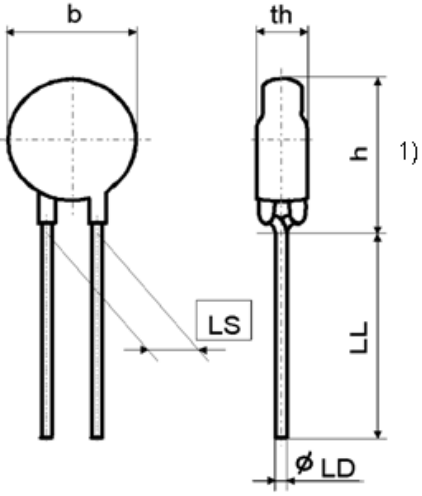


<p>Specification available from:</p> <p>Österreichischer Verband für Elektrotechnik (OVE) Eschenbachgasse 9 A-1010 VIENNA</p>	<p>IEC 60539-1-1 AT0002 <a href="#">Issue 3 / 2021-06</a></p>
<p>ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH:</p> <p><a href="#">IEC 60539-1:2016-04</a> <a href="#">IEC 60539-1:2016/COR1:2017</a></p>	<p>IEC/PAS 60539-1-1: 2008-11</p>
<p>Outline drawing: [see 1.2]</p>  <p>Note: 1-Other shapes and crimp styles are permitted within the dimensions given. 2-The undimensioned details do not affect the performance of the device.</p>	<p>DIRECTLY HEATED NEGATIVE TEMPERATURE COEFFICIENT THERMISTORS – Inrush Current Limiters</p>

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

## 1. General data

### 1.1 Method(s) of mounting

The ICLs shall be mounted by their normal means in such a manner that there shall be no parasitic vibration.

### 1.2 Dimensions

- Body diameter: b
- Body thickness (including terminations of styles with wire terminations): th
- Body height: h
- Diameter of wire terminations: LD
- Length of wire termination: LL
- Distance between wire terminations: LS

Ordering code	b <sub>max</sub>	th <sub>max</sub>	h <sub>max</sub>	LD <sup>1)</sup>	LL <sub>min</sub>	LS <sup>1)</sup>
	mm	mm	mm	mm	mm	mm
B57205P*	8	6	12	0.6±0.05	2.5	5.0±0.6
B57153S*	9.5	6	15	0.6±0.05	2.5	5.0±0.6
B57235S*	11	6	16	0.6±0.05	2.5	5.0±0.6
B57236S*	12.5	6	18	0.6±0.05	2.5	5.0±0.6
B57211P*	14	7	22	0.8±0.05	2.5	7.5±0.8
B57213P*	15.5	7	24	0.8±0.05	2.5	7.5±0.8
B57234S*	18	7	24	0.8±0.05	2.5	7.5±0.8
B57237S*	18	7	24	0.8±0.05	2.5	7.5±0.8
B57238S*	19	7	25	1.0±0.05	2.5	7.5±0.8
B57364S*	24	7	30	1.0±0.05	2.5	7.5±0.8
B57464S*	28	7	35	1.0±0.05	2.5	7.5±0.8

<sup>1)</sup> Also other LD/LS are permitted, which do not affect the performance of device.

### 1.3 Coating

Heat resisting silicone base coating material, flame retardant

Relative Thermal Index(RTI): min 200.

Insulated types: Same material, double coated.

### 1.4 Terminations

The terminations are suitable for soldering.

The terminations are suitable for printed wiring applications.

The terminations are tinned copper wire

### 1.5 Flammability

According to 1.3, flame retardant

### 1.6 Resistance to solvents

The coating and marking of the thermistors is resistant to solvents.

### 1.7 Packaging

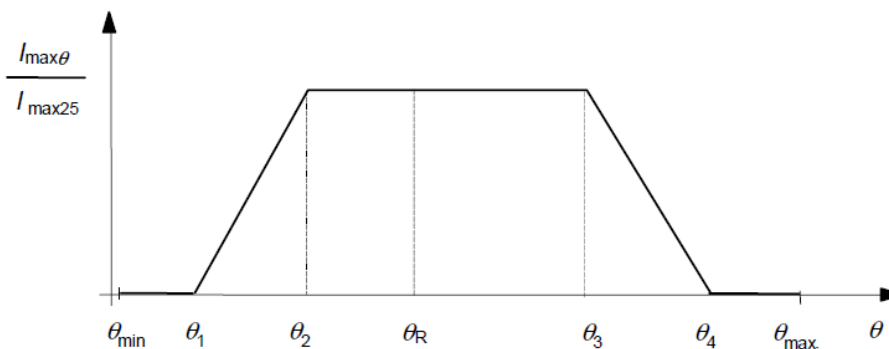
The packages containing the ICLs are clearly label with below information:

- a) Rated zero-power resistance;
- b) Manufacturer's name and/or trade mark;
- c) Date of manufacture;
- d) Tolerance on rated zero-power resistance;

### 1.8 Electrical data/ratings and characteristics

Climatic category :	55/170/21
Lower/Upper category temperature (LCT/UCT, $\theta_{min}/\theta_{max}$ )	-55°C/170°C
$\theta_1, \theta_4$ : Same as $\theta_{min}/\theta_{max}$	-55°C/170°C
Lowest temperature with $I_{max25}$ ( $\theta_2$ )	0°C
Highest temperature with $I_{max25}$ ( $\theta_3$ )	25°C for P5, P11, P13, S237 65°C for the rest types.
Highest temperature with $P_{max25}$ ( $\theta_3$ )	25°C
Zero-power resistance ( $R_T = R_{25}$ )	see rating table
Resistance tolerance of $R_{25}$ ( $R_{25-tol.}$ )	see note of rating table
B-value	not specified
Maximum current at 25°C ( $I_{max25}$ )	see rating table
Maximum permissible capacitance ( $C_T$ )	see rating table
Isolation voltage (for insulated types only)	1000 V <sub>DC</sub>
Insulation resistance (for insulated types only)	>500 MOhm
Cooling time constant, in air ( $\tau_c$ )	see rating table
Maximum power dissipation at 25°C ( $P_{max25}$ )	see rating table
Resistance-temperature characteristics	see annex A

### Derating curve



Ordering Code <sup>3)</sup>	R <sub>25</sub> [Ohm]	R <sub>100</sub> <sup>2)</sup> [Ohm]	ΔR <sub>100</sub> <sup>2)</sup> [%]	I <sub>max25</sub> [A]	C <sub>T</sub> 230Vac [μF]	C <sub>T</sub> 110Vac [μF]	δ <sub>th</sub> typ. <sup>1)</sup> [mW/K]	T <sub>c</sub> typ. <sup>1)</sup> [s]	P <sub>max25</sub> [W]
B57205Px100y***	10	1.516	± 25.7	1	50	200	7	25	0.8
B57153Sx479y***	4.7	0.713	± 25.7	3	100	400	8	30	1.4
B57153Sx809y***	8	1.213	± 25.7	2.2	100	400	8	30	1.4
B57153Sx100y***	10	1.516	± 25.7	2	100	400	8	30	1.4
B57153Sx150y***	15	2.124	± 25.9	1.8	100	400	8	30	1.4
B57153Sx160y***	16	2.265	± 25.9	1.7	100	400	8	30	1.4
B57153Sx200y***	20	2.647	± 26.1	1.6	100	400	8	30	1.4
B57153Sx330y***	33	4.367	± 26.1	1.3	100	400	8	30	1.4
B57235Sx259y***	2.5	0.405	± 25.5	5.2	200	800	9	60	1.8
B57235Sx479y***	4.7	0.713	± 25.7	4.4	200	800	9	60	1.8
B57235Sx509y***	5	0.758	± 25.7	4.2	200	800	9	60	1.8
B57235Sx609y***	6	0.91	± 25.7	4	200	800	9	60	1.8
B57235Sx809y***	8	1.133	± 25.9	3.5	200	800	9	60	1.8
B57235Sx100y***	10	1.416	± 25.9	3	200	800	9	60	1.8
B57236Sx229y***	2.2	0.356	± 25.5	6	200	800	10	70	2.1
B57236Sx259y***	2.5	0.405	± 25.5	5.5	200	800	10	70	2.1
B57236Sx309y***	3	0.486	± 25.5	5	300	1200	10	70	2.1
B57236Sx479y***	4.7	0.713	± 25.7	4.6	300	1200	10	70	2.1
B57236Sx509y***	5	0.708	± 25.9	4.5	300	1200	10	70	2.4
B57236Sx809y***	8	1.133	± 25.9	3.7	300	1200	10	70	2.4
B57236Sx100y***	10	1.416	± 25.9	3.5	300	1200	10	70	2.1
B57236Sx120y***	12	1.699	± 25.9	3.2	300	1200	10	70	2.1
B57236Sx160y***	16	2.167	± 26	2.9	300	1200	10	70	2.1
B57236Sx200y***	20	2.535	± 26.2	2.8	300	1200	10	70	2.1
B57236Sx250y***	25	3.168	± 26.2	2.5	300	1200	10	70	2.1
B57236Sx500y***	50	5.925	± 26.5	1.9	300	1200	10	70	2.1
B57236Sx800y***	80	9.48	± 26.5	1.6	400	1600	10	70	2.1
B57236Sx121y***	120	13.27	± 26.7	1.5	400	1600	10	70	2.1
B57211Px109y***	1	0.162	± 25.5	7	330	1320	13	70	3
B57211Px139y***	1.3	0.226	± 25.5	7	330	1320	13	70	3
B57211Px259y***	2.5	0.379	± 25.7	6	330	1320	13	70	3
B57211Px409y***	4	0.566	± 25.9	5	330	1320	13	70	3
B57211Px479y***	4.7	0.665	± 25.9	5	330	1320	13	70	3
B57211Px509y***	5	0.708	± 25.9	5	330	1320	13	70	3
B57211Px709y***	7	0.948	± 26.0	4	330	1320	13	70	3
B57211Px809y***	8	1.083	± 26.0	4	330	1320	13	70	3
B57211Px100y***	10	1.267	± 26.2	4	330	1320	13	70	3
B57211Px120y***	12	1.521	± 26.2	4	330	1320	13	70	3
B57211Px150y***	15	1.901	± 26.2	3	330	1320	13	70	3
B57211Px160y***	16	2.028	± 26.2	3	330	1320	13	70	3
B57211Px180y***	18	2.281	± 26.2	3	330	1320	13	70	3
B57211Px200y***	20	2.37	± 26.5	3	330	1320	13	70	3
B57211Px220y***	22	2.607	± 26.5	3	330	1320	13	70	3
B57211Px250y***	25	2.963	± 26.5	2.5	330	1320	13	70	3
B57211Px300y***	30	3.241	± 26.7	2.5	330	1320	13	70	3
B57211Px330y***	33	3.565	± 26.7	2.5	330	1320	13	70	3
B57211Px400y***	40	4.321	± 26.7	2	330	1320	13	70	3
B57211Px470y***	47	5.078	± 26.7	2	330	1320	13	70	3

