RELIABILITY REPORT
FOR
MAX3806GTC+
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED
160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Quality Assurance
Reliability Engineer
Conclusion

The MAX3806GTC+ 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.

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I. Device Description

A. General

The MAX3806 is a high-gain linear preamplifier for distance measurement applications using a laser beam. The device operates from a single +5.0V supply and converts current from an AC-coupled photodiode into a single-ended voltage signal. The input accepts single pulses or bursts of pulses with widths down to 30ns. The amplifier remains linear with input amplitudes from 42nA (SNR = 3) to 40µA. It can also withstand overload signals as large as 2mA. The output stage is designed to drive a high-impedance load to deliver the output-voltage swing at the lowest possible power dissipation. The gain of the preamplifier stage is selected using the GAIN pin to be 60k or 30k. There is also an internal 14dB attenuator that is selected using the ATT pin. The output stage can be disabled (high impedance). The device is available in a 3mm x 3mm, 12-pin TQFN package and operates over the -40°C to +105°C temperature range.
II. Manufacturing Information

A. Description/Function: Receiver for Optical Distance Measurement
B. Process: G4
C. Number of Device Transistors: 440
D. Fabrication Location: Oregon
E. Assembly Location: Taiwan, China, Thailand
F. Date of Initial Production: July 01, 2009

III. Packaging Information

A. Package Type: 12-pin TQFN 3x3
B. Lead Frame: Copper
C. Lead Finish: 100% matte Tin
D. Die Attach: Conductive
E. Bondwire: Au (1 mil dia.)
F. Mold Material: Epoxy with silica filler
G. Assembly Diagram: #05-9000-3087
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: 68°C/W
K. Single Layer Theta Jc: 10.8°C/W
L. Multi Layer Theta Ja: 60°C/W
M. Multi Layer Theta Jc: 10.8°C/W

IV. Die Information

A. Dimensions: 42.12X40.16 mils
B. Passivation: Si3N4
C. Interconnect: Au
D. Backside Metallization: None
E. Minimum Metal Width: 1.2 microns (as drawn)
F. Minimum Metal Spacing: 1.6 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 150°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{240 \times 9706 \times 50 \times 2}$$

(Chi square value for MTTF upper limit)

(where 9706 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 7.87 \times 10^9$$

$$\lambda = 7.87 \text{ F.I.T. (60% confidence level @ 25°C)}$$

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 G4 Process results in a FIT Rate of 0.02 @ 25°C and 0.35 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NLZZBQ001C, D/C 0912)

The HQ20 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.
### Table 1
Reliability Evaluation Test Results

**MAX3806GTC+**

<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 &amp; functionality</td>
<td>50</td>
<td>0</td>
<td>NLZZBO001C, D/C 0912</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 240 hrs.</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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