Panasonic



Product Discontinuation Notice: ERG-(x) S, ERG-(x) F, ERG-D, ERQ-A, ERQ-Z, ERX-L Series Leaded / Fusing Resistors

PDN.PG24.12.03.2021 12.03.2021

Effective Date:	Immediate
Last Time Buy Date:	January 31, 2022
Last Eligible Ship Date:	May 31, 2022
Discontinuation Details:	Due to low market demand, the Metal Oxide Film and Metal Film Fuse Resistors are being discontinued.
Suggested Replacement:	No Replacement.
Affected Part Numbers:	See Attached.
Datasheets:	See Attached.
Notes:	



Metal (Oxide) Film Resistors

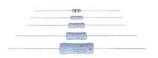
Discontinued

ERG(X)S type (Small size)

(0.5 W, 1 W, 2 W, 3 W, 5 W)

ERG(X)F type (Anti-heat conducting for PCB)

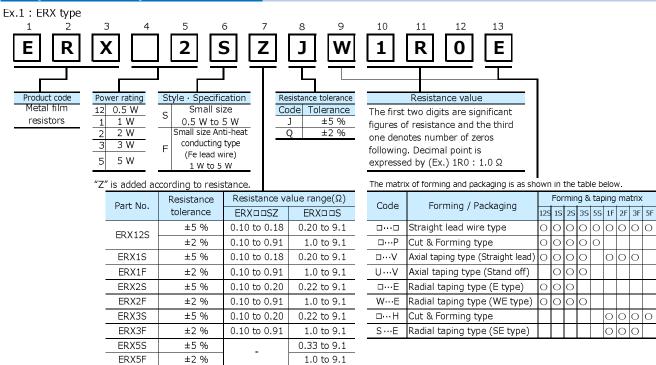
(1 W, 2 W, 3 W, 5 W)



Features

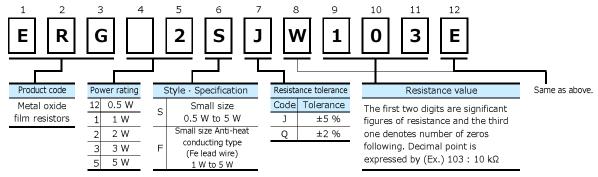
- Miniaturized 50 % smaller compared to existing models
- Non-flammable
- High reliability
- Automatic insertion
- Reference standards : IEC 60115-2, IEC 60115-4, JIS C 5201-4, EIAJ RC-2138
- RoHS compliant

Explanation of part numbers



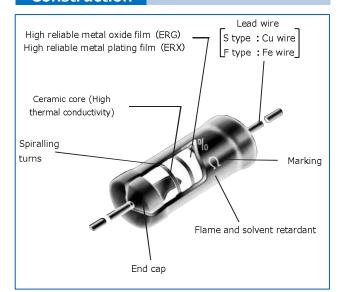
The above example 1 shows a small metal film resistor, 2 W power rating, resistance value of 1.0 Ω , tolerance ± 5 %, and package of radial taping.



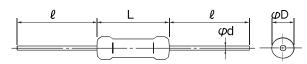


The above example 2 shows a small metal oxide film resistor, 2 W power rating, resistance value of 10 kΩ, tolerance ±5 %, and package of radial taping.

Construction



Dimensions in mm (not to scale)



Unit : mm									
Davit Na		Dime	nsions		Mass				
Part No.	L	øD	l	ød	(Weight) (g/ pc)				
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	2.8 ^{±0.5}	30.0 ^{±3.0}	0.65 ^{±0.05}	0.33				
ERG(X)1F	9.00 - 1.00	2.0	30.0	0.80 ^{±0.05}	0.55				
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	- 1.00	2	50.0	0.00	0				
ERG(X)3S	15.00 ^{±1.50}	5.5 ^{±1.0}	38.0 ^{±3.0}	0.80 ^{±0.05}	1.47				
ERG(X)3F	15.00	3.	30.0	0.00	1.77				
ERG(X)5S	24.00 ^{±1.50}	8.0 ^{±1.0}	38.0 ^{±3.0}	0.80 ^{±0.05}	3.54				
ERG(X)5F	24.00	0.0	30.0	0.00	5.54				

Ratings

Part No.	Power rating (70 ℃) (W)	Limiting element voltage ^{*1} (V)	Maximum overload voltage ^{*2} (V)	Maximum intermittent overload voltage ^{*3} (V)	Dielectric withstanding voltage (V)	Resistance tolerance*4 (%)	Resis rang (S min.*6	ge ^{*5} Σ) max.	T.C.R. (×10 ⁻⁶ /K)	Standard resistance value
ERG(X)12S	0.5	300	600	600	350	G (±2) J (±5)	1 0.2	22 k 47 k	±350	E 24
ERG(X)1S ERG(X)1F	1	350	600	600	350	G (±2) J (±5)	0.2	68 k 100 k	±350	E 24
ERG(X)2S ERG(X)2F	2	350	700	1000	600	G (±2) J (±5)	1 0.22	100 k 100 k	±350	E 24
ERG(X)3S ERG(X)3F	3	350	700	1000	1000	G (±2) J (±5)	1 0.22	100 k 100 k	±300	E 24
ERG(X)5S ERG(X)5F	5	500	1000	1500	1000	G (±2) J (±5)	1 0.33	100 k 100 k	±200	E 24

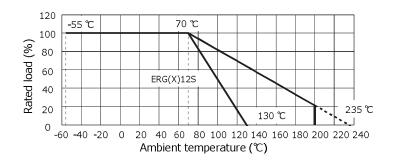
- *1: Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=√Power Rating × Resistance Value, or Limiting Element Voltage listed above, whichever less.
- *2: Overload (Short-time Overload) Test Voltage (SOTV) shall be determined from SOTV=2.5×Power Rating or max. Overload Voltage listed above whichever less.
- *3: Intermittent Overload Test Voltage (IOTV) shall be determined from IOTV=4.0×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 Ω , type ERX : \leq 9.1 Ω
- *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.	Resistance value range(Ω)	Code	Part No.	Res.tol.	Resistance value $range(\Omega)$
	125	±2 %	0.1 to 0.91		2S	±2 %	0.1 to 0.91
7	125	±5 %	0.1 to 0.18	7	2F	±5 %	0.1 to 0.2
2	1S	±2 %	0.1 to 0.91	_	3S	±2 %	0.1 to 0.91
	1F	±5 %	0.1 to 0.18		3F	±5 %	0.1 to 0.2

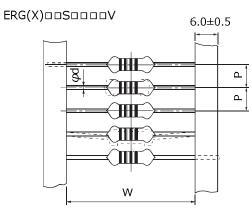
Power derating curve

For resistors operated in ambient temperatures above 70 $^{\circ}$ C, power rating shall be derated in accordance with the figure on the right.

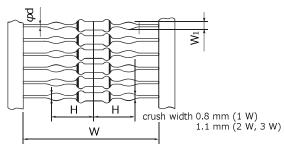


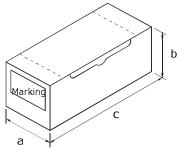
Taped & Box

Stand-off taped & Box



ERG(X)00S0U000V



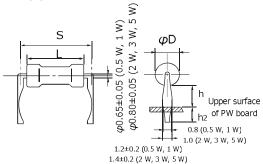


Unit: mm

Unit : i												
Part No.	Standard guantity	Taping dimensions						Box				
	(pcs/box)	р	50×P	W	Н	W_1	ød	а	b	С		
ERG(X)12SDDDDDV	2,000	5.0 ^{±0.3}	250 ^{±2}	52.0 ^{±1.5}	-	-	0.65 ^{±0.05}	85	80	255		
ERG(X) 1SDDDDDV	2 000	2 000	2,000	5.0 ^{±0.3}	250 ^{±2}	52.0 ^{±1.5}	-	-	0.65 ^{±0.05}	85	80	255
ERG(X) 1S□U□□□V	2,000	5.0	230	32.0	12.0 0	1.20 +0.15	0.03	0.5	80	233		
ERG(X) 2SDDDDDV	1,000	5.0 ^{±0.3}	250 ^{±2}	52.0 ^{±1.5}	-	-	0.80 ^{±0.05}	85	80	255		
ERG(X) 2SDUDDDV	1,000	5.0	250	52.0	15.5 ⁰	1.40 +0.15	0.00	65	80	255		
ERG(X) 3SDDDDDV	1,000	10.0 ^{±0.5}	500 ^{±2}	74.0 ^{±2.0}	-	-	0.80 ^{±0.05}	105	100	325		
ERG(X) 3SDUDDDV	1,000	10.0	300	74.0	23.0 0	1.40 +0.15	0.60	103	100	323		

