



# 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

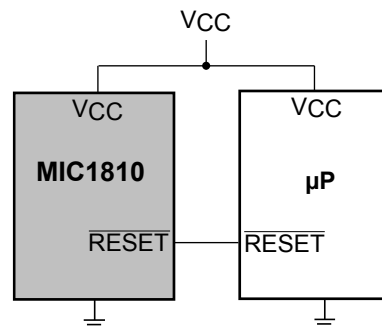
- Portable equipment
- Intelligent instruments
- Critical microprocessor power monitoring
- Printers/computers
- Embedded controllers

### Ordering Information

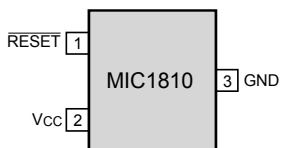
| Part Number  | Marking*  | Threshold Voltage | Operating Temp. Range | Package | Pb-Free |
|--------------|-----------|-------------------|-----------------------|---------|---------|
| MIC1810-5U   | NA        | 4.62V             | -40°C to +85°C        | SOT-23  | No      |
| MIC1810-10U  | NB        | 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**

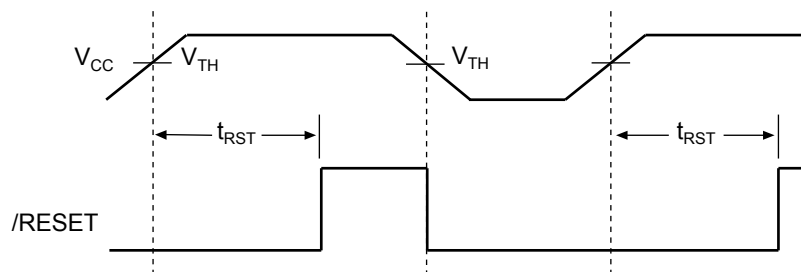
For typical values  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ ; **bold** values indicate  $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$ ; unless noted

| 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.

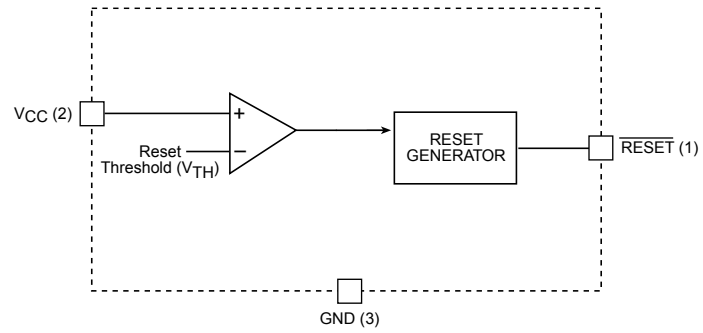
**Note 2.** The device is not guaranteed to function outside its operating rating.

**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

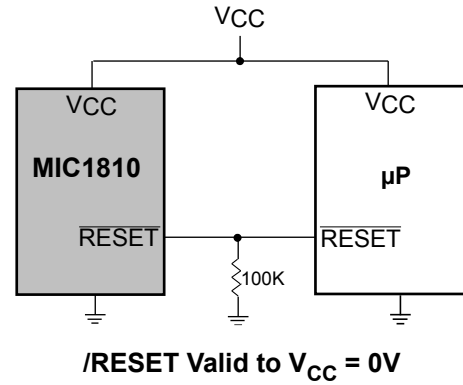
The /RESET pin is asserted whenever  $V_{CC}$  falls below the reset threshold voltage. The reset pin remains asserted for a period of  $t_{RST}$  after  $V_{CC}$  has risen above the reset threshold voltage. The reset function ensures the microprocessor is properly reset and powers up into a known condition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

### $V_{CC}$ Transients

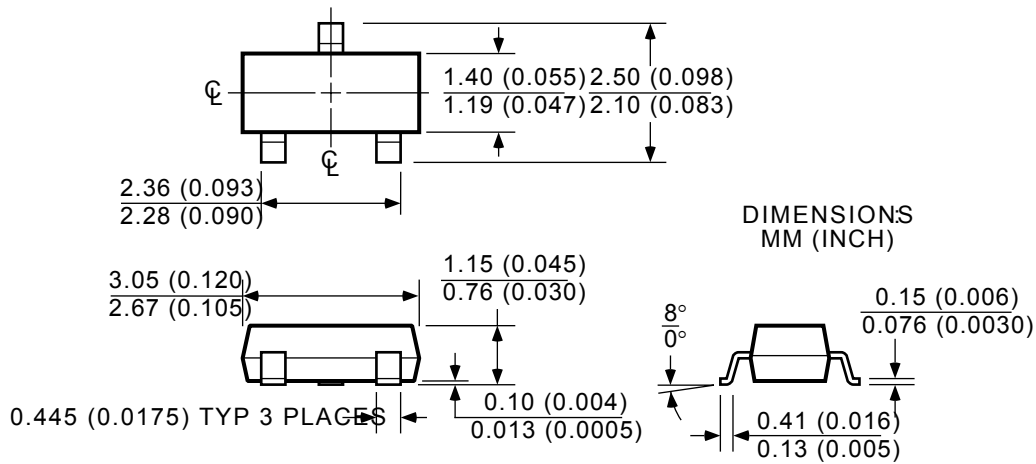
The MIC1810 is relatively immune to negative-going  $V_{CC}$  glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 20 $\mu$ s or less will not cause an unwanted reset.

### /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**

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