Wirewound Resistors, Flameproof, Bath-tub Type

Type: **ERF**

Axial leads type	ERFA	
Radial insertion type	ERFT(L)	
Off PC board type	ERFZX ERFZY ERFZ	

■ Features

- Flameproof
- Exclusive surge characteristics
- Uniform quality
- Reference standards to IEC 60115-4, EIAJ RC-2123A

■ Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	R	F	1	0	Z	Y	K	4	R	7	

Product Code

Fixed Wirewound Resistor Bath-tub

Power Rating

Code	Rated power
2	2 W
3	3 W
5	5 W
7	7 W
10	10 W

5	5 W
7	7 W
10	10 W
15	15 W
20	20 W

Style of Terminal with Fixture

Code	Style
A	Axial leads
T (L)	Radial insertion (Low resistance)
ZX	Short terminal
ZY	Long terminal
Z	Long terminal (Dual nail)

Resistance Tolerance

Code	Tol.
J	±5 %
K	±10 %

Standard Resistance Tolerance

10 Ω≦ : J

<10 Ω : K

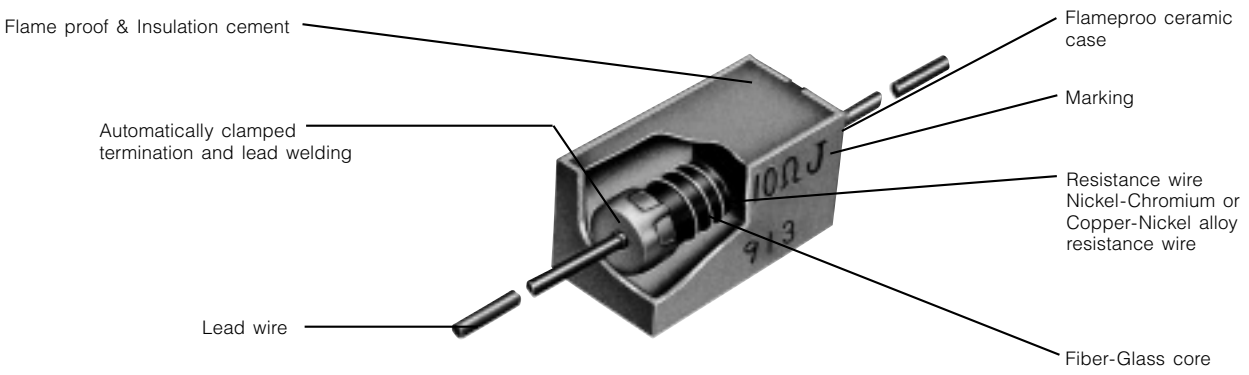
Resistance Value

The first two digits are significant figures of resistance and the third one denotes number of zeros following. Decimal point is expressed by R as 4.7 = 4R7

Suffix for Special Features or Packing

Code	
Nil.	Std. Packing

■ Construction



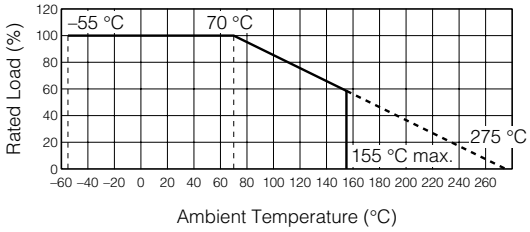
ERFA (Axial Lead Type)

■ Ratings

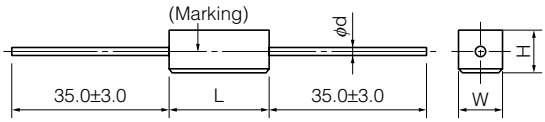
Type	Power Rating at 70 °C (W)	Resistance Range (Ω)		Dielectric Withstanding Voltage (VAC)	Standard Quantity (pcs.)
		min.	max.		
ERF2A	2	0.1	390	1000	1000
ERF3A	3	0.18	680	1000	1000
ERF5A	5	0.18	680	1000	1000
ERF7A	7	0.22	1.5 k	1000	500
ERF10A	10	0.33	2.4 k	1000	500

Power Derating Curve

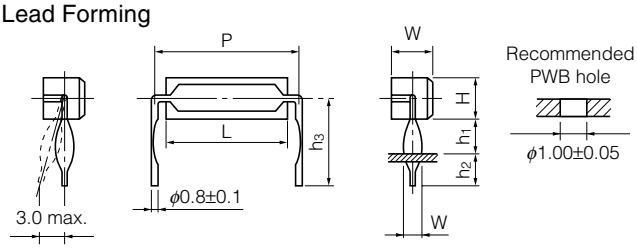
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure below.



