Panasonic
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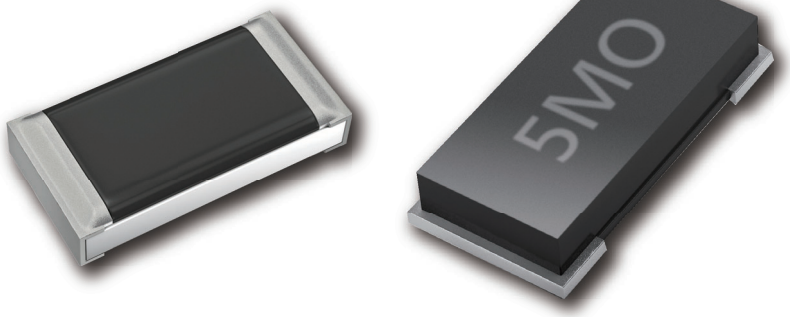
Your Committed Enabler

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



IN Your Future

2023.2

Fixed Resistors (Surface Mount Resistors) INDEX

*Not Recommended for New Design

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.

■ Please ensure the safety by means of protection circuit, redundant circuit etc. in your system design in order to prevent the occurrence of life crisis and other serious damages due to the failure of our products.

■ 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 catalog is to be exported, 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.

Please note that we do not owe any liability and responsibility if our products are used beyond the description of this catalog or without complying with precautions in this catalog.

⚠ Application Guidelines (Fixed Resistors)

1. Safety precautions

- Make sure to exchange product specifications before using this product, regardless of the intended use. 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.
- If a malfunction of this product may result in the loss of human life or other serious damage in transportation equipment (trains, automobiles, ships, etc.), signaling equipment, medical equipment, aerospace equipment, electric heating equipment, combustion and gas equipment, rotating equipment, disaster prevention and security equipment, and other equipment, ensure safety by implementing a fail-safe design with the following system.
  ✻ 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.

2. Precautions for use

- These products are designed and manufactured for general and standard use in general elec tron ic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) If the product is to be used in an application that requires special quality and reliability and where failure or malfunction of the product may directly threaten human life or cause bodily harm (e.g., aerospace equipment, transportation equipment, combustion equipment, medical equipment, disaster prevention and security equipment, safety devices, etc.), be sure to consult with our sales office in advance and exchange product specifications appropriate for the application.
- These products are not intended for use in the following special conditions. Before using the products, carefully check the effects on their quality and performance, and determine whether or not they can be used.
  1. In liquid, such as water, oil, chemicals, or organic solvent.
  2. In direct sunlight, outdoors, or in dust.
  3. In salty air or air with a high concentration of corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_X .
  4. Electric Static Discharge (ESD) Environment.
     These components are sensitive to static electricity and can be damaged under static shock (ESD).
     Please take measures to avoid any of these environments.
     Smaller components are more sensitive to ESD environment.
  5. Electromagnetic and Radioactive Environment.
     Avoid any environment where strong electromagnetic waves and radiation exist.
  6. In an environment where these products cause dew condensation.
  7. Sealing or coating of these products or a printed circuit board on which these products are mounted, with resin or other materials.
- These products generate Joule heat when energized. Carefully position these products so that their heat will not affect the other components.
- Carefully position these products so that their temperatures will not exceed the category temperature range due to the effects of neighboring heat-generating components. Do not mount or place heat-generating components or inflammables, such as vinyl-coated wires, near these products.
- Note that non-cleaning solder, halogen-based highly active flux, or water-soluble flux may deteriorate the performance or reliability of the products.
- Carefully select a flux cleaning agent for use after soldering. An unsuitable agent may deteriorate the performance or reliability. In particular, when using water or a water-soluble cleaning agent, be careful not to leave water residues. Otherwise, the insulation performance may be deteriorated.
- Do not apply flux to these products after soldering. The activity of flux may be a cause of failures in these products.
- Refer to the recommended soldering conditions and set the soldering condition. High peak temperature or long heating time may impair the performance or the reliability of these products.
- Recommended soldering condition is for the guideline for ensuring the basic characteristics of the products, not for the stable soldering conditions. Conditions for proper soldering should be set up according to individual conditions.
- Do not reuse any products after removal from mounting boards.
- Do not drop these products. If these products are dropped, do not use them. Such products may have received mechanical or electrical damage.
- If any doubt or concern to the safety on these products arise, make sure to inform us immediately and conduct technical examinations at your side.

3. 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 Cl2, H2S, NH3, SO2, or NOX .
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.

4. 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., make sure to exchange product specifications for each product when placing an order.

⚠ 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 temper a tures can become factors in the rise of the temperature of the resistors, regardless of the level of power applied. Therefore, check the conditions before use and op timize them so as not to damage the boards and peripheral components.
   Make sure to contact us before using the resistors under special conditions.
3. If a transient load (heavy load in a short time) like a pulse is expected to be applied, check and evaluate the operations of the resistors when installed in your products before use. Never exceed the rated power. Otherwise, the performance and/or reliability of the resistors may be impaired.
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. The electrical characteristics may change when used in high-frequency circuits, so check thoroughly 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. The connection reliability and performance may be affected if the amount of solder is too much or too little. Check the performance and reliability of the product and use an appropriate amount of solder.
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.

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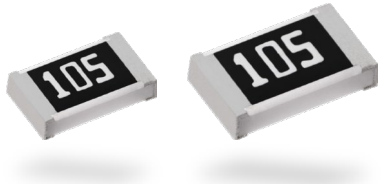
UPDATE

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, ERJ1GN)
- RoHS compliant

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

Explanation of part numbers

- ERJXGN, 1GN, 1GJ, 2GE, 3GE, 6GE, 8GE, 14, 12, 12Z, 1T series, ±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

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
XGN	01005	0.031 W
1GN	0201	0.05 W
NEW 1GJ		
2GE	0402	0.1 W
3GE	0603	0.1 W
6GE	0805	0.125 W
NRFND 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

Marking

Code	Marking
Y	Value marking on black side
*Nil	No marking

Resistance tolerance

Code	Tolerance
J	±5 %
0	Jumper

Resistance value

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 kΩ
4R7 : 4.7 Ω

Packaging methods

Code	Packaging	Part No.
Y	Pressed carrier taping W8P2, 20,000 pcs	ERJXGN
U	Embossed carrier taping W4P1, 40,000 pcs	
C	Pressed carrier taping 2 mm pitch, 15,000 pcs	ERJ1GN ERJ1GJ
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJ2GE
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJ3GE ERJ6GE NRFND ERJ8GE
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	NRFND ERJ14 NRFND ERJ12 NRFND ERJ12Z
	Embossed carrier taping 4 mm pitch, 4,000 pcs	NRFND ERJ1T

* Series XGN, 1GN, 1GJ 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.

* For the automotive application, please use ERJ1GJ as 0201 inch size from the new design.

Not recommended for new design

Ratings

【For Resistor】

Part No. (inch size)	Rated power*1 (70 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	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	-
ERJ1GN (0201)	0.05	25	50	±5	1 to 10 M (E24)			
NEW ERJ1GJ (0201)	0.05	25	50	±5	1 to 10 M (E24)	R<10 Ω : –100 to +600		Grade 1
ERJ2G (0402)	0.1	50	100	±5	1 to 10 M (E24)	10 Ω to 1 M Ω : ±200		
ERJ3G (0603)	0.1	75	150	±5	1 to 10 M (E24)	1 MΩ<R : –400 to +150	-55 to ＋155	Grade 0
ERJ6G (0805)	0.125	150	200	±5	1 to 10 M (E24)			
NRFND ERJ8G (1206)	0.25	200	400	±5	1 to 10 M (E24)			
NRFND ERJ14 (1210)	0.5	200	400	±5	1 to 10 M (E24)	R<10 Ω : –100 to +600		
NRFND ERJ12 (1812)	0.75	200	500	±5	1 to 10 M (E24)	10 Ω to 1 M Ω : ±200	-55 to ＋155	Grade 0
NRFND ERJ12Z (2010)	0.75	200	500	±5	1 to 10 M (E24)	1 MΩ<R : –400 to +150		
NRFND 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=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

NRFND Not recommended for new design

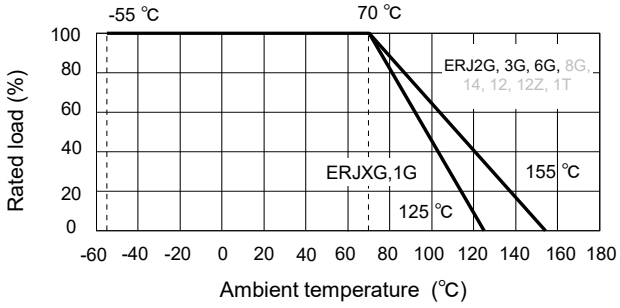
【For Jumper】

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

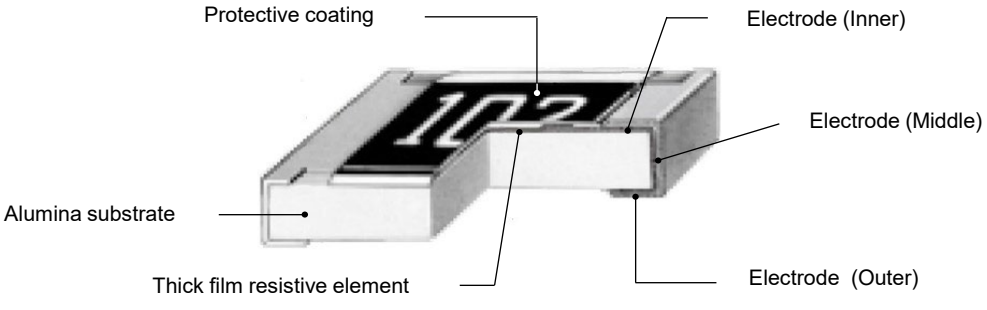
* 1 :Overload test current

Power derating curve

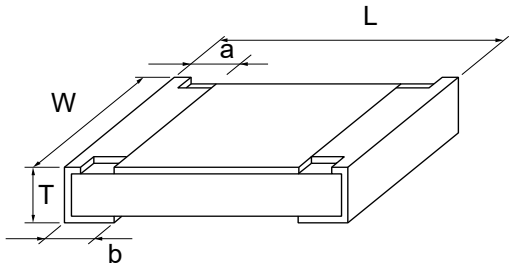
above 70 ℃, power rating shall be derated in accordance with the figure below.



Construction



Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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
NRFND 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
NRFND ERJ14	3.20±0.20	2.50±0.20	0.50±0.20	0.50±0.20	0.60±0.10	16
NRFND ERJ12	4.50±0.20	3.20±0.20	0.50±0.20	0.50±0.20	0.60±0.10	27
NRFND ERJ12Z	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.20	0.60±0.10	27
NRFND 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 ⊿R		Test conditions
	Resistor type	Jumper type	
Resistance	Within specified tolerance	50 mΩ or less	20 ℃
T. C. R.	Within specified T. C. R.	50 mΩ or less	+25℃ / +155℃ (ERJXG,1G : +25℃ / +125℃)
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 ℃, 10 s
Rapid change of temperature	±1 %	50 mΩ or less	–55 ℃ (30 min.) / +155 ℃ (ERJXG,1G : +125 ℃) (30 min.)，100 cycles
High temperature exposure	±1 %	50 mΩ or less	+155℃ (ERJXG,1G : +125℃), 1000 h
Damp heat, Steady state	±1 %	50 mΩ or less	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	50 mΩ or less	60 ℃, 90 % to 95 %RH, Rated voltage (Jumper type :Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70℃	±3 %	50 mΩ or less	70℃，Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

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UPDATE

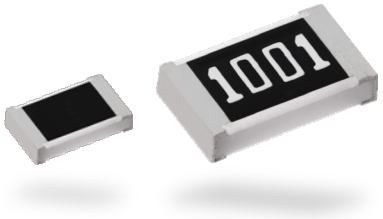
Precision Thick Film Chip Resistors

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, 1Tseries
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 : ±1 %
  ERJ1R, 2R, 3R, 6R series : ±0.5 %
- Reference standard : IEC 60115-8, JIS C 5201-8, JEITA RC-2134C
- AEC-Q200 compliant (except ERJ1R, ERJXG, ERJ1GN)
- 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 : ±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

Code	inch	Power rating
1R	0201	0.05 W
2R	0402	0.063 W
3R	0603	0.1 W
6R	0805	0.1 W

T.C.R., Marking

Code	T.C.R.
H	±50 × 10^{-6}/K (1R, 2R)
B	±50 × 10^{-6}/K (3R, 6R)
K	±100 × 10^{-6}/K (2R)
E	±100 × 10^{-6}/K (3R, 6R)

Resistance tolerance

Code	Tolerance
D	±0.5 %

Resistance value

The first three digits are significant figures of resistance and the last one denotes number of zeros following.
Example : 1002 → 10 KΩ

Packaging methods

Code	Packaging	Part No.
C	Pressed carrier taping 2 mm pitch, 15,000 pcs	ERJ1R
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJ2R
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJ3R ERJ6R

Explanation of part numbers

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

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	8	E	N	F	1	0	0	2	V

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
XGN	01005	0.031 W
1GN	0201	0.05 W
NEW 1GJ		
2RC	0402	0.1 W
2RK	0402	0.1 W
3EK	0603	0.1 W
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

Resistance tolerance

Code	Tolerance
F	±1 %

Resistance value

The first three digits are significant figures of resistance and the last one denotes number of zeros following.
Decimal point is expressed by "R".
Example : 1002 → 10 kΩ

Packaging methods

Code	Packaging	Part No.
Y	Pressed carrier taping W8P2, 20,000 pcs	ERJXGN
U	Embossed carrier taping W4P1, 40,000 pcs	
C	Pressed carrier taping 2 mm pitch, 15,000 pcs	ERJ1GN ERJ1GJ
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJ2RC ERJ2RK
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJ3EK ERJ6EN NRFND ERJ8EN
NRFND U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJ14N ERJ12N ERJ12S
	Embossed carrier taping 4 mm pitch, 4,000 pcs	ERJ1TN

* For the automotive application, please use ERJ1GJ as 0201 inch size from the new design.

NRFND Not recommended for new design

Ratings

<±0.5 %>

Part No. (inch size)	Rated power*1 (70 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJ1RH (0201)	0.05	15	30	±0.5	1 k to 1 M (E24,E96)	±50	-55 to ＋125	-
ERJ2RH (0402)	0.063	50	100	±0.5	100 to 100 k (E24,E96)	±50	-55 to ＋155	Grade 0
ERJ2RK (0402)	0.063	50	100	±0.5	10 to 97.6 102 k to 1 M (E24,E96)	±100		
ERJ3RB (0603)	0.1	75	150	±0.5	100 to 100 k (E24,E96)	±50		
ERJ3RE (0603)	0.1	75	150	±0.5	10 to 97.6 102 k to 1 M (E24,E96)	±100		
ERJ6RB (0805)	0.1	150	200	±0.5	100 to 100 k (E24,E96)	±50		
ERJ6RE (0805)	0.1	150	200	±0.5	10 to 97.6 102 k to 1 M (E24,E96)	±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 = specified magnification (refer to performance) × RCWV or maximum overload voltage listed above, whichever less.

Ratings

<±1 %>

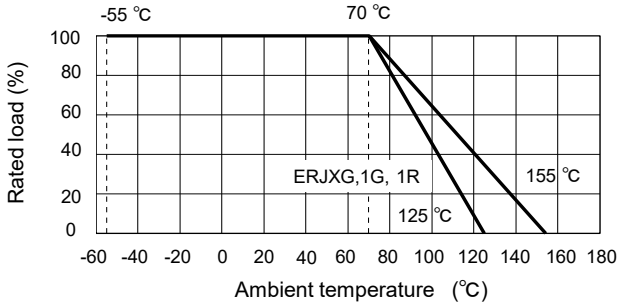
Part No. (inch size)	Power rating*1 (70 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJXGN (01005)	0.031	15	30	±1	10 to 1 M*4 (E24,E96)	R < 100 Ω : ±300 100 Ω ≤ R : ±200	-55 to +125	-
ERJ1GN (0201)	0.05	25	50	±1	10 to 1 M*4 (E24,E96)	±200		
NEW ERJ1GJ (0201)	0.05	25	50	±1	10 to 1 M*4 (E24,E96)			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		
ERJ3EK (0603)	0.1	75	150	±1	10 to 1 M (E24,E96)			
ERJ6EN (0805)	0.125	150	200	±1	10 to 2.2 M (E24,E96)			
NRFND ERJ8EN (1206)	0.25	200	400	±1	10 to 2.2 M (E24,E96)	±100	-55 to +155	Grade 0
NRFND ERJ14N (1210)	0.5	200	400	±1	10 to 1 M (E24,E96)			
NRFND ERJ12N (1812)	0.75	200	500	±1	10 to 1 M (E24,E96)			
NRFND ERJ12S (2010)	0.75	200	500	±1	10 to 1 M (E24,E96)			
NRFND ERJ1TN (2512)	1	200	500	±1	10 to 1 M (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 = specified magnification (refer to performance) × 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.

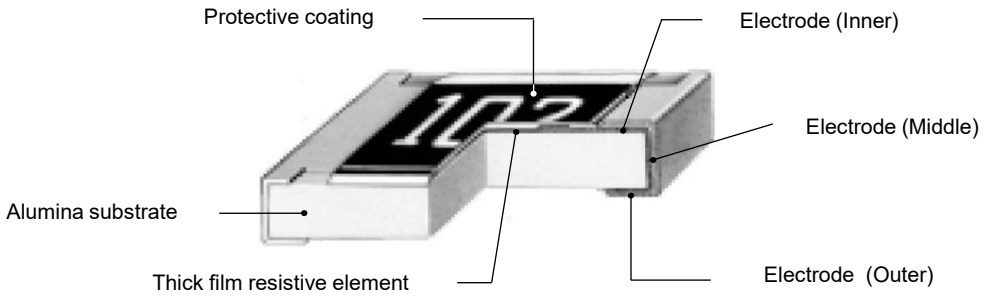
NRFND Not recommended for new design

Power derating curve

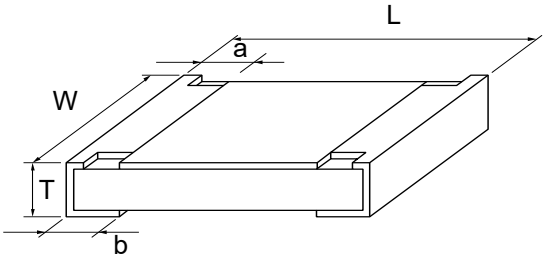
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)



Part No.	Dimensions (mm)					Mass (Weight) (Reference) (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 ERJ1R	0.60±0.03	0.30±0.03	0.10±0.05	0.15±0.05	0.23±0.03	0.15
ERJ2R	1.00±0.05	0.50±0.05	0.20±0.10	0.25±0.05	0.35±0.05	0.8
ERJ3R ERJ3E	1.60±0.15	0.80+0.15/-0.05	0.30±0.20	0.30±0.15	0.45±0.10	2
ERJ6R ERJ6E	2.00±0.20	1.25±0.10	0.40±0.20	0.40±0.20	0.60±0.10	4
NRFND 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
NRFND ERJ14N	3.20±0.20	2.50±0.20	0.50±0.20	0.50±0.20	0.60±0.10	16
NRFND ERJ12N	4.50±0.20	3.20±0.20	0.50±0.20	0.50±0.20	0.60±0.10	27
NRFND ERJ12S	5.00±0.20	2.50±0.20	0.60±0.20	0.60±0.20	0.60±0.10	27
NRFND 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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 %	–55 ℃ (30 min.) / +155 ℃ (ERJ1R : +125 ℃)(30 min.), 100 cycles
High temperature exposure	±1 %	+155 ℃ (ERJ1R : +125 ℃), 1000 h
Damp heat, Steady state	±1 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±2 % ERJ1R : ±3 %	60 ℃, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 ℃	±2 % ERJ1R : ±3 %	70 ℃, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

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

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

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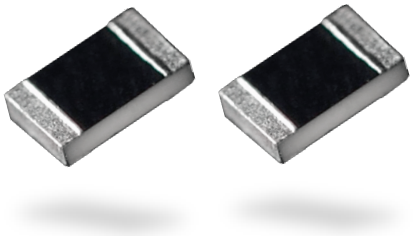
Thin Film Chip Resistors, High Voltage Type

ERA P type

ERA 8P series



Features

- High voltage : Achieves high limiting element voltage with original design concept (500V @1MΩ)
- High reliability : Stable at high temperature and humidity (85 ℃ 85 %RH rated load, Category temperature range : –55 ℃ to +155 ℃)
- 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 Guarantee at 4 kV)
- 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	8	P	E	B	1	6	9	3	V

Product code

Thin film chip resistors

Size, Power rating

Code	inch	Power rating
8P	1206	0.25 W

Temperature coefficient

Code	T.C.R.
P	±15×10^{-6}/K
E	±25×10^{-6}/K

Resistance tolerance

Code	Tolerance
B	±0.1 %

Resistance value

Consist of four figures.The first three digits are signficant figures of resistance and the fourth one denotes number of zeros following.
(Ex.)
1693 : 169 kΩ

Packaging methods

Code	Packaging	Part No.
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERA8P

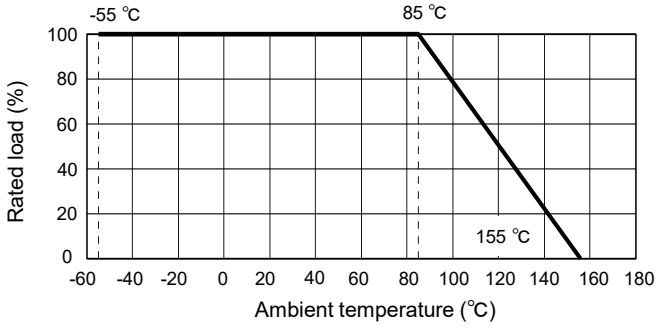
Ratings

Part No. (inch size)	Power rating at 85 ℃[*1] (W)	Limiting element voltage[*2] (V)	Maximum overload voltage (V)	Part No. (detail)	Resistance tolerance (%)	T.C.R. (×10^{-6}/K)	Resistance range[*3] (Ω)	Category temperature range (℃)	AEC-Q200 Grade
ERA8P (1206)	0.25	500	1000	ERA8PEB	±0.1	±25	160 k to 1 M (E24, E96)	–55 to +155	Grade 0
				ERA8PPB		±15			

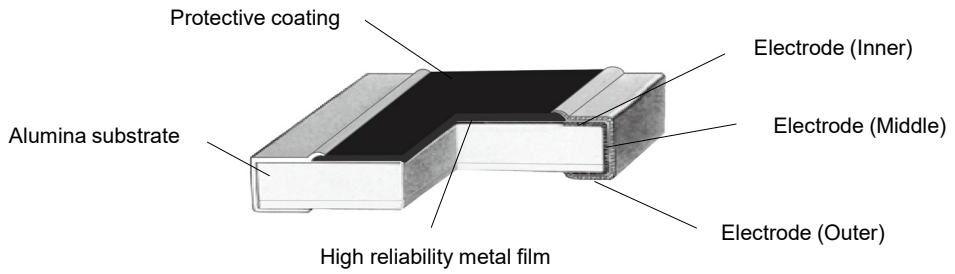
*1: Use it on the condition that the case temperature is below the upper category temperature.
*2: Rated continuous working voltage (RCWV) shall be determined from RCWV=$\sqrt{(\text{Power Rating} \times \text{Resistance Values})}$, or limiting element voltage listed above, whichever less.
*3: E192 series resistance values are also available. The E192 series has custom part numbers. Please contact us for details.

