

ROYALOHM

C O N F I D E N T I A L D O C U M E N T

SPECIFICATION FOR APPROVAL

TRELIK

Description : Wire-Wound Fixed Resistors

Royalohm Part no.:

KNP01SJxxxxA10 (KNP 1W-S +/- 5% PT-52mm. T/B-1,000)

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

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1. Scope:

This specification for approval relates to Wire-Wound Fixed Resistors manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form :

(Ex.)	KNP	1W-S	J	10Ω
	Type	Power Rating	Resistance Tolerance	Nominal Resistance

3. Ratings:

Ratings shall be shown in the table 1.

Table 1

Type	KNP
Rated Power at 70°C	1W-S
Max. Working Voltage	500 V
Max. Overload Voltage	1,000 V
Dielectric Withstanding Voltage	350 V
Rated Ambient Temp.	70 °C
Operating Temp. Range	-55°C ~+155°C
Resistance Tolerance	± 5 %
Resistance Range	0.1Ω~39Ω

3.1 Power rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70 °C. For temperature in excess of 70 °C , the load shall be derated as shown in the figure 1.

3.2 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating , as determined from the following formula :

$$RCWV = \sqrt{P \times R}$$

Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

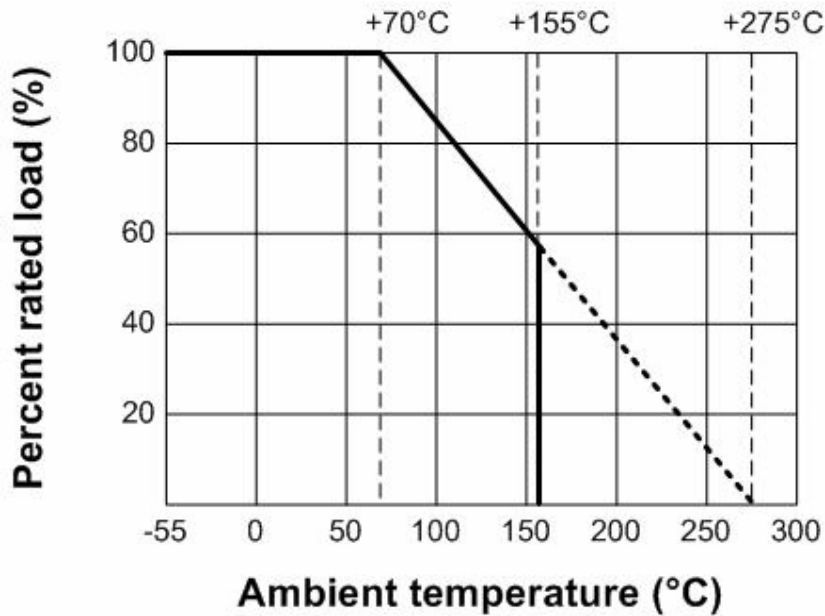
P = Power Rating (watt)

R = Nominal Resistance (ohm)

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In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value

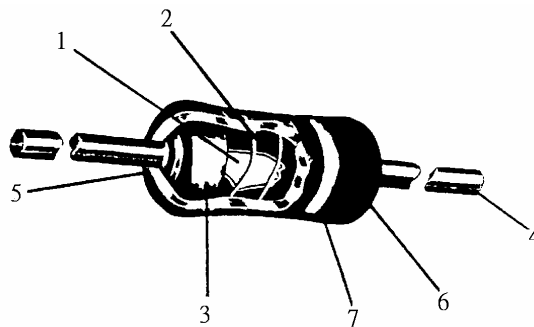
Figure 1.



3.3 Nominal resistance :

Effective figures of nominal resistance shall be in accordance with E-24 series, and resistance tolerance shall be shown by table 1.

