HIGH DOSE RADIATION TEST REPORT OP471S

February 2013

Generic -6

Radiation Test Report	
Product:	OP471S
Gamma:	0,100k
Gamma Source:	Co60/TM1019 Condition A
Dose Rate:	98 Rad/s
Facilities:	UMass - Lowell
Tested:	2/21/13

The RADTEST® DATA SERVICE is a compilation of radiation test results on Analog Devices' Space grade products. It is designed to assist customers in selecting the right product for applications where radiation is a consideration. Many products manufactured by Analog Devices, Inc. have been shown to be radiation tolerant to most tactical radiation environments. Analog Devices, Inc. does not make any claim to maintain or guarantee these levels of radiation tolerance without lot qualification test.

It is the responsibility of the Procuring Activity to screen products from Analog Devices, Inc. for compliance to Nuclear Hardness Critical Items (HCI) specifications.

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Wafer #	SN	+ ISY VS=15V (mA)		-Isy VS = -15V (mA)		VIO Vcc=+/-15V Side A (uV)	
		0K	100K	0K	100K	0K	100K
7	**1**	**7.751**	**7.672**	**-7.745**	**-7.664**	**167.523**	**165.81**
7	2	7.83	7.227	-7.829	-7.214	43.47	-47.658
7	3	7.764	7.12	-7.756	-7.108	1.845	-89.547
7	4	7.981	7.417	-7.973	-7.409	8.219	-58.893
7	5	7.788	7.175	-7.783	-7.167	172.712	61.078
8	22	7.846	7.249	-7.836	-7.243	153.775	79.192
8	23	7.71	7.108	-7.71	-7.101	232.176	110.142
8	24	7.903	7.275	-7.892	-7.27	46.717	-40.527
8	25	7.797	7.174	-7.774	-7.166	212.154	88.254
9	32	7.995	7.541	-7.989	-7.543	-136.416	-190.384
9	33	7.735	7.155	-7.721	-7.155	-77.774	-166.258
9	34	8.017	7.486	-8.011	-7.474	11.62	-64.521
9	35	8.049	7.462	-8.039	-7.467	-39.736	-116.251
10	51	7.758	7.134	-7.746	-7.109	-19.11	-115.395
10	52	7.845	7.333	-7.841	-7.325	78.304	-25.738
10	53	7.735	7.202	-7.721	-7.187	-32.901	-97.402
10	54	7.75	7.229	-7.741	-7.229	187.424	89.395
11	68	7.767	7.075	-7.752	-7.072	253	146.852
11	69	7.788	7.176	-7.774	-7.167	110.834	31.95
11	70	7.807	7.21	-7.791	-7.204	82.286	-3.213
11	71	7.852	7.178	-7.839	-7.175	83.351	-3.301
min		7.710	7.075	-8.039	-7.543	-136.416	-190.384
max		8.049	7.541	-7.710	-7.072	253.000	146.852
mean		7.836	7.246	-7.826	-7.239	68.598	-20.611
std. dev		0.102	0.133	0.103	0.136	107.975	95.271
mean - 3 sigma		7.531	6.846	-8.134	-7.646	-255.327	-306.425
mean +3 sigma		8.141	7.646	-7.518	-6.832	392.522	265.203

Wafer #	SN	VIO Vcc=+/-15V Side B (uV)		VIO Vcc=+/-15V Side C (uV)		VIO Vcc=+/-15V Side D (uV)	
		0K	100K	0K	100K	0K	100K
7	**1**	**-48.009**	**-49.6**	**-255.004**	**-253.82**	**71.271**	**71.161**
7	2	-152.401	-248.861	-192.139	-291.079	-70.16	-159.456
7	3	-43.982	-111.895	-476.241	-553.699	-31.124	-117.414
7	4	-116.119	-152.95	-366.473	-409.24	-66.364	-133.97
7	5	-123.667	-224.658	-311.101	-399.629	82.989	-33.209
8	22	-211.58	-270.266	-388.481	-464.798	-3.586	-96.974
8	23	-99.881	-188.859	-381.899	-481.179	6.793	-125.192
8	24	-186.335	-256.124	-396.688	-485.534	-71.915	-170.383
8	25	-124.61	-218.306	-301.907	-397.786	-20.24	-143.383
9	32	-147.31	-206.161	-101.856	-183.571	-226.249	-308.293
9	33	-202.375	-279.164	-374.712	-471.853	-43.84	-139.466
9	34	-165.906	-214.115	-183.899	-257.923	-140.212	-228.773
9	35	-226.479	-269.926	-207.981	-282.762	-93.309	-191.81
10	51	-178.907	-262.992	-349.555	-448.462	-107.309	-204.109
10	52	-215.201	-280.338	-339.429	-414.045	-62.864	-148.254
10	53	-56.15	-135.977	-303.706	-391.17	-87.659	-153.52
10	54	-70.906	-170.57	-374.372	-476.68	-82.623	-206.336
11	68	-133.442	-213.775	-362.655	-448.506	-47.296	-163.296
11	69	-141.375	-220.928	-277.726	-386.156	8.614	-103.283
11	70	-114.879	-199.293	-238.635	-323.817	0.879	-93.101
11	71	-118.675	-190.088	-268.104	-355.36	-38.376	-142.571
min		-226.479	-280.338	-476.241	-553.699	-226.249	-308.293
max		-43.982	-111.895	-101.856	-183.571	82.989	-33.209
mean		-141.509	-215.762	-309.878	-396.162	-54.693	-153.140
std. dev		52.053	48.154	90.241	91.239	64.169	57.869
mean - 3 sigma		-297.667	-360.223	-580.600	-669.880	-247.200	-326.746
mean +3 sigma		14.649	-71.302	-39.156	-122.445	137.815	20.467

