

RELIABILITY REPORT  
FOR  
MAX997ESA+  
PLASTIC ENCAPSULATED DEVICES

August 13, 2015

**MAXIM INTEGRATED**

160 RIO ROBLES  
SAN JOSE, CA 95134

<b>Approved by</b>
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Quality Assurance
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## Conclusion

The MAX997ESA+ successfully meets the quality and reliability standards required of all Maxim Integrated products. In addition, Maxim Integrated's continuous reliability monitoring program ensures that all outgoing product will continue to meet Maxim Integrated's quality and reliability standards.

## Table of Contents

<b>I. ....Device Description</b>	<b>IV. ....Die Information</b>
<b>II. ....Manufacturing Information</b>	<b>V. ....Quality Assurance Information</b>
<b>III. ....Packaging Information</b>	<b>VI. ....Reliability Evaluation</b>
<b>.....Attachments</b>	

### I. Device Description

#### A. General

The MAX961-MAX964/MAX997/MAX999 are low-power, ultra-high-speed comparators with internal hysteresis. These devices are optimized for single +3V or +5V operation. The input common-mode range extends 100mV Beyond-the-Rails(tm), and the outputs can sink or source 4mA to within 0.52V of GND and VCC. Propagation delay is 4.5ns (5mV overdrive), while supply current is 5mA per comparator. The MAX961/MAX963/MAX964 and MAX997 have a shutdown mode in which they consume only 270µA supply current per comparator. The MAX961/MAX963 provide complementary outputs and a latch-enable feature. Latch enable allows the user to hold a valid comparator output. The MAX999 is available in a tiny SOT23-5 package. The single MAX961/MAX997 and dual MAX962 are available in space-saving 8-pin µMAX® packages.

## II. Manufacturing Information

A. Description/Function:	Single/Dual/Quad, Ultra-High-Speed, +3V/+5V, Beyond-the-Rails Comparators
B. Process:	CB2
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Philippines, Thailand
F. Date of Initial Production:	January 24, 1998

## III. Packaging Information

A. Package Type:	8-pin SOIC (N)
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:	#05-1501-0145
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:	170°C/W
K. Single Layer Theta Jc:	40°C/W
L. Multi Layer Theta Ja:	136°C/W
M. Multi Layer Theta Jc:	38°C/W

## IV. Die Information

A. Dimensions:	57X33 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> (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 <sub>2</sub>
I. Die Separation Method:	Wafer Saw

## V. Quality Assurance Information

- A. Quality Assurance Contacts: 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 150C biased (static) life test are shown in Table 1. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{1048 \times 9706 \times 77 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

(where 9706 = Temperature Acceleration factor assuming an activation energy of 0.8eV)

$$\lambda = 1.17 \times 10^{-9}$$

$$\lambda = 1.17 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim Integrated's reliability monitor program. Maxim Integrated performs quarterly life test monitors on its processes. This data is published in the Reliability Report found at <http://www.maximintegrated.com/qa/reliability/monitor>. Cumulative monitor data for the CB2 Process results in a FIT Rate of 0.06 @ 25C and 0.95 @ 55C (0.8 eV, 60% UCL)

### B. E.S.D. and Latch-Up Testing (lot N65BBA005E, D/C 0108)

The CM40-1 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

**MAX997ESA+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
<b>Static Life Test</b> (Note 1)	Ta = 150°C Biased Time = 1048 hrs.	DC Parameters & functionality	77	0	NL5BBA034B, D/C 0626

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