



PTC thermistors

Limit temperature sensors,
SMD, EIA size 0603, ± 5 °C tolerance

Series/Type: B59601
Date: November 2005

SMD
Applications

- DC/DC converters
- Home appliances
- Dimmers
- Electronic ballasts
- Temperature management in automotive electronics
- Over temperature protection of power transistors and power ICs (e.g. in battery pack, notebook)
- SMPS

Features

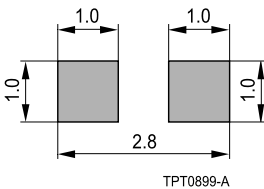
- Thermistor chip with lead-free tinned terminations
- Small size
- Fast and reliable response
- Suitable for reflow soldering
- RoHS-compatible

Options

- Other T_{NTT} values on request

Delivery mode

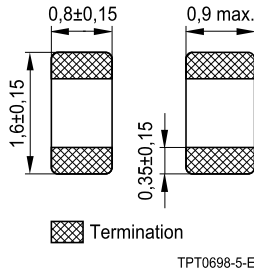
- Blister tape, 180-mm reel

Geometry of solder pad


Recommended maximum dimensions (mm)

General technical data

| | | | | |
|-----------------------------|--|-----------------|------------------------------|------------------|
| Max. operating voltage | $(T_A = -40^\circ\text{C} \dots T_{NTT} + 15\text{K})$ | V_{\max} | 32 | VDC |
| Rated resistance | $(T_A = 25^\circ\text{C})$ | R_R | 470 | Ω |
| Tolerance of R_R | | ΔR_R | ± 50 | % |
| Operating temperature range | $(V \leq V_{\max})$ | T_{op} | $-40 / T_{NTT} + 15\text{K}$ | $^\circ\text{C}$ |

Dimensional drawing


Dimensions in mm


Electrical specifications and ordering codes

| $T_{NTT} \pm \Delta T$ °C | R ($T_{NTT} - \Delta T$) ($V_{PTC} \leq 2.5$ V) k Ω | R ($T_{NTT} + \Delta T$) ($V_{PTC} \leq 2.5$ V) k Ω | Ordering code |
|------------------------------|---|---|-----------------|
| 75 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0075A062 |
| 85 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0085A062 |
| 95 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0095A062 |
| 105 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0105A062 |
| 115 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0115A062 |
| 125 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0125A062 |
| 135 ± 5 | ≤ 4.7 | ≥ 4.7 | B59601A0135A062 |

