

## ADM1810–ADM1813/ADM1815–ADM1818

### FEATURES

Reliable Low Cost Voltage Monitor with Reset Output Suitable for Monitoring 2.5 V, 3 V, 3.3 V, and 5 V Power Supply Voltages

Reset Threshold Levels: 4.62 V, 4.35 V, 3.06 V, 2.88 V, 2.55 V, 2.31 V, and 2.18 V (Typ)

Active High and Low Push-Pull Output Choices (ADM1810, ADM1812, ADM1815, and ADM1817)

Open-Drain Output Choices (ADM1811, ADM1813, ADM1816, and ADM1818)

Can Be Used with a Manual Push-Button to Generate a Reset (ADM1813, ADM1818)

Initialize Microprocessor Systems with Added Safety Available in 3-Lead SOT-23 and SC70 Packages

### APPLICATIONS

Microprocessor Systems

Computers

Controllers

Intelligent Instruments

Automotive Systems

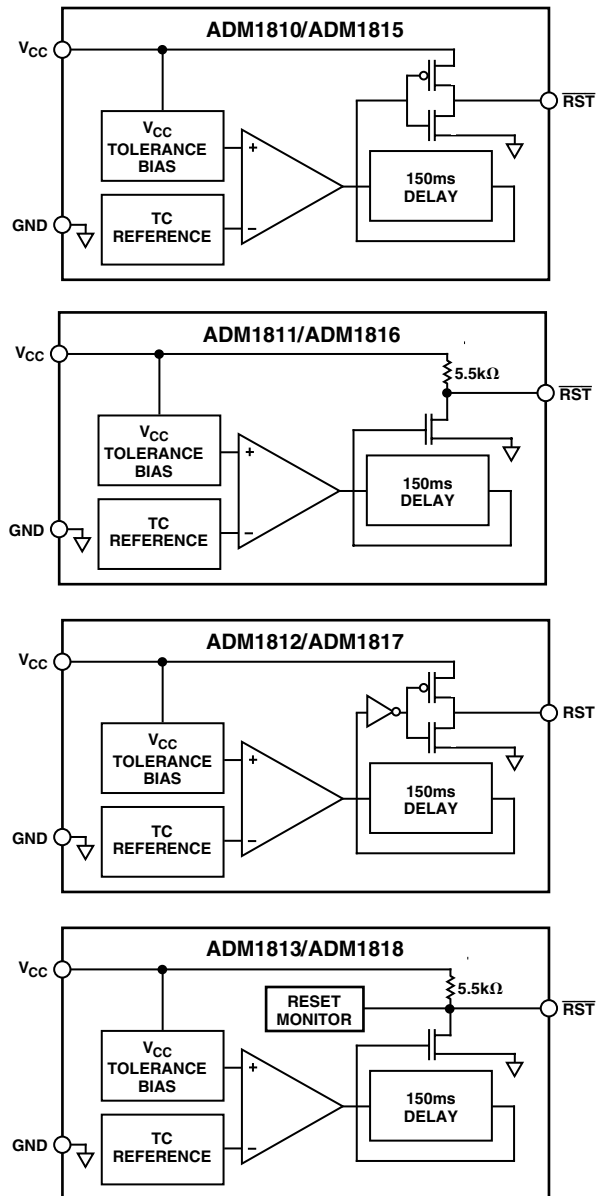
### GENERAL DESCRIPTION

The ADM181x range of voltage monitoring circuits can be used in any application where an electronic system needs to be reset when a voltage increases above or below a predetermined value.

Because of the reset delay time incorporated into the ADM181x series, these devices can provide a safe startup for electronic systems. Before a system initializes, the power supply must stabilize. Using the ADM181x series ensures that there are typically 150 ms for the power supply to stabilize before the system is reset and safe system initialization begins.

The ADM181x series of microprocessor reset circuits are available in low cost, space-saving SOT-23 and SC70 packages.

