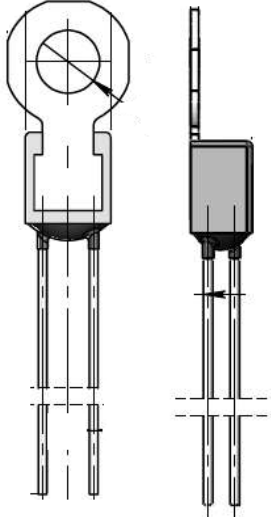


Specification available from: Österreichischer Verband für Elektrotechnik (OVE) Eschenbachgasse 9 A-1010 VIENNA	IEC 60738-1-4 – AT0003 Issue 1 / 2025-10 QC 440004
Electronic Components of assessed quality in accordance with: IEC 60738-1: 2022-10 IEC 60730-1: 2022, Annex J17, J19 Edition 6	IEC 60738-1-4: 2008-02 QC 440004
	Directly heated positive step-function temperature coefficient thermistors for sensing application (Limit temperature sensors)
	Modified ferro-electric ceramic material parts for over-temperature protection Assessment level: EZ

Information on the availability of components
qualified to this detail specification is given in
the Register of Approvals

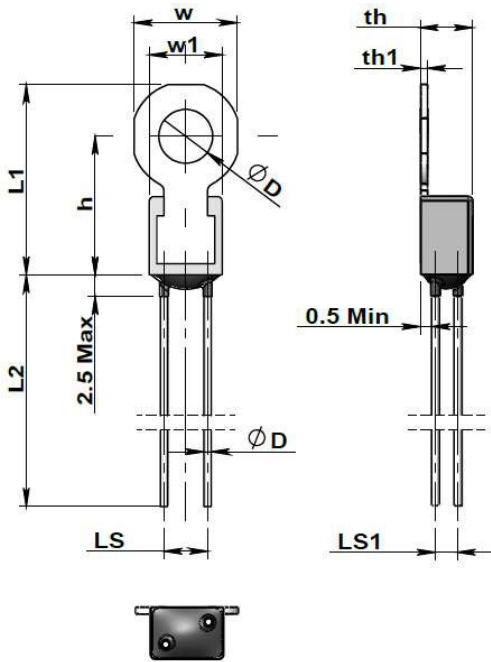
1 GENERAL DATA

1.1 Method of mounting

PTCs are equipped with tin leads for soldering, and metal tag for easy mounting. They are placed in heatsink for temperature sensor.

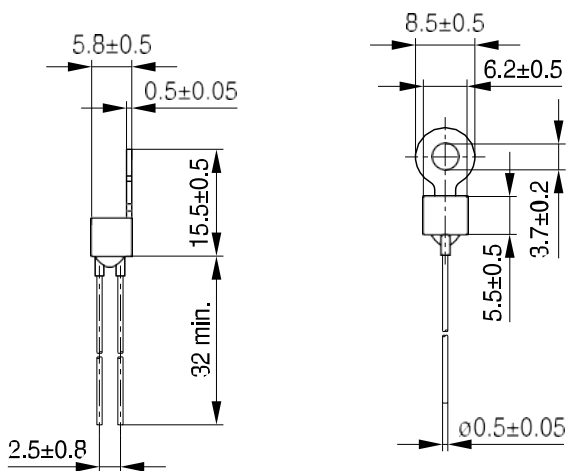
1.2 Dimensions

B59051D1* and B59053D*



W	7.1 ± 0.3	mm
ϕD	3.7 ± 0.3	mm
W1	5 ± 0.3	mm
LS	3.5 ± 1.5	mm
th	3.6 ± 0.3	mm
th1	0.5 ± 0.05	mm
ϕd	0.5 ± 0.05	mm
h	9.5 ± 0.5	mm
L1	13.2 ± 0.5	mm
L2	39 ± 5	mm
LS1(typ.)	1	mm

B59052D*



All dimensions in mm

1.3 Coating

Thermistor is insulated by casting material and injection-moulded plastic housing

1.4 Terminations

The terminations are suitable for soldering

1.5 Flammability

Not defined

1.6 Resistance to solvents

Not applicable.

