

## 3-Pin Reset Monitors for 5V Systems

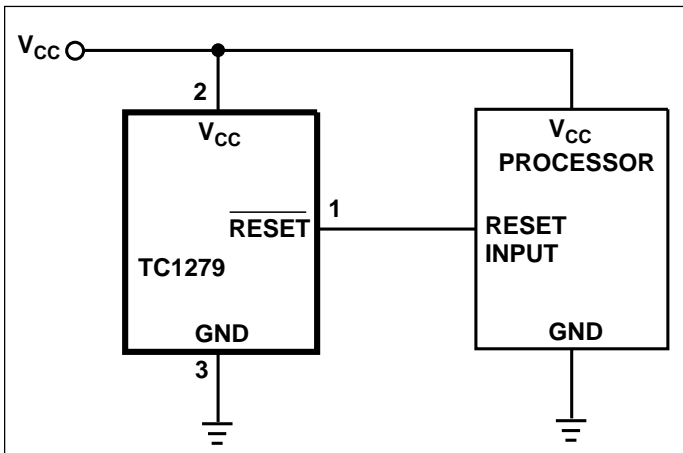
### FEATURES

- Precision  $V_{CC}$  Monitor for 5.0V System Supplies
- 250msec Guaranteed Minimum RESET Output Duration
- Output Guaranteed to  $V_{CC} = 1.2V$
- $V_{CC}$  Transient Immunity
- 3-Pin SOT-23B Package
- No External Components

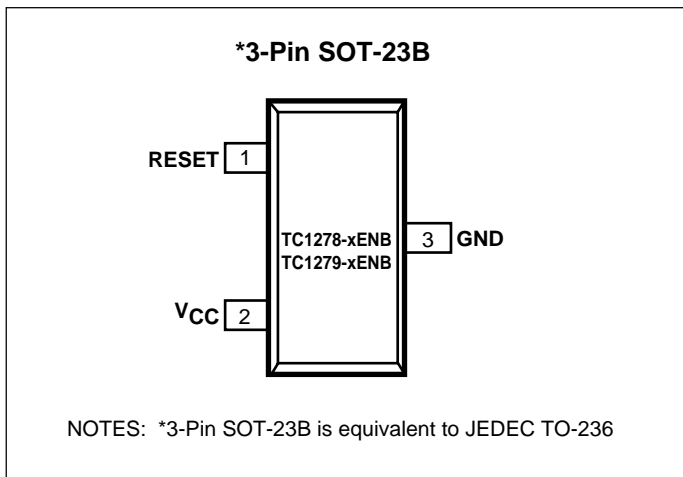
### TYPICAL APPLICATIONS

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical  $\mu P$  Power Supply Monitoring

### TYPICAL OPERATING CIRCUIT



### PIN CONFIGURATION



### GENERAL DESCRIPTION

The TC1278 and TC1279 are cost-effective system supervisor circuits designed to monitor  $V_{CC}$  in digital systems and provide a reset signal to the host processor when necessary. No external components are required.

The reset output is driven active within 5 $\mu$ sec of  $V_{CC}$  falling through the reset voltage threshold. Reset is maintained active for a minimum of 250msec after  $V_{CC}$  rises above the reset threshold. The TC1278 has an active-high RESET output while the TC1279 has an active-low  $\overline{\text{RESET}}$  output, and both devices have an open drain output stage. The output is guaranteed valid down to  $V_{CC} = 1.2V$ . Both devices are available in a 3-Pin SOT-23 package.

### ORDERING INFORMATION

Part No.	Order	Package	Temp. Range
TC1278-xENB	Open Drain	3-Pin SOT-23B	-40°C to +85°C
TC1279-xENB	Open Drain	3-Pin SOT-23B	-40°C to +85°C

NOTE: The "x" denotes a suffix for  $V_{CC}$  threshold - see table below.

Suffix	Reset $V_{CC}$ Threshold (V)
5	4.625
10	4.375
15	4.125

## TC1278 TC1279

### ABSOLUTE MAXIMUM RATINGS\*

Supply Voltage ( $V_{CC}$ to GND) .....	+6.0V
$\overline{\text{RESET}}$ , RESET .....	- 0.3V to ( $V_{CC} + 0.3V$ )
Input Current, $V_{CC}$ .....	20mA
Output Current, RESET .....	20mA
Operating Temperature Range .....	- 40°C to +85°C

Power Dissipation ( $T_A \leq 70^\circ\text{C}$ )

3-Pin SOT-23B (Derate 4mW/°C above +70°C) ..... 230mW

Storage Temperature Range .....

