



Microprocessor Supervisory Circuits in 3-Lead SC70 and SOT-23

ADM803/ADM809/ADM810

FEATURES

- Specified over Temperature
- Low Power Consumption (17 μ A)
- Precision Voltage Monitor: 2.5 V, 3 V, 3.3 V, 5 V Options
- Reset Assertion Down to 1 V V_{CC}
- 140 ms Min Power-On Reset
- Open-Drain $\overline{\text{RESET}}$ Output (ADM803)
- Push-Pull $\overline{\text{RESET}}$ Output (ADM809)
- Push-Pull RESET Output (ADM810)
- SC70 and SOT-23 Packages

APPLICATIONS

- Microprocessor Systems
- Computers
- Controllers
- Intelligent Instruments
- Automotive Systems

GENERAL DESCRIPTION

The ADM803/ADM809/ADM810 supervisory circuits monitor the power supply voltage in microprocessor systems. They provide a reset output during power-up, power-down, and brownout conditions. On power-up, an internal timer holds reset asserted for 240 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 ADM803 and ADM809 provide an active low reset signal ($\overline{\text{RESET}}$), while the ADM810 provides an active high signal (RESET) output. The ADM809 and ADM810 have push-pull outputs whereas the ADM803 has an open-drain output, which requires an external pull-up resistor.

Seven reset threshold voltage options are available, suitable for monitoring a variety of supply voltages. Refer to Table I.

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

The ADM803/ADM809/ADM810 consume only 17 μ A, making it suitable for low power portable equipment. The ADM803 is available in a 3-lead SC70; the ADM809/ADM810 is available in 3-lead SOT-23 and SC70 packages.

FUNCTIONAL BLOCK DIAGRAM

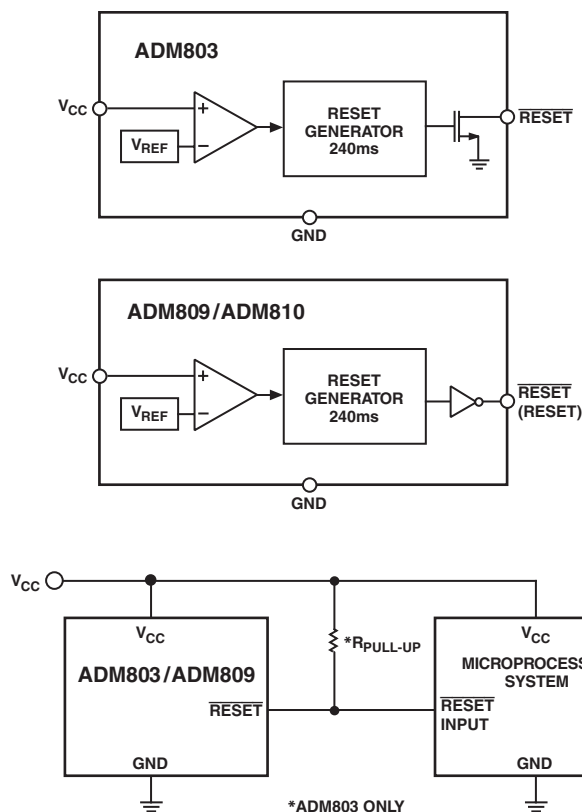


Figure 1. Typical Operating Circuit

REV. C

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ADM803/ADM809/ADM810—SPECIFICATIONS

(V_{CC} = full operating range, $T_A = T_{MIN}$ to T_{MAX} ,
 V_{CC} Typ = 5 V for L/M/J models, 3.3 V for T/S models, 3 V for R models, 2.5 V for Z models, unless otherwise noted.)

