RELIABILITY REPORT

FOR

MAX3736ETE+

PLASTIC ENCAPSULATED DEVICES

December 16, 2009

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

| **Approved by** |
| --- |
| Ken Wendel |
| Quality Assurance |
| Director, Reliability Engineering |

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**Conclusion**

The MAX3736ETE+ 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 MAX3736 is a compact, +3.3V multirate laser driver for SFP/SFF applications up to 3.2Gbps. The device accepts differential data and provides bias and modulation currents for driving a laser. DC-coupling to the laser allows for multirate applications, and reduces the number of external components. The wide 5mA to 60mA (85mA AC-coupled) modulation current range and 1mA to 100mA bias current make the MAX3736 ideal for driving FP/DFB laser diodes in fiber optic modules. The laser current setting can be controlled by a current DAC, a voltage DAC, or a resistor. Very low power dissipation, small package size, and reduced component count, make this part an ideal solution for SFP-module applications. The MAX3736 is available in dice or in a small 3mm x 3mm, 16-pin thin QFN package. It operates over a -40° to +85° temperature range.

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**II. Manufacturing Information**

| | |
|---|---|
| A. Description/Function: | 3.2Gbps, Low-Power, Compact, SFP Laser Driver |
| B. Process: | G4 |
| C. Number of Device Transistors: | |
| D. Fabrication Location: | Oregon |
| E. Assembly Location: | China, Malaysia, Thailand |
| F. Date of Initial Production: | January 21, 2004 |

**III. Packaging Information**

| | |
|---|---|
| A. Package Type: | 16-pin TQFN 3x3 |
| B. Lead Frame: | Copper |
| C. Lead Finish: | 100% matte Tin |
| D. Die Attach: | Conductive |
| E. Bondwire: | Au (1.3 mil dia.) |
| F. Mold Material: | Epoxy with silica filler |
| G. Assembly Diagram: | #05-9000-0816 |
| 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: | 64°C/W |
| K. Single Layer Theta Jc: | 6.9°C/W |
| L. Multi Layer Theta Ja: | 48°C/W |
| M. Multi Layer Theta Jc: | 6.9°C/W |

**IV. Die Information**

| | |
|---|---|
| A. Dimensions: | 61 X 45 mils |
| B. Passivation: | $Si_3N_4$ |
| C. Interconnect: | Au |
| D. Backside Metallization: | None |
| E. Minimum Metal Width: | 1.2 microns (as drawn) Metal 1, 2 & 3 5.6 microns (as drawn) Metal 4 |
| F. Minimum Metal Spacing: | 1.6 microns (as drawn) Metal 1, 2 & 3, 4.2 microns (as drawn) Metal 4 |
| G. Bondpad Dimensions: | 5 mil. Sq. |
| H. Isolation Dielectric: | $SiO_2$ |
| I. Die Separation Method: | Wafer Saw |

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**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 150°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ($\lambda$) is calculated as follows:

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

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

$\lambda = 23.9 \times 10^{-9}$

$\lambda$ = 23.9 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 G4 Process results in a FIT Rate of 0.02 @ 25C and 0.37 @ 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 HD55 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

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**Table 1**
Reliability Evaluation Test Results

**MAX3736ETE+**

| TEST ITEM | TEST CONDITION | FAILURE IDENTIFICATION | SAMPLE SIZE | NUMBER OF FAILURES |
|---|---|---|---|---|
| **Static Life Test** (Note 1) | | | | |
| | Ta = 150°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

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