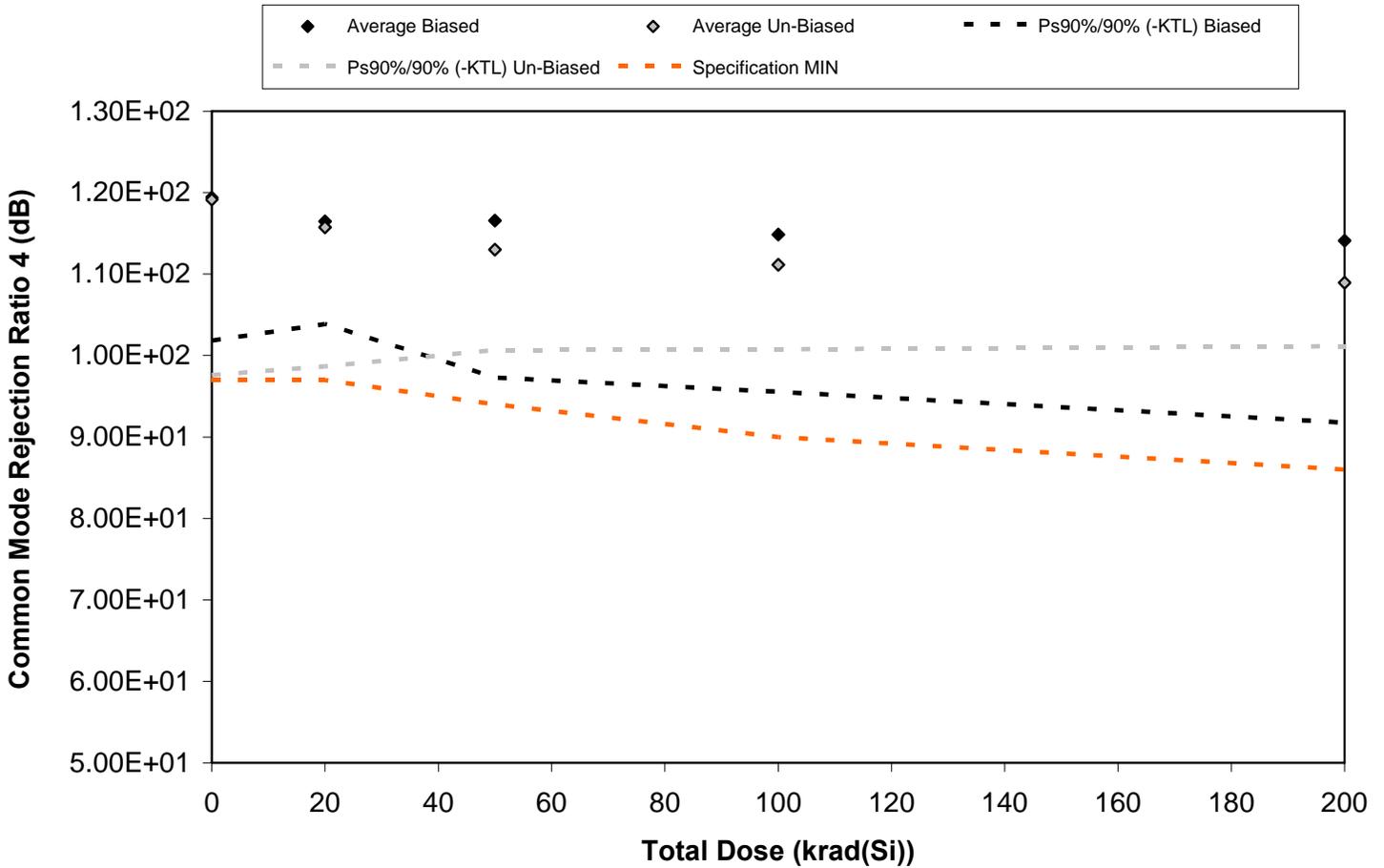


Figure 5.22. Plot of Common Mode Rejection Ratio 4 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.22. Raw data for Common Mode Rejection Ratio 4 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Common Mode Rejection Ratio 4 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.16E+02	1.21E+02	1.28E+02	1.27E+02	1.28E+02
1116	1.22E+02	1.17E+02	1.15E+02	1.14E+02	1.12E+02
1117	1.12E+02	1.10E+02	1.09E+02	1.08E+02	1.08E+02
1118	1.18E+02	1.14E+02	1.13E+02	1.11E+02	1.10E+02
1119	1.29E+02	1.20E+02	1.17E+02	1.14E+02	1.12E+02
1120	1.21E+02	1.17E+02	1.15E+02	1.13E+02	1.11E+02
1121	1.30E+02	1.25E+02	1.19E+02	1.16E+02	1.12E+02
1122	1.10E+02	1.09E+02	1.08E+02	1.06E+02	1.05E+02
1123	1.13E+02	1.11E+02	1.09E+02	1.08E+02	1.07E+02
1124	1.22E+02	1.17E+02	1.15E+02	1.13E+02	1.10E+02
1125	1.83E+02	1.39E+02	1.44E+02	1.46E+02	1.47E+02
1126	1.26E+02	1.26E+02	1.26E+02	1.27E+02	1.27E+02
Biased Statistics					
Average Biased	1.19E+02	1.16E+02	1.17E+02	1.15E+02	1.14E+02
Std Dev Biased	6.39E+00	4.60E+00	7.03E+00	7.04E+00	8.15E+00
Ps90%/90% (+KTL) Biased	1.37E+02	1.29E+02	1.36E+02	1.34E+02	1.36E+02
Ps90%/90% (-KTL) Biased	1.02E+02	1.04E+02	9.73E+01	9.55E+01	9.18E+01
Un-Biased Statistics					
Average Un-Biased	1.19E+02	1.16E+02	1.13E+02	1.11E+02	1.09E+02
Std Dev Un-Biased	7.86E+00	6.22E+00	4.49E+00	3.78E+00	2.85E+00
Ps90%/90% (+KTL) Un-Biased	1.41E+02	1.33E+02	1.25E+02	1.21E+02	1.17E+02
Ps90%/90% (-KTL) Un-Biased	9.76E+01	9.87E+01	1.01E+02	1.01E+02	1.01E+02
Specification MIN	9.70E+01	9.70E+01	9.40E+01	9.00E+01	8.60E+01
Status	PASS	PASS	PASS	PASS	PASS

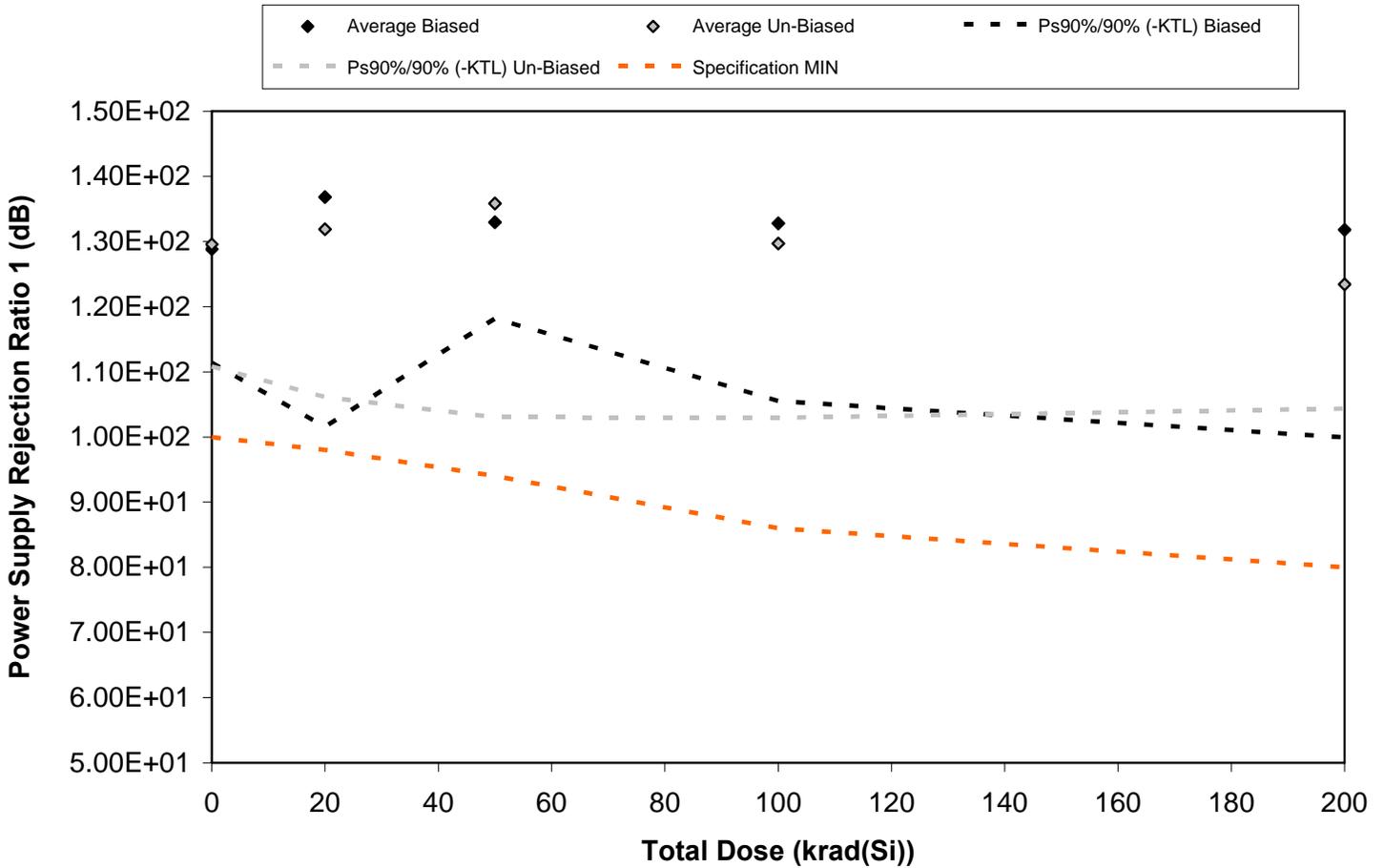


Figure 5.23. Plot of Power Supply Rejection Ratio 1 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.23. Raw data for Power Supply Rejection Ratio 1 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Power Supply Rejection Ratio 1 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.23E+02	1.24E+02	1.29E+02	1.36E+02	1.48E+02
1116	1.31E+02	1.36E+02	1.33E+02	1.25E+02	1.23E+02
1117	1.23E+02	1.25E+02	1.27E+02	1.21E+02	1.19E+02
1118	1.28E+02	1.51E+02	1.35E+02	1.38E+02	1.32E+02
1119	1.39E+02	1.49E+02	1.41E+02	1.45E+02	1.37E+02
1120	1.25E+02	1.27E+02	1.26E+02	1.30E+02	1.34E+02
1121	1.27E+02	1.48E+02	1.49E+02	1.44E+02	1.22E+02
1122	1.24E+02	1.26E+02	1.21E+02	1.18E+02	1.16E+02
1123	1.31E+02	1.27E+02	1.37E+02	1.32E+02	1.26E+02
1124	1.41E+02	1.31E+02	1.45E+02	1.24E+02	1.19E+02
1125	1.30E+02	1.51E+02	1.33E+02	1.36E+02	1.29E+02
1126	1.19E+02	1.19E+02	1.17E+02	1.16E+02	1.19E+02
Biased Statistics					
Average Biased	1.29E+02	1.37E+02	1.33E+02	1.33E+02	1.32E+02
Std Dev Biased	6.36E+00	1.29E+01	5.40E+00	9.95E+00	1.16E+01
Ps90%/90% (+KTL) Biased	1.46E+02	1.72E+02	1.48E+02	1.60E+02	1.64E+02
Ps90%/90% (-KTL) Biased	1.11E+02	1.02E+02	1.18E+02	1.06E+02	9.99E+01
Un-Biased Statistics					
Average Un-Biased	1.30E+02	1.32E+02	1.36E+02	1.30E+02	1.23E+02
Std Dev Un-Biased	6.84E+00	9.40E+00	1.20E+01	9.76E+00	6.95E+00
Ps90%/90% (+KTL) Un-Biased	1.48E+02	1.58E+02	1.69E+02	1.56E+02	1.42E+02
Ps90%/90% (-KTL) Un-Biased	1.11E+02	1.06E+02	1.03E+02	1.03E+02	1.04E+02
Specification MIN	1.00E+02	9.80E+01	9.40E+01	8.60E+01	8.00E+01
Status	PASS	PASS	PASS	PASS	PASS

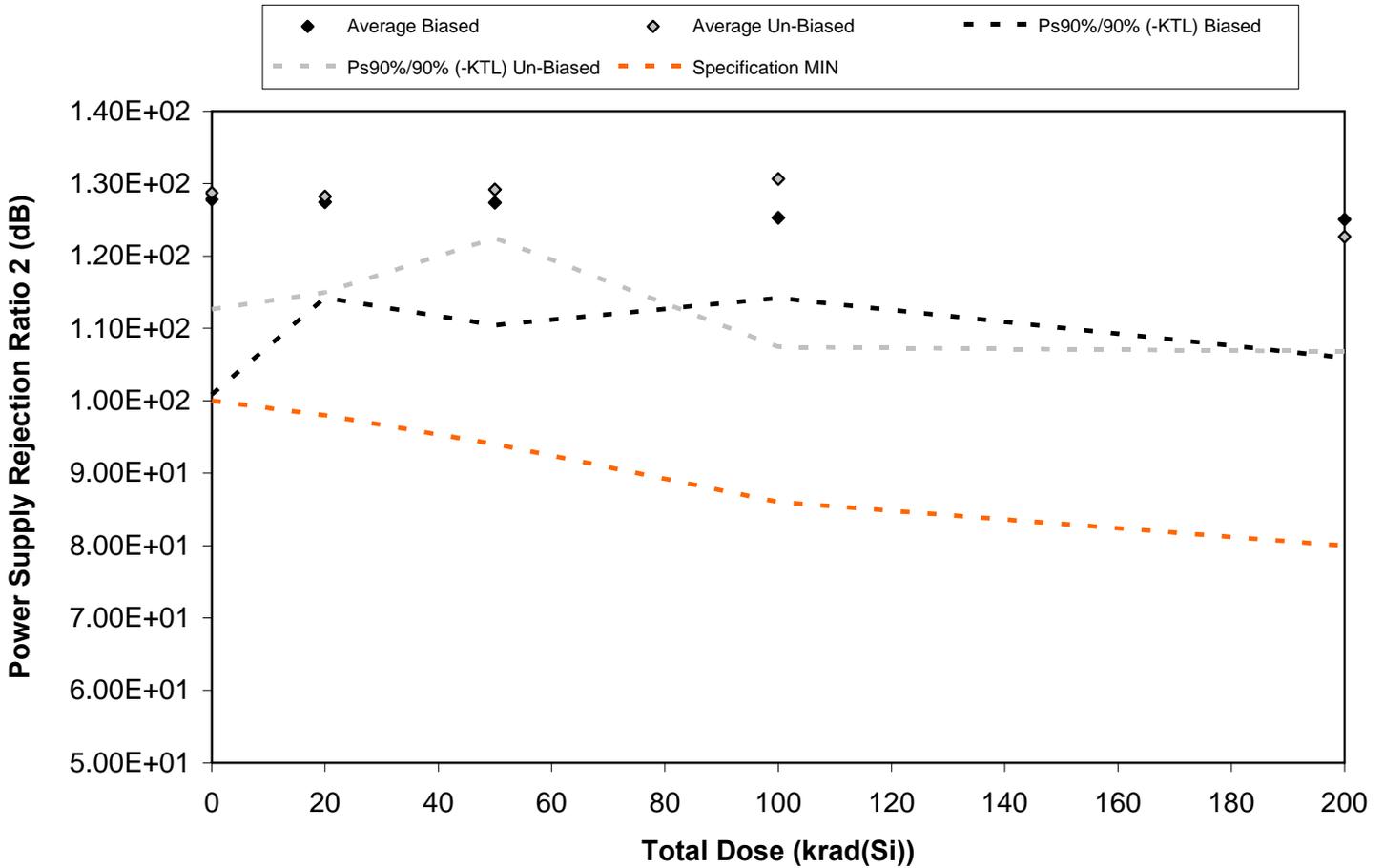


Figure 5.24. Plot of Power Supply Rejection Ratio 2 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.24. Raw data for Power Supply Rejection Ratio 2 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Power Supply Rejection Ratio 2 (dB)	Total Dose (krad(Si))				
Device	0	20	50	100	200
1115	1.26E+02	1.29E+02	1.38E+02	1.30E+02	1.33E+02
1116	1.25E+02	1.26E+02	1.24E+02	1.20E+02	1.17E+02
1117	1.20E+02	1.21E+02	1.21E+02	1.23E+02	1.23E+02
1118	1.45E+02	1.34E+02	1.28E+02	1.25E+02	1.21E+02
1119	1.23E+02	1.27E+02	1.26E+02	1.28E+02	1.32E+02
1120	1.24E+02	1.25E+02	1.27E+02	1.41E+02	1.25E+02
1121	1.26E+02	1.27E+02	1.32E+02	1.34E+02	1.23E+02
1122	1.39E+02	1.37E+02	1.30E+02	1.24E+02	1.18E+02
1123	1.27E+02	1.25E+02	1.31E+02	1.34E+02	1.31E+02
1124	1.28E+02	1.27E+02	1.26E+02	1.20E+02	1.16E+02
1125	1.26E+02	1.31E+02	1.28E+02	1.29E+02	1.27E+02
1126	1.35E+02	1.36E+02	1.32E+02	1.31E+02	1.37E+02
Biased Statistics					
Average Biased	1.28E+02	1.27E+02	1.27E+02	1.25E+02	1.25E+02
Std Dev Biased	9.81E+00	4.82E+00	6.17E+00	4.04E+00	6.97E+00
Ps90%/90% (+KTL) Biased	1.55E+02	1.41E+02	1.44E+02	1.36E+02	1.44E+02
Ps90%/90% (-KTL) Biased	1.01E+02	1.14E+02	1.10E+02	1.14E+02	1.06E+02
Un-Biased Statistics					
Average Un-Biased	1.29E+02	1.28E+02	1.29E+02	1.31E+02	1.23E+02
Std Dev Un-Biased	5.85E+00	4.83E+00	2.45E+00	8.47E+00	5.78E+00
Ps90%/90% (+KTL) Un-Biased	1.45E+02	1.41E+02	1.36E+02	1.54E+02	1.39E+02
Ps90%/90% (-KTL) Un-Biased	1.13E+02	1.15E+02	1.22E+02	1.07E+02	1.07E+02
Specification MIN	1.00E+02	9.80E+01	9.40E+01	8.60E+01	8.00E+01
Status	PASS	PASS	PASS	PASS	PASS

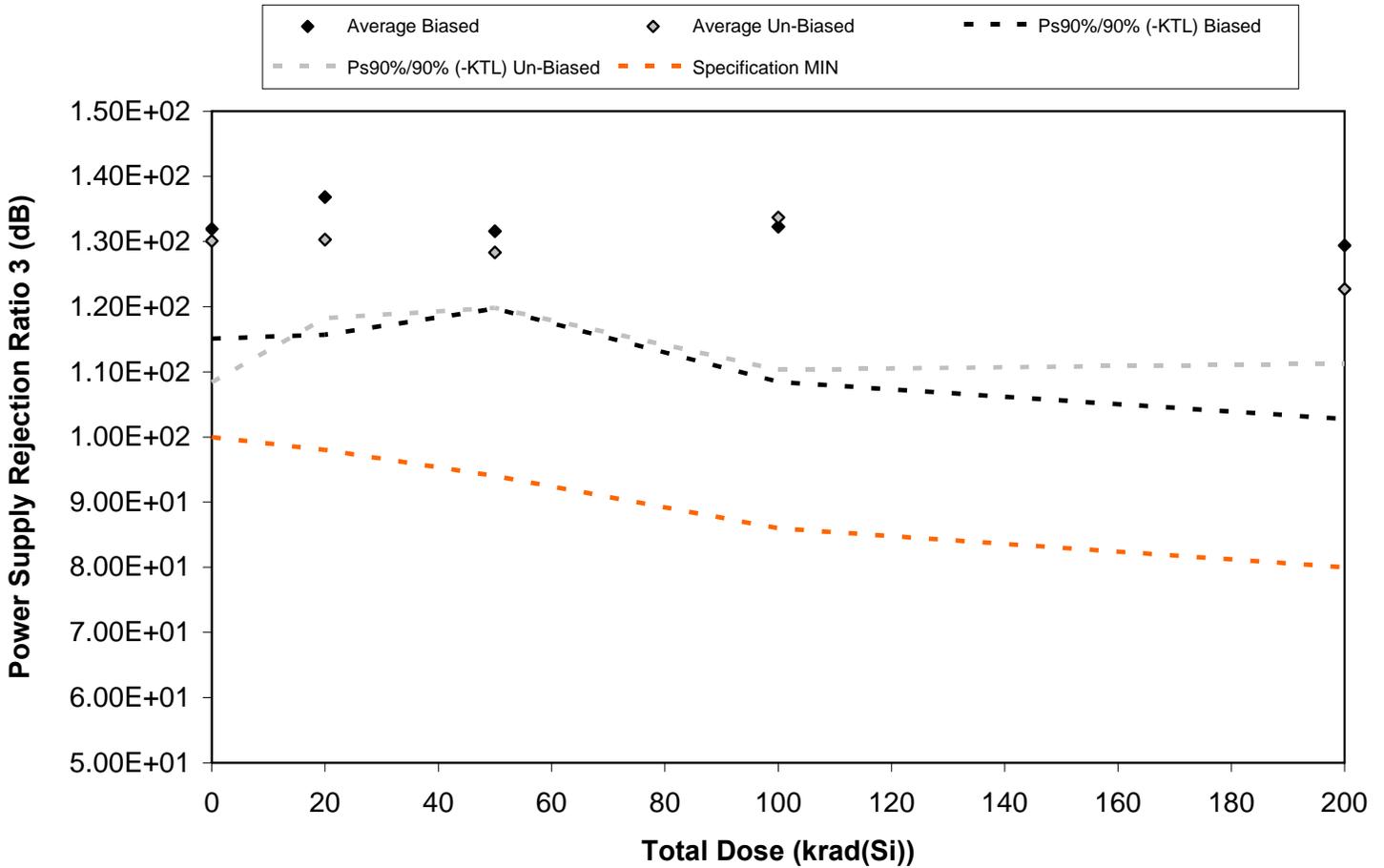


Figure 5.25. Plot of Power Supply Rejection Ratio 3 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.25. Raw data for Power Supply Rejection Ratio 3 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Power Supply Rejection Ratio 3 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.28E+02	1.43E+02	1.31E+02	1.34E+02	1.26E+02
1116	1.42E+02	1.32E+02	1.39E+02	1.45E+02	1.30E+02
1117	1.32E+02	1.43E+02	1.27E+02	1.24E+02	1.24E+02
1118	1.33E+02	1.26E+02	1.30E+02	1.24E+02	1.22E+02
1119	1.25E+02	1.40E+02	1.30E+02	1.33E+02	1.46E+02
1120	1.28E+02	1.28E+02	1.32E+02	1.37E+02	1.22E+02
1121	1.22E+02	1.26E+02	1.26E+02	1.32E+02	1.24E+02
1122	1.31E+02	1.37E+02	1.28E+02	1.21E+02	1.18E+02
1123	1.43E+02	1.33E+02	1.31E+02	1.34E+02	1.20E+02
1124	1.27E+02	1.28E+02	1.25E+02	1.44E+02	1.29E+02
1125	1.35E+02	1.38E+02	1.43E+02	1.49E+02	1.44E+02
1126	1.27E+02	1.28E+02	1.24E+02	1.25E+02	1.30E+02
Biased Statistics					
Average Biased	1.32E+02	1.37E+02	1.32E+02	1.32E+02	1.29E+02
Std Dev Biased	6.14E+00	7.71E+00	4.33E+00	8.68E+00	9.71E+00
Ps90%/90% (+KTL) Biased	1.49E+02	1.58E+02	1.43E+02	1.56E+02	1.56E+02
Ps90%/90% (-KTL) Biased	1.15E+02	1.16E+02	1.20E+02	1.08E+02	1.03E+02
Un-Biased Statistics					
Average Un-Biased	1.30E+02	1.30E+02	1.28E+02	1.34E+02	1.23E+02
Std Dev Un-Biased	7.92E+00	4.41E+00	3.10E+00	8.53E+00	4.16E+00
Ps90%/90% (+KTL) Un-Biased	1.52E+02	1.42E+02	1.37E+02	1.57E+02	1.34E+02
Ps90%/90% (-KTL) Un-Biased	1.08E+02	1.18E+02	1.20E+02	1.10E+02	1.11E+02
Specification MIN	1.00E+02	9.80E+01	9.40E+01	8.60E+01	8.00E+01
Status	PASS	PASS	PASS	PASS	PASS

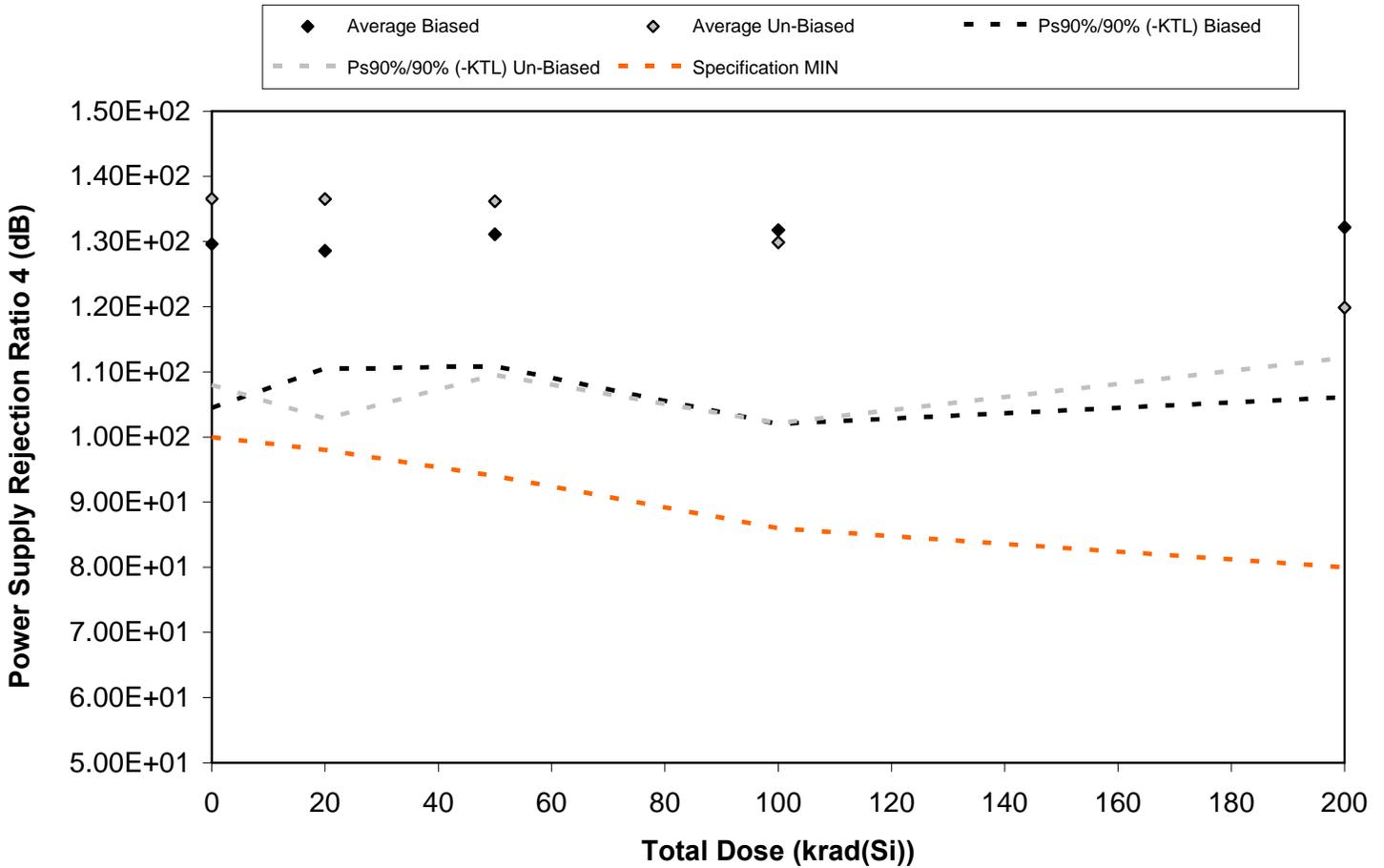


Figure 5.26. Plot of Power Supply Rejection Ratio 4 (dB) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.26. Raw data for Power Supply Rejection Ratio 4 (dB) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Power Supply Rejection Ratio 4 (dB)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.21E+02	1.24E+02	1.29E+02	1.25E+02	1.48E+02
1116	1.30E+02	1.25E+02	1.29E+02	1.51E+02	1.34E+02
1117	1.43E+02	1.32E+02	1.37E+02	1.29E+02	1.28E+02
1118	1.34E+02	1.39E+02	1.39E+02	1.27E+02	1.23E+02
1119	1.21E+02	1.23E+02	1.21E+02	1.27E+02	1.28E+02
1120	1.45E+02	1.58E+02	1.47E+02	1.27E+02	1.19E+02
1121	1.23E+02	1.31E+02	1.27E+02	1.29E+02	1.24E+02
1122	1.28E+02	1.33E+02	1.26E+02	1.22E+02	1.17E+02
1123	1.45E+02	1.28E+02	1.45E+02	1.47E+02	1.22E+02
1124	1.41E+02	1.33E+02	1.36E+02	1.24E+02	1.18E+02
1125	1.22E+02	1.25E+02	1.24E+02	1.24E+02	1.23E+02
1126	1.26E+02	1.27E+02	1.21E+02	1.22E+02	1.27E+02
Biased Statistics					
Average Biased	1.30E+02	1.29E+02	1.31E+02	1.32E+02	1.32E+02
Std Dev Biased	9.18E+00	6.60E+00	7.39E+00	1.09E+01	9.52E+00
Ps90%/90% (+KTL) Biased	1.55E+02	1.47E+02	1.51E+02	1.62E+02	1.58E+02
Ps90%/90% (-KTL) Biased	1.04E+02	1.10E+02	1.11E+02	1.02E+02	1.06E+02
Un-Biased Statistics					
Average Un-Biased	1.37E+02	1.37E+02	1.36E+02	1.30E+02	1.20E+02
Std Dev Un-Biased	1.04E+01	1.23E+01	9.72E+00	1.01E+01	2.81E+00
Ps90%/90% (+KTL) Un-Biased	1.65E+02	1.70E+02	1.63E+02	1.58E+02	1.28E+02
Ps90%/90% (-KTL) Un-Biased	1.08E+02	1.03E+02	1.10E+02	1.02E+02	1.12E+02
Specification MIN	1.00E+02	9.80E+01	9.40E+01	8.60E+01	8.00E+01
Status	PASS	PASS	PASS	PASS	PASS

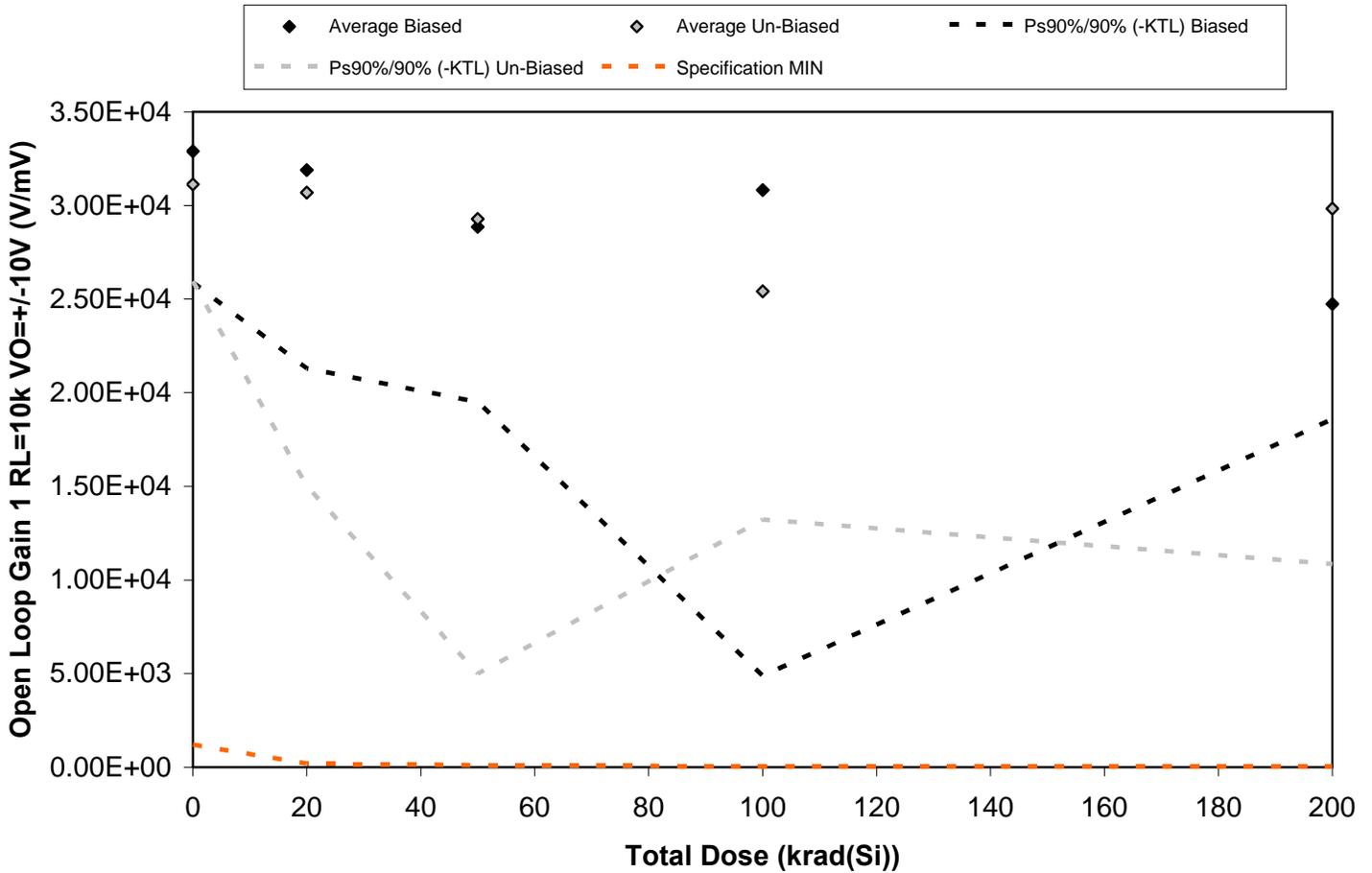


Figure 5.27. Plot of Open Loop Gain 1 RL=10k VO=+/-10V (V/mV) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.27. Raw data for Open Loop Gain 1 RL=10k VO=+/-10V (V/mV) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Open Loop Gain 1 RL=10k VO=+/-10V (V/mV)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.67E+04	3.39E+04	2.93E+04	4.45E+04	2.55E+04
1116	3.20E+04	2.83E+04	3.11E+04	1.93E+04	2.62E+04
1117	3.18E+04	3.34E+04	3.30E+04	3.17E+04	2.48E+04
1118	3.41E+04	2.74E+04	2.62E+04	3.32E+04	2.63E+04
1119	3.00E+04	3.65E+04	2.47E+04	2.52E+04	2.09E+04
1120	2.95E+04	2.22E+04	1.99E+04	2.67E+04	3.68E+04
1121	2.93E+04	3.03E+04	2.67E+04	2.51E+04	2.17E+04
1122	3.08E+04	2.94E+04	2.80E+04	3.22E+04	3.71E+04
1123	3.35E+04	3.40E+04	4.39E+04	2.09E+04	2.85E+04
1124	3.26E+04	3.75E+04	2.78E+04	2.21E+04	2.51E+04
1125	4.41E+04	5.09E+04	4.35E+04	3.04E+04	3.27E+04
1126	4.46E+04	3.17E+04	3.59E+04	3.61E+04	3.84E+04
Biased Statistics					
Average Biased	3.29E+04	3.19E+04	2.89E+04	3.08E+04	2.47E+04
Std Dev Biased	2.56E+03	3.86E+03	3.41E+03	9.46E+03	2.25E+03
Ps90%/90% (+KTL) Biased	3.99E+04	4.25E+04	3.82E+04	5.68E+04	3.09E+04
Ps90%/90% (-KTL) Biased	2.59E+04	2.13E+04	1.95E+04	4.87E+03	1.86E+04
Un-Biased Statistics					
Average Un-Biased	3.11E+04	3.07E+04	2.93E+04	2.54E+04	2.98E+04
Std Dev Un-Biased	1.88E+03	5.71E+03	8.85E+03	4.44E+03	6.93E+03
Ps90%/90% (+KTL) Un-Biased	3.63E+04	4.64E+04	5.35E+04	3.76E+04	4.88E+04
Ps90%/90% (-KTL) Un-Biased	2.60E+04	1.50E+04	4.99E+03	1.32E+04	1.08E+04
Specification MIN	1.20E+03	2.00E+02	1.00E+02	5.00E+01	2.50E+01
Status	PASS	PASS	PASS	PASS	PASS

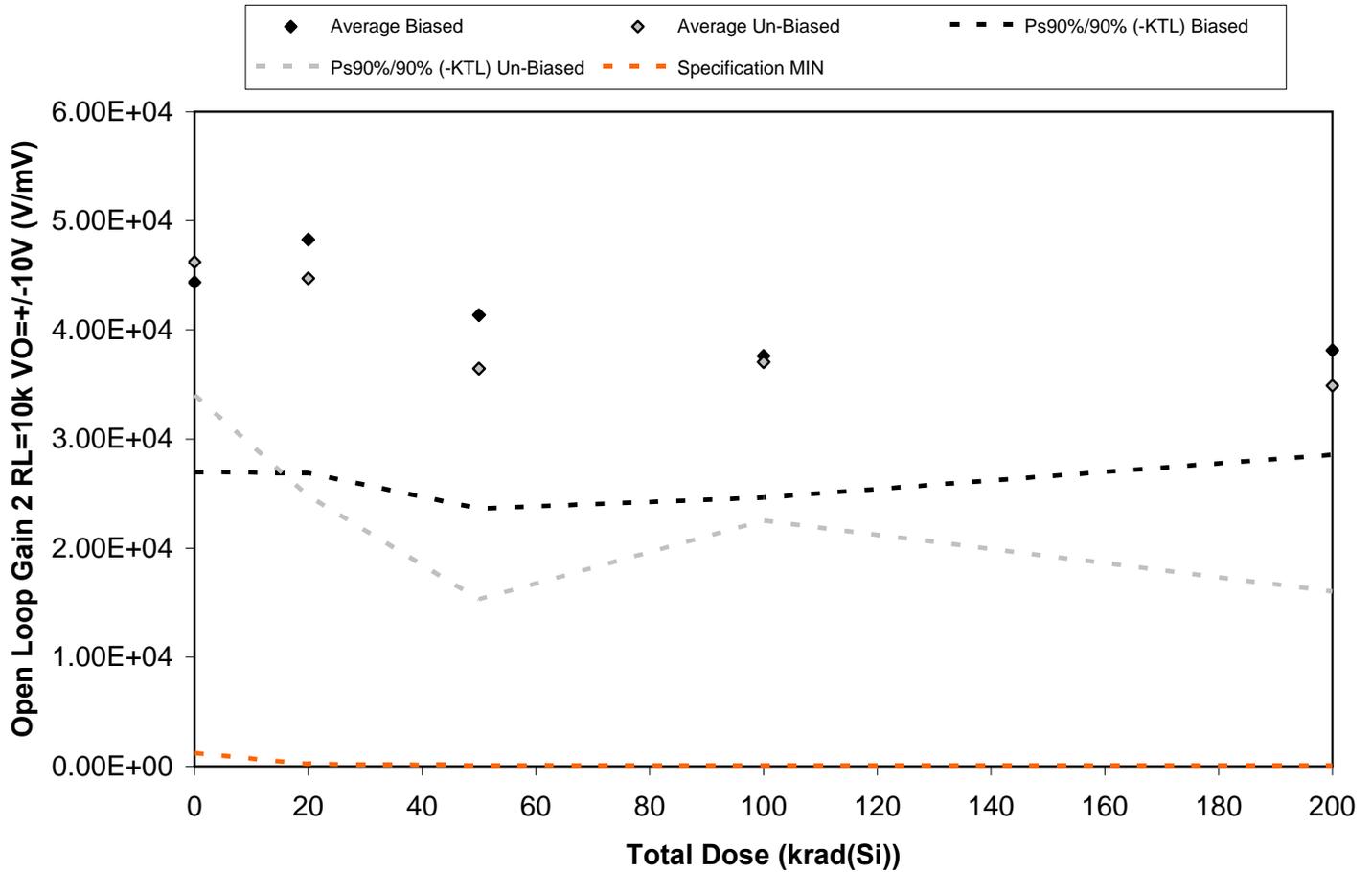


Figure 5.28. Plot of Open Loop Gain 2 RL=10k VO=+/-10V (V/mV) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.28. Raw data for Open Loop Gain 2 RL=10k VO=+/-10V (V/mV) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Open Loop Gain 2 RL=10k VO=+/-10V (V/mV)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	5.39E+04	5.99E+04	3.60E+04	3.80E+04	3.61E+04
1116	4.18E+04	3.81E+04	3.84E+04	4.38E+04	3.41E+04
1117	4.07E+04	4.67E+04	4.44E+04	3.31E+04	3.69E+04
1118	3.80E+04	4.99E+04	3.67E+04	3.28E+04	4.22E+04
1119	4.75E+04	4.68E+04	5.13E+04	4.03E+04	4.14E+04
1120	4.19E+04	4.19E+04	3.70E+04	3.38E+04	3.38E+04
1121	4.43E+04	3.60E+04	4.71E+04	4.09E+04	4.31E+04
1122	4.91E+04	4.34E+04	4.01E+04	3.34E+04	3.22E+04
1123	5.25E+04	4.63E+04	2.81E+04	3.27E+04	3.99E+04
1124	4.32E+04	5.59E+04	3.00E+04	4.44E+04	2.55E+04
1125	4.71E+04	4.77E+04	4.38E+04	4.60E+04	5.74E+04
1126	5.29E+04	4.26E+04	3.98E+04	4.38E+04	4.66E+04
Biased Statistics					
Average Biased	4.44E+04	4.83E+04	4.13E+04	3.76E+04	3.81E+04
Std Dev Biased	6.34E+03	7.81E+03	6.46E+03	4.74E+03	3.50E+03
Ps90%/90% (+KTL) Biased	6.17E+04	6.97E+04	5.91E+04	5.06E+04	4.77E+04
Ps90%/90% (-KTL) Biased	2.70E+04	2.69E+04	2.36E+04	2.46E+04	2.86E+04
Un-Biased Statistics					
Average Un-Biased	4.62E+04	4.47E+04	3.65E+04	3.71E+04	3.49E+04
Std Dev Un-Biased	4.45E+03	7.27E+03	7.72E+03	5.30E+03	6.88E+03
Ps90%/90% (+KTL) Un-Biased	5.84E+04	6.46E+04	5.76E+04	5.16E+04	5.38E+04
Ps90%/90% (-KTL) Un-Biased	3.40E+04	2.48E+04	1.53E+04	2.25E+04	1.60E+04
Specification MIN	1.20E+03	2.00E+02	1.00E+02	5.00E+01	2.50E+01
Status	PASS	PASS	PASS	PASS	PASS

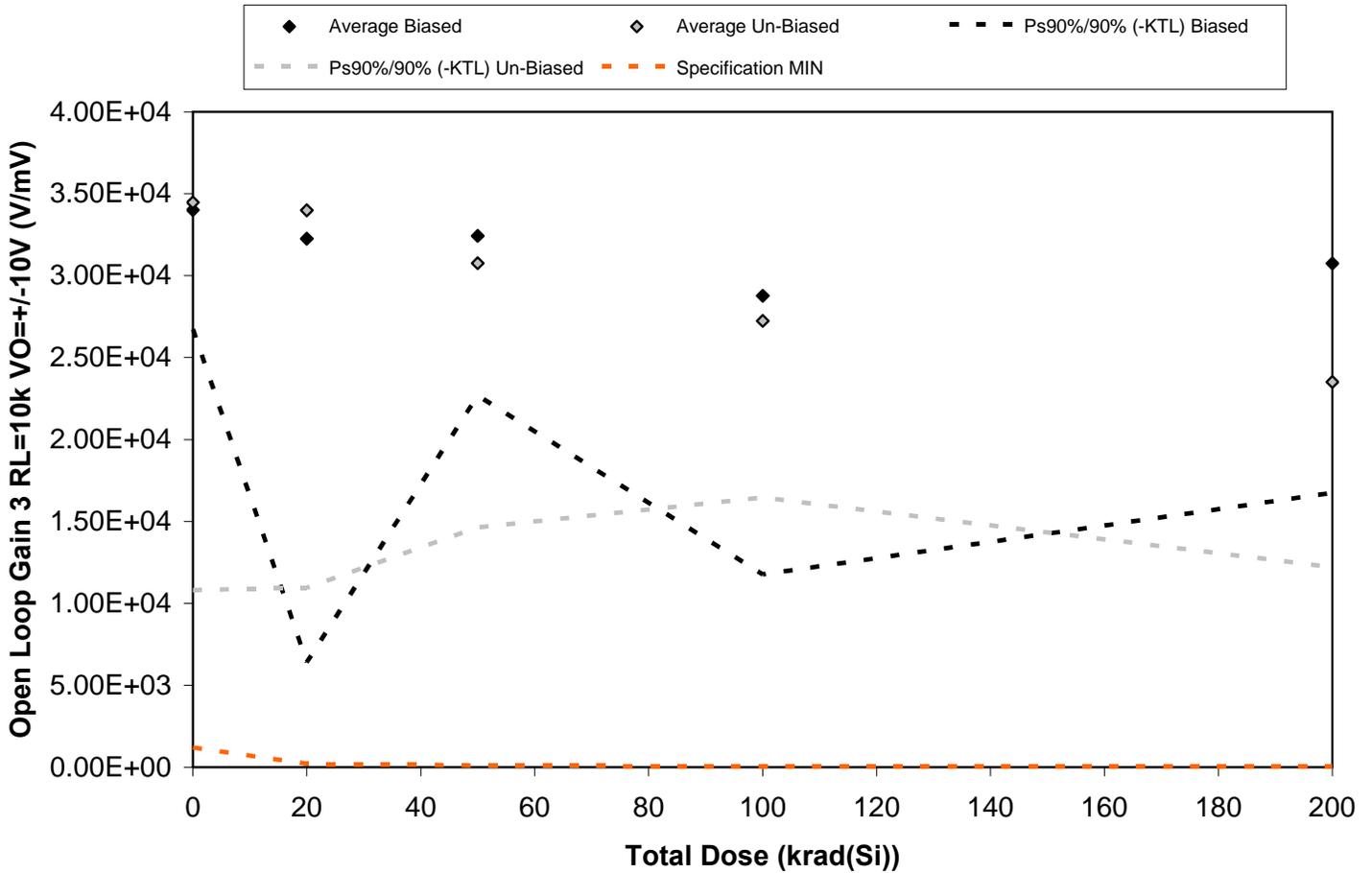


Figure 5.29. Plot of Open Loop Gain 3 RL=10k VO=+/-10V (V/mV) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.29. Raw data for Open Loop Gain 3 RL=10k VO=+/-10V (V/mV) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Open Loop Gain 3 RL=10k VO=+/-10V (V/mV)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.70E+04	3.11E+04	2.93E+04	2.30E+04	2.64E+04
1116	3.07E+04	3.66E+04	3.13E+04	2.47E+04	3.35E+04
1117	3.64E+04	4.60E+04	3.83E+04	2.60E+04	3.84E+04
1118	3.23E+04	2.29E+04	3.30E+04	3.80E+04	2.84E+04
1119	3.36E+04	2.47E+04	3.02E+04	3.21E+04	2.70E+04
1120	4.71E+04	2.89E+04	4.10E+04	3.19E+04	2.80E+04
1121	3.30E+04	4.15E+04	2.91E+04	2.47E+04	1.84E+04
1122	2.58E+04	2.23E+04	2.64E+04	2.70E+04	2.29E+04
1123	2.79E+04	3.55E+04	2.75E+04	2.23E+04	2.73E+04
1124	3.86E+04	4.18E+04	2.99E+04	3.03E+04	2.09E+04
1125	3.48E+04	3.72E+04	2.33E+04	2.45E+04	2.44E+04
1126	3.41E+04	4.15E+04	3.65E+04	4.44E+04	3.63E+04
Biased Statistics					
Average Biased	3.40E+04	3.23E+04	3.24E+04	2.88E+04	3.07E+04
Std Dev Biased	2.66E+03	9.43E+03	3.56E+03	6.20E+03	5.10E+03
Ps90%/90% (+KTL) Biased	4.13E+04	5.81E+04	4.22E+04	4.58E+04	4.47E+04
Ps90%/90% (-KTL) Biased	2.67E+04	6.39E+03	2.27E+04	1.18E+04	1.67E+04
Un-Biased Statistics					
Average Un-Biased	3.45E+04	3.40E+04	3.08E+04	2.72E+04	2.35E+04
Std Dev Un-Biased	8.63E+03	8.40E+03	5.88E+03	3.94E+03	4.12E+03
Ps90%/90% (+KTL) Un-Biased	5.81E+04	5.70E+04	4.69E+04	3.80E+04	3.48E+04
Ps90%/90% (-KTL) Un-Biased	1.08E+04	1.09E+04	1.46E+04	1.65E+04	1.22E+04
Specification MIN	1.20E+03	2.00E+02	1.00E+02	5.00E+01	2.50E+01
Status	PASS	PASS	PASS	PASS	PASS

