TC1278/TC1279

3-Pin Reset Monitors for 5V Systems

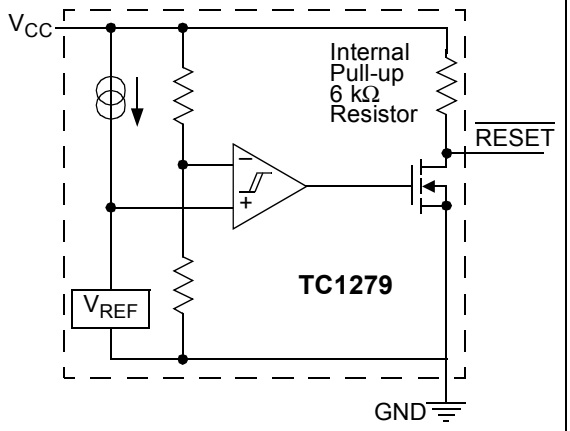
Features

- Precision V_{CC} Monitor for 5.0V System Supplies
- 250 msec Minimum RESET Output Duration
- Output Valid to V_{CC} = 1.2V
- V_{CC} Transient Immunity
- Small 3-Pin SOT-23B Package
- No External Components
- Internal Pull-up Resistor
- Available in 3 different voltage detection levels:
  - 4.625V (typ.), -5 suffix
  - 4.375V (typ.), -10 suffix
  - 4.125V (typ.), -15 suffix

Applications

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

Typical Operating Circuit



TC1278 has an active-high RESET output.

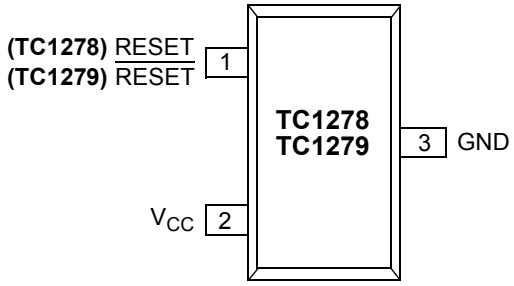
General Description

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 open-drain output uses an internal pull-up resistor of approximately 6 kΩ.

The reset output is driven active within 5 µsec of V_{CC} falling through the reset voltage threshold. RESET is maintained active for a minimum of 250 msec 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, with both devices having 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.

Package Type

3-Pin SOT-23B



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

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} .....20 mA
Output Current, RESET.....20 mA
Power Dissipation ($T_A \leq 70°C$)
3-Pin SOT-23B (derate 4mW/°C above +70°C)
.....230 mW
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.

DC CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, T_A = -40°C to +85°C. Typical values are at T_A = +25°C.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Supply Voltage	V_{CC}	1.2	—	5.5	V	**Note 1**
Low Level @ RESET **(TC1278)** $\overline{RESET}$ **(TC1279)**	V_{OL}	—	—	0.4	V	**Note 1**
Output Current @ 0.4 Volts	I_{OL}	+8	—	—	mA	**Note 2**
Operating Current: **TC1278**	I_{CC1}	—	0.9	2.0	mA	$V_{CC} > V_{CCTP(MAX)}$, RESET = 1, **(Note 3)**
TC1279		—	—	40	µA	$V_{CC} > V_{CCTP(MAX)}$, $\overline{RESET}$ = 1, **Note 4**
Operating Current: **TC1278**	I_{CC2}	—	—	40	µA	$V_{CC} < V_{CCTP(MIN)}$, RESET = 0, **(Note 4)**
TC1279		—	0.9	2.0	mA	$V_{CC} < V_{CCTP(MIN)}$, $\overline{RESET}$ = 0, **(Note 3)**
V_{CC} Trip Point **(TC1278/9-5)**	V_{CCTP-5}	4.50	4.625	4.74	V	**Note 1**
V_{CC} Trip Point **(TC1278/9-10)**	$V_{CCTP-10}$	4.25	4.375	4.49	V	**Note 1**
V_{CC} Trip Point **(TC1278/9-15)**	$V_{CCTP-15}$	4.00	4.125	4.24	V	**Note 1**
Output Capacitance	C_{OUT}	—	9	—	pF	
Internal Pull-Up Resistor	R_P	3	6	9	kΩ	

Note 1: All voltages referenced to ground.