### FUNCTIONAL BLOCK DIAGRAMS



REV. C

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# ADM1810–ADM1813/ADM1815–ADM1818 SPECIFICATIONS

( $V_{CC}$  = Full Operating Range,  $T_A$  =  $-40^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$ , unless otherwise noted.)

Parameter	Min	Typ	Max	Unit	Conditions/Note
<b>SUPPLY</b>					
Voltage	1		5.5	V	$T_A = 0^{\circ}\text{C}$ to $105^{\circ}\text{C}$
	1.2		5.5	V	$T_A = -40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$
Current		9	16	$\mu\text{A}$	$V_{CC} = 5.5\text{ V}$ , $V_{CC} > V_{TH}$ , No Load
		4	10	$\mu\text{A}$	$V_{CC} = 3.6\text{ V}$ , $V_{CC} > V_{TH}$ , No Load
<b>OUTPUT CURRENT</b>					
$\overline{\text{RST}}$ Output Source Current		350		$\mu\text{A}$	$V_{CC} \geq V_{TH}$ (Max), Reset Not Asserted (ADM1810/ADM1815)
RST Output Source Current		350		$\mu\text{A}$	$V_{CC} \leq V_{TH}$ (Min), Reset Asserted (ADM1812/ADM1817)
$\overline{\text{RST}}$ Output Sink Current	8			mA	$V_{CC} \geq 2.7\text{ V}$ , Reset Asserted, $V_{OUT} = 0.4\text{ V}$ , (ADM1810/ADM1811/ADM1813/ADM1815/ADM1816/ADM1818)
RST Output Sink Current	8			mA	$V_{CC} \geq 2.7\text{ V}$ , Reset Not Asserted, $V_{OUT} = 0.4\text{ V}$ (ADM1812/ADM1817)
<b>OUTPUT VOLTAGE</b>					
	$V_{CC} - 0.5$	$V_{CC} - 0.1$		V	(ADM1810/ADM1812/ADM1815/ADM1817) @ $0\text{ }\mu\text{A}$ to $500\text{ }\mu\text{A}$
<b><math>V_{CC}</math> TRIP POINT</b>					
ADM1810-5, ADM1811-5, ADM1812-5, ADM1813-5	4.50	4.62	4.75	V	
ADM1810-10, ADM1811-10, ADM1812-10, ADM1813-10	4.25	4.35	4.49	V	
ADM1815-5, ADM1816-5, ADM1817-5, ADM1818-5	2.98	3.06	3.15	V	
ADM1815-10, ADM1816-10, ADM1817-10, ADM1818-10	2.80	2.88	2.97	V	
ADM1815-20, ADM1816-20, ADM1817-20, ADM1818-20	2.47	2.55	2.64	V	
ADM1815-R23, ADM1816-R23, ADM1817-R23, ADM1818-R23	2.25	2.31	2.37	V	
ADM1815-R22, ADM1816-R22, ADM1817-R22, ADM1818-R22	2.12	2.18	2.25	V	
<b>INTERNAL PULL-UP RESISTOR</b>					
ADM1811/ADM1816	3.5	5.5	7.5	k $\Omega$	
ADM1813/ADM1818	3.1	5.5	7.5	k $\Omega$	
<b>OUTPUT CAPACITANCE</b>					
			10	pF	
<b>RESET ACTIVE TIME</b>					
	100	150	250	ms	
<b><math>V_{CC}</math> DETECT TO RESET</b>					
Falling		10		$\mu\text{s}$	(ADM1810/ADM1811/ADM1812/ADM1813)
		10		$\mu\text{s}$	(ADM1815/ADM1816/ADM1817/ADM1818)
Rising	100	150	250	ms	$t_R = 5\text{ }\mu\text{s}$
<b>PUSH-BUTTON DETECT TO <math>\overline{\text{RST}}</math></b>					
	1			$\mu\text{s}$	(ADM1813/ADM1818)
<b>PUSH-BUTTON RESET</b>					
	100	150	250	ms	(ADM1813/ADM1818)

Specifications subject to change without notice.