| Parameter | Min | Typ | Max | Unit | Test Conditions/Comments |
|--|----------------|------|------|-----------------------|---|
| V_{CC} OPERATING VOLTAGE RANGE | 1.0 | | 5.5 | V | $T_A = 0^\circ\text{C}$ to 70°C |
| Supply Current | 1.2 | | 5.5 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| | | 24 | 35 | μA | $V_{CC} < 5.5$ V, ADM8_L/M/J, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| | | 17 | 30 | μA | $V_{CC} < 3.6$ V, ADM8_R/S/T/Z, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| | | | 60 | μA | $V_{CC} < 5.5$ V, ADM8_L/M/J, $T_A = 85^\circ\text{C}$ to 125°C |
| | | | 60 | μA | $V_{CC} < 3.6$ V, ADM8_R/S/T/Z, $T_A = 85^\circ\text{C}$ to 125°C |
| RESET THRESHOLD | | | | | |
| Reset Voltage Threshold | | | | | |
| ADM8_L | 4.56 | 4.63 | 4.70 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_L | 4.50 | | 4.75 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_L | 4.44 | | 4.82 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| ADM8_M | 4.31 | 4.38 | 4.45 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_M | 4.25 | | 4.50 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_M | 4.20 | | 4.56 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| ADM8_J* | 3.93 | 4.00 | 4.06 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_J* | 3.89 | | 4.10 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_J* | 3.80 | | 4.20 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| ADM8_T | 3.04 | 3.08 | 3.11 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_T | 3.00 | | 3.15 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_T | 2.95 | | 3.21 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| ADM8_S | 2.89 | 2.93 | 2.96 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_S | 2.85 | | 3.00 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_S | 2.81 | | 3.05 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| ADM8_R | 2.59 | 2.63 | 2.66 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_R | 2.55 | | 2.70 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_R | 2.52 | | 2.74 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| ADM8_Z | 2.28 | 2.32 | 2.35 | V | $T_A = 25^\circ\text{C}$ |
| ADM8_Z | 2.25 | | 2.38 | V | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| ADM8_Z | 2.22 | | 2.42 | V | $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$ |
| RESET THRESHOLD TEMPERATURE COEFFICIENT | | 30 | | ppm/ $^\circ\text{C}$ | |
| V_{CC} to Reset Delay | | 20 | | μs | $V_{CC} = V_{TH}$ to $(V_{TH} - 100 \text{ mV})$ |
| RESET ACTIVE TIMEOUT PERIOD | 140 | 240 | 460 | ms | $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ |
| | 100 | | 840 | ms | $T_A = 85^\circ\text{C}$ to 125°C |
| RESET OUTPUT VOLTAGE LOW (ADM803/ADM809) | | | 0.3 | V | $V_{CC} = V_{TH} \text{ min}$, $I_{SINK} = 1.2 \text{ mA}$, ADM803R/S/T/Z, ADM809R/S/T/Z |
| | | | 0.4 | V | $V_{CC} = V_{TH} \text{ min}$, $I_{SINK} = 3.2 \text{ mA}$, ADM803L/M/J, ADM809L/M/J |
| | | | 0.3 | V | $V_{CC} > 1.0 \text{ V}$, $I_{SINK} = 50 \mu\text{A}$ |
| RESET OUTPUT VOLTAGE HIGH (ADM809) | 0.8 V_{CC} | | | V | $V_{CC} > V_{TH} \text{ max}$, $I_{SOURCE} = 500 \mu\text{A}$, ADM809R/S/T/Z |
| | $V_{CC} - 1.5$ | | | V | $V_{CC} > V_{TH} \text{ max}$, $I_{SOURCE} = 800 \mu\text{A}$, ADM809L/M/J |
| RESET OUTPUT VOLTAGE LOW (ADM810) | | | 0.3 | V | $V_{CC} = V_{TH} \text{ min}$, $I_{SINK} = 1.2 \text{ mA}$, ADM810R/S/T/Z |
| | | | 0.4 | V | $V_{CC} = V_{TH} \text{ min}$, $I_{SINK} = 3.2 \text{ mA}$, ADM810L/M/J |
| RESET OUTPUT VOLTAGE HIGH (ADM810) | 0.8 V_{CC} | | | V | $1.8 \text{ V} < V_{CC} < V_{TH} \text{ min}$, $I_{SOURCE} = 150 \mu\text{A}$ |
| RESET OPEN-DRAIN OUTPUT Leakage Current (ADM803) | | | 1 | μA | $V_{CC} > V_{TH}$, reset de-asserted |

*ADM809/ADM810 only.