Ordering Code <sup>3)</sup>	R <sub>25</sub> [Ohm]	R <sub>100</sub> <sup>2)</sup> [Ohm]	$\Delta R_{100}$ <sup>2)</sup> [%]	I <sub>max25</sub> [A]	C <sub>T</sub> 230Vac [μF]	C <sub>T</sub> 110Vac [μF]	δ <sub>th</sub> typ. <sup>1)</sup> [mW/K]	T <sub>c</sub> typ. <sup>1)</sup> [s]	P <sub>max25</sub> [W]
B57211Px600y***	60	5.863	± 27.0	2	330	1320	13	70	3
B57211Px800y***	80	7.818	± 27.0	1.5	330	1320	13	70	3
B57211Px101y***	100	9.772	± 27.0	1.5	330	1320	13	70	3
B57211Px121y***	120	11.73	± 27.0	1.5	330	1320	13	70	3
B57213Px109y***	1	0.162	± 25.5	8	470	1880	15	80	3.8
B57213Px139y***	1.3	0.226	± 25.5	8	470	1880	15	80	3.8
B57213Px159y***	1.5	0.26	± 25.5	8	470	1880	15	80	3.8
B57213Px209y***	2	0.347	± 25.5	8	470	1880	15	80	3.8
B57213Px259y***	2.5	0.379	± 25.7	8	470	1880	15	80	3.8
B57213Px309y***	3	0.425	± 25.9	7	470	1880	15	80	3.8
B57213Px409y***	4	0.566	± 25.9	6	470	1880	15	80	3.8
B57213Px479y***	4.7	0.665	± 25.9	5.1	470	1880	15	80	3.8
B57213Px509y***	5	0.708	± 25.9	6	470	1880	15	80	3.8
B57213Px609y***	6	0.813	± 26.0	5	470	1880	15	80	3.8
B57213Px709y***	7	0.948	± 26.0	5	470	1880	15	80	3.8
B57213Px809y***	8	1.083	± 26.0	5	470	1880	15	80	3.8
B57213Px100y***	10	1.267	± 26.2	5	470	1880	15	80	3.8
B57213Px120y***	12	1.422	± 26.5	5	470	1880	15	80	3.8
B57213Px150y***	15	1.778	± 26.5	4	470	1880	15	80	3.8
B57213Px160y***	16	1.896	± 26.5	4	470	1880	15	80	3.8
B57213Px180y***	18	2.133	± 26.5	4	470	1880	15	80	3.8
B57213Px200y***	20	2.37	± 26.5	4	470	1880	15	80	3.8
B57213Px220y***	22	2.377	± 26.7	4	470	1880	15	80	3.8
B57213Px250y***	25	2.701	± 26.7	3	470	1880	15	80	3.8
B57213Px300y***	30	3.241	± 26.7	3	470	1880	15	80	3.8
B57213Px330y***	33	3.565	± 26.7	3	470	1880	15	80	3.8
B57213Px400y***	40	3.909	± 27.0	3	470	1880	15	80	3.8
B57213Px470y***	47	4.593	± 27.0	3	470	1880	15	80	3.8
B57213Px600y***	60	5.863	± 27.0	2	470	1880	15	80	3.8
B57213Px800y***	80	5.396	± 28.1	2	470	1880	15	80	3.8
B57213Px101y***	100	6.745	± 28.1	2	470	1880	15	80	3.8
B57213Px121y***	120	8.094	± 28.1	2	470	1880	15	80	3.8
B57234Sx109y***	1	0.162	± 25.5	11.5	700	2800	17	90	3.6
B57234Sx229y***	2.2	0.334	± 25.7	9	700	2800	17	90	3.6
B57234Sx259y***	2.5	0.379	± 25.7	8.4	700	2800	17	90	3.6
B57234Sx479y***	4.7	0.665	± 25.9	6.6	700	2800	17	90	3.6
B57234Sx509y***	5	0.708	± 25.9	6.4	700	2800	17	90	3.6
B57234Sx709y***	7	0.926	± 26.1	6	700	2800	17	90	3.6
B57234Sx100y***	10	1.271	± 26.2	5	700	2800	17	90	3.6
B57234Sx150y***	15	1.985	± 26.1	4	700	2800	17	90	3.6
B57234Sx220y***	22	2.377	± 26.7	4	700	2800	17	90	3.6
B57234Sx330y***	33	3.565	± 26.7	3.3	900	3600	17	90	3.6
B57234Sx400y***	40	3.909	± 27	3.4	400	1600	17	90	3.6
B57234Sx600y***	60	4.047	± 76.7	4	400	1600	17	90	3.6
B57234Sx221y***	220	15.87	± 27.9	2	500	2000	17	90	3.6
B57237Sx109y***	1	0.162	± 25.5	9	700	2800	17	90	3.1
B57237Sx139y***	1.3	0.197	± 25.7	8.5	700	2800	17	90	3.1
B57237Sx229y***	2.2	0.334	± 25.7	7	700	2800	17	90	3.1

Ordering Code <sup>3)</sup>	R <sub>25</sub> [Ohm]	R <sub>100</sub> <sup>2)</sup> [Ohm]	ΔR <sub>100</sub> <sup>2)</sup> [%]	I <sub>max25</sub> [A]	C <sub>T</sub> 230Vac [μF]	C <sub>T</sub> 110Vac [μF]	δ <sub>th</sub> typ. <sup>1)</sup> [mW/K]	T <sub>c</sub> typ. <sup>1)</sup> [s]	P <sub>max25</sub> [W]
B57237Sx259y***	2.5	0.379	± 25.7	6.5	700	2800	17	90	3.1
B57237Sx479y***	4.7	0.665	± 25.9	5.1	700	2800	17	90	3.1
B57237Sx509y***	5	0.708	± 25.9	5	700	2800	17	90	3.1
B57237Sx709y***	7	0.926	± 26.1	4.2	700	2800	17	90	3.1
B57237Sx100y***	10	1.271	± 26.2	3.7	700	2800	17	90	3.1
B57237Sx150y***	15	1.985	± 26.1	3	700	2800	17	90	3.1
B57237Sx220y***	22	2.377	± 26.7	2.8	700	2800	17	90	3.1
B57237Sx330y***	33	3.565	± 26.7	2.5	900	3600	17	90	3.1
<b>B57237Sx600y***</b>	<b>60</b>	<b>4.047</b>	<b>± 76.7</b>	<b>2</b>	<b>400</b>	<b>1600</b>	<b>17</b>	<b>90</b>	<b>3.1</b>
B57238Sx259y***	2.5	0.379	± 25.7	8.4	700	2800	20	80	3.9
B57238Sx309y***	3	0.425	± 25.9	7.4	700	2800	20	80	3.9
B57238Sx479y***	4.7	0.637	± 26	6.6	700	2800	20	80	3.9
B57238Sx509y***	5	0.677	± 26	6.4	700	2800	20	80	3.9
B57238Sx709y***	7	0.948	± 26	6	700	2800	20	80	3.9
B57238Sx809y***	8	1.014	± 26.2	5.5	700	2800	20	80	3.9
B57238Sx100y***	10	1.267	± 26.2	5	700	2800	20	80	3.9
B57238Sx150y***	15	1.778	± 26.5	4.4	700	2800	20	80	3.9
B57238Sx160y***	16	1.896	± 26.5	4	700	2800	20	80	3.9
B57238Sx220y***	22	2.433	± 26.7	4	700	2800	20	80	3.9
B57238Sx250y***	25	2.765	± 26.7	3.4	700	2800	20	80	3.9
B57364Sx209y***	2	0.283	± 25.9	12	1000	4000	24	100	5.1
B57364Sx259y***	2.5	0.354	± 25.9	11	1000	4000	24	100	5.1
B57364Sx409y***	4	0.508	± 26.2	9.5	1000	4000	24	100	5.1
B57364Sx509y***	5	0.635	± 26.2	8.5	1000	4000	24	100	5.1
B57364Sx100y***	10	1.08	± 26.7	7.5	1000	4000	24	100	5.1
B57364Sx121y***	120	8.203	± 28.1	3.5	1000	4000	24	100	5.1
B57464Sx209y***	2	0.283	± 25.9	13.5	2500	10000	30	130	6.7
B57464Sx229y***	2.2	0.311	± 25.9	13	2500	10000	30	130	6.7
B57464Sx259y***	2.5	0.354	± 25.9	12.5	2500	10000	30	130	6.7
B57464Sx309y***	3	0.406	± 26	12	2500	10000	30	130	6.7
B57464Sx409y***	4	0.542	± 26	11.5	2500	10000	30	130	6.7
B57464Sx479y***	4.7	0.596	± 26.2	10.5	2500	10000	30	130	6.7
B57464Sx509y***	5	0.635	± 26.2	9.5	2500	10000	30	130	6.7
B57464Sx609y***	6	0.711	± 26.5	9.5	2500	10000	30	130	6.7
B57464Sx689y***	6.8	0.806	± 26.5	9	2500	10000	30	130	6.7
B57464Sx709y***	7	0.83	± 26.5	9	2500	10000	30	130	6.7
B57464Sx809y***	8	0.948	± 26.5	8.5	2500	10000	30	130	6.7
B57464Sx100y***	10	1.08	± 26.7	8	2500	10000	30	130	6.7
B57464Sx400y***	40	3.909	± 27	4	2500	10000	30	130	6.7

\*\*\* =kink style and packing model; do not affect the performance of the device

<sup>1)</sup> The values for dissipation factor and cooling time constant are typical values. The limits are ±35%.

