



MICROCHIP TC1272/TC1273/TC1274

3-Pin Reset Monitors for 5V Systems

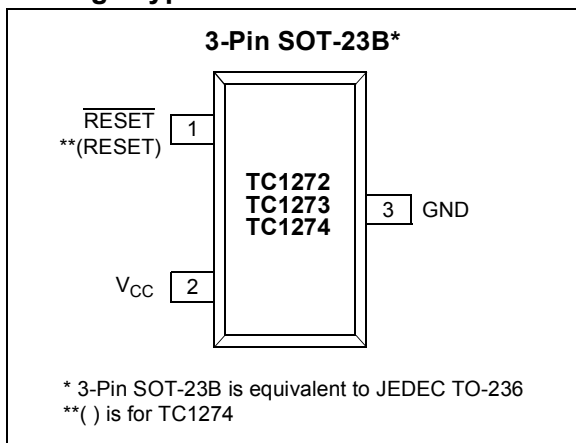
Features

- Precision V_{CC} Monitor for 5.0V Systems
- 100 msec Minimum $\overline{\text{RESET}}$, RESET Output Duration
- Output Valid to $V_{CC} = 1.2\text{V}$
- 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

Package Type



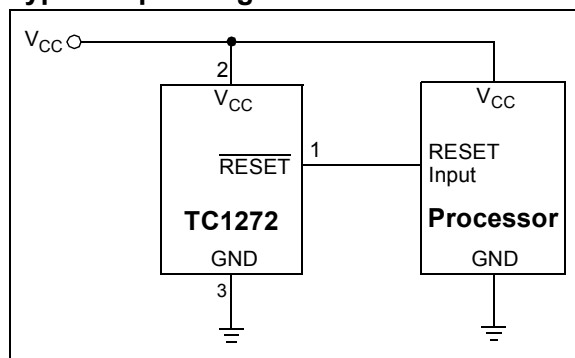
General Description

The TC1272/TC1273/TC1274 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 20 μsec of V_{CC} falling through the reset voltage threshold. RESET is maintained active for a minimum of 100 msec after V_{CC} rises above the reset threshold. The TC1274 has an active-high RESET output, while the TC1272 and TC1273 have an active-low RESET output. The TC1272 and TC1274 each have a complimentary output, while the TC1273 has an open-drain output. The output of the TC1272 and TC1273 is valid down to $V_{CC} = 1.2\text{V}$. The TC1274 is valid down to $V_{CC} = 1.8\text{V}$. All three devices are available in a 3-Pin SOT-23B package.

The TC1272/TC1273/TC1274 devices are optimized to reject fast transient glitches on the V_{CC} line.

