

Fusible Wire Wound Fixed Resistor


Type FWFU Series

INTRODUCTION

Fusible resistors are a special type of resistor that also act as a safety fuse. They allow current to flow normally but break the circuit when the current exceeds a safe level, protecting electronic devices from damage. These resistors are commonly used in power supplies, chargers, and household appliances to prevent overheating and short circuits. Unlike traditional fuses, they provide some resistance before they "blow," making them useful for controlling inrush current.



FEATURES

- UL recognised (UL1412) : UL file no. 
- Power up to 7 watts
- RoHS compliant with no exemptions
- Moisture sensitivity level-MSL1
- Flameproof coating meets UL 94 V0 requirements
- Fusing time up to 120s

ELECTRICAL CHARACTERISTICS

	FWFU 1W	FWFU 2W	FWFU 3W	FWFU 5W	FWFU 7W
Rated Power@70°C Watts	1	2	3	5	7
Resistance Tolerance%	±5				
Ohmic Value Min (Ω)	R47	R47	R47	R47	R47
Ohmic Value Max (Ω)	240R	240R	240R	240R	47R
Dielectric Withstand Voltage	1000VAC				
Max Working Voltage					
Max Overload Voltage					
Operating Temperature	-55°C-155°C				
Climatic Category					
Net Weight (GR's)	630	990	1620	2490	3940

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 on the derating curve.

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

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

Note: Max. Working voltage or $\sqrt{P \times R}$ whichever is lesser

Max. Overload voltage or $2.5 \sqrt{P \times R}$ whichever is lesser

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

P = Power Rating (watt)

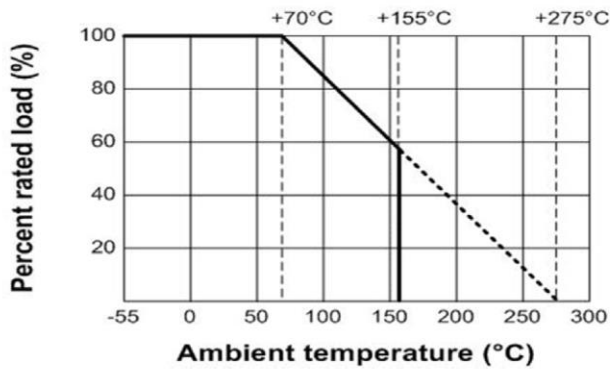
R = Nominal Resistance (ohm)

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

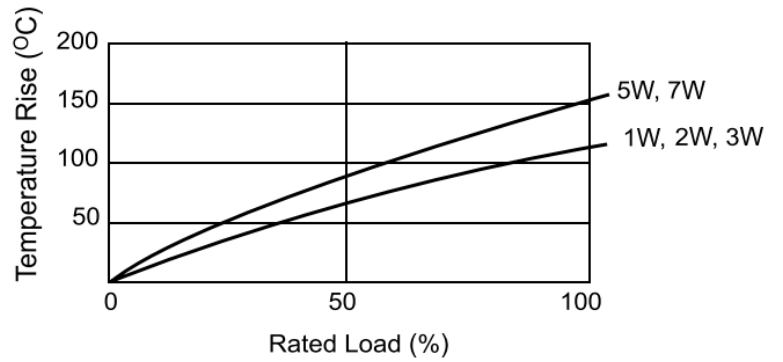
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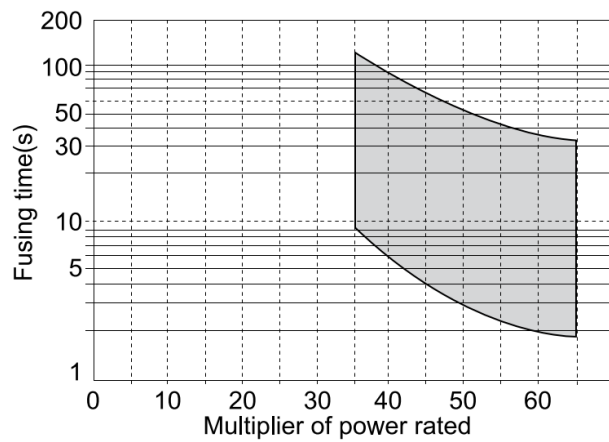
DERATING CURVE