Wafer #	SN	+IB VCM=0V Side A (nA)		-IB VCM=0V Side A (nA)		+IB VCM=0V Side B (nA)	
		0K	100K	0K	100K	0K	100K
7	**1**	**3.64**	**3.662**	**4.633**	**4.551**	**3.6**	**3.655**
7	2	3.615	173.815	3.861	187.524	3.414	161.248
7	3	3.963	168.755	4.99	189.121	4.122	167.431
7	4	2.602	123.26	3.016	132.667	2.384	130.891
7	5	4.382	174.719	4.598	190.685	4.108	170.528
8	22	3.264	155.221	3.618	165.479	2.676	161.874
8	23	4.632	172.425	5.311	190.88	3.343	172.552
8	24	3.458	154.287	4.445	171.287	2.967	154.707
8	25	3.85	177.049	4.557	194.61	4.903	186.334
9	32	3.379	174.555	4.66	182.12	2.734	176.601
9	33	3.002	152.586	4.665	169.918	2.282	151.064
9	34	5.1	157.57	4.216	168.172	2.568	167.364
9	35	3.702	175.306	3.872	185.215	2.419	173.555
10	51	3.541	174.37	4.561	191.383	4.228	172.919
10	52	3.64	150.351	4.342	162.927	3.102	149.291
10	53	3.782	171.685	4.399	179.086	4.479	158.88
10	54	4.836	171.351	4.981	179.699	4.017	155.431
11	68	3.444	156.018	3.858	167.953	2.689	153.572
11	69	3.981	170.88	4.003	179.511	3.332	169.872
11	70	3.529	165.704	3.829	179.032	3.222	173.039
11	71	3.894	166.811	4.443	179.938	3.157	164.168
min		2.602	123.260	3.016	132.667	2.282	130.891
max		5.100	177.049	5.311	194.610	4.903	186.334
mean		3.780	164.336	4.311	177.360	3.307	163.566
std. dev		0.600	13.066	0.538	14.170	0.765	12.283
mean - 3 sigma		1.979	125.138	2.697	134.849	1.012	126.718
mean +3 sigma		5.581	203.534	5.925	219.871	5.603	200.414

Wafer #	SN	-IB VCM=0V Side B (nA)		+IB VCM=0V Side C (nA)		-IB VCM=0V Side C (nA)	
		0K	100K	0K	100K	0K	100K
7	**1**	**4.213**	**4.108**	**4.506**	**4.489**	**4.603**	**4.567**
7	2	4.186	179.687	4.371	157.19	3.852	168.404
7	3	4.566	180.596	4.48	159.254	7.943	175.138
7	4	2.682	136.084	2.744	126.868	2.795	132.354
7	5	4.316	188.501	3.534	164.471	3.46	176.165
8	22	3.727	170.683	3.331	154.938	3.483	161.11
8	23	4.748	190.947	4.829	169.611	5.079	182.841
8	24	3.853	168.631	3.322	148.128	3.973	163.379
8	25	6.256	207.66	4.268	177.49	4.922	191.48
9	32	3.783	185.65	4.357	163.758	4.049	175.68
9	33	3.25	166.626	3.524	148.181	3.825	160.987
9	34	3.2	174.919	2.854	163.523	1.901	172.826
9	35	3.383	183.452	3.649	159.051	3.417	172.378
10	51	5.413	189.252	4.733	169.888	4.756	184.536
10	52	3.499	162.639	2.7	146.919	3.004	153.63
10	53	4.945	174.369	4.14	155.572	4.339	167.315
10	54	5.052	171.093	4.93	144.561	4.732	161.628
11	68	3.824	169.914	2.523	145.16	3.012	158.663
11	69	4.936	179.154	3.756	152.509	3.893	165.104
11	70	4.329	180.409	4.358	168.832	4.033	174.543
11	71	3.948	182.714	3.436	159.555	3.607	173.094
min		2.682	136.084	2.523	126.868	1.901	132.354
max		6.256	207.660	4.930	177.490	7.943	191.480
mean		4.195	177.149	3.792	156.773	4.004	168.563
std. dev		0.861	14.135	0.745	11.542	1.208	12.687
mean - 3 sigma		1.613	134.743	1.556	122.146	0.379	130.501
mean +3 sigma		6.777	219.555	6.028	191.400	7.628	206.625