Specifications subject to change without notice.

ABSOLUTE MAXIMUM RATINGS*

(T_A = 25°C, unless otherwise noted.)

V_{CC} -0.3 V to +6 V

RESET, $\overline{\text{RESET}}$ -0.3 V to V_{CC} + 0.5 V

Input Current

V_{CC} 20 mA

Output Current

RESET, $\overline{\text{RESET}}$ 20 mA

Rate of Rise, V_{CC} 100 V/μs

θ_{JA} Thermal Impedance, SC70 146°C/W

θ_{JA} Thermal Impedance, SOT-23 270°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

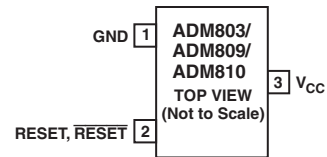
*Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not implied. Exposure to absolute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

Table I. Reset Threshold Options

| RESET Model | Threshold (V) |
|-------------|---------------|
| ADM8_L | 4.63 |
| ADM8_M | 4.38 |
| ADM8_J* | 4.00 |
| ADM8_T | 3.08 |
| ADM8_S | 2.93 |
| ADM8_R | 2.63 |
| ADM8_Z | 2.32 |

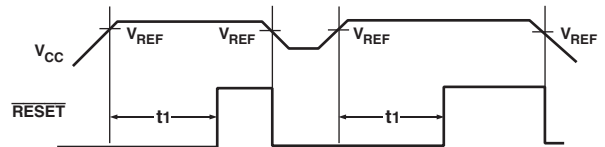
*ADM809/ADM810 only.

PIN CONFIGURATION



PIN FUNCTION DESCRIPTIONS

| Pin No. | Mnemonic | Function |
|---------|---|---|
| 1 | GND | 0 V. Ground reference for all signals. |
| 2 | $\overline{\text{RESET}}$ (ADM803/ADM809) | Active Low Logic Output. $\overline{\text{RESET}}$ remains low while V _{CC} is below the reset threshold and remains low for 240 ms (typ) after V _{CC} rises above the reset threshold. |
| 2 | RESET (ADM810) | Active High Logic Output. RESET remains high while V _{CC} is below the reset threshold and remains high for 240 ms (typ) after V _{CC} rises above the reset threshold. |
| 3 | V _{CC} | Supply Voltage Being Monitored. |



t₁ = RESET TIME = 240ms TYP
V_{REF} = RESET VOLTAGE THRESHOLD

Figure 2. Power Fail Reset Timing

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 ADM803/ADM809/ADM810 feature 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.



ADM803/ADM809/ADM810

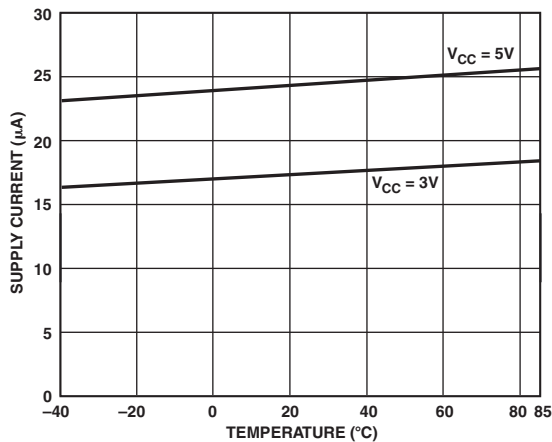
ORDERING GUIDE (ADM803 and ADM809)

