RELIABILITY REPORT
FOR
MAX6018AEUR12+
PLASTIC ENCAPSULATED DEVICES

October 20, 2009

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

Approved by
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Quality Assurance
Director, Reliability Engineering
Conclusion

The MAX6018AEUR12+ 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 MAX6018 is a precision, low-voltage, low-dropout, micropower voltage reference in a SOT23 package. This three-terminal reference operates with an input voltage from (VOUT + 200mV) to 5.5V, and is available with output voltage options of 1.2V, 1.6V, 1.8V, and 2.048V. The MAX6018 voltage reference consumes less than 5µA (max) of supply current and can source and sink up to 1mA of load current. Unlike conventional shunt-mode (two-terminal) references that waste supply current and require an external resistor, devices in the MAX6018 family offer a supply current that is virtually independent of supply voltage (with only 0.1µA/V variation with supply voltage) and do not require an external resistor. The MAX6018 has initial accuracies of 0.2% (A grade) and 0.4% (B grade) and temperature drift of 50ppm/°C (max). The low-dropout voltage and the ultra-low, supply voltage-independent supply current make this device ideal for two-cell alkaline, end-of-life, battery-monitoring systems. The MAX6018 is available in a tiny 3-pin SOT23 package.
II. Manufacturing Information

A. Description/Function: Precision, Micropower, 1.8V Supply, Low-Dropout, SOT23 Voltage Reference
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 27, 2001

III. Packaging Information

A. Package Type: 3-pin SOT23
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: 84-1lmisr4 Epoxy
E. Bondwire: Gold (1 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-0901-0170
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C Level 1
J. Single Layer Theta Jb: 250°C/W
K. Single Layer Theta Jc: 130°C/W

IV. Die Information

A. Dimensions: 44 X 31 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 (λ) is calculated as follows:

\[
\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 154 \times 2} = 6.98 \times 10^{-9} \\
\text{(Chi square value for MTTF upper limit)}  \\
\text{(where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV)}  \\
\lambda = 6.98 \times 10^{-9}  \\
\lambda = 6.98 \text{ F.I.T. (60% confidence level @ 25°C)}
\]

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 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 RF27 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>
<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>
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<tr>
<td><strong>Static Life Test</strong> (Note 1)</td>
<td>Ta = 135°C Biased Time = 192 hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>154</td>
<td>0</td>
</tr>
<tr>
<td><strong>Moisture Testing</strong> (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><strong>Mechanical Stress</strong> (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