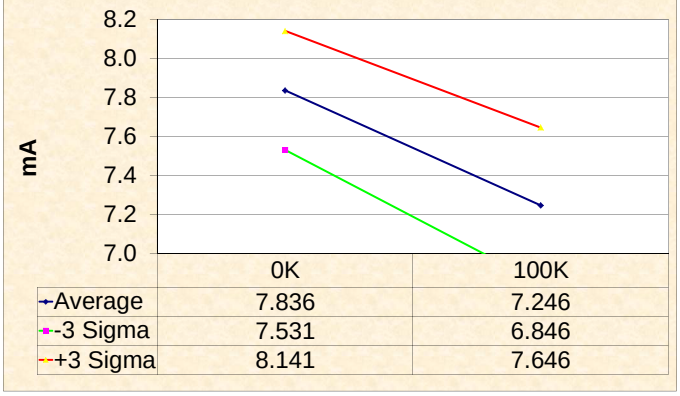
Wafer #	SN	+IB VCM=0V Side D (nA)		-IB VCM=0V Side D (nA)		IOS Vcm=0V Side A (nA)	
		0K	100K	0K	100K	0K	100K
7	**1**	**5.08**	**5.01**	**3.839**	**3.782**	**-0.994**	**-0.889**
7	2	4.161	167.822	3.716	172.94	-0.246	-13.709
7	3	4.003	162.727	3.791	173.206	-1.027	-20.366
7	4	2.673	126.718	2.697	130.959	-0.414	-9.407
7	5	4.109	177.921	4.091	184.637	-0.215	-15.966
8	22	3.959	157.292	3.578	163.113	-0.355	-10.258
8	23	5.782	170.914	4.296	183.859	-0.679	-18.455
8	24	3.654	151.67	3.463	164.908	-0.987	-17
8	25	4.885	176.674	5.675	194.542	-0.707	-17.561
9	32	4.595	163.267	4.274	176.591	-1.281	-7.565
9	33	3.673	151.495	3.423	162.161	-1.663	-17.332
9	34	4.589	150.566	3.994	164.885	0.884	-10.602
9	35	5.651	161.921	5.321	176.167	-0.17	-9.909
10	51	4.462	172.371	4.086	183.875	-1.02	-17.013
10	52	3.488	150.67	3.624	154.569	-0.702	-12.576
10	53	4.586	166.974	3.716	173.533	-0.617	-7.401
10	54	4.633	142.992	3.852	158.238	-0.145	-8.349
11	68	3.111	143.58	3.238	156.61	-0.414	-11.935
11	69	4.013	152.055	4.092	164.354	-0.021	-8.631
11	70	5.564	171.397	5.371	177.24	-0.3	-13.328
11	71	4.026	158.079	4.033	171.528	-0.549	-13.127
min		2.673	126.718	2.697	130.959	-1.663	-20.366
max		5.782	177.921	5.675	194.542	0.884	-7.401
mean		4.281	158.855	4.017	169.396	-0.531	-13.025
std. dev		0.804	12.907	0.728	13.830	0.536	3.998
mean - 3 sigma		1.868	120.135	1.834	127.905	-2.140	-25.020
mean +3 sigma		6.694	197.576	6.199	210.887	1.077	-1.029

