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
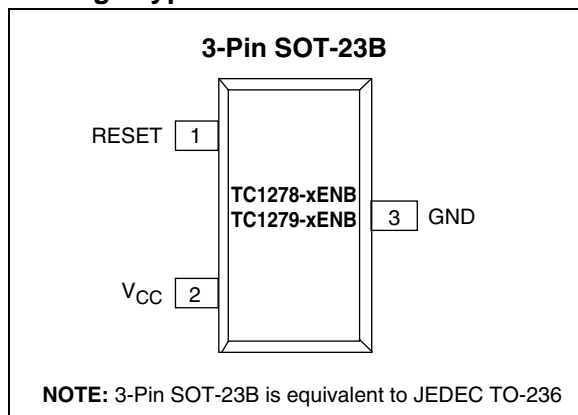- Critical µP Power Supply Monitoring

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

3-Pin SOT-23B

RESET 1

TC1278-xENB
TC1279-xENB

3 GND

V_{CC} 2

**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 $\overline{RESET}$ 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
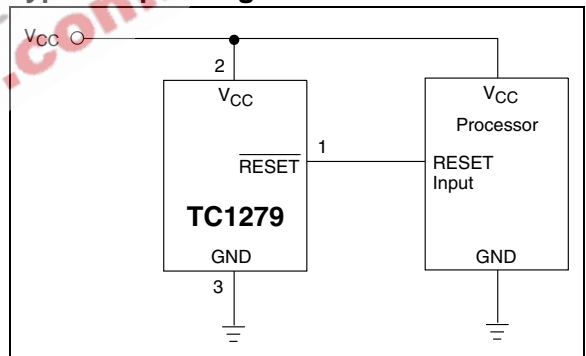
TC1278/TC1279

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	Device	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)	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.

TC1278/TC1279

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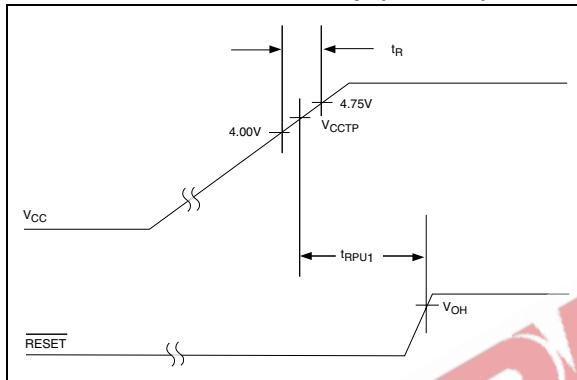
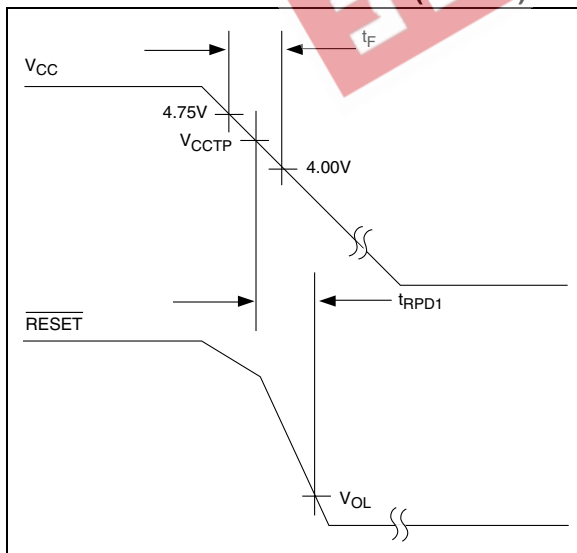**FIGURE 3-2:   Timing Diagram – Power Down (TC1279)**

