DALLAS SEMICONDUCTOR MAXIM

09/13/2004

RELIABILITY REPORT
FOR

DS1384

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:

DS1384

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.

Device Description:

A description of the device used in this qualification 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:

The Arrhenius model will be used to determine the acceleration factor for failure mechanisms that are temperature accelerated.

AfT = exp((Ea/k)*(1/Tu - 1/Ts)) = tu/ts
AfT = Acceleration factor due to Temperature
tu = Time at use temperature (e.g. 55°C)
ts = Time at stress temperature (e.g. 125°C)
k = Boltzmann's Constant (8.617 x 10-5 eV/°K)
Tu = Temperature at Use (°K)
Ts = Temperature at Stress (°K)
Ea = Activation Energy (e.g. 0.7 ev)

The activation energy of the failure mechanism is derived from either internal studies or industry accepted standards, or activation energy of 0.7ev will be used whenever actual failure mechanisms or their activation energies are unknown. All deratings will be done from the stress ambient temperature to the use ambient temperature.

An exponential model will be used to determine the acceleration factor for failure mechanisms, which are voltage accelerated.

AfV = exp(B*(Vs - Vu))
AfV = Acceleration factor due to Voltage
Vs = Stress Voltage (e.g. 7.0 volts)
Vu = Maximum Operating Voltage (e.g. 5.5 volts)
B = Constant related to failure mechanism type (e.g. 1.0, 2.4, 2.7, etc.)

The Constant, B, related to the failure mechanism is derived from either internal studies or industry accepted standards, or a B of 1.0 will be used whenever actual failure mechanisms or their B are unknown. All deratings will be done from the stress voltage to the maximum operating voltage. Failure rate data from the operating life test is reported using a Chi-Squared statistical model at the 60% or 90% confidence level (Cf).

The failure rate, Fr, is related to the acceleration during life test by:

Fr = X/(ts * AfV * AfT * N * 2)
X = Chi-Sq statistical upper limit
N = Life test sample size

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 device/process/assembly is:

FAILURE RATE: **MTTF (YRS): 27261** **FITS: 4.2**

The parameters used to calculate this 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 device information. This is a description of the device for this report. Following this is the assembly information. This section includes a description of the assembly vehicle used to generate this reliability data for both qualifications and monitors. The next section is the detailed reliability data for each stress found in the qualification / monitor. If there are additional assemblies used as part of this report, a description of each will follow which includes the respective reliability data for that assembly. The reliability data section includes the latest data available. Some of this data may be generic with other products.

Device Information:

Process:	1P, 1M, 1.2um, NdDiode, Pch VT Implant , TEOS Spacer,
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	185 x 142
Number of Transistors:	0
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	225 Å

Assembly Information:

Qualification Vehicle:	DS1384
Assembly Site:	ATP (Amkor, PI)
Pin Count:	44
Package Type:	MQFP
Body Size:	10x10x2
Mold Compound:	Nitto MP8000C
Lead Frame:	Stamped Copper C7025
Lead Finsh:	SnPb Plate
Die Attach:	8361J Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	79
Theta JC:	21
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 3
Date Code Range:	9910 to 9913

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ULTRASOUND	9913	J-STD-020	1	DYS	8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		30C/60% R.H.	240	HRS	8		
SOLDER HEAT		HTC VAPOR PHASE	3	PASS	8	0	
EXTERNAL VISUAL		MIL-STD-883-2009	1	DYS	8	0	

PRECONDITION U/S	9913	J-STD-020	1	DYS	8	0	
				Total:		**0**	

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HIGH VOLTAGE LIFE	9910	125C, 7.0 VOLTS	1000	HRS	116	0	
HIGH VOLTAGE LIFE	9913	125C, 7.0 VOLTS	1000	HRS	116	0	
				Total:		**0**	

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
CONSTRUCTION ANALYSIS	9910	SENT TO OUTSIDE SOURCE	2	WKS	5	0	
SOLDERABILITY	9910	MIL-STD-883-2003	1	DYS	3	0	
X-RAY	9910	MIL-STD-883-2012 : TOP & SIDE VIEW	2	DYS	6	0	
PHYSICAL DIMENSIONS		MIL-STD-883-2016	4	DYS	6	0	
MARK PERMANENCY		MIL-STD-883-2015	6	DYS	6	0	
LEAD INTEGRITY		MIL-STD-883-2004 : COND B2	8	DYS	6	0	
SOLDERABILITY	9913	MIL-STD-883-2003	3	DYS	3	0	
X-RAY	9913	MIL-STD-883-2012 : TOP & SIDE VIEW	3	DYS	6	0	
PHYSICAL DIMENSIONS		MIL-STD-883-2016	3	DYS	6	0	
MARK PERMANENCY		MIL-STD-883-2015	3	DYS	6	0	
LEAD INTEGRITY		MIL-STD-883-2004 : COND B2	3	DYS	6	0	
				Total:		**0**	

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
STORAGE LIFE	9910	125C	24	HRS	315		
MOISTURE SOAK		30C/60% R.H.	240	HRS	315		
SOLDER HEAT		HTC VAPOR PHASE	3	PASS	315	0	
STORAGE LIFE	9913	125C	24	HRS	315		
MOISTURE SOAK		30C/60% R.H.	240	HRS	315		
SOLDER HEAT		HTC VAPOR PHASE	3	PASS	315	0	
				Total:		**0**	

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
TEMP CYCLE	9910	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	9913	-55C TO 125C	1000	CYS	77	0	
				Total:		**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
BIASED MOISTURE	9913	85/85, 5.5 VOLTS	959	HRS	42	0	
				Total:		**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
AUTOCLAVE	9910	121C, 2 ATM STEAM, UNBIASED	168	HRS	45	0	

AUTOCLAVE	9913	121C, 2 ATM STEAM, UNBIASED	168	HRS	45	0
				Total:		**0**

FAILURE RATE: **MTTF (YRS): 27261** **FITS: 4.2**