

**Products Catalog**

## **Fixed Resistors**

- General purpose chip resistors type
- High precision type
- Current sensing type
- Small & High power type
- Anti-Sulfurated type
- High temperature type
- Resistor network / Array type



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# Fixed Resistors (Surface Mount Resistors) INDEX

Classification	Product item	Part No.	Page
<u><a href="#">Safety precautions (Common precautions for Fixed Resistors / Common precautions for Surface Mount Resistors)</a></u>			1
General purpose chip resistors	<u><a href="#">Thick film chip resistors</a></u> ★Not Recommended for New Design	ERJ XG, 1G, 2G, 3G, 6G, <b>8G, 14, 12, 12Z, 1T</b>	5
	<u><a href="#">Precision thick film chip resistors</a></u> ★Not Recommended for New Design	ERJ XG, 1G, 1R, 2R, 3R, 6R, 3E, 6E, <b>8E, ERJ 14, 12, 1T</b>	8
High precision	<u><a href="#">Thin film chip resistors, High stability and reliability type</a></u>	ERA 2V, 3V, 3K, 6V, 6K	12
	<u><a href="#">Metal film (Thin film) Chip resistors, High reliability type</a></u>	ERA 1A, 2A, 3A, 6A, 8A	15
	<u><a href="#">High precision thick film chip resistors</a></u>	ERJ PB3, PB6	18
Current sensing	<u><a href="#">Thick film chip resistors / Low resistance type</a></u>	ERJ 2LW, 3LW, 6LW, ERJ 2BW,3BW,6BW,8BW,6CW,8CW ERJ 2B, 3B, 6D, 6B, 8B, 14B, 3R, 6R, 8R, 14R, ERJ 12R, 12Z, ERJ 1TR, L03, L06, L08, L14, L12, L1D, L1W	20
	<u><a href="#">Current sensing resistors, Metal plate type</a></u>	ERJ MS4S, MS4H, MB1S	26
	<u><a href="#">High power chip resistors / Wide terminal type</a></u>	ERJ A1, B1, B2, B3	30
	<u><a href="#">Low TCR high power chip resistors / Wide terminal type</a></u>	ERJ D1, D2	35
Small & High power	<u><a href="#">Anti-Surge thick film chip resistors</a></u>	ERJ PA2, P03, PA3, P06, P08, PM8, P14	38
	<u><a href="#">Anti-Pulse thick film chip resistors</a></u>	ERJ T06, T08, T14	43
Anti-Sulfurated	<u><a href="#">Anti-Sulfurated thick film chip resistors</a></u>	ERJ S02, S03, S06, S08, S14, S12, S1D, S1T, ERJ U0X, U01, U02, U03, U06, U08, U14, U12, ERJ U1D, ERJ U1T, ERJ U6S, U6Q	46
	<u><a href="#">Anti-Sulfurated thick film chip resistors / Precision type</a></u>	ERJ U2R, U3R, U6R	50
	<u><a href="#">Anti-Sulfurated thick film chip resistors / Anti-Surge type</a></u>	ERJ UP3, UP6, UP8	52
	<u><a href="#">Anti-Sulfurated thick film chip resistors / Wide terminal type</a></u>	ERJ C1	55
High temperature	<u><a href="#">High temperature thick film chip resistors (Automotive Grade)</a></u>	ERJ H2G, H2C, H2R, H3G, H3E, H3Q, H6G, HP6	58
Resistor network/Array	<u><a href="#">Chip resistor array</a></u>	EXB 14V, 18V, 24V, 28V, N8V, 2HV, 34V, V4V, 38V, V8V, S8V	61
	<u><a href="#">Anti-Sulfurated chip resistor array</a></u>	EXB U14, U18, U24, U28, U2H, U34, U38	65
	<u><a href="#">Chip resistor networks</a></u>	EXB D, E, A, Q	68
	<u><a href="#">Chip attenuator</a></u>	EXB 14AT, 24AT	72
Common specifications	<u><a href="#">Packaging methods (Taping)</a></u>		74
	<u><a href="#">Recommended land pattern</a></u>		79
	<u><a href="#">Recommended soldering conditions</a></u>		82
	<u><a href="#">Standard for resistance value and resistance tolerance</a></u>		83

## **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.**



## Application Guidelines (Fixed Resistors)

### Safety precautions

- 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 equipment.
  - \* Systems equipped with a protection circuit and a protection device.
  - \* Systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault.
  - \* Systems equipped with an arresting the spread of fire or preventing glitch.

### Precautions for use

- These products are designed and manufactured for general and standard use in general electronic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) 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 Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, or NO<sub>x</sub>.
  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.

## 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<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, or NO<sub>X</sub> .
2. In direct sunlight.

### <Package markings>

Package markings include the product number, quantity, and country of origin.

In principle, the country of origin should be indicated in English.

## 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.



## Application Guidelines (Surface Mount Resistors)

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

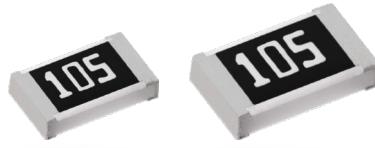
1. Take measures against mechanical stress during and after mounting of Surface Mount Resistors (hereafter called the resistors) so as not to damage their electrodes and protective coatings.  
Be careful not to misplace the resistors on the land patterns. Otherwise, solder bridging may occur.
2. Keep 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 temperatures 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 optimize 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.
4. 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.
6. 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.

## Thick Film Chip Resistors

ERJ type

**ERJ XG, 1G, 2G, 3G, 6G series**

**ERJ 8G, 14, 12, 12Z, 1T series**



(Oct. 2021) Products marked as "NRFND" are not recommended for new design.  
Target products : ERJ8G, 14, 12, 12Z, 1T series  
Please refer to the recommended alternatives with ["Design Support Tool"](#) .

### Features

- Small size and lightweight
- High reliability : Metal glaze thick film resistive element and three layers of electrodes
- Compatible with placement machines : Taping packaging available
- Suitable for both reflow and flow soldering
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant (except ERJXG)
- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

- ERJXGN, 1GN, 2GE, 3GE, 6GE, 8GE, 14, 12, 12Z, 1T series,  $\pm 5\%$

1	2	3	4	5	6	7	8	9	10	11	12								
E	R	J	3	G	E	Y	J	1	0	2	V								
<hr/>																			
Product code		Size, Power rating			Marking		Resistance tolerance		Resistance value		Packaging methods								
Thick film chip resistors		Code	inch	Power rating	Code	Marking	Code	Tolerance	Code	Packaging	Part No.								
		XGN	01005	0.031 W	Y	Value marking on black side	J	$\pm 5\%$	The first two digits are significant figures of resistance and the third one denotes number of zeros following. Jumper is expressed by R00. (Ex.) 222 : 2.2 k $\Omega$										
		1GN	0201	0.05 W			0	Jumper	4R7 : 4.7 $\Omega$										
		2GE	0402	0.1 W	<hr/>														
		3GE	0603	0.1 W															
		6GE	0805	0.125 W															
		8GE	1206	0.25 W															
		NRFND	14	1210	0.5 W														
		NRFND	12	1812	0.75 W														
		NRFND	12Z	2010	0.75 W														
		NRFND	1T	2512	1 W														

\*Series XGN, 1GN and 2GE do not have value markings on the black side.

Please omit the letter "Y" from the part number for these series of parts.

The other part number factors will move up respectively.

Not recommended for new design

## Ratings

### 【For Resistor】

Part No. (inch size)	Rated power <sup>*1</sup> (70 °C) (W)	Limiting element voltage <sup>*2</sup> (V)	Maximum overload voltage <sup>*3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC- Q200 Grade
ERJXG (01005)	0.031	15	30	±5	1 to 1 M (E24)	R<10Ω : -100 to +600 10Ω to 100Ω : ±300 100Ω≤R : ±200	-55 to +125	-
ERJ1G (0201)	0.05	25	50	±5	1 to 10 M (E24)	R<10Ω : -100 to +600 10Ω to 1 MΩ : ±200 1 MΩ<R : -400 to +150	-55 to +155	Grade 1
ERJ2G (0402)	0.1	50	100	±5	1 to 10 M (E24)			Grade 0
ERJ3G (0603)	0.1	75	150	±5	1 to 10 M (E24)			Grade 0
ERJ6G (0805)	0.125	150	200	±5	1 to 10 M (E24)	R<10Ω : -100 to +600 10Ω to 1 MΩ : ±200 1 MΩ<R : -400 to +150	-55 to +155	Grade 0
ERJ8G (1206)	0.25	200	400	±5	1 to 10 M (E24)			
ERJ14 (1210)	0.5	200	400	±5	1 to 10 M (E24)			
ERJ12 (1812)	0.75	200	500	±5	1 to 10 M (E24)			
ERJ12Z (2010)	0.75	200	500	±5	1 to 10 M (E24)			
ERJ1T (2512)	1	200	500	±5	1 to 1 M (E24)			

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: 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.

\*3: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification (refer to performance)} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

NRFND Not recommended for new design

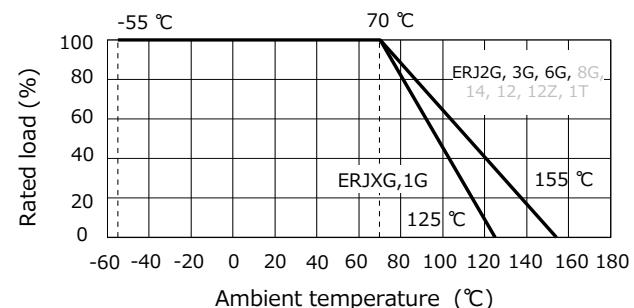
### 【For Jumper】

Part No.	Resistance(Ω)	Rated current(A)	Maximum overload current (A) <sup>*1</sup>
ERJXG	50 mΩ or less	0.5	1
ERJ1G		1	2
ERJ2G		2	4
ERJ3G		2	4
ERJ6G			
ERJ8G	50 mΩ or less	2	4
ERJ14			
ERJ12			
ERJ12Z			
ERJ1T			

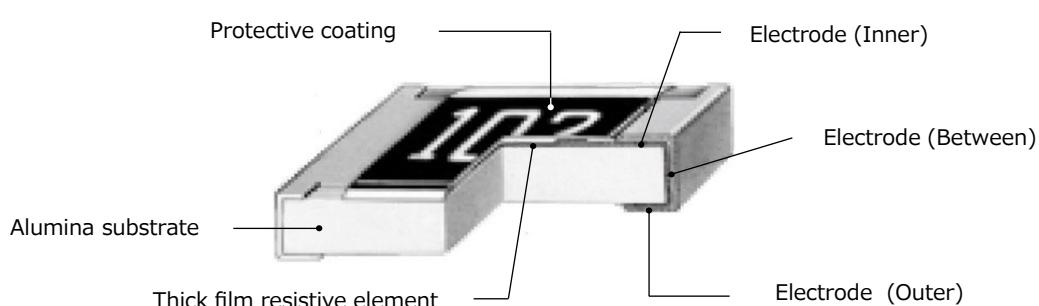
\* 1 :Overload test current

### Power derating curve

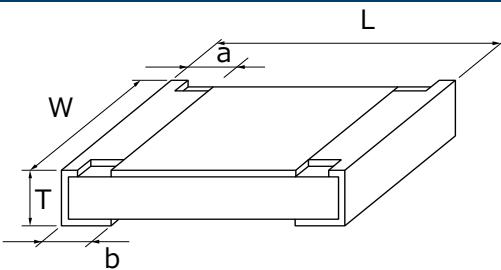
above 70 °C, power rating shall be derated in accordance with the figure on the right.



## Construction



## Dimensions (not to scale)



Unit : mm

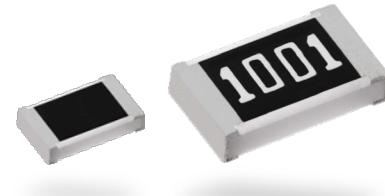
Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJXG	0.40±0.02	0.20±0.02	0.10±0.03	0.10±0.03	0.13±0.02	0.04
ERJ1G	0.60±0.03	0.30±0.03	0.10±0.05	0.15±0.05	0.23±0.03	0.15
ERJ2G	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.05	0.35±0.05	0.8
ERJ3G	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJ6G	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	4
<small>NRFND</small> ERJ8G	3.20+0.05/-0.20	1.60+0.05/-0.15	0.50±0.20	0.50±0.20	0.60±0.10	10
<small>NRFND</small> ERJ14	3.20±0.20	2.50±0.20	0.50±0.20	0.50±0.20	0.60±0.10	16
<small>NRFND</small> ERJ12	4.50±0.20	3.20±0.20	0.50±0.20	0.50±0.20	0.60±0.10	27
<small>NRFND</small> ERJ12Z	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.20	0.60±0.10	27
<small>NRFND</small> ERJ1T	6.40±0.20	3.20±0.20	0.65±0.20	0.60±0.20	0.60±0.10	45

NRFND Not recommended for new design

## Performance

Test item	Performance requirements $\Delta R$		Test conditions
	Resistor type	Jumper type	
Resistance	Within specified tolerance	50 mΩ or less	20 °C
T. C. R.	Within specified T. C. R.	50 mΩ or less	+25°C / +155°C (ERJXG,1G : +25°C / +125°C)
Overload	±2 %	50 mΩ or less	Rated voltage × 2.5, 5 s Jumper type : Max. overload current, 5 s
Resistance to soldering heat	±1 %	50 mΩ or less	270 °C, 10 s
Rapid change of temperature	±1 %	50 mΩ or less	-55 °C (30 min.) / +155 °C (ERJXG,1G : +125 °C) (30 min.), 100 cycles
High temperature exposure	±1 %	50 mΩ or less	+155°C (ERJXG,1G : +125°C), 1000 h
Damp heat, Steady state	±1 %	50 mΩ or less	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	50 mΩ or less	60 °C, 90 % to 95 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70°C	±3 %	50 mΩ or less	70°C, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

## Precision Thick Film Chip Resistors



ERJ type

**ERJ XG, 1G series**

**ERJ 1R, 2R, 3R, 6R series**

**ERJ 3E, 6E, 8E, 14, 12, 1T series**

(Oct. 2021) Products marked as "NRFND" are not recommended for new design.  
Target products : ERJ8E, 14, 12, 1T series  
Please refer to the recommended alternatives with "Design Support Tool".

### Features

- Small size and lightweight
- High reliability : Metal glaze thick film resistive element and three layers of electrodes
- Compatible with placement machines : Taping packaging available
- Suitable for both reflow and flow soldering
- Low resistance tolerance : ERJXG, 1G, 2R, 3E, 6E, 8E, 14, 12, 1T series :  $\pm 1\%$   
ERJ1R, 2R, 3R, 6R series :  $\pm 0.5\%$
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant (except ERJXG, ERJ1R)
- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

- ERJ1R, 2R, 3R, 6R series :  $\pm 0.5\%$

1	2	3	4	5	6	7	8	9	10	11	12															
E	R	J	3	R	B	D	1	0	0	2	V															
Product code																										
Thick film chip resistors																										
Size, Power rating																										
<table border="1"> <thead> <tr> <th>Code</th> <th>inch</th> <th>Power rating</th> </tr> </thead> <tbody> <tr> <td>1R</td> <td>0201</td> <td>0.05 W</td> </tr> <tr> <td>2R</td> <td>0402</td> <td>0.063 W</td> </tr> <tr> <td>3R</td> <td>0603</td> <td>0.1 W</td> </tr> <tr> <td>6R</td> <td>0805</td> <td>0.1 W</td> </tr> </tbody> </table>												Code	inch	Power rating	1R	0201	0.05 W	2R	0402	0.063 W	3R	0603	0.1 W	6R	0805	0.1 W
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T.C.R., Marking																										
<table border="1"> <thead> <tr> <th>Code</th> <th>T.C.R.</th> </tr> </thead> <tbody> <tr> <td>H</td> <td><math>\pm 50 \times 10^{-6}/K</math> (1R, 2R)</td> </tr> <tr> <td>B</td> <td><math>\pm 50 \times 10^{-6}/K</math> (3R, 6R)</td> </tr> <tr> <td>K</td> <td><math>\pm 100 \times 10^{-6}/K</math> (2R)</td> </tr> <tr> <td>E</td> <td><math>\pm 100 \times 10^{-6}/K</math> (3R, 6R)</td> </tr> </tbody> </table>												Code	T.C.R.	H	$\pm 50 \times 10^{-6}/K$ (1R, 2R)	B	$\pm 50 \times 10^{-6}/K$ (3R, 6R)	K	$\pm 100 \times 10^{-6}/K$ (2R)	E	$\pm 100 \times 10^{-6}/K$ (3R, 6R)					
Code	T.C.R.																									
H	$\pm 50 \times 10^{-6}/K$ (1R, 2R)																									
B	$\pm 50 \times 10^{-6}/K$ (3R, 6R)																									
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Resistance tolerance																										
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The first three digits are significant figures of resistance and the last one denotes number of zeros following.  
Example : 1002 → 10 K $\Omega$

## Explanation of part numbers

- ERJXGN, 1GN, 2RC, 2RK, 3EK, 6EN, 8EN, 14N, 12N, 12S, 1TN series :  $\pm 1\%$

Product code	Size, Power rating			Resistance tolerance	Resistance value	Packaging methods			
Thick film chip resistors	Code	inch	Power rating	Code	Tolerance		Code	Packaging	Part No.
XGN	01005		0.031 W				Y	Pressed carrier taping W8P2, 20,000 pcs	ERJXGN
1GN	0201		0.05 W				U	Embossed carrier taping W4P1, 40,000 pcs	
2RC	0402		0.1 W				C	Pressed carrier taping 2 mm pitch, 15,000 pcs	ERJ1GN
2RK	0402		0.1 W				X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJ2RC ERJ2RK
3EK	0603		0.1 W				V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJ3EK ERJ6EN ERJ8EN
6EN	0805		0.125 W						
NRFND	8EN	1206	0.25 W						
NRFND	14N	1210	0.5 W						
NRFND	12N	1812	0.75 W						
NRFND	12S	2010	0.75 W						
NRFND	1TN	2512	1 W						
NRFND Not recommended for new design									

## Ratings

< $\pm 0.5\%$ >

Part No. (inch size)	Rated power <sup>*1</sup> (70 °C) (W)	Limiting element voltage <sup>*2</sup> (V)	Maximum overload voltage <sup>*3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJ1RH (0201)	0.05	15	30	$\pm 0.5$	1 k to 1 M (E24,E96)	$\pm 50$	-55 to +125	-
ERJ2RH (0402)	0.063	50	100	$\pm 0.5$	100 to 100 k (E24,E96)	$\pm 50$		
ERJ2RK (0402)	0.063	50	100	$\pm 0.5$	10 to 97.6 102 k to 1 M (E24,E96)	$\pm 100$		
ERJ3RB (0603)	0.1	75 <sup>*4</sup>	150 <sup>*4</sup>	$\pm 0.5$	100 to 100 k (E24,E96)	$\pm 50$		
ERJ3RE (0603)	0.1	75 <sup>*4</sup>	150 <sup>*4</sup>	$\pm 0.5$	10 to 97.6 102 k to 1 M (E24,E96)	$\pm 100$	-55 to +155	Grade 0
ERJ6RB (0805)	0.1	150	200	$\pm 0.5$	100 to 100 k (E24,E96)	$\pm 50$		
ERJ6RE (0805)	0.1	150	200	$\pm 0.5$	10 to 97.6 102 k to 1 M (E24,E96)	$\pm 100$		

\*1 : Use it on the condition that the case temperature is below the upper category temperature.

\*2 : 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.

\*3 : Overload test voltage (OTV) shall be determined from  $OTV = \text{specified magnification (refer to performance)} \times RCWV$  or maximum overload voltage listed above, whichever less.

\*4 : UPGRADE

# Precision Thick Film Chip Resistors

## Ratings

<±1 %>

Part No. (inch size)	Power rating <sup>1</sup> (70 °C) (W)	Limiting element voltage <sup>2</sup> (V)	Maximum overload voltage <sup>3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/\text{K}$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJXGN (01005)	0.031	15	30	±1	10 to 1 M <sup>4</sup> (E24,E96)	R < 100 Ω : ±300 100 Ω ≤ R : ±200	-55 to +125	-
ERJ1GN (0201)	0.05	25	50	±1	10 to 1 M <sup>4</sup> (E24,E96)	±200	-55 to +125	Grade 1
ERJ2RC (0402)	0.1	50	100	±1	1 to 9.76 (E24,E96)	-100 to +600	-55 to +155	Grade 0
ERJ2RK (0402)	0.1	50	100	±1	10 to 1 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ3EK (0603)	0.1	75	150	±1	10 to 1 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ6EN (0805)	0.125	150	200	±1	10 to 2.2 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ8EN (1206) <small>NRFND</small>	0.25	200	400	±1	10 to 2.2 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ14N (1210) <small>NRFND</small>	0.5	200	400	±1	10 to 1 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ12N (1812) <small>NRFND</small>	0.75	200	500	±1	10 to 1 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ12S (2010) <small>NRFND</small>	0.75	200	500	±1	10 to 1 M (E24,E96)	±100	-55 to +155	Grade 0
ERJ1TN (2512) <small>NRFND</small>	1	200	500	±1	10 to 1 M (E24,E96)	±100	-55 to +155	Grade 0

\*1 : Use it on the condition that the case temperature is below the upper category temperature.

\*2 : 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.

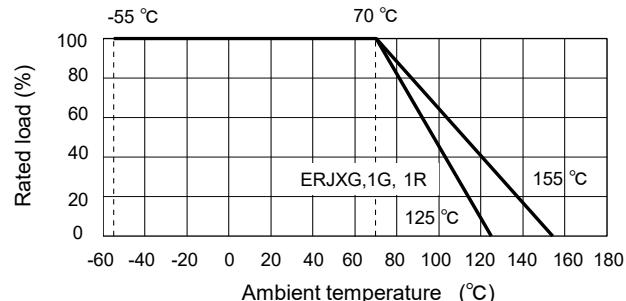
\*3 : Overload test voltage (OTV) shall be determined from  $OTV = \text{specified magnification (refer to performance)} \times RCWV$  or maximum overload voltage listed above, whichever less.

\*4 : Please contact us when you need a type with a resistance of less than 10 Ω.

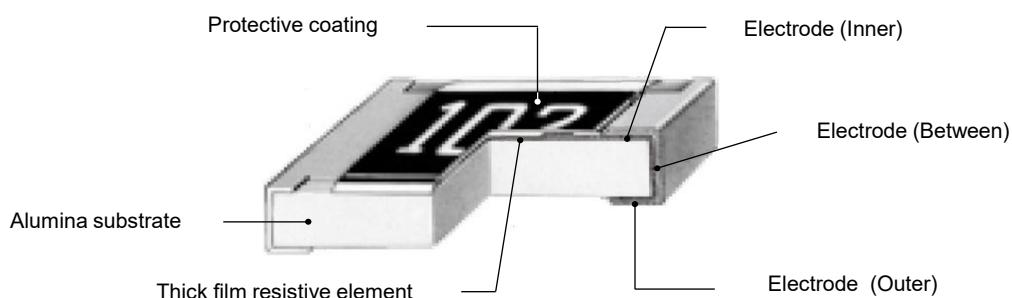
NRFND Not recommended for new design

## Power derating curve

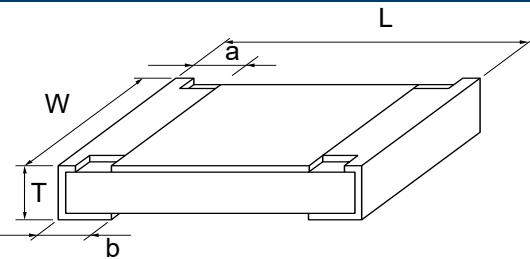
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



## Construction



## Dimensions (not to scale)



Part No.	Dimensions (mm)					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJXGN	0.40±0.02	0.20±0.02	0.10±0.03	0.10±0.03	0.13±0.02	0.04
ERJ1GN	0.60±0.03	0.30±0.03	0.10±0.05	0.15±0.05	0.23±0.03	0.15
ERJ1R	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.05	0.35±0.05	0.8
ERJ2R	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJ3R	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	4
ERJ3EK						
ERJ6R						
ERJ6EN						
ERJ8EN	3.20+0.05/-0.20	1.60+0.05/-0.15	0.50±0.20	0.50±0.20	0.60±0.10	10
ERJ14N	3.20±0.20	2.50±0.20	0.50±0.20	0.50±0.20	0.60±0.10	16
ERJ12N	4.50±0.20	3.20±0.20	0.50±0.20	0.50±0.20	0.60±0.10	27
ERJ12S	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.20	0.60±0.10	27
ERJ1TN	6.40±0.20	3.20±0.20	0.65±0.20	0.60±0.20	0.60±0.10	45

NRFND Not recommended for new design

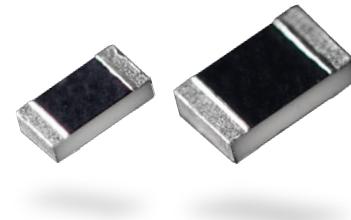
## Performance

### ● ERJ1R, 2R, 3R, 6R series : ±0.5 % (D)

Test item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±2 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±1 %	-55 °C (30 min.) / +155 °C (ERJ1R : +125 °C)(30 min.), 100 cycles
High temperature exposure	±1 %	+155 °C (ERJ1R : +125 °C), 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±2 % ERJ1R : ±3 %	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±2 % ERJ1R : ±3 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

### ● ERJXGN, 1GN, 2RC, 2RK, 3EK, 6EN, 8EN, 14N, 12N, 12S, 1TN series : ±1 % (F)

Test item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +155 °C (ERJXG,ERJ1G : +25°C / +125 °C)
Overload	±2 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±1 %	-55 °C (30 min.) / +155 °C (ERJXG,ERJ1G : +125 °C)(30 min.), 100 cycles
High temperature exposure	±1 %	+155 °C (ERJXG,ERJ1G : +125 °C), 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±2 % ERJXG,1G : ±3 %	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±2 % ERJXG,1G : ±3 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Thin Film Chip Resistors, High Stability and Reliability Type

ERA V type

(High resistance value ERA K type)

ERA 2V, 3V, 6V series

(ERA 3K, 6K series)

### Features

- High Power : To realize higher power rating, Limiting element voltage, and maximum overload voltage than current products
- High reliability : Stable at high temperature and humidity (85 °C 85 %RH rated load, Category temperature range : -55 °C to +155 °C)
- High accuracy : Low resistance tolerance and temperature coefficient of resistance
- High performance : Low current noise, excellent linearity
- Anti-ESD : Original structure for high ESD performance (AEC-Q200-002 HBM Class 1c and above)
- Anti-sulfurated : Original structure for sulfurated performance
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2133C
- RoHS compliant

■ As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12																																																																																																												
E	R	A	3	V	E	B	1	0	5	1	V																																																																																																												
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## Thin Film Chip Resistors, High Stability and Reliability Type

### Ratings

Part No. (inch size)	Power rating at 85 °C <sup>1</sup> (W)	Limiting element voltage <sup>2</sup> (V)	Maximum overload voltage <sup>3</sup> (V)	Part No. (detail)	Resistance tolerance (%)	T.C.R. ( $\times 10^{-6}/\text{K}$ )	Resistance range <sup>4</sup> ( $\Omega$ )	Category temperature range (°C)	AEC-Q200 Grade		
ERA2V (0402)	0.1	75	150	ERA2VEB	±0.1	±25	47 to 100 k <sup>5</sup> (E24, E96)	-55 to +155	Grade 0		
				ERA2VPB	±0.1	±15	1 k to 47 k <sup>5</sup> (E24, E96)				
				ERA2VRB	±0.1	±10					
				ERA2VRW	±0.05						
ERA3V (0603)	0.125	100	200	ERA3VEB	±0.1	±25	47 to 100 k (E24, E96)	-55 to +155	Grade 0		
				ERA3VPB	±0.1	±15	1 k to 100 k (E24, E96)				
				ERA3VRB	±0.1	±10					
				ERA3VRW	±0.05						
ERA3K (0603)	0.125	100	200	ERA3KEB	±0.1	±25	102 k to 240 k (E24, E96)				
ERA6V (0805)	0.25	150	300	ERA6VEB	±0.1	±25	47 to 100 k (E24, E96)	-55 to +155	Grade 0		
				ERA6VPB	±0.1	±15	1 k to 100 k (E24, E96)				
				ERA6VRB	±0.1	±10					
				ERA6VRW	±0.05						
ERA6K (0805)	0.25	150	300	ERA6KEB	±0.1	±25	102 k to 750 k (E24, E96)				

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: Rated Continuous Working Voltage (RCWV) shall be determined from  $\text{RCWV} = \sqrt{\text{Power Rating} \times \text{Resistance Values}}$ , or Limiting Element Voltage listed above, whichever less.

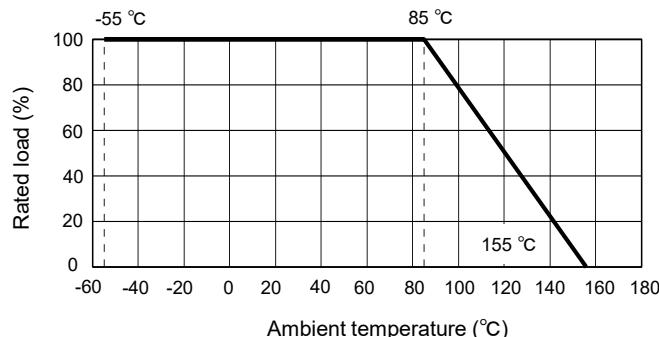
\*3: Overload Test Voltage (OTV) shall be determined from  $\text{OTV} = \text{Specified Magnification (2.5)} \times \text{RCWV}$  or Maximum Overload Voltage listed above, whichever less.

\*4: E192 series resistance values are also available. The E192 series has custom part numbers. Please contact us for details.

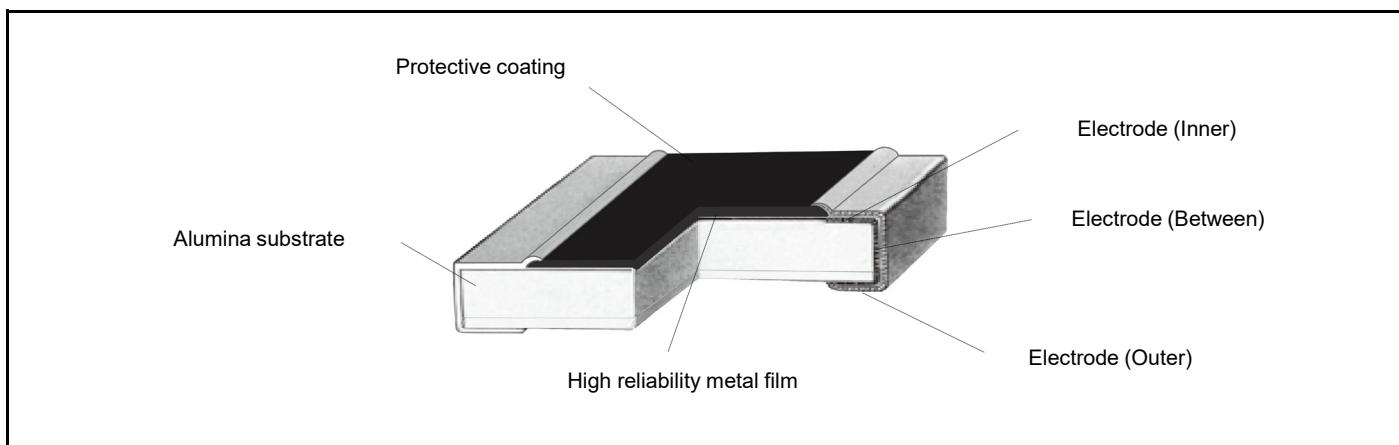
\*5: Expanded resistance range

### Power derating curve

For resistors operated in ambient temperatures above 85°C, power rating shall be derated in accordance with the figure on the right.

