

RELIABILITY REPORT
FOR

DS2105, Rev B2

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:

DS2105, Rev B2

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): 83491** **FITS: 1.4**

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, 0.8um, Neg ZTC P1R, PdpID, Low Vts, BPSG ILO, N+
 Passivation: Laser/Nit - Pass/Nit - General LaserPrb
 Die Size: 77 x 104
 Number of Transistors: 0
 Interconnect: Aluminum / 1% Silicon / 0.5% Copper
 Gate Oxide Thickness: 175 Å

OPERATING LIFE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
INFANT LIFE	9851		125C, 7.0 VOLTS	48 HRS	229	0	
HIGH VOLTAGE LIFE	9851		125C, 7.0 VOLTS	1000 HRS	77	0	
INFANT LIFE	9908		125C, 7.0 VOLTS	48 HRS	231	0	
HIGH VOLTAGE LIFE	9908		125C, 7.0 VOLTS	1000 HRS	77	0	
INFANT LIFE	9913		125C, 7.0 VOLTS	48 HRS	229	0	
HIGH VOLTAGE LIFE	9913		125C, 7.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	9933		125C, 7.0 VOLTS	1000 HRS	116	0	
INFANT LIFE	9937		125C, 7.0 VOLTS	48 HRS	234	0	
HIGH VOLTAGE LIFE	9937		125C, 7.0 VOLTS	1000 HRS	77	0	
INFANT LIFE	0013		125C, 7.0 VOLTS	48 HRS	234	0	
HIGH VOLTAGE LIFE	0013		125C, 7.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0047		125C, 7.0 VOLTS	1000 HRS	77	0	
HIGH VOLTAGE LIFE	0112		125C, 7.0 VOLTS	1000 HRS	77	0	
Total:						0	

TEMPERATURE CYCLE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	9851		-55C TO 125C	1000 CYS	38	0	
TEMP CYCLE	9908		-55C TO 125C	1000 CYS	40	0	

TEMP CYCLE	9913	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	9937	-55C TO 125C	1000 CYS	38	0
TEMP CYCLE	0013	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0047	-55C TO 125C	1000 CYS	40	0
TEMP CYCLE	0112	-55C TO 125C	1000 CYS	45	0
			Total:		0

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	9851	85/85, 5.5 VOLTS	959 HRS	77	0	
BIASED MOISTURE	9908	85/85, 5.5 VOLTS	959 HRS	74	0	
BIASED MOISTURE	9913	85/85, 5.5 VOLTS	959 HRS	72	0	
BIASED MOISTURE	9937	85/85, 5.5 VOLTS	959 HRS	76	0	
BIASED MOISTURE	0013	85/85, 5.5 VOLTS	959 HRS	77	0	
BIASED MOISTURE	0047	85/85, 5.5 VOLTS	959 HRS	77	0	
BIASED MOISTURE	0112	85/85, 5.5 VOLTS	959 HRS	77	0	
			Total:		0	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	9851	121C, 2 ATM STEAM, UNBIASED	96 HRS	37	0	
AUTOCLAVE	9908	121C, 2 ATM STEAM, UNBIASED	96 HRS	40	0	
AUTOCLAVE	9913	121C, 2 ATM STEAM, UNBIASED	96 HRS	40	0	
AUTOCLAVE	9937	121C, 2 ATM STEAM, UNBIASED	96 HRS	38	0	
AUTOCLAVE	0013	121C, 2 ATM STEAM, UNBIASED	96 HRS	40	0	
AUTOCLAVE	0047	121C, 2 ATM STEAM, UNBIASED	96 HRS	36	0	
AUTOCLAVE	0112	121C, 2 ATM STEAM, UNBIASED	168 HRS	34	0	
			Total:		0	

FAILURE RATE: **MTTF (YRS): 83491** **FITS: 1.4**