



RELIABILITY REPORT
FOR
MAX98095EWG+T
WAFER LEVEL PRODUCTS

March 15, 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 MAX98095EWG+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

TINI® products deliver unparalleled integration to consumer applications. The portfolio includes complete system-on-chip (SoC) solutions and codecs that integrate multiple functions to achieve advantages in board space. A flagship member of the TINI family, the MAX98095 is a full-featured audio hub with Maxim's™ FlexSound® digital signal processor. This highly integrated device provides three I²S/PCM interfaces and powerful, high-performance amplifiers. The FlexSound DSP offers best-in-class noise suppression, echo cancellation, speaker protection, and ambient-aware algorithms to handle all the audio processing needs of portable devices. So you get the highest integration and audio quality possible. Three differential analog microphone inputs and four 1-bit digital microphone inputs accept audio from main, accessory, and background microphones. Analog line inputs accept four single-ended or two differential audio signals. Three digital audio interfaces support I²S/PCM/TDM audio formats. Three integrated sample rate converters and highly configurable signal routing enable a wide range of use cases. Integrated amplifiers can output signals from three DACs or any of the analog inputs. Amplifiers include a differential receiver amplifier, a stereo Class D speaker amplifier, a stereo Class H headphone amplifier and four single-ended line outputs. The IC is fully specified over the -40°C to +85°C extended temperature.

II. Manufacturing Information

A. Description/Function:	TINI Audio Hub with FlexSound Processor
B. Process:	S18
C. Number of Device Transistors:	4770881
D. Fabrication Location:	Taiwan
E. Assembly Location:	Taiwan
F. Date of Initial Production:	February 21, 2012

III. Packaging Information

A. Package Type:	108-bump WLP 9x12
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:	#05-9000-4472
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:	22°C/W
M. Multi Layer Theta Jc:	°C/W

IV. Die Information

A. Dimensions:	185.04 X 252.36 mils
B. Passivation:	Si ₃ N 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 45 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 24.4 \times 10^{-9}$$

$$\lambda = 24.4 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 V5AZAQ001A, D/C 1143)

The AX48 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 +/- 100mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX98095EWG+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	45	0	V5AZAQ002C, D/C 1143

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