| Model | Reset Threshold (V) | Temperature Range | Branding | Quantity | Package Type |
|-------------------|---------------------|-------------------|----------|----------|---------------|
| ADM803LAKS-REEL | 4.63 | –40°C to +125°C | M02 | 10 k | 3-Lead SC70 |
| ADM803LAKS-REEL-7 | 4.63 | –40°C to +125°C | M02 | 3 k | 3-Lead SC70 |
| ADM803MAKS-REEL | 4.38 | –40°C to +125°C | M03 | 10 k | 3-Lead SC70 |
| ADM803MAKS-REEL-7 | 4.38 | –40°C to +125°C | M03 | 3 k | 3-Lead SC70 |
| ADM803TAKS-REEL | 3.08 | –40°C to +125°C | M05 | 10 k | 3-Lead SC70 |
| ADM803TAKS-REEL-7 | 3.08 | –40°C to +125°C | M05 | 3 k | 3-Lead SC70 |
| ADM803SAKS-REEL | 2.93 | –40°C to +125°C | M06 | 10 k | 3-Lead SC70 |
| ADM803SAKS-REEL-7 | 2.93 | –40°C to +125°C | M06 | 3 k | 3-Lead SC70 |
| ADM803RAKS-REEL | 2.63 | –40°C to +125°C | M07 | 10 k | 3-Lead SC70 |
| ADM803RAKS-REEL-7 | 2.63 | –40°C to +125°C | M07 | 3 k | 3-Lead SC70 |
| ADM803ZAKS-REEL | 2.32 | –40°C to +125°C | M08 | 10 k | 3-Lead SC70 |
| ADM803ZAKS-REEL-7 | 2.32 | –40°C to +125°C | M08 | 3 k | 3-Lead SC70 |
| ADM809LART-REEL | 4.63 | –40°C to +125°C | 9LXX | 10 k | 3-Lead SOT-23 |
| ADM809LART-REEL-7 | 4.63 | –40°C to +125°C | 9LXX | 3 k | 3-Lead SOT-23 |
| ADM809LAKS-REEL | 4.63 | –40°C to +125°C | M9A | 10 k | 3-Lead SC70 |
| ADM809LAKS-REEL-7 | 4.63 | –40°C to +125°C | M9A | 3 k | 3-Lead SC70 |
| ADM809MART-REEL | 4.38 | –40°C to +125°C | 9MXX | 10 k | 3-Lead SOT-23 |
| ADM809MART-REEL-7 | 4.38 | –40°C to +125°C | 9MXX | 3 k | 3-Lead SOT-23 |
| ADM809MAKS-REEL | 4.38 | –40°C to +125°C | M9B | 10 k | 3-Lead SC70 |
| ADM809MAKS-REEL-7 | 4.38 | –40°C to +125°C | M9B | 3 k | 3-Lead SC70 |
| ADM809JART-REEL | 4.00 | –40°C to +125°C | 9JXX | 10 k | 3-Lead SOT-23 |
| ADM809JART-REEL-7 | 4.00 | –40°C to +125°C | 9JXX | 3 k | 3-Lead SOT-23 |
| ADM809JAKS-REEL | 4.00 | –40°C to +125°C | M9C | 10 k | 3-Lead SC70 |
| ADM809JAKS-REEL-7 | 4.00 | –40°C to +125°C | M9C | 3 k | 3-Lead SC70 |
| ADM809TART-REEL | 3.08 | –40°C to +125°C | 9TXX | 10 k | 3-Lead SOT-23 |
| ADM809TART-REEL-7 | 3.08 | –40°C to +125°C | 9TXX | 3 k | 3-Lead SOT-23 |
| ADM809TAKS-REEL | 3.08 | –40°C to +125°C | M9D | 10 k | 3-Lead SC70 |
| ADM809TAKS-REEL-7 | 3.08 | –40°C to +125°C | M9D | 3 k | 3-Lead SC70 |
| ADM809SART-REEL | 2.93 | –40°C to +125°C | 9SXX | 10 k | 3-Lead SOT-23 |
| ADM809SART-REEL-7 | 2.93 | –40°C to +125°C | 9SXX | 3 k | 3-Lead SOT-23 |
| ADM809SAKS-REEL | 2.93 | –40°C to +125°C | M9E | 10 k | 3-Lead SC70 |
| ADM809SAKS-REEL-7 | 2.93 | –40°C to +125°C | M9E | 3 k | 3-Lead SC70 |
| ADM809RART-REEL | 2.63 | –40°C to +125°C | 9RXX | 10 k | 3-Lead SOT-23 |
| ADM809RART-REEL-7 | 2.63 | –40°C to +125°C | 9RXX | 3 k | 3-Lead SOT-23 |
| ADM809RAKS-REEL | 2.63 | –40°C to +125°C | M9F | 10 k | 3-Lead SC70 |
| ADM809RAKS-REEL-7 | 2.63 | –40°C to +125°C | M9F | 3 k | 3-Lead SC70 |
| ADM809ZART-REEL | 2.32 | –40°C to +125°C | 9ZXX | 10 k | 3-Lead SOT-23 |
| ADM809ZART-REEL-7 | 2.32 | –40°C to +125°C | 9ZXX | 3 k | 3-Lead SOT-23 |
| ADM809ZAKS-REEL | 2.32 | –40°C to +125°C | M9G | 10 k | 3-Lead SC70 |
| ADM809ZAKS-REEL-7 | 2.32 | –40°C to +125°C | M9G | 3 k | 3-Lead SC70 |

