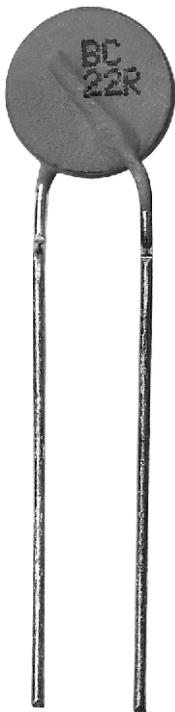


## 145 V PTC Thermistors For Overload Protection



### 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)<sup>(1)</sup>

I <sub>int</sub> MAX. at 25 °C (mA)	I <sub>t</sub> MIN. at 25 °C (mA)	R <sub>25</sub> ± 20 % (Ω)	I <sup>(2)</sup> MAX. at 25 °C (mA)	I <sub>res</sub> MAX. at V <sub>max.</sub> 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

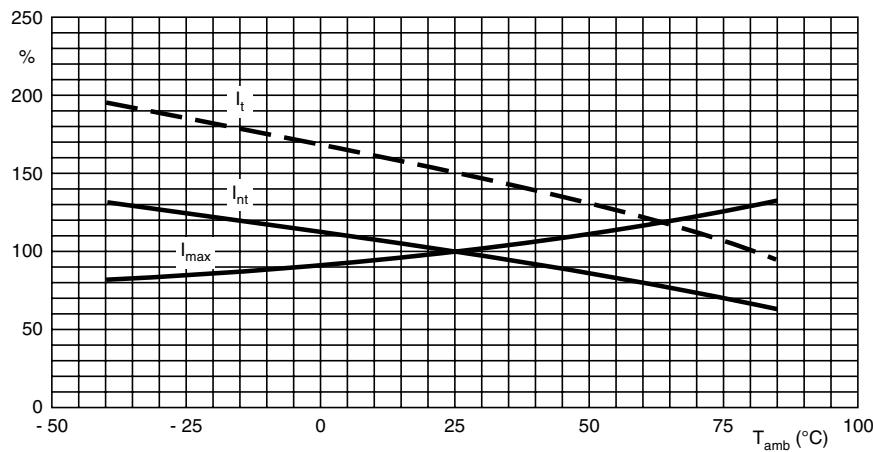
(2) I<sub>max.</sub> is the maximum overload current that may flow through the PTC when it passes from the low ohmic to the high ohmic state.  
UL approval: I<sub>max.</sub> \* 0.8

**SAP AND 12NC PART NUMBERS**

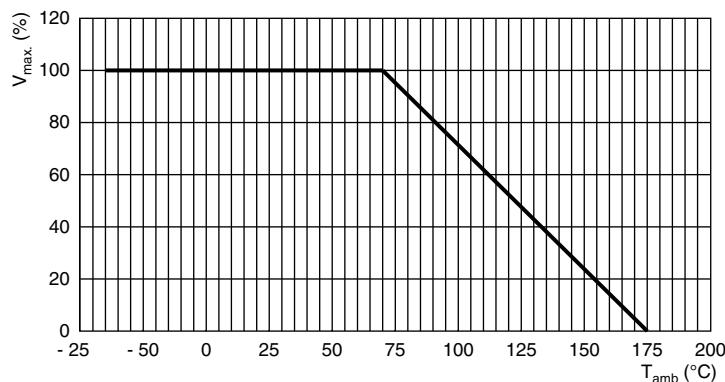
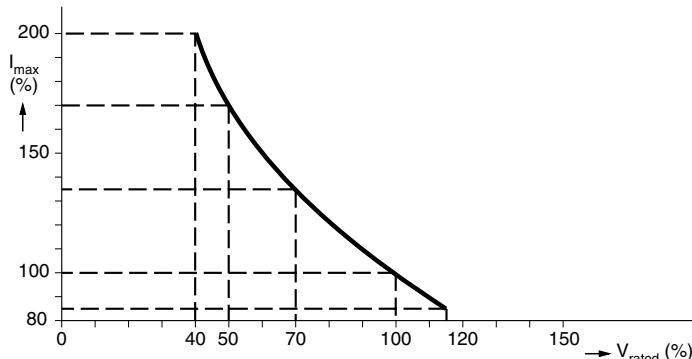
12NC	SAP CODING	12NC	SAP CODING
2381 660 x4792	PTCCL05H470FyE	2381 662 x3212	PTCCL11H321FyE
2381 660 x6592	PTCCL05H650FyE	2381 662 x3612	PTCCL11H361FyE
2381 660 x9392	PTCCL05H930FyE	2381 662 x4112	PTCCL13H411FyE
2381 660 x1112	PTCCL05H111FyE	2381 662 x4512	PTCCL13H451FyE
2381 660 x1312	PTCCL05H131FyE	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**


