

Ni1000SOT

Temperature Sensor

SPECIFICATIONS

- **Contact temperature sensing**
- **Comply with former DIN 43760 standard**
- **Small SMD package SOT 23**
- **Automotive qualified**

Ni1000SOT is a nickel thin film resistance temperature detector (RTD) that is suitable for use in contact temperature sensing. The devices are manufactured by PVD-deposition on a silicon substrate. The thin film structure is covered by a passivation layer for environmental protection and enhanced stability. The nickel elements are mounted on lead frames and encapsulated in SOT23 packages. This technology allows the production of miniature, low cost, high precision temperature sensors. The characteristics of the temperature sensor comply with the former DIN 43760 standard. It is qualified for the most demanding automotive applications (incl. exposure to hot oil) and is suitable for many more applications in harsh environments

FEATURES

- Resistance: 1000 ohms at 0°C
- Min/ Max temp -55°C to +160°C
- Good linearity between resistance and temperature (R V's T)
- Large temperature coefficient of resistance: 6178 ppm/K (0°C, 100°C)
- Low power consumption
- Good thermal contact via Pin 3
- Tape and reel (8mm format)

APPLICATIONS

- Temperature sensing, control and compensation
- General instrumentation
- Automotive (VW standard 801-01 vibration)
- Remote sensing

PERFORMANCE SPECS

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|---|-----------------|-------------------|--------|---------|---------|-------|
| Basic resistance | R ₀ | 0°C | 997,81 | 1000 | 1002,20 | Ω |
| Temperature coefficient of resistance (according to DIN 43760, see below) | TCR | 0°C to +100°C | 6100 | 6178 | 6240 | ppm/K |
| Measurement current | I | | | 0.2 | 5 | mA |
| Self heating coefficient | EK | +23 °C, still air | 1.4 | 1.7 | 2 | mW/K |
| Operation temperature | T _{Op} | | -55 | | +160 | °C |
| Maximum resistance drift | ΔR | 1000h@150°C | | 0.1 | | % |
| Storage temperature | T _{St} | | -55 | | +160 | °C |
| ESD resistant | | MIL 883E3015.7 | | Class 1 | | |

SELF HEATING EFFECT

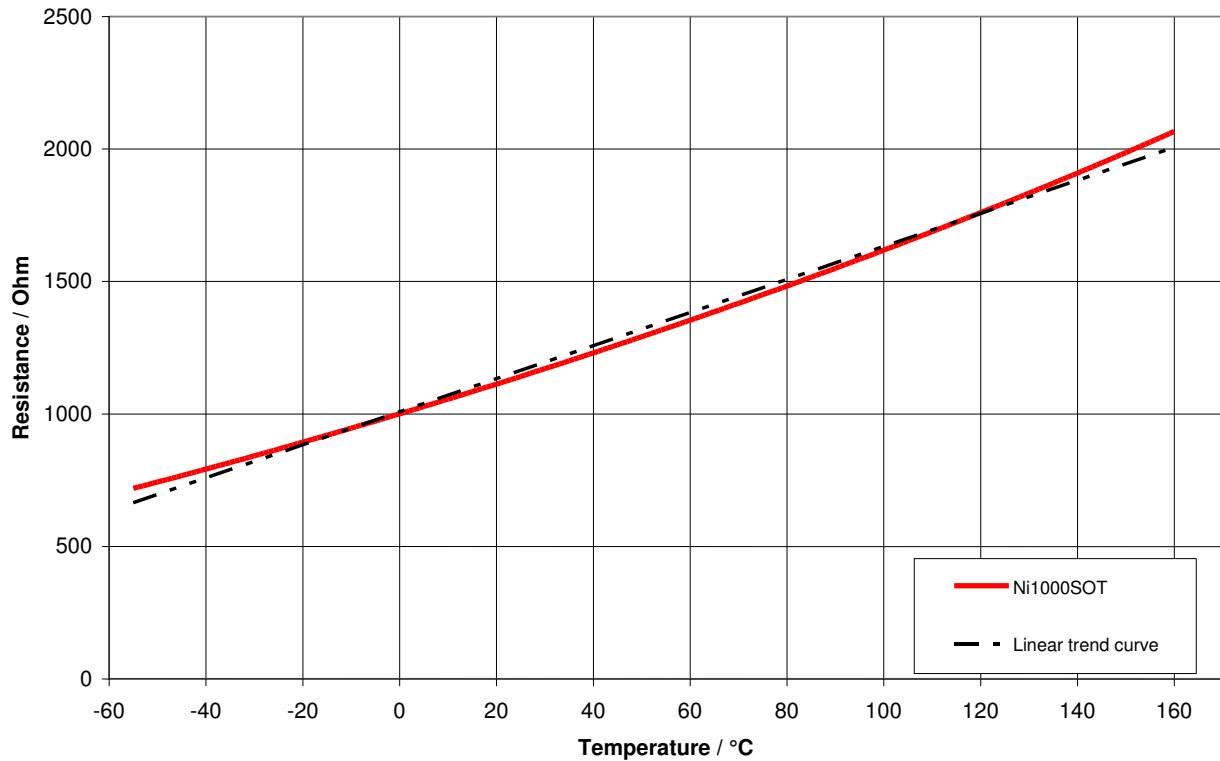
For accurate temperature measurement it is recommended to choose a small current to avoid self heating of the nickel sensing element. The temperature error caused by excessive measurement current can be calculated using: $\Delta T = P/EK$

