RELIABILITY REPORT

FOR

MAX9716EUA+

PLASTIC ENCAPSULATED DEVICES

February 5, 2010

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX9716EUA+ 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 MAX9716/MAX9717 audio power amplifiers are ideal for portable audio devices with internal speakers. A bridge-tied load (BTL) architecture minimizes external component count, while providing high-quality audio reproduction. Both devices deliver 1.4W continuous power into a 4 load with less than 1% Total Harmonic Distortion (THD) while operating from a single +5V supply. With an 8 load, both devices deliver 1W continuous power. These devices also deliver 350mW continuous power into an 8 load while operating from a single +3.0V supply. The devices are available as adjustable gain amplifiers (MAX9716/MAX9717A) or with internally fixed gains of 6dB, 9dB, and 12dB (MAX9717B/MAX9717C/MAX9717D), reducing component count. A low-power shutdown mode disables the bias generator and amplifiers, reducing quiescent current consumption to less than 10nA. These devices feature Maxim's industry-leading, comprehensive click-and-pop suppression that reduces audible clicks and pops during startup and shutdown. The MAX9717 features a headphone sense input (active-low BTL/SE) that senses when a headphone is connected to the device, disables the BTL slave driver, muting the speaker while driving the headphone as a single-ended load. The MAX9716 is pin compatible with the LM4890 and is available in 9-bump UCSP(tm), 8-pin TDFN (3mm x 3mm), and 8-pin µMAX® packages. The MAX9717 is available in 9-bump UCSP, 8-pin TDFN, and 8-pin µMAX packages. Both devices operate over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	Low-Cost, Mono, 1.4W BTL Audio Power Amplifiers
B. Process:	C6Y
C. Number of Device Transistors:	
D. Fabrication Location:	Japan
E. Assembly Location:	Malaysia, Philippines
F. Date of Initial Production:	March 17, 2004

III. Packaging Information

A. Package Type:	8-pin uMAX
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:	#05-9000-0842
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:	97°C/W
K. Single Layer Theta Jc:	4.8°C/W
L. Multi Layer Theta Ja:	77.6°C/W
M. Multi Layer Theta Jc:	4.8°C/W

IV. Die Information

A. Dimensions:	56 X 56 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{MTTF} = \frac{1.83}{192 \times 4340 \times 95 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 11.3 \times 10^{-9}$

λ = 11.3 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 C6Y Process results in a FIT Rate of 0.90 @ 25C and 15.55 @ 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 AU31 die type has been found to have all pins able to withstand a transient pulse of:

HBM: +/-2500 V per JESD22-A114

CDM: +/-750 V per JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1

Reliability Evaluation Test Results

MAX9716EUA+

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	95	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	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