

**B39 Element Qualification Report**  
**Revision 1.0, Jan. 11, 2002**

**PURPOSE**

This report summarizes element qualification test results obtained on TriQuint's B39 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.

**METHOD**

Four lots were built at FAB3 for the element qualification. The lots and wafers are shown in Table 1.

**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>
A121504B	380331-004AR65E1	380331-006AR65C3	380331-003AR65F0	8/3/01	9/26/01
A123302A	380331-027AR65C2	380331-028AR65B3	380331-023AR65F6	8/21/01	10/7/01
A125704A	130920-055AR65E4	130920-046AR65E2	130920-005AR65G1	9/14/01	11/1/01
A129803A	22.0480-030AR	22.0480-026AR	22.0480-006AR	10/25/01	11/22/01

**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**

Four sets of structures were chosen to be analyzed for the qualification report. Structures from the R29CA process control monitor (PCM) of mask set B6478 were used. Table 3 gives a general summary of the structures used. Fifty-five (55) sites were tested on each wafer.

**Table 3** Test Structures

<i>Structure</i>	<i>Structure Description</i>
Vias/contact chains	<p>NiCr-to-Met0, min. sized metal links, 302 links</p> <p>Met0-to-Met1,            Min. sized metal links w/ 390, 2028 Via1 (Min. 2x2 um &amp; 2x4 um)            Large “Homer” metal links w/ min. 2x2 um and 2x4 um Via1, 160 vias</p> <p>MIM Met-to-Met1            Min. sized metal links w/ 174 Via1 (Min. 2x2 um &amp; 2x4 um)</p> <p>Met1-to-Met2,            Min. sized metal links w/ 229, 1302, 2028 Via2 (Min. 3x3 um)            Large “Homer” metal links w/ min. 3x3 um Via2, 160 vias</p> <p>Met2-to-Met3, min. Via3 (3x3um) w/ min. &amp; large metal links.            Min. sized metal links w/ 228, 1302, 2028 Via3 (Min. 3x3 um)            Large “Homer” metal links w/ min. 3x3 um Via3, 160 vias</p> <p>Met0-to-Met2,            Min. sized metal links w/ 282, 1302, 2028 stacked Via1/2 (Min. 2x2 &amp; 2x4 um            Via1, 3x3 um Via2)            Large “Homer” metal links w/ min. sized 160 stacked Via1/2</p> <p>Met1-to-Met3,            Min. sized metal links w/ 230, 1302, 2028 stacked Via2/3 (Min. 3x3 um Via2 &amp;            3x3 um Via3)            Large “Homer” metal links w/ min. sized 160 stacked Via2/3 &amp; unstacked Via3</p> <p>Met0-to-Met3,            Min. sized metal links w/ 129, 1302, 2028 stacked Via1/2/3 (Min. 2x2 &amp; 2x4            um Via1, 3x3 um Via2, 3x3um Via3)            Large “Homer” metal links w/ min. sized 160 stacked Via1/2/3 &amp; unstacked            Via3</p>
Capacitors	5 Kum <sup>2</sup> , 16.5 Kum <sup>2</sup> , 91 Kum <sup>2</sup> , 182 Kum <sup>2</sup>
NiCr Resistors	2x2um, 2x20um, 20x20um, 20x2 um, and Van der Pauw
Metal Combs	<p>Met1-to-Met1, at min. gap (3 um) &amp; min. line width (2 um), 4031 um length</p> <p>Met2-to-Met2, at min. gap (3 um) &amp; min. line width (2 um), 4369 um length</p> <p>Met3-to-Met3, at min. gap (5 um) &amp; min. line width (5 um), 2111 um length</p> <p>Met0/Met1-to-Met0/1, at min. gap (3 um) &amp; min. line width (5 um), 3279 um length</p> <p>Met1/Met2-to-Met1/2, at min. gap (3 um) &amp; min. line width (5 um), 2651 um length</p> <p>Met2/Met3-to-Met2/3, at min. gap (5 um) &amp; min. line width (5 um), 1470 um length</p> <p>Met2/Met3-to-Met2/3, at min. gap (5 um) &amp; wide line width (20 um), 1055 um length</p> <p>Line space sizing array (1215 um length):            Met0/Met1-to-Met0/1, at 1.5 &amp; 2 um gap            Met1/Met2-to-Met1/Met2, at 1.5, 2, &amp; 3 um gap            Met2/Met3-to-Met2/Met3, at 3, 4, &amp; 5 um gap            Met1/Met2/Met3-to-Met1/Met2/Met3, at 3, 4, &amp; 5 um gap</p>

Vias/contact chains test the robustness of the vias that connect together the various metal layers. Two general types were constructed to monitor the process:

- 1) High density of contact chains using the minimum allowed via sizes and metal link dimensions.
- 2) “Homer” contact chains which used the minimum allowed vias sizes with very large metal link dimensions (30 x 38 um). This type of contact chain places the greatest stress on the vias.

Note that stacked minimum vias (i.e. Met0-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 and to demonstrate the robustness of this process.

MIM capacitors (1000 Å thick PSN) were constructed with areas of 5K, 16.5K, 91K, and 182K sq. um. The Via1 coverage area over the MIM metal plate for each test structure was ~10%, the maximum allowed under the B39 layout design rules.

NiCr Resistors of various dimensions (2x2, 2x20, 20x20, and 20x2 um) were tested as well as a NiCr Van der Pauw structure.

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). Additional leakage combs of stacked metal layers were constructed with spacings (or gaps) smaller than the minimum allowed to determine the robustness of the B39 layout design rules governing metal feature exclusions.

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

**Table 4** Electrical Tests

<i>Structure(s)</i>	<i>Electrical Tests</i>		
Via/contact chains	Resistance		
Capacitors	Capacitance/Area (1 MHz)	Leakage @ 10 V	Leakage @ 25 V
NiCr Resistors	Resistance	Sheet Resistance	
Metal Combs	Leakage @ 10 V		

## **RESULTS**

### **VIA/CONTACT CHAINS**

Overall, via/contact chains showed slight to no movement in resistance. Tables 5 – 12 summarize the data of the various via/contact chains before and after stress.

Tables 5.1 – 5.3 summarize the results of the NiCr-to-Met0 contact chains.

**Table 5.1** Summary of NiCr-to-Met0 contact chains for Autoclaved wafers

Lot	Test (Test #)	0 Hrs				96 Hrs				% Change		
		Yield	Avg [W]	Std. Dev [W]	Good Sites	Yield	Average [W]	Std. Dev [W]	Good Sites	Yield	Avg	Std. Dev
A121504B	M0_TF_VC(4003)	100.0%	22.48	0.300	55	100.0%	22.44	0.314	55	0.0%	-0.2%	4.9%
A123302A	M0_TF_VC(4003)	100.0%	20.87	0.648	55	100.0%	20.85	0.646	55	0.0%	-0.1%	-0.2%
A125704A	M0_TF_VC(4003)	100.0%	21.97	0.445	55	100.0%	21.98	0.451	55	0.0%	0.0%	1.4%
A129803A	M0_TF_VC(4003)	100.0%	23.53	0.555	55	100.0%	23.533	0.557	55	0.0%	0.0%	0.3%

**Table 5.2** Summary of NiCr-to-Met0 contact chains for Temp Cycled wafers

Lot	Test (Test #)	0 Cycles				500 Cycles				% Change		
		Yield	Avg [W]	Std. Dev [W]	Good Sites	Yield	Average [W]	Std. Dev [W]	Good Sites	Yield	Avg	Std. Dev
A121504B	M0_TF_VC(4003)	100.0%	22.63	0.41	55	100.0%	22.59	0.42	55	0.0%	-0.2%	0.8%
A123302A	M0_TF_VC(4003)	100.0%	21.09	0.59	55	100.0%	21.07	0.58	55	0.0%	-0.1%	-1.6%
A125704A	M0_TF_VC(4003)	100.0%	22.02	0.46	55	100.0%	22.02	0.46	55	0.0%	0.0%	0.6%
A129803A	M0_TF_VC(4003)	100.0%	22.70	0.37	55	100.0%	22.71	0.37	55	0.0%	0.0%	-0.9%

**Table 5.3** Summary of NiCr-to-Met0 contact chains for Air Baked wafers

Lot	Test (Test #)	0 Hrs				168 Hrs				% Change		
		Yield	Avg [W]	Std. Dev [W]	Good Sites	Yield	Average [W]	Std. Dev [W]	Good Sites	Yield	Avg	Std. Dev
A121504B	M0_TF_VC(4003)	100.0%	22.58	0.509	55	100.0%	22.73	0.547	55	0.0%	0.6%	7.6%
A123302A	M0_TF_VC(4003)	100.0%	20.52	1.784	55	100.0%	20.64	1.709	55	0.0%	0.6%	-4.2%
A125704A	M0_TF_VC(4003)	100.0%	21.92	0.633	55	100.0%	22.12	0.635	55	0.0%	0.9%	0.4%
A129803A	M0_TF_VC(4003)	100.0%	22.79	0.494	55	100.0%	22.95	0.514	55	0.0%	0.7%	4.0%

Tables 6.1 – 6.3 summarize the results of the MIM metal-to-Met1 contact chains.

**Table 6.1** Summary of MIM-to-Met0 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
A121504B	MIM_M1_VC(4004)	100.0%	149.13	2.49	55	100.0%	151.12	3.04	55	0.0%	1.3%	22.0%
	MIM_M1_VC2x4(4014)	100.0%	99.76	1.39	55	100.0%	100.81	2.10	55	0.0%	1.1%	51.2%
A123302A	MIM_M1_VC(4004)	100.0%	146.91	3.83	55	100.0%	147.67	4.40	55	0.0%	0.5%	14.7%
	MIM_M1_VC2x4(4014)	100.0%	98.37	2.17	55	100.0%	98.90	2.54	55	0.0%	0.5%	17.2%
A125704A	MIM_M1_VC(4004)	100.0%	148.68	3.89	55	100.0%	149.03	4.11	55	0.0%	0.2%	5.8%
	MIM_M1_VC2x4(4014)	100.0%	99.66	2.10	55	100.0%	99.95	2.27	55	0.0%	0.3%	8.3%
A129803A	MIM_M1_VC(4004)	100.0%	147.03	3.17	55	100.0%	148.02	5.01	55	0.0%	0.7%	58.2%
	MIM_M1_VC2x4(4014)	100.0%	98.43	1.97	55	100.0%	99.58	3.97	55	0.0%	1.2%	101.2%

**Table 6.2** Summary of MIM-to-Met0 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
A121504B	MIM_M1_VC(4004)	100.0%	147.96	2.82	55	100.0%	146.79	2.86	55	0.0%	-0.8%	1.3%
	MIM_M1_VC2x4(4014)	100.0%	98.92	1.74	55	100.0%	98.26	1.76	55	0.0%	-0.7%	1.2%
A123302A	MIM_M1_VC(4004)	100.0%	146.85	3.85	55	100.0%	146.73	3.93	55	0.0%	-0.1%	2.3%
	MIM_M1_VC2x4(4014)	100.0%	98.46	2.23	55	100.0%	98.36	2.22	55	0.0%	-0.1%	-0.2%
A125704A	MIM_M1_VC(4004)	100.0%	149.90	3.33	55	100.0%	149.90	3.37	55	0.0%	0.0%	1.2%
	MIM_M1_VC2x4(4014)	100.0%	100.58	1.87	55	100.0%	100.59	1.88	55	0.0%	0.0%	0.4%
A129803A	MIM_M1_VC(4004)	100.0%	141.54	3.17	55	100.0%	140.40	3.17	55	0.0%	-0.8%	0.2%
	MIM_M1_VC2x4(4014)	100.0%	93.54	1.86	55	100.0%	93.03	1.89	55	0.0%	-0.5%	1.8%

**Table 6.3** Summary of MIM-to-Met0 contact chains for Air Baked 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
A121504B	MIM_M1_VC(4004)	100.0%	148.90	3.35	55	100.0%	153.73	6.20	55	0.0%	3.2%	85.0%
	MIM_M1_VC2x4(4014)	100.0%	99.91	1.82	55	100.0%	103.73	3.02	55	0.0%	3.8%	65.5%
A123302A	MIM_M1_VC(4004)	100.0%	147.20	3.37	55	100.0%	151.54	4.37	55	0.0%	3.0%	29.5%
	MIM_M1_VC2x4(4014)	100.0%	98.57	1.93	55	100.0%	104.87	7.83	55	0.0%	6.4%	305.0%
A125704A	MIM_M1_VC(4004)	100.0%	149.08	3.39	55	100.0%	151.46	3.89	55	0.0%	1.6%	14.8%
	MIM_M1_VC2x4(4014)	100.0%	99.68	1.78	55	100.0%	102.28	2.29	55	0.0%	2.6%	28.8%
A129803A	MIM_M1_VC(4004)	100.0%	147.24	3.11	55	100.0%	148.88	3.18	55	0.0%	1.1%	2.3%
	MIM_M1_VC2x4(4014)	100.0%	98.17	1.79	55	100.0%	100.01	2.03	55	0.0%	1.9%	13.7%

Tables 7.1 – 7.3 summarize the results of the Met0-to-Met1 contact chains. All Via1 sizes were 2x2 um (the minimum allowed) except for Tests 4010, 702, and 738 which used a Via1 size of 2x4 um. High-density (2028 vias) via/contact chains w/ min. sized metal links were monitored under Tests 700 and 702. “Homer” via/contact chains were monitored under Tests 736 and 738.

**Table 7.1** Summary of Met0-to-Met1 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
A121504B	M0_M1_VC(4000)	100.0%	118.85	1.47	55	100.0%	115.38	1.93	55	0.0%	-2.9%	31.2%
	M0_M1_VC2x4(4010)	100.0%	83.49	1.27	55	100.0%	81.29	1.38	55	0.0%	-2.6%	8.9%
	M0M1_VC2028v2x2(700)	100.0%	101.16	1.00	55	100.0%	101.25	1.07	55	0.0%	0.1%	7.4%
	M0M1_VC2028v2x4(702)	100.0%	82.22	1.36	55	100.0%	82.13	1.07	55	0.0%	-0.1%	-21.5%
	M0M1_HC2x2(736)	100.0%	113.39	8.28	55	100.0%	113.85	9.52	55	0.0%	0.4%	15.0%
	M0M1_HC2x4(738)	100.0%	95.90	8.35	55	100.0%	98.63	8.89	55	0.0%	2.8%	6.5%
A123302A	M0_M1_VC(4000)	100.0%	115.00	3.26	55	100.0%	110.53	3.27	55	0.0%	-3.9%	0.4%
	M0_M1_VC2x4(4010)	100.0%	80.90	2.09	55	100.0%	78.32	2.13	55	0.0%	-3.2%	2.3%
	M0M1_VC2028v2x2(700)	100.0%	99.36	1.74	55	100.0%	99.70	1.96	55	0.0%	0.3%	12.6%
	M0M1_VC2028v2x4(702)	100.0%	80.18	1.72	55	100.0%	80.17	1.99	55	0.0%	0.0%	15.7%
	M0M1_HC2x2(736)	100.0%	113.17	8.13	55	100.0%	113.87	8.22	55	0.0%	0.6%	1.1%
	M0M1_HC2x4(738)	100.0%	94.31	7.91	55	100.0%	94.09	7.55	55	0.0%	-0.2%	-4.5%
A125704A	M0_M1_VC(4000)	100.0%	114.23	2.46	55	100.0%	114.30	2.48	55	0.0%	0.1%	0.6%
	M0_M1_VC2x4(4010)	100.0%	80.11	1.71	55	100.0%	80.15	1.72	55	0.0%	0.0%	0.6%
	M0M1_VC2028v2x2(700)	100.0%	100.74	1.45	55	100.0%	100.79	1.55	55	0.0%	0.1%	6.6%
	M0M1_VC2028v2x4(702)	100.0%	81.54	1.51	55	100.0%	81.54	1.43	55	0.0%	0.0%	-4.9%
	M0M1_HC2x2(736)	100.0%	112.73	8.15	55	100.0%	113.19	8.13	55	0.0%	0.4%	-0.3%
	M0M1_HC2x4(738)	100.0%	95.00	8.87	55	100.0%	96.14	6.31	55	0.0%	1.2%	-28.9%
A129803A	M0_M1_VC(4000)	100.0%	114.66	2.75	55	100.0%	115.39	3.10	55	0.0%	0.6%	12.8%
	M0_M1_VC2x4(4010)	100.0%	79.82	1.81	55	100.0%	80.05	1.95	55	0.0%	0.3%	8.0%
	M0M1_VC2028v2x2(700)	100.0%	100.54	1.69	55	100.0%	100.68	1.71	55	0.0%	0.1%	1.2%
	M0M1_VC2028v2x4(702)	100.0%	81.34	1.73	55	100.0%	81.30	1.69	55	0.0%	0.0%	-2.3%
	M0M1_HC2x2(736)	100.0%	110.91	9.33	55	100.0%	113.19	8.81	55	0.0%	2.1%	-5.6%
	M0M1_HC2x4(738)	100.0%	91.60	8.00	55	100.0%	94.32	7.91	55	0.0%	3.0%	-1.1%

