



Product division: NTC

Product type: S153/xxx/M

Product name: Inrush Current Limiter

Ordering code: B57153S0xxxM000

Data sheet

APPLICATION :

NTC-thermistor for inrush current limiting in peripheral communication equipment, e.g. in switch-mode power supplies

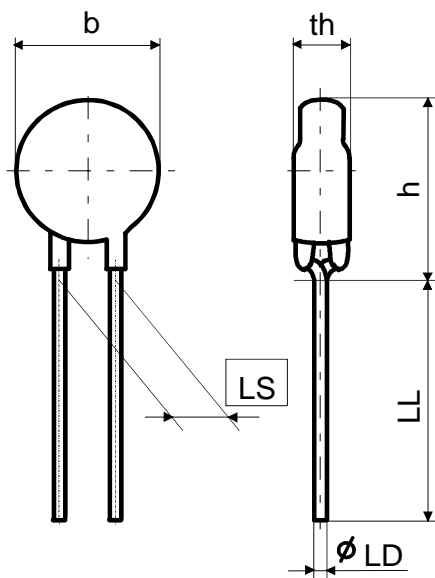
FEATURES :

- Black coated thermistor disk
- Coating material is flame retardant (UL 94 V-0 approved)
- Kinked leads of tinned copper wire
- Lead spacing 5 mm
- Manufacturer's logo, NTC and resistance value stamped in white
- High stability of electrical characteristic
- Terminals solderable in accordance with IEC 60068-2-20, test ta, method 1
- ICL support to fulfill the requirements according EN 61000 of power circuits
- Usable in series connections up to 265 V_{rms}
- UL approval (E 69802)
- The component is compliant with ROHS (DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment
- Available on tape

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DRAWING :


b	8.5 max	mm
th	6.0 max	mm
h	13.0 max	mm
LL	36 ⁻¹	mm
LD	0.6 ± 0.05	mm
LS	5.0 ^{-0.1/+0.6}	mm

Approx. weight : 0.6 [g]

RATINGS AND CHARACTERISTICS

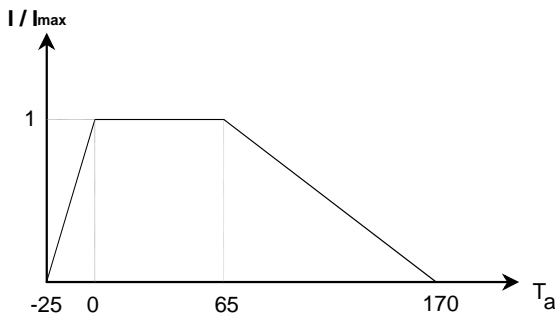
Lower/upper category temperature	T	[°C]	-55/+170
Resistance tolerance	$\Delta R/R_N$	[%]	± 20
Rated temperature	T _N	[°C]	25
B value tolerance	$\Delta B/B$	[%]	± 3
Max. power at 25°C	P _{max}	[W]	1.4
Dissipation factor (in air)	δ_{th}	[mW/K]	approx.8
Thermal cooling time constant (in air)	τ_{th}	[s]	approx.30
Heat capacity	C _{th}	[mJ/K]	approx. 240

Ordering Code	R ₂₅ [Ω]	I _{max} [A]	B _{25/100} [K]	C _T at 110 VAC [μF]	C _T at 230 VAC [μF]	Parameter for R(I) k	Parameter for R(I) n
B57153S0479M000	4.7	3.0	2800	400	100	0.644	-1.30
B57153S0809M000	8.0	2.2	2800	400	100	0.778	-1.30
B57153S0100M000	10	2.0	2800	400	100	0.838	-1.30
B57153S0150M000	15	1.8	2900	400	100	0.934	-1.32
B57153S0160M000	16	1.7	2900	400	100	0.953	-1.32
B57153S0330M000	33	1.3	3000	400	100	1.18	-1.33

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Maximum continuous current I_{max} :

The I_{max} denotes the maximum permissible continuous current (dc or rms values for sine-shaped ac) in the temperature range 0 to 65°C.

Maximum current derating (I / I_{max}) :


$$\text{Percent of } I_{max} = 100 \left[1 - \frac{T_A - 65^\circ C}{T_{max} - 65^\circ C} \right]$$

T_A = ambient temperature ($T_A > 65^\circ C$)
 $T_{max} = 170^\circ C$

Fig. 1. - Maximum current derating (I / I_{max})

Maximum switchable capacity (C_T) :

The maximum switchable capacity (C_T) is the maximum capacity which may be discharged across the thermistor. See Fig. 2 Maximum switchable capacity measuring circuit.

Dependence of NTC resistance on current :

The resistance effective in the usual current range can be approximated with the fit parameter **k** and **n**.

$$R_{NTC} = k * I^n \quad 0.3 * I_{max} < I \leq I_{max}$$

R_{NTC} Resistance value to be determined at current I [Ω]

k, n Fit parameter, see table with ordering codes

I Current flowing through the NTC (insert numerical value in A)

The calculated values only serve as an estimate for operation in still air at an ambient temperature of 25°C.