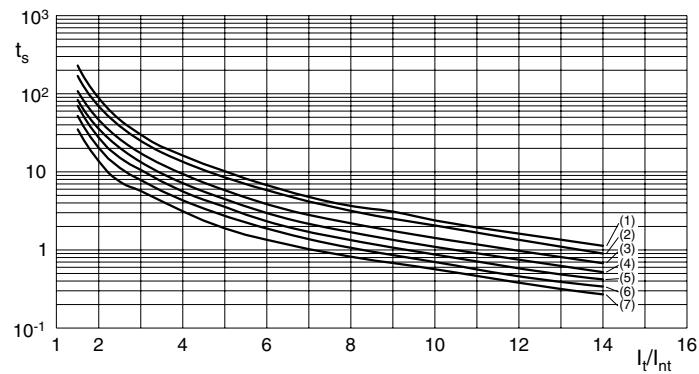
## VOLTAGE DERATING AS A FUNCTION OF AMBIENT TEMPERATURE

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:  $\varnothing D_{max.} = 20.5$  mm  
 Curve 2:  $\varnothing D_{max.} = 16.5$  mm  
 Curve 3:  $\varnothing D_{max.} = 12.5$  mm  
 Curve 4:  $\varnothing D_{max.} = 10.5$  mm  
 Curve 5:  $\varnothing D_{max.} = 8.5$  mm  
 Curve 6:  $\varnothing D_{max.} = 7.0$  mm  
 Curve 7:  $\varnothing D_{max.} = 5.0$  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;  $\varnothing D_{max.} = 7.0$  mm:

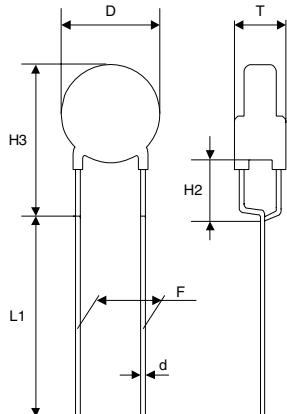
$I_{nt}$  from the table: 210 mA at 25 °C

$I_{nt} = 210 \times 1.12 = 235$  mA (at 0 °C).

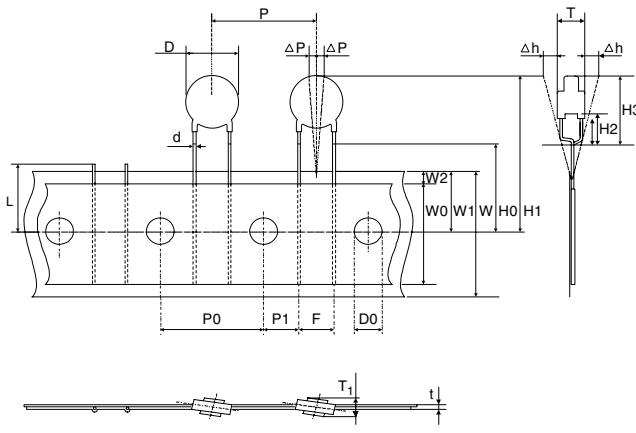
Overload current = 0.8 A; factor  $I_t/I_{nt} = 0.8/0.235 = 3.40$ . In the typical trip-time as a function of trip current ratio graph, at the 7.0 mm line and  $I_t/I_{nt} = 3.40$ , the typical trip-time is 6.0 s.

