RELIABILITY REPORT

FOR

MAX414ESD+T
(MAX410/MAX412/MAX414)

PLASTIC ENCAPSULATED DEVICES

January 14, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

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Conclusion

The MAX414ESD+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.

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I. Device Description

A. General

The MAX410/MAX412/MAX414 single/dual/quad op amps set a new standard for noise performance in high-speed, low-voltage systems. Input voltage-noise density is guaranteed to be less than 2.4nV per root-Hz at 1kHz. A unique design not only combines low noise with ±5V operation, but also consumes 2.5mA supply current per amplifier. Low-voltage operation is guaranteed with an output voltage swing of 7.3VP-P into 2k from ±5V supplies. The MAX410/MAX412/MAX414 also operate from supply voltages between ±2.4V and ±5V for greater supply flexibility. Unity-gain stability, 28MHz bandwidth, and 4.5V/µs slew rate ensure low-noise performance in a wide variety of wideband and measurement applications. The MAX410/MAX412/MAX414 are available in DIP and SO packages in the industry-standard single/dual/quad op amp pin configurations. The single comes in an ultra-small TDFN package (3mm x 3mm).

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II. Manufacturing Information

A. Description/Function:	Single/Dual/Quad, 28MHz, Low-Noise, Low-Voltage, Precision Op Amps
B. Process:	CB20
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	ATP Philippines
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	14-pin SOIC (N)
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#31-4775
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:	120°C/W
K. Single Layer Theta Jc:	37°C/W

IV. Die Information

A. Dimensions:	65 x 102 mils
B. Passivation:	Si_3N_4 (Silicon nitride)
C. Interconnect:	Gold
D. Backside Metallization:	None
E. Minimum Metal Width:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 80 \times 2}$$ (Chi square value for MTTF upper limit)

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

$\lambda = 13.4 \times 10^{-9}$

λ = 13.4 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 CB20 Process results in a FIT Rate of 0.14 @ 25C and 2.14 @ 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 OY10 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

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Table 1
Reliability Evaluation Test Results

MAX414ESD+T

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	80	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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