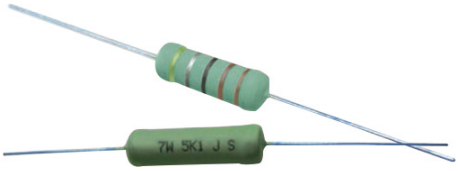
Anti Surge Wire Wound Fixed Resistor
Axaial Leaded

multicomp PRO



RoHS Compliant

Scope: This specification for approval relates to Anti-Surge Wire-Wound Fixed Resistors

Type designation: The type designation shall be in the following form:

Type	Power Rating	Resistance tolerance	Nominal Resistance
MCPKNPA	2W	F, J	200Ω

Ratings:

Type		Rated Power at 70°C	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	Operating Temp. Range
Normal size	MCPKNPA 1/2W	1/2W (0.50W)	500 V	1,000 V	350 V	10Ω--560Ω	-55°C to +155°C
	MCPKNPA 1W	1W			500 V	10Ω--1KΩ	
	MCPKNPA 2W	2W				10Ω--2KΩ	
	MCPKNPA 3W	3W				10Ω--3KΩ	
	MCPKNPA 5W	5W				10Ω--5KΩ	
	MCPKNPA 7W	7W				10Ω--6KΩ	
	MCPKNPA 8W	8W				10Ω--10KΩ	
	MCPKNPA 9W	9W				10Ω--15KΩ	
Small size	MCPKNPA 1W-S	1W-S			350 V	10Ω--560Ω	
	MCPKNPA 2W-S	2W-S			500 V	10Ω--1KΩ	
	MCPKNPA 3W-S	3W-S				10Ω--2KΩ	
	MCPKNPA 5W-S	5W-S				10Ω--3KΩ	
	MCPKNPA 7W-S	7W-S				10Ω--5KΩ	
	MCPKNPA 8W-S	8W-S				10Ω--6KΩ	
	MCPKNPA 9W-S	9W-S				10Ω--10KΩ	
	MCPKNPA 10W-S	10W-S				10Ω--15KΩ	

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.

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 commercialline frequency and waveform corresponding to the power rating, as determined from the following formula :

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

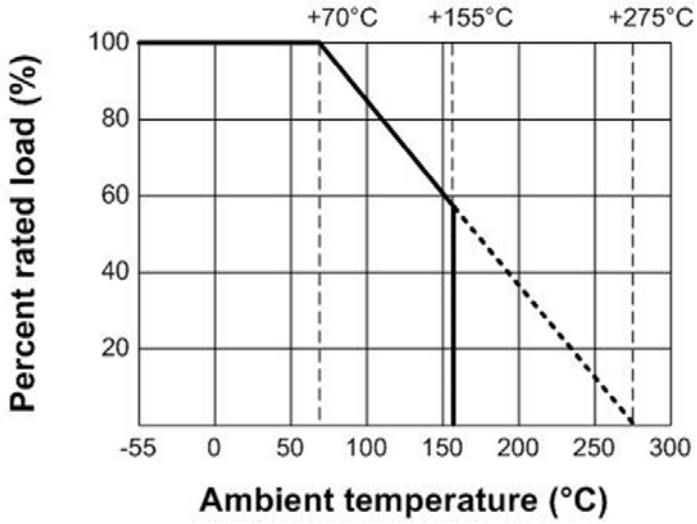
Where : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

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

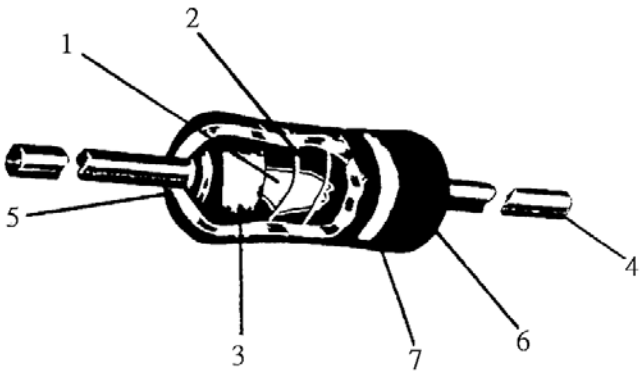
Figure 1.



Nominal resistance

Effective figures of nominal resistance shall be in accordance with E-96,E-24 series, and resistance tolerance shall be shown by table 1.

