MIC8114

Microprocessor Reset Circuit

Features

- Precision Voltage Monitor for 3.3V Power Supplies
- Specifically Tailored to the AMD Elan SC400/410
- /RESET Remains Valid with V_{CC} as Low as 1V
- 5 µA Typical Supply Current
- 790 ms Minimum Reset Pulse Width
- Manual Reset Input
- Available in a 4-Lead SOT-143 Package

Applications

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

General Description

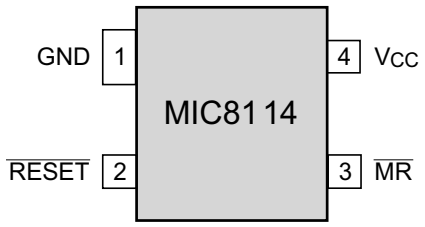
The MIC8114 is an inexpensive microprocessor supervisory circuit that monitors the power supply in microprocessor-based systems.

The function of this device is to assert a reset if the power supply drops below a designated reset threshold level or if /MR is forced low.

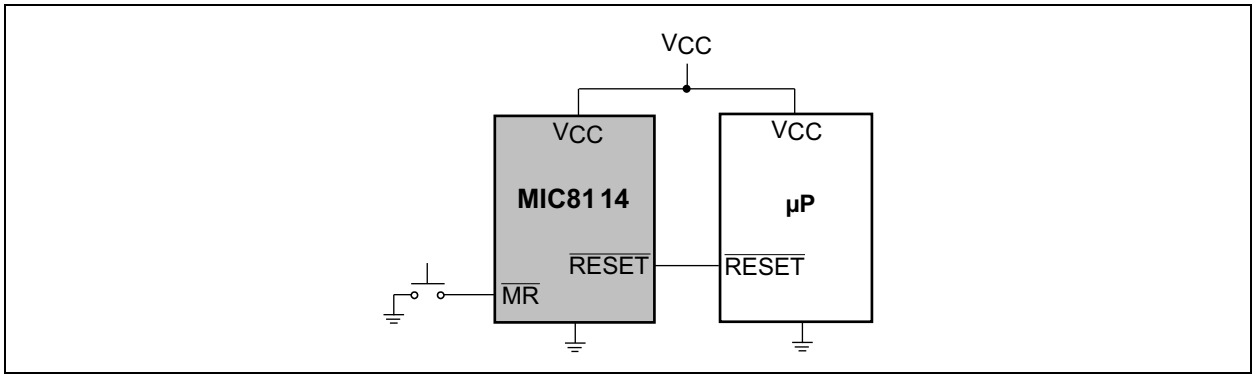
The MIC8114 has an active-low /RESET output. The reset output is ensured to remain asserted for a minimum of 790 ms after V_{CC} has risen above the designated reset threshold level. The MIC8114 comes in a 4-lead SOT-143 package.

Package Type

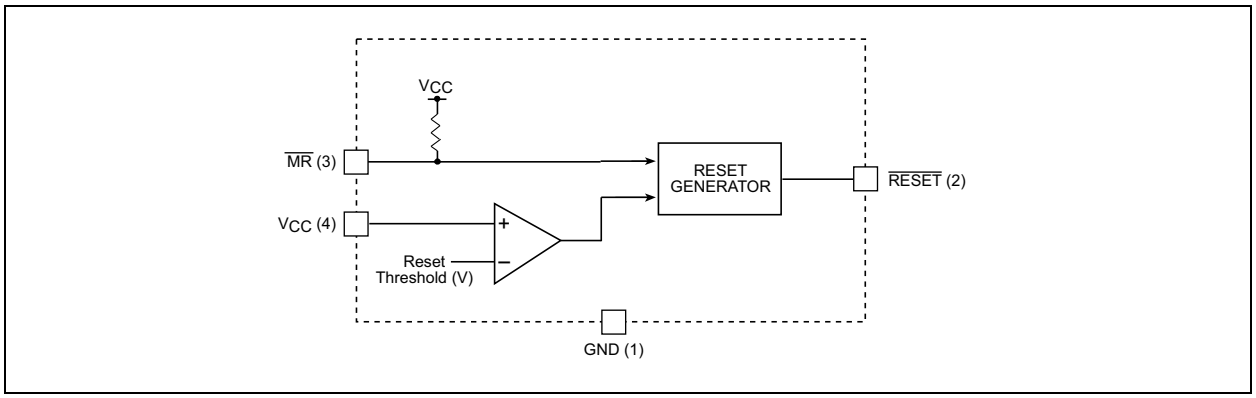
MIC8114
4-Lead SOT-143 (TU)
(Top View)