Lead Temperature (Soldering, 10 sec) .....

\*This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to Absolute Maximum Rating Conditions for extended periods may affect device reliability.

**RECOMMENDED DC OPERATING CONDITIONS:**  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$  unless otherwise specified. Typical values apply at  $T_A = +25^\circ\text{C}$ .

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{CC}$	Supply Voltage	(Note 1)	1.2	—	5.5	

**DC ELECTRICAL CHARACTERISTICS:**  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$  unless otherwise specified. Typical values apply at  $T_A = +25^\circ\text{C}$ .

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{OL}$	Low Level@RESET(TC1278) RESET(TC1279)	(Note 1)	—	—	0.4	V
$I_{OL}$	Output Current @0.4 volts	(Note 2)	+8	—	—	mA
$I_{CC1}$	Operating Current (TC1278) (TC1279)	$V_{CC} > V_{CCTP} \text{ (MAX)}$ $V_{CC} > V_{CCTP} \text{ (MAX)}$	—	0.9	2.0	mA $\mu\text{A}$
$I_{CC2}$	Operating Current (TC1278) (TC1279)	$V_{CC} < V_{CCTP} \text{ (MIN)}$ $V_{CC} < V_{CCTP} \text{ (MIN)}$	—	—	40	$\mu\text{A}$ mA
$V_{CCTP-5}$	$V_{CC}$ Trip Point (TC1278/9-5)	(Note 1)	4.50	4.625	4.74	V
$V_{CCTP-10}$	$V_{CC}$ Trip Point (TC1278/9-10)	(Note 1)	4.25	4.375	4.49	V
$V_{CCTP-15}$	$V_{CC}$ Trip Point (TC1278/9-15)	(Note 1)	4.00	4.125	4.24	V
$C_{OUT}$	Output Capacitance		—	9	—	pF
$R_P$	Internal Pull-Up Resistor		3	6	9	k $\Omega$

**AC ELECTRICAL CHARACTERISTICS:**  $T_A = -40^\circ\text{C}$  to  $+85^\circ\text{C}$  unless otherwise specified. Typical values apply at  $T_A = +25^\circ\text{C}$ .

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{RST}$	RESET Active Time		250	350	450	msec
$t_{RPD1}$	$V_{CC}$ Detect to $\overline{\text{RESET}}$ (TC1279)	(Figure 2)	—	2	5	$\mu\text{sec}$
$t_{RPD2}$	$V_{CC}$ Detect to RESET (TC1278)	(Figure 4)	—	2	5	$\mu\text{sec}$
$t_F$	$V_{CC}$ Slew Rate (4.75V-4.00V)	(Figures 2, 4)	300	—	—	$\mu\text{sec}$
$t_R$	$V_{CC}$ Slew Rate (4.00V-4.75V)	(Figures 1, 3)	0	—	—	nsec
$t_{RPU1}$	$V_{CC}$ Detect to $\overline{\text{RESET}}$ (TC1279)	(Figure1)	250	350	450	msec
$t_{RPU2}$	$V_{CC}$ Detect to RESET (TC1278)	(Figure 3)	250	350	450	msec

- NOTES:**
1. All voltages are referenced to ground.
  2. A 1k $\Omega$  external resistor may be required in some applications for proper operation of the microprocessor reset control circuit when using the TC1279.  $V_{CC} = 1.8V$

### PIN DESCRIPTION

Pin No. (3-Pin SOT-23) Symbol	Description
1 RESET (TC1279)	RESET output remains low while $V_{CC}$ is below the reset voltage threshold, and for 350msec (250msec min.) after $V_{CC}$ rises above reset threshold. The output stage of the TC1279 is open drain.
1 RESET (TC1278)	RESET output remains high while $V_{CC}$ is below the reset voltage threshold, and for 350msec (250msec min.) after $V_{CC}$ rises above reset threshold. The output stage of the TC1278 is open drain.
2 $V_{CC}$	Supply voltage (1.2V to 5.5V)
3 GND	Ground

### APPLICATION INFORMATION

#### Operation - Power Monitor

The TC1278 and TC1279 provide the function of detecting out-of-tolerance power supply conditions and warning a processor-based system of impending power failure. When  $V_{CC}$  is detected as out-of-tolerance, the RESET signal is asserted. On power-up, RESET is kept active for approximately 350msec after the power supply has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before RESET is released.