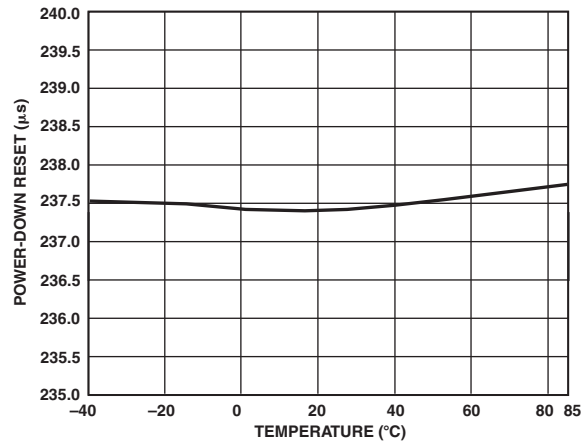
ORDERING GUIDE (ADM810)

| Model | Reset Threshold (V) | Temperature Range | Branding | Quantity | Package Type |
|-------------------|----------------------------|--------------------------|-----------------|-----------------|---------------------|
| ADM810LART-REEL | 4.63 | −40°C to +125°C | ALXX | 10 k | 3-Lead SOT-23 |
| ADM810LART-REEL-7 | 4.63 | −40°C to +125°C | ALXX | 3 k | 3-Lead SOT-23 |
| ADM810LAKS-REEL | 4.63 | −40°C to +125°C | MAA | 10 k | 3-Lead SC70 |
| ADM810LAKS-REEL-7 | 4.63 | −40°C to +125°C | MAA | 3 k | 3-Lead SC70 |
| ADM810MART-REEL | 4.38 | −40°C to +125°C | AMXX | 10 k | 3-Lead SOT-23 |
| ADM810MART-REEL-7 | 4.38 | −40°C to +125°C | AMXX | 3 k | 3-Lead SOT-23 |
| ADM810MAKS-REEL | 4.38 | −40°C to +125°C | MAB | 10 k | 3-Lead SC70 |
| ADM810MAKS-REEL-7 | 4.38 | −40°C to +125°C | MAB | 3 k | 3-Lead SC70 |
| ADM810JART-REEL | 4.00 | −40°C to +125°C | AJXX | 10 k | 3-Lead SOT-23 |
| ADM810JART-REEL-7 | 4.00 | −40°C to +125°C | AJXX | 3 k | 3-Lead SOT-23 |
| ADM810JAKS-REEL | 4.00 | −40°C to +125°C | MAC | 10 k | 3-Lead SC70 |
| ADM810JAKS-REEL-7 | 4.00 | −40°C to +125°C | MAC | 3 k | 3-Lead SC70 |
| ADM810TART-REEL | 3.08 | −40°C to +125°C | ATXX | 10 k | 3-Lead SOT-23 |
| ADM810TART-REEL-7 | 3.08 | −40°C to +125°C | ATXX | 3 k | 3-Lead SOT-23 |
| ADM810TAKS-REEL | 3.08 | −40°C to +125°C | MAD | 10 k | 3-Lead SC70 |
| ADM810TAKS-REEL-7 | 3.08 | −40°C to +125°C | MAD | 3 k | 3-Lead SC70 |
| ADM810SART-REEL | 2.93 | −40°C to +125°C | ASXX | 10 k | 3-Lead SOT-23 |
| ADM810SART-REEL-7 | 2.93 | −40°C to +125°C | ASXX | 3 k | 3-Lead SOT-23 |
| ADM810SAKS-REEL | 2.93 | −40°C to +125°C | MAE | 10 k | 3-Lead SC70 |
| ADM810SAKS-REEL-7 | 2.93 | −40°C to +125°C | MAE | 3 k | 3-Lead SC70 |
| ADM810RART-REEL | 2.63 | −40°C to +125°C | ARXX | 10 k | 3-Lead SOT-23 |
| ADM810RART-REEL-7 | 2.63 | −40°C to +125°C | ARXX | 3 k | 3-Lead SOT-23 |
| ADM810RAKS-REEL | 2.63 | −40°C to +125°C | MAF | 10 k | 3-Lead SC70 |
| ADM810RAKS-REEL-7 | 2.63 | −40°C to +125°C | MAF | 3 k | 3-Lead SC70 |
| ADM810ZART-REEL | 2.32 | −40°C to +125°C | AZXX | 10 k | 3-Lead SOT-23 |
| ADM810ZART-REEL-7 | 2.32 | −40°C to +125°C | AZXX | 3 k | 3-Lead SOT-23 |
| ADM810ZAKS-REEL | 2.32 | −40°C to +125°C | MAG | 10 k | 3-Lead SC70 |
| ADM810ZAKS-REEL-7 | 2.32 | −40°C to +125°C | MAG | 3 k | 3-Lead SC70 |

