EPCOS

PTC thermistors for overcurrent protection

Leaded disks, coated, 63 V

Series/Type: **B599*0**

Date: March 2006

Applications

- Overcurrent and short-circuit protection

Features

- Lead-free terminals
- Wide range of rated currents: 30 mA up to 1 A
- Manufacturer's logo and type designation stamped on in black or red for T_{ref} = 80 °C and for T_{ref} = 120 °C and 130 °C stamped on in white
- UL approval for T_{ref} = 120 °C and 130 °C to UL 1434 with V_{max} = 65 V and V_R = 63 V (file number E69802)
- UL approval for T_{ref} = 80 °C to UL 1434 with V_{max} = 63 V and V_R = 50 V (file number E69802)
- VDE approval (license number 104843 E)
- RoHS-compatible

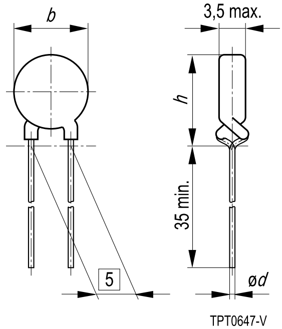
Options

- Leadless disks and leaded disks without coating available on request
- Thermistors with diameter *b* ≤ 11.0 mm are also available on tape (to IEC 60286-2)

Delivery mode

- Cardboard strips (standard)
- Cardboard tape reeled or in Ammo pack on request

Dimensional drawing



Dimensions (mm)

Type	T_{ref} °C	b_{max}	h_{max}	∅d
C910	130	22.0	25.5	0.8
C930	80	22.0	25.5	0.6
C930	120	22.0	25.5	0.6
C930	130	17.5	21.0	0.8
C940	80	17.5	21.0	0.6
C940	120	17.5	21.0	0.6
C940	130	13.5	17.0	0.6
C950	80	13.5	17.0	0.6
C950	120	13.5	17.0	0.6
C950	130	11.0	14.5	0.6
C960	80	11.0	14.5	0.6
C960	120	11.0	14.5	0.6
C960	130	9.0	12.5	0.6
C970	80	9.0	12.5	0.6
C970	120	9.0	12.5	0.6
C970	130	6.5	10.0	0.6
C980	80	6.5	10.0	0.6
C980	120	6.5	10.0	0.6
C980	130	4.0	7.5	0.6
C990	80	4.0	7.5	0.5
C990	120	4.0	7.5	0.5

General technical data

Max. operating voltage	(T_A = 60 °C)	V_{max}	80	VDC or VAC
Rated voltage		V_R	63	VDC or VAC
Switching cycles		N	100	
Tolerance of R_R	(T_{ref} = 80 °C or 120 °C)	ΔR_R	±25	%
Tolerance of R_R	(T_{ref} = 130 °C)	ΔR_R	±20	%
Operating temperature range	(V = 0)	T_{op}	−40/+125	°C
Operating temperature range	(V = V_{max}, T_{ref} = 80 °C)	T_{op}	−40/+85	°C
Operating temperature range	(V = V_{max}, T_{ref} = 120 °C/130 °C)	T_{op}	−40/+125	°C

