

Microprocessor Reset Circuits

Features

- Precision Voltage Monitor for 3V, 3.3V, or 5V Power Supplies
- /RESET Remains Valid with V_{CC} as Low as 1.4V for the SOT-23
- /RESET Remains Valid with V_{CC} as Low as 1V for the SC-70
- Typically Less Than 15 μA Supply Current for the SOT-23
- 5 μA Typical Supply Current for the SC-70
- 140 ms Minimum Reset Pulse Width Available
- Available in 3-Lead SOT-23 and SC-70 Packages

Applications

- Portable Equipment
- Intelligent Instruments
- Critical Microprocessor Power Monitoring
- Printers/Computers
- Controllers

General Description

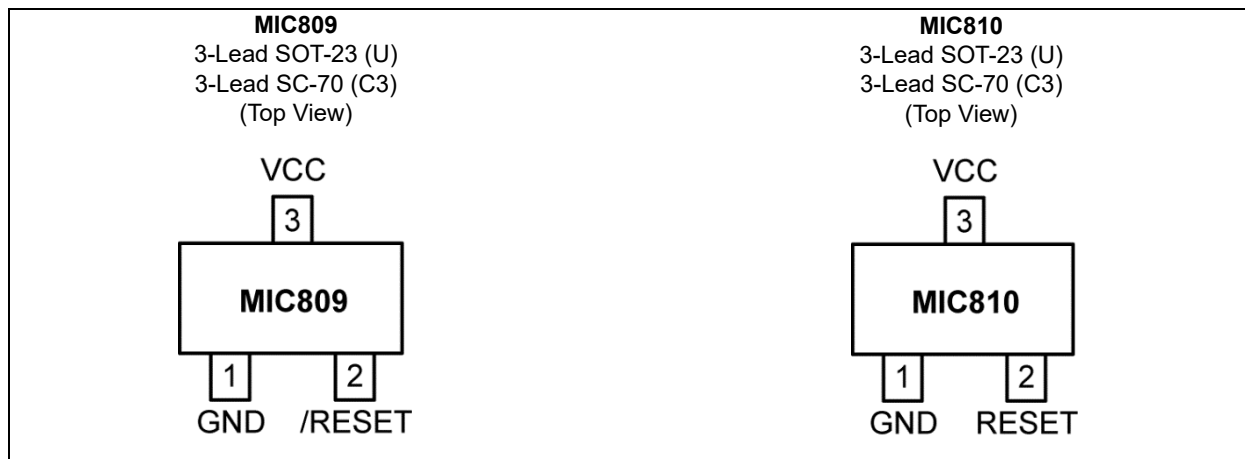
The MIC809 and MIC810 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor-based systems.

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 140 ms after V_{CC} has risen above the designated reset threshold level. Having a push-pull output stage, the MIC809/810 do not require a pull-up resistor at the output. The MIC809/810 come in a 3-lead SOT-23 and SC-70 package.

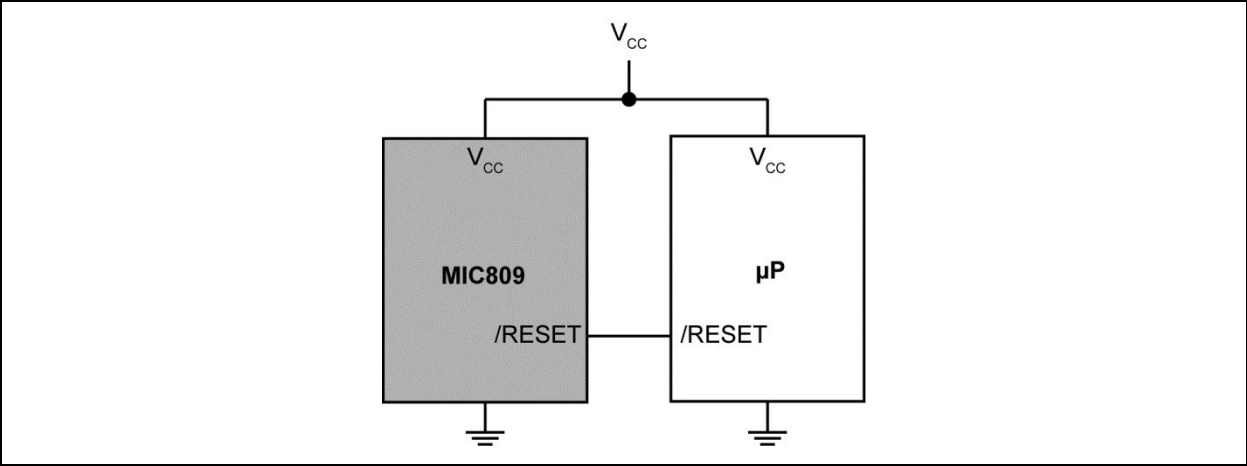
The MIC809 is also available with a shorter reset timeout (30 ms, minimum).

