

## General Description

The MIC809 and MIC810 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor based systems.

The function of these devices is to assert a reset if the power supply drops below a designated reset threshold level. Several different reset threshold levels are available to accommodate 3V, 3.3V or 5V powered systems.

The MIC809 has an active-low /RESET output, while the MIC810 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 designated reset threshold level. Having a push-pull output stage, the MIC809/810 does not require a pull-up resistor at the output. The MIC809/810 comes in a 3-pin SOT-23 and SC-70 package.

The MIC809 is also available with a shorter reset timeout (30ms min.). See the MIC809-5.

All support documentation can be found on Micrel's web site at [www.micrel.com](http://www.micrel.com).

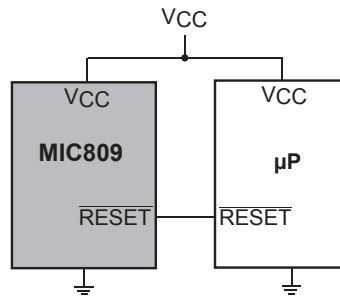
## Features

- Precision voltage monitor for 3V, 3.3V or 5V power supplies
- /RESET remains valid with  $V_{CC}$  as low as 1.4V for SOT-23 packaged part
- /RESET remains valid with  $V_{CC}$  as low as 1V for SC70 packaged part
- Typically less than 15 $\mu$ A supply current for SOT-23 packaged part
- 5 $\mu$  typical supply current for SC70 packaged part
- 140ms minimum reset pulse widths available
- Available in 3-pin SOT-23 and SC-70 package

## Applications

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

## Typical Application

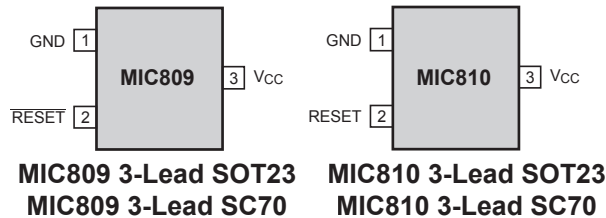


## Ordering Information

Part Number		Marking	Threshold Voltage	Operating Temp. Range	Lead Finish
3-lead SOT-23 Package	3-lead SC-70 Package				
MIC809LU	MIC809LBC3	IL	4.63	-40°C to +85°C	Standard
MIC809MU	MIC809MBC3	IM	4.38	-40°C to +85°C	Standard
MIC809JU	MIC809JBC3	IJ	4.00	-40°C to +85°C	Standard
MIC809TU	MIC809TBC3	IT	3.08	-40°C to +85°C	Standard
MIC809SU	MIC809SBC3	IS	2.93	-40°C to +85°C	Standard
MIC809RU	MIC809RBC3	IR	2.63	-40°C to +85°C	Standard
MIC810LU	MIC810LBC3	JL	4.63	-40°C to +85°C	Standard
MIC810MU	MIC810MBC3	JM	4.38	-40°C to +85°C	Standard
MIC810JU	MIC810JBC3	JJ	4.00	-40°C to +85°C	Standard
MIC810TU	MIC810TBC3	JT	3.08	-40°C to +85°C	Standard
MIC810SU	MIC810SBC3	JS	2.93	-40°C to +85°C	Standard
MIC810RU	MIC810RBC3	JR	2.63	-40°C to +85°C	Standard
MIC809LUY	MIC809LYC3	<u>IL</u>	4.63	-40°C to +85°C	Pb-Free
MIC809MUY	MIC809MYC3	<u>IM</u>	4.38	-40°C to +85°C	Pb-Free
MIC809JUY	MIC809JYC3	<u>IJ</u>	4.00	-40°C to +85°C	Pb-Free
MIC809TUY	MIC809TYC3	<u>IT</u>	3.08	-40°C to +85°C	Pb-Free
MIC809SUY	MIC809SYC3	<u>IS</u>	2.93	-40°C to +85°C	Pb-Free
MIC809RUY	MIC809RYC3	<u>IR</u>	2.63	-40°C to +85°C	Pb-Free
MIC810LUY	MIC810LYC3	<u>JL</u>	4.63	-40°C to +85°C	Pb-Free
MIC810MUY	MIC810MYC3	<u>JM</u>	4.38	-40°C to +85°C	Pb-Free
MIC810JUY	MIC810JYC3	<u>JJ</u>	4.00	-40°C to +85°C	Pb-Free
MIC810TUY	MIC810TYC3	<u>JT</u>	3.08	-40°C to +85°C	Pb-Free
MIC810SUY	MIC810SYC3	<u>JS</u>	2.93	-40°C to +85°C	Pb-Free
MIC810RUY	MIC810RYC3	<u>JR</u>	2.63	-40°C to +85°C	Pb-Free

Note: Contact factory for SC70 packaged Pb-free options..

