



AHEAD OF WHAT'S POSSIBLE™

DISPLACEMENT DAMAGE TEST REPORT OP470S

January 2023



Radiation Test Report

Product:	OP470S
Die:	1470X-6B3
Fluence:	2e12 n/cm ²
Test Method:	MIL-STD-883 TM1017
Facilities:	UMass Lowell
Tested:	January 3, 2023

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.

Warning:

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Wafer #	SN	+ICC @ VCC=+-15V			-ICC @ VCC=+-15V			VIO A		
		A			A			V		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	318	8.60E-03	8.21E-03	8.17E-03	-8.59E-03	-8.21E-03	-8.17E-03	3.43E-05	3.02E-05	3.39E-05
	308	8.41E-03	8.59E-03	8.64E-03	-8.42E-03	-8.59E-03	-8.64E-03	4.10E-06	-5.29E-06	-5.91E-06
	309	8.76E-03	8.52E-03	8.58E-03	-8.75E-03	-8.52E-03	-8.58E-03	-1.41E-04	-1.53E-04	-1.62E-04
	310	8.74E-03	8.53E-03	8.57E-03	-8.74E-03	-8.53E-03	-8.58E-03	-5.03E-05	-5.99E-05	-6.47E-05
	311	8.85E-03	8.49E-03	8.53E-03	-8.85E-03	-8.49E-03	-8.53E-03	-1.45E-04	-1.51E-04	-1.50E-04
	312	8.81E-03	8.57E-03	8.61E-03	-8.80E-03	-8.57E-03	-8.61E-03	-1.40E-05	-1.13E-05	-8.33E-06
	313	8.90E-03	8.65E-03	8.68E-03	-8.89E-03	-8.65E-03	-8.68E-03	1.57E-05	1.09E-05	4.18E-06
	314	8.81E-03	8.51E-03	8.55E-03	-8.80E-03	-8.51E-03	-8.56E-03	-2.03E-04	-2.05E-04	-2.16E-04
	315	8.75E-03	8.50E-03	8.53E-03	-8.75E-03	-8.50E-03	-8.53E-03	-7.21E-05	-7.15E-05	-7.43E-05
	316	8.79E-03	8.41E-03	8.44E-03	-8.78E-03	-8.42E-03	-8.44E-03	-7.29E-05	-8.26E-05	-8.70E-05
	317	8.79E-03	8.59E-03	8.64E-03	-8.78E-03	-8.59E-03	-8.64E-03	-7.45E-05	-7.44E-05	-7.93E-05
	min	8.41E-03	8.41E-03	8.44E-03	-8.89E-03	-8.65E-03	-8.68E-03	-2.03E-04	-2.05E-04	-2.16E-04
	max	8.90E-03	8.65E-03	8.68E-03	-8.42E-03	-8.42E-03	-8.44E-03	1.57E-05	1.09E-05	4.18E-06
	mean	8.76E-03	8.54E-03	8.58E-03	-8.76E-03	-8.54E-03	-8.58E-03	-7.52E-05	-8.04E-05	-8.43E-05
	std. dev	1.32E-04	6.57E-05	6.95E-05	1.29E-04	6.57E-05	6.96E-05	7.03E-05	7.09E-05	7.29E-05
	mean - 3 sigma	8.37E-03	8.34E-03	8.37E-03	-9.14E-03	-8.73E-03	-8.79E-03	-2.86E-04	-2.93E-04	-3.03E-04
	mean +3 sigma	9.16E-03	8.73E-03	8.78E-03	-8.37E-03	-8.34E-03	-8.37E-03	1.36E-04	1.32E-04	1.35E-04