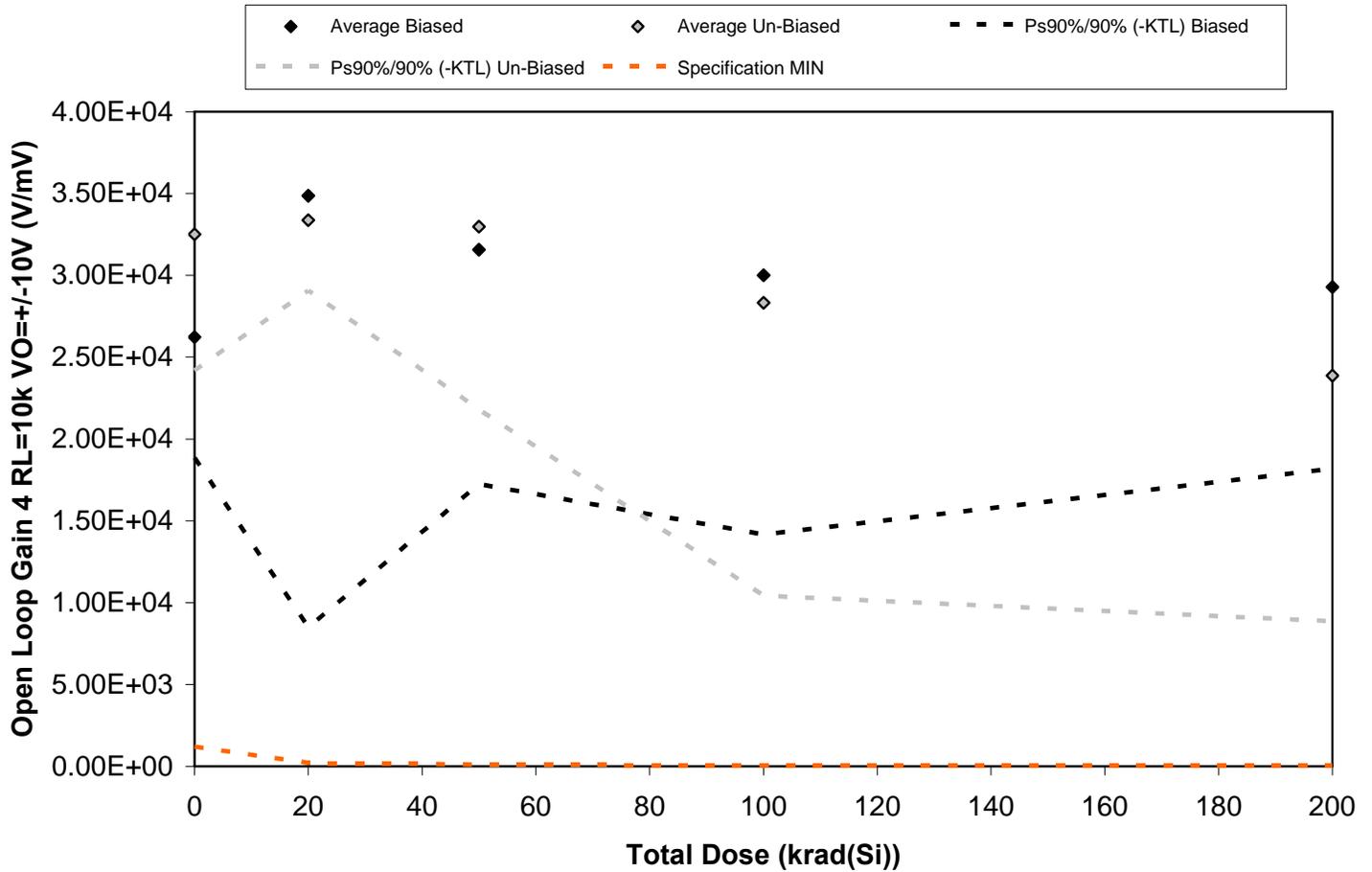


Figure 5.30. Plot of Open Loop Gain 4 RL=10k VO=+-10V (V/mV) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.30. Raw data for Open Loop Gain 4 RL=10k VO=+/-10V (V/mV) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Open Loop Gain 4 RL=10k VO=+/-10V (V/mV)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.06E+04	2.29E+04	3.10E+04	2.91E+04	2.28E+04
1116	2.45E+04	4.18E+04	3.16E+04	3.58E+04	2.92E+04
1117	2.70E+04	3.01E+04	2.51E+04	2.78E+04	3.04E+04
1118	2.39E+04	3.24E+04	3.04E+04	3.53E+04	3.39E+04
1119	2.52E+04	4.71E+04	3.97E+04	2.19E+04	3.01E+04
1120	3.19E+04	3.30E+04	3.52E+04	3.90E+04	2.33E+04
1121	2.90E+04	3.36E+04	3.64E+04	2.22E+04	3.12E+04
1122	3.04E+04	3.59E+04	2.60E+04	2.41E+04	1.65E+04
1123	3.64E+04	3.17E+04	3.44E+04	2.87E+04	2.17E+04
1124	3.47E+04	3.27E+04	3.29E+04	2.76E+04	2.67E+04
1125	3.12E+04	3.52E+04	2.42E+04	2.98E+04	3.36E+04
1126	4.37E+04	4.81E+04	3.11E+04	4.00E+04	3.43E+04
Biased Statistics					
Average Biased	2.62E+04	3.49E+04	3.16E+04	3.00E+04	2.93E+04
Std Dev Biased	2.69E+03	9.62E+03	5.22E+03	5.78E+03	4.04E+03
Ps90%/90% (+KTL) Biased	3.36E+04	6.12E+04	4.59E+04	4.59E+04	4.04E+04
Ps90%/90% (-KTL) Biased	1.88E+04	8.48E+03	1.73E+04	1.42E+04	1.82E+04
Un-Biased Statistics					
Average Un-Biased	3.25E+04	3.34E+04	3.30E+04	2.83E+04	2.39E+04
Std Dev Un-Biased	3.04E+03	1.58E+03	4.08E+03	6.52E+03	5.48E+03
Ps90%/90% (+KTL) Un-Biased	4.08E+04	3.77E+04	4.42E+04	4.62E+04	3.89E+04
Ps90%/90% (-KTL) Un-Biased	2.42E+04	2.91E+04	2.18E+04	1.04E+04	8.86E+03
Specification MIN	1.20E+03	2.00E+02	1.00E+02	5.00E+01	2.50E+01
Status	PASS	PASS	PASS	PASS	PASS

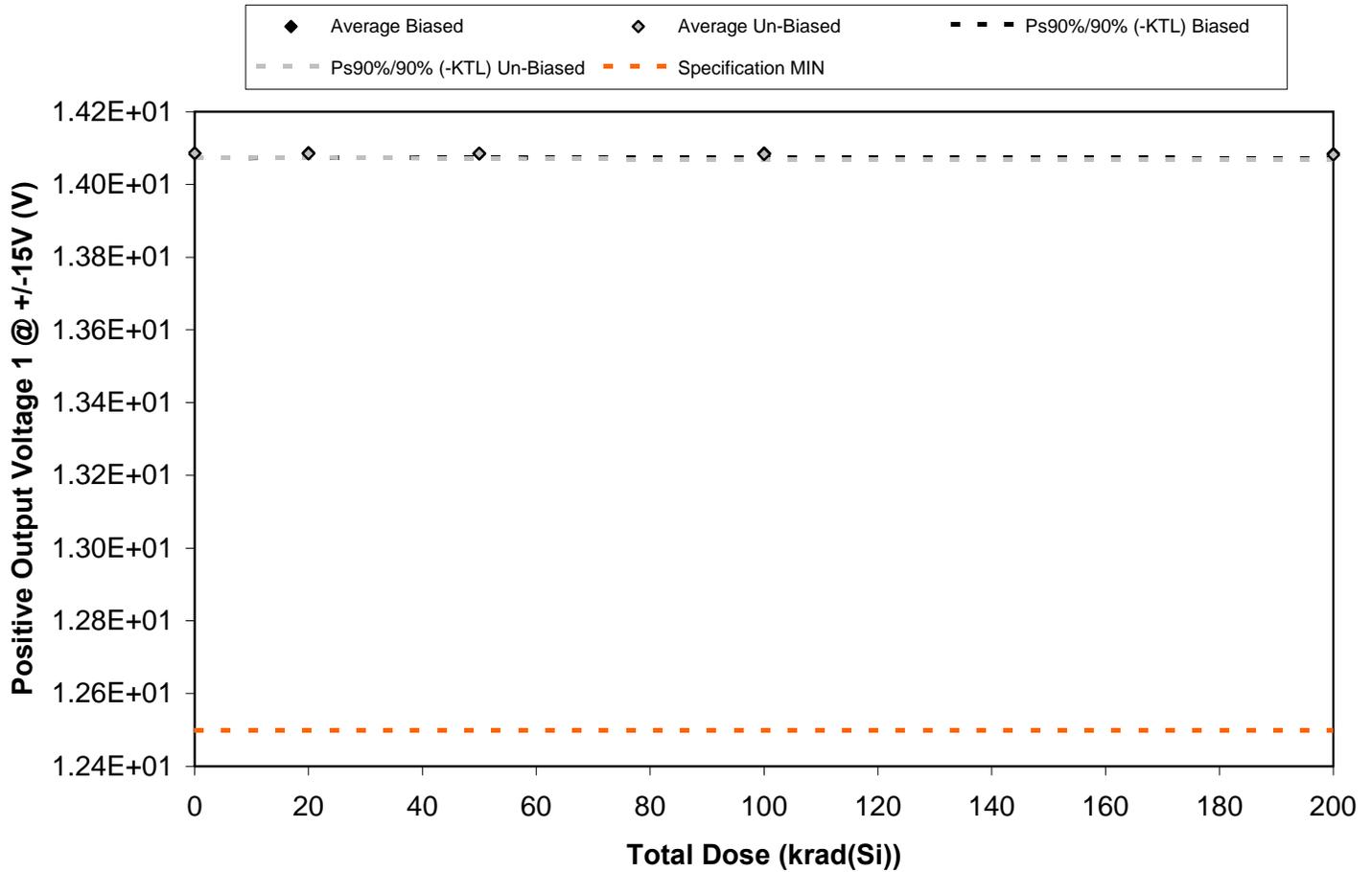


Figure 5.31. Plot of Positive Output Voltage 1 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.31. Raw data for Positive Output Voltage 1 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 1 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1116	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1117	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1118	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1119	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1120	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1121	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1122	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1123	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1124	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1125	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1126	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Biased Statistics					
Average Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Biased	4.76E-03	4.66E-03	4.32E-03	4.51E-03	4.58E-03
Ps90%/90% (+KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Un-Biased Statistics					
Average Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Un-Biased	4.64E-03	3.94E-03	4.92E-03	5.37E-03	5.20E-03
Ps90%/90% (+KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Specification MIN	1.25E+01	1.25E+01	1.25E+01	1.25E+01	1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

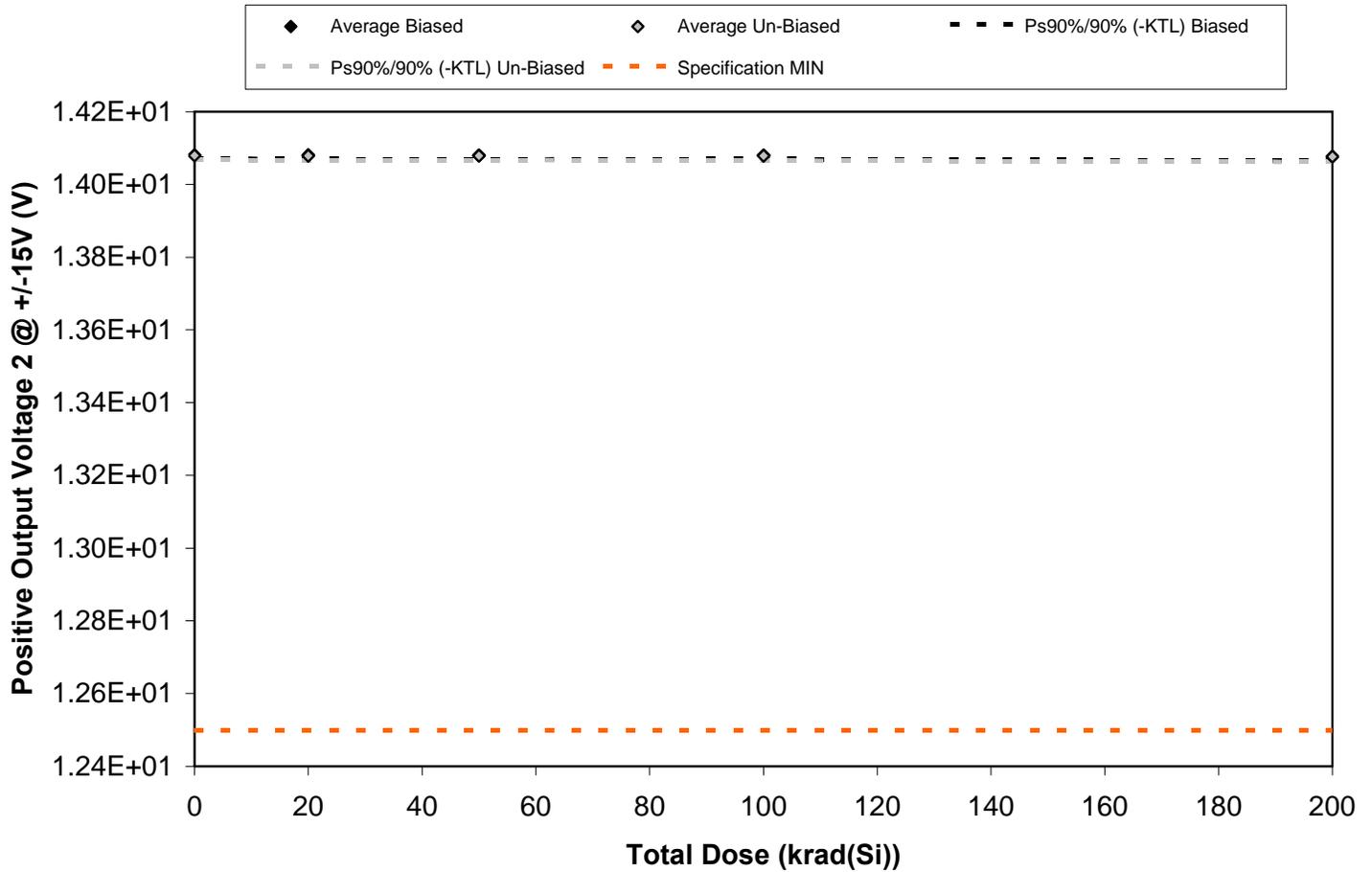


Figure 5.32. Plot of Positive Output Voltage 2 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.32. Raw data for Positive Output Voltage 2 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 2 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1116	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1117	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1118	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1119	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1120	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1121	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1122	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1123	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1124	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1125	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1126	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Biased Statistics					
Average Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Biased	3.56E-03	3.94E-03	4.15E-03	3.70E-03	4.27E-03
Ps90%/90% (+KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Un-Biased Statistics					
Average Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Un-Biased	4.15E-03	4.85E-03	4.15E-03	4.56E-03	5.26E-03
Ps90%/90% (+KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Specification MIN	1.25E+01	1.25E+01	1.25E+01	1.25E+01	1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

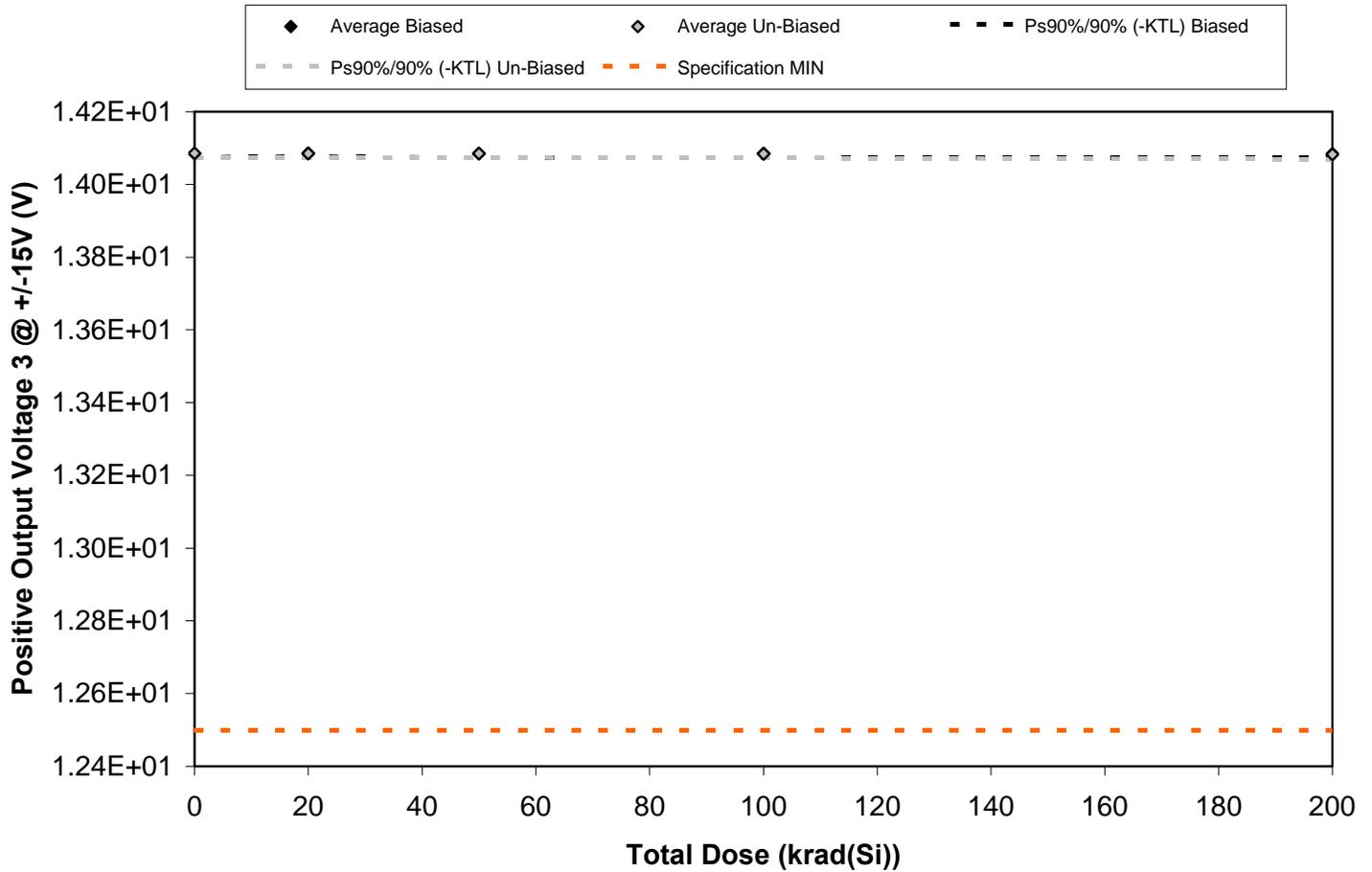


Figure 5.33. Plot of Positive Output Voltage 3 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.33. Raw data for Positive Output Voltage 3 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 3 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1116	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1117	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1118	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1119	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1120	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1121	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1122	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1123	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1124	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1125	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1126	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Biased Statistics					
Average Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Biased	3.70E-03	3.35E-03	4.32E-03	4.27E-03	3.27E-03
Ps90%/90% (+KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Un-Biased Statistics					
Average Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Un-Biased	4.60E-03	4.16E-03	3.85E-03	4.12E-03	4.66E-03
Ps90%/90% (+KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Specification MIN	1.25E+01	1.25E+01	1.25E+01	1.25E+01	1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

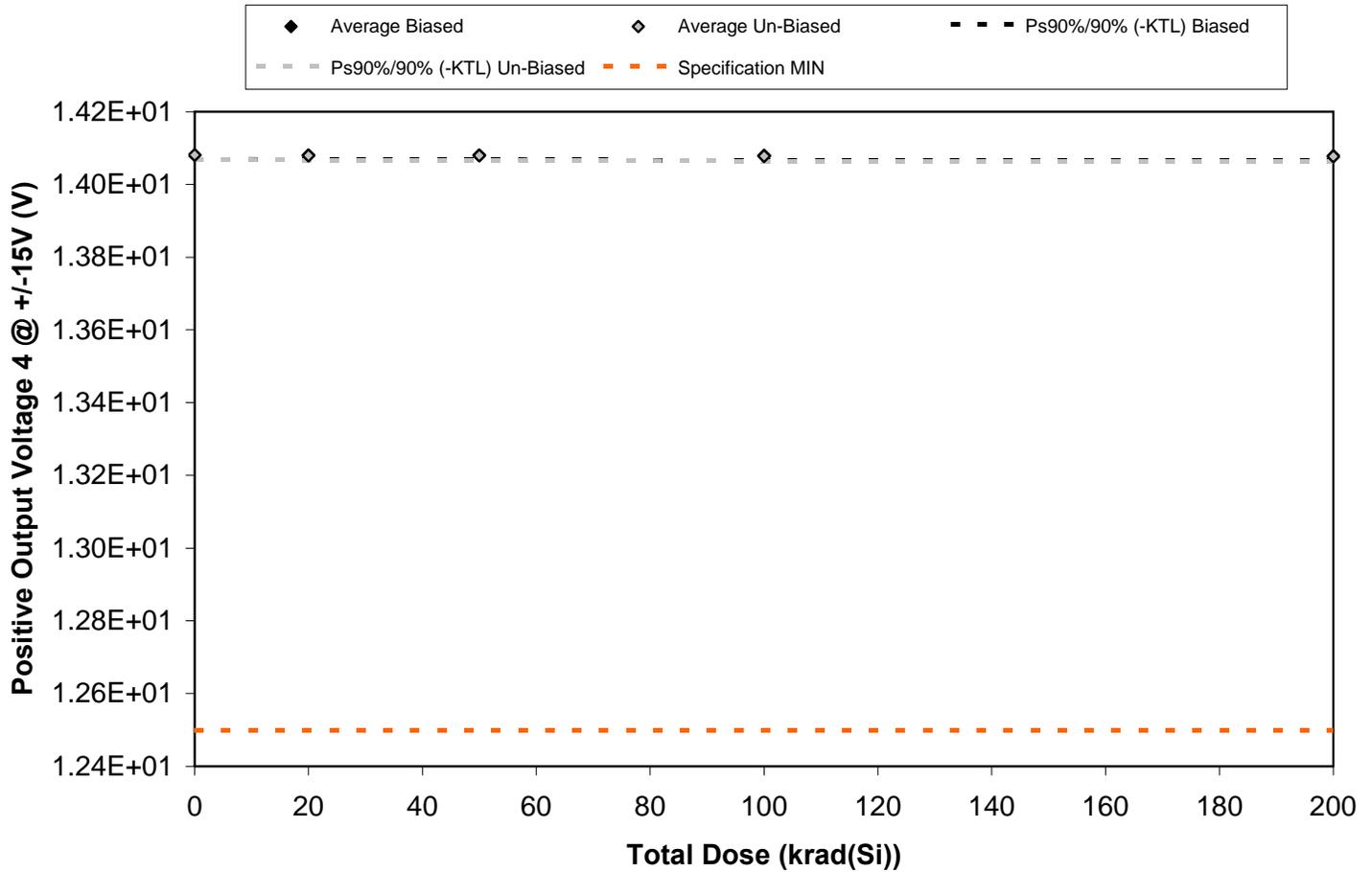


Figure 5.34. Plot of Positive Output Voltage 4 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.34. Raw data for Positive Output Voltage 4 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 4 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1116	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1117	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1118	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1119	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1120	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1121	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1122	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1123	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1124	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1125	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
1126	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Biased Statistics					
Average Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Biased	4.32E-03	4.32E-03	4.09E-03	4.77E-03	4.77E-03
Ps90%/90% (+KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Un-Biased Statistics					
Average Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Std Dev Un-Biased	4.36E-03	4.62E-03	4.60E-03	5.26E-03	5.26E-03
Ps90%/90% (+KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Ps90%/90% (-KTL) Un-Biased	1.41E+01	1.41E+01	1.41E+01	1.41E+01	1.41E+01
Specification MIN	1.25E+01	1.25E+01	1.25E+01	1.25E+01	1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

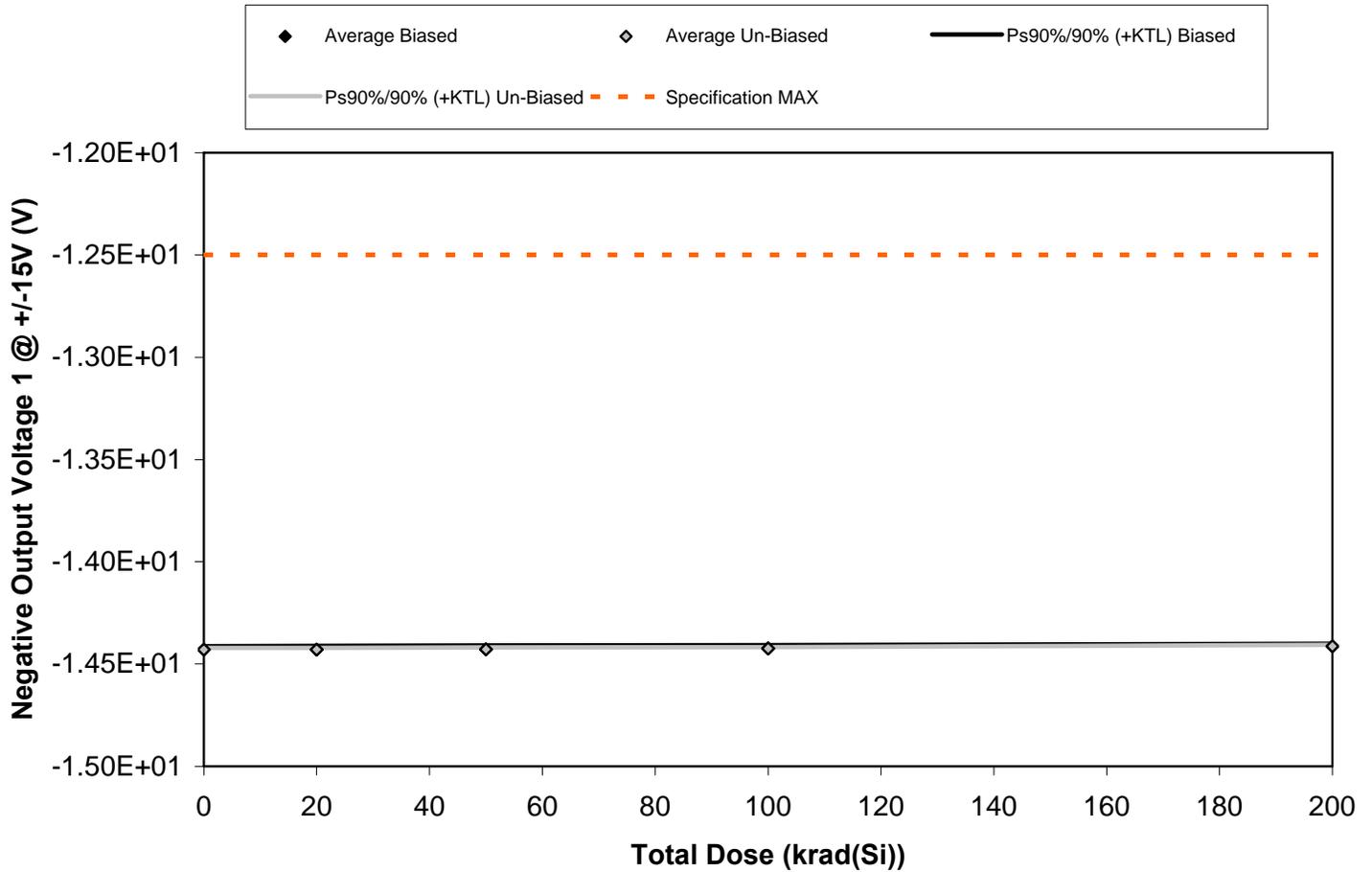


Figure 5.35. Plot of Negative Output Voltage 1 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.35. Raw data for Negative Output Voltage 1 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Output Voltage 1 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1116	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1117	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1118	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1119	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1120	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1121	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1122	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1123	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1124	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1125	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1126	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Biased Statistics					
Average Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Biased	6.42E-03	6.31E-03	7.04E-03	5.87E-03	4.69E-03
Ps90%/90% (+KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Un-Biased Statistics					
Average Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Un-Biased	2.88E-03	2.70E-03	3.16E-03	2.70E-03	2.49E-03
Ps90%/90% (+KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Specification MAX	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

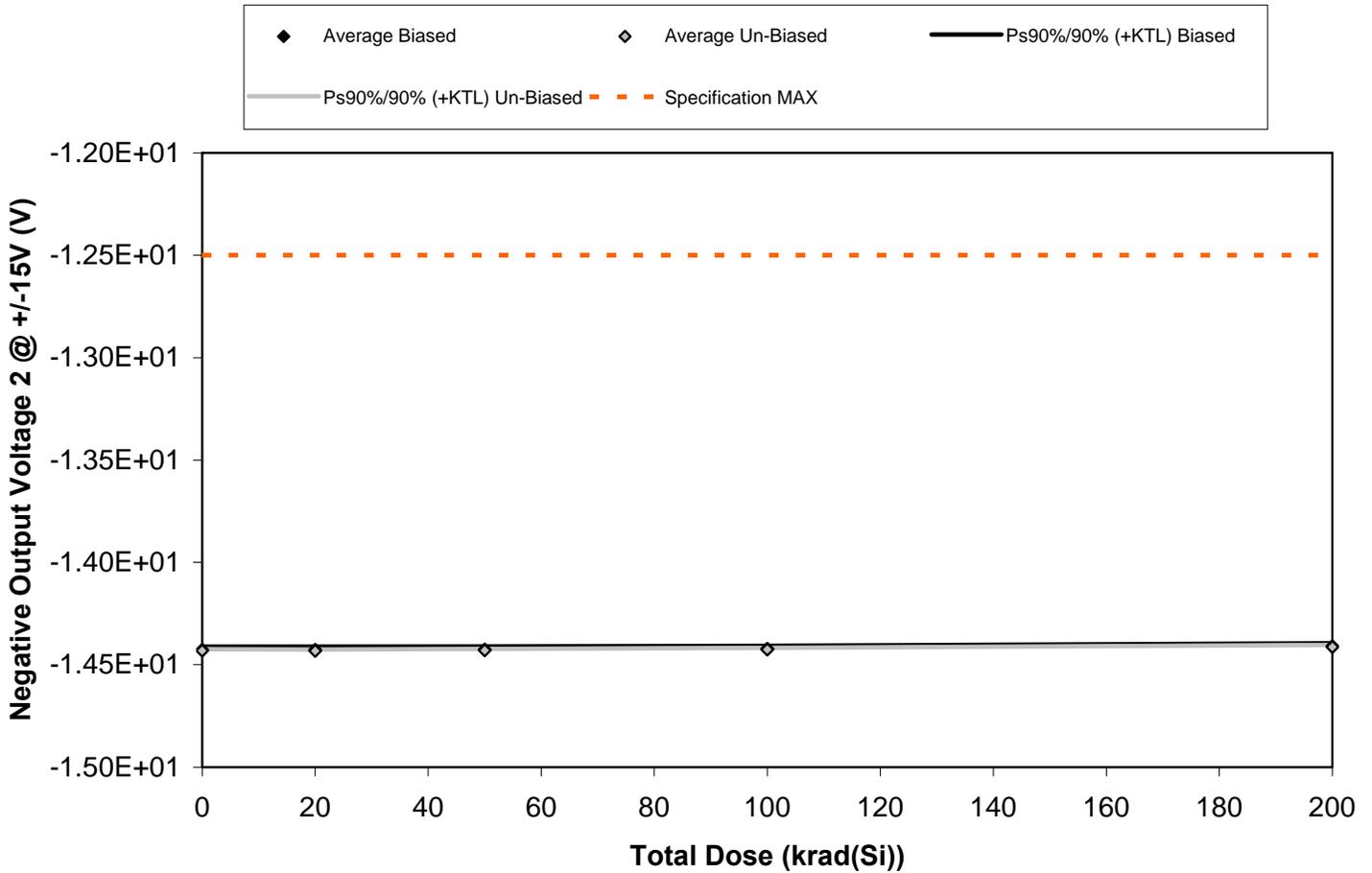


Figure 5.36. Plot of Negative Output Voltage 2 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.36. Raw data for Negative Output Voltage 2 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Output Voltage 2 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1116	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1117	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1118	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1119	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1120	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1121	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1122	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1123	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1124	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1125	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1126	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Biased Statistics					
Average Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Biased	5.59E-03	5.45E-03	5.68E-03	4.97E-03	4.76E-03
Ps90%/90% (+KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Un-Biased Statistics					
Average Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Un-Biased	2.59E-03	2.49E-03	2.70E-03	3.11E-03	3.32E-03
Ps90%/90% (+KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Specification MAX	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

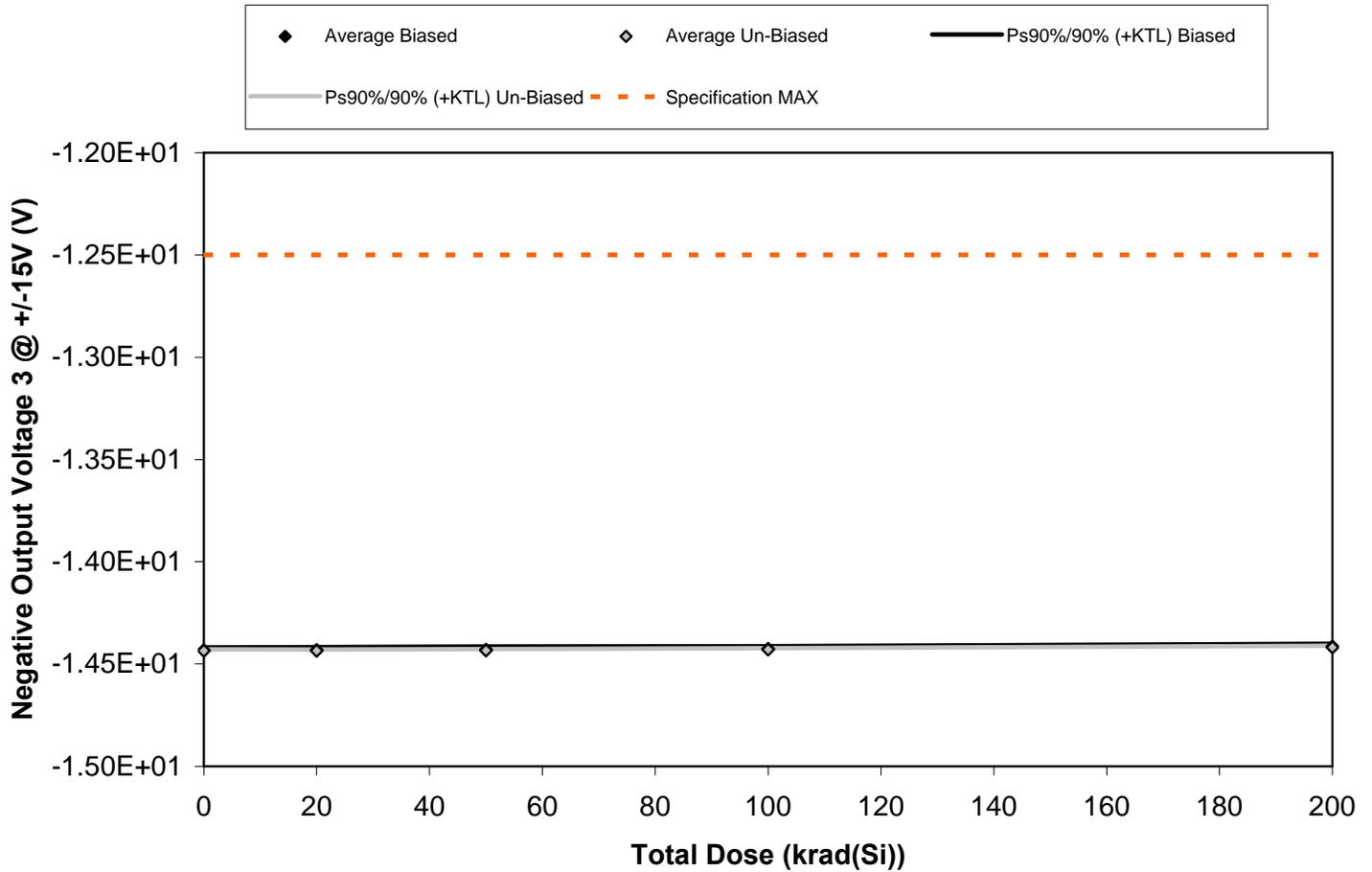


Figure 5.37. Plot of Negative Output Voltage 3 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.37. Raw data for Negative Output Voltage 3 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Output Voltage 3 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1116	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1117	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1118	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1119	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1120	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1121	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1122	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1123	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1124	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1125	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1126	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Biased Statistics					
Average Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Biased	5.22E-03	5.17E-03	5.59E-03	4.77E-03	4.88E-03
Ps90%/90% (+KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Un-Biased Statistics					
Average Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Un-Biased	2.41E-03	2.19E-03	2.19E-03	2.74E-03	2.88E-03
Ps90%/90% (+KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Specification MAX	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

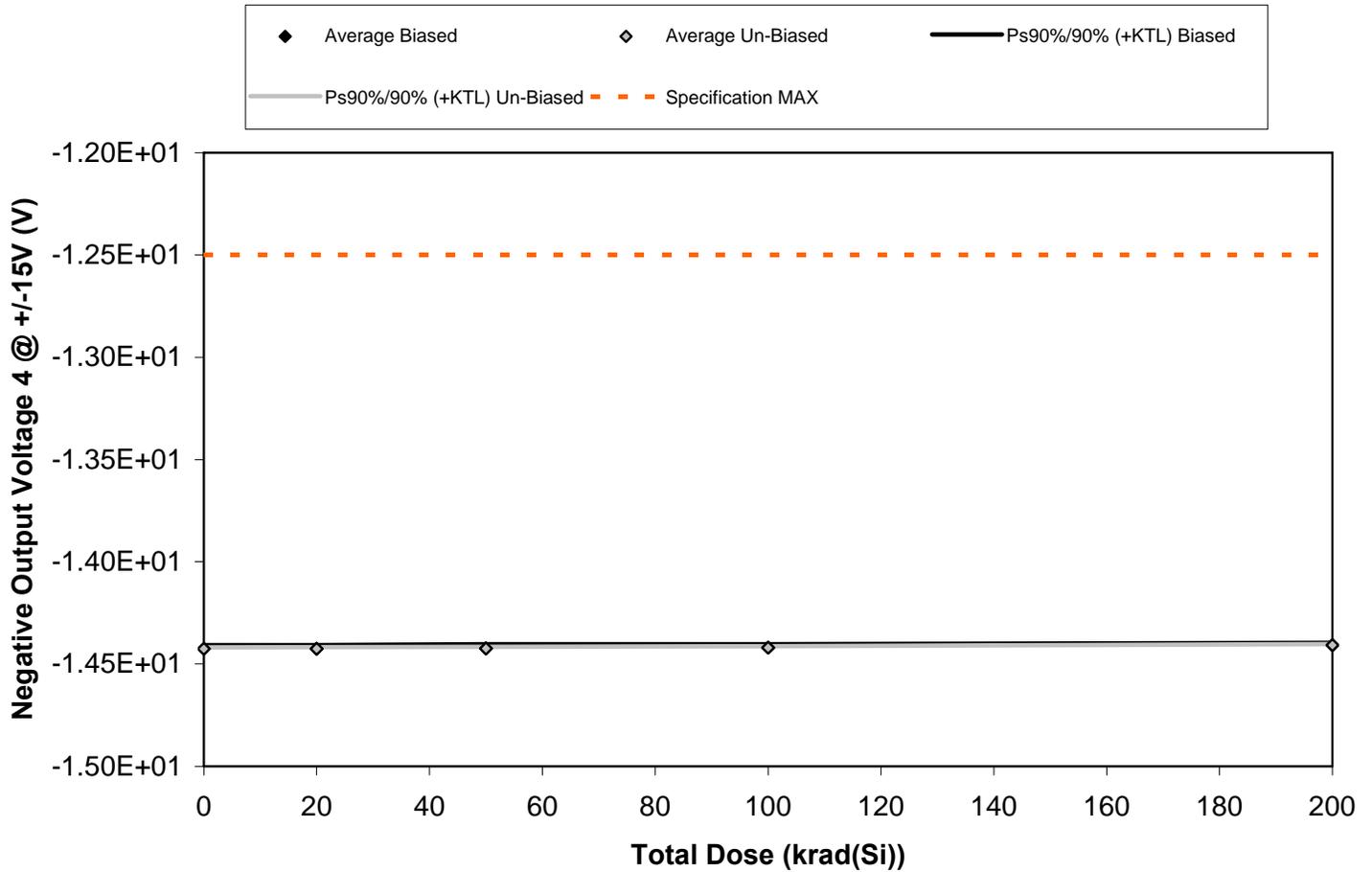


Figure 5.38. Plot of Negative Output Voltage 4 @ +/-15V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.38. Raw data for Negative Output Voltage 4 @ +/-15V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Output Voltage 4 @ +/-15V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1116	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1117	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1118	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1119	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1120	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1121	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1122	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1123	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1124	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1125	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
1126	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Biased Statistics					
Average Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Biased	6.53E-03	6.42E-03	7.09E-03	5.94E-03	4.02E-03
Ps90%/90% (+KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Un-Biased Statistics					
Average Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Std Dev Un-Biased	2.59E-03	3.03E-03	2.97E-03	2.59E-03	2.19E-03
Ps90%/90% (+KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Ps90%/90% (-KTL) Un-Biased	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01	-1.44E+01
Specification MAX	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01	-1.25E+01
Status	PASS	PASS	PASS	PASS	PASS

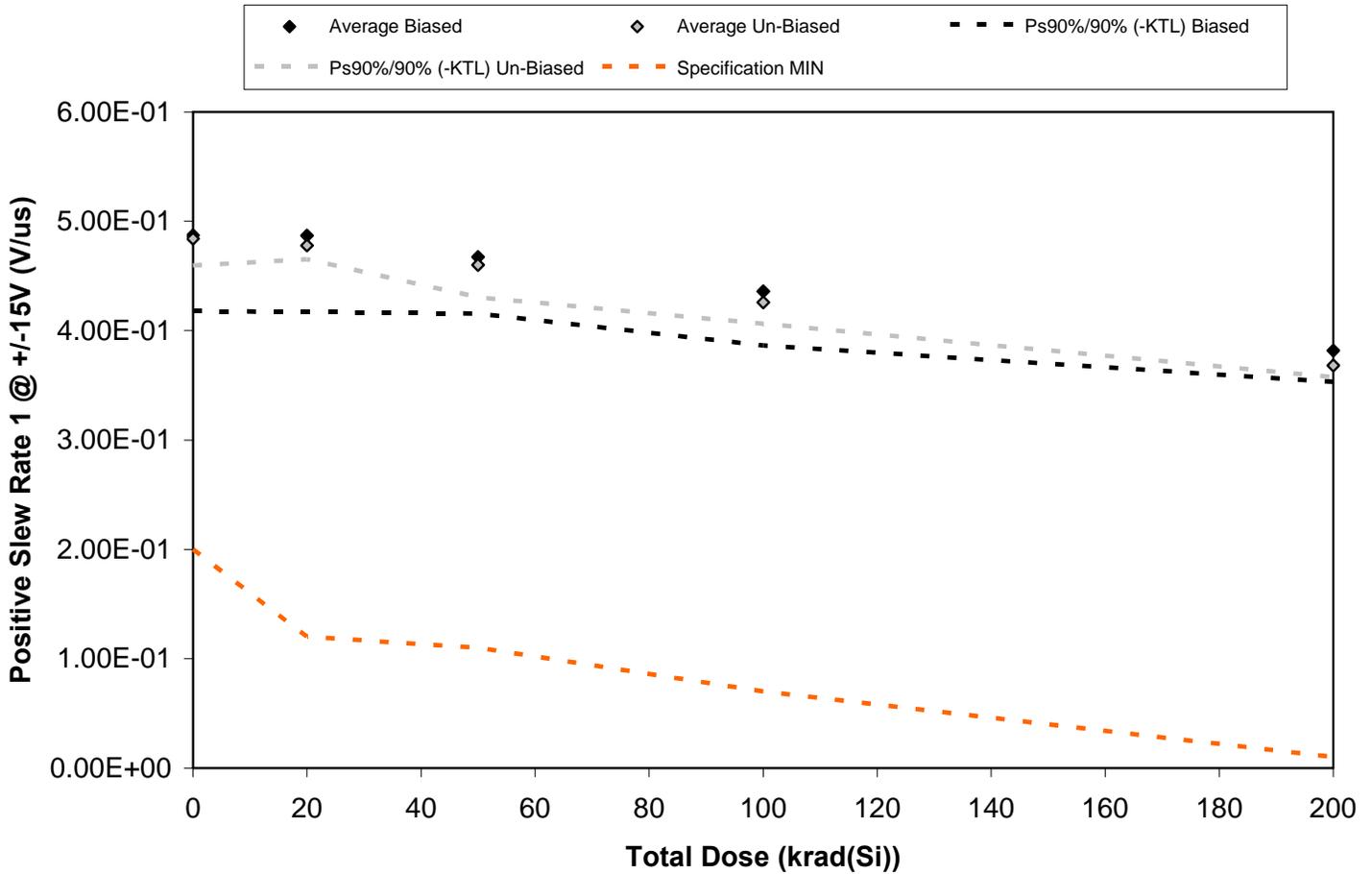


Figure 5.39. Plot of Positive Slew Rate 1 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.39. Raw data for Positive Slew Rate 1 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Slew Rate 1 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	5.20E-01	5.13E-01	4.88E-01	4.58E-01	3.89E-01
1116	4.84E-01	4.76E-01	4.57E-01	4.30E-01	3.81E-01
1117	4.60E-01	4.57E-01	4.43E-01	4.14E-01	3.69E-01
1118	4.67E-01	4.74E-01	4.64E-01	4.27E-01	3.75E-01
1119	5.05E-01	5.14E-01	4.84E-01	4.51E-01	3.95E-01
1120	4.96E-01	4.77E-01	4.64E-01	4.30E-01	3.71E-01
1121	4.89E-01	4.85E-01	4.77E-01	4.34E-01	3.71E-01
1122	4.84E-01	4.79E-01	4.56E-01	4.25E-01	3.70E-01
1123	4.75E-01	4.73E-01	4.52E-01	4.25E-01	3.67E-01
1124	4.76E-01	4.75E-01	4.51E-01	4.15E-01	3.62E-01
1125	4.74E-01	4.76E-01	4.78E-01	4.76E-01	4.78E-01
1126	5.10E-01	5.03E-01	5.08E-01	5.08E-01	5.01E-01
Biased Statistics					
Average Biased	4.87E-01	4.87E-01	4.67E-01	4.36E-01	3.82E-01
Std Dev Biased	2.53E-02	2.55E-02	1.88E-02	1.81E-02	1.04E-02
Ps90%/90% (+KTL) Biased	5.56E-01	5.57E-01	5.19E-01	4.86E-01	4.10E-01
Ps90%/90% (-KTL) Biased	4.18E-01	4.17E-01	4.16E-01	3.86E-01	3.53E-01
Un-Biased Statistics					
Average Un-Biased	4.84E-01	4.78E-01	4.60E-01	4.26E-01	3.68E-01
Std Dev Un-Biased	8.86E-03	4.60E-03	1.08E-02	7.12E-03	3.83E-03
Ps90%/90% (+KTL) Un-Biased	5.08E-01	4.90E-01	4.90E-01	4.45E-01	3.79E-01
Ps90%/90% (-KTL) Un-Biased	4.60E-01	4.65E-01	4.30E-01	4.06E-01	3.58E-01
Specification MIN	2.00E-01	1.20E-01	1.10E-01	7.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

