MIC809/810

Microprocessor Reset Circuits

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.

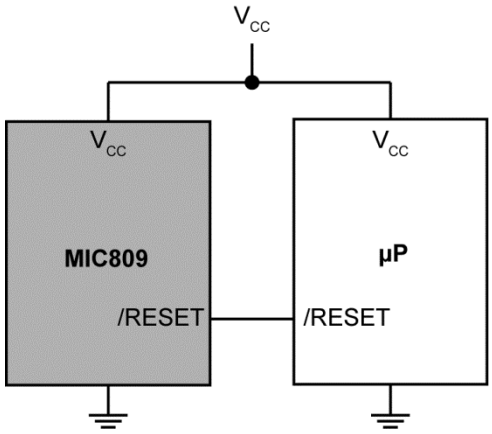
Features

- 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 15µA supply current for SOT-23 packaged part
- 5µA (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



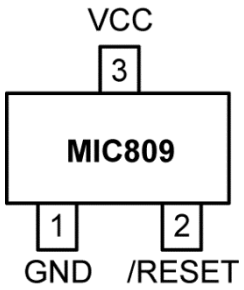
Ordering Information[1]

Part Number		Marking[2]	Threshold Voltage (V)	Operating Temperature Range	Lead Finish
3-Pin SOT-23	3-Pin SC-70				
MIC809LUY	MIC809LYC3	IL	4.63	–40°C to +85°C	Pb-Free
MIC809MUY	MIC809MYC3	IM	4.38	–40°C to +85°C	Pb-Free
MIC809JUY	MIC809JYC3	IJ	4.00	–40°C to +85°C	Pb-Free
MIC809TUY	MIC809TYC3	IT	3.08	–40°C to +85°C	Pb-Free
MIC809SUY	MIC809SYC3	IS	2.93	–40°C to +85°C	Pb-Free
MIC809RUY	MIC809RYC3	IR	2.63	–40°C to +85°C	Pb-Free
MIC810LUY	MIC810LYC3	JL	4.63	–40°C to +85°C	Pb-Free
MIC810MUY	MIC810MYC3	JM	4.38	–40°C to +85°C	Pb-Free
MIC810JUY	MIC810JYC3	JJ	4.00	–40°C to +85°C	Pb-Free
MIC810TUY	MIC810TYC3	JT	3.08	–40°C to +85°C	Pb-Free
MIC810SUY	MIC810SYC3	JS	2.93	–40°C to +85°C	Pb-Free
MIC810RUY	MIC810RYC3	JR	2.63	–40°C to +85°C	Pb-Free

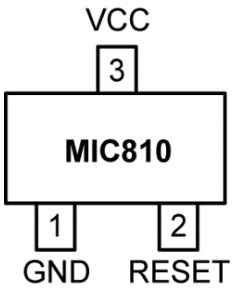
Note:

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)

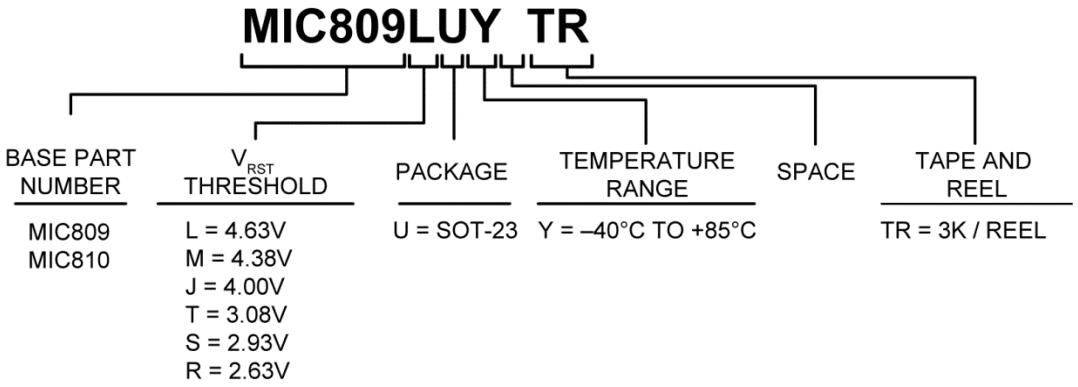


3-Pin MIC810 SOT-23
3-Pin MIC810 SC-70
(Top View)