Typical Operating Circuit



TC1272/TC1273/TC1274

1.0 ELECTRICAL CHARACTERISTICS

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}	20 mA
Output Current, $\overline{\text{RESET}}$, RESET	20 mA
Power Dissipation ($T_A \leq 70^\circ\text{C}$)	
3-Pin SOT-23B (derate 4 mW/°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 noted, $T_A = -40^\circ\text{C}$ to +85°C. Typical values are at $T_A = +25^\circ\text{C}$.						
Parameters	Sym	Min	Typ	Max	Units	Conditions
Supply Voltage						
TC1272, TC1273	V_{CC}	1.2	—	5.5	V	Note 1
TC1274	V_{CC}	1.8	—	5.5	V	
Output Voltage @ 0-500 μA	V_{OH}	$V_{CC} - 0.5V$	$V_{CC} - 0.1V$	—	V	TC1272, TC1274 (Note 1)
Output Current @ 2.4 Volts						
$V_{CC} = 5V$ TC1272	I_{OH}	—	10	—	mA	Note 2
$V_{CC} = 4V$ TC1274	I_{OH}	—	8	—	mA	
Output Current @ 0.4 Volts	I_{OL}	+10	30	—	mA	Note 2, Note 5
Operating Current						
$V_{CC} < 5.5V$: TC1272, TC1274	I_{CC}	—	17	40	μA	Note 3
$V_{CCTP} < V_{CC} < 5.5V$: TC1273	I_{CC}	—	17	40	μA	Note 3
$V_{CC} < V_{CCTP}$: TC1273	I_{CC}	—	700	1200	μA	Note 3
V_{CC} Trip Point (TC1272/3/4-5)	V_{CCTP-5}	4.50	4.62	4.75	V	Note 1
V_{CC} Trip Point (TC1272/3/4-10)	$V_{CCTP-10}$	4.25	4.37	4.49	V	Note 1
V_{CC} Trip Point (TC1272/3/4-15)	$V_{CCTP-15}$	4.00	4.12	4.24	V	Note 1
Output Capacitance	C_{OUT}	—	9	—	pF	
Internal Pull-Up Resistor	R_P	3	6	9	k Ω	
AC Electrical Characteristics: $T_A = -40^\circ\text{C}$ to +85°C unless otherwise noted. Typical values are at $T_A = +25^\circ\text{C}$.						
RESET Active Time	t_{RST}	100	200	300	msec	
V_{CC} Detect to $\overline{\text{RESET}}$ TC1272, TC1273	t_{RPD1}	—	20	50	μsec	$V_{CC(LOW)} = 1V$, Figure 4-2
V_{CC} Detect to RESET - TC1274	t_{RPD2}	—	20	50	μsec	$V_{CC(LOW)} = 1V$, Figure 4-4
V_{CC} Slew Rate ($V_{CCTP(MAX)}$ to $V_{CCTP(MIN)}$)	t_F	300	—	—	μsec	Figure 4-2, Figure 4-4
V_{CC} Slew Rate ($V_{CCTP(MIN)}$ to $V_{CCTP(MAX)}$)	t_R	0	—	—	nsec	Figure 4-1, Figure 4-3
V_{CC} Detect to RESET TC1272, TC1273	t_{RPU1}	100	200	300	msec	Note 4, Figure 4-1
V_{CC} Detect to RESET - TC1274	t_{RPU2}	100	200	300	msec	Note 4, Figure 4-3

Note 1: All voltages referenced to ground.

Note 2: Measured with $V_{CC} \geq 2.7$ volts.

Note 3: Measured with RESET output open for TC1272/TC1273; measured with RESET output open for TC1274.

Note 4: $t_R = 5 \mu\text{sec}$.

Note 5: A 1 k Ω external resistor may be required in some applications for proper operation of the microprocessor reset control circuit when using the TC1273.

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

Note: Unless otherwise indicated, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$. Typical values are at $T_A = +25^{\circ}\text{C}$.
Comparator Overdrive voltage (V_{OD}) is defined in Figure 4-5

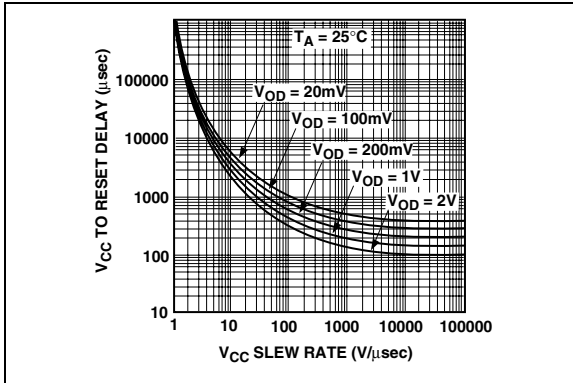


FIGURE 2-1: V_{CC} Detect to Reset (RESET).

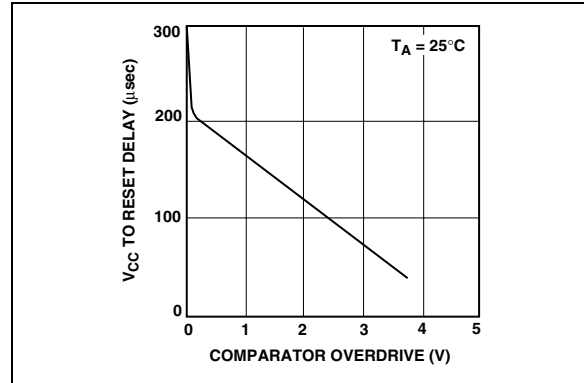


FIGURE 2-2: Reset Delays vs. Comparator Overdrive.

