TC1272A

3-Pin Reset Monitor

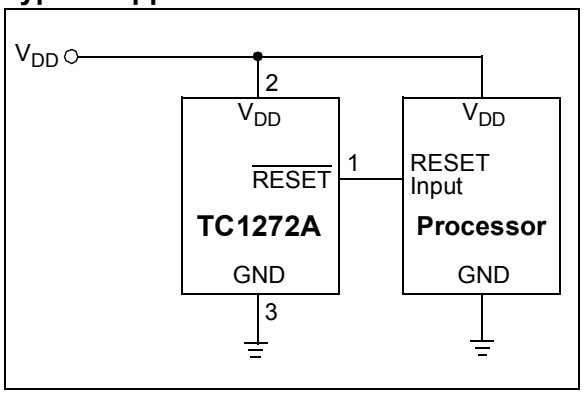
Features

- Precision V_{DD} Monitor
- 140 msec Minimum $\overline{\text{RESET}}$, Output Duration
- Output Valid to V_{DD} = 1.2V
- 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

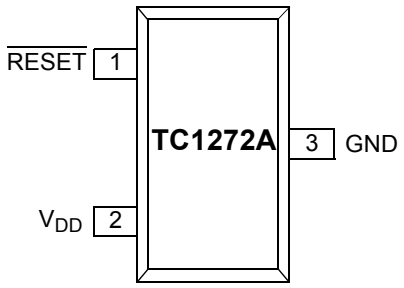
The TC1272A are cost-effective system supervisor circuits designed to monitor V_{DD} in digital systems and provide a reset signal to the host processor, when necessary. No external components are required.

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} = 1.2V. 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

3-Pin SOT-23B*



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

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1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Supply Voltage (V_{DD} to GND) 6.0V
$\overline{RESET}$ ..... –0.3V to (V_{DD} +0.3V)
Input Current, V_{DD}.....20 mA
Output Current, $\overline{RESET}$ .....20 mA
dV/dt (V_{DD}).....100V/µsec
Operating Temperature Range.....–40°C to +125°C
Power Dissipation (T_A = 70°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
$\overline{RESET}$	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°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	—	5.5	V	T_A = 0°C to +70°C
		1.2	—	5.5		T_A = – 40°C to +125°C
Supply Current	I_{CC}	—	12	30	µA	**TC1272A**L/M/J: V_{DD} < 5.5V
		—	9	25		**TC1272A**R/S/T/Z: V_{DD} < 3.6V
Reset Threshold **(Note 2)**	V_{TH}	4.56	4.63	4.70	V	**TC1272A**L: T_A = +25°C
		4.50	—	4.75		T_A = – 40°C to +125°C
		4.31	4.38	4.45	V	**TC1272A**M: T_A = +25°C
		4.25	—	4.50	V	T_A = – 40°C to +125°C
		3.93	4.00	4.06	V	**TC1272A**J: T_A = +25°C
		3.89	—	4.10	V	T_A = – 40°C to +125°C
		3.04	3.08	3.11	V	**TC1272A**T: T_A = +25°C
		3.00	—	3.15	V	T_A = – 40°C to +125°C
		2.89	2.93	2.96	V	**TC1272A**S: T_A = +25°C
		2.85	—	3.00	V	T_A = – 40°C to +125°C
		2.59	2.63	2.66	V	**TC1272A**R: T_A = +25°C
		2.55	—	2.70	V	T_A = – 40°C to +125°C
		2.28	2.32	2.35	V	**TC1272A**Z: T_A = +25°C
		2.25	—	2.38	V	T_A = – 40°C to +125°C
Reset Threshold Tempco		—	30	—	ppm/°C	
V_{DD} to Reset Delay,		—	65	—	µsec	V_{DD} = V_{TH} to (V_{TH} – 100 mV) **(Note 2)**
Reset Active Time Out Period		140	320	560	msec	
$\overline{RESET}$ Output Voltage Low	V_{OL}	—	—	0.3	V	**TC1272A**R/S/T/Z: V_{DD} = V_{TH} min, I_{SINK} = 1.2 mA
		—	—	0.4		**TC1272A**L/M/J: V_{DD} = V_{TH} min, I_{SINK} = 3.2 mA
		—	—	0.3		V_{DD} > 1.0V, I_{SINK} = 50 µA
$\overline{RESET}$ Output Voltage High	V_{OH}	0.8 V_{DD}	—	—	V	**TC1272A**R/S/T/Z: V_{DD} > V_{TH} max, I_{SOURCE} = 500 µA
		V_{DD} – 1.5	—	—		**TC1272A**L/M/J: V_{DD} > V_{TH} max, I_{SOURCE} = 800 µA

