



## **PTC thermistors as limit temperature sensors**

Motor protection, triple sensors

**Series/Type:**            **B59300**  
**Date:**                    2025-07-24

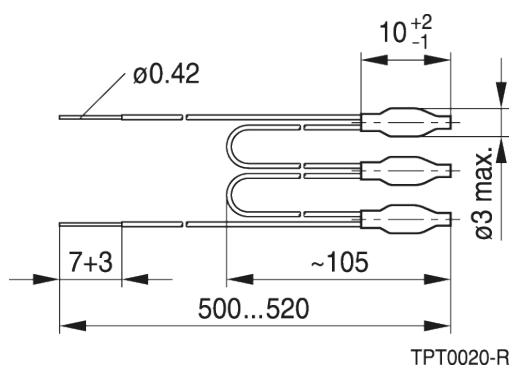
### Application

- Thermal protection of winding in electric motors
- Limit temperature monitoring

### Features

- Thermistor pellets with insulating encapsulation in series connection (triple sensor)
- Low-resistance type, steep R/T curve
- Silver-plated and PTFE-insulated AWG 26 litz wires
- Characteristics for sensing temperatures  
 $T_{\text{sense}} = 100$  up to  $160$  °C, conform with DIN VDE V 0898-1-401
- Color coding of litz wires according to DIN VDE V 0898-1-401, connecting wires in yellow
- UL approval to UL 1434 (file number E69802)
- RoHS-compatible

### Dimensional drawing



Dimensions in mm

### Delivery mode

Bulk

### General technical data

Max. operating voltage	( $T_A = 0 \dots 40$ °C)	$V_{\text{max}}$	30	V DC
Measuring voltage <sup>1)</sup>	( $T_A = -25$ °C ... $T_{\text{sense}} + 5$ K)	$V_{\text{meas}}$	$\leq 2.5$	V DC
Max. measuring voltage <sup>1)</sup>	For $T_A$ see table "Electrical specifications"	$V_{\text{meas,max}}$	7.5	V DC
Rated resistance	( $V_{\text{PTC}} \leq 2.5$ V)	$R_R$	$\leq 300$	$\Omega$
Insulating test voltage		$V_{\text{ins}}$	2.5	kV AC
Thermal threshold time		$t_a$	$< 3$	s
Operating temperature range	( $V \leq V_{\text{meas,max}}$ )	$T_{\text{op}}$	$-25/T_{\text{sense}} + 23$	°C
Operating temperature range	( $V = V_{\text{max}}$ )	$T_{\text{op}}$	0/+40	°C

<sup>1)</sup>  $V_{\text{meas}}$  and  $V_{\text{meas,max}}$  for  $90$  °C  $\leq T_{\text{sense}} \leq 160$  °C acc. to DIN VDE V 0898-1-401.

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**B59300**
**Electrical specifications and ordering codes**

$T_{\text{sense}}$ °C	R ( $T_{\text{sense}} - \Delta T$ ) ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	R ( $T_{\text{sense}} + \Delta T$ ) ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	R ( $T_{\text{sense}} + 15 \text{ K}$ ) ( $V_{\text{PTC}} \leq 7.5 \text{ V}$ ) $\Omega$	R ( $T_{\text{sense}} + 23 \text{ K}$ ) ( $V_{\text{PTC}} \leq 7.5 \text{ V}$ ) $\Omega$	Ordering code
<b><math>\Delta T = \pm 5 \text{ K}</math></b>					
70	$\leq 1710$	$\geq 1710$	-	$\geq 30 \text{ k}$	B59300M1070A070
80	$\leq 1710$	$\geq 1710$	-	$\geq 30 \text{ k}$	B59300M1080A070
90	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1090A070
100	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1100A070
110	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1110A070
120	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1120A070
130	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1130A070
140	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1140A070
145	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1145A070
150	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1150A070
155	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1155A070
160	$\leq 1650$	$\geq 3990$	$\geq 12 \text{ k}$	-	B59300M1160A070
<b><math>\Delta T = \pm 7 \text{ K}</math></b>					
180	$\leq 1710$	$\geq 1710$	-	$\geq 30 \text{ k}$	B59300M1180A070

**Color coding of litz wires (to DIN VDE V 0898-1-401)**

$T_{\text{sense}}$ °C	Color
70	white/brown
80	white/white
90	green/green
100	red/red
110	brown/brown
120	grey/grey
130	blue/blue
140	white/blue
145	white/black
150	black/black
155	blue/black
160	blue/red
180	white/red