Wafer #	SN	IOS Vcm=0V Side B (nA)		IOS Vcm=0V Side C (nA)		IOS Vcm=0V Side D (nA)	
		0K	100K	0K	100K	0K	100K
7	**1**	**-0.613**	**-0.453**	**-0.097**	**-0.078**	**1.241**	**1.227**
7	2	-0.772	-18.439	0.518	-11.214	0.445	-5.118
7	3	-0.444	-13.165	-3.463	-15.885	0.213	-10.478
7	4	-0.297	-5.193	-0.051	-5.486	-0.024	-4.241
7	5	-0.208	-17.973	0.074	-11.694	0.018	-6.716
8	22	-1.051	-8.809	-0.152	-6.172	0.381	-5.821
8	23	-1.406	-18.394	-0.25	-13.23	1.487	-12.945
8	24	-0.886	-13.924	-0.651	-15.252	0.191	-13.238
8	25	-1.353	-21.326	-0.654	-13.99	-0.79	-17.868
9	32	-1.049	-9.049	0.308	-11.922	0.322	-13.323
9	33	-0.968	-15.562	-0.3	-12.806	0.25	-10.667
9	34	-0.632	-7.555	0.954	-9.302	0.594	-14.32
9	35	-0.963	-9.897	0.231	-13.327	0.329	-14.246
10	51	-1.185	-16.333	-0.023	-14.648	0.376	-11.504
10	52	-0.398	-13.348	-0.304	-6.711	-0.136	-3.899
10	53	-0.466	-15.49	-0.199	-11.743	0.87	-6.558
10	54	-1.036	-15.662	0.199	-17.067	0.781	-15.246
11	68	-1.135	-16.343	-0.489	-13.503	-0.127	-13.03
11	69	-1.604	-9.282	-0.137	-12.596	-0.079	-12.299
11	70	-1.106	-7.37	0.325	-5.711	0.193	-5.843
11	71	-0.792	-18.547	-0.171	-13.539	-0.007	-13.45
min		-1.604	-21.326	-3.463	-17.067	-0.790	-17.868
max		-0.208	-5.193	0.954	-5.486	1.487	-3.899
mean		-0.888	-13.583	-0.212	-11.790	0.264	-10.541
std. dev		0.384	4.581	0.859	3.421	0.463	4.176
mean - 3 sigma		-2.038	-27.327	-2.789	-22.052	-1.125	-23.069
mean +3 sigma		0.263	0.161	2.365	-1.528	1.654	1.988

Wafer #	SN	AVO Rl=10k Side A (V/mV)		AVO Rl=10k Side B (V/mV)		AVO Rl=10k Side C (V/mV)	
		0K	100K	0K	100K	0K	100K
7	**1**	**752.184**	**710.527**	**772.919**	**760.963**	**752.494**	**776.527**
7	2	784.228	104.901	803.947	108.375	785.242	106.445
7	3	742.681	103.997	784.228	105.453	763.528	104.54
7	4	886.028	130.932	886.891	132.339	892.975	129.114
7	5	715.562	101.755	747.862	104.504	719.801	102.275
8	22	783.89	113.442	835.65	113.64	825.057	110.841
8	23	709.157	99.986	745.72	100.052	719.801	98.724
8	24	798.313	112.192	810.022	112.559	771.937	110.197
8	25	701.244	97.791	725.532	97.264	694.563	97.524
9	32	762.889	107.932	769.006	106.625	709.71	105.076
9	33	797.963	110.679	838.727	112.061	781.537	109.588
9	34	766.096	111.118	794.484	109.845	779.532	107.512
9	35	762.889	106.327	774.233	106.756	784.903	105.416
10	51	756.555	102.835	793.792	103.831	764.489	100.983
10	52	810.382	115.235	836.034	116.205	770.957	112.143
10	53	806.081	105.155	804.302	107.462	744.501	104.696
10	54	717.816	99.451	748.169	101.772	741.171	101.264
11	68	817.654	114.181	858.886	116.831	807.152	114.152
11	69	765.774	108.311	832.977	110.23	808.226	108.093
11	70	755.301	104.774	786.597	105.313	738.468	101.71
11	71	743.59	106.228	774.891	107.824	774.233	105.502
min		701.244	97.791	725.532	97.264	694.563	97.524
max		886.028	130.932	886.891	132.339	892.975	129.114
mean		769.205	107.861	797.598	108.947	768.889	106.790
std. dev		43.964	7.390	41.576	7.475	45.064	6.870
mean - 3 sigma		637.314	85.692	672.870	86.522	633.696	86.180
mean +3 sigma		901.095	130.030	922.325	131.372	904.082	127.399