MARKING :

- EPCOS – logo
- resistance value
- NTC
- Date code with 4 digits (year and week of production): 0440 (example for week 40 in year 2004)

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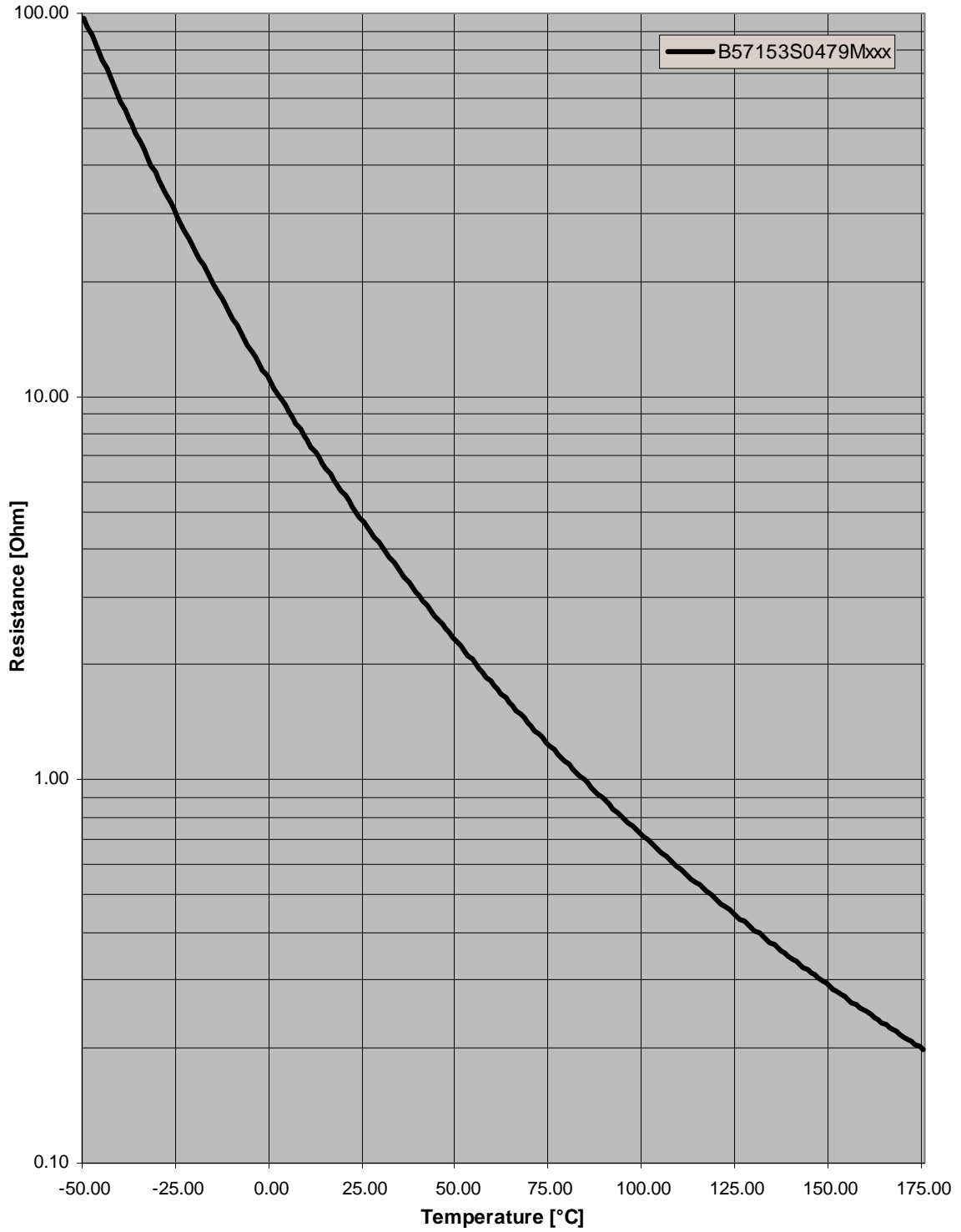
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Data sheet

