RELIABILITY REPORT
FOR
MAX9511CEG+
PLASTIC ENCAPSULATED DEVICES

May 10, 2012

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

Approved by

Sokhom Chum
Quality Assurance
Reliability Engineer
Conclusion

The MAX9511CEG+ 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.

Table of Contents

I. Device Description        IV. Die Information
II. Manufacturing Information V. Quality Assurance Information
III. Packaging Information   VI. Reliability Evaluation
.....Attachments

I. Device Description

A. General

The MAX9511 provides a complete VGA interface between a graphics controller and/or docking station. The MAX9511 has output drivers with variable electromagnetic interference (EMI) suppression for graphics video and sync (RGBHV) signals and includes external load-detection circuitry. The MAX9511 suppresses EMI emissions by limiting the slew rate (SR) rather than limiting bandwidth with fixed L-C filters. The SR controls the large-signal bandwidth without affecting the small-signal bandwidth, resulting in sharper video images, while reducing EMI. The SR of the MAX9511 provides tighter control than traditional passive L-C components, and allows the SR to track the resolution by varying an external resistor (RRX) rather than being fixed to a sub-optimal value. The load-detection circuitry of the MAX9511 automatically detects and transmits a change in load status to the input stages when an external load (monitor, docking station, or projector) is connected. The MAX9511 is compatible with the load-detection circuitry on the digital-to-analog (DAC) outputs of most video graphics controllers. The output drivers provide 6dB of gain to compensate for the 75 back-termination resistors, which reduce transmission line reflections. The RGBHV channels can be placed into shutdown to reduce power when no external load is connected. The MAX9511 operates from 3V and 5V supplies. The DDC circuitry performs bidirectional level translation from 3V to 5V logic levels. The MAX9511 is offered in a 24-pin QSOP package and is specified over the commercial 0°C to +70°C temperature range.
II. Manufacturing Information

A. Description/Function: RGBHV Driver with EMI Suppression
B. Process: CB20
C. Number of Device Transistors: 
D. Fabrication Location: Oregon
E. Assembly Location: Thailand, Philippines
F. Date of Initial Production: April 23, 2005

III. Packaging Information

A. Package Type: 0.150 24L QSOP
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: #05-9000-1639 / A
H. Flammability Rating: Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C
   J. Single Layer Theta Ja: 105°C/W
   K. Single Layer Theta Jc: 34°C/W
   L. Multi Layer Theta Ja: 88°C/W
   M. Multi Layer Theta Jc: 34°C/W

IV. Die Information

A. Dimensions: 43 X 103 mils
B. Passivation: Si$_3$N$_4$ (Silicon nitride)
C. Interconnect: Au
D. Backside Metallization: None
E. Minimum Metal Width: 2 microns (as drawn)
F. Minimum Metal Spacing: 2 microns (as drawn)
G. Bondpad Dimensions: 5 mil. Sq.
H. Isolation Dielectric: SiO$_2$
I. Die Separation Method: Wafer Saw
V. Quality Assurance Information

A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)  
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (\( \lambda \)) is calculated as follows:

\[
\chi = \frac{1}{\text{MTTF}} = \frac{1.83}{96 \times 4340 \times 47 \times 2}
\]  
(Chi square value for MTTF upper limit)

where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV

\[ \lambda = 46.7 \times 10^{-9} \]  
\( \lambda = 46.7 \text{ F.I.T.} \) (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 CB20 Process results in a FIT Rate of 0.14 @ 25C and 2.48 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NYM0BQ001A D/C 0539)

The VA36 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.
Table 1
Reliability Evaluation Test Results
MAX9511CEG+

<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>47</td>
<td>0</td>
<td>NYM0BQ001A, D/C 0539</td>
</tr>
<tr>
<td></td>
<td>Biased</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time = 96 hrs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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