

RELIABILITY REPORT
FOR
MAX3795ETG+
PLASTIC ENCAPSULATED DEVICES

February 15, 2011

MAXIM INTEGRATED PRODUCTS

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Approved by
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Quality Assurance
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Conclusion

The MAX3795ETG+ 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 MAX3795 is a high-speed VCSEL driver for small-form-factor (SFF) and small-form-factor pluggable (SFP) fiber optic transmitters. It contains a bias generator, a laser modulator, and comprehensive safety features. The automatic power control (APC) adjusts the laser bias current to maintain average optical power over changes in temperature and laser properties. The driver accommodates common-cathode and differential configurations. The MAX3795 operates up to 4.25Gbps. It can switch up to 15mA of laser modulation current and source up to 15mA of bias current. Adjustable temperature compensation is provided to keep the optical extinction ratio within specifications over the operating temperature range. The MAX3795 interfaces with the Dallas DS1856/DS1859 to meet SFF-8472 timing and diagnostic requirements. The MAX3795 accommodates various VCSEL packages, including low-cost TO-46 headers. The MAX3795 safety circuit detects faults that could cause hazardous light levels and disables the VCSEL output. The safety circuits are compliant with SFF and SFP multisource agreements (MSAs). The MAX3795 is available in a compact 4mm x 4mm, 24-pin thin QFN package and operates over the -40°C to +85°C temperature range. The MAX3795 is pin-for-pin compatible with the MAX3740A and is available in lead-free packages.

II. Manufacturing Information

A. Description/Function:	1Gbps to 4.25Gbps Multirate VCSEL Driver with Diagnostic Monitors
B. Process:	G4
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	China, Thailand
F. Date of Initial Production:	July 24, 2004

III. Packaging Information

A. Package Type:	24-pin TQFN 4x4
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:	#05-9000-2276
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:	48°C/W
K. Single Layer Theta Jc:	2.7°C/W
L. Multi Layer Theta Ja:	36°C/W
M. Multi Layer Theta Jc:	2.7°C/W

IV. Die Information

A. Dimensions:	81 X 81 mils
B. Passivation:	Si ₃ N 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

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 (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 50 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22 \times 10^{-9}$$
$$\lambda = 22 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 G4 Process results in a FIT Rate of 0.02 @ 25C and 0.37 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot NVI0BA015 D/C 0605).

The HD70 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX3795ETG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	50	0	NVI0BA015B, D/C 0605

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