

Metal Film Thermosensitive Chip Resistors

0603, 0805

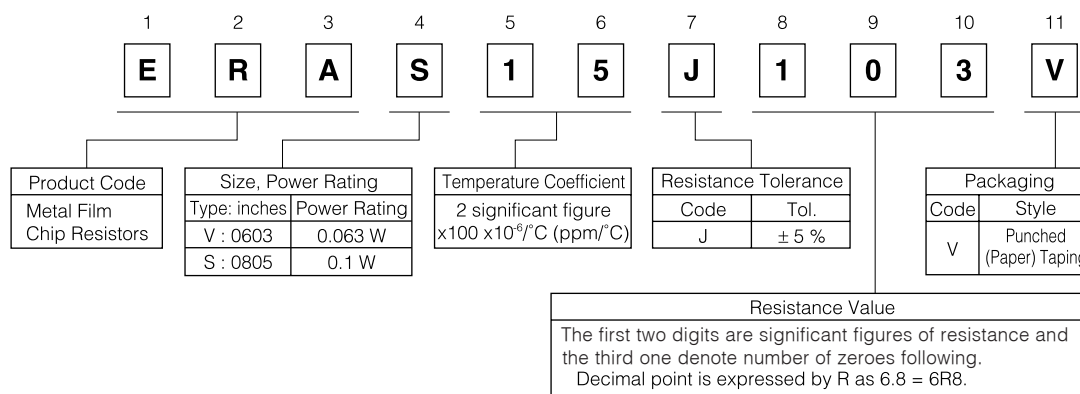
Type: **ERAV, S**



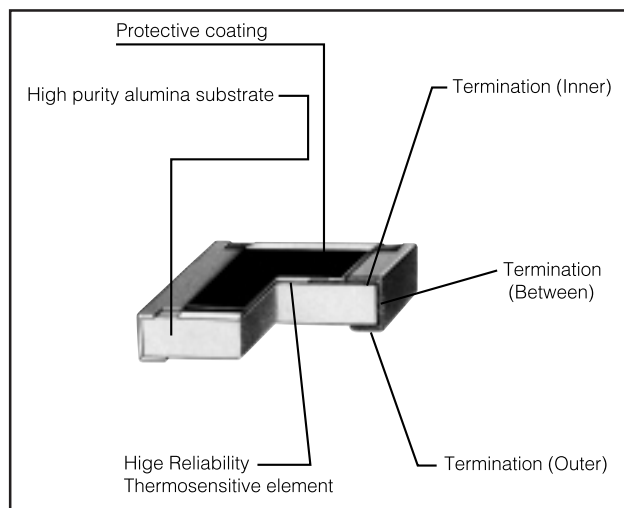
■ Features

- Most Suitable for Temperature correction circuits
- Wide Product Line
Temperature coefficient value $1000 \times 10^{-6}/^{\circ}\text{C}(\text{ppm}/^{\circ}\text{C})$ to $4700 \times 10^{-6}/^{\circ}\text{C}(\text{ppm}/^{\circ}\text{C})$
- High performance
Quick response to temperature change
- Excellent linear resistance value change in wide temperature range (-40°C to $+125^{\circ}\text{C}$)
- High reliability, High density placing
- Small size and lightweight for PCB size reduction and lightweight products
- Taping packaging available for automatic placement machines
- Suitable for both reflow soldering and flow soldering
- Approved under the ISO 9001 system

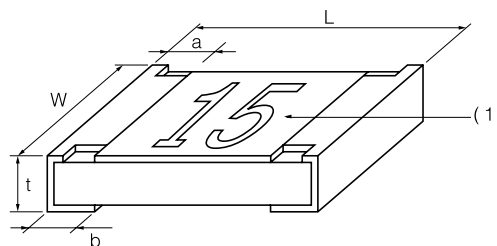
■ Explanation of Part Numbers



■ Construction



■ Dimensions in mm (not to scale)



Type (inches)	Dimensions (mm)					Net Weight (1000 pcs.)
	L	W	a	b	t	
ERAV (0603)	1.60 ± 0.20	0.80 ± 0.20	0.30 ± 0.20	0.30 ± 0.20	0.45 ± 0.10	2g
ERAS (0805)	2.00 ± 0.20	1.25 ± 0.10	0.40 ± 0.25	0.40 ± 0.25	0.50 ± 0.10	4g

1) Marking Temperature Coefficient value :
2 significant figure $\times 100 \times 10^{-6}/^{\circ}\text{C}(\text{ppm}/^{\circ}\text{C})$

■ Ratings

Type (inched)	Power Rating at 70 °C (W)	Standard Specification ⁽¹⁾		T.C.R. Tolerance	Standard Resistance Values	Resistance Tolerance (%)
		T.C.R. ×10 ⁻⁶ /°C (ppm/°C) ⁽²⁾	Resistance Range(Ω)			
ERAV (0603)	0.063	1500	1 k to 10 k	±200 ×10 ⁻⁶ /°C(ppm/°C)	E12	±5
		2700 3900	1 k to 3.3 k 5.6 to 390	±10 %		
ERAS (0805)	0.1	1500	1 k to 10 k	±200 ×10 ⁻⁶ /°C(ppm/°C)	E12	±5
		2700 3900	1 k to 4.7 k 5.6 to 470	±10 %		

(1) Below table shows the range of resistance value and T.C.R. which can be supplied(Please ask us when resistors other than standard specification shown in the above table are needed).