where $P = I^2 \cdot R$ is the power generated by the measurement current and EK is the self heating coefficient.

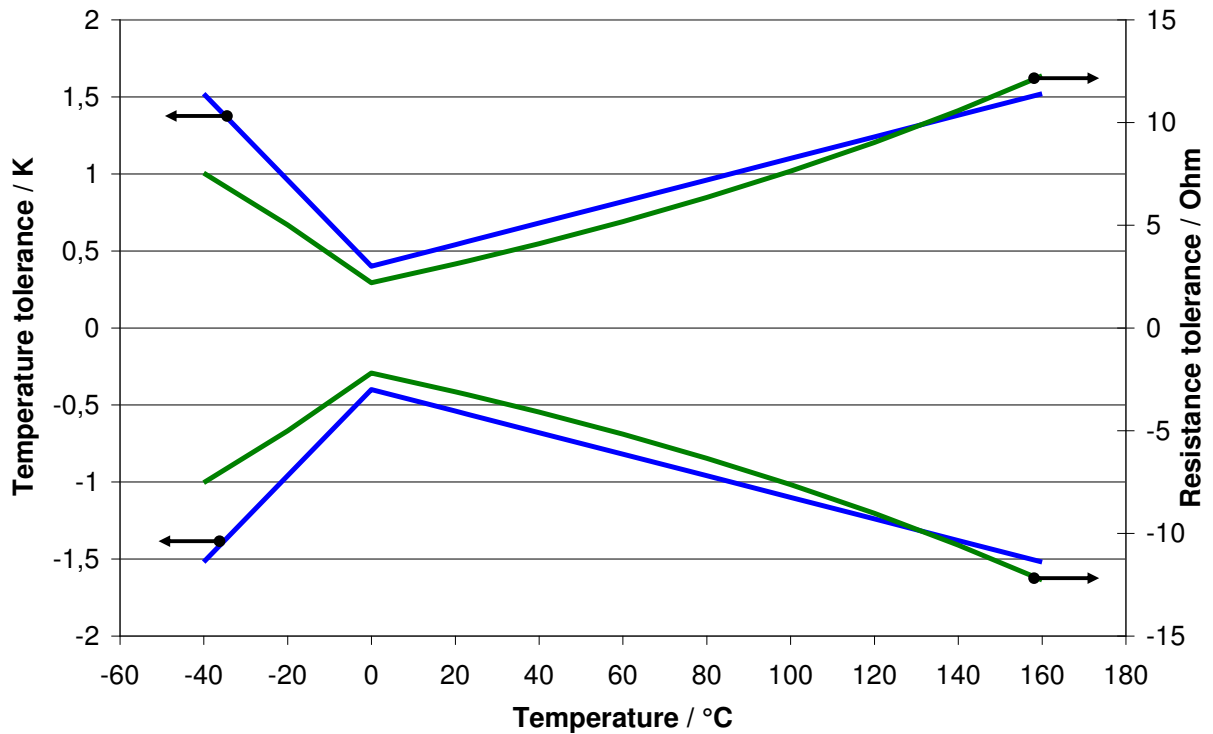
PACKAGE INFORMATION

| Parameter | Condition | Typ. | Unit |
|-----------------|-------------------|---|--------------------------|
| Package | | SOT23 | |
| Soldering | Reflow to + 260°C | 96Sn4Ag | |
| Packing units | | 13" (330 mm) / 10000 | Reel Size / # of sensors |
| Package marking | | Three Digit code: "1" + "XX", where "XX" is the revision. | |

