



RELIABILITY REPORT  
FOR  
MAX97236EWA+T  
WAFER LEVEL PRODUCTS

April 20, 2012

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
SUNNYVALE, CA 94086

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## Conclusion

The MAX97236EWA+T 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 MAX97236 is an audio amplifier with volume control and microphone preamplifier intended for use in portable audio systems employing a headphone jack. The audio circuit is powered from a single, dual-mode charge pump, allowing the output signals to be ground referenced, and eliminating the need for large and expensive DC-blocking capacitors. The configuration of a 3.5mm jack is determined by autoconfigure circuitry. The IC's functional blocks are auto-enabled after the configuration of the jack is determined. The audio amplifier is powered from a single 1.8V power supply that reduces overall power consumption. The microphone preamplifier and bias are powered from a separate power-supply input accommodating bias voltages that are greater than 2.4V. The automatic jack detection determines when a 3.5mm plug is inserted into the system jack and determines the configuration of the installed load. The configuration of the load is then reported to the system through the I2C interface. Multiple popular jack and load configurations are detectable with this scheme. The IC detects headsets, headphones, and A/V cables. The headphone amplifier is capable of over 35mW into 16 $\Omega$ . The device is available in a small, 25-bump WLP package with a 0.4mm pitch and is specified over the extended -40C to +85C temperature range.

**II. Manufacturing Information**

A. Description/Function:	Audio Amplifier with Jack Detection
B. Process:	S18
C. Number of Device Transistors:	96306
D. Fabrication Location:	USA
E. Assembly Location:	USA
F. Date of Initial Production:	March 25, 2011

**III. Packaging Information**

A. Package Type:	25-bump WLP 5x5 array
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	None
E. Bondwire:	N/A (N/A mil dia.)
F. Mold Material:	None
G. Assembly Diagram:	#05-9000-4128
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:	°C/W
K. Single Layer Theta Jc:	°C/W
L. Multi Layer Theta Ja:	52°C/W
M. Multi Layer Theta Jc:	°C/W

**IV. Die Information**

A. Dimensions:	96.85 X 89.76 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 2.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.23 / Metal2-3 = 0.28 / Metal 4 = 3.0 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

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

$$\lambda = 22.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S18 Process results in a FIT Rate of 0.06 @ 25C and 1.04 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot SL7ZFA005C, D/C 1106)

The AX33 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.

**Table 1**  
Reliability Evaluation Test Results

**MAX97236EWA+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	SL7ZFA005C, D/C 1106

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