



## MIC811/812

### Microprocessor Reset Circuits

### Final Information

## General Description

The MIC811 and MIC812 are inexpensive microprocessor supervisory circuit that monitors 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 is guaranteed to remain asserted for a minimum of 140ms after  $V_{CC}$  has risen above the designed reset threshold level. Having a push-pull output stage, MIC811/812 does not require a pull-up resistor at the output. The MIC811/812 comes in a 4-pin SOT-143 package.

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

## Features

- Precision voltage monitor for 3V, 3.3V or 5V power supplies
- /RESET remains valid with  $V_{CC}$  as low as 1.4V
- $<15\mu A$  supply current
- 140ms minimum reset pulse width available
- Manual reset input
- Available in 4-pin SOT-143 package

## Applications

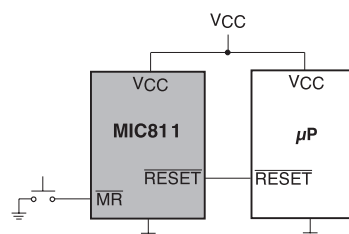
- Portable equipment
- Intelligent instruments
- Critical microprocessor power monitoring
- Printers/computers
- Embedded controllers

## Ordering Information

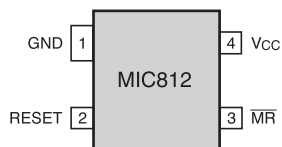
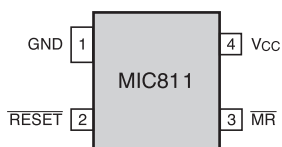
Standard		Pb-Free		Threshold Voltage	Operating Temp. Range	Package
Part Number	Marking	Part Number	Marking			
MIC811LU	KL	MIC811LUY	<u>KL</u>	4.63	-40°C to +85°C	4-lead SOT-143
MIC811MU	KM	MIC811MUY	<u>KM</u>	4.38	-40°C to +85°C	4-lead SOT-143
MIC811JU	KJ	MIC811JUY	<u>KJ</u>	4.00	-40°C to +85°C	4-lead SOT-143
MIC811UU	KU	MIC811UUY	<u>KU</u>	3.00	-40°C to +85°C	4-lead SOT-143
MIC811TU	KT	MIC811TUY	<u>KT</u>	3.08	-40°C to +85°C	4-lead SOT-143
MIC811SU	KS	MIC811SUY	<u>KS</u>	2.93	-40°C to +85°C	4-lead SOT-143
MIC811RU	KR	MIC811RUY	<u>KR</u>	2.63	-40°C to +85°C	4-lead SOT-143
MIC812LU	LL	MIC812LUY	<u>LL</u>	4.63	-40°C to +85°C	4-lead SOT-143
MIC812MU	LM	MIC812MUY	<u>LM</u>	4.38	-40°C to +85°C	4-lead SOT-143
MIC812JU	LJ	MIC812JUY	<u>LJ</u>	4.00	-40°C to +85°C	4-lead SOT-143
MIC812UU	LU	MIC812UUY	<u>LU</u>	3.00	-40°C to +85°C	4-lead SOT-143
MIC812TU	LT	MIC812TUY	<u>LT</u>	3.08	-40°C to +85°C	4-lead SOT-143
MIC812SU	LS	MIC812SUY	<u>LS</u>	2.93	-40°C to +85°C	4-lead SOT-143
MIC812RU	LR	MIC812RUY	<u>LR</u>	2.63	-40°C to +85°C	4-lead SOT-143

\*Under bar symbol (  ) may not be to scale.

## Typical Application



## Pin Configuration



**MIC811 4-Lead SOT-143**

**MIC812 4-Lead SOT-143**

## Pin Description

Pin Number MIC811	Pin Number MIC812	Pin Name	Pin Function
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 (140ms 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 (140ms min.) after $V_{CC}$ exceeds the reset threshold
3	3	/MR	Manual Reset Input. A logic low on /MR forces a reset. The reset will remain asserted as long as /MR is held low and for one reset timeout period (140ms 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.