Power derating curve

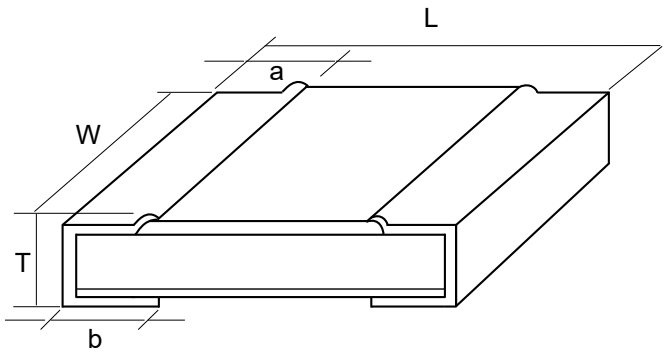
For resistors operated in ambient temperatures above 85℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (g/1000 pcs)
	L	W	a	b	T	
ERA8P	3.20±0.20	1.60±0.10	0.50±0.20	0.50±0.20	0.55±0.10	10

Performance

Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±0.1 %	Specified magnification (2.5) × RCWV or Maximum overload voltage, whichever less, 5 s
Resistance to soldering heat	±0.1 %	270 ℃, 10 s
Rapid change of temperature	±0.1 %	–55 ℃ (30 min.) / +155 ℃ (30 min.), 1000 cycles
High temperature exposure	±0.1 %	+155 ℃, 1000 h
Damp heat, Steady state	±0.1 %	85 ℃, 85 %RH, 1000 h
Load life in humidity	±0.1 %	85 ℃, 85 %RH, 10 % of Rated power[*1], 1.5 h ON / 0.5 h OFF cycle , 1000 h
Endurance at 85℃	±0.1 %	85 ℃, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Electro static discharge (HBM)	±0.1 %	AEC-Q200-002 : 150 pF, 2000 Ω, positive 5 times, negative 5 times ERA8P : 4.0 kV (Class 3)

*1: Applied Voltage is "$\sqrt{0.1 \times \text{Power Rating} \times \text{Resistance Values}}$".

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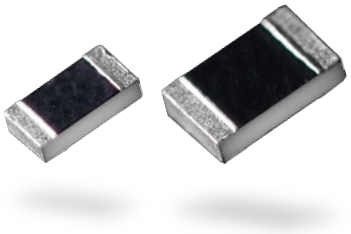
Thin Film Chip Resistors, High Stability and Reliability Type

ERA V type

(High resistance value ERA K type)

ERA 2V, 3V, 6V, 8V series

(ERA 3K, 6K, 8K 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 ℃ 85 %RH rated load, Category temperature range : –55 ℃ to +155 ℃)
- 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

Product code

Thin film chip resistors

Size, Power rating

Code	inch	Power rating
2V	0402	0.1 W
3V	0603	0.125 W
3K		
6V	0805	0.25 W
6K		
8V	1206	0.25 W
8K		

Temperature coefficient

Code	T.C.R.
R	±10×10^{-6}/K
P	±15×10^{-6}/K
E	±25×10^{-6}/K

Resistance tolerance

Code	Tolerance
W	±0.05 %
B	±0.1 %

Resistance value

Consist of four figures.The first three digits are significant figures of resistance and the fourth one denotes number of zeros following.
(Ex.)
1051 : 1.05 kΩ

Packaging methods

Code	Packaging	Part No.
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERA2V
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERA3V ERA3K ERA6V ERA6K ERA8V ERA8K

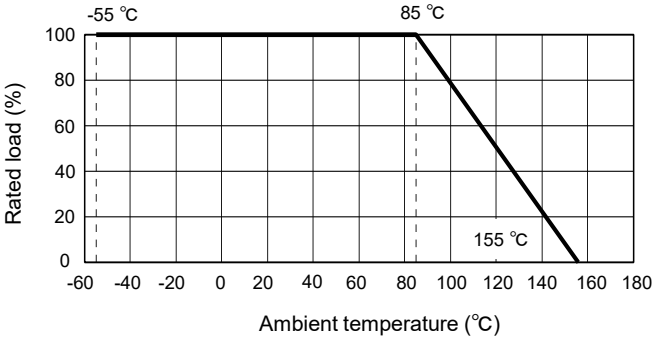
Ratings

Part No. (inch size)	Power rating at 85 ℃[*1] (W)	Limiting element voltage[*2] (V)	Maximum overload voltage[*3] (V)	Part No. (detail)	Resistance tolerance (%)	T.C.R. (×10^{-6}/K)	Resistance range[*4] (Ω)	Category temperature range (℃)	AEC-Q200 Grade
ERA2V (0402)	0.1	75	150	ERA2VEB	±0.1	±25	47 to 100 k[*5] (E24, E96)	–55 to +155	Grade 0
				ERA2VPB	±0.1	±15	1 k to 47 k[*5] (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)		
				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)		
				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)		
ERA8V (1206)	0.25	200	400	ERA8VEB	±0.1	±25	47 to 100 k (E24, E96)		
				ERA8VPB		±15	1 k to 100 k (E24, E96)		
				ERA8VRB		±10	1 k to 100 k (E24, E96)		
				ERA8VRW	±0.05				
ERA8K (1206)	0.25	200	400	ERA8KEB	±0.1	±25	102 k to 1 M (E24, E96)		
				ERA8KPB		±15			
				ERA8KRB		±10	102 k to 160 k (E24, E96)		
				ERA8KRW	±0.05				

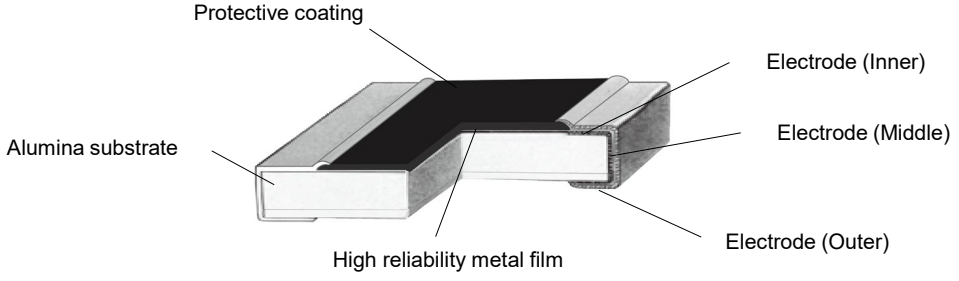
*1: Use it on the condition that the case temperature is below the upper category temperature.
*2: Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power Rating} \times \text{Resistance Values}}$, or Limiting Element Voltage listed above, whichever less.
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (2.5) × 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

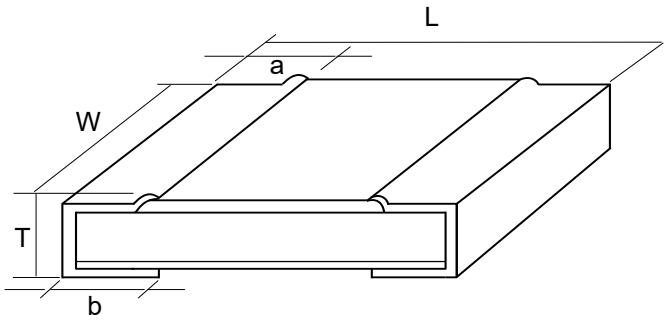
For resistors operated in ambient temperatures above 85℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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
ERA8V,8K	3.20±0.20	1.60±0.10	0.50±0.20	0.50±0.20	0.55±0.10	10

Performance

Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±0.1 %	Rated voltage× 2.5，5 s
Resistance to soldering heat	±0.1 %	270 ℃, 10 s
Rapid change of temperature	±0.1 %	–55 ℃ (30 min.) / +155 ℃ (30 min.)，1000 cycles
High temperature exposure	±0.1 %	+155 ℃, 1000 h
Damp heat, Steady state	±0.1 %	85 ℃, 85 %RH, 1000 h
Load life in humidity	±0.1 %	85 ℃, 85 %RH, 10 % of Rated power[*1], 1.5 h ON / 0.5 h OFF cycle , 1000 h
Endurance at 85℃	±0.1 %	85 ℃, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Electro static discharge (HBM)	±0.1 %[*2]	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) ERA8V(8K) : 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.

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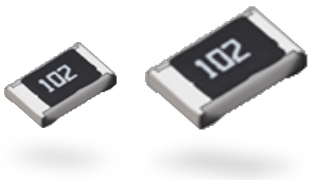
Metal Film (Thin Film) Chip Resistors, High Reliability Type

ERA A type

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



Features

- High reliability : Stable at high temperature and humidity
  (85 ℃ 85 %RH rated load, Category temperature range : –55 ℃ to +155 ℃)
- 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

1	2	3	4	5	6	7	8	9	10	11
E	R	A	3	A	E	B	1	0	2	V

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	±10×10^{-6}/K
P	±15×10^{-6}/K
E	±25×10^{-6}/K
H	±50×10^{-6}/K
K	±100×10^{-6}/K

Resistance tolerance

Code	Tolerance
W	±0.05 %
B	±0.1 %
C	±0.25 %
D	±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 kΩ

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

1	2	3	4	5	6	7	8	9	10	11	12
E	R	A	3	A	E	B	1	0	5	1	V

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	±10×10^{-6}/K
P	±15×10^{-6}/K
E	±25×10^{-6}/K
H	±50×10^{-6}/K
K	±100×10^{-6}/K

Resistance tolerance

Code	Tolerance
W	±0.05 %
B	±0.1 %
C	±0.25 %
D	±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 kΩ

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 umbers shall follow E24 part numbers.
(apply three digit resistance value)

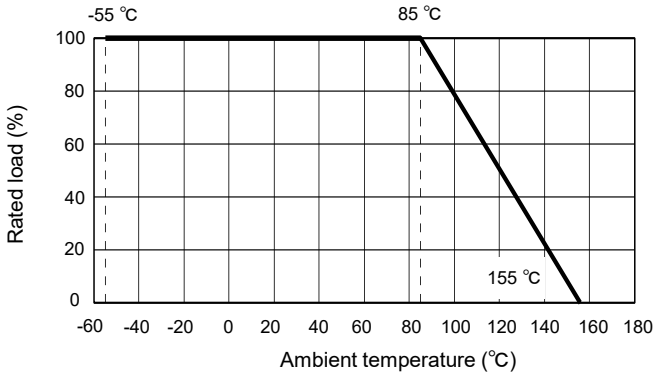
Ratings

Part No. (inch size)	Power rating*1 (85 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Part No. (detail)	Resistance tolerance (%)	T.C.R. (×10^{-6}/K)	Resistance range*4 *5 (Ω)	Category temperature range (℃)	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				
				ERA1ARC	±0.25	±10	100 to 10 k (E24,E96)		
				ERA1ARB	±0.1				
				ERA1ARW	±0.05		1 k to 10 k (E24,E96)		
ERA2A (0402)	0.063	50	100	ERA2AKD	±0.5	±100	10 to 46.4 (E24,E96)		Grade 1
				ERA2AED	±0.5	±25	47 to 100 k (E24,E96)		
				ERA2AEC	±0.25				
				ERA2AEB	±0.1				
				ERA2APC	±0.25	±15	200 to 47 k (E24,E96)		
				ERA2APB	±0.1				
				ERA2ARC	±0.25	±10	200 to 47 k (E24,E96)		
				ERA2ARB	±0.1				
ERA3A (0603)	0.1	75	150	ERA3AHD	±0.5	±50	10 to 46.4 (E24,E96)		Grade 0
				ERA3AED	±0.5	±25	47 to 330 k (E24,E96)		
				ERA3AEC	±0.25				
				ERA3AEB	±0.1				
				ERA3APC	±0.25	±15	470 to 100 k (E24,E96)		
				ERA3APB	±0.1				
				ERA3ARC	±0.25	±10	1 k to 100 k (E24,E96)		
				ERA3ARB	±0.1				
				ERA3ARW	±0.05				
ERA6A (0805)	0.125	100	200	ERA6AHD	±0.5	±50	10 to 46.4 (E24,E96)		
				ERA6AED	±0.5	±25	47 to 1 M (E24,E96)		
				ERA6AEC	±0.25				
				ERA6AEB	±0.1				
				ERA6APC	±0.25	±15	470 to 100 k (E24,E96)		
				ERA6APB	±0.1				
				ERA6ARC	±0.25	±10	1 k to 100 k (E24,E96)		
				ERA6ARB	±0.1				
				ERA6ARW	±0.05				
ERA8A (1206)	0.25	150	300	ERA8AHD	±0.5	±50	10 to 46.4 (E24,E96)		
				ERA8AED	±0.5	±25	47 to 1 M (E24,E96)		
				ERA8AEC	±0.25				
				ERA8AEB	±0.1				
				ERA8APC	±0.25	±15	470 to 100 k (E24,E96)		
				ERA8APB	±0.1				
				ERA8ARC	±0.25	±10	1 k to 100 k (E24,E96)		
				ERA8ARB	±0.1				
				ERA8ARW	±0.05				

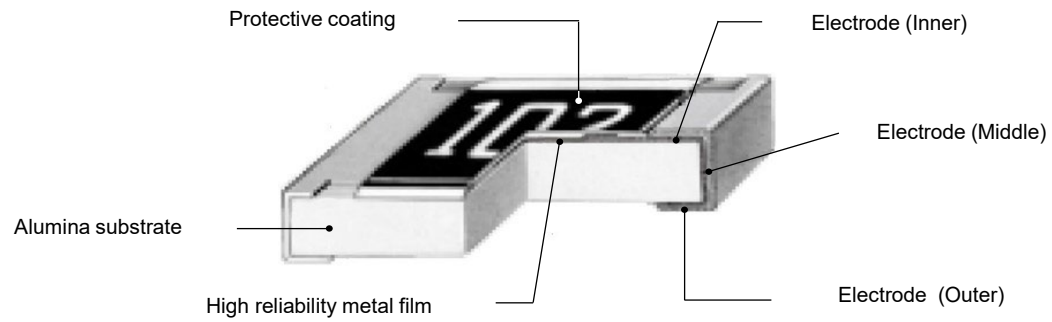
*1: Use it on the condition that the case temperature is below the upper category temperature.
*2: Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power Rating} \times \text{Resistance Values}}$, or Limiting Element Voltage listed above, whichever less.
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (2.5) × 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 ℃, power rating shall be derated in accordance with the figure on the right.

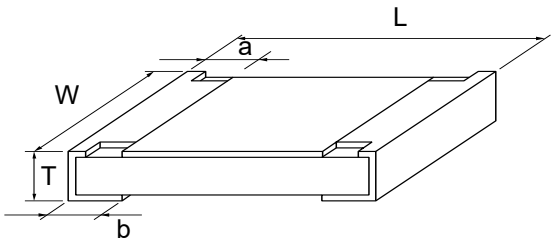


Construction



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

Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	Rated voltage x 2.5, 5 s
Resistance to soldering heat	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	270 ℃, 10 s
Rapid change of temperature	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	ERA1A, 2A : –55 ℃ (30 min.) / +125 ℃ (30 min.),1000 cycles ERA3A, 6A, 8A : –55 ℃ (30 min.) / +155 ℃ (30 min.),1000 cycles
High temperature exposure	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	+155 ℃, 1000 h
Damp heat, Steady state	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	85 ℃, 85 %RH, 1000 h
Load life in humidity	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	85 ℃, 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℃	R<47 Ω : ±0.5 % R≧47Ω : ±0.1 %	85℃, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

Panasonic
INDUSTRY

High Precision Thick Film Chip Resistors

ERJ PB type

ERJ PB3, PB6 series

Features

- Achieve the resistance tolerance ±0.1 % with high reliability metal glaze thick film resistor
- Guarantee the temperature coefficient of Resistance ±50×10^{-6}/K in high resistance range up to 1 MΩ
- High power : 0.20 W : 0603 inch /1608 mm size(ERJPB3)
  : 0.25 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

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
PB3	0603	0.20 W
PB6	0805	0.25 W

Resistance tolerance

Code	Tolerance
B	±0.1 %
D	±0.5 %

Resistance value

The first three digits are significant figures of resistance and the last one denotes number of zeros following.
(Ex.) 5110 : 511 Ω
1003 : 100 kΩ

Packaging methods

Code	Packaging	Part No.
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJPB3 ERJPB6

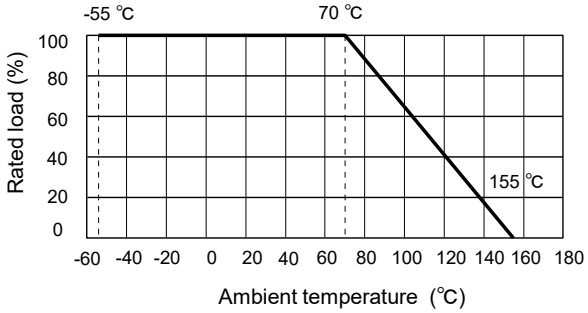
Ratings

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

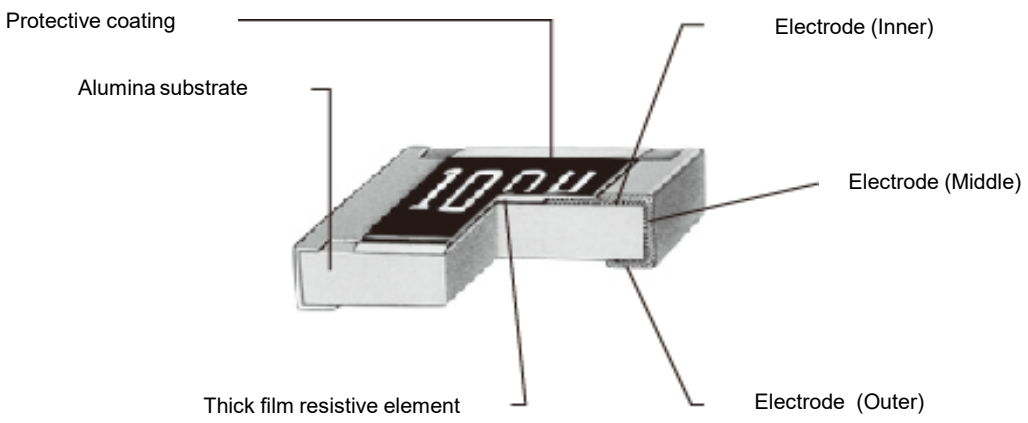
*1: Use it on the condition that the case temperature is below the upper category temperature.
*2: Rated continuous working voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power rating} \times \text{Resistance value}}$,
or Limiting Element Voltage listed above, whichever less.
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV
or Maximum overload voltage listed above, whichever less.

Power derating curve

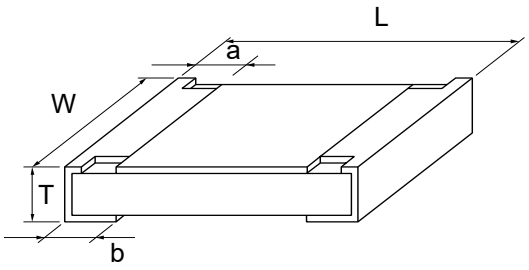
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±0.5 %	Rated voltage× 2.0，5 s
Resistance to soldering heat	±0.5 %	270 ℃, 10 s
Rapid change of temperature	±0.5 %	–55 ℃ (30 min.) / +155 ℃ (30 min.)，100 cycles
High temperature exposure	±0.5 %	+155 ℃, 1000 h
Damp heat, Steady state	±0.5 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±0.5 %	60 ℃, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 ℃	±0.5 %	70 ℃，Rated voltage , 1.5 h ON / 0.5 h OFF cycle, 1000 h

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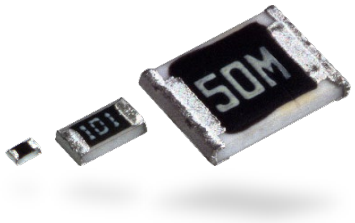
⚠ ERJL1W are not a recommended product.
Not recommended for new design.

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 : ±75×10^{-6}/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
Thick film chip resistors

Code	inch size	Power rating	Resistance value
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

Resistance tolerance	
Code	Tolerance
D	±0.5 %*
F	±1 %
G	±2 %
J	±5 %

*Please refer to the rating table for the resistance tolerance.

Resistance value
Shown by 4 digits or letters. (Ex.) R005 : 0.005 Ω = 5 mΩ R047 : 0.047 Ω = 47 mΩ

Packaging methods		
Code	Packaging	Part No.
X	Pressed carrier taping 2 mm pitch, 10,000 pcs	ERJ2LW ERJ2BW
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJ3LW ERJ6LW ERJ3BW ERJ6BW ERJ8BW ERJ6CW ERJ8CW

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

Product code

Thick film chip resistors

Size, Power rating

Code	inch size	Power rating
2B	0402	0.166 W
3B	0603	0.25 W
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

Resistance value region

S	0.1Ω to 0.2Ω
Q	0.22Ω to 9.1Ω*

*2B:0.22 Ω to 1.0 Ω

Resistance tolerance

Code	Tolerance
D	±0.5 %*
F	±1 %
G	±2 %
J	±5 %

*Please refer to the rating table for the resistance tolerance.

Resistance value

Shown by 3 digits or letters.
Only when it is D (E24,E96) or F (E96), shown by 4 digits or letters.
(Ex.)
R22 : 0.22 Ω
R102 : 0.102 Ω

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

Product Code

Thick film chip resistors

Size, Power rating

Code	inch size	Power rating
L03	0603	0.2 W
L06	0805	0.25 W
L08	1206	0.33 W
L14	1210	0.33 W
L12	1812	0.5 W
L1D	2010	0.5 W
NRFND L1W	2512	1 W

NRFND Not recommended for new design

Resistance value

Code	Resistance value
K	Standard * (20 mΩ, 22 mΩ, 33 mΩ, 39 mΩ, 47 mΩ, 50 mΩ, 100mΩ)
U	20 mΩ to 100 mΩ*

*L03, L06, L08 : 47 mΩ to 100 mΩ
L1D, L1W : 40 mΩ to 100 mΩ

Resistance tolerance

Code	Tolerance
F	±1 %
J	±5 %

Resistance value

Shown by 3 digits or letters.
(Ex.)
50M : 50 mΩ
10C : 100 mΩ

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	NRFND ERJL1W

Ratings

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

Part No. (inch size)	Power rating (70 ℃)*1 (W)	Resistance tolerance (%)	Resistance range*2 (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range(℃)	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		
			10 m	0 to +300		
ERJ6LW (0805)	0.5	±1, ±2, ±5	5, 6, 7, 8, 9 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		
ERJ6CW (0805)	0.5	±0.5, ±1, ±2, ±5	10 m to 30 m (E24)	±75	–55 to +125	Grade 1
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.
*2: 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=Specified Magnification (refer to performance) × RCW.

