THE DATASHEET OF

ADM812RARTZ-REEL7

Microprocessor Supervisory Circuit in 4-Lead SOT-143 with DSP

Data Sheet

ADM811/ADM812

FEATURES

Superior upgrade for MAX811/MAX812
Specified over temperature
Low power consumption: 5 µA typical
Precision voltage monitor: 2.5 V, 3 V, 3.3 V, 5 V options
Reset assertion down to 1 V_{CC}
Power-on reset: 140 ms minimum
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

FUNCTIONAL BLOCK DIAGRAM

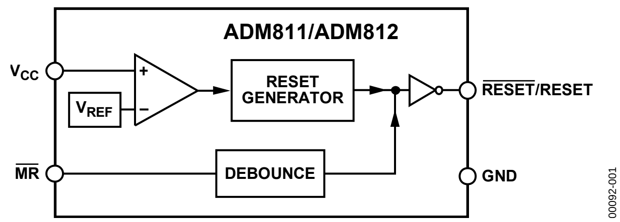

Figure 1.

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.

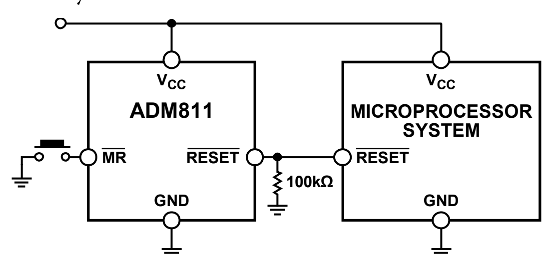

Figure 2. Typical ADM811 Operating Circuit

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3/13—Rev. F to Rev. G

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5/02—Rev. 0 to Rev. A

Deleted ADM812 ... Universal

4/99—Revision 0: Initial Version

SPECIFICATIONS

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

Table 1.

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
SUPPLY					
Voltage	1.0		5.5	V	T_A = 0°C to 70°C
	1.2			V	T_A = −40°C to +85°C
Current		8	15	µA	V_{CC} < 5.5 V, ADM811L/ADM812L/ADM811M/ADM812M, I_{OUT} = 0 mA
		5	10	µA	V_{CC} < 3.6 V, ADM811R/ADM812R/ADM811S/ADM812S/ ADM811T/ADM812T/ADM811Z/ADM812Z, I_{OUT} = 0 mA
RESET VOLTAGE THRESHOLD					
ADM811L/ADM812L	4.54	4.63	4.72	V	T_A = 25°C
ADM811L/ADM812L	4.50		4.75	V	T_A = −40°C to +85°C
ADM811M/ADM812M	4.30	4.38	4.46	V	T_A = 25°C
ADM811M/ADM812M	4.25		4.50	V	T_A = −40°C to +85°C
ADM811T/ADM812T	3.03	3.08	3.14	V	T_A = 25°C
ADM811T/ADM812T	3.00		3.15	V	T_A = −40°C to +85°C
ADM811S/ADM812S	2.88	2.93	2.98	V	T_A = 25°C
ADM811S/ADM812S	2.85		3.00	V	T_A = −40°C to +85°C
ADM811R/ADM812R	2.58	2.63	2.68	V	T_A = 25°C
ADM811R/ADM812R	2.55		2.70	V	T_A = −40°C to +85°C
ADM811Z/ADM812Z	2.28	2.32	2.35	V	T_A = 25°C
ADM811Z/ADM812Z	2.25		2.38	V	T_A = −40°C to +85°C
RESET THRESHOLD TEMPERATURE COEFFICIENT		30		ppm/°C	
V_{CC} TO RESET/$\overline{\text{RESET}}$ DELAY		40		µs	V_{OD} = 125 mV, ADM811L/ADM812L/ADM811M/ADM812M
		20		µs	V_{OD} = 125 mV, ADM811R/ADM812R/ADM811S/ADM812S/ ADM811T/ADM812T/ADM811Z/ADM812Z
RESET ACTIVE TIMEOUT PERIOD	140		560	ms	V_{CC} = $V_{TH(MAX)}$
	300		700	ms	ADM811-3T only
MANUAL RESET					
Minimum Pulse Width	10			µs	
Glitch Immunity		100		ns	
RESET/$\overline{\text{RESET}}$ Propagation Delay		0.5		µs	
Pull-Up Resistance	10	20	30	kΩ	
The Manual Reset Circuit Acts On					
An Input Rising Above	2.3			V	V_{CC} > $V_{TH(MAX)}$, ADM811L/ADM812L/ADM811M/ADM812M
An Input Falling Below			0.8	V	V_{CC} > $V_{TH(MAX)}$, ADM811L/ADM812L/ADM811M/ADM812M
An Input Rising Above	0.7 × V_{CC}			V	V_{CC} > $V_{TH(MAX)}$, ADM811R/ADM812R/ADM811S/ADM812S/ ADM811T/ADM812T/ADM811Z/ADM812Z
An Input Falling Below			0.25 × V_{CC}	V	V_{CC} > $V_{TH(MAX)}$, ADM811R/ADM812R/ADM811S/ADM812S/ ADM811T/ADM812T/ADM811Z/ADM812Z

