



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:

Analog Devices, Inc. does not recommend use of this data to qualify other product grades or process levels. Analog Devices, Inc. is not responsible and has no liability for any consequences, and all applicable Warranties are null and void if any Analog Devices product is modified in any way or used outside of normal environmental and operating conditions, including the parameters specified in the corresponding data sheet. Analog Devices, Inc. does not guarantee that wafer manufacturing is the same for all process levels.

Wafer #	SN	+ICC @ VCC=+-15V			-ICC @ VCC=+-15V			VIO A		
		A			A			V		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	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		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	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		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	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

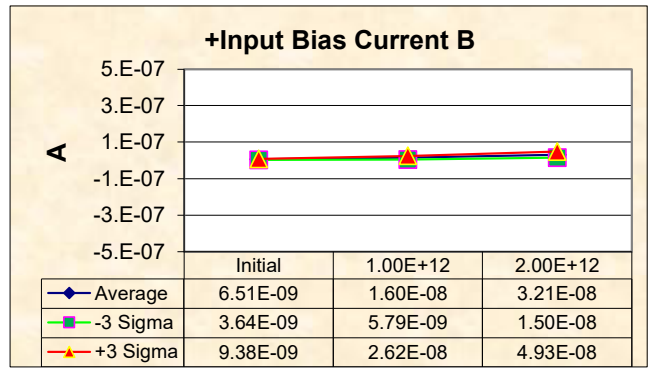
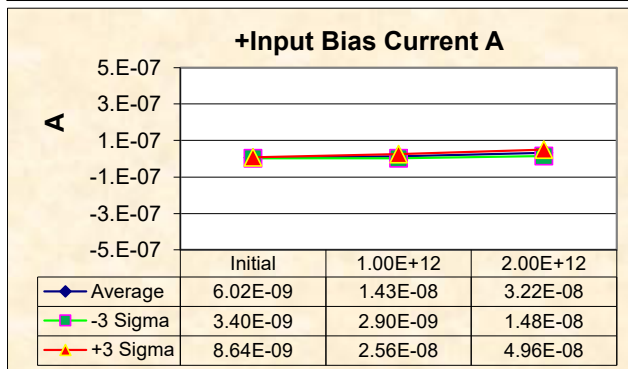
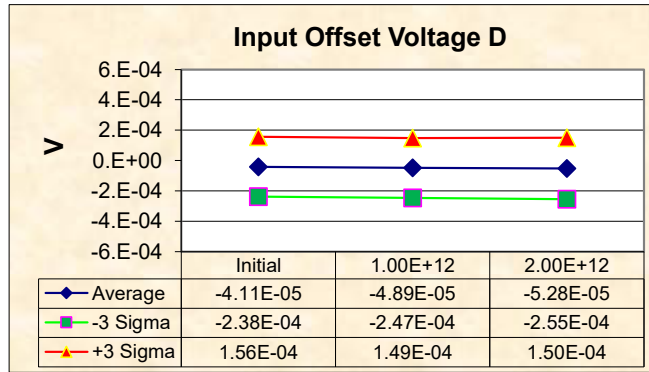
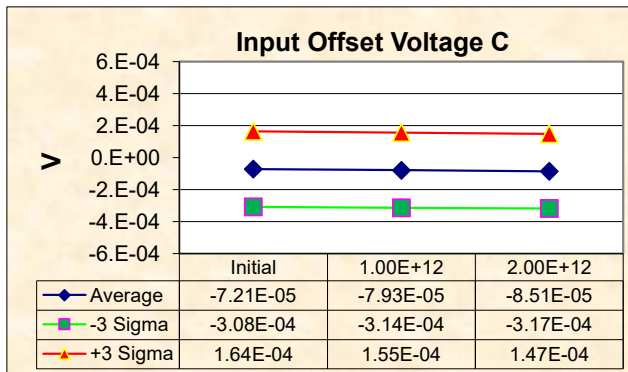
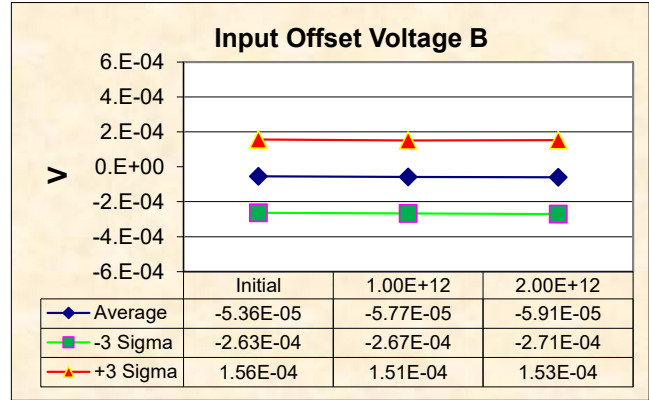
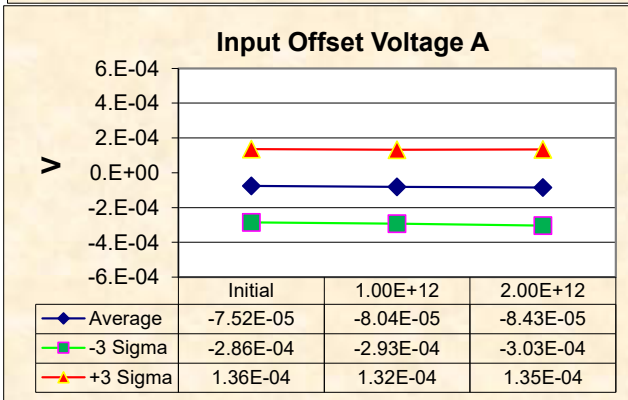
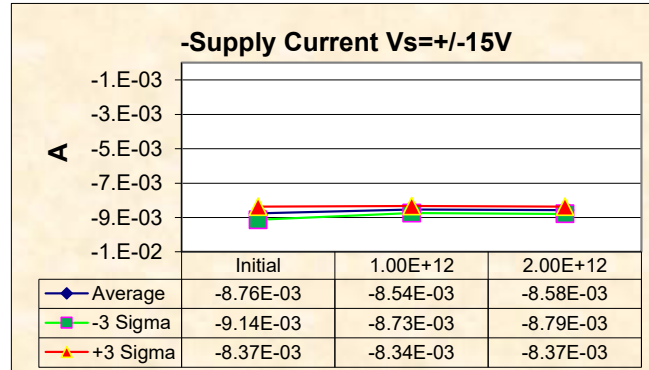
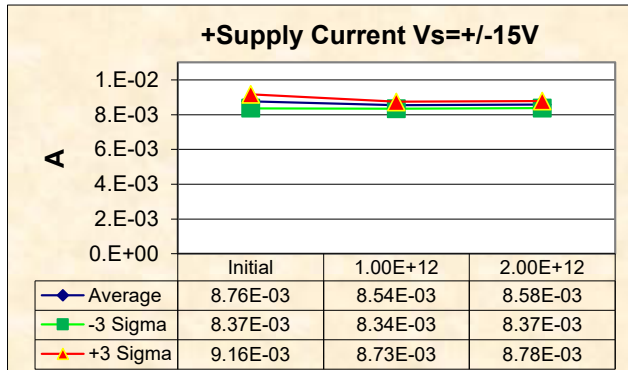
Wafer #	SN	+IIB D @ VCM=0V			-IIB A @ VCM=0V			-IIB B @ VCM=0V		
		A			A			A		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12
CTRL	308	4.37E-09	4.43E-09	4.30E-09	4.14E-09	4.20E-09	4.04E-09	5.23E-09	5.32E-09	5.20E-09
	309	3.46E-09	1.38E-08	3.12E-08	4.98E-09	1.06E-08	2.01E-08	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

