

## 3-Pin Reset Monitor

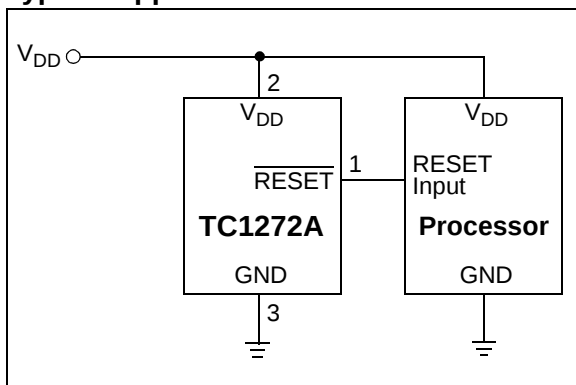
### Features

- 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  $\mu\text{P}$  Power Supply Monitoring

### Typical Application Circuit



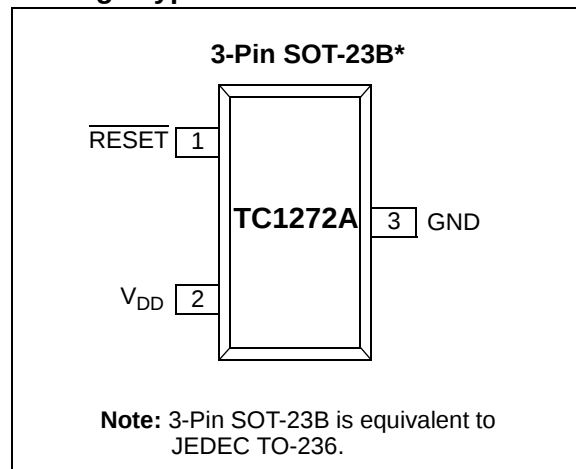
### General Description

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  $\mu\text{sec}$  (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                         |
| RESET .....                                                                                                       | -0.3V to ( $V_{DD} + 0.3V$ ) |
| Input Current, $V_{DD}$ .....                                                                                     | 20 mA                        |
| Output Current, RESET .....                                                                                       | 20 mA                        |
| dV/dt ( $V_{DD}$ ) .....                                                                                          | 100V/ $\mu$ sec              |
| Operating Temperature Range .....                                                                                 | -40°C to +125°C              |
| Power Dissipation ( $T_A = 70^\circ\text{C}$ ):<br>3-Pin SOT-23B (derate 4 mW/ $^\circ\text{C}$ 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                                                                                                                                                    |
| 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 |
| $V_{DD}$ |                                                                                                                                                           |

