

3-Pin Reset Monitor

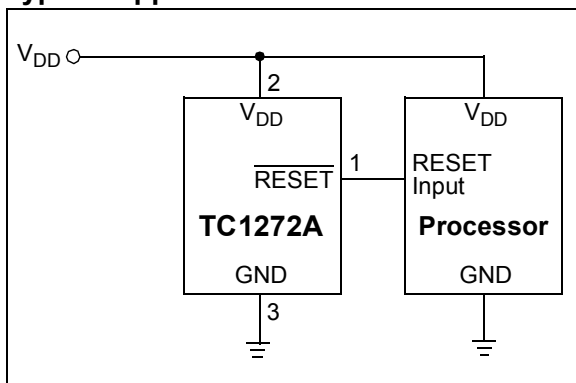
Features

- Precision V_{DD} Monitor
- 140 msec Minimum $\overline{\text{RESET}}$, Output Duration
- Output Valid to $V_{DD} = 1.2\text{V}$
- V_{DD} Transient Immunity
- Small 3-Pin SOT-23B Package
- No External Components

Applications

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

Typical Application Circuit



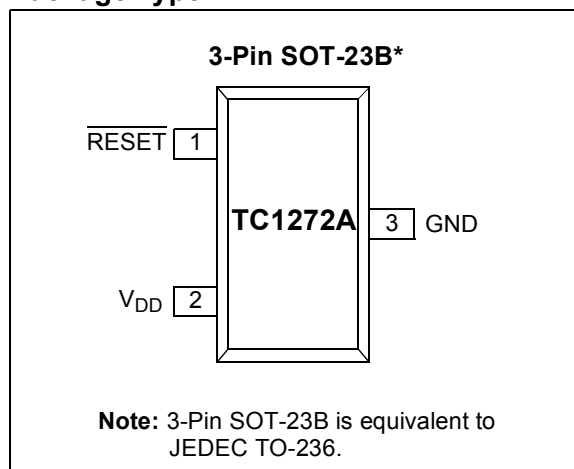
General Description

The TC1272A are cost-effective system supervisor circuits designed to monitor V_{DD} 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 65 μsec (typ.) of V_{DD} falling through the reset voltage threshold. $\overline{\text{RESET}}$ is maintained active for a minimum of 140 msec after V_{DD} rises above the reset threshold. The TC1272A has a complimentary output. The output of the TC1272A is valid down to $V_{DD} = 1.2\text{V}$. The device is available in a 3-Pin SOT-23B package.

The TC1272A device is optimized to reject fast transient glitches on the V_{DD} line.

Package Type



TC1272A

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Supply Voltage (V_{DD} to GND)	6.0V
$\overline{\text{RESET}}$	-0.3V to ($V_{DD} + 0.3V$)
Input Current, V_{DD}	20 mA
Output Current, $\overline{\text{RESET}}$	20 mA
dV/dt (V_{DD})	100V/ μsec
Operating Temperature Range	-40°C to +125°C
Power Dissipation ($T_A = 70^\circ\text{C}$):	
3-Pin SOT-23B (derate 4 mW/°C above +70°C)	320 mW
Storage Temperature Range	-65°C to +150°C
Maximum Junction Temperature, T_J	150°C

† **Notice:** Stresses above those listed under “Maximum ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

PIN FUNCTION TABLE

NAME	FUNCTION
GND	Ground
$\overline{\text{RESET}}$	RESET push-pull output remains low while V_{DD} is below the reset voltage threshold and for 140 msec (min.) after V_{DD} rises above reset threshold
V_{DD}	

ELECTRICAL CHARACTERISTICS

V_{DD} = Full Range, T_A = Operating Temperature Range, unless otherwise noted. Typical values are at $T_A = +25^\circ\text{C}$, $V_{DD} = 5V$ for L/M/J, 3.3V for T/S, 3.0V for R and 2.5V for Z (**Note 1**).