## Pin Configuration



## Pin Description

Pin Number MIC809	Pin Number MIC810	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	VCC	Power Supply Input.

**Absolute Maximum Ratings<sup>(1)</sup>**

Terminal Voltage ( $V_{CC}$ )	–0.3V to 6.0V
Input Current ( $V_{CC}$ )	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 <sup>(3)</sup>	3kV (SC70 Package)

**Operating Ratings<sup>(2)</sup>**

Operating Temperature Range	
MIC809	–40°C to 85°C
MIC810	–40°C to 85°C
Power Dissipation ( $T_A = +70^\circ\text{C}$ )	320mW

**Electrical Characteristics<sup>(4)</sup>**

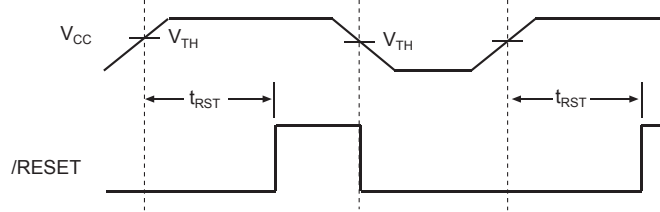
For typical values,  $V_{CC} = 5\text{V}$  for MIC8\_L/M/J,  $V_{CC} = 3.3\text{V}$  for MIC8\_S/T,  $V_{CC} = 3\text{V}$  for MIC8\_R;  $T_A = 25^\circ\text{C}$ , **bold** values indicate  $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$ ; unless noted.

Symbol	Parameter	Condition	Min	Typ	Max	Units
$V_{CC}$	Operating Voltage Range	$T_A = 0^\circ\text{C}$ to $70^\circ\text{C}$ SOT-23 package	<b>1.4</b>		<b>5.5</b>	V
		$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$ SOT-23 package	<b>1.6</b>		<b>5.5</b>	V
		$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$ SC70 package	<b>1</b>		<b>5.5</b>	V
$I_{CC}$	Supply Current	MIC809L/M/J, MIC810L/M/J SOT-23 Package		9	<b>15</b>	$\mu\text{A}$
		For SC-70 Package: MIC809L/M/J, MIC810L/M/J		5	<b>15</b>	$\mu\text{A}$
		$V_{CC} < 3.6\text{V}$ , MIC809R/S/T, MIC810R/S/T SOT-23 package		6	<b>10</b>	$\mu\text{A}$
		For SC-70 Package: $V_{CC} < 3.6\text{V}$ , MIC809R/S/T, MIC810R/S/T		5	<b>10</b>	$\mu\text{A}$
$V_{TH}$	Reset Voltage Threshold	MIC809L, MIC810L	<b>4.50</b>	4.63	<b>4.75</b>	V
		MIC809M, MIC810M	<b>4.25</b>	4.38	<b>4.50</b>	V
		MIC809J, MIC810J	<b>3.89</b>	4.00	<b>4.10</b>	V
		MIC809T, MIC810T	<b>3.00</b>	3.08	<b>3.15</b>	V
		MIC809S, MIC810S	<b>2.85</b>	2.93	<b>3.00</b>	V
		MIC809R, MIC810R	<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 MIC809	$I_{SOURCE} = 800\mu\text{A}$ , MIC809L/M/J	<b><math>V_{CC} - 1.5\text{V}</math></b>			V
		$I_{SOURCE} = 500\mu\text{A}$ , MIC809R/S/T	<b><math>0.8 \times V_{CC}</math></b>			V
$V_{OL}$	/RESET Output Voltage MIC809	$V_{CC} = V_{TH}$ min., $I_{SINK} = 3.2\text{mA}$ , MIC809L/M/J			<b>0.4</b>	V
		$V_{CC} = V_{TH}$ min., $I_{SINK} = 1.2\text{mA}$ , MIC809R/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
		For SC-70 Package: $V_{CC} = 1\text{V}$ , $I_{SINK} = 50\mu\text{A}$ $T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$			<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 MIC810	$1.8\text{V} < V_{CC} < V_{TH}$ min., $I_{SOURCE} = 150\mu\text{A}$	<b><math>0.8 \times V_{CC}</math></b>			V
$V_{OL}$	RESET Output Voltage MIC810	$I_{SINK} = 3.2\text{mA}$ , MIC810L/M/J			<b>0.4</b>	V
		$I_{SINK} = 1.2\text{mA}$ , MIC810R/S/T			<b>0.3</b>	V

