

Not Recommended for New Design : ERG , ERQ and ERX Series Leaded Resistors

NRFND.PG 24.07.15.2019

07.15.2019

About This Notice:	Panasonic Leaded Resistors are now Not Recommended For New Design. Panasonic will continue to support these Series for existing designs.
Effective Date :	Immediate
Affected Parts and/or Replacements :	See Attached .
Datasheet(s):	See Attached .
Notes:	

Anti-Pulse Power Resistors

Type: **ERGD**
(0.5 W, 1 W, 2 W, 3 W)

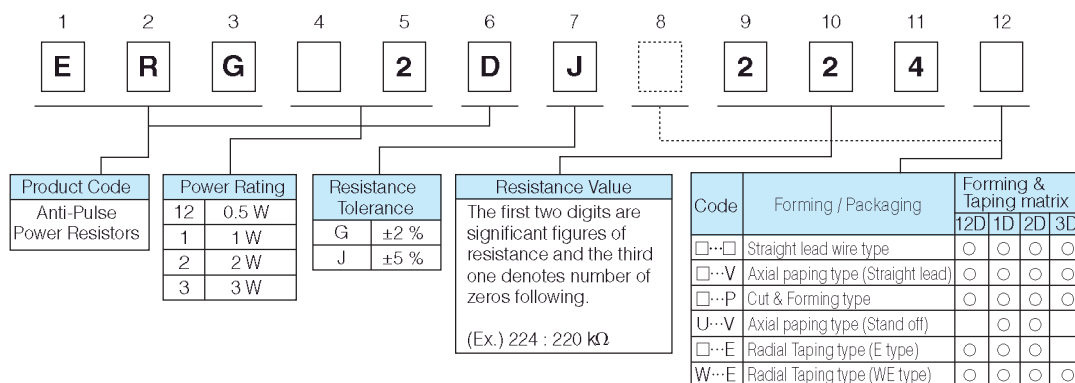


This series is not a recommended product.
Not recommended for new design.

Features

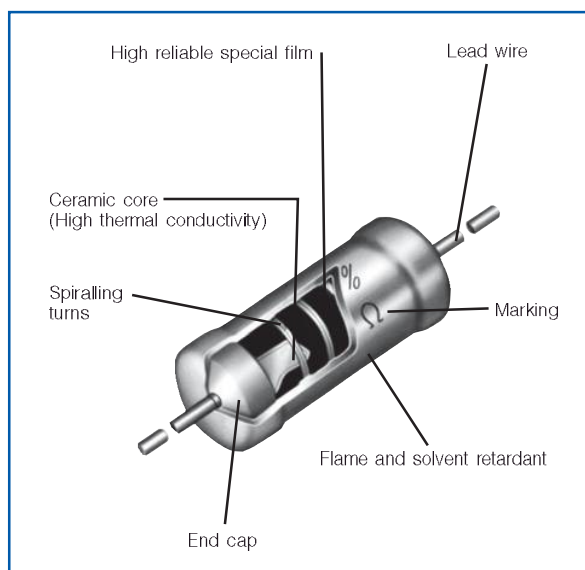
- Miniaturized
- Non-flammable
- Anti-Pulse Characteristic
- Automatic Insertion
- RoHS compliant

Explanation of Part Numbers

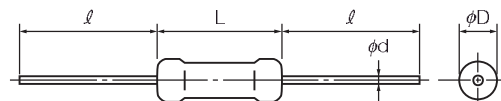


The above example shows an anti-pulse resistor, 2 W power rating, resistance value of 220 k ohms, tolerance ±5 %, and package of standard bulk packing.

Construction



Dimensions in mm (not to scale)



Part No.	Dimensions (mm)				Mass (Weight) [g/pc.]
	L	φD	ℓ	φd	
ERG12D	6.35 ^{+0.65} _{-0.35}	2.3 ^{+0.5} _{-0.3}	30.0 ^{+3.0}	0.65 ^{+0.05}	0.26
ERG1D	9.00 ^{+1.50} _{-1.00}	2.8 ^{+0.5}	30.0 ^{+3.0}	0.65 ^{+0.05}	0.33
ERG2D	12.00 ^{+1.50} _{-1.00}	4.0 ^{+1.0}	30.0 ^{+3.0}	0.80 ^{+0.05}	0.66
ERG3D	15.00 ^{+1.50}	5.5 ^{+1.0}	38.0 ^{+3.0}	0.80 ^{+0.05}	1.47

Ratings

Part No.	Power Rating at 70 °C (W)	Limiting Element Voltage ⁽¹⁾ (V)	Maximum Overload Voltage ⁽²⁾ (V)	Maximum Intermittent Overload Voltage ⁽³⁾ (V)	Dielectric Withstanding Voltage (VAC)	Res. Tol. (%)	Resistance Range (Ω) ⁽⁴⁾		Standard Resistance Value
							min.	max.	
ERG12D	0.5	400	800	800	500	J (±5) G (±2)	51 k	240 k	E24
ERG1D	1	500	1000	1000	500	J (±5) G (±2)	110 k	330 k	E24
ERG2D	2	500	1000	1000	700	J (±5) G (±2)	110 k	510 k	E24
ERG3D	3	500	1000	1000	700	J (±5) G (±2)	110 k	750 k	E24

(1) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ or Limiting Element Voltage listed above whichever less.

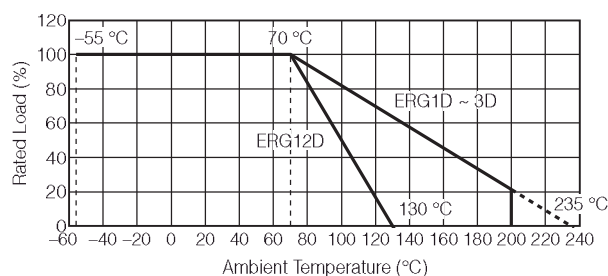
(2) Overload (Short-time Overload) Test Voltage (SOTV) shall be determined from $SOTV = 2.5 \times \text{Power Rating}$ or max. Overload Voltage listed above whichever less.

(3) Intermittent Overload Test Voltage (IOTV) shall be determined from $IOTV = 4.0 \times \text{Power Rating}$ or max. Intermittent Overload Voltage listed above whichever less.

(4) Resistance tolerance and resistance range is of use besides range listed, please inquire.

Power Derating Curve

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



■ As for Packaging Methods and / or cut formed leads,

Please see Metal (Oxide) Film Resistors Packaging Methods

⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the common precautions for Fixed Resistors in this catalog.

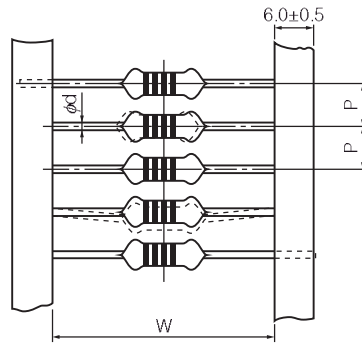
1. Transient voltage

If there is a possibility that the transient phenomenon (significantly high voltage applied in a short time) may occur or that a high voltage pulse may be applied, make sure to evaluate and check the characteristics of Anti-Pulse Power Resistors (hereafter called the resistors) mounted on your product rather than only depending on the calculated power limit or steady-state conditions to complete the design or decide to use the resistors.

- The resistors are covered with a special coating. Do not apply shock or vibration to them, or pinch them with long-nose pliers. Otherwise, the resistors may be damaged.
- Do not apply excessive tension to the lead-connected sections. When bending the lead wire, do not apply excessive stress to the resistors and provide the wire with a natural curvature.
- Do not brush the resistors during or after the cleaning process, which may be conducted after soldering. Otherwise, the coating film may be damaged.

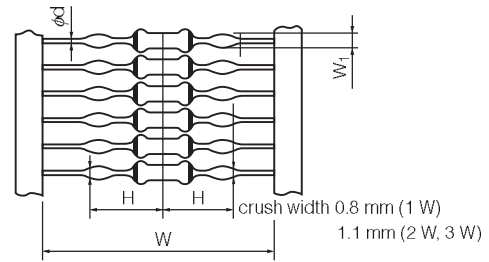
Taped & Box

ERG(X)□□S□□□□V

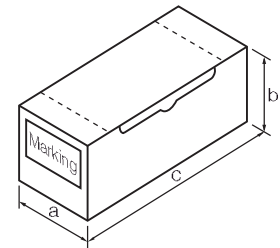


Stand-off Taped & Box

ERG(X)□□S□□□□V

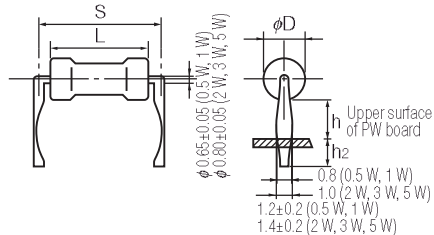


Part Number	Standard Quantity (pcs./box)	Taping (mm)						Box (mm)		
		P	50xP	W	H	W ₁	φd	a	b	c
ERG(X) 12S□□□□V	2,000	5.0 ^{+0.3}	250 ^{±2}	52.0 ^{+1.5}	—	—	0.65 ^{+0.05}	85	80	255
ERG(X) 1S□□□□V	2,000	5.0 ^{+0.3}	250 ^{±2}	52.0 ^{+1.5}	—	—	0.65 ^{+0.05}	85	80	255
ERG(X) 1S□□□□V					12.0 ^{+0.9} _{-2.0}	1.20 ^{+0.15} _{-0.0}				
ERG(X) 2S□□□□V	1,000	5.0 ^{+0.3}	250 ^{±2}	52.0 ^{+1.5}	—	—	0.80 ^{+0.05}	85	80	255
ERG(X) 2S□□□□V					15.5 ^{+0.9} _{-2.0}	1.40 ^{+0.15} _{-0.0}				
ERG(X) 3S□□□□V	1,000	10.0 ^{+0.5}	500 ^{±2}	74.0 ^{+2.0}	—	—	0.80 ^{+0.05}	105	100	325
ERG(X) 3S□□□□V					23.0 ^{+0.9} _{-2.0}	1.4 ^{+0.15} _{-0.0}				



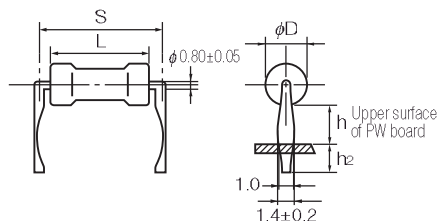
Cut & Formed Type

ERG(X)□□S□□□□P



Part Number	Standard Quantity (pcs./box)	Dimensions (mm)				
		L	φD	S	h	h ₂
ERG(X) 12S□□□□P	1,000	6.35 ^{+0.65} _{-0.35}	2.3 ^{+0.5} _{-0.3}	10.0 ^{+1.5}	4.0 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 1S□□□□P	1,000	9.00 ^{+1.50} _{-1.00}	2.8 ^{+0.5}	12.5 ^{+1.5}	4.0 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 2S□□□□P	1,000	12.00 ^{+1.50} _{-1.00}	4.0 ^{+1.0}	15.0 ^{+1.5}	6.0 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 3S□□□□P	1,000	15.00 ^{+1.50}	5.5 ^{+1.0}	20.0 ^{+2.0}	6.5 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 5S□□□□P	500	24.00 ^{+1.50}	8.0 ^{+1.0}	30.0 ^{+2.0}	7.5 ^{+1.5}	4.0 ^{+1.5}

