



The Infinite Bandwidth Company™

MIC809-5

Microprocessor Reset Circuit

Final Information

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 pinout. 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 6 μ A. 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

Applications

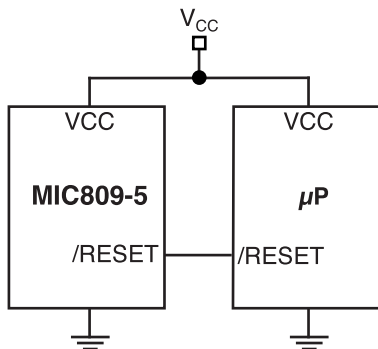
- PDAs, hand-held PCs
- Embedded controllers
- Telecommunications systems
- Power supplies
- Wireless/cellular systems
- Networking hardware

Ordering Information

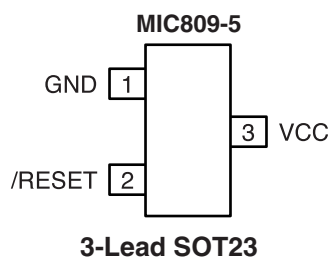
Part Number	Marking	Typical Application Voltage*	Nominal Threshold Voltage	t _{RST} (ms)	Operating Temp. Range	Package
MIC809-5S-U	IX	3.3V \pm 5%	2.93	30	-40°C to +85°C	SOT23-3

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

Typical Application



Pin Configuration



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 (Note 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.) $300^{\circ}C$
 Storage Temperature (T_S) $-65^{\circ}C$ to $150^{\circ}C$
 Rate of Rise (V_{CC}) $100V/\mu s$
 ESD Rating, **Note 3**

Operating Ratings (Note 2)

Ambient Temperature (T_A) $-40^{\circ}C$ to $+85^{\circ}C$
 Power Dissipation ($T_A = +70^{\circ}C$) $320mW$

Electrical Characteristics

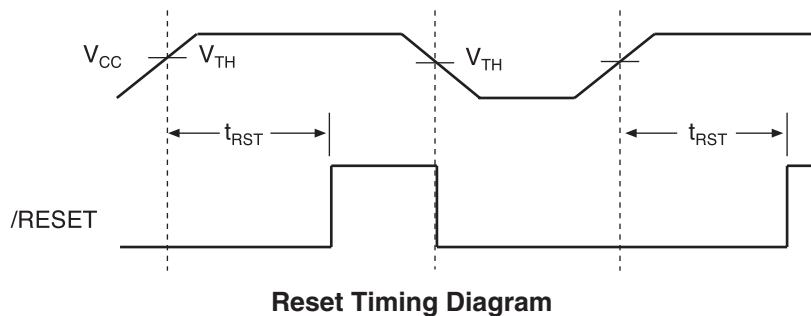
For typical values, $V_{CC} = 3.3V$, $T_A = 25^{\circ}C$; **bold** are for $-40^{\circ}C$ to $+85^{\circ}C$; unless otherwise noted

Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{CC}	Operating Voltage Range	$T_A = 0^{\circ}C$ to $70^{\circ}C$	1.4		5.5	V
		$T_A = -40^{\circ}C$ to $85^{\circ}C$	1.6		5.5	V
I_{CC}	Supply Current	$V_{CC} < 3.6V$		6	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		9.3		μs
V_{OH}	$/RESET$ Output Voltage High	$I_{SOURCE} = 500\mu A$	$0.8 \times V_{CC}$			V
V_{OL}	$/RESET$ Output Voltage Low	$V_{CC} = V_{TH}$ min., $I_{SINK} = 1.2mA$			0.3	V
		$V_{CC} > 1.4V$, $I_{SINK} = 50\mu A$, $T_A = 0^{\circ}C$ to $+70^{\circ}C$			0.3	V
		$V_{CC} > 1.6V$, $I_{SINK} = 50\mu A$, $T_A = -40^{\circ}$ to $+85^{\circ}C$			0.3	V

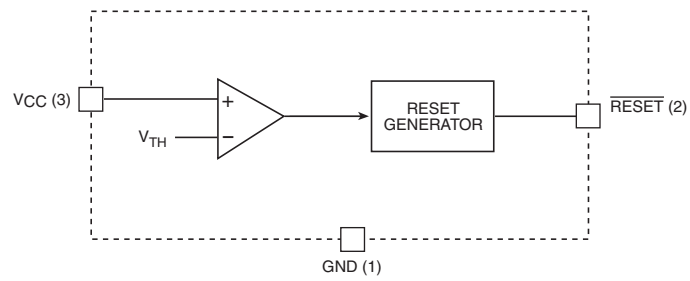
Note 1. Exceeding the absolute maximum rating may damage the device.

