MIC811/MIC812

Microprocessor Reset Circuits

Features

- Precision Voltage Monitor for 3V, 3.3V, or 5V Power Supplies
- /RESET Remains Valid with V_{CC} as Low as 1V
- 5 µA Typical Supply Current
- 140 ms Minimum Reset Pulse Width Available
- Manual Reset Input
- Available in 4-Lead SOT-143 Package

Applications

- Portable Equipment
- Intelligent Instruments
- Critical Microprocessor Power Monitoring
- Printers/Computers
- Controllers

General Description

The MIC811 and MIC812 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor based systems.

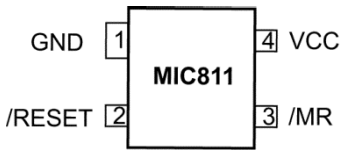
The function of this device is to assert a reset if either the power supply drops below a designated reset threshold level or /MR is forced low. Several different reset threshold levels are available to accommodate 3V, 3.3V, or 5V powered systems.

The MIC811 has an active-low /RESET output, while the MIC812 offers an active-high RESET output. The reset output remains asserted for a minimum of 140 ms after V_{CC} has risen above the designed reset threshold level. Having a push-pull output stage, the MIC811/812 do not require a pull-up resistor at the output. The MIC811 and MIC812 come in a 4-lead SOT-143 package.

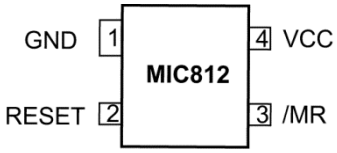
If a microprocessor voltage supervisor with an open-drain output stage is needed, see MIC6315.

Package Types

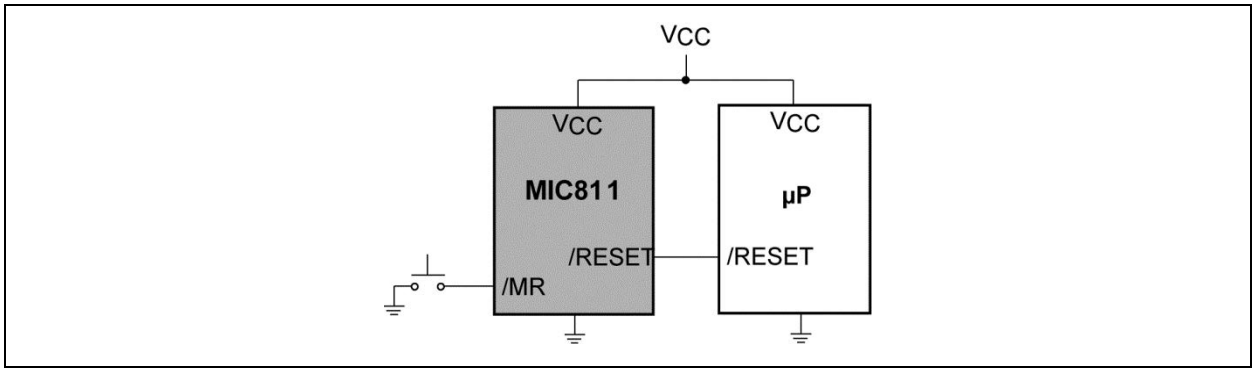
MIC811
4-Lead SOT-143 (U)
(Top View)



