

RELIABILITY REPORT  
FOR

**DS2430A, Rev A4**

**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:

DS2430A, Rev A4

**Device Description:**

A description of the device used in this qualification 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:

$$\text{MTTF} = 1/\text{Fr}$$

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this device/process/assembly is:

<b>FAILURE RATE:</b>	<b>MTTF (YRS):</b>	<b>9048</b>	<b>FITS:</b>	<b>12.6</b>
	<b>DEVICE HOURS:</b>	<b>77000</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. This is a description of the device for this report. Following this is the assembly information. This section includes a description of the assembly vehicle used to generate this reliability data for both qualifications and monitors. The next section is the detailed reliability data for each stress found in the qualification / monitor. If there are additional assemblies used as part of this report, a description of each will follow which includes the respective reliability data for that assembly. The reliability data section includes the latest data available.

**Device Information:**

Device: DS2430  
 Process: EC8X-1P2M, E2, DSDw/LVWells,PF-Ring, ALOCOS:GOI 5" Reticles  
 Passivation: NRL Laser w/Nov TEOS Oxide-Nitride  
 Die Size: 96 x 70  
 Number of Transistors: 9708  
 Interconnect: Aluminum / 0.5% Copper  
 Gate Oxide Thickness:

**Assembly Information:**

Qualification Vehicle: DS2430  
 Assembly Site: Hana  
 Pin Count: 3  
 Package Type: TO92 (Pb-Free)  
 Body Size: 185  
 Mold Compound: Sumitomo 6710S  
 Lead Frame: Stamped Copper CDA194  
 Lead Finsh: Sn Plate 100% Matte (With Anneal Bake)  
 Die Attach: 84-1 LMISR4 Epoxy Silverfilled Ablebond  
 Bond Wire / Size: Au / 1.0 mil  
 Theta JA: 120  
 Theta JC: 40  
 Flammability: UL 94-V0  
 Moisture Sensitivity (JEDEC J-STD20A) Level 1  
 Date Code Range: 0637 to 0637

**DATE CODE:** 0637      **LOT NUMBER:** QU706660AB-NPI

**ELECTRICAL CHARACTERIZATION**

DESCRIPTION	DATE CODE CONDITION	READPOINT	QTY FAILS	FA#
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ESD SENSITIVITY	0637	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0637	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0637	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0637	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0637	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 CONTACT 2000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 CONTACT 4000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 CONTACT 6000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 CONTACT 8000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 AIR 2000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 AIR 4000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 AIR 8000 VOLTS	10	PUL'S	3	0	
ESD SENSITIVITY	0637	IEC 61000-4-2 AIR 15000 VOLTS	10	PUL'S	3	1	No FA
LATCH-UP	0637	JESD78, V-SUPPLY TEST 125C			6	0	
					<b>Total:</b>	<b>1</b>	

#### OPERATING LIFE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH TEMP OP LIFE	0637		125C, 6.0 VOLTS	1000 HRS	77	0	
					<b>Total:</b>	<b>0</b>	

#### TEMPERATURE CYCLE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0637		-55C TO 125C	1000 CYS	77	0	
					<b>Total:</b>	<b>0</b>	

#### TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	0637		85/85, 5.5 VOLTS	1000 HRS	77	0	
					<b>Total:</b>	<b>0</b>	

#### UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	0637		121C, 2 ATM STEAM, UNBIASED	168 HRS	77	0	
					<b>Total:</b>	<b>0</b>	

#### W/E ENDURANCE AND DATA RET'N

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
WRITE CYCLE STRESS (KCYS)	0637		25 C, 5.0 VOLTS	100 KCYS	77	0	
STORAGE LIFE			150C	1000 HRS	77	0	
					<b>Total:</b>	<b>0</b>	

**FAILURE RATE:**                      **MTTF (YRS):**                      **9048**      **FITS:**                      **12.6**  
**DEVICE HOURS:**                      **77000**      **FAILS:**                      **0**