■ Dimensions in mm (not to scale)



Lead Forming



Type	Dimensions (mm)				Mass (Weight) [g/pc.]
	L	W±1.0	H±1.0	d±0.1	
ERF2A	18.0±1.0	6.4	6.4	0.8	2
ERF3A	22.0±1.0	8.0	8.0	0.8	4
ERF5A	22.0±1.0	9.5	9.0	0.8	5
ERF7A	35.0±1.5	9.5	9.0	0.8	8
ERF10A	48.0±2.0	9.5	9.0	0.8	12

Type	L±1	W±1.0	H±1.0	P±2	W±0.2	h_1±2	h_2±1	h_3±1
ERF2A...P	18	6.4	6.4	25	1.4	6	4	13.2
ERF3A...H	22	8.0	8.0	27.5	1.4	10	4	18
ERF5A...H	22	9.0	9.5	27.5	1.4	10	4	18.75

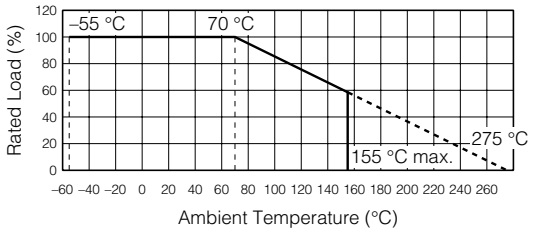
Radial Insertion Type

■ Ratings

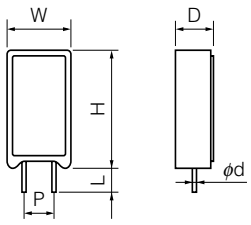
Type	Power Rating at 70 °C (W)	Resistance Range (Ω)		Dielectric Withstanding Voltage (VAC)	Standard Quantity (pcs.)
		min.	max.		
ERF2T(L)	2	(0.01) 0.1	(0.082) 390	1000	500
ERF3T(L)	3	(0.01) 0.18	(0.082) 680	1000	500
ERF5T(L)	5	(0.01) 0.18	(0.082) 680	1000	500
ERF7T(L)	7	(0.01) 0.22	(0.1) 1.5 k	1000	500
ERF10T(L)	10	(0.01) 0.33	(0.1) 2 k	1000	500

● TL (2TL to 10TL) are series of low resistance value.

Power Derating Curve



■ Dimensions in mm (not to scale)



Type	Dimensions (mm)						Mass (Weight) [g/pc.]
	W	D	H	L	P	ϕd	
ERF2T(L)	11.0±1.0	7.0±1.0	20.5±1.5	$4.5^{+2.0}_{-1.0}$	$5.0^{+2.0}_{-1.0}$	0.8±0.1	3.9
ERF3T(L)	12.0±1.0	8.0±1.0	25.0±1.5	$4.5^{+2.0}_{-1.0}$	$5.0^{+2.0}_{-1.0}$	0.8±0.1	5.5
ERF5T(L)	13.0±1.0	9.0±1.0	25.5±1.5	$4.5^{+2.0}_{-1.0}$	$5.0^{+2.0}_{-1.0}$	0.8±0.1	6.7
ERF7T(L)	16.0±1.0	9.0±1.0	29.0±1.5	$4.5^{+2.0}_{-1.0}$	$7.5^{+2.0}_{-1.0}$	0.8±0.1 (1.0±0.1)	8.8
ERF10T(L)	16.0±1.0	9.0±1.0	34.0±1.5	$4.5^{+2.0}_{-1.0}$	$7.5^{+2.0}_{-1.0}$	0.8±0.1 (1.0±0.1)	10.7

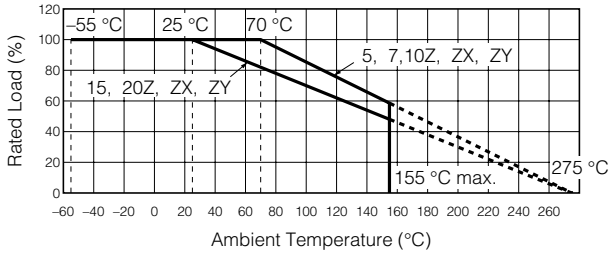
ERFZ (Off PC Board Type)