Wafer #	SN	VIO B			VIO C			VIO D		
		V			V			V		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	308	-2.82E-05	-3.07E-05	-2.69E-05	-9.52E-05	-9.67E-05	-9.49E-05	7.59E-06	4.26E-06	7.31E-06
	309	5.47E-05	4.98E-05	4.62E-05	-1.15E-04	-1.17E-04	-1.24E-04	-2.82E-05	-3.15E-05	-4.15E-05
	310	-7.52E-05	-7.69E-05	-8.38E-05	-5.51E-05	-6.47E-05	-7.14E-05	-1.17E-04	-1.23E-04	-1.31E-04
	311	-1.25E-04	-1.36E-04	-1.31E-04	3.39E-05	2.09E-05	1.27E-05	-1.04E-04	-1.14E-04	-1.23E-04
	312	-6.42E-05	-6.29E-05	-6.73E-05	3.65E-05	2.92E-05	1.91E-05	-6.23E-05	-6.16E-05	-5.83E-05
	313	-7.92E-06	-1.45E-05	-6.24E-06	-1.91E-04	-1.97E-04	-2.00E-04	1.04E-04	9.51E-05	9.36E-05
	314	1.11E-05	6.54E-06	6.89E-06	-1.63E-04	-1.73E-04	-1.80E-04	-1.05E-04	-1.21E-04	-1.20E-04
	315	-1.62E-04	-1.62E-04	-1.61E-04	-1.21E-04	-1.29E-04	-1.31E-04	1.05E-05	1.48E-06	-8.04E-07
	316	-6.94E-05	-7.29E-05	-7.62E-05	-1.01E-04	-1.09E-04	-1.19E-04	-1.96E-05	-2.91E-05	-2.69E-05
	317	-1.14E-04	-1.19E-04	-1.30E-04	-2.49E-05	-2.45E-05	-3.40E-05	-4.09E-05	-4.59E-05	-4.89E-05
	318	1.48E-05	1.07E-05	1.19E-05	-2.00E-05	-2.90E-05	-2.42E-05	-4.86E-05	-5.91E-05	-7.08E-05
	min	-1.62E-04	-1.62E-04	-1.61E-04	-1.91E-04	-1.97E-04	-2.00E-04	-1.17E-04	-1.23E-04	-1.31E-04
	max	5.47E-05	4.98E-05	4.62E-05	3.65E-05	2.92E-05	1.91E-05	1.04E-04	9.51E-05	9.36E-05
	mean	-5.36E-05	-5.77E-05	-5.91E-05	-7.21E-05	-7.93E-05	-8.51E-05	-4.11E-05	-4.89E-05	-5.28E-05
	std. dev	6.98E-05	6.96E-05	7.06E-05	7.87E-05	7.81E-05	7.74E-05	6.56E-05	6.60E-05	6.75E-05
	mean - 3 sigma	-2.63E-04	-2.67E-04	-2.71E-04	-3.08E-04	-3.14E-04	-3.17E-04	-2.38E-04	-2.47E-04	-2.55E-04
	mean +3 sigma	1.56E-04	1.51E-04	1.53E-04	1.64E-04	1.55E-04	1.47E-04	1.56E-04	1.49E-04	1.50E-04

Wafer #	SN	+IIB A @ VCM=0V			+IIB B @ VCM=0V			+IIB C @ VCM=0V		
		A			A			A		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	308	5.67E-09	5.71E-09	5.58E-09	6.41E-09	6.51E-09	6.29E-09	2.90E-09	3.04E-09	2.82E-09
	309	5.56E-09	1.64E-08	3.28E-08	6.55E-09	1.62E-08	3.47E-08	2.19E-09	4.85E-09	1.94E-08
	310	5.30E-09	8.59E-09	3.02E-08	6.49E-09	2.13E-08	2.94E-08	2.53E-09	-9.13E-10	1.78E-08
	311	6.34E-09	1.65E-08	3.56E-08	6.03E-09	1.49E-08	3.44E-08	4.41E-09	1.18E-08	2.16E-08
	312	5.35E-09	1.69E-08	3.30E-08	5.88E-09	1.43E-08	2.73E-08	4.33E-09	9.77E-09	2.22E-08
	313	7.19E-09	1.89E-08	4.14E-08	7.12E-09	2.25E-08	4.33E-08	4.15E-09	1.66E-08	2.79E-08
	314	7.75E-09	1.76E-08	3.84E-08	8.71E-09	1.33E-08	3.39E-08	3.86E-09	1.54E-08	3.22E-08
	315	5.40E-09	9.76E-09	2.33E-08	5.32E-09	1.55E-08	3.42E-08	3.46E-09	1.18E-08	2.79E-08
	316	5.53E-09	1.63E-08	3.47E-08	5.70E-09	1.14E-08	2.14E-08	3.93E-09	4.91E-09	1.96E-08
	317	5.37E-09	1.11E-08	2.78E-08	7.03E-09	1.50E-08	3.27E-08	4.22E-09	9.42E-09	2.18E-08
	318	6.43E-09	1.05E-08	2.46E-08	6.25E-09	1.57E-08	3.00E-08	4.72E-09	1.13E-08	2.56E-08
	min	5.30E-09	8.59E-09	2.33E-08	5.32E-09	1.14E-08	2.14E-08	2.19E-09	-9.13E-10	1.78E-08
	max	7.75E-09	1.89E-08	4.14E-08	8.71E-09	2.25E-08	4.33E-08	4.72E-09	1.66E-08	3.22E-08
	mean	6.02E-09	1.43E-08	3.22E-08	6.51E-09	1.60E-08	3.21E-08	3.78E-09	9.48E-09	2.36E-08
	std. dev	8.73E-10	3.79E-09	5.80E-09	9.56E-10	3.41E-09	5.71E-09	8.24E-10	5.27E-09	4.62E-09
	mean - 3 sigma	3.40E-09	2.90E-09	1.48E-08	3.64E-09	5.79E-09	1.50E-08	1.31E-09	-6.31E-09	9.72E-09
	mean +3 sigma	8.64E-09	2.56E-08	4.96E-08	9.38E-09	2.62E-08	4.93E-08	6.25E-09	2.53E-08	3.75E-08

