RELIABILITY REPORT
FOR
MAX706CSA+
PLASTIC ENCAPSULATED DEVICES

December 11, 2009

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

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<th>Approved by</th>
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<tbody>
<tr>
<td>Ken Wendel</td>
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<tr>
<td>Quality Assurance</td>
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<tr>
<td>Director, Reliability Engineering</td>
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</tbody>
</table>
Conclusion

The MAX706CSA+ 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 MAX705-MAX706/MAX813L microprocessor (μP) supervisory circuits reduce the complexity and number of components required to monitor power-supply and battery functions in μP systems. These devices significantly improve system reliability and accuracy compared to separate ICs or discrete components. The MAX705/MAX706/MAX813L provide four functions:

- A reset output during power-up, power-down, and brownout conditions.
- An independent watchdog output that goes low if the watchdog input has not been toggled within 1.6 seconds.
- A 1.25V threshold detector for power-fail warning, low-battery detection, or for monitoring a power supply other than +5V.
- An active-low manual-reset input. The MAX707/MAX708 are the same as the MAX705/MAX706, except an active-high reset is substituted for the watchdog timer. The MAX813L is the same as the MAX705, except RESET is provided instead of active-low RESET. Two supply-voltage monitor levels are available: The MAX705/MAX707/MAX813L generate a reset pulse when the supply voltage drops below 4.65V, while the MAX706/MAX708 generate a reset pulse below 4.40V. All four parts are available in 8-pin DIP, SO and µMAX® packages.
II. Manufacturing Information

A. Description/Function: Low-Cost, µP Supervisory Circuits
B. Process: S3
C. Number of Device Transistors:
D. Fabrication Location: Oregon
E. Assembly Location: Malaysia, Philippines, Thailand
F. Date of Initial Production: Pre 1997

III. Packaging Information

A. Package Type: 8-pin SOIC (N)
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive
E. Bondwire: Au (1 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-1701-0101
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: 170°C/W
K. Single Layer Theta Jc: 40°C/W
L. Multi Layer Theta Ja: 136°C/W
M. Multi Layer Theta Jc: 38°C/W

IV. Die Information

A. Dimensions: 51 X 74 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: 3.0 microns (as drawn)
F. Minimum Metal Spacing: 3.0 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:

\[
\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 1160 \times 2} \quad (\text{Chi square value for MTTF upper limit})
\]

\[
\lambda = \frac{1}{192 \times 4340 \times 1160 \times 2} \quad (\text{where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV})
\]

\[
\lambda = 0.93 \times 10^{-9}
\]

\[
\lambda = 0.93 \text{ F.I.T. (60% confidence level @ 25°C)}
\]

The following failure rate represents data collected from Maxim’s reliability monitor program. Maxim performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maxim-ic.com/qa/reliability/monitor.

Cumulative monitor data for the S3 Process results in a FIT Rate of 0.04 @ 25°C and 0.69 @ 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 PW27-1 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
MAX706CSA+

<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 &amp; functionality</td>
<td>1160</td>
<td>0</td>
</tr>
<tr>
<td>(Note 1)</td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Time = 192 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Moisture Testing</strong></td>
<td>Ta = 130°C</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>(Note 2)</td>
<td>RH = 85%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 96hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mechanical Stress</strong></td>
<td>-65°C/150°C</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>(Note 2)</td>
<td>1000 Cycles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Method 1010</td>
<td></td>
<td></td>
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Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data