



11/15/2010

**PRODUCT RELIABILITY REPORT
FOR**

MAXQ613, 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:

MAXQ613, Rev B1

In addition, Maxim's continuous reliability monitor program ensures that all outgoing product will continue to meet Maxim's quality and reliability standards. The current status of the reliability monitor program can be viewed at <http://www.maxim-ic.com/TechSupport/dsreliability.html>.

Device Description:

A description of this device 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 is:

FAILURE RATE: **MTTF (YRS):** **123529** **FITS:** **0.9**
DEVICE HOURS: **991532724** **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: 3.6 Volts**

The reliability data follows. At the start of this data is the device information. The next section is the detailed reliability data for each stress. The reliability data section includes the latest data available and may contain some generic data. **Bold** Product Number denotes specific product data.

Device Information:

Process: TSMC 0.18um Logic General Purpose 1P6M Salicide 1.8V/3.3V
 Passivation: Passivation w/Nitride
 Die Size: 71 x 72
 Number of Transistors: 1700000
 Interconnect: Aluminum / 0.5% Copper
 Gate Oxide Thickness: 32 Å

ESD HBM

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
ESD SENSITIVITY	1030	MAXQ613	QJ101861CH JESD22-A114 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	1030	MAXQ613	QJ101861CH JESD22-A114 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	1030	MAXQ613	QJ101861CH JESD22-A114 HBM 2000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	1030	MAXQ613	QJ101861CH JESD22-A114 HBM 4000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	1030	MAXQ613	QJ101861CH JESD22-A114 HBM 8000 VOLTS	1	PUL'S	3	0
Total:						0	

LATCH-UP

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
LATCH-UP I	1030	MAXQ613	QJ101861CH JESD78A, I-TEST 25C 100mA			6	0
LATCH-UP V	1030	MAXQ613	QJ101861CH JESD78A, V-SUPPLY TEST 25C			6	0
Total:						0	

OPERATING LIFE

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
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HIGH TEMP OP LIFE	0743	DS32506	QK074592A	125C, 2.0V (PSA) & 3.5V (PSB)	1000 HRS	45	0
HIGH TEMP OP LIFE	0744	DS33X162	QK075519BA	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0804	DS34T104	QL075523BD	125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	45	0
HIGH TEMP OP LIFE	0808	DS34T102	QL075523BF	125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	45	0
HIGH TEMP OP LIFE	0810	DS26518	QG073727B	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0810	DS26518	QG073727BL	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0810	DS26518	QG073727BJ	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0824	DS34T108	QN085617A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0825	DS33X42	QK089099A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0826	DS33X41	QK089099AB	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0826	DS33X81	QK089099A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0831	DS33M33	QG095632A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0842	DS3102	QX085545A	125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	45	0
HIGH TEMP OP LIFE	0842	DS3104	QX085545AF	125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	25	0
HIGH TEMP OP LIFE	0843	DS3102	QX085545AE	125C, 3.5V (PSA) & 2.0V (PSB)	1000 HRS	25	0
HIGH TEMP OP LIFE	0848	DS34T102	QX096583A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0848	DS34T102	QX096583A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0848	DS34T101	QX096583AB	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0907	DS34S132	QX096061BB	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	43	0
HIGH TEMP OP LIFE	0933	DS34S132	QX096061B	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	43	0
HIGH TEMP OP LIFE	0933	DS34S132	QX096061BA	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	43	0
HIGH TEMP OP LIFE	0951	DS26514	QX108235AB	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0951	MAXQ61C	QJ101202AC	125C, 3.6 VOLTS	192 HRS	45	0

HIGH TEMP OP LIFE	0953	DS26514	QX108235A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	0953	DS26514	QX108235A	125C, 2.0V (PSB) & 3.5V (PSA)	1000 HRS	45	0
HIGH TEMP OP LIFE	1018	DS31400	QZ106781AB	125C, 2.0V (PSA) & 3.5V (PSB)	192 HRS	45	0
HIGH TEMP OP LIFE	1030	MAXQ613	QJ101861CH	135C, 3.6 VOLTS	192 HRS	45	0
						Total:	0

FAILURE RATE: **MTTF (YRS):** **123529** **FITS:** **0.9**
DEVICE HOURS: **991532724** **FAILS:** **0**