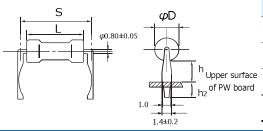
Cut & Formed type





Part No.	Standard quantity	Unit: mm Dimensions							
rare ivo.	(pcs/box)	L	øD	S	h	h ₂			
ERG(X)12SDDDDDP	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)1SDDDDDD	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)2SDDDDD	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)3SuuuuuP	1,000	15.00 ^{±1.50}	5.5 ^{±1.0}	20.0 ^{±2.0}	6.5 ^{±1.5}	4.0 ^{±1.5}			
ERG(X)5SUUUUUP	500	24.00 ^{±1.50}	8.0 ^{±1.0}	30.0 ^{±2.0}	7.5 ^{±1.5}	4.0 ^{±1.5}			

ERG(X)DFDDDDH

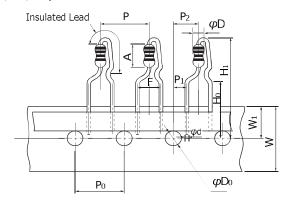


						Unit : mm		
Part No.	Standard quantity	Dimensions						
	(pcs/box)	L	øD	S	h	h ₂		
ERG(X)1F0000H	1,000	9.0 ^{+1.5} _{-1.0}	2.8 ^{±0.5}	12.5 ^{±1.5}	8 ^{±2}	4.0 ^{±1.5}		
ERG(X)2F0000H	1,000	12.0 ^{+1.5} _{-1.0}	4.0 ^{±1.0}	15.0 ^{±1.5}	8 ^{±2}	5.0 ^{±1.5}		
ERG(X)3F0000H	1,000	15.0 ±1.5	5.5 ^{±1.0}	20.0 ^{±2.0}	10 ^{±2}	5.0 ^{±1.5}		
ERG(X)5F0000H	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

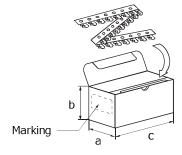
ERG(X) = = S = = = = = (12S, 1S, 2S)



Unit: mm

	Dimensions											
Р	12.7±1.0	W	18.0±0.5		12S	32 max.		12S	6.35 ^{+0.65} -0.35		12S	2.3 ^{+0.5} -0.3
Po	12.7±0.3	W ₁	9.0±0.5	H ₁	1S	32 max.	Α	1S	9.0 +1.5 - 1.0	øD	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			Ho	16.0±0.5		ød		0.65±0.05			
F	5.0±0.8			øD ₀		4.0±0.2						

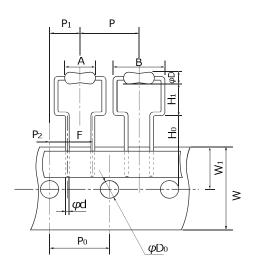
• Radial Tape Package Specifications



				Unit: mm	
Part No.	Standard quantity	Dimensions			
	(pcs/box)	а	b	С	
ERG(X)12SDDDDDE	2,000	46	130	335	
ERG(X) 1SDDDDE	2,000	46	130	335	
ERG(X) 2SDDDDDE	1,000	49	100	335	

For Panasert Au to mat ic Insertion Machine Radial Taped & Box

ERG(X) = S = W = D = E (12S, 1S, 2S, 3S)

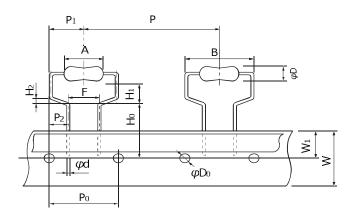


	Dimensions	(mm)		Dimensions	(mm)
Р	12S	12.7±1.0	øD0	12S, 1S, 2S, 3S	4.0±0.2
Р	1S, 2S, 3S	30.0±1.0		12S	6.35 ^{+0.65} -0.35
Po	12S	12.7±0.3	Α	1S	9.0 +1.5 - 1.0
	1S, 2S, 3S	15.0±0.3		2S	12.0 +1.5 - 1.0
P ₁	12S	6.35±1.00		3S	15.0±1.5
٢1	1S, 2S, 3S	7.5±1.0		12S	11.2 max.
P ₂	12S	3.85±0.70	В	1S	14.0 max.
г2	1S, 2S, 3S	3.75±0.50	Ь	2S	17.0 max.
F	12S	5.0±0.5		3S	21.0 max.
Г	1S, 2S, 3S	7.5±0.8		12S	2.3 +0.5
W	12S, 1S, 2S, 3S	18.0±0.5	αD	1S	2.8±0.5
W_1	12S, 1S, 2S, 3S	9.0±0.5	øD	2S	4.0±1.0
	12S	16.0±0.5		3S	5.5±1.0
H_0	1S, 2S	18.0±1.0	ød	12S	ø0.65±0.05
	3S	19.0±1.0	ωu	1S, 2S, 3S	ø0.80±0.05
	12S	6.5 ^{+0.6} 0			
H_1	1S, 2S	$6.5 \begin{array}{c} +1.0 \\ 0 \end{array}$]		
	3S	8.0 +1.0			



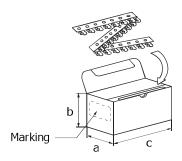
For Panasert Au to mat ic Insertion Machine Radial Taped & Box

ERG(X) OFOSOOOE (1F, 2F, 3F)



	Dimension	ns (mm)		Dimensio	ons (mm)
Р	30.	0±1.0	H ₂	1	0±0.3
P ₀	15.	0±0.3	φD_0	4	1.0±0.2
P ₁	7.5	5±1.0		1F	9.0 ^{+1.5} -1.0
P ₂	3.75	5±0.50	Α	2F	12.0 ^{+1.5} -1.0
F	7.5	5±0.8		3F	15.0±1.5
W	18.	18.0±0.5		1F	14.0 max.
W_1	9.0)±0.5	В	2F	17.0 max.
Ho	16	5.0 ^{+1.0} 0		3F	21.0 max.
	1F	7.0 ^{+1.0} ₀		1F	2.8±0.5
H_1	2F	$8.0 \begin{array}{c} +1.0 \\ 0 \end{array}$	φD	2F	4.0±1.0
	3F	9.0 +1.0		3F	5.5±1.0
				0.	80±0.05

• Radial Tape Package Specifications

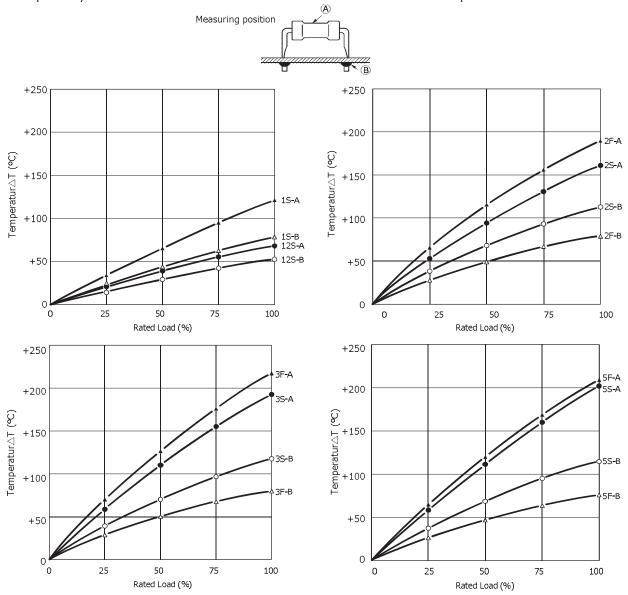


Part No.	Standard Quantity	Dimensions (mm)			
raicitor	(pcs/box)	а	b	С	
ERG(X)12S□W□□□E	2,000	46	145	325	
ERG(X) 1S□W□□□E	1,000	49	150	317	
ERG(X) 1F□S□□□E	1,000	49	130	317	
ERG(X) 2S□W□□□E	500	49	450	317	
ERG(X) 2FDSDDDE	300	49	150	317	
ERG(X) 3F□S□□□E	500	49	190	315	



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.

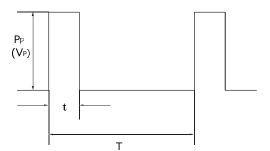
1. Transient voltage

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.