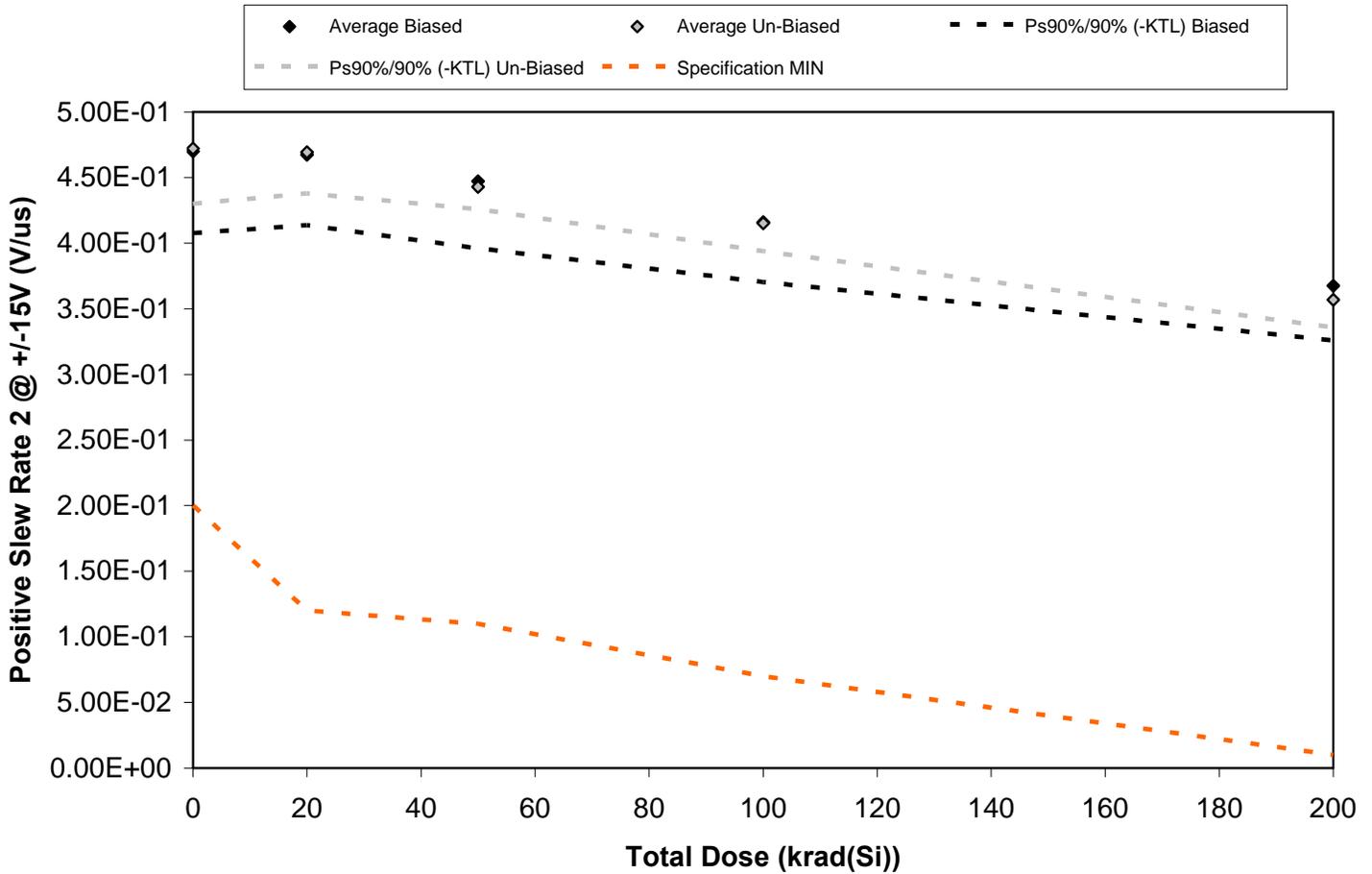


Figure 5.40. Plot of Positive Slew Rate 2 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.40. Raw data for Positive Slew Rate 2 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Slew Rate 2 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	4.88E-01	4.77E-01	4.51E-01	4.30E-01	3.69E-01
1116	4.53E-01	4.41E-01	4.29E-01	3.99E-01	3.53E-01
1117	4.69E-01	4.73E-01	4.60E-01	4.20E-01	3.77E-01
1118	4.43E-01	4.55E-01	4.27E-01	3.98E-01	3.52E-01
1119	4.97E-01	4.91E-01	4.69E-01	4.33E-01	3.87E-01
1120	4.49E-01	4.60E-01	4.38E-01	4.08E-01	3.47E-01
1121	4.80E-01	4.77E-01	4.43E-01	4.11E-01	3.53E-01
1122	4.64E-01	4.54E-01	4.36E-01	4.11E-01	3.55E-01
1123	4.86E-01	4.76E-01	4.47E-01	4.19E-01	3.66E-01
1124	4.81E-01	4.79E-01	4.51E-01	4.27E-01	3.63E-01
1125	4.44E-01	4.49E-01	4.65E-01	4.59E-01	4.46E-01
1126	4.73E-01	4.86E-01	4.75E-01	4.89E-01	4.86E-01
Biased Statistics					
Average Biased	4.70E-01	4.67E-01	4.47E-01	4.16E-01	3.68E-01
Std Dev Biased	2.28E-02	1.96E-02	1.87E-02	1.67E-02	1.52E-02
Ps90%/90% (+KTL) Biased	5.32E-01	5.21E-01	4.98E-01	4.62E-01	4.09E-01
Ps90%/90% (-KTL) Biased	4.08E-01	4.14E-01	3.96E-01	3.70E-01	3.26E-01
Un-Biased Statistics					
Average Un-Biased	4.72E-01	4.69E-01	4.43E-01	4.15E-01	3.57E-01
Std Dev Un-Biased	1.53E-02	1.14E-02	6.20E-03	7.76E-03	7.69E-03
Ps90%/90% (+KTL) Un-Biased	5.14E-01	5.00E-01	4.60E-01	4.36E-01	3.78E-01
Ps90%/90% (-KTL) Un-Biased	4.30E-01	4.38E-01	4.26E-01	3.94E-01	3.36E-01
Specification MIN	2.00E-01	1.20E-01	1.10E-01	7.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

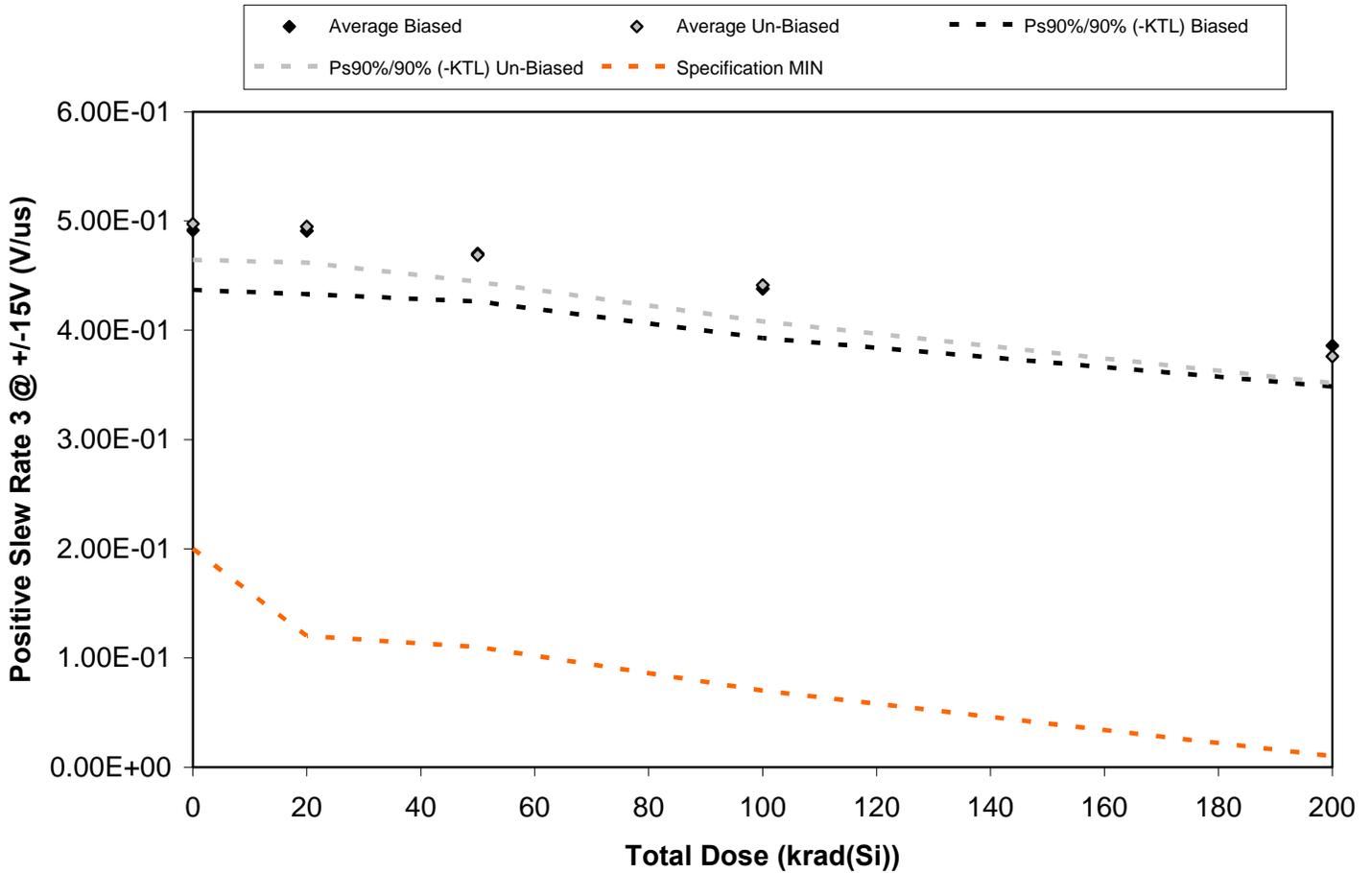


Figure 5.41. Plot of Positive Slew Rate 3 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.41. Raw data for Positive Slew Rate 3 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Slew Rate 3 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	5.09E-01	5.10E-01	4.80E-01	4.50E-01	3.89E-01
1116	4.75E-01	4.70E-01	4.57E-01	4.27E-01	3.72E-01
1117	4.91E-01	4.89E-01	4.81E-01	4.44E-01	3.98E-01
1118	4.69E-01	4.71E-01	4.49E-01	4.15E-01	3.71E-01
1119	5.14E-01	5.15E-01	4.84E-01	4.54E-01	3.99E-01
1120	4.92E-01	4.82E-01	4.57E-01	4.23E-01	3.65E-01
1121	4.90E-01	4.89E-01	4.68E-01	4.41E-01	3.69E-01
1122	4.85E-01	4.92E-01	4.64E-01	4.38E-01	3.78E-01
1123	5.07E-01	4.97E-01	4.78E-01	4.54E-01	3.86E-01
1124	5.13E-01	5.14E-01	4.77E-01	4.50E-01	3.83E-01
1125	4.76E-01	4.83E-01	4.76E-01	4.87E-01	4.77E-01
1126	5.11E-01	5.03E-01	4.98E-01	4.98E-01	5.18E-01
Biased Statistics					
Average Biased	4.92E-01	4.91E-01	4.70E-01	4.38E-01	3.86E-01
Std Dev Biased	1.99E-02	2.11E-02	1.60E-02	1.65E-02	1.36E-02
Ps90%/90% (+KTL) Biased	5.46E-01	5.49E-01	5.14E-01	4.83E-01	4.23E-01
Ps90%/90% (-KTL) Biased	4.37E-01	4.33E-01	4.26E-01	3.93E-01	3.48E-01
Un-Biased Statistics					
Average Un-Biased	4.97E-01	4.95E-01	4.69E-01	4.41E-01	3.76E-01
Std Dev Un-Biased	1.20E-02	1.20E-02	8.87E-03	1.21E-02	8.98E-03
Ps90%/90% (+KTL) Un-Biased	5.30E-01	5.28E-01	4.93E-01	4.74E-01	4.01E-01
Ps90%/90% (-KTL) Un-Biased	4.65E-01	4.62E-01	4.44E-01	4.08E-01	3.52E-01
Specification MIN	2.00E-01	1.20E-01	1.10E-01	7.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

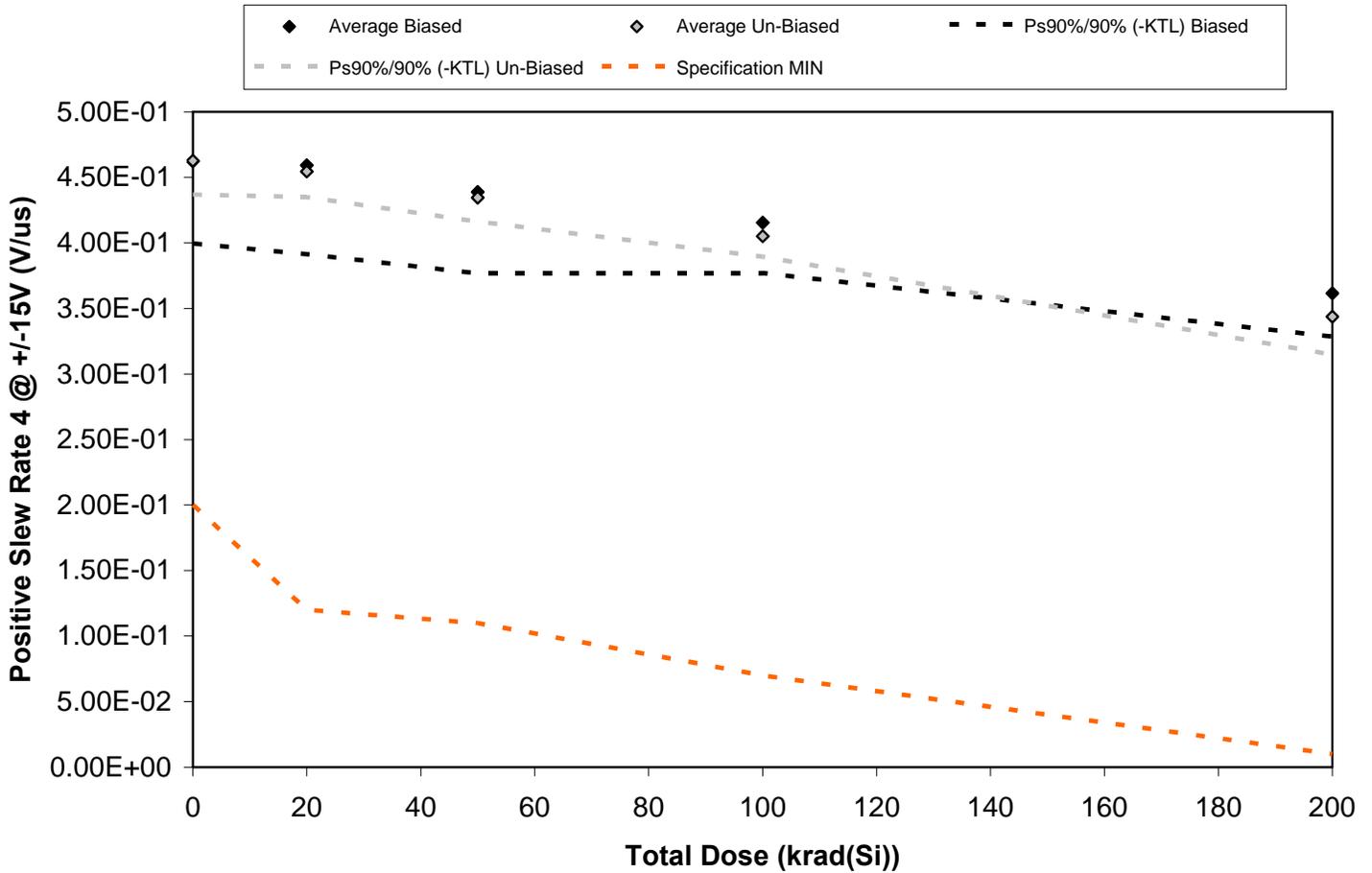


Figure 5.42. Plot of Positive Slew Rate 4 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.42. Raw data for Positive Slew Rate 4 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Slew Rate 4 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	4.88E-01	4.89E-01	4.65E-01	4.27E-01	3.78E-01
1116	4.52E-01	4.47E-01	4.22E-01	4.11E-01	3.54E-01
1117	4.35E-01	4.29E-01	4.21E-01	4.00E-01	3.52E-01
1118	4.52E-01	4.51E-01	4.24E-01	4.06E-01	3.53E-01
1119	4.84E-01	4.80E-01	4.62E-01	4.33E-01	3.71E-01
1120	4.74E-01	4.60E-01	4.38E-01	4.08E-01	3.47E-01
1121	4.68E-01	4.54E-01	4.38E-01	4.11E-01	3.52E-01
1122	4.65E-01	4.62E-01	4.42E-01	4.09E-01	3.26E-01
1123	4.53E-01	4.52E-01	4.27E-01	3.99E-01	3.43E-01
1124	4.53E-01	4.44E-01	4.28E-01	3.99E-01	3.51E-01
1125	4.53E-01	4.60E-01	4.57E-01	4.52E-01	4.43E-01
1126	4.84E-01	4.80E-01	4.79E-01	4.88E-01	4.93E-01
Biased Statistics					
Average Biased	4.62E-01	4.59E-01	4.39E-01	4.15E-01	3.62E-01
Std Dev Biased	2.29E-02	2.47E-02	2.26E-02	1.40E-02	1.21E-02
Ps90%/90% (+KTL) Biased	5.25E-01	5.27E-01	5.01E-01	4.54E-01	3.95E-01
Ps90%/90% (-KTL) Biased	4.00E-01	3.91E-01	3.77E-01	3.77E-01	3.29E-01
Un-Biased Statistics					
Average Un-Biased	4.63E-01	4.54E-01	4.35E-01	4.05E-01	3.44E-01
Std Dev Un-Biased	9.34E-03	7.13E-03	6.69E-03	5.76E-03	1.06E-02
Ps90%/90% (+KTL) Un-Biased	4.88E-01	4.74E-01	4.53E-01	4.21E-01	3.73E-01
Ps90%/90% (-KTL) Un-Biased	4.37E-01	4.35E-01	4.16E-01	3.89E-01	3.15E-01
Specification MIN	2.00E-01	1.20E-01	1.10E-01	7.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

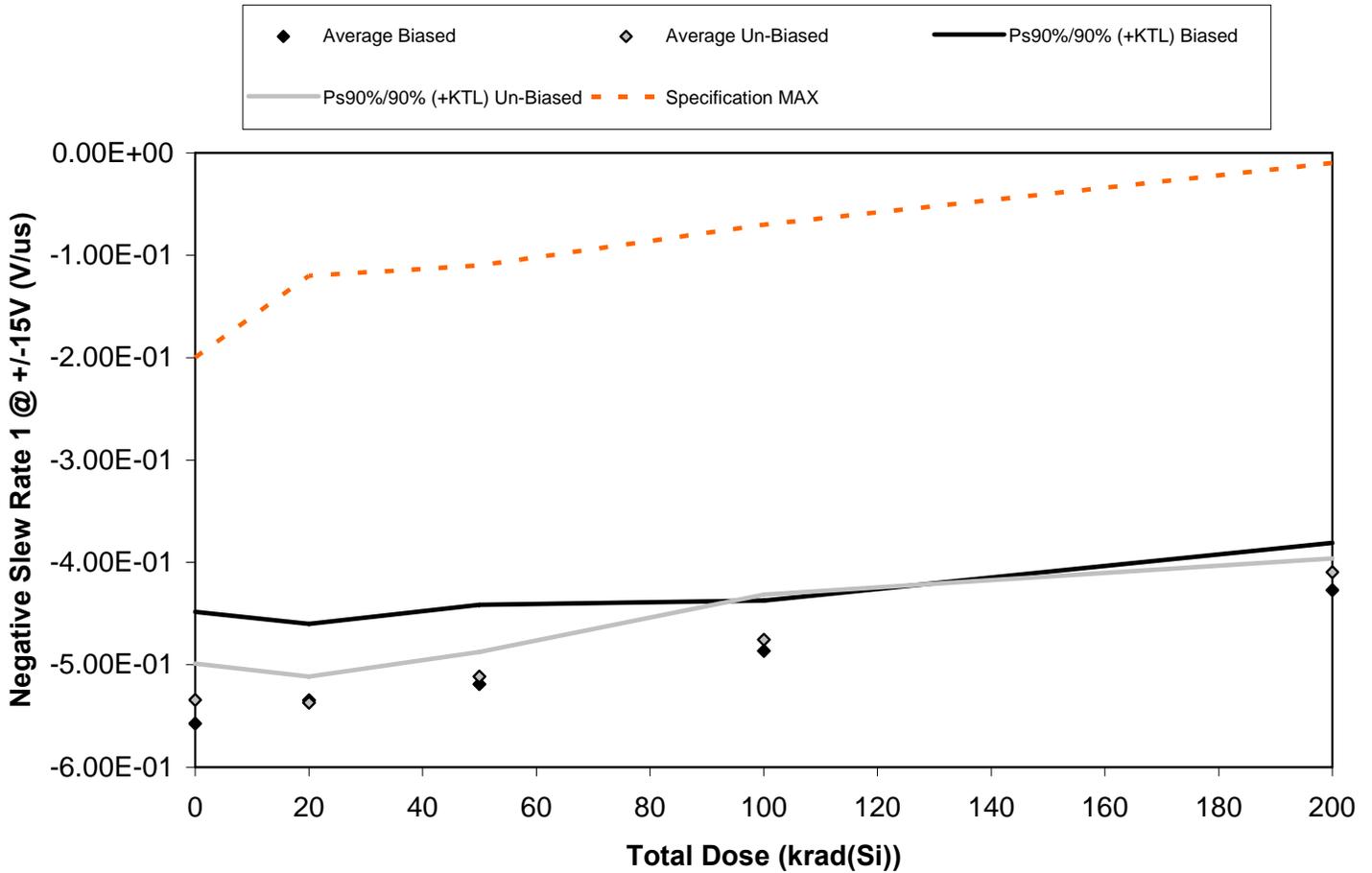


Figure 5.43. Plot of Negative Slew Rate 1 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.43. Raw data for Negative Slew Rate 1 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Slew Rate 1 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-5.95E-01	-5.62E-01	-5.38E-01	-5.10E-01	-4.49E-01
1116	-5.43E-01	-5.26E-01	-5.01E-01	-4.86E-01	-4.23E-01
1117	-5.15E-01	-5.10E-01	-4.87E-01	-4.62E-01	-4.09E-01
1118	-5.30E-01	-5.10E-01	-5.12E-01	-4.79E-01	-4.15E-01
1119	-6.04E-01	-5.65E-01	-5.57E-01	-4.96E-01	-4.40E-01
1120	-5.31E-01	-5.38E-01	-5.10E-01	-4.80E-01	-4.06E-01
1121	-5.54E-01	-5.47E-01	-5.17E-01	-4.98E-01	-4.15E-01
1122	-5.36E-01	-5.44E-01	-5.21E-01	-4.80E-01	-4.15E-01
1123	-5.33E-01	-5.24E-01	-5.11E-01	-4.61E-01	-4.06E-01
1124	-5.18E-01	-5.32E-01	-4.98E-01	-4.59E-01	-4.06E-01
1125	-5.39E-01	-5.34E-01	-5.29E-01	-5.26E-01	-5.30E-01
1126	-5.82E-01	-5.84E-01	-5.54E-01	-5.82E-01	-5.73E-01
Biased Statistics					
Average Biased	-5.57E-01	-5.35E-01	-5.19E-01	-4.87E-01	-4.27E-01
Std Dev Biased	3.98E-02	2.72E-02	2.83E-02	1.80E-02	1.69E-02
Ps90%/90% (+KTL) Biased	-4.48E-01	-4.60E-01	-4.41E-01	-4.37E-01	-3.81E-01
Ps90%/90% (-KTL) Biased	-6.67E-01	-6.09E-01	-5.97E-01	-5.36E-01	-4.73E-01
Un-Biased Statistics					
Average Un-Biased	-5.34E-01	-5.37E-01	-5.11E-01	-4.76E-01	-4.10E-01
Std Dev Un-Biased	1.29E-02	9.27E-03	8.73E-03	1.60E-02	4.93E-03
Ps90%/90% (+KTL) Un-Biased	-4.99E-01	-5.12E-01	-4.87E-01	-4.32E-01	-3.96E-01
Ps90%/90% (-KTL) Un-Biased	-5.70E-01	-5.62E-01	-5.35E-01	-5.20E-01	-4.23E-01
Specification MAX	-2.00E-01	-1.20E-01	-1.10E-01	-7.00E-02	-1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

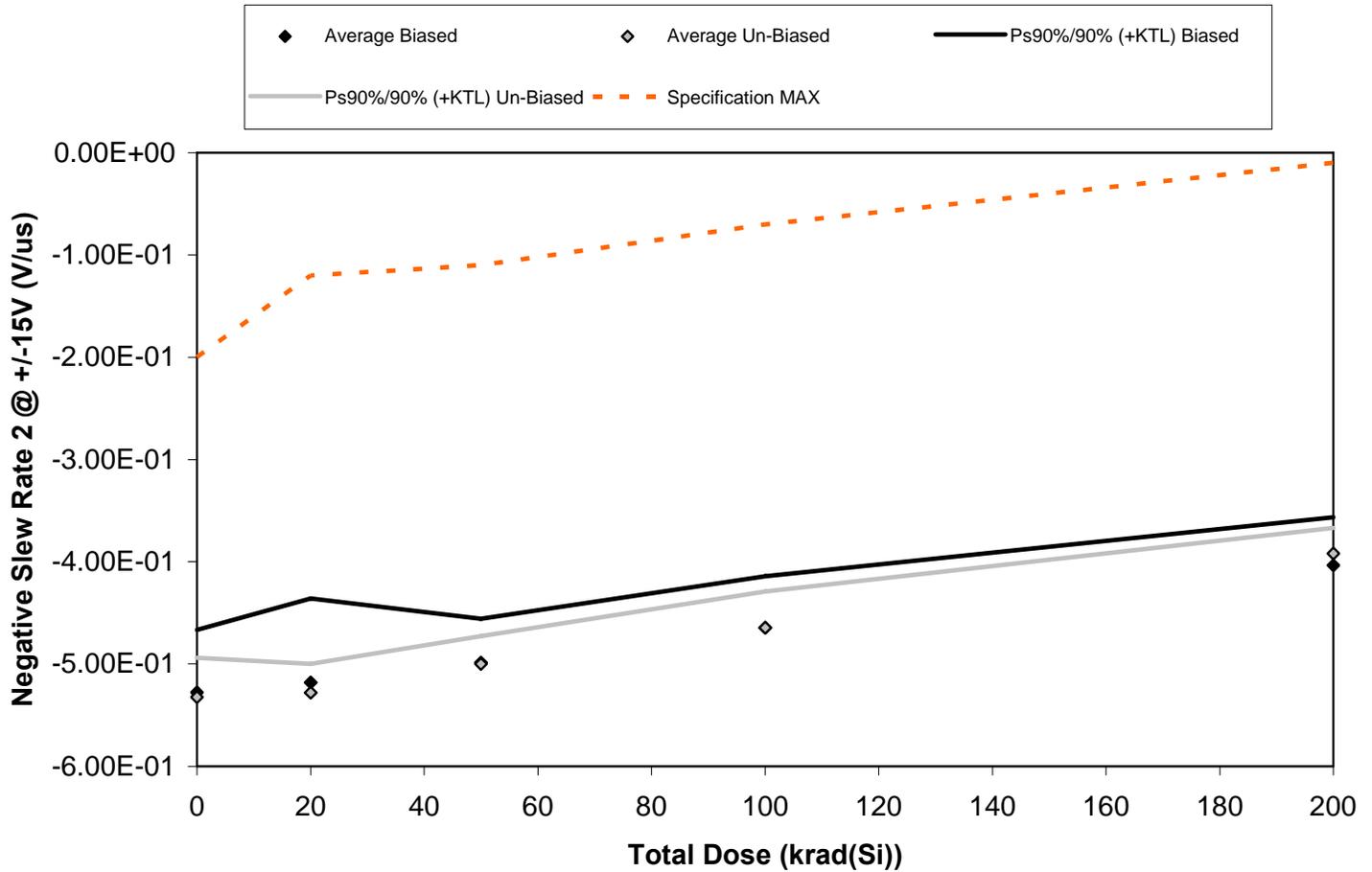


Figure 5.44. Plot of Negative Slew Rate 2 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.44. Raw data for Negative Slew Rate 2 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Slew Rate 2 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-5.42E-01	-5.47E-01	-5.08E-01	-4.73E-01	-4.07E-01
1116	-5.03E-01	-4.95E-01	-4.83E-01	-4.49E-01	-3.89E-01
1117	-5.42E-01	-5.20E-01	-5.05E-01	-4.68E-01	-4.14E-01
1118	-5.04E-01	-4.81E-01	-4.81E-01	-4.44E-01	-3.83E-01
1119	-5.48E-01	-5.47E-01	-5.16E-01	-4.89E-01	-4.24E-01
1120	-5.13E-01	-5.18E-01	-4.83E-01	-4.48E-01	-3.91E-01
1121	-5.31E-01	-5.34E-01	-5.08E-01	-4.74E-01	-3.77E-01
1122	-5.26E-01	-5.16E-01	-5.00E-01	-4.55E-01	-3.94E-01
1123	-5.47E-01	-5.38E-01	-5.06E-01	-4.67E-01	-3.97E-01
1124	-5.45E-01	-5.34E-01	-5.03E-01	-4.79E-01	-4.01E-01
1125	-5.05E-01	-4.99E-01	-4.99E-01	-5.02E-01	-5.06E-01
1126	-5.28E-01	-5.52E-01	-5.49E-01	-5.21E-01	-5.32E-01
Biased Statistics					
Average Biased	-5.28E-01	-5.18E-01	-4.99E-01	-4.65E-01	-4.03E-01
Std Dev Biased	2.23E-02	2.99E-02	1.57E-02	1.83E-02	1.71E-02
Ps90%/90% (+KTL) Biased	-4.67E-01	-4.36E-01	-4.56E-01	-4.14E-01	-3.56E-01
Ps90%/90% (-KTL) Biased	-5.89E-01	-6.00E-01	-5.42E-01	-5.15E-01	-4.50E-01
Un-Biased Statistics					
Average Un-Biased	-5.32E-01	-5.28E-01	-5.00E-01	-4.65E-01	-3.92E-01
Std Dev Un-Biased	1.41E-02	1.02E-02	9.97E-03	1.29E-02	9.17E-03
Ps90%/90% (+KTL) Un-Biased	-4.94E-01	-5.00E-01	-4.73E-01	-4.29E-01	-3.67E-01
Ps90%/90% (-KTL) Un-Biased	-5.71E-01	-5.56E-01	-5.27E-01	-5.00E-01	-4.17E-01
Specification MAX	-2.00E-01	-1.20E-01	-1.10E-01	-7.00E-02	-1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

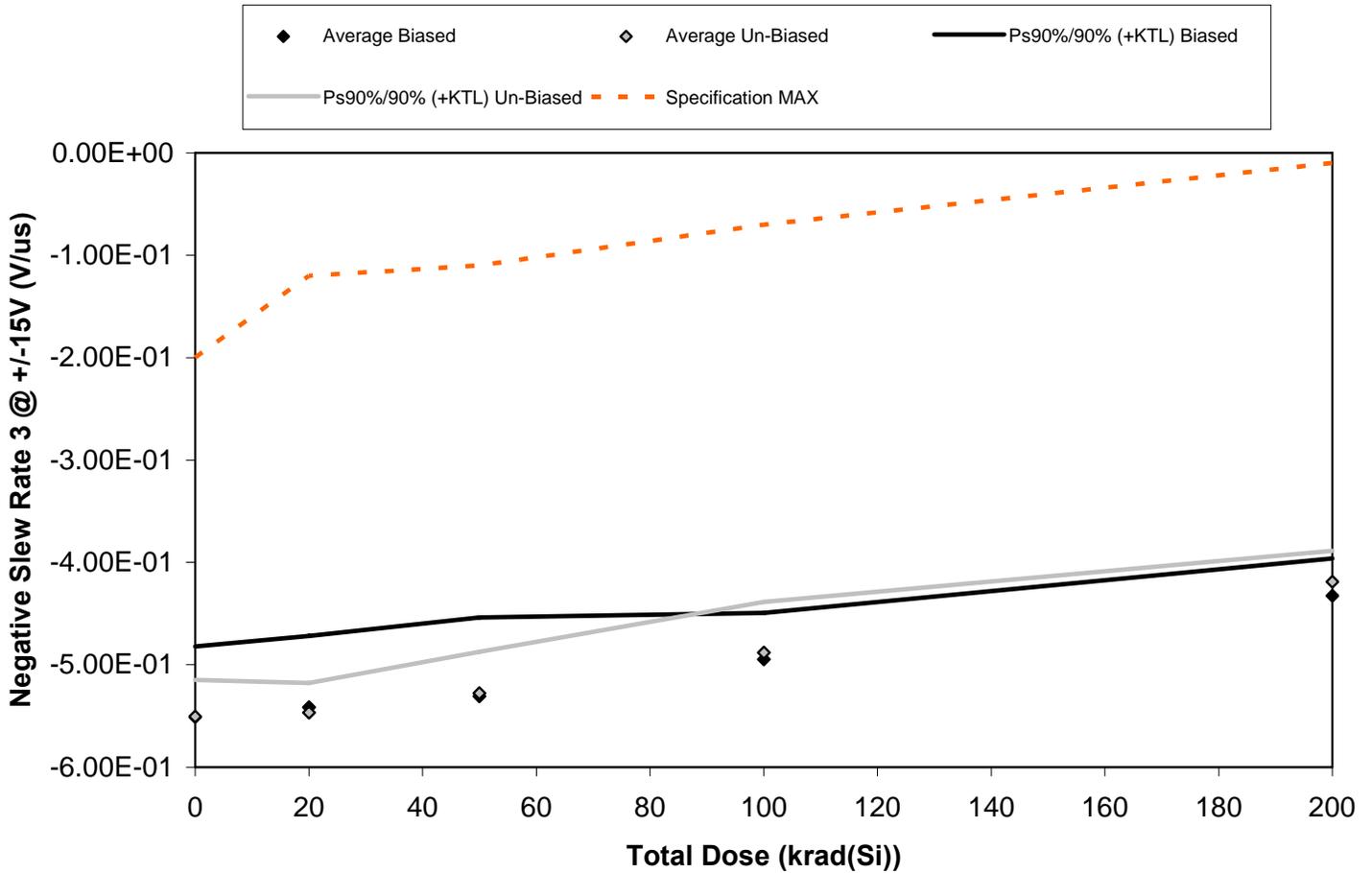


Figure 5.45. Plot of Negative Slew Rate 3 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.45. Raw data for Negative Slew Rate 3 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Slew Rate 3 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-5.71E-01	-5.53E-01	-5.52E-01	-5.03E-01	-4.41E-01
1116	-5.32E-01	-5.34E-01	-5.16E-01	-4.77E-01	-4.14E-01
1117	-5.41E-01	-5.39E-01	-5.24E-01	-4.98E-01	-4.41E-01
1118	-5.27E-01	-5.06E-01	-4.96E-01	-4.79E-01	-4.23E-01
1119	-5.84E-01	-5.75E-01	-5.66E-01	-5.16E-01	-4.44E-01
1120	-5.33E-01	-5.29E-01	-5.12E-01	-4.72E-01	-4.05E-01
1121	-5.44E-01	-5.55E-01	-5.14E-01	-4.76E-01	-4.15E-01
1122	-5.54E-01	-5.47E-01	-5.28E-01	-4.85E-01	-4.15E-01
1123	-5.53E-01	-5.48E-01	-5.42E-01	-4.90E-01	-4.27E-01
1124	-5.68E-01	-5.54E-01	-5.43E-01	-5.18E-01	-4.33E-01
1125	-5.31E-01	-5.32E-01	-5.32E-01	-5.37E-01	-5.40E-01
1126	-5.67E-01	-5.74E-01	-5.87E-01	-5.45E-01	-5.54E-01
Biased Statistics					
Average Biased	-5.51E-01	-5.41E-01	-5.31E-01	-4.95E-01	-4.33E-01
Std Dev Biased	2.51E-02	2.54E-02	2.81E-02	1.65E-02	1.33E-02
Ps90%/90% (+KTL) Biased	-4.82E-01	-4.72E-01	-4.54E-01	-4.49E-01	-3.96E-01
Ps90%/90% (-KTL) Biased	-6.20E-01	-6.11E-01	-6.08E-01	-5.40E-01	-4.69E-01
Un-Biased Statistics					
Average Un-Biased	-5.50E-01	-5.47E-01	-5.28E-01	-4.88E-01	-4.19E-01
Std Dev Un-Biased	1.30E-02	1.05E-02	1.48E-02	1.81E-02	1.10E-02
Ps90%/90% (+KTL) Un-Biased	-5.15E-01	-5.18E-01	-4.87E-01	-4.39E-01	-3.89E-01
Ps90%/90% (-KTL) Un-Biased	-5.86E-01	-5.75E-01	-5.68E-01	-5.38E-01	-4.49E-01
Specification MAX	-2.00E-01	-1.20E-01	-1.10E-01	-7.00E-02	-1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

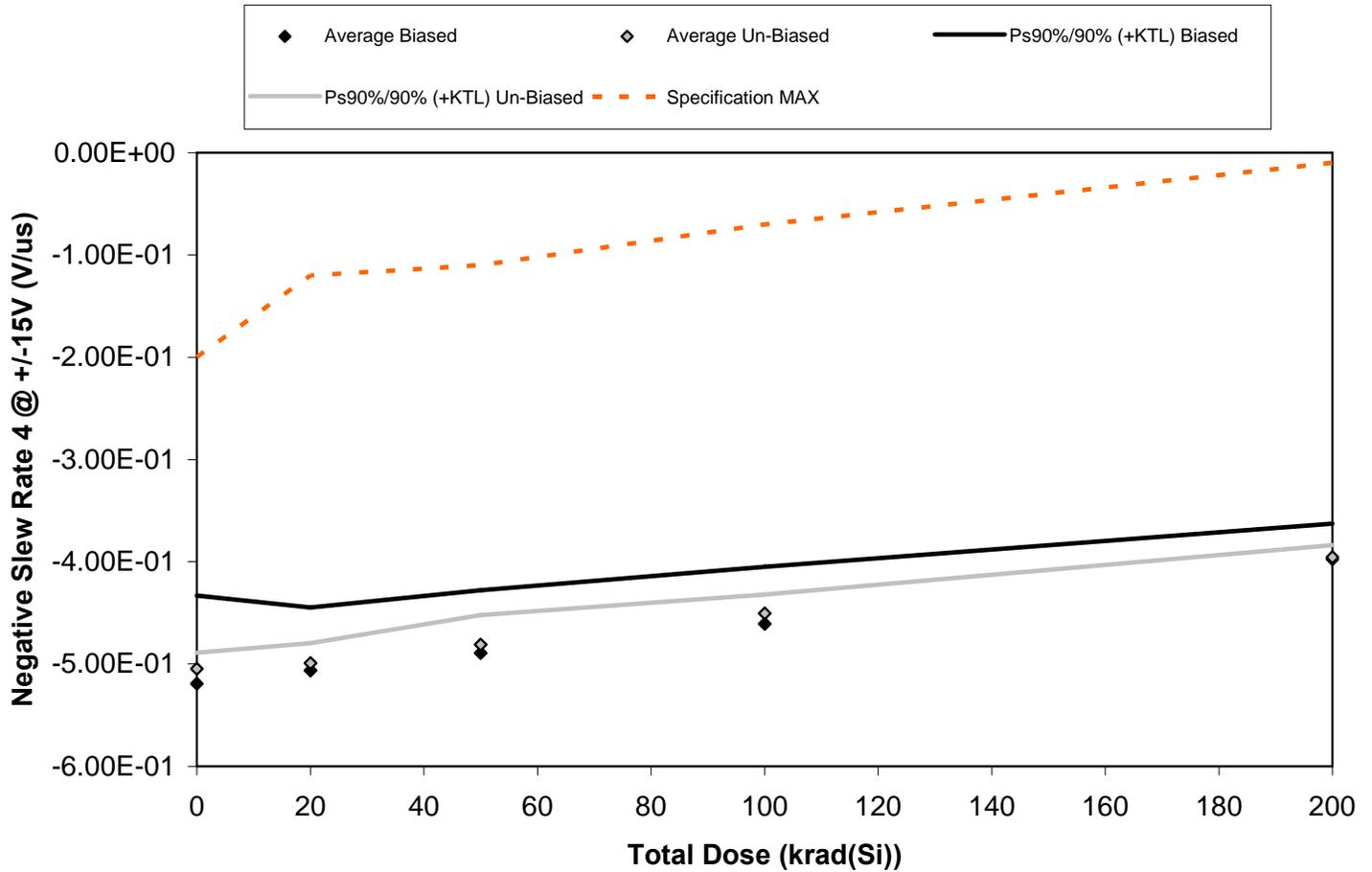


Figure 5.46. Plot of Negative Slew Rate 4 @ +/-15V (V/us) versus total dose. The data show some degradation with radiation, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points for the samples irradiated 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.46. Raw data for Negative Slew Rate 4 @ +/-15V (V/us) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Slew Rate 4 @ +/-15V (V/us)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-5.59E-01	-5.36E-01	-5.11E-01	-4.84E-01	-4.19E-01
1116	-4.96E-01	-4.93E-01	-4.82E-01	-4.61E-01	-3.91E-01
1117	-4.92E-01	-4.81E-01	-4.63E-01	-4.34E-01	-3.88E-01
1118	-5.02E-01	-4.99E-01	-4.76E-01	-4.48E-01	-3.91E-01
1119	-5.47E-01	-5.23E-01	-5.14E-01	-4.76E-01	-3.98E-01
1120	-5.13E-01	-5.03E-01	-4.85E-01	-4.53E-01	-3.89E-01
1121	-5.06E-01	-5.06E-01	-4.87E-01	-4.56E-01	-3.95E-01
1122	-5.05E-01	-5.04E-01	-4.93E-01	-4.56E-01	-3.97E-01
1123	-4.98E-01	-4.90E-01	-4.69E-01	-4.41E-01	-4.01E-01
1124	-5.01E-01	-4.93E-01	-4.71E-01	-4.46E-01	-3.96E-01
1125	-4.97E-01	-4.94E-01	-5.00E-01	-4.97E-01	-4.89E-01
1126	-5.46E-01	-5.41E-01	-5.51E-01	-5.42E-01	-5.35E-01
Biased Statistics					
Average Biased	-5.19E-01	-5.06E-01	-4.89E-01	-4.61E-01	-3.97E-01
Std Dev Biased	3.13E-02	2.25E-02	2.24E-02	2.03E-02	1.26E-02
Ps90%/90% (+KTL) Biased	-4.33E-01	-4.45E-01	-4.28E-01	-4.05E-01	-3.63E-01
Ps90%/90% (-KTL) Biased	-6.05E-01	-5.68E-01	-5.51E-01	-5.16E-01	-4.32E-01
Un-Biased Statistics					
Average Un-Biased	-5.05E-01	-4.99E-01	-4.81E-01	-4.50E-01	-3.96E-01
Std Dev Un-Biased	5.68E-03	7.19E-03	1.05E-02	6.66E-03	4.34E-03
Ps90%/90% (+KTL) Un-Biased	-4.89E-01	-4.79E-01	-4.52E-01	-4.32E-01	-3.84E-01
Ps90%/90% (-KTL) Un-Biased	-5.20E-01	-5.19E-01	-5.10E-01	-4.69E-01	-4.07E-01
Specification MAX	-2.00E-01	-1.20E-01	-1.10E-01	-7.00E-02	-1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

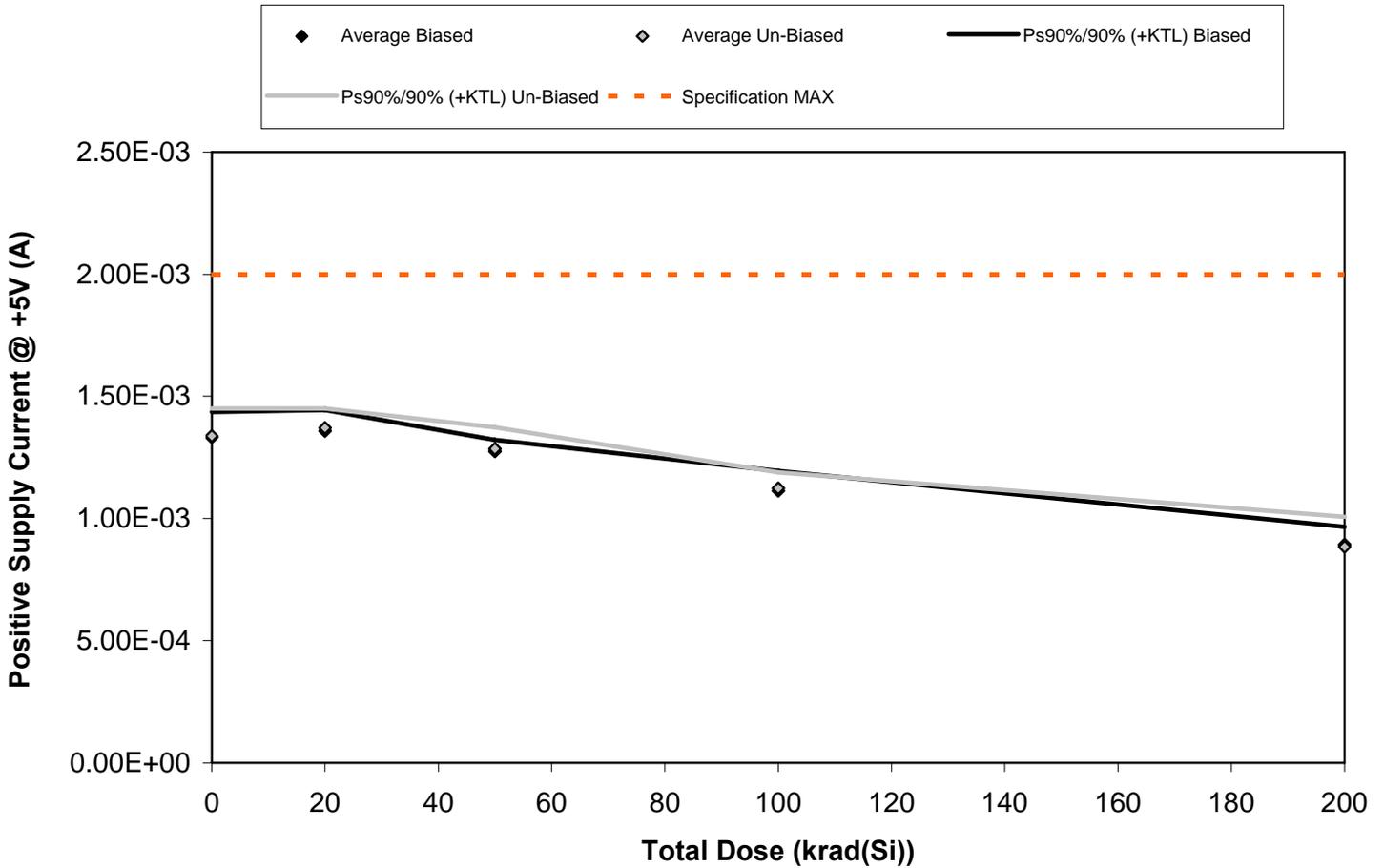


Figure 5.47. Plot of Positive Supply Current @ +5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.47. Raw data for Positive Supply Current @ +5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Supply Current @ +5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.29E-03	1.32E-03	1.26E-03	1.07E-03	8.53E-04
1116	1.38E-03	1.39E-03	1.30E-03	1.15E-03	9.15E-04
1117	1.30E-03	1.35E-03	1.27E-03	1.11E-03	9.15E-04
1118	1.34E-03	1.34E-03	1.28E-03	1.13E-03	8.84E-04
1119	1.35E-03	1.39E-03	1.27E-03	1.11E-03	9.02E-04
1120	1.35E-03	1.37E-03	1.27E-03	1.11E-03	8.52E-04
1121	1.27E-03	1.35E-03	1.27E-03	1.11E-03	8.28E-04
1122	1.38E-03	1.42E-03	1.34E-03	1.17E-03	9.43E-04
1123	1.33E-03	1.37E-03	1.27E-03	1.11E-03	9.01E-04
1124	1.36E-03	1.34E-03	1.27E-03	1.12E-03	8.95E-04
1125	1.32E-03	1.33E-03	1.32E-03	1.32E-03	1.31E-03
1126	1.38E-03	1.39E-03	1.35E-03	1.37E-03	1.37E-03
Biased Statistics					
Average Biased	1.33E-03	1.36E-03	1.27E-03	1.11E-03	8.94E-04
Std Dev Biased	3.82E-05	3.15E-05	1.71E-05	3.00E-05	2.61E-05
Ps90%/90% (+KTL) Biased	1.44E-03	1.44E-03	1.32E-03	1.19E-03	9.65E-04
Ps90%/90% (-KTL) Biased	1.23E-03	1.27E-03	1.23E-03	1.03E-03	8.22E-04
Un-Biased Statistics					
Average Un-Biased	1.34E-03	1.37E-03	1.28E-03	1.12E-03	8.84E-04
Std Dev Un-Biased	4.11E-05	2.86E-05	3.22E-05	2.38E-05	4.49E-05
Ps90%/90% (+KTL) Un-Biased	1.45E-03	1.45E-03	1.37E-03	1.19E-03	1.01E-03
Ps90%/90% (-KTL) Un-Biased	1.22E-03	1.29E-03	1.20E-03	1.06E-03	7.61E-04
Specification MAX	2.00E-03	2.00E-03	2.00E-03	2.00E-03	2.00E-03
Status	PASS	PASS	PASS	PASS	PASS

