

# ZNI1000

## TEMPERATURE SENSOR

### DESCRIPTION

The ZNI1000 is a Ni thin film Resistance Temperature Detector (RTD), specified to DIN 43760. The high temperature coefficient offers higher signal outputs than other RTD's, which results in higher accuracy with smaller temperature changes.

### FEATURES

- Resistance at 0°C: 1000Ω
- SOT23 package
- Available on 8mm tape

### APPLICATIONS

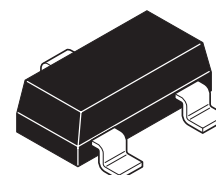
- Automotive electronic
- Circuit protection
- Temperature compensation
- Temperature measurement

### ORDERING INFORMATION

| DEVICE    | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|-----------|-----------|------------|-------------------|
| ZNI1000TA | 7"        | 8mm        | 3,000 units       |
| ZNI1000TC | 13"       | 8mm        | 10,000 units      |

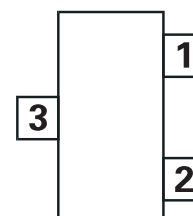
### DEVICE MARKING

- ZNI



SOT23

### PINOUT



Top View

Pin 1 - Ni1000  
Pin 2 - Ni1000  
Pin 3 - need a good thermal contact for a short response time

# ZNI1000

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                   | SYMBOL           | LIMIT       | UNIT |
|-----------------------------|------------------|-------------|------|
| Continuous current          | I <sub>CC</sub>  | 4           | mA   |
| Total power dissipation     | P <sub>TOT</sub> | 20          | mW   |
| Operating temperature range | T <sub>amb</sub> | -55 to +150 | °C   |
| Storage temperature range   | T <sub>stg</sub> | -55 to +150 | °C   |

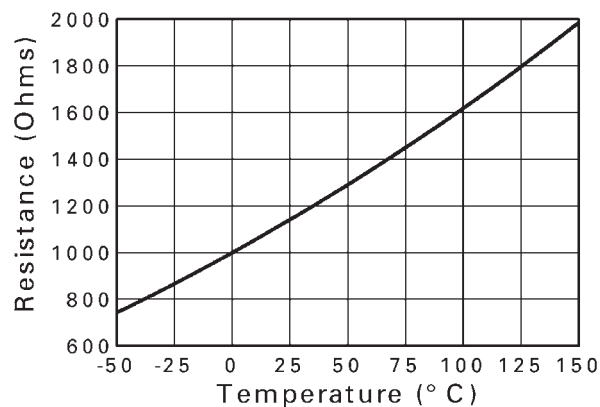
## ELECTRICAL CHARACTERISTICS

| PARAMETER         | SYMBOL           | MIN | TYP                | MAX | UNIT | CONDITIONS     |
|-------------------|------------------|-----|--------------------|-----|------|----------------|
| Resistance 0°C    | R <sub>0</sub>   | -   | 1000               | -   | Ω    | T=0°C, I<1mA   |
| Resistance 100°C  | R <sub>100</sub> | -   | 1618               | -   | Ω    | T=100°C, I<1mA |
| Tolerance class B |                  | -   | ±(0.4+0.028 x  T ) | -   |      | -55 to 0°C     |
| Tolerance class B |                  | -   | ±(0.4+0.007 x  T ) | -   |      | 0 to 150°C     |

## CHARACTERISTICS ACCORDING TO DIN43760

### Resistance at a given temperature

$$\begin{array}{llll}
 R_0 & \text{Resistance at } 0^\circ\text{C} & B & 6.650 \times 10^{-6} \\
 T & \text{Temperature in } ^\circ\text{C} & C & 2.805 \times 10^{-11} \\
 A & 5.485 \times 10^{-3} & D & -2.000 \times 10^{-17} \\
 R(T) = R_0 \times (1 + A \times T + B \times T^2 + C \times T^4 + D \times T^6)
 \end{array}$$



