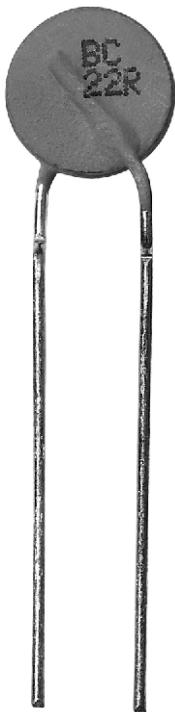


145 V PTC Thermistors For Overload Protection



FEATURES

- Wide range of trip and non-trip currents:
From 47 mA up to 1 A for the non-trip current
- Small ratio between trip and non-trip currents ($I_t/I_{nt} = 1.5$ at 25 °C)
- High maximum inrush current (up to 13 A)
- Leaded parts withstand mechanical stresses and vibration
- UL file E148885 according to XGPU standard UL1434
- UL approved PTCs are guaranteed to withstand severe test programs
 - Long-life cycle tests (over 5000 trip cycles)
 - Long-life storage tests (3000 h at 250 °C)
 - Electrical cycle tests at low ambient temperatures (- 40 °C or 0 °C)
 - Damp-heat and water immersion tests
 - Overvoltage tests at up to 200 % of rated voltage
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS
COMPLIANT

APPLICATIONS

Over-temperature/over-load protection:

- Telecommunications
- Automotive systems
- Industrial electronics
- Consumer electronics
- Electronic data processing

DESCRIPTION

These directly heated thermistors have a positive temperature coefficient and are primarily intended for overload protection. They consist of a naked disk with two tinned brass or copper clad steel leads and are coated with a high temperature silicone UL 94 V-0 coating. Leadless disks and leaded disks without coating are available on request.

MOUNTING

The PTC Thermistors are suitable for processing on automatic insertion equipment.

Typical soldering

235 °C; duration: 5 s (Pb-bearing)
245 °C, duration: 5 s (Lead (Pb)-free)

Resistance to soldering heat

260 °C, duration: 10 s max.

MARKING

Only the grey lacquered thermistors with a diameter of 8.5 mm to 20.5 mm are marked with BC, R_{25} value (example 1R9) on one side and I_{nt} , V_{max} on the other side.

| QUICK REFERENCE DATA | | |
|---|------------|------|
| PARAMETER | VALUE | UNIT |
| Maximum voltage (RMS or DC) | 145 | V |
| Holding current | 0.047 to 1 | A |
| Resistance at 25 °C (R_{25}) | 1.3 to 240 | Ω |
| $I_{max.}$ | 0.2 to 13 | A |
| Switch temperature | 140 | °C |
| Operating temperature range at max. voltage | 0 to 70 | °C |
| Climatic category | 25/125/56 | |

ELECTRICAL DATA AND ORDERING INFORMATION for 2381 66.5...2; max. voltage = 145 V (AC or DC)⁽¹⁾

