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NTC thermistors for inrush current limiting

Leaded and coated disks

Series/Type: **B57235**
Date: March 2006

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Applications

- Switch-mode power supplies

Features

- Useable in series connections up to 265 V_{rms}
- Coated thermistor disk
- Kinked leads of tinned copper wire
- Wide resistance range
- Small space requirement
- Cost-effective
- UL approval (E69802)

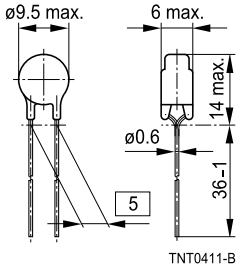
Options

Resistance tolerance <20% and alternative lead configurations available on request

Delivery mode

Bulk (standard),
cardboard tape, reeled or in Ammo pack

Dimensional drawing



Dimensions in mm
Approx. weight 0.8 g

General technical data

Climatic category	(IEC 60068-1)		55/170/21	
Max. power	(at 25 °C)	P_{max}	1.8	W
Resistance tolerance		$\Delta R_R/R_R$	±20	%
Rated temperature		T_R	25	°C
B value tolerance		$\Delta B/B$	±3	%
Dissipation factor	(in air)	δ_{th}	approx. 9	mW/K
Thermal cooling time constant	(in air)	τ_c	approx. 60	s
Heat capacity		C_{th}	approx. 540	mJ/K

Electrical specification and ordering codes

R_{25} Ω	I_{max} (0...65 °C) A	No. of R/T characteristic	$B_{25/100}$ K	C_{test} [1] 230 V µF	C_{test} [1] 110 V µF	Param. for R(I) [1] k	Param. for R(I) [1] n	Ordering code
5	4.2	1202	2800	200	800	0.710	−1.30	B57235S0509M000
6	4.0	1202	2800	200	800	0.757	−1.30	B57235S0609M000
8	3.5	1203	2900	200	800	0.814	−1.32	B57235S0809M000
10	3.0	1203	2900	200	800	0.879	−1.32	B57235S0100M000

1) For details on the capacitance C_{test} as well as on the parameters k and n refer to "Application Notes", chapters 2.6 and 2.7.

Reliability data

Test	Standard	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	IEC 60068-2-2	Storage at upper category temperature T: 170 °C t: 1000 h	< 10%	No visible damage
Storage in damp heat, steady state	IEC 60068-2-78	Temperature of air: 40 °C Relative humidity of air: 93% Duration: 21 days	< 5%	No visible damage
Rapid temperature cycling	IEC 60068-2-14	Lower test temperature: −55 °C Upper test temperature: 170 °C Number of cycles: 10	< 10%	No visible damage
Endurance		$I = I_{max}$ t: 1000 h	< 10%	No visible damage
Cyclic endurance		$I = I_{max}$, 1000 cycles On-time = 1 min Cooling time = 6 min	< 10%	No visible damage
Transient load		Capacitance = C_{test} Number of cycles: 1000	< 5%	No visible damage

Cautions and warnings for ICLs

The self-heating of a thermistor during operation depends on the load applied and the applicable dissipation factor.

When loaded with maximum allowable current/power and the specified dissipation factor is taken as a basis, the NTC thermistor may reach a mean temperature of up to 250 °C.

The heat developed during operation will also be dissipated through the lead wires. So the contact areas, too, may become quite hot at maximum load.

When mounting NTC thermistors you have to ensure that there is an adequate distance between the thermistor and all parts which are sensitive to heat or combustible.

Cautions and warnings

General

See "Important notes" at the end of this document.

Storage

- Store thermistors only in original packaging. Do not open the package before storage.
- Storage conditions in original packaging: storage temperature −25 °C ... +45 °C, relative humidity ≤75% annual mean, maximum 95%, dew precipitation is inadmissible.
- Do not store SMDs where they are exposed to heat or direct sunlight. Otherwise, the packing material may be deformed or SMDs may stick together, causing problems during mounting.
- Avoid contamination of thermistors surface during storage, handling and processing.
- Avoid storage of thermistor in harmful environments like corrosive gases (SOx, Cl etc).
- After opening the factory seals, such as polyvinyl-sealed packages, use the SMDs as soon as possible.
- Solder thermistors after shipment from EPCOS within the time specified:
  SMDs: 12 months
  Leaded components: 24 months

Handling

- NTC thermistors must not be dropped. Chip-offs must not be caused during handling of NTCs.
- Components must not be touched with bare hands. Gloves are recommended.
- Avoid contamination of thermistor surface during handling.

Soldering

- Use resin-type flux or non-activated flux.
- Insufficient preheating may cause ceramic cracks.
- Rapid cooling by dipping in solvent is not recommended.
- Complete removal of flux is recommended.

Mounting

- When NTC thermistors are encapsulated with sealing material or overmolded with plastic material, the precautions given in chapter “Mounting instructions”, “Sealing, potting and overmolding” must be observed.
- Electrode must not be scratched before/during/after the mounting process.
- Contacts and housings used for assembly with thermistor have to be clean before mounting.
- During operation, the thermistor’s surface temperature can be very high (ICL). Ensure that adjacent components are placed at a sufficient distance from the thermistor to allow for proper cooling ot the thermistors.
- Ensure that adjacent materials are designed for operation at temperatures comparable to the surface temperature of the thermistor. Be sure that surrounding parts and materials can withstand this temperature.
- Make sure that thermistors (ICLs) are adequately ventilated to avoid overheating.
- Avoid contamination of thermistor surface during processing.

Operation

- Use thermistors only within the specified operating temperature range.
- Use thermistors only within the specified voltage and current ranges (ICLs).
- Environmental conditions must not harm the thermistors. Use thermistors only in normal atmospheric conditions.
- Contact of NTC thermistors with any liquids and solvents should be prevented. It must be ensured that no water enters the NTC thermistor (e.g. through plug terminals). For measurement purposes (checking the specified resistance vs. temperature), the component must not be immersed in water but in suitable liquids (e.g. Galden).
- Avoid dewing and condensation.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by malfunction (e.g. use VDR for limitation of overvoltage condition).

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