**Sensor Resistance vs Temperature**

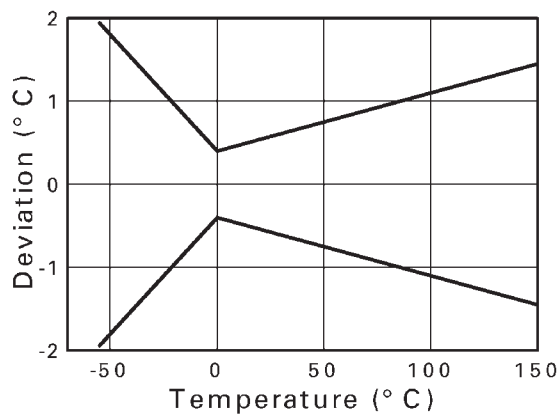
# ZNI1000

**Formula for temperature at a given resistance:**

$$T(R) = a + bR + cR^2 + dR^3$$

coefficients:

$$\begin{aligned} a. &= -232.2 \\ b. &= 0.290 \\ c. &= -66.65 \times 10^{-6} \\ d. &= -8.85 \times 10^{-9} \end{aligned}$$



## ZNI1000 Tolerances Class B

**Tolerances:** Class B      +/- (0,4 + 0,007 \*|T|) in range from 0 to 150°C  
                                          +/- (0,4 + 0,028 \*|T|) in range from -55 to 0°C

**Specification:**                R<sub>0</sub> = 1000 Ohm at 0°C

**Temperature range:**        operating -55 to +150°C  
                                          storage -55 to +150°C

**Long Term stability:**        ΔR = 0,1 % after 1000 h at 150°C

**Measurement Current (DC):**   typ. 1,2 mA; max. 5 mA

### Self heating

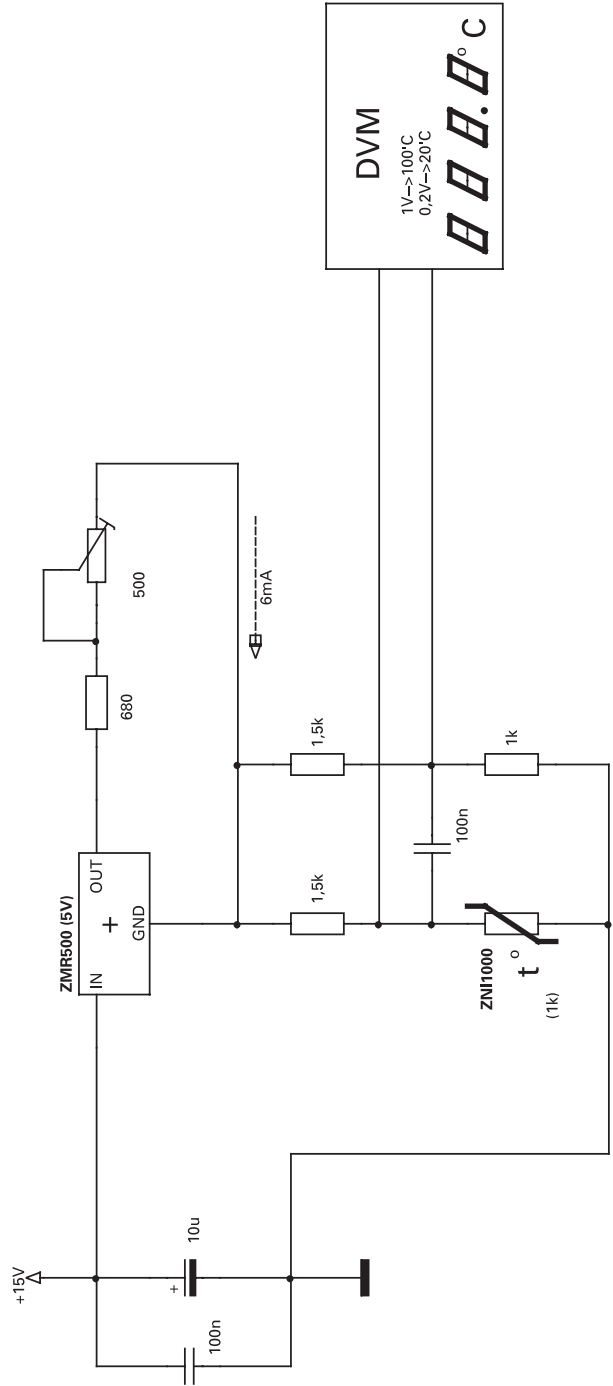
For accurate temperature measurement it's recommended to choose a small current in order to avoid self heating of the resistor. The temperature failure caused by the measurement current can be calculated with:

$$\Delta T = P/EK$$

where P = I<sup>2</sup> \* R is the heat power caused by the measurement current and EK is the self heating coefficient.

The self heating coefficient for the Ni1000-SOT is EW=(1,7 ± 0,3) mW/K (Air: 23°C; no air flow)

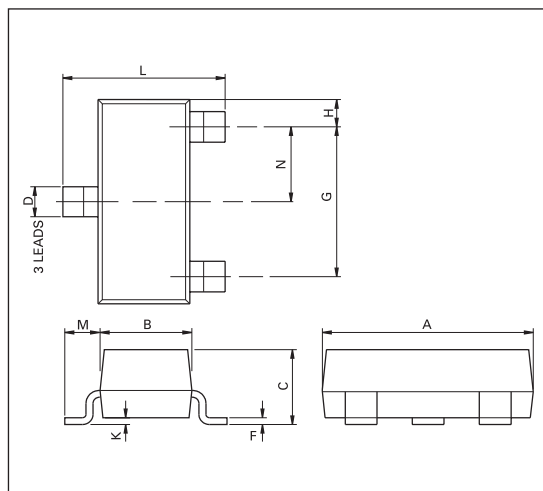
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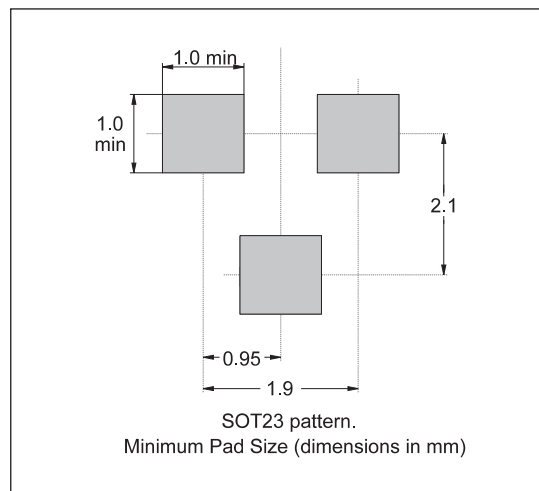
Application of the nickel sensor ZNI 1000

# ZNI1000

## PACKAGE OUTLINE



## PAD LAYOUT



CONTROLLING DIMENSIONS IN MILLIMETERS APPROX CONVERSIONS INCHES

## PACKAGE DIMENSIONS

| DIM | Millimeters |      | Inches    |        | DIM | Millimeters |      | Inches     |        |
|-----|-------------|------|-----------|--------|-----|-------------|------|------------|--------|
|     | Min         | Max  | Min       | Max    |     | Min         | Max  | Max        | Max    |
| A   | 2.67        | 3.05 | 0.105     | 0.120  | H   | 0.33        | 0.51 | 0.013      | 0.020  |
| B   | 1.20        | 1.40 | 0.047     | 0.055  | K   | 0.01        | 0.10 | 0.0004     | 0.004  |
| C   | —           | 1.10 | —         | 0.043  | L   | 2.10        | 2.50 | 0.083      | 0.0985 |
| D   | 0.37        | 0.53 | 0.015     | 0.021  | M   | 0.45        | 0.64 | 0.018      | 0.025  |
| F   | 0.085       | 0.15 | 0.0034    | 0.0059 | N   | 0.95 NOM    |      | 0.0375 NOM |        |
| G   | 1.90 NOM    |      | 0.075 NOM |        | —   | —           |      | —          |        |

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Issue 4 - April 2006