**Absolute Maximum Ratings**(Note 1)

Terminal Voltage ( $V_{CC}$ )	–0.3V to +6.0V
Input Current ( $V_{CC}$ , /MR)	20mA
Output Current (/RESET, RESET)	20mA
Lead Temperature (soldering, 10 sec.)	300°C
Storage Temperature ( $T_S$ )	–65°C to 150°C
Rate of Rise ( $V_{CC}$ )	100V/ $\mu$ s
ESD Rating, <b>Note 3</b>	

**Operating Ratings**(Note 2)

Operating Temperature Range	
MIC811	–40°C to 85°C
MIC812	–40°C to 85°C
Power Dissipation ( $T_A = +70^\circ\text{C}$ )	320mW

**Electrical Characteristics**

For typical values,  $V_{CC} = 5\text{V}$  for MIC8\_L/M/J,  $V_{CC} = 3.3\text{V}$  for MIC8\_S/T,  $V_{CC} = 3\text{V}$  for MIC8\_R;  $T_A = 25^\circ\text{C}$ , **bold** values indicate  $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$ ; unless noted

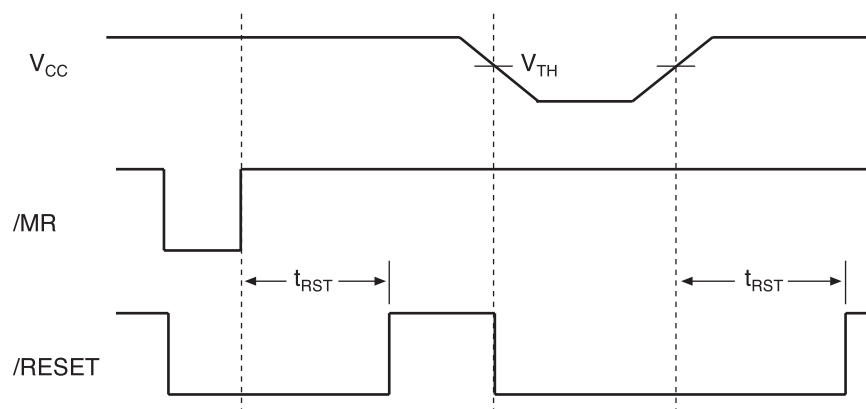
Symbol	Parameter	Condition	Min	Typ	Max	Units
$V_{CC}$	Operating Voltage Range	$T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$	<b>1.4</b>		<b>5.5</b>	V
		$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$	<b>1.6</b>		<b>5.5</b>	V
$I_{CC}$	Supply Current	MIC811L/M/J, MIC812L/M/J: $V_{CC} = 5.0\text{V}$ , no load		9	<b>15</b>	$\mu\text{A}$
		MIC811S/T, MIC812S/T $V_{CC} = 3.3\text{V}$ , no load		6	<b>10</b>	$\mu\text{A}$
		MIC811R, MIC812R: $V_{CC} = 3.0\text{V}$ , no load		6	<b>10</b>	$\mu\text{A}$
$V_{TH}$	Reset Voltage Threshold	MIC811L, MIC812L	<b>4.50</b>	4.63	<b>4.75</b>	V
		MIC811M, MIC812M	<b>4.25</b>	4.38	<b>4.50</b>	V
		MIC811J, MIC812J	<b>3.89</b>	4.00	<b>4.10</b>	V
		MIC811T, MIC812T	<b>3.00</b>	3.08	<b>3.15</b>	V
		MIC811S, MIC812S	<b>2.85</b>	2.93	<b>3.00</b>	V
		MIC811R, MIC812R	<b>2.55</b>	2.63	<b>2.70</b>	V
$t_{RST}$	Reset Timeout Period		<b>140</b>	240	<b>560</b>	ms
$V_{OH}$	/RESET Output Voltage	$I_{SOURCE} = 800\mu\text{A}$ , MIC811L/M/J	<b><math>V_{CC} - 1.5\text{V}</math></b>			V
		$I_{SOURCE} = 500\mu\text{A}$ , MIC811R/S/T	<b><math>0.8 \times V_{CC}</math></b>			V
$V_{OL}$	/RESET Output Voltage	$V_{CC} = V_{TH} \text{ min.}$ , $I_{SINK} = 3.2\text{mA}$ , MIC811L/M/J			<b>0.4</b>	V
		$V_{CC} = V_{TH} \text{ min.}$ , $I_{SINK} = 1.2\text{mA}$ , MIC811R/S/T			<b>0.3</b>	V
		$V_{CC} > 1.4\text{V}$ , $I_{SINK} = 50\mu\text{A}$ , $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$			<b>0.3</b>	V
		$V_{CC} > 1.6\text{V}$ , $I_{SINK} = 50\mu\text{A}$ , $T_A = -40^\circ$ to $+85^\circ\text{C}$			<b>0.3</b>	V
$V_{OH}$	RESET Output Voltage	$1.8\text{V} < V_{CC} < V_{TH} \text{ min.}$ , $I_{SOURCE} = 150\mu\text{A}$	<b><math>0.8 \times V_{CC}</math></b>			V
$V_{OL}$	RESET Output Voltage	$I_{SINK} = 3.2\text{mA}$ , MIC812L/M/J			<b>0.4</b>	V
		$I_{SINK} = 1.2\text{mA}$ , MIC812R/S/T			<b>0.3</b>	V
	/MR Minimum Pulse Width		<b>10</b>			$\mu\text{s}$
	/MR to Reset Delay			0.5		$\mu\text{s}$
$V_{IH}$	/MR Input Threshold	$V_{CC} > V_{TH} \text{ max.}$ , MIC81_L/M/J	<b>2.3</b>			V
		MIC81_R/S/T	<b><math>0.7 \times V_{CC}</math></b>			V
$V_{IL}$	/MR Input Threshold	$V_{CC} \cdot V_{TH} \text{ max.}$ , MIC81-L/M/_			0.8	V
		MIC81_R/S/T			<b><math>0.25 \times V_{CC}</math></b>	
	/MR Pull-Up Resistance		<b>10</b>	20	<b>30</b>	k $\Omega$
	/MR Glitch Immunity			100		ns