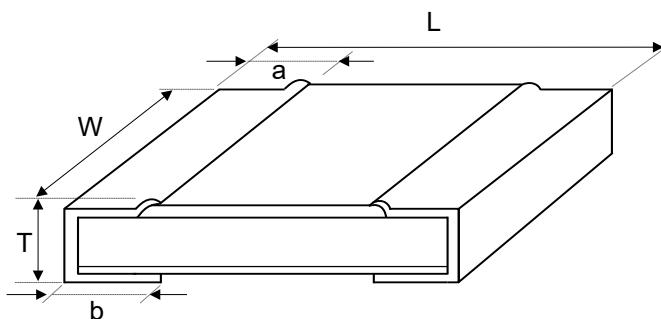


### Construction



# Thin Film Chip Resistors, High Stability and Reliability Type

## Dimensions (not to scale)



Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERA2V	1.00±0.05	0.50+0.10/-0.05	0.25±0.10	0.25±0.10	0.35±0.05	0.6
ERA3V,3K	1.60±0.15	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10	2
ERA6V,6K	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.55±0.10	5

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±0.1 %	Rated voltage× 2.5, 5 s
Resistance to soldering heat	±0.1 %	270 °C, 10 s
Rapid change of temperature	±0.1 %	-55 °C (30 min.) / +155 °C (30 min.), 1000 cycles
High temperature exposure	±0.1 %	+155 °C, 1000 h
Damp heat, Steady state	±0.1 %	85 °C, 85 %RH, 1000 h
Load life in humidity	±0.1 %	85 °C, 85 %RH, 10 % of Rated power <sup>*1</sup> , 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 85°C	±0.1 %	85 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Electro static discharge (HBM)	±0.1 % <sup>*2</sup>	AEC-Q200-002 : 150 pF, 2000 Ω, positive 5 times, negative 5 times ERA2V : 1.0 kV (Class 1c) ERA3V(3K) : 1.5 kV (Class 1c) ERA6V(6K) : 2.0 kV (Class 2)

\*1: Applied Voltage is " $\sqrt{0.1} \times \text{Power Rating} \times \text{Resistance Values}$ ", or "Limiting Element Voltage×0.316", whichever less.

\*2: Depends on resistance value.



## Metal Film (Thin Film) Chip Resistors, High Reliability Type

ERA A type

**ERA 1A, 2A, 3A, 6A, 8A series**

### Features

- High reliability : Stable at high temperature and humidity (85 °C 85 %RH rated load, Category temperature range : -55 °C to +155 °C)
- High accuracy : Low resistance tolerance and Temperature Coefficient of Resistance
- High performance : Low current noise, excellent linearity
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2133C
- AEC-Q200 compliant (except ERA1A)
- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

#### ● E24 series

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
<b>E</b>	<b>R</b>	<b>A</b>	<b>3</b>	<b>A</b>	<b>E</b>	<b>B</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>V</b>
Product code										
Thin film chip resistors										
Size, Power rating										
Code      inch size      Power rating										
1A      0201      0.05 W										
2A      0402      0.063 W										
3A      0603      0.1 W										
6A      0805      0.125 W										
8A      1206      0.25 W										
Temp. coefficient										
Code      T.C.R.										
R $\pm 10 \times 10^{-6}/K$										
P $\pm 15 \times 10^{-6}/K$										
E $\pm 25 \times 10^{-6}/K$										
H $\pm 50 \times 10^{-6}/K$										
K $\pm 100 \times 10^{-6}/K$										
Resistance tolerance										
Code      Tolerance										
W $\pm 0.05 \%$										
B $\pm 0.1 \%$										
C $\pm 0.25 \%$										
D $\pm 0.5 \%$										
Resistance value										
Consist of three figures for E24 series resistance value. The first two digits are significant figures of resistance and the third one denotes number of zeros following. (example) 102 : 1 k $\Omega$										
Packaging methods										
Code      Packaging      Part No.										
C      Pressed carrier taping 2 mm pitch, 15,000 pcs      ERA1A										
X      Punched carrier taping 2 mm pitch, 10,000 pcs      ERA2A										
V      Punched carrier taping 4 mm pitch, 5,000 pcs      ERA3A ERA6A ERA8A										

#### ● E96 series and other Resistance values

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>E</b>	<b>R</b>	<b>A</b>	<b>3</b>	<b>A</b>	<b>E</b>	<b>B</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>1</b>	<b>V</b>
Product Code											
Thin film chip resistors											
Size, Power rating											
Code      inch size      Power rating											
1A      0201      0.05 W											
2A      0402      0.063 W											
3A      0603      0.1 W											
6A      0805      0.125 W											
8A      1206      0.25 W											
Temp. coefficient											
Code      T.C.R.											
R $\pm 10 \times 10^{-6}/K$											
P $\pm 15 \times 10^{-6}/K$											
E $\pm 25 \times 10^{-6}/K$											
H $\pm 50 \times 10^{-6}/K$											
K $\pm 100 \times 10^{-6}/K$											
Resistance tolerance											
Code      Tolerance											
W $\pm 0.05 \%$											
B $\pm 0.1 \%$											
C $\pm 0.25 \%$											
D $\pm 0.5 \%$											
Resistance value											
Consist of four figures for E96 series resistance value. The first three digits are significant figures of resistance and the fourth one denotes number of zeros following. (example) 1051 : 1.05 k $\Omega$											
Packaging methods											
Code      Packaging      Part No.											
C      Pressed carrier taping 2 mm pitch, 15,000 pcs      ERA1A											
X      Punched carrier taping 2 mm pitch, 10,000 pcs      ERA2A											
V      Punched carrier taping 4 mm pitch, 5,000 pcs      ERA3A ERA6A ERA8A											

Note : Duplicated resistance values as E24 series part numbers shall follow E24 part numbers.  
(apply three digit resistance value)

# Metal Film (Thin Film) Chip Resistors, High Reliability Type

## Ratings

Part No. (inch size)	Power rating <sup>*1</sup> (85 °C) (W)	Limiting element voltage <sup>*2</sup> (V)	Maximum overload voltage <sup>*3</sup> (V)	Part No. (detail)	Resistance tolerance (%)	T.C.R. (×10 <sup>-6</sup> /K)	Resistance range <sup>*4 *5</sup> (Ω)	Category temperature range (°C)	AEC-Q200 Grade
ERA1A (0201)	0.05	25	50	ERA1AEB	±0.1	±25	100 to 10 k (E24,E96)	-55 to +155	-
				ERA1AEC	±0.25		100 to 10 k (E24,E96)		
				ERA1ARC	±0.25	±10	1 k to 10 k (E24,E96)		
				ERA1ARB	±0.1		10 to 46.4 (E24,E96)		
				ERA1ARW	±0.05	±100	47 to 100 k (E24,E96)		
ERA2A (0402)	0.063	50	100	ERA2AKD	±0.5	±25	200 to 47 k (E24,E96)	Grade 1	
				ERA2AED	±0.5		200 to 47 k (E24,E96)		
				ERA2AEC	±0.25	±15	200 to 47 k (E24,E96)		
				ERA2AEB	±0.1	±10	10 to 46.4 (E24,E96)		
				ERA2APC	±0.25	±50	47 to 330 k (E24,E96)		
				ERA2APB	±0.1	±25	470 to 100 k (E24,E96)		
				ERA2ARC	±0.25	±10	1 k to 100 k (E24,E96)		
ERA3A (0603)	0.1	75	150	ERA3AHD	±0.5	±10	10 to 46.4 (E24,E96)	-55 to +155	
				ERA3AED	±0.5	±50	47 to 1 M (E24,E96)		
				ERA3AEC	±0.25	±25	470 to 100 k (E24,E96)		
				ERA3AEB	±0.1	±15	1 k to 100 k (E24,E96)		
				ERA3APC	±0.25	±10	10 to 46.4 (E24,E96)		
				ERA3APB	±0.1	±50	47 to 330 k (E24,E96)		
				ERA3ARC	±0.25	±25	470 to 100 k (E24,E96)		
				ERA3ARB	±0.1	±15	1 k to 100 k (E24,E96)		
ERA6A (0805)	0.125	100	200	ERA6AHD	±0.5	±10	10 to 46.4 (E24,E96)	Grade 0	
				ERA6AED	±0.5	±50	47 to 1 M (E24,E96)		
				ERA6AEC	±0.25	±25	470 to 100 k (E24,E96)		
				ERA6AEB	±0.1	±15	1 k to 100 k (E24,E96)		
				ERA6APC	±0.25	±10	10 to 46.4 (E24,E96)		
				ERA6APB	±0.1	±50	47 to 330 k (E24,E96)		
				ERA6ARC	±0.25	±25	470 to 100 k (E24,E96)		
				ERA6ARB	±0.1	±15	1 k to 100 k (E24,E96)		
ERA8A (1206)	0.25	150	300	ERA8AHD	±0.5	±10	10 to 46.4 (E24,E96)		
				ERA8AED	±0.5	±50	47 to 1 M (E24,E96)		
				ERA8AEC	±0.25	±25	470 to 100 k (E24,E96)		
				ERA8AEB	±0.1	±15	1 k to 100 k (E24,E96)		
				ERA8APC	±0.25	±10	10 to 46.4 (E24,E96)		
				ERA8APB	±0.1	±50	47 to 330 k (E24,E96)		
				ERA8ARC	±0.25	±25	470 to 100 k (E24,E96)		
				ERA8ARB	±0.1	±15	1 k to 100 k (E24,E96)		
				ERA8ARW	±0.05	±10	10 to 46.4 (E24,E96)		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: Rated Continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Values}}$ , or Limiting Element Voltage listed above, whichever less.

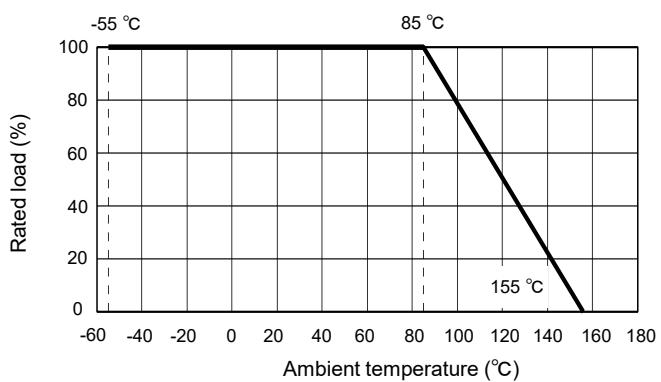
\*3: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification (2.5)} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

\*4: E192 series resistance values are also available. Please contact us for details.

\*5: Duplicated resistance values between E96, E192 and E24 series shall follow E24 Part Numbers.  
(apply three digit resistance value)

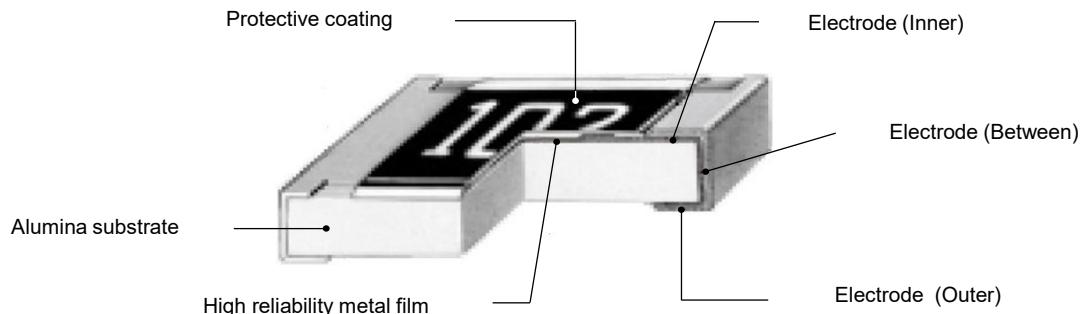
### Power derating curve

For resistors operated in ambient temperatures above 85 °C, power rating shall be derated in accordance with the figure on the right.



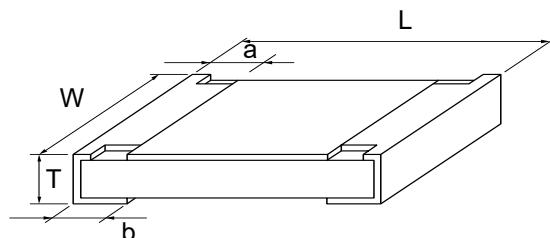
# Metal Film (Thin Film) Chip Resistors, High Reliability Type

## Construction



\*0201/0402 size or E96 series do not have value markings.

## Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERA1A	0.60±0.03	0.30±0.03	0.15±0.05	0.15±0.05	0.23±0.03	0.14
ERA2A	1.00±0.10	0.50+0.10/-0.05	0.15±0.10	0.25±0.10	0.35±0.05	0.6
ERA3A	1.60±0.20	0.80±0.20	0.30±0.20	0.30±0.20	0.45±0.10	2
ERA6A	2.00±0.20	1.25±0.10	0.40±0.25	0.40±0.25	0.50±0.10	4
ERA8A	3.20±0.20	1.60+0.05/-0.15	0.50±0.25	0.50±0.25	0.60±0.10	8

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	Rated voltage x 2.5, 5 s
Resistance to soldering heat	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	270 °C, 10 s
Rapid change of temperature	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	ERA1A, 2A : -55 °C (30 min.) / +125 °C (30 min.), 1000 cycles ERA3A, 6A, 8A : -55 °C (30 min.) / +155 °C (30 min.), 1000 cycles
High temperature exposure	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	+155 °C, 1000 h
Damp heat, Steady state	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	85 °C, 85 %RH, 1000 h
Load life in humidity	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	85 °C, 85%RH, 10% rated power, 1.5 h ON / 0.5 h OFF cycle, 1000 h, Max. test voltage : ERA2A : 15.8 V, ERA3A : 23.7 V, ERA6A : 31.6 V, ERA8A : 47.4 V
Endurance at 85°C	$R < 47 \Omega : \pm 0.5 \%$ $R \geq 47 \Omega : \pm 0.1 \%$	85°C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

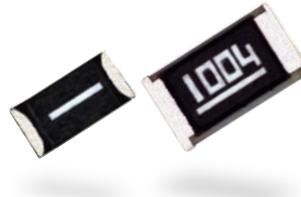
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

1-Jul-21

## High Precision Thick Film Chip Resistors

ERJ PB type

**ERJ PB3, PB6** series



### Features

- Achieve the resistance tolerance  $\pm 0.1\%$  with high reliability metal glaze thick film resistor
- Guarantee the temperature coefficient of Resistance  $\pm 50 \times 10^{-6}/\text{K}$  in high resistance range up to  $1 \text{ M}\Omega$
- High power :  $0.20 \text{ W}$  : 0603 inch /1608 mm size(ERJPB3)  
:  $0.25 \text{ W}$  : 0805 inch /2012 mm size(ERJPB6)
- Reference Standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant
- RoHS compliant

■ As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12																								
E	R	J	P	B	6	B	1	0	0	2	V																								
<hr/>																																			
<hr/>																																			
<table border="1"> <tr> <td>Product code</td> <td>Size, Power rating</td> <td>Resistance tolerance</td> <td>Resistance value</td> <td>Packaging methods</td> </tr> <tr> <td>Thick film chip resistors</td> <td>Code inch Power rating</td> <td>Code Tolerance</td> <td>The first three digits are significant figures of resistance and the last one denotes number of zeros following. (Ex.) 5110 : <math>511 \Omega</math> 1003 : <math>100 \text{ k}\Omega</math></td> <td>Code Packaging Part No.</td> </tr> <tr> <td>PB3</td> <td>0603</td> <td>B <math>\pm 0.1\%</math></td> <td></td> <td>V Punched carrier taping 4 mm pitch, 5,000 pcs</td> </tr> <tr> <td>PB6</td> <td>0805</td> <td>D <math>\pm 0.5\%</math></td> <td></td> <td>ERJPB3</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>ERJPB6</td> </tr> </table>											Product code	Size, Power rating	Resistance tolerance	Resistance value	Packaging methods	Thick film chip resistors	Code inch Power rating	Code Tolerance	The first three digits are significant figures of resistance and the last one denotes number of zeros following. (Ex.) 5110 : $511 \Omega$ 1003 : $100 \text{ k}\Omega$	Code Packaging Part No.	PB3	0603	B $\pm 0.1\%$		V Punched carrier taping 4 mm pitch, 5,000 pcs	PB6	0805	D $\pm 0.5\%$		ERJPB3					ERJPB6
Product code	Size, Power rating	Resistance tolerance	Resistance value	Packaging methods																															
Thick film chip resistors	Code inch Power rating	Code Tolerance	The first three digits are significant figures of resistance and the last one denotes number of zeros following. (Ex.) 5110 : $511 \Omega$ 1003 : $100 \text{ k}\Omega$	Code Packaging Part No.																															
PB3	0603	B $\pm 0.1\%$		V Punched carrier taping 4 mm pitch, 5,000 pcs																															
PB6	0805	D $\pm 0.5\%$		ERJPB3																															
				ERJPB6																															

### Ratings

Part No. (inch size)	Power rating <sup>**1</sup> (70 °C)(W)	Limiting element voltage <sup>**2</sup> (V)	Maximum overload voltage <sup>**3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/\text{K}$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJPB3 (0603)	0.20	150	200	$\pm 0.1$ $\pm 0.5$	200 to 100 k (E24, E96)	$\pm 50$	-55 to +155	Grade 0
ERJPB6 (0805)	0.25	150	200	$\pm 0.1$ $\pm 0.5$	200 to 1 M (E24, E96)	$\pm 50$		

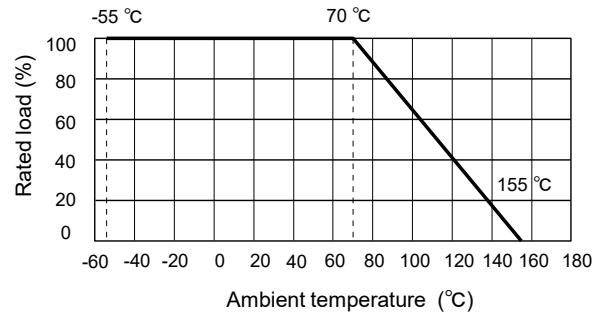
\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: Rated continuous working voltage (RCWV) shall be determined from  $\text{RCWV} = \sqrt{\text{Power rating} \times \text{Resistance value}}$ , or Limiting Element Voltage listed above, whichever less.

\*3: Overload Test Voltage (OTV) shall be determined from  $\text{OTV} = \text{Specified Magnification} \times \text{RCWV}$  or Maximum overload voltage listed above, whichever less.

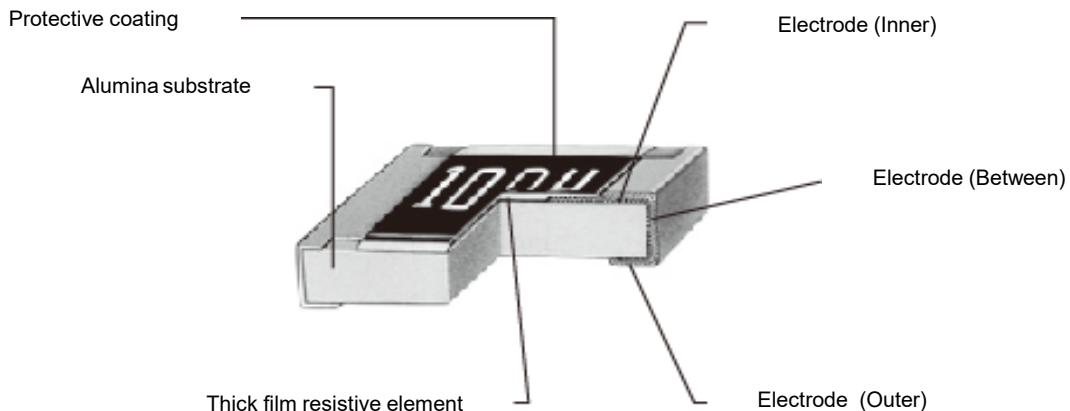
### Power derating curve

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

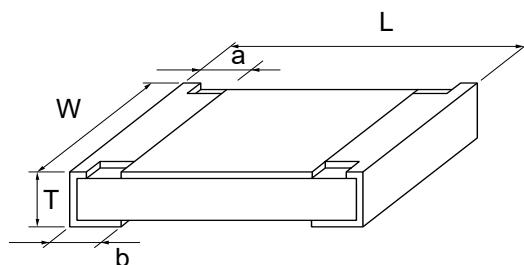


# High Precision Thick Film Chip Resistors

## Construction



## Dimensions (not to scale)



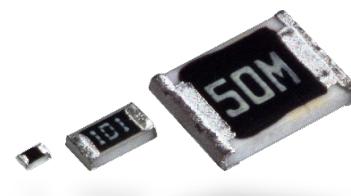
Unit : mm

Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJPB3	1.60±0.15	0.80+0.15/-0.05	0.15+0.15/-0.10	0.25±0.10	0.45±0.10	2
ERJPB6	2.00±0.20	1.25±0.10	0.25±0.20	0.40±0.20	0.60±0.10	4

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±0.5 %	Rated voltage × 2.0, 5 s
Resistance to soldering heat	±0.5 %	270 °C, 10 s
Rapid change of temperature	±0.5 %	-55 °C (30 min.) / +155 °C (30 min.), 100 cycles
High temperature exposure	±0.5 %	+155 °C, 1000 h
Damp heat, Steady state	±0.5 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±0.5 %	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±0.5 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

## Thick Film Chip Resistors (Low Resistance Type)



### ERJ type

#### ERJ 2LW, 3LW, 6LW series

#### ERJ 2BW, 3BW, 6BW, 8BW, 6CW, 8CW series

#### ERJ 2B, 3B, 6D, 6B, 8B, 14B series

#### ERJ 3R, 6R, 8R, 14R, 12R, 12Z, 1TR series

#### ERJ L03, L06, L08, L14, L12, L1D, L1W series

### Features

- Current sensing resistor
- Small size and lightweight
- Realize both low-resistance & High-precision by original thick film resistive element & special electrode structure
- Suitable for both reflow and flow soldering
- Realize High-power by double-sided resistive elements structure that aimed to suppress temperature rising
  - : ERJ2LW, 3LW, 6LW, 2BW, 3BW, 6BW, 8BW, 6CW, 8CW
- Low TCR
  - :  $\pm 75 \times 10^{-6} / \text{K}$  (ERJ6CW, ERJ8CW)
- Low resistance value
  - : Thick film resistors available from 5 mΩ (ERJ3LW, 6LW)
- Reference standard
  - : IEC 60115-8, JIS C 5201-8, JEITA RC-2144
- AEC-Q200 compliant
- RoHS compliant

■ As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

- ERJ2LW, 3LW, 6LW, 2BW, 3BW, 6BW, 8BW, 6CW, 8CW series  
<High power (double-sided resistive elements structure) type>

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	2	B	W	G	R	0	4	7	X
Product code				Code inch size				Power rating			
Thick film chip resistors				2LW 0402 0.2 W				10 mΩ			
				3LW 0603 0.25 W				5 mΩ, 10 mΩ			
				6LW 0805 0.5 W				5, 6, 7, 8, 9 mΩ			
				2BW 0402 0.25 W				47 m to 100 mΩ			
				3BW 0603 0.33 W				20 m to 100 mΩ			
				6BW 0805 0.5 W				10 m to 100 mΩ			
				8BW 1206 1 W				10 m to 100 mΩ			
				6CW 0805 0.5 W				10 m to 30 mΩ			
				8CW 1206 1 W				10 m to 50 mΩ			

## Thick Film Chip Resistors (Low Resistance Type)

### Explanation of part numbers

- ERJ2BS/2BQ, 3BS/3BQ, 6BS/6BQ, 8BS/8BQ, 14BS/14BQ, 6D, 3R, 6R, 8R, 14R, 12R, 12Z, 1TR series <High power type/Standard type>

1	2	3	4	5	6	7	8	9	10	11					
E	R	J	8	R	Q	F	R	2	2	V					
<hr/>															
Product code		Size, Power rating			Resistance value region			Resistance tolerance		Resistance value					
Thick film chip resistors		Code	inch size	Power rating	S	0.1Ω to 0.2Ω	Code	Tolerance							
		2B	0402	0.166 W	Q	0.22Ω to 9.1Ω*	D	±0.5 %*							
		3B	0603	0.25 W	*2B: 0.22 Ω to 1.0 Ω										
		3R	0603	0.1 W											
		6D	0805	0.5 W											
		6B	0805	0.33 W											
		6R	0805	0.125 W											
		8B	1206	0.5 W											
		8R	1206	0.25 W											
		14B	1210	0.5 W											
		14R	1210	0.25 W											
		12R	1812	0.5 W											
		12Z	2010	0.5 W											
		1TR	2512	1 W											
<hr/>															
Packaging methods															
Code	Packaging	Part No.													
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJ2B													
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJ3B/3R ERJ6D/6B/ ERJ6R ERJ8B/8R													
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJ14B/14R ERJ12R ERJ12Z													
	Embossed carrier taping 4 mm pitch, 4,000 pcs	ERJ1TR													

- ERJL03, L06, L08, L14, L12, L1D, L1W series <Low TCR type>

1	2	3	4	5	6	7	8	9	10	11	12							
E	R	J	L	1	4	K	J	5	0	M	U							
<hr/>																		
Product Code		Size, Power rating			Code			Resistance value		Resistance tolerance								
Thick film chip resistors		Code	inch size	Power rating	Code			Code		Resistance value								
		L03	0603	0.2 W	K			F		Shown by 3 digits or letters.								
		L06	0805	0.25 W	Standard *			J		(Ex.)								
		L08	1206	0.33 W	20 mΩ, 22 mΩ, 33 mΩ, 39 mΩ, 47 mΩ, 50 mΩ, 100 mΩ			50M : 50 mΩ		50M : 50 mΩ								
		L14	1210	0.33 W	U			10C : 100 mΩ		10C : 100 mΩ								
		L12	1812	0.5 W	*L03, L06, L08 : 47 mΩ to 100 mΩ			L1D		L1D, L1W : 40 mΩ to 100 mΩ								
		L1D	2010	0.5 W														
		L1W	2512	1 W														
<hr/>																		
Packaging methods																		
Code	Packaging	Part No.																
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJL03 ERJL06 ERJL08																
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJL14 ERJL12 ERJL1D																
	Embossed carrier taping 4 mm pitch, 3,000 pcs	ERJL1W																

### Ratings

#### <High power (double-sided resistive elements structure) type>

Part No. (inch size)	Power rating (70 °C)* (W)	Resistance tolerance (%)	Resistance range* <sup>2</sup> (Ω)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range(°C)	AEC-Q200 Grade
ERJ2LW (0402)	0.2	±1, ±2, ±5	10 m	0 to +500	-55 to +125	Grade 1
ERJ3LW (0603)	0.25	±1, ±2, ±5	5 m	0 to +700		
ERJ6LW (0805)	0.5	±1, ±2, ±5	10 m	0 to +300		
ERJ2BW (0402)	0.25	±1, ±2, ±5	47 m to 100 m (E24)	0 to +300	-55 to +155	Grade 0
ERJ3BW (0603)	0.33	±1, ±2, ±5	20 m to 100 m (E24)	20 mΩ ≤ R < 39 mΩ : 0 to +250 39 mΩ ≤ R ≤ 100 mΩ : 0 to +150		
ERJ6BW (0805)	0.5	±1, ±2, ±5	10 m to 100 m (E24)	10 mΩ ≤ R < 15 mΩ : 0 to +300 15 mΩ ≤ R ≤ 100 mΩ : 0 to +200		
ERJ8BW (1206)	1	±1, ±2, ±5	10 m to 100 m (E24)	10 mΩ ≤ R < 20 mΩ : 0 to +200 20 mΩ ≤ R < 47 mΩ : 0 to +150 47 mΩ ≤ R ≤ 100 mΩ : 0 to +100	-55 to +125	Grade 1
ERJ6CW (0805)	0.5	±0.5, ±1, ±2, ±5	10 m to 30 m (E24)	±75		
ERJ8CW (1206)	1	±1, ±2, ±5	10 m to 50 m (E24)	±75		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

- Rated Continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ .
- Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCW$ .

\*2: Please contact us when resistors of irregular series are needed.

## Thick Film Chip Resistors (Low Resistance Type)

### Ratings

#### <High power type>

Part No. (inch size)	Power rating (70 °C) <sup>1</sup> (W)	Resistance tolerance <sup>2</sup> (%)	Resistance range <sup>3</sup> (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range(°C)	AEC-Q200 Grade
ERJ2BS (0402)	0.166	$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +300	-55 to +155	Grade 0
ERJ2BQ (0402)			0.22 to 1.0 (E24)	0.22 $\Omega \leq R \leq 1.0 \Omega$ : 0 to +250		
ERJ3BS (0603)		$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +300		
ERJ3BQ (0603)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +300		
ERJ6DS (0805)			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 200$		
ERJ6DQ (0805)		$\pm 0.5, \pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24,E96)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +150		
ERJ6BS (0805)			0.22 to 9.1 (E24,E96)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +100		
ERJ6BQ (0805)			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 100$		
ERJ8BS (1206)	0.5	$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +250	-55 to +155	Grade 0
ERJ8BQ (1206)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +250		
ERJ14BS (1210)			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 200$		
ERJ14BQ (1210)	0.5	$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +200		
			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +200		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 100$		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: E96 series also have  $\pm 0.5 \%$ ,  $\pm 1 \%$  line-up.

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

• Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} (\text{refer to performance}) \times RCW$ .

\*3: Please contact us when resistors of irregular series are needed.

#### <Standard type>

Part No. (inch size)	Power rating (70 °C) <sup>1</sup> (W)	Resistance tolerance (%)	Resistance range <sup>2</sup> (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range(°C)	AEC-Q200 Grade
ERJ3RS (0603)	0.1	$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +300	-55 to +155	Grade 0
ERJ3RQ (0603)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +300		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 200$		
ERJ6RS (0805)		$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +250		
ERJ6RQ (0805)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +250		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 200$		
ERJ8RS (1206)		$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +250		
ERJ8RQ (1206)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +250		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 200$		
ERJ14RS (1210)		$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +200		
ERJ14RQ (1210)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +200		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 100$		
ERJ12RS (1812)	0.5	$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +200	-55 to +155	Grade 0
ERJ12RQ (1812)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +200		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 100$		
ERJ12ZS (2010)		$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +200		
ERJ12ZQ (2010)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +200		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 100$		
ERJ1TRS (2512)	1	$\pm 1, \pm 2, \pm 5$	0.10 to 0.20 (E24)	0.10 $\Omega \leq R < 0.22 \Omega$ : 0 to +200		
ERJ1TRQ (2512)			0.22 to 0.91 (E24)	0.22 $\Omega \leq R < 1.0 \Omega$ : 0 to +200		
			1.0 to 9.1 (E24)	1.0 $\Omega \leq R \leq 9.1 \Omega$ : $\pm 100$		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

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

• Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} (\text{refer to performance}) \times RCW$ .

\*2: Please contact us when resistors of irregular series are needed.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

29-Jan-20

# Thick Film Chip Resistors (Low Resistance Type)

## Ratings

### <Low TCR type>

Part No. (inch size)	Power rating (70 °C) <sup>1</sup> (W)	Resistance tolerance (%)	Resistance range <sup>2</sup> (Ω)	T.C.R. ( $\times 10^6/K$ )	Category temperature range(°C)	AEC-Q200 Grade		
ERJL03 (0603)	0.2	$\pm 1, \pm 5$	47 m to 100 m	$\pm 200$	-55 to +125	Grade 1		
ERJL06 (0805)	0.25	$\pm 1, \pm 5$	47 m to 100 m	$\pm 100$				
ERJL08 (1206)	0.33	$\pm 1, \pm 5$	47 m to 100 m	$\pm 100$				
ERJL14 (1210)	0.33	$\pm 1, \pm 5$	20 m to 100 m	$R < 47 \text{ m}\Omega : \pm 300$ $R \geq 47 \text{ m}\Omega : \pm 100$				
ERJL12 (1812)	0.5	$\pm 1, \pm 5$	20 m to 100 m					
ERJL1D (2010)	0.5	$\pm 1, \pm 5$	40 m to 100 m					
ERJL1W (2512)	1	$\pm 1, \pm 5$	40 m to 100 m					

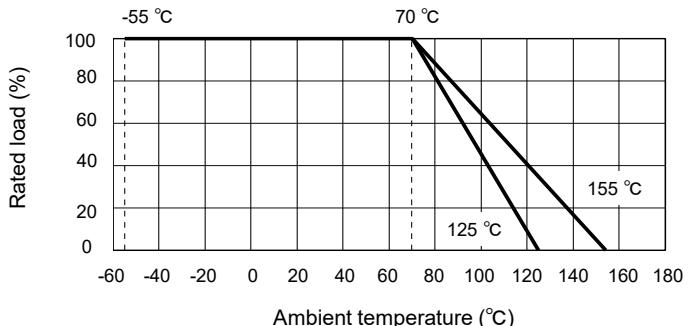
\*1: Use it on the condition that the case temperature is below the upper category temperature.

- Rated Continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ .
- Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} (\text{refer to performance}) \times RCW$ .