Electrical specifications and ordering codes

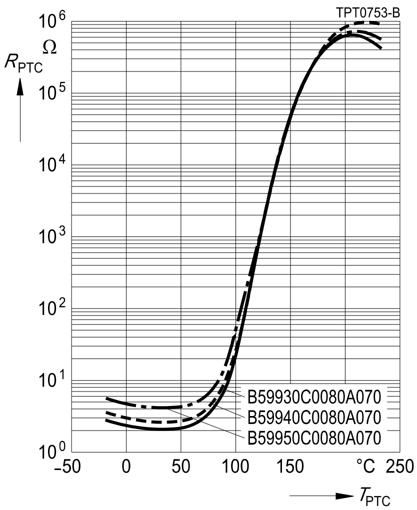
Type	I_R mA	I_S mA	I_{Smax} (V = V_{max}) A	I_r (V = V_{max}) typ. mA	T_{ref} °C	R_R Ω	R_{min} Ω	Ordering code
C910	1000	1500	10.0	60	130	1.2	0.8	B59910C0130A070
C930	700	1400	10.0	50	120	1.65	1.1	B59930C0120A070
C930	700	1100	8.0	50	130	2.2	1.5	B59930C0130A070
C940	450	900	8.0	40	120	2.3	1.5	B59940C0120A070
C940	450	690	5.5	30	130	3.3	2.2	B59940C0130A070
C930	340	700	10.0	35	80	1.65	1.1	B59930C0080A070
C950	320	640	5.5	30	120	3.7	2.4	B59950C0120A070
C950	320	500	4.3	25	130	4.9	3.2	B59950C0130A070
C960	250	500	4.3	25	120	5.6	3.7	B59960C0120A070
C960	250	380	3.0	20	130	8.0	5.2	B59960C0130A070
C940	245	500	8.0	25	80	2.3	1.5	B59940C0080A070
C950	170	350	5.5	20	80	3.7	2.4	B59950C0080A070
C970	150	240	1.0	18	130	20	13.2	B59970C0130A070
C970	150	300	3.0	20	120	9.4	6.2	B59970C0120A070
C960	130	265	4.3	15	80	5.6	3.7	B59960C0080A070
C970	90	190	3.0	11	80	9.4	6.2	B59970C0080A070
C980	85	170	1.0	16	120	25	16.5	B59980C0120A070
C980	85	130	0.7	15	130	62	40.9	B59980C0130A070
C980	50	110	1.0	8	80	25	16.5	B59980C0080A070
C990	50	100	0.7	12	120	55	36.3	B59990C0120A070
C990	30	60	0.7	5	80	55	36.3	B59990C0080A070

Reliability data

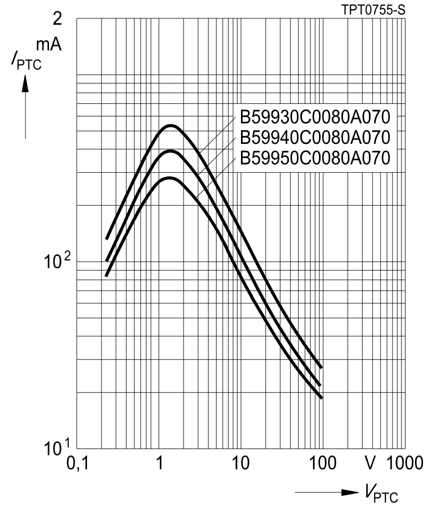
Test	Standard	Test conditions	$\lvert\Delta R_{25}/R_{25}\rvert$
Electrical endurance, cycling	IEC 60738-1	Room temperature, $I_{Smax;}$ V_{max} Number of cycles: 100	< 25%
Electrical endurance, constant	IEC 60738-1	Storage at V_{max} /T_{op} Test duration : 1000 h	< 25%
Damp heat	IEC 60738-1	Temperature 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	$T = T_{LCT}$, $T = T_{UCT}$ Number of cycles: 5 Test duration: 30 min Test according to IEC 60068-2-14, Test Na	< 10%
Vibration	IEC 60738-1	Frequency range: 10 to 55 Hz Displacement amplitude: 0.75 mm Test duration: 3 · 2 h Test according to IEC 60028-2-6, Test Fc	< 5%
Bump	IEC 60738-1	Pulse shape: half-sine Acceleration: 50 g Pulse duration: 1 ms; 6 · 3 pulses Test according to IEC 60068-2-29	< 5%
Climatic sequence	IEC 60738-1	Dry heat: $T = T_{UCT}$ Test duration: 16 h Damp heat first cycle Cold: $T = T_{LCT}$ Test duration: 2 h Damp heat 5 cycles Tests performed according to IEC 60068-2-30	< 10%

Characteristics (typical) for T_{ref} = 80 °C

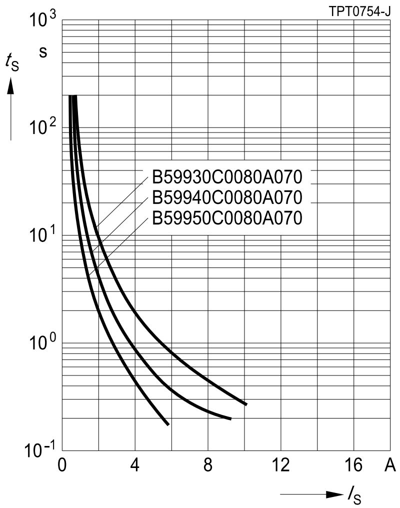
PTC resistance R_{PTC} versus
PTC temperature T_{PTC}
(measured at low signal voltage)