**Note 1.** Exceeding the absolute maximum rating may damage the device.

**Note 2.** The device is not guaranteed to function outside its operating rating.

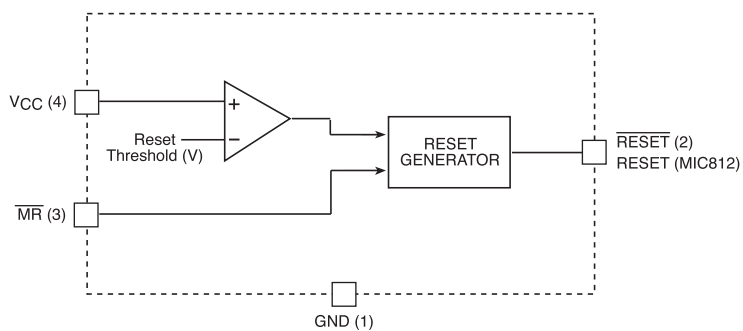
**Note 3.** Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.

## Timing Diagram



Reset Timing Diagram

## Functional Diagram



## Applications Information

### 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 140ms after  $V_{CC}$  has risen above the reset threshold voltage. The reset function ensures 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 1.4V.

### $V_{CC}$ Transients

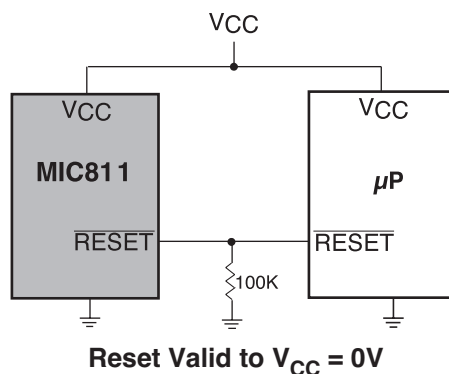
The MIC811/812 are relatively immune to negative-going  $V_{CC}$  glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 50 $\mu$ s (25 $\mu$ s for MIC8\_R/S/T) or less will not cause a reset.

### Interfacing to Bidirectional Reset Pins

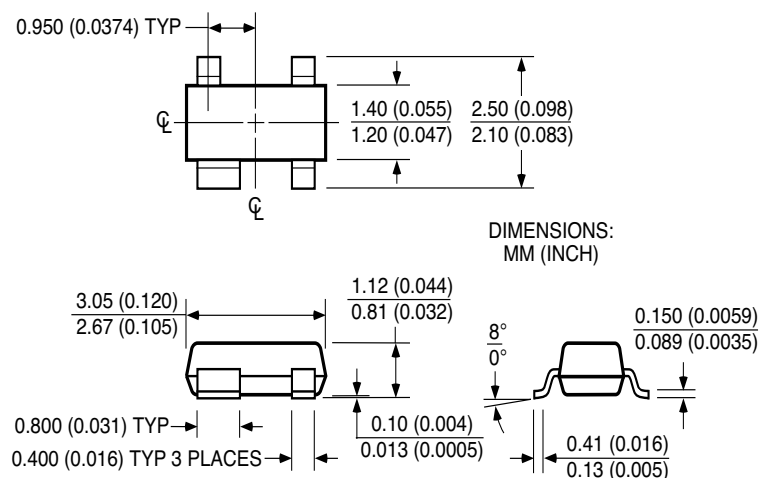
The MIC811/812 can interface with  $\mu$ Ps with bidirectional reset pins by connecting a 4.7k $\Omega$  resistor in series with the MIC811/812 output and the  $\mu$ P reset pin.

### /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 100k $\Omega$  resistor connected from the /RESET to ground is recommended. The size of the resistor should be large enough not to load the output excessively and small enough to pull-down any stray leakage currents.



## Package Information



**4-lead SOT-143 (M3)**

**MICREL INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA**

TEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

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