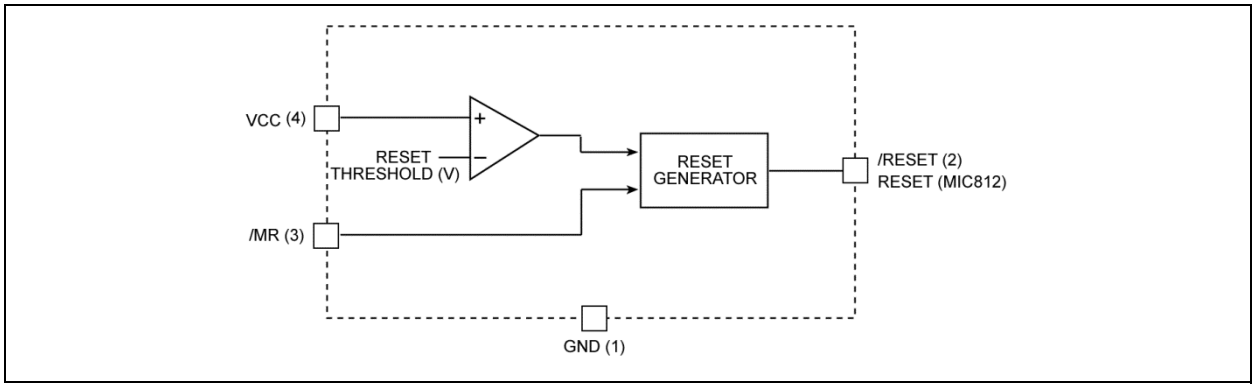
MIC812
4-Lead SOT-143 (U)
(Top View)



Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Terminal Voltage (VCC)..... –0.3V to +6.0V
Input Current (VCC, /MR)..... 20 mA
Output Current (/RESET, RESET) ..... 20 mA
Rate of Rise (VCC) 100V/µs
ESD Rating (Note 1) ..... 3 kV

Operating Ratings ‡

Power Dissipation (T_A = +70°C)..... 320 mW

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.
‡ Notice: The device is not guaranteed to function outside its operating rating.

Note 1: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: For typical values, V_{CC} = 5V for MIC81_L/M/J, V_{CC} = 3.3V for MIC81_S/T, V_{CC} = 3V for MIC81_R; T_A = +25°C, bold values indicate –40°C to ≤ T_A ≤ +85°C; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Voltage Range	V_{CC}	**1**	—	**5.5**	V	T_A = –40°C to +85°C
Supply Current	I_{VCC}	—	5	**15**	µA	MIC811L/M/J, MIC812L/M/J: V_{CC} = 5.0V, no load
		—	5	**10**		MIC811S/T, MIC812S/T: V_{CC} = 3.3V, no load
		—	5	**10**		MIC811R, MIC812R: V_{CC} = 3.0V, no load
Reset Voltage Threshold	V_{TH}	**4.50**	4.63	**4.75**	V	MIC811L, MIC812L
		4.25	4.38	**4.50**		MIC811M, MIC812M
		3.89	4.00	**4.10**		MIC811J, MIC812J
		3.00	3.08	**3.15**		MIC811T, MIC812T
		2.85	2.93	**3.00**		MIC811S, MIC812S
		2.55	2.63	**2.70**		MIC811R, MIC812R
Reset Timeout Period	t_{RST}	**140**	240	**560**	ms	—
/RESET Output Voltage	V_{OH}	**V_{CC} – 1.5V**	—	—	V	I_{SOURCE} = 800 µA, MIC811L/M/J
		0.8 x V_{CC}	—	—		I_{SOURCE} = 500 µA, MIC811R/S/T

Note 1: Specification for packaged product only.