TC1272/TC1273/TC1274

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLES

Pin No.	Symbol	Function
1	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ Output (TC1272 and TC1273)
1	RESET	RESET Output (TC1274)
2	V_{CC}	Supply voltage (1.2V to 5.5V TC1272 and TC1273; 1.8V to 5.5V TC1274)
3	GND	Ground

3.1 $\overline{\text{RESET}}$ Output ($\overline{\text{RESET}}$)

The $\overline{\text{RESET}}$ output remains low while V_{CC} is below the reset voltage threshold, and for 200 msec (100 msec min.) after V_{CC} rises above reset threshold. The output stage of the TC1272 is complimentary, while the output stage of the TC1273 is open-drain.

3.2 RESET Output (RESET)

The RESET output remains high while V_{CC} is below the reset voltage threshold, and for 200 msec (100 msec min.) after V_{CC} rises above reset threshold. The output stage of the TC1274 is complimentary.

4.0 APPLICATIONS INFORMATION

4.1 Operation – Power Monitor

The TC1272/TC1273/TC1274 is designed to function as a voltage monitor for +5V systems. These devices provide a RESET signal to indicate that the V_{CC} has dropped below a preset voltage level that is selected by the suffix part number. In addition, the RESET is held active for approximately 200 ms after the power supply has risen above the voltage threshold level to allow time for the power supply to stabilize before system operation commences.

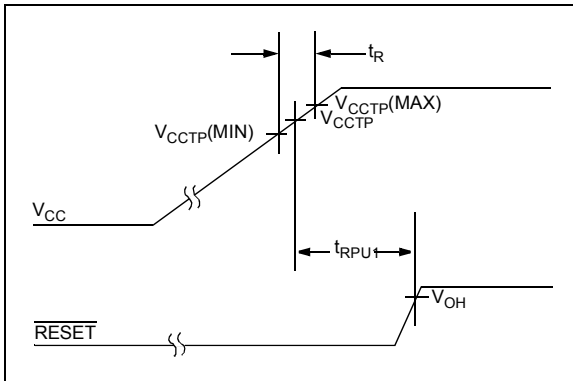


FIGURE 4-1: Timing Diagram – Power Up (TC1272/TC1273).

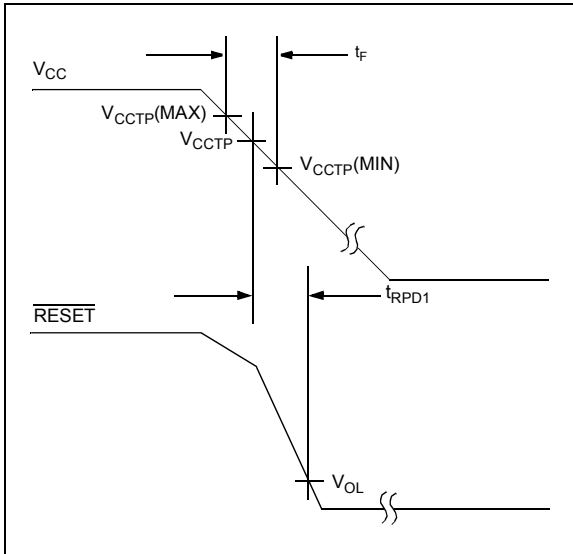


FIGURE 4-2: Timing Diagram – Power Down (TC1272/TC1273).