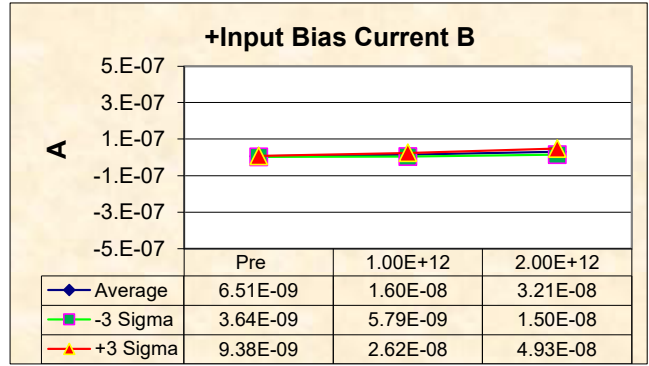
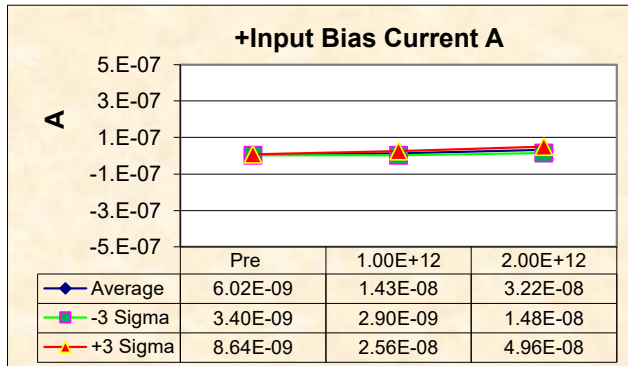
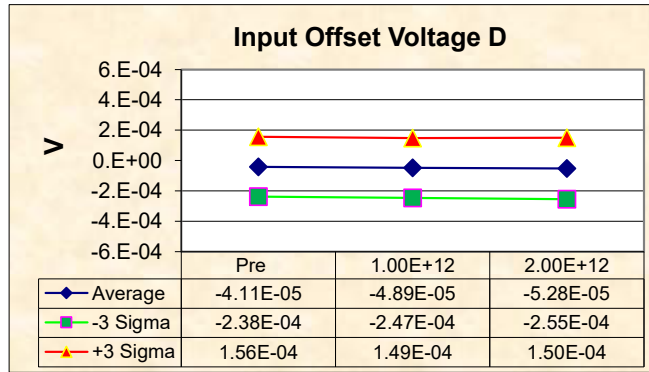
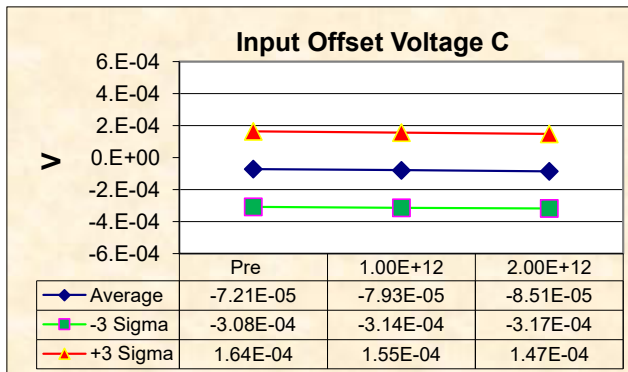
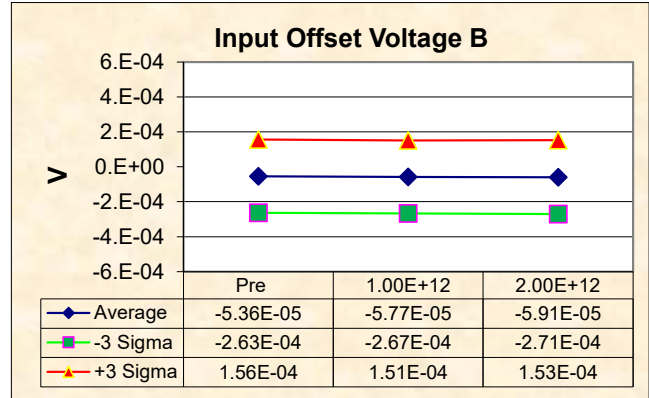
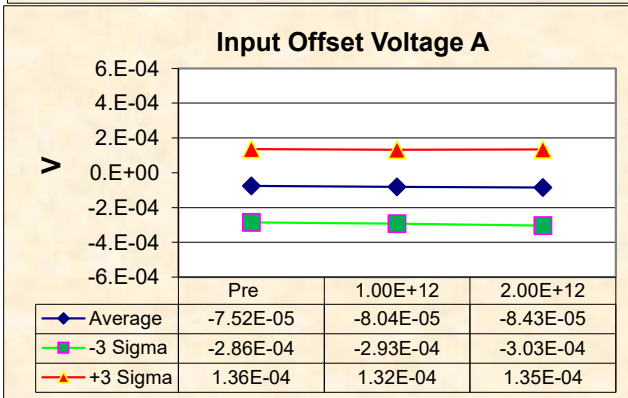
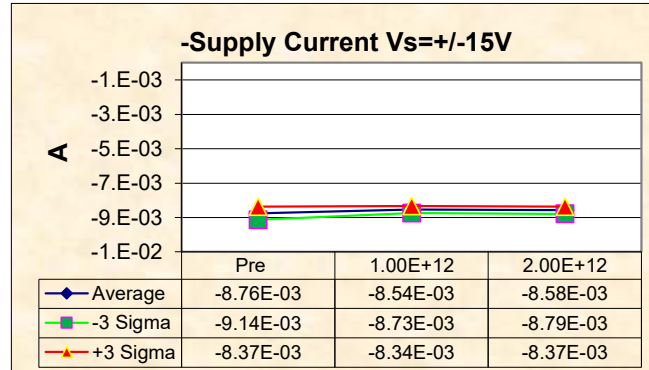
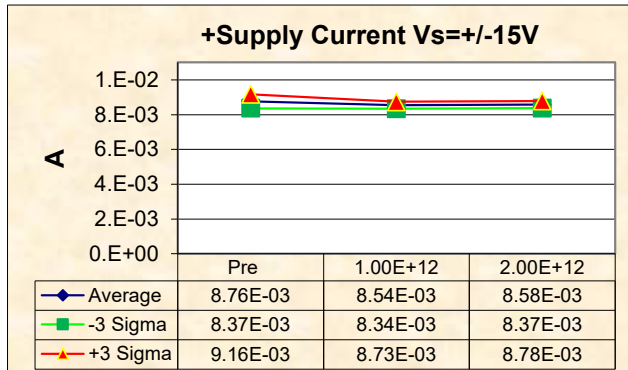
Wafer #	SN	+IIB D @ VCM=0V			-IIB A @ VCM=0V			-IIB B @ VCM=0V		
		A			A			A		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	308	4.37E-09	4.43E-09	4.30E-09	4.14E-09	4.20E-09	4.04E-09	5.23E-09	5.32E-09	5.20E-09
	309	3.46E-09	1.38E-08	3.12E-08	4.98E-09	1.06E-08	2.01E-08	5.27E-09	1.38E-08	3.21E-08
	310	3.47E-09	9.53E-09	1.66E-08	4.82E-09	9.36E-09	2.73E-08	5.50E-09	1.43E-08	2.86E-08
	311	3.32E-09	1.88E-08	3.30E-08	5.48E-09	1.79E-08	4.48E-08	5.39E-09	7.03E-09	2.68E-08
	312	4.14E-09	2.53E-09	1.48E-08	5.01E-09	1.15E-08	2.46E-08	5.46E-09	1.13E-08	2.46E-08
	313	7.10E-09	2.37E-08	4.24E-08	5.85E-09	1.90E-08	3.97E-08	6.49E-09	1.83E-08	3.66E-08
	314	3.22E-09	1.17E-08	2.68E-08	6.87E-09	1.70E-08	3.91E-08	7.76E-09	2.27E-08	4.30E-08
	315	4.22E-09	9.18E-09	2.33E-08	4.79E-09	1.28E-08	3.17E-08	4.69E-09	9.33E-09	2.45E-08
	316	3.62E-09	1.50E-08	2.64E-08	5.35E-09	9.38E-09	2.83E-08	5.21E-09	9.95E-09	2.31E-08
	317	4.53E-09	1.13E-08	2.95E-08	5.67E-09	1.14E-08	2.36E-08	5.12E-09	1.47E-08	3.20E-08
	318	4.64E-09	1.35E-08	2.70E-08	5.99E-09	1.77E-08	3.76E-08	5.12E-09	1.32E-08	2.89E-08
	min	3.22E-09	2.53E-09	1.48E-08	4.79E-09	9.36E-09	2.01E-08	4.69E-09	7.03E-09	2.31E-08
	max	7.10E-09	2.37E-08	4.24E-08	6.87E-09	1.90E-08	4.48E-08	7.76E-09	2.27E-08	4.30E-08
	mean	4.17E-09	1.29E-08	2.71E-08	5.48E-09	1.37E-08	3.17E-08	5.60E-09	1.34E-08	3.00E-08
	std. dev	1.15E-09	5.70E-09	7.94E-09	6.45E-10	3.80E-09	8.22E-09	8.88E-10	4.55E-09	6.16E-09
	mean - 3 sigma	7.26E-10	-4.21E-09	3.27E-09	3.54E-09	2.24E-09	7.02E-09	2.94E-09	-1.93E-10	1.15E-08
	mean +3 sigma	7.62E-09	3.00E-08	5.09E-08	7.42E-09	2.51E-08	5.63E-08	8.27E-09	2.71E-08	4.85E-08

