RELIABILITY REPORT

FOR

MAX1811ESA+

PLASTIC ENCAPSULATED DEVICES

February 5, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by

Ken Wendel

Quality Assurance

Director, Reliability Engineering
Conclusion

The MAX1811ESA+ 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 MAX1811 is a single-cell lithium-ion (Li+) battery charger that can be powered directly from a USB port* or from an external supply up to 6.5V. It has a 0.5% overall battery regulation voltage accuracy to allow maximum utilization of the battery capacity. The charger uses an internal FET to deliver up to 500mA charging current to the battery. The device can be configured for either a 4.1V or 4.2V battery, using the SELV input. The SELI input sets the charge current to either 100mA or 500mA. An open-drain output (active-low CHG) indicates charge status. The MAX1811 has preconditioning that soft-starts a near-dead battery cell before charging. Other safety features include continuous monitoring of voltage and current and initial checking for fault conditions before charging. The MAX1811 is available in a small 1.4W thermally enhanced 8-pin SO package.

* USB port voltages may vary from 4.75V to 5.25V.
II. Manufacturing Information

A. Description/Function: USB-Powered Li+ Charger
B. Process: B12
C. Number of Device Transistors: 
D. Fabrication Location: Oregon, California or Texas
E. Assembly Location: Philippines, Thailand
F. Date of Initial Production: April 27, 2001

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 (1.3 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-2301-0094
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C
   Level 1
J. Multi Layer Theta Ja: 82°C/W
K. Single Layer Theta Ja: 32°C/W
L. Multi Layer Theta Jc: 82°C/W
M. Multi Layer Theta Jc: 32°C/W

IV. Die Information

A. Dimensions: 80 X 90 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:

   $\lambda = \frac{1}{MTTF} = \frac{1}{192 x 4340 x 160 x 2} = 1.83 \times 10^{-9}$

   (Chi square value for MTTF upper limit)

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

   $\lambda = 6.71 \times 10^{-9}$

   $\lambda = 6.71$ 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 B12 Process results in a FIT Rate of 0.06 @ 25C and 1.06 @ 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 PY35 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>
<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>160</td>
<td>0</td>
</tr>
<tr>
<td></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>
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<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></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>
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</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></td>
<td>1000 Cycles</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Method 1010</td>
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</table>

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