RELIABILITY REPORT

FOR

MAX2034CTM+

PLASTIC ENCAPSULATED DEVICES

January 7, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
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Quality Assurance
Director, Reliability Engineering

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Conclusion

The MAX2034CTM+ 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 MAX2034 four-channel, low-power, ultra-low-noise preamplifier is designed for ultrasound and medical instrumentation applications. Each low-noise amplifier has a single-ended input, differential output, a highly accurate 19dB fixed gain, and a wide -3dB bandwidth of 70MHz. The high-gain accuracy of the amplifier allows for exceptional channel-to-channel gain matching, which is necessary for high-performance ultrasound-imaging applications. The MAX2034 also includes an on-chip programmable input impedance feature that allows the device to be compatible with a variety of common source impedances ranging from 50 to 1k . The input impedance of each amplifier uses a feedback topology for active impedance matching. The active input impedance matching feature achieves an exceptionally low 2.2dB noise figure with a source and input impedance of 200 . The MAX2034 has excellent dynamic and linearity performance characteristics optimized for all ultrasound-imaging modalities including second harmonic 2D imaging and continuous wave Doppler. The device achieves a second harmonic distortion of -68dBc at VOUT = 1VP-P and fIN = 5MHz, and an ultrasound-specific* two-tone third-order intermodulation distortion performance of -55dBc at VOUT = 1VP-P and fIN = 5MHz. The MAX2034 is also optimized for quick overload recovery for operation under the large input signal conditions typically found in ultrasound input-buffer imaging applications. The MAX2034 is available in a 48-pin thin QFN package with an exposed paddle. Electrical performance is guaranteed over a 0°C to +70°C temperature range.

MAX2034MAX2035MAX2037EEPW AnalogMixed-Signal IC Technical Innovation Award Winner 2006

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II. Manufacturing Information

A. Description/Function:	Quad-Channel, Ultra-Low-Noise Amplifier with Digitally Programmable Input Impedance
B. Process:	CB4
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ATK Korea
F. Date of Initial Production:	April 21, 2006

III. Packaging Information

A. Package Type:	48-pin TQFN 7x7
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1.3 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-2011
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:	36°C/W
K. Single Layer Theta Jc:	0.8°C/W
L. Multi Layer Theta Ja:	25°C/W
M. Multi Layer Theta Jc:	0.8°C/W

IV. Die Information

A. Dimensions:	149 X 107 mils
B. Passivation:	Si_3N_4 (Silicon nitride)
C. Interconnect:	Gold
D. Backside Metallization:	None
E. Minimum Metal Width:	Metal1 = 0.5 / Metal2 = 0.6 / Metal3 = 0.6 microns (as drawn)
F. Minimum Metal Spacing:	Metal1 = 0.45 / Metal2 = 0.5 / Metal3 = 0.6 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO_2
I. Die Separation Method:	Wafer Saw

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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 150°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)

$\lambda = 9.98 \times 10^{-9}$

$\lambda = 9.98$ 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 CB4 Process results in a FIT Rate of 0.14 @ 25C and 2.42 @ 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 CR25 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114-D. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

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Table 1
Reliability Evaluation Test Results

MAX2034CTM+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 150°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

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