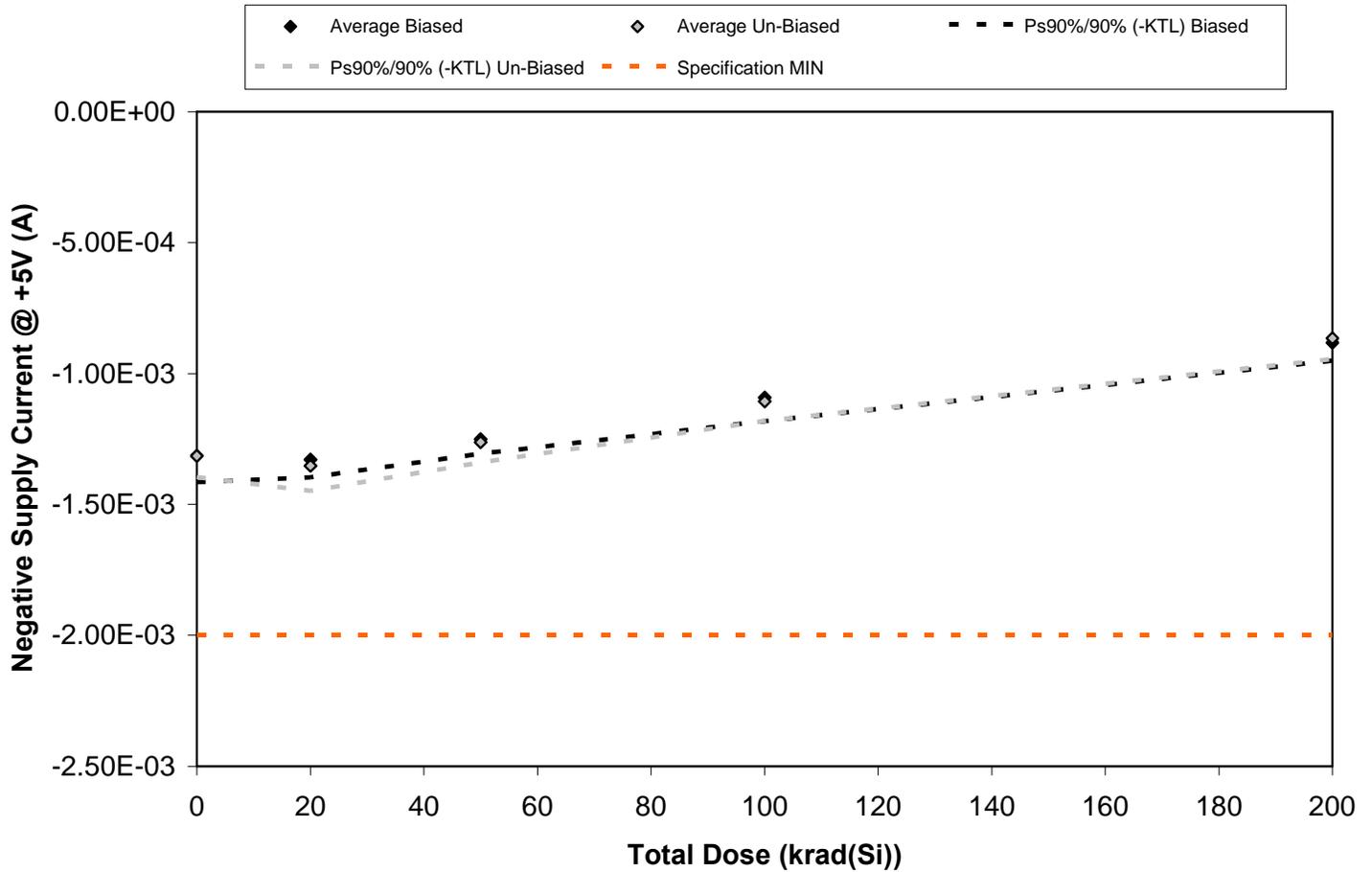


Figure 5.48. Plot of Negative Supply Current @ +5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.48. Raw data for Negative Supply Current @ +5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Supply Current @ +5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.27E-03	-1.29E-03	-1.23E-03	-1.04E-03	-8.45E-04
1116	-1.36E-03	-1.36E-03	-1.28E-03	-1.13E-03	-9.11E-04
1117	-1.29E-03	-1.32E-03	-1.24E-03	-1.10E-03	-8.92E-04
1118	-1.33E-03	-1.34E-03	-1.27E-03	-1.10E-03	-8.92E-04
1119	-1.32E-03	-1.34E-03	-1.24E-03	-1.08E-03	-8.72E-04
1120	-1.30E-03	-1.34E-03	-1.25E-03	-1.10E-03	-8.45E-04
1121	-1.27E-03	-1.32E-03	-1.23E-03	-1.08E-03	-8.37E-04
1122	-1.35E-03	-1.41E-03	-1.31E-03	-1.15E-03	-9.08E-04
1123	-1.33E-03	-1.35E-03	-1.27E-03	-1.11E-03	-8.81E-04
1124	-1.32E-03	-1.35E-03	-1.25E-03	-1.10E-03	-8.55E-04
1125	-1.29E-03	-1.29E-03	-1.29E-03	-1.29E-03	-1.28E-03
1126	-1.35E-03	-1.35E-03	-1.36E-03	-1.35E-03	-1.35E-03
Biased Statistics					
Average Biased	-1.31E-03	-1.33E-03	-1.25E-03	-1.09E-03	-8.82E-04
Std Dev Biased	3.67E-05	2.45E-05	2.04E-05	3.29E-05	2.50E-05
Ps90%/90% (+KTL) Biased	-1.21E-03	-1.26E-03	-1.19E-03	-1.00E-03	-8.14E-04
Ps90%/90% (-KTL) Biased	-1.41E-03	-1.40E-03	-1.31E-03	-1.18E-03	-9.51E-04
Un-Biased Statistics					
Average Un-Biased	-1.32E-03	-1.35E-03	-1.26E-03	-1.11E-03	-8.65E-04
Std Dev Un-Biased	2.92E-05	3.49E-05	2.82E-05	2.72E-05	2.91E-05
Ps90%/90% (+KTL) Un-Biased	-1.24E-03	-1.26E-03	-1.18E-03	-1.03E-03	-7.85E-04
Ps90%/90% (-KTL) Un-Biased	-1.40E-03	-1.45E-03	-1.34E-03	-1.18E-03	-9.45E-04
Specification MIN	-2.00E-03	-2.00E-03	-2.00E-03	-2.00E-03	-2.00E-03
Status	PASS	PASS	PASS	PASS	PASS

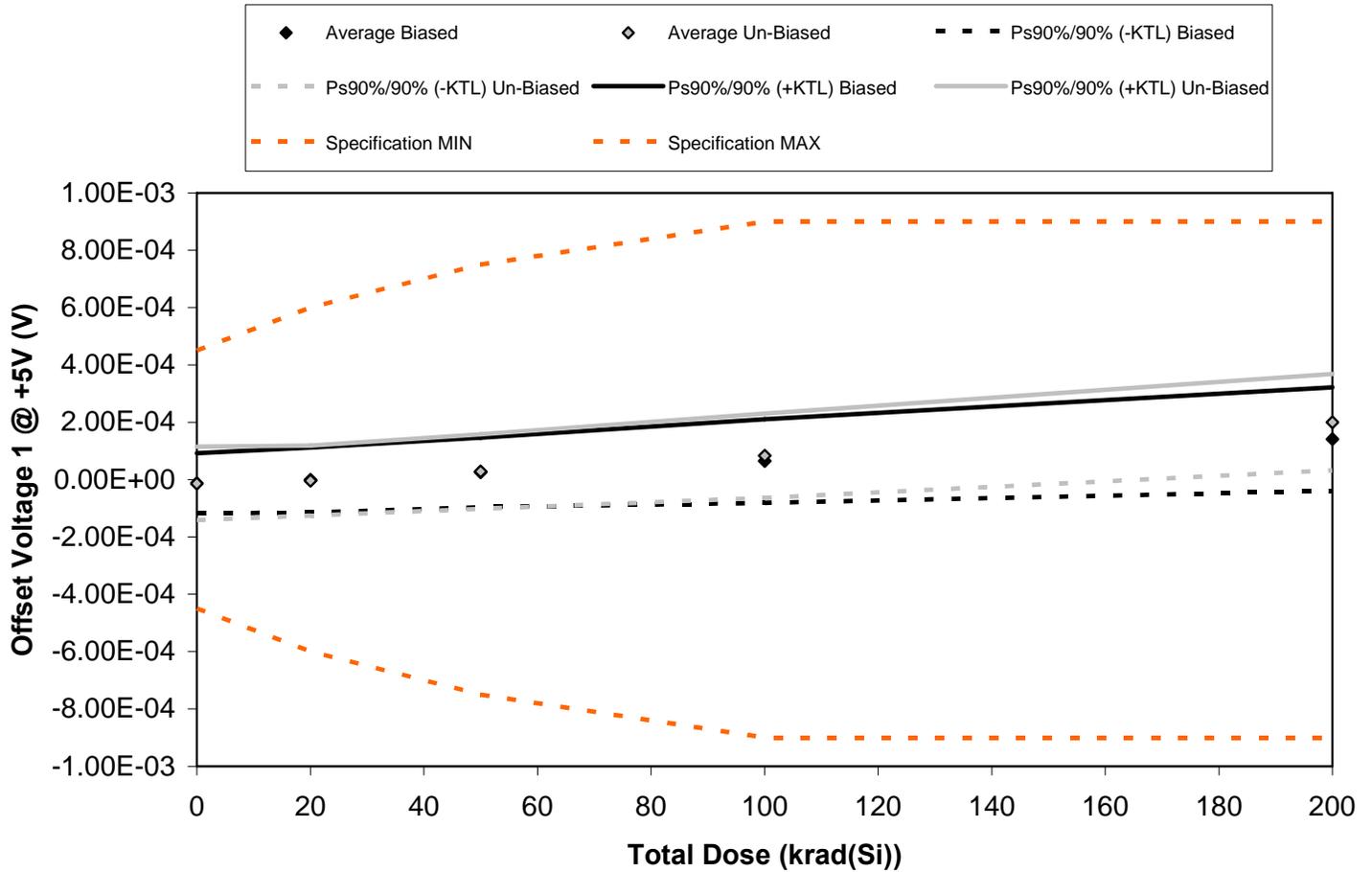


Figure 5.49. Plot of Offset Voltage 1 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.49. Raw data for Offset Voltage 1 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 1 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-5.16E-05	-5.28E-05	-3.20E-05	-8.08E-06	5.12E-05
1116	1.91E-05	3.14E-05	6.47E-05	1.20E-04	2.21E-04
1117	1.45E-06	1.38E-05	4.61E-05	9.66E-05	1.82E-04
1118	-5.63E-05	-3.75E-05	-1.21E-05	2.75E-05	1.06E-04
1119	2.26E-05	3.81E-05	5.82E-05	8.93E-05	1.48E-04
1120	-4.44E-05	-3.24E-05	-8.69E-06	3.30E-05	1.34E-04
1121	-1.21E-05	-1.58E-05	5.57E-06	5.09E-05	1.57E-04
1122	6.05E-05	6.67E-05	1.03E-04	1.61E-04	2.81E-04
1123	-1.12E-05	1.02E-05	4.61E-05	1.17E-04	2.45E-04
1124	-6.11E-05	-4.66E-05	-6.27E-06	5.64E-05	1.85E-04
1125	5.20E-06	3.88E-06	5.33E-06	5.69E-06	6.41E-06
1126	3.25E-05	3.23E-05	3.23E-05	3.38E-05	3.19E-05
Biased Statistics					
Average Biased	-1.29E-05	-1.41E-06	2.50E-05	6.51E-05	1.41E-04
Std Dev Biased	3.83E-05	4.13E-05	4.40E-05	5.33E-05	6.58E-05
Ps90%/90% (+KTL) Biased	9.21E-05	1.12E-04	1.46E-04	2.11E-04	3.22E-04
Ps90%/90% (-KTL) Biased	-1.18E-04	-1.15E-04	-9.57E-05	-8.11E-05	-3.90E-05
Un-Biased Statistics					
Average Un-Biased	-1.37E-05	-3.59E-06	2.80E-05	8.36E-05	2.00E-04
Std Dev Un-Biased	4.67E-05	4.46E-05	4.74E-05	5.35E-05	6.13E-05
Ps90%/90% (+KTL) Un-Biased	1.14E-04	1.19E-04	1.58E-04	2.30E-04	3.68E-04
Ps90%/90% (-KTL) Un-Biased	-1.42E-04	-1.26E-04	-1.02E-04	-6.32E-05	3.22E-05
Specification MIN	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	4.50E-04	6.00E-04	7.50E-04	9.00E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

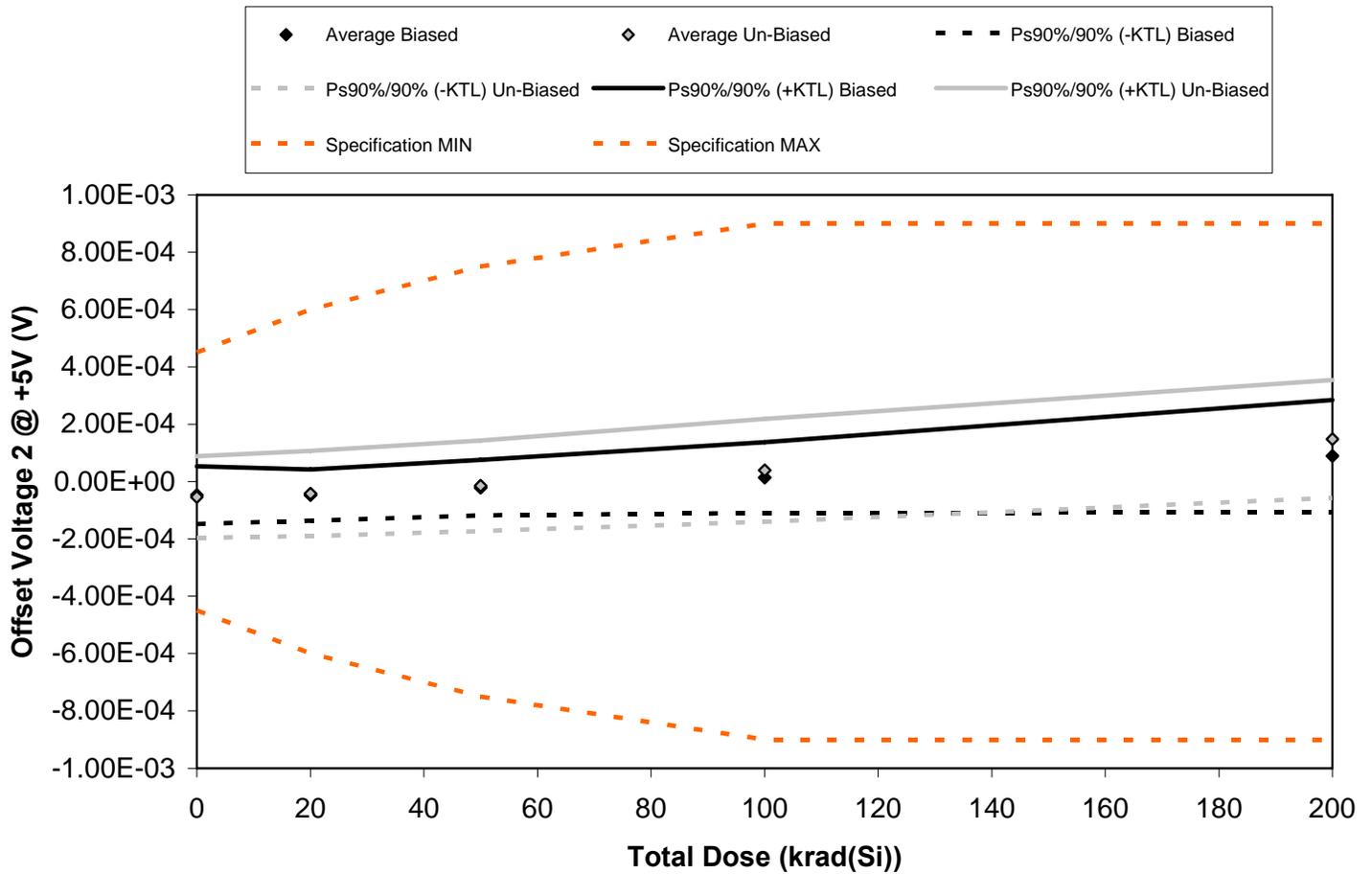


Figure 5.50. Plot of Offset Voltage 2 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.50. Raw data for Offset Voltage 2 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 2 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-2.83E-05	-3.83E-05	-1.46E-05	1.27E-05	9.01E-05
1116	-5.39E-05	-4.27E-05	-6.27E-06	5.63E-05	1.69E-04
1117	-1.07E-04	-1.00E-04	-8.28E-05	-6.12E-05	-2.00E-05
1118	-3.97E-05	-4.31E-05	-9.17E-06	3.65E-05	1.32E-04
1119	-9.30E-06	-1.13E-05	5.93E-06	2.63E-05	7.29E-05
1120	-5.94E-05	-4.38E-05	-1.54E-05	4.03E-05	1.62E-04
1121	-1.18E-04	-1.13E-04	-9.11E-05	-4.61E-05	5.33E-05
1122	2.72E-05	3.99E-05	7.14E-05	1.38E-04	2.61E-04
1123	-6.39E-05	-4.40E-05	-1.51E-05	3.50E-05	1.35E-04
1124	-5.51E-05	-4.79E-05	-2.29E-05	2.94E-05	1.30E-04
1125	-2.99E-05	-3.18E-05	-3.07E-05	-3.05E-05	-3.02E-05
1126	-3.32E-05	-3.40E-05	-3.50E-05	-3.31E-05	-3.30E-05
Biased Statistics					
Average Biased	-4.75E-05	-4.71E-05	-2.14E-05	1.41E-05	8.87E-05
Std Dev Biased	3.68E-05	3.25E-05	3.52E-05	4.50E-05	7.14E-05
Ps90%/90% (+KTL) Biased	5.33E-05	4.19E-05	7.50E-05	1.38E-04	2.84E-04
Ps90%/90% (-KTL) Biased	-1.48E-04	-1.36E-04	-1.18E-04	-1.09E-04	-1.07E-04
Un-Biased Statistics					
Average Un-Biased	-5.38E-05	-4.17E-05	-1.46E-05	3.93E-05	1.48E-04
Std Dev Un-Biased	5.20E-05	5.42E-05	5.77E-05	6.54E-05	7.49E-05
Ps90%/90% (+KTL) Un-Biased	8.86E-05	1.07E-04	1.44E-04	2.19E-04	3.54E-04
Ps90%/90% (-KTL) Un-Biased	-1.96E-04	-1.90E-04	-1.73E-04	-1.40E-04	-5.71E-05
Specification MIN	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	4.50E-04	6.00E-04	7.50E-04	9.00E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

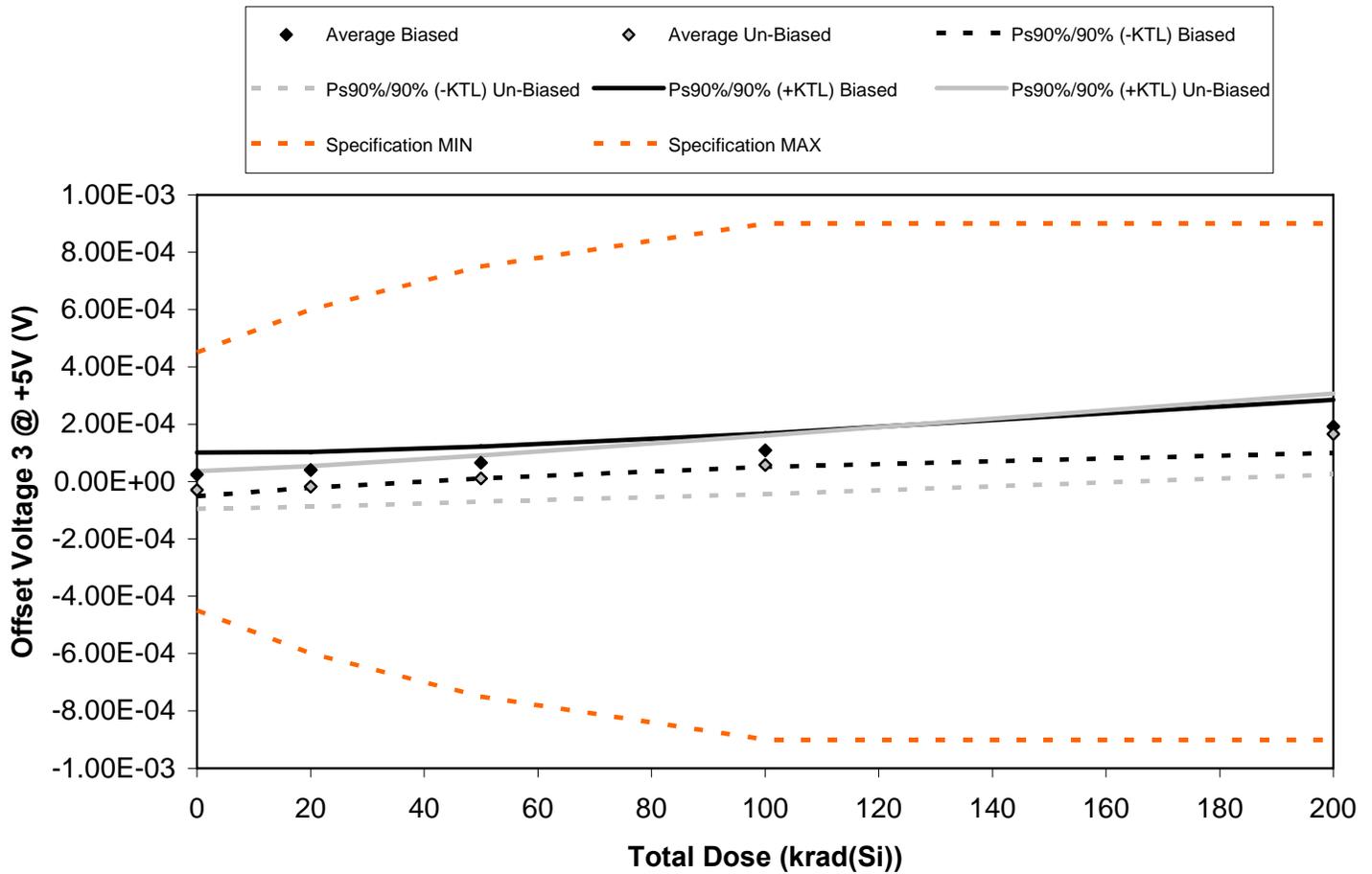


Figure 5.51. Plot of Offset Voltage 3 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.51. Raw data for Offset Voltage 3 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 3 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	8.70E-06	1.90E-05	4.63E-05	8.21E-05	1.51E-04
1116	2.56E-05	4.74E-05	7.10E-05	1.22E-04	2.17E-04
1117	3.02E-06	2.31E-05	4.69E-05	8.96E-05	1.67E-04
1118	1.51E-05	3.71E-05	7.04E-05	1.25E-04	2.32E-04
1119	7.23E-05	7.56E-05	9.51E-05	1.26E-04	1.95E-04
1120	-3.42E-05	-1.90E-05	1.04E-05	6.06E-05	1.78E-04
1121	-5.29E-05	-4.29E-05	-1.87E-05	2.38E-05	1.30E-04
1122	3.26E-06	1.52E-05	5.03E-05	1.08E-04	2.34E-04
1123	-1.42E-05	1.46E-06	2.75E-05	7.98E-05	1.86E-04
1124	-5.04E-05	-4.19E-05	-1.64E-05	1.92E-05	1.02E-04
1125	-2.53E-06	-1.80E-06	-3.01E-06	-3.13E-06	2.51E-07
1126	-2.91E-05	-2.73E-05	-2.80E-05	-2.78E-05	-2.80E-05
Biased Statistics					
Average Biased	2.50E-05	4.04E-05	6.59E-05	1.09E-04	1.92E-04
Std Dev Biased	2.78E-05	2.27E-05	2.03E-05	2.13E-05	3.38E-05
Ps90%/90% (+KTL) Biased	1.01E-04	1.03E-04	1.22E-04	1.67E-04	2.85E-04
Ps90%/90% (-KTL) Biased	-5.12E-05	-2.18E-05	1.03E-05	5.06E-05	9.97E-05
Un-Biased Statistics					
Average Un-Biased	-2.97E-05	-1.74E-05	1.06E-05	5.82E-05	1.66E-04
Std Dev Un-Biased	2.40E-05	2.58E-05	2.94E-05	3.75E-05	5.14E-05
Ps90%/90% (+KTL) Un-Biased	3.62E-05	5.35E-05	9.11E-05	1.61E-04	3.07E-04
Ps90%/90% (-KTL) Un-Biased	-9.56E-05	-8.83E-05	-6.99E-05	-4.46E-05	2.50E-05
Specification MIN	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	4.50E-04	6.00E-04	7.50E-04	9.00E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

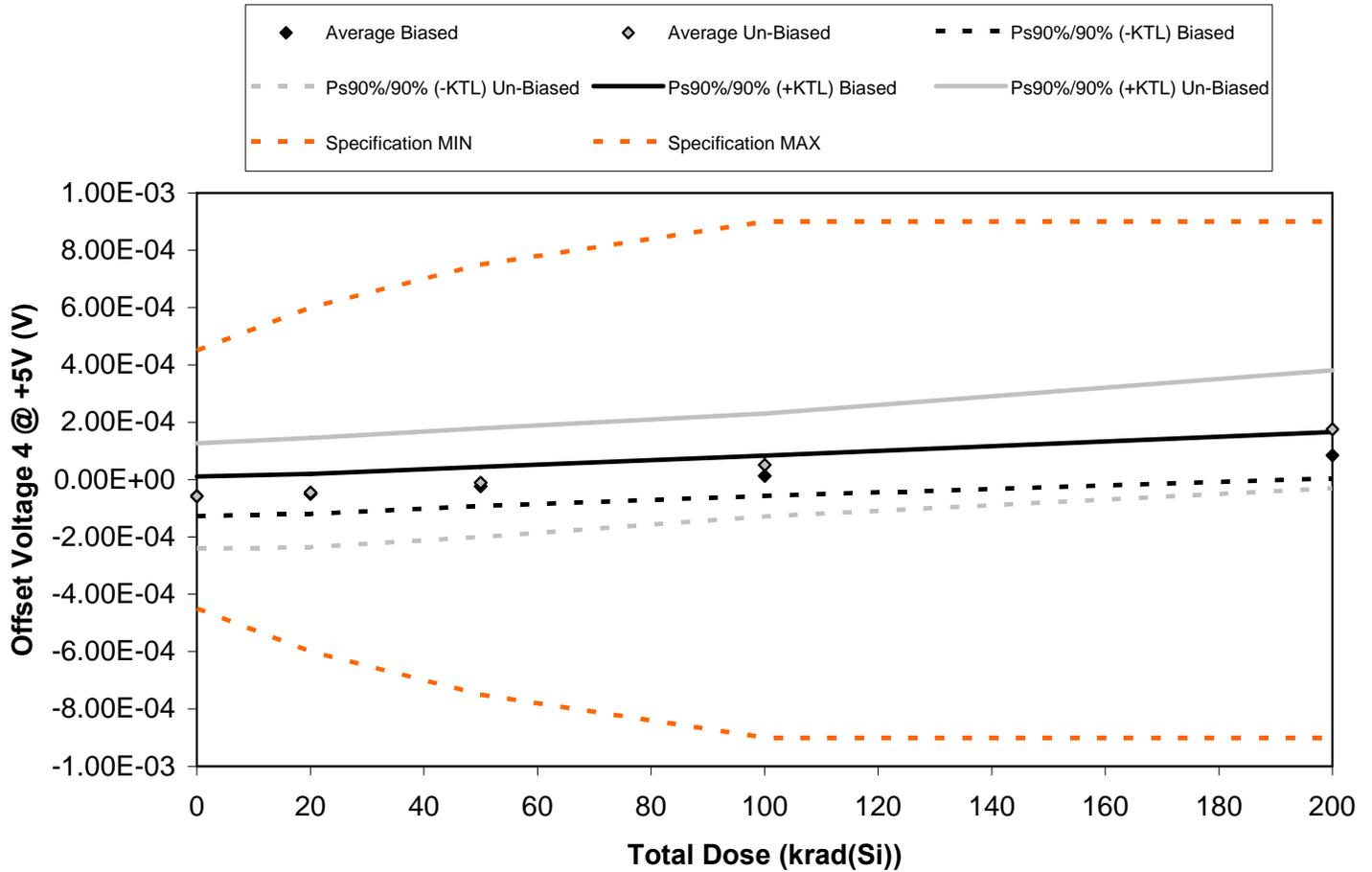


Figure 5.52. Plot of Offset Voltage 4 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.52. Raw data for Offset Voltage 4 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Voltage 4 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-4.17E-05	-3.68E-05	-1.35E-05	1.32E-05	7.74E-05
1116	-7.00E-05	-5.48E-05	-2.57E-05	1.52E-05	1.05E-04
1117	-2.61E-05	-1.62E-05	1.14E-05	5.40E-05	1.14E-04
1118	-9.09E-05	-8.39E-05	-5.41E-05	-5.30E-06	8.88E-05
1119	-6.20E-05	-5.95E-05	-3.75E-05	-1.11E-05	3.84E-05
1120	-2.96E-05	-1.05E-05	2.46E-05	7.67E-05	2.00E-04
1121	-6.77E-05	-6.51E-05	-3.83E-05	1.87E-05	1.16E-04
1122	-1.47E-04	-1.36E-04	-1.00E-04	-2.86E-05	9.54E-05
1123	-7.85E-05	-6.18E-05	-2.38E-05	4.26E-05	1.80E-04
1124	3.49E-05	4.96E-05	8.31E-05	1.46E-04	2.85E-04
1125	-1.21E-05	-1.38E-05	-1.28E-05	-1.16E-05	-1.32E-05
1126	6.89E-06	5.33E-06	5.45E-06	6.05E-06	6.41E-06
Biased Statistics					
Average Biased	-5.81E-05	-5.03E-05	-2.39E-05	1.32E-05	8.47E-05
Std Dev Biased	2.52E-05	2.54E-05	2.48E-05	2.55E-05	2.95E-05
Ps90%/90% (+KTL) Biased	1.08E-05	1.94E-05	4.40E-05	8.31E-05	1.66E-04
Ps90%/90% (-KTL) Biased	-1.27E-04	-1.20E-04	-9.18E-05	-5.67E-05	3.73E-06
Un-Biased Statistics					
Average Un-Biased	-5.77E-05	-4.48E-05	-1.09E-05	5.11E-05	1.75E-04
Std Dev Un-Biased	6.70E-05	6.93E-05	6.89E-05	6.54E-05	7.50E-05
Ps90%/90% (+KTL) Un-Biased	1.26E-04	1.45E-04	1.78E-04	2.30E-04	3.81E-04
Ps90%/90% (-KTL) Un-Biased	-2.41E-04	-2.35E-04	-2.00E-04	-1.28E-04	-3.04E-05
Specification MIN	-4.50E-04	-6.00E-04	-7.50E-04	-9.00E-04	-9.00E-04
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	4.50E-04	6.00E-04	7.50E-04	9.00E-04	9.00E-04
Status	PASS	PASS	PASS	PASS	PASS

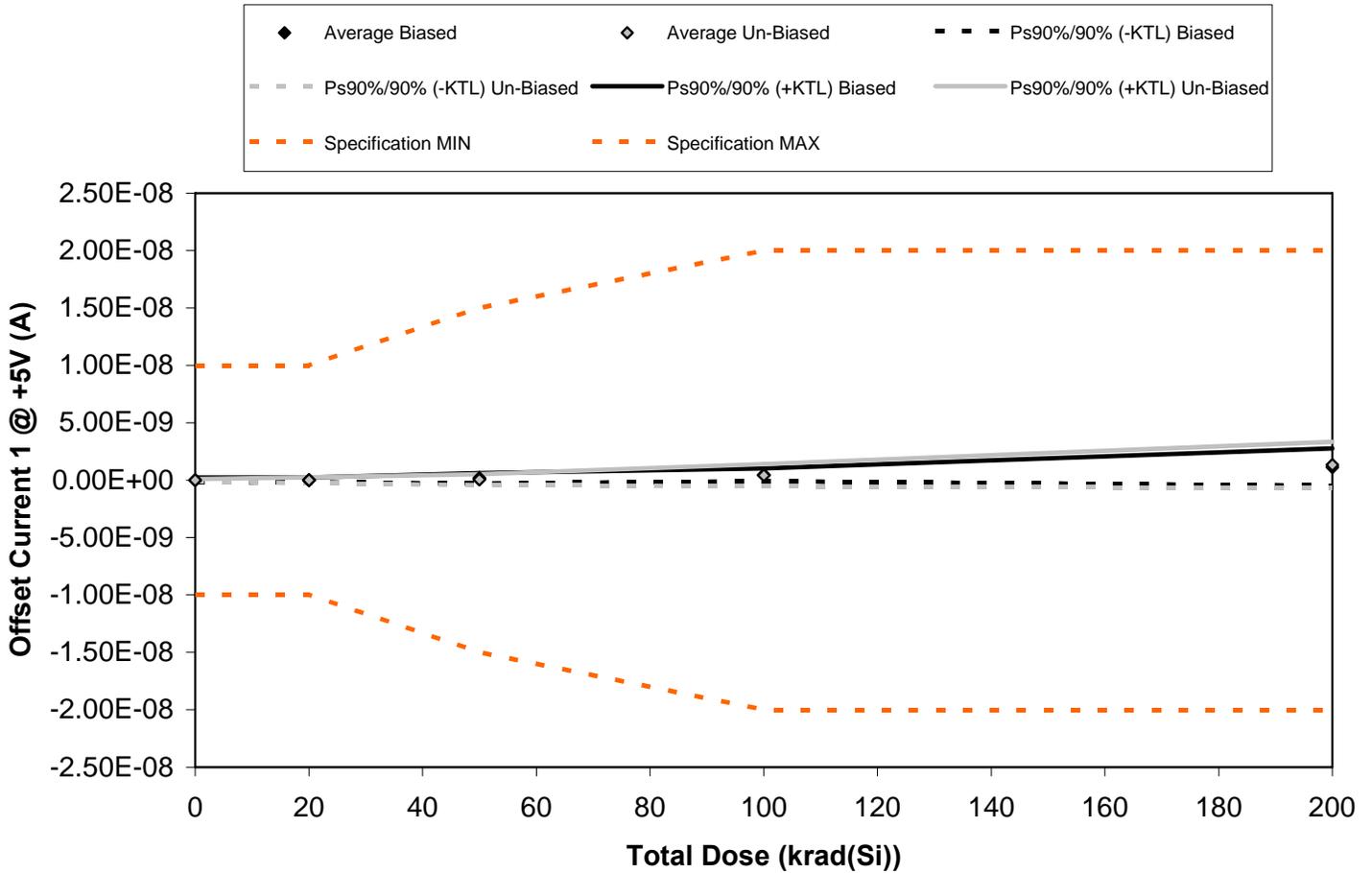


Figure 5.53. Plot of Offset Current 1 @ +5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.53. Raw data for Offset Current 1 @ +5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 1 @ +5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.14E-10	-1.02E-10	4.10E-10	6.66E-10	1.55E-09
1116	-4.70E-11	-3.50E-11	-5.40E-11	1.97E-10	5.60E-10
1117	2.20E-11	4.60E-11	1.63E-10	4.04E-10	1.03E-09
1118	1.01E-10	8.80E-11	1.11E-10	3.72E-10	6.08E-10
1119	1.00E-11	5.70E-11	1.81E-10	6.81E-10	1.92E-09
1120	-3.70E-11	-7.30E-11	9.30E-11	5.98E-10	1.72E-09
1121	-4.40E-11	-4.60E-11	1.72E-10	9.04E-10	2.34E-09
1122	2.10E-11	-2.60E-11	-4.40E-11	2.48E-10	4.31E-10
1123	5.00E-11	1.52E-10	1.97E-10	4.25E-10	1.20E-09
1124	0.00E+00	-6.60E-11	-2.33E-10	-4.00E-11	9.46E-10
1125	-3.60E-11	-6.90E-11	-4.80E-11	-8.90E-11	-1.02E-10
1126	-1.97E-10	-2.51E-10	-2.02E-10	-2.31E-10	-1.96E-10
Biased Statistics					
Average Biased	-5.60E-12	1.08E-11	1.62E-10	4.64E-10	1.13E-09
Std Dev Biased	8.04E-11	7.77E-11	1.67E-10	2.07E-10	5.93E-10
Ps90%/90% (+KTL) Biased	2.15E-10	2.24E-10	6.19E-10	1.03E-09	2.76E-09
Ps90%/90% (-KTL) Biased	-2.26E-10	-2.02E-10	-2.95E-10	-1.03E-10	-4.95E-10
Un-Biased Statistics					
Average Un-Biased	-2.00E-12	-1.18E-11	3.70E-11	4.27E-10	1.33E-09
Std Dev Un-Biased	3.95E-11	9.34E-11	1.78E-10	3.56E-10	7.32E-10
Ps90%/90% (+KTL) Un-Biased	1.06E-10	2.44E-10	5.24E-10	1.40E-09	3.33E-09
Ps90%/90% (-KTL) Un-Biased	-1.10E-10	-2.68E-10	-4.50E-10	-5.49E-10	-6.80E-10
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.00E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.00E-08
Status	PASS	PASS	PASS	PASS	PASS

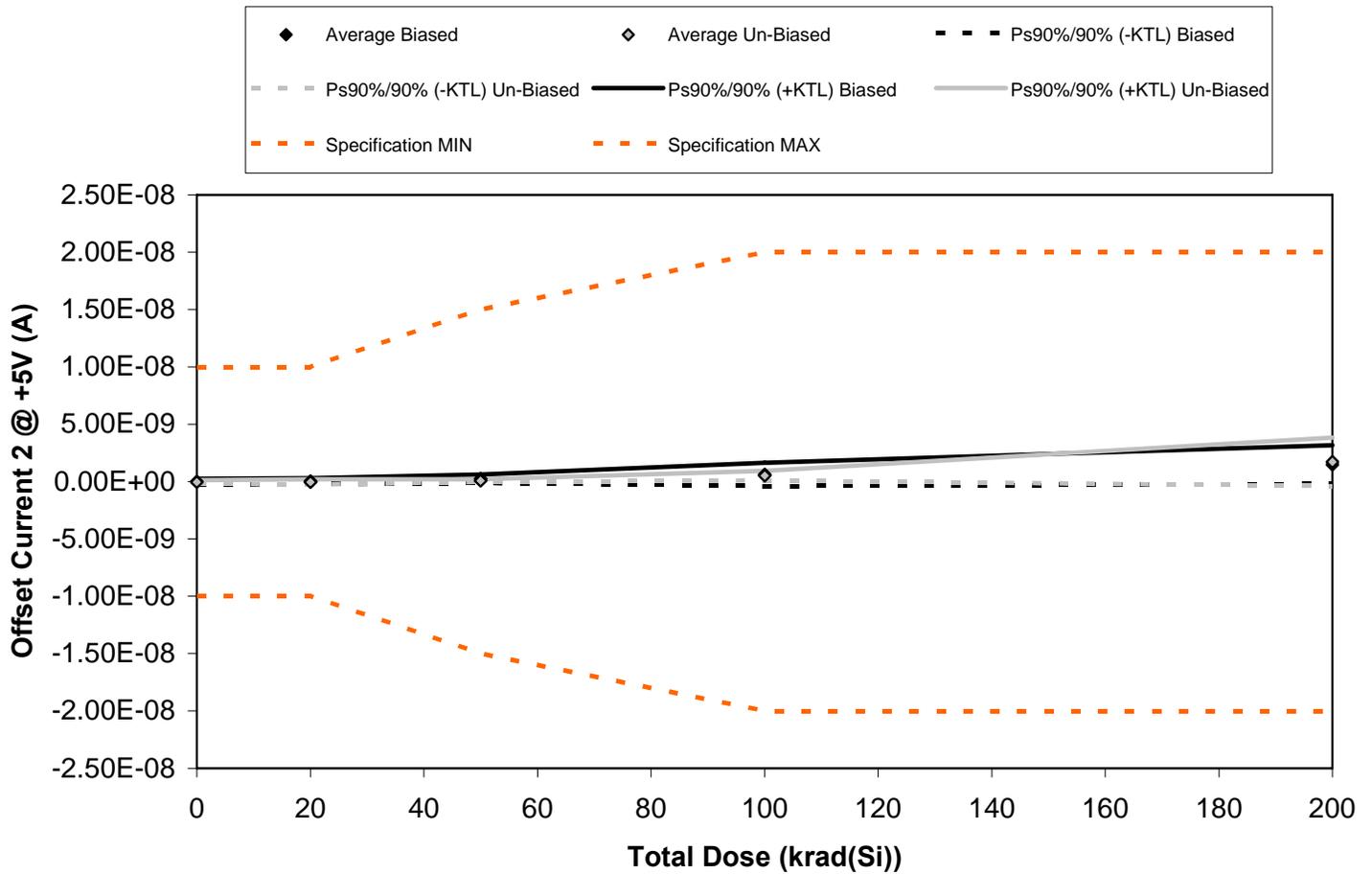


Figure 5.54. Plot of Offset Current 2 @ +5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.54. Raw data for Offset Current 2 @ +5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 2 @ +5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-5.70E-11	-5.40E-11	4.18E-10	8.61E-10	1.83E-09
1116	-5.10E-11	-3.00E-11	1.61E-10	-1.80E-11	5.69E-10
1117	1.47E-10	1.84E-10	1.48E-10	6.85E-10	1.47E-09
1118	-8.00E-12	-1.20E-11	1.52E-10	6.61E-10	1.27E-09
1119	-6.80E-11	5.60E-11	3.81E-10	9.10E-10	2.21E-09
1120	-9.00E-11	-1.24E-10	8.80E-11	4.02E-10	1.59E-09
1121	5.00E-12	-7.60E-11	4.90E-11	5.42E-10	1.91E-09
1122	3.40E-11	-2.00E-11	4.50E-11	3.22E-10	4.74E-10
1123	-3.70E-11	9.70E-11	1.41E-10	7.02E-10	2.06E-09
1124	-9.70E-11	-7.00E-11	8.60E-11	5.97E-10	2.54E-09
1125	1.03E-10	8.10E-11	1.01E-10	6.60E-11	7.70E-11
1126	-4.00E-11	-2.30E-11	-3.00E-11	-6.40E-11	-2.70E-11
Biased Statistics					
Average Biased	-7.40E-12	2.88E-11	2.52E-10	6.20E-10	1.47E-09
Std Dev Biased	8.93E-11	9.59E-11	1.35E-10	3.73E-10	6.19E-10
Ps90%/90% (+KTL) Biased	2.37E-10	2.92E-10	6.23E-10	1.64E-09	3.17E-09
Ps90%/90% (-KTL) Biased	-2.52E-10	-2.34E-10	-1.19E-10	-4.02E-10	-2.28E-10
Un-Biased Statistics					
Average Un-Biased	-3.70E-11	-3.86E-11	8.18E-11	5.13E-10	1.72E-09
Std Dev Un-Biased	5.75E-11	8.43E-11	3.87E-11	1.52E-10	7.73E-10
Ps90%/90% (+KTL) Un-Biased	1.21E-10	1.92E-10	1.88E-10	9.30E-10	3.83E-09
Ps90%/90% (-KTL) Un-Biased	-1.95E-10	-2.70E-10	-2.43E-11	9.62E-11	-4.04E-10
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.00E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.00E-08
Status	PASS	PASS	PASS	PASS	PASS

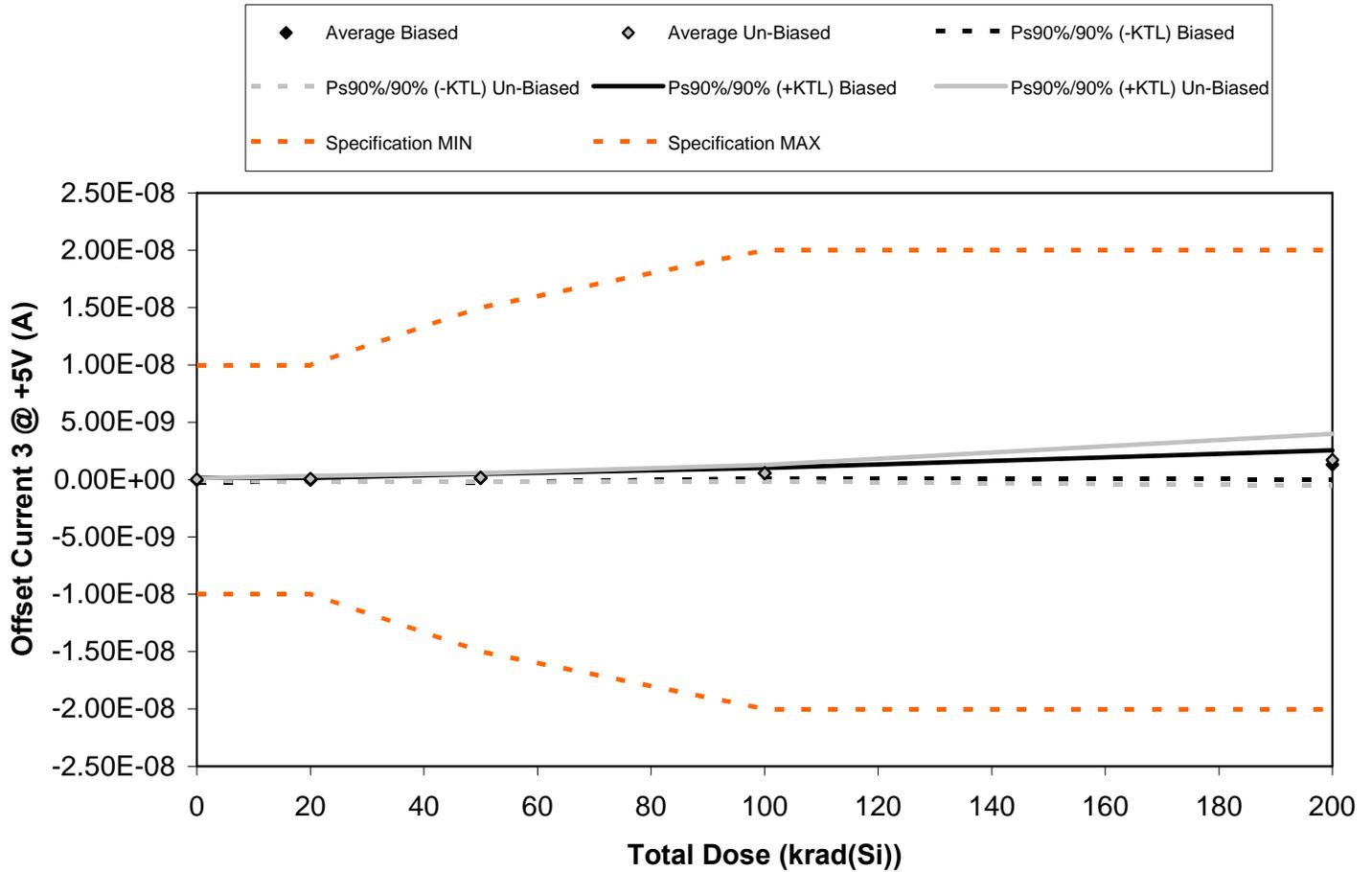


Figure 5.55. Plot of Offset Current 3 @ +5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.55. Raw data for Offset Current 3 @ +5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 3 @ +5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.48E-10	-7.00E-12	2.98E-10	7.88E-10	1.70E-09
1116	-7.40E-11	-5.40E-11	1.00E-11	3.37E-10	6.37E-10
1117	-5.80E-11	-7.40E-11	9.20E-11	5.74E-10	1.37E-09
1118	5.60E-11	7.40E-11	2.23E-10	5.43E-10	1.03E-09
1119	8.00E-12	-2.40E-11	-1.50E-11	5.16E-10	1.71E-09
1120	-3.30E-11	3.00E-11	2.01E-10	5.29E-10	1.61E-09
1121	4.30E-11	1.34E-10	2.43E-10	6.42E-10	2.06E-09
1122	5.40E-11	4.40E-11	-8.70E-11	1.70E-10	4.14E-10
1123	2.00E-11	1.90E-10	2.06E-10	5.24E-10	1.91E-09
1124	2.00E-12	-4.80E-11	2.72E-10	8.97E-10	2.64E-09
1125	1.09E-10	8.80E-11	8.10E-11	9.10E-11	8.00E-11
1126	-1.31E-10	-1.33E-10	-1.44E-10	-8.90E-11	-1.21E-10
Biased Statistics					
Average Biased	-4.32E-11	-1.70E-11	1.22E-10	5.52E-10	1.29E-09
Std Dev Biased	7.84E-11	5.71E-11	1.35E-10	1.61E-10	4.59E-10
Ps90%/90% (+KTL) Biased	1.72E-10	1.40E-10	4.93E-10	9.93E-10	2.55E-09
Ps90%/90% (-KTL) Biased	-2.58E-10	-1.74E-10	-2.50E-10	1.10E-10	3.03E-11
Un-Biased Statistics					
Average Un-Biased	1.72E-11	7.00E-11	1.67E-10	5.52E-10	1.73E-09
Std Dev Un-Biased	3.46E-11	9.31E-11	1.45E-10	2.62E-10	8.24E-10
Ps90%/90% (+KTL) Un-Biased	1.12E-10	3.25E-10	5.64E-10	1.27E-09	3.99E-09
Ps90%/90% (-KTL) Un-Biased	-7.76E-11	-1.85E-10	-2.30E-10	-1.66E-10	-5.31E-10
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.00E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.00E-08
Status	PASS	PASS	PASS	PASS	PASS