Parameter	Sym	Min	Typ	Max	Units	Test Conditions		
V_{DD} Range		1.0 1.2	— —	5.5 5.5	V	$T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
Supply Current	I_{CC}	— —	12 9	30 25	μA	TC1272AL/M/J: $V_{DD} < 5.5V$ TC1272AR/S/T/Z: $V_{DD} < 3.6V$		
Reset Threshold (Note 2)	V_{TH}	4.56 4.50	4.63 —	4.70 4.75	V	TC1272AL: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		4.31 4.25	4.38 —	4.45 4.50	V V	TC1272AM: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		3.93 3.89	4.00 —	4.06 4.10	V V	TC1272AJ: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		3.04 3.00	3.08 —	3.11 3.15	V V	TC1272AT: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		2.89 2.85	2.93 —	2.96 3.00	V V	TC1272AS: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		2.59 2.55	2.63 —	2.66 2.70	V V	TC1272AR: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		2.28 2.25	2.32 —	2.35 2.38	V V	TC1272AZ: $T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$		
		Reset Threshold Tempco		—	30	—	ppm/°C	
		V_{DD} to Reset Delay,		—	65	—	μsec	$V_{DD} = V_{TH}$ to $(V_{TH} - 100\text{ mV})$ (Note 2)
		Reset Active Time Out Period		140	320	560	msec	
$\overline{\text{RESET}}$ Output Voltage Low	V_{OL}	— — —	— — —	0.3 0.4 0.3	V	TC1272AR/S/T/Z: $V_{DD} = V_{TH}$ min, $I_{SINK} = 1.2\text{ mA}$ TC1272AL/M/J: $V_{DD} = V_{TH}$ min, $I_{SINK} = 3.2\text{ mA}$ $V_{DD} > 1.0V$, $I_{SINK} = 50\text{ }\mu\text{A}$		
$\overline{\text{RESET}}$ Output Voltage High	V_{OH}	$0.8 V_{DD}$ $V_{DD} - 1.5$	— —	— —	V	TC1272AR/S/T/Z: $V_{DD} > V_{TH}$ max, $I_{SOURCE} = 500\text{ }\mu\text{A}$ TC1272AL/M/J: $V_{DD} > V_{TH}$ max, $I_{SOURCE} = 800\text{ }\mu\text{A}$		

- Note 1:** Production testing done at $T_A = +25^\circ\text{C}$, overtemperature limits ensured by QC screen.
Note 2: RESET Output for **TC1272A**.

2.0 TYPICAL PERFORMANCE CHARACTERISTICS

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.

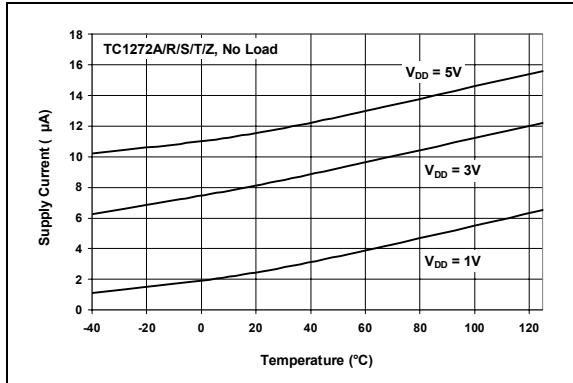


FIGURE 2-1: Supply Current vs. Temperature.

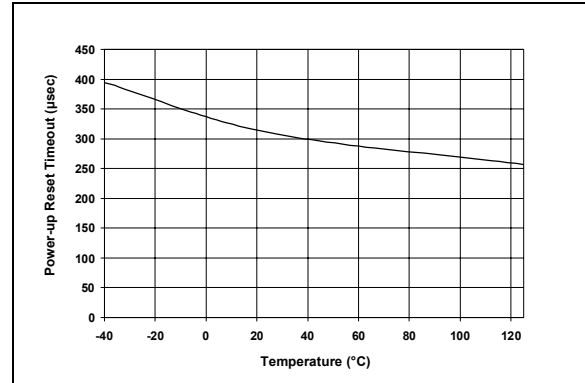


FIGURE 2-3: Power-up Reset Time Out vs. Temperature.

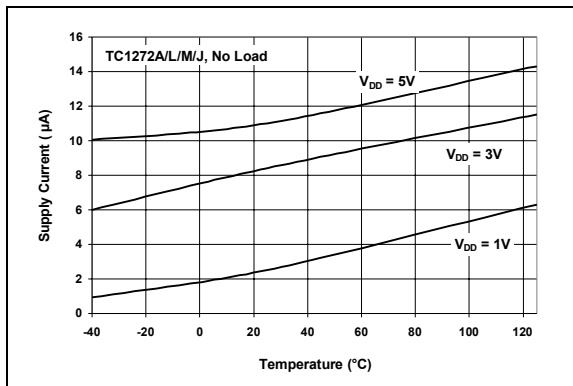


FIGURE 2-2: Supply Current vs. Temperature.