Ratings

<High power type>

Part No. (inch size)	Power rating (70 ℃)[*1] (W)	Resistance tolerance (%)	Resistance range[*3] (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range(℃)	AEC-Q200 Grade
ERJ2BS (0402)	0.166	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +300	–55 to +155	Grade 0
ERJ2BQ (0402)			0.22 to 1.0 (E24)	0.22 Ω ≤ R ≤ 1.0 Ω : 0 to +250		
ERJ3BS (0603)	0.25	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +300		
ERJ3BQ (0603)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +300		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±200		
ERJ6DS (0805)	0.5	±0.5, ±1, ±2, ±5	0.10 to 0.20 (E24[*2])	0.10 Ω ≤ R < 0.22 Ω : 0 to +150		
ERJ6DQ (0805)			0.22 to 9.1 (E24[*2])	0.22 Ω ≤ R < 1.0 Ω : 0 to +100		
				1.0 Ω ≤ R ≤ 9.1 Ω : ±100		
ERJ6BS (0805)	0.33	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +250		
ERJ6BQ (0805)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +250		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±200		
ERJ8BS (1206)	0.5	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +250		
ERJ8BQ (1206)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +250		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±200		
ERJ14BS (1210)	0.5	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +200		
ERJ14BQ (1210)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +200		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±100		

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

*2: E96 series resistance values are also available. Please contact us for details.

*3: 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=Specified Magnification (refer to performance) × RCW.

<Standard type>

Part No. (inch size)	Power rating (70 ℃)[*1] (W)	Resistance tolerance (%)	Resistance range[*2] (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range(℃)	AEC-Q200 Grade
ERJ3RS (0603)	0.1	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +300	–55 to +155	Grade 0
ERJ3RQ (0603)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +300		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±200		
ERJ6RS (0805)	0.125	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +250		
ERJ6RQ (0805)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +250		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±200		
ERJ8RS (1206)	0.25	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +250		
ERJ8RQ (1206)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +250		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±200		
ERJ14RS (1210)	0.25	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +200		
ERJ14RQ (1210)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0～+200		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±100		
ERJ12RS (1812)	0.5	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +200		
ERJ12RQ (1812)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +200		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±100		
ERJ12ZS (2010)	0.5	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +200		
ERJ12ZQ (2010)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +200		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±100		
ERJ1TRS (2512)	1	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +200		
ERJ1TRQ (2512)			0.22 to 0.91 (E24)	0.22 Ω ≤ R < 1.0 Ω : 0 to +200		
			1.0 to 9.1 (E24)	1.0 Ω ≤ R ≤ 9.1 Ω : ±100		

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

*2: 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=Specified Magnification (refer to performance) × RCW.

Ratings

<Low TCR type>

Part No. (inch size)	Power rating (70 ℃)*1 (W)	Resistance tolerance (%)	Resistance range*2 (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range(℃)	AEC-Q200 Grade
ERJL03 (0603)	0.2	±1, ±5	47 m to 100 m	±200	–55 to +125	Grade 1
ERJL06 (0805)	0.25	±1, ±5	47 m to 100 m	±100		
ERJL08 (1206)	0.33	±1, ±5	47 m to 100 m	±100		
ERJL14 (1210)	0.33	±1, ±5	20 m to 100 m	R < 47 mΩ : ±300 R ≥ 47 mΩ : ±100		
ERJL12 (1812)	0.5	±1, ±5	20 m to 100 m			
ERJL1D (2010)	0.5	±1, ±5	40 m to 100 m			
NRFND ERJL1W (2512)	1	±1, ±5	40 m to 100 m			

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

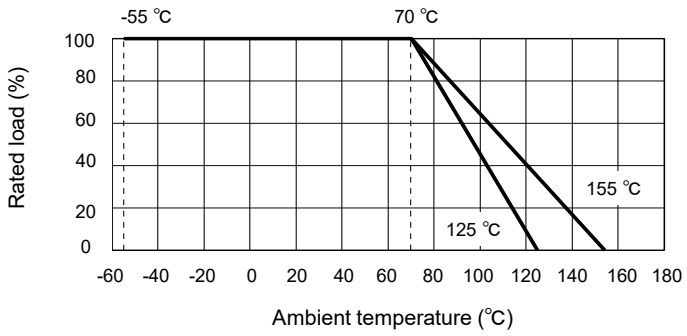
NRFND Not recommended for new design

*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.

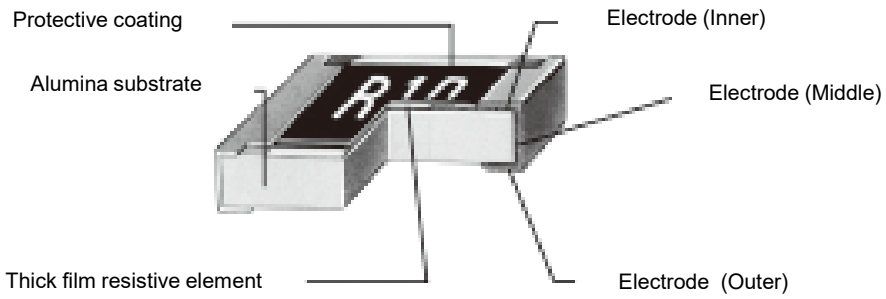
- Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power Rating} \times \text{Resistance Value}}$.
- Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCW.

Power derating curve

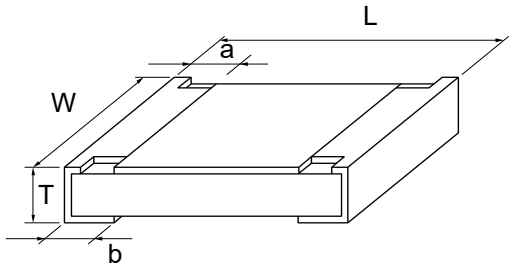
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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
NRFND ERJL1W	6.40±0.20	3.20±0.20	0.65±0.20	1.30±0.20	1.10±0.10	79

NRFND Not recommended for new design

Performance

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

Test item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	ERJ6LW : Rated voltag× 1.77, 5 s ERJ8BW (R > 0.05 Ω) : Rated voltag× 1.77, 5 s Other : Rated voltag× 2.0, 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 % ERJ2LW : ±2 %	–55 ℃ (30min.) / +155 ℃ (ERJ□LW, ERJ□CW : +125 ℃) (30 min.), 100 cycles
High temperature exposure	±1 %	+155 ℃ (ERJ□LW, ERJ□CW : +125 ℃), 1000 h
Damp Heat, Steady state	±1 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 ℃, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 ℃	±3 %	70 ℃, 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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	Rated voltage× 2.5 (ERJ6D : ×1.77), 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 %	–55 ℃ (30 min.) / +155 ℃ (30 min.), 100 cycles
High temperature exposure	±1 %	+155 ℃, 1000 h
Damp Heat, Steady state	±1 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 ℃, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 ℃	±3 %	70 ℃, 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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	Rated voltage× 2.5, 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 %	–55 ℃ (30 min.) / +125 ℃ (30 min.), 100 cycles
High temperature exposure	±1 %	+125 ℃, 1000 h
Damp Heat, Steady state	±1 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 ℃, 90 % to 95 %RH, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 ℃	±3 %	70 ℃, Rated voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

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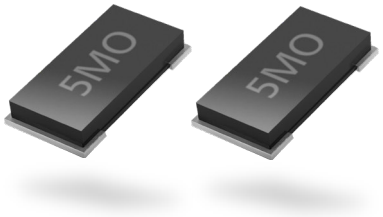
Current Sensing Resistors, Metal Plate Type

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 ℃ to +170 ℃)
- 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

Product code

Metal plate chip resistors

Type code

Code	inch size	Electrode type
S4S	2512	Standard
S4H	2512	Narrow
B1S	1020	Standard

Resistance tolerance

Code	Tolerance
F	±1 %

Resistance value

Shown by 3 digits or letters.Decimal point is expressed by M as
2.0 mΩ=2M0,
10.0 mΩ=10M

Packaging methods

Code	Packaging	Part No.
U	Embossed carrier taping 4 mm pitch, 2,000 pcs	ERJMS4
	Embossed carrier taping 4 mm pitch, 3,000 pcs	ERJMB1

Ratings

Part No. (inch size)	Power rating (70 ℃) (W)	Resistance range (mΩ)	Resistance tolerance (%)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	Terminal temp. upper limit (℃)	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			
	2	7, 8, 9, 10	F : ±1	±75		100	
ERJMB1S (1020)	2	1, 2, 3, 4, 5	F : ±1	±75		130	

✻ Please contact us when resistors of irregular series are needed.

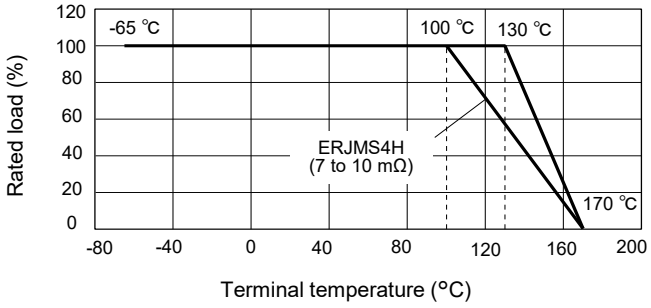
Power derating curve

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.

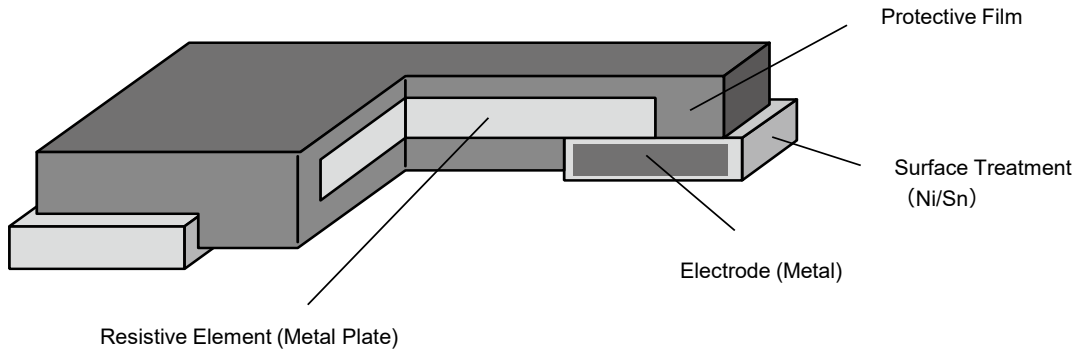
<Supplemented>

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.

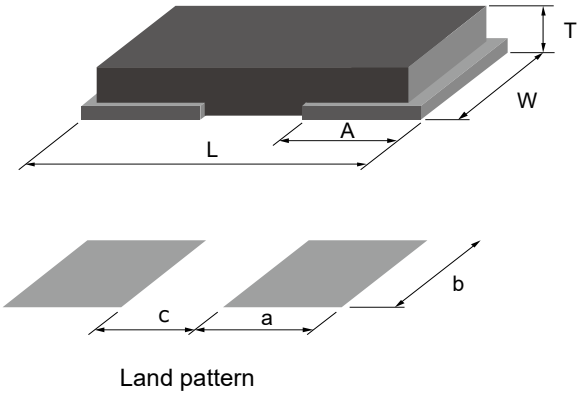


Construction



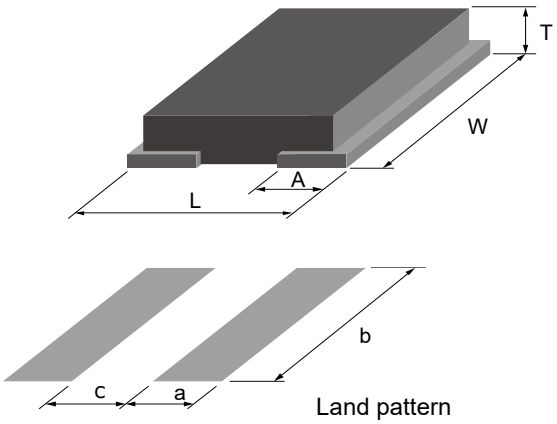
Dimensions in mm (not to scale), Recommended land pattern

● ERJMS4S/ERJMS4H



Land pattern

● ERJMB1S

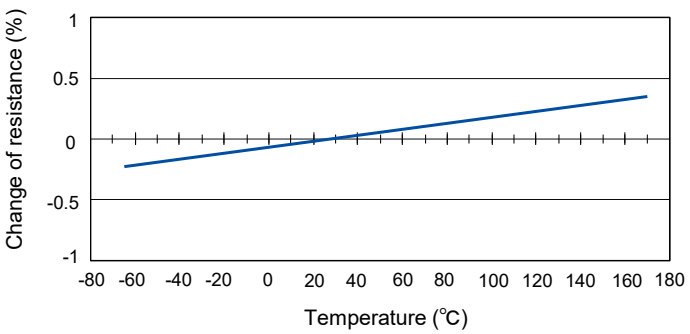


Land pattern

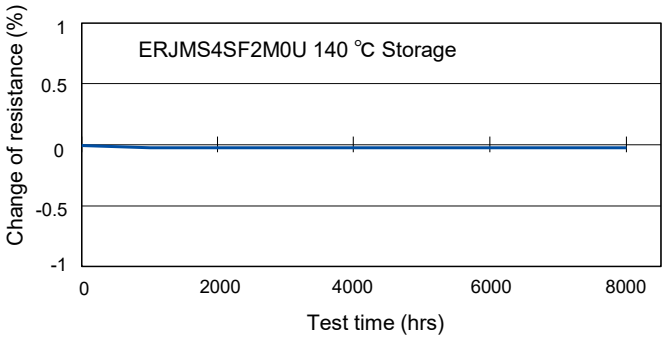
Unit : mm

Part No.	Dimensions				Recommended land pattern			Mass (Weight) (Reference) (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



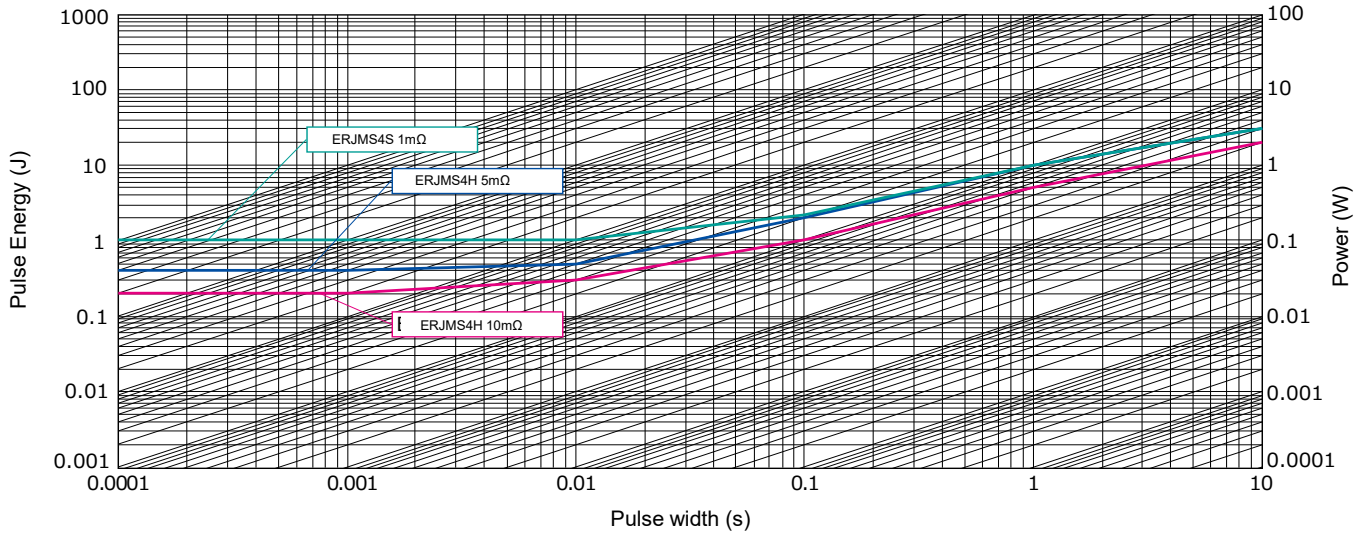
Long-term stability



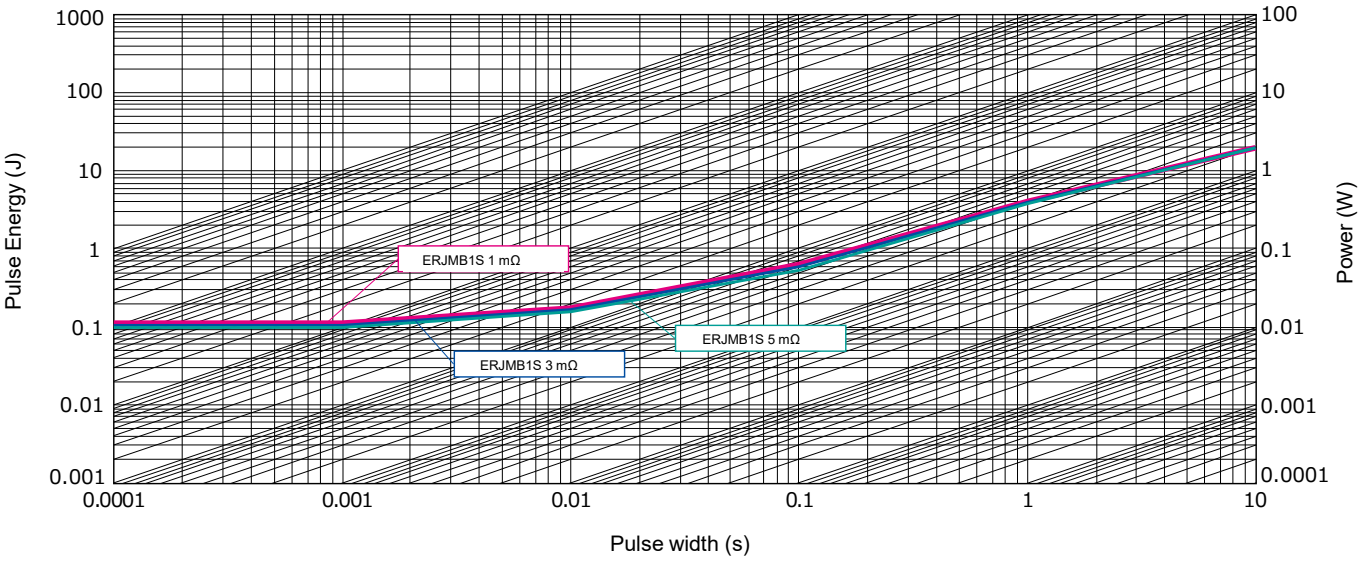
Maximum pulse energy respectively pulse power for continuous operation

Referance Data
Condition : Room Temperature, OFF : 10 s, 1000 cycle, Wave form : Square
Change of Resistance = ±1 %

● ERJMS4S/ERJMS4H



● ERJMB1S



Performance (AEC-Q200)

● ERJMS4S/ERJMS4H

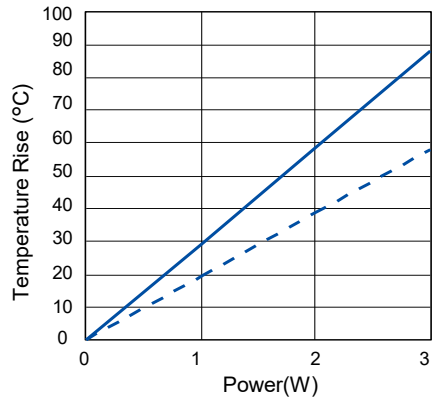
Test item	Performance requirements ⊿R	Typical value ⊿R	Test condition
Thermal shock	±1 %	0.20 %	–55 ℃ / +155 ℃, 1000 cycles
Overload	±0.5 %	0.10 %	Rated power x 3, 5 s
Solderability	> 95% coverage	> 95% coverage	245 ℃, 3 s
Resistance to solvents	No damage	No damage	MIL-STD-202 method 215, 2.1a, 2.1d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

● ERJMB1

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

Temperature rise

● ERJMS4HF5M0U

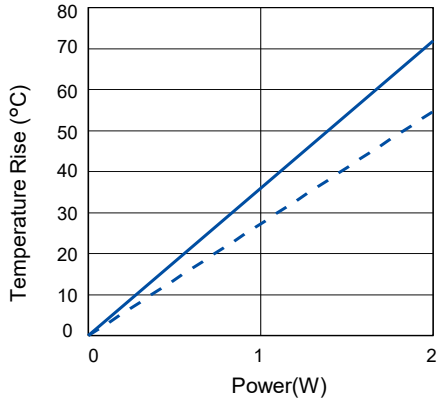


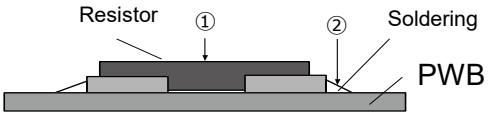
① ——— <Condition>

② - - - - Base material : FR-4 (t 1.6 mm)

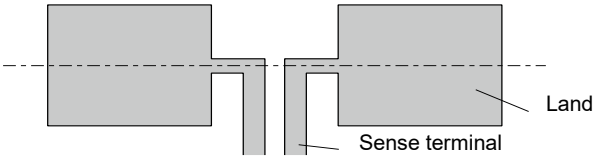
Copper Thickness : 70 µm, Two layer

● ERJMB1SF3M0U





Sense terminal-Layout



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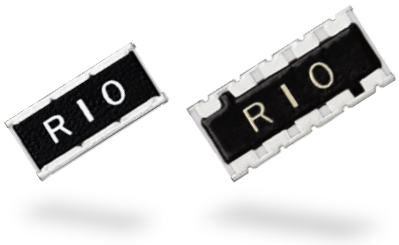
High Power Chip Resistors (Wide Terminal Type)

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
Thick film chip resistors

Code	inch
A1	1225
B1	1020
B2	0612
B3	0508

Code	Resistance value region
A	10 Ω≤R
B	0.22 Ω≤R<10 Ω
C	0.01 Ω≤R<0.22 Ω
D	0.005 Ω≤R<0.01 Ω

Resistance tolerance	
Code	Tolerance
F	±1 %
G	±2 %
J	±5 %

Nominal resistance value
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

Packaging methods		
Code	Packaging	Part No.
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJB2 ERJB3
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJB1
	Embossed carrier taping 4 mm pitch, 4,000 pcs	ERJA1

Ratings

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

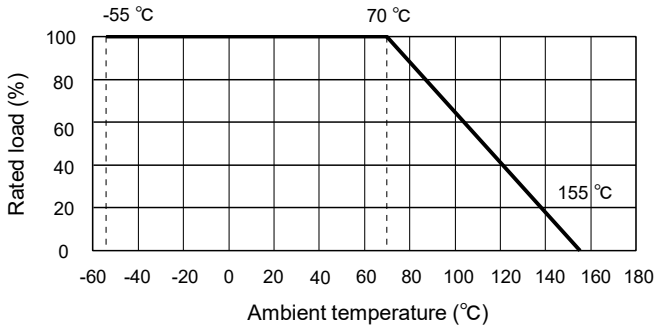
*3: Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power Rating} \times \text{Resistance Value}}$, or Limiting Element Voltage listed above, whichever less.

