RELIABILITY REPORT

FOR

MAX3986UTU+

PLASTIC ENCAPSULATED DEVICES

June 19, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX3986UTU+ 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 MAX3986 is a 4-channel low-power linear equalizer optimized for use up to 10.3Gbps that compensates for losses encountered with FR-4 stripline and twin-ax cable. This linear equalizer is intended for use with decision- feedback equalizers (DFEs) integrated into ASICs as well as other applications where increased margin is needed rather than full signal regeneration. DFEs can typically handle 20dB of channel loss at a frequency half the bit rate, assuming the channel is not degraded by reflections and crosstalk. The extended linear range of the MAX3986 preserves the essential signal characteristics needed for optimum DFE performance. The analog equalization of the MAX3986 adds to the effectiveness of the DFE. This increases margin to tolerate environmental and manufacturing variations or to increase the length of the transmission line. The MAX3986 operates from a single 3.3V supply and is housed in a lead-free, 5mm x 7mm TQFN package.

II. Manufacturing Information

A. Description/Function:	1Gbps to 10.3Gbps Linear Equalizer
B. Process:	MB3H
C. Number of Device Transistors:	515
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand
F. Date of Initial Production:	December 22, 2008

III. Packaging Information

A. Package Type:	38-pin TQFN 5x7
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	38°C/W
K. Single Layer Theta Jc:	1.4°C/W
L. Multi Layer Theta Ja:	28°C/W
M. Multi Layer Theta Jc:	1.4°C/W

IV. Die Information

A. Dimensions:	83.1 X 160.3 mils
B. Passivation:	BCB
C. Interconnect:	2 x Aluminum/Cu (Cu = 0.5%), top layer 100% Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.35 um
F. Minimum Metal Spacing:	0.35 um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
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:

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

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

$\lambda = 21.5 \times 10^{-9}$

$\lambda = 21.5$ 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 MB3H Process results in a FIT Rate of 1.84 @ 25C and 22.3 @ 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 HQ23 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCCMax Overvoltage per JESD78.

Table 1
Reliability Evaluation Test Results

MAX3986UTU+

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	50	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