4. Construction :



No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Wire	Resistance Wire Alloy
3	End Cap	Steel (Tin plated iron surface)
4	Lead Wire	Annealed copper wire coated with tin
5	Joint	By Welding
6	Coating	Insulated & Non-Flame paint (Color : Light Green)
7	Color Code	Epoxy Resin

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5. Characteristics :

Characteristics	Limits	Test Methods (JIS C 5201-1)
DC. resistance	Must be within the specified tolerance	The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance (Sub-clause 4.5)
Temperature coefficient	<20Ω : ±400 PPM/°C ≥20Ω : ±300 PPM/°C	Natural resistance change per temp. degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{PPM}/^\circ\text{C})$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)
Short time overload	Resistance change rate is ± (2% + 0.05 Ω) Max. with no evidence of mechanical damage	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)
Terminal strength	No evidence of mechanical damage	Direct load : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads Twist test : Terminal leads shall be bent through 90 ° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations (Sub-clause 4.16)
Solderability	95 % coverage Min.	The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. of solder : 245°C ± 3°C Dwell time in solder : 2 ~ 3 seconds (Sub-clause 4.17)
Soldering temp. reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance. (95 % coverage Min.)	The leads immersed into solder bath to 3.2 to 4.8 mm. from the body. Permanent resistance change shall be checked. <u>Wave soldering condition: (2 cycles Max.)</u> Pre-heat : 100 ~ 120 °C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 °C, 10 sec. (Max.) Peak temp.: 260 °C <u>Hand soldering condition:</u> Hand Soldering bit temp. : 380 ± 10 °C Dwell time in solder : 3 +1/-0 sec.

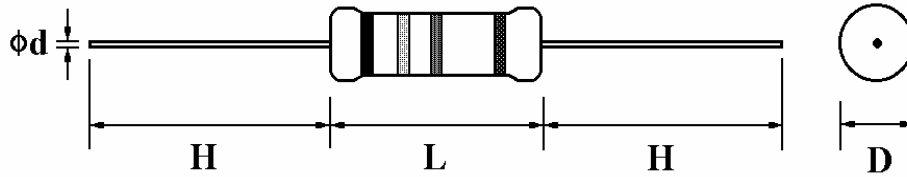
Wire-Wound Fixed Resistors

Characteristics	Limits	Test Methods (JIS C 5201-1)		
Resistance to soldering heat	Resistance change rate is $\pm (1\% + 0.05 \Omega)$ Max. with no evidence of mechanical damage.	Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in $350^\circ\text{C} \pm 10^\circ\text{C}$ solder for 3 ± 0.5 seconds. (Sub-clause 4.18)		
Temperature cycling	Resistance change rate is $\pm (2\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty shown below:		
		Step	Temperature	Time
		1	$-55^\circ\text{C} \pm 3^\circ\text{C}$	30 mins
		2	Room temp.	10~15 mins
		3	$+155^\circ\text{C} \pm 2^\circ\text{C}$	30 mins
		4	Room temp.	10~15 mins
		(Sub-clause 4.19)		
Vibration	Resistance change rate is $\pm (1\% + 0.05 \Omega)$ Max.	55Hz, 3 planes 2hrs each Total amplitude = 1.5mm (Sub-clause 4.22)		
Load life in humidity	Resistance change rate is $\pm(5\% + 0.05 \Omega)$ Max. with no evidence of mechanical damage	Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity test chamber controlled at $40^\circ\text{C} \pm 2^\circ\text{C}$ and 90 to 95 % relative humidity (Sub-clause 4.24.2.1)		
Load life	Resistance change rate is $\pm(5\% + 0.05 \Omega)$ Max. with no evidence of mechanical damage	Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at $70^\circ\text{C} \pm 2^\circ\text{C}$ ambient (Sub-clause 4.25.1)		
Resistance to solvent	No deterioration of protective coatings and markings	Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic (Sub-clause 4.30)		

Wire-Wound Fixed Resistors

6. Dimension :

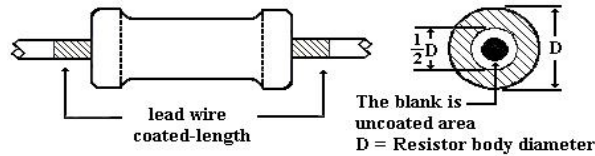
Unit : mm



Type	Power Rating	$D \pm 1$	$L \pm 1$	$d \pm 0.05$	$H \pm 3$
KNP	1W-S	3.5 mm	10.0 mm	0.70 mm	28 mm

