RELIABILITY REPORT
FOR
MAX1709EUI+
PLASTIC ENCAPSULATED DEVICES

July 13, 2009

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

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX1709EUI+ 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 MAX1709 sets a new standard of space savings for high-power, step-up DC-DC conversion. It delivers up to 20W at a fixed (3.3V or 5V) or adjustable (2.5V to 5.5V) output, using an on-chip power MOSFET from a +0.7V to +5V supply. Fixed-frequency PWM operation ensures that the switching noise spectrum is constrained to the 600kHz fundamental and its harmonics, allowing easy postfiltering for noise reduction. External clock synchronization capability allows for even tighter noise spectrum control. Quiescent power consumption is less than 1mW to extend operating time in battery-powered systems. Two control inputs (ONA, active-low ONB) allow simple push-on, push-off control through a single momentary pushbutton switch, as well as conventional on/off logic control. The MAX1709 also features programmable soft-start and current limit for design flexibility and optimum performance with batteries. The MAX1709 is supplied in both a high-power TSSOP package, which allows a 10ARMS switch current and a 4A output, and a narrow SO package, which supplies a 2.4A output with a switch rated at 6ARMS. Although the narrow SO device has a lower RMS switch rating, it has the same peak switch current rating as the TSSOP device, and so can supply 4A loads intermittently. If loads of 2A or less are required, refer to the MAX1708.
II. Manufacturing Information

A. Description/Function: 4A, Low-Noise, High-Frequency, Step-Up DC-DC Converter
B. Process: S12
C. Number of Device Transistors: 
D. Fabrication Location: Oregon
E. Assembly Location: Philippines, Thailand
F. Date of Initial Production: April 22, 2000

III. Packaging Information

A. Package Type: 28-pin TSSOP
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive Epoxy
E. Bondwire: Gold (2 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
   Level 1
J. Single Layer Theta Ja: 45°C/W
K. Single Layer Theta Jc: 2°C/W

IV. Die Information

A. Dimensions: 86 X 193 mils
B. Passivation: Si₃N₄/SiO₂ (Silicon nitride/ Silicon dioxide
C. Interconnect: Al/0.5%Cu
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:

\[
\lambda = \frac{1}{MTTF} = \frac{1.83}{\frac{192 \times 4340 \times 80 \times 2}{(where \ 4340 = Temperature \ Acceleration \ factor \ assuming \ an \ activation \ energy \ of \ 0.8eV)} \]

\( \lambda = 13.4 \times 10^{-9} \)

\( \lambda = 13.4 \text{ F.I.T. (60% confidence level @ 25°C)} \)

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 S12 Process results in a FIT Rate of 0.09 @ 25°C and 1.48 @ 55°C, data limited (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 PX35 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000 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 (Note 1)</td>
<td>Ta = 135°C, Biased, Time = 192 hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>80</td>
<td>0</td>
</tr>
<tr>
<td>Moisture Testing (Note 2)</td>
<td>Ta = 85°C, RH = 85%, Biased, Time = 1000 hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>Mechanical Stress (Note 2)</td>
<td>-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