



# MIC1810

## Microprocessor Reset Circuit

### General Description

The MIC1810 is an inexpensive microprocessor supervisory circuit that monitors 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 5%, 10%, or 15% drop in 5V powered systems.

The MIC1810 has an active low /RESET output. The reset output is guaranteed to remain asserted for a minimum of 100ms after  $V_{CC}$  has risen above the designated reset threshold level. The MIC1810 comes in a 3-pin SOT-23 package.

### Features

- Precision voltage monitor for 5%, 10%, or 15% drop in 5V power supplies
- /RESET remains valid with  $V_{CC}$  as low as 1V
- 5 $\mu$ A supply current (typical)
- 100ms minimum reset pulse width
- No external components required
- Available in 3-pin SOT-23 package

### Applications

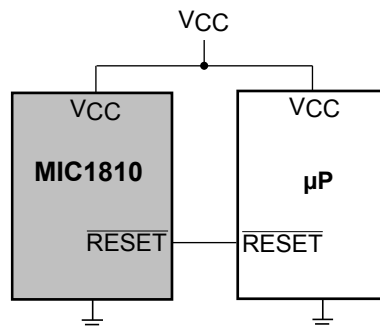
- Portable equipment
- Intelligent instruments
- Critical microprocessor power monitoring
- Printers/computers
- Embedded controllers

### Ordering Information

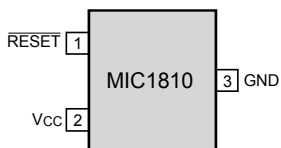
Part Number	Marking*	Threshold Voltage	Operating Temp. Range	Package	Pb-Free
MIC1810-5U	NA	4.62V	-40°C to +85°C	SOT-23	No
MIC1810-10U	NB	4.37V	-40°C to +85°C	SOT-23	No
MIC1810-15U	NC	4.12V	-40°C to +85°C	SOT-23	No
MIC1810-5UY	<u>NA</u>	4.62V	-40°C to +85°C	SOT-23	Yes
MIC1810-10UY	<u>NB</u>	4.37V	-40°C to +85°C	SOT-23	Yes
MIC1810-15UY	<u>NC</u>	4.12V	-40°C to +85°C	SOT-23	Yes

\* Underbar symbol may not be to scale

### Typical Application



## Pin Configuration



**3-Lead SOT-23**

## Pin Description

Pin Number	Pin Name	Pin Function
1	/RESET	/RESET goes low if $V_{CC}$ falls below the reset threshold and remains asserted for one reset timeout period (100ms min) after $V_{CC}$ exceeds the reset threshold.
2	VCC	Power supply input.
3	GND	IC ground pin

**Absolute Maximum Ratings**(Note 1)

Terminal Voltage ( $V_{CC}$ )	.....-0.3V to +6V
Input Current ( $V_{CC}$ )	..... 20mA
Output Current, /RESET	..... 20mA
Rate of Rise ( $V_{CC}$ )	..... 100V/ $\mu$ s
Lead Temperature (soldering, 10 sec.)	..... 300°C
Storage Temperature ( $T_S$ )	..... -65°C to 150°C
ESD Rating, <b>Note 3</b>	..... 3kV

**Operating Ratings**(Note 2)

Operating Temperature Range	
MIC1810-5U	..... -40°C to +85°C
MIC1810-10U	..... -40°C to +85°C
MIC1810-15U	..... -40°C to +85°C
Power Dissipation ( $T_A = +70^\circ\text{C}$ )	..... 320mW

**Electrical Characteristics**

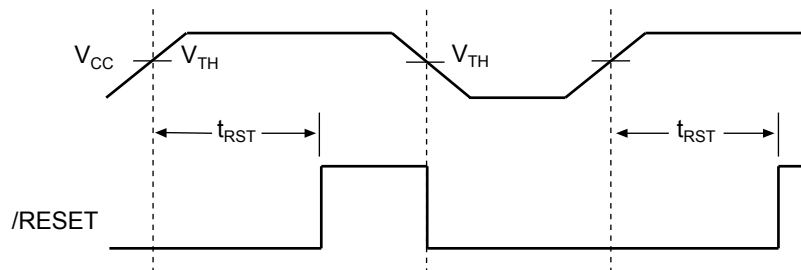
For typical values  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ ; **bold** values indicate  $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$ ; unless noted

