CPTC Thermistor

Introduction

The Ceramic Positive Temperature Coefficient (CPTC) thermistors are thermally sensitive semiconductor made of a doped polycrystalline ceramic containing barium titanate (BaTiO3) and other compounds resistors which exhibit an increase in resistance at a specified temperature .The dielectric constant of this ferroelectric material varies with temperature. Below the curie temperature (Tc), the high dielectric constant prevents the formation of potential barriers between the crystal grains, leading to a low resistance. In this region the device has a small negative temperature coefficient. At the curie temperature(Tc), the dielectric constant drops sufficiently to allow the formation of potential barriers at the grain boundaries, and the resistance increases sharply. At even higher temperatures, the material reverts to NTC behavior.

CPTC thermistors can apply to degaussing, motor starting protection, ballast lighting protection, heater, circuit current limiter and temperature sensors because of their characteristic.

- **Advantages**

(1) High temperature coefficient of resistance of thermistor.

(2) A wide variety of thermistors with switch temperature from -40℃ to +320℃.

(3) A wide resistance range from 0.1Ω to 10KΩ.

(4) A wide operating voltage from 6V to 1000V.

(5) Diversified structure.

(6) Simple circuit of application and lower cost.

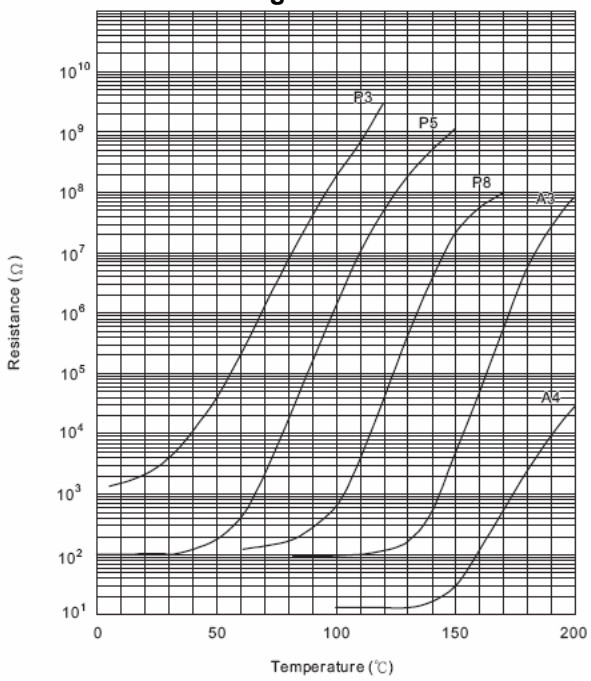
- **Characteristics**

From applications, PTC characteristics have three parts: resistance-temperature (R-T) characteristic, current-time (I-t) characteristic, and voltage-current (V-I) characteristic.

◆ **Resistance-temperature characteristic (R-T curve, see Fig. 1)**

It illustrates the relationship between zero-power resistance and temperature in the specified voltage. When PTC temperature reaches the switch temperature, its resistance increases sharply, this temperature increase can be caused by self-heating due to current flow or ambient temperature rise.

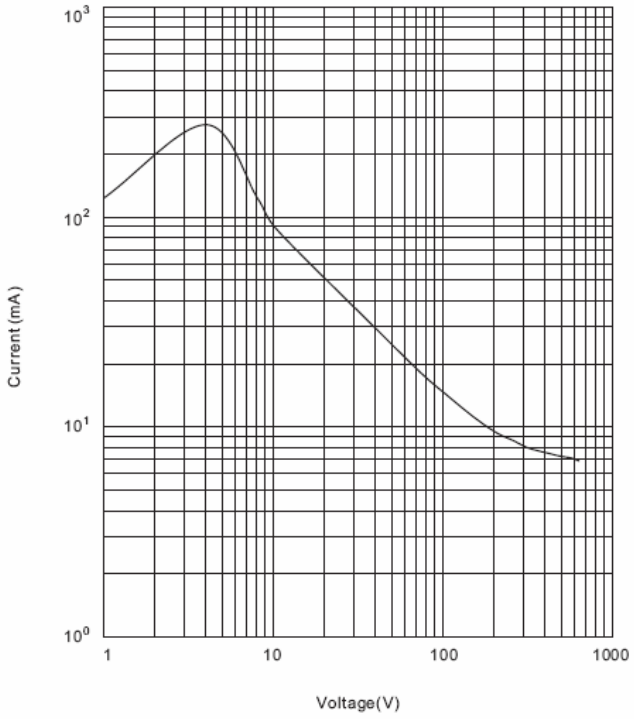
Fig 1 R-T



◆ Voltage-current characteristic (V-I curve, see Fig. 2)

It illustrates the relationship between voltage and current in a thermally steady state in still air at 25℃.

Fig 2 V-I Curve



◆ Current-time characteristic (I-T curve, see Fig. 3)

It illustrates the relationship between current and time in a specified voltage and current in still air at 25℃.

Fig 3 I - T Curve