

RELIABILITY REPORT
FOR
MAX6339_UT+T
PLASTIC ENCAPSULATED DEVICES

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MAXIM INTEGRATED

160 RIO ROBLES
SAN JOSE, CA 95134

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Conclusion

The MAX6339_UT+T 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 MAX6339 is a precision quad voltage monitor with microprocessor (μP) supervisory reset timing. The device can monitor up to four system supply voltages without any external components and asserts a single reset if any supply voltage drops below its preset threshold. The device significantly reduces system size and component count while improving reliability compared to separate ICs or discrete components. A variety of factory-trimmed threshold voltages are available to accommodate different supply voltages and tolerances with minimal external component requirements. The selection includes internally fixed options for monitoring +5.0V, +3.3V, +3.0V, +2.5V, +1.8V, and -5.0V supplies with -5% and/or -10% tolerances. The device is also available with one or two user-adjustable threshold options if non-standard thresholds are desired (use external resistor-divider network). The quad monitor provides a single active-low reset output that is asserted when any monitored input is below its associated threshold. The output is open drain with a weak internal pullup ($10\mu\text{A}$) to IN2. Reset remains low for a reset timeout period (140ms min) after all voltages are above the selected thresholds. The output is valid as long as either the IN1 or IN2 input voltage remains $> 1\text{V}$. The MAX6339 is available in a small 6-pin SOT23 package and operates over the extended (-40°C to $+85^{\circ}\text{C}$) temperature range.

II. Manufacturing Information

A. Description/Function:	Quad Voltage μ P Supervisory Circuit in SOT Package
B. Process:	S12
C. Fabrication Location:	USA
D. Assembly Location:	Thailand
E. Date of Initial Production:	July 22, 2000

III. Packaging Information

A. Package Type:	6-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	NiPdAu
D. Die Attach:	Non-conductive
E. Bondwire:	Au (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1601-0120
H. Flammability Rating:	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard J-STD-020-C	Level 1
J. Single Layer Theta Jb:	115°C/W
K. Single Layer Theta Jc:	80°C/W
L. Multi Layer Theta Ja:	74.6°C/W
M. Multi Layer Theta Jc:	6°C/W

IV. Die Information

A. Dimensions:	42 X 61 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: 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 135°C biased (static) life test are shown in Table 1. Using these results, the Failure Rate (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 222 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 5.0 \times 10^{-9}$$

$$\lambda = 5.0 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 S12 Process results in a FIT Rate of 0.03 @ 25°C and 0.5 @ 55°C (0.8 eV, 60% UCL)

B. E.S.D. and Latch-Up Testing

The MS47 die type has been found to have all pins able to withstand an HBM transient pulse of +/-1000V per JEDEC JESD22-A114. Latch-Up testing has shown that this device withstands a current of +/-250mA and overvoltage per JEDEC JESD78.

Table 1
Reliability Evaluation Test Results

MAX6339_UT+T

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	222	0	

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