DID YOU KNOW?

HOW NTC TEMPERATURE SENSORS WORK

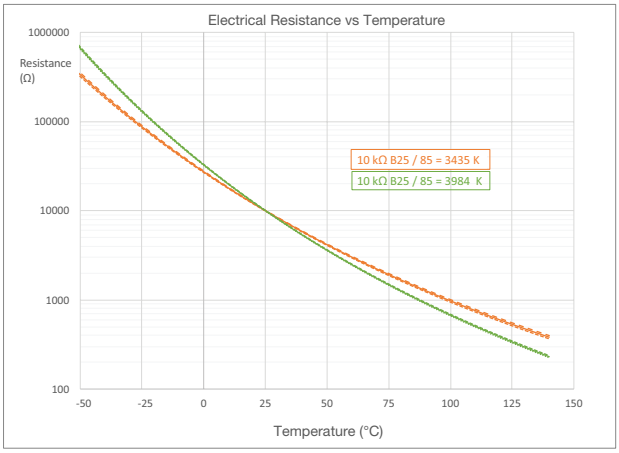
NTC temperature sensors have a decreasing electrical resistance when temperature increases. For a given resistance and tolerance value, important parameters to determine the best suitable lug type would be the B value and tolerance, the response time, and the thermal gradient.

B Value

The relatively large negative resistance slope means that even small temperature changes cause a significant change in electrical resistance, which makes NTC sensors ideal for accurate temperature measurement and control.

As shown in Graph 1, the 10 kΩ NTCALUG with B = 3984 K is a more sensitive NTC to temperature changes than the 10 kΩ NTCALUG with B = 3435 K.

GRAPH 1



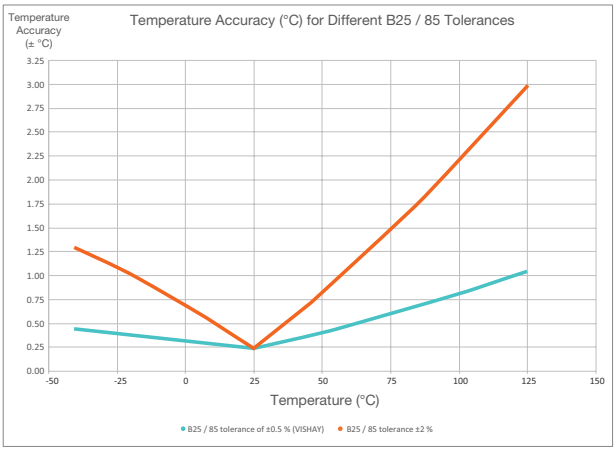
B Value Tolerance

The total tolerance of the NTC sensor over its operating temperature range is a combination of the tolerances at R25 and the B value.

Graph 2 is a graphical representation of the better known “Butterfly” curve, comparing two NTC lug types defined as 10 kΩ, 1 % with a B25 / 85 = 3984 K, ± 0.5 % versus a 10 kΩ, 1 % with a B25 / 85 = 3984 K, ± 2 %.

The exceptionally low B value tolerance of the Vishay NTC lug type compared with those of typical competitors gives circuit designers a much more accurate temperatures measurement, especially at temperatures lower and higher than 25 °C.

GRAPH 2



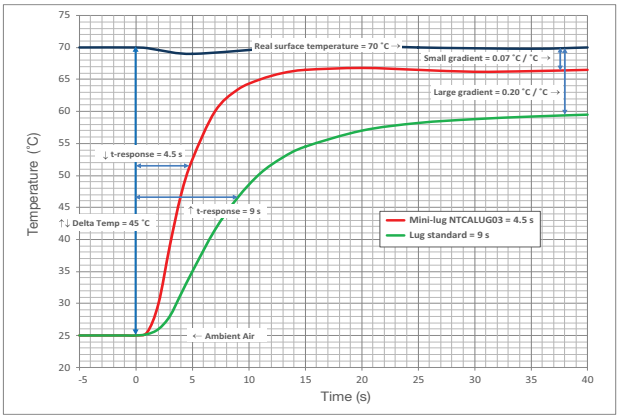
Response Time and Thermal Gradient

A NTC sensor’s speed of response is characterized by its time constant. This is the time it takes for the sensor’s temperature to change by 63.2 % of the change that occurs when the sensor is subjected to a change in temperature.

The thermal gradient of a NTC lug sensor is characterized by its design and good thermal contact between the object or surface to measure and the NTC lug sensor. It is the relative difference between the real temperature and the measured surface temperature.

Graph 3 represents the typical sensed temperature variation when a Vishay NTC lug (NTCALUG03…) is exposed to a high temperature increase and compared with a typical standard from the competition.

GRAPH 3



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