| I _{int} MAX. at 25 °C (mA) | I _t MIN. at 25 °C (mA) | R ₂₅ ± 20 % (Ω) | I ⁽²⁾ MAX. at 25 °C (mA) | I _{res} MAX. at V _{max.} and 25 °C (mA) | DISSIP. FACTOR (mW/K) | Ø D MAX. (mm) | CATALOG NUMBERS | |
|--|--|----------------------------------|--|---|-----------------------------|---------------------|-----------------|----------------|
| | | | | | | | BULK | TAPE ON REEL |
| 47 | 70 | 240 | 200 | 9 | 7.3 | 5 | 2381 660 54792 | 2381 660 64792 |
| 65 | 100 | 115 | 300 | 11 | 7.3 | 5 | 2381 660 56592 | 2381 660 66592 |
| 93 | 140 | 55 | 450 | 13 | 7.3 | 5 | 2381 660 59392 | 2381 660 69392 |
| 110 | 165 | 40 | 500 | 13 | 7.3 | 5 | 2381 660 51112 | 2381 660 61112 |
| 130 | 195 | 28 | 600 | 13 | 7.3 | 5 | 2381 660 51312 | 2381 660 61312 |
| 170 | 255 | 19 | 1000 | 15 | 8.3 | 7 | 2381 661 51712 | 2381 661 61712 |
| 210 | 315 | 12 | 1400 | 15 | 8.3 | 7 | 2381 661 52112 | 2381 661 62112 |
| 250 | 375 | 9.4 | 2000 | 16.5 | 9 | 8.5 | 2381 661 52512 | 2381 661 62512 |
| 270 | 405 | 8 | 2200 | 16.5 | 9 | 8.5 | 2381 661 52712 | 2381 661 62712 |
| 320 | 480 | 6.7 | 3000 | 19 | 10.5 | 10.5 | 2381 662 53212 | 2381 662 63212 |
| 360 | 540 | 5.3 | 3500 | 19 | 10.5 | 10.5 | 2381 662 53612 | 2381 662 63612 |
| 410 | 615 | 4.6 | 4500 | 22.5 | 11.7 | 12.5 | 2381 662 54112 | 2381 662 64112 |
| 450 | 675 | 3.8 | 5000 | 22.5 | 11.7 | 12.5 | 2381 662 54512 | 2381 662 64512 |
| 600 | 900 | 2.9 | 7200 | 28.5 | 15.5 | 16.5 | 2381 663 56012 | - |
| 710 | 1065 | 2.1 | 8500 | 28.5 | 15.5 | 16.5 | 2381 663 57112 | - |
| 880 | 1320 | 1.7 | 11 000 | 37.5 | 19.8 | 20.5 | 2381 664 58812 | - |
| 1000 | 1500 | 1.3 | 13 000 | 37.5 | 19.8 | 20.5 | 2381 664 51022 | - |

Notes

(1) The thermistors are clamped at the seating plane

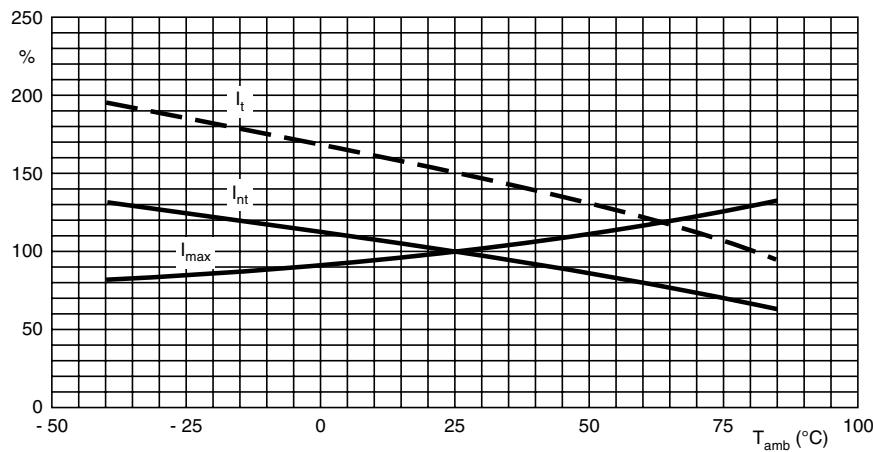
(2) I_{max.} is the maximum overload current that may flow through the PTC when it passes from the low ohmic to the high ohmic state.
UL approval: I_{max.} * 0.8