Package Types

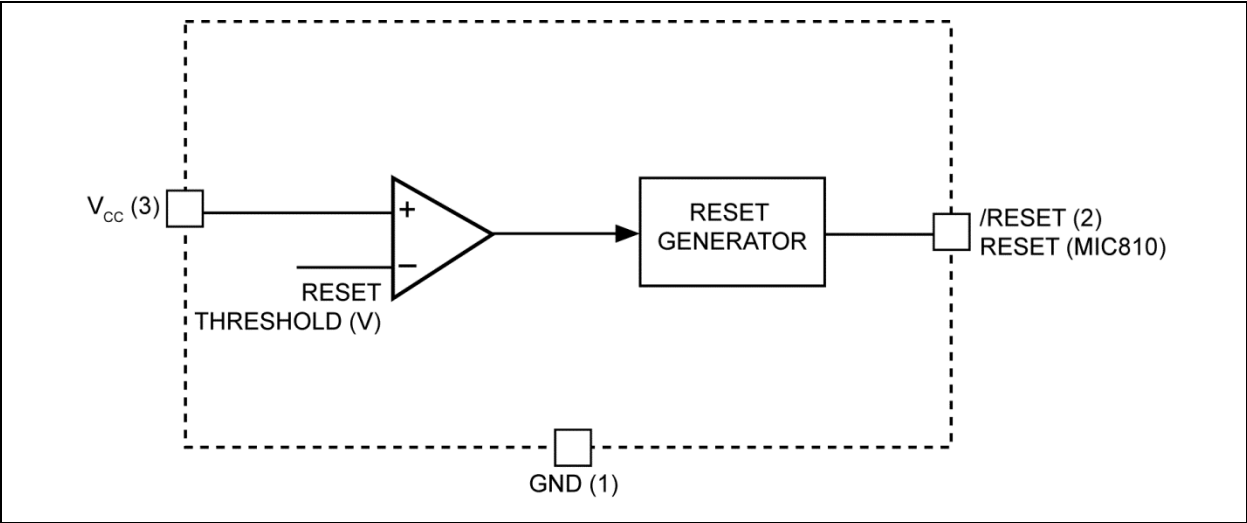


MIC809/MIC810

Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Terminal Voltage (V_{CC}).....	–0.3V to +6.0V
Input Current (V_{CC} , /MR).....	20 mA
Output Current (/RESET, RESET)	20 mA
Rate of Rise (V_{CC})	100V/ μ s
ESD Rating, SC-70 (Note 1)	3 kV

Operating Ratings ‡

Power Dissipation ($T_A = +70^\circ\text{C}$).....	320 mW
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† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ **Notice:** The device is not guaranteed to function outside its operating rating.

Note 1: Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5 k Ω in series with 100 pF.