Typical Application Circuit



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Terminal Voltage (V_{CC}) ..... –0.3V to +6.0V
Terminal Voltage (/MR) ..... –0.3V to (V_{CC} + 0.3V)
Input Current (V_{CC}, /MR) ..... 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: Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5 kΩ in series with 100 pF.

ELECTRICAL CHARACTERISTICS

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

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Operating Voltage Range	V_{CC}	**1**	—	**5.5**	V	T_A = –40°C to 85°C
Supply Current	I_{CC}	—	5	**15**	µA	—
Reset Voltage Threshold	V_{TH}	**3.00**	3.08	**3.15**	V	—
Reset Timeout Period	t_{RST}	**790**	1200	**1800**	ms	—
/RESET Output Voltage	V_{OH}	**0.8 x V_{CC}**	—	—	V	I_{SOURCE} = 500 µA
/RESET Output Voltage	V_{OL}	—	—	0.3	V	V_{CC} = $V_{TH(MIN)}$, I_{SINK} = 1.2 mA
		—	—	**0.3**		V_{CC} = 1V, I_{SINK} = 50 µA, T_A = –40°C to +85°C
/MR Minimum Pulse Width	—	**10**	—	—	µs	—
/MR to Reset Delay	—	—	0.5	—	µs	—
/MR Input Threshold	V_{IH}	**0.7 x V_{CC}**	—	—	V	—
/MR Input Threshold	V_{IL}	—	—	**0.25 x V_{CC}**	V	—
/MR Pull-Up Resistance	—	**10**	20	**30**	kΩ	—
/MR Glitch Immunity	—	—	100	—	ns	—

TEMPERATURE SPECIFICATIONS

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

Timing Diagram

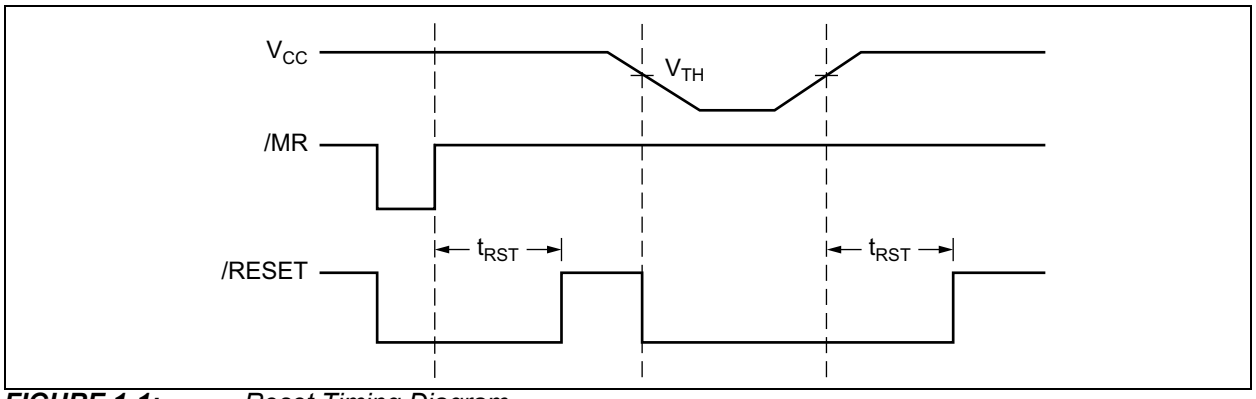


FIGURE 1-1: *Reset Timing Diagram.*

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	GND	IC ground pin.
2	/RESET	/RESET goes low if either V_{CC} falls below the supply reset threshold voltage or if /MR is asserted. /RESET remains asserted for one reset timeout period after both V_{CC} exceeds the supply reset threshold voltage and /MR is deasserted.
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 driven from CMOS or TTL logic. Pulled high internally through a 20 kΩ resistor. Float if unused.
4	V_{CC}	Power supply input.