2: A 1 kΩ 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.

3: Operating current is specified with the open-drain output in the active (“ON”) condition.

4: Operating current is specified with the open-drain output in the non-active (“OFF”) condition.

AC CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, T_A = -40°C to +85°C. Typical values are at T_A = +25°C.						
Parameters	**Sym**	**Min**	**Typ**	**Max**	**Units**	**Conditions**
RESET Active Time	t_{RST}	250	350	450	msec	
V_{CC} Detect to $\overline{\text{RESET}}$ (TC1279)	t_{RPD1}	—	2	5	µsec	Figure 3-2
V_{CC} Detect to RESET (TC1278)	t_{RPD2}	—	2	5	µsec	Figure 3-4
V_{CC} Slew Rate (4.75V-4.00V)	t_F	300	—	—	µsec	Figure 3-2, Figure 3-4
V_{CC} Slew Rate (4.00V-4.75V)	t_R	0	—	—	nsec	Figure 3-1, Figure 3-3
V_{CC} Detect to $\overline{\text{RESET}}$ (TC1279)	t_{RPU1}	250	350	450	msec	Figure 3-1
V_{CC} Detect to RESET (TC1278)	t_{RPU2}	250	350	450	msec	Figure 3-3

2.0 PIN DESCRIPTIONS

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

TABLE 2-1: PIN FUNCTION TABLE

Pin No.	Symbol	Function
1	$\overline{\text{RESET}}$ (TC1279)	$\overline{\text{RESET}}$ output
1	RESET (TC1278)	REST output
2	V_{CC}	Supply voltage (1.2V to 5.5V).
3	GND	Ground.

2.1 $\overline{\text{RESET}}$ (TC1279)

$\overline{\text{RESET}}$ output remains low while V_{CC} is below the reset voltage threshold, and for 350 msec (250 msec min.) after V_{CC} rises above reset threshold. The output stage of the TC1279 is open-drain.

2.2 RESET (TC1278)

RESET output remains high while V_{CC} is below the reset voltage threshold, and for 350 msec (250 msec min.) after V_{CC} rises above reset threshold. The output stage of the TC1278 is open-drain.

2.3 V_{CC}

Supply voltage (1.2V to 5.5V).

2.4 Ground

Device 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 350 msec after the power supply has reached the selected tolerance. This allows the power supply and microprocessor to stabilize before RESET is released.