TYPICAL PERFORMANCE CURVES



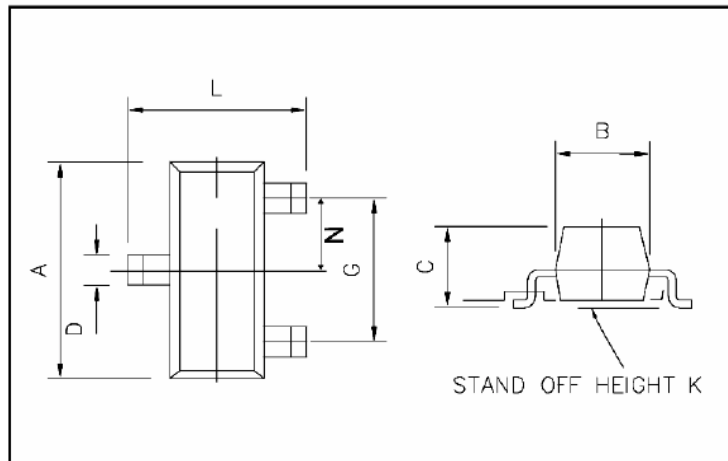
Resistance characteristics



Tolerance chart

MECHANICAL DIMENSIONS

PACKAGE DIMENSIONS SOT23



| DIM | Millimeters | | Inches | |
|-----|-------------|------|--------|--------|
| | Min | Max | Min | Max |
| A | 2.67 | 3.05 | 0.1051 | 0.1201 |
| B | 1.20 | 1.40 | 0.0472 | 0.0551 |
| C | 0.89 | 1.12 | 0.0350 | 0.0441 |
| D | 0.37 | 0.53 | 0.0146 | 0.0209 |
| G | 1.78 | 2.05 | 0.0701 | 0.0807 |
| K | 0.01 | 0.10 | 0.0004 | 0.0039 |
| L | 2.10 | 2.64 | 0.0827 | 0.1039 |
| N | 0.89 | 1.03 | 0.0350 | 0.0406 |

PIN DIMENSIONS

| Dimension | Millimeters | | Inches | |
|---------------|-------------|------|--------|--------|
| | Min | Max | Min | Max |
| Pin Thickness | 0.085 | 0.18 | 0.0033 | 0.0071 |

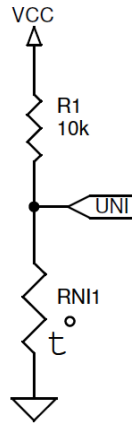
CONNECTIONS

| Top view: | Pin # | Description |
|-----------|---------|---------------------------------------|
| | Pin # 1 | Nickel RTD electrical contact |
| | Pin # 2 | Nickel RTD electrical contact |
| | Pin # 3 | Electrically isolated thermal contact |

APPLICATION NOTE 1

Analogue Interface Circuit for general purpose measurement

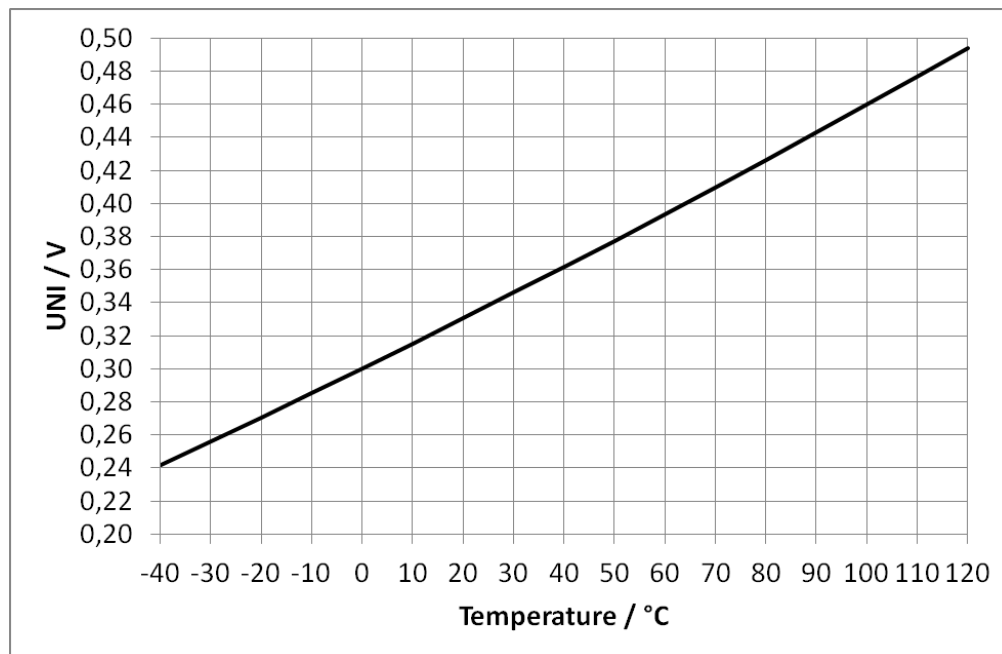
The following voltage dividing circuit can be used for low accuracy measurements. There is no linearization given.