# ADM1810–ADM1813/ADM1815–ADM1818

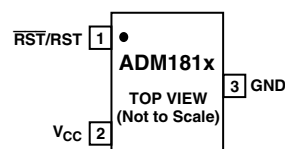
## ABSOLUTE MAXIMUM RATINGS\*

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

V <sub>CC</sub>	–0.3 V to +6.0 V
Input Current	20 mA
Operating Temperature Range	–40°C to +105°C
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.

## PIN CONFIGURATION



## PIN FUNCTION DESCRIPTIONS

Pin	Mnemonic	Function
1	$\overline{\text{RST}}/\text{RST}$	Reset Output. $\overline{\text{RST}}/\text{RST}$ remains active while V <sub>CC</sub> is below the reset threshold and remains active for 150 ms (typ) after V <sub>CC</sub> rises above the reset threshold.
2	V <sub>CC</sub>	Supply voltage being monitored.
3	GND	0 V. Ground reference for all signals.

## ORDERING GUIDE

Model*	Trip Point	Package Option	Brand	Model*	Trip Point	Package Option	Brand
ADM1810-5AKS-REEL	4.62 V	KS-3 (SC70)	MZV	ADM1813-5ART-REEL7	4.62 V	RT-3 (SOT-23)	M3V
ADM1810-5AKS-REEL7	4.62 V	KS-3 (SC70)	MZV	ADM1813-10AKS-REEL	4.35 V	KS-3 (SC70)	M3T
ADM1810-5ART-REEL	4.62 V	RT-3 (SOT-23)	MZV	ADM1813-10AKS-REEL7	4.35 V	KS-3 (SC70)	M3T
ADM1810-5ART-REEL7	4.62 V	RT-3 (SOT-23)	MZV	ADM1813-10ART-REEL	4.35 V	RT-3 (SOT-23)	M3T
ADM1810-10AKS-REEL	4.35 V	KS-3 (SC70)	MZT	ADM1813-10ART-REEL7	4.35 V	RT-3 (SOT-23)	M3T
ADM1810-10AKS-REEL7	4.35 V	KS-3 (SC70)	MZT	ADM1815-5AKS-REEL	3.06 V	KS-3 (SC70)	M5K
ADM1810-10ART-REEL	4.35 V	RT-3 (SOT-23)	MZT	ADM1815-5AKS-REEL7	3.06 V	KS-3 (SC70)	M5K
ADM1810-10ART-REEL7	4.35 V	RT-3 (SOT-23)	MZT	ADM1815-5ART-REEL	3.06 V	RT-3 (SOT-23)	M5K
ADM1811-5AKS-REEL	4.62 V	KS-3 (SC70)	M1V	ADM1815-5ART-REEL7	3.06 V	RT-3 (SOT-23)	M5K
ADM1811-5AKS-REEL7	4.62 V	KS-3 (SC70)	M1V	ADM1815-10AKS-REEL	2.88 V	KS-3 (SC70)	M5E
ADM1811-5ART-REEL	4.62 V	RT-3 (SOT-23)	M1V	ADM1815-10AKS-REEL7	2.88 V	KS-3 (SC70)	M5E
ADM1811-5ART-REEL7	4.62 V	RT-3 (SOT-23)	M1V	ADM1815-10ART-REEL	2.88 V	RT-3 (SOT-23)	M5E
ADM1811-10AKS-REEL	4.35 V	KS-3 (SC70)	M1T	ADM1815-10ART-REEL7	2.88 V	RT-3 (SOT-23)	M5E
ADM1811-10AKS-REEL7	4.35 V	KS-3 (SC70)	M1T	ADM1815-20AKS-REEL	2.55 V	KS-3 (SC70)	M5A
ADM1811-10ART-REEL	4.35 V	RT-3 (SOT-23)	M1T	ADM1815-20AKS-REEL7	2.55 V	KS-3 (SC70)	M5A
ADM1811-10ART-REEL7	4.35 V	RT-3 (SOT-23)	M1T	ADM1815-20ART-REEL	2.55 V	RT-3 (SOT-23)	M5A
ADM1812-5AKS-REEL	4.62 V	KS-3 (SC70)	MTV	ADM1815-20ART-REEL7	2.55 V	RT-3 (SOT-23)	M5A
ADM1812-5AKS-REEL7	4.62 V	KS-3 (SC70)	MTV	ADM1815-R22AKS-REEL	2.18 V	KS-3 (SC70)	M5B
ADM1812-5ART-REEL	4.62 V	RT-3 (SOT-23)	MTV	ADM1815-R22AKS-REEL7	2.18 V	KS-3 (SC70)	M5B
ADM1812-5ART-REEL7	4.62 V	RT-3 (SOT-23)	MTV	ADM1815-R22ART-REEL	2.18 V	RT-3 (SOT-23)	M5B
ADM1812-10AKS-REEL	4.35 V	KS-3 (SC70)	MTT	ADM1815-R22ART-REEL7	2.18 V	RT-3 (SOT-23)	M5B
ADM1812-10AKS-REEL7	4.35 V	KS-3 (SC70)	MTT	ADM1815-R23AKS-REEL	2.31 V	KS-3 (SC70)	M5C
ADM1812-10ART-REEL	4.35 V	RT-3 (SOT-23)	MTT	ADM1815-R23AKS-REEL7	2.31 V	KS-3 (SC70)	M5C
ADM1812-10ART-REEL7	4.35 V	RT-3 (SOT-23)	MTT	ADM1815-R23ART-REEL	2.31 V	RT-3 (SOT-23)	M5C
ADM1813-5AKS-REEL	4.62 V	KS-3 (SC70)	M3V	ADM1815-R23ART-REEL7	2.31 V	RT-3 (SOT-23)	M5C
ADM1813-5AKS-REEL7	4.62 V	KS-3 (SC70)	M3V	ADM1816-5AKS-REEL	3.06 V	KS-3 (SC70)	M6K
ADM1813-5ART-REEL	4.62 V	RT-3 (SOT-23)	M3V	ADM1816-5AKS-REEL7	3.06 V	KS-3 (SC70)	M6K

