EPCOS

Product Brief 2008


# NTC Thermistors

## Glass-encapsulated NTC Sensor Elements

Sensors with faster response, more compact dimensions and higher temperature resistance are increasingly needed in the sector of temperature measurement with NTCs.

EPCOS offers an innovative solution: glass-encapsulated NTC sensor elements for temperature measurement with flexible electrical insulation (the G1541, G1551 and G1561 series). In addition to the benefits of the glass-encapsulated NTCs already available for some time, they offer insulation with a specified voltage resistance of 500 V DC/1s in NaCl solution. This assured voltage resistance obviates subsequent insulation, e.g. with Teflon tubes, and simplifies processing so that the costs incurred are significantly reduced. They can even be used in highly constrained insertion situations, such as in sleeves.

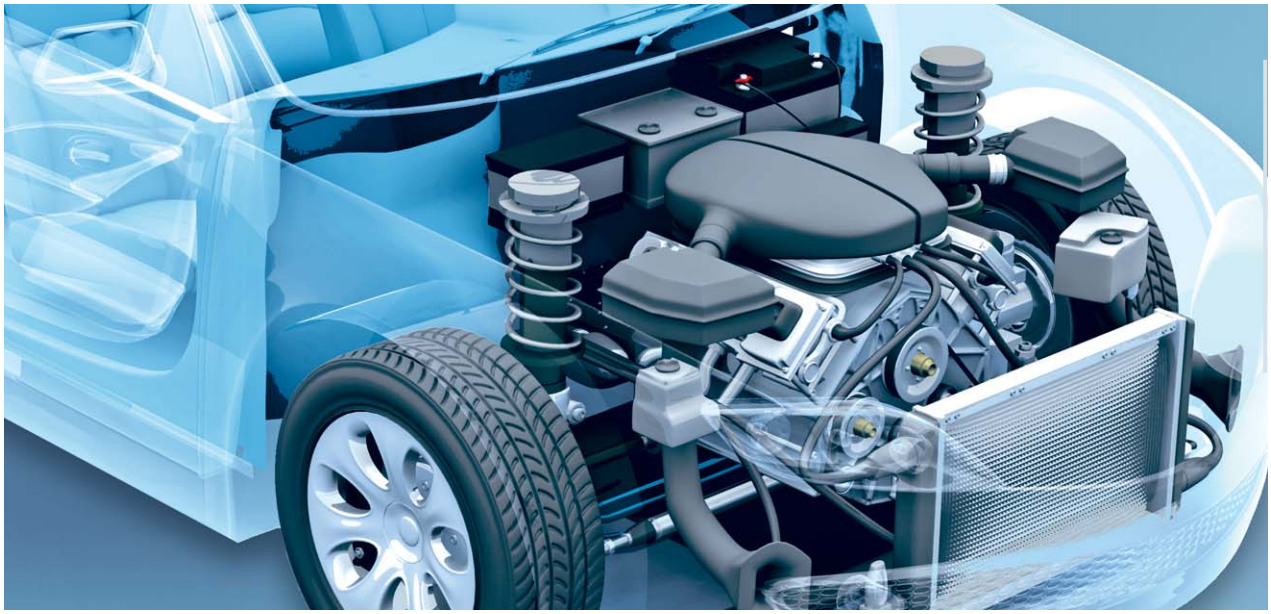
### Typical applications

- Automotive (e.g. engine management)
- Home appliances
- Medical technology

### Features

- Compact dimensions
- Very short response times
- High measurement accuracy and long-term stability
- High temperature resistance up to +300 °C
- Temperature tolerances from ±0.1 Kelvin
- Wide range of resistance values from 2 kΩ to 1.4 MΩ
- Series with various geometries and wire diameters

# Typical Applications of Glass-encapsulated Temperature Sensors



## Automotive – engine management

New environmental regulations designed to reduce fuel consumption and improve exhaust-gas values in new motor vehicles make ever tougher demands on engine management. Optimum control of the engine parameters requires more precise knowledge of various engine states than in the past. This applies especially to the temperatures of the oil and coolant, the exhaust gas and the intake air. Today's sensors must record temperature changes more quickly while simultaneously being exposed to higher temperatures.

Thanks to their faster response and a temperature resistance of up to +300 °C, glass-encapsulated NTC sensor elements are particularly suited for air-flow sensors as well as for measuring oil temperatures and the gas temperature in the exhaust-gas recirculation system.

The insulated variants with a specified voltage resistance of 500 V DC also allow cost-effective use in constrained spaces such as sleeves without the need for complex additional insulation.

## Medical technology

To measure temperatures in medical technology, fast response and high accuracy in the region of the body temperature (+37 °C) are required. EPCOS has developed a series of insulated glass-encapsulated NTC sensor elements specifically for this purpose in various sizes with a tolerance of ±0.1 Kelvin between +25 °C and +45 °C. Apart from their high accuracy, compact size (B57542G3103F000: maximum head diameter 1.4 mm) and fast response, their maximum operating temperature of +150 °C assures reliable sterilization in clinical use. Typical applications for temperature sensors are in body temperature measurement, respiration equipment, dialysis equipment and incubators.

