



TECHNICAL NOTES OF CPTC – CERAMIC PTC THERMISTOR

Q: What's the rated zero power resistance R25?

A: The Zero power resistance, related to the PTC resistance Value under certain temperature, and under this temperature the power of PTC is very low that can be ignored. Zero power resistor, refers to PTC thermistor resistance value under certain temperature, the power consumption is very low, and the change of resistance caused by power consumption can be ignored. And hereby the rated zero-power resistance refers to zero-power resistance value when ambient temperature is 25 ° C .

Q; What is Rmin?

A: The Rmin refers to the minimum Zero-power resistance value of the PTC termistor.

Q: What is Tc?

A: For the application of PTC thermistor, the temperature value under which the resistance value sharply increases is important, we define this temperature value as Curie temperature. And the corresponding PTC thermistor resistance under Curie temperature is $R_{Tc} = 2 * R_{min}$.

Q: What is temperature coefficient α ?

A: PTC thermistor temperature coefficient is defined as relative changes of resistance caused by the changes of temperature. The greater temperature coefficient, the more sensitive response of the PTC thermistor will be. $\alpha = (I_{gR2} - I_{gR1}) / I_{ge} (T2 - T1)$

Q: What is surface temperature Tsurf?

A: Tsurf refers to the surface temperature of PTC thermistor, when PTC thermistor is under required voltage and keep the thermal equilibrium with surrounding environment for a long time.

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Q: what is Trip current I_k ?

A: The minimum current at which the surface temperature of PTC thermistor increase to the point of Curies temperature.

Q: What is the trip time T_s

A: With the ambient temperature of 25 °C, add an initial current (Trip current is guaranteed) to PTC thermistor, the time when the current in thermistor reduced to 50% of initial one is trip time.

Q: What is hold current I_h ?

A: The current of PTC thermistor is not enough to make the self-heating temperature rise over Curie temperature, such current is called no tripping current. And the maximum current value is defined as hold current I_h .

Q: What is the I_{max} ?

A: The maximum current I_{max} refers to the current affordability of PTC thermistor, and the PTC thermistor will be invalid once the current exceed I_{max} .

Q: What is I_r ?

A: I_r refers to the current under the thermal equilibrium and Maximum working Voltage V_{max} .

Q: What is the Maximum working Voltage V_{max} ?

A: V_{max} refers to the maximum voltage that the PTC thermistor can withstand without damage. For the same product, the higher ambient temperature, the lower Maximum working current V_{max} will be.

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Q: What is rated voltage VN?

A: Rated voltage VN refers to the supplying voltage under the Maximum working voltage, usually $V_{max} = VN + 15\%$

Q: What is VD?

A: VD refers to the voltage affordability of PTC thermistor. The PTC thermistor will be invalid once the voltage exceed the breakdown voltage.

Q: What is structure and function of PTC thermistor?

A: Ceramic materials are usually considered as excellent high-resistance insulator, and ceramic PTC thermistor is barium titanate-based and doped with polycrystalline ceramic materials, it has properties of lower resistance and semi-conductivity. And the properties are achieved through purposive doping of multivalent chemical material as crystal lattice: in the crystal lattice, partial Barium ions or titanium acid ions are replaced by the multivalent ions, which comes to considerable quantity conductive free electrons. The PTC thermistor phenomenon, that is, the reason of sharp increase of resistance values lies in the material organization is composed of many small-ceramic component. In the grain interface, the so-called grain boundaries (boundary) create potential barrier, impeding electronic access to the adjacent regions, and therefore create a high resistance. This effect is offset under lower temperatures: in the grain boundary, high dielectric constant and spontaneous polarization strength will hamper Barrier and the formation of the free flow of electrons in low temperature. But the dielectric constant intensity and polarization strength substantially reduced in high temperature, which leads to the barrier and significant increase of resistance, showing a strong PTC effect.

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