ELECTRICAL CHARACTERISTICS

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 valid for -40°C to $T_A \leq +85^\circ\text{C}$; unless noted. (Note 1)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Voltage Range	V_{CC}	1.4	—	5.5	V	$T_A = 0^\circ\text{C}$ to 70°C (SOT-23)
		1.6	—	5.5		$T_A = -40^\circ\text{C}$ to 85°C (SOT-23)
		1.0	—	5.5		$T_A = -40^\circ\text{C}$ to 85°C (SC-70)
Supply Current	I_{CC}	—	9	15	μA	MIC809L/M/J, MIC810L/M/J (SOT-23)
		—	5	15		MIC809L/M/J, MIC810L/M/J (SC-70)
		—	6	10		$V_{CC} < 3.6\text{V}$, MIC809R/S/T, MIC810R/S/T (SOT-23)
		—	5	10		$V_{CC} < 3.6\text{V}$, MIC809R/S/T, MIC810R/S/T (SC-70)
Reset Voltage Threshold	V_{TH}	4.50	4.63	4.75	V	MIC809L, MIC810L
		4.25	4.38	4.50		MIC809M, MIC810M
		3.89	4.00	4.10		MIC809J, MIC810J
		3.00	3.08	3.15		MIC809T, MIC810T
		2.85	2.93	3.00		MIC809S, MIC810S
		2.55	2.63	2.70		MIC809R, MIC810R
Reset Timeout Period	t_{RST}	140	240	560	ms	—

Note 1: Specification for packaged product only.

MIC809/MIC810

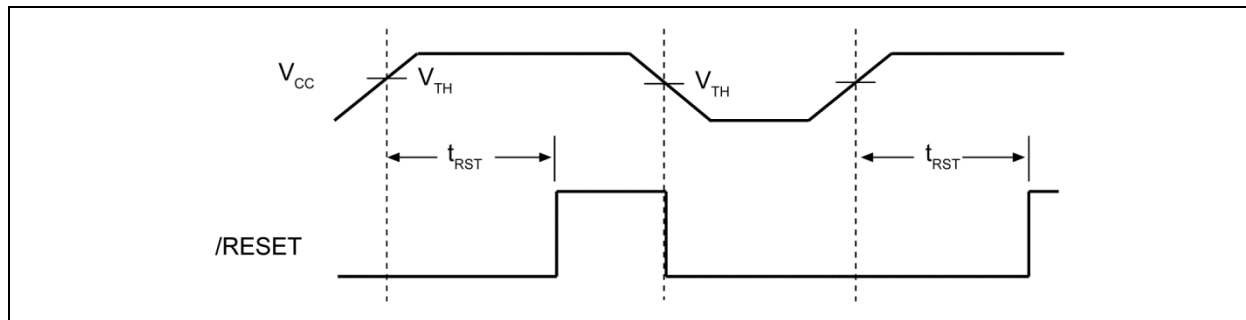
ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: 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 valid for $-40^\circ C$ to $\leq T_A \leq +85^\circ C$; unless noted. ([Note 1](#))

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
/RESET Output Voltage (MIC809)	V_{OH}	$V_{CC} - 1.5V$	—	—	V	$I_{SOURCE} = 800 \mu A$, MIC809L/M/J
		$0.8 \times V_{CC}$	—	—		$I_{SOURCE} = 500 \mu A$, MIC809R/S/T
/RESET Output Voltage (MIC809)	V_{OL}	—	—	0.4	V	$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 3.2 \text{ mA}$, MIC809L/M/J
		—	—	0.3		$V_{CC} = V_{TH}$ (minimum), $I_{SINK} = 1.2 \text{ mA}$, MIC809R/S/T
		—	—	0.3		$V_{CC} > 1.4V$, $I_{SINK} = 50 \mu A$, $T_A = 0^\circ C$ to $+70^\circ C$
		—	—	0.3		$V_{CC} = 1V$, $I_{SINK} = 50 \mu A$, $T_A = -40^\circ C$ to $+85^\circ C$ (SC-70)
		—	—	0.3		$V_{CC} > 1.6V$, $I_{SINK} = 50 \mu A$, $T_A = -40^\circ C$ to $+85^\circ C$
RESET Output Voltage (MIC810)	V_{OH}	$0.8 \times V_{CC}$	—	—	V	$1.8V < V_{CC} < V_{TH}$ (minimum), $I_{SOURCE} = 150 \mu A$
RESET Output Voltage (MIC810)	V_{OL}	—	—	0.4	V	$I_{SINK} = 3.2 \text{ mA}$, MIC810L/M/J
		—	—	0.3		$I_{SINK} = 1.2 \text{ mA}$, MIC810R/S/T

Note 1: Specification for packaged product only.

