RELIABILITY REPORT
FOR
MAX517BCPA+
PLASTIC ENCAPSULATED DEVICES

November 14, 2014

MAXIM INTEGRATED
160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
Reliability Engineer
Conclusion

The MAX517BCPA+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

Table of Contents

I. Device Description
   A. General
   The MAX517/MAX518/MAX519 are 8-bit voltage output digital-to-analog converters (DACs) with a simple 2-wire serial interface that allows communication between multiple devices. They operate from a single 5V supply and their internal precision buffers allow the DAC outputs to swing rail-to-rail. The MAX517 is a single DAC and the MAX518/MAX519 are dual DACs. The MAX518 uses the supply voltage as the reference for both DACs. The MAX517 has a reference input for its single DAC and each of the MAX519's two DACs has its own reference input. The MAX517/MAX518/MAX519 feature a serial interface and internal software protocol, allowing communication at data rates up to 400kbps. The interface, combined with the double-buffered input configuration, allows the DAC registers of the dual devices to be updated individually or simultaneously. In addition, the devices can be put into a low-power shutdown mode that reduces supply current to 4µA. Power-on reset ensures the DAC outputs are at 0V when power is initially applied. The MAX517/MAX518 are available in space-saving 8-pin DIP and SO packages. The MAX519 comes in 16-pin DIP and SO packages.
II. Manufacturing Information

A. Description/Function: 2-Wire, Serial, 8-Bit DACs with Rail-to-Rail Outputs
B. Process: S3
C. Number of Device Transistors: 
D. Fabrication Location: Oregon
E. Assembly Location: Thailand, Philippines
F. Date of Initial Production: Pre 1997

III. Packaging Information

A. Package Type: 8-pin PDIP
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: #05-0401-0426
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: 110°C/W
K. Single Layer Theta Jc: 40°C/W
L. Multi Layer Theta Ja: N/A
M. Multi Layer Theta Jc: N/A

IV. Die Information

A. Dimensions: 78X135 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: 3.0 microns (as drawn)
F. Minimum Metal Spacing: 3.0 microns (as drawn)
G. Bondpad Dimensions: 
H. Isolation Dielectric: SiO₂
I. Die Separation Method: Wafer Saw
V. Quality Assurance Information

A. Quality Assurance Contacts:  
   Don Lipps (Manager, Reliability Engineering)  
   Bryan Preeshl (Vice President 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:

$$\chi = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 479 \times 2}$$  
   (Chi square value for MTTF upper limit)  
   (where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 2.30 \times 10^{-9}$$  
   $$\lambda = 2.30 \text{ F.I.T. (60% confidence level @ 25°C)}$$

   The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the S3 Process results in a FIT Rate of 0.03 @ 25°C and 0.50 @ 55°C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot NHBACU003D, D/C 9849)  
   The DA53 die type has been found to have all pins able to withstand a HBM transient pulse of +/-3000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.
<table>
<thead>
<tr>
<th>TEST ITEM</th>
<th>TEST CONDITION</th>
<th>FAILURE IDENTIFICATION</th>
<th>SAMPLE SIZE</th>
<th>NUMBER OF FAILURES</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Static Life Test</td>
<td>Ta = 135°C</td>
<td>DC Parameters</td>
<td>80</td>
<td>0</td>
<td>XHBCBC007B</td>
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<tr>
<td></td>
<td>Biased</td>
<td>&amp; functionality</td>
<td>80</td>
<td>0</td>
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<td>Time = 192 hrs.</td>
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<td>XHABA005C</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>79</td>
<td>0</td>
<td>XHBAAY001A</td>
</tr>
</tbody>
</table>

Note 1: Life Test Data may represent plastic DIP qualification lots.