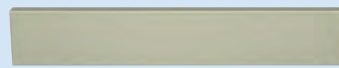
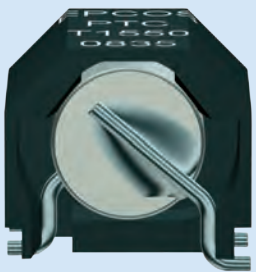


EPCOS Product Profile 2016

# PTC Thermistors





# PTC Thermistors



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# Important Notes

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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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# Preview



This short form catalog presents the wide selection of EPCOS PTC thermistors. With decades of experience in the development, manufacture and marketing of electronic components, TDK is the world market leader in PTC thermistors, and one of the world's biggest producers of electronic components, modules and systems.

PTC thermistors are ceramic components whose electrical resistance rapidly increases when a certain temperature is exceeded. This property makes them ideal for use in countless applications of modern electrical and electronic engineering, for example, as self-resetting fuses against current overload or for short circuit protection in motors. PTC thermistors are used in electronic lamp ballasts and switch-mode power supplies for delayed switching. Special motor-start PTC thermistors are also used in refrigerator compressors, for instance.

Thermal protection of motors and transformers is another example of the versatility of PTC thermistors. Their potential applications include measurement and control engineering and extend to entertainment, household and automotive electronics, as well as to IT systems and telecommunications. PTC thermistors are also suitable as self-regulating heater elements in hot plates and hot-glue guns, or for auxiliary heating and carburetor and fuel injection pre-heating in automobiles.

The various PTC thermistors types offered by TDK are equally diverse, providing a suitable solution for virtually every application. Backed by a wealth of expertise, our specialists are also able to produce PTC thermistors precisely to all custom specifications.

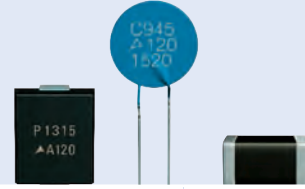
Turn our creativity and competence into your success.

# Overcurrent Protection



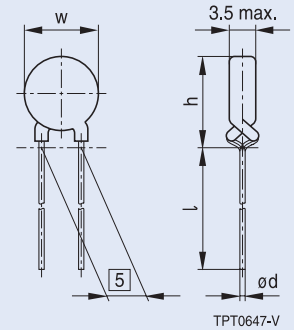
## Applications

- Overload and short-circuit protection, e.g. for
  - motors
  - transformers
  - switch-mode power supplies
  - battery chargers
  - automotive electronics



## Leaded disks, coated

Rated current $I_R$ mA	Switching current $I_S$ mA	Rated resistance $R_R$ $\Omega$	Dimensions				Ordering code	Dimensional drawing mm
			$w_{max}$ mm	$h_{max}$ mm	$\phi d$ mm	$l_{min}$ mm		
<b><math>V_R = 12 \text{ V DC/ V AC}, V_{max} = 20 \text{ V DC/ V AC}</math></b>								
1500	3050	0.45	17.5	21.0	0.6	25	B59945C0160A070	
950	1900	0.80	13.5	17.0	0.6	25	B59955C0160A070	
700	1450	1.20	11.0	14.5	0.6	25	B59965C0160A070	
550	1100	1.80	9.0	12.5	0.6	25	B59975C0160A070	
300	600	4.60	6.5	10.0	0.6	25	B59985C0160A070	
150	300	13.00	4.0	7.5	0.5	25	B59995C0160A070	
<b><math>V_R = 12, 24 \text{ V DC/ V AC}, V_{max} = 30 \text{ V DC/ V AC}</math></b>								
1800	3600	0.30	22.0	25.5	0.6	35	B59935C0120A070	
1300	2600	0.45	17.5	21.0	0.6	25	B59945C0120A070	
850	1700	0.80	13.5	17.0	0.6	25	B59955C0120A070	
600	1200	1.20	11.0	14.5	0.6	25	B59965C0120A070	
450	900	1.80	9.0	12.5	0.6	25	B59975C0120A070	
250	500	4.60	6.5	10.0	0.6	25	B59985C0120A070	
120	240	13.00	4.0	7.5	0.5	25	B59995C0120A070	
<b><math>V_R = 63 \text{ V DC/ V AC}, V_{max} = 80 \text{ V DC/ V AC}</math></b>								
1000	1500	1.20	22.0	25.5	0.8	35	B59910C0130A070	
700	1400	1.65	22.0	25.5	0.6	35	B59930C0120A070	
700	1100	2.20	17.5	21.0	0.8	25	B59930C0130A070	
450	900	2.30	17.5	21.0	0.6	25	B59940C0120A070	
320	640	3.70	13.5	17.0	0.6	25	B59950C0120A070	
320	500	4.90	11.0	14.5	0.6	35	B59950C0130A070	
250	500	5.60	11.0	14.5	0.6	25	B59960C0120A070	
250	380	8.00	9.0	12.5	0.6	25	B59960C0130A070	
170	350	3.70	13.5	17.0	0.6	35	B59950C0080A070	
150	300	9.40	9.0	12.5	0.6	25	B59970C0120A070	
150	240	20.00	6.5	10.0	0.6	25	B59970C0130A070	
130	265	5.60	11.0	14.5	0.6	35	B59960C0080A070	
90	190	9.40	9.0	12.5	0.6	25	B59970C0080A070	
85	170	25.00	6.5	10.0	0.6	25	B59980C0120A070	
85	130	62.00	4.0	7.5	0.6	25	B59980C0130A070	
50	110	25.00	6.5	10.0	0.6	25	B59980C0080A070	
50	100	55.00	4.0	7.5	0.5	25	B59990C0120A070	
30	60	55.00	4.0	7.5	0.5	25	B59990C0080A070	