1.7 Packaging

Bulk

1.8 Electrical data / ratings and characteristics

Electrical specifications and ordering codes for B59051D*

Max. operating voltage	$V_{\max}$	16	VDC
Measuring voltage	V_{meas}	≤ 2.5	VDC
Rated resistance @ 25°C ($V_{\text{PTC}} \leq 2.5 \text{ V}$)	R_{25}	≤ 330	Ω
Insulating test voltage (between tags and leads)	V_{ins}	500	VAC
Lower / upper category temperature ($V \leq V_{\text{meas,max}}$)	$T_{\text{opmin}}(V=\text{meas,max}) / T_{\text{opmax}}(V=\text{meas,max})$	-25/ 130	°C
Operating temperature ($V = V_{\max}$)	$T_{\text{opmin}}(V=\text{max}) / T_{\text{opmax}}(V=\text{max})$	0/+40	°C

T_{sense} °C	$R_{(T_{\text{sense}} - 10 \text{ K})}$ (VPTC $\leq 2.5 \text{ V}$) Ω	$R_{(T_{\text{sense}})}$ (VPTC $\leq 2.5 \text{ V}$) Ω	Ordering code
100	≤ 1500	≥ 2200	B59051D1100A040Z15
110	≤ 1500	≥ 2200	B59051D1110A040Z15
120	≤ 1500	≥ 2200	B59051D1120A040Z15

Electrical specifications and ordering codes for B59052D* and B59053D*

Max. operating voltage	$V_{\max}$	B59052D*: 30V B59053D*: 16V	VDC
Measuring voltage	V_{meas}	≤ 2.5	VDC
Max. measuring voltage	$V_{\text{meas,max}}$	7.5	VDC
Rated resistance @ 25°C ($V_{\text{PTC}} \leq 2.5 \text{ V}$)	R_{25}	≤ 100	Ω
Insulating test voltage (between tags and leads)	V_{ins}	500	VAC
Lower / upper category temperature ($V \leq V_{\text{meas,max}}$)	$T_{\text{opmin}}(V=\text{meas,max}) /$ $T_{\text{opmax}}(V=\text{meas,max})$	-40/ $T_{\text{sense}} + 23$	°C
Operating temperature ($V = V_{\max}$)	$T_{\text{opmin}}(V=\text{max}) /$ $T_{\text{opmax}}(V=\text{max})$	0/+40	°C

T_{sense} °C	$R_{(T_{\text{sense}} - 5\text{K})}$ ($V_{\text{PTC}} \leq 2.5\text{V}$) Ω	$R_{(T_{\text{sense}} + 5\text{K})}$ ($V_{\text{PTC}} \leq 2.5\text{V}$) Ω	$R_{(T_{\text{sense}} + 15\text{K})}$ ($V_{\text{PTC}} \leq 7.5\text{V}$) Ω	$R_{(T_{\text{sense}} + 23\text{K})}$ ($V_{\text{PTC}} \leq 7.5\text{V}$) Ω	Ordering code
60	≤ 570	≥ 570	-	$\geq 10\text{k}$	B59052D1060A040Z15
70	≤ 570	≥ 570	-	$\geq 10\text{k}$	B59052D1070A040Z15
80	≤ 570	≥ 570	-	$\geq 10\text{k}$	B59052D1080A040Z15
90	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59052D1090A040Z15
100	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59052D1100A040Z15
110	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59052D1110A040Z15
120	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59052D1120A040Z15

T_{sense} °C	$R_{(T_{\text{sense}} - 5\text{K})}$ ($V_{\text{PTC}} \leq 2.5\text{V}$) Ω	$R_{(T_{\text{sense}} + 5\text{K})}$ ($V_{\text{PTC}} \leq 2.5\text{V}$) Ω	$R_{(T_{\text{sense}} + 15\text{K})}$ ($V_{\text{PTC}} \leq 7.5\text{V}$) Ω	$R_{(T_{\text{sense}} + 23\text{K})}$ ($V_{\text{PTC}} \leq 7.5\text{V}$) Ω	Ordering code
60	≤ 570	≥ 570	-	$\geq 10\text{k}$	B59053D1060A040Z15
70	≤ 570	≥ 570	-	$\geq 10\text{k}$	B59053D1070A040Z15
80	≤ 570	≥ 570	-	$\geq 10\text{k}$	B59053D1080A040Z15
90	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59053D1090A040Z15
100	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59053D1100A040Z15
110	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59053D1110A040Z15
120	≤ 550	≥ 1330	$\geq 4\text{k}$	-	B59053D1120A040Z15

1.9 Normative references

IEC 60738-1, thermistors – directly heated positive step-function temperature coefficient – Part 1: Generic specification.

