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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS
COMPLIANT

APPLICATIONS

Overload (current, voltage, temperature) protection in:

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

QUICK REFERENCE DATA

PARAMETER	VALUE	UNIT
Maximum voltage (RMS or DC)	145	V
Maximum holding current (I_{nt})	0.047 to 1	A
Resistance at 25 °C (R_{25})	1.3 to 240	Ω
Tolerance on R_{25} value	20	%
Maximum overload current I_{ol}	0.2 to 13	A
Switching temperature	135 to 140	°C
Operating temperature range at max. voltage	0 to 70	°C
Storage temperature	-40 to +175	°C

QUALITY

UL approved PTCs are guaranteed to withstand severe test programs and have factory audited follow-up programs. Major UL qualification tests are long-life (6000 cycles) electrical cycle tests at trip-current, long-life stability storage tests (3000 h at 250 °C), damp heat and water immersion tests and over-voltage tests up to 200 % of rated voltage.

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

DESCRIPTION

These directly heated ceramic-based thermistors have a positive temperature coefficient and are primarily intended for overload protection. They consist of a ceramic pellet soldered between two tinned CCS wires and coated with a UL 94 V-0 high temperature hard silicone lacquer.

MOUNTING

PTC thermistors can be mounted by wave, reflow, or hand-soldering. Current levels have been determined according IEC 60738 conditions. Different ways of mounting or connecting the thermistors can influence their thermal and electrical behavior. Standard operation is in still air, any potting or encapsulation of PTC thermistors is not recommended and will change its operating characteristics.

Typical Soldering

235 °C; duration: 5 s (Lead (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.

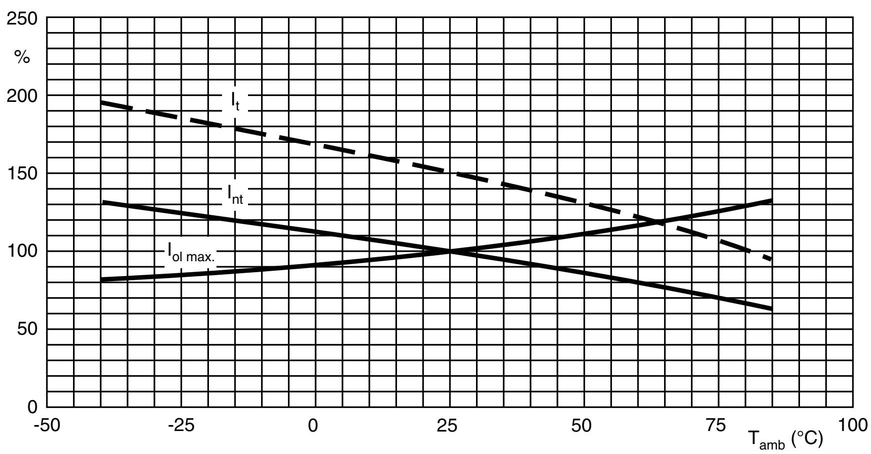
ELECTRICAL DATA AND ORDERING INFORMATION								
I_{nt} MAX. at 25 °C (mA) (1)	I_t MIN. at 25 °C (mA) (1)	R_{25} ± 20 % (Ω)	I_{ol} MAX. at 25 °C (mA) (2)	I_{res} MAX. at $V_{max.}$ and 25 °C (mA) (1)	DISSIP. FACTOR (mW/K) (1)	Ø D MAX. (mm)	ORDERING PART NUMBERS	
							BULK	TAPE ON REEL
47	70	240	200	9	7.3	5	PTCCL05H470FBE	PTCCL05H470FTE
65	100	115	300	11	7.3	5	PTCCL05H650FBE	PTCCL05H650FTE
93	140	55	450	13	7.3	5	PTCCL05H930FBE	PTCCL05H930FTE
110	165	40	500	13	7.3	5	PTCCL05H111FBE	PTCCL05H111FTE
130	195	28	600	13	7.3	5	PTCCL05H131FBE	PTCCL05H131FTE
170	255	19	1000	15	8.3	7	PTCCL07H171FBE	PTCCL07H171FTE
210	315	12	1400	15	8.3	7	PTCCL07H211FBE	PTCCL07H211FTE
250	375	9.4	2000	16.5	9	8.5	PTCCL09H251FBE	PTCCL09H251FTE
270	405	8	2200	16.5	9	8.5	PTCCL09H271FBE	PTCCL09H271FTE
320	480	6.7	3000	19	10.5	10.5	PTCCL11H321FBE	PTCCL11H321FTE
360	540	5.3	3500	19	10.5	10.5	PTCCL11H361FBE	PTCCL11H361FTE
410	615	4.6	4500	22.5	11.7	12.5	PTCCL13H411FBE	PTCCL13H411FTE
450	675	3.8	5000	22.5	11.7	12.5	PTCCL13H451FBE	PTCCL13H451FTE
600	900	2.9	7200	28.5	15.5	16.5	PTCCL17H601FBE	-
710	1065	2.1	8500	28.5	15.5	16.5	PTCCL17H711FBE	-
880	1320	1.7	11 000	37.5	19.8	20.5	PTCCL21H881FBE	-
1000	1500	1.3	13 000	37.5	19.8	20.5	PTCCL21H102FBE	-

