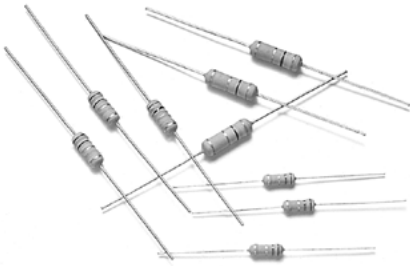


## Wirewound Resistors

# General Type

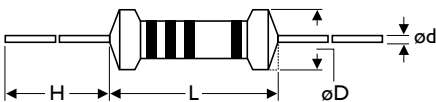
## Normal & Miniature Style [ KNP Series ]



### INTRODUCTION

The resistor element is a resistive wire which is wound in a single layer on a ceramic rod, with tinned connecting wires of electrolytic copper welded to the end-caps. The ends of the resistive wire are connected to the caps by welding. The resistors are coated with layers of green color flame-proof lacquer.

### DIMENSIONS



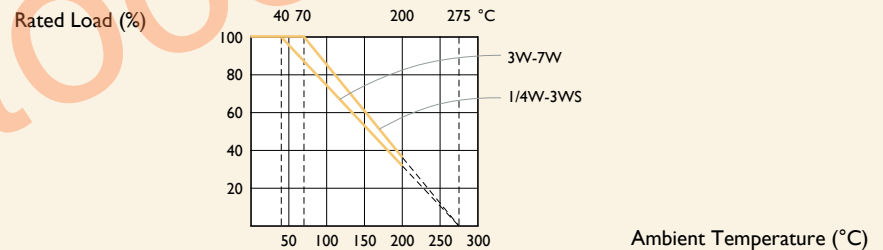
Note: KNP1WS ( for MBType )  $\phi d = 0.8 \pm 0.05$  mm

### FEATURES

Power Rating	1/4W, 1/2W, 1W, 2W, 3W, 4W, 5W, 7W
Resistance Tolerance	$\pm 1\%$ , $\pm 5\%$
T.C.R.	$\pm 300$ ppm/ $^{\circ}$ C
Flameproof Multi-layer Coating Meets	UL-94V-0
Flameproof Feature Meets Overload Test	UL-1412

### DERATING CURVE

For resistors operated in ambient temperatures above  $40^{\circ}$ C, power rating must be derated in accordance with the curve below.



Unit: mm

STYLE		DIMENSION			
Normal	Miniature	L	$\phi D$	H	$\phi d$
KNP-25	KNP50S	$6.3 \pm 0.5$	$2.5 \pm 0.3$	$28 \pm 2.0$	$0.55 \pm 0.05$
KNP-50	KNP1WS	$9.0 \pm 0.5$	$3.5 \pm 0.3$	$26 \pm 2.0$	$0.55 \pm 0.05$
KNP100	KNP2WS KNP3SS	$11.5 \pm 1.0$	$4.6 \pm 0.5$	$35 \pm 2.0$	$0.8 \pm 0.05$
KNP200	KNP3WS	$15.5 \pm 1.0$	$5.2 \pm 0.5$	$33 \pm 2.0$	$0.8 \pm 0.05$
KNP300	KNP5WS	$17.5 \pm 1.0$	$6.5 \pm 0.5$	$32 \pm 2.0$	$0.8 \pm 0.05$
KNP400					
KNP500					
KNP600	KNP7WS	$24.5 \pm 1.0$	$8.5 \pm 0.5$	$38 \pm 2.0$	$0.8 \pm 0.05$
KNP700	-	$24.5 \pm 1.0$	$8.5 \pm 0.5$	$38 \pm 2.0$	$0.8 \pm 0.05$

