5/31/2005

RELIABILITY REPORT
FOR

DS3231S Rev A3B & A3C

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:

DS3231S Rev A3B & A3C

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): 5288** **FITS: 21.6**

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. 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:	DS3231S
Process:	E6E-2P2M,HPVt,EPROM,LV-NRDSD ALOCOS:GOI
Passivation:	Passivation w/Nov TEOS Oxide-OxyNitride
Die Size:	89 x 141
Number of Transistors:	0
Interconnect:	Aluminum / 1% Silicon / 0.5% Copper
Gate Oxide Thickness:	150 Å

Assembly Information:

Qualification Vehicle:	DS3231S
Assembly Site:	ATP (Amkor, PI)
Pin Count:	16
Package Type:	SOIC w/Soldered Crystal
Body Size:	300x2.3
Mold Compound:	Sumitomo G600
Lead Frame:	Etched Copper CDA194
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:	0453 to 0453

ELECTRICAL CHARACTERIZATION

DESCRIPTION	DATE CODE	CONDITION	READPOINT		QTY	FAILS	FA#
ESD SENSITIVITY	0453	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0453	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0453	EOS/ESD S5.1 HBM 1500 VOLTS	1	PUL'S	3	0	

ESD SENSITIVITY	0453	EOS/ESD S5.1 HBM 1800 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0453	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0	
LATCH-UP	0453	JESD78, I-TEST 85C	2	DYS	6	0	
LATCH-UP	0453	JESD78, Vsupply TEST 125C	2	DYS	6	0	
				Total:		**0**	

OPERATING LIFE

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
HIGH TEMP OP LIFE	0453	125C, 5.5 VOLTS	1000	HRS	45	0	
				Total:		**0**	

STORAGE LIFE

DESCRIPTION	**DATE CODE**	**CONDITION**	**READPOINT**		**QTY**	**FAILS**	**FA#**
STORAGE LIFE	0453	125C	1000	HRS	77	0	
				Total:		**0**	

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