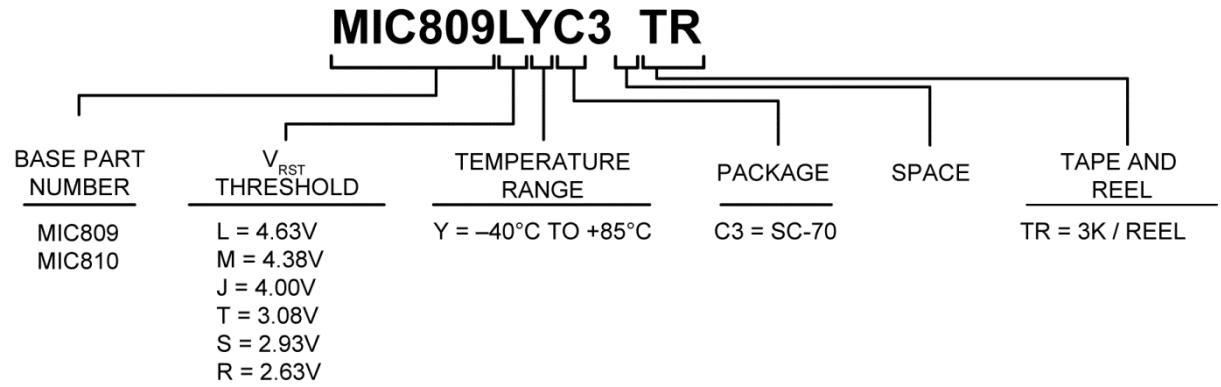
Pin Description

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[3]

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/µs
ESD Rating[5] 3kV (SC-70)

Operating Ratings[4]

Operating Temperature Range
MIC809 ..... –40°C to +85°C
MIC810 ..... –40°C to +85°C
Power Dissipation (T_A = +70°C) 320mW

Electrical Characteristics[6]

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°C.
Bold values indicate –40°C to ≤ T_A ≤ +85°C; unless otherwise noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{CC}	Operating Voltage Range	T_A = 0°C to 70°C (SOT-23)	**1.4**		**5.5**	V
		T_A = –40°C to 85°C (SOT-23)	**1.6**		**5.5**	V
		T_A = –40°C to 85°C (SC70)	**1**		**5.5**	V
I_{CC}	Supply Current	MIC809L/M/J, MIC810L/M/J (SOT-23)		9	**15**	µA
		MIC809L/M/J, MIC810L/M/J (SC-70)		5	**15**	
		V_{CC} <3.6V, MIC809R/S/T, MIC810R/S/T (SOT-23)		6	**10**	
		V_{CC} <3.6V, MIC809R/S/T, MIC810R/S/T (SC-70)		5	**10**	
V_{TH}	Reset Voltage Threshold	MIC809L, MIC810L	**4.50**	4.63	**4.75**	V
		MIC809M, MIC810M	**4.25**	4.38	**4.50**	
		MIC809J, MIC810J	**3.89**	4.00	**4.10**	
		MIC809T, MIC810T	**3.00**	3.08	**3.15**	
		MIC809S, MIC810S	**2.85**	2.93	**3.00**	
		MIC809R, MIC810R	**2.55**	2.63	**2.70**	
t_{RST}	Reset Timeout Period		**140**	240	**560**	ms
V_{OH}	/RESET Output Voltage (MIC809)	I_{SOURCE} = 800µA, MIC809L/M/J	**V_{CC} – 1.5V**			V
		I_{SOURCE} = 500µA, MIC809R/S/T	**0.8 × V_{CC}**			

Notes:

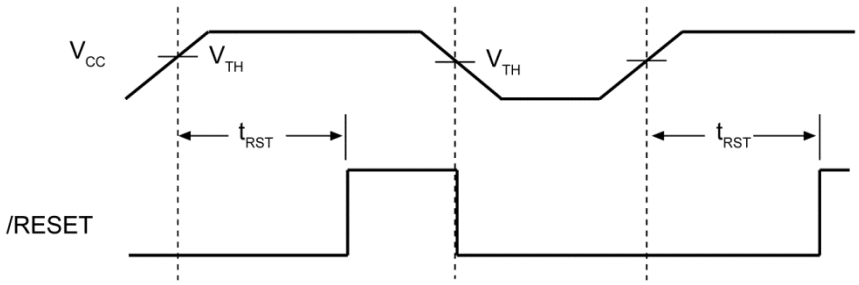
3. Exceeding the absolute maximum ratings may damage the device.
4. The device is not guaranteed to function outside its operating ratings.
5. Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5kΩ in series with 100pF.
6. Specification for packaged product only.

Electrical Characteristics[6] (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°C.
Bold values indicate –40°C to ≤ T_A ≤ +85°C; unless otherwise noted.

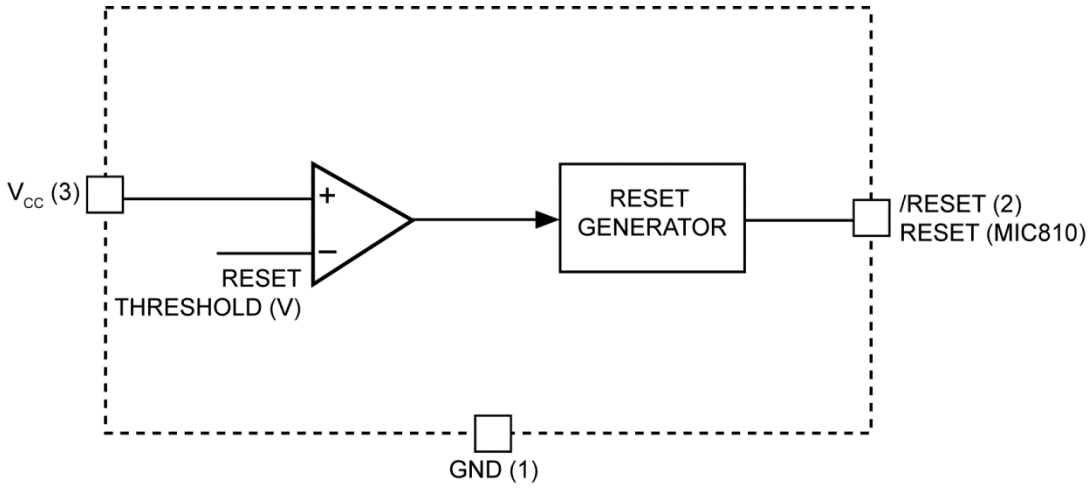
Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{OL}	/RESET Output Voltage (MIC809)	V_{CC} = V_{TH} (minimum), I_{SINK} = 3.2mA, MIC809L/M/J			**0.4**	V
		V_{CC} = V_{TH} (minimum)., I_{SINK} = 1.2mA, MIC809R/S/T			**0.3**	
		V_{CC} >1.4V, I_{SINK} = 50µA, T_A = 0°C to +70°C			**0.3**	
		V_{CC} = 1V,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

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 2µs or less (SC70 package) will not cause a reset.

Interfacing to Bidirectional Reset Pins

The MIC809/810 can interface with µPs with bidirectional reset pins by connecting a 4.7kΩ resistor in series with the MIC809/810 output and the µP 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 100kΩ 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).

