

# MAX809, MAX810

## 3-Pin Microprocessor Reset Monitors

The MAX809 and MAX810 are cost-effective system supervisor circuits designed to monitor  $V_{CC}$  in digital systems and provide a reset signal to the host processor when necessary. No external components are required.

The reset output is driven active within 20  $\mu$ sec of  $V_{CC}$  falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after  $V_{CC}$  rises above the reset threshold. The MAX810 has an active-high  $\overline{\text{RESET}}$  output while the MAX809 has an active-low  $\overline{\text{RESET}}$  output. The output of the MAX809 is guaranteed valid down to  $V_{CC} = 1V$ . Both devices are available in a SOT-23 package.

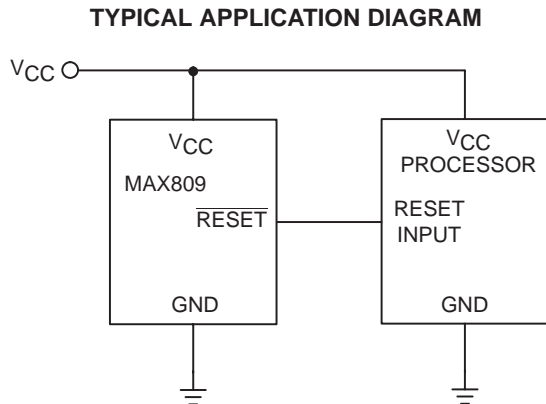
The MAX809/810 are optimized to reject fast transient glitches on the  $V_{CC}$  line. Low supply current of 17 $\mu$ A ( $V_{CC} = 3.3V$ ) makes these devices suitable for battery powered applications.

### Features

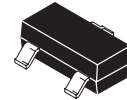
- Precision  $V_{CC}$  Monitor for 3.0V, 3.3V, and 5.0V Supplies
- 140msec Guaranteed Minimum  $\overline{\text{RESET}}$ ,  $\overline{\text{RESET}}$  Output Duration
- $\overline{\text{RESET}}$  Output Guaranteed to  $V_{CC} = 1.0V$  (MAX809)
- Low 17 $\mu$ A Supply Current
- $V_{CC}$  Transient Immunity
- Small SOT-23 Package
- No External Components
- Wide Operating Temperature:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$

### Typical Applications

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical  $\mu$ P Power Supply Monitoring

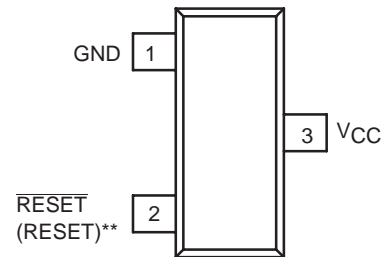


**ON Semiconductor**  
Formerly a Division of Motorola  
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**SOT-23  
(TO-236)  
CASE 318**

### PIN CONFIGURATION (Top View)



**SOT-23\***

NOTE: \*SOT-23 is equivalent to JEDEC (TO-236)  
\*\* RESET is for MAX809  
\*\* RESET is for MAX810

### ORDERING INFORMATION

Device	Package	Shipping
MAX809xTR	SOT-23	3000 Tape/Reel
MAX810xTR	SOT-23	3000 Tape/Reel

NOTE: The "x" denotes a suffix for  $V_{CC}$  threshold – see table below

Suffix	Reset $V_{CC}$ Threshold (V)
L	4.63
M	4.38
J*	4.00
T	3.08
S	2.93
R	2.63

NOTE: \*J version is available for MAX809 only

## MAX809, MAX810

### ABSOLUTE MAXIMUM RATINGS\*

Symbol	Parameter	Value	Unit
	Supply Voltage ( $V_{CC}$ to GND)	6.0	V
	RESET, RESET	-0.3 to ( $V_{CC} + 0.3$ )	V
	Input Current, $V_{CC}$	20	mA
	Output Current, RESET, RESET	20	mA
	dV/dt ( $V_{CC}$ )	100	V/ $\mu$ sec
$P_D$	Power Dissipation ( $T_A \leq 70^\circ\text{C}$ ) SOT-23 (derate 4mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$ )	230	mW
$T_A$	Operating Temperature Range	-40 to +85	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-65 to +150	$^\circ\text{C}$
$T_{sol}$	Lead Temperature (Soldering, 10 Seconds)	+260	$^\circ\text{C}$

\* Maximum Ratings are those values beyond which damage to the device may occur.