Resistance - Temperature Curve



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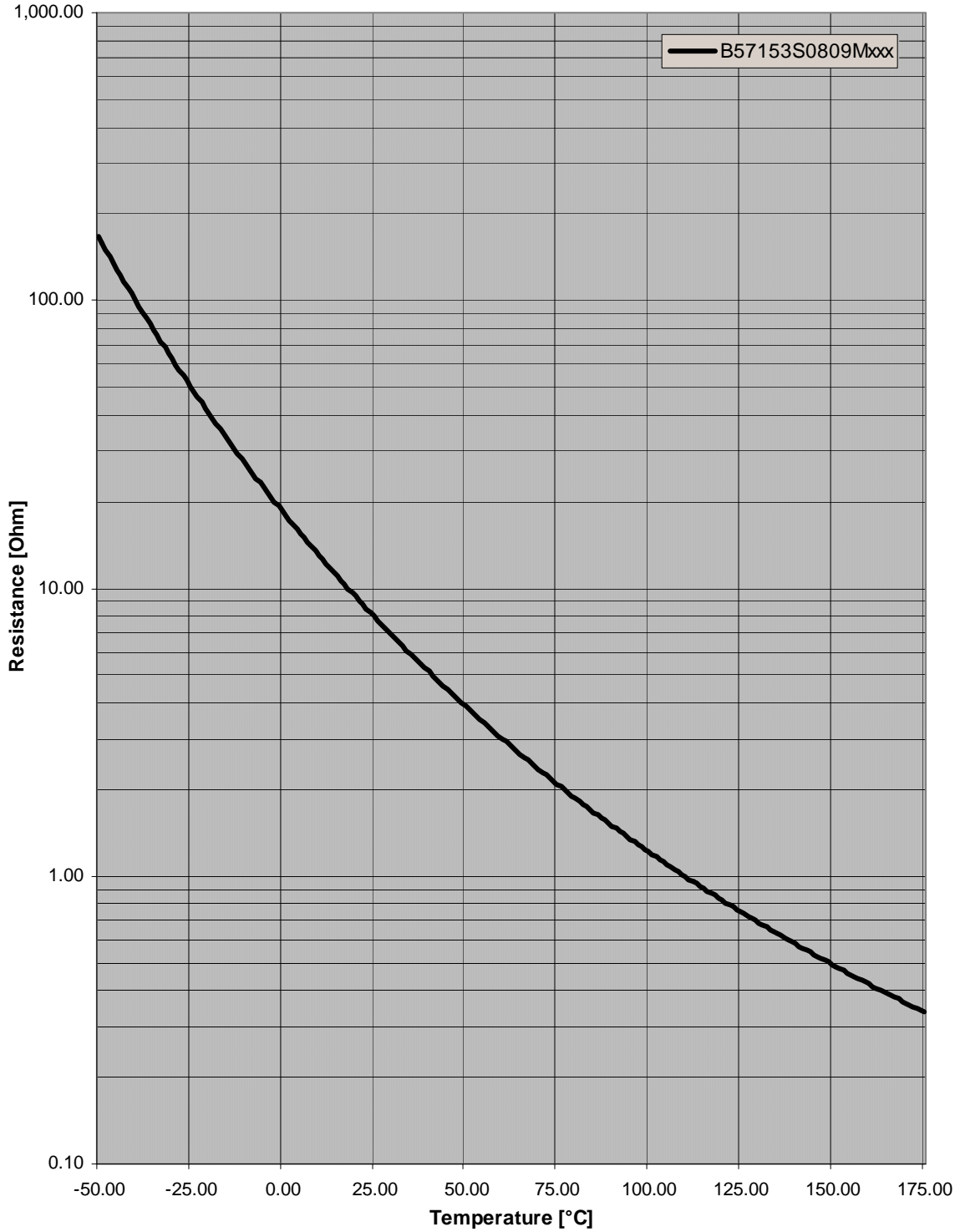
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Resistance - Temperature Curve



