RELIABILITY REPORT

FOR

MAX3518ETP+

PLASTIC ENCAPSULATED DEVICES

December 15, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Reliability Engineer

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Conclusion

The MAX3518ETP+ 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.

Table of Contents

I. Device Description

A. General

The MAX3518 is an integrated CATV upstream amplifier IC designed to meet the DOCSIS 3.0 requirements, while dissipating only 1.25W. The amplifier covers a 5MHz to 85MHz input frequency range (275MHz, 3dB bandwidth), and is capable of transmitting four QPSK modulated carriers, each at +58dBmV, simultaneously within this range. Both input and output ports are differential, requiring that an external balun be used at the output port. The gain is controlled in 1dB steps over a 63dB range using a SPI(tm) 3-wire interface. The MAX3518 operates from a single +5V supply. Four power codes are provided to allow maximum supply current to be reduced as determined by distortion requirements. In addition, for each power code, supply current is automatically reduced as gain is reduced while maintaining distortion performance. For DOCSIS 3.0 applications, the MAX3518 draws 300mA at 33dB gain, dropping to 250mA at 31dB gain. The MAX3518 supply current drops to 5mA between bursts to minimize power dissipation in transmit-disable mode. Control logic levels are 3.3V CMOS. The MAX3518 is available in a 20-pin thin QFN package, and operates over the extended industrial temperature range (-40°C to +85°C).

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II. Manufacturing Information

A. Description/Function:	DOCSIS 3.0 Upstream Amplifier
B. Process:	MB3
C. Number of Device Transistors:	9118
D. Fabrication Location:	California
E. Assembly Location:	Taiwan, Thailand
F. Date of Initial Production:	January 23, 2009

III. Packaging Information

A. Package Type:	20L TQFN 5x5
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:	#05-9000-3499 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	47°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:	59 X 59 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 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)

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

$\lambda = 22.9$ 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 STIXAQ002A D/C 1105)

The WG61-2 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

MAX3518ETP+

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	STIZAQ001C, D/C 0849

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

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