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THE DATASHEET OF

MIC6315-30D3UY-TR

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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 is available in a 4-pin SOT-143 package.

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

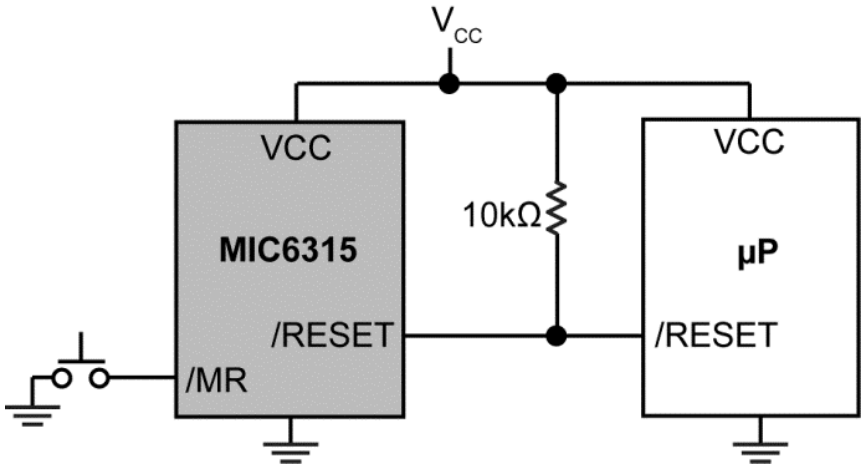
Features

- Precision voltage monitor for 3V, 3.3V, or 5V power supplies
- /RESET remains valid with V_{CC} as low as 1V
- 5µA supply current
- 20ms, 140ms, or 1100ms minimum reset pulse widths available
- Manual reset input
- Available in 4-pin SOT-143 package

Applications

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

Typical Application



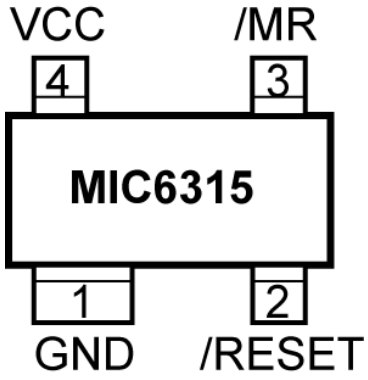
Ordering Information

Part Number[1, 2]	Marking[3]	Nominal V_{TH} (V)	Minimum t_{RST} (ms)	Operating Temperature Range	Package	Lead Finish
MIC6315-26D2UY	NY	2.63	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-29D2UY	NM	2.93	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-30D2UY	N2	3.00	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-31D2UY	NF	3.08	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-40D2UY	NW	4.00	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-41D2UY	N6	4.10	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-44D2UY	NG	4.38	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-46D2UY	NQ	4.63	20	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-26D3UY	NR	2.63	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-29D3UY	NP	2.93	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-30D3UY	N3	3.00	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-31D3UY	NU	3.08	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-40D3UY	N8	4.00	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-41D3UY	N5	4.10	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-42D3UY	05	4.20	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-44D3UY	NH	4.38	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-46D3UY	NX	4.63	140	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-26D4UY	NS	2.63	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-29D4UY	NN	2.93	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-30D4UY	N4	3.00	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-31D4UY	2N	3.08	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-40D4UY	M9	4.00	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-41D4UY	M7	4.10	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-44D4UY	NJ	4.38	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free
MIC6315-46D4UY	NZ	4.63	1100	–40°C to +85°C	4-Pin SOT-143	Pb-Free

Note:

1. Ship format Tape and reel only (ordering part number add space TR example. MIC6315-26D2UY TR).
2. Standard reel quantity is 3000 pieces.
   Reel diameter 7in. / Hub diameter 2in. / Width 8mm.
3. Underbar symbol (_) may not be to scale.