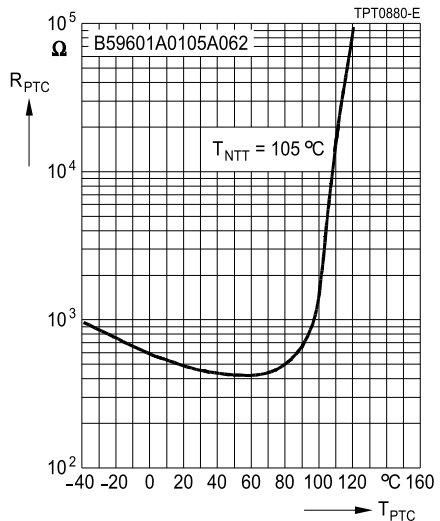
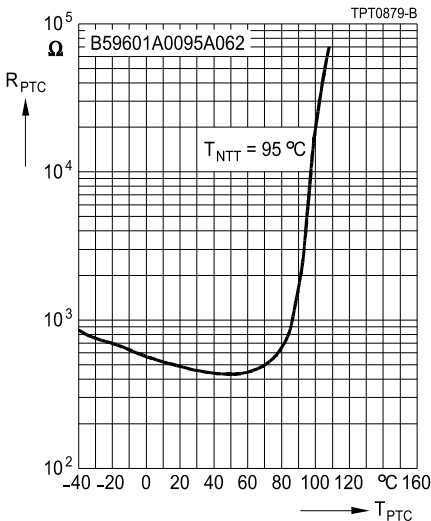
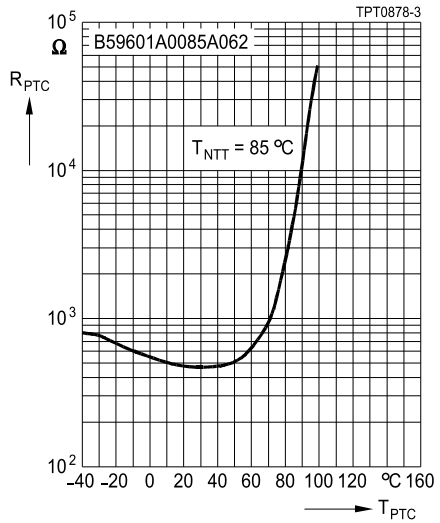
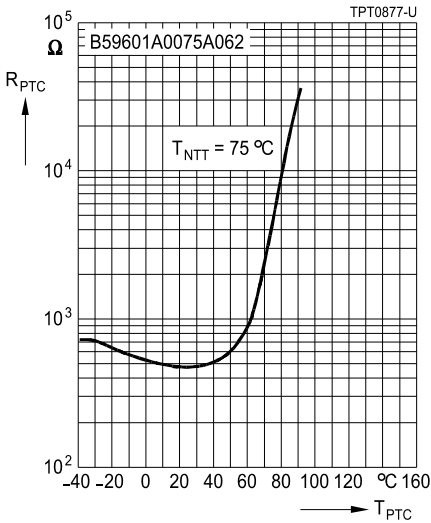
Reliability data

| Test | Standard | Test conditions | $ \Delta R_{25}/R_{25} $ |
|--|----------------------------|--|--------------------------|
| Electrical endurance, const. at 85 °C | IEC 60738-1 | Storage at V_{max} $T = 85$ °C $t : 1000$ h | < 25% |
| Damp heat | IEC 60068-2-3 | Storage at 40 °C Relative humidity: 93% Duration: 56 days | < 10% |
| Rapid change of temperature in air | IEC 60068-2-14, Test Na | -25 °C, 125 °C Number of cycles: 5 $t : 30$ min | < 10% |
| Vibration | IEC 60068-2-6, Test Fc | $f = 10-55-10$ Hz $h = 0.75$ mm (respectively 10 g) $t = 3 \cdot 2$ h | < 5% |
| Bump | IEC 60068-2-27 | Pulse shape: half-sine $a = 50$ g Pulse duration: 1 ms; 6 · 3 pulses | < 5% |
| Climatic sequence | IEC 60068-2-30 | Dry heat: $T = 125$ °C, $t : 16$ h Damp heat first cycle Cold: $T = -25$ °C, $t : 2$ h Damp heat 5 cycles | < 10% |
| Adhesive strength on PCB | | Shearing of the component soldered on PCB by a force of 5 N in normal to components longitudinal axis | No visible damage |



Characteristics (typical)

