



RELIABILITY REPORT  
FOR  
MAX4253EBC+T  
CHIP SCALE PACKAGE

December 8, 2011

**MAXIM INTEGRATED PRODUCTS**

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<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX4253EBC+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.

## Table of Contents

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

### I. Device Description

#### A. General

The MAX4249-MAX4257 low-noise, low-distortion operational amplifiers offer rail-to-rail outputs and single-supply operation down to 2.4V. They draw 400 $\mu$ A of quiescent supply current per amplifier while featuring ultra-low distortion (0.0002% THD), as well as low input voltage-noise density (7.9nV per root-Hz ) and low input current-noise density (0.5fA per root-Hz). These features make the devices an ideal choice for portable/battery-powered applications that require low distortion and/or low noise. For additional power conservation, the MAX4249/MAX4251/MAX4253/MAX4256 offer a low-power shutdown mode that reduces supply current to 0.5 $\mu$ A and puts the amplifiers' outputs into a high-impedance state. The MAX4249-MAX4257's outputs swing rail-to-rail and their input common-mode voltage range includes ground. The MAX4250-MAX4254 are unity-gain stable with a gain-bandwidth product of 3MHz. The MAX4249/MAX4255/MAX4256/MAX4257 are internally compensated for gains of 10V/V or greater with a gain-bandwidth product of 22MHz. The single MAX4250/MAX4255 are available in space-saving 5-pin SOT23 packages. The MAX4252 is available in an 8-bump chip-scale package (UCSP(tm)) and the MAX4253 is available in a 10-bump UCSP. The MAX4250AAUK comes in a 5-pin SOT23 package and is specified for operation over the automotive (-40°C to +125°C) temperature range.

## II. Manufacturing Information

A. Description/Function:	UCSP, Single-Supply, Low-Noise, Low-Distortion, Rail-to-Rail Op Amps
B. Process:	B12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Texas
F. Date of Initial Production:	July 28, 2001

## III. Packaging Information

A. Package Type:	3x4 array 12L UCSP (B)
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:	#05-2501-0187 B
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	N/A
K. Single Layer Theta Jc:	N/A
L. Multi Layer Theta Ja:	178.3
M. Multi Layer Theta Jc:	N/A

## IV. Die Information

A. Dimensions:	63 X 83 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 microns (as drawn)
G. Bondpad Dimensions:	
H. Isolation Dielectric:	SiO <sub>2</sub>
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) 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 B12 Process results in a FIT Rate of 0.06 @ 25C and 1.06 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot I450AQ001C D/C 0123)

The OX81 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250mA.

**Table 1**  
Reliability Evaluation Test Results

**MAX4253EBC+T**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	45	0	I450AQ001C, D/C 0123

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