

**B31 Element Qualification Report**  
**Revision 1.0, Feb. 14, 2002**

**PURPOSE**

This report summarizes element qualification test results obtained on TriQuint's B31 process fabricated at FAB3 in Hillsboro, OR. A comprehensive series of testing was performed on wafer in order to verify successful reliability of the process for the Process Engineering Release Milestone. Note that only two lots are required for verification of the element qualification since the B31 process is a synergy of two existing fully-qualified processes (see REL.024):

1. B32 for the front-end processing: implants, FETs, ohmic & gate contacts, NiCr resistors, and MIM capacitors.
2. B39 for the interconnect processing: 3 layers of plated Gold.

**METHOD**

Three lots were built at FAB3 for the element qualification. The first lot, A127602A, received the initial B31 process which included 50 nm Ti in the Gate metallization and high-stress Gate PSN (AH350 recipe). The subsequent lots, A129605A and A130102A, received the upgraded B31 process which included 70 nm Ti in the Gate metallization and low-stress Gate PSN (A350 recipe). The upgrade to the gate metallization and Gate PSN has already been qualified for the B32 process.

The lots and wafers are shown in Table 1.

Note that the lead product(s) from the B31 process do not use the G-FETs and thus no G- implants were used in the wafers for element qualification. This was deemed not an issue since B31 uses the same G-implant/FETs as the fully-qualified B32 process.

**Table 1** Test Wafer Designation

<i>Lot</i>	<i>Autoclave Wafer</i>	<i>Temp. Cycle Wafer</i>	<i>Air Bake Wafer</i>	<i>Fab Start</i>	<i>Fab Complete</i>
A127602A	29145—037FE65G6	29145—033FE65D6	29145—032FE65D6	10/3/01	11/5/01
A129605A	460215-042AR65D6	460215-040AR65F4	460215-044AR65C0	10/23/01	12/3/01
A130102A	340393-005AR65F4	340393-006AR65E5	340393-004AR65G3	10/28/01	12/10/01

**STRESSES**

Table 2 summarizes the stresses performed.

**Table 2** Stress Parameters

<i>Test</i>	<i>Test Condition</i>	<i>Test Point 1</i>	<i>Test Point 2</i>
Autoclave	121 °C, 100% RH	0 Hrs	96 Hrs
Temp. Cycle	-40 °C to +125 °C	0 cycles	500 cycles
Air Bake	275 °C	0 Hrs	168 Hrs

*Autoclave* followed JEDEC Standard Number 22, Method A102-B. The purpose of this test was to apply severe conditions of pressure, humidity, and temperature that accelerate the penetration of moisture to the wafer. The test condition used consisted of 121 °C with a 100% humidity at two atmospheres. Test points were taken at 0 hours and 96 hours.

*Temperature Cycle* followed JEDEC Standard Number 22, Method A104-A, Condition “G.” The purpose of this test was to determine the wafer resistance to alternating extremes of high and low temperatures in air. The test condition cycled at a low temperature of –40 °C to a high temperature of 125 °C with a ten minute dwell time at each extreme. Test points were taken at 0 cycles and 500 cycles.

*Air Bake* was performed for acceleration of thermally activated failure mechanisms. A temperature of 275 °C was chosen for maximum acceleration without compromising the dielectric material. Test points were taken at 0 hours and 168 hours.

## **TEST STRUCTURES**

Nine (9) sets of structures were chosen to be analyzed for the qualification report. Structures from the R31BA process control monitor (PCM) of mask sets B6683 and B6685 were used. Table 3 below gives a general summary of the structures used. Fifty-five (55) sites were tested on each wafer.

FETs with two gate length (0.5 & 0.6  $\mu\text{m}$ ), two different widths (6x50  $\mu\text{m}$  & 1 x 250 $\mu\text{m}$ ), and two different rotations (0 & 90 deg) were evaluated. The threshold/pinch-off voltage ( $I_d = 1 \text{ mA/mm}$ ,  $V_{ds} = 1.5 \text{ V}$ ), max. drain current ( $V_{gs}=0.7/0 \text{ V}$ ,  $V_{ds} = 1.5 \text{ V}$ ), gate turn-on voltage ( $I_{gs} = 1 \text{ mA/mm}$ ,  $V_{ds}=0\text{V}$ ), gate leakage ( $V_g = -4.5\text{V}$ ,  $V_{ds} = 0 \text{ V}$ ), and breakdown voltage ( $I_g = 1\text{mA/mm}$ ,  $V_{ds}=1.5\text{V}$  ) were all monitored.

Ohmic contact TLMs were evaluated to monitor the calculated contact and sheet resistance of the ohmic contacts.

Implant structures were evaluated to monitor the sheet resistance of the channel implants and the leakage of isolation implant.

Schottky diodes with 2 different widths (2 & 50  $\mu\text{m}$ ) were evaluated to monitor the turn-on voltage (@  $I = 10 \text{ uA}/\mu\text{m}$ ) and breakdown voltage of the Schottky gate metal.

The MIM capacitor (500 Å thick PSN) was constructed with an area of 25K sq.  $\mu\text{m}$ .

NiCr Resistors of various dimensions (2x2, 2x20, 20x20, and 20x2  $\mu\text{m}$ ) were tested as well as a NiCr Van der Pauw structure.

**Table 3** Test Structures

<i>Structure</i>	<i>Structure Description</i>
FETs	E-FET and D-FET: 0.6um Lg, 50 um gate x 6 gates (300 um width), Lgs = 0.6 um, Lgd = 1 um 0.5um Lg, 50 um gate x 6 gates (300 um width), Lgs = 0.6 um, Lgd = 1 um 0.6um Lg, 250 um gate x 1 gate (250 um width), Lgs = 0.6 um, Lgd = 1 um 0.6um Lg, 250 um gate x 1 gate (250 um width), Lgs = 0.6 um, Lgd = 1 um, rotated 90 deg w.r.t wafer flat.
Ohmic Contact TLMs	2x2, 2x4, 2x8 um implanted channels w/ min. length ohmic contacts
Implant	E-, D-, & N+ Van der Pauw, Substrate Isolation combs (w/ & w/o Iso implant), D-2x2 um resistors
Schottky Diodes	2 um and 50 um wide Schottky diodes
Capacitors	Area = 25 Kum <sup>2</sup>
NiCr Resistors	2x2um, 2x20um, 20x20um, 20x2 um, and Van der Pauw
Via/Contact Chains	Ohmic-to-Met0, min. sized metal links, 324 links Gate-to-Met0, min. sized metal links, 332 links NiCr-to-Met0, min. sized metal links, 302 links Met0-to-Met1, Min. sized metal links w/ 390 Via1 (Min. 2x2 um & 2x4 um) MIM Met-to-Met1 Min. sized metal links w/ 174 Via1 (Min. 2x2 um & 2x4 um) Met1-to-Met2, Min. sized metal links w/ 229 Via2 (Min. 3x3 um). Min. sized 3x3 um Via2 at 75, 100, 125, & 150 um inclusion. (Radial) Met2-to-Met3, Min. sized metal links w/ 228 Via3 (Min. 3x3 um) Min. sized 3x3 um Via3 at 50, 75, 100, 125, and 150 um inclusion. (Radial) Met0-to-Met2, Min. sized metal links w/ 282 stacked Via1/2 (Min. 2x2 & 2x4 um Via1, 3x3 um Via2) Met1-to-Met3, Min. sized metal links w/ 230 stacked Via2/3 (Min. 3x3 um Via2 & Via3) Met0-to-Met3, Min. sized metal links w/ 129 stacked Via1/2/3 (Min. 2x2 & 2x4 um Via1, 3x3 um Via2 & Via3)
Metal Combs	Met1-to-Met1, at min. gap (3 um) & min. line width (2 um), 4031 um length Met2-to-Met2, at min. gap (3 um) & min. line width (2 um), 4369 um length Met3-to-Met3, at min. gap (5 um) & min. line width (5 um), 2111 um length Met0/Met1-to-Met0/1, at min. gap (3 um) & min. line width (5 um), 3279 um length Met1/Met2-to-Met1/2, at min. gap (3 um) & min. line width (5 um), 2651 um length Met2/Met3-to-Met2/3, at min. gap (5 um) & min. line width (5 um), 1470 um length Met2/Met3-to-Met2/3, at min. gap (5 um) & wide line width (20 um), 1055 um length
Metal line bias	MIM metal, Met0, Met1, Met1 w/ parallel bars, Met2, and Met2 w/ parallel bars. (250 um long structures) Met3 and Met3 w/ parallel bars (400 um long structures)

Vias/contact chains test the robustness of the vias that connect together the various metal layers. Note that stacked minimum vias (i.e. Met0-to-Met2, Met0-to-Met3) and stacked Via2+Via3 (Met1-to-Met3) are **NOT** allowed under the current B39 layout design rules. These test structures were included in this report for completeness. Radial Met1-to-Met2 and Met2-to-Met3 “inclusion” contact chains were also constructed to test the robustness and limits of the B39 layout design rule governing via inclusion.

Metal leakage combs were constructed from single metal layers (i.e. Met1-to-Met1) and stacked metal layers (i.e. Met1+Met2). It was noted during process development that lines constructed from stacked metal layers (with accompanying via) were more prone to “shorting” than lines constructed from a single metal layer (without underlying via).

Metal line bias structures were constructed to monitor the sheet resistance of the metal lines. For the three global plated layers (i.e. Met1, Met2, & Met3), two sets of structures were constructed: an isolated metal line and a metal line with parallel metal bars at min. spacing.

Table 4 lists the electrical tests conducted on each of the structures.

**Table 4** Electrical Tests

<i>Structure(s)</i>	<i>Electrical Tests</i>				
FETs	Threshold Voltage	Max. Drain Current	Gate forward voltage	Gate Leakage	Breakdown Voltage
Ohmic TLMs	Contact Resistance	Resistivity			
Implant	Sheet Resistance	Isolation leakage current	Resistance		
Schottky diodes	Turn-on voltage	Breakdown voltage			
Capacitors	Cap/Area (1 MHz)	Leakage @ 10 V	Leakage @ 25 V		
NiCr Resistors	Resistance	Resistivity			
Via/contact chains	Resistance				
Metal Combs	Leakage @ 10 V				
Metal line bias	Resistivity				

## **RESULTS**

### **FETS**

FET parameters remained relatively stable through all three stresses, staying well within the guaranteed specification range. Tables 5 – 9 summarize the E-FET parametrics while Tables 10 – 14 summarize the D-FET parametrics. The various geometries of FETs are denoted as follows:

“610” => 0.6 um Lg, 1.0 um Lgd      “-300” => 6x50 um width      “610R” => rotated  
 “510” => 0.5 um Lg, 1.0 um Lgd      “-250” => 1x250 um width

Table 5 summarizes the threshold voltage of the E-FETs before and after all the stresses.

**Table 5** Summary of threshold voltages of E-FETs for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	E610-300(100)	100.0%	108.06	20.10	55	100.0%	108.50	20.01	55	0.0%	0.4%	-0.4%
	E510-300(1100)	100.0%	76.75	21.10	55	100.0%	83.55	22.52	55	0.0%	8.9%	6.7%
	E610R-250(1700)	100.0%	110.00	21.20	55	100.0%	110.09	21.16	55	0.0%	0.1%	-0.2%
	E610-250(600)	100.0%	104.78	19.63	55	100.0%	102.89	19.72	55	0.0%	-1.8%	0.5%
A129605A	E610-300(100)	100.0%	129.28	11.72	55	100.0%	130.60	11.55	55	0.0%	1.0%	-1.5%
	E510-300(1100)	100.0%	102.33	12.26	55	100.0%	103.80	12.04	55	0.0%	1.4%	-1.8%
	E610R-250(1700)	100.0%	130.77	11.02	55	100.0%	131.94	11.10	55	0.0%	0.9%	0.8%
	E610-250(600)	100.0%	128.93	11.09	55	100.0%	129.77	10.97	55	0.0%	0.7%	-1.1%
A130102A	E610-300(100)	100.0%	145.31	16.49	55	100.0%	146.07	16.45	55	0.0%	0.5%	-0.2%
	E510-300(1100)	100.0%	120.04	17.49	55	100.0%	121.02	17.48	55	0.0%	0.8%	-0.1%
	E610R-250(1700)	100.0%	142.09	14.66	55	100.0%	143.04	15.30	55	0.0%	0.7%	4.4%
	E610-250(600)	100.0%	142.04	17.49	55	96.4%	142.95	17.18	53	-3.6%	0.6%	-1.8%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	E610-300(100)	100.0%	154.63	16.47	55	100.0%	156.00	16.43	55	0.0%	0.9%	-0.2%
	E510-300(1100)	100.0%	125.22	16.26	55	100.0%	133.45	17.80	55	0.0%	6.6%	9.4%
	E610R-250(1700)	100.0%	155.40	16.20	55	100.0%	155.94	16.26	55	0.0%	0.3%	0.4%
	E610-250(600)	100.0%	151.73	15.12	55	98.2%	152.75	14.83	54	-1.8%	0.7%	-1.9%
A129605A	E610-300(100)	100.0%	122.72	13.51	55	100.0%	123.96	13.39	55	0.0%	1.0%	-0.9%
	E510-300(1100)	100.0%	95.97	13.88	55	100.0%	97.47	13.68	55	0.0%	1.6%	-1.4%
	E610R-250(1700)	100.0%	124.05	13.51	55	100.0%	124.82	13.40	55	0.0%	0.6%	-0.8%
	E610-250(600)	100.0%	121.70	13.65	55	100.0%	122.49	13.54	55	0.0%	0.6%	-0.8%
A130102A	E610-300(100)	100.0%	169.72	15.37	55	100.0%	170.84	15.27	55	0.0%	0.7%	-0.6%
	E510-300(1100)	100.0%	144.68	15.83	55	100.0%	146.00	15.70	55	0.0%	0.9%	-0.8%
	E610R-250(1700)	100.0%	164.02	13.89	55	100.0%	164.26	14.04	55	0.0%	0.1%	1.1%
	E610-250(600)	100.0%	164.85	24.73	55	100.0%	165.58	23.91	55	0.0%	0.4%	-3.3%

Lot	Air Bake	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	E610-300(100)	100.0%	148.37	13.08	55	100.0%	155.98	13.21	55	0.0%	5.1%	0.9%
	E510-300(1100)	100.0%	119.79	13.75	55	98.2%	136.03	12.87	54	-1.8%	13.6%	-6.4%
	E610R-250(1700)	100.0%	149.18	14.18	55	100.0%	156.81	14.17	55	0.0%	5.1%	-0.1%
	E610-250(600)	100.0%	145.18	12.71	55	100.0%	154.84	12.54	55	0.0%	6.7%	-1.3%
A129605A	E610-300(100)	100.0%	120.08	19.15	55	98.2%	117.97	14.29	54	-1.8%	-1.8%	-25.4%
	E510-300(1100)	100.0%	90.09	14.50	55	100.0%	90.25	14.53	55	0.0%	0.2%	0.2%
	E610R-250(1700)	100.0%	120.06	14.17	55	98.2%	119.00	14.07	54	-1.8%	-0.9%	-0.7%
	E610-250(600)	100.0%	116.92	14.35	55	100.0%	116.56	14.51	55	0.0%	-0.3%	1.1%
A130102A	E610-300(100)	100.0%	157.07	17.23	55	100.0%	158.09	16.30	55	0.0%	0.6%	-5.4%
	E510-300(1100)	100.0%	131.38	17.89	55	100.0%	133.89	16.94	55	0.0%	1.9%	-5.3%
	E610R-250(1700)	100.0%	154.41	16.74	55	100.0%	155.10	16.08	55	0.0%	0.4%	-3.9%
	E610-250(600)	100.0%	155.41	16.64	55	100.0%	155.87	16.11	55	0.0%	0.3%	-3.2%

Table 6 summarizes the max. drain current at  $V_{gs} = 0.7$  V (IMAX.7) of the E-FETs before and after all the stresses.

**Table 6** Summary of IMAX of E-FETs for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [uA/um]	Std. Dev [uA/um]	Good Sites	Yield	Average [uA/um]	Std. Dev [uA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	IMAX.7_E610-300(102)	100.0%	107.65	5.42	55	100.0%	107.40	5.44	55	0.0%	-0.2%	0.5%
	IMAX.7_E510-300(1102)	100.0%	120.49	5.89	55	100.0%	120.15	5.90	55	0.0%	-0.3%	0.2%
	IMAX.7_E610R-250(1702)	100.0%	97.01	7.02	55	100.0%	96.08	7.43	55	0.0%	-1.0%	5.9%
	IMAX.7_E610-250(602)	100.0%	106.19	5.61	55	100.0%	106.01	5.63	55	0.0%	-0.2%	0.3%
A129605A	IMAX.7_E610-300(102)	100.0%	98.01	2.87	55	100.0%	97.73	2.76	55	0.0%	-0.3%	-3.7%
	IMAX.7_E510-300(1102)	100.0%	109.58	3.06	55	100.0%	109.22	2.90	55	0.0%	-0.3%	-5.2%
	IMAX.7_E610R-250(1702)	100.0%	88.32	3.24	55	100.0%	87.99	3.28	55	0.0%	-0.4%	1.1%
	IMAX.7_E610-250(602)	100.0%	94.24	3.21	55	100.0%	94.09	3.20	55	0.0%	-0.2%	-0.4%
A130102A	IMAX.7_E610-300(102)	100.0%	95.61	4.19	55	100.0%	95.39	4.17	55	0.0%	-0.2%	-0.4%
	IMAX.7_E510-300(1102)	100.0%	106.79	4.83	55	100.0%	106.29	4.91	55	0.0%	-0.5%	1.8%
	IMAX.7_E610R-250(1702)	100.0%	88.19	3.31	55	100.0%	87.28	4.02	55	0.0%	-1.0%	21.4%
	IMAX.7_E610-250(602)	100.0%	92.24	4.41	55	98.2%	90.17	11.80	54	-1.8%	-2.2%	167.4%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IMAX.7_E610-300(102)	100.0%	95.64	4.10	55	100.0%	95.59	4.12	55	0.0%	-0.1%	0.5%
	IMAX.7_E510-300(1102)	100.0%	108.09	4.17	55	100.0%	107.83	4.20	55	0.0%	-0.2%	0.7%
	IMAX.7_E610R-250(1702)	100.0%	86.10	4.04	55	100.0%	85.91	4.08	55	0.0%	-0.2%	0.9%
	IMAX.7_E610-250(602)	100.0%	93.78	3.78	55	100.0%	91.92	13.15	55	0.0%	-2.0%	248.2%
A129605A	IMAX.7_E610-300(102)	100.0%	99.56	3.18	55	100.0%	99.32	3.17	55	0.0%	-0.2%	-0.4%
	IMAX.7_E510-300(1102)	100.0%	110.77	3.51	55	100.0%	110.28	3.50	55	0.0%	-0.4%	-0.1%
	IMAX.7_E610R-250(1702)	100.0%	88.96	3.65	55	100.0%	88.71	3.54	55	0.0%	-0.3%	-2.9%
	IMAX.7_E610-250(602)	100.0%	95.73	3.78	55	100.0%	95.42	3.72	55	0.0%	-0.3%	-1.5%
A130102A	IMAX.7_E610-300(102)	100.0%	89.60	3.93	55	100.0%	89.26	3.91	55	0.0%	-0.4%	-0.4%
	IMAX.7_E510-300(1102)	100.0%	100.47	4.47	55	100.0%	99.87	4.42	55	0.0%	-0.6%	-1.3%
	IMAX.7_E610R-250(1702)	100.0%	83.38	2.75	55	100.0%	83.05	2.75	55	0.0%	-0.4%	0.1%
	IMAX.7_E610-250(602)	100.0%	85.84	3.78	55	100.0%	85.50	3.75	55	0.0%	-0.4%	-0.7%

Lot	Air Bake	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IMAX.7_E610-300(102)	100.0%	97.54	3.08	55	100.0%	95.92	3.17	55	0.0%	-1.7%	2.9%
	IMAX.7_E510-300(1102)	100.0%	108.98	6.14	55	100.0%	105.95	14.55	55	0.0%	-2.8%	137.2%
	IMAX.7_E610R-250(1702)	100.0%	86.80	3.69	55	100.0%	84.53	3.76	55	0.0%	-2.6%	2.1%
	IMAX.7_E610-250(602)	100.0%	95.91	3.34	55	100.0%	92.70	3.45	55	0.0%	-3.3%	3.5%
A129605A	IMAX.7_E610-300(102)	100.0%	99.06	4.62	55	98.2%	99.64	3.26	54	-1.8%	0.6%	-29.5%
	IMAX.7_E510-300(1102)	100.0%	111.01	3.52	55	100.0%	111.33	3.53	55	0.0%	0.3%	0.1%
	IMAX.7_E610R-250(1702)	100.0%	90.50	3.74	55	98.2%	90.54	3.71	54	-1.8%	0.0%	-0.9%
	IMAX.7_E610-250(602)	100.0%	96.52	4.00	55	100.0%	96.22	3.98	55	0.0%	-0.3%	-0.6%
A130102A	IMAX.7_E610-300(102)	100.0%	92.66	4.75	55	100.0%	92.52	4.65	55	0.0%	-0.2%	-2.1%
	IMAX.7_E510-300(1102)	100.0%	103.57	6.69	55	100.0%	102.96	6.44	55	0.0%	-0.6%	-3.8%
	IMAX.7_E610R-250(1702)	100.0%	85.88	3.74	55	100.0%	85.18	3.62	55	0.0%	-0.8%	-3.2%
	IMAX.7_E610-250(602)	100.0%	88.86	4.30	55	100.0%	87.79	4.14	55	0.0%	-1.2%	-3.6%

Table 7 summarizes the gate turn-on voltage (VF) of the E-FETs before and after all the stresses.