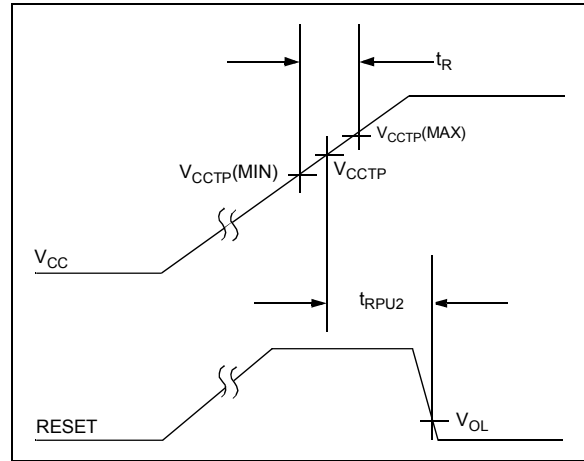


FIGURE 4-3: Timing Diagram – Power Up (TC1274).

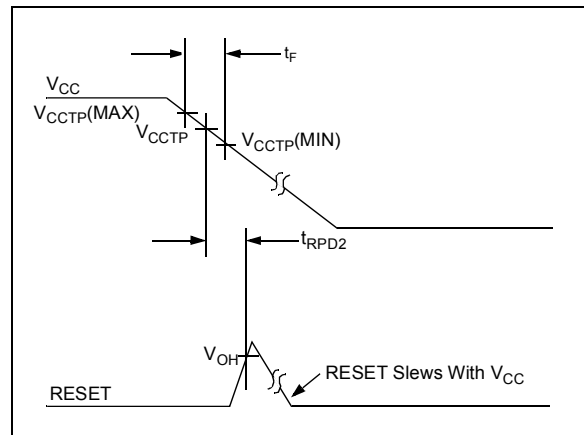


FIGURE 4-4: Timing Diagram – Power Down (TC1274).

TC1272/TC1273/TC1274

4.2 V_{CC} Transient Rejection

The TC1272/TC1273/TC1274 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 4-5 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 condition. Transient immunity can be improved by adding a capacitor in close proximity to the V_{CC} pin of the TC1272/TC1273/TC1274.

4.3 RESET Signal Integrity During Power-Down

The TC1272 $\overline{\text{RESET}}$ output is valid to $V_{CC} = 1.2V$. Below this voltage the output becomes an "open circuit" and does not sink current. This means CMOS logic inputs to the μP will be floating at an undetermined voltage. Most digital systems are completely shut down well above this voltage. However, in situations where $\overline{\text{RESET}}$ must be maintained valid to $V_{CC} = 0V$, a pull-down resistor must be connected from $\overline{\text{RESET}}$ to ground to discharge stray capacitances and hold the output low (Figure 4-6). This resistor value, though not critical, should be chosen such that it does not appreciably load $\overline{\text{RESET}}$ under normal operation (100 k Ω will be suitable for most applications). Similarly, a pull-up resistor to V_{CC} is required for the TC1274 to ensure a valid high $\overline{\text{RESET}}$ for V_{CC} below 1.8V.

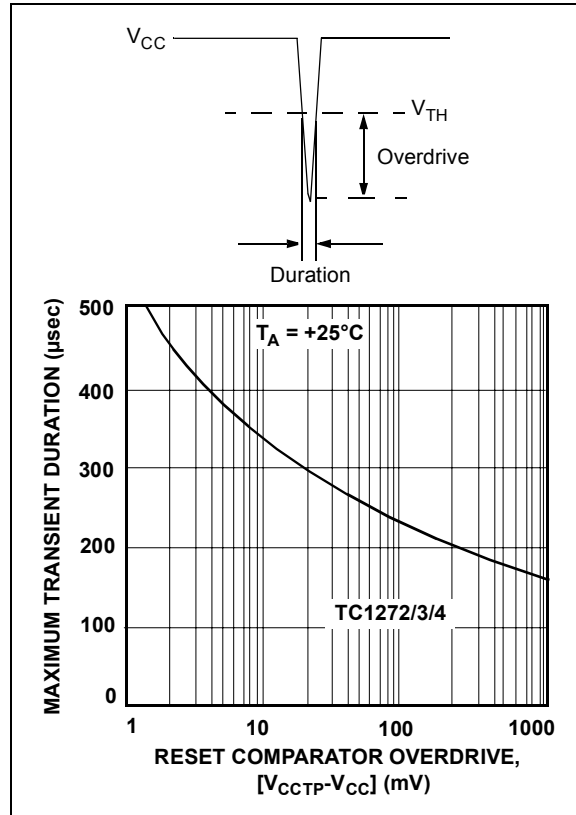


FIGURE 4-5: Maximum Transient Duration vs. Overdrive For Glitch Rejection At $+25^\circ C$.

