

## ADM809-5S/L

### FEATURES

**Specified over Temperature**  
**Low Power Consumption (17  $\mu$ A)**  
**Precision Voltage Monitor: 3 V, 5 V Options**  
**Reset Assertion Down to 1 V  $V_{CC}$**   
**30 ms Min Power-On Reset**  
**Logic Low RESET Output**  
**Available in SOT-23 and SC70 Packages**

### APPLICATIONS

**Microprocessor Systems**  
**Computers**  
**Controllers**  
**Intelligent Instruments**  
**Automotive Systems**

### GENERAL DESCRIPTION

The ADM809-5S/L supervisory circuit monitors the power supply voltage in microprocessor systems. It provides a reset output during power-up, power-down, and brownout conditions. On power-up, an internal timer holds reset asserted for 55 ms. This holds the microprocessor in a reset state until conditions have stabilized. The  $\overline{\text{RESET}}$  output remains operational with  $V_{CC}$  as low as 1 V. The ADM809-5S/L provides an active low reset signal ( $\overline{\text{RESET}}$ ).

The reset comparator features built-in glitch immunity, making it immune to fast transients on  $V_{CC}$ .

The ADM809-5S/L consumes only 17  $\mu$ A, making it suitable for low power portable equipment.

### FUNCTIONAL BLOCK DIAGRAM

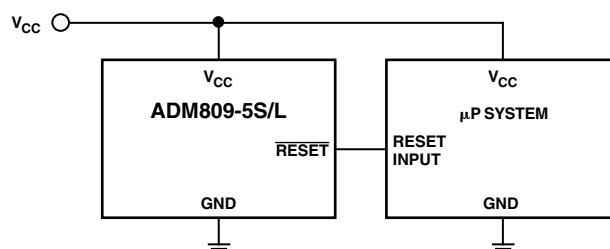
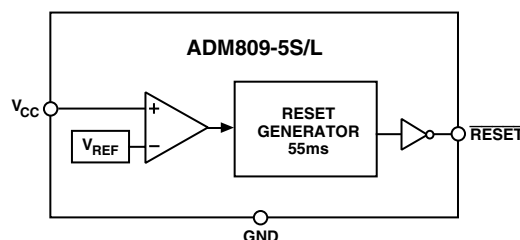


Figure 1. Typical Operating Circuit

REV. A

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# ADM809-5S/L—SPECIFICATIONS (V<sub>CC</sub> = Full Operating Range, T<sub>A</sub> = T<sub>MIN</sub> to T<sub>MAX</sub>, V<sub>CC</sub> typ = 5 V for L, 3.3 V for S Models, unless otherwise noted.)