**Table 7** Summary of VF of E-FETs for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	VF1.0_E610-300(119)	100.0%	559.75	1.50	55	100.0%	559.15	2.42	55	0.0%	-0.1%	62.0%
	VF1.0_E510-300(1119)	100.0%	564.83	1.61	55	100.0%	564.07	2.47	55	0.0%	-0.1%	53.5%
	VF1.0_E610R-250(1719)	100.0%	565.92	1.30	55	100.0%	564.52	3.02	55	0.0%	-0.2%	132.0%
	VF1.0_E610-250(619)	100.0%	566.01	1.37	55	100.0%	564.54	3.53	55	0.0%	-0.3%	157.4%
A129605A	VF1.0_E610-300(119)	100.0%	562.00	1.77	55	100.0%	562.00	2.53	55	0.0%	0.0%	42.9%
	VF1.0_E510-300(1119)	100.0%	567.17	2.08	55	100.0%	567.13	2.79	55	0.0%	0.0%	33.9%
	VF1.0_E610R-250(1719)	100.0%	566.87	1.58	55	100.0%	564.69	4.31	55	0.0%	-0.4%	172.6%
	VF1.0_E610-250(619)	100.0%	566.62	1.50	55	100.0%	565.53	3.39	55	0.0%	-0.2%	126.4%
A130102A	VF1.0_E610-300(119)	100.0%	562.42	2.94	55	100.0%	561.46	3.31	55	0.0%	-0.2%	12.8%
	VF1.0_E510-300(1119)	100.0%	566.25	2.67	55	100.0%	563.84	4.50	55	0.0%	-0.4%	68.9%
	VF1.0_E610R-250(1719)	100.0%	568.44	3.11	55	100.0%	564.86	6.37	55	0.0%	-0.6%	104.7%
	VF1.0_E610-250(619)	100.0%	567.90	2.91	55	98.2%	555.87	74.28	54	-1.8%	-2.1%	2454%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	VF1.0_E610-300(119)	100.0%	562.87	2.17	55	100.0%	563.68	2.08	55	0.0%	0.1%	-4.1%
	VF1.0_E510-300(1119)	100.0%	568.04	1.90	55	100.0%	569.10	1.79	55	0.0%	0.2%	-5.6%
	VF1.0_E610R-250(1719)	100.0%	568.35	2.05	55	100.0%	568.47	1.98	55	0.0%	0.0%	-3.4%
	VF1.0_E610-250(619)	100.0%	568.72	1.87	55	100.0%	569.11	1.77	55	0.0%	0.1%	-5.4%
A129605A	VF1.0_E610-300(119)	100.0%	563.26	2.10	55	100.0%	563.76	2.03	55	0.0%	0.1%	-3.3%
	VF1.0_E510-300(1119)	100.0%	568.20	2.11	55	100.0%	568.95	2.04	55	0.0%	0.1%	-3.3%
	VF1.0_E610R-250(1719)	100.0%	567.94	1.99	55	100.0%	567.88	1.97	55	0.0%	0.0%	-0.7%
	VF1.0_E610-250(619)	100.0%	567.75	1.88	55	100.0%	567.73	1.84	55	0.0%	0.0%	-1.8%
A130102A	VF1.0_E610-300(119)	100.0%	563.08	3.33	55	100.0%	563.34	3.23	55	0.0%	0.0%	-2.9%
	VF1.0_E510-300(1119)	100.0%	568.17	3.09	55	100.0%	568.64	2.95	55	0.0%	0.1%	-4.6%
	VF1.0_E610R-250(1719)	100.0%	570.46	3.76	55	100.0%	570.16	3.70	55	0.0%	-0.1%	-1.5%
	VF1.0_E610-250(619)	100.0%	570.07	3.40	55	100.0%	569.84	3.33	55	0.0%	0.0%	-2.1%

Lot	Air Bake	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	VF1.0_E610-300(119)	100.0%	560.54	1.13	55	100.0%	545.01	0.86	55	0.0%	-2.8%	-24.1%
	VF1.0_E510-300(1119)	100.0%	565.55	1.36	55	98.2%	549.24	0.94	54	-1.8%	-2.9%	-30.7%
	VF1.0_E610R-250(1719)	100.0%	566.44	1.14	55	100.0%	551.40	0.90	55	0.0%	-2.7%	-20.8%
	VF1.0_E610-250(619)	100.0%	566.10	1.21	55	100.0%	551.03	0.96	55	0.0%	-2.7%	-20.5%
A129605A	VF1.0_E610-300(119)	100.0%	561.60	1.63	55	100.0%	541.06	73.49	55	0.0%	-3.7%	4411%
	VF1.0_E510-300(1119)	100.0%	567.05	1.64	55	100.0%	556.30	3.63	55	0.0%	-1.9%	120.8%
	VF1.0_E610R-250(1719)	100.0%	567.35	1.85	55	100.0%	546.55	74.36	55	0.0%	-3.7%	3912%
	VF1.0_E610-250(619)	100.0%	567.02	1.86	55	100.0%	556.55	3.72	55	0.0%	-1.8%	100.3%
A130102A	VF1.0_E610-300(119)	100.0%	562.47	2.72	55	100.0%	547.77	2.77	55	0.0%	-2.6%	2.0%
	VF1.0_E510-300(1119)	100.0%	566.53	2.86	55	100.0%	552.76	3.02	55	0.0%	-2.4%	5.8%
	VF1.0_E610R-250(1719)	100.0%	568.92	2.56	55	100.0%	554.71	2.82	55	0.0%	-2.5%	10.2%
	VF1.0_E610-250(619)	100.0%	568.44	2.51	55	100.0%	554.00	2.73	55	0.0%	-2.5%	8.9%

Table 8 summarizes the gate leakage current (IGSS) of the E-FETs before and after all the stresses.

**Table 8** Summary of IGSS of E-FETs for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [pA/um]	Std. Dev [pA/um]	Good Sites	Yield	Average [pA/um]	Std. Dev [pA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	IGSS_E610-300(120)	100.0%	271.08	99.59	55	100.0%	172.16	39.56	55	0.0%	-36.5%	-60.3%
	IGSS_E510-300(1120)	100.0%	285.58	105.16	55	100.0%	187.86	39.51	55	0.0%	-34.2%	-62.4%
	IGSS_E610R-250(1720)	100.0%	244.12	55.65	55	100.0%	137.24	73.68	55	0.0%	-43.8%	32.4%
	IGSS_E610-250(620)	98.2%	334.70	120.81	54	98.1%	188.39	71.55	53	-1.9%	-43.7%	-40.8%
A129605A	IGSS_E610-300(120)	100.0%	280.04	112.62	55	100.0%	176.22	32.71	55	0.0%	-37.1%	-71.0%
	IGSS_E510-300(1120)	100.0%	278.16	106.92	55	100.0%	180.36	24.25	55	0.0%	-35.2%	-77.3%
	IGSS_E610R-250(1720)	100.0%	246.90	57.47	55	98.2%	153.44	51.40	54	-1.8%	-37.9%	-10.6%
	IGSS_E610-250(620)	100.0%	296.31	63.37	55	100.0%	168.87	43.49	55	0.0%	-43.0%	-31.4%
A130102A	IGSS_E610-300(120)	100.0%	303.97	118.27	55	100.0%	205.54	66.40	55	0.0%	-32.4%	-43.9%
	IGSS_E510-300(1120)	100.0%	304.40	113.97	55	100.0%	217.22	58.63	55	0.0%	-28.6%	-48.6%
	IGSS_E610R-250(1720)	100.0%	253.15	66.99	55	98.2%	133.49	39.22	54	-1.8%	-47.3%	-41.5%
	IGSS_E610-250(620)	98.2%	319.48	93.80	54	98.1%	180.16	65.40	53	-1.9%	-43.6%	-30.3%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IGSS_E610-300(120)	100.0%	260.05	79.18	55	100.0%	157.74	33.76	55	0.0%	-39.3%	-57.4%
	IGSS_E510-300(1120)	100.0%	275.36	79.78	55	100.0%	167.80	30.86	55	0.0%	-39.1%	-61.3%
	IGSS_E610R-250(1720)	100.0%	222.13	45.40	55	100.0%	106.15	21.20	55	0.0%	-52.2%	-53.3%
	IGSS_E610-250(620)	100.0%	273.01	75.05	55	100.0%	149.48	45.27	55	0.0%	-45.2%	-39.7%
A129605A	IGSS_E610-300(120)	100.0%	271.63	110.91	55	100.0%	174.12	36.87	55	0.0%	-35.9%	-66.8%
	IGSS_E510-300(1120)	100.0%	271.48	107.85	55	100.0%	177.12	29.14	55	0.0%	-34.8%	-73.0%
	IGSS_E610R-250(1720)	100.0%	239.60	59.42	55	100.0%	134.43	25.69	55	0.0%	-43.9%	-56.8%
	IGSS_E610-250(620)	100.0%	292.45	78.90	55	100.0%	166.15	43.24	55	0.0%	-43.2%	-45.2%
A130102A	IGSS_E610-300(120)	100.0%	238.73	90.45	55	100.0%	145.39	31.94	55	0.0%	-39.1%	-64.7%
	IGSS_E510-300(1120)	100.0%	249.67	97.38	55	100.0%	160.13	60.97	55	0.0%	-35.9%	-37.4%
	IGSS_E610R-250(1720)	100.0%	211.19	92.21	55	100.0%	95.12	34.90	55	0.0%	-55.0%	-62.2%
	IGSS_E610-250(620)	100.0%	258.41	62.63	55	100.0%	125.86	33.25	55	0.0%	-51.3%	-46.9%

Lot	Air Bake	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IGSS_E610-300(120)	100.0%	307.31	132.59	55	100.0%	469.49	85.64	55	0.0%	52.8%	-35.4%
	IGSS_E510-300(1120)	98.2%	300.34	112.86	54	98.1%	483.87	135.11	53	-1.9%	61.1%	19.7%
	IGSS_E610R-250(1720)	100.0%	270.45	69.26	55	98.2%	411.31	103.26	54	-1.8%	52.1%	49.1%
	IGSS_E610-250(620)	100.0%	360.88	111.71	55	98.2%	611.31	241.52	54	-1.8%	69.4%	116.2%
A129605A	IGSS_E610-300(120)	100.0%	272.50	108.50	55	98.2%	363.63	58.63	54	-1.8%	33.4%	-46.0%
	IGSS_E510-300(1120)	100.0%	275.66	105.13	55	100.0%	350.97	44.27	55	0.0%	27.3%	-57.9%
	IGSS_E610R-250(1720)	98.2%	238.42	59.65	54	100.0%	277.97	34.83	54	0.0%	16.6%	-41.6%
	IGSS_E610-250(620)	100.0%	311.18	81.11	55	100.0%	359.03	75.03	55	0.0%	15.4%	-7.5%
A130102A	IGSS_E610-300(120)	100.0%	264.35	112.61	55	100.0%	85.43	97.50	55	0.0%	-67.7%	-13.4%
	IGSS_E510-300(1120)	100.0%	269.93	112.30	55	100.0%	71.66	69.06	55	0.0%	-73.5%	-38.5%
	IGSS_E610R-250(1720)	100.0%	218.24	61.68	55	98.2%	31.02	42.02	54	-1.8%	-85.8%	-31.9%
	IGSS_E610-250(620)	100.0%	292.69	92.64	55	96.4%	68.14	76.40	53	-3.6%	-76.7%	-17.5%

Table 9 summarizes the breakdown voltage (BV) of the E-FETs before and after all the stresses.

**Table 9** Summary of BV of E-FETs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [V]	Std. Dev [V]	Good Sites	Yield	Average [V]	Std. Dev [V]	Good Sites	Yield	Avg	Std. Dev
A127602A	BV1-E610-300(128)	100.0%	19.26	0.75	55	100.0%	19.19	0.77	55	0.0%	-0.4%	2.7%
	BV1-E510-300(1128)	100.0%	19.77	0.50	55	100.0%	19.74	0.54	55	0.0%	-0.2%	9.5%
	BV1-E610R-250(1728)	100.0%	18.28	1.78	55	100.0%	18.22	1.84	55	0.0%	-0.3%	3.1%
	BV1-E610-250(628)	100.0%	20.00	0.00	55	100.0%	20.00	0.00	55	0.0%	0.0%	-15.3%
A129605A	BV1-E610-300(128)	100.0%	19.53	0.50	55	100.0%	19.50	0.48	55	0.0%	-0.1%	-3.5%
	BV1-E510-300(1128)	100.0%	19.98	0.07	55	100.0%	19.98	0.08	55	0.0%	0.0%	14.8%
	BV1-E610R-250(1728)	100.0%	17.57	1.26	55	100.0%	17.65	1.26	55	0.0%	0.4%	-0.2%
	BV1-E610-250(628)	100.0%	20.00	0.03	55	100.0%	20.00	0.04	55	0.0%	0.0%	60.3%
A130102A	BV1-E610-300(128)	100.0%	19.18	0.94	55	100.0%	19.13	0.96	55	0.0%	-0.3%	2.2%
	BV1-E510-300(1128)	100.0%	19.73	0.58	55	100.0%	19.72	0.59	55	0.0%	0.0%	1.5%
	BV1-E610R-250(1728)	100.0%	19.15	1.11	55	100.0%	19.16	1.12	55	0.0%	0.0%	1.8%
	BV1-E610-250(628)	98.2%	19.99	0.05	54	100.0%	20.00	0.00	54	0.0%	0.0%	-99.6%

Lot	Temp. Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg [V]	Std. Dev [V]	Good Sites	Yield	Average [V]	Std. Dev [V]	Good Sites	Yield	Avg	Std. Dev
A127602A	BV1-E610-300(128)	100.0%	19.65	1.27	55	100.0%	19.59	1.27	55	0.0%	-0.3%	0.1%
	BV1-E510-300(1128)	100.0%	19.99	0.07	55	100.0%	19.98	0.09	55	0.0%	0.0%	31.3%
	BV1-E610R-250(1728)	100.0%	18.83	1.19	55	100.0%	18.72	1.23	55	0.0%	-0.6%	3.0%
	BV1-E610-250(628)	100.0%	20.00	0.00	55	100.0%	20.00	0.00	55	0.0%	0.0%	-12.8%
A129605A	BV1-E610-300(128)	100.0%	19.40	0.69	55	100.0%	19.36	0.70	55	0.0%	-0.2%	1.6%
	BV1-E510-300(1128)	100.0%	19.88	0.30	55	100.0%	19.88	0.31	55	0.0%	0.0%	4.2%
	BV1-E610R-250(1728)	100.0%	16.76	1.30	55	100.0%	16.70	1.30	55	0.0%	-0.3%	-0.5%
	BV1-E610-250(628)	100.0%	19.97	0.11	55	100.0%	19.96	0.13	55	0.0%	0.0%	19.3%
A130102A	BV1-E610-300(128)	100.0%	19.65	0.58	55	100.0%	19.60	0.62	55	0.0%	-0.3%	6.2%
	BV1-E510-300(1128)	100.0%	19.94	0.23	55	100.0%	19.93	0.26	55	0.0%	0.0%	12.0%
	BV1-E610R-250(1728)	100.0%	19.41	1.00	55	100.0%	19.37	1.04	55	0.0%	-0.2%	3.8%
	BV1-E610-250(628)	100.0%	20.00	0.01	55	100.0%	20.00	0.02	55	0.0%	0.0%	97.0%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg [V]	Std. Dev [V]	Good Sites	Yield	Average [V]	Std. Dev [V]	Good Sites	Yield	Avg	Std. Dev
A127602A	BV1-E610-300(128)	100.0%	19.22	0.56	55	100.0%	19.01	0.59	55	0.0%	-1.1%	5.3%
	BV1-E510-300(1128)	100.0%	19.90	0.22	55	100.0%	19.44	2.52	55	0.0%	-2.3%	1024%
	BV1-E610R-250(1728)	100.0%	17.99	1.31	55	100.0%	17.83	1.50	55	0.0%	-0.9%	14.4%
	BV1-E610-250(628)	100.0%	20.00	0.00	55	100.0%	20.00	0.00	55	0.0%	0.0%	-16.6%
A129605A	BV1-E610-300(128)	100.0%	18.62	2.67	55	100.0%	18.61	2.34	55	0.0%	0.0%	-12.3%
	BV1-E510-300(1128)	100.0%	19.75	0.43	55	100.0%	19.73	0.45	55	0.0%	-0.1%	4.9%
	BV1-E610R-250(1728)	98.2%	17.74	1.44	54	100.0%	17.80	1.44	54	0.0%	0.3%	-0.3%
	BV1-E610-250(628)	100.0%	19.94	0.20	55	100.0%	19.93	0.23	55	0.0%	-0.1%	14.3%
A130102A	BV1-E610-300(128)	100.0%	19.26	2.04	55	100.0%	19.22	1.91	55	0.0%	-0.2%	-6.1%
	BV1-E510-300(1128)	100.0%	19.60	2.39	55	100.0%	19.58	2.37	55	0.0%	-0.1%	-0.7%
	BV1-E610R-250(1728)	100.0%	19.46	0.91	55	100.0%	19.42	0.95	55	0.0%	-0.2%	4.3%
	BV1-E610-250(628)	100.0%	19.98	0.08	55	100.0%	19.97	0.11	55	0.0%	0.0%	45.0%

Table 10 summarizes the pinch-off voltage of the D-FETs before and after all the stresses.

