

RELIABILITY REPORT
FOR

DS21Q48

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:

DS21Q48

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>Quantity:</u>	<u>MTTF (Yrs):</u>	<u>FITs:</u>
DS21348	4	<u>1335</u>	<u>85.5</u>
Totals:		1335	86

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

Cf: 60% **Ea: 0.7** **B: 0** **Tu: 25 °C** **Vu: 5.5 Volts**

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 proprietary products may be excepted from this requirement.

Assembly Information:

Qualification Vehicle: DS21Q48
 Assembly Site: Dallas
 Pin Count: 144
 Package Type: CSBGA Interposer
 Body Size: 17x17X1.6
 Mold Compound: ?
 Lead Frame: Printed Crt Brd; BT
 Lead Finsh:
 Die Attach: Underfill FP4527, Dexter Hysol
 Bond Wire / Size: /
 Flammability: UL 94-V0
 Moisture Sensitivity (JEDEC J-STD20A) Level 5A
 Date Code Range: 0202 to 0215

MOISTURE SENSITIVITY LEVEL 5A

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
EXTERNAL VISUAL	0202	J-STD-020		8	0
ULTRASOUND		J-STD-020		8	0
STORAGE LIFE		125C	48 HOURS	8	
MOISTURE SOAK		30C/60% R.H.	48 HOURS	8	
CONVECTION REFLOW		220C	3 PASS	8	0
EXTERNAL VISUAL		J-STD-020		8	0
PRECONDITION U/S		J-STD-020		8	0
EXTERNAL VISUAL	0203	J-STD-020		8	0
ULTRASOUND		J-STD-020		8	0
STORAGE LIFE		125C	48 HOURS	8	
MOISTURE SOAK		30C/60% R.H.	48 HOURS	8	
CONVECTION REFLOW		220C	3 PASS	8	0
EXTERNAL VISUAL		J-STD-020		8	0
PRECONDITION U/S		J-STD-020		8	0
EXTERNAL VISUAL	0204	J-STD-020		8	0
ULTRASOUND		J-STD-020		8	0
STORAGE LIFE		125C	48 HOURS	8	
MOISTURE SOAK		30C/60% R.H.	48 HOURS	8	
CONVECTION REFLOW		220C	3 PASS	8	0
EXTERNAL VISUAL		J-STD-020		8	0
PRECONDITION U/S		J-STD-020		8	0
EXTERNAL VISUAL	0205	J-STD-020		8	0
ULTRASOUND		J-STD-020		8	0

STORAGE LIFE	0205	125C	48	HOURS	8	
MOISTURE SOAK		30C/60% R.H.	48	HOURS	8	
CONVECTION REFLOW		220C	3	PASS	8	0
EXTERNAL VISUAL		J-STD-020			8	0
PRECONDITION U/S		J-STD-020			8	0
					Total:	0

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS	
X-RAY	0202	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS		JESD22-B100		6	0	
BALL SHEAR		JESD22-B117		6	0	
X-RAY	0203	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS		JESD22-B100		6	0	
BALL SHEAR		JESD22-B117		6	0	
X-RAY	0204	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS		JESD22-B100		6	0	
BALL SHEAR		JESD22-B117		6	0	
X-RAY	0205	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS		JESD22-B100		6	0	
BALL SHEAR		JESD22-B117		6	0	
X-RAY	0215	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS		JESD22-B100		6	0	
BALL SHEAR		JESD22-B117		6	0	
					Total:	0

PRECONDITIONING LEVEL 5A

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS	
STORAGE LIFE	0202	125C	48	HOURS	100	
MOISTURE SOAK		30C/60% R.H.	48	HOURS	100	
CONVECTION REFLOW		220C	3	PASS	100	
STORAGE LIFE	0203	125C	48	HOURS	100	
MOISTURE SOAK		30C/60% R.H.	48	HOURS	100	
CONVECTION REFLOW		220C	3	PASS	100	
STORAGE LIFE	0204	125C	48	HOURS	83	
MOISTURE SOAK		30C/60% R.H.	48	HOURS	83	
CONVECTION REFLOW		220C	3	PASS	83	
STORAGE LIFE	0205	125C	48	HOURS	122	
MOISTURE SOAK		30C/60% R.H.	48	HOURS	122	
CONVECTION REFLOW		220C	3	PASS	122	
STORAGE LIFE	0215	125C	48	HOURS	135	
MOISTURE SOAK		30C/60% R.H.	48	HOURS	135	
CONVECTION REFLOW		220C	3	PASS	135	
					Total:	2

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
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STORAGE LIFE	0202	125C	1000 HOURS	30	1
STORAGE LIFE	0203	125C	1000 HOURS	30	3
STORAGE LIFE	0204	125C	1000 HOURS	25	3
STORAGE LIFE	0205	125C	1000 HOURS	50	1
STORAGE LIFE	0215	125C	1000 HOURS	45	0
				Total:	8

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
TEMP CYCLE	0202	-55C TO 125C	1000 CYCLES	35	2
TEMP CYCLE	0203	-55C TO 125C	1000 CYCLES	35	3
TEMP CYCLE	0204	-55C TO 125C	1000 CYCLES	28	2
TEMP CYCLE	0205	-55C TO 125C	1000 CYCLES	37	0
TEMP CYCLE	0215	-55C TO 125C	1000 CYCLES	45	0
				Total:	7

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
MOISTURE SOAK	0202	85 C/85% R.H.	959 HOURS	35	3
MOISTURE SOAK	0203	85 C/85% R.H.	959 HOURS	35	2
MOISTURE SOAK	0204	85 C/85% R.H.	959 HOURS	30	1
MOISTURE SOAK	0205	85 C/85% R.H.	959 HOURS	35	1
MOISTURE SOAK	0215	85 C/85% R.H.	959 HOURS	43	0
				Total:	7

All Failures are marginal parametrics or VCC hi/lo functional failures at end of life except the two preconditioning failures which are solder shorts on the top of the interposer. (FA30006154). The marginal failures were determined to be due to a change in tester from the Duo to the Catalyst at the last readpoint of all stresses. All failures pass when tested on the Duo. The Catalyst is the current production tester.