



MIC811/812

Microprocessor Reset Circuits

General Description

The MIC811 and MIC812 are inexpensive microprocessor supervisory circuits that monitor power supplies in microprocessor based systems.

The function of this device is to assert a reset if either the power supply drops below a designated reset threshold level or /MR is forced low. Several different reset threshold levels are available to accommodate 3V, 3.3V or 5V powered systems.

The MIC811 has an active low /RESET output, while the MIC812 offers an active high RESET output. The reset output is guaranteed to remain asserted for a minimum of 140ms after VCC has risen above the designed reset threshold level. Having a push-pull output stage, the MIC811/812 does not require a pull-up resistor at the output. The MIC811/812 comes in a 4-pin SOT-143 package.

If a microprocessor voltage supervisor with an open-drain output stage is needed, see MIC6315.

Datasheets and support documentation are available on Micrel's web site at: www.micrel.com.

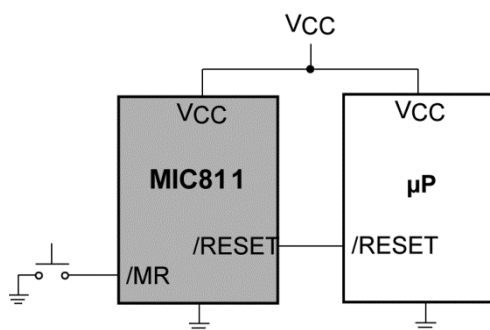
Features

- Precision voltage monitor for 3V, 3.3V or 5V power supplies
- /RESET remains valid with VCC as low as 1V
- 5 μ A typical supply current
- 140ms minimum reset pulse width available
- Manual reset input
- Available in 4-pin SOT-143 package

Applications

- Portable equipment
- Intelligent instruments
- Critical microprocessor power monitoring
- Printers/computers
- Controllers

Typical Application



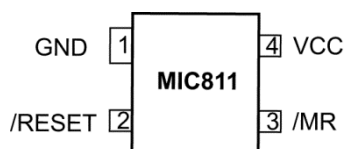
Ordering Information

| Part Number Pb-Free | Marking ⁽¹⁾ | Threshold Voltage | Operating Temp. Range | Package |
|------------------------|------------------------|-------------------|-----------------------|---------------|
| MIC811LUY | <u>KL</u> | 4.63 | –40°C to +85°C | 4-pin SOT-143 |
| MIC811MUJ | <u>KM</u> | 4.38 | –40°C to +85°C | 4-pin SOT-143 |
| MIC811JUY | <u>KJ</u> | 4.00 | –40°C to +85°C | 4-pin SOT-143 |
| MIC811TUY | <u>KT</u> | 3.08 | –40°C to +85°C | 4-pin SOT-143 |
| MIC811SUY | <u>KS</u> | 2.93 | –40°C to +85°C | 4-pin SOT-143 |
| MIC811RUY | <u>KR</u> | 2.63 | –40°C to +85°C | 4-pin SOT-143 |
| MIC812LUY | <u>LL</u> | 4.63 | –40°C to +85°C | 4-pin SOT-143 |
| MIC812MUJ | <u>LM</u> | 4.38 | –40°C to +85°C | 4-pin SOT-143 |
| MIC812JUY | <u>LJ</u> | 4.00 | –40°C to +85°C | 4-pin SOT-143 |
| MIC812TUY | <u>LT</u> | 3.08 | –40°C to +85°C | 4-pin SOT-143 |
| MIC812SUY | <u>LS</u> | 2.93 | –40°C to +85°C | 4-pin SOT-143 |
| MIC812RUY | <u>LR</u> | 2.63 | –40°C to +85°C | 4-pin SOT-143 |

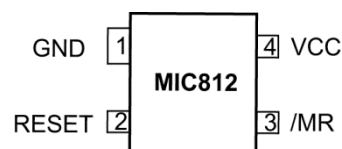
Note:

1. “ ” underbar symbol not to scale

Pin Configuration



MIC811 4-Pin SOT-143 (U)



MIC812 4-Pin SOT-143 (U)

Pin Description

| MIC811 | MIC812 | Pin Name | Pin Name |
|--------|--------|----------|---|
| 1 | 1 | GND | IC Ground Pin. |
| 2 | N/A | /RESET | /RESET goes low if VCC falls below the reset threshold and remains asserted for one reset timeout period (140ms min.) after VCC exceeds the reset threshold. |
| N/A | 2 | RESET | RESET goes high if VCC falls below the reset threshold and remains asserted for one reset timeout period (140ms min.) after VCC exceeds the reset threshold. |
| 3 | 3 | /MR | Manual Reset Input. A logic low on /MR will force a reset. The reset will remain asserted as long as /MR is held low and for one reset timeout period (140ms min.) after /MR goes high. This input can be shorted to ground via a switch or driven from CMOS or TTL logic. Float if unused. |
| 4 | 4 | VCC | Power Supply Input. |

Absolute Maximum Ratings⁽²⁾

| | |
|---|----------------|
| Terminal Voltage (VCC) | -0.3V to +6.0V |
| Input Current (VCC, /MR) | 20mA |
| Output Current (/RESET, RESET) | 20mA |
| Lead Temperature (soldering, 10s) | 300°C |
| Storage Temperature (Ts) | 5°C to 150°C |
| Rate of Rise (VCC) | 100V/μs |
| ESD Rating ⁽⁴⁾ | 3kV |

Operating Ratings⁽³⁾

| | |
|--|----------------|
| Operating Temperature Range | |
| MIC811 | -40°C to +85°C |
| MIC812 | -40°C to +85°C |
| Power Dissipation (T _A = +70°C) | 320mW |
| Thermal Resistance | |
| SOT-143 (θ _{JA}) | 265°C/W |

Electrical Characteristics⁽⁵⁾

For typical values, VCC = 5V for MIC8_L/M/J, VCC = 3.3V for MIC8_S/T, VCC = 3V for MIC8_R; T_A = 25°C, **bold** values indicate -40°C to ≤ T_A ≤ +85°C; unless noted.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|------------------|-------------------------|---|-----------------|------|-------------|-------|
| VCC | Operating Voltage Range | T _A = -40°C to 85°C | 1 | | 5.5 | V |
| I _{VCC} | Supply Current | MIC811L/M/J, MIC812L/M/J: VCC = 5.0V, no load | | 5 | 15 | μA |
| | | MIC811S/T, MIC812S/T: VCC = 3.3V, no load | | 5 | 10 | μA |
| | | MIC811R, MIC812R: VCC = 3.0V, no load | | 5 | 10 | μA |
| V _{TH} | Reset Voltage Threshold | MIC811L, MIC812L | 4.50 | 4.63 | 4.75 | V |
| | | MIC811M, MIC812M | 4.25 | 4.38 | 4.50 | V |
| | | MIC811J, MIC812J | 3.89 | 4.00 | 4.10 | V |
| | | MIC811T, MIC812T | 3.00 | 3.08 | 3.15 | V |
| | | MIC811S, MIC812S | 2.85 | 2.93 | 3.00 | V |
| | | MIC811R, MIC812R | 2.55 | 2.63 | 2.70 | V |
| t _{RST} | Reset Timeout Period | | 140 | 240 | 560 | ms |
| V _{OH} | /RESET Output Voltage | I _{SOURCE} = 800μA, MIC811L/M/J | VCC-1.5V | | | V |
| | | I _{SOURCE} = 500μA, MIC811R/S/T | 0.8xVCC | | | V |
| V _{OL} | /RESET Output Voltage | VCC = V _{TH} min., I _{SINK} = 3.2mA, MIC811L/M/J | | | 0.4 | V |
| | | VCC = V _{TH} min., I _{SINK} = 1.2mA, MIC811R/S/T | | | 0.3 | V |
| | | VCC > 1V, I _{SINK} = 50μA, T _A = -40°C to +85°C | | | 0.3 | V |
| V _{OH} | RESET Output Voltage | 1.8V < VCC < V _{TH} min., I _{SOURCE} = 150μA | 0.8xVCC | | | V |
| V _{OL} | RESET Output Voltage | I _{SINK} = 3.2mA, MIC812L/M/J | | | 0.4 | V |
| | | I _{SINK} = 1.2mA, MIC812R/S/T | | | 0.3 | V |