| Parameter                                     | Min                   | Typ | Max  | Unit   | Test Conditions/Comments                                                             |
|-----------------------------------------------|-----------------------|-----|------|--------|--------------------------------------------------------------------------------------|
| V <sub>CC</sub> Operating Voltage Range       | 1.0                   | 3.3 | 5.5  | V      | T <sub>A</sub> = 0°C to 150°C with 100 kΩ Pull-Down on Output (Figure 3)             |
|                                               | 1.2                   | 3.3 | 5.5  | V      | T <sub>A</sub> = -40°C to +150°C with 22 kΩ External Pull-Up on Output (Figure 6)    |
| Supply Current                                |                       | 24  | 60   | μA     | V <sub>CC</sub> < 5.5 V, ADM8_L, T <sub>A</sub> = -40°C to +150°C                    |
|                                               |                       | 17  | 50   | μA     | V <sub>CC</sub> < 3.6 V, ADM8_S, T <sub>A</sub> = -40°C to +150°C                    |
| <b>RESET THRESHOLD</b>                        |                       |     |      |        |                                                                                      |
| Reset Voltage Threshold                       |                       |     |      |        |                                                                                      |
| ADM809-5L                                     | 4.5                   |     | 4.75 | V      | T <sub>A</sub> = -40°C to +85°C                                                      |
| ADM809-5L                                     | 4.40                  |     | 4.86 | V      | T <sub>A</sub> = 85°C to 150°C                                                       |
| ADM809-5S                                     | 2.85                  |     | 3.00 | V      | T <sub>A</sub> = -40°C to +85°C                                                      |
| ADM809-5S                                     | 2.78                  |     | 3.08 | V      | T <sub>A</sub> = 85°C to 150°C                                                       |
| Reset Threshold Temperature Coefficient       |                       | 30  |      | ppm/°C |                                                                                      |
| V <sub>CC</sub> to Reset Delay                |                       | 20  |      | μs     | V <sub>CC</sub> = V <sub>TH</sub> to (V <sub>TH</sub> - 100 mV)                      |
| Reset Active Timeout Period                   | 30                    | 55  | 80   | ms     | T <sub>A</sub> = -40°C to +150°C                                                     |
| $\overline{\text{RESET}}$ Output Voltage Low  |                       |     | 0.3  | V      | V <sub>CC</sub> = V <sub>TH</sub> min, I <sub>SINK</sub> = 1.2 mA, ADM809-5S         |
|                                               |                       |     | 0.4  | V      | V <sub>CC</sub> = V <sub>TH</sub> min, I <sub>SINK</sub> = 3.2 mA, ADM809-5L         |
|                                               |                       |     | 0.3  | V      | V <sub>CC</sub> > 1.0 V, I <sub>SINK</sub> = 50 μA, T <sub>A</sub> = 0°C to 150°C    |
|                                               |                       |     |      |        | V <sub>CC</sub> > 1.2 V, I <sub>SINK</sub> = 50 μA, T <sub>A</sub> = -40°C to +150°C |
| $\overline{\text{RESET}}$ Output Voltage High | 0.8 V <sub>CC</sub>   |     |      | V      | V <sub>CC</sub> > V <sub>TH</sub> max, I <sub>SOURCE</sub> = 500 μA                  |
|                                               | V <sub>CC</sub> - 1.5 |     |      | V      | V <sub>CC</sub> > V <sub>TH</sub> max, I <sub>SOURCE</sub> = 800 μA                  |
| JUNCTION TEMPERATURE                          | -40                   |     | +150 | °C     |                                                                                      |

## ABSOLUTE MAXIMUM RATINGS\*

(T<sub>A</sub> = 25°C, unless otherwise noted.)

|                                           |                                   |
|-------------------------------------------|-----------------------------------|
| V <sub>CC</sub>                           | -0.3 V to +6 V                    |
| RESET, $\overline{\text{RESET}}$          | -0.3 V to V <sub>CC</sub> + 0.5 V |
| Input Current                             |                                   |
| V <sub>CC</sub>                           | 20 mA                             |
| Output Current                            |                                   |
| RESET, $\overline{\text{RESET}}$          | 20 mA                             |
| Rate of Rise, V <sub>CC</sub>             | 100 V/μs                          |
| θ <sub>JA</sub> Thermal Impedance, SOT-23 | 270°C/W                           |
| θ <sub>JA</sub> Thermal Impedance, SC70   | 146°C/W                           |

|                                      |                 |
|--------------------------------------|-----------------|
| Lead Temperature (Soldering, 10 sec) | 300°C           |
| Vapor Phase (60 sec)                 | 215°C           |
| Infrared (15 sec)                    | 220°C           |
| Storage Temperature Range            | -65°C to +150°C |

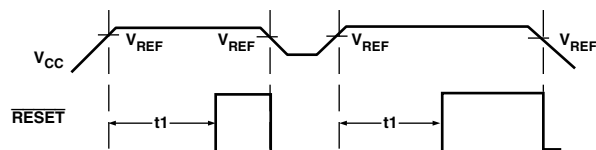
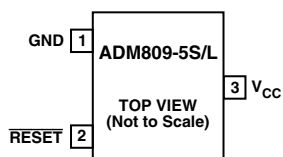
\*Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute maximum ratings for extended periods of time may affect device reliability.

## CAUTION

ESD (electrostatic discharge) sensitive device. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although the ADM809-5S/L features proprietary ESD protection circuitry, permanent damage may occur on devices subjected to high energy electrostatic discharges. Therefore, proper ESD precautions are recommended to avoid performance degradation or loss of functionality.