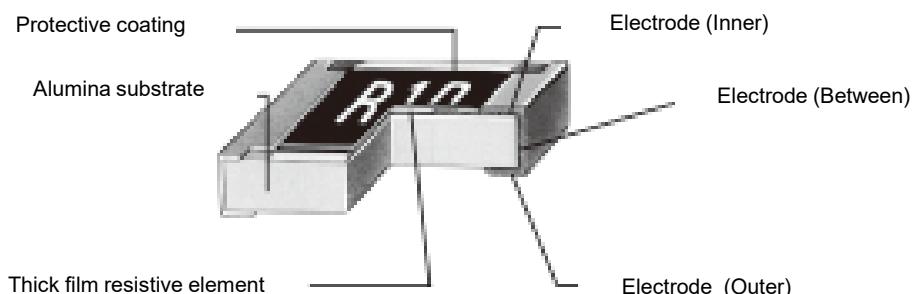
\*2: Standard R.V. : 20 mΩ, 22 mΩ, 33 mΩ, 39 mΩ, 47 mΩ, 50 mΩ, 100 mΩ, Custom R.V. : Each 1 mΩ within upper range.

### 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.

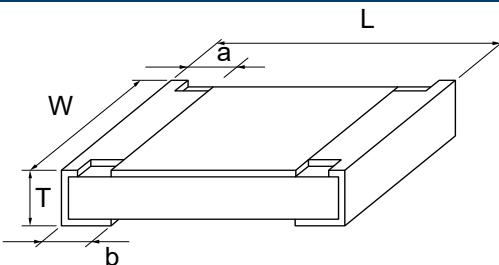


## Construction



## Thick Film Chip Resistors (Low Resistance Type)

### Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJ2LW	1.00±0.10	0.50+0.10/-0.05	0.25±0.10	0.25±0.10	0.40±0.05	0.8
ERJ2BW	1.00±0.10	0.50+0.10/-0.05	0.24±0.10	0.24±0.10	0.35±0.05	0.8
ERJ2B	1.00±0.10	0.50+0.10/-0.05	0.20±0.10	0.27±0.10	0.35±0.05	0.8
ERJ3LW (5 mΩ)	1.60±0.15	0.80±0.15	0.50±0.20	0.50±0.20	0.55±0.10	3
ERJ3LW (10 mΩ) ERJ3BW	1.60±0.15	0.80±0.15	0.40±0.20	0.40±0.20	0.55±0.10	3
ERJ3R ERJ3B ERJL03	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJ6LW	2.00±0.20	1.25±0.20	0.63±0.20	0.63±0.20	0.70±0.10	6
ERJ6BW	2.00±0.20	1.25±0.20	0.55±0.20	0.55±0.20	0.65±0.10	6
ERJ6CW (10 to 13 mΩ)	2.05±0.20	1.30±0.20	0.60±0.20	0.60±0.20	0.65±0.10	6
ERJ6CW (15 to 30 mΩ)			0.45±0.20	0.45±0.20		
ERJ6D	2.00±0.20	1.25±0.10	0.40±0.20	0.55±0.25	0.60±0.10	5
ERJ6R ERJ6B ERJL06	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	5
ERJ8BW	3.20±0.20	1.60±0.20	1.00±0.20	1.00±0.20	0.65±0.10	13
ERJ8CW (10 to 16 mΩ)	3.20±0.20	1.60±0.20	1.10±0.20	1.10±0.20	0.65±0.10	13
ERJ8CW (18 to 50 mΩ)	3.20±0.20	1.60±0.20	0.60±0.20	0.60±0.20	0.65±0.10	13
ERJ8R ERJ8B ERJL08	3.20+0.05/-0.20	1.60+0.05/-0.15	0.50±0.20	0.50±0.20	0.60±0.10	10
ERJ14R ERJ14B ERJL14	3.20±0.20	2.50±0.20	0.50±0.20	0.50±0.20	0.60±0.10	16
ERJ12R ERJL12	4.50±0.20	3.20±0.20	0.50±0.20	0.50±0.20	0.60±0.10	27
ERJ12Z ERJL1D	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.20	0.60±0.10	27
ERJ1TR	6.40±0.20	3.20±0.20	0.65±0.20	0.60±0.20	0.60±0.10	45
ERJL1W	6.40±0.20	3.20±0.20	0.65±0.20	1.30±0.20	1.10±0.10	79

## Thick Film Chip Resistors (Low Resistance Type)

### Performance

- ERJ2LW, 3LW, 6LW, 2BW, 3BW, 6BW, 8BW, 6CW, 8CW series  
<High power (double-sided resistive elements structure) type>

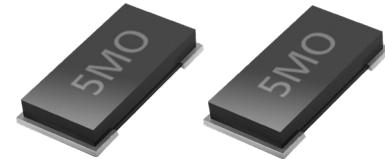
Test item	Performance requirements $\Delta R$	Test conditions	
Resistance	Within specified tolerance	20 °C	
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C	
Overload	$\pm 2\%$	ERJ6LW ERJ8BW ( $R > 0.05\Omega$ ) Other	: Rated voltage $\times 1.77, 5\text{ s}$ : Rated voltage $\times 1.77, 5\text{ s}$ : Rated voltage $\times 2.0, 5\text{ s}$
Resistance to soldering heat	$\pm 1\%$	270 °C, 10 s	
Rapid change of temperature	$\pm 1\%$ ERJ2LW : $\pm 2\%$	-55 °C (30min.) / +155 °C (ERJ□LW, ERJ□CW : +125 °C) (30 min.), 100 cycles	
High temperature exposure	$\pm 1\%$	+155 °C (ERJ□LW, ERJ□CW : +125 °C), 1000 h	
Damp Heat, Steady state	$\pm 1\%$	60 °C, 90 % to 95 %RH, 1000 h	
Load life in humidity	$\pm 3\%$	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h	
Endurance at 70 °C	$\pm 3\%$	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h	

- ERJ2BS/2BQ, 3BS/3BQ, 6BS/6BQ, 8BS/8BQ, 14BS/14BQ, 6D, 3R, 6R, 8R, 14R, 12R, 12Z, 1TR series <High power type/Standard type>

Test item	Performance requirements $\Delta R$	Test conditions	
Resistance	Within specified tolerance	20 °C	
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C	
Overload	$\pm 2\%$	Rated voltage $\times 2.5$ (ERJ6D : $\times 1.77$ ), 5 s	
Resistance to soldering heat	$\pm 1\%$	270 °C, 10 s	
Rapid change of temperature	$\pm 1\%$	-55 °C (30 min.) / +155 °C (30 min.), 100 cycles	
High temperature exposure	$\pm 1\%$	+155 °C, 1000 h	
Damp Heat, Steady state	$\pm 1\%$	60 °C, 90 % to 95 %RH, 1000 h	
Load life in humidity	$\pm 3\%$	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h	
Endurance at 70 °C	$\pm 3\%$	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h	

- ERJL03, L06, L08, L14, L12, L1D, L1W series < Low TCR type >

Test item	Performance requirements $\Delta R$	Test conditions	
Resistance	Within specified tolerance	20 °C	
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C	
Overload	$\pm 2\%$	Rated voltage $\times 2.5$ , 5 s	
Resistance to soldering heat	$\pm 1\%$	270 °C, 10 s	
Rapid change of temperature	$\pm 1\%$	-55 °C (30 min.) / +125 °C (30 min.), 100 cycles	
High temperature exposure	$\pm 1\%$	+125 °C, 1000 h	
Damp Heat, Steady state	$\pm 1\%$	60 °C, 90 % to 95 %RH, 1000 h	
Load life in humidity	$\pm 3\%$	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h	
Endurance at 70 °C	$\pm 3\%$	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h	



## Current Sensing Resistors, Metal Plate Type

### ERJ MS, MB type ERJ MS4, MB1 series

#### Features

- Ideal for current sensing solution
- Small case size with high power
- Metal plate bonding technology. Excellent long term stability
- Outer Resin with high heat dissipation. Wide temperature range (-65 °C to +170 °C)
- AEC-Q200 compliant
- RoHS compliant
- ISO9001, ISO/TS16949 certified

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

#### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	M	S	4	S	F	2	M	0	U
<hr/>											
<hr/>											
Product code	Type code	Resistance tolerance	Resistance value	Packaging methods							
Metal plate chip resistors	Code inch size	Code Tolerance	Shown by 3 digits or letters. Decimal point is expressed by M as 2.0 mΩ=2M0, 10.0 mΩ=10M	Code	Packaging	Part No.					
S4S 2512	2512	Standard	U	Embossed carrier taping 4 mm pitch, 2,000 pcs	ERJMS4						
S4H 2512	2512	Narrow			ERJMB1						
B1S 1020	1020	Standard		Embossed carrier taping 4 mm pitch, 3,000 pcs							

#### Ratings

Part No. (inch size)	Power rating (70 °C) (W)	Resistance range (mΩ)	Resistance tolerance (%)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	Terminal temp. upper limit (°C)	AEC-Q200 Grade
ERJMS4S (2512)	3	1, 2, 3, 4	F : ±1	±75	-65 to +170	130	Grade 0
ERJMS4H (2512)	3	5, 6	F : ±1	±75		100	
ERJMB1S (1020)	2	7, 8, 9, 10	F : ±1	±75		130	
	2	1, 2, 3, 4, 5	F : ±1	±75			

\* Please contact us when resistors of irregular series are needed.

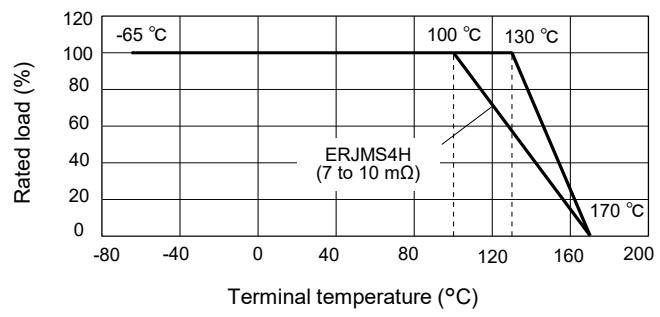
#### Power derating curve

If the terminal temperature of the resistor is more than terminal temperature upper limit value of the rated table, please reduce the rated power according to the Power Derating Curve shown in the figure on the right.

<Supplemented>

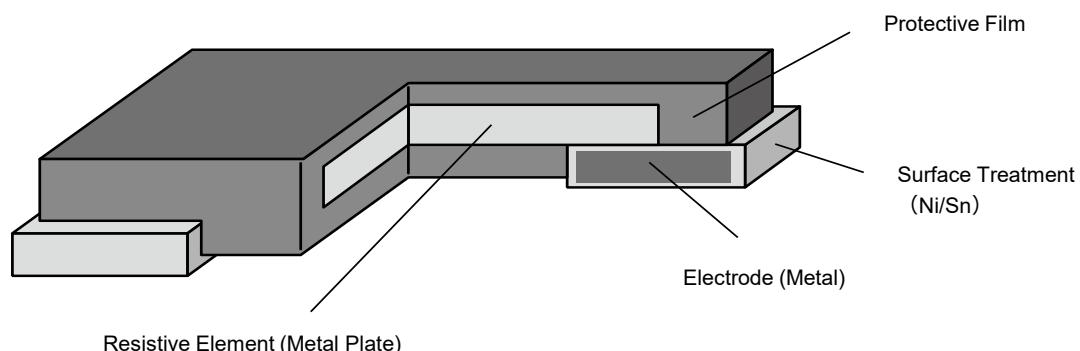
In the case of the temperature measurement of the terminal portion of the resistor, Please perform under the following conditions.

- 1) Terminal temperature measurement, please apply the temperature of the higher of either the left or right electrode upper surface of the resistor.
- 2) Please measure the temperature of the resistor in the land pattern printed of circuit board and plan to use by real conditions.



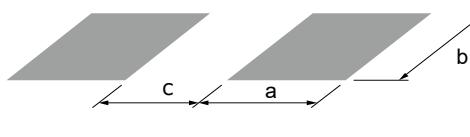
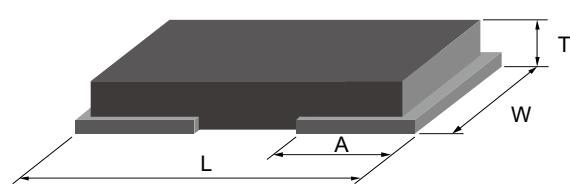
## Current Sensing Resistors, Metal Plate Type

### Construction

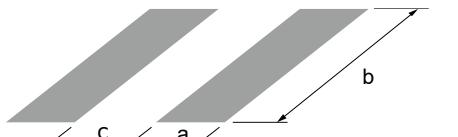
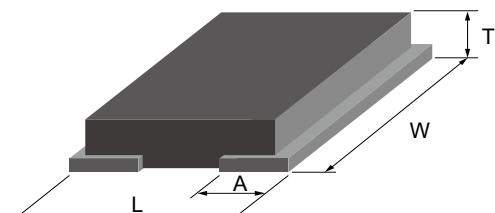


### Dimensions in mm (not to scale), Recommended land pattern

#### ● ERJMS4S/ERJMS4H



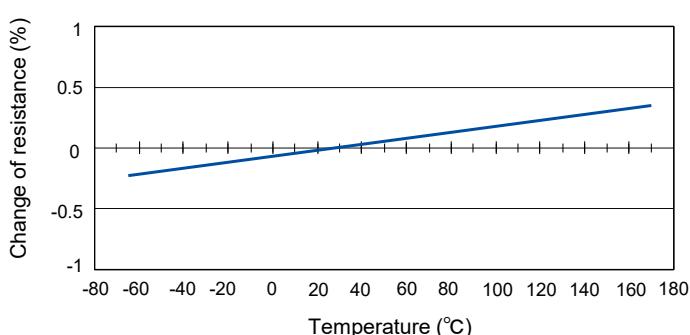
#### ● ERJMB1S



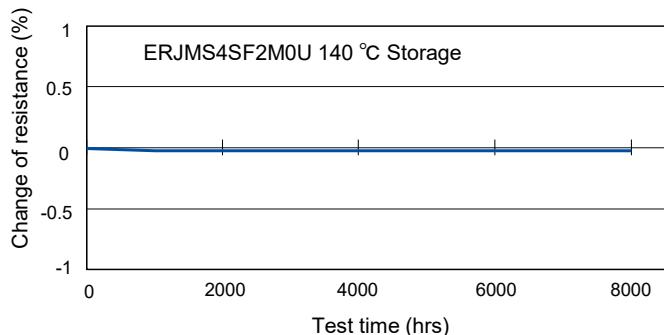
Unit : mm

Part No.	Dimensions				Recommended land pattern			Mass (Weight) (g/1000 pcs)
	L	W	A	T	a	b	c	
ERJMS4S	6.40±0.25	3.20±0.25	2.20±0.25	1.20±0.15	2.7	3.4	2.0	120
ERJMS4H	6.40±0.25	3.20±0.25	1.25±0.25	1.20±0.15	1.7	3.4	4.0	115
ERJMB1S	2.55±0.25	5.00±0.25	0.68 +0.15/-0.20	0.90±0.15	1.15	5.5	1.1	40

### Typical temp. dependence of electrical resistance



### Long-term stability



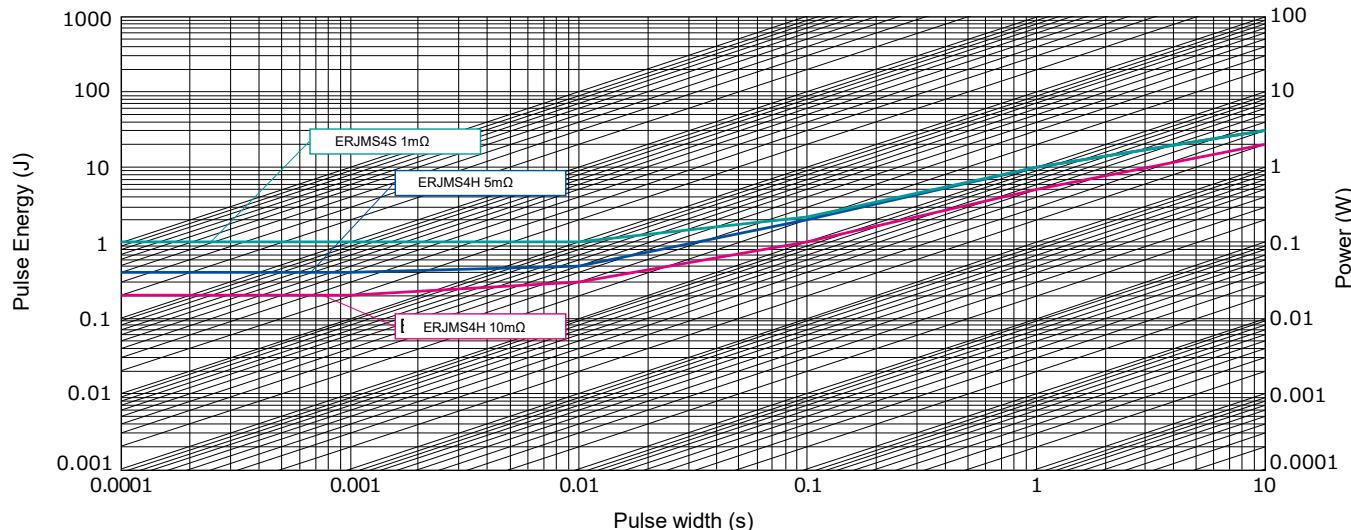
## Maximum pulse energy respectively pulse power for continuous operation

### Reference Data

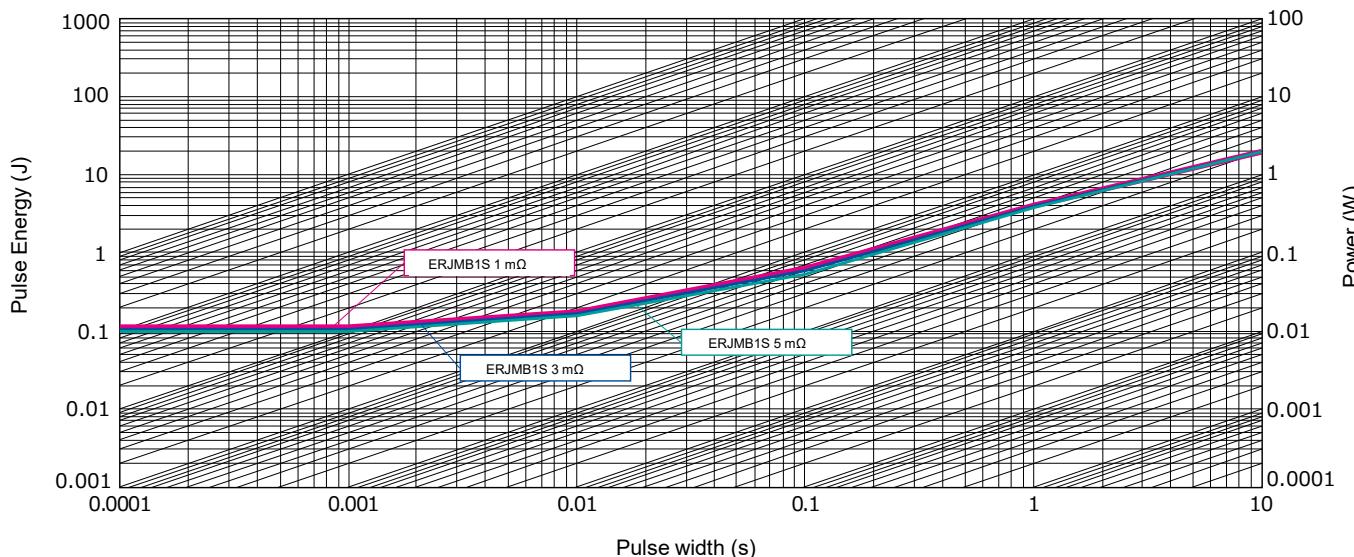
Condition : Room Temperature, OFF : 10 s, 1000 cycle, Wave form : Square

Change of Resistance =  $\pm 1\%$

### ● ERJMS4S/ERJMS4H



### ● ERJMB1S



## Current Sensing Resistors, Metal Plate Type

### Performance (AEC-Q200)

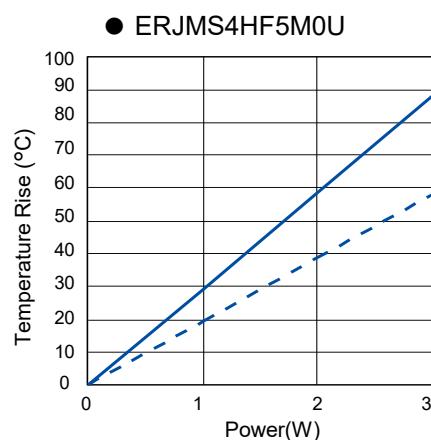
#### ● ERJMS4S/ERJMS4H

Test item	Performance requirements $\Delta R$	Typical value $\Delta R$	Test condition
Thermal shock	$\pm 1\%$	0.20 %	-55 °C / +155 °C, 1000 cycles
Overload	$\pm 0.5\%$	0.10 %	Rated power x 3, 5 s
Solderability	> 95% coverage	> 95% coverage	245 °C, 3 s
Resistance to solvents	No damage	No damage	MIL-STD-202 method 215, 2.1a, 2.1d
Low temperature storage and operation	$\pm 0.5\%$	0.03 %	-65 °C, 24 h
Resistance to soldering heat	$\pm 0.5\%$	0.10 %	MIL-STD-202 method 210 (260 °C, 10 s)
Moisture resistance	$\pm 0.5\%$	0.10 %	MIL-STD-202 method 106
Shock	$\pm 0.5\%$	0.10 %	MIL-STD-202 method 213-A
Vibration, High frequency	$\pm 0.5\%$	0.05 %	10 to 2000 (Hz)
Life	$\pm 1\%$	0.30 %	70 °C, Rated Power, 2000 h
Storage life at elevated temperature	$\pm 1\%$	0.30 %	170 °C, 2000 h
High temperature characteristics	$\pm 0.5\%$	0.05 %	140 °C, 2000 h
Frequency characteristics	< 5 nH	< 2 nH	Inductance

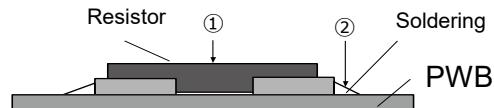
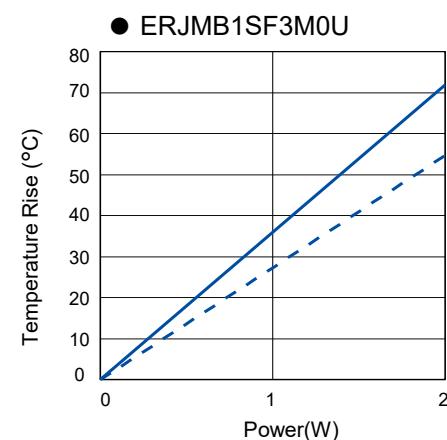
#### ● ERJMB1

Test item	Performance requirements $\Delta R$	Typical value $\Delta R$	Test condition
Thermal shock	$\pm 1\%$	0.30 %	-55 °C / +155 °C, 1000 cycles
Overload	$\pm 1\%$	0.30 %	Rated power x 2.5, 5 s
Solderability	> 95% coverage	> 95% coverage	245 °C, 3 s
Resistance to solvents	No damage	No damage	MIL-STD-202 method 215, 2.1a, 2.1d
Low temperature storage and operation	$\pm 0.5\%$	0.03 %	-65 °C, 24 h
Resistance to soldering heat	$\pm 0.5\%$	0.10 %	MIL-STD-202 method 210 (260 °C, 10 s)
Moisture resistance	$\pm 0.5\%$	0.10 %	MIL-STD-202 method 106
Shock	$\pm 0.5\%$	0.10 %	MIL-STD-202 method 213-A
Vibration, High frequency	$\pm 0.5\%$	0.05 %	10 to 2000 (Hz)
Life	$\pm 1\%$	0.30 %	70 °C, Rated Power, 2000 h
Storage life at elevated temperature	$\pm 1\%$	0.30 %	170 °C, 2000 h
High temperature characteristics	$\pm 0.5\%$	0.05 %	140 °C, 2000 h
Frequency characteristics	< 5 nH	< 2 nH	Inductance

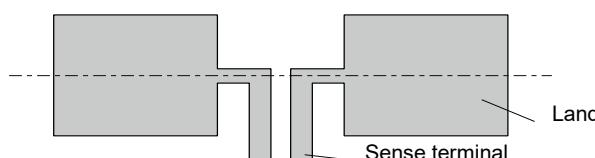
### Temperature rise



(1) — **<Condition>**  
(2) - - - Base material : FR-4 (t 1.6 mm)  
Copper Thickness : 70  $\mu$ m, Two layer



### Sense terminal-Layout



# High Power Chip Resistors (Wide Terminal Type)

ERJ A, B type

ERJ A1, B1, B2, B3 series



## Features

- High solder-joint reliability by wide terminal construction
- Excellent heat dissipation characteristics by wide terminal construction
- AEC-Q200 compliant
- RoHS compliant

## Recommended applications

- Automotive electronic circuits including ECUs (Electrical control unit), anti-lock breaking systems and air-bag systems.
- Current sensing for power supply circuits in a variety of equipment.

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

## Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	
E	R	J	A	1	A	J	1	0	2	U	
Product code	Code	inch	Code	Resistance value region		Resistance tolerance		Nominal resistance value	Packaging methods		
Thick film chip resistors	A1	1225	A	10 Ω≤R	Code	Tolerance		Shown by 3 digits or letters. Only when it is impossible, shown by 4 digits or letters. (Ex.) • 102 : 1.0 kΩ • 4R7 : 4.7 Ω • R01: 0.01Ω=10 mΩ • R015: 0.015Ω=15 mΩ	Code	Packaging	Part No.
	B1	1020	B	0.22 Ω≤R<10 Ω		F	±1 %	V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJB2 ERJB3	
	B2	0612	C	0.01 Ω≤R<0.22 Ω		G	±2 %		Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJB1	
	B3	0508	D	0.005 Ω≤R<0.01 Ω		J	±5 %	U	Embossed carrier taping 4 mm pitch, 4,000 pcs	ERJA1	

## High Power Chip Resistors (Wide Terminal Type)

### Ratings

Part No. (inch size)	Power rating <sup>*1</sup> (W)	Rated ambient temperature <sup>*2</sup> (°C)	Rated terminal part temperature <sup>*2</sup> (°C)	Limiting element voltage <sup>*3</sup> (V)	Maximum overload voltage <sup>*4</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade							
ERJA1 (1225)	1.33	70	-	200	400	±1	100m to 10k (E24)	±100									
						±2, ±5	10m to 10k (E24)	10mΩ≤R<100mΩ : ±350 100mΩ≤R≤10kΩ : ±200									
ERJB1 (1020)	2 (R≤10Ω)	70	125	200	400	±1	10m to 10 (E24)	±1 % : 10mΩ≤R<22mΩ : 0 to +350 22mΩ≤R<47mΩ : 0 to +200 47mΩ≤R<100mΩ : 0 to +150 100mΩ≤R≤10kΩ : ±100		-55 ~ +155 Grade 0							
						±2, ±5											
	1 (R>10Ω)	70	95			±1	11 to 10k (E24)	±2 %, ±5 % : 10mΩ≤R<22mΩ : 0 to +350 22mΩ≤R<100mΩ : 0 to +200 100mΩ≤R≤10kΩ : ±200									
						±2, ±5											
ERJB2 (0612)	1.5 (R≤1kΩ)	-	125	200	400	±1	10m to 1k (E24)	±1 % : 10mΩ≤R<22mΩ : 0 to +300 22mΩ≤R<47mΩ : 0 to +200		-55 ~ +155 Grade 0							
						±2, ±5											
	0.75 (R>1kΩ)	-	90			±1	1.1k to 1M (E24)	47mΩ≤R<100mΩ : 0 to +150 100mΩ≤R≤220mΩ : 0 to +100 220mΩ≤R≤1MΩ : ±100									
						±2, ±5											
	1 (R≤10Ω)	70	-			±1	10m to 10 (E24)	±2 %, ±5 % : 5mΩ≤R<22mΩ : 0 to +300 22mΩ≤R<47mΩ : 0 to +200 47mΩ≤R<100mΩ : 0 to +150 100mΩ≤R<220mΩ : 0 to +200 220mΩ≤R≤1MΩ : ±200									
						±2											
	0.75 (R>10Ω)	70	-			±5	5, 6, 7, 8, 9, 10m to 10 (E24)										
						±1											
ERJB3 (0508)	1	-	105	150	200	±1	20m to 10 (E24)	±1% : 20mΩ≤R<47mΩ : 0 to +300 47mΩ≤R<1Ω : 0 to +200 1Ω≤R≤10Ω : ±100		-55 ~ +155 Grade 0							
						±2, ±5											
	0.5 (R≤1Ω)	70	-			±1	20m to 1 (E24)	±2 %, ±5 % : 20mΩ≤R<47mΩ : 0 to +300 47mΩ≤R<1Ω : 0 to +200 1Ω≤R≤10Ω : ±200									
						±2, ±5											
	0.33 (R>1Ω)	70	-			±1	1.1 to 10 (E24)										
						±2, ±5											

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: If there is a doubt whether the rated ambient temperature or the rated terminal part temperature is used, give priority to the rated terminal part temperature.

\*3: 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.

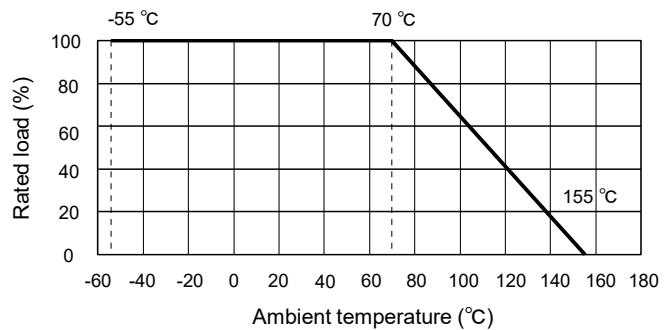
\*4: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

## Ratings

### Power derating curve

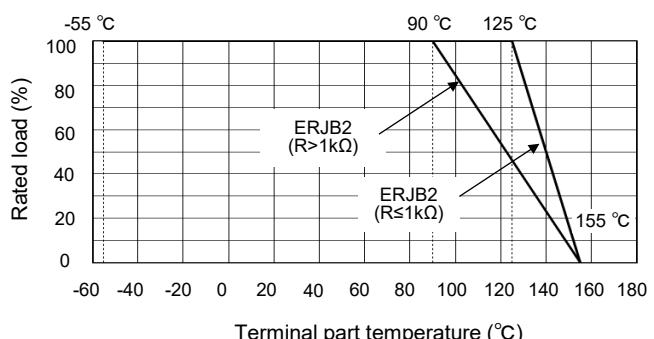
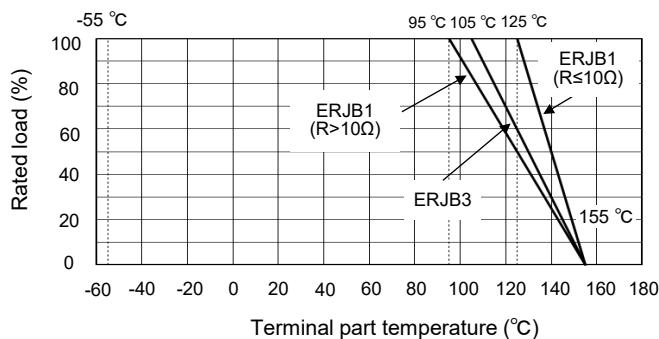
- For resistors operated in ambient rated ambient temperature, power rating shall be derated in accordance with the figure below.

In addition, please use under the condition that the product temperature is below the upper category temperature.

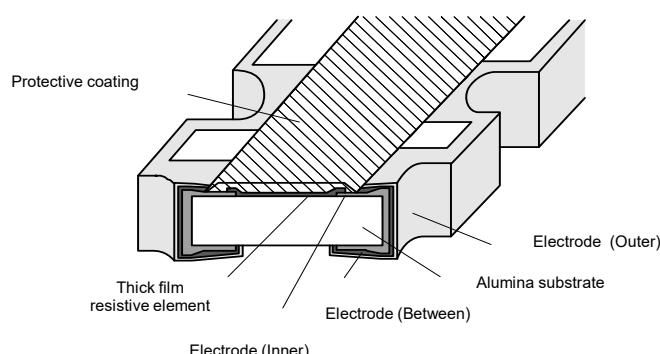


- For resistors operated in ambient rated terminal part temperature, power rating shall be derated in accordance with the figure below.

In addition, please use under the condition that the product temperature is below the upper category temperature.