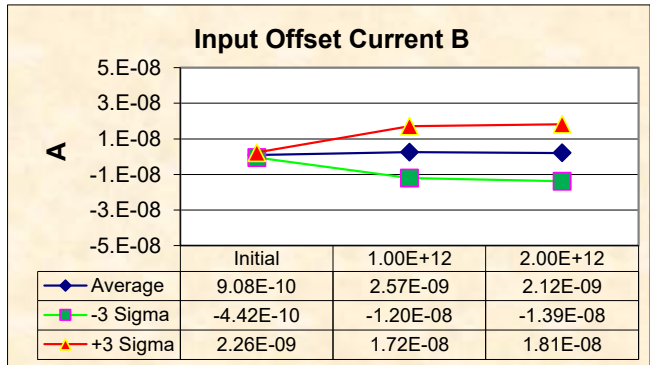
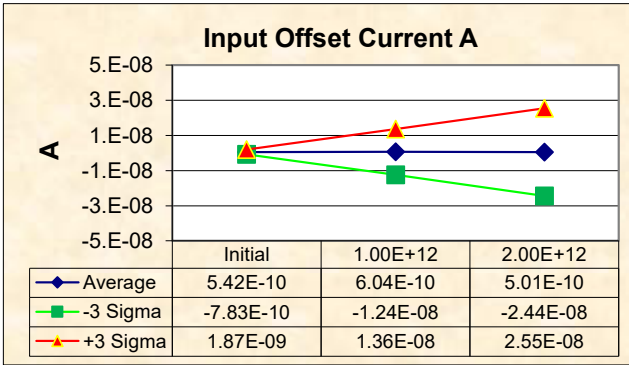
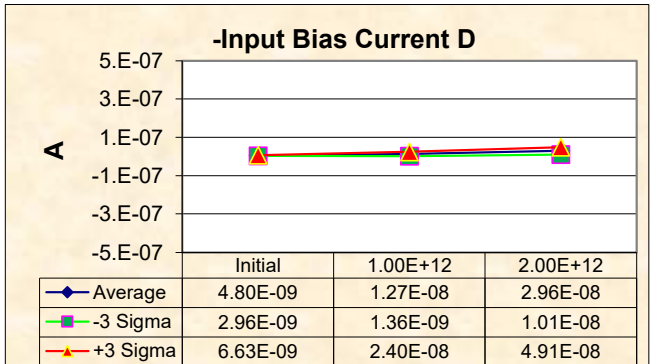
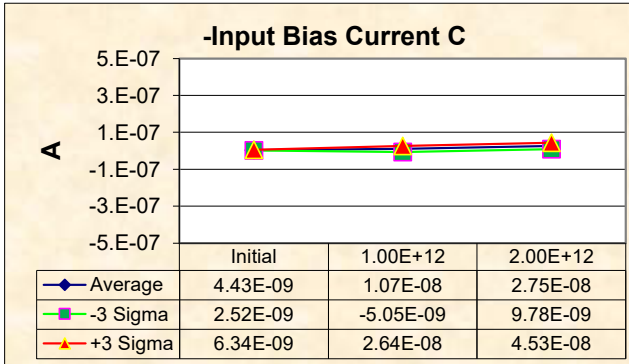
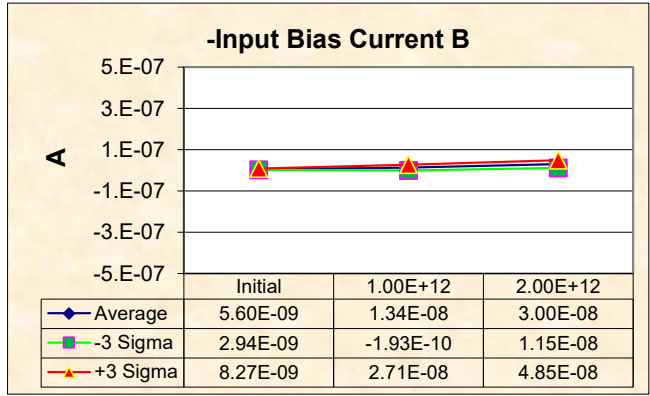
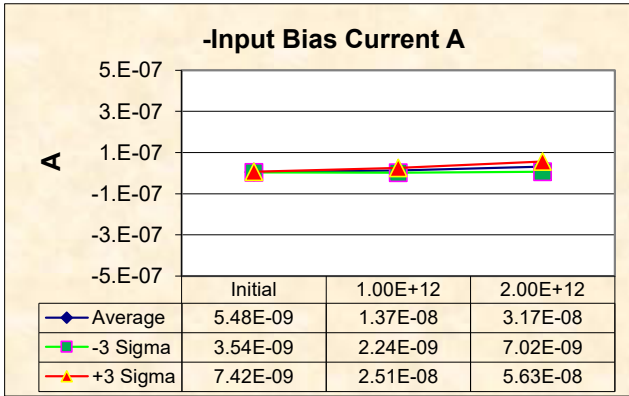
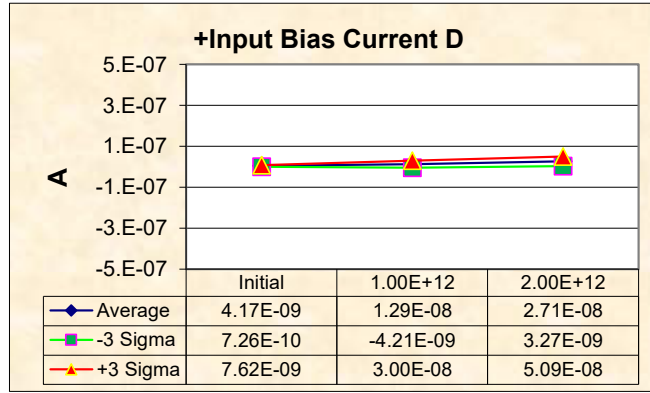
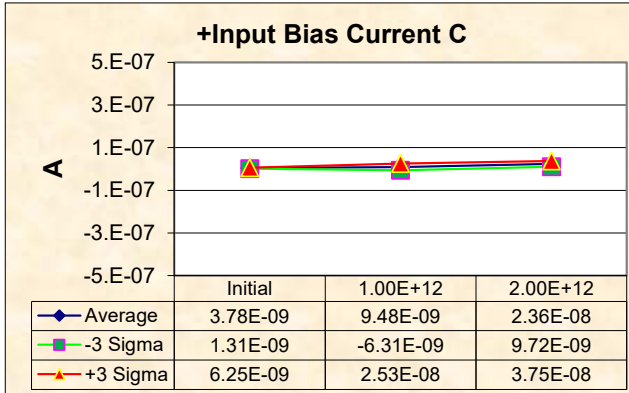
Wafer #	SN	-IIB C @ VCM=0V			-IIB D @ VCM=0V			IIO A @ VCM=0V		
		A			A			A		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12
CTRL	308	3.74E-09	3.90E-09	3.83E-09	4.52E-09	4.61E-09	4.49E-09	1.52E-09	1.51E-09	1.54E-09
	309	3.75E-09	7.53E-09	2.51E-08	5.16E-09	1.10E-08	2.78E-08	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		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	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