# Typical Applications of Glass-encapsulated Temperature Sensors



## Home appliances

Ever higher demands are being made on small home appliances. Whereas a simple coffee machine used to suffice, today people want an automatic espresso machine with its own steam generation. Higher performance and lower power consumption are also demanded of toasters, dryers, washing machines and irons. To satisfy these increased expectations, the temperatures prevailing in these appliances must be measured with high accuracy and short delays even in temperature ranges significantly over +100 °C. Thus the water temperature required for brewing a perfect espresso must be precisely maintained, and the temperature of the steam used to froth the milk must be exactly controlled during the heating process.

This is where glass-encapsulated NTC sensor elements from EPCOS exploit their advantages to the full. Thanks to their high accuracy, fast response and optimum application temperatures, they deliver the convenience in the home desired by users.

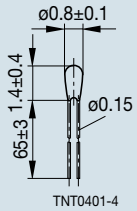
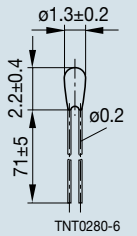
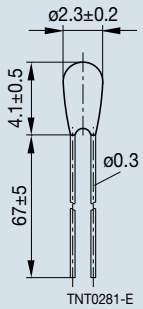
The broad product range, compact dimensions and flexible insulation allow simple processing – even in constrained spaces such as occur in tube sensors – plus the choice of a temperature measuring component optimally suited to the respective requirements.

# Glass-encapsulated NTCs



## Technical data

For high-temperature measurement with extremely short response time. Particularly suitable for measuring sites with limited space and for rapid temperature changes, e.g. engine management.

| Dimensional drawing | Type | Rated resistance $R_{25}$ Ω | Tolerance $\Delta R_{25}$ | B value $B_{0/100}$ K | B value $B_{25/100}$ K | Ordering code[1] | Features |
|---|---|---|---|---|---|---|---|
|  | G540 | 5 k | ±1% | 3450 | 3497 | B57540G0502+000 | • Heat-resistant and highly stable thanks to glass-encapsulation<br>• For temperature measurement up to 300 °C (G540/G1540 up to 250 °C)<br>• Dumet wires, copper-clad FeNi<br>• Climatic category (IEC 60068-1): 55/300/56, Type G540/G1540 = 55/250/56<br>• Options: Ni-plated wires also available |
| | | 230 k | ±3% | 4537[2] | 4264 | B57540G0234+000 | |
| | | 1400 k | ±5% | 5133[3] | 4581 | B57540G0145+000 | |
| | G1540 | 10 k | ±1% | 3586 | 3625 | B57540G1103+005 | |
| | | 10 k | ±2% | 3450 | 3492 | B57540G1103+000 | |
| | | 20 k | ±3% | 3970 | 4012 | B57540G1203+000 | |
| | | 30 k | | 3944 | 3988 | B57540G1303+005 | |
| | | 30 k | | 3970 | 4012 | B57540G1303+000 | |
| | | 100 k | | 4036 | 4092 | B57540G1104+000 | |
|  | G550 | 2 k | ±1% | 3390 | 3436 | B57550G0202+000 | |
| | | 5 k | ±3% | 3450 | 3497 | B57550G0502+000 | |
| | | 230 k | ±5% | 4537[2] | 4264 | B57550G0234+000 | |
| | | 1400 k | | 5133[3] | 4581 | B57550G0145+000 | |
| | G1550 | 10 k | ±1% | 3586 | 3625 | B57550G1103+005 | |
| | | 10 k | ±2% | 3450 | 3492 | B57550G1103+000 | |
| | | 20 k | ±3% | 3970 | 4012 | B57550G1203+000 | |
| | | 30 k | | 3944 | 3988 | B57550G1303+005 | |
| | | 30 k | | 3970 | 4012 | B57550G1303+000 | |
| | | 100 k | | 4036 | 4092 | B57550G1104+000 | |
|  | G560 | 2 k | ±1% | 3390 | 3436 | B57560G0202+000 | |
| | | 5 k | ±3% | 3450 | 3497 | B57560G0502+000 | |
| | | 1400 k | ±5% | 5133[3] | 4581 | B57560G0145+000 | |
| | G1560 | 10 k | ±1% | 3586 | 3625 | B57560G1103+005 | |
| | | 10 k | ±2% | 3450 | 3492 | B57560G1103+000 | |
| | | 20 k | ±3% | 3970 | 4012 | B57560G1203+000 | |
| | | 30 k | | 3944 | 3988 | B57560G1303+005 | |
| | | 30 k | | 3970 | 4012 | B57560G1303+000 | |
| | | 100 k | | 4036 | 4092 | B57560G1104+000 | |

[1] Ordering code example: e.g. B57540G0502H000 ≙ Tolerance $R_{25}$ of ±3%

+: F = $\Delta R_{25}$ = ±1%
G = $\Delta R_{25}$ = ±2%
H = $\Delta R_{25}$ = ±3%
J = $\Delta R_{25}$ = ±5%

[2] $B_{100/200}$

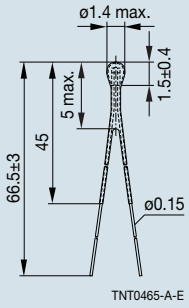
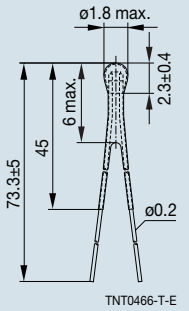
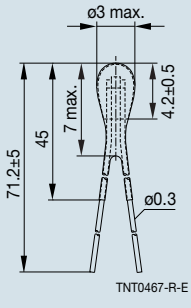
[3] $B_{200/300}$

# Glass-encapsulated NTCs with Insulation



## Technical data

For high-temperature measurement with extremely short response time and tight mounting situations. Easy processing due to insulation of head and wires.

