

**RELIABILITY REPORT  
FOR**

**DS1644, 28 pin Module with Hi Density SMT**

**Dallas Semiconductor**

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**Prepared by:**

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**Conclusion:**

The following qualification successfully meets the quality and reliability standards required of all Dallas Semiconductor products and processes:

DS1644, 28 pin Module with Hi Density SMT

In addition, Dallas Semiconductor's continuous reliability monitor program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards. The current status of the reliability monitor program can be viewed at <http://www.maxim-ic.com/TechSupport/dsreliability.html>.\*

**Module Description:**

A description of this Module can be found in the product data sheet. You can find the product data sheet at [http://dbserv.maxim-ic.com/l\\_datasheet3.cfm](http://dbserv.maxim-ic.com/l_datasheet3.cfm).\*

**Reliability Derating:**

A module device consists of one or more IC's in a single, upward integrated, package. This package is assembled to include batteries, crystals, and other piece parts that make up the configuration of the Module. Because of either the complexity of the package or the included piece parts, standard high temperature reliability testing is not possible. Therefore, in order to determine the reliability of module products, the reliability of each of the piece parts is individually determined, then summed to determine the reliability of the integrated module product. If there are "n" significant components in the module then:

$$\begin{aligned} Fr(\text{module}) &= Fr(1) + Fr(2) + Fr(3) + \dots + Fr(n) \\ Fr(\text{module}) &= \text{Failure rate of module} \\ Fr(n) &= \text{Failure rate of the nth component} \end{aligned}$$

Failure Rates are reported in FITs (Failures in Time) or MTTF (Mean Time To Failure). The FIT rate is related to MTTF by:

$$MTTF = 1/Fr$$

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this module/assembly is:

<b>Module Device:</b>	<b>Module Units:</b>	<b>Quantity:</b>	<b>Fails:</b>	<b>Ea:</b>	<b>MTTF (Yrs):</b>	<b>FITs:</b>
<b>256K SRAM 5V</b>	1	1800	2	0.7	62408	1.8
<b>BR1632</b>	1	100	1	1.0	47996	2.4
<b>CRYSTAL</b>	1	100	0	0.7	12463	9.2
<b>DS1648</b>	1	1760	3	0.7	30066	3.8
<b>Totals:</b>					<u>6651</u>	<u>17.2</u>

The parameters used to calculate the module failure rate are as follows:

**Cf: 60%**      **Tu: 25 °C**

The reliability data follows. At the start of this data is the module assembly information. This is a description of the module. The next section is the detailed reliability data for each stress found in the qualification / monitor. If there are additional processes or assemblies used as part of this report, a description of each will follow which includes the respective reliability data for that process/ assembly. The reliability data section includes the latest data available. Some of this data may be generic with other packages or products.

\* Some proprietary products may be excepted from this requirement.

**Assembly Information:**

Assembly Site: Fastech  
 Pin Count: 28  
 Package Type: Module w/Hi Density SMT  
 Body Size: 720  
 Mold Compound: Amicon  
 Lead Frame: PCB; FR4  
 Lead Finsh:  
 Die Attach: ?  
 Bond Wire / Size: /  
 Flammability: UL 94-V0  
 Moisture Sensitivity (JEDEC J-STD20A)  
 Date Code Range: 0104 to 0404

**PACKAGE TESTS**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
SOLDERABILITY	0104	MIL-STD-883-2003	5 DYS	3	0	
PHYSICAL DIMENSIONS	0104	MIL-STD-883-2016	5 DYS	6	0	
SOLDERABILITY	0317	JESD22-B102	5 DYS	3	0	
PHYSICAL DIMENSIONS	0317	JESD22-B100	5 DYS	6	0	
SOLDERABILITY	0333	JESD22-B102	5 DYS	3	0	
PHYSICAL DIMENSIONS	0333	JESD22-B100	5 DYS	6	0	
SOLDERABILITY	0404	JESD22-B102	5 DYS	3	0	
PHYSICAL DIMENSIONS	0404	JESD22-B100	5 DYS	6	0	
<b>Total:</b>					<b>0</b>	

**STORAGE LIFE**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0104	70 C	1000 HRS	77	0	
STORAGE LIFE	0317	70 C	1000 HRS	77	0	
STORAGE LIFE	0333	70 C	1000 HRS	77	0	
STORAGE LIFE	0404	70 C	1000 HRS	77	0	
<b>Total:</b>					<b>0</b>	

