

RELIABILITY REPORT
FOR
MAX4335EXT+
(MAX4335-MAX4338)
PLASTIC ENCAPSULATED DEVICES

December 23, 2008

MAXIM INTEGRATED PRODUCTS

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Conclusion

The MAX4335EXT+ 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 MAX4335-MAX4338 op amps deliver 40mW per channel into 32 Ω from ultra-small SC70/SOT23 packages making them ideal for mono/stereo headphone drivers in portable applications. These amplifiers have a 5MHz gain-bandwidth product and are guaranteed to deliver 50mA of output current while operating from a single supply of 2.7V to 5.5V. The MAX4336 and the MAX4338 have a shutdown/mute mode that reduces the supply current to 0.04 μ A per amplifier and places the outputs in a high-impedance state. The MAX4335-MAX4338 have 90dB power-supply rejection ratio (PSRR), eliminating the need for costly preregulation in most audio applications. Both the input voltage range and the output voltage swing include both supply rails, maximizing dynamic range. The MAX4335/MAX4336 single amplifiers are available in ultra-small 6-pin SC70 packages. The MAX4337/MAX4338 dual amplifiers are available in an 8-pin SOT23 and a 10-pin μ MAX[®] package, respectively. All devices are specified from -40°C to +85°C.

II. Manufacturing Information

A. Description/Function:	SC70/SOT23-8, 50mA I _{OUT} , Rail-to-Rail I/O Op Amps with Shutdown/Mute
B. Process:	B6
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Carsem Malaysia, UTL Thailand
F. Date of Initial Production:	July 28, 2001

III. Packaging Information

A. Package Type:	6-pin SC70
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Non Conductive Epoxy
E. Bondwire:	Au (1.0 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#
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:	326°C/W
K. Single Layer Theta Jc:	115°C/W

IV. Die Information

A. Dimensions:	32 X 31 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	0.6 microns (as drawn)
F. Minimum Metal Spacing:	0.6 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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 159 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.8 \times 10^{-9}$$

$\lambda = 6.8 \text{ F.I.T. (60\% confidence level @ 25°C)}$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 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 OX61-1 die type has been found to have all pins able to withstand a HBM transient pulse of <400 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX4335EXT+

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	159	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