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RELIABILITY REPORT

FOR

MAX3955ETJ+

PLASTIC ENCAPSULATED DEVICES

January 13, 2014

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

Approved by
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Quality Assurance
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Conclusion

The MAX3955ETJ+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

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I. Device Description

A. General

The MAX3955 is an 11.3Gbps, highly-integrated, low power transceiver with dual CDRs, and digital diagnostics monitoring (DDM) designed for next-generation SONET transmission systems. The receiver incorporates a limiting amplifier with loss-of-signal (LOS) circuit. The limiting amplifier features an independent 9.95 to 11.32Gbps CDR. The transmitter incorporates Maxim’s proprietary DC-coupled laser driver interface, an independent 9.95 to 11.32Gbps CDR, and closed-loop control of average laser power. The MAX3955 supports differential AC-coupled signaling with integrated 50Ù terminations at Rx input, Rx output, and Tx input. The Tx output is a DC-coupled 25Ù laser diode interface with dedicated pins for the laser anode (TOUTA) and the laser cathode (TOUTC). An integrated 12-bit analog-to-digital converter (ADC) is utilized to provide digital monitors of internal/external temperature, VCC, and received signal strength indication (RSSI). The MAX3955"s analog monitors and the use of a 2-wire or 3-wire slave interface enables configuration through either a digital-only microcontroller (ìC) or through the DS1978 SFP+ controller (future product). The MAX3955 operates from single +3.3V supply and over a -40°C to +95°C temperature range and is available in a standard 5mm x 5mm, 32-pin TQFN-EP package.

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II. Manufacturing Information

A. Description/Function:	11.3Gbps Transceiver with Dual CDR, Digital Monitors and DC-Coupled Laser Driver
B. Process:	SBC18
C. Number of Device Transistors:	451479
D. Fabrication Location:	USA
E. Assembly Location:	Taiwan, China, Thailand
F. Date of Initial Production:	December 12, 2013

III. Packaging Information

A. Package Type:	32-pin TQFN
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:	#05-9000-5396
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:	47°C/W
K. Single Layer Theta Jc:	1.7°C/W
L. Multi Layer Theta Ja:	29°C/W
M. Multi Layer Theta Jc:	1.7°C/W

IV. Die Information

A. Dimensions:	113.3858 X 101.0236 mils
B. Passivation:	Si_3N_4/SiO_2
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.23 microns (as drawn)
F. Minimum Metal Spacing:	0.23 microns (as drawn)
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: 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:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.7 \times 10^{-9}$

λ = 13.7 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at http://www.maximintegrated.com/qa/reliability/monitor. Cumulative monitor data for the SBC18 Process results in a FIT Rate of 0.04 @ 25°C and 0.69 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot XANY7Q001C, D/C 1330)

The HQ46-0 die type has been found to have all pins able to withstand an HBM transient pulse of +/-2500V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-100mA and overvoltage per JEDEC JESD78.

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Table 1
Reliability Evaluation Test Results

MAX3955ETJ+

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	80	0	XANY7Q001C, D/C 1330

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

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