Pin Configuration



4-Pin SOT-143 (U)
(Top View)

Pin Description

Pin Number	Pin Name	Pin Function
1	GND	IC Ground.
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[4]

Terminal Voltage
(VCC, /RESET)..... –0.3V to +6.0V
(/MR)..... –0.3V to (V_{CC} + 0.3V)
Rate-of-Rise (VCC) 100V/µs
Input Current (VCC, /MR)..... 20mA
Output Current (/RESET) 20mA
Lead Temperature (soldering, 10s)..... 300°C
Storage Temperature (T_S)..... –65°C to +150°C
ESD Rating[6]..... 3kV

Operating Ratings[5]

Input Voltage (/RESET)..... GND to 5.5V
Operating Temperature Range ..... –40°C to +85°C
Junction Temperature (T_J) ..... –40°C to +125°C
Power Dissipation (T_A = +70°C)..... 320mW

Electrical Characteristics

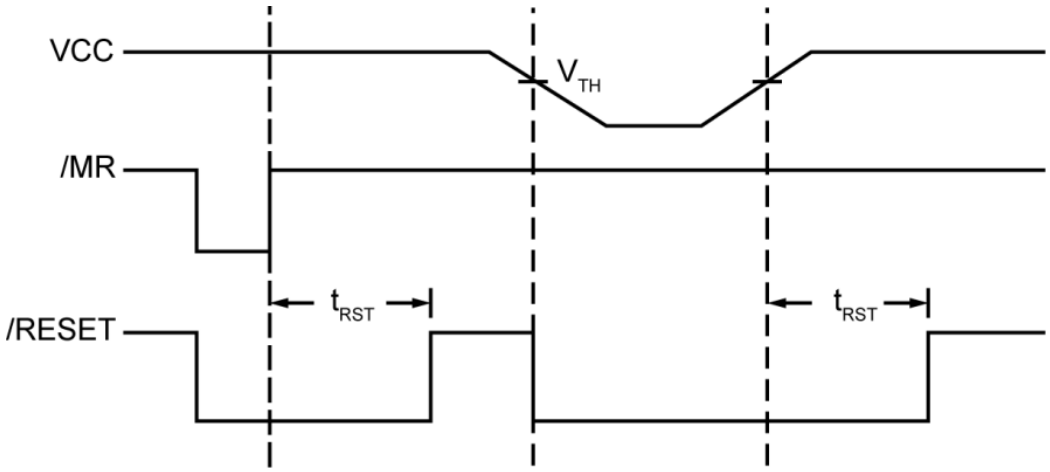
For typical values, V_{CC} = 2.5V to 5.5V; T_A = +25°C, **bold** values indicate –40°C≤ T_A ≤ +85°C, unless noted.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{CC}	Operating Voltage Range		**1**		**5.5**	V
I_{CC}	Supply Current	V_{CC} = 5.5V, no load.		5	**15**	µA
		V_{CC} = 3.6V, no load.		5	**10**	
V_{TH}	Reset Voltage Threshold	Note 7	**V_{TH} – 2.5%**	V_{TH}	**V_{TH} + 2.5%**	V
t_{RST}	Reset Timeout Period	D2U	**20**	28	**44**	ms
		D3U	**140**	200	**320**	
		D4U	**1100**	1500	**2500**	
V_{OL}	/RESET Output Voltage	V_{CC} ≥ 4.0V, t_{SINK} = 3.2mA			**0.4**	V
		V_{CC} ≥ 2.5V, t_{SINK} = 1.2mA			**0.3**	
		V_{CC} ≥ 1.0V, t_{SINK} = 50µA			**0.3**	
	/RESET Output Leakage	/RESET de-asserted			**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_{IL}	/MR Input Threshold	V_{TH} > 4.0V			**0.8**	V
		V_{TH} < 4.0V			**0.25 × V_{CC}**	
	/MR Pull-Up Resistance		**10**	20	**30**	kΩ
	/MR Glitch Immunity			100		ns

