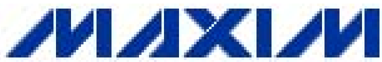

RELIABILITY REPORT

FOR

MAX14950CTO+T

PLASTIC ENCAPSULATED DEVICES

June 14, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Richard Aburano
Quality Assurance
Manager, Reliability Engineering

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Conclusion

The MAX14950CTO+T 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 MAX14950 is a quad equalizer/redriver designed to improve PCI Express® (PCIe) signal integrity by providing programmable input equalization at its receiver and programmable redrive circuitry. The output circuitry reestablishes deemphasis lost on the board and compensates for circuit-board loss. The device permits optimal placement of key PCIe components. The device is useful with stripline, microstrip printed circuits, and balanced 100 cable. The device is tailored for PCIe and features electrical idle and receiver detection on each channel. It is optimized for PCIe Gen III (8.0GT/s) and Gen II (5.0GT/s) data rates, while still handling Gen I (2.5GT/s). The MAX14950 is available in a small, lead-free, 42-pin (3.5mm x 9.0mm) TQFN package for optimal layout and minimal space requirements. The device is specified over the 0°C to +70°C operating temperature range.

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II. Manufacturing Information

A. Description/Function:	Quad PCI Express Equalizer/Redriver
B. Process:	MB3
C. Number of Device Transistors:	36577
D. Fabrication Location:	California
E. Assembly Location:	Taiwan and Thailand
F. Date of Initial Production:	December 22, 2010

III. Packaging Information

A. Package Type:	42-pin TQFN 3.5x9
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:	#05-9000-4200
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:	40°C/W
K. Single Layer Theta Jc:	2°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	2°C/W

IV. Die Information

A. Dimensions:	61.42 X 220.08 mils
B. Passivation:	BCB
C. Interconnect:	Al with top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35µm
F. Minimum Metal Spacing:	0.35µm
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

A. Quality Assurance Contacts: Richard Aburano (Manager, Reliability Engineering)
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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

$\lambda = 22.9 \times 10^{-9}$

λ = 22.9 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 MB3 Process results in a FIT Rate of 0.08 @ 25C and 1.33 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SO9ZBQ001B, D/C 1042)

The AK02 die type has been found to have all pins able to withstand a HBM transient pulse of +/- 2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78.

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Table 1
Reliability Evaluation Test Results

MAX14950CTO+T

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	48	0	SO9ZBQ001B, D/C 1042

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

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