4/13/2007

RELIABILITY REPORT
FOR

DS1086H, Rev A2, 8" Fab, Automotive

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:

DS1086H, Rev A2, 8" Fab, Automotive

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):**	**31726**	**FITS:**	**3.6**
	DEVICE HOURS:	**270000**	**FAILS:**	**0**

Only data from Operating Life or similar stresses are used for this calculation.

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. At 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:	DS1086H
Process:	EC6W-2P2M,HPVt,E2,EPROGVt,TCN3, ALOCOS:GOI 5" Reticles
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	58 x 84
Number of Transistors:	8949
Interconnect:	Aluminum / 0.5% Copper
Gate Oxide Thickness:	150 Å

Assembly Information:

Qualification Vehicle:	DS1086H
Assembly Site:	Unisem
Pin Count:	8
Package Type:	uSOP (Pb-Free) Automotive
Body Size:	3x0.85
Mold Compound:	Sumitomo G600 w/BCB4026 Die Coat
Lead Frame:	Stamped Copper CDA194
Lead Finsh:	Sn Plate 100% Matte (With Anneal Bake)
Die Attach:	8290 Ablestik
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	221
Theta JC:	39
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	0647 to 0649

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ESD SENSITIVITY	0647	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0	

ESD SENSITIVITY	0647	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0647	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0647	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	2	No FA
ESD SENSITIVITY	0647	EOS/ESD S5.1 HBM 8000 VOLTS	1	PUL'S	3	3	No FA
LATCH-UP	0647	JESD78, I-TEST 125C			6	0	
LATCH-UP	0647	JESD78, V-SUPPLY TEST 125C			6	0	
ESD SENSITIVITY	0647	JESD22-A115 MM 50 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-A115 MM 100 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-A115 MM 200 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-A115 MM 400 VOLTS	1	PUL'S	3	3	No FA
ESD SENSITIVITY	0647	JESD22-C101 CDM 100 VOLTS	5	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-C101 CDM 200 VOLTS	5	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-C101 CDM 500 VOLTS	5	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-C101 CDM 1000 VOLTS	5	PUL'S	3	0	
ESD SENSITIVITY	0647	JESD22-C101 CDM 2000 VOLTS	5	PUL'S	3	0	
				Total:		**8**	

MOISTURE SENSITIVITY LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ULTRASOUND	0647	J-STD-020			8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8		
CONVECTION REFLOW		260C +0/-5C	3	PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0	
PRECONDITION U/S		J-STD-020			8	0	
ULTRASOUND	0648	J-STD-020			8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8		
CONVECTION REFLOW		260C +0/-5C	3	PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0	
PRECONDITION U/S		J-STD-020			8	0	
ULTRASOUND	0649	J-STD-020			8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8		
CONVECTION REFLOW		260C +0/-5C	3	PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0	
PRECONDITION U/S		J-STD-020			8	0	
				Total:		**0**	

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HIGH TEMP OP LIFE	0647	125C, 5.25 VOLTS	1000	HRS	45	0	
HIGH TEMP OP LIFE	0648	125C, 5.25 VOLTS	1000	HRS	45	0	

HIGH TEMP OP LIFE	0649	125C, 5.25 VOLTS	1000	HRS	45	0
				Total:		**0**

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
SOLDERABILITY (Pb-Free)	0647	JESD22-B102, COND C			15	0	
SOLDERABILITY (Sn/Pb)		JESD22-B102, COND C			15	0	
EXTERNAL VISUAL	0647	JESD22-B101			30	0	
PHYSICAL DIMENSIONS		JESD22-B100			30	0	
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW			30	0	
MARK PERMANENCY		JESD22-B107			30	0	
LEAD INTEGRITY		JESD22-B105, COND B			30	0	
SOLDERABILITY (Pb-Free)	0648	JESD22-B102, COND C			15	0	
SOLDERABILITY (Sn/Pb)		JESD22-B102, COND C			15	0	
EXTERNAL VISUAL	0648	JESD22-B101			30	0	
PHYSICAL DIMENSIONS		JESD22-B100			30	0	
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW			30	0	
MARK PERMANENCY		JESD22-B107			30	0	
LEAD INTEGRITY		JESD22-B105, COND B			30	0	
SOLDERABILITY (Pb-Free)	0649	JESD22-B102, COND C			15	0	
SOLDERABILITY (Sn/Pb)		JESD22-B102, COND C			15	0	
EXTERNAL VISUAL	0649	JESD22-B101			30	0	
PHYSICAL DIMENSIONS		JESD22-B100			30	0	
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW			30	0	
MARK PERMANENCY		JESD22-B107			30	0	
LEAD INTEGRITY		JESD22-B105, COND B			30	0	
				Total:		**0**	

PRECONDITIONING LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
STORAGE LIFE	0647	125C	24	HRS	276		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	276		
CONVECTION REFLOW		260C +0/-5C	3	PASS	276	0	
STORAGE LIFE	0648	125C	24	HRS	276		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	276		
CONVECTION REFLOW		260C +0/-5C	3	PASS	276	0	
STORAGE LIFE	0649	125C	24	HRS	276		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	276		
CONVECTION REFLOW		260C +0/-5C	3	PASS	276	0	
				Total:		**0**	

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
STORAGE LIFE	0647	150C	1000	HRS	77	0	
STORAGE LIFE	0648	150C	1000	HRS	77	0	

