

### FEATURES

- Superior upgrade for MAX811/MAX812
- Specified over temperature
- Low power consumption (5  $\mu$ A typ)
- Precision voltage monitor: 2.5 V, 3 V, 3.3 V, 5 V options
- Reset assertion down to 1 V<sub>CC</sub>
- 140 ms min power-on reset
- Logic low  $\overline{\text{RESET}}$  output (ADM811)
- Logic high RESET output (ADM812)
- Built-in manual reset

### APPLICATIONS

- Microprocessor systems
- Controllers
- Intelligent instruments
- Automotive systems
- Safety systems
- Portable instruments

### GENERAL DESCRIPTION

The ADM811/ADM812 are reliable voltage monitoring devices suitable for use in most voltage monitoring applications. The ADM811/ADM812 are designed to monitor six different voltages, each allowing a 5% or 10% degradation of standard PSU voltages before a reset occurs. These voltages have been selected for the effective monitoring of 2.5 V, 3 V, 3.3 V, and 5 V supply voltage levels.

Included in this circuit is a debounced manual reset input. Reset can be activated using an electrical switch (or an input from another digital device) or by a degradation of the supply voltage. The manual reset function is very useful, especially if the circuit in which the ADM811/ADM812 are operating enters into a state that can only be detected by the user. Allowing the user to reset a system manually can reduce the damage or danger that could otherwise be caused by an out-of-control or locked system.

### FUNCTIONAL BLOCK DIAGRAM

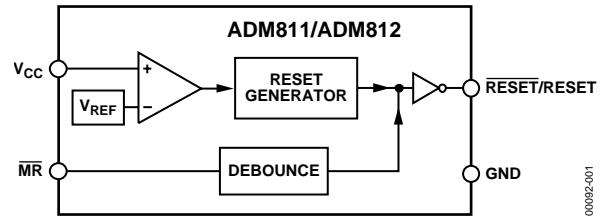


Figure 1.

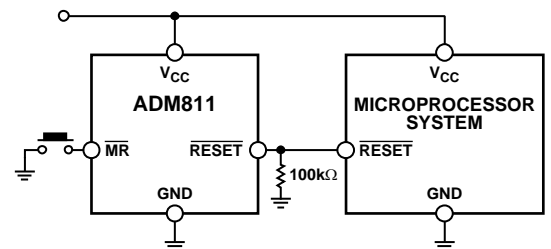


Figure 2. Typical ADM811 Operating Circuit

### Rev. D

Information furnished by Analog Devices is believed to be accurate and reliable. However, no responsibility is assumed by Analog Devices for its use, nor for any infringements of patents or other rights of third parties that may result from its use. Specifications subject to change without notice. No license is granted by implication or otherwise under any patent or patent rights of Analog Devices. Trademarks and registered trademarks are the property of their respective owners.

## TABLE OF CONTENTS

Features .....	1	Reset Output .....	7
Applications.....	1	Manual Reset.....	7
Functional Block Diagram .....	1	Glitch Immunity.....	7
General Description .....	1	Interfacing to Other Devices.....	8
Specifications.....	3	Output.....	8
Absolute Maximum Ratings.....	4	Benefits of a Very Accurate Reset Threshold .....	8
ESD Caution.....	4	Ensuring a Valid $\overline{\text{RESET}}$ /Reset Output Down to $V_{CC} = 0\text{ V}$ ....	8
Pin Configuration and Function Descriptions.....	5	Outline Dimensions .....	9
Typical Performance Characteristics .....	6	ADM811 Ordering Guide .....	9
Circuit Information.....	7	ADM812 Ordering Guide .....	10
Reset Thresholds.....	7		