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

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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.

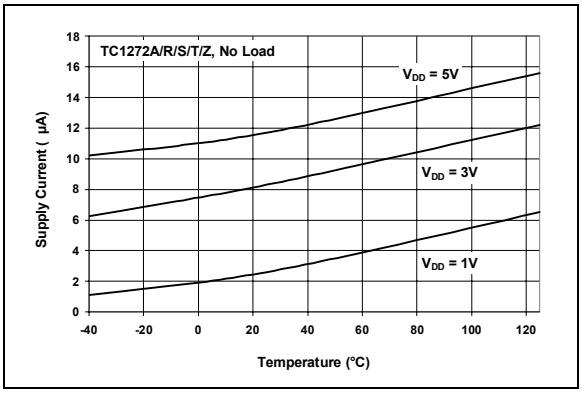

FIGURE 2-1: *Supply Current vs. Temperature.*

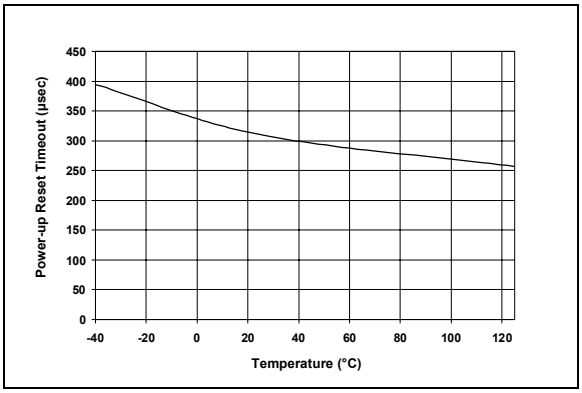

FIGURE 2-3: *Power-up Reset Time Out vs. Temperature.*

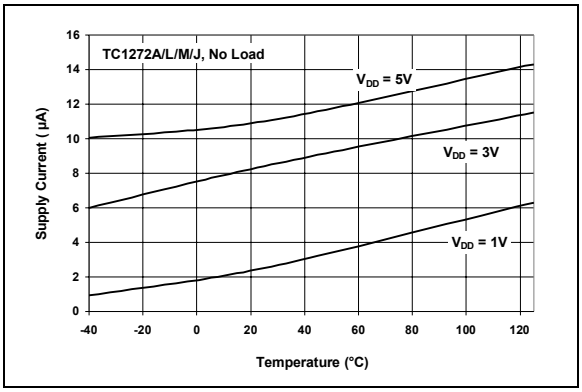

FIGURE 2-2: *Supply Current vs. Temperature.*

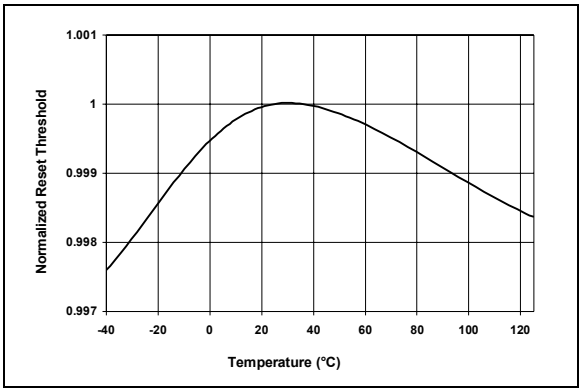

FIGURE 2-4: *Normalized Reset Threshold vs. Temperature.*

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.