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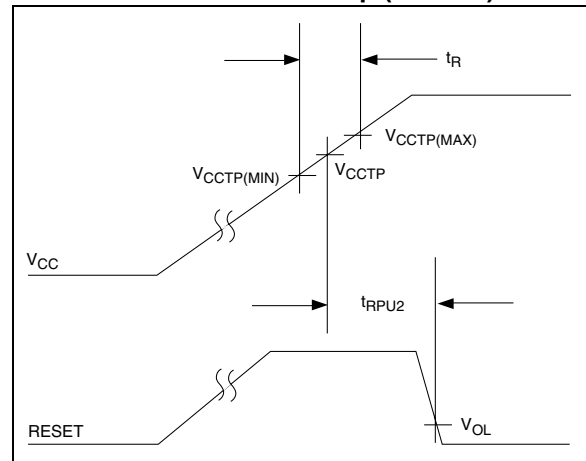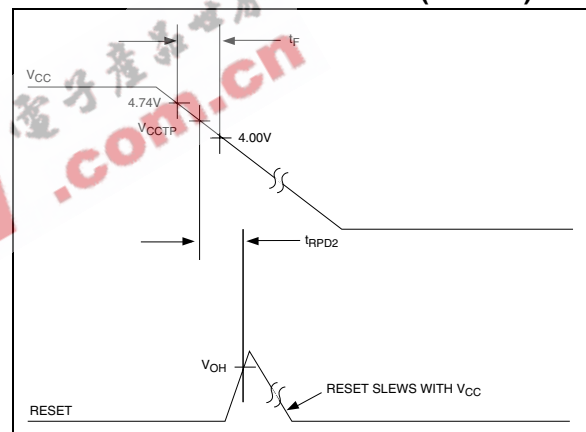

FIGURE 3-4:   Timing Diagram – Power Down (TC1278)

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.
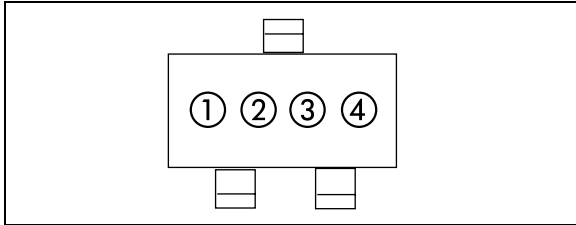
FIGURE 3-5: MAXIMUM TRANSIENT DURATION VS. OVERDRIVE FOR GLITCH REJECTION AT 25°C
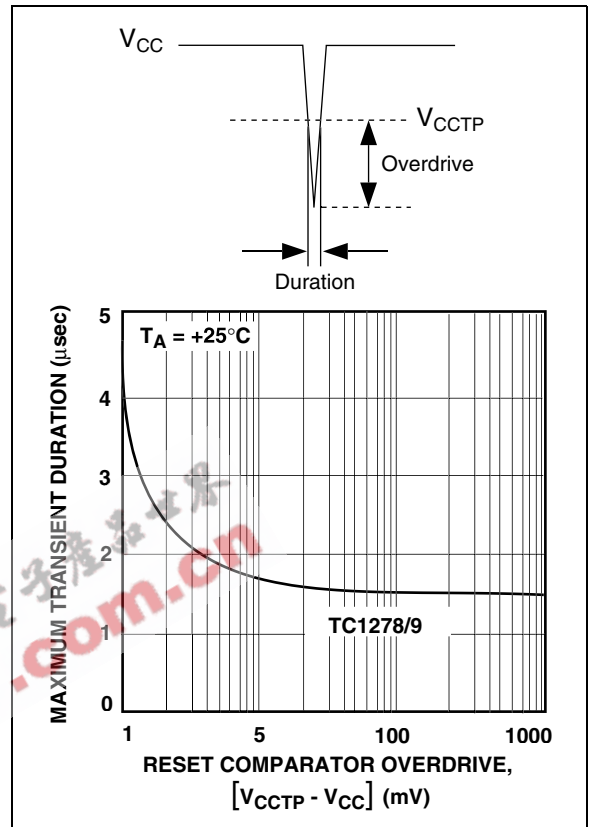
TC1278/TC1279

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
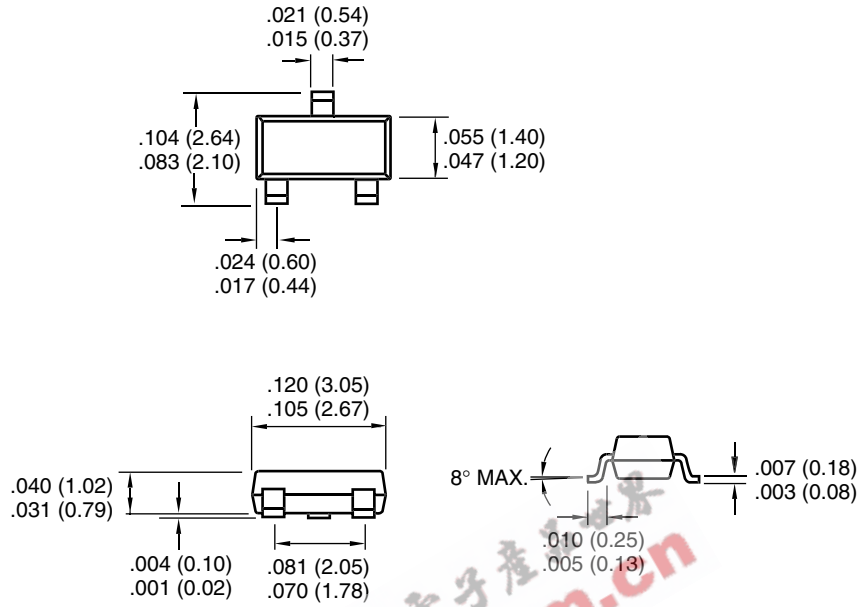
4.2 Taping Form