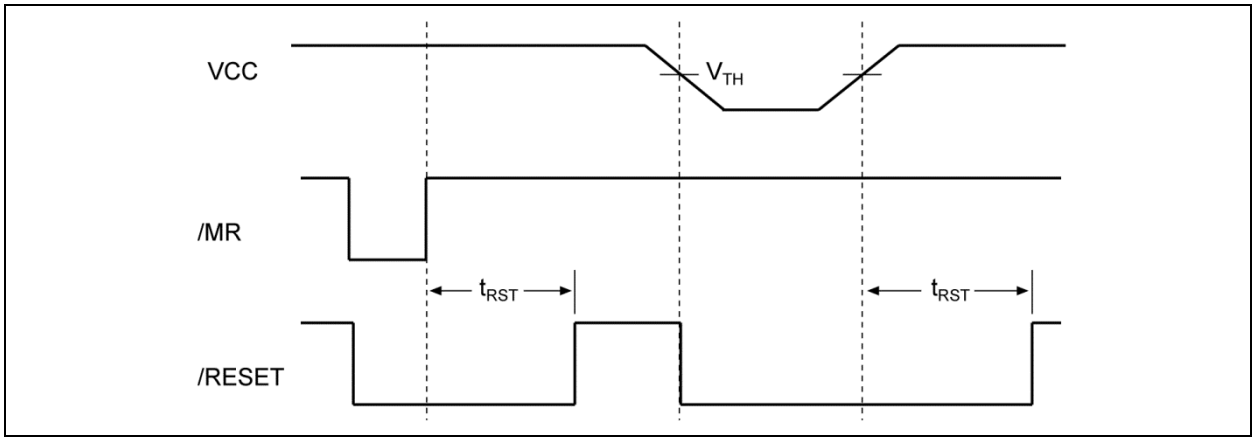
ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: For typical values, V_{CC} = 5V for MIC81_L/M/J, V_{CC} = 3.3V for MIC81_S/T, V_{CC} = 3V for MIC81_R; T_A = +25°C, bold values indicate –40°C to ≤ T_A ≤ +85°C; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
/RESET Output Voltage	V_{OL}	—	—	**0.4**	V	V_{CC} = V_{TH} min., I_{SINK} = 3.2 mA, MIC811L/M/J
		—	—	**0.3**		V_{CC} = V_{TH} min., I_{SINK} = 1.2 mA, MIC811R/S/T
		—	—	**0.3**		V_{CC} >1V, I_{SINK} = 50 µA, T_A = –40°C to +85°C
RESET Output Voltage	V_{OH}	**0.8 x V_{CC}**	—	—	V	1.8V < V_{CC} < V_{TH} min., I_{SOURCE} = 150 µA
RESET Output Voltage	V_{OL}	—	—	**0.4**	V	I_{SINK} = 3.2 mA, MIC812L/M/J
		—	—	**0.3**		I_{SINK} = 1.2 mA, MIC812R/S/T
/MR Minimum Pulse Width	—	**10**	—	—	µs	—
/MR to Reset Delay	—	—	0.5	—	µs	—
/MR Input Threshold	V_{IH}	**2.3**	—	—	V	V_{CC} > V_{TH} max., MIC81_L/M/J
		0.7 x V_{CC}	—	—		MIC81_R/S/T
/MR Input Threshold	V_{IL}	—	—	**0.8**	V	V_{CC} > V_{TH} max., MIC81_L/M/J
		—	—	**0.25 x V_{CC}**		MIC81_R/S/T
/MR Pull-Up Resistance	—	**10**	20	**30**	kΩ	—
/MR Glitch Immunity	—	—	100	—	ns	—

Note 1: Specification for packaged product only.

Reset Timing Diagram



TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	–40	—	+85	°C	—
Storage Temperature Range	T_S	+5	—	+150	°C	—
Lead Temperature	—	—	—	+300	°C	Soldering, 10 sec.
Package Thermal Resistance						
Thermal Resistance, SOT-143, 4-Ld	θ_{JA}	—	265	—	°C/W	—

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +85°C rating. Sustained junction temperatures above +85°C can impact the device reliability.

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number MIC811	Pin Number MIC812	Pin Name	Description
1	1	GND	IC Ground Pin.
2	N/A	/RESET	/RESET goes low if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after V_{CC} exceeds the reset threshold.
N/A	2	RESET	RESET goes high if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (140 ms min.) after V_{CC} exceeds the reset threshold.
3	3	/MR	Manual Reset Input. A logic low on /MR will force a reset. The reset will remain asserted as long as /MR is held low and for one reset time-out period (140 ms min.) after /MR goes high. This input can be shorted to ground via a switch or driven from CMOS or TTL logic. Float if unused.
4	4	VCC	Power Supply Input.

3.0 APPLICATION INFORMATION

3.1 Microprocessor Reset

The /RESET (or RESET) pin is asserted whenever V_{CC} falls below the reset threshold voltage. The /RESET pin remains asserted for a period of 140 ms after V_{CC} has risen above the reset threshold voltage. The reset function ensures that the microprocessor is properly reset and powers up in a known condition after a power failure. /RESET will remain valid with V_{CC} as low as 1V.

3.2 VCC Transients

The MIC811/812 are relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125 mV below the reset threshold with a duration of 20 µs or less will not cause a reset.