*4: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

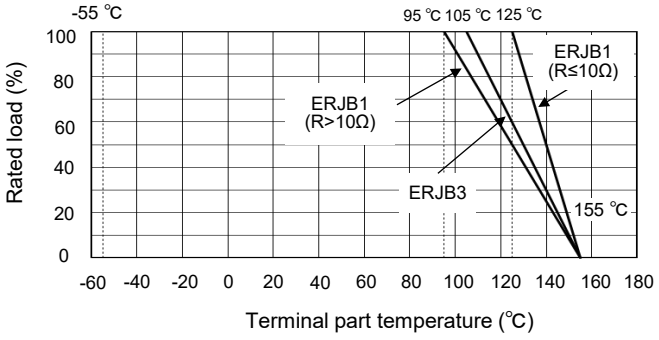
Ratings

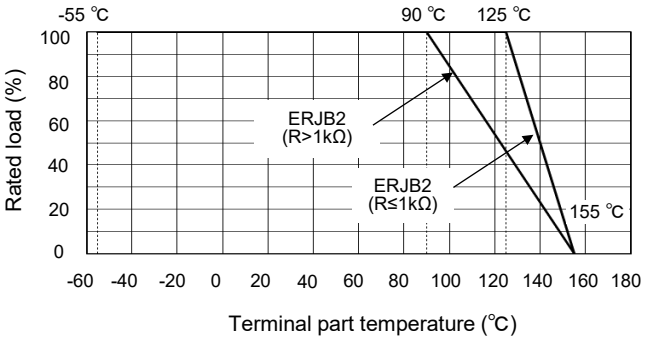
Power derating curve

・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.

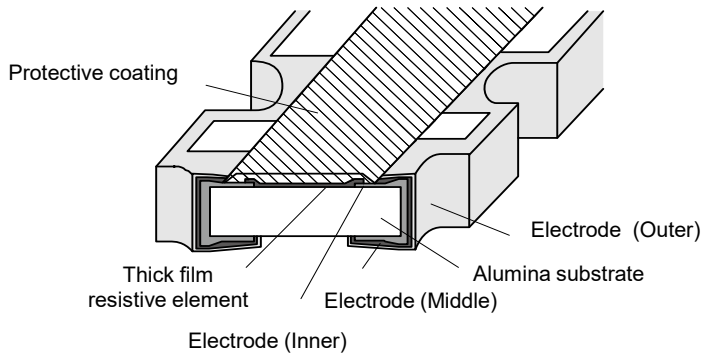


・For resistors operated in ambient rated terminal part temperature, power rating shall be derated in accordance with the figure below.
In addition, please use under the condition that the product temperature is below the upper category temperature.

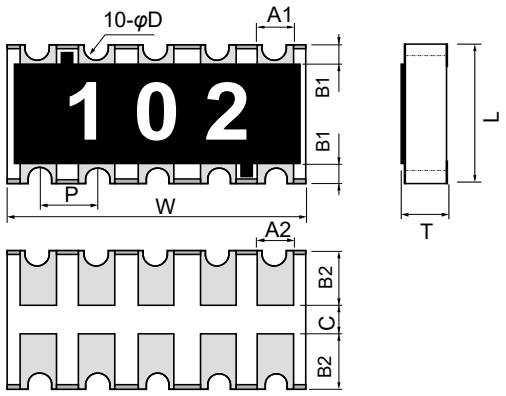




Construction (Example : ERJA1 type)

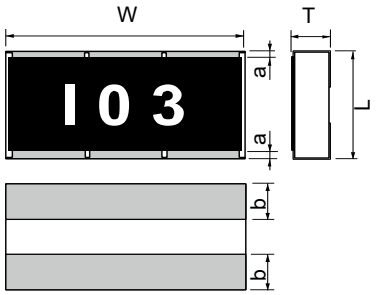


Dimensions (not to scale)



Unit : mm

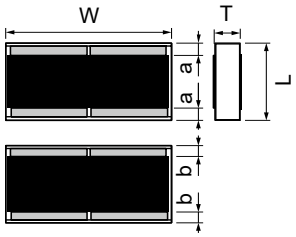
Part No.	Dimensions					Mass (Weight) (Reference) (g/1000 pcs)
	L	W	A_1	B_1	T	
ERJA1	3.20±0.20	6.40±0.20	0.70±0.20	0.45±0.20	0.55±0.10	40
	A_2	B_2	P	øD	C	
	0.70±0.20	1.25±0.15	1.27±0.10	0.30+0.10/-0.20	0.4 min.	



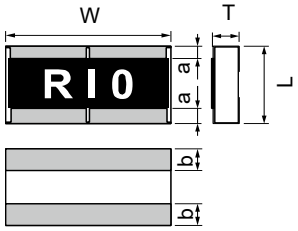
Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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)

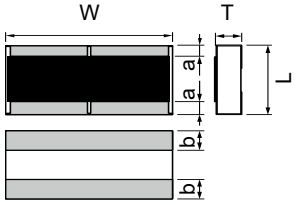


(10 mΩ ≤ R ≤ 1 MΩ)



Unit : mm

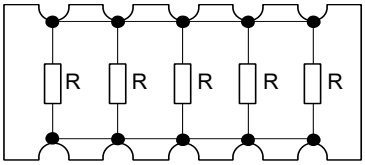
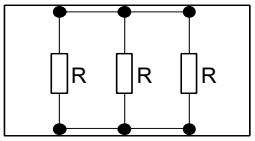
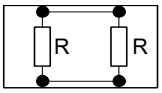
Part No.	Dimensions					Mass (Weight) (Reference) (g/1000 pcs)
ERJB2	L	W	a	b	T	
5 mΩ≤R<10 mΩ	1.60±0.15	3.20±0.20	0.30±0.20	0.30±0.20	0.65±0.15	11
10 mΩ≤R<220 mΩ				0.50±0.20	0.55±0.15	
220 mΩ≤R≤1 MΩ			0.25±0.20			

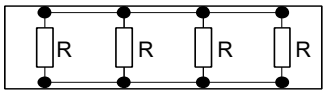
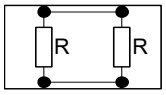
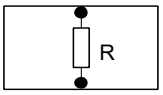


Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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

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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	ERJA1, ERJB1 (1W) : Rated voltag x 2.5, 5 s ERJB2 (0.75 W) : Rated voltag x 2.2, 5 s ERJB1 (2 W), ERJB2 (1.5 W, 1 W), ERJB3 : Rated voltag x 2.0, 5 s
Resistance to soldering heat	±1 %	270℃, 10 s
Rapid change of temperature	±2 %	–55 ℃ (30 min.) / +125 ℃ (30 min.), 1000 cycles
High temperature exposure	±1 %	+155 ℃, 1000 h
Damp heat, Steady state	±1 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity 1 (Applicable to rated ambient temperature-regulated products)	±3 %	60 ℃, 90 % to 95 %RH, Rated voltage 1.5 h ON / 0.5 h OFF cycle, 1000 h
Load life in humidity 2 (Applicable to rated ambient temperature-regulated products)	±3 %	85 ℃, 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

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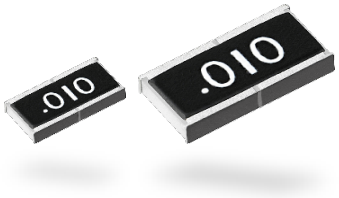
Low TCR High Power Chip Resistors (Wide Terminal Type)

ERJ D type

ERJ D1, D2 series



Features

- Achieved High power and low TCR (±100×10^{-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

Product code

Thick film chip resistors

Code	inch	Power rating	Resistance value region
D1C	1020	2 W	22 mΩ ≤R≤ 200 mΩ
D1D			10 mΩ ≤R≤ 20 mΩ
D2C	0612	1 W	33 mΩ ≤R≤ 200 mΩ
D2D			10 mΩ ≤R≤ 30 mΩ

Resistance tolerance

Code	Tolerance
F	±1 %
J	±5 %

Resistance value

Shown by 4 digits or letters.
(Ex.)
・R010:
0.010 Ω=10 mΩ

Packaging methods

Code	Packaging	Part No.
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJD1
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJD2

Ratings

Part No. (inch size)	Power rating (70 ℃)*1 (W)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJD1 (1020)	2	±1, ±5	10 m to 200 m (E24)	±100	–55 to +155	Grade 0
ERJD2 (0612)	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.

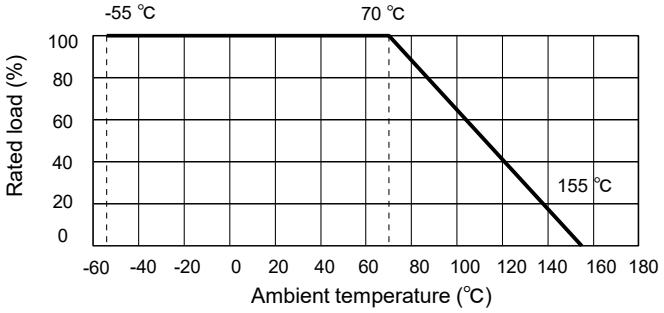
・Please contact us when resistors of irregular series are needed.

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

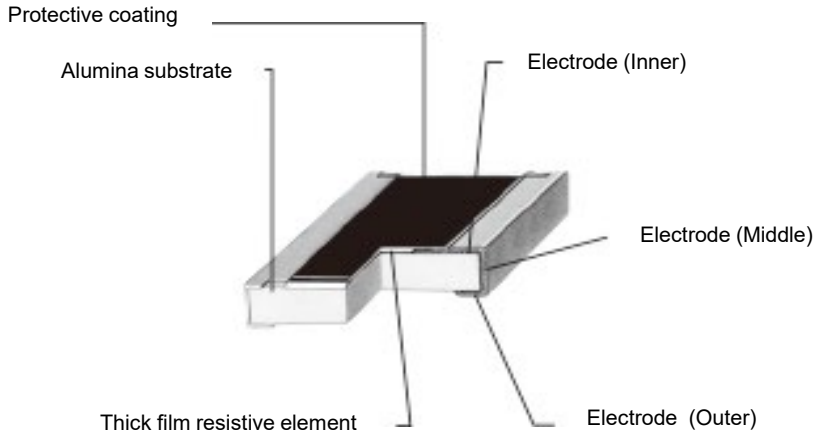
・Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV.

Power derating curve

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

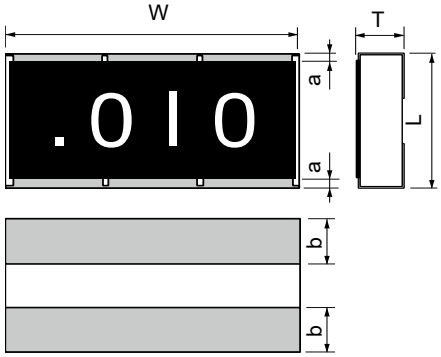


Construction

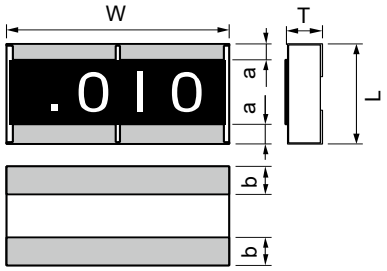


Dimensions (not to scale)

ERJD1



ERJD2

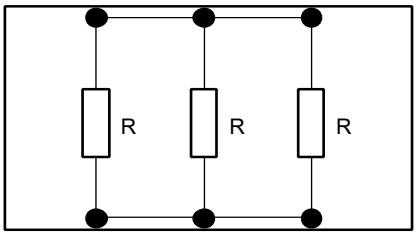


Unit : mm

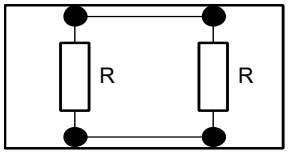
Part No.	Dimensions					Mass (Weight) (Reference) (g/1000 pcs)
	L	W	a	b	T	
ERJD1	2.50±0.20	5.00±0.20	0.30±0.20	0.90±0.20	0.60±0.20	27
ERJD2	1.60±0.15	3.20±0.20	0.30±0.20	0.50±0.20	0.65±0.15	11

Circuit configuration

ERJD1



ERJD2



Performance

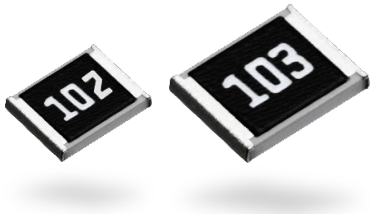
Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	Rated voltag x 2.0, 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±2 %	–55 ℃ (30 min.) / +125 ℃ (30 min.), 1000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

Panasonic
INDUSTRY

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 ±1 %, TCR ±100 (x 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

Product code
Thick film chip resistors

Code	inch size
PA2	0402
PA3	0603
P03	
P06	0805
P08	1206
PM8	
P14	1210

Resistance tolerance	
Code	Tolerance
D	±0.5 %
F	±1 %
J	±5 %

Nominal resistance value
Three digit type (±5 %), Four digit type (±1 %, ±0.5 %) Example: 222 : 2.2 KΩ 10R0 : 10 Ω 1002 : 10 KΩ

Packaging methods		
Code	Packaging	Part No.
X	Punched carrier Ttaping 2 mm pitch, 10,000 pcs	ERJPA2
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJPA3 ERJP03 ERJP06 ERJP08 ERJPM8
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJP14

Ratings

Part No. (inch size)	Power rating[*1] (W)	Rated ambient temperature[*2] (℃)	Rated terminal part temperature[*2] (℃)	Limiting element voltage[*3] (V)	Maximum overload voltage[*4] (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJPA2 (0402)	0.20	70	-	50	100	±0.5, ±1	10 to 1M (E24, E96)	±0.5, ±1 : ±100 ±5 : ±200	–55 to +155	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		
						±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		
						±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		
						±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		
						±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.

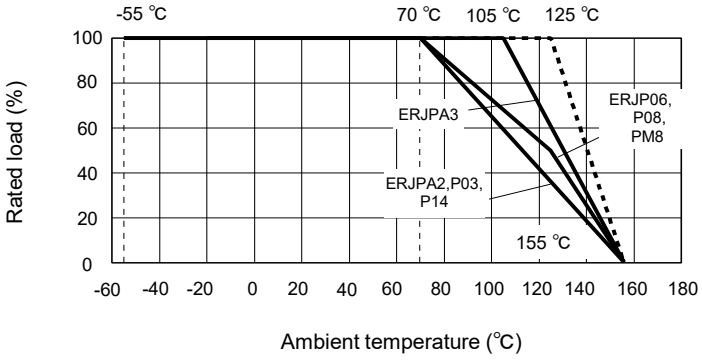
*4: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

Ratings

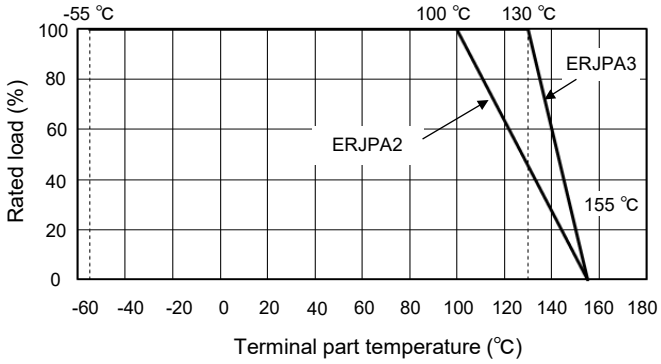
Power derating curve

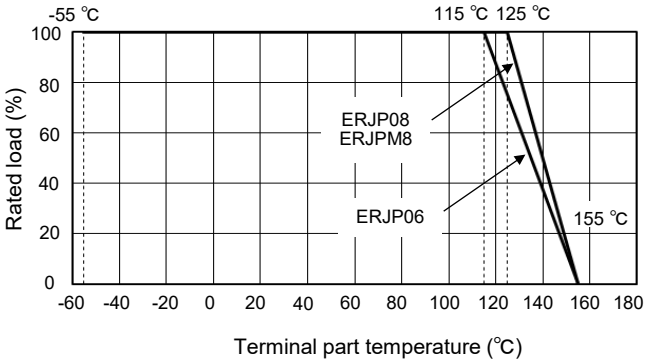
・For resistors operated in ambient rated ambient temperature, power rating shall be derated in accordance with the figure below.
In addition, please use under the condition that the product temperature is below the upper category temperature.

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

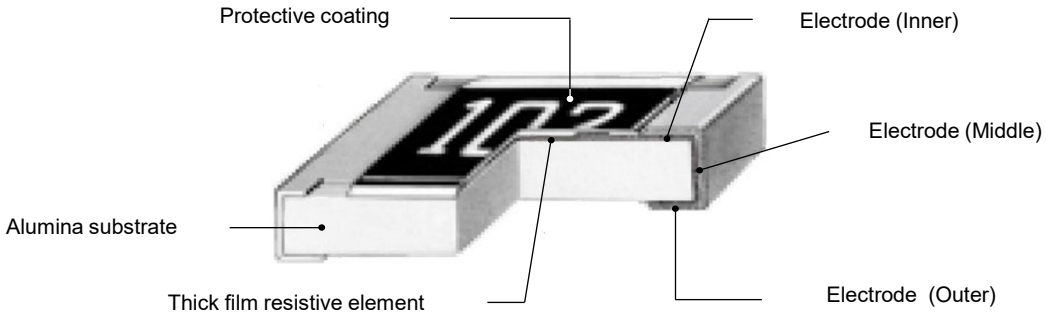


・For resistors operated in ambient rated terminal part temperature, power rating shall be derated in accordance with the figure below.
In addition, please use under the condition that the product temperature is below the upper category temperature.

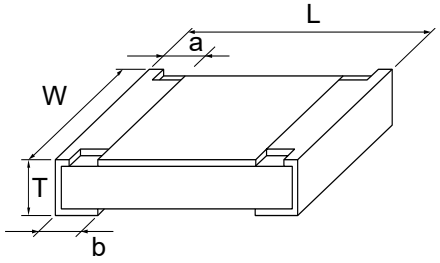




Construction



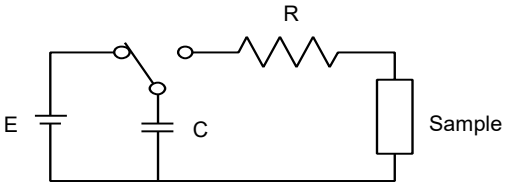
Dimensions (not to scale)



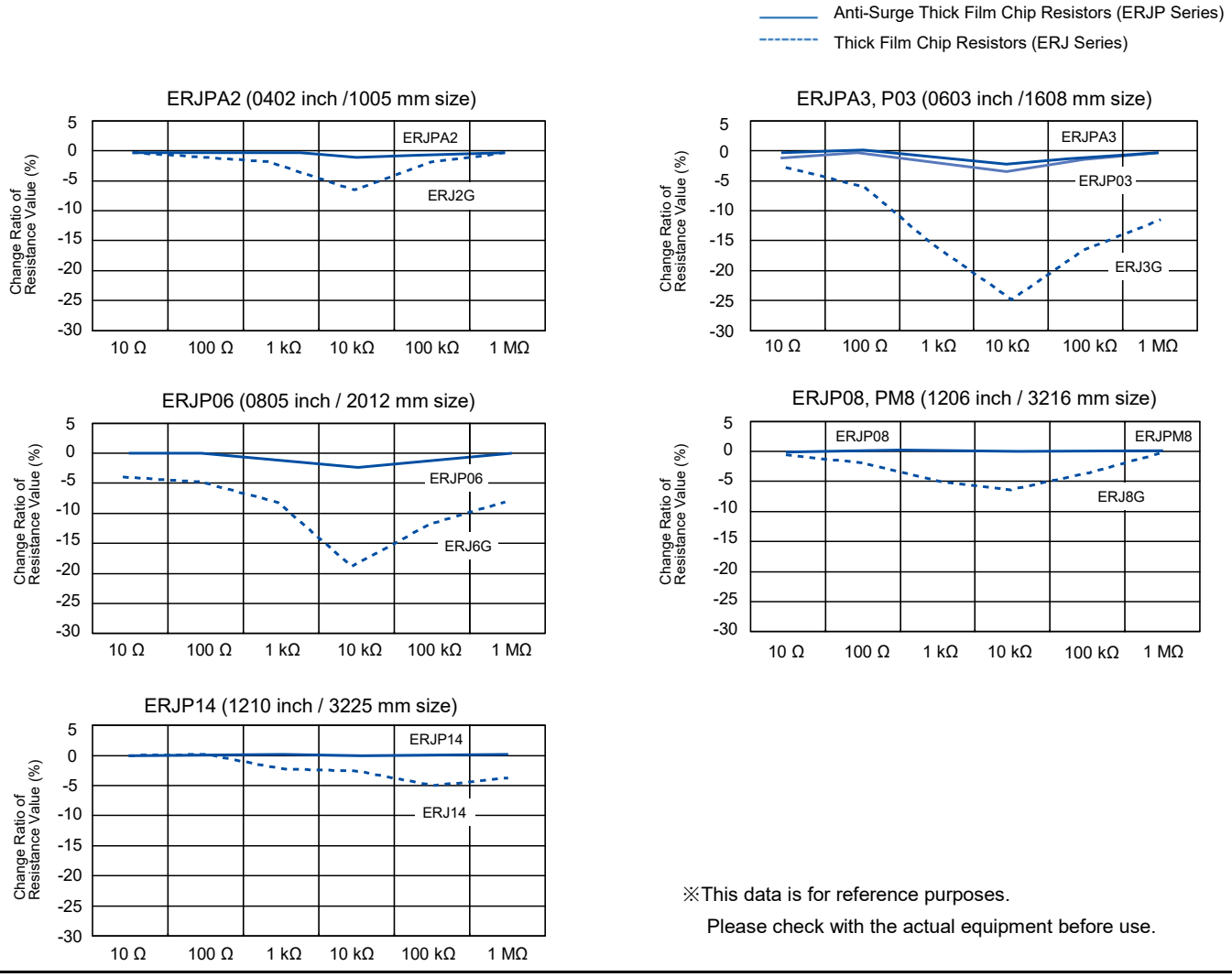
Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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 (≤1.5 kΩ) / 150 Ω (>1.5 kΩ)
C	100 pF	150 pF
E	±1 kV	±3 kV



※This data is for reference purposes.
Please check with the actual equipment before use.

Performance

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

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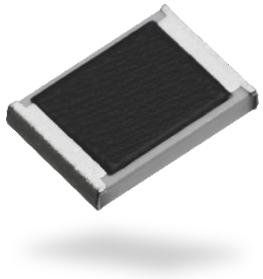
⚠ This series is not a recommended product.
Not recommended for new design.