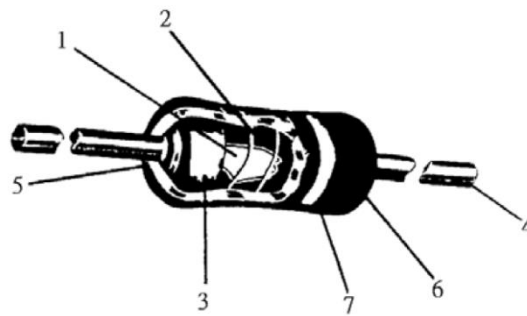
HEAT RISE CHART



FUSING GRAPH



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 with a tin matte finish
5	Connection	Lead wire to end cap attachment method: welded
6	Coating	Insulated and non-flame paint (colour: green)
7	Colour Code	Non-flame epoxy resin

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PERFORMANCE CHARACTERISTICS

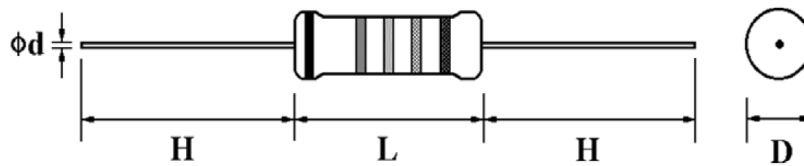
Characteristics	Limits	Test Methods (JIS C 5201-1)
DC. Resistance	Must be within the specified tolerance	The limit of error of measuring apparatus shall not exceed allowable range or 5% of the resistance tolerance (Sub-clause 4.5)
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	Resistors shall be clamped in the trough of a 90° metallic V-block or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at AC potential respectively specified in the electrical characteristic, for 60 +10/-0 secs. (Sub-clause 4.7)
Temperature coefficient	<20Ω : ± 400 PPM/°C ≥20Ω : ± 300 PPM/°	Natural resistance change per temp. degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : Resistance value at room temperature (t ₁) R ₂ : Resistance value at room temperature plus 100°C (t ₂) (Sub-clause 4.13)
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 or Max. overload voltage, whichever is lesser for 5 seconds (Sub-clause 4.13)
Terminal strength	No evidence of mechanical damage	Direct load: Resistance to a 2.5kgs 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 (Sub-clause 4.16)
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 (Sub-clause 4.17)
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 4.8mm. from the body. Permanent resistance change shall be checked. <u>Wave soldering condition: (2 cycles Max.)</u> Pre-heat : 100~120°C, 30±5 sec. Suggestion solder temp : 235~255°C, 10 sec. (Max.) Peak temp : 260°C <u>Hand soldering condition:</u> 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 4.8mm from the body in 350°C ± 10°C solder for 3 ± 0.5 seconds. (Sub-clause 4.18)

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Temperature cycling	Resistance change rate is $\pm (2\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	Resistance change after continuous 100 cycles for duty shown below:		
		Step	Temperature	Time
		1	-55°C \pm 3°C	30 mins
		2	Room temp.	10-15 mins
		3	+155°C \pm 2°C	30 mins
4	Room temp.	10-15 mins		
		(Sub-clause 4.19)		
Load life in humidity	Resistance change rate is $\pm(5\% + 0.05\Omega)$ 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 \pm 2°C and 90 to 95% relative humidity (Sub-clause 4.24.2.1)		
Load life	Resistance change rate is $\pm(5\% + 0.05\Omega)$ 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 \pm 2°C ambient (Sub-clause 4.25)		
Flammability	No ignition of the tissue paper or scorching of the pinewood board	V-0 or V-1 are acceptable. Electrical test not required. (UL 94 rating)		
Fusing test	Resistance should be opened (The resistance value is over than 50 times from before test value) follow fusing curve condition		<p>Fusing curve</p>	
	Magnification of power	Fusing		
	35 times	120s (max)		