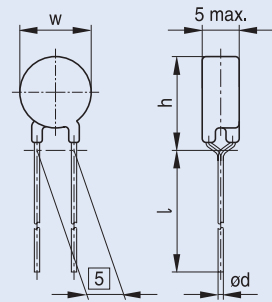


# Overcurrent Protection



## Leaded disks, coated

Rated current $I_R$ mA	Switching current $I_S$ mA	Rated resistance $R_R$ $\Omega$	Dimensions				Ordering code	Dimensional drawing mm
			$w_{max}$ mm	$h_{max}$ mm	$\phi d$ mm	$l_{min}$ mm		
<b><math>V_R = 110 \text{ V DC/ V AC}, V_{max} = 160 \text{ V DC/ V AC}</math></b>								
525	1050	3.7	22.0	25.5	0.6	35	B59830C0160A070	
400	800	6.0	17.5	21.0	0.6	35	B59840C0160A070	
250	500	10.0	13.5	17.0	0.6	25	B59850C0160A070	
180	360	15.0	11.0	14.5	0.6	25	B59860C0160A070	
125	250	25.0	9.0	12.5	0.6	25	B59870C0160A070	
70	140	70.0	6.5	10.0	0.6	25	B59880C0160A070	
35	70	150.0	4.0	7.5	0.5	25	B59890C0160A070	
<b><math>V_R = 230 \text{ V DC/ V AC}, V_{max} = 265 \text{ V DC/ V AC}</math></b>								
650	980	3.5	22.0	25.5	0.8	35	B59810C0130A070	
460	920	3.7	22.0	25.5	0.6	35	B59830C0120A070	
450	680	5.0	17.5	21.0	0.8	35	B59830C0130A070	
330	660	6.0	17.5	21.0	0.6	35	B59840C0120A070	
330	500	9.0	13.5	17.0	0.6	35	B59840C0130A070	
200	400	10.0	13.5	17.0	0.6	25	B59850C0120A070	
200	320	13.0	11.0	14.5	0.6	25	B59850C0130A070	
170	350	6.0	17.5	21.0	0.6	35	B59840C0080A070	
140	280	15.0	11.0	14.5	0.6	35	B59860C0120A070	
140	230	25.0	9.0	12.5	0.6	25	B59860C0130A070	
110	230	10.0	13.5	17.0	0.6	25	B59850C0080A070	
100	200	25.0	9.0	12.5	0.6	25	B59870C0120A070	
100	150	50.0	6.5	10.0	0.6	25	B59870C0130A070	
90	180	15.0	11.0	14.5	0.6	25	B59860C0080A070	
80	160	35.0	9.0	12.5	0.6	25	B59872C0120A070	
70	140	45.0	9.0	12.5	0.6	25	B59873C0120A070	
60	130	25.0	9.0	12.5	0.6	25	B59870C0080A070	
60	125	55.0	9.0	12.5	0.6	25	B59874C0120A070	
55	110	65.0	9.0	12.5	0.6	25	B59875C0120A070	
55	110	70.0	6.5	10.0	0.6	25	B59880C0120A070	
55	90	160.0	4.0	7.5	0.6	25	B59880C0130A070	
35	70	120.0	6.5	10.0	0.6	25	B59883C0120A070	
30	70	70.0	6.5	10.0	0.6	35	B59880C0080A070	
30	60	150.0	4.0	7.5	0.5	25	B59890C0120A070	
15	40	150.0	4.0	7.5	0.5	25	B59890C0080A070	
<b><math>V_R = 230 \text{ V DC/ V AC}, V_{max} = 265 \text{ V DC/ V AC}, \text{lead-free series}</math></b>								
220	330	10	13.5	17.0	0.6	35	B59850C0120A570	
170	260	15	11.0	14.5	0.6	35	B59860C0120A570	
90	140	45	9.0	12.5	0.6	35	B59873C0120A570	
80	120	65	9.0	12.5	0.6	35	B59875C0120A570	
65	98	70	6.5	10.0	0.6	35	B59880C0120A570	
50	75	120	6.5	10.0	0.6	35	B59883C0120A570	



TPT0648-4

# Overcurrent Protection



Leaded disks, coated									
Rated current $I_R$ mA	Switching current $I_S$ mA	Rated resistance $R_R$ $\Omega$	Dimensions				Ordering code	Dimensional drawing mm	
			$w_{max}$ mm	$h_{max}$ mm	$\phi d$ mm	$l_{min}$ mm			
<b><math>V_R = 380 \text{ V DC/ V AC}, V_{max} = 420 \text{ V DC/ V AC}</math></b>									
21	39	600	6.5	10.0	0.6	25	B59884C0120A070		
<b><math>V_R = 500 \text{ V DC/ V AC}, V_{max} = 550 \text{ V DC/ V AC}</math></b>									
15	30	1200	6.5	10.0	0.6	25	B59885C0120A070		
12	24	1500	6.5	10.0	0.6	25	B59886C0120A070		

Leaded disks, coated and uncoated									
Rated current $I_R$ mA	Switching current $I_S$ mA	Rated resistance $R_R$ $\Omega$	Dimensions					Ordering code	Dimensional drawing mm
			$w_{max}$ mm	$h_{max}$ mm	$th_{max}$ mm	$\phi d$ mm	$l_{min}$ mm		
<b><math>V_R = 400 \text{ V DC/ V AC}, V_{max} = 440 \text{ V DC/ V AC}</math></b>									
123	245	25	12.5	16.5	5.0	0.6	35	B59750B0120A070 <sup>1)</sup>	<p><b>For B59***B...</b></p>
64	127	70	8.5	12.0	7.0	0.6	25	B59770B0120A070 <sup>1)</sup>	
87	173	50	13.0	18.0	7.5	0.6	35	B59751C0120A070	
69	137	50	13.0	18.0	7.5	0.6	25	B59752C0120A070	
56	112	120	13.0	18.0	7.5	0.6	25	B59753C0120A070	
50	100	150	13.0	18.0	7.5	0.6	25	B59754C0120A070	
49	97	120	9.0	13.5	7.5	0.6	25	B59771C0120A070	
43	86	150	9.0	13.5	7.5	0.6	25	B59772C0120A070	
<b><math>V_R = 400 \text{ V DC/ V AC}, V_{max} = 440 \text{ V DC/ V AC}</math></b>									
75	150	120	16.0	20.5	8.0	0.8	35	B59412C1130B070	
100	200	56	16.0	20.5	8.0	0.8	35	B59451C1130B070	
<b><math>V_R = 500 \text{ V DC/ V AC}, V_{max} = 550 \text{ V DC/ V AC}</math></b>									
28	55	500	13.0	18.0	7.5	0.6	35	B59755C0115A070	
16	32	1100	9.0	13.5	7.5	0.6	25	B59774C0115A070	
<b><math>V_R = 500 \text{ V DC/ V AC}, V_{max} = 550 \text{ V DC/ V AC}</math></b>									
24	48	500	9.0	13.5	7.5	0.6	25	B59773C0120A070	
<b><math>V_R = 1000 \text{ V DC/ V AC}, V_{max} = 1000 \text{ V DC/ V AC}</math></b>									
8	17	7500	13.0	18.0	7.5	0.6	35	B59758C0110A070	

