Enhanced Low Dose Rate Sensitivity (ELDRS) Characterization Report

LM2940WG5.0RLQV – 5962R8958702VXA

Literature Number: SNAA176

National Semiconductor
Hi-Rel Operations Radiation Engineering/RHA Programs
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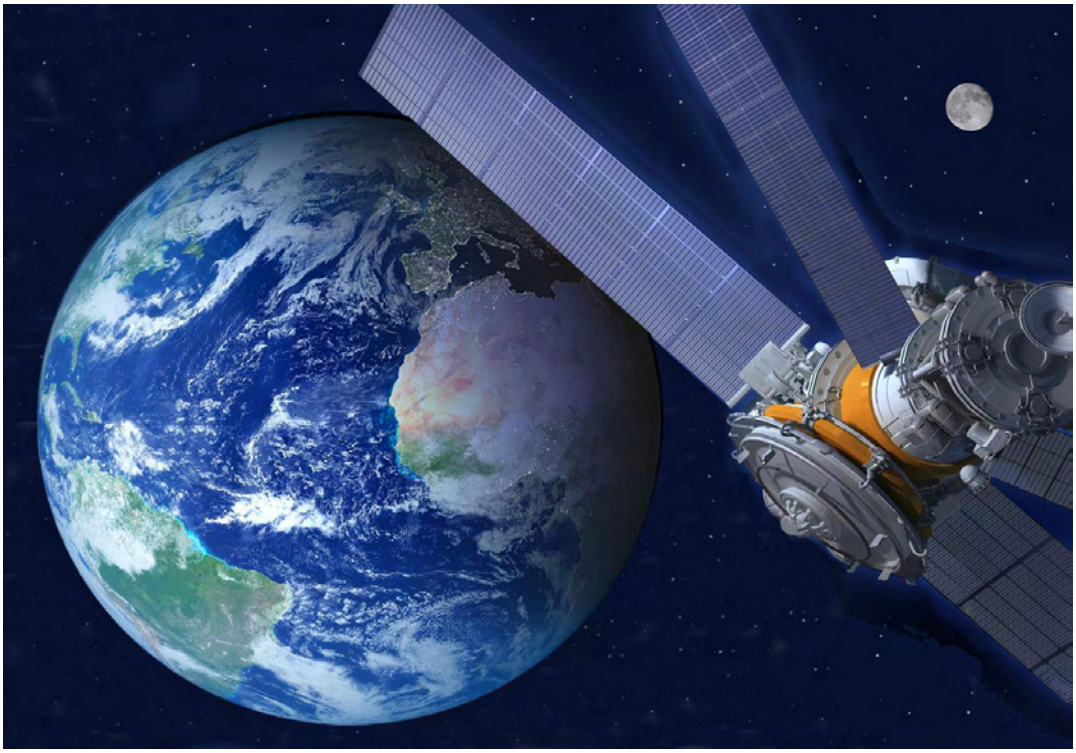
LM2940WG5.0RLQV – 5962R8958702VXA



Date: December 16, 2009

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PowerWise®

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LM2940-5.0 Enhanced Low Dose Rate Sensitivity (ELDRS) Characterization Report

1.0 Summary

National Semiconductor has released a new version of the LM2940-5.0 (LM2940WG5.0RLQV, DSC SMD # 5962R8958702VXA) that went through a low dose rate characterization and was found to be ELDRS-free to a total ionizing dose (TID) of 100 krad(Si).

2.0 Test method, characterization matrix and sample size

The product tested was National's LM2940WG5.0RLQV, DSCC SMD# 5962R8958702VXA. The "RL" in the National part number and the "02" device number in the DSCC SMD number are unique identifiers for the ELDRS-free version of the product. The results in this report are only for these unique product numbers and not applicable to other versions of the part, which will have different radiation performance.

This characterization was performed using MIL-STD-883G, test method 1019.7, section 3.13.1.1 as a guide. The test procedure was modified to increase the sample size to 3 different wafers, with 5 units per wafer, for a total of 15 units per test leg.

Low dose rate, units biased during radiation (LDR BIASED)	15 units
Low dose rate, units unbiased during radiation (LDR UNBIAS)	15 units
High dose rate, units biased during radiation (HDR_BIASED)	15 units
High dose rate, units unbiased during radiation (HDR UNBIAS)	15 units

For the biased units, Vin was taken to 25.5 V through a 100 Ω resistor and Vout was connected to ground through a 1 kΩ resistor for a 5 mA load. A low output load is used to prevent high power dissipation and internal heating of the die that could result in self annealing. For the unbiased condition, all pins were grounded.

The test units, along with control units were tested before radiation. They were split into the four test legs and sent through irradiation, according to 1019.7. The units were pulled out at various irradiation points (see attached tables) and tested.

Wafer lot number:	JM986X44A	
Wafer and assembly lot numbers:	1	EM8A6603A019
	2	EM8A6604K019
	3	EM8A6605H019
Radiation board:	06332IR	
Test program:	RAD2940XRA	

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3.0 Radiation details

3.1 High dose rate

Radiation site: National Semiconductor, Santa Clara, California
Radiation rate: 158-159 rad(Si)/s

3.2 Low dose rate

Radiation site: Radiation Assured Devices, Colorado Springs, Colorado
Radiation rate: 0.01 rad(Si)/s

4.0 Results

A summary of the results is presented in the following tables and graphs. A separate table is presented for each parametric test. The dose rate and bias condition (TEST_BIAS), the accumulated dose test point (DOSE(k)), the number of units tested (OBS), the average reading (AVG), maximum and minimum readings (MAX, MIN) and standard deviation (SIGMA) are shown for each test leg at the various radiation test points.

The upper and lower datasheet limits are listed in the columns "UTL" and "LTL", respectively. The pre and post irradiation limits are the same for all tests.

In the "Delta Median (from 0 rad)" column, the median drift from the pre-irradiation readings is shown. This is denoted as "median Δpara" in section 3.13.1.1 of 1019.7. The last column shows the ratio of the median drift for the LDR to the HDR at the bias condition. In cases where the HDR drift was 0, the drift ratio is indicated by "#DIV/0". According to 1019.7, section 3.13.1.1, "If this ratio exceeds 1.5 for any of the most sensitive parameters then the part is to be considered ELDRS sensitive This test does not apply to parameters which exhibit changes that are within experimental error or whose values are below the pre-irradiation electrical specification limits at low dose rate at the specification dose."

Each parametric table is accompanied by 5 graphs. The first graph plots the average reading of each of the four test conditions vs. accumulated dose. The other graphs show the average, maximum and minimum readings and parametric limits for a specific test condition.

5.0 Discussion and Conclusion

Since no parameter drifted outside the pre irradiation test limits, this product could be considered ELDRS-free, per the definition in MIL-STD-883G, Test Method 1019.7.

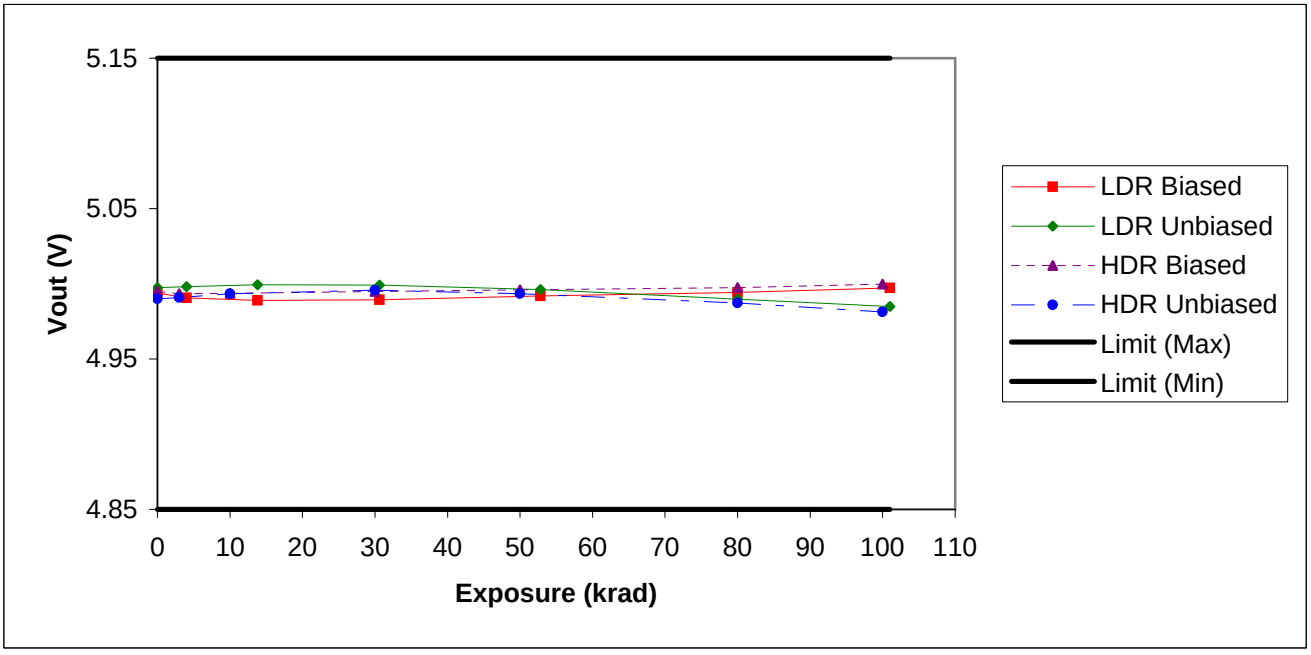
National Semiconductor

TEST ID: 5.1 Output Voltage; Vout Start up

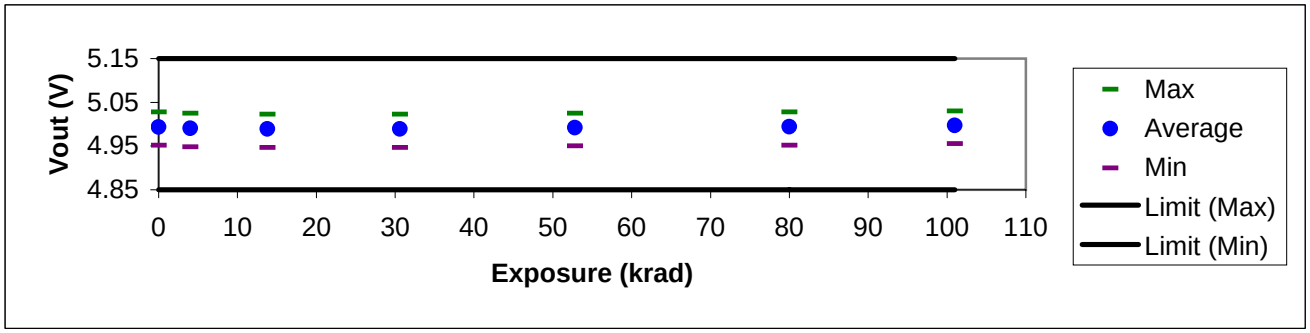
TEST ID: 5.1 VO Startup V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.99375	5.0281	4.952	0.0247537	5.15	4.85			
LDR BIASED	4	15	4.9906	5.0248	4.9483	0.024817	5.15	4.85	-0.00309992	0.0003115	2.06643424
LDR BIASED	13.8	15	4.98885	5.0225	4.9466	0.0249378	5.15	4.85	-0.00470018	0.0006681	2.93799811
LDR BIASED	30.6	15	4.98929	5.0229	4.9469	0.0249319	5.15	4.85	-0.00460004	0.00095381	23.0243756
LDR BIASED	52.8	15	4.99199	5.0252	4.9503	0.0248177	5.15	4.85	-0.00169992	0.00127498	-1.41636394
LDR BIASED	80	15	4.99431	5.0281	4.9518	0.0250386	5.15	4.85	0.00049973	0.00140198	0.1998872
LDR BIASED	101	15	4.99725	5.0303	4.9555	0.0248686	5.15	4.85	0.00399971	0.00151212	0.81627068
LDR UNBIAS	0	15	4.99743	5.0237	4.9625	0.0194994	5.15	4.85			
LDR UNBIAS	4	15	4.99807	5.0242	4.9628	0.0195583	5.15	4.85	0.00059986	0.00030633	0.66631862
LDR UNBIAS	13.8	15	4.99945	5.0255	4.9641	0.0195205	5.15	4.85	0.0019002	0.00038523	0.54291584
LDR UNBIAS	30.6	15	4.99907	5.0246	4.9633	0.0195318	5.15	4.85	0.00180006	0.0005355	0.30509957
LDR UNBIAS	52.8	15	4.99617	5.0217	4.9606	0.0194354	5.15	4.85	-0.0012002	0.00072683	-0.37505664
LDR UNBIAS	80	15	4.98984	5.016	4.9542	0.0197325	5.15	4.85	-0.0074997	0.0007951	2.58599644
LDR UNBIAS	101	15	4.98489	5.013	4.9485	0.0198236	5.15	4.85	-0.0124002	0.00113117	1.44184348
HDR BIASED	0	15	4.99499	5.0315	4.9553	0.021651	5.15	4.85			
HDR BIASED	3	15	4.99337	5.0302	4.954	0.0218293	5.15	4.85	-0.00150013	0.00046016	
HDR BIASED	10	15	4.99356	5.0311	4.9539	0.0219954	5.15	4.85	-0.00159979	0.000641	
HDR BIASED	30	15	4.99496	5.0328	4.9558	0.0220552	5.15	4.85	-0.00019979	0.00102866	
HDR BIASED	50	15	4.99593	5.0336	4.9566	0.0220277	5.15	4.85	0.0012002	0.00101398	
HDR BIASED	80	15	4.99747	5.0355	4.9583	0.0218306	5.15	4.85	0.00250006	0.00126063	
HDR BIASED	100	15	4.99974	5.0366	4.9604	0.02123	5.15	4.85	0.00489998	0.00187842	
HDR UNBIAS	0	15	4.99	5.029	4.9534	0.0225389	5.15	4.85			
HDR UNBIAS	3	15	4.99087	5.0299	4.9538	0.0226787	5.15	4.85	0.00090026	0.00032882	
HDR UNBIAS	10	15	4.99341	5.0326	4.9561	0.0227514	5.15	4.85	0.00349999	0.00053516	
HDR UNBIAS	30	15	4.99575	5.0349	4.9581	0.0227834	5.15	4.85	0.00589991	0.0008315	
HDR UNBIAS	50	15	4.99349	5.032	4.9559	0.022569	5.15	4.85	0.00320005	0.00096622	
HDR UNBIAS	80	15	4.98727	5.0257	4.9498	0.0227042	5.15	4.85	-0.00290012	0.00126927	
HDR UNBIAS	100	15	4.98132	5.0195	4.9448	0.0223514	5.15	4.85	-0.00860024	0.00148667	

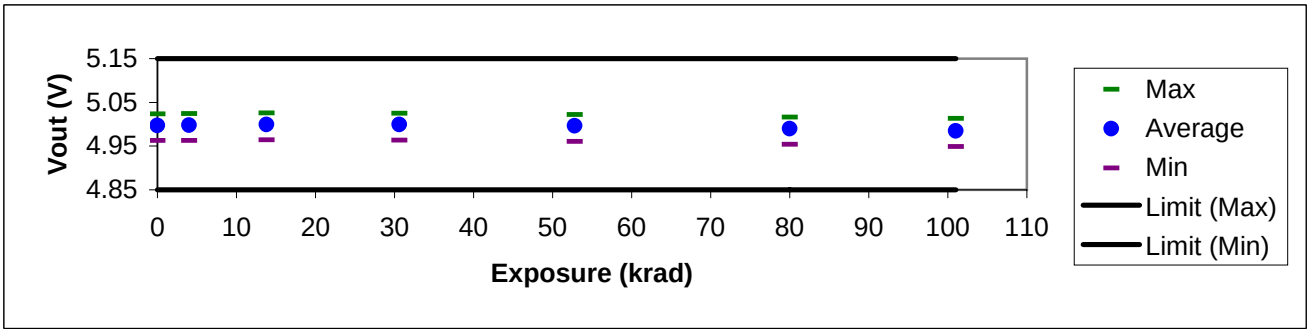
Plot of the average readings for each radiation/bias condition



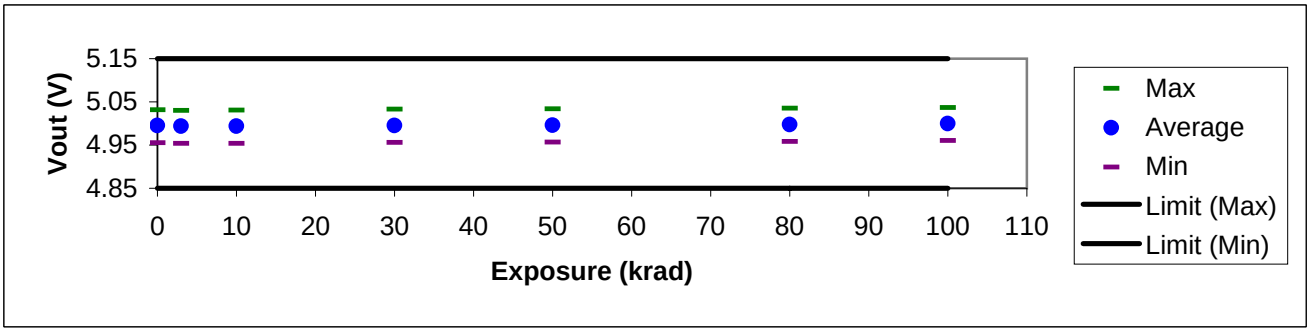
TEST ID: 5.1 Output Voltage; Vout Start up
Low dose rate biased



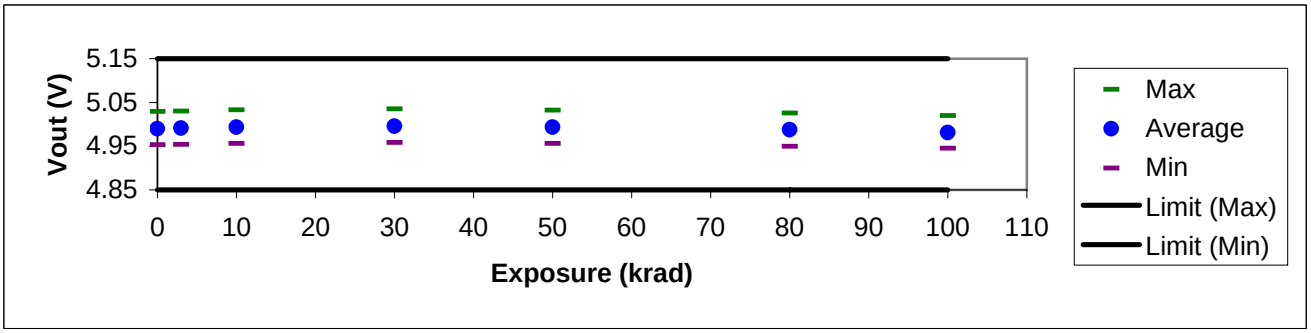
TEST ID: 5.1 Output Voltage; Vout Start up
Low dose rate unbiased



TEST ID: 5.1 Output Voltage; Vout Start up
High dose rate biased



TEST ID: 5.1 Output Voltage; Vout Start up
High dose rate unbiased



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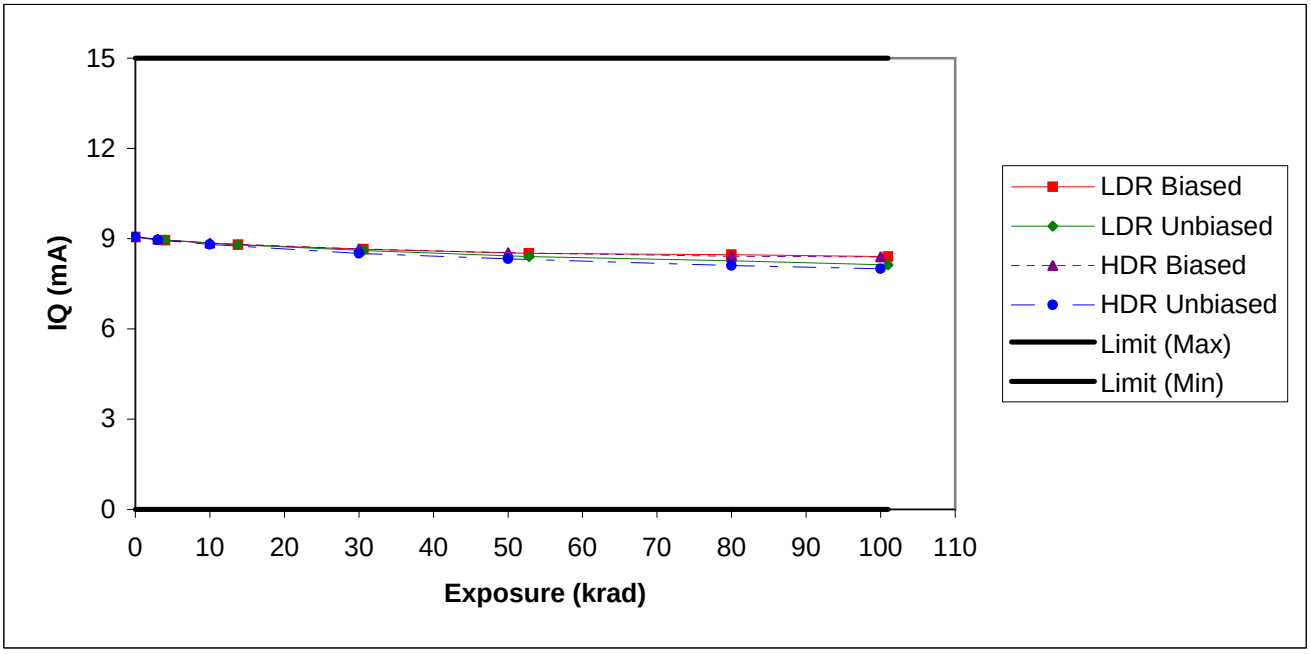
TEST ID: 6.2 Quiescent Current; IQ Functionality

TEST ID:	6.2 IQ Functionality						mA				
EM8A6603A019 EM8A6604K019 EM8A6605H019											
TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	9.05333	9.25	8.9	0.0897352	15	0			
LDR BIASED	4	15	8.95067	9.14	8.78	0.0909056	15	0	-0.1	0.0133453	1.11110988
LDR BIASED	13.8	15	8.794	8.98	8.62	0.090617	15	0	-0.25	0.0157963	1.19047619
LDR BIASED	30.6	15	8.65333	8.84	8.5	0.0867399	15	0	-0.4	0.0196397	1
LDR BIASED	52.8	15	8.51467	8.68	8.38	0.0789093	15	0	-0.54	0.0229492	1.03846354
LDR BIASED	80	15	8.47067	8.64	8.34	0.0812814	15	0	-0.589999	0.0198087	0.90769077
LDR BIASED	101	15	8.39933	8.6	8.25	0.0919991	15	0	-0.65	0.0195668	0.98484699
LDR UNBIAS	0	15	9.06267	9.25	8.91	0.0923864	15	0			
LDR UNBIAS	4	15	8.95267	9.14	8.81	0.0930028	15	0	-0.1	0.0169032	1.11110864
LDR UNBIAS	13.8	15	8.794	8.98	8.65	0.0871616	15	0	-0.27	0.0180739	1.03846553
LDR UNBIAS	30.6	15	8.60533	8.8	8.47	0.0936458	15	0	-0.45	0.0225092	0.83333333
LDR UNBIAS	52.8	15	8.40667	8.61	8.26	0.0937066	15	0	-0.650001	0.0297128	0.90277917
LDR UNBIAS	80	15	8.26533	8.45	8.11	0.0941023	15	0	-0.8	0.0406145	0.84210526
LDR UNBIAS	101	15	8.12333	8.31	7.96	0.0963377	15	0	-0.94	0.0418272	0.8952381
HDR BIASED	0	15	9.05933	9.37	8.93	0.128756	15	0			
HDR BIASED	3	15	8.978	9.28	8.84	0.12382	15	0	-0.0900001	0.0168467	
HDR BIASED	10	15	8.852	9.13	8.73	0.114093	15	0	-0.21	0.0201659	
HDR BIASED	30	15	8.66067	8.94	8.55	0.112216	15	0	-0.4	0.0250333	
HDR BIASED	50	15	8.53667	8.78	8.42	0.103279	15	0	-0.519999	0.0303471	
HDR BIASED	80	15	8.41467	8.65	8.31	0.100204	15	0	-0.65	0.0405086	
HDR BIASED	100	15	8.38867	8.64	8.27	0.106628	15	0	-0.660001	0.0391819	
HDR UNBIAS	0	15	9.058	9.16	8.89	0.0782122	15	0			
HDR UNBIAS	3	15	8.962	9.07	8.8	0.0823061	15	0	-0.0900002	0.0105561	
HDR UNBIAS	10	15	8.80333	8.9	8.63	0.0832094	15	0	-0.259999	0.0118721	
HDR UNBIAS	30	15	8.51533	8.62	8.35	0.0809644	15	0	-0.54	0.020166	
HDR UNBIAS	50	15	8.33467	8.46	8.16	0.0848415	15	0	-0.72	0.0205866	
HDR UNBIAS	80	15	8.11	8.23	7.92	0.0869318	15	0	-0.95	0.0275681	
HDR UNBIAS	100	15	7.99933	8.12	7.82	0.0895598	15	0	-1.05	0.0358303	

Plot of the average readings for each radiation/bias condition



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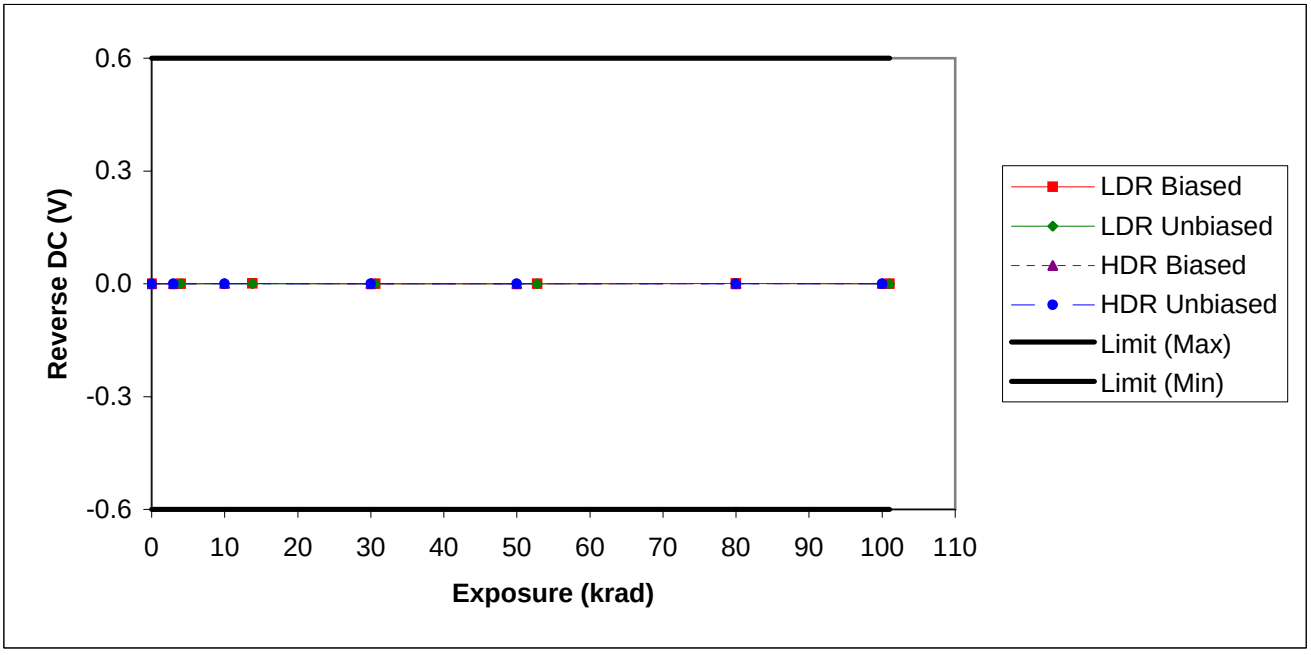
TEST ID: 8..4 Reverse Polariry Input Voltage DC

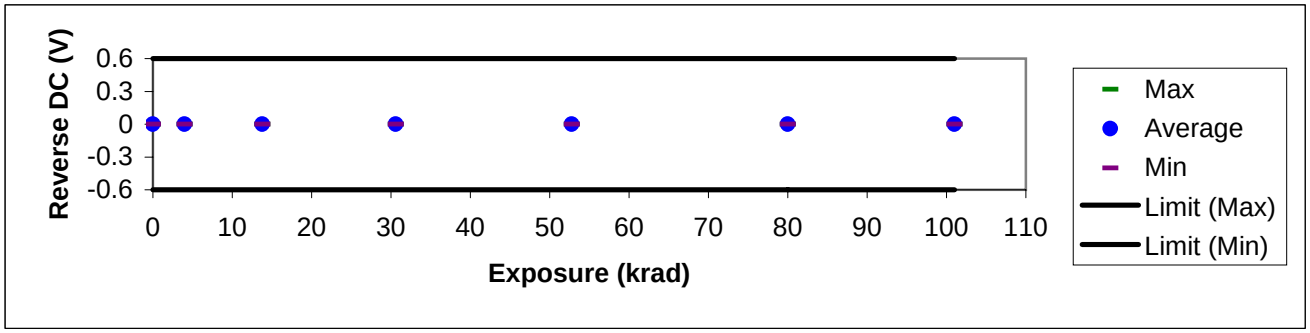
TEST ID: 8.4 Reverse Polarity DC, Vin = -15.1V V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	0.00042	0.0005	0.0004	4.14E-05	0.6	-0.6			
LDR BIASED	4	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	5.16E-05	#DIV/0!
LDR BIASED	13.8	15	0.00044	0.0005	0.0004	5.07E-05	0.6	-0.6	0	5.61E-05	#DIV/0!
LDR BIASED	30.6	15	0.0004	0.0004	0.0004	0	0.6	-0.6	0	4.14E-05	#DIV/0!
LDR BIASED	52.8	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	5.16E-05	#DIV/0!
LDR BIASED	80	15	0.00045	0.0005	0.0004	5.16E-05	0.6	-0.6	0	6.17E-05	#DIV/0!
LDR BIASED	101	15	0.0004	0.0005	0.0003	3.78E-05	0.6	-0.6	0	4.14E-05	#DIV/0!
LDR UNBIAS	0	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6			
LDR UNBIAS	4	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	3.78E-05	#DIV/0!
LDR UNBIAS	13.8	15	0.00042	0.0005	0.0004	4.14E-05	0.6	-0.6	0	5.16E-05	#DIV/0!
LDR UNBIAS	30.6	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	3.78E-05	#DIV/0!
LDR UNBIAS	52.8	15	0.0004	0.0004	0.0004	0	0.6	-0.6	0	2.58E-05	#DIV/0!
LDR UNBIAS	80	15	0.00046	0.0008	0.0004	0.00010556	0.6	-0.6	0	0.00011255	#DIV/0!
LDR UNBIAS	101	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	3.78E-05	#DIV/0!
HDR BIASED	0	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6			
HDR BIASED	3	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	3.78E-05	
HDR BIASED	10	15	0.00044	0.0005	0.0004	5.07E-05	0.6	-0.6	0	6.17E-05	
HDR BIASED	30	15	0.00042	0.0005	0.0003	5.61E-05	0.6	-0.6	0	6.40E-05	
HDR BIASED	50	15	0.00041	0.0005	0.0004	3.52E-05	0.6	-0.6	0	4.58E-05	
HDR BIASED	80	15	0.00041	0.0005	0.0004	3.52E-05	0.6	-0.6	0	4.58E-05	
HDR BIASED	100	15	0.00043	0.0005	0.0004	4.88E-05	0.6	-0.6	0	5.94E-05	
HDR UNBIAS	0	15	0.00041	0.0005	0.0004	3.52E-05	0.6	-0.6			
HDR UNBIAS	3	15	0.00041	0.0005	0.0004	2.58E-05	0.6	-0.6	0	4.58E-05	
HDR UNBIAS	10	15	0.00042	0.0005	0.0004	4.14E-05	0.6	-0.6	0	5.94E-05	
HDR UNBIAS	30	15	0.00042	0.0005	0.0004	4.14E-05	0.6	-0.6	0	4.58E-05	
HDR UNBIAS	50	15	0.00041	0.0005	0.0004	3.52E-05	0.6	-0.6	0	3.78E-05	
HDR UNBIAS	80	15	0.00041	0.0005	0.0003	4.58E-05	0.6	-0.6	0	5.94E-05	
HDR UNBIAS	100	15	0.00042	0.0005	0.0004	4.14E-05	0.6	-0.6	0	5.94E-05	

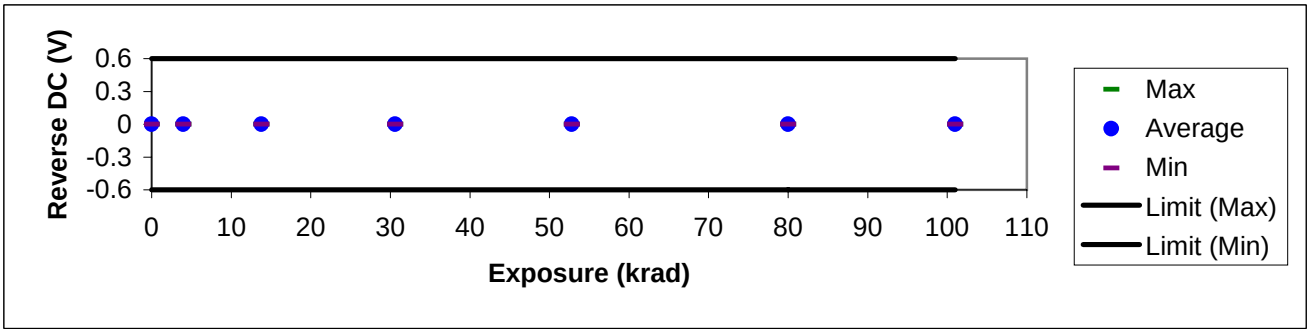
Plot of the average readings for each radiation/bias condition



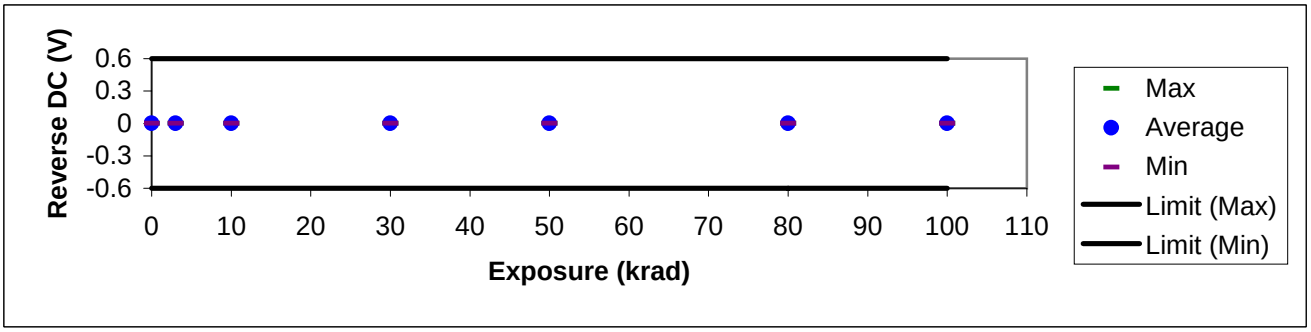
TEST ID: 8..4 Reverse Polariry Input Voltage DC
Low dose rate biased