**Table 7.2** Summary of Met0-to-Met1 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
A121504B	M0_M1_VC(4000)	100.0%	116.25	1.72	55	100.0%	111.25	1.91	55	0.0%	-4.3%	10.7%
	M0_M1_VC2x4(4010)	100.0%	81.37	1.46	55	100.0%	78.39	1.48	55	0.0%	-3.7%	1.2%
	M0M1_VC2028v2x2(700)	100.0%	99.27	1.07	55	100.0%	98.80	1.20	55	0.0%	-0.5%	11.8%
	M0M1_VC2028v2x4(702)	100.0%	80.54	1.40	55	100.0%	79.98	1.42	55	0.0%	-0.7%	2.1%
	M0M1_HC2x2(736)	100.0%	112.26	7.79	55	100.0%	111.60	8.28	55	0.0%	-0.6%	6.3%
	M0M1_HC2x4(738)	100.0%	93.17	9.86	55	100.0%	93.87	7.93	55	0.0%	0.7%	-19.6%
A123302A	M0_M1_VC(4000)	100.0%	110.79	2.88	55	100.0%	110.65	2.90	55	0.0%	-0.1%	0.8%
	M0_M1_VC2x4(4010)	100.0%	78.34	1.94	55	100.0%	78.25	1.98	55	0.0%	-0.1%	1.7%
	M0M1_VC2028v2x2(700)	100.0%	99.58	1.85	55	100.0%	99.47	1.97	55	0.0%	-0.1%	6.6%
	M0M1_VC2028v2x4(702)	100.0%	80.25	1.77	55	100.0%	80.14	1.82	55	0.0%	-0.1%	3.2%
	M0M1_HC2x2(736)	100.0%	112.72	8.16	55	100.0%	111.60	8.62	55	0.0%	-1.0%	5.7%
	M0M1_HC2x4(738)	100.0%	93.40	9.27	55	100.0%	95.23	6.58	55	0.0%	2.0%	-29.0%
A125704A	M0_M1_VC(4000)	100.0%	114.29	2.26	55	100.0%	114.25	2.23	55	0.0%	0.0%	-1.1%
	M0_M1_VC2x4(4010)	100.0%	80.11	1.65	55	100.0%	80.12	1.66	55	0.0%	0.0%	0.6%
	M0M1_VC2028v2x2(700)	98.2%	100.67	1.58	54	100.0%	100.61	1.55	54	0.0%	-0.1%	-1.7%
	M0M1_VC2028v2x4(702)	100.0%	81.48	1.67	55	100.0%	81.61	1.48	55	0.0%	0.2%	-11.2%
	M0M1_HC2x2(736)	100.0%	112.05	8.32	55	100.0%	113.19	8.13	55	0.0%	1.0%	-2.3%
	M0M1_HC2x4(738)	100.0%	94.78	8.23	55	100.0%	92.50	9.19	55	0.0%	-2.4%	11.7%
A129803A	M0_M1_VC(4000)	100.0%	112.38	3.16	55	100.0%	111.59	3.17	55	0.0%	-0.7%	0.4%
	M0_M1_VC2x4(4010)	100.0%	79.22	1.97	55	100.0%	78.88	1.98	55	0.0%	-0.4%	0.5%
	M0M1_VC2028v2x2(700)	100.0%	100.15	1.70	55	100.0%	99.38	1.76	55	0.0%	-0.8%	3.7%
	M0M1_VC2028v2x4(702)	100.0%	80.57	1.61	55	100.0%	79.58	1.63	55	0.0%	-1.2%	1.4%
	M0M1_HC2x2(736)	100.0%	112.51	8.33	55	100.0%	112.50	7.61	55	0.0%	0.0%	-8.7%
	M0M1_HC2x4(738)	100.0%	93.87	7.93	55	100.0%	91.14	6.21	55	0.0%	-2.9%	-21.7%

**Table 7.3 Summary of Met0-to-Met1 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
A121504B	M0_M1_VC(4000)	100.0%	117.74	1.67	55	100.0%	121.37	2.20	55	0.0%	3.1%	31.8%
	M0_M1_VC2x4(4010)	100.0%	82.41	1.44	55	100.0%	84.18	1.91	55	0.0%	2.2%	33.2%
	M0M1_VC2028v2x2(700)	100.0%	100.37	1.24	55	100.0%	101.89	2.29	55	0.0%	1.5%	84.3%
	M0M1_VC2028v2x4(702)	100.0%	81.34	1.59	55	100.0%	83.44	1.83	55	0.0%	2.6%	15.6%
	M0M1_HC2x2(736)	100.0%	113.40	7.93	55	100.0%	118.40	8.63	55	0.0%	4.4%	8.8%
	M0M1_HC2x4(738)	100.0%	94.99	9.19	55	100.0%	98.40	8.69	55	0.0%	3.6%	-5.4%
A123302A	M0_M1_VC(4000)	100.0%	116.23	3.04	55	100.0%	117.23	3.33	55	0.0%	0.9%	9.5%
	M0_M1_VC2x4(4010)	100.0%	81.12	2.04	55	100.0%	84.36	4.94	55	0.0%	4.0%	142.0%
	M0M1_VC2028v2x2(700)	100.0%	100.10	1.93	55	100.0%	100.44	2.18	55	0.0%	0.3%	12.5%
	M0M1_VC2028v2x4(702)	100.0%	80.57	1.92	55	100.0%	81.54	2.09	55	0.0%	1.2%	8.5%
	M0M1_HC2x2(736)	100.0%	114.08	8.35	55	100.0%	117.26	8.84	55	0.0%	2.8%	5.8%
	M0M1_HC2x4(738)	100.0%	93.85	7.56	55	100.0%	99.31	8.13	55	0.0%	5.8%	7.5%
A125704A	M0_M1_VC(4000)	100.0%	113.87	2.31	55	100.0%	115.22	2.52	55	0.0%	1.2%	9.1%
	M0_M1_VC2x4(4010)	100.0%	79.70	1.66	55	100.0%	80.80	1.65	55	0.0%	1.4%	-0.9%
	M0M1_VC2028v2x2(700)	100.0%	100.51	1.56	55	100.0%	101.24	1.72	55	0.0%	0.7%	10.5%
	M0M1_VC2028v2x4(702)	100.0%	81.32	1.38	55	100.0%	82.45	1.57	55	0.0%	1.4%	14.0%
	M0M1_HC2x2(736)	100.0%	112.96	8.32	55	100.0%	114.55	7.12	55	0.0%	1.4%	-14.4%
	M0M1_HC2x4(738)	100.0%	95.69	8.41	55	100.0%	96.14	6.75	55	0.0%	0.5%	-19.7%
A129803A	M0_M1_VC(4000)	100.0%	114.74	2.48	55	100.0%	114.98	2.15	55	0.0%	0.2%	-13.5%
	M0_M1_VC2x4(4010)	100.0%	79.80	1.67	55	100.0%	80.64	1.28	55	0.0%	1.1%	-23.4%
	M0M1_VC2028v2x2(700)	98.2%	100.63	1.74	54	100.0%	100.70	1.92	54	0.0%	0.1%	10.1%
	M0M1_VC2028v2x4(702)	98.2%	81.66	1.85	54	100.0%	82.35	1.67	54	0.0%	0.8%	-10.0%
	M0M1_HC2x2(736)	100.0%	113.64	8.43	55	100.0%	111.37	8.08	55	0.0%	-2.0%	-4.2%
	M0M1_HC2x4(738)	100.0%	95.23	7.01	55	100.0%	94.55	8.25	55	0.0%	-0.7%	17.7%

Tables 8.1 – 8.3 summarize the results of the Met1-to-Met2 contact chains. All Via2 sizes were 3x3 um (the minimum allowed). High-density (2028 & 1302 vias) via/contact chains w/ min. sized metal links were monitored under Tests 704 and 706. “Homer” via/contact chains were monitored under Test 744.

**Table 8.1** Summary of Met1-to-Met2 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
A121504B	M1_M2_VC(4001)	100.0%	55.03	0.51	55	100.0%	55.27	0.50	55	0.0%	0.4%	-0.8%
	M1M2_VC2028(704)	100.0%	25.53	0.92	55	100.0%	25.71	0.95	55	0.0%	0.7%	2.5%
	M1M2_VC1302(706)	100.0%	30.30	1.46	55	100.0%	30.52	1.39	55	0.0%	0.7%	-5.1%
	M1M2_HC43(744)	100.0%	36.36	8.76	55	100.0%	30.91	7.16	55	0.0%	-15.0%	-18.3%
A123302A	M1_M2_VC(4001)	100.0%	52.95	0.85	55	100.0%	53.02	0.85	55	0.0%	0.1%	0.2%
	M1M2_VC2028(704)	100.0%	25.14	0.93	55	100.0%	25.28	0.90	55	0.0%	0.6%	-3.3%
	M1M2_VC1302(706)	100.0%	29.66	1.44	55	100.0%	29.89	1.38	55	0.0%	0.8%	-4.4%
	M1M2_HC43(744)	100.0%	37.72	9.16	55	100.0%	27.96	8.32	55	0.0%	-25.9%	-9.1%
A125704A	M1_M2_VC(4001)	100.0%	54.13	0.47	55	100.0%	54.38	0.47	55	0.0%	0.5%	0.7%
	M1M2_VC2028(704)	98.2%	25.39	0.86	54	100.0%	25.61	0.98	54	0.0%	0.9%	13.4%
	M1M2_VC1302(706)	100.0%	30.11	1.41	55	100.0%	29.97	1.50	55	0.0%	-0.5%	7.0%
	M1M2_HC43(744)	100.0%	26.82	8.48	55	100.0%	27.50	8.81	55	0.0%	2.5%	3.9%
A129803A	M1_M2_VC(4001)	100.0%	54.32	0.51	55	100.0%	54.60	0.56	55	0.0%	0.5%	7.9%
	M1M2_VC2028(704)	100.0%	25.53	0.88	55	100.0%	25.86	0.78	55	0.0%	1.3%	-12.3%
	M1M2_VC1302(706)	100.0%	29.97	1.35	55	100.0%	30.44	1.26	55	0.0%	1.6%	-6.9%
	M1M2_HC43(744)	100.0%	25.91	7.93	55	100.0%	25.68	9.45	55	0.0%	-0.9%	19.2%

**Table 8.2** Summary of Met1-to-Met2 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
A121504B	M1_M2_VC(4001)	100.0%	54.28	0.51	55	100.0%	54.14	0.54	55	0.0%	-0.3%	5.1%
	M1M2_VC2028(704)	100.0%	25.53	0.80	55	100.0%	25.53	0.98	55	0.0%	0.0%	22.8%
	M1M2_VC1302(706)	100.0%	30.41	1.52	55	100.0%	30.16	1.66	55	0.0%	-0.8%	9.1%
	M1M2_HC43(744)	100.0%	39.31	8.81	55	100.0%	27.50	8.12	55	0.0%	-30.0%	-7.8%
A123302A	M1_M2_VC(4001)	100.0%	52.88	0.64	55	100.0%	52.83	0.64	55	0.0%	-0.1%	0.8%
	M1M2_VC2028(704)	100.0%	24.74	0.92	55	100.0%	24.73	0.93	55	0.0%	-0.1%	1.3%
	M1M2_VC1302(706)	100.0%	29.15	1.27	55	100.0%	29.33	1.26	55	0.0%	0.6%	-0.5%
	M1M2_HC43(744)	100.0%	29.54	8.46	55	100.0%	25.91	8.63	55	0.0%	-12.3%	2.0%
A125704A	M1_M2_VC(4001)	100.0%	53.93	0.51	55	100.0%	53.89	0.50	55	0.0%	-0.1%	-1.2%
	M1M2_VC2028(704)	100.0%	25.39	0.89	55	100.0%	25.16	0.95	55	0.0%	-0.9%	5.8%
	M1M2_VC1302(706)	100.0%	29.77	1.27	55	100.0%	29.83	1.28	55	0.0%	0.2%	0.6%
	M1M2_HC43(744)	100.0%	27.73	8.57	55	100.0%	27.50	9.44	55	0.0%	-0.8%	10.2%
A129803A	M1_M2_VC(4001)	100.0%	53.44	0.59	55	100.0%	53.30	0.61	55	0.0%	-0.3%	3.8%
	M1M2_VC2028(704)	100.0%	24.98	0.74	55	100.0%	25.05	0.84	55	0.0%	0.3%	14.1%
	M1M2_VC1302(706)	100.0%	29.44	1.25	55	100.0%	28.43	0.93	55	0.0%	-3.4%	-25.4%
	M1M2_HC43(744)	100.0%	28.18	8.06	55	100.0%	28.18	6.46	55	0.0%	0.0%	-19.8%

**Table 8.3** Summary of Met1-to-Met2 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
A121504B	M1_M2_VC(4001)	100.0%	54.62	0.49	55	100.0%	56.03	1.97	55	0.0%	2.6%	299.0%
	M1M2_VC2028(704)	100.0%	25.76	0.83	55	100.0%	26.93	1.04	55	0.0%	4.5%	25.2%
	M1M2_VC1302(706)	100.0%	30.61	1.32	55	100.0%	31.50	1.10	55	0.0%	2.9%	-16.4%
	M1M2_HC43(744)	100.0%	36.81	8.48	55	100.0%	40.68	8.75	55	0.0%	10.5%	3.2%
A123302A	M1_M2_VC(4001)	100.0%	53.19	0.73	55	100.0%	54.49	1.36	55	0.0%	2.4%	86.3%
	M1M2_VC2028(704)	100.0%	24.96	0.98	55	100.0%	26.64	1.31	55	0.0%	6.8%	32.9%
	M1M2_VC1302(706)	100.0%	29.55	1.32	55	100.0%	30.80	1.81	55	0.0%	4.3%	36.8%
	M1M2_HC43(744)	100.0%	35.68	9.13	55	100.0%	39.32	9.13	55	0.0%	10.2%	0.0%
A125704A	M1_M2_VC(4001)	100.0%	53.98	0.63	55	100.0%	54.91	0.74	55	0.0%	1.7%	17.5%
	M1M2_VC2028(704)	100.0%	25.09	1.07	55	100.0%	26.92	1.27	55	0.0%	7.3%	18.6%
	M1M2_VC1302(706)	98.2%	29.81	1.28	54	100.0%	30.92	1.64	54	0.0%	3.7%	27.4%
	M1M2_HC43(744)	100.0%	27.50	8.81	55	100.0%	27.50	9.13	55	0.0%	0.0%	3.7%
A129803A	M1_M2_VC(4001)	100.0%	53.94	0.50	55	100.0%	54.59	0.55	55	0.0%	1.2%	10.2%
	M1M2_VC2028(704)	100.0%	25.03	0.96	55	98.2%	26.26	0.88	54	-1.8%	4.9%	-7.8%
	M1M2_VC1302(706)	98.2%	29.47	1.23	54	100.0%	30.92	1.49	54	0.0%	4.9%	21.1%
	M1M2_HC43(744)	98.2%	28.94	8.35	54	100.0%	29.40	8.47	54	0.0%	1.6%	1.4%

Tables 9.1 – 9.3 summarize the results of the Met2-to-Met3 contact chains. All Via3 sizes were 3x3 um (the minimum allowed). High-density (2028 & 1302 vias) via/contact chains w/ min. sized metal links were monitored under Tests 712 and 714. “Homer” via/contact chains were monitored under Test 754.

**Table 9.1** Summary of Met2-to-Met3 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
A121504B	M2_M3_VC(4002)	100.0%	30.97	0.74	55	100.0%	31.11	0.76	55	0.0%	0.5%	1.8%
	M2M3_VC2028(712)	100.0%	20.24	0.71	55	100.0%	20.22	0.50	55	0.0%	-0.1%	-29.6%
	M2M3_VC1302(714)	100.0%	23.29	1.17	55	100.0%	23.04	1.02	55	0.0%	-1.1%	-12.8%
	M2M3_HC43(754)	100.0%	22.95	7.12	55	100.0%	24.09	8.62	55	0.0%	5.0%	21.1%
A123302A	M2_M3_VC(4002)	100.0%	30.07	0.75	55	100.0%	30.19	0.70	55	0.0%	0.4%	-6.4%
	M2M3_VC2028(712)	100.0%	20.19	0.76	55	100.0%	20.32	0.82	55	0.0%	0.6%	8.3%
	M2M3_VC1302(714)	100.0%	23.15	1.21	55	100.0%	23.21	1.17	55	0.0%	0.3%	-3.5%
	M2M3_HC43(754)	100.0%	24.32	6.98	55	98.2%	23.38	6.89	54	-1.8%	-3.8%	-1.3%
A125704A	M2_M3_VC(4002)	100.0%	30.74	0.70	55	100.0%	30.88	0.67	55	0.0%	0.5%	-4.3%
	M2M3_VC2028(712)	100.0%	20.62	0.81	55	98.2%	20.71	0.77	54	-1.8%	0.4%	-5.6%
	M2M3_VC1302(714)	100.0%	23.41	1.25	55	98.2%	23.95	1.14	54	-1.8%	2.3%	-9.2%
	M2M3_HC43(754)	100.0%	22.05	7.20	55	100.0%	22.50	7.76	55	0.0%	2.1%	7.7%
A129803A	M2_M3_VC(4002)	100.0%	31.21	0.64	55	100.0%	31.36	0.67	55	0.0%	0.5%	4.5%
	M2M3_VC2028(712)	100.0%	20.80	0.79	55	100.0%	20.75	0.71	55	0.0%	-0.3%	-10.1%
	M2M3_VC1302(714)	100.0%	24.13	0.97	55	100.0%	24.05	0.99	55	0.0%	-0.3%	2.5%
	M2M3_HC43(754)	98.2%	18.52	6.30	54	98.1%	22.17	6.78	53	-1.9%	19.7%	7.5%

**Table 9.2** Summary of Met2-to-Met3 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
A121504B	M2_M3_VC(4002)	100.0%	31.01	0.90	55	100.0%	30.90	0.88	55	0.0%	-0.4%	-1.6%
	M2M3_VC2028(712)	100.0%	20.39	0.69	55	100.0%	20.23	0.76	55	0.0%	-0.8%	10.3%
	M2M3_VC1302(714)	100.0%	23.35	1.04	55	100.0%	23.41	1.10	55	0.0%	0.3%	6.1%
	M2M3_HC43(754)	100.0%	24.77	7.41	55	100.0%	21.36	7.48	55	0.0%	-13.7%	1.0%
A123302A	M2_M3_VC(4002)	100.0%	30.74	0.82	55	100.0%	30.69	0.82	55	0.0%	-0.2%	-0.9%
	M2M3_VC2028(712)	100.0%	20.48	0.68	55	100.0%	20.37	0.69	55	0.0%	-0.5%	1.0%
	M2M3_VC1302(714)	100.0%	23.51	1.21	55	100.0%	23.35	1.27	55	0.0%	-0.7%	4.4%
	M2M3_HC43(754)	94.5%	20.19	6.14	52	103.8%	21.07	6.79	54	3.8%	4.3%	10.6%
A125704A	M2_M3_VC(4002)	100.0%	30.62	0.71	55	100.0%	30.57	0.70	55	0.0%	-0.2%	-1.3%
	M2M3_VC2028(712)	98.2%	20.60	0.85	54	100.0%	20.38	0.69	54	0.0%	-1.1%	-18.7%
	M2M3_VC1302(714)	100.0%	23.29	1.01	55	100.0%	23.29	1.21	55	0.0%	0.0%	19.4%
	M2M3_HC43(754)	100.0%	19.77	7.09	55	100.0%	20.91	6.83	55	0.0%	5.7%	-3.7%
A129803A	M2_M3_VC(4002)	100.0%	30.78	0.67	55	100.0%	30.61	0.65	55	0.0%	-0.6%	-3.3%
	M2M3_VC2028(712)	100.0%	20.78	0.73	55	100.0%	20.75	0.78	55	0.0%	-0.2%	6.8%
	M2M3_VC1302(714)	98.2%	23.92	1.02	54	100.0%	22.62	1.09	54	0.0%	-5.5%	7.6%
	M2M3_HC43(754)	100.0%	22.27	7.09	55	100.0%	19.77	8.57	55	0.0%	-11.2%	20.8%