DIMENSIONS



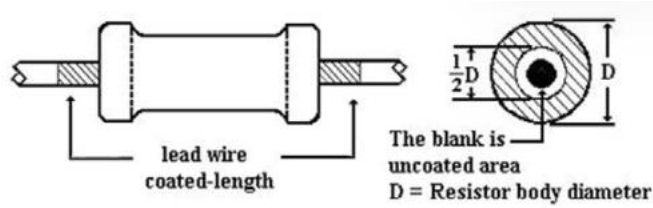
	D (Max)	L (Max)	d \pm 0.05	H \pm 3
FWFU 1W	5.0	12.0	0.70	28
FWFU 2W	5.5	16.0	0.70	28
FWFU 3W	6.5	17.5	0.75	28
FWFU 5W	8.0	20.0	0.75	38
FWFU 7W	8.5	25.0	0.75	38

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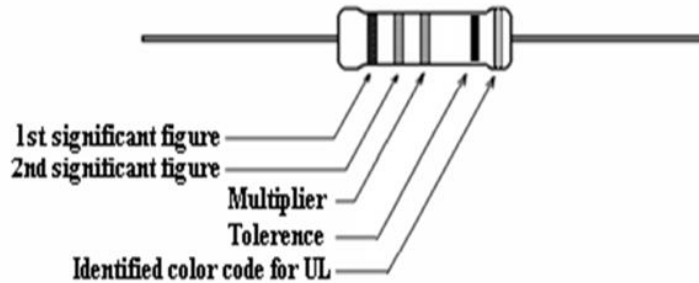
PAINTING METHOD

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover.
The extent should be within $\frac{1}{2}$ of cap diameter



MARKING

Resistors shall be marked with colour coding
Colours shall be in accordance with JIS C 0802




LABELS

Label shall be marked with the following items:

- (1) Type and style
- (2) Nominal Resistance
- (3) Resistance Tolerance
- (4) Quantity
- (5) PPM
- (6) Lot number

Example:

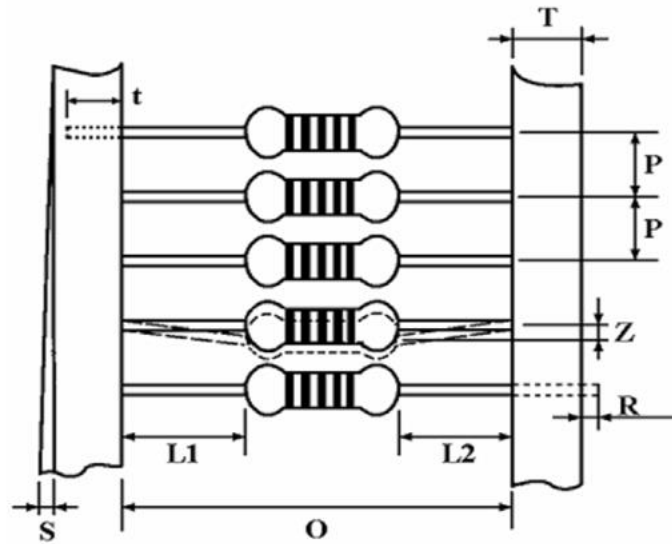
TYCO Pn	2-2176791-9		
DESC	FWFU 1W 6R8 5%		
QTY	1000 Pcs.	PPM:	
LOT	SAMPLE		
REF	RoHS 2002/95/EC		
			

