

Datasheet

## RS Pro RS Series Thick Film Surface Mount Resistor 0603

Case  $4.7\Omega \pm 5\%$   $0.1W \pm 200\text{ppm}/^\circ\text{C}$

RS Stock No: 713-4052



### Product Details

RS Pro 0603 thick film surface mount resistor with  $\pm 5\%$  tolerance, provides  $4.7\Omega$  resistance and is power rated at  $0.1\text{ W}$ . The temperature coefficient of resistance is  $\pm 200\text{ ppm}/^\circ\text{C}$ . Applications include telecommunication equipment, radio and tape recorders, TV tuners, video cameras, watches, pocket calculators, automotive industry, computers, instruments, medical and military equipment.

### Features and Benefits

- Small size and lightweight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process

**Specifications:**

|                                 |                     |
|---------------------------------|---------------------|
| Case Style                      | Ruthenium Oxide     |
| Depth                           | 0.8 mm              |
| Dimensions                      | 1.6 x 0.8 x 0.45 mm |
| Height                          | 0.45 mm             |
| Length                          | 1.6 mm              |
| Maximum Operating Temperature   | +155°C              |
| Maximum Temperature Coefficient | +200 ppm/°C         |
| Minimum Operating Temperature   | -55°C               |
| Minimum Temperature Coefficient | -200 ppm/°C         |
| Package/Case                    | 0603                |
| Power Rating                    | 0.1 W               |
| Resistance                      | 4.7 Ω               |
| Technology                      | Thick Film          |
| Temperature Coefficient         | ±200 ppm/°C         |
| Termination Style               | Solder Pad          |
| Tolerance                       | ±5%                 |
| Maximum Overload Voltage        | 150 V               |
| Maximum Operating Voltage       | 75 V                |
| Tape Width                      | 8 mm                |

# Thick Film Chip Resistor 5% - RS Series

## 0201/0402/0603/0805/1206

### Construction



|                         |                           |   |
|-------------------------|---------------------------|---|
| ① Alumina Substrate     | ④ Edge Electrode (NiCr)   | ⑦ Resistor Layer (RuO <sub>2</sub> /Ag) |
| ② Bottom Electrode (Ag) | ⑤ Barrier Layer (Ni)      | ⑧ Primary Overcoat (Glass)              |
| ③ Top Electrode (Ag-Pd) | ⑥ External Electrode (Sn) | ⑨ Secondary Overcoat (Epoxy)            |

### Dimensions

Unit: mm

| Type    | Size (Inch) | L         | W         | T         | D1        | D2        | Weight (g) (1000pcs) |
|---------|-------------|-----------|-----------|-----------|-----------|-----------|----------------------|
| RS-0201 | 0201        | 0.60±0.03 | 0.30±0.03 | 0.23±0.03 | 0.15±0.05 | 0.15±0.05 | 0.150                |
| RS-0402 | 0402        | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.20±0.10 | 0.620                |
| RS-0603 | 0603        | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 | 2.042                |
| RS-0805 | 0805        | 2.00±0.10 | 1.25±0.10 | 0.50±0.10 | 0.35±0.20 | 0.40±0.20 | 4.368                |
| RS-1206 | 1206        | 3.10±0.10 | 1.55±0.10 | 0.55±0.10 | 0.50±0.25 | 0.50±0.20 | 8.947                |

### Part Numbering



Derating Curve



Standard Electrical Specifications

| Item<br>Type | Power Rating at 70°C<br>Jumper<br>Rated Current | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | TCR (PPM/°C) |
|--------------|---|-----------------------|------------------------|-----------------------|------------------|--------------|
|              |   |                       |                        |                       | ±5%              |              |
| RS-0201      | 1/20W   | -55 ~ +155°C          | 25V                    | 50V                   | 1Ω – 9.76MΩ      | ±200         |
| Jumper       | 1A  |                       |                        |                       | 0Ω (<50mΩ)       | -            |
| RS-0402      | 1/16W   | -55 ~ +155°C          | 50V                    | 100V                  | 1Ω – 9.76MΩ      | ±200         |
| Jumper       | 1A  |                       |                        |                       | 0Ω (<50mΩ)       | -            |
| RS-0603      | 1/10W   | -55 ~ +155°C          | 75V                    | 150V                  | 1Ω – 9.76MΩ      | ±200         |
| Jumper       | 1A  |                       |                        |                       | 0Ω (<50mΩ)       | -            |
| RS-0805      | 1/8W  | -55 ~ +155°C          | 150V                   | 300V                  | 1Ω – 9.76MΩ      | ±200         |
| Jumper       | 2A  |                       |                        |                       | 0Ω (<50mΩ)       | -            |
| RS-1206      | 1/4W  | -55 ~ +155°C          | 200V                   | 400V                  | 1Ω – 9.76MΩ      | ±200         |
| Jumper       | 2A  |                       |                        |                       | 0Ω (<50mΩ)       | -            |

Soldering Condition



IR Reflow Soldering

- (1) Time of IR reflow soldering at maximum temperature point 260°C: 10s
- (2) Time of wave soldering at maximum temperature point 260°C: 10s
- (3) Time of soldering iron at maximum temperature point 410°C: 5s

Wave Soldering (Flow Soldering)