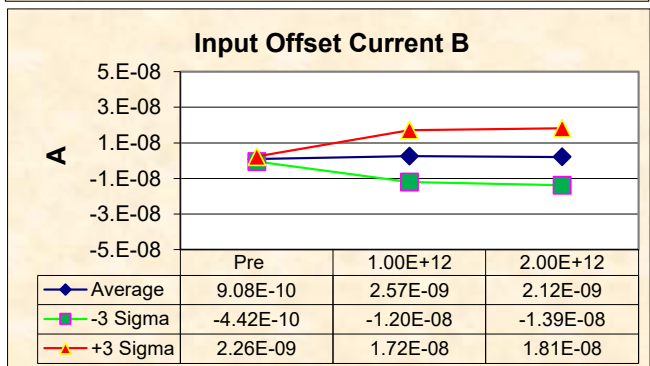
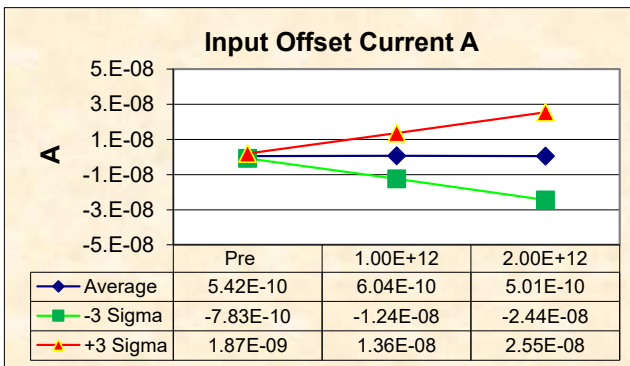
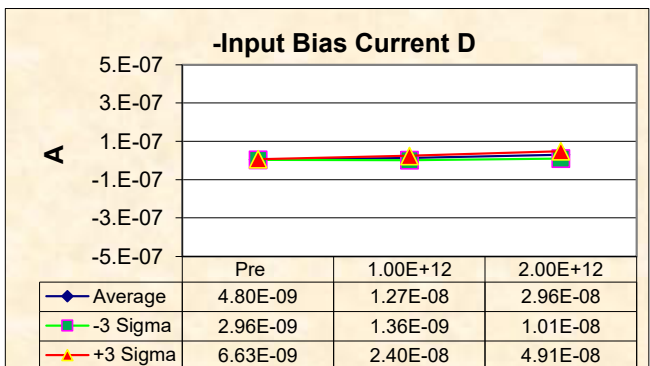
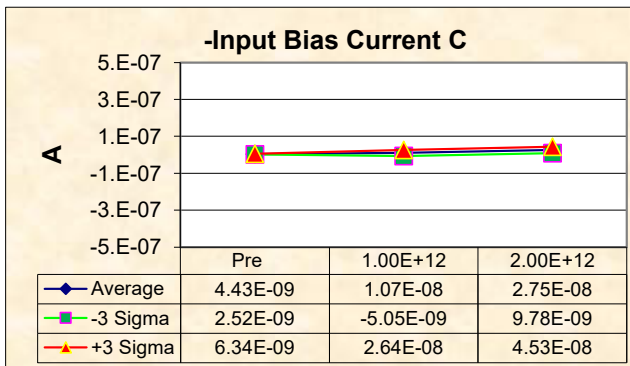
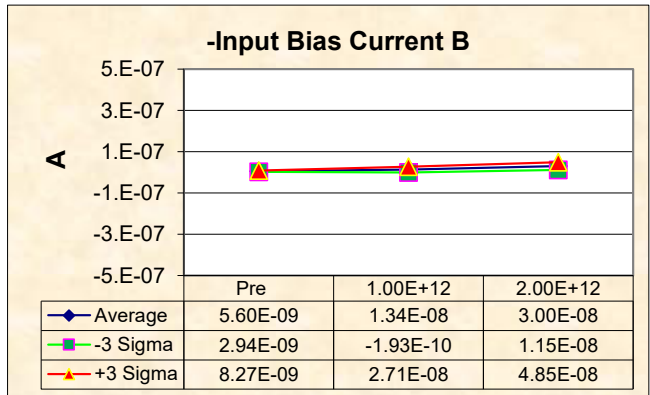
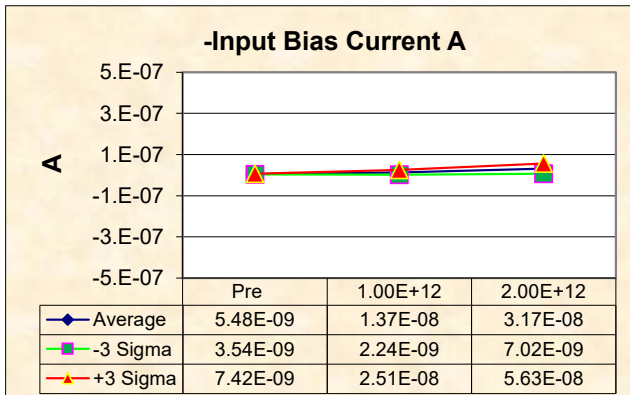
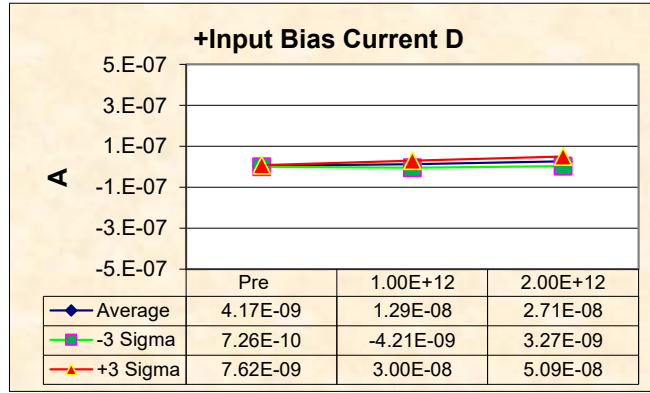
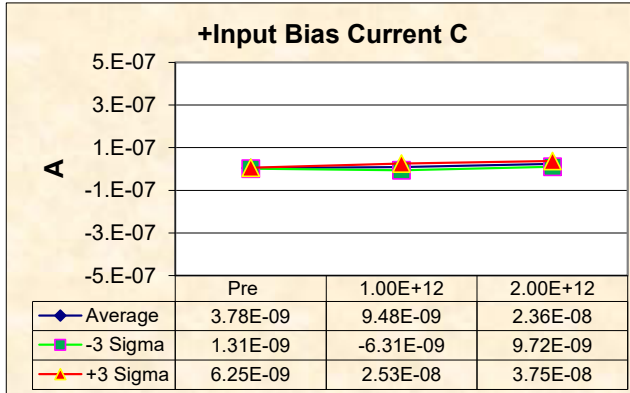
Wafer #	SN	-IIB C @ VCM=0V			-IIB D @ VCM=0V			IIO A @ VCM=0V		
		A			A			A		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	308	3.74E-09	3.90E-09	3.83E-09	4.52E-09	4.61E-09	4.49E-09	1.52E-09	1.51E-09	1.54E-09
	309	3.75E-09	7.53E-09	2.51E-08	5.16E-09	1.10E-08	2.78E-08	5.88E-10	5.79E-09	1.27E-08
	310	3.66E-09	4.91E-09	2.35E-08	4.89E-09	6.29E-09	2.40E-08	4.81E-10	-7.70E-10	2.90E-09
	311	4.11E-09	1.65E-08	2.92E-08	4.71E-09	1.41E-08	2.43E-08	8.63E-10	-1.36E-09	-9.12E-09
	312	4.41E-09	1.55E-08	3.58E-08	4.93E-09	7.21E-09	2.07E-08	3.32E-10	5.36E-09	8.40E-09
	313	5.61E-09	1.17E-08	2.63E-08	6.29E-09	1.63E-08	3.98E-08	1.34E-09	-9.31E-11	1.66E-09