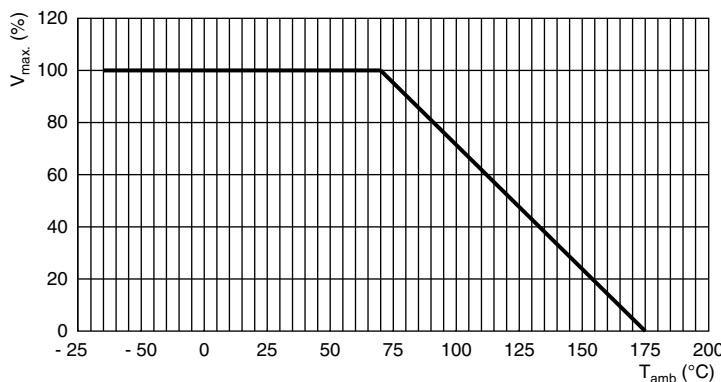
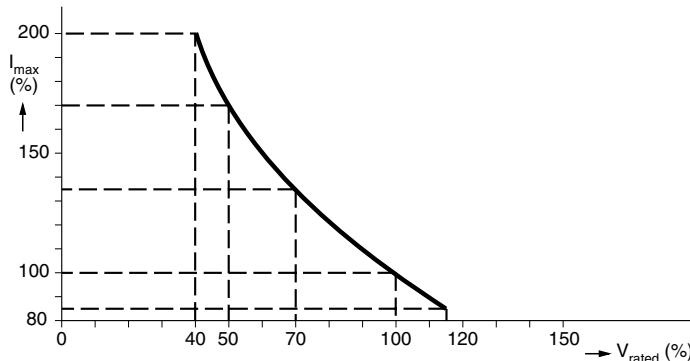
SAP AND 12NC PART NUMBERS

| 12NC | SAP CODING | 12NC | SAP CODING |
|----------------|----------------|----------------|----------------|
| 2381 660 x4792 | PTCCL05H470FyE | 2381 662 x3212 | PTCCL11H321FyE |
| 2381 660 x6592 | PTCCL05H650FyE | 2381 662 x3612 | PTCCL11H361FyE |
| 2381 660 x9392 | PTCCL05H930FyE | 2381 662 x4112 | PTCCL13H411FyE |
| 2381 660 x1112 | PTCCL05H111FyE | 2381 662 x4512 | PTCCL13H451FyE |
| 2381 660 x1312 | PTCCL05H131FyE | 2381 663 56012 | PTCCL17H601FBE |
| 2381 661 x1712 | PTCCL07H171FyE | 2381 663 57112 | PTCCL17H711FBE |
| 2381 661 x2112 | PTCCL07H211FyE | 2381 664 58812 | PTCCL21H881FBE |
| 2381 661 x2512 | PTCCL09H251FyE | 2381 664 51022 | PTCCL21H102FBE |
| 2381 661 x2712 | PTCCL09H271FyE | | |

Notes

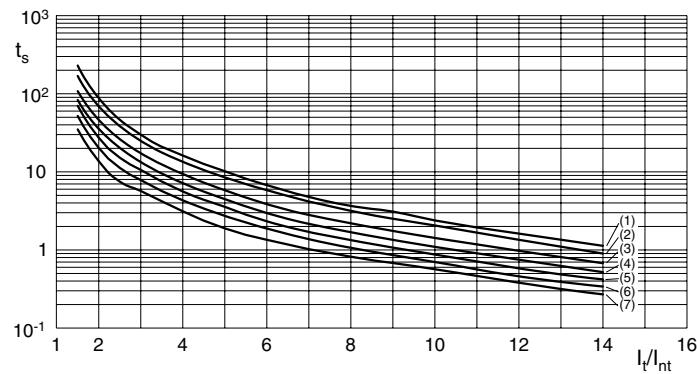
- For bulk parts replace x by "5" and y by "B"
- For taped on reel parts replace x by "6" and y by "T"

CURRENT DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE


VOLTAGE DERATING AS A FUNCTION OF AMBIENT TEMPERATURE**ELECTRICAL CHARACTERISTICS I_{max} AS A FUNCTION OF VOLTAGE**

I_{max}, as stated in the electrical data and ordering information tables, is the maximum overload current that may flow through the PTC when passing from the low ohmic to high ohmic state at rated voltage.

When other voltages are present after tripping, the I_{max} value can be derived from the above I_{max} as a function of voltage graph. Voltages below V_{rated} will allow higher overload currents to pass the PTC.

