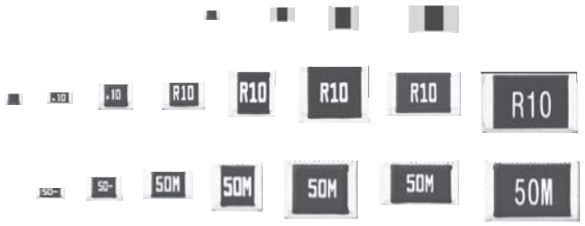
Thick Film Chip Resistors / Low Resistance Type



Series: ERJ 2LW, 3LW, 6LW,
ERJ 2BW, 3BW, 6BW, 8BW, 6CW, 8CW
ERJ 2B, 3B, 6D, 6B, 8B, 14B,
ERJ 3R, 6R, 8R, 14R, 12R, 12Z, 1TR
ERJ L03, L06, L08, L14, L12, L1D, L1W

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
  <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 : 0.05 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

● ERJ2BS/2BQ, 3BS/3BQ, 6BS/6BQ, 8BS/8BQ, 14BS/14BQ, 6D, 3R, 6R, 8R, 14R, 12R, 12Z, 1TR
<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 <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
L1W	2512	1 W

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	ERJL1W

Ratings

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

Part No. (inch size)	Power Rating at 70 °C (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	−55 to +125	Grade 1
			10 m	0 to +300	−55 to +125	
ERJ6LW (0805)	0.5	±1, ±2, ±5	5, 6, 7, 8, 9 m	0 to +300	−55 to +125	Grade 1
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	−55 to +155	Grade 0
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	−55 to +155	Grade 0
ERJ8BW (1206)	1	±1, ±2, ±5	10 m to 100 m (E24)	10 mΩ ≤ R < 20 mΩ:0 to +200 20 mΩ ≤ R < 47 mΩ:0 to +150 47 mΩ ≤ R ≤ 100 mΩ:0 to +100	−55 to +155	Grade 0
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	−55 to +125	Grade 1

(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.
(2) Please contact us when resistors of irregular series are needed.

Ratings

<High power type>

Part No. (inch size)	Power Rating at 70 °C (1) (W)	Resistance Tolerance(2) (%)	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	−55 to +155	Grade 0
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,E96)	0.10 Ω ≤ R < 0.22 Ω : 0 to +150	−55 to +155	Grade 0
ERJ6DQ (0805)			0.22 to 9.1 (E24,E96)	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	−55 to +155	Grade 0
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	−55 to +155	Grade 0
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	−55 to +155	Grade 0
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 also have ±0.5 %, ±1 % line-up.
・Rated Continuous Working Voltage (RCWV) shall be determined from RCWV=$\sqrt{\text{Power Rating} \times \text{Resistance Value}}$.
・Overload Test Voltage (OTV) shall be determined from OTV=Specified Magnification (refer to performance) × RCW.
(3) Please contact us when resistors of irregular series are needed.

<Standard type>

Part No. (inch size)	Power Rating at 70 °C (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	−55 to +155	Grade 0
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	−55 to +155	Grade 0
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	−55 to +155	Grade 0
ERJ14RQ (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		
ERJ12RS (1812)	0.5	±1, ±2, ±5	0.10 to 0.20 (E24)	0.10 Ω ≤ R < 0.22 Ω : 0 to +200	−55 to +155	Grade 0
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	−55 to +155	Grade 0
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	−55 to +155	Grade 0
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.
・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.
(2) Please contact us when resistors of irregular series are needed.