■ Ratings

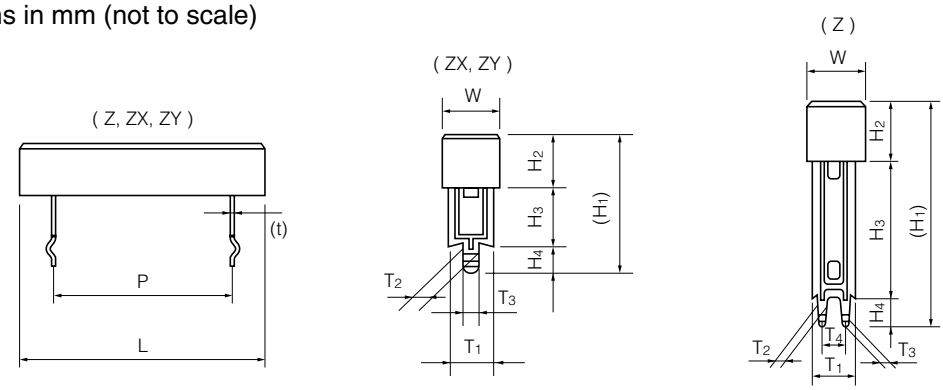
Type		Power Rating (W)	Resistance Range (Ω) min.	Resistance Range (Ω) max.	Dielectric Withstanding Voltage (VAC)	Standard Quantity pcs.
ERF5Z	X	5	0.22	820	1000	500
	Y					
ERF7Z	X	7	0.39	1.5k	1000	500
	Y					
ERF10Z	X	10	0.39	2.2k	1000	500
	Y					
ERF15Z	X	15	0.51	2.2k	1000	500
	Y					
ERF20Z	X	20	0.51	2.4k	1000	500
	Y					

Power Derating Curve

For resistors operating in ambient temperatures above 70 °C (25 °C) power rating shall be derated in accordance with the figure below.



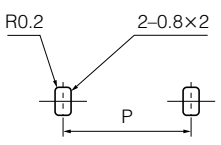
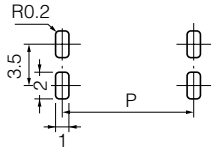
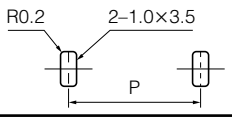
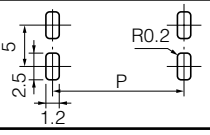
■ Dimensions in mm (not to scale)



Type		Dimensions (mm) L	P±1.5	W±1.0	(H_1)	H_2±1.0	H_3^{+2}	H_4±0.5	T_1±0.3	T_2±0.2	T_3±0.2	T_4	(t)	Mass (Weight) [g/pc.]
ERF5Z	X	27.0±1.0	15.0	9.5	24	9.5	10	4.5	7.3	1.6	1.4	—	0.5	6
	Y	27.0±1.0	15.0	9.5	39	9.5	25	4.5	7.3	1.6	1.4	—	0.5	7
		27.0±1.0	(15.0)(1)	9.5	36	9.5	22	4.5	7.3	1.5	1.0	3.5	0.5	6.9
ERF7Z	X	35.0±1.0	22.5	9.5	24	9.5	10	4.5	7.3	1.6	1.4	—	0.5	7.6
	Y	35.0±1.0	22.5	9.5	39	9.5	25	4.5	7.3	1.6	1.4	—	0.5	8.6
		35.0±1.0	(22.5)(2)	9.5	36	9.5	22	4.5	7.3	1.5	1.0	3.5	0.5	8.5
ERF10Z	X	48.0±1.5	35.0	9.5	24	9.5	10	4.5	7.3	1.6	1.4	—	0.5	10
	Y	48.0±1.5	35.0	9.5	39	9.5	25	4.5	7.3	1.6	1.4	—	0.5	10.8
		48.0±1.5	(35.0)(3)	9.5	36	9.5	22	4.5	7.3	1.5	1.0	3.5	0.5	10.6
ERF15Z	X	48.0±1.5	32.5	12.5	32.5	12.5	15	5.0	10.0	3.0	2.7	—	0.5	17
	Y	48.0±1.5	32.5	12.5	47.5	12.5	30	5.0	10.0	3.0	2.7	—	0.5	20
		48.0±1.5	(32.5)(4)	12.5	47.5	12.5	30	5.0	10.0	2.0	1.5	5	0.5	19.2
ERF20Z	X	63.5±1.5	47.5	12.5	32.5	12.5	15	5.0	10.0	3.0	2.7	—	0.5	23.5
	Y	63.5±1.5	47.5	12.5	47.5	12.5	30	5.0	10.0	3.0	2.7	—	0.5	26.5
		63.5±1.5	(47.5)(5)	12.5	47.5	12.5	30	5.0	10.0	2.0	1.5	5	0.5	25.7

