

PRODUCT RELIABILITY REPORT
FOR

DS1339, 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:

DS1339, 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.

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): 6451** **FITS: 17.7**

The parameters used to calculate this failure rate are as follows:

Cf: 60% **Ea: 0.7** **B: 0** **Tu: 55 °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,TCN1 PBL:GOI
 Passivation: Passivation w/Nov TEOS Oxide-Nitride
 Die Size: 58 x 84
 Number of Transistors: 12000
 Interconnect: Aluminum / 1% Silicon / 0.5% Copper
 Gate Oxide Thickness: 150 Å

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
ESD SENSITIVITY	0224 *	EOS/ESD S5.1 HBM 500 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0224 *	EOS/ESD S5.1 HBM 1000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0224 *	EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0224 *	EOS/ESD S5.1 HBM 4000 VOLTS	1 PUL'S	3	0	
ESD SENSITIVITY	0224 *	EOS/ESD S5.1 HBM 8000 VOLTS	1 PUL'S	3	0	
LATCH-UP	0224 *	JESD78, I-TEST 125C		3	0	
LATCH-UP	0224 *	JESD78, Vsupply TEST 125C		3	0	
Total:					0	

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
INFANT LIFE	9918	125C, 6.0 VOLTS	48 HRS	746	0	
HIGH VOLTAGE LIFE	9935	125C, 6.0 VOLTS	1000 HRS	120	0	
INFANT LIFE	0027	125C, 5.0 VOLTS	48 HRS	315	0	
HIGH VOLTAGE LIFE	0027	125C, 5.0 VOLTS	1000 HRS	149	0	
HIGH VOLTAGE LIFE	0047	125C, 6.0 VOLTS	1000 HRS	150	0	
HIGH VOLTAGE LIFE	0106	125C, 6.0 VOLTS	192 HRS	77	0	
HIGH VOLTAGE LIFE	0145	125C, 6.0 VOLTS	240 HRS	77	0	
HIGH VOLTAGE LIFE	0210	125C, 6.0 VOLTS	1000 HRS	80	0	

HIGH VOLTAGE LIFE	0224 *	125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0224 *	125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0227	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0227	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0227	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0238	125C, 6.0 VOLTS	1000 HRS	45	2	FREQUENCY
HIGH VOLTAGE LIFE	0241	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0247	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0302	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0306	125C, 4.9 V (PSA) & 3.6 V (PSB)	1000 HRS	45	0	
HIGH VOLTAGE LIFE	0307	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0308	125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0310	125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0310	125C, 6.0 VOLTS	1000 HRS	45	0	
HIGH VOLTAGE LIFE	0310	125C, 6.0 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0311	125C, 3.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0312	125C, 3.3 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0318	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0324	125C, 5.25 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0403	125C, 3.6 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0403	125C, 5.5 VOLTS	1000 HRS	77	0	
HIGH TEMP OP LIFE	0412	125C, 3.5 VOLTS	1000 HRS	64	0	
HIGH TEMP OP LIFE	0421	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0421	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0422	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0424	125C, 5.5 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0434	85 C, 3.3 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0440	85 C, 3.3 VOLTS	1000 HRS	45	0	
HIGH TEMP OP LIFE	0440	85 C, 3.3 VOLTS	1000 HRS	45	0	
HIGH VOLTAGE LIFE	0530	125C, 4.9 V (PSA) & 3.6 V (PSB)	192 HRS	45		
			Total:		2	

FAILURE RATE:

MTTF (YRS): 6451

FITS: 17.7