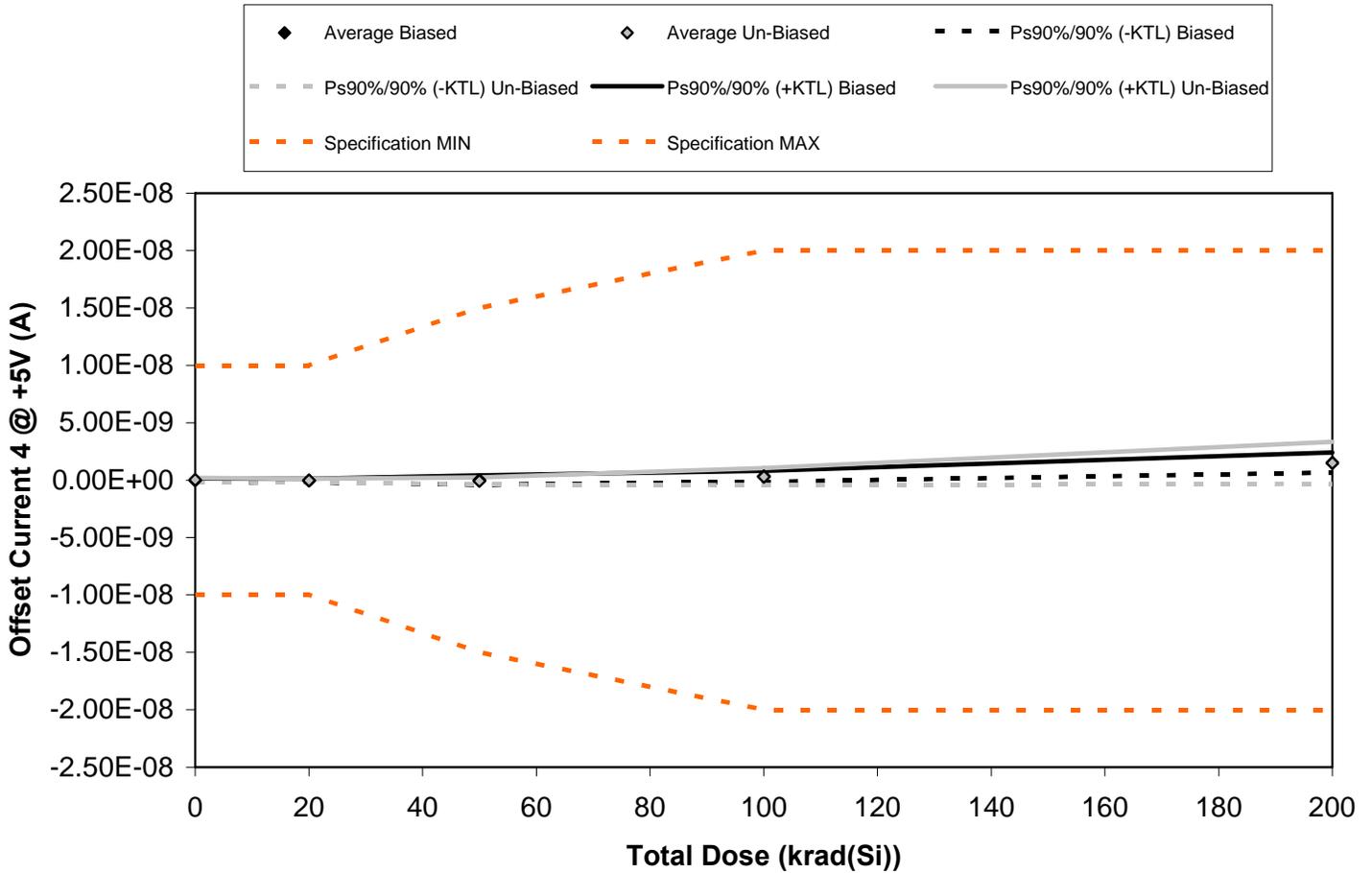


Figure 5.56. Plot of Offset Current 4 @ +5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.56. Raw data for Offset Current 4 @ +5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Offset Current 4 @ +5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	-1.15E-10	-7.10E-11	1.61E-10	5.90E-10	1.83E-09
1116	-7.40E-11	-6.40E-11	-1.12E-10	2.63E-10	1.37E-09
1117	4.60E-11	4.80E-11	1.62E-10	4.38E-10	1.50E-09
1118	-4.70E-11	-1.04E-10	-1.06E-10	1.49E-10	1.11E-09
1119	2.20E-11	-3.10E-11	-1.08E-10	2.59E-10	1.85E-09
1120	-4.90E-11	-9.00E-11	-2.90E-11	5.18E-10	1.79E-09
1121	1.30E-11	-9.30E-11	-1.36E-10	3.67E-10	2.22E-09
1122	1.00E-10	-1.50E-11	-1.94E-10	-1.54E-10	4.64E-10
1123	5.60E-11	-1.40E-11	-6.20E-11	2.68E-10	1.30E-09
1124	-5.80E-11	4.30E-11	1.05E-10	4.91E-10	1.72E-09
1125	9.40E-11	8.40E-11	5.50E-11	3.90E-11	5.20E-11
1126	-1.03E-10	-1.01E-10	-9.00E-11	-1.01E-10	-1.08E-10
Biased Statistics					
Average Biased	-3.36E-11	-4.44E-11	-6.00E-13	3.40E-10	1.53E-09
Std Dev Biased	6.68E-11	5.78E-11	1.48E-10	1.74E-10	3.15E-10
Ps90%/90% (+KTL) Biased	1.50E-10	1.14E-10	4.05E-10	8.17E-10	2.39E-09
Ps90%/90% (-KTL) Biased	-2.17E-10	-2.03E-10	-4.06E-10	-1.37E-10	6.68E-10
Un-Biased Statistics					
Average Un-Biased	1.24E-11	-3.38E-11	-6.32E-11	2.98E-10	1.50E-09
Std Dev Un-Biased	6.76E-11	5.77E-11	1.14E-10	2.72E-10	6.65E-10
Ps90%/90% (+KTL) Un-Biased	1.98E-10	1.24E-10	2.49E-10	1.04E-09	3.32E-09
Ps90%/90% (-KTL) Un-Biased	-1.73E-10	-1.92E-10	-3.75E-10	-4.47E-10	-3.24E-10
Specification MIN	-1.00E-08	-1.00E-08	-1.50E-08	-2.00E-08	-2.00E-08
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	1.00E-08	1.00E-08	1.50E-08	2.00E-08	2.00E-08
Status	PASS	PASS	PASS	PASS	PASS

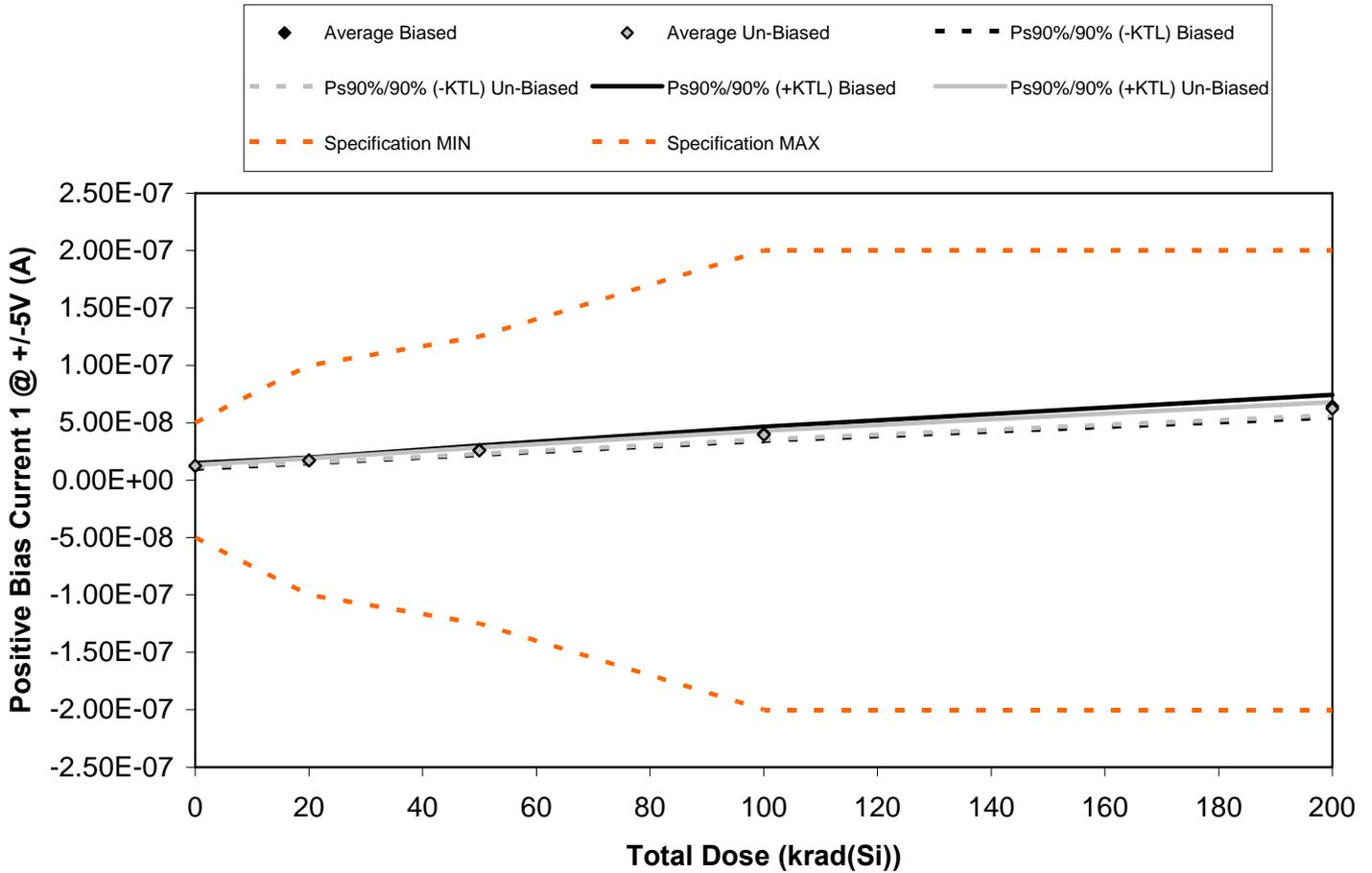


Figure 5.57. Plot of Positive Bias Current 1 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.57. Raw data for Positive Bias Current 1 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 1 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.10E-08	1.56E-08	2.39E-08	3.73E-08	6.01E-08
1116	1.33E-08	1.79E-08	2.71E-08	4.14E-08	6.63E-08
1117	1.31E-08	1.76E-08	2.62E-08	4.01E-08	6.29E-08
1118	1.23E-08	1.71E-08	2.58E-08	3.98E-08	6.27E-08
1119	1.21E-08	1.76E-08	2.77E-08	4.34E-08	6.95E-08
1120	1.21E-08	1.65E-08	2.48E-08	3.79E-08	6.04E-08
1121	1.20E-08	1.70E-08	2.59E-08	3.95E-08	6.31E-08
1122	1.23E-08	1.71E-08	2.55E-08	3.91E-08	6.19E-08
1123	1.25E-08	1.70E-08	2.53E-08	3.87E-08	6.04E-08
1124	1.29E-08	1.81E-08	2.74E-08	4.17E-08	6.54E-08
1125	1.27E-08	1.28E-08	1.28E-08	1.28E-08	1.27E-08
1126	1.20E-08	1.20E-08	1.20E-08	1.20E-08	1.20E-08
Biased Statistics					
Average Biased	1.24E-08	1.72E-08	2.61E-08	4.04E-08	6.43E-08
Std Dev Biased	9.21E-10	9.13E-10	1.45E-09	2.23E-09	3.65E-09
Ps90%/90% (+KTL) Biased	1.49E-08	1.97E-08	3.01E-08	4.65E-08	7.43E-08
Ps90%/90% (-KTL) Biased	9.85E-09	1.47E-08	2.22E-08	3.43E-08	5.43E-08
Un-Biased Statistics					
Average Un-Biased	1.24E-08	1.72E-08	2.58E-08	3.94E-08	6.22E-08
Std Dev Un-Biased	3.45E-10	5.93E-10	9.75E-10	1.41E-09	2.08E-09
Ps90%/90% (+KTL) Un-Biased	1.33E-08	1.88E-08	2.84E-08	4.32E-08	6.79E-08
Ps90%/90% (-KTL) Un-Biased	1.14E-08	1.55E-08	2.31E-08	3.55E-08	5.65E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

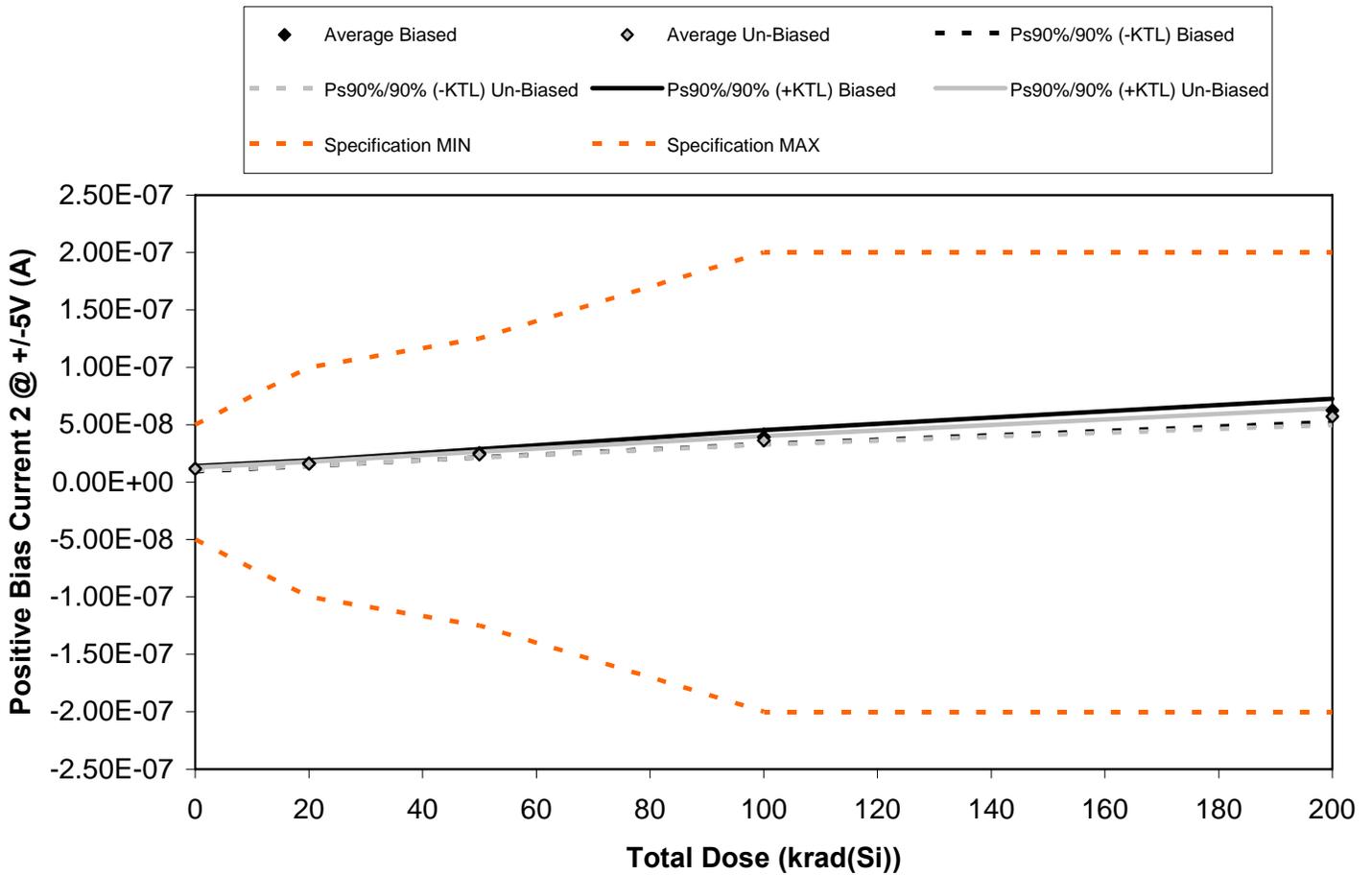


Figure 5.58. Plot of Positive Bias Current 2 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.58. Raw data for Positive Bias Current 2 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 2 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.08E-08	1.53E-08	2.36E-08	3.66E-08	5.90E-08
1116	1.29E-08	1.74E-08	2.65E-08	4.08E-08	6.50E-08
1117	1.13E-08	1.56E-08	2.39E-08	3.69E-08	5.83E-08
1118	1.21E-08	1.69E-08	2.57E-08	3.98E-08	6.28E-08
1119	1.11E-08	1.66E-08	2.62E-08	4.15E-08	6.67E-08
1120	1.20E-08	1.65E-08	2.45E-08	3.70E-08	5.80E-08
1121	1.12E-08	1.61E-08	2.45E-08	3.69E-08	5.86E-08
1122	1.18E-08	1.66E-08	2.48E-08	3.78E-08	5.96E-08
1123	1.09E-08	1.50E-08	2.24E-08	3.42E-08	5.30E-08
1124	1.12E-08	1.57E-08	2.36E-08	3.59E-08	5.59E-08
1125	1.20E-08	1.21E-08	1.20E-08	1.20E-08	1.20E-08
1126	1.20E-08	1.20E-08	1.20E-08	1.20E-08	1.19E-08
Biased Statistics					
Average Biased	1.16E-08	1.64E-08	2.52E-08	3.91E-08	6.24E-08
Std Dev Biased	8.49E-10	8.98E-10	1.32E-09	2.24E-09	3.68E-09
Ps90%/90% (+KTL) Biased	1.40E-08	1.88E-08	2.88E-08	4.53E-08	7.25E-08
Ps90%/90% (-KTL) Biased	9.31E-09	1.39E-08	2.16E-08	3.30E-08	5.23E-08
Un-Biased Statistics					
Average Un-Biased	1.14E-08	1.60E-08	2.39E-08	3.64E-08	5.70E-08
Std Dev Un-Biased	4.47E-10	6.39E-10	9.54E-10	1.38E-09	2.63E-09
Ps90%/90% (+KTL) Un-Biased	1.27E-08	1.77E-08	2.66E-08	4.02E-08	6.42E-08
Ps90%/90% (-KTL) Un-Biased	1.02E-08	1.42E-08	2.13E-08	3.26E-08	4.98E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

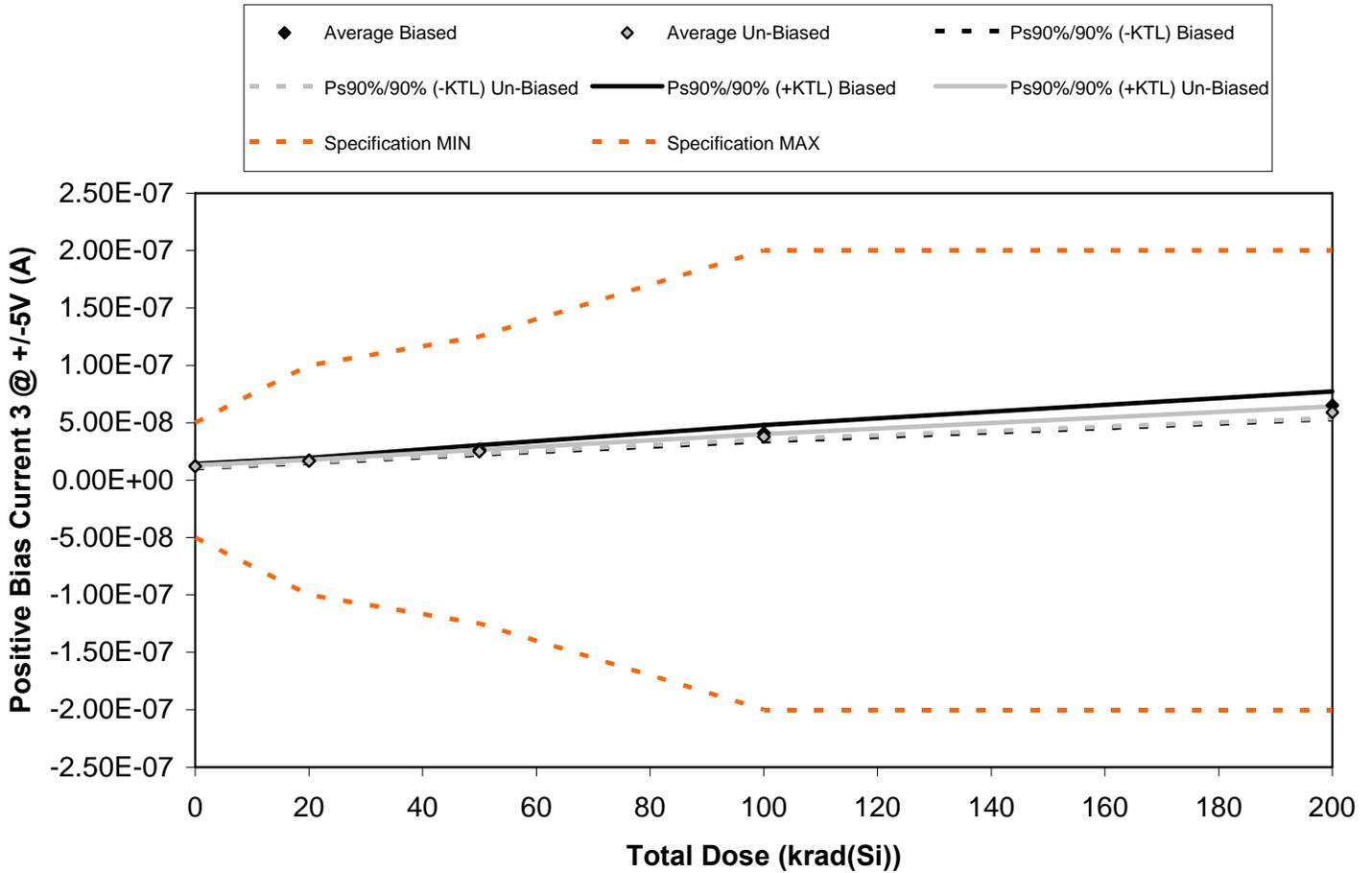


Figure 5.59. Plot of Positive Bias Current 3 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.59. Raw data for Positive Bias Current 3 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 3 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.13E-08	1.58E-08	2.44E-08	3.76E-08	6.06E-08
1116	1.32E-08	1.79E-08	2.74E-08	4.19E-08	6.74E-08
1117	1.25E-08	1.71E-08	2.57E-08	3.95E-08	6.23E-08
1118	1.24E-08	1.72E-08	2.62E-08	4.08E-08	6.43E-08
1119	1.20E-08	1.77E-08	2.83E-08	4.45E-08	7.16E-08
1120	1.25E-08	1.70E-08	2.55E-08	3.86E-08	6.07E-08
1121	1.17E-08	1.66E-08	2.51E-08	3.81E-08	6.02E-08
1122	1.22E-08	1.69E-08	2.53E-08	3.85E-08	6.04E-08
1123	1.19E-08	1.62E-08	2.41E-08	3.67E-08	5.64E-08
1124	1.16E-08	1.62E-08	2.45E-08	3.72E-08	5.80E-08
1125	1.29E-08	1.30E-08	1.30E-08	1.30E-08	1.29E-08
1126	1.24E-08	1.24E-08	1.24E-08	1.24E-08	1.24E-08
Biased Statistics					
Average Biased	1.23E-08	1.72E-08	2.64E-08	4.09E-08	6.52E-08
Std Dev Biased	7.22E-10	8.18E-10	1.50E-09	2.58E-09	4.36E-09
Ps90%/90% (+KTL) Biased	1.43E-08	1.94E-08	3.05E-08	4.79E-08	7.72E-08
Ps90%/90% (-KTL) Biased	1.03E-08	1.49E-08	2.23E-08	3.38E-08	5.33E-08
Un-Biased Statistics					
Average Un-Biased	1.20E-08	1.66E-08	2.49E-08	3.78E-08	5.92E-08
Std Dev Un-Biased	3.83E-10	3.63E-10	5.97E-10	8.44E-10	1.85E-09
Ps90%/90% (+KTL) Un-Biased	1.30E-08	1.76E-08	2.65E-08	4.01E-08	6.42E-08
Ps90%/90% (-KTL) Un-Biased	1.09E-08	1.56E-08	2.33E-08	3.55E-08	5.41E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

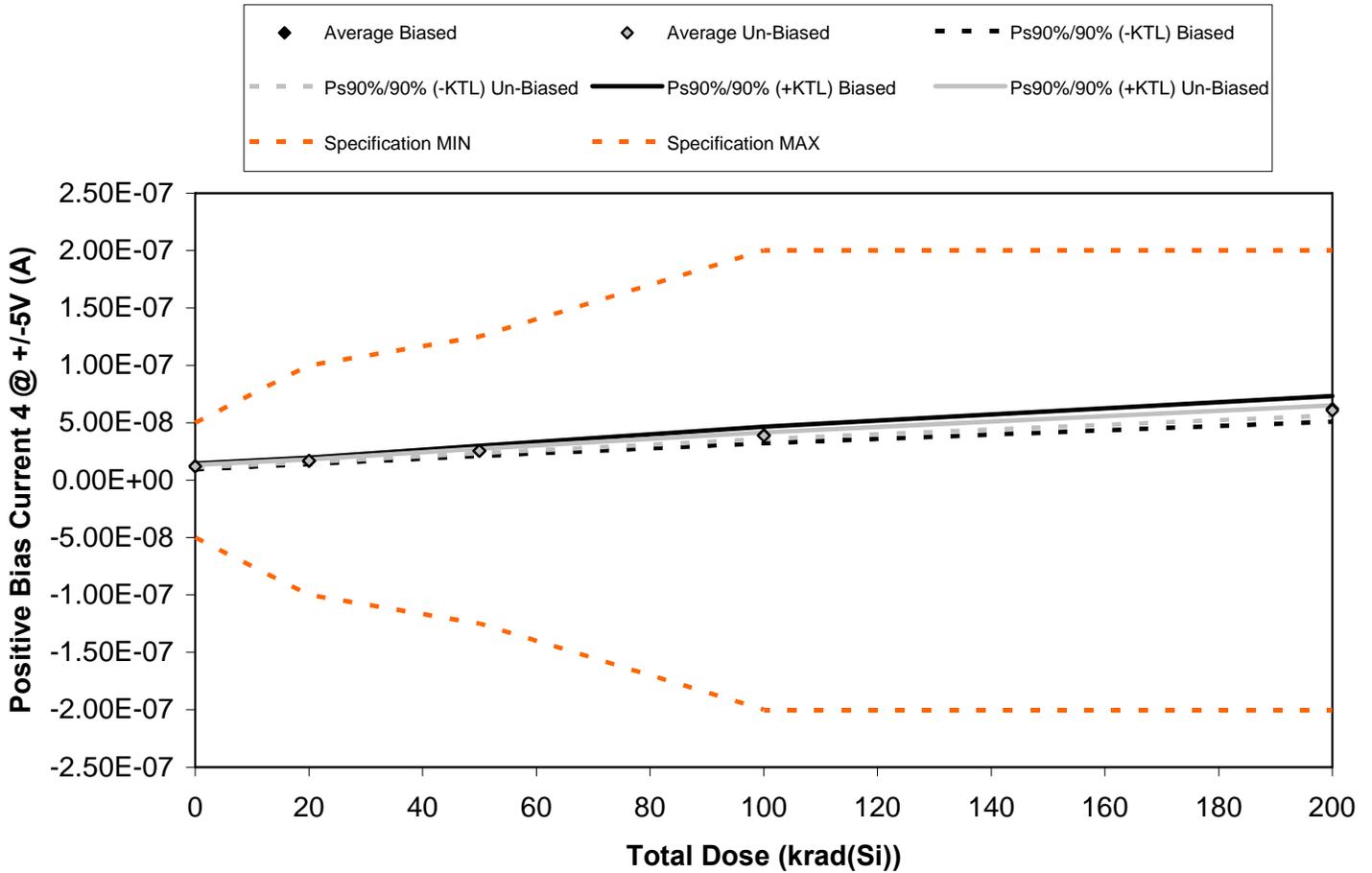


Figure 5.60. Plot of Positive Bias Current 4 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.60. Raw data for Positive Bias Current 4 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Bias Current 4 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.06E-08	1.51E-08	2.32E-08	3.59E-08	5.77E-08
1116	1.29E-08	1.73E-08	2.63E-08	4.01E-08	6.35E-08
1117	1.19E-08	1.63E-08	2.44E-08	3.74E-08	5.86E-08
1118	1.27E-08	1.75E-08	2.64E-08	4.05E-08	6.32E-08
1119	1.17E-08	1.74E-08	2.72E-08	4.26E-08	6.77E-08
1120	1.22E-08	1.67E-08	2.52E-08	3.81E-08	6.03E-08
1121	1.16E-08	1.65E-08	2.53E-08	3.84E-08	6.10E-08
1122	1.19E-08	1.66E-08	2.50E-08	3.84E-08	6.02E-08
1123	1.21E-08	1.68E-08	2.49E-08	3.80E-08	5.90E-08
1124	1.28E-08	1.76E-08	2.67E-08	4.06E-08	6.34E-08
1125	1.23E-08	1.23E-08	1.24E-08	1.24E-08	1.23E-08
1126	1.16E-08	1.17E-08	1.16E-08	1.16E-08	1.16E-08
Biased Statistics					
Average Biased	1.20E-08	1.67E-08	2.55E-08	3.93E-08	6.21E-08
Std Dev Biased	9.34E-10	1.02E-09	1.62E-09	2.65E-09	4.05E-09
Ps90%/90% (+KTL) Biased	1.45E-08	1.95E-08	2.99E-08	4.65E-08	7.32E-08
Ps90%/90% (-KTL) Biased	9.41E-09	1.39E-08	2.10E-08	3.20E-08	5.10E-08
Un-Biased Statistics					
Average Un-Biased	1.21E-08	1.68E-08	2.54E-08	3.87E-08	6.08E-08
Std Dev Un-Biased	4.27E-10	4.51E-10	7.17E-10	1.10E-09	1.62E-09
Ps90%/90% (+KTL) Un-Biased	1.33E-08	1.81E-08	2.74E-08	4.17E-08	6.52E-08
Ps90%/90% (-KTL) Un-Biased	1.10E-08	1.56E-08	2.34E-08	3.57E-08	5.63E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

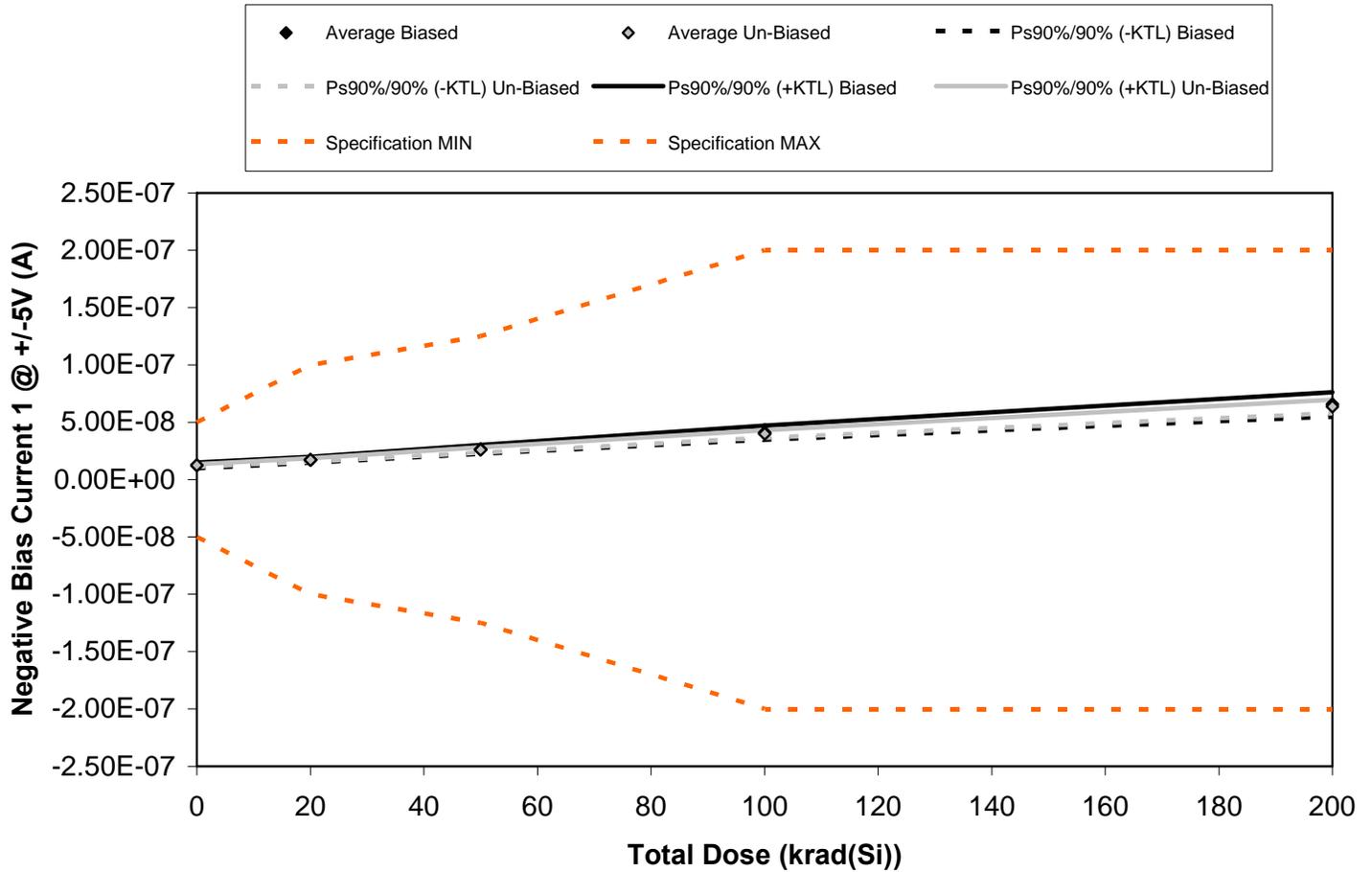


Figure 5.61. Plot of Negative Bias Current 1 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.61. Raw data for Negative Bias Current 1 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 1 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.09E-08	1.56E-08	2.43E-08	3.80E-08	6.18E-08
1116	1.33E-08	1.79E-08	2.71E-08	4.17E-08	6.70E-08
1117	1.31E-08	1.77E-08	2.64E-08	4.06E-08	6.41E-08
1118	1.24E-08	1.72E-08	2.60E-08	4.03E-08	6.34E-08
1119	1.22E-08	1.78E-08	2.80E-08	4.41E-08	7.17E-08
1120	1.21E-08	1.64E-08	2.50E-08	3.85E-08	6.23E-08
1121	1.20E-08	1.71E-08	2.62E-08	4.05E-08	6.56E-08
1122	1.24E-08	1.71E-08	2.55E-08	3.95E-08	6.25E-08
1123	1.26E-08	1.72E-08	2.55E-08	3.92E-08	6.17E-08
1124	1.30E-08	1.80E-08	2.72E-08	4.17E-08	6.64E-08
1125	1.27E-08	1.28E-08	1.28E-08	1.28E-08	1.27E-08
1126	1.18E-08	1.19E-08	1.19E-08	1.18E-08	1.18E-08
Biased Statistics					
Average Biased	1.24E-08	1.73E-08	2.64E-08	4.09E-08	6.56E-08
Std Dev Biased	9.30E-10	9.42E-10	1.37E-09	2.23E-09	3.88E-09
Ps90%/90% (+KTL) Biased	1.49E-08	1.98E-08	3.01E-08	4.70E-08	7.62E-08
Ps90%/90% (-KTL) Biased	9.83E-09	1.47E-08	2.26E-08	3.48E-08	5.50E-08
Un-Biased Statistics					
Average Un-Biased	1.24E-08	1.72E-08	2.59E-08	3.99E-08	6.37E-08
Std Dev Un-Biased	4.05E-10	5.50E-10	8.43E-10	1.22E-09	2.14E-09
Ps90%/90% (+KTL) Un-Biased	1.35E-08	1.87E-08	2.82E-08	4.32E-08	6.96E-08
Ps90%/90% (-KTL) Un-Biased	1.13E-08	1.57E-08	2.36E-08	3.65E-08	5.78E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

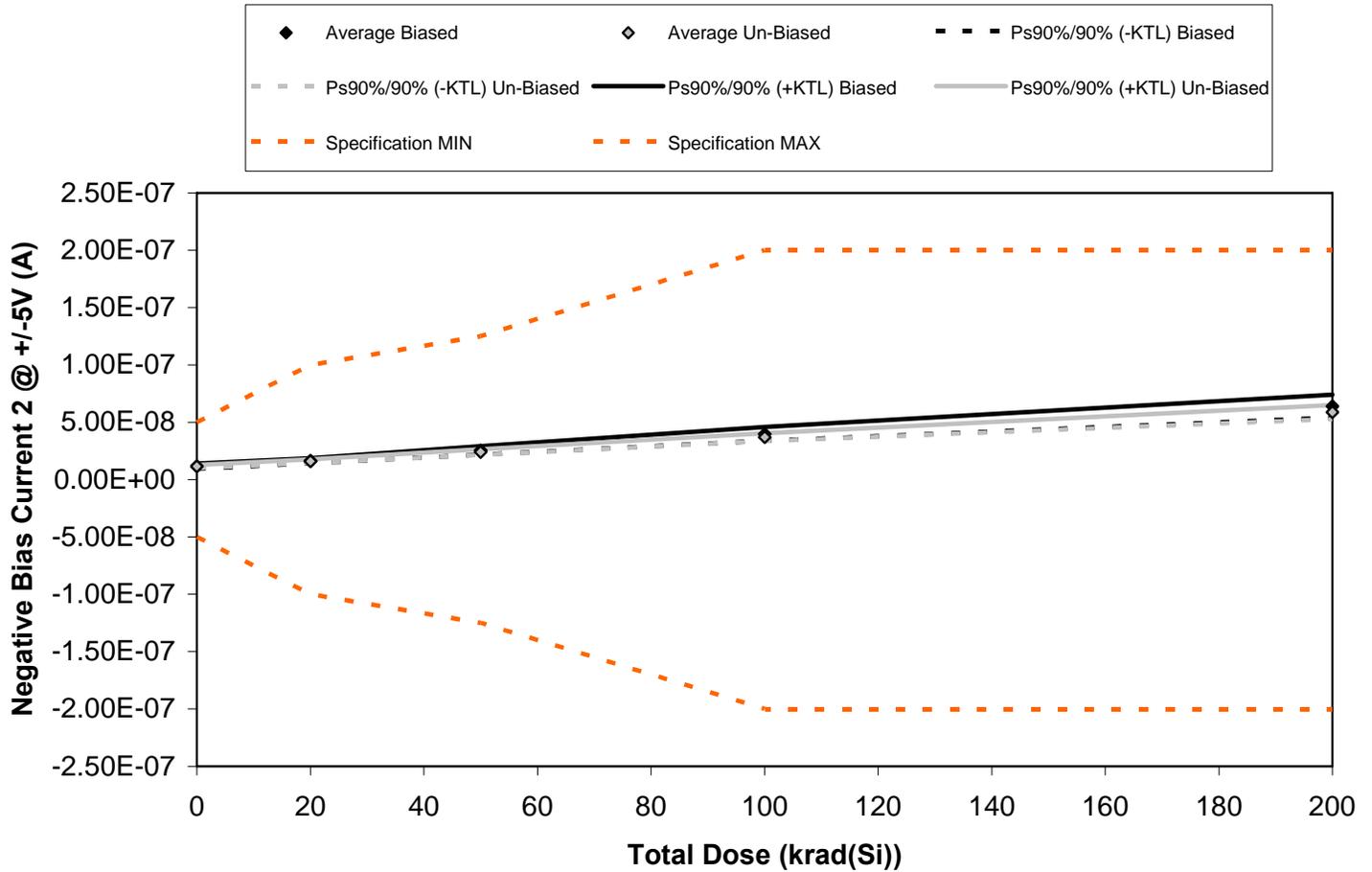


Figure 5.62. Plot of Negative Bias Current 2 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.62. Raw data for Negative Bias Current 2 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 2 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.08E-08	1.54E-08	2.40E-08	3.75E-08	6.11E-08
1116	1.29E-08	1.74E-08	2.67E-08	4.09E-08	6.57E-08
1117	1.15E-08	1.59E-08	2.42E-08	3.77E-08	5.99E-08
1118	1.20E-08	1.69E-08	2.59E-08	4.05E-08	6.42E-08
1119	1.11E-08	1.67E-08	2.67E-08	4.25E-08	6.90E-08
1120	1.19E-08	1.64E-08	2.46E-08	3.75E-08	5.97E-08
1121	1.13E-08	1.61E-08	2.46E-08	3.76E-08	6.07E-08
1122	1.19E-08	1.66E-08	2.48E-08	3.82E-08	6.03E-08
1123	1.09E-08	1.52E-08	2.26E-08	3.49E-08	5.52E-08
1124	1.11E-08	1.56E-08	2.38E-08	3.66E-08	5.85E-08
1125	1.21E-08	1.22E-08	1.21E-08	1.22E-08	1.21E-08
1126	1.19E-08	1.20E-08	1.20E-08	1.20E-08	1.19E-08
Biased Statistics					
Average Biased	1.17E-08	1.64E-08	2.55E-08	3.98E-08	6.40E-08
Std Dev Biased	8.36E-10	8.22E-10	1.31E-09	2.16E-09	3.67E-09
Ps90%/90% (+KTL) Biased	1.40E-08	1.87E-08	2.91E-08	4.57E-08	7.41E-08
Ps90%/90% (-KTL) Biased	9.37E-09	1.42E-08	2.19E-08	3.39E-08	5.39E-08
Un-Biased Statistics					
Average Un-Biased	1.14E-08	1.60E-08	2.41E-08	3.70E-08	5.89E-08
Std Dev Un-Biased	4.67E-10	5.96E-10	8.99E-10	1.28E-09	2.22E-09
Ps90%/90% (+KTL) Un-Biased	1.27E-08	1.76E-08	2.65E-08	4.05E-08	6.49E-08
Ps90%/90% (-KTL) Un-Biased	1.02E-08	1.44E-08	2.16E-08	3.35E-08	5.28E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

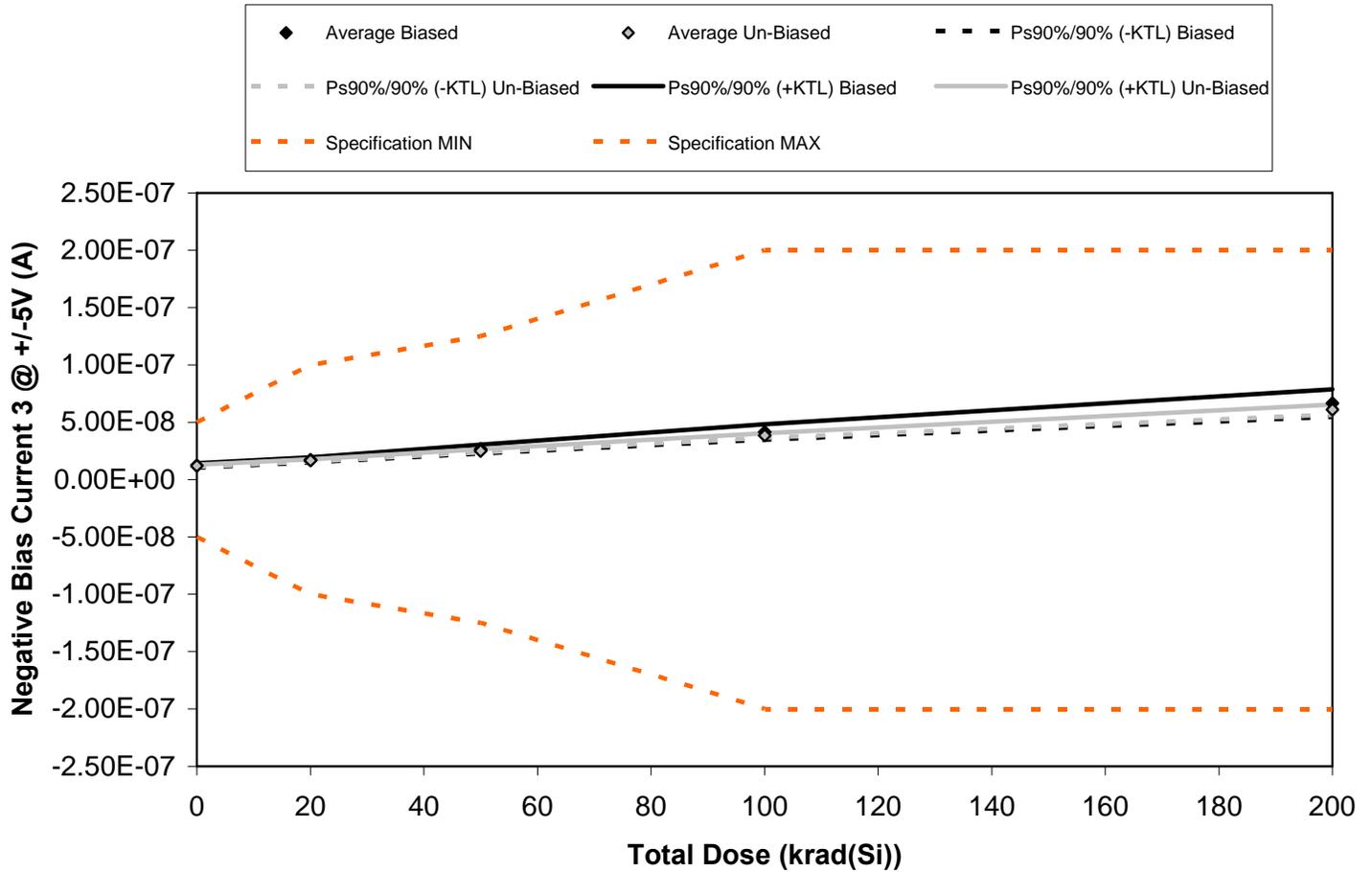


Figure 5.63. Plot of Negative Bias Current 3 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.63. Raw data for Negative Bias Current 3 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 3 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.12E-08	1.59E-08	2.47E-08	3.85E-08	6.24E-08
1116	1.32E-08	1.78E-08	2.74E-08	4.24E-08	6.81E-08
1117	1.25E-08	1.70E-08	2.58E-08	4.02E-08	6.38E-08
1118	1.24E-08	1.74E-08	2.65E-08	4.14E-08	6.55E-08
1119	1.20E-08	1.78E-08	2.83E-08	4.50E-08	7.34E-08
1120	1.25E-08	1.71E-08	2.58E-08	3.92E-08	6.23E-08
1121	1.18E-08	1.68E-08	2.53E-08	3.88E-08	6.24E-08
1122	1.22E-08	1.70E-08	2.52E-08	3.88E-08	6.10E-08
1123	1.20E-08	1.64E-08	2.44E-08	3.74E-08	5.85E-08
1124	1.16E-08	1.62E-08	2.48E-08	3.82E-08	6.08E-08
1125	1.31E-08	1.31E-08	1.31E-08	1.30E-08	1.31E-08
1126	1.23E-08	1.22E-08	1.22E-08	1.22E-08	1.22E-08
Biased Statistics					
Average Biased	1.23E-08	1.72E-08	2.65E-08	4.15E-08	6.67E-08
Std Dev Biased	7.54E-10	8.06E-10	1.38E-09	2.46E-09	4.34E-09
Ps90%/90% (+KTL) Biased	1.43E-08	1.94E-08	3.03E-08	4.82E-08	7.86E-08
Ps90%/90% (-KTL) Biased	1.02E-08	1.50E-08	2.27E-08	3.47E-08	5.47E-08
Un-Biased Statistics					
Average Un-Biased	1.20E-08	1.67E-08	2.51E-08	3.85E-08	6.10E-08
Std Dev Un-Biased	3.36E-10	3.72E-10	5.34E-10	7.18E-10	1.60E-09
Ps90%/90% (+KTL) Un-Biased	1.29E-08	1.77E-08	2.66E-08	4.04E-08	6.54E-08
Ps90%/90% (-KTL) Un-Biased	1.11E-08	1.57E-08	2.37E-08	3.65E-08	5.66E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

