DALLAS SEMICONDUCTOR MAXIM

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RELIABILITY REPORT
FOR

DS2129, 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:

DS2129, Rev A1

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): 5288** **FITS: 21.6**

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. Some of this data may be generic with other products.

Device Information:

Device:	DS2129
Process:	D6P-2P1M,HPVt,N+ESD,TCN3 ALOCOS:GOI
Passivation:	Laser/LTO Ox - Pass/Nit - Gen. LaserPrb
Die Size:	70 x 100
Number of Transistors:	0
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	150 Å

Assembly Information:

Qualification Vehicle:	DS2129
Assembly Site:	ATP (Amkor, PI)
Pin Count:	16
Package Type:	SOIC
Body Size:	150x1.4
Mold Compound:	Sumitomo 6600CS
Lead Frame:	Stamped Copper CDA194
Lead Finsh:	SnPb Plate
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	0409 to 0409

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ESD SENSITIVITY	0409	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0409	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0409	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ESD SENSITIVITY	0409	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0409	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	3	3
LATCH-UP	0409	JESD78, I-TEST 125C	2	DYS	6	0
LATCH-UP	0409	JESD78, Vsupply TEST 125C	2	DYS	6	0
				Total:		**3**

MOISTURE SENSITIVITY LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
EXTERNAL VISUAL	0409	J-STD-020, 6.1a	3	DYS	8	0
ULTRASOUND		J-STD-020	3	DYS	8	0
STORAGE LIFE		125C	24	HRS	8	
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8	
CONVECTION REFLOW		235C +5/-0C	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	0409	125C, 5.5 VOLTS	1000	HRS	45	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
SOLDERABILITY	0409	JESD22-B102	6	DYS	3	0
X-RAY	0409	MIL-STD-883-2012 : TOP & SIDE VIEW	3	DYS	6	0
PHYSICAL DIMENSIONS		JESD22-B100	3	DYS	6	0
MARK PERMANENCY		JESD22-B107	3	DYS	6	0
LEAD INTEGRITY		JESD22-B105 TEST CONDITION B	3	DYS	6	0
				Total:		**0**

PRECONDITIONING LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
STORAGE LIFE	0409	125C	24	HRS	199	
MOISTURE SOAK		85 C/85% R.H.	168	HRS	199	
CONVECTION REFLOW		235C +5/-0C	3	PASS	199	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	0409	-55C TO 125C	1000	CYS	77	0
				Total:		**0**

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
AUTOCLAVE	0409	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
				Total:		**0**

FAILURE RATE: **MTTF (YRS): 5288** **FITS: 21.6**