

Precision Thick Film Chip Resistors

ERJ R: 0402, 0603, 0805

ERJ E: 0603, 0805, 1206,
1210, 1812

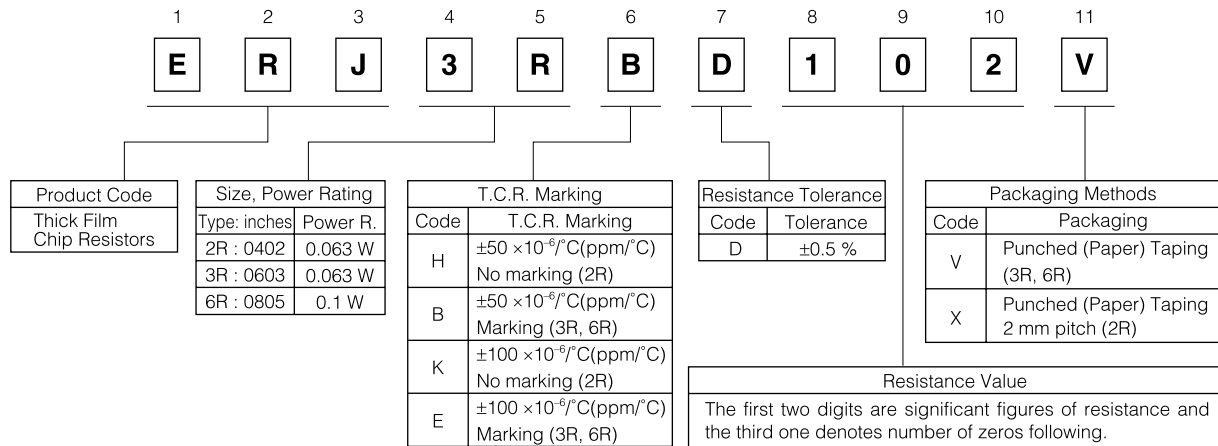
Type: ERJ 2R, 3R, 6R
ERJ 3E, 6E, 8E, 14, 12



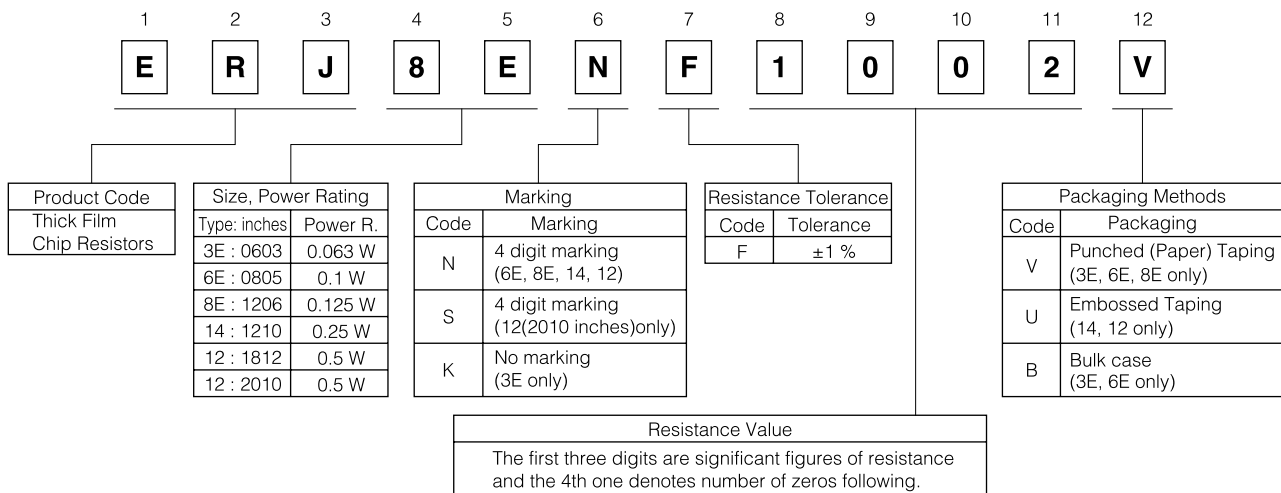
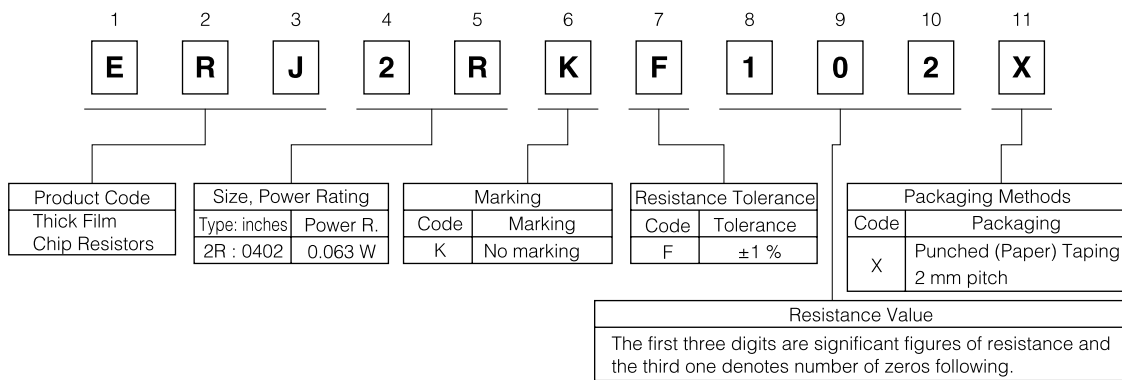
■ Features