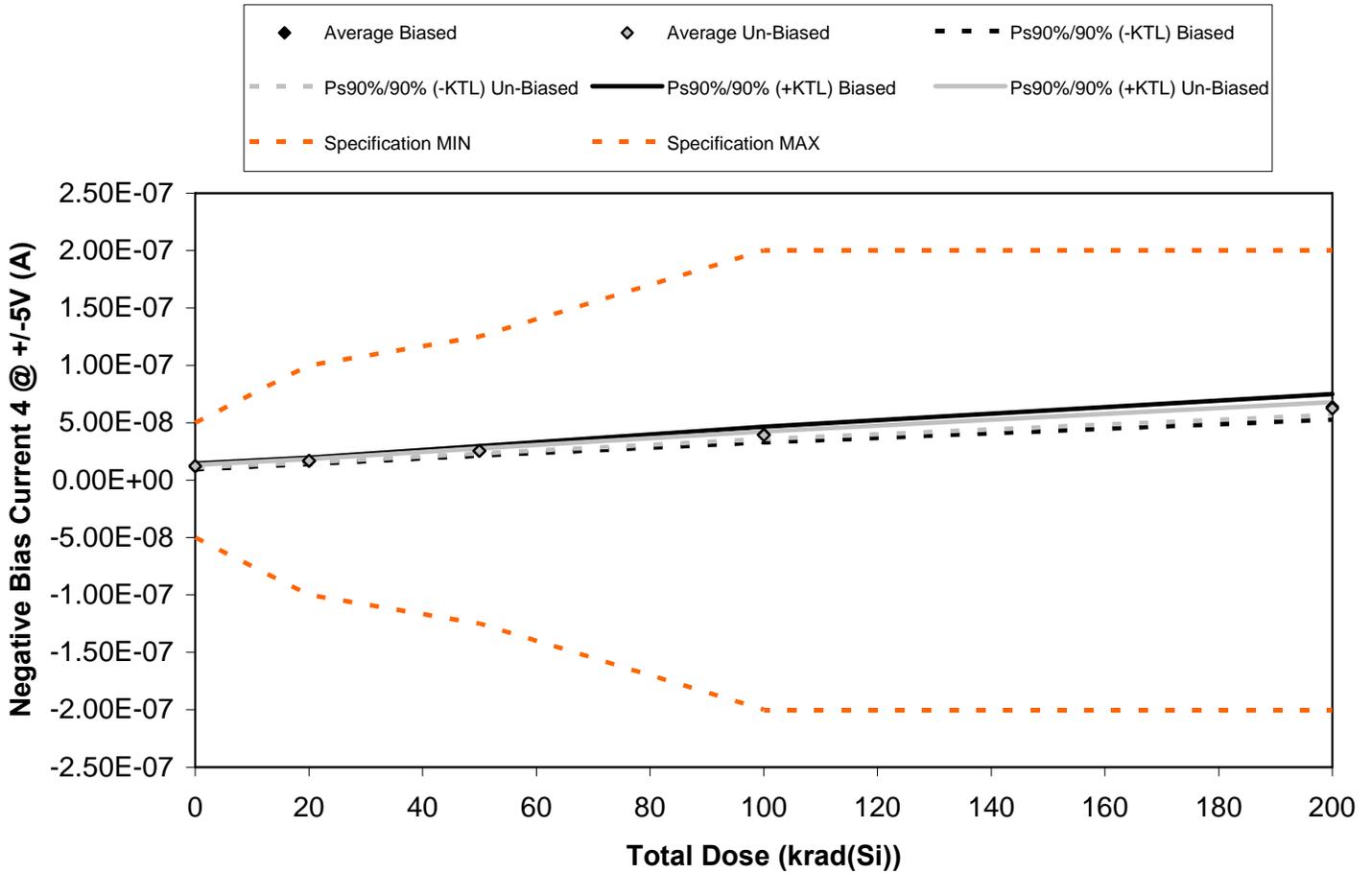


Figure 5.64. Plot of Negative Bias Current 4 @ +/-5V (A) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.64. Raw data for Negative Bias Current 4 @ +/-5V (A) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Negative Bias Current 4 @ +/-5V (A)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.05E-08	1.51E-08	2.34E-08	3.65E-08	5.97E-08
1116	1.29E-08	1.73E-08	2.62E-08	4.05E-08	6.51E-08
1117	1.20E-08	1.63E-08	2.46E-08	3.79E-08	6.03E-08
1118	1.27E-08	1.75E-08	2.63E-08	4.08E-08	6.45E-08
1119	1.18E-08	1.73E-08	2.71E-08	4.29E-08	6.96E-08
1120	1.22E-08	1.66E-08	2.52E-08	3.88E-08	6.21E-08
1121	1.16E-08	1.64E-08	2.53E-08	3.89E-08	6.33E-08
1122	1.20E-08	1.66E-08	2.49E-08	3.84E-08	6.07E-08
1123	1.23E-08	1.68E-08	2.49E-08	3.83E-08	6.05E-08
1124	1.27E-08	1.78E-08	2.68E-08	4.13E-08	6.53E-08
1125	1.24E-08	1.25E-08	1.25E-08	1.25E-08	1.23E-08
1126	1.15E-08	1.15E-08	1.15E-08	1.15E-08	1.15E-08
Biased Statistics					
Average Biased	1.20E-08	1.67E-08	2.55E-08	3.97E-08	6.38E-08
Std Dev Biased	9.37E-10	1.03E-09	1.51E-09	2.52E-09	4.03E-09
Ps90%/90% (+KTL) Biased	1.45E-08	1.95E-08	2.97E-08	4.66E-08	7.49E-08
Ps90%/90% (-KTL) Biased	9.40E-09	1.39E-08	2.14E-08	3.28E-08	5.28E-08
Un-Biased Statistics					
Average Un-Biased	1.22E-08	1.68E-08	2.54E-08	3.91E-08	6.24E-08
Std Dev Un-Biased	3.89E-10	5.40E-10	8.02E-10	1.22E-09	1.99E-09
Ps90%/90% (+KTL) Un-Biased	1.32E-08	1.83E-08	2.76E-08	4.25E-08	6.78E-08
Ps90%/90% (-KTL) Un-Biased	1.11E-08	1.54E-08	2.32E-08	3.58E-08	5.69E-08
Specification MIN	-5.00E-08	-1.00E-07	-1.25E-07	-2.00E-07	-2.00E-07
Status	PASS	PASS	PASS	PASS	PASS
Specification MAX	5.00E-08	1.00E-07	1.25E-07	2.00E-07	2.00E-07
Status	PASS	PASS	PASS	PASS	PASS

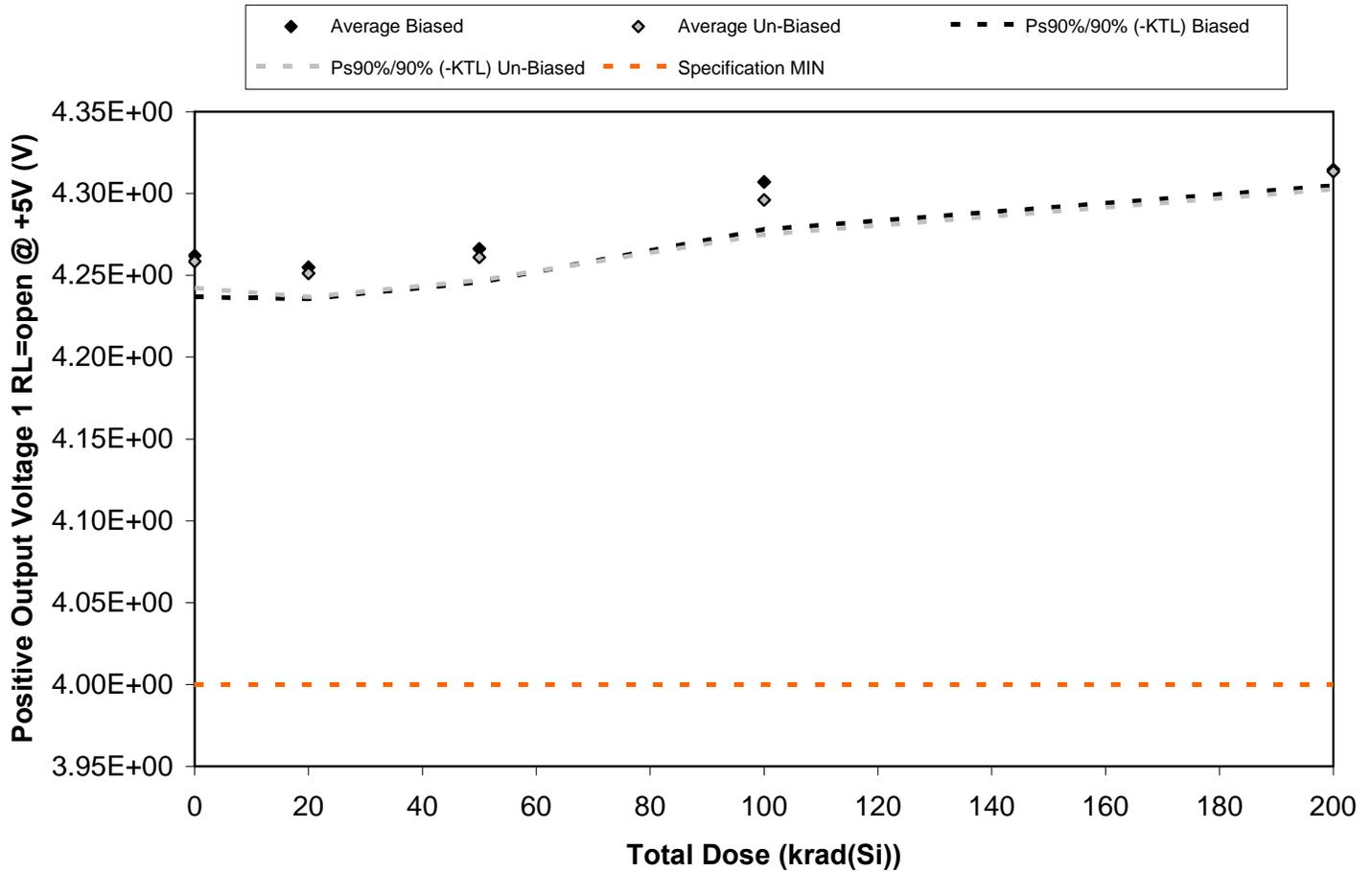


Figure 5.65. Plot of Positive Output Voltage 1 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.65. Raw data for Positive Output Voltage 1 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 1 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	4.27E+00	4.26E+00	4.27E+00	4.32E+00	4.32E+00
1116	4.25E+00	4.25E+00	4.26E+00	4.29E+00	4.31E+00
1117	4.27E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
1118	4.25E+00	4.25E+00	4.26E+00	4.30E+00	4.31E+00
1119	4.27E+00	4.26E+00	4.27E+00	4.32E+00	4.32E+00
1120	4.26E+00	4.25E+00	4.26E+00	4.30E+00	4.31E+00
1121	4.27E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
1122	4.25E+00	4.24E+00	4.26E+00	4.29E+00	4.31E+00
1123	4.25E+00	4.25E+00	4.26E+00	4.29E+00	4.31E+00
1124	4.26E+00	4.26E+00	4.26E+00	4.29E+00	4.32E+00
1125	4.26E+00	4.27E+00	4.27E+00	4.27E+00	4.27E+00
1126	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
Biased Statistics					
Average Biased	4.26E+00	4.25E+00	4.27E+00	4.31E+00	4.31E+00
Std Dev Biased	9.22E-03	7.01E-03	7.43E-03	1.05E-02	3.58E-03
Ps90%/90% (+KTL) Biased	4.29E+00	4.27E+00	4.29E+00	4.34E+00	4.32E+00
Ps90%/90% (-KTL) Biased	4.24E+00	4.24E+00	4.25E+00	4.28E+00	4.30E+00
Un-Biased Statistics					
Average Un-Biased	4.26E+00	4.25E+00	4.26E+00	4.30E+00	4.31E+00
Std Dev Un-Biased	5.86E-03	5.26E-03	5.15E-03	7.65E-03	3.91E-03
Ps90%/90% (+KTL) Un-Biased	4.27E+00	4.27E+00	4.28E+00	4.32E+00	4.32E+00
Ps90%/90% (-KTL) Un-Biased	4.24E+00	4.24E+00	4.25E+00	4.28E+00	4.30E+00
Specification MIN	4.00E+00	4.00E+00	4.00E+00	4.00E+00	4.00E+00
Status	PASS	PASS	PASS	PASS	PASS

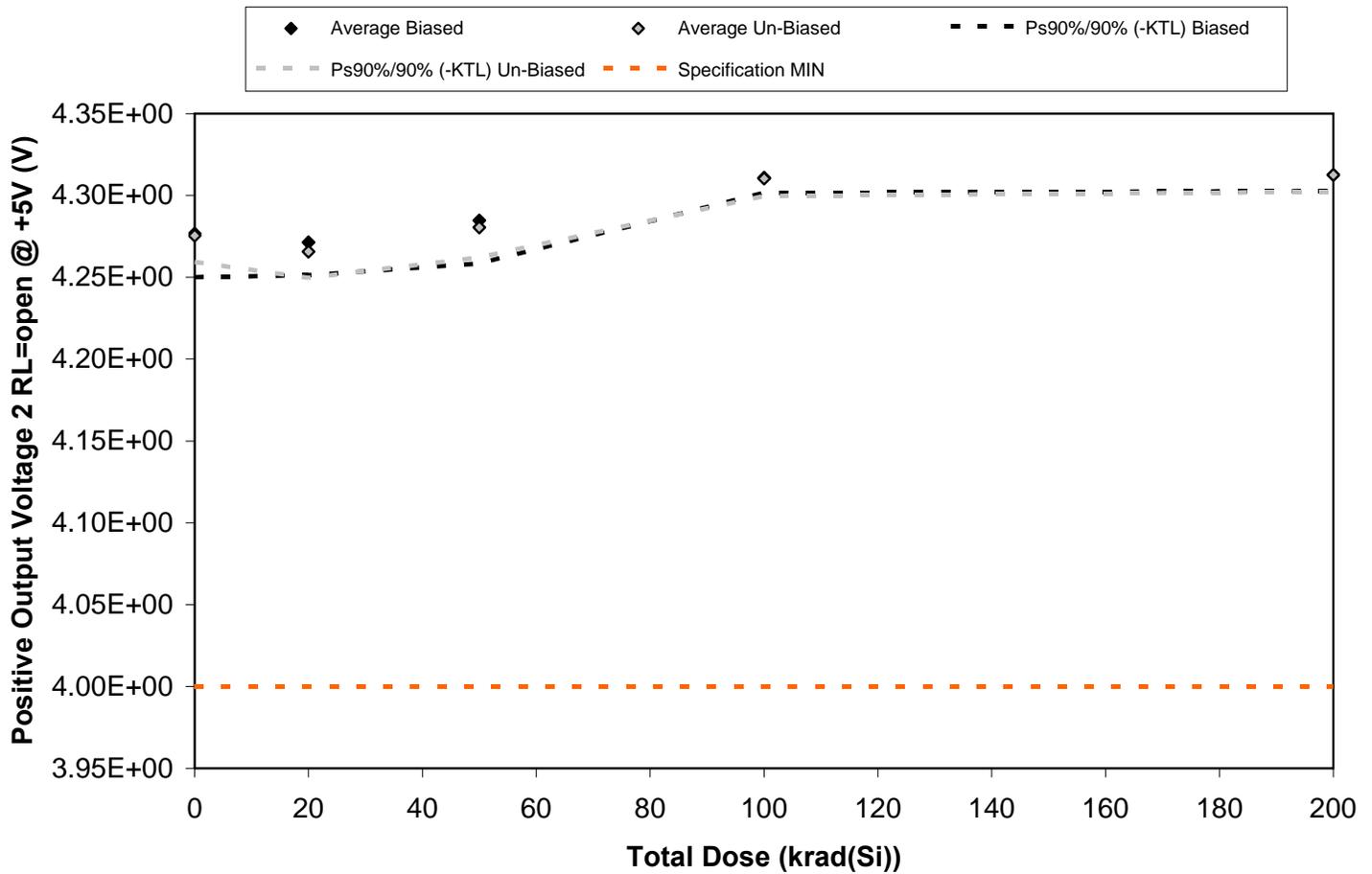


Figure 5.66. Plot of Positive Output Voltage 2 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.66. Raw data for Positive Output Voltage 2 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 2 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	4.29E+00	4.28E+00	4.29E+00	4.31E+00	4.32E+00
1116	4.27E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1117	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1118	4.27E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1119	4.28E+00	4.28E+00	4.30E+00	4.32E+00	4.32E+00
1120	4.27E+00	4.26E+00	4.28E+00	4.31E+00	4.32E+00
1121	4.29E+00	4.27E+00	4.29E+00	4.31E+00	4.32E+00
1122	4.27E+00	4.26E+00	4.27E+00	4.30E+00	4.31E+00
1123	4.27E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1124	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1125	4.28E+00	4.28E+00	4.28E+00	4.28E+00	4.27E+00
1126	4.27E+00	4.27E+00	4.27E+00	4.27E+00	4.27E+00
Biased Statistics					
Average Biased	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
Std Dev Biased	9.69E-03	7.33E-03	9.63E-03	3.35E-03	3.58E-03
Ps90%/90% (+KTL) Biased	4.30E+00	4.29E+00	4.31E+00	4.32E+00	4.32E+00
Ps90%/90% (-KTL) Biased	4.25E+00	4.25E+00	4.26E+00	4.30E+00	4.30E+00
Un-Biased Statistics					
Average Un-Biased	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
Std Dev Un-Biased	5.86E-03	5.81E-03	6.66E-03	3.91E-03	3.78E-03
Ps90%/90% (+KTL) Un-Biased	4.29E+00	4.28E+00	4.30E+00	4.32E+00	4.32E+00
Ps90%/90% (-KTL) Un-Biased	4.26E+00	4.25E+00	4.26E+00	4.30E+00	4.30E+00
Specification MIN	4.00E+00	4.00E+00	4.00E+00	4.00E+00	4.00E+00
Status	PASS	PASS	PASS	PASS	PASS

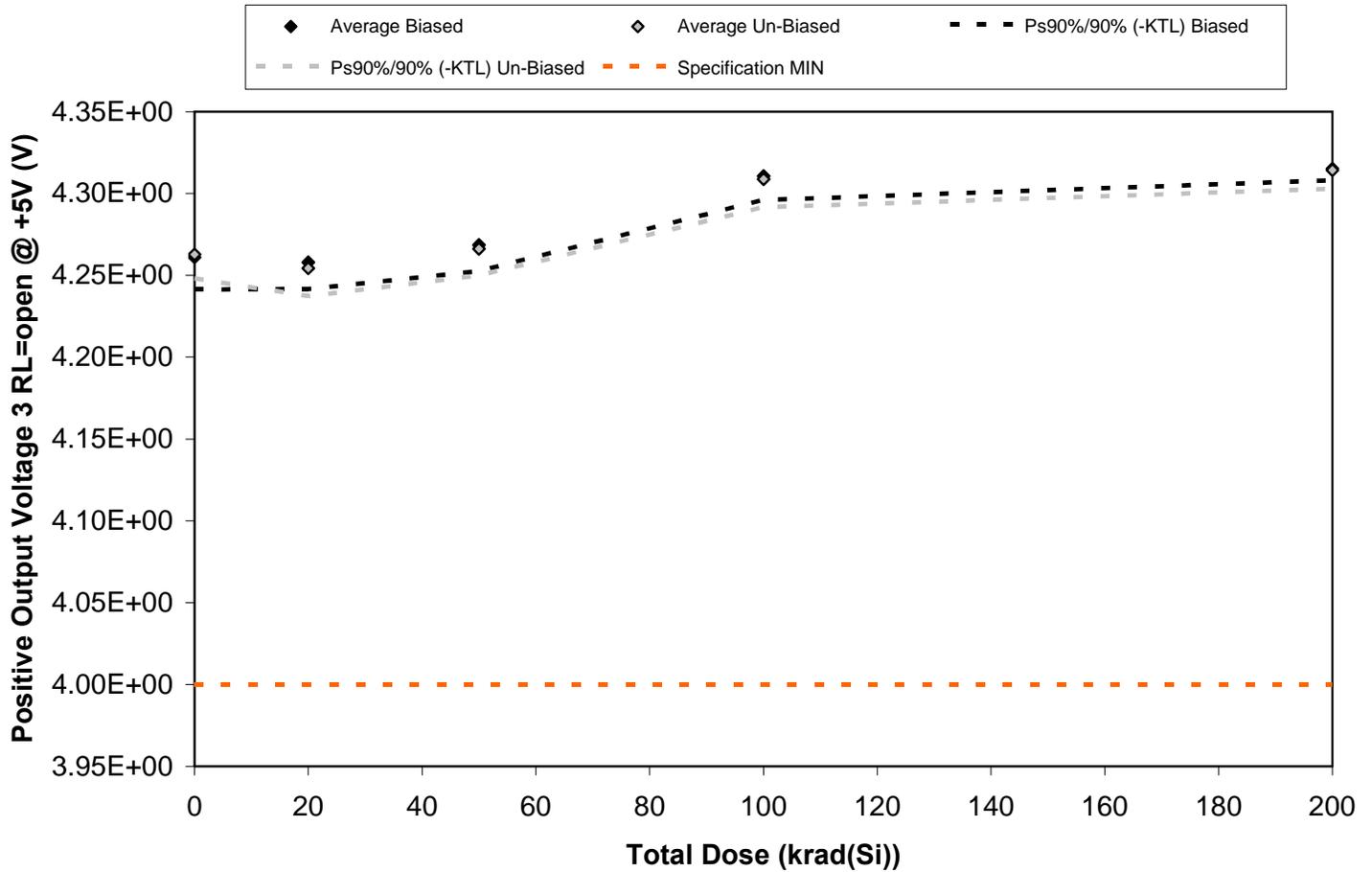


Figure 5.67. Plot of Positive Output Voltage 3 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.67. Raw data for Positive Output Voltage 3 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 3 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	4.27E+00	4.27E+00	4.27E+00	4.32E+00	4.32E+00
1116	4.25E+00	4.25E+00	4.26E+00	4.31E+00	4.31E+00
1117	4.26E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
1118	4.26E+00	4.25E+00	4.26E+00	4.31E+00	4.31E+00
1119	4.27E+00	4.26E+00	4.28E+00	4.32E+00	4.32E+00
1120	4.26E+00	4.25E+00	4.27E+00	4.30E+00	4.32E+00
1121	4.27E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
1122	4.26E+00	4.24E+00	4.26E+00	4.30E+00	4.31E+00
1123	4.26E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
1124	4.26E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
1125	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
1126	4.26E+00	4.26E+00	4.26E+00	4.26E+00	4.26E+00
Biased Statistics					
Average Biased	4.26E+00	4.26E+00	4.27E+00	4.31E+00	4.32E+00
Std Dev Biased	7.18E-03	5.96E-03	5.86E-03	5.32E-03	2.59E-03
Ps90%/90% (+KTL) Biased	4.28E+00	4.27E+00	4.28E+00	4.33E+00	4.32E+00
Ps90%/90% (-KTL) Biased	4.24E+00	4.24E+00	4.25E+00	4.30E+00	4.31E+00
Un-Biased Statistics					
Average Un-Biased	4.26E+00	4.25E+00	4.27E+00	4.31E+00	4.31E+00
Std Dev Un-Biased	5.36E-03	6.23E-03	5.93E-03	6.30E-03	4.09E-03
Ps90%/90% (+KTL) Un-Biased	4.28E+00	4.27E+00	4.28E+00	4.33E+00	4.33E+00
Ps90%/90% (-KTL) Un-Biased	4.25E+00	4.24E+00	4.25E+00	4.29E+00	4.30E+00
Specification MIN	4.00E+00	4.00E+00	4.00E+00	4.00E+00	4.00E+00
Status	PASS	PASS	PASS	PASS	PASS

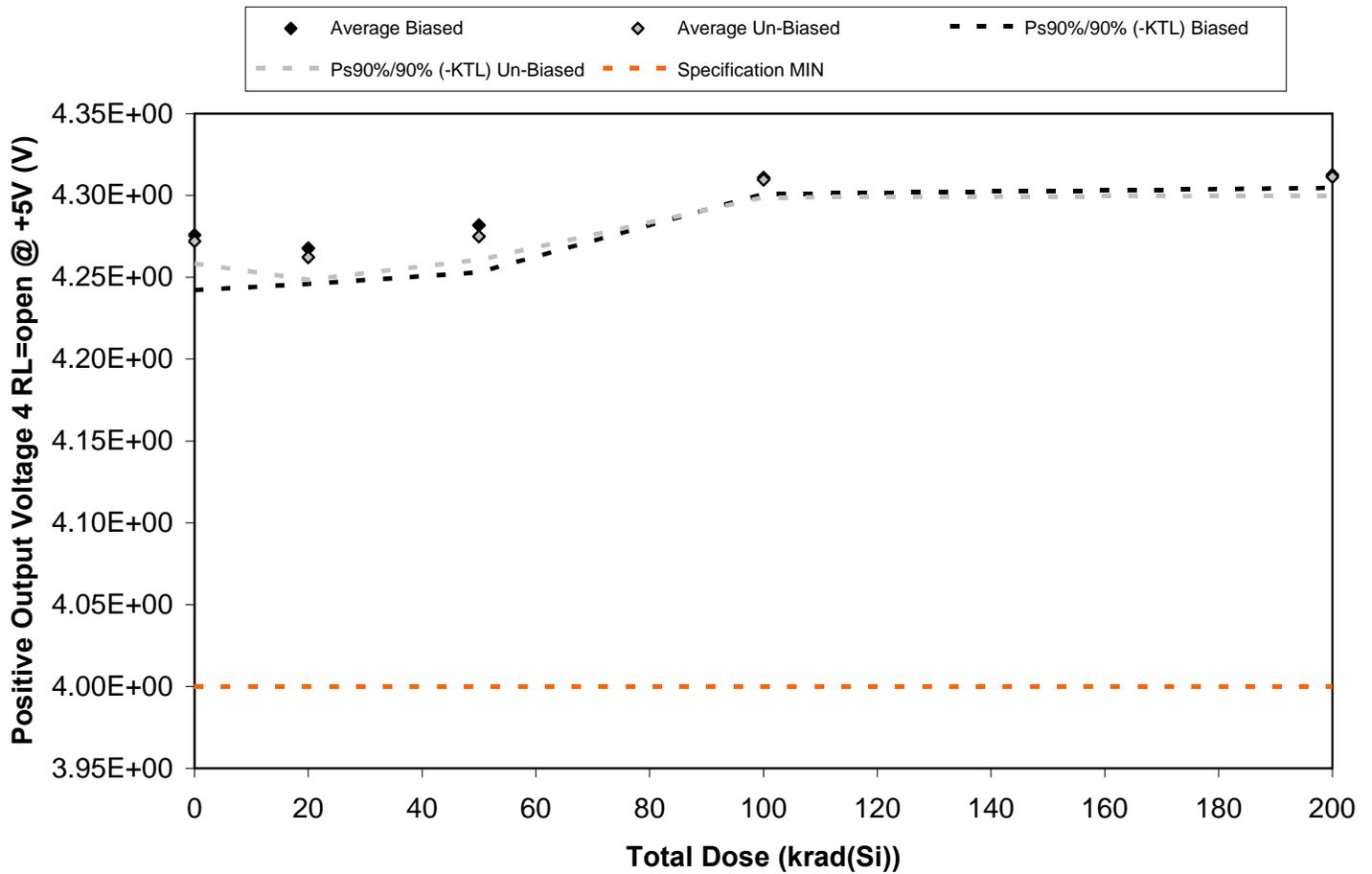


Figure 5.68. Plot of Positive Output Voltage 4 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.68. Raw data for Positive Output Voltage 4 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 4 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	4.29E+00	4.28E+00	4.29E+00	4.31E+00	4.32E+00
1116	4.26E+00	4.26E+00	4.27E+00	4.31E+00	4.31E+00
1117	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1118	4.27E+00	4.26E+00	4.27E+00	4.31E+00	4.31E+00
1119	4.28E+00	4.27E+00	4.29E+00	4.32E+00	4.32E+00
1120	4.27E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
1121	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.32E+00
1122	4.27E+00	4.26E+00	4.27E+00	4.31E+00	4.31E+00
1123	4.27E+00	4.26E+00	4.27E+00	4.31E+00	4.31E+00
1124	4.27E+00	4.26E+00	4.28E+00	4.31E+00	4.31E+00
1125	4.28E+00	4.28E+00	4.28E+00	4.28E+00	4.28E+00
1126	4.27E+00	4.27E+00	4.27E+00	4.28E+00	4.27E+00
Biased Statistics					
Average Biased	4.28E+00	4.27E+00	4.28E+00	4.31E+00	4.31E+00
Std Dev Biased	1.23E-02	7.95E-03	1.05E-02	3.63E-03	2.88E-03
Ps90%/90% (+KTL) Biased	4.31E+00	4.29E+00	4.31E+00	4.32E+00	4.32E+00
Ps90%/90% (-KTL) Biased	4.24E+00	4.25E+00	4.25E+00	4.30E+00	4.30E+00
Un-Biased Statistics					
Average Un-Biased	4.27E+00	4.26E+00	4.28E+00	4.31E+00	4.31E+00
Std Dev Un-Biased	4.95E-03	4.97E-03	5.20E-03	3.91E-03	4.22E-03
Ps90%/90% (+KTL) Un-Biased	4.29E+00	4.28E+00	4.29E+00	4.32E+00	4.32E+00
Ps90%/90% (-KTL) Un-Biased	4.26E+00	4.25E+00	4.26E+00	4.30E+00	4.30E+00
Specification MIN	4.00E+00	4.00E+00	4.00E+00	4.00E+00	4.00E+00
Status	PASS	PASS	PASS	PASS	PASS

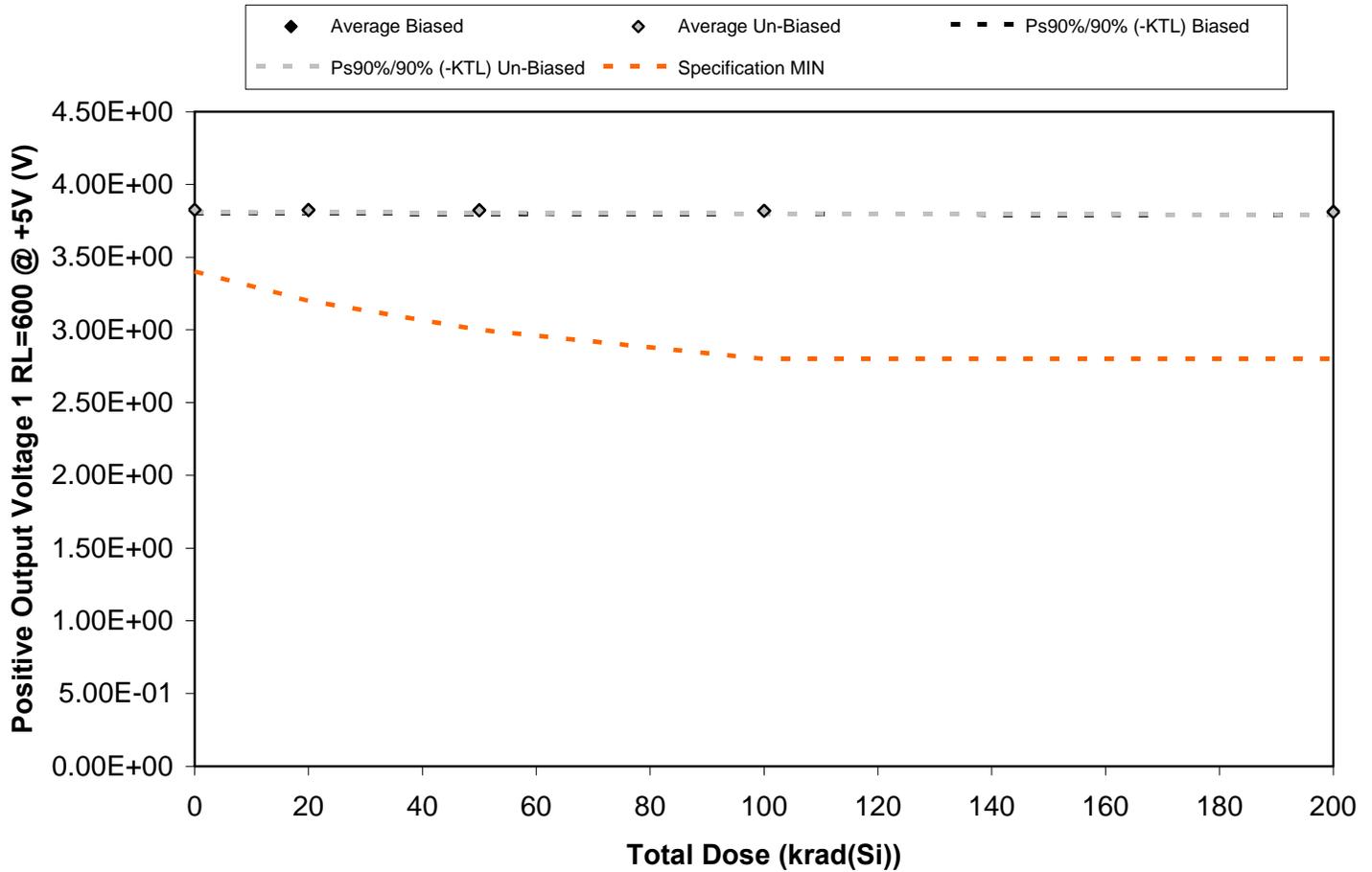


Figure 5.69. Plot of Positive Output Voltage 1 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.69. Raw data for Positive Output Voltage 1 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 1 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
1116	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1117	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
1118	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1119	3.84E+00	3.84E+00	3.84E+00	3.83E+00	3.83E+00
1120	3.83E+00	3.83E+00	3.82E+00	3.82E+00	3.81E+00
1121	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
1122	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.80E+00
1123	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.80E+00
1124	3.83E+00	3.83E+00	3.82E+00	3.82E+00	3.81E+00
1125	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.83E+00
1126	3.84E+00	3.84E+00	3.84E+00	3.84E+00	3.84E+00
Biased Statistics					
Average Biased	3.83E+00	3.83E+00	3.82E+00	3.82E+00	3.81E+00
Std Dev Biased	8.17E-03	8.90E-03	8.41E-03	8.46E-03	9.18E-03
Ps90%/90% (+KTL) Biased	3.85E+00	3.85E+00	3.85E+00	3.84E+00	3.84E+00
Ps90%/90% (-KTL) Biased	3.80E+00	3.80E+00	3.80E+00	3.80E+00	3.79E+00
Un-Biased Statistics					
Average Un-Biased	3.83E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
Std Dev Un-Biased	6.08E-03	5.73E-03	5.41E-03	6.07E-03	6.88E-03
Ps90%/90% (+KTL) Un-Biased	3.84E+00	3.84E+00	3.84E+00	3.83E+00	3.83E+00
Ps90%/90% (-KTL) Un-Biased	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.79E+00
Specification MIN	3.40E+00	3.20E+00	3.00E+00	2.80E+00	2.80E+00
Status	PASS	PASS	PASS	PASS	PASS

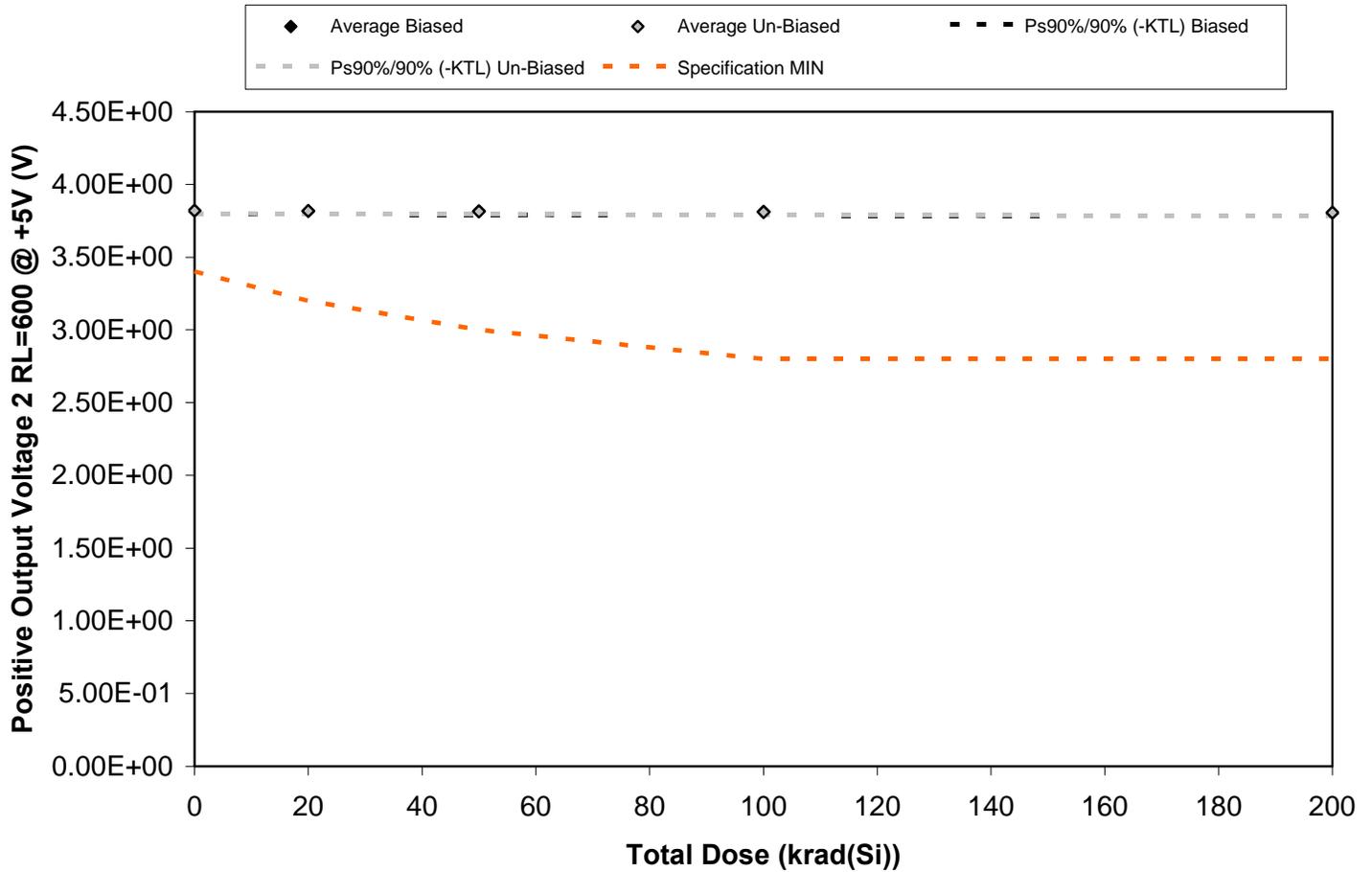


Figure 5.70. Plot of Positive Output Voltage 2 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.70. Raw data for Positive Output Voltage 2 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 2 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.83E+00	3.83E+00	3.82E+00	3.82E+00	3.81E+00
1116	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.80E+00
1117	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
1118	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.80E+00
1119	3.83E+00	3.83E+00	3.82E+00	3.82E+00	3.82E+00
1120	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1121	3.83E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
1122	3.81E+00	3.81E+00	3.80E+00	3.80E+00	3.79E+00
1123	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
1124	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1125	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00
1126	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00
Biased Statistics					
Average Biased	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
Std Dev Biased	8.35E-03	8.56E-03	8.35E-03	8.88E-03	9.48E-03
Ps90%/90% (+KTL) Biased	3.84E+00	3.84E+00	3.84E+00	3.84E+00	3.83E+00
Ps90%/90% (-KTL) Biased	3.80E+00	3.79E+00	3.79E+00	3.79E+00	3.78E+00
Un-Biased Statistics					
Average Un-Biased	3.82E+00	3.82E+00	3.81E+00	3.81E+00	3.81E+00
Std Dev Un-Biased	6.76E-03	6.53E-03	6.77E-03	7.52E-03	7.60E-03
Ps90%/90% (+KTL) Un-Biased	3.84E+00	3.84E+00	3.83E+00	3.83E+00	3.83E+00
Ps90%/90% (-KTL) Un-Biased	3.80E+00	3.80E+00	3.80E+00	3.79E+00	3.79E+00
Specification MIN	3.40E+00	3.20E+00	3.00E+00	2.80E+00	2.80E+00
Status	PASS	PASS	PASS	PASS	PASS

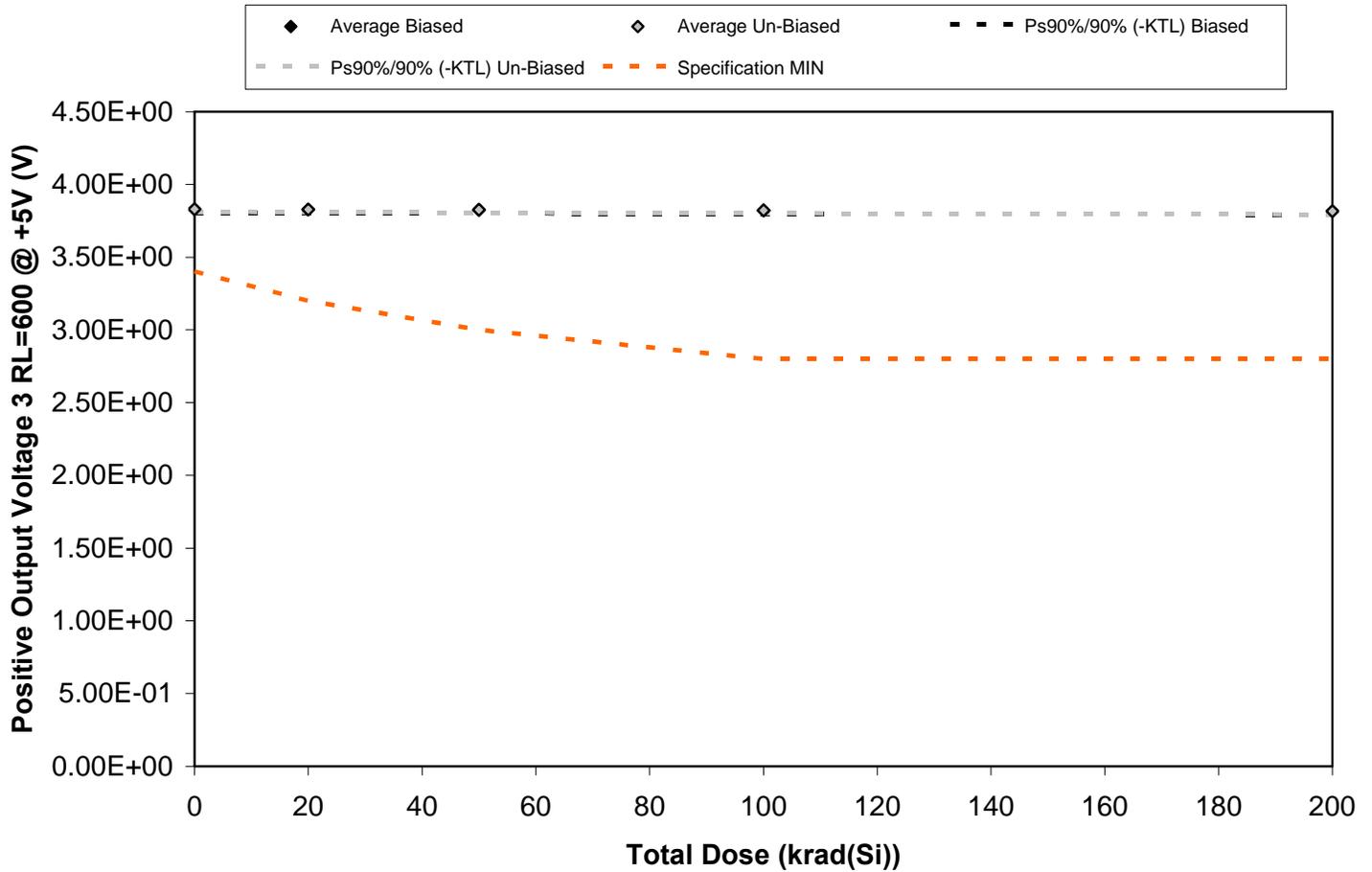


Figure 5.71. Plot of Positive Output Voltage 3 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.71. Raw data for Positive Output Voltage 3 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 3 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.84E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
1116	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1117	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
1118	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1119	3.84E+00	3.84E+00	3.83E+00	3.83E+00	3.82E+00
1120	3.83E+00	3.83E+00	3.83E+00	3.82E+00	3.82E+00
1121	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
1122	3.82E+00	3.82E+00	3.81E+00	3.81E+00	3.80E+00
1123	3.83E+00	3.83E+00	3.83E+00	3.82E+00	3.82E+00
1124	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
1125	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.83E+00
1126	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.83E+00
Biased Statistics					
Average Biased	3.83E+00	3.83E+00	3.82E+00	3.82E+00	3.82E+00
Std Dev Biased	7.83E-03	7.56E-03	7.89E-03	8.46E-03	8.67E-03
Ps90%/90% (+KTL) Biased	3.85E+00	3.85E+00	3.85E+00	3.85E+00	3.84E+00
Ps90%/90% (-KTL) Biased	3.81E+00	3.81E+00	3.80E+00	3.80E+00	3.79E+00
Un-Biased Statistics					
Average Un-Biased	3.83E+00	3.83E+00	3.83E+00	3.82E+00	3.82E+00
Std Dev Un-Biased	6.19E-03	6.11E-03	7.04E-03	7.13E-03	8.26E-03
Ps90%/90% (+KTL) Un-Biased	3.85E+00	3.84E+00	3.84E+00	3.84E+00	3.84E+00
Ps90%/90% (-KTL) Un-Biased	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.79E+00
Specification MIN	3.40E+00	3.20E+00	3.00E+00	2.80E+00	2.80E+00
Status	PASS	PASS	PASS	PASS	PASS

