RELIABILITY REPORT
FOR
MAX1759EUB+
PLASTIC ENCAPSULATED DEVICES

December 11, 2009

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

Approved by

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Ken Wendel</td>
<td>Quality Assurance</td>
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<td></td>
<td>Director, Reliability Engineering</td>
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</table>
Conclusion

The MAX1759EUB+ 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 MAX1759 is a buck/boost regulating charge pump that generates a regulated output voltage from a single lithium-ion (Li+) cell, or two or three NiMH or alkaline cells for small hand-held portable equipment. The MAX1759 operates over a wide +1.6V to +5.5V input voltage range and generates a fixed 3.3V or adjustable (2.5V to 5.5V) output (Dual Mode). Maxim’s unique charge-pump architecture allows the input voltage to be higher or lower than the regulated output voltage. Despite its high 1.5MHz operating frequency, the MAX1759 maintains low 50µA quiescent supply current. Designed to be an extremely compact buck/boost converter, this device requires only three small ceramic capacitors to build a complete DC-DC converter capable of generating a guaranteed 100mA (min) output current from a +2.5V input. For added flexibility, the MAX1759 also includes an open-drain power-OK (POK) output that signals when the output voltage is in regulation. The MAX1759 is available in a space-saving 10-pin µMAX package that is 1.09mm high and half the size of an 8-pin SO.
II. Manufacturing Information

A. Description/Function: Buck/Boost Regulating Charge Pump in µMAX
B. Process: B8
C. Number of Device Transistors: 0
D. Fabrication Location: California or Texas
E. Assembly Location: Malaysia, Philippines, Thailand
F. Date of Initial Production: January 07, 2000

III. Packaging Information

A. Package Type: 10-pin uMAX
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive
E. Bondwire: Au (1.3 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-1101-0142
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: 180°C/W
K. Single Layer Theta Jc: 41.9°C/W
L. Multi Layer Theta Ja: 113.1°C/W
M. Multi Layer Theta Jc: 41.9°C/W

IV. Die Information

A. Dimensions: 61 X 87 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 Preeishl (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:

   \[
   \lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 156 \times 2} \quad (\text{Chi square value for MTTF upper limit})
   \]

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

   \[
   \lambda = 6.89 \times 10^{-9}
   \]

   \[
   \lambda = 6.89 \text{ F.I.T. (60% confidence level @ 25°C)}
   \]

   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 B8 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 PX73 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.
<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</td>
<td>DC Parameters &amp; functionality</td>
<td>156</td>
<td>0</td>
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<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Time = 192 hrs.</td>
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<td></td>
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<tr>
<td><strong>Moisture Testing</strong> (Note 2)</td>
<td>HAST</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Ta = 130°C</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>RH = 85%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Time = 96hrs.</td>
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<tr>
<td><strong>Mechanical Stress</strong> (Note 2)</td>
<td>Temperature</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
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<tr>
<td></td>
<td>-65°C/150°C</td>
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<tr>
<td></td>
<td>Cycle</td>
<td></td>
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<tr>
<td></td>
<td>1000 Cycles</td>
<td></td>
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<tr>
<td></td>
<td>Method 1010</td>
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Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data