PRODUCT RELIABILITY REPORT
FOR

MAX72420

Maxim Integrated Products

4401 South Beltwood Parkway
Dallas, TX 75244-3292

Prepared by:

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

MAX72420

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

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

\[ \text{AfT} = \exp((Ea/k)*(1/Tu - 1/Ts)) = tu/ts \]
\[ \text{AfT} = \text{Acceleration factor due to Temperature} \]
\[ tu = \text{Time at use temperature (e.g. 55°C)} \]
\[ ts = \text{Time at stress temperature (e.g. 125°C)} \]
\[ k = \text{Boltzmann's Constant (8.617 x 10-5 eV/°K)} \]
\[ Tu = \text{Temperature at Use (°K)} \]
\[ Ts = \text{Temperature at Stress (°K)} \]
\[ Ea = \text{Activation Energy (e.g. 0.7 ev)} \]

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.

\[ \text{AfV} = \exp(B*(Vs - Vu)) \]
\[ \text{AfV} = \text{Acceleration factor due to Voltage} \]
\[ Vs = \text{Stress Voltage (e.g. 7.0 volts)} \]
\[ Vu = \text{Maximum Operating Voltage (e.g. 5.5 volts)} \]
\[ B = \text{Constant related to failure mechanism type (e.g. 1.0, 2.4, 2.7, etc.)} \]

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:

\[ Fr = X/(ts * AfV * AfT * N * 2) \]
\[ X = \text{Chi-Sq statistical upper limit} \]
\[ N = \text{Life test sample size} \]
Failure Rates are reported in FITs (Failures in Time) or MTTF (Mean Time To Failure). The FIT rate is related to MTTF by:

\[ MTTF = \frac{1}{Fr} \]

The calculated failure rate for this device/process is:

<table>
<thead>
<tr>
<th>FAILURE RATE:</th>
<th>MTTF (YRS):</th>
<th>FITS:</th>
<th>FAILOWS:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27641</td>
<td>4.1</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:

- \( Cf: 60\% \)
- \( Ea: 0.7 \)
- \( B: 0 \)
- \( Tu: 25^\circ C \)
- \( Vu: 3.3 \) 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: SMIC Fab7 180nm 1P5M, 8 inch wafer LCMO18GE-H-25-1P5M0C03.1, 1.8 & 3.3V
- Die Size: 3.48 x 3.48mm
- Number of Transistors: 1611829

**ESD MM**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>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>MAX72420 HP2248TTT3A - H2248.05</td>
<td>JESD22-A115 MM 200 VOLTS</td>
<td>1 PUL'S</td>
<td>42</td>
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Total: 0

**ESD HBM**

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<th>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>MAX72044 HP2248TTT3A - H2248.05</td>
<td>JESD22-A114 HBM 2000 VOLTS</td>
<td>1 PUL'S</td>
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Total: 0

**LATCH-UP**

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<th>PRODUCT/LOT</th>
<th>CONDITION</th>
<th>READPOIN</th>
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<th>FAILS</th>
<th>FA#</th>
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<tbody>
<tr>
<td>LATCH-UP I</td>
<td>MAX72044 HP2248TTT3A - H2248.05</td>
<td>JESD78A, 85C</td>
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Total: 0

**OPERATING LIFE**

<table>
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<th>DESCRIPTION</th>
<th>PRODUCT/LOT</th>
<th>CONDITION</th>
<th>READPOIN</th>
<th>QTY</th>
<th>FAILS</th>
<th>FA#</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH TEMP OP LIFE</td>
<td>MAX72044 HP2248TTT3A - H2248.05</td>
<td>125C, 2.52V &amp; 4.62V</td>
<td>1000 HRS</td>
<td>80</td>
<td>0</td>
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<tr>
<td>HIGH TEMP OP LIFE</td>
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<td>125C, 2.52V &amp; 4.62V</td>
<td>1000 HRS</td>
<td>80</td>
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<td>HIGH TEMP OP LIFE</td>
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<td>125C, 2.52V &amp; 4.62V</td>
<td>1000 HRS</td>
<td>80</td>
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</tbody>
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Total: 0