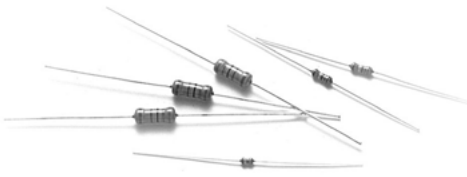


## Wirewound Resistors

# High Power Type

## Ultra Miniature Style [ PNP 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. High power in small packages.

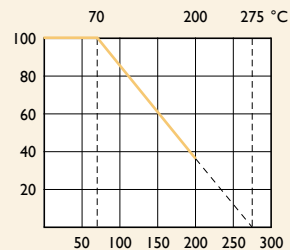
### FEATURES

Power Rating	1W, 2W, 3W, 4W
Resistance Tolerance	±1%, ±5%
T.C.R.	±300ppm/°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 70°C, power rating must be derated in accordance with the curve below.

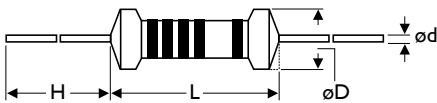
Rated Load (%)



Ambient Temperature (°C)

### DIMENSIONS

Unit: mm



5th color code: violet

STYLE	DIMENSION			
	L	øD	H	ød
Ultra Miniature				
PNP100	6.3±0.5	2.5±0.3	28±2.0	0.55±0.05
PNP200	9.0±0.5	3.5±0.3	26±2.0	0.55±0.05
PNP300	11.5±1.0	4.6±0.5	35±2.0	0.8±0.05
PNP400	15.5±1.0	5.2±0.5	33±2.0	0.8±0.05

Note:

## ELECTRICAL CHARACTERISTICS

STYLE	PNP100	PNP200	PNP300	PNP400
Power Rating at 70°C	1W	2W	3W	4W
Maximum working voltage	$\sqrt{P \times R}$			
Voltage Proof on Insulation	300V			
Resistance Range ( $\pm 1\%$ )	0.22 $\Omega$ - 130 $\Omega$	0.1 $\Omega$ - 820 $\Omega$	0.1 $\Omega$ - 2.2K $\Omega$	0.1 $\Omega$ - 2.8K $\Omega$
Resistance Range ( $\pm 5\%$ )	0.1 $\Omega$ - 130 $\Omega$	0.1 $\Omega$ - 820 $\Omega$	0.1 $\Omega$ - 2.2K $\Omega$	0.1 $\Omega$ - 2.8K $\Omega$
Operating Temp. Range	-40°C to +200°C			
Temperature Coefficient	$\pm 300$ ppm/°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 $\pm 5$ °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	$\geq 2.5$ kg (24.5N)
Damp Heat Steady State	IEC 60115-1 4.24 40 $\pm 2$ °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 $\pm 2$ °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 $\pm 3$ °C for 10 $\pm 1$ Sec., immersed to a point 3 $\pm 0.5$ 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

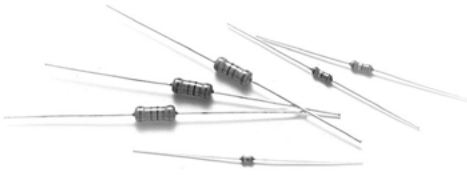
Note: RCWV(Rated Continuous Working Voltage) =  $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$  or Max. working voltage listed above, whichever less.

Revision: 201304

## Wirewound Resistors

# High Power Type

## Normal Style [ PNP V Series ]



### INTRODUCTION

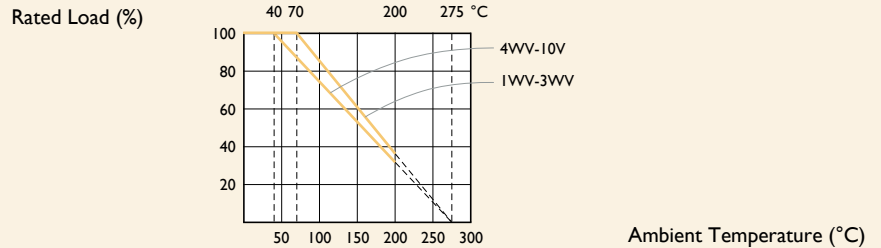
The resistor element is a resistive wire which is wound in a single layer on a ceramic rod, with tinned connecting wires of electrolytic copper welded to the end-caps. The ends of the resistive wire are connected to the caps by welding. The resistors are coated with layers of green color flame-proof lacquer. High power in small package. The 5th color band is violet to represent PNPV series.

### FEATURES

Power Rating	1W, 3W, 4W, 5W, 7W, 10W
Resistance Tolerance	±1%, ±5%
T.C.R.	±100ppm/°C, ±300ppm/°C
Flameproof Multi-layer Coating Meets	UL-94V-0
Flameproof Feature Meets Overload Test	UL-1412

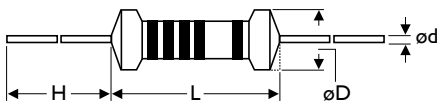
### DERATING CURVE

For resistors operated in ambient temperatures above 40°C, power rating must be derated in accordance with the curve below.



### DIMENSIONS

Unit: mm



5th color code: violet

STYLE	DIMENSION			
	L	øD	H	ød
PNP1WV	10±1.0	4.3±0.5	26±2.0	0.8±0.05
PNP3WV	13±1.0	5.5±0.5	34±2.0	0.8±0.05
PNP4WV	17±1.0	5.5±0.5	32±2.0	0.8±0.05
PNP5WV	17±1.0	7.5±0.5	32±2.0	0.8±0.05
PNP7WV	25±1.0	7.5±0.5	38±2.0	0.8±0.05
PNP10V	44±1.0	8.0±0.5	28±2.0	0.8±0.05

Note:

### ELECTRICAL CHARACTERISTICS

STYLE	PNPIWV	PNP3WV	PNP4WV	PNP5WV	PNP7WV	PNPI0V
Power Rating at 40°C			4W	5W	7W	10W
Power Rating at 70°C	1W	3W				
Maximum working voltage	$\sqrt{P \times R}$					
Voltage Proof on Insulation	300V					
Resistance Range ( $\pm 1\%$ )	0.1 $\Omega$ - 1K $\Omega$	0.1 $\Omega$ - 2.8K $\Omega$	0.1 $\Omega$ - 4.3K $\Omega$	0.1 $\Omega$ - 8.2K $\Omega$	0.1 $\Omega$ - 10K $\Omega$	0.1 $\Omega$ - 17K $\Omega$
Resistance Range ( $\pm 5\%$ )	0.047 $\Omega$ - 1K $\Omega$	0.047 $\Omega$ - 2.8K $\Omega$	0.047 $\Omega$ - 4.3K $\Omega$	0.047 $\Omega$ - 8.2K $\Omega$	0.1 $\Omega$ - 10K $\Omega$	0.1 $\Omega$ - 17K $\Omega$
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: RCWV(Rated Continuous Working Voltage) =  $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$  or Max. working voltage listed above, whichever less.



## EXPLANATIONS OF ORDERING CODE

<b>MFR</b>	<b>-12</b>	<b>F</b>	<b>T</b>	<b>F</b>	<b>52-</b>	<b>100R</b>
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-**

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