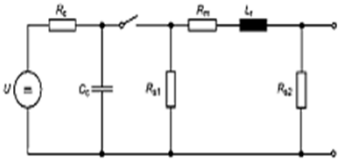
Construction



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	Normal size: Insulated & Non-Flame paint (Color : Dark Green) Smalll size: Insulated & Non-Flame paint (Color : Light Green)
7	Color Code	Non-Flame epoxy resin

Performance specification

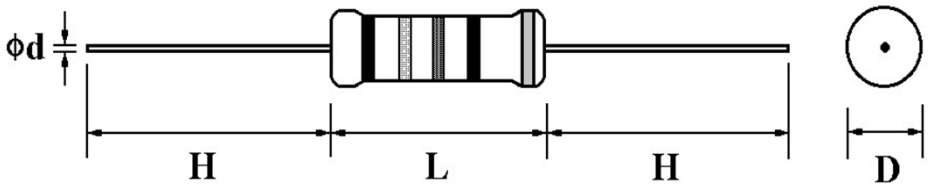
Characteristics	Limits	Test Methods (JIS C 5201-1)
DC. resistance	Must be within the specified tolerance.	The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance
Temperature coefficient	<20Ω : ± 400 PPM/°C Max. ≥20Ω : ± 300 PPM/°C Max.	Natural resistance change per temp. degree centigrade. $\frac{R2-R1}{R1(t2-t1)} \times 10^6$ (PPM/°C) R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100°C (t2)
Short time overload	Resistance change rate is ± (2% + 0.05Ω) Max. with no evidence of mechanical damage	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds
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
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
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. Wave soldering condition: (2 cycles Max.) Pre-heat : 100 ~ 120°C, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255°C, 10 sec. (Max.) Peak temp.: 260°C Hand soldering condition: Hand Soldering bit temp. : 380 ± 10°C Dwell time in solder : 3 +1/-0 sec.
Resistance to soldering heat	Resistance change rate is ± (1% + 0.05Ω) 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°C ± 10°C solder for 3 ± 0.5 seconds.

<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods
(JIS C 5201-1)</th></tr>
<tr><td>Temperature cycling</td><td>Resistance change rate is ± (2% + 0.05Ω) Max. with no evidence of mechanical damage</td><td>Resistance change after continuous
5 cycles for duty shown below:
<table>
<tr><td>Step</td><td>Temperature</td><td>Time</td></tr>
<tr><td>1</td><td>-55°C ± 3°C</td><td>30 mins</td></tr>
<tr><td>2</td><td>Room temp.</td><td>10 to 15 mins</td></tr>
<tr><td>3</td><td>+155°C ± 2°C</td><td>30 mins</td></tr>
<tr><td>4</td><td>Room temp.</td><td>10 to 15 mins</td></tr>
</table></td></tr>
<tr><td>Vibration</td><td>Resistance change rate is ± (1% + 0.05Ω) Max.</td><td>55Hz, 3 planes 2hrs each Total amplitude = 1.5mm</td></tr>
<tr><td>Load life in humidity</td><td>Resistance change rate is ±(5% + 0.05Ω) Max. with no evidence of mechanical damage</td><td>Resistance change after 1,000 hours (1.5 hours “on”, 0.5 hour “off”) at RCWV in a humidity test chamber controlled at 40°C ± 2°C and 90 to 95 % relative humidity</td></tr>
<tr><td>Load life</td><td>Resistance change rate is ±(5% + 0.05Ω) Max. with no evidence of mechanical damage</td><td>Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours “on”, 0.5 hour “off”) at 70°C ± 2°C ambient</td></tr>
<tr><td>Resistance to solvent</td><td>No deterioration of protective coatings and markings</td><td>Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic</td></tr>
<tr><td>Surge immunity test</td><td>Resistance change rate is ±(5% + 0.05Ω) Max.</td><td>Refer to IEC61000-4-5
 
1.2µsec rising time and 50µsec discharge;
every 1 minute for 10 cycles</td></tr>
</table>