Reset Timing Diagram



TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	-40	—	+85	°C	Note 1
Storage Temperature Range	T_S	-65	—	+150	°C	—
Lead Temperature	—	—	—	+300	°C	Soldering, 10 sec.

Note 1: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction to air (i.e., T_A , T_J , θ_{JA}). Exceeding the maximum allowable power dissipation will cause the device operating junction temperature to exceed the maximum +85°C rating. Sustained junction temperatures above +85°C can impact the device reliability.

MIC809/MIC810

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 2-1](#).

TABLE 2-1: PIN FUNCTION TABLE

Pin Number MIC809	Pin Number MIC810	Pin Name	Description
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 (140 ms 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 (140 ms min.) after V_{CC} exceeds the reset threshold.
3	3	VCC	Power Supply Input.

3.0 APPLICATION INFORMATION

3.1 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 140 ms after V_{CC} has risen above the reset threshold voltage. The reset function ensures that 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 for the SOT-23 package and as low as 1V for the SC-70 package.

3.2 V_{CC} Transients

The MIC809/810 are relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125 mV below the reset threshold with a duration of 2 μ s or less (SC-70 package) will not cause a reset.

3.3 Interfacing to Bidirectional Reset Pins

The MIC809/810 can interface with microprocessors with bidirectional reset pins by connecting a 4.7 k Ω resistor in series with the MIC809/810 output and the microprocessor reset pin.

3.4 /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 100 k Ω resistor connected from the /RESET to ground is recommended. The value of the resistor should be small enough to pull-down any stray leakage currents and large enough not to load the reset output.

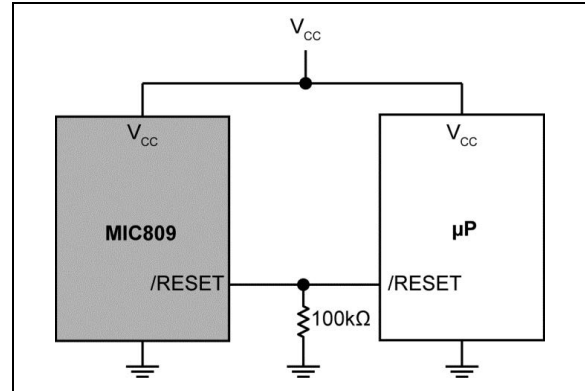


FIGURE 3-1: Reset Valid to $V_{CC} = 0V$.

MIC809/MIC810

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

3-Lead SOT-23* (Front)	Example	3-Lead SOT-23* (Back)	Example
<u>XX</u>	<u>IR</u>	MNNN	4R1S
3-Lead SC-70* (Front)	Example	3-Lead SC-70* (Back)	Example
<u>XX</u>	<u>JT</u>	NNN	JA9

Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.
	•, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar () and/or Overbar () symbol may not be to scale.	

TABLE 4-1: MARKING CODES

SOT-23 Part Number	SC-70 Part Number	Marking Code	Threshold Voltage
MIC809LUY	MIC809LYC3	<u>IL</u>	4.63V
MIC809MU Y	MIC809MYC3	<u>IM</u>	4.38V
MIC809JU Y	MIC809JYC3	<u>IJ</u>	4.00V
MIC809TU Y	MIC809TYC3	<u>IT</u>	3.08V
MIC809SU Y	MIC809SYC3	<u>IS</u>	2.93V
MIC809RU Y	MIC809RYC3	<u>IR</u>	2.63V
MIC810LU Y	MIC810LYC3	<u>JL</u>	4.63V
MIC810MU Y	MIC810MYC3	<u>JM</u>	4.38V
MIC810JU Y	MIC810JYC3	<u>JJ</u>	4.00V
MIC810TU Y	MIC810TYC3	<u>JT</u>	3.08V
MIC810SU Y	MIC810SYC3	<u>JS</u>	2.93V
MIC810RU Y	MIC810RYC3	<u>JR</u>	2.63V