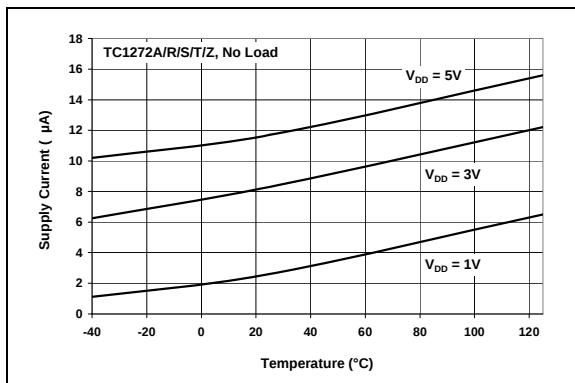
## ELECTRICAL CHARACTERISTICS

| $V_{DD}$ = 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 ( <b>Note 1</b> ). |          |                                    |             |                   |                       |                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------------------------------------|-------------|-------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parameter                                                                                                                                                                                                                 | Sym      | Min                                | Typ         | Max               | Units                 | Test Conditions                                                                                                                                                                                            |
| $V_{DD}$ Range                                                                                                                                                                                                            |          | 1.0<br>1.2                         | —<br>—      | 5.5<br>5.5        | V                     | $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                        |
| Supply Current                                                                                                                                                                                                            | $I_{CC}$ | —<br>—                             | 12<br>9     | 30<br>25          | $\mu\text{A}$         | <b>TC1272AL/M/J:</b> $V_{DD} < 5.5V$<br><b>TC1272AR/S/T/Z:</b> $V_{DD} < 3.6V$                                                                                                                             |
| Reset Threshold ( <b>Note 2</b> )                                                                                                                                                                                         | $V_{TH}$ | 4.56<br>4.50                       | 4.63<br>—   | 4.70<br>4.75      | V                     | <b>TC1272AL:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
|                                                                                                                                                                                                                           |          | 4.31<br>4.25                       | 4.38<br>—   | 4.45<br>4.50      | V<br>V                | <b>TC1272AM:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
|                                                                                                                                                                                                                           |          | 3.93<br>3.89                       | 4.00<br>—   | 4.06<br>4.10      | V<br>V                | <b>TC1272AJ:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
|                                                                                                                                                                                                                           |          | 3.04<br>3.00                       | 3.08<br>—   | 3.11<br>3.15      | V<br>V                | <b>TC1272AT:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
|                                                                                                                                                                                                                           |          | 2.89<br>2.85                       | 2.93<br>—   | 2.96<br>3.00      | V<br>V                | <b>TC1272AS:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
|                                                                                                                                                                                                                           |          | 2.59<br>2.55                       | 2.63<br>—   | 2.66<br>2.70      | V<br>V                | <b>TC1272AR:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
|                                                                                                                                                                                                                           |          | 2.28<br>2.25                       | 2.32<br>—   | 2.35<br>2.38      | V<br>V                | <b>TC1272AZ:</b> $T_A = +25^\circ\text{C}$<br>$T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$                                                                                                            |
| Reset Threshold Tempco                                                                                                                                                                                                    |          | —                                  | 30          | —                 | ppm/ $^\circ\text{C}$ |                                                                                                                                                                                                            |
| $V_{DD}$ to Reset Delay,                                                                                                                                                                                                  |          | —                                  | 65          | —                 | $\mu\text{sec}$       | $V_{DD} = V_{TH}$ to ( $V_{TH} - 100\text{ mV}$ ) ( <b>Note 2</b> )                                                                                                                                        |
| Reset Active Time Out Period                                                                                                                                                                                              |          | 140                                | 320         | 560               | msec                  |                                                                                                                                                                                                            |
| RESET Output Voltage Low                                                                                                                                                                                                  | $V_{OL}$ | —<br>—<br>—                        | —<br>—<br>— | 0.3<br>0.4<br>0.3 | V                     | <b>TC1272AR/S/T/Z:</b> $V_{DD} = V_{TH}$ min, $I_{SINK} = 1.2\text{ mA}$<br><b>TC1272AL/M/J:</b> $V_{DD} = V_{TH}$ min, $I_{SINK} = 3.2\text{ mA}$<br>$V_{DD} > 1.0V$ , $I_{SINK} = 50\text{ }\mu\text{A}$ |
| RESET Output Voltage High                                                                                                                                                                                                 | $V_{OH}$ | 0.8 $V_{DD}$<br><br>$V_{DD} - 1.5$ | —<br>—<br>— | —<br>—<br>—       | V                     | <b>TC1272AR/S/T/Z:</b> $V_{DD} > V_{TH}$ max,<br>$I_{SOURCE} = 500\text{ }\mu\text{A}$<br><b>TC1272AL/M/J:</b> $V_{DD} > V_{TH}$ max, $I_{SOURCE} = 800\text{ }\mu\text{A}$                                |

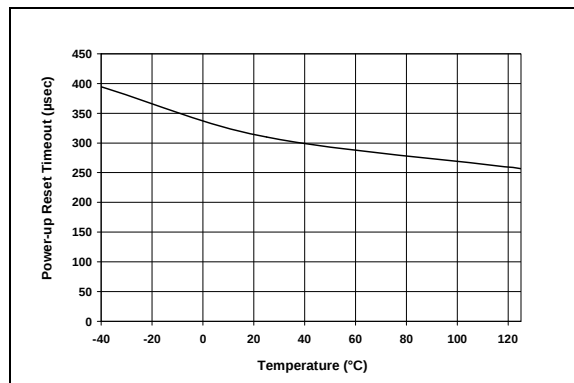
- Note 1:** Production testing done at  $T_A = +25^\circ\text{C}$ , overtemperature limits ensured by QC screen.  
**Note 2:** RESET Output for **TC1272A**.