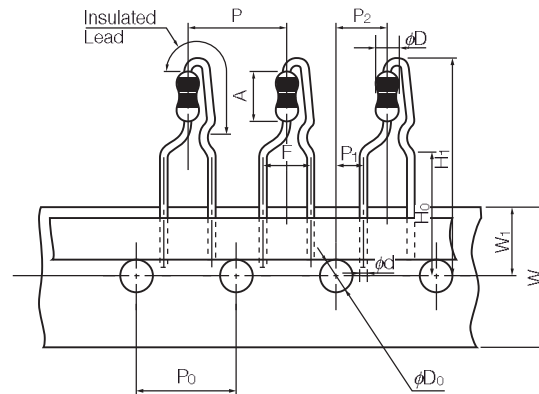
ERG(X)□F□□□□H



Part Number	Standard Quantity (pcs./box)	Dimensions (mm)				
		L	φD	S	h	h ₂
ERG(X) 1F□□□□H	1,000	9.0 ^{+1.5} _{-1.0}	2.8 ^{+0.5}	12.5 ^{+1.5}	8 ⁺²	4.0 ^{+1.5}
ERG(X) 2F□□□□H	1,000	12.0 ^{+1.5} _{-1.0}	4.0 ^{+1.0}	15.0 ^{+1.5}	6 ⁺²	5.0 ^{+1.5}
ERG(X) 3F□□□□H	1,000	15.0 ^{+1.5}	5.5 ^{+1.0}	20.0 ^{+2.0}	10 ⁺²	5.0 ^{+1.5}
ERG(X) 5F□□□□H	500	24.0 ^{+1.5}	8.0 ^{+1.0}	30.0 ^{+2.0}	10 ⁺²	5.0 ^{+1.5}

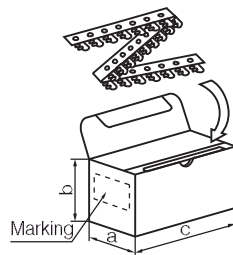
For Panasert Automatic Insertion Machine Radial Taped & Box

ERG(X)□□S□□□□E (12S, 1S, 2S)



Dimensions (mm)		Dimensions (mm)		Dimensions (mm)		Dimensions (mm)			Dimensions (mm)			
P	12.7±1.0	W	18.0±0.5	H ₁	12S	32 max.	A	12S	6.35 ^{+0.65} _{-0.35}	ϕD	12S	2.3 ^{+0.5} _{-0.3}
P ₀	12.7±0.3	W ₁	9.0±0.5		1S	32 max.		1S	9.0 ^{+1.5} _{-1.0}		1S	2.8±0.5
P ₁	3.85±0.70				2S	38 max.		2S	12.0 ^{+1.5} _{-1.0}		2S	4.0±1.0
P ₂	6.35±1.00			H ₀	16.0±0.5		ϕd	0.65±0.05				
F	5.0±0.8			ϕD ₀	4.0±0.2							

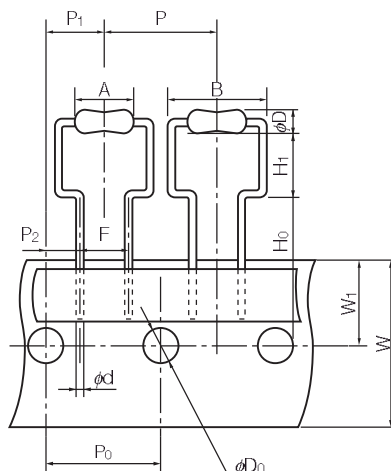
● Radial Tape Package Specifications



Part Number	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERG(X) 12S□□□□E	46	130	335	2,000
ERG(X) 1S□□□□E	46	130	335	2,000
ERG(X) 2S□□□□E	49	100	335	1,000

For Panasert Automatic Insertion Machine Radial Taped & Box

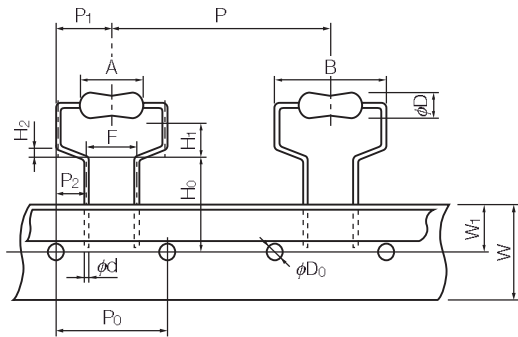
ERG(X)□□S□W□□□E (12S, 1S, 2S, 3S)



Dimensions (mm)			Dimensions (mm)			
P	12S	12.7±1.0	φD ₀	12S, 1S, 2S, 3S	4.0±0.2	
	1S, 2S, 3S	30.0±1.0		12S	6.35 ^{+0.65} _{-0.35}	
P ₀	12S	12.7±0.3		A	1S	9.0 ^{+1.5} _{-1.0}
	1S, 2S, 3S	15.0±0.3			2S	12.0 ^{+1.5} _{-1.0}
P ₁	12S	6.35±1.00			3S	15.0±1.5
	1S, 2S, 3S	7.5±1.0		12S	11.2 max.	
P ₂	12S	3.85±0.70		B	1S	14.0 max.
	1S, 2S, 3S	3.75±0.50			2S	17.0 max.
F	12S	5.0±0.5			3S	21.0 max.
	1S, 2S, 3S	7.5±0.8		12S	2.3 ^{+0.5} _{-0.3}	
W	12S, 1S, 2S, 3S	18.0±0.5	φD	1S	2.8±0.5	
W ₁	12S, 1S, 2S, 3S	9.0±0.5		2S	4.0±1.0	
H ₀	12S	16.0±0.5		3S	5.5±1.0	
	1S, 2S	18.0±1.0	φd	12S	φ0.65±0.05	
	3S	19.0±1.0		1S, 2S, 3S	φ0.80±0.05	
H ₁	12S	6.5 ^{+0.6} ₀				
	1S, 2S	6.5 ^{+1.0} ₀				
	3S	8.0 ^{+1.0} ₀				

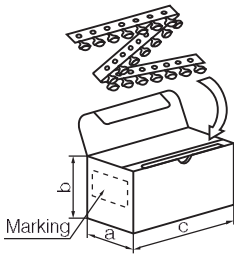
For Panasert Automatic Insertion Machine Radial Taped & Box

ERG(X)□F□S□□□E (1F, 2F, 3F)



Dimensions (mm)		Dimensions (mm)	
P	30.0±1.0	H ₂	1.0±0.3
P ₀	15.0±0.3	ϕD_0	4.0±0.2
P ₁	7.5±1.0	A	1F 9.0 ^{+1.5} _{-1.0}
P ₂	3.75±0.50		2F 12.0 ^{+1.5} _{-1.0}
F	7.5±0.8		3F 15.0±1.5
W	18.0±0.5	B	1F 14 max.
W ₁	9.0±0.5		2F 17 max.
H ₀	16.0 ^{+1.0} ₀		3F 21 max.
H ₁	1F 7.0 ^{+1.0} ₀	ϕD	1F 2.8±0.5
	2F 8.0 ^{+1.0} ₀		2F 4.0±1.0
	3F 9.0 ^{+1.0} ₀		3F 5.5±1.0
		ϕd	0.80±0.05

● Radial Tape Package Specifications



Part No.	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERG(X)12S□W□□□E	46	145	325	2,000
ERG(X) 1S□W□□□E	49	150	317	1,000
ERG(X) 1F□ S□□□E				
ERG(X) 2S□W□□□E	49	150	317	500
ERG(X) 2F□ S□□□E				
ERG(X) 3F□ S□□□E	49	190	315	500

⚠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.

Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.

Metal Film Fusing Resistors

Type: **ERQA**
ERQZ

(0.25 W, 0.5 W, 1 W, 2 W coating type)



This series is not a recommended product.
Not recommended for new design.

Features

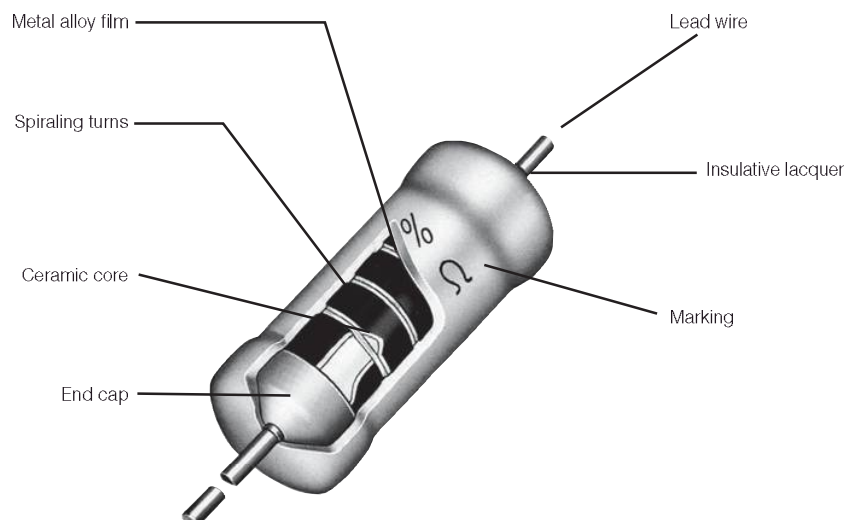
- Accurate fusing
- Small size and lightweight
- Uniform quality, consistent performance and reliability
- Flame retardant, utilizing exclusive silicon insulation material
- Reference Standard
EIAJ RC-2125
- RoHS compliant

Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	R	Q		2	A	B	J		1	0	1	
Product Code Metal Film Fusing Resistors		Power Rating at 70 °C amb.		Special Feature		Resistance Tolerance		Resistance Value		Suffix for Packaging and/or Cut & Formed Leads		
		14	0.25 W	A	Standard	J		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 2.2=2R2.		Nil	Std. bulk packing	
		12	0.5 W	Z	Less than 2 Ω					P	P type cut & formed	
		1	1 W	AB	Standard					P...S	P...S type cut & formed	
		2	2 W	Z	Less than 2 Ω					E	Radial Taped & Box	
										W...E	Radial Taped & Box	

The above example shows a standard Metal Film Fusing Resistors, 2 W power rating, resistance value of 100 Ω, tolerance of ±5 %, and package of standard bulk packing.