Anti-Surge Thick Film Chip Resistors (Double-sided resistive elements structure)

ERJ P□W type

ERJ P6W series



Features

- ESD surge characteristics superior to standard metal film resistors
- Metal glaze thick film resistive element and three layers of electrodes
- Suitable for both reflow and flow soldering
- High power : 0.50 W, 2012(0805) size(ERJP6W)
- High pulse characteristics : 1.5 times higher than 0805 inch size Anti-Surge thick film chip resistors (ERJP06)
- Reference standards : IEC 60115-8、JIS C 5201-8、EIAJ RC-2134B
- 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	6	W	F	1	0	0	2	V

Product code

Thick film chip resistors

Size (inch), Power rating

Code	size	Power R.
P6W	0805	0.5 W

Resistance tolerance

Code	Tolerance
F	±1 %
J	±5 %

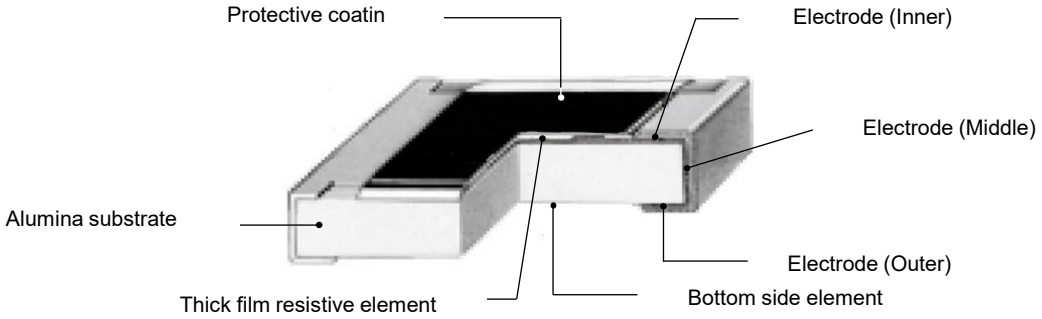
Resistance value

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 (±5%), four digit type (±1%)
Example: 222:2.2 kΩ, 1002:10 kΩ

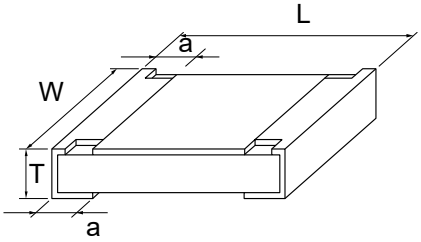
Packaging methods

Code	Packaging
V	Punched carrier taping 4 mm pitch, 5,000 pcs.

Construction



Dimensions in mm (not to scale)



Unit : mm

Type	Dimensions				Mass (Weight) (g/1000 pcs)
	L	W	a	T	
ERJP6W (0805)	2.00±0.20	1.25±0.20	0.35±0.20	0.65±0.10	6

Anti-Surge Thick Film Chip Resistors (Double-sided resistive elements structure)

Ratings

Part No. (inch size)	Power rating*1 (70 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (°C)
ERJP6W (0805)	0.5	150	200	± 1	10 to 1 M (E24,E96)	± 200	–55 to +155
				± 5	1 to 1 M (E24)	R < 10 Ω : -100 to +600	
						10 Ω ≦ R : ±200	

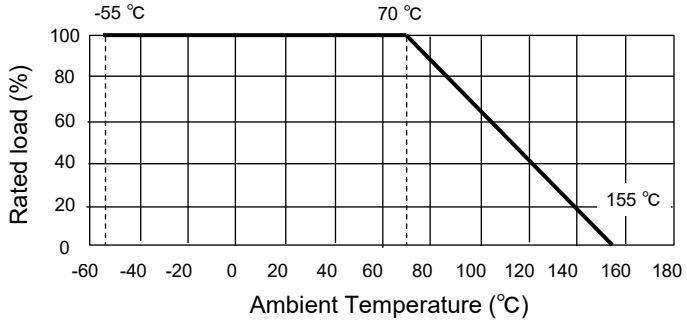
*1: Use it on the condition that the case temperature is below 155 ℃.

*2: Overload (Short-time Overload) test voltage (SOTV) shall be determined from SOTV=2.5 × Power rating or max. Over load voltage listed above whichever less.

*3: 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.

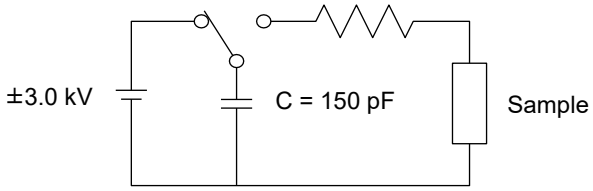
Power derating curve

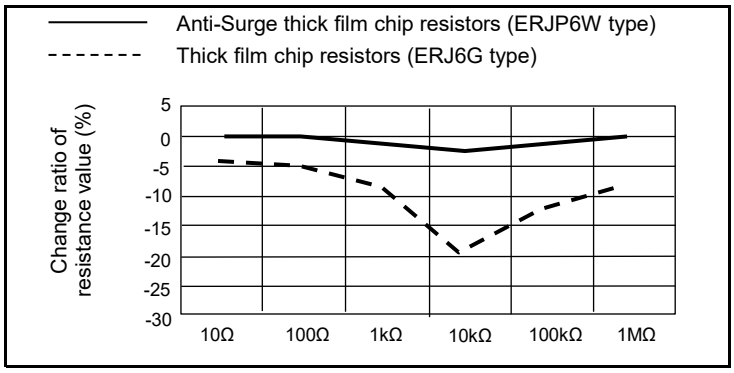
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure below.



ESD Characteristic

R = 0 Ω (≦ 1.5 kΩ) / 150 Ω (> 1.5 kΩ)





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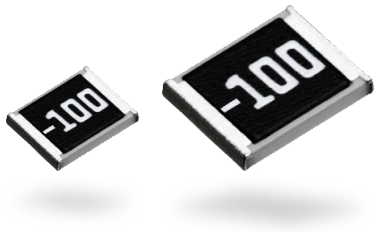
Anti-Pulse Thick Film Chip Resistors

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	2	3	4	5	6	7	8	9	10	11
E	R	J	T	0	6	J	1	0	0	V

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
T06	0805	0.25 W
T08	1206	0.33 W
T14	1210	0.5 W

Resistance tolerance

Code	Tolerance
J	±5 %

Resistance value

The first two digits are significant figures of resistance and the third one denotes number of zeros following.
(Ex.) 222 : 2.2 kΩ

Packaging methods

Code	Packaging	Part No.
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJT06 ERJT08
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJT14

- ERJT14L series

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	T	1	4	L	M	1	0	0	U

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
T14	1210	0.5 W

Product specifications

Code	Specifications
L	Trimming-less

Resistance tolerance

Code	Tolerance
K	±10 %
M	±20 %

Resistance value

The first two digits are significant figures of resistance and the third one denotes number of zeros following.
(Ex.) 222 : 2.2 kΩ

Packaging methods

Code	Packaging	Part No.
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJT14L

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

Ratings

Part No. (inch size)	Power rating*1 (70 ℃)(W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	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		

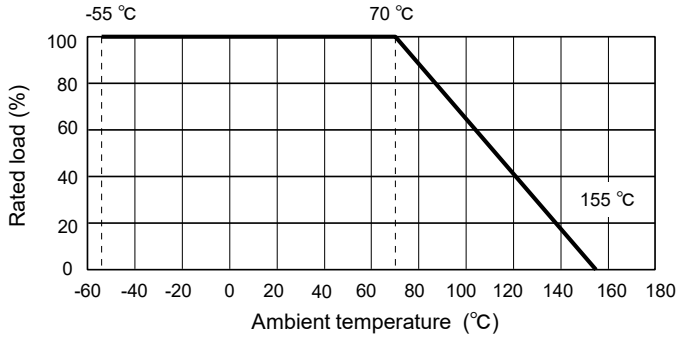
*1: Use it on the condition that the case temperature is below the upper category temperature.

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

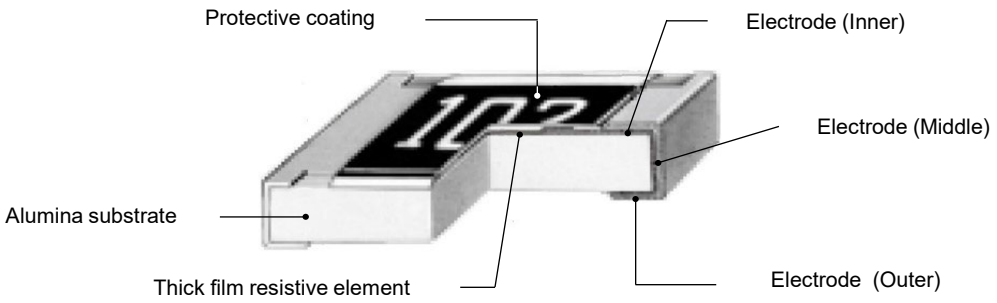
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

Power derating curve

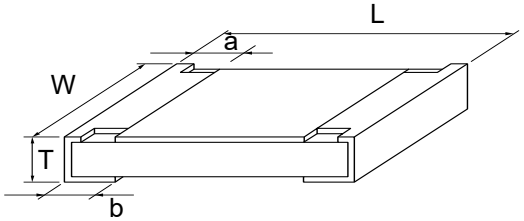
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)

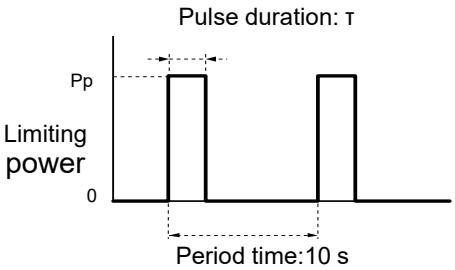


Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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

Limiting power curve

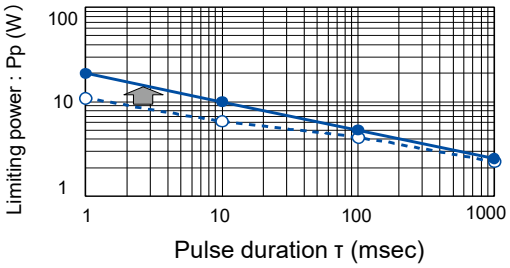
● In rush pulse Characteristic



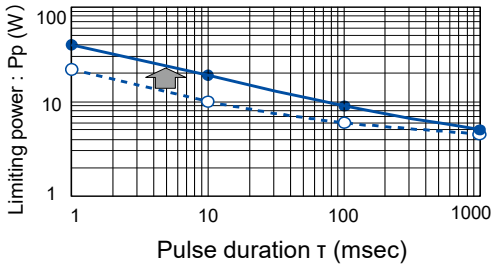
Test cycle : 1000 cycles
Spec : Resistance value = within ±5 %

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

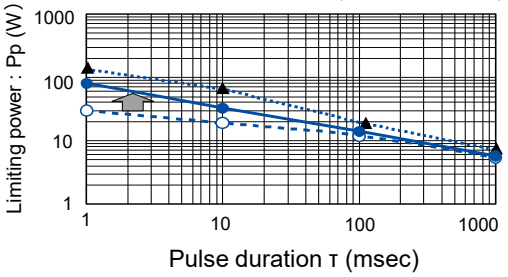
●ERJT06 (0805 inch size)



●ERJT08 (1206 inch size)



●ERJT14, ERJT14L (1210 inch size)



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

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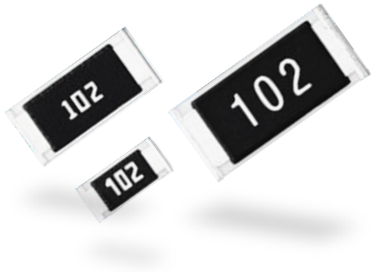
Anti-Sulfurated Thick Film Chip Resistors



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 Ω to 1 Ω
- 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

1	2	3	4	5	6	7	8	9	10	11	12
E	R	J	S	0	6	F	1	0	0	2	V

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating	Code	inch	Power rating
U0X	01005	0.031 W	S08 U08	1206	0.25 W
U01	0201	0.05 W	S14 U14	1210	0.5 W
S02 U02	0402	0.1 W	S12 U12	1812	0.75 W
S03 U03	0603	0.1 W	S1D U1D	2010	0.75 W
S06 U06	0805	0.125 W	S1T U1T	2512	1 W

Resistance tolerance

Code	Tolerance
D	±0.5 %
F	±1 %
J	±5 %
0	Jumper

Resistance value

The first two or three digits are significant figures of resistance and the third or fourth one denotes number of zeros following. Jumper is expressed by R00.
Three digit type (±5 %),
four digit type (±0.5 %, ±1 %)
(Ex.) 222 : 2.2 kΩ, 1002 : 10 kΩ

Packaging methods

Code	Packaging	Part No.
Y	Pressed carrier taping 2 mm pitch, 20,000 pcs	ERJU0X
C	Pressed carrier taping 2 mm pitch, 15,000 pcs	ERJU01
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJS02, ERJU02
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJS03, ERJU03 ERJS06, ERJU06 ERJS08, ERJU08
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJS14, ERJU14 ERJS12, ERJU12 ERJS1D, ERJU1D
	Embossed carrier taping 4 mm pitch, 4,000 pcs	ERJS1T, ERJU1T

- ERJU6S, U6Q series

1	2	3	4	5	6	7	8	9	10	11
E	R	J	U	6	S	J	R	2	0	V

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
U6	0805	0.25 W

Resistance value region

S	0.1 Ω to 0.2 Ω
Q	0.22 Ω to 1 Ω

Resistance tolerance

Code	Tolerance
F	±1 %
G	±2 %
J	±5 %

Resistance value

Shown by 3 digits or letters.
(Ex.)
R20 : 0.20 Ω=200 mΩ
1R0 : 1.0 Ω=1000 mΩ

Packaging methods

Code	Packaging	Part No.
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJU6S ERJU6Q

Ratings

Part No. (inch size)	Power rating*1 (70 ℃)(W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJU0X (01005)	0.031	15	30	±1	10 to 1 M (E24, E96)	R<10 Ω : –100 to +600 10 Ω≤R<100 Ω : ±300	–55 to +125	-
				±5	1 to 1 M (E24)	100 Ω≤R : ±200		
ERJU01 (0201)	0.05	25	50	±1	10 to 1 M (E24, E96)	R<10 Ω : –100 to +600		
				±5	1 to 1 M (E24)			
ERJS02 ERJU02 (0402)	0.1	50	100	±0.5, ±1	1 to 1 M (E24, E96)	10 Ω to 1 MΩ : ±200	–55 to +155	Grade 0
				±5	1 to 3.3 M (E24)	1 MΩ<R : –400 to +150		
ERJS03 ERJU03 (0603)	0.1	75	150	±0.5, ±1	1 to 1 M (E24, E96)	R<10 Ω : –100 to +600 10 Ω to 1 MΩ : ±200 (± 5 %) : ±100 (±0.5 %, ±1 %) 1 MΩ<R : –400 to +150		
				±5	1 to 10 M (E24)			
ERJS06 ERJU06 (0805)	0.125	150	200	±0.5, ±1	1 to 1 M (E24, E96)			
				±5	1 to 10 M (E24)			
ERJS08 ERJU08 (1206)	0.25	200	400	±0.5, ±1	1 to 1 M (E24, E96)			
				±5	1 to 10 M (E24)			
ERJS14 ERJU14 (1210)	0.5	200	400	±0.5, ±1	1 to 1 M (E24, E96)			
				±5	1 to 10 M (E24)			
ERJS12 ERJU12 (1812)	0.75	200	500	±0.5, ±1	1 to 1 M (E24, E96)			
				±5	1 to 10 M (E24)			
ERJS1D ERJU1D (2010)	0.75	200	500	±0.5, ±1	1 to 1 M (E24, E96)			
				±5	1 to 10 M (E24)			
ERJS1T ERJU1T (2512)	1.0	200	500	±0.5, ±1	1 to 1 M (E24, E96)			
				±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=√Power Rating × Resistance Value, or Limiting Element Voltage listed above, whichever less.
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

【Low resistance type】

Part No. (inch size)	Power rating*1 (70 ℃)(W)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJU6S (0805)	0.25	±1, ±2, ±5	0.1 to 0.2 (E24)	0 to +150	–55 to +155	Grade 0
ERJU6Q (0805)			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=√Power Rating × Resistance Value.
・Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCW.

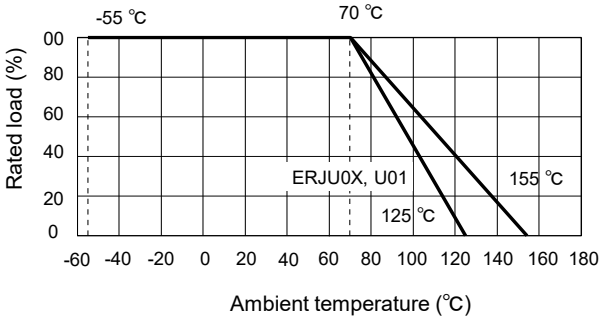
【For jumper】

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

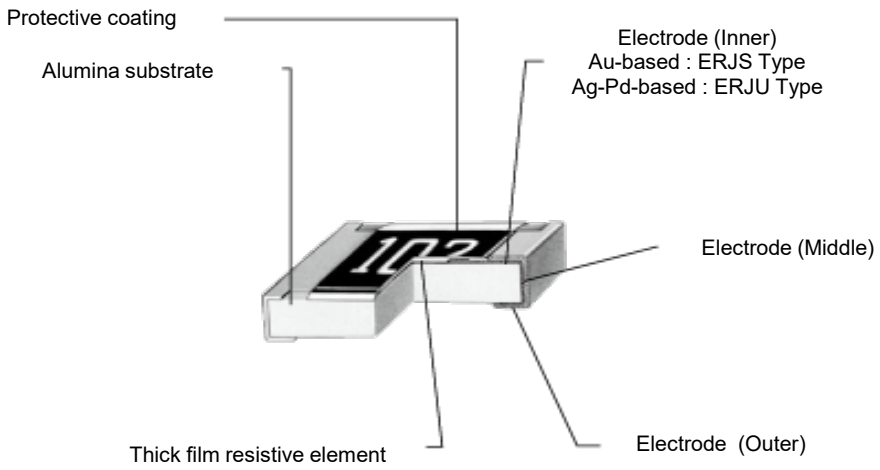
*1: Overload test current

Power derating curve

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

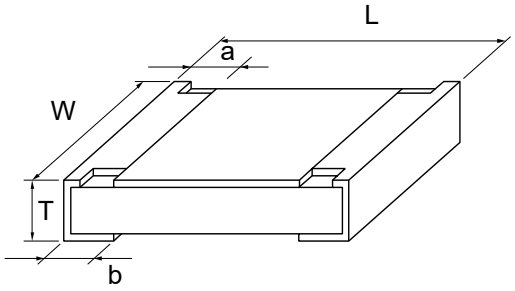


Construction



*Value markings color
ERJS Type : Blue
ERJU Type : Red

Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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 ⊿R		Test conditions
	Resistor type	Jumper type	
Resistance	Within specified tolerance	100 mΩ or less	20 ℃
T. C. R.	Within Specified T. C. R.	200 mΩ or less	+25 ℃ / +155 ℃ (ERJU0X,U01 : +25 ℃ / +125 ℃)
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 ℃, 10 s
Rapid change of temperature	±1 %	100 mΩ or less	–55 ℃ (30min.)/+155 ℃ (ERJU0X,U01 : +125 ℃) (30min.), 100 cycles
High temperature exposure	±1 %	100 mΩ or less	+155 ℃ (ERJU0X,U01 : +125 ℃), 1000 h
Damp heat, Steady state	±1 %	100 mΩ or less	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	100 mΩ or less	60 ℃, 90 % to 95 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70 ℃	±3 %	100 mΩ or less	70 ℃, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

● ERJU6S, U6Q series

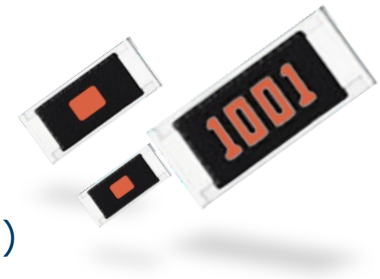
Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±1 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 %	–55 ℃ (30 min.) / +125 ℃ (30min.), 100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

Panasonic
INDUSTRY

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 : ±0.5 %、TCR : ±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

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
U2R	0402	0.1 W
U3R	0603	0.1 W
U6R	0805	0.125 W

Resistance tolerance

Code	Tolerance
D	±0.5 %

Resistance value

The first three digits are significant figures of resistance and the 4th one denotes number of zeros following.
Example : 1002 → 10 kΩ

Packaging methods

Code	Packaging	Part No.
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJU2R
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJU3R ERJU6R

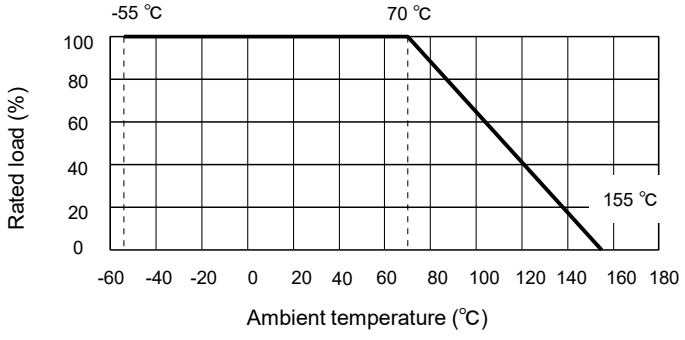
Ratings

Part No. (inch size)	Power rating*1 (70 ℃) (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 (℃)	AEC-Q200 Grade
ERJU2R (0402)	0.1	50	100	±0.5	100 to 100 k (E24, E96)	±50	−55 to +155	Grade 0
ERJU3R (0603)	0.1	75	150	±0.5	100 to 100 k (E24, E96)			
ERJU6R (0805)	0.125	150	200	±0.5	100 to 100 k (E24, E96)			

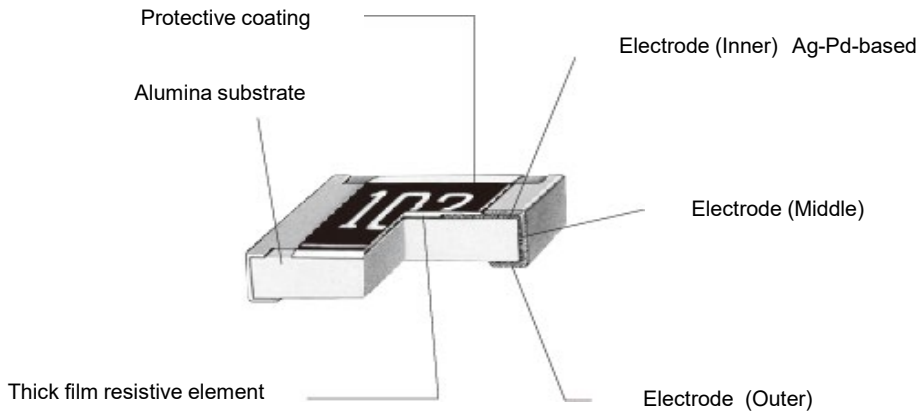
*1 : Use it on the condition that the case temperature is below the upper category temperature.
*2 : Rated continuous working voltage (RCWV) shall be determined from RCWV=√Power rating × Resistance value, or limiting element voltage listed above, whichever less.
*3 : Overload test voltage (OTV) shall be determined from OTV = Specified magnification (refer to performance) × RCWV or maximum overload voltage listed above, whichever less.