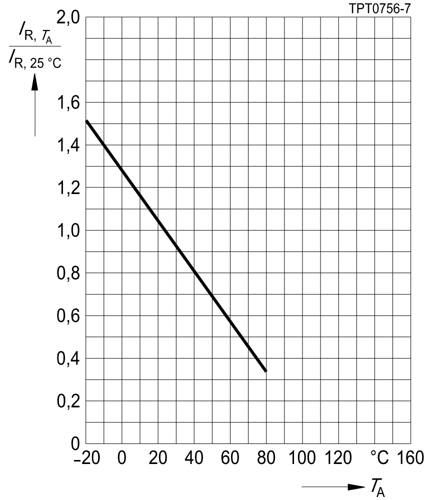
PTC current I_{PTC} versus PTC voltage V_{PTC}
(measured at 25 °C in still air)



Switching time t_S versus switching current I_S
(measured at 25 °C in still air)

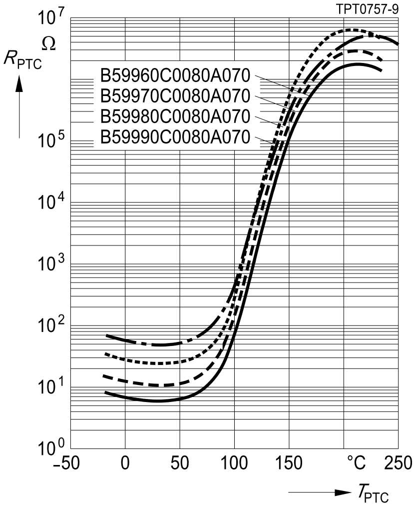


Rated current I_R versus ambient temperature T_A
(measured in still air)

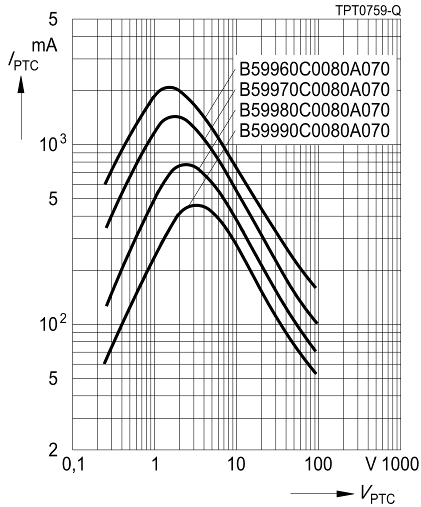


Characteristics (typical) for T_{ref} = 80 °C

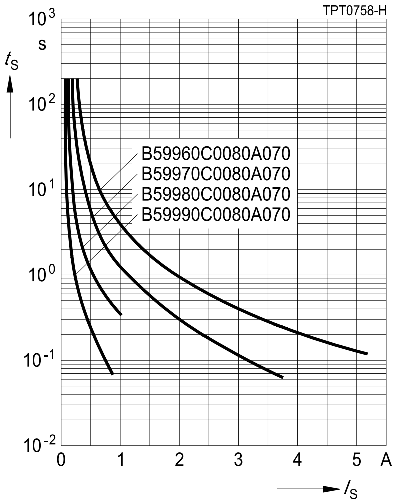
PTC resistance R_{PTC} versus
PTC temperature T_{PTC}
(measured at low signal voltage)



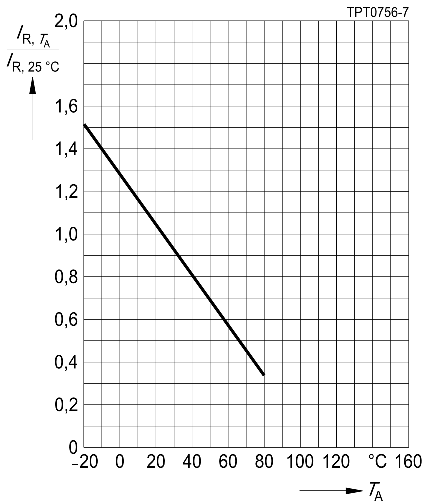
PTC current I_{PTC} versus PTC voltage V_{PTC}
(measured at 25 °C in still air)



Switching time t_S versus switching current I_S
(measured at 25 °C in still air)

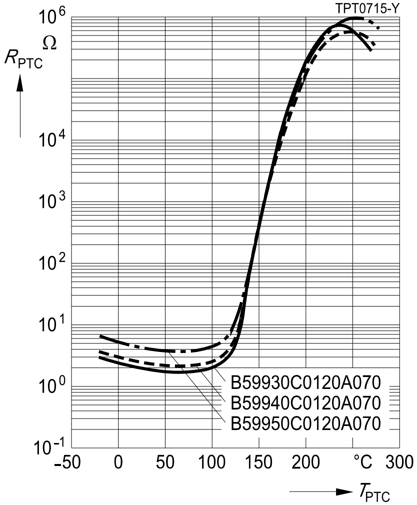


Rated current I_R versus ambient temperature T_A
(measured in still air)