Notes

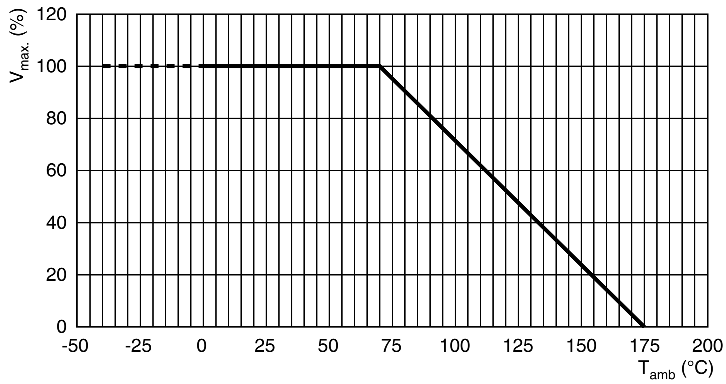
(1) The indicated current levels are guaranteed according IEC 60738 mounting conditions. For different mounting conditions the indicated current levels can change and should be evaluated in the application.

(2) $I_{ol\ max.}$ 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: $I_{ol\ max.}$ x 0.85

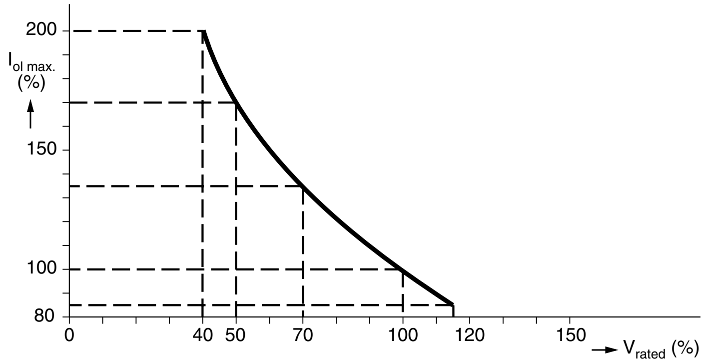
CURRENT DEVIATION AS A FUNCTION OF THE AMBIENT TEMPERATURE



VOLTAGE DERATING AS A FUNCTION OF AMBIENT TEMPERATURE



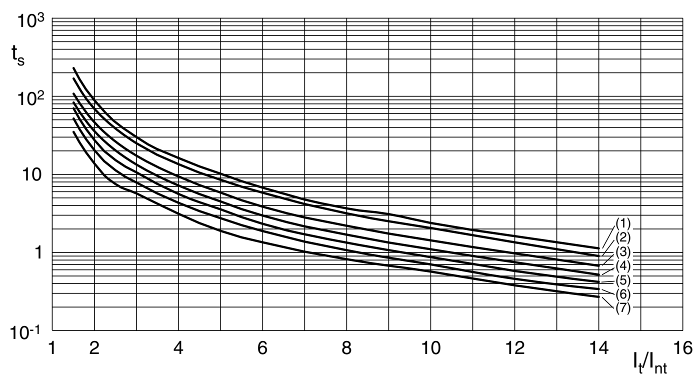
MAXIMUM OVERLOAD CURRENT $I_{ol\ max.}$ DERATING AS A FUNCTION OF VOLTAGE



$I_{ol\ max.}$ 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 $I_{ol\ max.}$ 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 PTCCL07H211FBE; 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 PACKING INFORMATION

SAP ORDERING PART NUMBER		SPQ	PACKING OUTLINE
PTCCL05H....BE		500	Bulk
PTCCL05H....TE		1500	Tape and reel
PTCCL07H....BE	PTCCL09H....BE	250	Bulk
PTCCL07H....TE	PTCCL09H....TE	1500	Tape and reel
PTCCL11H....BE	PTCCL13H....BE	200	Bulk
PTCCL11H....TE		1500	Tape and reel
PTCCL13H....TE		750	Tape and reel
PTCCL17H....BE		100	Bulk
PTCCL21H....BE		100	Bulk

