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## 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, minimum).

Datasheets and support documentation are available on Micrel's web site at: [www.micrel.com](http://www.micrel.com).

## Features

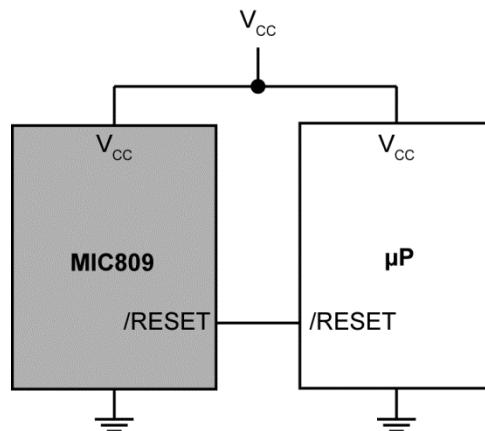
- Precision voltage monitor for 3V, 3.3V, or 5V power supplies
- /RESET remains valid with  $V_{CC}$  as low as 1.4V for SOT-23 packaged part
- /RESET remains valid with  $V_{CC}$  as low as 1V for SC70-packaged part
- Typically less than 15 $\mu$ A supply current for SOT-23 packaged part
- 5 $\mu$ A (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

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## Typical Application

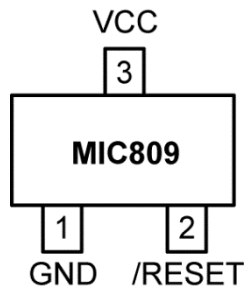


## Ordering Information<sup>(1)</sup>

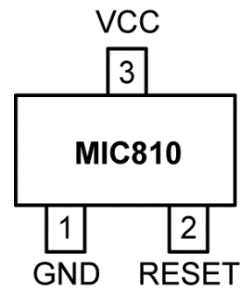
Part Number		Marking <sup>(2)</sup>	Threshold Voltage (V)	Operating Temperature Range	Lead Finish
3-Pin SOT-23	3-Pin SC-70				
MIC809LUY	MIC809LYC3	<u>IL</u>	4.63	-40°C to +85°C	Pb-Free
MIC809MUY	MIC809MYC3	<u>IM</u>	4.38	-40°C to +85°C	Pb-Free
MIC809JUY	MIC809JYC3	<u>IJ</u>	4.00	-40°C to +85°C	Pb-Free
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:**
1. All devices available in Tape and Reel only (Order entry PN, add TR, i.e., MIC809LUY TR). Standard/full reel quantity is 3,000 pieces. Reel diameter is 7in, hub diameter is 2in, and width is 8mm.
  2. Underbar symbol (  ) may not be to scale.

## Pin Configuration



3-Pin MIC809 SOT-23  
3-Pin MIC809 SC-70  
(Top View)

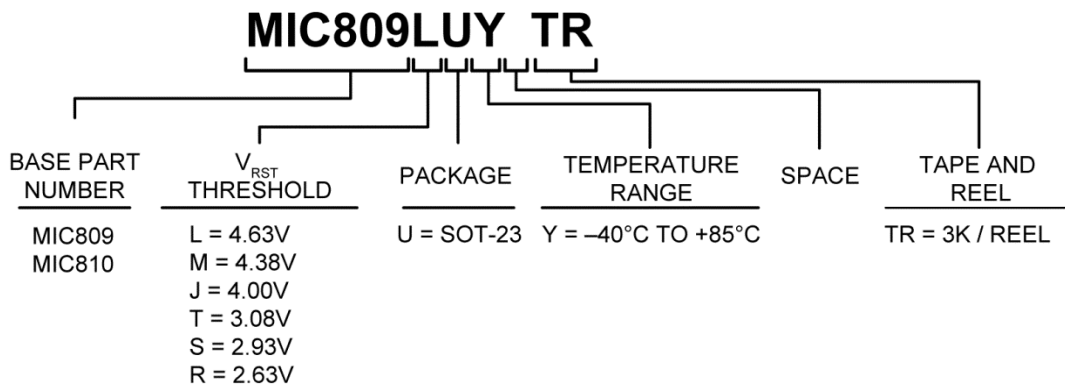


3-Pin MIC810 SOT-23  
3-Pin MIC810 SC-70  
(Top View)