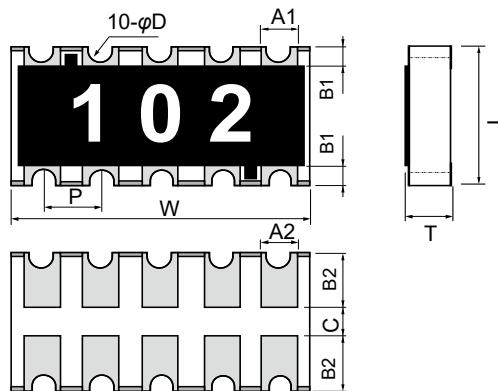


## Construction (Example : ERJA1 type)

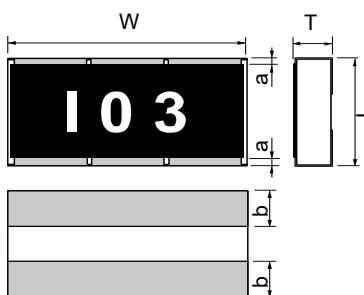


## High Power Chip Resistors (Wide Terminal Type)

### Dimensions (not to scale)

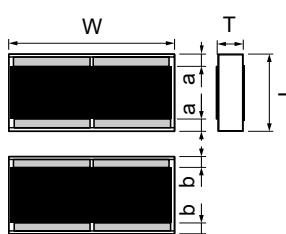


Part No.	Dimensions					Mass(Weight) (g/1000 pcs)
	L	W	A <sub>1</sub>	B <sub>1</sub>	T	
ERJA1	3.20±0.20	6.40±0.20	0.70±0.20	0.45±0.20	0.55±0.10	40
	A <sub>2</sub>	B <sub>2</sub>	P	øD	C	
	0.70±0.20	1.25±0.15	1.27±0.10	0.30+0.10/-0.20	0.4 min.	

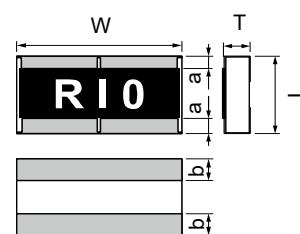


Part No.	Dimensions					Mass(Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJB1	2.50±0.20	5.00±0.20	0.25±0.20	0.90±0.20	0.55±0.20	27

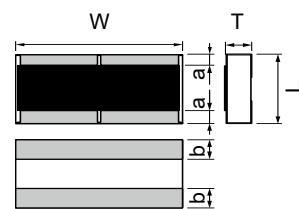
( R< 10 mΩ )



( 10 mΩ ≤ R ≤ 1 MΩ )



Part No.	Dimensions					Mass(Weight)
ERJB2	L	W	a	b	T	(g/1000 pcs)
5 mΩ≤R<10 mΩ	1.60±0.15	3.20±0.20	0.30±0.20	0.30±0.20	0.65±0.15	11
10 mΩ≤R<220 mΩ				0.50±0.20	0.55±0.15	
220 mΩ≤R≤1 MΩ			0.25±0.20			



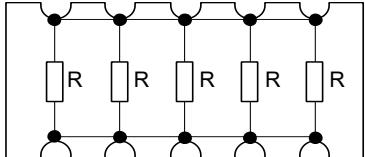
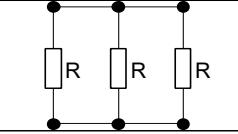
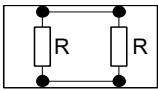
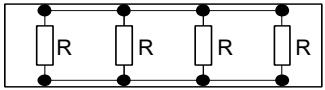
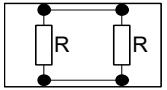
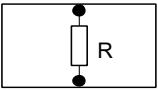
Part No.	Dimensions					Mass(Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJB3	1.25±0.10	2.00±0.15	0.25±0.20	0.40±0.20	0.50±0.10	4.8

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

24-Feb-22

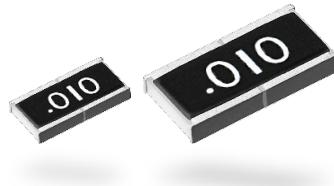
## High Power Chip Resistors (Wide Terminal Type)

### Circuit configuration

ERJA1 Series	ERJB1 Series	ERJB3 Series
		
ERJB2 Series		
Less than 10 mΩ	Low resistance zone	High resistance zone
		

### Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±2 %	ERJA1, ERJB1 (1W) : Rated voltage x 2.5, 5 s ERJB2 (0.75 W) : Rated voltage x 2.2, 5 s ERJB1 (2 W), ERJB2 (1.5 W, 1 W), ERJB3 : Rated voltage x 2.0, 5 s
Resistance to soldering heat	±1 %	270°C, 10 s
Rapid change of temperature	±2 %	-55 °C (30 min.) / +125 °C (30 min.), 1000 cycles
High temperature exposure	±1 %	+155 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity 1 <small>(Applicable to rated ambient temperature-regulated products)</small>	±3 %	60 °C, 90 % to 95 %RH, Rated voltage 1.5 h ON / 0.5 h OFF cycle, 1000 h
Load life in humidity 2 <small>(Applicable to rated ambient temperature-regulated products)</small>	±3 %	85 °C, 85 %RH, Rated power 10%, Continuously power, 1000 h
Durability at rated ambient temperature or rated terminal part temperature	±3 %	Rated ambient temperature or rated terminal part temperature, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Low TCR High Power Chip Resistors (Wide Terminal Type)

ERJ D type

ERJ D1, D2 series

### Features

- Achieved High power and low TCR ( $\pm 100 \times 10^{-6}/K$ ) using wide terminal electrode structure and original material
- Suitable for small size/high power current detection  
(Low TCR enables high accuracy of current detection)
- High solder-joint reliability by wide terminal construction
- Excellent heat dissipation characteristics by wide terminal construction
- AEC-Q200 compliant
- RoHS compliant

### Recommended applications

- Automotive electronic circuits including ECUs (Electrical control unit), anti-lock breaking systems and air-bag systems.
- Current sensing for power supply circuits in a variety of equipment.

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12																																																			
E	R	J	D	1	D	F	R	0	1	0	U																																																			
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<table border="1"> <tr> <td>Product code</td> <td>Code</td> <td>inch</td> <td>Power rating</td> <td>Resistance value region</td> <td>Resistance tolerance</td> <td>Resistance value</td> <td colspan="4">Packaging methods</td> </tr> <tr> <td>Thick film chip resistors</td> <td>D1C</td> <td>1020</td> <td>2 W</td> <td>22 mΩ ≤ R ≤ 200 mΩ</td> <td>Code F Tolerance ±1 %</td> <td>Shown by 4 digits or letters. (Ex.)</td> <td>Code U</td> <td>Packaging Embossed carrier taping 4 mm pitch, 5,000 pcs</td> <td>Part No. ERJD1</td> </tr> <tr> <td></td> <td>D1D</td> <td></td> <td></td> <td>10 mΩ ≤ R ≤ 20 mΩ</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>D2C</td> <td>0612</td> <td>1 W</td> <td>33 mΩ ≤ R ≤ 200 mΩ</td> <td>Code J Tolerance ±5 %</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>D2D</td> <td></td> <td></td> <td>10 mΩ ≤ R ≤ 30 mΩ</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>												Product code	Code	inch	Power rating	Resistance value region	Resistance tolerance	Resistance value	Packaging methods				Thick film chip resistors	D1C	1020	2 W	22 mΩ ≤ R ≤ 200 mΩ	Code F Tolerance ±1 %	Shown by 4 digits or letters. (Ex.)	Code U	Packaging Embossed carrier taping 4 mm pitch, 5,000 pcs	Part No. ERJD1		D1D			10 mΩ ≤ R ≤ 20 mΩ							D2C	0612	1 W	33 mΩ ≤ R ≤ 200 mΩ	Code J Tolerance ±5 %						D2D			10 mΩ ≤ R ≤ 30 mΩ					
Product code	Code	inch	Power rating	Resistance value region	Resistance tolerance	Resistance value	Packaging methods																																																							
Thick film chip resistors	D1C	1020	2 W	22 mΩ ≤ R ≤ 200 mΩ	Code F Tolerance ±1 %	Shown by 4 digits or letters. (Ex.)	Code U	Packaging Embossed carrier taping 4 mm pitch, 5,000 pcs	Part No. ERJD1																																																					
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	D2D			10 mΩ ≤ R ≤ 30 mΩ																																																										

### Ratings

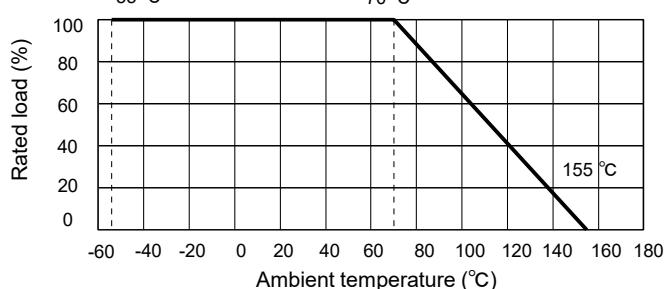
Part No. (inch size)	Power rating (70 °C) <sup>1</sup> (W)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJD1 (2550)	2	±1, ±5	10 m to 200 m (E24)	±100	-55 to +155	Grade 0
ERJD2 (1632)	1	±1, ±5	10 m to 200 m (E24)	±100		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

- Please contact us when resistors of irregular series are needed.
- Rated Continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ .
- Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCWV$ .

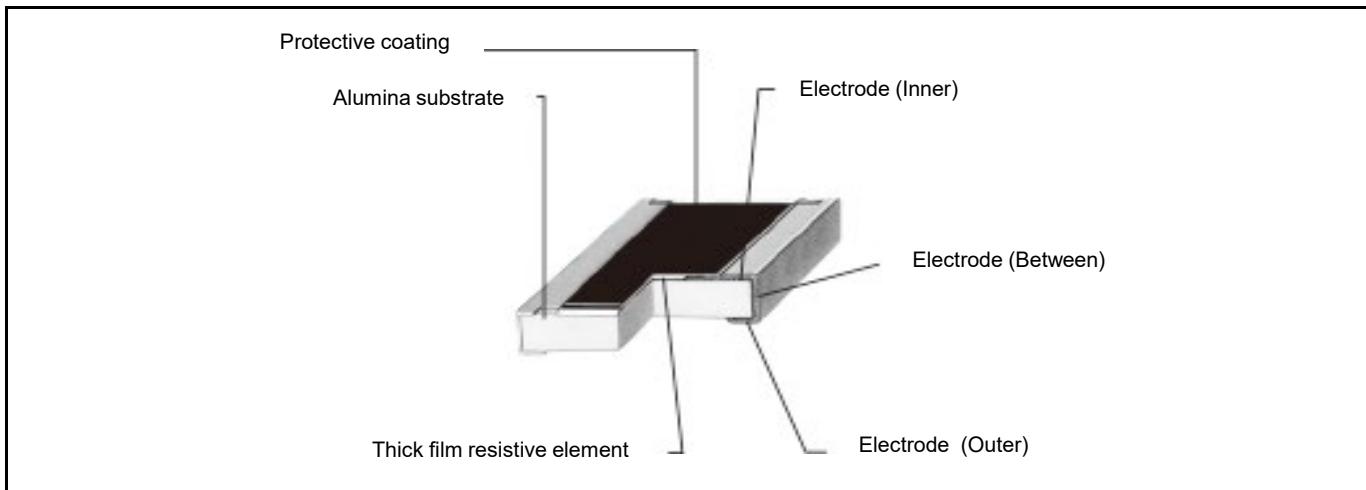
### Power derating curve

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

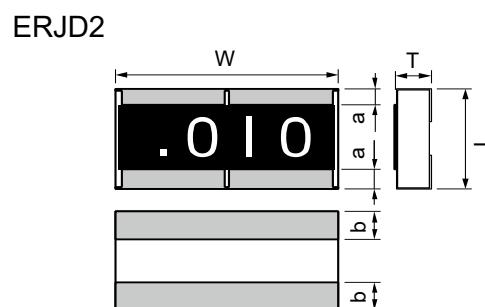
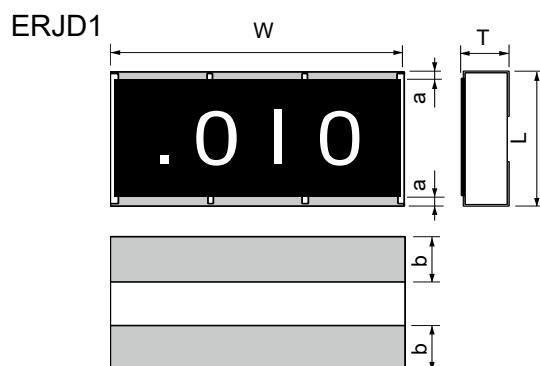


# Low TCR High Power Chip Resistors (Wide Terminal Type)

## Construction



## Dimensions (not to scale)

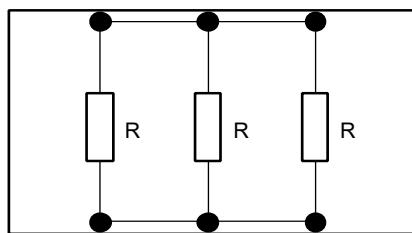


Unit : mm

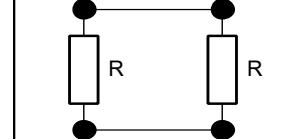
Part No.	Dimensions					Mass(Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJD1	2.50±0.20	5.00±0.20	0.90±0.20	0.30±0.20	0.60±0.20	27
ERJD2	1.60±0.15	3.20±0.20	0.50±0.20	0.30±0.20	0.65±0.15	11

## Circuit configuration

ERJD1



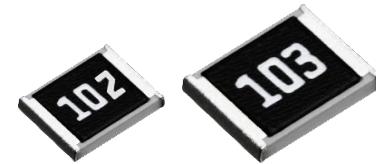
ERJD2



## Low TCR High Power Chip Resistors (Wide Terminal Type)

### Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±2 %	Rated voltage x 2.0, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±2 %	-55 °C (30 min.) / +125 °C (30 min.), 1000 cycles
High temperature exposure	±1 %	+155 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Anti-Surge Thick Film Chip Resistors

ERJ P, PA,PM type

**ERJ PA2, PA3, P03, P06, P08, PM8, P14** series

### Features

- ESD surge characteristics superior to standard metal film resistors
- High reliability : Metal glaze thick film resistive element and three layers of electrodes
- Suitable for both reflow and flow soldering
- High power      0.20 W : 0603 inch / 1608 mm size (ERJP03)  
                      0.20 W : 0402 inch / 1005 mm size (ERJPA2)  
                      0.33 W : 0603 inch / 1608 mm size (ERJPA3)  
                      0.50 W : 0805 inch / 2012 mm size (ERJP06), 1210 inch / 3225 mm size (ERJP14)  
                      0.66 W : 1206 inch / 3216 mm size (ERJP08)
- High precision, High voltage, High resistance value (ERJPM8)  
    : Limiting element voltage 500 V, Resistance tolerance  $\pm 1\%$ , TCR  $\pm 100 \times 10^{-6} / K$
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant
- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	P	0	6	D	1	0	0	2	V
<hr/>											
<b>Product code</b>	<b>Code</b>	<b>inch size</b>	<b>Resistance tolerance</b>			<b>Nominal resistance value</b>			<b>Packaging methods</b>		
Thick film chip resistors	PA2	0402	Code	Tolerance		Three digit type ( $\pm 5\%$ ), Four digit type ( $\pm 1\%$ , $\pm 0.5\%$ ) Example: 222 : 2.2 K $\Omega$ 10R0 : 10 $\Omega$ 1002 : 10 K $\Omega$			Code	Packaging	Part No.
	PA3	0603	D	$\pm 0.5\%$				X	Punched carrier Ttaping 2 mm pitch, 10,000 pcs	ERJPA2	
	P03		F	$\pm 1\%$						ERJPA3	
	P06	0805	J	$\pm 5\%$						ERJP03	
	P08									ERJP06	
	PM8	1206								ERJP08	
	P14	1210								ERJPM8	
								V	Punched carrier taping 4 mm pitch, 5,000 pcs		
								U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJP14	

## Anti-Surge Thick Film Chip Resistors

### Ratings

Part No. (inch size)	Power rating <sup>*1</sup> (W)	Rated ambient temperature <sup>*2</sup> (°C)	Rated terminal part temperature <sup>*2</sup> (°C)	Limiting element voltage <sup>*3</sup> (V)	Maximum overload voltage <sup>*4</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	AEC-Q200 Grade	
ERJPA2 (0402)	0.20	70	-	50	100	±0.5, ±1	10 to 1M (E24, E96)	±0.5, ±1 : ±100 ±5 : ±200	Grade 1		
						±5	10 to 1M (E24)				
	0.25	-	100			±0.5, ±1	10 to 1M (E24, E96)				
						±5	10 to 1M (E24)				
ERJPA3 (0603)	0.25	105	-	150	200	±0.5, ±1	10 to 1M (E24, E96)	±0.5, ±1 : ±100 ±5 : ±200	Grade 0		
						±5	1 to 1.5M (E24)				
	0.33	-	130			±0.5, ±1	10 to 1M (E24, E96)				
						±5	1 to 1.5M (E24)				
ERJP03 (0603)	0.20	70	-	150	200	±0.5	10 to 1M (E24, E96)	±150	-55 to +155		
						±1	10 to 1M (E24, E96)	R<10Ω : -150 to +400 10Ω≤R : ±200			
						±5	1 to 1M (E24)				
ERJP06 (0805)	0.50	70	115	400	600	±0.5, ±1	10 to 1M (E24, E96)	R<33Ω : ±300 33Ω≤R : ±100	Grade 0		
						±5	1 to 3.3M (E24)	R<10Ω : -100 to +600 10Ω≤R<33Ω : ±300 33Ω≤R : ±200			
ERJP08 (1206)	0.66	70	125	500	1000	±0.5, ±1	10 to 1M (E24, E96)	±100	-55 to +155		
						±5	1 to 10M (E24)	R<10Ω : -100 to +600 10Ω≤R : ±200			
ERJPM8 (1206)	0.66	70	125	500	1000	±1	1.02M to 10M (E24, E96)	±100			
ERJP14 (1210)	0.50	70	-	200	400	±0.5, ±1	10 to 1M (E24, E96)	±100	Grade 0		
						±5	1 to 1M (E24)	R<10Ω : -100 to +600 10Ω≤R : ±200			

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: If there is a doubt whether the rated ambient temperature or the rated terminal part temperature is used, give priority to the rated terminal part temperature.

\*3: 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.

\*4: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times \text{RCWV}$  or Maximum Overload Voltage listed above, whichever less.

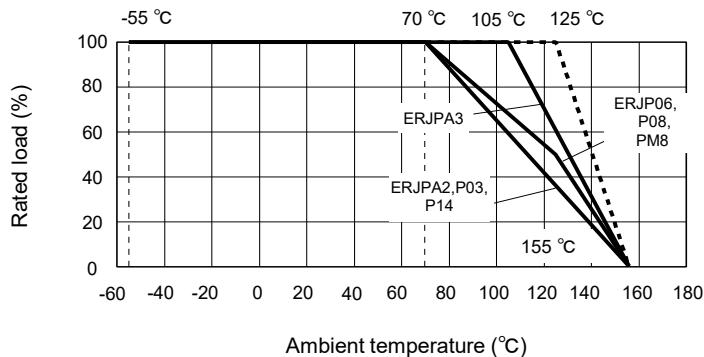
## Ratings

### Power derating curve

- For resistors operated in ambient rated ambient temperature, power rating shall be derated in accordance with the figure below.

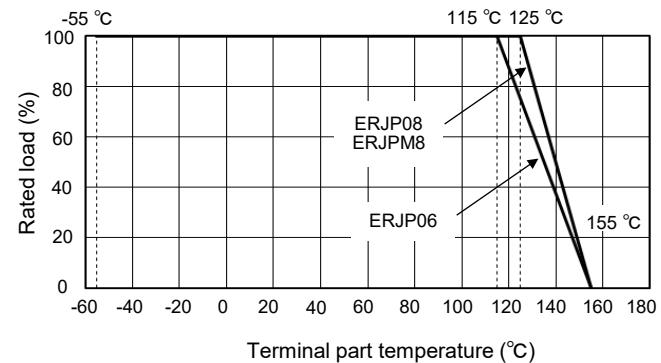
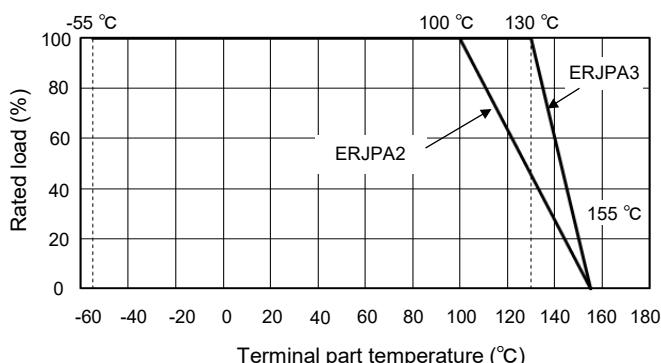
In addition, please use under the condition that the product temperature is below the upper category temperature.

※ When the temperature of ERJP14 is 155 °C or less, the derating start temperature can be changed to 125 °C. (See the dotted line)

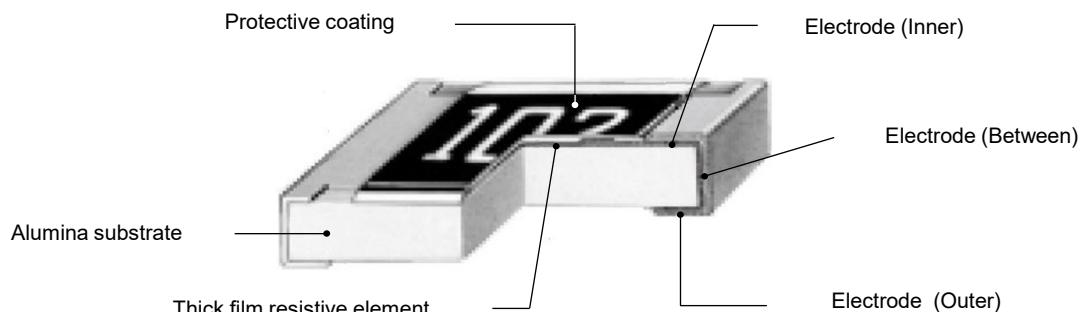


- For resistors operated in ambient rated terminal part temperature, power rating shall be derated in accordance with the figure below.

In addition, please use under the condition that the product temperature is below the upper category temperature.

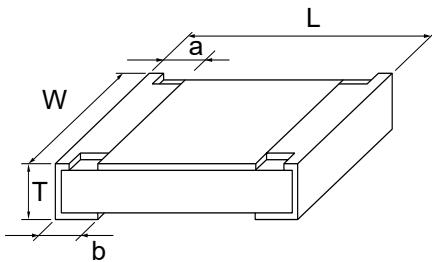


## Construction



## Anti-Surge Thick Film Chip Resistors

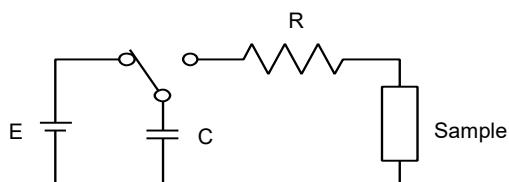
### Dimensions (not to scale)



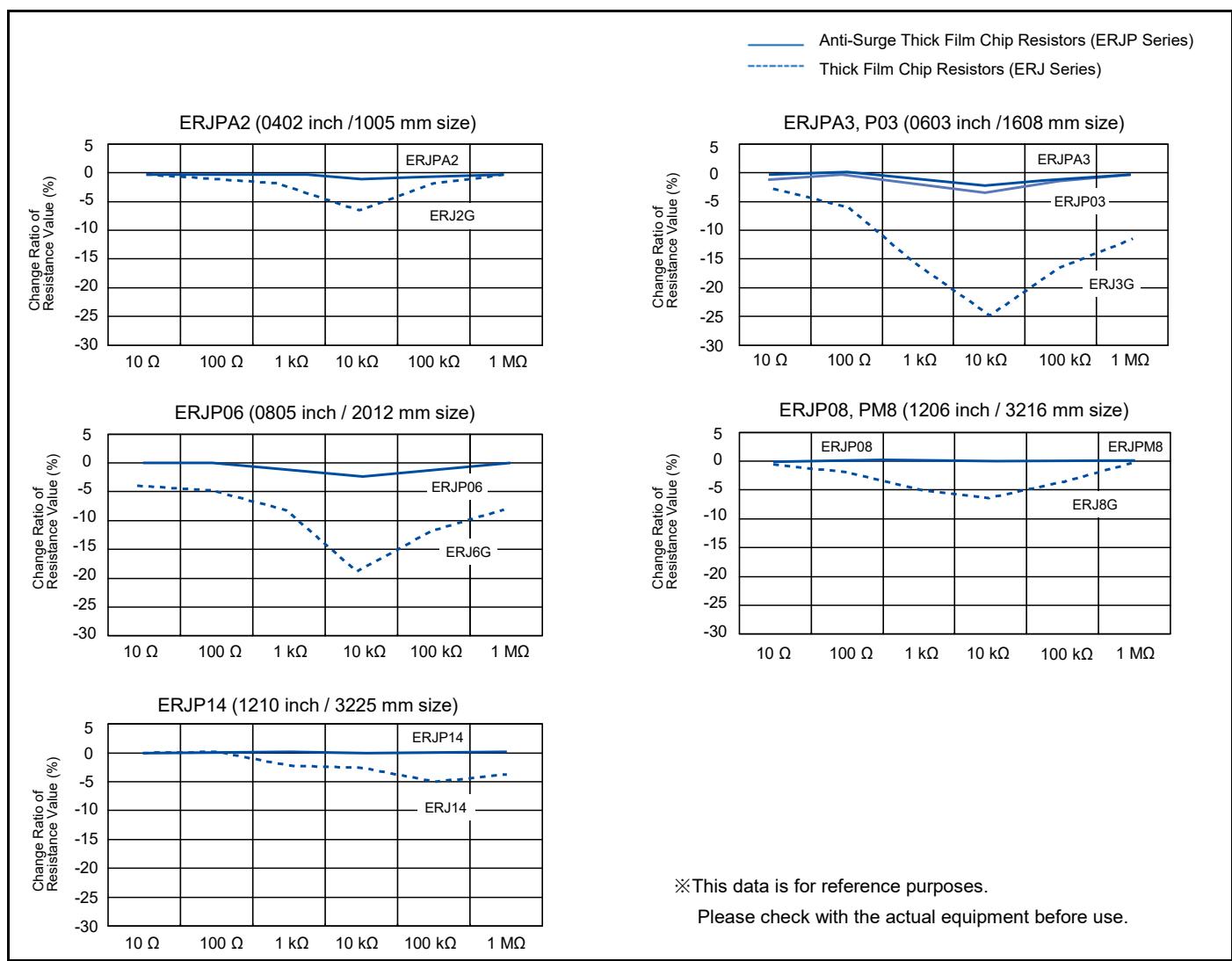
Unit : mm

Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJPA2	1.00±0.05	0.50±0.05	0.20±0.15	0.25±0.10	0.35±0.05	0.8
ERJPA3	1.60±0.15	0.80±0.15/-0.05	0.15±0.15/-0.10	0.25±0.10	0.45±0.10	2
ERJP03	1.60±0.15	0.80±0.15/-0.05	0.15±0.15/-0.10	0.30±0.15	0.45±0.10	2
ERJP06	2.00±0.20	1.25±0.10	0.25±0.20	0.40±0.20	0.60±0.10	4
ERJP08,PM8	3.20±0.05/-0.20	1.60±0.05/-0.15	0.40±0.20	0.50±0.20	0.60±0.10	10
ERJP14	3.20±0.20	2.50±0.20	0.35±0.20	0.50±0.20	0.60±0.10	16

### ESD Characteristic



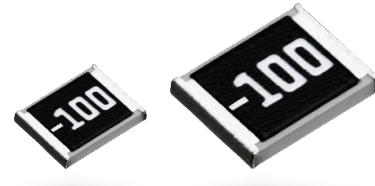
Size (inch)	0402	0603, 0805, 1206, 1210
R	1.5 kΩ	R=0 Ω ( $\leq 1.5$ kΩ) / 150 Ω ( $> 1.5$ kΩ)
C	100 pF	150 pF
E	±1 kV	±3 kV



## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +155 °C (ERJPA2 : +125 °C)
Overload	$\pm 2\%$ Only when it is ERJP03 (D), P14 (D) : $\pm 0.5\%$	ERJP06 : Rated voltage $\times 1.77$ , 5 s ERJPA2, ERJPA3, ERJP08, ERJPM8 : Rated voltage $\times 2.0$ , 5 s ERJP03, ERJP14 : Rated voltage $\times 2.5$ , 5 s
Resistance to soldering heat	D : $\pm 0.5\%$ , F, J : $\pm 1\%$	270 °C, 10 s
Rapid change of temperature	$\pm 1\%$	-55 °C (30min.) / +155 °C (ERJPA2 : +125 °C) (30min.), 100 cycles
High temperature exposure	$\pm 1\%$	+155 °C, 1000 h
Damp heat, Steady state	$\pm 1\%$	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity 1 <small>(Applicable to rated ambient temperature-regulated products)</small>	$\pm 3\%$ Only when it is ERJP03 (D), P14 (D) : $\pm 1\%$	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Load life in humidity 2 <small>(Applicable to rated ambient temperature-regulated products)</small>	$\pm 3\%$	85 °C, 85 %RH, Rated power 10%, Continuously power, 1000 h
Durability at rated ambient temperature or rated terminal part temperature	$\pm 3\%$ Only when it is ERJP03 (D), P14 (D) : $\pm 1\%$	Rated ambient temperature or rated terminal part temperature, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

## Anti-Pulse Thick Film Chip Resistors



ERJ T type

**ERJ T06, T08, T14 series**

**ERJ T14L series**

### Features

- Anti-Pulse characteristics  
High pulse characteristics achieved by the optimized trimming specifications (ERJT06, T08, T14)
- Further high pulse characteristics achieved by trimming-less specifications (ERJT14L)
- High reliability : Metal glaze thick film resistive element and three layers of electrodes
- Suitable for both reflow and flow soldering
- High power      0.25 W : 0805 inch /2012 mm size(ERJT06)  
                    0.33 W : 1206 inch /3216 mm size(ERJT08)  
                    0.50 W : 1210 inch /3225 mm size(ERJT14, ERJT14L)
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant
- RoHS compliant

■ As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

- ERJT06, T08, T14 series

1 <b>E</b>	2 <b>R</b>	3 <b>J</b>	4 <b>T</b>	5 <b>0</b>	6 <b>6</b>	7 <b>J</b>	8 <b>1</b>	9 <b>0</b>	10 <b>0</b>	11 <b>V</b>			
<hr/>													
Product code		Size, Power rating			Resistance tolerance		Resistance value			Packaging methods			
Thick film chip resistors		Code	inch	Power rating	Code	Tolerance	The first two digits are significant figures of resistance and the third one denotes number of zeros following. (Ex.) 222 : 2.2 kΩ			Code	Packaging	Part No.	
		T06	0805	0.25 W	J	±5 %				V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJT06 ERJT08	
		T08	1206	0.33 W							U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJT14
		T14	1210	0.5 W									

- ERJT14L series

1 <b>E</b>	2 <b>R</b>	3 <b>J</b>	4 <b>T</b>	5 <b>1</b>	6 <b>4</b>	7 <b>L</b>	8 <b>M</b>	9 <b>1</b>	10 <b>0</b>	11 <b>0</b>	12 <b>U</b>					
<hr/>																
Product code		Size, Power rating			Product specifications		Resistance tolerance			Resistance value						
Thick film chip resistors		Code	inch	Power rating	Code	Specifications	Code	Tolerance	The first two digits are significant figures of resistance and the third one denotes number of zeros following. (Ex.) 222 : 2.2 kΩ			Code	Packaging	Part No.		
		T14	1210	0.5 W			Code					U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJT14L		
							L									
							K		Trimming-less							
							M									

\* Please contact us for 0805 (inch) and 1206 (inch) size trimming-less types.