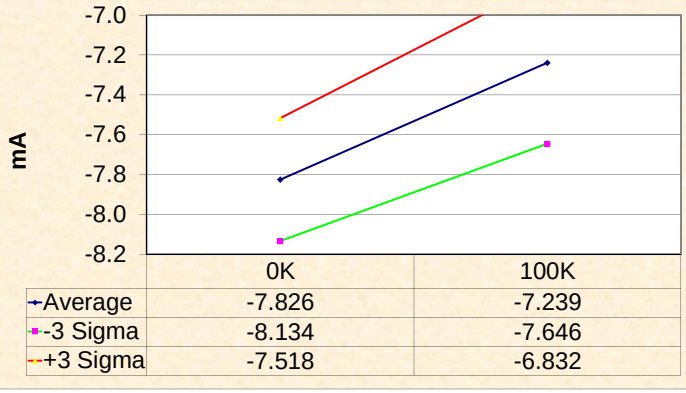
Wafer #	SN	AVO Rl=10k Side D (V/mV)	
		0K	100K
7	**1**	**726.4**	**775.866**
7	2	793.447	104.654
7	3	727.56	104.426
7	4	854.857	128.061
7	5	732.531	100.211
8	22	840.274	109.004
8	23	688.267	99.202
8	24	797.614	109.246
8	25	712.484	96.166
9	32	738.767	106.825
9	33	807.152	108.998
9	34	787.277	110.25
9	35	782.544	105.87
10	51	747.555	99.843
10	52	823.194	112.261
10	53	741.171	102.235
10	54	718.382	100.721
11	68	826.929	112.323
11	69	798.313	106.619
11	70	750.634	100.76
11	71	749.092	104.744
min		688.267	96.166
max		854.857	128.061
mean		770.902	106.121
std. dev		46.523	6.894
mean - 3 sigma		631.332	85.439
mean +3 sigma		910.472	126.802

+Isy VS = 15V



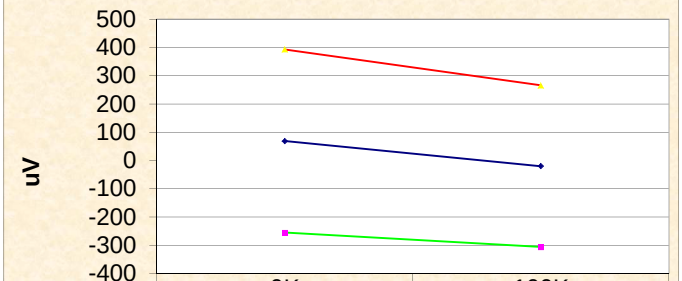
	0K	100K
Average	7.836	7.246
-3 Sigma	7.531	6.846
+3 Sigma	8.141	7.646

-Isy VS = -15V



	0K	100K
Average	-7.826	-7.239
-3 Sigma	-8.134	-7.646
+3 Sigma	-7.518	-6.832

VIO Vcc=+/-15V Side A

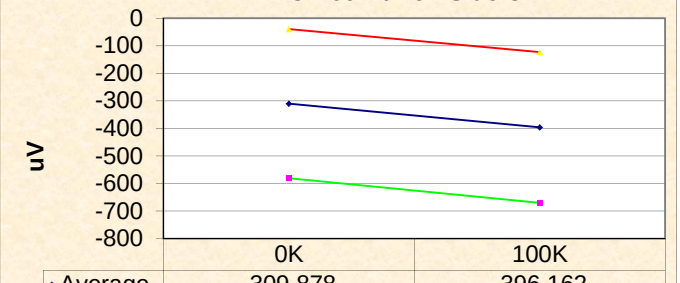


	0K	100K
Average	68.598	-20.611
-3 Sigma	-255.327	-306.425
+3 Sigma	392.522	265.203

VIO Vcc=+/-15V Side B

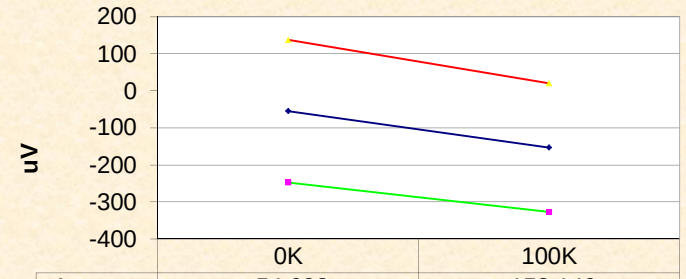
	0K	100K
Average	-141.509	-215.762
-3 Sigma	-297.667	-360.223
+3 Sigma	14.649	-71.302

VIO Vcc=+/-15V Side C



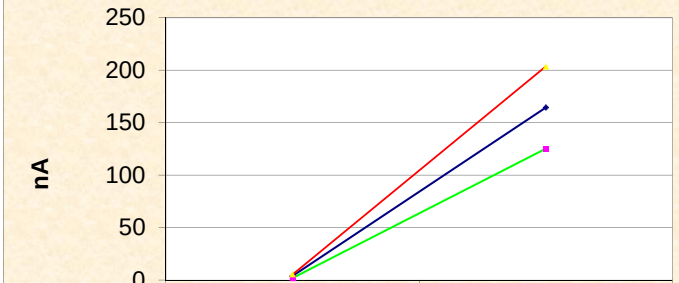
	0K	100K
Average	-309.878	-396.162
-3 Sigma	-580.600	-669.880
+3 Sigma	-39.156	-122.445

