TC1278/TC1279

3-Pin Reset Monitors for 5V Systems

Features

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

Applications

- Computers
- Embedded Systems
- Battery Powered Equipment
- Critical µP Power Supply Monitoring

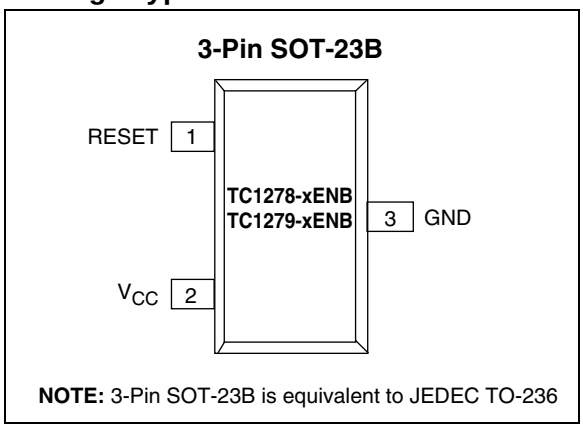
Device Selection Table

Part Number	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: "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

Package Type



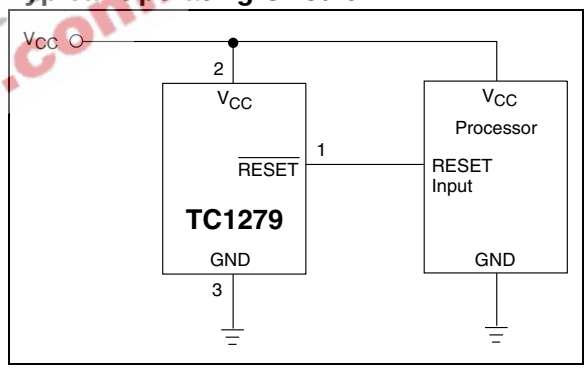
NOTE: 3-Pin SOT-23B is equivalent to JEDEC TO-236

General Description

The TC1278/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 5µsec 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 valid down to V_{CC} = 1.2V. Both devices are available in a 3-Pin SOT-23B package.

Typical Operating Circuit



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Supply Voltage (V_{CC} to GND) .....+6.0V
$\overline{RESET}$, RESET.....-0.3V to (V_{CC} + 0.3V)
Input Current, V_{CC} 20mA
Output Current, RESET.....20mA
Power Dissipation ($T_A \leq 70°C$)
3-Pin SOT-23B (derate 4mW/°C above +70°C)
.....230mW
Operating Temperature Range.....-40°C to +85°C
Storage Temperature Range .....-65°C to +150°C

*Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

TC1278/TC1279 ELECTRICAL SPECIFICATIONS

Recommended DC Operating Conditions: T_A = -40°C to +85°C unless otherwise noted. Typical values are at T_A = +25°C.							
Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Units**	**Device**	**Test Conditions**
V_{CC}	Supply Voltage	1.2	—	5.5	V		Note 1
DC Electrical Characteristics: T_A = -40°C to +85°C unless otherwise noted. Typical values are at T_A = +25°C.							
Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Units**		**Test Conditions**
V_{OL}	Low Level @ RESET $\overline{RESET}$	—	—	0.4	V	TC1278 TC1279	Note 1
I_{OL}	Output Current @ 0.4 Volts	+8	—	—	mA		Note 2
I_{CC1}	Operating Current	— —	0.9 —	2.0 40	mA µA	TC1278 TC1279	$V_{CC} > V_{CCTP(MAX)}$ $V_{CC} > V_{CCTP(MAX)}$
I_{CC2}	Operating Current	— —	— 0.9	40 2.0	µA mA	TC1278 TC1279	$V_{CC} < V_{CCTP(MIN)}$ $V_{CC} < V_{CCTP(MIN)}$
V_{CCTP-5}	V_{CC} Trip Point (TC1278/9-5)	4.50	4.625	4.74	V		Note 1
$V_{CCTP-10}$	V_{CC} Trip Point (TC1278/9-10)	4.25	4.375	4.49	V		Note 1
$V_{CCTP-15}$	V_{CC} Trip Point (TC1278/9-15)	4.00	4.125	4.24	V		Note 1
C_{OUT}	Output Capacitance	—	9	—	pF		
R_P	Internal Pull-Up Resistor	3	6	9	kΩ		
AC Electrical Characteristics: T_A = -40°C to +85°C unless otherwise noted. Typical values are at T_A = +25°C.							
Symbol	**Parameter**	**Min**	**Typ**	**Max**	**Units**		**Test Conditions**
t_{RST}	RESET Active Time	250	350	450	msec		
t_{RPD1}	V_{CC} Detect to $\overline{RESET}$	—	2	5	µsec	TC1279	Figure 3-2
t_{RPD2}	V_{CC} Detect to RESET	—	2	5	µsec	TC1278	Figure 3-4
t_F	V_{CC} Slew Rate (4.75V-4.00V)	300	—	—	µsec		Figure 3-2, Figure 3-4
t_R	V_{CC} Slew Rate (4.00V-4.75V)	0	—	—	nsec		Figure 3-1, Figure 3-3
t_{RPU1}	V_{CC} Detect to $\overline{RESET}$	250	350	450	msec	TC1279	Figure 3-1
t_{RPU2}	V_{CC} Detect to RESET	250	350	450	msec	TC1278	Figure 3-3

Note 1: All voltages referenced to ground.
2: A 1kΩ 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.

2.0 PIN DESCRIPTIONS

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

TABLE 2-1: PIN FUNCTION TABLE

Pin No. (3-Pin SOT-23B)	Symbol	Description
1	$\overline{\text{RESET}}$ (TC1279)	$\overline{\text{RESET}}$ 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.

3.0 APPLICATIONS INFORMATION

3.1 Operation – Power Monitor

The TC1278/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 3-1: Timing Diagram – Power Up (TC1279)

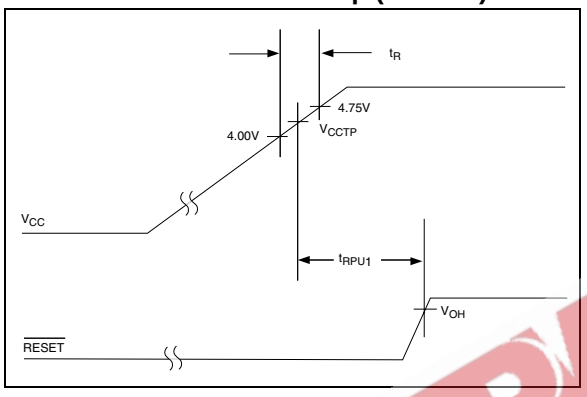


FIGURE 3-2: Timing Diagram – Power Down (TC1279)

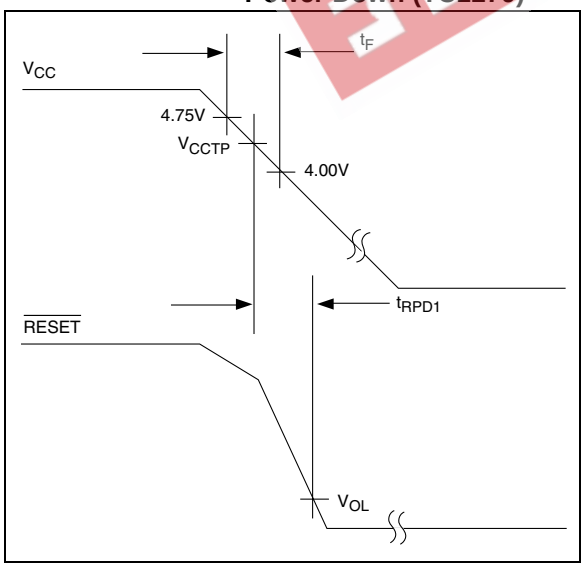


FIGURE 3-3: Timing Diagram – Power Up (TC1278)