T.C.R. ×10 ⁻⁶ /°C (ppm/°C)	Resistance Range (Ω)	
	ERAV type	ERAS Type
1000	10 to 10 k	10 to 10 k
1500	10 to 10 k	10 to 10 k
2700	43 to 3.3 k	43 to 5.1 k

T.C.R. ×10 ⁻⁶ /°C (ppm/°C)	Resistance Range (Ω)	
	ERAV type	ERAS Type
3300	22 to 1.2 k	22 to 1.8 k
3900	5.6 to 390	5.6 to 470
4700	0.56 to 12	0.56 to 15

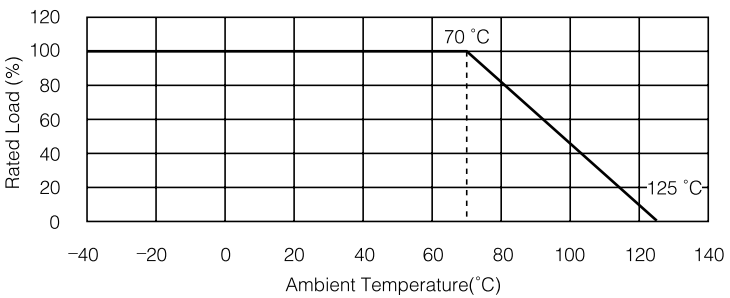
(2) $T.C.R. = \left\{ \frac{R_{75} - R_{25}}{R_{25}} \times \frac{1}{75 - 25} \times 10^6 \right\} \times 10^{-6}/^{\circ}C \text{ (ppm}/^{\circ}C)$

R_{25} : Resistance value at reference temperature 25 °C
 R_{75} : Resistance value at temperature 75 °C

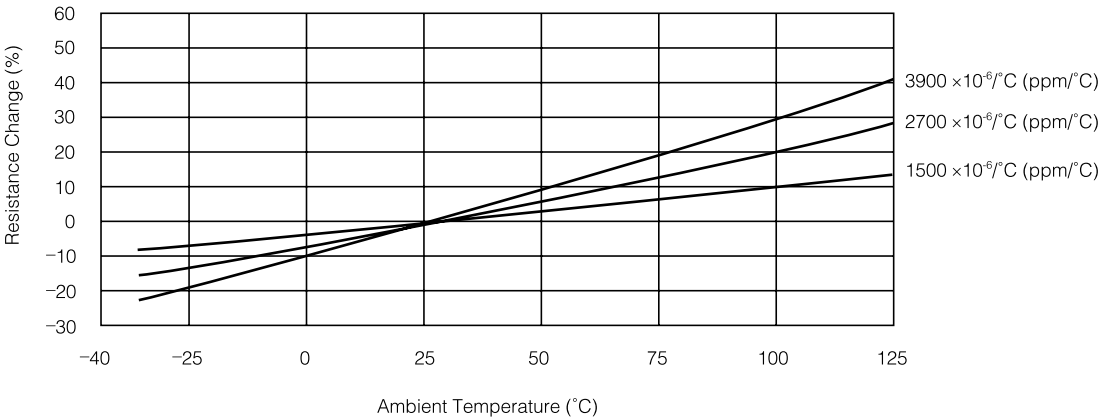
Power Derating Curve

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

Category Temperature Range
(Operating Temperature Range)
-40 °C to +125 °C



■ Typical Linearity of Resistance Change

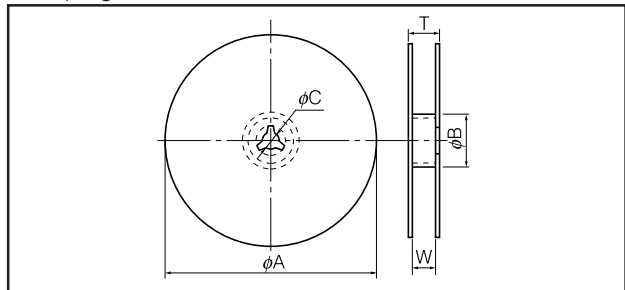


■ Packaging Specifications

● Standard Quantity

Type (inches)	Thickness (mm)	Punched (Paper) Taping
ERAV (0603)	0.45	5000 pcs./reel
ERAS (0805)	0.5	5000 pcs./reel