	314	4.24E-09	1.48E-08	3.32E-08	4.24E-09	1.54E-08	3.14E-08	8.84E-10	5.46E-10	-7.01E-10
	315	4.29E-09	1.80E-08	3.66E-08	4.27E-09	1.73E-08	3.41E-08	6.10E-10	-3.01E-09	-8.37E-09
	316	5.06E-09	4.17E-09	2.06E-08	4.22E-09	1.06E-08	2.48E-08	1.74E-10	6.96E-09	6.40E-09
	317	4.02E-09	7.94E-09	2.41E-08	4.66E-09	1.49E-08	3.89E-08	-2.94E-10	-2.46E-10	4.19E-09
	318	5.12E-09	5.61E-09	2.09E-08	4.62E-09	1.41E-08	3.02E-08	4.43E-10	-7.13E-09	-1.30E-08
	min	3.66E-09	4.17E-09	2.06E-08	4.22E-09	6.29E-09	2.07E-08	-2.94E-10	-7.13E-09	-1.30E-08
	max	5.61E-09	1.80E-08	3.66E-08	6.29E-09	1.73E-08	3.98E-08	1.34E-09	6.96E-09	1.27E-08
	mean	4.43E-09	1.07E-08	2.75E-08	4.80E-09	1.27E-08	2.96E-08	5.42E-10	6.04E-10	5.01E-10
	std. dev	6.37E-10	5.24E-09	5.92E-09	6.11E-10	3.78E-09	6.51E-09	4.42E-10	4.34E-09	8.32E-09
	mean - 3 sigma	2.52E-09	-5.05E-09	9.78E-09	2.96E-09	1.36E-09	1.01E-08	-7.83E-10	-1.24E-08	-2.44E-08
	mean +3 sigma	6.34E-09	2.64E-08	4.53E-08	6.63E-09	2.40E-08	4.91E-08	1.87E-09	1.36E-08	2.55E-08