VIO Vcc=+/-15V Side D



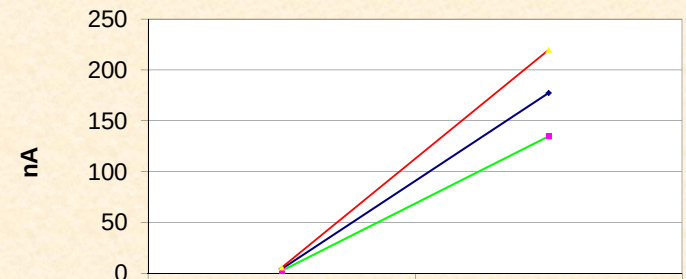
	0K	100K
Average	-54.693	-153.140
-3 Sgima	-247.200	-326.746
+3 SIgma	137.815	20.467

+Ibias Vcm=0V Side A



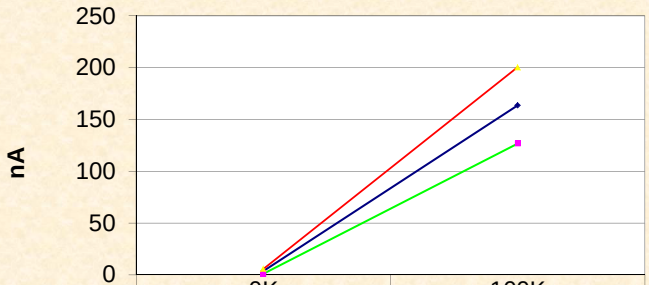
	0K	100K
Average	3.780	164.336
-3 Sigma	1.979	125.138
+3 Sigma	5.581	203.534

-Ibias Vcm=0V Side A



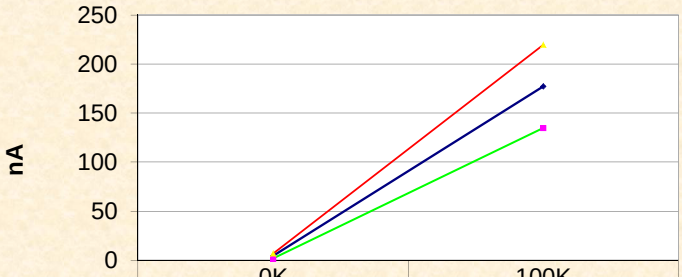
	0K	100K
Average	4.311	177.360
-3 Sigma	2.697	134.849
+3 Sigma	5.925	219.871

+Ibias Vcm=0V Side B



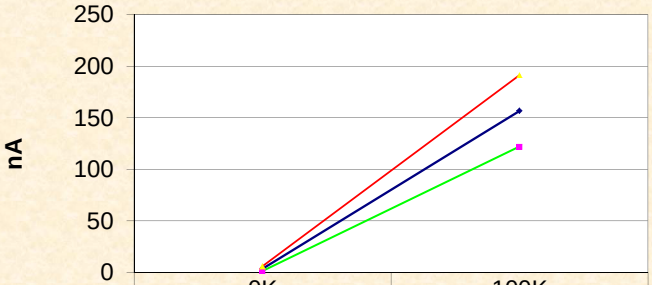
	0K	100K
Average	3.307	163.566
-3 Sigma	1.012	126.718
+3 Sigma	5.603	200.414

-Ibias Vcm=0V Side B



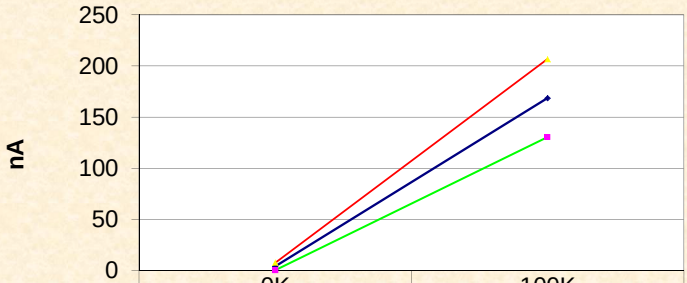
	0K	100K
Average	4.195	177.149
-3 Sigma	1.613	134.743
+3 Sigma	6.777	219.555

