CPTC Thermistor
Glossary

■ Directly heated positive step-function temperature coefficient thermistors (PTC-S)

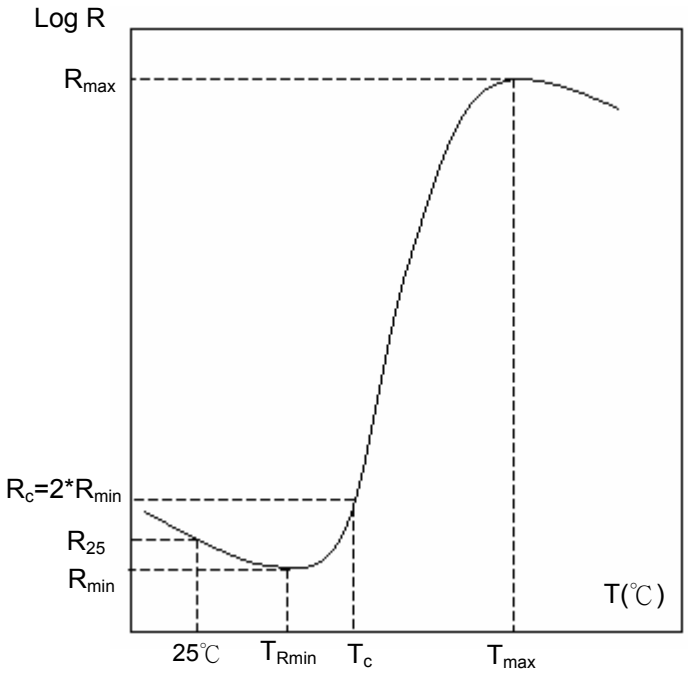
Directly heated positive step-function temperature coefficient thermistor is a thermally sensitive semi-conductor resistor, which shows a step-like increase in its resistance when the increasing temperature reaches a specific value.

■ Zero-power resistance (R_T)

The direct current resistance value of a thermistor measured at a specified temperature under conditions such that the change in resistance due to the internal generation of heat is negligible with respect to the total error of measurement. Zero-power resistance may also be measured using alternating current, if required by the detail specification.

■ Resistance-temperature characteristic (R-T curve, see Fig. 4)

The relation at a specified direct voltage between the zero-power resistance of a PTC thermistor and the temperature of the thermal sensitive element. It is represented by a curve drawn on a semi-logarithmic coordinate graph (T in liner abscissa and R in logarithmic ordinate).



R25： Rated zero power resistance at 25℃

Rmin：Minimum zero power resistance

T_{Rmin} ： Temperature corresponding to minimum resistance

Tc： Switch temperature or curie temperature

Rc：Switch resistance (Rc=2*Rmin)

Rmax： Maximum resistance

T_{Rmax} ：Temperature corresponding to maximum resistance

Fig. 4 R-T curve

■ Rated resistance (R_{25} or R_n)

The zero-power resistance at 25℃, unless another temperature is prescribed in the customer's specification.

■ Minimum resistance (R_{min})

The beginning of the temperature range with a positive temperature coefficient specified by the temperature T_{Rmin} , The value of the PTC resistance value at this temperature is designated as R_{min} , which is the lower limit of the PTC part of the R/T characteristic (see Fig. 4)

■ Switch temperature (T_c)

The specified temperature at which the step-like increase of the resistance occurs. For the individual type of PTC thermistors it is defined as the temperature at which the zero-power resistance is equal to the value R_{Tc} =2 ×R_{min} .

Voltage-current characteristic (V- I curve, see Fig. 5)

The relationship in still air at 25℃ (unless other specified) between the applied voltage (d.c or a.c) at the thermistor terminations and the current under steady-state conditions, thermal equilibrium having been reached. (it is represented by a curve drawn on a dual logarithmic coordinate).

