RELIABILITY REPORT

FOR

MAX3030EEUE+

PLASTIC ENCAPSULATED DEVICES

April 27, 2010

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

| **Approved by** |
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| Don Lipps |
| Quality Assurance |
| Manager, Reliability Engineering |

**Conclusion**

The MAX3030EEUE+ 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**

A. General

The MAX3030E-MAX3033E family of quad RS-422 transmitters send digital data transmission signals over twisted-pair balanced lines in accordance with TIA/EIA-422-B and ITU-T V.11 standards. All transmitter outputs are protected to ±15kV using the Human Body Model. The MAX3030E-MAX3033E are available with either a 2Mbps or 20Mbps guaranteed baud rate. The 2Mbps baud rate transmitters feature slew-rate-limiting to minimize EMI and reduce reflections caused by improperly terminated cables. The 20Mbps baud rate transmitters feature low-static current consumption (ICC < 100µA), making them ideal for battery-powered and power-conscious applications. They have a maximum propagation delay of 16ns and a part-to-part skew less than 5ns, making these devices ideal for driving parallel data. The MAX3030E-MAX3033E feature hot-swap capability that eliminates false transitions on the data cable during power-up or hot insertion. The MAX3030E-MAX3033E are low-power, ESD-protected, pin-compatible upgrades to the industry-standard 26LS31 and SN75174. They are available in space-saving 16-pin TSSOP and SO packages.

## II. Manufacturing Information

| | |
|---|---|
| A. Description/Function: | ±15kV ESD-Protected, 3.3V Quad RS-422 Transmitters |
| B. Process: | B8 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | California or Texas |
| E. Assembly Location: | Malaysia, Philippines, Thailand |
| F. Date of Initial Production: | October 26, 2002 |

## III. Packaging Information

| | |
|---|---|
| A. Package Type: | 16-pin TSSOP |
| 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: | #05-9000-0202 |
| 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: | 106°C/W |
| K. Single Layer Theta Jc: | 27°C/W |
| L. Multi Layer Theta Ja: | 90°C/W |
| M. Multi Layer Theta Jc: | 27°C/W |

## IV. Die Information

| | |
|---|---|
| A. Dimensions: | 54 X 108 mils |
| B. Passivation: | $Si_3N_4/SiO_2$ (Silicon nitride/ Silicon dioxide) |
| C. Interconnect: | Al/0.5%Cu with Ti/TiN Barrier |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 0.8 microns (as drawn) |
| F. Minimum Metal Spacing: | 0.8 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: | Don Lipps (Manager, Reliability Engineering)<br>Bryan Preeshl (Managing Director of QA) |
| B. Outgoing Inspection Level: | 0.1% for all electrical parameters guaranteed by the Datasheet.<br>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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 45 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 24.4 \times 10^{-9}$

$\lambda = 24.4$ 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 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 RT31 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**
Reliability Evaluation Test Results

**MAX3030EEUE+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES |
|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | |
| | Ta = 135°C<br>Biased<br>Time = 192 hrs. | DC Parameters<br>& functionality | 45 | 0 |
| **Moisture Testing** (Note 2) | | | | |
| HAST | Ta = 130°C<br>RH = 85%<br>Biased<br>Time = 96hrs. | DC Parameters<br>& functionality | 77 | 0 |
| **Mechanical Stress** (Note 2) | | | | |
| Temperature Cycle | -65°C/150°C<br>1000 Cycles<br>Method 1010 | DC Parameters<br>& functionality | 77 | 0 |

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