PTC THERMISTORS IN BULK

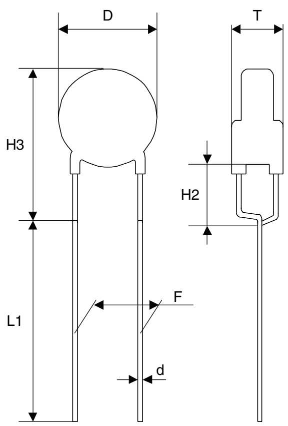


Fig. 1

DIMENSIONS OF BULK TYPE PTCs (in mm)

D	See table
d	0.6 ± 0.05
T	5.0 max.
H2	4.0 ± 1.0
H3	D + 5 max.
L1	20 min.
F	5.0

PTC THERMISTORS ON TAPE AND REEL

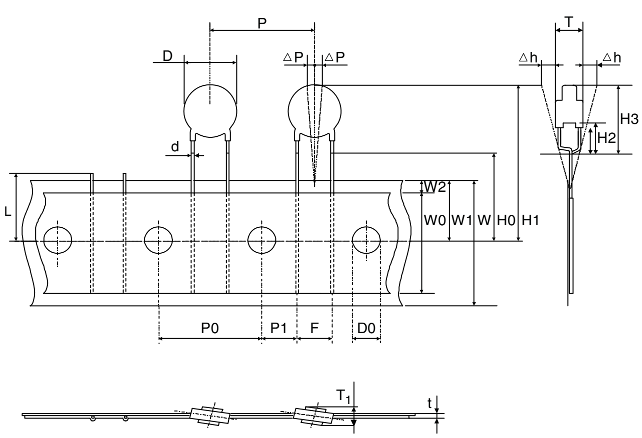
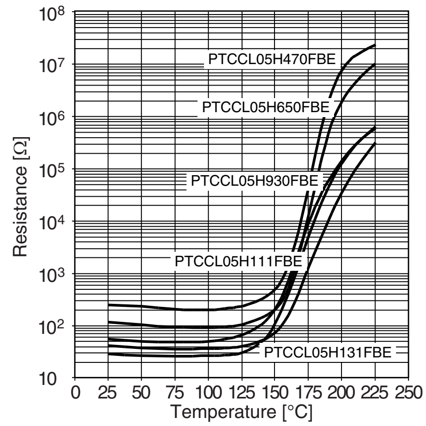


Fig. 2

TAPE AND REEL ACCORDING TO IEC 60286-2 (in mm)

SYMBOL	PARAMETER	DIMENSIONS	TOLERANCE
D	Body diameter	See table	max.
d	Lead diameter	0.6	± 0.05
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	+ 0.5 / - 0.2
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)	2	± 0.2
T	Total thinkness	5.0	max.

TYPICAL RESISTANCE / TEMPERATURE CHARACTERISTIC



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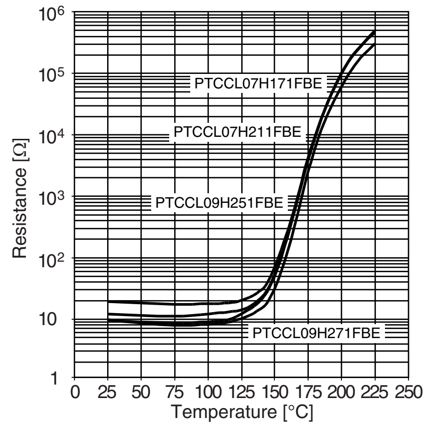

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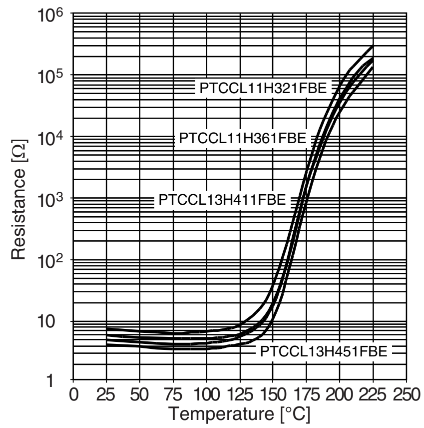
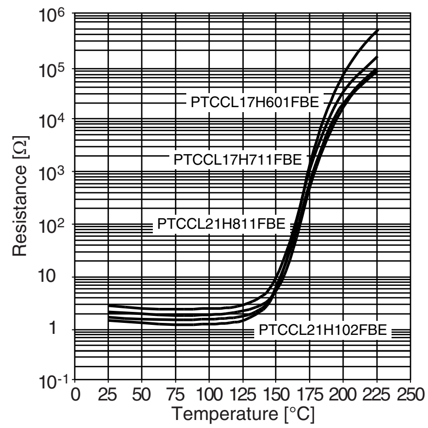


TYPICAL RESISTANCE / TEMPERATURE CHARACTERISTIC



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