

## 3-Pin Microcontroller Power Supply Supervisor

The IMP809/IMP810 are 3.0V, 3.3V and 5.0V power supply supervisor circuits optimized for low-power microprocessor ( $\mu\text{P}$ ), microcontroller ( $\mu\text{C}$ ) and digital systems. The IMP809/810 are improved drop-in replacements for the Maxim MAX809/810 and feature 60% lower supply current.

A reset signal is issued if the power supply voltage drops below a preset reset threshold and is asserted for at least 140ms after the supply has risen above the reset threshold. The IMP809 has an active-low  $\overline{\text{RESET}}$  output that is guaranteed to be in the correct state for  $V_{\text{CC}}$  down to 1.1V. The IMP810 has an active-high RESET output. The reset comparator is designed to ignore fast transients on  $V_{\text{CC}}$ .

Low supply current makes the IMP809/IMP810 ideal for use in portable and battery operated equipment. The IMP809/IMP810 are available in a compact 3-pin SOT23 package.

Six voltage thresholds are available to support 3V to 5V systems:

Reset Threshold	
Suffix	Voltage (V)
L	4.63
M	4.38
J	4.00
T	3.08
S	2.93
R	2.63

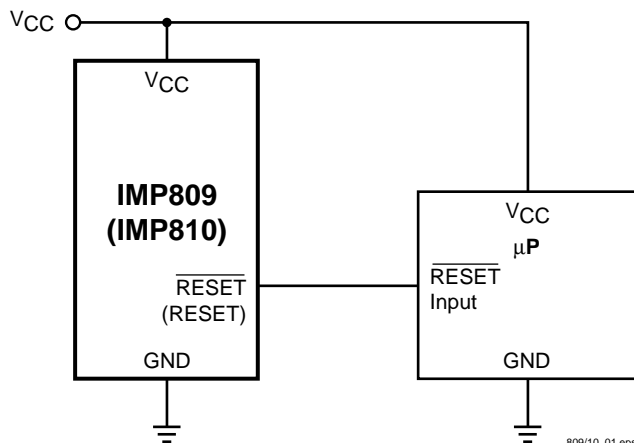
### Key Features

- ◆ Improved Maxim MAX809/MAX810 replacement
  - Lower supply current...6 $\mu\text{A}$
  - 80% lower maximum supply current
- ◆ Monitor 5V, 3.3V and 3V supplies
- ◆ 140ms min. reset pulse width
- ◆ Active-low reset valid with 1.1V supply (IMP809)
- ◆ Small 3-pin SOT-23 package
- ◆ No external components
- ◆ Specified over full temperature range
  - $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$

### Applications

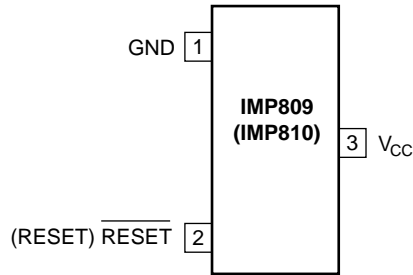
- ◆ Embedded controllers
- ◆ Battery operated systems
- ◆ Intelligent instruments
- ◆ Wireless communication systems
- ◆ PDAs and handheld equipment

### Block Diagrams



## Pin Configuration

SOT23



809/10\_02.eps

## Ordering Information

Part Number <sup>1</sup>	Reset Threshold (V)	Temperature Range	Pin-Package	Package Marking <sup>2</sup> (XX Lot Code)
<b>IMP809 Active LOW Reset</b>				
IMP809LEUR-T	4.63	-40°C to +105°C	3-SOT23	AAXX
IMP809MEUR-T	4.38	-40°C to +105°C	3-SOT23	ABXX
IMP809JEUR-T	4.00	-40°C to +105°C	3-SOT23	CWXX
IMP809TEUR-T	3.08	-40°C to +105°C	3-SOT23	ACXX
IMP809SEUR-T	2.93	-40°C to +105°C	3-SOT23	ADXX
IMP809REUR-T	2.63	-40°C to +105°C	3-SOT23	AFXX
<b>IMP810 Active HIGH Reset</b>				
IMP810LEUR-T	4.63	-40°C to +105°C	3-SOT23	AGXX
IMP810MEUR-T	4.38	-40°C to +105°C	3-SOT23	AHXX
IMP810JEUR-T	4.00	-40°C to +105°C	3-SOT23	AIXX
IMP810TEUR-T	3.08	-40°C to +105°C	3-SOT23	AJXX
IMP810SEUR-T	2.93	-40°C to +105°C	3-SOT23	AKXX
IMP810REUR-T	2.63	-40°C to +105°C	3-SOT23	ALXX

Notes: 1. Tape and Reel packaging is indicated by the -T designation.  
 2. Devices may also be marked with full part number: 809L, 810M etc. XX refers to lot.

