

RELIABILITY REPORT
FOR
MAX3942ETG+
PLASTIC ENCAPSULATED DEVICES

February 6, 2009

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX3942ETG+ 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 MAX3942 is designed to drive high-speed optical modulators at data rates up to 10.7Gbps. It functions as a modulation circuit, with an integrated control op amp externally programmed by a DC voltage. A high-bandwidth, fully differential signal path is internally implemented to minimize jitter accumulation. When a clock signal is available, the integrated data-retiming function can be selected to reject input-signal jitter. The MAX3942 receives differential CML signals (groundreferenced) with on-chip line terminations of 50 . Each of the differential outputs has an on-chip 50 resistor for back termination. The driver is able to deliver a modulation current of 40mAP-P to 120mAP-P, with an edge speed of 23ps (typical 20% to 80%). This modulation current reflects a modulation voltage of 1.0VP-P to 3.0VP-P single ended or 2.0VP-P to 6.0VP-P differential. The MAX3942 also includes an adjustable pulse-width control circuit to precompensate for asymmetrical modulator characteristics. It is available in a compact 4mm x 4mm, 24-pin thin QFN package and operates over the -40°C to +85°C temperature range.

II. Manufacturing Information

A. Description/Function:	10Gbps Modulator Driver
B. Process:	G4
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ASAT China, UTL Thailand
F. Date of Initial Production:	July 25, 2003

III. Packaging Information

A. Package Type:	24-pin TQFN 4x4
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:	#05-9000-0310
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:	99 X 68 mils
B. Passivation:	TEOS Ox-Nit 2-Mask Laser/Pass
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.4 um
F. Minimum Metal Spacing:	0.35um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	Silicon Dioxide
I. Die Separation Method:	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 (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 24.2 \times 10^{-9}$$

$$\lambda = 24.2 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at <http://www.maxim-ic.com/>. Current monitor data for the E35X Process results in a FIT Rate of 0.28 @ 25C and 17.30 @ 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 HT30-1 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 1
Reliability Evaluation Test Results

MAX3942ETG+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
Moisture Testing (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
Mechanical Stress (Note 2) Temperature Cycle	-65°C/150°C 1000 Cycles Method 1010	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data