

## ADM809-5L/ADM809-5S

### 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 minimum power-on reset  
 Logic low  $\overline{\text{RESET}}$  output  
 Available in SOT-23 and SC70 packages

### APPLICATIONS

Microprocessor systems  
 Computers  
 Controllers  
 Intelligent instruments  
 Automotive systems

### GENERAL DESCRIPTION

The supervisory circuit of the ADM809-5L/ADM809-5S 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 ADM809-5L/ADM809-5S provide 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 ADM809-5L/ADM809-5S consume only 17  $\mu$ A, making them suitable for low power, portable equipment.

### FUNCTIONAL BLOCK DIAGRAM

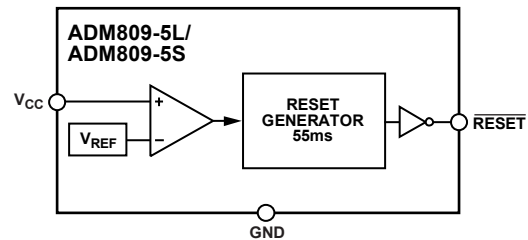


Figure 1.

### TYPICAL OPERATING CIRCUIT

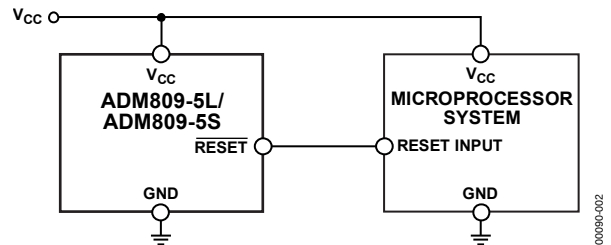


Figure 2.

#### Rev. B

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## REVISION HISTORY

### 10/08—Rev. A to Rev. B

|                                  |           |
|----------------------------------|-----------|
| Updated Format.....              | Universal |
| Updated Outline Dimensions ..... | 8         |
| Changes to Ordering Guide .....  | 8         |

### 3/03—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         |

## SPECIFICATIONS

$V_{CC}$  = full operating range,  $T_A = T_{MIN}$  to  $T_{MAX}$ ,  $V_{CC}$  typical = 5 V for L models and 3.3 V for S models, unless otherwise noted.

**Table 1.**

| Parameter                                     | Min            | Typ | Max  | Unit                    | Test Conditions/Comments                                                                                             |
|-----------------------------------------------|----------------|-----|------|-------------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>POWER SUPPLY</b>                           |                |     |      |                         |                                                                                                                      |
| $V_{CC}$ Operating Voltage Range              | 1.0            | 3.3 | 5.5  | V                       | $T_A = 0^{\circ}\text{C}$ to $150^{\circ}\text{C}$ with 100 k $\Omega$ pull-down on output (Figure 10)               |
|                                               | 1.2            | 3.3 | 5.5  | V                       | $T_A = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ with 22 k $\Omega$ external pull-up on output (Figure 13)      |
| Supply Current                                |                | 24  | 60   | $\mu\text{A}$           | $V_{CC} < 5.5\text{ V}$ , ADM809-5L, $T_A = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$                           |
|                                               |                | 17  | 50   | $\mu\text{A}$           | $V_{CC} < 3.6\text{ V}$ , ADM809-5S, $T_A = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$                           |
| <b>RESET VOLTAGE THRESHOLD</b>                |                |     |      |                         |                                                                                                                      |
| ADM809-5L                                     | 4.5            |     | 4.75 | V                       | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                                                 |
| ADM809-5L                                     | 4.40           |     | 4.86 | V                       | $T_A = 85^{\circ}\text{C}$ to $150^{\circ}\text{C}$                                                                  |
| ADM809-5S                                     | 2.85           |     | 3.00 | V                       | $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                                                 |
| ADM809-5S                                     | 2.78           |     | 3.08 | V                       | $T_A = 85^{\circ}\text{C}$ to $150^{\circ}\text{C}$                                                                  |
| RESET THRESHOLD TEMPERATURE COEFFICIENT       |                | 30  |      | ppm/ $^{\circ}\text{C}$ |                                                                                                                      |
| $V_{CC}$ TO RESET DELAY                       |                | 20  |      | $\mu\text{s}$           | $V_{CC} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$                                                                      |
| RESET ACTIVE TIMEOUT PERIOD                   | 30             | 55  | 80   | ms                      | $T_A = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$                                                                |
| <b>RESET OUTPUT VOLTAGE</b>                   |                |     |      |                         |                                                                                                                      |
| $\overline{\text{RESET}}$ Output Voltage Low  |                |     | 0.3  | V                       | $V_{CC} = V_{TH}$ minimum, $I_{SINK} = 1.2\text{ mA}$ , ADM809-5S                                                    |
|                                               |                |     | 0.4  | V                       | $V_{CC} = V_{TH}$ minimum, $I_{SINK} = 3.2\text{ mA}$ , ADM809-5L                                                    |
|                                               |                |     | 0.3  | V                       | $V_{CC} > 1.0\text{ V}$ , $I_{SINK} = 50\text{ }\mu\text{A}$ , $T_A = 0^{\circ}\text{C}$ to $150^{\circ}\text{C}$    |
| $\overline{\text{RESET}}$ Output Voltage High |                |     |      |                         | $V_{CC} > 1.2\text{ V}$ , $I_{SINK} = 50\text{ }\mu\text{A}$ , $T_A = -40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ |
|                                               | $0.8 V_{CC}$   |     |      | V                       | $V_{CC} > V_{TH}$ maximum, $I_{SOURCE} = 500\text{ }\mu\text{A}$                                                     |
|                                               | $V_{CC} - 1.5$ |     |      | V                       | $V_{CC} > V_{TH}$ maximum, $I_{SOURCE} = 800\text{ }\mu\text{A}$                                                     |
| JUNCTION TEMPERATURE                          | -40            |     | +150 | $^{\circ}\text{C}$      |                                                                                                                      |

## ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ , unless otherwise noted.

Table 2.

| Parameter                                   | Rating                                    |
|---------------------------------------------|-------------------------------------------|
| $V_{CC}$                                    | $-0.3\text{ V to }+6\text{ V}$            |
| $\overline{\text{RESET}}$                   | $-0.3\text{ V to }V_{CC} + 0.5\text{ V}$  |
| Input Current<br>$V_{CC}$                   | 20 mA                                     |
| Output Current<br>$\overline{\text{RESET}}$ | 20 mA                                     |
| Rate of Rise, $V_{CC}$                      | 100 V/ $\mu\text{s}$                      |
| $\theta_{JA}$ Thermal Impedance             |                                           |
| SOT-23                                      | 270°C/W                                   |
| 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                   | $-65^\circ\text{C to }+150^\circ\text{C}$ |

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 indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

### ESD CAUTION



**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

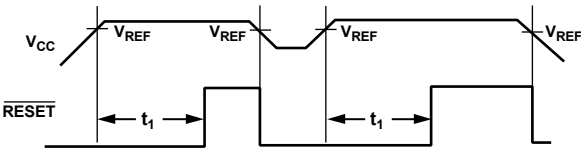
PIN CONFIGURATION AND FUNCTION DESCRIPTIONS



Figure 3. Pin Configuration

Table 3. Pin Function Descriptions

| Pin No. | Mnemonic        | Function                                                                                                                                                                                  |
|---------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | GND             | Ground Reference for All Signals (0 V).                                                                                                                                                   |
| 2       | RESET           | Active Low Logic Output. RESET remains low while V <sub>CC</sub> is below the reset threshold, and remains low for 55 ms (typical) after V <sub>CC</sub> rises above the reset threshold. |
| 3       | V <sub>CC</sub> | Supply Voltage Being Monitored.                                                                                                                                                           |



- NOTES
- 1.  $t_1$  = RESET TIME = 55ms TYPICAL.
  - 2.  $V_{REF}$  = RESET VOLTAGE THRESHOLD.