Surge Rating

Type	Low Resistance Range	Maximum Surge Voltage	Medium Resistance Range	Maximum Surge Voltage	High Resist-ance Range	Maximum Surge Voltage
Normal Size						
MCPKNPAW2	10Ω to 40Ω	2KV	43Ω to 240Ω	3KV	270Ω to 560Ω	4KV
MCPKNPA1W	10Ω to 50Ω	3KV	51Ω to 240Ω	4KV	270Ω to 1KΩ	5KV
MCPKNPA2W	10Ω to 100Ω	4KV	110Ω to 240Ω	5KV	270Ω to 2KΩ	6KV
MCPKNPA3W	10Ω to 100Ω	6KV	110Ω to 680Ω	7KV	270Ω to 3KΩ	8KV
MCPKNPA5W	10Ω to 160Ω	7KV	180Ω to 680Ω	8KV	750Ω to 5KΩ	9KV
MCPKNPA7W	10Ω to 160Ω	8KV	180Ω to 680Ω	9KV	750Ω to 6KΩ	10KV
MCPKNPA8W	10Ω to 160Ω	9KV	180Ω to 680Ω	10KV	750Ω to 10KΩ	10KV
MCPKNPA9W	10Ω to 160Ω	10KV	180Ω to 680Ω	10KV	750Ω to 15Ω	10KV
Small Size						
MCPKNPA1S	10Ω to 40Ω	2KV	43Ω to 240Ω	3KV	270Ω to 560Ω	4KV
MCPKNPA2S	10Ω to 50Ω	3KV	51Ω to 240Ω	4KV	270Ω to 1KΩ	5KV
MCPKNPA3S	10Ω to 100Ω	4KV	110Ω to 240Ω	5KV	270Ω to 2KΩ	6KV
MCPKNPA5S	10Ω to 100Ω	6KV	110Ω to 240Ω	7KV	750Ω to 3KΩ	8KV
MCPKNPA7S	10Ω to 160Ω	7KV	180Ω to 680Ω	8KV	750Ω to 5KΩ	9KV
MCPKNPA8S	10Ω to 160Ω	8KV	180Ω to 680Ω	9KV	750Ω to 6KΩ	10KV
MCPKNPA9S	10Ω to 160Ω	9KV	180Ω to 680Ω	10KV	750Ω to 10KΩ	10KV
MCPKNPAAS	10Ω to 160Ω	10KV	180Ω to 680Ω	10KV	750Ω to 15KΩ	10KV

Dimension



Dimensions : Millimetres

Part Number	Style	Power Rating at 70	Dimension (mm)			
			D ± 1	L ± 1	d ± 0.05	H ± 3
Normal size						
MCPKNPAW2	MCPKNPA-50	1/2W (0.50W)	3.5	10	0.54	28
MCPKNPA1W	MCPKNPA-100	1W	5	12	0.7	25
MCPKNPA2W	MCPKNPA-200	2W	5.5	16	0.7	28
MCPKNPA3W	MCPKNPA-300	3W	6.5	17.5	0.75	28
MCPKNPA5W	MCPKNPA-500	5W	8.5	25	0.75	38
MCPKNPA7W	MCPKNPA-700	7W	8.5	30	0.75	38
MCPKNPA8W	MCPKNPA-800	8W	8.5	40	0.75	38
MCPKNPA9W	MCPKNPA-900	9W	8.5	53	0.75	38
Small size						
MCPKNPA1S	MCPKNPA-100-S	1W-S	3.5	10	0.54	28
MCPKNPA2S	MCPKNPA-200-S	2W-S	5	12	0.7	25
MCPKNPA3S	MCPKNPA-300-S	3W-S	5.5	16	0.7	28
MCPKNPA5S	MCPKNPA-500-S	5W-S	6.5	17.5	0.75	28
MCPKNPA7S	MCPKNPA-700-S	7W-S	8.5	25	0.75	38
MCPKNPA8S	MCPKNPA-800-S	8W-S	8.5	30	0.75	38
MCPKNPA9S	MCPKNPA-900-S	9W-S	8.5	40	0.75	38
MCPKNPAAS	MCPKNPA-1000-S	10W-S	8.5	53	0.75	38

