08/02/2004

RELIABILITY REPORT
FOR

DS12885, Rev B1

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:

DS12885, Rev B1

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 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): 55462 FITS: 2.1

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 either used as a reliability test vehicle for a process / assembly qualification / monitor or a device used as part of a product qualification / monitor. 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 processes or assemblies used as part of this report, a description of each will follow which includes the respective reliability data for that process/ assembly. The reliability data section includes the latest data available. Some of this data may be generic with other products.

Device Information:

Device:	DS12885
Process:	D6N-1P1M,LLVt,ND cap PBL:GOI
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	99 x 122
Number of Transistors:	16100
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	150 Å

Assembly Information:

Qualification Vehicle:	DS12885
Assembly Site:	ATEC
Pin Count:	24
Package Type:	PDIP
Body Size:	600
Mold Compound:	Sumitomo 6300H
Lead Frame:	Stamped Alloy 42
Lead Finsh:	SnPb Dip
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.3 mil
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	
Date Code Range:	0028 to 0208

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CD	CONDITION	READPOINT	QTY	FAILS	FA#
PACKAGE, ASSEMBLY PROCESS	0028	TO BE DONE BY F/A	0 WKS	5	0	
			Total:		**0**	

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CD	CONDITION	READPOINT		QTY	FAILS	FA#
ESD SENSITIVITY	0208	EOS/ESD S5.1 HBM 500 VOLTS	2	PUL'S	3	0	
ESD SENSITIVITY	0208	EOS/ESD S5.1 HBM 1000 VOLTS	2	PUL'S	3	0	
ESD SENSITIVITY	0208	EOS/ESD S5.1 HBM 2000 VOLTS	2	PUL'S	3	0	
ESD SENSITIVITY	0208	EOS/ESD S5.1 HBM 4000 VOLTS	2	PUL'S	3	3	No FA
ESD SENSITIVITY	0208	EOS/ESD S5.1 HBM 8000 VOLTS	2	PUL'S	3	3	XXXXXXX
LATCH-UP	0208	JESD78, I-TEST 125C	2	DYS	3	0	
LATCH-UP	0208	JESD78, Vsupply TEST 125C	2	DYS	3	0	
					Total:	**6**	

OPERATING LIFE

DESCRIPTION	DATE CD	CONDITION	READPOINT		QTY	FAILS	FA#
HIGH VOLTAGE LIFE	0028	125C, 6.0 VOLTS	1000	HRS	116	0	
HIGH VOLTAGE LIFE	0039	125C, 6.0 VOLTS	1000	HRS	116	0	
HIGH VOLTAGE LIFE	0208	125C, 6.0 VOLTS	1000	HRS	80	0	
HIGH VOLTAGE LIFE	0208	125C, 6.0 VOLTS	1000	HRS	80	0	
HIGH VOLTAGE LIFE	0208	125C, 6.0 VOLTS	1000	HRS	80	0	
					Total:	**0**	

PACKAGE TESTS

DESCRIPTION	DATE CD	CONDITION	READPOINT		QTY	FAILS	FA#
SOLDERABILITY	0028	MIL-STD-883-2003	2	DYS	3	0	
X-RAY	0028	MIL-STD-883-2012 : TOP & SIDE VIEW	2	DYS	6	0	
PHYSICAL DIMENSIONS		MIL-STD-883-2016	2	DYS	6	0	
MARK PERMANENCY		MIL-STD-883-2015	2	DYS	6	0	
LEAD INTEGRITY		MIL-STD-883-2004 : COND B2	2	DYS	6	0	
SOLDERABILITY	0039	MIL-STD-883-2003	2	DYS	3	0	
X-RAY	0039	MIL-STD-883-2012 : TOP & SIDE VIEW	2	DYS	6	0	
PHYSICAL DIMENSIONS		MIL-STD-883-2016	2	DYS	6	0	
MARK PERMANENCY		MIL-STD-883-2015	2	DYS	6	0	
LEAD INTEGRITY		MIL-STD-883-2004 : COND B2	2	DYS	6	0	
					Total:	**0**	

TEMPERATURE CYCLE

DESCRIPTION	DATE CD	CONDITION	READPOINT		QTY	FAILS	FA#
TEMP CYCLE	0028	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0039	-55C TO 125C	1000	CYS	77	0	
					Total:	**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CD	CONDITION	READPOINT		QTY	FAILS	FA#
HAST	0028	130C, 85%R.H.,5.5V	100	HRS	77	0	
HAST	0039	130C, 85%R.H.,5.5V	100	HRS	77	0	

						Total:	**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	**DATE CD**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
AUTOCLAVE	0028	121C, 2 ATM STEAM, UNBIASED	168	HRS	45	0	
AUTOCLAVE	0039	121C, 2 ATM STEAM, UNBIASED	168	HRS	45	0	
					Total:	**0**	

FAILURE RATE: **MTTF (YRS): 55462** **FITS: 2.1**