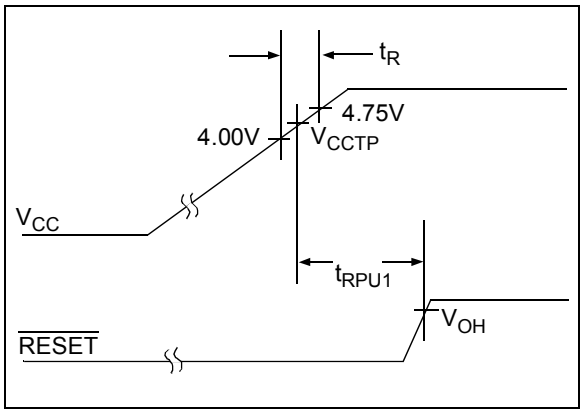


FIGURE 3-1: *TC1279 Power Up Timing Diagram.*

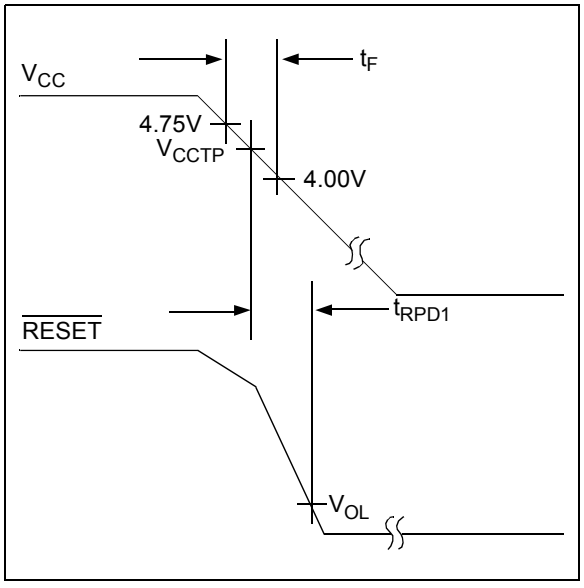


FIGURE 3-2: *TC1279 Power-Down Timing Diagram.*

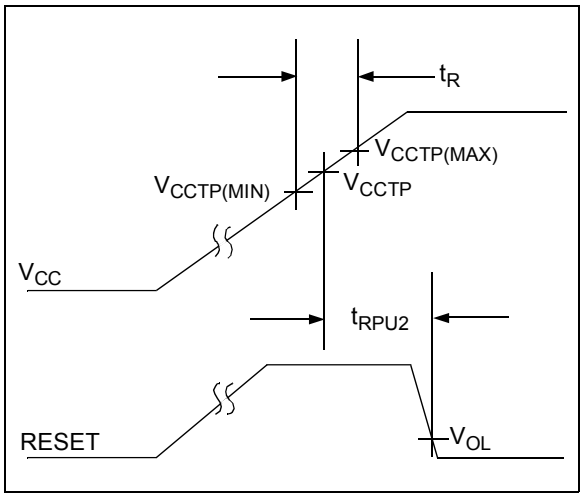


FIGURE 3-3: *TC1278 Power-Up Timing Diagram.*

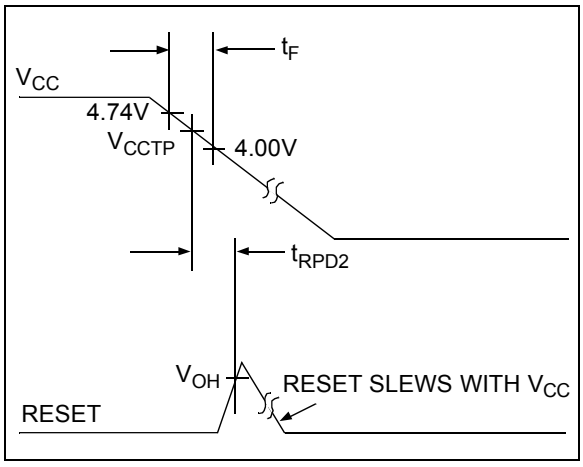


FIGURE 3-4: *TC1278 Power-Down Timing Diagram.*

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. Furthermore, it 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.

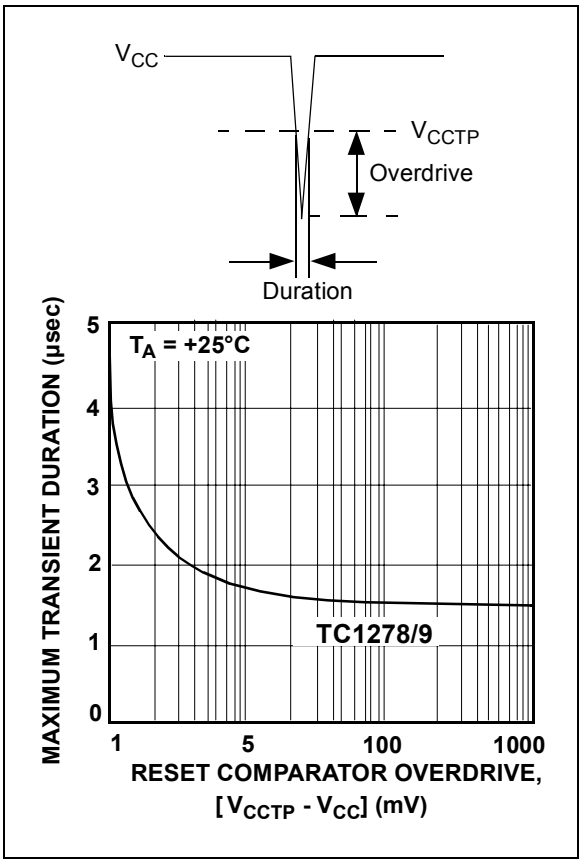
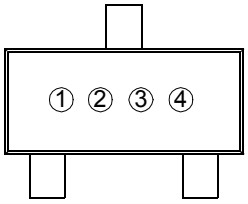


FIGURE 3-5: *Maximum Transient Duration vs. Overdrive For Glitch Rejection At 25°C.*

