

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 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 |

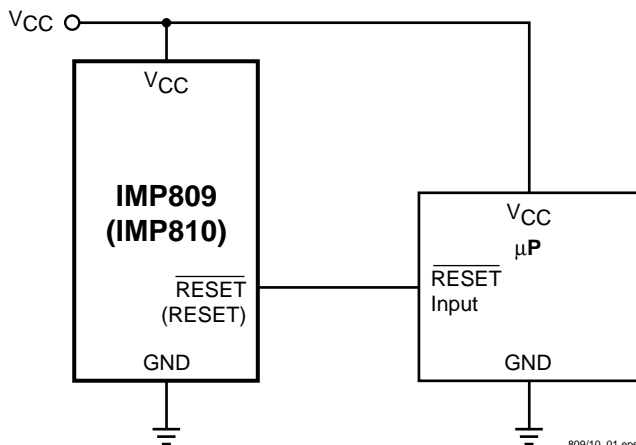
Key Features

- ◆ Improved Maxim MAX809/MAX810 replacement
 - Lower supply current...6 μA
 - 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

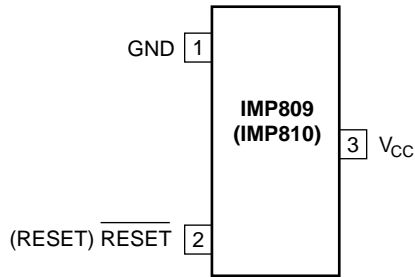
- ◆ Embedded controllers
- ◆ Battery operated systems
- ◆ Intelligent instruments
- ◆ Wireless communication systems
- ◆ PDAs and handheld equipment

Block Diagrams



Pin Configuration

SOT23



809/10_02.eps

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, $\overline{\text{RESET}}$ | -0.3V to ($V_{CC} + 0.3V$) |
| Input Current at V_{CC} | 20mA |
| Output Current: RESET, $\overline{\text{RESET}}$ | 20mA |
| Rate of Rise at V_{CC} | 100V/ μ s |

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 ($T_A = 70^\circ\text{C}$) | 320mW |
| (Derate 4mW/ $^\circ\text{C}$ above 70 $^\circ\text{C}$) | |
| Operating Temperature Range | -40 $^\circ\text{C}$ to 105 $^\circ\text{C}$ |
| Storage Temperature Range | -65 $^\circ\text{C}$ to 160 $^\circ\text{C}$ |
| Lead Temperature (soldering, 10 sec) | 300 $^\circ\text{C}$ |

Electrical Characteristics

Unless otherwise noted V_{CC} is over the full voltage range, $T_A = -40^\circ\text{C}$ to 105 $^\circ\text{C}$.

