FrelTec GmbH

Mathildenstr. 10A
82319 Starnberg
Germany

Wire Wound Fixed Resistor

Wire Wound Fixed Resistors

SPECIFICATION

Part Number

054		N*		_ _ _		H*		J*		B01*		0*		_*
Type		Body Size		Value		Power Rating		Tolerance		Packing Type		Style		Option
054 : Wire Wound Fixed Resistor		N:Normal size		The last digit is the		H: 1/2W		J : ±5%		B01: Tape in box for 1kpcs		0 = PT-52mm		I : Non-Inductive product)
		S:Small size		multiplier which denotes		J: 1W		K :±10%		B0A: Tape in box for 500pcs		8 = PT-58mm		
		U : Ultra-small size		the number of zero following		L: 2W				L0Y : Embossed tape and reel for 2,5k pcs		9 = PT-64mm		
				000 = 0Ohm		M: 3W				L01 : Embossed tape and reel for 1k pcs		7 = Lead wire (h) 38mm		
				R = Decimal		Q: 5W				L0A : Embossed tape and reel for 500pcs				
				Example: R010 = 0,01Ohm		W:7W								
				97R6=		X: 8W								
				9760 = 976Ohm		Y: 9W								* not all combination is possible
				1001 = 1kOhm		Z: 10W								
						1: 11W								

All products according to RoHS (2011/65/EU)

Wire Wound Fixed Resistors

Marking

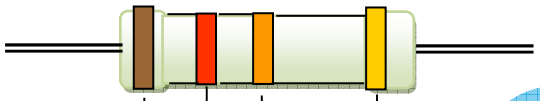
Colour code indication for nominal resistance value and tolerance

Fixed resistors of which the nominal resistance value and tolerance are indicated by colour codes in accordance with JIS C 0802, following the standard as below for

Normal size ½ W, 1W, 2W and 3W

Small Size 1W, 2W, 3W, 5W and

Ultra-small: 1W, 2W, 3W and 4W

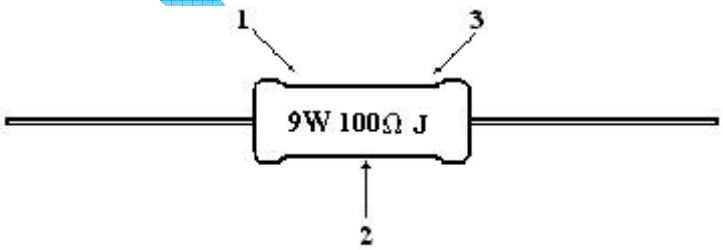


COLOR	1ST DIGIT	2ND DIGIT	MULTIPLIER	TOLERANCE
BLACK	0	0	1	
BROWN	1	1	10	
RED	2	2	100	
ORANGE	3	3	1.000	
YELLOW	4	4	10.000	
GREEN	5	5	100.000	
BLUE	6	6	1.000.000	
VIOLET	7	7	10.000.000	
GREY	8	8		
WHITE	9	9		
GOLD			0,1	J (±5%)
SILVER			0,01	K (±10%)

For Normal size 5W, 7W, 8W and 9W and

Small Size 7W, 8W, 9W and 10W and

Ultra-small size 10W:



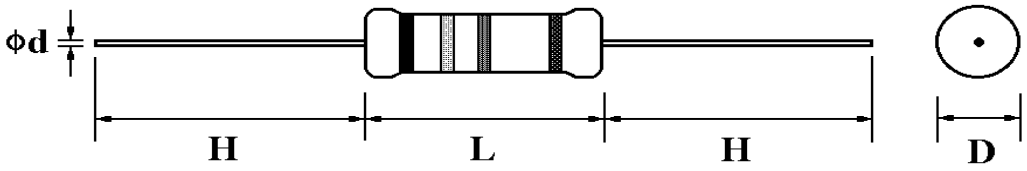
Wire Wound Fixed Resistors

Specification

Type	Rated Power at 70℃	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Tolerance	TCR PPM/℃	Resistance Range	Operating Temp. Range
Normal size	0,50 W	500 V	1,000 V	350 V	1% 5%	400	10Ω ≤R<20Ω	-55℃ - +155℃
						300	20Ω≤R≤560Ω	
	1 W			500 V		400	10Ω≤R<20Ω	
						300	20Ω≤R≤1KΩ	
	2 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤2KΩ	
	3 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤3KΩ	
	5 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤5KΩ	
	7 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤6KΩ	
	8 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤10KΩ	
	9 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤15KΩ	
Small size	1 W			350 V		400	10Ω≤R<20Ω	
						300	20Ω≤R≤560Ω	
	2 W			500 V		400	10Ω≤R<20Ω	
						300	20Ω≤R≤1KΩ	
	3 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤2KΩ	
	5 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤3KΩ	
	7 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤5KΩ	
	8 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤6KΩ	
	9 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤10KΩ	
	10 W					400	10Ω≤R<20Ω	
						300	20Ω≤R≤15KΩ	
Ultra-small size	1W			350 V		400	0,1Ω≤R<20Ω	
						300	20Ω≤R≤180Ω	
	2W					400	0,1Ω≤R<20Ω	
						300	20Ω≤R≤220Ω	
	3W			500 V		400	0,2Ω≤R<20Ω	
						300	20Ω≤R≤620Ω	
	4W					400	0,2Ω≤R<20Ω	
						300	20Ω≤R≤750Ω	
	10W					400	1Ω≤R<20Ω	
						300	20Ω≤R≤5KΩ	

Wire Wound Fixed Resistors

DIMENSIONS:



Normal size				
Power Rating at 70 ℃	Dimension (mm)			
	D ± 0,05	L ± 0,05	d ± 0,05	H ± 3
1/2W	3,5	10,0	0,54	28
1W	5,0	12,0	0,70	25
2W	5,5	16,0	0,70	28
3W	6,5	17,5	0,75	28
5W	8,5	25,0	0,75	38
7W	8,5	30,0	0,75	38
8W	8,5	40,0	0,75	38
9W	8,5	53,0	0,75	38
Small size				
1W	3,5	10,0	0,54	28
2W	5,0	12,0	0,70	25
3W	5,5	16,0	0,70	28
5W	6,5	17,5	0,75	28
7W	8,5	25,0	0,75	38
8W	8,5	30,0	0,75	38
9W	8,5	40,0	0,75	38
10W	8,5	53,0	0,75	38
Ultra-small size				
1W	3,0	9,0	0,54	28
2W	3,5	10,0	0,54	28
3W	5,5	13,5	0,70	28
4W	5,5	16,0	0,70	28
11W	8,5	40,0	0,75	38

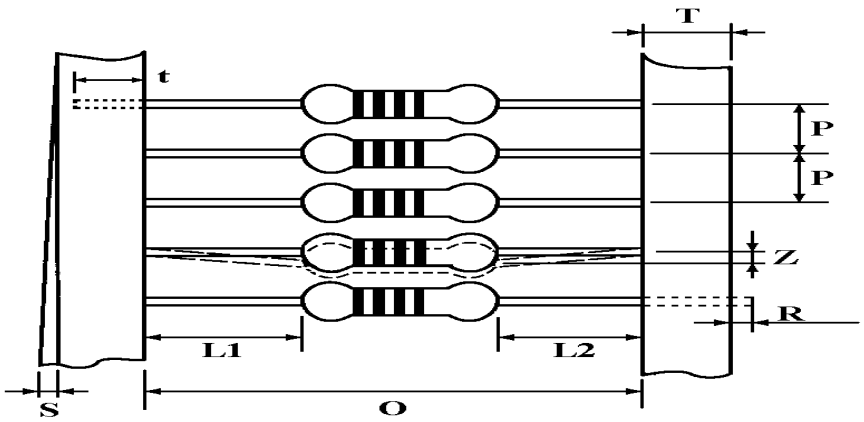
Painting method:

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover. The extent should be within 1/2 of the angle.

