



11/6/2007

**RELIABILITY REPORT
FOR**

DS4026, Rev A5

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:

DS4026, Rev A5

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>Beta:</u>	<u>MTTF (Yrs):</u>	<u>FITs:</u>
CRYSTAL	1	100	0	0.7	0.0	12463	9.2
DS4026C	1	1826	0	0.7	0.0	216854	0.5
MX02	1	45	0	0.7	0.0	5288	21.6
Totals:						3650	31.3

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

Cf: 60% **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 of this data may be generic with other packages or products.

* Some proprietary products may be excepted from this requirement

Assembly Information:

Assembly Site: CIRTEK
 Pin Count: 16
 Package Type: SOIC 2 Die on PCB and Wire Bond Crystal (Pb-Free)
 Body Size: 300x2.3
 Mold Compound: Sumitomo 6650RL
 Lead Frame: Stamped Copper CDA194
 Lead Finish: Sn Plate 100% Matte (With Anneal Bake)
 Die Attach: Ablebond 8900 Crystal & DS4026C, Ablebond 8352L MX02Z
 Bond Wire / Size: Au / 1.0 mil
 Flammability: UL 94-V0
 Moisture Sensitivity (JEDEC J-STD20A) Level 3
 Date Code Range: 0632 to 0649

DATE CODE: 0632 **LOT NUMBER:** ZH601625ABD-NPI **VEHICLE:** DS4026

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
LATCH-UP	0632	JESD78, I-TEST 25C		6	0	
LATCH-UP	0632	JESD78, V-SUPPLY TEST 25C		6	0	
Total:					0	

DATE CODE: 0649 **LOT NUMBER:** QH611603BE-NPI **VEHICLE:** DS4026

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ULTRASOUND	0649	J-STD-020		8	0	
STORAGE LIFE	0649	125C	24 HRS	8		
MOISTURE SOAK	0649	30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW	0649	260C +/-5C	3 PASS	8	0	
EXTERNAL VISUAL	0649	J-STD-020, 6.1a		8	0	
PRECONDITION U/S	0649	J-STD-020		8	0	
Total:					0	

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0649	125C	24 HRS	308		
MOISTURE SOAK	0649	30C/60% R.H.	192 HRS	308		
CONVECTION REFLOW	0649	260C +/-5C	3 PASS	308	0	

FOLLOWED BY: **Total: 0**

STORAGE LIFE

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	125C	1000 HRS	77	0	
Total:				0	

TEMPERATURE CYCLE

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

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	85/85, 3.5 VOLTS	1000 HRS	77	0	
Total:				0	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	121C, 2 ATM STEAM, UNBIASED	168 HRS	74	0	
Total:				0	

PACKAGE TESTS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
SOLDERABILITY (Pb-Free)	0649	JESD22-B102, COND C		6	0	
X-RAY	0649	MIL-STD-883-2012 : TOP & SIDE VIEW		5	0	
PHYSICAL DIMENSIONS	0649	JESD22-B100		6	0	
MARK PERMANENCY	0649	JESD22-B107		6	0	
LEAD INTEGRITY	0649	JESD22-B105, COND B		6	0	
SOLDERABILITY (Sn/Pb)	0649	JESD22-B102, COND C		6	0	
Total:				0		

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
PACKAGE, ASSEMBLY PROCESS	0649	PERFORMED BY ASSEMBLY SITE	2	10	0	
Total:				0		

DATE CODE: 0649 **LOT NUMBER:** QH611603BF-NPI **VEHICLE:** DS4026

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ULTRASOUND	0649	J-STD-020		8	0	
STORAGE LIFE	0649	125C	24 HRS	8		
MOISTURE SOAK	0649	30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW	0649	260C +/-5C	3 PASS	8	0	
EXTERNAL VISUAL	0649	J-STD-020, 6.1a		8	0	
PRECONDITION U/S	0649	J-STD-020		8	0	
Total:				0		

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0649	125C	24 HRS	308		
MOISTURE SOAK	0649	30C/60% R.H.	192 HRS	308		

CONVECTION REFLOW 0649 260C +0/-5C 3 PASS 308 0
Total: 0

FOLLOWED BY:

STORAGE LIFE

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	125C	1000 HRS	77	0	
Total:				0	

TEMPERATURE CYCLE

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

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	85/85, 3.5 VOLTS	1000 HRS	77	0	
Total:				0	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	121C, 2 ATM STEAM, UNBIASED	168 HRS	76	0	
Total:				0	

PACKAGE TESTS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
SOLDERABILITY (Pb-Free)	0649	JESD22-B102, COND C		6	0	
SOLDERABILITY (Sn/Pb)	0649	JESD22-B102, COND C		6	0	
X-RAY	0649	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS	0649	JESD22-B100		6	0	
MARK PERMANENCY	0649	JESD22-B107		6	0	
LEAD INTEGRITY	0649	JESD22-B105, COND B		6	0	
Total:				0		

DATE CODE: 0649 **LOT NUMBER:** QH611603BD-NPI **VEHICLE:** DS4026

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ULTRASOUND	0649	J-STD-020		8	0	
STORAGE LIFE	0649	125C	24 HRS	8		
MOISTURE SOAK	0649	30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW	0649	260C +0/-5C	3 PASS	8	0	
EXTERNAL VISUAL	0649	J-STD-020, 6.1a		8	0	
PRECONDITION U/S	0649	J-STD-020		8	0	
Total:				0		

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0649	125C	24 HRS	385		
MOISTURE SOAK	0649	30C/60% R.H.	192 HRS	385		
CONVECTION REFLOW	0649	260C +0/-5C	3 PASS	385	0	

FOLLOWED BY: **Total:** **0**

STORAGE LIFE

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	85 C	1000 HRS	77	0	
STORAGE LIFE	125C	1000 HRS	77	0	
Total:				0	

TEMPERATURE CYCLE

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

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	85/85, 3.5 VOLTS	1000 HRS	77	0	
Total:				0	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOClave	121C, 2 ATM STEAM, UNBIASED	168 HRS	76	0	
Total:				0	

PACKAGE TESTS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
SOLDERABILITY (Pb-Free)	0649	JESD22-B102, COND C		6	0	
SOLDERABILITY (Sn/Pb)	0649	JESD22-B102, COND C		6	0	
X-RAY	0649	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS	0649	JESD22-B100		6	0	
MARK PERMANENCY	0649	JESD22-B107		6	0	
LEAD INTEGRITY	0649	JESD22-B105, COND B		6	0	
Total:				0		

DATE CODE: 0632 **LOT NUMBER:** ZH601625ABD-NPI **VEHICLE:** DS4026

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 500 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 1000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 2500 VOLTS	1 PUL'S	3	3	No FA
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 3000 VOLTS	1 PUL'S	3	3	No FA
Total:				6		

DATE CODE: 0632 **LOT NUMBER:** ZH601625EEE-ESD **VEHICLE:** DS4026

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 1000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 2500 VOLTS	1 PUL'S	3	1	No FA
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 3000 VOLTS	1 PUL'S	3	3	No FA
ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 500 VOLTS	1 PUL'S	3	0	

ESD SENSITIVITY	0632	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	3	No FA
LATCH-UP	0632	JESD78, I-TEST 125C			6	0	
LATCH-UP	0632	JESD78, V-SUPPLY TEST 125C			6	0	
				Total:		7	