RELIABILITY REPORT
FOR
MAX5302EUA+
PLASTIC ENCAPSULATED DEVICES

November 3, 2009

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

Approved by

<table>
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<tr>
<th>Ken Wendel</th>
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<tr>
<td>Quality Assurance</td>
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<tr>
<td>Director, Reliability Engineering</td>
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</table>
Conclusion

The MAX5302EUA+ 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 MAX5302 combines a low-power, voltage-output, 12-bit digital-to-analog converter (DAC) and a precision output amplifier in an 8-pin µMAX package. It operates from a single +5V supply, drawing less than 280µA of supply current. The output amplifier’s inverting input is available to the user, allowing specific gain configurations, remote sensing, and high output current capability. This makes the MAX5302 ideal for a wide range of applications, including industrial process control. Other features include a software shutdown and power-on reset. The serial interface is SPI™/QSPI™/MICROWIRE™ compatible. The DAC has a double-buffered input, organized as an input register followed by a DAC register. A 16-bit serial word loads data into the input register. The DAC register can be updated independently or simultaneously with the input register. All logic inputs are TTL/CMOS-logic compatible and buffered with Schmitt triggers to allow direct interfacing to optocouplers.
II. Manufacturing Information

A. Description/Function: Low-Power, 12-Bit Voltage-Output DAC with Serial Interface
B. Process: S12
C. Number of Device Transistors: 
D. Fabrication Location: Oregon, California or Texas
E. Assembly Location: Malaysia, Philippines, Thailand
F. Date of Initial Production: October 22, 1999

III. Packaging Information

A. Package Type: 8-pin uMAX
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive Epoxy
E. Bondwire: Gold (1 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-0401-0475
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: 221°C/W
K. Single Layer Theta Jc: 41.9°C/W
L. Multi Layer Theta Ja: 206.3°C/W
M. Multi Layer Theta Jc: 41.9°C/W

IV. Die Information

A. Dimensions: 58 X 84 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:

   \[
   \lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 320 \times 2}
   \]

   (Chi square value for MTTF upper limit)

   \[
   \lambda = 3.36 \times 10^{-9}
   \]

   \( \lambda = 3.36 \) 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 S12 Process results in a FIT Rate of 0.17 @ 25C and 3.00 @ 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 DA61-1 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 1
Reliability Evaluation Test Results
MAX5302EUAP

<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</td>
<td>DC Parameters &amp; functionality</td>
<td>320</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>Moisture Testing (Note 2)</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>
<td></td>
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<tr>
<td>Mechanical Stress (Note 2)</td>
<td>Temperature</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-65°C/150°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cycle</td>
<td></td>
<td></td>
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<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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Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data