Part Number Table

Description	Part Number
Resistor, 1W, 5%, 10R	MCPKNPA1WJ0100A10
Resistor, 1W, 5%, 20R	MCPKNPA1WJ0200A10
Resistor, 1W, 5%, 22R	MCPKNPA1WJ0220A10
Resistor, 1W, 5%, 33R	MCPKNPA1WJ0330A10
Resistor, 1W, 5%, 39R	MCPKNPA1WJ0390A10
Resistor, 1W, 5%, 47R	MCPKNPA1WJ0470A10
Resistor, 1W, 5%, 51R	MCPKNPA1WJ0510A10
Resistor, 1W, 5%, 68R	MCPKNPA1WJ0680A10
Resistor, 1W, 5%, 75R	MCPKNPA1WJ0750A10
Resistor, 1W, 5%, 100R	MCPKNPA1WJ0101A10
Resistor, 1W, 5%, 200R	MCPKNPA1WJ0201A10
Resistor, 1W, 5%, 220R	MCPKNPA1WJ0221A10
Resistor, 1W, 5%, 330R	MCPKNPA1WJ0331A10
Resistor, 1W, 5%, 470R	MCPKNPA1WJ0471A10
Resistor, 1W, 5%, 1K	MCPKNPA1WJ0102A10
Resistor, 1S, 5%, 10R	MCPKNPA1SJ0100A10
Resistor, 1S, 5%, 15R	MCPKNPA1SJ0150A10
Resistor, 1S, 5%, 18R	MCPKNPA1SJ0180A10
Resistor, 1S, 5%, 22R	MCPKNPA1SJ0220A10
Resistor, 1S, 5%, 27R	MCPKNPA1SJ0270A10
Resistor, 1S, 5%, 33R	MCPKNPA1SJ0330A10
Resistor, 1S, 5%, 47R	MCPKNPA1SJ0470A10
Resistor, 1S, 5%, 68R	MCPKNPA1SJ0680A10
Resistor, 1S, 5%, 100R	MCPKNPA1SJ0101A10
Resistor, 1S, 5%, 150R	MCPKNPA1SJ0151A10
Resistor, 1S, 5%, 220R	MCPKNPA1SJ0221A10
Resistor, 1S, 5%, 330R	MCPKNPA1SJ0331A10
Resistor, 2W, 5%, 10R	MCPKNPA2WJ0100A19
Resistor, 2W, 5%, 15R	MCPKNPA2WJ0150A19
Resistor, 2W, 5%, 22R	MCPKNPA2WJ0220A19
Resistor, 2W, 5%, 33R	MCPKNPA2WJ0330A19
Resistor, 2W, 5%, 39R	MCPKNPA2WJ0390A19
Resistor, 2W, 5%, 68R	MCPKNPA2WJ0680A19
Resistor, 2W, 5%, 91R	MCPKNPA2WJ0910A19
Resistor, 2W, 5%, 100R	MCPKNPA2WJ0101A19
Resistor, 2W, 5%, 120R	MCPKNPA2WJ0121A19
Resistor, 2W, 5%, 150R	MCPKNPA2WJ0151A19
Resistor, 2W, 5%, 180R	MCPKNPA2WJ0181A19

Description	Part Number
Resistor, 2W, 5%, 220R	MCPKNPA2WJ0221A19
Resistor, 2W, 5%, 330R	MCPKNPA2WJ0331A19
Resistor, 2W, 5%, 470R	MCPKNPA2WJ0471A19
Resistor, 2W, 5%, 680R	MCPKNPA2WJ0681A19
Resistor, 2W, 5%, 1K	MCPKNPA2WJ0102A19
Resistor, 2W, 5%, 1.5K	MCPKNPA2WJ0152A19
Resistor, 2W, 5%, 2K	MCPKNPA2WJ0202A19
Resistor, 2S, 5%, 4.7R	MCPKNPA2SJ047JA10
Resistor, 2S, 5%, 10R	MCPKNPA2SJ0100A10
Resistor, 2S, 5%, 33R	MCPKNPA2SJ0330A10
Resistor, 3W, 5%, 10R	MCPKNPA3WJ0100AA9
Resistor, 3W, 5%, 12R	MCPKNPA3WJ0120AA9
Resistor, 3W, 5%, 15R	MCPKNPA3WJ0150AA9
Resistor, 3W, 5%, 22R	MCPKNPA3WJ0220AA9
Resistor, 3W, 5%, 27R	MCPKNPA3WJ0270AA9
Resistor, 3W, 5%, 33R	MCPKNPA3WJ0330AA9
Resistor, 3W, 5%, 39R	MCPKNPA3WJ0390AA9
Resistor, 3W, 5%, 47R	MCPKNPA3WJ0470AA9
Resistor, 3W, 5%, 51R	MCPKNPA3WJ0510AA9
Resistor, 3W, 5%, 56R	MCPKNPA3WJ0560AA9
Resistor, 3W, 5%, 100R	MCPKNPA3WJ0101AA9
Resistor, 3W, 5%, 120R	MCPKNPA3WJ0121AA9
Resistor, 3W, 5%, 150R	MCPKNPA3WJ0151AA9
Resistor, 3W, 5%, 180R	MCPKNPA3WJ0181AA9
Resistor, 3W, 5%, 220R	MCPKNPA3WJ0221AA9
Resistor, 3W, 5%, 680R	MCPKNPA3WJ0681AA9
Resistor, 3W, 5%, 1K	MCPKNPA3WJ0102AA9
Resistor, 3S, 5%, 1R	MCPKNPA3SJ010JA19
Resistor, 3S, 5%, 10R	MCPKNPA3SJ0100A19
Resistor, 3S, 5%, 15R	MCPKNPA3SJ0150A19
Resistor, 3S, 5%, 22R	MCPKNPA3SJ0220A19
Resistor, 3S, 5%, 33R	MCPKNPA3SJ0330A19
Resistor, 3S, 5%, 47R	MCPKNPA3SJ0470A19
Resistor, 3S, 5%, 68R	MCPKNPA3SJ0680A19
Resistor, 3S, 5%, 100R	MCPKNPA3SJ0101A19
Resistor, 3S, 5%, 150R	MCPKNPA3SJ0151A19
Resistor, 3S, 5%, 220R	MCPKNPA3SJ0221A19
Resistor, 3S, 5%, 330R	MCPKNPA3SJ0331A19

