RELIABILITY REPORT

FOR

MAX3558CGI+

PLASTIC ENCAPSULATED DEVICES

February 13, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX3558CGI+ 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 MAX3558 broadband quad-output low-noise amplifier (LNA) is designed for digital set tops and digital terrestrial applications. The LNA covers a 50MHz to 878MHz input frequency range, while integrating a separate automatic gain-control (AGC) function with over 30dB of control range for each of four balanced outputs. Each output has its own shutdown control to reduce power consumption when not used. The MAX3558 also includes a power detector that can be used to close the loop on any of the AGCs to prevent overload conditions. The LNA's attack point is adjustable with an external resistor. The MAX3558 is available in a very small 28-pin QFN package with exposed paddle (EP).

II. Manufacturing Information

A. Description/Function:	Quad-Output LNA with AGC for Cable TV Applications
B. Process:	GST3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ASAT China, UTL Thailand, Unisem Malaysia
F. Date of Initial Production:	October 25, 2003

III. Packaging Information

A. Package Type:	28-pin QFN 5x5
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:	48°C/W
K. Single Layer Theta Jc:	2.3°C/W
L. Multi Layer Theta Ja:	30°C/W
M. Multi Layer Theta Jc:	2.3°C/W

IV. Die Information

A. Dimensions:	94 X 96 mils
B. Passivation:	Si_3N_4 (Silicon nitride)
C. Interconnect:	Gold
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer 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 150°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \text{ x } 4340 \text{ x } 44 \text{ x } 2} \text{ (Chi square value for MTTF upper limit)}$$

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

$\lambda = 10.9 \text{ x } 10^{-9}$

λ = 10.9 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 GST3 Process results in a FIT Rate of 0.21 @ 25C and 3.64 @ 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 WG16 die type has been found to have all pins able to withstand a HBM transient pulse of +/-200 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

MAX3558CGI+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 150°C Biased Time = 192 hrs.	DC Parameters & functionality	44	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