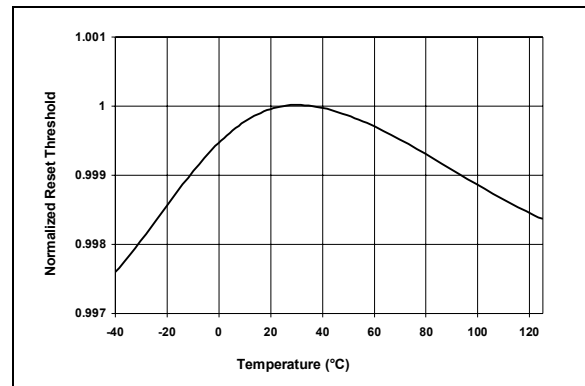


FIGURE 2-4: Normalized Reset Threshold vs. Temperature.

3.0 APPLICATIONS INFORMATION

3.1 V_{DD} Transient Rejection

The TC1272A provides accurate V_{DD} monitoring and reset timing during power-up, power-down and brown-out/sag conditions. These devices also reject negative-going transients (glitches) on the power supply line. Figure 3-1 shows the maximum transient duration vs. maximum negative excursion (overdrive) for glitch rejection. Any combination of duration and overdrive that lies under the curve will not generate a reset signal.

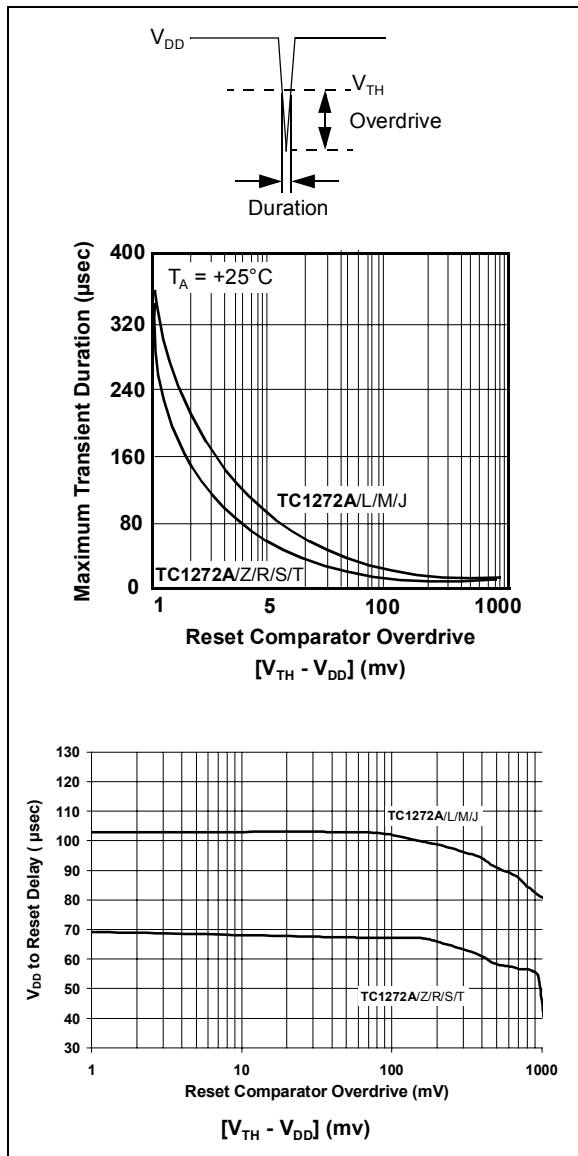


FIGURE 3-1: Maximum Transient Duration vs. Overdrive for Glitch Rejection at $+25^\circ\text{C}$.

Combinations above the curve are detected as a brown-out or power-down condition. Transient immunity can be improved by adding a capacitor in close proximity to the V_{DD} pin of the TC1272A.

3.2 $\overline{\text{RESET}}$ Signal Integrity During Power-Down

The TC1272A $\overline{\text{RESET}}$ output is valid to $V_{DD} = 1.0\text{V}$. Below this voltage, the output becomes an "open circuit" and does not sink current. This means CMOS logic inputs to the microcontroller 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 $V_{DD} = 0\text{V}$, a pull-down resistor must be connected from $\overline{\text{RESET}}$ to ground to discharge stray capacitances and hold the output low (Figure 3-2). 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).