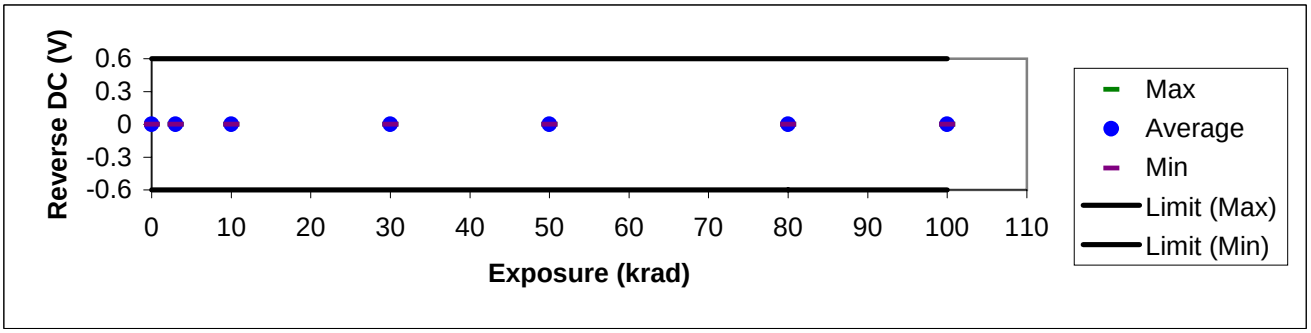
TEST ID: 8..4 Reverse Polariry Input Voltage DC
Low dose rate unbiased



TEST ID: 8..4 Reverse Polariry Input Voltage DC
High dose rate biased



TEST ID: 8..4 Reverse Polariry Input Voltage DC
High dose rate unbiased



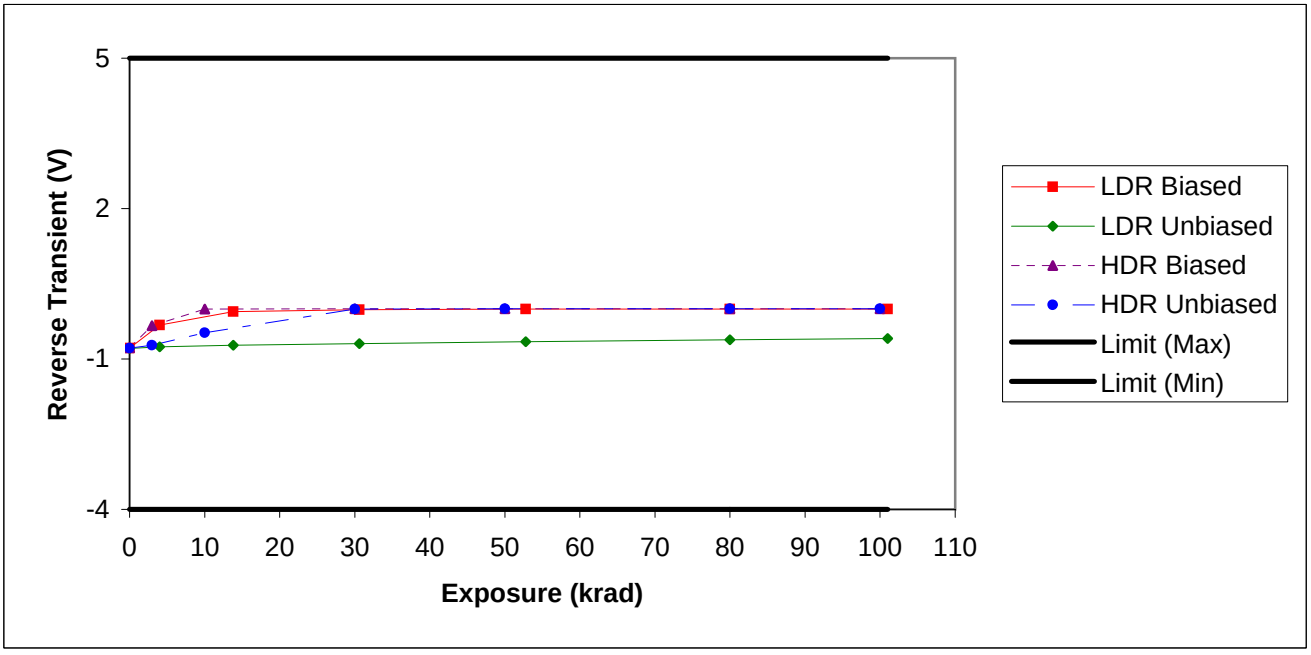
National Semiconductor

TEST ID: 9.5 Reverse Transient;

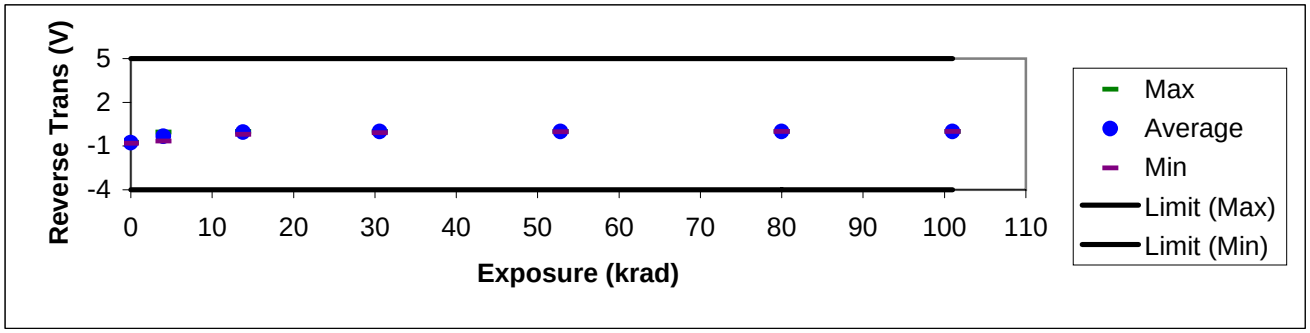
TEST ID: 9.5 Reverse Transient, Vin = -45V V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	-0.78388	-0.7516	-0.8195	0.0203459	5	-4			
LDR BIASED	4	15	-0.32432	-0.0494	-0.6701	0.191772	5	-4	0.4669	0.171751	0.75992839
LDR BIASED	13.8	15	-0.05365	-0.0003	-0.2013	0.0586762	5	-4	0.7443	0.0407329	0.9783123
LDR BIASED	30.6	15	-0.01481	0.0005	-0.0877	0.0254187	5	-4	0.7733	0.0147439	1.01629649
LDR BIASED	52.8	15	-0.00167	0.0009	-0.0169	0.00467511	5	-4	0.786	0.0172476	1.03325884
LDR BIASED	80	15	-0.00323	-0.0006	-0.0116	0.00305676	5	-4	0.7839	0.0185268	1.03036278
LDR BIASED	101	15	-0.00111	0.0007	-0.007	0.00202889	5	-4	0.7851	0.0187397	1.03194006
LDR UNBIAS	0	15	-0.78644	-0.7497	-0.8242	0.024547	5	-4			
LDR UNBIAS	4	15	-0.75455	-0.7011	-0.8004	0.0328311	5	-4	0.029	0.00859157	0.56751468
LDR UNBIAS	13.8	15	-0.72532	-0.6435	-0.7835	0.0456668	5	-4	0.0523	0.021887	0.1924209
LDR UNBIAS	30.6	15	-0.69163	-0.5576	-0.7674	0.0667375	5	-4	0.0744	0.0436695	0.09448819
LDR UNBIAS	52.8	15	-0.65524	-0.4593	-0.7536	0.0962112	5	-4	0.0965	0.0735561	0.12257081
LDR UNBIAS	80	15	-0.61671	-0.3827	-0.737	0.120994	5	-4	0.1243	0.0982868	0.15788137
LDR UNBIAS	101	15	-0.59117	-0.3337	-0.7253	0.136835	5	-4	0.1412	0.114155	0.17925606
HDR BIASED	0	15	-0.77881	-0.7446	-0.8273	0.0301085	5	-4			
HDR BIASED	3	15	-0.3389	-0.0466	-0.7112	0.274551	5	-4	0.6144	0.2448	
HDR BIASED	10	15	-0.0073	0.0006	-0.05	0.0147899	5	-4	0.7608	0.0207903	
HDR BIASED	30	15	0.00035	0.0006	-1.0E-04	0.00020307	5	-4	0.7609	0.0300608	
HDR BIASED	50	15	0.00045	0.0009	0	0.00026422	5	-4	0.7607	0.0301255	
HDR BIASED	80	15	0.00044	0.0008	1.0E-04	0.00021647	5	-4	0.7608	0.0302226	
HDR BIASED	100	15	0.00042	0.0007	0	0.00021112	5	-4	0.7608	0.0300562	
HDR UNBIAS	0	15	-0.78496	-0.7437	-0.8181	0.0218392	5	-4			
HDR UNBIAS	3	15	-0.72817	-0.6333	-0.7788	0.0415694	5	-4	0.0511	0.0204374	
HDR UNBIAS	10	15	-0.47561	-0.1151	-0.7084	0.189786	5	-4	0.2718	0.168236	
HDR UNBIAS	30	15	-0.00379	0.0007	-0.0238	0.00885324	5	-4	0.7874	0.0168075	
HDR UNBIAS	50	15	0.0004	0.0009	0	0.00023905	5	-4	0.7873	0.0218419	
HDR UNBIAS	80	15	0.00043	0.0007	1.0E-04	0.00018387	5	-4	0.7873	0.0218809	
HDR UNBIAS	100	15	0.00051	0.0009	1.0E-04	0.00022949	5	-4	0.7877	0.0217827	

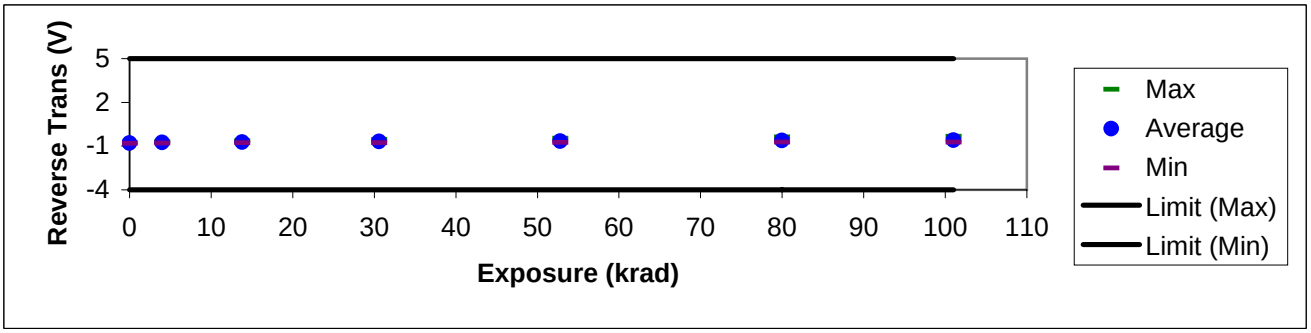
Plot of the average readings for each radiation/bias condition



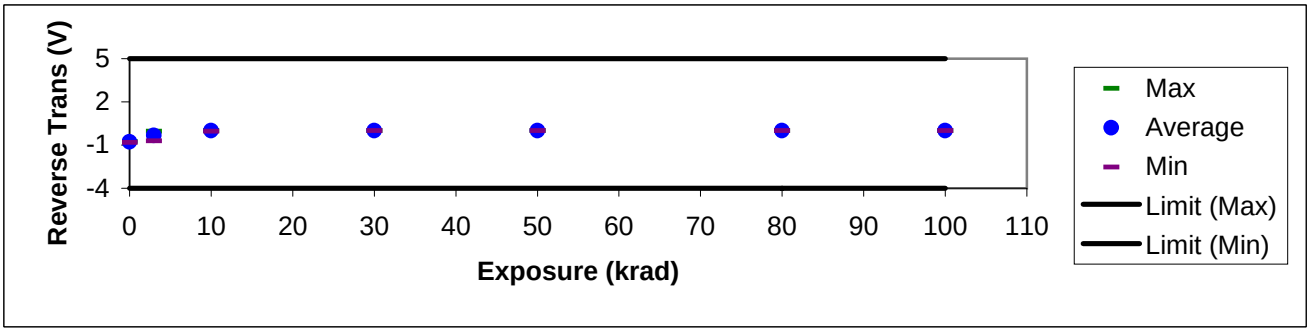
TEST ID: 9.5 Reverse Transient;
Low dose rate biased



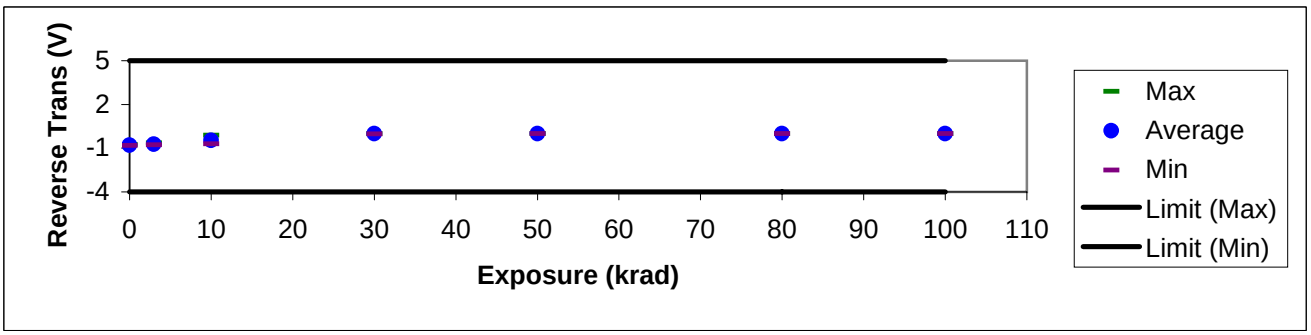
TEST ID: 9.5 Reverse Transient;
Low dose rate unbiased



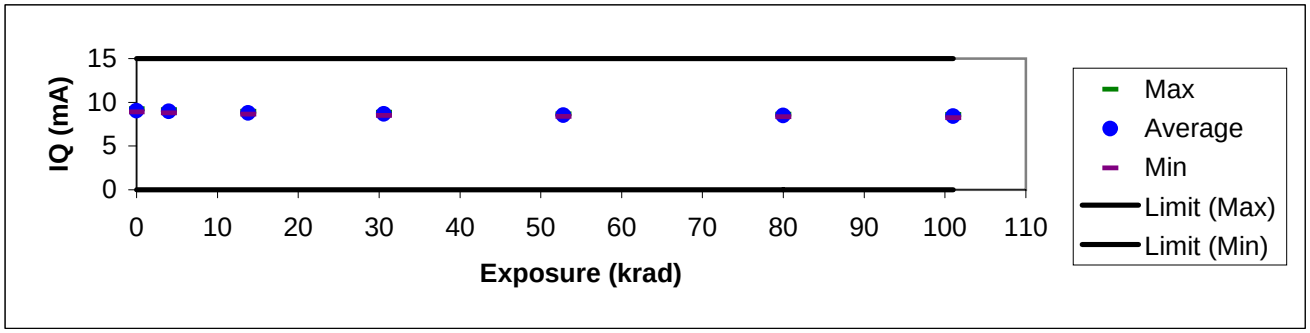
TEST ID: 9.5 Reverse Transient;
High dose rate biased



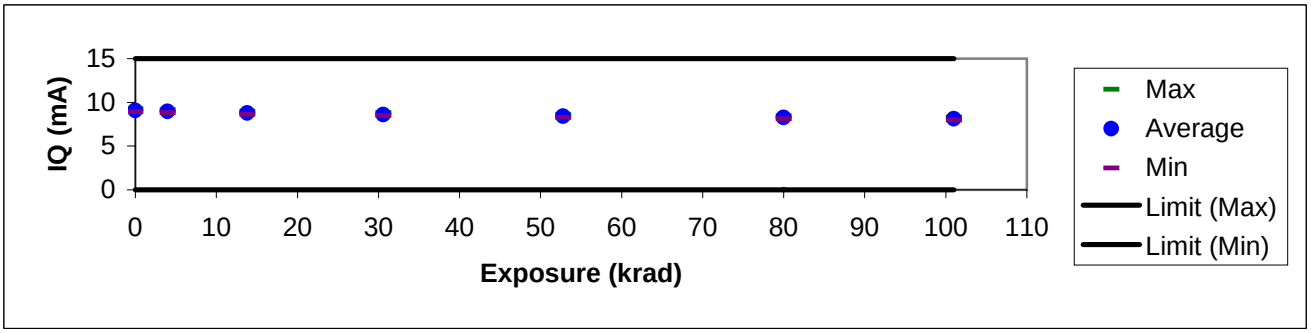
TEST ID: 9.5 Reverse Transient;
High dose rate unbiased



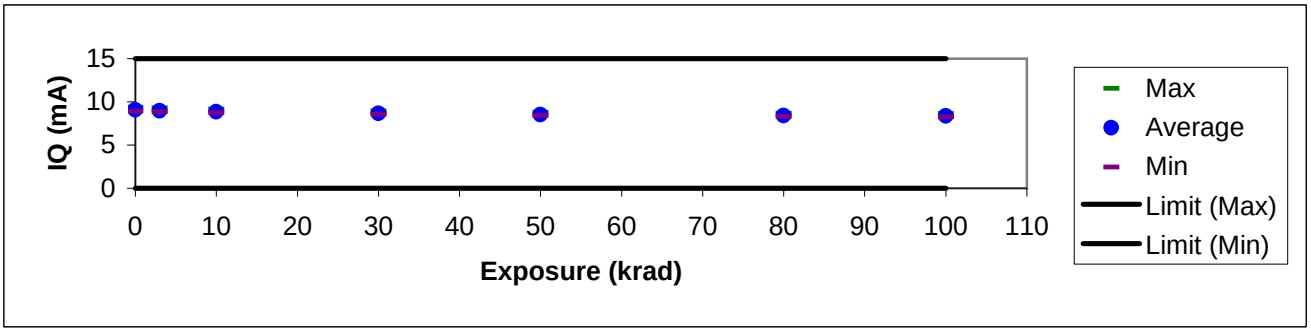
TEST ID: 6.2 Quiescent Current; IQ Functionality
Low dose rate biased



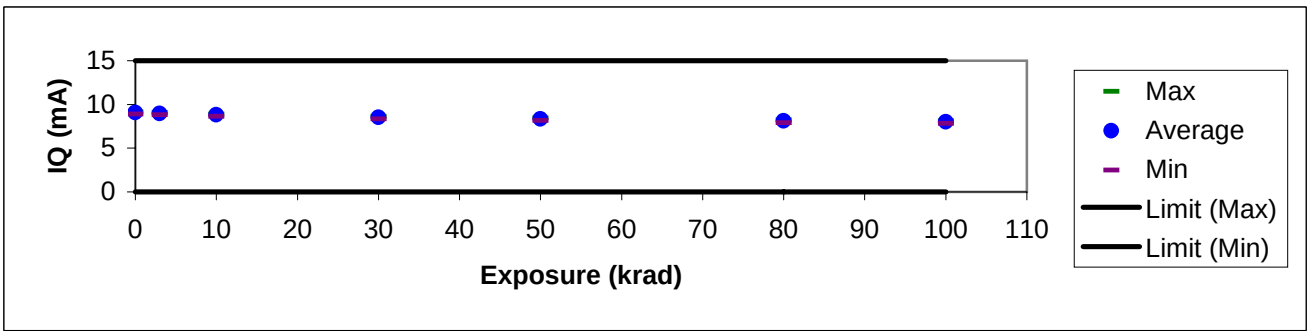
TEST ID: 6.2 Quiescent Current; IQ Functionality
Low dose rate unbiased



TEST ID: 6.2 Quiescent Current; IQ Functionality
High dose rate biased



TEST ID: 6.2 Quiescent Current; IQ Functionality
High dose rate unbiased



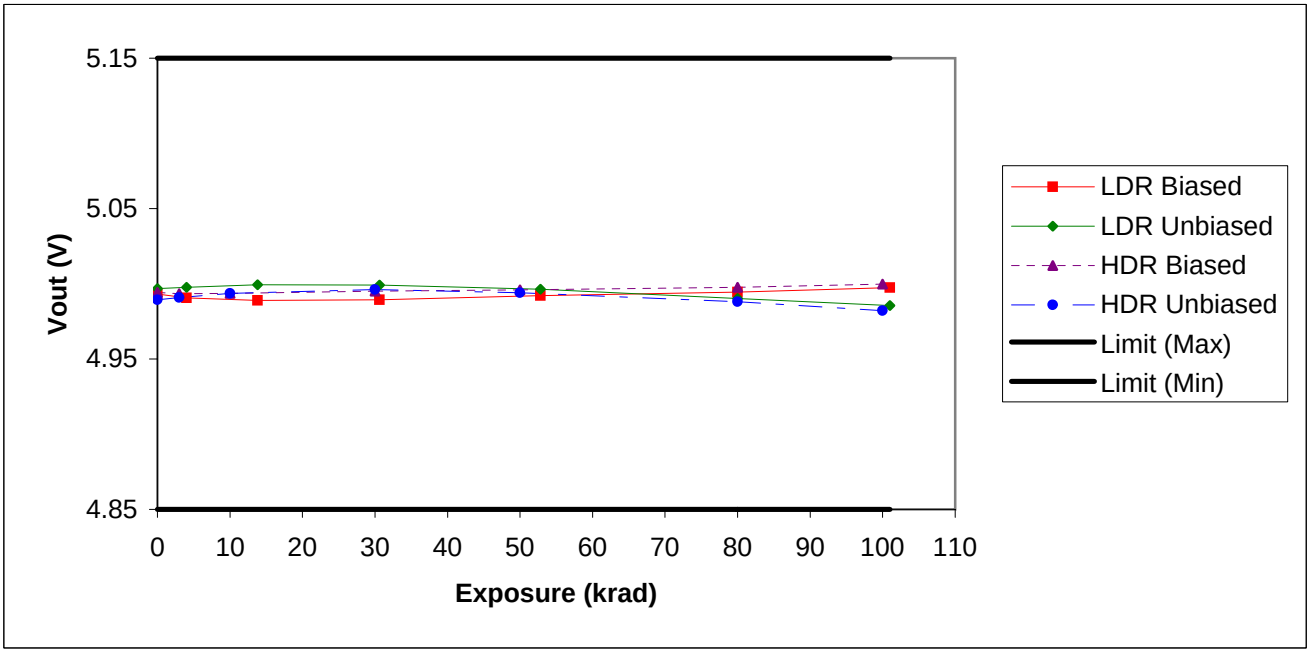
National Semiconductor

TEST ID: 10.6 Output Voltage; Vin = 7V, Iout = 5mA

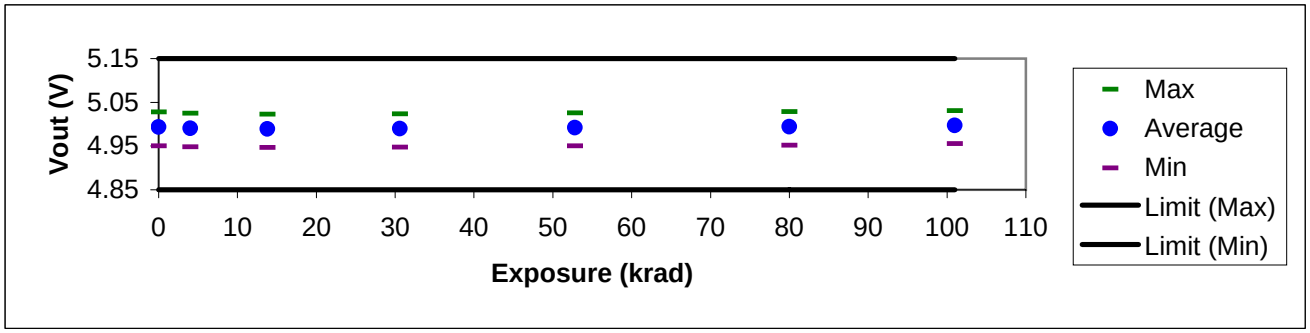
TEST ID: 10.6 VO @ Vin = 7V, Iout = 5mA V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.99311	5.0278	4.9504	0.0250658	5.15	4.85			
LDR BIASED	4	15	4.99071	5.0249	4.9483	0.0248399	5.15	4.85	-0.00239992	0.00035654	3.42845714
LDR BIASED	13.8	15	4.98899	5.0226	4.9467	0.0249581	5.15	4.85	-0.00399971	0.00051203	7.99622151
LDR BIASED	30.6	15	4.98943	5.0231	4.9471	0.0249403	5.15	4.85	-0.00359964	0.00078918	-3.59989199
LDR BIASED	52.8	15	4.99213	5.0254	4.9504	0.0248224	5.15	4.85	-0.00060034	0.00121465	-0.31601499
LDR BIASED	80	15	4.99445	5.0282	4.9519	0.0250381	5.15	4.85	0.00150013	0.00129487	0.41668889
LDR BIASED	101	15	4.99739	5.0305	4.9556	0.0248662	5.15	4.85	0.00489998	0.00142204	0.87500112
LDR UNBIAS	0	15	4.99677	5.0233	4.9611	0.0197519	5.15	4.85			
LDR UNBIAS	4	15	4.99772	5.024	4.9619	0.0197409	5.15	4.85	0.00090027	0.0002825	0.64305
LDR UNBIAS	13.8	15	4.9993	5.0254	4.9634	0.0197036	5.15	4.85	0.00230026	0.00043862	0.53492926
LDR UNBIAS	30.6	15	4.99913	5.0248	4.963	0.0196683	5.15	4.85	0.00239993	0.00057909	0.35292154
LDR UNBIAS	52.8	15	4.99643	5.0221	4.9607	0.0195277	5.15	4.85	-0.00039959	0.00078087	-0.09082066
LDR UNBIAS	80	15	4.99031	5.0167	4.9544	0.0198446	5.15	4.85	-0.0065999	0.00086179	5.07743201
LDR UNBIAS	101	15	4.98545	5.0132	4.949	0.0198356	5.15	4.85	-0.0109997	0.0011033	1.57139245
HDR BIASED	0	15	4.99419	5.0311	4.9549	0.0218904	5.15	4.85			
HDR BIASED	3	15	4.99342	5.0303	4.9541	0.021849	5.15	4.85	-0.0007	0.00042876	
HDR BIASED	10	15	4.99367	5.0311	4.954	0.0220006	5.15	4.85	-0.0005002	0.00042292	
HDR BIASED	30	15	4.99506	5.0328	4.9559	0.0220338	5.15	4.85	0.00099993	0.00075922	
HDR BIASED	50	15	4.99603	5.0338	4.9567	0.0220341	5.15	4.85	0.00189972	0.00089199	
HDR BIASED	80	15	4.99759	5.0356	4.9585	0.0218135	5.15	4.85	0.00360012	0.00121007	
HDR BIASED	100	15	4.99987	5.0368	4.9605	0.0212289	5.15	4.85	0.00559997	0.00203991	
HDR UNBIAS	0	15	4.98933	5.0288	4.9524	0.0227162	5.15	4.85			
HDR UNBIAS	3	15	4.99076	5.03	4.9534	0.022788	5.15	4.85	0.0014	0.00033912	
HDR UNBIAS	10	15	4.99365	5.0329	4.9562	0.0227757	5.15	4.85	0.00430012	0.00062249	
HDR UNBIAS	30	15	4.99624	5.0351	4.9585	0.0227486	5.15	4.85	0.00680018	0.00094908	
HDR UNBIAS	50	15	4.99411	5.0326	4.9568	0.0225334	5.15	4.85	0.00439977	0.00110876	
HDR UNBIAS	80	15	4.98811	5.0266	4.9506	0.0226856	5.15	4.85	-0.00129985	0.00139443	
HDR UNBIAS	100	15	4.98219	5.0202	4.9458	0.0223168	5.15	4.85	-0.00699997	0.00168477	

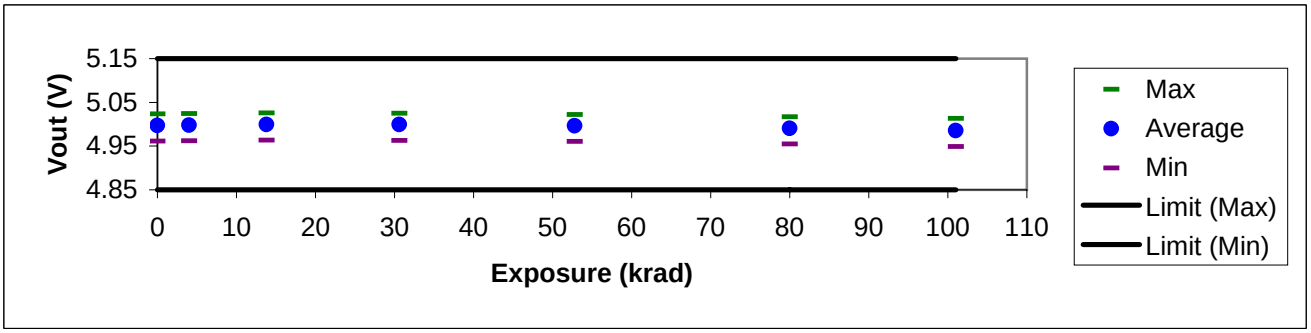
Plot of the average readings for each radiation/bias condition



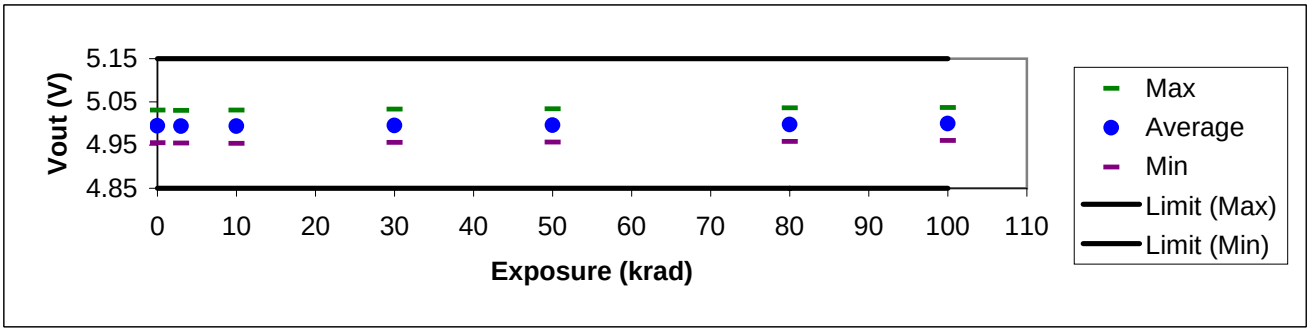
TEST ID: 10.6 Output Voltage; Vin = 7V, Iout = 5mA
Low dose rate biased



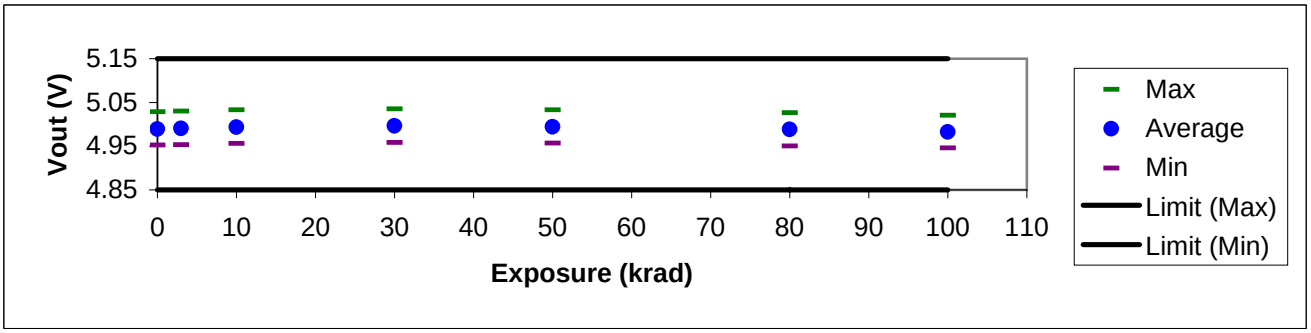
TEST ID: 10.6 Output Voltage; Vin = 7V, Iout = 5mA
Low dose rate unbiased



TEST ID: 10.6 Output Voltage; Vin = 7V, Iout = 5mA
High dose rate biased



TEST ID: 10.6 Output Voltage; Vin = 7V, Iout = 5mA
High dose rate unbiased



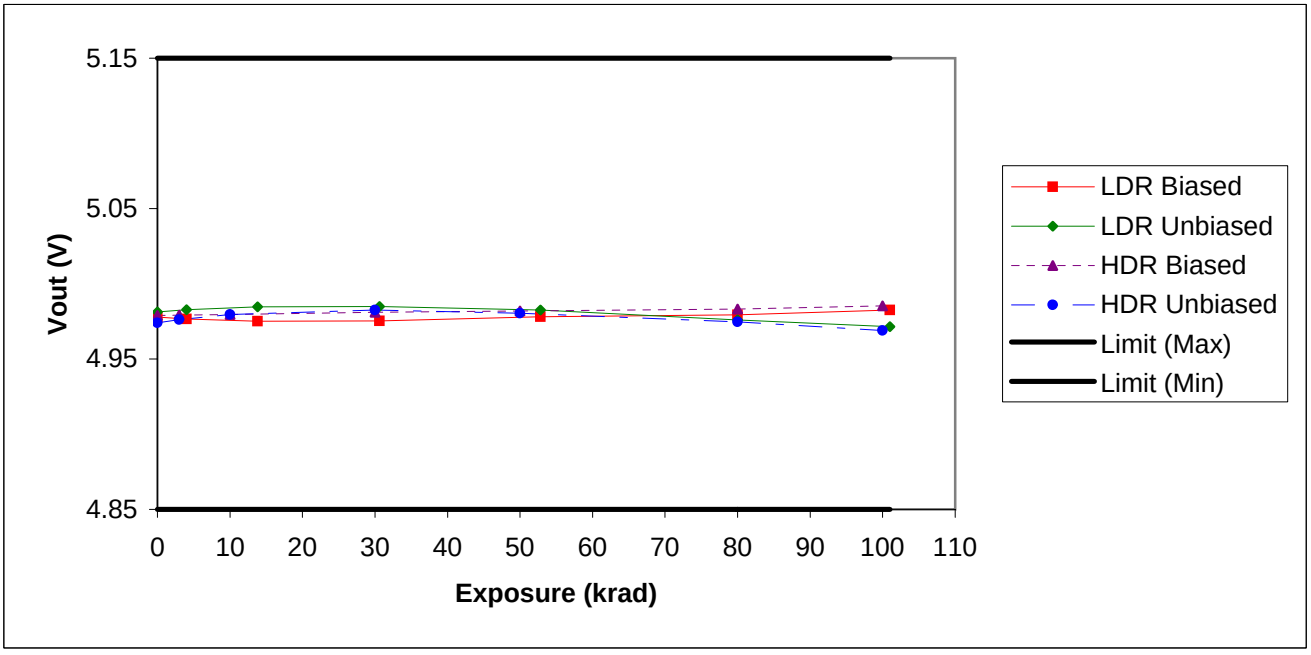
National Semiconductor

TEST ID: 11.25 Output Voltage; Vin = 6V, Iout = 5mA

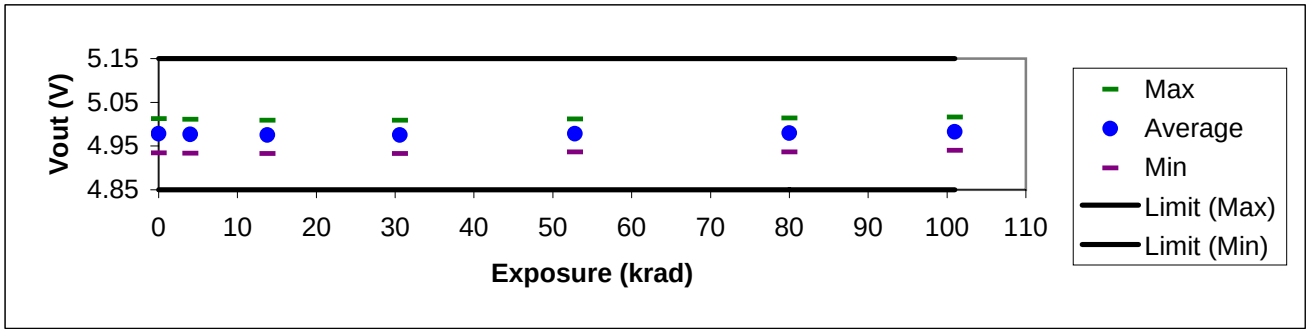
TEST ID: 11.25 VO @ Vin = 6V, Iout = 5mA V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.97792	5.0126	4.9341	0.0254662	5.15	4.85			
LDR BIASED	4	15	4.97659	5.011	4.9336	0.024989	5.15	4.85	-0.00159979	0.00068936	-8.00735773
LDR BIASED	13.8	15	4.97505	5.0087	4.9325	0.025057	5.15	4.85	-0.00279999	0.00062047	-3.49941884
LDR BIASED	30.6	15	4.97535	5.0091	4.9327	0.0250422	5.15	4.85	-0.00239993	0.00084493	-1.19976704
LDR BIASED	52.8	15	4.97814	5.0114	4.9363	0.0249156	5.15	4.85	0.00020027	0.00127564	0.0625834
LDR BIASED	80	15	4.97939	5.0138	4.9365	0.0251813	5.15	4.85	0.00169992	0.00123098	0.3953192
LDR BIASED	101	15	4.98254	5.016	4.9403	0.0250283	5.15	4.85	0.00470018	0.0013497	0.78335681
LDR UNBIAS	0	15	4.9813	5.0084	4.9446	0.0201291	5.15	4.85			
LDR UNBIAS	4	15	4.98285	5.0096	4.946	0.0200546	5.15	4.85	0.00149965	0.00042574	0.7892064
LDR UNBIAS	13.8	15	4.98475	5.0114	4.9482	0.0199326	5.15	4.85	0.00340032	0.00051946	0.61820403
LDR UNBIAS	30.6	15	4.98489	5.0111	4.948	0.0198955	5.15	4.85	0.00349999	0.00064574	0.42169418
LDR UNBIAS	52.8	15	4.98264	5.0089	4.9464	0.0196926	5.15	4.85	0.00129986	0.0008314	0.21664189
LDR UNBIAS	80	15	4.97589	5.0028	4.9398	0.0200151	5.15	4.85	-0.00559997	0.00088149	-11.1954618
LDR UNBIAS	101	15	4.97159	5	4.9346	0.0200018	5.15	4.85	-0.00979996	0.00119674	2.00000408
HDR BIASED	0	15	4.97894	5.016	4.9406	0.0219904	5.15	4.85			
HDR BIASED	3	15	4.97913	5.0159	4.9403	0.0218641	5.15	4.85	0.00019979	0.00079892	
HDR BIASED	10	15	4.97959	5.0169	4.9402	0.0219873	5.15	4.85	0.00080013	0.00078998	
HDR BIASED	30	15	4.98098	5.0185	4.9423	0.0220147	5.15	4.85	0.00200033	0.00091013	
HDR BIASED	50	15	4.98189	5.0193	4.9428	0.0220279	5.15	4.85	0.00320005	0.0010934	
HDR BIASED	80	15	4.98321	5.0209	4.9445	0.0217772	5.15	4.85	0.00430012	0.00137708	
HDR BIASED	100	15	4.98537	5.022	4.9464	0.0212219	5.15	4.85	0.00600005	0.00219196	
HDR UNBIAS	0	15	4.97411	5.0139	4.9369	0.0227114	5.15	4.85			
HDR UNBIAS	3	15	4.97617	5.0158	4.9386	0.0228208	5.15	4.85	0.0019002	0.00048794	
HDR UNBIAS	10	15	4.97956	5.0189	4.942	0.0227238	5.15	4.85	0.00550032	0.00082534	
HDR UNBIAS	30	15	4.98246	5.0214	4.9446	0.0227108	5.15	4.85	0.00829983	0.00123094	
HDR UNBIAS	50	15	4.98036	5.019	4.9431	0.0224736	5.15	4.85	0.00600004	0.00132105	
HDR UNBIAS	80	15	4.97467	5.0132	4.9371	0.0226412	5.15	4.85	0.0005002	0.00169811	
HDR UNBIAS	100	15	4.96895	5.0071	4.9324	0.0223128	5.15	4.85	-0.00489997	0.00200167	

