RELIABILITY REPORT
FOR
MAX6459UTB+
PLASTIC ENCAPSULATED DEVICES

August 31, 2009

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

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX6459UTB+ 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.

Table of Contents

I. Device Description V. Quality Assurance Information
II. Manufacturing Information VI. Reliability Evaluation
III. Packaging Information IV. Die Information
.....Attachments

I. Device Description

A. General

The MAX6457-MAX6460 high supply voltage, low-power voltage monitors operate over a 4V to 28V supply voltage range. Each device includes a precision bandgap reference, one or two low-offset voltage comparators, internal threshold hysteresis, power-good or reset timeout options, and one or two high-voltage open-drain outputs. Two external resistors (three for window detection) set the trip threshold voltages. The MAX6457 is a single voltage monitor for undervoltage or overvoltage detection. A logic-based clear input either latches the output for overvoltage applications or allows the device to operate in transparent mode. The MAX6458 includes two comparators (one overvoltage and one undervoltage) for window detection and a single output to indicate if the monitored input is within an adjustable voltage window. The MAX6459 includes dual overvoltage/undervoltage comparators with two independent comparator outputs. Use the MAX6459 as a window comparator with separate undervoltage and overvoltage outputs or as two independent, single voltage monitors. The MAX6460 includes a single comparator and an internal reference, and can also accept an external reference. The inverting and noninverting inputs of the comparator are externally accessible to support positive or negative voltage monitors and to configure the device for active-high or active-low output logic. The MAX6457/MAX6458 offer fixed timing options as a voltage detector with a 50µs typical delay or as a reset circuit with a 90ms minimum reset timeout delay. The monitored input must be above the adjusted trip threshold (or within the adjusted voltage window for the MAX6458) for the selected timeout period before the output changes state. The MAX6459/MAX6460 offer only a fixed 50µs timeout period. Internal threshold hysteresis options (0.5%, 5%, and 8.3% for the MAX6457/MAX6458/MAX6459, and 0.5% for the MAX6460) reduce output chatter in noise-sensitive applications. Each device is available in a small SOT23 package and specified over the extended temperature range of -40°C to +125°C.
II. Manufacturing Information

A. Description/Function: High-Voltage, Low-Current Voltage Monitors in SOT Packages
B. Process: B8
C. Number of Device Transistors: 
D. Fabrication Location: California or Texas
E. Assembly Location: Malaysia, Philippines, Thailand
F. Date of Initial Production: July 27, 2002

III. Packaging Information

A. Package Type: 6-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: #05-1601-0190
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: 115°C/W
K. Single Layer Theta Jc: 80°C/W

IV. Die Information

A. Dimensions: 53 X 35 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: 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 (χ) is calculated as follows:

   \[
   \chi = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2}
   \]

   (where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

   \[
   \chi = 23.9 \times 10^{-9}
   \]

   \[
   \chi = 23.9 \text{ F.I.T.} \ (60\% \text{ confidence level @ 25°C})
   \]

   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 B3 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (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 MS80-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-200 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.
Table 1
Reliability Evaluation Test Results

MAX6459UTB+

<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></td>
<td>Ta = 135°C</td>
<td>DC Parameters</td>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td>&amp; functionality</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 192 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Moisture Testing</strong></td>
<td>Ta = 85°C</td>
<td>DC Parameters</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>RH = 85%</td>
<td>&amp; functionality</td>
<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><strong>Mechanical Stress</strong></td>
<td>Temperature -65°C/150°C</td>
<td>DC Parameters</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Cycle 1000 Cycles Method 1010</td>
<td>&amp; functionality</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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