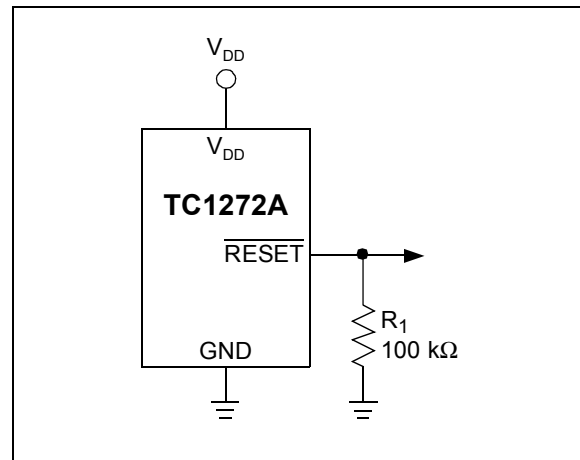


FIGURE 3-2: The addition of R_1 at the $\overline{\text{RESET}}$ output of the TC1272A ensures that the $\overline{\text{RESET}}$ output is valid to $V_{DD} = 0\text{V}$.

3.3 Controllers and Processors With Bidirectional I/O Pins

Some microcontrollers have bidirectional reset pins. Depending on the current drive capability of the controller pin, an indeterminate logic level may result if there is a logic conflict. This can be avoided by adding a 4.7 kΩ resistor in series with the output of the TC1272A (Figure 3-3). If there are other components in the system that require a reset signal, they should be buffered so as not to load the reset line. If the other components are required to follow the reset I/O of the microcontroller, the buffer should be connected as shown with the solid line.

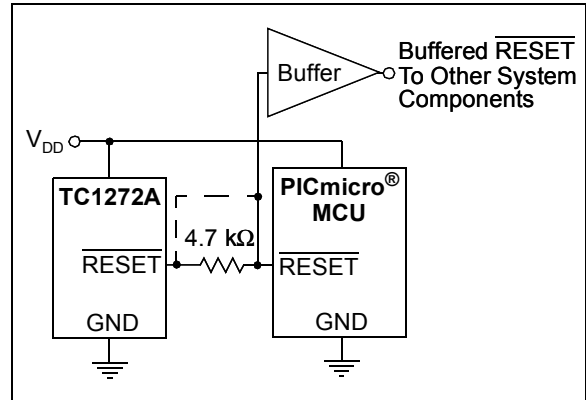


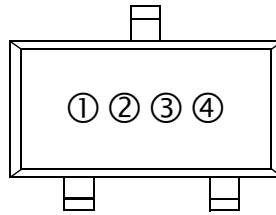
FIGURE 3-3: Interfacing the TC1272A to a Bidirectional RESET I/O.

