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 (µP), microcontroller (µC) 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_{CC} down to 1.1V. The IMP810 has an active-high RESET output. The reset comparator is designed to ignore fast transients on V_{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

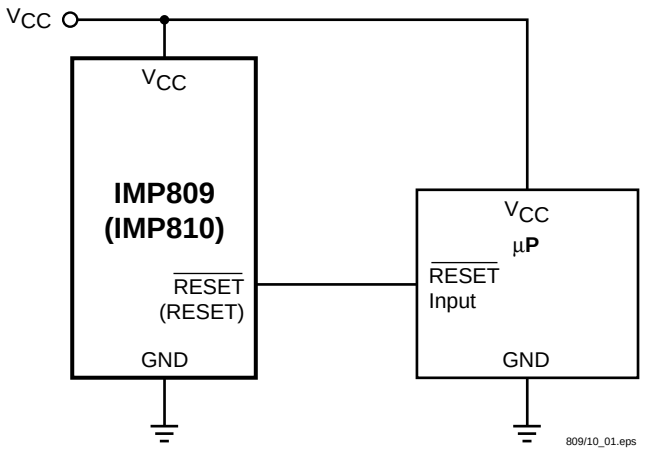
Key Features

- Improved Maxim MAX809/MAX810 replacement
  - Lower supply current...6µA
  - 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°C to 105°C

Applications

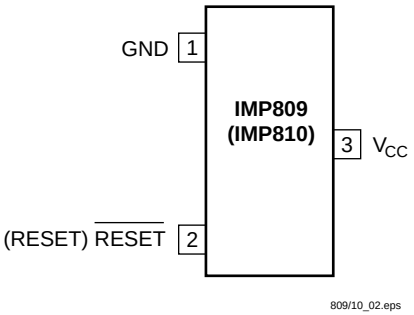
- Embedded controllers
- Battery operated systems
- Intelligent instruments
- Wireless communication systems
- PDAs and handheld equipment

Block Diagrams



Pin Configuration

SOT23



Ordering Information

Part Number [1]	Reset Threshold (V)	Temperature Range	Pin-Package	Package Marking[2] (XX Lot Code)
IMP809 Active LOW Reset				
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
IMP810 Active HIGH Reset				
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_{CC} . . . . . −0.3V to 6.0V
RESET, $\overline{RESET}$ . . . . . −0.3V to (V_{CC} + 0.3V)
Input Current at V_{CC} 20mA
Output Current: RESET, $\overline{RESET}$ 20mA
Rate of Rise at V_{CC} 100V/µs

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

Power Dissipation (T_A = 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

Electrical Characteristics

Unless otherwise noted V_{CC} is over the full voltage range, T_A = −40°C to 105°C.
Typical values at T_A = 25°C, V_{CC} = 5V for L/M/J devices, V_{CC} = 3.3V for T/S devices and V_{CC} = 3V for R devices.