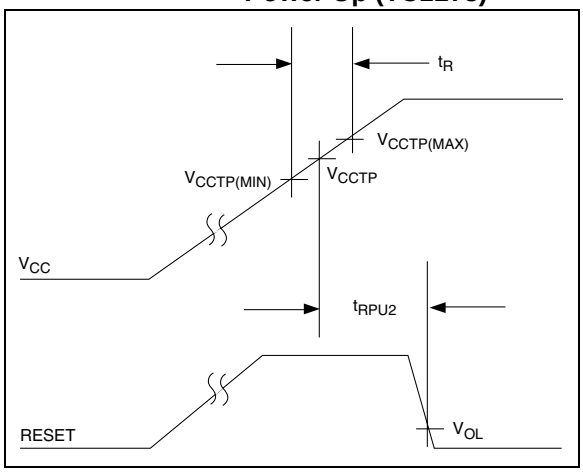
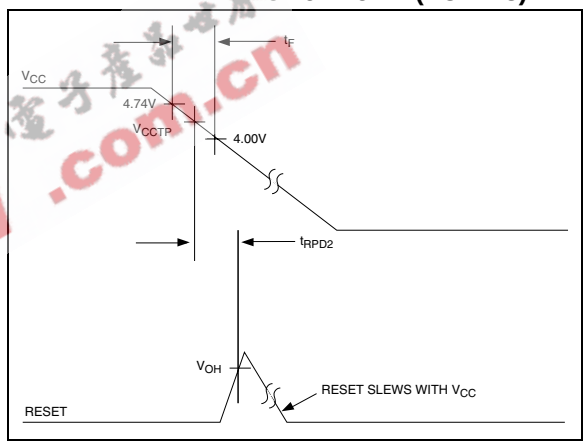


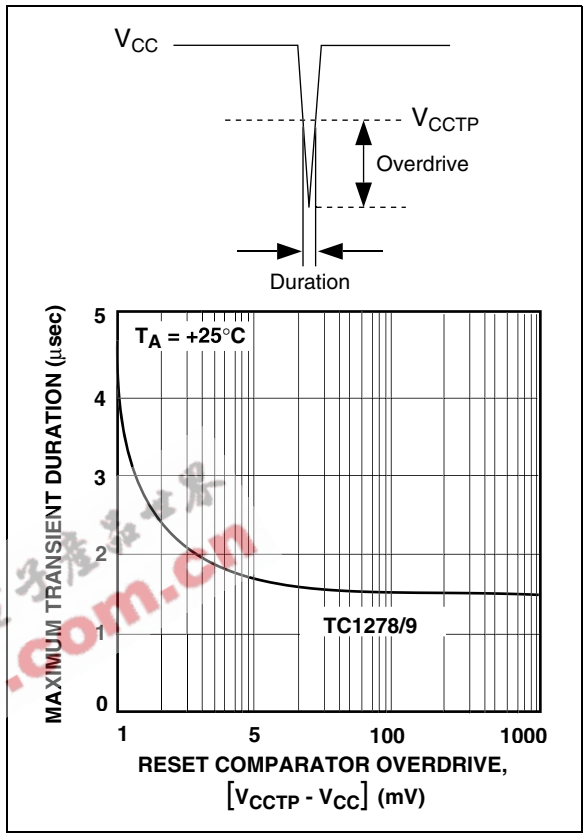
FIGURE 3-4: Timing Diagram – Power Down (TC1278)



3.2 V_{CC} Transient Rejection

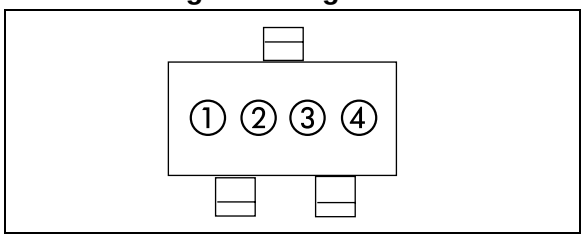
The TC1278/TC1279 provides accurate V_{CC} monitoring and reset timing during power-up, power-down, and brownout/sag conditions, and rejects negative-going transients (glitches) on the power supply line. Figure 3-5 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive that lays 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 improved by adding a capacitor in close proximity to the V_{CC} pin of the TC1278/TC1279.

