DALLAS SEMICONDUCTOR MAXIM

04/26/05

RELIABILITY REPORT
FOR

DS80C400, Rev B1

Dallas Semiconductor

4401 South Beltwood Parkway
Dallas, TX 75244-3292

Prepared by:

Don Lipps
Staff Reliability Engineer
Dallas Semiconductor
4401 South Beltwood Pkwy.
Dallas, TX 75244-3292
Email : don.lipps@dalsemi.com
ph: 972-371-3739
fax: 972-371-6016

Conclusion:

The following Reliability Test successfully meets the quality and reliability standards set forth by this special Temperature Cycle Evaluation:

DS80C400, Rev B1

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.

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/assembly is:

FAILURE RATE: **MTTF (YRS): 23383** **FITS: 4.9**

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. 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:	DS80C400
Process:	1P, 4M, 0.18um, Sal. P1+Act,Ti/TiN M1-M4, BPSG ,
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	133 x 131
Number of Transistors:	1200000
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	

Assembly Information:

Qualification Vehicle:	DS80C400
Assembly Site:	ATP (Amkor, PI)
Pin Count:	100
Package Type:	LQFP
Body Size:	14x14x1.4
Mold Compound:	Sumitomo 7320CR
Lead Frame:	EFTEC 64T w/Ag Spot
Lead Finsh:	SnPb Plate
Die Attach:	M2500 Ag Polymer
Bond Wire / Size:	Au / 1.2 mil
Theta JA:	
Theta JC:	
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 4
Date Code Range:	0238 to 0435

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
DIE, FAB PROCESS	0238	TO BE DONE BY F/A	2	WKS	5	0	3000870
			Total:			**0**	

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	1	No FA
ESD SENSITIVITY	0238	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	3	No FA
LATCH-UP	0238	JESD78, I-TEST 125C	2	DYS	6	0	
LATCH-UP	0238	JESD78, Vsupply TEST 125C	2	DYS	6	0	
			Total:			**4**	

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HIGH VOLTAGE LIFE	0238	125C, 5.5V (PSA) & 3.3V (PSB)	1000	HRS	45	0	
HIGH VOLTAGE LIFE	0402	125C, 5.5V (PSA) & 3.3V (PSB)	1000	HRS	77	0	
HIGH VOLTAGE LIFE	0435	125C, 5.5V (PSA) & 3.3V (PSB)	1000	HRS	77	0	
			Total:			**0**	

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
TEMP CYCLE	0238	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0402	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0435	-55C TO 125C	1000	CYS	77	0	
			Total:			**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HAST	0238	130C, 85%R.H.,3.5V	96	HRS	77	0	
HAST	0402	130C, 85%R.H.,3.5V	96	HRS	77	0	
HAST	0435	130C, 85%R.H.,3.5V	96	HRS	77	0	
			Total:			**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HAST, NO BIAS	0238	130C, 85% R.H.	200	HRS	77	0	
HAST, NO BIAS	0402	130C, 85% R.H.	200	HRS	77	0	
HAST, NO BIAS	0435	130C, 85% R.H.	200	HRS	77	0	
			Total:			**0**	

FAILURE RATE: MTTF (YRS): 23383 FITS: 4.9