Power derating curve

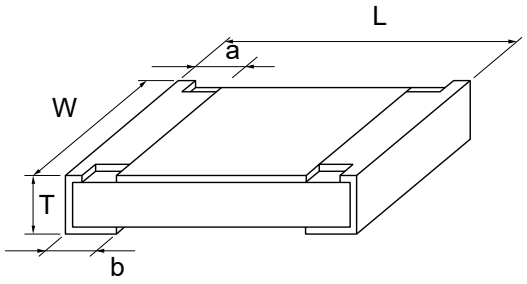
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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

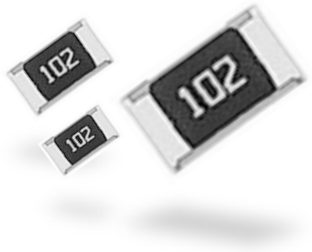
Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +155 ℃
Overload	±2 %	Rated voltage × 2.5, 5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 %	–55 ℃ (30 min.) / +155 ℃ (30 min.),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

Panasonic
INDUSTRY

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

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
UP3	0603	0.25 W
UP6	0805	0.50 W
UP8	1206	0.66 W

Resistance tolerance

Code	Tolerance
D	±0.5 %
F	±1 %
J	±5 %

Resistance value

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 (±5 %),
Four digit type (±1 %, ±0.5 %)
Ex. 222: 2.2 kΩ, 1002 : 10 kΩ

Packaging methods

Code	Packaging	Part No.
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJUP3 ERJUP6 ERJUP8

Ratings

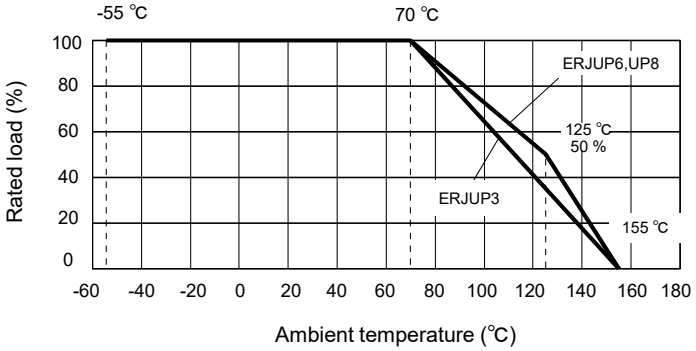
Part No. (inch size)	Power rating*1 (70 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. ($\times10^{-6}$/K)	Category temperature range (℃)	AEC-Q200 Grade
ERJUP3 (0603)	0.25	150	200	±0.5, ±1	10 to 1 M (E24, E96)	±100	–55 to +155	Grade 0
				±5	1 to 1.5 M (E24)	±200		
ERJUP6 (0805)	0.50	400	600	±0.5, ±1	10 to 1 M (E24, E96)	±100		
				±5	1 to 3.3 M (E24)	R<10 Ω : –100 to +600 10 Ω≤R : ±200		
ERJUP8 (1206)	0.66	500	1000	±0.5, ±1	10 to 1 M (E24, E96)	±100		
				±5	1 to 10 M (E24)	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 RCWV=√Power Rating × Resistance Value, or Limiting Element Voltage listed above, whichever less.
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

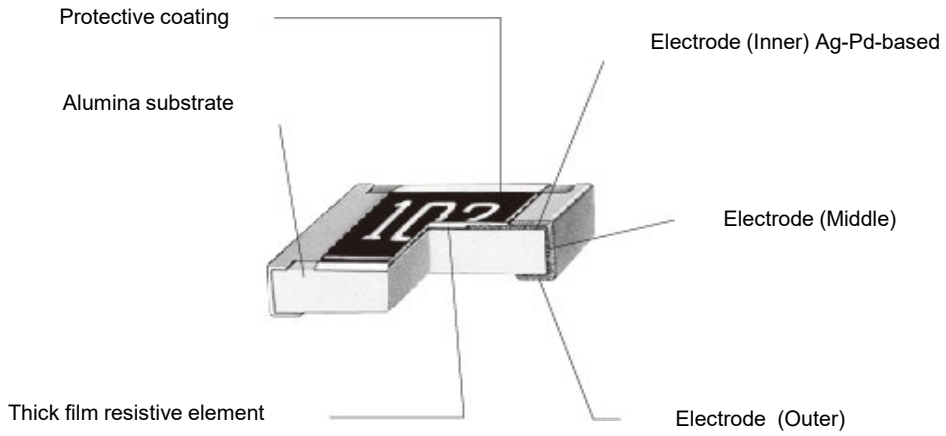
Ratings

Power derating curve

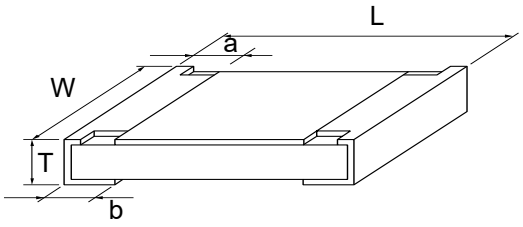
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



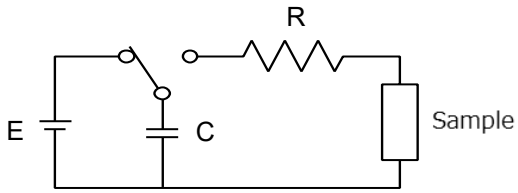
Dimensions in mm (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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

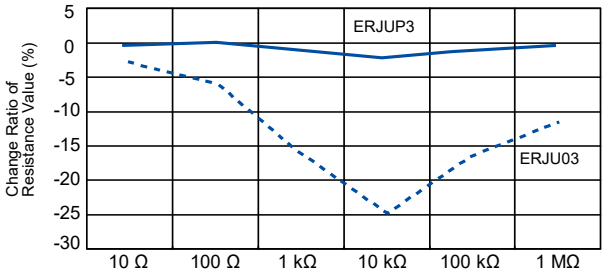
ESD Characteristic



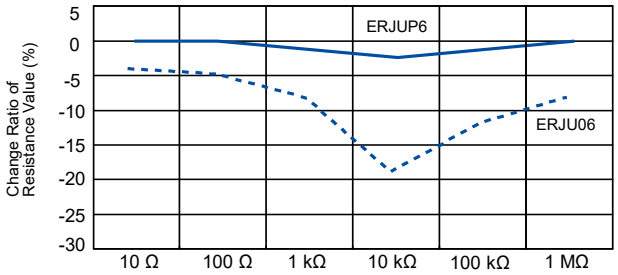
R	R=0 Ω(≤1.5 kΩ) / 150 Ω(> 1.5 kΩ)
C	150 pF
E	±3 kV

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

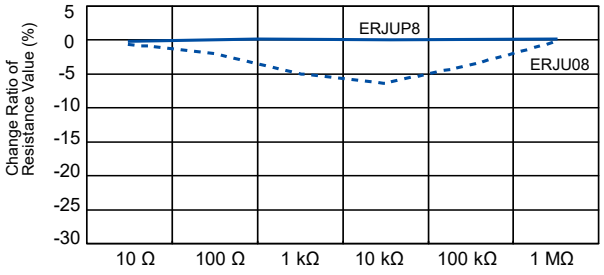
ERJUP3 (0603 inch/1608 mm)



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

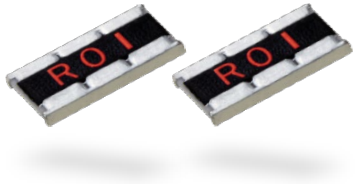
Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +155 ℃
Overload	±2 %	ERJUP6 : Rated voltag x 1.77, 5 s ERJUP3, ERJUP8 : Rated voltag x 2.0, 5 s
Resistance to soldering heat	D : ±0.5 % F, J : ±1 %	270 ℃, 10 s
Rapid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

Panasonic
INDUSTRY

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 rode
Thick film chip resistors

Size,Power rating		
Code	inch	Power rating
C1	1020	2 W

Code	Resistance value region
B	220 mΩ ≤R≤ 1 Ω
C	10 mΩ ≤R< 220 mΩ

Resistance tolerance	
Code	Tolerance
F	±1 %
J	±5 %

Resistance value

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

Packaging methods		
Code	Packaging	Part No.
U	Embossed carrier taping 4 mm pitch, 5,000 pcs	ERJC1

Ratings

Part No. (inch size)	Power rating*1 (70 ℃) (W)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	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.

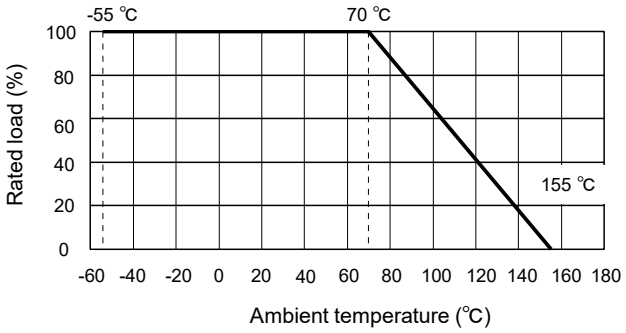
・Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power Rating} \times \text{Resistance Value}}$.

・Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCW.

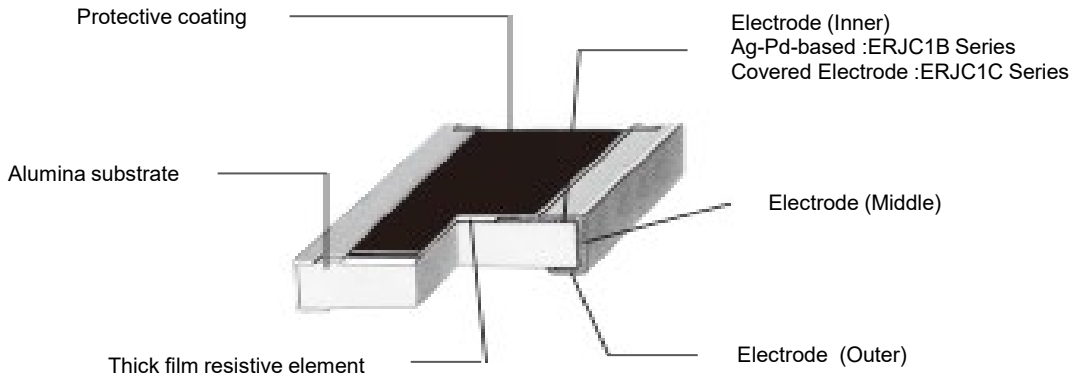
Ratings

Power derating curve

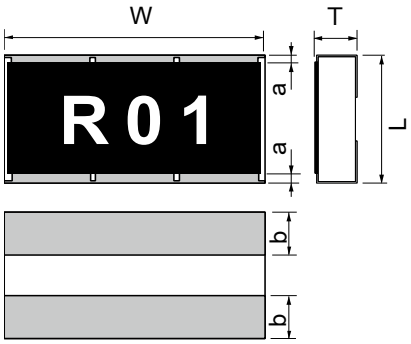
For resistors operated in ambient temperatures above 70 ℃, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions (not to scale)

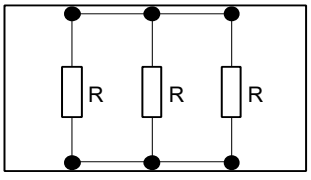


Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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



Performance

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

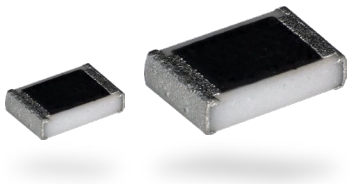
Panasonic
INDUSTRY

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 ℃ and rated category temperature 105 ℃
- 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

Product code

Thick film chip resistors

Size, Power rating

Code	inch	Power rating
H2G	0402	0.1 W
H2C	0402	0.1 W
H2R	0402	0.1 W
H3G	0603	0.125 W
H3E	0603	0.125 W
H3Q	0603	0.25 W
HP6	0805	0.5 W

Resistance tolerance

Code	Tolerance
D	±0.5 %
F	±1 %
J	±5 %

Resistance value

The first two or three digits are significant figures of resistance and the third or fourth one denotes number of zeros following.
Three digit type (±5 %),
Four digit type (±1 %, ±0.5 %)
(Ex.) 222 : 2.2 kΩ
1002 : 10 KΩ
4R7 : 4.7 Ω

Packaging methods

Code	Packaging	Part No.
X	Punched Carrier Taping 2 mm pitch, 10,000 pcs	ERJH2G ERJH2C ERJH2R
V	Punched Carrier Taping 4 mm pitch, 5,000 pcs	ERJH3G ERJH3E ERJH3Q ERJHP6

- 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

Product code

Thick film chip resistors

Size, Rated current

Code	inch	Rated current
H2G	0402	1 A
H3G	0603	1 A
H6G	0805	2 A

Resistance tolerance

Code	Tolerance
0	Jumper

Resistance value

Jumper is expressed by R00.

Packaging methods

Code	Packaging	Part No.
X	Punched carrier taping 2 mm pitch, 10,000 pcs	ERJH2G
V	Punched carrier taping 4 mm pitch, 5,000 pcs	ERJH3G ERJH6G

Ratings

【For Resistor】

Part No. (inch size)	Power rating*1 (105 ℃) (W)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	Resistance tolerance (%)	Resistance range (Ω)		T.C.R. (×10^{-6}/K)	Category temperature range (℃)	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)	±200		
				±5	1 to 9.1	(E24)			
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=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

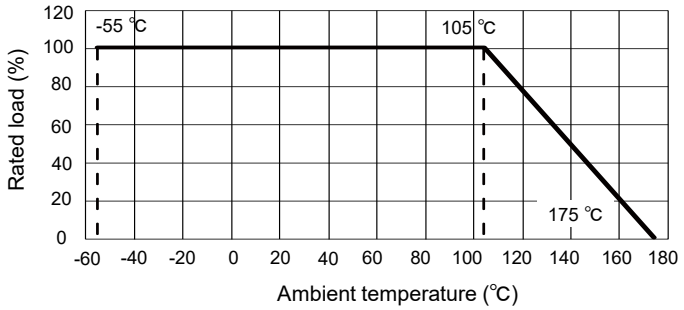
【For Jumper】

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

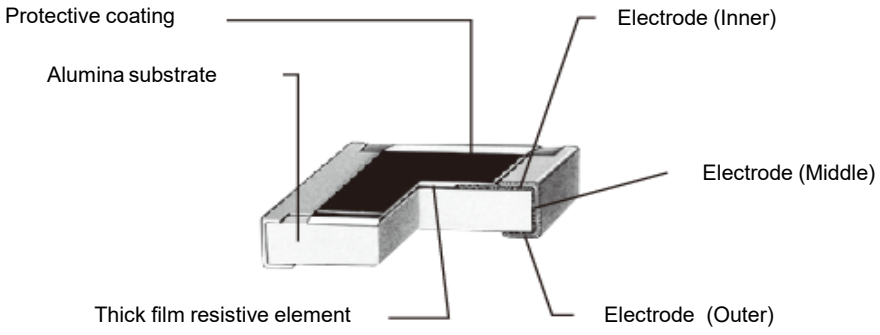
*1: Overload test current

Power derating curve

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

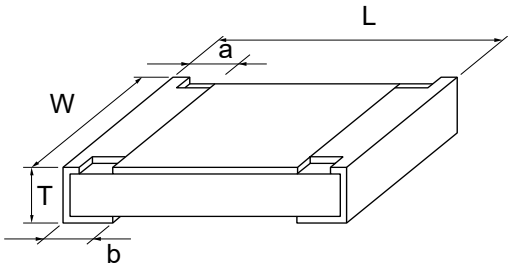


Construction



*No value markings
*ERJH3Q : special electrode structure

Dimensions (not to scale)



Unit : mm

Part No.	Dimensions					Mass (Weight) (Reference) (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 ⊿R		Test conditions
	Resistor type	Jumper type	
Resistance	Within specified tolerance	50 mΩ or less	20 ℃
T. C. R.	Within specified T. C. R.	50 mΩ or less	+25 ℃ / +175 ℃
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 ℃, 10 s
Rapid change of temperature	±1 %	50 mΩ or less	–55 ℃ (30 min.) / +175 ℃ (30 min.), 1000 cycles
High temperature exposure	±1 %	50 mΩ or less	+175 ℃, 1000 h
Damp heat, Steady state	±1 %	50 mΩ or less	85 ℃, 85 %RH, 1000 h
Load life in humidity	±3 %	50 mΩ or less	85 ℃, 85 %RH, Rated voltage (Jumper type :Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 105 ℃	±3 %	50 mΩ or less	105 ℃, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

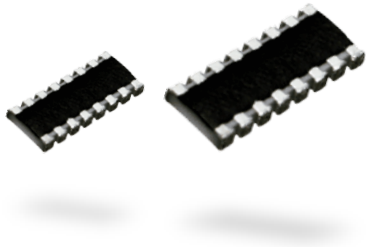
Panasonic
INDUSTRY

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

Product code

Thick film chip resistor networks

Code	inch size	Construction
14	0201×2	Convex terminal
18	0201×4	Flat terminal
24	0402×2	Convex terminal
28	0402×4	Convex terminal
2H	0602×8	Convex terminal
34	0603×2	Convex terminal
38	0603×4	Convex terminal
N8	0402×4	Concave terminal
V4	0603×2	Concave terminal
V8	0603×4	Concave terminal
S8	0805×4	Concave terminal

Schematics

Code	Schematics
V	Isolated type

Resistance value

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

Resistance tolerance

Code	Tolerance
J	±5 %
0	Jumper

Packaging methods

Code	Packaging	Part No.
Nil	Embossed carrier taping 4 mm pitch, 2,500 pcs	EXBS8V
X	Punched carrier taping 2 mm pitch,10,000 pcs	EXB14V
		EXB18V
		EXB24V
		EXB28V
		EXBN8V
V	Punched carrier taping 4 mm pitch, 5,000 pcs	EXB2HV
		EXB34V
		EXB38V
		EXBV4V
		EXBV8V

Ratings

【For Resistor】

Part No. (inch size)	Power rating (70 ℃) (W/element)	Limiting element voltage*1 (V)	Maximum overload voltage*2 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
EXB14V (0201×2)	0.031	12.5	25	±5	10 to 1 M (E24)	R<10 Ω : –200 to +600 10 Ω to 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)			Grade 1
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=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

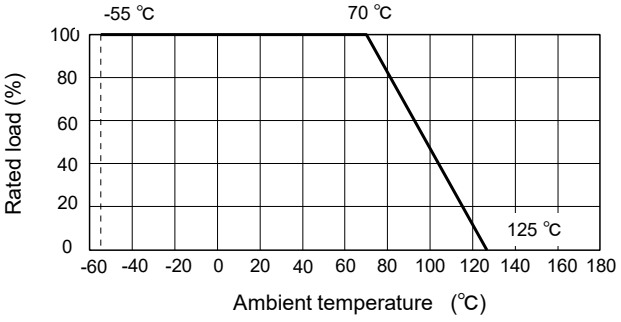
【For Jumper】

Part No.	Resistance	Rated current	Maximum overload current*1
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

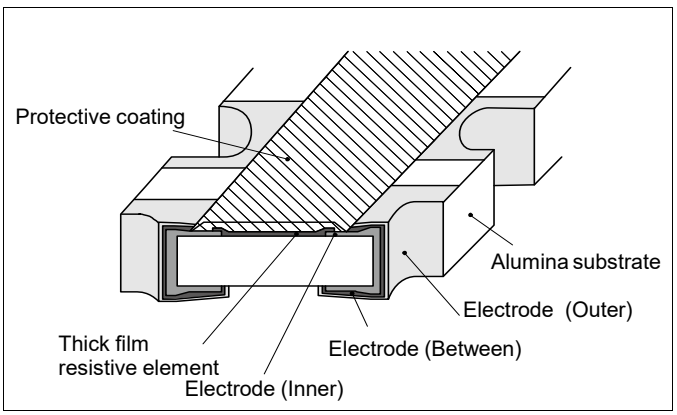
*1: Overload test current

Power derating curve

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

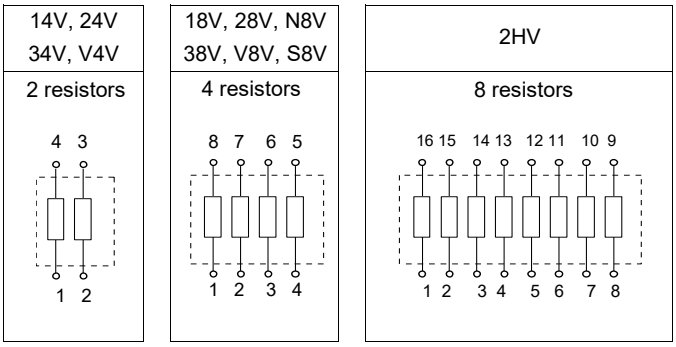


Construction (Example : Concave terminal)



Schematics

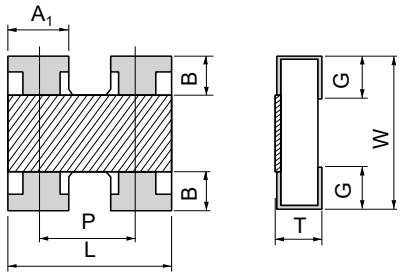
● Isolated type



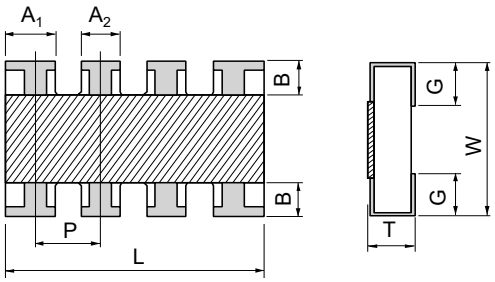
Dimensions (not to scale)

(1) Convex terminal type

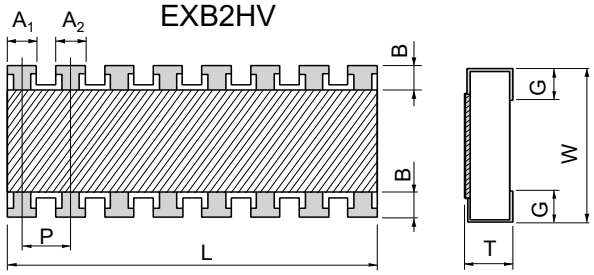
EXB14V, 24V, 34V



EXB28V, 38V



EXB2HV



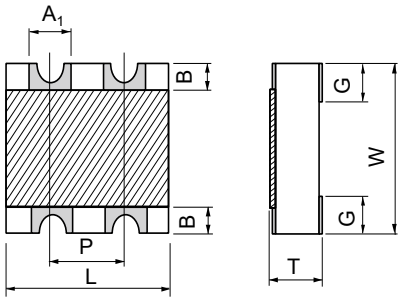
Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	B	P	G	
EXB14V (0201×2)	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 (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
EXB28V (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
EXB2HV (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
EXB34V (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
EXB38V (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

