RELIABILITY REPORT

FOR

MAX98089EWY+

WAFER LEVEL PRODUCTS

March 22, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX98089EWY+ 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 MAX98089 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. The IC features a stereo Class H headphone amplifier that utilizes a dual-mode charge pump to maximize efficiency while outputting a ground referenced signal that does not require output coupling capacitors. The IC also features a mono differential amplifier that can also be configured as a stereo line output. Two differential analog microphone inputs are available as well as support for two PDM digital microphones. Integrated switches allow for an additional microphone input as well as 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™ 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:	Low-Power, Stereo Audio Codec with FlexSound Technology
B. Process:	S18
C. Number of Device Transistors:	1011801
D. Fabrication Location:	Taiwan
E. Assembly Location:	Japan
F. Date of Initial Production:	June 9, 2011

III. Packaging Information

A. Package Type:	63-bump WLP 7x9 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:	#05-9000-4290
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:	39°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	149.61 X 129.92 mils
B. Passivation:	Si_3N_4/SiO_2 (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_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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

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

λ = 22.9 F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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

The AX56 die type has been found to have all pins able to withstand a transient pulse of:

ESD-HBM:	+/- 2500V per JEDEC JESD22-A114 (lot VU2ZCQ002A, D/C 1127)
ESD-CDM:	+/- 500V per JEDEC JESD22-C101 (lot VU2ZCQ002A, D/C 1127)
ESD-MM:	+/- 100V per JEDEC JESD22-A115 (lot VU2ZCQ002B, D/C 1127)

Latch-Up testing has shown that this device withstands a current of +/- 250mA and overvoltage per JEDEC JESD78 (lot VR5ZCQ002A, D/C 1114).

Table 1
Reliability Evaluation Test Results

MAX98089EWY+

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	48	0	VU2ZCQ002A, D/C 1127

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