## REVISION HISTORY

<b>5/06—Rev. C to Rev. D</b>		<b>1/03—Rev. A to Rev. B</b>	
Changes to Ordering Guide .....	9	Added ADM812 .....	Universal
<b>2/03—Rev. B to Rev. C</b>		Changes to Specifications.....	2
Changes Features .....	1	Changes to Ordering Guide .....	3
Changes to General Description .....	1	Changes to Pin Configuration .....	4
Changes to Specifications .....	2	Changes to Pin Function Description .....	4
Removed Note 2 from Ordering Guide.....	3	Additions to Table I.....	6
Changes to Pin Function Descriptions.....	4	Changes to Manual Reset section.....	6
Removed Note from Table I .....	6	<b>5/02—Rev. 0 to Rev. A</b>	
		Deletion of ADM812.....	Universal

## SPECIFICATIONS

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

Table 1.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
<b>SUPPLY</b>					
Voltage	1.0		5.5	V	$T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$
	1.2			V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
Current		8	15	$\mu\text{A}$	$V_{CC} < 5.5\text{ V}$ , ADM81_L/M, $I_{OUT} = 0\text{ mA}$
		5	10	$\mu\text{A}$	$V_{CC} < 3.6\text{ V}$ , ADM81_R/S/T/Z, $I_{OUT} = 0\text{ mA}$
<b>RESET VOLTAGE THRESHOLD</b>					
ADM81_L	4.54	4.63	4.72	V	$T_A = 25^\circ\text{C}$
ADM81_L	4.50		4.75	V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
ADM81_M	4.30	4.38	4.46	V	$T_A = 25^\circ\text{C}$
ADM81_M	4.25		4.50	V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
ADM81_T	3.03	3.08	3.14	V	$T_A = 25^\circ\text{C}$
ADM81_T	3.00		3.15	V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
ADM81_S	2.88	2.93	2.98	V	$T_A = 25^\circ\text{C}$
ADM81_S	2.85		3.00	V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
ADM81_R	2.58	2.63	2.68	V	$T_A = 25^\circ\text{C}$
ADM81_R	2.55		2.70	V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
ADM81_Z	2.28	2.32	2.35	V	$T_A = 25^\circ\text{C}$
ADM81_Z	2.25		2.38	V	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
RESET THRESHOLD TEMPERATURE COEFFICIENT		30		ppm/ $^\circ\text{C}$	
$V_{CC}$ TO RESET/RESET DELAY		40		$\mu\text{s}$	$V_{OD} = 125\text{ mV}$ , ADM81_L/M
		20		$\mu\text{s}$	$V_{OD} = 125\text{ mV}$ , ADM81_R/S/T/Z
RESET ACTIVE TIMEOUT PERIOD	140		560	ms	$V_{CC} = V_{TH(MAX)}$
	300		700	ms	ADM811-3T only
<b>MANUAL RESET</b>					
Minimum Pulse Width	10			$\mu\text{s}$	
Glitch Immunity		100		ns	
RESET/RESET Propagation Delay		0.5		$\mu\text{s}$	
Pull-Up Resistance	10	20	30	$\text{k}\Omega$	
The Manual Reset Circuit Acts On					
An Input Rising Above	2.3			V	$V_{CC} > V_{TH(MAX)}$ , ADM81_L/M
An Input Falling Below			0.8	V	$V_{CC} > V_{TH(MAX)}$ , ADM81_L/M
An Input Rising Above	$0.7 \times V_{CC}$			V	$V_{CC} > V_{TH(MAX)}$ , ADM81_R/S/T/Z
An Input Falling Below			$0.25 \times V_{CC}$	V	$V_{CC} > V_{TH(MAX)}$ , ADM81_R/S/T/Z
RESET/RESET Output Voltage					
Low (ADM812R/S/T/Z)			0.3	V	$V_{CC} = V_{TH(MAX)}$ , $I_{SINK} = 1.2\text{ mA}$
Low (ADM812L/M)			0.4	V	$V_{CC} = V_{TH(MAX)}$ , $I_{SINK} = 3.2\text{ mA}$
High (ADM812R/S/T/Z/L/M)	$0.8 \times V_{CC}$			V	$1.8\text{ V} < V_{CC} < V_{TH(MIN)}$ , $I_{SOURCE} = 150\text{ }\mu\text{A}$
Low (ADM811R/S/T/Z)			0.3	V	$V_{CC} = V_{TH(MIN)}$ , $I_{SINK} = 1.2\text{ mA}$
Low (ADM811L/M)			0.4	V	$V_{CC} = V_{TH(MIN)}$ , $I_{SINK} = 3.2\text{ mA}$
Low (ADM811R/S/T/Z/L/M)			0.3	V	$V_{CC} > 1.0\text{ V}$ , $I_{SINK} = 50\text{ }\mu\text{A}$
High (ADM811R/S/T/Z)	$0.8 \times V_{CC}$			V	$V_{CC} > V_{TH(MAX)}$ , $I_{SOURCE} = 500\text{ }\mu\text{A}$
High (ADM811L/M)	$V_{CC} \times 1.5$			V	$V_{CC} > V_{TH(MAX)}$ , $I_{SOURCE} = 800\text{ }\mu\text{A}$