**Table 10** Summary of pinch-off voltage of D-FETs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	D610-300(200)	100.0%	-587.57	27.69	55	100.0%	-588.41	28.05	55	0.0%	0.1%	1.3%
	D510-300(1200)	100.0%	-625.55	28.22	55	100.0%	-627.46	27.88	55	0.0%	0.3%	-1.2%
	D610R-250(1800)	100.0%	-601.28	29.74	55	100.0%	-603.34	29.33	55	0.0%	0.3%	-1.4%
	D610-250(1000)	100.0%	-597.13	34.22	55	100.0%	-619.49	33.06	55	0.0%	3.7%	-3.4%
A129605A	D610-300(200)	100.0%	-561.91	23.03	55	100.0%	-560.79	22.74	55	0.0%	-0.2%	-1.3%
	D510-300(1200)	98.2%	-595.95	21.29	54	100.0%	-594.53	21.10	54	0.0%	-0.2%	-0.9%
	D610R-250(1800)	100.0%	-579.88	27.44	55	100.0%	-579.33	25.91	55	0.0%	-0.1%	-5.6%
	D610-250(1000)	98.2%	-580.47	22.46	54	100.0%	-579.67	22.17	54	0.0%	-0.1%	-1.3%
A130102A	D610-300(200)	100.0%	-560.64	23.85	55	100.0%	-561.08	24.36	55	0.0%	0.1%	2.1%
	D510-300(1200)	100.0%	-591.35	24.84	55	100.0%	-590.97	24.92	55	0.0%	-0.1%	0.3%
	D610R-250(1800)	100.0%	-577.86	25.55	55	100.0%	-578.16	24.95	55	0.0%	0.1%	-2.3%
	D610-250(1000)	100.0%	-576.21	24.96	55	100.0%	-577.77	26.48	55	0.0%	0.3%	6.1%

Lot	Temp. Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	D610-300(200)	100.0%	-528.49	25.06	55	100.0%	-529.44	24.92	55	0.0%	0.2%	-0.6%
	D510-300(1200)	100.0%	-565.44	25.92	55	100.0%	-566.39	25.24	55	0.0%	0.2%	-2.6%
	D610R-250(1800)	100.0%	-541.34	26.93	55	100.0%	-551.31	26.98	55	0.0%	1.8%	0.2%
	D610-250(1000)	100.0%	-518.65	34.54	55	100.0%	-527.35	31.78	55	0.0%	1.7%	-8.0%
A129605A	D610-300(200)	100.0%	-574.20	31.92	55	100.0%	-563.44	31.39	55	0.0%	-1.9%	-1.7%
	D510-300(1200)	100.0%	-603.93	47.22	55	100.0%	-593.10	46.84	55	0.0%	-1.8%	-0.8%
	D610R-250(1800)	100.0%	-593.40	19.96	55	100.0%	-584.18	19.68	55	0.0%	-1.6%	-1.4%
	D610-250(1000)	100.0%	-596.87	20.63	55	100.0%	-587.08	20.22	55	0.0%	-1.6%	-2.0%
A130102A	D610-300(200)	100.0%	-526.75	22.79	55	100.0%	-527.95	23.03	55	0.0%	0.2%	1.1%
	D510-300(1200)	100.0%	-557.14	23.03	55	100.0%	-559.03	23.69	55	0.0%	0.3%	2.9%
	D610R-250(1800)	100.0%	-542.70	21.45	55	100.0%	-543.52	22.66	55	0.0%	0.2%	5.7%
	D610-250(1000)	100.0%	-540.69	22.20	55	100.0%	-540.57	23.17	55	0.0%	0.0%	4.4%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	D610-300(200)	98.2%	-535.70	19.74	54	101.9%	-507.43	23.04	55	1.9%	-5.3%	16.7%
	D510-300(1200)	100.0%	-570.76	19.64	55	100.0%	-536.80	21.87	55	0.0%	-6.0%	11.3%
	D610R-250(1800)	100.0%	-548.91	20.21	55	100.0%	-524.62	19.54	55	0.0%	-4.4%	-3.3%
	D610-250(1000)	100.0%	-547.22	20.55	55	100.0%	-523.62	19.34	55	0.0%	-4.3%	-5.9%
A129605A	D610-300(200)	100.0%	-574.20	31.92	55	100.0%	-563.44	31.39	55	0.0%	-1.9%	-1.7%
	D510-300(1200)	100.0%	-603.93	47.22	55	100.0%	-593.10	46.84	55	0.0%	-1.8%	-0.8%
	D610R-250(1800)	100.0%	-593.40	19.96	55	100.0%	-584.18	19.68	55	0.0%	-1.6%	-1.4%
	D610-250(1000)	100.0%	-596.87	20.63	55	100.0%	-587.08	20.22	55	0.0%	-1.6%	-2.0%
A130102A	D610-300(200)	100.0%	-545.48	23.77	55	100.0%	-529.08	20.83	55	0.0%	-3.0%	-12.3%
	D510-300(1200)	98.2%	-576.92	25.62	54	100.0%	-560.63	23.08	54	0.0%	-2.8%	-9.9%
	D610R-250(1800)	100.0%	-559.96	26.06	55	100.0%	-545.60	25.45	55	0.0%	-2.6%	-2.3%
	D610-250(1000)	100.0%	-559.58	25.89	55	100.0%	-542.33	25.66	55	0.0%	-3.1%	-0.9%

Table 11 summarizes the max. drain current (IDSS) at Vgs = 0 V of the D-FETs before and after all the stresses.

**Table 11** Summary of IDSS of D-FETs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [uA/um]	Std. Dev [uA/um]	Good Sites	Yield	Average [uA/um]	Std. Dev [uA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	IDSS_D610_300(202)	100.0%	78.23	6.02	55	100.0%	78.13	6.04	55	0.0%	-0.1%	0.3%
	IDSS_D510-300(1202)	100.0%	91.82	6.65	55	100.0%	91.51	6.60	55	0.0%	-0.3%	-0.7%
	IDSS_D610R-250(1802)	100.0%	75.02	6.54	55	100.0%	74.58	6.61	55	0.0%	-0.6%	0.9%
	IDSS_D610-250(1002)	100.0%	72.59	9.68	55	100.0%	74.04	6.62	55	0.0%	2.0%	-31.7%
A129605A	IDSS_D610_300(202)	100.0%	69.93	4.35	55	100.0%	69.82	4.26	55	0.0%	-0.2%	-2.0%
	IDSS_D510-300(1202)	100.0%	82.41	4.68	55	100.0%	82.20	4.59	55	0.0%	-0.3%	-1.7%
	IDSS_D610R-250(1802)	100.0%	66.92	4.04	55	100.0%	66.94	4.07	55	0.0%	0.0%	0.6%
	IDSS_D610-250(1002)	100.0%	65.27	6.74	55	100.0%	66.91	6.07	55	0.0%	2.5%	-9.8%
A130102A	IDSS_D610_300(202)	100.0%	69.28	4.66	55	100.0%	69.18	4.63	55	0.0%	-0.1%	-0.7%
	IDSS_D510-300(1202)	100.0%	80.56	5.31	55	100.0%	80.30	5.28	55	0.0%	-0.3%	-0.6%
	IDSS_D610R-250(1802)	100.0%	68.25	4.17	55	100.0%	68.13	4.19	55	0.0%	-0.2%	0.6%
	IDSS_D610-250(1002)	100.0%	66.75	6.95	55	100.0%	67.59	6.70	55	0.0%	1.3%	-3.6%

Lot	Temp. Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IDSS_D610_300(202)	100.0%	66.53	4.90	55	100.0%	66.38	4.92	55	0.0%	-0.2%	0.4%
	IDSS_D510-300(1202)	100.0%	79.32	5.41	55	100.0%	79.00	5.54	55	0.0%	-0.4%	2.4%
	IDSS_D610R-250(1802)	100.0%	64.21	4.82	55	100.0%	64.61	4.83	55	0.0%	0.6%	0.2%
	IDSS_D610-250(1002)	100.0%	61.19	8.05	55	100.0%	66.54	4.82	55	0.0%	8.7%	-40.1%
A129605A	IDSS_D610_300(202)	100.0%	71.19	3.83	55	100.0%	71.05	3.80	55	0.0%	-0.2%	-0.8%
	IDSS_D510-300(1202)	100.0%	83.32	4.20	55	100.0%	82.82	4.66	55	0.0%	-0.6%	11.0%
	IDSS_D610R-250(1802)	100.0%	68.15	3.56	55	100.0%	68.03	3.55	55	0.0%	-0.2%	-0.3%
	IDSS_D610-250(1002)	100.0%	66.23	6.56	55	100.0%	60.20	4.35	55	0.0%	-9.1%	-33.7%
A130102A	IDSS_D610_300(202)	100.0%	63.07	4.33	55	100.0%	62.92	4.32	55	0.0%	-0.2%	-0.2%
	IDSS_D510-300(1202)	100.0%	74.04	4.79	55	100.0%	73.73	4.79	55	0.0%	-0.4%	-0.1%
	IDSS_D610R-250(1802)	100.0%	62.47	3.45	55	100.0%	62.41	3.46	55	0.0%	-0.1%	0.3%
	IDSS_D610-250(1002)	100.0%	60.30	5.92	55	100.0%	54.50	5.01	55	0.0%	-9.6%	-15.5%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IDSS_D610_300(202)	100.0%	68.12	3.47	55	100.0%	64.61	3.58	55	0.0%	-5.1%	3.1%
	IDSS_D510-300(1202)	100.0%	80.62	3.82	55	100.0%	76.53	3.96	55	0.0%	-5.1%	3.8%
	IDSS_D610R-250(1802)	100.0%	65.17	3.75	55	100.0%	61.80	3.71	55	0.0%	-5.2%	-0.9%
	IDSS_D610-250(1002)	100.0%	62.96	7.97	55	100.0%	58.91	4.66	55	0.0%	-6.4%	-41.5%
A129605A	IDSS_D610_300(202)	100.0%	71.36	6.06	55	100.0%	70.23	6.03	55	0.0%	-1.6%	-0.5%
	IDSS_D510-300(1202)	100.0%	83.18	9.02	55	100.0%	82.01	8.92	55	0.0%	-1.4%	-1.1%
	IDSS_D610R-250(1802)	100.0%	69.10	3.41	55	100.0%	68.06	3.44	55	0.0%	-1.5%	1.0%
	IDSS_D610-250(1002)	100.0%	67.06	6.39	55	100.0%	68.37	5.32	55	0.0%	2.0%	-16.7%
A130102A	IDSS_D610_300(202)	100.0%	66.68	4.66	55	100.0%	64.52	4.40	55	0.0%	-3.2%	-5.7%
	IDSS_D510-300(1202)	100.0%	78.28	5.61	55	100.0%	75.75	5.25	55	0.0%	-3.2%	-6.3%
	IDSS_D610R-250(1802)	100.0%	65.68	4.46	55	100.0%	63.59	4.36	55	0.0%	-3.2%	-2.4%
	IDSS_D610-250(1002)	100.0%	64.10	6.89	55	100.0%	54.76	4.71	55	0.0%	-14.6%	-31.6%

Table 12 summarizes the gate turn-on voltage (VF) of the D-FETs before and after all the stresses.

**Table 12** Summary of VF of D-FETs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	VF1.0_D610_300(219)	100.0%	556.06	1.31	55	100.0%	555.24	2.38	55	0.0%	-0.1%	81.0%
	VF1.0_D510-300(1219)	100.0%	561.62	1.50	55	100.0%	560.66	3.18	55	0.0%	-0.2%	111.6%
	VF1.0_D610R-250(1819)	100.0%	562.02	1.16	55	100.0%	560.23	3.52	55	0.0%	-0.3%	202.6%
	VF1.0_D610-250(1019)	100.0%	562.52	3.45	55	100.0%	561.78	4.24	55	0.0%	-0.1%	23.0%
A129605A	VF1.0_D610_300(219)	100.0%	557.89	1.94	55	100.0%	558.00	2.09	55	0.0%	0.0%	7.6%
	VF1.0_D510-300(1219)	100.0%	563.51	2.25	55	100.0%	563.66	2.81	55	0.0%	0.0%	25.1%
	VF1.0_D610R-250(1819)	100.0%	562.36	1.83	55	100.0%	561.45	3.53	55	0.0%	-0.2%	92.6%
	VF1.0_D610-250(1019)	100.0%	561.90	2.00	55	100.0%	561.36	3.57	55	0.0%	-0.1%	78.8%
A130102A	VF1.0_D610_300(219)	100.0%	558.04	2.95	55	100.0%	557.31	3.69	55	0.0%	-0.1%	25.0%
	VF1.0_D510-300(1219)	100.0%	562.01	2.34	55	100.0%	561.09	3.53	55	0.0%	-0.2%	51.3%
	VF1.0_D610R-250(1819)	100.0%	563.93	2.92	55	100.0%	561.53	4.85	55	0.0%	-0.4%	66.0%
	VF1.0_D610-250(1019)	100.0%	562.44	2.69	55	100.0%	560.88	3.95	55	0.0%	-0.3%	47.1%

Lot	Temp. Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	VF1.0_D610_300(219)	100.0%	557.70	1.85	55	100.0%	558.56	1.76	55	0.0%	0.2%	-5.2%
	VF1.0_D510-300(1219)	100.0%	563.70	1.77	55	100.0%	564.84	1.70	55	0.0%	0.2%	-3.6%
	VF1.0_D610R-250(1819)	100.0%	563.51	2.10	55	100.0%	563.53	2.03	55	0.0%	0.0%	-3.4%
	VF1.0_D610-250(1019)	100.0%	563.86	1.85	55	100.0%	564.24	1.81	55	0.0%	0.1%	-1.9%
A129605A	VF1.0_D610_300(219)	100.0%	549.22	75.08	55	100.0%	549.79	75.15	55	0.0%	0.1%	0.1%
	VF1.0_D510-300(1219)	100.0%	564.61	2.33	55	100.0%	565.41	2.23	55	0.0%	0.1%	-4.2%
	VF1.0_D610R-250(1819)	100.0%	563.79	2.01	55	100.0%	563.77	1.98	55	0.0%	0.0%	-1.8%
	VF1.0_D610-250(1019)	100.0%	562.78	1.78	55	100.0%	562.74	1.74	55	0.0%	0.0%	-2.4%
A130102A	VF1.0_D610_300(219)	100.0%	558.14	3.52	55	100.0%	558.50	3.43	55	0.0%	0.1%	-2.6%
	VF1.0_D510-300(1219)	100.0%	563.15	2.97	55	100.0%	563.71	2.82	55	0.0%	0.1%	-5.0%
	VF1.0_D610R-250(1819)	100.0%	565.51	3.30	55	100.0%	565.10	3.22	55	0.0%	-0.1%	-2.4%
	VF1.0_D610-250(1019)	100.0%	564.39	3.43	55	100.0%	564.13	3.36	55	0.0%	0.0%	-2.1%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mV]	Std. Dev [mV]	Good Sites	Yield	Average [mV]	Std. Dev [mV]	Good Sites	Yield	Avg	Std. Dev
A127602A	VF1.0_D610_300(219)	100.0%	554.87	4.04	55	100.0%	539.19	2.29	55	0.0%	-2.8%	-43.4%
	VF1.0_D510-300(1219)	100.0%	560.92	1.15	55	100.0%	544.23	0.77	55	0.0%	-3.0%	-32.9%
	VF1.0_D610R-250(1819)	100.0%	561.38	0.99	55	100.0%	545.83	0.81	55	0.0%	-2.8%	-18.0%
	VF1.0_D610-250(1019)	100.0%	561.27	1.05	55	100.0%	545.58	0.83	55	0.0%	-2.8%	-20.9%
A129605A	VF1.0_D610_300(219)	100.0%	557.86	1.44	55	100.0%	547.22	3.62	55	0.0%	-1.9%	151.9%
	VF1.0_D510-300(1219)	100.0%	563.08	1.79	55	100.0%	553.10	4.15	55	0.0%	-1.8%	132.5%
	VF1.0_D610R-250(1819)	100.0%	563.37	1.82	55	100.0%	552.56	3.56	55	0.0%	-1.9%	96.3%
	VF1.0_D610-250(1019)	100.0%	562.47	1.64	55	100.0%	551.79	3.46	55	0.0%	-1.9%	110.9%
A130102A	VF1.0_D610_300(219)	100.0%	557.68	2.73	55	100.0%	543.19	3.06	55	0.0%	-2.6%	11.9%
	VF1.0_D510-300(1219)	100.0%	562.04	2.68	55	100.0%	547.55	2.50	55	0.0%	-2.6%	-6.6%
	VF1.0_D610R-250(1819)	100.0%	564.32	2.53	55	100.0%	550.09	2.86	55	0.0%	-2.5%	13.1%
	VF1.0_D610-250(1019)	100.0%	562.72	2.54	55	100.0%	548.27	2.62	55	0.0%	-2.6%	2.9%

Table 13 summarizes the gate leakage current (IGSS) of the D-FETs before and after all the stresses.

