RELIABILITY REPORT
FOR
MAX3162EAI+
PLASTIC ENCAPSULATED DEVICES

November 5, 2009

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

Approved by

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

The MAX3162EAI+ 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 MAX3160/MAX3161/MAX3162 are programmable RS-232/RS-485/422 multiprotocol transceivers. The MAX3160/MAX3161 are pin programmable as a 2TX/2RX RS-232 interface or a single RS-485/422 transceiver. The MAX3162 is configured as a 2TX/2RX RS-232 interface and a single RS-485/422 transceiver simultaneously. All devices incorporate a proprietary low-dropout transmitter output stage and an on-board dual charge pump to allow RS-232 and RS-485/422 compliant performance from a +3V to +5.5V supply. The receivers feature true fail-safe circuitry that guarantees a logic-high receiver output when the receiver inputs are open or shorted. These devices also feature pin-selectable transmitter slew rates for both RS-232 and RS-485/422 modes. Slew-rate limiting minimizes EMI and reduces reflections caused by improperly terminated cables, allowing error-free data transmission up to 250kbps. Disabling slew-rate limiting allows these devices to transmit at data rates up to 10Mbps in RS-485/422 mode and up to 1Mbps in RS-232 mode. The MAX3160/MAX3161/MAX3162 feature a 1μA shutdown mode, and short-circuit limiting and thermal shutdown circuitry to protect against excessive power dissipation. The MAX3160/MAX3162 offer a flow-through pinout that facilitates board layout. The MAX3160/MAX3161/MAX3162 are available in tiny SSOP packages and operate over the commercial and extended temperature ranges.
II. Manufacturing Information

A. Description/Function: +3.0V to +5.5V, 1µA, RS-232/RS-485/422 Multiprotocol Transceivers
B. Process: B3
C. Number of Device Transistors:
D. Fabrication Location: Oregon
E. Assembly Location: Malaysia, Philippines
F. Date of Initial Production: July 20, 2000

III. Packaging Information

A. Package Type: 28-pin SSOP
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: #05-1901-0214
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: 105°C/W
K. Single Layer Theta Jc: 23.9°C/W
L. Multi Layer Theta Ja: 66.6°C/W
M. Multi Layer Theta Jc: 23°C/W

IV. Die Information

A. Dimensions: 135 X 159 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: 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:

$$\lambda = \frac{1}{\text{MTTF}} = 1.83$$

(Chi square value for MTTF upper limit)

MTTF = $\frac{192 \times 4340 \times 160 \times 2}{(4340 = \text{Temperature Acceleration factor assuming an activation energy of 0.8eV})}$

$$\lambda = 11.9 \times 10^{-9}$$

$$\lambda = 11.9 \text{ F.I.T. (60% confidence level @ 25°C)}$$

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 B3 Process results in a FIT Rate of 0.51 @ 25C and 8.79 @ 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 RS45-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 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>
<tbody>
<tr>
<td>Static Life Test (Note 1)</td>
<td>Ta = 135°C Biased Time = 192 hrs.</td>
<td>DC Parameters &amp; functionality</td>
<td>160</td>
<td>0</td>
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<tr>
<td>Moisture Testing (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>
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<tr>
<td>Mechanical Stress (Note 2)</td>
<td>Temperature Cycle</td>
<td>-65°C/150°C 1000 Cycles Method 1010</td>
<td>DC Parameters &amp; functionality</td>
<td>77</td>
</tr>
</tbody>
</table>

Note 1: Life Test Data may represent plastic DIP qualification lots.
Note 2: Generic Package/Process data