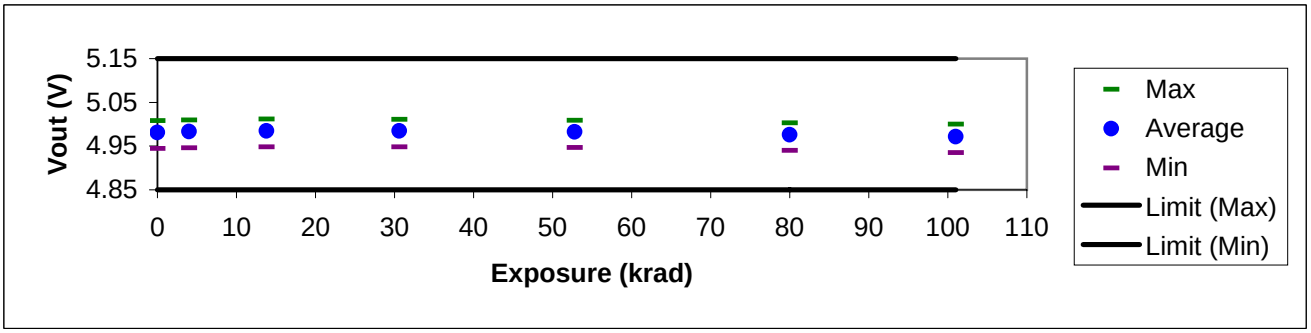
Plot of the average readings for each radiation/bias condition



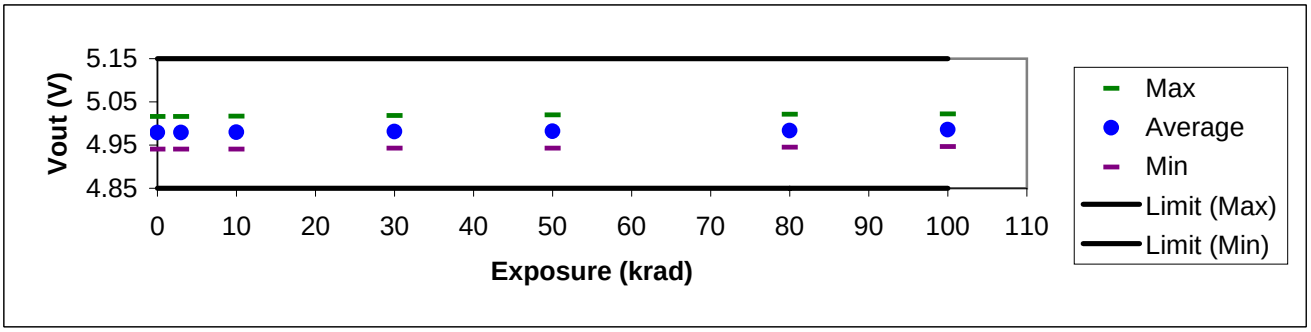
TEST ID: 11.25 Output Voltage; Vin = 6V, Iout = 5mA
Low dose rate biased



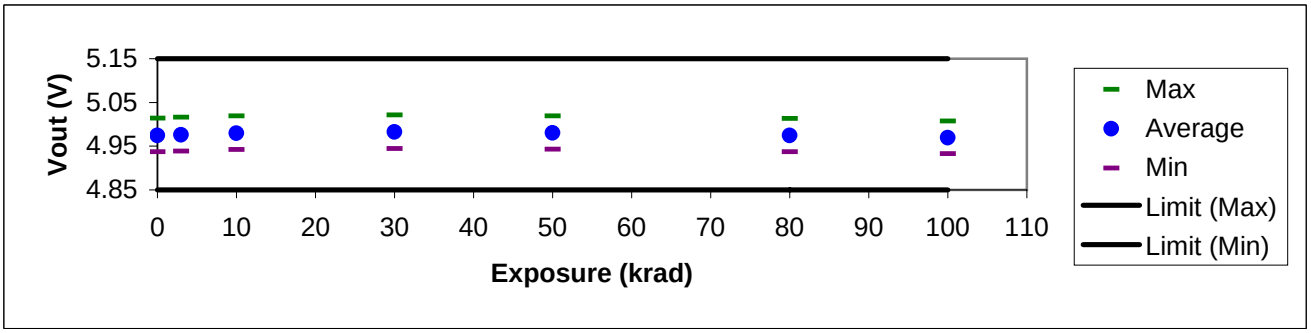
TEST ID: 11.25 Output Voltage; Vin = 6V, Iout = 5mA
Low dose rate unbiased



TEST ID: 11.25 Output Voltage; Vin = 6V, Iout = 5mA
High dose rate biased



TEST ID: 11.25 Output Voltage; Vin = 6V, Iout = 5mA
High dose rate unbiased



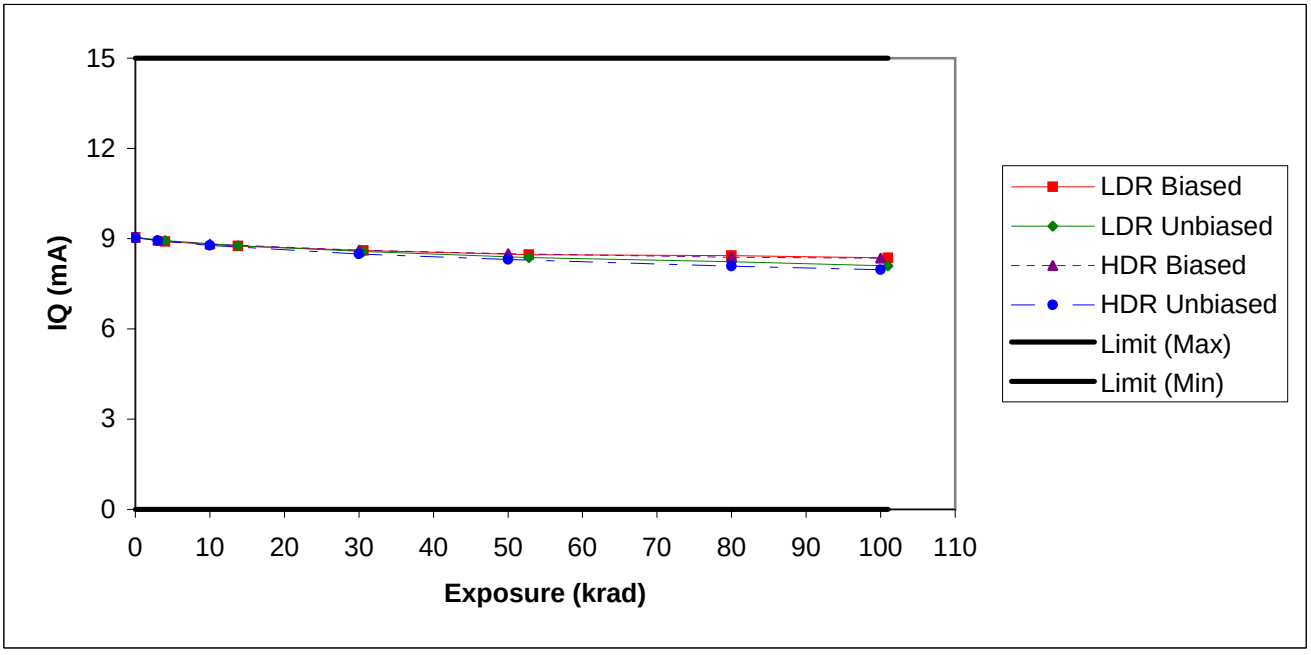
National Semiconductor

TEST ID: 12.7 Quiescent Current; IQ @ Vin = 7V, Iout = 5mA

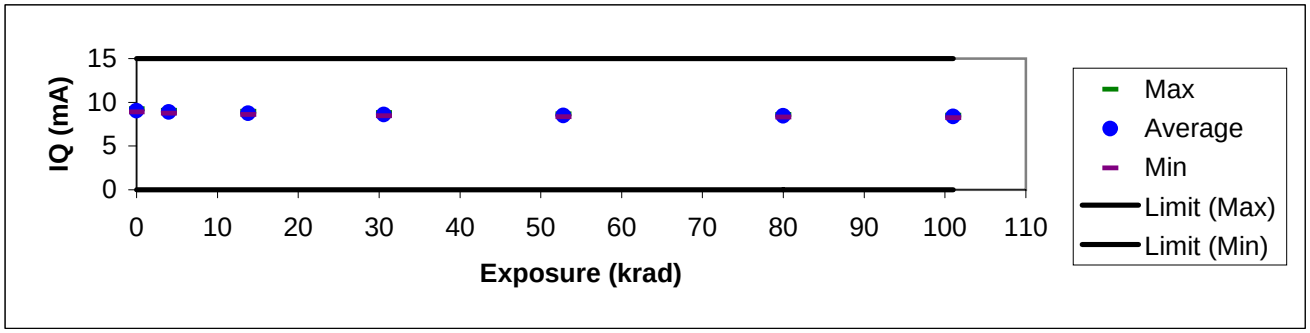
TEST ID: 12.7 IQ @ Vin = 7V, Iout = 5mA mA
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	9.04267	9.25	8.88	0.092309	15	0			
LDR BIASED	4	15	8.908	9.09	8.73	0.0914332	15	0	-0.13	0.0172657	1.3000078
LDR BIASED	13.8	15	8.75933	8.95	8.59	0.0874615	15	0	-0.28	0.0225727	1.21738601
LDR BIASED	30.6	15	8.60933	8.8	8.46	0.0840465	15	0	-0.43	0.0228871	1.02380952
LDR BIASED	52.8	15	8.47267	8.68	8.34	0.0881936	15	0	-0.57	0.0232994	1.0754717
LDR BIASED	80	15	8.43933	8.6	8.3	0.0830204	15	0	-0.59	0.0335234	0.90769231
LDR BIASED	101	15	8.36133	8.53	8.22	0.0832265	15	0	-0.679999	0.0289993	0.9855058
LDR UNBIAS	0	15	9.044	9.23	8.9	0.0891067	15	0			
LDR UNBIAS	4	15	8.932	9.14	8.81	0.0899365	15	0	-0.11	0.0165616	1.1000066
LDR UNBIAS	13.8	15	8.76867	8.98	8.63	0.089112	15	0	-0.27	0.0159763	1.03846553
LDR UNBIAS	30.6	15	8.57667	8.76	8.45	0.0890157	15	0	-0.47	0.0179151	0.87037037
LDR UNBIAS	52.8	15	8.376	8.57	8.23	0.091636	15	0	-0.66	0.0275681	0.90410959
LDR UNBIAS	80	15	8.23867	8.44	8.1	0.093493	15	0	-0.8	0.0294877	0.84210526
LDR UNBIAS	101	15	8.09467	8.26	7.94	0.0907797	15	0	-0.94	0.040438	0.8952381
HDR BIASED	0	15	9.04067	9.35	8.9	0.128312	15	0			
HDR BIASED	3	15	8.94267	9.25	8.81	0.124984	15	0	-0.0999994	0.0156753	
HDR BIASED	10	15	8.81667	9.11	8.7	0.11666	15	0	-0.230001	0.0229286	
HDR BIASED	30	15	8.61933	8.88	8.5	0.108131	15	0	-0.42	0.0322638	
HDR BIASED	50	15	8.49933	8.74	8.4	0.100957	15	0	-0.53	0.0371998	
HDR BIASED	80	15	8.38267	8.62	8.29	0.0980136	15	0	-0.65	0.0427953	
HDR BIASED	100	15	8.35533	8.61	8.24	0.103016	15	0	-0.69	0.0432382	
HDR UNBIAS	0	15	9.034	9.14	8.86	0.0836491	15	0			
HDR UNBIAS	3	15	8.93733	9.05	8.79	0.0795043	15	0	-0.0999994	0.0154304	
HDR UNBIAS	10	15	8.77467	8.88	8.6	0.0803446	15	0	-0.259999	0.0186957	
HDR UNBIAS	30	15	8.488	8.6	8.33	0.0793907	15	0	-0.54	0.0258569	
HDR UNBIAS	50	15	8.30467	8.43	8.13	0.0844196	15	0	-0.73	0.0293908	
HDR UNBIAS	80	15	8.082	8.19	7.91	0.0861228	15	0	-0.95	0.0364889	
HDR UNBIAS	100	15	7.97	8.08	7.79	0.087831	15	0	-1.05	0.0381352	

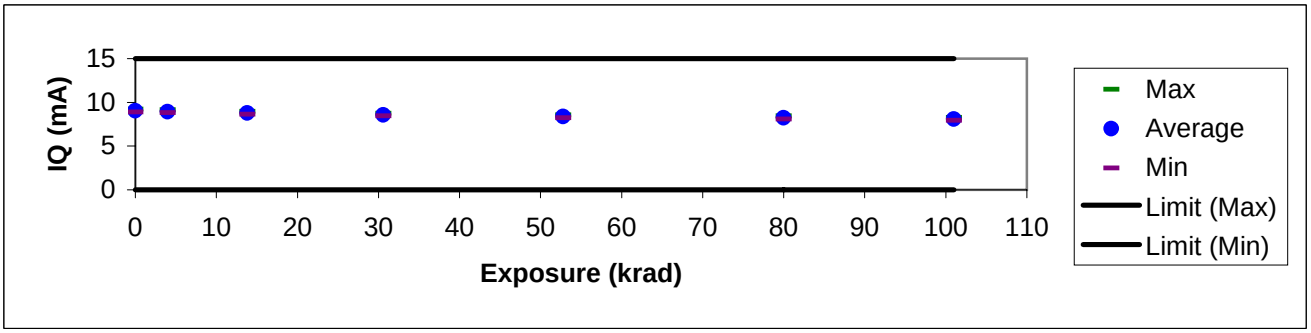
Plot of the average readings for each radiation/bias condition



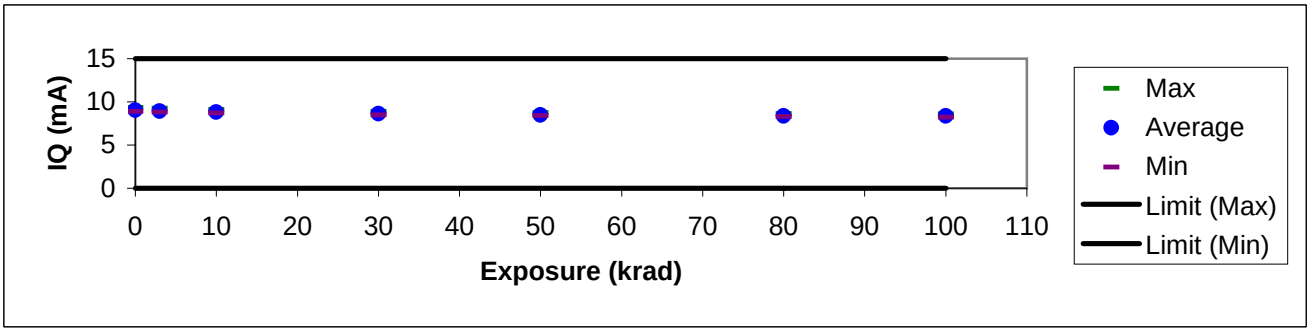
TEST ID: 12.7 Quiescent Current; IQ @ Vin = 7V, Iout = 5mA
Low dose rate biased



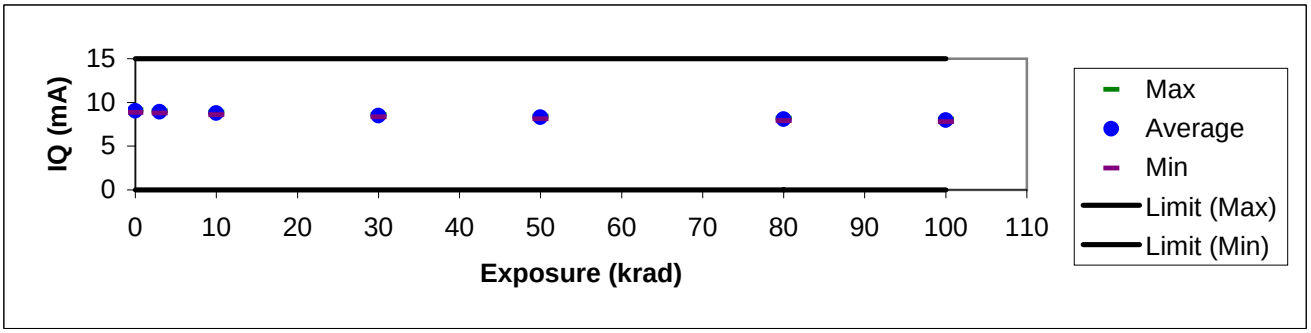
TEST ID: 12.7 Quiescent Current; IQ @ Vin = 7V, Iout = 5mA
Low dose rate unbiased



TEST ID: 12.7 Quiescent Current; IQ @ Vin = 7V, Iout = 5mA
High dose rate biased



TEST ID: 12.7 Quiescent Current; IQ @ Vin = 7V, Iout = 5mA
High dose rate unbiased



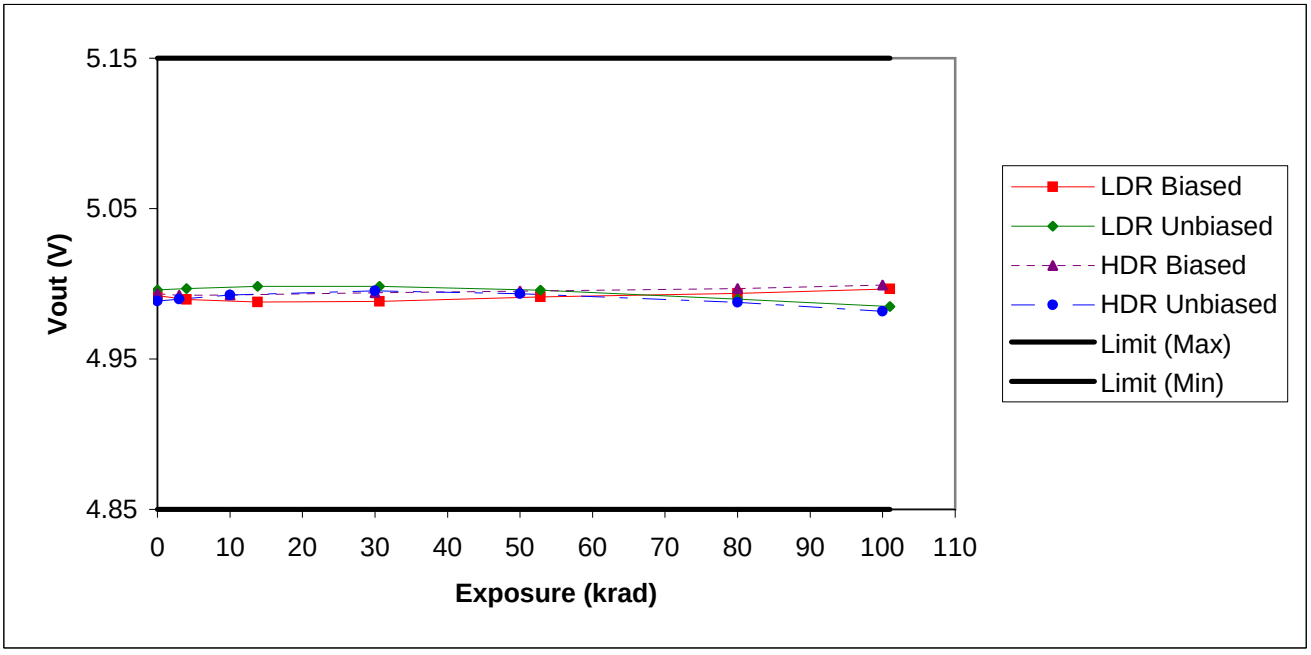
National Semiconductor

TEST ID: 13.8 Output Voltage; Vin = 26V, Iout = 5mA

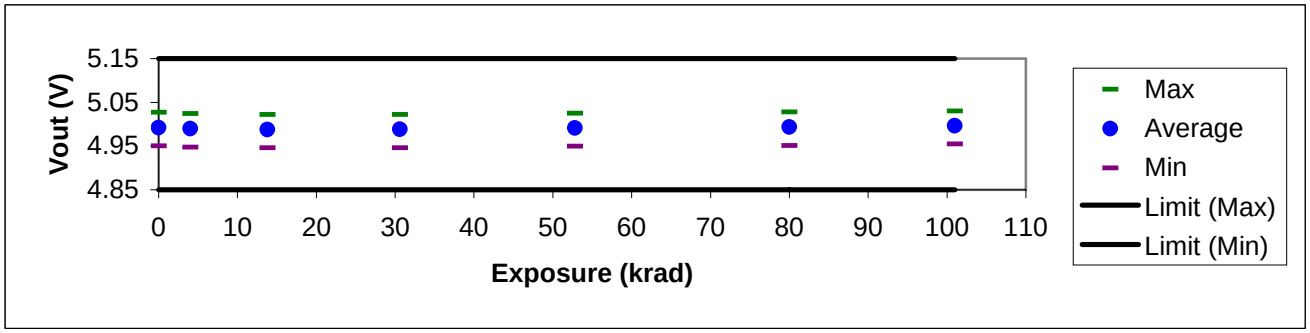
TEST ID: 13.8 VO @ Vin = 26V, Iout = 5mA V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.99223	5.027	4.9499	0.0250176	5.15	4.85			
LDR BIASED	4	15	4.98953	5.0238	4.9472	0.0248728	5.15	4.85	-0.00269986	0.0003262	2.700049
LDR BIASED	13.8	15	4.98789	5.0217	4.9456	0.024991	5.15	4.85	-0.00419998	0.00051118	4.66768171
LDR BIASED	30.6	15	4.9884	5.0222	4.9461	0.0249624	5.15	4.85	-0.00379992	0.00085165	-3.80018601
LDR BIASED	52.8	15	4.9912	5.0246	4.9495	0.0248648	5.15	4.85	-0.00089979	0.0012275	-0.49986667
LDR BIASED	80	15	4.99361	5.0276	4.9511	0.0250953	5.15	4.85	0.00129986	0.00131656	0.36110733
LDR BIASED	101	15	4.99662	5.0299	4.9549	0.0249144	5.15	4.85	0.00499964	0.00143725	0.86197123
LDR UNBIAS	0	15	4.99588	5.0225	4.9604	0.0196729	5.15	4.85			
LDR UNBIAS	4	15	4.99674	5.0231	4.9611	0.0196937	5.15	4.85	0.00089979	0.00026412	0.74999375
LDR UNBIAS	13.8	15	4.99835	5.0245	4.9626	0.0196551	5.15	4.85	0.00230026	0.00043827	0.54768226
LDR UNBIAS	30.6	15	4.99831	5.024	4.9623	0.0196236	5.15	4.85	0.00260019	0.00059458	0.37684787
LDR UNBIAS	52.8	15	4.99575	5.0215	4.9601	0.0195175	5.15	4.85	-0.00010013	0.00077339	-0.02176715
LDR UNBIAS	80	15	4.98973	5.0162	4.9538	0.0198339	5.15	4.85	-0.00629997	0.00081131	7.87368303
LDR UNBIAS	101	15	4.98496	5.0127	4.9486	0.0198278	5.15	4.85	-0.0105	0.00105035	1.61532497
HDR BIASED	0	15	4.99335	5.0301	4.9539	0.0218288	5.15	4.85			
HDR BIASED	3	15	4.99229	5.0292	4.9529	0.0218495	5.15	4.85	-0.00099993	0.00037006	
HDR BIASED	10	15	4.99255	5.03	4.9529	0.022006	5.15	4.85	-0.0008998	0.00044155	
HDR BIASED	30	15	4.99407	5.0318	4.955	0.0220434	5.15	4.85	0.00099993	0.00082586	
HDR BIASED	50	15	4.99515	5.0328	4.9557	0.0220505	5.15	4.85	0.00180006	0.00089755	
HDR BIASED	80	15	4.99682	5.0348	4.9577	0.0218109	5.15	4.85	0.00359965	0.00121972	
HDR BIASED	100	15	4.99919	5.0361	4.9598	0.0212453	5.15	4.85	0.00580024	0.00198729	
HDR UNBIAS	0	15	4.98843	5.0278	4.9517	0.0226884	5.15	4.85			
HDR UNBIAS	3	15	4.98973	5.029	4.9526	0.0227858	5.15	4.85	0.00119973	0.00031512	
HDR UNBIAS	10	15	4.99263	5.0318	4.9553	0.0227587	5.15	4.85	0.00419999	0.00058492	
HDR UNBIAS	30	15	4.99537	5.0344	4.9577	0.0227714	5.15	4.85	0.00689984	0.00092799	
HDR UNBIAS	50	15	4.99344	5.032	4.9561	0.0226011	5.15	4.85	0.00460005	0.00106997	
HDR UNBIAS	80	15	4.98762	5.0261	4.9502	0.0226646	5.15	4.85	-0.00080013	0.00135854	
HDR UNBIAS	100	15	4.98174	5.0198	4.9453	0.0223586	5.15	4.85	-0.00650024	0.00162668	

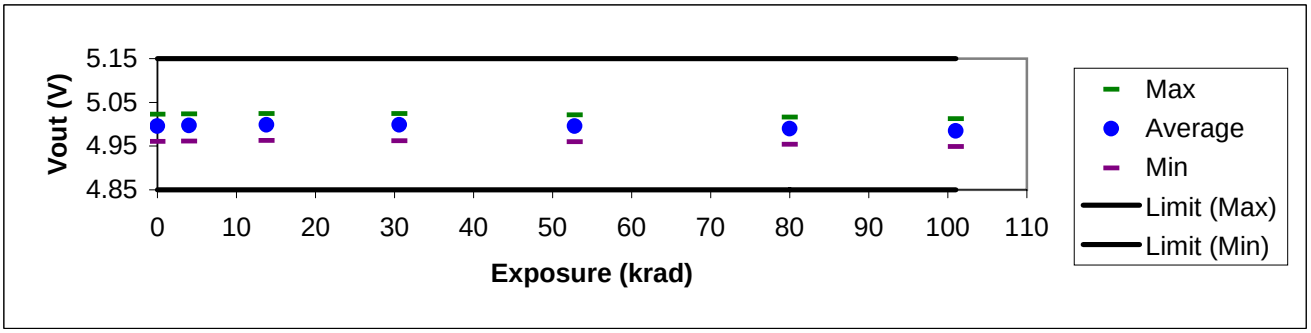
Plot of the average readings for each radiation/bias condition



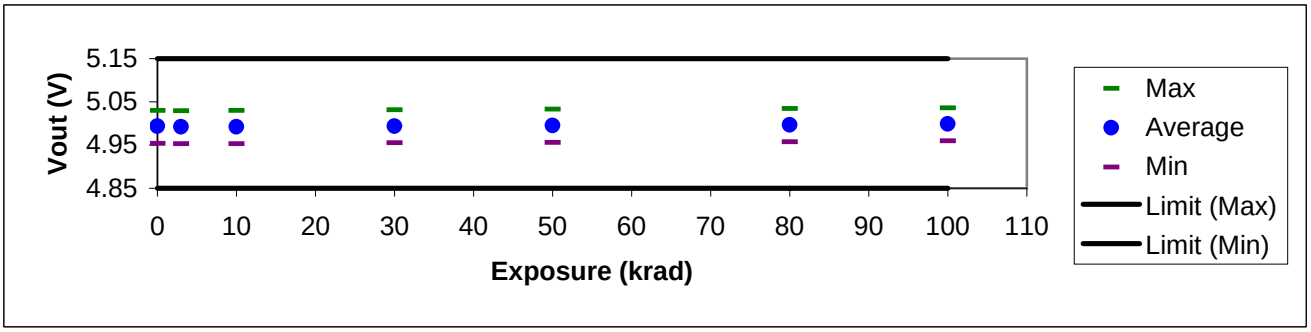
TEST ID: 13.8 Output Voltage; Vin = 26V, Iout = 5mA
Low dose rate biased



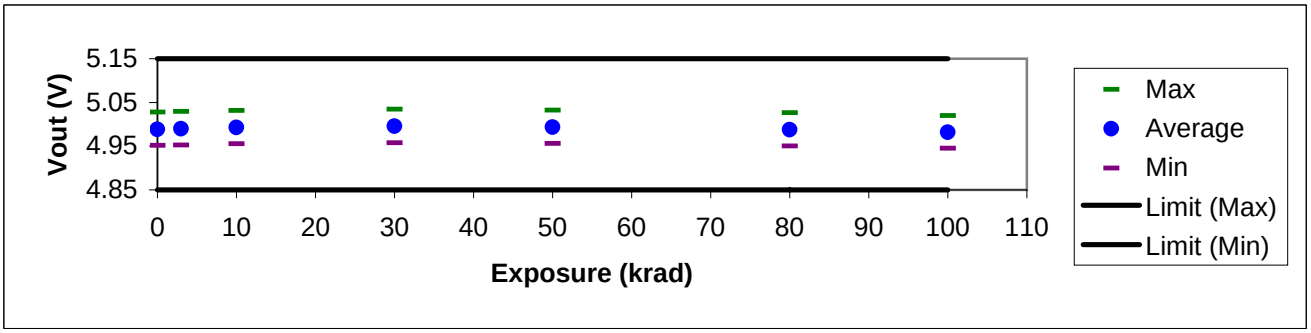
TEST ID: 13.8 Output Voltage; Vin = 26V, Iout = 5mA
Low dose rate unbiased