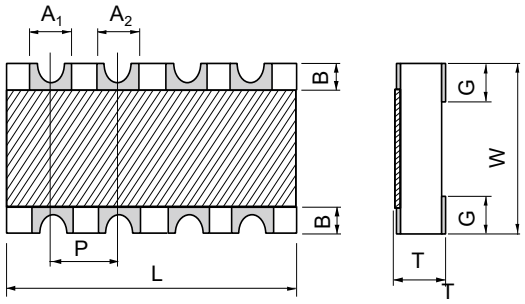
( ) Reference

(2) Concave terminal type

EXBV4V



EXBN8V, V8V, S8V



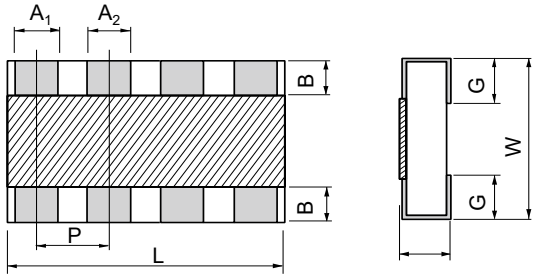
Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	B	P	G	
EXBN8V (0402×4)	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 (0603×2)	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 (0603×4)	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 (0805×4)	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

Dimensions (not to scale)

(3) Flat terminal type EXB18V



Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	B	P	G	
EXB18V (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

( ) Reference

Performance

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

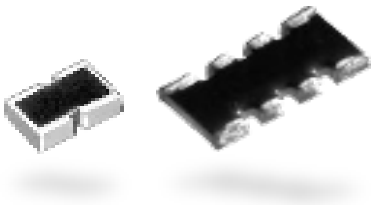
Panasonic
INDUSTRY

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

Product code

Thick film chip resistor networks

Code	inch size	Construction
U14	0201×2	Convex terminal
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

Resistance value

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

Resistance tolerance

Code	Tolerance
J	±5 %
0	Jumper

Packaging methods

Code	Packaging	Part No.
X	Punched carrier taping 2 mm pitch,10,000 pcs	EXBU14
		EXBU18
		EXBU24
		EXBU28
V	Punched carrier taping 4 mm pitch, 5,000 pcs	EXBU2H
		EXBU34
		EXBU38

Ratings

【For Resistor】

Part No. (inch size)	Power rating (70 ℃) (W/element)	Limiting element voltage*1 (V)	Maximum overload voltage*2 (V)	Resistance tolerance (%)	Resistance range (Ω)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	AEC-Q200 Grade
EXBU14 (0201×2)	0.031	12.5	25	±5	10 to 1 M (E24)	R<10 Ω : –200 to +600 10 Ω to 1 MΩ : ±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)			Grade 1
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=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

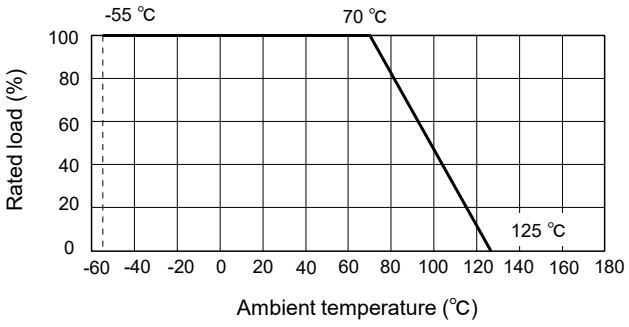
【For Jumper】

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

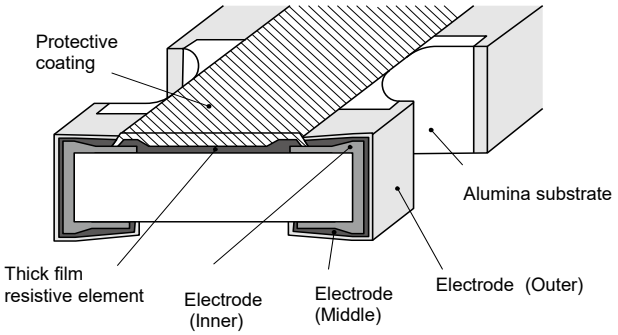
*1: Overload test current

Power derating curve

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

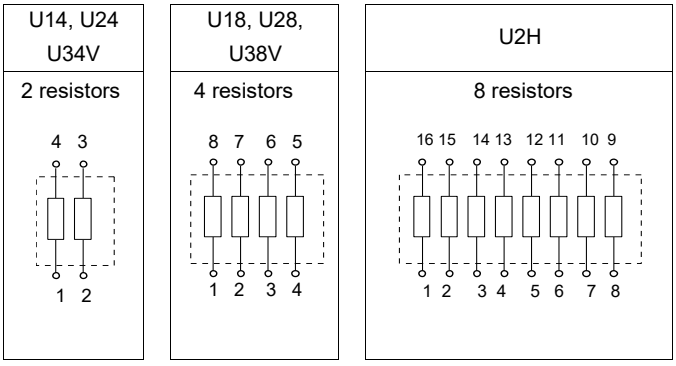


Construction



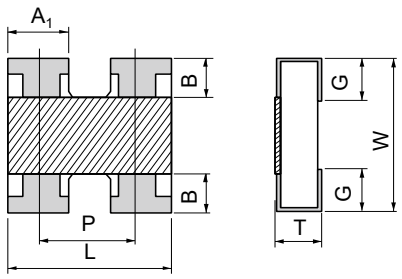
Schematics

● Isolated type

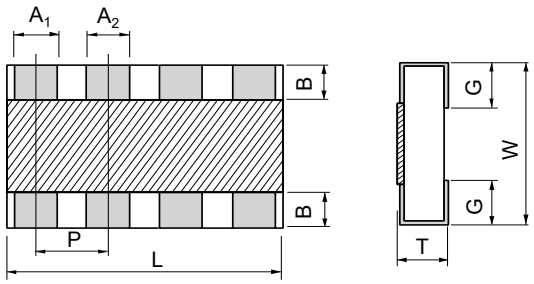


Dimensions (not to scale)

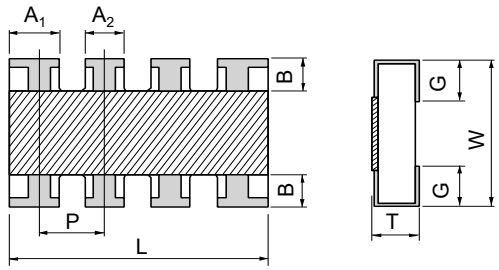
EXBU14, U24, U34



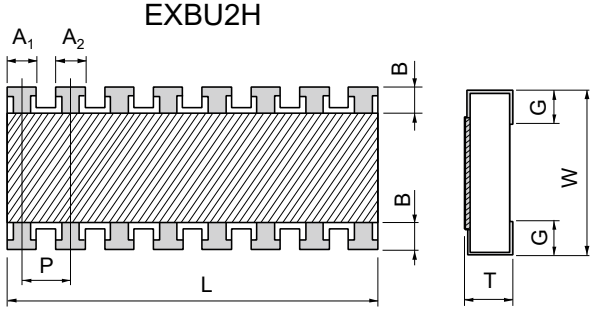
EXBU18



EXBU28, U38



EXBU2H



Unit : mm

Part No. (inch size)	Dimensions								Mass (Weight) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	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 ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within Specified T. C. R.	+25 ℃ / +125 ℃
Overload	±2 %	Rated voltage x 2.5，5 s Jumper type : Max. overload current，5 s
Resistance to soldering heat	±1 %	270 ℃, 10 s
Rapid change of temperature	±1 %	–55 ℃ (30 min.) / +125 ℃ (30 min.)，100 cycles
High temperature exposure	±1 %	+125 ℃, 1000 h
Damp heat, Steady state	±1 %	60 ℃, 90 % to 95 %RH, 1000 h
Load life in humidity	±3 %	60 ℃, 90 % to 95 %RH, Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h
Endurance at 70℃	±3 %	70℃，Rated voltage (Jumper type : Rated current), 1.5 h ON / 0.5 h OFF cycle, 1000 h

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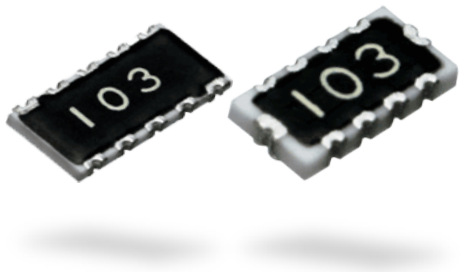
Chip Resistors Networks

EXB type

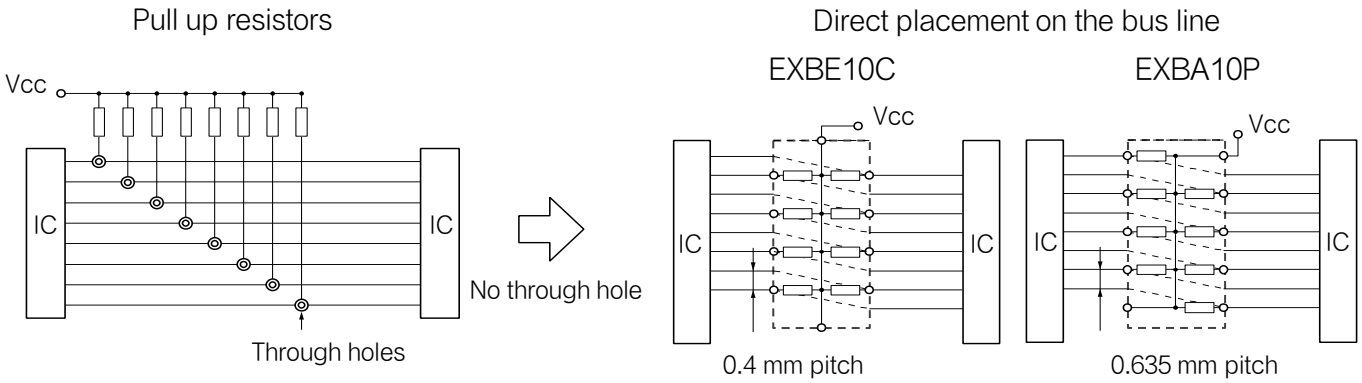
EXB D, E, A, Q series



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 】



■ **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	E	1	0	C	1	0	3	J	

Suffix for special requirements

Product code

Thick Film Resistor Networks

Dimension code of chip resistor network

Code	Inch	Dimensions (mm)
D	1206	3.2×1.6
E	1608	4.0×2.1
A	2512	6.4×3.1
Q	1506	3.8×1.6

Number of terminals

10 Terminals (EXBD) (EXBE) (EXBA)

16 Terminals (EXBQ)

Circuit configuration

Code	Common terminal position
C	Center common circuit (EXBD,EXBE)
P	Diagonal common circuit (Terminal 5 and Terminal 10) (EXBA)
P	One side common circuit (Terminal 16) (EXBQ)
E	Diagonal common circuit (Terminal 1 and Terminal 6) (EXBA)

Resistance value

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

Resistance tolerance

Code	Tolerance
J	±5 %

Ratings

Part No. (inch size)	Resistance range (Ω)	Resistance tolerance (%)	Number of terminals	Number of resistors	Power rating*1 (70 ℃) (W/element)	Limiting element voltage*2 (V)	Maximum overload voltage*3 (V)	T.C.R. (×10^{-6}/K)	Category temperature range (℃)	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		

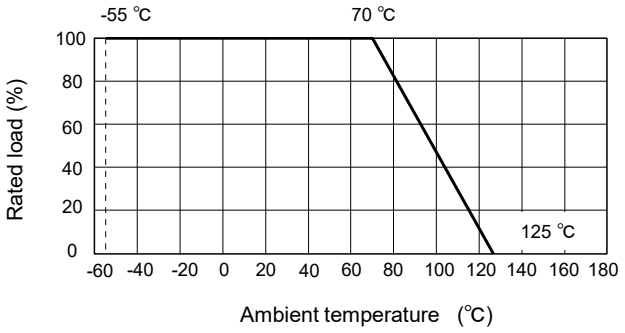
*1: Use it on the condition that the case temperature is below the upper category temperature.

*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.

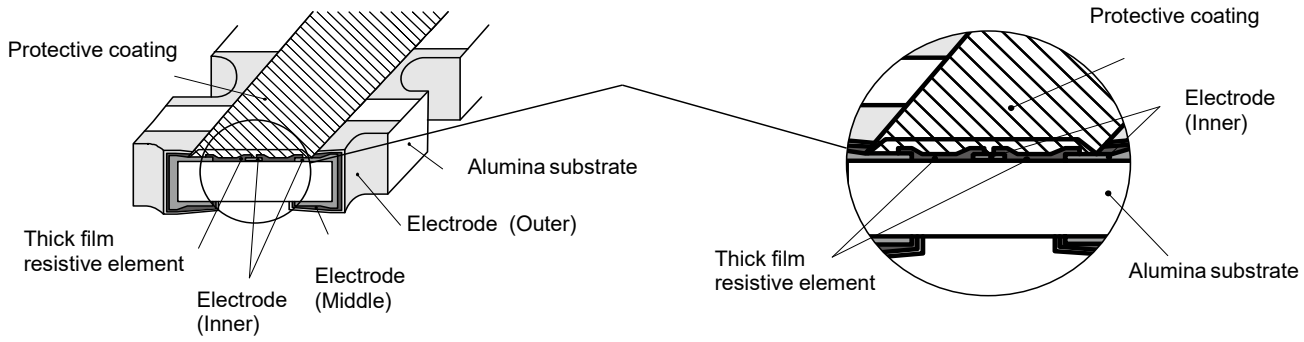
*3: Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCWV or Maximum Overload Voltage listed above, whichever less.

Power derating curve

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

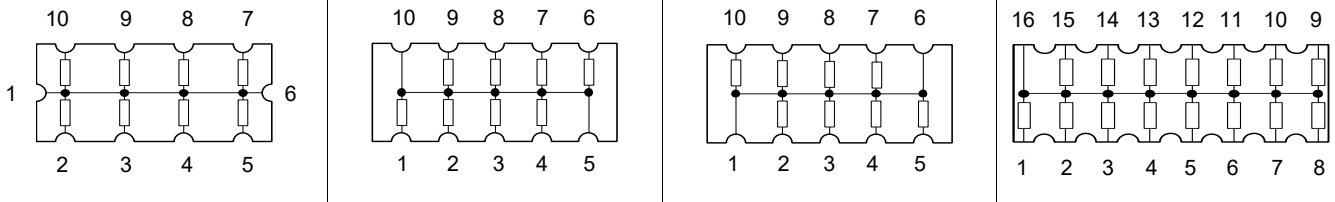


Construction (Example : EXBD)



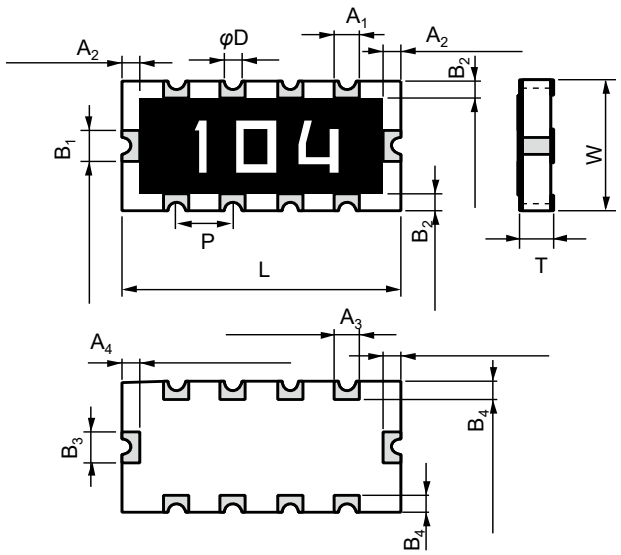
Circuit configuration

EXBD, EXBE	EXBA		EXBQ
	EXBA10P	EXBA10E	

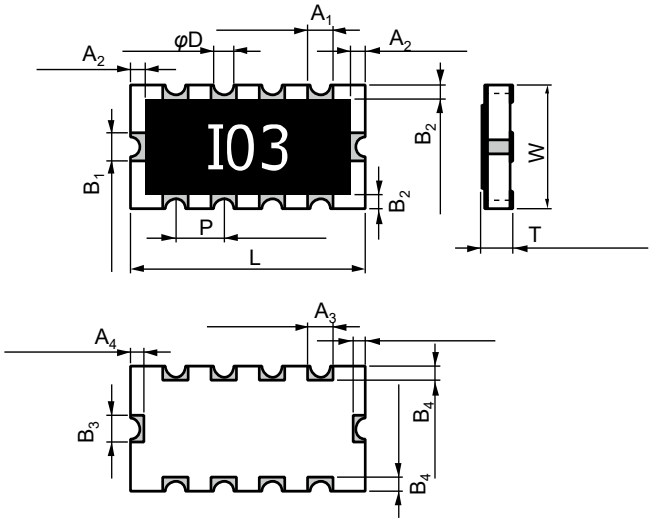


Dimensions (not to scale)

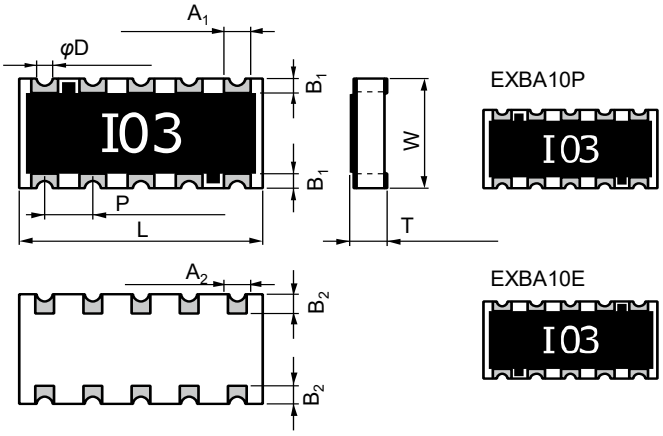
EXBD



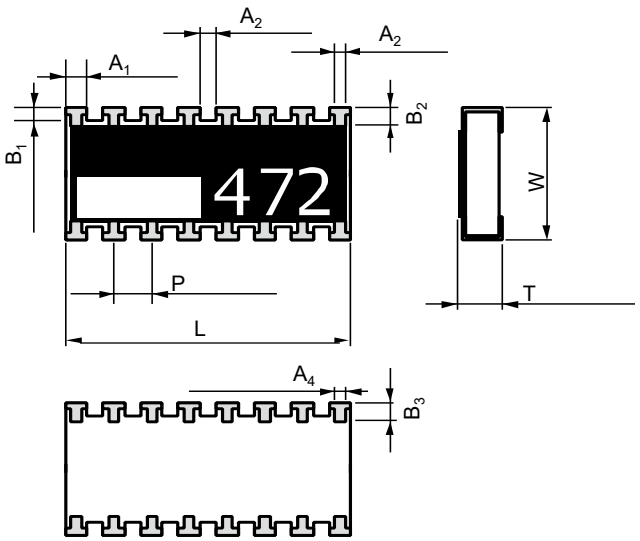
EXBE



EXBA



EXBQ



Unit : mm

Part No.	Dimensions							Mass (Weight) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	B_1	B_2	
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_3	A_4	B_3	B_4	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) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	B_1	B_2	
EXBE	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	16
	A_3	A_4	B_3	B_4	P	ø D		
	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) (Reference) (g/1000 pcs)
	L	W	T	A_1	B_1	A_2	B_2	
EXBA	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	40
	P	ø D						
	1.27±0.10	0.3+0.1/-0.2						

Part No.	Dimensions							Mass (Weight) (Reference) (g/1000 pcs)
	L	W	T	A_1	A_2	A_3	B_1	
EXBQ	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	9
	B_2	A_4	B_3	P				
	0.25±0.15	0.15+0.20/-0.05	0.30±0.15	0.5±0.1				

Performance

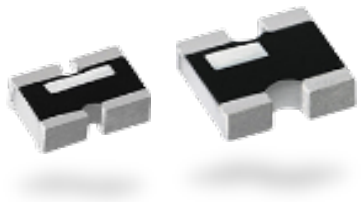
Test Item	Performance requirements ⊿R	Test conditions
Resistance	Within specified tolerance	20 ℃
T. C. R.	Within specified T. C. R.	+25 ℃ / +125 ℃
Overload	±3 %	Rated voltage x 2.5，5 s
Resistance to soldering heat	±1 %	260 ℃ ±5 ℃, 5 s ±1 s
Rapid change of temperature	±2 %	–55 ℃ (30 min.) / +125 ℃ (30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

Panasonic
INDUSTRY

Chip Attenuator

EXB type

EXB 14AT, 24AT series



Features

- Unbalanced π 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
Thick film resistor networks

Code	Dimensions and circuit configuration (π type attenuator)
14AT	0.8 mm × 0.6 mm (inch size : 0302)
24AT	1.0 mm × 1.0 mm (inch size : 0404)

Attenuation value
One-digit number /one letter shows attenuation value (Ex.) 1→1 dB, A→10 dB

Characteristics impedance	
A	50 Ω

Tolerance	
R3	±0.3 dB
R5	±0.5 dB

Packaging methods	
Code	Packaging
X	Punched carrier taping 2 mm pitch, 10,000 pcs

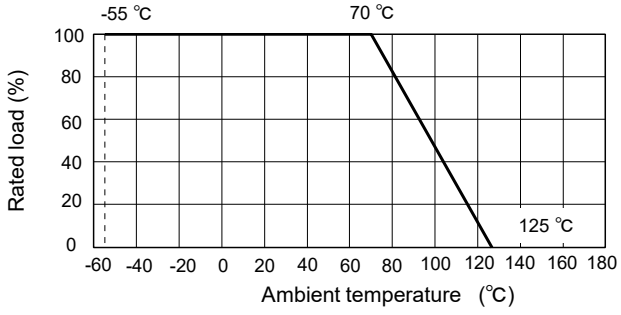
Ratings

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, 5dB : ±0.3 dB 6 dB, 10 dB : ±0.5 dB
Characteristic impedance	50 Ω
Power rating at 70 ℃	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 ℃ to +125 ℃