<sup>1)</sup> Uncoated version



# Overcurrent Protection



SMD types					
Rated current $I_R^{1)}$ mA	Switching current $I_S^{1)}$ mA	Rated resistance $R_R$ $\Omega$	EIA size	Ordering code	Dimensional drawing mm
<b><math>V_R = 24 \text{ V DC/ V AC}, V_{\text{max}} = 30 \text{ V DC/ V AC}</math></b>					<b>EIA case size 0402</b>  Termination TPT0948-M-E
90	180	27	1210	B59606A0110A062	
70	130	55	1210	B59607A0120A062	
<b><math>V_R = 24 \text{ V DC/ V AC}, V_{\text{max}} = 32 \text{ V DC/ V AC}</math></b>					<b>EIA case size 0603</b>  Termination TPT0698-5-E
13	32	470	0402	B59407A0115A062	
<b><math>V_R = 42 \text{ V DC/ V AC}, V_{\text{max}} = 60 \text{ V DC/ V AC}</math></b>					<b>EIA case size 1210</b>  Termination TPT0790-F-E
20	40	220	0603	B59622A0090A062	
<b><math>V_R = 63 \text{ V DC/ V AC}, V_{\text{max}} = 80 \text{ V DC/ V AC}</math></b>					
13	25	470	0603	B59623A0090A062	
50	90	125	1210	B59707A0120A062	
<b><math>V_R = 230 \text{ V DC/ V AC}, V_{\text{max}} = 265 \text{ V DC/ V AC}</math></b>					
15	40	400	1210	B59807A0090A062	
12	22	1500	1210	B59907A0120B062	
<b><math>V_R = 230 \text{ V DC/ V AC}, V_{\text{max}} = 400 \text{ V DC/ V AC}</math></b>					
12	22	1500	1210	B59907A0120A062	

<sup>1)</sup> Measured on component soldered to standardized PCB (material FR4, thickness 1.5 mm).

# Overcurrent Protection



SMD types									Dimensional drawing
Rated current $I_R$ mA	Switching current $I_S$ mA	Rated resistance $R_R$ $\Omega$	Dimensions				EIA case size	Ordering code	
			$h \pm 0.5$ mm	$w \pm 0.5$ mm	$l \pm 0.5$ mm	$a \pm 0.3$ mm			
<b><math>V_R = 24 \text{ V DC/ V AC}, V_{\max} = 30 \text{ V DC/ V AC}, T_{\text{ref}} = 80 \text{ }^\circ\text{C}</math></b>									
205	420	3.1	3.3	8.0	10.0	2.3	4032	B59301P1080A062	
165	340	4.6	3.3	6.3	8.0	1.7	3225	B59201P1080A062	
90	185	13.0	3.3	6.3	8.0	1.7	3225	B59101P1080A062	
<b><math>V_R = 24 \text{ V DC/ V AC}, V_{\max} = 30 \text{ V DC/ V AC}, T_{\text{ref}} = 120 \text{ }^\circ\text{C}</math></b>									
310	640	3.1	3.3	8.0	10.0	2.3	4032	B59301P1120A062	
265	545	4.6	3.3	6.3	8.0	1.7	3225	B59201P1120A062	
170	355	13.0	3.3	6.3	8.0	1.7	3225	B59101P1120A062	
<b><math>V_R = 63 \text{ V DC/ V AC}, V_{\max} = 80 \text{ V DC/ V AC}, T_{\text{ref}} = 80 \text{ }^\circ\text{C}</math></b>									
80	165	16.0	3.3	8.0	10.0	2.3	4032	B59315P1080A062	
65	135	25.0	3.3	6.3	8.0	1.7	3225	B59215P1080A062	
40	85	55.0	3.3	6.3	8.0	1.7	3225	B59115P1080A062	
<b><math>V_R = 63 \text{ V DC/ V AC}, V_{\max} = 80 \text{ V DC/ V AC}, T_{\text{ref}} = 120 \text{ }^\circ\text{C}</math></b>									
150	310	16.0	3.3	8.0	10.0	2.3	4032	B59315P1120A062	
100	210	25.0	3.3	6.3	8.0	1.7	3225	B59215P1120A062	
70	145	55.0	3.3	6.3	8.0	1.7	3225	B59115P1120A062	

# Inrush Current Limiters



## Applications

- Inrush current limiter for smoothing and DC link capacitors
- To replace high-power fixed resistors for capacitor charging



## Inrush current limiters, leaded disks, coated

Maximum voltage $V_{max}$ V AC	Maximum link voltage $V_{link, max}$ V DC	Rated resistance $R_R$ $\Omega$	Reference temperature $T_{ref} (typ.)$ $^{\circ}C$	Heat capacity $C_{th}$ J/K	Dimensions					Ordering code	Dimensional drawing mm
					$w_{max}$ mm	$h_{max}$ mm	$th_{max}$ mm	$\phi d$ mm	$l_{min}$ mm		
<b>Leaded disks, operating cycles at <math>V_{max}</math> (charging of capacitor) <math>N_c &gt; 100000</math> cycles</b>											<p>TPT1101-Y</p>
260	370	70	120	0.4	9.0	13.5	7.5	0.6	25	B59770C0120A070	
260	370	120	120	0.6	9.0	13.5	7.5	0.6	25	B59771C0120A070	
260	370	150	120	0.6	9.0	13.5	7.5	0.6	25	B59772C0120A070	
280	400	25	120	1.0	13.0	18.0	5.5	0.6	35	B59750C0120A070	
280	400	50	120	1.4	13.0	18.0	7.5	0.6	35	B59751C0120A070	
280	400	80	120	1.4	13.0	18.0	7.5	0.6	25	B59752C0120A070	
440	620	56	120	2.1	16.0	20.5	8.0	0.8	35	B59451C1130B070	
440	620	120	120	1.4	13.0	18.0	7.5	0.6	25	B59753C0120A070	
440	620	150	120	1.4	13.0	18.0	7.5	0.6	25	B59754C0120A070	
440	620	500	120	0.6	9.0	13.5	7.5	0.6	25	B59773C0120A070	
440	620	1100	115	0.6	9.0	13.5	7.5	0.6	25	B59774C0115A070	
480	680	120	130	2.1	16.0	20.5	8.0	0.8	35	B59412C1130B070	
560	800	500	115	1.4	13.0	18.0	7.5	0.6	35	B59755C0115A070	