Parameter	Min	Typ	Max	Unit	Test Conditions/Comments
RESET/$\overline{\text{RESET}}$ Output Voltage					
Low (ADM812R/ADM812S/ ADM812T/ADM812Z)			0.3	V	$V_{CC} = V_{TH(MAX)}$, $I_{SINK} = 1.2$ mA
Low (ADM812L/ADM812M)			0.4	V	$V_{CC} = V_{TH(MAX)}$, $I_{SINK} = 3.2$ mA
High (ADM812R/ADM812S/ ADM812T/ADM812Z/ADM812L/ ADM812M)	$0.8 \times V_{CC}$			V	$1.8\text{ V} < V_{CC} < V_{TH(MIN)}$, $I_{SOURCE} = 150$ µA
Low (ADM811R/ADM811S/ ADM811T/ADM811Z)			0.3	V	$V_{CC} = V_{TH(MIN),}$ $I_{SINK} = 1.2$ mA
Low (ADM811L/ADM811M)			0.4	V	$V_{CC} = V_{TH(MIN)}$, $I_{SINK} = 3.2$ mA
Low (ADM811R/ADM811S/ ADM811T/ADM811Z/ ADM811L/ADM811M)			0.3	V	$V_{CC} > 1.0$ V, $I_{SINK} = 50$ µA
High (ADM811R/ADM811S/ ADM811T/ADM811Z)	$0.8 \times V_{CC}$			V	$V_{CC} > V_{TH(MAX)}$, $I_{SOURCE} = 500$ µA
High (ADM811L/ADM811M)	$V_{CC} - 1.5$			V	$V_{CC} > V_{TH(MAX)}$, $I_{SOURCE} = 800$ µA

ABSOLUTE MAXIMUM RATINGS

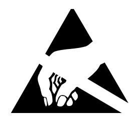
Typical values are at T_A = 25°C, unless otherwise noted.

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°C)	
RA-4 (SOT-143)	200 mW
Derate by 4 mW/°C Above 70°C	
θ_{JA} Thermal Impedance	330°C/W
Operating Temperature Range	−40°C to +85°C
Storage Temperature Range	−65°C to +160°C
Lead Temperature (Soldering, 10 sec)	300°C
Vapor Phase (60 sec)	215°C
Infrared (15 sec)	220°C
ESD Rating	3 kV

Stresses at or above those listed under Absolute Maximum Ratings may cause permanent damage to the product. This is a stress rating only; functional operation of the product at these or any other conditions above those indicated in the operational section of this specification is not implied. Operation beyond the maximum operating conditions for extended periods may affect product 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

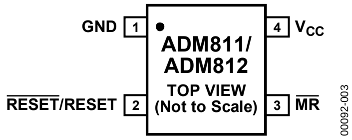


Figure 3. Pin Configuration

Table 3. Pin Function Descriptions

Pin No.	Mnemonic	Description
1	GND	Ground Reference For All Signals, 0 V.
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 μs. Leave floating when not used.
4	V_{CC}	Monitored Supply Voltage of 2.5 V, 3 V, 3.3 V, or 5 V. A 0.1 μF decoupling capacitor between V_{CC} and the GND pin is recommended.