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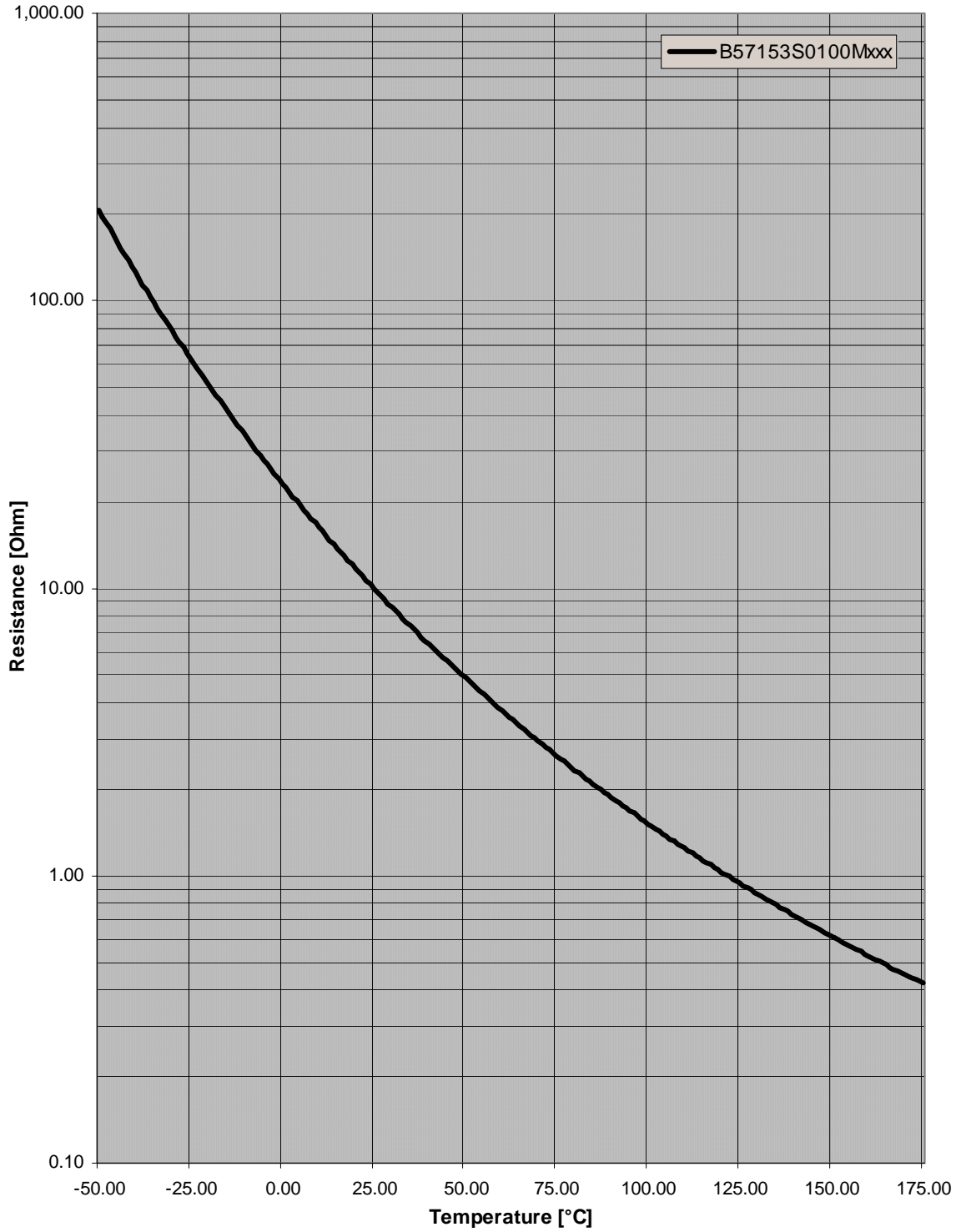
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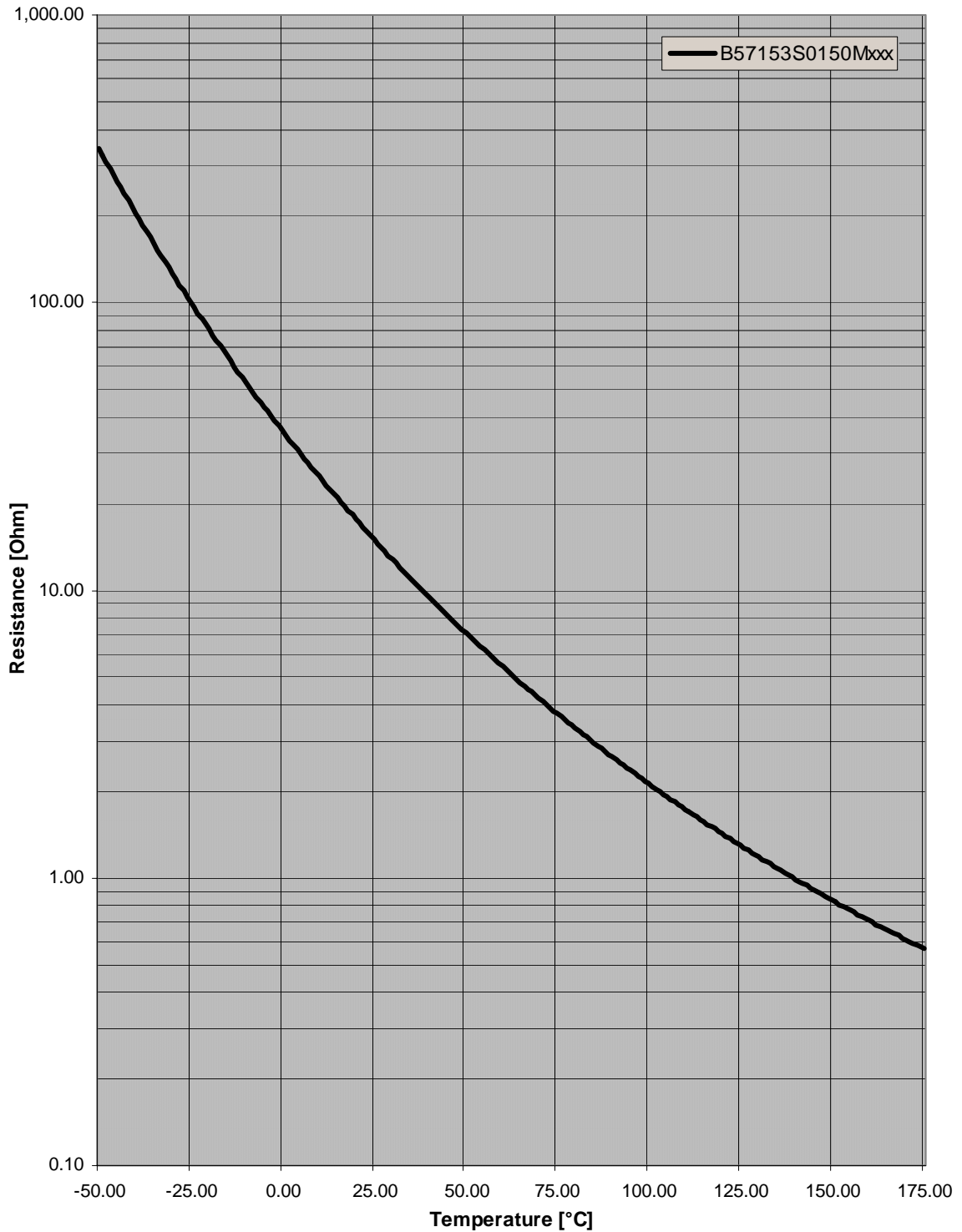
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