## Inrush current limiters in housing

Maximum voltage $V_{max}$ V AC	Maximum link voltage $V_{link, max}$ V DC	Rated resistance $R_R$ $\Omega$	Reference temperature $T_{ref} (typ.)$ $^{\circ}C$	Heat capacity $C_{th}$ J/K	Ordering code	Dimensional drawing mm	
<b>Phenolic resin plastic case, operating cycles at <math>V_{max}</math> (charging of capacitor) <math>N_c &gt; 100000</math> cycles</b>							<p>TPT1065-T</p>
280	400	22	130	2.3	B59105J0130A020		
440	620	56	130	2.3	B59107J0130A020		
560	800	100	130	2.3	B59109J0130A020		
<b>PBT plastic case, preferred types for new designs, operating cycles at <math>V_{max}</math> (charging of capacitor) <math>N_c &gt; 100000</math> cycles</b>							<p>TPT1061-C</p>
280	400	33	130	1.1	B59213J0130A020		
280	400	22	130	2.3	B59215J0130A020		
440	620	56	130	2.3	B59217J0130A020		
560	800	100	130	2.3	B59219J0130A020		

### Applications

- Overcurrent protection for telecom applications
- Suitable for line card applications e.g. POTS, access networks, customer premises equipment (CPE) or integrated voice data (IVD)



### Leaded disks

Rated resistance $R_R$ $\Omega$	$R_{25,match}$ (per packing unit) $ R_1 - R_2 _{max}$ $\Omega$	Rated current $I_R @ 25^\circ C$ mA	Switching current $I_S @ 25^\circ C$ mA	Dimensions			Figure	Ordering code	Dimensional drawing mm
				$w_{max}$ mm	$h_{max}$ mm	$th_{max}$ mm			
<b><math>V_{F,max} = 245 \text{ V AC}</math></b>									
6.0	No	185	440	13.0	17.0	5.0	1	B59098C1100B051	<b>Figure 1</b> 
20.8	1.0	80	240	7.5	4.0	10.5	2	B59084C1080B140	
50.0	1.0	65	150	6.0	10.0	4.5	1	B59154C1130A151	
50.0	1.0	65	150	6.0	10.0	4.0	2	B59154U1135B140	
50.0	3.0	95	250	8.0	11.0	5.5	1	B59172C1130A151	
50.0	1.0	90	190	9.0	12.5	4.5	1	B59184C1120B153	
50.0	1.0	100	210	9.0	13.0	4.5	1	B59184C1130A151	
55.0	3.0	90	210	8.0	11.0	5.5	1	B59173C1130A151	
55.0	3.0	115	270	9.5	13.0	6.0	2	B59183C1160A140	

## Telecom pair protector (TPP)

Rated resistance $R_R$ $\Omega$	Rated current $I_R$ @ 25°C mA	Switching current $I_S$ @ 25°C mA	Resistance matching in one housing $ R_2 - R_1 $ $\Omega$	Ordering code	Dimensional drawing  mm
<b><math>V_{F,max} = 245 \text{ V AC}</math></b>					
35	100	210	< 1.0	B59535T1120A262	
50	80	170	< 1.0	B59550T1120A262	
9	180	360	< 1.0	B59509T1120A062	
35	110	230	< 1.0	B59535T1120A062	
50	90	190	< 1.0	B59550T1120A062	
35	110	230	< 1.0	B59635T1120A062	
50	90	190	< 1.0	B59650T1120A062	
35	110	230	< 1.0	B59735T1120A062	
35	130	270	< 1.0	B59735T1150A062	
50	90	190	< 1.0	B59750T1120A062	

## Telecom pair protector (TPP)

Rated resistance $R_R$ $\Omega$	Rated current $I_R$ @ 25°C mA	Switching current $I_S$ @ 25°C mA	Resistance matching in one housing $ R_2 - R_1 $ $\Omega$	Ordering code	Dimensional drawing  mm
<b><math>V_{F,max} = 245 \text{ V AC}</math></b>					
35	115	240	< 1.0	B59835T1120A062	

## Telecom pair protector (TPP), for GR1089 Central Office

Rated resistance $R_R$ $\Omega$	Rated current $I_R$ @ 25°C mA	Switching current $I_S$ @ 25°C mA	Resistance matching in one housing $ R_2 - R_1 $ $\Omega$	Ordering code	Dimensional drawing  mm
<b><math>V_{F,max} = 600 \text{ V AC}</math></b>					
70	70	150	< 2.0	B59970T1100A062	
70	70	150	< 1.0	B59970T1100A162	

# Switching Applications



## Applications

- For delayed switching, primarily in switch-mode power supplies



## PTC thermistors in plastic case

Rated resistance $R_R$ $\Omega$	Rated current $I_R$ mA	Switching current $I_S$ mA	Ordering code	Dimensional drawing mm
<b><math>V_{max} = 265\text{ V}</math>, <math>V_R = 230\text{ V}</math>, switching cycles <math>N = 100000</math> cycles</b>				
500	20	40	B59339A1501P020	
2000	10	20	B59339A1202P020	
5000	7	15	B59339A1502P020	

# Motor Starting



## Applications

- Motor start in compressors and air conditioning systems (refrigerators)
- Time delay in turning off the auxiliary winding of single-phase AC motors (e.g. refrigerator compressors)



## Standard sizes

Operating current $I_{\max}$ A	Maximum voltage $V_{\max}$ V	Reference temperature $T_{\text{ref}}$ (typ.) °C	Breakdown voltage $V_{\text{BD}}^{1)}$ V	$R_R \pm \Delta R_R$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) Ω	Dimensions		Ordering code	Dimensional drawing  mm	
					w mm	th mm			
<b><math>V_R = 120 \text{ V}_{\text{RMS}}</math></b>									
12	180	120	> 360	4.7 ±20%	17.5 ±0.5	2.5 ±0.2	B59506A0120A020	<p><b>For B59314A*</b></p> <p>Termination TPT0449-Z-E</p>	
<b><math>V_R = 230 \text{ V}_{\text{RMS}}</math></b>									
6	355	135	> 700	33 ±20%	19.5 ±0.5	2.5 ±0.2	B59501A0135A020		
7	300	135	> 600	22 ±20%	19.5 ±0.5	2.5 ±0.2	B59524A0135A020		
8	320	120	> 650	20 ±20%	17.5 ±0.5	2.5 ±0.2	B59544A0120A020		
8	350	120	> 700	15 ±30%	19.5 ±0.5	3.2 ±0.2	B59196A0120A020		
9	350	120	> 700	33 ±30%	19.5 ±0.5	3.2 ±0.2	B59197A0120B020		
9	400	120	> 800	38 ±30%	20.0 +0.2/-0.8	5.0 ±0.25	B59314A0120B010		