**Notes:**

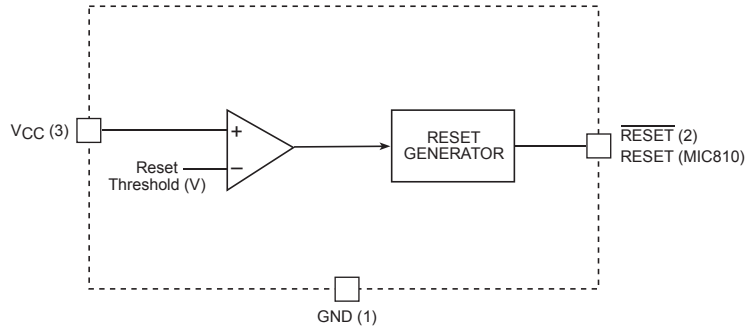
- Exceeding the absolute maximum rating may damage the device.
- The device is not guaranteed to function outside its operating rating.
- Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.
- Specification for packaged product only.

# 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 (1V for SC-70 package).

### $V_{CC}$ Transients

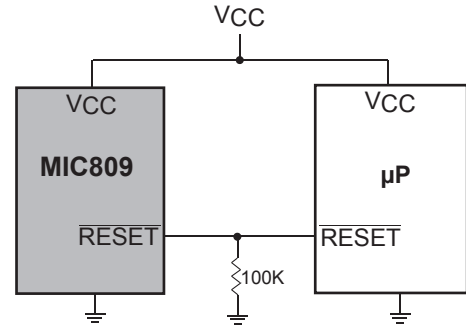
The MIC809/810 are relatively immune to negative-going  $V_{CC}$  glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 20 $\mu$ s or less (SC70 package) will not cause a reset.

### Interfacing to Bidirectional Reset Pins

The MIC809/810 can interface with  $\mu$ Ps with bidirectional reset pins by connecting a 4.7k $\Omega$  resistor in series with the MIC809/810 output and the  $\mu$ P reset pin.

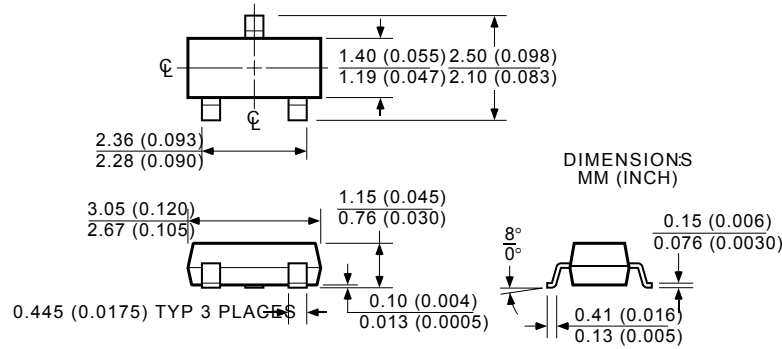
### /RESET Valid at Low Voltage

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 resistor should be small enough to pull-down any stray leakage currents and large enough not to load the reset output. See Figure below.

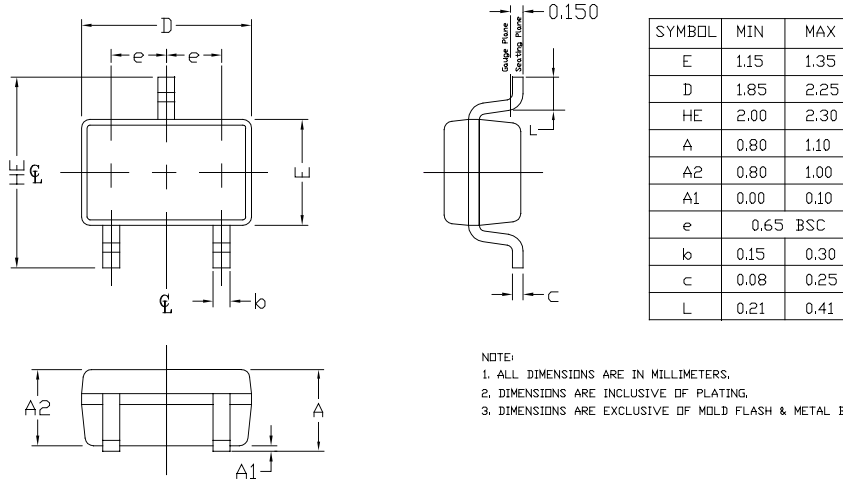


Reset Valid to  $V_{CC} = 0V$

Package Information



3-lead SOT-23 (M3)



3-Lead SC-70 (C3)

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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