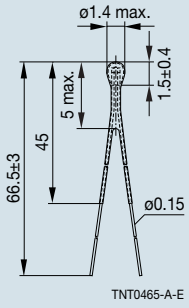
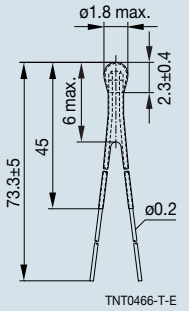
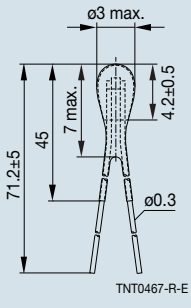
| Dimensional drawing | Type | Rated resistance $R_{25}$ Ω | Tolerance $\Delta R_{25}$ | B value $B_{0/100}$ K | B value $B_{25/100}$ K | Ordering code | Features |
|---|---|---|---|---|---|---|---|
|  | G1541 | 10 k | ±1% | 3586 | 3625 | B57541G1103+005 | • Glass-encapsulated NTC thermistor, heat-resistant and highly stable<br>• Coating of glass body and leads for electrical insulation<br>• For temperature measurement up to 260 °C (G1541 up to 250 °C)<br>• Fast response<br>• Small dimensions<br>• Leads: dumet wires (copper-clad FeNi)<br>• Climatic category (IEC 60068-1): Type G1541 = 55/250/56 Type G1551/G1561 = 55/260/56<br>• Options: Ni-plated dumet wires. Alternative dimensions available on request. |
| | | 30 k | ±2%<br>±3% | 3944 | 3988 | B57541G1303+005<br>+: F = $\Delta R_{25}$ = ±1%<br>G = $\Delta R_{25}$ = ±2%<br>H = $\Delta R_{25}$ = ±3% | |
|  | G1551 | 10 k | ±1% | 3586 | 3625 | B57551G1103+005 | |
| | | 30 k | ±2%<br>±3% | 3944 | 3988 | B57551G1303+005<br>+: F = $\Delta R_{25}$ = ±1%<br>G = $\Delta R_{25}$ = ±2%<br>H = $\Delta R_{25}$ = ±3% | |
|  | G1561 | 10 k | ±1% | 3586 | 3625 | B57561G1103+005 | |
| | | 30 k | ±2%<br>±3% | 3944 | 3988 | B57561G1303+005<br>+: F = $\Delta R_{25}$ = ±1%<br>G = $\Delta R_{25}$ = ±2%<br>H = $\Delta R_{25}$ = ±3% | |

# Glass-encapsulated NTCs with Insulation for Medical Devices



## Technical data

For precise and fast temperature measurement especially body temperatures e.g. in clinical thermometers, lung ventilators, renal dialysis units and incubators (Temperature tolerance ± 0.1 K between 25 °C and 45 °C).

| Dimensional drawing | Type | Resistance $R_{25}$ Ω | Tolerance ΔT | Ordering code | Features |
|---|---|---|---|---|---|
|  | G3542 | 10 k | ±0.1 K (25 ... 45 °C) | B57542G3103F000 | • Extremely high accuracy in the range of the body temperature (37 °C)<br>• Excellent long-term stability<br>• Glass-encapsulated NTC thermistor<br>• Simplified handling due to coating of glass body and leads for electrical insulation<br>• Fast response<br>• Small dimensions<br>• Leads: dumet wires (copper-clad FeNi)<br>• Climatic category (IEC 60068-1): 40/150/56<br>• Options: Ni-plated dumet wires. Alternative dimensions available on request |
|  | G3552 | 10 k<br>22.52 k | ±0.1 K (25 ... 45 °C) | B57552G3103F000<br>B57552G3233F000 | |
|  | G3562 | 10 k<br>22.52 k | ±0.1 K (25 ... 45 °C) | B57562G3103F000<br>B57562G3233F000 | |

**Important information:** Some parts of this publication contain statements about the suitability of our products for certain areas of application. These statements are based on our knowledge of typical requirements that are often placed on our products. We expressly point out that these statements cannot be regarded as binding statements about the suitability of our products for a particular customer application. It is incumbent on the customer to check and decide whether a product is suitable for use in a particular application. This publication is only a brief product survey which may be changed from time to time. Our products are described in detail in our data sheets. The Important Notes (www.epcos.com/ImportantNotes) and the product-specific warnings and cautions must be observed. All relevant information is available through our sales offices.

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