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PACKAGING

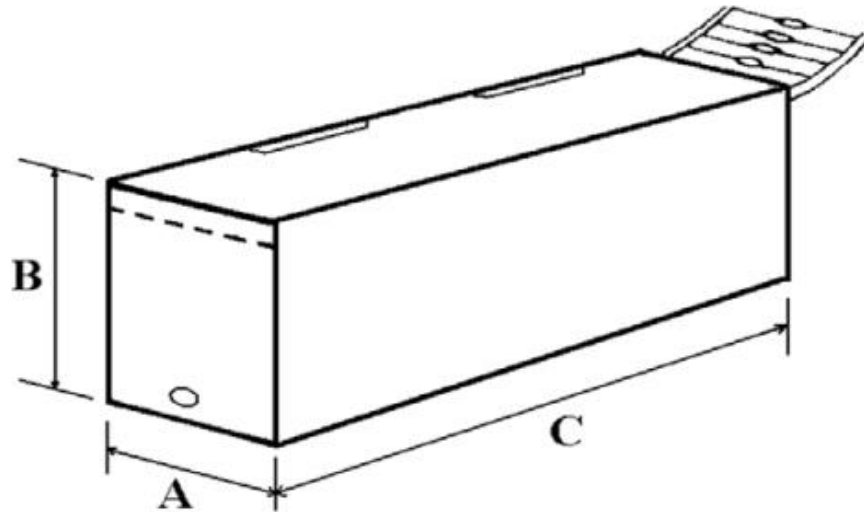
TAPING DIMENSIONS (mm)



Type	Style	O	P	L1-L2	T	Z	R	t	S
FWFU 1W	PT-52	52 ± 1	5 ± 0.3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0.5 Max.
FWFU 2W	PT-64	64 ± 1	5 ± 0.3	1 Max.	6 ± 1	1 Max.	0	4 ± 1	0.5 Max.
FWFU 3W	PT-64	64 ± 1	10 ± 0.5	1 Max.	6 ± 1	1 Max.	0	6 ± 1	0.5 Max.

TAPE IN BOX PACKAGING (mm)

AMMOPACK



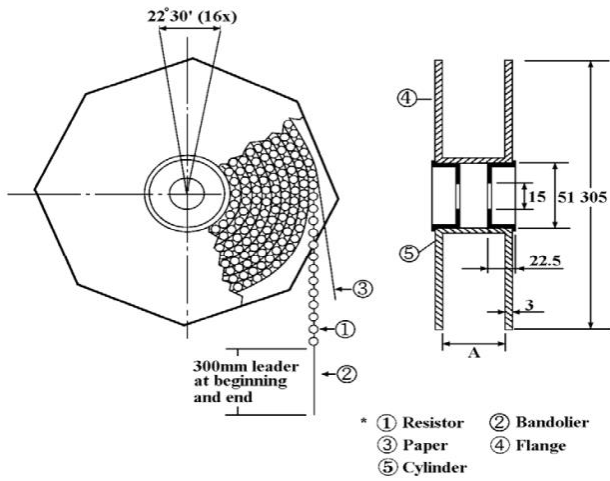
Type	Style	C ± 5	A ± 5	B ± 5	Quantity Per Box (pcs)
FWFU 1W	PT-52	262	86	80	1,000
FWFU 2W	PT-64	262	92	108	1,000
FWFU 3W	PT-64	256	92	80	500

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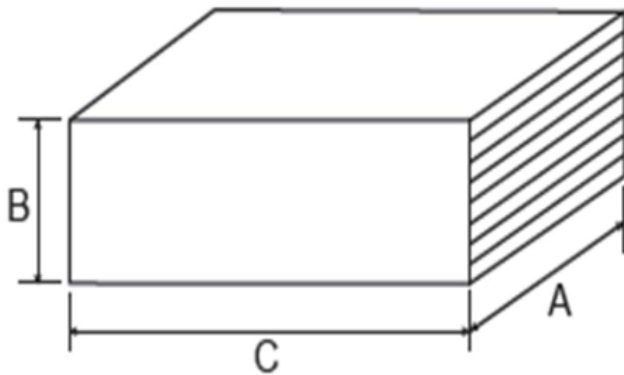
TAPE ON REEL PACKAGING (mm)