- 2. 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.
- 3. 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.
- 4. 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 Char ac ter is tics (Usual)



P_P : Pulse limit power (W)
V_P : Pulse limit voltage (V)
t : Pulse continuous time (s)

T : Period (s)

 $\begin{array}{lll} V_R & : & \text{Rated voltage (V)} \\ P & : & \text{Rated power (W)} \\ R & : & \text{Resistance value (Ω)} \\ V_{\text{p max.}} & : & \text{Max. pulse limit voltage (V)} \end{array}$

Withstand pulse limit power is calculated by the next method.

$$\begin{array}{lll} P_P & = & K \cdot P \cdot T/_t \\ V_P & = & \sqrt{K \cdot P \cdot R \cdot T/_t} \end{array}$$

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

Part No.	К	Vpmax. (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

- T>1(s) \rightarrow T=1(s)
- \bullet T/t>100 \rightarrow T/t =100
- \bullet P_P<P \rightarrow P stands for P_P

(VP<VR \rightarrow VR stands for VP)

- Added voltage ≤ V_{pmax}.
- P_P or V_P is referent value

Conditions: Pulse added time=1000 h

Resistance change = ±5 %

Room temperature



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.
- 2. 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.
- 3. 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.
- 4. Do not brush the resistors during or after the cleaning process, which may be conducted after soldering. Otherwise, the coating film may be damaged.

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.



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 under the actual conditions for use.
- 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
- * 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
- * Systems equipped with an arresting the spread of fire or preventing glitch.

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general elec tron ic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) For applications in which special quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury (such as for aircraft and aerospace equipment, traffic and transport equipment, combustion equipment, medical equipment, accident prevention and anti-theft devices, and safety equipment), please be sure to consult with our sales representative in advance and to exchange product specifications which conform to such applications.
- 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 Cl₂, H₂S, NH₃, SO₂, or NO_x.
 - 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 and Radioactive Environment.
 - Avoid any environment where strong electromagnetic waves and radiation 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.
- Do not apply flux to these products after soldering. The activity of flux may be a cause of failures in these products.
- Refer to the recommended soldering conditions and set the soldering condition. High peak temperature or long heating time may impair the performance or the reliability of these products.
- Recommended soldering condition is for the guideline for ensuring the basic characteristics of the products, not for the stable soldering conditions. Conditions for proper soldering should be set up according to individual conditions.



- Do not reuse any products after removal from mounting boards.
- Do not drop these products. If these products are dropped, do not use them. Such products may have received mechanical or electrical damage.
- If any doubt or concern to the safety on these products arise, make sure to inform us immediately and conduct technical examinations at your side.

(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_X .
- 2. In direct sunlight.

(3) AEC-Q200 Compliant

The products are tested based on all or part of the test conditions and methods defined in AEC-Q200. Please consult with Panasonic for the details of the product specification and specific evaluation test results, etc., and please review and approve Panasonic's product specification before ordering.

<Package markings>

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



Safety Precautions (Common precautions for Surface Mount Resistors)

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

- 1. Take measures against mechanical stress during and after mounting of Surface Mount Resistors (hereafter called the resistors) so as not to damage their electrodes and protective coatings. Be careful not to misplace the resistors on the land patterns. Otherwise, solder bridging may occur.
- 2. Keep the rated power and ambient temperature within the specified derating curve. Some circuit boards, wiring patterns, temperatures of heat generated by adjacent components, or ambient temper a tures can become factors in the rise of the temperature of the resistors, regardless of the level of power applied. Therefore, check the conditions before use and op timize them so as not to damage the boards and peripheral components.
 - Make sure to contact us before using the resistors under special conditions.
- 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 before use. Never exceed the rated power. Otherwise, the performance and/or reliability of the resistors may be impaired.
- 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 resistors mounted on your product rather than only depending on the calculated power limit or steady-state conditions.
- 5. If the resistors are to be used in high frequency circuits, carefully check the operation before use. Such circuits change the electrical characteristics of the resistors.
- Before using halogen-based or other high-activity flux, check the possible effects of the flux residues on the performance and reliability of the resistors.
- 7. When soldering with a soldering iron, never touch the resistors'bodies with the tip of the soldering iron. When using a soldering iron with a high temperature tip, finish soldering as quickly as possible (within three seconds at 350 °C max.).
- 8. Mounting of the resistors with excessive or insufficient wetting amount of solder may affect the connection reliability or the performance of the resistors. Carefully check the effects and apply a proper amount of solder for use.
- 9. When the resistors' protective coatings are chipped, flawed, or removed, the characteristics of the resistors may be impaired. Take special care not to apply mechanical shock during automatic mounting or cause damage during handling of the boards with the resistors mounted.
- 10. Do not apply shock to the resistors or pinch them with a hard tool (e.g. pliers and tweezers). Otherwise, the resistors' protective coatings and bodies may be chipped, affecting their performance.
- 11. Avoid excessive bending of printed circuit boards in order to protect the resistors from abnormal stress.
- 12. Do not immerse the resistors in solvent for a long time. Before using solvent, carefully check the effects of immersion.
- 13. Do not apply excessive tension to the terminals.

Discontinued

Anti-Pulse Power Resistors

Anti-Pulse Power Resistors

Type: ERGD

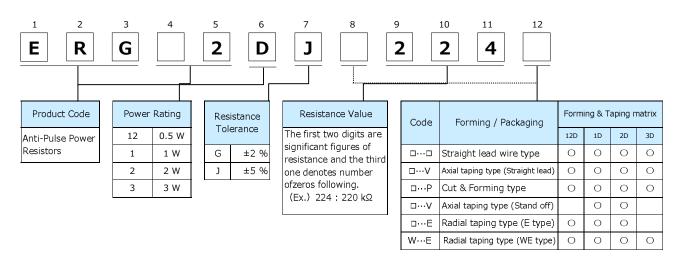
(0.5 W, 1 W, 2 W, 3 W)



Features

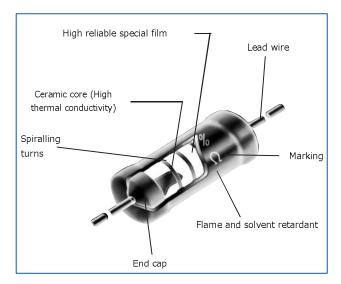
- Miniaturized
- Non-flammable
- Anti-Pulse Characteristic
- Automatic Insertion
- RoHS compliant

Explanation of Part Numbers

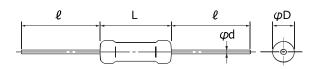


The above example shows an anti-pulse resistor, 2 W power rating, resistance value of 220 k ohms, tolerance ±5 %, and package of standard bulk packing.

Construction



Dimensions in mm (not to scale)



Part No.		Mass (Weight)				
Pait No.	L	φD	l	φd	(g/pc)	
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	



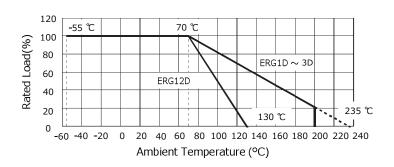
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Part No.	Power Rating at 70 °C	Limiting Element Voltage ⁽¹⁾	Maximum Overload Voltage ⁽²⁾	Maximum Intermittent Overload Voltage ⁽³⁾	Dielectric Withstanding Voltage	Resistance Tolerance	Resistance	: Range ⁽⁴⁾ Ω)	Standard Resistance Value
	(W)	(V)	(V)	(V)	(VAC)	(%)	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×Power Rating or max. Overload Voltage listed above whichever less.
- (3) Intermittent Overload Test Voltage (IOTV) shall be determined from IOTV=4.0×Power Rating or max. Intermittent Overload Voltage listed above whichever less.
- (4) Resistance tolerance 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.
- 2. 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.
- 3. 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.
- 4. Do not brush the resistors during or after the cleaning process, which may be conducted after soldering. Otherwise, the coating film may be damaged.

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.



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 under the actual conditions for use.
- 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
- * 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
- * Systems equipped with an arresting the spread of fire or preventing glitch.