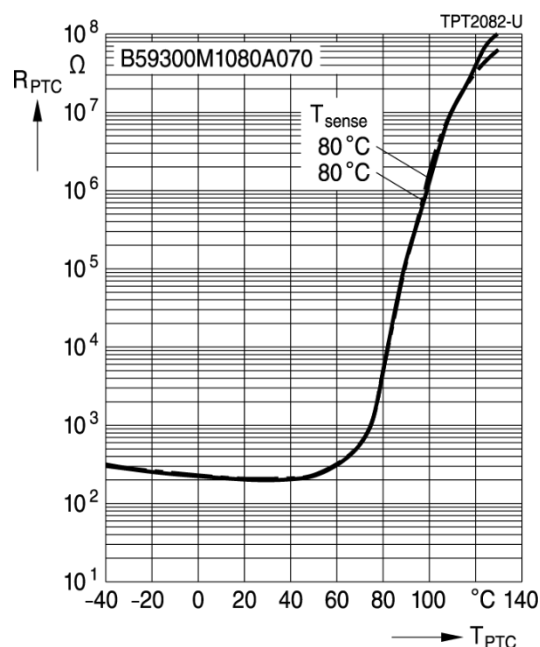
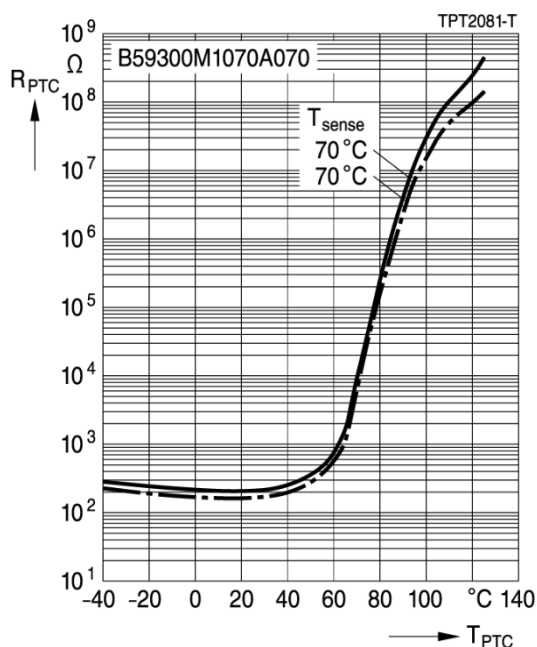
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**Reliability data**

Test	Standard	Test conditions	$ \Delta R_{25}/R_{25} $
Electrical endurance, constant	IEC 60738-1	Storage at $V_{max}$ and $T_{op,max}$ (@ $V_{max}$ ) Test duration: 1000 h	< 25%
Damp heat	IEC 60738-1	Temperature of air: 40 °C Relative humidity of air: 93% Duration: 56 days Test according to IEC 60068-2-78	< 10%
Rapid change of temperature	IEC 60738-1	$T_1 = T_{op,min}$ (0 V), $T_2 = T_{op,max}$ (0 V) Number of cycles: 100 Test duration: 30 min Test according to IEC 60068-2-14, test Na	< 25%
Vibration	IEC 60738-1	Frequency range: 10 ... 55 Hz Displacement amplitude: 0.75 mm Test duration: 3 × 2 h Test according to IEC 60068-2-6, test Fc	< 5%