TEST ID: 13.8 Output Voltage; Vin = 26V, Iout = 5mA
High dose rate biased



TEST ID: 13.8 Output Voltage; Vin = 26V, Iout = 5mA
High dose rate unbiased



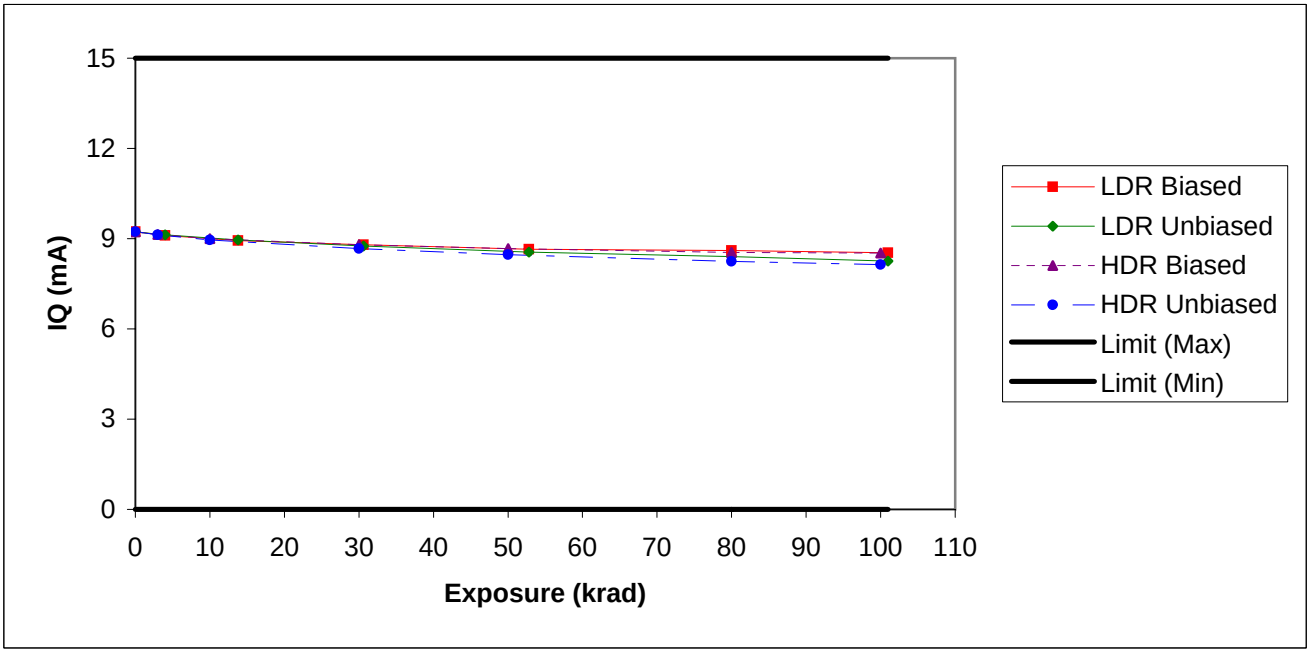
National Semiconductor

TEST ID: 14.9 Quiescent Current; IQ @ Vin = 26V, Iout = 5mA

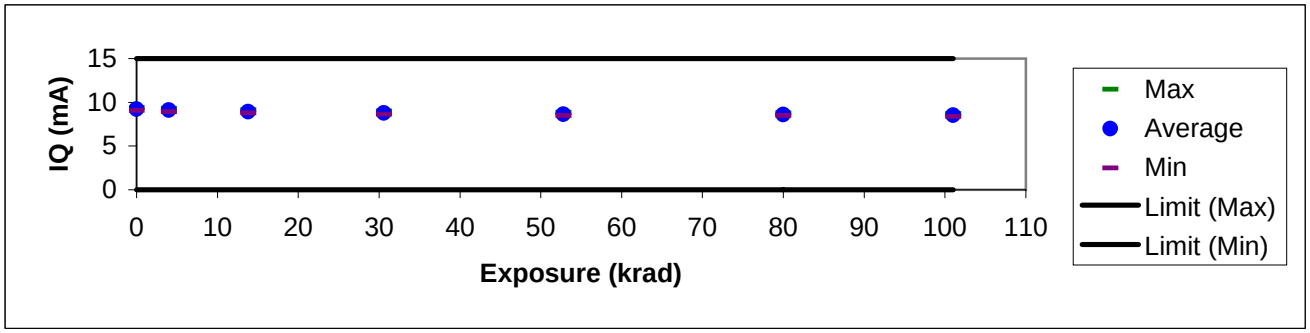
TEST ID: 14.9 IQ @ Vin = 26V, Iout = 5mA mA
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	9.22933	9.42	9.06	0.0938438	15	0			
LDR BIASED	4	15	9.104	9.31	8.93	0.0971595	15	0	-0.120001	0.0282507	1.20001
LDR BIASED	13.8	15	8.938	9.14	8.79	0.0921335	15	0	-0.29	0.0274815	1.26086957
LDR BIASED	30.6	15	8.79667	9.01	8.65	0.0907641	15	0	-0.43	0.0312745	1.02380952
LDR BIASED	52.8	15	8.64733	8.85	8.48	0.0905119	15	0	-0.580001	0.0236642	1.03571792
LDR BIASED	80	15	8.60667	8.79	8.47	0.087396	15	0	-0.62	0.0315021	0.91176471
LDR BIASED	101	15	8.52933	8.71	8.39	0.0871342	15	0	-0.71	0.0290319	1.01428427
LDR UNBIAS	0	15	9.22533	9.42	9.08	0.091719	15	0			
LDR UNBIAS	4	15	9.12733	9.34	8.97	0.0983773	15	0	-0.1	0.0126491	0.90909091
LDR UNBIAS	13.8	15	8.95467	9.15	8.84	0.0858458	15	0	-0.27	0.0246305	1
LDR UNBIAS	30.6	15	8.75533	8.93	8.62	0.0865916	15	0	-0.47	0.0210442	0.8245614
LDR UNBIAS	52.8	15	8.548	8.75	8.4	0.0911983	15	0	-0.67	0.0349421	0.87012987
LDR UNBIAS	80	15	8.40467	8.61	8.25	0.0988408	15	0	-0.82	0.0375053	0.83673469
LDR UNBIAS	101	15	8.25667	8.46	8.09	0.0941629	15	0	-0.96	0.0435671	0.87272727
HDR BIASED	0	15	9.22667	9.54	9.09	0.128489	15	0			
HDR BIASED	3	15	9.13333	9.41	8.99	0.12585	15	0	-0.1	0.0202368	
HDR BIASED	10	15	8.99733	9.26	8.86	0.11628	15	0	-0.23	0.0246305	
HDR BIASED	30	15	8.80067	9.07	8.69	0.108197	15	0	-0.42	0.0258568	
HDR BIASED	50	15	8.66933	8.91	8.55	0.102641	15	0	-0.559999	0.0349422	
HDR BIASED	80	15	8.54333	8.8	8.42	0.102307	15	0	-0.68	0.0399402	
HDR BIASED	100	15	8.52	8.79	8.39	0.110905	15	0	-0.700001	0.0392186	
HDR UNBIAS	0	15	9.23467	9.34	9.08	0.0789093	15	0			
HDR UNBIAS	3	15	9.12933	9.25	8.96	0.0839614	15	0	-0.11	0.0216684	
HDR UNBIAS	10	15	8.956	9.05	8.79	0.0830492	15	0	-0.27	0.0229492	
HDR UNBIAS	30	15	8.66933	8.79	8.48	0.093003	15	0	-0.57	0.0264215	
HDR UNBIAS	50	15	8.47267	8.59	8.29	0.0881125	15	0	-0.77	0.0336367	
HDR UNBIAS	80	15	8.244	8.36	8.06	0.0880584	15	0	-0.98	0.0414843	
HDR UNBIAS	100	15	8.13533	8.27	7.96	0.0916412	15	0	-1.1	0.0438287	

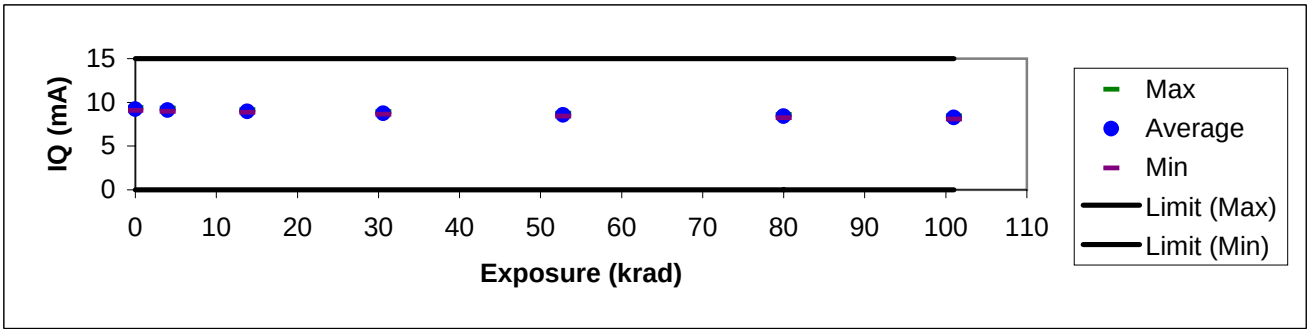
Plot of the average readings for each radiation/bias condition



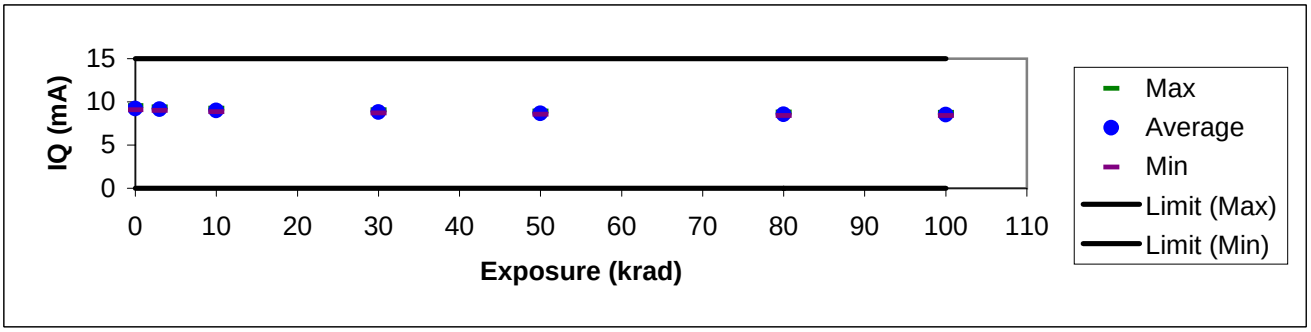
TEST ID: 14.9 Quiescent Current; IQ @ Vin = 26V, Iout = 5mA
Low dose rate biased



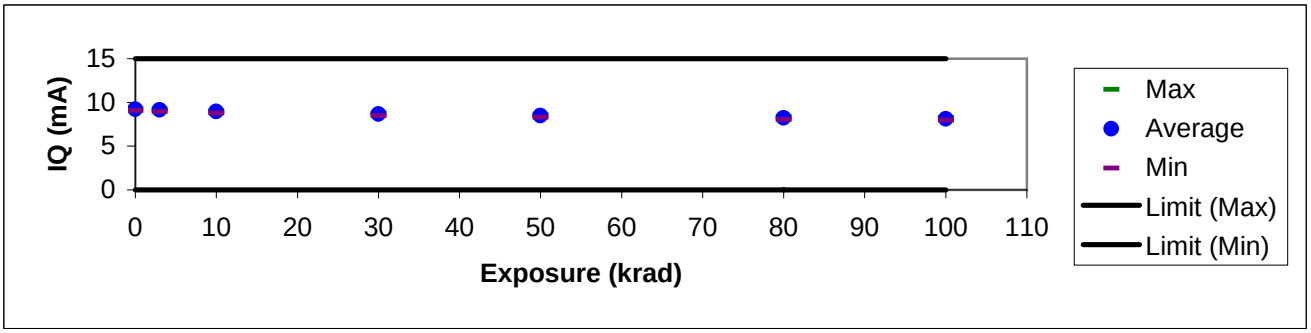
TEST ID: 14.9 Quiescent Current; IQ @ Vin = 26V, Iout = 5mA
Low dose rate unbiased



TEST ID: 14.9 Quiescent Current; IQ @ Vin = 26V, Iout = 5mA
High dose rate biased



TEST ID: 14.9 Quiescent Current; IQ @ Vin = 26V, Iout = 5mA
High dose rate unbiased

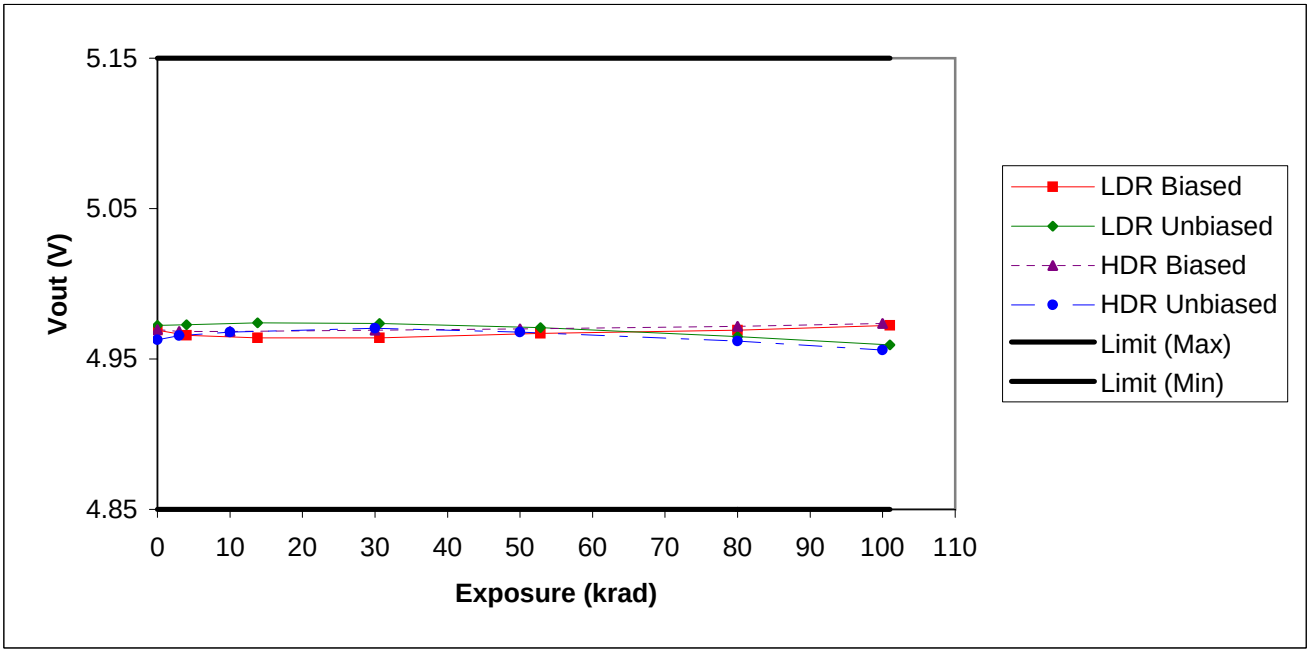


National Semiconductor

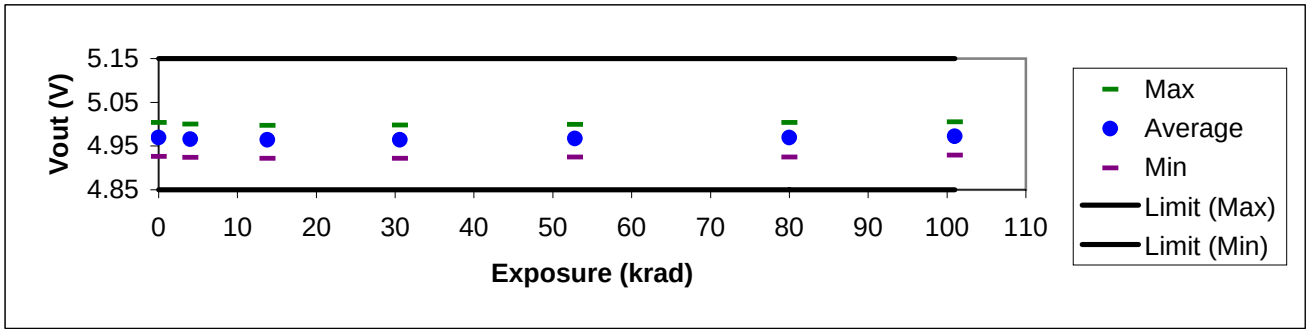
TEST ID: 15.10 Output Voltage; Vin = 10V, Iout = 1A

TEST ID:	15.1	VO @ Vin = 10V, Iout = 1A				V					
EM8A6603A019 EM8A6604K019 EM8A6605H019											
									Delta Median	Delta Sigma	Delta Ratio
TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	From 0K	From 0K	LDR/HDR
LDR BIASED	0	15	4.96913	5.0035	4.9262	0.0248458	5.15	4.85			
LDR BIASED	4	15	4.96581	5.0001	4.9237	0.0247489	5.15	4.85	-0.00339985	0.00093258	2.61458542
LDR BIASED	13.8	15	4.96409	4.9974	4.9215	0.0248664	5.15	4.85	-0.00480032	0.00065978	3.42882449
LDR BIASED	30.6	15	4.96413	4.9978	4.9215	0.0250839	5.15	4.85	-0.00510025	0.00118413	8.50240056
LDR BIASED	52.8	15	4.96697	4.9995	4.9247	0.0248691	5.15	4.85	-0.00159979	0.0014721	-2.66693895
LDR BIASED	80	15	4.96911	5.0036	4.925	0.0252141	5.15	4.85	0.0005002	0.00143434	0.22735124
LDR BIASED	101	15	4.97227	5.0053	4.9293	0.0249438	5.15	4.85	0.00340033	0.00169943	0.91894602
LDR UNBIAS	0	15	4.97242	4.998	4.9363	0.0194016	5.15	4.85			
LDR UNBIAS	4	15	4.97284	5.0003	4.9368	0.0196983	5.15	4.85	0.0005002	0.00086622	0.45489683
LDR UNBIAS	13.8	15	4.97407	5.0005	4.9378	0.0197444	5.15	4.85	0.00159979	0.00062095	0.45708416
LDR UNBIAS	30.6	15	4.97358	4.999	4.9379	0.0196188	5.15	4.85	0.00139999	0.001035	0.24560754
LDR UNBIAS	52.8	15	4.97079	4.9956	4.9349	0.0195105	5.15	4.85	-0.00159979	0.000978	-0.44443055
LDR UNBIAS	80	15	4.96491	4.9921	4.929	0.019886	5.15	4.85	-0.00740003	0.00130813	2.74041691
LDR UNBIAS	101	15	4.95945	4.9864	4.9225	0.0200107	5.15	4.85	-0.0128999	0.00139556	1.48276417
HDR BIASED	0	15	4.96967	5.0072	4.93	0.0219075	5.15	4.85			
HDR BIASED	3	15	4.96833	5.0049	4.9277	0.0220242	5.15	4.85	-0.00130034	0.00079447	
HDR BIASED	10	15	4.96837	5.0058	4.9285	0.022064	5.15	4.85	-0.00139999	0.00074357	
HDR BIASED	30	15	4.96923	5.007	4.9294	0.0222787	5.15	4.85	-0.00059986	0.00086516	
HDR BIASED	50	15	4.97006	5.0083	4.9307	0.0221928	5.15	4.85	0.00059986	0.00100609	
HDR BIASED	80	15	4.97161	5.0096	4.9324	0.0218812	5.15	4.85	0.00220012	0.001197	
HDR BIASED	100	15	4.97357	5.0105	4.9345	0.0212835	5.15	4.85	0.00370025	0.00176343	
HDR UNBIAS	0	15	4.96279	5.0033	4.9276	0.0219257	5.15	4.85			
HDR UNBIAS	3	15	4.96562	5.0044	4.9269	0.0229213	5.15	4.85	0.00109959	0.00707393	
HDR UNBIAS	10	15	4.96795	5.0069	4.9294	0.0228149	5.15	4.85	0.00349999	0.00678881	
HDR UNBIAS	30	15	4.97032	5.0098	4.9316	0.0228314	5.15	4.85	0.00570011	0.00694393	
HDR UNBIAS	50	15	4.96797	5.0069	4.9291	0.0228949	5.15	4.85	0.00359964	0.00722303	
HDR UNBIAS	80	15	4.96183	5.0006	4.9228	0.0229675	5.15	4.85	-0.00270033	0.00776134	
HDR UNBIAS	100	15	4.95602	4.9938	4.9189	0.0223816	5.15	4.85	-0.0086999	0.00782664	

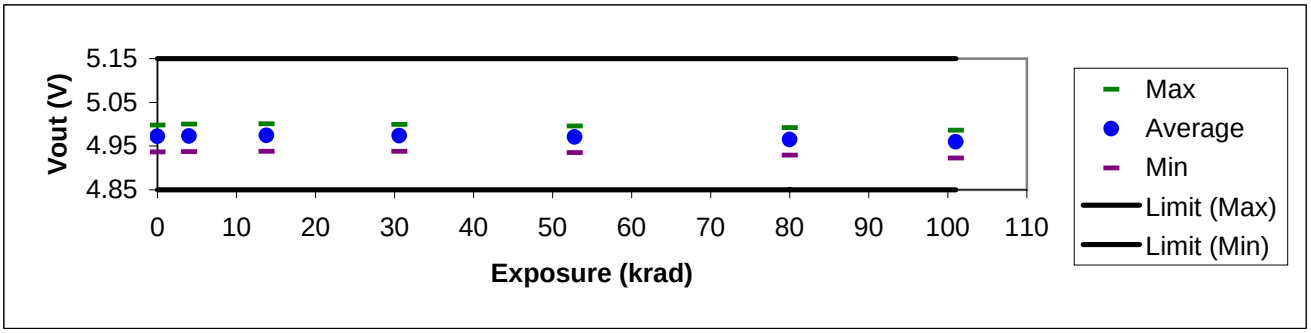
Plot of the average readings for each radiation/bias condition



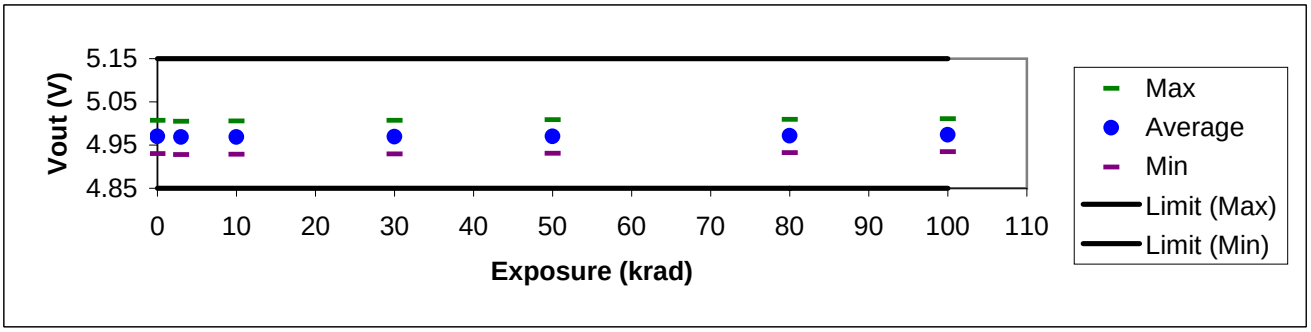
TEST ID: 15.10 Output Voltage; Vin = 10V, Iout = 1A
Low dose rate biased



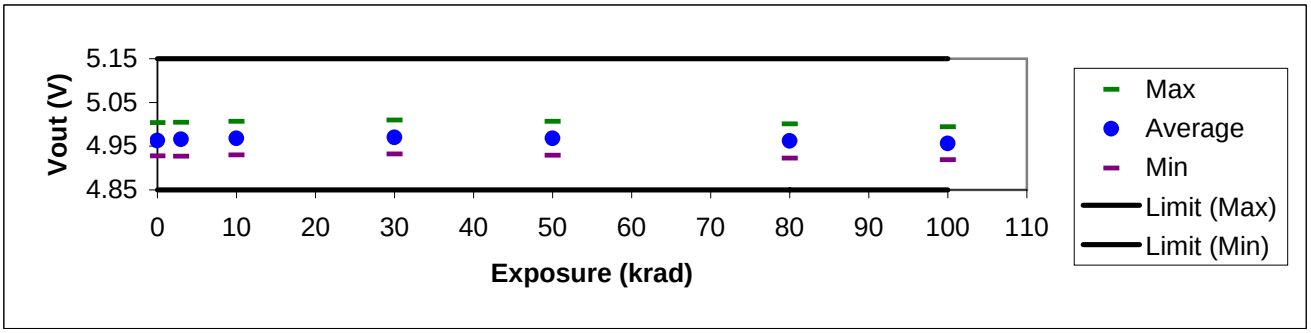
TEST ID: 15.10 Output Voltage; Vin = 10V, Iout = 1A
Low dose rate unbiased



TEST ID: 15.10 Output Voltage; Vin = 10V, Iout = 1A
High dose rate biased



TEST ID: 15.10 Output Voltage; Vin = 10V, Iout = 1A
High dose rate unbiased



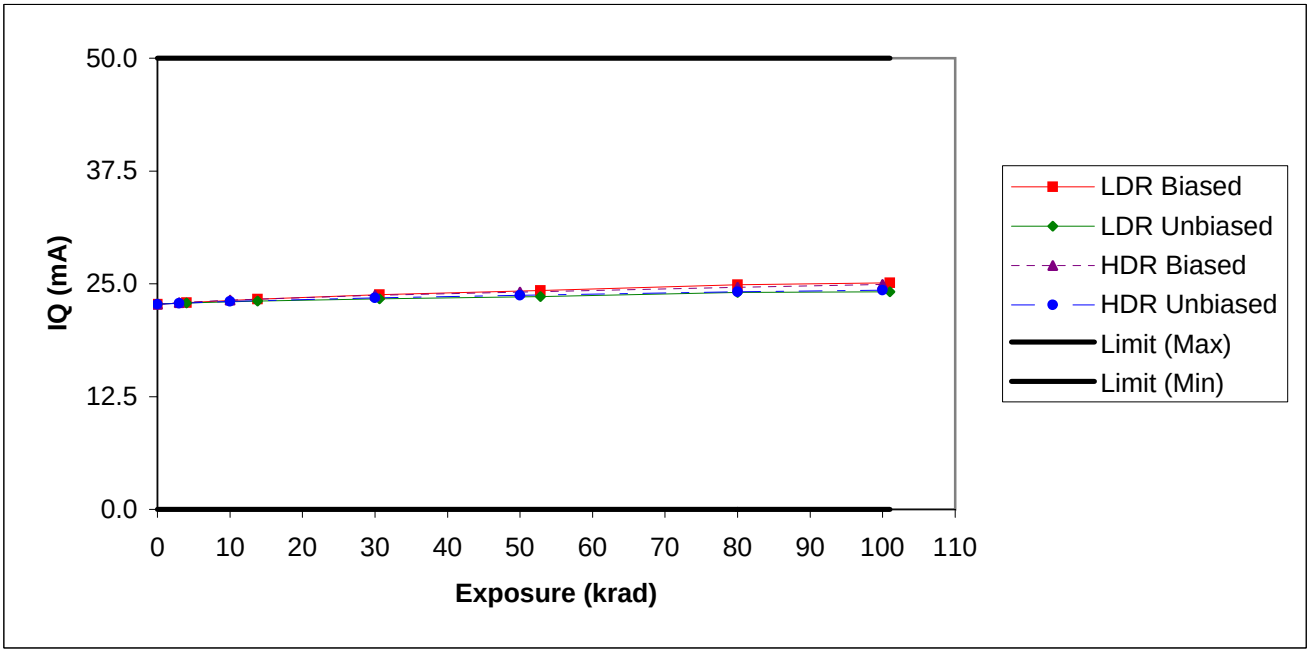
National Semiconductor

TEST ID: 16.11 Quiescent Current; IQ @ Vin = 10V, Iout = 1A

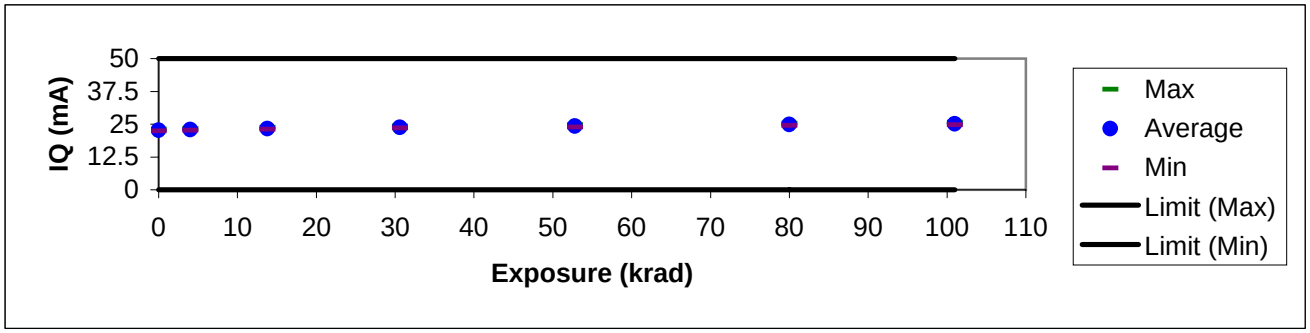
TEST ID: 16.11 IQ @ Vin = 10V, Iout = 1A mA
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	22.7333	23.1	22.5	0.205866	50	0			
LDR BIASED	4	15	22.92	23.3	22.7	0.217781	50	0	0.200001	0.0351865	1.00001
LDR BIASED	13.8	15	23.3067	23.8	23.1	0.228244	50	0	0.6	0.0593616	1.5
LDR BIASED	30.6	15	23.78	24.3	23.5	0.236643	50	0	1	0.0743223	1
LDR BIASED	52.8	15	24.24	24.7	23.9	0.247271	50	0	1.5	0.0883719	1.15384615
LDR BIASED	80	15	24.9	25.4	24.5	0.264575	50	0	2.2	0.11127	1.15789474
LDR BIASED	101	15	25.12	25.7	24.7	0.309839	50	0	2.4	0.150555	1.09090909
LDR UNBIAS	0	15	22.7733	23.1	22.5	0.170991	50	0			
LDR UNBIAS	4	15	22.8867	23.3	22.6	0.188477	50	0	0.1	0.0351865	1
LDR UNBIAS	13.8	15	23.08	23.5	22.8	0.200713	50	0	0.299999	0.0593621	1
LDR UNBIAS	30.6	15	23.32	23.7	23	0.204241	50	0	0.599998	0.0639942	0.85713878
LDR UNBIAS	52.8	15	23.5933	24	23.2	0.234419	50	0	0.800001	0.0861897	0.800001
LDR UNBIAS	80	15	24.04	24.5	23.7	0.250143	50	0	1.3	0.117514	0.92857143
LDR UNBIAS	101	15	24.12	24.6	23.8	0.254109	50	0	1.3	0.124595	0.86666667
HDR BIASED	0	15	22.7467	23.2	22.4	0.223181	50	0			
HDR BIASED	3	15	22.9133	23.4	22.6	0.24456	50	0	0.199999	0.0487949	
HDR BIASED	10	15	23.18	23.7	22.8	0.256905	50	0	0.4	0.0617216	
HDR BIASED	30	15	23.72	24.2	23.4	0.265115	50	0	1	0.079881	
HDR BIASED	50	15	24.0667	24.6	23.7	0.291956	50	0	1.3	0.114643	
HDR BIASED	80	15	24.6133	25.2	24.2	0.329213	50	0	1.9	0.149603	
HDR BIASED	100	15	24.9133	25.6	24.5	0.350238	50	0	2.2	0.171825	
HDR UNBIAS	0	15	22.74	23	22.3	0.199284	50	0			
HDR UNBIAS	3	15	22.84	23.2	22.4	0.206329	50	0	0.1	0.0534522	
HDR UNBIAS	10	15	23.0333	23.4	22.6	0.212692	50	0	0.299999	0.0457737	
HDR UNBIAS	30	15	23.4267	23.8	23	0.215362	50	0	0.700001	0.05164	
HDR UNBIAS	50	15	23.7267	24.1	23.3	0.221897	50	0	1	0.0743223	
HDR UNBIAS	80	15	24.12	24.6	23.7	0.256905	50	0	1.4	0.108233	
HDR UNBIAS	100	15	24.3067	24.8	23.9	0.243389	50	0	1.5	0.104653	

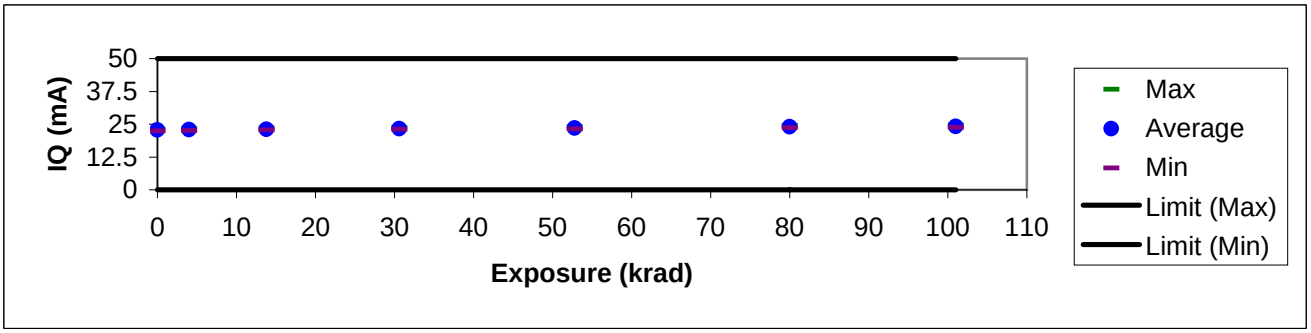
Plot of the average readings for each radiation/bias condition



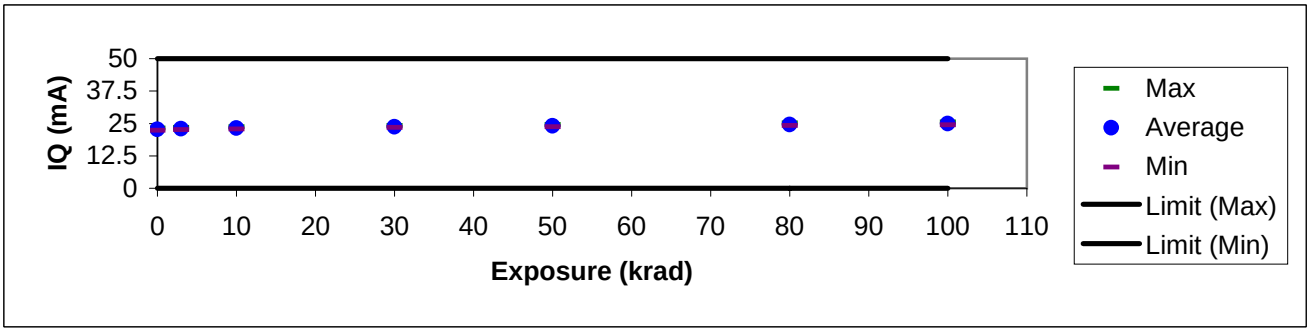
TEST ID: 16.11 Quiescent Current; IQ @ Vin = 10V, Iout = 1A
Low dose rate biased



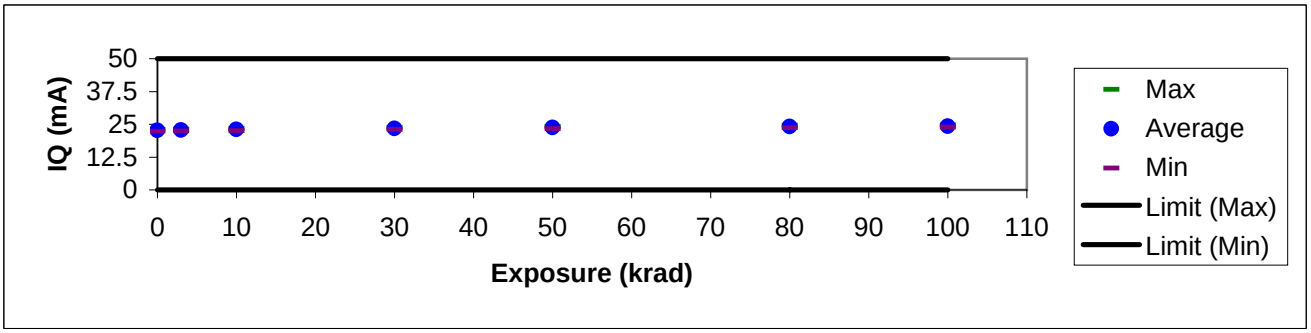
TEST ID: 16.11 Quiescent Current; IQ @ Vin = 10V, Iout = 1A
Low dose rate unbiased



TEST ID: 16.11 Quiescent Current; IQ @ Vin = 10V, Iout = 1A
High dose rate biased



TEST ID: 16.11 Quiescent Current; IQ @ Vin = 10V, Iout = 1A
High dose rate unbiased