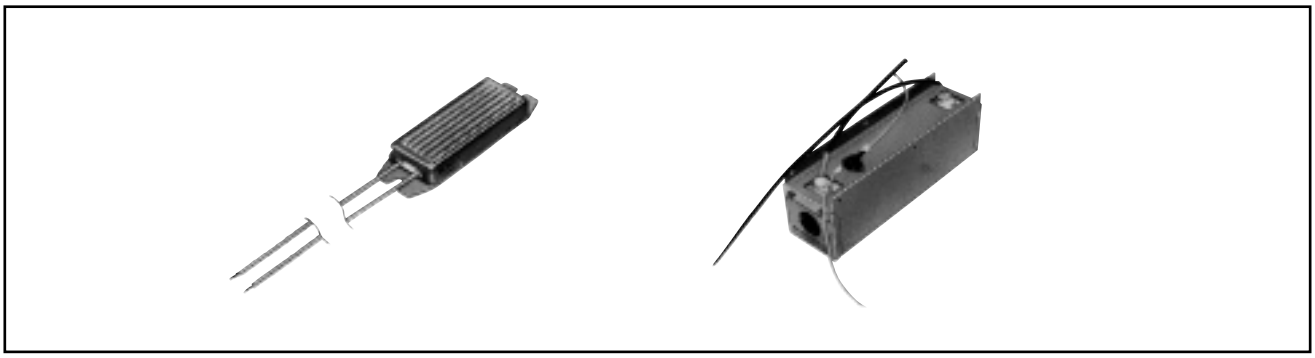
Note: (1) to (3); Tolerance +2 to +6, (4) to (5); Tolerance 0 to +4.

Recommended PWB Hole

Power Rating (W)	Dimensions (mm) ZX · ZY	Dimensions (mm) Z	P
5			15
7			22.5
10			35
15			32.5
20			47.5

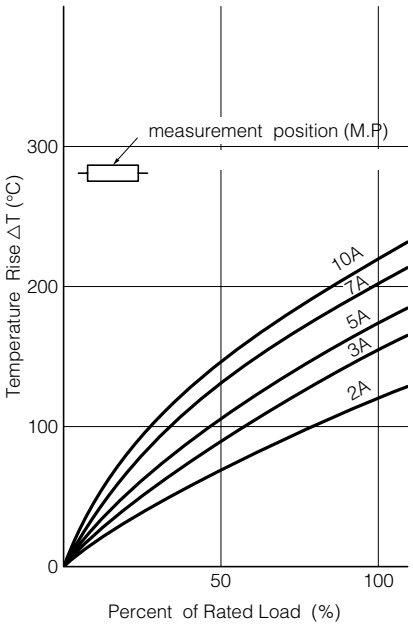
■ Special Applications

● Special applications

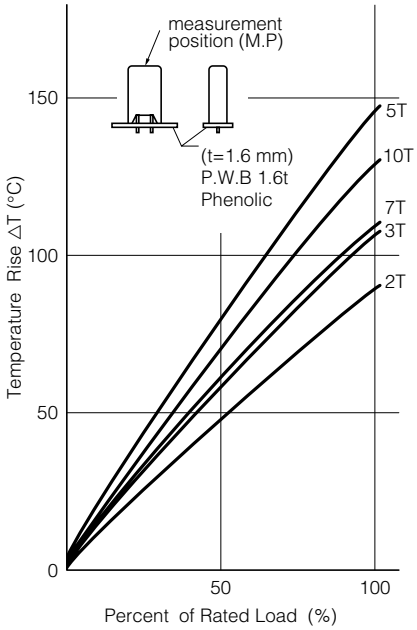


■ Temperature Rising Data

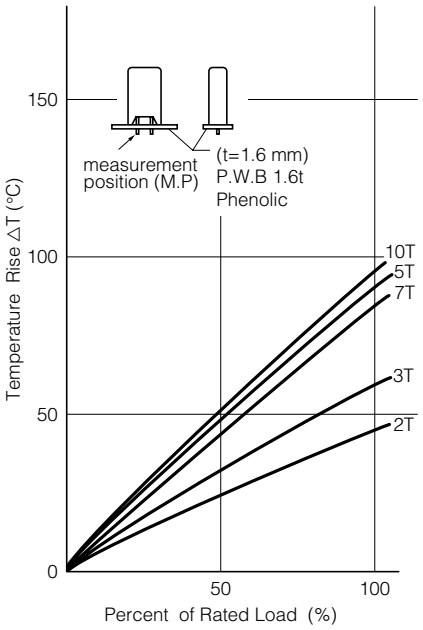
Axial Leads Type
(Hot Spot Temperature)