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

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 1.4V.

Transients on V_{CC}

The MIC809-5 is inherently immune to very short “glitches” on V_{CC} . In the case of very brief transients, V_{CC} may drop below the under-voltage threshold without triggering a reset. As shown in the graph of Figure 1, the narrower the transient, the deeper the threshold overdrive that will be ignored. The line on the graph represents the typical allowable transient duration for a given amount of threshold overdrive that will *not* generate a reset. The data from which Figure 1 is derived was taken by adding negative-going square-wave pulses to a DC input voltage set at 0.5V above the actual measured threshold for the part being characterized.

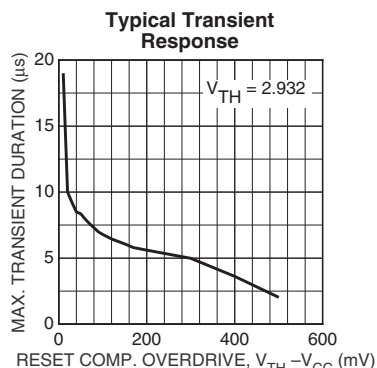


Figure 1. Comparator Overdrive vs. Duration

Ensuring Proper Operation at Low V_{CC}

At levels of V_{CC} below 1.4V, 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 $V_{CC}=1.4V$.)

If a given application requires that /RESET be valid below $V_{CC}=1.4V$, 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.

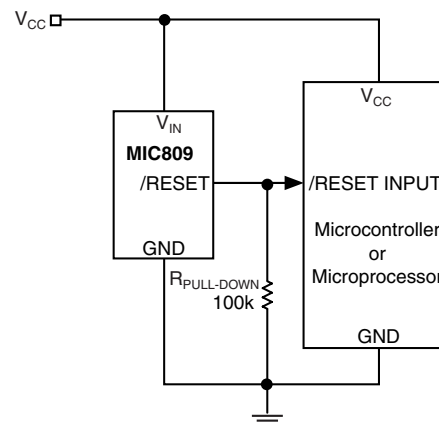


Figure 2. Ensuring a Valid /RESET Signal at Low Voltage

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.

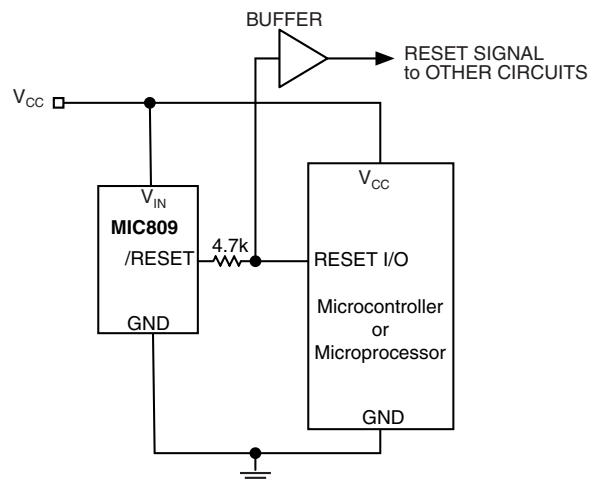
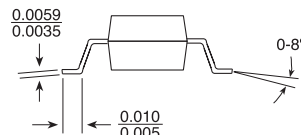
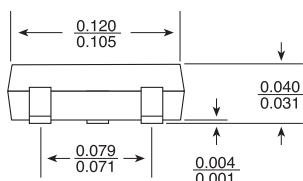
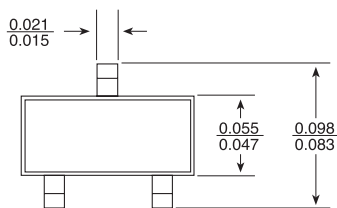


Figure 3. Interfacing to Processors with Bidirectional Reset Pins

Package Information



3-lead SOT-23 (M3)

MICREL, INC. 1849 FORTUNE DRIVE SAN JOSE, CA 95131 USA

TEL + 1 (408) 944-0800 FAX + 1 (408) 944-0970 WEB <http://www.micrel.com>

The information furnished by Micrel in this datasheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify

Micrel for any damages resulting from such use or sale.

© 2003 Micrel, Incorporated.