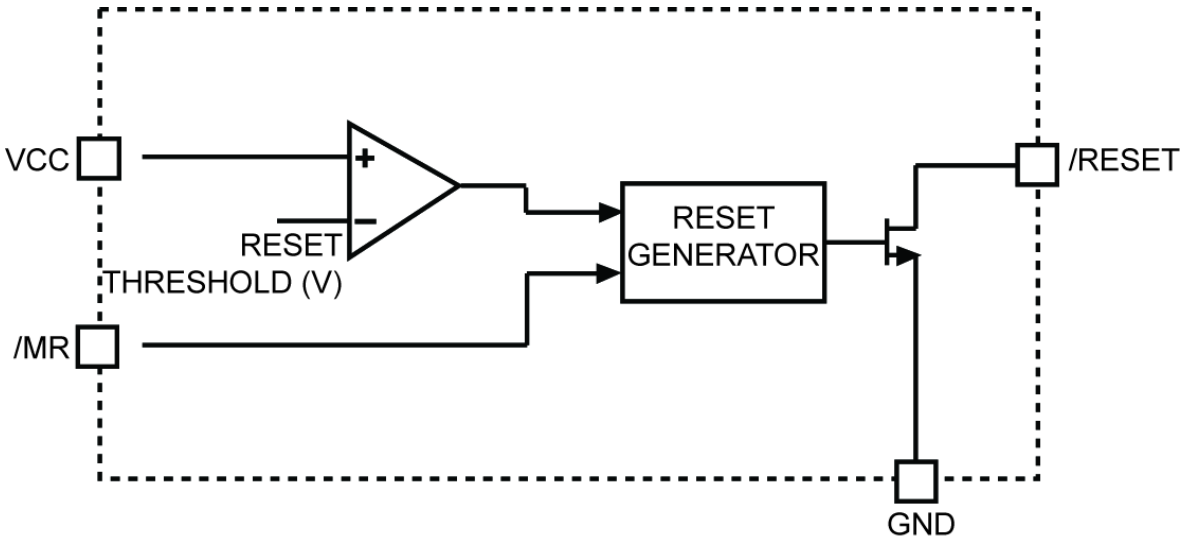
Notes:

4. Exceeding the absolute maximum ratings may damage the device.
5. The device is not guaranteed to function outside its operating ratings.
6. Devices are ESD sensitive. Handling precautions are recommended. Human body model, 1.5kΩ in series with 100pF.
7. Various reset thresholds available. See *Ordering Information* or contact factory.

Timing Diagram



Functional Diagram



Application 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 1V.

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-OR'ed, 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 duration of 20μs 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.