Ratings

<Low TCR type>

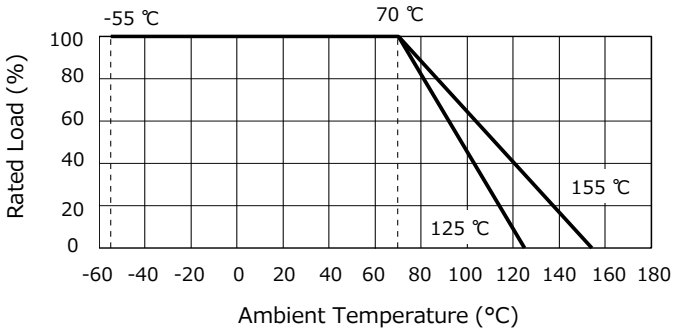
Part No. (inch size)	Power Rating at 70 °C (1) (W)	Resistance Tolerance (%)	Resistance Range(2) (Ω)	T.C.R. (×10^{-6}/K)	Category Temperature Range (℃)	AEC-Q200 Grade
ERJL03 (0603)	0.2	±1, ±5	47 m to 100 m	±200	−55 to +125	Grade 1
ERJL06 (0805)	0.25	±1, ±5	47 m to 100 m	±100	−55 to +125	Grade 1
ERJL08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

(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.

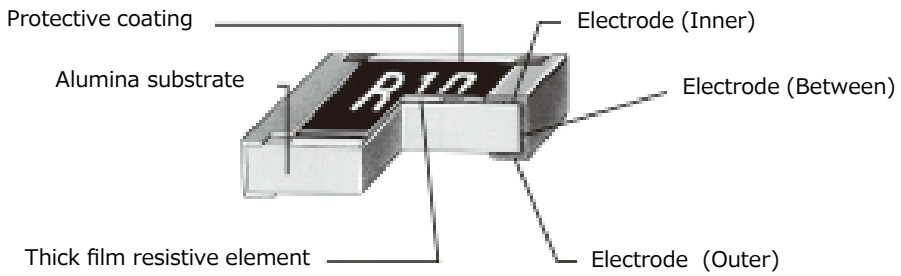
(2) Standard R.V. : 20 mΩ, 22 mΩ, 33 mΩ, 39 mΩ, 47 mΩ, 50 mΩ, 100 mΩ, Custom R.V. : Each 1 mΩ within upper range.

Power Derating Curve

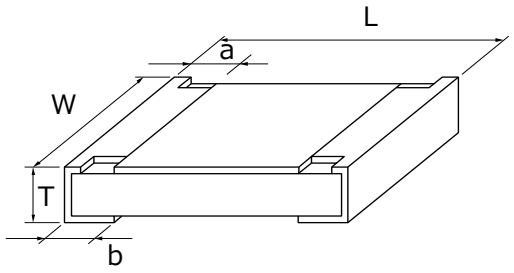
For resistors operated in ambient temperatures above 70 °C, power rating shall be derated in accordance with the figure on the right.



Construction



Dimensions in mm (not to scale)



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

Performance

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

Test Item	Performance Requirements ⊿R	Test Conditions
Resistance	Within Specified Tolerance	20 °C
T. C. R.	Within Specified T. C. R.	+25 °C/+125 °C
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 °C, 10 s
Rapid Change of Temperature	±1 % ERJ2LW : ±2 %	−55 °C (30min.) / +155 °C (ERJ□LW, ERJ□CW : +125 ℃) (30 min.), 100 cycles
High Temperature Exposure	±1 %	+155 °C (ERJ□LW, ERJ□CW : +125 ℃), 1000 h
Damp Heat, Steady State	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load Life in Humidity	±3 %	60 °C, 90 % to 95 %RH, Rated Voltage, 1.5 h ON / 0.5 h OFF cycle , 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated Voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

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

Test Item	Performance Requirements ⊿R	Test Conditions
Resistance	Within Specified Tolerance	20 °C
T. C. R.	Within Specified T. C. R.	+25 °C/+125 °C
Overload	±2 %	Rated Voltage× 2.5 (ERJ6D : ×1.77), 5 s
Resistance to Soldering Heat	±1 %	270 °C, 10 s
Rapid Change of Temperature	±1 %	−55 °C (30 min.) / +155 °C (30 min.), 100 cycles
High Temperature Exposure	±1 %	+155 °C, 1000 h
Damp Heat, Steady State	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load Life in Humidity	±3 %	60 °C, 90 % to 95 %RH, Rated Voltage, 1.5 h ON / 0.5 h OFF cycle , 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated Voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