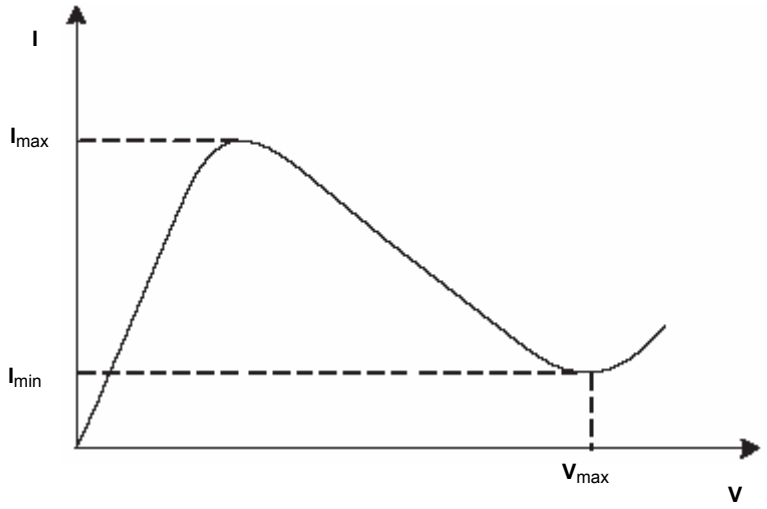


Fig. 5 V-I curve

Rated voltage (V_R)

V_R is supply voltage ling below Vmax. V_R is typically equal to the supply source voltage.

Maximum operating voltage (V_{max})

The maximum voltage which may be continuously applied to the thermistor after switching at the ambient temperature specified in the data sheets.

Maximum operating current (I_{max})

The maximum permissible current (I_{max}) is limited by the specification before switching.

Maximum non-tripping current(I_N)

The maximum current at a specified ambient temperature (preferably 25℃), which the thermistor will keep definitely in its low resistance condition.

Tripping current (I_t)

The lowest current which will cause the thermistor to trip to a high resistance condition at a specified temperature (preferably 25℃) and within a time to be specified in the detail specification.

Insulated thermistor

Thermistors capable of meeting the requirements of the insulation resistance and voltage proof tests when specified in the test schedule.

Non-insulation PTC thermistor

Non-adaptability to insulation voltage and insulation resistance.

Current-time characteristic (I- t curve, see Fig. 6)

The relationship between current and time in a specified voltage and current in still air at 25℃.

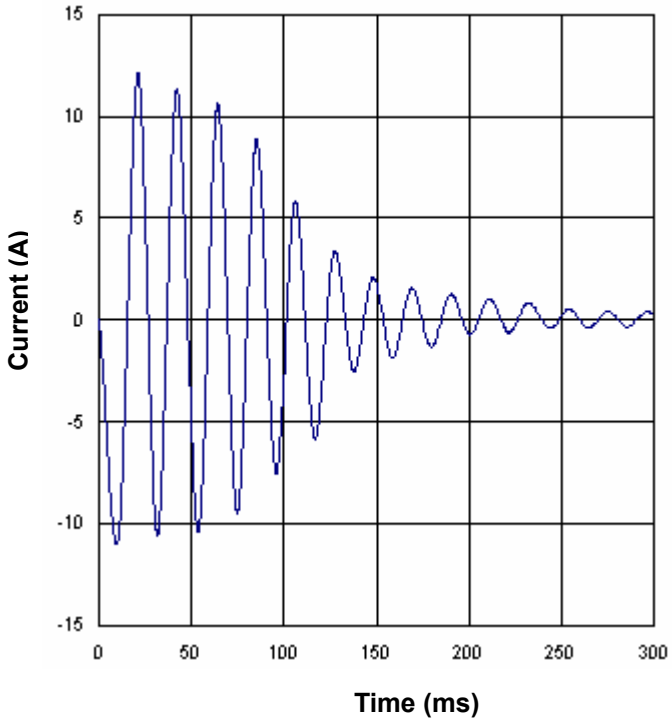


Fig. 6 I-t curve

Residual current (I_{res})

The value of current in the thermistor at a specified ambient temperature (preferably 25℃) under steady-state conditions. The applied voltage is the maximum voltage unless otherwise specified.

Inrush current (I_{in})

The current occurring during the transient period from the moment of switching to the steady state condition.

Peak-to-peak current (I_{inp-p})

The value of the inrush current measured between adjacent positive and negative peaks.

Response time

a) Response time by ambient temperature change (t_a)

The time (in seconds) required by a thermistor to change its temperature between two defined condition when subjected to a change in ambient temperature.

b) Response time by power change (t_p)

The time (in seconds) required by thermistor to change its temperature between two defined conditions of power input.

Range of rated temperature

Thermistor operates in the range of ambient temperature continuously. The range is limited by lower limited temperature of classification; another scope is limited by upper limited temperature of classification.

Rated operation temperature range under maximum applied voltage

Thermistor in the maximum voltage operates in the range of ambient continuously without exceeding the maximum overload current.