3.3 Interfacing to Bidirectional Reset Pins

The MIC811/812 can interface with microprocessors with bidirectional reset pins by connecting a 4.7 kΩ resistor in series with the MIC811/812 output and the microprocessor reset pin.

3.4 /RESET Valid at Low Voltage

A resistor can be added from the /RESET pin to ground to ensure the /RESET output remains low with V_{CC} down to 0V. A 100 kΩ resistor connected from the /RESET to ground is recommended. The value of the resistor should be large enough not to load the output excessively and small enough to pull-down any stray leakage currents.

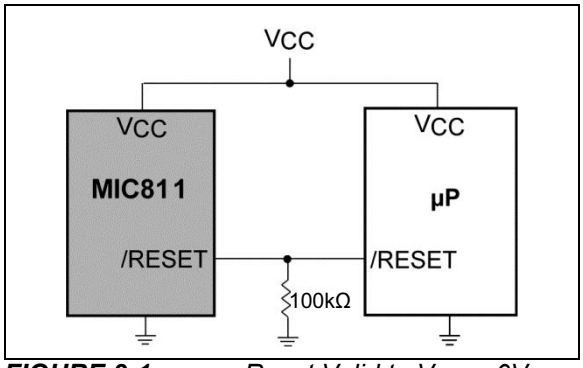


FIGURE 3-1: *Reset Valid to V_{CC} = 0V.*

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

4-Lead SOT-143* (Front)

XX

Example

KM

4-Lead SOT-143* (Back)

MNNN

Example

95H4

Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

Underbar (_) and/or Overbar (¯) symbol may not be to scale.