Wire Wound Fixed Resistors

Packing

Tape Packing



Power Rating at 70 ℃	Style	O	P	L1-L2	T	Z	R	t	S
Normal size									
1/2W	PT-52	52 ± 1	5 ± 0,3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0,5 Max.
1W	PT-52	52 ± 1	5 ± 0,3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0,5 Max.
2W	PT-64	64 ± 1	10 ± 0,5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0,5 Max.
3W	PT-64	64 ± 1	10 ± 0,5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0,5 Max.
Small size									
1W	PT-52	52 ± 1	5 ± 0,3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0,5 Max.
2W	PT-52	52 ± 1	5 ± 0,3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0,5 Max.
3W	PT-64	64 ± 1	10 ± 0,5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0,5 Max.
5W	PT-64	64 ± 1	10 ± 0,5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0,5 Max.
Ultra-small size									
1W	PT-52	52 ± 1	5 ± 0,3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0,5 Max.
2W	PT-52	52 ± 1	5 ± 0,3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0,5 Max.
3W	PT-64	64 ± 1	10 ± 0,5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0,5 Max.
4W	PT-64	64 ± 1	10 ± 0,5	1 Max.	6 ± 1	1 Max.	0	5 ± 1	0,5 Max.

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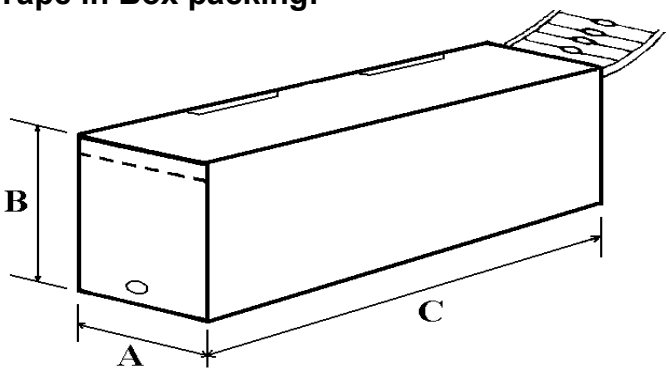
Tape in Box packing:



Bandoliers may also be contained in a cardboard box ("Ammopack")

Normal size					
Power Rating at 70 °C	Style	L (C) ±5	W (A) ±5	H (B) ±5	Quantity Per Box (pcs.)
1/2W	PT-52	260	85	70	1.000
1W	PT-52	262	86	80	1.000
2W	PT-64	262	92	108	1.000
3W	PT-64	256	92	80	500
Small size					
1W	PT-52	260	85	70	1.000
2W	PT-52	262	86	80	1.000
3W	PT-64	262	92	108	1.000
5W	PT-64	256	92	80	500
Ultra-small size					
1W	PT- 52	260	85	70	1.000
2W	PT- 52	260	85	70	1.000
3W	PT- 64	262	92	108	1.000
4W	PT- 64	262	92	108	1.000

"Ammopack" is an abbreviation of "ammunition pack"

