PRODUCT RELIABILITY REPORT
FOR

MAX17048

Maxim Integrated

14460 Maxim Dr.
Dallas, TX 75244

Approved by:

Sokhom Chum
SMTS, Reliability Engineering
Conclusion:
The following qualification successfully meets the quality and reliability standards required of all
Maxim Integrated products:

MAX17048

In addition, Maxim Integrated'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.maximintegrated.com/qa/reliability/monitor.

Device Description:
A description of this device can be found in the product data sheet. You can find the product data

Reliability Derating:
The Arrhenius model will be used to determine the acceleration factor for failure mechanisms that
are temperature accelerated.

\[
AfT = \exp\left(\frac{Ea}{k}\right) \left(\frac{1}{Tu} - \frac{1}{Ts}\right) = \frac{tu}{ts}
\]

AfT = Acceleration factor due to Temperature
Tu = Temperature at Use (°K)
Ts = Temperature at Stress (°K)
Ea = Activation Energy (eV)
k = Boltzmann’s Constant (8.617 x 10^{-5} eV/°K)

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.

\[
AfV = \exp\left(B \cdot (Vs - Vu)\right)
\]

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:

\[
Fr = \frac{X}{(ts \cdot AfV \cdot AfT \cdot N \cdot 2)}
\]

X = Chi-Sq statistical upper limit
N = Life test sample size
The calculated failure rate for this device/process is:

\[ \text{MTTF} = \frac{1}{\text{FIT}} \]

NOTE: MTTF is frequently used interchangeably with MTBF.

The calculated failure rate for this device/process is:

<table>
<thead>
<tr>
<th>FAILURE RATE</th>
<th>MTTF (YRS)</th>
<th>FITS:</th>
<th>DEVICE HOURS</th>
<th>FAILS:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1737</td>
<td>65.7</td>
<td>13943783</td>
<td>0</td>
</tr>
</tbody>
</table>

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

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

- \( \text{Cf: } 60\% \)   
- \( \text{Ea: } 0.7 \)   
- \( \text{B: } 0 \)   
- \( \text{Tu: } 25 \degree \text{C} \)   
- \( \text{Vu: } 5 \) 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.  

**Device Information:**

- **Process:** Maxim X3, EPSON & SAN ANTONIO Fabs S18B 5V CMOS, 36V DMOS, 4 metals
- **Passivation:** SiN / SiO2
- **Die Size:** 38 x 67
- **Number of Transistors:** 96706
- **Interconnect:** Aluminum / 0.5% Copper
- **Gate Oxide Thickness:** 140Å

**ESD CDM**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>DATE CODE/PRODUCT/LOT</th>
<th>CONDITION</th>
<th>READPOIN</th>
<th>QTY</th>
<th>FAILS</th>
<th>FA#</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD SENSITIVITY</td>
<td>1344 MAX17048</td>
<td>XW440200A</td>
<td>JESD22-C101 CDM 250 VOLTS</td>
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**ESD HBM**

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<th>FA#</th>
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<tbody>
<tr>
<td>ESD SENSITIVITY</td>
<td>1302 MAX17048</td>
<td>ZJ386023AB</td>
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<th>READPOIN</th>
<th>QTY</th>
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<th>FA#</th>
</tr>
</thead>
<tbody>
<tr>
<td>LATCH-UP I</td>
<td>1302 MAX17048</td>
<td>JESD78A, I-TEST 25C, 100mA</td>
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<tr>
<td>LATCH-UP I</td>
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<td>LATCH-UP V</td>
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<td>JESD78A, V-SUPPLY TEST 25C</td>
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</thead>
<tbody>
<tr>
<td>HIGH TEMP OP LIFE</td>
<td>1134 MAX17048</td>
<td>125C, 5.0 VOLTS</td>
<td>192 HRS</td>
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Total: 0

FAILURE RATE: MTTF (YRS): 1737 FITS: 65.7

DEVICE HOURS: 13943783 FAILS: 0