RELIABILITY REPORT
FOR MAX6010+ (Rev A)
PLASTIC ENCAPSULATED DEVICES

August 10, 2009

MAXIM INTEGRATED PRODUCTS
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Approved by
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Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX6010+ (Rev A) 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 MAX6010 is a precision, low-noise, low-dropout, micropower voltage reference in a SOT23 package. This three-terminal voltage reference operates with an input voltage from 3.2V to 5.5V, and outputs 3V. The MAX6010 voltage reference consumes less than 5µA (max) of supply current and can source up to 7mA and sink up to 1mA of load current when the input is 5V. Unlike conventional shunt-mode (two-terminal) references that waste supply current and require an external resistor, the MAX6010 offers a supply current that is virtually independent of supply voltage (with only 0.05µAV variation with supply voltage) and does not require an external resistor. The MAX6010 has initial accuracies of 0.2% (A grade) and 0.4% (B grade) and a temperature drift of 50ppm/°C (max). The low-dropout voltage and the ultra-low supply current over the full voltage range make this device ideal for portable and battery-operated applications. The MAX6010 is available in a small, 3-pin SOT23 package.
II. Manufacturing Information

A. Description/Function: Precision, Micropower, 3V Series Voltage Reference in SOT23
B. Process: S12
C. Number of Device Transistors: 87
D. Fabrication Location: Oregon, California or Texas
E. Assembly Location: Malaysia, Philippines, Thailand
F. Date of Initial Production: April 25, 2009

III. Packaging Information

A. Package Type: 3-pin SOT23
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: 84-1lmisr4
E. Bondwire: Au (1 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-0901-0170
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C
J. Single Layer Theta Jb: 250°C/W
K. Single Layer Theta Jc: 130°C/W

IV. Die Information

A. Dimensions: 44 X 31 mils
B. Passivation: Si₃N₄/SiO₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect: Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization: None
E. Minimum Metal Width: 1.2 microns (as drawn)
F. Minimum Metal Spacing: 1.2 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 ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 154 \times 2}$$

(Chi square value for MTTF upper limit)

$$\lambda = \frac{7.0 \times 10^{-9}}{(where \ 4340 = \ Temperature \ Acceleration \ factor \ assuming \ an \ activation \ energy \ of \ 0.8eV)}$$

$$\lambda = 7.0 \ F.I.T. \ (60% \ confidence \ level \ @ \ 25^\circ C)$$

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 S12 Process results in a FIT Rate of 0.09 @ 25C and 1.48 @ 55C, data limited (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 RF27-4 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 V, 1.5x VCCMax Overvoltage per JESD76.
## Table 1
Reliability Evaluation Test Results

<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><strong>Static Life Test</strong> (Note 1)</td>
<td>Ta = 135°C Biased Time = 192 hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>154</td>
<td>0</td>
</tr>
<tr>
<td><strong>Moisture Testing</strong> (Note 2)</td>
<td>85/85 Ta = 85°C RH = 85% Biased Time = 1000hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td><strong>Mechanical Stress</strong> (Note 2)</td>
<td>Temperature Cycle -65°C/150°C 1000 Cycles Method 1010</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
</tbody>
</table>

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