TC1272A

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

3-Pin SOT-23B

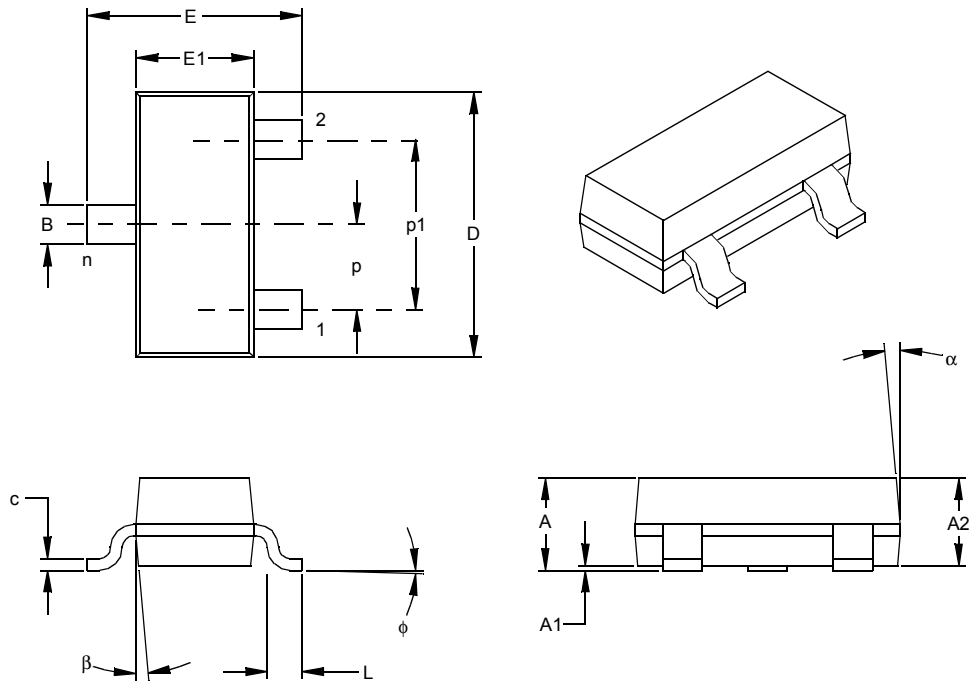


Part Number	SOT-23
TC1272AZVNBTR	BA
TC1272ARVNBTR	BB
TC1272ASVNBTR	BC
TC1272ATVNBTR	BD
TC1272AJVNBTR	BE
TC1272AMVNBTR	BF
TC1272ALVNBTR	BG

Legend:	1	Part Number + temperature range and voltage (two-digit code)
	2	Part Number + temperature range and voltage (two-digit code)
	3	Lot ID number
	4	Year and work week
	5	Year and work week
	6	Year and work week

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line thus limiting the number of available characters for customer specific information.

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

TC1272A

4.2 Product Tape and Reel Specifications

FIGURE 4-1: EMBOSSED CARRIER DIMENSIONS (8, 12, 16, AND 24 MM TAPE ONLY)

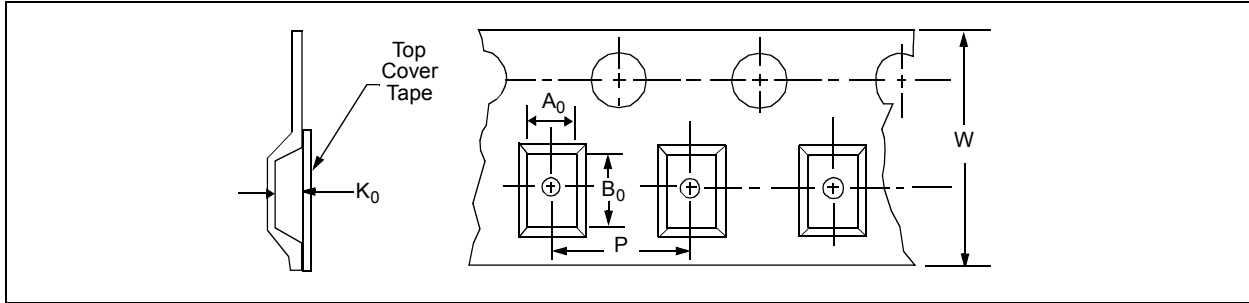
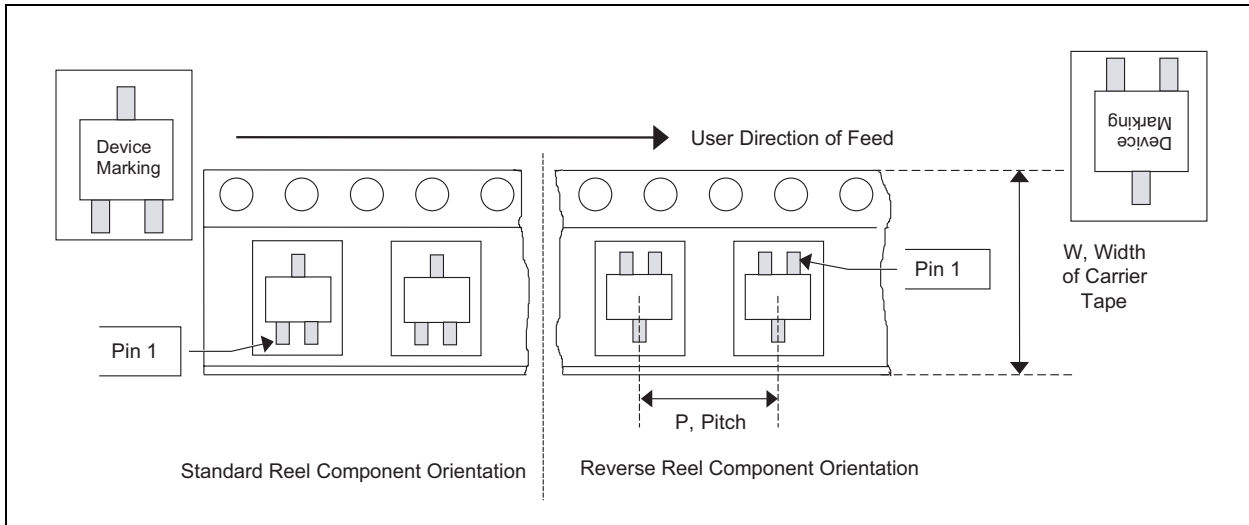