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general elec tron ic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) For applications in which special quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury (such as for aircraft and aerospace equipment, traffic and transport equipment, combustion equipment, medical equipment, accident prevention and anti-theft devices, and safety equipment), please be sure to consult with our sales representative in advance and to exchange product specifications which conform to such applications.
- 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 Cl₂, H₂S, NH₃, SO₂, or NO_x.
 - 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 and Radioactive Environment.
 - Avoid any environment where strong electromagnetic waves and radiation 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.
- Do not apply flux to these products after soldering. The activity of flux may be a cause of failures in these products.
- Refer to the recommended soldering conditions and set the soldering condition. High peak temperature or long heating time may impair the performance or the reliability of these products.
- Recommended soldering condition is for the guideline for ensuring the basic characteristics of the products, not for the stable soldering conditions. Conditions for proper soldering should be set up according to individual conditions.



- Do not reuse any products after removal from mounting boards.
- Do not drop these products. If these products are dropped, do not use them. Such products may have received mechanical or electrical damage.
- If any doubt or concern to the safety on these products arise, make sure to inform us immediately and conduct technical examinations at your side.

(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_X .
- 2. In direct sunlight.

(3) AEC-Q200 Compliant

The products are tested based on all or part of the test conditions and methods defined in AEC-Q200. Please consult with Panasonic for the details of the product specification and specific evaluation test results, etc., and please review and approve Panasonic's product specification before ordering.

<Package markings>

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



Safety Precautions (Common precautions for Surface Mount Resistors)

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

- 1. Take measures against mechanical stress during and after mounting of Surface Mount Resistors (hereafter called the resistors) so as not to damage their electrodes and protective coatings. Be careful not to misplace the resistors on the land patterns. Otherwise, solder bridging may occur.
- 2. Keep the rated power and ambient temperature within the specified derating curve. Some circuit boards, wiring patterns, temperatures of heat generated by adjacent components, or ambient temper a tures can become factors in the rise of the temperature of the resistors, regardless of the level of power applied. Therefore, check the conditions before use and op timize them so as not to damage the boards and peripheral components.
 - Make sure to contact us before using the resistors under special conditions.
- 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 before use. Never exceed the rated power. Otherwise, the performance and/or reliability of the resistors may be impaired.
- 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 resistors mounted on your product rather than only depending on the calculated power limit or steady-state conditions.
- 5. If the resistors are to be used in high frequency circuits, carefully check the operation before use. Such circuits change the electrical characteristics of the resistors.
- Before using halogen-based or other high-activity flux, check the possible effects of the flux residues on the performance and reliability of the resistors.
- 7. When soldering with a soldering iron, never touch the resistors'bodies with the tip of the soldering iron. When using a soldering iron with a high temperature tip, finish soldering as quickly as possible (within three seconds at 350 °C max.).
- 8. Mounting of the resistors with excessive or insufficient wetting amount of solder may affect the connection reliability or the performance of the resistors. Carefully check the effects and apply a proper amount of solder for use.
- 9. When the resistors' protective coatings are chipped, flawed, or removed, the characteristics of the resistors may be impaired. Take special care not to apply mechanical shock during automatic mounting or cause damage during handling of the boards with the resistors mounted.
- 10. Do not apply shock to the resistors or pinch them with a hard tool (e.g. pliers and tweezers). Otherwise, the resistors' protective coatings and bodies may be chipped, affecting their performance.
- 11. Avoid excessive bending of printed circuit boards in order to protect the resistors from abnormal stress.
- 12. Do not immerse the resistors in solvent for a long time. Before using solvent, carefully check the effects of immersion.
- 13. Do not apply excessive tension to the terminals.



Metal Film Resistors, Low Resistance Value

Discontinued

Metal Film Resistors

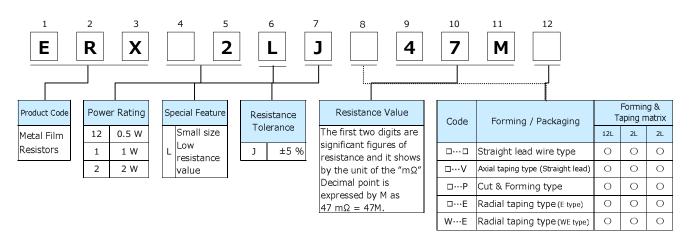
Type: ERXL (Low Resistance Value) (0.5 W, 1 W, 2 W)



Features

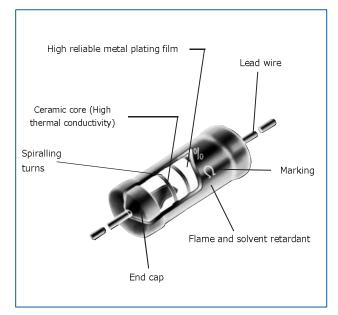
- ullet Resistance Range 22 m Ω to 82 m Ω
- Miniaturized
- Non-flammable
- Automatic Insertion
- RoHS compliant

Explanation of Part Numbers

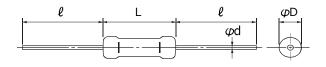


The above example shows a small size and low resistance value met al film re sis tor, 2 W pow er rat ing, resistance value of 47 m ohms, tolerance ±5 %, and pack age of standard bulk packing.

Construction



Dimensions in mm (not to scale)



Part No.		Mass (Weight)				
raic No.	L φD		l	φd	(g/ pc)	
ERX12L	6.35 ^{+0.65} _{-0.35}	2.3 +0.5 - 0.3	30.0 ^{±3.0}	0.65 ^{±0.05}	0.26	
ERX1L	9.00 ^{+1.50} _{-1.00}	2.8 ^{±0.5}	30.0 ^{±3.0}	0.65 ^{±0.05}	0.33	
ERX2L	12.00 ^{+1.50} _{-1.00}	4.0 ^{±1.0}	30.0 ^{±3.0}	0.80 ^{±0.05}	0.66	

Ratings

ERX2L

Rating							
Part No.	Power Rating at 70 °C (1)	Dielectric Withstanding Voltage	Tolerance (2)		tance Range $^{(2)}$ T.C.R. $^{(\Omega)}$ $(\times 10^{-6}/\mathrm{K})$		Standard Resistance Value
	(W)	(VAC)	(%)	min.	max.	(//13 ////)	
ERX12L	0.5	350	J (±5)	22 m	82 m		E12
ERX1L	1	350	J (±5)	22 m	82 m	22 to 39 m Ω = ±1000 47 to 82 m Ω = ± 500	E12

22 m

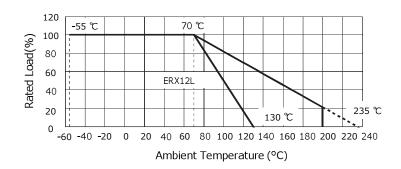
82 m

J (±5)

600

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.
- 2. 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.
- 3. 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.
- 4. Do not brush the resistors during or after the cleaning process, which may be conducted after soldering. Otherwise, the coating film may be damaged.

E12

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

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

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.



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 under the actual conditions for use.
- 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
- * 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
- * Systems equipped with an arresting the spread of fire or preventing glitch.

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general elec tron ic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) For applications in which special quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury (such as for aircraft and aerospace equipment, traffic and transport equipment, combustion equipment, medical equipment, accident prevention and anti-theft devices, and safety equipment), please be sure to consult with our sales representative in advance and to exchange product specifications which conform to such applications.
- 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 Cl₂, H₂S, NH₃, SO₂, or NO_x.
 - 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 and Radioactive Environment.
 - Avoid any environment where strong electromagnetic waves and radiation 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.
- Do not apply flux to these products after soldering. The activity of flux may be a cause of failures in these products.
- Refer to the recommended soldering conditions and set the soldering condition. High peak temperature or long heating time may impair the performance or the reliability of these products.
- Recommended soldering condition is for the guideline for ensuring the basic characteristics of the products, not for the stable soldering conditions. Conditions for proper soldering should be set up according to individual conditions.



- Do not reuse any products after removal from mounting boards.
- Do not drop these products. If these products are dropped, do not use them. Such products may have received mechanical or electrical damage.
- If any doubt or concern to the safety on these products arise, make sure to inform us immediately and conduct technical examinations at your side.

(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_X .
- 2. In direct sunlight.

(3) AEC-Q200 Compliant

The products are tested based on all or part of the test conditions and methods defined in AEC-Q200. Please consult with Panasonic for the details of the product specification and specific evaluation test results, etc., and please review and approve Panasonic's product specification before ordering.

