

RELIABILITY REPORT  
FOR

**DS1833, Rev A2**

**Dallas Semiconductor**

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Prepared by:

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**Conclusion:**

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

DS1833, Rev A2

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): 57339**                      **FITS: 2.0**

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.

**Device Information:**

Process: 1P, 1M, 1.2um, ZTC P1, Ndepletion ,Latell ZTC,TEOSsp,  
 Passivation: Passivation w/Nitride  
 Die Size: 65 x 72  
 Number of Transistors: 0  
 Interconnect: Aluminum / 1% Silicon / 0.5% Copper  
 Gate Oxide Thickness: 225 Å

**OPERATING LIFE**

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	0110		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0128		125C, 7.0 VOLTS	1000 HRS	68	1	No FA
HIGH VOLTAGE LIFE	0150		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0150		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0150		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0245		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0245		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0245		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0308		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH VOLTAGE LIFE	0308		125C, 7.0 VOLTS	1000 HRS	68	0	
HIGH TEMP OP LIFE	0308		125C, 5.0 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0311		125C, 5.5 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0326		125C, 5.5 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0402		125C, 5.5 VOLTS	1000 HRS	80	0	
HIGH TEMP OP LIFE	0410		125C, 5.5 VOLTS	1000 HRS	80	0	
<b>Total:</b>						<b>1</b>	

**TEMPERATURE CYCLE**

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
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TEMP CYCLE	0110	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0128	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0150	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0150	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0150	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0245	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0245	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0245	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0308	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0308	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0308	-55C TO 125C	1000 CYS	77	0
TEMP CYCLE	0311	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0326	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0402	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0410	-55C TO 125C	1000 CYS	40	0
<b>Total:</b>				<b>0</b>	<b>0</b>

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#### TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HAST	0110		130C, 85%R.H.,5.5V	100 HRS	77	0	
HAST	0128		130C, 85%R.H.,5.5V	100 HRS	77	0	
HAST	0150		130C, 85%R.H.,5.5V	100 HRS	77	0	
HAST	0150		130C, 85%R.H.,5.5V	100 HRS	77	0	
HAST	0150		130C, 85%R.H.,5.5V	100 HRS	76	0	
HAST	0245		130C, 85%R.H.,5.5V	96 HRS	77	0	
HAST	0245		130C, 85%R.H.,5.5V	96 HRS	77	0	
HAST	0245		130C, 85%R.H.,5.5V	96 HRS	75	0	
HAST	0308		130C, 85%R.H.,5.5V	96 HRS	77	0	
HAST	0308		130C, 85%R.H.,5.5V	96 HRS	77	0	
HAST	0308		130C, 85%R.H.,5.5V	96 HRS	77	0	
HAST	0311		130C, 85%R.H.,5.5V	96 HRS	77	0	
HAST	0326		130C, 85%R.H.,5.5V	96 HRS	77	0	
<b>Total:</b>						<b>0</b>	

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#### UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	0110		121C, 2 ATM STEAM, UNBIASED	96 HRS	40	0	
AUTOCLAVE	0128		121C, 2 ATM STEAM, UNBIASED	96 HRS	40	0	
AUTOCLAVE	0150		121C, 2 ATM STEAM, UNBIASED	96 HRS	77	0	

AUTOCLAVE	0150	121C, 2 ATM STEAM, UNBIASED	96	HRS	77	0
AUTOCLAVE	0150	121C, 2 ATM STEAM, UNBIASED	96	HRS	77	0
AUTOCLAVE	0245	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
AUTOCLAVE	0245	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
AUTOCLAVE	0245	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
AUTOCLAVE	0308	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
AUTOCLAVE	0308	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
AUTOCLAVE	0308	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0
AUTOCLAVE	0311	121C, 2 ATM STEAM, UNBIASED	168	HRS	40	0
AUTOCLAVE	0326	121C, 2 ATM STEAM, UNBIASED	168	HRS	40	0
AUTOCLAVE	0402	121C, 2 ATM STEAM, UNBIASED	168	HRS	40	0
AUTOCLAVE	0410	121C, 2 ATM STEAM, UNBIASED	168	HRS	40	0
				<b>Total:</b>		<b>0</b>

**FAILURE RATE:**

**MTTF (YRS): 57339**

**FITS: 2.0**