

Features

- Highly reliable multilayer electrode construction
- Higher component and equipment reliability
- Excellent performance at high voltage
- Reduced size of final equipment
- Low VCR
- Manufactured in accordance with AEC-Q200 compliance

RS PRO High Voltage Low VCR Thick Film Chip Resistor RSPHVRC Series



RS PRO is the own brand of RS. The RS PRO Seal of Approval is your assurance of professional quality, a guarantee that every part is rigorously tested, inspected, and audited against demanding standards. Making RS PRO the Smart Choice for our customers.

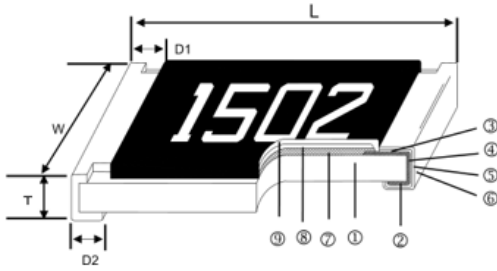
High Voltage Thick Film Chip Resistor

Product Description

Applications Include:

- Inverter - Outdoor Equipment
- Converter - High Pulse Equipment, Automotive Industry

Construction:



| | | |
|---------------------|----------------------|----------------------|
| ① Alumina Substrate | ④ Edge Electrode | ⑦ Resistor Layer |
| ② Bottom Electrode | ⑤ Barrier Layer | ⑧ Primary Overcoat |
| ③ Top Electrode | ⑥ External Electrode | ⑨ Secondary Overcoat |

Dimensions

| Type | Size (Inch) | L (mm) | W (mm) | T (mm) | D1 (mm) | D2 (mm) | Weight (g) (1000pcs) |
|-----------|-------------|-----------|-----------|-----------|-----------|-----------|----------------------|
| RSPHVRC06 | 1206 | 3.10±0.10 | 1.55±0.10 | 0.55±0.10 | 0.50±0.25 | 0.50±0.20 | 8.9 |
| RSPHVRC0A | 2010 | 5.00±0.10 | 2.50±0.15 | 0.55±0.10 | 0.60±0.25 | 0.50±0.20 | 24.7 |
| RSPHVRC12 | 2512 | 6.35±0.10 | 3.10±0.15 | 0.55±0.10 | 0.60±0.25 | 0.50±0.20 | 39.8 |

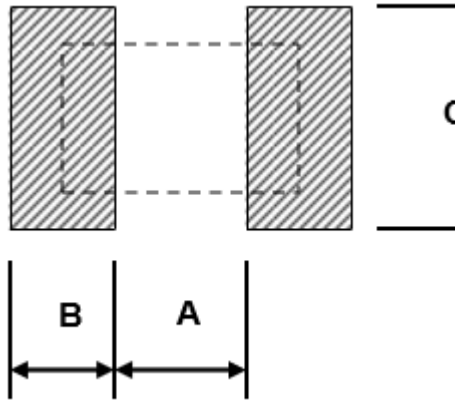
Part Number Make Up

| Product Type | Dimensions | Resistance Tolerance | Packaging Code | TCR (PPM/°C) | Power Rating | Resistance |
|--------------|----------------------------------|----------------------|-------------------|--------------|-----------------------------|--|
| RSPHVRC | 06: 1206 0A: 2010 12: 2512 | F: ±1% | T: 7" Taping Reel | E: ±100 | O: 1/3W U: 1/2W T: 1W | 1004: 1MΩ 1005: 10MΩ 1006: 100MΩ |