Description	Part Number
Resistor, 3S, 5%, 470R	MCPKNPA3SJ0471A19
Resistor, 3S, 5%, 680R	MCPKNPA3SJ0681A19
Resistor, 3S, 5%, 1K	MCPKNPA3SJ0102A19
Resistor, 3S, 5%, 1.5K	MCPKNPA3SJ0152A19
Resistor, 5W, 5%, 10R	MCPKNPA5WJ0100B00
Resistor, 5W, 5%, 22R	MCPKNPA5WJ0220B00
Resistor, 5W, 5%, 100R	MCPKNPA5WJ0101B00
Resistor, 5W, 5%, 470R	MCPKNPA5WJ0471B00
Resistor, 5S, 5%, 10R	MCPKNPA5SJ0100AA9
Resistor, 5S, 5%, 15R	MCPKNPA5SJ0150AA9
Resistor, 5S, 5%, 22R	MCPKNPA5SJ0220AA9
Resistor, 5S, 5%, 27R	MCPKNPA5SJ0270AA9
Resistor, 5S, 5%, 33R	MCPKNPA5SJ0330AA9
Resistor, 5S, 5%, 47R	MCPKNPA5SJ0470AA9
Resistor, 5S, 5%, 68R	MCPKNPA5SJ0680AA9
Resistor, 5S, 5%, 100R	MCPKNPA5SJ0101AA9
Resistor, 5S, 5%, 150R	MCPKNPA5SJ0151AA9
Resistor, 5S, 5%, 220R	MCPKNPA5SJ0221AA9
Resistor, 5S, 5%, 330R	MCPKNPA5SJ0331AA9
Resistor, 5S, 5%, 470R	MCPKNPA5SJ0471AA9

Description	Part Number
Resistor, 5S, 5%, 680R	MCPKNPA5SJ0681AA9
Resistor, 5S, 5%, 1K	MCPKNPA5SJ0102AA9
Resistor, 5S, 5%, 1.5K	MCPKNPA5SJ0152AA9
Resistor, 5S, 5%, 2.2K	MCPKNPA5SJ0222AA9
Resistor, 5S, 5%, 3.3K	MCPKNPA5SJ0332AA9
Resistor, 7W , 1%, 10R	MCPKNPA7WJ0100B00
Resistor, 7W , 1%, 100R	MCPKNPA7WJ0101B00
Resistor, 7W , 1%, 680R	MCPKNPA7WJ0681B00
Resistor, 7W , 1%, 2.2K	MCPKNPA7WJ0222B00
Resistor, 7S , 1%, 10R	MCPKNPA7SJ0100B00
Resistor, 7S , 1%, 15R	MCPKNPA7SJ0150B00
Resistor, 7S , 1%, 22R	MCPKNPA7SJ0220B00
Resistor, 7S , 1%, 33R	MCPKNPA7SJ0330B00
Resistor, 7S , 1%, 47R	MCPKNPA7SJ0470B00
Resistor, 7S , 1%, 68R	MCPKNPA7SJ0680B00
Resistor, 7S , 1%, 100R	MCPKNPA7SJ0101B00
Resistor, 7S , 1%, 220R	MCPKNPA7SJ0221B00
Resistor, 7S , 1%, 330R	MCPKNPA7SJ0331B00
Resistor, 7S , 1%, 1K	MCPKNPA7SJ0102B00
Resistor, 7S , 1%, 2.2K	MCPKNPA7SJ0222B00