1.10 Marking

No marking

1.11 Ordering information

Ordering code:

B59051-D1120-A040+

1 st block:	type designation	B59xxx	B59... PTC Thermistor xxx... type number
2 nd block	sensing temperature	D1yyy	yyy ... T _{sense} [°C]
3 rd block:	Packing, processing, customer specific information	A(B)zzz+	zzz ... + ... can be followed by additional numbers and letters (3 digits) not effecting IEC specifications.

2. INSPECTION REQUIREMENTS

2.1 Procedures

2.1.1 For qualification approval, the procedures shall be in accordance with the generic specification IEC 60738-1, annex Q.6.4

2.1.2 For quality conformance inspection the test schedules include sampling, periodicity severities and requirements. The formation of inspection lots is covered by par. Q.6.7 of the generic specification.

The following list applies to the test schedules developed in the following tables (item nos. according to the blank detail specification):.

1) The Subclause numbers of tests refer to the generic specification IEC 60738-1:2022 and to the data of this specification.

2a) Where the test schedule of a blank detail specification omits a test, that test may be omitted from the corresponding fixed sample size schedule in this specification.

2b) Where additional tests are specified in a detail specification, that test shall be included in the corresponding fixed sample size schedule, either by its addition to an existing group or by the addition of another group. In the former case, there shall be no change in the number of specimens to be tested or in the acceptance criteria. In the latter case, the number of specimens to be tested and the acceptance criteria shall be comparable to those already specified.

- 3) In these tables:
- p = periodicity in months
 - n = number of devices in the samples
 - c = the acceptance criterion (permitted number of non-conforming items)
 - D = indicates a destructive test
 - ND = indicates a non destructive test
 - IL = the inspection level
- 4) The temperature at which the zero-power resistance shall be measured is the temperature specified in the detail specification. This temperature shall be stated, where required, in the test schedule.
- 5) Data for conditions of test are defined in the detail specification.
- 6) The additional specimens are to permit substitution for incidents not attributable to the manufacturer. The specimens may be used to replace non-conforming specimens which occur as a result of a test in a group which is identified as being "destructive". Where a specimen is used for this purpose, it shall be subjected to those tests in the group to which the non-conforming item had already been subjected, before proceeding with the remaining tests in the group
- 7) The specimens used for this group may, at the discretion of the manufacturer, be used for any subsequent group which is identified as being "destructive".
- 8) Ten samples from group 0 tests samples shall be chosen; 5, having the lowest zero- power resistance of the sample, shall be used for group 1A; 5, having the highest zero- power resistance of the sample, shall be used for group 1B.
- 9) The soldering – solderability and soldering – resistance to soldering heat tests shall only be applied where the thermistor has terminations which are appropriate for soldering.
- 10) Where the terminations are stated to be suitable for printed wiring applications, the appropriate test conditions in IEC 60068 shall apply.
- 11) The thermistors shall be mounted by their normal means.
- 12) 100% testing shall be followed by re-inspection by sampling in order to monitor outgoing quality level by non-conforming items per million ($\times 10^{-6}$). The sampling level shall be established by the manufacturer. For the calculation of $\times 10^{-6}$ values any parametric failure shall be counted as non-conforming item. In case one or more non-conforming items occur in a sample, this lot shall be rejected.