<Package markings>

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



Safety Precautions (Common precautions for Surface Mount Resistors)

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

- 1. Take measures against mechanical stress during and after mounting of Surface Mount Resistors (hereafter called the resistors) so as not to damage their electrodes and protective coatings. Be careful not to misplace the resistors on the land patterns. Otherwise, solder bridging may occur.
- 2. Keep the rated power and ambient temperature within the specified derating curve. Some circuit boards, wiring patterns, temperatures of heat generated by adjacent components, or ambient temper a tures can become factors in the rise of the temperature of the resistors, regardless of the level of power applied. Therefore, check the conditions before use and op timize them so as not to damage the boards and peripheral components.
 - Make sure to contact us before using the resistors under special conditions.
- 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 before use. Never exceed the rated power. Otherwise, the performance and/or reliability of the resistors may be impaired.
- 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 resistors mounted on your product rather than only depending on the calculated power limit or steady-state conditions.
- 5. If the resistors are to be used in high frequency circuits, carefully check the operation before use. Such circuits change the electrical characteristics of the resistors.
- Before using halogen-based or other high-activity flux, check the possible effects of the flux residues on the performance and reliability of the resistors.
- 7. When soldering with a soldering iron, never touch the resistors'bodies with the tip of the soldering iron. When using a soldering iron with a high temperature tip, finish soldering as quickly as possible (within three seconds at 350 °C max.).
- 8. Mounting of the resistors with excessive or insufficient wetting amount of solder may affect the connection reliability or the performance of the resistors. Carefully check the effects and apply a proper amount of solder for use.
- 9. When the resistors' protective coatings are chipped, flawed, or removed, the characteristics of the resistors may be impaired. Take special care not to apply mechanical shock during automatic mounting or cause damage during handling of the boards with the resistors mounted.
- 10. Do not apply shock to the resistors or pinch them with a hard tool (e.g. pliers and tweezers). Otherwise, the resistors' protective coatings and bodies may be chipped, affecting their performance.
- 11. Avoid excessive bending of printed circuit boards in order to protect the resistors from abnormal stress.
- 12. Do not immerse the resistors in solvent for a long time. Before using solvent, carefully check the effects of immersion.
- 13. Do not apply excessive tension to the terminals.

Panasonic PDN.PG24.12.03.2021 Affected Parts

Part Number

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

ERG-12SJ152V

ERG-12SJ153P

ERG-12SJ180

ERG-12SJ200

ERG-12SJ203E

ERG-12SJ220

ERG-12SJ243V

ERG-12SJ270V

ERG-12SJ272V

ERG-12SJ273V

ERG-12SJ330

ERG-12SJ331P

ERG-12SJ332

ERG-12SJ431V

ERG-12SJ470E

ERG-12SJ470V

ERG-12SJ471V

ERG-12SJ510

ERG-12SJ561

ERG-12SJ621V

ERG-12SJ681V

ERG-12SJ751V

ERG-12SJ821V

ERG-12SJ822E

- ERG-12SJ911V
- ERG-12SJS100H
- ERG-12SJS101H
- ERG-12SJS102H
- ERG-12SJS103H
- ERG-12SJS120H
- ERG-12SJS122H
- ERG-12SJS150H
- ERG-12SJS152H
- ERG-12SJS180H
- ERG-12SJS1R0H
- ERG-12SJS1R0J
- ERG-12SJS220H
- ERG-12SJS222H
- ERG-12SJS270H
- ERG-12SJS272H
- ERG-12SJS332H
- ERG-12SJS390H
- ERG-12SJS392H
- ERG-12SJS470H
- LIKO 12000-7011
- ERG-12SJS472H
- ERG-12SJS681H
- ERG-12SJS821H
- ERG-1ANG680V
- ERG-1ANJ150V
- ERG-1ANJ330V
- ERG-1ANJ470V
- ERG-1ANJ473A
- ERG-1ANJ680V
- ERG-1ANJP122H
- **ERG-1ANJP680S**
- ERG-1FJ301
- ERG-1FJ621
- ERG-1FJP101D
- ERG-1FJP102D
- ERG-1FJP221D
- ERG-1FJP222D
- ERG-1FJP471D
- ERG-1FJS100E
- ERG-1FJS101E
- ERG-1FJS102E
- ERG-1FJS103E
- ERG-1FJS104E
- ERG-1FJS110E
- ERG-1FJS111E
- ERG-1FJS112E
- ERG-1FJS113E

- ERG-1FJS120E
- ERG-1FJS121E
- ERG-1FJS122E
- ERG-1FJS123D
- ERG-1FJS123E
- ERG-1FJS130E
- LING-11 33 130L
- ERG-1FJS131E
- ERG-1FJS132E
- ERG-1FJS133E
- ERG-1FJS150E
- ERG-1FJS151E
- ERG-1FJS152E
- ERG-1FJS153D
- ERG-1FJS153E
- ERG-1FJS160E
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- ERG-1FJS162E
- ERG-1FJS163E
- ERG-1FJS180E
- ERG-1FJS181E
- ERG-1FJS182D
- ERG-1FJS182E
- ERG-1FJS183E
- ERG-1FJS200E
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- ERG-1FJS622E
- ERG-1FJS623E
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- ERG-1FJS750E
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- ERG-1FJS752E ERG-1FJS820E
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- ERG-2ANJ102V
- ERG-2ANJ183V
- ERG-2ANJ471
- ERG-2ANJ682
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- ERG-2FG223V
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- ERG-2FJ104H
- ERG-2FJ150H
- ERG-2FJ182H
- ERG-2FJ202
- ERG-2FJ220H
- ERG-2FJ221H
- ERG-2FJ240
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- ERG-3SJ101P
- ERG-3SJ101V

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- ERG-3SJ102P
- ERG-3SJ102V
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- ERG-3SJ104V
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- ERX-2HQJ82MH
- ERX-2HZGR10H
- ERX-2HZJR10H
- ERX-2HZJR12H

- ERX-2HZJR15H
- ERX-2HZJR18H
- ERX-2HZJR47H
- ERX-2SG1R0P
- ERX-2SG1R0V
- ERX-2SG2R0P
- ERX-2SG2R7V
- ERX-2SG3R9V
- ERX-2SG4R3V
- ERX-2SJ1R0
- ERX-2SJ1R0A
- ERX-2SJ1R0E
- ERX-2SJ1R0P
- ERX-2SJ1R0V
- ERX-2SJ1R1
- ERX-2SJ1R1A
- ERX-2SJ1R1E
- ERX-2SJ1R1V
- ERX-2SJ1R2
- ERX-2SJ1R2A
- ERX-2SJ1R2E
- ERX-2SJ1R2V
- ERX-2SJ1R3
- ERX-2SJ1R3A
- ERX-2SJ1R3E
- ERX-2SJ1R3V
- ERX-2SJ1R5
- ERX-2SJ1R5A
- ERX-2SJ1R5E
- ERX-2SJ1R5V
- ERX-2SJ1R6
- ERX-2SJ1R6A
- ERX-2SJ1R6E
- ERX-2SJ1R6V
- ERX-2SJ1R8
- ERX-2SJ1R8A
- ERX-2SJ1R8E
- ERX-2SJ1R8V
- ERX-2SJ2R0
- ERX-2SJ2R0A
- ERX-2SJ2R0E
- ERX-2SJ2R0V
- ERX-2SJ2R2
- ERX-2SJ2R2A
- ERX-2SJ2R2E
- ERX-2SJ2R2V
- ERX-2SJ2R4

- ERX-2SJ2R4A
- ERX-2SJ2R4E
- ERX-2SJ2R4V
- ERX-2SJ2R7
- ERX-2SJ2R7A
- ERX-2SJ2R7E
- ERX-2SJ2R7V
- ERX-2SJ3R0
- ERX-2SJ3R0A
- ERX-2SJ3R0E
- ERX-2SJ3R0V
- ERX-2SJ3R3
- ERX-2SJ3R3A
- ERX-2SJ3R3E
- ERX-2SJ3R3V
- ERX-2SJ3R6
- ERX-2SJ3R6A
- ERX-2SJ3R6E
- ERX-2SJ3R6V
- ERX-2SJ3R9
- ERX-2SJ3R9A
- ERX-2SJ3R9E
- ERX-2SJ3R9V
- ERX-2SJ4R3
- ERX-2SJ4R3A
- ERX-2SJ4R3E
- ERX-2SJ4R3V
- ERX-2SJ4R7
- ERX-2SJ4R7A
- ERX-2SJ4R7E
- ERX-2SJ4R7V
- ERX-2SJ5R1
- ERX-2SJ5R1A
- ERX-2SJ5R1E
- ERX-2SJ5R1V
- ERX-2SJ5R6
- ERX-2SJ5R6A
- ERX-2SJ5R6E
- ERX-2SJ5R6V
- ERX-2SJ6R2
- ERX-2SJ6R2A
- ERX-2SJ6R2E
- ERX-2SJ6R2P
- ERX-2SJ6R2V
- ERX-2SJ6R8
- ERX-2SJ6R8A
- ERX-2SJ6R8E

