RELIABILITY REPORT

FOR

MAX4209HAUA+

PLASTIC ENCAPSULATED DEVICES

May 23, 2011

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
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Conclusion

The MAX4209HAUA+ 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 MAX4208/MAX4209 ultra-low offset and drift instrumentation amplifiers feature exceptional precision specifications, low power consumption, rail-to-rail output, excellent gain-bandwidth product, and buffered REFIN/MODE input in a very small µMAX® package. These devices use a spread-spectrum, autozeroing technique that constantly measures and corrects the input offset, eliminating drift over time and temperature and the effect of 1/f noise. This technique achieves less than 20µV offset voltage, allows ground-sensing capability, provides ultra-low CMOS input bias current and increased common-mode rejection performance. The MAX4208/MAX4209 provide high-impedance inputs optimized for small-signal differential voltages (±100mV). All devices provide a gain-bandwidth product of 750kHz. The MAX4208 provides an adjustable gain with two external resistors or unity gain with FB connected to OUT. The MAX4209 is available with a fixed gain of 100V/V with ±0.03% (typ) accuracy. Both devices include a reference input (REF) to level-shift the output, allowing for bipolar signals in single-supply applications. In both devices, REFIN/MODE is an input to a precision unity-gain buffer, which sets the REF voltage to level-shift the output. The internal REF buffer allows the reference to be set by a simple resistive divider or an ADC reference without any loading error. The MAX4208/MAX4209 operate with a 2.85V to 5.5V single-supply voltage and consume only 750µA of quiescent current (when the internal buffer is off) and only 1.4µA in shutdown mode. These amplifiers also operate with ±2.5V dual supplies with REF connected to ground and REFIN/MODE to VSS. The MAX4208/MAX4209 are available in space-saving 8-pin µMAX packages and are specified over the automotive operating temperature range (-40°C to +125°C).

MAX4208MAX42092008 Product of the Year Award Winner from the EN-Genius Network

Most Innovative Instrumentation Amplifier

II. Manufacturing Information

A. Description/Function:	Ultra-Low Offset/Drift, Precision Instrumentation Amplifiers with REF Buffer
B. Process:	B6
C. Number of Device Transistors:	
D. Fabrication Location:	California
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	July 28, 2007

III. Packaging Information

A. Package Type:	8-pin uMAX
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-1404
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:	221°C/W
K. Single Layer Theta Jc:	42°C/W
L. Multi Layer Theta Ja:	206.3°C/W
M. Multi Layer Theta Jc:	42°C/W

IV. Die Information

A. Dimensions:	63 X 88 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al with Ti/TiN Barrier
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:	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 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)

$\lambda = 22.9 \times 10^{-9}$

$\lambda = 22.9$ F.I.T. (60% confidence level @ 25°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 B6 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 SVX2DA012F D/C 0728)

The OY15-2 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 +/-250mA.

Table 1
Reliability Evaluation Test Results

MAX4209HAUA+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)					
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0	SVX2DA012F, D/C 0728

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