**Table 13** Summary of IGSS of D-FETs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [pA/um]	Std. Dev [pA/um]	Good Sites	Yield	Average [pA/um]	Std. Dev [pA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	IGSS_D610_300(220)	100.0%	627.96	233.91	55	100.0%	406.04	72.778	55	0.0%	-35.3%	-68.9%
	IGSS_D510-300(1220)	100.0%	663.62	285.33	55	100.0%	414.2	100.3	55	0.0%	-37.6%	-64.8%
	IGSS_D610R-250(1820)	98.2%	678.89	166.1	54	100.0%	379.35	124.79	54	0.0%	-44.1%	-24.9%
	IGSS_D610-250(1020)	94.5%	807.64	291.9	52	98.1%	446.76	130.21	51	-1.9%	-44.7%	-55.4%
A129605A	IGSS_D610_300(220)	100.0%	815.23	279.6	55	100.0%	579.67	93.117	55	0.0%	-28.9%	-66.7%
	IGSS_D510-300(1220)	100.0%	797.11	289.07	55	98.2%	568.96	105.57	54	-1.8%	-28.6%	-63.5%
	IGSS_D610R-250(1820)	100.0%	715.02	178.23	55	100.0%	461.98	103.73	55	0.0%	-35.4%	-41.8%
	IGSS_D610-250(1020)	100.0%	830.91	211.47	55	100.0%	537.11	136.1	55	0.0%	-35.4%	-35.6%
A130102A	IGSS_D610_300(220)	100.0%	651.55	219.46	55	100.0%	461.54	112.72	55	0.0%	-29.2%	-48.6%
	IGSS_D510-300(1220)	98.2%	666.75	267.83	54	101.9%	483.96	154.27	55	1.9%	-27.4%	-42.4%
	IGSS_D610R-250(1820)	98.2%	590.56	165.74	54	100.0%	378.82	89.568	54	0.0%	-35.9%	-46.0%
	IGSS_D610-250(1020)	98.2%	746.46	239.08	54	101.9%	497.52	234.16	55	1.9%	-33.3%	-2.1%

Lot	Temp. Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IGSS_D610_300(220)	100.0%	571.71	161.00	55	100.0%	360.38	62.73	55	0.0%	-37.0%	-61.0%
	IGSS_D510-300(1220)	100.0%	637.46	197.22	55	100.0%	394.36	81.03	55	0.0%	-38.1%	-58.9%
	IGSS_D610R-250(1820)	100.0%	545.37	103.09	55	100.0%	317.37	59.66	55	0.0%	-41.8%	-42.1%
	IGSS_D610-250(1020)	96.4%	675.37	201.59	53	103.8%	421.72	180.87	55	3.8%	-37.6%	-10.3%
A129605A	IGSS_D610_300(220)	98.2%	759.99	302.31	54	100.0%	549.41	133.47	54	0.0%	-27.7%	-55.9%
	IGSS_D510-300(1220)	100.0%	744.16	312.20	55	100.0%	532.47	142.05	55	0.0%	-28.4%	-54.5%
	IGSS_D610R-250(1820)	100.0%	710.60	166.26	55	100.0%	487.94	84.04	55	0.0%	-31.3%	-49.5%
	IGSS_D610-250(1020)	100.0%	783.07	220.73	55	100.0%	523.31	129.44	55	0.0%	-33.2%	-41.4%
A130102A	IGSS_D610_300(220)	100.0%	566.33	189.99	55	100.0%	383.74	94.82	55	0.0%	-32.2%	-50.1%
	IGSS_D510-300(1220)	100.0%	597.69	202.05	55	100.0%	402.03	89.39	55	0.0%	-32.7%	-55.8%
	IGSS_D610R-250(1820)	100.0%	503.60	108.66	55	100.0%	290.18	45.11	55	0.0%	-42.4%	-58.5%
	IGSS_D610-250(1020)	100.0%	659.06	143.57	55	100.0%	389.47	80.86	55	0.0%	-40.9%	-43.7%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	IGSS_D610_300(220)	98.2%	659.63	240.20	54	100.0%	1438.6	593.9	54	0.0%	118%	147%
	IGSS_D510-300(1220)	100.0%	673.79	258.01	55	98.2%	1921.5	1045.6	54	-1.8%	185%	305%
	IGSS_D610R-250(1820)	100.0%	661.16	160.24	55	98.2%	1336.1	574.9	54	-1.8%	102%	259%
	IGSS_D610-250(1020)	100.0%	846.34	299.28	55	98.2%	1920.2	1114.2	54	-1.8%	127%	272%
A129605A	IGSS_D610_300(220)	100.0%	855.95	309.33	55	100.0%	1165.6	243.9	55	0.0%	36.2%	-21.2%
	IGSS_D510-300(1220)	100.0%	861.65	348.45	55	100.0%	1186.4	304.8	55	0.0%	37.7%	-12.5%
	IGSS_D610R-250(1820)	100.0%	820.67	180.13	55	100.0%	1025.1	142.7	55	0.0%	24.9%	-20.8%
	IGSS_D610-250(1020)	100.0%	966.18	241.67	55	100.0%	1255.0	442.8	55	0.0%	29.9%	83.2%
A130102A	IGSS_D610_300(220)	100.0%	689.12	319.93	55	100.0%	352.2	258.3	55	0.0%	-48.9%	-19.3%
	IGSS_D510-300(1220)	100.0%	731.55	344.01	55	100.0%	319.3	255.7	55	0.0%	-56.4%	-25.7%
	IGSS_D610R-250(1820)	98.2%	590.42	165.36	54	100.0%	281.7	276.1	54	0.0%	-52.3%	66.9%
	IGSS_D610-250(1020)	100.0%	811.75	417.75	55	98.2%	419.2	571.3	54	-1.8%	-48.4%	36.8%

Table 14 summarizes the breakdown voltage (BV) of the D-FETs before and after all the stresses.

**Table 14** Summary of BV of D-FETs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [V]	Std. Dev [V]	Good Sites	Yield	Average [V]	Std. Dev [V]	Good Sites	Yield	Avg	Std. Dev
A127602A	BV1-D610-300(228)	100.0%	14.40	0.50	55	100.0%	14.31	0.52	55	0.0%	-0.6%	4.4%
	BV1-D510-300(1228)	100.0%	14.84	0.57	55	100.0%	14.76	0.65	55	0.0%	-0.6%	14.6%
	BV1-D610R-250(1828)	100.0%	13.83	1.26	55	100.0%	13.83	1.33	55	0.0%	0.0%	5.2%
	BV1-D610-250(1028)	100.0%	16.05	1.19	55	100.0%	15.93	1.20	55	0.0%	-0.7%	0.6%
A129605A	BV1-D610-300(228)	100.0%	14.46	0.57	55	100.0%	14.43	0.56	55	0.0%	-0.2%	-0.3%
	BV1-D510-300(1228)	100.0%	14.72	2.14	55	100.0%	14.69	2.14	55	0.0%	-0.2%	0.0%
	BV1-D610R-250(1828)	100.0%	13.19	0.87	55	100.0%	13.20	0.98	55	0.0%	0.1%	12.9%
	BV1-D610-250(1028)	100.0%	15.06	2.15	55	100.0%	15.09	2.22	55	0.0%	0.2%	3.0%
A130102A	BV1-D610-300(228)	100.0%	14.51	0.64	55	100.0%	14.47	0.66	55	0.0%	-0.3%	3.4%
	BV1-D510-300(1228)	100.0%	15.10	0.61	55	100.0%	15.10	0.70	55	0.0%	0.0%	14.9%
	BV1-D610R-250(1828)	100.0%	14.33	0.95	55	100.0%	14.41	1.20	55	0.0%	0.5%	26.1%
	BV1-D610-250(1028)	100.0%	15.87	0.62	55	100.0%	15.84	0.82	55	0.0%	-0.2%	32.8%

Lot	Temp. Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	BV1-D610-300(228)	100.0%	15.13	0.41	55	100.0%	14.93	0.40	55	0.0%	-1.3%	-1.8%
	BV1-D510-300(1228)	100.0%	15.60	0.42	55	100.0%	15.41	0.42	55	0.0%	-1.3%	0.6%
	BV1-D610R-250(1828)	100.0%	14.43	0.90	55	100.0%	14.21	0.88	55	0.0%	-1.5%	-2.3%
	BV1-D610-250(1028)	100.0%	16.62	0.72	55	100.0%	16.34	0.72	55	0.0%	-1.7%	-0.1%
A129605A	BV1-D610-300(228)	100.0%	14.09	2.03	55	100.0%	14.01	2.02	55	0.0%	-0.5%	-0.5%
	BV1-D510-300(1228)	100.0%	14.96	0.63	55	100.0%	14.89	0.63	55	0.0%	-0.5%	-0.7%
	BV1-D610R-250(1828)	100.0%	12.57	0.84	55	100.0%	12.49	0.84	55	0.0%	-0.6%	-0.7%
	BV1-D610-250(1028)	100.0%	15.09	0.59	55	100.0%	14.98	0.59	55	0.0%	-0.7%	0.4%
A130102A	BV1-D610-300(228)	100.0%	15.19	0.50	55	100.0%	15.05	0.51	55	0.0%	-0.9%	1.1%
	BV1-D510-300(1228)	100.0%	15.82	0.44	55	100.0%	15.67	0.44	55	0.0%	-0.9%	0.8%
	BV1-D610R-250(1828)	100.0%	15.06	0.96	55	100.0%	14.93	0.96	55	0.0%	-0.9%	0.3%
	BV1-D610-250(1028)	100.0%	16.27	0.61	55	100.0%	16.11	0.60	55	0.0%	-0.9%	-1.6%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	BV1-D610-300(228)	100.0%	14.07	1.80	55	100.0%	13.65	1.56	55	0.0%	-3.0%	-13.5%
	BV1-D510-300(1228)	100.0%	14.84	0.35	55	100.0%	14.07	0.57	55	0.0%	-5.2%	62.2%
	BV1-D610R-250(1828)	100.0%	13.49	0.83	55	100.0%	13.20	1.09	55	0.0%	-2.2%	30.4%
	BV1-D610-250(1028)	100.0%	15.83	0.77	55	100.0%	15.31	0.99	55	0.0%	-3.3%	29.0%
A129605A	BV1-D610-300(228)	100.0%	13.84	0.75	55	100.0%	13.77	0.77	55	0.0%	-0.5%	2.6%
	BV1-D510-300(1228)	100.0%	14.43	0.93	55	100.0%	14.33	0.98	55	0.0%	-0.7%	5.5%
	BV1-D610R-250(1828)	100.0%	12.90	0.93	55	100.0%	12.90	0.91	55	0.0%	-0.1%	-2.0%
	BV1-D610-250(1028)	100.0%	14.79	0.73	55	100.0%	14.78	0.80	55	0.0%	0.0%	8.8%
A130102A	BV1-D610-300(228)	100.0%	15.03	0.55	55	100.0%	14.81	0.57	55	0.0%	-1.5%	3.4%
	BV1-D510-300(1228)	100.0%	15.39	2.09	55	100.0%	15.21	2.07	55	0.0%	-1.1%	-1.0%
	BV1-D610R-250(1828)	100.0%	14.94	1.00	55	100.0%	14.82	1.11	55	0.0%	-0.8%	11.0%
	BV1-D610-250(1028)	100.0%	16.05	0.69	55	100.0%	15.89	0.77	55	0.0%	-1.0%	10.8%

OHMIC CONTACT TLMS

The ohmic contact test structures showed no movement in the contact resistance (Rc) and sheet resistance (Rsh) over all stresses.

Table 15 summarizes the Ohmic contact TLMs results.

**Table 15** Summary of Ohmic contact TLMs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave		0 Hrs				96 Hrs				% Change		
	Test (Test #)		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	RSH3X2B(40)	[Ω/sq]	100.0%	106.22	7.82	55	100.0%	106.49	7.71	55	0.0%	0.3%	-1.4%
	RC3X2B(41)	[Ω]	100.0%	67.77	7.28	55	100.0%	65.59	6.97	55	0.0%	-3.2%	-4.3%
A129605A	RSH3X2B(40)	[Ω/sq]	100.0%	101.09	8.68	55	100.0%	101.24	8.13	55	0.0%	0.2%	-6.3%
	RC3X2B(41)	[Ω]	100.0%	68.09	7.69	55	100.0%	66.42	6.58	55	0.0%	-2.5%	-14.4%
A130102A	RSH3X2B(40)	[Ω/sq]	100.0%	104.29	7.58	55	98.2%	103.76	7.54	54	-1.8%	-0.5%	-0.4%
	RC3X2B(41)	[Ω]	100.0%	60.59	5.07	55	98.2%	58.74	4.69	54	-1.8%	-3.1%	-7.5%

Lot	Temp Cycle		0 Cycles				500 Cycles				% Change		
	Test (Test #)		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	RSH3X2B(40)	[Ω/sq]	100.0%	105.26	7.68	55	100.0%	105.64	7.19	55	0.0%	0.4%	-6.4%
	RC3X2B(41)	[Ω]	100.0%	65.65	5.65	55	100.0%	59.70	5.10	55	0.0%	-9.1%	-9.7%
A129605A	RSH3X2B(40)	[Ω/sq]	100.0%	105.16	8.61	55	100.0%	105.31	8.27	55	0.0%	0.1%	-3.9%
	RC3X2B(41)	[Ω]	100.0%	72.34	6.43	55	100.0%	68.43	5.78	55	0.0%	-5.4%	-10.1%
A130102A	RSH3X2B(40)	[Ω/sq]	100.0%	105.33	6.74	55	100.0%	105.40	6.86	55	0.0%	0.1%	1.8%
	RC3X2B(41)	[Ω]	100.0%	62.00	4.43	55	100.0%	58.55	4.19	55	0.0%	-5.6%	-5.3%

Lot	Air Baked		0 Hrs				168 Hrs				% Change		
	Test (Test #)		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	RSH3X2B(40)	[Ω/sq]	100.0%	100.54	5.63	55	100.0%	100.65	5.85	55	0.0%	0.1%	3.8%
	RC3X2B(41)	[Ω]	100.0%	61.84	4.78	55	100.0%	69.63	4.85	55	0.0%	12.6%	1.5%
A129605A	RSH3X2B(40)	[Ω/sq]	100.0%	107.27	7.35	55	100.0%	107.09	7.27	55	0.0%	-0.2%	-1.1%
	RC3X2B(41)	[Ω]	100.0%	72.14	7.39	55	100.0%	82.45	7.89	55	0.0%	14.3%	6.8%
A130102A	RSH3X2B(40)	[Ω/sq]	100.0%	104.59	7.89	55	100.0%	104.77	7.86	55	0.0%	0.2%	-0.3%
	RC3X2B(41)	[Ω]	100.0%	60.76	4.80	55	100.0%	67.33	4.73	55	0.0%	10.8%	-1.5%

## IMPLANTS

The implant test structures showed no movement in the implant sheet resistance (VDP), substrate isolation leakage current (ISO), and the D- 2x2 um implanted resistance over all stresses.

Tables 16.1 – 16.3 summarize the results of the implant isolation, implant Van der Pauw, and 2x2 um D-implant resistor structures.

**Table 16.1** Summary of implant structures for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	ISO(10) [pA/um]	100.0%	11.21	0.51	55	100.0%	11.45	0.55	55	0.0%	2.1%	7.2%
	ISOX6(11) [pA/um]	100.0%	9.66	0.49	55	100.0%	9.87	0.52	55	0.0%	2.3%	6.9%
	D-VDP(7) [Ω/sq]	100.0%	708.7	15.9	55	100.0%	711.2	15.8	55	0.0%	0.3%	-0.8%
	E-VDP(8) [Ω/sq]	100.0%	980.0	29.5	55	100.0%	976.6	29.0	55	0.0%	-0.3%	-1.5%
	N+VDP(5) [Ω/sq]	100.0%	110.3	4.4	55	100.0%	110.5	4.4	55	0.0%	0.1%	-0.8%
	D-2X2(5200) [Ω]	100.0%	5482.2	951.5	55	100.0%	5336.1	1059.1	55	0.0%	-2.7%	11.3%
A129605A	ISO(10) [pA/um]	100.0%	25.67	1.95	55	100.0%	23.16	1.83	55	0.0%	-9.8%	-6.2%
	ISOX6(11) [pA/um]	100.0%	17.42	0.98	55	100.0%	15.86	0.88	55	0.0%	-9.0%	-10.3%
	D-VDP(7) [Ω/sq]	100.0%	722.7	16.0	55	100.0%	722.2	16.0	55	0.0%	-0.1%	-0.4%
	E-VDP(8) [Ω/sq]	100.0%	1008.2	26.4	55	100.0%	1007.3	26.3	55	0.0%	-0.1%	-0.5%
	N+VDP(5) [Ω/sq]	100.0%	109.1	4.2	55	100.0%	109.1	4.2	55	0.0%	0.0%	0.0%
	D-2X2(5200) [Ω]	100.0%	5552.5	1020.2	55	100.0%	5100.8	1303.4	55	0.0%	-8.1%	27.8%
A130102A	ISO(10) [pA/um]	100.0%	28.08	2.56	55	100.0%	26.52	2.71	55	0.0%	-5.6%	5.7%
	ISOX6(11) [pA/um]	100.0%	17.93	0.99	55	100.0%	17.21	1.08	55	0.0%	-4.0%	9.2%
	D-VDP(7) [Ω/sq]	100.0%	716.7	15.2	55	98.2%	716.1	15.4	54	-1.8%	-0.1%	1.8%
	E-VDP(8) [Ω/sq]	100.0%	1007.9	29.4	55	100.0%	1005.0	29.0	55	0.0%	-0.3%	-1.2%
	N+VDP(5) [Ω/sq]	100.0%	112.3	4.5	55	96.4%	112.5	4.4	53	-3.6%	0.2%	-0.3%
	D-2X2(5200) [Ω]	100.0%	4426.7	1320.5	55	100.0%	4268.0	1408.8	55	0.0%	-3.6%	6.7%

**Table 16.2** Summary of implant structures for Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	ISO(10) [pA/um]	100.0%	11.06	0.74	55	100.0%	11.21	0.73	55	0.0%	1.4%	-1.4%
	ISOX6(11) [pA/um]	100.0%	9.41	0.62	55	100.0%	9.31	0.62	55	0.0%	-1.0%	0.8%
	D-VDP(7) [Ω/sq]	100.0%	721.41	15.54	55	100.0%	724.67	15.677	55	0.0%	0.5%	0.9%
	E-VDP(8) [Ω/sq]	100.0%	1014.5	29.76	55	100.0%	1019.3	30.381	55	0.0%	0.5%	2.1%
	N+VDP(5) [Ω/sq]	100.0%	110.06	4.67	55	100.0%	110.11	4.6923	55	0.0%	0.0%	0.6%
	D-2X2(5200) [Ω]	100.0%	6020.7	892.4	55	100.0%	5998.4	891.8	55	0.0%	-0.4%	-0.1%
A129605A	ISO(10) [pA/um]	100.0%	25.51	2.16	55	100.0%	23.84	1.98	55	0.0%	-6.5%	-8.4%
	ISOX6(11) [pA/um]	100.0%	17.81	1.22	55	100.0%	17.11	1.10	55	0.0%	-3.9%	-10.0%
	D-VDP(7) [Ω/sq]	100.0%	727.6	16.8	55	100.0%	729.9	17.2	55	0.0%	0.3%	2.1%
	E-VDP(8) [Ω/sq]	100.0%	1020.3	33.0	55	100.0%	1022.2	33.5	55	0.0%	0.2%	1.6%
	N+VDP(5) [Ω/sq]	100.0%	112.1	4.7	55	100.0%	112.2	4.7	55	0.0%	0.1%	0.2%
	D-2X2(5200) [Ω]	100.0%	5922.0	1085.0	55	100.0%	5921.7	1081.7	55	0.0%	0.0%	-0.3%
A130102A	ISO(10) [pA/um]	100.0%	28.18	2.23	55	100.0%	26.64	2.12	55	0.0%	-5.5%	-5.1%
	ISOX6(11) [pA/um]	100.0%	17.50	1.23	55	100.0%	17.03	1.16	55	0.0%	-2.6%	-5.3%
	D-VDP(7) [Ω/sq]	100.0%	727.3	14.1	55	100.0%	728.1	14.1	55	0.0%	0.1%	-0.3%
	E-VDP(8) [Ω/sq]	100.0%	1032.7	28.6	55	100.0%	1032.8	29.5	55	0.0%	0.0%	3.2%
	N+VDP(5) [Ω/sq]	100.0%	113.4	3.9	55	100.0%	113.5	4.0	55	0.0%	0.1%	0.7%
	D-2X2(5200) [Ω]	100.0%	6331.1	1150.5	55	100.0%	6320.4	1152.2	55	0.0%	-0.2%	0.1%

**Table 16.3** Summary of implant structures for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	ISO(10) [pA/um]	100.0%	11.77	1.16	55	100.0%	11.34	1.09	55	0.0%	-3.6%	-6.5%
	ISOX6(11) [pA/um]	100.0%	9.13	0.47	55	100.0%	8.96	0.54	55	0.0%	-1.8%	13.4%
	D-VDP(7) [Ω/sq]	100.0%	707.2	8.6	55	100.0%	705.7	8.5	55	0.0%	-0.2%	-1.0%
	E-VDP(8) [Ω/sq]	100.0%	983.2	15.9	55	100.0%	979.4	15.9	55	0.0%	-0.4%	0.4%
	N+VDP(5) [Ω/sq]	100.0%	105.9	3.2	55	100.0%	106.0	3.1	55	0.0%	0.1%	-1.0%
	D-2X2(5200) [Ω]	100.0%	5552.6	555.0	55	100.0%	5328.9	580.4	55	0.0%	-4.0%	4.6%
A129605A	ISO(10) [pA/um]	100.0%	26.16	1.87	55	100.0%	24.25	1.96	55	0.0%	-7.3%	5.0%
	ISOX6(11) [pA/um]	100.0%	17.51	1.23	55	100.0%	16.52	1.19	55	0.0%	-5.6%	-3.1%
	D-VDP(7) [Ω/sq]	98.2%	725.9	22.1	54	100.0%	728.2	23.0	54	0.0%	0.3%	3.9%
	E-VDP(8) [Ω/sq]	100.0%	1012.2	32.0	55	100.0%	1015.3	32.1	55	0.0%	0.3%	0.1%
	N+VDP(5) [Ω/sq]	100.0%	112.3	4.1	55	100.0%	112.5	4.1	55	0.0%	0.2%	1.1%
	D-2X2(5200) [Ω]	100.0%	6709.3	607.1	55	100.0%	6627.0	625.4	55	0.0%	-1.2%	3.0%
A130102A	ISO(10) [pA/um]	100.0%	27.18	2.42	55	100.0%	24.08	2.32	55	0.0%	-11.4%	-3.9%
	ISOX6(11) [pA/um]	100.0%	17.84	0.83	55	100.0%	16.26	0.84	55	0.0%	-8.9%	0.7%
	D-VDP(7) [Ω/sq]	100.0%	720.4	15.0	55	100.0%	722.5	16.0	55	0.0%	0.3%	6.7%
	E-VDP(8) [Ω/sq]	100.0%	1019.9	29.0	55	98.2%	1023.0	30.9	54	-1.8%	0.3%	6.6%
	N+VDP(5) [Ω/sq]	100.0%	112.9	4.3	55	100.0%	113.1	4.4	55	0.0%	0.2%	0.5%
	D-2X2(5200) [Ω]	100.0%	4742.5	1337.6	55	100.0%	4600.0	1258.9	55	0.0%	-3.0%	-5.9%

**SCHOTTKY DIODES**

The Schottky diode test structures showed no movement in the forward turn-on voltage (VF) and the reverse breakdown voltage (BV) for both diode widths (2 um & 50 um) over all stresses. Table 17 summarizes the results of the Schottky diode structures.

