01/12/05

RELIABILITY REPORT
FOR

DS1685, Rev B2

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:

DS1685, Rev B2

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): 35947 FITS: 3.2

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:	DS1685
Process:	D8N-1P2M,LLVt,ND cap LOCOS:GOI
Passivation:	Laser/TEOS Ox - Pass/Nit -SRAM LaserPrb
Die Size:	98 x 153
Number of Transistors:	25000
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	175 Å

Assembly Information:

Qualification Vehicle:	DS1685
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
Theta JA:	
Theta JC:	
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	
Date Code Range:	0249 to 0249

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ESD SENSITIVITY	0249	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0249	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0249	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0	

ESD SENSITIVITY	0249	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	3	No FA
ESD SENSITIVITY	0249	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	3	3	No FA
LATCH-UP	0249	JESD78, I-TEST 125C	2	DYS	6	0	
LATCH-UP	0249	JESD78, Vsupply TEST 125C	2	DYS	6	0	
				Total:		**6**	

Assembly Information:

Qualification Vehicle:	DS1685
Assembly Site:	ATK (Amkor, K)
Pin Count:	24
Package Type:	TSSOP
Body Size:	4.4x0.9
Mold Compound:	Shinetsu 184
Lead Frame:	Stamped copper
Lead Finsh:	SnPb Plate
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	82
Theta JC:	15
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	9728 to 9728

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	9728	125C, 5.5 VOLTS	1000 HRS	153	0	
			Total:		**0**	

Assembly Information:

Qualification Vehicle:	DS1685
Assembly Site:	ATP (Amkor, PI)
Pin Count:	24
Package Type:	SOIC
Body Size:	300x2.3
Mold Compound:	Sumitomo 6300H
Lead Frame:	Stamped Copper CDA194
Lead Finsh:	SnPb Plate
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	85
Theta JC:	18
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	9926 to 9926

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH VOLTAGE LIFE	9926	125C, 5.5 VOLTS	1000 HRS	144	0	
			Total:		**0**	

Device Information:

Device:	DS1685
Process:	1P, 2M, 0.8um, Nd,PdDiode, O2 Bleeds , Ti/TiN M1+M2
Passivation:	Laser/TEOS Ox - Pass/Nit -SRAM LaserPrb
Die Size:	98 x 153
Number of Transistors:	25000
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	175 Å

Assembly Information:

Qualification Vehicle:	DS1685
Assembly Site:	ATK (Amkor, K)
Pin Count:	24
Package Type:	TSSOP
Body Size:	4.4x0.9
Mold Compound:	Shinetsu 184
Lead Frame:	Stamped copper
Lead Finsh:	SnPb Plate
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	82
Theta JC:	15
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	9626 to 9626

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
INFANT LIFE	9626	125C, 7.0 VOLTS	48 HRS	315	1	960286
HIGH VOLTAGE LIFE	9626	125C, 7.0 VOLTS	1000 HRS	116	0	
			Total:		**1**	

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	9626	-55C TO 125C	1000 CYS	77	0	
			Total:		**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HAST	9626	120C, 85%R.H.,5.5V	200 HRS	77	0	
			Total:		**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
AUTOCLAVE	9626	121C, 2 ATM STEAM, UNBIASED	168 HRS	43	0	
			Total:		**0**	

Assembly Information:

Qualification Vehicle:	DS1685
Assembly Site:	ATP (Amkor, PI)
Pin Count:	24
Package Type:	TSSOP
Body Size:	4.4x0.9
Mold Compound:	Sumitomo 7351T
Lead Frame:	Stamped Copper C7025
Lead Finsh:	SnPb Plate
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	82
Theta JC:	15
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	9723 to 9841

MOISTURE SENSITIVITY LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
PRECONDITION U/S	9723	J-STD-020	199	DYS	8	0	
ULTRASOUND		J-STD-020	199	DYS	8	0	
STORAGE LIFE		125C	26	HRS	8		
MOISTURE SOAK		85 C/85% R.H.	194	HRS	8		
SOLDER HEAT		HTC VAPOR PHASE	3	PASS	8	0	
EXTERNAL VISUAL		MIL-STD-883-2009	198	DYS	8	0	
PRECONDITION U/S	9841	J-STD-020	199	DYS	8	0	
ULTRASOUND		J-STD-020	199	DYS	8	0	
STORAGE LIFE		125C	26	HRS	8		
MOISTURE SOAK		85 C/85% R.H.	194	HRS	8		
CONVECTION REFLOW		235C +5/-0C	3	PASS	8	0	
EXTERNAL VISUAL		MIL-STD-883-2009	198	DYS	8	0	
				Total:		**0**	

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
INFANT LIFE	9723	125C, 7.0 VOLTS	48	HRS	314	0	
HIGH VOLTAGE LIFE	9723	125C, 7.0 VOLTS	1000	HRS	116	0	
HIGH TEMP OP LIFE	9841	125C, 5.5 VOLTS	1000	HRS	116	0	
				Total:		**0**	

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
SOLDERABILITY	9841	MIL-STD-883-2003	1	DYS	3	0	
X-RAY	9841	MIL-STD-883-2012 : TOP & SIDE VIEW	1	DYS	6		
PHYSICAL DIMENSIONS		MIL-STD-883-2016	2	DYS	6		
MARK PERMANENCY		MIL-STD-883-2015	3	DYS	6		
LEAD INTEGRITY		MIL-STD-883-2004 : COND B2	4	DYS	6	0	
				Total:		**0**	

PRECONDITIONING LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
STORAGE LIFE	9723	125C	24	HRS	315		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	315		
SOLDER HEAT		HTC VAPOR PHASE	3	PASS	315	0	
STORAGE LIFE	9841	125C	24	HRS	315		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	315		
CONVECTION REFLOW		235C +5/-0C	3	PASS	315	0	
				Total:		**0**	

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
TEMP CYCLE	9723	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	9841	-55C TO 125C	1000	CYS	77	0	
				Total:		**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HAST	9723	120C, 85%R.H.,5.5V	100	HRS	77	0	
HAST	9841	120C, 85%R.H.,5.5V	100	HRS	77	0	
				Total:		**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
AUTOCLAVE	9723	121C, 2 ATM STEAM, UNBIASED	168	HRS	44	0	
AUTOCLAVE	9841	121C, 2 ATM STEAM, UNBIASED	168	HRS	44	0	
				Total:		**0**	

FAILURE RATE: **MTTF (YRS): 35947** **FITS: 3.2**