<sup>2)</sup> Internal specification

<sup>3)</sup> x and y are internal codes, x=0/ 1/ 2; do not affect the performance of the device

y =M/ L/ K/ A. M: R<sub>25-tol.</sub> ±20%; L: R<sub>25-tol.</sub> ±15%, insulated; K: R<sub>25-tol.</sub> ±10%;

A: customer specific, R<sub>25-tol.</sub> ±10%/ ±15%/ ±20%

## 1.9 Related documents

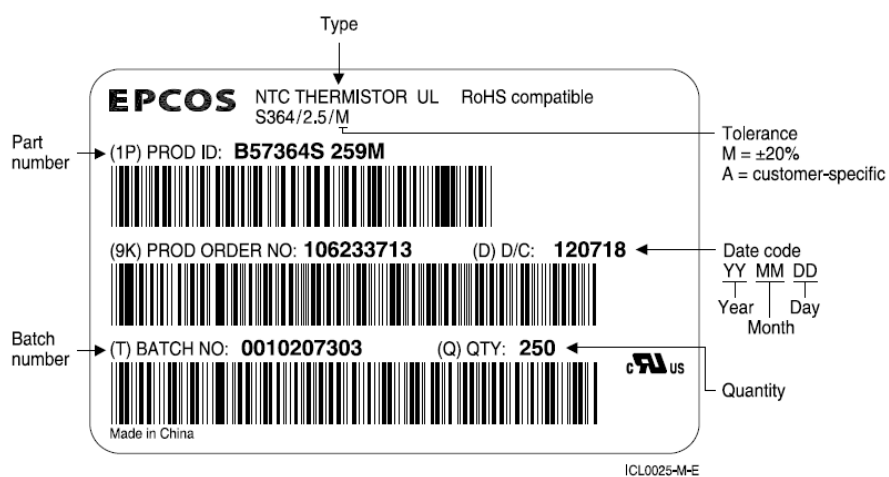
IEC 60539-1:2008, Thermistors – Directly heated negative temperature coefficient – Part 1: Generic specification

## 1.10 Marking

Marking on the Thermistor:

- Manufacturer – logo
- Resistance value
- NTC
- Date code with 4 digits (year and week of production).

Marking on the package with bar code label (as example):



Note:

For part number, when “0”, “00” and “000” next after the letters, respectively, they display as one/ two/ three blank space in the label.

### 1.11 Ordering information

#### Ordering code structure for Inrush Current Limiters

Example: Nominal diameter  $\Phi$  11.5 mm,  $R_{25} = 8\Omega \pm 20\%$ , bulk packing

B57	236S	0	809	M	000
NTC thermistor					
<b>ICLs series:</b> 153S = S153 series, nominal diameter $\Phi$ 8.5 mm 235S = S235 series, nominal diameter $\Phi$ 9.5 mm 236S = S236 series, nominal diameter $\Phi$ 11.5 mm 211P = P11 series, nominal diameter $\Phi$ 13 mm 213P = P13 series, nominal diameter $\Phi$ 14.5 mm 237S = S237 series, nominal diameter $\Phi$ 15 mm 238S = S238 series, nominal diameter $\Phi$ 16 mm 364S = S364 series, nominal diameter $\Phi$ 21 mm 464S = S464 series, nominal diameter $\Phi$ 26 mm					
<b>Internal coding</b>					
<b>Resistance at rated temperature (25°C):</b> Examples: 259 = $25 \times 10^{-1}\Omega = 2.5 \Omega$ 250 = $25 \times 10^0\Omega = 25 \Omega$ 251 = $25 \times 10^1\Omega = 250 \Omega$					
<b>Internal coding</b> M = Resistance tolerance $\pm 20\%$ L = Resistance tolerance $\pm 15\%$ , Insulated A = Customer specific					
<b>Kink style and packing model</b>					

### 1.12 Additional information (not for inspection purposes)

None.

### 1.13 Additional or increased severities or requirements to those specified in the generic sectional specification

ICL specific requirements according to IEC60539-1.



## Inspection requirements

### 2.1 Procedures

- 2.1.1** For qualification approval, the procedures shall be in accordance with the generic specification, [IEC 60539-1, 4.4 / Annex Q](#).
- 2.1.2** For quality conformance inspection, the test schedules (tables 1 and 2) include sampling, periodicity, severities and requirements. The formation of inspection lots is covered by the generic specification [IEC 60539-1, 4.4 / Annex Q](#).

#### The following list applies to the test schedules developed in tables 1 and 2:

- 1) Sub-clause numbers of tests and performance requirements refer to the generic specification IEC 60539-1.
- 2) Number to be tested: sample size as directly allotted to the code letter for IL of [IEC 61193-2](#) (Single sampling plan for normal inspection).
- 3) In these tables: p is the periodicity (in months)  
n is the sample size  
c is the acceptance criterion (permitted number of non-conforming items)  
D indicates a destructive test  
ND indicates a non-destructive test  
IL is 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) 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".
- 6) The soldering – solderability and soldering resistance to heat tests – shall only be applied where the thermistor has terminations which are appropriate for soldering.
- 7) Where the terminations are stated to be suitable for printed wiring applications, the appropriate test conditions in IEC 60068-2-58 shall apply.
- 8) The thermistors shall be mounted by their normal means.
- 9) The bump test and the shock test are alternatives. The test selected in the detail specification shall be used.
- 10) The detail specification shall specify which test is appropriate to the construction and application of the thermistor for measuring the thermal time constant.
- 11) Any deviation from annex B of the generic specification shall be given in the detail specification.
- 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 a non-conforming item. In case one or more non-conforming items occur in a sample, this lot shall be rejected.
- 13) IL deviant to IEC/PAS 60539-1-1 requirement: Changed from S-4 to S-2.
- 14) For each diameter and soldering method, the sample size is calculated according the total produced quantity in the week, according to the indicated IL.

**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)	Sample size and criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			IL	n	c	
<b>GROUP A INSPECTION</b> <b>Subgroup A0</b> 5.6 Zero power resistance $R_T$	ND	$R_{25}$	100% (see list item 12)			according the detail specification 1.8
<b>Subgroup A1</b> 5.5.1 Visual examination	ND	According OIP	S-4	2)	0	According 4.5.1
<b>Subgroup A2</b> 5.5.1 Marking 5.5.2 Dimensions	ND	According 1.2 b, th, h, LD, LL, LS	S-2	2) 13)	0	according the detail specification 1.2
<b>GROUP B INSPECTION</b> <b>Subgroup B1</b> 5.7 B-Value  5.10 Resistance/temp. characteristic	ND	Not specified  $R_{25}$ ( $R_T$ ), $R_{100}$ Resistance-temperature curve	S-2	2)	0	according the detail specification 1.8
<b>Subgroup B2</b> 5.9 Voltage proof  5.16 Solderability  5.29 Solvent resistance of the marking	ND	IEC 60539-1, (5.8.2 Method 1) 1000V <sub>DC</sub> , 60s ± 5 s  IEC 60068-2-20 Test Ta, Method 1: solder bath Bath temp. 245°C±5°C Duration: 3 sec.  IEC 60068-2-45, xA (3.1.1, Method 1): T = 23±5°C, t = 5±0,5 min Solvent: 2-propanol  Rubbing material: Cotton wool F = 5±0,5 N, 10 strokes.  Visual examination	S-2	2) 14)	0	No breakdown/ flashover according 4.9.4  Wetting of the wire according OIP  Legible marking