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

Test Item	Performance Requirements ⊿R	Test Conditions
Resistance	Within Specified Tolerance	20 °C
T. C. R.	Within Specified T. C. R.	+25 °C/+125 °C
Overload	±2 %	Rated Voltage× 2.5, 5 s
Resistance to Soldering Heat	±1 %	270 °C, 10 s
Rapid Change of Temperature	±1 %	−55 °C (30 min.) / +125 °C (30 min.), 100 cycles
High Temperature Exposure	±1 %	+125 °C, 1000 h
Damp Heat, Steady State	±1 %	60 °C, 90 % to 95 %RH, 1000 h
Load Life in Humidity	±3 %	60 °C, 90 % to 95 %RH, Rated Voltage, 1.5 h ON / 0.5 h OFF cycle , 1000 h
Endurance at 70 °C	±3 %	70 °C, Rated Voltage, 1.5 h ON / 0.5 h OFF cycle, 1000 h

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

- If you want to use our products described in this online catalog for applications requiring special qualities or reliability, or for applications where the failure or malfunction of the products may directly jeopardize human life or potentially cause personal injury (e.g. aircraft and aerospace equipment, traffic and transportation equipment, combustion equipment, medical equipment, accident prevention, anti-crime equipment, and/or safety equipment), it is necessary to verify whether the specifications of our products fit to such applications. Please ensure that you will ask and check with our inquiry desk as to whether the specifications of our products fit to such applications use before you use our products.

- The quality and performance of our products as described in this online catalog only apply to our products when used in isolation. Therefore, please ensure you evaluate and verify our products under the specific circumstances in which our products are assembled in your own products and in which our products will actually be used.

- If you use our products in equipment that requires a high degree of reliability, regardless of the application, it is recommended that you set up protection circuits and redundancy circuits in order to ensure safety of your equipment.

- The products and product specifications described in this online catalog are subject to change for improvement without prior notice. Therefore, please be sure to request and confirm the latest product specifications which explain the specifications of our products in detail, before you finalize the design of your applications, purchase, or use our products.

- The technical information in this online catalog provides examples of our products' typical operations and application circuits. We do not guarantee the non-infringement of third party's intellectual property rights and we do not grant any license, right, or interest in our intellectual property.

- If any of our products, product specifications and/or technical information in this online catalog is to be exported or provided to non-residents, the laws and regulations of the exporting country, especially with regard to security and export control, shall be observed.

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

- The switchover date for compliance with the RoHS Directive/REACH Regulations varies depending on the part number or series of our products.

- When you use the inventory of our products for which it is unclear whether those products are compliant with the RoHS Directive/REACH Regulation, please select "Sales Inquiry" in the website inquiry form and contact us.

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

⚠ Safety Precautions (Common precautions for Fixed Resistors)

- When using our products, no matter what sort of equipment they might be used for, be sure to make a written agreement on the specifications with us in advance. The design and specifications in this catalog are subject to change without prior notice.
- Do not use the products beyond the specifications described in this catalog.
- This catalog explains the quality and performance of the products as individual components. Before use, check and evaluate their operations when installed in your products under the actual conditions for use.
- Install the following systems for a failsafe design to ensure safety if these products are to be used in equipment where a defect in these products may cause the loss of human life or other significant damage, such as damage to vehicles (automobile, train, vessel), traffic lights, medical equipment, aerospace equipment, electric heating appliances, combustion/gas equipment, rotating equipment, and disaster/crime prevention equipment.