**Table 17** Summary of Schottky diodes for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	VF_10u_2(3003) [mV]	100.0%	576.60	2.65	55	98.2%	576.21	3.04	54	-1.8%	-0.1%	14.9%
	BV_2(3005) [V]	100.0%	3.25	0.14	55	100.0%	3.31	0.45	55	0.0%	1.6%	229.6%
	VF_10u_50(3053) [mV]	100.0%	570.12	2.31	55	100.0%	569.53	2.35	55	0.0%	-0.1%	1.7%
	BV_50(3055) [V]	100.0%	3.15	0.12	55	100.0%	3.15	0.12	55	0.0%	-0.1%	-0.9%
A129605A	VF_10u_2(3003) [mV]	100.0%	564.80	2.56	55	100.0%	564.90	2.58	55	0.0%	0.0%	1.1%
	BV_2(3005) [V]	100.0%	3.01	0.12	55	100.0%	3.00	0.12	55	0.0%	-0.3%	-0.2%
	VF_10u_50(3053) [mV]	100.0%	544.28	6.67	55	100.0%	544.25	6.72	55	0.0%	0.0%	0.8%
	BV_50(3055) [V]	100.0%	2.82	0.09	55	100.0%	2.82	0.09	55	0.0%	0.0%	0.8%
A130102A	VF_10u_2(3003) [mV]	100.0%	568.65	3.00	55	100.0%	568.01	3.02	55	0.0%	-0.1%	0.5%
	BV_2(3005) [V]	100.0%	3.14	0.12	55	100.0%	3.14	0.13	55	0.0%	-0.3%	2.3%
	VF_10u_50(3053) [mV]	100.0%	557.75	1.19	55	100.0%	557.16	1.33	55	0.0%	-0.1%	11.6%
	BV_50(3055) [V]	100.0%	3.05	0.09	55	100.0%	3.05	0.10	55	0.0%	-0.1%	0.9%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	VF_10u_2(3003) [mV]	100.0%	575.85	3.58	55	100.0%	575.65	3.57	55	0.0%	0.0%	-0.3%
	BV_2(3005) [V]	100.0%	3.21	0.15	55	100.0%	3.21	0.15	55	0.0%	0.0%	-0.3%
	VF_10u_50(3053) [mV]	100.0%	569.25	2.65	55	100.0%	568.76	2.62	55	0.0%	-0.1%	-1.3%
	BV_50(3055) [V]	100.0%	3.10	0.12	55	100.0%	3.10	0.12	55	0.0%	0.1%	0.0%
A129605A	VF_10u_2(3003) [mV]	100.0%	567.35	2.78	55	100.0%	567.53	2.72	55	0.0%	0.0%	-2.3%
	BV_2(3005) [V]	100.0%	3.10	0.13	55	100.0%	3.10	0.13	55	0.0%	0.1%	-1.7%
	VF_10u_50(3053) [mV]	100.0%	546.73	6.78	55	100.0%	546.53	6.93	55	0.0%	0.0%	2.1%
	BV_50(3055) [V]	100.0%	2.90	0.08	55	100.0%	2.90	0.08	55	0.0%	0.1%	0.6%
A130102A	VF_10u_2(3003) [mV]	100.0%	569.36	2.83	55	100.0%	569.06	2.68	55	0.0%	-0.1%	-5.6%
	BV_2(3005) [V]	100.0%	3.16	0.11	55	100.0%	3.16	0.11	55	0.0%	0.0%	-1.5%
	VF_10u_50(3053) [mV]	100.0%	557.51	2.33	55	100.0%	557.08	2.50	55	0.0%	-0.1%	7.0%
	BV_50(3055) [V]	100.0%	3.05	0.09	55	100.0%	3.05	0.09	55	0.0%	0.0%	-0.8%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	VF_10u_2(3003) [mV]	100.0%	0.57	0.00	55	100.0%	0.56	0.00	55	0.0%	-2.4%	4.4%
	BV_2(3005) [V]	100.0%	3.06	0.10	55	100.0%	2.92	0.10	55	0.0%	-4.5%	-2.2%
	VF_10u_50(3053) [mV]	100.0%	0.57	0.00	55	100.0%	0.55	0.00	55	0.0%	-2.7%	0.3%
	BV_50(3055) [V]	100.0%	2.98	0.09	55	100.0%	2.81	0.08	55	0.0%	-5.8%	-11.4%
A129605A	VF_10u_2(3003) [mV]	100.0%	0.57	0.00	55	100.0%	0.56	0.00	55	0.0%	-0.7%	36.5%
	BV_2(3005) [V]	100.0%	3.11	0.11	55	100.0%	3.07	0.11	55	0.0%	-1.3%	4.8%
	VF_10u_50(3053) [mV]	100.0%	0.54	0.01	55	100.0%	0.54	0.01	55	0.0%	-0.6%	81.0%
	BV_50(3055) [V]	100.0%	2.90	0.08	55	100.0%	2.83	0.11	55	0.0%	-2.1%	38.4%
A130102A	VF_10u_2(3003) [mV]	100.0%	0.5665	0.0019	55	100.0%	0.5627	0.0026	55	0.0%	-0.7%	36.5%
	BV_2(3005) [V]	100.0%	3.1126	0.1088	55	100.0%	3.0718	0.1139	55	0.0%	-1.3%	4.8%
	VF_10u_50(3053) [mV]	100.0%	0.5444	0.0066	55	100.0%	0.5413	0.012	55	0.0%	-0.6%	81.0%
	BV_50(3055) [V]	100.0%	2.8956	0.0785	55	100.0%	2.8337	0.1087	55	0.0%	-2.1%	38.4%

## NiCr RESISTORS

Overall, NiCr resistors showed little to no changes in resistance or resistivity (VDP) over all stresses. Table 18 summarizes the results from the NiCr resistor test structures.

**Table 18** Summary of NiCr resistors for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	TFR2X2(5000) [Ω]	100.0%	49.56	1.382	55	100.0%	49.60	1.386	55	0.0%	0.1%	0.3%
	TFR20X2(5002) [Ω]	100.0%	4.64	0.078	55	100.0%	4.66	0.078	55	0.0%	0.3%	0.1%
	TFR2X20(5003) [Ω]	100.0%	536.49	10.919	55	100.0%	536.55	10.933	55	0.0%	0.0%	0.1%
	TFR20X20(5004) [Ω]	100.0%	48.05	0.535	55	100.0%	48.09	0.541	55	0.0%	0.1%	1.1%
	TFRVDP(5100) [Ω/sq]	100.0%	48.50	0.513	55	100.0%	48.51	0.521	55	0.0%	0.0%	1.7%
A129605A	TFR2X2(5000) [Ω]	100.0%	45.78	1.15	55	100.0%	45.75	1.16	55	0.0%	-0.1%	0.5%
	TFR20X2(5002) [Ω]	100.0%	4.53	0.09	55	100.0%	4.54	0.08	55	0.0%	0.3%	-6.0%
	TFR2X20(5003) [Ω]	100.0%	515.17	8.77	55	100.0%	514.87	8.78	55	0.0%	-0.1%	0.1%
	TFR20X20(5004) [Ω]	100.0%	48.44	0.54	55	100.0%	48.42	0.54	55	0.0%	-0.1%	1.5%
	TFRVDP(5100) [Ω/sq]	100.0%	49.32	0.55	55	100.0%	49.35	0.54	55	0.0%	0.0%	-1.8%
A130102A	TFR2X2(5000) [Ω]	100.0%	48.57	1.43	55	100.0%	48.55	1.43	55	0.0%	0.0%	0.1%
	TFR20X2(5002) [Ω]	100.0%	4.69	0.11	55	98.2%	4.70	0.11	54	-1.8%	0.2%	1.4%
	TFR2X20(5003) [Ω]	100.0%	532.32	7.04	55	96.4%	532.13	7.13	53	-3.6%	0.0%	1.3%
	TFR20X20(5004) [Ω]	100.0%	49.18	0.39	55	98.2%	49.17	0.39	54	-1.8%	0.0%	1.6%
	TFRVDP(5100) [Ω/sq]	100.0%	49.97	0.33	55	100.0%	49.99	0.34	55	0.0%	0.0%	1.2%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	TFR2X2(5000) [Ω]	100.0%	49.44	1.31	55	100.0%	50.68	1.31	55	0.0%	2.5%	0.0%
	TFR20X2(5002) [Ω]	100.0%	4.64	0.08	55	100.0%	4.64	0.08	55	0.0%	0.2%	-2.9%
	TFR2X20(5003) [Ω]	100.0%	539.50	8.79	55	100.0%	539.66	8.80	55	0.0%	0.0%	0.1%
	TFR20X20(5004) [Ω]	100.0%	48.80	0.55	55	100.0%	48.81	0.55	55	0.0%	0.0%	0.1%
	TFRVDP(5100) [Ω/sq]	100.0%	49.46	0.58	55	98.2%	49.47	0.58	54	-1.8%	0.0%	-1.0%
A129605A	TFR2X2(5000) [Ω]	100.0%	45.86	1.03	55	100.0%	45.81	1.03	55	0.0%	-0.1%	-0.2%
	TFR20X2(5002) [Ω]	100.0%	4.48	0.09	55	100.0%	4.47	0.10	55	0.0%	-0.2%	5.0%
	TFR2X20(5003) [Ω]	100.0%	519.49	7.51	55	100.0%	519.15	7.51	55	0.0%	-0.1%	0.1%
	TFR20X20(5004) [Ω]	100.0%	48.95	0.50	55	100.0%	48.92	0.50	55	0.0%	-0.1%	-0.6%
	TFRVDP(5100) [Ω/sq]	100.0%	50.00	0.57	55	100.0%	50.03	0.57	55	0.0%	0.0%	-0.9%
A130102A	TFR2X2(5000) [Ω]	100.0%	45.36	1.35	55	100.0%	45.32	1.35	55	0.0%	-0.1%	-0.2%
	TFR20X2(5002) [Ω]	100.0%	4.33	0.13	55	100.0%	4.32	0.13	55	0.0%	-0.2%	0.6%
	TFR2X20(5003) [Ω]	100.0%	524.02	8.19	55	100.0%	523.71	8.18	55	0.0%	-0.1%	-0.2%
	TFR20X20(5004) [Ω]	100.0%	48.49	0.52	55	100.0%	48.47	0.52	55	0.0%	-0.1%	0.0%
	TFRVDP(5100) [Ω/sq]	100.0%	49.45	0.47	55	100.0%	49.48	0.47	55	0.0%	0.0%	-1.8%

Lot	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	TFR2X2(5000) [Ω]	100.0%	51.35	1.41	55	100.0%	51.68	1.43	55	0.0%	0.7%	1.1%
	TFR20X2(5002) [Ω]	100.0%	4.66	0.07	55	100.0%	4.69	0.07	55	0.0%	0.8%	-2.1%
	TFR2X20(5003) [Ω]	100.0%	548.34	11.04	55	100.0%	552.02	11.14	55	0.0%	0.7%	0.9%
	TFR20X20(5004) [Ω]	100.0%	48.80	0.41	55	100.0%	49.08	0.42	55	0.0%	0.6%	2.9%
	TFRVDP(5100) [Ω/sq]	100.0%	49.28	0.41	55	100.0%	49.54	0.42	55	0.0%	0.5%	4.3%
A129605A	TFR2X2(5000) [Ω]	100.0%	44.99	1.57	55	100.0%	45.19	1.59	55	0.0%	0.4%	1.2%
	TFR20X2(5002) [Ω]	100.0%	4.43	0.13	55	100.0%	4.44	0.14	55	0.0%	0.4%	5.5%
	TFR2X20(5003) [Ω]	100.0%	513.56	8.27	55	100.0%	516.54	8.37	55	0.0%	0.6%	1.1%
	TFR20X20(5004) [Ω]	100.0%	48.26	0.61	55	100.0%	48.49	0.62	55	0.0%	0.5%	1.1%
	TFRVDP(5100) [Ω/sq]	100.0%	49.22	0.58	55	100.0%	49.53	0.58	55	0.0%	0.6%	1.4%
A130102A	TFR2X2(5000) [Ω]	100.0%	46.63	1.34	55	100.0%	46.87	1.35	55	0.0%	0.5%	0.5%
	TFR20X2(5002) [Ω]	100.0%	4.57	0.11	55	100.0%	4.59	0.10	55	0.0%	0.4%	-2.6%
	TFR2X20(5003) [Ω]	100.0%	527.41	6.93	55	100.0%	530.83	7.03	55	0.0%	0.6%	1.5%
	TFR20X20(5004) [Ω]	100.0%	49.20	0.36	55	100.0%	49.44	0.36	55	0.0%	0.5%	0.2%
	TFRVDP(5100) [Ω/sq]	100.0%	50.25	0.37	55	100.0%	50.56	0.36	55	0.0%	0.6%	-1.4%

## CAPACITORS

Overall, capacitors showed no significant changes (within measurement tolerances) in capacitance/area and leakage current (10 V and 15 V) over all stresses.

Table 19 summarizes the results from the 25K sq. um MIM PSN capacitor test structures.

**Table 19** Summary of MIM PSN capacitors for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	MIM_C/A(7001 [fF/um <sup>2</sup> ])	100.0%	1.19	0.01	55	98.2%	1.19	0.01	54	-1.8%	0.0%	0.6%
	CAPLK10(7003) [pA]	98.2%	15.75	1.59	54	100.0%	14.84	1.72	54	0.0%	-5.8%	8.0%
	CAPLK15(7006) [pA]	98.2%	87.13	46.00	54	100.0%	77.18	39.47	54	0.0%	-11.4%	-14.2%
A129605A	MIM_C/A(7001 [fF/um <sup>2</sup> ])	100.0%	1.28	0.03	55	100.0%	1.28	0.03	55	0.0%	0.0%	-0.1%
	CAPLK10(7003) [pA]	100.0%	88.73	2.04	55	100.0%	88.30	2.92	55	0.0%	-0.5%	43.4%
	CAPLK15(7006) [pA]	100.0%	460.53	303.40	55	100.0%	444.93	292.42	55	0.0%	-3.4%	-3.6%
A130102A	MIM_C/A(7001 [fF/um <sup>2</sup> ])	100.0%	1.26	0.02	55	100.0%	1.26	0.02	55	0.0%	0.0%	0.1%
	CAPLK10(7003) [pA]	100.0%	88.20	2.44	55	100.0%	87.82	3.63	55	0.0%	-0.4%	48.9%
	CAPLK15(7006) [pA]	100.0%	404.27	230.67	55	100.0%	386.45	215.87	55	0.0%	-4.4%	-6.4%

	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	MIM_C/A(7001 [fF/um <sup>2</sup> ])	100.0%	1.27	0.03	55	100.0%	1.27	0.03	55	0.0%	-0.1%	0.1%
	CAPLK10(7003) [pA]	98.2%	16.52	1.73	54	100.0%	15.38	2.14	54	0.0%	-6.9%	23.8%
	CAPLK15(7006) [pA]	98.2%	247.88	175.40	54	100.0%	227.61	162.69	54	0.0%	-8.2%	-7.2%
A129605A	MIM_C/A(7001 [fF/um <sup>2</sup> ])	100.0%	1.25	0.02	55	100.0%	1.25	0.02	55	0.0%	0.0%	0.1%
	CAPLK10(7003) [pA]	100.0%	87.88	2.25	55	100.0%	88.74	2.18	55	0.0%	1.0%	-3.4%
	CAPLK15(7006) [pA]	100.0%	280.22	125.62	55	100.0%	269.99	116.62	55	0.0%	-3.6%	-7.2%
A130102A	MIM_C/A(7001 [fF/um <sup>2</sup> ])	100.0%	1.26	0.02	55	100.0%	1.26	0.02	55	0.0%	0.0%	0.1%
	CAPLK10(7003) [pA]	100.0%	88.27	1.70	55	100.0%	89.41	1.18	55	0.0%	1.3%	-30.6%
	CAPLK15(7006) [pA]	100.0%	368.79	197.63	55	100.0%	357.07	190.63	55	0.0%	-3.2%	-3.5%

	Air Baked	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	MIM_C/A(7001)	98.2%	1.20	0.02	54	100.0%	1.21	0.02	54	0.0%	0.2%	0.9%
	CAPLK10(7003)	98.2%	15.91	1.77	54	100.0%	20.31	1.82	54	0.0%	27.7%	2.6%
	CAPLK15(7006)	98.2%	97.52	52.71	54	100.0%	122.04	60.07	54	0.0%	25.1%	14.0%
A129605A	MIM_C/A(7001)	100.0%	1.25	0.02	55	100.0%	1.26	0.02	55	0.0%	0.2%	0.8%
	CAPLK10(7003)	98.2%	87.98	2.17	54	100.0%	86.81	3.61	54	0.0%	-1.3%	66.0%
	CAPLK15(7006)	98.2%	288.20	129.69	54	100.0%	331.94	157.79	54	0.0%	15.2%	21.7%
A130102A	MIM_C/A(7001)	100.0%	1.26	0.02	55	100.0%	1.27	0.02	55	0.0%	0.2%	0.1%
	CAPLK10(7003)	100.0%	88.60	1.53	55	100.0%	88.50	2.27	55	0.0%	-0.1%	48.6%
	CAPLK15(7006)	100.0%	401.17	206.25	55	100.0%	461.17	246.69	55	0.0%	15.0%	19.6%

## VIA/CONTACT CHAINS

Overall, via/contact chains showed slight to no movement in resistance (excluding stack contacts). Tables 20 – 27 summarize the results of the various via/contact chains before and after all the stress.

Table 20 summarizes the results of the Met0-to-NiCr, Met0-to-Gate, and Met0-Ohmic contact chains.