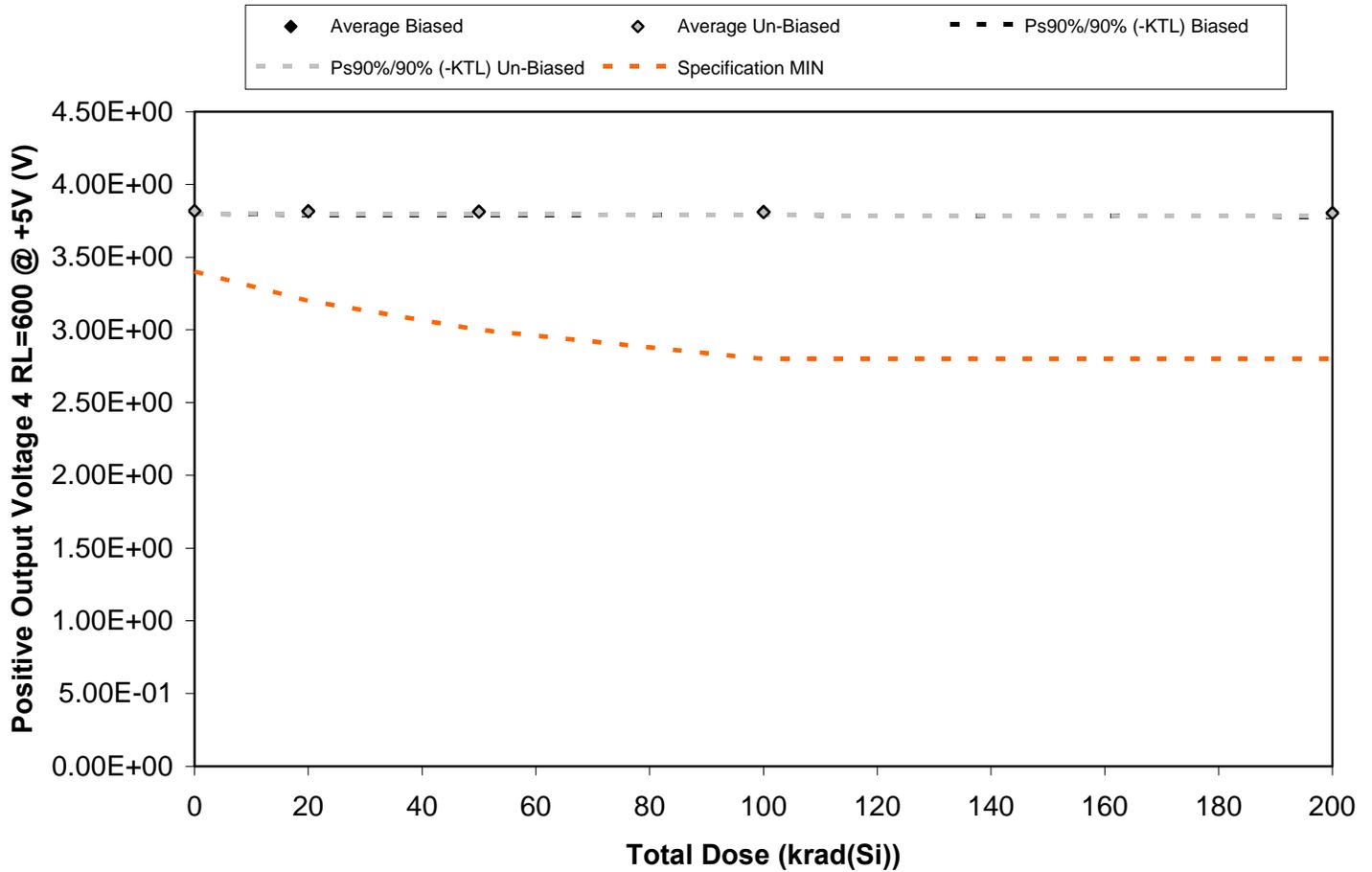


Figure 5.72. Plot of Positive Output Voltage 4 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.72. Raw data for Positive Output Voltage 4 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Positive Output Voltage 4 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
1116	3.81E+00	3.81E+00	3.81E+00	3.81E+00	3.80E+00
1117	3.82E+00	3.82E+00	3.81E+00	3.81E+00	3.80E+00
1118	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.80E+00
1119	3.83E+00	3.83E+00	3.83E+00	3.82E+00	3.82E+00
1120	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1121	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.81E+00
1122	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.79E+00
1123	3.81E+00	3.81E+00	3.81E+00	3.80E+00	3.80E+00
1124	3.82E+00	3.82E+00	3.82E+00	3.81E+00	3.81E+00
1125	3.82E+00	3.82E+00	3.82E+00	3.82E+00	3.82E+00
1126	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.83E+00
Biased Statistics					
Average Biased	3.82E+00	3.82E+00	3.81E+00	3.81E+00	3.81E+00
Std Dev Biased	7.73E-03	8.64E-03	8.23E-03	8.44E-03	9.47E-03
Ps90%/90% (+KTL) Biased	3.84E+00	3.84E+00	3.84E+00	3.83E+00	3.83E+00
Ps90%/90% (-KTL) Biased	3.80E+00	3.79E+00	3.79E+00	3.79E+00	3.78E+00
Un-Biased Statistics					
Average Un-Biased	3.82E+00	3.81E+00	3.81E+00	3.81E+00	3.80E+00
Std Dev Un-Biased	5.79E-03	6.06E-03	5.93E-03	7.40E-03	7.28E-03
Ps90%/90% (+KTL) Un-Biased	3.83E+00	3.83E+00	3.83E+00	3.83E+00	3.82E+00
Ps90%/90% (-KTL) Un-Biased	3.80E+00	3.80E+00	3.80E+00	3.79E+00	3.78E+00
Specification MIN	3.40E+00	3.20E+00	3.00E+00	2.80E+00	2.80E+00
Status	PASS	PASS	PASS	PASS	PASS

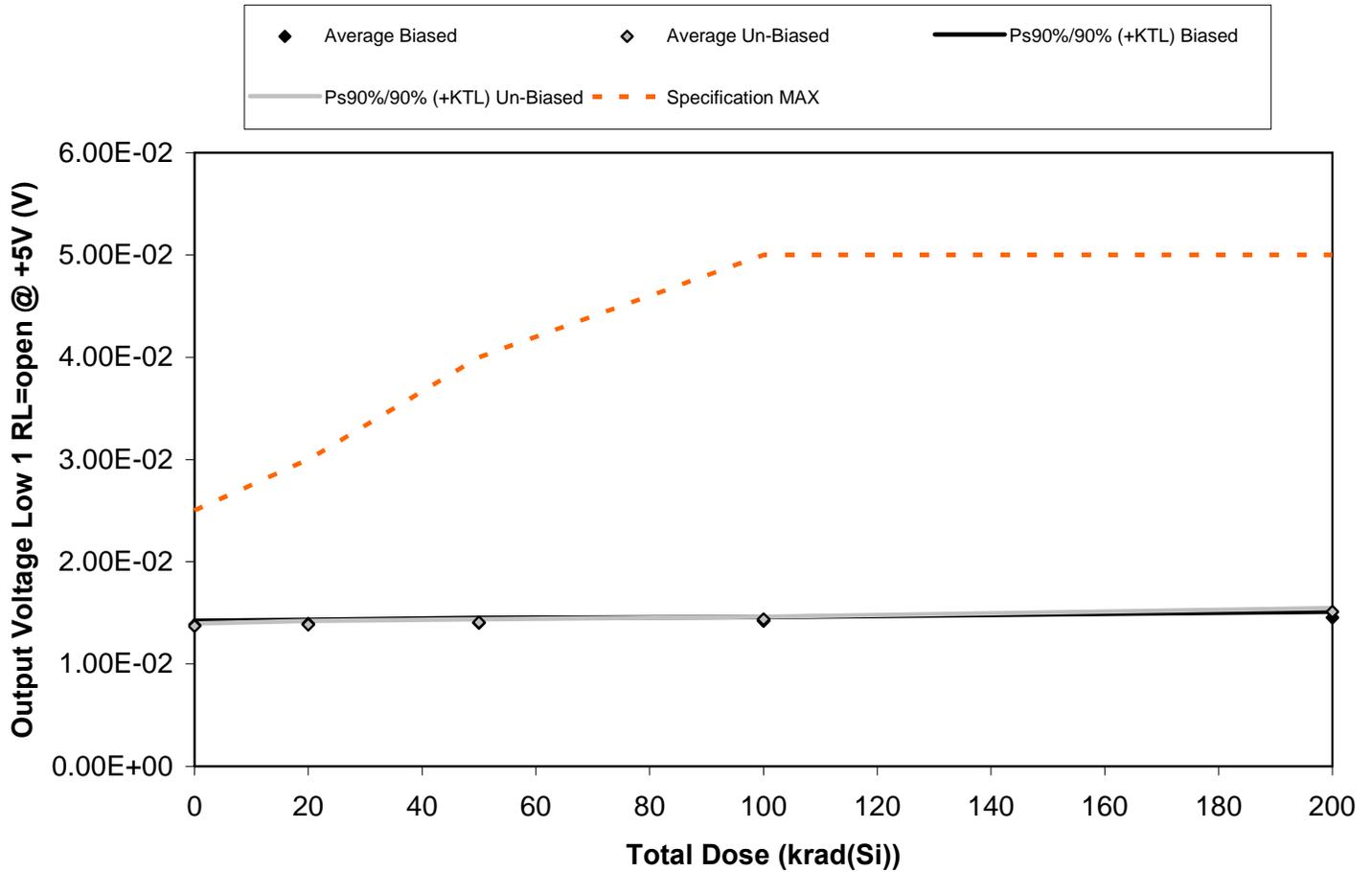


Figure 5.73. Plot of Output Voltage Low 1 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.73. Raw data for Output Voltage Low 1 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 1 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.40E-02	1.40E-02	1.42E-02	1.44E-02	1.47E-02
1116	1.36E-02	1.38E-02	1.40E-02	1.42E-02	1.45E-02
1117	1.38E-02	1.40E-02	1.39E-02	1.42E-02	1.43E-02
1118	1.37E-02	1.38E-02	1.38E-02	1.40E-02	1.44E-02
1119	1.39E-02	1.41E-02	1.42E-02	1.42E-02	1.48E-02
1120	1.38E-02	1.39E-02	1.40E-02	1.44E-02	1.50E-02
1121	1.38E-02	1.40E-02	1.42E-02	1.45E-02	1.53E-02
1122	1.37E-02	1.37E-02	1.40E-02	1.43E-02	1.52E-02
1123	1.36E-02	1.39E-02	1.40E-02	1.43E-02	1.50E-02
1124	1.37E-02	1.37E-02	1.42E-02	1.44E-02	1.51E-02
1125	1.38E-02	1.40E-02	1.39E-02	1.39E-02	1.39E-02
1126	1.40E-02	1.40E-02	1.40E-02	1.41E-02	1.40E-02
Biased Statistics					
Average Biased	1.38E-02	1.39E-02	1.40E-02	1.42E-02	1.45E-02
Std Dev Biased	1.58E-04	1.34E-04	1.79E-04	1.41E-04	2.07E-04
Ps90%/90% (+KTL) Biased	1.42E-02	1.43E-02	1.45E-02	1.46E-02	1.51E-02
Ps90%/90% (-KTL) Biased	1.34E-02	1.36E-02	1.35E-02	1.38E-02	1.40E-02
Un-Biased Statistics					
Average Un-Biased	1.37E-02	1.38E-02	1.41E-02	1.44E-02	1.51E-02
Std Dev Un-Biased	8.37E-05	1.34E-04	1.10E-04	8.37E-05	1.30E-04
Ps90%/90% (+KTL) Un-Biased	1.39E-02	1.42E-02	1.44E-02	1.46E-02	1.55E-02
Ps90%/90% (-KTL) Un-Biased	1.35E-02	1.35E-02	1.38E-02	1.42E-02	1.48E-02
Specification MAX	2.50E-02	3.00E-02	4.00E-02	5.00E-02	5.00E-02
Status	PASS	PASS	PASS	PASS	PASS

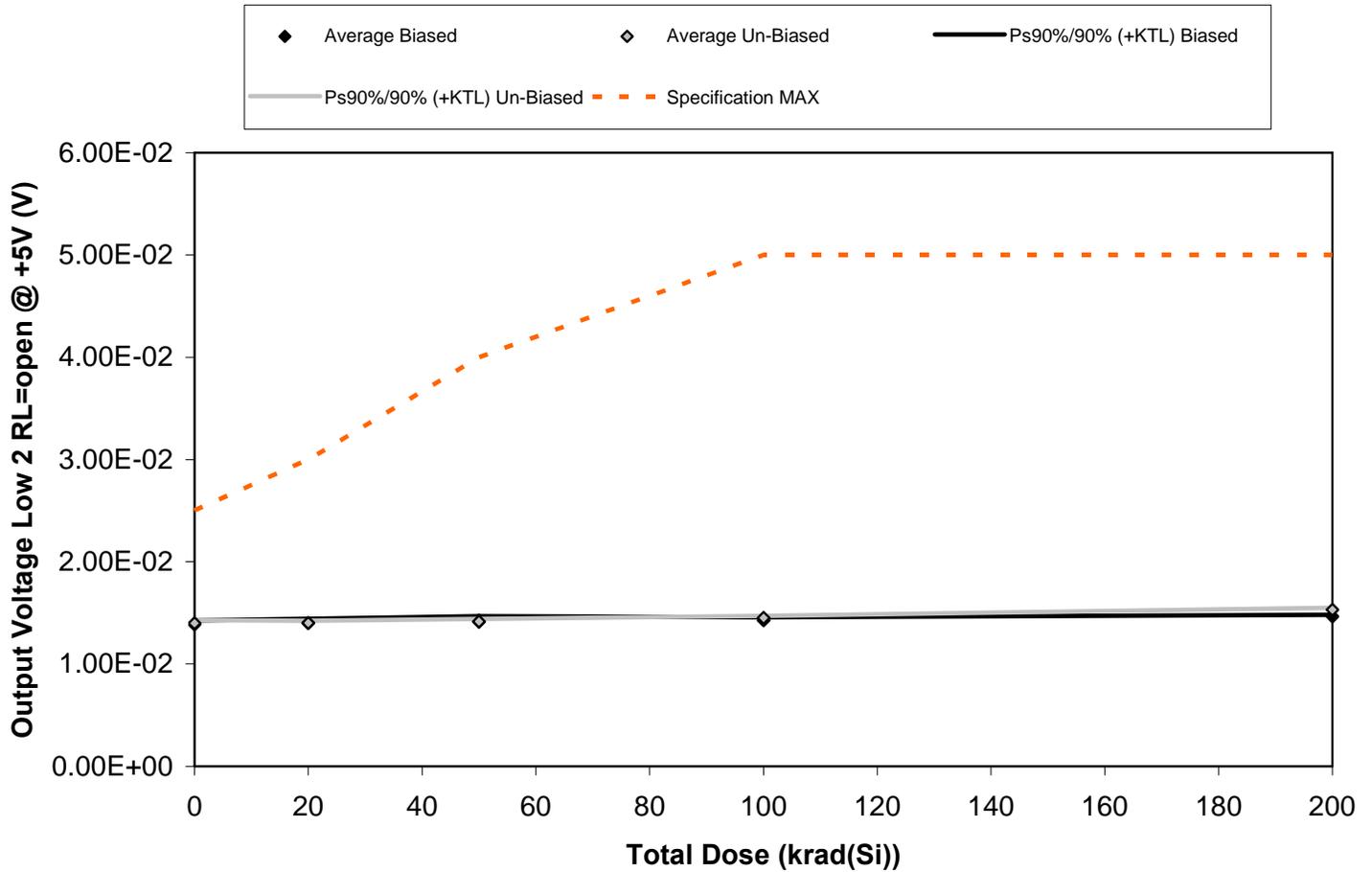


Figure 5.74. Plot of Output Voltage Low 2 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.74. Raw data for Output Voltage Low 2 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 2 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.41E-02	1.41E-02	1.44E-02	1.43E-02	1.47E-02
1116	1.38E-02	1.39E-02	1.40E-02	1.41E-02	1.46E-02
1117	1.38E-02	1.40E-02	1.42E-02	1.43E-02	1.46E-02
1118	1.37E-02	1.38E-02	1.39E-02	1.42E-02	1.47E-02
1119	1.39E-02	1.42E-02	1.42E-02	1.44E-02	1.47E-02
1120	1.41E-02	1.41E-02	1.43E-02	1.45E-02	1.52E-02
1121	1.40E-02	1.41E-02	1.42E-02	1.46E-02	1.53E-02
1122	1.40E-02	1.39E-02	1.41E-02	1.45E-02	1.54E-02
1123	1.38E-02	1.40E-02	1.41E-02	1.44E-02	1.53E-02
1124	1.40E-02	1.40E-02	1.41E-02	1.45E-02	1.53E-02
1125	1.39E-02	1.41E-02	1.40E-02	1.39E-02	1.38E-02
1126	1.38E-02	1.39E-02	1.38E-02	1.39E-02	1.39E-02
Biased Statistics					
Average Biased	1.39E-02	1.40E-02	1.41E-02	1.43E-02	1.47E-02
Std Dev Biased	1.52E-04	1.58E-04	1.95E-04	1.14E-04	5.48E-05
Ps90%/90% (+KTL) Biased	1.43E-02	1.44E-02	1.47E-02	1.46E-02	1.48E-02
Ps90%/90% (-KTL) Biased	1.34E-02	1.36E-02	1.36E-02	1.39E-02	1.45E-02
Un-Biased Statistics					
Average Un-Biased	1.40E-02	1.40E-02	1.42E-02	1.45E-02	1.53E-02
Std Dev Un-Biased	1.10E-04	8.37E-05	8.94E-05	7.07E-05	7.07E-05
Ps90%/90% (+KTL) Un-Biased	1.43E-02	1.42E-02	1.44E-02	1.47E-02	1.55E-02
Ps90%/90% (-KTL) Un-Biased	1.37E-02	1.38E-02	1.39E-02	1.43E-02	1.51E-02
Specification MAX	2.50E-02	3.00E-02	4.00E-02	5.00E-02	5.00E-02
Status	PASS	PASS	PASS	PASS	PASS

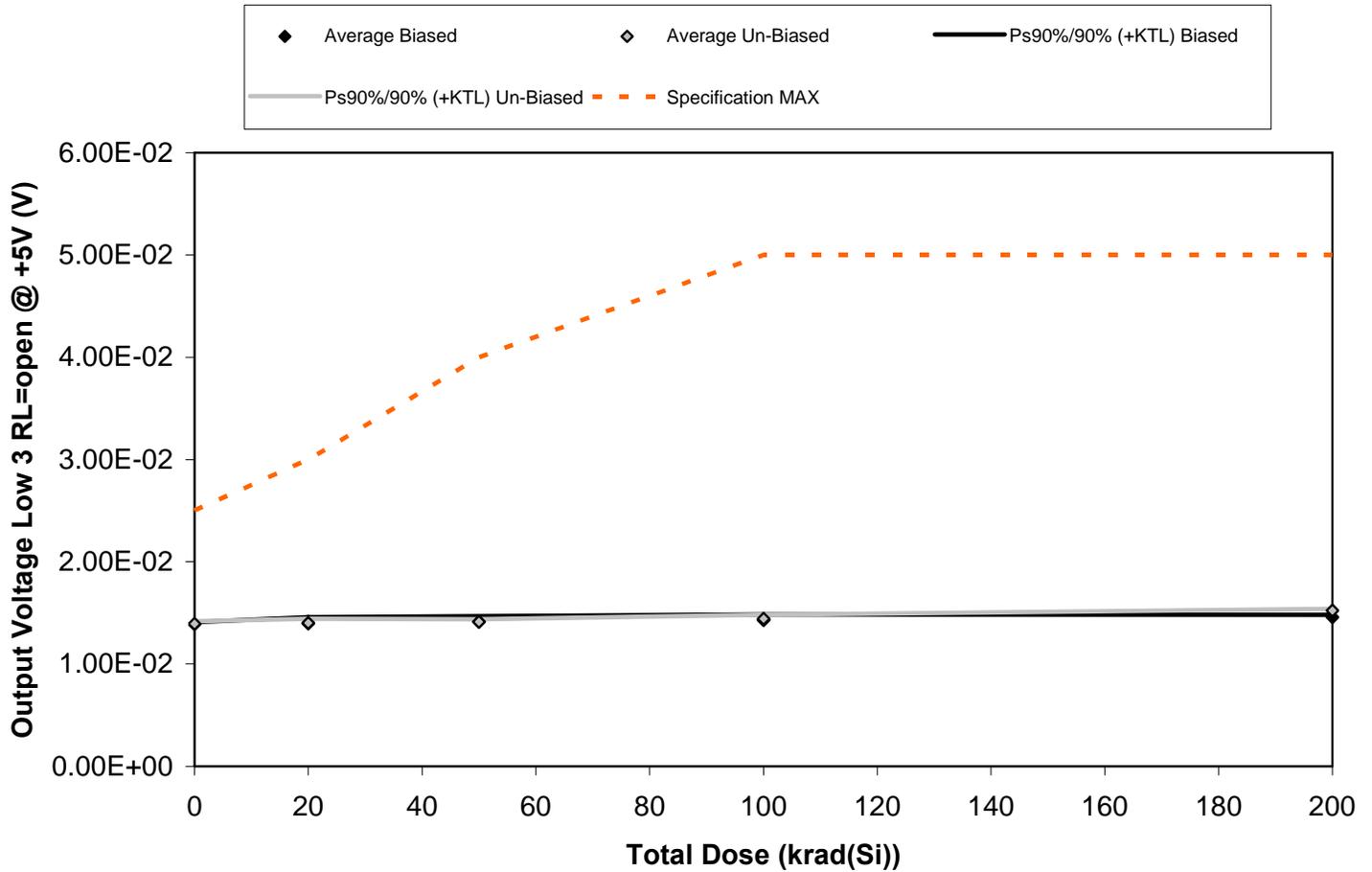


Figure 5.75. Plot of Output Voltage Low 3 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.75. Raw data for Output Voltage Low 3 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 3 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.39E-02	1.43E-02	1.43E-02	1.45E-02	1.47E-02
1116	1.38E-02	1.37E-02	1.40E-02	1.41E-02	1.45E-02
1117	1.39E-02	1.39E-02	1.40E-02	1.43E-02	1.46E-02
1118	1.38E-02	1.39E-02	1.40E-02	1.41E-02	1.45E-02
1119	1.40E-02	1.40E-02	1.44E-02	1.45E-02	1.46E-02
1120	1.39E-02	1.41E-02	1.41E-02	1.44E-02	1.52E-02
1121	1.41E-02	1.42E-02	1.42E-02	1.46E-02	1.53E-02
1122	1.39E-02	1.38E-02	1.40E-02	1.42E-02	1.53E-02
1123	1.39E-02	1.40E-02	1.42E-02	1.44E-02	1.52E-02
1124	1.39E-02	1.40E-02	1.42E-02	1.45E-02	1.52E-02
1125	1.39E-02	1.39E-02	1.40E-02	1.39E-02	1.39E-02
1126	1.38E-02	1.39E-02	1.40E-02	1.38E-02	1.38E-02
Biased Statistics					
Average Biased	1.39E-02	1.40E-02	1.41E-02	1.43E-02	1.46E-02
Std Dev Biased	8.37E-05	2.19E-04	1.95E-04	2.00E-04	8.37E-05
Ps90%/90% (+KTL) Biased	1.41E-02	1.46E-02	1.47E-02	1.48E-02	1.48E-02
Ps90%/90% (-KTL) Biased	1.37E-02	1.34E-02	1.36E-02	1.38E-02	1.44E-02
Un-Biased Statistics					
Average Un-Biased	1.39E-02	1.40E-02	1.41E-02	1.44E-02	1.52E-02
Std Dev Un-Biased	8.94E-05	1.48E-04	8.94E-05	1.48E-04	5.48E-05
Ps90%/90% (+KTL) Un-Biased	1.42E-02	1.44E-02	1.44E-02	1.48E-02	1.54E-02
Ps90%/90% (-KTL) Un-Biased	1.37E-02	1.36E-02	1.39E-02	1.40E-02	1.51E-02
Specification MAX	2.50E-02	3.00E-02	4.00E-02	5.00E-02	5.00E-02
Status	PASS	PASS	PASS	PASS	PASS

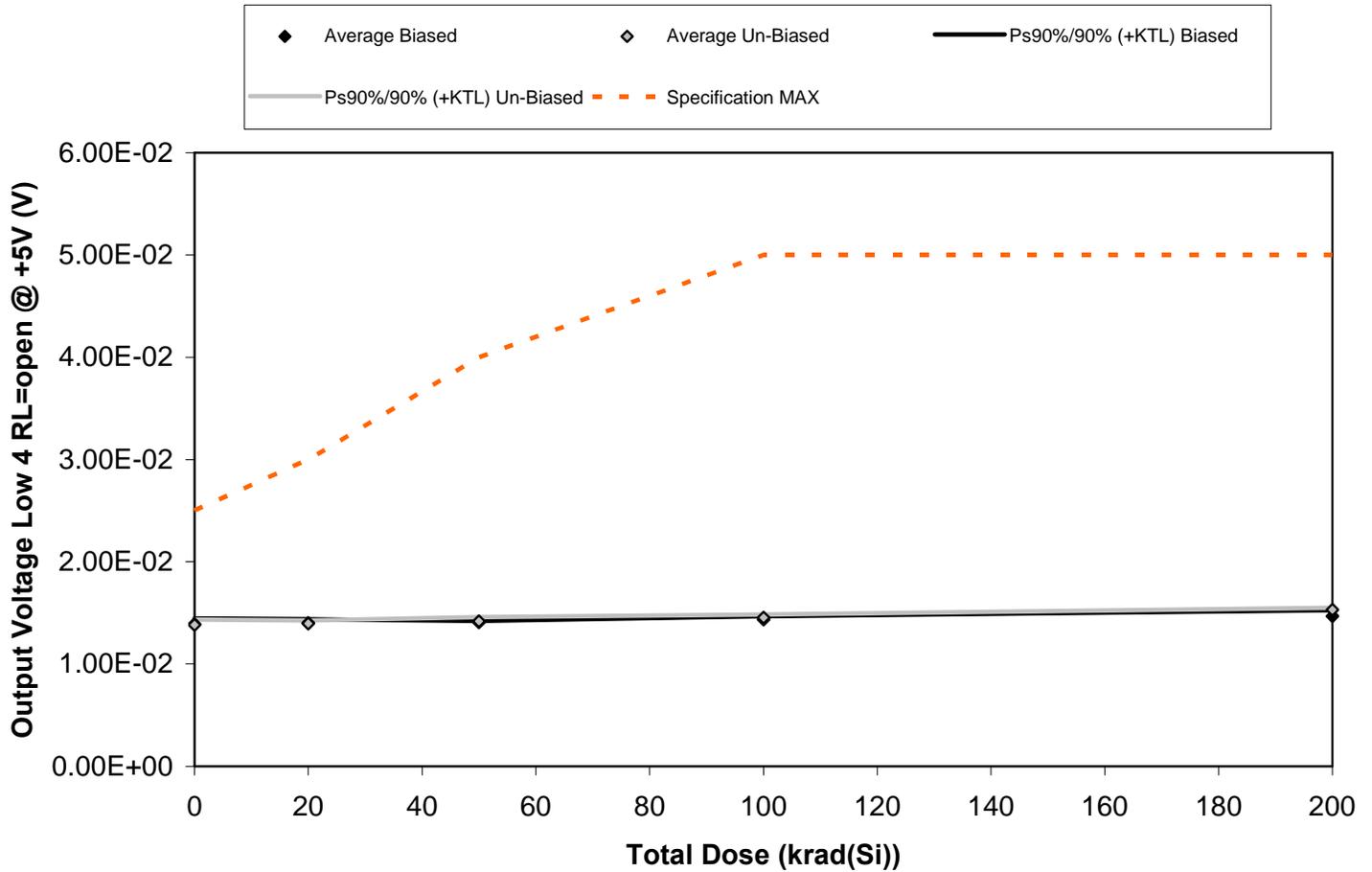


Figure 5.76. Plot of Output Voltage Low 4 RL=open @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.76. Raw data for Output Voltage Low 4 RL=open @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 4 RL=open @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	1.40E-02	1.42E-02	1.41E-02	1.45E-02	1.47E-02
1116	1.38E-02	1.39E-02	1.40E-02	1.44E-02	1.45E-02
1117	1.38E-02	1.39E-02	1.41E-02	1.43E-02	1.45E-02
1118	1.37E-02	1.40E-02	1.41E-02	1.42E-02	1.47E-02
1119	1.42E-02	1.41E-02	1.41E-02	1.44E-02	1.50E-02
1120	1.38E-02	1.40E-02	1.42E-02	1.45E-02	1.53E-02
1121	1.41E-02	1.41E-02	1.44E-02	1.47E-02	1.54E-02
1122	1.37E-02	1.38E-02	1.41E-02	1.45E-02	1.52E-02
1123	1.36E-02	1.39E-02	1.40E-02	1.44E-02	1.53E-02
1124	1.39E-02	1.40E-02	1.42E-02	1.46E-02	1.53E-02
1125	1.42E-02	1.41E-02	1.40E-02	1.40E-02	1.40E-02
1126	1.40E-02	1.42E-02	1.41E-02	1.40E-02	1.41E-02
Biased Statistics					
Average Biased	1.39E-02	1.40E-02	1.41E-02	1.44E-02	1.47E-02
Std Dev Biased	2.00E-04	1.30E-04	4.47E-05	1.14E-04	2.05E-04
Ps90%/90% (+KTL) Biased	1.44E-02	1.44E-02	1.42E-02	1.47E-02	1.52E-02
Ps90%/90% (-KTL) Biased	1.34E-02	1.37E-02	1.40E-02	1.40E-02	1.41E-02
Un-Biased Statistics					
Average Un-Biased	1.38E-02	1.40E-02	1.42E-02	1.45E-02	1.53E-02
Std Dev Un-Biased	1.92E-04	1.14E-04	1.48E-04	1.14E-04	7.07E-05
Ps90%/90% (+KTL) Un-Biased	1.43E-02	1.43E-02	1.46E-02	1.49E-02	1.55E-02
Ps90%/90% (-KTL) Un-Biased	1.33E-02	1.36E-02	1.38E-02	1.42E-02	1.51E-02
Specification MAX	2.50E-02	3.00E-02	4.00E-02	5.00E-02	5.00E-02
Status	PASS	PASS	PASS	PASS	PASS

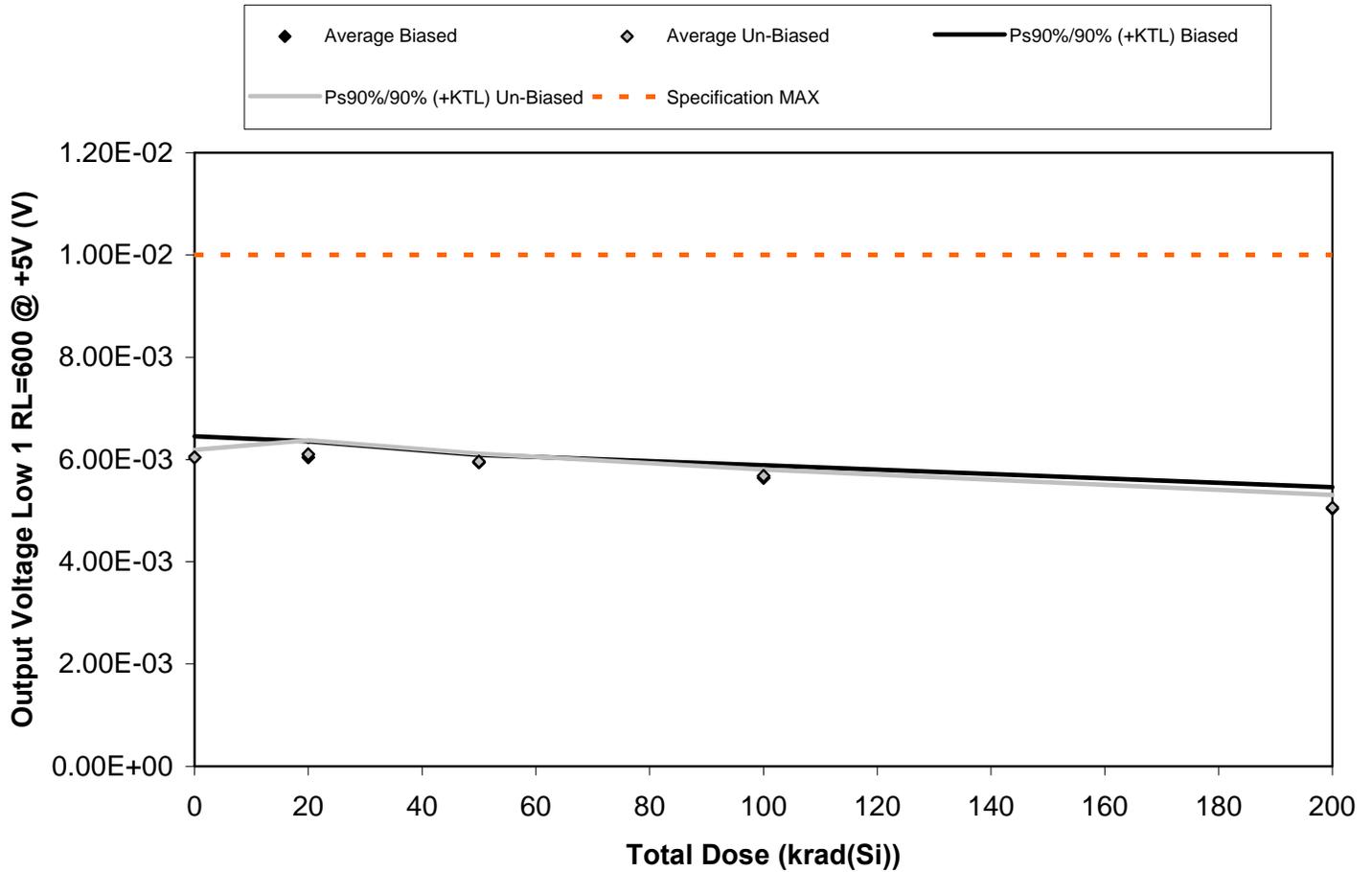


Figure 5.77. Plot of Output Voltage Low 1 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.77. Raw data for Output Voltage Low 1 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 1 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	6.00E-03	6.10E-03	5.90E-03	5.60E-03	4.90E-03
1116	6.20E-03	6.00E-03	5.90E-03	5.70E-03	5.20E-03
1117	5.90E-03	5.90E-03	5.90E-03	5.50E-03	5.20E-03
1118	5.90E-03	6.00E-03	6.00E-03	5.70E-03	4.90E-03
1119	6.20E-03	6.20E-03	6.00E-03	5.70E-03	5.00E-03
1120	6.10E-03	6.20E-03	5.90E-03	5.60E-03	5.20E-03
1121	6.00E-03	6.00E-03	6.00E-03	5.70E-03	5.10E-03
1122	6.00E-03	6.10E-03	6.00E-03	5.70E-03	5.00E-03
1123	6.10E-03	6.00E-03	6.00E-03	5.70E-03	5.00E-03
1124	6.00E-03	6.20E-03	5.90E-03	5.70E-03	5.00E-03
1125	6.00E-03	5.80E-03	6.10E-03	6.00E-03	5.90E-03
1126	6.10E-03	6.10E-03	6.20E-03	6.10E-03	6.10E-03
Biased Statistics					
Average Biased	6.04E-03	6.04E-03	5.94E-03	5.64E-03	5.04E-03
Std Dev Biased	1.52E-04	1.14E-04	5.48E-05	8.94E-05	1.52E-04
Ps90%/90% (+KTL) Biased	6.46E-03	6.35E-03	6.09E-03	5.89E-03	5.46E-03
Ps90%/90% (-KTL) Biased	5.62E-03	5.73E-03	5.79E-03	5.39E-03	4.62E-03
Un-Biased Statistics					
Average Un-Biased	6.04E-03	6.10E-03	5.96E-03	5.68E-03	5.06E-03
Std Dev Un-Biased	5.48E-05	1.00E-04	5.48E-05	4.47E-05	8.94E-05
Ps90%/90% (+KTL) Un-Biased	6.19E-03	6.37E-03	6.11E-03	5.80E-03	5.31E-03
Ps90%/90% (-KTL) Un-Biased	5.89E-03	5.83E-03	5.81E-03	5.56E-03	4.81E-03
Specification MAX	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

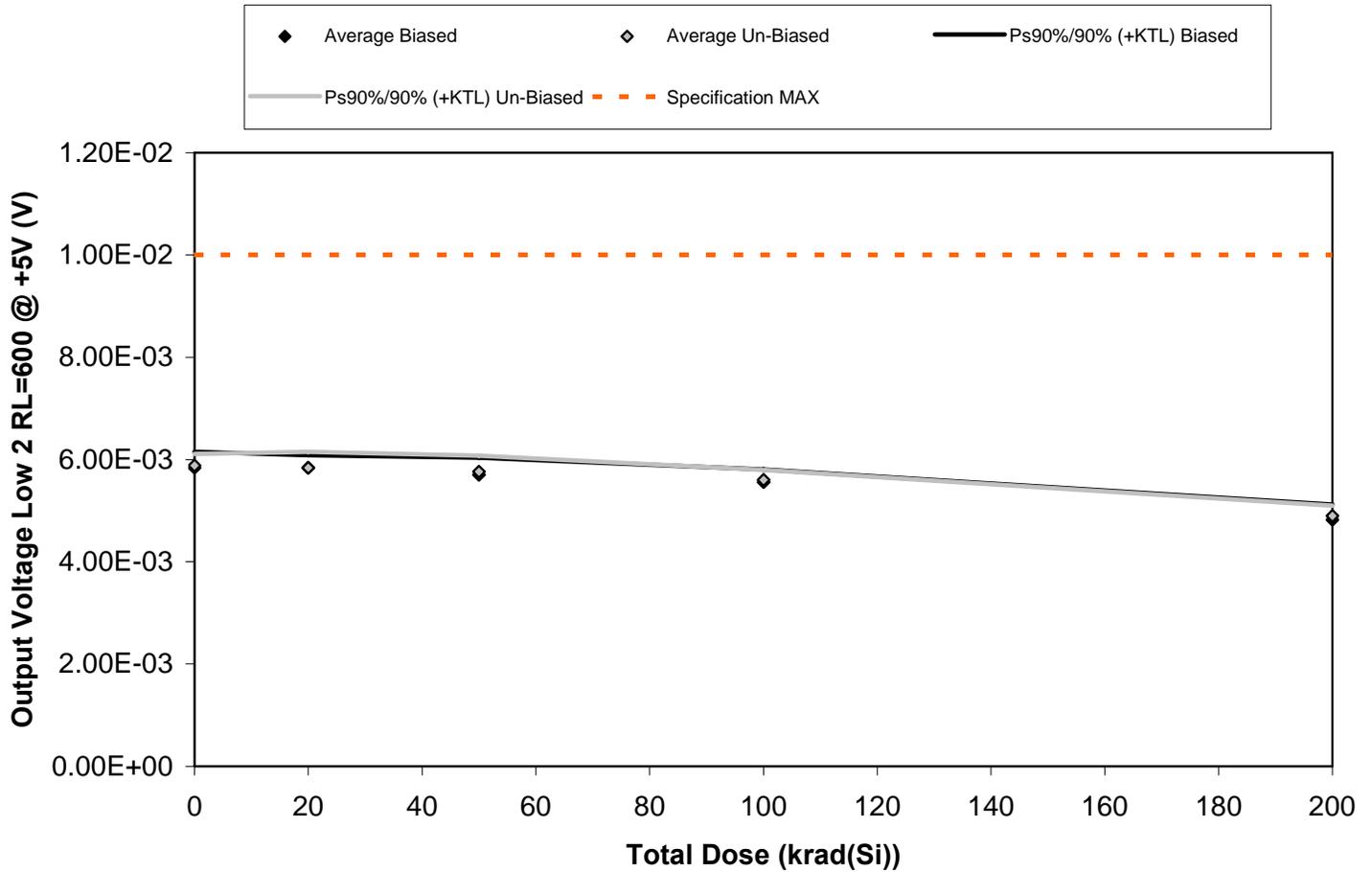


Figure 5.78. Plot of Output Voltage Low 2 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.78. Raw data for Output Voltage Low 2 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 2 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	5.80E-03	5.90E-03	5.80E-03	5.50E-03	4.80E-03
1116	5.90E-03	5.70E-03	5.70E-03	5.50E-03	4.80E-03
1117	5.80E-03	5.80E-03	5.70E-03	5.70E-03	5.00E-03
1118	5.70E-03	5.90E-03	5.50E-03	5.50E-03	4.70E-03
1119	6.00E-03	5.90E-03	5.80E-03	5.60E-03	4.80E-03
1120	5.90E-03	5.90E-03	5.60E-03	5.60E-03	4.90E-03
1121	5.80E-03	6.00E-03	5.80E-03	5.60E-03	4.90E-03
1122	5.80E-03	5.70E-03	5.70E-03	5.50E-03	4.80E-03
1123	5.90E-03	5.80E-03	5.80E-03	5.60E-03	5.00E-03
1124	6.00E-03	5.80E-03	5.90E-03	5.70E-03	4.90E-03
1125	5.90E-03	5.80E-03	5.80E-03	5.60E-03	5.80E-03
1126	5.80E-03	6.00E-03	6.00E-03	6.00E-03	5.70E-03
Biased Statistics					
Average Biased	5.84E-03	5.84E-03	5.70E-03	5.56E-03	4.82E-03
Std Dev Biased	1.14E-04	8.94E-05	1.22E-04	8.94E-05	1.10E-04
Ps90%/90% (+KTL) Biased	6.15E-03	6.09E-03	6.04E-03	5.81E-03	5.12E-03
Ps90%/90% (-KTL) Biased	5.53E-03	5.59E-03	5.36E-03	5.31E-03	4.52E-03
Un-Biased Statistics					
Average Un-Biased	5.88E-03	5.84E-03	5.76E-03	5.60E-03	4.90E-03
Std Dev Un-Biased	8.37E-05	1.14E-04	1.14E-04	7.07E-05	7.07E-05
Ps90%/90% (+KTL) Un-Biased	6.11E-03	6.15E-03	6.07E-03	5.79E-03	5.09E-03
Ps90%/90% (-KTL) Un-Biased	5.65E-03	5.53E-03	5.45E-03	5.41E-03	4.71E-03
Specification MAX	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

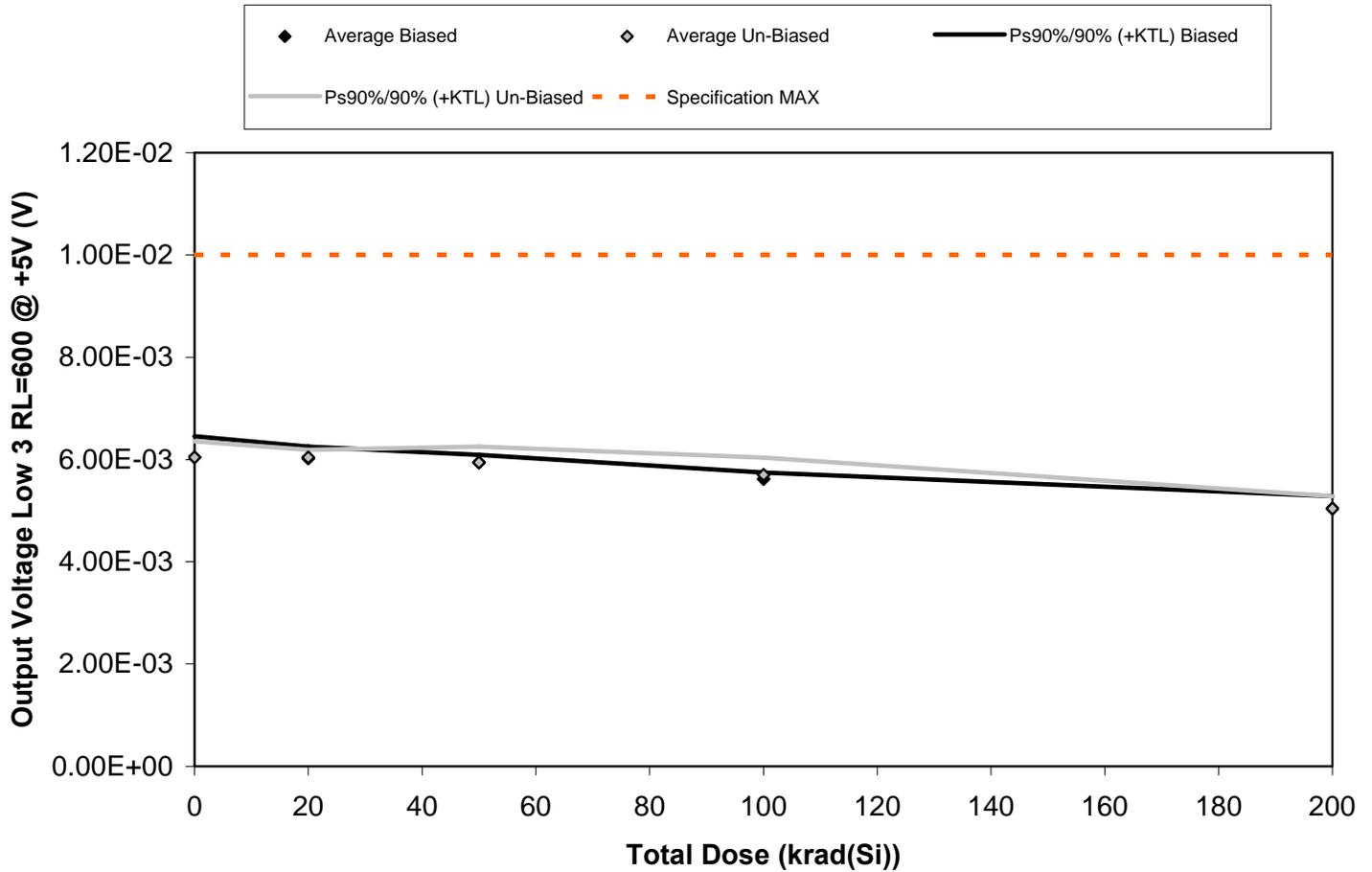


Figure 5.79. Plot of Output Voltage Low 3 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.79. Raw data for Output Voltage Low 3 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 3 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	6.00E-03	6.10E-03	5.90E-03	5.70E-03	4.90E-03
1116	5.80E-03	5.90E-03	5.90E-03	5.60E-03	5.00E-03
1117	6.10E-03	6.10E-03	6.00E-03	5.60E-03	5.10E-03
1118	6.10E-03	6.00E-03	5.90E-03	5.60E-03	5.10E-03
1119	6.20E-03	6.00E-03	6.00E-03	5.60E-03	5.10E-03
1120	5.90E-03	6.00E-03	6.00E-03	5.50E-03	5.10E-03
1121	6.00E-03	6.10E-03	5.90E-03	5.70E-03	5.00E-03
1122	6.00E-03	6.10E-03	6.10E-03	5.70E-03	4.90E-03
1123	6.20E-03	6.00E-03	5.80E-03	5.80E-03	5.10E-03
1124	6.10E-03	6.00E-03	5.90E-03	5.80E-03	5.10E-03
1125	6.10E-03	6.00E-03	6.00E-03	6.30E-03	6.00E-03
1126	6.30E-03	5.90E-03	6.20E-03	6.30E-03	6.30E-03
Biased Statistics					
Average Biased	6.04E-03	6.02E-03	5.94E-03	5.62E-03	5.04E-03
Std Dev Biased	1.52E-04	8.37E-05	5.48E-05	4.47E-05	8.94E-05
Ps90%/90% (+KTL) Biased	6.46E-03	6.25E-03	6.09E-03	5.74E-03	5.29E-03
Ps90%/90% (-KTL) Biased	5.62E-03	5.79E-03	5.79E-03	5.50E-03	4.79E-03
Un-Biased Statistics					
Average Un-Biased	6.04E-03	6.04E-03	5.94E-03	5.70E-03	5.04E-03
Std Dev Un-Biased	1.14E-04	5.48E-05	1.14E-04	1.22E-04	8.94E-05
Ps90%/90% (+KTL) Un-Biased	6.35E-03	6.19E-03	6.25E-03	6.04E-03	5.29E-03
Ps90%/90% (-KTL) Un-Biased	5.73E-03	5.89E-03	5.63E-03	5.36E-03	4.79E-03
Specification MAX	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