## PIN CONFIGURATION



$t_1 = \overline{RESET}$  TIME = 55ms TYP.  
 $V_{REF} = \overline{RESET}$  VOLTAGE THRESHOLD

Figure 2. Power Fail  $\overline{RESET}$  Timing

## PIN FUNCTION DESCRIPTIONS

| Pin No. | Mnemonic           | Function                                                                                                                                                                             |
|---------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | GND                | 0 V. Ground reference for all signals.                                                                                                                                               |
| 2       | $\overline{RESET}$ | Active Low Logic Output. $\overline{RESET}$ remains low while $V_{CC}$ is below the reset threshold, and remains low for 55 ms (typ) after $V_{CC}$ rises above the reset threshold. |
| 3       | $V_{CC}$           | Supply Voltage Being Monitored.                                                                                                                                                      |

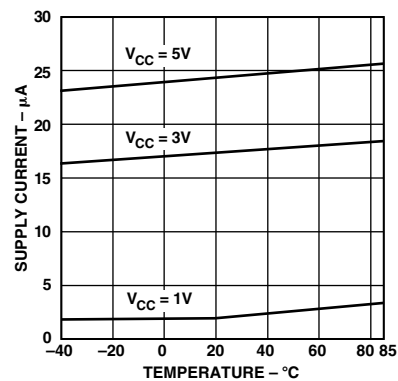
Table I.  $\overline{RESET}$  Threshold Options

| Model     | $\overline{RESET}$ Threshold (V) |
|-----------|----------------------------------|
| ADM809-5L | 4.63                             |
| ADM809-5S | 2.93                             |

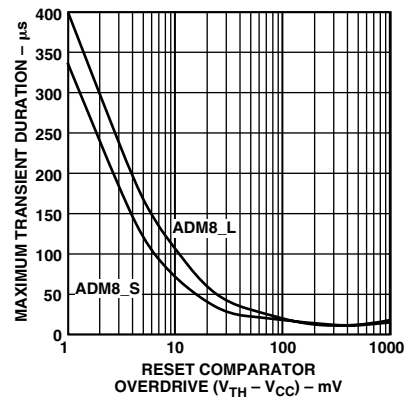
## ORDERING GUIDE

| Model               | Reset Threshold (V) | Temperature Range | Branding Information | Quantity (K) | Package Type  |
|---------------------|---------------------|-------------------|----------------------|--------------|---------------|
| ADM809-5LART-REEL   | 4.63                | -40°C to +150°C   | M9L                  | 10           | 3-Lead SOT-23 |
| ADM809-5LART-REEL-7 | 4.63                | -40°C to +150°C   | M9L                  | 3            | 3-Lead SOT-23 |
| ADM809-5LAKS-REEL   | 4.63                | -40°C to +150°C   | M9L                  | 10           | 3-Lead SC70   |
| ADM809-5LAKS-REEL-7 | 4.63                | -40°C to +150°C   | M9L                  | 3            | 3-Lead SC70   |
| ADM809-5SART-REEL   | 2.93                | -40°C to +150°C   | M9S                  | 10           | 3-Lead SOT-23 |
| ADM809-5SART-REEL-7 | 2.93                | -40°C to +150°C   | M9S                  | 3            | 3-Lead SOT-23 |
| ADM809-5SAKS-REEL   | 2.93                | -40°C to +150°C   | M9S                  | 10           | 3-Lead SC70   |
| ADM809-5SAKS-REEL-7 | 2.93                | -40°C to +150°C   | M9S                  | 3            | 3-Lead SC70   |
| ADM809-5SCHIPS      | 2.93                | -40°C to +150°C   | NA                   | 1 Wafer      |               |

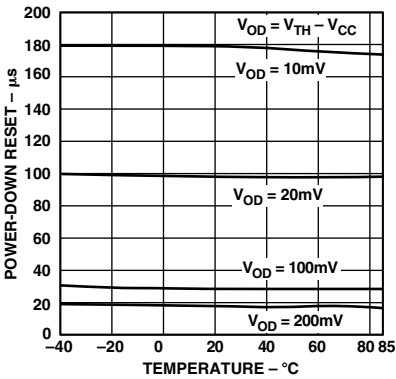
# ADM809-5S/L –Typical Performance Characteristics