Symbol	Parameter	Condition	Min	Typ	Max	Units
	Operating Voltage Range	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$	<b>1</b>		<b>5.5</b>	V
$I_{CC}$	Supply Current			5	<b>20</b>	$\mu\text{A}$
$V_{TH}$	Reset Voltage Threshold	MIC1810-5	<b>4.50</b>	4.62	<b>4.75</b>	V
		MIC1810-10	<b>4.25</b>	4.37	<b>4.50</b>	V
		MIC1810-15	<b>4.00</b>	4.12	<b>4.24</b>	V
$t_{RST}$	Reset Timeout Period		<b>100</b>	150	<b>250</b>	ms
$V_{OH}$	/RESET Output Voltage, High	$I_{SOURCE} = 800\mu\text{A}$	$V_{CC}-1.5$			V
$V_{OL}$	/RESET Output Voltage, Low	$V_{CC} = V_{TH}$ min., $I_{SINK} = 10\text{mA}$			<b>0.4</b>	V
		$V_{CC} \geq 1\text{V}$ , $I_{SINK} = 50\mu\text{A}$			<b>0.3</b>	V

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

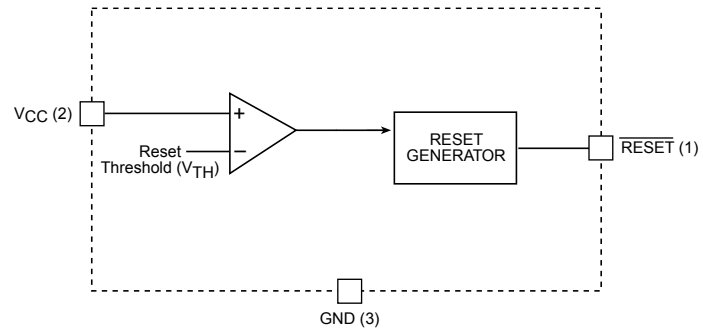
**Note 2.** The device is not guaranteed to function outside its operating rating.

**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

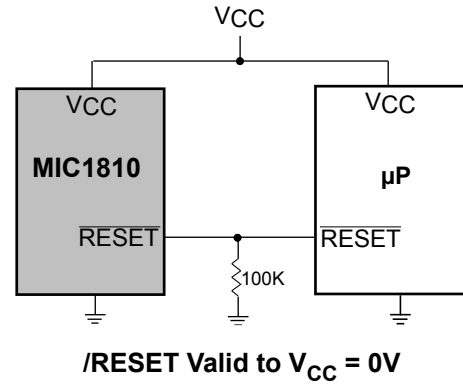
The /RESET pin is asserted whenever  $V_{CC}$  falls below the reset threshold voltage. The reset pin remains asserted for a period of  $t_{RST}$  after  $V_{CC}$  has risen above the reset threshold voltage. The reset function ensures the microprocessor is properly reset and powers up into a known condition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

### $V_{CC}$ Transients

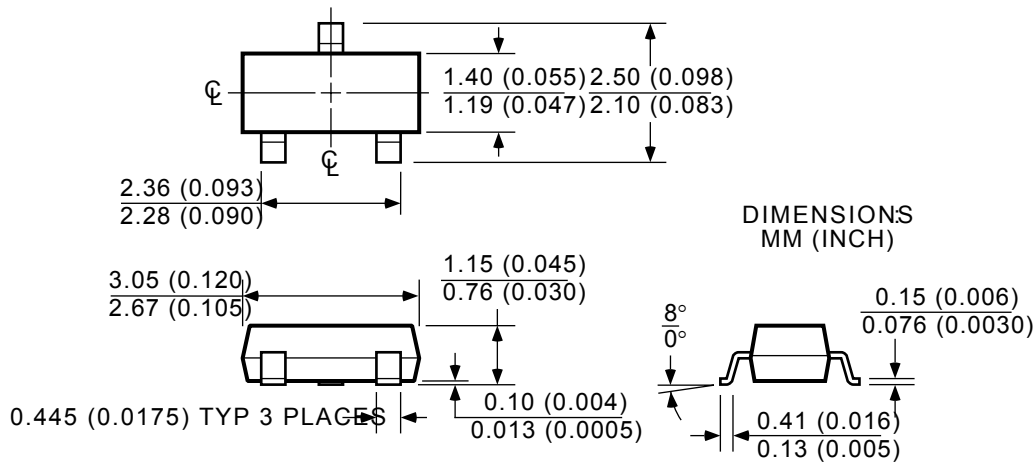
The MIC1810 is relatively immune to negative-going  $V_{CC}$  glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 20 $\mu$ s or less will not cause an unwanted reset.

### /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 /RESET-to-ground is recommended. The resistor should be large enough not to load the /RESET output and small enough to pull-down any stray leakage currents. See Figure below.



## Package Information



**3-Pin SOT-23 Small Outline Transistor**

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