



RELIABILITY REPORT
FOR
MAX9888EWY+T
WAFER LEVEL PRODUCTS

January 31, 2012

MAXIM INTEGRATED PRODUCTS

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Approved by
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Conclusion

The MAX9888EWY+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 MAX9888 is a full-featured audio CODEC whose high performance and low power consumption make it ideal for portable applications. Class D speaker amplifiers provide efficient amplification for two speakers. Low radiated emissions enable completely filterless operation. Integrated bypass switches optionally connect an external amplifier to the transducer when the Class D amplifiers are disabled. DirectDrive® headphone amplifiers provide a true ground-referenced output, eliminating the need for large DC-blocking capacitors. 1.8V headphone operation ensures low power consumption. The device also includes a differential receiver amplifier. Three differential analog microphone inputs are available as well as support for two PDM digital microphones. Integrated switches allow microphone signals to be routed out to external devices. Two flexible single-ended or differential line inputs may be connected to an FM radio or other sources. Integrated FlexSound(tm) technology improves loudspeaker performance by optimizing the signal level and frequency response while limiting the maximum distortion and power at the output to prevent speaker damage. Automatic gain control (AGC) and a noise gate optimize the signal level of microphone input signals to make best use of the ADC dynamic range. The device is fully specified over the -40°C to +85°C extended temperature range.

II. Manufacturing Information

A. Description/Function:	Stereo Audio CODEC with FlexSound Technology
B. Process:	S18
C. Number of Device Transistors:	839717
D. Fabrication Location:	California
E. Assembly Location:	Japan
F. Date of Initial Production:	April 24, 2010

III. Packaging Information

A. Package Type:	63 bmp WLP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	None
E. Bondwire:	N/A
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-3911 / B
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	39°C/W
M. Multi Layer Theta Jc:	N/A

IV. Die Information

A. Dimensions:	149.61X129.92 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.18μm
F. Minimum Metal Spacing:	0.18μm
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO ₂
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

(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 0.40 @ 25C and 6.96 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot SVNZGQ001A D/C N/A)

The AX14 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

MAX9888EWY+T

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	N/A

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