Construction



Ratings

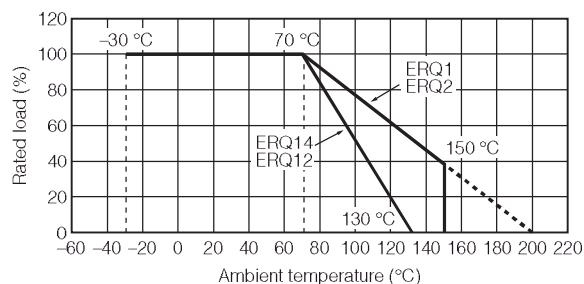
Part No.	Power Rating at 70°C (W)	Maximum Open Circuit Voltage ⁽¹⁾ (V)	Maximum Overload Voltage	Dielectric With-standing Voltage (V)	Resistance Tolerance (%)	Resistance Range (Ω)		T.C.R. (×10 ⁻⁶ /°C)	Standard Resistance Values	Marking Method on Body	Mass (Weight) [g/p.c.]
						min.	max.				
ERQ14Z	0.25	200	3 times of rated voltage ⁽²⁾	AC 350	J (± 5)	1.0	1.8	±350	E24	Color code	0.24
ERQ14A						2.0	470				
ERQ12Z	0.5	250		AC 350	J (± 5)	1.0	1.8	±350	E24	Stamp	0.32
ERQ12A						2.0	560			Color code	
ERQ1Z	1	250		AC 600	J (± 5)	1.0	1.8	±350	E24	Stamp	0.64
ERQ1AB						2.0	560				
ERQ2Z	2	250		AC 1000	J (± 5)	1.0	1.8	±350	E24	Stamp	1.54
ERQ2AB						2.0	560				

(1) Maximum Open Circuit Voltage: Referring to the maximum value of the voltage applied between terminals of the resistor when the resistor is opened in an electric circuit 1000 times power rating or voltage specified above whichever less is regarded as the maximum open circuit voltage.

(2) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$

Power Derating Curve

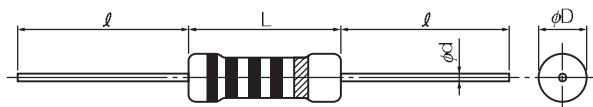
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



Performance Specifications

Characteristics	Specifications	Test Methods																
Fusing Characteristics	<table border="1"> <thead> <tr> <th>Rated Power</th><th>Res. Value (Ω)</th><th>Limit</th></tr> </thead> <tbody> <tr> <td>0.25 W 0.5 W</td><td rowspan="2">1 to 1.8</td><td>Open within 30 seconds at 30 times the rated power</td></tr> <tr> <td>1 W 2 W</td><td>Open within 30 seconds at 25 times the rated power</td></tr> <tr> <td>0.25 W 0.5 W 1 W 2 W</td><td>2 to 9.1</td><td>Open within 30 seconds at 16 times the rated power</td></tr> <tr> <td>0.25 W</td><td>10 to 470</td><td rowspan="2">Open within 30 seconds at 12 times the rated power</td></tr> <tr> <td>0.5 W 1 W 2 W</td><td>10 to 560</td></tr> </tbody> </table>	Rated Power	Res. Value (Ω)	Limit	0.25 W 0.5 W	1 to 1.8	Open within 30 seconds at 30 times the rated power	1 W 2 W	Open within 30 seconds at 25 times the rated power	0.25 W 0.5 W 1 W 2 W	2 to 9.1	Open within 30 seconds at 16 times the rated power	0.25 W	10 to 470	Open within 30 seconds at 12 times the rated power	0.5 W 1 W 2 W	10 to 560	<p>The test potential shall be preadjusted using a dummy resistor and then be subjected to the test specimens. The potential shall be readjusted within two seconds to reach the exact value of specified current. This test shall be made under the conditions at 20 °C and 65 % RH (or at a temperature of 5 °C to 35 °C and 45 to 85 % RH, only when any doubt may not be caused), and the use of stabilized power source is suggested. Fusing time shall be measured as the duration until the circuit current is decreased to a 1/50 the initial test current or less.</p>
Rated Power	Res. Value (Ω)	Limit																
0.25 W 0.5 W	1 to 1.8	Open within 30 seconds at 30 times the rated power																
1 W 2 W		Open within 30 seconds at 25 times the rated power																
0.25 W 0.5 W 1 W 2 W	2 to 9.1	Open within 30 seconds at 16 times the rated power																
0.25 W	10 to 470	Open within 30 seconds at 12 times the rated power																
0.5 W 1 W 2 W	10 to 560																	

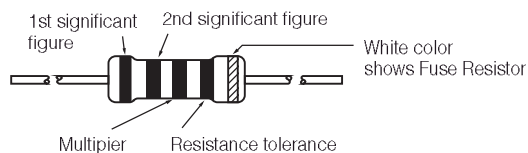
Dimensions in mm (not to scale)



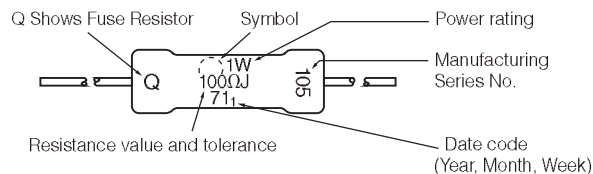
Part No.	Dimensions (mm)			
	L	ϕD	l	ϕd
ERQ14	$6.3^{+1.5}_{-1.0}$	$2.3^{+0.5}$	$30.0^{+3.0}$	$0.65^{+0.05}$
ERQ12	$9.0^{+1.5}_{-1.0}$	$2.8^{+0.5}$	$30.0^{+3.0}$	$0.65^{+0.05}$
ERQ1	$12.0^{+1.5}_{-1.0}$	$4.0^{+1.0}$	$30.0^{+3.0}$	$0.80^{+0.05}$
ERQ2	$15.0^{+1.5}$	$5.5^{+1.0}$	$38.0^{+3.0}$	$0.80^{+0.05}$

Explanation of Marking

Type ERQ14, ERQ12 (0.25 W, 0.5 W)

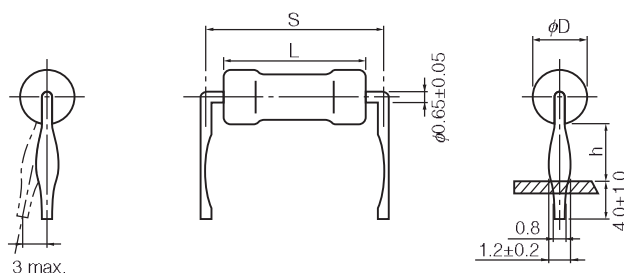


Type ERQ1, ERQ2 (1W, 2W)



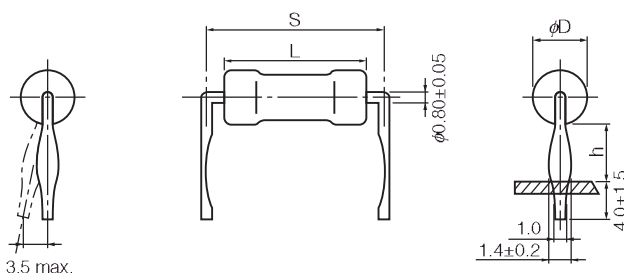
Cut & Formed Type

ERQ□□AJ□□□□P
ERQ□□ZJ□□□□P



Part No.	Power Rating at 70 °C (W)	Standard Q'ty/Packing (pcs.)	Dimensions (mm)			
			L	ϕD	S	h
ERQ14□□AJ□□□□P	0.25	2,000	$6.3^{+1.5}_{-1.0}$	$2.3^{+0.5}$	$10.0^{+1.5}$	$4.0^{+1.5}$
ERQ12□□AJ□□□□P	0.5	2,000	$9.0^{+1.5}_{-1.0}$	$2.8^{+0.5}$	$12.5^{+1.5}$	$4.0^{+1.5}$

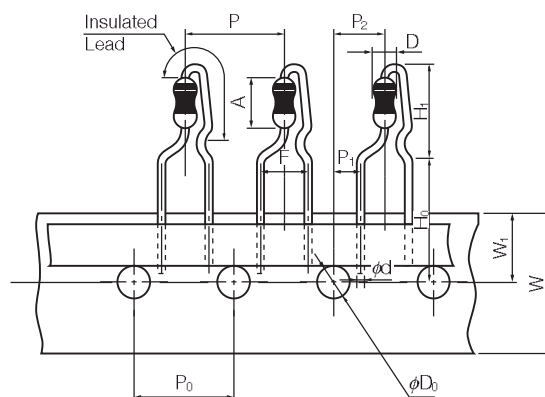
ERQ□□ABJP□□□□S
ERQ□□ZJP□□□□S



Part No.	Power Rating at 70 °C (W)	Standard Q'ty/Packing (pcs.)	Dimensions (mm)			
			L	ϕD	S	h
ERQ1□□ABJP□□□□S	1	1,000	$12.0^{+1.5}_{-1.0}$	$4.0^{+1.0}$	$15.0^{+1.5}$	$6.0^{+1.5}$
ERQ2□□ABJP□□□□S	2	1,000	$15.0^{+1.5}$	$5.5^{+1.0}$	$20.0^{+2.0}$	$6.5^{+1.5}$

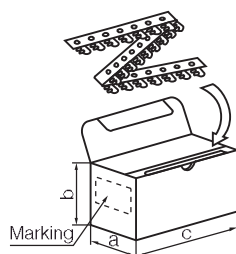
For Panasert Automatic Insertion Machine Radial Taped & Box

ERQ□□AJ□□□□E
ERQ□□ZJ□□□□E
(14A/14Z, 12A/12Z, 1AB/1Z)



Dimensions (mm)		Dimensions (mm)		Dimensions (mm)			Dimensions (mm)			Dimensions (mm)		
P	12.7±1.0	W	18.0±0.5	H ₁	14A/14Z	12 max.	A	14A/14Z	6.35 ^{+0.65} _{-0.35}	D	14A/14Z	2.3±0.5
P ₀	12.7±0.3	W ₁	9.0±0.5		12A/12Z	15.5 max.		12A/12Z	9.0 ^{+1.5} _{-1.0}		12A/12Z	2.8±0.5
P ₁	3.85±0.70				1AB/1Z	19 max.		1AB/1Z	12.0 ^{+1.5} _{-1.0}		1AB/1Z	4.0±1.0
P ₂	6.35±1.00			H ₀	16.0±0.5		φd	0.65±0.05				
F	5.0±0.8			φD ₀	4.0±0.2							

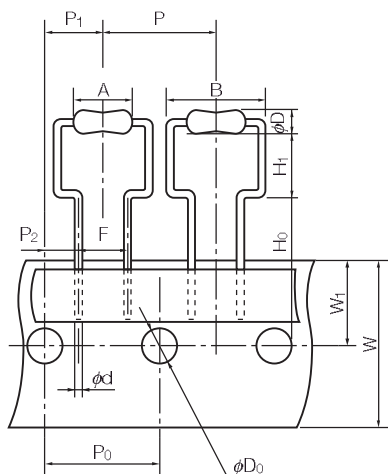
● Radial Tape Packaging Methods



Part Number	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERQ14AJ□□□□E ERQ14ZJ□□□□E	46	130	335	2,000 pcs./box
ERQ12AJ□□□□E ERQ12ZJ□□□□E	46	130	335	2,000 pcs./box
ERQ1ABJ□□□□E ERQ1ZJ□□□□E	49	100	335	1,000 pcs./box

