RELIABILITY REPORT
FOR
MAX4246AKA+
(MAX4245/MAX4246/MAX4247)
PLASTIC ENCAPSULATED DEVICES

December 22, 2008

MAXIM INTEGRATED PRODUCTS
120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX4246AKA+ successfully meets the quality and reliability standards required of all Maxim products. In addition, Maxim’s continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim’s quality and reliability standards.

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I. Device Description

A. General

The MAX4245/MAX4246/MAX4247 family of low-cost op amps offer Rail-to-Rail inputs and outputs, draw only 320μA of quiescent current, and operate from a single +2.5V to +5.5V supply. For additional power conservation, the MAX4245/MAX4247 offer a low-power shutdown mode that reduces supply current to 50nA, and puts the amplifiers’ outputs in a high-impedance state. These devices are unity-gain stable with a 1MHz gain-bandwidth product driving capacitive loads up to 470pF. The MAX4245/MAX4246/MAX4247 family is specified from -40°C to +125°C, making them suitable for use in a variety of harsh environments, such as automotive applications. The MAX4245 single amplifier is available in ultra-small 6-pin SC70 and space-saving 6-pin SOT23 packages. The MAX4246 dual amplifier is available in 8-pin, SO, SOT23 and µMAX® packages. The MAX4247 dual amplifier comes in a tiny 10-pin µMAX package.
II. Manufacturing Information

A. Description/Function: Ultra-Small, Rail-to-Rail I/O with Disable, Single/Dual-Supply, Low-Power Op Amps
B. Process: B8
C. Number of Device Transistors: 
D. Fabrication Location: Texas
E. Assembly Location: Carsem Malaysia
F. Date of Initial Production: April 27, 2001

III. Packaging Information

A. Package Type: 8-pin SOT23
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive Epoxy
E. Bondwire: Gold (1 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-2501-0164
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C: Level 1
J. Single Layer Theta Jb: 110°C/W
K. Single Layer Theta Jc: 80°C/W

IV. Die Information

A. Dimensions: 80 X 24 mils
B. Passivation: Si₃N₄/SiO₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect: Aluminum/Si (Si = 1%)
D. Backside Metallization: None
E. Minimum Metal Width: 0.8 microns (as drawn)
F. Minimum Metal Spacing: 0.8 microns (as drawn)
G. Bondpad Dimensions: 5 mil. Sq.
H. Isolation Dielectric: SiO₂
I. Die Separation Method: Wafer Saw
V. Quality Assurance Information

A. Quality Assurance Contacts:
   Ken Wendel (Director, Reliability Engineering)
   Bryan Preeshl (Managing Director of QA)

B. Outgoing Inspection Level:
   0.1% for all electrical parameters guaranteed by the Datasheet.
   0.1% for all Visual Defects.

C. Observed Outgoing Defect Rate:
   < 50 ppm

D. Sampling Plan:
   Mil-Std-105D

VI. Reliability Evaluation

A. Accelerated Life Test

The results of the 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

\[
\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}
\]

(Chi square value for MTTF upper limit)

\[
\lambda = \frac{13.4 \times 10^{-9}}{4340 = \text{Temperature Acceleration factor assuming an activation energy of 0.8eV}}
\]

\[
\lambda = 13.4 \times 10^{-9}
\]

\[
\lambda = 13.4 \text{ F.I.T. (60% confidence level @ 25°C)}
\]

The following failure rate represents data collected from Maxim’s reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the B8 Process results in a FIT Rate of 2.71 @ 25°C and 17.30 @ 55°C (0.8 eV, 60% UCL)

B. Moisture Resistance Tests

The industry standard 85°C/85%RH or HAST testing is monitored per device process once a quarter.

C. E.S.D. and Latch-Up Testing

The OX58 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.
Table 1
Reliability Evaluation Test Results

MAX4246AKA+

<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>TEST CONDITION</th>
<th>FAILURE IDENTIFICATION</th>
<th>SAMPLE SIZE</th>
<th>NUMBER OF FAILURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Life Test (Note 1)</td>
<td>Ta = 135°C</td>
<td>DC Parameters &amp; functionality</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 192 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture Testing (Note 2)</td>
<td>Ta = 85°C</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>85/85</td>
<td>RH = 85%</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 1000hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Stress (Note 2)</td>
<td>Temperature -65°C/150°C</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>Cycle</td>
<td>1000 Cycles</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Method 1010</td>
<td></td>
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</tr>
</tbody>
</table>

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data