Notes:

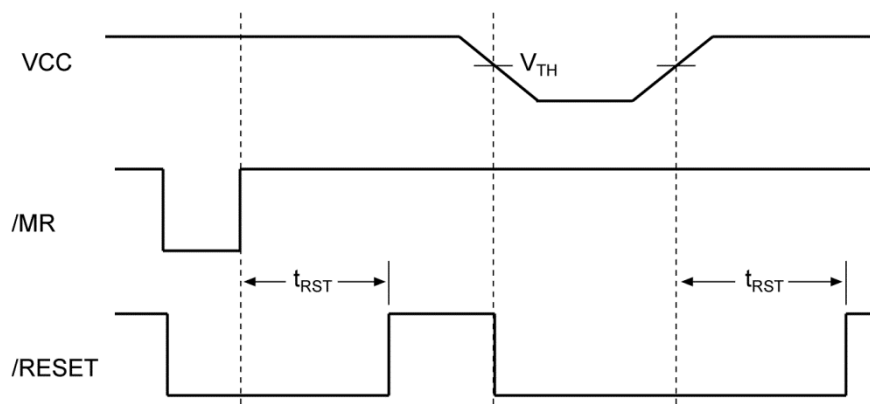
- Exceeding the absolute maximum ratings may damage the device.
- The device is not guaranteed to function outside its operating ratings.
- Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5kΩ in series with 100pF.
- Specification for packaged product only

Electrical Characteristics (Continued)⁽⁵⁾

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 noted.

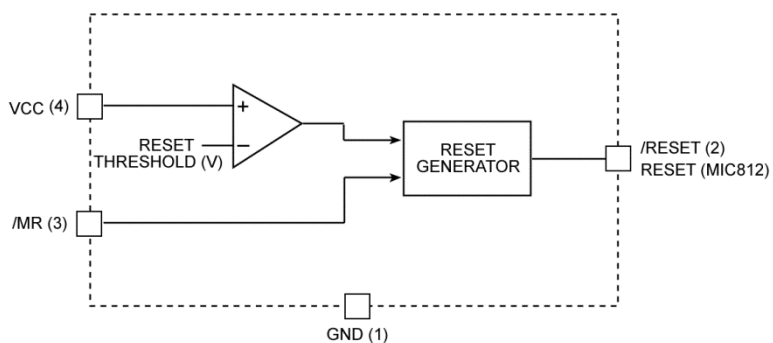
| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|----------|-------------------------|---|---------------------------------------|-----|--|-----------|
| | /MR Minimum Pulse Width | | 10 | | | μs |
| | /MR to Reset Delay | | | 0.5 | | μs |
| V_{IH} | /MR Input Threshold | $V_{CC} > V_{TH} \text{ max.}, \text{MIC81_L/M/J}$ | 2.3 | | | V |
| | | MIC81_R/S/T | $0.7 \times V_{CC}$ | | | V |
| V_{IL} | /MR Input Threshold | $V_{CC} > V_{TH} \text{ max.}, \text{MIC81_L/M/J}$ | | | 0.8 | V |
| | | MIC81_R/S/T | | | $0.25 \times V_{CC}$ | V |
| | /MR Pull-Up Resistance | | 10 | 20 | 30 | $k\Omega$ |
| | /MR Glitch Immunity | | | 100 | | ns |

Timing Diagram



Reset Timing Diagram

Functional Diagram



Application Information

Microprocessor Reset

The /RESET (or RESET) pin is asserted whenever VCC falls below the reset threshold voltage. The /RESET pin remains asserted for a period of 140ms after VCC 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 VCC as low as 1V.