TYPICAL PERFORMANCE CHARACTERISTICS

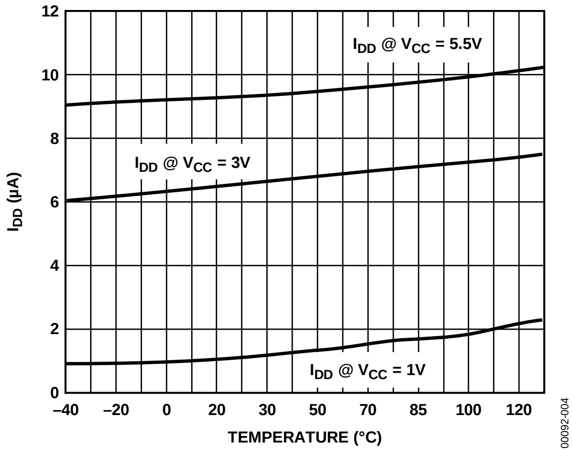


Figure 4. Supply Current vs. Temperature (ADM811R/ADM812R/ADM811S/ADM812S/ ADM811T/ADM812T/ADM811Z/ADM812Z)

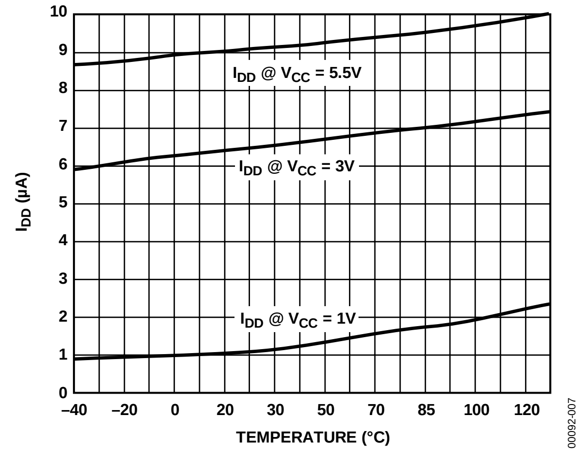


Figure 7. Supply Current vs. Temperature (ADM811L/ADM812L/ ADM811M/ADM812M)

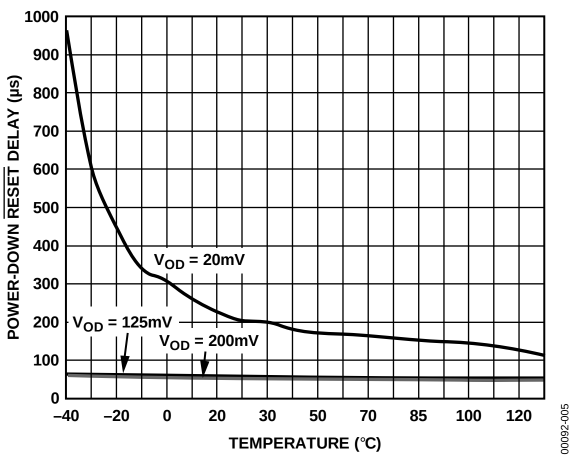


Figure 5. Power-Down $\overline{\text{RESET}}$ Delay vs. Temperature (ADM811R/ADM812R/ADM811S/ADM812S/ ADM811T/ADM812T/ADM811Z/ADM812Z)

