

RELIABILITY REPORT  
FOR  
MAX6328UR27+  
(MAX6326/MAX6327/MAX6328/MAX6346/MAX6347/MAX634)  
PLASTIC ENCAPSULATED DEVICES

December 17, 2008

**MAXIM INTEGRATED PRODUCTS**

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## Conclusion

The MAX6328UR27+ 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 MAX6326/MAX6327/MAX6328/MAX6346/MAX6347/MAX6348 microprocessor ( $\mu$ P) supervisory circuits monitor the power supplies in  $\mu$ P and digital systems. These devices provide excellent circuit reliability and low cost by eliminating external components and adjustments when used with 2.5V, 3V, 3.3V, and 5V powered circuits. These circuits perform a single function: they assert a reset signal whenever the VCC supply voltage declines below a preset threshold, keeping it asserted for at least 100ms after VCC has risen above the reset threshold. The only difference between the devices is their output. The MAX6326/MAX6346 (push-pull) and MAX6328/MAX6348 (open-drain) have an active-low reset output. The MAX6327/MAX6347 have an active-high push-pull reset output. All of these parts are guaranteed to be in the correct state for VCC down to 1V. The reset comparator is designed to ignore fast transients on VCC. Reset thresholds are factory-trimmable between 2.2V and 4.63V, in approximately 100mV increments. Twenty-one standard versions are available. Contact the factory for availability of nonstandard versions. Ultra-low supply currents (1 $\mu$ A max for the MAX6326/MAX6327/MAX6328) make these parts ideal for use in portable equipment. All six devices are available in space-saving SOT23 and SC70 packages.

## II. Manufacturing Information

A. Description/Function:	3-Pin, Ultra-Low-Power SC70/SOT $\mu$ P Reset Circuits
B. Process:	S12
C. Number of Device Transistors:	
D. Fabrication Location:	Oregon
E. Assembly Location:	Carsem Malaysia, UTL Thailand
F. Date of Initial Production:	October 25, 1997

## III. Packaging Information

A. Package Type:	3-pin SOT23
B. Lead Frame:	Copper
C. Lead Finish:	100% matte Tin
D. Die Attach:	Non-conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler
G. Assembly Diagram:	#05-1601-0043
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:	250°C/W
K. Single Layer Theta Jc:	130°C/W

## IV. Die Information

A. Dimensions:	44 X 31 mils
B. Passivation:	$\text{Si}_3\text{N}_4/\text{SiO}_2$ (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
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:	5 mil. Sq.
H. Isolation Dielectric:	$\text{SiO}_2$
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 pending. Using these results, the Failure Rate ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{1.83}{192 \times 4340 \times 179 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

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

$$\lambda = 6.0 \times 10^{-9}$$

$\lambda = 6.0$  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 B12 Process results in a FIT Rate of 3.13 @ 25C and 54.16 @ 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 MS17-2 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

**MAX6328UR27+**

TEST ITEM	TEST CONDITION	FAILURE IDENTIFICATION	SAMPLE SIZE	NUMBER OF FAILURES
<b>Static Life Test</b> (Note 1)	Ta = 135°C Biased Time = 192 hrs.	DC Parameters & functionality	179	0
<b>Moisture Testing</b> (Note 2) 85/85	Ta = 85°C RH = 85% Biased Time = 1000hrs.	DC Parameters & functionality	77	0
<b>Mechanical Stress</b> (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