- ERX-2SJ6R8V
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- ERX-2SJ7R5A
- ERX-2SJ7R5E
- ERX-2SJ7R5V
- ERX-2SJ8R2
- ERX-2SJ8R2A
- ERX-2SJ8R2E
- ERX-2SJ8R2V
- ERX-2SJ9R1
- ERX-2SJ9R1A
- ERX-2SJ9R1E
- ERX-2SJ9R1V
- ERX-2SJR22A
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- ERX-2SJR22V
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- ERX-2SJR24V
- ERX-2SJR27E
- ERX-2SJR27V
- ERX-2SJR30E
- ERX-2SJR30V
- ERX-2SJR33
- LIVY-2001100
- ERX-2SJR33E
- ERX-2SJR33V ERX-2SJR36E
- ERX-2SJR36V
- ERX-2SJR39E
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- ERX-2SJR56A
- ERX-2SJR56E
- ERX-2SJR56V
- ERX-2SJR62
- ERX-2SJR62A
- ERX-2SJR62E

- ERX-2SJR62V
- ERX-2SJR68
- ERX-2SJR68A
- ERX-2SJR68E
- ERX-2SJR68V
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- ERX-2SJR75A
- ERX-2SJR75E
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- ERX-2SJR91
- ERX-2SJR91A
- ERX-2SJR91E
- ERX-2SJR91V
- ERX-2SJS1R5H
- ERX-2SJS2R2H
- ERX-2SJSR22H
- ERX-2SJW4R7E
- ERX-2SJXR39V
- ERX-2SZGR10
- ERX-2SZGR10P
- ERX-2SZGR10V
- ERX-2SZGR22A
- ERX-2SZJR10E
- ERX-2SZJR10V
- ERX-2SZJR16A
- EDV 007 ID00E
- ERX-2SZJR20E
- ERX-3FJ1R0
- ERX-3FJ1R0H
- ERX-3FJ1R5H
- ERX-3FJ2R2H
- ERX-3FJ8R2H
- ERX-3FJP5R6D
- ERX-3FJPR22D
- ERX-3FJPR27D
- ERX-3FJPR33D
- ERX-3FJPR68D
- ERX-3FJR10H
- ERX-3FJR33H
- ERX-3FJR47
- ERX-3FJR47H
- ERX-3FJR68H
- ERX-3FJS1R0E
- ERX-3FJS1R1E

- ERX-3FJS1R2E
- ERX-3FJS1R3E
- ERX-3FJS1R5E
- ERX-3FJS1R6E
- ERX-3FJS1R8E
- ERX-3FJS2R0E
- ERX-3FJS2R2E
- ERX-3FJS2R4E
- ERX-3FJS2R7E
- ERX-3FJS3R0E
- ERX-3FJS3R3E
- ERX-3FJS3R6E
- ERX-3FJS3R9E ERX-3FJS4R3E
- ERX-3FJS4R7E
- ERX-3FJS5R1E
- ERX-3FJS5R6E
- ERX-3FJS6R2E
- ERX-3FJS6R8E
- ERX-3FJS7R5E
- ERX-3FJS8R2E
- ERX-3FJS9R1E
- ERX-3FJSR22E
- ERX-3FJSR24E
- ERX-3FJSR27E
- **ERX-3FJSR30E**
- ERX-3FJSR33E
- ERX-3FJSR36E
- ERX-3FJSR39E
- ERX-3FJSR43E
- ERX-3FJSR47E
- ERX-3FJSR51E
- ERX-3FJSR56E
- ERX-3FJSR62E
- ERX-3FJSR68E
- ERX-3FJSR75E
- ERX-3FJSR82E
- ERX-3FJSR91E
- ERX-3FZJR10H
- ERX-3SG1R2V
- ERX-3SG2R2
- ERX-3SG3R9
- ERX-3SG6R2V
- ERX-3SG8R2V
- ERX-3SGR33
- ERX-3SGR62
- ERX-3SJ1R0

- ERX-3SJ1R0A
- ERX-3SJ1R0P
- ERX-3SJ1R0V
- ERX-3SJ1R1
- ERX-3SJ1R1A
- ERX-3SJ1R1V
- ERX-3SJ1R2
- ERX-3SJ1R2A
- ERX-3SJ1R2V
- ERX-3SJ1R3
- ERX-3SJ1R3A
- ERX-3SJ1R3V
- ERX-3SJ1R5
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- ERX-3SJ1R5V
- ERX-3SJ1R6
- ERX-3SJ1R6A
- ERX-3SJ1R6V
- ERX-3SJ1R8
- ERX-3SJ1R8A
- ERX-3SJ1R8V
- ERX-3SJ2R0
- ERX-3SJ2R0A
- ERX-3SJ2R0V
- ERX-3SJ2R2
- ERX-3SJ2R2A
- ERX-3SJ2R2V
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- ERX-3SJ2R4A
- ERX-3SJ2R4V
- ERX-3SJ2R7
- ERX-3SJ2R7A
- ERX-3SJ2R7V
- ERX-3SJ332V
- ERX-3SJ3R0
- ERX-3SJ3R0A
- ERX-3SJ3R0V
- ERX-3SJ3R3
- ERX-3SJ3R3A
- ERX-3SJ3R3V
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- ERX-3SJ3R9
- ERX-3SJ3R9A
- ERX-3SJ3R9V
- ERX-3SJ4R3

- ERX-3SJ4R3A
- ERX-3SJ4R3V
- ERX-3SJ4R7
- ERX-3SJ4R7A
- ERX-3SJ4R7V
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- ERX-3SJ5R1A
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- ERX-3SJ7R5V
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- ERX-3SJ9R1V
- ERX-3SJR20
- ERX-3SJR20V
- ERX-3SJR22
- ERX-3SJR22P
- ERX-3SJR22V
- ERX-3SJR24V
- ERX-3SJR27V ERX-3SJR30
- ERX-3SJR30V
- ERX-3SJR33V
- ERX-3SJR36V
- ERX-3SJR39V
- ERX-3SJR43V
- ERX-3SJR47
- ERX-3SJR47A
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- ERX-3SJR51A
- ERX-3SJR51V
- ERX-3SJR56

- ERX-3SJR56A
- ERX-3SJR56V
- ERX-3SJR62
- ERX-3SJR62A
- ERX-3SJR62V
- ERX-3SJR68
- ERX-3SJR68A
- ERX-3SJR68V
- ERX-3SJR75
- ERX-3SJR75A
- ERX-3SJR75V
- ERX-3SJR82
- ERX-3SJR82A
- ERX-3SJR82P
- ERX-3SJR82V
- ERX-3SJR91
- ERX-3SJR91A
- ERX-3SJR91V
- ERX-3SJS2R2H
- ERX-3SJSR62H
- ERX-3SJSR68H
- ERX-3SJW1R0E
- ERX-3SJX4R7V
- ERX-3SZJR20
- ERX-5SJ1R5
- ERX-5SJ1R8
- ERX-5SJ4R7
- ERX-5SJR33
- ERX-5SJR68
- ERX103E03890
- ERX1SZFR50V



Metal Film Fusing Resistors

Metal Film Fusing Resistors

Type : ERQA Type : ERQZ

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

(MIII)

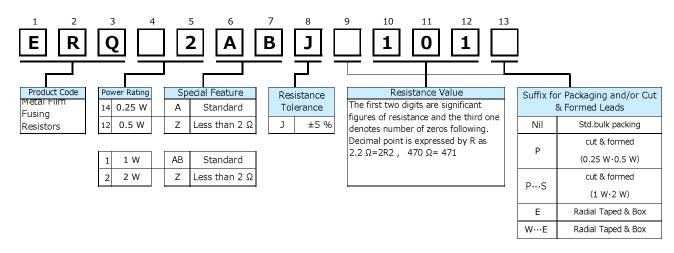
Features

- Accurate fusing
- Small size and lightweight
- Uniform quality, consistent performance and reliability
- Flame retardant, utilizing exclusive silicon insulation material