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 790 ms 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 V_{CC} Transients

The MIC8114 is relatively immune to the 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 a 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.

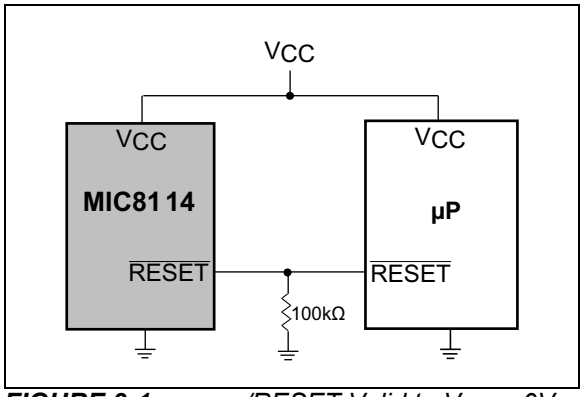
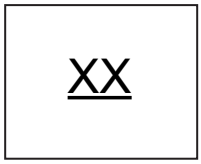


FIGURE 3-1: */RESET Valid to V_{CC} = 0V.*

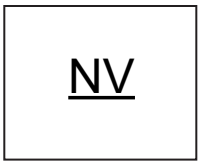
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

4-Lead SOT-143* (Front)



Example



4-Lead SOT-143* (Back)

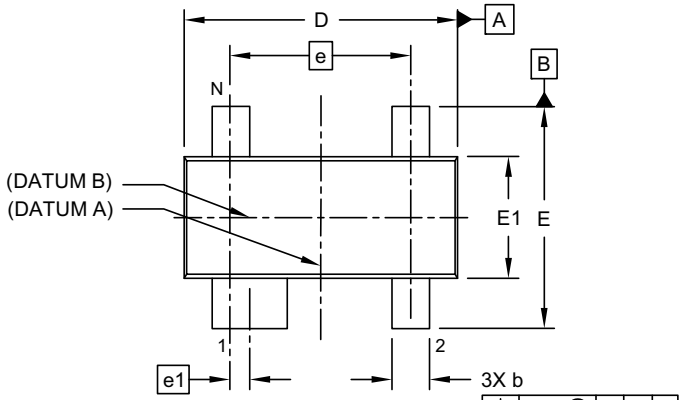
Example

Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	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 (_) symbol may not be to scale.	

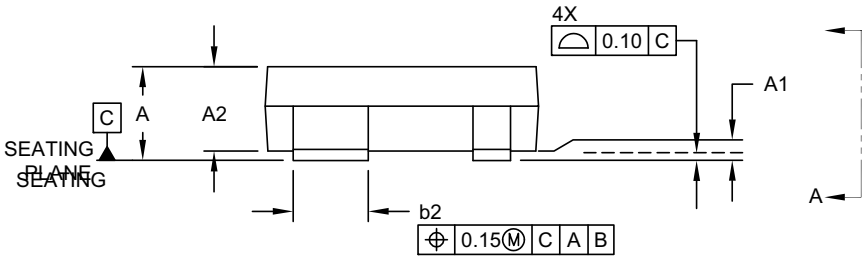
Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space:
6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN;
2 Characters = NN; 1 Character = N

4-Lead Plastic Small Outline Transistor (DAA) [SOT-143]
Micrel Legacy Package

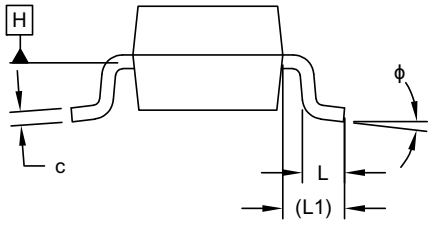
Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