**Table 9.3** Summary of Met2-to-Met3 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
A121504B	M2_M3_VC(4002)	100.0%	31.47	0.75	55	100.0%	31.11	0.76	55	0.0%	-1.2%	0.6%
	M2M3_VC2028(712)	100.0%	20.51	0.77	55	98.2%	20.69	0.80	54	-1.8%	0.9%	4.2%
	M2M3_VC1302(714)	100.0%	23.51	1.10	55	98.2%	23.67	1.28	54	-1.8%	0.6%	16.7%
	M2M3_HC43(754)	100.0%	24.09	7.92	55	100.0%	25.23	8.15	55	0.0%	4.7%	2.9%
A123302A	M2_M3_VC(4002)	100.0%	30.98	0.74	55	100.0%	31.84	1.50	55	0.0%	2.8%	103.8%
	M2M3_VC2028(712)	100.0%	20.53	0.74	55	100.0%	21.03	1.07	55	0.0%	2.4%	45.8%
	M2M3_VC1302(714)	98.2%	23.41	1.26	54	100.0%	24.29	1.40	54	0.0%	3.8%	10.9%
	M2M3_HC43(754)	100.0%	21.59	7.40	55	100.0%	27.72	8.57	55	0.0%	28.4%	15.9%
A125704A	M2_M3_VC(4002)	100.0%	30.54	0.85	55	100.0%	30.43	0.77	55	0.0%	-0.4%	-8.5%
	M2M3_VC2028(712)	98.2%	20.33	0.75	54	100.0%	21.51	0.92	54	0.0%	5.8%	22.4%
	M2M3_VC1302(714)	100.0%	23.24	1.11	55	96.4%	25.13	4.20	53	-3.6%	8.1%	278.8%
	M2M3_HC43(754)	100.0%	20.91	8.00	55	100.0%	24.55	7.97	55	0.0%	17.4%	-0.4%
A129803A	M2_M3_VC(4002)	100.0%	30.99	0.94	55	100.0%	30.12	0.87	55	0.0%	-2.8%	-7.9%
	M2M3_VC2028(712)	100.0%	20.96	0.69	55	100.0%	22.31	0.88	55	0.0%	6.4%	27.5%
	M2M3_VC1302(714)	100.0%	24.05	0.99	55	100.0%	25.39	1.28	55	0.0%	5.6%	29.6%
	M2M3_HC43(754)	98.2%	21.30	7.54	54	101.9%	25.00	7.61	55	1.9%	17.4%	1.0%

Tables 10.1 – 10.3 summarize the results of the Met0-Met2 stacked via contact chains. All contact chains use the minimum allowed Via2 sizes of 3x3 um. Via1 sizes were 2x2 um (the minimum allowed) except for Tests 4015, 726, and 742 which used a Via1 size of 2x4 um. **Note that stacked minimum vias are NOT allowed under the B39 layout design rules. These test structures were included in this report for completeness and to demonstrate the robustness of this process.** High-density (2028 vias) via/contact chains w/ min. sized metal links were monitored under Tests 724 and 726. “Homer” via/contact chains were monitored under Tests 740 and 742.

**Table 10.1** Summary of Met0-to-Met2 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
A121504B	M0_M2_VC(4005)	100.0%	161.20	1.58	55	100.0%	162.26	1.75	55	0.0%	0.7%	10.6%
	M0_M2_VC2x4(4015)	100.0%	92.62	0.97	55	100.0%	93.64	10.45	55	0.0%	1.1%	980.8%
	M0M2_VC2028v2x2(724)	100.0%	108.67	1.21	55	100.0%	109.44	1.10	55	0.0%	0.7%	-9.0%
	M0M2_VC2028v2x4(726)	100.0%	90.13	1.25	55	100.0%	90.81	1.13	55	0.0%	0.8%	-10.2%
	M0M2_HC2x2(740)	100.0%	121.58	6.11	55	100.0%	118.63	7.17	55	0.0%	-2.4%	17.2%
	M0M2_HC2x4(742)	100.0%	115.21	7.86	55	100.0%	105.44	7.12	55	0.0%	-8.5%	-9.4%
A123302A	M0_M2_VC(4005)	100.0%	154.64	3.93	55	100.0%	155.14	4.04	55	0.0%	0.3%	2.7%
	M0_M2_VC2x4(4015)	100.0%	89.54	1.81	55	100.0%	88.40	1.86	55	0.0%	-1.3%	2.8%
	M0M2_VC2028v2x2(724)	100.0%	106.25	1.98	55	100.0%	106.62	1.81	55	0.0%	0.3%	-8.5%
	M0M2_VC2028v2x4(726)	100.0%	87.69	1.99	55	100.0%	88.49	1.99	55	0.0%	0.9%	0.2%
	M0M2_HC2x2(740)	100.0%	120.67	6.46	55	100.0%	117.73	7.09	55	0.0%	-2.4%	9.8%
	M0M2_HC2x4(742)	100.0%	114.08	9.33	55	100.0%	100.00	9.62	55	0.0%	-12.3%	3.1%
A125704A	M0_M2_VC(4005)	100.0%	160.33	2.55	55	100.0%	160.61	2.61	55	0.0%	0.2%	2.3%
	M0_M2_VC2x4(4015)	100.0%	89.92	1.18	55	100.0%	90.27	1.34	55	0.0%	0.4%	13.4%
	M0M2_VC2028v2x2(724)	96.4%	108.11	1.60	53	100.0%	108.47	1.66	53	0.0%	0.3%	3.7%
	M0M2_VC2028v2x4(726)	100.0%	89.88	1.25	55	100.0%	90.75	1.43	55	0.0%	1.0%	14.2%
	M0M2_HC2x2(740)	100.0%	117.73	7.87	55	100.0%	118.41	7.92	55	0.0%	0.6%	0.8%
	M0M2_HC2x4(742)	100.0%	101.59	8.69	55	100.0%	103.41	8.14	55	0.0%	1.8%	-6.3%
A129803A	M0_M2_VC(4005)	100.0%	162.03	3.57	55	100.0%	163.15	3.72	55	0.0%	0.7%	4.3%
	M0_M2_VC2x4(4015)	100.0%	89.89	1.67	55	100.0%	90.55	1.73	55	0.0%	0.7%	4.0%
	M0M2_VC2028v2x2(724)	100.0%	108.14	1.92	55	100.0%	108.57	1.71	55	0.0%	0.4%	-10.8%
	M0M2_VC2028v2x4(726)	96.4%	89.65	1.82	53	100.0%	90.27	1.58	53	0.0%	0.7%	-13.1%
	M0M2_HC2x2(740)	100.0%	117.05	8.46	55	100.0%	119.32	7.54	55	0.0%	1.9%	-10.9%
	M0M2_HC2x4(742)	100.0%	102.73	9.53	55	100.0%	102.96	8.99	55	0.0%	0.2%	-5.7%

**Table 10.2** Summary of Met0-to-Met2 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
A121504B	M0_M2_VC(4005)	100.0%	158.57	1.73	55	100.0%	157.91	1.97	55	0.0%	-0.4%	13.9%
	M0_M2_VC2x4(4015)	100.0%	91.01	1.05	55	100.0%	88.71	1.11	55	0.0%	-2.5%	4.9%
	M0M2_VC2028v2x2(724)	100.0%	106.77	1.07	55	100.0%	106.05	1.24	55	0.0%	-0.7%	16.7%
	M0M2_VC2028v2x4(726)	100.0%	88.50	1.31	55	100.0%	88.21	1.28	55	0.0%	-0.3%	-1.6%
	M0M2_HC2x2(740)	100.0%	119.08	6.74	55	100.0%	116.37	8.29	55	0.0%	-2.3%	22.9%
	M0M2_HC2x4(742)	100.0%	112.03	7.97	55	100.0%	99.78	9.16	55	0.0%	-10.9%	15.0%
A123302A	M0_M2_VC(4005)	100.0%	156.07	3.55	55	100.0%	155.88	3.56	55	0.0%	-0.1%	0.4%
	M0_M2_VC2x4(4015)	100.0%	88.55	1.56	55	100.0%	88.40	1.58	55	0.0%	-0.2%	0.8%
	M0M2_VC2028v2x2(724)	100.0%	106.93	1.93	55	100.0%	106.75	1.91	55	0.0%	-0.2%	-1.2%
	M0M2_VC2028v2x4(726)	100.0%	88.26	1.72	55	100.0%	88.17	1.78	55	0.0%	-0.1%	3.8%
	M0M2_HC2x2(740)	100.0%	119.31	6.72	55	100.0%	119.32	7.91	55	0.0%	0.0%	17.7%
	M0M2_HC2x4(742)	100.0%	100.67	8.81	55	100.0%	101.14	9.40	55	0.0%	0.5%	6.7%
A125704A	M0_M2_VC(4005)	100.0%	160.38	2.53	55	100.0%	160.37	2.53	55	0.0%	0.0%	0.1%
	M0_M2_VC2x4(4015)	100.0%	89.87	1.27	55	100.0%	89.82	1.26	55	0.0%	-0.1%	-0.3%
	M0M2_VC2028v2x2(724)	96.4%	108.15	1.65	53	100.0%	108.26	1.44	53	0.0%	0.1%	-12.6%
	M0M2_VC2028v2x4(726)	100.0%	89.84	1.67	55	100.0%	89.71	1.58	55	0.0%	-0.1%	-5.5%
	M0M2_HC2x2(740)	100.0%	118.19	8.27	55	100.0%	118.41	7.93	55	0.0%	0.2%	-4.1%
	M0M2_HC2x4(742)	98.2%	100.00	9.08	54	100.0%	101.16	8.51	54	0.0%	1.2%	-6.4%
A129803A	M0_M2_VC(4005)	100.0%	158.50	4.00	55	100.0%	157.70	4.04	55	0.0%	-0.5%	1.0%
	M0_M2_VC2x4(4015)	100.0%	88.84	1.73	55	100.0%	88.48	1.78	55	0.0%	-0.4%	3.0%
	M0M2_VC2028v2x2(724)	100.0%	107.77	1.90	55	100.0%	107.41	1.71	55	0.0%	-0.3%	-10.1%
	M0M2_VC2028v2x4(726)	100.0%	88.94	1.77	55	100.0%	87.95	1.82	55	0.0%	-1.1%	2.7%
	M0M2_HC2x2(740)	100.0%	118.19	7.91	55	100.0%	113.87	5.20	55	0.0%	-3.7%	-34.3%
	M0M2_HC2x4(742)	100.0%	100.69	9.45	55	100.0%	99.78	7.79	55	0.0%	-0.9%	-17.5%

**Table 10.3** Summary of Met0-to-Met2 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
A121504B	M0_M2_VC(4005)	100.0%	160.26	2.27	55	100.0%	166.50	3.87	55	0.0%	3.9%	70.7%
	M0_M2_VC2x4(4015)	98.2%	92.38	0.91	54	100.0%	94.34	1.90	54	0.0%	2.1%	107.8%
	M0M2_VC2028v2x2(724)	100.0%	108.27	1.55	55	100.0%	112.24	3.91	55	0.0%	3.7%	152.7%
	M0M2_VC2028v2x4(726)	100.0%	89.79	1.48	55	100.0%	93.46	2.51	55	0.0%	4.1%	69.9%
	M0M2_HC2x2(740)	100.0%	120.90	6.39	55	100.0%	126.12	7.33	55	0.0%	4.3%	14.7%
	M0M2_HC2x4(742)	100.0%	114.99	8.81	55	100.0%	116.81	7.31	55	0.0%	1.6%	-17.0%
A123302A	M0_M2_VC(4005)	100.0%	157.22	3.93	55	100.0%	160.58	5.36	55	0.0%	2.1%	36.4%
	M0_M2_VC2x4(4015)	100.0%	90.67	1.68	55	98.2%	95.22	5.82	54	-1.8%	5.0%	247.3%
	M0M2_VC2028v2x2(724)	100.0%	107.58	2.12	55	100.0%	109.87	3.94	55	0.0%	2.1%	85.7%
	M0M2_VC2028v2x4(726)	100.0%	88.78	2.01	55	100.0%	92.39	3.39	55	0.0%	4.1%	68.7%
	M0M2_HC2x2(740)	100.0%	120.67	6.90	55	100.0%	127.94	15.02	55	0.0%	6.0%	117.8%
	M0M2_HC2x4(742)	100.0%	112.94	8.32	55	100.0%	119.53	14.98	55	0.0%	5.8%	80.1%
A125704A	M0_M2_VC(4005)	100.0%	160.37	2.57	55	100.0%	164.71	4.88	55	0.0%	2.7%	89.9%
	M0_M2_VC2x4(4015)	100.0%	89.97	1.28	55	100.0%	91.80	1.98	55	0.0%	2.0%	55.4%
	M0M2_VC2028v2x2(724)	100.0%	108.27	1.65	55	98.2%	110.46	2.81	54	-1.8%	2.0%	70.2%
	M0M2_VC2028v2x4(726)	100.0%	89.84	1.42	55	100.0%	92.76	2.22	55	0.0%	3.3%	56.2%
	M0M2_HC2x2(740)	100.0%	118.41	7.92	55	100.0%	122.28	7.49	55	0.0%	3.3%	-5.5%
	M0M2_HC2x4(742)	100.0%	100.46	7.97	55	100.0%	107.28	8.90	55	0.0%	6.8%	11.8%
A129803A	M0_M2_VC(4005)	100.0%	161.34	3.28	55	100.0%	163.28	3.26	55	0.0%	1.2%	-0.4%
	M0_M2_VC2x4(4015)	100.0%	89.41	1.58	55	100.0%	90.44	1.10	55	0.0%	1.2%	-30.8%
	M0M2_VC2028v2x2(724)	96.4%	108.60	1.69	53	100.0%	110.10	2.38	53	0.0%	1.4%	40.8%
	M0M2_VC2028v2x4(726)	98.2%	89.64	1.74	54	100.0%	93.20	1.62	54	0.0%	4.0%	-6.8%
	M0M2_HC2x2(740)	100.0%	117.28	7.41	55	100.0%	125.92	8.95	55	0.0%	7.4%	20.8%
	M0M2_HC2x4(742)	100.0%	100.46	7.97	55	100.0%	109.55	7.59	55	0.0%	9.1%	-4.7%

Tables 11.1 – 11.3 summarize the results of the Met1-Met3 stacked via contact chains. All contact chains use the minimum allowed Via2 and Via3 sizes of 3x3 um. **Note that coincident Via2 and Via3 are NOT allowed under the current B39 layout design rules. These test structures were included in this report for completeness and to demonstrate the robustness of this process.** High-density (2028 & 1302 vias) via/contact chains w/ min. sized metal links were monitored under Tests 728 and 730. “Homer” via/contact chains were monitored under Tests 764 and 774. Via3 was unstacked for Test 774.

**Table 11.1** Summary of Met1-to-Met3 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
A121504B	M1_M3_VC(4006)	100.0%	33.90	0.64	55	100.0%	34.29	0.76	55	0.0%	1.1%	18.7%
	M1M3_VC2028(728)	100.0%	30.59	0.77	55	100.0%	30.68	0.82	55	0.0%	0.3%	6.4%
	M1M3_VC1302(730)	100.0%	33.29	1.18	55	100.0%	33.34	1.05	55	0.0%	0.2%	-11.2%
	M1M3_HCstack(764)	100.0%	29.54	8.11	55	100.0%	31.82	9.26	55	0.0%	7.7%	14.2%
	M1M3_HC1.0off(774)	100.0%	32.95	8.11	55	100.0%	41.13	7.86	55	0.0%	24.8%	-3.1%
A123302A	M1_M3_VC(4006)	100.0%	33.22	0.72	55	100.0%	33.55	0.73	55	0.0%	1.0%	1.6%
	M1M3_VC2028(728)	100.0%	30.01	0.73	55	100.0%	30.38	0.67	55	0.0%	1.2%	-8.4%
	M1M3_VC1302(730)	100.0%	32.34	1.16	55	100.0%	32.87	1.09	55	0.0%	1.7%	-6.1%
	M1M3_HCstack(764)	100.0%	27.50	8.80	55	100.0%	28.18	8.06	55	0.0%	2.5%	-8.5%
	M1M3_HC1.0off(774)	100.0%	35.68	6.55	55	100.0%	35.23	7.25	55	0.0%	-1.3%	10.7%
A125704A	M1_M3_VC(4006)	100.0%	33.60	0.59	55	100.0%	33.99	0.50	55	0.0%	1.1%	-15.3%
	M1M3_VC2028(728)	100.0%	30.52	0.75	55	100.0%	30.93	0.81	55	0.0%	1.4%	9.1%
	M1M3_VC1302(730)	100.0%	32.90	1.01	55	100.0%	33.49	1.08	55	0.0%	1.8%	7.1%
	M1M3_HCstack(764)	100.0%	29.09	8.35	55	100.0%	29.09	8.00	55	0.0%	0.0%	-4.2%
	M1M3_HC1.0off(774)	100.0%	35.46	6.70	55	100.0%	34.55	7.97	55	0.0%	-2.6%	18.8%
A129803A	M1_M3_VC(4006)	100.0%	33.37	0.49	55	98.2%	33.77	0.52	54	-1.8%	1.2%	6.4%
	M1M3_VC2028(728)	100.0%	30.25	0.78	55	98.2%	31.21	3.56	54	-1.8%	3.2%	353.7%
	M1M3_VC1302(730)	100.0%	32.96	1.10	55	100.0%	33.60	1.15	55	0.0%	1.9%	4.4%
	M1M3_HCstack(764)	100.0%	27.96	8.32	55	100.0%	30.00	7.83	55	0.0%	7.3%	-5.9%
	M1M3_HC1.0off(774)	100.0%	34.32	6.00	55	100.0%	34.77	8.57	55	0.0%	1.3%	42.9%

