RELIABILITY REPORT

FOR

MAX9710ETP+T

PLASTIC ENCAPSULATED DEVICES

March 1, 2018

MAXIM INTEGRATED

160 RIO ROBLES

SAN JOSE, CA 95134

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Conclusion

The MAX9710ETP+T 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 MAX9710/MAX9711 are stereo/mono 3W bridge-tied load (BTL) audio power amplifiers. These devices are PC99/01 compliant, operate from a single 4.5V to 5.5V supply, and feature an industry-leading 100dB PSRR, which allows these devices to operate from noisy supplies without additional, costly power-supply conditioning. An ultra-low 0.005% THD+N ensures clean, low-distortion amplification of the audio signal while click-and-pop suppression eliminates audible transients on power and shutdown cycles. Power-saving features include low 2mV VOS (minimizing DC current drain through the speakers), low 7mA supply current, and a 0.5µA shutdown mode. A MUTE function allows the outputs to be quickly enabled or disabled. These devices include thermal overload protection, are specified over the extended -40°C to +85°C temperature range and are supplied in thermally efficient packages. The MAX9710 is available in a 20-pin thin QFN package (5mm x 5mm x 0.8mm). The MAX9711 is available in a 12-pin thin QFN package (4mm x 4mm x 0.8mm).

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II. Manufacturing Information

A. Description/Function:	3W Mono/Stereo BTL Audio Power Amplifiers with Shutdown
B. Process:	B8
C. Fabrication Location:	USA
D. Assembly Location:	Taiwan, China, Thailand
E. Date of Initial Production:	April 26, 2003

III. Packaging Information

A. Package Type:	20-pin TQFN 5x5
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Bondwire:	Au (1.3 mil dia.)
E. Mold Material:	Epoxy with silica filler
F. Assembly Diagram:	#05-9000-0199
G. Flammability Rating:	Class UL94-V0
H. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
I. Single Layer Theta Ja:	48°C/W
J. Single Layer Theta Jc:	2.1°C/W
K. Multi Layer Theta Ja:	30°C/W
L. Multi Layer Theta Jc:	2.1°C/W

IV. Die Information

A. Dimensions:	108X99 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Minimum Metal Width:	0.8 microns (as drawn)
E. Minimum Metal Spacing:	0.8 microns (as drawn)
F. Isolation Dielectric:	SiO_2
G. Die Separation Method:	Wafer Saw

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V. Quality Assurance Information

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

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 96 \times 2}$$

(Chi square value for MTTF upper limit)

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

$\lambda = 11.45 \times 10^{-9}$

λ = 11.45 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The AU03 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1500V 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

MAX9710ETP+T

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	96	0	

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

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