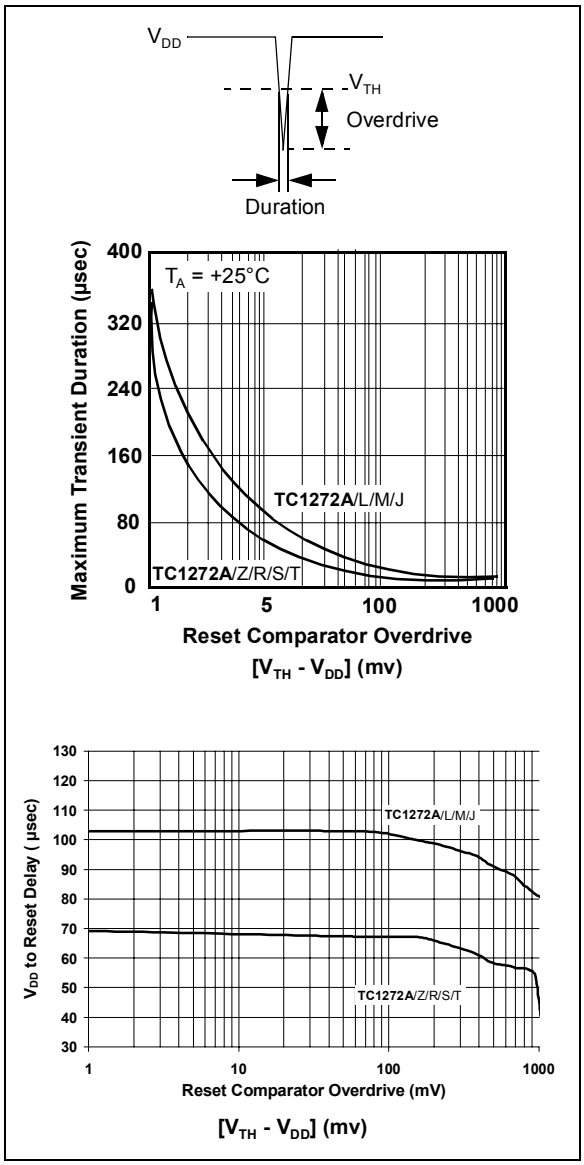

FIGURE 3-1: *Maximum Transient Duration vs. Overdrive for Glitch Rejection at +25°C.*

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} = 1.0V. 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} = 0V, 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 kΩ will be suitable for most applications).

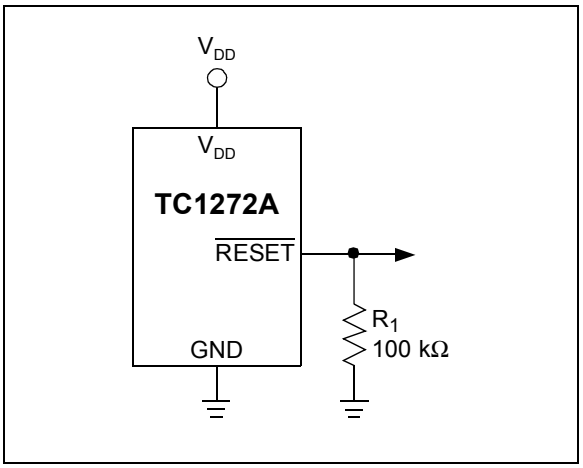

FIGURE 3-2: *The addition of R_1 at the $\overline{\text{RESET}}$ output of the TC1272A ensures that the $\overline{\text{RESET}}$ output is valid to V_{DD} = 0V.*

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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.