**Table 11.2** Summary of Met1-to-Met3 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
A121504B	M1_M3_VC(4006)	100.0%	33.52	0.73	55	100.0%	33.29	0.71	55	0.0%	-0.7%	-2.7%
	M1M3_VC2028(728)	100.0%	30.34	0.80	55	100.0%	30.30	0.92	55	0.0%	-0.1%	14.3%
	M1M3_VC1302(730)	100.0%	33.18	1.27	55	100.0%	32.76	1.11	55	0.0%	-1.3%	-13.0%
	M1M3_HCstack(764)	100.0%	26.59	8.69	55	100.0%	27.50	8.81	55	0.0%	3.4%	1.3%
	M1M3_HC1.0off(774)	100.0%	34.77	7.49	55	100.0%	34.32	7.30	55	0.0%	-1.3%	-2.4%
A123302A	M1_M3_VC(4006)	100.0%	32.77	0.58	55	100.0%	32.65	0.58	55	0.0%	-0.3%	0.0%
	M1M3_VC2028(728)	100.0%	29.64	0.79	55	100.0%	29.39	0.81	55	0.0%	-0.8%	2.8%
	M1M3_VC1302(730)	100.0%	31.86	1.23	55	100.0%	32.04	0.95	55	0.0%	0.5%	-22.2%
	M1M3_HCstack(764)	100.0%	27.50	8.80	55	100.0%	27.50	7.76	55	0.0%	0.0%	-11.9%
	M1M3_HC1.0off(774)	100.0%	35.45	6.26	55	100.0%	31.59	6.74	55	0.0%	-10.9%	7.8%
A125704A	M1_M3_VC(4006)	100.0%	33.75	0.62	55	100.0%	33.62	0.60	55	0.0%	-0.4%	-2.7%
	M1M3_VC2028(728)	100.0%	30.57	0.83	55	100.0%	30.43	0.75	55	0.0%	-0.5%	-9.8%
	M1M3_VC1302(730)	100.0%	32.79	1.11	55	100.0%	32.93	1.06	55	0.0%	0.4%	-5.2%
	M1M3_HCstack(764)	100.0%	27.73	8.90	55	100.0%	28.86	8.29	55	0.0%	4.1%	-6.9%
	M1M3_HC1.0off(774)	100.0%	33.18	7.69	55	100.0%	33.18	7.69	55	0.0%	0.0%	0.0%
A129803A	M1_M3_VC(4006)	98.2%	33.05	0.58	54	100.0%	32.81	0.57	54	0.0%	-0.7%	-2.6%
	M1M3_VC2028(728)	100.0%	30.11	0.68	55	100.0%	29.91	0.66	55	0.0%	-0.7%	-3.1%
	M1M3_VC1302(730)	100.0%	32.85	1.00	55	100.0%	31.48	0.88	55	0.0%	-4.2%	-12.1%
	M1M3_HCstack(764)	100.0%	27.50	8.12	55	100.0%	26.82	4.45	55	0.0%	-2.5%	-45.2%
	M1M3_HC1.0off(774)	100.0%	35.00	7.38	55	100.0%	32.96	8.11	55	0.0%	-5.8%	9.9%

**Table 11.3** Summary of Met1-to-Met3 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
A121504B	M1_M3_VC(4006)	100.0%	33.77	0.61	55	100.0%	33.12	2.61	55	0.0%	-1.9%	329.1%
	M1M3_VC2028(728)	100.0%	30.52	0.64	55	98.2%	30.75	1.41	54	-1.8%	0.8%	119.7%
	M1M3_VC1302(730)	100.0%	32.87	1.05	55	100.0%	32.81	1.78	55	0.0%	-0.2%	69.8%
	M1M3_HCstack(764)	100.0%	29.77	8.84	55	90.9%	32.25	7.61	50	-9.1%	8.3%	-13.8%
	M1M3_HC1.0off(774)	100.0%	35.45	7.52	55	100.0%	40.90	10.05	55	0.0%	15.4%	33.7%
A123302A	M1_M3_VC(4006)	100.0%	32.95	0.63	55	98.2%	33.15	1.00	54	-1.8%	0.6%	58.3%
	M1M3_VC2028(728)	100.0%	29.87	0.88	55	98.2%	30.04	2.03	54	-1.8%	0.6%	130.3%
	M1M3_VC1302(730)	100.0%	32.45	1.03	55	98.2%	32.14	2.86	54	-1.8%	-1.0%	178.8%
	M1M3_HCstack(764)	100.0%	27.04	8.25	55	100.0%	32.27	7.49	55	0.0%	19.3%	-9.2%
	M1M3_HC1.0off(774)	100.0%	34.54	6.35	55	100.0%	39.54	8.59	55	0.0%	14.5%	35.4%
A125704A	M1_M3_VC(4006)	100.0%	33.46	0.63	55	100.0%	32.86	0.71	55	0.0%	-1.8%	13.3%
	M1M3_VC2028(728)	98.2%	30.34	0.81	54	100.0%	30.61	1.52	54	0.0%	0.9%	87.3%
	M1M3_VC1302(730)	94.5%	32.85	1.06	52	100.0%	33.35	1.86	52	0.0%	1.5%	75.3%
	M1M3_HCstack(764)	100.0%	28.41	9.15	55	100.0%	31.36	6.75	55	0.0%	10.4%	-26.2%
	M1M3_HC1.0off(774)	100.0%	34.09	7.78	55	100.0%	38.64	8.43	55	0.0%	13.3%	8.3%
A129803A	M1_M3_VC(4006)	100.0%	33.62	0.63	55	100.0%	31.45	0.51	55	0.0%	-6.4%	-19.0%
	M1M3_VC2028(728)	98.2%	30.70	0.74	54	100.0%	31.23	1.21	54	0.0%	1.7%	63.1%
	M1M3_VC1302(730)	100.0%	33.40	1.08	55	100.0%	34.55	1.41	55	0.0%	3.4%	31.5%
	M1M3_HCstack(764)	100.0%	29.32	8.75	55	100.0%	32.73	8.50	55	0.0%	11.6%	-2.8%

Tables 12.1 – 12.3 summarize the results of the Met0-Met3 stacked via contact chains. All contact chains use the minimum allowed Via2 and Via3 sizes of 3x3 um. All Via1 sizes were 2x2 um (the minimum allowed) except for Test 4017 which used a Via1 size of 2x4 um. **Note that stacked minimum vias are NOT allowed under the B39 layout design rules. These test structures were included in this report for completeness and to demonstrate the robustness of this process.** High-density (2028 & 1302 vias) via/contact chains w/ min. sized metal links were monitored under Tests 732 and 734. “Homer” via/contact chains were monitored under Tests 776 and 782. Via3 was unstacked for Test 782.

**Table 12.1** Summary of Met0-to-Met3 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
A121504B	M0_M3_VC(4007)	100.0%	247.52	4.16	55	98.2%	252.61	23.42	54	-1.8%	2.1%	462.8%
	M0_M3_VC2x4(4017)	100.0%	162.89	2.96	55	100.0%	163.72	2.96	55	0.0%	0.5%	0.0%
	M0M3_VC2028(732)	100.0%	112.93	1.36	55	98.2%	113.88	1.19	54	-1.8%	0.8%	-12.0%
	M0M3_VC1302(734)	100.0%	134.27	1.84	55	100.0%	134.24	2.22	55	0.0%	0.0%	20.9%
	M0M3_HCstack(776)	100.0%	119.99	6.18	55	100.0%	120.22	8.84	55	0.0%	0.2%	43.0%
	M0M3_HC1.0off(782)	100.0%	135.21	8.01	55	100.0%	129.08	7.63	55	0.0%	-4.5%	-4.8%
A123302A	M0_M3_VC(4007)	100.0%	235.42	7.22	55	100.0%	235.94	7.43	55	0.0%	0.2%	3.0%
	M0_M3_VC2x4(4017)	100.0%	156.47	4.21	55	100.0%	157.25	4.17	55	0.0%	0.5%	-0.9%
	M0M3_VC2028(732)	100.0%	110.18	2.16	55	100.0%	110.64	2.16	55	0.0%	0.4%	0.3%
	M0M3_VC1302(734)	98.2%	130.19	3.08	54	100.0%	130.46	3.03	54	0.0%	0.2%	-1.8%
	M0M3_HCstack(776)	100.0%	114.08	8.69	55	100.0%	116.60	7.63	55	0.0%	2.2%	-12.2%
	M0M3_HC1.0off(782)	100.0%	131.12	7.93	55	100.0%	121.82	7.30	55	0.0%	-7.1%	-7.9%
A125704A	M0_M3_VC(4007)	100.0%	245.08	5.39	55	100.0%	250.37	22.14	55	0.0%	2.2%	310.4%
	M0_M3_VC2x4(4017)	100.0%	160.98	3.24	55	100.0%	161.65	3.34	55	0.0%	0.4%	3.2%
	M0M3_VC2028(732)	100.0%	112.55	1.69	55	100.0%	113.02	1.81	55	0.0%	0.4%	7.2%
	M0M3_VC1302(734)	100.0%	133.23	2.46	55	100.0%	133.84	2.31	55	0.0%	0.5%	-6.3%
	M0M3_HCstack(776)	100.0%	117.96	7.52	55	100.0%	120.92	5.92	55	0.0%	2.5%	-21.3%
	M0M3_HC1.0off(782)	100.0%	122.28	8.90	55	100.0%	122.05	7.20	55	0.0%	-0.2%	-19.1%
A129803A	M0_M3_VC(4007)	100.0%	247.92	6.91	55	100.0%	254.78	23.63	55	0.0%	2.8%	242.1%
	M0_M3_VC2x4(4017)	100.0%	161.68	4.00	55	100.0%	164.09	13.36	55	0.0%	1.5%	233.8%
	M0M3_VC2028(732)	96.4%	112.52	2.11	53	96.2%	113.16	3.26	51	-3.8%	0.6%	54.3%
	M0M3_VC1302(734)	100.0%	133.59	3.00	55	100.0%	133.84	3.03	55	0.0%	0.2%	0.9%
	M0M3_HCstack(776)	100.0%	117.96	7.12	55	100.0%	119.55	6.26	55	0.0%	1.3%	-12.2%
	M0M3_HC1.0off(782)	100.0%	121.82	7.69	55	100.0%	124.32	9.45	55	0.0%	2.1%	22.8%

**Table 12.2** Summary of Met0-to-Met3 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
A121504B	M0_M3_VC(4007)	100.0%	243.06	4.75	55	100.0%	242.10	4.99	55	0.0%	-0.4%	5.0%
	M0_M3_VC2x4(4017)	100.0%	159.50	3.07	55	100.0%	158.75	3.14	55	0.0%	-0.5%	2.3%
	M0M3_VC2028(732)	100.0%	111.14	1.19	55	100.0%	110.51	1.53	55	0.0%	-0.6%	28.8%
	M0M3_VC1302(734)	100.0%	131.73	2.03	55	98.2%	130.86	2.29	54	-1.8%	-0.7%	13.2%
	M0M3_HCstack(776)	100.0%	119.31	7.54	55	94.5%	129.81	24.15	52	-5.5%	8.8%	220.4%
	M0M3_HC1.0off(782)	100.0%	133.40	6.83	55	100.0%	122.96	8.60	55	0.0%	-7.8%	25.9%
A123302A	M0_M3_VC(4007)	100.0%	237.71	6.93	55	100.0%	237.51	6.97	55	0.0%	-0.1%	0.6%
	M0_M3_VC2x4(4017)	100.0%	157.81	4.07	55	100.0%	157.62	4.09	55	0.0%	-0.1%	0.5%
	M0M3_VC2028(732)	100.0%	111.00	1.96	55	100.0%	110.82	1.96	55	0.0%	-0.2%	-0.1%
	M0M3_VC1302(734)	100.0%	131.31	2.82	55	100.0%	131.19	2.84	55	0.0%	-0.1%	0.8%
	M0M3_HCstack(776)	100.0%	118.17	7.91	55	100.0%	116.14	9.21	55	0.0%	-1.7%	16.5%
	M0M3_HC1.0off(782)	100.0%	121.35	7.86	55	100.0%	121.60	6.99	55	0.0%	0.2%	-11.0%
A125704A	M0_M3_VC(4007)	100.0%	245.11	5.34	55	100.0%	245.08	5.36	55	0.0%	0.0%	0.3%
	M0_M3_VC2x4(4017)	100.0%	160.93	3.30	55	100.0%	160.79	3.32	55	0.0%	-0.1%	0.5%
	M0M3_VC2028(732)	98.2%	112.78	1.63	54	100.0%	112.63	1.63	54	0.0%	-0.1%	0.1%
	M0M3_VC1302(734)	98.2%	133.65	2.44	54	100.0%	133.48	2.66	54	0.0%	-0.1%	9.0%
	M0M3_HCstack(776)	98.2%	117.14	8.86	54	100.0%	116.44	8.35	54	0.0%	-0.6%	-5.7%
	M0M3_HC1.0off(782)	100.0%	121.82	7.69	55	100.0%	121.60	8.14	55	0.0%	-0.2%	5.9%
A129803A	M0_M3_VC(4007)	100.0%	243.76	7.10	55	100.0%	242.75	7.25	55	0.0%	-0.4%	2.1%
	M0_M3_VC2x4(4017)	100.0%	159.98	4.05	55	100.0%	159.27	4.06	55	0.0%	-0.4%	0.2%
	M0M3_VC2028(732)	100.0%	111.66	1.88	55	100.0%	111.32	1.93	55	0.0%	-0.3%	3.1%
	M0M3_VC1302(734)	100.0%	132.47	2.90	55	100.0%	130.74	2.61	55	0.0%	-1.3%	-10.0%
	M0M3_HCstack(776)	100.0%	118.87	7.93	55	100.0%	115.00	5.59	55	0.0%	-3.2%	-29.5%
	M0M3_HC1.0off(782)	100.0%	122.28	7.86	55	100.0%	115.00	5.05	55	0.0%	-5.9%	-35.8%

**Table 12.3** Summary of Met0-to-Met3 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
A121504B	M0_M3_VC(4007)	100.0%	244.76	4.55	55	100.0%	249.89	8.73	55	0.0%	2.1%	92.0%
	M0_M3_VC2x4(4017)	98.2%	160.89	3.03	54	100.0%	161.93	4.07	54	0.0%	0.6%	34.4%
	M0M3_VC2028(732)	98.2%	111.99	1.48	54	100.0%	115.12	9.07	54	0.0%	2.8%	512.7%
	M0M3_VC1302(734)	100.0%	132.68	2.22	55	100.0%	133.57	2.94	55	0.0%	0.7%	32.5%
	M0M3_HCstack(776)	100.0%	116.80	8.75	55	98.2%	124.29	10.42	54	-1.8%	6.4%	19.2%
	M0M3_HC1.0off(782)	100.0%	133.85	7.08	55	100.0%	141.35	9.58	55	0.0%	5.6%	35.3%
A123302A	M0_M3_VC(4007)	100.0%	238.66	7.48	55	100.0%	244.57	9.56	55	0.0%	2.5%	27.8%
	M0_M3_VC2x4(4017)	100.0%	158.03	4.32	55	100.0%	162.48	10.52	55	0.0%	2.8%	143.4%
	M0M3_VC2028(732)	100.0%	111.50	2.08	55	100.0%	112.50	2.80	55	0.0%	0.9%	34.5%
	M0M3_VC1302(734)	98.2%	131.55	3.34	54	98.1%	130.81	3.91	53	-1.9%	-0.6%	17.2%
	M0M3_HCstack(776)	100.0%	116.58	8.00	55	100.0%	121.58	7.40	55	0.0%	4.3%	-7.5%
	M0M3_HC1.0off(782)	100.0%	134.76	7.09	55	100.0%	146.35	9.52	55	0.0%	8.6%	34.3%
A125704A	M0_M3_VC(4007)	100.0%	244.76	4.91	55	100.0%	248.23	6.47	55	0.0%	1.4%	31.8%
	M0_M3_VC2x4(4017)	100.0%	160.75	3.21	55	100.0%	162.48	4.06	55	0.0%	1.1%	26.2%
	M0M3_VC2028(732)	98.2%	113.00	5.55	54	98.1%	113.58	2.93	53	-1.9%	0.5%	-47.2%
	M0M3_VC1302(734)	98.2%	133.30	2.54	54	101.9%	133.54	3.54	55	1.9%	0.2%	39.1%
	M0M3_HCstack(776)	100.0%	117.51	8.54	55	100.0%	122.28	8.22	55	0.0%	4.1%	-3.7%
	M0M3_HC1.0off(782)	100.0%	122.50	7.37	55	100.0%	130.46	7.89	55	0.0%	6.5%	7.0%
A129803A	M0_M3_VC(4007)	100.0%	246.56	6.34	55	100.0%	248.17	6.82	55	0.0%	0.7%	7.5%
	M0M3_VC2028(732)	100.0%	112.66	1.89	55	98.2%	116.30	14.88	54	-1.8%	3.2%	688.5%
	M0M3_VC1302(734)	100.0%	133.93	2.49	55	100.0%	135.35	2.29	55	0.0%	1.1%	-8.3%
	M0M3_HCstack(776)	100.0%	118.42	7.55	55	100.0%	127.51	8.12	55	0.0%	7.7%	7.6%
	M0M3_HC1.0off(782)	100.0%	122.51	7.38	55	100.0%	133.87	9.21	55	0.0%	9.3%	24.9%

## CAPACITORS

Overall, capacitors showed no significant changes (within measurement tolerances) in capacitance/area and leakage current over all stresses. The capacitance/area (C/A) test is in units of aF/um<sup>2</sup>. The leakage tests at 10V and 25V are in units of pA.

Tables 13, 14, 15, and 16 summarize the results from the 5K, 16.5K, 91K, and 182K sq. um MIM PSN capacitor test structures, respectively.