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Input Voltage (V_{CC}) Range	V_{CC}	T_A = 0°C to 70°C T_A = −40°C to 105°C		1.1 1.2		5.5 5.5	V
Supply Current	I_{CC}	T_A = −40°C to 85°C T_A = −40°C to 85°C T_A = 85°C to 105°C T_A = 85°C to 105°C	V_{CC} < 5.5V, L/M/J V_{CC} < 3.6V, R/S/T V_{CC} < 5.5V, L/M/J V_{CC} < 3.6V, R/S/T		9 6	15 10 25 20	µA
Reset Threshold	V_{TH}	L devices	T_A = 25°C T_A = −40°C to 85°C T_A = 85°C to 105°C	4.56 4.50 4.40	4.63	4.70 4.75 4.86	V
		M devices	T_A = 25°C T_A = −40°C to 85°C T_A = 85°C to 105°C	4.31 4.25 4.16	4.38	4.45 4.50 4.56	
		J devices	T_A = 25°C T_A = −40°C to 85°C T_A = 85°C to 105°C	3.93 3.89 3.80	4.00	4.06 4.10 4.20	
		T devices	T_A = 25°C T_A = −40°C to 85°C T_A = 85°C to 105°C	3.04 3.00 2.92	3.08	3.11 3.15 3.23	
		S devices	T_A = 25°C T_A = −40°C to 85°C T_A = 85°C to 105°C	2.89 2.85 2.78	2.93	2.96 3.00 3.08	
		R devices	T_A = 25°C T_A = −40°C to 85°C T_A = 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_{CC} to Reset Delay		V_{CC} = V_{TH} to V_{TH} - 100mV			20		µs
Reset Active Timeout Period	V_{OL}	T_A = −40°C to 85°C		140	240	560	ms
		T_A = 85°C to 105°C		100		840	
Low $\overline{RESET}$ Output Voltage (IMP809)	V_{OL}	V_{CC} = V_{TH} min., I_{SINK} = 1.2mA, IMP809R/S/T				0.3	V
		V_{CC} = V_{TH} min., I_{SINK} = 3.2mA, IMP809L/M/J				0.4	
		V_{CC} > 1.1V, I_{SINK} = 50µA				0.3	
High $\overline{RESET}$ Output Voltage (IMP809)	V_{OH}	V_{CC} > V_{TH} max., I_{SOURCE} = 500µA, IMP809R/S/T		0.8V_{CC}			V
		V_{CC} > V_{TH} max., I_{SOURCE} = 800µA, IMP809L/M/J		V_{CC} -1.5			
Low RESET Output Voltage (IMP810)	V_{OL}	V_{CC} = V_{TH} max., I_{SINK} = 1.2mA, IMP810R/S/T				0.3	V
		V_{CC} = V_{TH} max., I_{SINK} = 3.2mA, IMP810L/M/J				0.4	
High RESET Output Voltage (IMP810)	V_{OH}	1.8V < V_{CC} < V_{TH} min., I_{SOURCE} = 150µA		0.8V_{CC}			V

Notes: 1. *Production testing done at T_A = 25°C. Over-temperature specifications guaranteed by design only.*
2. *$\overline{RESET}$ 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.

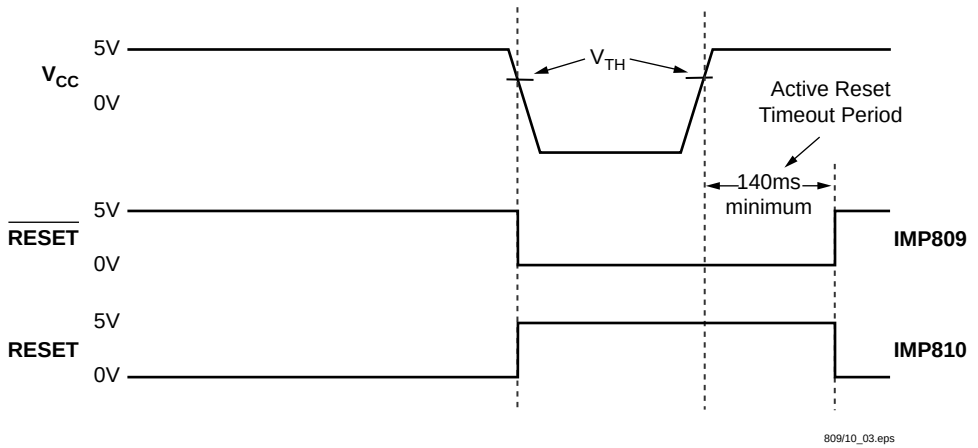


Figure 1. Reset Timing Diagram

Negative V_{CC} Transients

The IMP809/810 protect µPs from brownouts and low V_{CC}. Short duration transients of 100mV amplitude and 20µs 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 100kΩ 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.