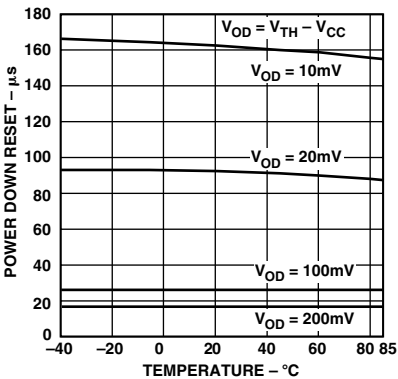
TPC 1. Supply Current vs. Temperature (No Load)



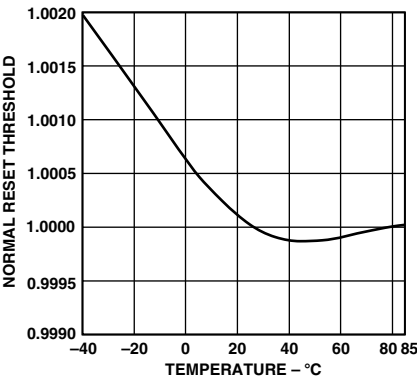
TPC 2. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive



TPC 3. Power-Down Reset Delay vs. Temperature ADM809-5L



TPC 4. Power-Down Reset Delay vs. Temperature ADM809-5S



TPC 5. Normalized Reset Voltage Threshold vs. Temperature

## INTERFACING TO OTHER DEVICES' OUTPUT

The ADM809-5S/L is designed to integrate with as many devices as possible and therefore has an output dependent on  $V_{CC}$ . Because of this design approach, interfacing this device to other devices is simplified.

## ENSURING A VALID RESET OUTPUT DOWN TO $V_{CC} = 0$ V

When  $V_{CC}$  falls below 0.8 V, ADM809-5S/L's  $\overline{\text{RESET}}$  no longer sinks current. A high impedance CMOS logic input connected to  $\overline{\text{RESET}}$  may, therefore, drift to undetermined logic levels. To eliminate this problem, a 100 k $\Omega$  resistor should be connected from  $\overline{\text{RESET}}$  to ground.

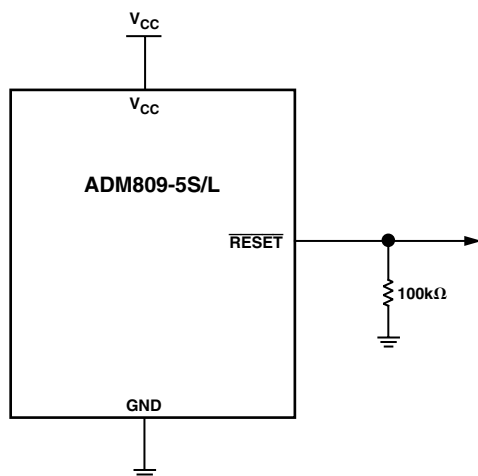


Figure 3. Ensuring a Valid  $\overline{\text{RESET}}$  Output Down to  $V_{CC} = 0$  V

## BENEFITS OF A VERY ACCURATE $\overline{\text{RESET}}$ THRESHOLD

In other microprocessor supervisory circuits, tolerances in supply voltages lead to an overall increase in  $\overline{\text{RESET}}$  tolerance levels due to the deterioration of the microprocessor  $\overline{\text{RESET}}$  circuit's power supply. The possibility of a malfunction during a power failure is greatly reduced because the ADM809-5S/L series can operate effectively even when there are large degradations of the supply voltages. Another advantage of the ADM809-5S/L series is its very accurate internal voltage reference circuit. These benefits combine to produce an exceptionally reliable voltage monitor circuit.

## INTERFACING TO MICROPROCESSORS WITH MULTIPLE INTERRUPTS

In a number of cases, it is necessary to interface many interrupts from different devices (i.e., thermal, attitude, and velocity sensors). The ADM809-5S/L can easily be integrated into existing interrupt-handling circuits (Figure 4) or used as a standalone device.

