MIC6315

Open-Drain µP Reset Circuit

General Description

The MIC6315 is an inexpensive reset generator circuit that monitors 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 MIC6315 has an active low, open-drain /RESET output. The reset output is guaranteed to remain asserted for a minimum of either 20ms, 140ms, or 1100ms after V_{CC} has risen above the designed reset threshold level. The MIC6315 comes in a 4-pin SOT-143 package.

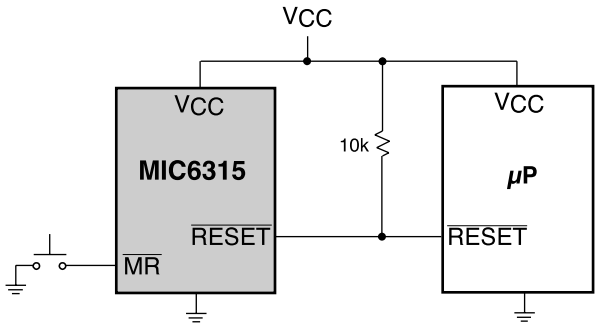
Features

- Precision voltage monitor for 3V, 3.3V or 5V power supplies
- /RESET remains valid with V_{CC} as low as 1.4V
- <15µA supply current
- 20ms, 40ms, or 1100ms minimum reset pulse widths available
- Manual reset input
- 4-pin SOT-143 package

Applications

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

Typical Application



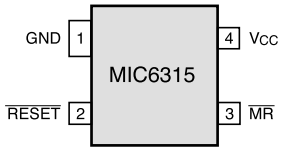
Ordering Information[1, 2]

Part Number	Marking	Nominal V_{TH} (V)	Min. t_{RST} (ms)	Operating Temp. Range	Package
MIC6315-26D2U	NY	2.63	20	–40°C to +85°C	4-lead SOT-143
MIC6315-29D2U	NM	2.93	20	–40°C to +85°C	4-lead SOT-143
MIC6315-30D2U	N2	3.00	20	–40°C to +85°C	4-lead SOT-143
MIC6315-31D2U	zz	3.08	20	–40°C to +85°C	4-lead SOT-143
MIC6315-44D2U	zz	4.38	20	–40°C to +85°C	4-lead SOT-143
MIC6315-46D2U	zz	4.63	20	–40°C to +85°C	4-lead SOT-143
MIC6315-26D3U	NR	2.63	140	–40°C to +85°C	4-lead SOT-143
MIC6315-29D3U	NP	2.93	140	–40°C to +85°C	4-lead SOT-143
MIC6315-30D3U	N3	3.00	140	–40°C to +85°C	4-lead SOT-143
MIC6315-31D3U	NU	3.08	140	–40°C to +85°C	4-lead SOT-143
MIC6315-44D3U	zz	4.38	140	–40°C to +85°C	4-lead SOT-143
MIC6315-46D3U	NX	4.63	140	–40°C to +85°C	4-lead SOT-143
MIC6315-26D4U	NS	2.63	1100	–40°C to +85°C	4-lead SOT-143
MIC6315-29D4U	NN	2.93	1100	–40°C to +85°C	4-lead SOT-143
MIC6315-30D4U	N4	3.00	1100	–40°C to +85°C	4-lead SOT-143
MIC6315-31D4U	zz	3.08	1100	–40°C to +85°C	4-lead SOT-143
MIC6315-44D4U	zz	4.38	1100	–40°C to +85°C	4-lead SOT-143
MIC6315-46D4U	NZ	4.63	1100	–40°C to +85°C	4-lead SOT-143

Notes

1. All devices available in tape and reel only.
2. Parts not yet assigned an identification code are shown as “zz”. Contact Micrel for details. Minimum order may apply.