For Panasert Automatic Insertion Machine Radial Taped & Box

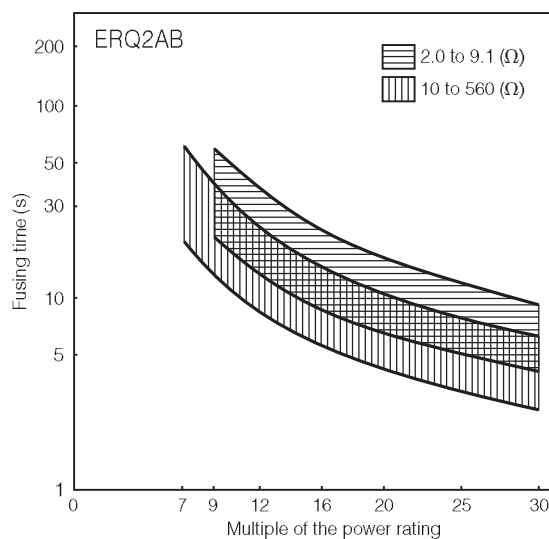
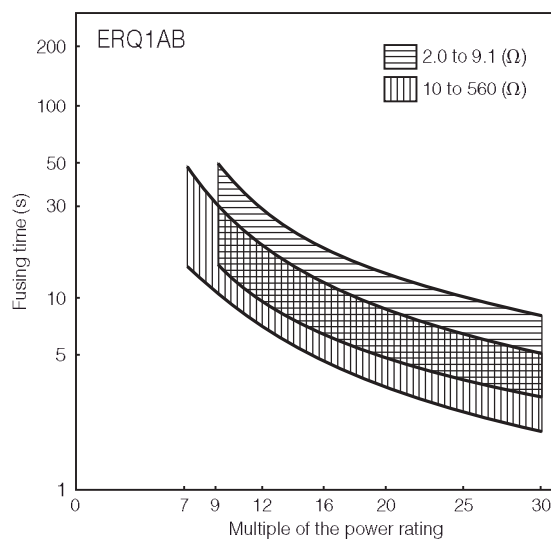
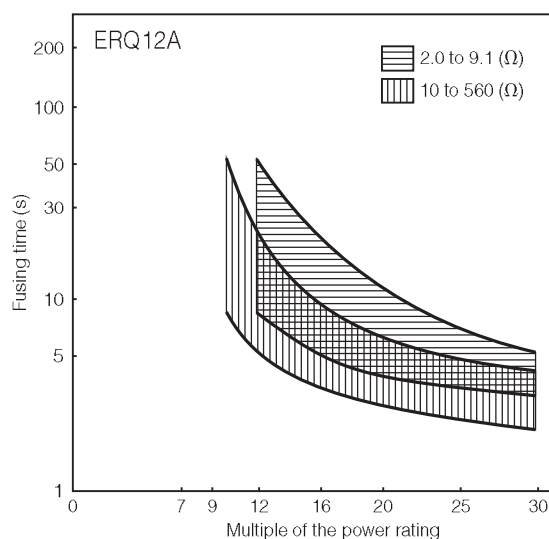
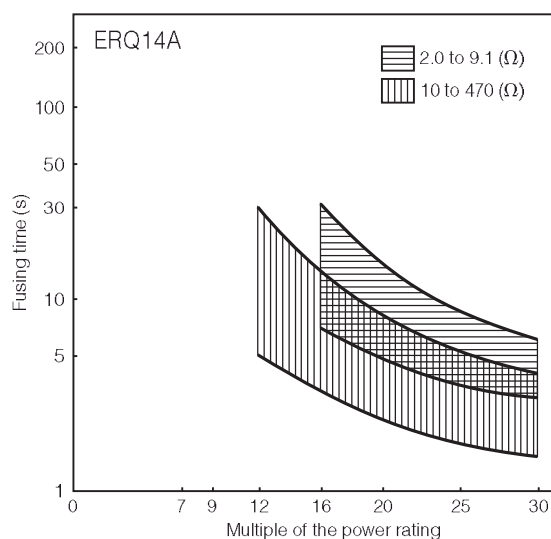
ERQ□□A/ZJW□□□□E (14A/14Z, 12A/12Z, 1AB/1Z)



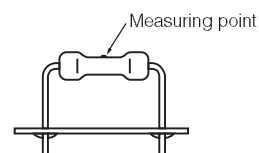
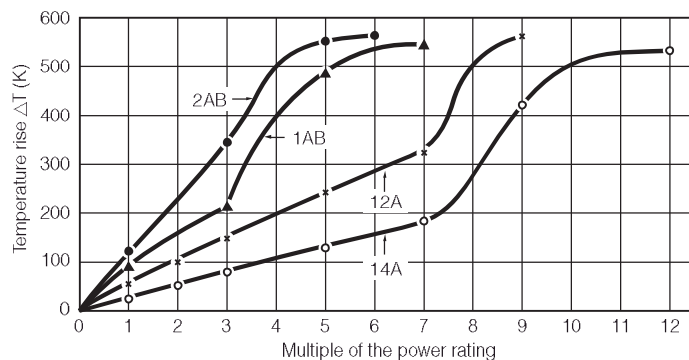
Dimensions (mm)			Dimensions (mm)		
P	14A/14Z	12.7±1.0	H ₁	14A/14Z	6.5 ^{+0.6} _{-0.3}
	12A/12Z, 1AB/1Z	30.0±1.0		12A/12Z	6.5 ^{+1.0} _{-0.5}
P ₀	14A/14Z	12.7±0.3	φD ₀	1AB/1Z	6.5 ^{+1.0} _{-0.5}
	12A/12Z, 1AB/1Z	15.0±0.3		4.0±0.2	
P ₁	14A/14Z	6.35±1.00	A	14A/14Z	6.35 ^{+0.65} _{-0.35}
	12A/12Z, 1AB/1Z	7.5±1.0		12A/12Z	9.0 ^{+1.5} _{-1.0}
P ₂	14A/14Z	3.85±0.70	B	1AB/1Z	12.0 ^{+1.5} _{-1.0}
	12A/12Z, 1AB/1Z	3.75±0.50		14A/14Z	11.2 max.
F	14A/14Z	5.0 ^{+0.8} _{-0.2}	B	12A/12Z	14 max.
	12A/12Z, 1AB/1Z	7.5 ^{+0.8} _{-0.2}		1AB/1Z	17 max.
W	18.0±0.5		φD	14A/14Z	2.3 ^{+0.5} _{-0.3}
W ₁	9.0±0.5			12A/12Z	2.8±0.5
H ₀	14A/14Z	16.0±0.5	φd	1AB/1Z	4.0±1.0
	12A/12Z	18.0±1.0		14A/14Z	0.65±0.05
	1AB/1Z	18.0±1.0		12A/12Z, 1AB/1Z	0.80±0.05

Fusing Characteristics (Constant Voltage Circuit)

This data is for reference only, specifications should be verified in written form with the engineering division.



Hot Spot Temperature (for reference)



⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the common precautions for Fixed Resistors in this catalog.

1. Checking the fusing conditions

- 1) Fusing characteristics differ depending on the type, shape, and resistance. Check the fusing conditions before selecting the type of Metal Film Fusing Resistors (hereafter called the fusing resistor) to be used.
- 2) Use the fusing resistors under the maximum open circuit voltage. Otherwise, arcing may occur when a voltage much higher than the rated one is applied in the event of an abnormality in the circuit, or when a high voltage is applied after fusing.
- 3) Under abnormal conditions of a constant voltage circuit, a current of about 2 or 3 times the initial abnormal current passes through, accelerating the speed at which the fusing resistors blows. When using a constant current circuit, carefully check the conditions because the fusing resistors may not blow in a constant current circuit.

2. Checking for pulse voltage, impact voltage, and transient voltage

Make sure to evaluate and check the fusing resistors mounted on your product if they are to be mounted on a circuit that generates an impact voltage, or if there is a possibility that the transient phenomenon (significantly high voltage applied in a short time) may occur or that a pulse voltage with a high peak voltage may be applied. Make sure to consult our sales staff before using the fusing resistors under special conditions.

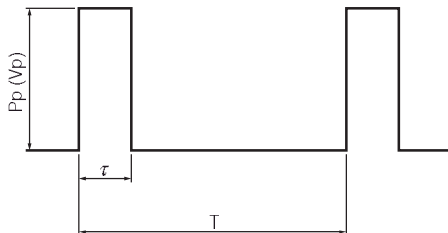
3. Conditions of use in a steady state

Make sure that the load conditions have a sufficient allowance for the power derating curve. The characteristics of the fusing resistors are set by using a constant voltage circuit.

4. The solvent resistance of the fusing resistors is not assured. If you use a solvent for cleaning after soldering or other processes, make sure to consult our sales staff before use and perform a prior test and evaluation to ensure that the solvent will not affect the reliability of the fusing resistors.

(Data for Reference)

Pulse Characteristics (Usual)



- P_p : Pulse limit power (W)
- V_p : Pulse limit voltage (V)
- τ : Pulse continuous time (s)
- T : Period (s)
- V_R : Rated voltage (V)
- P : Rated power (W)
- R : Resistance value (Ω)
- $V_{p\max.}$: Max. pulse limit voltage (V)

Withstand pulse limit power is calculated by the next method.

$$P_p = K \cdot P \cdot T/\tau$$

$$V_p = \sqrt{K \cdot P \cdot R \cdot T/\tau}$$

Reference to the right about a fixed number of $V_{p\max.}$

Part No.	K	$V_{p\max.}$ (V)
ERQ14A	0.6	200
ERQ12A	0.6	250
ERQ1AB	0.6	250
ERQ2AB	0.4	250

- $T > 1(s) \rightarrow T = 1(s)$
- $T/\tau > 100 \rightarrow T/\tau = 100$
- $P_p < P \rightarrow P$ stands for P_p
($V_p < V_R \rightarrow V_R$ stands for V_p)
- Added voltage $\leq V_{p\max.}$
- P_p or V_p is reference value

Conditions : Pulse added time=1000 h, Resistance change=±5 %
Room temperature

⚠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.

Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.

Metal Film Resistors

Type: **ERXL** (Low Resistance Value)
(0.5 W, 1 W, 2 W)



This series is not a recommended product.
Not recommended for new design.

