DALLAS SEMICONDUCTOR MAXIM

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RELIABILITY REPORT
FOR

DS3148, Rev A1

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:

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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 this device 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 is:

FAILURE RATE: MTTF (YRS): 5405 FITS: 21.1

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 either used as a reliability test vehicle for a process / assembly qualification / monitor or a device used as part of a product qualification / monitor. 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 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.

Device Information:

Device:	DS31412
Process:	1P, 4M,0.35um, Sil.P1, Ti/TiN M1-M4 ,BPSG,Masked N+ES
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	444 x 438
Number of Transistors:	3100000
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	75 Å

Assembly Information:

Qualification Vehicle:	DS31412
Assembly Site:	ASAT
Pin Count:	349
Package Type:	CSBGA
Body Size:	27x27x1.5
Mold Compound:	Nitto HC-100-XJAA-M
Lead Frame:	PCB; BT
Lead Finsh:	SnPbAg
Die Attach:	CRM1525D
Bond Wire / Size:	Au / 1.0 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 3
Date Code Range:	0319 to 0319

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
PACKAGE, ASSEMBLY P	0319	TO BE SUBMITTED BY ASSEMBLY SITE	5	WKS	0	0
				Total:		**0**

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ESD SENSITIVITY	0319	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0319	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0319	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0319	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	3
LATCH-UP	0319	JESD78, I-TEST 125C	2	DYS	6	0
LATCH-UP	0319	JESD78, Vsupply TEST 125C	2	DYS	6	0
				Total:		**3**

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
EXTERNAL VISUAL	0319	J-STD-020, 6.1a	3	DYS	8	0
ULTRASOUND		J-STD-020	3	DYS	8	0
STORAGE LIFE		125C	48	HRS	8	
MOISTURE SOAK		30C/60% R.H.	192	HRS	8	
CONVECTION REFLOW		220C	3	PASS	8	0
EXTERNAL VISUAL		J-STD-020, 6.1a	3	DYS	8	0
PRECONDITION U/S		J-STD-020	3	DYS	8	0
				Total:		**0**

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
HIGH TEMP OP LIFE	0319	125C, 3.5 VOLTS	1000	HRS	46	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
X-RAY	0319	MIL-STD-883-2012 : TOP & SIDE VIEW	6	DYS	6	0
PHYSICAL DIMENSIONS		JESD22-B100	6	DYS	6	0
BALL SHEAR		JESD22-B117	6	DYS	6	0
MARK PERMANENCY		JESD22-B107	6	DYS	6	0
				Total:		**0**

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
STORAGE LIFE	0319	125C	48	HRS	244	
MOISTURE SOAK		30C/60% R.H.	192	HRS	244	
CONVECTION REFLOW		220C	3	PASS	243	0
				Total:		**0**

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
STORAGE LIFE	0319	150C	1000	HRS	76	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	0319	-55C TO 125C	1000	CYS	77	0
				Total:		**0**

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
BIASED MOISTURE	0319	85/85, 3.5 VOLTS	1000 HRS	43	0
			Total:		**0**

FAILURE RATE: **MTTF (YRS): 5405** **FITS: 21.1**