Typical values at $T_A = 25^\circ\text{C}$, $V_{CC} = 5V$ 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} | $T_A = 0^\circ\text{C}$ to 70 $^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 105 $^\circ\text{C}$ | 1.1 1.2 | | 5.5 5.5 | V | |
| Supply Current | I_{CC} | $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ | $V_{CC} < 5.5V$, 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 | μ A | |
| Reset Threshold | V_{TH} | L devices M devices J devices T devices S devices R devices | $T_A = 25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ $T_A = 25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ $T_A = 25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ $T_A = 25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ $T_A = 25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ | 4.56 4.50 4.40 4.31 4.25 4.16 3.93 3.89 3.80 3.04 3.00 2.92 2.89 2.85 2.78 2.59 2.55 2.50 | 4.63 4.38 4.00 3.08 2.93 2.63 | 4.70 4.75 4.86 4.45 4.50 4.56 4.06 4.10 4.20 3.11 3.15 3.23 2.96 3.00 3.08 2.66 2.70 2.76 | V |
| Reset Threshold Stability | | | | 30 | | ppm/ $^\circ\text{C}$ | |
| V_{CC} to Reset Delay | | $V_{CC} = V_{TH}$ to $V_{TH} - 100\text{mV}$ | | 20 | | μ s | |
| Reset Active Timeout Period | V_{OL} | $T_A = -40^\circ\text{C}$ to 85 $^\circ\text{C}$ $T_A = 85^\circ\text{C}$ to 105 $^\circ\text{C}$ | 140 100 | 240 | 560 840 | ms | |
| Low $\overline{\text{RESET}}$ Output Voltage (IMP809) | V_{OL} | $V_{CC} = V_{TH}$ min., $I_{SINK} = 1.2\text{mA}$, IMP809R/S/T $V_{CC} = V_{TH}$ min., $I_{SINK} = 3.2\text{mA}$, IMP809L/M/J $V_{CC} > 1.1V$, $I_{SINK} = 50\mu\text{A}$ | | | 0.3 0.4 0.3 | V | |
| High $\overline{\text{RESET}}$ Output Voltage (IMP809) | V_{OH} | $V_{CC} > V_{TH}$ max., $I_{SOURCE} = 500\mu\text{A}$, IMP809R/S/T $V_{CC} > V_{TH}$ max., $I_{SOURCE} = 800\mu\text{A}$, IMP809L/M/J | 0.8 V_{CC} $V_{CC} - 1.5$ | | | V | |
| Low RESET Output Voltage (IMP810) | V_{OL} | $V_{CC} = V_{TH}$ max., $I_{SINK} = 1.2\text{mA}$, IMP810R/S/T $V_{CC} = V_{TH}$ max., $I_{SINK} = 3.2\text{mA}$, IMP810L/M/J | | | 0.3 0.4 | V | |
| High RESET Output Voltage (IMP810) | V_{OH} | $1.8V < V_{CC} < V_{TH}$ min., $I_{SOURCE} = 150\mu\text{A}$ | 0.8 V_{CC} | | | V | |

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

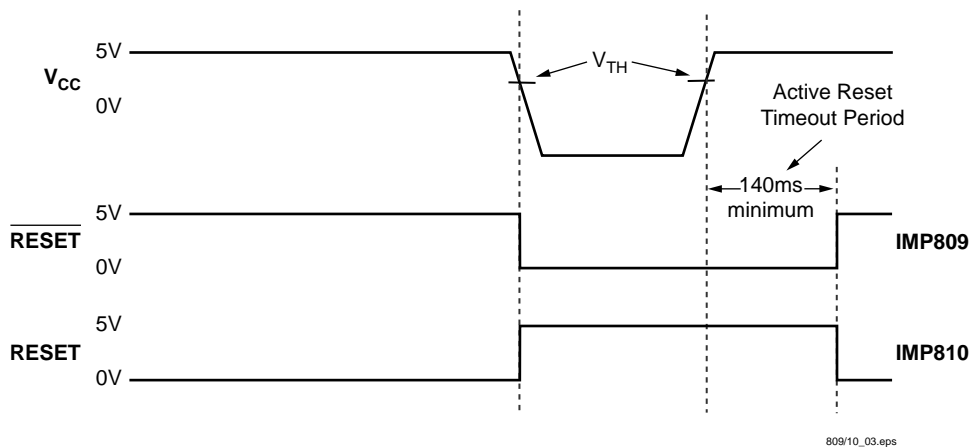


Figure 1. Reset Timing Diagram

Application Information

Negative V_{CC} Transients

The IMP809/810 protect μ P's from brownouts and low V_{CC} . Short duration transients of 100mV amplitude and 20 μ 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 Ω 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.

