

RELIABILITY REPORT
FOR

DS1558, Rev A6

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.

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 is:

FAILURE RATE: **MTTF (YRS): 100592** **FITS: 1.1**

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: D6N-1P2M,LLVt,ND cap PBL:GOI
 Passivation: Passivation w/Nov TEOS Oxide-Nitride
 Die Size: 126 x 145
 Number of Transistors: 0
 Interconnect: Aluminum / 1% Silicon / 0.5% Copper
 Gate Oxide Thickness: 150 Å

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0324		EOS/ESD S5.1 HBM 500 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0324		EOS/ESD S5.1 HBM 1000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0324		EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0324		EOS/ESD S5.1 HBM 4000 VOLTS	1 PUL'S	3	3	No FA
ESD SENSITIVITY	0324		EOS/ESD S5.1 HBM 8000 VOLTS	1 PUL'S	3	3	No FA
LATCH-UP	0324		JESD78, I-TEST 125C	2 DYS	6	0	
LATCH-UP	0324		JESD78, Vsupply TEST 125C	2 DYS	6	0	
Total:						6	

OPERATING LIFE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	0028		125C, 6.0 VOLTS	1000 HRS	116	0	
HIGH VOLTAGE LIFE	0039		125C, 6.0 VOLTS	1000 HRS	116	0	
HIGH VOLTAGE LIFE	0208		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0208		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0208		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0303		125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0303		125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0324		125C, 5.5 VOLTS	988 HRS	77	0	

HIGH TEMP OP LIFE	0324	125C, 5.5 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0324	125C, 5.5 VOLTS	1000 HRS	77	0
Total:				0	0

TEMPERATURE CYCLE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0028		-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE	0039		-55C TO 125C	1000 CYS	77	0	
Total:						0	0

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HAST	0028		130C, 85%R.H.,5.5V	100 HRS	77	0	
HAST	0039		130C, 85%R.H.,5.5V	100 HRS	77	0	
Total:						0	0

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	0028		121C, 2 ATM STEAM, UNBIASED	168 HRS	45	0	
AUTOCLAVE	0039		121C, 2 ATM STEAM, UNBIASED	168 HRS	45	0	
Total:						0	0

FAILURE RATE: MTTF (YRS): 100592 FITS: 1.1