RELIABILITY REPORT

FOR

MAX9788Exx+

PLASTIC ENCAPSULATED DEVICES

July 27, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAXD9788Exx+ 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.

Table of Contents

I. .....Device Description
II. .....Manufacturing Information
III. .....Packaging Information
.....Attachments
V. .....Quality Assurance Information
VI. .....Reliability Evaluation
IV. .....Die Information

I. Device Description

A. General

The MAX9788 features a mono Class G power amplifier with an integrated inverting charge-pump power supply specifically designed to drive the high capacitance of a ceramic loudspeaker. The charge pump can supply greater than 700mA of peak output current at 5.5VDC, guaranteeing an output of 14VP-P. The MAX9788 maximizes battery life by offering high-performance efficiency. Maxim's proprietary Class G output stage provides efficiency levels greater than Class AB devices without the EMI penalties commonly associated with Class D amplifiers. The MAX9788 is ideally suited to deliver the high output-voltage swing required to drive ceramic/piezoelectric speakers. The device utilizes fully differential inputs and outputs, comprehensive click-and-pop suppression, shutdown control, and soft-start circuitry. The MAX9788 is fully specified over the -40°C to +85°C extended temperature range and is available in small lead-free 28-pin TQFN (4mm x 4mm) or 20-bump WLP (2mm x 2.5mm) packages.

II. Manufacturing Information

A. Description/Function:	14V_{P-P}, Class G Ceramic Speaker Driver
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand
F. Date of Initial Production:	December 20, 2006

III. Packaging Information

A. Package Type:	28-pin TQFN 4x4	20-pin WLP 2x2.5
B. Lead Frame:	Copper	NA
C. Lead Finish:	100% matte Tin	SnCuAg Balls
D. Die Attach:	Conductive Epoxy	NA
E. Bondwire:	Gold (1.3 mil dia.)	NA
F. Mold Material:	Epoxy with silica filler	NA
G. Assembly Diagram:	#05-9000-2479	
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1	Level 1
J. Single Layer Theta Ja:	48°C/W	
K. Single Layer Theta Jc:	2.7°C/W	
L. Multi Layer Theta Ja:	35°C/W	
M. Multi Layer Theta Jc:	2.7°C/W	

IV. Die Information

A. Dimensions:	84 X 104 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Al/0.5%Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 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:

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

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

$\lambda = 22.4 \times 10^{-9}$

$\lambda = 22.4$ F.I.T. (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the B8 Process results in a FIT Rate of 1.29 @ 25C and 15.6 @ 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 AU71 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2000 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 ma.

Table 1
Reliability Evaluation Test Results

MAXD9788Exx+

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	48	0
Moisture Testing (Note 2)				
85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	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