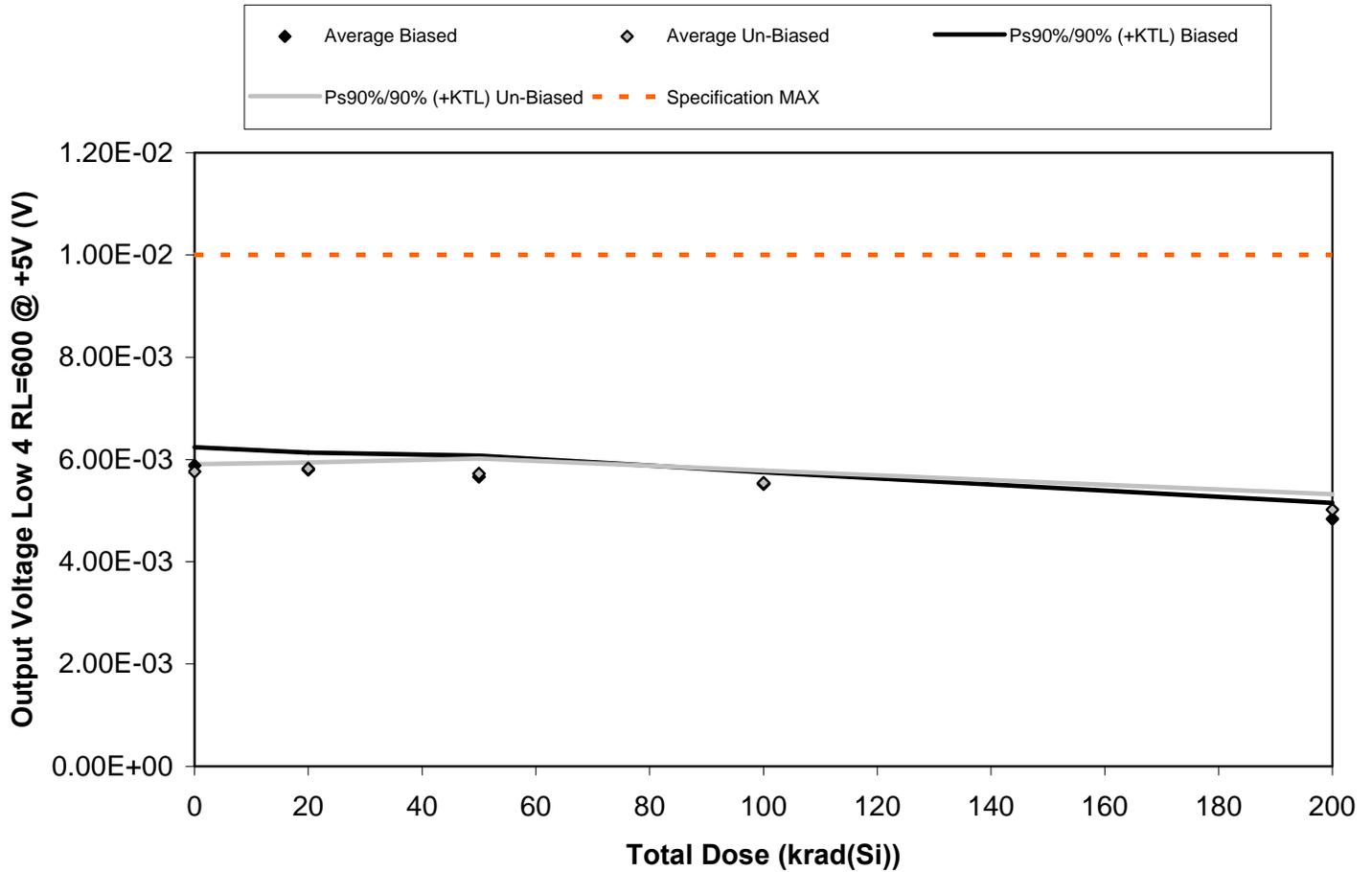


Figure 5.80. Plot of Output Voltage Low 4 RL=600 @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.80. Raw data for Output Voltage Low 4 RL=600 @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 4 RL=600 @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	5.80E-03	6.00E-03	5.90E-03	5.50E-03	4.70E-03
1116	5.80E-03	5.80E-03	5.60E-03	5.60E-03	4.90E-03
1117	5.80E-03	5.70E-03	5.50E-03	5.40E-03	5.00E-03
1118	5.90E-03	5.70E-03	5.60E-03	5.50E-03	4.80E-03
1119	6.10E-03	5.80E-03	5.70E-03	5.60E-03	4.80E-03
1120	5.70E-03	5.80E-03	5.90E-03	5.60E-03	5.00E-03
1121	5.70E-03	5.90E-03	5.70E-03	5.50E-03	4.90E-03
1122	5.80E-03	5.80E-03	5.70E-03	5.60E-03	5.00E-03
1123	5.80E-03	5.80E-03	5.60E-03	5.40E-03	5.20E-03
1124	5.80E-03	5.80E-03	5.70E-03	5.60E-03	5.00E-03
1125	5.70E-03	5.90E-03	5.90E-03	5.70E-03	5.70E-03
1126	5.90E-03	5.80E-03	6.00E-03	5.80E-03	5.70E-03
Biased Statistics					
Average Biased	5.88E-03	5.80E-03	5.66E-03	5.52E-03	4.84E-03
Std Dev Biased	1.30E-04	1.22E-04	1.52E-04	8.37E-05	1.14E-04
Ps90%/90% (+KTL) Biased	6.24E-03	6.14E-03	6.08E-03	5.75E-03	5.15E-03
Ps90%/90% (-KTL) Biased	5.52E-03	5.46E-03	5.24E-03	5.29E-03	4.53E-03
Un-Biased Statistics					
Average Un-Biased	5.76E-03	5.82E-03	5.72E-03	5.54E-03	5.02E-03
Std Dev Un-Biased	5.48E-05	4.47E-05	1.10E-04	8.94E-05	1.10E-04
Ps90%/90% (+KTL) Un-Biased	5.91E-03	5.94E-03	6.02E-03	5.79E-03	5.32E-03
Ps90%/90% (-KTL) Un-Biased	5.61E-03	5.70E-03	5.42E-03	5.29E-03	4.72E-03
Specification MAX	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
Status	PASS	PASS	PASS	PASS	PASS

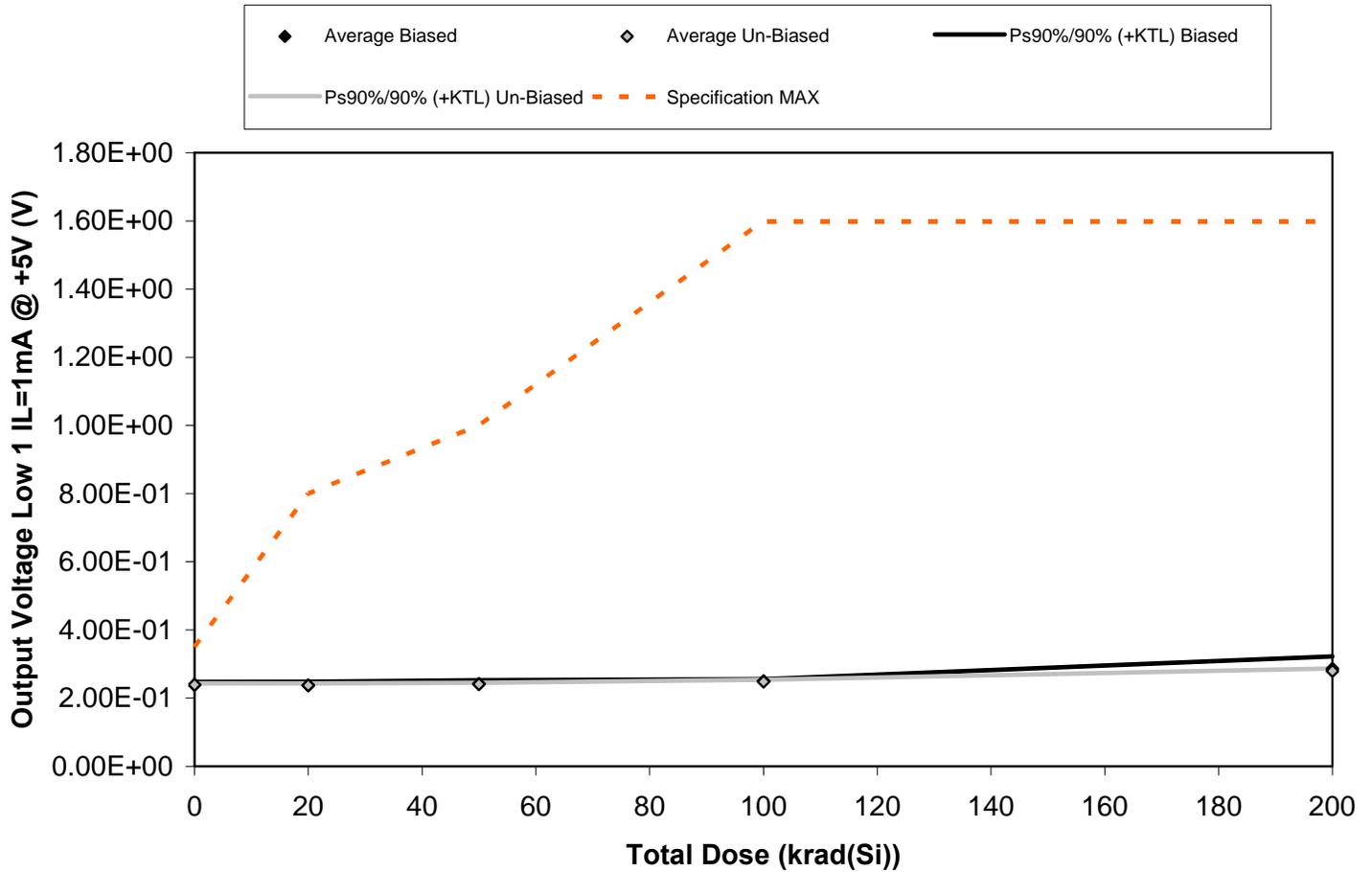


Figure 5.81. Plot of Output Voltage Low 1 IL=1mA @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.81. Raw data for Output Voltage Low 1 IL=1mA @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 1 IL=1mA @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.34E-01	2.32E-01	2.35E-01	2.46E-01	3.08E-01
1116	2.39E-01	2.39E-01	2.42E-01	2.50E-01	2.77E-01
1117	2.43E-01	2.42E-01	2.45E-01	2.52E-01	2.80E-01
1118	2.39E-01	2.39E-01	2.44E-01	2.50E-01	2.77E-01
1119	2.39E-01	2.37E-01	2.41E-01	2.50E-01	2.89E-01
1120	2.37E-01	2.35E-01	2.39E-01	2.46E-01	2.79E-01
1121	2.41E-01	2.38E-01	2.41E-01	2.49E-01	2.83E-01
1122	2.38E-01	2.36E-01	2.39E-01	2.47E-01	2.82E-01
1123	2.40E-01	2.39E-01	2.43E-01	2.51E-01	2.77E-01
1124	2.39E-01	2.40E-01	2.41E-01	2.49E-01	2.77E-01
1125	2.41E-01	2.42E-01	2.42E-01	2.42E-01	2.41E-01
1126	2.35E-01	2.36E-01	2.35E-01	2.36E-01	2.36E-01
Biased Statistics					
Average Biased	2.39E-01	2.38E-01	2.41E-01	2.50E-01	2.86E-01
Std Dev Biased	3.19E-03	3.70E-03	3.91E-03	2.19E-03	1.31E-02
Ps90%/90% (+KTL) Biased	2.48E-01	2.48E-01	2.52E-01	2.56E-01	3.22E-01
Ps90%/90% (-KTL) Biased	2.30E-01	2.28E-01	2.31E-01	2.44E-01	2.50E-01
Un-Biased Statistics					
Average Un-Biased	2.39E-01	2.38E-01	2.41E-01	2.48E-01	2.80E-01
Std Dev Un-Biased	1.58E-03	2.07E-03	1.67E-03	1.95E-03	2.79E-03
Ps90%/90% (+KTL) Un-Biased	2.43E-01	2.43E-01	2.45E-01	2.54E-01	2.87E-01
Ps90%/90% (-KTL) Un-Biased	2.35E-01	2.32E-01	2.36E-01	2.43E-01	2.72E-01
Specification MAX	3.50E-01	8.00E-01	1.00E+00	1.60E+00	1.60E+00
Status	PASS	PASS	PASS	PASS	PASS

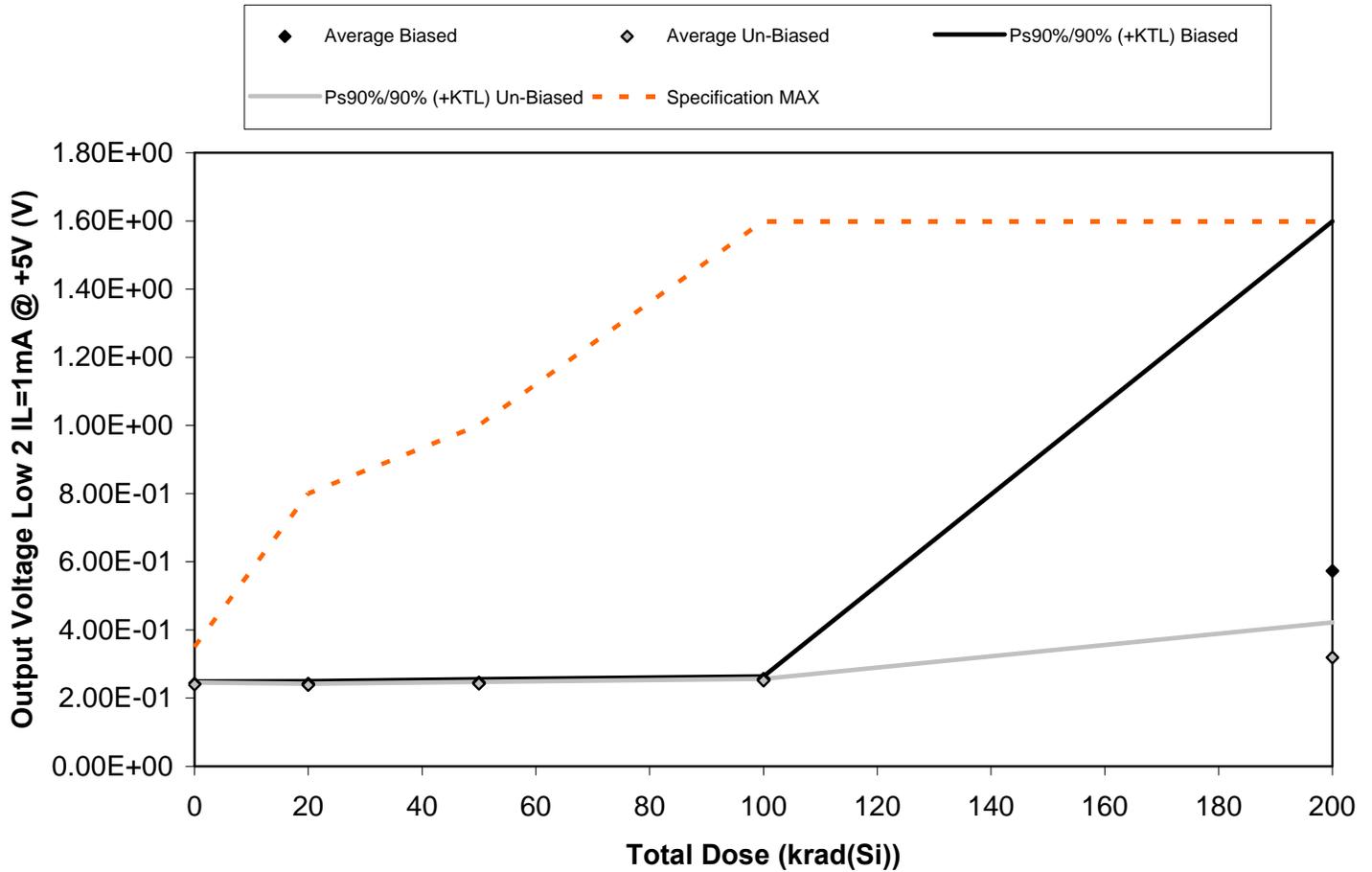


Figure 5.82. Plot of Output Voltage Low 2 IL=1mA @ +5V (V) versus total dose. The data show significant degradation at the 200krad(Si) dose level, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.82. Raw data for Output Voltage Low 2 IL=1mA @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 2 IL=1mA @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.39E-01	2.38E-01	2.40E-01	2.56E-01	9.56E-01
1116	2.44E-01	2.45E-01	2.48E-01	2.58E-01	3.07E-01
1117	2.43E-01	2.41E-01	2.44E-01	2.52E-01	2.87E-01
1118	2.45E-01	2.44E-01	2.49E-01	2.58E-01	3.06E-01
1119	2.42E-01	2.43E-01	2.47E-01	2.58E-01	1.01E+00
1120	2.40E-01	2.39E-01	2.43E-01	2.52E-01	2.99E-01
1121	2.42E-01	2.40E-01	2.45E-01	2.54E-01	3.86E-01
1122	2.42E-01	2.40E-01	2.43E-01	2.52E-01	3.05E-01
1123	2.38E-01	2.37E-01	2.41E-01	2.50E-01	2.99E-01
1124	2.38E-01	2.37E-01	2.41E-01	2.50E-01	3.08E-01
1125	2.44E-01	2.46E-01	2.46E-01	2.46E-01	2.46E-01
1126	2.38E-01	2.39E-01	2.40E-01	2.39E-01	2.38E-01
Biased Statistics					
Average Biased	2.43E-01	2.42E-01	2.46E-01	2.56E-01	5.73E-01
Std Dev Biased	2.30E-03	2.77E-03	3.65E-03	2.61E-03	3.74E-01
Ps90%/90% (+KTL) Biased	2.49E-01	2.50E-01	2.56E-01	2.64E-01	1.60E+00
Ps90%/90% (-KTL) Biased	2.36E-01	2.35E-01	2.36E-01	2.49E-01	-4.53E-01
Un-Biased Statistics					
Average Un-Biased	2.40E-01	2.39E-01	2.43E-01	2.52E-01	3.19E-01
Std Dev Un-Biased	2.00E-03	1.52E-03	1.67E-03	1.67E-03	3.74E-02
Ps90%/90% (+KTL) Un-Biased	2.45E-01	2.43E-01	2.47E-01	2.56E-01	4.22E-01
Ps90%/90% (-KTL) Un-Biased	2.35E-01	2.34E-01	2.38E-01	2.47E-01	2.17E-01
Specification MAX	3.50E-01	8.00E-01	1.00E+00	1.60E+00	1.60E+00
Status	PASS	PASS	PASS	PASS	PASS

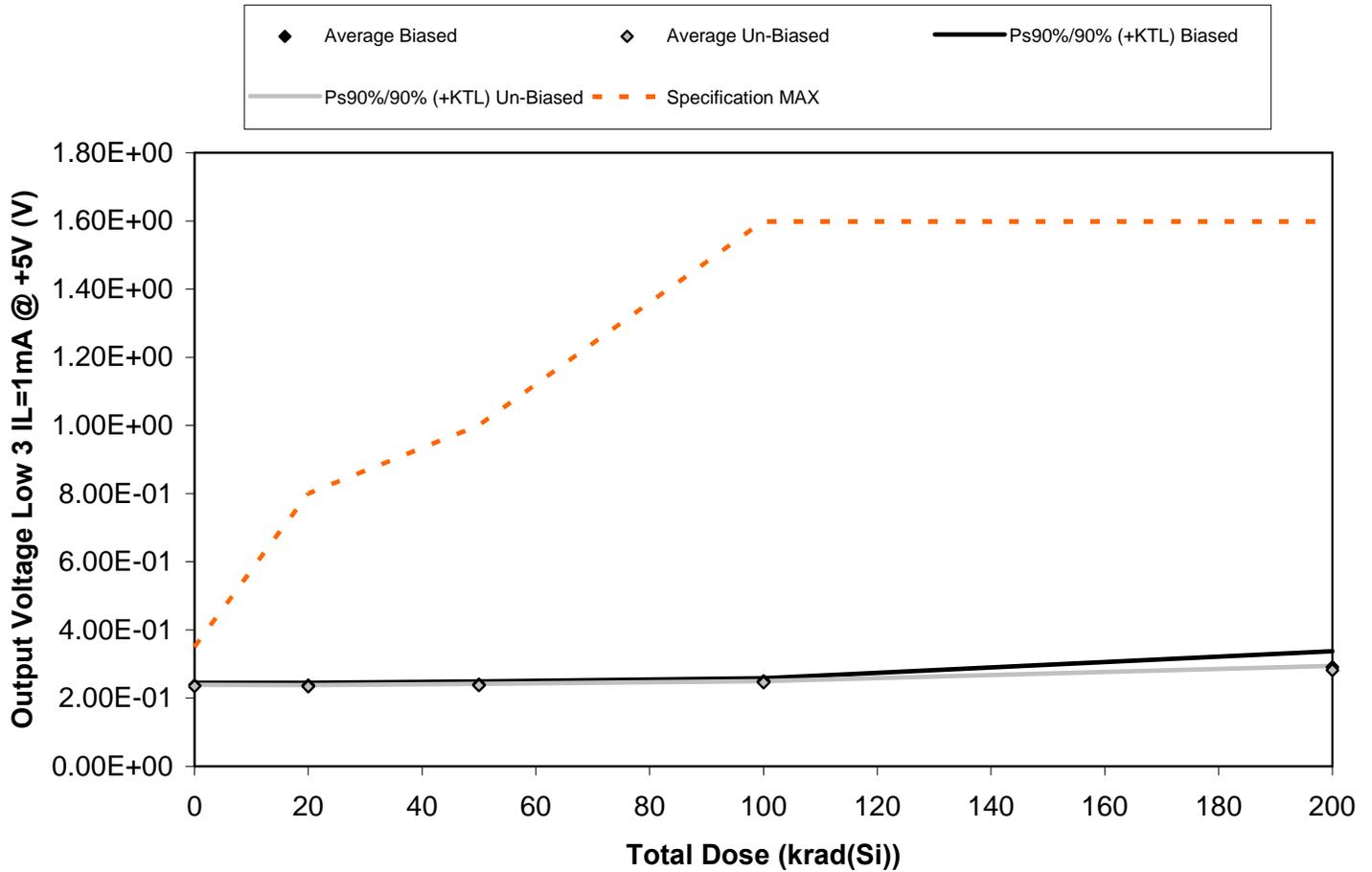


Figure 5.83. Plot of Output Voltage Low 3 IL=1mA @ +5V (V) versus total dose. The data show no significant change with radiation. The solid diamonds are the average of the measured data points for the samples irradiated under electrical bias while the shaded diamonds are the average of the measured data points for the samples irradiated with all pins tied to ground. The black lines (solid and/or dashed) are the average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.83. Raw data for Output Voltage Low 3 IL=1mA @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 3 IL=1mA @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.33E-01	2.33E-01	2.35E-01	2.47E-01	3.15E-01
1116	2.40E-01	2.40E-01	2.43E-01	2.53E-01	2.83E-01
1117	2.37E-01	2.37E-01	2.39E-01	2.46E-01	2.74E-01
1118	2.39E-01	2.40E-01	2.43E-01	2.51E-01	2.82E-01
1119	2.37E-01	2.37E-01	2.40E-01	2.51E-01	3.02E-01
1120	2.36E-01	2.35E-01	2.39E-01	2.46E-01	2.79E-01
1121	2.37E-01	2.35E-01	2.39E-01	2.48E-01	2.90E-01
1122	2.36E-01	2.35E-01	2.38E-01	2.46E-01	2.82E-01
1123	2.34E-01	2.32E-01	2.36E-01	2.44E-01	2.79E-01
1124	2.34E-01	2.32E-01	2.36E-01	2.44E-01	2.81E-01
1125	2.40E-01	2.42E-01	2.41E-01	2.41E-01	2.40E-01
1126	2.34E-01	2.36E-01	2.35E-01	2.35E-01	2.34E-01
Biased Statistics					
Average Biased	2.37E-01	2.37E-01	2.40E-01	2.50E-01	2.91E-01
Std Dev Biased	2.68E-03	2.88E-03	3.32E-03	2.97E-03	1.68E-02
Ps90%/90% (+KTL) Biased	2.45E-01	2.45E-01	2.49E-01	2.58E-01	3.37E-01
Ps90%/90% (-KTL) Biased	2.30E-01	2.30E-01	2.31E-01	2.41E-01	2.45E-01
Un-Biased Statistics					
Average Un-Biased	2.35E-01	2.34E-01	2.38E-01	2.46E-01	2.82E-01
Std Dev Un-Biased	1.34E-03	1.64E-03	1.52E-03	1.67E-03	4.55E-03
Ps90%/90% (+KTL) Un-Biased	2.39E-01	2.38E-01	2.42E-01	2.50E-01	2.95E-01
Ps90%/90% (-KTL) Un-Biased	2.32E-01	2.29E-01	2.33E-01	2.41E-01	2.70E-01
Specification MAX	3.50E-01	8.00E-01	1.00E+00	1.60E+00	1.60E+00
Status	PASS	PASS	PASS	PASS	PASS

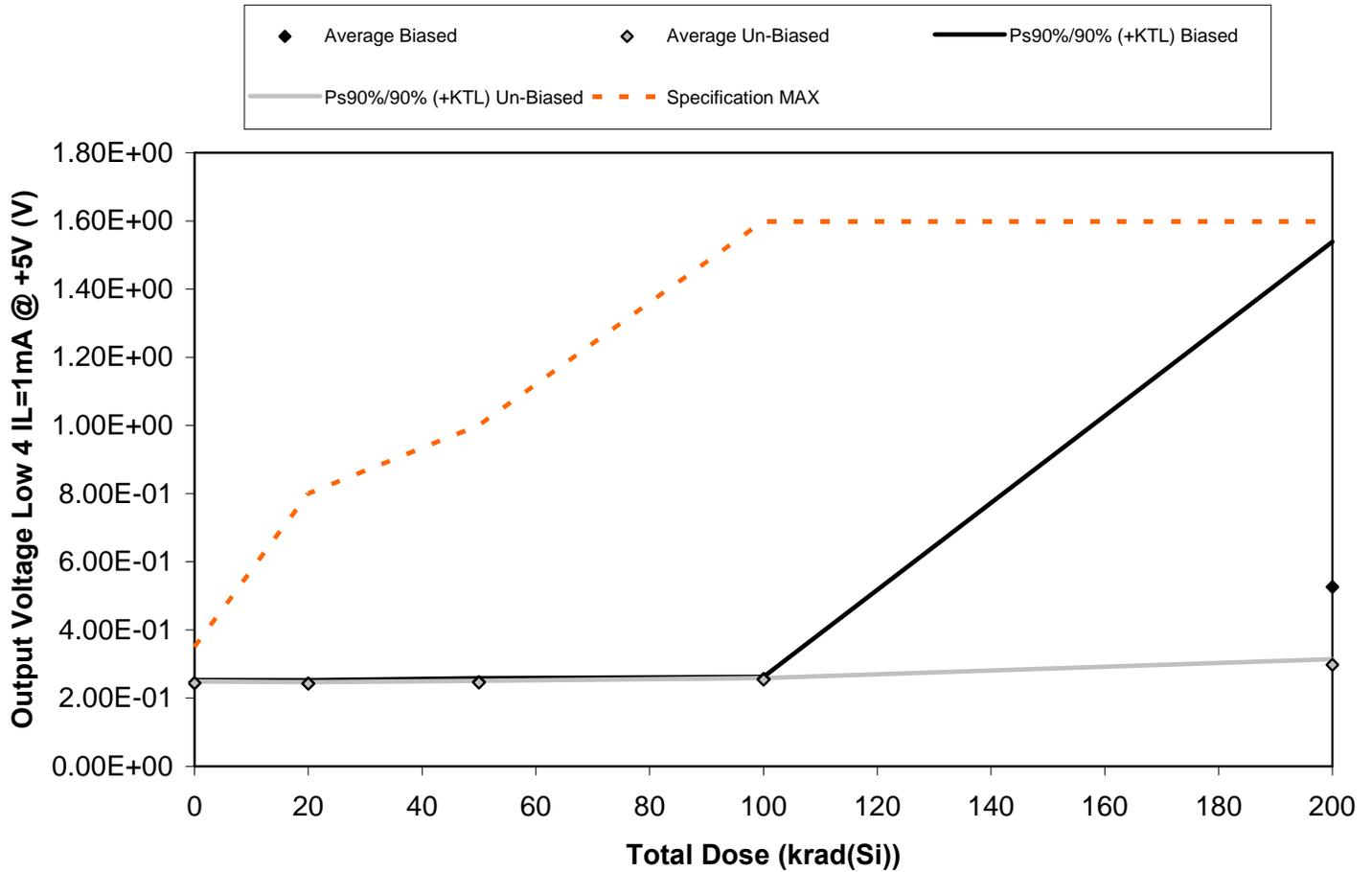


Figure 5.84. Plot of Output Voltage Low 4 IL=1mA @ +5V (V) versus total dose. The data show significant degradation at the 200krad(Si) dose level, however the parameter remains within specification even after application of the KTL statistics. The solid diamonds are the average of the measured data points 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 average of the data points after application of the KTL statistics on the samples irradiated under electrical bias while the gray lines (solid and/or dashed) are the average of the data points after application of the 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 5.84. Raw data for Output Voltage Low 4 IL=1mA @ +5V (V) versus total dose, including the statistical analysis, specification and the status of the testing (pass/fail).

Output Voltage Low 4 IL=1mA @ +5V (V)	Total Dose (krad(Si))				
	0	20	50	100	200
Device					
1115	2.38E-01	2.37E-01	2.40E-01	2.53E-01	1.14E+00
1116	2.45E-01	2.44E-01	2.48E-01	2.57E-01	2.94E-01
1117	2.47E-01	2.46E-01	2.50E-01	2.58E-01	2.91E-01
1118	2.45E-01	2.44E-01	2.49E-01	2.57E-01	2.97E-01
1119	2.44E-01	2.44E-01	2.49E-01	2.58E-01	6.09E-01
1120	2.41E-01	2.40E-01	2.43E-01	2.51E-01	2.98E-01
1121	2.44E-01	2.43E-01	2.46E-01	2.54E-01	3.05E-01
1122	2.44E-01	2.42E-01	2.44E-01	2.54E-01	3.02E-01
1123	2.46E-01	2.44E-01	2.48E-01	2.56E-01	2.91E-01
1124	2.44E-01	2.43E-01	2.46E-01	2.54E-01	2.92E-01
1125	2.45E-01	2.47E-01	2.46E-01	2.46E-01	2.47E-01
1126	2.39E-01	2.40E-01	2.41E-01	2.39E-01	2.40E-01
Biased Statistics					
Average Biased	2.44E-01	2.43E-01	2.47E-01	2.57E-01	5.26E-01
Std Dev Biased	3.42E-03	3.46E-03	4.09E-03	2.07E-03	3.69E-01
Ps90%/90% (+KTL) Biased	2.53E-01	2.52E-01	2.58E-01	2.62E-01	1.54E+00
Ps90%/90% (-KTL) Biased	2.34E-01	2.34E-01	2.36E-01	2.51E-01	-4.86E-01
Un-Biased Statistics					
Average Un-Biased	2.44E-01	2.42E-01	2.45E-01	2.54E-01	2.98E-01
Std Dev Un-Biased	1.79E-03	1.52E-03	1.95E-03	1.79E-03	6.11E-03
Ps90%/90% (+KTL) Un-Biased	2.49E-01	2.47E-01	2.51E-01	2.59E-01	3.14E-01
Ps90%/90% (-KTL) Un-Biased	2.39E-01	2.38E-01	2.40E-01	2.49E-01	2.81E-01
Specification MAX	3.50E-01	8.00E-01	1.00E+00	1.60E+00	1.60E+00
Status	PASS	PASS	PASS	PASS	PASS



6.0. Summary / Conclusions

The total ionizing dose testing described in this final report was performed using the facilities at Radiation Assured Devices' Longmire Laboratories in Colorado Springs, CO. The high dose rate total ionizing dose (TID) source is a JLSA 84-21 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 $120\text{rad}(\text{Si})/\text{s}$, 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 were presented in this report. The attributes data contains the average, standard deviation and the average with the KTL values applied. The KTL value used was 2.742 per MIL HDBK 814 using one-sided tolerance limits of 99/90 and a 5-piece sample size. Note that the following criteria was used to determine the outcome of the testing: following the radiation exposure each parameter had to pass the specification value and the average value for the five-piece sample must pass the specification value when the KTL limits are applied. If these conditions were not both satisfied following the radiation exposure, then the lot would be logged as an RLAT failure.

Based on these criteria, the RH1014 quad operational amplifier discussed in this report passed the RLAT to the maximum tested level of $200\text{krad}(\text{Si})$ (for the $\pm 15\text{V}$ supply conditions) and for the $+5\text{V}$ and 0V supply conditions with all measured parameters remaining within specification, including after application of the KTL statistics. Input offset voltage, open loop gain (AVOL), input bias current, slew rate and select output voltage low suffered from some measure of radiation-induced degradation, however, as noted above, it was not sufficient to cause any of the parameters to go out of specification even after application of the KTL statistics.



Appendix A: Photograph of device-under-test to show part markings





Appendix B: TID Bias Connections

(Extracted from LINEAR TECHNOLOGY CORPORATION RH1014M Quad Precision Operational Amplifier Datasheet)

Biased Samples:

Pin	Function	Bias
1	OUT A	To Pin 2 Via 10k Ω Resistor
2	-IN A	To Pin 1 Via 10k Ω Resistor
3	+IN A	8V Via 10k Ω Resistor
4	V+	+15V Decoupled to GND W/ 0.1 μ F
5	+IN B	8V Via 10k Ω Resistor
6	-IN B	To Pin 7 Via 10k Ω Resistor
7	OUT B	To Pin 6 Via 10k Ω Resistor
8	OUT C	To Pin 9 Via 10k Ω Resistor
9	-IN C	To Pin 8 Via 10k Ω Resistor
10	+IN C	8V Via 10k Ω Resistor
11	V-	-15V Decoupled to GND W/ 0.1 μ F
12	+IN D	8V Via 10k Ω Resistor
13	-IN D	To Pin 14 Via 10k Ω Resistor
14	OUT D	To Pin 13 Via 10k Ω Resistor



Unbiased Samples (All Pins Tied to Ground):

Pin	Function	Bias
1	OUT A	GND
2	-IN A	GND
3	+IN A	GND
4	V+	GND
5	+IN B	GND
6	-IN B	GND
7	OUT B	GND
8	OUT C	GND
9	-IN C	GND
10	+IN C	GND
11	V-	GND
12	+IN D	GND
13	-IN D	GND
14	OUT D	GND

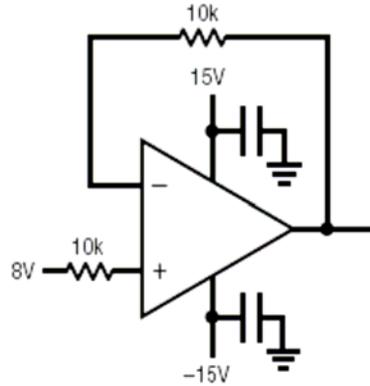


Figure B.1. Irradiation bias drawing for the units to be irradiated under electrical bias. This figure was extracted from the LINEAR TECHNOLOGY CORPORATION RH1014M Quad Precision Operational Amplifier Datasheet.

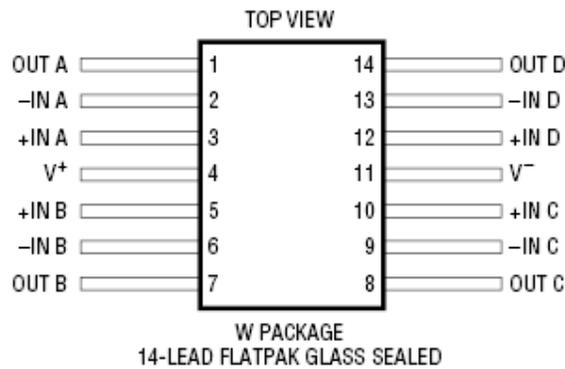


Figure B.2. Package drawing (for reference only). This figure was extracted from the LINEAR TECHNOLOGY CORPORATION RH1014M Quad Precision Operational Amplifier Datasheet.



Appendix C: Electrical Test Parameters and Conditions

All electrical tests for this device are performed on Radiation Assured Device's LTS2020 Test System. The LTS2020 Test System is a programmable parametric tester that provides parameter measurements for a variety of digital, analog and mixed signal products including voltage regulators, voltage comparators, D to A and A to D converters. The LTS2020 Test System achieves accuracy and sensitivity through the use of software self-calibration and an internal relay matrix with separate family boards and custom personality adapter boards. The tester uses this relay matrix to connect the required test circuits, select the appropriate voltage / current sources and establish the needed measurement loops for all the tests performed. The measured parameters and test conditions are shown in Table C.1.

A listing of the measurement precision/resolution for each parameter is shown in Table C.2. The precision/resolution values were obtained either from test data or from the DAC resolution of the LTS-2020. To generate the precision/resolution shown in Table C.2, one of the units-under-test was tested repetitively (a total of 10-times with re-insertion between tests) to obtain the average test value and standard deviation. Using this test data MIL-HDBK-814 90/90 KTL statistics were applied to the measured standard deviation to generate the final measurement range. This value encompasses the precision/resolution of all aspects of the test system, including the LTS2020 mainframe, family board, socket assembly and DUT board as well as insertion error. In some cases, the measurement resolution is limited by the internal DACs, which results in a measured standard deviation of zero. In these instances the precision/resolution will be reported back as the LSB of the DAC.

Note that the testing and statistics used in this document are based on an "analysis of variables" technique, which relies on small sample sizes to qualify much larger lot sizes (see MIL-HDBK-814, p. 91 for a discussion of statistical treatments). Unfortunately, not all measured parameters are well suited to this approach due to inherent large variations. One such parameter is pre-irradiation Open Loop Gain, where the device exhibits extreme sensitivity to input conditions, resulting in a very large standard deviation and a statistical error often greater than the measured value. If necessary, larger samples sizes could be used to qualify these parameters using an "attributes" approach.



Table C.1. Measured parameters and test conditions for the RH1014MW. Unless otherwise noted the conditions were selected to match the post-irradiation specifications. See LINEAR TECHNOLOGY CORPORATION RH1014M Quad Precision Operational Amplifier Datasheet for the post irradiation test conditions and specifications.

TEST NUMBER	TEST DESCRIPTION	TEST CONDITIONS
1	Positive Supply Current (ICC+)	$V_S = \pm 15V$
2	Negative Supply Current (IEE-)	$V_S = \pm 15V$
3	Input Offset Voltage ($V_{OS1} - V_{OS4}$)	$V_S = \pm 15V$
4	Input Offset Current ($I_{OS1} - I_{OS4}$)	$V_S = \pm 15V$
5	+ Input Bias Current ($I_{B+1} - I_{B+4}$)	$V_S = \pm 15V$
6	- Input Bias Current ($I_{B-1} - I_{B-4}$)	$V_S = \pm 15V$
7	Common Mode Rejection Ratio (CMRR1-CMRR4)	$V_{CM} = 13.5V, -15V$
8	Power Supply Rejection Ratio (PSRR1-PSRR4)	$V_S = \pm 10V$ to $\pm 18V$
9	Large Signal Voltage Gain ($A_{VOL9} - A_{VOL12}$)	$V_S = \pm 15V, V_O = \pm 10V, R_L = 10k\Omega$
10	Positive Output Voltage Swing ($V_{OUT+1} - V_{OUT+4}$)	$V_S = \pm 15V, R_L = 10k\Omega$
11	Negative Output Voltage Swing ($V_{OUT-1} - V_{OUT-4}$)	$V_S = \pm 15V, R_L = 10k\Omega$
12	Positive Slew Rate (SlewRate+1-SlewRate+4)	$V_S = \pm 15V, R_L = 10k\Omega$
13	Negative Slew Rate (SlewRate-1-SlewRate-4)	$V_S = \pm 15V, R_L = 10k\Omega$



14	Positive Supply Current (I_{CC+2})	$V_S=+5V$
15	Negative Supply Current (I_{EE-2})	$V_S=+5V$
16	Input Offset Voltage ($V_{OS5}-V_{OS8}$)	$V_S=+5V$
17	Input Offset Current ($I_{OS5}-I_{OS8}$)	$V_S=+5V$
18	+ Input Bias Current ($I_{B+5}-I_{B+8}$)	$V_S=+5V$
19	- Input Bias Current ($I_{B-5}-I_{B-8}$)	$V_S=+5V$
20	Positive Output Voltage Swing ($V_{OUT+5}-V_{OUT+8}$)	$V_S=+5V$, No Load
21	Positive Output Voltage Swing ($V_{OUT+9}-V_{OUT+12}$)	$V_S=+5V$, $R_L= 600\Omega$
22	Output Voltage Low ($V_{OUT-5}-V_{OUT-8}$)	$V_S=+5V$, No Load
23	Output Voltage Low ($V_{OUT-9}-V_{OUT-12}$)	$V_S=+5V$, $R_L= 600\Omega$
24	Output Voltage Low ($V_{OUT-13}-V_{OUT-16}$)	$V_S=+5V$, $I_{SINK}= 1mA$



Measured Parameter	Pre-Irradiation Specification	Measurement Resolution/Precision
Positive Supply Current (ICC+)	2.2mA	± 1.07E-05A
Negative Supply Current (IEE-)	-2.2mA	±1.07E-05A
Input Offset Voltage (V _{OS1} -V _{OS4})	±0.3mV	± 2.65E-06V
Input Offset Current (I _{OS1} -I _{OS4})	±10nA	± 6.69E-11A
+ Input Bias Current (I _{B+1} -I _{B+4})	±30nA	±6.97E-11A
- Input Bias Current (I _{B-1} -I _{B-4})	±30nA	± 8.01E-11A
Common Mode Rejection Ratio (CMRR1-CMRR4)	97dB	±1.37E+00dB
Power Supply Rejection Ratio (PSRR1-PSRR4)	100dB	±1.53E+01dB
Large Signal Voltage Gain (A _{VOL9} -A _{VOL12})	1200V/mV	±1.0E+04V/mV
Positive Output Voltage Swing (V _{OUT+1} -V _{OUT+4})	12.5V	±2.99E-03V
Negative Output Voltage Swing (V _{OUT-1} -V _{OUT-4})	-12.5V	±2.89E-03V
Positive Slew Rate (SlewRate+1-SlewRate+4)	0.2V/μs	±1.32E-02V/μs
Negative Slew Rate (SlewRate-1-SlewRate-4)	-0.2V/μs	±1.87E-02V/μs



Positive Supply Current (ICC+2)	2.0mA	±8.71E-06A
Negative Supply Current (IEE-2)	-2.0mA	±1.31E-05A
Input Offset Voltage (VOS5-VOS8)	±0.45mV	± 1.27E-06V
Input Offset Current (IOS5-IOS8)	±10nA	± 2.64E-11A
+ Input Bias Current (IB+5-IB+8)	±50nA	±5.02E-11A
- Input Bias Current (IB-5-IB-8)	±50nA	± 3.95E-11A
Positive Output Voltage Swing (VOUT+5-VOUT+8)	4.0V	±1.96E-03V
Positive Output Voltage Swing (VOUT+9-VOUT+12)	3.4V	±2.05E-03V
Output Voltage Low (VOUT-5-VOUT-8)	25mV	±1.90E-04V
Output Voltage Low (VOUT-9-VOUT-12)	10mV	±1.46E-04V
Output Voltage Low (VOUT-13-VOUT-16)	350mV	±1.63E-03V



Appendix D: List of Figures Used in Section 5 (RLAT Test Results)

- 5.1 Positive Supply Current @ +/-15V (A)
- 5.2 Negative Supply Current @ +/-15V (A)
- 5.3 Offset Voltage 1 @ +/-15V (V)
- 5.4 Offset Voltage 2 @ +/-15V (V)
- 5.5 Offset Voltage 3 @ +/-15V (V)
- 5.6 Offset Voltage 4 @ +/-15V (V)
- 5.7 Offset Current 1 @ +/-15V (A)
- 5.8 Offset Current 2 @ +/-15V (A)
- 5.9 Offset Current 3 @ +/-15V (A)
- 5.10 Offset Current 4 @ +/-15V (A)
- 5.11 Positive Bias Current 1 @ +/-15V (A)
- 5.12 Positive Bias Current 2 @ +/-15V (A)
- 5.13 Positive Bias Current 3 @ +/-15V (A)
- 5.14 Positive Bias Current 4 @ +/-15V (A)
- 5.15 Negative Bias Current 1 @ +/-15V (A)
- 5.16 Negative Bias Current 2 @ +/-15V (A)
- 5.17 Negative Bias Current 3 @ +/-15V (A)
- 5.18 Negative Bias Current 4 @ +/-15V (A)
- 5.19 Common Mode Rejection Ratio 1 (dB)
- 5.20 Common Mode Rejection Ratio 2 (dB)
- 5.21 Common Mode Rejection Ratio 3 (dB)
- 5.22 Common Mode Rejection Ratio 4 (dB)
- 5.23 Power Supply Rejection Ratio 1 (dB)
- 5.24 Power Supply Rejection Ratio 2 (dB)
- 5.25 Power Supply Rejection Ratio 3 (dB)
- 5.26 Power Supply Rejection Ratio 4 (dB)
- 5.27 Open Loop Gain 1 RL=10k VO=+/-10V (V/mV)
- 5.28 Open Loop Gain 2 RL=10k VO=+/-10V (V/mV)
- 5.29 Open Loop Gain 3 RL=10k VO=+/-10V (V/mV)
- 5.30 Open Loop Gain 4 RL=10k VO=+/-10V (V/mV)
- 5.31 Positive Output Voltage 1 @ +/-15V (V)
- 5.32 Positive Output Voltage 2 @ +/-15V (V)
- 5.33 Positive Output Voltage 3 @ +/-15V (V)
- 5.34 Positive Output Voltage 4 @ +/-15V (V)
- 5.35 Negative Output Voltage 1 @ +/-15V (V)
- 5.36 Negative Output Voltage 2 @ +/-15V (V)
- 5.37 Negative Output Voltage 3 @ +/-15V (V)
- 5.38 Negative Output Voltage 4 @ +/-15V (V)
- 5.39 Positive Slew Rate 1 @ +/-15V (V/us)



- 5.40 Positive Slew Rate 2 @ +/-15V (V/us)
- 5.41 Positive Slew Rate 3 @ +/-15V (V/us)
- 5.42 Positive Slew Rate 4 @ +/-15V (V/us)
- 5.43 Negative Slew Rate 1 @ +/-15V (V/us)
- 5.44 Negative Slew Rate 2 @ +/-15V (V/us)
- 5.45 Negative Slew Rate 3 @ +/-15V (V/us)
- 5.46 Negative Slew Rate 4 @ +/-15V (V/us)
- 5.47 Positive Supply Current @ +5V (A)
- 5.48 Negative Supply Current @ +5V (A)
- 5.49 Offset Voltage 1 @ +5V (V)
- 5.50 Offset Voltage 2 @ +5V (V)
- 5.51 Offset Voltage 3 @ +5V (V)
- 5.52 Offset Voltage 4 @ +5V (V)
- 5.53 Offset Current 1 @ +5V (A)
- 5.54 Offset Current 2 @ +5V (A)
- 5.55 Offset Current 3 @ +5V (A)
- 5.56 Offset Current 4 @ +5V (A)
- 5.57 Positive Bias Current 1 @ +/-5V (A)
- 5.58 Positive Bias Current 2 @ +/-5V (A)
- 5.59 Positive Bias Current 3 @ +/-5V (A)
- 5.60 Positive Bias Current 4 @ +/-5V (A)
- 5.61 Negative Bias Current 1 @ +/-5V (A)
- 5.62 Negative Bias Current 2 @ +/-5V (A)
- 5.63 Negative Bias Current 3 @ +/-5V (A)
- 5.64 Negative Bias Current 4 @ +/-5V (A)
- 5.65 Positive Output Voltage 1 RL=open @ +5V (V)
- 5.66 Positive Output Voltage 2 RL=open @ +5V (V)
- 5.67 Positive Output Voltage 3 RL=open @ +5V (V)
- 5.68 Positive Output Voltage 4 RL=open @ +5V (V)
- 5.69 Positive Output Voltage 1 RL=600 @ +5V (V)
- 5.70 Positive Output Voltage 2 RL=600 @ +5V (V)
- 5.71 Positive Output Voltage 3 RL=600 @ +5V (V)
- 5.72 Positive Output Voltage 4 RL=600 @ +5V (V)
- 5.73 Output Voltage Low 1 RL=open @ +5V (V)
- 5.74 Output Voltage Low 2 RL=open @ +5V (V)
- 5.75 Output Voltage Low 3 RL=open @ +5V (V)
- 5.76 Output Voltage Low 4 RL=open @ +5V (V)
- 5.77 Output Voltage Low 1 RL=600 @ +5V (V)
- 5.78 Output Voltage Low 2 RL=600 @ +5V (V)
- 5.79 Output Voltage Low 3 RL=600 @ +5V (V)
- 5.80 Output Voltage Low 4 RL=600 @ +5V (V)



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- 5.81 Output Voltage Low 1 $I_L=1\text{mA}$ @ +5V (V)
- 5.82 Output Voltage Low 2 $I_L=1\text{mA}$ @ +5V (V)
- 5.83 Output Voltage Low 3 $I_L=1\text{mA}$ @ +5V (V)
- 5.84 Output Voltage Low 4 $I_L=1\text{mA}$ @ +5V (V)