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RELIABILITY REPORT
FOR

DS21FF44, 300 Pin MCMBGA

Dallas Semiconductor

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Conclusion:

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

DS21FF44, 300 Pin MCMBGA

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:	Quantity:	MTTF (Yrs):	FITs:
DS21Q44	**4**	**17852**	**6.4**
Totals:		**17852**	**6**

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. A 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:	DS21FF44
Assembly Site:	ATP (Amkor, PI)
Pin Count:	300
Package Type:	MCMBGA
Body Size:	27x27x1.73
Mold Compound:	Plaskon SMT-B1
Lead Frame:	Printed Crt Brd; BT
Lead Finsh:	
Die Attach:	A8510AA Silverfilled Ablestik
Bond Wire / Size:	Au / 1.2 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 4
Date Code Range:	9844 to 9844

HIGH TEMPERATURE OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
INFANT LIFE	9844	125C, 3.5 VOLTS	48	HOURS	215	0
HIGH VOLTAGE LIFE	9844	125C, 3.5 VOLTS	2000	HOURS	48	1
INFANT LIFE	9844	125C, 3.5 VOLTS	48	HOURS	155	0
HIGH VOLTAGE LIFE	9844	125C, 3.5 VOLTS	1000	HOURS	48	0
				Total:		**1**

MOISTURE SENSITIVITY LEVEL 4

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ULTRASOUND	9844	J-STD-020			8	0
STORAGE LIFE		125C	24	HOURS	8	
MOISTURE SOAK		30C/60% R.H.	144	HOURS	8	
CONVECTION REFLOW		220C	3	PASS	8	0
EXTERNAL VISUAL		MIL-STD-883-2009			8	0
PRECONDITION U/S		J-STD-020			8	0
EXTERNAL VISUAL	9844	MIL-STD-883-2009			8	0
ULTRASOUND		J-STD-020			8	0
STORAGE LIFE		125C	24	HOURS	8	
MOISTURE SOAK		30C/60% R.H.	144	HOURS	8	
CONVECTION REFLOW		220C	3	PASS	8	0
EXTERNAL VISUAL		MIL-STD-883-2009			8	0
PRECONDITION U/S		J-STD-020			8	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
X-RAY	9844	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0
PHYSICAL DIMENSIONS		MIL-STD-883-2016		6	0
MARK PERMANENCY		MIL-STD-883-2015		6	0
LEAD INTEGRITY		MIL-STD-883-2004 : COND B2		6	0
BALL SHEAR		TBD		6	0
X-RAY	9844	MIL-STD-883-2012 : TOP & SIDE VIEW		6	0
PHYSICAL DIMENSIONS		MIL-STD-883-2016		6	0
MARK PERMANENCY		MIL-STD-883-2015		6	0
BALL SHEAR		TBD		6	0
			Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
TEMP CYCLE	9844	-55C TO 125C	1000 CYCLES	77	1
TEMP CYCLE	9844	-55C TO 125C	1000 CYCLES	77	0
			Total:		**1**

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
BIASED MOISTURE	9844	85/85, 5.5 VOLTS	274 HOURS	30	0
BIASED MOISTURE	9844	85/85, 3.5 VOLTS	959 HOURS	30	0
BIASED MOISTURE	9844	85/85, 3.5 VOLTS	959 HOURS	25	1
			Total:		**1**

Assembly Information:

Qualification Vehicle:	DS21FF44
Assembly Site:	Stats
Pin Count:	300
Package Type:	MCMBGA
Body Size:	27x27x1.73
Mold Compound:	Plaskon SMT-B1
Lead Frame:	Printed Crt Brd; BT
Lead Finsh:	
Die Attach:	A8510AA Silverfilled Ablestik
Bond Wire / Size:	Au / 1.2 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 4
Date Code Range:	9917 to 9917

HIGH TEMPERATURE OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
INFANT LIFE	9917	125C, 3.5 VOLTS	48 HOURS	200	0
HIGH VOLTAGE LIFE	9917	125C, 3.5 VOLTS	2000 HOURS	48	0

					Total:	**0**

MOISTURE SENSITIVITY LEVEL 4

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ULTRASOUND	9917	J-STD-020			8	0
STORAGE LIFE		125C	24	HOURS	8	
MOISTURE SOAK		30C/60% R.H.	144	HOURS	8	
CONVECTION REFLOW		220C	3	PASS	8	0
EXTERNAL VISUAL		MIL-STD-883-2009			8	0
PRECONDITION U/S		J-STD-020			8	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
X-RAY	9917	MIL-STD-883-2012 : TOP & SIDE VIEW			6	0
PHYSICAL DIMENSIONS		MIL-STD-883-2016			6	0
MARK PERMANENCY		MIL-STD-883-2015			6	0
BALL SHEAR		TBD			6	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	9917	-55C TO 125C	1000	CYCLES	83	0
				Total:		**0**

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
BIASED MOISTURE	9917	85/85, 3.5 VOLTS	959	HOURS	27	0
				Total:		**0**

Assembly Information:

Qualification Vehicle:	DS21FT44
Assembly Site:	Stats
Pin Count:	300
Package Type:	MCMBGA
Body Size:	27x27x1.73
Mold Compound:	Plaskon SMT-B1
Lead Frame:	Printed Crt Brd; BT
Lead Finsh:	
Die Attach:	A8510AA Silverfilled Ablestik
Bond Wire / Size:	Au / 1.2 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 4
Date Code Range:	9844 to 9844

HIGH TEMPERATURE OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
INFANT LIFE	9844	125C, 3.5 VOLTS	48	HOURS	200	0

HIGH VOLTAGE LIFE	9844	125C, 3.5 VOLTS	2000	HOURS	48	0
				Total:		**0**

MOISTURE SENSITIVITY LEVEL 4

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ULTRASOUND	9844	J-STD-020			8	0
STORAGE LIFE		125C	24	HOURS	8	
MOISTURE SOAK		30C/60% R.H.	144	HOURS	8	
CONVECTION REFLOW		220C	3	PASS	8	0
EXTERNAL VISUAL		MIL-STD-883-2009			8	0
PRECONDITION U/S		J-STD-020			8	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
CONSTRUCTION ANALY	9844	TO BE DONE BY F/A			5	0
X-RAY	9844	MIL-STD-883-2012 : TOP & SIDE VIEW			6	0
PHYSICAL DIMENSIONS		MIL-STD-883-2016			6	0
MARK PERMANENCY		MIL-STD-883-2015			6	0
BALL SHEAR		TBD			6	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	9844	-55C TO 125C	1000	CYCLES	77	0
				Total:		**0**

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
BIASED MOISTURE	9844	85/85, 3.5 VOLTS	959	HOURS	30	2
				Total:		**2**