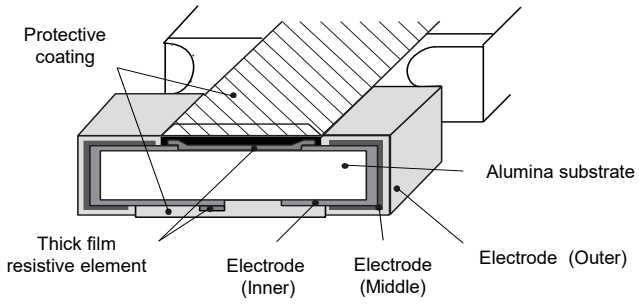
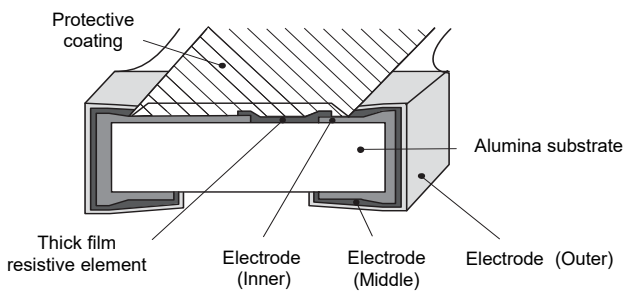
✻ Please inquire about the other Attenuator value

Power derating curve

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

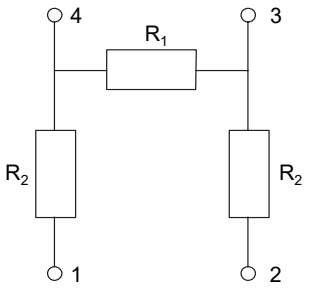


Construction

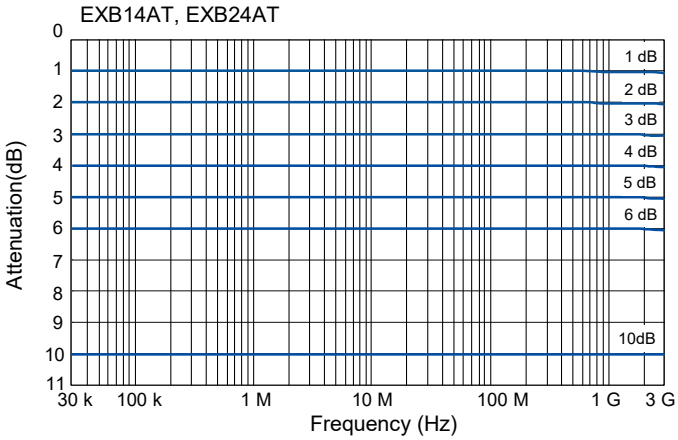
EXB14AT	EXB24AT
	

Circuit configuration

Unbalanced π type

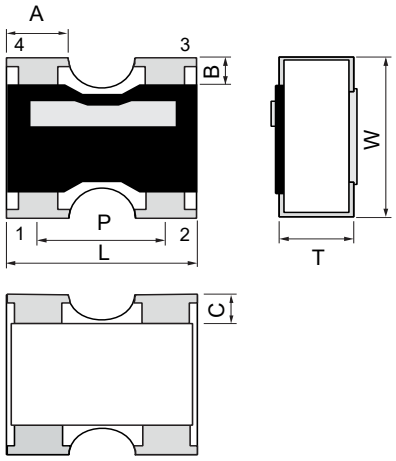


Attenuation-frequency characteristics



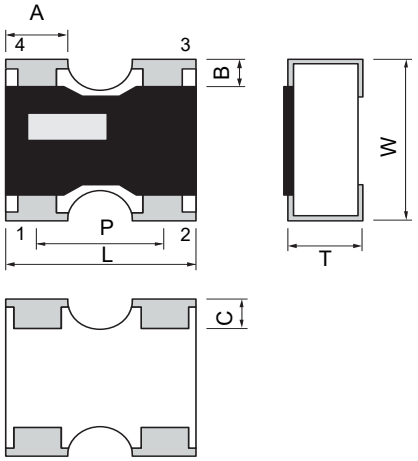
Dimensions (not to scale)

EXB14AT



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

EXB24AT



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

Unit : mm

Part No.	Dimensions							Mass (Weight) (Reference) (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 Packaging Method (Taping)

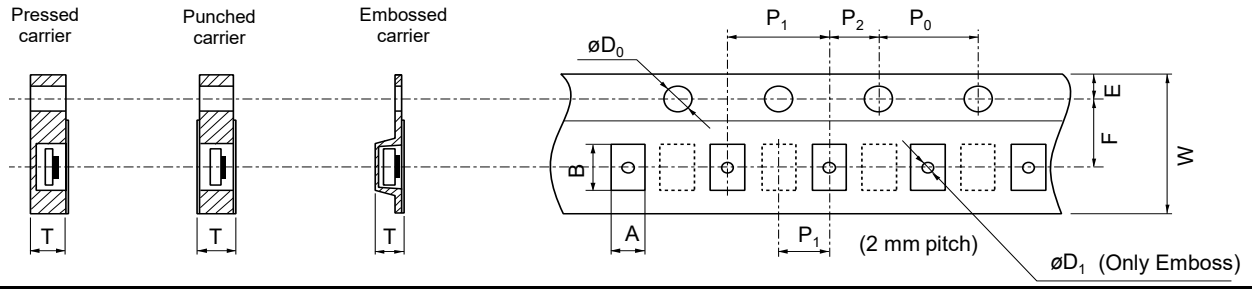
Surface mount resistors series			Packaging (Standard quantity : pcs/reel)			
Products	Part No.	Size (mm) (inch)	Pressed carrier taping (2 mm pitch)	Punched carrier taping (2 mm pitch)	Punched carrier taping (4 mm pitch)	Embossed carrier taping (4 mm pitch)
Thick film chip resistors	ERJXGN	0402 (01005)	20,000*1	—	—	40,000*2
	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*1	—	—	40,000*2
	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/8V/8K/8P	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 ERJ6D/6R/L06	2012 (0805)	—	—	5,000	—
	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
	ERJL1W	6432 (2512)	—	—	—	3,000
Current sensing resistors, Metal plate type	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
	ERJM1W	6432 (2512)	—	—	—	3,000
Current sensing resistors, Metal foil type	ERJMFBA	1005 (0402)	—	10,000	—	—
High power chip resistors/ Wide terminal type	ERJA1	3264 (1225)	—	—	—	4,000
	ERJB1/ERJC1*3 ERJD1*4	2550 (1020)	—	—	—	5,000
	ERJB2/ERJD2*4	1632 (0612)	—	—	5,000	—
	ERJB3	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 Packaging Method (Taping)

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/PM8	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 ERJU6S/U6Q	2012 (0805)	—	—	5,000	—
	ERJS08/U08	3216 (1206)	—	—	5,000	—
	ERJS14/U14	3225 (1210)	—	—	—	5,000
	ERJS12/U12	4532 (1812)	—	—	—	5,000
	ERJS1D/U1D	5025 (2010)	—	—	—	5,000
	ERJS1T/U1T	6432 (2512)	—	—	—	4,000
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
	EXB2HV	3816 (1506)	—	—	5,000	—
Anti-Sulfurated chip resistor array	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	—
	EXBU2H	3816 (1506)	—	—	5,000	—
Chip resistor networks	EXBD	3216 (1206)	—	—	5,000	—
	EXBE	4021 (1608)	—	—	—	4,000
	EXBA	6431 (2512)	—	—	—	4,000
	EXBQ	3816 (1506)	—	—	5,000	—
Chip attenuator	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_1	P_2	P_0	øD_0	T
ERJXGN ERJU0X	0402 (01005)	0.24±0.03	0.45±0.03	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	0.31±0.05
ERJ1GN ERJ1R□ ERJU01 ERA1A	0603 (0201)	0.38±0.05	0.68±0.05								0.42±0.05
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_1	P_2	P_0	øD_0	T
ERJ2□ ERJPA2 ERJ□□2 ERJ□2□ ERA2□	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
ERJMFBA											0.60±0.05

● Chip resistor array / Anti-Sulfurated chip resistor Aarray / Chip attenuator

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T
EXB14V EXB14AT	0806 (0302)	0.70 +0.10/-0.05	0.95 +0.05/-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
EXB18V	1406 (0502)	1.20±0.10	1.60±0.10								
EXB24V EXBU24 EXB24AT	1010 (0404)		1.20±0.10								
EXB28V EXBU28 EXBN8V	2010 (0804)		2.20±0.10								

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_1	P_2	P_0	øD_0	T
ERJ3□ ERJ3LW(10mΩ) ERJ3BW ERJ□□3 ERJ□3□ ERA3□	1608 (0603)	1.10±0.10	1.90±0.10	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
ERJ3LW(5mΩ)											0.84±0.05
ERJ6□ ERJ□□6 ERJ□6□ ERA6□	2012 (0805)	1.65±0.15	2.50±0.20								
ERJB3	1220 (0508)										
ERJ6BW ERJ6LW ERJ6CW	2012 (0805)	1.55±0.15	2.30±0.20								0.94±0.05
ERJ8□ ERJ8□W ERJ□□8 ERA8□	3216 (1206)	2.00±0.15	3.60±0.20								0.84±0.05
ERJB2 ERJD2	1632 (0612)										

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

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T
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
EXB38V EXBU38	3216 (1206)		3.60±0.20								
EXB2HV EXBU2H	3816 (1506)		4.10±0.15								
EXBV4V	1616 (0606)		1.95±0.20								0.84±0.05
EXBV8V	3216 (1206)		3.60±0.20								
EXBD	3216 (1206)	2.00±0.20	3.60±0.20								0.84±0.10
EXBQ	3816 (1506)	1.90±0.20	4.10±0.20								0.64±0.05

Embossed carrier taping (1 mm Pitch)

● Chip resistors

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T
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

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T	øD_1
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	12.00 ±0.30	5.50±0.20							15 min.
ERJ12Z ERJ12S ERJ□1D	5025 (2010)	2.80±0.20	5.30±0.20									
ERJB1 ERJC1 ERJD1	2550 (1020)											
ERJ1T□ ERJ□1T	6432 (2512)	3.60±0.20	6.90±0.20									
ERJL1W											1.60±0.10	
ERJA1	3264 (1225)	3.50±0.20	6.80±0.20								1.10±0.20	

● Current sensing resistors, Metal plate type

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T	øD_1
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	—
ERJMP2 (2 mΩ)	3216 (1206)										1.40±0.20	—
ERJMP2 (3 to 50 mΩ)	3216 (1206)										1.10±0.20	—
ERJMP3 (1 to 2 mΩ)	5025 (2010)	2.90±0.20	5.40±0.20	12.00 ±0.30	5.50±0.10						1.55±0.20	—
ERJMP3 (3 to 50 mΩ)	5025 (2010)										1.15±0.20	—
ERJMB1	2550 (1020)										1.55±0.20	—
ERJMP4 (1 to 2 mΩ)	6432 (2512)	3.50±0.20	6.90±0.20	12.00 ±0.30	5.50±0.10						1.60±0.20	1.5 min.
ERJMP4 (3 to 50 mΩ)	6432 (2512)										1.20±0.20	—
ERJMS4	6432 (2512)										1.60±0.20	1.5 min.
ERJM1W	6432 (2512)										1.80±0.20	1.5 min.

● Chip resistor array / Chip resistor networks

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T	øD_1
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.
EXBE	4021 (1608)	2.50±0.20	4.40±0.20								1.10±0.20	
EXBA	6431 (2512)	3.50±0.20	6.80±0.20									

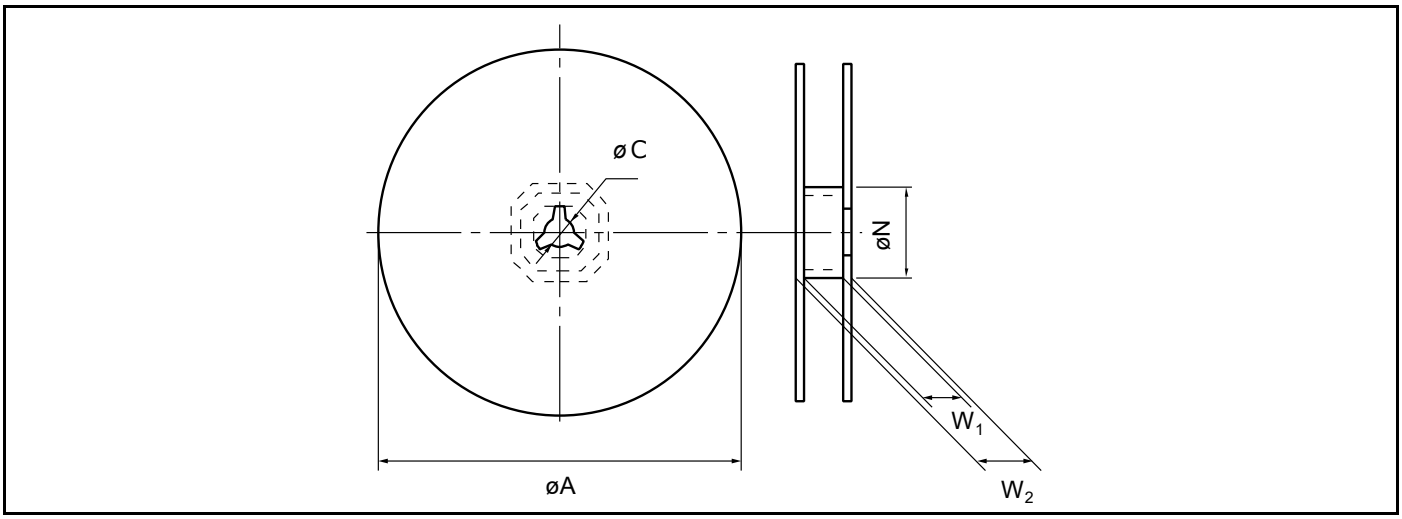
Embossed carrier taping (8 mm Pitch)

● Current sensing resistors, Metal plate type

Unit : mm

Part No.	Size (inch)	A	B	W	F	E	P_1	P_2	P_0	øD_0	T	øD_1
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



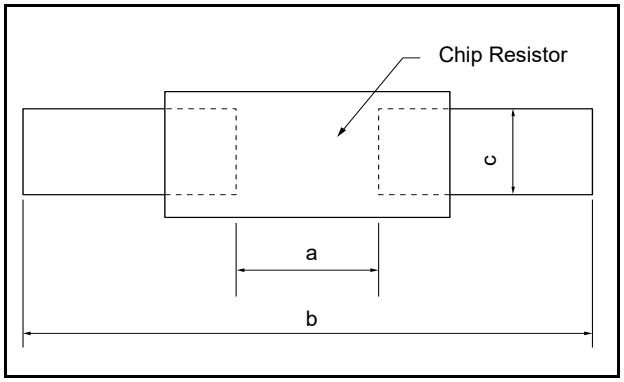
Unit : mm

Tape width (W)	Dimensions				
	øA	øN	øC	W_1	W_2
4 mm width	180.0±3.0	60.0+1.0/0	13.0±0.2	4.5±0.5	7.0±0.5
8 mm width	180.0 0/-1.5			9.0+1.0/0	11.4±1.0
12 mm width				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

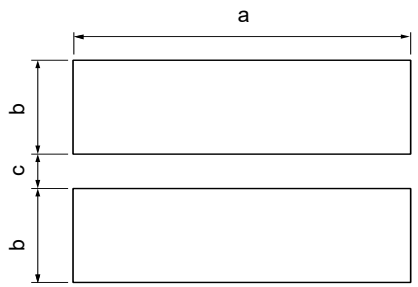
* ERJL1W

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)				
ERJ8CW (18 to 50 mΩ)		2.0 to 2.6	4.4 to 5.0	1.2 to 1.8

Unit : mm

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



Unit : mm

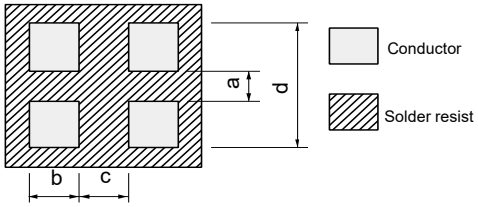
Part No.	Dimensions		
	a	b	c
ERJA1	6.4	1.70	0.60
ERJB1 ERJC1*1 ERJD1*2	5.0	1.30	0.75
ERJB2 ERJD2*2	3.2	0.95	0.70
ERJB3	2.0	0.80	0.60

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

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

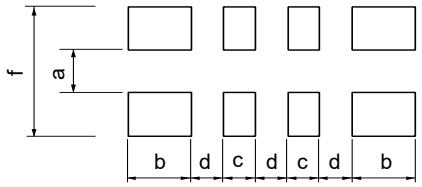
Recommended land pattern

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



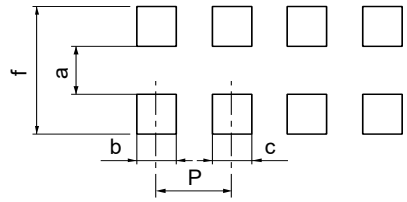
Unit : mm

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



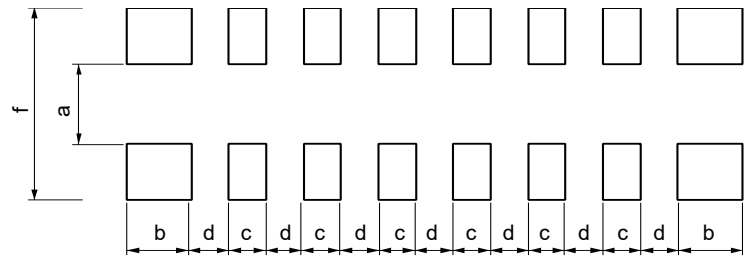
Unit : mm

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



Unit : mm

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

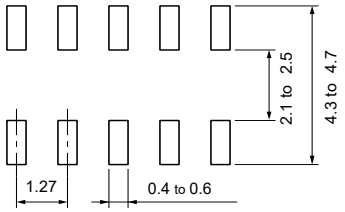
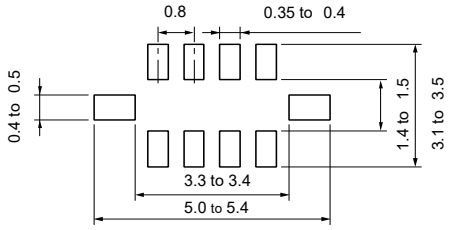
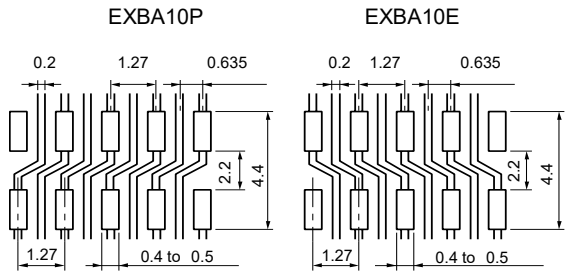
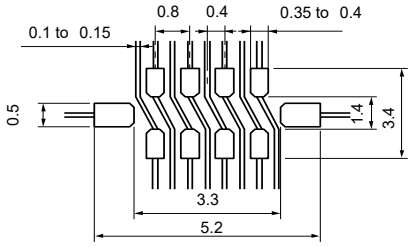


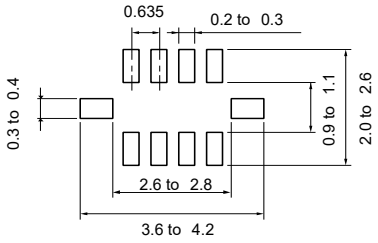
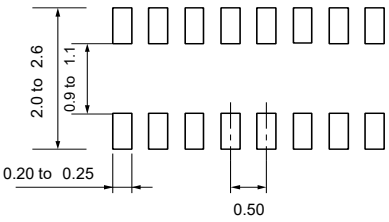
Unit : mm

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	Pitch 1.27 mm 	Pitch 0.8 mm 
For high density pattern✻	Pitch 0.635 mm Through-hole less 	Pitch 0.8 mm Through-hole less 

	EXBD	EXBQ
For popular pattern	Pitch 0.635 mm 	Pitch 0.5 mm 

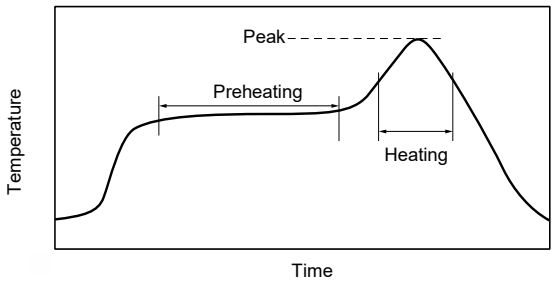
✻ When designing high density land patterns, examine the reliability of isolation among the lines and adopt the chip resistor networks.

Recommended soldering conditions (Rectagular 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 be fore actual use.



For soldering (Example : Sn/Pb)

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

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

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

● **Recommended soldering conditions for flow**

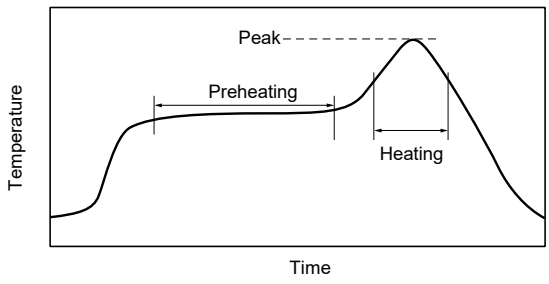
	For soldering		For lead-free soldering	
	Temperature	Time	Temperature	Time
Preheating	140 ℃ to 160 ℃	60 s to 120 s	150 ℃ to 180 ℃	60 s to 120 s
Soldering	245 ± 5 ℃	20 s to 30 s	max. 260 ℃	max. 10 s

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 be fore actual use.



For soldering (Example : Sn/Pb)

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

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

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

● **Flow soldering**

We do not recommend flow soldering, because a solder bridge may form.
Please contact us regarding flow sol der ing 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 forresistors 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 iden tified 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
10	10	10	100	100
				102
			105	105
				107
		11	110	110
				113
			115	115
				118
	12	12	121	121
				124
			127	127
				130
		13	133	133
				137
			140	140
				143
			147	147
				150
15	15	15	154	154
				158
		16	162	162
				165
			169	169
				174
			178	178
				182
	18	18	187	187
				191
			196	196
		20		200
			205	205
				210

E6	E12	E24	E48	E96
22	22	22	215	215
				221
			226	226
				232
		24	237	237
				243
			249	249
				255
	27	27	261	261
				267
			274	274
				280
			287	287
				294
		30	301	301
				309
			316	316
				324
33	33	33	332	332
				340
			348	348
				357
		36	365	365
				374
			383	383
				392
	39	39	402	402
				412
			422	422
		43		432
			442	442
				453

E6	E12	E24	E48	E96
47	47	47	464	464
				475
			487	487
				499
		51	511	511
				523
			536	536
				549
	56	56	562	562
				576
			590	590
				604
		62	619	619
				634
			649	649
				665
68	68	68	681	681
				698
			715	715
				732
		75	750	750
				768
			787	787
				806
	82	82	825	825
				845
			866	866
				887
		91	909	909
				931
			953	953
				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

Panasonic Industry Co., Ltd.
Device Solutions Business Division

1006 Kadoma, Kadoma City, Osaka
571-8506 Japan

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