PRODUCT RELIABILITY REPORT
FOR

DS2431, Rev C2

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.

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

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)

The activation energy of the failure mechanism is derived from either internal studies or industry accepted standards, or activation energy of 0.7 ev 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:

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

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:** 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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>37894</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**DEVICE HOURS:** 304163849 **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:** 5.25 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:** SA E35K, 0.4um, 3.3V CMOS with embedded Array EEPROM, embedded RSE EEPROM, 18V CMOS, P2-P1 ONO Cap, LVMOSCAP, HVMOSCAP, Varactor Cap, CP Diode, 3LM
- **Passivation:** TEOS Oxide-Nitride Passivation
- **Die Size:** 52 x 63
- **Number of Transistors:** 32096
- **Interconnect:** Aluminum / 0.5% Copper
- **Gate Oxide Thickness:** 120 Å

### 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>1046 DS2431</td>
<td>ZJ163079AC</td>
<td>JESD22-A114 HBM 500 VOLTS</td>
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<td>PUL'S</td>
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### ESD IEC

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<th>QTY</th>
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<tbody>
<tr>
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<td>LATCH-UP</td>
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**Total:** 0

**FAILURE RATE:**

- **MTTF (YRS):** 37894
- **FITS:** 3.0
- **DEVICE HOURS:** 304163849
- **FAILS:** 0