MIC1815

Microprocessor Reset Circuit

Features

- Precision Voltage Monitor for 10% or 20% Drop in 3.3V Power Supplies
- /RESET Remains Valid with V_{CC} as Low as 1V
- 5 µA Supply Current
- 100 ms Minimum Reset Pulse Width
- No External Components Required
- Available in 3-Lead SOT-23 Package

Applications

- Portable Equipment
- Intelligent Instruments
- Critical Microprocessor Power Monitoring
- Printers/Computers
- Embedded Controllers

General Description

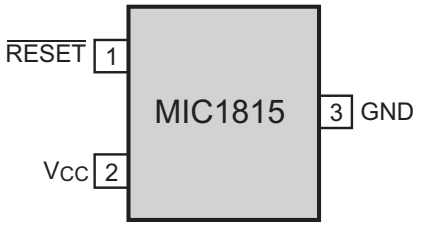
The MIC1815 is an inexpensive microprocessor supervisory circuit that monitors power supplies in microprocessor based systems.

The function of these devices is to assert a reset if the power supply drops below a designated reset threshold level. Several different reset threshold levels are available to accommodate 10% or 20% drop in 3.3V powered systems.

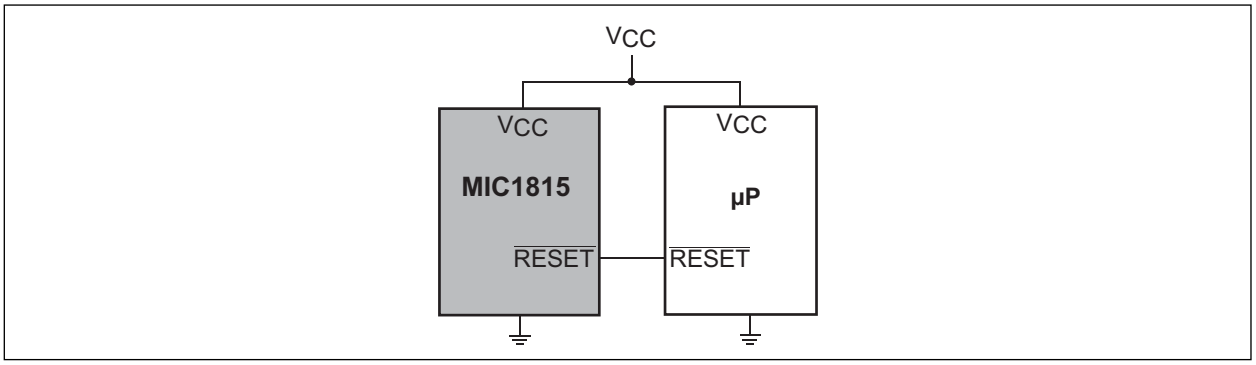
The MIC1815 has an active low /RESET output. The reset output is guaranteed to remain asserted for a minimum of 100 ms after V_{CC} has risen above the designated reset threshold level. The MIC1815 comes in a 3-lead SOT-23 package.

Package Type

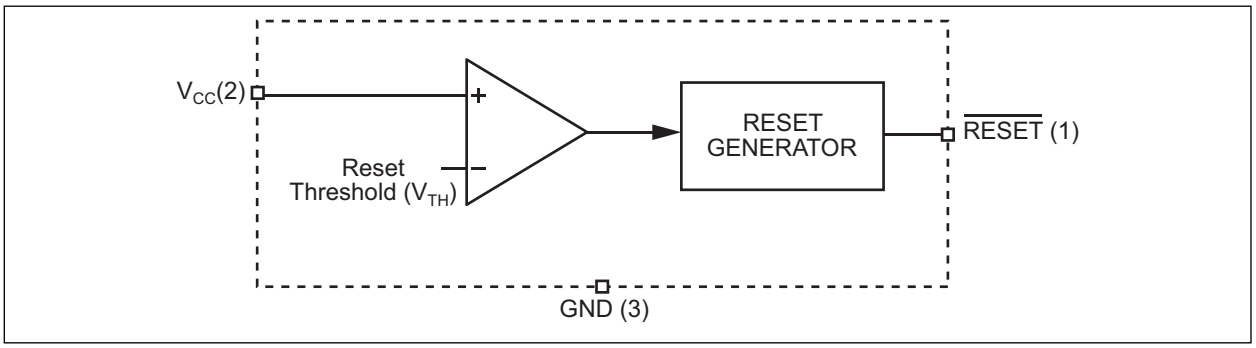
MIC1815
3-Lead SOT-23 (U)
(Top View)