## ABSOLUTE MAXIMUM RATINGS

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

**Table 2.**

Parameter	Rating
Terminal Voltage (With Respect to Ground)	
$V_{CC}$	-0.3 V to +6 V
All Other Inputs	-0.3 V to $V_{CC} + 0.3$ V
Input Current	
$V_{CC}$	20 mA
$\overline{MR}$	20 mA
Output Current	
$\overline{RESET}$	20 mA
Power Dissipation ( $T_A = 70^\circ\text{C}$ )	
RT-4 (SOT-143)	200 mW
Derate by 4 mW/ $^\circ\text{C}$ Above $70^\circ\text{C}$	
$\theta_{JA}$ Thermal Impedance	330 $^\circ\text{C}/\text{W}$
Operating Temperature Range	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
Storage Temperature Range	-65 $^\circ\text{C}$ to +160 $^\circ\text{C}$
Lead Temperature (Soldering, 10 sec)	300 $^\circ\text{C}$
Vapor Phase (60 sec)	215 $^\circ\text{C}$
Infrared (15 sec)	220 $^\circ\text{C}$
ESD Rating	3 kV

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. Electrostatic charges as high as 4000 V readily accumulate on the human body and test equipment and can discharge without detection. Although this product 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 AND FUNCTION DESCRIPTIONS

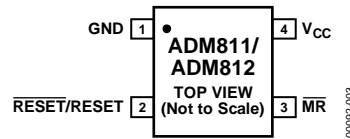


Figure 3. Pin Configuration

Table 3. Pin Function Descriptions

Pin No.	Mnemonic	Function
1	GND	0 V. Ground reference for all signals.
2	$\overline{\text{RESET}}$ (ADM811)	Active Low Logic Output. $\overline{\text{RESET}}$ remains low while $V_{CC}$ is below the reset threshold or when $\overline{\text{MR}}$ is low; $\overline{\text{RESET}}$ then remains low for at least 140 ms (at least 300 ms for the ADM811-3T) after $V_{CC}$ rises above the reset threshold.
	RESET (ADM812)	Active High Logic Output. RESET remains high while $V_{CC}$ is below the reset threshold or when $\overline{\text{MR}}$ is low; RESET then remains high for 240 ms (typical) after $V_{CC}$ rises above the reset threshold.
3	$\overline{\text{MR}}$	Manual Reset. This active low debounced input ignores input pulses of 100 ns or less (typical) and is guaranteed to accept input pulses of greater than 10 $\mu\text{s}$ . Leave floating when not used.
4	$V_{CC}$	2.5 V, 3 V, 3.3 V, or 5 V Monitored Supply Voltage.