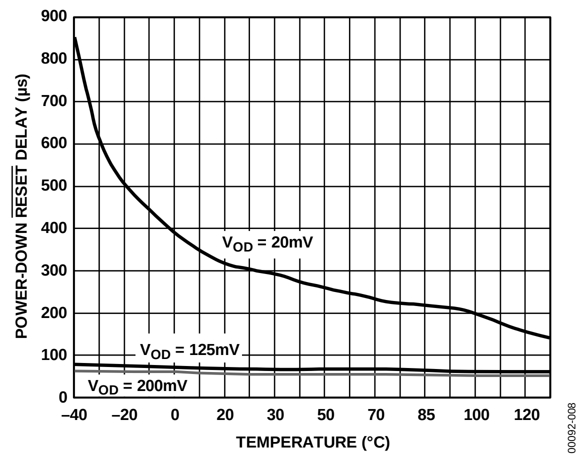


Figure 8. Power-Down $\overline{\text{RESET}}$ Delay vs. Temperature (ADM811L/ADM812L/ ADM811M/ADM812M)

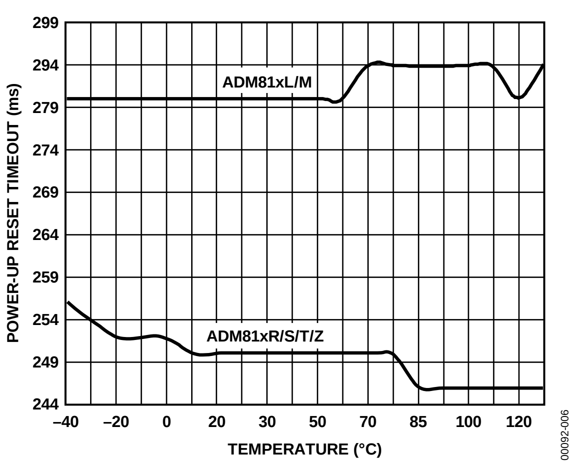


Figure 6. Power-Up RESET Timeout vs. Temperature

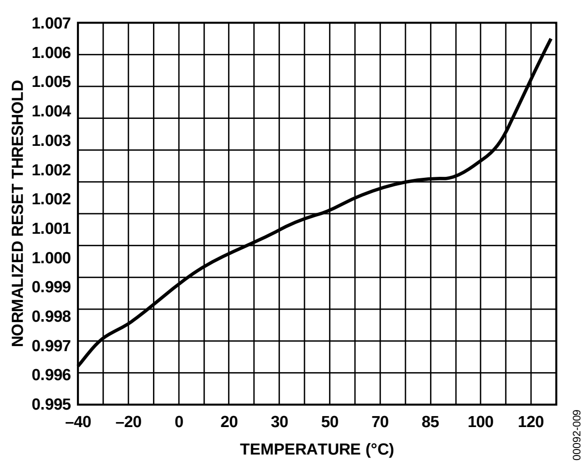


Figure 9. RESET Threshold Deviation vs. Temperature

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 (see 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 µs.

GLITCH IMMUNITY

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

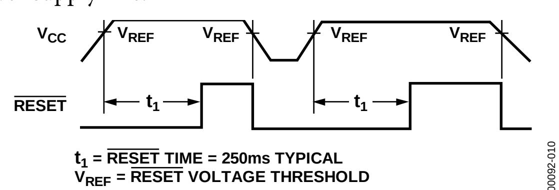


Figure 10. Power Fall $\overline{\text{RESET}}$ Timing

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 are the very accurate internal voltage reference circuits. Combined, these benefits produce an exceptionally reliable microprocessor supervisory circuit.

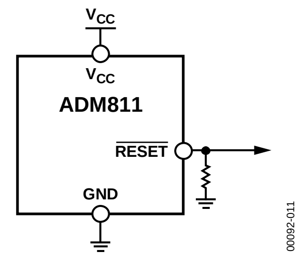


Figure 11. Ensuring a Valid $\overline{\text{RESET}}$ Output Down to V_{CC} = 0 V

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

When V_{CC} falls below 0.8 V, the $\overline{\text{RESET}}$/RESET of the ADM811/ADM812 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 kΩ resistor should be connected from $\overline{\text{RESET}}$/RESET to ground.