Discontinued

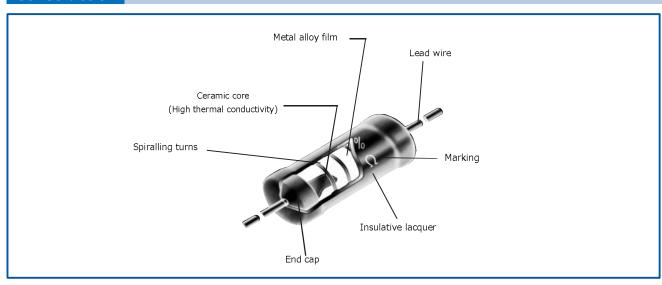
- Reference Standard ······ EIAJ RC-2125
- RoHS compliant

Explanation of Part Numbers



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



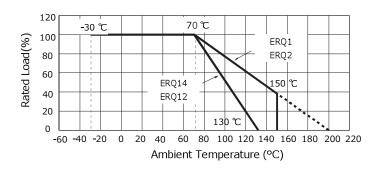
Ratings

Part No.	Power Rating at 70 °C	Maximum Open Circuit Voltage ⁽¹⁾	Maximum Overload Voltage	Dielectric Withstanding Voltage	Resistance Tolerance	Rar	tance nge 2)	T.C.R.	Standard Resistance Value	Marking Method on Body	Mass (Weight) (g/ pc)
	(W)	(V)	(V)		(%)	min.	max.	(×10 ⁻⁶ /K)	Value	on body	(9/ 50)
ERQ14Z	0.25	0.25 200		AC 350	J (±5)	1.0	1.8	±350	E 24	Color	0.24
ERQ14A	0.23	200		AC 330	J (±3)	2.0	470	1330	L 24	code	0.24
ERQ12Z	0.5	250		AC 350	J (±5)	1.0	1.8	±350	E 24	Stamp	0.32
ERQ12A	0.5	250	3 times of rated		J (±3)	2.0	560	±330		Color code	
ERQ1Z	1	250 voltage ⁽		40.000	J (±5)	1.0	1.8	±350	F 24	G.	0.64
ERQ1AB	1	230	3	AC 600	J (±3)	2.0	560	±330	E 24	Stamp	0.64
ERQ2Z	2	250	AC 100		J (±5)	1.0	1.8	±350	E 24	C.	1.54
ERQ2AB	2	230		AC 1000	J (±3)	2.0	560	±350	L 24	Stamp	1.54

⁽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.

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.

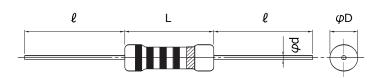


Performance Specifications

Characteristics		Specifica	ations	Test Methods
Characteristics Fusing Characteristics	Rated Power 0.25 W 0.5 W 1 W 2 W 0.25 W 0.5 W 1 W 2 W	Specification (Ω) Res. Value (Ω) 1 to 1.8 2 to 9.1 10 to 470	Limit Open within 30 seconds at 30 times the rated power Open within 30 seconds at 25 times the rated power Open within 30 seconds at 16 times the rated power Open within 30	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 tabilized power source is suggested. Fusing time shall be measured as the
	0.5 W 1 W 2 W	10 to 560	seconds at 12 times the rated power	duration until the circuit current is decreased to a 1/50 the initial test current or less.

⁽²⁾ Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=√Power Rating × Resistance Value

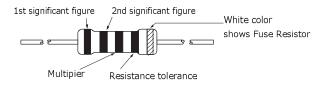
Dimensions in mm (not to scale)



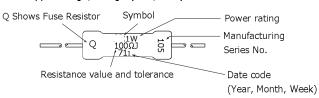
Part No.	Dimensions (mm)						
Pait NO.	L	φD	l	φd			
ERQ14	6.3 +1.5 - 1.0	2.3 ^{±0.5}	30.0 ^{±3.0}	0.65 ^{±0.05}			
ERQ12	9.0 +1.5 - 1.0	2.8 ^{±0.5}	30.0 ^{±3.0}	0.65 ^{±0.05}			
ERQ1	12.0 +1.5 - 1.0	4.0 ^{±1.0}	30.0 ^{±3.0}	0.80 ^{±0.05}			
ERQ2	15.0 ^{±1.5}	5.5 ^{±1.0}	38.0 ^{±3.0}	0.80 ^{±0.05}			

Explanation of Marking

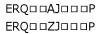
Type ERQ14, ERQ12 (0.25 W, 0.5 W)



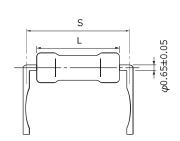
Type ERQ1, ERQ2 (1W, 2W)

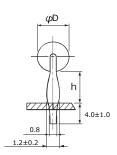


Cut & Formed Type





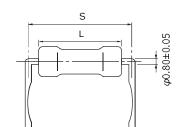


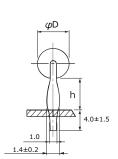


Part No.	Power Rating at 70 ℃	Standard Q'ty/Packing	Dimensions (mm)				
raremor	(W)	(pcs)	L	φD	S	h	
ERQ14□J□□□P	0.25	2,000	6.3 ^{+1.5} _{-1.0}	2.3 ^{±0.5}	10.0 ^{±1.5}	4.0 ^{±1.5}	
ERQ120J000P	0.5	2,000	9.0 +1.5 - 1.0	2.8 ^{±0.5}	12.5 ^{±1.5}	4.0 ^{±1.5}	

ERQOABJPOOS ERQOZJPOOS



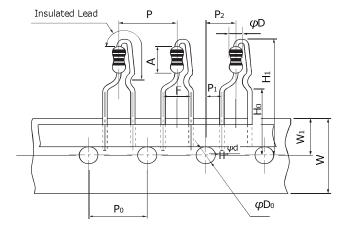




Part No.	Power Rating at 70 ℃	Standard Q'ty/Packing	Dimensions (mm)				
	(W)	(pcs)	L	φD	S	h	
ERQ100JP000S	1	1,000	12.0 ^{+1.5} _{-1.0}	4.0 ^{±1.0}	15.0 ^{±1.5}	6.0 ^{±1.5}	
ERQ200JP000S	2	1,000	15.0 ±1.5	5.5 ^{±1.0}	20.0 ^{±2.0}	6.5 ^{±1.5}	

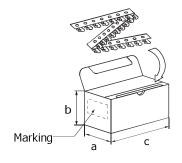
For Panasert Automatic Insertion Machine Radial Taped & Box

ERQ00ZJ000E ERQ00ZJ000E (14A/14Z, 12A/12Z, 1AB/1Z)



Dim	nensions (mm)	Din	nensions (mm)	Dimensions (mm)		Dimensions (mm)		Dimensions (mm)				
Р	12.7±1.0	W	18.0±0.5		14A/14Z	12 max.		14A/14Z	6.35 ^{+0.65} -0.35		14A/14Z	2.3±0.5
P ₀	12.7±0.3	W_1	9.0±0.5	H ₁	12A/12Z	15.5 max.	Α	12A/12Z	9.0 ^{+1.5} - 1.0	φ D	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			Нο	16.0	±0.5	φd	0.65	5±0.05			·
F	5.0±0.8			ϕD_0	4.0=	±0.2						

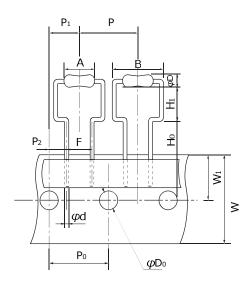
• Radial Tape Packaging Methods



Part No.	Standard Quantity	Dimensions (mm)				
	(pcs/box)	а	b	С		
ERQ14AJDDDE	2,000	46	130	335		
ERQ14ZJ□□□E	2,000	40	150			
ERQ12AJ□□□E	2,000	46	130	335		
ERQ12ZJ□□□E	2,000	40	150	333		
ERQ1ABJ□□□E	1,000	49	100	335		
ERQ1ZJ==E	1,000	פד	100	333		