## TYPICAL PERFORMANCE CHARACTERISTICS

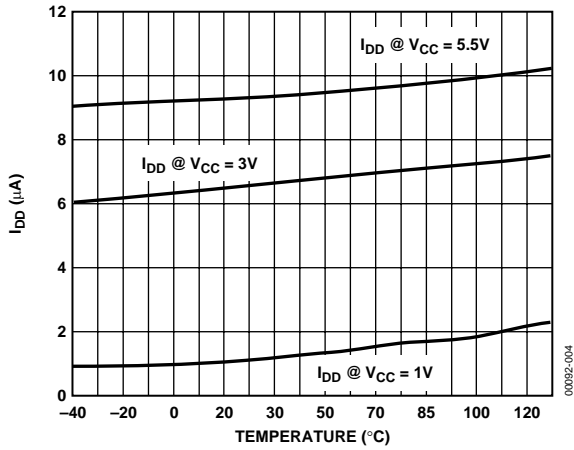


Figure 4. Supply Current vs. Temperature (ADM81\_R/S/T/Z)

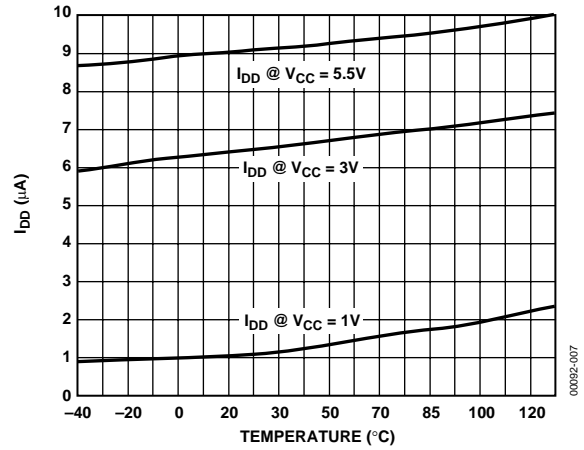


Figure 7. Supply Current vs. Temperature (ADM81\_L/M)

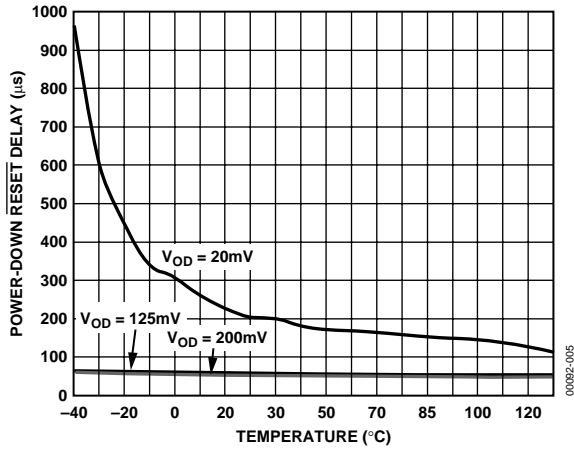


Figure 5. Power-Down  $\overline{\text{RESET}}$  Delay vs. Temperature (ADM81\_R/S/T/Z)

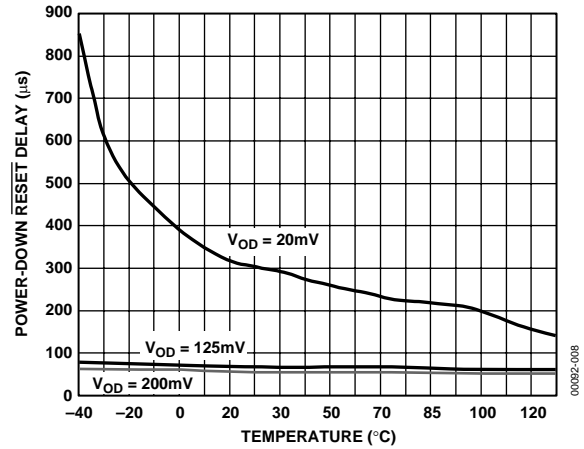


Figure 8. Power-Down  $\overline{\text{RESET}}$  Delay vs. Temperature (ADM81\_L/M)