Features

- Miniaturized
- Non-flammable
- Automatic Insertion
- RoHS compliant

Explanation of Part Numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	R	X		2	L	J		4	7	M	
Product Code		Power Rating		Special Feature		Resistance Tolerance		Resistance Value		Forming / Packaging	
ERX	Metal Film Resistors	12 0.5 W	1 1 W	2 2 W	L	Small size Low resistance value	J ±5 %	The first two digits are significant figures of resistance and it shows by the unit of the "mΩ". Decimal point is expressed by M as 47 mΩ = 47M.		Forming & Taping matrix	

Ratings

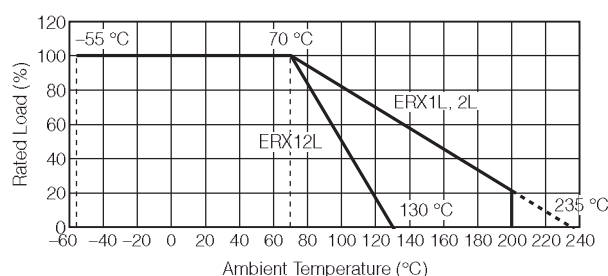
Part No.	Power Rating at 70 °C ⁽¹⁾ (W)	Dielectric Withstanding Voltage (VAC)	Res. Tol. (%) ⁽²⁾	Resistance Range (Ω) ⁽²⁾		T.C.R. ($\times 10^{-6}/^{\circ}\text{C}$)	Standard Resistance Value
				min.	max.		
ERX12L	0.5	350	J (± 5)	22 m	82 m	22 to 39 $\text{m}\Omega = \pm 1000$ 47 to 82 $\text{m}\Omega = \pm 500$	E12
ERX1L	1	350	J (± 5)	22 m	82 m		E12
ERX2L	2	600	J (± 5)	22 m	82 m		E12

(1) Rated Continuous Working Voltage (RCWV) shall be determined from $\text{RCWV} = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$.

(2) Resistance tolerance and resistance range is of use besides range listed, please inquire.

Power Derating Curve

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



■ As for Packaging Methods and / or cut formed leads,

Please see Metal (Oxide) Film Resistors Packaging Methods

⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the common precautions for Fixed Resistors in this catalog.

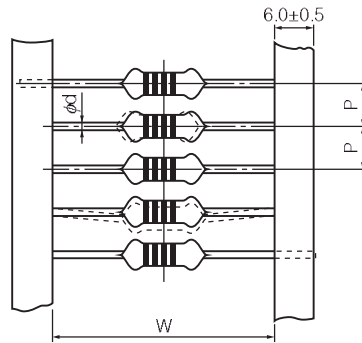
1. Transient voltage

If there is a possibility that the transient phenomenon (significantly high voltage applied in a short time) may occur or that a high voltage pulse may be applied, make sure to evaluate and check the characteristics of Metal Film Resistors (hereafter called the resistors) mounted on your product rather than only depending on the calculated power limit or steady-state conditions to complete the design or decide to use the resistors.

- The resistors are covered with a special coating. Do not apply shock or vibration to them, or pinch them with long-nose pliers. Otherwise, the resistors may be damaged.
- Do not apply excessive tension to the lead-connected sections. When bending the lead wire, do not apply excessive stress to the resistors and provide the wire with a natural curvature.
- Do not brush the resistors during or after the cleaning process, which may be conducted after soldering. Otherwise, the coating film may be damaged.

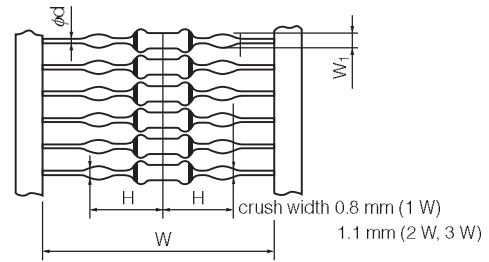
Taped & Box

ERG(X)□□S□□□□V

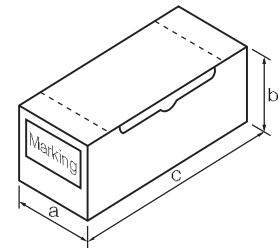


Stand-off Taped & Box

ERG(X)□□S□□□□V

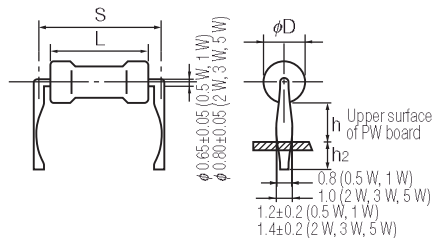


Part Number	Standard Quantity (pcs./box)	Taping (mm)						Box (mm)		
		P	50xP	W	H	W1	φd	a	b	c
ERG(X) 12S□□□□V	2,000	5.0 ^{+0.3}	250 ^{±2}	52.0 ^{+1.5}	—	—	0.65 ^{+0.05}	85	80	255
ERG(X) 1S□□□□V	2,000	5.0 ^{+0.3}	250 ^{±2}	52.0 ^{+1.5}	—	—	0.65 ^{+0.05}	85	80	255
ERG(X) 1S□□□□V					12.0 ^{+0.9} _{-2.0}	1.20 ^{+0.15} _{-0.0}				
ERG(X) 2S□□□□V	1,000	5.0 ^{+0.3}	250 ^{±2}	52.0 ^{+1.5}	—	—	0.80 ^{+0.05}	85	80	255
ERG(X) 2S□□□□V					15.5 ^{+0.9} _{-2.0}	1.40 ^{+0.15} _{-0.0}				
ERG(X) 3S□□□□V	1,000	10.0 ^{+0.5}	500 ^{±2}	74.0 ^{+2.0}	—	—	0.80 ^{+0.05}	105	100	325
ERG(X) 3S□□□□V					23.0 ^{+0.9} _{-2.0}	1.4 ^{+0.15} _{-0.0}				



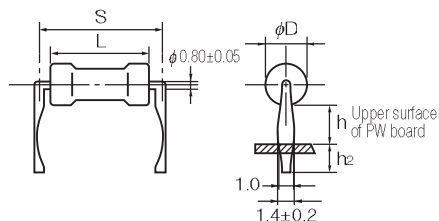
Cut & Formed Type

ERG(X)□□S□□□□P



Part Number	Standard Quantity (pcs./box)	Dimensions (mm)				
		L	φD	S	h	h2
ERG(X) 12S□□□□P	1,000	6.35 ^{+0.65} _{-0.35}	2.3 ^{+0.5} _{-0.3}	10.0 ^{+1.5}	4.0 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 1S□□□□P	1,000	9.00 ^{+1.50} _{-1.00}	2.8 ^{+0.5}	12.5 ^{+1.5}	4.0 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 2S□□□□P	1,000	12.00 ^{+1.50} _{-1.00}	4.0 ^{+1.0}	15.0 ^{+1.5}	6.0 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 3S□□□□P	1,000	15.00 ^{+1.50}	5.5 ^{+1.0}	20.0 ^{+2.0}	6.5 ^{+1.5}	4.0 ^{+1.5}
ERG(X) 5S□□□□P	500	24.00 ^{+1.50}	8.0 ^{+1.0}	30.0 ^{+2.0}	7.5 ^{+1.5}	4.0 ^{+1.5}

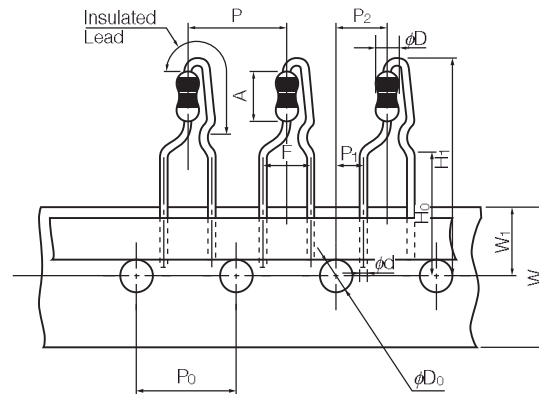
ERG(X)□F□□□□H



Part Number	Standard Quantity (pcs./box)	Dimensions (mm)				
		L	φD	S	h	h2
ERG(X) 1F□□□□H	1,000	9.0 ^{+1.5} _{-1.0}	2.8 ^{+0.5}	12.5 ^{+1.5}	8 ⁺²	4.0 ^{+1.5}
ERG(X) 2F□□□□H	1,000	12.0 ^{+1.5} _{-1.0}	4.0 ^{+1.0}	15.0 ^{+1.5}	6 ⁺²	5.0 ^{+1.5}
ERG(X) 3F□□□□H	1,000	15.0 ^{+1.5}	5.5 ^{+1.0}	20.0 ^{+2.0}	10 ⁺²	5.0 ^{+1.5}
ERG(X) 5F□□□□H	500	24.0 ^{+1.5}	8.0 ^{+1.0}	30.0 ^{+2.0}	10 ⁺²	5.0 ^{+1.5}

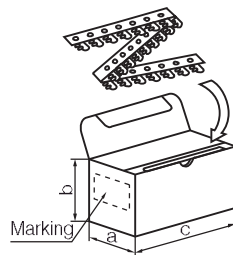
For Panasert Automatic Insertion Machine Radial Taped & Box

ERG(X)□□S□□□□E (12S, 1S, 2S)



Dimensions (mm)		Dimensions (mm)		Dimensions (mm)		Dimensions (mm)			Dimensions (mm)			
P	12.7±1.0	W	18.0±0.5	H ₁	12S	32 max.	A	12S	6.35 ^{+0.65} _{-0.35}	ϕD	12S	2.3 ^{+0.5} _{-0.3}
P ₀	12.7±0.3	W ₁	9.0±0.5		1S	32 max.		1S	9.0 ^{+1.5} _{-1.0}		1S	2.8±0.5
P ₁	3.85±0.70				2S	38 max.		2S	12.0 ^{+1.5} _{-1.0}		2S	4.0±1.0
P ₂	6.35±1.00			H ₀	16.0±0.5		ϕd	0.65±0.05				
F	5.0±0.8			ϕD ₀	4.0±0.2							

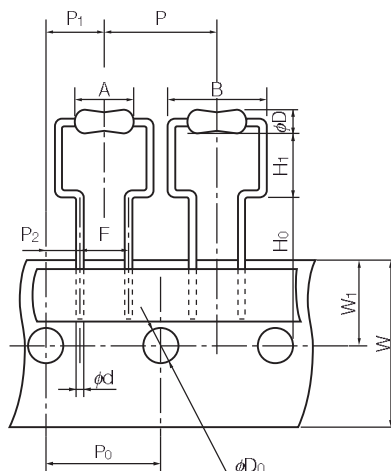
● Radial Tape Package Specifications



Part Number	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERG(X) 12S□□□□E	46	130	335	2,000
ERG(X) 1S□□□□E	46	130	335	2,000
ERG(X) 2S□□□□E	49	100	335	1,000

For Panasert Automatic Insertion Machine Radial Taped & Box

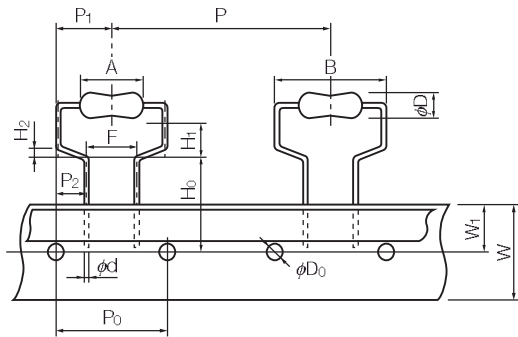
ERG(X)□□S□W□□□E (12S, 1S, 2S, 3S)