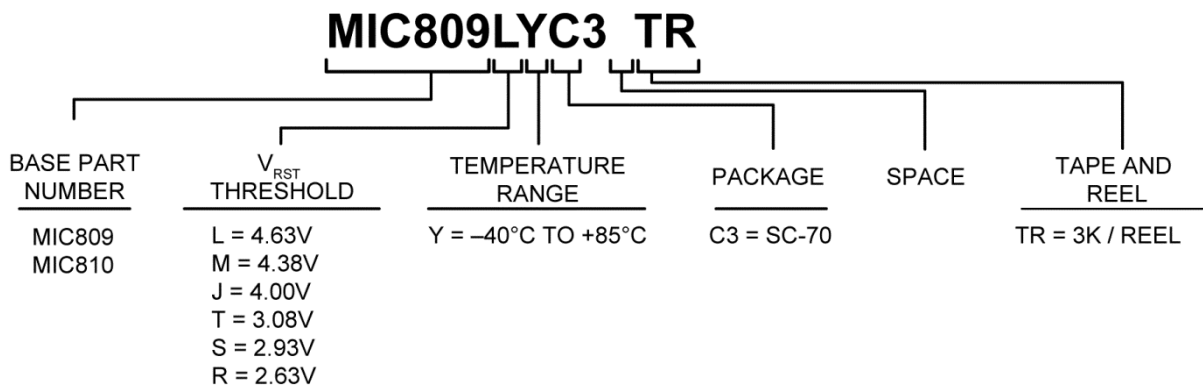
### Pin Description

Pin Number MIC809	Pin Number MIC810	Pin Name	Pin Name
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, minimum) after $V_{CC}$ exceeds the reset threshold.
3	3	VCC	Power Supply Input.

### Part Numbering Conventions



**MIC809 SOT-23**



**MIC809 SC-70**

**Absolute Maximum Ratings<sup>(3)</sup>**

Terminal Voltage ( $V_{CC}$ ).....	-0.3V to +6.0V
Input Current ( $V_{CC}$ ).....	20mA
Output Current (/RESET, RESET).....	20mA
Lead Temperature (soldering, 10s).....	300°C
Storage Temperature ( $T_S$ ).....	-65°C to 150°C
Rate-of-Rise ( $V_{CC}$ ).....	100V/ $\mu$ s
ESD Rating <sup>(5)</sup> .....	3kV (SC-70)

**Operating Ratings<sup>(4)</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>(6)</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  $-40^\circ\text{C}$  to  $\leq T_A \leq +85^\circ\text{C}$ ; unless otherwise 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)	<b>1.4</b>		<b>5.5</b>	V
		$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$ (SOT-23)	<b>1.6</b>		<b>5.5</b>	V
		$T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$ (SC70)	<b>1</b>		<b>5.5</b>	V
$I_{CC}$	Supply Current	MIC809L/M/J, MIC810L/M/J (SOT-23)		9	<b>15</b>	$\mu\text{A}$
		MIC809L/M/J, MIC810L/M/J (SC-70)		5	<b>15</b>	
		$V_{CC} < 3.6\text{V}$ , MIC809R/S/T, MIC810R/S/T (SOT-23)		6	<b>10</b>	
		$V_{CC} < 3.6\text{V}$ , MIC809R/S/T, MIC810R/S/T (SC-70)		5	<b>10</b>	
$V_{TH}$	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>	
		MIC809J, MIC810J	<b>3.89</b>	4.00	<b>4.10</b>	
		MIC809T, MIC810T	<b>3.00</b>	3.08	<b>3.15</b>	
		MIC809S, MIC810S	<b>2.85</b>	2.93	<b>3.00</b>	
		MIC809R, MIC810R	<b>2.55</b>	2.63	<b>2.70</b>	
$t_{RST}$	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>			