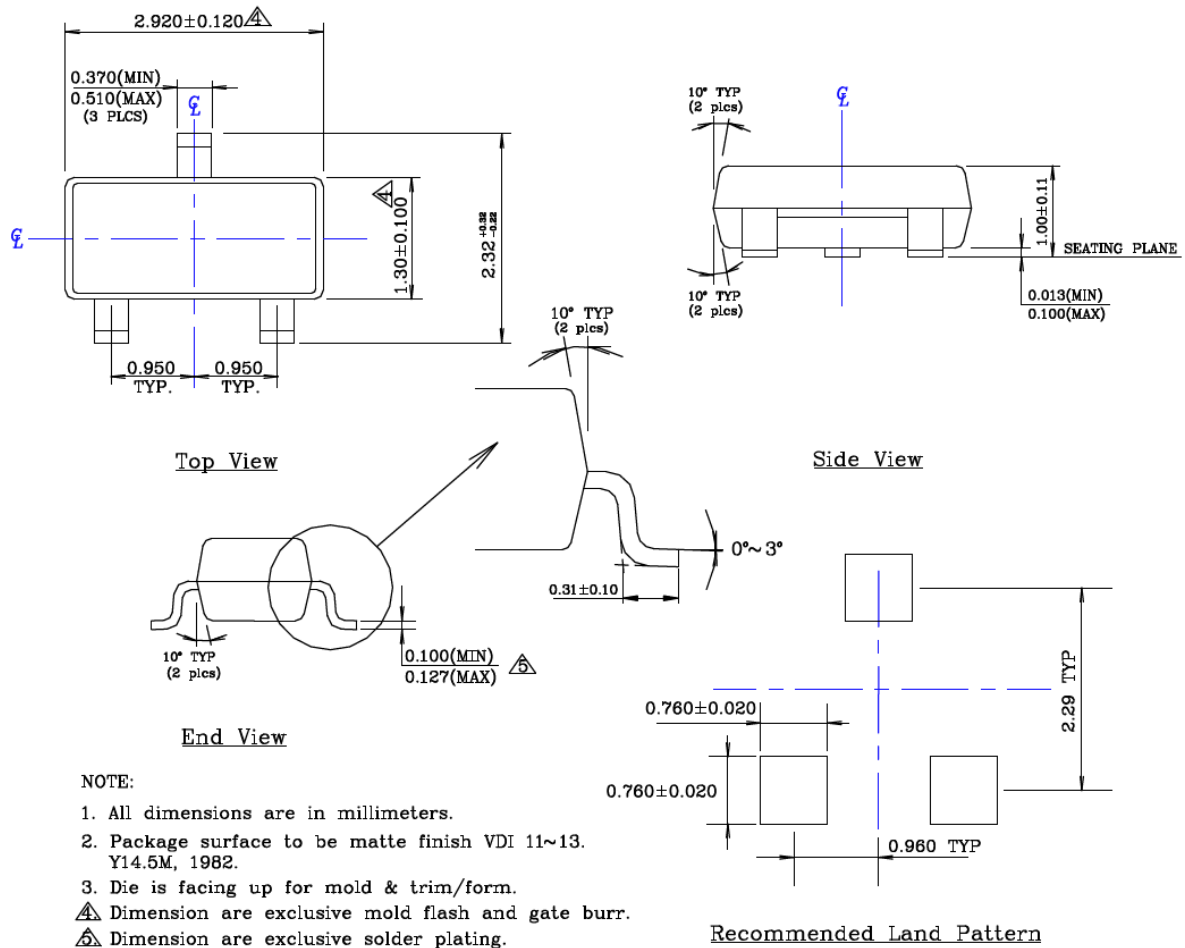
3-Lead SOT-23 Package Outline and Recommended Land Pattern

TITLE

3 LEAD SOT23 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING # SOT23-3LD-PL-1

UNIT MM



Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>.