Table 1- Test schedule for quality conformance inspection: lot-by-lot

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	IL	n	c	Performance requirements (see list item 1)
			(see list item 3)			
GROUP A INSPECTION	ND	R@25±2°C	100 %			According to par. 1.8
Subgroup A0						
6.1 Zero-power resistance R ₂₅						
Subgroup A1	ND		S-4	2)	0	As in 7.1.1
7.1.1 Visual examination						
Subgroup A2	ND	Not applicable	S-3	2)	0	
7.1.2 Marking						
7.1.3 Dimensions (gauging)						
GROUP B INSPECTION	ND	R@25°C±2°C	S-2	2)	0	According to par. 1.8
Subgroup B1						
6.1 Zero-power resistance R ₂₅						
6.5 Resistance/temperature characteristic		R@T _{sense} ±ΔT				According to par. 1.8
6.13 Residual current		Not applicable				
Subgroup B2	ND	Acc. to 6.3.2*) and 6.4.3*); method 1 (metal ball bath, Ø1.6±0.2mm) 500VAC, t= 60±5s	S-2	2)	0	No breakdown or flashover
6.4 Voltage proof						
9.1 Soldering - Solderability		Acc. To 9.1.2*) IEC 60068-2-20 Test Ta: soldering bath conditions: - for leaded solder: 235±5°C, 2s - for lead free solder: 245±5°C, 3s				The terminations should be uniformly tinned.

*)The Subclause numbers of tests refer to the generic specification IEC 60738-1:2022

Table 2- Test schedule for quality conformance inspection: periodic

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
GROUP C INSPECTION						
Subgroup C1A	D		6	5	0	
Part of sample						
9.2 Resistance to soldering heat		Acc. To 9.2.2*) IEC 60068-2-20 Test Tb: soldering bath 260±5°C, Pb-free solder soldering time: 10s Visual examination Zero-power resistance R ₂₅				No visible damage $\Delta R_{25}/R_{25}: \pm 10 \%$
7.2 Robustness of termination		Acc. to 7.2.1*) IEC 60068-2-21 - Test Ua1 - Tensile test, F = 5±0,5 N - Test Ub – Bending test, F= 2.5±0,25N - Test Uc - Torsion test (Methode1/ Severity 2): 2x 180° Visual examination Zero-power resistance R ₂₅				No visible damage $\Delta R_{25}/R_{25}: \pm 10 \%$
Subgroup C1B	D		6	5	0	
Other part of sample						
8.1 Rapid change of temperature		IEC 60068-2-14; Na T1 = T _{opmin} (V=meas,max) T2 = T _{opmax} (V=meas,max) 5 cycles; t=30min Zero-power resistance R ₂₅ Visual examination				$\Delta R_{25}/R_{25}: \pm 25\%$ No visible damage

*)The Subclause numbers of tests refer to the generic specification IEC 60738-1:2022

Table 2- continued

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
7.3 Vibration		IEC 60068-2-6, Fc Frequency range: 10 to 55 Hz Amplitude: 0.75 mm Acceleration: 98 m/s ² Sweep endurance: Total duration 6h (3x2h in x,y,z) Zero-power resistance R ₂₅ Visual examination				$\Delta R_{25}/R_{25}$: $\pm 5\%$ No visible damage
7.4 Shock		IEC 60068-2-27 Acceleration: 500 m/s ² ; t=11ms Number of shocks: 6 x 3 pulses Zero-power resistance R ₂₅ Visual examination				$\Delta R_{25}/R_{25}$: $\pm 5\%$ No visible damage
Subgroup C1 Combined sample of specimens of subgroups C1A and C1B 8.3 Climatic sequence	D	IEC 60068-2-30 test Db, IEC 60068-2-1 test Aa, IEC 60068-2-2 test Ba Category: T _{opmin} (V=meas,max) / T _{opmax} (V=meas,max) / 56 - Dry heat: T = T _{opmax} $\pm 2^{\circ}\text{C}$, t = 16h - Damp heat, 55°C, 93% r.h, cyclic, first cycle - Cold: T = T _{opmin} $\pm 2^{\circ}\text{C}$, t = 2h - Damp heat, 55°C, 93% r.h, cyclic, remaining 5 cycles Zero-power resistance R ₂₅ Visual examination Voltage proof 500VAC, t= 60 $\pm$ 5s	6	10	0	$\Delta R_{25}/R_{25}$: $\pm 20\%$ No visible damage No breakdown or flashover
Subgroup C2 6.7 Response time by ambient temp. t _a 6.8 Response time by power change t _b	ND	Not specified Not specified	6	10	0	