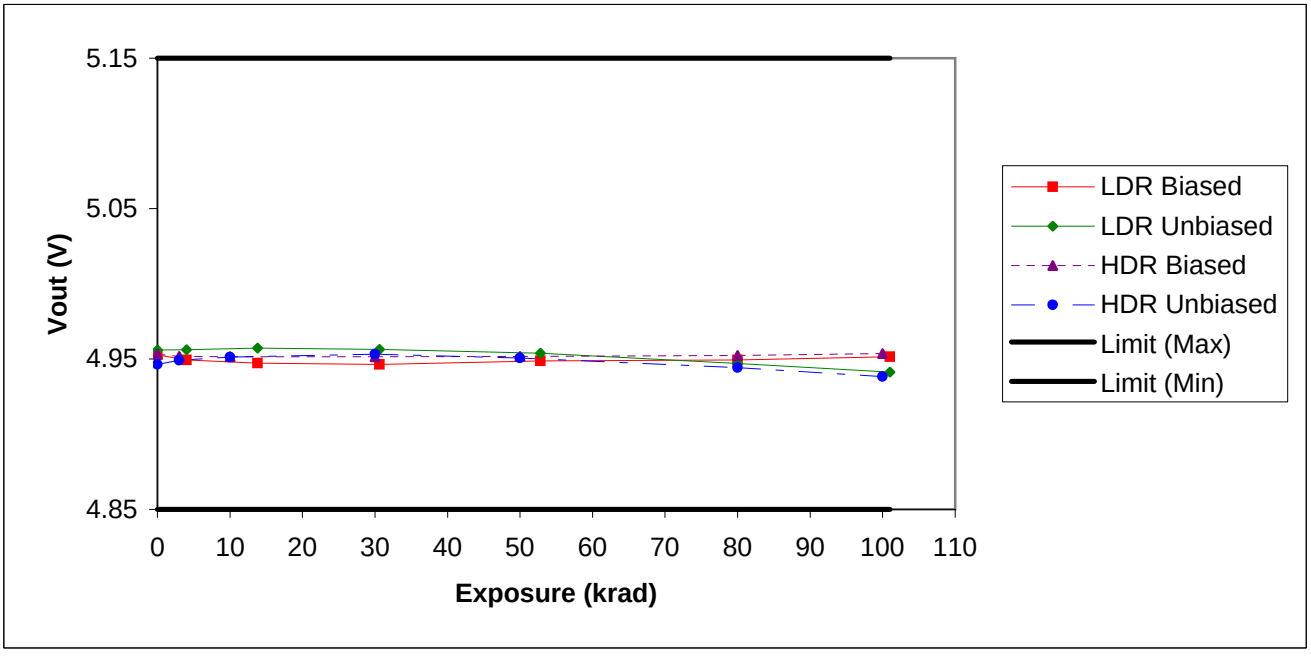
National Semiconductor

TEST ID: 17.24 Output Voltage; Vin = 6V, Iout = 1A

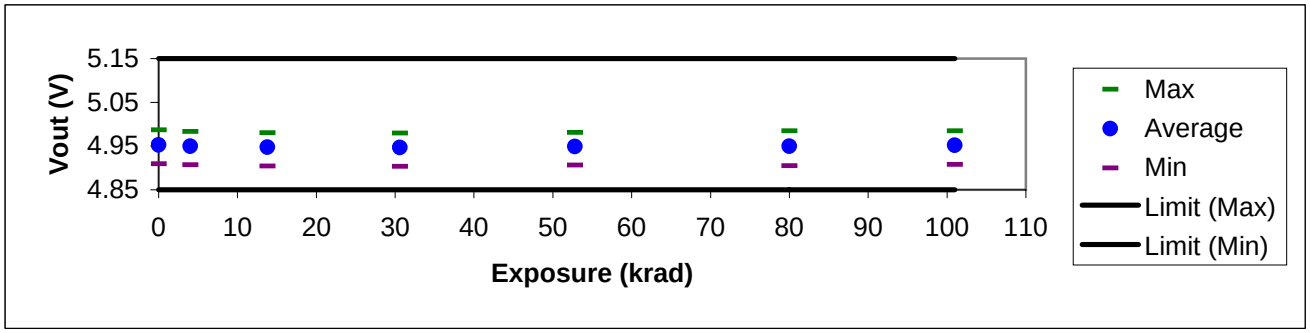
TEST ID: 17.24 VO @ Vin = 6V, Iout = 1A V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.95273	4.987	4.9094	0.0249958	5.15	4.85			
LDR BIASED	4	15	4.94943	4.9835	4.9068	0.0247983	5.15	4.85	-0.00339985	0.00096033	2.42846429
LDR BIASED	13.8	15	4.94717	4.9803	4.9042	0.0249917	5.15	4.85	-0.00559998	0.00074337	3.73299647
LDR BIASED	30.6	15	4.94638	4.9798	4.9033	0.0251439	5.15	4.85	-0.00619983	0.00122528	3.647109
LDR BIASED	52.8	15	4.94871	4.981	4.9062	0.0249501	5.15	4.85	-0.00360012	0.00149567	2.76862027
LDR BIASED	80	15	4.94941	4.9843	4.905	0.0252193	5.15	4.85	-0.00269985	0.00148282	5.40272553
LDR BIASED	101	15	4.95159	4.9843	4.9081	0.0250077	5.15	4.85	-0.00099993	0.00178869	-4.99290957
LDR UNBIAS	0	15	4.95586	4.9826	4.9195	0.0196138	5.15	4.85			
LDR UNBIAS	4	15	4.95624	4.984	4.9199	0.019798	5.15	4.85	0.00040007	0.00070026	0.44462597
LDR UNBIAS	13.8	15	4.95719	4.984	4.9206	0.0198289	5.15	4.85	0.00130033	0.00060441	0.39401671
LDR UNBIAS	30.6	15	4.95639	4.9822	4.92	0.0197838	5.15	4.85	0.00069999	0.00105276	0.14582153
LDR UNBIAS	52.8	15	4.9538	4.9789	4.9177	0.01955	5.15	4.85	-0.00180006	0.00105558	-0.72000672
LDR UNBIAS	80	15	4.94707	4.9748	4.911	0.0200939	5.15	4.85	-0.00860023	0.0014435	2.26327202
LDR UNBIAS	101	15	4.94121	4.9682	4.9039	0.0200557	5.15	4.85	-0.0144	0.00137368	1.41176471
HDR BIASED	0	15	4.95309	4.9904	4.9137	0.0219478	5.15	4.85			
HDR BIASED	3	15	4.95172	4.9883	4.9115	0.0220859	5.15	4.85	-0.0014	0.00080489	
HDR BIASED	10	15	4.95144	4.9889	4.9117	0.0221455	5.15	4.85	-0.00150013	0.00062085	
HDR BIASED	30	15	4.95145	4.9891	4.9117	0.0223363	5.15	4.85	-0.00169993	0.00084241	
HDR BIASED	50	15	4.95167	4.9898	4.9124	0.0223319	5.15	4.85	-0.00130033	0.00101784	
HDR BIASED	80	15	4.9523	4.9902	4.9133	0.0219891	5.15	4.85	-0.00049972	0.00108269	
HDR BIASED	100	15	4.95363	4.9906	4.9151	0.0213053	5.15	4.85	0.00020027	0.00158334	
HDR UNBIAS	0	15	4.94643	4.9867	4.9114	0.0217292	5.15	4.85			
HDR UNBIAS	3	15	4.94921	4.9878	4.9107	0.0228505	5.15	4.85	0.00089979	0.00716301	
HDR UNBIAS	10	15	4.95136	4.9901	4.9128	0.0227551	5.15	4.85	0.00330019	0.00690507	
HDR UNBIAS	30	15	4.95321	4.9926	4.9146	0.0227755	5.15	4.85	0.00480032	0.00696366	
HDR UNBIAS	50	15	4.95063	4.9893	4.9121	0.022671	5.15	4.85	0.00250006	0.0072908	
HDR UNBIAS	80	15	4.94421	4.983	4.9051	0.0228691	5.15	4.85	-0.00379991	0.00787052	
HDR UNBIAS	100	15	4.93832	4.976	4.9012	0.0223485	5.15	4.85	-0.0102	0.00800131	

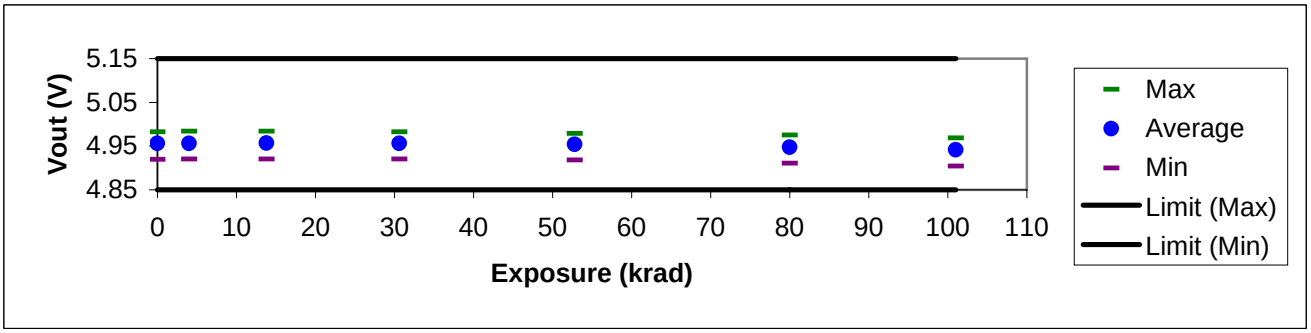
Plot of the average readings for each radiation/bias condition



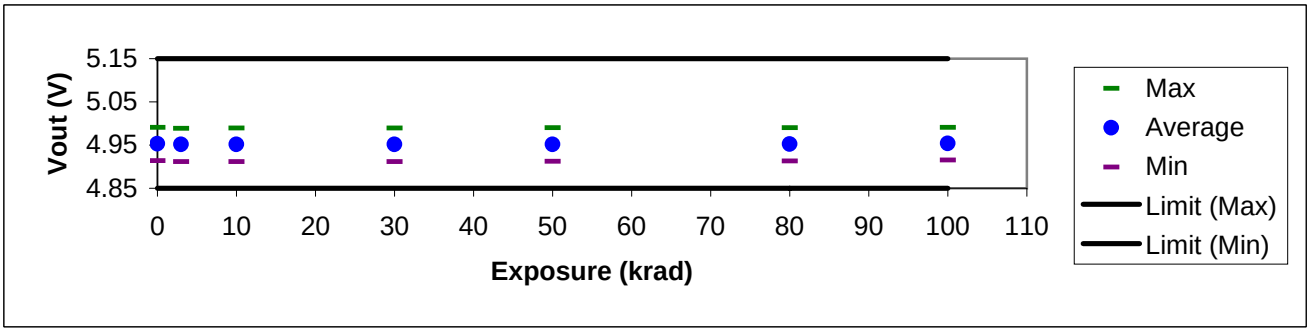
TEST ID: 17.24 Output Voltage; Vin = 6V, Iout = 1A
Low dose rate biased



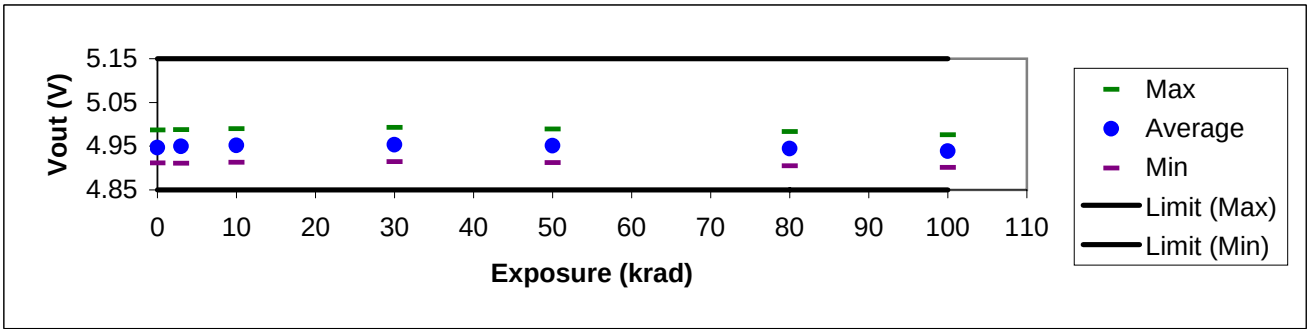
TEST ID: 17.24 Output Voltage; Vin = 6V, Iout = 1A
Low dose rate unbiased



TEST ID: 17.24 Output Voltage; Vin = 6V, Iout = 1A
High dose rate biased



TEST ID: 17.24 Output Voltage; Vin = 6V, Iout = 1A
High dose rate unbiased



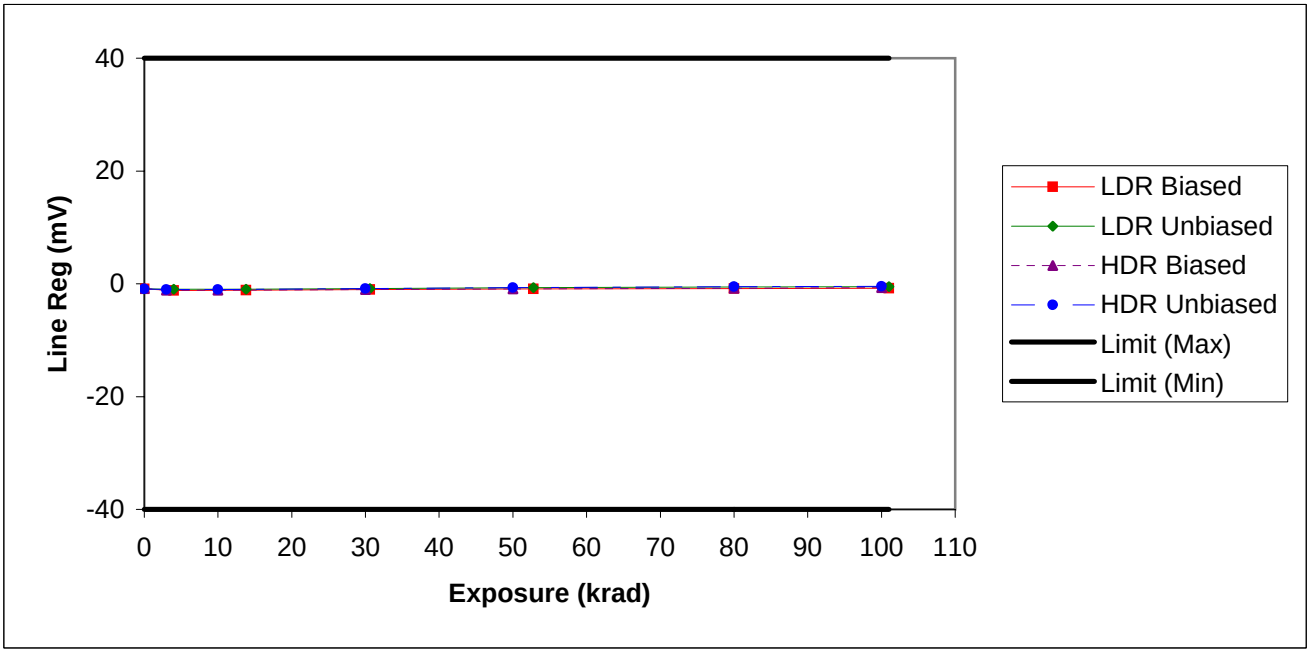
National Semiconductor

TEST ID: 18.12 Line Regulation; Vin = 7V - 26V, Iout = 5mA

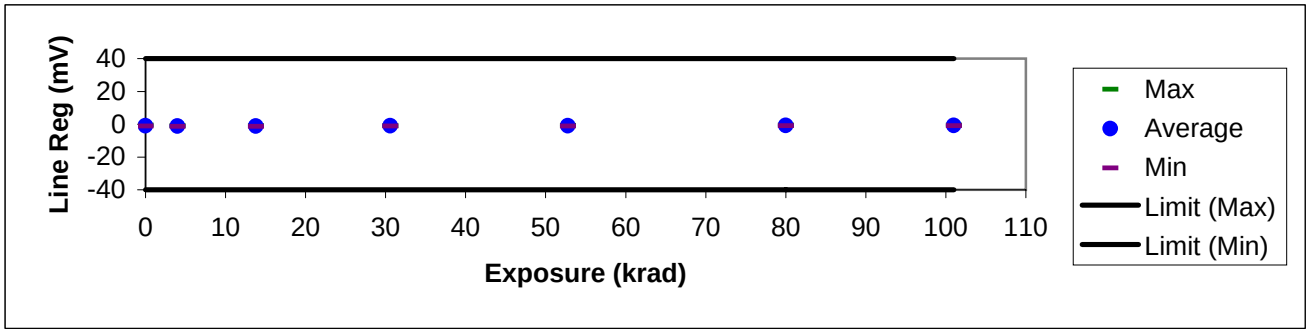
TEST ID: 18.12 Vrline @ Vin = 7V - 26V, Iout = 5mA mV
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	-0.888	-0.49	-1.15	0.173337	40	-40			
LDR BIASED	4	15	-1.17	-1.04	-1.33	0.089682	40	-40	-0.24	0.142287	1.26315789
LDR BIASED	13.8	15	-1.11733	-0.98	-1.29	0.0963229	40	-40	-0.2	0.144394	1.17647059
LDR BIASED	30.6	15	-1.01933	-0.89	-1.17	0.0926951	40	-40	-0.08	0.145006	0.57142857
LDR BIASED	52.8	15	-0.92133	-0.79	-1.12	0.102321	40	-40	0.02	0.164346	0.33333333
LDR BIASED	80	15	-0.83733	-0.65	-1	0.105049	40	-40	0.11	0.170565	0.6875
LDR BIASED	101	15	-0.76667	-0.62	-0.94	0.101887	40	-40	0.16	0.153431	0.84210526
LDR UNBIAS	0	15	-0.886	-0.61	-1.09	0.151224	40	-40			
LDR UNBIAS	4	15	-0.96333	-0.76	-1.16	0.130037	40	-40	-0.07	0.06	0.466666
LDR UNBIAS	13.8	15	-0.95267	-0.77	-1.15	0.106333	40	-40	-0.07	0.0718795	0.41176471
LDR UNBIAS	30.6	15	-0.84667	-0.66	-1.01	0.0994748	40	-40	0.02	0.0665976	2.000002
LDR UNBIAS	52.8	15	-0.68133	-0.43	-0.84	0.100133	40	-40	0.18	0.10246	0.62068966
LDR UNBIAS	80	15	-0.57333	-0.09	-0.74	0.158189	40	-40	0.35	0.139769	0.79545455
LDR UNBIAS	101	15	-0.48733	-0.34	-0.57	0.0713609	40	-40	0.44	0.15702	0.91666667
HDR BIASED	0	15	-0.85533	-0.56	-1.13	0.181654	40	-40			
HDR BIASED	3	15	-1.12333	-0.73	-1.38	0.135313	40	-40	-0.19	0.169966	
HDR BIASED	10	15	-1.12	-0.82	-1.36	0.129228	40	-40	-0.17	0.204306	
HDR BIASED	30	15	-0.99733	-0.72	-1.29	0.128867	40	-40	-0.14	0.201891	
HDR BIASED	50	15	-0.88067	-0.58	-1	0.108131	40	-40	0.06	0.190521	
HDR BIASED	80	15	-0.77333	-0.49	-1.05	0.124422	40	-40	0.16	0.198358	
HDR BIASED	100	15	-0.69	-0.39	-0.98	0.136172	40	-40	0.19	0.2057	
HDR UNBIAS	0	15	-0.89733	-0.73	-1.17	0.113608	40	-40			
HDR UNBIAS	3	15	-1.02733	-0.77	-1.24	0.11628	40	-40	-0.15	0.0638078	
HDR UNBIAS	10	15	-1.03067	-0.85	-1.23	0.101803	40	-40	-0.17	0.105808	
HDR UNBIAS	30	15	-0.86467	-0.72	-1.03	0.100418	40	-40	0.00999999	0.129751	
HDR UNBIAS	50	15	-0.67133	-0.45	-0.88	0.128389	40	-40	0.29	0.144855	
HDR UNBIAS	80	15	-0.494	-0.36	-0.7	0.100698	40	-40	0.44	0.109458	
HDR UNBIAS	100	15	-0.44933	-0.23	-0.56	0.0840465	40	-40	0.48	0.122603	

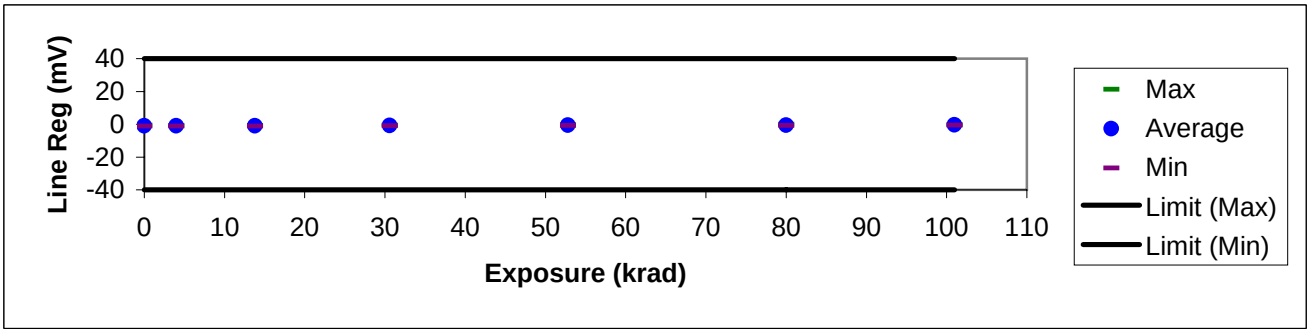
Plot of the average readings for each radiation/bias condition



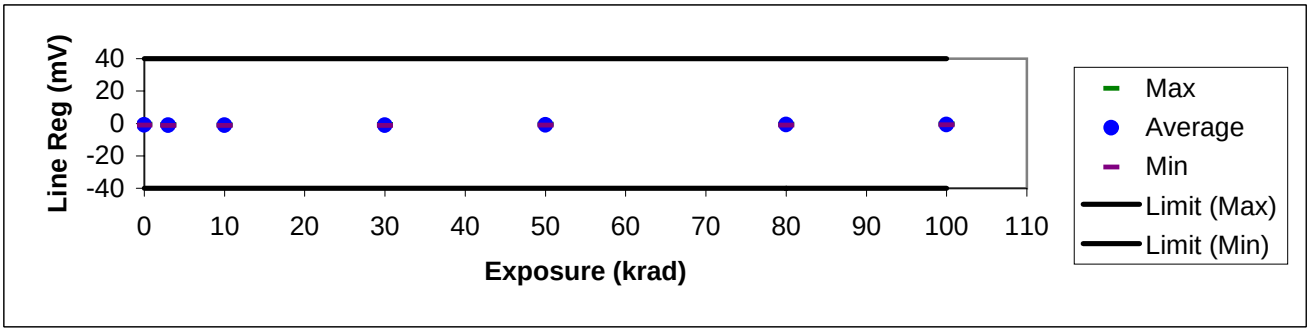
TEST ID: 18.12 Line Regulation; Vin = 7V - 26V, Iout = 5mA
Low dose rate biased



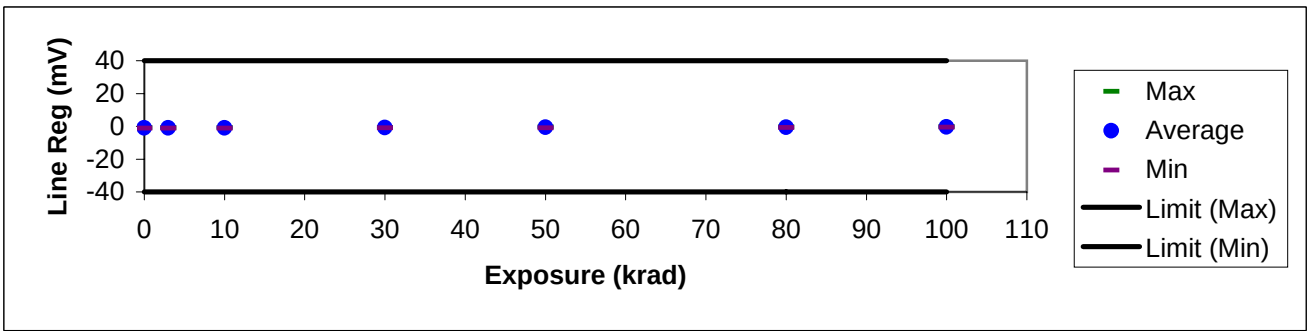
TEST ID: 18.12 Line Regulation; Vin = 7V - 26V, Iout = 5mA
Low dose rate unbiased



TEST ID: 18.12 Line Regulation; Vin = 7V - 26V, Iout = 5mA
High dose rate biased



TEST ID: 18.12 Line Regulation; Vin = 7V - 26V, Iout = 5mA
High dose rate unbiased



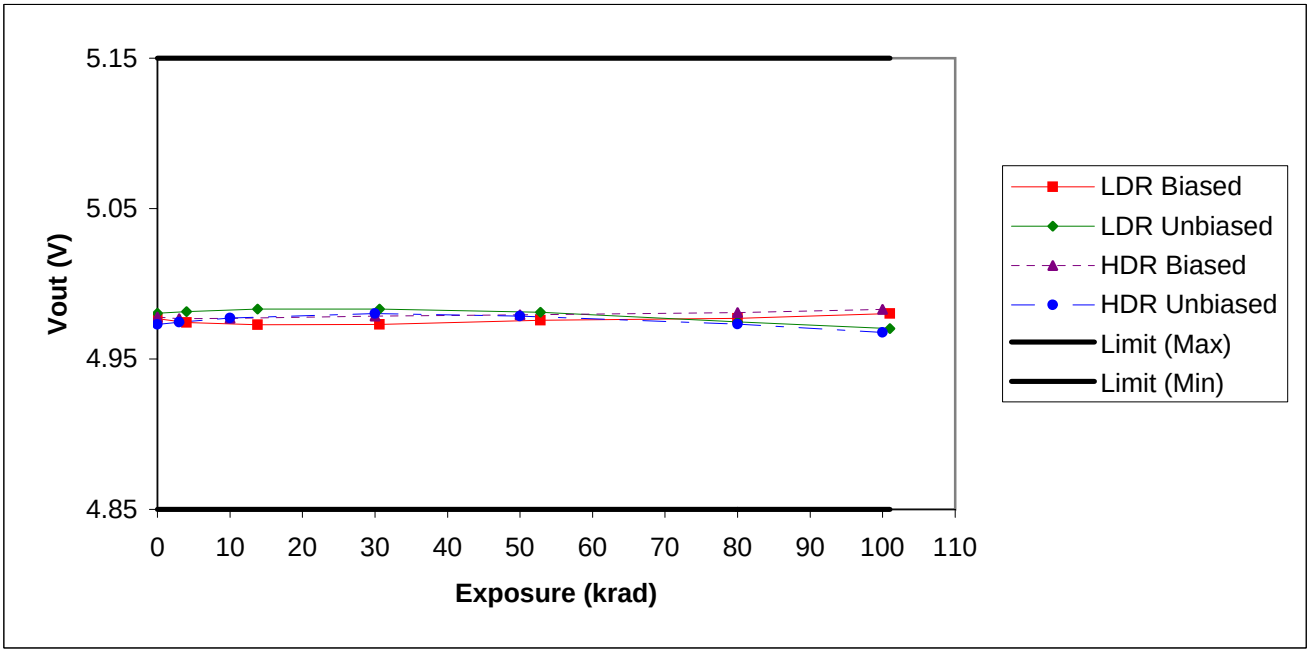
National Semiconductor

TEST ID: 19.13 Output Voltage; Vin = 6V, Iout = 50mA

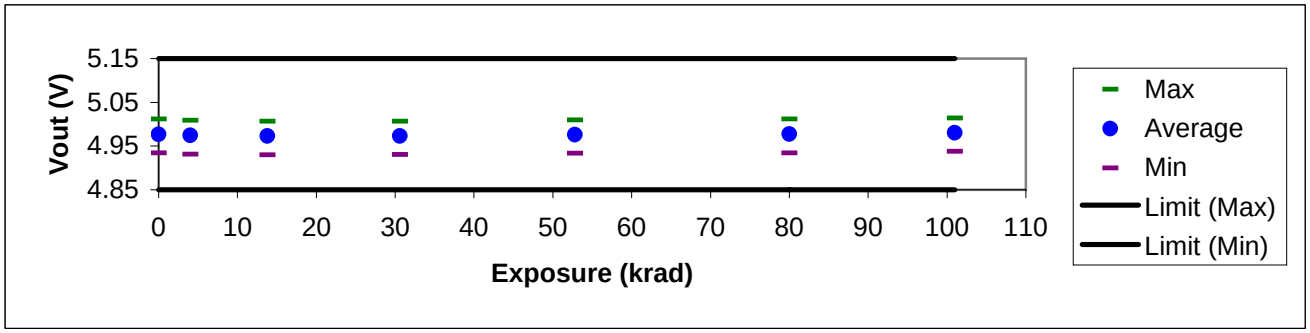
TEST ID: 19.13 VO @ Vin = 6V, Iout = 50mA V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.97691	5.0115	4.934	0.0251683	5.15	4.85			
LDR BIASED	4	15	4.97435	5.0088	4.9314	0.025024	5.15	4.85	-0.00250006	0.0003994	2.77701134
LDR BIASED	13.8	15	4.97274	5.0065	4.93	0.0251599	5.15	4.85	-0.00400019	0.00060059	4.99936261
LDR BIASED	30.6	15	4.97301	5.0069	4.9302	0.0251373	5.15	4.85	-0.00389958	0.00088157	-5.57082857
LDR BIASED	52.8	15	4.97584	5.0092	4.9337	0.0250206	5.15	4.85	-0.0008998	0.00126062	-0.50000556
LDR BIASED	80	15	4.97707	5.0116	4.934	0.0252654	5.15	4.85	0.00029993	0.00128218	0.099984
LDR BIASED	101	15	4.98028	5.0138	4.9378	0.0251386	5.15	4.85	0.00379991	0.0013952	0.73076457
LDR UNBIAS	0	15	4.98036	5.0074	4.9446	0.0198137	5.15	4.85			
LDR UNBIAS	4	15	4.98141	5.0084	4.9453	0.0198651	5.15	4.85	0.00090027	0.00040159	0.60031607
LDR UNBIAS	13.8	15	4.98309	5.0098	4.947	0.0197874	5.15	4.85	0.00259972	0.00049949	0.59087634
LDR UNBIAS	30.6	15	4.98319	5.0094	4.9466	0.0198014	5.15	4.85	0.00300026	0.00068631	0.41668889
LDR UNBIAS	52.8	15	4.98104	5.0075	4.945	0.019669	5.15	4.85	0.00069999	0.00077004	0.13724621
LDR UNBIAS	80	15	4.97459	5.0019	4.9386	0.0200063	5.15	4.85	-0.00570011	0.00086147	-57.1955649
LDR UNBIAS	101	15	4.97018	4.9983	4.9333	0.0200008	5.15	4.85	-0.00989962	0.00111621	1.79998327
HDR BIASED	0	15	4.9778	5.0145	4.9387	0.0218844	5.15	4.85			
HDR BIASED	3	15	4.97678	5.0136	4.9377	0.0219715	5.15	4.85	-0.00090027	0.00054279	
HDR BIASED	10	15	4.97707	5.0145	4.9375	0.0221365	5.15	4.85	-0.00080014	0.00059814	
HDR BIASED	30	15	4.97843	5.0162	4.9395	0.022179	5.15	4.85	0.0007	0.00087632	
HDR BIASED	50	15	4.97938	5.017	4.9402	0.0221713	5.15	4.85	0.00179958	0.00091359	
HDR BIASED	80	15	4.9808	5.0188	4.9418	0.021949	5.15	4.85	0.00299978	0.00116735	
HDR BIASED	100	15	4.98297	5.0198	4.9439	0.021335	5.15	4.85	0.00519991	0.00186982	
HDR UNBIAS	0	15	4.97299	5.0123	4.9365	0.0225523	5.15	4.85			
HDR UNBIAS	3	15	4.97443	5.0138	4.9373	0.0228095	5.15	4.85	0.00149966	0.00065228	
HDR UNBIAS	10	15	4.97733	5.0166	4.94	0.0227942	5.15	4.85	0.00439977	0.00073475	
HDR UNBIAS	30	15	4.98027	5.0194	4.9424	0.0228205	5.15	4.85	0.00720024	0.00110276	
HDR UNBIAS	50	15	4.97855	5.0171	4.9413	0.0226028	5.15	4.85	0.00510025	0.00123148	
HDR UNBIAS	80	15	4.97318	5.0119	4.9355	0.0227676	5.15	4.85	9.97E-05	0.00158406	
HDR UNBIAS	100	15	4.96756	5.0058	4.931	0.0224208	5.15	4.85	-0.00549984	0.00184639	

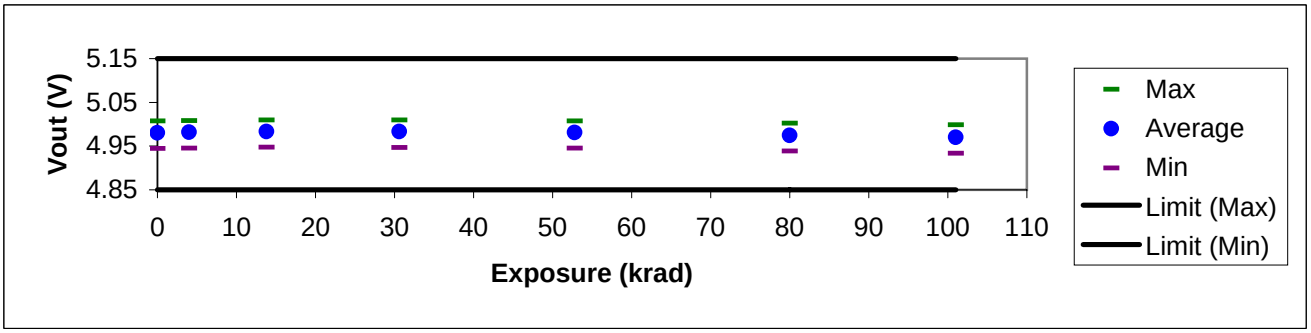
Plot of the average readings for each radiation/bias condition



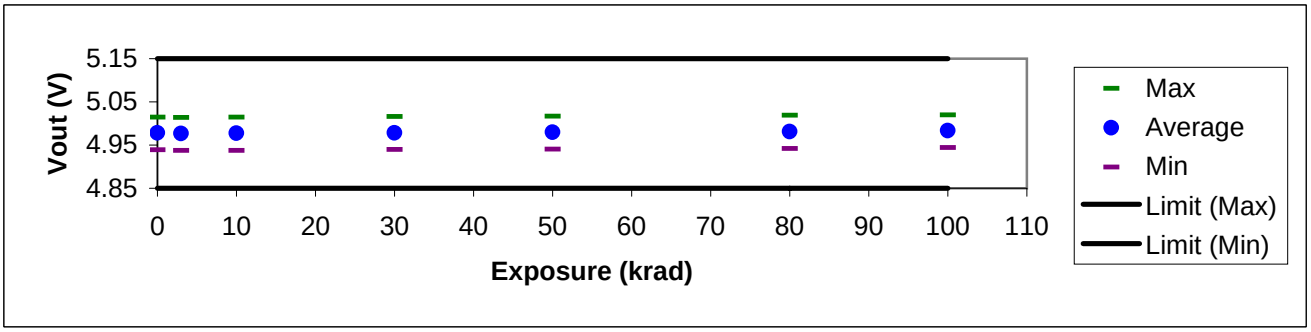
TEST ID: 19.13 Output Voltage; Vin = 6V, Iout = 50mA
Low dose rate biased



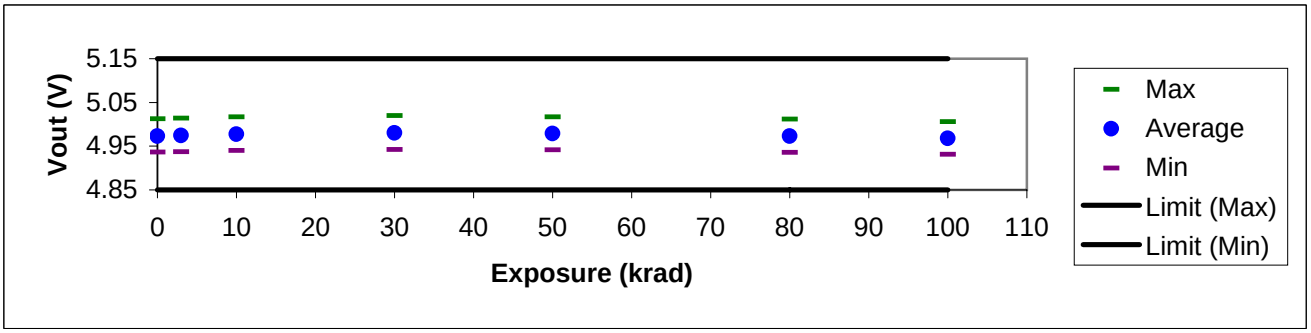
TEST ID: 19.13 Output Voltage; Vin = 6V, Iout = 50mA
Low dose rate unbiased