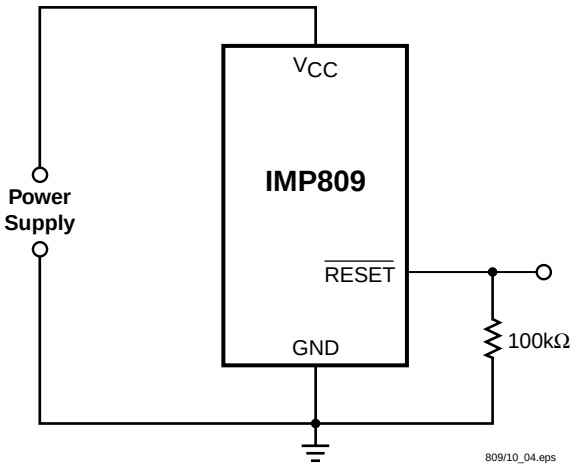


Figure 2. $\overline{\text{RESET}}$ Valid with V_{CC} Under 1.1V

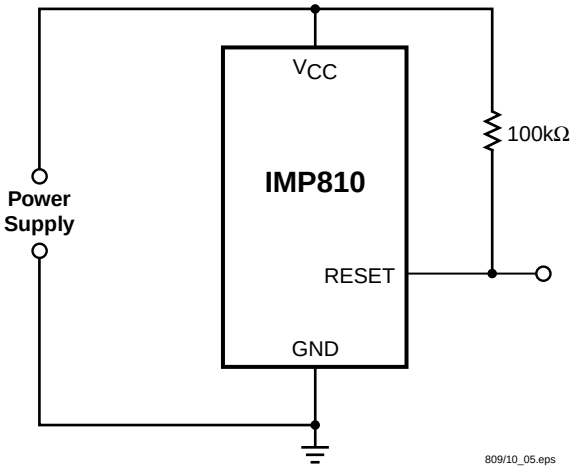


Figure 3. RESET Valid with V_{CC} Under 1.1V

Bi-directional Reset Pin Interfacing

The IMP809/810 can interface with µP/µC bi-directional reset pins by connecting a 4.7kΩ resistor in series with the IMP809/810 reset output and the µP/µC bi-directional reset pin.

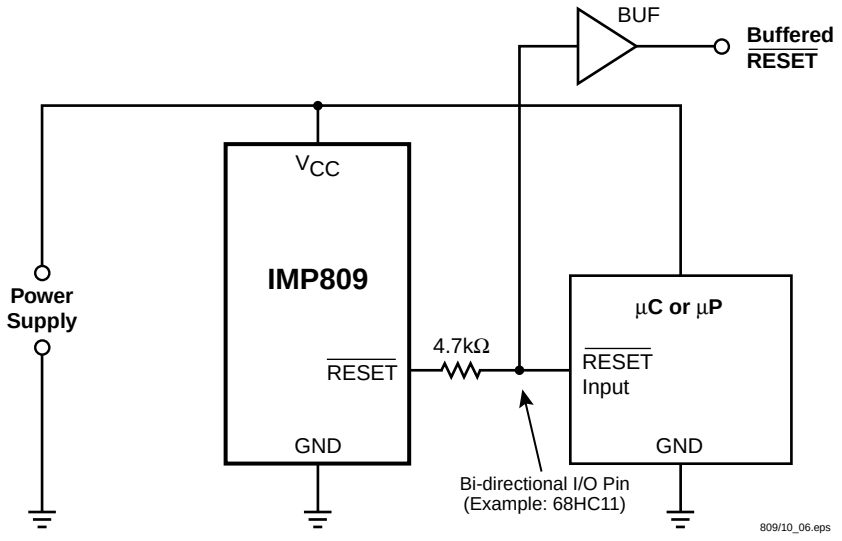
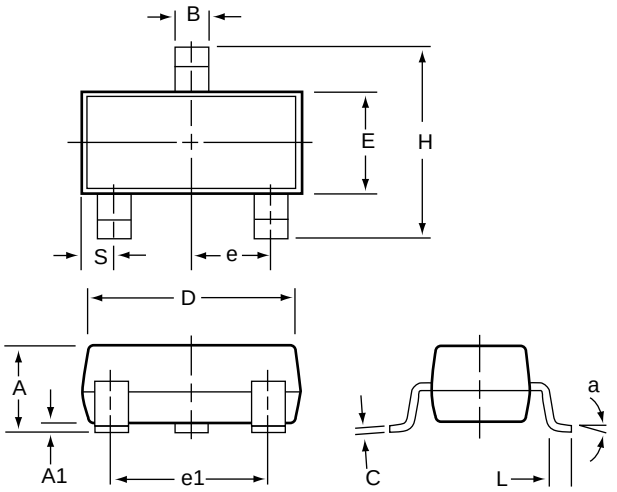


Figure 4. Bi-directional Reset Pin Interfacing

Package Dimensions

Plastic SOT-23 (3-Pin)



SOT-23 (3-Pin).eps

	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SOT-23 (3-Pin)				
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

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