STORAGE LIFE	0649	150C	1000	HRS	77	0
				Total:		**0**

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
TEMP CYCLE	0647	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0648	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0649	-55C TO 125C	1000	CYS	77	0	
				Total:		**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HAST	0647	130C, 85%R.H.,5.5V	96	HRS	45	0	
HAST	0648	130C, 85%R.H.,5.5V	96	HRS	45	0	
HAST	0649	130C, 85%R.H.,5.5V	96	HRS	45	0	
				Total:		**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
AUTOCLAVE	0647	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0	
AUTOCLAVE	0648	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0	
AUTOCLAVE	0649	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0	
				Total:		**0**	

Assembly Information:

Qualification Vehicle:	DS1086H
Assembly Site:	UTL (NSEB) UTAC Thailand
Pin Count:	8
Package Type:	uSOP (Pb-Free) Automotive
Body Size:	3x0.85
Mold Compound:	Sumitomo G600 w/BCB4026 Die Coat
Lead Frame:	Stamped Copper CDA194
Lead Finsh:	Sn Plate 100% Matte (With Anneal Bake)
Die Attach:	8200T Ablebond Silverfiled Epoxy
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	221
Theta JC:	39
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 1
Date Code Range:	0651 to 0701

MOISTURE SENSITIVITY LEVEL 1

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ULTRASOUND	0651	J-STD-020			8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8		
CONVECTION REFLOW		260C +0/-5C	3	PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0	

PRECONDITION U/S	0651	J-STD-020			8	0
ULTRASOUND	0652	J-STD-020			8	0
STORAGE LIFE		125C	24	HRS	8	
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8	
CONVECTION REFLOW		260C +0/-5C	3	PASS	8	0
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
ULTRASOUND	0701	J-STD-020			8	0
STORAGE LIFE		125C	24	HRS	8	
MOISTURE SOAK		85 C/85% R.H.	168	HRS	8	
CONVECTION REFLOW		260C +0/-5C	3	PASS	8	0
EXTERNAL VISUAL		J-STD-020, 6.1a			8	0
PRECONDITION U/S		J-STD-020			8	0
				Total:		**0**

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HIGH TEMP OP LIFE	0651	125C, 5.25 VOLTS	1000	HRS	45	0	
HIGH TEMP OP LIFE	0652	125C, 5.25 VOLTS	1000	HRS	45	0	
HIGH TEMP OP LIFE	0701	125C, 5.25 VOLTS	1000	HRS	45	0	
				Total:		**0**	

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
SOLDERABILITY (Pb-Free)	0651	JESD22-B102, COND C		15	0	
SOLDERABILITY (Sn/Pb)		JESD22-B102, COND C		15	0	
EXTERNAL VISUAL	0651	JESD22-B101		30	0	
PHYSICAL DIMENSIONS		JESD22-B100		30	0	
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW		30	0	
MARK PERMANENCY		JESD22-B107		30	0	
LEAD INTEGRITY		JESD22-B105, COND B		30	0	
SOLDERABILITY (Pb-Free)	0652	JESD22-B102, COND C		15	0	
SOLDERABILITY (Sn/Pb)		JESD22-B102, COND C		15	0	
EXTERNAL VISUAL	0652	JESD22-B101		30	0	
PHYSICAL DIMENSIONS		JESD22-B100		30	0	
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW		30	0	
MARK PERMANENCY		JESD22-B107		30	0	
LEAD INTEGRITY		JESD22-B105, COND B		30	0	
SOLDERABILITY (Pb-Free)	0701	JESD22-B102, COND C		15	0	
SOLDERABILITY (Sn/Pb)		JESD22-B102, COND C		15	0	
EXTERNAL VISUAL	0701	JESD22-B101		30	0	
PHYSICAL DIMENSIONS		JESD22-B100		30	0	
X-RAY		MIL-STD-883-2012 : TOP & SIDE VIEW		30	0	
MARK PERMANENCY		JESD22-B107		30	0	
LEAD INTEGRITY		JESD22-B105, COND B		30	0	

					Total:		**0**	

PRECONDITIONING LEVEL 1

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
STORAGE LIFE	0651	125C	24	HRS	276		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	276		
CONVECTION REFLOW		260C +0/-5C	3	PASS	276	0	
STORAGE LIFE	0652	125C	24	HRS	276		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	276		
CONVECTION REFLOW		260C +0/-5C	3	PASS	276	0	
STORAGE LIFE	0701	125C	24	HRS	276		
MOISTURE SOAK		85 C/85% R.H.	168	HRS	276		
CONVECTION REFLOW		260C +0/-5C	3	PASS	276	0	
				Total:		**0**	

STORAGE LIFE

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
STORAGE LIFE	0651	150C	1000	HRS	77	0	
STORAGE LIFE	0652	150C	1000	HRS	77	0	
STORAGE LIFE	0701	150C	1000	HRS	76	0	
				Total:		**0**	

TEMPERATURE CYCLE

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
TEMP CYCLE	0651	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0652	-55C TO 125C	1000	CYS	77	0	
TEMP CYCLE	0701	-55C TO 125C	1000	CYS	77	0	
				Total:		**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
HAST	0651	130C, 85%R.H.,5.5V	96	HRS	45	0	
HAST	0652	130C, 85%R.H.,5.5V	96	HRS	45	0	
HAST	0701	130C, 85%R.H.,5.5V	96	HRS	45	0	
				Total:		**0**	

UNBIASED MOISTURE RESISTANCE

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
AUTOCLAVE	0651	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0	
AUTOCLAVE	0652	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0	
AUTOCLAVE	0701	121C, 2 ATM STEAM, UNBIASED	168	HRS	77	0	
				Total:		**0**	

FAILURE RATE: **MTTF (YRS):** **31726** **FITS:** **3.6**

DEVICE HOURS: **270000** **FAILS:** **0**