## Low power consumption

Operating current $I_{\max}$ A	Maximum voltage $V_{\max}$ V	Reference temperature $T_{\text{ref}}$ (typ.) °C	Breakdown voltage $V_{\text{BD}}^{1)}$ V	$R_R \pm \Delta R_R$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) Ω	Ordering code	Dimensional drawing  mm	
							<b><math>V_R = 120 \text{ V}_{\text{RMS}}</math></b>
12	180	135	> 360	4.70 ±20%	B59546A0135A020		
12	200	135	> 400	6.80 ±20%	B59548A0135A020		
<b><math>V_R = 230 \text{ V}_{\text{RMS}}</math></b>							
5	400	135	> 710	47.00 ±20%	B59551A0135A020		
8	350	135	> 640	22.00 ±20%	B59549A0135A020		
8	355	135	> 700	33.00 ±20%	B59550A0135A020		
8	350	135	> 600	15.00 ±20%	B59556A0135A020		

<sup>1)</sup> PTC clamped between crown contacts (diameter: 2 mm).



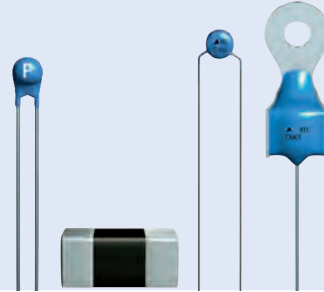
# Limit Temperature Sensors



## Applications

Sensors for limit temperature monitoring

- in lighting applications
- in home appliances (dish washers, washing machines, ironing machines, electric cookers etc.)
- in automotive electronics
- in data and communications engineering (DC/DC converters)
- in motor windings



## Motor protection, single sensors

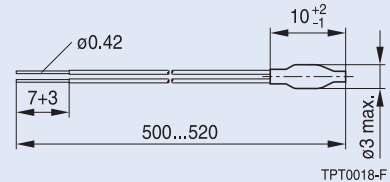
Sensing temperature $T_{\text{sense}}$ °C	Resistance $R(T_{\text{sense}} - \Delta T)$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Resistance $R(T_{\text{sense}} + \Delta T)$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Ordering code
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### Dimensional drawing

mm

$V_{\text{max}} = 30 \text{ V DC}$ , insulating test voltage  $V_{\text{ins}} = 2.5 \text{ kV AC}$ ,  $\Delta T = \pm 5 \text{ K}$

60	$\leq 570$	$\geq 570$	B59100M1060A070
70	$\leq 570$	$\geq 570$	B59100M1070A070
80	$\leq 570$	$\geq 570$	B59100M1080A070
90	$\leq 550$	$\geq 1330$	B59100M1090A070
100	$\leq 550$	$\geq 1330$	B59100M1100A070
110	$\leq 550$	$\geq 1330$	B59100M1110A070
120	$\leq 550$	$\geq 1330$	B59100M1120A070
130	$\leq 550$	$\geq 1330$	B59100M1130A070
140	$\leq 550$	$\geq 1330$	B59100M1140A070
145	$\leq 550$	$\geq 1330$	B59100M1145A070
150	$\leq 550$	$\geq 1330$	B59100M1150A070
155	$\leq 550$	$\geq 1330$	B59100M1155A070
160	$\leq 550$	$\geq 1330$	B59100M1160A070



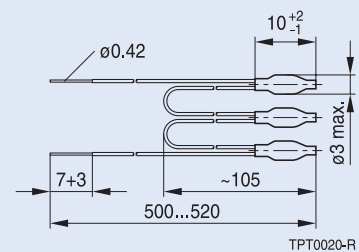
$V_{\text{max}} = 30 \text{ V DC}$ , insulating test voltage  $V_{\text{ins}} = 2.5 \text{ kV AC}$ ,  $\Delta T = \pm 7 \text{ K}$

170	$\leq 570$	$\geq 570$	B59100M1170A070
180	$\leq 570$	$\geq 570$	B59100M1180A070

## Motor protection, triple sensors

$V_{\text{max}} = 30 \text{ V DC}$ , insulating test voltage  $V_{\text{ins}} = 2.5 \text{ kV AC}$ ,  $\Delta T = \pm 5 \text{ K}$

100	$\leq 1650$	$\geq 3990$	B59300M1100A070
110	$\leq 1650$	$\geq 3990$	B59300M1110A070
120	$\leq 1650$	$\geq 3990$	B59300M1120A070
130	$\leq 1650$	$\geq 3990$	B59300M1130A070
140	$\leq 1650$	$\geq 3990$	B59300M1140A070
150	$\leq 1650$	$\geq 3990$	B59300M1150A070
155	$\leq 1650$	$\geq 3990$	B59300M1155A070
160	$\leq 1650$	$\geq 3990$	B59300M1160A070



$V_{\text{max}} = 30 \text{ V DC}$ , insulating test voltage  $V_{\text{ins}} = 2.5 \text{ kV AC}$ ,  $\Delta T = \pm 7 \text{ K}$

180	$\leq 1710$	$\geq 1710$	B59300M1180A070
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# Limit Temperature Sensors



Limit temperature sensors, leaded disks, coated, miniaturized				
Sensing temperature $T_{\text{sense}}$ °C	Resistance $R(T_{\text{sense}} - \Delta T)$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Resistance $R(T_{\text{sense}} + \Delta T)$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Ordering code	Dimensional drawing  mm
$V_{\text{max}} = 30 \text{ V DC}, \Delta T = \pm 5 \text{ K}$				
70	$\leq 570$	$\geq 570$	B59008C0070A040	
80	$\leq 570$	$\geq 570$	B59008C0080A040	
90	$\leq 550$	$\geq 1330$	B59008C0090A040	
100	$\leq 550$	$\geq 1330$	B59008C0100A040	
110	$\leq 550$	$\geq 1330$	B59008C0110A040	
120	$\leq 550$	$\geq 1330$	B59008C0120A040	
130	$\leq 550$	$\geq 1330$	B59008C0130A040	
140	$\leq 550$	$\geq 1330$	B59008C0140A040	
150	$\leq 550$	$\geq 1330$	B59008C0150A040	
160	$\leq 550$	$\geq 1330$	B59008C0160A040	