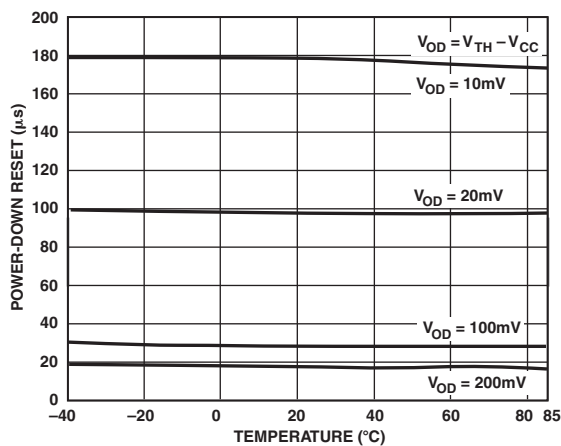
ADM803/ADM809/ADM810—Typical Performance Characteristics



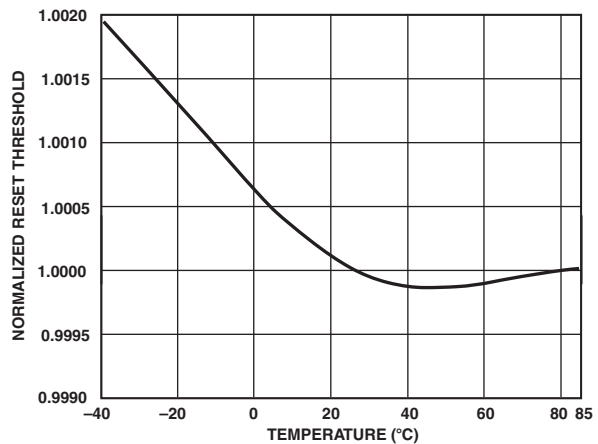
TPC 1. Supply Current vs. Temperature (No Load)



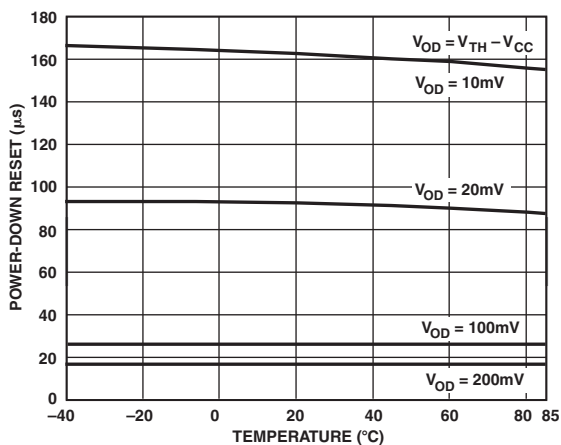
TPC 4. Power-Down RESET Delay vs. Temperature ADM8_R