TABLE 1: CARRIER TAPE/CAVITY DIMENSIONS

Case Outline	Package Type		Carrier Dimensions		Cavity Dimensions			Output Quantity Units	Reel Diameter in mm
			W mm	P mm	A0 mm	B0 mm	K0 mm		
NB	SOT-23	3L	8	4	3.15	2.77	1.22	3000	180

FIGURE 4-2: 3-LEAD SOT-23 DEVICE TAPE AND REEL SPECIFICATIONS



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.	X	X	XXXXX
Device	V_{DD} Reset Threshold	Temperature Range	Package
<p>Device: TC1272A: Supervisor circuit with active-low $\overline{\text{RESET}}$ output</p> <p>V_{DD} Reset Threshold: L = 4.63V M = 4.38V J = 4.00V T = 3.08V S = 2.93V R = 2.63V Z = 2.32V</p> <p>Temperature Range: V = -40°C to +125°C</p> <p>Package: NBTR = SOT-23B, 3-pin (Tape and Reel)</p>			
<p>Examples:</p> <p>a) TC1272AZVNBTR: Supervisor w/2.32 V_{DD} option.</p> <p>b) TC1272ARVNBTR: Supervisor w/2.63 V_{DD} option.</p> <p>c) TC1272ASVNBTR: Supervisor w/2.93 V_{DD} option.</p> <p>d) TC1272ATVNBTR: Supervisor w/3.08 V_{DD} option.</p> <p>e) TC1272AJVNBTR: Supervisor w/4.00 V_{DD} option.</p> <p>f) TC1272AMVNBTR: Supervisor w/4.38 V_{DD} option.</p> <p>g) TC1272ALVNBTR: Supervisor w/4.63 V_{DD} option.</p>			

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:

1. Your local Microchip sales office
2. The Microchip Corporate Literature Center U.S. FAX: (480) 792-7277
3. The Microchip Worldwide Site (www.microchip.com)

Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

Customer Notification System

Register on our web site (www.microchip.com/cn) to receive the most current information on our products.

TC1272A

NOTES:

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is intended through suggestion only and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. No representation or warranty is given and no liability is assumed by Microchip Technology Incorporated with respect to the accuracy or use of such information, or infringement of patents or other intellectual property rights arising from such use or otherwise. Use of Microchip's products as critical components in life support systems is not authorized except with express written approval by Microchip. No licenses are conveyed, implicitly or otherwise, under any intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, Accuron, dsPIC, KEELoQ, MPLAB, PIC, PICmicro, PICSTART, PRO MATE, PowerSmart and rPIC are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.


Amplab, FilterLab, microID, MXDEV, MXLAB, PICMASTER, SEEVAL, SmartShunt and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Application Maestro, dsPICDEM, dsPICDEM.net, dsPICworks, ECAN, ECONOMONITOR, FanSense, FlexROM, fuzzyLAB, In-Circuit Serial Programming, ICSP, ICEPIC, Migratable Memory, MPASM, MPLIB, MPLINK, MPSIM, PICkit, PICDEM, PICDEM.net, PICtail, PowerCal, PowerInfo, PowerMate, PowerTool, rLAB, Select Mode, SmartSensor, SmartTel and Total Endurance are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

Serialized Quick Turn Programming (SQTP) is a service mark of Microchip Technology Incorporated in the U.S.A.

All other trademarks mentioned herein are property of their respective companies.

© 2004, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

 Printed on recycled paper.