\*Only available in reels.

## 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 ADM1810–ADM1813/ADM1815–ADM1818 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.



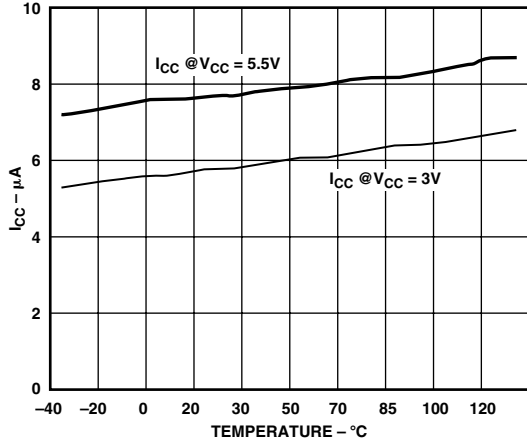
# ADM1810–ADM1813/ADM1815–ADM1818

## ORDERING GUIDE (continued)

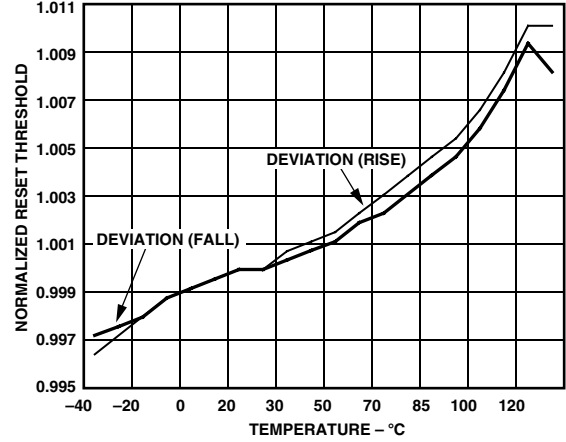
Model*	Trip Point	Package Option	Brand	Model*	Trip Point	Package Option	Brand
ADM1816-5ART-REEL	3.06 V	RT-3 (SOT-23)	M6K	ADM1817-20ART-REEL7	2.55 V	RT-3 (SOT-23)	M7A
ADM1816-5ART-REEL7	3.06 V	RT-3 (SOT-23)	M6K	ADM1817-R22AKS-REEL	2.18 V	KS-3 (SC70))	M7B
ADM1816-10AKS-REEL	2.88 V	KS-3 (SC70)	M6E	ADM1817-R22AKS-REEL7	2.18 V	KS-3 (SC70)	M7B
ADM1816-10AKS-REEL7	2.88 V	KS-3 (SC70)	M6E	ADM1817-R22ART-REEL	2.18 V	RT-3 (SOT-23)	M7B
ADM1816-10ART-REEL	2.88 V	RT-3 (SOT-23)	M6E	ADM1817-R22ART-REEL7	2.18 V	RT-3 (SOT-23)	M7B
ADM1816-10ART-REEL7	2.88 V	RT-3 (SOT-23)	M6E	ADM1817-R23AKS-REEL	2.31 V	KS-3 (SC70)	M7C
ADM1816-20AKS-REEL	2.55 V	KS-3 (SC70)	M6A	ADM1817-R23AKS-REEL7	2.31 V	KS-3 (SC70)	M7C
ADM1816-20AKS-REEL7	2.55 V	KS-3 (SC70)	M6A	ADM1817-R23ART-REEL	2.31 V	RT-3 (SOT-23)	M7C
ADM1816-20ART-REEL	2.55 V	RT-3 (SOT-23)	M6A	ADM1817-R23ART-REEL7	2.31 V	RT-3 (SOT-23)	M7C
ADM1816-20ART-REEL7	2.55 V	RT-3 (SOT-23)	M6A	ADM1818-5AKS-REEL	3.06 V	KS-3 (SC70)	M8K
ADM1816-R22AKS-REEL	2.18 V	KS-3 (SC70)	M6B	ADM1818-5AKS-REEL7	3.06 V	KS-3 (SC70)	M8K
ADM1816-R22AKS-REEL7	2.18 V	KS-3 (SC70)	M6B	ADM1818-5ART-REEL	3.06 V	RT-3 (SOT-23)	M8K