## MAX809, MAX810

**ELECTRICAL CHARACTERISTICS** ( $V_{CC}$  = Full Range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  unless otherwise noted. typical values are at  $T_A$  =  $+25^{\circ}\text{C}$ ,  $V_{CC}$  = 5V for L/M/J, 3.3V for T/S, 3.0V for R) (Note NO TAG)

Symbol	Characteristic	Min	Typ	Max	Unit
	$V_{CC}$ Range $T_A = 0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	1.0 1.2	— —	5.5 5.5	V
$I_{CC}$	Supply Current MAX8xxL/M/J: $V_{CC} < 5.5\text{V}$ MAX8xxR/S/T: $V_{CC} < 3.6\text{V}$	— —	24 17	60 50	$\mu\text{A}$
$V_{TH}$	Reset Threshold (Note NO TAG) MAX8xxL: $T_A = 25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ MAX8xxM: $T_A = 25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ MAX809J: $T_A = 25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ MAX8xxT: $T_A = 25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ MAX8xxS: $T_A = 25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ MAX8xxR: $T_A = 25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$	4.56 4.50 4.31 4.25 3.93 3.89 3.04 3.00 2.89 2.85 2.59 2.55	4.63 — 4.38 — 4.00 — 3.08 — 2.93 — 2.63 —	4.70 4.75 4.45 4.50 4.06 4.10 3.11 3.15 2.96 3.00 2.66 2.70	V
	Reset Threshold Temperature Coefficient	—	30	—	ppm/ $^{\circ}\text{C}$
	$V_{CC}$ to Reset Delay $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{mV})$	—	20	—	$\mu\text{sec}$
	Reset Active Timeout Period	140	240	560	msec
$V_{OL}$	RESET Output Voltage Low (MAX809) MAX809R/S/T: $V_{CC} = V_{TH}$ min, $I_{SINK} = 1.2\text{mA}$ MAX809L/M/J: $V_{CC} = V_{TH}$ min, $I_{SINK} = 3.2\text{mA}$ $V_{CC} > 1.0\text{V}$ , $I_{SINK} = 50\mu\text{A}$	— — —	— — —	0.3 0.4 0.3	V
$V_{OH}$	RESET Output Voltage High (MAX809) MAX809R/S/T: $V_{CC} > V_{TH}$ max, $I_{SOURCE} = 500\mu\text{A}$ MAX809L/M/J: $V_{CC} > V_{TH}$ max, $I_{SOURCE} = 800\mu\text{A}$	$0.8 V_{CC}$ $V_{CC} - 1.5$	— —	— —	V
$V_{OL}$	RESET Output Voltage Low (MAX810) MAX810R/S/T: $V_{CC} = V_{TH}$ max, $I_{SINK} = 1.2\text{mA}$ MAX810L/M/J: $V_{CC} = V_{TH}$ max, $I_{SINK} = 3.2\text{mA}$	— —	— —	0.3 0.4	V
$V_{OH}$	RESET Output Voltage High (MAX810) $1.8 < V_{CC} < V_{TH}$ min, $I_{SOURCE} = 150\mu\text{A}$	$0.8 V_{CC}$	—	—	V

1. Production testing done at  $T_A = 25^{\circ}\text{C}$ , over temperature limits guaranteed by design.

### PIN DESCRIPTION

Pin No.	Symbol	Description
1	GND	Ground
2	RESET (MAX809)	RESET output remains low while $V_{CC}$ is below the reset voltage threshold, and for 240msec (typ.) after $V_{CC}$ rises above reset threshold
2	RESET (MAX810)	RESET output remains high while $V_{CC}$ is below the reset voltage threshold, and for 240msec (typ.) after $V_{CC}$ rises above reset threshold
3	$V_{CC}$	Supply Voltage (typ.)

APPLICATIONS INFORMATION

V<sub>CC</sub> Transient Rejection

The MAX809/810 provides accurate V<sub>CC</sub> monitoring and reset timing during power-up, power-down, and brownout/sag conditions, and rejects negative-going transients (glitches) on the power supply line. Figure 1 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive which lies **under** the curve will **not** generate a reset signal. Combinations above the curve are detected as a brownout or power-down. Transient immunity can be improved by adding a capacitor in close proximity to the V<sub>CC</sub> pin of the MAX809/810.