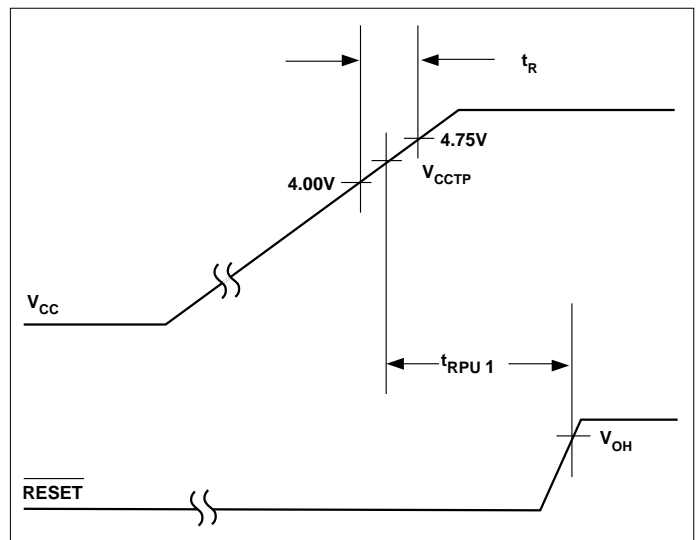


Figure 1. Timing Diagram: Power Up (TC1279)

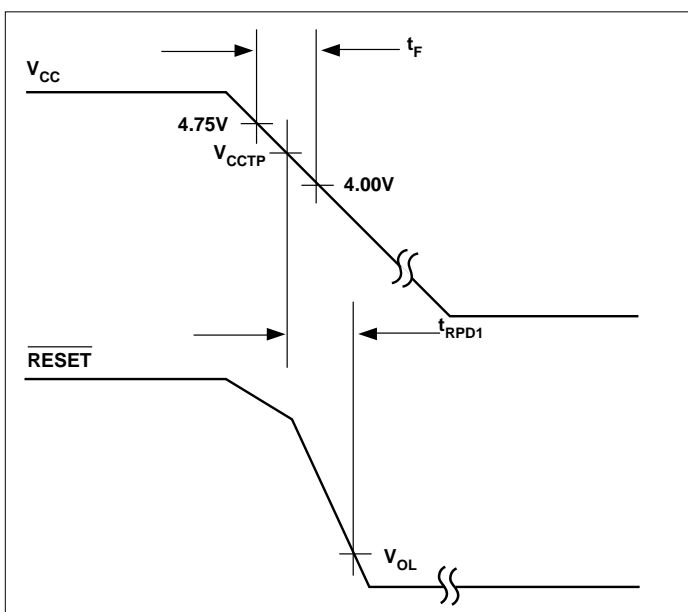


Figure 2. Timing Diagram: Power Down (TC1279)

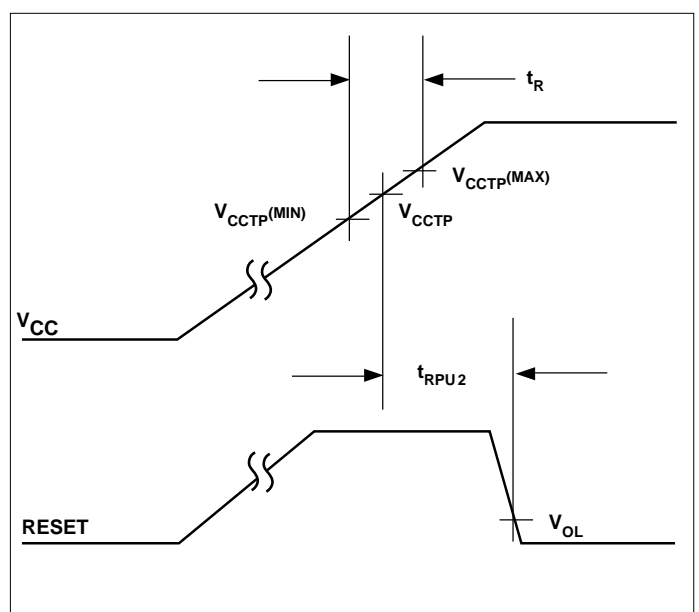


Figure 3. Timing Diagram: Power Up (TC1278)