Wafer #	SN	IIO B @ VCM=0V			IIO C @ VCM=0V			IIO D @ VCM=0V		
		A			A			A		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	308	1.18E-09	1.20E-09	1.09E-09	-8.38E-10	-8.63E-10	-1.00E-09	-1.49E-10	-1.77E-10	-1.82E-10
	309	1.28E-09	2.34E-09	2.56E-09	-1.55E-09	-2.68E-09	-5.77E-09	-1.70E-09	2.88E-09	3.37E-09
	310	9.90E-10	7.10E-09	8.46E-10	-1.13E-09	-5.83E-09	-5.67E-09	-1.42E-09	3.24E-09	-7.35E-09
	311	6.45E-10	7.87E-09	7.59E-09	3.04E-10	-4.74E-09	-7.63E-09	-1.38E-09	4.72E-09	8.67E-09
	312	4.26E-10	3.05E-09	2.67E-09	-8.35E-11	-5.68E-09	-1.36E-08	-7.89E-10	-4.68E-09	-5.86E-09
	313	6.36E-10	4.21E-09	6.77E-09	-1.47E-09	4.89E-09	1.55E-09	8.12E-10	7.36E-09	2.56E-09
	314	9.42E-10	-9.34E-09	-9.16E-09	-3.74E-10	6.02E-10	-9.79E-10	-1.03E-09	-3.67E-09	-4.67E-09
	315	6.29E-10	6.19E-09	9.74E-09	-8.24E-10	-6.26E-09	-8.74E-09	-4.90E-11	-8.11E-09	-1.08E-08
	316	4.93E-10	1.41E-09	-1.65E-09	-1.12E-09	7.34E-10	-9.99E-10	-6.00E-10	4.44E-09	1.60E-09
	317	1.91E-09	3.01E-10	7.26E-10	2.03E-10	1.48E-09	-2.27E-09	-1.27E-10	-3.53E-09	-9.50E-09
	318	1.13E-09	2.54E-09	1.08E-09	-4.00E-10	5.72E-09	4.74E-09	1.61E-11	-6.57E-10	-3.17E-09
	min	4.26E-10	-9.34E-09	-9.16E-09	-1.55E-09	-6.26E-09	-1.36E-08	-1.70E-09	-8.11E-09	-1.08E-08
	max	1.91E-09	7.87E-09	9.74E-09	3.04E-10	5.72E-09	4.74E-09	8.12E-10	7.36E-09	8.67E-09
	mean	9.08E-10	2.57E-09	2.12E-09	-6.45E-10	-1.18E-09	-3.94E-09	-6.26E-10	1.99E-10	-2.52E-09
	std. dev	4.50E-10	4.87E-09	5.34E-09	6.72E-10	4.48E-09	5.40E-09	7.89E-10	5.04E-09	6.33E-09
	mean - 3 sigma	-4.42E-10	-1.20E-08	-1.39E-08	-2.66E-09	-1.46E-08	-2.01E-08	-2.99E-09	-1.49E-08	-2.15E-08
	mean +3 sigma	2.26E-09	1.72E-08	1.81E-08	1.37E-09	1.23E-08	1.23E-08	1.74E-09	1.53E-08	1.65E-08