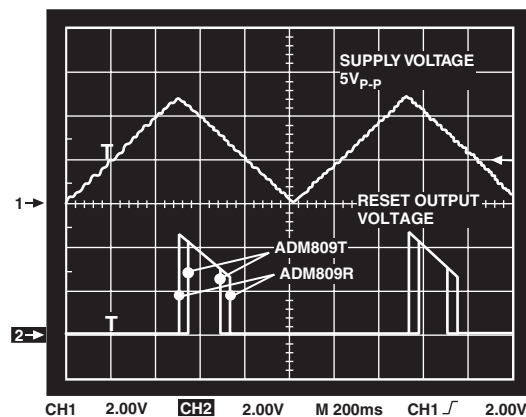
TPC 2. Power-Down RESET Delay vs. Temperature ADM8_L/M/J



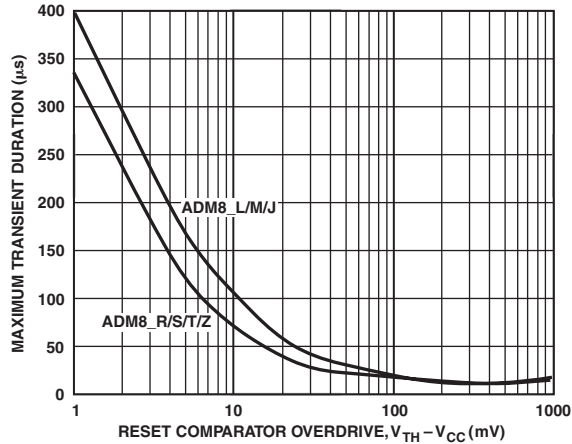
TPC 5. Normalized RESET Voltage Threshold vs. Temperature



TPC 3. Power-Down RESET Delay vs. Temperature ADM8_T/S/R/Z



TPC 6. RESET Output Voltage vs. Supply Voltage



TPC 7. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive

INTERFACING TO OTHER DEVICES' OUTPUT

The ADM803/ADM809/ADM810 series is designed to integrate with as many devices as possible and, therefore, has a standard output dependent on V_{CC} . This enables the part to be used in both 3 V and 5 V or any nominal voltage within the minimum and maximum specifications for 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, the ADM803/ADM809's \overline{RESET} no longer sinks current. A high impedance CMOS logic input connected to \overline{RESET} may, therefore, drift to undetermined logic levels. To eliminate this problem, a 100 k Ω resistor should be connected from \overline{RESET} to ground.

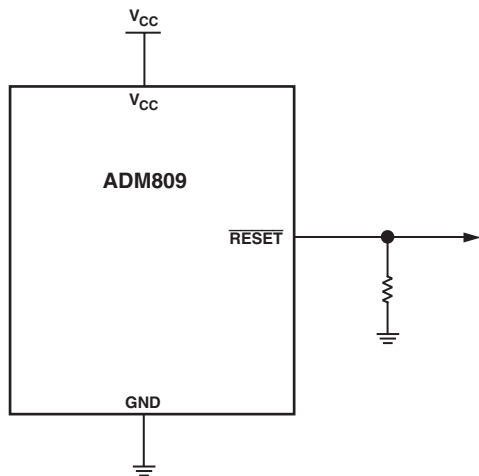


Figure 3. Ensuring a Valid Reset Output Down to $V_{CC} = 0$ V

Benefits of a Very Accurate Reset Threshold

In other microprocessor supervisory circuits, tolerances in supply voltages lead to an overall increase in reset tolerance levels due to the deterioration of the microprocessor reset circuit's power supply. The possibility of a malfunction during a power failure is greatly reduced because the ADM803/ADM809/ADM810 series can operate effectively even when there are large degradations of the supply voltages. Another advantage of the ADM803/ADM809/ADM810 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 (e.g., thermal, altitude, and velocity sensors). The ADM803/ADM809/ADM810 can easily be integrated into existing interrupt-handling circuits (Figure 4) or be used as a standalone device.

