



11/20/2008

RELIABILITY REPORT  
FOR

**DS26518, Rev B1**

**Maxim Integrated Products**

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Prepared by:

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**Conclusion:**

The following qualification successfully meets the quality and reliability standards required of all Maxim products and processes:

DS26518, Rev B1

**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](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<sup>-5</sup> 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:

<b>FAILURE RATE:</b>	<b>MTTF (YRS):</b>	<b>15863</b>	<b>FITS:</b>	<b>7.2</b>
	<b>DEVICE HOURS:</b>	<b>135000</b>	<b>FAILS:</b>	<b>0</b>

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

The parameters used to calculate this failure rate are as follows:

<b>Cf: 60%</b>	<b>Ea: 0.7</b>	<b>B: 0</b>	<b>Tu: 25 °C</b>	<b>Vu: 5.5 Volts</b>
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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:	DS26518
Process:	
Passivation:	Laser/TEOS Ox - Pass/Nit -PreLP+GenLP
Die Size:	316 x 346
Number of Transistors:	0
Interconnect:	Aluminum / 0.5% Copper
Gate Oxide Thickness:	

**Assembly Information:**

Qualification Vehicle:	DS26518
Assembly Site:	USG (NSEB) UTAC Singapore
Pin Count:	256
Package Type:	CSBGA (Pb-Free)
Body Size:	17x17x1.46
Mold Compound:	Nitto GE-100BC-UL
Lead Frame:	PCB; BT 4 layers
Lead Finsh:	SnAgCu Ball (95.5/4.0/0.5)
Die Attach:	2025D Ablebond Silverfiled Epoxy
Bond Wire / Size:	Au / 0.96 mil
Theta JA:	16.6
Theta JC:	3
Flammability:	UL 94-V0
Moisture Sensitivity (JEDEC J-STD20A)	Level 3
Date Code Range:	0810 to 0810

**DATE CODE:** 0810      **LOT NUMBER:** QG073727BK-NPI

**ELECTRICAL CHARACTERIZATION**

DESCRIPTION	DATE CODE	CONDITION	READPOINT	QTY	FAILS	FA#
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ESD SENSITIVITY	0810	EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0810	EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0810	EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0810	EOS/ESD S5.1 HBM 3000 VOLTS	1	PUL'S	3	0	
ESD SENSITIVITY	0810	EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	1	No FA
LATCH-UP	0810	JESD78, I-TEST 125C			6	0	
LATCH-UP	0810	JESD78, V-SUPPLY TEST 125C			6	0	
<b>Total:</b>						<b>1</b>	

### MOISTURE SENSITIVITY LEVEL 3

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
ULTRASOUND	0810		J-STD-020		8	0	
STORAGE LIFE	0810		125C	48 HRS	8		
MOISTURE SOAK	0810		30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW	0810		260C +/-5C	3 PASS	8	0	
EXTERNAL VISUAL	0810		J-STD-020, 6.1a		8	0	
PRECONDITION U/S	0810		J-STD-020		8	0	
ULTRASOUND	0810		J-STD-020		8	0	
STORAGE LIFE	0810		125C	48 HRS	8		
MOISTURE SOAK	0810		30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW	0810		260C +/-5C	3 PASS	8	0	
EXTERNAL VISUAL	0810		J-STD-020, 6.1a		8	0	
PRECONDITION U/S	0810		J-STD-020		8	0	
ULTRASOUND	0810		J-STD-020		8	0	
STORAGE LIFE	0810		125C	48 HRS	8		
MOISTURE SOAK	0810		30C/60% R.H.	192 HRS	8		
CONVECTION REFLOW	0810		260C +/-5C	3 PASS	8	0	
EXTERNAL VISUAL	0810		J-STD-020, 6.1a		8	0	
PRECONDITION U/S	0810		J-STD-020		8	0	
<b>Total:</b>						<b>0</b>	

### OPERATING LIFE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
HIGH TEMP OP LIFE	0810		125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0810		125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0	
HIGH TEMP OP LIFE	0810		125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0	
<b>Total:</b>						<b>0</b>	

### PACKAGE TESTS

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
X-RAY	0810		MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS	0810		JESD22-B100		6	0	
BALL SHEAR	0810		JESD22-B117		6	0	
X-RAY	0810		MIL-STD-883-2012 : TOP & SIDE VIEW		6	0	
PHYSICAL DIMENSIONS	0810		JESD22-B100		6	0	
BALL SHEAR	0810		JESD22-B117		6	0	

X-RAY	0810	MIL-STD-883-2012 : TOP & SIDE VIEW	6	0
PHYSICAL DIMENSIONS	0810	JESD22-B100	6	0
BALL SHEAR	0810	JESD22-B117	6	0
<b>Total:</b>			<b>0</b>	<b>0</b>

### PRECONDITIONING LEVEL 3

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0810		125C	48 HRS	244		
MOISTURE SOAK	0810		30C/60% R.H.	192 HRS	244		
CONVECTION REFLOW	0810		260C +/-5C	3 PASS	244	0	
STORAGE LIFE	0810		125C	48 HRS	244		
MOISTURE SOAK	0810		30C/60% R.H.	192 HRS	244		
CONVECTION REFLOW	0810		260C +/-5C	3 PASS	244	0	
STORAGE LIFE	0810		125C	48 HRS	244		
MOISTURE SOAK	0810		30C/60% R.H.	192 HRS	244		
CONVECTION REFLOW	0810		260C +/-5C	3 PASS	244	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### STORAGE LIFE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
STORAGE LIFE	0810		150C	1000 HRS	77	0	
STORAGE LIFE	0810		150C	1000 HRS	77	0	
STORAGE LIFE	0810		150C	1000 HRS	77	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### TEMPERATURE CYCLE

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
TEMP CYCLE, 5' RAMP, 10' DWELL	0810		-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE, 5' RAMP, 10' DWELL	0810		-55C TO 125C	1000 CYS	77	0	
TEMP CYCLE, 5' RAMP, 10' DWELL	0810		-55C TO 125C	1000 CYS	77	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

### TEMPERATURE HUMIDITY BIAS

DESCRIPTION	DATE	CODE	CONDITION	READPOINT	QTY	FAILS	FA#
BIASED MOISTURE	0810		85/85, 2.0 VOLTS	1000 HRS	44	0	
BIASED MOISTURE	0810		85/85, 2.0 VOLTS	500 HRS	44	0	
BIASED MOISTURE	0810		85/85, 2.0 VOLTS	500 HRS	44	0	
<b>Total:</b>						<b>0</b>	<b>0</b>

**FAILURE RATE:**                      **MTTF (YRS):**                      **15863**                      **FITS:**                      **7.2**  
**DEVICE HOURS:**                      **135000**                      **FAILS:**                      **0**