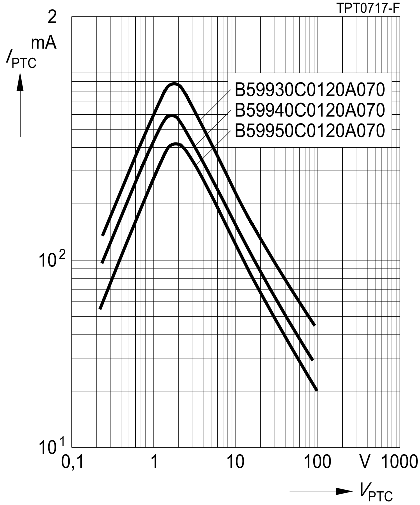


Characteristics (typical) for T_{ref} = 120 °C

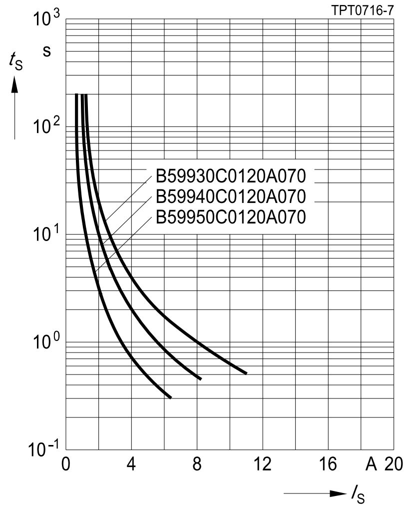
PTC resistance R_{PTC} versus
PTC temperature T_{PTC}
(measured at low signal voltage)



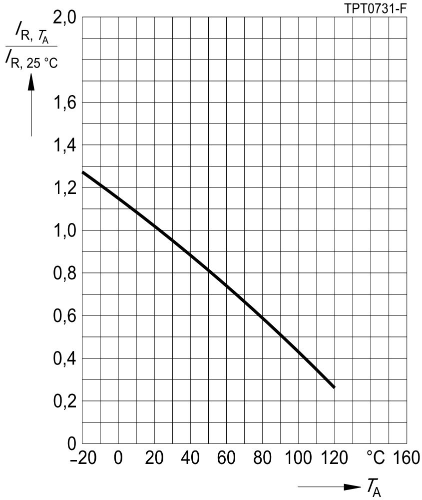
PTC current I_{PTC} versus PTC voltage V_{PTC}
(measured at 25 °C in still air)



Switching time t_S versus switching current I_S
(measured at 25 °C in still air)

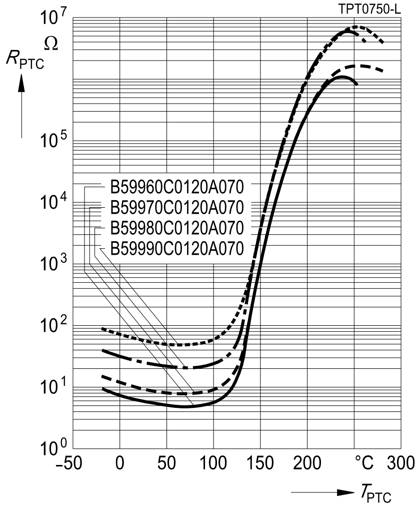


Rated current I_R versus ambient temperature T_A
(measured in still air)