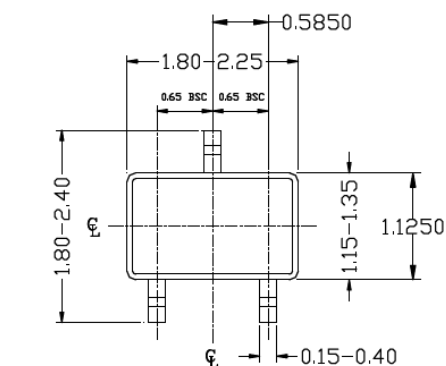
MIC809/MIC810

3-Lead SC-70 Package Outline and Recommended Land Pattern

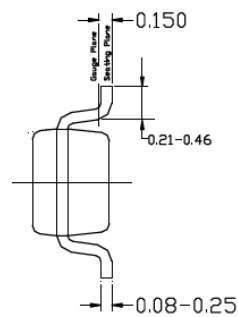
TITLE

3 LEAD SC70 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

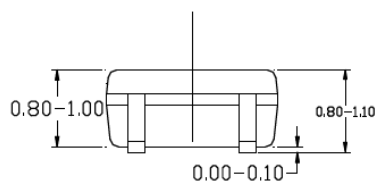
DRAWING #	SC70-3LD-PL-1	UNIT	MM
Lead Frame	Copper	Lead Finish	Matte Tin



TOP VIEW

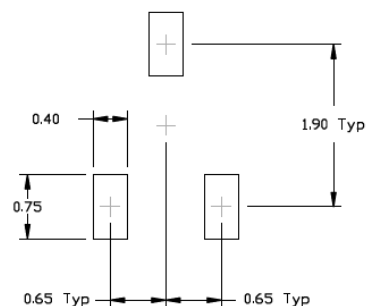


END VIEW



SIDE VIEW

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



RECOMMENDED LAND PATTERN

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>.

APPENDIX A: REVISION HISTORY

Revision A (August 2022)

- Converted Micrel document MIC809/MIC810 to Microchip data sheet template DS20006707A.
- Minor grammatical text changes throughout.

MIC809/MIC810

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

<h3>MIC809LUY-TR</h3> <table> <tr> <th>DEVICE</th><th>THRESHOLD</th><th>PACKAGE</th><th>TEMP. RANGE</th><th>MEDIA TYPE</th></tr> <tr> <td>MIC809: Microprocessor Reset Circuit with Active-Low /RESET</td><td>VOLTAGE</td><td>U = 3-Lead SOT-23</td><td>Y = -40°C to +85°C</td><td>TR = 3,000/Reel</td></tr> <tr> <td>MIC810: Microprocessor Reset Circuit with Active-High RESET</td><td>R = 2.63V S = 2.93V T = 3.08V J = 4.00V M = 4.38V L = 4.63V</td><td></td><td></td><td></td></tr> </table>					DEVICE	THRESHOLD	PACKAGE	TEMP. RANGE	MEDIA TYPE	MIC809: Microprocessor Reset Circuit with Active-Low /RESET	VOLTAGE	U = 3-Lead SOT-23	Y = -40°C to +85°C	TR = 3,000/Reel	MIC810: Microprocessor Reset Circuit with Active-High RESET	R = 2.63V S = 2.93V T = 3.08V J = 4.00V M = 4.38V L = 4.63V			
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Examples: a) MIC809RUY-TR: MIC809, 2.63V Threshold Voltage, 3-Lead SOT-23, -40°C to +85°C Temp. Range, 3,000/Reel b) MIC809JYC3-TR: MIC809, 4.00V Threshold Voltage, 3-Lead SC-70, -40°C to +85°C Temp. Range, 3,000/Reel c) MIC809TUY-TR: MIC809, 3.08V Threshold Voltage, 3-Lead SOT-23, -40°C to +85°C Temp. Range, 3,000/Reel d) MIC810SYC3-TR: MIC810, 2.93V Threshold Voltage, 3-Lead SC-70, -40°C to +85°C Temp. Range, 3,000/Reel e) MIC810LUY-TR: MIC810, 4.63V Threshold Voltage, 3-Lead SOT-23, -40°C to +85°C Temp. Range, 3,000/Reel f) MIC810MYC3-TR: MIC810, 4.38V Threshold Voltage, 3-Lead SC-70, -40°C to +85°C Temp. Range, 3,000/Reel Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.																			

MIC809/MIC810

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