

Automotive Application Solutions with Vishay Temperature Sensors



INTRODUCTION

Thermistor-based temperature sensors are commonly used for temperature sensing, measurement, and control in a wide variety of automotive systems. Thermistor technology has evolved with the constantly changing automotive environment and continues to support the increasing demands for higher performance, improved safety, and more efficient systems required by automotive system designers. Vishay's broad lineup of NTC and linear PTC temperature sensors, from surface-mount to through-hole and assemblies, offer solutions to existing and emerging automotive applications where high accuracy and stability in temperature sensing over a wide temperature range is essential.

AEC-Q200 qualification available on select product series.

APPLICATIONS

- Engine systems
- Battery management
- Electrical systems
- Body control management
- Transmission systems

RESOURCES

- For technical questions contact nlr@vishay.com

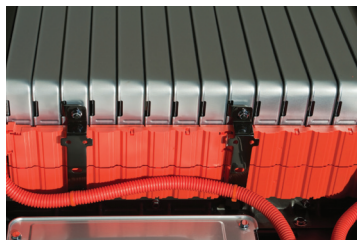


Engine Control Unit (ECU)



Multiple automotive applications utilize NTC temperature sensors to provide input signals to the Engine Control Unit to assist in providing engine status, as well as to control the many system components that make performance, efficiency, and safety possible. In automotive applications where the NTC sensor is exposed to external elements or is in pressurized environments (examples include Intake Air Temperature (IAT) Sensors and Temperature-Manifold Absolute Pressure (TMAP) Sensors), an NTC sensor with high resistance to water and humidity is essential to prevent sensor element failure due to water ingress. For automotive applications requiring a sealed-potted probe assembly (examples include Engine Coolant Temperature (ECT) Sensors, Fuel Temperature Sensors (FTS), Exhaust Gas Recirculation Temperature (EGR-T) Sensors, and Engine Oil Temperature (EOT) Sensors), a robust NTC sensor designed for reliable potting is critical to ensure continual functionality and longevity of the sensor assembly.

Hybrid / Electric Vehicle Battery Management



For proper battery temperature management, NTC sensors sense the temperature of battery cells, and the temperature between adjacent cells, to prevent battery damage from being caused by thermal runaway. Since battery packs come in a range of configurations, Vishay offers many NTC packaging options, including customized solutions.

Temperature Sensor Solutions Through-Hole NTC Sensors

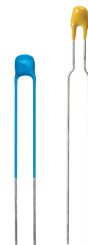
NTCLE300 / NTCLE305

- Negative Temperature Coefficient mini / micro chip epoxy coated sensors with insulated nickel leads for use in confined spaces
- Automotive R_{25} values (2K06 to 10 K Ω) with 2-point sensor accuracy (± 0.5 °C)
- Fast response time
- Improved resistance against water (2000 h/80 °C) and high humidity



NTCLE203...SB0

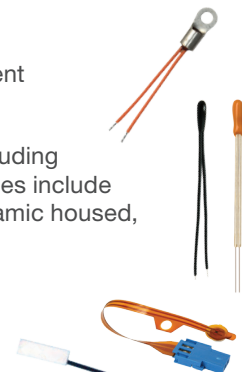
- Negative Temperature Coefficient epoxy coated sensors with solid tin plated nickel leads
- Robust double coating for reliable potting
- Automotive R_{25} values (2K06 to 10 K Ω) with 2-point sensor accuracy (± 0.5 °C)
- Exceptional performance in thermal shock environments



Temperature Sensor Solutions Through-Hole / Assembly NTC Sensors

NTCLE / NTCALUG NTCASRF / NTCAFLEX

- Negative Temperature Coefficient
- High insulation voltage
- Multiple packaging options including customizable solutions (examples include epoxy coated, lug contact, ceramic housed, and flex cable)
- Fast response time

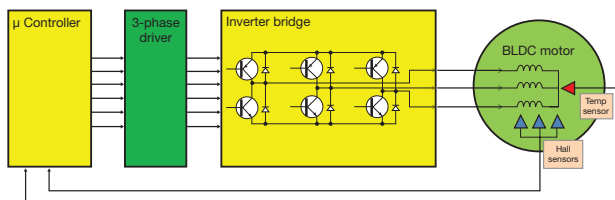


THERMISTORS

Automotive Applications



Brushless DC Motor Controls

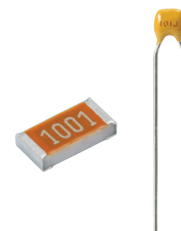
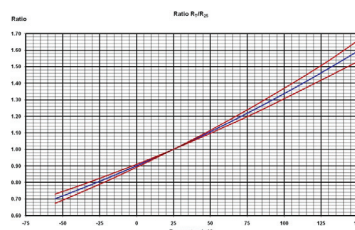


Applications include over temperature protection for power seats, windows, mirrors, roofs and cargo doors. These devices also provide temperature sensing for motor controls such as engine fan and climate control.

