MIC809-5

Microprocessor Reset Circuit

General Description

The MIC809-5 is a power supply supervisor that provides under-voltage monitoring and power-on reset generation in an industry standard 3-pin SOT package and SC-70 package. The reset output is asserted at power-on and any time the input voltage drops below the programmed threshold. It remains asserted for 30ms (min.) after the input subsequently rises back above the threshold boundary. The MIC809-5 has an active-low reset output.

The MIC809-5 is inherently immune to brief power supply transients. Typical supply current is a low 5µA. For those applications that require a manual reset function, see the MIC811/812. For those applications that require a longer reset timeout, see the MIC809/810. (The MIC809-5 is identical to the industry-standard MIC809 with the exception of a shorter reset timeout).

Features

- Under-voltage monitor
- Power-on reset generation (30ms minimum)
- Choice of threshold voltages
- Active-low reset output
- No external components required
- Rejects brief input transients
- Industry standard package and pinout
- 3-pin IttyBitty™ SOT23-3 package and SC-70 package

Applications

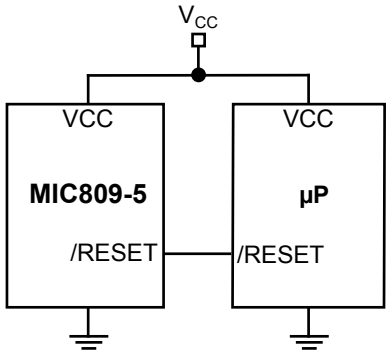
- PDAs, hand-held PCs
- Embedded controllers
- Telecommunications systems
- Power supplies
- Wireless/cellular systems
- Networking hardware

Ordering Information

Part Number	Marking	Typical Application Voltage*	Nominal Threshold Voltage	t_{RST} (ms)	Operating Temp. Range	Package	Pb-Free
MIC809-5SU	IX	3.3V±5%	2.93	30	–40°C to +85°C	SOT23-3	No
MIC809-5SBC3	IX	3.3V±5%	2.93	30	–40°C to +85°C	SC70-3	No
MIC809-5SUY	IX	3.3V±5%	2.93	30	–40°C to +85°C	SOT23-3	Yes
MIC809-5SYC3	IX	3.3V±5%	2.93	30	–40°C to +85°C	SC70-3	Yes

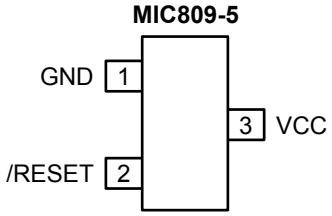
*Other voltages available. Contact Micrel for details. Minimum order may apply.

Typical Application



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Pin Configuration



3-Lead SOT23

3-Lead SC-70

Pin Description

Pin Number	Pin Name	Pin Function
1	GND	Ground return for all IC functions.
2	/RESET	Digital Output. Active-low. Asserted whenever V_{CC} falls below the threshold voltage. It will remain asserted for no less than 30ms and be de-asserted after V_{CC} returns above the threshold.
3	VCC	Analog Input. Power supply input to the IC.

Absolute Maximum Ratings[1]

Terminal Voltage (V_{CC}) ..... –0.3V to +6.0V
Input Current (V_{CC}) 20mA
Output Current (/RESET, RESET) 20mA
Lead Temperature (soldering, 10 sec.) ..... 300°C
Storage Temperature (T_S) ..... –65°C to 150°C
Rate of Rise (V_{CC}) 100V/µs
ESD Rating[3] 3kV

Operating Ratings[2]

Ambient Temperature (T_A) ..... –40°C to +85°C
Power Dissipation (T_A = +70°C) 320mW

Electrical Characteristics

For typical values, V_{CC} = 3.3V, T_A = 25°C; **bold** are for –40°C to +85°C; unless otherwise noted