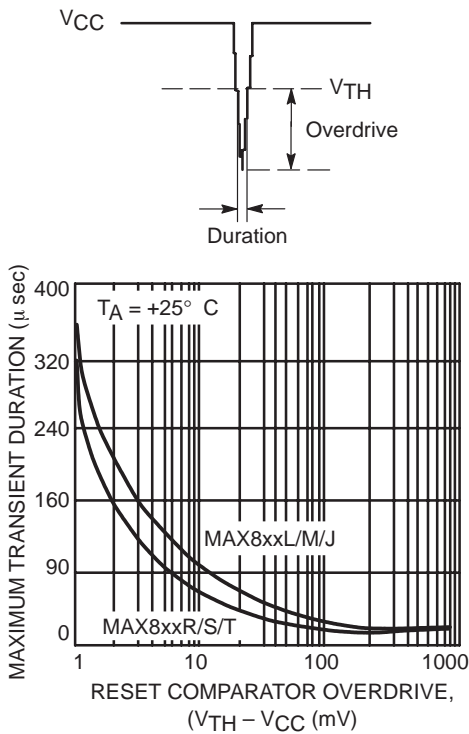


Figure 1. Maximum Transient Duration vs. Overdrive for Glitch Rejection at 25° C

RESET Signal Integrity During Power-Down

The MAX809 RESET output is valid to V<sub>CC</sub> = 1.0V. Below this voltage the output becomes an "open circuit" and does not sink current. This means CMOS logic inputs to the µP will be floating at an undetermined voltage. Most digital systems are completely shutdown well above this voltage. However, in situations where RESET must be maintained valid to V<sub>CC</sub> = 0V, a pull-down resistor must be connected from RESET to ground to discharge stray capacitances and

hold the output low (Figure 2). This resistor value, though not critical, should be chosen such that it does not appreciably load RESET under normal operation (100kΩ will be suitable for most applications). Similarly, a pull-up resistor to V<sub>CC</sub> is required for the MAX810 to ensure a valid high RESET for V<sub>CC</sub> below 1.0V.

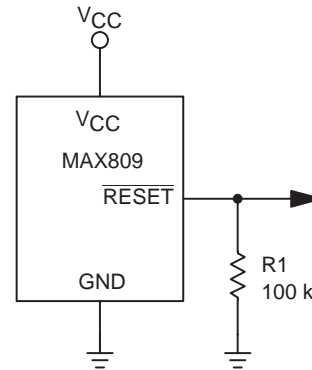


Figure 2. Ensuring RESET Valid to V<sub>CC</sub> = 0 V

Processors With Bidirectional I/O Pins

Some µP's (such as Motorola 68HC11) have bi-directional reset pins. Depending on the current drive capability of the processor pin, an indeterminate logic level may result if there is a logic conflict. This can be avoided by adding a 4.7kΩ resistor in series with the output of the MAX809/810 (Figure 3). If there are other components in the system which require a reset signal, they should be buffered so as not to load the reset line. If the other components are required to follow the reset I/O of the µP, the buffer should be connected as shown with the solid line.