Figure 4. Power Fail RESET Timing

Table 4. RESET Threshold Options

| Model     | RESET Threshold (V) |
|-----------|---------------------|
| ADM809-5L | 4.63                |
| ADM809-5S | 2.93                |

## TYPICAL PERFORMANCE CHARACTERISTICS

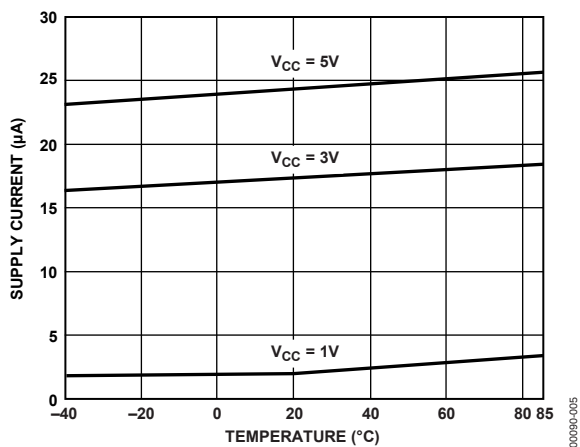


Figure 5. Supply Current vs. Temperature (No Load)

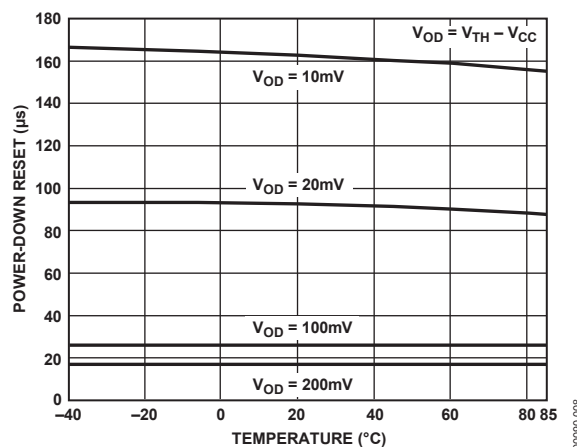


Figure 8. ADM809-5S Power-Down Reset Delay vs. Temperature

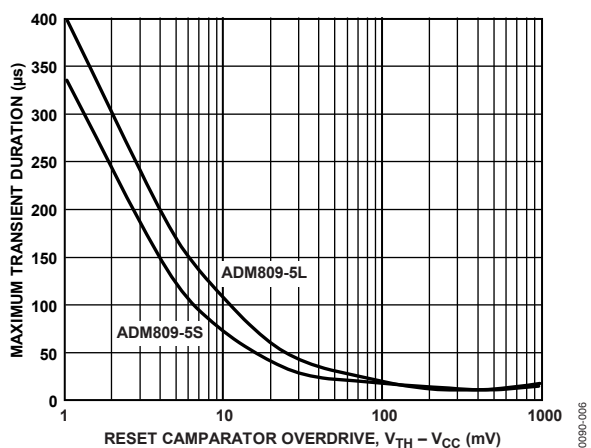


Figure 6. Maximum Transient Duration Without Causing a Reset Pulse vs. Reset Comparator Overdrive

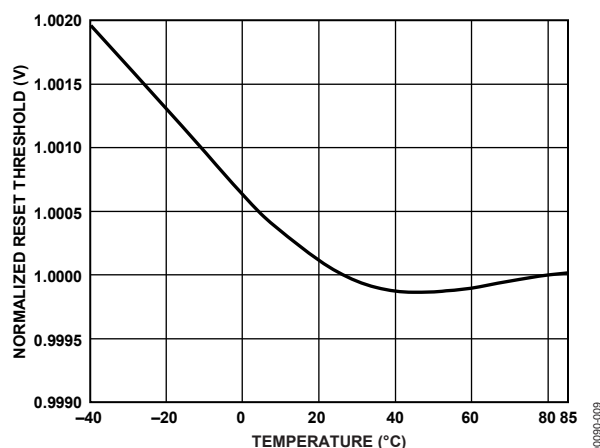


Figure 9. Normalized Reset Voltage Threshold vs. Temperature

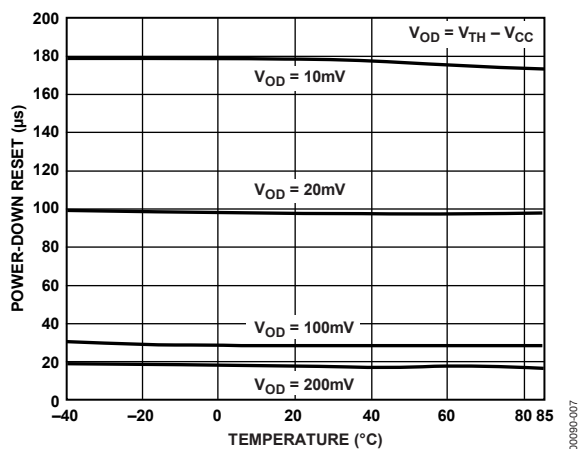


Figure 7. ADM809-5L Power-Down Reset Delay vs. Temperature

## THEORY OF OPERATION

### INTERFACING TO OUTPUT OF OTHER DEVICES

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

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

When  $V_{CC}$  falls below 0.8 V, the ADM809-5L/ADM809-5S  $\overline{\text{RESET}}$  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.