**Table 13.1** Summary of 5K sq. um MIM PSN capacitors 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
A121504B	MIM5k_C/A_11(8041)	100.0%	618.14	3.54	55	100.0%	618.08	3.48	55	0.0%	0.0%	-1.7%
	MIM5k_11_10(8044)	100.0%	16.26	1.52	55	100.0%	15.03	1.43	55	0.0%	-7.6%	-6.1%
	MIM5k_11_25(8046)	100.0%	37.11	1.39	55	100.0%	34.83	1.41	55	0.0%	-6.1%	1.5%
A123302A	MIM5k_C/A_11(8041)	100.0%	620.72	4.02	55	100.0%	620.64	4.12	55	0.0%	0.0%	2.4%
	MIM5k_11_10(8044)	100.0%	15.96	1.25	55	100.0%	15.03	1.34	55	0.0%	-5.9%	6.8%
	MIM5k_11_25(8046)	100.0%	36.54	1.70	55	100.0%	35.13	1.26	55	0.0%	-3.9%	-26.0%
A125704A	MIM5k_C/A_11(8041)	100.0%	603.85	3.87	55	100.0%	603.95	3.89	55	0.0%	0.0%	0.7%
	MIM5k_11_10(8044)	100.0%	17.32	1.45	55	100.0%	15.28	1.24	55	0.0%	-11.8%	-14.2%
	MIM5k_11_25(8046)	100.0%	40.29	2.50	55	100.0%	34.82	1.55	55	0.0%	-13.6%	-38.1%
A129803A	MIM5k_C/A_11(8041)	100.0%	628.80	2.75	55	100.0%	628.91	2.76	55	0.0%	0.0%	0.5%
	MIM5k_11_10(8044)	100.0%	17.64	1.36	55	100.0%	71.12	2.67	55	0.0%	303%	95.9%
	MIM5k_11_25(8046)	100.0%	43.37	2.09	55	100.0%	174.02	5.72	55	0.0%	301%	173.6%

**Table 13.2** Summary of 5K sq. um MIM PSN capacitors 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
A121504B	MIM5k_C/A_11(8041)	100.0%	614.93	3.50	55	100.0%	614.84	3.54	55	0.0%	0.0%	1.0%
	MIM5k_11_10(8044)	100.0%	16.32	1.10	55	100.0%	14.88	1.22	55	0.0%	-8.9%	10.6%
	MIM5k_11_25(8046)	98.2%	36.63	1.54	54	100.0%	34.34	1.71	54	0.0%	-6.2%	10.9%
A123302A	MIM5k_C/A_11(8041)	100.0%	618.06	3.83	55	100.0%	618.10	3.82	55	0.0%	0.0%	-0.3%
	MIM5k_11_10(8044)	100.0%	17.52	1.37	55	100.0%	87.33	2.42	55	0.0%	399%	75.9%
	MIM5k_11_25(8046)	100.0%	41.46	2.29	55	100.0%	213.16	3.98	55	0.0%	414%	74.1%
A125704A	MIM5k_C/A_11(8041)	100.0%	603.36	3.81	55	100.0%	603.44	3.79	55	0.0%	0.0%	-0.6%
	MIM5k_11_10(8044)	100.0%	16.24	1.18	55	100.0%	15.64	1.43	55	0.0%	-3.7%	21.0%
	MIM5k_11_25(8046)	100.0%	38.84	1.58	55	100.0%	36.65	1.59	55	0.0%	-5.6%	0.9%
A129803A	MIM5k_C/A_11(8041)	100.0%	631.46	3.10	55	100.0%	631.51	3.09	55	0.0%	0.0%	-0.5%
	MIM5k_11_10(8044)	100.0%	16.29	1.37	55	100.0%	14.55	1.42	55	0.0%	-10.7%	3.6%
	MIM5k_11_25(8046)	98.2%	39.47	1.92	54	100.0%	35.46	1.81	54	0.0%	-10.2%	-5.9%

**Table 13.3** Summary of 5K sq. um MIM PSN capacitors 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
A121504B	MIM5k_C/A_11(8041)	100.0%	653.84	10.82	55	100.0%	653.87	10.85	55	0.0%	0.0%	0.3%
	MIM5k_11_10(8044)	100.0%	16.95	1.33	55	100.0%	14.98	1.27	55	0.0%	-11.6%	-5.0%
	MIM5k_11_25(8046)	100.0%	45.70	4.52	55	100.0%	40.41	5.79	55	0.0%	-11.6%	28.1%
A123302A	MIM5k_C/A_11(8041)	100.0%	628.04	4.20	55	100.0%	628.05	4.20	55	0.0%	0.0%	0.1%
	MIM5k_11_10(8044)	100.0%	18.05	1.73	55	100.0%	15.01	1.36	55	0.0%	-16.8%	-21.8%
	MIM5k_11_25(8046)	100.0%	43.15	3.20	55	100.0%	34.17	1.52	55	0.0%	-20.8%	-52.4%
A125704A	MIM5k_C/A_11(8041)	100.0%	642.60	8.18	55	100.0%	642.28	8.26	55	0.0%	0.0%	1.0%
	MIM5k_11_10(8044)	100.0%	20.00	1.77	55	100.0%	14.98	1.28	55	0.0%	-25.1%	-27.6%
	MIM5k_11_25(8046)	100.0%	48.32	3.33	55	100.0%	35.23	2.04	55	0.0%	-27.1%	-38.9%
A129803A	MIM5k_C/A_11(8041)	100.0%	638.52	7.50	55	100.0%	638.50	7.61	55	0.0%	0.0%	1.5%
	MIM5k_11_10(8044)	100.0%	16.98	1.69	55	100.0%	14.77	1.28	55	0.0%	-13.0%	-24.0%
	MIM5k_11_25(8046)	100.0%	41.58	3.80	55	100.0%	35.24	2.46	55	0.0%	-15.2%	-35.2%

**Table 14.1** Summary of 16.5K sq. um MIM PSN capacitors 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
A121504B	MIM16.5k_C/A_10(8111)	100.0%	612.53	3.39	55	100.0%	612.61	3.39	55	0.0%	0.0%	0.0%
	MIM16.5k_10_10(8114)	100.0%	16.44	1.42	55	100.0%	15.10	1.20	55	0.0%	-8.1%	-15.6%
	MIM16.5k_10_25(8116)	100.0%	38.49	2.26	55	100.0%	35.88	1.61	55	0.0%	-6.8%	-28.9%
A123302A	MIM16.5k_C/A_10(8111)	100.0%	614.66	3.78	55	100.0%	614.74	3.79	55	0.0%	0.0%	0.2%
	MIM16.5k_10_10(8114)	100.0%	16.17	1.04	55	100.0%	15.11	1.31	55	0.0%	-6.6%	25.9%
	MIM16.5k_10_25(8116)	100.0%	38.91	2.23	55	100.0%	36.23	1.81	55	0.0%	-6.9%	-19.0%
A125704A	MIM16.5k_C/A_10(8111)	100.0%	598.58	3.78	55	100.0%	598.65	3.78	55	0.0%	0.0%	0.0%
	MIM16.5k_10_10(8114)	100.0%	17.59	1.23	55	100.0%	15.23	1.28	55	0.0%	-13.4%	4.6%
	MIM16.5k_10_25(8116)	100.0%	41.62	2.43	55	100.0%	36.08	1.54	55	0.0%	-13.3%	-36.6%
A129803A	MIM16.5k_C/A_10(8111)	100.0%	623.67	2.51	55	100.0%	623.78	2.40	55	0.0%	0.0%	-4.3%
	MIM16.5k_10_10(8114)	100.0%	18.29	1.34	55	100.0%	74.26	2.54	55	0.0%	306%	90.3%
	MIM16.5k_10_25(8116)	100.0%	46.89	3.49	55	100.0%	179.11	5.88	55	0.0%	282%	68.5%

**Table 14.2** Summary of 16.5K sq. um MIM PSN capacitors 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
A121504B	MIM16.5k_C/A_10(8111)	100.0%	609.77	3.50	55	100.0%	609.81	3.49	55	0.0%	0.0%	-0.3%
	MIM16.5k_10_10(8114)	100.0%	16.49	1.08	55	100.0%	14.98	1.20	55	0.0%	-9.1%	11.3%
	MIM16.5k_10_25(8116)	100.0%	38.52	1.85	55	100.0%	35.49	1.39	55	0.0%	-7.9%	-24.8%
A123302A	MIM16.5k_C/A_10(8111)	100.0%	612.04	3.62	55	100.0%	612.05	3.63	55	0.0%	0.0%	0.2%
	MIM16.5k_10_10(8114)	98.2%	17.91	1.34	54	100.0%	89.52	2.45	54	0.0%	400%	83.3%
	MIM16.5k_10_25(8116)	98.2%	44.25	3.05	54	100.0%	216.65	5.13	54	0.0%	390%	68.1%
A125704A	MIM16.5k_C/A_10(8111)	100.0%	597.94	3.52	55	100.0%	597.95	3.53	55	0.0%	0.0%	0.1%
	MIM16.5k_10_10(8114)	100.0%	17.20	1.22	55	100.0%	16.00	1.50	55	0.0%	-7.0%	23.0%
	MIM16.5k_10_25(8116)	100.0%	39.81	1.39	55	100.0%	37.70	1.57	55	0.0%	-5.3%	13.4%
A129803A	MIM16.5k_C/A_10(8111)	100.0%	626.72	2.99	55	100.0%	626.64	3.00	55	0.0%	0.0%	0.3%
	MIM16.5k_10_10(8114)	100.0%	16.53	1.28	55	100.0%	14.86	1.44	55	0.0%	-10.1%	13.1%
	MIM16.5k_10_25(8116)	98.2%	44.75	4.35	54	100.0%	39.97	3.65	54	0.0%	-10.7%	-16.2%

**Table 14.3** Summary of 16.5K sq. um MIM PSN capacitors 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
A121504B	MIM16.5k_C/A_10(8111)	100.0%	648.27	10.61	55	100.0%	648.45	10.55	55	0.0%	0.0%	-0.5%
	MIM16.5k_10_10(8114)	100.0%	17.32	1.61	55	100.0%	15.15	1.34	55	0.0%	-12.5%	-17.1%
	MIM16.5k_10_25(8116)	100.0%	61.19	15.48	55	100.0%	58.25	17.68	55	0.0%	-4.8%	14.3%
A123302A	MIM16.5k_C/A_10(8111)	100.0%	621.67	3.99	55	100.0%	621.87	3.92	55	0.0%	0.0%	-1.5%
	MIM16.5k_10_10(8114)	98.2%	18.57	1.49	54	100.0%	15.31	1.17	54	0.0%	-17.6%	-21.8%
	MIM16.5k_10_25(8116)	98.2%	45.87	3.78	54	100.0%	37.53	2.87	54	0.0%	-18.2%	-24.0%
A125704A	MIM16.5k_C/A_10(8111)	100.0%	637.42	7.94	55	100.0%	637.46	7.85	55	0.0%	0.0%	-1.1%
	MIM16.5k_10_10(8114)	100.0%	19.87	1.46	55	100.0%	14.99	1.17	55	0.0%	-24.6%	-20.4%
	MIM16.5k_10_25(8116)	100.0%	49.74	2.49	55	100.0%	38.31	2.37	55	0.0%	-23.0%	-4.7%
A129803A	MIM16.5k_C/A_10(8111)	100.0%	633.58	7.25	55	100.0%	633.53	7.23	55	0.0%	0.0%	-0.2%
	MIM16.5k_10_10(8114)	100.0%	17.23	1.53	55	100.0%	15.01	1.50	55	0.0%	-12.9%	-2.0%
	MIM16.5k_10_25(8116)	100.0%	46.00	5.22	55	100.0%	40.44	4.65	55	0.0%	-12.1%	-10.9%

**Table 15.1** Summary of 91K sq. um MIM PSN capacitors 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
A121504B	MIM91k_C/A_10(8181)	100.0%	614.46	3.49	55	100.0%	615.01	3.50	55	0.0%	0.1%	0.4%
	MIM91k_10_10(8184)	100.0%	14.82	1.17	55	100.0%	17.74	1.59	55	0.0%	19.7%	35.9%
	MIM91k_10_25(8186)	100.0%	46.43	6.57	55	100.0%	51.70	4.49	55	0.0%	11.3%	-31.7%
A123302A	MIM91k_C/A_10(8181)	100.0%	616.98	3.60	55	100.0%	617.83	3.63	55	0.0%	0.1%	1.0%
	MIM91k_10_10(8184)	100.0%	15.05	1.30	55	100.0%	12.97	1.25	55	0.0%	-13.8%	-3.8%
	MIM91k_10_25(8186)	100.0%	46.47	7.48	55	100.0%	39.72	6.10	55	0.0%	-14.5%	-18.5%
A125704A	MIM91k_C/A_10(8181)	100.0%	601.39	3.91	55	100.0%	601.49	3.90	55	0.0%	0.0%	-0.3%
	MIM91k_10_10(8184)	100.0%	22.79	2.19	55	100.0%	13.16	1.52	55	0.0%	-42.2%	-30.4%
	MIM91k_10_25(8186)	100.0%	62.17	6.81	55	100.0%	37.05	5.00	55	0.0%	-40.4%	-26.5%
A129803A	MIM16.5k_C/A_10(8111)	100.0%	623.67	2.51	55	100.0%	623.78	2.40	55	0.0%	0.0%	-4.3%
	MIM16.5k_10_10(8114)	100.0%	18.29	1.34	55	100.0%	74.26	2.54	55	0.0%	306%	90.3%
	MIM16.5k_10_25(8116)	100.0%	46.89	3.49	55	100.0%	179.11	5.88	55	0.0%	282%	68.5%
A129803A	MIM91k_C/A_10(8181)	100.0%	628.58	2.61	55	100.0%	628.65	2.52	55	0.0%	0.0%	-3.5%
	MIM91k_10_10(8184)	98.2%	15.70	1.39	54	100.0%	14.21	1.50	54	0.0%	-9.4%	7.5%
	MIM91k_10_25(8186)	98.2%	62.56	15.72	54	100.0%	55.34	12.56	54	0.0%	-11.6%	-20.1%

**Table 15.2** Summary of 91K sq. um MIM PSN capacitors 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
A121504B	MIM91k_C/A_10(8181)	100.0%	611.98	3.61	55	100.0%	612.32	3.57	55	0.0%	0.1%	-1.2%
	MIM91k_10_10(8184)	100.0%	15.01	1.31	55	100.0%	12.99	1.42	55	0.0%	-13.4%	8.3%
	MIM91k_10_25(8186)	100.0%	45.13	5.99	55	100.0%	38.46	5.24	55	0.0%	-14.8%	-12.5%
A123302A	MIM91k_C/A_10(8181)	100.0%	615.09	3.57	55	100.0%	615.15	3.57	55	0.0%	0.0%	0.0%
	MIM91k_10_10(8184)	100.0%	16.20	1.71	55	100.0%	16.22	2.12	55	0.0%	0.1%	23.6%
	MIM91k_10_25(8186)	98.2%	52.50	9.87	54	100.0%	49.13	6.47	54	0.0%	-6.4%	-34.5%
A125704A	MIM91k_C/A_10(8181)	100.0%	600.61	3.58	55	100.0%	600.64	3.56	55	0.0%	0.0%	-0.4%
	MIM91k_10_10(8184)	100.0%	21.77	1.25	55	100.0%	14.48	1.50	55	0.0%	-33.5%	19.9%
	MIM91k_10_25(8186)	100.0%	56.49	3.41	55	100.0%	38.98	2.56	55	0.0%	-31.0%	-25.0%
A129803A	MIM91k_C/A_10(8181)	100.0%	630.91	2.99	55	100.0%	630.82	3.00	55	0.0%	0.0%	0.2%
	MIM91k_10_10(8184)	100.0%	21.25	1.30	55	100.0%	12.59	1.38	55	0.0%	-40.8%	5.6%
	MIM91k_10_25(8186)	100.0%	93.10	24.14	55	100.0%	63.10	21.06	55	0.0%	-32.2%	-12.7%

**Table 15.3** Summary of 91K sq. um MIM PSN capacitors 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
A121504B	MIM91k_C/A_10(8181)	100.0%	650.76	10.76	55	100.0%	645.09	47.01	55	0.0%	-0.9%	336.9%
	MIM91k_10_10(8184)	100.0%	15.86	1.39	55	100.0%	12.91	1.45	55	0.0%	-18.6%	3.8%
	MIM91k_10_25(8186)	100.0%	163.05	83.69	55	100.0%	166.62	286.93	55	0.0%	2.2%	14.3%
A123302A	MIM91k_C/A_10(8181)	100.0%	624.34	3.92	55	100.0%	617.60	49.42	55	0.0%	-1.1%	1162%
	MIM91k_10_10(8184)	100.0%	17.97	1.58	55	100.0%	13.20	1.61	55	0.0%	-26.5%	1.7%
	MIM91k_10_25(8186)	100.0%	63.82	13.98	55	100.0%	52.46	14.20	55	0.0%	-17.8%	1.6%
A125704A	MIM91k_C/A_10(8181)	100.0%	640.75	7.94	55	100.0%	640.88	7.98	55	0.0%	0.0%	0.5%
	MIM91k_10_10(8184)	100.0%	35.06	1.84	55	100.0%	13.30	1.30	55	0.0%	-62.1%	-29.3%
	MIM91k_10_25(8186)	100.0%	101.53	8.40	55	100.0%	49.56	10.84	55	0.0%	-51.2%	29.0%
A129803A	MIM91k_C/A_10(8181)	98.2%	638.76	7.24	54	100.0%	638.96	7.30	54	0.0%	0.0%	0.9%
	MIM91k_10_10(8184)	98.2%	22.19	1.53	54	100.0%	12.62	1.31	54	0.0%	-43.1%	-14.3%
	MIM91k_10_25(8186)	98.2%	96.60	24.93	54	100.0%	67.14	25.48	54	0.0%	-30.5%	2.2%

**Table 16.1** Summary of 182K sq. um MIM PSN capacitors 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
A121504B	MIM182k_C/A_10(8241)	100.0%	602.13	3.52	55	100.0%	602.16	3.52	55	0.0%	0.0%	0.0%
	MIM182k_10_10(8244)	100.0%	16.41	1.48	55	100.0%	12.71	1.52	55	0.0%	-22.5%	3.1%
	MIM182k_10_25(8246)	100.0%	60.42	12.99	55	100.0%	45.45	8.93	55	0.0%	-24.8%	-31.3%
A123302A	MIM182k_C/A_10(8241)	100.0%	604.91	3.58	55	100.0%	604.89	3.58	55	0.0%	0.0%	0.0%
	MIM182k_10_10(8244)	100.0%	15.51	1.66	55	100.0%	12.90	1.60	55	0.0%	-16.8%	-3.6%
	MIM182k_10_25(8246)	100.0%	61.12	14.54	55	100.0%	51.02	11.59	55	0.0%	-16.5%	-20.3%
A125704A	MIM182k_C/A_10(8241)	98.2%	588.66	4.03	54	100.0%	588.73	4.03	54	0.0%	0.0%	-0.1%
	MIM182k_10_10(8244)	98.2%	16.41	1.60	54	100.0%	13.08	1.38	54	0.0%	-20.3%	-13.7%
	MIM182k_10_25(8246)	98.2%	55.13	10.30	54	100.0%	44.51	8.55	54	0.0%	-19.3%	-16.9%
A129803A	MIM182k_C/A_10(8241)	100.0%	615.56	2.51	55	100.0%	615.60	2.48	55	0.0%	0.0%	-0.9%
	MIM182k_10_10(8244)	100.0%	17.78	1.64	55	100.0%	16.75	1.61	55	0.0%	-5.8%	-1.7%
	MIM182k_10_25(8246)	100.0%	93.88	30.74	55	100.0%	82.15	25.48	55	0.0%	-12.5%	-17.1%