- Small size and lightweight
For PCB size reduction and lightweight products
- High reliability
Metal glaze thick film resistive element and three layered electrode results in high reliability.
- Matching with placement machines
Bulk, Taping and magazine packagings for automatic placement machines
- Solderability
Suitable for both reflow soldering and flow soldering
- Marking
Four digit marking of resistance value on resistive element side (except 2R, 3R, 6R, 3E Type)
- High power
One rank up approval of power rating is available for 3E, 6E, 8E type
- Low Resistance Tolerance
ERJ2R, 3E, 6E, 8E, 14, 12 Series ... ±1%
ERJ2R, 3R, 6R Series ±0.5%
- Reference Standards
IEC 60115-8, JIS C 5201-8

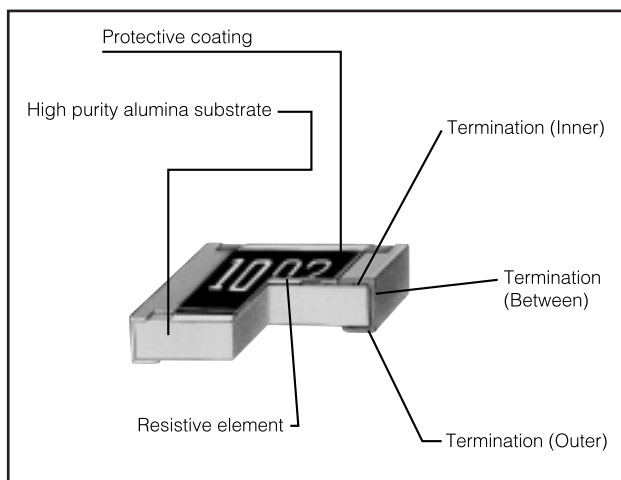
■ Explanation of Part Numbers (ERJ2R, 3R, 6R Series, ±0.5 % type)



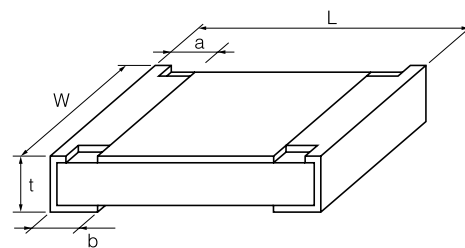
■ Explanation of Part Numbers (ERJ2R, 3E, 6E, 8E, 14, 12 Series, ±1 % type)



■ Construction



■ Dimensions in mm (not to scale)