## Related Products

	IMP809	IMP810	IMP811	IMP812
Max. Supply Current	15µA	15µA	15µA	15µA
Package Pins	3	3	4	4
Manual RESET input			■	■
Package Type	SOT-23	SOT-23	SOT-143	SOT-143
Active-HIGH RESET output		■		■
Active-LOW RESET output	■		■	

## Absolute Maximum Ratings

### Pin Terminal Voltage with Respect to Ground

V <sub>CC</sub> .....	-0.3V to 6.0V
RESET, $\overline{\text{RESET}}$ .....	-0.3V to (V <sub>CC</sub> + 0.3V)
Input Current at V <sub>CC</sub> .....	20mA
Output Current: RESET, $\overline{\text{RESET}}$ .....	20mA
Rate of Rise at V <sub>CC</sub> .....	100V/μs

Power Dissipation (T <sub>A</sub> = 70°C) .....	320mW
(Derate 4mW/°C above 70°C)	
Operating Temperature Range .....	-40°C to 105°C
Storage Temperature Range .....	-65°C to 160°C
Lead Temperature (soldering, 10 sec) .....	300°C

These are stress ratings only and functional operation is not implied.  
Exposure to absolute maximum ratings for prolonged time periods may affect device reliability

## Electrical Characteristics

Unless otherwise noted V<sub>CC</sub> is over the full voltage range, T<sub>A</sub> = -40°C to 105°C.

Typical values at T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5V for L/M/J devices, V<sub>CC</sub> = 3.3V for T/S devices and V<sub>CC</sub> = 3V for R devices.

Parameter	Symbol	Conditions	Min	Typ	Max	Units	
Input Voltage (V <sub>CC</sub> ) Range	V <sub>CC</sub>	T <sub>A</sub> = 0°C to 70°C T <sub>A</sub> = -40°C to 105°C	1.1 1.2		5.5 5.5	V	
Supply Current	I <sub>CC</sub>	T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C T <sub>A</sub> = 85°C to 105°C		9 6	15 10 25 20	μA	
Reset Threshold	V <sub>TH</sub>	L devices	T <sub>A</sub> = 25°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C	4.56 4.50 4.40	4.63	4.70 4.75 4.86	V
		M devices	T <sub>A</sub> = 25°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C	4.31 4.25 4.16	4.38	4.45 4.50 4.56	
		J devices	T <sub>A</sub> = 25°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C	3.93 3.89 3.80	4.00	4.06 4.10 4.20	
		T devices	T <sub>A</sub> = 25°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C	3.04 3.00 2.92	3.08	3.11 3.15 3.23	
		S devices	T <sub>A</sub> = 25°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C	2.89 2.85 2.78	2.93	2.96 3.00 3.08	
		R devices	T <sub>A</sub> = 25°C T <sub>A</sub> = -40°C to 85°C T <sub>A</sub> = 85°C to 105°C	2.59 2.55 2.50	2.63	2.66 2.70 2.76	
Reset Threshold Stability				30		ppm/°C	
V <sub>CC</sub> to Reset Delay		V <sub>CC</sub> = V <sub>TH</sub> to V <sub>TH</sub> - 100mV		20		μs	
Reset Active Timeout Period	V <sub>OL</sub>	T <sub>A</sub> = -40°C to 85°C	140	240	560	ms	
		T <sub>A</sub> = 85°C to 105°C	100		840		
Low $\overline{\text{RESET}}$ Output Voltage (IMP809)	V <sub>OL</sub>	V <sub>CC</sub> = V <sub>TH</sub> min., I <sub>SINK</sub> = 1.2mA, IMP809R/S/T			0.3	V	
		V <sub>CC</sub> = V <sub>TH</sub> min., I <sub>SINK</sub> = 3.2mA, IMP809L/M/J			0.4		
		V <sub>CC</sub> > 1.1V, I <sub>SINK</sub> = 50μA			0.3		
High $\overline{\text{RESET}}$ Output Voltage (IMP809)	V <sub>OH</sub>	V <sub>CC</sub> > V <sub>TH</sub> max., I <sub>SOURCE</sub> = 500μA, IMP809R/S/T	0.8V <sub>CC</sub>			V	
		V <sub>CC</sub> > V <sub>TH</sub> max., I <sub>SOURCE</sub> = 800μA, IMP809L/M/J	V <sub>CC</sub> - 1.5				
Low RESET Output Voltage (IMP810)	V <sub>OL</sub>	V <sub>CC</sub> = V <sub>TH</sub> max., I <sub>SINK</sub> = 1.2mA, IMP810R/S/T			0.3	V	
		V <sub>CC</sub> = V <sub>TH</sub> max., I <sub>SINK</sub> = 3.2mA, IMP810L/M/J			0.4		
High RESET Output Voltage (IMP810)	V <sub>OH</sub>	1.8V < V <sub>CC</sub> < V <sub>TH</sub> min., I <sub>SOURCE</sub> = 150μA	0.8V <sub>CC</sub>			V	