**Notes:**

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

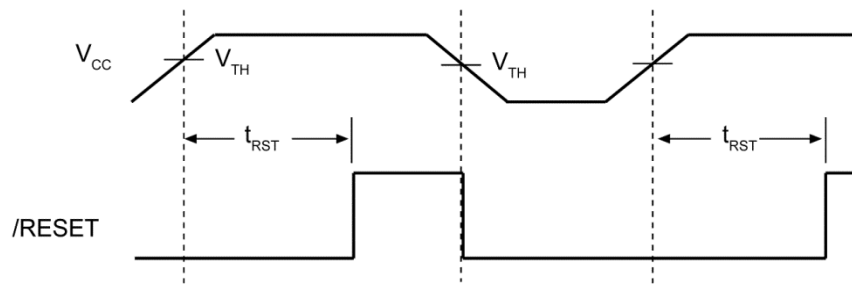
## Electrical Characteristics<sup>(6)</sup> (Continued)

For typical values,  $V_{CC} = 5V$  for MIC8\_L/M/J,  $V_{CC} = 3.3V$  for MIC8\_S/T,  $V_{CC} = 3V$  for MIC8\_R;  $T_A = 25^\circ C$ .

**Bold** values indicate  $-40^\circ C$  to  $\leq T_A \leq +85^\circ C$ ; unless otherwise noted.

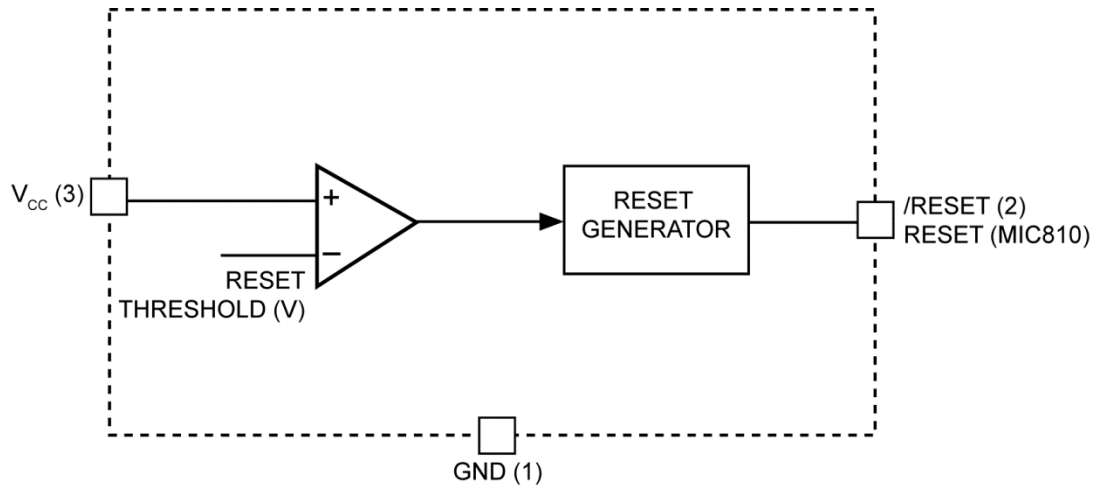
Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
$V_{OL}$	/RESET Output Voltage (MIC809)	$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 3.2mA$ , MIC809L/M/J			<b>0.4</b>	V
		$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 1.2mA$ , MIC809R/S/T			<b>0.3</b>	
		$V_{CC} > 1.4V$ , $I_{SINK} = 50\mu A$ , $T_A = 0^\circ C$ to $+70^\circ C$			<b>0.3</b>	
		$V_{CC} = 1V$ , $I_{SINK} = 50\mu A$ , $T_A = -40^\circ C$ to $+85^\circ C$ (SC-70)			<b>0.3</b>	
		$V_{CC} > 1.6V$ , $I_{SINK} = 50\mu A$ , $T_A = -40^\circ C$ to $+85^\circ C$			<b>0.3</b>	
$V_{OH}$	RESET Output Voltage (MIC810)	$1.8V < V_{CC} < V_{TH}$ (minimum), $I_{SOURCE} = 150\mu A$	<b><math>0.8 \times V_{CC}</math></b>			V
$V_{OL}$	RESET Output Voltage (MIC810)	$I_{SINK} = 3.2mA$ , MIC810L/M/J			<b>0.4</b>	V
		$I_{SINK} = 1.2mA$ , MIC810R/S/T			<b>0.3</b>	

