



RELIABILITY REPORT
FOR
MAX6323AUT46+
PLASTIC ENCAPSULATED DEVICES

October 8, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR.
SUNNYVALE, CA 94086

Approved by
Ken Wendel
Quality Assurance
Director, Reliability Engineering

Conclusion

The MAX6323AUT46+ 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 MAX6323/MAX6324 microprocessor (μ P) supervisory circuits monitor power supplies and μ P activity in digital systems. A watchdog timer looks for activity outside an expected window of operation. Six laser-trimmed reset thresholds are available with $\pm 2.5\%$ accuracy from +2.32V to +4.63V. Valid active-low RESET output is guaranteed down to $V_{CC} = +1.2V$. The active-low RESET output is either push-pull (MAX6323) or open-drain (MAX6324). active-low RESET is asserted low when V_{CC} falls below the reset threshold, or when the manual reset input (active-low MR) is asserted low. active-low RESET remains asserted for at least 100ms after V_{CC} rises above the reset threshold and active-low MR is deasserted. The watchdog pulse output (active-low WDPO) utilizes an open-drain configuration. It can be triggered either by a fast timeout fault (watchdog input pulses are too close to each other) or a slow timeout fault (no watchdog input pulse is observed within the timeout period). The watchdog timeout is measured from the last falling edge of watchdog input (WDI) with a minimum pulse width of 300ns. Active-low WDPO is asserted for 1ms when a fault is observed. Eight laser-trimmed timeout periods are available. The MAX6323/MAX6324 are offered in a 6-pin SOT23 package and operate over the extended temperature range ($-40^{\circ}C$ to $+125^{\circ}C$).

II. Manufacturing Information

A. Description/Function:	µP Supervisory Circuits with Windowed (Min/Max) Watchdog and Manual Reset
B. Process:	B8
C. Number of Device Transistors:	
D. Fabrication Location:	California or Texas
E. Assembly Location:	Malaysia, Thailand
F. Date of Initial Production:	January 22, 2001

III. Packaging Information

A. Package Type:	6-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1601-0091
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

IV. Die Information

A. Dimensions:	57 X 35 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:	0.8 microns (as drawn)
F. Minimum Metal Spacing:	0.8 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO ₂
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 (λ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 240 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 4.48 \times 10^{-9}$$

$$\lambda = 4.48 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

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 MS38 die type has been found to have all pins able to withstand a HBM transient pulse of +/-2500 V per Mil-Std 883 Method 3015.7. Latch-Up testing has shown that this device withstands a current of +/-250 mA.

Table 1
Reliability Evaluation Test Results

MAX6323AUT46+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
Static Life Test (Note 1)				
	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	240	0
Moisture Testing (Note 2)				
HAST	Ta = 130°C RH = 85% Biased Time = 96hrs.	DC Parameters & functionality	77	0
Mechanical Stress (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