Painting method:

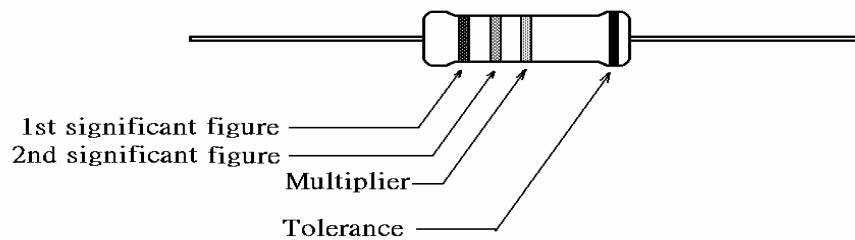
Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the arc angle.



7. Marking :

7.1 Resistor :

Resistors shall be marked with color coding colors shall be in accordance with JIS C 0802



7.2 Label :

Label shall be marked with following items:

- (1) Type and style
- (2) Nominal resistance
- (3) Resistance tolerance
- (4) Quantity
- (5) Lot number
- (6) PPM

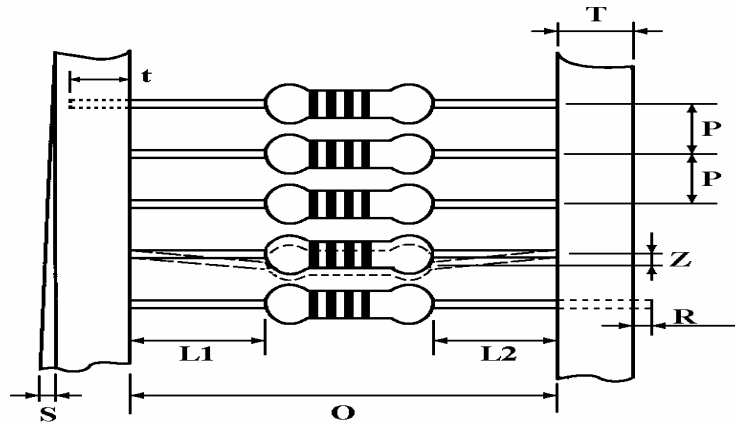
Example :

Wire-Wound Fixed Resistors			
Watt :	1W-S	Val :	10E
Q'TY :	1,000	Tol :	5%
Lot :	709012	PPM :	
	ROYALOHM		Pb Free

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8. Packing specification :

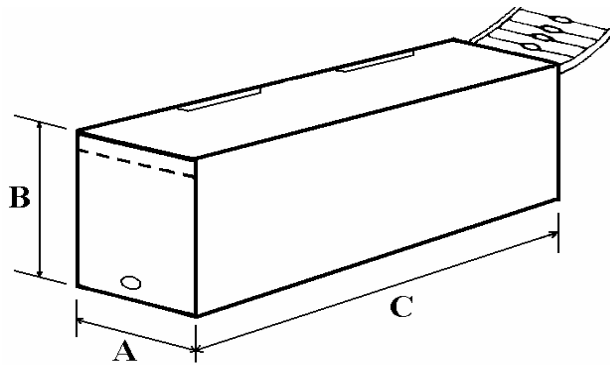
8.1 Taping dimension :



Dimensions (mm)

Type	Style	O	P	L1-L2	T	Z	R	t	S
KNP-100-S	PT-52	52 ± 1	5 ± 0.3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0.5 Max.

8.2 Tape in box packing :



Bandoliers may also be contained in a cardboard box ("Ammopack")