Table 2- continued

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
Subgroup C3 7.1.4 Dimensions (detail) 6.6 Dissipation factor at V_{opmax}	ND	According par. 1.2 Not specified	6	10	0	According par. 1.2
Subgroup C4 8.4.2 Endurance at upper category temperature	ND	IEC 60068-2-2 Test Ba: $T = T_{opmax}(V=meas,max)$, tolerance $\pm 2^{\circ}C$ $t = 1000 \pm 48h$ Examination at 168h, 500h, 1000h Zero-power resistance R_{25} Visual examination Voltage proof 500VAC, $t = 60 \pm 5s$	6	10	0	$\Delta R_{25}/R_{25}: \pm 25\%$ No visible damage No breakdown or flashover
GROUP D INSPECTION Subgroup D1 8.4.1 Endurance at room temperature cycling	D	Not applicable	12	10	0	
Subgroup D2 8.4.3 Endurance at max. operating temperature and maximum voltage	D	$T = T_{opmax}(V_{max}) \pm 2^{\circ}C$; $V = V_{max}$ $t = 1000 \pm 48h$ Examination at 168h, 500h, 1000h Zero-power resistance R_{25} Visual examination Voltage proof 500VAC, $t = 60 \pm 5s$	12	10	0	$\Delta R_{25}/R_{25}: \pm 25\%$ No visible damage No breakdown or flashover

Table 2- continued

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance Requirements (see list item 1)
			p	n	c	
Subgroup D4 8.3 Damp heat, steady state	D	IEC 60068-2-78, Ca T = 40±2°C, r.H. = 93±3% t = 56d-0/+2d Zero-power resistance R ₂₅ Visual examination Voltage proof 500VAC, t= 60±5s	12	10	0	ΔR ₂₅ /R ₂₅ : ±10% No visible damage No breakdown or flashover

*The Subclause numbers of tests refer to the generic specification IEC 60738-1:2022

Table 3- Additional requirements only for qualification project according IEC 60730-1:2022, Annex J17+J19 (Ed. 6). Tests are not part of regular re-qualification test programme (incl. product audit). Sample size per test = 3pcs.

Subclause number and test	D or ND	Conditions of test	Performance Requirements
J.19.17.1 Heat-cold-humidity cycling	D	Dry heat: $T = T_{opmax}(V=meas,max) \pm 2^{\circ}C$, $t = 24h$ Damp heat: $T = 40 \pm 2^{\circ}C$, r.H. = 90-95% $t = 168h$ Cold: $T = T_{opmin}(V=meas,max) \pm 2^{\circ}C$, $t = 8h$ $R@T_{sense} \pm \Delta T$ according par. 1.8	$\Delta T_{sense}/T_{sense}: \pm 5\%$
J.19.17.2.1 Overload (Rapid change of temperature) J.19.17.2.2 Endurance(Rapid change of temperature)	D	Test sequence: $T1 = 25 \pm 2^{\circ}C$, $T2 = T_{opmax} + 20\%$, tolerance $\pm 2^{\circ}C$ 50 cycles dwell time= 15min $T1 = 25 \pm 2^{\circ}C$, $T2 = T_{opmax} \pm 2^{\circ}C$ 6000 cycles— dwell time= 15min Intermediate measurement in 1000 and 3000 cycles $R@T_{sense} \pm \Delta T$ according par. 1.8	$\Delta T_{sense}/T_{sense}: \pm 5\%$
J.19.17.6 Cold environmental thermal cycling	D	$T1 = T_{opmin} \pm 2^{\circ}C$, $T2 = T_{opmax} \pm 2^{\circ}C$ 1000 cycles dwell time= 15min $R@T_{sense} \pm \Delta T$ according par. 1.8	$\Delta T_{sense}/T_{sense}: \pm 5\%$
J.19.17.3.1 Thermal conditioning (Passive ageing)	D	IEC 60068-2-2 Test Ba: $T = T_{opmax} + 30^{\circ}C$, tolerance $\pm 5^{\circ}C$ $t = 1000 \pm 48h$ Examination at 168h, 500h, 1000h $R@T_{sense} \pm \Delta T$ according par. 1.8 (only beginning and end of test, not for intermediate measurement)	$\Delta T_{sense}/T_{sense}: \pm 5\%$