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

3-Pin SOT-23B



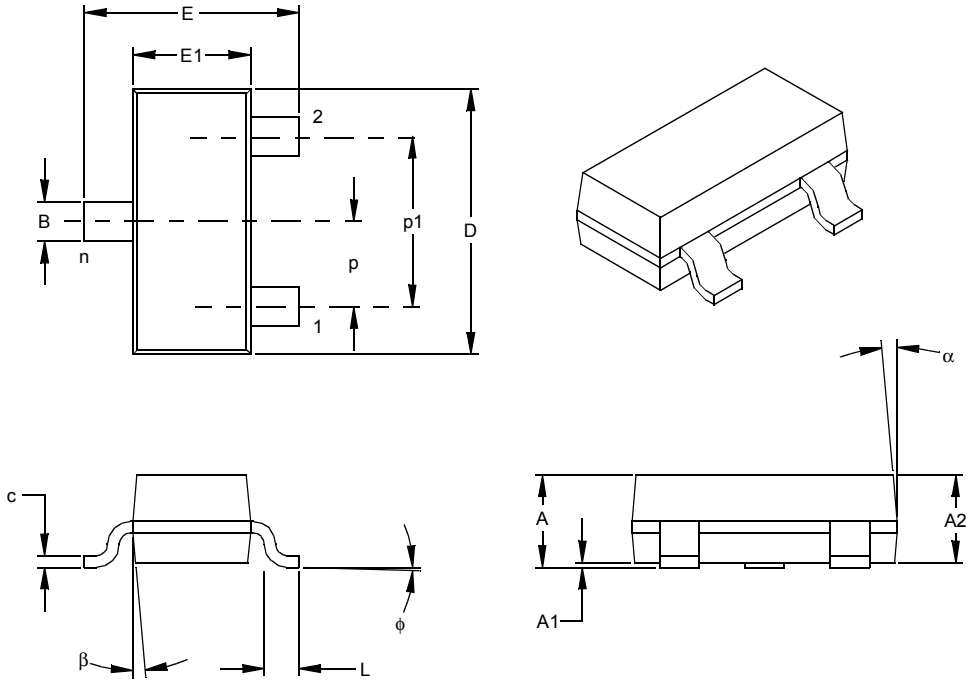
① & ② = part number code + temperature range and voltage

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

3-Lead Plastic Small Outline Transistor (NB) (SOT-23)



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		3			3	
Pitch	p		.038			0.96	
Outside lead pitch (basic)	p1		.076			1.92	
Overall Height	A	.035	.040	.044	0.89	1.01	1.12
Molded Package Thickness	A2	.035	.037	.040	0.88	0.95	1.02
Standoff §	A1	.000	.002	.004	0.01	0.06	0.10
Overall Width	E	.083	.093	.104	2.10	2.37	2.64
Molded Package Width	E1	.047	.051	.055	1.20	1.30	1.40
Overall Length	D	.110	.115	.120	2.80	2.92	3.04
Foot Length	L	.014	.018	.022	0.35	0.45	0.55
Foot Angle	ϕ	0	5	10	0	5	10
Lead Thickness	c	.004	.006	.007	0.09	0.14	0.18
Lead Width	B	.015	.017	.020	0.37	0.44	0.51
Mold Draft Angle Top	α	0	5	10	0	5	10
Mold Draft Angle Bottom	β	0	5	10	0	5	10

* Controlling Parameter
§ Significant Characteristic

Notes:
Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010” (0.254mm) per side.
JEDEC Equivalent: TO-236
Drawing No. C04-104

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	-XX	X	XX
Device	Reset V_{CC} Threshold	Temperature Range	Package

Device	TC1278:	3-Pin Reset Monitor for 3.3V Systems
	TC1279:	3-Pin Reset Monitor for 5V Systems
Reset V_{CC} Threshold:	5	= 4.625V
	10	= 4.375V
	15	= 4.125V
Temperature Range	E	= -40°C to +85°C
Package	NBTR	= 3LD SOT23 (Tape and Reel)

Examples:

a) TC1278-5ENBTR: 4.625 Reset
b) TC1278-10ENBTR: 4.375 Reset
c) TC1278-15ENBTR: 4.125 Reset

a) TC1279-5ENBTR: 4.625 Reset
b) TC1279-10ENBTR: 4.375 Reset
c) TC1279-15ENBTR: 4.125 Reset

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