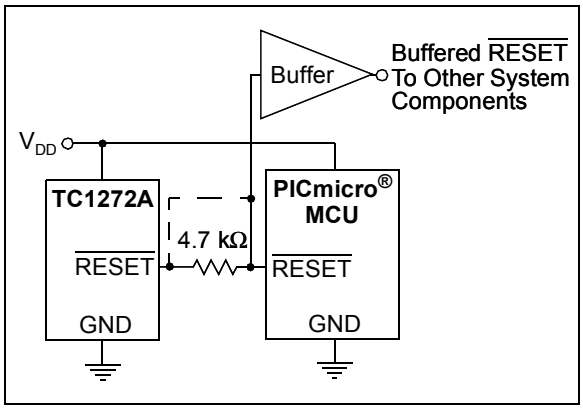
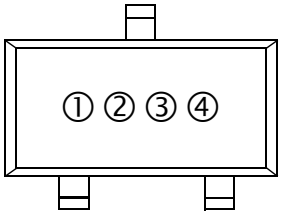


FIGURE 3-3: *Interfacing the TC1272A to a Bidirectional RESET I/O.*

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.

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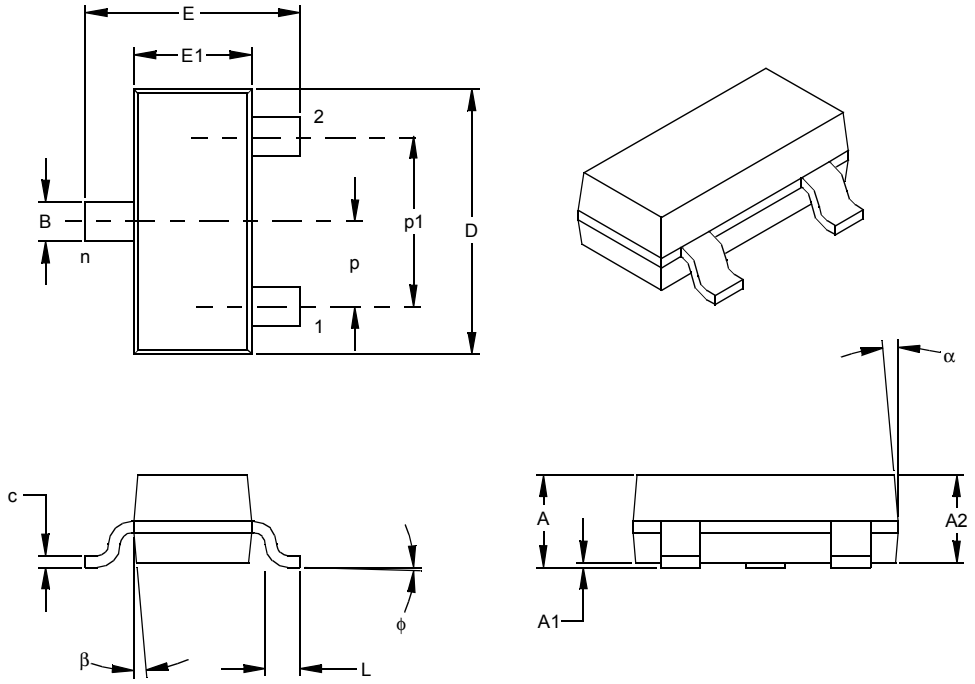
3-Lead Plastic Small Outline Transistor (NB) (SOT-23)