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO/TS 16949:2002 ==

Microchip received ISO/TS-16949:2002 quality system certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona and Mountain View, California in October 2003. The Company's quality system processes and procedures are for its PICmicro® 8-bit MCUs, KEELoQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.



WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office

2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support: 480-792-7627
Web Address: <http://www.microchip.com>

Atlanta

3780 Mansell Road, Suite 130
Alpharetta, GA 30022
Tel: 770-640-0034
Fax: 770-640-0307

Boston

2 Lan Drive, Suite 120
Westford, MA 01886
Tel: 978-692-3848
Fax: 978-692-3821

Chicago

333 Pierce Road, Suite 180
Itasca, IL 60143
Tel: 630-285-0071
Fax: 630-285-0075

Dallas

4570 Westgrove Drive, Suite 160
Addison, TX 75001
Tel: 972-818-7423
Fax: 972-818-2924

Detroit

Tri-Atria Office Building
32255 Northwestern Highway, Suite 190
Farmington Hills, MI 48334
Tel: 248-538-2250
Fax: 248-538-2260

Kokomo

2767 S. Albright Road
Kokomo, IN 46902
Tel: 765-864-8360
Fax: 765-864-8387

Los Angeles

18201 Von Karman, Suite 1090
Irvine, CA 92612
Tel: 949-263-1888
Fax: 949-263-1338

San Jose

1300 Terra Bella Avenue
Mountain View, CA 94043
Tel: 650-215-1444
Fax: 650-961-0286

Toronto

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

ASIA/PACIFIC

Australia

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

China - Beijing

Unit 706B
Wan Tai Bei Hai Bldg.
No. 6 Chaoyangmen Bei Str.
Beijing, 100027, China
Tel: 86-10-85282100
Fax: 86-10-85282104

China - Chengdu

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

Unit 28F, World Trade Plaza
No. 71 Wusi Road
Fuzhou 350001, China
Tel: 86-591-7503506
Fax: 86-591-7503521

China - Hong Kong SAR

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

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

Rm. 1812, 18/F, Building A, United Plaza
No. 5022 Binhe Road, Futian District
Shenzhen 518033, China
Tel: 86-755-82901380
Fax: 86-755-8295-1393

China - Shunde

Room 401, Hongjian Building, No. 2
Fengxiangnan Road, Ronggui Town, Shunde
District, Foshan City, Guangdong 528303, China
Tel: 86-757-28395507 Fax: 86-757-28395571

China - Qingdao

Rm. B505A, Fullhope Plaza,
No. 12 Hong Kong Central Rd.
Qingdao 266071, China
Tel: 86-532-5027355 Fax: 86-532-5027205

India

Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, O'Shaughnessy Road
Bangalore, 560 025, India
Tel: 91-80-22290061 Fax: 91-80-22290062

Japan

Benex S-1 6F
3-18-20, Shinyokohama
Kohoku-Ku, Yokohama-shi
Kanagawa, 222-0033, Japan
Tel: 81-45-471-6166 Fax: 81-45-471-6122

Korea

168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku
Seoul, Korea 135-882
Tel: 82-2-554-7200 Fax: 82-2-558-5932 or
82-2-558-5934

Singapore

200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-6334-8870 Fax: 65-6334-8850

Taiwan

Kaohsiung Branch
30F - 1 No. 8
Min Chuan 2nd Road
Kaohsiung 806, Taiwan
Tel: 886-7-536-4818
Fax: 886-7-536-4803

Taiwan

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

EUROPE

Austria

Durisolstrasse 2
A-4600 Wels
Austria
Tel: 43-7242-2244-399
Fax: 43-7242-2244-393

Denmark

Regus Business Centre
Lautrup høj 1-3
Ballerup DK-2750 Denmark
Tel: 45-4420-9895 Fax: 45-4420-9910

France

Parc d'Activite du Moulin de Massy
43 Rue du Saule Trapu
Batiment A - 1er Etage
91300 Massy, France
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany

Steinheilstrasse 10
D-85737 Ismaning, Germany
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy

Via Quasimodo, 12
20025 Legnano (MI)
Milan, Italy
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands

P. A. De Biesbosch 14
NL-5152 SC Drunen, Netherlands
Tel: 31-416-690399
Fax: 31-416-690340

United Kingdom

505 Eskdale Road
Winkersham Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44-118-921-5869
Fax: 44-118-921-5820

02/17/04