Limit temperature sensors, leaded disks, coated				
Sensing temperature $T_{\text{sense}}$ °C	Resistance $R(T_{\text{sense}} - \Delta T)$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Resistance $R(T_{\text{sense}} + \Delta T)$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Ordering code	Dimensional drawing  mm
$V_{\text{max}} = 30 \text{ V DC}, \Delta T = \pm 5 \text{ K}$				
80	$\leq 570$	$\geq 570$	B59100C0080A070	
90	$\leq 550$	$\geq 1330$	B59100C0090A070	
100	$\leq 550$	$\geq 1330$	B59100C0100A070	
110	$\leq 550$	$\geq 1330$	B59100C0110A070	
120	$\leq 550$	$\geq 1330$	B59100C0120A070	
130	$\leq 550$	$\geq 1330$	B59100C0130A070	
140	$\leq 550$	$\geq 1330$	B59100C0140A070	

# Limit Temperature Sensors



## Limit temperature sensors, probe assemblies

Sensing temperature $T_{\text{sense}}$ °C	Resistance $R(T_{\text{sense}} - 5 \text{ K})$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Resistance $R(T_{\text{sense}} + 5 \text{ K})$ ( $V_{\text{PTC}} \leq 2.5 \text{ V}$ ) $\Omega$	Ordering code	Dimensional drawing  mm
<b>Type D1052, <math>V_{\text{max}} = 30 \text{ V DC}</math></b>				<b>Type D1052</b> <p>5.8±0.5, 0.5±0.05, 15.5±0.5, 32 min., 2.5±0.8, 8.5±0.5, 6.2±0.5, 5.5±0.5, 3.7±0.2, ø0.5±0.05 TPT1057-Y</p>
60	≤ 570	≥ 570	B59052D1060A040	
70	≤ 570	≥ 570	B59052D1070A040	
80	≤ 570	≥ 570	B59052D1080A040	
90	≤ 550	≥ 1330	B59052D1090A040	
<b>Type D901, <math>V_{\text{max}} = 30 \text{ V DC}</math></b>				<b>Type D901</b> <p>5.5±1, 0.5±0.05, 18±1, 32 min., 2.5±0.8, 8.5±0.5, 3.7±0.2, ø0.5±0.05 TPT0016-Y</p>
60	≤ 570	≥ 570	B59901D0060A040	
70	≤ 570	≥ 570	B59901D0070A040	
80	≤ 570	≥ 570	B59901D0080A040	
90	≤ 550	≥ 1330	B59901D0090A040	
100	≤ 550	≥ 1330	B59901D0100A040	
110	≤ 550	≥ 1330	B59901D0110A040	
120	≤ 550	≥ 1330	B59901D0120A040	
<b>Type D1051, <math>V_{\text{max}} = 30 \text{ V DC}</math></b>				<p>3.6±0.2, 0.5±0.05, 52±5, 39±5, 1±0.5, -1.0, 7.1±0.3, 5±0.2, 2.5 max., 10±0.5, 3.7±0.1, ø0.5±0.05, 3±0.8 TPT1121-X</p>
100	≤ 1500	≥ 2200	B59051D1100A040	
110	≤ 1500	≥ 2200	B59051D1110A040	
120	≤ 1500	≥ 2200	B59051D1120A040	

# Limit Temperature Sensors



Limit temperature sensors, superior series							
Rated resistance $R_R$ ( $V \leq V_{max}$ ) $\Omega$	Resistance tolerance $\Delta R_R$ %	Sensing temperature $T_{sense,1}$ (@ 4.7 k $\Omega$ ) $^{\circ}C$	Sensing temperature $T_{sense,2}$ (@ 4.7 k $\Omega$ ) $^{\circ}C$	Ordering code	Dimensional drawing	SMD	
<b><math>V_{max} = 32</math> V DC, EIA case size 0402</b>					<b>EIA case size 0402</b>		
470	$\pm 50$	75 $\pm 5$	–	B59421A0075A062	<p>TPT0948-M-E</p>		
470	$\pm 50$	85 $\pm 5$	–	B59421A0085A062			
470	$\pm 50$	95 $\pm 5$	–	B59421A0095A062			
470	$\pm 50$	105 $\pm 5$	–	B59421A0105A062			
470	$\pm 50$	115 $\pm 5$	–	B59421A0115A062			
470	$\pm 50$	125 $\pm 5$	–	B59421A0125A062			
470	$\pm 50$	135 $\pm 5$	–	B59421A0135A062			
<b><math>V_{max} = 32</math> V DC, EIA case size 0603</b>					<b>EIA case size 0603</b>		
470	$\pm 50$	75 $\pm 5$	90 $\pm 7$	B59641A0075A062	<p>TPT0698-5-E</p>		
470	$\pm 50$	85 $\pm 5$	100 $\pm 7$	B59641A0085A062			
470	$\pm 50$	95 $\pm 5$	110 $\pm 7$	B59641A0095A062			
470	$\pm 50$	105 $\pm 5$	120 $\pm 7$	B59641A0105A062			
470	$\pm 50$	115 $\pm 5$	130 $\pm 7$	B59641A0115A062			
470	$\pm 50$	125 $\pm 5$	140 $\pm 7$	B59641A0125A062			
470	$\pm 50$	135 $\pm 5$	150 $\pm 7$	B59641A0135A062			
470	$\pm 50$	145 $\pm 5$	–	B59641A0145A062			
Rated resistance $R_R$ ( $V \leq V_{max}$ ) $\Omega$	Resistance tolerance $\Delta R_R$ %	Sensing temperature $T_{sense,1}$ $^{\circ}C$	Resistance $R(T_{sense,1} - 5^{\circ}C)$ k $\Omega$	Resistance $R(T_{sense,1} + 5^{\circ}C)$ k $\Omega$	Ordering code	Dimensional drawing	SMD
<b><math>V_{max} = 32</math> V DC, EIA case size 0805</b>					<b>EIA case size 0805</b>		
680	$\pm 50$	70	$\leq 5.7$	$\geq 5.7$	B59721A0070A062	<p>TPT0650-F-E</p>	
680	$\pm 50$	80	$\leq 5.7$	$\geq 5.7$	B59721A0080A062		
680	$\pm 50$	90	$\leq 5.5$	$\geq 13.3$	B59721A0090A062		
680	$\pm 50$	100	$\leq 5.5$	$\geq 13.3$	B59721A0100A062		
680	$\pm 50$	110	$\leq 5.5$	$\geq 13.3$	B59721A0110A062		
680	$\pm 50$	120	$\leq 5.5$	$\geq 13.3$	B59721A0120A062		
680	$\pm 50$	130	$\leq 5.5$	$\geq 13.3$	B59721A0130A062		

