



12/2/2005

**RELIABILITY REPORT
FOR**

DS12R887, Rev A2-R0A

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:

DS12R887, Rev A2-R0A

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.*

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:

$$Fr(\text{module}) = Fr(1) + Fr(2) + Fr(3) + \dots + Fr(n)$$

Fr (module) = Failure rate of module
 Fr(n) = Failure rate of the nth component

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:

<u>Module Device:</u>	<u>Module Units:</u>	<u>Quantity:</u>	<u>Fails:</u>	<u>Ea:</u>	<u>MTTF (Yrs):</u>	<u>FITs:</u>
CRYSTAL	1	100	0	0.7	12463	9.2
DS12R885-5	1	810	0	0.7	83595	1.4
ML614R	1	5	0	1.0	1956	58.4
Totals:					<u>1657</u>	<u>68.9</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: Carsem
 Pin Count: 48
 Package Type: Single Piece BGA Module w/Battery & Crystal
 Body Size: 15.3x11.8x3.06
 Mold Compound: Nitto GE-100-LFC
 Lead Frame: PCB; BT; Sn/ Pb Balls
 Lead Finish: Sn Plate/Ni/Stainless Steel
 Die Attach: QMI 516, Dexter Hysol
 Bond Wire / Size: Au / 1.0 mil
 Flammability: UL 94-V0
 Moisture Sensitivity (JEDEC J-STD20A) Level 4
 Date Code Range: 0522 to 0527

BATTERY CHARGING

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
BATTERY CHARGING	0522	25 C, 3.3 VOLTS	72 HRS	154	0	
BATTERY CHARGING	0527	25 C, 3.3 VOLTS	72 HRS	154	0	
BATTERY CHARGING	0527	25 C, 3.3 VOLTS	72 HRS	154	0	
Total:					0	

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
PACKAGE, ASSEMBLY PROCESS	0522	PERFORMED BY ASSEMBLY SITE	2	6	0	
Total:					0	

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ULTRASOUND	0522	J-STD-020		8	0	
STORAGE LIFE		125C	48 HRS	8		
MOISTURE SOAK		30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW		220C +5/-0C	2 PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a		8	0	
PRECONDITION U/S		J-STD-020		8		
ULTRASOUND	0527	J-STD-020		8	0	
STORAGE LIFE		125C	48 HRS	8		
MOISTURE SOAK		30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW		220C +5/-0C	2 PASS	8	0	

EXTERNAL VISUAL	0527	J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
ULTRASOUND	0527	J-STD-020			8	0
STORAGE LIFE		125C	48	HRS	8	
MOISTURE SOAK		30C/60% R.H.	192	HRS	8	
CONVECTION REFLOW		220C +5/-0C	2	PASS	8	0
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
Total:					0	0

OPERATING LIFE

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH TEMP OP LIFE	0522		85 C, 3.3 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0527		85 C, 3.3 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0527		85 C, 3.3 VOLTS	1000 HRS	45	0	
Total:					0	0	

PACKAGE TESTS

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
X-RAY	0522		MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
MARK PERMANENCY			JESD22-B107		6	0	
BALL SHEAR			JESD22-B117		6	0	
EXTERNAL VISUAL			JESD22-B101		6	0	
X-RAY	0527		MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
MARK PERMANENCY			JESD22-B107		6	0	
BALL SHEAR			JESD22-B117		6	0	
EXTERNAL VISUAL			JESD22-B101		6	0	
X-RAY	0527		MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS			JESD22-B100		6	0	
MARK PERMANENCY			JESD22-B107		6	0	
BALL SHEAR			JESD22-B117		6	0	
EXTERNAL VISUAL			JESD22-B101		6	0	
Total:					0	0	

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0522		125C	48 HRS	271		
MOISTURE SOAK			30C/60% R.H.	192 HRS	271		
CONVECTION REFLOW			220C +5/-0C	2 PASS	271	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		50	0	
X-RAY			MIL-STD-883-2012 : TOP & SIDE VIEW		271	0	
STORAGE LIFE	0527		125C	48 HRS	270		
MOISTURE SOAK			30C/60% R.H.	192 HRS	270		
CONVECTION REFLOW			220C +5/-0C	2 PASS	270	0	
EXTERNAL VISUAL			J-STD-020, 6.1a		50	0	

X-RAY	0527	MIL-STD-883-2012 : TOP & SIDE VIEW			271	0
STORAGE LIFE	0527	125C	48	HRS	271	
MOISTURE SOAK		30C/60% R.H.	192	HRS	271	
CONVECTION REFLOW		220C +/-0C	2	PASS	271	0
EXTERNAL VISUAL		J-STD-020, 6.1a			50	0
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW			271	0
Total:					0	0

STORAGE LIFE

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0522		85 C	1000 HRS	76	0	
STORAGE LIFE	0527		85 C	1000 HRS	76	0	
STORAGE LIFE	0527		85 C	1000 HRS	77	0	
Total:					0	0	

TEMPERATURE CYCLE

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0522		-40 TO 85C	1000 CYS	77	0	
TEMP CYCLE	0527		-40 TO 85C	1000 CYS	77	0	
TEMP CYCLE	0527		-40 TO 85C	1000 CYS	77	0	
Total:					0	0	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE	CD	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	0522		85/85, 3.5 VOLTS	1000 HRS	72	0	
BIASED MOISTURE	0527		85/85, 3.5 VOLTS	1000 HRS	70	0	
BIASED MOISTURE	0527		85/85, 3.5 VOLTS	1000 HRS	72	0	
Total:					0	0	