**Table 16.2** Summary of 182K sq. um MIM PSN capacitors 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
A121504B	MIM182k_C/A_10(8241)	100.0%	599.84	3.66	55	100.0%	599.82	3.66	55	0.0%	0.0%	0.1%
	MIM182k_10_10(8244)	100.0%	16.62	1.94	55	100.0%	13.01	1.95	55	0.0%	-21.7%	0.5%
	MIM182k_10_25(8246)	100.0%	59.61	12.18	55	100.0%	48.15	10.19	55	0.0%	-19.2%	-16.3%
A123302A	MIM182k_C/A_10(8241)	100.0%	601.76	5.58	55	100.0%	601.86	5.58	55	0.0%	0.0%	0.0%
	MIM182k_10_10(8244)	98.2%	16.60	1.71	54	100.0%	20.10	2.15	54	0.0%	21.1%	25.7%
	MIM182k_10_25(8246)	96.4%	70.40	18.98	53	100.0%	71.67	12.60	53	0.0%	1.8%	-33.6%
A125704A	MIM182k_C/A_10(8241)	100.0%	588.04	3.54	55	100.0%	588.12	3.54	55	0.0%	0.0%	0.0%
	MIM182k_10_10(8244)	98.2%	16.45	1.40	54	100.0%	14.11	2.17	54	0.0%	-14.2%	54.7%
	MIM182k_10_25(8246)	98.2%	47.94	6.42	54	100.0%	40.65	5.15	54	0.0%	-15.2%	-19.7%
A129803A	MIM182k_C/A_10(8241)	100.0%	617.57	2.96	55	100.0%	617.51	2.95	55	0.0%	0.0%	-0.1%
	MIM182k_10_10(8244)	100.0%	16.73	1.58	55	100.0%	14.66	1.72	55	0.0%	-12.4%	8.9%
	MIM182k_10_25(8246)	100.0%	113.57	45.20	55	100.0%	95.46	36.77	55	0.0%	-15.9%	-18.7%

**Table 16.3** Summary of 182K sq. um MIM PSN capacitors 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
A121504B	MIM182k_C/A_10(8241)	100.0%	637.80	10.63	55	100.0%	626.73	86.72	55	0.0%	-1.7%	715.7%
	MIM182k_10_10(8244)	96.4%	17.25	1.69	53	100.0%	13.73	29.00	53	0.0%	-20.4%	470.7%
	MIM182k_10_25(8246)	96.4%	289.99	168.29	53	100.0%	303.17	575.18	53	0.0%	4.5%	13.9%
A123302A	MIM182k_C/A_10(8241)	100.0%	611.89	3.86	55	100.0%	612.40	3.88	55	0.0%	0.1%	0.7%
	MIM182k_10_10(8244)	100.0%	19.61	1.64	55	100.0%	12.53	1.40	55	0.0%	-36.1%	-14.5%
	MIM182k_10_25(8246)	100.0%	94.08	41.73	55	100.0%	75.01	27.60	55	0.0%	-20.3%	-33.9%
A125704A	MIM182k_C/A_10(8241)	100.0%	627.35	7.70	55	100.0%	627.68	7.76	55	0.0%	0.1%	0.8%
	MIM182k_10_10(8244)	100.0%	19.59	1.84	55	100.0%	12.99	1.59	55	0.0%	-33.7%	-13.2%
	MIM182k_10_25(8246)	100.0%	79.22	17.77	55	100.0%	70.28	21.63	55	0.0%	-11.3%	21.7%
A129803A	MIM182k_C/A_10(8241)	100.0%	625.30	6.98	55	100.0%	625.60	7.05	55	0.0%	0.0%	1.0%
	MIM182k_10_10(8244)	100.0%	17.32	1.84	55	100.0%	11.69	1.64	55	0.0%	-32.5%	-10.5%
	MIM182k_10_25(8246)	98.2%	120.48	47.68	54	100.0%	106.82	49.42	54	0.0%	-11.3%	3.6%

**NICR RESISTORS**

Overall, resistors showed little to no changes in resistance or sheet resistance over all stresses. Tables 17.1 – 17.3 summarize the results from the NiCr resistor test structures.

**Table 17.1** Summary of NiCr resistors for Autoclaved wafers

Lot	Test (Test #) [Units]	0 Hrs				96 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A121504B	TFR2X2(5000) [Ω]	100.0%	44.59	0.68	55	100.0%	44.57	0.68	55	0.0%	0.0%	0.0%
	TFR20X2(5002) [Ω]	100.0%	4.41	0.06	55	100.0%	4.42	0.06	55	0.0%	0.2%	3.9%
	TFR2X20(5003) [Ω]	100.0%	505.51	5.52	55	100.0%	505.47	5.51	55	0.0%	0.0%	-0.2%
	TFR20X20(5004) [Ω]	100.0%	48.53	0.54	55	100.0%	48.52	0.54	55	0.0%	0.0%	-0.2%
	TFRVDP(5100) [Ω/sq]	100.0%	49.65	0.74	55	100.0%	49.57	0.72	55	0.0%	-0.2%	-2.3%
A123302A	TFR2X2(5000) [Ω]	100.0%	41.19	1.24	55	100.0%	41.18	1.23	55	0.0%	0.0%	-0.2%
	TFR20X2(5002) [Ω]	100.0%	4.26	0.14	55	100.0%	4.26	0.14	55	0.0%	-0.1%	-0.6%
	TFR2X20(5003) [Ω]	100.0%	493.52	5.74	55	100.0%	493.48	5.73	55	0.0%	0.0%	-0.2%
	TFR20X20(5004) [Ω]	100.0%	48.74	0.49	55	100.0%	48.73	0.49	55	0.0%	0.0%	-0.5%
	TFRVDP(5100) [Ω/sq]	100.0%	50.28	0.55	55	100.0%	50.19	0.66	55	0.0%	-0.2%	20.3%
A125704A	TFR2X2(5000) [Ω]	100.0%	43.30	0.97	55	100.0%	43.32	0.98	55	0.0%	0.0%	1.1%
	TFR20X2(5002) [Ω]	100.0%	4.41	0.08	55	100.0%	4.41	0.08	55	0.0%	0.1%	-2.5%
	TFR2X20(5003) [Ω]	100.0%	506.53	4.53	55	100.0%	506.54	4.53	55	0.0%	0.0%	0.0%
	TFR20X20(5004) [Ω]	100.0%	48.90	0.33	55	100.0%	48.90	0.34	55	0.0%	0.0%	1.6%
	TFRVDP(5100) [Ω/sq]	100.0%	50.98	8.09	55	98.2%	49.88	0.60	54	-1.8%	-2.2%	-92.5%
A129803A	TFR2X2(5000) [Ω]	100.0%	46.75	1.03	55	100.0%	46.77	1.03	55	0.0%	0.0%	0.2%
	TFR20X2(5002) [Ω]	100.0%	4.57	0.11	55	100.0%	4.58	0.11	55	0.0%	0.2%	-3.0%
	TFR2X20(5003) [Ω]	100.0%	532.58	7.01	55	100.0%	532.61	7.02	55	0.0%	0.0%	0.1%
	TFR20X20(5004) [Ω]	100.0%	49.88	0.57	55	100.0%	49.90	0.57	55	0.0%	0.0%	0.1%
	TFRVDP(5100) [Ω/sq]	100.0%	50.77	0.72	55	100.0%	50.77	0.66	55	0.0%	0.0%	-7.7%

**Table 17.2** Summary of NiCr resistors 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
A121504B	TFR2X2(5000) [Ω]	100.0%	44.69	0.94	55	100.0%	44.69	0.94	55	0.0%	0.0%	0.3%
	TFR20X2(5002) [Ω]	100.0%	4.43	0.07	55	100.0%	4.42	0.07	55	0.0%	-0.1%	-0.5%
	TFR2X20(5003) [Ω]	100.0%	502.13	4.71	55	100.0%	502.10	4.72	55	0.0%	0.0%	0.2%
	TFR20X20(5004) [Ω]	100.0%	47.95	0.28	55	100.0%	47.93	0.27	55	0.0%	0.0%	-1.4%
	TFRVDP(5100) [Ω/sq]	100.0%	48.99	0.50	55	100.0%	48.81	0.46	55	0.0%	-0.4%	-6.9%
A123302A	TFR2X2(5000) [Ω]	100.0%	41.45	1.16	55	100.0%	41.45	1.16	55	0.0%	0.0%	0.0%
	TFR20X2(5002) [Ω]	100.0%	4.31	0.12	55	100.0%	4.31	0.12	55	0.0%	0.1%	3.9%
	TFR2X20(5003) [Ω]	100.0%	500.01	4.78	55	100.0%	499.94	4.77	55	0.0%	0.0%	-0.2%
	TFR20X20(5004) [Ω]	100.0%	49.41	0.32	55	100.0%	49.40	0.31	55	0.0%	0.0%	-2.9%
	TFRVDP(5100) [Ω/sq]	100.0%	51.02	0.52	55	100.0%	50.89	0.38	55	0.0%	-0.3%	-26.7%
A125704A	TFR2X2(5000) [Ω]	100.0%	43.51	0.97	55	100.0%	43.52	0.97	55	0.0%	0.0%	0.0%
	TFR20X2(5002) [Ω]	100.0%	4.41	0.08	55	100.0%	4.41	0.08	55	0.0%	0.0%	1.1%
	TFR2X20(5003) [Ω]	100.0%	506.83	4.44	55	100.0%	506.80	4.44	55	0.0%	0.0%	-0.1%
	TFR20X20(5004) [Ω]	100.0%	48.70	0.24	55	100.0%	48.71	0.24	55	0.0%	0.0%	-0.9%
	TFRVDP(5100) [Ω/sq]	100.0%	49.65	0.42	55	100.0%	49.64	0.41	55	0.0%	0.0%	-1.7%
A129803A	TFR2X2(5000) [Ω]	100.0%	45.98	0.49	55	100.0%	47.20	0.49	55	0.0%	2.6%	0.5%
	TFR20X2(5002) [Ω]	100.0%	4.39	0.07	55	100.0%	4.40	0.07	55	0.0%	0.2%	3.0%
	TFR2X20(5003) [Ω]	100.0%	530.98	5.80	55	100.0%	531.12	5.80	55	0.0%	0.0%	0.1%
	TFR20X20(5004) [Ω]	100.0%	49.86	0.50	55	100.0%	49.86	0.50	55	0.0%	0.0%	-0.4%
	TFRVDP(5100) [Ω/sq]	100.0%	50.99	0.66	55	100.0%	51.01	0.61	55	0.0%	0.0%	-6.9%

**Table 17.3** Summary of NiCr resistors for Air Baked wafers

Lot	Test (Test #) [Units]	0 Hrs				168 Hrs				% Change		
		Yield	Avg	Std. Dev	Good Sites	Yield	Average	Std. Dev	Good Sites	Yield	Avg	Std. Dev
A121504B	TFR2X2(5000) [Ω]	100.0%	44.59	1.07	55	98.2%	44.99	1.25	54	-1.8%	0.9%	16.3%
	TFR20X2(5002) [Ω]	100.0%	4.41	0.08	55	100.0%	4.48	0.13	55	0.0%	1.7%	58.6%
	TFR2X20(5003) [Ω]	100.0%	506.36	7.16	55	100.0%	509.57	7.76	55	0.0%	0.6%	8.3%
	TFR20X20(5004) [Ω]	100.0%	48.41	0.54	55	100.0%	48.95	1.84	55	0.0%	1.1%	239.3%
	TFRVDP(5100) [Ω/sq]	100.0%	49.41	0.67	55	98.2%	49.76	0.71	54	-1.8%	0.7%	5.8%
A123302A	TFR2X2(5000) [Ω]	100.0%	41.54	1.25	55	98.2%	42.35	1.73	54	-1.8%	1.9%	37.8%
	TFR20X2(5002) [Ω]	100.0%	4.35	0.13	55	96.4%	4.72	0.69	53	-3.6%	8.5%	447.5%
	TFR2X20(5003) [Ω]	100.0%	495.30	5.44	55	100.0%	498.15	5.48	55	0.0%	0.6%	0.7%
	TFR20X20(5004) [Ω]	100.0%	49.49	0.51	55	100.0%	50.59	2.29	55	0.0%	2.2%	345.8%
	TFRVDP(5100) [Ω/sq]	100.0%	51.13	0.76	55	100.0%	51.37	0.66	55	0.0%	0.5%	-12.6%
A125704A	TFR2X2(5000) [Ω]	100.0%	43.21	1.35	55	100.0%	43.59	1.37	55	0.0%	0.9%	1.2%
	TFR20X2(5002) [Ω]	100.0%	4.40	0.10	55	100.0%	4.42	0.11	55	0.0%	0.6%	1.6%
	TFR2X20(5003) [Ω]	100.0%	508.00	16.49	55	100.0%	513.13	16.56	55	0.0%	1.0%	0.4%
	TFR20X20(5004) [Ω]	100.0%	48.59	0.42	55	100.0%	48.95	0.43	55	0.0%	0.7%	1.7%
	TFRVDP(5100) [Ω/sq]	100.0%	49.58	0.58	55	100.0%	49.85	0.59	55	0.0%	0.5%	0.8%
A129803A	TFR2X2(5000) [Ω]	100.0%	45.15	0.92	55	100.0%	45.45	0.93	55	0.0%	0.7%	1.8%
	TFR20X2(5002) [Ω]	100.0%	4.46	0.08	55	100.0%	4.49	0.09	55	0.0%	0.8%	3.7%
	TFR2X20(5003) [Ω]	100.0%	526.85	7.12	55	100.0%	531.96	7.28	55	0.0%	1.0%	2.2%
	TFR20X20(5004) [Ω]	100.0%	49.15	0.55	55	100.0%	49.50	0.56	55	0.0%	0.7%	2.2%
	TFRVDP(5100) [Ω/sq]	100.0%	50.10	0.71	55	100.0%	50.34	0.66	55	0.0%	0.5%	-6.4%

**METAL COMBS**

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

Tables 18.1 – 18.3 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 (18um).

**Table 18.1** 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
A121504B	M1_M1_LK(6000)	100.0%	3.79	0.38	55	100.0%	5.62	0.32	55	0.0%	48.2%	-16.3%
	M2_M2_LK(6001)	100.0%	98.78	11.32	55	100.0%	101.23	10.35	55	0.0%	2.5%	-8.6%
	M3_M3_LK(6002)	100.0%	8.99	0.81	55	100.0%	7.67	0.72	55	0.0%	-14.7%	-11.1%
	M01_M01_LK(6020)	100.0%	4.78	0.79	55	100.0%	3.68	0.64	55	0.0%	-22.9%	-19.1%
	M12_M12_LK(6021)	100.0%	21.34	1.85	55	100.0%	22.08	1.77	55	0.0%	3.5%	-4.6%
	M23_M23_LK5(6022)	100.0%	26.85	4.22	55	100.0%	28.57	2.88	55	0.0%	6.4%	-31.9%
	M23_M23_LK20(6023)	100.0%	23.38	3.23	55	100.0%	12.72	2.07	55	0.0%	-45.6%	-35.9%
A123302A	M1_M1_LK(6000)	100.0%	3.65	0.33	55	100.0%	6.50	0.33	55	0.0%	77.8%	0.5%
	M2_M2_LK(6001)	100.0%	104.08	10.36	55	100.0%	103.07	10.03	55	0.0%	-1.0%	-3.1%
	M3_M3_LK(6002)	100.0%	9.24	0.73	55	100.0%	5.42	0.64	55	0.0%	-41.4%	-12.9%
	M01_M01_LK(6020)	98.2%	4.60	0.57	54	100.0%	3.80	0.58	54	0.0%	-17.3%	2.2%
	M12_M12_LK(6021)	100.0%	20.48	1.91	55	98.2%	20.83	1.85	54	-1.8%	1.7%	-3.1%
	M23_M23_LK5(6022)	100.0%	24.39	2.67	55	100.0%	18.10	1.51	55	0.0%	-25.8%	-43.7%
	M23_M23_LK20(6023)	100.0%	20.17	2.58	55	100.0%	11.77	1.19	55	0.0%	-41.7%	-54.0%
A125704A	M1_M1_LK(6000)	100.0%	4.21	0.36	55	100.0%	6.40	0.28	55	0.0%	52.0%	-23.4%
	M2_M2_LK(6001)	100.0%	105.91	12.51	55	98.2%	102.81	11.27	54	-1.8%	-2.9%	-9.9%
	M3_M3_LK(6002)	100.0%	11.94	0.81	55	100.0%	6.04	1.22	55	0.0%	-49.4%	51.1%
	M01_M01_LK(6020)	100.0%	5.69	0.60	55	100.0%	3.78	0.44	55	0.0%	-33.5%	-26.4%
	M12_M12_LK(6021)	92.7%	23.53	1.64	51	100.0%	20.99	1.36	51	0.0%	-10.8%	-17.2%
	M23_M23_LK5(6022)	100.0%	28.27	4.34	55	100.0%	19.44	2.46	55	0.0%	-31.2%	-43.2%
	M23_M23_LK20(6023)	100.0%	28.55	6.45	55	100.0%	13.13	2.60	55	0.0%	-54.0%	-59.7%
A129803A	M1_M1_LK(6000)	100.0%	6.12	0.31	55	100.0%	4.68	0.29	55	0.0%	-23.6%	-7.8%
	M2_M2_LK(6001)	100.0%	107.05	12.56	55	100.0%	105.89	10.00	55	0.0%	-1.1%	-20.3%
	M3_M3_LK(6002)	100.0%	9.78	0.63	55	100.0%	5.97	0.56	55	0.0%	-39.0%	-12.1%
	M01_M01_LK(6020)	100.0%	4.84	0.58	55	100.0%	5.26	0.60	55	0.0%	8.9%	2.8%
	M12_M12_LK(6021)	98.2%	22.56	1.74	54	100.0%	35.23	1.91	54	0.0%	56.2%	9.7%
	M23_M23_LK5(6022)	100.0%	40.00	6.20	55	100.0%	18.92	1.75	55	0.0%	-52.7%	-71.7%
	M23_M23_LK20(6023)	98.2%	38.08	6.58	54	100.0%	14.62	1.26	54	0.0%	-61.6%	-80.9%