# Limit Temperature Sensors



## Limit temperature sensors, standard series

Rated resistance $R_R$ ( $V \leq V_{max}$ ) $\Omega$	Resistance tolerance $\Delta R_R$ %	Sensing temperature $T_{sense,1}$ (@ 4.7 k $\Omega$ ) $^{\circ}\text{C}$	Sensing temperature $T_{sense,1}$ (@ 4.7 M $\Omega$ ) $^{\circ}\text{C}$	Ordering code	Dimensional drawing <b>SMD</b> mm	
<b><math>V_{max} = 32 \text{ V DC}</math>, EIA case size 0402, high ohmic types</b>					<b>EIA case size 0402</b>	
10000	$\pm 50$	–	130 $\pm 5$	B59404A0130A062		
<b><math>V_{max} = 32 \text{ V DC}</math>, EIA case size 0603, standard types</b>					<b>EIA case size 0603</b>	
470	$\pm 50$	75 $\pm 5$	–	B59601A0075A062		
470	$\pm 50$	85 $\pm 5$	–	B59601A0085A062		
470	$\pm 50$	95 $\pm 5$	–	B59601A0095A062		
470	$\pm 50$	105 $\pm 5$	–	B59601A0105A062		
470	$\pm 50$	115 $\pm 5$	–	B59601A0115A062		
470	$\pm 50$	125 $\pm 5$	–	B59601A0125A062		
470	$\pm 50$	135 $\pm 5$	–	B59601A0135A062		
<b><math>V_{max} = 32 \text{ V DC}</math>, EIA case size 0603, tight temperature tolerance types</b>						
470	$\pm 50$	85 $\pm 3$	–	B59601A0085B062		
470	$\pm 50$	95 $\pm 3$	–	B59601A0095B062		
470	$\pm 50$	105 $\pm 3$	–	B59601A0105B062		
470	$\pm 50$	115 $\pm 3$	–	B59601A0115B062		
470	$\pm 50$	125 $\pm 3$	–	B59601A0125B062		
Rated resistance $R_R$ ( $V \leq V_{max}$ ) $\Omega$	Resistance tolerance $\Delta R_R$ %	Sensing temperature $T_{sense,1}$ $^{\circ}\text{C}$	Resistance R ( $T_{sense,1} - 5^{\circ}\text{C}$ ) k $\Omega$	Resistance R ( $T_{sense,1} + 5^{\circ}\text{C}$ ) k $\Omega$	Ordering code	Dimensional drawing <b>SMD</b> mm
<b><math>V_{max} = 32 \text{ V DC}</math>, EIA case size 0603, tight resistance tolerance types</b>					<b>EIA case size 0603</b>	
110	$\pm 15$	70	$\leq 1.1$	$\geq 1.0$	B59602A0055B062	
470	$\pm 15$	55	$\leq 4.7$	$\geq 4.7$	B59603A0055A062	
470	$\pm 15$	105	$\leq 4.7$	$\geq 4.7$	B59603A0105A062	
<b><math>V_{max} = 32 \text{ V DC}</math>, EIA case size 0805, standard types</b>					<b>EIA case size 0805</b>	
680	$\pm 50$	70	$\leq 5.7$	$\geq 5.7$	B59701A0070A062	
680	$\pm 50$	90	$\leq 5.5$	$\geq 13.3$	B59701A0090A062	
680	$\pm 50$	100	$\leq 5.5$	$\geq 13.3$	B59701A0100A062	
680	$\pm 50$	110	$\leq 5.5$	$\geq 13.3$	B59701A0110A062	
680	$\pm 50$	120	$\leq 5.5$	$\geq 13.3$	B59701A0120A062	
680	$\pm 50$	130	$\leq 5.5$	$\geq 13.3$	B59701A0130A062	
680	$\pm 50$	140	$\leq 5.5$	$\geq 13.3$	B59701A0140A062	

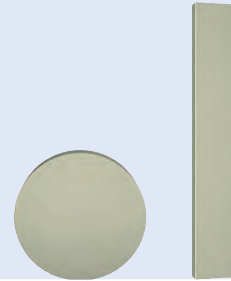
# Heating Elements



## Applications

For all sorts of heating systems

- In household appliances (hot plates, water heaters, hot-adhesive pistols, hair curlers etc.)
- In automotive electronics (preheating of diesel filter and injection system, additional heating of passenger compartment)
- In medical appliances (vaporizers, inhalators)



## Disk shaped with silver metallization

Reference temperature $T_{ref}$ (typ.) °C	Minimum resistance $R_{min}$ ( $V = V_R$ ) Ω	Surface temperature $T_{surf}$ <sup>1)</sup> ( $V = V_R$ ) °C	Rated resistance $R_R$ ( $V_{meas} \leq 1.5 V$ ) Ω	Ordering code	Dimensional drawing  mm
<b><math>V_{max} = 30 V DC, V_R = 12 V DC</math></b>					
0	20 <sup>2)</sup>	40	≥ 320	B59060A0000A010	
40	4 <sup>2)</sup>	70	9	B59060A0040A010	
60	5	80	9	B59060A0060A010	
80	4	95	9	B59060A0080A010	
120	4	140	9	B59060A0120A010	
160	3	165	9	B59060A0160A010	
180	3	185	9	B59060A0180A010	
220	2	220	9	B59060A0220A010	
<b><math>V_{max} = 265 V DC, V_R = 230 V DC</math></b>					
110	960	135	4200	B59053A0110A010	
130	840	155	4200	B59053A0130A010	
150	700	170	4200	B59053A0150A010	
180	530	200	4200	B59053A0180A010	
220	640	235	6000	B59053A0220A010	

<sup>1)</sup> Measured between points.

