

RELIABILITY REPORT
FOR
MAX924ESE+
PLASTIC ENCAPSULATED DEVICES

February 3, 2014

MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

Approved by
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Conclusion

The MAX924ESE+ 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.

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I. Device Description

A. General

The MAX921-MAX924 single, dual, and quad micropower, low-voltage comparators feature the lowest power consumption available. These comparators draw less than 4 μ A supply current over temperature (MAX921/MAX922), and include an internal 1.182V \pm 1% voltage reference, programmable hysteresis, and TTL/CMOS outputs that sink and source current. Ideal for 3V or 5V single-supply applications, the MAX921-MAX924 operate from a single +2.5V to +11V supply (or a \pm 1.25V to \pm 5V dual supply), and each comparator's input voltage range swings from the negative supply rail to within 1.3V of the positive supply. The MAX921-MAX924's unique output stage continuously sources as much as 40mA. And by eliminating power-supply glitches that commonly occur when comparators change logic states, the MAX921-MAX924 minimize parasitic feedback, which makes them easier to use. The single MAX921 and dual MAX923 provide a unique and simple method for adding hysteresis without feedback and complicated equations, simply by using the HYST pin and two resistors.

II. Manufacturing Information

A. Description/Function:	Ultra Low-Power, Single/Dual-Supply Comparators
B. Process:	S3
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Malaysia, Thailand, Philippines
F. Date of Initial Production:	Pre 1997

III. Packaging Information

A. Package Type:	16-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:	#05-1501-0107
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:	115°C/W
K. Single Layer Theta Jc:	32°C/W
L. Multi Layer Theta Ja:	75°C/W
M. Multi Layer Theta Jc:	24°C/W

IV. Die Information

A. Dimensions:	70X110 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:	3.0 microns (as drawn)
F. Minimum Metal Spacing:	3.0 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: 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 135C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 160 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.9 \times 10^{-9}$$

$$\lambda = 6.9 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S3 Process results in a FIT Rate of 0.03 @ 25C and 0.5 @ 55C (0.8 eV, 60% UCL).

B. E.S.D. and Latch-Up Testing (lot NNYABX001A, D/C 9707)

The CM31 die type has been found to have all pins able to withstand a HBM transient pulse of +/-1000V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-100mA.

Table 1
Reliability Evaluation Test Results

MAX924ESE+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES	COMMENTS
Static Life Test (Note 1)	Ta = 135°C	DC Parameters	80	0	XNYBAQ001A, D/C 9622
	Biased	& functionality	80	0	XNYBAQ001A, D/C 9621
	Time = 192 hrs.				

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