ADM1816-R22ART-REEL	2.18 V	RT-3 (SOT-23)	M6B	ADM1818-5ART-REEL7	3.06 V	RT-3 (SOT-23)	M8K
ADM1816-R22ART-REEL7	2.18 V	RT-3 (SOT-23)	M6B	ADM1818-10AKS-REEL	2.88 V	KS-3 (SC70)	M8E
ADM1816-R23AKS-REEL	2.31 V	KS-3 (SC70)	M6C	ADM1818-10AKS-REEL7	2.88 V	KS-3 (SC70)	M8E
ADM1816-R23AKS-REEL7	2.31 V	KS-3 (SC70)	M6C	ADM1818-10ART-REEL	2.88 V	RT-3 (SOT-23)	M8E
ADM1816-R23ART-REEL	2.31 V	RT-3 (SOT-23)	M6C	ADM1818-10ART-REEL7	2.88 V	RT-3 (SOT-23)	M8E
ADM1816-R23ART-REEL7	2.31 V	RT-3 (SOT-23)	M6C	ADM1818-20AKS-REEL	2.55 V	KS-3 (SC70)	M8A
ADM1817-5AKS-REEL	3.06 V	KS-3 (SC70)	M7K	ADM1818-20AKS-REEL7	2.55 V	KS-3 (SC70)	M8A
ADM1817-5AKS-REEL7	3.06 V	KS-3 (SC70)	M7K	ADM1818-20ART-REEL	2.55 V	RT-3 (SOT-23)	M8A
ADM1817-5ART-REEL	3.06 V	RT-3 (SOT-23)	M7K	ADM1818-20ART-REEL7	2.55 V	RT-3 (SOT-23)	M8A
ADM1817-5ART-REEL7	3.06 V	RT-3 (SOT-23)	M7K	ADM1818-R22AKS-REEL	2.18 V	KS-3 (SC70)	M8B
ADM1817-10AKS-REEL	2.88 V	KS-3 (SC70)	M7E	ADM1818-R22AKS-REEL7	2.18 V	KS-3 (SC70)	M8B
ADM1817-10AKS-REEL7	2.88 V	KS-3 (SC70)	M7E	ADM1818-R22ART-REEL	2.18 V	RT-3 (SOT-23)	M8B
ADM1817-10ART-REEL	2.88 V	RT-3 (SOT-23)	M7E	ADM1818-R22ART-REEL7	2.18 V	RT-3 (SOT-23)	M8B
ADM1817-10ART-REEL7	2.88 V	RT-3 (SOT-23)	M7E	ADM1818-R23AKS-REEL	2.31 V	KS-3 (SC70)	M8C
ADM1817-20AKS-REEL	2.55 V	KS-3 (SC70)	M7A	ADM1818-R23AKS-REEL7	2.31 V	KS-3 (SC70)	M8C
ADM1817-20AKS-REEL7	2.55 V	KS-3 (SC70)	M7A	ADM1818-R23ART-REEL	2.31 V	RT-3 (SOT-23)	M8C
ADM1817-20ART-REEL	2.55 V	RT-3 (SOT-23)	M7A	ADM1818-R23ART-REEL7	2.31 V	RT-3 (SOT-23)	M8C