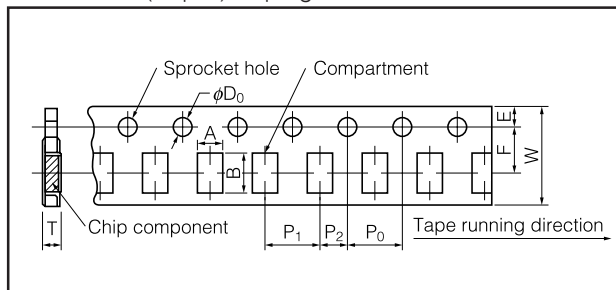
● Taping Reel



Dimensions (mm)	Type	φA	φB	φC
	ERAV	180.0 ^{+0.0} _{-0.0}	60 min.	13.0 ^{±1.0}
	ERAS			

Dimensions (mm)	Type	W	T
	ERAV	9.0 ^{±1.0}	11.4 ^{±2.0}
	ERAS		

● Punched (Paper) Taping



Dimensions (mm)	Type	A	B	W	F	E
	ERAV	1.10 ^{±0.10}	1.90 ^{±0.10}	8.00 ^{±0.20}	3.50 ^{±0.05}	1.75 ^{±0.10}
	ERAS	1.65 ^{±0.15}	2.50 ^{±0.20}			

Dimensions (mm)	Type	P ₁	P ₂	P ₀	φD ₀	T
	ERAV	4.00 ^{±0.10}	2.00 ^{±0.05}	4.00 ^{±0.10}	1.50 ^{+0.1} _{0.0}	0.70 ^{±0.05}
	ERAS					0.84 ^{±0.05}

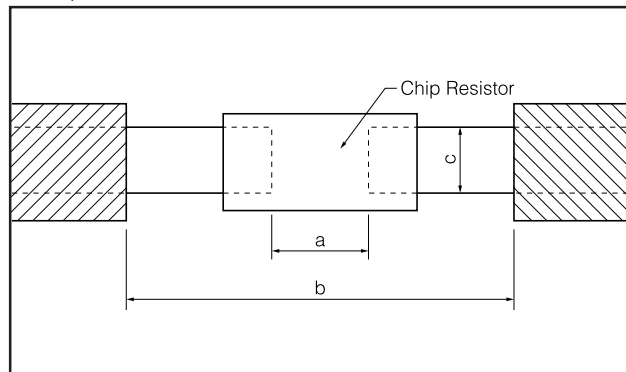
■ Attention

The ERS has a high temperature coefficient. When measuring resistance value, it changes by Joule Heat. Measuring current should be very small in order to prevent the resistance value from changing. (For example, when the resistor is used at RCWV, temperature of the resistor may rise about 15°C and the resistance value may rise a few percent.) Resistance value also change by ambient temperature. Resistance value is measured at 25 °C.

■ 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 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 of chip resistor width (W).

Example



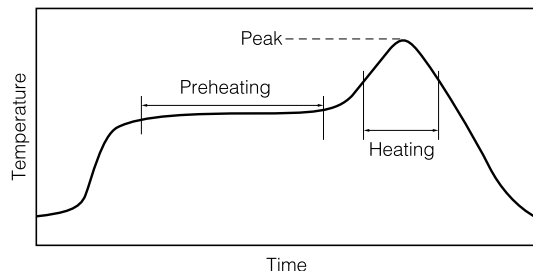
Type (inches)	Dimensions (mm)		
	a	b	c
ERAV (0603)	0.7 to 0.9	2 to 2.2	0.8 to 1
ERAS (0805)	1 to 1.4	3.2 to 3.8	0.9 to 1.4

■ Recommended Soldering Conditions

Recommendations and precautions are described below.

● Recommended soldering conditions for reflow

- Reflow soldering should be 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 terminations and study every type of printed circuit board for solderability, 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

⚠ Safety Precautions

1. Rated Power and Ambient Temperature

Keep the rated power and ambient temperature within the specified derating curve.

*Mount resistors and other heating components on the board, taking into consideration the cumulative temperature rise of all components.

2. External Shock

Mechanical shock during automatic mounting or handling of board after the chip is mounted may result in breakage, and separation of the protective coating of the resistor which may impair initial characteristics. Avoid nipping resistor with hard tool (pliers or tweezers) as it may damage the protective film or electrode of the resistor and may affect resistor's performance.

3. Application of Pulse

When pulse is applied to a resistor, the peak value of the pulse should be within rated value.

4. The resistor is neither non-combustible nor flame retardant.

5. When using soldering iron, never let the tip of the soldering iron touch the body of the chip resistor. When using a soldering iron with a tip at high temperature, solder as fast as possible (three seconds or less up to 350°C).

6. Avoid immersing chip resistor in solvent for a long time. when using solvent, confirm the effect of it upon the resistor's performance.

7. Keep the product away from high humidity atmospheres.