## 2.0 TYPICAL PERFORMANCE CHARACTERISTICS

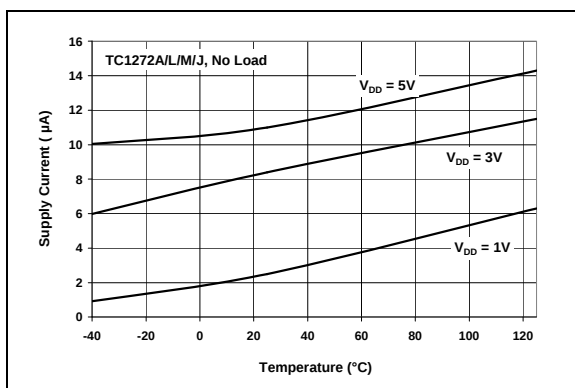
**Note:** The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be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



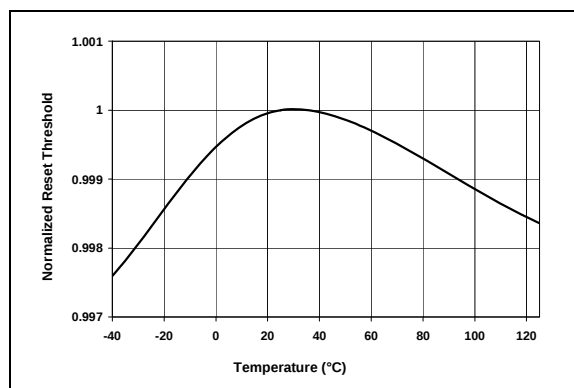
**FIGURE 2-1:** Supply Current vs. Temperature.



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



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

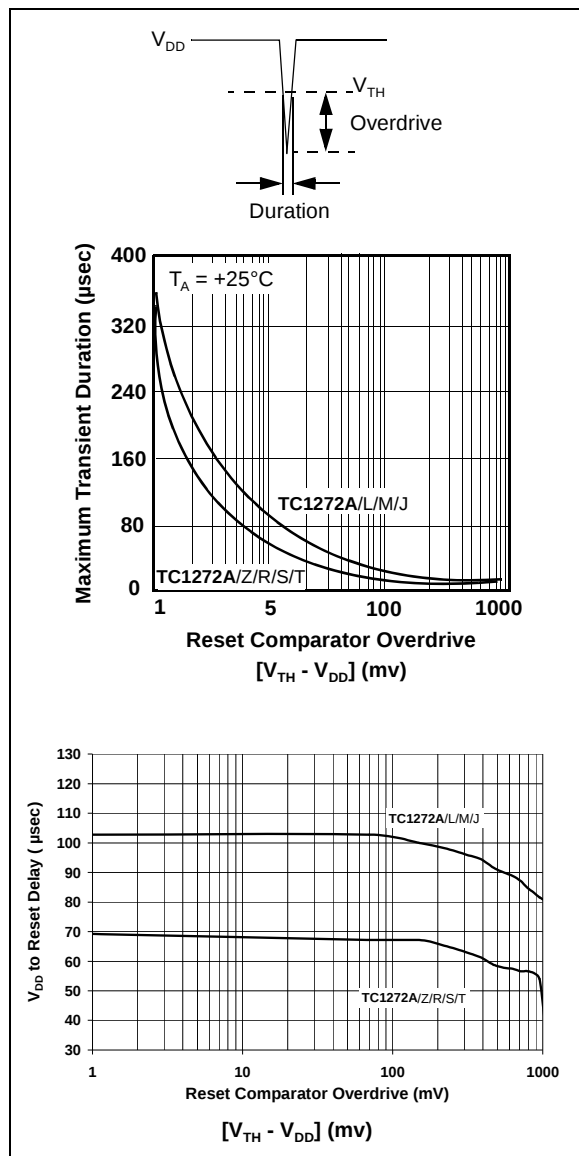


**FIGURE 2-4:** Normalized Reset Threshold vs. Temperature.

## 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.

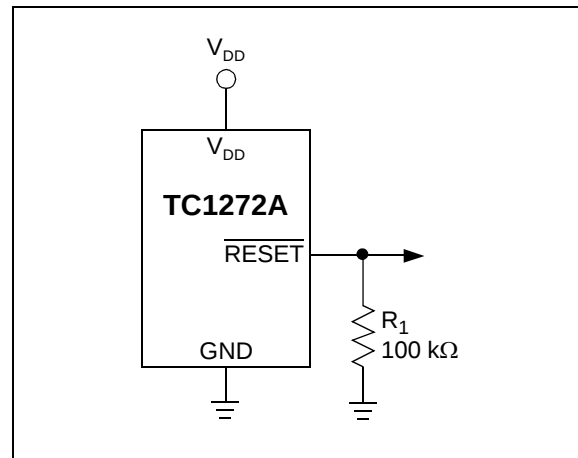


**FIGURE 3-1:** Maximum Transient Duration vs. Overdrive for Glitch Rejection at +25°C.

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 RESET Signal Integrity During Power-Down