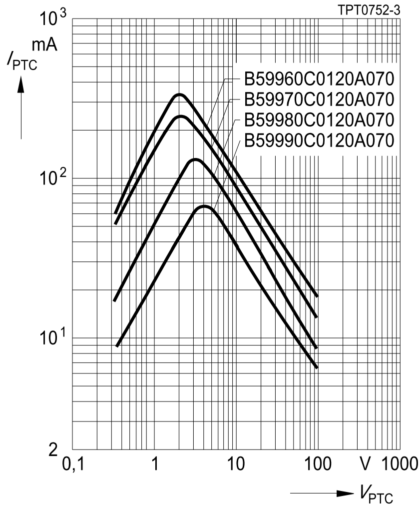


Characteristics (typical) for T_{ref} = 120 °C

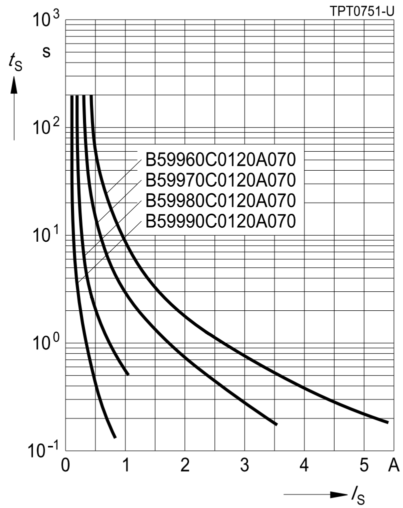
PTC resistance R_{PTC} versus PTC temperature T_{PTC} (measured at low signal voltage)



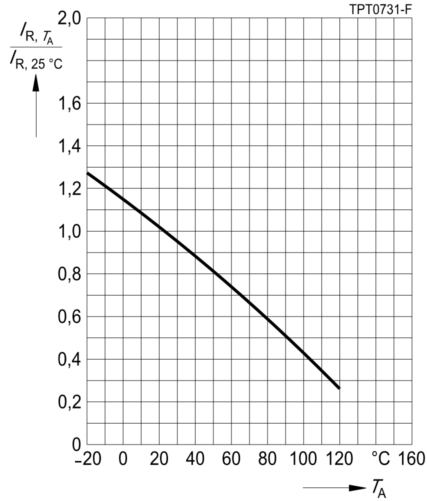
PTC current I_{PTC} versus PTC voltage V_{PTC} (measured at 25 °C in still air)



Switching time t_S versus switching current I_S (measured at 25 °C in still air)

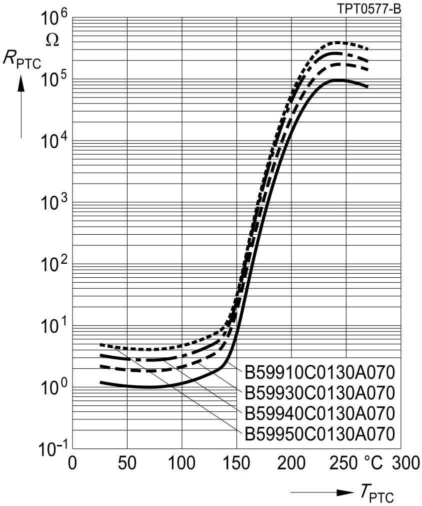


Rated current I_R versus ambient temperature T_A (measured in still air)

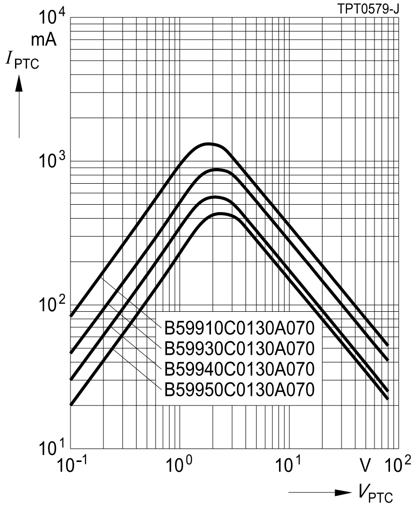


Characteristics (typical) for T_{ref} = 130 °C

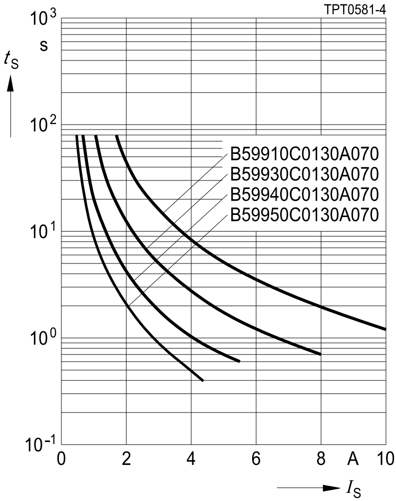
PTC resistance R_{PTC} versus PTC temperature T_{PTC} (measured at low signal voltage)