\*Only available in reels.

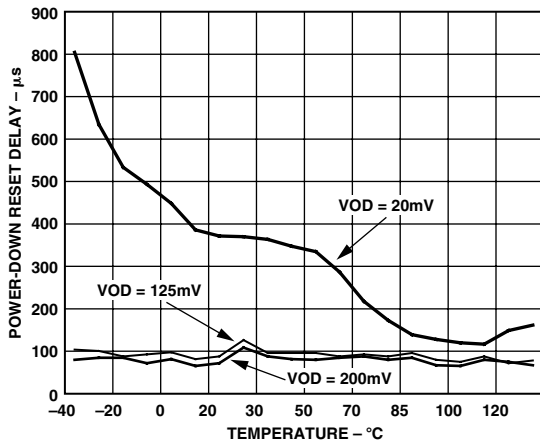
# Typical Performance Characteristics—ADM1810—ADM1813/ADM1815—ADM1818



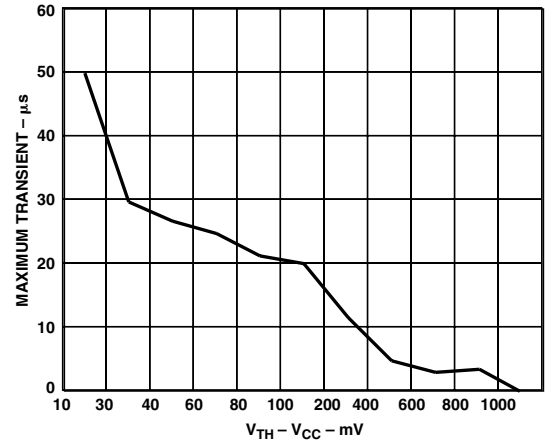
TPC 1. Supply Current vs. Temperature



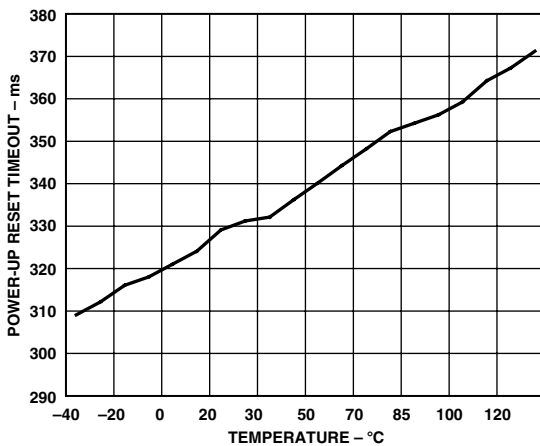
TPC 4. Normalized Reset Threshold vs. Temperature