## Timing Diagram



Reset Timing Diagram

### Functional Diagram



## Application 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 duration of 2 $\mu$ 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 (Figure 1).

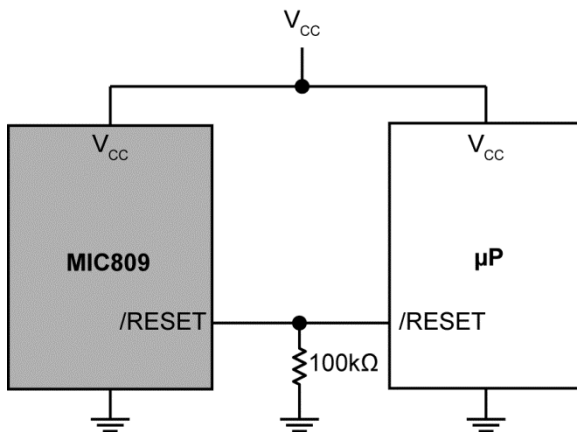
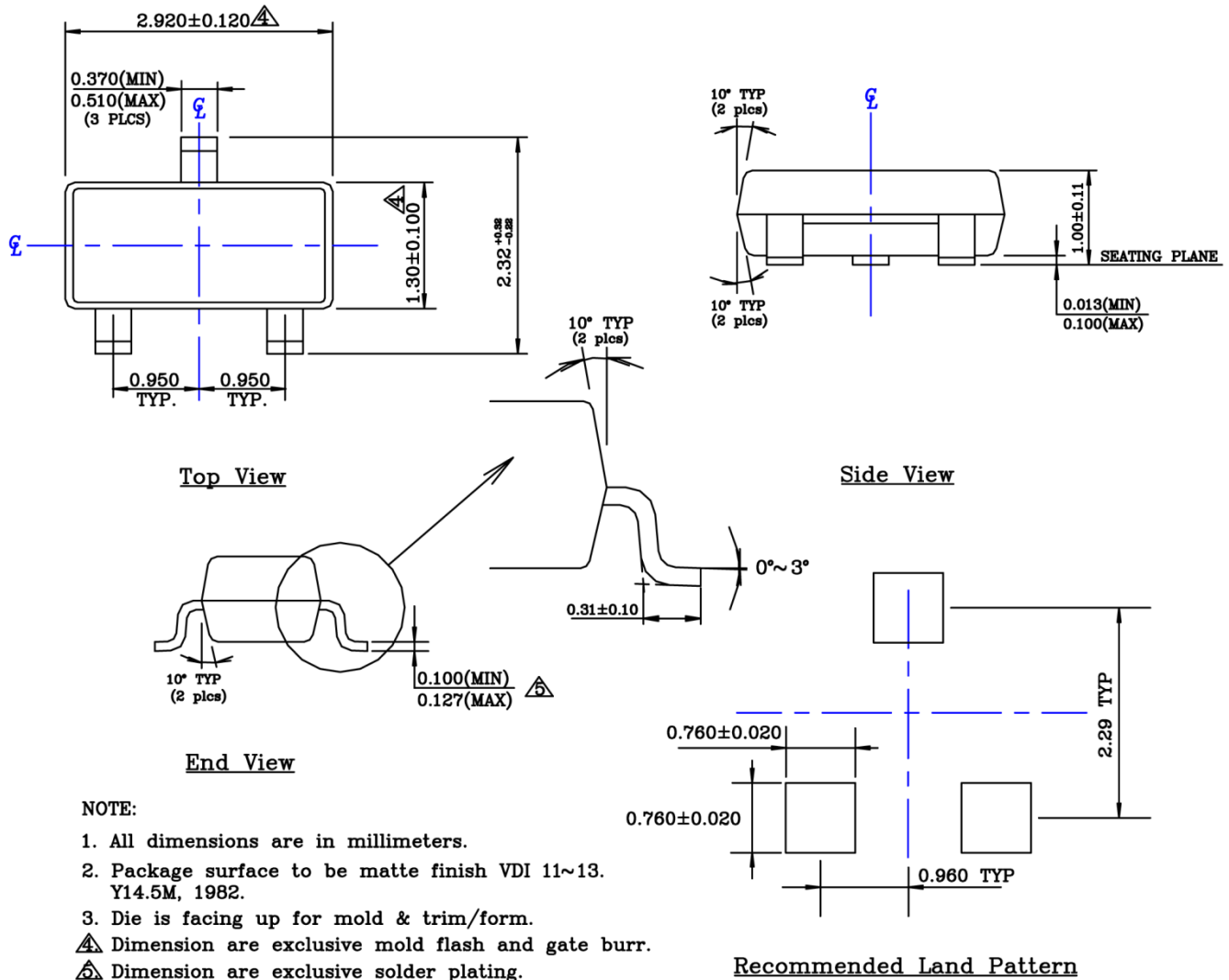


