

RELIABILITY REPORT
FOR
MAX9724BEBC+
CHIP SCALE PACKAGE

March 23, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX9724BEBC+ 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 MAX9724A/MAX9724B stereo headphone amplifiers are designed for portable equipment where board space is at a premium. These devices use a unique, patented DirectDrive(tm) architecture to produce a ground-referenced output from a single supply, eliminating the need for large DC-blocking capacitors, saving cost, board space, and component height. The MAX9724 suppresses RF radiation received by input and supply traces acting as antennas and prevents the amplifier from demodulating the coupled noise. The MAX9724A offers an externally adjustable gain while the MAX9724B has an internally preset gain of -1.5V/V. The MAX9724A/MAX9724B deliver up to 60mW per channel into a 32 load and have low 0.02% THD+N. An 80dB at 1kHz power-supply rejection ratio (PSRR) allows these devices to operate from noisy digital supplies without an additional linear regulator. Comprehensive click-and-pop circuitry suppresses audible clicks and pops on startup and shutdown. The MAX9724A/MAX9724B operate from a single 2.7V to 5.5V supply, consume only 3.5mA of supply current, feature short-circuit and thermal-overload protection, and are specified over the extended -40°C to +85°C temperature range. The devices are available in tiny 12-bump UCSP(tm) (1.5mm x 2mm) and 12-pin thin QFN (3mm x 3mm x 0.8mm) packages.

II. Manufacturing Information

A. Description/Function:	60mW, DirectDrive, Stereo Headphone Amplifier with Low RF Susceptibility and Shutdown
B. Process:	C6
C. Number of Device Transistors:	992
D. Fabrication Location:	California
E. Assembly Location:	Dallas TX
F. Date of Initial Production:	January 19, 2005

III. Packaging Information

A. Package Type:	12-pin UCSP
B. Lead Frame:	N/A
C. Lead Finish:	N/A
D. Die Attach:	N/A
E. Bondwire:	N/A
F. Mold Material:	N/A
G. Assembly Diagram:	#05-9000-2559
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1

IV. Die Information

A. Dimensions:	80 X 61 mils
B. Passivation:	SiO ₂ /SiN ₃
C. Interconnect:	Al/Cu
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6um
F. Minimum Metal Spacing:	0.6um
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
I. Die Separation Method:	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 f 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)

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

$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 C6Y Process results in a FIT Rate of 1.6 @ 25C and 19.9 @ 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 AU78-1 die type has been found to have all pins able to withstand a HBM transient pulse of per +/- 1500V. Latch-Up testing has shown that this device withstands a current of 250mA.

Table 1
Reliability Evaluation Test Results

MAX9724BEBE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)	Ta = f 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 & 3) Temperature Cycle	-40°C/125°C 1000 Cycles (Note 3)	DC Parameters & functionality	77	0

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

Note 2: Generic Package/Process data

Note 3: Ramp rate 11°C/minute, dwell=15 minutes, One cycle/hour.