



RELIABILITY REPORT  
FOR  
MAX9062EUK+  
PLASTIC ENCAPSULATED DEVICES

November 3, 2009

**MAXIM INTEGRATED PRODUCTS**

120 SAN GABRIEL DR.  
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<b>Approved by</b>
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## Conclusion

The MAX9062EUK+ 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 MAX9060-MAX9064 are small single comparators, ideal for a wide variety of portable electronics applications such as cell phones, media players, and notebooks that have extremely tight board space and power constraints. These comparators are offered in both, a miniature 4-bump UCSP(tm) package with a 1mm x 1mm footprint (as small as two 0402 resistors), and a 5-pin SOT23 package. The MAX9060-MAX9064 feature an input voltage range of -0.3V to +5.5V independent of supply voltage. These devices maintain high impedance at the inputs even when powered down ( $V_{CC}$  or  $V_{REF} = 0V$ ). They also feature internal filtering to provide high RF immunity. The MAX9060 and MAX9061 feature a patent-pending architecture. Both have open-drain outputs and draw quiescent supply current from a user-supplied reference voltage,  $V_{REF}$ , between 0.9V and 5.5V. These devices consume only 100nA (max) supply current and operate over the extended -40°C to +85°C temperature range. The MAX9062, MAX9063 and MAX9064 are single comparators with an internal 0.2V reference. These devices feature either a push-pull or an open-drain output. They consume only 700nA (max) supply current. The MAX9062, MAX9063, and MAX9064 operate down to  $V_{CC} = 1V$  over the extended -40°C to +85°C temperature range.

**II. Manufacturing Information**

A. Description/Function:	Ultra-Small, Low-Power Single Comparators in 4-Bump UCSP and 5-SOT23
B. Process:	B8
C. Number of Device Transistors:	202
D. Fabrication Location:	California or Texas
E. Assembly Location:	Malaysia, Thailand, China
F. Date of Initial Production:	4/26/2008

**III. Packaging Information**

A. Package Type:	5-pin SOT23
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:	#05-9000-3169
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:	324.3°C/W
K. Single Layer Theta Jc:	82°C/W

**IV. Die Information**

A. Dimensions:	41 X 41 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 48 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 22.4 \times 10^{-9}$$

$$\lambda = 22.4 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly 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 B8 Process results in a FIT Rate of 0.06 @ 25C and 0.99 @ 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 CM92-2 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250 mA, 1.5x VCC Overvoltage per JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX9062EUK+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	48	0
<b>Moisture Testing</b> (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (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