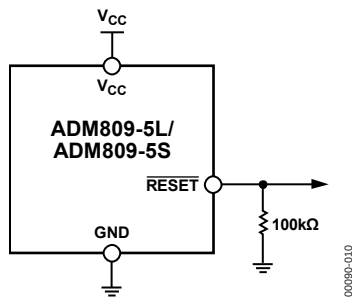


Figure 10. Ensuring a Valid  $\overline{\text{RESET}}$  Output Down to  $V_{CC} = 0\text{ V}$

### 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  $\overline{\text{RESET}}$  circuit power supply of the microprocessor. The possibility of a malfunction during a power failure is greatly reduced because the ADM809-5L/ADM809-5S can operate effectively even when there are large degradations of the supply voltages. Another advantage of the ADM809-5L/ADM809-5S 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 to many interrupts from different devices (for example, from thermal, attitude, and velocity sensors). The ADM809-5L/ADM809-5S can be easily integrated into existing interrupt-handling circuits (see Figure 13) or used as standalone devices.

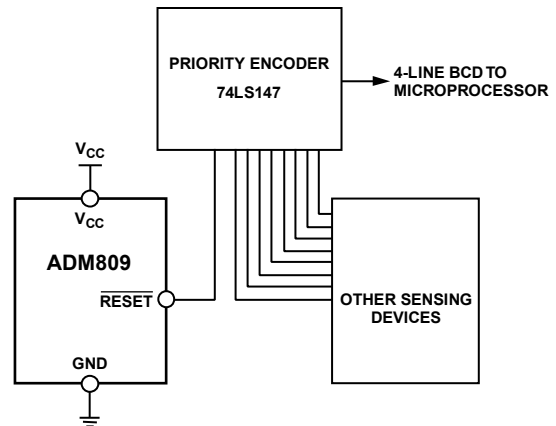


Figure 11. Interfacing to Microprocessors with Multiple Interrupts

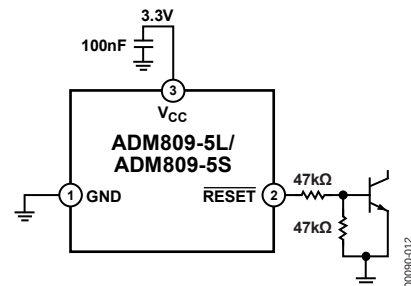


Figure 12. Alternative Application Circuit with Extra Decoupling

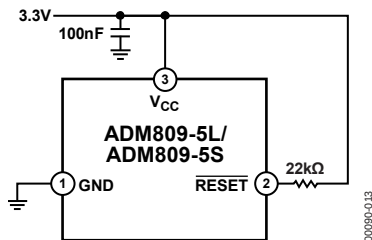
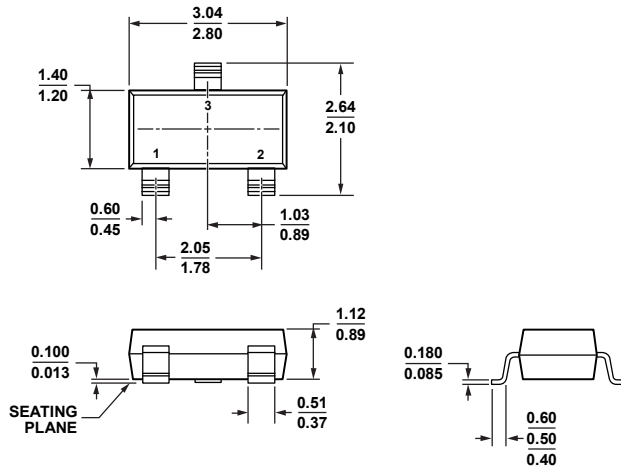


