RELIABILITY REPORT
FOR
MAX8881EUT33+
PLASTIC ENCAPSULATED DEVICES

April 9, 2009

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

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX8881EUT33+ 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 MAX8880/MAX8881 are ultra-low supply current, low-dropout linear regulators, capable of delivering up to 200mA. They are designed for battery-powered applications where reverse battery protection and long battery life are critical. These regulators' low 3.5µA supply current extends battery life in applications with long standby periods. Unlike PNP-based designs, a PMOS device maintains ultra-low supply current throughout the entire operating range and in dropout. The parts are internally protected from output short circuits, reverse battery connection, and thermal overload. An internal power-OK (POK) comparator indicates when the output is out of regulation. The MAX8880 output is adjustable from 1.25V to 5V using an external resistor-divider. The MAX8881 provides only factory-set output voltages of 1.8V, 2.5V, 3.3V, or 5V (see Ordering Information in the full data sheet). The devices are available in 6-pin SOT23 and 6-pin TDFN packages.
II. Manufacturing Information

A. Description/Function: 12V, Ultra-Low-I<sub>Q</sub>, Low-Dropout Linear Regulators with POK
B. Process: B8
C. Number of Device Transistors: 
D. Fabrication Location: Texas
E. Assembly Location: UTL Thailand
F. Date of Initial Production: April 22, 2000

III. Packaging Information

A. Package Type: 6-pin SOT23
B. Lead Frame: Cu Alloy
C. Lead Finish: 100% matte Tin
D. Die Attach: Non Conductive Epoxy
E. Bondwire: Au (1.0 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: 
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C
J. Single Layer Theta Jb: 115°C/W
K. Single Layer Theta Jc: 80°C/W
L. Multi Layer Theta Ja: 74.6°C/W
M. Multi Layer Theta Jc: 6.1°C/W

IV. Die Information

A. Dimensions: 41 X 60 mils
B. Passivation: Si<sub>3</sub>N<sub>4</sub>/SiO<sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect: Aluminum/Si (Si = 1%)
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: SiO<sub>2</sub>
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:

   $$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 240 \times 2}$$ (Chi square value for MTTF upper limit)

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

   $$\lambda = 4.5 \times 10^{-9}$$

   $$\lambda = 4.5 \text{ F.I.T. (60% confidence level @ 25°C)}$$

   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 B8 Process results in a FIT Rate of 2.71 @ 25C and 17.30 @ 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 PY17-3 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 1
Reliability Evaluation Test Results

<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>Static Life Test</td>
<td>Ta = 135°C</td>
<td>DC Parameters &amp; functionality</td>
<td>240</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 192 hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moisture Testing</td>
<td>Ta = 85°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 = 1000hrs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Stress</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>
<td></td>
</tr>
<tr>
<td></td>
<td>Method 1010</td>
<td></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