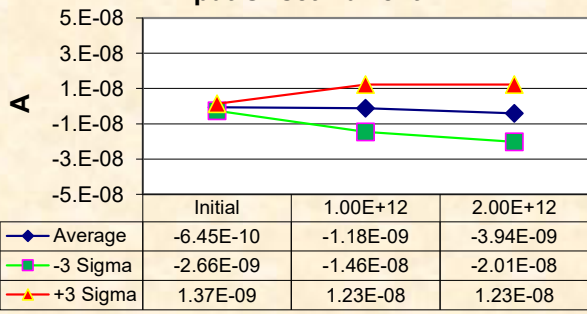
Wafer #	SN	AVO A @ VO=+-10V, RL=10K			AVO B @ VO=+-10V, RL=10K			AVO C @ VO=+-10V, RL=10K		
		V/mV			V/mV			V/mV		
		Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12	Initial	1.00E+12	2.00E+12
CTRL	308	2392.54	2425.65	2435.38	2266.72	2341.40	2270.60	2485.27	2540.49	2506.13
	309	2274.23	982.09	717.07	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		
		Initial	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

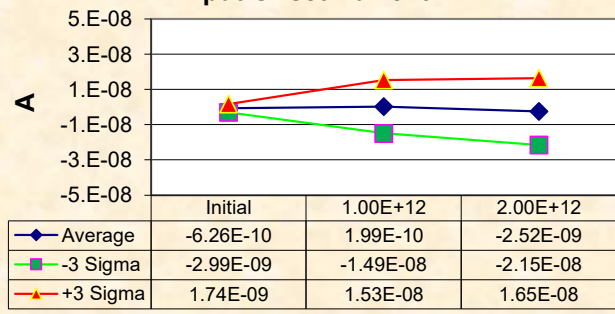




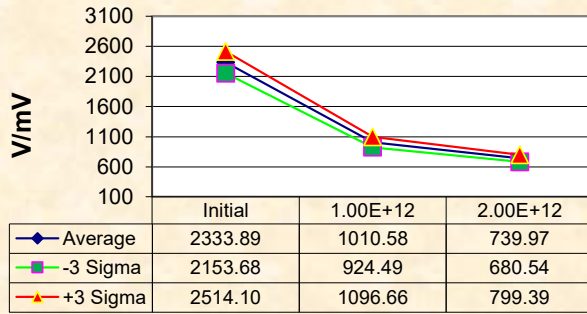
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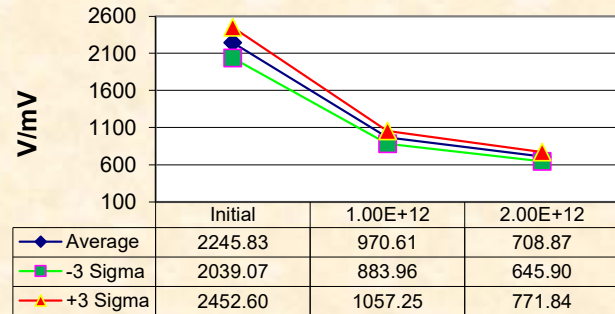
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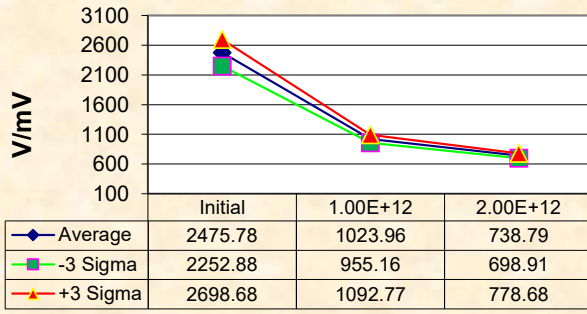
AVO RI=10k A



AVO RI=10k B



AVO RI=10k C



AVO RI=10k D