TYPICAL TRIP-TIME AS A FUNCTION OF TRIP CURRENT RATIO

- Curve 1: Ø D_{max.} = 20.5 mm
 - Curve 2: Ø D_{max.} = 16.5 mm
 - Curve 3: Ø D_{max.} = 12.5 mm
 - Curve 4: Ø D_{max.} = 10.5 mm
 - Curve 5: Ø D_{max.} = 8.5 mm
 - Curve 6: Ø D_{max.} = 7.0 mm
 - Curve 7: Ø D_{max.} = 5.0 mm
- Measured in accordance with "IEC 60738".

Trip-time or switching time (t_s)

To check the trip-time for a specific PTC, refer to the Electrical Data and Ordering Information tables for the value I_{nt}. Divide the overload or trip current by this I_{nt} and you realize the factor I_t/I_{nt}. This rule is valid for any ambient temperature between 0 °C and 70 °C. Adapt the correct non-trip current with the appropriate curve in the Current Deviation as a Function of the Ambient Temperature graph. The relationship between the I_t/I_{nt} factor and the switching time is a function of the PTC diameter; see the above graphs.

Example

What will be the trip-time at I_{ol} = 0.8 A and T_{amb} = 0 °C of a thermistor type 2381 661 52112; 12 Ω; Ø D_{max.} = 7.0 mm:

I_{nt} from the table: 210 mA at 25 °C

I_{nt}: 210 x 1.12 = 235 mA (at 0 °C).

Overload current = 0.8 A; factor I_t/I_{nt}: 0.8/0.235 = 3.40. In the typical trip-time as a function of trip current ratio graph, at the 7.0 mm line and I_t/I_{nt} = 3.40, the typical trip-time is 6.0 s.

COMPONENTS OUTLINE

| CODE NUMBER 2381 | | SPQ | OUTLINE |
|------------------|---------------|------|---------|
| 660 | 5...2 | 500 | Fig. 1a |
| | 6...2 | 1500 | Fig. 1b |
| 661 | 5...2 | 250 | Fig. 1a |
| | 6...2 | 1500 | Fig. 1b |
| 662 | 5...2 | 200 | Fig. 1a |
| | 63212 - 63612 | 1500 | Fig. 1b |
| | 64112 - 64512 | 750 | Fig. 1b |
| 663 | 5...2 | 100 | Fig. 1a |
| 664 | 5...2 | 100 | Fig. 1a |

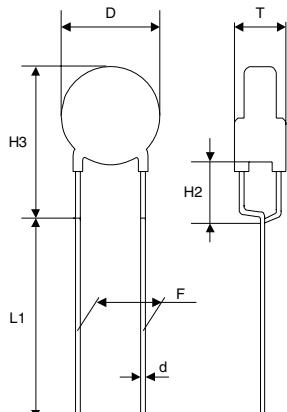
PTC THERMISTORS IN BULK


Fig. 1a

DIMENSIONS OF BULK TYPE PTC'S (in mm)

| | |
|----|------------|
| D | See table |
| d | 0.6 ± 10 % |
| T | 5.0 max. |
| H2 | 4.0 ± 1.0 |
| H3 | D + 5 max. |
| L1 | 20 min. |
| F | 5.0 |