## ELECTRICAL CHARACTERISTICS

### NORMAL STYLE

STYLE	KNP-25	KNP-50	KNP100	KNP200	KNP300	KNP400	KNP500	KNP600	KNP700
Power Rating at 40°C					3W	4W	5W	6W	7W
Power Rating at 70°C	1/4W	1/2W	1W	2W					
Maximum working voltage	$\sqrt{P \times R}$								
Voltage Proof on Insulation	250V	300V	400V						
Resistance Range ( $\pm 1\%$ )	0.1 $\Omega$ - 150 $\Omega$	0.1 $\Omega$ - 750 $\Omega$	0.1 $\Omega$ - 1.5K $\Omega$	0.1 $\Omega$ - 2.4K $\Omega$	0.1 $\Omega$ - 3.3K $\Omega$		0.1 $\Omega$ - 6.2K $\Omega$		
Resistance Range ( $\pm 5\%$ )	0.1 $\Omega$ - 200 $\Omega$	0.1 $\Omega$ - 800 $\Omega$	0.1 $\Omega$ - 2.2K $\Omega$	0.1 $\Omega$ - 2.7K $\Omega$	0.1 $\Omega$ - 3.9K $\Omega$		0.1 $\Omega$ - 6.8K $\Omega$		
Operating Temp. Range	-40°C to +200°C								
Temperature Coefficient	$\pm 300\text{ppm}/^\circ\text{C}$								

Note: Special value is available on request

### MINIATURE STYLE

STYLE	KNP50S	KNP1WS	KNP2WS	KNP3SS	KNP3WS	KNP5WS	KNP7WS
Power Rating at 40°C						5W	7W
Power Rating at 70°C	1/2W	1W	2W	3W			
Maximum working voltage	$\sqrt{P \times R}$						
Voltage Proof on Insulation	200V	300V	400V				
Resistance Range ( $\pm 1\%$ )	0.1 $\Omega$ - 150 $\Omega$	0.1 $\Omega$ - 750 $\Omega$	0.1 $\Omega$ - 1.5K $\Omega$		0.1 $\Omega$ - 2.4K $\Omega$	0.1 $\Omega$ - 3.3K $\Omega$	
Resistance Range ( $\pm 5\%$ )	0.1 $\Omega$ - 200 $\Omega$	0.1 $\Omega$ - 800 $\Omega$	0.1 $\Omega$ - 2.2K $\Omega$		0.1 $\Omega$ - 2.7K $\Omega$	0.1 $\Omega$ - 3.9K $\Omega$	
Operating Temp. Range	-40°C to +200°C						
Temperature Coefficient	$\pm 300\text{ppm}/^\circ\text{C}$						

Note: Special value is available on request

## ENVIRONMENTAL CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD		APPRAISE
Short Time Overload	IEC 60115-1 4.13	10 times rated power for 5 Sec.	$\pm 2.0\% + 0.05\Omega$
Voltage Proof on Insulation	IEC 60115-1 4.7	in V-block for 60 Sec., test voltage by type	By type
Temperature Coefficient	IEC 60115-1 4.8	-55°C to +155°C	By type
Insulation Resistance	IEC 60115-1 4.6	in V-block for 60 Sec.	>100M $\Omega$
Solderability	IEC 60115-1 4.17	235 $\pm 5^\circ\text{C}$ for 3 $\pm 0.5$ Sec	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5 $\pm 0.5$ Min. with ultrasonic	No deterioration of coatings and markings
Robustness of Terminations	IEC 60115-1 4.16	Direct load for 10 Sec. in the direction of the terminal leads	$\geq 2.5\text{kg}$ (24.5N)
Damp Heat Steady State	IEC 60115-1 4.24	40 $\pm 2^\circ\text{C}$ , 90-95% RH for 56 days, loaded with 0.1 times RCWV	$\pm 5.0\% + 0.05\Omega$
Endurance at 70°C	IEC 60115-1 4.25	70 $\pm 2^\circ\text{C}$ at RCWV for 1,000 Hr. (1.5 Hr. on, 0.5 Hr. off)	$\pm 5.0\% + 0.05\Omega$
Temperature Cycling	IEC 60115-1 4.19	-55°C $\Rightarrow$ Room Temp. $\Rightarrow$ +155°C $\Rightarrow$ Room Temp. (5 cycles)	$\pm 1.0\% + 0.05\Omega$
Resistance to Soldering Heat	IEC 60115-1 4.18	260 $\pm 3^\circ\text{C}$ for 10 $\pm 1$ Sec., immersed to a point 3 $\pm 0.5\text{mm}$ from the body	$\pm 1.0\% + 0.05\Omega$
Accidental Overload Test	IEC 60115-1 4.26	4 times RCWV for 1 Min.	No evidence of flaming or arcing

Note: Rated Continuous Working Voltage (RCWV) =  $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$  or Max. working voltage listed above, whichever less.