<sup>2)</sup>  $T (R_{PTC} = R_{min}) < 25 °C$

# Heating Elements



## Rectangular with silver metallization

Reference temperature $T_{ref}$ (typ.) °C	Minimum resistance $R_{min}$ ( $V = V_R$ ) Ω	Surface temperature $T_{surf}$ <sup>1)</sup> ( $V = V_R$ ) °C	Rated resistance $R_R$ ( $V_{meas} \leq 1.5 V$ ) Ω	Ordering code	Dimensional drawing  mm
$V_{max} = 24 V DC, V_R = 12 V DC$					
80	1.00	110	3.2	B59041R0080A010	<p>TPT0240-H-E</p>
120	1.00	145	3.2	B59041R0120A010	
160	0.75	180	3.2	B59041R0160A010	
180	0.75	200	3.2	B59041R0180A010	
220	1.00	230	6.4	B59041R0220A010	

## Rectangular with aluminum metallization

Reference temperature $T_{ref}$ (typ.) °C	Minimum resistance $R_{min}$ ( $V = V_R$ ) Ω	Surface temperature $T_{surf}$ <sup>1)</sup> ( $V = V_R$ ) °C	Rated resistance $R_R$ ( $V_{meas} \leq 1.5 V$ ) Ω	Ordering code	Dimensional drawing  mm
$V_{max} = 265 V DC, V_R = 230 V DC$					
50	225 <sup>2)</sup>	100	700	B59102R0050A010	<p>TPT0363-Z-E</p>
70	130	115	700	B59102R0070A010	
90	115	130	700	B59102R0090A010	
110	100	145	700	B59102R0110A010	
130	105	160	700	B59102R0130A010	
150	90	180	700	B59102R0150A010	
180	66	205	700	B59102R0180A010	
220	80	240	1000	B59102R0220A010	
240	75	255	1000	B59102R0240A010	
270	85	280	1300	B59102R0270A010	

## Rectangular, 400 V, with aluminum metallization

Reference temperature $T_{ref}$ (typ.) ( $V_{meas} \leq 1.5 V$ ) °C	Minimum resistance $R_{min}$ ( $V = V_R$ ) Ω	Surface temperature $T_{surf}$ <sup>1)</sup> ( $V = V_R$ ) °C	Rated resistance $R_R$ ( $V_{meas} \leq 1.5 V$ ) Ω	Ordering code	Dimensional drawing  mm
$V_{max} = 600 V DC, V_R = 400 V DC$					
155	220	190	3000	B59249R0155B010	<p>TPT1064-H-E</p>

<sup>1)</sup> Measured between points

<sup>2)</sup> T ( $R_{PTC} = R_{min}$ ) < 25 °C

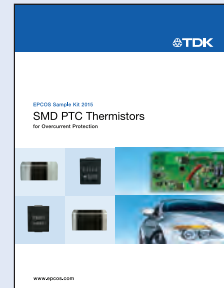
# Sample Kits

## Sample kit SMD PTC thermistors for overcurrent protection

### Features

- 19 different ceramic SMD PTC thermistors for overcurrent protection
- Case sizes 0402, 0603, 1210, 3225 and 4032

Ordering code: B59002Z0999A099

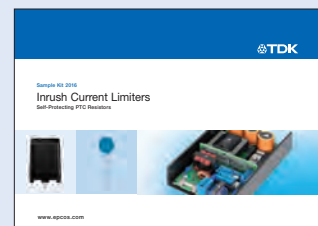


## Sample kit PTC inrush current limiters

### Features

- 11 different PTC inrush current limiters as self-protecting PTC resistors
- In housing or as leaded disks with coating

Ordering code: B59006Z0999A099



## Sample kit SMD PTC thermistors for limit temperature sensing, superior series

### Features

- 22 different ceramic SMD PTC thermistors for limit temperature sensing
- Case sizes 0402, 0603, and 0805
- All products from the superior series are qualified based on AEC-Q200, Rev. D

Ordering code: B59001Z0999A099

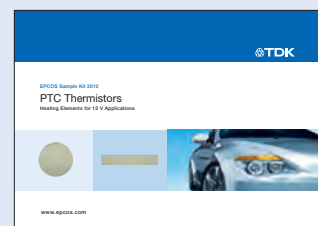


## Sample kit PTC thermistors as heating elements for 12 V applications

### Features

- 12 different PTC heating elements
- Disk shaped with  $\varnothing 12$  mm (A60)
- Metallized rectangular, 35 x 6.2 mm (R41)

Ordering code: B59004Z0999A099

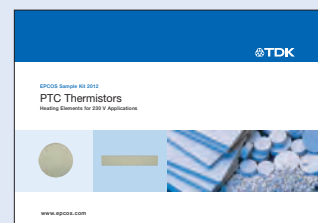


## Sample kit PTC thermistors as heating elements for 230 V applications

### Features

- 12 different PTC heating elements
- Disk shaped with  $\varnothing 8$  mm (A53)
- Metallized rectangular, 35 x 6.2 mm (R102)

Ordering code: B59005Z0999A099





# 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 prior to processing.
- Storage conditions in original packaging: storage temperature  $-25\text{ °C} \dots +45\text{ °C}$ , relative humidity  $\leq 75\%$  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 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

- 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 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 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).

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

## Display of ordering codes for EPCOS products

The ordering code for one and the same EPCOS product can be represented differently in data sheets, data books, other publications, on the EPCOS website, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.** Detailed information can be found on the Internet under [www.epcos.com/orderingcodes](http://www.epcos.com/orderingcodes)

# Symbols and Terms

Symbol	Term
$C_{th}$	Heat capacity
$I_{max}$	Operating current
$I_R$	Rated current ( $T = T_R$ )
$I_S$	Switching current
$N_c$	Operating cycles at $V_{max}$ , charging of capacitor
$R_{25, match}$	Resistance matching per reel/packing unit at 25 °C
$R_{min}$	Minimum resistance
$R_{PTC}$	PTC resistance (at specified temperature)
$R_R$	Rated resistance ( $T = T_R$ )
$T_{ref}$	Reference temperature
$T_{sense}$	Nominal threshold temperature
$T_{surf}$	Surface temperature
$V_{BD}$	Breakdown voltage
$V_{F, max}$	Maximum voltage applied at fault conditions in protection mode
$V_{ins}$	Insulation test voltage
$V_{link, max}$	Maximum link voltage
$V_{max}$	Maximum operating voltage
$V_{meas}$	Measuring voltage
$V_{PTC}$	Voltage drop across a PTC thermistor
$V_R$	Rated voltage
$V_{RMS}$	Root-mean-square value of voltage
$\Delta$	Tolerance
$e$	Lead spacing (in mm)
Abbreviations/General notes	
<b>SMD</b>	Surface-mount devices
	All dimensions are given in mm.

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