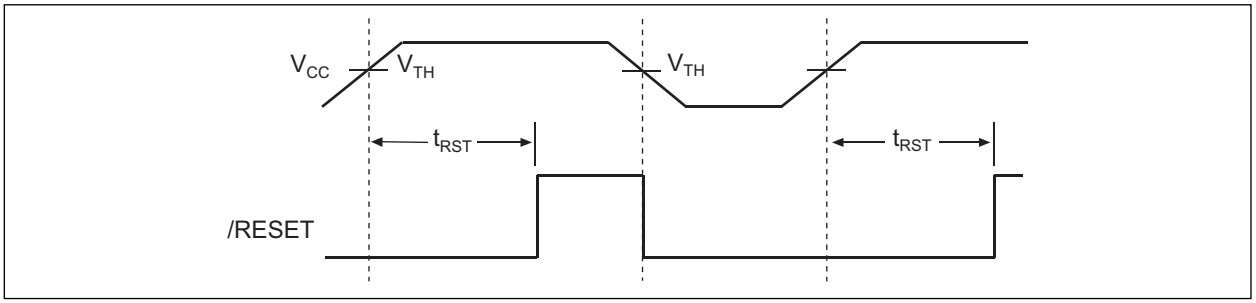
Typical Application Circuit



Functional Block Diagram



Timing Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Terminal Voltage (V_{CC}) ..... –0.3V to +6V
Input Current (V_{CC}) ..... 20 mA
Output Current (/RESET) ..... 20 mA
Rate of Rise (V_{CC}) 100V/µs
ESD Rating (Note 1) ..... 3 kV

Operating Ratings ‡

Power Dissipation (T_A = +70°C) ..... 320 mW

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ Notice: The device is not guaranteed to function outside its operating ratings.

Note 1: Device is ESD sensitive. Handling precautions are recommended. Human body model, 1.5 kΩ in series with 100 pF.

ELECTRICAL CHARACTERISTICS

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

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Supply Voltage	V_{CC}	**1**	—	**5.5**	V	T_A = –40°C to +85°C
Supply Current	I_{CC}	—	5	**20**	µA	—
Reset Voltage Threshold	V_{TH}	**2.80**	2.88	**2.97**	V	MIC1815-10U
		2.47	2.55	**2.64**		MIC1815-20U
Reset Timeout Period	t_{RST}	**100**	150	**250**	ms	—
/RESET Output Voltage High	V_{OH}	**1.5**	—	—	V	I_{SOURCE} = 800 µA
/RESET Output Voltage Low	V_{OL}	—	—	**0.4**	V	V_{CC} = $V_{TH(MIN)}$, I_{SINK} = 10 mA
		—	—	**0.3**		V_{CC} > 1V, I_{SINK} = 50 µA

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Storage Temperature Range	T_S	–65	—	+150	°C	—
Junction Temperature Range	T_J	–40	—	+85	°C	—
Lead Temperature	T_{LEAD}	—	—	300	°C	Soldering, 10 sec.

2.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	/RESET	/RESET goes low if V_{CC} falls below the reset threshold and remains asserted for one reset timeout period (100ms min) after VCC exceeds the reset threshold.
2	VCC	Power supply input.
3	GND	IC ground pin.

3.0 APPLICATION INFORMATION

3.1 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 t_{RST} after V_{CC} has risen above the reset threshold voltage. The reset function ensures the microprocessor is properly reset and powers up into a known condition after a power failure. /RESET will remain valid with V_{CC} as low as 1V.

3.2 VCC Transients

The MIC1815 is relatively immune to negative-going V_{CC} glitches below the reset threshold. Typically, a negative-going transient 125 mV below the reset threshold with a duration of 20 µs or less will not cause an unwanted reset.

3.3 /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 100 kΩ resistor connected from /RESET to ground is recommended. The resistor should be large enough not to load the /RESET output and small enough to pull down any stray leakage currents. See Figure 3-1.