Revision: 201304



## EXPLANATIONS OF ORDERING CODE

MFR	-12	F	T	F	52-	100R
Code 1 - 3 <b>Series Name</b> See Index	Code 4 - 6 <b>Power Rating</b> -05 = $\varnothing$ d0.5mm -06 = $\varnothing$ d0.6mm -07 = $\varnothing$ d0.7mm -08 = $\varnothing$ d0.8mm -10 = $\varnothing$ d1.0mm -14 = $\varnothing$ d1.4mm -12 = 1/6W -25 = 1/4W 25S = 1/4WS -50 = 1/2W 50S = 1/2WS 100 = 1W 1WS = 1WS 200 = 2W 2WS = 2WS 204 = 0.4W 207 = 0.6W 300 = 3W 3WS = 3WS 3WM = 3WM 400 = 4W 500 = 5W 5WS = 5WS 5SS = 5WSS 700 = 7W 7WS = 7WS 10A = 10W 20A = 20W 30A = 30W 40A = 40W 50A = 50W 10S = 10WS 15A = 15W 25A = 25W 10B = 100W 25B = 250W	Code 7 <b>Tolerance</b> P = $\pm 0.02$ % A = $\pm 0.05$ % B = $\pm 0.1$ % C = $\pm 0.25$ % D = $\pm 0.5$ % F = $\pm 1$ % G = $\pm 2$ % J = $\pm 5$ % K = $\pm 10$ % - = Base on Spec.	Code 8 <b>Packing Style</b> T = Tape/Box R = Tape/Reel B = Bulk	Code 9 <b>Temperature Coefficient of Resistance</b> - = Base on Spec. A = $\pm 5$ ppm/ $^{\circ}$ C B = $\pm 10$ ppm/ $^{\circ}$ C C = $\pm 15$ ppm/ $^{\circ}$ C S = $\pm 20$ ppm/ $^{\circ}$ C D = $\pm 25$ ppm/ $^{\circ}$ C E = $\pm 50$ ppm/ $^{\circ}$ C F = $\pm 100$ ppm/ $^{\circ}$ C G = $\pm 200$ ppm/ $^{\circ}$ C H = $\pm 250$ ppm/ $^{\circ}$ C I = $\pm 300$ ppm/ $^{\circ}$ C J = $\pm 350$ ppm/ $^{\circ}$ C	Code 10 - 12 <b>Forming Type</b> 26- = 26mm 52- = 52.4mm 73- = 73mm 81- = 81mm 91- = 91mm F = F Type FK = FK Type FKK = FKK Type FFK = F-form Kink M = M-Type Forming MB = M-form W/flat MT = MT Type Forming MR = MR Type AV = AVIsert PN = PANAsert	Code 13 - 17 <b>Resistance Value</b> 0R1 = 0.1 100R = 100 10K = 10,000 10M = 10,000,000

### EXCEPTION:

#### • Cement series:

<Code 8>: Special packing style code

- B: Bulk with wirewound or metal oxide sub-assembly for resistance value
- W: Bulk with ceramic based wirewound sub-assembly for resistance value
- M: Bulk with metal oxide sub-assembly for resistance value
- F: Bulk with Fiberglass based wirewound sub-assembly for resistance value

<Code 10-12>: Without forming code

Example: **SQP500JB-10R**

#### • JPW series:

<Code 13-17>: without resistance value code

Example: **JPW-06-T-52-**