**Table 20** Summary of Met0-to-NiCr/Gate/Ohmic VCs for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	24.62	0.86	55	100.0%	24.63	0.86	55	0.0%	0.0%	0.7%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	192.95	5.44	55	100.0%	192.99	5.45	55	0.0%	0.0%	0.1%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	951.72	25.62	55	100.0%	937.82	25.18	55	0.0%	-1.5%	-1.7%
A129605A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	22.84	0.58	55	100.0%	22.69	0.58	55	0.0%	-0.7%	-0.6%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	196.55	3.87	55	100.0%	196.02	3.83	55	0.0%	-0.3%	-1.0%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	912.80	38.79	55	100.0%	889.91	41.01	55	0.0%	-2.5%	5.7%
A130102A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	23.95	0.60	55	100.0%	23.78	0.59	55	0.0%	-0.7%	-1.5%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	196.10	5.30	55	98.2%	195.80	5.34	54	-1.8%	-0.2%	0.8%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	888.99	37.08	55	100.0%	866.43	37.66	55	0.0%	-2.5%	1.6%

Lot	Temp Cycle Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	25.58	0.71	55	100.0%	25.57	0.71	55	0.0%	0.0%	0.3%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	195.27	4.92	55	100.0%	195.09	5.01	55	0.0%	-0.1%	1.8%
	M0_OH_VC(4021) [ $m\Omega$ ]	98.2%	984.83	32.57	54	100.0%	965.93	31.60	54	0.0%	-1.9%	-3.0%
A129605A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	23.47	0.56	55	100.0%	23.31	0.55	55	0.0%	-0.7%	-2.5%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	197.84	3.59	55	100.0%	197.45	3.57	55	0.0%	-0.2%	-0.6%
	M0_OH_VC(4021) [ $m\Omega$ ]	98.2%	930.70	35.26	54	100.0%	906.00	38.76	54	0.0%	-2.7%	9.9%
A130102A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	22.98	0.90	55	100.0%	22.83	0.88	55	0.0%	-0.7%	-2.0%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	195.21	4.83	55	100.0%	194.89	4.80	55	0.0%	-0.2%	-0.5%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	870.23	33.44	55	100.0%	847.40	35.26	55	0.0%	-2.6%	5.4%

Lot	Air Bake Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	26.00	0.63	55	100.0%	26.18	0.64	55	0.0%	0.7%	0.9%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	192.30	5.22	55	100.0%	195.51	5.36	55	0.0%	1.7%	2.7%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	972.81	40.28	55	98.2%	858.11	42.32	54	-1.8%	-11.8%	5.1%
A129605A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	22.33	0.79	55	100.0%	22.29	0.79	55	0.0%	-0.2%	0.9%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	195.41	3.89	55	100.0%	197.35	3.79	55	0.0%	1.0%	-2.7%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	970.23	29.77	55	100.0%	816.47	25.22	55	0.0%	-15.8%	-15.3%
A130102A	M0_TF_VC(4003) [ $\Omega$ ]	100.0%	23.43	0.69	55	100.0%	23.43	0.68	55	0.0%	0.0%	-1.1%
	M0_G_VC(4020) [ $m\Omega$ ]	100.0%	195.38	5.24	55	100.0%	197.68	5.28	55	0.0%	1.2%	0.8%
	M0_OH_VC(4021) [ $m\Omega$ ]	100.0%	851.05	36.90	55	100.0%	715.84	41.41	55	0.0%	-15.9%	12.2%

Tables 21.1 – 21.3 summarize the results of global metal interconnect contact chains. The Air Baked wafer from lot A130102A exhibited higher Met2-to-Met3 contact resistances for 3 sites. These sites were located in tiles at the extreme edges of the wafer. Note that the stacked Met1-Met3/Met0-Met3 (see Tables 22) and the “inclusion” (see Tables 24) Met2-Met3 contact chains did not exhibit any post-stress failures for the Air Baked wafer from lot A130102A.

**Table 21.1** Summary of global metal interconnect contact chains for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_M1_VC(4000)	100.0%	114.92	1.91	55	100.0%	115.45	1.84	55	0.0%	0.5%	-3.6%
	M0_M1_VC2x4(4010)	100.0%	79.38	1.42	55	100.0%	79.67	1.33	55	0.0%	0.4%	-6.5%
	M1_M2_VC(4001)	100.0%	53.66	0.43	55	100.0%	54.08	0.45	55	0.0%	0.8%	2.8%
	M2_M3_VC(4002)	100.0%	29.91	0.62	55	100.0%	30.06	0.67	55	0.0%	0.5%	7.7%
	MIM_M1_VC(4004)	100.0%	145.71	3.16	55	100.0%	146.23	3.16	55	0.0%	0.4%	0.0%
	MIM_M1_VC2x4(4014)	100.0%	96.72	2.21	55	100.0%	97.23	2.16	55	0.0%	0.5%	-1.9%
A129605A	M0_M1_VC(4000)	100.0%	122.60	1.86	55	100.0%	123.33	1.75	55	0.0%	0.6%	-5.9%
	M0_M1_VC2x4(4010)	100.0%	84.62	1.25	55	100.0%	84.76	1.21	55	0.0%	0.2%	-3.2%
	M1_M2_VC(4001)	100.0%	56.23	0.52	55	98.2%	56.55	0.63	54	-1.8%	0.6%	20.3%
	M2_M3_VC(4002)	100.0%	30.37	0.56	55	100.0%	30.67	0.67	55	0.0%	1.0%	20.4%
	MIM_M1_VC(4004)	100.0%	145.41	2.56	55	100.0%	146.01	2.72	55	0.0%	0.4%	6.2%
	MIM_M1_VC2x4(4014)	100.0%	96.00	1.38	55	100.0%	96.72	1.46	55	0.0%	0.8%	5.4%
A130102A	M0_M1_VC(4000)	100.0%	117.95	1.65	55	100.0%	117.98	1.57	55	0.0%	0.0%	-4.7%
	M0_M1_VC2x4(4010)	100.0%	80.89	1.24	55	100.0%	80.97	1.21	55	0.0%	0.1%	-2.0%
	M1_M2_VC(4001)	100.0%	54.45	0.41	55	100.0%	54.58	0.42	55	0.0%	0.2%	0.5%
	M2_M3_VC(4002)	100.0%	31.92	0.77	55	100.0%	32.15	0.86	55	0.0%	0.7%	12.3%
	MIM_M1_VC(4004)	100.0%	146.25	3.02	55	100.0%	146.49	3.08	55	0.0%	0.2%	2.0%
	MIM_M1_VC2x4(4014)	100.0%	96.70	1.64	55	100.0%	97.23	1.72	55	0.0%	0.5%	5.0%

**Table 21.2** Summary of global metal interconnect contact chains for Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_M1_VC(4000)	100.0%	115.00	2.07	55	100.0%	114.07	2.13	55	0.0%	-0.8%	2.5%
	M0_M1_VC2x4(4010)	100.0%	79.87	1.53	55	98.2%	79.35	1.56	54	-1.8%	-0.6%	2.1%
	M1_M2_VC(4001)	100.0%	53.65	0.48	55	100.0%	53.59	0.46	55	0.0%	-0.1%	-4.0%
	M2_M3_VC(4002)	100.0%	29.84	0.50	55	100.0%	29.75	0.49	55	0.0%	-0.3%	-1.6%
	MIM_M1_VC(4004)	100.0%	144.12	3.74	55	100.0%	142.98	3.79	55	0.0%	-0.8%	1.3%
	MIM_M1_VC2x4(4014)	98.2%	95.78	2.55	54	100.0%	95.14	2.56	54	0.0%	-0.7%	0.2%
A129605A	M0_M1_VC(4000)	100.0%	120.11	1.89	55	100.0%	119.50	1.92	55	0.0%	-0.5%	1.6%
	M0_M1_VC2x4(4010)	100.0%	83.86	1.27	55	100.0%	83.50	1.29	55	0.0%	-0.4%	1.7%
	M1_M2_VC(4001)	100.0%	56.38	0.48	55	100.0%	56.30	0.48	55	0.0%	-0.1%	0.9%
	M2_M3_VC(4002)	100.0%	30.27	0.60	55	100.0%	30.16	0.58	55	0.0%	-0.4%	-3.8%
	MIM_M1_VC(4004)	100.0%	139.03	3.81	55	100.0%	138.42	3.78	55	0.0%	-0.4%	-0.8%
	MIM_M1_VC2x4(4014)	100.0%	92.27	2.29	55	100.0%	92.13	2.25	55	0.0%	-0.2%	-1.6%
A130102A	M0_M1_VC(4000)	100.0%	117.05	1.82	55	100.0%	116.30	1.87	55	0.0%	-0.6%	2.9%
	M0_M1_VC2x4(4010)	98.2%	80.98	1.20	54	100.0%	80.57	1.21	54	0.0%	-0.5%	1.5%
	M1_M2_VC(4001)	100.0%	54.37	0.50	55	100.0%	54.30	0.49	55	0.0%	-0.1%	-0.3%
	M2_M3_VC(4002)	100.0%	31.91	0.72	55	96.4%	31.79	0.72	53	-3.6%	-0.4%	-0.3%
	MIM_M1_VC(4004)	100.0%	145.21	2.66	55	100.0%	144.30	2.66	55	0.0%	-0.6%	-0.1%
	MIM_M1_VC2x4(4014)	100.0%	96.14	1.41	55	100.0%	95.62	1.40	55	0.0%	-0.5%	-1.1%

**Table 21.3** Summary of global metal interconnect contact chains for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_M1_VC(4000)	100.0%	115.11	2.59	55	100.0%	115.80	2.72	55	0.0%	0.6%	4.9%
	M0_M1_VC2x4(4010)	100.0%	79.87	1.70	55	100.0%	80.38	1.73	55	0.0%	0.6%	1.7%
	M1_M2_VC(4001)	100.0%	53.75	0.63	55	100.0%	55.38	1.22	55	0.0%	3.0%	92.5%
	M2_M3_VC(4002)	100.0%	29.87	0.48	55	100.0%	30.27	1.03	55	0.0%	1.3%	116.1%
	MIM_M1_VC(4004)	100.0%	143.12	4.67	55	100.0%	144.87	4.89	55	0.0%	1.2%	4.7%
	MIM_M1_VC2x4(4014)	100.0%	94.72	2.93	55	100.0%	96.00	3.12	55	0.0%	1.3%	6.7%
A129605A	M0_M1_VC(4000)	100.0%	118.77	2.09	55	98.2%	136.39	19.59	54	-1.8%	14.8%	836.2%
	M0_M1_VC2x4(4010)	100.0%	82.69	1.33	55	100.0%	86.20	1.28	55	0.0%	4.2%	-3.7%
	M1_M2_VC(4001)	100.0%	56.09	0.47	55	100.0%	57.82	0.65	55	0.0%	3.1%	37.9%
	M2_M3_VC(4002)	100.0%	30.25	0.58	55	100.0%	31.54	1.44	55	0.0%	4.3%	147.9%
	MIM_M1_VC(4004)	100.0%	140.69	2.90	55	100.0%	160.88	10.96	55	0.0%	14.4%	278.5%
	MIM_M1_VC2x4(4014)	100.0%	93.71	1.72	55	98.2%	104.94	3.23	54	-1.8%	12.0%	87.6%
A130102A	M0_M1_VC(4000)	100.0%	117.34	1.75	55	100.0%	120.33	4.81	55	0.0%	2.5%	175.6%
	M0_M1_VC2x4(4010)	100.0%	80.40	1.31	55	100.0%	80.91	1.56	55	0.0%	0.6%	19.8%
	M1_M2_VC(4001)	98.2%	54.01	0.44	54	100.0%	55.10	0.93	54	0.0%	2.0%	108.4%
	M2_M3_VC(4002)	100.0%	31.55	0.79	55	94.5%	32.62	1.54	52	-5.5%	3.4%	93.4%
	MIM_M1_VC(4004)	100.0%	145.81	2.93	55	100.0%	147.94	3.50	55	0.0%	1.5%	19.3%
	MIM_M1_VC2x4(4014)	100.0%	96.57	1.59	55	100.0%	98.36	2.08	55	0.0%	1.9%	30.8%

Tables 22.1 – 22.3 summarize the results of stacked global metal interconnect contact chains. **Note that stacked minimum Via1/Via2 and stacked Via2/Via3 are NOT allowed under the B39 layout design rules due to known reliability issues.** These structures were included in this report for completeness.

**Table 22.1** Summary of stacked global metal interconnect contact chains for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_M2_VC(4005)	100.0%	161.03	2.52	55	87.3%	165.18	12.39	48	-12.7%	2.6%	391.1%
	M1_M3_VC(4006)	100.0%	32.86	0.69	55	100.0%	33.70	0.79	55	0.0%	2.5%	14.3%
	M0_M3_VC(4007)	100.0%	318.68	6.61	55	100.0%	324.97	32.84	55	0.0%	2.0%	396.6%
	M0_M2_VC2x4(4015)	100.0%	89.27	1.41	55	98.2%	91.12	6.88	54	-1.8%	2.1%	386.3%
	M0_M3_VC2x4(4017)	100.0%	161.69	3.42	55	100.0%	165.09	16.71	55	0.0%	2.1%	389.3%
A129605A	M0_M2_VC(4005)	100.0%	173.85	3.59	55	100.0%	178.99	18.84	55	0.0%	3.0%	424.7%
	M1_M3_VC(4006)	100.0%	31.95	0.62	55	98.2%	32.99	0.73	54	-1.8%	3.2%	17.1%
	M0_M3_VC(4007)	98.2%	347.87	9.31	54	96.3%	355.59	28.37	52	-3.7%	2.2%	204.8%
	M0_M2_VC2x4(4015)	100.0%	95.70	1.62	55	96.4%	103.61	18.42	53	-3.6%	8.3%	1035%
	M0_M3_VC2x4(4017)	100.0%	174.76	3.90	55	98.2%	182.38	24.51	54	-1.8%	4.4%	528.7%
A130102A	M0_M2_VC(4005)	100.0%	167.60	2.97	55	100.0%	167.74	2.83	55	0.0%	0.1%	-4.7%
	M1_M3_VC(4006)	100.0%	31.70	0.67	55	98.2%	32.69	1.11	54	-1.8%	3.1%	66.2%
	M0_M3_VC(4007)	100.0%	331.54	8.23	55	100.0%	334.60	15.86	55	0.0%	0.9%	92.6%
	M0_M2_VC2x4(4015)	100.0%	92.57	1.37	55	100.0%	93.03	1.65	55	0.0%	0.5%	20.9%
	M0_M3_VC2x4(4017)	100.0%	166.90	3.55	55	100.0%	168.06	3.45	55	0.0%	0.7%	-2.8%

**Table 22.2** Summary of stacked global metal interconnect contact chains Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_M2_VC(4005)	100.0%	161.64	2.83	55	100.0%	161.19	3.28	55	0.0%	-0.3%	15.7%
	M1_M3_VC(4006)	100.0%	32.46	0.50	55	100.0%	32.38	0.49	55	0.0%	-0.2%	-2.3%
	M0_M3_VC(4007)	100.0%	320.18	7.71	55	100.0%	322.93	7.82	55	0.0%	0.9%	1.4%
	M0_M2_VC2x4(4015)	100.0%	89.96	1.45	55	100.0%	89.46	1.44	55	0.0%	-0.6%	-1.0%
	M0_M3_VC2x4(4017)	100.0%	162.48	3.67	55	100.0%	161.82	3.71	55	0.0%	-0.4%	1.0%
A129605A	M0_M2_VC(4005)	98.2%	170.86	3.70	54	100.0%	170.16	3.75	54	0.0%	-0.4%	1.1%
	M1_M3_VC(4006)	100.0%	32.24	0.63	55	100.0%	32.27	1.27	55	0.0%	0.1%	101.5%
	M0_M3_VC(4007)	100.0%	344.85	9.49	55	100.0%	344.35	10.25	55	0.0%	-0.1%	8.0%
	M0_M2_VC2x4(4015)	100.0%	94.40	1.73	55	100.0%	93.97	1.74	55	0.0%	-0.5%	0.5%
	M0_M3_VC2x4(4017)	100.0%	173.46	4.07	55	100.0%	172.80	4.07	55	0.0%	-0.4%	-0.2%
A130102A	M0_M2_VC(4005)	100.0%	166.85	3.54	55	100.0%	166.09	3.53	55	0.0%	-0.5%	-0.4%
	M1_M3_VC(4006)	100.0%	31.53	0.65	55	100.0%	31.45	0.64	55	0.0%	-0.3%	-1.5%
	M0_M3_VC(4007)	100.0%	330.31	9.07	55	98.2%	329.14	9.10	54	-1.8%	-0.4%	0.4%
	M0_M2_VC2x4(4015)	100.0%	92.54	1.53	55	100.0%	92.07	1.54	55	0.0%	-0.5%	0.4%
	M0_M3_VC2x4(4017)	100.0%	167.05	3.81	55	100.0%	166.42	3.82	55	0.0%	-0.4%	0.1%

**Table 22.3** Summary of stacked global metal interconnect contact chains for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M0_M2_VC(4005)	100.0%	161.62	3.67	55	100.0%	165.39	9.41	55	0.0%	2.3%	156.3%
	M1_M3_VC(4006)	100.0%	32.73	0.49	55	98.2%	34.72	3.61	54	-1.8%	6.1%	632.4%
	M0_M3_VC(4007)	100.0%	318.49	9.32	55	100.0%	329.03	36.18	55	0.0%	3.3%	288.3%
	M0_M2_VC2x4(4015)	100.0%	89.96	1.95	55	89.1%	92.45	4.28	<b>49</b>	<b>-10.9%</b>	2.8%	119.3%
	M0_M3_VC2x4(4017)	100.0%	162.36	4.06	55	100.0%	166.05	4.54	55	0.0%	2.3%	12.0%
A129605A	M0_M2_VC(4005)	100.0%	168.85	3.82	55	98.2%	181.74	9.88	54	-1.8%	7.6%	158.4%
	M1_M3_VC(4006)	100.0%	32.15	0.58	55	98.2%	34.83	2.68	54	-1.8%	8.3%	365.4%
	M0_M3_VC(4007)	100.0%	340.62	9.82	55	100.0%	380.86	51.62	55	0.0%	11.8%	425.8%
	M0_M2_VC2x4(4015)	100.0%	93.16	1.68	55	100.0%	101.28	12.53	55	0.0%	8.7%	645.3%
	M0_M3_VC2x4(4017)	100.0%	171.25	4.09	55	80.0%	196.11	37.90	<b>44</b>	<b>-20.0%</b>	14.5%	827.0%
A130102A	M0_M2_VC(4005)	100.0%	166.60	3.26	55	100.0%	170.11	4.41	55	0.0%	2.1%	35.3%
	M1_M3_VC(4006)	100.0%	31.32	0.70	55	100.0%	33.33	2.87	55	0.0%	6.4%	311.9%
	M0_M3_VC(4007)	100.0%	328.96	8.83	55	100.0%	344.09	28.17	55	0.0%	4.6%	218.9%
	M0_M2_VC2x4(4015)	100.0%	91.92	1.42	55	100.0%	94.07	2.30	55	0.0%	2.3%	61.9%
	M0_M3_VC2x4(4017)	100.0%	166.03	3.68	55	100.0%	171.78	6.40	55	0.0%	3.5%	73.9%

Tables 23.1 – 23.3 summarize the results of the Radial Met1-Met2 “Inclusion” contact chains. These structures test the robustness and limits of the current B39 layout design rules. The rules limit the placement of the Via2 to be not more the 100 um from any given metal edge (inclusion rule) due to the increased thickness of the ILD dielectric over large metal features. The test structures include minimum-sized 3x3 um Via2 contact chains with inclusions of 75, 100, 125, and 150 um. Based on the pre-stress and post-stress data, the B39 layout design rules are sufficient as the B39 process is capable of reliably producing Via2 which exceed the inclusion limit.

