RELIABILITY REPORT

FOR

MAX4094ASD+

PLASTIC ENCAPSULATED DEVICES

January 27, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.

SUNNYVALE, CA 94086

Approved by
Sokhom Chum
Quality Assurance
Reliability Engineer

Conclusion

The MAX4094ASD+ 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

A. General

The single MAX4091, dual MAX4092, and quad MAX4094 operational amplifiers combine excellent DC accuracy with rail-to-rail operation at the input and output. Since the common-mode voltage extends from VCC to VEE, the devices can operate from either a single supply (2.7V to 6V) or split supplies (±1.35V to ±3V). Each op amp requires less than 130µA of supply current. Even with this low current, the op amps are capable of driving a 1k load, and the input-referred voltage noise is only 12nV/ Hz. In addition, these op amps can drive loads in excess of 2000pF. The precision performance of the MAX4091/MAX4092/MAX4094 combined with their wide input and output dynamic range, low-voltage, single-supply operation, and very low supply current, make them an ideal choice for battery-operated equipment, industrial, and data acquisition and control applications. In addition, the MAX4091 is available in space-saving 5-pin SOT23, 8-pin µMAX®, and 8-pin SO packages. The MAX4092 is available in 8-pin µMAX and SO packages, and the MAX4094 is available in 14-pin TSSOP and 14-pin SO packages.

II. Manufacturing Information

A. Description/Function:	Single/Dual/Quad, Micropower, Single-Supply, Rail-to-Rail Op Amps
B. Process:	CB20
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Thailand
F. Date of Initial Production:	January 26, 2002

III. Packaging Information

A. Package Type:	150 mil 14L SOIC
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:	#05-2501-0142 / 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:	120°C/W
K. Single Layer Theta Jc:	37°C/W
L. Multi Layer Theta Ja:	84°C/W
M. Multi Layer Theta Jc:	34°C/W

IV. Die Information

A. Dimensions:	69 X 100 mils
B. Passivation:	Si_3N_4 (Silicon nitride)
C. Interconnect:	Au
D. Backside Metallization:	None
E. Minimum Metal Width:	2 microns (as drawn)
F. Minimum Metal Spacing:	2 microns (as drawn)
G. Bondpad Dimensions:	
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 biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

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

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

$\lambda = 13.7 \times 10^{-9}$

$\lambda = 13.7$ 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 CB20 Process results in a FIT Rate of 0.14 @ 25C and 2.48 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot N380BQ001D D/C 0145)

The OX56 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500V 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

MAX4094ASD+

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	80	0	N380BQ001C, D/C 0145

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