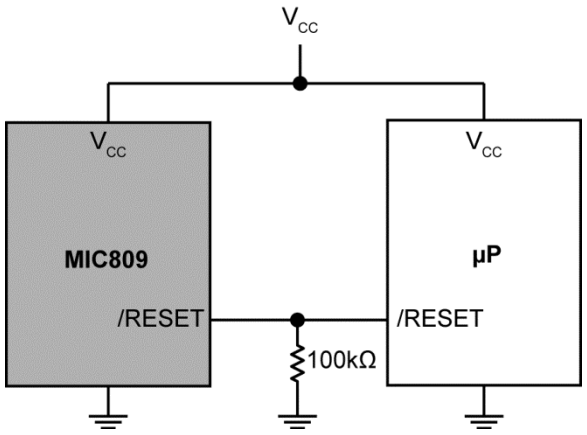
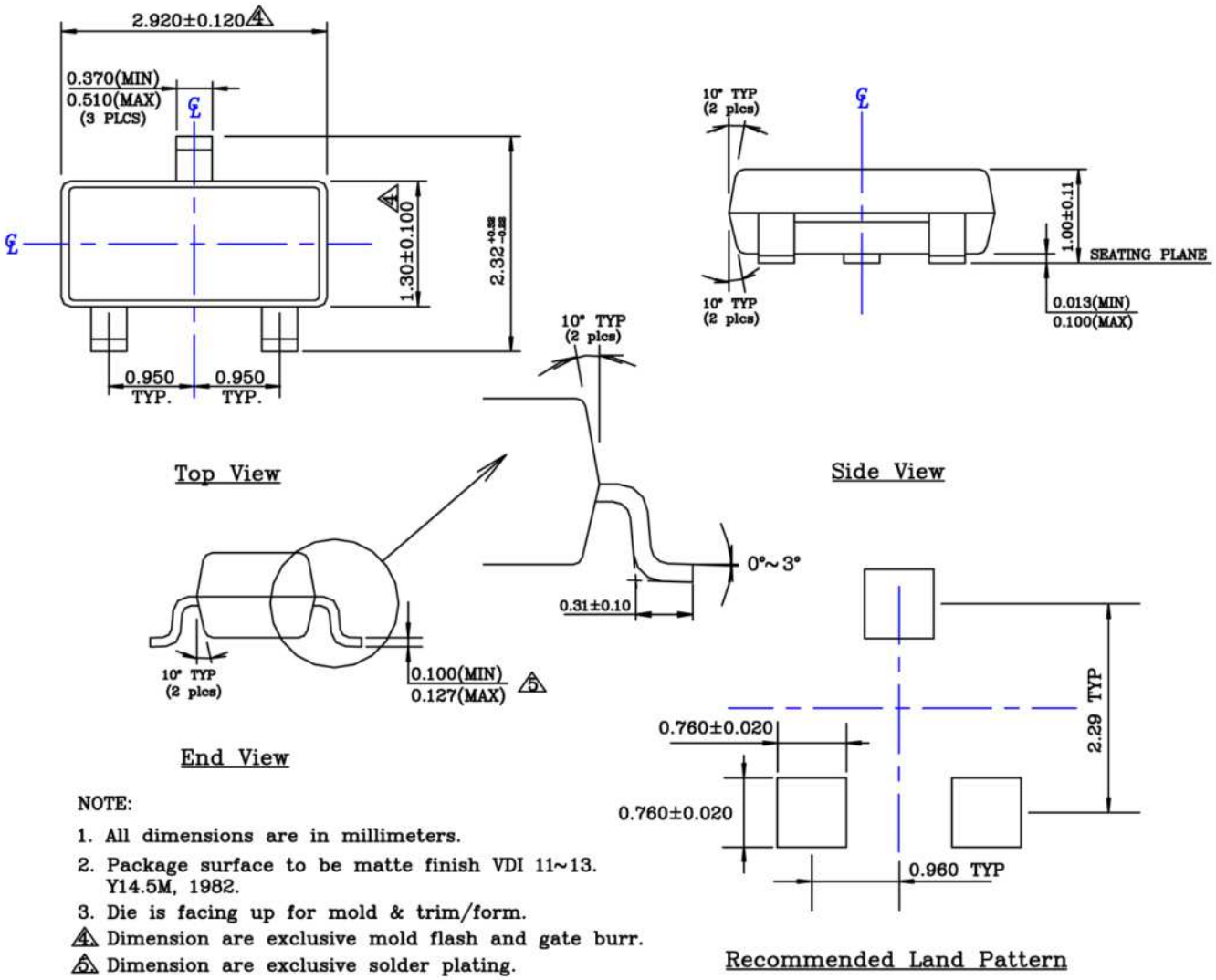


