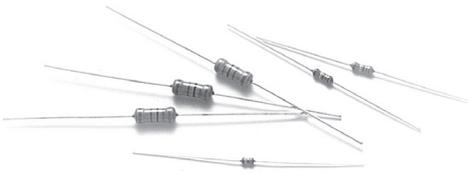


## Wirewound Resistors

# 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.	±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 70°C, power rating must be derated in accordance with the curve below.

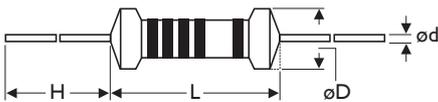
Rated Load (%)



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:

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### 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 (±1%)	0.22Ω - 130Ω	0.1Ω - 820Ω	0.1Ω - 2.2KΩ	0.1Ω - 2.8KΩ
Resistance Range (±5%)	0.1Ω - 130Ω	0.1Ω - 820Ω	0.1Ω - 2.2KΩ	0.1Ω - 2.8KΩ
Operating Temp. Range	-40°C to +200°C			
Temperature Coefficient	±100ppm/°C, ±300ppm/°C			

Note: Special value is available on request

### ENVIRONMENTAL CHARACTERISTICS

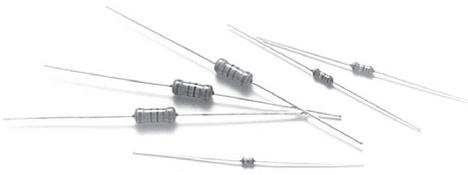
PERFORMANCE TEST	TEST METHOD		APPRAISE
Short Time Overload	IEC 60115-1 4.13	10 times rated power for 5 Sec.	±2.0%+0.05Ω
Voltage Proof on Insulation	IEC 60115-1 4.7	In V-Block for 60 sec., test voltage as above table	No Breakdown
Temperature Coefficient	IEC 60115-1 4.8	Between -40°C to +155°C	By type
Insulation Resistance	IEC 60115-1 4.6	in V-block for 60 Sec.	>100MΩ
Solderability	IEC 60115-1 4.17	245±5°C for 3±0.5 Sec.	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5±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	≥2.5kg (24.5N)
Damp Heat Steady State	IEC 60115-1 4.24	40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV	±5.0%+0.05Ω
Endurance at 70°C	IEC 60115-1 4.25	70±2°C at RCWV (or Umax., Whichever less) for 1,000 Hr. (1.5Hr:on, 0.5Hr: Off)	±5.0%+0.05Ω
Temperature Cycling	IEC 60115-1 4.19	-55°C ⇌ Room Temp. ⇌ +155°C ⇌ Room Temp. (5 cycles)	±1.0%+0.05Ω
Resistance to Soldering Heat	IEC 60115-1 4.18	260±3°C for 10±1 Sec., immersed to a point 3±0.5mm from the body	±1.0%+0.05Ω
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.

## Wirewound Resistors

# High Power Type

## Normal Style [ PNP V Series ]



### INTRODUCTION

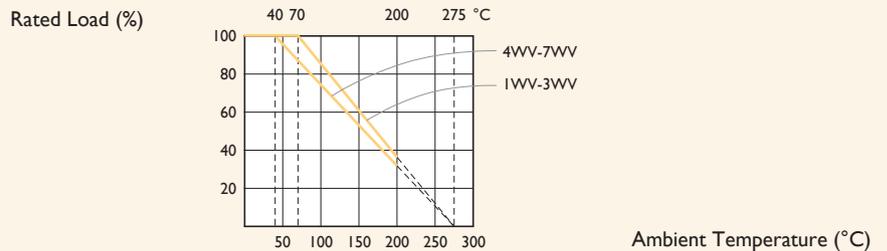
The resistor element is a resistive wire which is wound in a single layer on a ceramic rod, with tinned connecting wires of electrolytic copper welded to the end-caps. The ends of the resistive wire are connected to the caps by welding. The resistors are coated with layers of green color flame-proof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

### FEATURES

Power Rating	1W, 3W, 4W, 5W, 7W
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

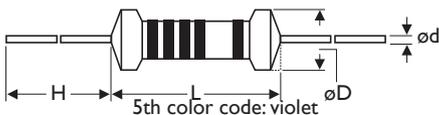
### DERATING CURVE

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



### DIMENSIONS

Unit: mm



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	17.5±1.0	6.2±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

Note:

### ELECTRICAL CHARACTERISTICS

STYLE	PNPIWV	PNP3WV	PNP4WV	PNP5WV	PNP7WV
Power Rating at 40°C			4W	5W	7W
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 $\Omega$
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 $\Omega$
Operating Temp. Range	-40°C to +200°C				
Temperature Coefficient	$\pm 100\text{ppm}/^\circ\text{C}$ , $\pm 300\text{ppm}/^\circ\text{C}$				

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 as above table	No Breakdown
Temperature Coefficient	IEC 60115-1 4.8	Between -40°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	245 $\pm 5^\circ\text{C}$ 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 (or Umax., Whichever less) for 1,000 Hr. (1.5Hr: on, 0.5Hr: 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.

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