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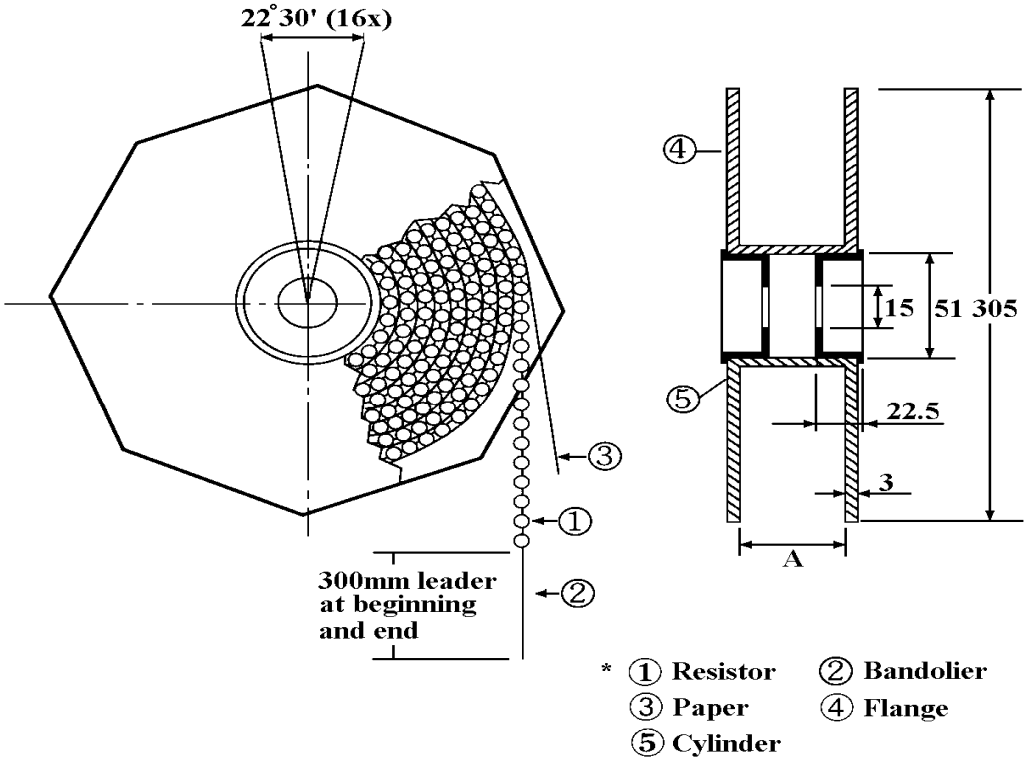
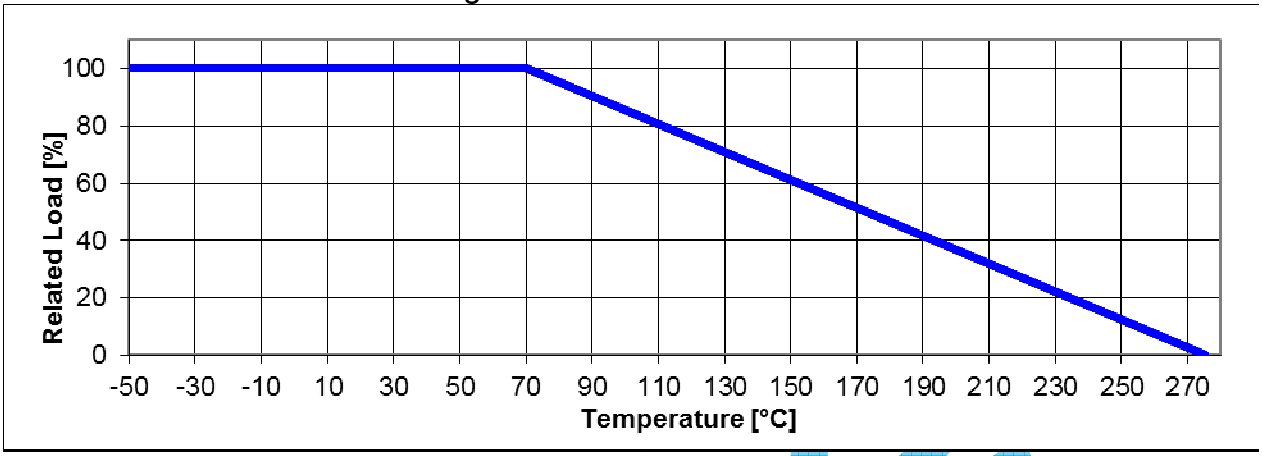
Tape in Reel packing:



Power Rating at 70 °C	Style	Across Flange (A)	Quantity Per Reel
Normal size			
1/2W	PT-52	73 ± 2	2.500
1W	PT-52	73 ± 2	2.500
2W	PT-64	81 ± 5	1.000
3W	PT-64	81 ± 5	500
Small size			
1W	PT-52	73 ± 2	2.500
2W	PT-52	73 ± 2	2.500
3W	PT-64	81 ± 5	1.000
5W	PT-64	81 ± 5	500
Ultra-small size			
1W	PT52	73 ± 2	2.500
2W	PT-52	73 ± 2	2.500
3W	PT-64	81 ± 5	1.000
4W	PT-64	81 ± 5	1.000

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 below.