TEST ID: 19.13 Output Voltage; Vin = 6V, Iout = 50mA
High dose rate biased



TEST ID: 19.13 Output Voltage; Vin = 6V, Iout = 50mA
High dose rate unbiased



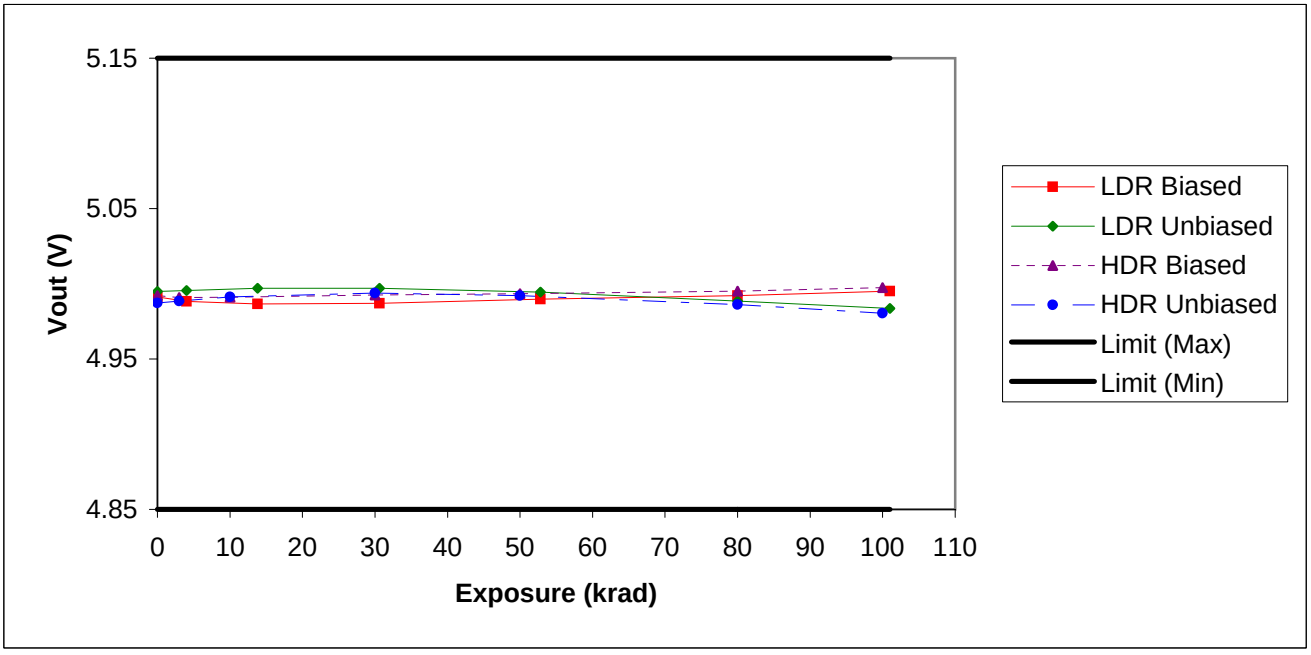
National Semiconductor

TEST ID: 20.14 Output Voltage; Vin = 10V, Iout = 50mA

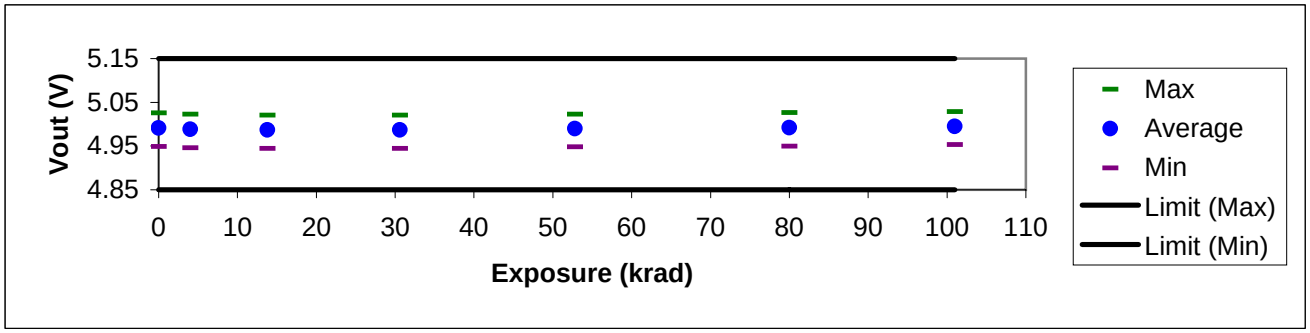
TEST ID: 20.14 VO @ Vin = 10V, Iout = 50mA V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.99119	5.0258	4.9488	0.0249848	5.15	4.85			
LDR BIASED	4	15	4.9883	5.0225	4.9458	0.0249213	5.15	4.85	-0.00299978	0.0002939	2.4994001
LDR BIASED	13.8	15	4.98658	5.0202	4.9441	0.0250228	5.15	4.85	-0.00440025	0.00055531	3.66770023
LDR BIASED	30.6	15	4.98701	5.0208	4.9445	0.0250491	5.15	4.85	-0.00430012	0.00088971	-10.7486877
LDR BIASED	52.8	15	4.98976	5.023	4.9479	0.0249048	5.15	4.85	-0.00129986	0.00125221	-0.86649824
LDR BIASED	80	15	4.99209	5.026	4.9493	0.0251423	5.15	4.85	0.00089979	0.00133307	0.299952
LDR BIASED	101	15	4.99515	5.0283	4.9531	0.0250136	5.15	4.85	0.00460005	0.00149464	0.85190844
LDR UNBIAS	0	15	4.99479	5.0211	4.9593	0.0196799	5.15	4.85			
LDR UNBIAS	4	15	4.99558	5.022	4.9598	0.0197317	5.15	4.85	0.00079965	0.00027737	0.66626396
LDR UNBIAS	13.8	15	4.99709	5.0233	4.9611	0.019707	5.15	4.85	0.00220013	0.00040176	0.52384297
LDR UNBIAS	30.6	15	4.99701	5.0228	4.9609	0.0196645	5.15	4.85	0.00229979	0.00057054	0.35380078
LDR UNBIAS	52.8	15	4.99445	5.0202	4.9586	0.0195885	5.15	4.85	-0.00029993	0.00077174	-0.06974922
LDR UNBIAS	80	15	4.98853	5.015	4.9524	0.0198604	5.15	4.85	-0.00619984	0.00073842	6.20027402
LDR UNBIAS	101	15	4.9836	5.0112	4.9471	0.0198817	5.15	4.85	-0.0109	0.00105658	1.65154017
HDR BIASED	0	15	4.99215	5.0291	4.9525	0.0218993	5.15	4.85			
HDR BIASED	3	15	4.99093	5.028	4.9514	0.0219507	5.15	4.85	-0.0012002	0.00039185	
HDR BIASED	10	15	4.99111	5.0288	4.9513	0.0221261	5.15	4.85	-0.00119973	0.00049112	
HDR BIASED	30	15	4.99249	5.0304	4.9531	0.0221773	5.15	4.85	0.00040006	0.00086826	
HDR BIASED	50	15	4.99351	5.0314	4.954	0.0221929	5.15	4.85	0.00150013	0.00094254	
HDR BIASED	80	15	4.99517	5.0334	4.9558	0.0219571	5.15	4.85	0.00299978	0.0011927	
HDR BIASED	100	15	4.99754	5.0346	4.958	0.0213505	5.15	4.85	0.0053997	0.00195835	
HDR UNBIAS	0	15	4.9872	5.0265	4.9505	0.0226697	5.15	4.85			
HDR UNBIAS	3	15	4.98849	5.0277	4.9513	0.0228566	5.15	4.85	0.0012002	0.0005496	
HDR UNBIAS	10	15	4.99131	5.0304	4.9539	0.0228289	5.15	4.85	0.00419998	0.00068296	
HDR UNBIAS	30	15	4.99393	5.033	4.9561	0.0228688	5.15	4.85	0.00650024	0.0010754	
HDR UNBIAS	50	15	4.99204	5.0307	4.9545	0.0227151	5.15	4.85	0.00430012	0.0011927	
HDR UNBIAS	80	15	4.98627	5.0248	4.9487	0.0227782	5.15	4.85	-0.00099993	0.00153411	
HDR UNBIAS	100	15	4.98043	5.0185	4.9439	0.0224436	5.15	4.85	-0.0065999	0.00177098	

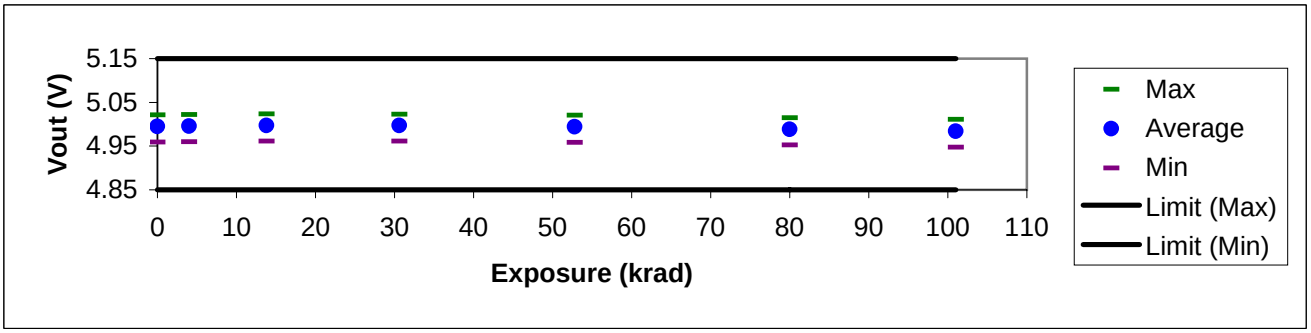
Plot of the average readings for each radiation/bias condition



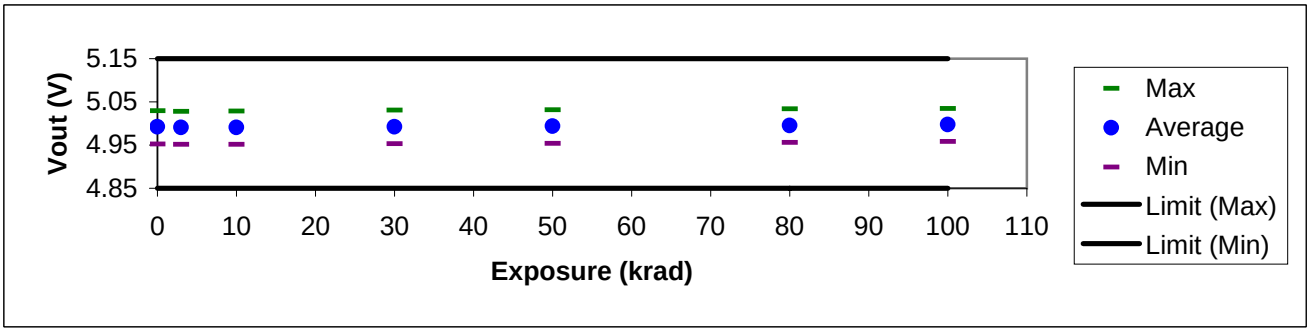
TEST ID: 20.14 Output Voltage; Vin = 10V, Iout = 50mA
Low dose rate biased



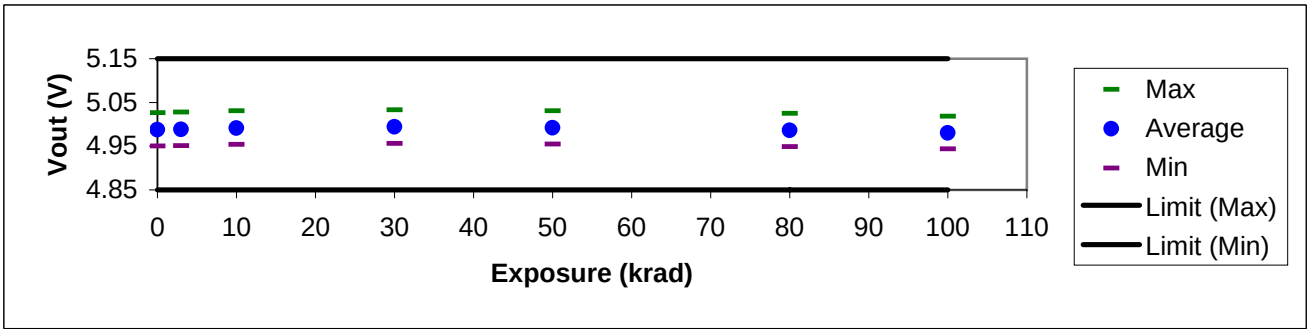
TEST ID: 20.14 Output Voltage; Vin = 10V, Iout = 50mA
Low dose rate unbiased



TEST ID: 20.14 Output Voltage; Vin = 10V, Iout = 50mA
High dose rate biased



TEST ID: 20.14 Output Voltage; Vin = 10V, Iout = 50mA
High dose rate unbiased



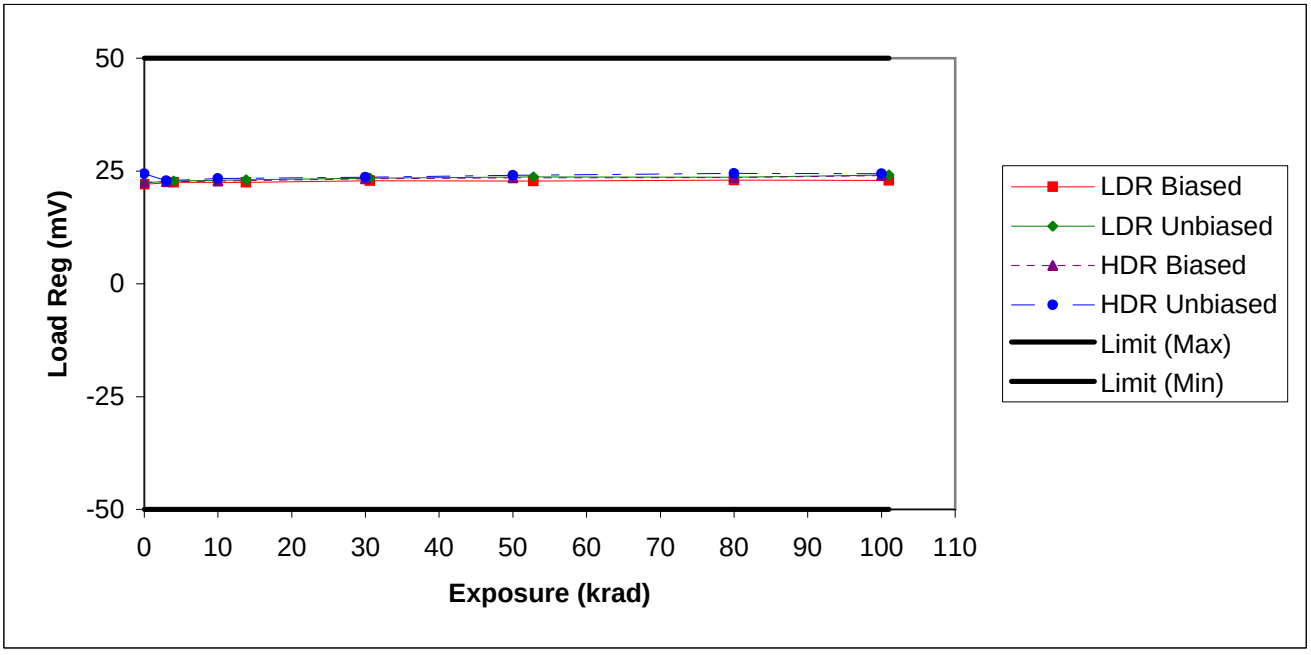
National Semiconductor

TEST ID: 21.15 Load Regulation; Vin = 10V, Iout = 50mA - 1A

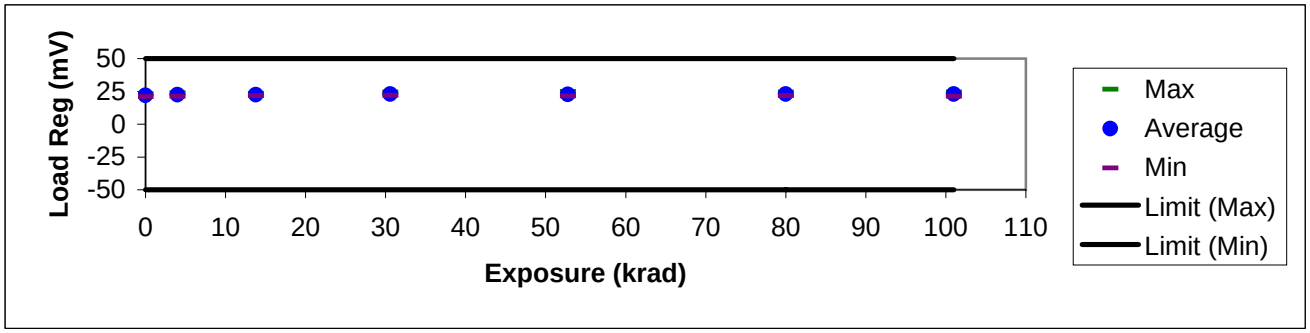
TEST ID: 21.15 Vrload @ Vin = 10V, Iout = 50mA - 1A mV
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	22.0667	23.2	20.9	0.637704	50	-50			
LDR BIASED	4	15	22.5	23.9	21.2	0.889623	50	-50	0.4	0.827791	1.33333778
LDR BIASED	13.8	15	22.5	23.5	21.7	0.508499	50	-50	0.300001	0.443471	1.00000667
LDR BIASED	30.6	15	22.8667	24.4	21.9	0.622973	50	-50	0.6	0.546417	0.85714163
LDR BIASED	52.8	15	22.7933	24.8	21.5	0.781452	50	-50	0.800001	0.567534	0.800001
LDR BIASED	80	15	23	24.3	21.8	0.682432	50	-50	1.2	0.708788	1.33333333
LDR BIASED	101	15	22.8933	24.5	21.3	0.781452	50	-50	0.9	0.552225	0.64285714
LDR UNBIAS	0	15	22.3867	23.7	20.7	0.806993	50	-50			
LDR UNBIAS	4	15	22.7467	24.2	21.5	0.847574	50	-50	0.5	0.832208	5.00008
LDR UNBIAS	13.8	15	23.0333	24.5	21.9	0.79072	50	-50	0.5	0.593858	1
LDR UNBIAS	30.6	15	23.4133	24.5	22.3	0.686468	50	-50	0.799999	0.828481	1.599998
LDR UNBIAS	52.8	15	23.6667	24.7	22.1	0.749921	50	-50	1.3	0.621289	0.92857143
LDR UNBIAS	80	15	23.6267	25.1	22	0.907482	50	-50	1.3	0.75857	0.92857143
LDR UNBIAS	101	15	24.1267	25.6	22.2	0.917657	50	-50	1.6	0.858404	0.88888889
HDR BIASED	0	15	22.4867	24.2	21	0.899894	50	-50			
HDR BIASED	3	15	22.6067	23.8	21	0.828481	50	-50	0.299999	0.71634	
HDR BIASED	10	15	22.7467	24.4	21	0.924173	50	-50	0.299999	0.579162	
HDR BIASED	30	15	23.26	24.7	21.6	0.964217	50	-50	0.700001	0.404381	
HDR BIASED	50	15	23.44	25	21.8	0.967176	50	-50	1	0.461158	
HDR BIASED	80	15	23.54	24.6	22.1	0.671672	50	-50	0.9	0.690618	
HDR BIASED	100	15	23.9667	25.3	22.4	0.899735	50	-50	1.4	0.568457	
HDR UNBIAS	0	15	24.4067	48.1	21.6	6.58315	50	-50			
HDR UNBIAS	3	15	22.86	24.4	20.9	0.813107	50	-50	0.0999984	6.58948	
HDR UNBIAS	10	15	23.3067	24.4	22.2	0.748776	50	-50	0.5	6.33742	
HDR UNBIAS	30	15	23.6067	25.3	22.3	0.736271	50	-50	0.5	6.16696	
HDR UNBIAS	50	15	24.0533	25.4	23	0.713008	50	-50	1.4	6.44048	
HDR UNBIAS	80	15	24.4467	26	23.2	0.743415	50	-50	1.4	6.57982	
HDR UNBIAS	100	15	24.3933	25.5	23.4	0.688131	50	-50	1.8	6.57917	

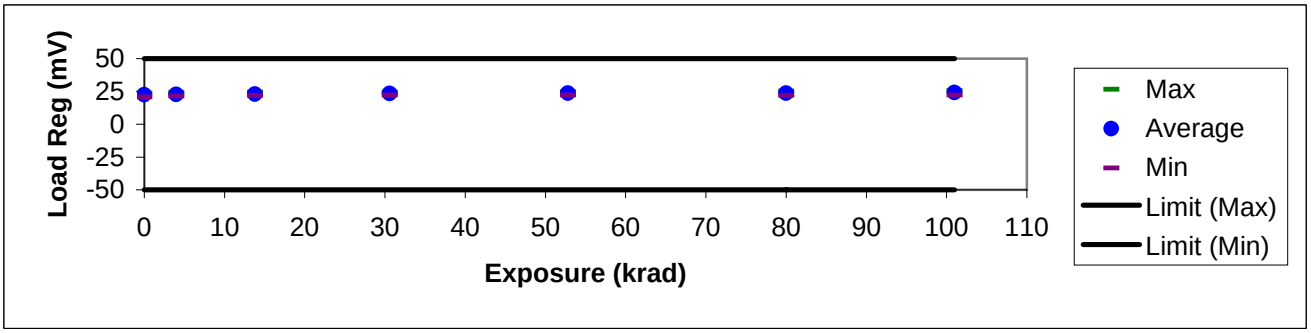
Plot of the average readings for each radiation/bias condition



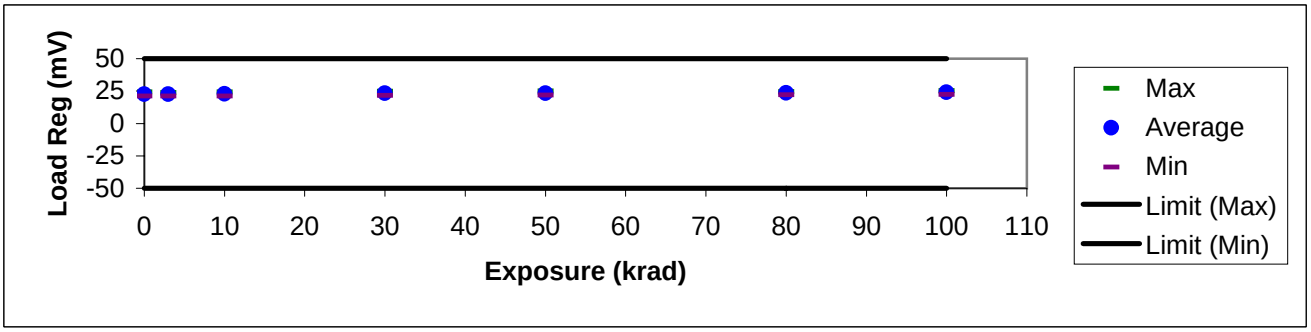
TEST ID: 21.15 Load Regulation; Vin = 10V, Iout = 50mA - 1A
Low dose rate biased



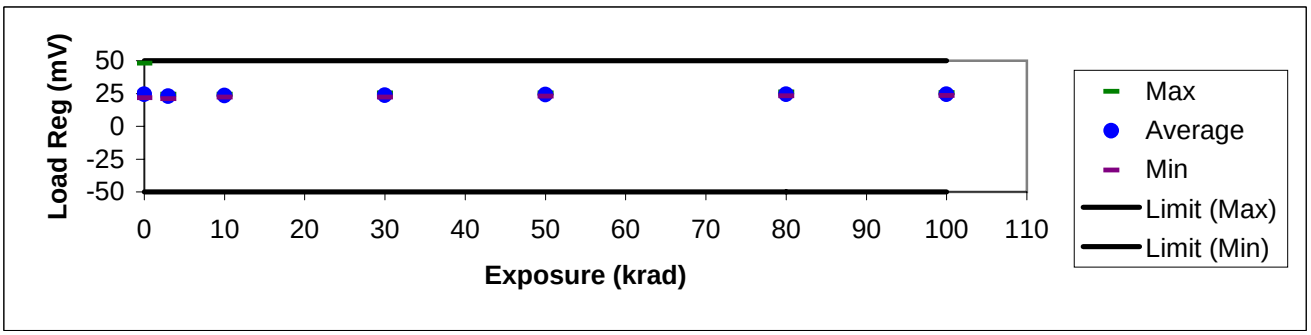
TEST ID: 21.15 Load Regulation; Vin = 10V, Iout = 50mA - 1A
Low dose rate unbiased



TEST ID: 21.15 Load Regulation; Vin = 10V, Iout = 50mA - 1A
High dose rate biased



TEST ID: 21.15 Load Regulation; Vin = 10V, Iout = 50mA - 1A
High dose rate unbiased



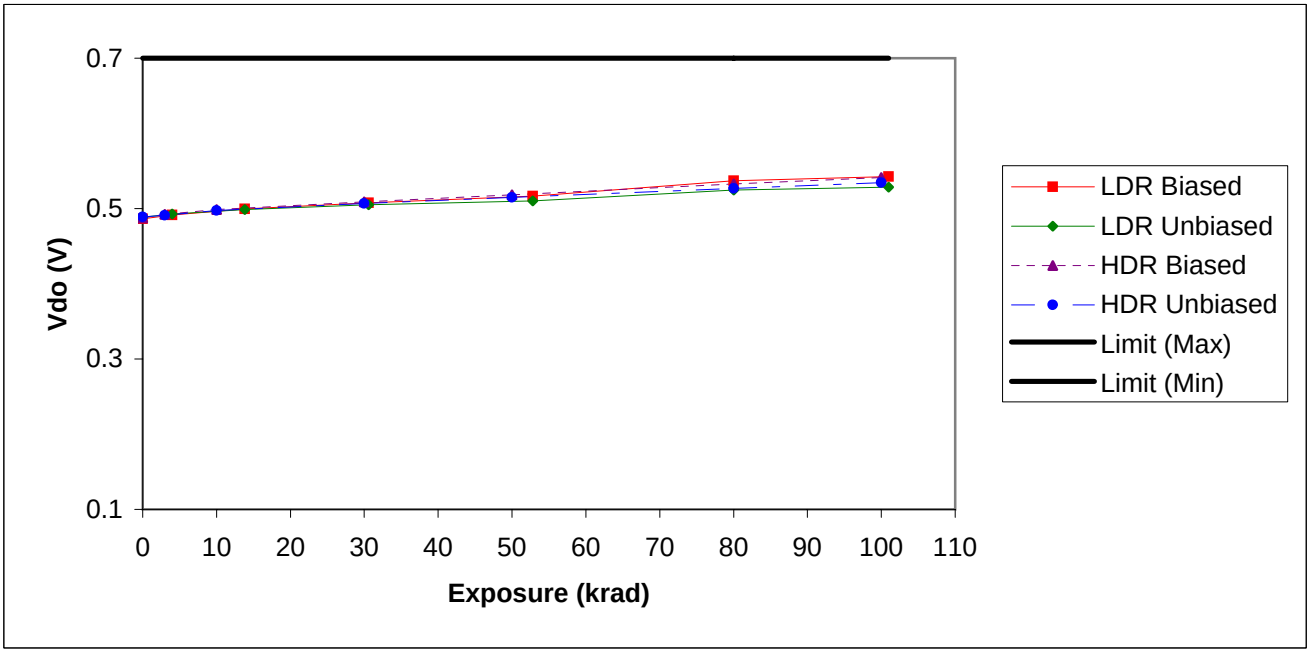
National Semiconductor

TEST ID: 22.17 Dropout Voltage; Iout = 1A

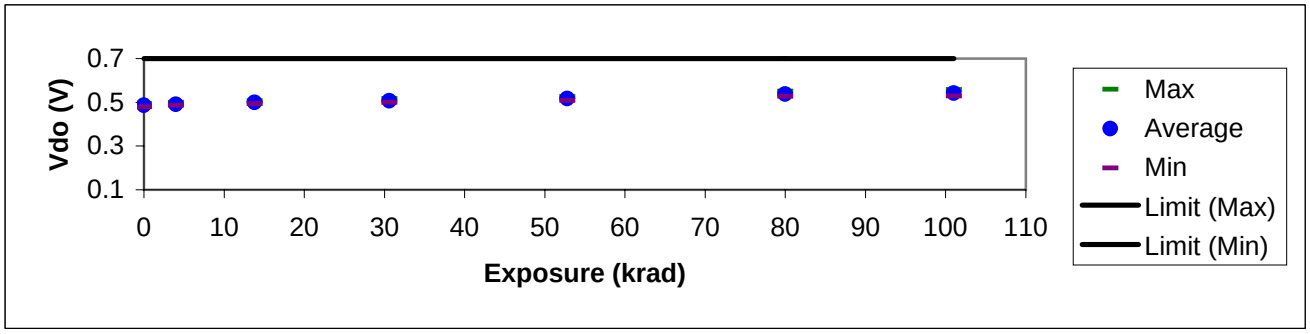
TEST ID: 22.17 Vdo @ Iout = 1A V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	0.4864	0.494	0.479	0.00443686	0.7	0			
LDR BIASED	4	15	0.49133	0.5	0.486	0.00436981	0.7	0	0.005	0.00133453	1.24999688
LDR BIASED	13.8	15	0.49947	0.507	0.494	0.00410343	0.7	0	0.013	0.00166762	1.08333333
LDR BIASED	30.6	15	0.50747	0.517	0.5	0.00477892	0.7	0	0.021	0.00162422	1
LDR BIASED	52.8	15	0.51673	0.526	0.509	0.00533809	0.7	0	0.03	0.00198805	1
LDR BIASED	80	15	0.537	0.55	0.528	0.00650275	0.7	0	0.05	0.00320268	1.11111111
LDR BIASED	101	15	0.54253	0.558	0.529	0.00782731	0.7	0	0.055	0.00388894	1.01851852
LDR UNBIAS	0	15	0.48853	0.5	0.477	0.00581705	0.7	0			
LDR UNBIAS	4	15	0.49267	0.504	0.482	0.00586353	0.7	0	0.00400001	0.00124595	1
LDR UNBIAS	13.8	15	0.49853	0.512	0.489	0.00585378	0.7	0	0.00999999	0.00151186	0.90909
LDR UNBIAS	30.6	15	0.505	0.519	0.494	0.00604743	0.7	0	0.017	0.0019223	0.89473684
LDR UNBIAS	52.8	15	0.51	0.523	0.499	0.0063471	0.7	0	0.022	0.00140746	0.81481481
LDR UNBIAS	80	15	0.52453	0.54	0.509	0.00814043	0.7	0	0.036	0.00304724	0.92307692
LDR UNBIAS	101	15	0.5286	0.545	0.513	0.00820105	0.7	0	0.04	0.00298727	0.86956522
HDR BIASED	0	15	0.4876	0.494	0.48	0.00422239	0.7	0			
HDR BIASED	3	15	0.4922	0.499	0.484	0.00409181	0.7	0	0.00400001	0.00135224	
HDR BIASED	10	15	0.49893	0.506	0.489	0.00407898	0.7	0	0.012	0.00205866	
HDR BIASED	30	15	0.509	0.517	0.501	0.0041576	0.7	0	0.021	0.00195668	
HDR BIASED	50	15	0.51827	0.528	0.507	0.00532469	0.7	0	0.03	0.00231968	
HDR BIASED	80	15	0.5326	0.543	0.518	0.00641204	0.7	0	0.045	0.00299999	
HDR BIASED	100	15	0.54147	0.553	0.526	0.00696794	0.7	0	0.054	0.00350237	
HDR UNBIAS	0	15	0.48887	0.521	0.481	0.00991296	0.7	0			
HDR UNBIAS	3	15	0.491	0.5	0.485	0.00486973	0.7	0	0.00400001	0.00785464	
HDR UNBIAS	10	15	0.49753	0.506	0.492	0.00465781	0.7	0	0.011	0.00721771	
HDR UNBIAS	30	15	0.507	0.516	0.501	0.00485504	0.7	0	0.019	0.00711003	
HDR UNBIAS	50	15	0.51487	0.525	0.507	0.00622055	0.7	0	0.027	0.00689721	
HDR UNBIAS	80	15	0.52687	0.54	0.517	0.00673866	0.7	0	0.039	0.00803564	
HDR UNBIAS	100	15	0.53427	0.547	0.524	0.00711605	0.7	0	0.046	0.00794445	

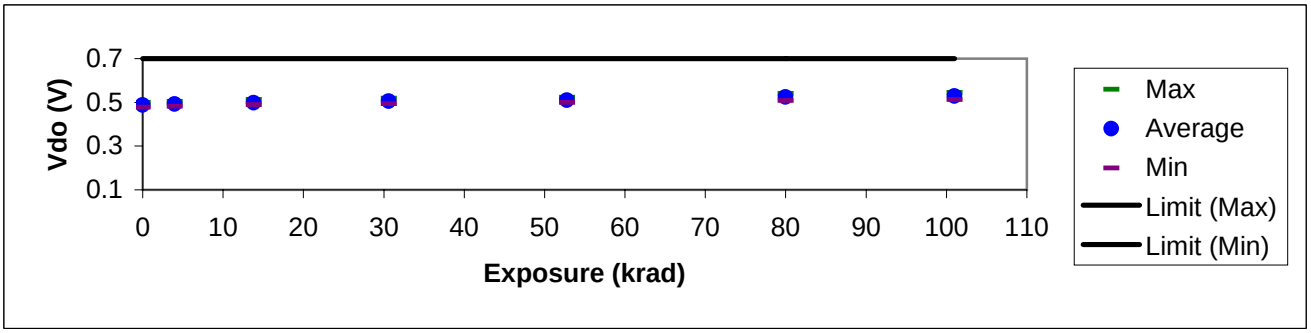
Plot of the average readings for each radiation/bias condition



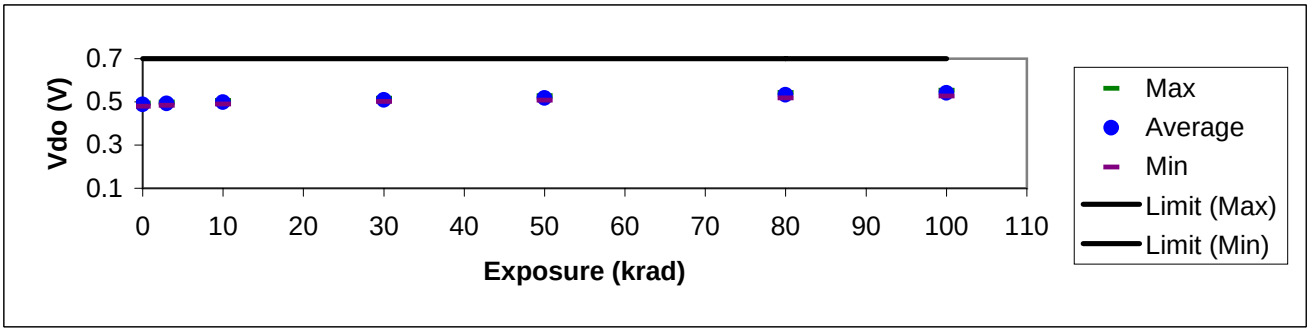
TEST ID: 22.17 Dropout Voltage; Iout = 1A
Low dose rate biased



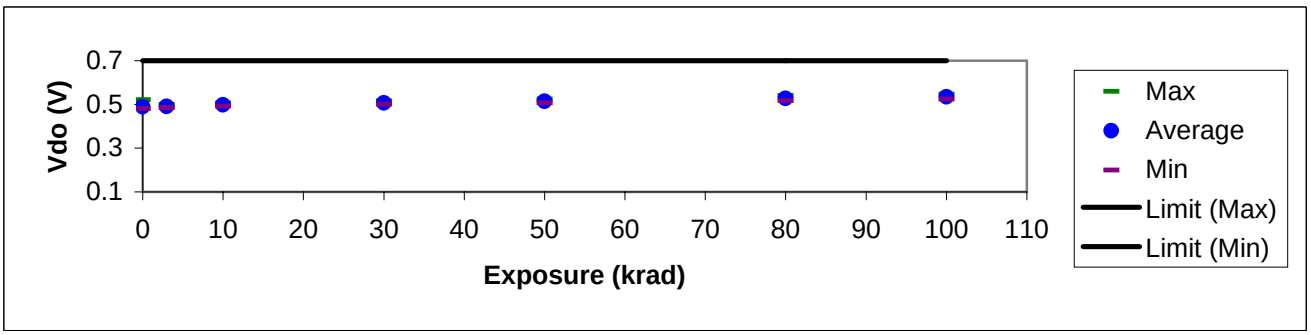
TEST ID: 22.17 Dropout Voltage; Iout = 1A
Low dose rate unbiased



