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# TY-OHM ELECTRONIC WORKS CO.,LTD.

## WIRE WOUND RESISTORS, FLAMEPROOF/ANTI-BURST RESISTOR SPECIFICATION

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APPROVED BY

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# WIRE WOUND RESISTORS, FLAMEPROOF/ANTI-BURST

## 1. Applicable Scope:

This standard specification is for use in consumer electronics, computers, telecommunications, control instruments...etc.

## 2. Part Number:

It is composed by Type, Rated Wattage, Nominal Resistance, Tolerance, Anti-Burst, Special Wire and Package. e.g.

KNP	1WS	10R	J	A	H2	T/B
Type	Rated Wattage	Nominal Resistance	Tolerance	Anti-Burst	Special Wire	Package

### 2.1 Type :

Wire Wound Resistors, Flameproof/Anti-Burst are called "KNP".

### 2.2 Rated Wattage:

Shown by "W", such as 1WS.

### 2.3 Nominal Resistance:

$\Omega$  is its unit, which be in accordance with JIS-C6409 article 6 (EIA RS-196A) series.

Letter "10R" indicates resistance value  $10\Omega$ .

### 2.4 Tolerance:

It is measured by Bridge-method at room temperature and expressed by a capital letter.

J =  $\pm 5\%$ .

### 2.5 Anti-Burst:

Letter "A" indicates anti-burst.

### 2.6 Special Wire:

Letter "H2" indicates special wire.

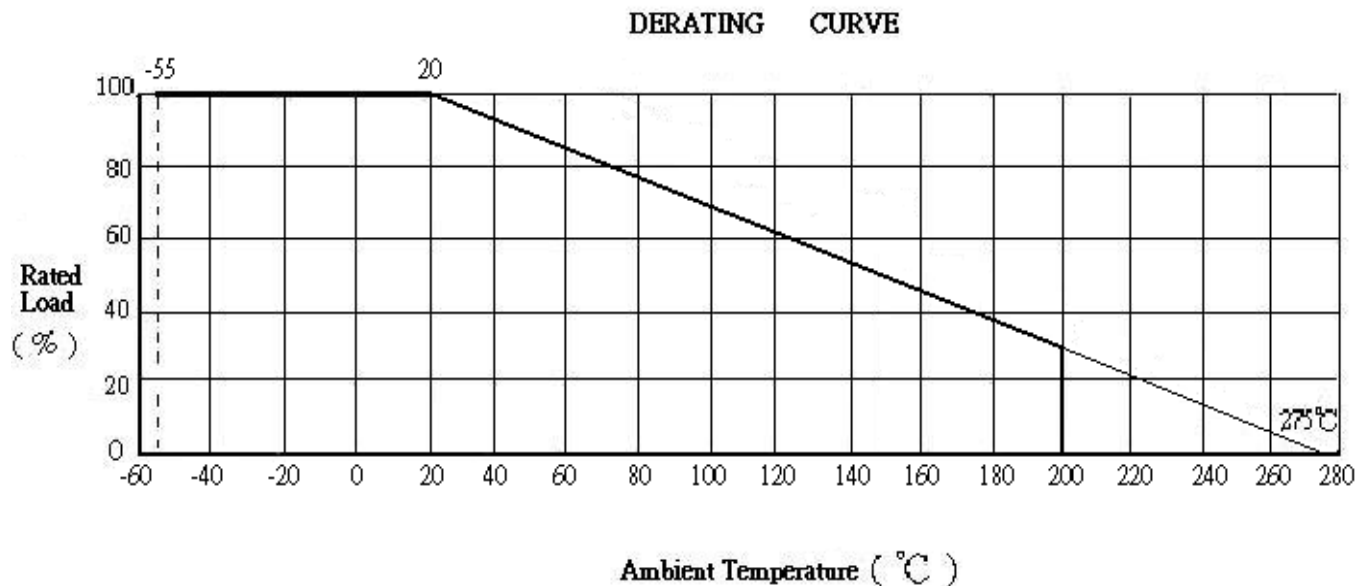
### 2.7 Package:

T/B = tape in box; Nil = Bulk.

**Remark: KNP Series Resistors are RoHS Compliant.**

## 3. Rated Power:

Rated power is the value of Max load wattage specified at the ambient temperature of 20°C, and shall meet the functions of electrical and mechanical performance. When the ambient temperature surpasses above mentioned temperature, the value declines as per following DERATING CURVE.