# Anti-Pulse Thick Film Chip Resistors

## Ratings

Part No. (inch size)	Power rating <sup>1</sup> (70 °C)(W)	Limiting element voltage <sup>2</sup> (V)	Maximum overload voltage <sup>3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/\text{K}$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJT06 (0805)	0.25	150	200	±5	1 to 1 M (E24)	R<10 Ω : -100 to +600 10 Ω≤R<33 Ω : ±300 33 Ω≤R : ±200	-55 to +155	Grade 0
ERJT08 (1206)	0.33	200	400	±5	1 to 1 M (E24)	R<10 Ω : -100 to +600 10 Ω≤R : ±200		
ERJT14 (1210)	0.50	200	400	±5	1 to 1 M (E24)	R<10 Ω : -100 to +600 10 Ω≤R : ±200		
ERJT14L (1210)	0.50	200	400	±10 ±20	1 to 1 M (E12)	R<10 Ω : -100 to +600 10 Ω≤R : ±200		

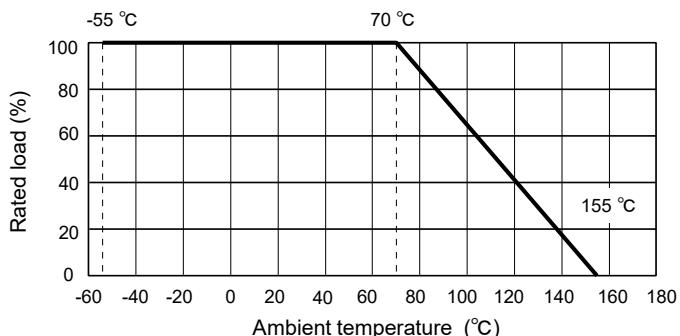
\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: Rated Continuous Working Voltage (RCWV) shall be determined from  $\text{RCWV} = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ , or Limiting Element Voltage listed above, whichever less.

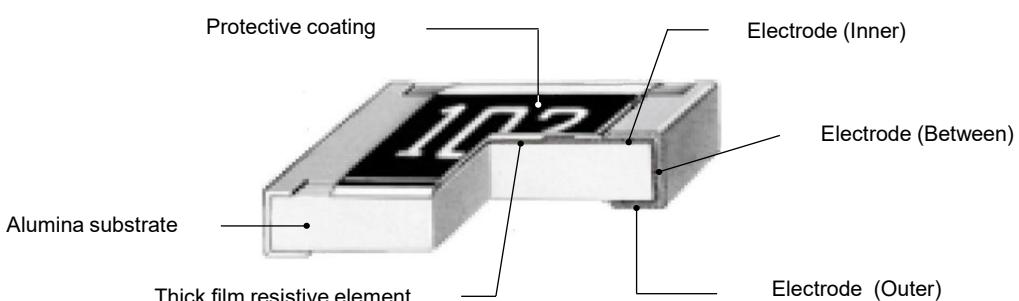
\*3: Overload Test Voltage (OTV) shall be determined from  $\text{OTV} = \text{Specified Magnification (refer to performance)} \times \text{RCWV}$  or Maximum Overload Voltage listed above, whichever less.

## Power derating curve

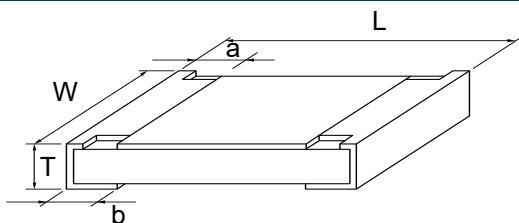
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



## Construction



## Dimensions (not to scale)



Unit : mm

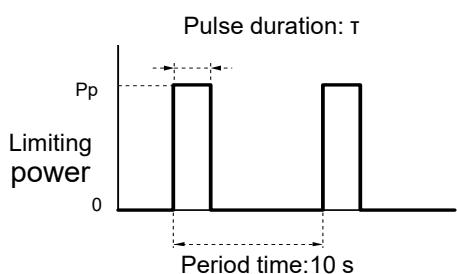
Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJT06	2.00±0.20	1.25±0.10	0.25±0.20	0.40±0.20	0.60±0.10	4
ERJT08	3.20+0.05/-0.20	1.60+0.05/-0.15	0.40±0.20	0.50±0.20	0.60±0.10	10
ERJT14 ERJT14L	3.20±0.20	2.50±0.20	0.35±0.20	0.50±0.20	0.60±0.10	16

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

1-Mar-20

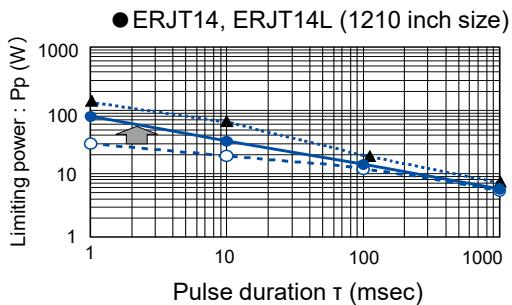
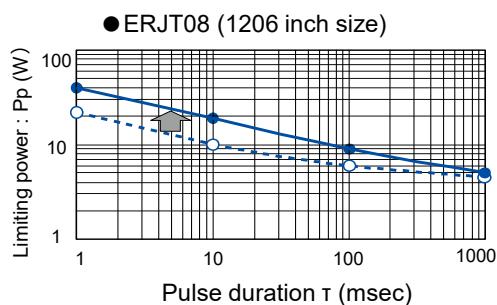
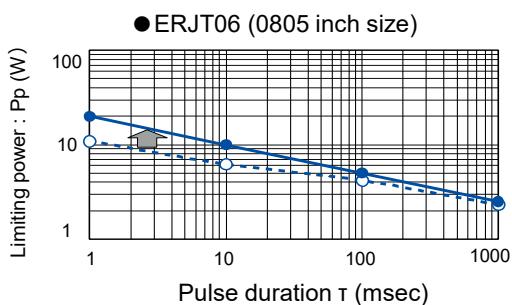
## Limiting power curve

- In rush pulse Characteristic



Test cycle : 1000 cycles  
Spec : Resistance value = within  $\pm 5\%$

▲ : Anti-Pulse Thick Film Chip Resistors (Series ERJT14L)  
● : Anti-Pulse Thick Film Chip Resistors(Series ERJT)  
○ : Thick Film Chip Resistors(Series ERJ : 1  $\Omega$ )



※This data is for reference purposes.

Please check with the actual equipment before use.

※ Please contact us for 0805 (inch) and 1206 (inch) size trimming-less types.

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +155 °C
Overload	$\pm 2\%$	Rated voltage $\times 2.5$ , 5 s
Resistance to soldering heat	$\pm 1\%$	270 °C $\pm 3$ °C, 10 s $\pm 1$ s
Rapid change of temperature	$\pm 1\%$	-55 °C (30 min.) / +155 °C (30 min.), 100 cycles
High temperature exposure	$\pm 1\%$	+155 °C, 1000 h
Damp heat, Steady state	$\pm 1\%$	60 °C $\pm 2$ °C, 90 % to 95 %RH, 1000 h
Load life in humidity	$\pm 3\%$	60 °C $\pm 2$ °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70°C	$\pm 3\%$	70 °C $\pm 2$ °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

# Anti-Sulfurated Thick Film Chip Resistors

## ERJ S type (Au-based inner electrode type)

## ERJ S02, S03, S06, S08, S14 series

## ERJ S12, S1D, S1T series

## ERJ U type (Ag-Pd-based inner electrode type)

## ERJ U0X, U01, U02, U03, U06, U08, U14 series

## ERJ U12, U1D, U1T, U6S, U6Q series

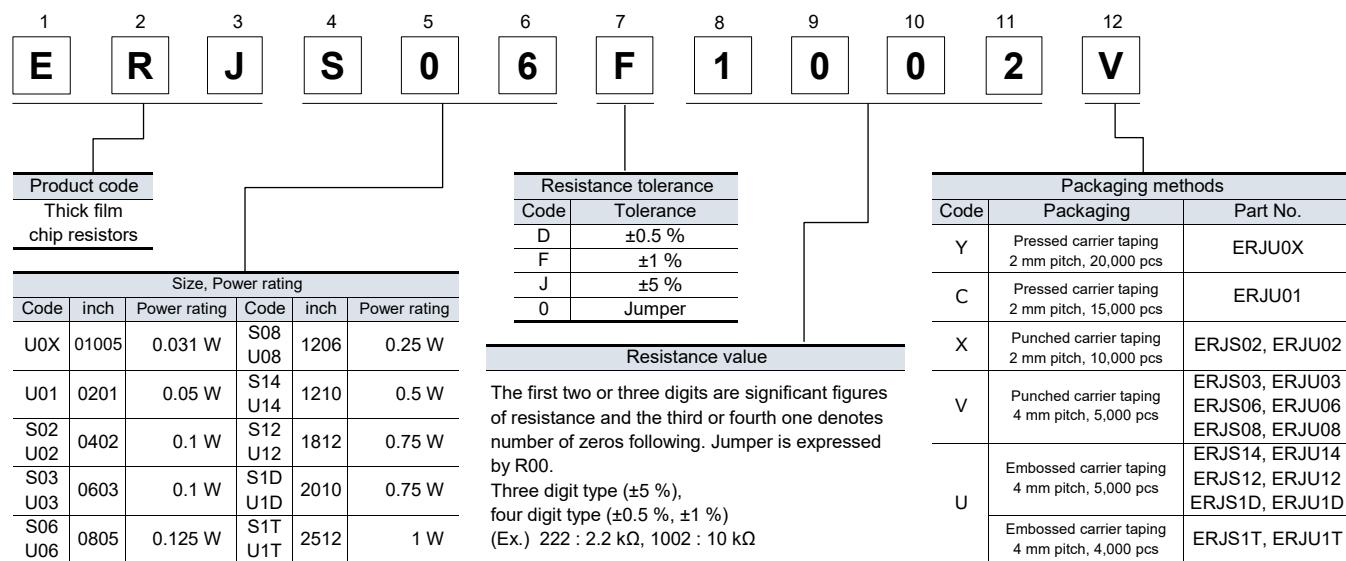
## Features

- High resistance to sulfurization achieved by adopting an Au-based inner electrode (Series ERJS) and Ag-Pd-based inner electrode (Series ERJU )
- High reliability : Metal glaze thick film resistive element and three layers of electrodes
- Suitable for both reflow and flow soldering
- Low resistance type : ERJU6S, U6Q series :  $0.1\ \Omega$  to  $1\ \Omega$
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant (except ERJU0X, ERJU01)
- RoHS compliant

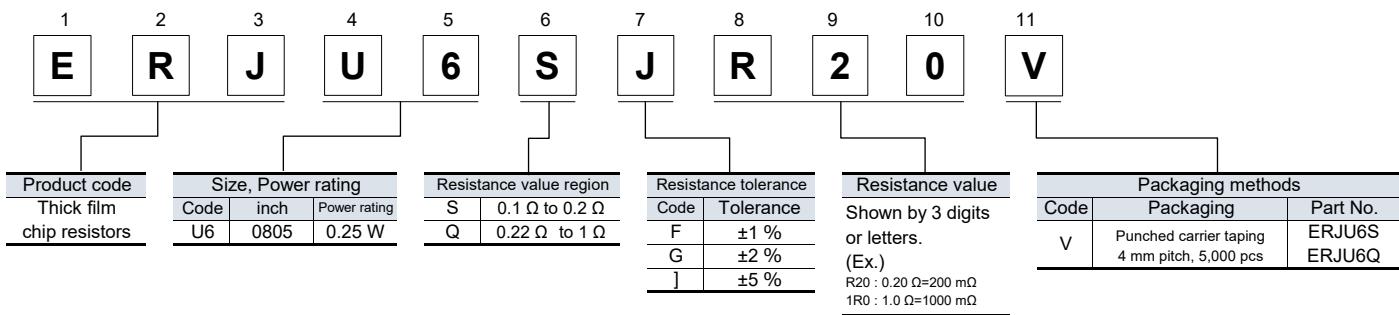
- As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

## Explanation of part numbers

- ERJS02 to ERJS1T, ERJU0X to ERJU1T series



- ERJU6S, U6Q series



## Anti-Sulfurated Thick Film Chip Resistors

### Ratings

Part No. (inch size)	Power rating <sup>*1</sup> (70 °C)(W)	Limiting element voltage <sup>*2</sup> (V)	Maximum overload voltage <sup>*3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	AEC-Q200 Grade
ERJU0X (01005)	0.031	15	30	±1	10 to 1 M (E24, E96)	R<10 Ω : -100 to +600	-55 to +125	-
				±5	1 to 1 M (E24)	10 Ω≤R<100 Ω : ±300		
						100 Ω≤R : ±200		
ERJU01 (0201)	0.05	25	50	±1	10 to 1 M (E24, E96)	R<10 Ω : -100 to +600	-55 to +125	-
				±5	1 to 1 M (E24)	10 Ω to 1 MΩ : ±200		
						1 MΩ<R : -400 to +150		
ERJS02 ERJU02 (0402)	0.1	50	100	±0.5, ±1	1 to 1 M (E24, E96)	R<10 Ω : -100 to +600	-55 to +125	-
				±5	1 to 3.3 M (E24)			
ERJS03 ERJU03 (0603)	0.1	75	150	±0.5, ±1	1 to 1 M (E24, E96)	R<10 Ω : -100 to +600	-55 to +125	-
				±5	1 to 10 M (E24)			
ERJS06 ERJU06 (0805)	0.125	150	200	±0.5, ±1	1 to 1 M (E24, E96)	R<10 Ω : -100 to +600	-55 to +125	-
				±5	1 to 10 M (E24)			
ERJS08 ERJU08 (1206)	0.25	200	400	±0.5, ±1	1 to 1 M (E24, E96)	R<10 Ω : -100 to +600	-55 to +155	Grade 0
				±5	1 to 10 M (E24)			
ERJS14 ERJU14 (1210)	0.5	200	400	±0.5, ±1	1 to 1 M (E24, E96)	10 Ω to 1 MΩ : ±200 (± 5 %) : ±100 (±0.5 %, ±1 %)	-55 to +155	Grade 0
				±5	1 to 10 M (E24)			
ERJS12 ERJU12 (1812)	0.75	200	500	±0.5, ±1	1 to 1 M (E24, E96)	10 Ω to 1 MΩ : ±200 (± 5 %) : ±100 (±0.5 %, ±1 %)	-55 to +155	Grade 0
				±5	1 to 10 M (E24)			
ERJS1D ERJU1D (2010)	0.75	200	500	±0.5, ±1	1 to 1 M (E24, E96)	1 MΩ<R : -400 to +150	-55 to +155	Grade 0
				±5	1 to 10 M (E24)			
ERJS1T ERJU1T (2512)	1.0	200	500	±0.5, ±1	1 to 1 M (E24, E96)	1 MΩ<R : -400 to +150	-55 to +155	Grade 0
				±5	1 to 10 M (E24)			

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: 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.

\*3: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

### 【Low resistance type】

Part No. (inch size)	Power rating <sup>*1</sup> (70 °C)(W)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	AEC-Q200 Grade
ERJU6S (0805)	0.25	±1, ±2, ±5	0.1 to 0.2 (E24)	0 to +150	-55 to +155	Grade 0
			0.22 to 1 (E24)			

\*1: Use it on the condition that the case temperature is below the upper category temperature.

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

• Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCWV$ .

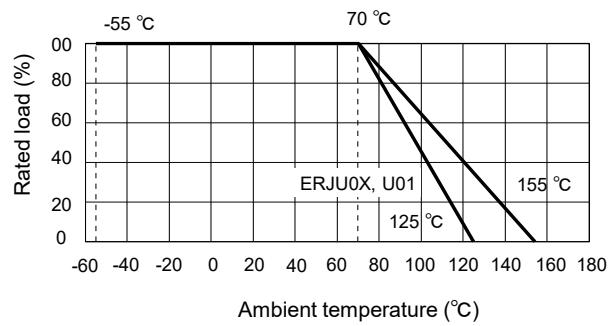
### 【For jumper】

Part No.	Resistance	Rated current	Maximum overload current <sup>*1</sup>
ERJU0X ERJU01 ERJS02,ERJU02 ERJS03,ERJU03 ERJS06,ERJU06 ERJS08,ERJU06 ERJS14,ERJU14 ERJS12,ERJU12 ERJS1D,ERJU1D ERJS1T,ERJU1T	100 mΩ or less	0.5 A	1 A
		1 A	2 A
		2 A	4 A

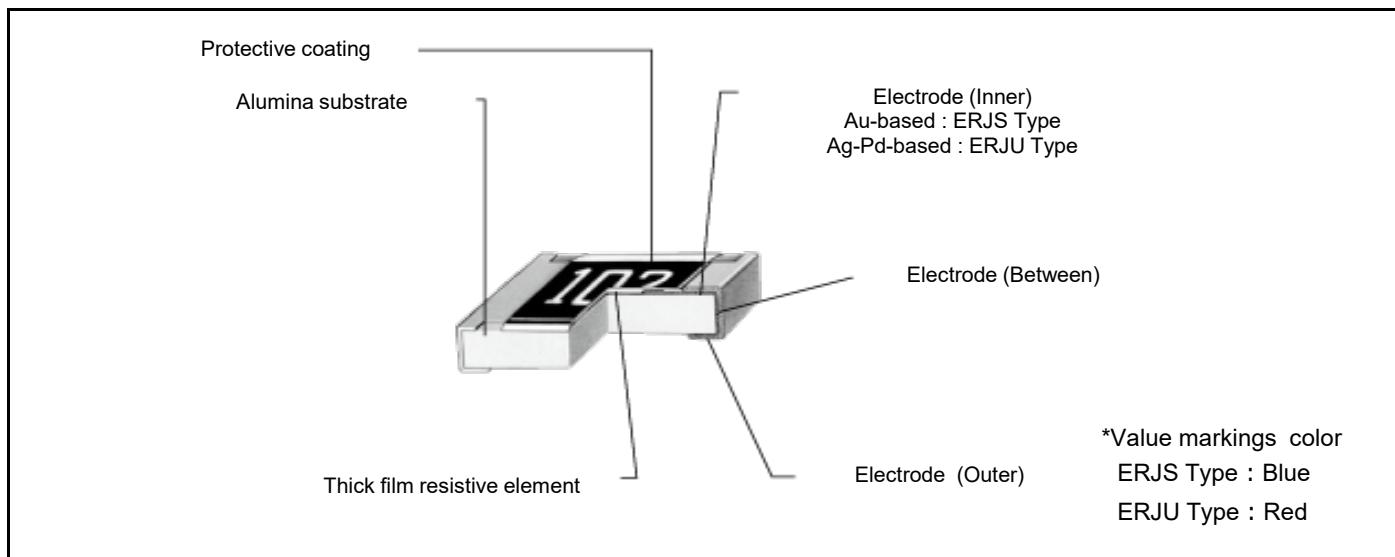
\*1: Overload test current

### Power derating curve

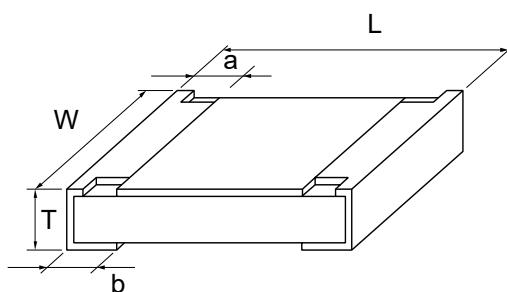
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure below.



## Construction



## Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJU0X	0.40±0.02	0.20±0.02	0.10±0.03	0.10±0.03	0.13±0.02	0.04
ERJU01	0.60±0.03	0.30±0.03	0.10±0.05	0.15±0.05	0.23±0.03	0.15
ERJS02 ERJU02	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05	0.8
ERJS03 ERJU03	1.60±0.15	0.80±0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJS06 ERJU06	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	4
ERJU6□	2.00±0.20	1.25±0.10	0.45±0.20	0.45±0.20	0.55±0.10	6
ERJS08 ERJU08	3.20±0.05/-0.20	1.60±0.05/-0.15	0.50±0.20	0.50±0.20	0.60±0.10	10
ERJS14 ERJU14	3.20±0.20	2.50±0.20	0.50±0.20	0.50±0.20	0.60±0.10	16
ERJS12 ERJU12	4.50±0.20	3.20±0.20	0.50±0.20	0.50±0.20	0.60±0.10	27
ERJS1D ERJU1D	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.20	0.60±0.10	27
ERJS1T ERJU1T	6.40±0.20	3.20±0.20	0.65±0.20	0.60±0.20	0.60±0.10	45

## Performance

### ● ERJS02 to ERJS1T, ERJU0X to ERJU1T series

Test item	Performance requirements $\Delta R$		Test conditions
	Resistor type	Jumper type	
Resistance	Within specified tolerance	100 mΩ or less	20 °C
T. C. R.	Within Specified T. C. R.	200 mΩ or less	+25 °C / +155 °C (ERJU0X, U01 : +25 °C / +125 °C)
Overload	±2 %	100 mΩ or less	Rated voltage × 2.5, 5 s Jumper type : Max. overload current, 5 s
Resistance to soldering heat	±1 %	100 mΩ or less	270 °C, 10 s
Rapid change of temperature	±1 %	100 mΩ or less	-55 °C (30min.) / +155 °C (ERJU0X, U01 : +125 °C) (30min.), 100 cycles
High temperature exposure	±1 %	100 mΩ or less	+155 °C (ERJU0X, U01 : +125 °C), 1000 h
Damp heat, Steady state	±1 %	100 mΩ or less	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	100 mΩ or less	60 °C, 90 % to 95 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±3 %	100 mΩ or less	70 °C, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

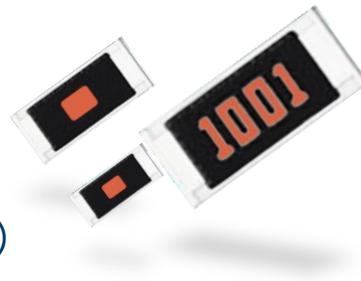
### ● ERJU6S, U6Q series

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±1 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±1 %	-55 °C (30 min.) / +125 °C (30min.), 100 cycles
High temperature exposure	±1 %	+155 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 °C, 90 % to 95 %RH, Rated voltage 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

## Anti-Sulfurated Thick Film Chip Resistors (Precision Type)

ERJ U□R type (Ag-Pd-based inner electrode type)

**ERJ U2R, U3R, U6R** series



### Features

- High resistance to sulfurization achieved by adopting an Ag-Pd-based inner electrode.
- High precision : Resistance tolerance :  $\pm 0.5\%$ , TCR :  $\pm 50 \times 10^{-6}/K$
- High reliability : Metal glaze thick film resistive element and three layers of electrodes.
- Suitable for both reflow and flow soldering.
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant
- RoHS compliant

■ As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

#### ● ERJU2R, U3R, U6R series

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	U	3	R	D	1	0	0	2	V
<hr/>											
Product code		Size, Power rating		Resistance tolerance		Resistance value		Packaging methods			
Thick film chip resistors		Code	inch	Code	Tolerance	The first three digits are significant figures of resistance and the 4th one denotes number of zeros following.		Code	Packaging	Part No.	
		U2R	0402	U	$\pm 0.5\%$	Example : 1002 $\rightarrow$ 10 k $\Omega$		X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJU2R	
		U3R	0603	U				V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJU3R	ERJU6R
		U6R	0805	U							

### Ratings

Part No. (inch size)	Power rating <sup>*1</sup> (70 °C) (W)	Limiting element voltage <sup>*2</sup> (V)	Maximum overload voltage <sup>*3</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJU2R (0402)	0.1	50	100	$\pm 0.5$	100 to 100 k (E24, E96)	$\pm 50$	-55 to +155	Grade 0
ERJU3R (0603)	0.1	75	150	$\pm 0.5$	100 to 100 k (E24, E96)			
ERJU6R (0805)	0.125	150	200	$\pm 0.5$	100 to 100 k (E24, E96)			

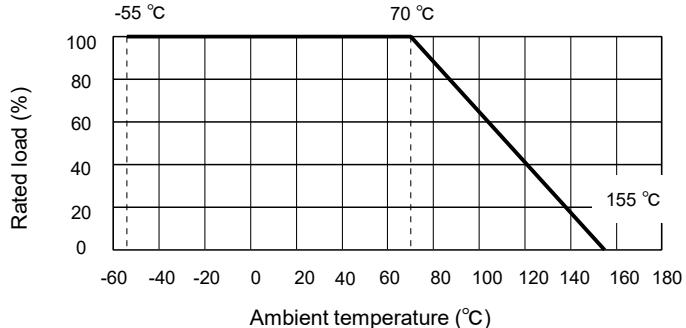
\*1 : Use it on the condition that the case temperature is below the upper category temperature.

\*2 : 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.

\*3 : Overload test voltage (OTV) shall be determined from  $OTV = \text{Specified magnification (refer to performance)} \times RCWV$  or maximum overload voltage listed above, whichever less.

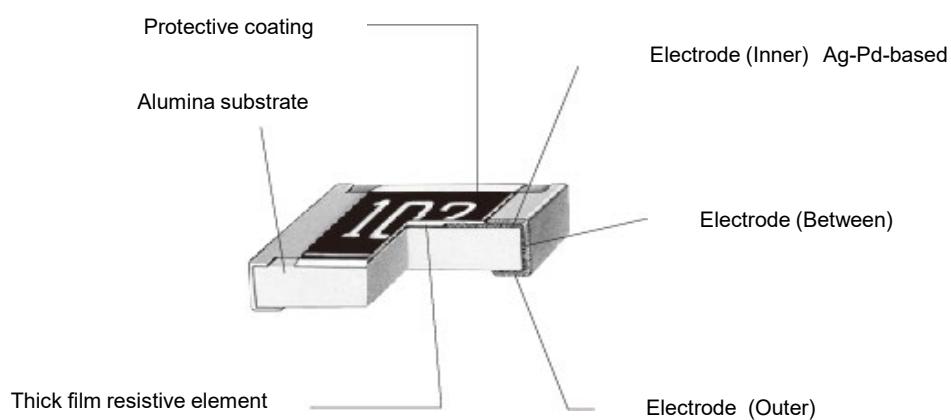
#### Power derating curve

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

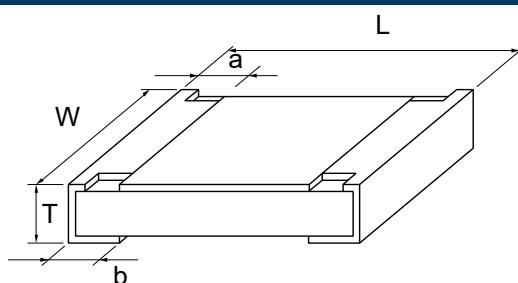


# Anti-Sulfurated Thick Film Chip Resistors (Precision Type)

## Construction



## Dimensions (not to scale)



Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJU2R	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05	0.8
ERJU3R	1.60±0.15	0.80±0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJU6R	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	4

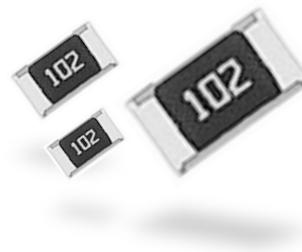
## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +155 °C
Overload	±2 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±1 %	-55 °C (30 min.) / +155 °C (30 min.), 100 cycles
High temperature exposure	±1 %	+155 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±2 %	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±2 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

## Anti-Sulfurated Thick Film Chip Resistors (Anti-Surge Type)

ERJ UP type

ERJ UP3, UP6, UP8 series



### Features

- High resistance to sulfurization achieved by adopting Anti-Sulfurated electrode material (Ag-Pd-based inner electrode) and structure
- ESD surge characteristics superior to standard metal film resistors
- High reliability : Metal glaze thick film resistive element and three layers of electrodes
- Suitable for both reflow and flow soldering
- High power 0.25 W : 0603 inch / 1608 mm size (ERJUP3)  
0.50 W : 0805 inch / 2012 mm size (ERJUP6)  
0.66 W : 1206 inch / 3216 mm size (ERJUP8)
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant
- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12	
E	R	J	U	P	6	D	1	0	0	2	V	
Product code	Size, Power rating		Resistance tolerance		Resistance value						Packaging methods	
Thick film chip resistors	Code inch Power rating		Code Tolerance		The first two or three digits are significant figures of resistance and the third or 4th one denotes number of zeros following. Three digit type ( $\pm 0.5\%$ ), Four digit type ( $\pm 1\%$ , $\pm 0.5\%$ ) Ex. 222: 2.2 k $\Omega$ , 1002 : 10 k $\Omega$							Code Packaging Part No.
	UP3 0603 0.25 W		D $\pm 0.5\%$								V Punched carrier taping 4 mm pitch, 5,000 pcs ERJUP3	
	UP6 0805 0.50 W		F $\pm 1\%$								ERJUP6	
	UP8 1206 0.66 W		J $\pm 5\%$								ERJUP8	

### Ratings

Part No. (inch size)	Power rating*1 (70 °C) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade
ERJUP3 (0603)	0.25	150	200	$\pm 0.5, \pm 1$	10 to 1 M (E24, E96)	$\pm 100$	-55 to +155	Grade 0
				$\pm 5$	1 to 1.5 M (E24)	$\pm 200$		
ERJUP6 (0805)	0.50	400	600	$\pm 0.5, \pm 1$	10 to 1 M (E24, E96)	$\pm 100$	-55 to +155	Grade 0
				$\pm 5$	1 to 3.3 M (E24)	$R < 10 \Omega : -100 \text{ to } +600$ $10 \Omega \leq R : \pm 200$		
ERJUP8 (1206)	0.66	500	1000	$\pm 0.5, \pm 1$	10 to 1 M (E24, E96)	$\pm 100$	-55 to +155	Grade 0
				$\pm 5$	1 to 10 M (E24)	$R < 10 \Omega : -100 \text{ to } +600$ $10 \Omega \leq R : \pm 200$		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: 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.

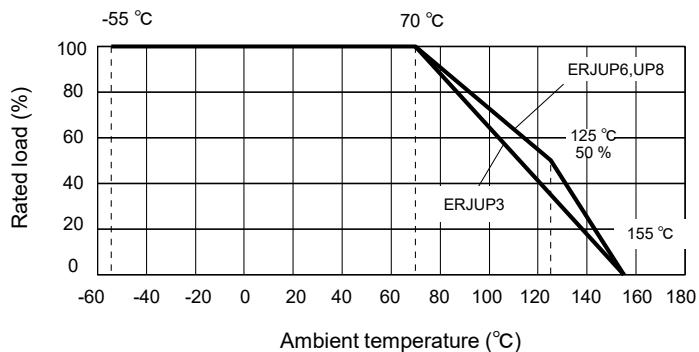
\*3: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

# Anti-Sulfurated Thick Film Chip Resistors (Anti-Surge Type)

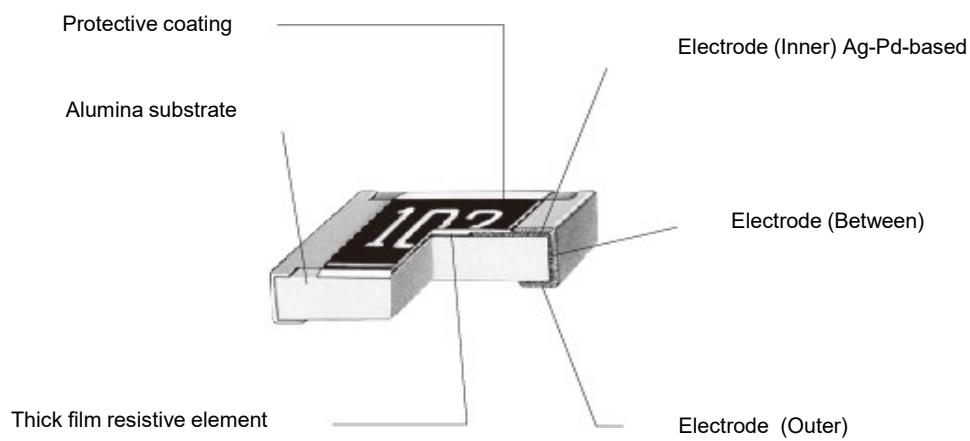
## Ratings

### Power derating curve

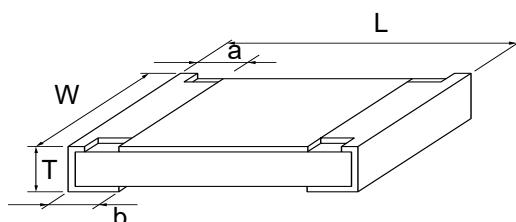
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



## Construction



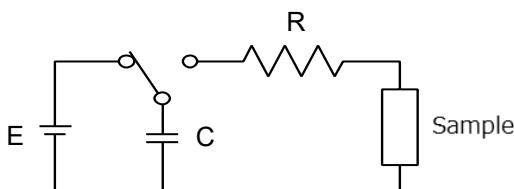
## Dimensions in mm (not to scale)



Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJUP3	1.60±0.15	0.80+0.15/-0.05	0.15+0.15/-0.10	0.25±0.10	0.45±0.10	2
ERJUP6	2.00±0.20	1.25±0.10	0.25±0.20	0.40±0.20	0.60±0.10	4
ERJUP8	3.20+0.05/-0.20	1.6+0.05/-0.15	0.40±0.20	0.50±0.20	0.60±0.10	10

# Anti-Sulfurated Thick Film Chip Resistors (Anti-Surge Type)

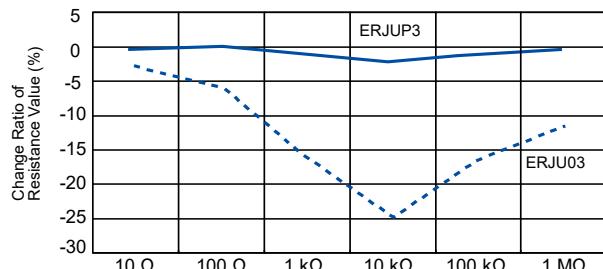
## ESD Characteristic



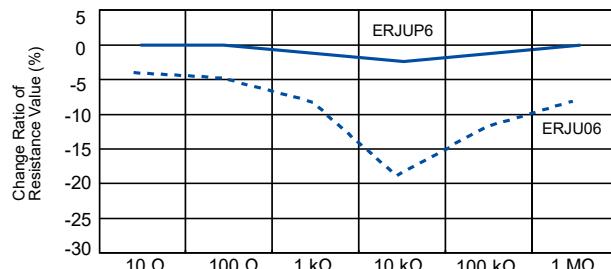
R	$R=0 \Omega (\leq 1.5 \text{ k}\Omega) / 150 \Omega (> 1.5 \text{ k}\Omega)$
C	150 pF
E	$\pm 3 \text{ kV}$

— Anti-Sulfurated Thick Film Chip Resistors / Anti-Surge Type (ERJUP Type)  
 - - - Anti-Sulfurated Thick Film Chip Resistors (ERJU Type)

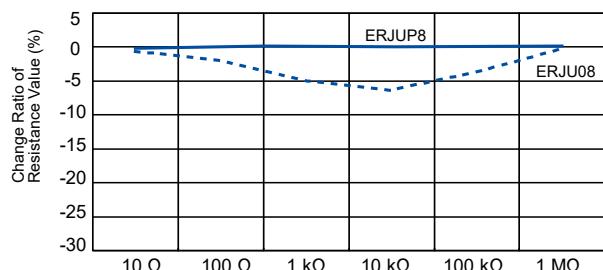
ERJUP3 (0603 inch/1608 mm)



ERJUP6 (0805 inch/2012 mm)



ERJUP8 (1206 inch/3216 mm)

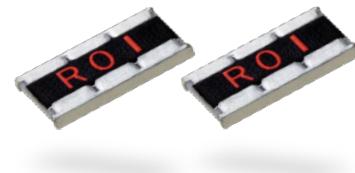


※This data is for reference purposes.