High Voltage Thick Film Chip Resistor

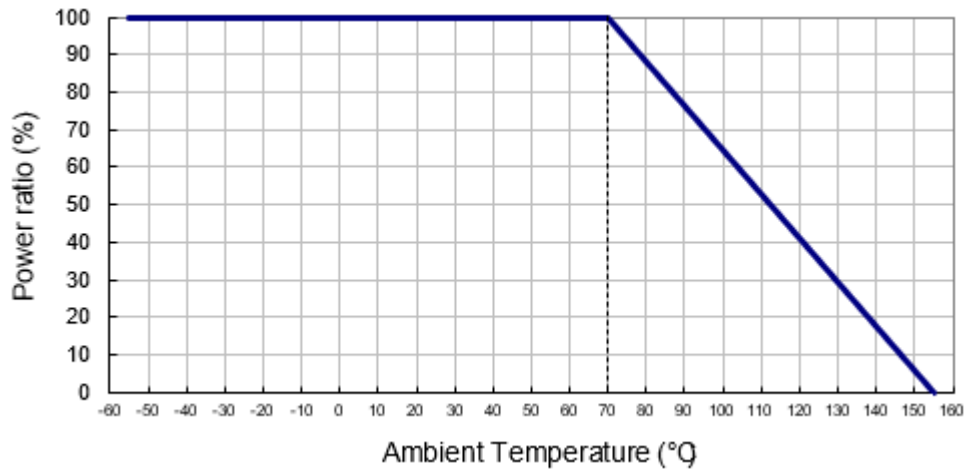


Recommended Land Pattern



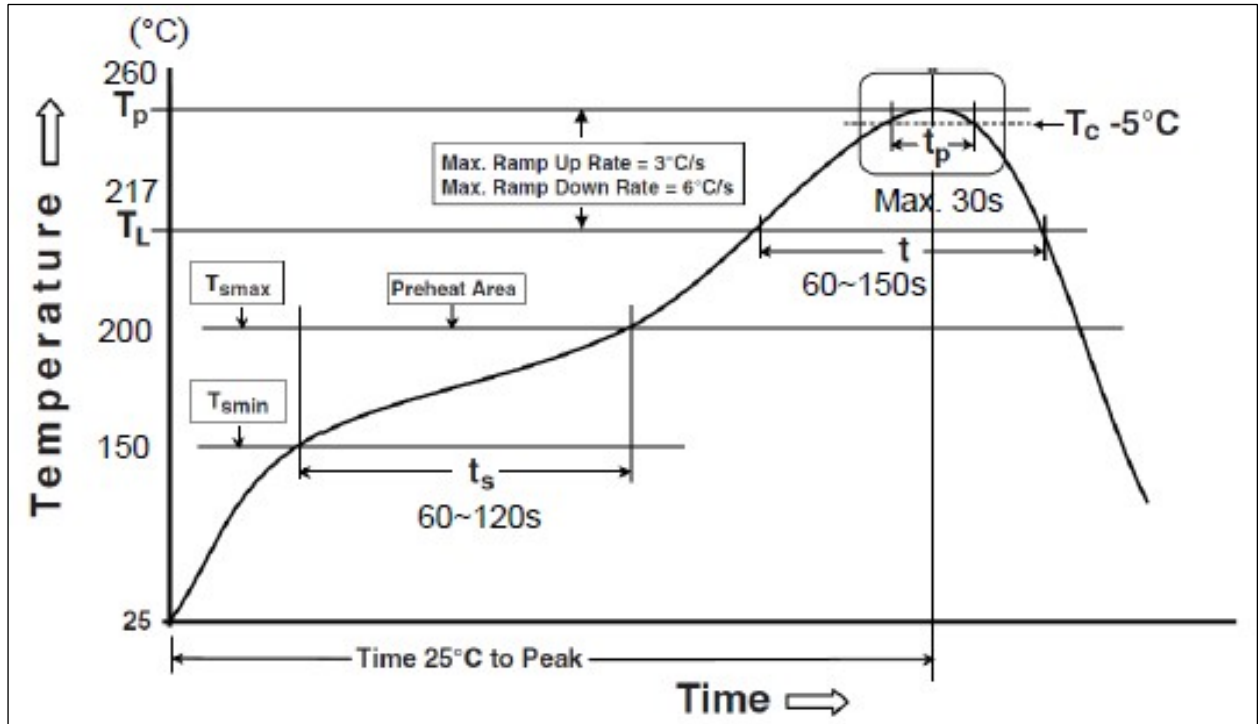
| Type | A (mm) | B (mm) | C (mm) |
|-----------|--------|--------|--------|
| RSPHVRC06 | 2.00 | 0.90 | 1.60 |
| RSPHVRC0A | 3.80 | 0.90 | 2.80 |
| RSPHVRC12 | 4.90 | 1.60 | 3.50 |