OUTLINE DIMENSIONS

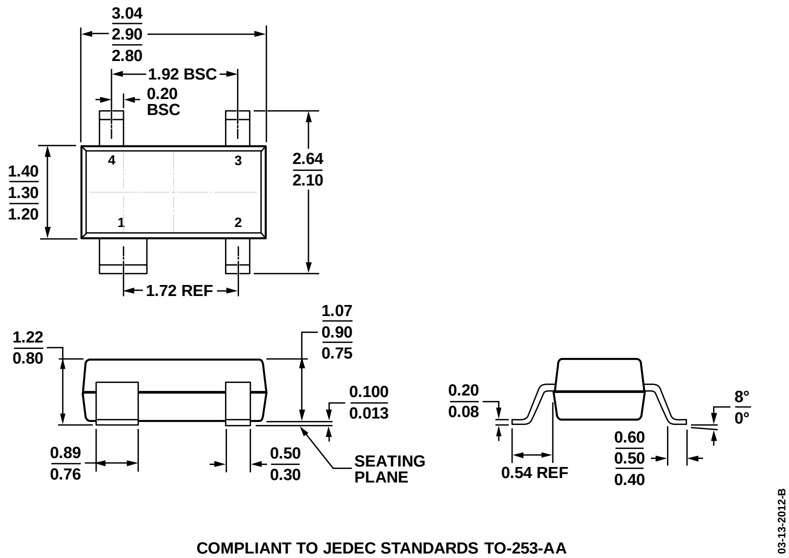


Figure 12. 4-Lead Small Outline Transistor Package [SOT-143]
(RA-4)
Dimensions shown in millimeters

ORDERING GUIDE

Model[1, 2]	Reset Threshold (V)	Temperature Range	Ordering Quantity	Package Description	Package Option	Branding
ADM811LART-REEL7	4.63	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBV
ADM811LARTZ-REEL7	4.63	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M4J
ADM811MARTZ-REEL	4.38	−40°C to +85°C	10,000	4-Lead SOT-143	RA-4	MBT #
ADM811MARTZ-REEL7	4.38	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBT #
ADM811TART-REEL7	3.08	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBG
ADM811TARTZ-REEL	3.08	−40°C to +85°C	10,000	4-Lead SOT-143	RA-4	MBG #
ADM811TARTZ-REEL7	3.08	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBG #
ADM811-3TART-REEL7	3.08	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MB3
ADM811-3TARTZ-RL7	3.08	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M4E
ADM811SART-REEL7	2.93	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBE
ADM811SARTZ-REEL	2.93	−40°C to +85°C	10,000	4-Lead SOT-143	RA-4	MBE #
ADM811SARTZ-REEL7	2.93	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBE #
ADM811RARTZ-REEL7	2.63	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M4N
ADM811ZART-REEL7	2.32	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	MBZ
ADM811ZARTZ-REEL7	2.32	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M6G
ADM812LARTZ-REEL7	4.63	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M5D
ADM812MARTZ-REEL7	4.38	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M6D
ADM812TARTZ-REEL7	3.08	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M68
ADM812SARTZ-REEL	2.93	−40°C to +85°C	10,000	4-Lead SOT-143	RA-4	M67
ADM812SARTZ-REEL7	2.93	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M67
ADM812RARTZ-REEL7	2.63	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M6F
ADM812ZARTZ-REEL7	2.32	−40°C to +85°C	3,000	4-Lead SOT-143	RA-4	M69

[1] Available only in reels.
[2] Z = RoHS Compliant Part. RoHS-compliant parts may have # branded on either the top or bottom of the device.

NOTES

NOTES