RELIABILITY REPORT
FOR
MAX1627ESA+
PLASTIC ENCAPSULATED DEVICES

December 9, 2009

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

Approved by
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Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX1627ESA+ 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 MAX1626/MAX1627 step-down DC-DC switching controllers provide high efficiency over loads ranging from 1mA to more than 2A. A unique current-limited, pulse-frequency-modulated (PFM) control scheme operates with up to a 100% duty cycle, resulting in very low dropout voltages. This control scheme eliminates minimum load requirements and reduces the supply current under light loads to 90µA (versus 2mA to 10mA for common pulse-width modulation controllers). These step-down controllers drive an external P-channel MOSFET, allowing design flexibility for applications to 12W or higher. Soft-start reduces current surges during start-up. A high switching frequency (up to 300kHz) and operation in continuous-conduction mode allow the use of tiny surface-mount inductors. Output capacitor requirements are also reduced, minimizing PC board area and system costs.

The output voltage is preset at 5V or 3.3V for the MAX1626 and adjustable for the MAX1627. Input voltages can be up to 16.5V. The MAX1626/MAX1627 are functional upgrades for the MAX1649/MAX1651.
II. Manufacturing Information

A. Description/Function: 5V/3.3V or Adjustable, 100% Duty Cycle, High-Efficiency, Step-Down DC-DC Controllers

B. Process: SG5

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 (1.3 mil dia.)

F. Mold Material: Epoxy with silica filler

G. Assembly Diagram: #05-1701-0271

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: 132°C/W

M. Multi Layer Theta Jc: 38°C/W

IV. Die Information

A. Dimensions: 81 X 105 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: 5.0 microns (as drawn)

F. Minimum Metal Spacing: 5.0 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:

\[
\lambda = \frac{1}{\frac{192 \times 4340 \times 480 \times 2}{\text{MTTF}}} = \frac{1.83}{(\text{Chi square value for MTTF upper limit})} \\
\text{(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)}
\]

\[
\lambda = 2.24 \times 10^{-9}
\]

\[
\lambda = 2.24 \text{ F.I.T. (60% confidence level @ 25°C)}
\]

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 SG5 Process results in a FIT Rate of 0.12 @ 25C and 2.04 @ 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 PW72-1 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>
<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>480</td>
<td>0</td>
</tr>
<tr>
<td>Moisture Testing (Note 2)</td>
<td>HAST Ta = 130°C RH = 85% Biased Time = 96hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td>Mechanical Stress (Note 2)</td>
<td>Temperature -65°C/150°C Cycle 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