

**PRODUCT RELIABILITY REPORT  
FOR**

**DS2148, 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:

DS2148, Rev C1

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:

<b>FAILURE RATE:</b>	<b>MTTF (YRS):</b>	<b>241059</b>	<b>FITS:</b>	<b>0.5</b>
	<b>DEVICE HOURS:</b>	<b>2051500</b>	<b>FAILS:</b>	<b>0</b>

Only data from Operating Life or similar stresses are used for this calculation.

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. "\*" after DATE CODE denotes specific product data.

**Device Information:**

Process: E6H-2P2M,HPVt,TCZ ALOCOS:GOI  
 Passivation: NRL Laser w/Nov TEOS Oxide-Nitride  
 Die Size: 208 x 207  
 Number of Transistors: 2000  
 Interconnect: Aluminum / 1% Silicon / 0.5% Copper  
 Gate Oxide Thickness: 150 Å

**OPERATING LIFE**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	0227	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0310	125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0332	125C, 5.25 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0343	125C, 5.0 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0402	125C, 3.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0411	125C, 5.0 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0418	125C, 5.0 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0418	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0420	125C, 3.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0426	125C, 3.6 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0428	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0432	125C, 5.0 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0438	125C, 5.0 VOLTS	1000 HRS	78	0	
HIGH TEMP OP LIFE	0439	125C, 5.0 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0440	125C, 3.6 VOLTS	1000 HRS	45	0	

HIGH TEMP OP LIFE	0442	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0447	125C, 5.0 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0506	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0512	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0512	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0512	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0517	125C, 3.3 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0518	125C, 3.3 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0523	125C, 5.0 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0541	125C, 3.3 VOLTS	500 HRS	77	
HIGH TEMP OP LIFE	0544	125C, 5.0 VOLTS	500 HRS	77	
HIGH TEMP OP LIFE	0611	125C, 3.5 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0611	125C, 3.5 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0614	125C, 3.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0621	125C, 3.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0621	125C, 3.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0622	125C, 3.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0622	125C, 3.5 VOLTS	500 HRS	45	
HIGH TEMP OP LIFE	0627	125C, 3.5 VOLTS	1000 HRS	45	0

**Total: 0**

**FAILURE RATE:                    MTTF (YRS):            241059            FITS:            0.5**  
**DEVICE HOURS:        2051500        FAILS:            0**