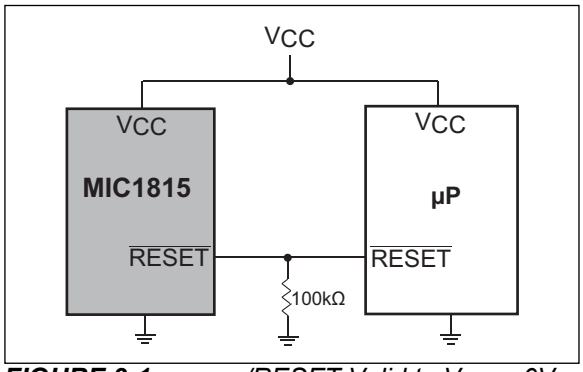


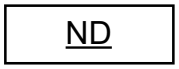
FIGURE 3-1: */RESET Valid to V_{CC} = 0V.*

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

3-Lead SOT-23* (Front)

Example



3-Lead SOT-23* (Back)

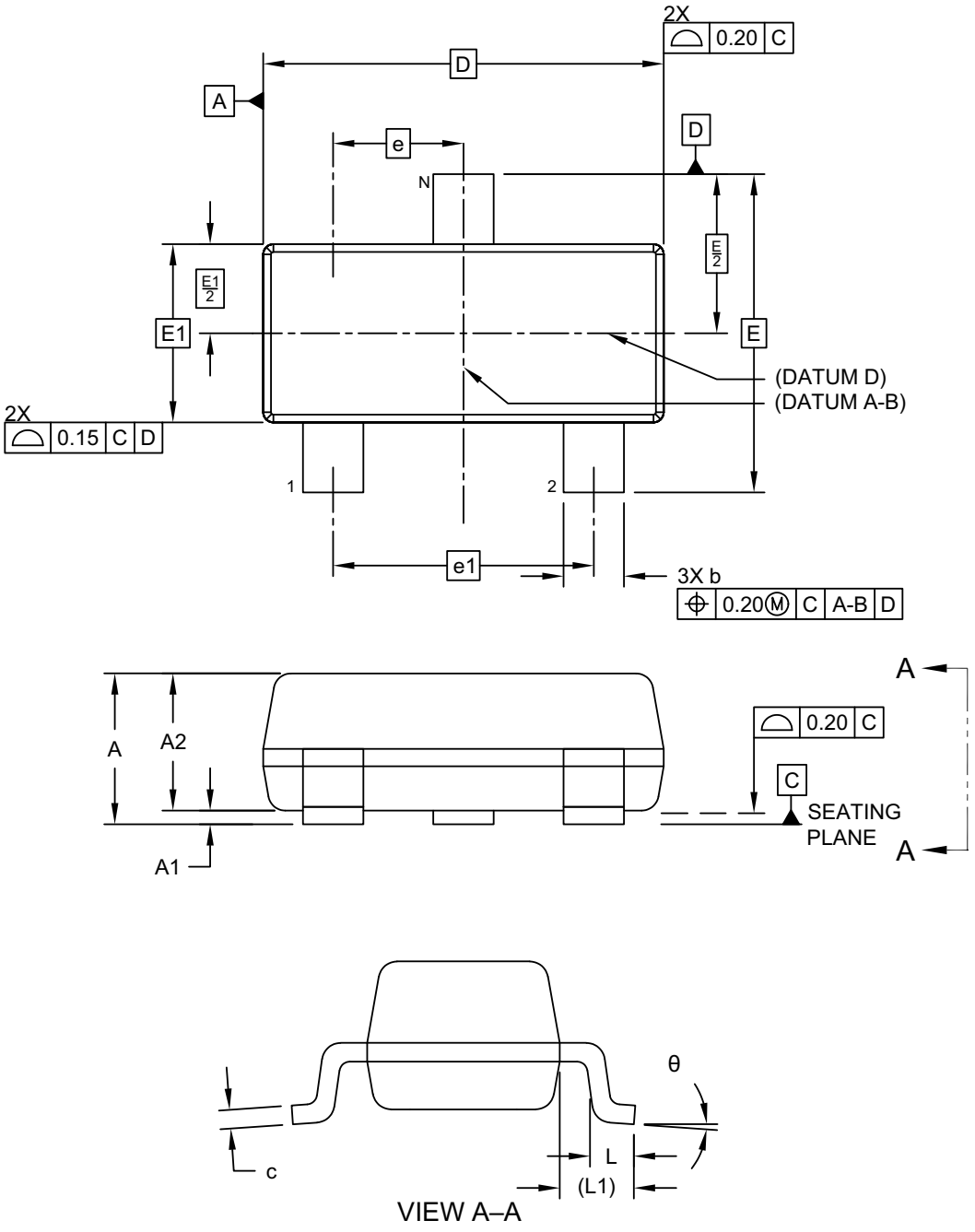
Example

Legend:	XX...X	Product code or customer-specific information
	M	Month of assembly. January is represented by “A” and each month thereafter follows the order of the alphabet through “L” for December.
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).
Note:	In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.	
	Underbar (_) and/or Overbar (¯) symbol may not be to scale.	

Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space:
6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN;
2 Characters = NN; 1 Character = N

3-Lead Plastic Small Outline Transistor (D7A) [SOT23]
Micrel Legacy Package SOT-023-03L

Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



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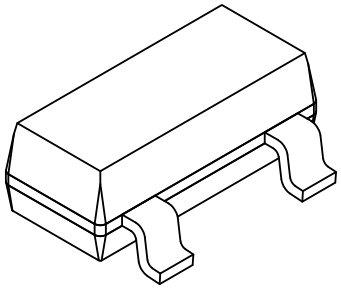
3-Lead Plastic Small Outline Transistor (D7A) [SOT23]
Micrel Legacy Package SOT-023-03L

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Terminals	N		3	
Pitch	e		0.95 BSC	
Outside Lead Pitch	e1		1.90 BSC	
Overall Height	A	0.89	1.00	1.12
Standoff	A1	0.013	–	0.10
Molded Package Thickness	A2	0.88	0.95	1.02
Overall Length	D		2.90 BSC	
Overall Width	E		2.32 BSC	
Molded Package Width	E1		1.30 BSC	
Terminal Width	b	0.37	–	0.51
Terminal Thickness	c	0.08	–	0.20
Terminal Length	L	0.21	0.31	0.41
Footprint	L1		0.54 REF	
Foot Angle	θ	0°	-	8°

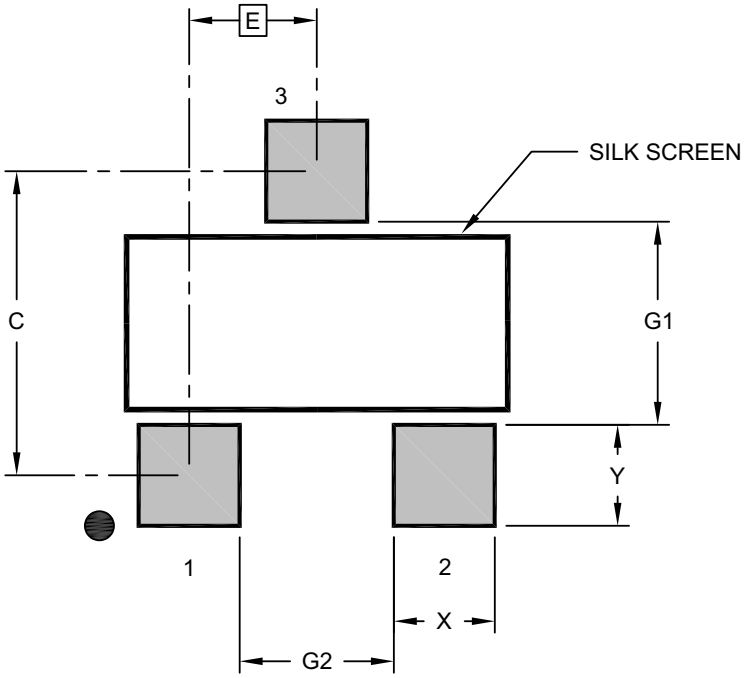
Notes:

1. Demension D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.25mm per side
2. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.
   REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1139 Rev A Sheet 2 of 2

3-Lead Plastic Small Outline Transistor (D7A) [SOT23]
Micrel Legacy Package SOT-023-03L

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	0.96 BSC		
Contact Pad Spacing	C		2.29	
Contact Pad Width (X3)	X			0.78
Contact Pad Length (X3)	Y			0.78
Contact Pad to Center Pad (X3)	G1	1.53		
Contact Pad to Contact Pad (X1)	G2	1.16		

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
   BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-3139 Rev A

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (October 2023)

- Converted Micrel document MIC1815 to Microchip data sheet DS20006821A.
- Minor text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

Part Number	-XX	X	X	-XX
Device	Output Voltage	Temperature Range	Package	Media Type

Device:	MIC1815:		Microprocessor Reset Circuit
Threshold Voltage:	-10	=	2.88V
	-20	=	2.55V
Package:	U	=	3-Lead SOT-23
Temperature Range:	Y	=	–40°C to +85°C
Media Type:	TR	=	3,000/Reel

Examples:

a) MIC1815-10UY-TR: MIC1815, 2.88V Threshold Voltage, –40°C to +85°C Temp. Range, 3-Lead SOT-23, 3,000/Reel

b) MIC1815-20UY-TR: MIC1815, 2.55V Threshold Voltage, –40°C to +85°C Temp. Range, 3-Lead SOT-23, 3,000/Reel

Note: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.

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