FIGURE 3-5: MAXIMUM TRANSIENT DURATION VS. OVERDRIVE FOR GLITCH REJECTION AT 25°C



4.0 PACKAGING INFORMATION

4.1 Package Marking Information



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

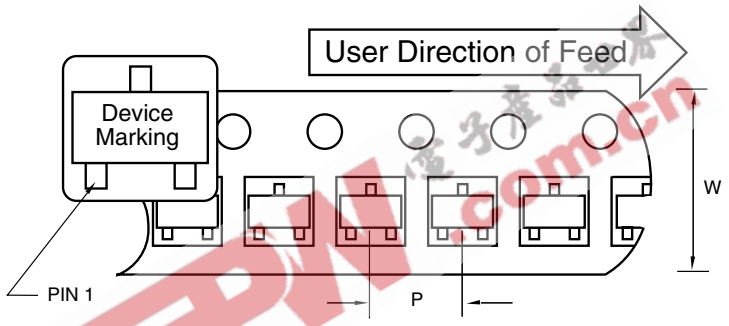
Part Number	Code
TC1278-5ENB	PA
TC1278-10ENB	PB
TC1278-15ENB	PC
TC1279-5ENB	RA
TC1279-10ENB	RB
TC1279-15ENB	RC

③ represents year and 2-month code

④ represents production lot ID code

4.2 Taping Form

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



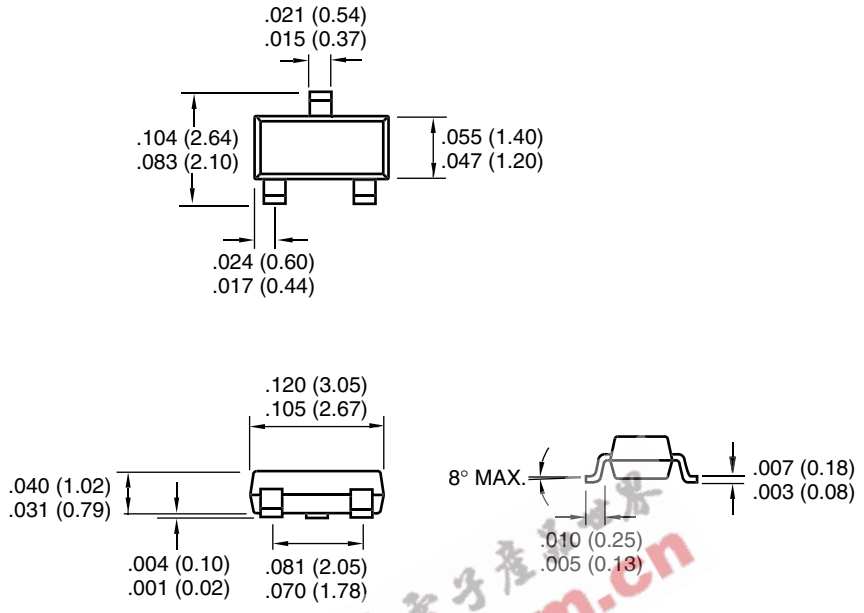
Standard Reel Component Orientation
For TR Suffix Device
(Mark Right Side Up)

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

4.3 Package Dimensions

3-Pin SOT-23B



Dimensions: inches (mm)

NOTES:

Sales and Support

Data Sheets
Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

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