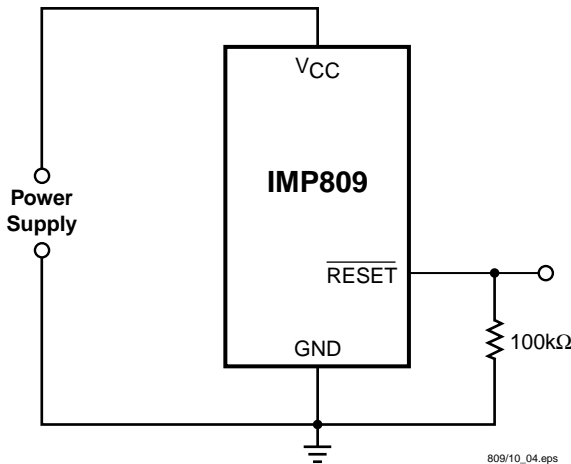


Figure 2. $\overline{\text{RESET}}$ Valid with V_{CC} Under 1.1V

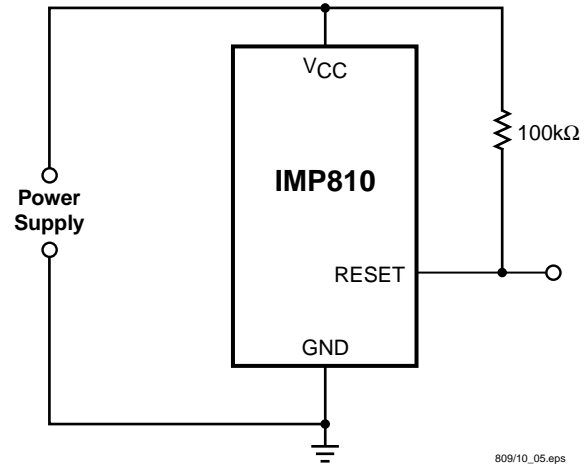


Figure 3. RESET Valid with V_{CC} Under 1.1V

Bi-directional Reset Pin Interfacing

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

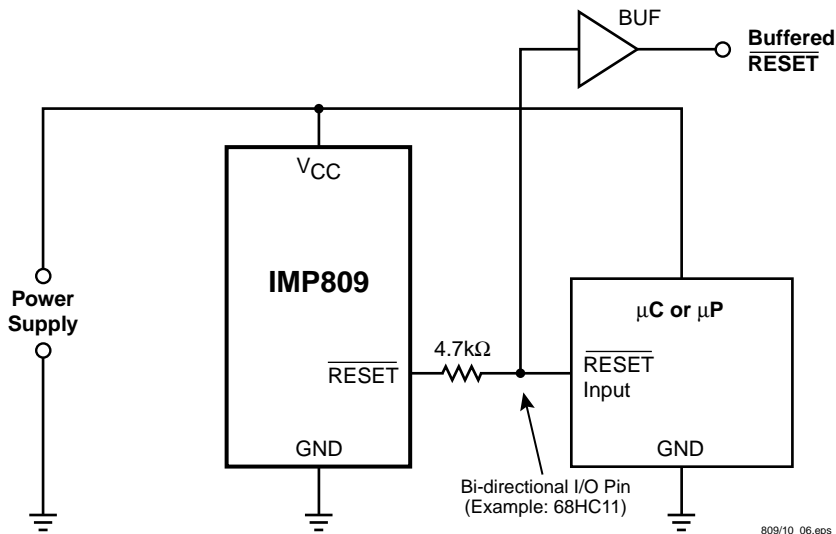
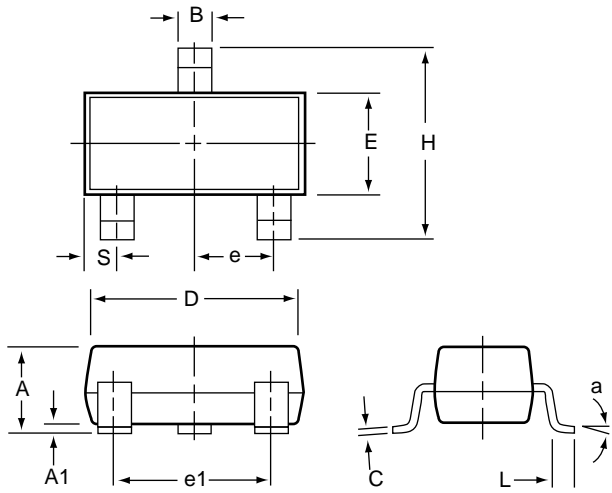


Figure 4. Bi-directional Reset Pin Interfacing

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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