Dimensions (mm)			Dimensions (mm)			
P	12S	12.7±1.0	φD ₀	12S, 1S, 2S, 3S	4.0±0.2	
	1S, 2S, 3S	30.0±1.0		12S	6.35 ^{+0.65} _{-0.35}	
P ₀	12S	12.7±0.3		A	1S	9.0 ^{+1.5} _{-1.0}
	1S, 2S, 3S	15.0±0.3			2S	12.0 ^{+1.5} _{-1.0}
P ₁	12S	6.35±1.00			B	3S
	1S, 2S, 3S	7.5±1.0		12S		11.2 max.
P ₂	12S	3.85±0.70		B		1S
	1S, 2S, 3S	3.75±0.50			2S	17.0 max.
F	12S	5.0±0.5			φD	3S
	1S, 2S, 3S	7.5±0.8		12S		2.3 ^{+0.5} _{-0.3}
W	12S, 1S, 2S, 3S	18.0±0.5	1S	2.8±0.5		
W ₁	12S, 1S, 2S, 3S	9.0±0.5	2S	4.0±1.0		
H ₀	12S	16.0±0.5	φd	3S		5.5±1.0
	1S, 2S	18.0±1.0		12S		φ0.65±0.05
	3S	19.0±1.0		1S, 2S, 3S		φ0.80±0.05
H ₁	12S	6.5 ^{+0.6} ₀	φD			
	1S, 2S	6.5 ^{+1.0} ₀				
	3S	8.0 ^{+1.0} ₀				

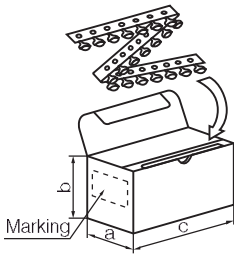
For Panasert Automatic Insertion Machine Radial Taped & Box

ERG(X)□F□S□□□E (1F, 2F, 3F)



Dimensions (mm)		Dimensions (mm)	
P	30.0±1.0	H ₂	1.0±0.3
P ₀	15.0±0.3	ϕD_0	4.0±0.2
P ₁	7.5±1.0	A	1F 9.0 ^{+1.5} _{-1.0}
P ₂	3.75±0.50		2F 12.0 ^{+1.5} _{-1.0}
F	7.5±0.8		3F 15.0±1.5
W	18.0±0.5	B	1F 14 max.
W ₁	9.0±0.5		2F 17 max.
H ₀	16.0 ^{+1.0} ₀		3F 21 max.
H ₁	1F 7.0 ^{+1.0} ₀	ϕD	1F 2.8±0.5
	2F 8.0 ^{+1.0} ₀		2F 4.0±1.0
	3F 9.0 ^{+1.0} ₀		3F 5.5±1.0
		ϕd	0.80±0.05

● Radial Tape Package Specifications



Part No.	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERG(X)12S□W□□□E	46	145	325	2,000
ERG(X) 1S□W□□□E	49	150	317	1,000
ERG(X) 1F□ S□□□E				
ERG(X) 2S□W□□□E	49	150	317	500
ERG(X) 2F□ S□□□E				
ERG(X) 3F□ S□□□E	49	190	315	500

⚠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.

Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.

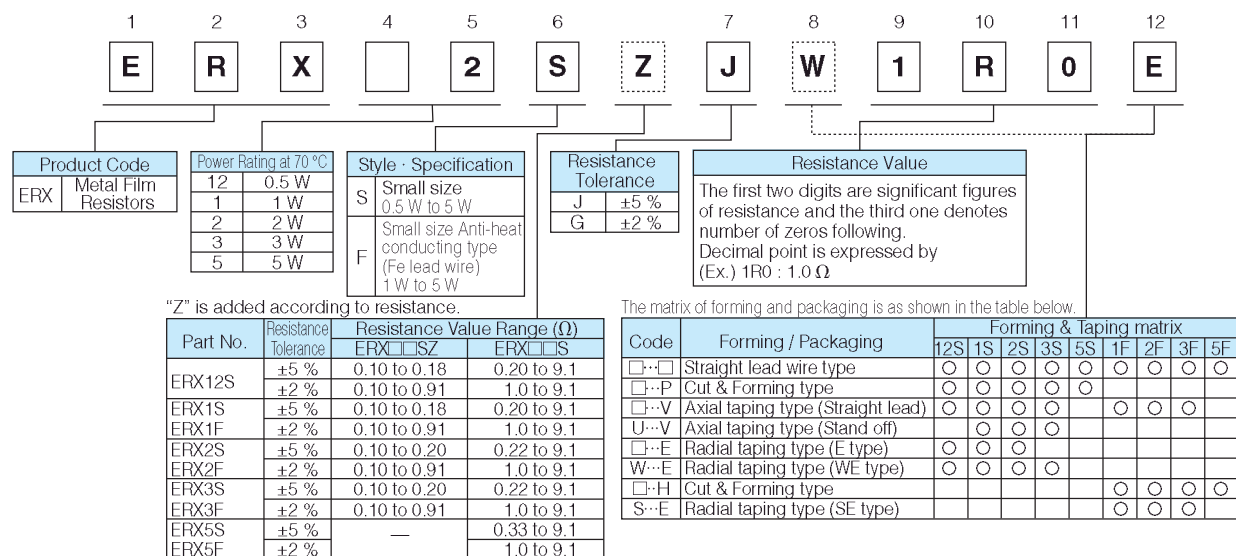
ERG(X)F (Anti-heat conducting for PCB)
(1 W, 2 W, 3 W, 5 W)



This series is not a recommended product.
Not recommended for new design.

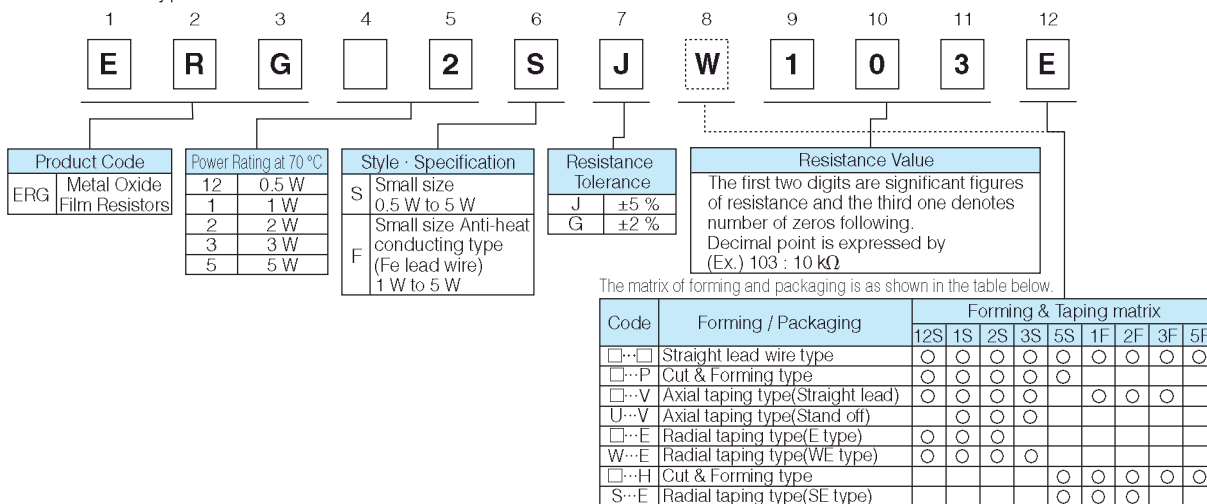
- Miniaturized
50 % smaller compared to existing models
- Non-flammable
- High Reliability
- Automatic Insertion
- Reference Standards
IEC 60115-2, IEC 60115-4, JIS C 5201-4, EIAJ RC-2138
- RoHS compliant

Ex.1 : ERX type



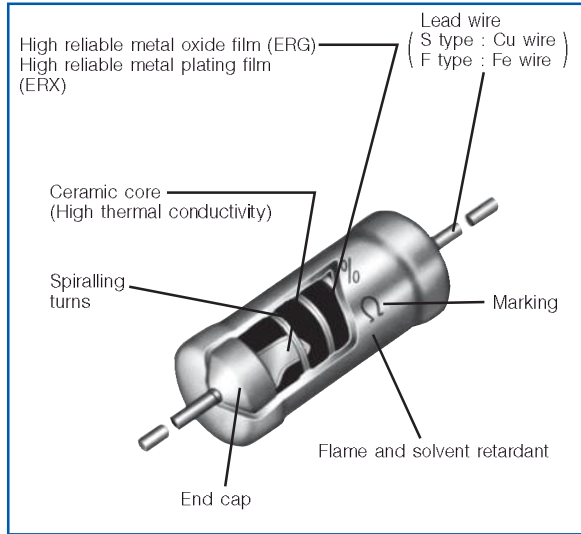
The above example 1 shows a small metal film resistor, 2 W power rating, resistance value of 1.0 Ω , tolerance $\pm 5\%$, and package of radial tapering.

Ex.2 : ERG type

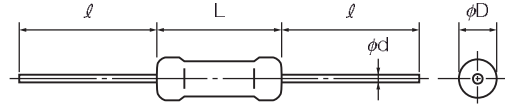


The above example 2 shows a small metal oxide film resistor, 2 W power rating, resistance value of 10 k Ω , tolerance $\pm 5\%$, and package of radial tapping.

Construction



Dimensions in mm (not to scale)



Part No.	Dimensions (mm)				Mass (Weight) [g/pc.]
	L	φD	ℓ	φd	
ERG(X)12S	6.35 ^{+0.65} _{-0.35}	2.3 ^{+0.5} _{-0.3}	30.0 ^{+3.0}	0.65 ^{+0.05}	0.26
ERG(X)1S	9.00 ^{+1.50} _{-1.00}	2.8 ^{+0.5}	30.0 ^{+3.0}	0.65 ^{+0.05}	0.33
ERG(X)1F				0.80 ^{+0.05}	
ERG(X)2S	12.00 ^{+1.50} _{-1.00}	4.0 ^{+1.0}	30.0 ^{+3.0}	0.80 ^{+0.05}	0.66
ERG(X)2F					
ERG(X)3S	15.00 ^{+1.50}	5.5 ^{+1.0}	38.0 ^{+3.0}	0.80 ^{+0.05}	1.47
ERG(X)3F					
ERG(X)5S	24.00 ^{+1.50}	8.0 ^{+1.0}	38.0 ^{+3.0}	0.80 ^{+0.05}	3.54
ERG(X)5F					

Ratings

Part No.	Power Rating at 70 °C (W)	Limiting Element Voltage ⁽¹⁾ (V)	Maximum Overload Voltage ⁽²⁾ (V)	Maximum Intermittent Overload Voltage ⁽³⁾ (V)	Dielectric Withstanding Voltage (VAC)	Res. Tol. (%) ⁽⁴⁾	Resistance Range (Ω) ⁽⁵⁾		T.C.R. (×10 ⁻⁶ /°C)	Standard Resistance Value
							min. ⁽⁶⁾	max.		
ERG(X)12S	0.5	300	600	600	350	G (±2) J (±5)	1 0.2	22 k 47 k	±350	E24
ERG(X)1S ERG(X)1F	1	350	600	600	350	G (±2) J (±5)	1 0.2	68 k 100 k	±350	E24
ERG(X)2S ERG(X)2F	2	350	700	1000	600	G (±2) J (±5)	1 0.22	100 k 100 k	±350	E24
ERG(X)3S ERG(X)3F	3	350	700	1000	1000	G (±2) J (±5)	1 0.22	100 k 100 k	±300	E24
ERG(X)5S ERG(X)5F	5	500	1000	1500	1000	G (±2) J (±5)	1 0.33	100 k 100 k	±200	E24

- (1) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ or Limiting Element Voltage listed above whichever less.
- (2) Overload (Short-time Overload) Test Voltage (SOTV) shall be determined from $SOTV = 2.5 \times \text{Power Rating}$ or max. Overload Voltage listed above whichever less.
- (3) Intermittent Overload Test Voltage (IOTV) shall be determined from $IOTV = 4.0 \times \text{Power Rating}$ or max. Intermittent Overload Voltage listed above whichever less.

