



6/18/2009

**PRODUCT RELIABILITY REPORT  
FOR**

**MAXQ1103, Rev B1 & B2**

**Maxim Integrated Products**

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**Conclusion:**

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

MAXQ1103, Rev B1 & B2

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](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 is:

**FAILURE RATE:**                      **MTTF (YRS):**                      **30410**                      **FITS:**                      **3.8**  
**DEVICE HOURS:**                      **244091649**                      **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 Mixed signal, Embedded Flash, General Purpose, Two Poly Five Metal, 1.8V/3.3V Polyimide - No  
 Passivation: SiO/SiN  
 Die Size: 220 x 223  
 Number of Transistors: 8322041  
 Interconnect: Aluminum / 0.5% Copper  
 Gate Oxide Thickness: 32 Å

**ELECTRICAL CHARACTERIZATION**

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
ESD SENSITIVITY	0751	<b>MAXQ1103</b>	QN089071AB EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0751	<b>MAXQ1103</b>	QN089071AB EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0751	<b>MAXQ1103</b>	QN089071AB EOS/ESD S5.1 HBM 2000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0751	<b>MAXQ1103</b>	QN089071AB EOS/ESD S5.1 HBM 3000 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0751	<b>MAXQ1103</b>	QN089071AB EOS/ESD S5.1 HBM 4000 VOLTS	1	PUL'S	3	0
LATCH-UP	0751	<b>MAXQ1103</b>	QN089071AB JESD78, I-TEST 125C			6	0
LATCH-UP	0751	<b>MAXQ1103</b>	QN089071AB JESD78, V-SUPPLY TEST 125C			6	0
ESD SENSITIVITY	0834	<b>MAXQ1103</b>	QN099609AA EOS/ESD S5.1 HBM 500 VOLTS	1	PUL'S	3	0
ESD SENSITIVITY	0834	<b>MAXQ1103</b>	QN099609AA EOS/ESD S5.1 HBM 1000 VOLTS	1	PUL'S	3	0

ESD SENSITIVITY	0834	<b>MAXQ1103</b>	QN099609AA EOS/ESD S5.1 HBM 2000 1 VOLTS	PUL'S	3	0
ESD SENSITIVITY	0834	<b>MAXQ1103</b>	QN099609AA EOS/ESD S5.1 HBM 3000 1 VOLTS	PUL'S	3	0
ESD SENSITIVITY	0834	<b>MAXQ1103</b>	QN099609AA EOS/ESD S5.1 HBM 4000 1 VOLTS	PUL'S	3	0
LATCH-UP	0834	<b>MAXQ1103</b>	QN099609AA JESD78, I-TEST 125C		6	0
LATCH-UP	0834	<b>MAXQ1103</b>	QN099609AA JESD78, V-SUPPLY TEST 125C		6	0
<b>Total:</b>					<b>0</b>	<b>0</b>

#### OPERATING LIFE

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
HIGH TEMP OP LIFE	0814	<b>MAXQ1103</b>	QN089294AA 125C, 3.6V (PSA) & 2.0V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0828	MAXQ2010	QK086138CA 125C, 3.6 VOLTS	1000 HRS	76	0	
HIGH TEMP OP LIFE	0837	MAX2990	QN096322AB 125C, 3.6V (PSA) & 2.0V (PSB)	1000 HRS	77	0	
HIGH TEMP OP LIFE	0851	MAXQ3108	QJ091011AC 125C, 3.6 VOLTS	192 HRS	73	0	
HIGH TEMP OP LIFE	0909	MAXQ8913	NQQ8ZAD 125C, 3.6V (PSA) & 5.0V (PSB)	192 HRS	77	0	
<b>Total:</b>					<b>0</b>	<b>0</b>	

#### W/E ENDURANCE AND DATA RET'N

DESCRIPTION	DATE	CODE/PRODUCT/LOT	CONDITION	READPOIN	QTY	FAILS	FA#
WRITE CYCLE STRESS (KCYS)	0828	MAXQ2010	QK086138CA 85 C, 3.6 VOLTS	20 KCYS	77	0	
STORAGE LIFE	0828	MAXQ2010	QK086138CA 150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0834	<b>MAXQ1103</b>	QN099609AA 85 C, 3.6V (PSA) & 2.0V (PSB)	20 KCYS	77	0	
STORAGE LIFE	0834	<b>MAXQ1103</b>	QN099609AA 150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0837	MAX2990	QN096322AB 85 C, 3.6V (PSA) & 2.0V (PSB)	1 KCYS	77	0	
STORAGE LIFE	0837	MAX2990	QN096322AB 150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0851	MAXQ3108	QJ091011AC 85 C, 3.6 VOLTS	1 KCYS	77	0	
STORAGE LIFE	0851	MAXQ3108	QJ091011AC 150C	96 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0904	<b>MAXQ1103</b>	QN091170BA 85 C, 3.6V (PSA) & 2.0V (PSB)	20 KCYS	77	0	
STORAGE LIFE	0904	<b>MAXQ1103</b>	QN091170BA 150C	1000 HRS	77	0	
WRITE CYCLE STRESS (KCYS)	0909	MAXQ8913	NQQ8ZAD 85 C, 3.6V (PSA) & 5.0V (PSB)	1 KCYS	77	0	
STORAGE LIFE	0909	MAXQ8913	NQQ8ZAD 150C	96 HRS	77	0	
<b>Total:</b>					<b>0</b>	<b>0</b>	

<b>FAILURE RATE:</b>	<b>MTTF (YRS):</b>	<b>30410</b>	<b>FITS:</b>	<b>3.8</b>
	<b>DEVICE HOURS:</b>	<b>244091649</b>	<b>FAILS:</b>	<b>0</b>