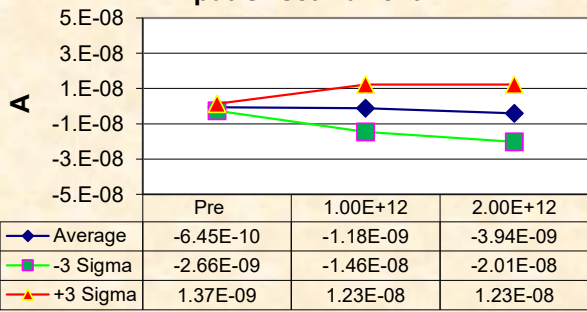
Wafer #	SN	AVO A @ VO=+-10V, RL=10K			AVO B @ VO=+-10V, RL=10K			AVO C @ VO=+-10V, RL=10K		
		V/mV			V/mV			V/mV		
		Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12	Pre	1.00E+12	2.00E+12
CTRL	308	2392.54	2425.65	2435.38	2266.72	2341.40	2270.60	2485.27	2540.49	2506.13
	309	2274.23	982.09	717.07	2202.25	952.83	695.96	2382.99	1022.80	733.57
	310	2253.56	981.59	718.07	2198.77	954.39	698.19	2439.07	1009.67	727.75
	311	2360.36	1034.62	748.88	2285.44	1009.42	730.58	2513.21	1055.71	753.60
	312	2365.59	1056.16	765.43	2333.36	1018.22	743.38	2495.76	1041.28	749.13
	313	2364.47	1004.08	739.84	2216.90	944.28	691.87	2388.88	976.04	712.09
	314	2304.80	1000.99	739.28	2200.64	940.51	686.70	2610.64	1026.99	736.28
	315	2413.00	1043.58	763.44	2355.97	980.10	726.45	2532.47	1043.72	751.15
	316	2365.37	1020.43	748.44	2253.55	979.91	714.61	2502.42	1025.85	751.45
	317	2393.82	1013.77	751.53	2280.27	988.41	719.97	2503.23	1034.06	742.47
	318	2243.70	968.48	707.68	2131.15	938.02	681.00	2389.11	1003.49	730.44
	min	2243.70	968.48	707.68	2131.15	938.02	681.00	2382.99	976.04	712.09
	max	2413.00	1056.16	765.43	2355.97	1018.22	743.38	2610.64	1055.71	753.60
	mean	2333.89	1010.58	739.97	2245.83	970.61	708.87	2475.78	1023.96	738.79
	std. dev	60.07	28.69	19.81	68.92	28.88	20.99	74.30	22.94	13.30
	mean - 3 sigma	2153.68	924.49	680.54	2039.07	883.96	645.90	2252.88	955.16	698.91
	mean +3 sigma	2514.10	1096.66	799.39	2452.60	1057.25	771.84	2698.68	1092.77	778.68