Derating Curve



Soldering Conditions

(Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles

| Profile Feature | Pb-Free Assembly |
|---|------------------------------------|
| Preheat Min. Temperature (T_{smin}) Max Temperature (T_{smax}) Preheating time (t_s) from (T_{smin} to T_{smax}) | 150 °C 200 °C 60-120 seconds |
| Ramp-up rate (T_L to T_p) | 3 °C/second max. |
| Liquidous temperature (T_L) Time (t_l) maintained above T_L | 217 °C 60-150 seconds |
| Min. Peak temperature (T_p min) | 235°C |
| Max. Peak temperature (T_p max) | 260°C |
| Time (t_p) within 5 °C of the specified classification temperature (T_c) | 30 seconds max. |
| Ramp-down rate (T_p to T_L) | 6 °C/second max. |
| Time 25 °C to peak temperature | 8 minutes max. |

High Voltage Thick Film Chip Resistor

Electrical Specifications

| Type | Power Rating | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | TCR (PPM/°C) | VCR (PPM/V) |
|------------------|--------------|-----------------------|------------------------|-----------------------|-----------------------------|------------------------------|-------------------------------|--------------|-------------|
| | | | | | ±0.5% (E24, E96) | ±1% (E24, E96) | ±5% (E24) | | |
| RSPHVRC06 (1206) | 1/3W | +55 ~ +155°C | 1000V | 1500V | 100K Ω - 1M Ω | 100K Ω - 10M Ω | 100K Ω - 500M Ω | ±100 | <25 |
| RSPHVRC0A (2010) | 1/2W | | 2000V | 3000V | 51K Ω - 1M Ω | 51K Ω - 20M Ω | 51K Ω - 500M Ω | ±100 | |
| RSPHVRC12 (2512) | 1W | | 3000V | 4000V | 30K Ω - 1M Ω | 30K Ω - 20M Ω | 30K Ω - 500M Ω | ±100 | |

Operating Voltage= $\sqrt{P \cdot R}$ or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. Overload Voltage listed above, whichever is lower.

Environmental Characteristics

| Item | Requirement | | Test Method |
|--|------------------------|------------------------|---|
| | ±1% and Below | ±5% | |
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | | JIS-C-5201-1 4.8 IEC-60115-1 4.8 At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature |
| Voltage Coefficient (VCR) | As Spec. | | IEC-60115-1 4.11 measured at 10 % and at 100 % of either the rated voltage or the limiting element voltage, whichever is the smaller |
| Short Time Overload | ±(1.0%+0.05 Ω) | ±(1.0%+0.05 Ω) | JIS-C-5201-1 4.13 IEC-60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds |
| Insulation Resistance | ±10G | | JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute |
| Endurance | ±(1.0%+0.10 Ω) | ±(2.0%+0.10 Ω) | JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" |
| Biased Humidity | ±(1.0%+0.10 Ω) | ±(3.0%+0.10 Ω) | MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power |
| High Temperature Exposure | ±(1.0%+0.05 Ω) | ±(1.0%+0.05 Ω) | MIL-STD-202 Method 108 at +155°C for 1000 hrs |
| Board Flex | ±(1.0%+0.05 Ω) | ±(1.0%+0.05 Ω) | AEC-Q200-005 Bending once for 60 seconds 1206 size: 3mm 2010, 2512 sizes: 2mm |

