

RELIABILITY REPORT  
FOR  
**MAX809LExR**  
PLASTIC ENCAPSULATED DEVICES

February 9, 2009

**MAXIM INTEGRATED PRODUCTS**

**120 SAN GABRIEL  
DR.**

**SUNNYVALE, CA 9408**

<b>Approved by</b>
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## Conclusion

The MAX809L 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 MAX809L is a microprocessor ( $\mu\text{P}$ ) supervisory circuit used to monitor the power supplies in  $\mu\text{P}$  and digital systems. This device provides excellent circuit reliability and low cost by eliminating external components and adjustments when used with +5V, +3.3V, +3.0V, or +2.5V-powered circuits.

This circuit performs a single function: It asserts a reset signal whenever the  $V_{\text{CC}}$  supply voltage declines below a preset threshold, keeping it asserted for at least 140ms after  $V_{\text{CC}}$  has risen above the reset threshold. The MAX809L has a push/pull, active-low /RESET output. The reset comparator is designed to ignore fast transients on  $V_{\text{CC}}$ , and the output is guaranteed to be in the correct state for  $V_{\text{CC}}$  down to 1V. Reset thresholds suitable for operation with a variety of supply voltages are available.

Low supply current makes the MAX809L ideal for use in portable equipment.

#### B. Absolute Maximum Ratings

<u>Item</u>	<u>Rating</u>
Terminal Voltage (with respect to GND)	
$V_{\text{CC}}$	-0.3V to +6.0V
/RESET (push-pull)	-0.3V to ( $V_{\text{CC}} + 0.3\text{V}$ )
Input Current, $V_{\text{CC}}$	20mA
Output Current, /RESET	20mA
Rate of Rise, $V_{\text{CC}}$	100V/ $\mu\text{s}$
Storage Temp.	-65°C to +150°C
Lead Temp. (10 sec.)	+300°C
Continuous Power Dissipation ( $T_{\text{A}} = +70^\circ\text{C}$ )	
3 Lead SC70	174mW
3 Lead SOT23	320mW
Derates above +70°C	
3 Lead SC70	2.17mW/°C
3 Lead SOT23	4.00mW/°C

## II. Manufacturing Information

A. Description/Function:	3-Pin Microprocessor Reset Circuit
B. Process:	S3 (SG3) - Standard 3 micron silicon gate CMOS
C. Number of Device Transistors:	275
D. Fabrication Location:	Oregon, USA
E. Assembly Location:	Malaysia or Thailand
F. Date of Initial Production:	December, 1994

## III. Packaging Information

A. Package Type:	<b>3 Lead SOT-23</b>	<b>3-Lead SC70</b>
B. Lead Frame:	Alloy 42	Alloy 42
C. Lead Finish:	Solder Plate	Solder Plate
D. Die Attach:	Silver-filled Epoxy	Non-Conductive Epoxy
E. Bondwire:	Gold (1 mil dia.)	Gold (1 mil dia.)
F. Mold Material:	Epoxy with silica filler	Epoxy with silica filler
G. Assembly Diagram:	# 05-1701-0199	# 05-1601-0080
H. Flammability Rating:	Class UL94-V0	Class UL94-V0
I. Classification of Moisture Sensitivity per JEDEC standard JESD22-A112:	Level 1	Level 1

## IV. Die Information

A. Dimensions:	44 x 31 mils
B. Passivation:	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub> (Silicon nitride/ Silicon dioxide)
C. Interconnect:	Aluminum/Si (Si = 1%)
D. Backside Metallization:	None
E. Minimum Metal Width:	3 microns (as drawn)
F. Minimum Metal Spacing:	3 microns (as drawn)
G. Bondpad Dimensions:	5 mil. Sq.
H. Isolation Dielectric:	SiO <sub>2</sub>
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 ( $\lambda$ ) is calculated as follows:

$$\lambda = \frac{1}{\text{MTTF}} = \frac{4.04}{192 \times 4389 \times 544 \times 2} \quad (\text{Chi square value for MTTF upper limit})$$

▲  
Temperature Acceleration factor assuming an activation energy of 0.8eV

$$\lambda = 4.41 \times 10^{-9}$$

$$\lambda = 4.41 \text{ F.I.T. (60\% confidence level @ 25°C)}$$

This low failure rate represents data collected from Maxim's reliability qualification and monitor programs. Maxim also performs weekly Burn-In on samples from production to assure reliability of its processes. The reliability required for lots which receive a burn-in qualification is 59 F.I.T. at a 60% confidence level, which equates to 3 failures in an 80 piece sample. Maxim performs failure analysis on rejects from lots exceeding this level. The attached Burn-In Schematic (Spec. # 06-5071) shows the static circuit used for this test. Maxim also performs 1000 hour life test monitors quarterly for each process. This data is published in the Product Reliability Report (RR-1M).

### B. Moisture Resistance Tests

Maxim evaluates pressure pot stress from every assembly process during qualification of each new design. Pressure Pot testing must pass a 20% LTPD for acceptance. Additionally, industry standard 85°C/85%RH or HAST tests are performed quarterly per device/package family.

### C. E.S.D. and Latch-Up Testing

The PW54 die type has been found to have all pins able to withstand a transient pulse of

ESD HBM: +/-3000V per Mil- Std-883 Method 3015

ESD CDM: +/-750V Per JESD22-C101

Latch-Up testing has shown that this device withstands a current of +/-250mA, 1.5x VCCMax Overvoltage per JESD78.

**Table 1**  
Reliability Evaluation Test Results

**MAX809LExR**

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	544	1
<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	DC Parameters (generic test vehicle) Method 1010	77	0

Note 1: Life Test Data may represent plastic D.I.P. qualification lots. Note 2:  
Generic Process/Package Dat