**Table 23** Summary of Met1-Met2 “Inclusion” contact chains  
for Autoclaved/Temp Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M2_VC75(4104)	100.0%	74.70	1.66	55	100.0%	76.79	2.28	55	0.0%	2.8%	37.9%
	M1_M2_VC100(4105)	100.0%	114.50	2.84	55	100.0%	116.39	3.08	55	0.0%	1.7%	8.6%
	M1_M2_VC125(4106)	100.0%	153.62	3.95	55	100.0%	155.21	3.99	55	0.0%	1.0%	1.0%
	M1_M2_VC150(4107)	100.0%	196.07	4.52	55	100.0%	198.61	5.16	55	0.0%	1.3%	14.2%
A129605A	M1_M2_VC75(4104)	100.0%	75.22	1.62	55	100.0%	78.03	2.46	55	0.0%	3.7%	51.8%
	M1_M2_VC100(4105)	100.0%	113.51	2.58	55	100.0%	115.32	3.01	55	0.0%	1.6%	16.6%
	M1_M2_VC125(4106)	100.0%	152.36	3.32	55	100.0%	153.63	3.80	55	0.0%	0.8%	14.2%
	M1_M2_VC150(4107)	100.0%	197.47	4.50	55	100.0%	200.17	4.85	55	0.0%	1.4%	7.8%
A130102A	M1_M2_VC75(4104)	100.0%	77.46	1.97	55	100.0%	78.39	2.16	55	0.0%	1.2%	9.8%
	M1_M2_VC100(4105)	100.0%	116.03	3.13	55	100.0%	116.81	3.26	55	0.0%	0.7%	4.1%
	M1_M2_VC125(4106)	100.0%	156.10	3.94	55	100.0%	157.03	4.34	55	0.0%	0.6%	10.4%
	M1_M2_VC150(4107)	100.0%	205.95	5.18	55	100.0%	208.02	5.57	55	0.0%	1.0%	7.7%

Lot	Temp Cycle	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M2_VC75(4104)	100.0%	74.27	1.74	55	100.0%	74.14	1.61	55	0.0%	-0.2%	-7.7%
	M1_M2_VC100(4105)	100.0%	113.71	2.78	55	100.0%	113.28	2.79	55	0.0%	-0.4%	0.6%
	M1_M2_VC125(4106)	100.0%	152.77	3.84	55	100.0%	152.07	3.65	55	0.0%	-0.5%	-5.0%
	M1_M2_VC150(4107)	100.0%	195.45	4.80	55	98.2%	194.39	4.84	54	-1.8%	-0.5%	1.0%
A129605A	M1_M2_VC75(4104)	100.0%	75.46	1.87	55	100.0%	75.30	1.90	55	0.0%	-0.2%	1.7%
	M1_M2_VC100(4105)	100.0%	114.33	3.12	55	100.0%	114.36	3.15	55	0.0%	0.0%	0.9%
	M1_M2_VC125(4106)	100.0%	153.43	4.00	55	100.0%	153.30	4.40	55	0.0%	-0.1%	10.1%
	M1_M2_VC150(4107)	100.0%	198.01	5.36	55	100.0%	198.30	5.28	55	0.0%	0.1%	-1.5%
A130102A	M1_M2_VC75(4104)	100.0%	77.81	1.85	55	100.0%	77.51	1.86	55	0.0%	-0.4%	0.0%
	M1_M2_VC100(4105)	100.0%	116.11	3.08	55	100.0%	116.26	3.04	55	0.0%	0.1%	-1.4%
	M1_M2_VC125(4106)	100.0%	156.18	4.00	55	100.0%	156.47	4.15	55	0.0%	0.2%	3.8%
	M1_M2_VC150(4107)	100.0%	206.91	5.09	55	100.0%	207.61	4.48	55	0.0%	0.3%	-11.9%

Lot	Air Bake	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M2_VC75(4104)	100.0%	75.13	1.85	55	100.0%	77.57	2.08	55	0.0%	3.2%	12.5%
	M1_M2_VC100(4105)	98.2%	114.78	2.44	54	100.0%	117.24	2.77	54	0.0%	2.1%	13.6%
	M1_M2_VC125(4106)	100.0%	154.02	3.68	55	100.0%	156.24	3.81	55	0.0%	1.4%	3.6%
	M1_M2_VC150(4107)	100.0%	196.19	4.79	55	100.0%	199.35	4.71	55	0.0%	1.6%	-1.7%
A129605A	M1_M2_VC75(4104)	100.0%	75.51	1.99	55	98.2%	77.70	2.48	54	-1.8%	2.9%	24.5%
	M1_M2_VC100(4105)	100.0%	114.27	3.25	55	100.0%	116.38	3.42	55	0.0%	1.8%	5.4%
	M1_M2_VC125(4106)	100.0%	153.54	4.13	55	100.0%	155.22	4.33	55	0.0%	1.1%	4.9%
	M1_M2_VC150(4107)	100.0%	197.97	5.50	55	100.0%	200.59	6.27	55	0.0%	1.3%	13.9%
A130102A	M1_M2_VC75(4104)	100.0%	76.27	2.02	55	100.0%	78.13	2.11	55	0.0%	2.4%	4.5%
	M1_M2_VC100(4105)	100.0%	114.24	3.15	55	100.0%	116.28	3.24	55	0.0%	1.8%	2.8%
	M1_M2_VC125(4106)	100.0%	153.84	4.20	55	100.0%	155.26	4.60	55	0.0%	0.9%	9.5%
	M1_M2_VC150(4107)	100.0%	202.75	5.49	55	100.0%	204.49	5.31	55	0.0%	0.9%	-3.2%

Tables 24.1 – 24.3 summarize the results of the Radial Met2-Met3 “Inclusion” contact chains. These structures test the robustness and limits of the current B39 layout design rules. The rules limit the placement of the Via3 to be not more the 100 um from any given metal edge (inclusion rule) due to the increased thickness of the ILD dielectric over large metal features. The test structures include minimum-sized 3x3 um Via3 contact chains with inclusions of 50, 75, 100, 125, and 150 um. Based on the pre-stress and post-stress data, the B39 layout design rules are sufficient as the B39 process is capable of reliably producing Via3 at the 100 um inclusion limit. Via3 contacts that exceed the 100 um inclusion limit are marginal.

**Table 24.1** Summary of Met2-Met3 “Inclusion” chains for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M2_M3_VC50(4203)	100.0%	43.06	1.07	55	100.0%	44.81	1.58	55	0.0%	4.1%	47.5%
	M2_M3_VC75(4204)	100.0%	66.29	1.52	55	98.2%	67.99	3.31	54	-1.8%	2.6%	118.3%
	M2_M3_VC100(4205)	100.0%	90.00	17.48	55	98.2%	90.31	9.17	54	-1.8%	0.3%	-47.6%
	M2_M3_VC125(4206)	<b>85.5%</b>	154.23	25.18	<b>47</b>	<b>72.3%</b>	153.00	27.32	<b>34</b>	<b>-27.7%</b>	-0.8%	8.5%
	M2_M3_VC150(4207)	<b>70.9%</b>	139.48	29.45	<b>39</b>	<b>97.4%</b>	150.55	33.17	<b>38</b>	<b>-2.6%</b>	7.9%	12.6%
A129605A	M2_M3_VC50(4203)	100.0%	43.08	0.94	55	100.0%	48.30	2.25	55	0.0%	12.1%	140.4%
	M2_M3_VC75(4204)	100.0%	65.88	1.45	55	89.1%	70.38	2.56	49	-10.9%	6.8%	76.5%
	M2_M3_VC100(4205)	100.0%	83.67	1.84	55	100.0%	88.00	2.63	55	0.0%	5.2%	42.6%
	M2_M3_VC125(4206)	100.0%	138.15	2.95	55	100.0%	141.95	2.79	55	0.0%	2.8%	-5.4%
	M2_M3_VC150(4207)	100.0%	113.61	2.47	55	100.0%	118.10	2.82	55	0.0%	3.9%	14.0%
A130102A	M2_M3_VC50(4203)	100.0%	44.36	1.17	55	100.0%	49.44	3.25	55	0.0%	11.5%	176.8%
	M2_M3_VC75(4204)	98.2%	68.31	1.96	54	100.0%	74.03	4.82	54	0.0%	8.4%	146.4%
	M2_M3_VC100(4205)	98.2%	86.58	2.56	54	98.1%	92.66	4.75	53	-1.9%	7.0%	85.6%
	M2_M3_VC125(4206)	100.0%	143.83	4.37	55	100.0%	150.05	6.76	55	0.0%	4.3%	54.7%
	M2_M3_VC150(4207)	100.0%	116.77	2.65	55	98.2%	123.80	5.10	54	-1.8%	6.0%	92.4%

**Table 24.2** Summary of Met2-Met3 “Inclusion” chains for Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M2_M3_VC50(4203)	100.0%	42.21	0.74	55	100.0%	81.50	0.77	55	0.0%	93.1%	3.5%
	M2_M3_VC75(4204)	100.0%	65.04	1.20	55	100.0%	64.54	1.22	55	0.0%	-0.8%	2.3%
	M2_M3_VC100(4205)	100.0%	84.21	2.90	55	100.0%	83.68	2.67	55	0.0%	-0.6%	-7.8%
	M2_M3_VC125(4206)	98.2%	144.77	14.73	54	100.0%	154.02	29.25	54	0.0%	6.4%	98.5%
	M2_M3_VC150(4207)	<b>89.1%</b>	133.22	33.47	<b>49</b>	100.0%	130.95	30.39	49	0.0%	-1.7%	-9.2%
A129605A	M2_M3_VC50(4203)	100.0%	42.98	0.96	55	100.0%	43.06	0.94	55	0.0%	0.2%	-1.6%
	M2_M3_VC75(4204)	100.0%	65.41	1.62	55	98.2%	65.17	1.59	54	-1.8%	-0.4%	-2.0%
	M2_M3_VC100(4205)	98.2%	83.22	1.80	54	100.0%	82.94	2.07	54	0.0%	-0.3%	15.1%
	M2_M3_VC125(4206)	98.2%	137.31	3.56	54	100.0%	137.13	3.38	54	0.0%	-0.1%	-5.0%
	M2_M3_VC150(4207)	100.0%	113.61	2.62	55	98.2%	113.39	2.53	54	-1.8%	-0.2%	-3.7%
A130102A	M2_M3_VC50(4203)	98.2%	44.58	1.16	54	100.0%	44.87	1.25	54	0.0%	0.6%	7.5%
	M2_M3_VC75(4204)	98.2%	68.49	1.88	54	100.0%	68.43	1.98	54	0.0%	-0.1%	5.8%
	M2_M3_VC100(4205)	98.2%	87.14	2.54	54	100.0%	86.95	2.61	54	0.0%	-0.2%	2.5%
	M2_M3_VC125(4206)	100.0%	144.37	4.14	55	100.0%	144.19	4.27	55	0.0%	-0.1%	3.1%
	M2_M3_VC150(4207)	100.0%	117.56	2.94	55	100.0%	117.31	3.08	55	0.0%	-0.2%	4.6%

**Table 24.3** Summary of Met2-Met3 “Inclusion” chains for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mW]	Std. Dev [mW]	Good Sites	Yield	Average [mW]	Std. Dev [mW]	Good Sites	Yield	Avg	Std. Dev
A127602A	M2_M3_VC50(4203)	100.0%	42.85	0.83	55	100.0%	45.95	1.33	55	0.0%	7.2%	60.5%
	M2_M3_VC75(4204)	100.0%	65.43	1.35	55	100.0%	67.94	1.35	55	0.0%	3.8%	-0.4%
	M2_M3_VC100(4205)	100.0%	83.37	1.79	55	100.0%	86.20	1.79	55	0.0%	3.4%	0.1%
	M2_M3_VC125(4206)	100.0%	137.68	3.15	55	100.0%	140.60	3.73	55	0.0%	2.1%	18.3%
	M2_M3_VC150(4207)	100.0%	116.77	8.63	55	100.0%	120.19	8.74	55	0.0%	2.9%	1.3%
A129605A	M2_M3_VC50(4203)	100.0%	43.01	1.02	55	100.0%	46.27	1.30	55	0.0%	7.6%	27.7%
	M2_M3_VC75(4204)	100.0%	65.79	1.70	55	100.0%	68.97	2.13	55	0.0%	4.8%	25.5%
	M2_M3_VC100(4205)	100.0%	83.61	2.02	55	100.0%	86.65	2.38	55	0.0%	3.6%	17.9%
	M2_M3_VC125(4206)	100.0%	138.24	3.25	55	98.2%	141.30	4.35	54	-1.8%	2.2%	34.1%
	M2_M3_VC150(4207)	100.0%	113.78	2.27	55	100.0%	115.73	2.30	55	0.0%	1.7%	1.1%
A130102A	M2_M3_VC50(4203)	100.0%	44.08	1.20	55	100.0%	46.74	1.06	55	0.0%	6.0%	-11.0%
	M2_M3_VC75(4204)	100.0%	67.56	1.90	55	100.0%	69.84	1.72	55	0.0%	3.4%	-9.1%
	M2_M3_VC100(4205)	100.0%	85.77	2.39	55	100.0%	88.17	2.30	55	0.0%	2.8%	-3.9%
	M2_M3_VC125(4206)	100.0%	142.43	3.97	55	100.0%	144.12	3.92	55	0.0%	1.2%	-1.2%
	M2_M3_VC150(4207)	100.0%	116.65	2.64	55	100.0%	118.39	2.72	55	0.0%	1.5%	3.2%

METAL COMBS

Overall, metal leakage combs showed no significant changes (within measurement tolerances) in leakage over all stresses.

Tables 25.1 – 25.3 summarize the intra-metal leakage between layers of single metal (i.e. Met1-to-Met1) and between layers of stacked metal (i.e. Met1+2-to-Met1+2). Two variants of the stacked Met2+Met3 combs were tested: 5 um wide lines with min. width Via3 and 20 um wide lines with large width Via3 (18 um).

**Table 25.1** Summary of Intra-Metal Leakage Combs for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [fA/um]	Std. Dev [fA/um]	Good Sites	Yield	Average [fA/um]	Std. Dev [fA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M1_LK(6000)	98.2%	6.63	0.37	54	100.0%	3.63	0.39	54	0.0%	-45.2%	6.5%
	M2_M2_LK(6001)	100.0%	80.24	10.99	55	100.0%	85.06	11.17	55	0.0%	6.0%	1.7%
	M3_M3_LK(6002)	100.0%	11.93	0.68	55	100.0%	8.26	1.31	55	0.0%	-30.8%	93.6%
	M01_M01_LK(6020)	98.2%	5.00	0.82	54	100.0%	4.43	0.87	54	0.0%	-11.3%	5.7%
	M12_M12_LK(6021)	100.0%	21.91	1.40	55	100.0%	20.04	2.26	55	0.0%	-8.5%	61.3%
	M23_M23_LK5(6022)	100.0%	26.28	2.97	55	100.0%	19.27	2.24	55	0.0%	-26.7%	-24.6%
	M23_M23_LK20(6023)	100.0%	26.74	4.35	55	100.0%	16.86	2.84	55	0.0%	-36.9%	-34.8%
A129605A	M1_M1_LK(6000)	100.0%	13.34	0.46	55	100.0%	13.12	1.25	55	0.0%	-1.6%	169.7%
	M2_M2_LK(6001)	100.0%	115.46	7.89	55	100.0%	109.85	8.48	55	0.0%	-4.9%	7.4%
	M3_M3_LK(6002)	100.0%	28.03	0.69	55	100.0%	24.32	2.30	55	0.0%	-13.3%	235.2%
	M01_M01_LK(6020)	100.0%	25.99	0.35	55	100.0%	25.72	1.20	55	0.0%	-1.1%	237.8%
	M12_M12_LK(6021)	100.0%	37.83	1.75	55	100.0%	37.97	6.22	55	0.0%	0.4%	255.1%
	M23_M23_LK5(6022)	98.2%	77.36	2.49	54	100.0%	75.98	18.05	54	0.0%	-1.8%	625.9%
	M23_M23_LK20(6023)	98.2%	58.65	2.14	54	100.0%	52.90	5.13	54	0.0%	-9.8%	140.1%
A130102A	M1_M1_LK(6000)	100.0%	13.21	0.43	55	100.0%	12.94	1.36	55	0.0%	-2.0%	217.5%
	M2_M2_LK(6001)	100.0%	113.17	8.59	55	100.0%	112.01	9.33	55	0.0%	-1.0%	8.6%
	M3_M3_LK(6002)	100.0%	28.56	0.90	55	100.0%	24.06	2.40	55	0.0%	-15.7%	165.7%
	M01_M01_LK(6020)	100.0%	26.00	0.54	55	100.0%	25.57	0.94	55	0.0%	-1.7%	73.2%
	M12_M12_LK(6021)	100.0%	37.80	1.44	55	100.0%	37.41	6.73	55	0.0%	-1.0%	366.3%
	M23_M23_LK5(6022)	100.0%	77.51	1.92	55	100.0%	71.11	5.36	55	0.0%	-8.3%	179.2%
	M23_M23_LK20(6023)	100.0%	58.11	1.94	55	100.0%	49.92	4.01	55	0.0%	-14.1%	106.7%

**Table 25.2** Summary of Intra-Metal Leakage Combs for Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [fA/um]	Std. Dev [fA/um]	Good Sites	Yield	Average [fA/um]	Std. Dev [fA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M1_LK(6000)	100.0%	6.80	0.32	55	100.0%	4.75	0.39	55	0.0%	-30.1%	21.6%
	M2_M2_LK(6001)	100.0%	85.25	12.53	55	100.0%	88.16	14.32	55	0.0%	3.4%	14.3%
	M3_M3_LK(6002)	100.0%	11.87	0.56	55	100.0%	6.83	0.68	55	0.0%	-42.5%	20.3%
	M01_M01_LK(6020)	98.2%	4.85	0.45	54	100.0%	4.27	0.58	54	0.0%	-12.0%	28.3%
	M12_M12_LK(6021)	100.0%	25.73	21.29	55	98.2%	31.67	22.73	54	-1.8%	23.1%	6.8%
	M23_M23_LK5(6022)	100.0%	27.87	2.65	55	100.0%	21.04	2.20	55	0.0%	-24.5%	-16.9%
	M23_M23_LK20(6023)	98.2%	24.47	2.72	54	98.1%	18.05	21.39	53	-1.9%	-26.2%	686.6%
A129605A	M1_M1_LK(6000)	100.0%	13.27	0.44	55	100.0%	13.04	0.40	55	0.0%	-1.7%	-9.1%
	M2_M2_LK(6001)	100.0%	114.14	10.32	55	100.0%	111.00	9.21	55	0.0%	-2.7%	-10.7%
	M3_M3_LK(6002)	100.0%	28.42	0.87	55	100.0%	25.95	0.81	55	0.0%	-8.7%	-6.7%
	M01_M01_LK(6020)	98.2%	25.95	0.35	54	100.0%	26.06	0.62	54	0.0%	0.4%	73.9%
	M12_M12_LK(6021)	100.0%	37.58	1.66	55	100.0%	37.87	1.83	55	0.0%	0.8%	10.3%
	M23_M23_LK5(6022)	100.0%	79.55	5.38	55	100.0%	71.18	3.29	55	0.0%	-10.5%	-38.8%
	M23_M23_LK20(6023)	100.0%	59.54	2.03	55	100.0%	51.47	1.31	55	0.0%	-13.6%	-35.6%
A130102A	M1_M1_LK(6000)	100.0%	13.33	0.38	55	100.0%	13.18	0.40	55	0.0%	-1.1%	4.1%
	M2_M2_LK(6001)	100.0%	112.29	8.28	55	100.0%	109.90	10.23	55	0.0%	-2.1%	23.6%
	M3_M3_LK(6002)	100.0%	28.10	0.69	55	100.0%	25.59	0.82	55	0.0%	-9.0%	18.7%
	M01_M01_LK(6020)	100.0%	26.00	0.49	55	100.0%	25.94	0.53	55	0.0%	-0.2%	6.8%
	M12_M12_LK(6021)	100.0%	37.71	1.55	55	100.0%	37.69	1.42	55	0.0%	0.0%	-8.6%
	M23_M23_LK5(6022)	100.0%	78.09	2.10	55	100.0%	71.46	1.76	55	0.0%	-8.5%	-16.2%
	M23_M23_LK20(6023)	100.0%	57.74	1.69	55	100.0%	51.52	1.43	55	0.0%	-10.8%	-15.4%