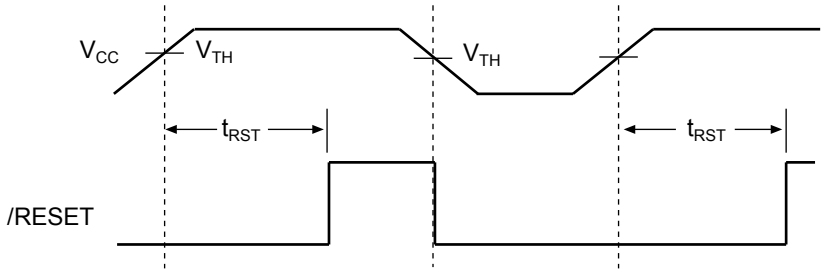
Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{CC}	Operating Voltage Range	T_A = –40°C to 85°C	**1**		**5.5**	**V**
I_{CC}	Supply Current	V_{CC} < 3.6V		5	**10**	**µA**
V_{TH}	Reset Voltage Threshold	S Voltage Options	**2.85**	2.93	**3.00**	V
V_{HYST}	Typical hysteresis			5		mV
t_{RST}	Reset Timeout Period		**30**		**66**	ms
t_{PROP}	Propogation delay	/RESET < V_{OL}, 100mV Overdrive		14.5		µs
V_{OH}	/RESET Output Voltage High	I_{SOURCE} = 500µA	**0.8×V_{CC}**			**V**
V_{OL}	/RESET Output Voltage Low	V_{CC} = V_{TH} min., I_{SINK} = 1.2mA			**0.3**	V
		V_{CC} > 1V, I_{SINK} = 50µA			**0.3**	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.

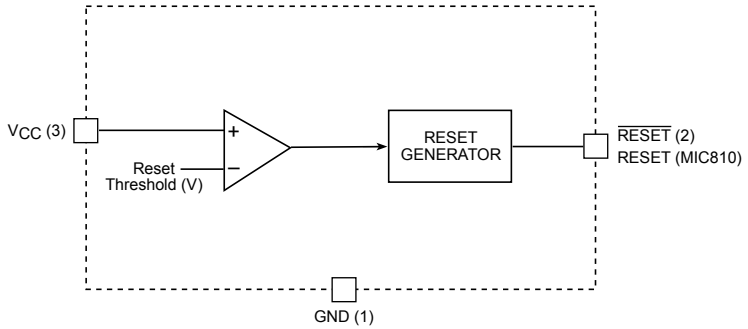
Note 3. Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.

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 30ms 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 1V.

Transients on V_{CC}

The MIC809-5 is inherently immune to very short “glitches” on VCC. In the case of very brief transients, VCC may drop below the reset-voltage threshold without triggering a reset. As shown in the graph, the MIC809-5 is relatively immune to transients with typical duration of 20µs. The lines on the graph of Figure 1 represent the typical allowable transient duration for a given amount of threshold overdrive that will not generate a reset. The data was taken by adding negative-going square-wave pulse to a DC input voltage set at 0.5V above actual measured threshold for the part being characterized.

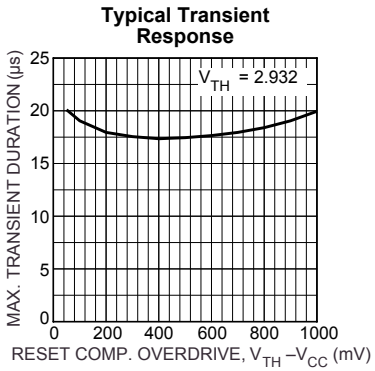


Figure 1. Comparator Overdrive vs. Duration

Ensuring Proper Operation at Low V_{CC}

At levels of V_{CC} below 1V, the MIC809-5’s output driver cannot always turn on sufficiently to produce a valid logic-low. In this situation, other circuits driven by /RESET could be allowed to float, causing undesired operation. (In most cases, however, it is expected that the circuits driven by the MIC809-5 will be similarly inoperative at V_{CC} =1V.)

If a given application requires that /RESET be valid below V_{CC} = 1V, this can be accomplished by adding a pull-down resistor to the output. A value of 100kΩ is recommended, as this is usually an acceptable compromise of leakage current and pull-down current. The resistor’s value is not critical, however. See Figure 2.

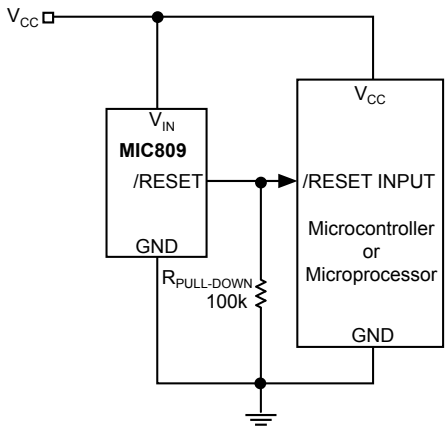


Figure 2. Ensuring a Valid /RESET Signal at Low Voltage

Interfacing to Processors with Bidirectional Reset Pins

Some microprocessors have reset signal pins that are bidirectional, rather than input only. The Motorola 68HC11 family is one example. To prevent excessive current flow when the processor asserts its reset output, a series resistor is employed between the MIC809-5’s output and the reset pin. This limits the current that will flow between the MIC809-5 and the reset pin to a theoretical maximum of V_{CC}/R_{SERIES}. Because this resistor also limits the drive capability of the supervisor’s output, a buffer may be required to drive additional circuitry. See Figure 3.

