

RELIABILITY REPORT  
FOR

**DS2119M, Rev C1**

**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](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<sup>-5</sup> 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): 130077**                      **FITS: 0.9**

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. At the start of this data is the device information. The next section is the detailed reliability data for each stress. The reliability data section includes the latest data available and may contain some generic data.

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**Device Information:**

Process: D6S-1P1M,HPVt,N+ESD,TCN3 ALOCOS:GOI  
 Passivation: Laser/LTO Ox - Pass/Nit - Gen. LaserPrb  
 Die Size: 79 x 170  
 Number of Transistors: 3908  
 Interconnect: Aluminum / 1% Silicon / 0.5% Copper  
 Gate Oxide Thickness: 150 Å

**OPERATING LIFE**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
HIGH VOLTAGE LIFE	0034	125C, 6.0 VOLTS	1000 HRS	168	0
HIGH VOLTAGE LIFE	0115	125C, 6.0 VOLTS	1000 HRS	80	0
HIGH VOLTAGE LIFE	0124	125C, 6.0 VOLTS	1000 HRS	77	0
HIGH VOLTAGE LIFE	0128	125C, 6.0 VOLTS	1000 HRS	77	0
HIGH VOLTAGE LIFE	0128	125C, 6.0 VOLTS	1000 HRS	77	0
HIGH VOLTAGE LIFE	0151	125C, 6.0 VOLTS	1000 HRS	80	0
HIGH VOLTAGE LIFE	0202	125C, 6.0 VOLTS	1000 HRS	80	0
HIGH VOLTAGE LIFE	0202	125C, 6.0 VOLTS	1000 HRS	80	0
HIGH VOLTAGE LIFE	0233	125C, 6.0 VOLTS	1000 HRS	75	0
HIGH TEMP OP LIFE	0303	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH VOLTAGE LIFE	0308	125C, 6.0 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0309	125C, 5.5 VOLTS	1000 HRS	79	0
HIGH TEMP OP LIFE	0407	125C, 5.5 VOLTS	1000 HRS	77	0
				<b>Total:</b>	<b>0</b>

**STORAGE LIFE**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
STORAGE LIFE	0128	150C	1000 HRS	77	0
STORAGE LIFE	0128	150C	1000 HRS	77	0

STORAGE LIFE	0407	150C	1000 HRS	77	0
			<b>Total:</b>		<b>0</b>

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**TEMPERATURE CYCLE**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
TEMP CYCLE	0115	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0124	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0127	-55C TO 125C	1000 CYS	76	0
TEMP CYCLE	0128	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0128	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0233	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0303	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0309	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0407	-55C TO 125C	1000 CYS	77	0
			<b>Total:</b>		<b>0</b>

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**UNBIASED MOISTURE RESISTANCE**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
AUTOCLAVE	0115	121C, 2 ATM STEAM, UNBIASED	168 HRS	100	0
AUTOCLAVE	0124	121C, 2 ATM STEAM, UNBIASED	168 HRS	100	0
AUTOCLAVE	0127	121C, 2 ATM STEAM, UNBIASED	168 HRS	100	0
AUTOCLAVE	0128	121C, 2 ATM STEAM, UNBIASED	168 HRS	77	0
AUTOCLAVE	0128	121C, 2 ATM STEAM, UNBIASED	168 HRS	77	0
AUTOCLAVE	0233	121C, 2 ATM STEAM, UNBIASED	168 HRS	77	0
AUTOCLAVE	0303	121C, 2 ATM STEAM, UNBIASED	168 HRS	77	0
AUTOCLAVE	0309	121C, 2 ATM STEAM, UNBIASED	168 HRS	77	0
AUTOCLAVE	0407	121C, 2 ATM STEAM, UNBIASED	168 HRS	75	0
			<b>Total:</b>		<b>0</b>

**FAILURE RATE:**                      **MTTF (YRS): 130077**                      **FITS: 0.9**