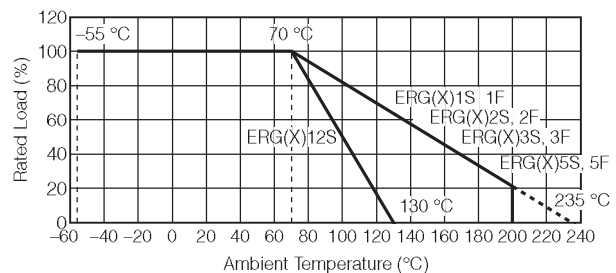
- (4) Resistance tolerance is of use besides range listed, please inquire.
- (5) Resistance Range Type ERG : $\geq 10 \Omega$
Type ERX : $\leq 9.1 \Omega$
- (6) As for the low resistance value range, "Z" is given to the part number. (Refer to the explanation of part numbers.)

* Z type is non standard resistance values.

Code	Part No.	Res. Tol.	Res. Value Range	Code	Part No.	Res. Tol.	Res. Value Range
Z	12S	±2 %	0.1 to 0.91 Ω	Z	2S	±2 %	0.1 to 0.91 Ω
		±5 %	0.1 to 0.18 Ω		2F	±5 %	0.1 to 0.2 Ω
	1S	±2 %	0.1 to 0.91 Ω		3S	±2 %	0.1 to 0.91 Ω
		±5 %	0.1 to 0.18 Ω		3F	±5 %	0.1 to 0.2 Ω

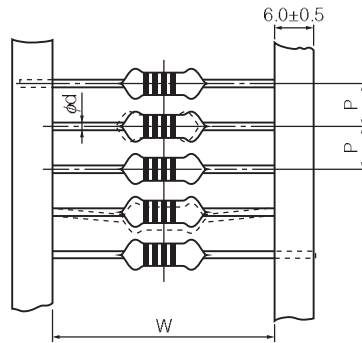
Power Derating Curve

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



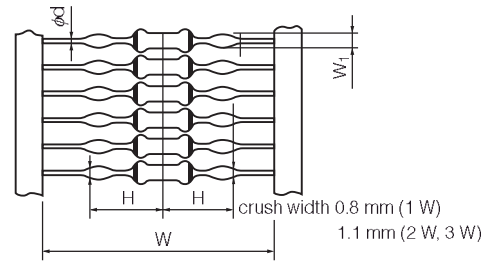
Taped & Box

ERG(X)□□S□□□□V

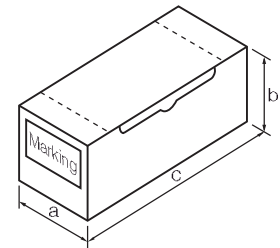


Stand-off Taped & Box

ERG(X)□□S□□□□V

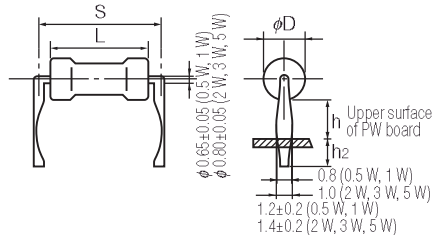


Part Number	Standard Quantity (pcs./box)	Taping (mm)						Box (mm)		
		P	50xP	W	H	W ₁	φd	a	b	c
ERG(X) 12S□□□□V	2,000	5.0 ^{±0.3}	250 ^{±2}	52.0 ^{±1.5}	—	—	0.65 ^{+0.05}	85	80	255
ERG(X) 1S□□□□V	2,000	5.0 ^{±0.3}	250 ^{±2}	52.0 ^{±1.5}	—	—	0.65 ^{+0.05}	85	80	255
ERG(X) 1S□□□□V					12.0 ^{+0.9} _{-2.0}	1.20 ^{+0.15} ₋₀				
ERG(X) 2S□□□□V	1,000	5.0 ^{±0.3}	250 ^{±2}	52.0 ^{±1.5}	—	—	0.80 ^{+0.05}	85	80	255
ERG(X) 2S□□□□V					15.5 ^{+0.9} _{-2.0}	1.40 ^{+0.15} ₋₀				
ERG(X) 3S□□□□V	1,000	10.0 ^{±0.5}	500 ^{±2}	74.0 ^{±2.0}	—	—	0.80 ^{+0.05}	105	100	325
ERG(X) 3S□□□□V					23.0 ^{+0.9} _{-2.0}	1.4 ^{+0.15} ₋₀				



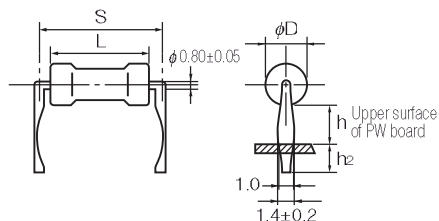
Cut & Formed Type

ERG(X)□□S□□□□P



Part Number	Standard Quantity (pcs./box)	Dimensions (mm)				
		L	φD	S	h	h ₂
ERG(X) 12S□□□□P	1,000	6.35 ^{+0.65} _{-0.35}	2.3 ^{+0.5} _{-0.3}	10.0 ^{±1.5}	4.0 ^{±1.5}	4.0 ^{±1.5}
ERG(X) 1S□□□□P	1,000	9.00 ^{+1.50} _{-1.00}	2.8 ^{±0.5}	12.5 ^{±1.5}	4.0 ^{±1.5}	4.0 ^{±1.5}
ERG(X) 2S□□□□P	1,000	12.00 ^{+1.50} _{-1.00}	4.0 ^{±1.0}	15.0 ^{±1.5}	6.0 ^{±1.5}	4.0 ^{±1.5}
ERG(X) 3S□□□□P	1,000	15.00 ^{±1.50}	5.5 ^{±1.0}	20.0 ^{±2.0}	6.5 ^{±1.5}	4.0 ^{±1.5}
ERG(X) 5S□□□□P	500	24.00 ^{±1.50}	8.0 ^{±1.0}	30.0 ^{±2.0}	7.5 ^{±1.5}	4.0 ^{±1.5}

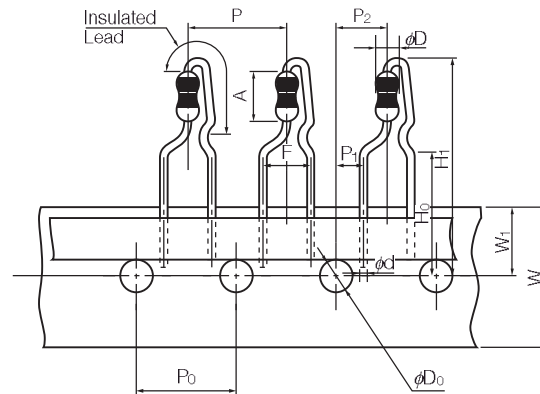
ERG(X)□F□□□□H



Part Number	Standard Quantity (pcs./box)	Dimensions (mm)				
		L	φD	S	h	h ₂
ERG(X) 1F□□□□H	1,000	9.0 ^{+1.5} _{-1.0}	2.8 ^{±0.5}	12.5 ^{±1.5}	8 ^{±2}	4.0 ^{±1.5}
ERG(X) 2F□□□□H	1,000	12.0 ^{+1.5} _{-1.0}	4.0 ^{±1.0}	15.0 ^{±1.5}	6 ^{±2}	5.0 ^{±1.5}
ERG(X) 3F□□□□H	1,000	15.0 ^{±1.5}	5.5 ^{±1.0}	20.0 ^{±2.0}	10 ^{±2}	5.0 ^{±1.5}
ERG(X) 5F□□□□H	500	24.0 ^{±1.5}	8.0 ^{±1.0}	30.0 ^{±2.0}	10 ^{±2}	5.0 ^{±1.5}

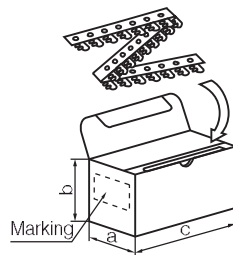
For Panasert Automatic Insertion Machine Radial Taped & Box

ERG(X)□□S□□□□E (12S, 1S, 2S)



Dimensions (mm)		Dimensions (mm)		Dimensions (mm)		Dimensions (mm)			Dimensions (mm)			
P	12.7±1.0	W	18.0±0.5	H ₁	12S	32 max.	A	12S	6.35 ^{+0.65} _{-0.35}	ϕD	12S	2.3 ^{+0.5} _{-0.3}
P ₀	12.7±0.3	W ₁	9.0±0.5		1S	32 max.		1S	9.0 ^{+1.5} _{-1.0}		1S	2.8±0.5
P ₁	3.85±0.70				2S	38 max.		2S	12.0 ^{+1.5} _{-1.0}		2S	4.0±1.0
P ₂	6.35±1.00			H ₀	16.0±0.5		ϕd	0.65±0.05				
F	5.0±0.8			ϕD ₀	4.0±0.2							

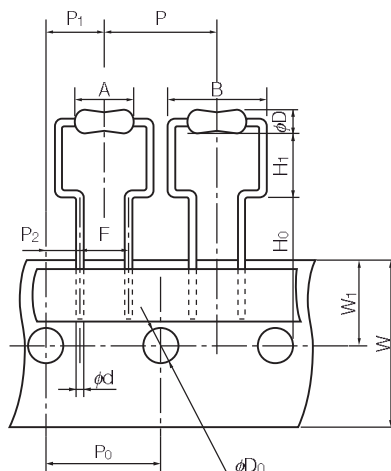
● Radial Tape Package Specifications



Part Number	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERG(X) 12S□□□□E	46	130	335	2,000
ERG(X) 1S□□□□E	46	130	335	2,000
ERG(X) 2S□□□□E	49	100	335	1,000