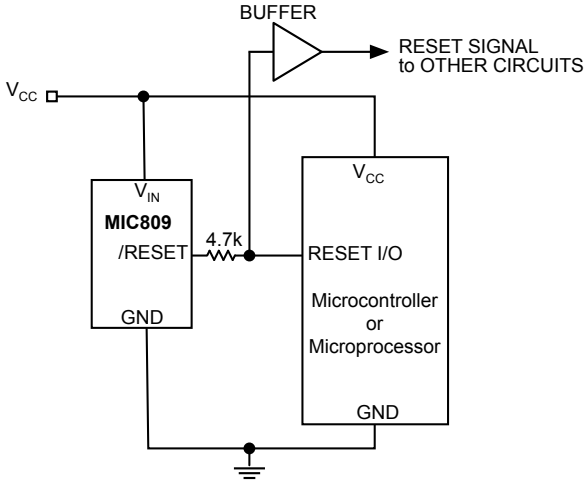
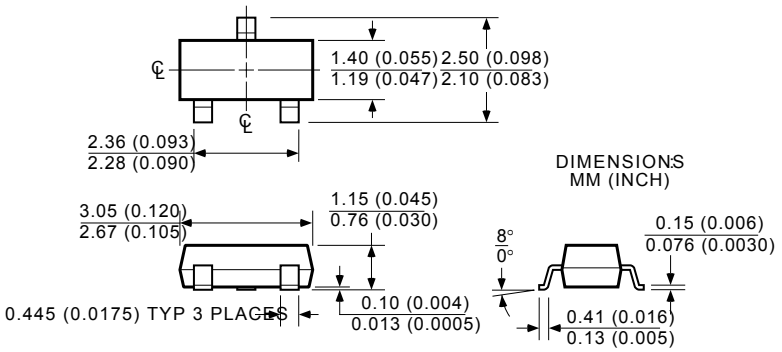
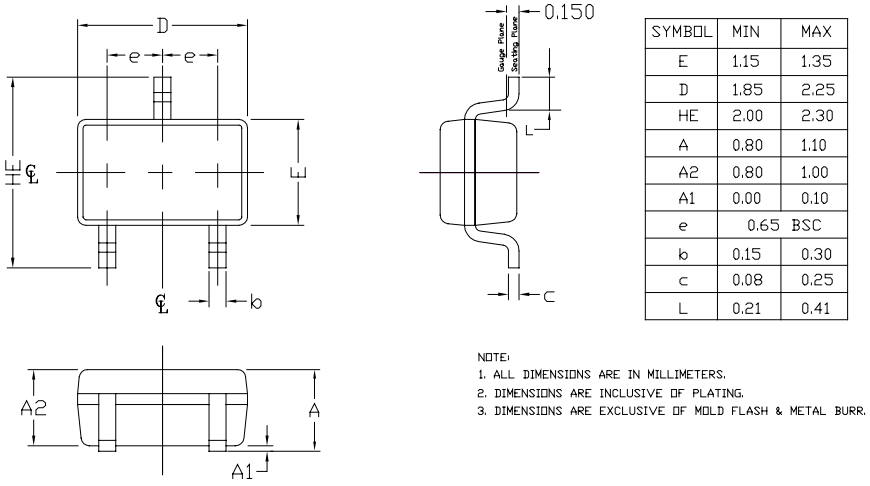


Figure 3. Interfacing to Processors with Bidirectional Reset Pins

Package Information



3-lead SOT-23 (M3)



SYMBOL	MIN	MAX
E	1.15	1.35
D	1.85	2.25
HE	2.00	2.30
A	0.80	1.10
A2	0.80	1.00
A1	0.00	0.10
e	0.65 BSC	
b	0.15	0.30
c	0.08	0.25
L	0.21	0.41

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

3-Lead SC-70 (C3)

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