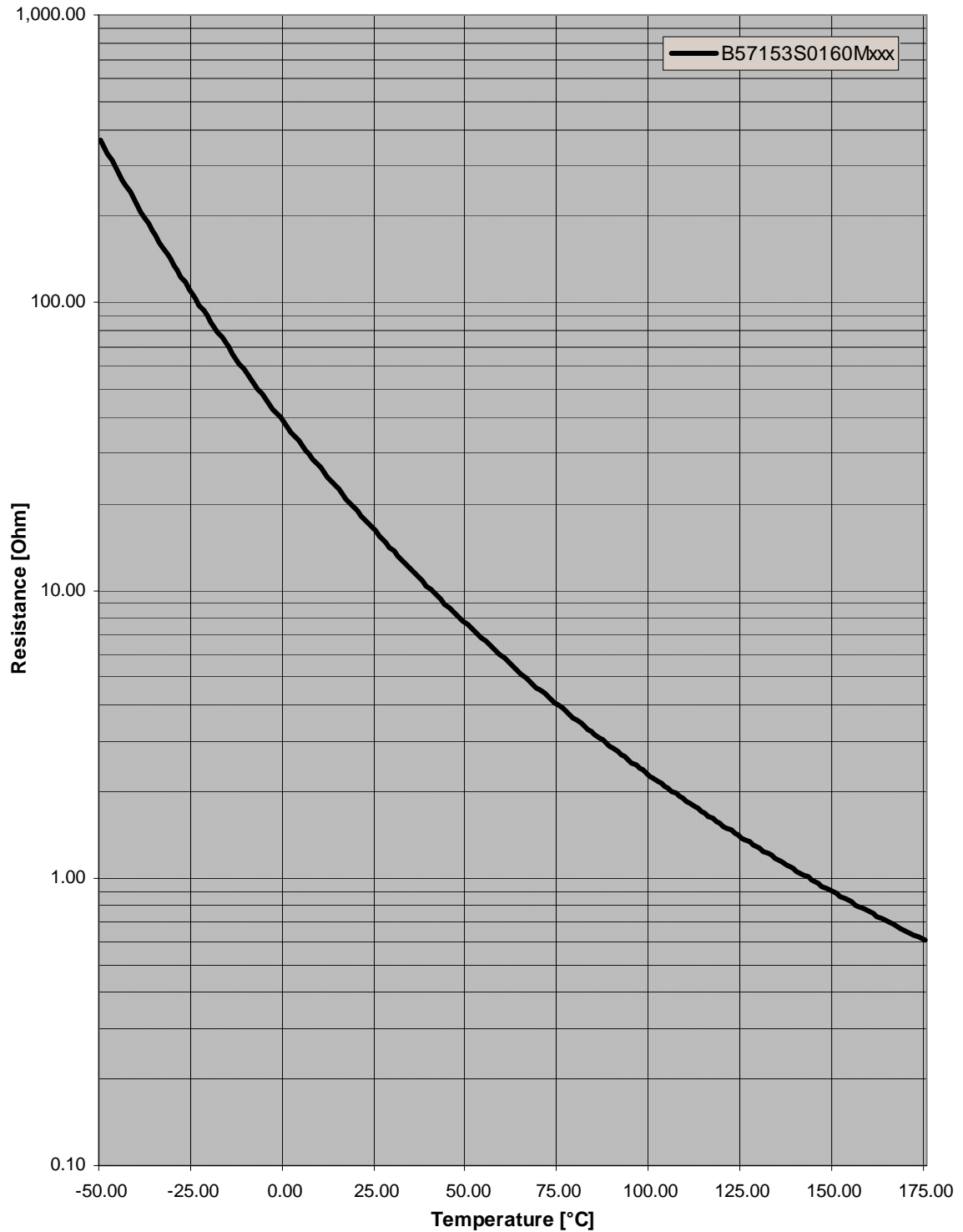
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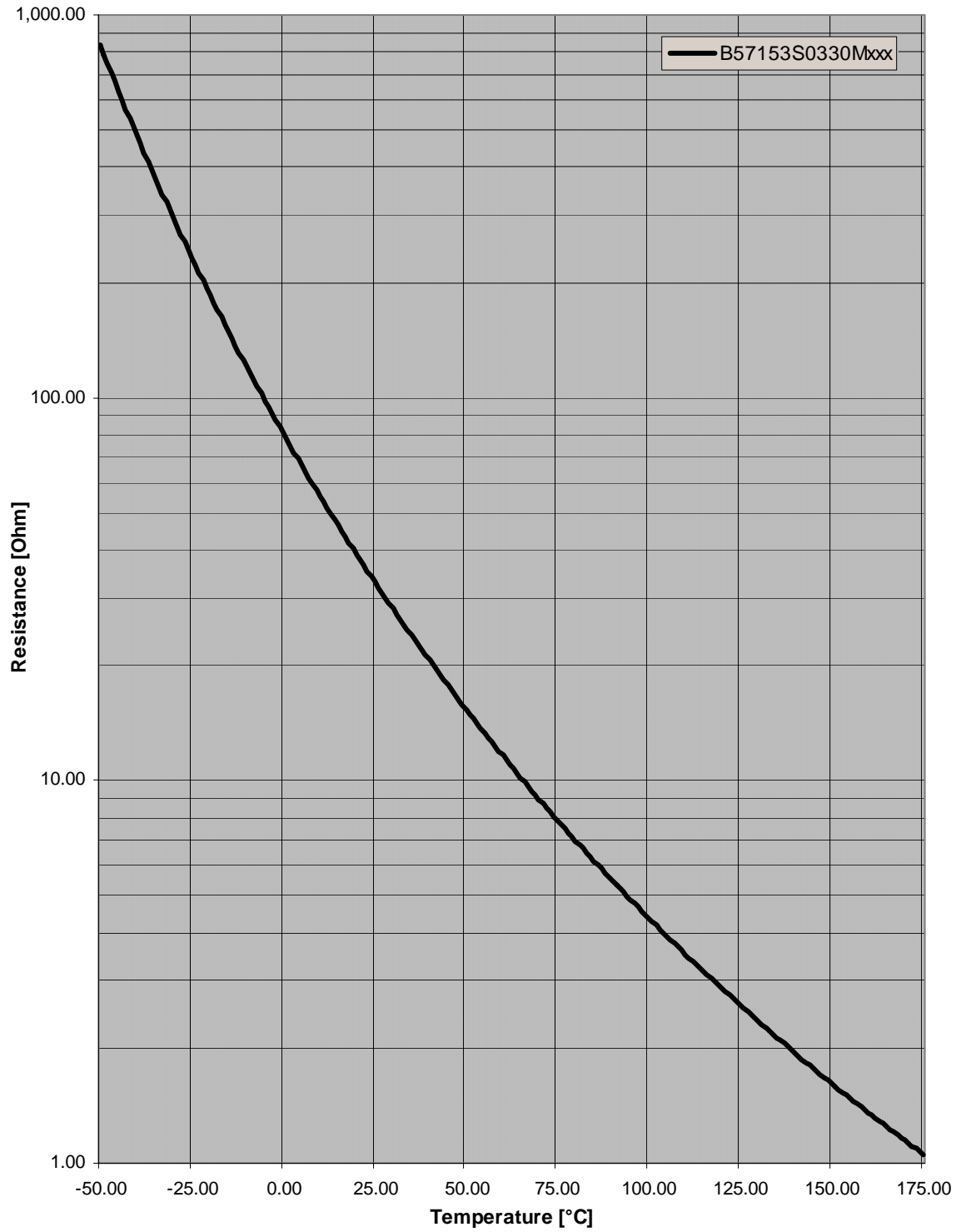
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Resistance - Temperature Curve