Voltage rating:

The resistor shall have a DC continuous working voltage or a rms AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined from the following:

E= Rated voltage [V]

P= Power rating [W]

R= Nominal resistance [Ω]

$$E = \sqrt{R \bullet P}$$

Stock period

The Temperature condition must be controlled at 25± 10 °C, the R.H. must be controlled at 60±10%. The stock can maintain quality level in one years, provided that they remain packed as they were when delivered.

Even within the above guarantee periods, do not store these products in the following conditions:
Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.
1. In salty air or in air with a high concentration of corrosive gas, such as Cl2, H2S, NH3, SO2, or NO2
2. In direct sunlight

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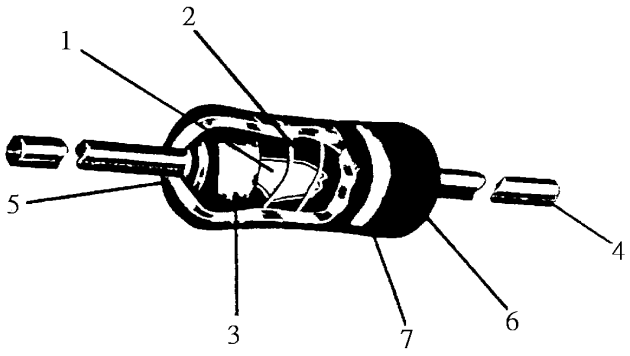
Structure Diagram



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) Small size and ultra small size: --Insulated & Non-Flame paint (Color :Light Green
7	Color Code	Non-Flame epoxy resin

Nominal Resistance

Effective figures of nominal resistance shall be in accordance E-24 series.

Characteristics

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 JIS C 5201-1, 5.1
Temperature coefficient	<20Ω : ± 400 PPM/°C ≥ 20Ω : ± 300 PPM/°C	Natural resistance change per temp. degree centigrade. $\frac{R1-R2}{R1\,(t2-t1)} x10^6\ ppm/°C$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) JIS C 5201-1, 5.2
Short time overload	Resistance change rate is ± (2,0% + 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 sec JIS C 5201-1, 5.5
Insulation resistance	1,000 MΩ or more	Apply 500V DC between protective coating and termination for 1 min, then measure JIS C 5201-1, 4.6
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	Apply 500V AC between protective coating and termination for 1 minute JIS C 5201-1, 4.7
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 JIS C 5201-1, 6.1
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. JIS C 5201-1, 6.4
Load life in humidity	Resistance change rate is ±(5% + 0,05Ω) Max. with no evidence of mechanical damage	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 JIS C 5201-1, 7.9
Load life	Resistance change rate is ±(5% + 0,05Ω) Max. with no evidence of mechanical damage	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 JIS C 5201-1, 7.10
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 JIS C 5201-1, 6.5

<table>
<tr><td rowspan="7">Temperature cycling</td><td rowspan="7">Resistance change rate is ± (2,0% + 0,05Ω) Max.</td><td colspan="3">Resistance change after continuous 5 cycles for duty cycle specified below :</td></tr>
<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>10~15 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>10~15 mins</td></tr>
<tr><td colspan="3">JIS C 5201-1, 4.19</td></tr>
<tr><td>Resistance to solvent</td><td>No deterioration of protective coatings and markings</td><td colspan="3">Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic
JIS C 5201-1, 4.30</td></tr>
<tr><td>Pulse overload</td><td>Resistance change rate is ± (5% + 0,05Ω) Max. with no evidence of mechanical damage</td><td colspan="3">Resistance change after 10.000 cycles
(1 sec. "on" , 25 secs. "off") at 4 times RCWV
JIS C 5201-1, 5.8</td></tr>
</table>

Environment Related Substance:
This product comply to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.
Ozone layer depleting substances. Ozone depleting substances are not used in our manufacturing process of these products.
This product is not manufacture using Chloro fluorocabons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substance in any phase of the manufacturing process.

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