**COMPONENTS OUTLINE**

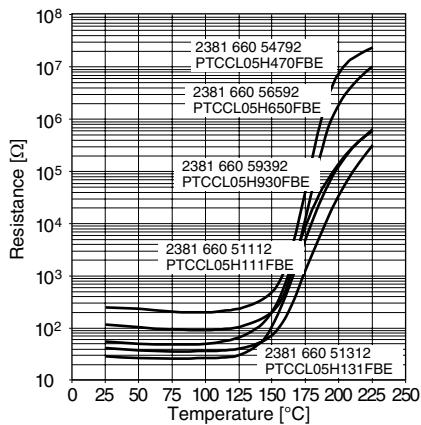
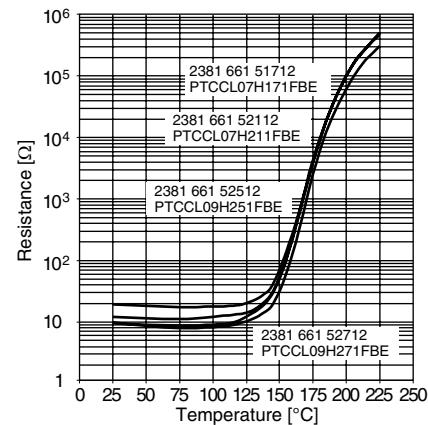
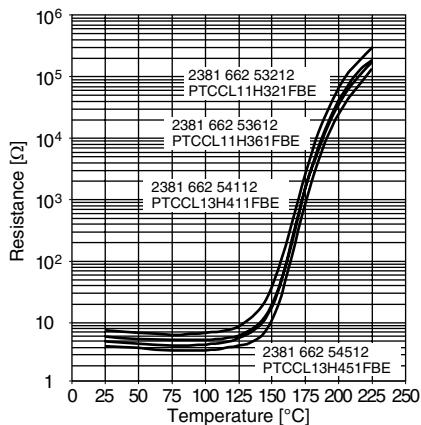
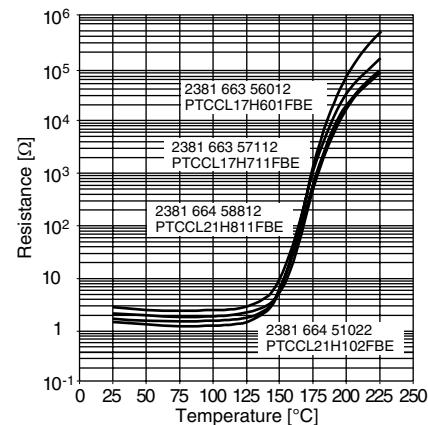
CODE NUMBER 2381		SPQ	OUTLINE
660	5...2	500	Fig. 1a
	6...2	1500	Fig. 1b
661	5...2	250	Fig. 1a
	6...2	1500	Fig. 1b
662	5...2	200	Fig. 1a
	63212 - 63612	1500	Fig. 1b
	64112 - 64512	750	Fig. 1b
663	5...2	100	Fig. 1a
664	5...2	100	Fig. 1a

**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 <sub>0</sub>	Feedhole pitch	12.7	± 0.3
F	Leadcenter to leadcenter distance (between component and tape)	5.0	+ 0.6 - 0.1
H <sub>0</sub>	Lead wire clinch height	16.0	± 0.5
H <sub>2</sub>	Component bottom to seating plane	4.0	± 1.0
H <sub>3</sub>	Component top to seating plane	D + 5	max.
H <sub>4</sub>	Seating plane difference (left-right lead)	0	± 0.2
T	Total thickness	5.0	max.

**TYPICAL RESISTANCE/TEMPERATURE  
CHARACTERISTIC**

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CHARACTERISTIC**

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**TYPICAL RESISTANCE/TEMPERATURE  
CHARACTERISTIC**


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