TPC 2. Power-Down Reset Delay vs. Temperature



TPC 5. Maximum Transient Duration without Causing a Reset Pulse vs. Reset Comparator Overdrive



TPC 3. Power-Up Reset Timeout vs. Temperature

# ADM1810–ADM1813/ADM1815–ADM1818

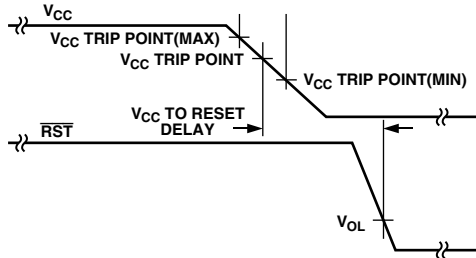


Figure 1. Power-Down Timing Diagram

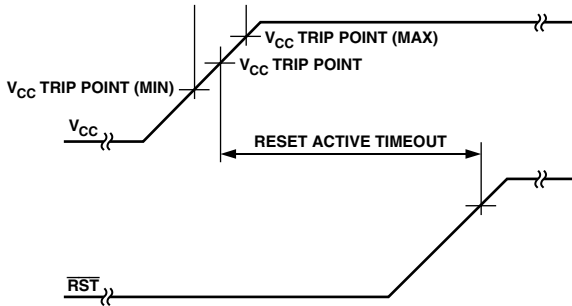


Figure 2. Power-Up Timing Diagram

## ADM1813 AND ADM1818

The ADM1813 and ADM1818 are low cost voltage monitoring devices featuring an open-drain output and optional push-button reset function.

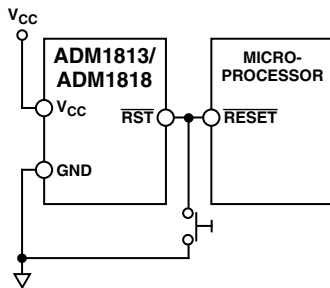


Figure 3. ADM1813/ADM1818 Typical Application

An optional push-button reset switch can be connected between  $\overline{\text{RST}}$  and ground. Pressing this switch will pull the reset output low. If the push-button reset button pulls the  $\overline{\text{RST}}$  output low for a period greater than 1  $\mu\text{s}$ , then, when the reset button releases the  $\overline{\text{RST}}$  line to float high, the  $\overline{\text{RST}}$  line will stay low for a further 150 ms typical.

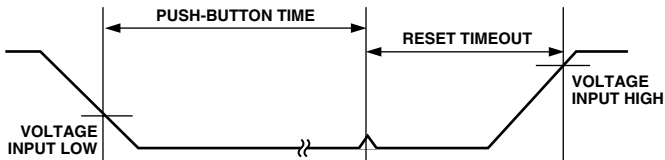


Figure 4. Push-Button Reset Timing Diagram

The ADM1818 range has 2.88 V and 2.55 V (typ) trip point options that allow the user to monitor 3.3 V and 3 V supplies. For 5 V monitoring requirements, the ADM1813 range has 4.62 V and 4.35 V (typ) trip point options.

## ADM1810, ADM1812, ADM1815, AND ADM1817

The ADM1812 is a 5 V supply monitor with an active high push-pull output and trip point options of 4.62 V and 4.35 V (typ). The ADM1810 is similar to the ADM1812, except that the ADM1810 has an active low push-pull output stage.

The ADM1817 is suitable for monitoring 3.3 V, 3 V, and 2.5 V supplies, with an active high push-pull output and trip-point options of 3.06 V, 2.88 V, 2.55 V, 2.31 V, and 2.18 V (typ). The ADM1815 is similar to the ADM1817, except that the ADM1815 has an active low push-pull output stage.

The ADM1810/ADM1812/ADM1815/ADM1817 can be connected directly to most microprocessor reset inputs without the need for external components.

