PRODUCT RELIABILITY REPORT
FOR

MAX79356

Maxim Integrated

14460 Maxim Dr.
Dallas, TX 75244

Approved by:

Sokhom Chum
Sr. Member of Technical Staff,
Reliability Engineering
Conclusion:
The following qualification successfully meets the quality and reliability standards required of all
Maxim Integrated products:

MAX79356

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
\( tu = \) 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.

\[ AfV = \exp(B \times (Vs - Vu)) \]

\( AfV = \) 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:

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

\( X = \) 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:

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

**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>FAILS:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33949</td>
<td>3.4</td>
<td>0</td>
</tr>
</tbody>
</table>

DEVICE HOURS: 272499843

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 90nm Low Power, Embedded flash
- Passivation: SiO/SiN = 400nm/600nm
- Die Size: 143 x 149
- Number of Transistors: 21451712
- Interconnect: Aluminum / 0.5% Copper

**ESD HBM**

<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>1441 MAX79356</td>
<td>ZNB00036AA JESD22-A114 HBM 500 VOLTS</td>
<td>PUL'S</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ESD SENSITIVITY</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD22-A114 HBM 1000 VOLTS</td>
<td>PUL'S</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ESD SENSITIVITY</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD22-A114 HBM 1500 VOLTS</td>
<td>PUL'S</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ESD SENSITIVITY</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD22-A114 HBM 2000 VOLTS</td>
<td>PUL'S</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>ESD SENSITIVITY</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD22-A114 HBM 2500 VOLTS</td>
<td>PUL'S</td>
<td>5</td>
<td>0</td>
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</table>

Total: 0

**LATCH-UP**

<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>LATCH-UP I</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD78A, I-TEST 25C 100mA</td>
<td>6</td>
<td>0</td>
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<tr>
<td>LATCH-UP I</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD78A, I-TEST 25C 250mA</td>
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<td>0</td>
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<tr>
<td>LATCH-UP V</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA JESD78A, V-SUPPLY TEST 25C</td>
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<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total: 0
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<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>HIGH TEMP OP LIFE</td>
<td>1404 MAX71637</td>
<td>ZN144839AC 125C, 3.6V (PSA) &amp; 3.8V (PSB)</td>
<td>240 HRS</td>
<td>80</td>
<td>0</td>
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</tr>
<tr>
<td>HIGH TEMP OP LIFE</td>
<td>1432 MAX71637</td>
<td>ZN144839AA 125C, 3.6V (PSA) &amp; 3.8V (PSB)</td>
<td>1000 HRS</td>
<td>80</td>
<td>0</td>
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<tr>
<td>HIGH TEMP OP LIFE</td>
<td>1432 MAX71637</td>
<td>ZN148158AB 125C, 3.6V (PSA) &amp; 3.8V (PSB)</td>
<td>1000 HRS</td>
<td>80</td>
<td>0</td>
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</tr>
<tr>
<td>HIGH TEMP OP LIFE</td>
<td>1432 MAX71637</td>
<td>ZN148159AB 125C, 3.6V (PSA) &amp; 3.8V (PSB)</td>
<td>1000 HRS</td>
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<td>HIGH TEMP OP LIFE</td>
<td>1437 MAX32550</td>
<td>ZX158472AA 125C, 3.6V (PSA) &amp; 5.5V (PSB)</td>
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<td>80</td>
<td>0</td>
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</tr>
<tr>
<td>HIGH TEMP OP LIFE</td>
<td>1441 MAX79356</td>
<td>ZNB00036AA 125C, 3.6 VOLTS</td>
<td>192 HRS</td>
<td>80</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**FAILURE RATE:**

MTTF (YRS): 33949

FITS: 3.4

DEVICE HOURS: 272499843

FAILS: 0