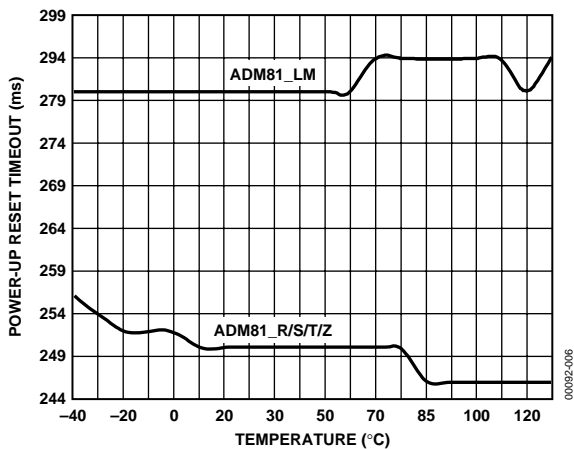


Figure 6. Power-Up  $\overline{\text{RESET}}$  Timeout vs. Temperature

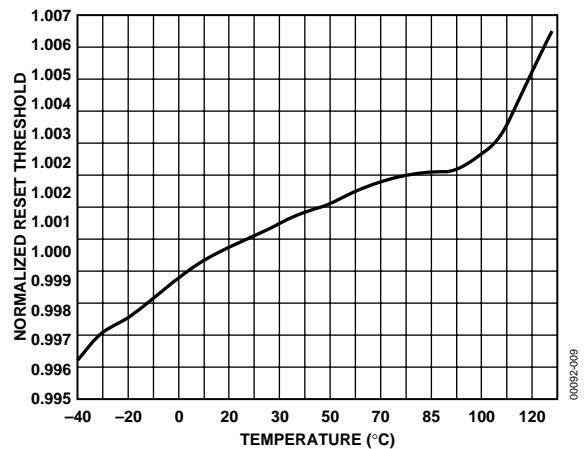


Figure 9.  $\overline{\text{RESET}}$  Threshold Deviation vs. Temperature

## CIRCUIT INFORMATION

### RESET THRESHOLDS

A reset output is provided to the microprocessor whenever the  $V_{CC}$  input is below the reset threshold. The actual reset threshold depends on whether an L, M, T, S, R, or Z suffix is used. Refer to Table 4.

**Table 4. Reset Threshold Options**

Model	Reset Threshold (V)
ADM811LART	4.63
ADM811MART	4.38
ADM811TART	3.08
ADM811-3TART	3.08
ADM811SART	2.93
ADM811RART	2.63
ADM811ZART	2.32
ADM812LART	4.63
ADM812MART	4.38
ADM812TART	3.08
ADM812SART	2.93
ADM812RART	2.63
ADM812ZART	2.32

### RESET OUTPUT

On power-up and after  $V_{CC}$  rises above the reset threshold, an internal timer holds the reset output active for 240 ms (typical). This is intended as a power-on reset signal for the processor. It allows time for both the power supply and the microprocessor to stabilize after power-up. If a power supply brownout or interruption occurs, the reset output is similarly activated and remains active for 240 ms (typical) after the supply recovers. This allows time for the power supply and microprocessor to stabilize.

The ADM811 provides an active low reset output ( $\overline{\text{RESET}}$ ) while the ADM812 provides an active high output (RESET).

During power-down of the ADM811, the  $\overline{\text{RESET}}$  output remains valid (low) with  $V_{CC}$  as low as 1 V. This ensures that the microprocessor is held in a stable shutdown condition as the supply falls and also ensures that no spurious activity can occur via the microprocessor as it powers up.

### MANUAL RESET

The ADM811/ADM812 are equipped with a manual reset input. This input is designed to operate in a noisy environment where unwanted glitches could be induced. These glitches could be produced by the bouncing action of a switch contact, or where a manual reset switch may be located some distance away from the circuit (the cabling of which can pick up noise).