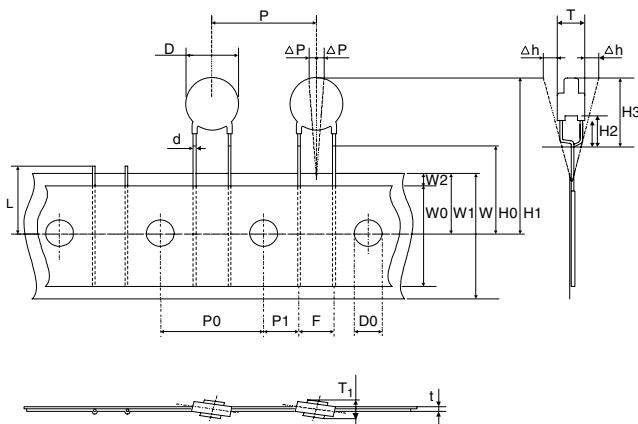
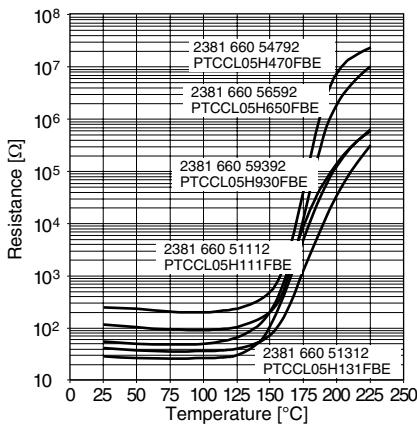
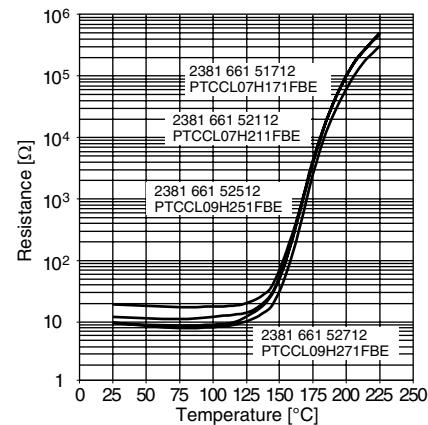
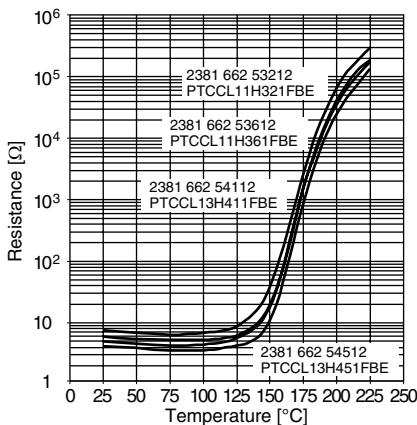
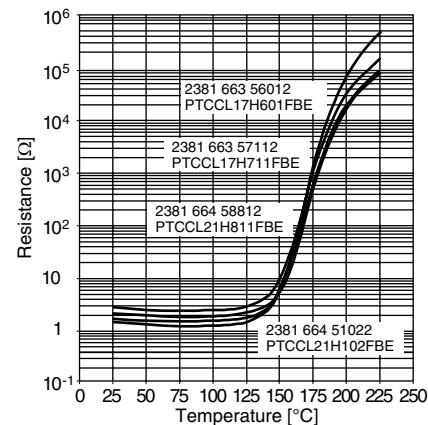
PTC THERMISTORS ON TAPE ON REEL


Fig. 1b

**TAPE AND REEL ACCORDING
TO IEC 60286-2** dimensions in millimeters

| SYMBOL | PARAMETER | DIMENSIONS | TOLERANCE |
|----------------|---|--------------|----------------|
| D | Body diameter | See table | max. |
| d | Lead diameter | 0.6 | ± 10 % |
| P | Pitch of components Diameter < 12 mm Diameter ≥ 12 mm | 12.7 25.4 | ± 1.0 ± 2.0 |
| P ₀ | Feedhole pitch | 12.7 | ± 0.3 |
| F | Leadcenter to leadcenter distance (between component and tape) | 5.0 | + 0.6 - 0.1 |
| H0 | Lead wire clinch height | 16.0 | ± 0.5 |
| H2 | Component bottom to seating plane | 4.0 | ± 1.0 |
| H3 | Component top to seating plane | D + 5 | max. |
| H4 | Seating plane difference (left-right lead) | 0 | ± 0.2 |
| T | Total thickness | 5.0 | max. |

TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC**TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC****TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC****TYPICAL RESISTANCE/TEMPERATURE CHARACTERISTIC**



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