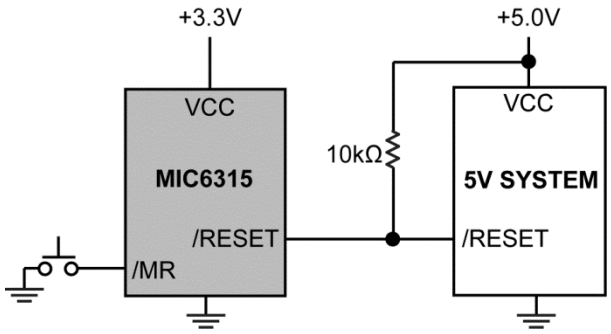
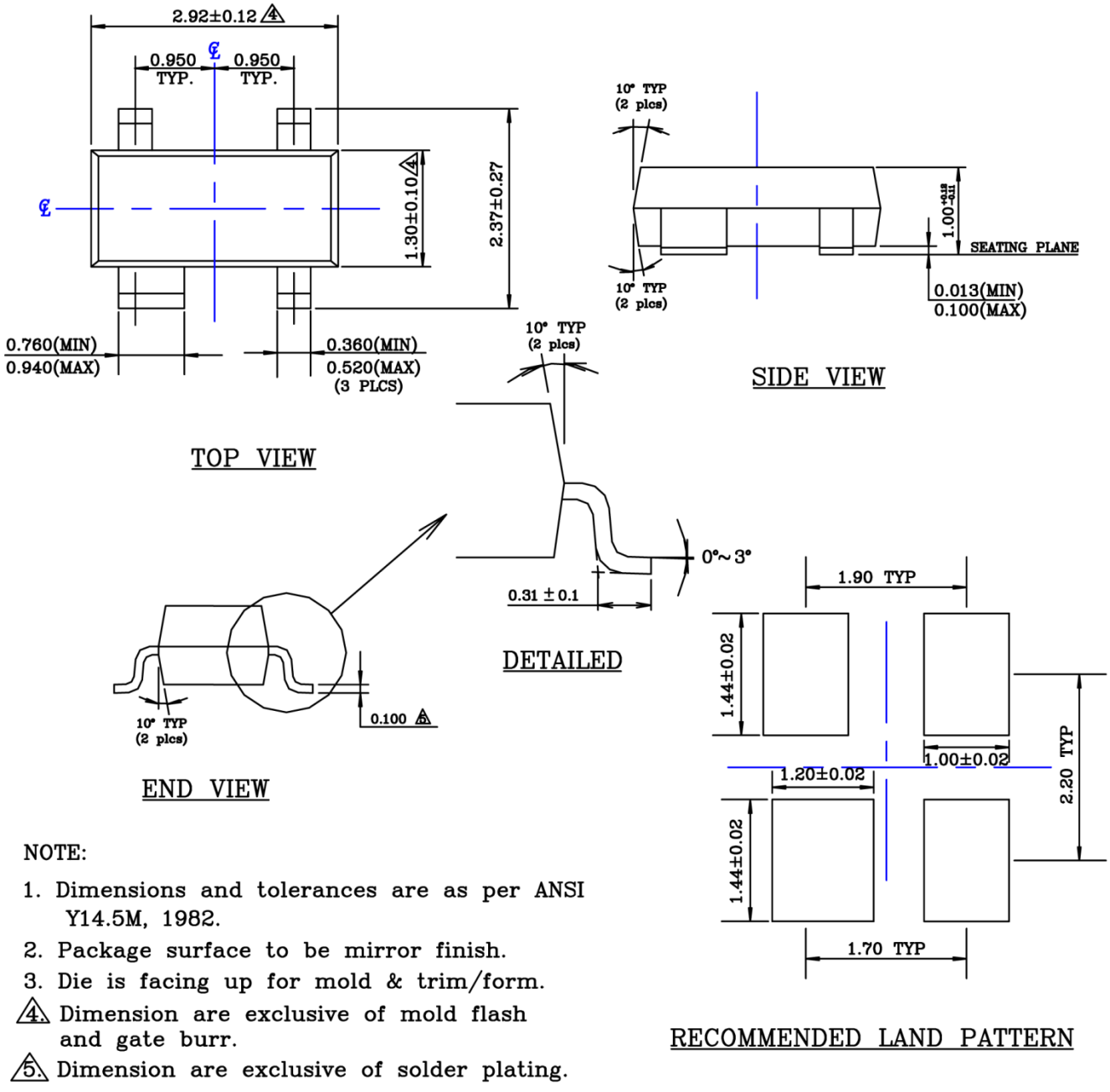


Figure 1. MIC6315 as Used in a Multiple Supply System

Package Information and Recommended Landing Pattern[8]



NOTE:

1. Dimensions and tolerances are as per ANSI Y14.5M, 1982.
2. Package surface to be mirror finish.
3. Die is facing up for mold & trim/form.
4. Dimension are exclusive of mold flash and gate burr.
5. Dimension are exclusive of solder plating.

4-Pin SOT-143 (U)

Note:

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

MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB http://www.micrel.com

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