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RELIABILITY REPORT
FOR

DS1870, Rev A1

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): 114566 FITS: 1.0

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. A 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.

Device Information:

Process:	D6W-2P2M,HPVt,E2,EPROGVt,TCZ ALOCOS:GOI
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	98 x 129
Number of Transistors:	1
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	150 Å

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 500 VOLTS	1 PUL'S	3	0
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 1000 VOLTS	1 PUL'S	3	0
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	3	0
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 4000 VOLTS	1 PUL'S	3	2
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 8000 VOLTS	1 PUL'S	3	0
LATCH-UP	0350	JESD78, I-TEST 125C		6	0
LATCH-UP	0350	JESD78, Vsupply TEST 125C		6	0
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 2000 VOLTS	1 PUL'S	12	0
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 4000 VOLTS	1 PUL'S	12	2
ESD SENSITIVITY	0350	EOS/ESD S5.1 HBM 8000 VOLTS	1 PUL'S	12	0
			Total:		**4**

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS
HIGH VOLTAGE LIFE	0251	125C, 6.0 VOLTS	1000 HRS	45	0
HIGH VOLTAGE LIFE	0305	125C, 6.0 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0315	125C, 5.5 VOLTS	1000 HRS	45	0
HIGH TEMP OP LIFE	0320	125C, 3.6 VOLTS	1000 HRS	77	0
HIGH TEMP OP LIFE	0325	125C, 5.5 VOLTS	1000 HRS	77	0

HIGH TEMP OP LIFE	0325	125C, 5.5 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0327	125C, 5.5 VOLTS	1000	HRS	45	0
HIGH TEMP OP LIFE	0330	125C, 5.5 VOLTS	1000	HRS	77	0
HIGH TEMP OP LIFE	0333	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH TEMP OP LIFE	0337	125C, 5.5 VOLTS	1000	HRS	44	0
HIGH TEMP OP LIFE	0339	125C, 5.5 VOLTS	1000	HRS	77	0
HIGH TEMP OP LIFE	0341	125C, 5.5 VOLTS	1000	HRS	45	0
HIGH TEMP OP LIFE	0341	125C, 5.5 VOLTS	1000	HRS	45	0
HIGH TEMP OP LIFE	0343	125C, 5.5 VOLTS	1000	HRS	77	0
HIGH TEMP OP LIFE	0348	125C, 3.5 VOLTS	1000	HRS	77	0
HIGH TEMP OP LIFE	0350	125C, 5.5 VOLTS	1000	HRS	45	0
				Total:		**0**

W/E ENDURANCE AND DATA RET'N

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
WRITE CYCLE STRESS	0251	70 C, 6.0 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0314	70 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0315	70 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0325	85 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	76	0
WRITE CYCLE STRESS	0327	70 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0330	70 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	76	0
WRITE CYCLE STRESS	0333	70 C, 3.6 VOLTS	5	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	76	0
WRITE CYCLE STRESS	0339	70 C, 5.5 VOLTS	30	KCYS	77	1
STORAGE LIFE		150C	1000	HRS	76	0
WRITE CYCLE STRESS	0343	85 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0348	70 C, 3.6 VOLTS	10	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0350	70 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	96	HRS	74	0
				Total:		**1**

FAILURE RATE: MTTF (YRS): 114566 FITS: 1.0

The single W/E Endurance failure (date code 0339) failed to write a single row of memory due to a random gate oxide defect in the EE control circuitry.