VCC Transients

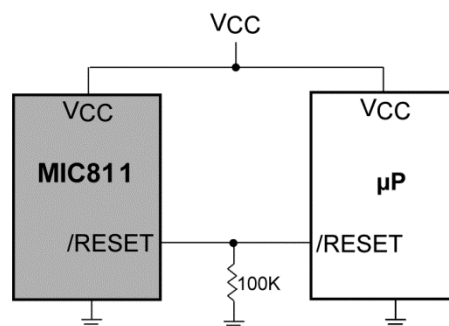
The MIC811/812 are relatively immune to negative-going VCC glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 20μs or less will not cause a reset.

Interfacing to Bidirectional Reset Pins

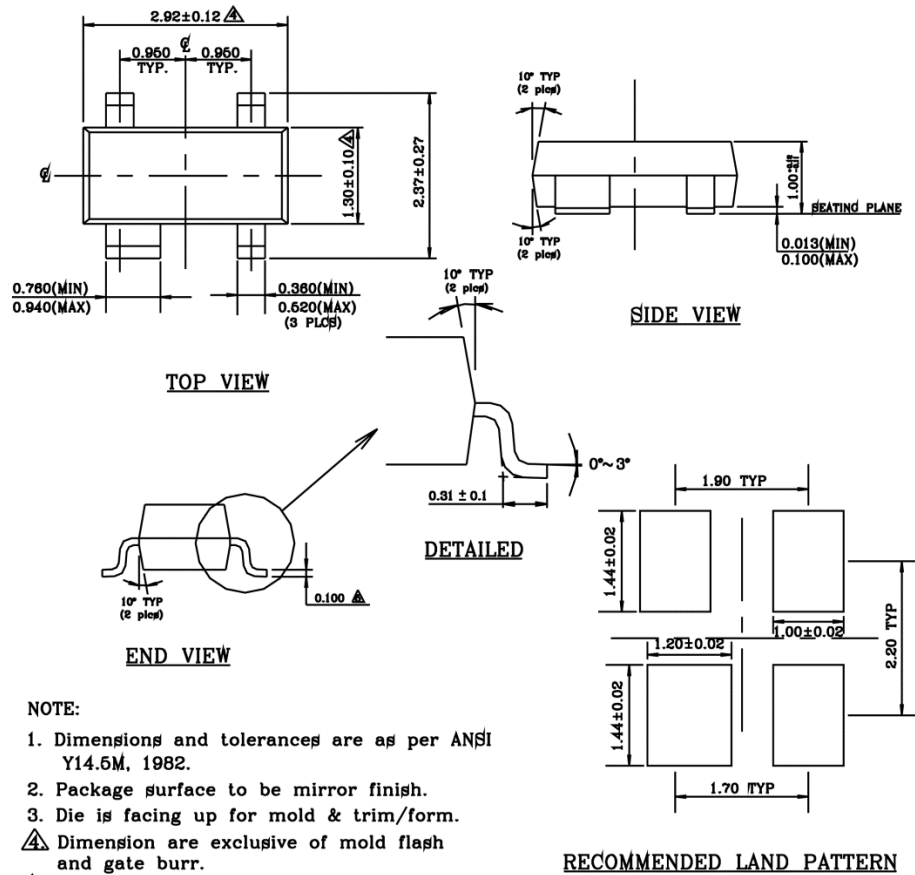
The MIC811/812 can interface with μPs with bidirectional reset pins by connecting a 4.7kΩ resistor in series with the MIC811/812 output and the μP reset pin.

/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 size of the resistor should be large enough not to load the output excessively and small enough to pull-down any stray leakage currents.



Package Information



4-Pin SOT-143 (U)

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