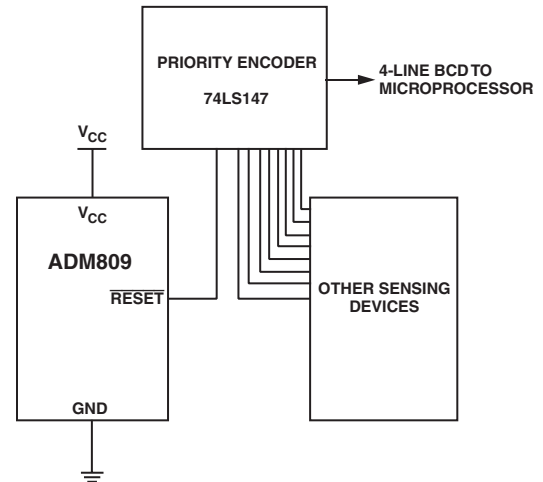
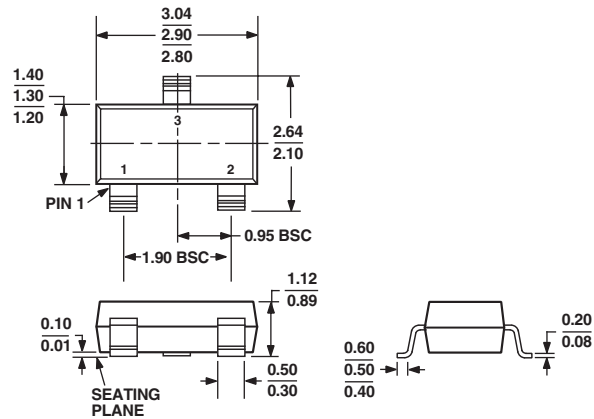


Figure 4. Interfacing to Microprocessors with Multiple Interrupts

OUTLINE DIMENSIONS

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

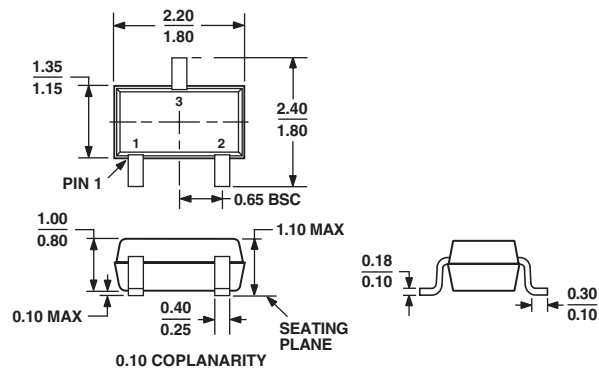
Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS TO-236AB

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

Dimensions shown in millimeters



Revision History

| Location | Page |
|--|-----------|
| 6/03—Data Sheet changed from REV. B to REV. C. | |
| Added ADM803 | Universal |
| Changes to FEATURES | 1 |
| Changes to GENERAL DESCRIPTION | 1 |
| Changes to Figure 1 | 1 |
| Changes to SPECIFICATIONS | 2 |
| Changes to Table I | 3 |
| Updated ORDERING GUIDE | 4 |
| 1/03—Data Sheet changed from REV. A to REV. B. | |
| Changes to SPECIFICATIONS | 2 |
| Changes to Table I | 3 |
| Changes to ORDERING GUIDE | 4 |
| Changes to TPCs 1–3, and TPC 7 | 5 |
| Updated OUTLINE DIMENSIONS | 7 |
| 10/02—Data Sheet changed from REV. 0 to REV. A. | |
| Addition of SC70 package | Universal |
| Change to GENERAL DESCRIPTION | 1 |
| Changes to SPECIFICATIONS | 2 |
| Changes to ABSOLUTE MAXIMUM RATINGS | 3 |
| Change to Table I | 3 |
| Change to ORDERING GUIDE | 4 |
| Change to TPC 1 | 5 |
| Updated OUTLINE DIMENSIONS | 7 |