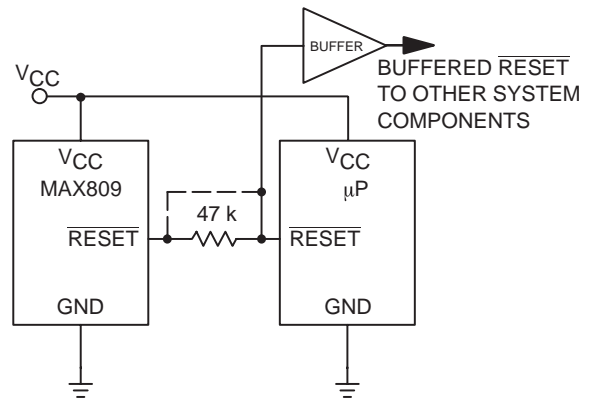


Figure 3. Interfacing to Bidirectional Reset I/O

# MAX809, MAX810

## TYPICAL CHARACTERISTICS

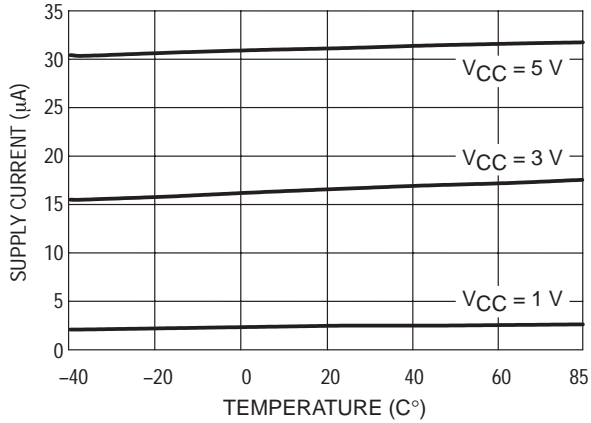


Figure 4. Supply Current vs Temperature (No Load, MAX8xxR/S/T)

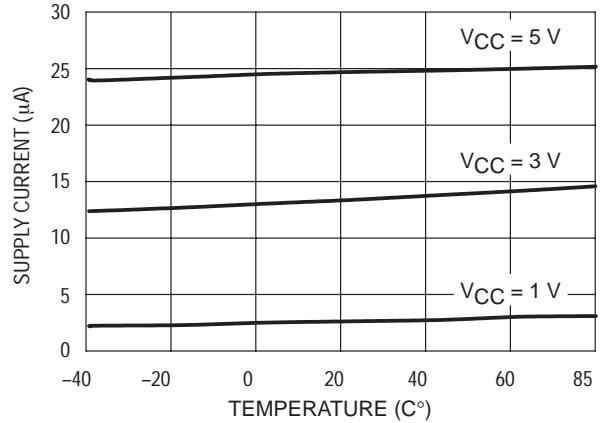


Figure 5. Supply Current vs Temperature (No Load, MAX8xxL/M/J)

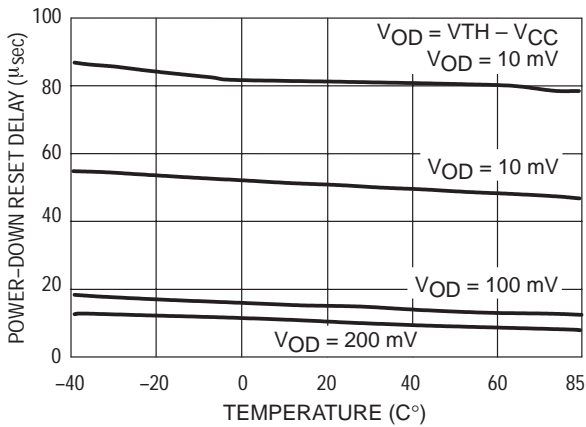


Figure 6. Power-Down Reset Delay vs Temperature and Overdrive (MAX8xxR/S/T)

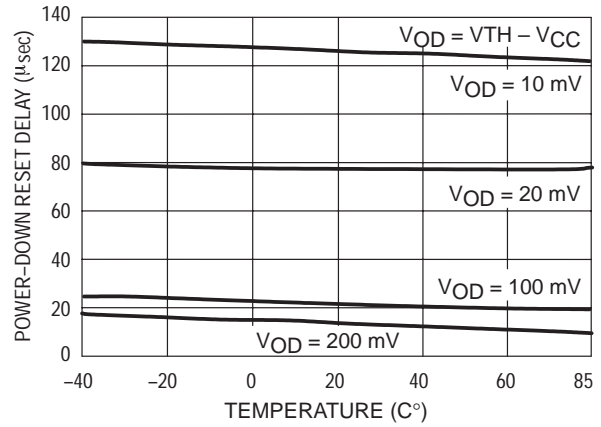


Figure 7. Power-Down Reset Delay vs Temperature and Overdrive (MAX8xxL/M/J)

