

RELIABILITY REPORT FOR

DS1972, iButton IC Assembly, Pb-Free

Maxim Integrated Products

4401 South Beltwood Parkway Dallas, TX 75244-3292

Prepared by:

Ken Wendel Director, Reliability Engineering Maxim Integrated Products 4401 South Beltwood Pkwy. Dallas, TX 75244-3292

 ${\bf Email: ken. wendel@maxim\text{-}ic.com}$

ph: 972-371-3726 fax: 972-371-6016 mbl: 214-435-6610

Conclusion:

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

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 (module) = Fr (1) + Fr (2) + Fr (3) + ..... + 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:

Module Device:	Module Units:	Quantity:	Fails:	<u>Ea:</u>	Beta:	MTTF (Yrs):	FITs:
DS2431	1	276	0	0.7	0.0	32431	3.5
Totals:						32431	3.5

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: Batangas Assembly

Pin Count: 2

Package Type: iButton F50 ICs (Pb-Free)

Body Size: 68 Mold Compound: ?

Lead Frame: PCB; FR4

Lead Finsh: Sn Plate/Ni/Stainless Steel

Die Attach: ?

Bond Wire / Size: NA / NA
Flammability: UL 94-V0
Moisture Sensitivity NA

(JEDEC J-STD20A)

Date Code Range: 0549 to 0804

DATE CODE: 0549						
DESCRIPTION DATE CD CONDITION READPOINT QTY F	DATE CODE: 0549	LOT NUMBER: MA350039AAC	VEHICLE: DS1904			
STORAGE LIFE	STORAGE LIFE					
Total: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY FT TOTAL TOTA	DESCRIPTION	DATE CD CONDITION	READPOINT	QTY	FAILS	FA#
TEMPERATURE CYCLE	STORAGE LIFE	0549 85 C	1000 HRS	77	0	
DESCRIPTION DATE CD CONDITION READPOINT (DIVIDING QTY FOR TOTAL READPOINT (DIVIDING QTY FOR TOTAL TOTAL<			Total:		0	
TEMP CYCLE, 5' RAMP, 0549	TEMPERATURE CYC	LE				
10' DWELL	DESCRIPTION	DATE CD CONDITION	READPOINT	QTY	FAILS	FA#
UNBIASED MOISTURE RESISTANCE DESCRIPTION DATE CD CONDITION READPOINT QTY F MOISTURE SOAK 0549 60C/90% R.H. 1000 HRS 77 Total: DATE CODE: 0549 LOT NUMBER: MA350040AAC VEHICLE: DS1904 STORAGE LIFE DESCRIPTION DATE CD CONDITION READPOINT QTY F STORAGE LIFE 0549 85 C 1000 HRS 77 Total: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 Total: UNBIASED MOISTURE RESISTANCE		0549 -40 TO 85C	1000 CYS	77	0	
DESCRIPTION DATE CD CONDITION READPOINT Total: QTY F F MOISTURE SOAK 0549 60C/90% R.H. 1000 HRS 77 Total: 77 Total: 77 Total: DATE CODE: 0549 LOT NUMBER: MA350040AAC VEHICLE: DS1904 STORAGE LIFE DESCRIPTION DATE CD CONDITION READPOINT QTY F 2TY Total: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F 2TY F TEMP CYCLE, 5' RAMP, 10' DWELL 0549 -40 TO 85C 1000 CYS 77 77 Total: UNBIASED MOISTURE RESISTANCE			Total:		0	
MOISTURE SOAK 0549 60C/90% R.H. 1000 HRS 77 Total: DATE CODE: 0549 LOT NUMBER: MA350040AAC VEHICLE: DS1904 STORAGE LIFE DESCRIPTION DATE CD CONDITION READPOINT QTY F TOTAL: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F TOTAL: TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 10' DWELL Total: UNBIASED MOISTURE RESISTANCE	UNBIASED MOISTUR	E RESISTANCE				
Total:	DESCRIPTION	DATE CD CONDITION	READPOINT	QTY	FAILS	FA#
DATE CODE: 0549 LOT NUMBER: MA350040AAC VEHICLE: DS1904 STORAGE LIFE DESCRIPTION DATE CD CONDITION READPOINT QTY F STORAGE LIFE 0549 85 C 1000 HRS 77 Total: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 Total: UNBIASED MOISTURE RESISTANCE	MOISTURE SOAK	0549 60C/90% R.H.	1000 HRS	77	0	
STORAGE LIFE			Total:		0	
DESCRIPTION DATE CD CONDITION READPOINT TOTAL QTY TOTAL F TOTAL <	DATE CODE: 0549	LOT NUMBER: MA350040AAC	VEHICLE: DS1904			
STORAGE LIFE 0549 85 C 1000 HRS 77 Total: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F F TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 10' DWELL Total: UNBIASED MOISTURE RESISTANCE	STORAGE LIFE					
Total: TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 TOtal: Total: UNBIASED MOISTURE RESISTANCE	DESCRIPTION	DATE CD CONDITION	READPOINT	QTY	FAILS	FA#
TEMPERATURE CYCLE DESCRIPTION DATE CD CONDITION READPOINT QTY F TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 10' DWELL Total:	STORAGE LIFE	0549 85 C	1000 HRS	77	0	
DESCRIPTION DATE CD CONDITION READPOINT QTY F TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 Total: UNBIASED MOISTURE RESISTANCE			Total:		0	
TEMP CYCLE, 5' RAMP, 0549 -40 TO 85C 1000 CYS 77 10' DWELL Total: UNBIASED MOISTURE RESISTANCE	TEMPERATURE CYC	LE				
10' DWELL Total: UNBIASED MOISTURE RESISTANCE	DESCRIPTION	DATE CD CONDITION	READPOINT	QTY	FAILS	FA#
UNBIASED MOISTURE RESISTANCE		0549 -40 TO 85C	1000 CYS	77	0	
			Total:		0	
DESCRIPTION DATE CD CONDITION READPOINT QTY F	UNBIASED MOISTUR	E RESISTANCE				
	DESCRIPTION	DATE CD CONDITION	READPOINT	QTY	FAILS	FA#