Type (inches)	Dimensions (mm)					Weight (1000 pcs.)
	L	W	a	b	t	
ERJ2R (0402)	1.00 ^{+0.05}	0.50 ^{+0.05}	0.20 ^{+0.10}	0.25 ^{+0.05}	0.35 ^{+0.05}	0.8 g
ERJ3R (0603)	1.60 ^{+0.15}	0.80 ^{+0.15} _{-0.05}	0.30 ^{+0.20}	0.30 ^{+0.15}	0.45 ^{+0.10}	2 g
ERJ6R (0805)	2.00 ^{+0.20}	1.25 ^{+0.10}	0.40 ^{+0.20}	0.40 ^{+0.20}	0.60 ^{+0.10}	4 g
ERJ3EK (0603)	1.60 ^{+0.15}	0.80 ^{+0.15} _{-0.05}	0.30 ^{+0.20}	0.30 ^{+0.15}	0.45 ^{+0.10}	2 g
ERJ6EN (0805)	2.00 ^{+0.20}	1.25 ^{+0.10}	0.40 ^{+0.20}	0.40 ^{+0.20}	0.60 ^{+0.10}	4 g
ERJ8EN (1206)	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 g
ERJ14N (1210)	3.20 ^{+0.20}	2.50 ^{+0.20}	0.50 ^{+0.20}	0.50 ^{+0.20}	0.60 ^{+0.10}	16 g
ERJ12N (1812)	4.50 ^{+0.20}	3.20 ^{+0.20}	0.50 ^{+0.20}	0.50 ^{+0.20}	0.60 ^{+0.10}	27 g
ERJ12S (2010)	5.00 ^{+0.20}	2.50 ^{+0.20}	0.60 ^{+0.20}	0.60 ^{+0.20}	0.60 ^{+0.10}	27 g

■ Ratings

Type (inches)	Power Rating at 70 °C (W)	Limiting Element Voltage (Maximum RCWV) ⁽¹⁾ (V)	Maximum Overload Voltage ⁽²⁾ (V)	Resistance Tolerance (%)	Resistance Ranges (Ω)		T.C.R. ×10 ⁻⁶ /°C (ppm/°C)	Standard Resistance Values
					min.	max.		
ERJ2R (0402)	0.063	50	100	±0.5	10	91	±100	E24
					100	100 K	±50	
					110 K	1 M	±100	
ERJ3R (0603)	0.063	50	100	±0.5	10	91	±100	E24
					100	100 K	±50	
					110 K	1 M	±100	
ERJ6R (0805)	0.1	150	200	±0.5	10	91	±100	E24
					100	100 K	±50	
					110 K	1 M	±100	
ERJ2RK (0402)	0.063	50	100	±1	10	1 M	±100	E24
ERJ3EK (0603)	0.063 (0.1)*	50	100	±1	10	1 M	±100	E24,E96
ERJ6EN (0805)	0.1 (0.125)*	150	200	±1	10	2.2 M	±100	E24,E96
ERJ8EN (1206)	0.125 (0.25)*	200	400	±1	10	2.2 M	±100	E24,E96
ERJ14N (1210)	0.25	200	400	±1	10	1 M	±100	E24,E96
ERJ12N, 12S (1812), (2010)	0.5	200	400	±1	10	1 M	±100	E24,E96

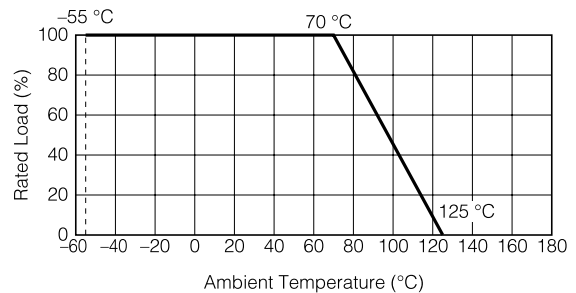
(1) Rated Continuous Working Voltage (RCWV) shall be determined from $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Values}}$, or Limiting Element Voltage (max. RCWV) listed above, whichever less.

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

* Please ask us when resistors guaranteed high power are needed.