Pin Configuration



MIC6315-xxDyU 4-Lead SOT-143

Pin Description

Pin Number	Pin Name	Pin Function
1	GND	IC Ground Pin.
2	/RESET	/RESET goes low if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period after V_{CC} exceeds the reset threshold.
3	/MR	Manual Reset Input. A logic low on /MR forces a reset. The reset will remain asserted as long as /MR is held low and for one reset timeout period after /MR goes high. This input can be shorted to ground via a switch or be driven by TTL or CMOS logic. Float if unused.
4	VCC	Power Supply Input.

Absolute Maximum Ratings(1)

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

Operating Ratings(2)

Operating Temperature Range ..... –40°C to +85°C
Input Voltage (/RESET) ..... GND – 5.5V
Power Dissipation (T_A = +70°C) 320mW

Electrical Characteristics

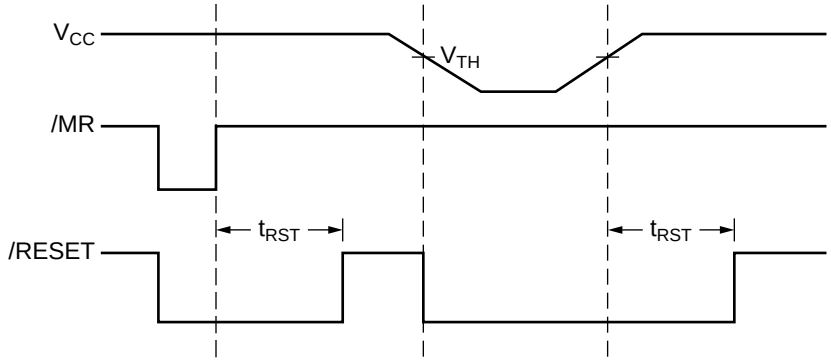
For typical values, V_{CC} = 2.5V to 5.5V, T_A = 25°C; **bold** values indicate –40°C ≤ T_A ≤ +85°C; unless noted

Symbol	Parameter	Condition	Min	Typ	Max	Units
	Operating Voltage Range		**1.4**		**5.5**	V
I_{CC}	Supply Current	V_{CC} = 5.5V, no load		9	**15**	µA
		V_{CC} = 3.6V, no load		6	**10**	µA
V_{TH}	Reset Voltage Threshold	**Note 4**	**V_{TH}–2.5%**	V_{TH}	**V_{TH}+2.5%**	V
t_{RST}	Reset Timeout Period		**20**	28	**44**	ms
			140	200	**320**	ms
			1100	1500	**2500**	ms
V_{OL}	/RESET Output Voltage	V_{CC} > 4.25V, I_{SINK} = 3.2mA			**0.4**	V
		V_{CC} > 2.5V, I_{SINK} = 1.2mA			**0.3**	V
		V_{CC} > 1.4V, I_{SINK} = 50µA			**0.3**	V
	/RESET Output Leakage	/RESET deasserted			**1**	µA
	/MR Minimum Pulse Width		**10**			µs
	/MR to Reset Delay			0.5		µs
V_{IH}	/MR Input Threshold	V_{TH} > 4.0V	**2.3**			V
		V_{TH} > 4.0V	**0.7×V_{CC}**			V
V_{IL}	/MR Input Threshold	V_{TH} > 4.0V			**0.8**	V
		V_{TH} > 4.0V			**0.25×V_{CC}**	V
	/MR Pull-Up Resistance		**10**	20	**30**	kΩ
	/MR Glitch Immunity			100		ns

Notes:

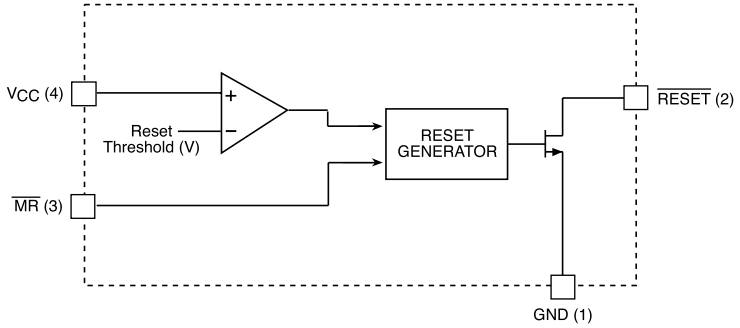
1. Exceeding the absolute maximum rating may damage the device.
2. The device is not guaranteed to function outside its operating rating.
3. Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100pF.
4. Various reset thresholds available. See ordering information or contact factory.