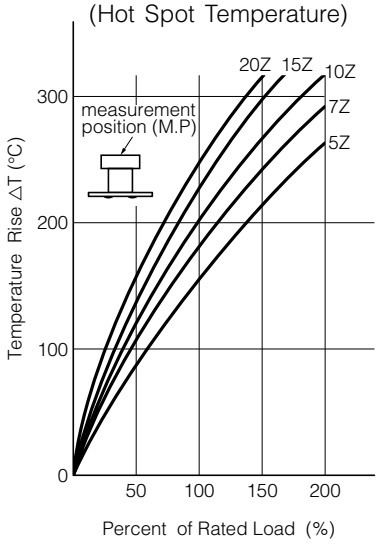
Radial Insertion Type
(Hot Spot Temperature)



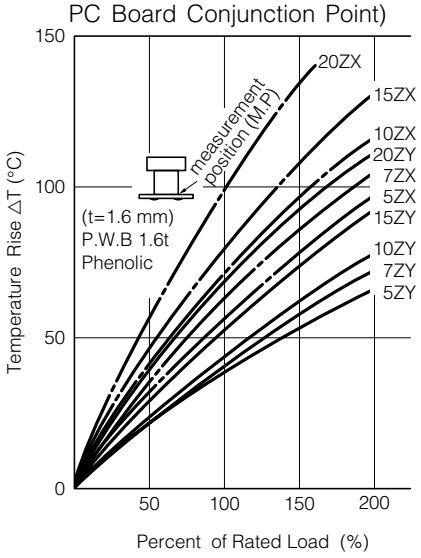
(Terminal Temperature of
PC Board Conjunction Point)



Off PC Board Type
(Hot Spot Temperature)



(Terminal Temperature of
PC Board Conjunction Point)



■ Packaging Methods

Please contact the factory for packaging methods

⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the precautions common to Fixed Resistors shown on page ER3 of this catalog.

1. Since Wirewound Resistors (hereafter called the resistors) generate heat during use, mount them on your product and carefully check the effect of heat on other components. Provide for adequate safety when designing your product. Otherwise, when a short circuit or other abnormality occurs, or when a voltage or current exceeding the rating is applied, the resistors may overheat without breaking, or may generate smoke or red-heat, breaking the ceramic case and thus exposing the red-heating resistor element.
2. Carefully check the inductance effect of the resistors when using them in a high-frequency circuit.
3. If a transient load (heavy load in a short time) like a pulse is expected to be applied, check and evaluate the operations of the resistors when installed in your products under the most adverse conditions before use.

⚠ Safety Precautions
(Common precautions for Fixed Resistors)

- When using our products, no matter what sort of equipment they might be used for, be sure to make a written agreement on the specifications with us in advance. The design and specifications in this catalog are subject to change without prior notice.
- Do not use the products beyond the specifications described in this catalog.
- This catalog explains the quality and performance of the products as individual components. Before use, check and evaluate their operations when installed in your products.
- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other significant damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/gas equipment, rotating equipment, and disaster/crime prevention equipment.

✻ Systems equipped with a protection circuit and a protection device
✻ Systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general electronic equipment (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment)
- These products are not intended for use in the following special conditions. Before using the products, carefully check the effects on their quality and performance, and determine whether or not they can be used.
  1. In liquid, such as water, oil, chemicals, or organic solvent
  2. In direct sunlight, outdoors, or in dust
  3. In salty air or air with a high concentration of corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_2
  4. Electric Static Discharge (ESD) Environment
     These components are sensitive to static electricity and can be damaged under static shock (ESD).
     Please take measures to avoid any of these environments.
     Smaller components are more sensitive to ESD environment.
  5. Electromagnetic Environment
     Avoid any environment where strong electromagnetic waves exist.
  6. In an environment where these products cause dew condensation
  7. Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin or other materials
- These products generate Joule heat when energized. Carefully position these products so that their heat will not affect the other components.
- Carefully position these products so that their temperatures will not exceed the category temperature range due to the effects of neighboring heat-generating components. Do not mount or place heat-generating components or inflammables, such as vinyl-coated wires, near these products .
- Note that non-cleaning solder, halogen-based highly active flux, or water-soluble flux may deteriorate the performance or reliability of the products.
- Carefully select a flux cleaning agent for use after soldering. An unsuitable agent may deteriorate the performance or reliability. In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues. Otherwise, the insulation performance may be deteriorated.

(2) Precautions for storage

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 5 °C to 35 ° C and a relative humidity of 45 % to 85 %.

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

<Package markings>
Package markings include the product number, quantity, and country of origin.
In principle, the country of origin should be indicated in English.