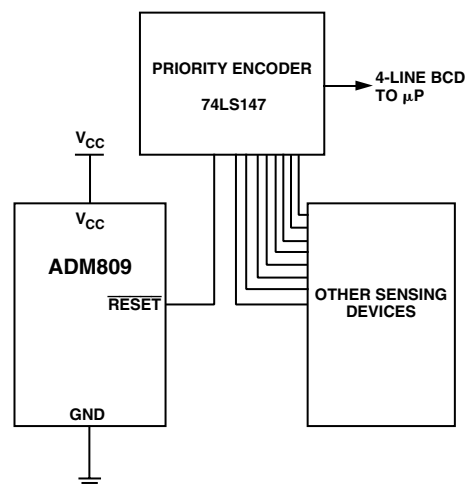


Figure 4. Interfacing to Microprocessors with Multiple Interrupts

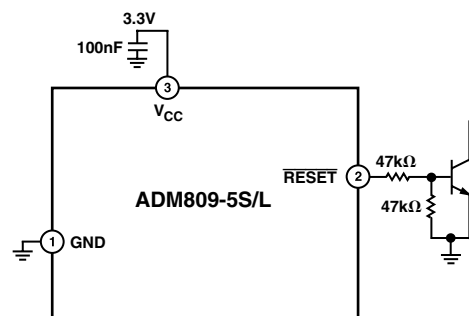


Figure 5. Alternative Application Circuit with Extra Decoupling

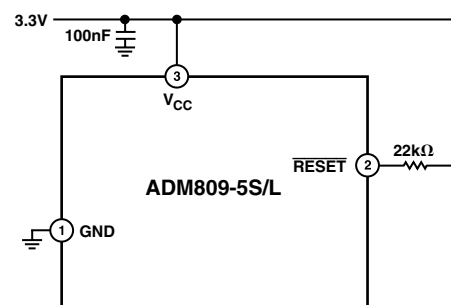
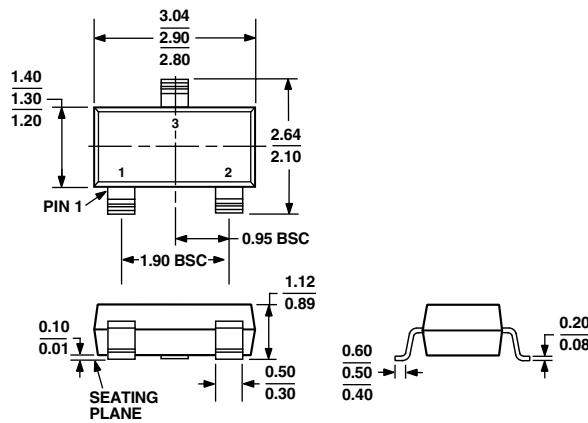


Figure 6. Additional Decoupling Can Be Achieved Using a 100 nF Capacitor between  $V_{CC}$  and Ground

OUTLINE DIMENSIONS

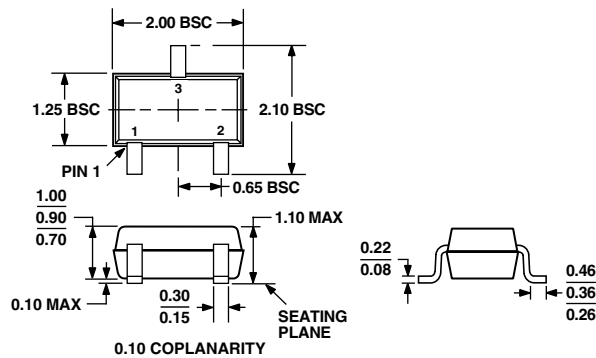
3-Lead Small Outline Transistor Package [SOT-23]  
(RT-3)

Dimensions shown in millimeters



3-Lead Thin Shrink Small Outline Transistor Package [SC70]  
(KS-3)

Dimensions shown in millimeters



# Revision History

| Location                                       | Page      |
|------------------------------------------------|-----------|
| 3/03—Data Sheet changed from REV. 0 to REV. A. |           |
| Added SC70 Package .....                       | Universal |
| Changes to FEATURES .....                      | 1         |
| Changes to SPECIFICATIONS .....                | 2         |
| Changes to ABSOLUTE MAXIMUM RATINGS .....      | 2         |
| Changes to Table I .....                       | 3         |
| Changes to ORDERING GUIDE .....                | 3         |
| Changes to TPC 2 .....                         | 4         |
| Updated OUTLINE DIMENSIONS .....               | 6         |