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## 3.1 Rated Voltage:

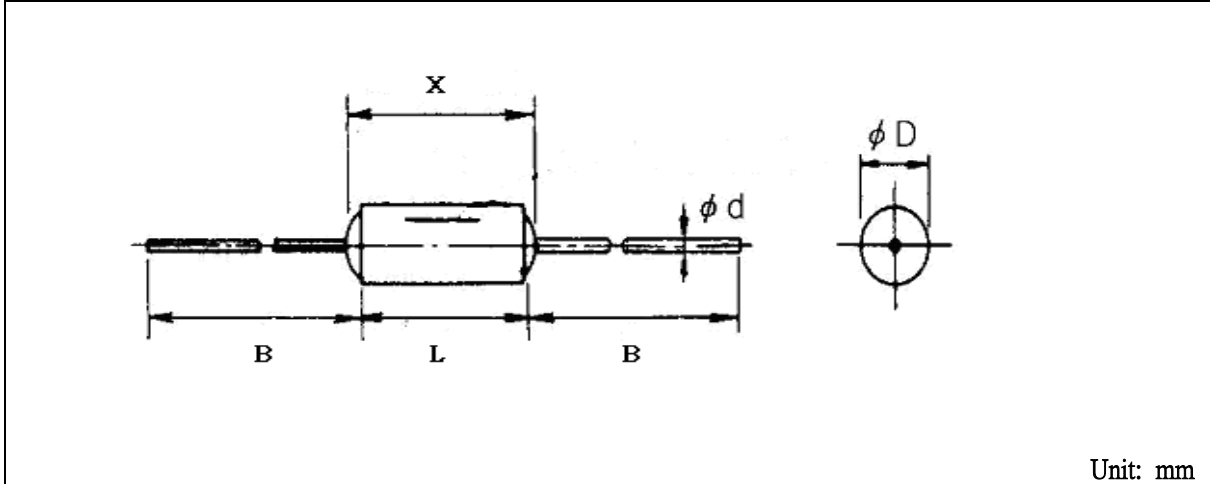
It is calculated through the following formula:

$$E = \sqrt{PXR}$$

where    E: rated voltage (V)  
                   P: rated power (W)  
                   R: total nominal resistance ( $\Omega$ )

## 4. Dimension and structure:

### 4.1 Dimension:



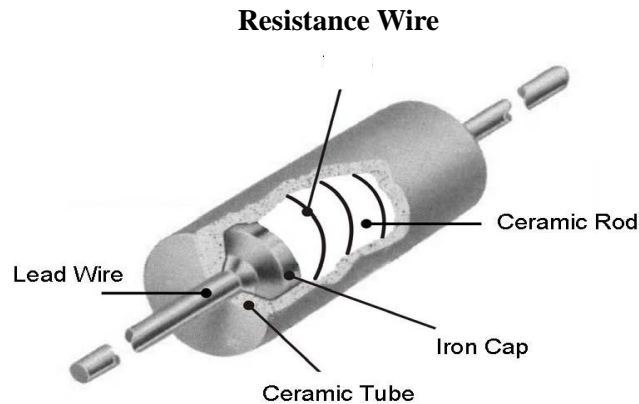
TYPE	D Max.	L $\pm$ 1	X Max.	B $\pm$ 3	d $\pm$ 0.1	Resistance	Dielectric Withstanding Voltage	Permissible $I^2t$ value *
KNP								
1WS	4	6	9	28	0.65	10 $\Omega$	1000V	$\geq 0.35 A^2s$

\*The exponential pulse waveform was used to determine the permissible  $I^2t$  value.

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## 4.2 Structure:



### 4.2.1 Ceramic Rod:

It is made of alumina ceramic of the kind.

### 4.2.2 Iron Cap:

It is made of tin plated iron base.

### 4.2.3 Lead Wire:

It is made of hot-dipped tin coated copper wire.

### 4.2.4 Resistance Wire:

It is made of special alloy with excellent anti-surge performance.

### 4.2.5 Ceramic Tube:

It is made of alumina ceramic with high dielectric withstanding voltage up to 1kV.

### 4.2.6 Marking:

Marking is made on resistors surface by color coding.

## 5. Operating Temperature Range: $-55^{\circ}\text{C} \sim 200^{\circ}\text{C}$

## 6. Mechanical Performance:

### 6.1 Terminal tensile:

To fix the resistor body, a static load of 1kg is to be gradually applied into the terminal for 10 seconds without causing any looseness and fall.

### 6.2 Twist withstand:

To bend the lead wire at the point of about 6mm from resistor body to  $90^{\circ}$ , then catch the wire at  $1.2 \pm 0.4\text{mm}$  apart from the bent point end and turn it (clockwise) by 360 degrees perpendicular to the resistor axis at speed of 10 seconds per turn, and do the same counterclockwise again which constitute a whole turn. Repeat the turn 2 times without causing any break and looseness.