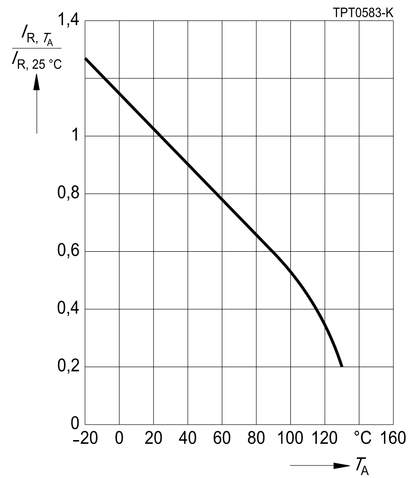
PTC current I_{PTC} versus PTC voltage V_{PTC} (measured at 25 °C in still air)



Switching time t_S versus switching current I_S (measured at 25 °C in still air)

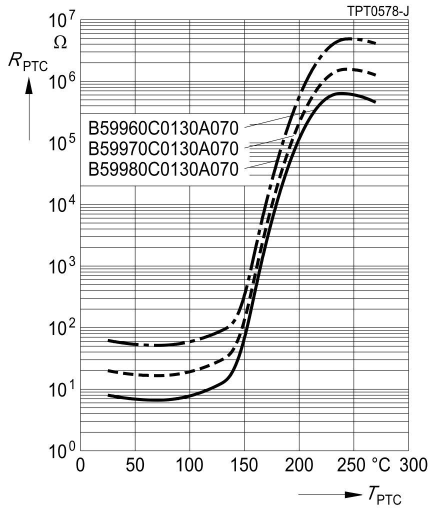


Rated current I_R versus ambient temperature T_A (measured in still air)

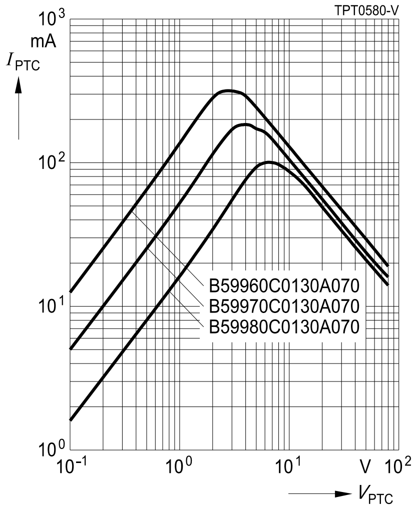


Characteristics (typical) for T_{ref} = 130 °C

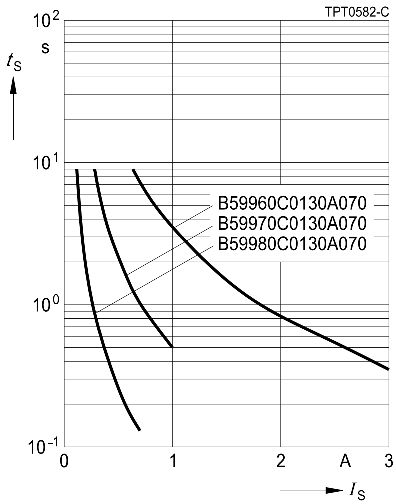
PTC resistance R_{PTC} versus
PTC temperature T_{PTC}
(measured at low signal voltage)



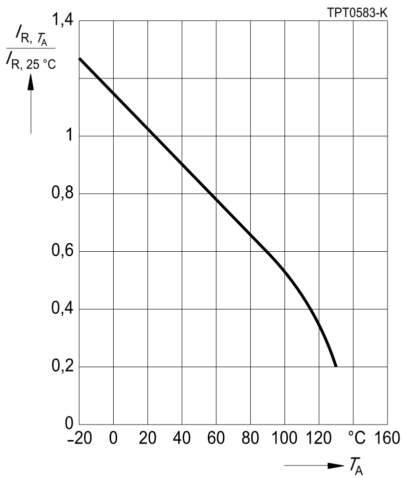
PTC current I_{PTC} versus PTC voltage V_{PTC}
(measured at 25 °C in still air)



Switching time t_S versus switching current I_S
(measured at 25 °C in still air)



Rated current I_R versus ambient temperature T_A
(measured in still air)



Cautions and warnings

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 ≤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).

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of passive 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 a passive 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 a passive electronic component.
3. **The warnings, cautions and product-specific notes must be observed**.
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as “hazardous”)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.epcos.com/material). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

   We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the “General Terms of Delivery for Products and Services in the Electrical Industry” published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, EPCOS-JONES, Baoke, CeraDiode, CSSP, MLSC, PhaseCap, PhaseMod, SIFI, SIKOREL, SilverCap, SIMID, SIOV, SIP5D, SIP5K, UltraCap, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.epcos.com/trademarks.