

RELIABILITY REPORT
FOR
MAX989EUA+
PLASTIC ENCAPSULATED DEVICES

June 14, 2012

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
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Approved by
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Conclusion

The MAX989EUA+ 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 MAX985/MAX986/MAX989/MAX990/MAX993/MAX994 single/dual/quad micropower comparators feature low-voltage operation and rail-to-rail inputs and outputs. Their operating voltages range from 2.5V to 5.5V, making them ideal for both 3V and 5V systems. These comparators also operate with $\pm 1.25V$ to $\pm 2.75V$ dual supplies. They consume only $11\mu A$ of supply current while achieving a 300ns propagation delay. Input bias current is typically $1.0pA$, and input offset voltage is typically $0.5mV$. Internal hysteresis ensures clean output switching, even with slow-moving input signals. The output stage's unique design limits supply-current surges while switching, virtually eliminating the supply glitches typical of many other comparators. The MAX985/MAX989/MAX993 have a push-pull output stage that sinks as well as sources current. Large internal output drivers allow rail-to-rail output swing with loads up to 8mA. The MAX986/MAX990/MAX994 have an open-drain output stage that can be pulled beyond V_{CC} to 6V (max) above V_{EE} . These open-drain versions are ideal for level translators and bipolar to single-ended converters. The single MAX985 is available in a chip-scale package (UCSP™), significantly reducing the required PC board area. The single MAX985/MAX986 are available in 5-pin SC70 packages and the dual MAX989/MAX990 are available in 8-pin SOT23 packages.

II. Manufacturing Information

A. Description/Function:	Micropower, Low-Voltage, UCSP/SC70, Rail-to-Rail I/O Comparators
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	July 26, 1997

III. Packaging Information

A. Package Type:	3x3 mm 8L UMAX
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:	#05-1501-0204 / A
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	1
J. Single Layer Theta Ja:	221°C/W
K. Single Layer Theta Jc:	42°C/W
L. Multi Layer Theta Ja:	206.3°C/W
M. Multi Layer Theta Jc:	42°C/W

IV. Die Information

A. Dimensions:	67 X 24 mils
B. Passivation:	Si ₃ N ₄ /SiO ₂ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Al/0.5%Cu with Ti/TiN Barrier
D. Backside Metallization:	None
E. Minimum Metal Width:	1.2 microns (as drawn)
F. Minimum Metal Spacing:	1.2 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:

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

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

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

$$\lambda = 13.7 \text{ F.I.T. (60\% confidence level @ 25}^\circ\text{C)}$$

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 S12 Process results in a FIT Rate of 0.17 @ 25C and 3.00 @ 55C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing (lot I7ZAAQ001A D/C 0020)

The CM62 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

MAX989EUA+

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	I17ZBAQ001C, D/C 0020

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