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## 7. Electrical Performance:

### 7.1 Resistance Temperature Coefficient:

It shall be within  $+4500\text{ppm}/^{\circ}\text{C}$ .

$$\text{T.C (ppm}/^{\circ}\text{C}) = \left[ \frac{R2 - R1}{R1} \right] \times \left[ \frac{1}{T2 - T1} \right] \times 10^6$$

where

R1: resistance value at reference temperature

R2: resistance value at test temp.

T1: reference temp. (usu.  $25^{\circ}\text{C}$ )

T2: test temp. (about  $75^{\circ}\text{C}$ )

### 7.2 Temperature Cycle:

Following temp. cycles are to be made 5 times and then put at room temp. for one hour, the resistance value change rate between pre-and-post test shall be within  $\pm 1\%$ .

Steps	Temperature( $^{\circ}\text{C}$ )	Time (minutes)
1 <sup>st</sup> step	$-55 \pm 3$	30
2 <sup>nd</sup> step	Room temp.	3
3 <sup>rd</sup> step	$200 \pm 3$	30
4 <sup>th</sup> step	Room temp.	3

### 7.3 Short Time Over Load:

When the resistors are applied 5 times as much as rated power for 5 seconds continuously, it shows no evidence of arc, flame...etc. Removing the voltage and place the resistors to the normal condition for 30 minutes, the resistance value change rate between pre-and-post test shall be within  $\pm 2\%$ .

### 7.4 Insulation Character :

Resistors are located in a V-shaped metal trough. Using the DC 500V megger instrument 2 poles to clutch either side of lead wires and metal trough, measuring the Insulation Resistance which shall be over  $1000\text{M}\Omega$ .

### 7.5 Voltage Withstanding:

Resistors are located in a V-shaped metal trough. Applying suitable voltage listed on DIMENSION for one minute and should find no physical damage to the resistors, such as arc, char...etc.

### 7.6 Load Life:

The resistors arrayed are sent into the  $70^{\circ}\text{C}$  oven, applying rated voltage at the cycle of 1.5 hours ON, 0.5 hour OFF for  $1000_{0}^{+48}$  hours in total. Then, after removing the voltage, take the resistors out of the oven and left under normal temp. for one hour cooling. The resistance value change rate between pre-and-post test shall be within  $\pm 3\%$ .

### 7.7 Moisture-proof Load Life:

The resistors arrayed are placed into a constant temp./humidity oven at the temp. of  $40 \pm 2^{\circ}\text{C}$  and the humidity of 90~95%, then 1/10 DC rated power is applied for 1.5 hours and cut off for 0.5 hour. The similar cycle will be repeated for  $1000_{0}^{+48}$  hours in total (including cut-off time). Then remove the voltage, taking the resistors out of the oven and leaving them at room temp. for one hour. The resistance value change rate between pre-and-post test shall be within  $\pm 3\%$ . There also shall be no evidence of remarkable change on appearance, and the marking shall not be illegible.

### 7.8 Solder-ability:

The leads with flux are dipped in a melted solder of  $235 \pm 5^{\circ}\text{C}$  for 2 seconds, more than 95% of the circumference of the lead wires shall be covered with solder.

### 7.9 Resistance to Soldering Heat:

Two leads are together dipped in a melted solder of  $270 \pm 5^{\circ}\text{C}$  for  $10 \pm 1$  seconds, or  $350 \pm 10^{\circ}\text{C}$  for  $3.5 \pm 0.5$  seconds, Then remove the resistors and leaving them at room temp. for one hour. The resistance value change rate between pre-and-post test shall be within  $\pm 1\%$ .

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## 7.10 Non-flammability:

The resistors have to fulfill "Fast release of the resistor at maximum overload". No flames, no explosion and no arc happened.

## 7.11 Fusing Characteristics:

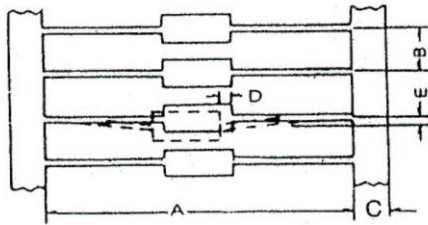
The resistors will fuse when mains voltage of 80 VAC (minimum) ~ 270 VAC (maximum) is directly applied. No flames, no explosion and no arc happened.

## 7.12 Surge Withstanding:

The resistors are designed to withstand 1.2kV (minimum) ~ 2kV (maximum) 1.2/50µs pulse according to IEC61-4-5, 30 pulses in total, 30 seconds between each pulse. The resistance value change rate between pre-and-post test shall be within ±5%.

## 8. Packing:

### 8.1 Taping Specifications:



Unit : mm

KNP	Size Type	A	B	C±1	D Max	E Max
		1WS	T-52	52±1	5±0.5	6

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