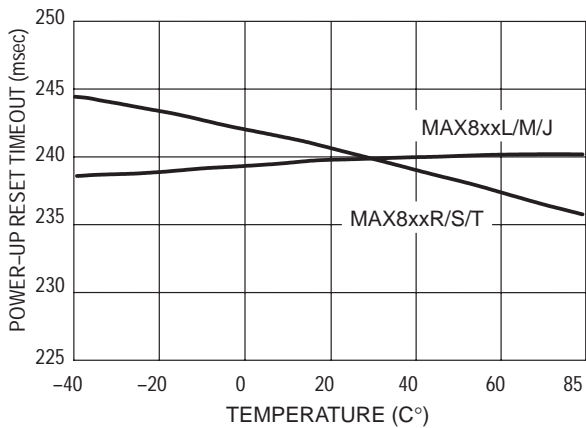


Figure 8. Power-Up Reset Timeout vs Temperature

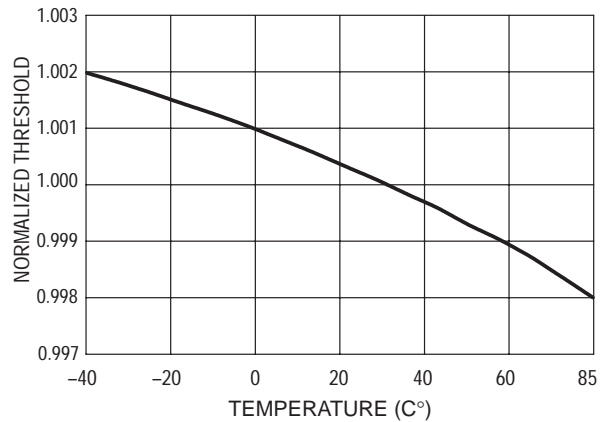
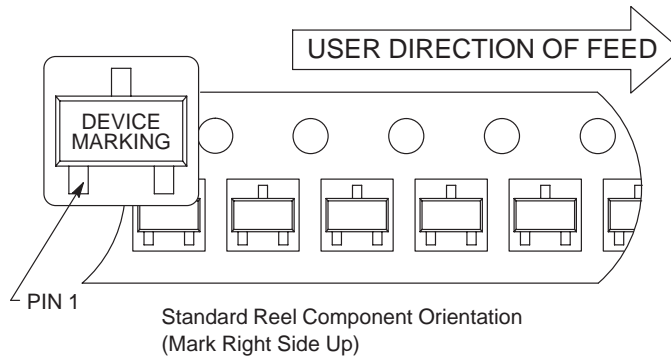


Figure 9. Normalized Reset Threshold vs Temperature

# MAX809, MAX810

## TAPING FORM

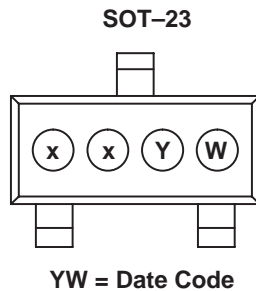
### Component Taping Orientation for 3L SOT-23 (JEDEC-236) Devices



Tape & Reel Specifications Table

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-23	8 mm	4 mm	3000	7 inches

## MARKING DIAGRAM



## MARKING

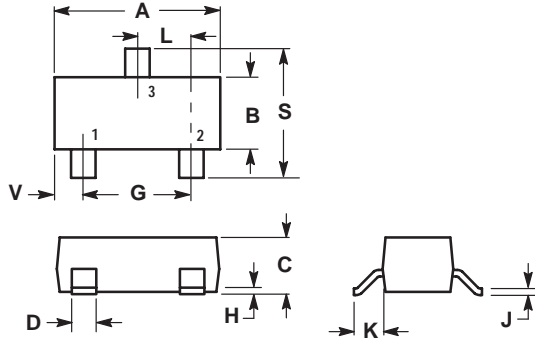
ON Semiconductor Part #	Reset Threshold or Address	Marking
MAX809L	4.63	J1YW
MAX809M	4.38	J2YW
MAX809T	3.08	J3YW
MAX809S	2.93	J4YW
MAX809R	2.63	J5YW
MAX809J	4.00	J6YW
MAX810L	4.63	K1YW
MAX810M	4.38	K2YW
MAX810T	3.08	K3YW
MAX810S	2.93	K4YW
MAX810R	2.63	K5YW

YW = Date code

# MAX809, MAX810

## PACKAGE DIMENSIONS

**SOT-23**  
 PLASTIC PACKAGE (TO-236)  
 CASE 318-08  
 ISSUE AF



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

# MAX809, MAX810

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