TOP VIEW



SIDE VIEW



VIEW A-A

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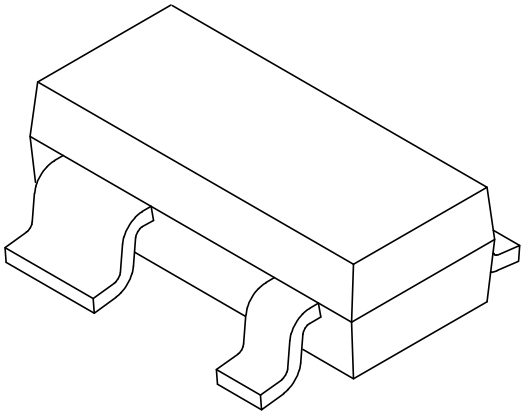
4-Lead Plastic Small Outline Transistor (DAA) [SOT-143]
Micrel Legacy Package

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 Pins	N		4	
Pitch	e		1.90 BSC	
Pin 1 Offset	e1		0.20 BSC	
Overall Height	A	0.89	1.00	1.14
Standoff §	A1	0.013	-	0.20
Overall Width	E	2.10	2.37	2.64
Molded Package Width	E1	1.20	1.30	1.40
Overall Length	D	2.72	2.92	3.04
Foot Length	L	0.21	0.31	0.41
Footprint	L1		0.54 REF	
Foot Angle	ϕ	0°	-	3°
Lead Thickness	c	-	.10	-
Lead 1 Width	b1	0.69	-	0.94
Leads 2, 3 & 4 Width	b	0.30	-	0.52

Notes:

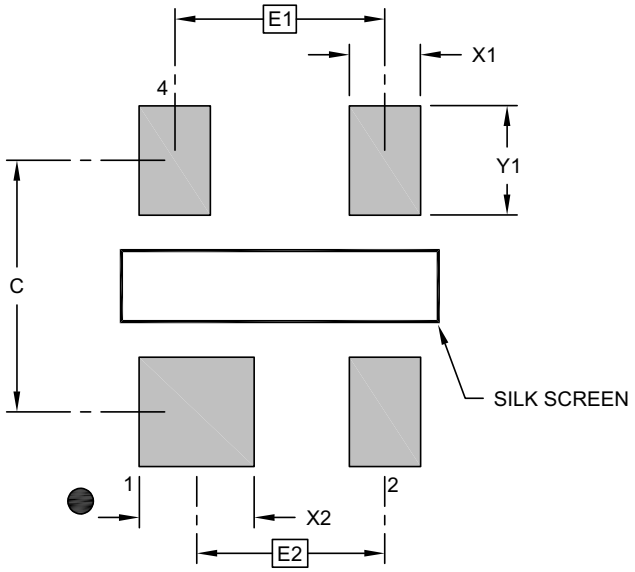
1. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127mm per side.
2. Dimensioning and tolerancing per ASME Y14.5M

BSC: Basic Dimension. Theoretically exact value shown without tolerances.
REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing C04-1137 Rev. A Sheet 1 of 2

4-Lead Plastic Small Outline Transistor (DAA) [SOT-143]
Micrel Legacy Package

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	E1	1.90 BSC		
Contact Pitch	E2	1.72 BSC		
Contact Pad Spacing	C		2.30	
Contact Pad Width (X3)	X1			0.65
Contact Pad Width	X2			1.05
Contact Pad Length (X4)	Y1			1.10

Notes:

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

Microchip Technology Drawing C04-3137 Rev. A

APPENDIX A: REVISION HISTORY

Revision A (October 2022)

- Converted Micrel document MIC8114 to Microchip data sheet DS20006738A.
- Minor text changes throughout.
- Updated package outline drawing to current standard.

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	-XX
Device	Package	Temperature Range	Media Type

Device:	MIC8114:		Microprocessor Reset Circuit
Package:	TU	=	4-Lead SOT-143
Temperature Range:	Y	=	–40°C to +85°C
Media Type:	TR	=	3,000/Reel

Examples:

a) MIC8114TUY-TR: MIC8114, 4-Lead SOT-143, –40°C to +125°C Temperature Range, 3,000/Reel

Note 1: 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.

NOTES:

Note the following details of the code protection feature on Microchip products:

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