

RELIABILITY REPORT FOR MAX6446+

PLASTIC ENCAPSULATED DEVICES

May 21, 2009

MAXIM INTEGRATED PRODUCTS

120 SAN GABRIEL DR. SUNNYVALE, CA 94086

Approved by
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Conclusion

The MAX6446+ 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 MAX6443-MAX6452 low-current microprocessor reset circuits feature single or dual manual reset inputs with an extended 6.72s setup period. Because of the extended setup period, short switch closures (nuisance resets) are ignored. On all devices, the reset output asserts when any of the monitored supply voltages drops below its specified threshold. The reset output remains asserted for the reset timeout period (210ms typ) after all monitored supplies exceed their reset thresholds. The reset output is one-shot pulse asserted for the reset timeout period (140ms min) when selected manual reset input(s) are held low for an extended setup timeout period of 6.72s. These devices ignore manual reset transitions of less than 6.72s (typ). The MAX6443-MAX6448 are single fixed-voltage µP supervisors. The MAX6443/MAX6444 have a single extended manual reset input. The MAX6445/MAX6446 have two extended manual reset inputs. The MAX6447/ MAX6448 have one extended and one immediate manual reset input. The MAX6449-MAX6452 have one fixed-threshold µP supervisor and one adjustable-threshold µP supervisor. The MAX6449/MAX6450 have two delayed manual reset inputs. The MAX6452 have one delayed and one immediate manual reset input. The MAX6443-MAX6452 have one fixed-threshold µP supervisor and one adjustable-threshold µP supervisor. The MAX6443-MAX6450 have two delayed manual reset inputs. The MAX6452 have one delayed and one immediate manual reset input. The MAX6443-MAX6452 have an active-low RESET with push-pull or open-drain output logic options. These devices, offered in small SOT packages, are fully guaranteed over the extended temperature range (-40°C to +85°C).



II. Manufacturing Information

µP Reset Circuits with Long Manual Reset Setup Period

Carsem Malaysia, UTL Thailand, Unisem Malaysia, ISPL Philippines

- A. Description/Function:
- B. Process:
- C. Number of Device Transistors:
- D. Fabrication Location:
- E. Assembly Location:
- F. Date of Initial Production:

III. Packaging Information

A. Package Type:	5-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:	#05-1601-0197
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:	31 X 44 mils
B. Passivation:	Si_3N_4/SiO_2 (Silicon nitride/ Silicon dioxide
C. Interconnect:	Aluminum/0.5% Cu
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

B8

Oregon

October 25, 2002



V. Quality Assurance Information

Α.	Quality Assurance Contacts:	Ken Wendel (Director, Reliability Engineering) Bryan Preeshl (Managing Director of QA)
В.	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:

 $\lambda = \frac{1}{\text{MTF}} = \frac{1.83}{192 \times 4340 \times 141 \times 2}$ (Chi square value for MTTF upper limit) (where 4340 = Temperature Acceleration factor assuming an activation energy of 0.8eV) $\lambda = 7.6 \times 10^{-9}$ $\lambda = 7.6 \text{ F.I.T.}$ (60% confidence level @ 25°C)

The following failure rate represents data collected from Maxim's reliability monitor program. Maxim performs quarterly

1000 hour life test monitors on its processes. This data is published in the Product Reliability Report found at http://www.maxim-ic.com/. Current monitor data for the B8 Process results in a FIT Rate of 1.29 @ 25C and 15.6 @ 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 MS76-1 die type has been found to have all pins able to withstand a HBM transient pulse of +/-600 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

MAX6446+

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES			
Static Life Test (Note 1)							
	Ta = 135°C	DC Parameters	141	0			
	Biased	& functionality					
	Time = 192 hrs.						
Moisture Testing (Note 2)							
85/85	Ta = 85°C	DC Parameters	77	0			
	RH = 85%	& functionality					
	Biased						
	Time = 1000hrs.						
Mechanical Stress (Note 2)							
Temperature	-65°C/150°C	DC Parameters	77	0			
Cycle	1000 Cycles	& functionality					
	Method 1010						

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

Note 2: Generic Package/Process data