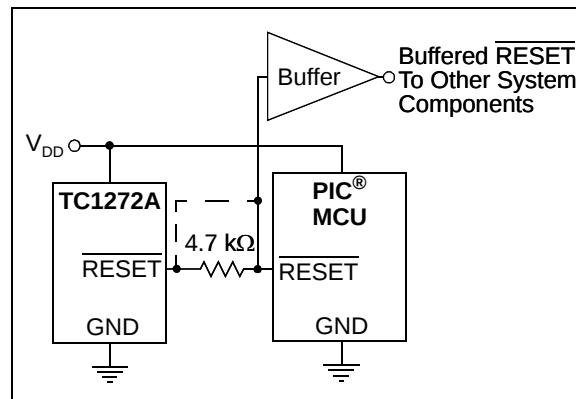
The TC1272A  $\overline{\text{RESET}}$  output is valid to  $V_{DD} = 1.0V$ . Below this voltage, the output becomes an "open circuit" and does not sink current. This means CMOS logic inputs to the microcontroller will be floating at an undetermined voltage. Most digital systems are completely shut down 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  $V_{DD} = 0V$ .

## 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 k $\Omega$  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.

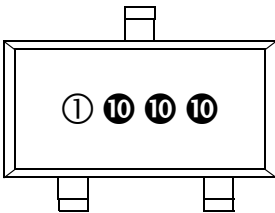


**FIGURE 3-3:** Interfacing the TC1272A to a Bidirectional RESET I/O.

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     |

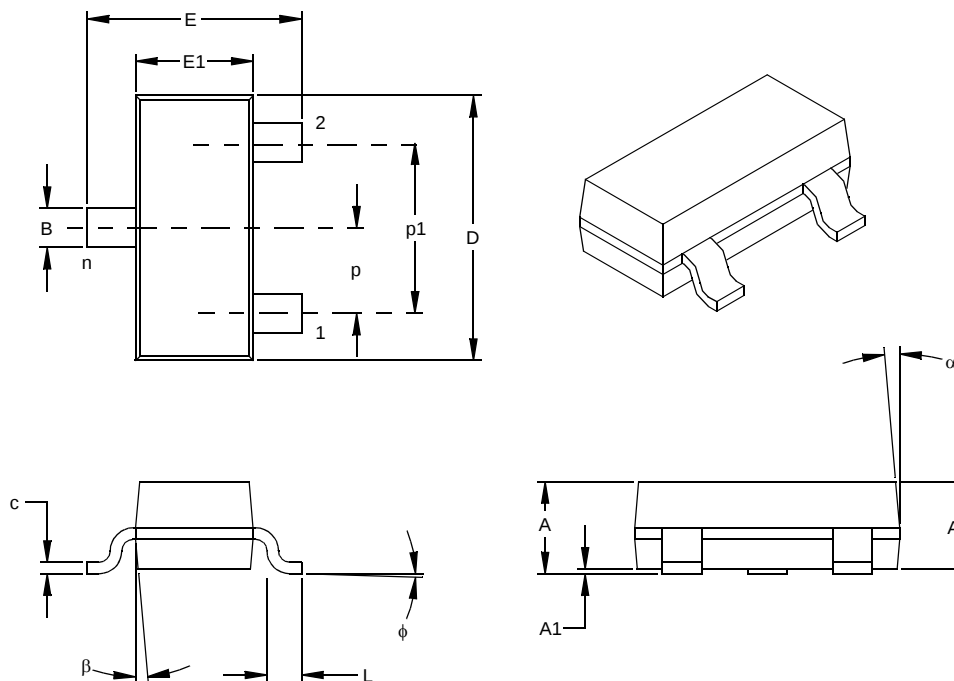
**Legend:**

|   |                                                              |
|---|--------------------------------------------------------------|
| 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.

