RELIABILITY REPORT
FOR
MAX823TEXK+
(MAX823-MAX825)
PLASTIC ENCAPSULATED DEVICES

November 30, 2008

MAXIM INTEGRATED PRODUCTS
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SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX823TEXK+ 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 MAX823/MAX824/MAX825* microprocessor (µP) supervisory circuits combine reset output, watchdog, and manual reset input functions in 5-pin SOT23 and SC70 packages. They significantly improve system reliability and accuracy compared to separate ICs or discrete components. The MAX823/MAX824/MAX825 are specifically designed to ignore fast transients on VCC. Seven preprogrammed reset threshold voltages are available (see Reset Threshold Table). All three devices have an active-low reset output, which is guaranteed to be in the correct state for VCC down to 1V. The MAX823 also offers a watchdog input and manual reset input. The MAX824 offers a watchdog input and a complementary active-high reset. The MAX825 offers a manual reset input and a complementary active-high reset. The Selector Guide explains the functions offered in this series of parts.
II. Manufacturing Information

A. Description/Function: 5-Pin Microprocessor Supervisory Circuits with Watchdog Timer and Manual Reset
B. Process: B12
C. Number of Device Transistors: 
D. Fabrication Location: Oregon
E. Assembly Location: Malaysia, Thailand, Philippines
F. Date of Initial Production: Pre 1997

III. Packaging Information

A. Package Type: 5-pin SOT23
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive Epoxy
E. Bondwire: Au (1.0 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: # 05-1601-0010
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C Level 1
J. Single Layer Theta Ja: 324.3°C/W
K. Single Layer Theta Jc: 82°C/W

IV. Die Information

A. Dimensions: 42 X 36 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 (λ) is calculated as follows:

\[
\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 94 \times 2}
\]

(Chi square value for MTTF upper limit)

(\text{where } 4340 = \text{Temperature Acceleration factor assuming an activation energy of } 0.8\text{eV})

\[
\lambda = 11.5 \times 10^{-9}
\]

\[
\lambda = 11.5 \text{ F.I.T. (60\% confidence level @ 25°C)}
\]

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 B12 Process results in a FIT Rate of 3.13 @ 25°C and 54.16 @ 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 MS05-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 1500 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

**MAX823TEXK+**

<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>94</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