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ROBUSTNESS OF TERMINATIONS :

The leads meet the requirements of IEC 60068-2-21.

Test	Test conditions	Remarks
Tensile strength	Test Ua1: Fasten body with a force applied to each lead 10 [N] for 10 [s]	No visible damage
Bending strength	Test Ub: Fasten body with two 90°-bends in opposite direction at a force of 10 [N]	No visible damage (Peel off of coating along the lead accepted)

RELIABILITY REQUIREMENTS :

Test	Standard	Test conditions	$\Delta R_{25}/R_{25}$ (typical)	Remarks
Storage in dry heat	IEC 60068-2-2	Storage at upper category temperature T: 170°C t: 1000 h	< 10 %	No visible damage
Storage in damp heat, steady state	IEC 60068-2-3	Temperature of air: 40°C Relative humidity of air: 93 % Duration: 21 days	< 5 %	No visible damage
Rapid change of temperature	IEC 60068-2-14	Lower test temperature: -55°C (time: 15 min) Upper test temperature: 170°C (time: 15 min) Time to change from lower to upper temperature : < 30 sec Number of cycles: 10	< 10 %	No visible damage
Endurance (storage at max. current)		$I = I_{max}$ t = 1000 h T = 25°C	< 10 %	No visible damage
Electrical cycling test	*	$I = I_{max}$ load on: 1 min load off: 6 min Number of cycles: 1000	< 10 %	No visible damage
Maximum switchable capacity test	**	Capacity = C_T Number of cycles: 1000	< 5 %	No visible damage

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Soldering of Components

Process	Conditions	Remarks
Soldering	Dip soldering : 260°C max, 4 sec max, 6mm min from thermistor body Iron soldering : 360°C max, 2 sec max, 6 mm min from thermistor body	Low resistance drift

* Electrical cycling Test

Each cycle has to start with parts cooled down to room temperature. It has to cover the portion of the R/T curve between room temperature and the resistance of the components as stabilized at the maximum continuous current I_{max} (that is the minimum operating resistance). One cycle lasts 7 minutes.

** Maximum switchable capacity test

The capacitor (C_T) is discharged across a series fixed resistor and the thermistor, shown in Figure 2. The charge voltage is chosen so that the voltage applied to the thermistor at the beginning of discharge is 170/345 [V], corresponding to $(110/230V + \Delta V) * 1.41$.

The capacitor is discharged across a series fixed resistor and the thermistor 1 000 times at ambient temperature of between 15°C and 35°C. Each cycle has to start with thermistors cooled down to ambient temperature.

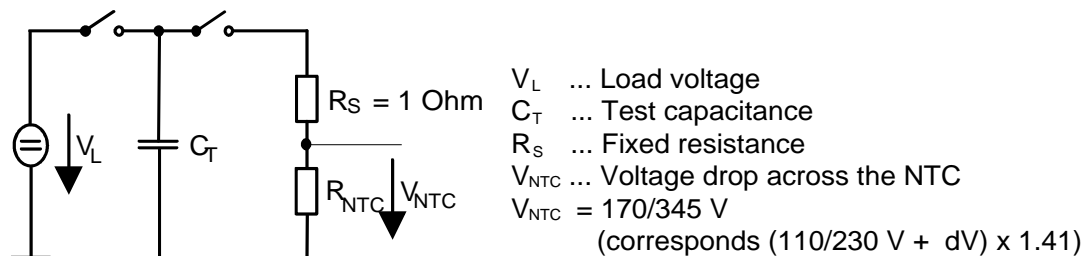


Fig. 2. - Maximum switchable capacity measuring circuit

TAPING AND PACKING :