**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 criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			p	n	c	
<b>GROUP C INSPECTION</b>						
<b>Subgroup C1A</b>						
<b>Part of sample</b>						
5.15 Resistance to soldering heat	D	IEC 60068-2-20 Test Tb, Method 1: solder bath T = 260°C±3°C, t = 5s. Visual examination Zero power resistance R <sub>25</sub>	6	5	0	No visible damage ΔR <sub>25</sub> /R <sub>25</sub> : ±10%
5.14 Robustness of terminations		IEC 60068-2-21 Tensile strength: Ua1, F = 10N, or 20N (20N types with LD=1mm); t = 10s; Bending strength: Ub: 2 bends 90°; Torsion strength: Uc: 2x 180° Visual examination Zero power resistance R <sub>25</sub>				No visible damage ΔR <sub>25</sub> /R <sub>25</sub> : ±10%
<b>Subgroup C1B</b>						
<b>Other part of sample</b>						
5.17 Rapid change of temperature	D	IEC60068-2-14; Na T <sub>A</sub> = -55±2°C T <sub>B</sub> = 170±2°C Dwell time: t= 30min, 5 cycles, Visual examination Zero power resistance R <sub>25</sub>	6	5	0	No visible damage Δ R <sub>25</sub> /R <sub>25</sub> : ±20%
5.18 Vibration		IEC 60068-2-6 Frequency range: f = 10 – 55Hz; amp = 0,75 mm or a = 100 m/s <sup>2</sup> , t = 6h Visual examination Zero power resistance R <sub>25</sub>				No visible damage Δ R <sub>25</sub> /R <sub>25</sub> : ±10%
5.19 Shock		IEC 60068-2-27 a = 400 m/s <sup>2</sup> , t = 6 ms Number of shocks: 5000 (each direction) Visual examination Zero power resistance R <sub>25</sub>				No visible damage Δ R <sub>25</sub> /R <sub>25</sub> : ±10%

**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 criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			p	n	c	
<b>Subgroup C1</b> <b>Combined sample of specimens of subgroups C1A and C1B</b> 5.23 Dry heat  5.32 Climatic sequence  Temperature/ Humidity cycle          Final measurement	D	IEC 60068-2-2 T = 170±2°C, t = 16h  IEC 60068-2-38  Damp heat: 10 cycles - first 5 cycles with cold, - next 5 cycles without cold: T = 25±2°C, 65±2°C 93±3% r.H.; Cold: T = -10±2°C, t=3h  Visual examination Zero power resistance R <sub>25</sub>  Insulation resistance 4.8 (Insulated types only): Metal balls method (1.6±0.2mm) U =500±15V, t = 60±5s  Voltage proof 4.9 (Insulated types only):	6	10	0	No visible damage $\Delta R_{25}/R_{25}: \pm 20\%$  R <sub>IS</sub> > 500 MOhm      No breakdown/flashover according 4.9.4
<b>GROUP D INSPECTION</b> <b>Subgroup D1</b> 5.11 Power dissipation  5.12 Thermal time constant by ambient temperature change  5.13 Thermal time constant by cooling after self-heating	D	T <sub>b</sub> = 85±2°C Dissipation factor in still air at T = 25±5°C.  Not specified      T <sub>a</sub> =25±2°C, T <sub>b</sub> =85±2°C Measurement in still air at T = 25±5°C. $\tau$ after $T_i = T_b - (T_b - T_a) \times 0,632$	6	10	0	according the detail specification 1.8          according the detail specification 1.8

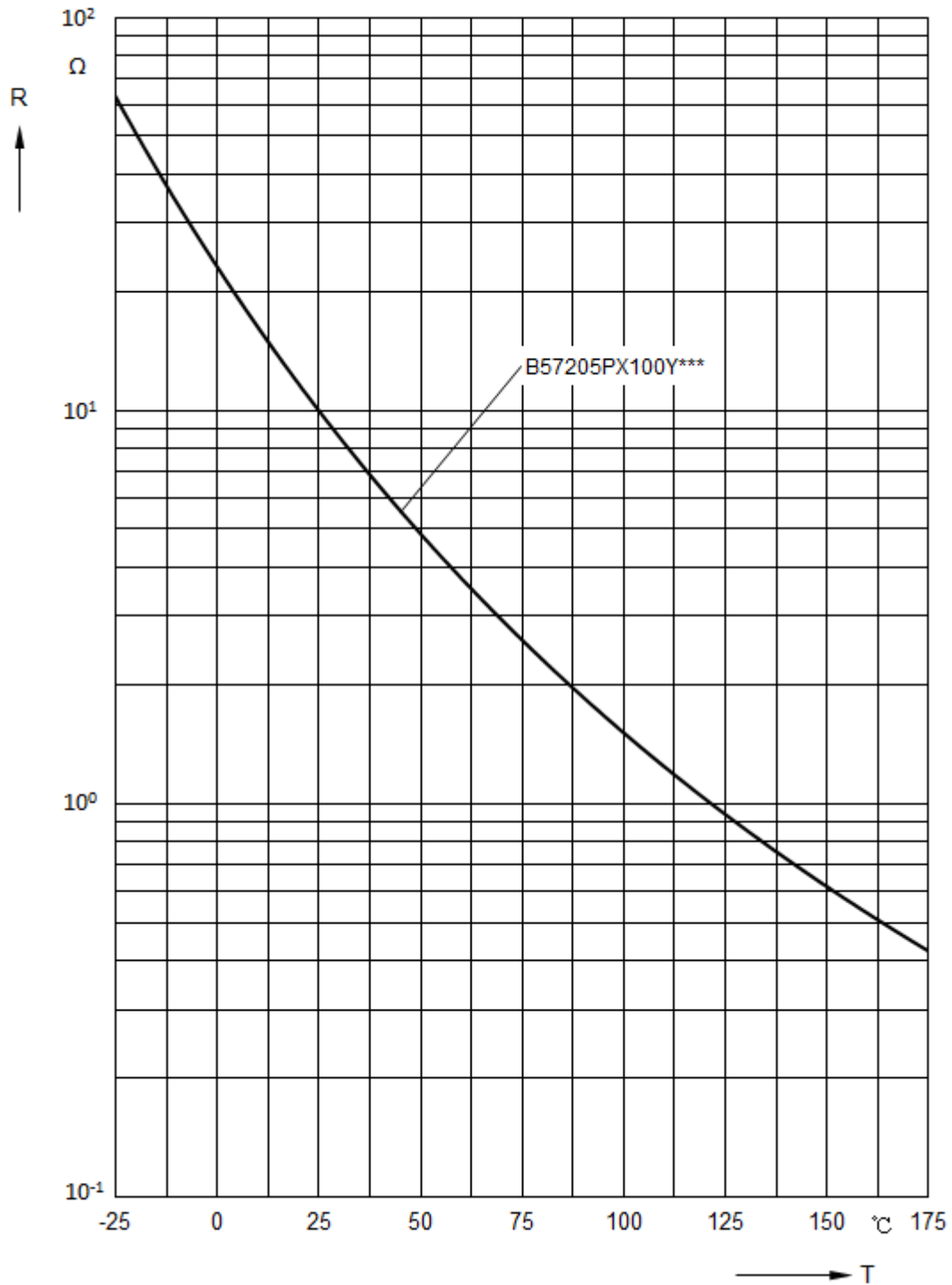
**Table 2 - Test schedule for quality conformance inspection: periodic**

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			p	n	c	
<b>Subgroup D2</b> 5.25.5 Endurance at upper category temperature	D	Temperature: 170±2°C Duration: 1000h  Zero power resistance R <sub>25</sub> Examination at 168h, 500h and 1000h Visual examination Zero power resistance R <sub>25</sub>	12	10	0	No visible damage Δ R <sub>25</sub> /R <sub>25</sub> : ±30%
<b>Subgroup D3</b> 5.25.4 Endurance at θ <sub>3</sub> and P <sub>max θ</sub>	D	Not specified	12	10	0	
<b>Subgroup D4</b> 5.24 Damp heat, steady state	D	IEC 60068-2-78, Cab Temperature: 40±2 °C Humidity: 93±3%rF Duration: t = 21 d  Visual examination Zero power resistance R <sub>25</sub>  Insulation resistance 4.8 (Insulated types only): Metal balls method (1.6±0.2mm) U =500±15V, t = 60±5s  Voltage proof 4.9 (Insulated types only):	12	10	0	No visible damage Δ R <sub>25</sub> /R <sub>25</sub> : ±20%  R <sub>IS</sub> > 500 MOhm  No breakdown/ flashover according 4.9.4

Subclause number and test (see list item 1)	D or ND	Conditions of test (see list item 1)	Sample size and criterion of acceptability (see list item 3)			Performance requirements (see list item 1)
			p	n	c	
<b>ICL specific test according to IEC60539-1</b>						
5.25.2 Endurance at room temperature with applied continuous maximum current (I <sub>max25</sub> )	D	Temperature: $\theta_3$  I = I <sub>max</sub> (according to 1.8.) Duration: 1000h  Examination at 168h, 500h and 1000h: Visual examination Zero power resistance R <sub>25</sub>	12	10	0	No visible damage $\Delta R_{25}/R_{25}: \pm 30\%$
5.25.3 Endurance at room temperature with applied cyclic maximum current (I <sub>max25</sub> )	D	Temperature: 25±5°C,  I = I <sub>max</sub> (according to 1.8.) On- time = 1 min Cooling time = 5 min Number of cycles: 1000  Visual examination Zero power resistance R <sub>25</sub>	12	10	0	No visible damage $\Delta R_{25}/R_{25}: \pm 20\%$
5.25.6 Maximum permissible capacitance	D	Temperature: 25±5°C, U <sub>NTC</sub> = 180V/375V Method 1: C = C <sub>T</sub> (according to 1.8.) Number of cycles: 1000  Visual examination Zero power resistance R <sub>25</sub>	12	10	0	No visible damage $\Delta R_{25}/R_{25}: \pm 30\%$