Notes: 1. Production testing done at T<sub>A</sub> = 25°C. Over-temperature specifications guaranteed by design only.  
2. RESET output is active LOW for the IMP809 and RESET output is active HIGH for the IMP810

## Pin Descriptions

Pin Number	Name	Function
1	GND	Ground
2 (IMP809)	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ is asserted LOW if $V_{CC}$ falls below the reset threshold and remains LOW for the 240ms typical reset timeout period (140ms minimum) after $V_{CC}$ exceeds the threshold.
2 (IMP810)	RESET	RESET is asserted HIGH if $V_{CC}$ falls below the reset threshold and remains HIGH for the 240ms typical reset timeout period (140ms minimum) after $V_{CC}$ exceeds the threshold.
3	$V_{CC}$	Power supply input voltage (3.0V, 3.3V, 5.0V)

## Detailed Descriptions

### Reset Timing

The reset signal is asserted–LOW for the IMP809 and HIGH for the IMP810–when the  $V_{CC}$  signal falls below the threshold trip voltage and remains asserted for 140ms minimum after the  $V_{CC}$  has risen above the threshold.

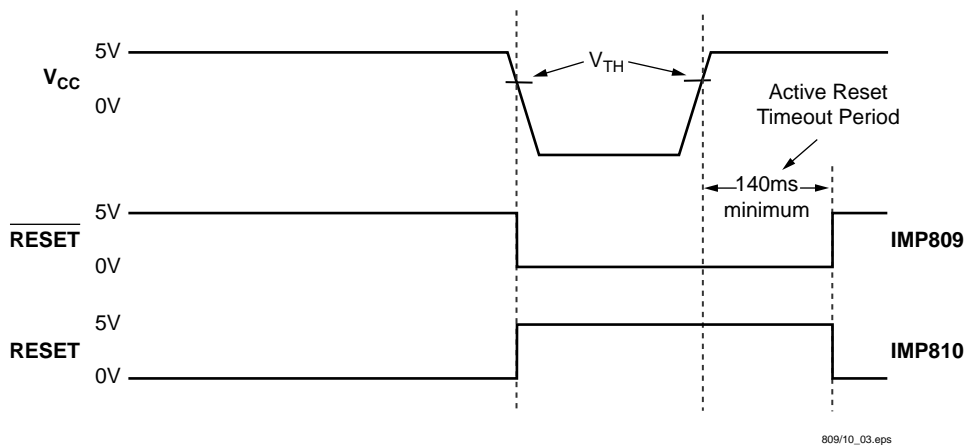


Figure 1. Reset Timing Diagram

## Application Information

### Negative $V_{CC}$ Transients

The IMP809/810 protect  $\mu$ Ps from brownouts and low  $V_{CC}$ . Short duration transients of 100mV amplitude and 20 $\mu$ s or less duration typically do not cause a false RESET.

### Valid Reset with $V_{CC}$ under 1.1V

To ensure logic inputs connected to the IMP809  $\overline{\text{RESET}}$  pin are in a known state when  $V_{CC}$  is under 1.1V, a 100k $\Omega$  pull-down

resistor at  $\overline{\text{RESET}}$  is needed. The value is not critical. A pull-up resistor to  $V_{CC}$  is needed with the IMP810.

