PRODUCT RELIABILITY REPORT
FOR

MAX2990, 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:

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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.

\[
AfT = \exp((E_a/k)*(1/T_u - 1/T_s)) = tu/ts
\]

\( AfT = \) 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)
\( E_a = \) 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.

\[
AfV = \exp(B*(V_s - V_u))
\]

\( AfV = \) 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

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The calculated failure rate for this device/process is:

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

NOTE: FITs is frequently used interchangeably with MTBF.

The calculated failure rate for this device/process is:

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

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

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

<table>
<thead>
<tr>
<th>Cf</th>
<th>60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ea</td>
<td>0.7</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
</tr>
<tr>
<td>Tu</td>
<td>25</td>
</tr>
<tr>
<td>Vu</td>
<td>3.6</td>
</tr>
</tbody>
</table>

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:** 127 x 160
- **Number of Transistors:** 0
- **Interconnect:** Aluminum / 0.5% Copper
- **Gate Oxide Thickness:** 32 Å

**ELECTRICAL CHARACTERIZATION**

<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>0751 MAX2990</td>
<td>QN089020AA EOS/ESD 5.1 HBM 500 VOLTS</td>
<td>1 PUL'S</td>
<td>3</td>
<td>0</td>
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</tr>
<tr>
<td>ESD SENSITIVITY</td>
<td>0751 MAX2990</td>
<td>QN089020AA EOS/ESD 5.1 HBM 1000 VOLTS</td>
<td>1 PUL'S</td>
<td>3</td>
<td>0</td>
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<tr>
<td>ESD SENSITIVITY</td>
<td>0751 MAX2990</td>
<td>QN089020AA EOS/ESD 5.1 HBM 2000 VOLTS</td>
<td>1 PUL'S</td>
<td>3</td>
<td>0</td>
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<td>ESD SENSITIVITY</td>
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<tr>
<td>ESD SENSITIVITY</td>
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<td>QN089020AA EOS/ESD 5.1 HBM 4000 VOLTS</td>
<td>1 PUL'S</td>
<td>3</td>
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<tr>
<td>LATCH-UP</td>
<td>0751 MAX2990</td>
<td>QN089020AA JESD78, I-TEST 125C</td>
<td>3</td>
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<tr>
<td>LATCH-UP</td>
<td>0751 MAX2990</td>
<td>QN089020AA JESD78, V-SUPPLY TEST 125C</td>
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</table>

**OPERATING LIFE**

<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>
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<tbody>
<tr>
<td>HIGH TEMP OP LIFE</td>
<td>0814 MAXQ1103</td>
<td>QN089294AA 125C, 3.6V (PSA) &amp; 2.0V (PSB)</td>
<td>1000 HRS</td>
<td>77</td>
<td>0</td>
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</table>

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<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>WRITE CYCLE STRESS (KCYS)</td>
<td>0828 MAXQ2010</td>
<td>QK086138CA 25C, 3.6 VOLTS</td>
<td>20</td>
<td>KCYS</td>
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<td>STORAGE LIFE</td>
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<td>QK086138CA 150C</td>
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<td>0834 MAXQ1103</td>
<td>QN099609AA 25C, 3.6 VOLTS</td>
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<td>KCYS</td>
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<tr>
<td>STORAGE LIFE</td>
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<td>QN099609AA 150C</td>
<td>1000 HRS</td>
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<td>QN096322AB 25C, 3.6 VOLTS</td>
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<td>KCYS</td>
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<tr>
<td>STORAGE LIFE</td>
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<td>QN096322AB 150C</td>
<td>1000 HRS</td>
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<tr>
<td>WRITE CYCLE STRESS (KCYS)</td>
<td>0851 MAXQ3108</td>
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<td>STORAGE LIFE</td>
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<td>96</td>
<td>HRS</td>
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<td>WRITE CYCLE STRESS (KCYS)</td>
<td>0904 MAXQ1103</td>
<td>QN091170BA 25C, 3.6 VOLTS</td>
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<td>STORAGE LIFE</td>
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<td>KCYS</td>
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<tr>
<td>STORAGE LIFE</td>
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<td>NQQ82ZAD 150C</td>
<td>96</td>
<td>HRS</td>
<td>77</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total:** 0

**FAILURE RATE:**

- **MTTF (YRS):** 30410
- **FITS:** 3.8
- **DEVICE HOURS:** 244091649
- **FAILS:** 0