## TC1278 TC1279

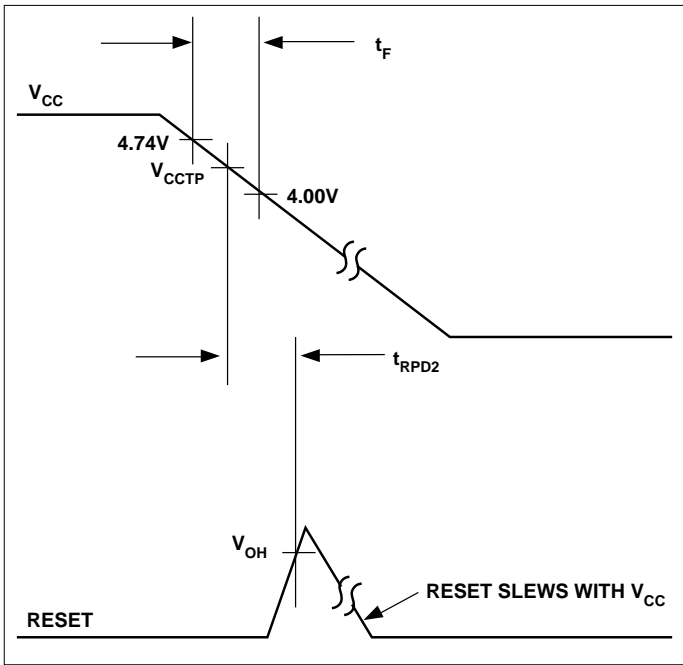


Figure 4. Timing Diagram: Power Down (TC1278)

### V<sub>CC</sub> Transient Rejection

The TC1278/9 provides accurate V<sub>CC</sub> monitoring and reset timing during power-up, power-down, and brownout/sag conditions, and responds quickly to negative-going transients on the power supply line. Figure 5 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive which lies **under** the curve will **not** generate a reset signal. Combinations above the curve are detected as a brownout or power-down. Transient immunity can be increased by adding a capacitor in close proximity to the V<sub>CC</sub> pin of the TC1278/9.

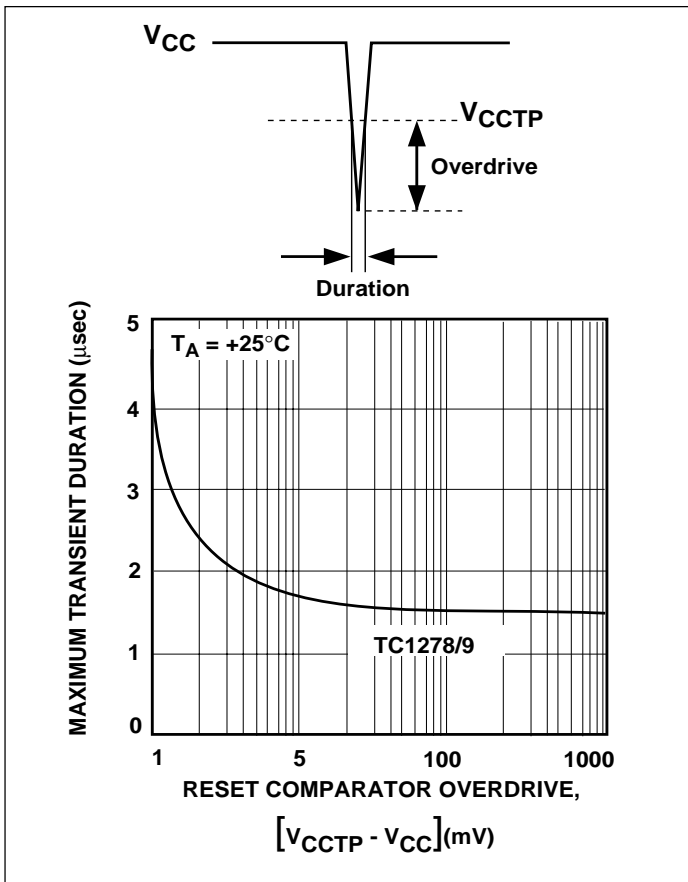
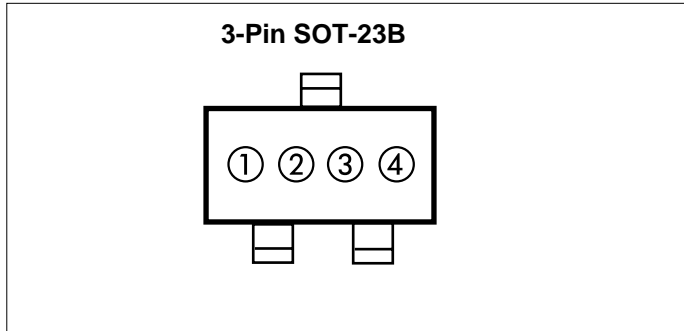