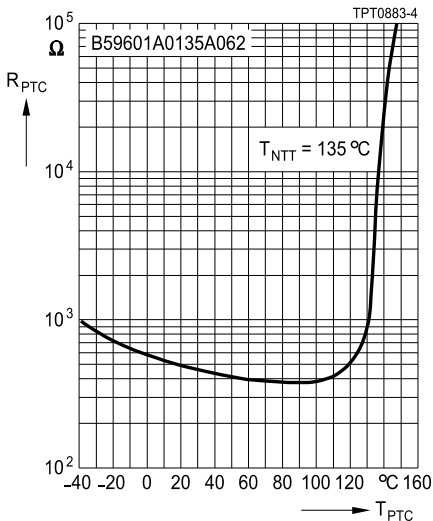
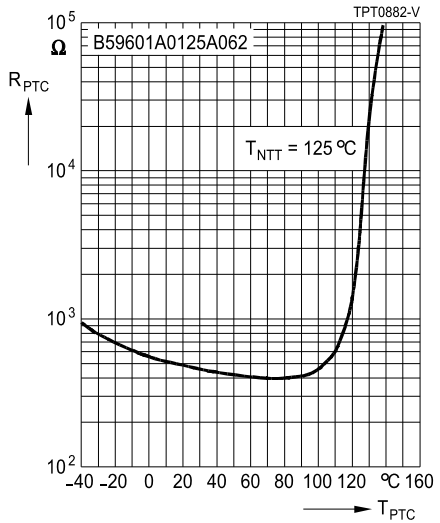
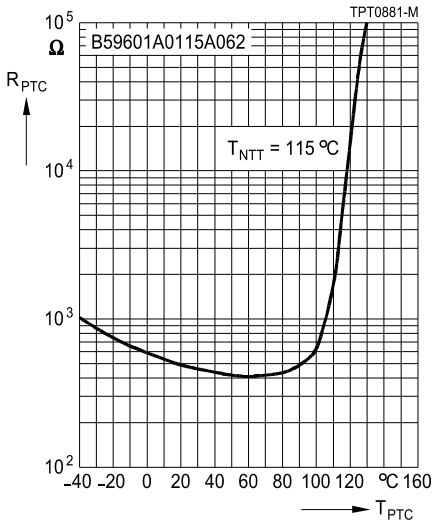
PTC resistance R_{PTC} versus
 PTC temperature T_{PTC}
 (measured at low signal voltage)





Characteristics (typical)

PTC resistance R_{PTC} versus
 PTC temperature T_{PTC}
 (measured at low signal voltage)





1 Precautions for PTC thermistor use

General

- EPCOS thermistors are designed for specific applications and should not be used for purposes not identified in our specifications, application notes and data books unless otherwise agreed with EPCOS during the design-in-phase.
- Ensure suitability of thermistor through reliability testing during the design-in phase. The thermistors should be evaluated taking into consideration worst-case conditions.

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 $\leq 75\%$ annual mean, maximum 95%, dew precipitation is inadmissible.
- Avoid contamination of thermistors surface during storage, handling and processing.
- Avoid storage of thermistor in harmful environment with effect on function on long-term operation (examples given under operation precautions).
- Use thermistor within 6 months after delivery.

Handling

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

Soldering

- Use rosin-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

- Electrode must not be scratched before/during/after the mounting process.
- Contacts and housing used for assembly with thermistor have to be clean before mounting. Especially grease or oil must be removed.
- When PTC thermistors are encapsulated with sealing material, the precautions given in chapter "Mounting instructions", "Sealing and potting" must be observed.
- When the thermistor is mounted, there must not be any foreign body between the electrode of the thermistor and the clamping contact.
- The minimum force of the clamping contacts pressing against the PTC must be 10 N.
- During operation, the thermistor's surface temperature can be very high. Ensure that adjacent components are placed at a sufficient distance from the thermistor to allow for proper cooling at the thermistors.
- Ensure that adjacent materials are designed for operation at temperatures comparable to the surface temperature of thermistor. Be sure that surrounding parts and materials can withstand this temperature.
- Avoid contamination of thermistor surface during processing.



Operation

- Use thermistors only within the specified temperature operating range.
- Use thermistors only within the specified voltage and current ranges.
- Environmental conditions must not harm the thermistors. Use thermistors only in normal atmospheric conditions. Avoid use in deoxidizing gases (chlorine gas, hydrogen sulfide gas, ammonia gas, sulfuric acid gas etc), corrosive agents, humid or salty conditions. Contact with any liquids and solvents should be prevented.
- Be sure to provide an appropriate fail-safe function to prevent secondary product damage caused by abnormal function (e.g. use VDR for limitation of overvoltage condition).

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The following applies to all products named in this publication:

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