

Datasheet

RS Pro RS Series Thick Film Surface Mount Resistor 0402

Case $12.4\text{k}\Omega \pm 1\%$ $0.063\text{W} \pm 100\text{ppm}/^\circ\text{C}$

RS Stock No: 716-9178



Product Details

RS Pro 0402 thick film surface mount resistor with $\pm 1\%$ tolerance, provides $12.4\text{ k}\Omega$ resistance and is power rated at 0.0625 W . The temperature coefficient of resistance is $\pm 100\text{ ppm}/^\circ\text{C}$. 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 | 0.5 mm |
| Dimensions | 1 x 0.5 x 0.35 mm |
| Height | 0.35 mm |
| Length | 1 mm |
| Maximum Operating Temperature | +155°C |
| Maximum Temperature Coefficient | +100 ppm/°C |
| Minimum Operating Temperature | -55°C |
| Minimum Temperature Coefficient | -100 ppm/°C |
| Package/Case | 0402 |
| Power Rating | 0.0625 W |
| Resistance | 12.4 kΩ |
| Technology | Thick Film |
| Temperature Coefficient | ±100 ppm/°C |
| Termination Style | Solder Pad |
| Tolerance | ±1% |
| Maximum Overload Voltage | 100 V |
| Maximum Operating Voltage | 50 V |
| Tape Width | 8 mm |

Thick Film Chip Resistor 1% - RS Series

0201/0402/0603/0805/1206

Construction



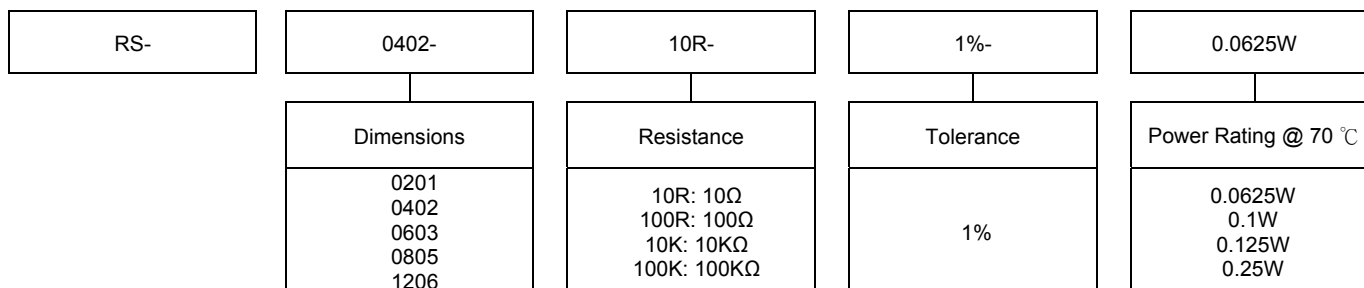
| | | |
|-------------------------|---------------------------|---|
| ① Alumina Substrate | ④ Edge Electrode (NiCr) | ⑦ Resistor Layer (RuO ₂ /Ag) |
| ② Bottom Electrode (Ag) | ⑤ Barrier Layer (Ni) | ⑧ Primary Overcoat (Glass) |
| ③ Top Electrode (Ag-Pd) | ⑥ External Electrode (Sn) | ⑨ Secondary Overcoat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

| Type \ Item | Power Rating at 70°C Jumper Rated Current | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | TCR (PPM/°C) |
|-------------|---|-----------------------|------------------------|-----------------------|------------------|--------------|
| | | | | | ±1% | |
| RS-0201 | 1/20W | -55 ~ +155°C | 25V | 50V | 10Ω – 910KΩ | ±200 |
| RS-0402 | 1/16W | -55 ~ +155°C | 50V | 100V | 10Ω – 910KΩ | ±100 |
| RS-0603 | 1/10W | -55 ~ +155°C | 75V | 150V | 10Ω – 910KΩ | ±100 |
| RS-0805 | 1/8W | -55 ~ +155°C | 150V | 300V | 10Ω – 910KΩ | ±100 |
| RS-1206 | 1/4W | -55 ~ +155°C | 200V | 400V | 10Ω – 910KΩ | ±100 |

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

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

■Packaging

Reel Specifications & Packaging Quantity



Unit: mm

| Type | Packaging Quantity | Tape Width | Reel Diameter | ΦA | ΦB | ΦC | W | T |
|-------------------------------|--------------------|------------|---------------|-----------|---------------------|----------|---------|----------|
| RS-0201 RS-0402 | Paper | 8mm | 7 inch | 178.5±1.5 | 60 ^{+1/-0} | 13.0±0.2 | 9.0±0.5 | 12.5±0.5 |
| RS-0603 RS-0805 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 ₀ | P ₁ | P ₂ | ΦD ₀ | 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

1% for 0805/1206: 4 digits marking

Example:

| | | | | | |
|------------|------|-------|------|--------|-------|
| Resistance | 100Ω | 2.2KΩ | 10KΩ | 49.9KΩ | 100KΩ |
| Marking | 1000 | 2201 | 1002 | 4992 | 1003 |

1% for 0603: 3 digits marking in E96



3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω
68B=4K99Ω 68X=49.9Ω

Marking Table

| Code | E96 | Code | E96 | Code | E96 | Code | E96 |
|------|-----|------|-----|------|-----|------|-----|
| 01 | 100 | 25 | 178 | 49 | 316 | 73 | 562 |
| 02 | 102 | 26 | 182 | 50 | 324 | 74 | 576 |
| 03 | 105 | 27 | 187 | 51 | 332 | 75 | 590 |
| 04 | 107 | 28 | 191 | 52 | 340 | 76 | 604 |
| 05 | 110 | 29 | 196 | 53 | 348 | 77 | 619 |
| 06 | 113 | 30 | 200 | 54 | 357 | 78 | 634 |
| 07 | 115 | 31 | 205 | 55 | 365 | 79 | 649 |
| 08 | 118 | 32 | 210 | 56 | 374 | 80 | 665 |
| 09 | 121 | 33 | 215 | 57 | 383 | 81 | 681 |
| 10 | 124 | 34 | 221 | 58 | 392 | 82 | 698 |
| 11 | 127 | 35 | 226 | 59 | 402 | 83 | 715 |
| 12 | 130 | 36 | 232 | 60 | 412 | 84 | 732 |
| 13 | 133 | 37 | 237 | 61 | 422 | 85 | 750 |
| 14 | 137 | 38 | 243 | 62 | 432 | 86 | 768 |
| 15 | 140 | 39 | 249 | 63 | 442 | 87 | 787 |
| 16 | 143 | 40 | 255 | 64 | 453 | 88 | 806 |
| 17 | 147 | 41 | 261 | 65 | 464 | 89 | 825 |
| 18 | 150 | 42 | 267 | 66 | 475 | 90 | 845 |
| 19 | 154 | 43 | 274 | 67 | 487 | 91 | 866 |
| 20 | 158 | 44 | 280 | 68 | 499 | 92 | 887 |
| 21 | 162 | 45 | 287 | 69 | 511 | 93 | 909 |
| 22 | 165 | 46 | 294 | 70 | 523 | 94 | 931 |
| 23 | 169 | 47 | 301 | 71 | 536 | 95 | 953 |
| 24 | 174 | 48 | 309 | 72 | 549 | 96 | 976 |

| Code | A | B | C | D | E | F | G | X | Y |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|
| Multiplier | 10 ⁰ | 10 ¹ | 10 ² | 10 ³ | 10 ⁴ | 10 ⁵ | 10 ⁶ | 10 ⁻¹ | 10 ⁻² |

■ 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 |