Figure 5. Maximum Transient Duration vs. Overdrive for Glitch Rejection at 25°C

# 3-Pin Monitors for 5V Systems

**TC1278**  
**TC1279**

## MARKINGS



## PART NUMBERS AND PART MARKINGS

① & ② = part number code + temperature range and voltage

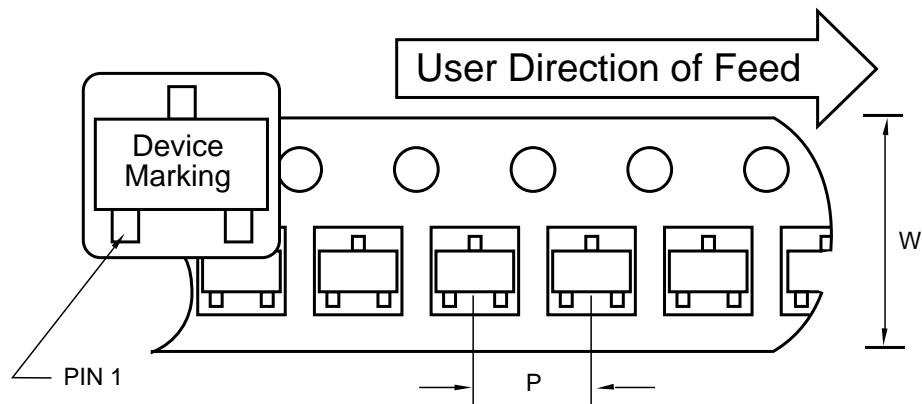
Part Number	Code
TC1278-5ENB	PA
TC1278-10ENB	PB
TC1278-15ENB	PC
TC1279-5ENB	RA
TC1279-10ENB	RB
TC1279-15ENB	RC

③ represents year and 2 - month code

④ represents lot ID number

## TAPE AND REEL DIAGRAM

### Component Taping Orientation for 3-Pin SOT-23B (JEDEC TO-236) Devices



Standard Reel Component Orientation  
For TR Suffix Device  
(Mark Right Side Up)

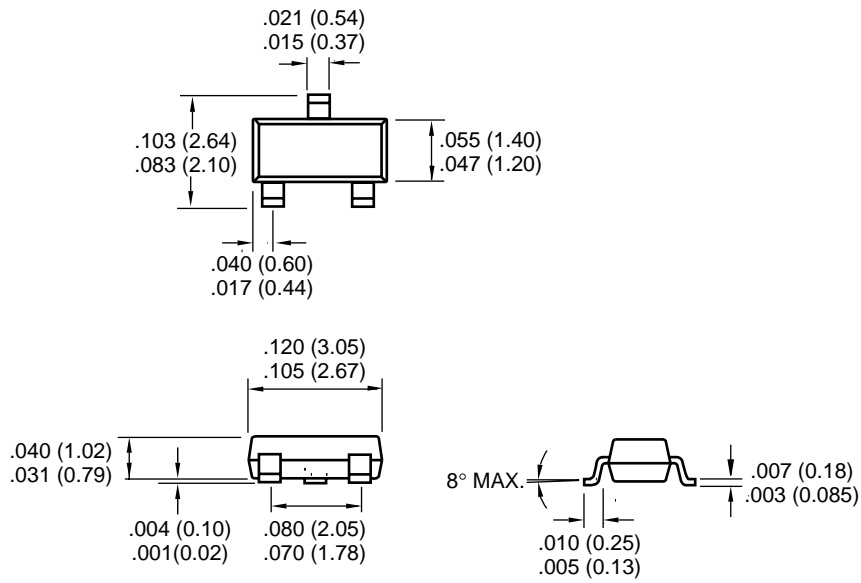
### Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
3-Pin SOT-23B	8 mm	4 mm	3000	7 in

**TC1278**  
**TC1279**

## PACKAGE DIMENSIONS

### 3-Pin SOT-23B (JEDEC TO-236)



Dimensions: inches (mm)



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