

RELIABILITY REPORT
FOR
MAX9915EXT+T
PLASTIC ENCAPSULATED DEVICES

January 26, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Conclusion

The MAX9915EXT+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 single MAX9914/MAX9915 and dual MAX9916/MAX9917 operational amplifiers feature maximized ratio of gain bandwidth to supply current and are ideal for battery-powered applications such as portable instrumentation, portable medical equipment, and wireless handsets. These CMOS op amps feature an ultra-low 1pA input bias current, rail-to-rail inputs and outputs, low 20 μ A supply current, and operate from a single 1.8V to 5.5V supply. For additional power conservation, the MAX9915/MAX9917 feature a low-power shutdown mode that reduces supply current to 1nA, and puts the amplifier outputs in a high-impedance state. These devices are unity-gain stable with a 1MHz gain-bandwidth product. The MAX9914 and MAX9915 are available in 5-pin and 6-pin SC70 packages, respectively. The MAX9916 is available in an 8-pin SOT23 package, and the MAX9917 in a 10-pin μ MAX $\text{\textcircled{R}}$ package. All devices are specified over the -40 $^{\circ}$ C to +85 $^{\circ}$ C extended operating temperature range.

II. Manufacturing Information

A. Description/Function:	1MHz, 20 μ A, Rail-to-Rail I/O Op Amps with Shutdown
B. Process:	B6
C. Number of Device Transistors:	180
D. Fabrication Location:	California
E. Assembly Location:	Malaysia and Thailand
F. Date of Initial Production:	October 23, 2004

III. Packaging Information

A. Package Type:	6-pin SC70
B. Lead Frame:	Alloy 42 or Copper
C. Lead Finish:	NiPdAu
D. Die Attach:	Non Conductive Epoxy
E. Bondwire:	Au (.001" mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-9000-0884
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:	326°C/W
K. Single Layer Theta Jc:	115°C/W
L. Multi Layer Theta Ja:	326.5°C/W
M. Multi Layer Theta Jc:	115°C/W

IV. Die Information

A. Dimensions:	30 X 30 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
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:	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:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 50 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 21.99 \times 10^{-9}$$

$$\lambda = 21.99 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 B6 Process results in a FIT Rate of 0.8 @ 25C and 14.2 @ 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 OY16-1 die type has been found to have all pins able to withstand a HBM transient pulse of 2000V 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

MAX9915EXT+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	50	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