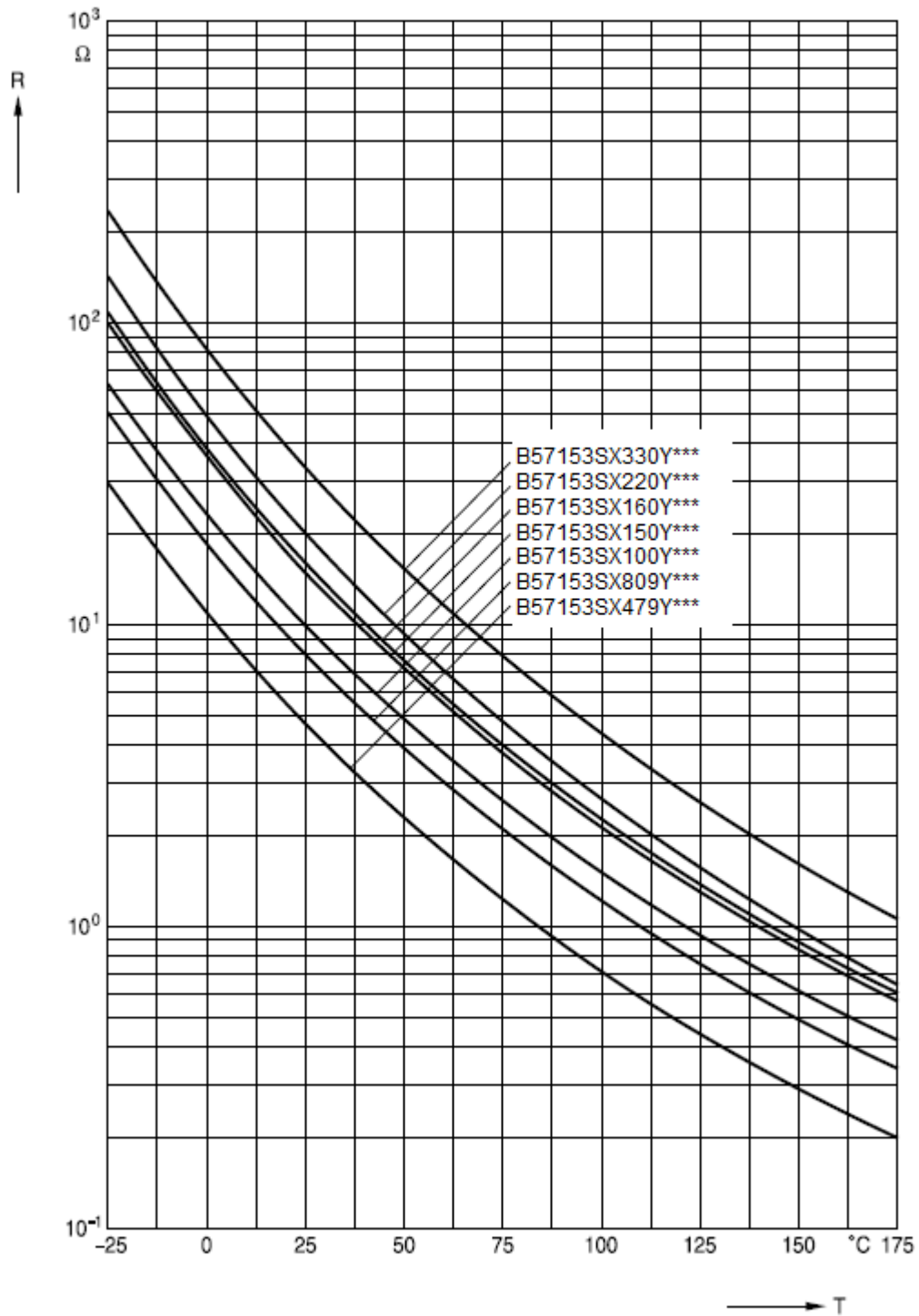
Annex A:

Resistance versus temperature



P5 series

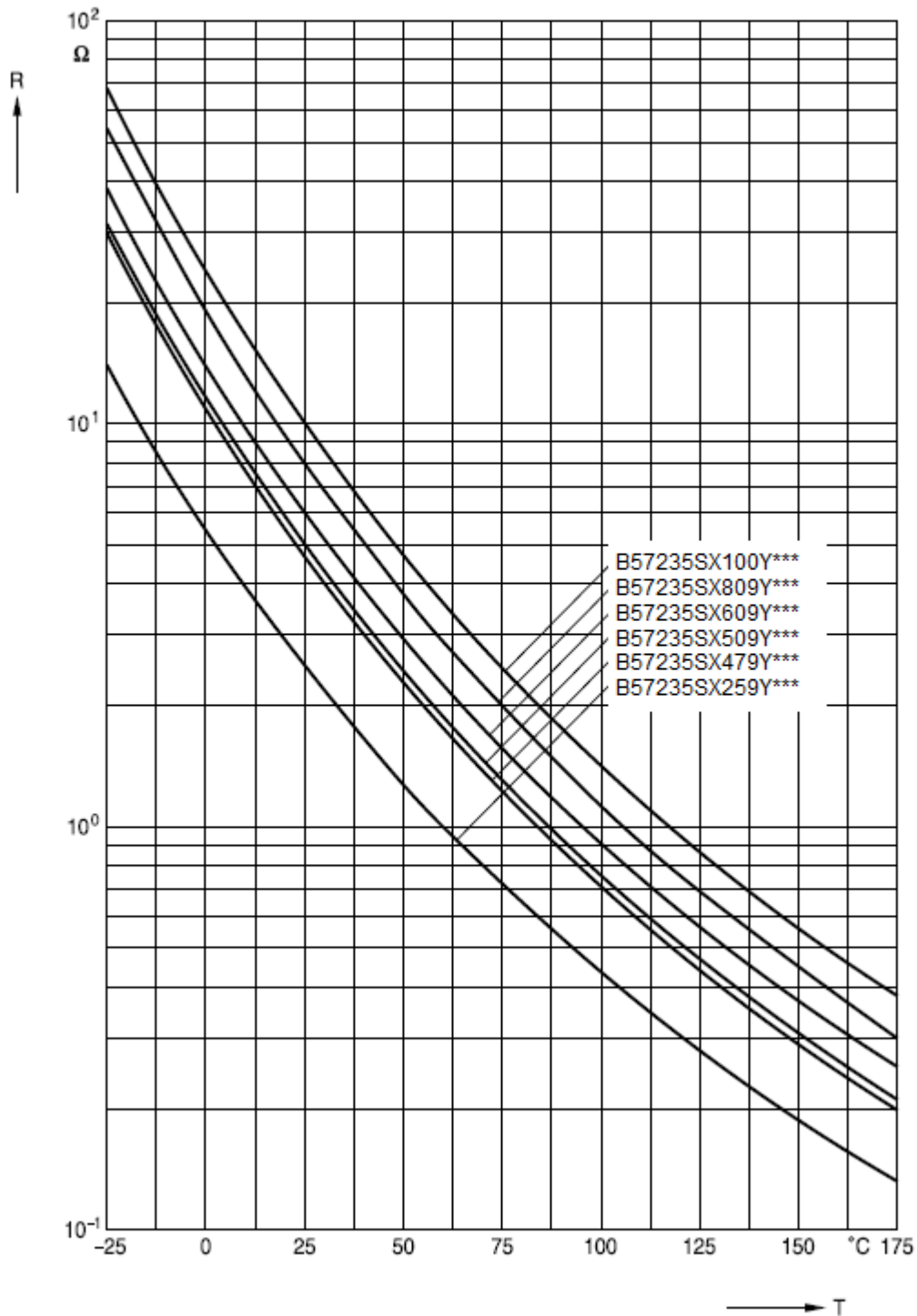
### Resistance versus temperature



S153 series

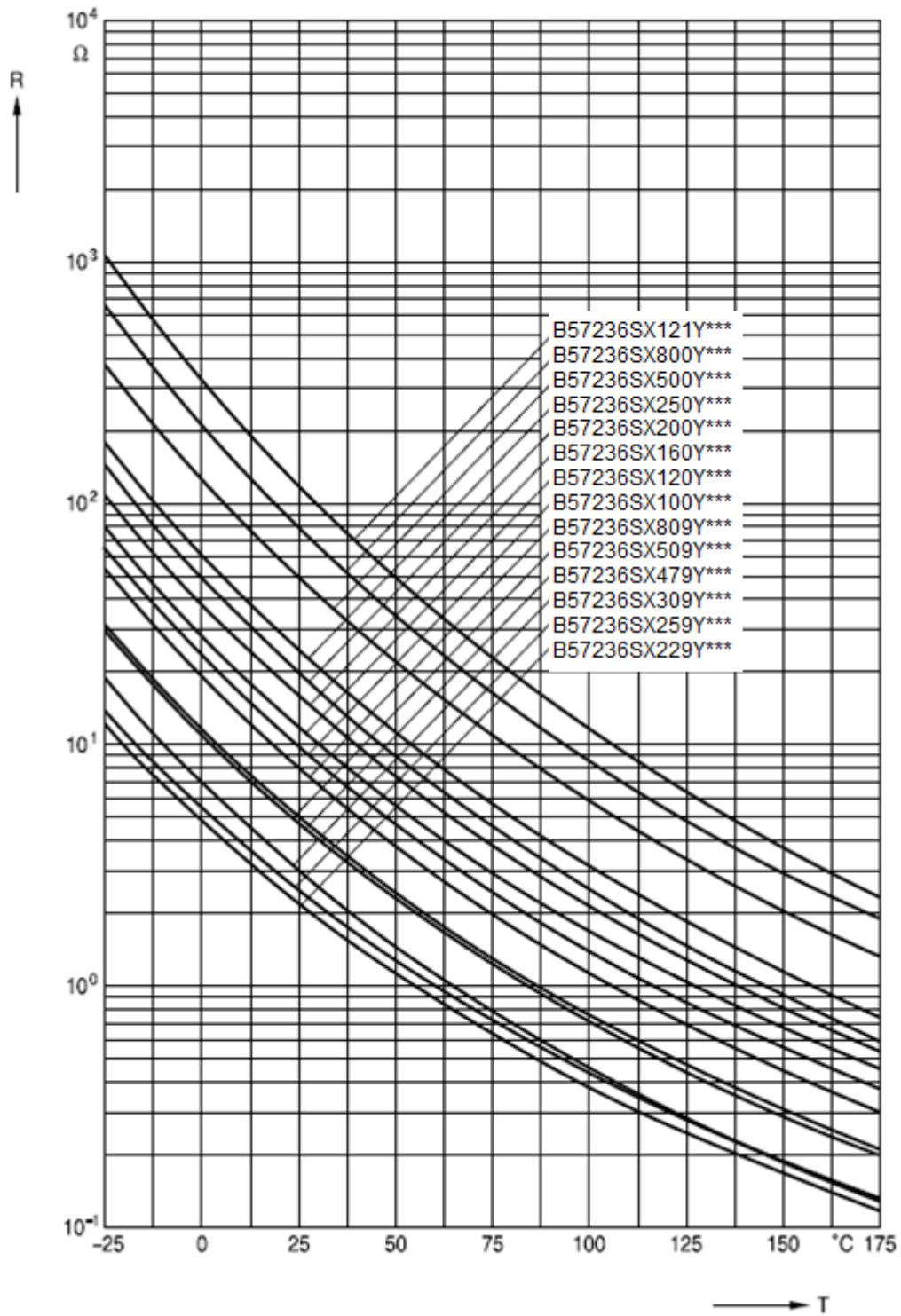


### Resistance versus temperature



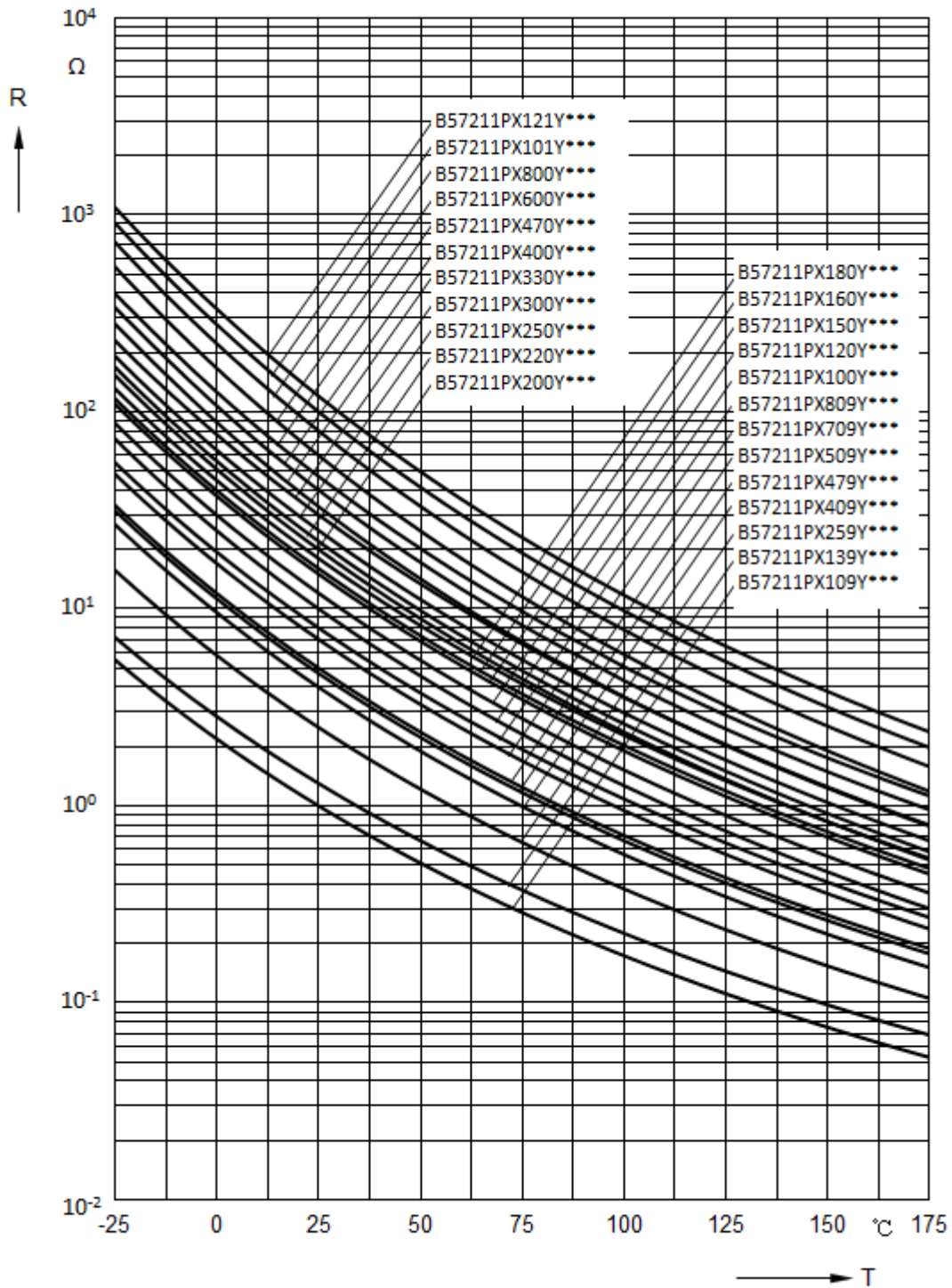
S235 series

### Resistance versus temperature



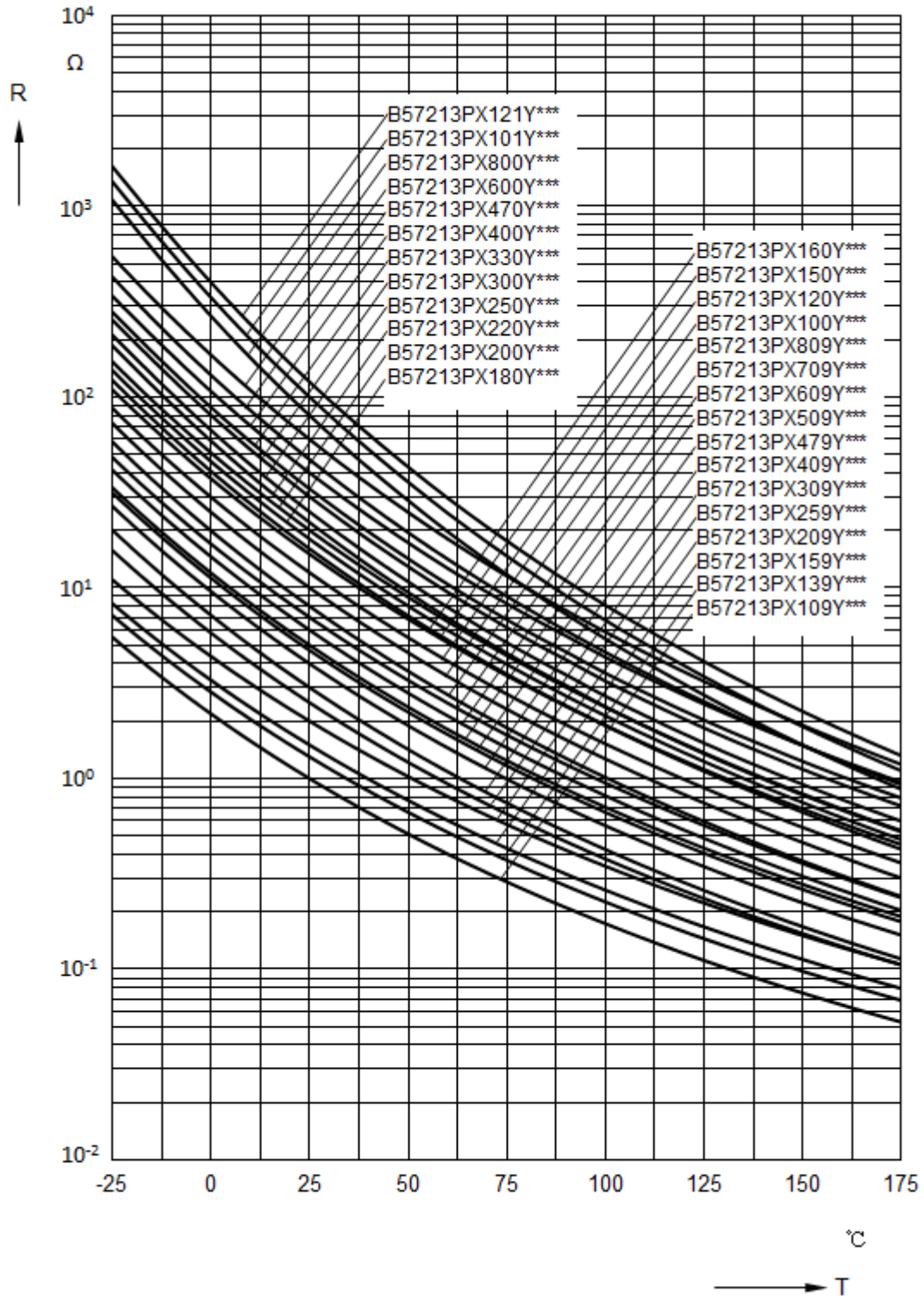
