07/17/2003

RELIABILITY REPORT
FOR

DS1631, Rev A4

Dallas Semiconductor

4401 South Beltwood Parkway
Dallas, TX 75244-3292

Prepared by:

Ken Wendel
Reliability Engineering Manager
Dallas Semiconductor
4401 South Beltwood Pkwy.
Dallas, TX 75244-3292
Email : ken.wendel@dalsemi.com
ph: 972-371-3726
fax: 972-371-6016
mbl: 214-435-6610

Conclusion:

The following qualification successfully meets the quality and reliability standards required of all Dallas Semiconductor products and processes:

DS1631, Rev A4

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): 56049 FITS: 2.0

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,TCN1 PBL:GOI
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	71 x 54
Number of Transistors:	9279
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	150 Å

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
ESD SENSITIVITY	0230	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0230	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0230	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0230	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0230	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	3	0
LATCH-UP	0230	JESD78, I-TEST 125C			3	0
LATCH-UP	0230	JESD78, Vsupply TEST 125C			3	0
				Total:		**0**

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
HIGH VOLTAGE LIFE	0140	125C, 6.0 VOLTS	1000	HRS	80	0
HIGH VOLTAGE LIFE	0145	125C, 6.0 VOLTS	1000	HRS	80	0
HIGH VOLTAGE LIFE	0223	125C, 6.0 VOLTS	1000	HRS	80	0
HIGH VOLTAGE LIFE	0230	125C, 6.0 VOLTS	1000	HRS	77	0
HIGH VOLTAGE LIFE	0307	125C, 6.0 VOLTS	1000	HRS	80	0
HIGH VOLTAGE LIFE	0307	125C, 6.0 VOLTS	1000	HRS	80	0
				Total:		**0**

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QUANTITY	FAILS

STORAGE LIFE	0223	150C	1000	HRS	77	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
TEMP CYCLE	0140	-55C TO 125C	1000	CYS	77	0
TEMP CYCLE	0307	-55C TO 125C	1000	CYS	80	0
TEMP CYCLE	0307	-55C TO 125C	1000	CYS	80	0
				Total:		**0**

W/E ENDURANCE AND DATA RET'N

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QUANTITY	FAILS
WRITE CYCLE STRESS	0140	85 C, 6.0 VOLTS	25	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	77	0
WRITE CYCLE STRESS	0145	85 C, 6.0 VOLTS	25	KCYS	77	0
STORAGE LIFE		150C	1000	HRS	75	0
WRITE CYCLE STRESS	0230	85 C, 5.5 VOLTS	30	KCYS	77	0
STORAGE LIFE		150C	168	HRS	77	0
				Total:		**0**

FAILURE RATE: **MTTF (YRS): 56049** **FITS: 2.0**