**Table 25.3** Summary of Intra-Metal Leakage Combs for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [fA/um]	Std. Dev [fA/um]	Good Sites	Yield	Average [fA/um]	Std. Dev [fA/um]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M1_LK(6000)	100.0%	6.94	0.32	55	100.0%	5.85	0.41	55	0.0%	-15.8%	26.7%
	M2_M2_LK(6001)	100.0%	85.59	11.19	55	100.0%	84.63	9.30	55	0.0%	-1.1%	-16.9%
	M3_M3_LK(6002)	100.0%	11.99	0.91	55	100.0%	8.49	0.59	55	0.0%	-29.2%	-35.1%
	M01_M01_LK(6020)	100.0%	5.09	0.54	55	100.0%	6.48	0.54	55	0.0%	27.4%	-1.3%
	M12_M12_LK(6021)	100.0%	22.10	1.63	55	100.0%	42.00	1.75	55	0.0%	90.1%	7.7%
	M23_M23_LK5(6022)	100.0%	30.06	4.00	55	100.0%	20.65	1.78	55	0.0%	-31.3%	-55.7%
	M23_M23_LK20(6023)	100.0%	29.04	5.01	55	100.0%	19.68	1.47	55	0.0%	-32.2%	-70.6%
A129605A	M1_M1_LK(6000)	100.0%	13.41	0.30	55	100.0%	13.08	1.32	55	0.0%	-2.5%	340.6%
	M2_M2_LK(6001)	100.0%	112.44	8.86	55	100.0%	110.59	8.14	55	0.0%	-1.6%	-8.1%
	M3_M3_LK(6002)	100.0%	28.34	0.80	55	100.0%	24.75	1.81	55	0.0%	-12.7%	126.2%
	M01_M01_LK(6020)	100.0%	26.08	0.50	55	100.0%	25.73	1.12	55	0.0%	-1.4%	125.0%
	M12_M12_LK(6021)	98.2%	45.38	39.89	54	100.0%	39.33	17.60	54	0.0%	-13.3%	-55.9%
	M23_M23_LK5(6022)	100.0%	78.01	2.53	55	100.0%	71.51	5.21	55	0.0%	-8.3%	105.7%
	M23_M23_LK20(6023)	100.0%	59.82	1.86	55	100.0%	50.99	4.11	55	0.0%	-14.8%	120.6%
A130102A	M1_M1_LK(6000)	100.0%	13.29	0.43	55	100.0%	13.11	0.41	55	0.0%	-1.3%	-3.6%
	M2_M2_LK(6001)	100.0%	112.71	8.98	55	100.0%	110.54	9.00	55	0.0%	-1.9%	0.2%
	M3_M3_LK(6002)	100.0%	27.98	0.61	55	100.0%	25.66	0.77	55	0.0%	-8.3%	25.0%
	M01_M01_LK(6020)	100.0%	26.36	2.62	55	100.0%	26.08	0.46	55	0.0%	-1.0%	-82.3%
	M12_M12_LK(6021)	100.0%	37.54	1.90	55	100.0%	37.86	1.80	55	0.0%	0.9%	-5.3%
	M23_M23_LK5(6022)	100.0%	76.78	2.05	55	100.0%	71.14	1.67	55	0.0%	-7.3%	-18.4%
	M23_M23_LK20(6023)	100.0%	58.56	11.00	55	100.0%	51.55	1.54	55	0.0%	-12.0%	-86.0%

Table 26 summarizes the inter-metal leakage between adjacent metal layers (i.e. Met1-to-Met2). No significant changes (within measurement tolerances) were noted between pre- and post-stress data.

**Table 26** Summary of Inter-Metal Leakage Combs for Autoclaved/Temp. Cycled/Air Baked wafers

Lot	Autoclave Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [pA]	Std. Dev [pA]	Good Sites	Yield	Average [pA]	Std. Dev [pA]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M2_LK(6003)	98.2%	23.21	1.33	54	100.0%	12.47	1.85	54	0.0%	-46.3%	39.1%
	M2_M3_LK(6004)	100.0%	20.73	1.21	55	100.0%	14.94	2.60	55	0.0%	-28.0%	114.9%
A129605A	M1_M2_LK(6003)	100.0%	52.64	1.53	55	100.0%	51.02	5.61	55	0.0%	-3.1%	265.5%
	M2_M3_LK(6004)	100.0%	59.40	1.52	55	100.0%	51.51	4.82	55	0.0%	-13.3%	216.8%
A130102A	M1_M2_LK(6003)	100.0%	53.44	1.78	55	100.0%	51.05	5.76	55	0.0%	-4.5%	223.2%
	M2_M3_LK(6004)	100.0%	60.55	1.77	55	100.0%	50.69	4.52	55	0.0%	-16.3%	156.0%

Lot	Temp Cycle Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [pA]	Std. Dev [pA]	Good Sites	Yield	Average [pA]	Std. Dev [pA]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M2_LK(6003)	100.0%	23.29	1.33	55	100.0%	16.36	1.51	55	0.0%	-29.8%	13.5%
	M2_M3_LK(6004)	100.0%	20.78	1.26	55	100.0%	11.92	1.68	55	0.0%	-42.6%	32.6%
A129605A	M1_M2_LK(6003)	100.0%	53.37	1.62	55	100.0%	52.23	1.93	55	0.0%	-2.1%	19.1%
	M2_M3_LK(6004)	100.0%	60.22	1.44	55	100.0%	54.84	1.71	55	0.0%	-8.9%	18.7%
A130102A	M1_M2_LK(6003)	100.0%	52.64	1.79	55	100.0%	51.89	1.73	55	0.0%	-1.4%	-3.7%
	M2_M3_LK(6004)	100.0%	60.08	1.70	55	100.0%	54.11	1.71	55	0.0%	-9.9%	0.8%

Lot	Air Baked Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [pA]	Std. Dev [pA]	Good Sites	Yield	Average [pA]	Std. Dev [pA]	Good Sites	Yield	Avg	Std. Dev
A127602A	M1_M2_LK(6003)	100.0%	24.29	1.28	55	100.0%	21.46	1.49	55	0.0%	-11.6%	16.0%
	M2_M3_LK(6004)	100.0%	21.12	1.34	55	100.0%	14.94	1.27	55	0.0%	-29.2%	-5.2%
A129605A	M1_M2_LK(6003)	100.0%	52.49	1.92	55	100.0%	51.06	5.14	55	0.0%	-2.7%	167.7%
	M2_M3_LK(6004)	100.0%	59.37	2.04	55	100.0%	51.95	4.27	55	0.0%	-12.5%	109.5%
A130102A	M1_M2_LK(6003)	100.0%	52.72	1.56	55	100.0%	51.75	1.63	55	0.0%	-1.8%	4.1%
	M2_M3_LK(6004)	100.0%	59.23	1.83	55	100.0%	53.72	1.62	55	0.0%	-9.3%	-11.3%

## METAL RESISTIVITY

Overall, resistivity of the metal layers showed no significant changes (within measurement tolerances) over all stresses. Note that “PP” denoted line bias with parallel bars structures.

Tables 27.1 – 27.3 summarize the metal resistivity.

**Table 27.1** Summary of metal resistivity for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [mW/sq]	Std. Dev [mW/sq]	Good Sites	Yield	Average [mW/sq]	Std. Dev [mW/sq]	Good Sites	Yield	Avg	Std. Dev
A127602A	MIM_RS_400(4544)	100.0%	205.46	6.83	55	100.0%	205.60	6.88	55	0.0%	0.1%	0.8%
	M0_RS_250(4506)	100.0%	93.24	2.94	55	100.0%	93.17	2.97	55	0.0%	-0.1%	0.9%
	M1_RS_250(4516)	100.0%	12.23	0.34	55	100.0%	12.25	0.34	55	0.0%	0.2%	-0.5%
	M1PP_RS_250(4518)	100.0%	12.79	0.41	55	100.0%	12.92	0.40	55	0.0%	1.0%	-1.0%
	M2_RS_250(4526)	100.0%	11.94	0.36	55	100.0%	11.96	0.29	55	0.0%	0.2%	-19.0%
	M2PP_RS_250(4528)	100.0%	12.01	0.37	55	100.0%	12.03	0.38	55	0.0%	0.2%	3.5%
	M3_RS_400(4533)	100.0%	4.55	0.49	55	100.0%	5.09	0.54	55	0.0%	11.9%	10.4%
	M3PP_RS_400(4538)	100.0%	4.03	0.42	55	100.0%	4.36	0.55	55	0.0%	8.3%	29.7%
A129605A	MIM_RS_400(4544)	100.0%	208.03	7.47	55	100.0%	207.50	7.41	55	0.0%	-0.3%	-0.7%
	M0_RS_250(4506)	100.0%	102.90	3.20	55	100.0%	102.61	3.20	55	0.0%	-0.3%	0.2%
	M1_RS_250(4516)	100.0%	12.36	0.37	55	100.0%	12.19	0.35	55	0.0%	-1.4%	-3.8%
	M1PP_RS_250(4518)	100.0%	13.09	0.38	55	100.0%	12.92	0.34	55	0.0%	-1.3%	-10.2%
	M2_RS_250(4526)	100.0%	12.57	0.24	55	100.0%	12.42	0.25	55	0.0%	-1.2%	1.5%
	M2PP_RS_250(4528)	100.0%	12.70	0.33	55	100.0%	12.53	0.31	55	0.0%	-1.3%	-8.5%
	M3_RS_400(4533)	100.0%	4.91	0.58	55	100.0%	4.35	0.38	55	0.0%	-11.5%	-33.7%
	M3PP_RS_400(4538)	100.0%	4.46	0.48	55	100.0%	3.99	0.35	55	0.0%	-10.4%	-28.1%
A130102A	MIM_RS_400(4544)	100.0%	208.43	7.49	55	100.0%	208.30	7.31	55	0.0%	-0.1%	-2.4%
	M0_RS_250(4506)	100.0%	96.27	2.96	55	100.0%	96.21	3.03	55	0.0%	-0.1%	2.1%
	M1_RS_250(4516)	100.0%	11.73	0.32	55	98.2%	11.60	0.32	54	-1.8%	-1.1%	1.2%
	M1PP_RS_250(4518)	100.0%	12.46	0.31	55	98.2%	12.36	0.29	54	-1.8%	-0.8%	-3.7%
	M2_RS_250(4526)	100.0%	13.50	0.40	55	100.0%	13.27	0.73	55	0.0%	-1.7%	82.0%
	M2PP_RS_250(4528)	100.0%	13.68	0.39	55	100.0%	13.59	0.58	55	0.0%	-0.7%	48.6%
	M3_RS_400(4533)	100.0%	5.28	0.63	55	100.0%	4.85	0.50	55	0.0%	-8.2%	-21.3%
	M3PP_RS_400(4538)	100.0%	4.61	0.50	55	98.2%	4.10	0.32	54	-1.8%	-11.0%	-36.5%

**Table 27.2** Summary of metal resistivity for Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [mW/sq]	Std. Dev [mW/sq]	Good Sites	Yield	Average [mW/sq]	Std. Dev [mW/sq]	Good Sites	Yield	Avg	Std. Dev
A127602A	MIM_RS_400(4544)	100.0%	202.16	8.20	55	100.0%	201.96	8.24	55	0.0%	-0.1%	0.5%
	M0_RS_250(4506)	100.0%	93.78	2.97	55	100.0%	93.77	3.00	55	0.0%	0.0%	0.9%
	M1_RS_250(4516)	100.0%	12.03	0.34	55	100.0%	12.06	0.34	55	0.0%	0.2%	1.3%
	M1PP_RS_250(4518)	100.0%	12.59	0.39	55	100.0%	12.72	0.37	55	0.0%	1.0%	-4.9%
	M2_RS_250(4526)	100.0%	11.93	0.35	55	100.0%	11.95	0.31	55	0.0%	0.1%	-8.8%
	M2PP_RS_250(4528)	100.0%	11.98	0.42	55	100.0%	12.03	0.39	55	0.0%	0.4%	-6.1%
	M3_RS_400(4533)	100.0%	4.45	0.50	55	100.0%	4.85	0.49	55	0.0%	9.1%	-1.9%
	M3PP_RS_400(4538)	100.0%	4.00	0.41	55	100.0%	4.43	0.51	55	0.0%	10.7%	23.6%
A129605A	MIM_RS_400(4544)	100.0%	203.17	9.13	55	100.0%	202.80	9.08	55	0.0%	-0.2%	-0.6%
	M0_RS_250(4506)	100.0%	102.85	3.26	55	100.0%	102.64	3.24	55	0.0%	-0.2%	-0.8%
	M1_RS_250(4516)	100.0%	12.65	0.34	55	100.0%	12.51	0.35	55	0.0%	-1.1%	3.2%
	M1PP_RS_250(4518)	100.0%	13.42	0.42	55	100.0%	13.30	0.41	55	0.0%	-0.9%	-1.8%
	M2_RS_250(4526)	100.0%	12.49	0.29	55	100.0%	12.41	0.32	55	0.0%	-0.6%	9.0%
	M2PP_RS_250(4528)	100.0%	12.57	0.36	55	100.0%	12.51	0.35	55	0.0%	-0.5%	-1.5%
	M3_RS_400(4533)	100.0%	5.04	0.71	55	100.0%	4.44	0.49	55	0.0%	-11.9%	-30.9%
	M3PP_RS_400(4538)	100.0%	4.50	0.50	55	100.0%	4.07	0.36	55	0.0%	-9.6%	-27.8%
A130102A	MIM_RS_400(4544)	100.0%	207.14	7.00	55	100.0%	206.89	6.98	55	0.0%	-0.1%	-0.4%
	M0_RS_250(4506)	100.0%	96.67	3.03	55	100.0%	96.53	3.03	55	0.0%	-0.1%	-0.3%
	M1_RS_250(4516)	98.2%	11.67	0.36	54	100.0%	11.49	0.36	54	0.0%	-1.5%	-1.0%
	M1PP_RS_250(4518)	100.0%	12.42	0.35	55	100.0%	12.25	0.33	55	0.0%	-1.3%	-6.0%
	M2_RS_250(4526)	98.2%	13.48	0.35	54	100.0%	13.38	0.36	54	0.0%	-0.8%	1.3%
	M2PP_RS_250(4528)	98.2%	13.65	0.40	54	100.0%	13.57	0.38	54	0.0%	-0.6%	-6.3%
	M3_RS_400(4533)	100.0%	5.40	0.61	55	100.0%	4.82	0.48	55	0.0%	-10.8%	-21.2%
	M3PP_RS_400(4538)	100.0%	4.65	0.51	55	100.0%	4.22	0.44	55	0.0%	-9.2%	-13.8%

**Table 27.3** Summary of metal resistivity for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [mW/sq]	Std. Dev [mW/sq]	Good Sites	Yield	Average [mW/sq]	Std. Dev [mW/sq]	Good Sites	Yield	Avg	Std. Dev
A127602A	MIM_RS_400(4544)	100.0%	199.13	8.17	55	100.0%	205.20	8.24	55	0.0%	3.0%	0.9%
	M0_RS_250(4506)	100.0%	93.60	2.94	55	100.0%	95.23	2.98	55	0.0%	1.7%	1.4%
	M1_RS_250(4516)	100.0%	12.38	0.34	55	100.0%	12.33	0.32	55	0.0%	-0.4%	-6.2%
	M1PP_RS_250(4518)	100.0%	13.02	0.41	55	100.0%	13.05	0.42	55	0.0%	0.2%	1.7%
	M2_RS_250(4526)	100.0%	11.93	0.32	55	100.0%	11.86	0.30	55	0.0%	-0.6%	-8.4%
	M2PP_RS_250(4528)	100.0%	11.98	0.37	55	100.0%	11.95	0.39	55	0.0%	-0.2%	6.3%
	M3_RS_400(4533)	100.0%	4.56	0.58	55	100.0%	4.52	0.54	55	0.0%	-0.9%	-6.1%
	M3PP_RS_400(4538)	100.0%	4.18	0.37	55	100.0%	4.14	0.40	55	0.0%	-0.9%	8.4%
A129605A	MIM_RS_400(4544)	100.0%	208.14	7.15	55	100.0%	213.97	7.27	55	0.0%	2.8%	1.7%
	M0_RS_250(4506)	100.0%	102.05	3.11	55	100.0%	103.38	3.13	55	0.0%	1.3%	0.9%
	M1_RS_250(4516)	100.0%	12.57	0.37	55	100.0%	12.42	0.40	55	0.0%	-1.2%	9.4%
	M1PP_RS_250(4518)	100.0%	13.35	0.43	55	100.0%	13.21	0.35	55	0.0%	-1.0%	-20.0%
	M2_RS_250(4526)	100.0%	12.61	0.33	55	100.0%	12.50	0.33	55	0.0%	-0.9%	0.0%
	M2PP_RS_250(4528)	100.0%	12.76	0.39	55	100.0%	12.62	0.38	55	0.0%	-1.1%	-4.3%
	M3_RS_400(4533)	100.0%	4.76	0.47	55	100.0%	4.39	0.38	55	0.0%	-7.7%	-19.2%
	M3PP_RS_400(4538)	100.0%	4.41	0.46	55	100.0%	4.06	0.40	55	0.0%	-8.0%	-12.9%
A130102A	MIM_RS_400(4544)	100.0%	207.82	7.60	55	100.0%	215.10	7.89	55	0.0%	3.5%	3.9%
	M0_RS_250(4506)	98.2%	96.23	2.97	54	100.0%	97.56	2.97	54	0.0%	1.4%	0.0%
	M1_RS_250(4516)	98.2%	11.62	0.33	54	100.0%	11.45	0.35	54	0.0%	-1.5%	5.2%
	M1PP_RS_250(4518)	98.2%	12.32	0.33	54	100.0%	12.18	0.34	54	0.0%	-1.1%	5.7%
	M2_RS_250(4526)	98.2%	13.15	0.36	54	100.0%	12.99	0.34	54	0.0%	-1.2%	-5.2%
	M2PP_RS_250(4528)	98.2%	13.28	0.39	54	100.0%	13.16	0.39	54	0.0%	-1.0%	-1.0%
	M3_RS_400(4533)	100.0%	5.31	0.61	55	100.0%	4.90	0.53	55	0.0%	-7.7%	-12.3%
	M3PP_RS_400(4538)	100.0%	4.78	0.54	55	100.0%	4.32	0.37	55	0.0%	-9.7%	-32.6%

**SUMMARY**

Overall, TriQuint’s B31 process produces robust yield and reliability for all wafers tested before and after stressing. All values for 100 parameters remained relatively stable during all reliability testing.