Temperature Sensor Solutions Through-Hole / SMD PTC Sensors

TFPTL / TFPT

- Positive, linear temperature characteristic
- High stability over entire temperature range of - 55 °C to + 150 °C
- Positive TCR provides secure “failure” mode behavior



Body Control Management



Applications include seat heating sensors, armrest heating sensors, sunray temperature sensors, and passenger occupant detection systems.

Temperature Sensor Solutions Through-Hole / SMD / Assembly NTC Sensors

NTCLE306 / NTCS / NTCAFLEX05

- Negative Temperature Coefficient mini chip epoxy coated, surface mount, and flex cable sensors for use in confined spaces
- Insulated multi-strand super-flex lead wires (NTCLE306)
- Automotive R25 values (2K06 to 10 KΩ) with tolerances as low as ± 1 %
- Fast response time



Automatic Transmission Control

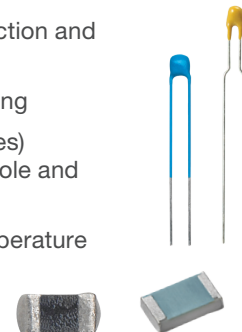


Temperature sensors are used for onboard Transmission Control Module (TCM) temperature sensing and as the sensing element within the Transmission Fluid Temperature (TFT) sensor. The temperature sensing element of the TFT senses transmission fluid temperature; when the sensor reads a specified value, the signal is used by the TCM to delay shifting when the fluid is cold, and control torque converter clutch operation when the fluid is hot.

Temperature Sensor Solutions Through-Hole / SMD NTC and SMD RTD Sensors

NTCLE203...SB0 / NTCS / PTS

- Robust design for added protection and stability in harsh environments
 - NTCLE203 suitable for potting
- Multiple R25 and B25/85 (Curves) available in standard through-hole and surface-mount case sizes
- High accuracy over a wide temperature range up to + 155 °C





THERMISTORS

Automotive Applications



WORLDWIDE SALES CONTACTS

THE AMERICAS

UNITED STATES

VISHAY AMERICAS
ONE GREENWICH PLACE
SHELTON, CT 06484
UNITED STATES
PH: +1-402-563-6866
FAX: +1-402-563-6296

ASIA

SINGAPORE

VISHAY INTERTECHNOLOGY ASIA PTE LTD.
37A TAMPINES STREET 92 #07-00
SINGAPORE 528886
PH: +65-6788-6668
FAX: +65-6788-0988

P.R. CHINA

VISHAY CHINA CO., LTD.
15D, SUN TONG INFOPORT PLAZA
55 HUAI HAI WEST ROAD
SHANGHAI 200030
P.R. CHINA
PH: +86-21-5258 5000
FAX: +86-21-5258 7979

JAPAN

VISHAY JAPAN CO., LTD.
SHIBUYA PRESTIGE BLDG. 4F
3-12-22, SHIBUYA
SHIBUYA-KU
TOKYO 150-0002
JAPAN
PH: +81-3-5466-7150
FAX: +81-3-5466-7160

EUROPE

GERMANY

VISHAY ELECTRONIC GMBH
DR.-FELIX-ZANDMAN-PLATZ 1
95100 SELB
GERMANY
PH: +49-9287-71-0
FAX: +49-9287-70435

FRANCE

VISHAY S.A.
199, BD DE LA MADELEINE
06003 NICE, CEDEX 1
FRANCE
PH: +33-4-9337-2727
FAX: +33-4-9337-2726

UNITED KINGDOM

VISHAY LTD.
SUITE 6C, TOWER HOUSE
ST. CATHERINE'S COURT
SUNDERLAND ENTERPRISE PARK
SUNDERLAND SR5 3XJ
UNITED KINGDOM
PH: +44-191-516-8584
FAX: +44-191-549-9556