For Panasert Automatic Insertion Machine Radial Taped & Box

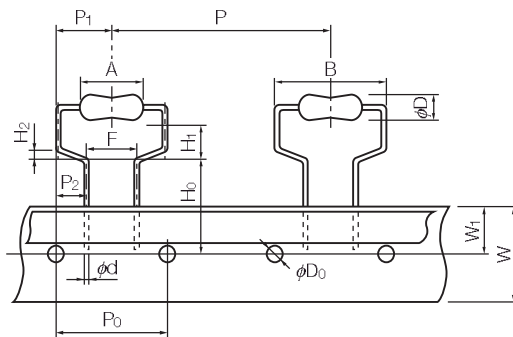
ERG(X)□□S□W□□□E (12S, 1S, 2S, 3S)



Dimensions (mm)			Dimensions (mm)			
P	12S	12.7±1.0	φD ₀	12S, 1S, 2S, 3S	4.0±0.2	
	1S, 2S, 3S	30.0±1.0		12S	6.35 ^{+0.65} _{-0.35}	
P ₀	12S	12.7±0.3		A	1S	9.0 ^{+1.5} _{-1.0}
	1S, 2S, 3S	15.0±0.3			2S	12.0 ^{+1.5} _{-1.0}
P ₁	12S	6.35±1.00			B	3S
	1S, 2S, 3S	7.5±1.0		12S		11.2 max.
P ₂	12S	3.85±0.70		B		1S
	1S, 2S, 3S	3.75±0.50			2S	17.0 max.
F	12S	5.0±0.5			φD	3S
	1S, 2S, 3S	7.5±0.8		12S		2.3 ^{+0.5} _{-0.3}
W	12S, 1S, 2S, 3S	18.0±0.5	1S	2.8±0.5		
W ₁	12S, 1S, 2S, 3S	9.0±0.5	2S	4.0±1.0		
H ₀	12S	16.0±0.5	φd	3S		5.5±1.0
	1S, 2S	18.0±1.0		12S		φ0.65±0.05
	3S	19.0±1.0		1S, 2S, 3S		φ0.80±0.05
H ₁	12S	6.5 ^{+0.6} ₀	φd			
	1S, 2S	6.5 ^{+1.0} ₀				
	3S	8.0 ^{+1.0} ₀				

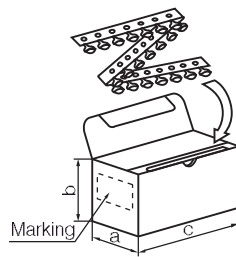
For Panasert Automatic Insertion Machine Radial Taped & Box

ERG(X)□F□S□□□E (1F, 2F, 3F)



Dimensions (mm)		Dimensions (mm)	
P	30.0±1.0	H ₂	1.0±0.3
P ₀	15.0±0.3	ϕD_0	4.0±0.2
P ₁	7.5±1.0	A	1F 9.0 ^{+1.5} _{-1.0}
P ₂	3.75±0.50		2F 12.0 ^{+1.5} _{-1.0}
F	7.5±0.8		3F 15.0±1.5
W	18.0±0.5	B	1F 14 max.
W ₁	9.0±0.5		2F 17 max.
H ₀	16.0 ^{+1.0} ₋₀		3F 21 max.
H ₁	1F 7.0 ^{+1.0} ₋₀	ϕD	1F 2.8±0.5
	2F 8.0 ^{+1.0} ₋₀		2F 4.0±1.0
	3F 9.0 ^{+1.0} ₋₀		3F 5.5±1.0
		ϕd	0.80±0.05

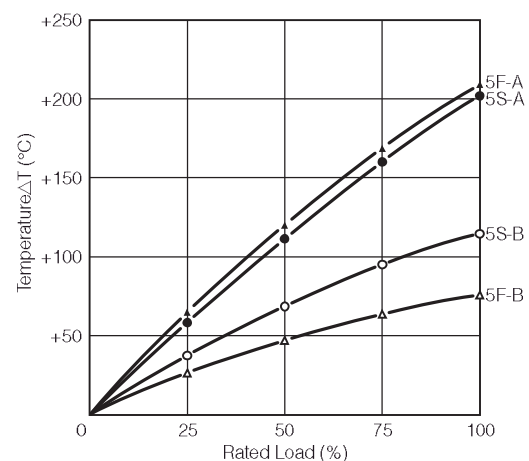
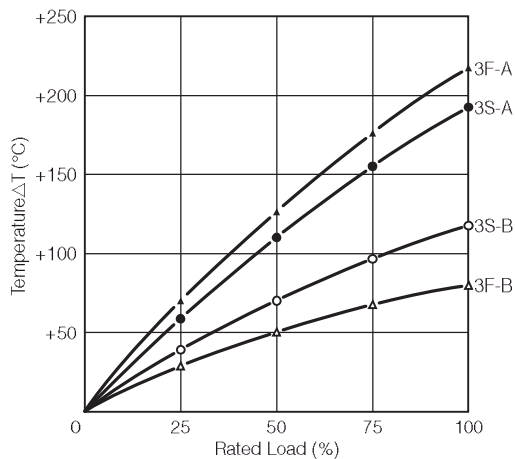
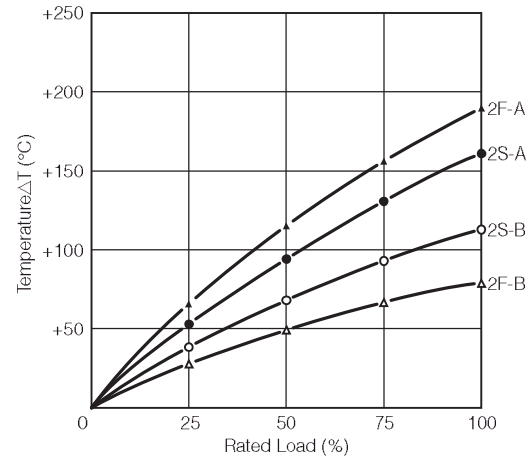
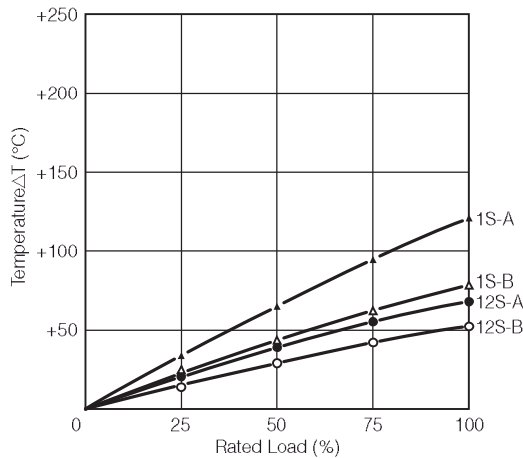
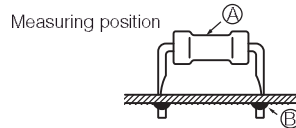
● Radial Tape Package Specifications



Part No.	Dimensions (mm)			Standard Quantity (pcs./box)
	a	b	c	
ERG(X)12S□W□□□E	46	145	325	2,000
ERG(X) 1S□W□□□E	49	150	317	1,000
ERG(X) 1F□ S□□□E				
ERG(X) 2S□W□□□E	49	150	317	500
ERG(X) 2F□ S□□□E				
ERG(X) 3F□ S□□□E	49	190	315	500

Hot-spot Temperature (for Reference)

The temperature of the resistor body increases with the curve below. A touching vinyl wire may cause damages to resistor element. Do not place vinyl wires around resistors and be sure to consider where the resistors will be placed.



⚠ Safety Precautions

The following are precautions for individual products. Please also refer to the common precautions for Fixed Resistors in this catalog.

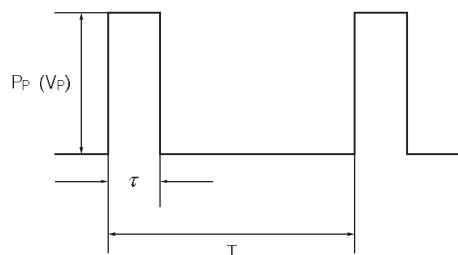
1. Transient voltage

If there is a possibility that the transient phenomenon (significantly high voltage applied in a short time) may occur or that a high voltage pulse may be applied, make sure to evaluate and check the characteristics of Metal(Oxide) Film Resistors (hereafter called the resistors) mounted on your product rather than only depending on the calculated power limit or steady-state conditions to complete the design or decide to use the resistors.

- The resistors are covered with a special coating. Do not apply shock or vibration to them, or pinch them with long-nose pliers. Otherwise, the resistors may be damaged.
- Do not apply excessive tension to the lead-connected sections. When bending the lead wire, do not apply excessive stress to the resistors and provide the wire with a natural curvature.
- Do not brush the resistors during or after the cleaning process, which may be conducted after soldering. Otherwise, the coating film may be damaged.

(Data for Reference)

Pulse Characteristics (Usual)



P_p : Pulse limit power (W)
 V_p : Pulse limit voltage (V)
 τ : Pulse continuous time (s)
 T : Period (s)
 V_R : Rated voltage (V)
 P : Rated power (W)
 R : Resistance value (Ω)
 $V_{p\max.}$: Max. pulse limit voltage (V)

Withstand pulse limit power is calculated by the next method.

$$P_p = K \cdot P \cdot T / \tau$$

$$V_p = \sqrt{K \cdot P \cdot R \cdot T / \tau}$$

Reference to the right about a fixed number of $V_{p\max.}$

- $T > 1(s) \rightarrow T = 1(s)$
- $T/\tau > 100 \rightarrow T/\tau = 100$
- $P_p < P \rightarrow P$ stands for P_p
 $(V_p < V_R \rightarrow V_R$ stands for $V_p)$
- Added voltage $\leq V_{p\max.}$
- P_p or V_p is referent value
 Conditions: Pulse added time=1000 h
 Resistance change= $\pm 5\%$
 Room temperature

Part No.	K	$V_{p\max.}$ (V)
ERG(X) 12S	0.5	600
ERG(X) 1S	0.5	600
ERG(X) 2S	0.5	700
ERG(X) 3S	0.5	700
ERG(X) 5S	0.5	1000

⚠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.

Guidelines and precautions regarding the technical information and use of our products described in this online catalog.

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.
- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.
- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.
- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.
- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.
- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

<Regarding the Certificate of Compliance with the EU RoHS Directive/REACH Regulations>

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.
- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

We do not take any responsibility for the use of our products outside the scope of the specifications, descriptions, guidelines and precautions described in this online catalog.

Panasonic NRFND.PG24.07.15.2019 Affected Parts

Part Numbers

ERG-12ANJ100R
ERG-12ANJ363R
ERG-12DJ104
ERG-12SG102
ERG-12SG510E
ERG-12SJ100P
ERG-12SJ101
ERG-12SJ101P
ERG-12SJ101V
ERG-12SJ102
ERG-12SJ103
ERG-12SJ112V
ERG-12SJ122
ERG-12SJ122V
ERG-12SJ132V
ERG-12SJ150
ERG-12SJ150A
ERG-12SJ150V
ERG-12SJ152
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