S236 series

### Resistance versus temperature



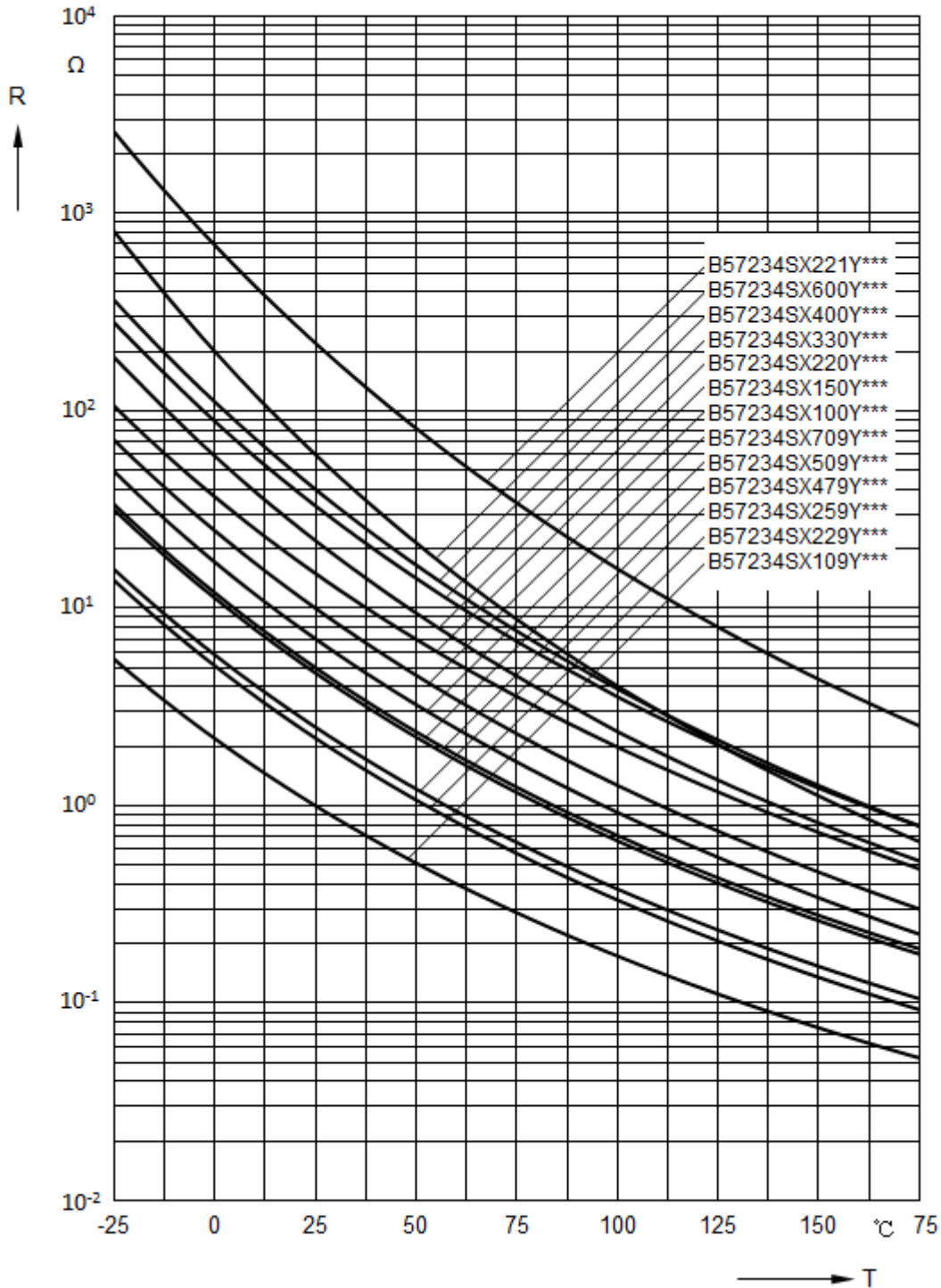
**P11 series**

### Resistance versus temperature



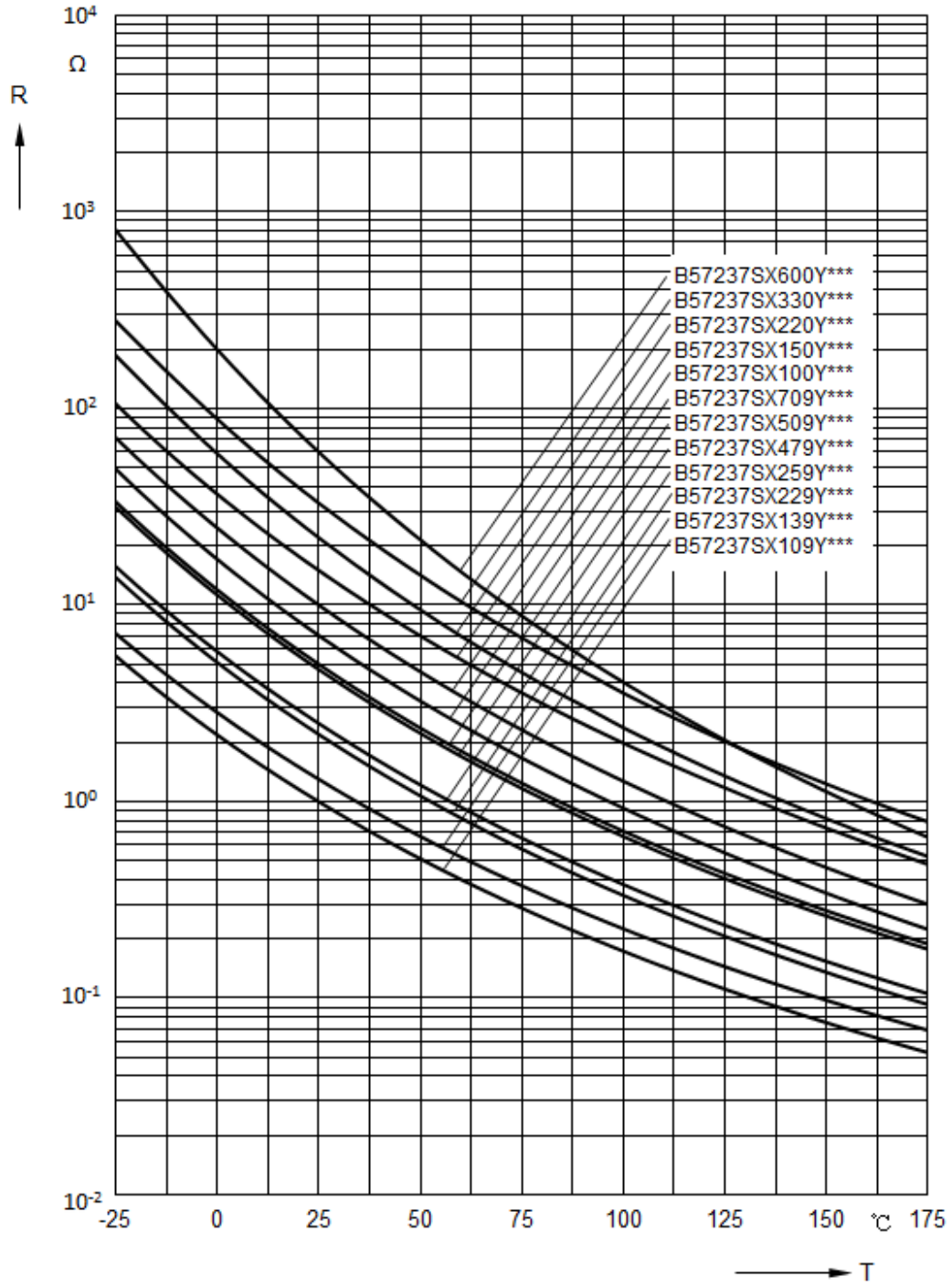
**P13 series**

### Resistance versus temperature



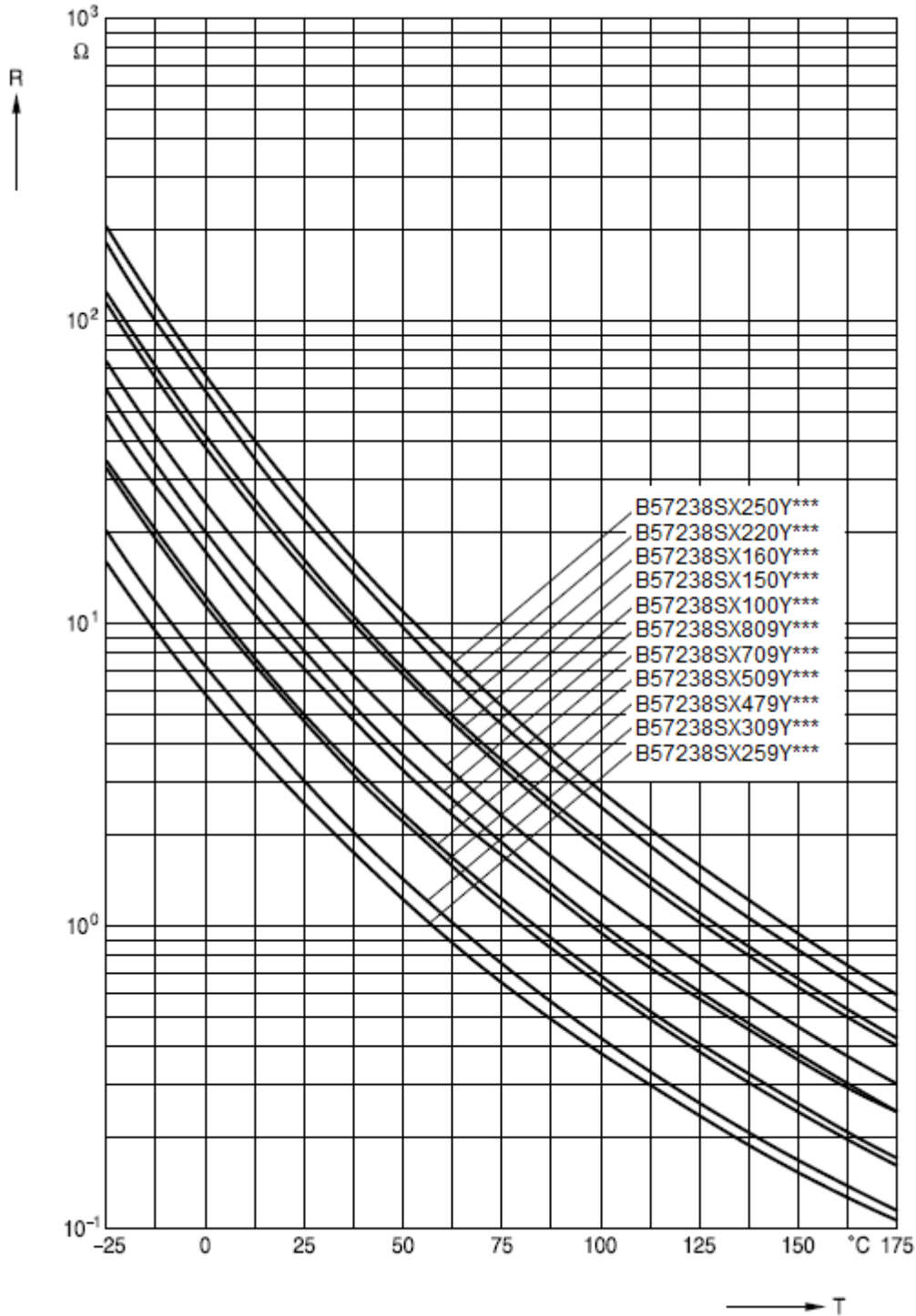