Wafer #	SN	AVO D @ VO=+-10V, RL=10K		
		V/mV		
		Pre	1.00E+12	2.00E+12
CTRL	308	2889.39	2947.91	2891.69
	309	2716.72	1091.25	777.14
	310	2724.58	1109.19	783.98
	311	2865.94	1123.50	820.31
	312	2845.99	1112.29	797.38
	313	2814.69	1077.47	775.33
	314	2708.28	1078.30	776.98
	315	2900.44	1137.04	806.22
	316	2852.40	1103.83	787.90
	317	2853.47	1098.05	801.81
	318	2773.85	1095.00	782.67
	min	2708.28	1077.47	775.33
	max	2900.44	1137.04	820.31
	mean	2805.64	1102.59	790.97
	std. dev	69.74	18.83	14.95
	mean - 3 sigma	2596.42	1046.10	746.12
	mean +3 sigma	3014.86	1159.08	835.82

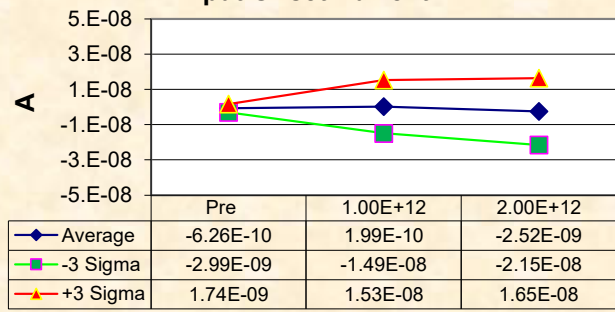




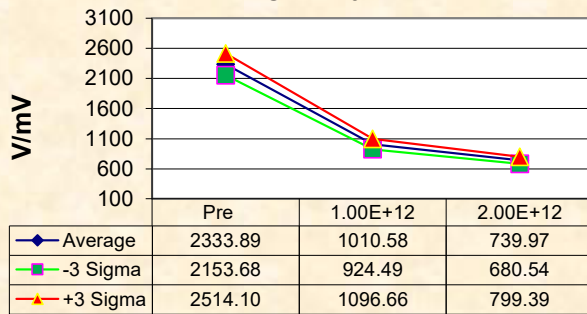
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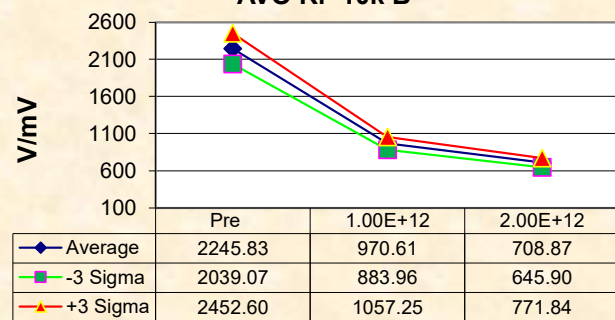
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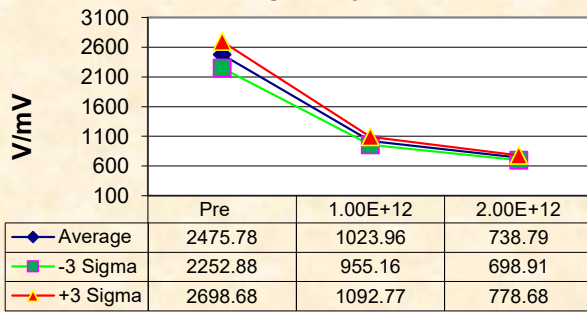
AVO RI=10k A



AVO RI=10k B



AVO RI=10k C



AVO RI=10k D