+Ibias Vcm=0V Side C



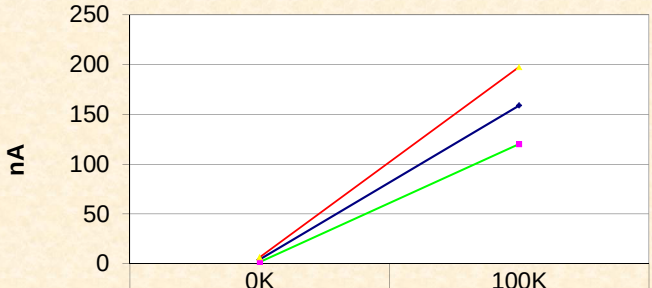
	0K	100K
Average	3.792	156.773
-3 SIgma	1.556	122.146
+3 Sigma	6.028	191.400

-Ibias Vcm=0V Side C



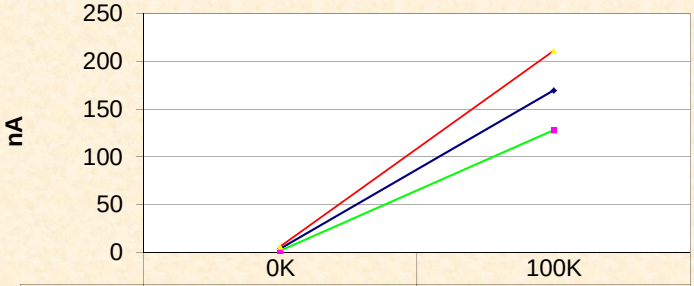
	0K	100K
Average	4.004	168.563
-3 SIgma	0.379	130.501
+3 Sgima	7.628	206.625

+Ibias Vcm=0V Side D



	0K	100K
Average	4.281	158.855
-3 Sigma	1.868	120.135
+3 Sigma	6.694	197.576

-Ibias Vcm=0V Side D



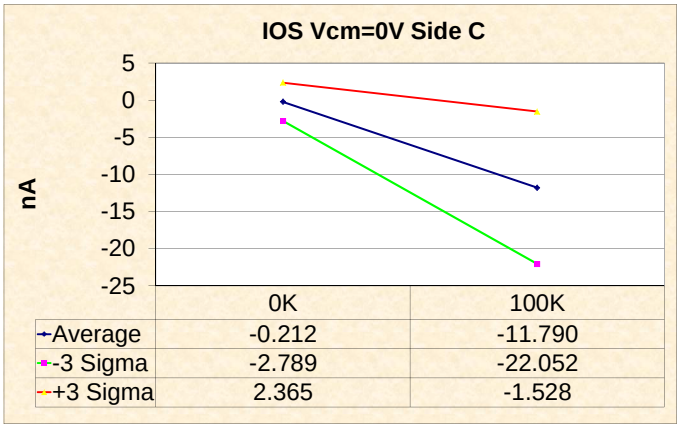
	0K	100K
Average	4.017	169.396
-3 Sigma	1.834	127.905
+ # sigma	6.199	210.887

IOS Vcm=0V Side A

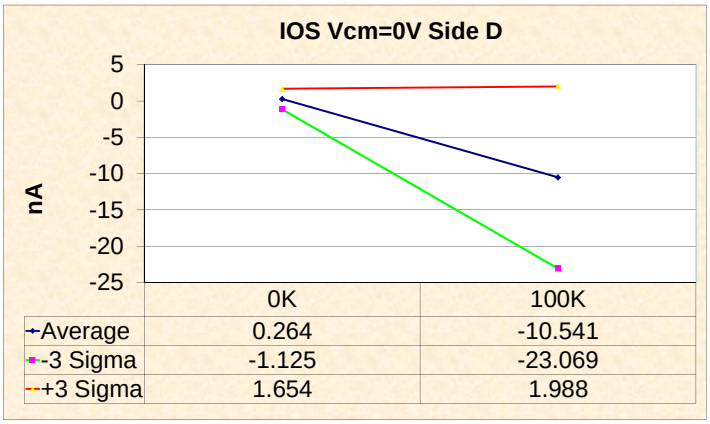
	0K	100K
Average	-0.531	-13.025
-3 Sigma	-2.140	-25.020
+3 Sigma	1.077	-1.029