Figure 1. Reset Valid to V_{CC} = 0V

Package Information and Recommended Landing Patterns[7]

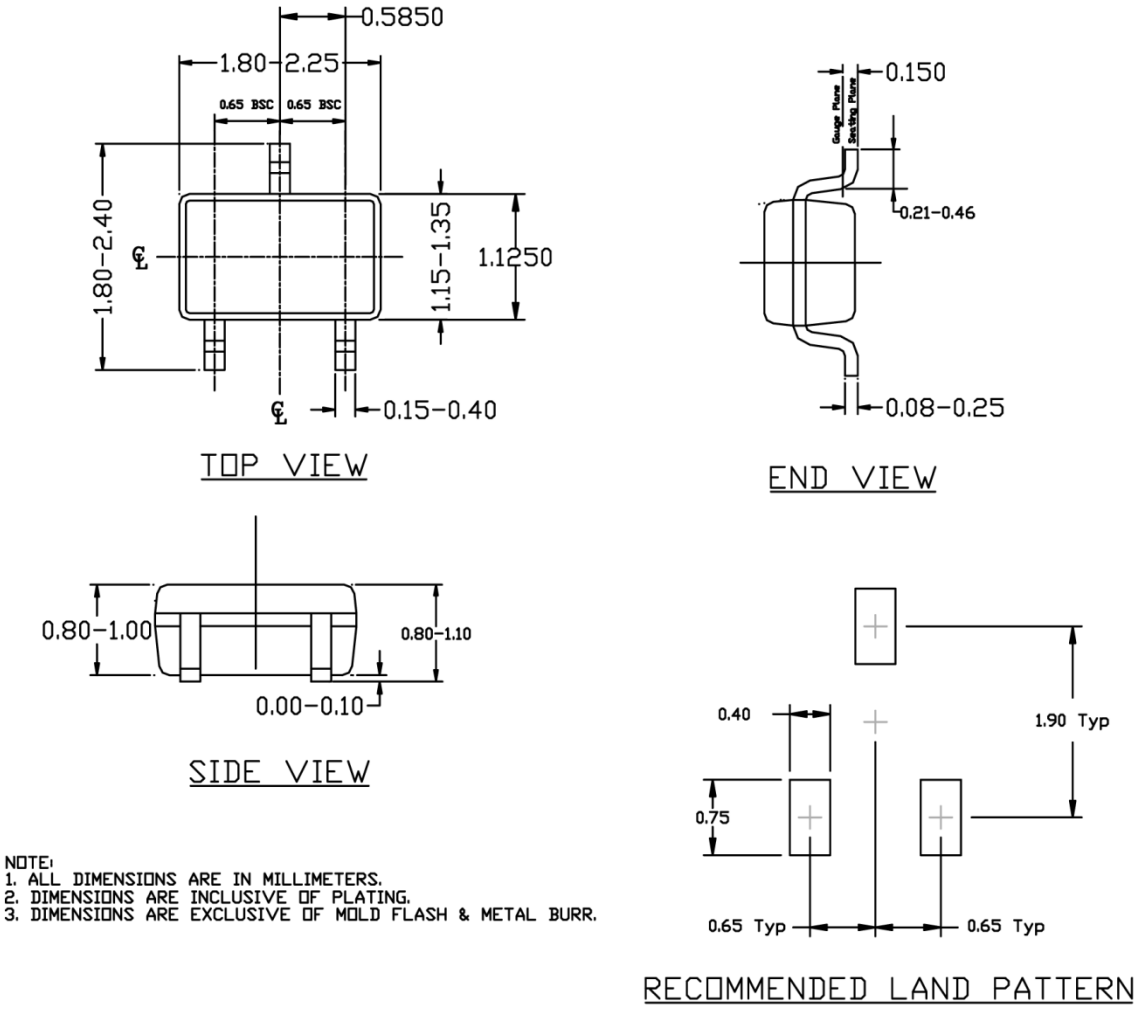


3-Pin SOT-23 (U)

Note:

7. Package information is correct as of the publication date. For updates and most current information, go to www.micrel.com.

Package Information and Recommended Landing Patterns[7] (Continued)



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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