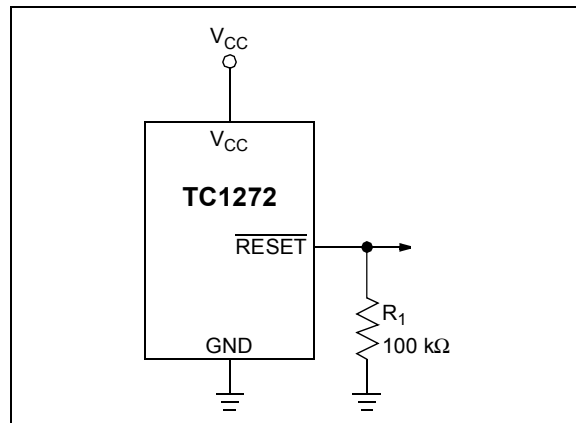
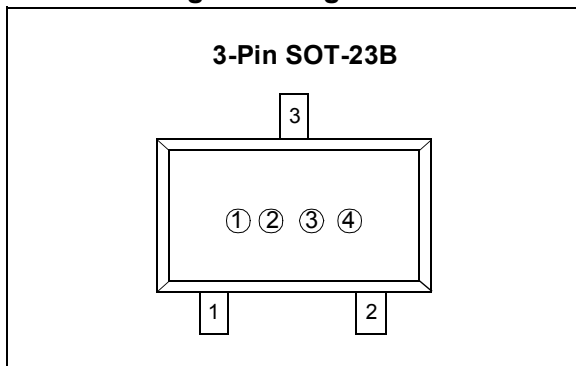


FIGURE 4-6: Ensuring Reset Valid To $V_{CC} = 0V$.

5.0 PACKAGING INFORMATION

5.1 Package Marking Information



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

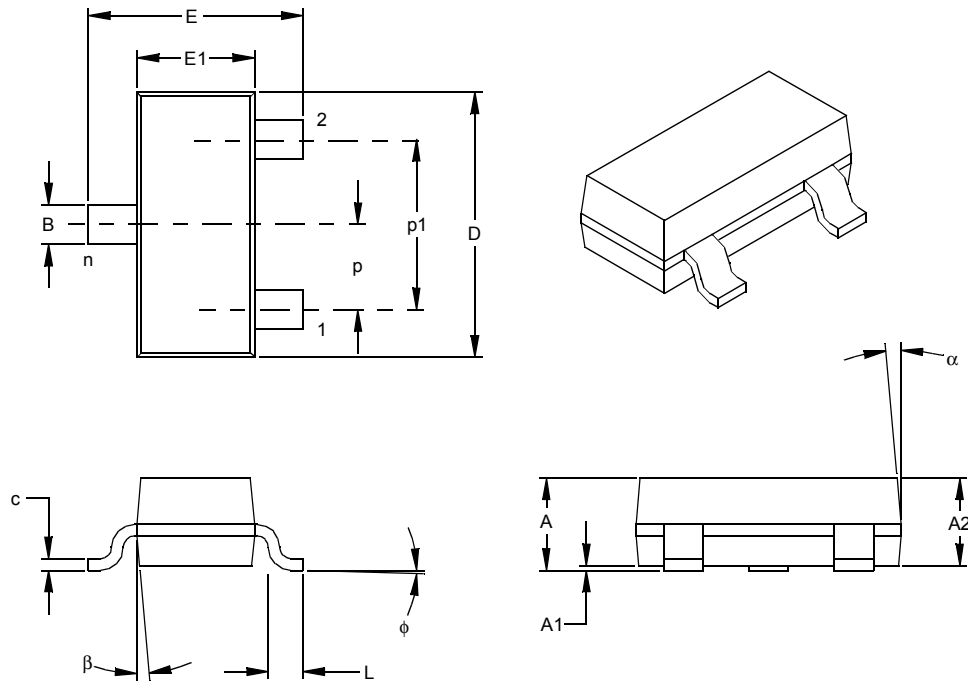
Reset V_{CC} Threshold (V)	TC1272 Code	TC1273 Code	TC1274 Code
4.62	X1	Y1	Z1
4.37	X2	Y2	Z2
4.12	X3	Y3	Z3