**Table 18.2** 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
A121504B	M1_M1_LK(6000)	100.0%	3.80	0.35	55	100.0%	6.11	0.37	55	0.0%	61.0%	6.6%
	M2_M2_LK(6001)	100.0%	100.67	10.65	55	100.0%	104.75	12.43	55	0.0%	4.0%	16.7%
	M3_M3_LK(6002)	100.0%	9.13	0.92	55	100.0%	5.37	0.58	55	0.0%	-41.2%	-36.9%
	M01_M01_LK(6020)	100.0%	4.97	1.09	55	100.0%	3.97	0.62	55	0.0%	-20.1%	-43.3%
	M12_M12_LK(6021)	98.2%	21.36	1.97	54	100.0%	20.42	1.48	54	0.0%	-4.4%	-25.1%
	M23_M23_LK5(6022)	98.2%	25.20	2.86	54	100.0%	17.92	1.94	54	0.0%	-28.9%	-32.1%
	M23_M23_LK20(6023)	100.0%	22.47	2.39	55	100.0%	11.23	1.16	55	0.0%	-50.0%	-51.5%
A123302A	M1_M1_LK(6000)	100.0%	3.45	0.41	55	100.0%	5.27	0.38	55	0.0%	52.8%	-7.8%
	M2_M2_LK(6001)	100.0%	103.79	10.59	55	100.0%	105.14	11.20	55	0.0%	1.3%	5.7%
	M3_M3_LK(6002)	100.0%	10.05	0.54	55	100.0%	9.20	0.80	55	0.0%	-8.5%	49.2%
	M01_M01_LK(6020)	98.2%	4.39	0.52	54	100.0%	5.59	0.63	54	0.0%	27.4%	21.0%
	M12_M12_LK(6021)	100.0%	21.17	2.16	55	100.0%	40.14	2.08	55	0.0%	89.7%	-3.5%
	M23_M23_LK5(6022)	100.0%	29.81	2.64	55	100.0%	25.28	2.49	55	0.0%	-15.2%	-5.5%
	M23_M23_LK20(6023)	100.0%	26.64	3.59	55	100.0%	22.80	1.52	55	0.0%	-14.4%	-57.6%
A125704A	M1_M1_LK(6000)	100.0%	3.97	0.32	55	100.0%	6.35	0.38	55	0.0%	60.1%	19.9%
	M2_M2_LK(6001)	100.0%	105.25	10.38	55	100.0%	102.73	10.65	55	0.0%	-2.4%	2.7%
	M3_M3_LK(6002)	100.0%	11.99	0.73	55	100.0%	9.42	0.77	55	0.0%	-21.4%	5.6%
	M01_M01_LK(6020)	98.2%	4.94	0.52	54	100.0%	3.95	0.44	54	0.0%	-20.1%	-16.0%
	M12_M12_LK(6021)	98.2%	22.82	1.70	54	100.0%	20.99	1.73	54	0.0%	-8.0%	1.6%
	M23_M23_LK5(6022)	100.0%	29.48	3.19	55	100.0%	24.78	2.50	55	0.0%	-15.9%	-21.7%
	M23_M23_LK20(6023)	100.0%	29.58	3.98	55	100.0%	20.63	2.76	55	0.0%	-30.2%	-30.7%
A129803A	M1_M1_LK(6000)	98.2%	6.47	0.32	54	100.0%	4.15	0.34	54	0.0%	-36.0%	4.9%
	M2_M2_LK(6001)	100.0%	103.73	10.90	55	100.0%	109.68	12.23	55	0.0%	5.7%	12.2%
	M3_M3_LK(6002)	100.0%	12.22	0.81	55	100.0%	5.07	0.80	55	0.0%	-58.5%	-1.7%
	M01_M01_LK(6020)	100.0%	4.68	0.61	55	100.0%	3.81	0.60	55	0.0%	-18.6%	-1.6%
	M12_M12_LK(6021)	100.0%	23.82	1.87	55	100.0%	21.65	1.98	55	0.0%	-9.1%	6.2%
	M23_M23_LK5(6022)	100.0%	38.72	2.44	55	100.0%	20.40	2.44	55	0.0%	-47.3%	-0.2%
	M23_M23_LK20(6023)	98.2%	22.59	2.93	54	100.0%	13.18	1.63	54	0.0%	-41.7%	-44.5%

**Table 18.3** 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
A121504B	M1_M1_LK(6000)	100.0%	4.05	0.31	55	100.0%	3.24	0.41	55	0.0%	-20.2%	29.4%
	M2_M2_LK(6001)	100.0%	98.25	9.72	55	100.0%	99.76	9.85	55	0.0%	1.5%	1.3%
	M3_M3_LK(6002)	98.2%	9.18	0.78	54	101.9%	5.70	0.79	55	1.9%	-37.8%	0.9%
	M01_M01_LK(6020)	96.4%	5.26	0.72	53	100.0%	3.88	0.57	53	0.0%	-26.2%	-20.4%
	M12_M12_LK(6021)	92.7%	22.39	1.94	51	102.0%	20.19	1.90	52	2.0%	-9.8%	-2.0%
	M23_M23_LK5(6022)	100.0%	34.92	8.16	55	100.0%	18.99	2.06	55	0.0%	-45.6%	-74.7%
	M23_M23_LK20(6023)	100.0%	31.42	5.02	55	100.0%	11.80	1.48	55	0.0%	-62.5%	-70.5%
A123302A	M1_M1_LK(6000)	98.2%	4.52	0.42	54	101.9%	3.28	0.40	55	1.9%	-27.6%	-2.7%
	M2_M2_LK(6001)	100.0%	102.37	11.18	55	100.0%	102.12	9.88	55	0.0%	-0.2%	-11.6%
	M3_M3_LK(6002)	100.0%	9.46	0.77	55	100.0%	5.51	0.66	55	0.0%	-41.8%	-13.8%
	M01_M01_LK(6020)	96.4%	5.67	0.76	53	101.9%	3.88	0.66	54	1.9%	-31.5%	-13.8%
	M12_M12_LK(6021)	98.2%	23.56	1.98	54	100.0%	20.20	1.73	54	0.0%	-14.3%	-12.5%
	M23_M23_LK5(6022)	100.0%	44.19	7.10	55	100.0%	18.63	2.51	55	0.0%	-57.8%	-64.7%
	M23_M23_LK20(6023)	98.2%	40.86	11.11	54	101.9%	11.48	1.40	55	1.9%	-71.9%	-87.4%
A125704A	M1_M1_LK(6000)	100.0%	4.73	0.33	55	100.0%	6.77	0.34	55	0.0%	43.2%	1.8%
	M2_M2_LK(6001)	100.0%	106.40	10.89	55	100.0%	103.72	11.50	55	0.0%	-2.5%	5.6%
	M3_M3_LK(6002)	100.0%	16.09	0.81	55	100.0%	6.15	0.64	55	0.0%	-61.8%	-21.3%
	M01_M01_LK(6020)	100.0%	6.21	0.43	55	100.0%	4.51	0.49	55	0.0%	-27.5%	12.1%
	M12_M12_LK(6021)	100.0%	26.44	2.25	55	100.0%	20.79	1.76	55	0.0%	-21.4%	-21.5%
	M23_M23_LK5(6022)	100.0%	46.36	6.80	55	100.0%	19.03	1.36	55	0.0%	-59.0%	-80.0%
	M23_M23_LK20(6023)	100.0%	45.91	9.94	55	100.0%	14.21	1.23	55	0.0%	-69.0%	-87.6%
A129803A	M1_M1_LK(6000)	100.0%	6.71	0.45	55	100.0%	2.87	0.42	55	0.0%	-57.3%	-6.3%
	M2_M2_LK(6001)	100.0%	102.87	11.01	55	100.0%	103.01	10.91	55	0.0%	0.1%	-0.9%
	M3_M3_LK(6002)	100.0%	12.52	0.78	55	100.0%	5.40	0.78	55	0.0%	-56.9%	0.1%
	M01_M01_LK(6020)	100.0%	5.04	0.59	55	100.0%	4.10	0.53	55	0.0%	-18.6%	-10.1%
	M12_M12_LK(6021)	100.0%	24.15	1.90	55	100.0%	20.70	2.01	55	0.0%	-14.3%	6.0%
	M23_M23_LK5(6022)	100.0%	40.71	3.16	55	100.0%	16.83	1.92	55	0.0%	-58.7%	-39.0%
	M23_M23_LK20(6023)	100.0%	28.69	6.66	55	100.0%	11.52	1.16	55	0.0%	-59.8%	-82.6%

Tables 19.1 – 19.3 summarize 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 19.1** Summary of Inter-Metal Leakage Combs for Autoclaved wafers

Lot	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
A121504B	M1_M2_LK(6003)	100.0%	14.91	1.46	55	100.0%	21.97	1.20	55	0.0%	47.4%	-17.8%
	M2_M3_LK(6004)	100.0%	18.95	1.82	55	100.0%	16.67	1.33	55	0.0%	-12.0%	-26.7%
A123302A	M1_M2_LK(6003)	100.0%	14.57	1.06	55	100.0%	24.58	1.39	55	0.0%	68.7%	31.3%
	M2_M3_LK(6004)	100.0%	19.46	1.31	55	100.0%	11.12	1.46	55	0.0%	-42.9%	11.3%
A125704A	M1_M2_LK(6003)	100.0%	16.51	1.55	55	100.0%	24.36	1.61	55	0.0%	47.5%	3.6%
	M2_M3_LK(6004)	100.0%	25.53	1.50	55	100.0%	12.43	2.50	55	0.0%	-51.3%	66.6%
A129803A	M1_M2_LK(6003)	100.0%	23.93	1.23	55	100.0%	17.94	1.30	55	0.0%	-25.0%	5.8%
	M2_M3_LK(6004)	100.0%	20.50	1.29	55	100.0%	12.40	1.58	55	0.0%	-39.5%	22.2%

**Table 19.2** Summary of Inter-Metal Leakage Combs for Temp Cycled wafers

Lot	Test (Test #)											
		Yield	Avg [pA]	Std. Dev [pA]	Good Sites	Yield	Average [pA]	Std. Dev [pA]	Good Sites	Yield	Avg	Std. Dev
A121504B	M1_M2_LK(6003)	100.0%	14.67	1.20	55	100.0%	23.33	1.28	55	0.0%	59.0%	6.6%
	M2_M3_LK(6004)	100.0%	19.18	1.45	55	100.0%	11.12	1.61	55	0.0%	-42.0%	10.8%
A123302A	M1_M2_LK(6003)	100.0%	13.38	1.44	55	100.0%	20.49	1.80	55	0.0%	53.1%	25.3%
	M2_M3_LK(6004)	100.0%	20.90	1.48	55	100.0%	19.58	1.75	55	0.0%	-6.3%	18.7%
A125704A	M1_M2_LK(6003)	100.0%	15.45	1.26	55	100.0%	23.75	1.66	55	0.0%	53.7%	31.9%
	M2_M3_LK(6004)	100.0%	25.32	1.65	55	100.0%	19.81	1.32	55	0.0%	-21.8%	-19.8%
A129803A	M1_M2_LK(6003)	98.2%	25.06	1.26	54	100.0%	16.27	1.78	54	0.0%	-35.0%	41.3%
	M2_M3_LK(6004)	100.0%	26.43	1.66	55	100.0%	11.57	1.42	55	0.0%	-56.2%	-14.4%

**Table 19.3** Summary of Inter-Metal Leakage Combs for Air Baked wafers

Lot	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
A121504B	M1_M2_LK(6003)	100.0%	16.19	1.39	55	100.0%	12.66	1.59	55	0.0%	-21.8%	13.7%
	M2_M3_LK(6004)	100.0%	19.61	4.64	55	100.0%	12.43	1.32	55	0.0%	-36.6%	-71.5%
A123302A	M1_M2_LK(6003)	98.2%	17.70	1.54	54	101.9%	12.17	1.30	55	1.9%	-31.2%	-15.2%
	M2_M3_LK(6004)	100.0%	19.88	1.66	55	100.0%	11.69	1.51	55	0.0%	-41.2%	-8.9%
A125704A	M1_M2_LK(6003)	100.0%	18.46	1.31	55	100.0%	25.81	1.23	55	0.0%	39.8%	-5.4%
	M2_M3_LK(6004)	100.0%	34.31	1.95	55	100.0%	12.99	1.36	55	0.0%	-62.2%	-30.0%
A129803A	M1_M2_LK(6003)	100.0%	26.48	1.83	55	100.0%	10.83	1.55	55	0.0%	-59.1%	-15.3%
	M2_M3_LK(6004)	100.0%	26.55	1.56	55	100.0%	11.18	1.63	55	0.0%	-57.9%	4.6%

Tables 20 – 23 contain results of leakage combs constructed from stacked metal layers (i.e. Met1+2). It was noted that 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). Leakage combs of stacked metal layers were constructed with spacings (or gaps) below the minimum allowed to determine the robustness of the B39 layout design rules governing metal feature exclusions.

Tables 20.1 – 20.3 summarize the stacked Met0+1 leakage combs with 1.5 and 2.0 um gaps. Note that 1.5 and 2.0 um gaps are **NOT** allowed for Met1 under the current B39 layout design rules. The 1.5 um gap combs exhibited pre-stress yield issues, thus indicating resolution issues for these metal layers at these dimensions. The 2.0 um gap exhibited no pre- or post-stress yield issues. The minimum gap allowed for Met0 and Met1 are 2 and 3 um, respectively. These results show that the current layout design rules governing Met0-to-Met0 and Met1-to-Met1 exclusions are sufficient.

**Table 20.1** Summary of Stacked Met0+1 Leakage Combs for Autoclaved wafers

Lot	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
A121504B	M01comb_Lk20(7502)	100.0%	16.96	1.77	55	100.0%	15.88	1.94	55	0.0%	-6.4%	9.4%
	M01comb_Lk15(7506)	90.9%	15.85	2.25	50	92.0%	23.38	1.80	46	-8.0%	47.4%	-20.0%
A123302A	M01comb_Lk20(7502)	98.2%	17.13	1.70	54	100.0%	15.53	1.53	54	0.0%	-9.3%	-9.9%
	M01comb_Lk15(7506)	92.7%	15.47	1.81	51	92.2%	27.36	1.72	47	-7.8%	76.9%	-5.1%
A125704A	M01comb_Lk20(7502)	100.0%	18.37	1.30	55	100.0%	15.86	1.09	55	0.0%	-13.7%	-16.4%
	M01comb_Lk15(7506)	100.0%	16.89	1.34	55	98.2%	27.13	1.17	54	-1.8%	60.7%	-12.4%
A129803A	M01comb_Lk20(7502)	100.0%	19.04	1.23	55	100.0%	74.07	2.49	55	0.0%	289%	102.0%
	M01comb_Lk15(7506)	98.2%	24.74	1.32	54	100.0%	19.28	1.76	54	0.0%	-22.1%	32.6%

**Table 20.2** Summary of Stacked Met0+1 Leakage Combs for Temp Cycled wafers

Lot	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
A121504B	M01comb_Lk20(7502)	100.0%	16.75	1.64	55	100.0%	15.43	2.01	55	0.0%	-7.9%	22.8%
	M01comb_Lk15(7506)	78.2%	16.22	4.69	43	97.7%	25.75	2.06	42	-2.3%	58.8%	-56.0%
A123302A	M01comb_Lk20(7502)	100.0%	18.05	1.91	55	100.0%	90.36	2.48	55	0.0%	401%	29.8%
	M01comb_Lk15(7506)	81.8%	15.24	2.67	45	104.4%	23.51	6.13	47	4.4%	54.3%	129.9%
A125704A	M01comb_Lk20(7502)	100.0%	17.69	1.32	55	100.0%	16.58	1.62	55	0.0%	-6.3%	22.3%
	M01comb_Lk15(7506)	100.0%	16.19	1.22	55	100.0%	26.39	1.55	55	0.0%	63.1%	27.2%
A129803A	M01comb_Lk20(7502)	100.0%	17.88	1.34	55	98.2%	16.86	1.83	54	-1.8%	-5.7%	36.8%
	M01comb_Lk15(7506)	98.2%	27.31	1.75	54	100.0%	18.31	2.08	54	0.0%	-32.9%	18.9%

**Table 20.3** Summary of Stacked Met0+1 Leakage Combs for Air Baked wafers

Lot	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
A121504B	M01comb_Lk20(7502)	100.0%	17.81	1.86	55	100.0%	16.30	1.85	55	0.0%	-8.5%	-0.6%
	M01comb_Lk15(7506)	87.3%	16.49	3.03	48	104.2%	13.96	2.35	50	4.2%	-15.4%	-22.4%
A123302A	M01comb_Lk20(7502)	100.0%	19.42	1.92	55	100.0%	15.39	1.93	55	0.0%	-20.7%	0.4%
	M01comb_Lk15(7506)	85.5%	18.22	2.56	47	104.3%	13.80	1.90	49	4.3%	-24.2%	-25.8%
A125704A	M01comb_Lk20(7502)	100.0%	20.97	1.56	55	100.0%	15.84	1.27	55	0.0%	-24.4%	-18.6%
	M01comb_Lk15(7506)	94.5%	18.63	1.39	52	100.0%	27.29	1.01	52	0.0%	46.5%	-27.4%
A129803A	M01comb_Lk20(7502)	100.0%	17.95	1.46	55	100.0%	15.41	1.60	55	0.0%	-14.2%	9.7%
	M01comb_Lk15(7506)	96.4%	27.04	1.70	53	101.9%	12.17	1.56	54	1.9%	-55.0%	-8.3%

Tables 21.1 – 21.3 summarize the stacked Met1+2 leakage combs with 1.5, 2.0, and 3.0 um gaps. Note that 1.5 and 2.0 um gaps are **NOT** allowed for either Met1 or Met2 under the current B39 layout design rules. The 1.5 um gap combs exhibited some pre-stress yield issues, thus indicating resolution issues for these two metal layers at these dimensions. The 2.0 and 3.0 um gaps exhibited almost no pre- or post-stress yield issues. The minimum gap allowed for Met1 and Met2 layers is 3 um.