TEST ID: 22.17 Dropout Voltage; Iout = 1A
High dose rate biased



TEST ID: 22.17 Dropout Voltage; Iout = 1A
High dose rate unbiased



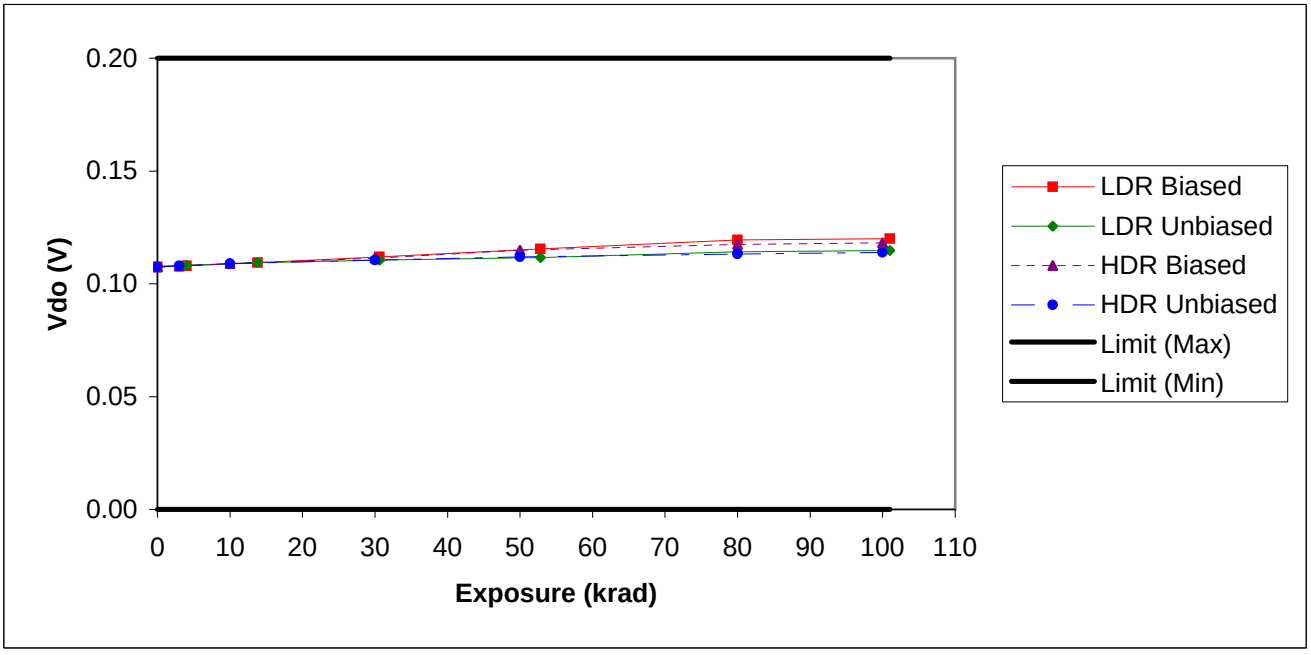
National Semiconductor

TEST ID: 23.18 Dropout Voltage; Iout = 100mA

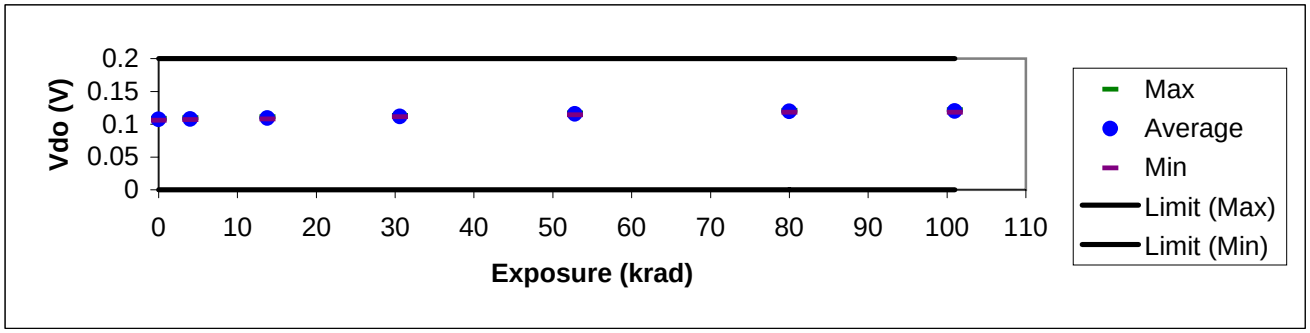
TEST ID: 23.18 Vdo @ Iout = 100mA V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	0.10753	0.109	0.106	0.00083381	0.2	0			
LDR BIASED	4	15	0.10793	0.11	0.107	0.00079881	0.2	0	0	0.00050709	#DIV/0!
LDR BIASED	13.8	15	0.1094	0.111	0.108	0.00073679	0.2	0	0.002	0.0005164	2
LDR BIASED	30.6	15	0.11193	0.113	0.111	0.00070373	0.2	0	0.004	0.00050709	1
LDR BIASED	52.8	15	0.1154	0.117	0.114	0.00091026	0.2	0	0.008	0.0005164	1.00000125
LDR BIASED	80	15	0.1194	0.121	0.118	0.0010556	0.2	0	0.012	0.0005164	1.2
LDR BIASED	101	15	0.11993	0.122	0.118	0.00109978	0.2	0	0.012	0.00063246	1.09090909
LDR UNBIAS	0	15	0.1078	0.11	0.106	0.00101419	0.2	0			
LDR UNBIAS	4	15	0.10827	0.111	0.107	0.00109978	0.2	0	0.00099999	0.00063994	1
LDR UNBIAS	13.8	15	0.10933	0.112	0.108	0.0011127	0.2	0	0.002	0.0005164	1
LDR UNBIAS	30.6	15	0.11053	0.113	0.108	0.00124595	0.2	0	0.003	0.00059362	1
LDR UNBIAS	52.8	15	0.11167	0.114	0.11	0.0011127	0.2	0	0.004	0.0005164	1
LDR UNBIAS	80	15	0.1142	0.117	0.111	0.00147358	0.2	0	0.006	0.00073679	1
LDR UNBIAS	101	15	0.11473	0.118	0.112	0.00143759	0.2	0	0.007	0.00070373	1.16666667
HDR BIASED	0	15	0.1074	0.109	0.106	0.00073679	0.2	0			
HDR BIASED	3	15	0.1078	0.109	0.106	0.0007746	0.2	0	0	0.00050709	
HDR BIASED	10	15	0.10887	0.11	0.107	0.00083381	0.2	0	0.001	0.0005164	
HDR BIASED	30	15	0.11133	0.113	0.11	0.0008165	0.2	0	0.004	0.00059362	
HDR BIASED	50	15	0.11493	0.116	0.113	0.00079881	0.2	0	0.00799999	0.0005164	
HDR BIASED	80	15	0.1174	0.119	0.115	0.00112122	0.2	0	0.01	0.00065465	
HDR BIASED	100	15	0.1182	0.12	0.116	0.00108233	0.2	0	0.011	0.00067612	
HDR UNBIAS	0	15	0.10747	0.109	0.106	0.00083381	0.2	0			
HDR UNBIAS	3	15	0.108	0.109	0.107	0.00084515	0.2	0	0.00099999	0.0005164	
HDR UNBIAS	10	15	0.109	0.11	0.108	0.00084515	0.2	0	0.002	0.0005164	
HDR UNBIAS	30	15	0.11053	0.112	0.109	0.00091548	0.2	0	0.003	0.00059362	
HDR UNBIAS	50	15	0.11187	0.113	0.11	0.00099043	0.2	0	0.004	0.00050709	
HDR UNBIAS	80	15	0.1132	0.115	0.112	0.00108232	0.2	0	0.006	0.00070373	
HDR UNBIAS	100	15	0.11393	0.116	0.112	0.00109978	0.2	0	0.006	0.0005164	

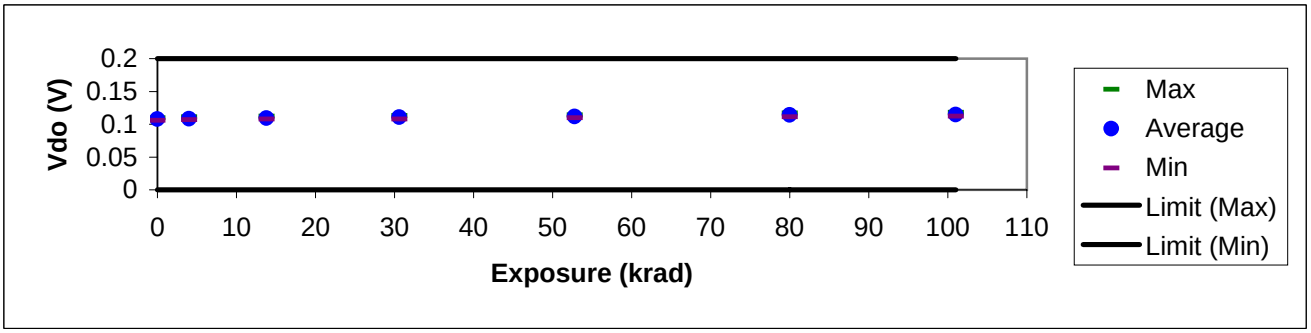
Plot of the average readings for each radiation/bias condition



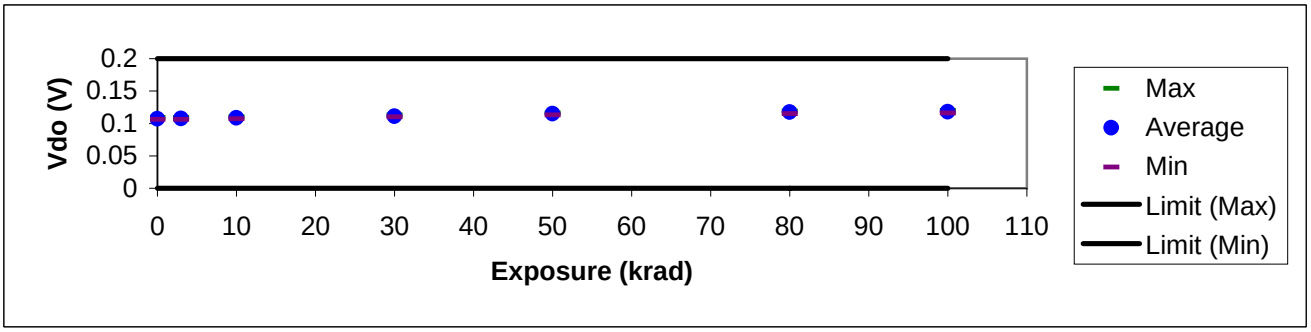
TEST ID: 23.18 Dropout Voltage; Iout = 100mA
Low dose rate biased



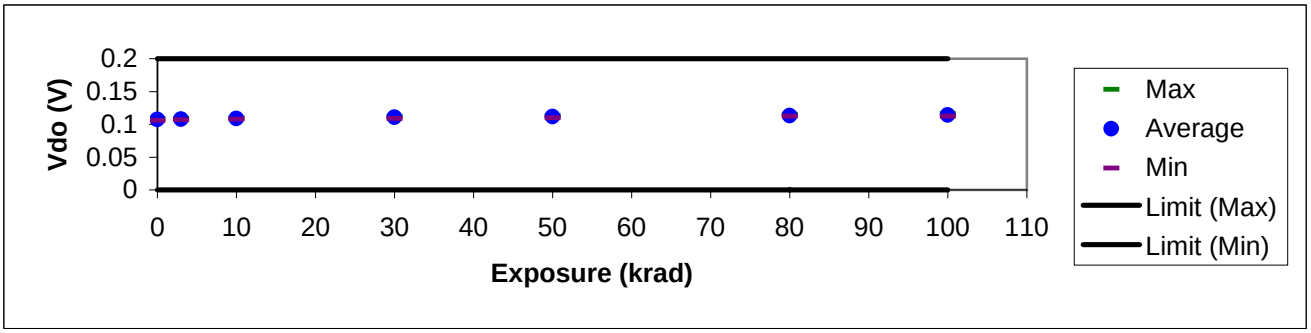
TEST ID: 23.18 Dropout Voltage; Iout = 100mA
Low dose rate unbiased



TEST ID: 23.18 Dropout Voltage; Iout = 100mA
High dose rate biased



TEST ID: 23.18 Dropout Voltage; Iout = 100mA
High dose rate unbiased



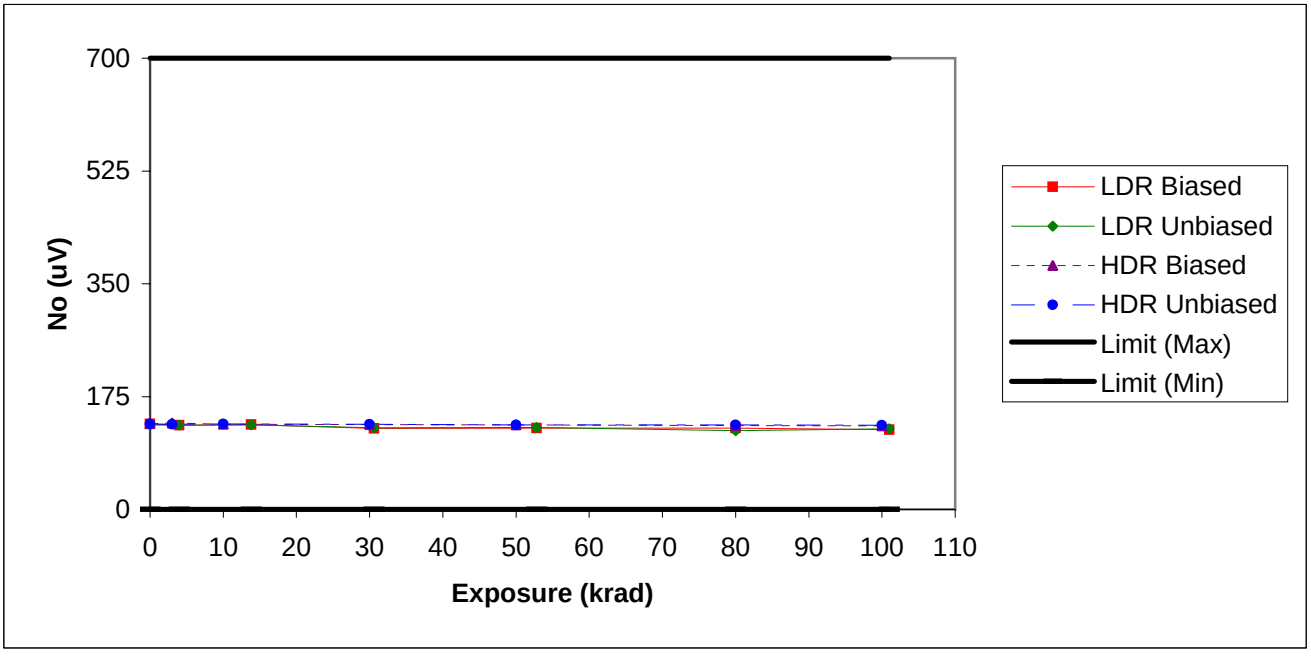
National Semiconductor

TEST ID: 24.19 Output Noise Voltage; Vin = 10V, Iout = 5mA

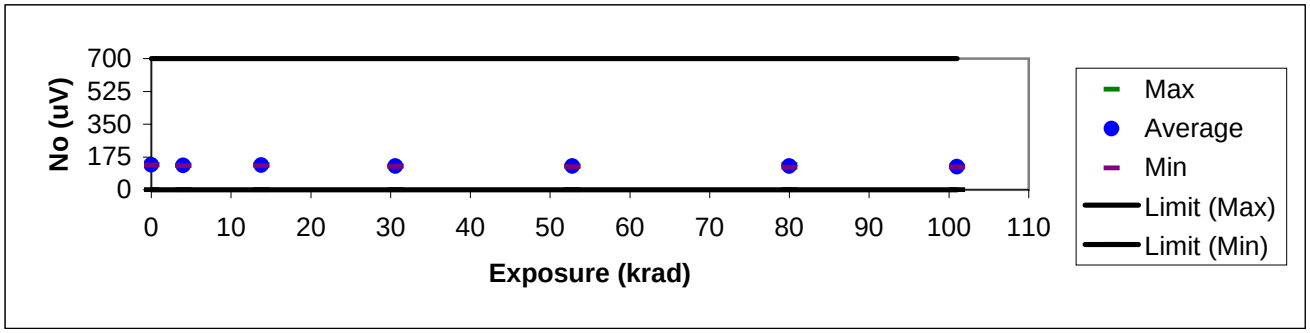
TEST ID: 24.19 No @ Vin = 10V, Iout = 5mA uV
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	132.78	135.7	130.9	1.29571	700	0			
LDR BIASED	4	15	130.467	132	127.8	1.10367	700	0	-2.3	1.08816	23.0020702
LDR BIASED	13.8	15	131.46	134.8	128.8	2.03884	700	0	-1.7	2.35954	1.21429439
LDR BIASED	30.6	15	125.613	126.9	124.1	0.85846	700	0	-7.20001	1.0019	6.00000833
LDR BIASED	52.8	15	125.933	128.2	123.2	1.33933	700	0	-6.60001	1.52637	3.88235882
LDR BIASED	80	15	126.1	135.7	120.1	5.5661	700	0	-8.59999	5.19137	3.439996
LDR BIASED	101	15	123.52	126	121.8	1.29681	700	0	-9.7	1.57062	2.93939394
LDR UNBIAS	0	15	131.247	134.6	129.5	1.44562	700	0			
LDR UNBIAS	4	15	130.52	132.6	128.5	1.20072	700	0	-0.199997	0.920766	0.5
LDR UNBIAS	13.8	15	131.253	133.8	129	1.24089	700	0	0.100006	0.939958	-0.5000375
LDR UNBIAS	30.6	15	126.54	128.4	124.5	1.02176	700	0	-4.89999	1.12407	#DIV/0!
LDR UNBIAS	52.8	15	127.187	130.5	125.4	1.23801	700	0	-4.10001	1.08943	3.72724793
LDR UNBIAS	80	15	122.22	126.3	118.8	2.11768	700	0	-9.8	2.30542	5.44447469
LDR UNBIAS	101	15	125.067	130.1	121.7	2.43975	700	0	-7.39999	2.38094	4.62496484
HDR BIASED	0	15	132.9	140.5	129.5	2.60329	700	0			
HDR BIASED	3	15	134.267	145.3	130	3.66833	700	0	-0.099991	4.18478	
HDR BIASED	10	15	131.94	138.1	128.8	2.53597	700	0	-1.39999	1.09727	
HDR BIASED	30	15	131.38	134	128.2	1.8644	700	0	-1.2	1.58078	
HDR BIASED	50	15	131.033	135	127.6	2.08521	700	0	-1.7	1.42612	
HDR BIASED	80	15	130.127	134.2	127.3	1.69177	700	0	-2.5	1.16034	
HDR BIASED	100	15	129.38	134.1	125.7	2.02033	700	0	-3.3	1.17728	
HDR UNBIAS	0	15	132.5	135	129.7	1.50428	700	0			
HDR UNBIAS	3	15	132.173	134.7	129.1	1.59215	700	0	-0.399994	0.934624	
HDR UNBIAS	10	15	132.533	134.8	129.4	1.54766	700	0	-0.199997	0.695564	
HDR UNBIAS	30	15	132.253	134.9	129.8	1.56929	700	0	0	0.983337	
HDR UNBIAS	50	15	131.3	133.2	128.2	1.57208	700	0	-1.10001	0.944907	
HDR UNBIAS	80	15	131.013	134	127.7	1.65351	700	0	-1.79999	1.08355	
HDR UNBIAS	100	15	130.387	133.4	123.3	2.3934	700	0	-1.60001	1.97624	

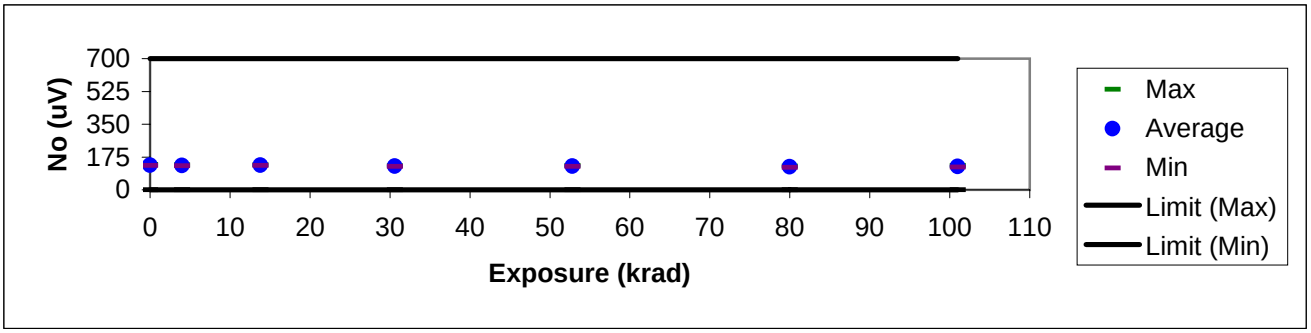
Plot of the average readings for each radiation/bias condition



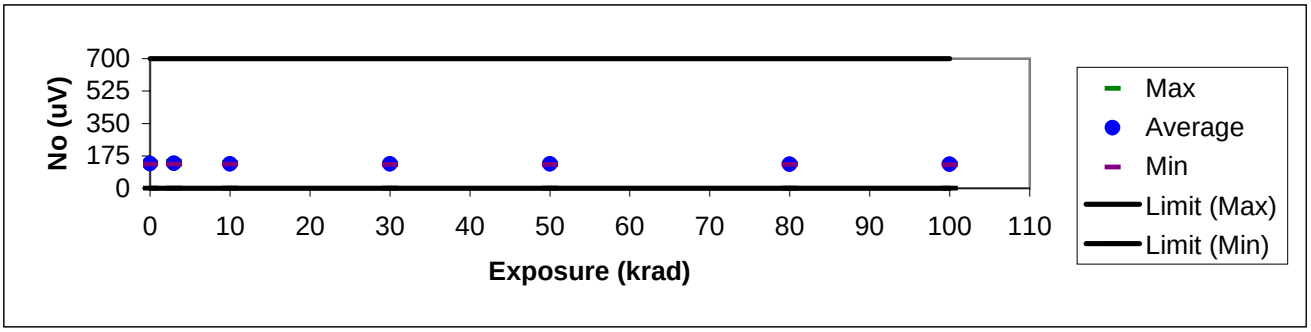
TEST ID: 24.19 Output Noise Voltage; Vin = 10V, Iout = 5mA
Low dose rate biased



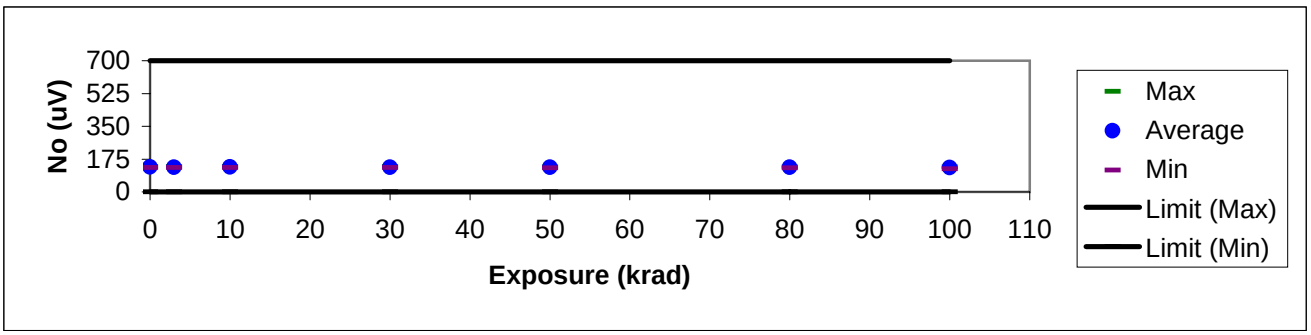
TEST ID: 24.19 Output Noise Voltage; Vin = 10V, Iout = 5mA
Low dose rate unbiased



TEST ID: 24.19 Output Noise Voltage; Vin = 10V, Iout = 5mA
High dose rate biased



TEST ID: 24.19 Output Noise Voltage; Vin = 10V, Iout = 5mA
High dose rate unbiased



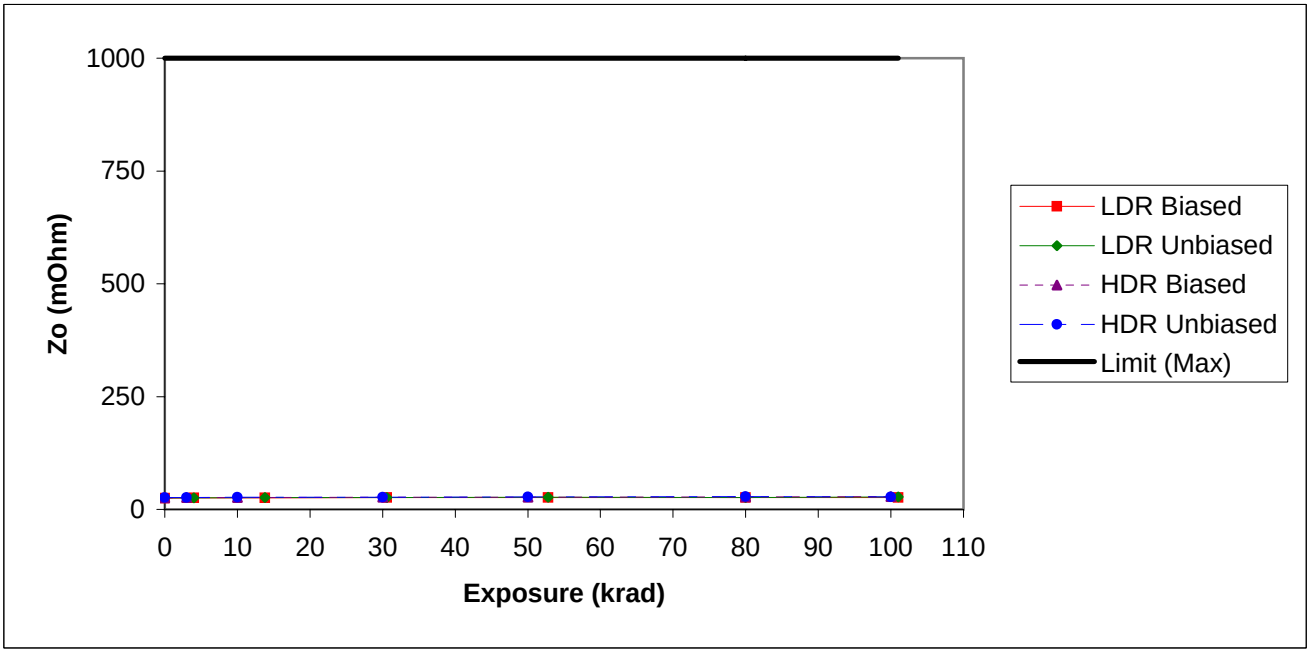
National Semiconductor

TEST ID: 25.20 Output Impedance; Vin = 10V, Iout = 100mA DC

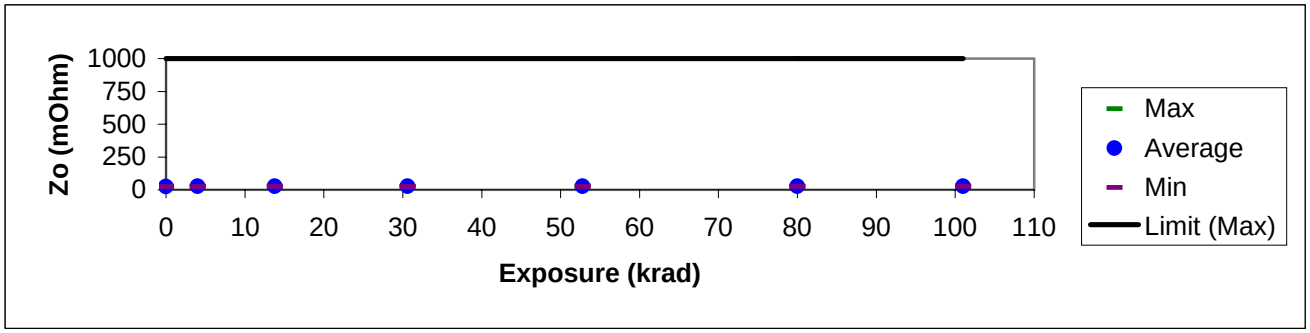
TEST ID: 25.2 Zo @ Vin = 10V, Iout = 100mA DC mOhm
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	25.1733	26.4	23.6	0.907482	1000				
LDR BIASED	4	15	25.6867	27.9	23.6	1.24491	1000		0.5	1.17769	1.24999375
LDR BIASED	13.8	15	25.7267	27.6	24	0.863106	1000		0.4	0.632305	0.999995
LDR BIASED	30.6	15	26.1133	27.8	25.3	0.839955	1000		1	0.821845	0.90909091
LDR BIASED	52.8	15	26.1533	28.2	24.5	1.04736	1000		1	0.638302	0.58823529
LDR BIASED	80	15	26.5933	28	24.7	0.970616	1000		1.6	0.927516	0.88888889
LDR BIASED	101	15	26.48	28.2	24.7	0.943549	1000		1.2	0.714609	0.46153846
LDR UNBIAS	0	15	25.1867	27.5	23	1.10961	1000				
LDR UNBIAS	4	15	25.6667	28	23.9	1.13116	1000		0.5	0.965993	1.66666111
LDR UNBIAS	13.8	15	26.1267	28.4	24.9	1.064	1000		0.6	0.765133	0.75000094
LDR UNBIAS	30.6	15	26.4933	28.1	25	0.920766	1000		1.2	1.15972	1.0
LDR UNBIAS	52.8	15	26.8133	28.3	24.8	0.987686	1000		1.5	0.957278	0.88235294
LDR UNBIAS	80	15	26.3067	28.8	24.3	1.33816	1000		1.3	1.01009	0.86666667
LDR UNBIAS	101	15	27.3867	29.2	24.9	1.24089	1000		1.9	1.2189	0.9047619
HDR BIASED	0	15	25.4933	27.2	24.1	0.989565	1000				
HDR BIASED	3	15	26.0533	28.4	24.5	1.00773	1000		0.400002	1.39376	
HDR BIASED	10	15	25.9267	28.5	23.9	1.22677	1000		0.400002	0.832952	
HDR BIASED	30	15	26.7533	29.1	25.1	1.15255	1000		1.1	0.621979	
HDR BIASED	50	15	27.1533	29.7	25.5	1.2654	1000		1.7	0.734652	
HDR BIASED	80	15	27.4667	28.3	25.9	0.688338	1000		1.8	1.00033	
HDR BIASED	100	15	28.2267	30.5	26.5	1.03886	1000		2.6	0.859125	
HDR UNBIAS	0	15	26	27.3	24.5	0.895226	1000				
HDR UNBIAS	3	15	26.08	28.3	23.9	1.19176	1000		0.300001	1.43487	
HDR UNBIAS	10	15	26.7067	28.3	25.1	1.06131	1000		0.799999	1.17987	
HDR UNBIAS	30	15	27.1067	28.8	25.4	0.947528	1000		1	1.37137	
HDR UNBIAS	50	15	27.5867	29.6	25.9	1.07296	1000		1.7	1.23107	
HDR UNBIAS	80	15	28.04	30.2	26.7	1.00129	1000		1.5	1.35689	
HDR UNBIAS	100	15	27.9133	29.6	26.1	0.963525	1000		2.1	1.40452	

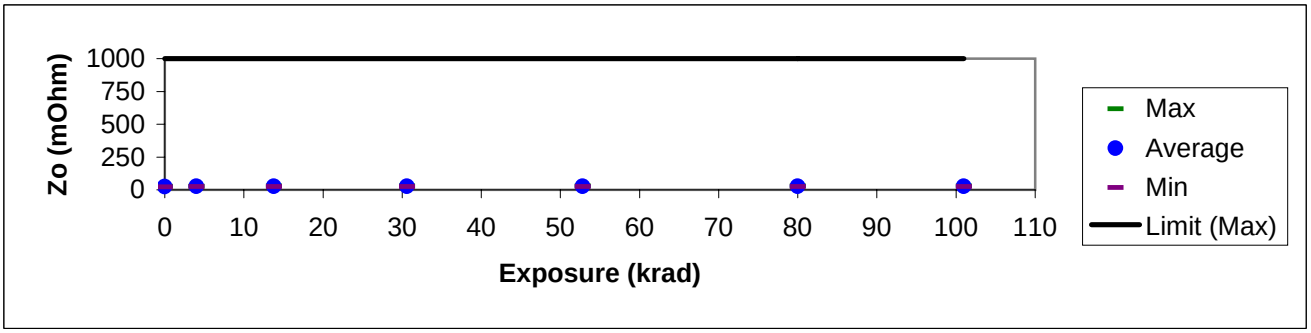
Plot of the average readings for each radiation/bias condition



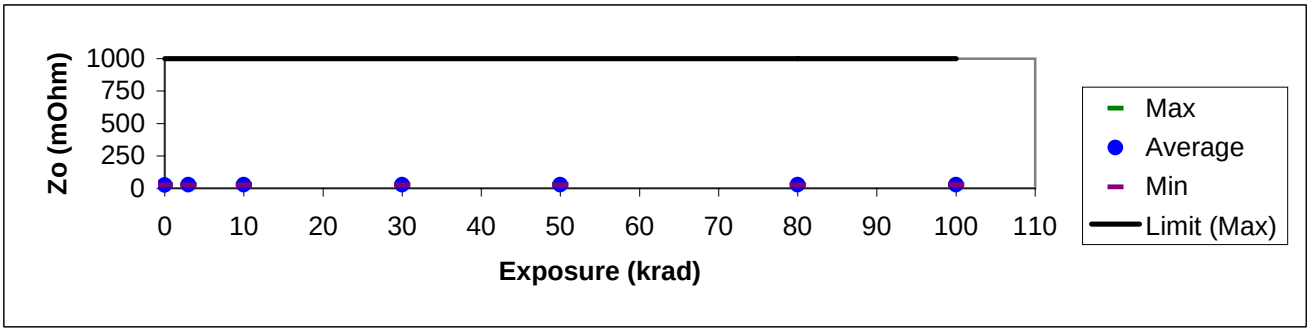
TEST ID: 25.20 Output Impedance; Vin = 10V, Iout = 100mA DC
Low dose rate biased



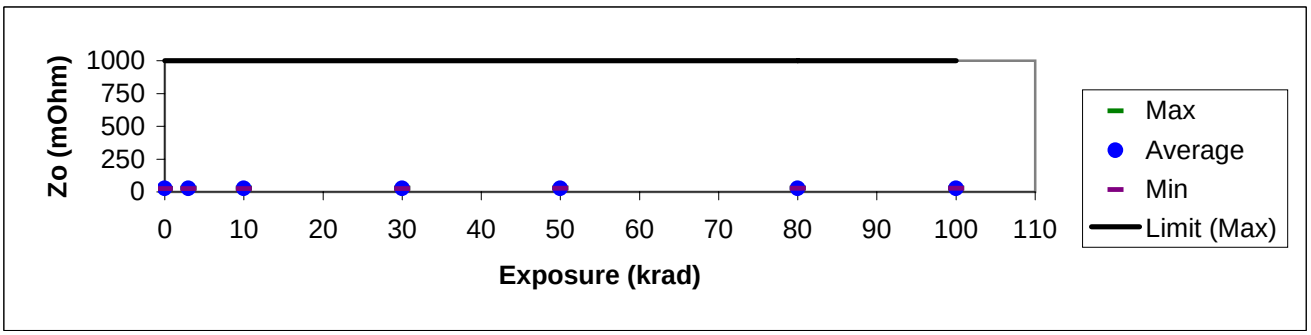
TEST ID: 25.20 Output Impedance; Vin = 10V, Iout = 100mA DC
Low dose rate unbiased



TEST ID: 25.20 Output Impedance; Vin = 10V, Iout = 100mA DC
High dose rate biased



TEST ID: 25.20 Output Impedance; Vin = 10V, Iout = 100mA DC
High dose rate unbiased