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

(1) Precautions for use

- These products are designed and manufactured for general and standard use in general elec tron ic equipment. (e.g. AV equipment, home electric appliances, office equipment, information and communication equipment) For applications in which special quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury (such as for aircraft and aerospace equipment, traffic and transport equipment, combustion equipment, medical equipment, accident prevention and anti-theft devices, and safety equipment), please be sure to consult with our sales representative in advance and to exchange product specifications which conform to such applications.
- These products are not intended for use in the following special conditions. Before using the products, carefully check the effects on their quality and performance, and determine whether or not they can be used.
  1. In liquid, such as water, oil, chemicals, or organic solvent.
  2. In direct sunlight, outdoors, or in dust.
  3. In salty air or air with a high concentration of corrosive gas, such as 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.

(2) Precautions for storage

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 5 °C to 35 °C and a relative humidity of 45 % to 85 %.

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_X .
2. In direct sunlight.

(3) AEC-Q200 Compliant

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

<Package markings>

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

⚠ Safety Precautions (Common precautions for Surface Mount Resistors)

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

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

Mouser Electronics

Authorized Distributor

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Panasonic:

ERJ-12ZQJR68U ERJ-8RQFR82V ERJ-3RSFR10V ERJ-12ZQJR27U ERJ-6RQFR51V ERJ-6RQFR56V ERJ-3RQF5R1V ERJ-1TRQFR24U ERJ-1TRQF1R2U ERJ-1TRQF1R0U ERJ-8RQJR22V ERJ-6RQJR47V ERJ-1TRQFR27U ERJ-1TRSJR10U ERJ-8RSJR12V ERJ-1TRQF1R6U ERJ-2BQFR22X ERJ-1TRQJR36U ERJ-1TRQF2R0U ERJ-2BSFR10X ERJ-L08KJ47MV ERJ-8RQFR68V ERJ-3RQFR82V ERJ-6RQF1R5V ERJ-8RQF4R7V ERJ-3RQF8R2V ERJ-6RQF3R3V ERJ-12ZQJR43U ERJ-8RSFR10V ERJ-L06KF50MV ERJ-8RQF2R4V ERJ-1TRQFR30U ERJ-14RQJ1R2U ERJ-3BQF1R5V ERJ-3BQF3R9V ERJ-L03KF10CV ERJ-L03KF47MV ERJ-L03KF50MV ERJ-L03KJ10CV ERJ-L03KJ47MV ERJ-L03KJ50MV ERJ-L03UF75MV ERJ-L03UJ75MV ERJ-L08KF10CV ERJ-L08KF47MV ERJ-L08KF50MV ERJ-L08KJ50MV ERJ-L08UF75MV ERJ-L08UJ75MV ERJ-L1DKF10CU ERJ-L1DKF47MU ERJ-L1DUF75MU ERJ-L1WKF47MU ERJ-L1WKJ47MU ERJ-14RQJR27U ERJ-14RQJR39U ERJ-14RQJR56U ERJ-14RQJR82U ERJ-14RSJR18U ERJ-2BQFR27X ERJ-2BWJR047X ERJ-2BWJR051X ERJ-2BWJR056X ERJ-2BWJR062X ERJ-2BWJR068X ERJ-2BWJR075X ERJ-2BWJR082X ERJ-2BWJR091X ERJ-3RQFR27V ERJ-3RQFR68V ERJ-3RQF1R2V ERJ-3RQF1R5V ERJ-3RQF1R8V ERJ-3RQF2R2V ERJ-3RQF2R7V ERJ-3RQF3R3V ERJ-3RQF3R9V ERJ-3RQF5R6V ERJ-3RQF6R8V ERJ-3RQJR27V ERJ-3RQJR39V ERJ-3RQJR47V ERJ-3RQJR56V ERJ-3RQJR68V ERJ-3RQJR82V ERJ-3RSFR12V ERJ-3RSFR15V ERJ-3RSFR18V ERJ-3RSJR12V ERJ-3RSJR15V ERJ-3RSJR18V ERJ-6RQFR39V ERJ-6RQJR22V ERJ-6RQJR27V ERJ-6RQJR33V ERJ-6RQJR39V ERJ-6RQJR68V ERJ-6RQJR82V ERJ-6RSJR18V ERJ-8RQFR27V