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 or if /MR (manual reset) is forced low. The /RESET pin remains asserted for the duration of the reset timeout period after V_{CC} has risen above the reset threshold or /MR has returned high. 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.

The /RESET output is a simple open-drain N-channel MOSFET structure. A pull-up resistor must be used to pull this output up to some voltage. For most applications, this voltage will be the same power supply that supplies V_{CC} to the MIC6315. It is possible however to tie this resistor to some other voltage. This will allow the MIC6315 to monitor one voltage while level-shifting the /RESET output to some other voltage. The pull-up voltage must be limited to 6.0V or less (absolute maximum) to avoid damage to the MIC6315. The resistor must be small enough to supply current to the inputs and leakage paths that are driven by the /RESET output.

/RESET Valid at Low Voltage

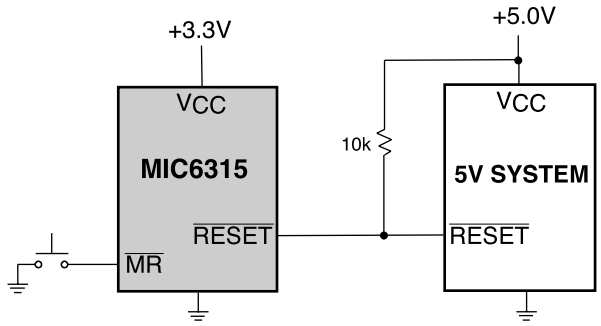
As V_{CC} drops to 0V, the MIC6315 will no longer be able to pull the /RESET output low. At this point, the pull-up resistor will pull the output high. The value of the pull-up resistor and the voltage it is connected to will affect the point at which this happens.

Wire OR'ing The /RESET Output

Because the RESET output is open-drain, several reset sources can be wire-ORed in parallel to allow resets from multiple sources.

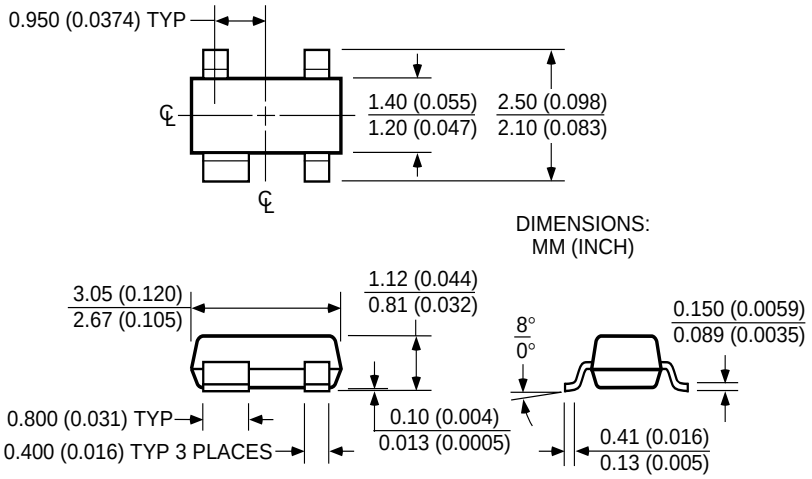
V_{CC} Transients

The MIC6315 is relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125mV below the reset threshold with a duration of 25µs or less will not cause an unwanted reset. If additional transient immunity is needed, a bypass capacitor can be placed a close as possible to the MIC6315.



MIC6315 Used in a Multiple Supply System

Package Information



4-Pin SOT-143 (U)

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