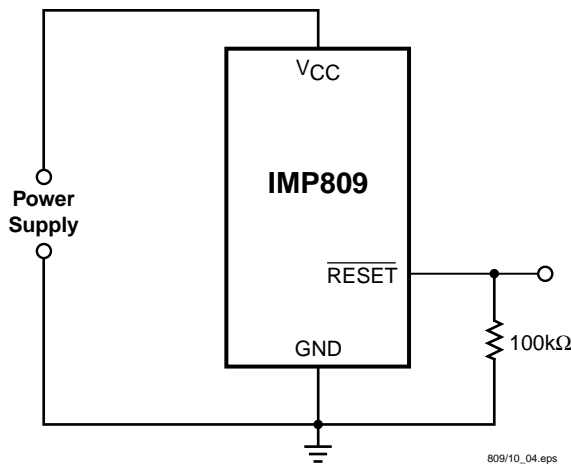


Figure 2.  $\overline{\text{RESET}}$  Valid with  $V_{CC}$  Under 1.1V

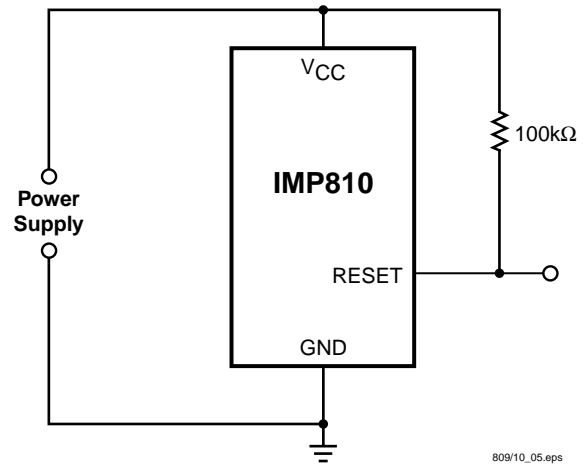


Figure 3. RESET Valid with  $V_{CC}$  Under 1.1V

### Bi-directional Reset Pin Interfacing

The IMP809/810 can interface with  $\mu$ P/ $\mu$ C bi-directional reset pins by connecting a 4.7k $\Omega$  resistor in series with the IMP809/810 reset output and the  $\mu$ P/ $\mu$ C bi-directional reset pin.

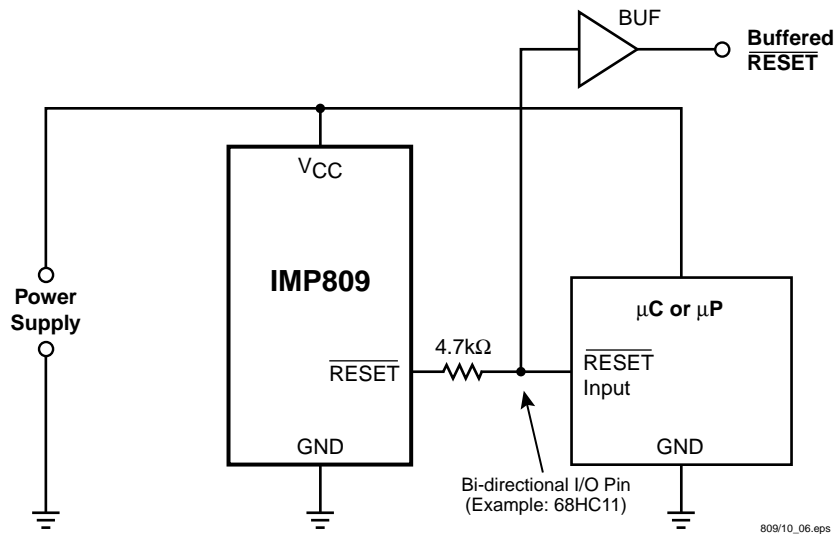
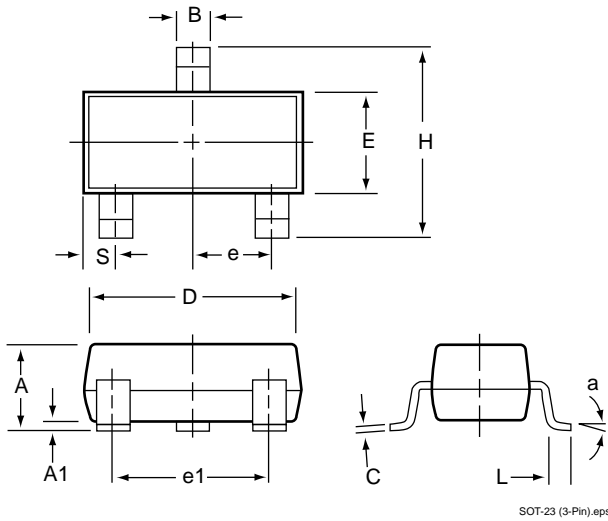


Figure 4. Bi-directional Reset Pin Interfacing

## Package Dimensions

Plastic SOT-23 (3-Pin)



	Inches		Millimeters	
	Min	Max	Min	Max
<b>Plastic SOT-23 (3-Pin)</b>				
A	0.031	0.050	0.80	1.27
A1	0.004	0.010	0.10	0.25
B	0.015	0.020	0.37	0.51
C	0.003	0.007	0.085	0.18
D	0.110	0.120	2.80	3.04
E	0.047	0.055	1.20	1.40
e	0.035	0.040	0.89	1.03
e1	0.070	0.080	1.78	2.05
H	0.083	0.1039	2.10	2.64
L	0.027 REF		0.069 REF	
S	0.018	0.024	0.45	0.60



IMP, Inc.  
Corporate Headquarters  
2830 N. First Street  
San Jose, CA 95134-2071  
Tel: 408-432-9100  
Tel: 800-438-3722  
Fax: 408-434-0335  
Fax-on-Demand: 1-800-249-1614 (USA)  
Fax-on-Demand: 1-303-575-6156 (International)  
e-mail: [info@impinc.com](mailto:info@impinc.com)  
<http://www.impweb.com>

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