

 <b>TERIDIAN</b> SEMICONDUCTOR CORP.	<b>71M653X – Quality &amp; Reliability Summary Report</b>			
	<i>Project #</i>	<i>Silicon Rev.</i>	<i>Doc Rev</i>	<i>Date</i>
	<b>6530</b>	<b>A05</b>	<b>1</b>	<b>February 15, 2009</b>

**Introduction**

This report summarizes the reliability data that have been collected by Teridian Semiconductor Corp for the 71M653X Meter product family including the 78M6618.

**Process Information**

The 71M653X device is manufactured in a standard 0.25u Embedded Flash CMOS process at TSMC.

Process Characteristics:

- 2.5V/3.3V, 5V Tolerant
- 2 Poly Layers
- 4 Metal Layers
- Special ESD implant for I/O devices (3.3 V)

**Process Technology Reliability Results:**

Test Description	Total Parts	Read Points	Results
<b>EFR JESD22-A108</b>	790	48 hours	All Passed
<b>HTOL JESD22-A108</b>	1690	168 hours	All Passed
		500 hours	All Passed
		1000 hours	All Passed
<b>85/85 JESD22-A101B</b>	120x2	168 hours	All Passed
		500 hours	All Passed
		1000 hours	All Passed
<b>Temp Cycling JESD22-A104</b>	120x2	500 cycles	All Passed
<b>Auto Clave JESD22-A102-C</b>	120x2	168 hours	All Passed
<b>High Temperature Storage JESD22-A103</b>	120x2	1000 hours	All Passed

**Product Biased Life Test:**

Teridian has collected HTOL data from the 0.25u CMOS process at TSMC for a total sample size of 1690 units (7 different lots). A corresponding **FIT rate of 2.0** was calculated using 0.7eV activation energy, 60% confidence, and normal use of 55°C. Data collected for the 653X IC is summarized below.

Test Description	Total Parts	Read Points	Results
<b>EFR JESD22-A108</b>	790	48hrs	All Passed
<b>HTOL JESD22-A108</b>	1690	500hrs	All Passed
	1690	1000hrs	All Passed

\*Burn-in at 150°C Junction Temp, 1.1X Bias



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### Package Information – 68 MLF

Package Type: 68MLF/QFN  
 Lead Count: 68  
 Body Size: 8x8x0.85mm  
 Lead Pitch: 0.40mm  
 JEDEC Outline: M0 220  
 Assembly Sites: Unisem China

### Bill of Materials:

	MLF (lead-free)
Lead frame	Copper Etched
Lead Finish	100% Matte Tin
Wire bond	1.0 mil: 99.99% Au/Be doped
Mold Compound	EME-G770HCD
Die Attach Material	CRM 1076DJ

### Package Marking:

Line 1	Line 2	Line 3
Marketing Number	B(AC)(DC)P3	Lot Number

B = Wafer Foundry TSMC  
 (AC) = Assembly Code (Unisem China = C )  
 (DC) = Date Code (YY, WW)

### Moisture Sensitivity Classification:

MRT Level 3 (260°C IR Reflow, J-STD-020B)

### Package Reliability:

Test Description	Total Parts	Read Points	Comments
Temp Cycling JESD22-A104	77x 3	500 cycles	ALL PASSED
High Temp Storage JESD22-A103	77x 3	500 hrs	ALL PASSED
		1000 hrs	ALL PASSED
85/85 JESD22-A101B	77x 3	500 hrs	ALL PASSED
		1000 hrs	ALL PASSED
HAST JESD22-A118	77x 3	168 hrs	ALL PASSED

Solder-ability Test Sn-3Ag-0.5Cu (SAC) Solder	40°C/85% RH Whisker Test
0/9	0/135



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### Package Information – 100/120 LQFP

Package Type: LQFP  
 Lead Count: 100/120  
 Body Size: 14x14x1.4mm  
 Lead Pitch: 0.50mm  
 JEDEC Outline: MS-026 BED  
 Assembly Sites: Amkor Philippines

### Bill of Materials:

	LQFP (lead-free)
Lead frame	Copper Etched
Lead Finish	100% Matte Tin
Wire bond	1.0 mil: 99.99% Au/Be doped
Mold Compound	G700
Die Attach Material	Ablestik 3230

### Package Marking:

Line 1	Line 2	Line 3
Marketing Number	B(AC)(DC)P3	Lot Number

B = Wafer Foundry TSMC  
 (AC) = Assembly Code (Amkor Philippines = P)  
 (DC) = Date Code (YY, WW)

### Moisture Sensitivity Classification:

MRT Level 3 (260°C IR Reflow, J-STD-020B)

### Package Reliability:

Test Description	Total Parts	Read Points	Comments
Temp Cycling JESD22-A104	77x 3	500 cycles	ALL PASSED
High Temp Storage JESD22-A103	77x 3	500 hrs	ALL PASSED
		1000 hrs	ALL PASSED
85/85 JESD22-A101B	77x 3	500 hrs	ALL PASSED
		1000 hrs	ALL PASSED
HAST JESD22-A118	77x 3	168 hrs	ALL PASSED

Solder-ability Test Sn-3Ag-0.5Cu (SAC) Solder	40°C/85% RH Whisker Test
0/9	0/135



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<b>6530</b>	<b>A05</b>	<b>1</b>	<b>February 15, 2009</b>

### Package Information – 100 LQFP

Package Type: LQFP  
 Lead Count: 100  
 Body Size: 14x14x1.4mm  
 Lead Pitch: 0.50mm  
 JEDEC Outline: MS-026 BED  
 Assembly Sites: Unisem, China

### Bill of Materials:

	LQFP (lead-free)
Lead frame	Copper Etched
Lead Finish	100% Matte Tin
Wire bond	1.0 mil: 99.99% Au/Be doped
Mold Compound	G700
Die Attach Material	Ablestik 8290

### Package Marking:

Line 1	Line 2	Line 3
Marketing Number	B(AC)(DC)P3	Lot Number

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Solder-ability Test Sn-3Ag-0.5Cu (SAC) Solder	40°C/85% RH Whisker Test
0/9	0/135

### Electrostatic Discharge:

The 653X device has been tested for ESD immunity in accordance with JEDEC JESD22-A114.

Package	ESD (HBM) Rating	ESD (MM) Rating
68 pin	Max 5.5KV	Max 250V
100 pin	Max 5KV	Max 250V

### Latch-Up:

Samples were tested in accordance to EIA/JEDEC 78 using a Keytek automatic test system. For all tests the failure criteria is specified as: 1.4X Inom or Inom+10mA, whichever is greater. Each pin was tested at the Trigger Duration of 1 second, which is the maximum limit per EIA/JEDEC 78.

Package	LU results
100 pin	All Pins >200 mA
68 pin	All Pins >200 mA

### ATE Characterization

#### **Method:**

The 653X IC was processed over a corner-split lot and characterized over supply and temperature. Channel length (Poly) and thresholds (Vtn, Vtp) and were varied in the process corner lot for a total of five (5) splits. Fifteen units from each split (total of 75 units) were tested on ATE with estimated 99% test coverage over 5 corners of supply and temperature.

#### **Results:**

The production ATE limits have been guard-banded and bench correlated to ensure compliance to specification over stated operating conditions and maintain an AQL level of 0.65. Optimized fuse trim targets for internal band gaps have also been implemented to achieve < 0.5% Wh accuracy over 2000:1 range for the 6530 part.