MOISTURE SOAK 0549 60C/90% R.H. 1000 HRS 77 0

MOIOTORE COARC	00-10	000/00/0	13.11.		1000	11110	, ,	U	
						Total:		0	
DATE CODE: 0549	LOT	NUMBER:	MA350041AAC	VEHICLE:	:	DS1904			
STORAGE LIFE									
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
STORAGE LIFE	0549	85 C			1000	HRS	77	0	
						Total:		0	
TEMPERATURE CYC	LE								
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
TEMP CYCLE, 5' RAMP,	0549	-40 TO 85	5C		1000	CYS	77	0	
10' DWELL						Total:		0	
UNBIASED MOISTUR	E RESIST	ANCE							
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
MOISTURE SOAK	0549	60C/90%	-			HRS	77	0	
						Total:		0	
DATE CODE: 0716	LOT	NUMBER:	MG360509-QUAL1	VEHICLE:		DS1990			
MECHANICAL LIFE									
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
MECHANICAL SHOCK	0716	JESD22-I	B104C CONDITION F		30	CYS	50	0	
VIBRATION, VARIABLE	0716	JESD22-I	B103-B CONDITION 2		9	HRS	50	0	
FREQUENCY						Total:		0	
STORAGE LIFE									
DESCRIPTION	DATE CD	CONDITI	ON		DΕΛ	DPOINT	OTV	FAILS	FA#
STORAGE LIFE	0716	85 C	OI4			HRS	77	0	1 7,11
0.010.000 511 5	07.10	00 0			1000	Total:	•	0	
UNBIASED MOISTUR	E RESIST	ANCE							
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
MOISTURE SOAK	0716	85 C/85%			959	HRS	77	0	
						Total:		0	
DATE CODE: 0804	LOT	NUMBER:	MG362158AAA-1	VEHICLE:	:	DS1990			
STORAGE LIFE									
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
STORAGE LIFE	0804	70 C			1000	HRS	77	0	
						Total:		0	
TEMPERATURE CYC	LE								
DESCRIPTION	DATE CD	CONDITI	ON		REA	DPOINT	QTY	FAILS	FA#
TEMP CYCLE, 5' RAMP,	0804	-40 TO 85	5C		500	CYS	77	0	
10' DWELL						Total:		0	
UNBIASED MOISTUR	F REGICT	ANCE				. 51411			
DESCRIPTION		CONDITI	ON		DE^	DPOINT	OTV	FAILS	FA#
MOISTURE SOAK	0804	60C/90%				HRS	77	0	r _M #
51010112 00/111	300 T	300/00/0	11		. 500	Total:	.,	0	
						. Jui.		•	