Packing codes :

The last two digits of the complete ordering code state the packing mode :

Packing		Code	Number of Pieces
Bulk packing	Bulk	00	1000
Reel packing	Tape	51	1500
AMMO packing	Tape	54	1000

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Example : B57153S0100M000 untaped
 B57153S0100M051 taped reel packing

Table 1: Package dimensions and weights of unit packages

Packing	Pcs / unit	Approx. Weight (g)	Dimensions (mm)
Bulk	1000	900	x=80, y=240, z=210
Ammo	1000	600	x=45, y=330, z=225
Reel	1500	1300	d=360, f=31±1, n=approx. 45, w=54 max

Dimensions x, y, z acc. to fig. 1
 Dimensions d, f, n, w acc. to fig. 2

Drawings

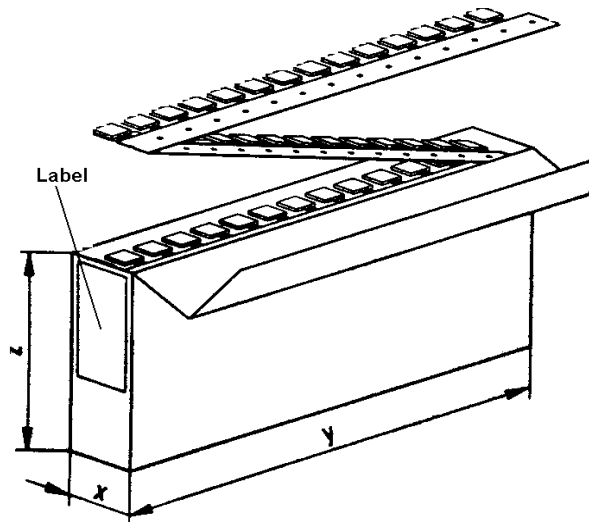


Fig. 1: AMMO packing

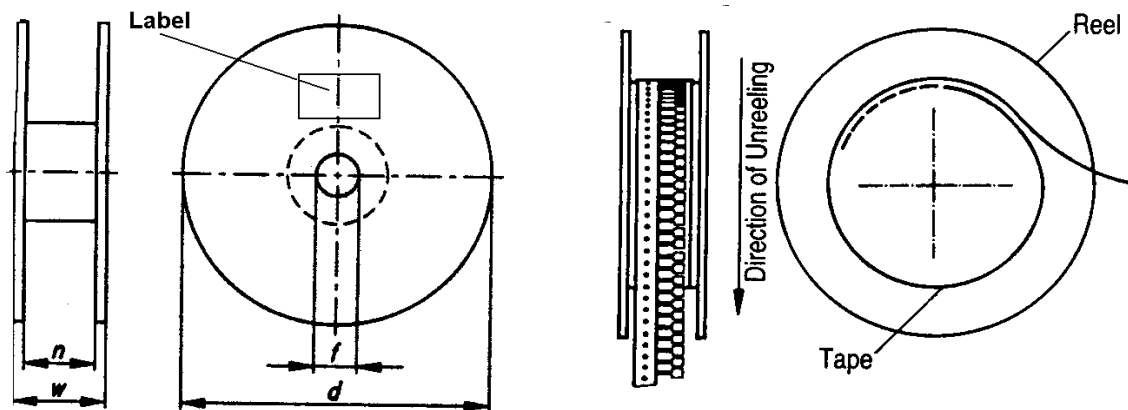


Fig. 2: Reel packing

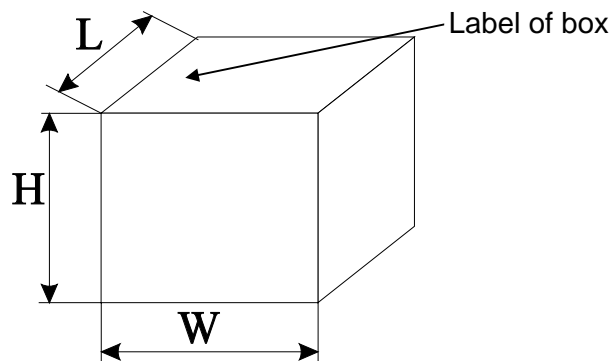
Data sheet
Shipping package
Table 2: Dimensions and weights of shipping package.

BULK		
Dimensions L x W x H	Pcs/package	Approx. Weight
(mm)	-	(kg)
330x230x100	1000	1.2
354x354x166	2000	2.6
370x270x270	5000	5.1
500x370x280	8000	8.5
500x440x370	16000	15.9
680x450x410	26000	25.4

AMMO		
Dimensions L x W x H	Pcs/package	Approx. Weight
(mm)	-	(kg)
330x230x100	2000	1.6
354x354x166	3000	2.6
370x270x270	5000	3.8
354x354x220	6000	4.5
354x354x274	8000	5.2
500x370x280	12000	8.5
500x440x370	19000	13.5
680x450x410	32000	22.2

REEL		
Dimensions L x W x H	Pcs/package	Approx. Weight
(mm)	-	(kg)
354x354x58	1500	1.8
354x354x112	3000	3.3
354x354x166	4500	4.6
354x354x220	6000	6.0
354x354x274	7500	7.3

L x W x H acc. to fig.3.