Please check with the actual equipment before use.

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +155 °C
Overload	$\pm 2 \%$	ERJUP6 : Rated voltage x 1.77, 5 s ERJUP3, ERJUP8 : Rated voltage x 2.0, 5 s
Resistance to soldering heat	D : $\pm 0.5 \%$ F, J : $\pm 1 \%$	270 °C, 10 s
Rapid change of temperature	$\pm 1 \%$	-55 °C (30 min.) / +155 °C (30 min.), 100 cycles
High temperature exposure	$\pm 1 \%$	+155 °C, 1000 h
Damp heat, Steady state	$\pm 1 \%$	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	$\pm 3 \%$	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	$\pm 3 \%$	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Anti-Sulfurated High Power Chip Resistors (Wide Terminal Type)

ERJ C type

ERJ C1 series

### Features

- High resistance to sulfurization achieved by adopting Anti-Sulfurated electrode material (Ag-Pd-based inner electrode) and structure (Covered electrode)
- High solder-joint reliability by wide terminal construction
- Excellent heat dissipation characteristics by wide terminal construction
- AEC-Q200 compliant
- RoHS compliant

### Recommended applications

- Motor control circuit of the industrial equipment
- Automotive electronic circuits including ECUs (Electrical control unit), anti-lock breaking systems and air-bag systems
- Current sensing for power supply circuits in a variety of equipment

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11
E	R	J	C	1	C	F	R	1	0	U
Product code	Size,Power rating	Code	Resistance value region	Resistance tolerance	Resistance value	Packaging methods				
Thick film chip resistors	Code inch Power rating	B	220 mΩ ≤ R ≤ 1 Ω	Code Tolerance	Code	Code Packaging Part No.				
	C1 1020 2 W	C	10 mΩ ≤ R < 220 mΩ	F	±1 %	U Embossed carrier taping 4 mm pitch, 5,000 pcs ERJC1				
				J	±5 %	Shown by 3 digits or letters. Only when it is impossible, shown by 4 digits or letters. (Ex.) •R01: 0.01 Ω=10 mΩ •R015: 0.015 Ω=15 mΩ				

### Ratings

Part No. (inch size)	Power rating <sup>1</sup> (70 °C) (W)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	AEC-Q200 Grade
ERJC1 (1020)	2	±1	10 m to 1 (E24)	10 mΩ ≤ R < 22 mΩ : 0 to +350 22 mΩ ≤ R < 47 mΩ : 0 to +200 47 mΩ ≤ R < 100 mΩ : 0 to +150 100 mΩ ≤ R ≤ 1 Ω : ±100	-55 to +155	Grade 0
		±5		10 mΩ ≤ R < 22 mΩ : 0 to +350 22 mΩ ≤ R < 100 mΩ : 0 to +200 100 mΩ ≤ R ≤ 1 Ω : ±200		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

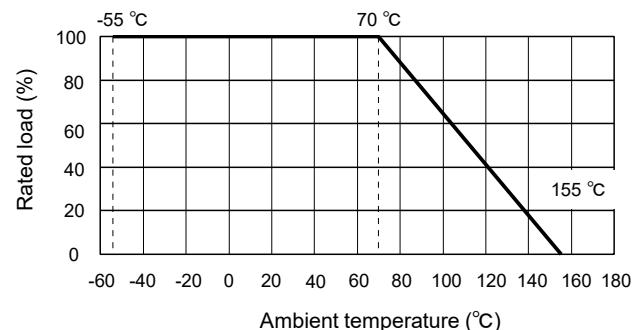
- Rated Continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}}$ .
- Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification} \times RCW$ .

# Anti-Sulfurated High Power Chip Resistors (Wide Terminal Type)

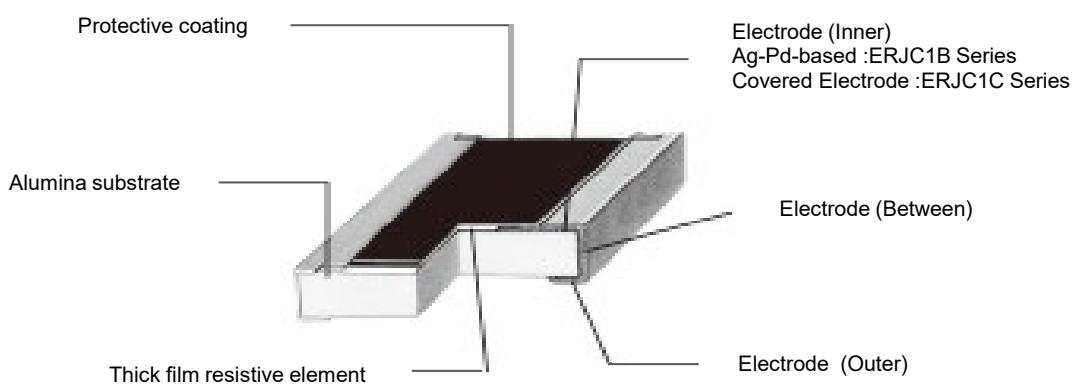
## Ratings

### Power derating curve

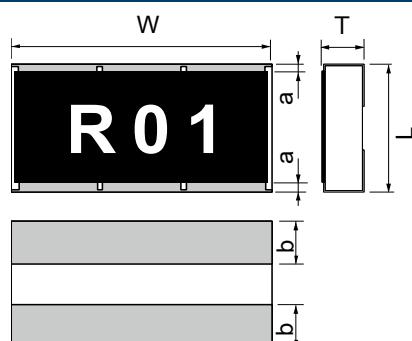
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



## Construction



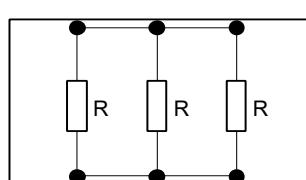
## Dimensions (not to scale)



Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJC1B	2.50±0.20	5.00±0.20	0.35±0.20	0.90±0.20	0.55±0.20	27
ERJC1C			0.60±0.20			

## Circuit configuration

ERJC1 series



## Anti-Sulfurated High Power Chip Resistors (Wide Terminal Type)

### Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±2 %	Rated voltage $\times$ 2.0, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±2 %	-55 °C (30 min.) / +125 °C (30 min.), 1000 cycles
High temperature exposure	±1 %	+155 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 °C, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h



## High Temperature Thick Film Chip Resistor (Automotive Grade)

ERJH type

**ERJ H2G, H2C, H2R, H3G series**

**ERJ H3E, H3Q, H6G, HP6 series**

### Features

- High reliability : Metal glaze thick film resistive element and high temperature of electrodes structure
- Achieve maximum category temperature 175 °C and rated category temperature 105 °C
- Compatible with placement machines : Taping packaging available
- Suitable for both reflow and flow soldering
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant
- RoHS compliant

■ As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

- ERJH2G, H2C, H2R, H3G, H3E, H3Q, HP6 series : ±0.5 %, ±1 %, ±5 %

1	2	3	4	5	6	7	8	9	10	11	12							
E	R	J	H	2	R	D	1	0	0	2	X							
<hr/>																		
Product code		Size, Power rating		Resistance tolerance		Resistance value		Packaging methods										
Thick film chip resistors		Code	inch	Power rating	Code	Tolerance	Code				Part No.							
		H2G	0402	0.1 W	D	±0.5 %	X				ERJH2G							
		H2C	0402	0.1 W	F	±1 %	X				ERJH2C							
		H2R	0402	0.1 W	J	±5 %	X				ERJH2R							
		H3G	0603	0.125 W	The first two or three digits are significant figures of resistance and the third or fourth one denotes number of zeros following.				V									
		H3E	0603	0.125 W	Three digit type (±5 %), Four digit type (±1 %, ±0.5 %)				Punched Carrier Taping 4 mm pitch, 5,000 pcs									
		H3Q	0603	0.25 W	(Ex.) 222 : 2.2 kΩ 1002 : 10 kΩ 4R7 : 4.7 Ω				ERJH3G									
		HP6	0805	0.5 W					ERJH3E									

- ERJH2G, H3G, H6G series : Jumper

1	2	3	4	5	6	7	8	9	10	11											
E	R	J	H	2	G	0	R	0	0	X											
<hr/>																					
Product code		Size, Rated current		Resistance tolerance		Resistance value		Packaging methods													
Thick film chip resistors		Code	inch	Rated current	Code	Tolerance	Code				Part No.										
		H2G	0402	1 A	0	Jumper	X				ERJH2G										
		H3G	0603	1 A																	
		H6G	0805	2 A																	
<hr/>																					

# High Temperature Thick Film Chip Resistor (Automotive Grade)

## Ratings

### [For Resistor]

Part No. (inch size)	Power rating*1 (105 °C) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	AEC-Q200 Grade
ERJH2G (0402)	0.1	50	100	±5	1 to 300 k (E24)	R < 10Ω : -100 to +600 10Ω ≤ R : ±200	-55 to +175	Grade 0
ERJH2C (0402)	0.1	50	100	±1	1 to 9.76 (E24,E96)	-100 to +600		
ERJH2R (0402)	0.1	50	100	±0.5,±1	10 to 300 k (E24,E96)	±100		
ERJH3G (0603)	0.125	75	150	±5	1 to 300 k (E24)	R < 10Ω : -100 to +600 10Ω ≤ R : ±200		
ERJH3E (0603)	0.125	75	150	±0.5,±1	10 to 300 k (E24,E96)	±100		
ERJH3Q (0603)	0.25	-	-	±0.5,±1	1 to 9.76 (E24,E96)			
				±5	1 to 9.1 (E24)	±200		
ERJHP6 (0805)	0.5	400	600	±0.5	10 to 300 k (E24,E96)	R < 33Ω : ±300 33Ω ≤ R : ±100		
	0.5	400	600	±1	1 to 300 k (E24,E96)	R < 10Ω : -100 to +600 10Ω ≤ R < 33Ω : ±300 33Ω ≤ R : ±100		
	0.5	400	600	±5	1 to 300 k (E24)	R < 10Ω : -100 to +600 10Ω ≤ R < 33Ω : ±300 33Ω ≤ R : ±100		

\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: Rated Continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value, or Limiting Element Voltage listed above, whichever less.}}$

\*3: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification (refer to performance)} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

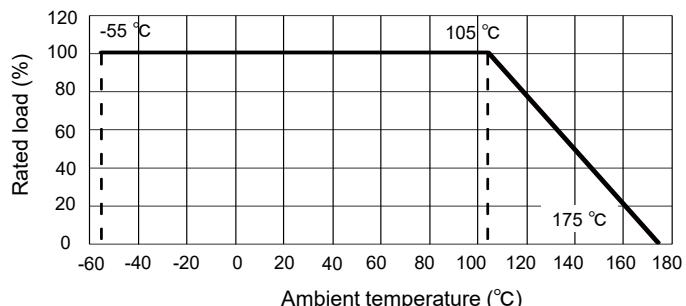
### [For Jumper]

Part No. (inch size)	Resistance	Rated current	Maximum overload current*1
ERJH2G (0402)	50 mΩ or less	1 A	2 A
ERJH3G (0603)		1 A	2 A
ERJH6G (0805)		2 A	4 A

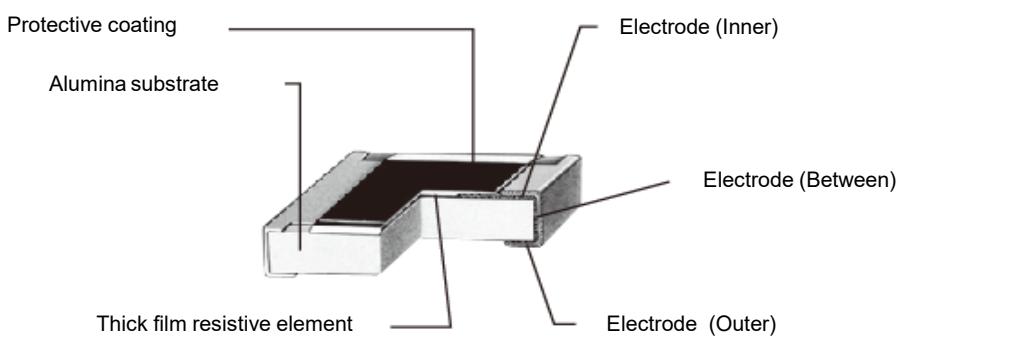
\*1: Overload test current

### Power derating curve

For resistors operated in ambient temperatures above 105 °C, power rating shall be derated in accordance with the figure below.



## Construction

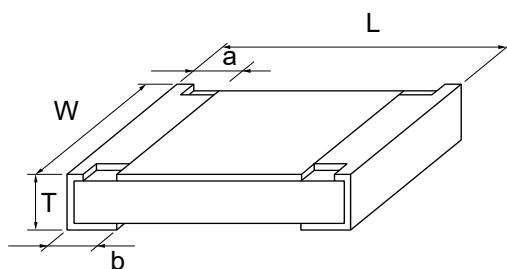


\*No value markings

\*ERJH3Q : special electrode structure

## High Temperature Thick Film Chip Resistor (Automotive Grade)

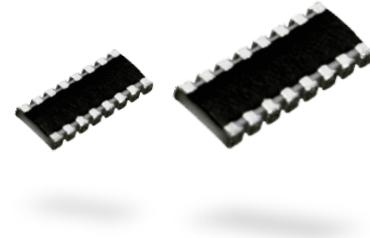
### Dimensions (not to scale)



Part No.	Dimensions					Mass (Weight) (g/1000 pcs)
	L	W	a	b	T	
ERJH2G	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.05	0.35±0.05	0.8
ERJH2C	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.05	0.35±0.05	0.8
ERJH2R	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.05	0.35±0.05	0.8
ERJH3G	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJH3E	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJH3Q	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJH6G	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	4
ERJHP6	2.00±0.20	1.25±0.10	0.25±0.20	0.40±0.20	0.60±0.10	4

### Performance

Test item	Performance requirements $\Delta R$		Test conditions
	Resistor type	Jumper type	
Resistance	Within specified tolerance	50 mΩ or less	20 °C
T. C. R.	Within specified T. C. R.	50 mΩ or less	+25 °C / +175 °C
Overload	±2 %	50 mΩ or less	ERJH2G, H2C, H2R, H3G, H3E, H3Q : Rated voltage × 2.5, 5 s ERJHP6 : Rated voltage × 1.77, 5 s Jumper type : Max. overload current, 5 s
Resistance to soldering heat	±1 %	50 mΩ or less	270 °C, 10 s
Rapid change of temperature	±1 %	50 mΩ or less	-55 °C (30 min.) / +175 °C (30 min.), 1000 cycles
High temperature exposure	±1 %	50 mΩ or less	+175 °C, 1000 h
Damp heat, Steady state	±1 %	50 mΩ or less	85 °C, 85 %RH, 1000 h
Load life in humidity	±3 %	50 mΩ or less	85 °C, 85 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 105 °C	±3 %	50 mΩ or less	105 °C, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Chip Resistors Array

EXB type

**EXB 14V, 18V, 24V, 28V, N8V, 2HV, series**

**EXB 34V, V4V, 38V, V8V, S8V series**

### Features

- High density

2 resistors in 0.8 mm × 0.6 mm size / 0302 inch size : EXB14V

4 resistors in 1.4 mm × 0.6 mm size / 0502 inch size : EXB18V

2 resistors in 1.0 mm × 1.0 mm size / 0404 inch size : EXB24V

4 resistors in 2.0 mm × 1.0 mm size / 0804 inch size : EXB28V, N8V

8 resistors in 3.8 mm × 1.6 mm size / 1506 inch size : EXB2HV

2 resistors in 1.6 mm × 1.6 mm size / 0606 inch size : EXB34V, V4V

4 resistors in 3.2 mm × 1.6 mm size / 1206 inch size : EXB38V, V8V

4 resistors in 5.1 mm × 2.2 mm size / 2009 inch size : EXBS8V

- Improvement of placement efficiency

Placement efficiency of Chip Resistor Array is two, four or eight times of the flat type chip resistor

- Reference Standard : IEC 60115-9, JIS C 5201-9, EIAJ RC-2129

- AEC-Q200 compliant (EXB2, EXB3)

- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11										
E	X	B	V	8	V	4	7	2	J	V										
<hr/>																				
<hr/> <b>Product code</b>		<b>Code</b>	<b>inch size</b>	<b>Construction</b>	<hr/>															
<hr/> Thick film chip resistor networks		14	0201×2	Convex terminal	<hr/>															
<hr/> 14		18	0201×4	Flat terminal	<hr/>															
<hr/> 18		24	0402×2	Convex terminal	<hr/>															
<hr/> 24		28	0402×4	Convex terminal	<hr/>															
<hr/> 28		2H	0602×8	Convex terminal	<hr/>															
<hr/> 2H		34	0603×2	Convex terminal	<hr/>															
<hr/> 34		38	0603×4	Convex terminal	<hr/>															
<hr/> 38		N8	0402×4	Convex terminal	<hr/>															
<hr/> N8		V4	0603×2	Convex terminal	<hr/>															
<hr/> V4		V8	0603×4	Convex terminal	<hr/>															
<hr/> V8		S8	0805×4	Convex terminal	<hr/>															
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## Chip Resistors Array

### Ratings

#### [For Resistor]

Part No. (inch size)	Power rating (70 °C) (W/element)	Limiting element voltage <sup>1</sup> (V)	Maximum overload voltage <sup>2</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade
EXB14V (0201×2)	0.031	12.5	25	±5	10 to 1 M (E24)	R<10 Ω : -200 ~ +600 10 Ω ~ 1 MΩ : ±200	-55 to +125	-
EXB18V (0201×4)	0.031 (0.1 W / package)	12.5	25	±5	10 to 1 M (E24)			
EXB24V (0402×2)	0.063	50	100	±5	1 to 1 M (E24)			
EXB28V (0402×4)	0.063	50	100	±5	1 to 1 M (E24)			
EXB2HV (0602×8)	0.063 (0.25 W / package)	25	50	±5	10 to 1 M (E24)			
EXB34V (0603×2)	0.063	50	100	±5	1 to 1 M (E24)			
EXB38V (0603×4)	0.063	50	100	±5	1 to 1 M (E24)			
EXBN8V (0402×4)	0.031	50	100	±5	10 to 1 M (E24)			
EXBV4V (0603×2)	0.063	50	100	±5	10 to 1 M (E24)			
EXBV8V (0603×4)	0.063	50	100	±5	10 to 1 M (E24)			
EXBS8V (0805×4)	0.1	100	200	±5	10 to 1 M (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.

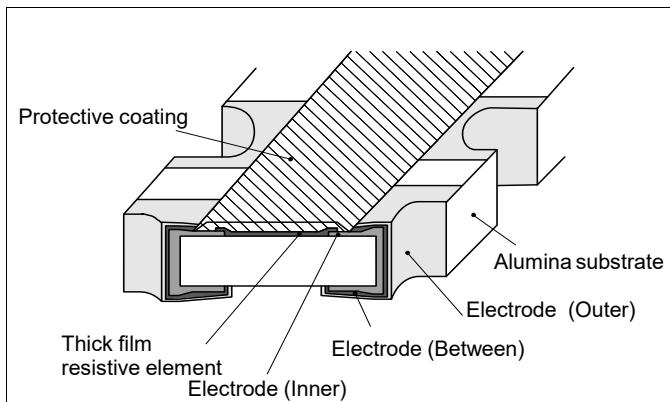
\*2: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification (refer to performance)} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

#### [For Jumper]

Part No.	Resistance	Rated current	Maximum overload current <sup>1</sup>
EXB14V	50 mΩ or less	0.5 A	1 A
EXB18V		0.5 A	1 A
EXB24V		1 A	2 A
EXB28V		1 A	2 A
EXB2HV		1 A	2 A
EXB34V		1 A	2 A
EXB38V		1 A	2 A
EXBN8V		1 A	2 A
EXBV4V		1 A	2 A
EXBV8V		1 A	2 A
EXBS8V		2 A	4 A

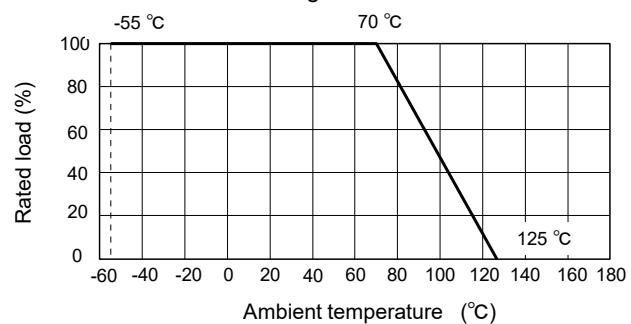
\*1: Overload test current

#### Construction (Example : Concave terminal)



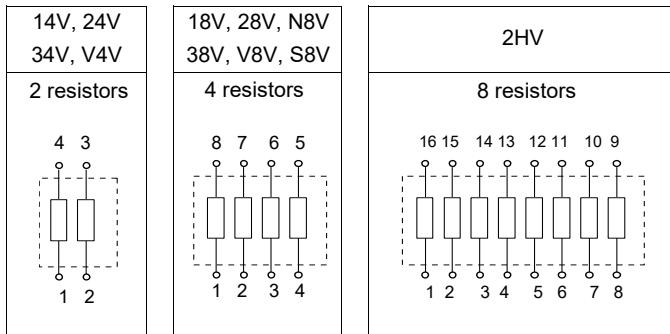
#### Power derating curve

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



#### Schematics

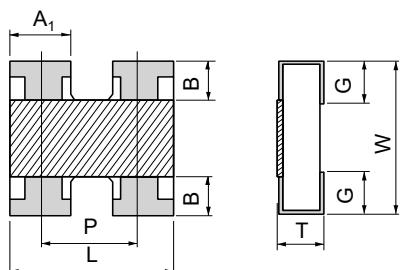
##### ● Isolated type



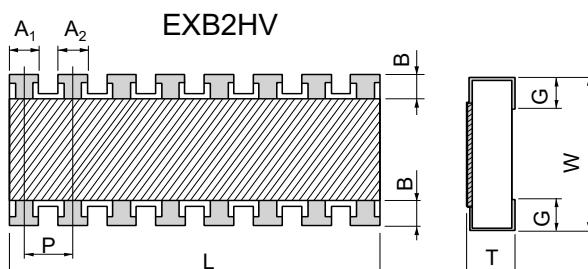
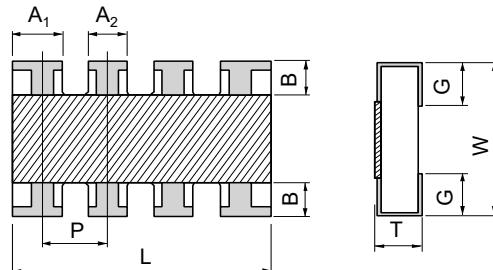
Dimensions (not to scale)

(1) Convex terminal type

EXB14V, 24V, 34V



EXB28V, 38V



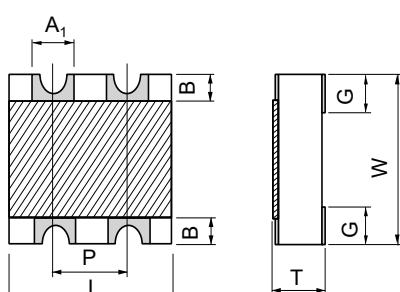
Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	B	P	G	
EXB14V (0603X2)	0.80±0.10	0.60±0.10	0.35±0.10	0.35±0.10	—	0.15±0.10	(0.50)	0.15±0.10	0.5
EXB24V (1005×2)	1.00±0.10	1.00±0.10	0.35±0.10	0.40±0.10	—	0.18±0.10	(0.65)	0.25±0.10	1.2
EXB28V (1005×4)	2.00±0.10	1.00±0.10	0.35±0.10	0.45±0.10	0.35±0.10	0.20±0.10	(0.50)	0.25±0.10	2.0
EXB2HV (1605×8)	3.80±0.10	1.60±0.10	0.45±0.10	0.35±0.10	0.35±0.10	0.30±0.10	(0.50)	0.30±0.10	9.0
EXB34V (1608×2)	1.60±0.20	1.60±0.15	0.50±0.10	0.65±0.15	—	0.30±0.20	(0.80)	0.30±0.20	3.5
EXB38V (1608×4)	3.20±0.20	1.60±0.15	0.50±0.10	0.65±0.15	0.45±0.15	0.30±0.20	(0.80)	0.35±0.20	7.0

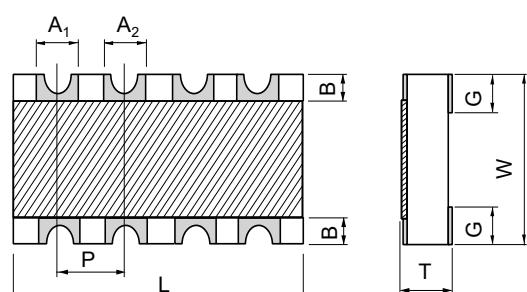
( ) Reference

(2) Concave terminal type

EXBV4V



EXBN8V, V8V, S8V



Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	B	P	G	
EXBN8V (1005×4)	2.00±0.10	1.00±0.10	0.45±0.10	0.30±0.10	0.30±0.10	0.20±0.15	(0.50)	0.30±0.15	3.0
EXBV4V (1608×2)	1.60 +0.20/-0.10	1.60 +0.20/-0.10	0.60±0.10	0.60±0.10	—	0.30±0.15	(0.80)	0.45±0.15	5.0
EXBV8V (1608×4)	3.20 +0.20/-0.10	1.60 +0.20/-0.10	0.60±0.10	0.60±0.10	0.60±0.10	0.30±0.15	(0.80)	0.45±0.15	10
EXBS8V (2012×4)	5.08 +0.20/-0.10	2.20 +0.20/-0.10	0.70±0.20	0.80±0.15	0.80±0.15	0.50±0.15	(1.27)	0.55±0.15	30

( ) Reference

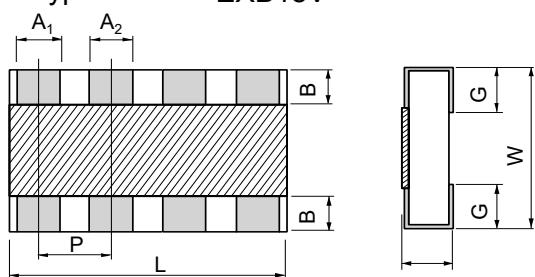
Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.

Should a safety concern arise regarding this product, please be sure to contact us immediately.