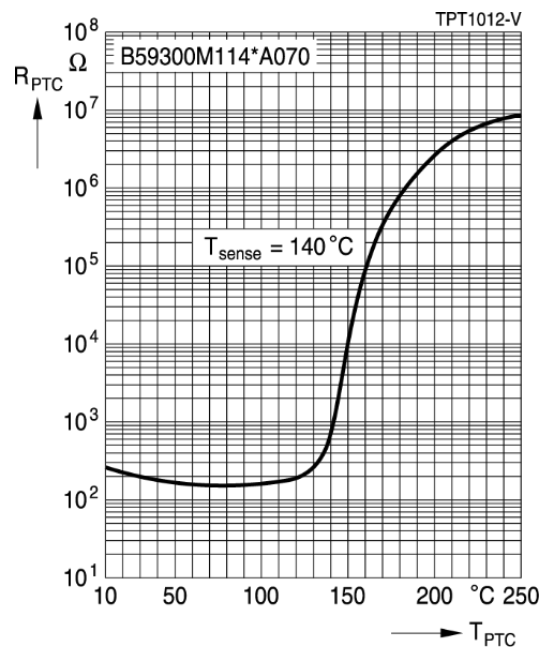
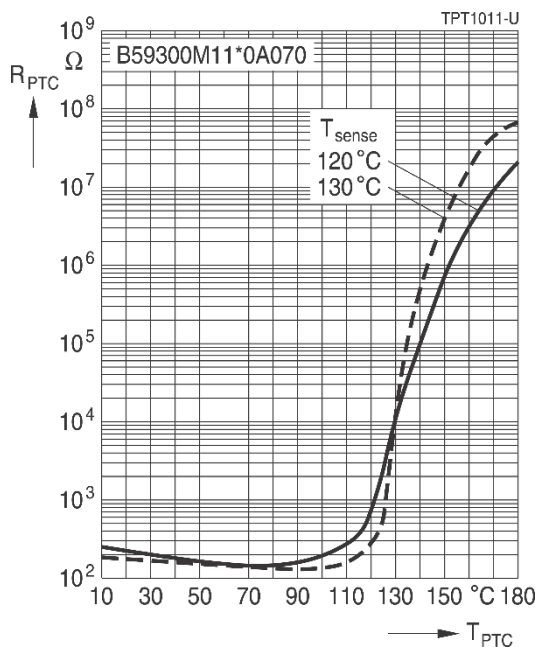
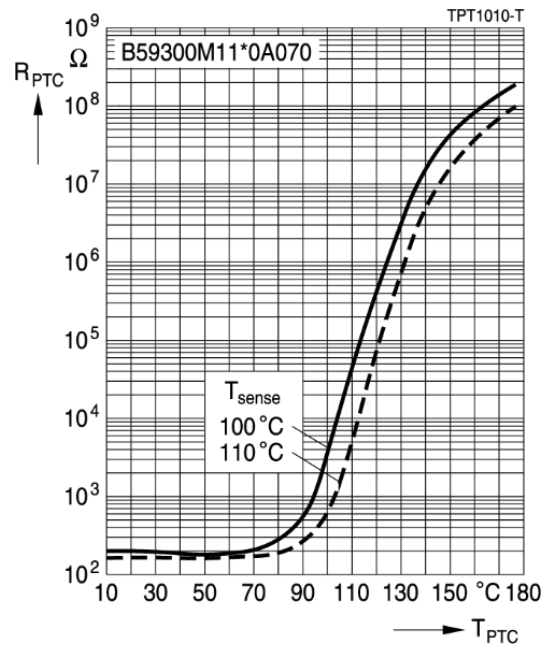
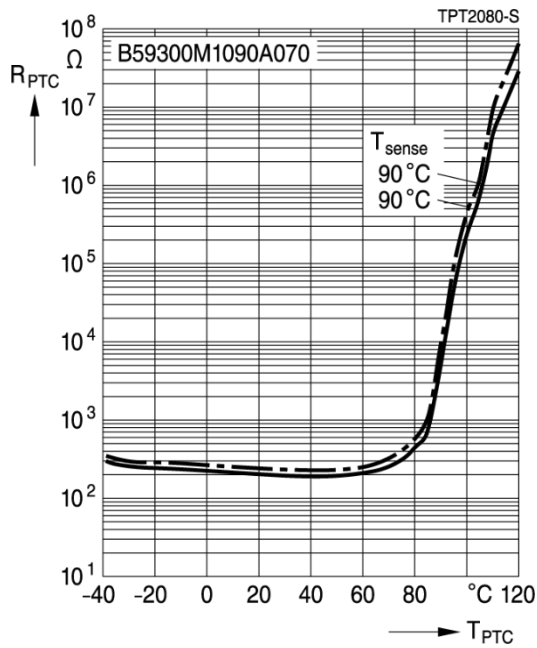
**Characteristics (typical)**