Drawing

Fig. 3: Shipping Package

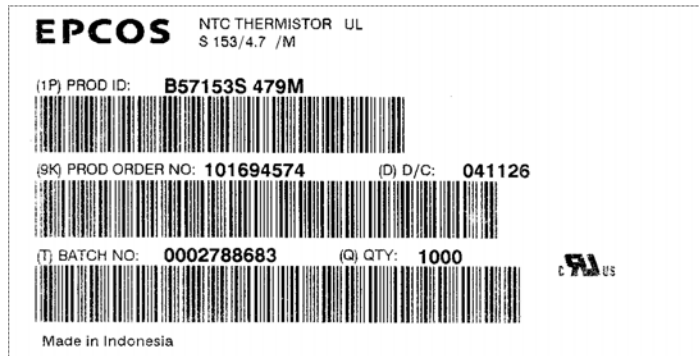
Packing material: Cardboard box

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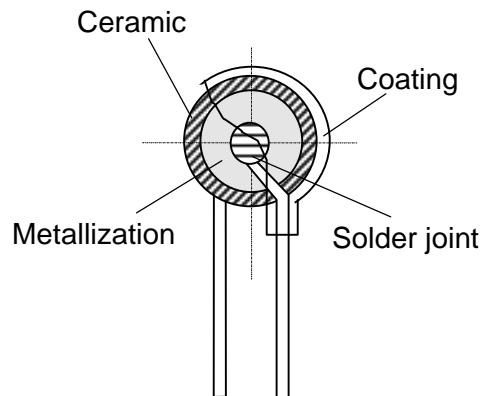
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Label

The shown label is an example for bulk packing. Type code and ordering code do not refer to the actual type.

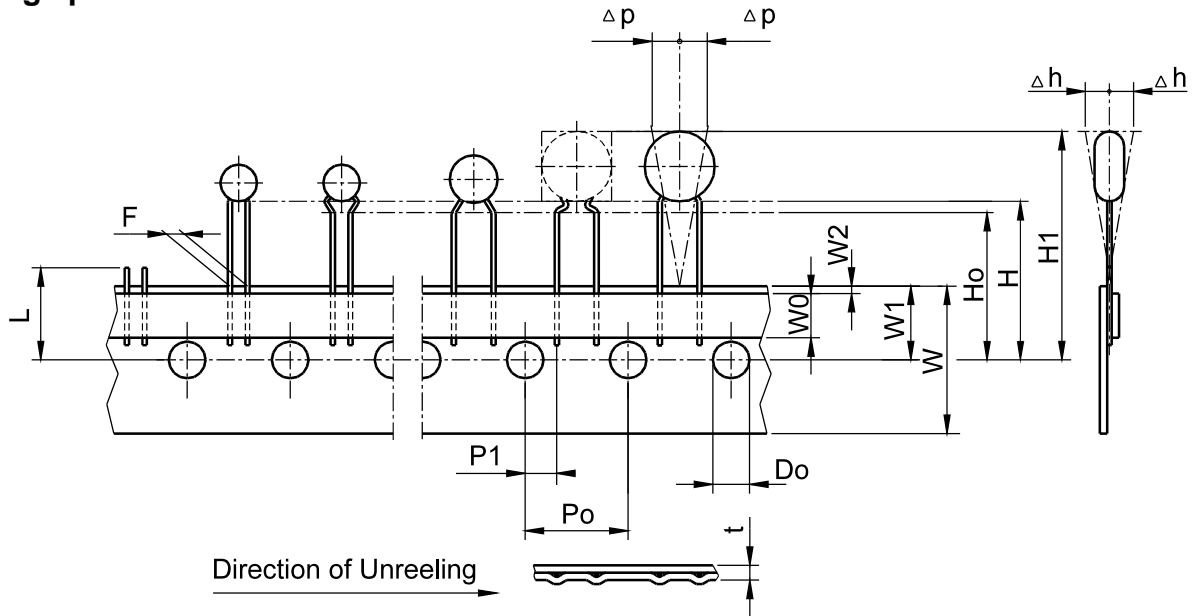


Internal Construction



The above picture shows the internal construction of EPCOS ICL's.

Note: Coating may have cracks or chips due to acting mechanical force on the wire, but this does not affect the performance of the component.

Data sheet
Taping specification :


Dimensions and tolerances (taping in accordance with IEC 60286-2) :

Designation	Symbol	Nominal size [mm]	Tolerance [mm]	Remarks
Lead Spacing	F	5.0	+0.6/-0.1	
Pitch of holes	P0	12.7	±0.3	±1 mm/20 sprocket holes
Spacing hole center	P1	3.85	±0.7	
Slope of component	Δ h	0	±2.0	measured at top of component body
Slope of component	Δ p	0	±1.3	
Spacing hole center / bottom edge of component	H	18.0	+2.0/-0	
Spacing hole center / niveau NTC	H0	16.0	±0.5	
Spacing hole center / upper edge of component	H1	32.2	max.	
carrier type width	W	18.0	±0.5	
hot adhesive tape width	W0	5.5	min.	peel-off force ≥ 5 N
position of holes	W1	9.0	±0.5	
position of adhesive tape	W2	2.0	max.	
hole diameter	D0	4.0	±0.2	
tape thickness	t	0.9	max.	without wires
length of remaining wire after removal of component	L	11.0	max.	