**■ Environmental Characteristics**

| Item   | Requirement   |        | Test Method   |
|--|---|--------|---|
|  | ±5%   | Jumper |   |
| Temperature Coefficient of Resistance (T.C.R.) | As Spec.  |        | JIS-C-5201-1 4.8<br>IEC-60115-1 4.8<br>-55°C~+125/+155°C, 25°C is the reference temperature                               |
| Short Time Overload                            | ±(2.0%+0.05Ω)   | <50mΩ  | JIS-C-5201-1 4.13<br>IEC-60115-1 4.13<br>RCWV*2.5 or Max. overload voltage for 5 seconds, 2 seconds for high power series |
| Insulation Resistance                          | ≥10G  |        | JIS-C-5201-1 4.6<br>IEC-60115-1 4.6<br>Max. overload voltage for 1 minute   |
| Endurance                                      | ±(3.0%+0.10Ω)   | <100mΩ | JIS-C-5201-1 4.25<br>IEC-60115-1 4.25.1<br>70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"  |
| Damp Heat with Load                            | ±(3.0%+0.10Ω)   | <100mΩ | JIS-C-5201-1 4.24<br>40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"            |
| Dry Heat                                       | ±(1.5%+0.10Ω)   | <50mΩ  | JIS-C-5201-1 4.23<br>IEC-60115-1 2.23.2<br>at +125/+155°C for 1000 hrs  |
| Bending Strength                               | ±(1.0%+0.05Ω)   | <50mΩ  | JIS-C-5201-1 4.33<br>IEC-60115-1 4.33<br>Bending once for 5 seconds<br>2010, 2512 sizes: 2mm Other sizes: 3mm             |
| Solderability                                  | 95% min. coverage   |        | JIS-C-5201-1 4.17<br>IEC-60115-1 4.17<br>245±5°C for 3 seconds  |
| Resistance to Soldering Heat                   | ±(1.0%+0.05Ω)   | <50mΩ  | JIS-C-5201-1 4.18<br>IEC-60115-1 4.18<br>260±5°C for 10 seconds   |
| Voltage Proof                                  | No breakdown or flashover                                 |        | JIS-C-5201-1 4.7<br>IEC-60115-1 4.7<br>1.42 times RCWV (RMS) for 1 minute   |
| Leaching                                       | Individual leaching area □5%<br>Total leaching area □ 10% |        | JIS-C-5201-1 4.18<br>IEC-60068-2-58 8.2.1<br>260±5°C for 30 seconds   |
| Rapid Change of Temperature                    | ±(1.0%+0.05Ω)   | <50mΩ  | JIS-C-5201-1 4.18<br>IEC-60115-1 4.18<br>-55°C to +125/+155°C, 5 cycles   |

**■ Storage Temperature: 25±3°C; Humidity < 80%RH**

## Packaging

ENGLISH

### Reel Specifications & Packaging Quantity



Unit: mm

| Type                          | Packaging Quantity | Tape Width | Reel Diameter | ΦA        | ΦB                  | ΦC       | W       | T        |
|-------------------------------|--------------------|------------|---------------|-----------|---------------------|----------|---------|----------|
| RS-0201<br>RS-0402            | Paper              | 8mm        | 7 inch        | 178.5±1.5 | 60 <sup>+1/-0</sup> | 13.0±0.2 | 9.0±0.5 | 12.5±0.5 |
| RS-0603<br>RS-0805<br>RS-1206 |                    |            | 10 inch       | 254±1     | 100±0.5             | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |
|                               |                    |            | 13 inch       | 330±1     | 100±0.5             | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |

### Paper Tape Specifications



Unit: mm

| Type    | A         | B         | W       | E        | F         | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ΦD <sub>0</sub> | T        |
|---------|-----------|-----------|---------|----------|-----------|----------------|----------------|----------------|-----------------|----------|
| RS-0201 | 0.38±0.05 | 0.68±0.05 | 8.0±0.2 | 1.75±0.1 | 3.50±0.05 | 4.00±0.10      | 2.00±0.05      | 2.00±0.05      | 1.50+0.1,-0     | 0.42±0.1 |
| RS-0402 | 0.65±0.10 | 1.15±0.1  | 8.0±0.2 | 1.75±0.1 | 3.50±0.05 | 4.00±0.10      | 2.00±0.05      | 2.00±0.05      | 1.50+0.1,-0     | 0.45±0.1 |
| RS-0603 | 1.10±0.10 | 1.90±0.1  | 8.0±0.2 | 1.75±0.1 | 3.50±0.05 | 4.00±0.10      | 4.00±0.05      | 2.00±0.05      | 1.50+0.1,-0     | 0.70±0.1 |
| RS-0805 | 1.60±0.10 | 2.40±0.2  | 8.0±0.2 | 1.75±0.1 | 3.50±0.05 | 4.00±0.10      | 4.00±0.05      | 2.00±0.05      | 1.50+0.1,-0     | 0.85±0.1 |
| RS-1206 | 1.90±0.10 | 3.50±0.2  | 8.0±0.2 | 1.75±0.1 | 3.50±0.05 | 4.00±0.10      | 4.00±0.05      | 2.00±0.05      | 1.50+0.1,-0     | 0.85±0.1 |



■ **Marking**

No Marking for 0201 and 0402

Jumper for all: Letter "0"

5% for 0603/0805/1206: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1<sup>st</sup> and 2<sup>nd</sup> are E24 code and 3<sup>rd</sup> code is multiplier)

|          |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| E24 code | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

■ **Recommend Land Pattern**

Unit: mm



| Type    | A    | B    | C    |
|---------|------|------|------|
| RS-0201 | 0.30 | 0.25 | 0.30 |
| RS-0402 | 0.50 | 0.45 | 0.60 |
| RS-0603 | 0.90 | 0.60 | 0.90 |
| RS-0805 | 1.20 | 0.70 | 1.30 |
| RS-1206 | 2.00 | 0.90 | 1.60 |