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

.021 (0.54)
.015 (0.37)

.104 (2.64)
.083 (2.10)

.055 (1.40)
.047 (1.20)

.024 (0.60)
.017 (0.44)

.120 (3.05)
.105 (2.67)

.040 (1.02)
.031 (0.79)

8° MAX.

.007 (0.18)
.003 (0.08)

.004 (0.10)
.001 (0.02)

.081 (2.05)
.070 (1.78)

.010 (0.25)
.005 (0.13)

Dimensions: inches (mm)

TC1278/TC1279

NOTES:

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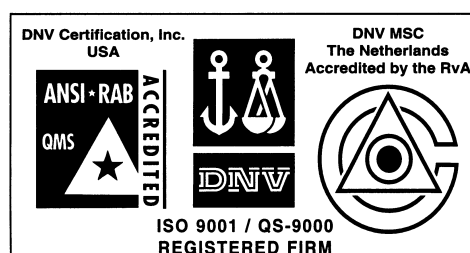
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New York
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Tel: 631-273-5305 Fax: 631-273-5335

San Jose
Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408-436-7950 Fax: 408-436-7955

Toronto
6285 Northam Drive, Suite 108
Mississauga, Ontario L4V 1X5, Canada
Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

Australia
Microchip Technology Australia Pty Ltd
Suite 22, 41 Rawson Street
Epping 2121, NSW
Australia
Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

China - Beijing
Microchip Technology Consulting (Shanghai)
Co., Ltd., Beijing Liaison Office
Unit 915
Bei Hai Wan Tai Bldg.
No. 6 Chaoyangmen Beidajie
Beijing, 100027, No. China
Tel: 86-10-85282100 Fax: 86-10-85282104

China - Chengdu
Microchip Technology Consulting (Shanghai)
Co., Ltd., Chengdu Liaison Office
Rm. 2401, 24th Floor,
Ming Xing Financial Tower
No. 88 TIDU Street
Chengdu 610016, China
Tel: 86-28-86766200 Fax: 86-28-86766599

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Co., Ltd., Fuzhou Liaison Office
Unit 28F, World Trade Plaza
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Room 701, Bldg. B
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Tel: 86-755-2350361 Fax: 86-755-2366086

China - Hong Kong SAR
Microchip Technology Hongkong Ltd.
Unit 901-6, Tower 2, Metroplaza
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: 852-2401-1200 Fax: 852-2401-3431

India
Microchip Technology Inc.
India Liaison Office
Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, O'Shaugnessey Road
Bangalore, 560 025, India
Tel: 91-80-2290061 Fax: 91-80-2290062

Japan
Microchip Technology Japan K.K.
Benex S-1 6F
3-18-20, Shinyokohama
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Kanagawa, 222-0033, Japan
Tel: 81-45-471- 6166 Fax: 81-45-471-6122

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Microchip Technology Korea
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Tel: 82-2-554-7200 Fax: 82-2-558-5934

Singapore
Microchip Technology Singapore Pte Ltd.
200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-6334-8870 Fax: 65-6334-8850

Taiwan
Microchip Technology Taiwan
11F-3, No. 207
Tung Hua North Road
Taipei, 105, Taiwan
Tel: 886-2-2717-7175 Fax: 886-2-2545-0139

EUROPE

Denmark
Microchip Technology Nordic ApS
Regus Business Centre
Lautrup hoj 1-3
Ballerup DK-2750 Denmark
Tel: 45 4420 9895 Fax: 45 4420 9910

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Parc d'Activite du Moulin de Massy
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Germany
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D-81739 Munich, Germany
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

Italy
Microchip Technology SRL
Centro Direzionale Colleoni
Palazzo Taurus 1 V. Le Colleoni 1
20041 Agrate Brianza
Milan, Italy
Tel: 39-039-65791-1 Fax: 39-039-6899883

United Kingdom
Microchip Ltd.
505 Eskdale Road
Winnersh Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44 118 921 5869 Fax: 44-118 921-5820

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