For Panasert Automatic Insertion Machine Radial Taped & Box

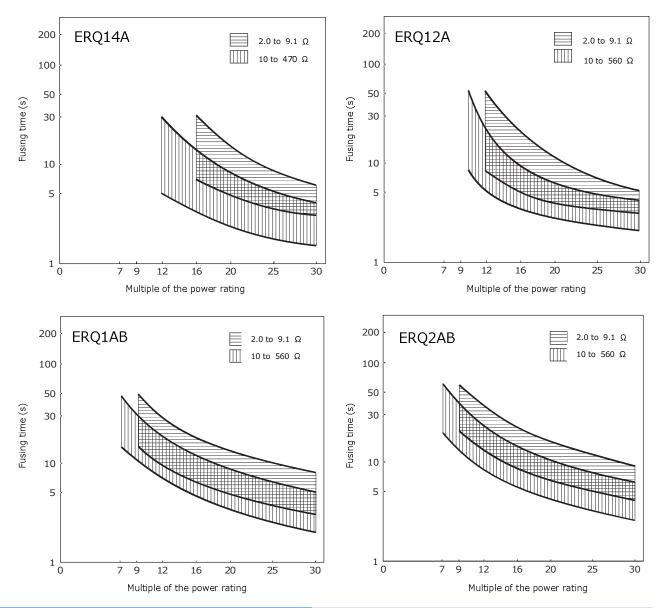
ERQ = 0A/ZJW = 0 = E (14A/14Z, 12A/12Z, 1AB/1Z)



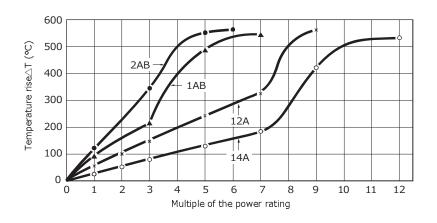
	Dimensions	(mm)	Dimensions (mm)			
Р	14A/14Z	12.7±1.0		14A/14Z	6.5 +0.6	
Р	12A/12Z, 1AB/1Z	30.0±1.0	H ₁	12A/12Z	6.5 0 +1.0	
P ₀	14A/14Z	12.7±0.3		1AB/1Z	6.5 0 +1.0	
10	12A/12Z, 1AB/1Z	15.0±0.3	φD_0	4.0±0.2		
P ₁	14A/14Z	6.35±1.00		14A/14Z	6.35 ^{+0.65} -0.35	
Γ1	12A/12Z, 1AB/1Z	7.5±1.0	Α	12A/12Z	9.0 +1.5 - 1.0	
P ₂	14A/14Z	3.85±0.70		1AB/1Z	12.0 +1.5 - 1.0	
Г 2	12A/12Z, 1AB/1Z	3.75±0.50		14A/14Z	11.2 max.	
F	14A/14Z	5.0 ^{+0.6} -0.2	В	12A/12Z	14.0 max.	
Г	12A/12Z, 1AB/1Z	7.5 ^{+0.6} -0.2		1AB/1Z	17.0 max.	
W	18.0±0.5			14A/14Z	2.3 +0.5 - 0.3	
W_1	9.0±0.5		φ D	12A/12Z	2.8±0.5	
	14A/14Z	16.0±0.5		1AB/1Z	4.0±1.0	
H_0	12A/12Z	18.0±1.0	φd	14A/14Z	φ0.65±0.05	
	1AB/1Z	18.0±1.0	φα	12A/12Z, 1AB/1Z	φ0.80±0.05	

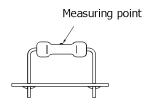
Fusing Characteristics (Constant Voltage Circuit)

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

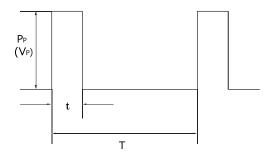
Make sure to evaluate and check the fusing resistors mounted on your product if they are to be mounted on a circuit that generates an impact voltage, or if there is a possibility that the transient phenomenon (significantly high voltage applied in a short time) may occur or that a pulse voltage with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

Make sure to consult our sales staff before using the fusing resistors under spe cial 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 character is tics 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 Char ac ter is tics (Usual)



P_P : Pulse limit power (W)
V_P : Pulse limit voltage (V)
t : Pulse continuous time (s)

T : Period (s)

V_R : Rated voltage (V)
P : Rated power (W)
R : Resistance value (Ω)
V_{n max} : Max. pulse limit voltage (V)

Withstand pulse limit power is calculated by the next method.

$$\begin{array}{lll} P_P & = & K & \cdot & P & \cdot & T/_t \\ V_P & = & \sqrt{K \cdot P \cdot R \cdot T/_t} \end{array}$$

Reference to the right about a fixed number of V_{n max}

Part No.	К	V _{pmax.} (V)
ERQ14A	0.6	200
ERQ12A	0.6	250
ERQ1AB	0.6	250
ERQ2AB	0.4	250

- \bullet T>1(s) \rightarrow T=1(s)
- \bullet T/t>100 \rightarrow T/t =100
- \bullet P_P<P \rightarrow P stands for P_P

 $(V_P < V_R \rightarrow V_R \text{ stands for } V_P)$

- Added voltage ≤ V_{pmax}.
- P_P or V_P is referent value

Conditions: Pulse added time=1000 h

Resistance change = ±5 %

Room temperature

Safety Precautions

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 - 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 spe cial 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 character is tics 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.

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.



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 under the actual conditions for use.
- 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
- * 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
- * Systems equipped with an arresting the spread of fire or preventing glitch.

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general elec tron ic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) For applications in which special quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury (such as for aircraft and aerospace equipment, traffic and transport equipment, combustion equipment, medical equipment, accident prevention and anti-theft devices, and safety equipment), please be sure to consult with our sales representative in advance and to exchange product specifications which conform to such applications.
- 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 Cl₂, H₂S, NH₃, SO₂, or NO_x.
 - 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 and Radioactive Environment.
 - Avoid any environment where strong electromagnetic waves and radiation 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.
- Do not apply flux to these products after soldering. The activity of flux may be a cause of failures in these products.
- Refer to the recommended soldering conditions and set the soldering condition. High peak temperature or long heating time may impair the performance or the reliability of these products.
- Recommended soldering condition is for the guideline for ensuring the basic characteristics of the products, not for the stable soldering conditions. Conditions for proper soldering should be set up according to individual conditions.



- Do not reuse any products after removal from mounting boards.
- Do not drop these products. If these products are dropped, do not use them. Such products may have received mechanical or electrical damage.
- If any doubt or concern to the safety on these products arise, make sure to inform us immediately and conduct technical examinations at your side.

(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_X .
- 2. In direct sunlight.

(3) AEC-Q200 Compliant

The products are tested based on all or part of the test conditions and methods defined in AEC-Q200. Please consult with Panasonic for the details of the product specification and specific evaluation test results, etc., and please review and approve Panasonic's product specification before ordering.

<Package markings>

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



Safety Precautions (Common precautions for Surface Mount Resistors)

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

- 1. Take measures against mechanical stress during and after mounting of Surface Mount Resistors (hereafter called the resistors) so as not to damage their electrodes and protective coatings. Be careful not to misplace the resistors on the land patterns. Otherwise, solder bridging may occur.
- 2. Keep the rated power and ambient temperature within the specified derating curve. Some circuit boards, wiring patterns, temperatures of heat generated by adjacent components, or ambient temper a tures can become factors in the rise of the temperature of the resistors, regardless of the level of power applied. Therefore, check the conditions before use and op timize them so as not to damage the boards and peripheral components.
 - Make sure to contact us before using the resistors under special conditions.
- 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 before use. Never exceed the rated power. Otherwise, the performance and/or reliability of the resistors may be impaired.
- 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 resistors mounted on your product rather than only depending on the calculated power limit or steady-state conditions.
- 5. If the resistors are to be used in high frequency circuits, carefully check the operation before use. Such circuits change the electrical characteristics of the resistors.
- Before using halogen-based or other high-activity flux, check the possible effects of the flux residues on the performance and reliability of the resistors.
- 7. When soldering with a soldering iron, never touch the resistors'bodies with the tip of the soldering iron. When using a soldering iron with a high temperature tip, finish soldering as quickly as possible (within three seconds at 350 °C max.).
- 8. Mounting of the resistors with excessive or insufficient wetting amount of solder may affect the connection reliability or the performance of the resistors. Carefully check the effects and apply a proper amount of solder for use.
- 9. When the resistors' protective coatings are chipped, flawed, or removed, the characteristics of the resistors may be impaired. Take special care not to apply mechanical shock during automatic mounting or cause damage during handling of the boards with the resistors mounted.
- 10. Do not apply shock to the resistors or pinch them with a hard tool (e.g. pliers and tweezers). Otherwise, the resistors' protective coatings and bodies may be chipped, affecting their performance.
- 11. Avoid excessive bending of printed circuit boards in order to protect the resistors from abnormal stress.
- 12. Do not immerse the resistors in solvent for a long time. Before using solvent, carefully check the effects of immersion.
- 13. Do not apply excessive tension to the terminals.