③ represents year and quarter code

④ represents lot ID number

TC1272/TC1273/TC1274

3-Lead Plastic Small Outline Transistor (TT) (SOT23)



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

TC1272/TC1273/TC1274

PRODUCT IDENTIFICATION SYSTEM

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

<u>PART NO.</u>	<u>XX</u>	<u>X</u>	<u>/XX</u>
Device	Reset V_{CC} Threshold	Temperature Range	Package
Device:	TC1272: 3-Pin Reset Monitor - Complementary TC1273: 3-Pin Reset Monitor - Open Drain TC1274: 3-Pin Reset Monitor - Complementary		
Reset V_{CC} Threshold Voltage	5 = 4.62V 10 = 4.37V 15 = 4.12V		
Temperature Range:	E = -40°C to +85°C		
Package:	NB = Plastic Small Outline Transistor (SOT-23), 3-lead		

Examples:
a) TC1272-10ENBTR: 4.37V Reset
b) TC1272-15ENBTR: 4.12V Reset
c) TC1272-5ENBTR: 4.62V Reset

a) TC1273-10ENBTR: 4.37V Reset
b) TC1273-15ENBTR: 4.12V Reset
c) TC1273-5ENBTR: 4.62V Reset

a) TC1274-10ENBTR: 4.37V Reset
b) TC1274-15ENBTR: 4.12V Reset
c) TC1274-5ENBTR: 4.62V Reset

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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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TC1272/TC1273/TC1274

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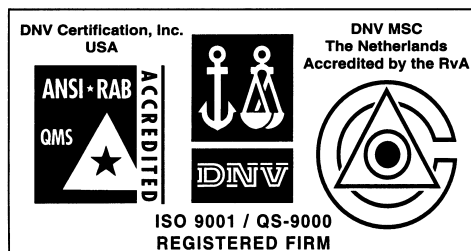
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Phoenix

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San Jose

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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
Marketing Support Division
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. 2401-2402, 24th Floor,
Ming Xing Financial Tower
No. 88 TIDU Street
Chengdu 610016, China
Tel: 86-28-86766200 Fax: 86-28-86766599

China - Fuzhou

Microchip Technology Consulting (Shanghai)
Co., Ltd., Fuzhou Liaison Office
Unit 28F, World Trade Plaza
No. 71 Wusi Road
Fuzhou 350001, China
Tel: 86-591-7503506 Fax: 86-591-7503521

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

China - Shanghai

Microchip Technology Consulting (Shanghai)
Co., Ltd.
Room 701, Bldg. B
Far East International Plaza
No. 317 Xian Xia Road
Shanghai, 200051
Tel: 86-21-6275-5700 Fax: 86-21-6275-5060

China - Shenzhen

Microchip Technology Consulting (Shanghai)
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Tel: 86-755-82901380 Fax: 86-755-82966626

China - Qingdao

Rm. B505A, Fullhope Plaza,
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Qingdao 266071, China
Tel: 86-532-5027355 Fax: 86-532-5027205

India

Microchip Technology Inc.
India Liaison Office
Marketing Support Division
Divyasree Chambers
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Bangalore, 560 025, India
Tel: 91-80-2290061 Fax: 91-80-2290062

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Microchip Technology Japan K.K.
Benex S-1 6F
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Kanagawa, 222-0033, Japan
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Korea

Microchip Technology Korea
168-1, Youngbo Bldg. 3 Floor
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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 (Barbados) Inc.,
Taiwan Branch
11F-3, No. 207
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United Kingdom

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Wokingham
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