**Table 21.1** Summary of Stacked Met1+2 Leakage Combs for Autoclaved wafers

Lot	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
A121504B	M12comb_Lk30(7514)	100.0%	16.12	1.85	55	100.0%	16.69	1.45	55	0.0%	3.5%	-21.4%
	M12comb_Lk20(7512)	98.2%	15.12	1.70	54	98.1%	12.36	1.43	53	-1.9%	-18.2%	-15.9%
	M12comb_Lk15(7520)	96.4%	14.34	1.49	53	94.3%	13.03	1.94	50	-5.7%	-9.2%	30.0%
A123302A	M12comb_Lk30(7514)	100.0%	15.76	1.44	55	100.0%	13.20	1.56	55	0.0%	-16.2%	8.5%
	M12comb_Lk20(7512)	98.2%	14.66	1.72	54	100.0%	12.52	1.44	54	0.0%	-14.6%	-15.9%
	M12comb_Lk15(7520)	81.8%	13.66	1.68	45	80.0%	14.71	3.84	36	-20.0%	7.7%	129.1%
A125704A	M12comb_Lk30(7514)	100.0%	15.76	1.84	55	100.0%	13.59	1.40	55	0.0%	-13.8%	-24.2%
	M12comb_Lk20(7512)	98.2%	16.64	1.56	54	100.0%	12.58	1.10	54	0.0%	-24.4%	-29.4%
	M12comb_Lk15(7520)	96.4%	14.27	1.54	53	100.0%	13.12	1.75	53	0.0%	-8.1%	13.3%
A129803A	M12comb_Lk30(7514)	98.2%	14.57	1.64	54	100.0%	15.91	1.86	54	0.0%	9.2%	13.2%
	M12comb_Lk20(7512)	100.0%	13.90	1.39	55	100.0%	16.39	1.49	55	0.0%	17.9%	7.6%
	M12comb_Lk15(7520)	100.0%	15.01	1.34	55	100.0%	15.89	1.51	55	0.0%	5.9%	12.9%

**Table 21.2** Summary of Stacked Met1+2 Leakage Combs for Temp Cycled wafers

Lot	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
A121504B	M12comb_Lk30(7514)	96.4%	15.66	1.52	53	101.9%	13.61	1.65	54	1.9%	-13.1%	8.5%
	M12comb_Lk20(7512)	96.4%	14.73	1.48	53	100.0%	12.46	1.46	53	0.0%	-15.4%	-1.5%
	M12comb_Lk15(7520)	98.2%	14.24	1.54	54	100.0%	12.64	1.27	54	0.0%	-11.2%	-17.4%
A123302A	M12comb_Lk30(7514)	98.2%	15.60	1.60	54	100.0%	17.93	1.61	54	0.0%	14.9%	0.8%
	M12comb_Lk20(7512)	98.2%	13.92	1.41	54	100.0%	18.43	1.45	54	0.0%	32.4%	2.2%
	M12comb_Lk15(7520)	98.2%	14.05	1.33	54	100.0%	18.05	1.57	54	0.0%	28.5%	18.4%
A125704A	M12comb_Lk30(7514)	98.2%	15.96	1.96	54	100.0%	14.64	1.41	54	0.0%	-8.3%	-28.1%
	M12comb_Lk20(7512)	100.0%	16.51	1.30	55	100.0%	12.87	1.48	55	0.0%	-22.1%	13.9%
	M12comb_Lk15(7520)	98.2%	13.69	1.30	54	100.0%	12.53	1.34	54	0.0%	-8.4%	2.9%
A129803A	M12comb_Lk30(7514)	96.4%	18.19	1.49	53	100.0%	13.72	2.08	53	0.0%	-24.6%	39.9%
	M12comb_Lk20(7512)	100.0%	14.37	1.24	55	100.0%	12.52	1.81	55	0.0%	-12.9%	46.5%
	M12comb_Lk15(7520)	100.0%	14.54	1.98	55	100.0%	14.65	2.26	55	0.0%	0.8%	14.1%

**Table 21.3** Summary of Stacked Met1+2 Leakage Combs for Air Baked wafers

Lot	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
A121504B	M12comb_Lk30(7514)	100.0%	16.33	2.19	55	100.0%	14.48	1.40	55	0.0%	-11.3%	-36.2%
	M12comb_Lk20(7512)	100.0%	15.52	1.61	55	100.0%	13.46	1.65	55	0.0%	-13.3%	2.5%
	M12comb_Lk15(7520)	100.0%	14.54	1.65	55	100.0%	12.65	1.51	55	0.0%	-13.0%	-8.6%
A123302A	M12comb_Lk30(7514)	100.0%	17.81	1.80	55	100.0%	14.32	1.30	55	0.0%	-19.6%	-28.1%
	M12comb_Lk20(7512)	100.0%	16.75	1.80	55	100.0%	13.33	1.34	55	0.0%	-20.5%	-25.6%
	M12comb_Lk15(7520)	100.0%	16.57	1.84	55	100.0%	12.44	1.45	55	0.0%	-24.9%	-21.1%
A125704A	M12comb_Lk30(7514)	100.0%	17.99	1.92	55	100.0%	13.76	1.77	55	0.0%	-23.5%	-8.1%
	M12comb_Lk20(7512)	100.0%	19.41	1.53	55	100.0%	12.68	1.59	55	0.0%	-34.7%	3.8%
	M12comb_Lk15(7520)	98.2%	15.78	1.72	54	101.9%	13.38	1.24	55	1.9%	-15.2%	-28.3%
A129803A	M12comb_Lk30(7514)	98.2%	18.72	1.99	54	100.0%	13.05	1.65	54	0.0%	-30.3%	-17.1%
	M12comb_Lk20(7512)	96.4%	14.44	1.51	53	101.9%	12.52	1.58	54	1.9%	-13.3%	4.3%
	M12comb_Lk15(7520)	96.4%	14.75	1.22	53	100.0%	12.48	1.44	53	0.0%	-15.4%	18.2%

Tables 22.1 – 22.3 summarize the stack Met2+3 leakage combs with 3.0, 4.0, and 5.0 um gaps. Note that 3.0 and 4.0 um gaps are **NOT** allowed for Met3 under the current B39 layout design rules. The 3.0, 4.0, and 5.0 um gaps exhibited almost no pre- or post-stress yield issues. The minimum gaps allowed for Met2 and Met3 are 3.0 um and 5.0 um, respectively.

**Table 22.1** Summary of Stacked Met2+3 Leakage Combs for Autoclaved wafers

Lot	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
A121504B	M23comb_Lk50(7532)	100.0%	27.97	4.37	55	100.0%	24.15	1.74	55	0.0%	-13.7%	-60.3%
	M23comb_Lk40(7536)	98.2%	25.92	2.80	54	100.0%	23.55	2.03	54	0.0%	-9.2%	-27.7%
	M23comb_Lk30(7540)	100.0%	444.93	38.72	55	100.0%	457.78	65.71	55	0.0%	2.9%	69.7%
A123302A	M23comb_Lk50(7532)	100.0%	26.85	4.46	55	100.0%	14.70	1.54	55	0.0%	-45.3%	-65.5%
	M23comb_Lk40(7536)	100.0%	23.67	1.65	55	100.0%	15.49	1.33	55	0.0%	-34.6%	-19.3%
	M23comb_Lk30(7540)	100.0%	452.77	38.94	55	100.0%	457.47	49.47	55	0.0%	1.0%	27.0%
A125704A	M23comb_Lk50(7532)	100.0%	43.27	9.26	55	100.0%	16.10	2.04	55	0.0%	-62.8%	-78.0%
	M23comb_Lk40(7536)	98.2%	28.47	6.98	54	100.0%	17.01	1.72	54	0.0%	-40.3%	-75.4%
	M23comb_Lk30(7540)	100.0%	455.13	41.57	55	100.0%	437.45	46.92	55	0.0%	-3.9%	12.9%
A129803A	M23comb_Lk50(7532)	100.0%	52.93	4.98	55	100.0%	13.87	1.67	55	0.0%	-73.8%	-66.5%
	M23comb_Lk40(7536)	100.0%	38.20	6.89	55	100.0%	16.54	1.35	55	0.0%	-56.7%	-80.5%
	M23comb_Lk30(7540)	100.0%	482.13	49.75	55	100.0%	470.58	56.65	55	0.0%	-2.4%	13.9%

**Table 22.2** Summary of Stacked Met2+3 Leakage Combs for Temp Cycled wafers

Lot	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
A121504B	M23comb_Lk50(7532)	100.0%	27.03	3.45	55	100.0%	13.99	1.22	55	0.0%	-48.3%	-64.5%
	M23comb_Lk40(7536)	100.0%	25.40	2.62	55	100.0%	15.52	1.28	55	0.0%	-38.9%	-51.3%
	M23comb_Lk30(7540)	100.0%	472.52	67.33	55	100.0%	447.28	49.26	55	0.0%	-5.3%	-26.8%
A123302A	M23comb_Lk50(7532)	100.0%	33.85	4.83	55	100.0%	23.00	2.50	55	0.0%	-32.0%	-48.3%
	M23comb_Lk40(7536)	100.0%	31.39	4.26	55	100.0%	25.60	2.02	55	0.0%	-18.4%	-52.6%
	M23comb_Lk30(7540)	100.0%	462.01	44.21	55	100.0%	469.49	47.69	55	0.0%	1.6%	7.9%
A125704A	M23comb_Lk50(7532)	100.0%	31.58	4.83	55	100.0%	24.59	3.96	55	0.0%	-22.1%	-18.1%
	M23comb_Lk40(7536)	100.0%	30.68	4.29	55	100.0%	25.14	3.00	55	0.0%	-18.1%	-30.1%
	M23comb_Lk30(7540)	100.0%	472.69	42.94	55	100.0%	455.35	57.92	55	0.0%	-3.7%	34.9%
A129803A	M23comb_Lk50(7532)	100.0%	43.00	3.51	55	100.0%	17.86	2.36	55	0.0%	-58.5%	-32.8%
	M23comb_Lk40(7536)	100.0%	36.54	2.73	55	100.0%	15.85	1.58	55	0.0%	-56.6%	-42.3%
	M23comb_Lk30(7540)	100.0%	453.15	55.37	55	100.0%	470.47	52.47	55	0.0%	3.8%	-5.2%

**Table 22.3** Summary of Stacked Met2+3 Leakage Combs for Air Baked wafers

Lot	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
A121504B	M23comb_Lk50(7532)	100.0%	38.33	8.23	55	100.0%	14.28	1.64	55	0.0%	-62.8%	-80.1%
	M23comb_Lk40(7536)	100.0%	31.45	6.32	55	100.0%	16.12	1.73	55	0.0%	-48.7%	-72.6%
	M23comb_Lk30(7540)	100.0%	473.45	49.19	55	100.0%	433.74	41.75	55	0.0%	-8.4%	-15.1%
A123302A	M23comb_Lk50(7532)	100.0%	64.79	11.04	55	100.0%	13.96	1.57	55	0.0%	-78.5%	-85.8%
	M23comb_Lk40(7536)	100.0%	42.83	12.12	55	100.0%	16.31	1.49	55	0.0%	-61.9%	-87.7%
	M23comb_Lk30(7540)	100.0%	458.64	44.59	55	100.0%	432.54	38.03	55	0.0%	-5.7%	-14.7%
A125704A	M23comb_Lk50(7532)	100.0%	58.05	9.42	55	100.0%	15.27	1.46	55	0.0%	-73.7%	-84.6%
	M23comb_Lk40(7536)	100.0%	51.26	11.77	55	100.0%	18.33	1.66	55	0.0%	-64.2%	-85.9%
	M23comb_Lk30(7540)	100.0%	484.82	37.75	55	100.0%	460.16	48.66	55	0.0%	-5.1%	28.9%
A129803A	M23comb_Lk50(7532)	100.0%	53.42	10.15	55	100.0%	13.35	1.59	55	0.0%	-75.0%	-84.3%
	M23comb_Lk40(7536)	100.0%	44.26	7.57	55	100.0%	14.73	1.58	55	0.0%	-66.7%	-79.1%
	M23comb_Lk30(7540)	100.0%	461.71	52.30	55	100.0%	449.10	53.26	55	0.0%	-2.7%	1.8%

Tables 23.1 – 23.3 summarize the stack Met1+2+3 leakage combs with 3.0, 4.0, and 5.0 um gaps. Note that 3.0 and 4.0 um gaps are **NOT** allowed for Met3 under the current B39 layout design rules. The 3.0, 4.0, and 5.0 um gaps exhibited almost no pre- or post-stress yield issues. The minimum gaps allowed for Met1, Met2, and Met3 are 3.0 um, 3.0 um, and 5.0 um, respectively.

**Table 23.1** Summary of Stacked Met1+2+3 Leakage Combs for Autoclaved wafers

Lot	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
A121504B	M123comb_Lk50(7552)	100.0%	438.99	43.72	55	100.0%	454.67	45.92	55	0.0%	3.6%	5.0%
	M123comb_Lk40(7556)	100.0%	33.99	6.87	55	98.2%	20.03	3.18	54	-1.8%	-41.1%	-53.6%
	M123comb_Lk30(7560)	100.0%	61.86	9.42	55	70.9%	61.41	14.78	39	-29.1%	-0.7%	56.8%
A123302A	M123comb_Lk50(7552)	100.0%	454.50	53.83	55	98.2%	452.94	47.14	54	-1.8%	-0.3%	-12.4%
	M123comb_Lk40(7556)	100.0%	27.52	5.39	55	98.2%	13.12	1.58	54	-1.8%	-52.3%	-70.7%
	M123comb_Lk30(7560)	98.2%	54.30	12.59	54	94.4%	41.54	10.87	51	-5.6%	-23.5%	-13.6%
A125704A	M123comb_Lk50(7552)	100.0%	475.06	47.92	55	98.2%	456.47	69.91	54	-1.8%	-3.9%	45.9%
	M123comb_Lk40(7556)	100.0%	49.20	9.39	55	100.0%	15.40	2.65	55	0.0%	-68.7%	-71.7%
	M123comb_Lk30(7560)	100.0%	70.63	9.09	55	100.0%	47.34	6.33	55	0.0%	-33.0%	-30.3%
A129803A	M123comb_Lk50(7552)	100.0%	489.07	51.91	55	100.0%	465.67	43.52	55	0.0%	-4.8%	-16.2%
	M123comb_Lk40(7556)	100.0%	53.95	6.05	55	100.0%	14.82	1.72	55	0.0%	-72.5%	-71.5%
	M123comb_Lk30(7560)	100.0%	65.56	9.12	55	98.2%	50.87	7.66	54	-1.8%	-22.4%	-16.0%

**Table 23.2** Summary of Stacked Met1+2+3 Leakage Combs for Temp Cycled wafers

Lot	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
A121504B	M123comb_Lk50(7552)	100.0%	457.30	46.92	55	100.0%	442.76	62.62	55	0.0%	-3.2%	33.5%
	M123comb_Lk40(7556)	100.0%	34.65	5.81	55	100.0%	12.53	1.41	55	0.0%	-63.9%	-75.7%
	M123comb_Lk30(7560)	100.0%	63.17	8.81	55	100.0%	45.17	7.76	55	0.0%	-28.5%	-12.0%
A123302A	M123comb_Lk50(7552)	100.0%	463.76	45.48	55	100.0%	455.87	39.20	55	0.0%	-1.7%	-13.8%
	M123comb_Lk40(7556)	100.0%	35.24	5.72	55	100.0%	25.20	2.72	55	0.0%	-28.5%	-52.5%
	M123comb_Lk30(7560)	96.4%	51.71	9.69	53	100.0%	58.97	13.45	53	0.0%	14.0%	38.8%
A125704A	M123comb_Lk50(7552)	100.0%	471.52	44.76	55	100.0%	461.26	51.61	55	0.0%	-2.2%	15.3%
	M123comb_Lk40(7556)	100.0%	43.87	7.17	55	100.0%	29.15	4.85	55	0.0%	-33.6%	-32.4%
	M123comb_Lk30(7560)	98.2%	67.41	7.65	54	100.0%	54.19	7.10	54	0.0%	-19.6%	-7.1%
A129803A	M123comb_Lk50(7552)	100.0%	463.73	52.56	55	98.2%	463.30	50.31	54	-1.8%	-0.1%	-4.3%
	M123comb_Lk40(7556)	100.0%	38.96	3.71	55	100.0%	13.19	1.65	55	0.0%	-66.1%	-55.5%
	M123comb_Lk30(7560)	100.0%	68.08	7.40	55	100.0%	49.50	9.22	55	0.0%	-27.3%	24.6%

**Table 23.3** Summary of Stacked Met1+2+3 Leakage Combs for Air Baked wafers

Lot	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
A121504B	M123comb_Lk50(7552)	100.0%	459.60	47.22	55	100.0%	428.37	39.98	55	0.0%	-6.8%	-15.3%
	M123comb_Lk40(7556)	100.0%	77.39	16.78	55	100.0%	13.49	1.69	55	0.0%	-82.6%	-89.9%
	M123comb_Lk30(7560)	98.2%	81.57	20.31	54	92.6%	45.29	8.47	50	-7.4%	-44.5%	-58.3%
A123302A	M123comb_Lk50(7552)	100.0%	487.17	44.47	55	100.0%	434.72	46.79	55	0.0%	-10.8%	5.2%
	M123comb_Lk40(7556)	100.0%	84.49	16.38	55	100.0%	13.33	1.45	55	0.0%	-84.2%	-91.1%
	M123comb_Lk30(7560)	98.2%	70.49	9.54	54	100.0%	45.26	6.75	54	0.0%	-35.8%	-29.3%
A125704A	M123comb_Lk50(7552)	100.0%	504.60	44.80	55	100.0%	454.27	39.33	55	0.0%	-10.0%	-12.2%
	M123comb_Lk40(7556)	98.2%	77.80	12.06	54	101.9%	15.29	1.59	55	1.9%	-80.4%	-86.8%
	M123comb_Lk30(7560)	96.4%	102.91	10.80	53	101.9%	50.74	5.46	54	1.9%	-50.7%	-49.5%
A129803A	M123comb_Lk50(7552)	100.0%	482.17	50.40	55	100.0%	452.02	44.50	55	0.0%	-6.3%	-11.7%
	M123comb_Lk40(7556)	100.0%	54.48	12.03	55	100.0%	13.10	1.57	55	0.0%	-76.0%	-86.9%
	M123comb_Lk30(7560)	100.0%	73.30	9.93	55	100.0%	41.90	8.16	55	0.0%	-42.8%	-17.9%

**SUMMARY**

Overall, TriQuint’s B39 process produces robust yield and reliability for all wafers tested before and after stressing. Almost values remained relatively stable for approximately 71 parameters during all reliability testing.