Figure 1. Reset Valid to  $V_{CC} = 0V$

# Package Information and Recommended Landing Patterns<sup>(7)</sup>



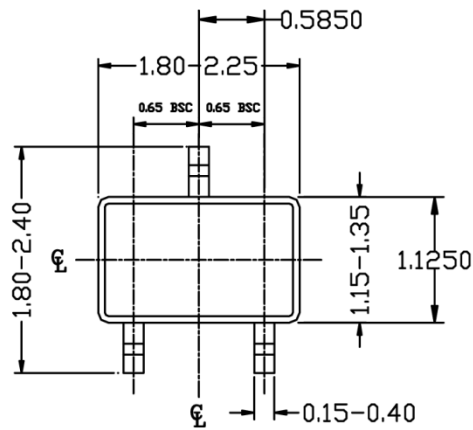
3-Pin SOT-23 (U)

**Note:**

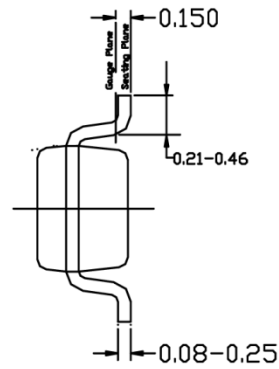
7. Package information is correct as of the publication date. For updates and most current information, go to [www.micrel.com](http://www.micrel.com).



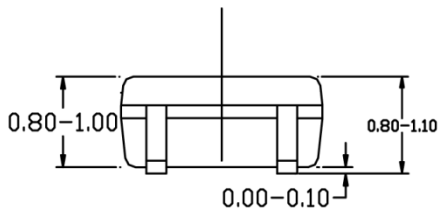
Package Information and Recommended Landing Patterns<sup>(7)</sup> (Continued)



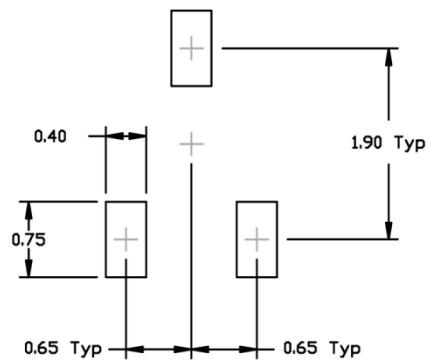
TOP VIEW



END VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN

- NOTE:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS.  
 2. DIMENSIONS ARE INCLUSIVE OF PLATING.  
 3. DIMENSIONS ARE EXCLUSIVE OF MOLD FLASH & METAL BURR.

3-Pin SC-70 (C3)

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