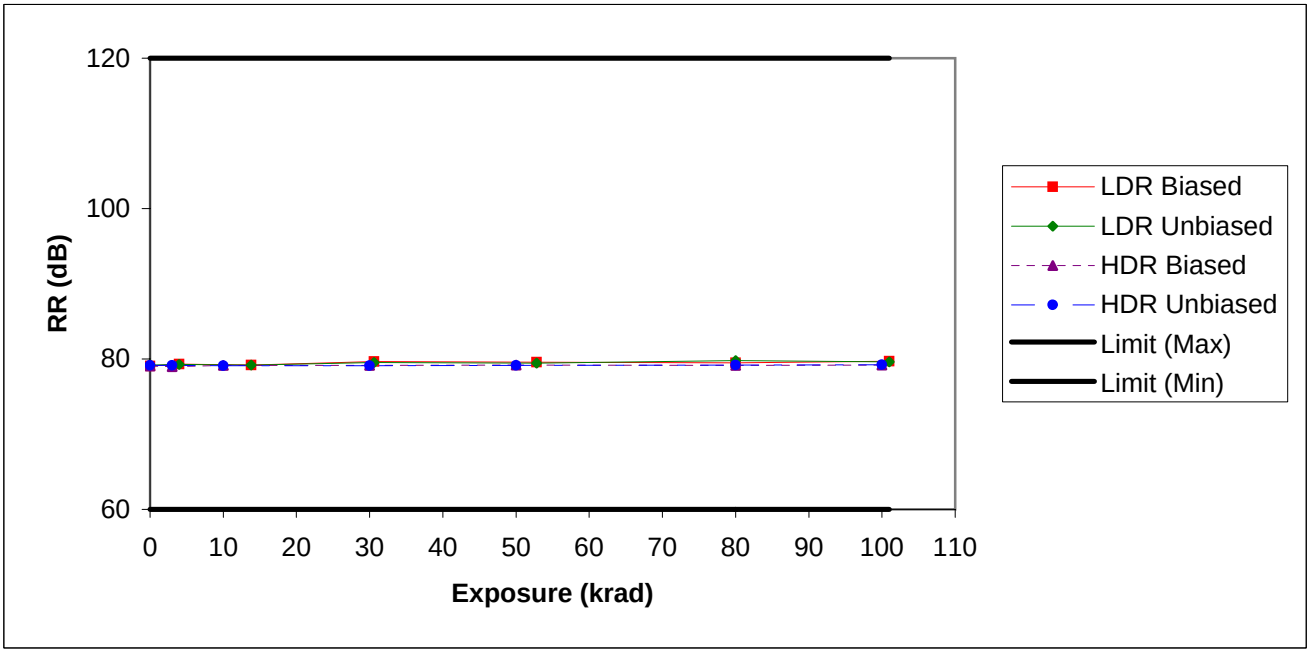
National Semiconductor

TEST ID: 26.21 Ripple Rejection; Vin = 10V, Iout = 5mA

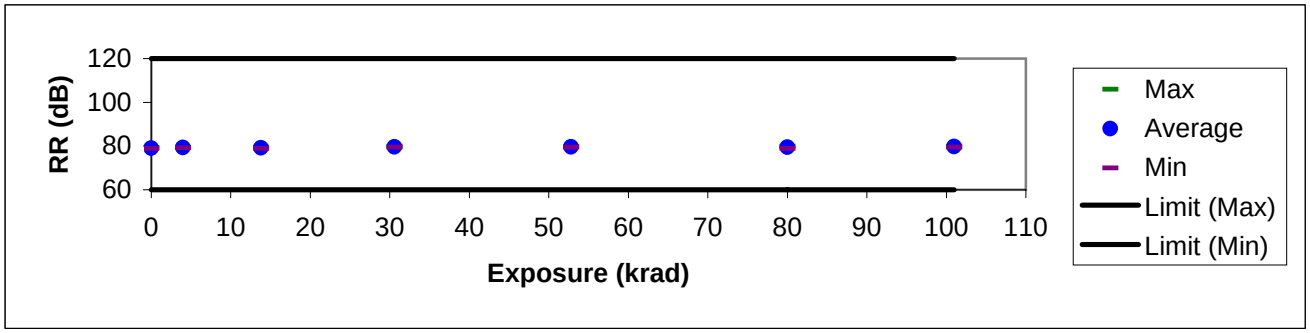
TEST ID: 26.21 RR @Vin = 10V, 1Vrms, f = 1KHz, Iout = 5mA dB
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	79.0667	79.3	78.9	0.111269	120	60			
LDR BIASED	4	15	79.3	79.5	79.2	0.0925836	120	60	0.299995	0.0816491	#DIV/0!
LDR BIASED	13.8	15	79.1933	79.4	78.9	0.148645	120	60	0.100006	0.170991	1.000076
LDR BIASED	30.6	15	79.6467	79.9	79.4	0.130201	120	60	0.599998	0.0861892	6.000076
LDR BIASED	52.8	15	79.5933	79.8	79.5	0.10328	120	60	0.5	0.170991	5.000075
LDR BIASED	80	15	79.4933	79.9	78.9	0.375055	120	60	0.5	0.323964	5.000075
LDR BIASED	101	15	79.6933	79.9	79.5	0.0961159	120	60	0.599998	0.133453	6.000076
LDR UNBIAS	0	15	79.1933	79.3	79	0.103281	120	60			
LDR UNBIAS	4	15	79.2867	79.5	79.1	0.118725	120	60	0.0999984	0.0883722	#DIV/0!
LDR UNBIAS	13.8	15	79.2	79.3	79	0.0925836	120	60	0	0.0798824	#DIV/0!
LDR UNBIAS	30.6	15	79.52	79.7	79.4	0.0861879	120	60	0.300003	0.0961149	#DIV/0!
LDR UNBIAS	52.8	15	79.46	79.6	79.3	0.0736777	120	60	0.300003	0.104654	#DIV/0!
LDR UNBIAS	80	15	79.7733	79.9	79.5	0.148646	120	60	0.599998	0.147359	#DIV/0!
LDR UNBIAS	101	15	79.6133	79.9	79	0.229493	120	60	0.399994	0.21112	4
HDR BIASED	0	15	79.08	79.3	78.4	0.221036	120	60			
HDR BIASED	3	15	78.9733	79.3	78.3	0.254857	120	60	0	0.289004	
HDR BIASED	10	15	79.16	79.4	78.6	0.195668	120	60	0.0999984	0.108232	
HDR BIASED	30	15	79.1667	79.4	78.8	0.158865	120	60	0.0999984	0.130202	
HDR BIASED	50	15	79.1733	79.5	78.8	0.20166	120	60	0.0999985	0.143758	
HDR BIASED	80	15	79.16	79.5	78.7	0.176474	120	60	0.0999985	0.108232	
HDR BIASED	100	15	79.2	79.4	78.8	0.169031	120	60	0.0999984	0.126491	
HDR UNBIAS	0	15	79.1333	79.3	79	0.0816495	120	60			
HDR UNBIAS	3	15	79.16	79.4	79	0.124213	120	60	0	0.10328	
HDR UNBIAS	10	15	79.12	79.3	79	0.101418	120	60	0	0.0639931	
HDR UNBIAS	30	15	79.12	79.3	78.9	0.126491	120	60	0	0.112546	
HDR UNBIAS	50	15	79.1533	79.3	79	0.112547	120	60	0	0.08619	
HDR UNBIAS	80	15	79.1867	79.4	79	0.106011	120	60	0	0.0915494	
HDR UNBIAS	100	15	79.2133	79.4	78.9	0.159763	120	60	0.0999985	0.137322	

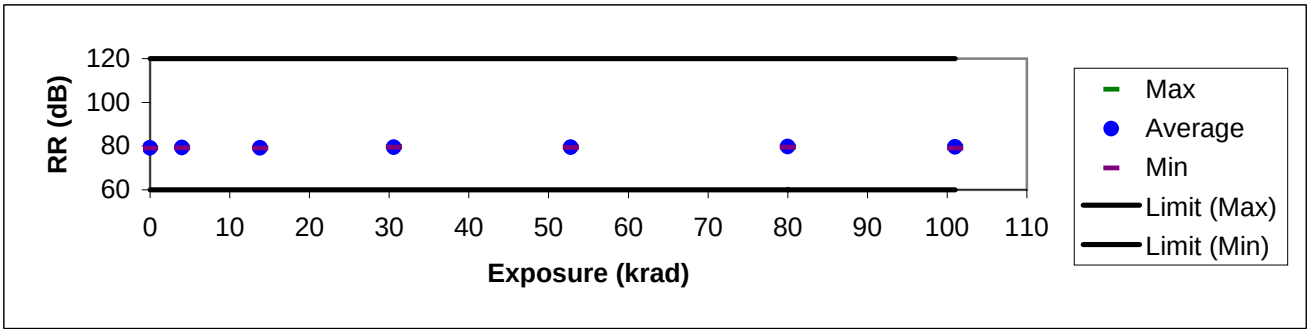
Plot of the average readings for each radiation/bias condition



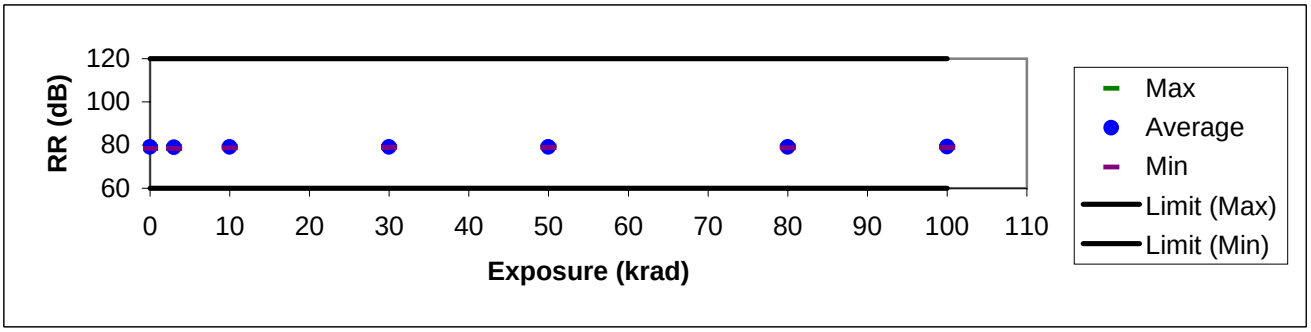
TEST ID: 26.21 Ripple Rejection; Vin = 10V, Iout = 5mA
Low dose rate biased



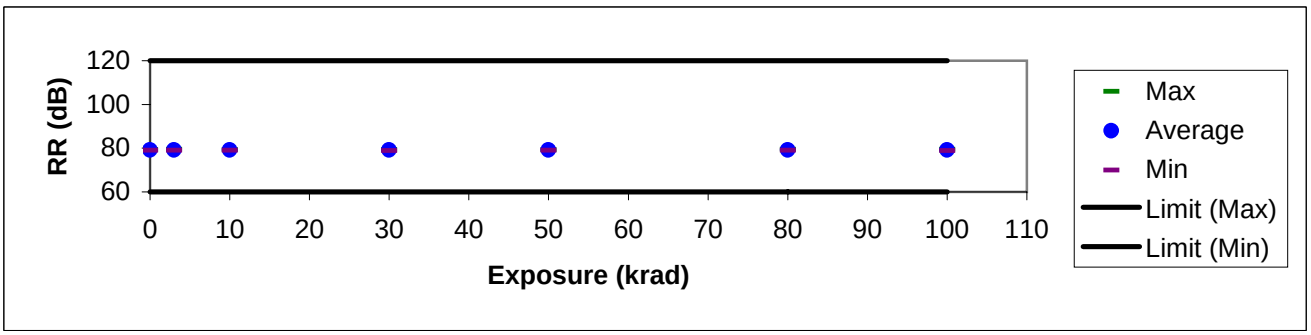
TEST ID: 26.21 Ripple Rejection; Vin = 10V, Iout = 5mA
Low dose rate unbiased



TEST ID: 26.21 Ripple Rejection; Vin = 10V, Iout = 5mA
High dose rate biased



TEST ID: 26.21 Ripple Rejection; Vin = 10V, Iout = 5mA
High dose rate unbiased



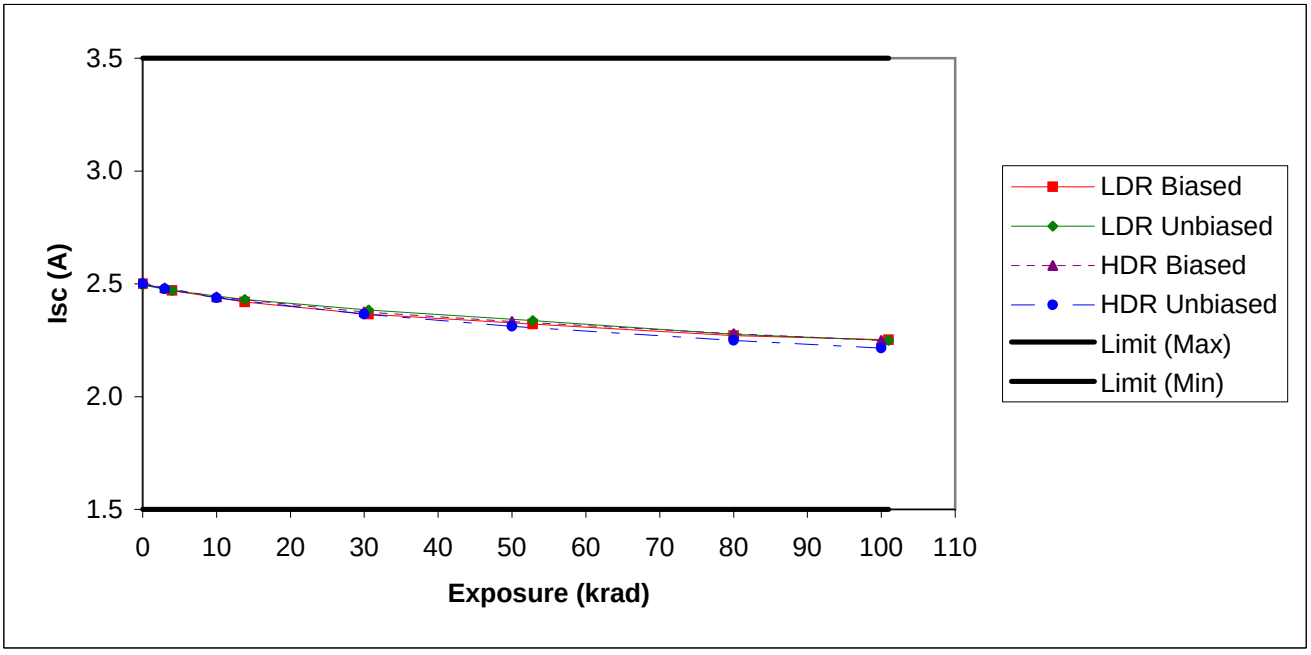
National Semiconductor

TEST ID: 27.22 Short Circuit Current Current ; Current Limit

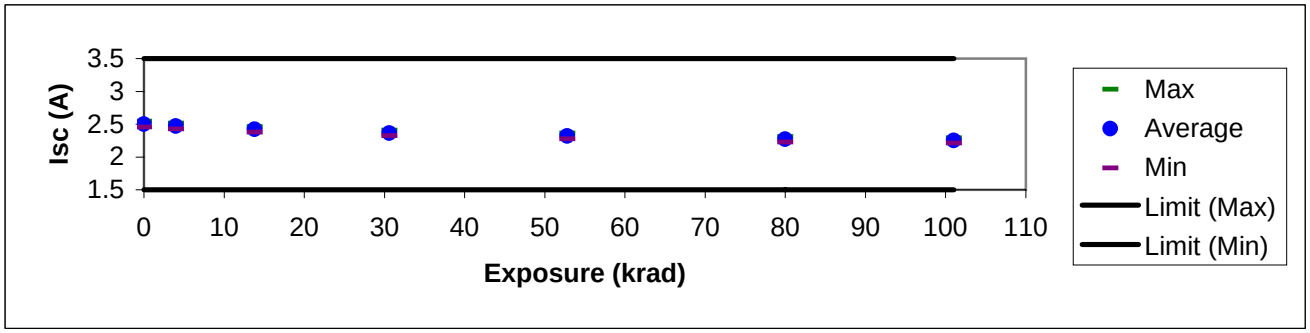
TEST ID: 27.22 Short Circuit Current, Isc @ Vin = 10V A
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	2.50053	2.545	2.456	0.0202726	3.5	1.5			
LDR BIASED	4	15	2.46953	2.513	2.426	0.0194344	3.5	1.5	-0.0310001	0.00290324	1.23999904
LDR BIASED	13.8	15	2.41973	2.461	2.377	0.0197754	3.5	1.5	-0.0810001	0.00398569	1.26562458
LDR BIASED	30.6	15	2.36573	2.407	2.322	0.0197646	3.5	1.5	-0.134	0.0047839	1.03875969
LDR BIASED	52.8	15	2.32147	2.365	2.278	0.0198669	3.5	1.5	-0.179	0.00570045	1.04069767
LDR BIASED	80	15	2.27033	2.31	2.227	0.0184649	3.5	1.5	-0.228	0.00676333	1.01333333
LDR BIASED	101	15	2.25127	2.291	2.21	0.0189453	3.5	1.5	-0.249	0.00781449	0.97647059
LDR UNBIAS	0	15	2.49387	2.559	2.462	0.0262702	3.5	1.5			
LDR UNBIAS	4	15	2.46987	2.53	2.436	0.0262811	3.5	1.5	-0.0239999	0.00316231	1.04347391
LDR UNBIAS	13.8	15	2.43073	2.493	2.398	0.0270118	3.5	1.5	-0.0639999	0.00322637	1.04917697
LDR UNBIAS	30.6	15	2.38307	2.443	2.348	0.0279935	3.5	1.5	-0.112	0.00507375	0.8358209
LDR UNBIAS	52.8	15	2.33713	2.399	2.304	0.0280328	3.5	1.5	-0.157	0.00533811	0.83510638
LDR UNBIAS	80	15	2.2758	2.332	2.239	0.0280515	3.5	1.5	-0.218	0.00772258	0.86166008
LDR UNBIAS	101	15	2.24827	2.302	2.211	0.027858	3.5	1.5	-0.245	0.00858407	0.85664336
HDR BIASED	0	15	2.50593	2.533	2.478	0.0163509	3.5	1.5			
HDR BIASED	3	15	2.48093	2.511	2.455	0.0156318	3.5	1.5	-0.0250001	0.00295197	
HDR BIASED	10	15	2.44227	2.475	2.416	0.0166539	3.5	1.5	-0.0640001	0.00384829	
HDR BIASED	30	15	2.3758	2.408	2.35	0.0156899	3.5	1.5	-0.129	0.00397972	
HDR BIASED	50	15	2.33213	2.367	2.31	0.0153942	3.5	1.5	-0.172	0.00599049	
HDR BIASED	80	15	2.27913	2.315	2.258	0.0152122	3.5	1.5	-0.225	0.00731146	
HDR BIASED	100	15	2.24893	2.284	2.23	0.0146652	3.5	1.5	-0.255	0.00789213	
HDR UNBIAS	0	15	2.49953	2.564	2.462	0.0310917	3.5	1.5			
HDR UNBIAS	3	15	2.477	2.541	2.443	0.0309516	3.5	1.5	-0.023	0.00247467	
HDR UNBIAS	10	15	2.4382	2.501	2.404	0.0304635	3.5	1.5	-0.0610001	0.00315473	
HDR UNBIAS	30	15	2.36487	2.426	2.332	0.0299902	3.5	1.5	-0.134	0.00508028	
HDR UNBIAS	50	15	2.31187	2.374	2.278	0.0310457	3.5	1.5	-0.188	0.00576526	
HDR UNBIAS	80	15	2.24833	2.308	2.214	0.0306423	3.5	1.5	-0.253	0.00783032	
HDR UNBIAS	100	15	2.2144	2.274	2.182	0.0307148	3.5	1.5	-0.286	0.00800773	

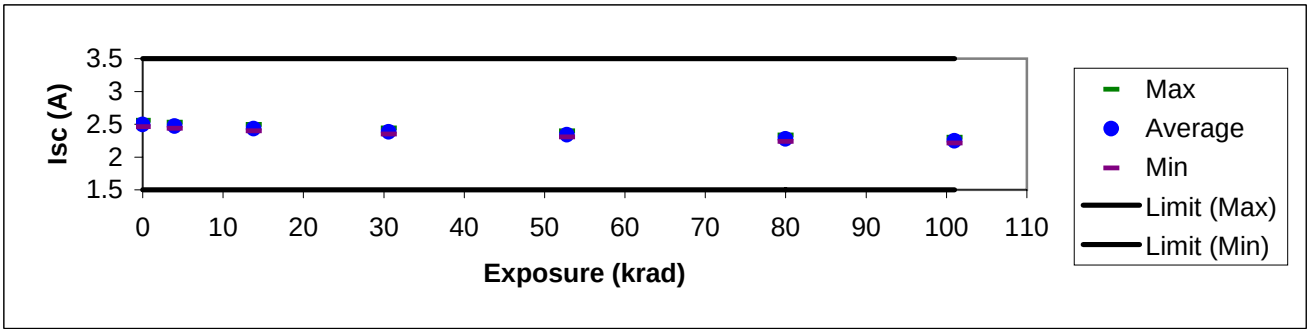
Plot of the average readings for each radiation/bias condition



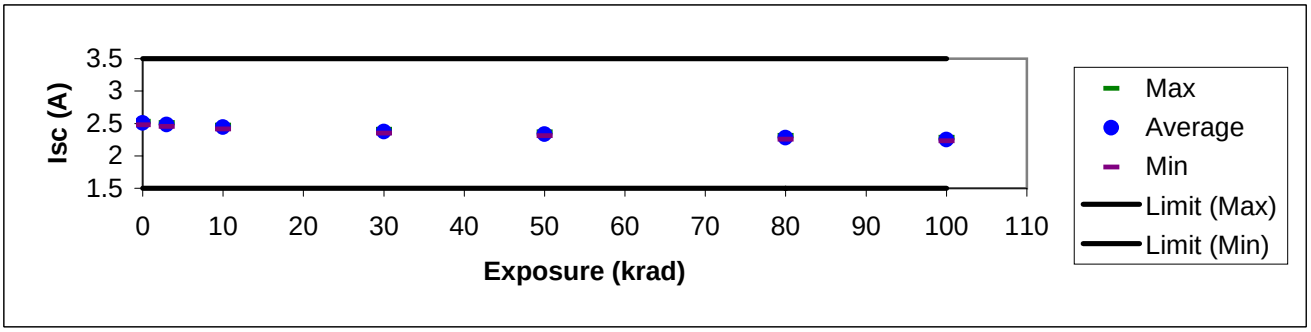
TEST ID: 27.22 Short Circuit Current Current ; Current Limit
Low dose rate biased



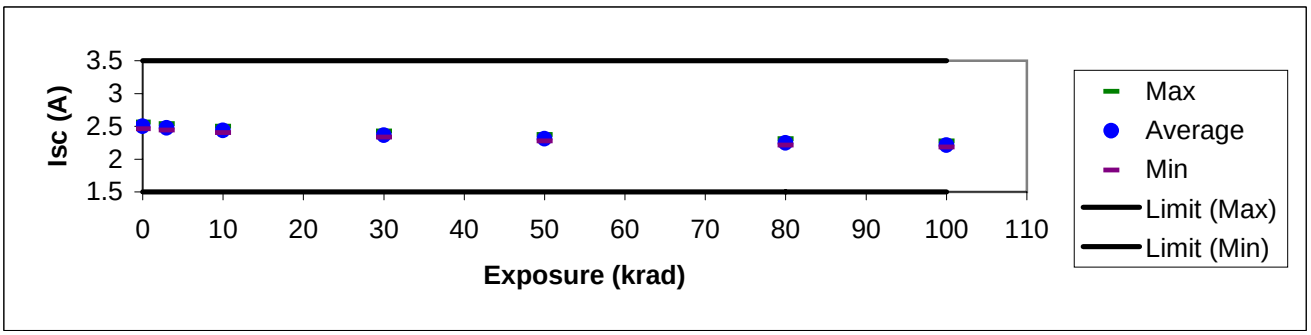
TEST ID: 27.22 Short Circuit Current Current ; Current Limit
Low dose rate unbiased



TEST ID: 27.22 Short Circuit Current Current ; Current Limit
High dose rate biased



TEST ID: 27.22 Short Circuit Current Current ; Current Limit
High dose rate unbiased



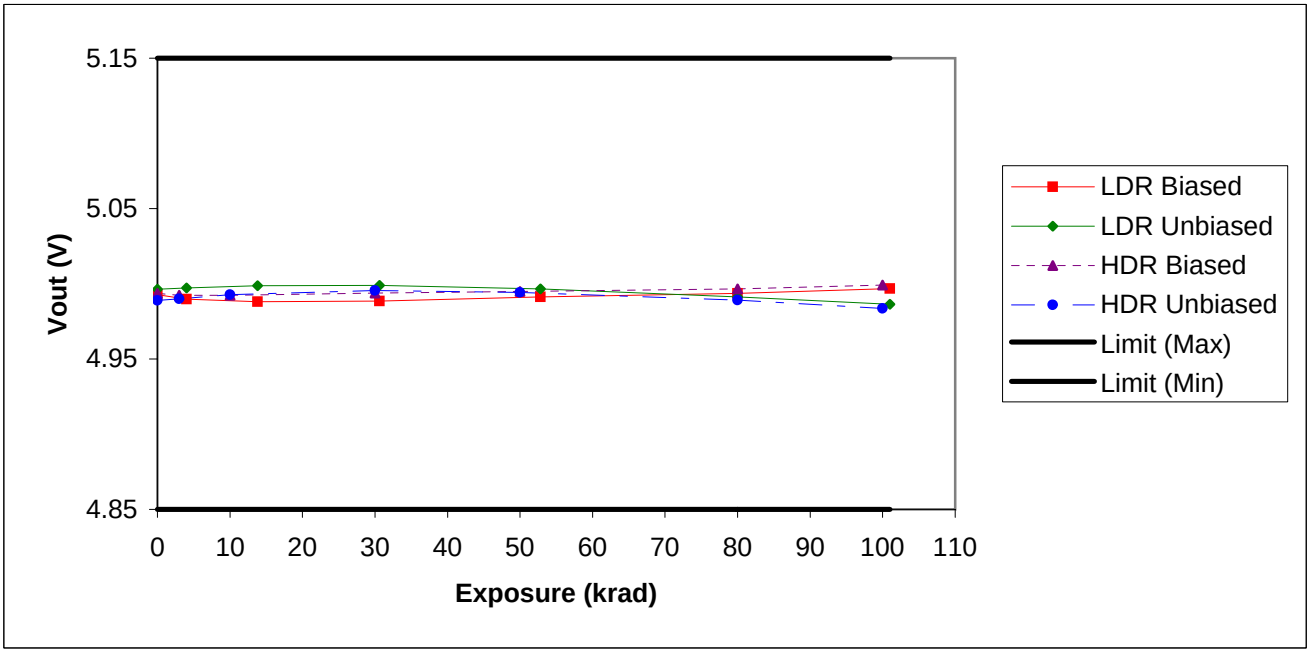
National Semiconductor

TEST ID: 28.23 Output Voltage; Vout Recovery

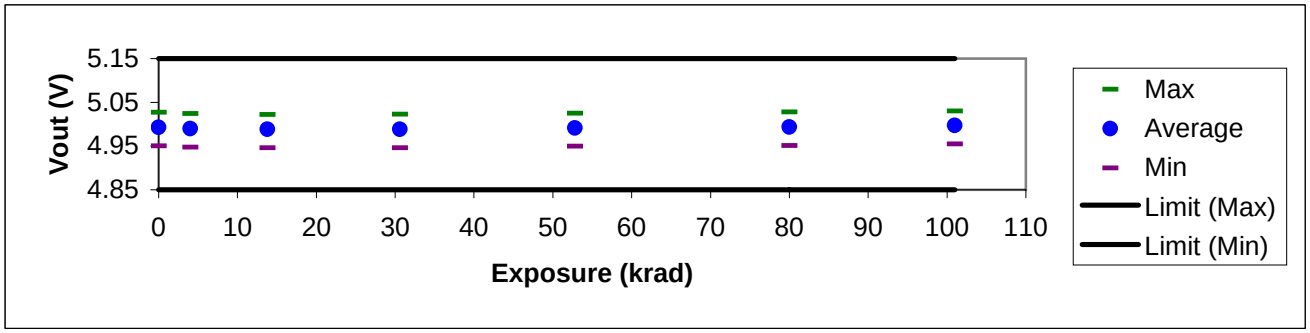
TEST ID: 28.23 VO Recovery V
EM8A6603A019 EM8A6604K019 EM8A6605H019

TEST_BIAS	DOSE(k)	OBS	AVG	MAX	MIN	SIGMA	UTL	LTL	Delta Median From 0K	Delta Sigma From 0K	Delta Ratio LDR/HDR
LDR BIASED	0	15	4.99272	5.0274	4.9504	0.0249791	5.15	4.85			
LDR BIASED	4	15	4.98973	5.0241	4.9471	0.0249935	5.15	4.85	-0.00289964	0.00025596	2.2299091
LDR BIASED	13.8	15	4.98805	5.0219	4.9455	0.0251209	5.15	4.85	-0.00449991	0.00061019	3.46184204
LDR BIASED	30.6	15	4.98855	5.0224	4.9459	0.0250876	5.15	4.85	-0.00439977	0.00089659	-21.9680947
LDR BIASED	52.8	15	4.99131	5.0247	4.9493	0.0249663	5.15	4.85	-0.00130034	0.0012569	-0.86681821
LDR BIASED	80	15	4.99371	5.0277	4.9509	0.0251923	5.15	4.85	0.00090027	0.00136127	0.29041811
LDR BIASED	101	15	4.99674	5.03	4.9547	0.0250009	5.15	4.85	0.00450039	0.00149056	0.78952687
LDR UNBIAS	0	15	4.99635	5.023	4.961	0.0196818	5.15	4.85			
LDR UNBIAS	4	15	4.99713	5.0235	4.9615	0.0196932	5.15	4.85	0.00080013	0.000265	0.72735124
LDR UNBIAS	13.8	15	4.99874	5.025	4.9629	0.0196956	5.15	4.85	0.00230026	0.00044305	0.5751067
LDR UNBIAS	30.6	15	4.99891	5.0248	4.9628	0.0197186	5.15	4.85	0.00279999	0.00061832	0.43075179
LDR UNBIAS	52.8	15	4.99668	5.0227	4.9609	0.0196005	5.15	4.85	0.0001998	0.00077885	0.04077568
LDR UNBIAS	80	15	4.99129	5.0179	4.9552	0.0198785	5.15	4.85	-0.00510025	0.00075579	-17.0048011
LDR UNBIAS	101	15	4.98645	5.0137	4.9501	0.0198533	5.15	4.85	-0.00969982	0.0009982	1.90200754
HDR BIASED	0	15	4.99363	5.0305	4.9539	0.0219427	5.15	4.85			
HDR BIASED	3	15	4.99225	5.0294	4.9527	0.0220362	5.15	4.85	-0.00130034	0.00038768	
HDR BIASED	10	15	4.9924	5.0301	4.9526	0.022199	5.15	4.85	-0.00129986	0.00049671	
HDR BIASED	30	15	4.99383	5.0318	4.9546	0.0222445	5.15	4.85	0.00020028	0.00089089	
HDR BIASED	50	15	4.99495	5.0329	4.9554	0.0222444	5.15	4.85	0.00150013	0.00090866	
HDR BIASED	80	15	4.99669	5.0349	4.9573	0.0219956	5.15	4.85	0.00309991	0.00117359	
HDR BIASED	100	15	4.99916	5.0364	4.9597	0.0214375	5.15	4.85	0.00570011	0.00189317	
HDR UNBIAS	0	15	4.98885	5.0282	4.9522	0.0227839	5.15	4.85			
HDR UNBIAS	3	15	4.99001	5.0293	4.9531	0.0228966	5.15	4.85	0.00110006	0.00030891	
HDR UNBIAS	10	15	4.99271	5.032	4.9555	0.0228874	5.15	4.85	0.00399971	0.0004968	
HDR UNBIAS	30	15	4.99555	5.0346	4.9576	0.022962	5.15	4.85	0.00650024	0.00089603	
HDR UNBIAS	50	15	4.9942	5.0329	4.9568	0.0227763	5.15	4.85	0.00489998	0.00101836	
HDR UNBIAS	80	15	4.98916	5.0276	4.9518	0.0227522	5.15	4.85	0.00029993	0.0012584	
HDR UNBIAS	100	15	4.98361	5.022	4.9471	0.0225139	5.15	4.85	-0.00509978	0.00149084	

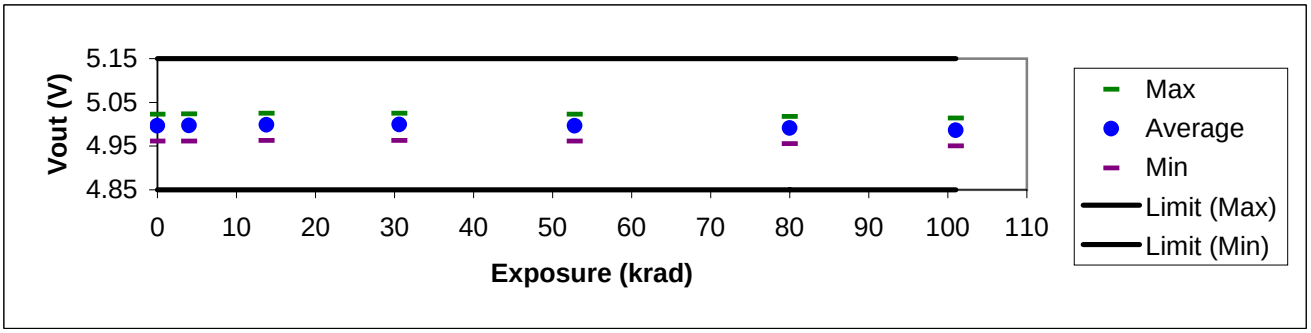
Plot of the average readings for each radiation/bias condition



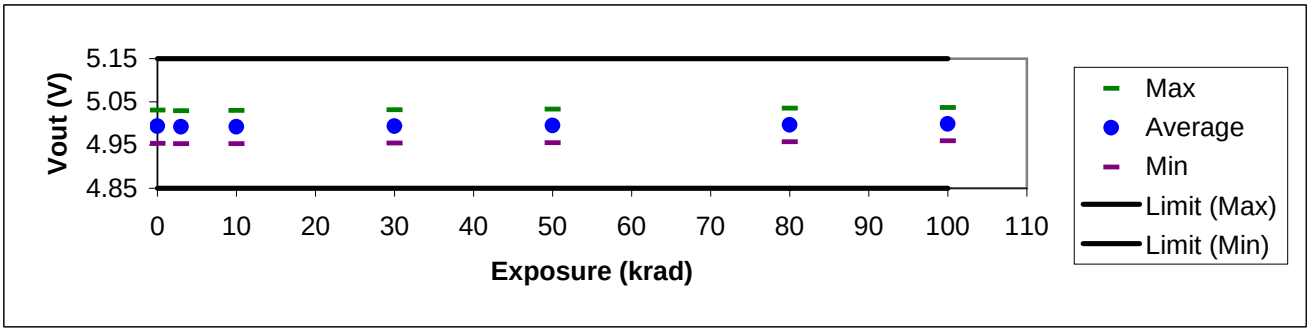
TEST ID: 28.23 Output Voltage; Vout Recovery
Low dose rate biased



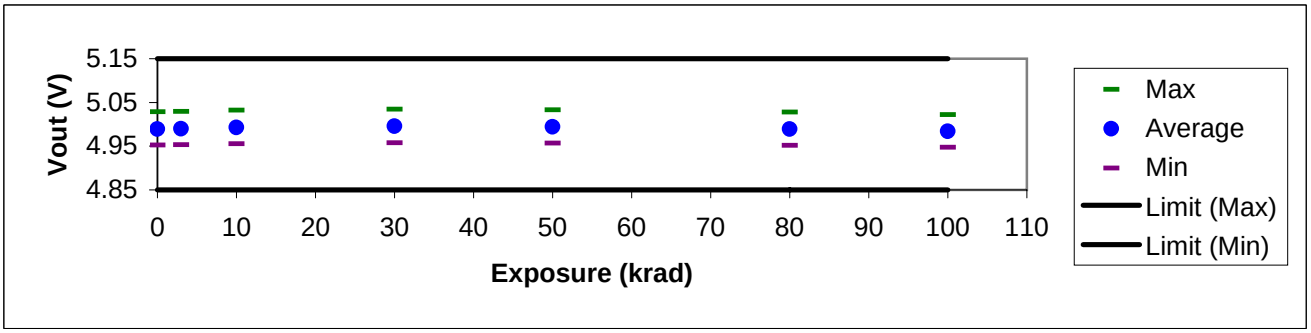
TEST ID: 28.23 Output Voltage; Vout Recovery
Low dose rate unbiased



TEST ID: 28.23 Output Voltage; Vout Recovery
High dose rate biased



TEST ID: 28.23 Output Voltage; Vout Recovery
High dose rate unbiased



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