## Dimensions (not to scale)

(3) Flat terminal type

EXB18V

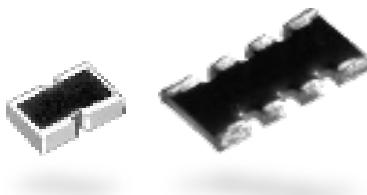


Part No. (inch size)	Dimensions								Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	B	P	G	
EXB18V (0603x4)	1.40±0.10	0.60±0.10	0.35±0.10	0.20±0.10	0.20±0.10	0.10±0.10	(0.40)	0.20±0.10	1.0

( ) Reference

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±2 %	Rated voltage x 2.5, 5 s Jumper type : Max. overload current, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±1 %	-55 °C (30 min.) / +155 °C (30 min.), 100 cycles
High temperature exposure	±1 %	+125 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 °C, 90 % to 95 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated voltage (Jumper type :Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Anti-Sulfurated Chip Resistors Array

EXB type

**EXB 14V, 18V, 24V, 28V, N8V, 2HV** series

**EXB 34V, V4V, 38V, V8V, S8V** series

### Features

- High resistance to sulfurization achieved by adopting an Ag-Pd-based inner electrode
- High density

2 resistors in 0.8 mm × 0.6 mm size / 0302 inch size : EXBU14

4 resistors in 1.4 mm × 0.6 mm size / 0502 inch size : EXBU18

2 resistors in 1.0 mm × 1.0 mm size / 0404 inch size : EXBU24

4 resistors in 2.0 mm × 1.0 mm size / 0804 inch size : EXBU28

8 resistors in 3.8 mm × 1.6 mm size / 1506 inch size : EXBU2H

2 resistors in 1.6 mm × 1.6 mm size / 0606 inch size : EXBU34

4 resistors in 3.2 mm × 1.6 mm size / 1206 inch size : EXBU38

- Improvement of placement efficiency

Placement efficiency of chip resistor array is two, four or eight times of the flat type chip resistor

- Reference standard : IEC 60115-9, JIS C 5201-9, EIAJ RC-2129
- AEC-Q200 compliant (EXBU2, EXBU3)
- RoHS compliant

■ **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11										
E	X	B	U	2	8	4	7	2	J	X										
<hr/>																				
Product code		Code	inch size	Construction				Resistance value												
Thick film chip resistor networks		U14	0201×2	Convex terminal				The first two digits are significant figures of resistance value and the third one denotes the number of zeros following. Jumper is expressed by R00. (Ex.) 222 : 2.2 kΩ												
		U18	0201×4	Flat terminal																
		U24	0402×2	Convex terminal																
		U28	0402×4	Convex terminal																
		U2H	0602×8	Convex terminal																
		U34	0603×2	Convex terminal																
		U38	0603×4	Convex terminal																
<hr/>																				
Resistance tolerance																				
		Code	Tolerance																	
		J	±5 %																	
		0	Jumper																	
<hr/>																				
Packaging methods																				
		Code	Packaging	Part No.																
		X	Punched carrier taping 2 mm pitch, 10,000 pcs	EXBU14 EXBU18 EXBU24 EXBU28 EXBU2H EXBU34 EXBU38																
		V	Punched carrier taping 4 mm pitch, 5,000 pcs	EXBU14 EXBU18 EXBU24 EXBU28 EXBU2H EXBU34 EXBU38																

## Ratings

### 【For Resistor】

Part No. (inch size)	Power rating (70 °C) (W/element)	Limiting element voltage <sup>*1</sup> (V)	Maximum overload voltage <sup>*2</sup> (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ( $\times 10^{-6}/K$ )	Category temperature range (°C)	AEC-Q200 Grade
EXBU14 (0201×2)	0.031	12.5	25	±5	10 to 1 M (E24)	$R < 10 \Omega$ : -200 to +600  $10 \Omega \text{ to } 1 M\Omega$ : ±200	-55 to +125	-
EXBU18 (0201×4)	0.031 (0.1 W / package)	12.5	25	±5	10 to 1 M (E24)			
EXBU24 (0402×2)	0.063	50	100	±5	1 to 1 M (E24)			
EXBU28 (0402×4)	0.063	50	100	±5	1 to 1 M (E24)			
EXBU2H (0602×8)	0.063 (0.25 W / package)	25	50	±5	10 to 1 M (E24)			
EXBU34 (0603×2)	0.063	50	100	±5	1 to 1 M (E24)			
EXBU38 (0603×4)	0.063	50	100	±5	1 to 1 M (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 Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification (refer to performance)} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

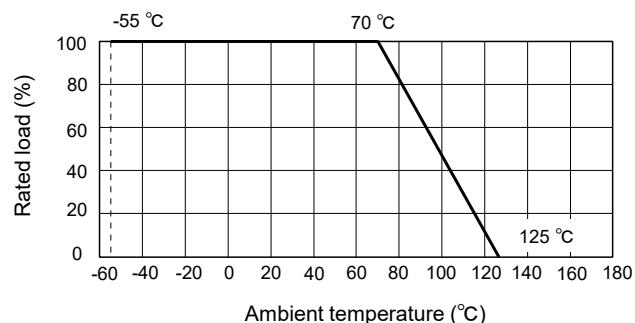
### 【For Jumper】

Part No.	Resistance	Rated current	Maximum overload current <sup>*1</sup>
EXBU24			
EXBU28			
EXBU2H	100 mΩ or less	1 A	2 A
EXBU34			
EXBU38			

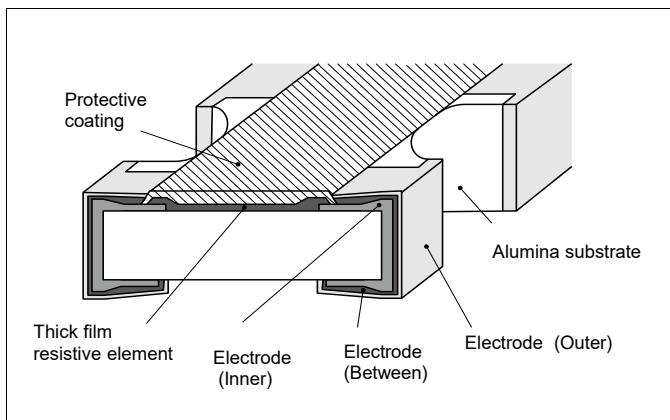
\*1: Overload test current

### Power derating curve

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

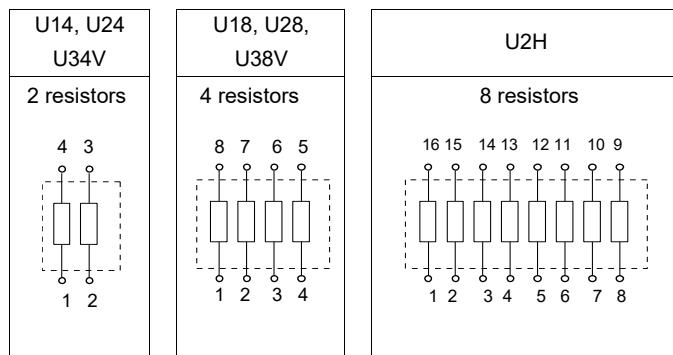


## Construction



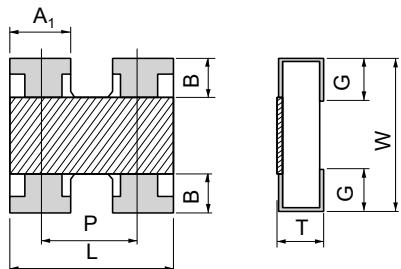
## Schematics

### ● Isolated type

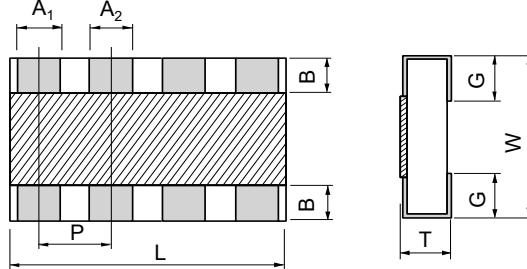


## Dimensions (not to scale)

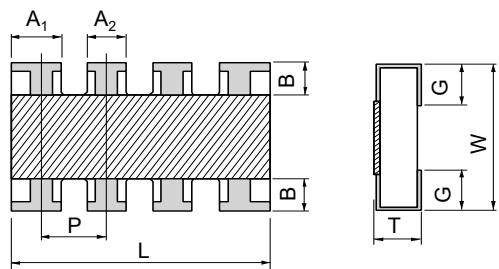
EXBU14, U24, U34



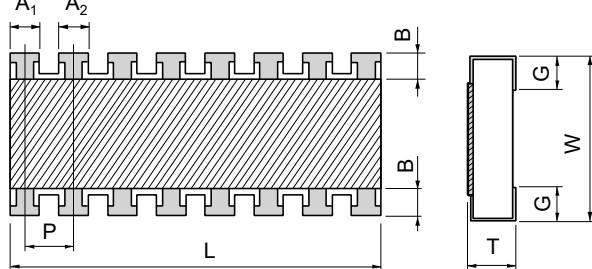
EXBU18



EXBU28, U38



EXBU2H



Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	B	P	G	
EXBU14 (0201X2)	0.80±0.10	0.60±0.10	0.35±0.10	0.35±0.10	—	0.15±0.10	(0.50)	0.15±0.10	0.5
EXBU18 (0201×4)	1.40±0.10	0.60±0.10	0.35±0.10	0.20±0.10	0.20±0.10	0.10±0.10	(0.40)	0.20±0.10	1.0
EXBU24 (0402×2)	1.00±0.10	1.00±0.10	0.35±0.10	0.40±0.10	—	0.18±0.10	(0.65)	0.25±0.10	1.2
EXBU28 (0402×4)	2.00±0.10	1.00±0.10	0.35±0.10	0.45±0.10	0.35±0.10	0.20±0.10	(0.50)	0.25±0.10	2.0
EXBU2H (0602×8)	3.80±0.10	1.60±0.10	0.45±0.10	0.35±0.10	0.35±0.10	0.30±0.10	(0.50)	0.30±0.10	9.0
EXBU34 (0603×2)	1.60±0.20	1.60±0.15	0.50±0.10	0.65±0.15	—	0.30±0.20	(0.80)	0.30±0.20	3.5
EXBU38 (0603×4)	3.20±0.20	1.60±0.15	0.50±0.10	0.65±0.15	0.45±0.15	0.30±0.20	(0.80)	0.35±0.20	7.0

( ) Reference

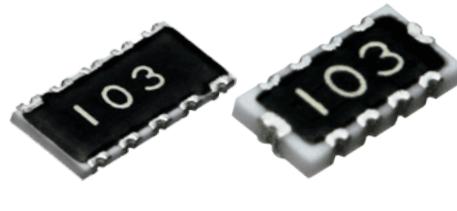
## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within Specified T. C. R.	+25 °C / +125 °C
Overload	±2 %	Rated voltage x 2.5, 5 s Jumper type : Max. overload current, 5 s
Resistance to soldering heat	±1 %	270 °C, 10 s
Rapid change of temperature	±1 %	-55 °C (30 min.) / +125 °C (30 min.), 100 cycles
High temperature exposure	±1 %	+125 °C, 1000 h
Damp heat, Steady state	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 °C, 90 % to 95 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70°C	±3 %	70°C, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

## Chip Resistors Networks

EXB type

**EXB D, E, A, Q series**

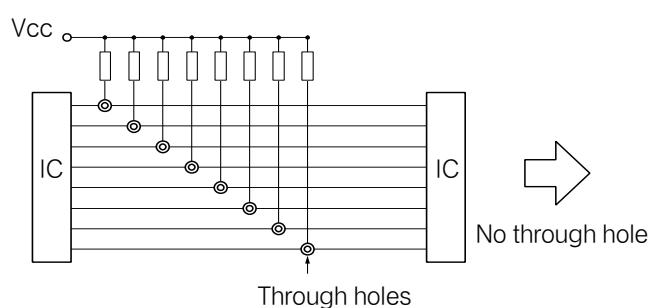


### Features

- High density placing for digital signal circuits
  - Bussed 8 or 15 resistors for pull up/down circuits
    - EXBD : 3.2 mm × 1.6 mm × 0.55 mm, 0.635 mm pitch
    - EXBE : 4.0 mm × 2.1 mm × 0.55 mm, 0.8 mm pitch
    - EXBA : 6.4 mm × 3.1 mm × 0.55 mm, 1.27 mm pitch
    - EXBQ : 3.8 mm × 1.6 mm × 0.45 mm, 0.5 mm pitch
  - Available direct placing on the bus line by means of half pitch spacing without through-holes on PWB ("High density placing" is shown below)
- High speed mounting using conventional placing machine
- Reference Standard : IEC 60115-9, JIS C 5201-9, EIAJ RC-2130
- RoHS compliant

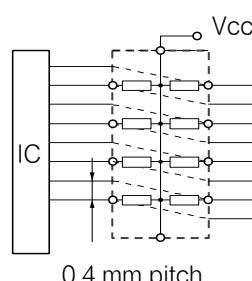
#### 【 High density placing 】

Pull up resistors



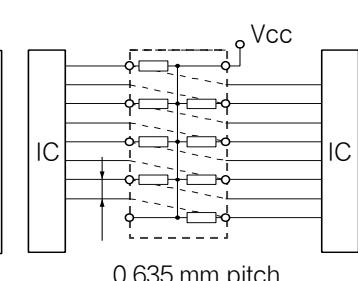
Direct placement on the bus line

EXBE10C



0.4 mm pitch

EXBA10P



0.635 mm pitch

- As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.

### Explanation of part numbers

1 <b>E</b>	2 <b>X</b>	3 <b>B</b>	4 <b>E</b>	5 <b>1</b>	6 <b>0</b>	7 <b>C</b>	8 <b>1</b>	9 <b>0</b>	10 <b>3</b>	11 <b>J</b>	12 
Product code										Suffix for special requirements	
Thick Film Resistor Networks											
Dimension code of chip resistor network										Circuit configuration	
Code      Inch      Dimensions (mm)										Code	Common terminal position
D      1206      3.2×1.6										C	Center common circuit (EXBD,EXBE)
E      1608      4.0×2.1										P	Diagonal common circuit (Terminal 5 and Terminal 10) (EXBA)
A      2512      6.4×3.1										P	One side common circuit (Terminal 16) (EXBQ)
Q      1506      3.8×1.6										E	Diagonal common circuit (Terminal 1 and Terminal 6) (EXBA)
										Code	Resistance value
										J	±5 %
										Resistance tolerance	
										Code	Tolerance
										J	±5 %

The first two digits are significant figures of resistance value and the third one denotes the number of zeros following.

### Ratings

Part No. (inch size)	Resistance range (Ω)	Resistance tolerance (%)	Number of terminals	Number of resistors	Power rating <sup>*1</sup> (70 °C) (W/element)	Limiting element voltage <sup>*2</sup> (V)	Maximum overload voltage <sup>*3</sup> (V)	T.C.R. (×10 <sup>-6</sup> /K)	Category temperature range (°C)	AEC-Q200 Grade
EXBD (1206)	47 to 1 M (E12)	±5	10 terminals	8 element	0.05 / element	25	50	±200	-55 to +125	-
EXBE (1608)					0.063 / element	25	50	±200		
EXBA (2512)					0.063 / element	50	100	±200		
EXBQ (1506)	100 to 470 k (E6)		16 terminals	15 element	0.025 / element	25	50	±200		

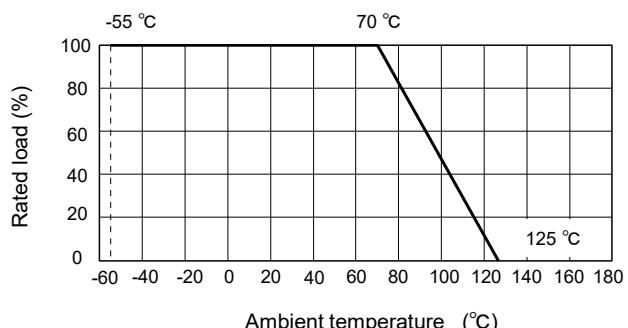
\*1: Use it on the condition that the case temperature is below the upper category temperature.

\*2: 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.

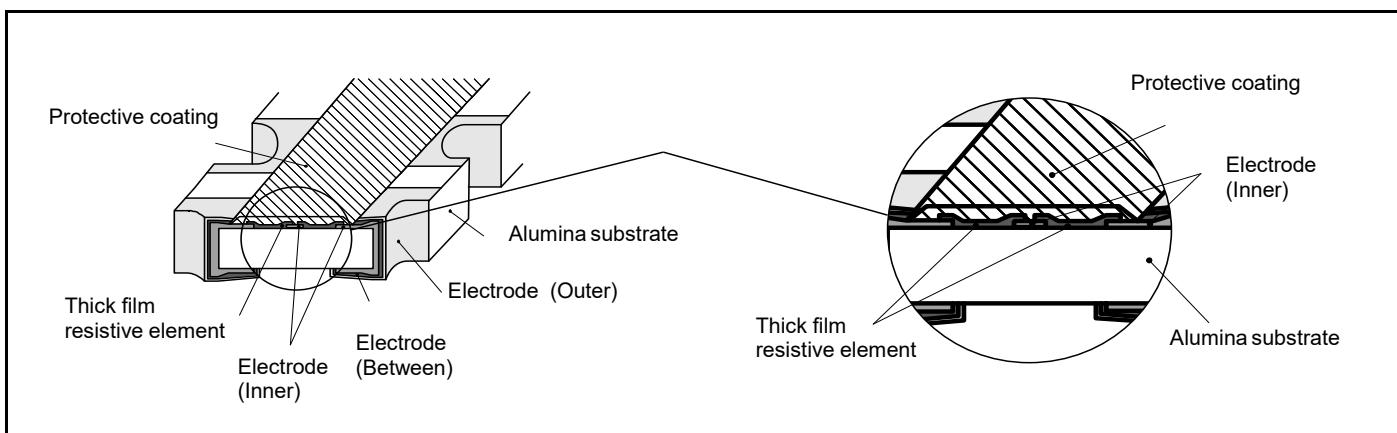
\*3: Overload Test Voltage (OTV) shall be determined from  $OTV = \text{Specified Magnification (refer to performance)} \times RCWV$  or Maximum Overload Voltage listed above, whichever less.

### 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.



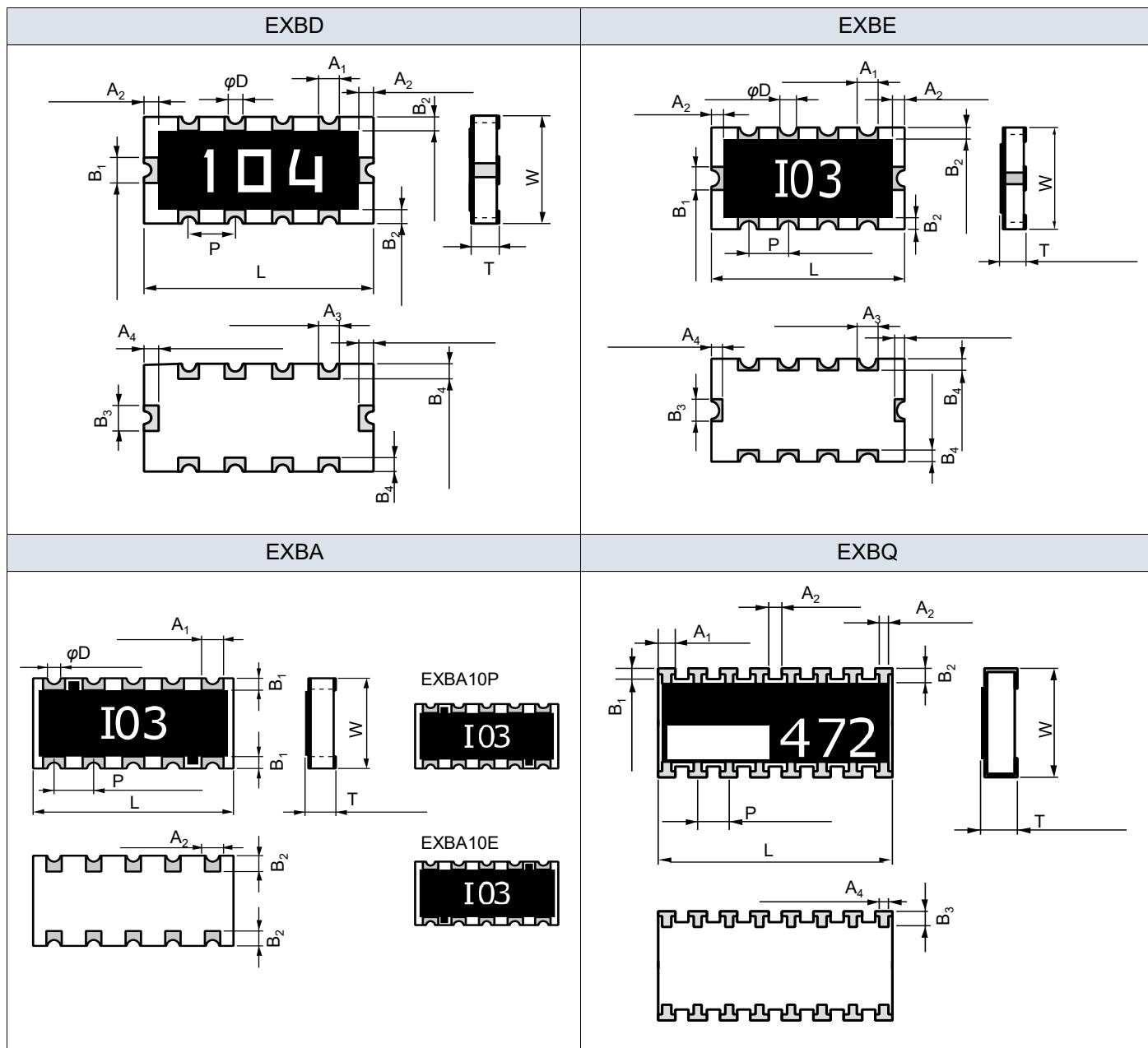
### Construction (Example : EXBD)



### Circuit configuration

EXBD, EXBE	EXBA	EXBQ

## Dimensions (not to scale)



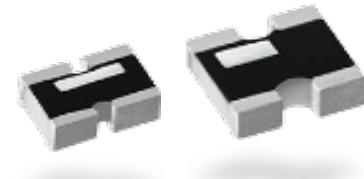
Unit : mm

Part No.	Dimensions							Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	
EXBD	3.20±0.15	1.60±0.15	0.55±0.10	0.33±0.15	0.2±0.1	0.40±0.15	0.2±0.1	10
	A <sub>3</sub>	A <sub>4</sub>	B <sub>3</sub>	B <sub>4</sub>	P	ø D		
	0.3±0.1	0.25±0.10	0.40±0.15	0.35±0.15	0.635±0.10	0.2±0.1		
Part No.	Dimensions							Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	
	4.0±0.2	2.1±0.2	0.55±0.10	0.5±0.2	0.3±0.2	0.5±0.2	0.25±0.20	
EXBE	A <sub>3</sub>	A <sub>4</sub>	B <sub>3</sub>	B <sub>4</sub>	P	ø D		16
	0.4±0.2	0.35±0.20	0.5±0.2	0.4±0.2	0.8±0.1	0.3+0.1/-0.2		
Part No.	Dimensions							Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	B <sub>1</sub>	A <sub>2</sub>	B <sub>2</sub>	
	6.4±0.2	3.1±0.2	0.55±0.10	0.7±0.2	0.3±0.2	0.5±0.2	0.5±0.20	
EXBA	P	ø D						40
	1.27±0.10	0.3+0.1/-0.2						
Part No.	Dimensions							Mass (Weight) (g/1000 pcs)
	L	W	T	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	B <sub>1</sub>	
	3.8±0.2	1.6±0.2	0.45±0.10	0.3±0.1	0.2±0.1	0.15+0.15/-0.05	0.15+0.15/-0.05	
EXBQ	B <sub>2</sub>	A <sub>4</sub>	B <sub>3</sub>	P				9
	0.25±0.15	0.15+0.20/-0.05	0.30±0.15	0.5±0.1				

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.  
Should a safety concern arise regarding this product, please be sure to contact us immediately.

## Performance

Test Item	Performance requirements $\Delta R$	Test conditions
Resistance	Within specified tolerance	20 °C
T. C. R.	Within specified T. C. R.	+25 °C / +125 °C
Overload	±3 %	Rated voltage x 2.5, 5 s
Resistance to soldering heat	±1 %	260 °C ±5 °C, 5 s ±1 s
Rapid change of temperature	±2 %	-55 °C (30 min.) / +125 °C (30 min.), 5 cycles
High temperature exposure	±3 %	+125 °C, 100 h
Load life in humidity	±3 %	60 °C±2 °C, 90 % to 95 %RH, Rated power × 0.1, 1.5 h ON / 0.5 h OFF cycle, 500 h
Endurance at 70 °C	±5 %	70 °C±2 °C, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h



## Chip Attenuator

EXB type

**EXB 14AT, 24AT series**

### Features

- Unbalanced  $\pi$  type attenuator circuit in one chip  
EXB14AT (0.8 mm×0.6 mm), EXB24AT (1.0 mm×1.0 mm)
- Reduced mounting area  
EXB14AT : About 60 % smaller than the area of an attenuator circuit consisting of three 0603 chip resistors, almost equal to the area of three 0402 chip resistors  
EXB24AT : About 50 % smaller than the area of an attenuator circuit consisting of three 1005 chip resistors, almost equal to the area of three 0603 chip resistors
- Mounting cost reduction : (Only 1 chip placed as compared to 3)
- Attenuation : 1 dB to 10 dB
- RoHS compliant

### Recommended applications

- Attenuation / level control / impedance matching of high frequency  
(communication signalling equipment cellular phones(GSM, CDMA, PDC, etc.), PHS, PDAs)
- **As for packaging methods, land pattern, soldering conditions and safety precautions, please see data files.**

### Explanation of part numbers

1	2	3	4	5	6	7	8	9	10	11	12
E	X	B	1	4	A	T	3	A	R	3	X
Product code	Code	Dimensions and circuit configuration ( $\pi$ type attenuator)			Attenuation value		Characteristics impedance		Tolerance		Packaging methods
Thick film resistor networks					One-digit number / one letter shows attenuation value (Ex.)		A   50 $\Omega$		R3   $\pm 0.3$ dB		Code   Packaging
14AT		0.8 mm × 0.6 mm (inch size : 0302)			1→1 dB, A→10 dB				R5   $\pm 0.5$ dB		X   Punched carrier taping 2 mm pitch, 10,000 pcs
24AT		1.0 mm × 1.0 mm (inch size : 0404)									

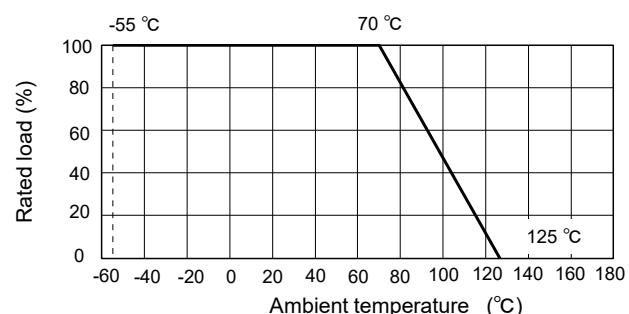
### Ratings

Part No.	EXB14AT, EXB24AT
Attenuation value	1 dB, 2 dB, 3 dB, 4 dB, 5 dB, 6 dB, 10 dB*
Attenuation value tolerance	1 dB, 2 dB, 3 dB, 4 dB, 5 dB : $\pm 0.3$ dB 6 dB, 10 dB : $\pm 0.5$ dB
Characteristic impedance	50 $\Omega$
Power rating at 70 °C	0.04 W / package
Frequency range	DC to 3.0 GHz
VSWR (Voltage standing wave ratio)	1.3 max.
Number of resistors	3 resistors
Number of terminals	4 terminals
Category temperature range	-55 °C to +125 °C

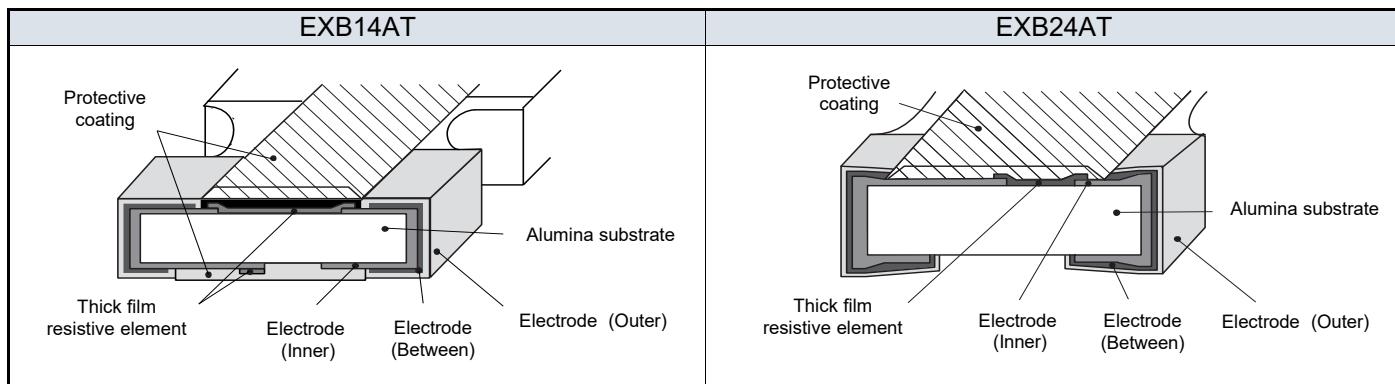
\* Please inquire about the other Attenuator value

### Power derating curve

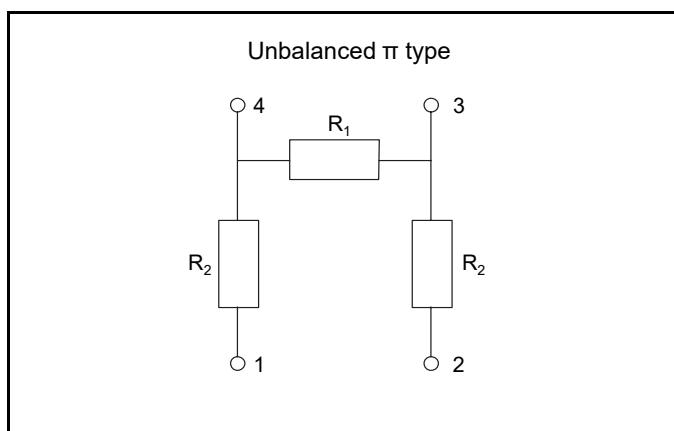
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



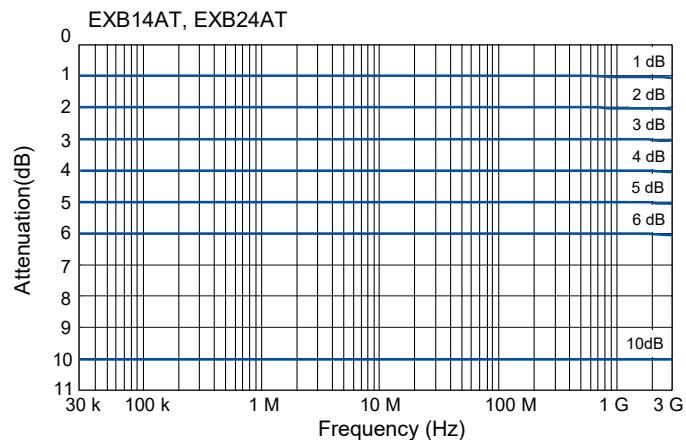
## Construction



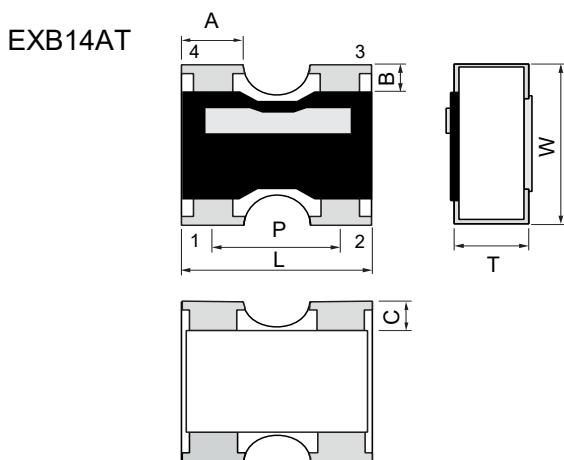
## Circuit configuration



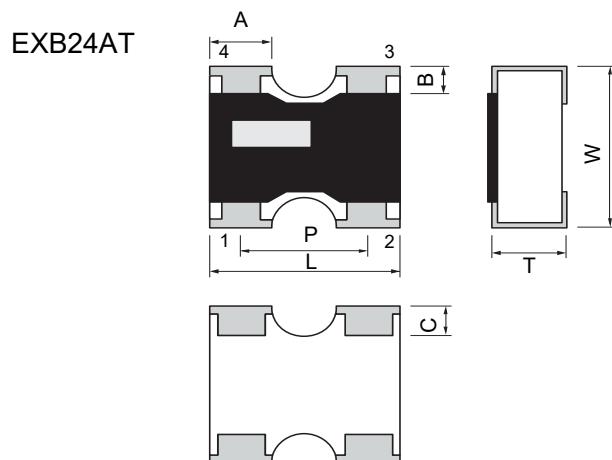
## Attenuation-frequency characteristics



## Dimensions (not to scale)



< Marking Configuration>  
The bar marking for recognizing terminal direction  
is located on the side of terminal 3, 4.



< Marking Configuration>  
The bar marking for recognizing terminal direction  
is located on the side of terminal 4.

