

**PRODUCT RELIABILITY REPORT  
FOR**

**DS1481, Rev A3**

**Dallas Semiconductor**

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**Conclusion:**

The following qualification successfully meets the quality and reliability standards required of all Dallas Semiconductor products:

DS1481, Rev A3

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):**        **386518**        **FITS:**                **0.3**  
**DEVICE HOURS:**            **3442408**        **FAILS:**                **0**

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:                    1P, 1M, 0.8um, PdpIDiode, Low Vts , N+ESDII, WJ BPSG,  
Passivation:                Passivation w/Nov TEOS Oxide-Nitride  
Die Size:                    64 x 55  
Number of Transistors:    0  
Interconnect:                Aluminum / 1% Silicon / 0.5% Copper  
Gate Oxide Thickness:     175 Å

**OPERATING LIFE**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	9515	125C, 7.0 VOLTS	1000 HRS	153	0	
INFANT LIFE	9515	125C, 7.0 VOLTS	48 HRS	307	0	
HIGH VOLTAGE LIFE	9515	125C, 7.0 VOLTS	1000 HRS	153	0	
INFANT LIFE	9518	125C, 7.0 VOLTS	48 HRS	307	0	
HIGH VOLTAGE LIFE	9518	ELEC TEST	1000 HRS	153	0	
HIGH VOLTAGE LIFE	9532	125C, 7.0 VOLTS	1000 HRS	153	0	
INFANT LIFE	9601	125C, 7.0 VOLTS	48 HRS	315	0	
HIGH VOLTAGE LIFE	9601	125C, 7.0 VOLTS	1000 HRS	116	0	
INFANT LIFE	9613	125C, 7.0 VOLTS	48 HRS	315	0	
HIGH VOLTAGE LIFE	9613	125C, 7.0 VOLTS	1000 HRS	116	0	
INFANT LIFE	9620	125C, 7.0 VOLTS	48 HRS	307	0	
HIGH VOLTAGE LIFE	9620	125C, 7.0 VOLTS	1000 HRS	153	0	
INFANT LIFE	9649 *	125C, 7.0 VOLTS	48 HRS	315	0	
HIGH VOLTAGE LIFE	9649 *	125C, 7.0 VOLTS	1000 HRS	116	0	
INFANT LIFE	9730	125C, 7.0 VOLTS	48 HRS	192	0	

HIGH VOLTAGE LIFE	9730	125C, 7.0 VOLTS	1000 HRS	114	0
INFANT LIFE	9731	125C, 7.0 VOLTS	48 HRS	192	0
HIGH VOLTAGE LIFE	9731	125C, 7.0 VOLTS	1000 HRS	108	0
INFANT LIFE	9733	125C, 7.0 VOLTS	48 HRS	192	0
HIGH VOLTAGE LIFE	9733	125C, 7.0 VOLTS	1000 HRS	108	0
INFANT LIFE	9830	125C, 7.0 VOLTS	48 HRS	232	0
HIGH VOLTAGE LIFE	9830	125C, 7.0 VOLTS	1000 HRS	77	0
INFANT LIFE	9848	125C, 7.0 VOLTS	48 HRS	234	0
HIGH VOLTAGE LIFE	9848	125C, 7.0 VOLTS	1000 HRS	77	0
INFANT LIFE	9848	125C, 7.0 VOLTS	48 HRS	234	0
HIGH VOLTAGE LIFE	9848	125C, 7.0 VOLTS	1000 HRS	77	0
INFANT LIFE	9904	125C, 7.0 VOLTS	48 HRS	186	0
INFANT LIFE	9904	125C, 7.0 VOLTS	48 HRS	186	0
HIGH VOLTAGE LIFE	9904	125C, 7.0 VOLTS	1000 HRS	108	0
HIGH VOLTAGE LIFE	9904	125C, 7.0 VOLTS	1000 HRS	108	0
INFANT LIFE	0011	125C, 7.0 VOLTS	48 HRS	233	0
HIGH VOLTAGE LIFE	0011	125C, 7.0 VOLTS	1000 HRS	77	0
INFANT LIFE	0024	125C, 7.0 VOLTS	48 HRS	234	0
HIGH VOLTAGE LIFE	0024	125C, 7.0 VOLTS	1000 HRS	77	0
INFANT LIFE	0039	125C, 7.0 VOLTS	48 HRS	232	0
HIGH VOLTAGE LIFE	0039	125C, 7.0 VOLTS	1000 HRS	77	0
INFANT LIFE	0051	125C, 7.0 VOLTS	48 HRS	233	0
HIGH VOLTAGE LIFE	0051	125C, 7.0 VOLTS	1000 HRS	77	0
HIGH VOLTAGE LIFE	0105	125C, 7.0 VOLTS	1000 HRS	77	0
HIGH VOLTAGE LIFE	0105	125C, 7.0 VOLTS	1000 HRS	80	0
HIGH VOLTAGE LIFE	0111	125C, 7.0 VOLTS	1000 HRS	79	0
HIGH VOLTAGE LIFE	0252	125C, 7.0 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	0310	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	0327	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	0403	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	0406	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	0429	125C, 5.5 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0437	125C, 5.5 VOLTS	1000 HRS	80	0
HIGH TEMP OP LIFE	0449	125C, 5.5 VOLTS	1000 HRS	78	0
HIGH TEMP OP LIFE	0527	125C, 5.5 VOLTS	1000 HRS	80	0

HIGH TEMP OP LIFE	0536	125C, 5.5 VOLTS	1000 HRS	80	0
			<b>Total:</b>		<b>0</b>
<b>FAILURE RATE:</b>		<b>MTTF (YRS):</b>	<b>386518</b>	<b>FITS:</b>	<b>0.3</b>
		<b>DEVICE HOURS:</b>	<b>3442408</b>	<b>FAILS:</b>	<b>0</b>