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

**Note:** For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



| 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)

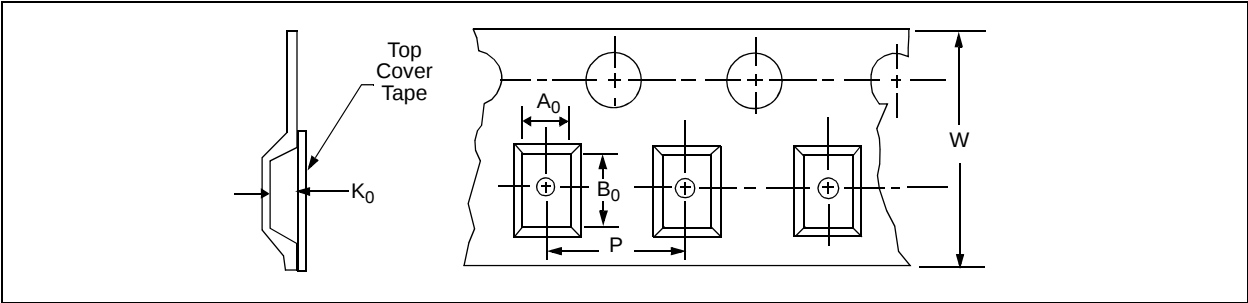
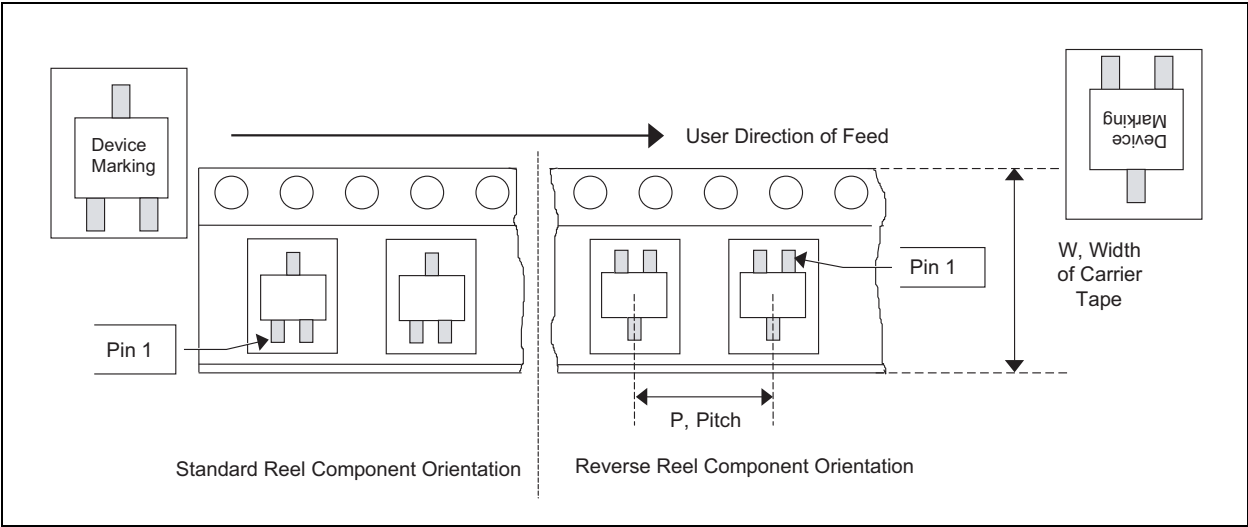


TABLE 1: CARRIER TAPE/CAVITY DIMENSIONS

| 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



## 5.0 REVISION HISTORY

### Revision B (January 2013)

Added a note to each package outline drawing.

# TC1272A

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NOTES:

## 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>X</u>                                                                     | <u>X</u>          | <u>XXXXX</u> |
|----------------------------------|--|------------------------------------------------------------------------------|-------------------|--------------|
| Device                           |  | V <sub>DD</sub> Reset Threshold                                              | Temperature Range | Package      |
| Device:                          |  | TC1272A: Supervisor circuit with active-low $\overline{\text{RESET}}$ output |                   |              |
| V <sub>DD</sub> 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<sub>DD</sub> option.

b) TC1272ARVNBTR: Supervisor w/2.63 V<sub>DD</sub> option.

c) TC1272ASVNBTR: Supervisor w/2.93 V<sub>DD</sub> option.

d) TC1272ATVNBTR: Supervisor w/3.08 V<sub>DD</sub> option.

e) TC1272AJVNBTR: Supervisor w/4.00 V<sub>DD</sub> option.

f) TC1272AMVNBTR: Supervisor w/4.38 V<sub>DD</sub> option.

g) TC1272ALVNBTR: Supervisor w/4.63 V<sub>DD</sub> option.

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# TC1272A

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NOTES:

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