The manual reset input is guaranteed to ignore logically valid inputs that are faster than 100 ns and to accept inputs longer in duration than 10  $\mu\text{s}$ .

### GLITCH IMMUNITY

The ADM811/ADM812 contain internal filtering circuitry providing glitch immunity from fast transient glitches on the power supply line.

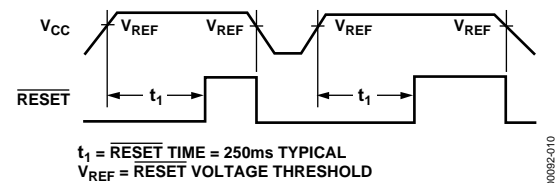


Figure 10. Power Fall  $\overline{\text{RESET}}$  Timing

## INTERFACING TO OTHER DEVICES

### OUTPUT

The ADM811/ADM812 are designed to integrate with as many devices as possible. One feature of the ADM811/ADM812 is the reset output, which is directly proportional to  $V_{CC}$  (this is guaranteed only while  $V_{CC}$  is greater than 1 V). This enables the part to be used with both 3 V and 5 V, or any nominal voltage within the minimum and maximum specifications for  $V_{CC}$ .

### BENEFITS OF A VERY ACCURATE RESET THRESHOLD

Because the ADM811/ADM812 can operate effectively even when there are large degradations of the supply voltages, the possibility of a malfunction during a power failure is greatly reduced. Another advantage of the ADM811/ADM812 is its very accurate internal voltage reference circuit. Combined, these benefits produce an exceptionally reliable microprocessor supervisory circuit.

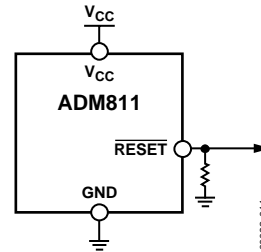


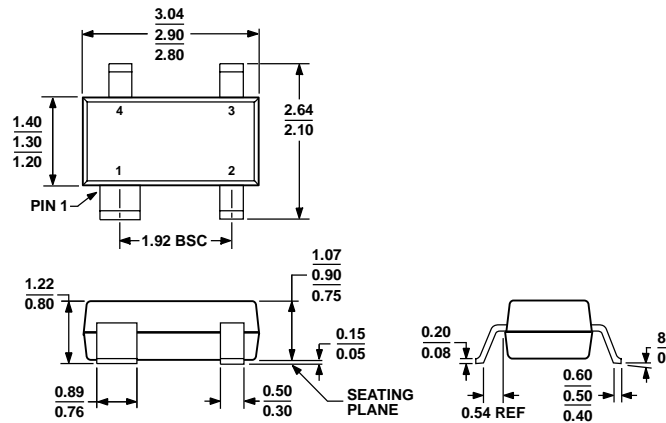
Figure 11. Ensuring a Valid  $\overline{\text{RESET}}$  Output Down to  $V_{CC} = 0 \text{ V}$

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

When  $V_{CC}$  falls below 0.8 V, the ADM811/ADM812's  $\overline{\text{RESET}}$ /RESET no longer sinks current. Therefore, a high impedance CMOS logic input connected to  $\overline{\text{RESET}}$ /RESET can drift to undetermined logic levels. To eliminate this problem, a 100 k $\Omega$  resistor should be connected from  $\overline{\text{RESET}}$ /RESET to ground.



## OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS TO-253-AA

Figure 12. 4-Lead Small Outline Transistor Package [SOT-143] (RT-4)

Dimensions shown in millimeters

111606-9

## ADM811 ORDERING GUIDE

Model <sup>1</sup>	Reset Threshold (V)	Temperature Range	Ordering Quantity	Package Description	Package Option	Branding
ADM811LART-REEL	4.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBV
ADM811LART-REEL7	4.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBV
ADM811LARTZ-REEL <sup>2</sup>	4.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M4J
ADM811LARTZ-REEL7 <sup>2</sup>	4.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M4J
ADM811MART-REEL	4.38	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBT
ADM811MART-REEL7	4.38	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBT
ADM811MARTZ-REEL <sup>2</sup>	4.38	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBT#
ADM811MARTZ-REEL7 <sup>2</sup>	4.38	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBT#
ADM811TART-REEL	3.08	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBG
ADM811TART-REEL7	3.08	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBG
ADM811TARTZ-REEL <sup>2</sup>	3.08	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBG#
ADM811TARTZ-REEL7 <sup>2</sup>	3.08	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBG#
ADM811-3TART-REEL	3.08	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MB3
ADM811-3TART-REEL-7	3.08	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MB3
ADM811-3TARTZ-RL <sup>2</sup>	3.08	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M4E
ADM811-3TARTZ-RL7 <sup>2</sup>	3.08	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M4E
ADM811SART-REEL	2.93	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBE
ADM811SART-REEL7	2.93	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBE
ADM811SARTZ-REEL <sup>2</sup>	2.93	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBE#
ADM811SARTZ-REEL7 <sup>2</sup>	2.93	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBE#
ADM811RART-REEL	2.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBB
ADM811RART-REEL7	2.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBB
ADM811RARTZ-REEL <sup>2</sup>	2.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M4N
ADM811RARTZ-REEL7 <sup>2</sup>	2.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M4N
ADM811ZART-REEL	2.32	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MBZ
ADM811ZART-REEL7	2.32	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MBZ
ADM811ZARTZ-REEL <sup>2</sup>	2.32	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M6G
ADM811ZARTZ-REEL7 <sup>2</sup>	2.32	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M6G

<sup>1</sup> Only available in reels.

<sup>2</sup> Z = Pb-free part, # denotes lead-free may be top or bottom marked.

# ADM811/ADM812

## ADM812 ORDERING GUIDE

Model <sup>1</sup>	Reset Threshold (V)	Temperature Range	Ordering Quantity	Package Description	Package Option	Branding
ADM812LART-REEL	4.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MCV
ADM812LART-REEL7	4.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MCV
ADM812LARTZ-REEL <sup>2</sup>	4.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M5D
ADM812LARTZ-REEL7 <sup>2</sup>	4.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M5D
ADM812MART-REEL	4.38	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MCT
ADM812MART-REEL7	4.38	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MCT
ADM812MARTZ-REEL <sup>2</sup>	4.38	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M6D
ADM812MARTZ-REEL7 <sup>2</sup>	4.38	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M6D
ADM812TART-REEL	3.08	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MCG
ADM812TART-REEL7	3.08	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MCG
ADM812TARTZ-REEL <sup>2</sup>	3.08	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M68
ADM812TARTZ-REEL7 <sup>2</sup>	3.08	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M68
ADM812SART-REEL	2.93	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MCE
ADM812SART-REEL7	2.93	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MCE
ADM812SARTZ-REEL <sup>2</sup>	2.93	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M67
ADM812SARTZ-REEL7 <sup>2</sup>	2.93	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M67
ADM812RART-REEL	2.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MCB
ADM812RART-REEL7	2.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MCB
ADM812RARTZ-REEL <sup>2</sup>	2.63	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M6F
ADM812RARTZ-REEL7 <sup>2</sup>	2.63	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M6F
ADM812ZART-REEL	2.32	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	MCZ
ADM812ZART-REEL7	2.32	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	MCZ
ADM812ZARTZ-REEL <sup>2</sup>	2.32	-40°C to +85°C	10,000	4-Lead SOT-143	RT-4	M69
ADM812ZARTZ-REEL7 <sup>2</sup>	2.32	-40°C to +85°C	3,000	4-Lead SOT-143	RT-4	M69

<sup>1</sup> Only available in reels.

<sup>2</sup> Z = Pb-free part.

**NOTES**

**NOTES**