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RELIABILITY REPORT
FOR

DS1339C, Rev A2

Dallas Semiconductor

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Conclusion:

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

DS1339C, Rev A2

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): 15040 FITS: 7.6

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. Some of this data may be generic or extended from a similar product type.

Device Information:

Device:	DS1337C
Process:	1P, 2M, 0.6um, Pd, Ti/TiN M1+M2 ,
Passivation:	Passivation w/Nov TEOS Oxide-Nitride
Die Size:	56 x 68
Number of Transistors:	2904
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	150 Å

Assembly Information:

Qualification Vehicle:	DS1337C
Assembly Site:	ATP (Amkor, PI)
Pin Count:	16
Package Type:	SOIC w/CRYSTAL
Body Size:	300x2.3
Mold Compound:	Sumitomo G600
Lead Frame:	Etched Copper CDA194 / solder plate
Lead Finsh:	SnPb Plate
Die Attach:	84-1 LMISR4 Epoxy Silverfilled Ablebond
Bond Wire / Size:	Au / 1.0 mil
Theta JA:	
Theta JC:	
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 3
Date Code Range:	0412 to 0412

CONSTRUCTION ANALYSIS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
PACKAGE, ASSEMBLY PROCESS	0412	TO BE SUBMITTED BY ASSEMBLY SITE	2	WKS	5	0	
PACKAGE, ASSEMBLY PROCESS	0412	TO BE SUBMITTED BY ASSEMBLY SITE	2	WKS	5	0	

				Total:		**0**	

MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ULTRASOUND	0412	J-STD-020	3	DYS	8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		30C/60% R.H.	192	HRS	8		
CONVECTION REFLOW		235C +5/-0C	2	PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a	3	DYS	8	0	
PRECONDITION U/S		J-STD-020	3	DYS	8	0	
ULTRASOUND	0412	J-STD-020	3	DYS	8	0	
STORAGE LIFE		125C	24	HRS	8		
MOISTURE SOAK		30C/60% R.H.	192	HRS	8		
CONVECTION REFLOW		235C +5/-0C	2	PASS	8	0	
EXTERNAL VISUAL		J-STD-020, 6.1a	3	DYS	8	0	
PRECONDITION U/S		J-STD-020	3	DYS	8	0	
				Total:		**0**	

OPERATING LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
HIGH TEMP OP LIFE	0412	125C, 5.5 VOLTS	1000	HRS	64	0	
HIGH TEMP OP LIFE	0412	125C, 5.5 VOLTS	1000	HRS	64	0	
				Total:		**0**	

PACKAGE TESTS

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
SOLDERABILITY	0412	JESD22-B102	6	DYS	3	0	
X-RAY	0412	MIL-STD-883-2012 : TOP & SIDE VIEW	3	DYS	6	0	
PHYSICAL DIMENSIONS		JESD22-B100	3	DYS	6	0	
MARK PERMANENCY		JESD22-B107	3	DYS	6	0	
LEAD INTEGRITY		JESD22-B105 TEST CONDITION B	3	DYS	6	0	
SOLDERABILITY	0412	JESD22-B102	6	DYS	3	0	
X-RAY	0412	MIL-STD-883-2012 : TOP & SIDE VIEW	3	DYS	6	0	
PHYSICAL DIMENSIONS		JESD22-B100	3	DYS	6	0	
MARK PERMANENCY		JESD22-B107	3	DYS	6	0	
LEAD INTEGRITY		JESD22-B105 TEST CONDITION B	3	DYS	6	0	
				Total:		**0**	

PRECONDITIONING LEVEL 3

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
STORAGE LIFE	0412	125C	24	HRS	372		
MOISTURE SOAK		30C/60% R.H.	192	HRS	372		
CONVECTION REFLOW		235C +5/-0C	2	PASS	372	0	
STORAGE LIFE	0412	125C	24	HRS	372		
MOISTURE SOAK		30C/60% R.H.	192	HRS	372		
CONVECTION REFLOW		235C +5/-0C	2	PASS	372	0	
				Total:		**0**	

STORAGE LIFE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0412	125C	1000 HRS	77	0	
STORAGE LIFE	0412	125C	1000 HRS	77	0	
			Total:		**0**	

TEMPERATURE CYCLE

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE	0412	-40 TO 85C	1000 CYS	77	0	
TEMP CYCLE	0412	-40 TO 85C	1000 CYS	77	0	
			Total:		**0**	

TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	0412	85/85, 5.5 VOLTS	1000 HRS	77	0	
BIASED MOISTURE	0412	85/85, 5.5 VOLTS	1000 HRS	77	0	
			Total:		**0**	

FAILURE RATE: **MTTF (YRS): 15040** **FITS: 7.6**