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

4.2 Product Tape and Reel Specifications

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

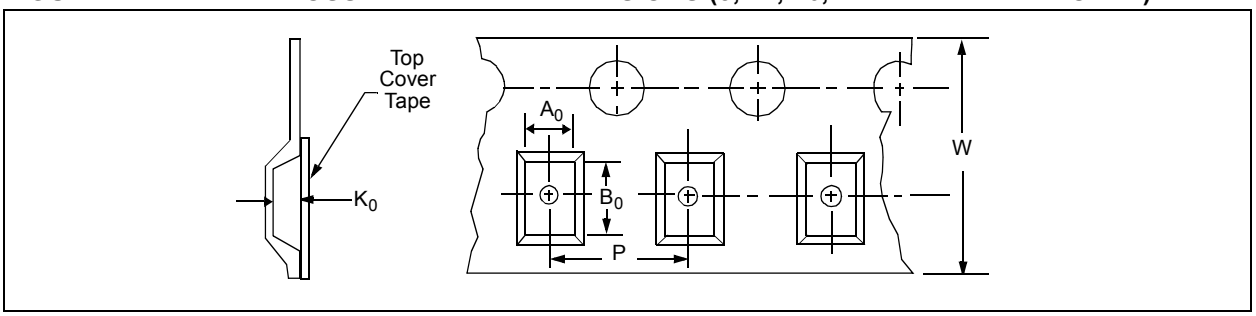
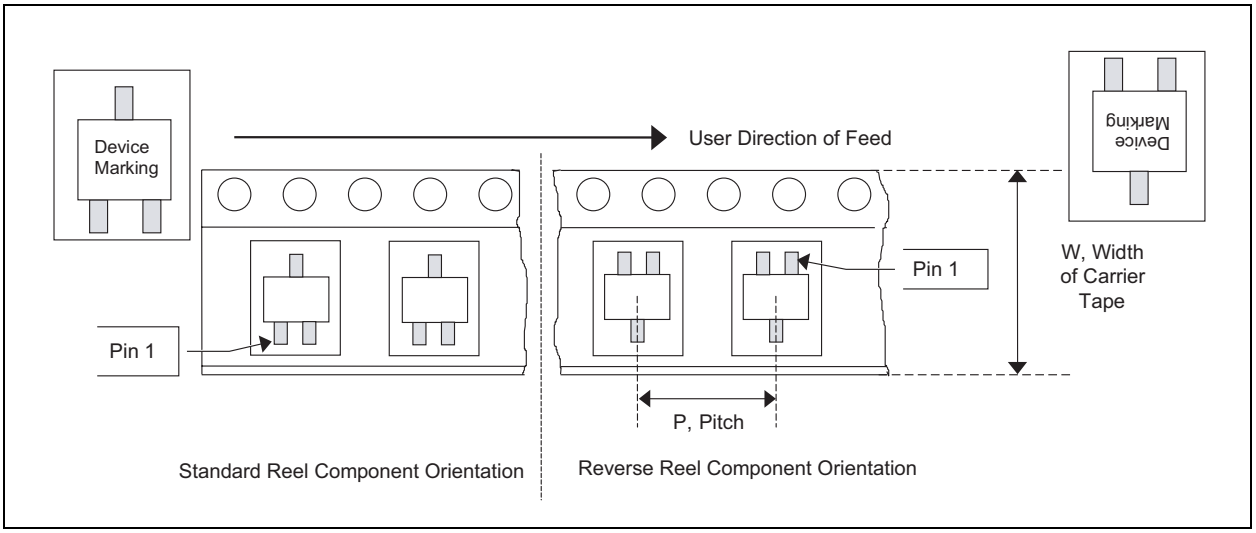


TABLE 1: CARRIER TAPE/CAVITY DIMENSIONS

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



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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

Device:	TC1272A:	Supervisor circuit with active-low $\overline{\text{RESET}}$ output
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	
Temperature Range:	V =	-40°C to +125°C
Package:	NBTR =	SOT-23B, 3-pin (Tape and Reel)

Examples:

a) TC1272AZVNBTR: Supervisor w/2.32 V_{DD} option.

b) TC1272ARVNBTR: Supervisor w/2.63 V_{DD} option.

c) TC1272ASVNBTR: Supervisor w/2.93 V_{DD} option.

d) TC1272ATVNBTR: Supervisor w/3.08 V_{DD} option.

e) TC1272AJVNBTR: Supervisor w/4.00 V_{DD} option.

f) TC1272AMVNBTR: Supervisor w/4.38 V_{DD} option.

g) TC1272ALVNBTR: Supervisor w/4.63 V_{DD} option.

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Lautrup hoj 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 - ler 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
Winnersh Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44-118-921-5869
Fax: 44-118-921-5820

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