Example of voltage dividing circuit using Ni1000SOT sensor

The output voltage will be calculated by the following equation:

$$UNI = RNI1 / (R1 + RNI1) \cdot VCC$$

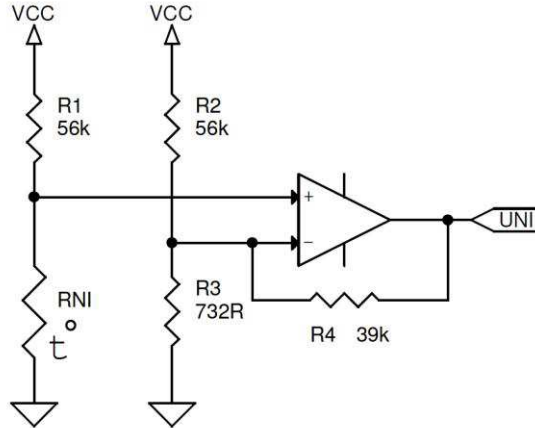


Output voltage characteristics with VCC = 3.3V

APPLICATION NOTE 2

Analogue Interface Circuit for high accuracy measurement

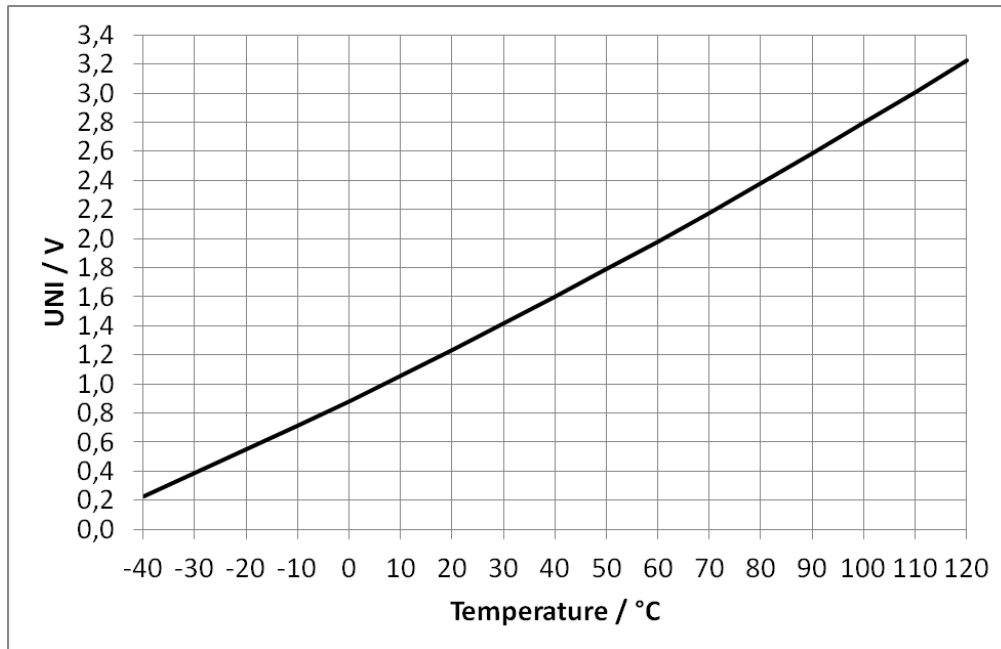
The following circuitry utilizes the output of a bridge circuitry which is amplified in order to improve the measurement resolution. By bridging RNI with an optional 3.65kOhm resistor this circuitry can be linearized.



Example of analog interface circuit for high accuracy measurement using Ni1000SOT sensor

The output voltage will be calculated by the following equation:

$$UNI = \frac{RNI}{R1+RNI} \cdot VCC \cdot [1 + R4 \cdot (1/R2 + 1/R3)] - R4/R2 \cdot VCC$$



Output voltage characteristics with VCC = 3.3V

ORDER INFORMATION

| | |
|--|------------------|
| Please order this product using following: | |
| Part Number | Part Description |
| G-NICO-001 | Ni1000SOT |

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