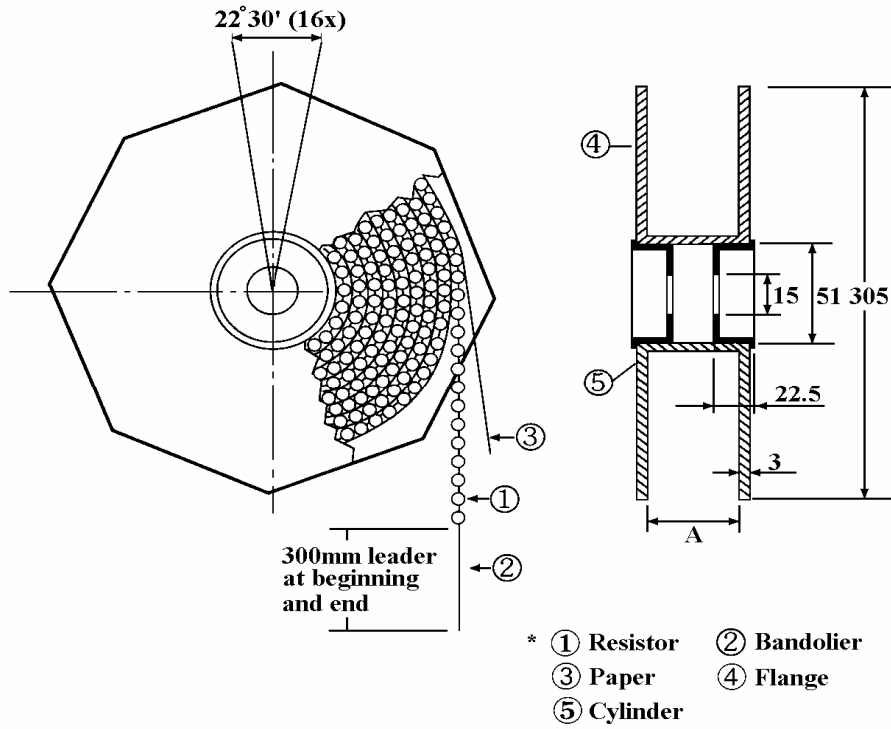
Dimension (mm)

Type	Style	L (C) ± 5	W (A) ± 5	H (B) ± 5	Quantity Per Box (pcs.)
KNP-100-S	PT- 52	260	85	70	1,000

"Ammopack" is an abbreviation of "ammunition pack"

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8.3 Tape on reel packing :



Dimension (mm) :

Type	Style	Across Flange (A)	Quantity Per Reel
KNP-100-S	PT- 52	73 ± 2	2,500 pcs.

Part Number System

Explanation of Part Number System (Wire-Wound Fixed Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
K	N	P	0	1	S	J	0	1	0	0	A	1	0

Product Type:
KNP = KNP Type

Special Feature:
0 = Standard
I = Non-Inductive

<p>Wattage:</p> <p>Normal size:</p> <p>W2 = 1/2W 1W = 1W 2W = 2W 3W = 3W 5W = 5W 6W = 6W 7W = 7W 8W = 8W 9W = 9W AW = 10W</p> <p>Extra Small size:</p> <p>3U = 3W-SS</p>	<p>Small size:</p> <p>1S = 1W-S 2S = 2W-S 3S = 3W-S 4S = 4W-S 5S = 5W-S 6S = 6W-S 7S = 7W-S 8S = 8W-S 9S = 9W-S AS = 10W-S</p>
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Tolerance:

F ~ ± 1%
G ~ ± 2%
J ~ ± 5%
K ~ ± 10%

Resistance Value:

E-24 series: the 1st digit is "0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the number of zeros following:
"J" ~ 0.1, "K" ~ 0.01
Ex.: 4.7Ω ~ 47J, 4.7KΩ ~ 472

E-96 Series: the 1st to 3rd digits are significant figures of resistance and the fourth one denotes number of zeros following:
Ex.: 1.33KΩ = 1331

Packing Type:

A = Tape/Box
T = Tape/Reel
B = Bulk/Box

Packing Quantity:

1 = 1,000pcs
A = 500pcs
B = 2,500pcs
0 = for Bulk/Box

Addition Information:

0 = PT-52mm, PT-26mm
8 = PT-58mm
9 = PT-64mm

Sample: KNP 1W-S +/- 5% 10Ω T/B 1,000 PT-52mm → KNP01SJ0100A10

Wire-Wound Fixed Resistors

Environment Related Substance

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

Storage Condition

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and a relative humidity of $60\%\text{RH} \pm 10\%\text{RH}$

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2 , H_2S , NH_3 , SO_2 , or NO_2
2. In direct sunlight