**S234 series**

### Resistance versus temperature



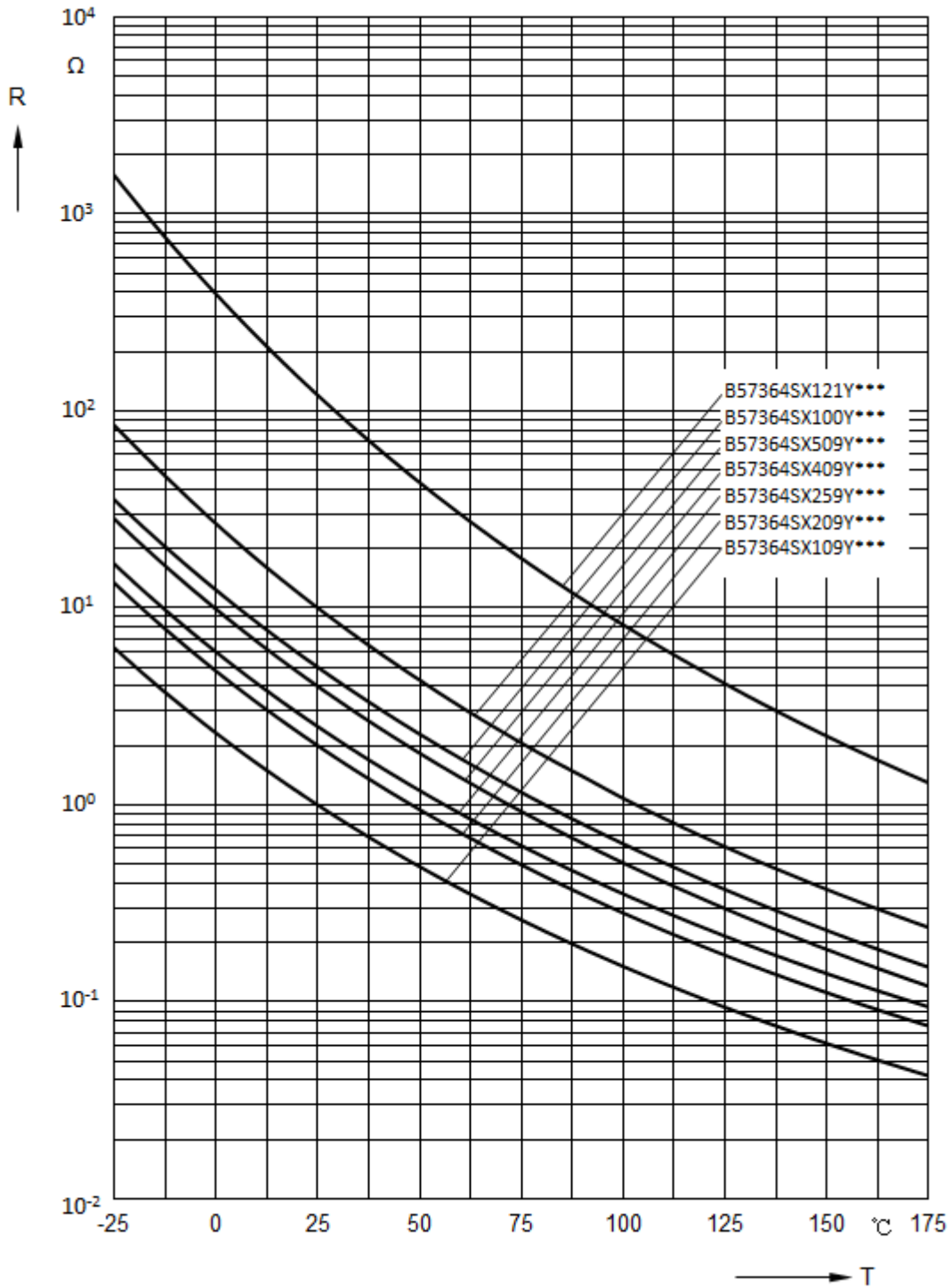
**S237 series**

### Resistance versus temperature



S238 series

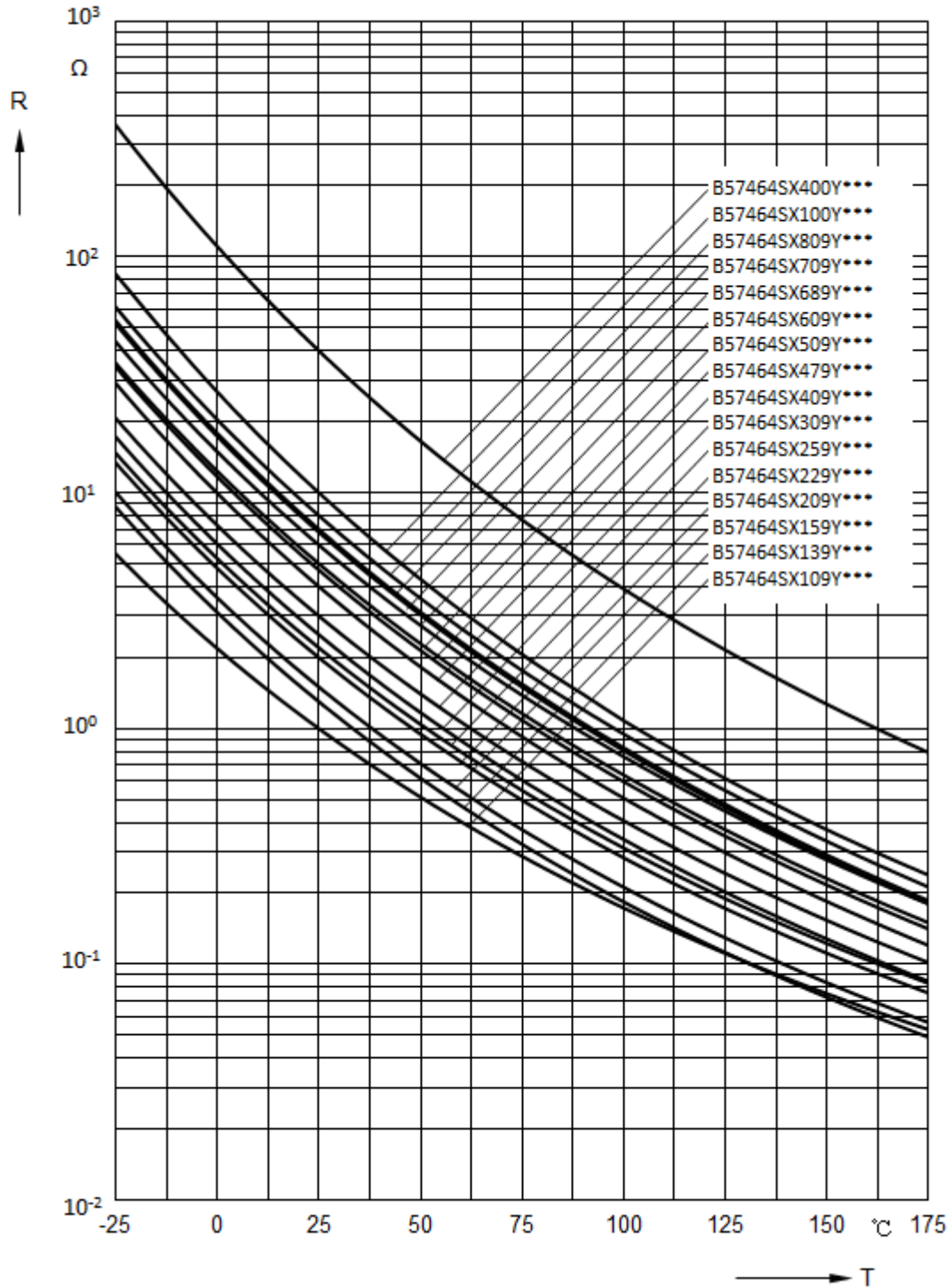
### Resistance versus temperature



**S364 series**



### Resistance versus temperature



**S464 series**