Power Derating Curve

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

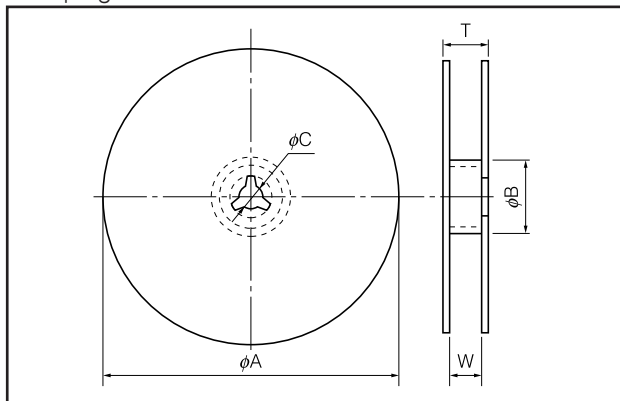


■ Packaging Methods

● Standard Quantity

Type (inches)	Thickness (mm)	Punched (Paper) Taping (4 mm pitch)	Embossed Taping (4 mm pitch)	Bulk Case
ERJ2R (0402)	0.35	10000 pcs./reel(2 mm pitch)		
ERJ3R (0603)	0.45	5000 pcs./reel		
ERJ6R (0805)	0.6	5000 pcs./reel		
ERJ2RK (0402)	0.35	10000 pcs./reel(2 mm pitch)		
ERJ3EK (0603)	0.45	5000 pcs./reel		25000 pcs./case
ERJ6EN (0805)	0.6	5000 pcs./reel		10000 pcs./case
ERJ8EN (1206)	0.6	5000 pcs./reel		
ERJ14N (1210)	0.6		5000 pcs./reel	
ERJ12N, 12S (1812), (2010)	0.6		5000 pcs./reel	

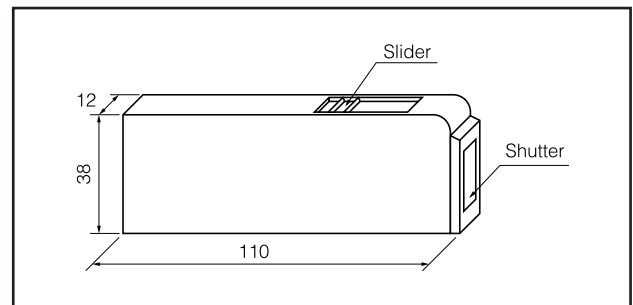
● Taping Reel



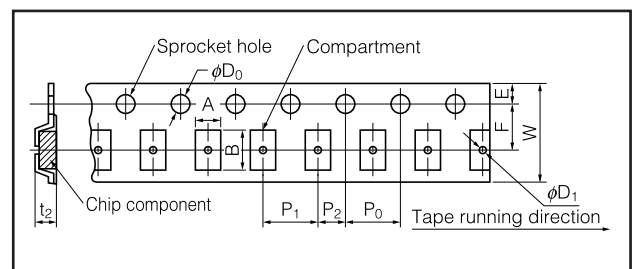
Dimensions (mm)	Type	ϕA	ϕB	ϕC	W	T
	2R, 3R, 6R 3EK, 6EN, 8EN, 14N	180.0 ⁰ _{-3.0}	60 min.	13.0 ^{±1.0}	9.0 ^{±1.0}	11.4 ^{±2.0}
	12N, 12S				13.0 ^{±1.0}	15.4 ^{±2.0}

● Bulk Case

(mm)



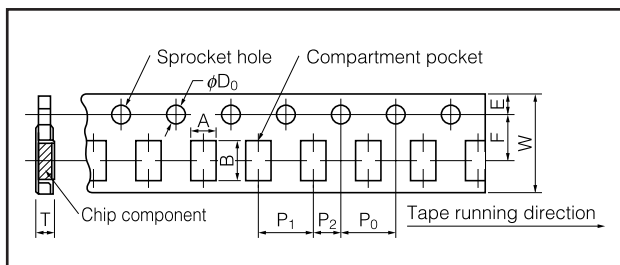
● Embossed Taping



Dimensions (mm)	Type	A	B	W	F	E	P ₁
	14N	2.80 ^{±0.20}	3.50 ^{±0.20}	8.00 ^{±0.30}	3.50 ^{±0.05}	1.75 ^{±0.10}	4.00 ^{±0.10}
	12N	3.50 ^{±0.20}	4.80 ^{±0.20}	12.00 ^{±0.30}	5.50 ^{±0.05}		
	12S	2.80 ^{±0.20}	5.30 ^{±0.20}				