Figure 13. Additional Decoupling Can Be Achieved Using a 100 nF Capacitor Between  $V_{CC}$  and Ground

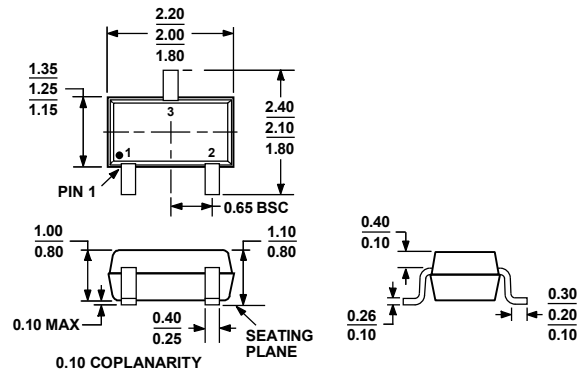
## OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS TO-236-AB

Figure 14. 3-Lead Small Outline Transistor Package [SOT-23] (RT-3)

Dimensions shown in millimeters



ALL DIMENSIONS COMPLIANT WITH EIAJ SC70

Figure 15. 3-Lead Thin Shrink Small Outline Transistor Package [SC70] (KS-3)

Dimensions shown in millimeters

## ORDERING GUIDE

| Model                           | Reset Threshold (V) | Temperature Range | Branding Information | Quantity (K) | Package Description | Package Option |
|---------------------------------|---------------------|-------------------|----------------------|--------------|---------------------|----------------|
| ADM809-5LART-REEL               | 4.63                | -40°C to +150°C   | M9L                  | 10           | 3-Lead SOT-23       | RT-3           |
| ADM809-5LART-REEL7              | 4.63                | -40°C to +150°C   | M9L                  | 3            | 3-Lead SOT-23       | RT-3           |
| ADM809-5LARTZ-REEL <sup>1</sup> | 4.63                | -40°C to +150°C   | M6Q                  | 10           | 3-Lead SOT-23       | RT-3           |
| ADM809-5LARTZ-RL7 <sup>1</sup>  | 4.63                | -40°C to +150°C   | M6Q                  | 3            | 3-Lead SOT-23       | RT-3           |
| ADM809-5LAKS-REEL               | 4.63                | -40°C to +150°C   | M9L                  | 10           | 3-Lead SC70         | KS-3           |
| ADM809-5LAKS-REEL7              | 4.63                | -40°C to +150°C   | M9L                  | 3            | 3-Lead SC70         | KS-3           |
| ADM809-5LAKSZ-REEL <sup>1</sup> | 4.63                | -40°C to +150°C   | M6Q                  | 10           | 3-Lead SC70         | KS-3           |
| ADM809-5LAKSZ-RL7 <sup>1</sup>  | 4.63                | -40°C to +150°C   | M6Q                  | 3            | 3-Lead SC70         | KS-3           |
| ADM809-5SART-REEL               | 2.93                | -40°C to +150°C   | M9S                  | 10           | 3-Lead SOT-23       | RT-3           |
| ADM809-5SART-REEL7              | 2.93                | -40°C to +150°C   | M9S                  | 3            | 3-Lead SOT-23       | RT-3           |
| ADM809-5SARTZ-REEL <sup>1</sup> | 2.93                | -40°C to +150°C   | M4C                  | 10           | 3-Lead SOT-23       | RT-3           |
| ADM809-5SARTZ-RL7 <sup>1</sup>  | 2.93                | -40°C to +150°C   | M4C                  | 3            | 3-Lead SOT-23       | RT-3           |
| ADM809-5SAKS-REEL               | 2.93                | -40°C to +150°C   | M9S                  | 10           | 3-Lead SC70         | KS-3           |
| ADM809-5SAKS-REEL7              | 2.93                | -40°C to +150°C   | M9S                  | 3            | 3-Lead SC70         | KS-3           |
| ADM809-5SAKSZ-RL <sup>1</sup>   | 2.93                | -40°C to +150°C   | M4C                  | 10           | 3-Lead SC70         | KS-3           |
| ADM809-5SAKSZ-RL7 <sup>1</sup>  | 2.93                | -40°C to +150°C   | M4C                  | 3            | 3-Lead SC70         | KS-3           |

<sup>1</sup> Z = RoHS Compliant Part.