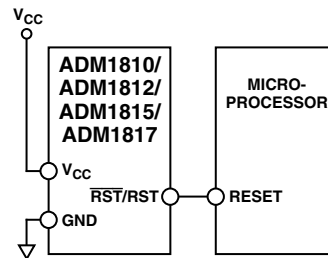


Figure 5. ADM1810/ADM1812/ADM1815/ADM1817 Typical Application

## ADM1811 AND ADM1816

The ADM1811 is a 5 V supply monitor with an active low open-drain output and trip point options of 4.62 V and 4.35 V (typ). The ADM1816 also has an active low open-drain output but is suitable for monitoring lower voltage supplies of 3.3 V, 3 V, and 2.5 V.

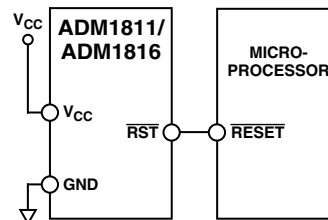


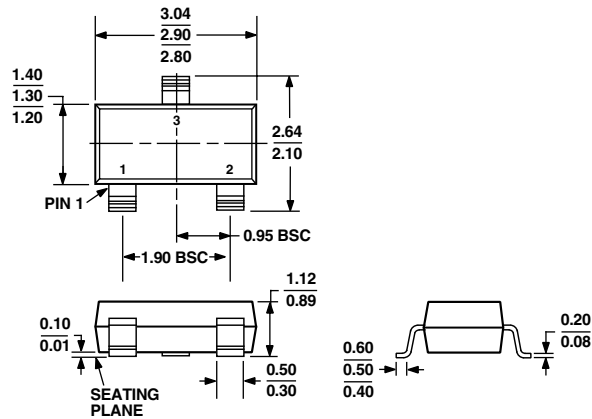
Figure 6. ADM1811/ADM1816 Typical Application

# ADM1810-ADM1813/ADM1815-ADM1818

## OUTLINE DIMENSIONS

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

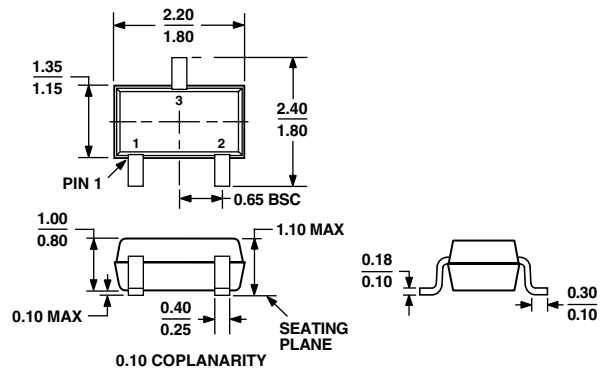
Dimensions shown in millimeters



COMPLIANT TO JEDEC STANDARDS TO-236AB

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

Dimensions shown in millimeters



# ADM1810–ADM1813/ADM1815–ADM1818

## Revision History

<b>Location</b>	<b>Page</b>
<b>9/03 Data Sheet changed from REV. B to REV. C.</b>	
Added SC70 .....	Universal
Edits to SPECIFICATIONS .....	2
Edits to ORDERING GUIDE .....	4
Updated OUTLINE DIMENSIONS .....	7
<b>2/03 Data Sheet changed from REV. A to REV. B.</b>	
Edits to FEATURES .....	1
Deleted Table I .....	1
Edits to SPECIFICATIONS .....	2
Edits to ABSOLUTE MAXIMUM RATINGS .....	3
Edits to ORDERING GUIDE .....	3
Added Typical Performance Characteristics .....	4
Edits to ADM1813 AND ADM1818 section .....	5
Edits to ADM1810, ADM1812, ADM1815, AND ADM1817 section .....	5
Edits to ADM1811 AND ADM1816 section .....	5
Updated OUTLINE DIMENSIONS .....	6
<b>3/02 Data Sheet changed from REV. 0 to REV. A.</b>	
Addition of Table I .....	1
Edits to ORDERING GUIDE .....	3
Addition of new text to ADM1813 and ADM1818 section .....	4

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