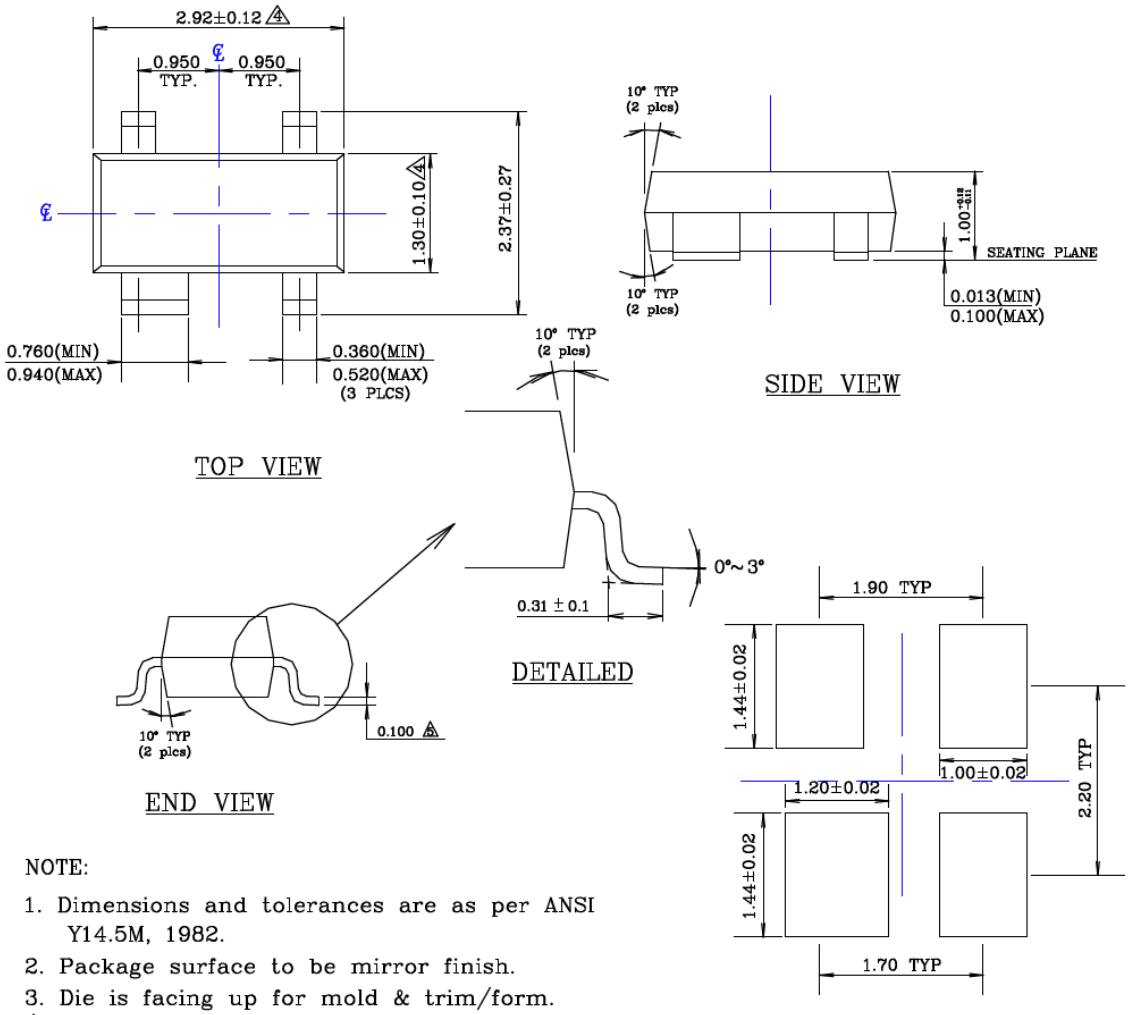
TABLE 4-1: MARKING CODES

Part Number	Marking Code	Threshold Voltage
MIC811LUY	KL	4.63V
MIC811MUY	KM	4.38V
MIC811JUY	KJ	4.00V
MIC811TUY	KT	3.08V
MIC811SUY	KS	2.93V
MIC811RUY	KR	2.63V
MIC812LUY	LL	4.63V
MIC812MUY	LM	4.38V
MIC812JUY	LJ	4.00V
MIC812TUY	LT	3.08V
MIC812SUY	LS	2.93V
MIC812RUY	LR	2.63V

4-Lead SOT-143 Package Outline and Recommended Land Pattern

TITLE
4 LEAD SOT143 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	SOT143-4LD-PL-1	UNIT	MM



NOTE:

1. Dimensions and tolerances are as per ANSI Y14.5M, 1982.
2. Package surface to be mirror finish.
3. Die is facing up for mold & trim/form.
4. Dimension are exclusive of mold flash and gate burr.
5. Dimension are exclusive of solder plating.

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging.

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (May 2022)

- Converted Micrel document MIC811/MIC812 to Microchip data sheet template DS20006526A.
- Minor grammatical text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

Device	X	X	X	-XX
Part No.	Threshold Voltage	Package	Temp. Range	Media Type

Device:	MIC811:	Microprocessor Reset Circuits with Active-Low /RESET	
	MIC812:	Microprocessor Reset Circuits with Active-High RESET	
Threshold Voltage:	R	=	2.63V
	S	=	2.93V
	T	=	3.08V
	J	=	4.00V
	M	=	4.38V
	L	=	4.63V
Package:	U	=	4-Lead SOT-143
Temperature Range:	Y	=	–40°C to +85°C
Media Type:	TR	=	3,000/Reel

Examples:

a) MIC811RUY-TR: MIC811, 2.63V Threshold Voltage, 4-Lead SOT-143, –40°C to +85°C Temp. Range, 3,000/Reel

b) MIC811JUY-TR: MIC811, 4.00V Threshold Voltage, 4-Lead SOT-143, –40°C to +85°C Temp. Range, 3,000/Reel

c) MIC811TUY-TR: MIC811, 3.08V Threshold Voltage, 4-Lead SOT-143, –40°C to +85°C Temp. Range, 3,000/Reel

d) MIC812SUY-TR: MIC812, 2.93V Threshold Voltage, 4-Lead SOT-143, –40°C to +85°C Temp. Range, 3,000/Reel

e) MIC812LUY-TR: MIC812, 4.63V Threshold Voltage, 4-Lead SOT-143, –40°C to +85°C Temp. Range, 3,000/Reel

f) MIC812MUY-TR: MIC812, 4.38V Threshold Voltage, 4-Lead SOT-143, –40°C to +85°C Temp. Range, 3,000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

NOTES:

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