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



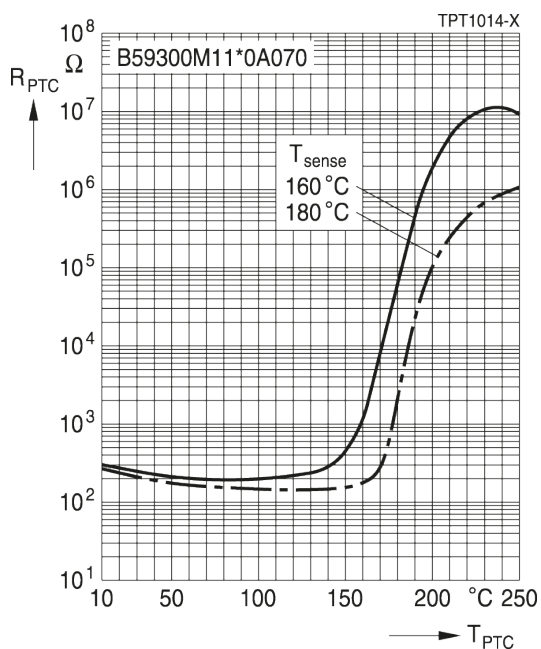
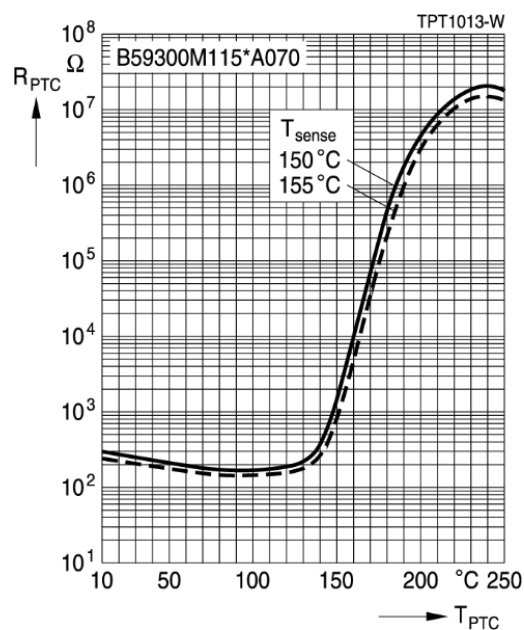
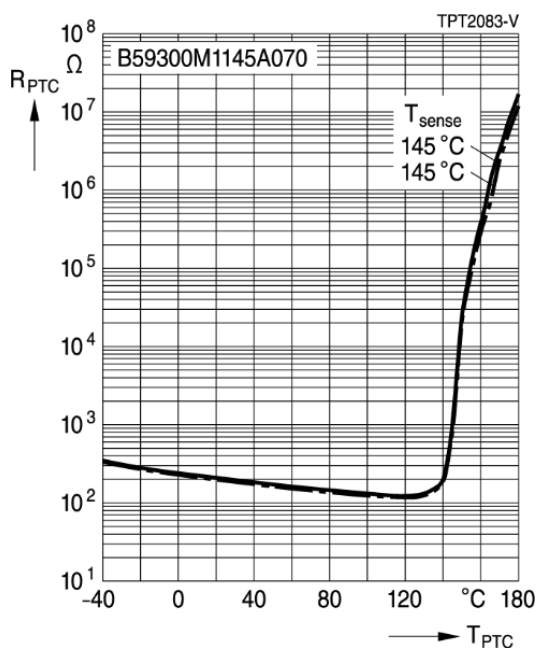
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PTC resistance  $R_{PTC}$  versus PTC temperature  $T_{PTC}$  (measured at low signal voltage)



## Cautions and warnings

### General

- TDK Electronics 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 TDK Electronics during the design-in-phase.
- Ensure suitability of thermistors 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 prior to processing.
- Storage conditions in original packaging: storage temperature -25 °C to +45 °C, relative humidity ≤ 75% annual mean, maximum 95%, dew precipitation is inadmissible.
- Avoid contamination of thermistors' surface during storage, handling and processing.
- Avoid storage of thermistors in harmful environment with effect on function on long-term operation (examples given under operation precautions).
- Use thermistors within the following period after delivery:
  - Through-hole devices (housed and leaded PTCs): 24 months
  - Motor protection sensors, glass-encapsulated sensors and probe assemblies: 24 months
  - Telecom pair and quattro protectors (TPP, TQP): 24 months
  - Leadless PTC thermistors for pressure contacting: 12 months
  - Leadless PTC thermistors for soldering: 6 months
  - SMDs in EIA sizes 3225 and 4032, and for PTCs with metal tags: 24 months
  - SMDs in EIA sizes 1210 and smaller: 12 months

### Handling

- PTCs must not be dropped. Chip-offs must not be caused during handling of PTCs.
- The ceramic and metallization of the components must not be touched with bare hands. Gloves are recommended.
- Avoid contamination of thermistor surface during handling.

### Soldering (where applicable)

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. Standard PTC heaters are not suitable for soldering.

### Mounting

- The electrode must not be scratched before/during/after the mounting process.
- Contacts and housing used for assembly with the 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 the chapters "Mounting instructions" and "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 and pressure of the clamping contacts pressing against the PTC must be 10 N and 50 kPa, respectively. In case the assembly is exposed to mechanical shock and/ or vibration this force should be higher in order to avoid movement of the PTC during operation.
- 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 thermistor.
- 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).

This listing does not claim to be complete, but merely reflects the experience of TDK Electronics.

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2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
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## Important notes

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