Part No.	Dimensions							Mass (Weight) (g/1000 pcs)
	L	W	T	A	B	C	P (typical value)	
EXB14AT	0.80±0.10	0.60±0.10	0.35±0.10	0.35±0.10	0.15±0.10	0.15±0.10	0.50	0.7
EXB24AT	1.00±0.10	1.00±0.10	0.35±0.10	0.40±0.10	0.15±0.10	0.25±0.10	0.65	1.1

Surface mount resistors series			Packaging (Standard quantity : pcs/reel)			
Products	Part No.	Size (mm) (inch)	Pressed carrier taping (2 mm pitch)	Punched carrier taping (2 mm pitch)	Punched carrier taping (4 mm pitch)	Embossed carrier taping (4 mm pitch)
Thick film chip resistors	ERJXGN	0402 (01005)	20,000 <sup>*1</sup>	—	—	40,000 <sup>*2</sup>
	ERJ1GN	0603 (0201)	15,000	—	—	—
	ERJ2GE	1005 (0402)	—	10,000	—	—
	ERJ3GE	1608 (0603)	—	—	5,000	—
	ERJ6GE	2012 (0805)	—	—	5,000	—
	ERJ8GE	3216 (1206)	—	—	5,000	—
	ERJ14	3225 (1210)	—	—	—	5,000
	ERJ12	4532 (1812)	—	—	—	5,000
	ERJ12Z	5025 (2010)	—	—	—	5,000
	ERJ1T	6432 (2512)	—	—	—	4,000
Precision thick film chip resistors	ERJXGN	0402 (01005)	20,000 <sup>*1</sup>	—	—	40,000 <sup>*2</sup>
	ERJ1GN/1RH	0603 (0201)	15,000	—	—	—
	ERJ2RC/2RH/2RK	1005 (0402)	—	10,000	—	—
	ERJ3RB/3RE/3EK	1608 (0603)	—	—	5,000	—
	ERJ6RB/6RE/6EN	2012 (0805)	—	—	5,000	—
	ERJ8EN	3216 (1206)	—	—	5,000	—
	ERJ14N	3225 (1210)	—	—	—	5,000
	ERJ12N	4532 (1812)	—	—	—	5,000
	ERJ12S	5025 (2010)	—	—	—	5,000
	ERJ1TN	6432 (2512)	—	—	—	4,000
Metal film (Thin film) chip resistors, High reliability type	ERA1A	0603 (0201)	15,000	—	—	—
	ERA2A/2V	1005 (0402)	—	10,000	—	—
	ERA3A/3V/3K	1608 (0603)	—	—	5,000	—
	ERA6A/6V/6K	2012 (0805)	—	—	5,000	—
	ERA8A	3216 (1206)	—	—	5,000	—
Thick film chip resistors/ Low resistance type	ERJ2LW/2BW	1005 (0402)	10,000	—	—	—
	ERJ2BS/2BQ	1005 (0402)	—	10,000	—	—
	ERJ3L/3B/3R/L03	1608 (0603)	—	—	5,000	—
	ERJ6L/6B/6C	2012 (0805)	—	—	5,000	—
	ERJ6D/6R/L06	—	—	—	—	—
	ERJ8B/8C/8R/L08	3216 (1206)	—	—	5,000	—
	ERJ14B/14R/L14	3225 (1210)	—	—	—	5,000
	ERJ12R/L12	4532 (1812)	—	—	—	5,000
	ERJ12Z/L1D	5025 (2010)	—	—	—	5,000
	ERJ1TR	6432 (2512)	—	—	—	4,000
Current sensing resistors, Metal plate type	ERJL1W	6432 (2512)	—	—	—	3,000
	ERJMP2	3216 (1206)	—	—	—	3,000
	ERJMP3	5025 (2010)	—	—	—	3,000
	ERJMP4	6432 (2512)	—	—	—	2,000
	ERJMS4	6432 (2512)	—	—	—	2,000
	ERJMS6	6468 (2526)	—	—	—	1,000 (8mm Pitch)
	ERJMB1	2550 (1020)	—	—	—	3,000
Current sensing resistors, Metal foil type	ERJM1W	6432 (2512)	—	—	—	3,000
	ERJMFBA	1005 (0402)	—	10,000	—	—
High power chip resistors/ Wide terminal type	ERJA1	3264 (1225)	—	—	—	4,000
	ERJB1/ERJC1 <sup>*3</sup>	2550 (1020)	—	—	—	5,000
	ERJD1 <sup>*4</sup>	1632 (0612)	—	—	5,000	—
	ERJB2/ERJD2 <sup>*4</sup>	1220 (0508)	—	—	5,000	—

\*1: W8P2 : Width 8 mm, Pitch 2 mm,

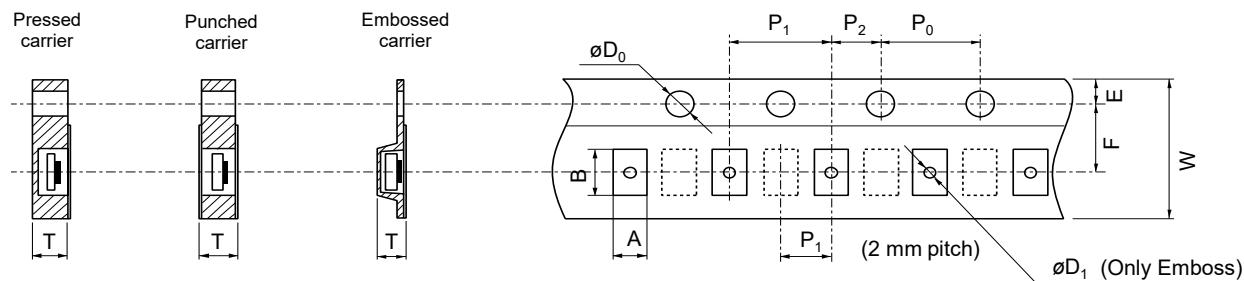
\*2: W4P1 : Width 4 mm, Pitch 1 mm

\*3: Anti-Sulfurated High power chip resistors / Wide terminal type

\*4: Low TCR High power chip Resistors / Wide terminal type

Surface mount resistors series			Packaging (Standard quantity : pcs/reel)			
Products	Part No.	Size (mm) (inch)	Pressed carrier taping (2 mm pitch)	Punched carrier taping (2 mm pitch)	Punched carrier taping (4 mm pitch)	Embossed carrier taping (4 mm pitch)
High precision thick film chip resistors	ERJPB3	1608 (0603)	—	—	5,000	—
	ERJPB6	2012 (0805)	—	—	5,000	—
Anti-Surge Thick film chip resistors	ERJPA2	1005 (0402)	—	10,000	—	—
	ERJP03/PA3	1608 (0603)	—	—	5,000	—
	ERJP06	2012 (0805)	—	—	5,000	—
	ERJP08	3216 (1206)	—	—	5,000	—
	ERJP14	3225 (1210)	—	—	—	5,000
Anti-Pulse Thick film chip resistors	ERJT06	2012 (0805)	—	—	5,000	—
	ERJT08	3216 (1206)	—	—	5,000	—
	ERJT14	3225 (1210)	—	—	—	5,000
Anti-Sulfurated Thick film chip resistors	ERJU0X	0402 (01005)	20,000	—	—	—
	ERJU01	0603 (0201)	15,000	—	—	—
	ERJS02/U02	1005 (0402)	—	10,000	—	—
	ERJS03/U03	1608 (0603)	—	—	5,000	—
	ERJS06/U06	2012 (0805)	—	—	5,000	—
	ERJU6S/U6Q	ERJU6S/U6Q	—	—	—	—
	ERJS08/U08	3216 (1206)	—	—	5,000	—
	ERJS14/U14	3225 (1210)	—	—	—	5,000
	ERJS12/U12	4532 (1812)	—	—	—	5,000
	ERJS1D/U1D	5025 (2010)	—	—	—	5,000
Anti-Sulfurated Thick film chip resistors / Precision type	ERJU2R	1005 (0402)	—	10,000	—	—
	ERJU3R	1608 (0603)	—	—	5,000	—
	ERJU6R	2012 (0805)	—	—	5,000	—
Anti-Sulfurated Thick film chip resistors / Anti-Surge type	ERJUP3	1608 (0603)	—	—	5,000	—
	ERJUP6	2012 (0805)	—	—	5,000	—
	ERJUP8	3216 (1206)	—	—	5,000	—
High temperature thick film chip resistor	ERJH2G/2C/2R	1005 (0402)	—	10,000	—	—
	ERJH3G/3E/3Q	1608 (0603)	—	—	5,000	—
	ERJH6G/HP6	2012 (0805)	—	—	5,000	—
Chip resistor array	EXB14V	0806 (0302)	—	10,000	—	—
	EXB24V	1010 (0404)	—	10,000	—	—
	EXB34V	1616 (0606)	—	—	5,000	—
	EXBV4V	1616 (0606)	—	—	5,000	—
	EXB18V	1406 (0502)	—	10,000	—	—
	EXB28V	2010 (0804)	—	10,000	—	—
	EXBN8V	2010 (0804)	—	10,000	—	—
	EXB38V	3216 (1206)	—	—	5,000	—
	EXBV8V	3216 (1206)	—	—	5,000	—
	EXBS8V	5022 (2009)	—	—	—	2,500
Anti-Sulfurated chip resistor array	EXB2HV	3816 (1506)	—	—	5,000	—
	EXBU14	0806 (0302)	—	10,000	—	—
	EXBU18	1406 (0502)	—	10,000	—	—
	EXBU24	1010 (0404)	—	10,000	—	—
	EXBU34	1616 (0606)	—	—	5,000	—
	EXBU28	2010 (0804)	—	10,000	—	—
	EXBU38	3216 (1206)	—	—	5,000	—
Chip resistor networks	EXBU2H	3816 (1506)	—	—	5,000	—
	EXBD	3216 (1206)	—	—	5,000	—
	EXBE	4021 (1608)	—	—	—	4,000
	EXBA	6431 (2512)	—	—	—	4,000
Chip attenuator	EXBQ	3816 (1506)	—	—	5,000	—
	EXB14AT	0806 (0302)	—	10,000	—	—
	EXB24AT	1010 (0404)	—	10,000	—	—

## Carrier tape



### Pressed carrier taping (2 mm Pitch)

- Chip resistors / Precision chip / Metal film(Thin film)chip / Low resistance / Anti-Sulfurated

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T
ERJXGN	0402 (01005)	0.24±0.03	0.45±0.03								0.31±0.05
ERJU0X											
ERJ1GN	0603 (0201)	0.38±0.05	0.68±0.05	8.00±0.20	3.50±0.05	1.75±0.10	2.00±0.10	2.00±0.05	4.00±0.10	1.50 +0.10/0	0.42±0.05
ERJ1R□											
ERJU01											
ERA1A											
ERJ2LW	1005 (0402)	0.68±0.10	1.20±0.10								0.60±0.05
ERJ2BW		0.67±0.10	1.17±0.10								0.61±0.05

### Punched carrier taping (2 mm Pitch)

- Chip resistors / Precision chip / Thin film chip / Low resistance / Anti-Surge / Anti-Sulfur / High temperature / Metal foil type

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T
ERJ2□											
ERJPA2											
ERJ□□2	1005 (0402)	0.67±0.05	1.17±0.05	8.00±0.20	3.50±0.05	1.75±0.10	2.00±0.10	2.00±0.05	4.00±0.10	1.50 +0.10/0	0.52±0.05
ERJ□2□											
ERA2□											
ERJMFBA											0.60±0.05

- Chip resistor array / Anti-Sulfurated chip resistor Array / Chip attenuator

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T
EXB14V	0806 (0302)	0.70 +0.10/-0.05	0.95 +0.05/-0.10								
EXB14AT											
EXB18V	1406 (0502)			1.60±0.10							
EXB24V	1010 (0404)	1.20±0.10		8.00±0.20	3.50±0.05	1.75±0.10	2.00±0.10	2.00±0.05	4.00±0.10	1.50 +0.10/0	0.52±0.05
EXBU24											
EXB24AT											
EXB28V	2010 (0804)			2.20±0.10							
EXBU28											
EXBN8V											

### Punched carrier taping (4 mm Pitch)

- Chip resistors / Precision chip / Metal film(Thin film)chip / Low resistance / High power / High precision / Anti-Surge / Anti-Pulse / Anti-Sulfurated / High temperature

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T
ERJ3□											
ERJ3LW(10mΩ)											
ERJ3BW											
ERJ□□3	1608 (0603)	1.10±0.10	1.90±0.10								0.70±0.05
ERJ□ 3 □											
ERA3□											
ERJ3LW(5mΩ)											
ERJ6□											
ERJ□□6	2012 (0805)	1.65±0.15	2.50±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50 +0.10/0	0.84±0.05
ERJ□6□											
ERA6□											
ERJB3	1220 (0508)										
ERJ6BW											
ERJ6LW	2012 (0805)	1.55±0.15	2.30±0.20								0.94±0.05
ERJ6CW											
ERJ8□											
ERJ8□W	3216 (1206)	2.00±0.15	3.60±0.20								0.84±0.05
ERJ□□8											
ERA8□											
ERJB2	1632 (0612)										
ERJD2											

● Chip resistor array / Anti-Sulfurated chip resistor array / Chip resistor networks

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T	Unit : mm
EXB34V EXBU34	1616 (0606)	1.95±0.15	1.95±0.20	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50 +0.10/0	0.70±0.05 0.84±0.05 0.84±0.10 0.64±0.05	0.70±0.05 0.84±0.05 0.84±0.10 0.64±0.05
EXB38V EXBU38	3216 (1206)		3.60±0.20									
EXB2HV EXBU2H	3816 (1506)		4.10±0.15									
EXBV4V	1616 (0606)		1.95±0.20									
EXBV8V	3216 (1206)		3.60±0.20									
EXBD	3216 (1206)		2.00±0.20									
EXBQ	3816 (1506)	1.90±0.20	4.10±0.20									

**Embossed carrier taping (1 mm Pitch)**

● Chip resistors

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T	Unit : mm
ERJXGN	0402 (01005)	0.25±0.05	0.45±0.05	4.00±0.20	1.80±0.05	0.90±0.10	1.00±0.10	1.00±0.10	2.00±0.10	0.80±0.10	0.5 max.	

**Embossed carrier taping (4 mm Pitch)**

● Chip resistors / Precision chip / Low resistance / High power / Anti-Surge / Anti-Pulse / Anti-Sulfurated

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T	øD <sub>1</sub>	
ERJ14□ ERJ□14	3225 (1210)	2.80±0.20	3.50±0.20	8.00±0.30	3.50±0.05		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.00±0.10	1.00 +0.10/0
ERJ12□ ERJ□12	4532 (1812)	3.50±0.20	4.80±0.20										
ERJ12Z ERJ12S ERJ□1D	5025 (2010)	2.80±0.20	5.30±0.20	12.00 ±0.30	5.50±0.20		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.00±0.10	15 min.
ERJB1 ERJC1 ERJD1	2550 (1020)												
ERJ1T□ ERJ□1T	6432 (2512)	3.60±0.20	6.90±0.20	12.00 ±0.30	5.50±0.20		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.60±0.10	1.10±0.20
ERJA1	3264 (1225)	3.50±0.20	6.80±0.20										

● Current sensing resistors, Metal plate type

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T	øD <sub>1</sub>	Unit : mm	
ERJMP2 (1 mΩ)	3216 (1206)	1.90±0.20	3.50±0.20	8.00±0.30	3.50±0.10		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.55±0.20	—	1.55±0.20
ERJMP2 (2 mΩ)	3216 (1206)													
ERJMP2 (3 to 50 mΩ)	3216 (1206)													
ERJMP3 (1 to 2 mΩ)	5025 (2010)	2.90±0.20	5.40±0.20	12.00 ±0.30	5.50±0.10		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.55±0.20	—	1.55±0.20
ERJMP3 (3 to 50 mΩ)	5025 (2010)													
ERJMB1	2550 (1020)	3.50±0.20	6.90±0.20	12.00 ±0.30	5.50±0.10		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.55±0.20	—	1.55±0.20
ERJMP4 (1 to 2 mΩ)	6432 (2512)													
ERJMP4 (3 to 50 mΩ)	6432 (2512)													
ERJMS4	6432 (2512)	3.50±0.20	6.80±0.20	12.00 ±0.30	5.50±0.10		1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.60±0.20	1.5 min.	1.5 min.
ERJM1W	6432 (2512)													

● Chip resistor array / Chip resistor networks

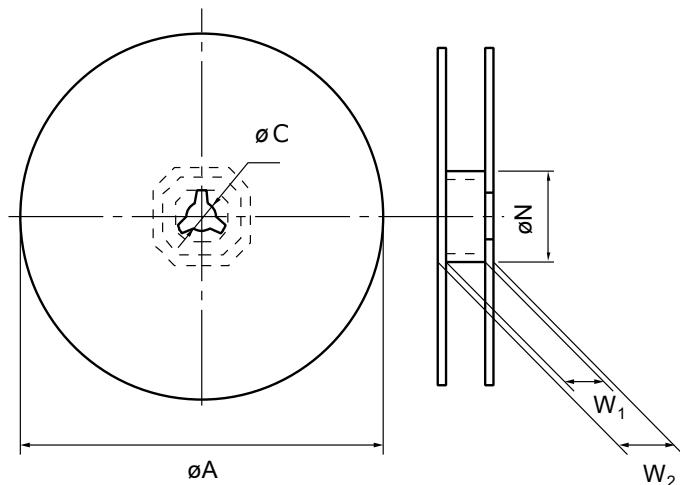
Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T	øD <sub>1</sub>	Unit : mm	
EXBS8V	5022 (2009)	2.80±0.20	5.70±0.20	12.00±0.30	5.50±0.20	1.75 ±0.10	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	1.6 max.	1.5 min.	1.5 min.	1.5 min.
EXBE	4021 (1608)	2.50±0.20	4.40±0.20											
EXBA	6431 (2512)	3.50±0.20	6.80±0.20											

**Embossed carrier taping (8 mm Pitch)**

● Current sensing resistors, Metal plate type

Part No.	Size (inch)	A	B	W	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>0</sub>	øD <sub>0</sub>	T	øD <sub>1</sub>	Unit : mm	
ERJMS6	6468 (2526)	6.90±0.20	7.50±0.20	12.00 ±0.30	5.50±0.05	1.75 ±0.10	8.00 ±0.10	2.00 ±0.05	4.00 ±0.10	1.50 +0.10/0	2.45±0.20	1.5 min.		

## Taping reel

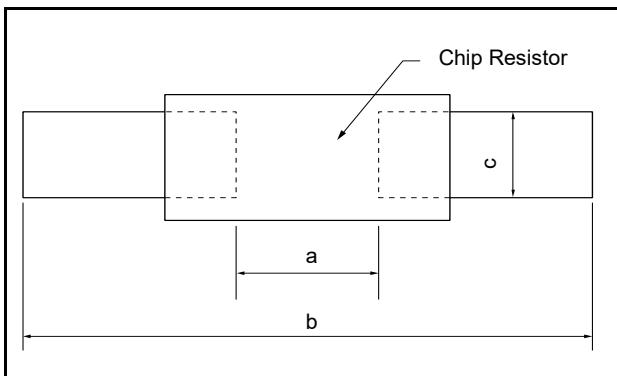


Tape width (W)	Dimensions				
	ØA	ØN	ØC	W <sub>1</sub>	W <sub>2</sub>
4 mm width	180.0±3.0			4.5±0.5	7.0±0.5
8 mm width		60.0+1.0/0		9.0+1.0/0	11.4±1.0
12 mm width	180.0 0/-1.5		13.0±0.2	13.0+1.0/0	15.4±1.0
24 mm width	380.0±2.0	80.0±1.0		25.4±1.0	29.4±1.0

## Recommended land pattern

- An example of a land pattern for the rectangular type is shown below.

<Ex.>



Unit : mm

Size mm/inch	Dimensions		
	a	b	c
0402/01005	0.15 to 0.20	0.5 to 0.7	0.20 to 0.25
0603/0201	0.3 to 0.4	0.8 to 0.9	0.25 to 0.35
1005/0402	0.5 to 0.6	1.4 to 1.6	0.4 to 0.6
1608/0603	0.7 to 0.9	2.0 to 2.2	0.8 to 1.0
2012/0805	1.0 to 1.4	3.2 to 3.8	0.9 to 1.4
3216/1206	2.0 to 2.4	4.4 to 5.0	1.2 to 1.8
3225/1210	2.0 to 2.4	4.4 to 5.0	1.8 to 2.8
4532/1812	3.3 to 3.7	5.7 to 6.5	2.3 to 3.5
5025/2010	3.6 to 4.0	6.2 to 7.0	1.8 to 2.8
6432/2512	5.0 to 5.4	7.6 to 8.6	2.3 to 3.5
6432/2512*	3.6 to 4.0	7.6 to 8.6	2.3 to 3.5

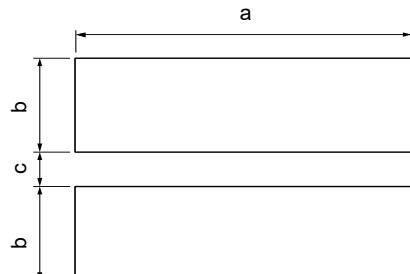
\* ERJL1W

High power (double-sided resistive elements structure) type

Part No.	Size (inch)	Dimensions		
		a	b	c
ERJ2LW/2BW	1005 (0402)	0.52	1.4 to 1.6	0.4 to 0.6
ERJ3LW/3BW	1608 (0603)	0.5 to 0.8	2.5 to 2.7	0.9 to 1.1
ERJ6LW	2012 (0805)	0.6 to 0.8	3.2 to 3.8	1.1 to 1.4
ERJ6BW		0.9	3.2 to 3.8	1.1 to 1.4
ERJ6CW (10 to 13 mΩ)		0.7 to 0.9	3.2 to 3.8	1.1 to 1.4
ERJ6CW (15 to 30 mΩ)		0.9 to 1.1	3.2 to 3.8	1.1 to 1.4
ERJ8BW	3216 (1206)	1.2	4.4 to 5.0	1.3 to 1.8
ERJ8CW (10 to 16 mΩ)		2.0 to 2.6	4.4 to 5.0	1.2 to 1.8
ERJ8CW (18 to 50 mΩ)				

Unit : mm

- An example of a land pattern for high power chip resistors / Wide terminal type is shown below.



Unit : mm

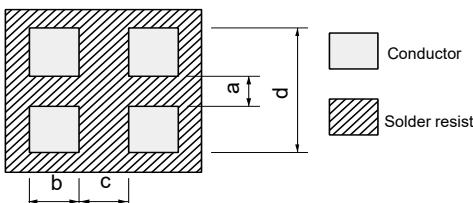
Part No.	Dimensions		
	a	b	c
ERJA1	6.4	1.70	0.60
ERJB1			
ERJC1 <sup>1</sup>	5.0	1.30	0.75
ERJD1 <sup>2</sup>			
ERJB2	3.2	0.95	0.70
ERJD2 <sup>2</sup>			
ERJB3	2.0	0.80	0.60

\*1: Anti-Sulfurated High power chip resistors / Wide terminal type

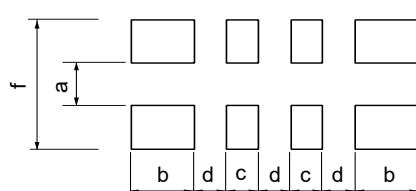
\*2: Low TCR High power chip resistors / Wide terminal type

## Recommended land pattern

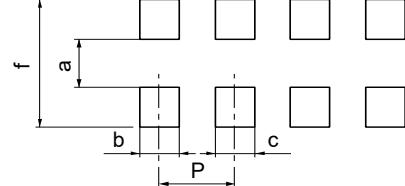
- An example of a land pattern for Chip Resistor Array, Anti-Sulfurated Chip Resistor Array and Chip Attenuator is shown below.



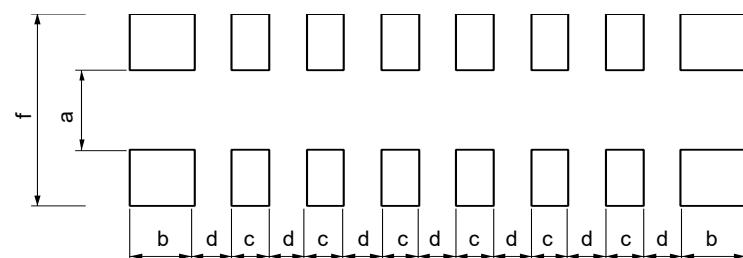
Part No.	Dimensions			
	a	b	c	d
EXB14V EXB14A	0.30	0.30	0.30	0.80 to 0.90
EXB24V EXBU24 EXB24A	0.5	0.35 to 0.40	0.30	1.4 to 1.5



Part No.	Dimensions				
	a	b	c	d	f
EXB28V EXBU28	0.40	0.525	0.25	0.25	1.40
EXBN8V	0.45 to 0.50	0.35 to 0.38	0.25	0.25	1.40 to 2.00



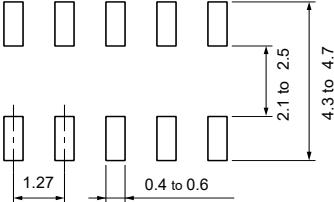
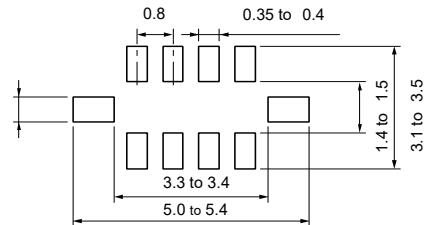
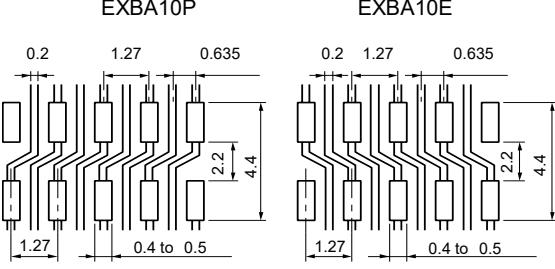
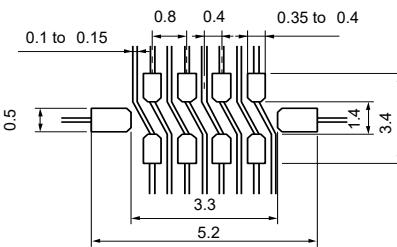
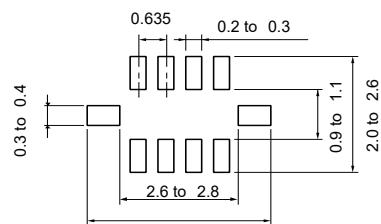
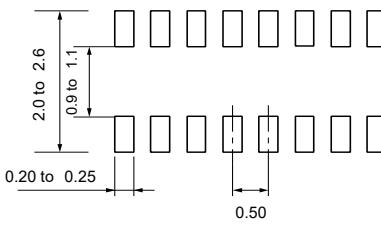
Part No.	Dimensions				
	a	b	c	f	P
EXB18V	0.20 to 0.30	0.15 to 0.20	0.15 to 0.20	0.80 to 0.90	0.40
EXBV4V EXBV8V	0.7 to 0.9	0.4 to 0.45	0.4 to 0.45	2 to 2.4	0.80
EXB34V EXB38V EXBU34 EXBU38	0.7 to 0.9	0.4 to 0.5	0.4 to 0.5	2.2 to 2.6	0.80
EXBS8V	1 to 1.2	0.5 to 0.75	0.5 to 0.75	3.2 to 3.8	1.27



Part No.	Dimensions				
	a	b	c	d	f
EXB2HV EXBU2H	1.00	0.425	0.25	0.25	2.00

## Recommended land pattern

- An example of a land pattern for Chip Resistor Networks is shown below.

	EXBA	EXBE
For popular pattern	<p>Pitch 1.27 mm</p> 	<p>Pitch 0.8 mm</p> 
For high density pattern*	<p>Pitch 0.635 mm Through-hole less</p> <p>EXBA10P      EXBA10E</p> 	<p>Pitch 0.8 mm Through-hole less</p> 
For popular pattern	<p>Pitch 0.635 mm</p> 	<p>Pitch 0.5 mm</p> 

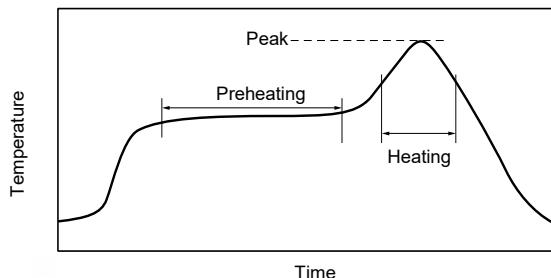
\* When designing high density land patterns, examine the reliability of isolation among the lines and adopt the chip resistor networks.

## Recommended soldering conditions (Rectangular type)

Recommendations and precautions are described below.

### ● Recommended soldering conditions for reflow

- Reflow soldering shall be performed a maximum of two times.
- Please contact us for additional information when used in conditions other than those specified.
- Please measure the temperature of the terminals and study every kind of solder and printed circuit board for solderability before actual use.



#### For soldering (Example : Sn/Pb )

	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s
Main heating	Above 200 °C	30 s to 40 s
Peak	235 ± 5 °C	max. 10 s

#### For lead-free soldering (Example : Sn/Ag/Cu)

	Temperature	Time
Preheating	150 °C to 180 °C	60 s to 120 s
Main heating	Above 230 °C	30 s to 40 s
Peak	max. 260 °C	max. 10 s

### ● Recommended soldering conditions for flow

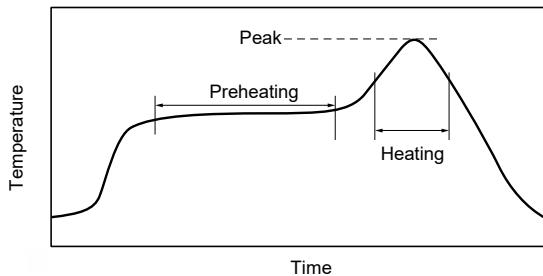
	For soldering		For lead-free soldering	
	Temperature	Time	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s	150 °C to 180 °C	60 s to 120 s
Soldering	245 ± 5 °C	20 s to 30 s	max. 260 °C	max. 10 s

## Recommended soldering conditions (Chip resistor array / networks and Chip attenuator)

Recommendations and precautions are described below.

### ● Recommended soldering conditions for reflow

- Reflow soldering shall be performed a maximum of two times.
- Please contact us for additional information when used in conditions other than those specified.
- Please measure the temperature of the terminals and study every kind of solder and printed circuit board for solderability before actual use.



#### For soldering (Example : Sn/Pb )

	Temperature	Time
Preheating	140 °C to 160 °C	60 s to 120 s
Main heating	Above 200 °C	30 s to 40 s
Peak	235 ± 5 °C	max. 10 s

#### For lead-free soldering (Example : Sn/Ag/Cu)

	Temperature	Time
Preheating	150 °C to 180 °C	60 s to 120 s
Main heating	Above 230 °C	30 s to 40 s
Peak	max. 260 °C	max. 10 s

### ● Flow soldering

We do not recommend flow soldering, because a solder bridge may form.

Please contact us regarding flow soldering of EXBA series.

## Standard for resistance value and resistance tolerance

### Basis standard

IEC Publication 60062 : Marking codes for resistors and capacitors.  
 IEC Publication 60063 : Preferred number series for resistors and capacitors.  
 JIS C 5062 : Marking codes for resistors and capacitors.  
 JIS C 5063 : Preferred number series for resistors and capacitors.

### Resistance values

The resistance values are notched by "Ratio" below in each series.

Series	Resistance tolerance (Standard)	Ratio	Remarks
E6	±20 %	$\sqrt[6]{10}=1.46$	Please refer to standard resistance values shown on this catalog.
E12	±10 %	$\sqrt[12]{10}=1.21$	
E24	± 5 %	$\sqrt[24]{10}=1.10$	
E48	± 2 %	$\sqrt[48]{10}=1.05$	
E96	± 1 %	$\sqrt[96]{10}=1.02$	

### How to express the resistance value with a Panasonic part number

The resistance value expressed in ohms is identified by a three digit number or a four digit number.

The last digit specifies the number of zeroes to follow.

The letter "R" shall be used as the decimal point for less than 10 Ω.

The examples of a three digit number

Resistance code	Value in ohms (Ω)
R56	0.56
5R6	5.6
100	10
271	270
102	1 k
273	27 k
104	100 k
275	2.7 M
106	10 M
107	100 M

The examples of a four digit number

Resistance code	Value in ohms (Ω)
R562	0.562
5R62	5.62
56R2	56.2
1000	100
2711	2.71 k
1002	10 k
2713	271 k
1004	1 M
2751	2.71 M
1006	100 M

### How to express the resistance tolerance with a Panasonic part number

The resistance tolerance is identified by a single letter in accordance with the following table and the code is placed just before the resistance code in the following examples.

Tolerance code	Tolerance (%)	Examples
W	± 0.05	W1001 : 1000 Ω ± 0.05 %
B	± 0.1	B1001 : 1000 Ω ± 0.1 %
C	± 0.25	C1001 : 1000 Ω ± 0.25 %
D	± 0.5	D1001 : 1000 Ω ± 0.5 %
F	± 1	F1001 : 1000 Ω ± 1 %
G	± 2	G1001 : 1000 Ω ± 2 %
J	± 5	J101 : 100 Ω ± 5 %
K	± 10	K101 : 100 Ω ± 10 %
M	± 20	M101 : 100 Ω ± 20 %

## Standard resistance values

E6	E12	E24	E48	E96	E6	E12	E24	E48	E96	E6	E12	E24	E48	E96
10	10	10	100	100	22	22	22	215	215	47	47	464	464	464
			102	102				221	221				475	475
		105	105	105		24	22	226	226			51	487	487
			107	107				232	232				499	499
			110	110		27	24	237	237				511	511
	11	11	113	113				243	243				523	523
			115	115				249	249				536	536
		118	118	118			27	255	255				549	549
			121	121		30	27	261	261			56	562	562
			124	124				267	267				576	576
12	12	12	127	127		30	27	274	274			56	590	590
			130	130				280	280				604	604
		133	133	133		33	30	287	287			62	619	619
			137	137				294	294				634	634
		140	140	140			33	301	301			62	649	649
			143	143		33		309	309				665	665
15	15	147	147	147		33	33	316	316			68	681	681
			150	150				324	324				698	698
		154	154	154			36	332	332			715	715	715
			158	158				340	340				732	732
		162	162	162		36	36	348	348			75	750	750
			165	165				357	357				768	768
18	16	169	169	169		39	36	365	365			787	787	787
			174	174				374	374				806	806
		178	178	178			39	383	383			82	825	825
			182	182				392	392				845	845
		187	187	187		43	39	402	402			82	866	866
			191	191				412	412				887	887
20	18	196	196	196		43	43	422	422			91	909	909
			200	200				432	432				931	931
		205	205	205			43	442	442			953	953	953
			210	210				453	453				976	976

## Safty Precautions

When using our products, no matter what sort of equipment they might be used for, be sure to confirm the applications and environmental conditions with our specifications in advance.

**Panasonic**  
INDUSTRY

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