Dimensions (mm)	Type	P ₂	P ₀	ϕD_0	t ₂	ϕD_1
	14N	2.00 ^{±0.05}	4.00 ^{±0.10}	1.50 ^{±0.10}	1.00 ^{±0.10}	1 min.
	12N					1.5 min.
	12S					

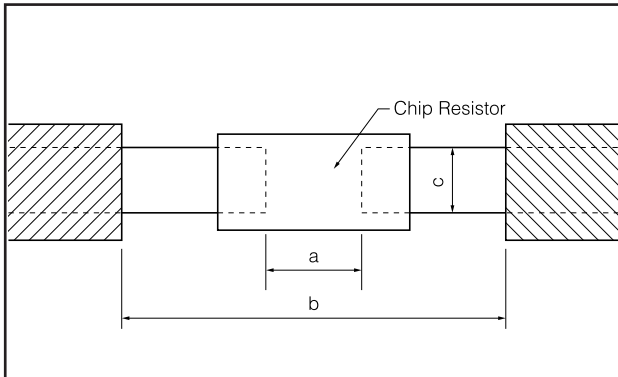
● Punched (Paper) Taping



Dimensions (mm)	Type	A	B	W	F	E	P ₁	P ₂	P ₀	ϕD_0	T
	2R	0.70 ^{±0.05}	1.20 ^{±0.05}	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}	0.52 ^{±0.05}
	3R, 3EK	1.10 ^{±0.10}	1.90 ^{±0.10}								0.70 ^{±0.05}
	6R, 6EN	1.65 ^{±0.15}	2.50 ^{±0.20}								0.84 ^{±0.05}
	8EN	2.00 ^{±0.15}	3.60 ^{±0.20}								

■ Recommended Land Pattern

In the case of flow soldering, the land width must be smaller than the Chip Resistor width to control the solder amount properly. Generally, the land width should be 0.7 to 0.8 times (W) of the width of chip resistor. In the case of reflow soldering, solder amount can be adjusted, therefore the land width should be set to 1.0 to 1.3 times chip resistor width (W).



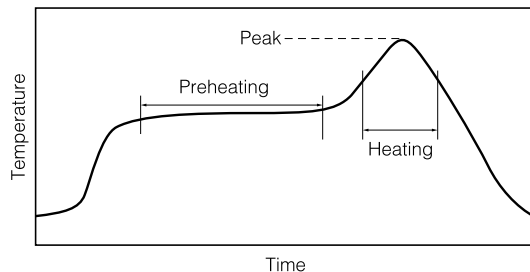
Type (inches)	Dimensions (mm)		
	a	b	c
ERJ2R (0402)	0.5 to 0.6	1.4 to 1.6	0.4 to 0.6
ERJ3R, 3EK (0603)	0.7 to 0.9	2 to 2.2	0.8 to 1
ERJ6R, 6EN (0805)	1 to 1.4	3.2 to 3.8	0.9 to 1.4
ERJ8EN (1206)	2 to 2.4	4.4 to 5	1.2 to 1.8
ERJ14N (1210)	2 to 2.4	4.4 to 5	1.8 to 2.8
ERJ12N (1812)	3.3 to 3.7	5.7 to 6.5	2.3 to 3.5
ERJ12S (2010)	3.6 to 4	6.2 to 7	1.8 to 2.8

■ Recommended Soldering Conditions

Recommendations and precautions are described below.

● Recommended soldering conditions for reflow

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



For solder (Example : Sn/Pb)

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

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

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

● Recommended soldering conditions for flow

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

⚠ Cautions for Safety

1. If transient load (heavy load in a short time) like pulse is expected to be applied, carry out evaluation and confirmation test with the resistors actually mounted on your own board.
When the load of more than rated power is applied under the load condition at steady state, it may impair performance and/or reliability of resistor.
Never exceed the rated power.
2. Chlorine type or other high-activity flux is not recommended as the residue may affect performance or reliability of resistors.
3. When soldering with soldering iron, never touch the body of the chip resistor with a tip of the soldering iron. When using a soldering iron with a tip at high temperature, solder for a time as short as possible (three seconds or less up to 350 °C).
4. Avoid physical shock to the resistor and nipping of the resistor with hard tool (a pair of pliers or tweezers) as it may damage protective film or the body of resistor and may affect resistor's performance.