(On request)



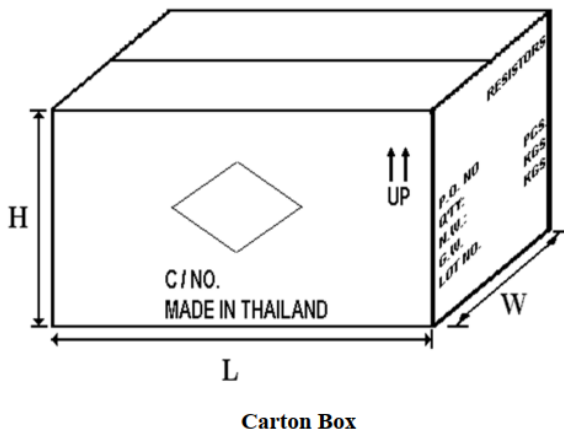
Type	Style	Across Flange (A)	Quantity Per Reel
FWFU 1W	PT-52	73 ± 2	2,500
FWFU 2W	PT-64	81 ± 5	1,000
FWFU 3W	PT-64	81 ± 5	500

BOX PACKING (PLASTIC CASE) (mm)



Type	C ± 5	A ± 5	B ± 5	Quantity Per Case/Box (pcs.)
FWFU 5W	36	20	8	100/1000

BULK IN INNER BOX PACKING (PLASTIC CASE) (mm)



Type	Quantity Bag (pcs)	Quantity Inner Box (pcs.)	Quantity Carton (pcs.)	Carton Box Size L x W x H (±5)
FWFU 7W	8	32	1600	560 x 305 x 310

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ENVIRONMENTAL RELATED SUBSTANCE

This product complies 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 this product. This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

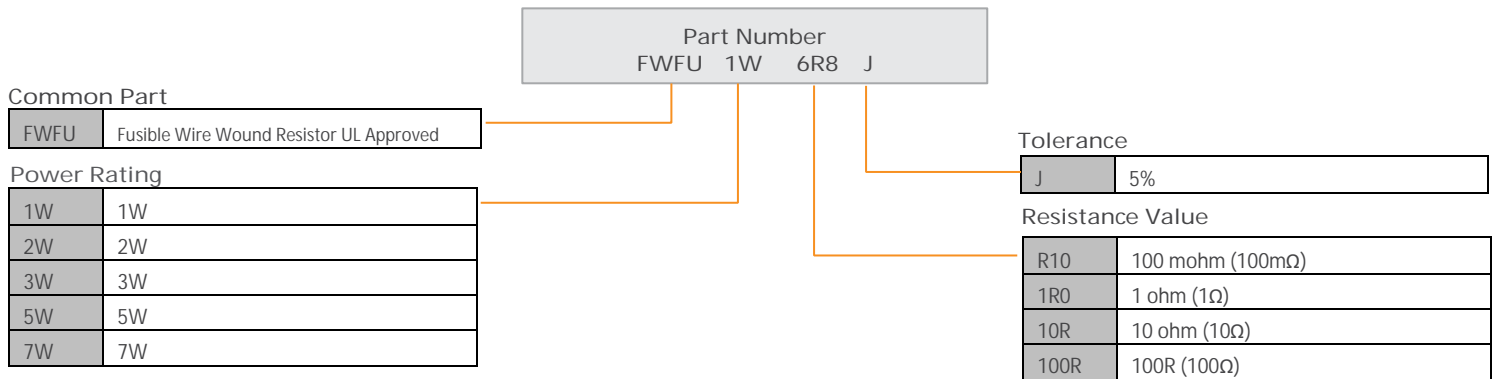
STORAGE CONDITION

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and a relative humidity of $60\%RH \pm 10\%RH$, chemical and dust free atmosphere.

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 Cl_2 , H_2S , NH_3 , SO_2 , or NO_2
2. In direct sunlight

ORDERING INFORMATION



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