

RELIABILITY REPORT
FOR

DS2152, Rev A2

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): 27182** **FITS: 4.2**

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: D8R-2P2M,HPVt,NDROM,N+ESD,Laser N-sub,LOCOS:GO
 Passivation: Laser/TEOS Ox - Pass/Nit - Gen.LaserPrb
 Die Size: 348 x 295
 Number of Transistors: 100000
 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	0106		125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0107		125C, 6.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0112		125C, 6.0 VOLTS	1000 HRS	150	0	
HIGH VOLTAGE LIFE	0125		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0126		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0225		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0225		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0225		125C, 6.0 VOLTS	1000 HRS	80	0	
HIGH VOLTAGE LIFE	0230		125C, 6.0 VOLTS	1000 HRS	80	2	30011723
Total:						2	

TEMPERATURE CYCLE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0106		-55C TO 125C	1000 CYS	80	0	
TEMP CYCLE	0107		-55C TO 125C	1000 CYS	80	0	
TEMP CYCLE	0112		-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE	0125		-55C TO 125C	1000 CYS	80	0	
TEMP CYCLE	0126		-55C TO 125C	1000 CYS	72	0	
TEMP CYCLE	0230		-55C TO 125C	1000 CYS	78	0	
Total:						0	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HAST, NO BIAS	0106		130C, 85% R.H.	200 HRS	68	0	
HAST, NO BIAS	0107		130C, 85% R.H.	200 HRS	76	0	
HAST, NO BIAS	0112		130C, 85% R.H.	200 HRS	96	0	
HAST, NO BIAS	0125		130C, 85% R.H.	200 HRS	77	0	
HAST, NO BIAS	0126		130C, 85% R.H.	200 HRS	72	0	
HAST, NO BIAS	0230		130C, 85% R.H.	200 HRS	77	0	
				Total:		0	

FAILURE RATE:

MTTF (YRS): 27182

FITS: 4.2