**TEMPERATURE CYCLE**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0104	0C TO 70C	1000 CYS	77	0	

TEMP CYCLE	0317	0C TO 70C	1000	CYS	77	0
TEMP CYCLE	0333	0C TO 70C	1000	CYS	77	0
TEMP CYCLE	0404	0C TO 70C	1000	CYS	77	0
<b>Total:</b>						<b>0</b>

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#### UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
MOISTURE SOAK	0317	60C/90% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0333	60C/90% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0404	60C/90% R.H.	1000 HRS	77	1	MODULE TRIM
<b>Total:</b>						<b>1</b>

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#### Assembly Information:

Assembly Site: Fastech  
 Pin Count: 32  
 Package Type: Module w/Hi Density SMT  
 Body Size: 720  
 Mold Compound: Amicon  
 Lead Frame: PCB; FR4  
 Lead Finsh:  
 Die Attach: ?  
 Bond Wire / Size: /  
 Flammability: UL 94-V0  
 Moisture Sensitivity  
 (JEDEC J-STD20A)  
 Date Code Range: 0101 to 0422

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#### ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0139	EOS/ESD S5.1 HBM 500 VOLTS	2 PUL'S	3	0	
ESD SENSITIVITY	0139	EOS/ESD S5.1 HBM 1000 VOLTS	2 PUL'S	3	0	
ESD SENSITIVITY	0139	EOS/ESD S5.1 HBM 2000 VOLTS	3 PUL'S	3	0	
LATCH-UP	0139	JESD78, I-TEST 125C	2 DYS	3	0	
LATCH-UP	0139	JESD78, Vsupply TEST 125C	2 DYS	3	0	
<b>Total:</b>						<b>0</b>

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#### PACKAGE TESTS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
SOLDERABILITY	0422	JESD22-B102	1 DYS	3	0	
SOLDERABILITY	0422	JESD22-B102	1 DYS	3	0	
SOLDERABILITY	0422	JESD22-B102	1 DYS	3	0	
<b>Total:</b>						<b>0</b>

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#### STORAGE LIFE

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
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STORAGE LIFE	0139	85 C	1000 HRS	49	0
				<b>Total:</b>	<b>0</b>

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**TEMPERATURE CYCLE**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0139	-40 TO 85C	1000 CYS	50	0	
				<b>Total:</b>	<b>0</b>	

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**TEMPERATURE HUMIDITY BIAS**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	0422	85/85, 5.5 VOLTS	1000 HRS	77	0	
BIASED MOISTURE	0422	85/85, 5.5 VOLTS	1000 HRS	77	0	
BIASED MOISTURE	0422	85/85, 5.5 VOLTS	500 HRS	77	0	
				<b>Total:</b>	<b>0</b>	

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**UNBIASED MOISTURE RESISTANCE**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
MOISTURE SOAK	0101	60C/90% R.H.	576 HRS	56	0	
MOISTURE SOAK	0139	60C/90% R.H.	960 HRS	50	0	
MOISTURE SOAK	0422	60C/90% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0422	60C/90% R.H.	1000 HRS	77	0	
MOISTURE SOAK	0422	60C/90% R.H.	1000 HRS	77	0	
				<b>Total:</b>	<b>0</b>	

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**Assembly Information:**

Assembly Site:	Fastech
Pin Count:	36
Package Type:	Module w/Hi Density SMT
Body Size:	720
Mold Compound:	Amicon
Lead Frame:	PCB; FR4
Lead Finsh:	
Die Attach:	?
Bond Wire / Size:	/
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	
Date Code Range:	0139 to 0139

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**ELECTRICAL CHARACTERIZATION**

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0139	EOS/ESD S5.1 HBM 500 VOLTS	2 PUL'S	3	0	
ESD SENSITIVITY	0139	EOS/ESD S5.1 HBM 1000 VOLTS	2 PUL'S	3	0	
ESD SENSITIVITY	0139	EOS/ESD S5.1 HBM 2000 VOLTS	2 PUL'S	3	0	
LATCH-UP	0139	JESD78, I-TEST 125C	2 DYS	3	0	
LATCH-UP	0139	JESD78, Vsupply TEST 125C	2 DYS	3	0	

Total: 0

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**STORAGE LIFE**

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0139		85 C	1000 HRS	77	0	
						<b>Total:</b>	<b>0</b>

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**TEMPERATURE CYCLE**

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0139		-40 TO 85C	1000 CYS	76	0	
						<b>Total:</b>	<b>0</b>

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**UNBIASED MOISTURE RESISTANCE**

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
MOISTURE SOAK	0139		60C/90% R.H.	960 HRS	76	0	
						<b>Total:</b>	<b>0</b>