IOS Vcm=0V Side B

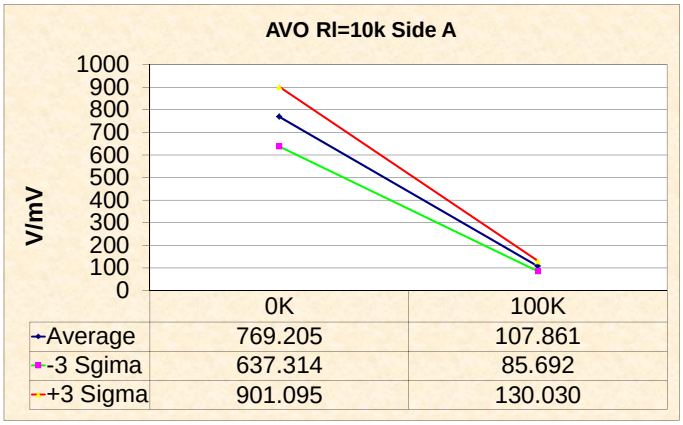
	0K	100K
Average	-0.888	-13.583
-3 Sigma	-2.038	-27.327
+3 Sigma	0.263	0.161



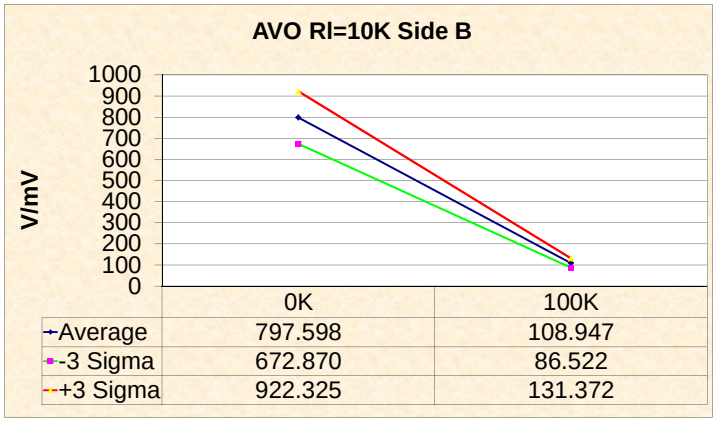
	0K	100K
Average	-0.212	-11.790
-3 Sigma	-2.789	-22.052
+3 Sigma	2.365	-1.528



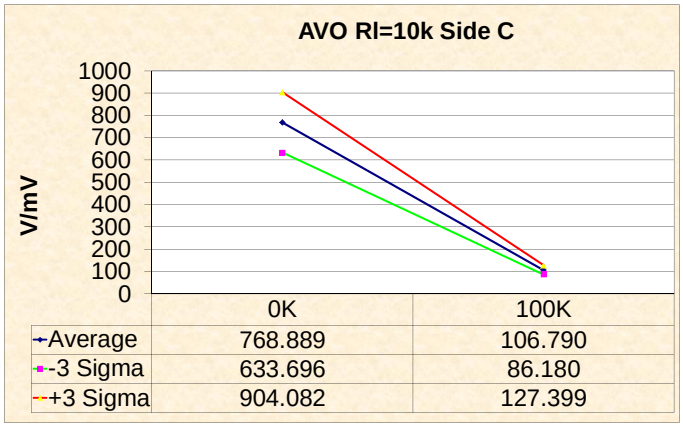
	0K	100K
Average	0.264	-10.541
-3 Sigma	-1.125	-23.069
+3 Sigma	1.654	1.988



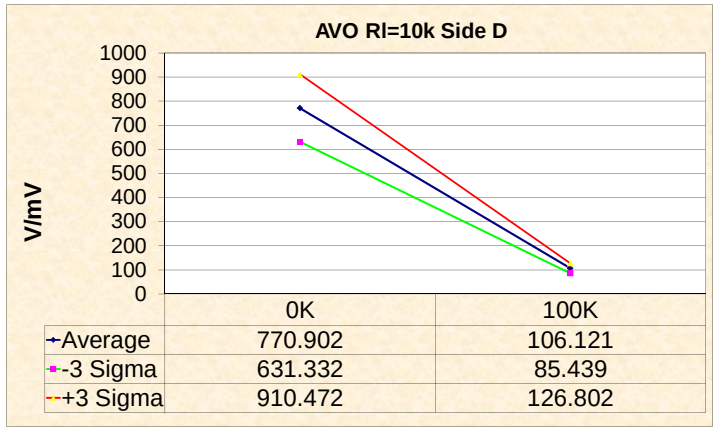
	0K	100K
Average	769.205	107.861
-3 Sgima	637.314	85.692
+3 Sigma	901.095	130.030



	0K	100K
Average	797.598	108.947
-3 Sigma	672.870	86.522
+3 Sigma	922.325	131.372



	0K	100K
Average	768.889	106.790
-3 Sigma	633.696	86.180
+3 Sigma	904.082	127.399



	0K	100K
Average	770.902	106.121
-3 Sigma	631.332	85.439
+3 Sigma	910.472	126.802