High Voltage Thick Film Chip Resistor



| 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) | ±(1.0%+0.05Ω) | JIS-C-5201-1 4.18 IEC-60115-1 4.18 260±5°C for 10 seconds |
| Item | Requirement | | Test Method |
| | ±1% and Below | ±5% | |
| Voltage Proof | No breakdown or flashover | | JIS-C-5201-1 4.7 IEC-60115-1 4.7 HVRC06/HVRC0A/HVRC12: 500V 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 |
| Temperature Cycling | ±(1.0%+0.05Ω) | | JESD22 Method JA-104 -55°C to +125°C, 1000 cycles |
| Mechanical Shock | ±(1.0%+0.05Ω) | | MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6. |
| Vibration | ±(1.0%+0.05Ω) | | MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz |
| ESD | ±(3%+0.05Ω) | | AEC-Q200-002 Human body model 2KV |
| Resistance to Solvents | No visible damage on appearance and marking. | | MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents. |
| Terminal Strength | No broken | | AEC-Q200-006 Force of 1.8kg for 60 seconds. |
| Flammability | No ignition of the tissue paper or scorching or the pinewood board | | UL-94 V-0 or V-1 are acceptable. Electrical test not required. |

RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

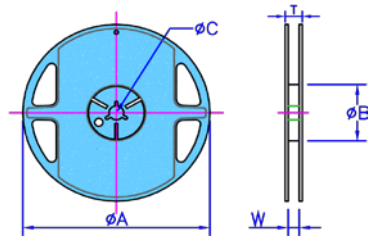
Storage Temperature: 15~28°C; Humidity < 80%RH

Shelf Life: 2 years from production date.

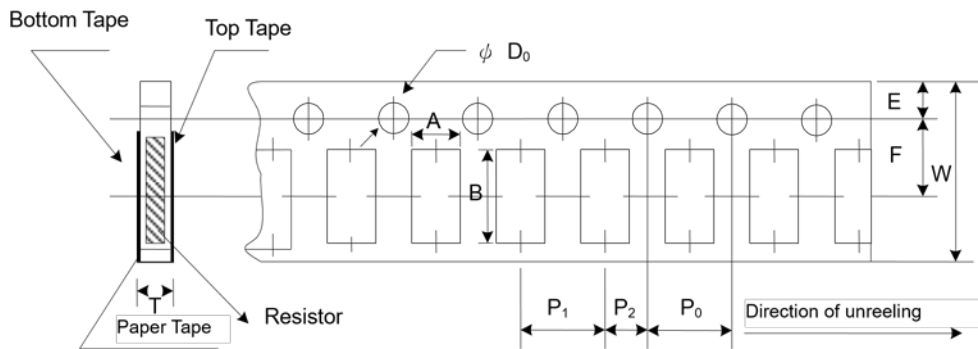
High Voltage Thick Film Chip Resistor

Packaging

Reel Specifications



| Type | Packaging Quantity | Tape Width | Reel Diameter | ΦA (mm) | ΦB (mm) | ΦC (mm) | W (mm) | T (mm) | |
|------------------------|--------------------|------------|---------------|---------|-----------|---------|----------|----------|----------|
| RSPHVRC06 | Paper | 5K | 8mm | 7 inch | 178.5±1.5 | 60+1/-0 | 13.0±0.2 | 9.0±0.5 | 12.5±0.5 |
| | | 10K | 8mm | 10 inch | 254±1.0 | 100±0.5 | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |
| | | 20K | 8mm | 13 inch | 330±1.0 | 100±0.5 | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |
| RSPHVRC0A RSPHVRC12 | Embossed | 4K | 12mm | 7 inch | 178.5±1.5 | 60+1/-0 | 13.0±0.5 | 13.0±0.5 | 15.5±0.5 |
| | | 8K | 12mm | 10 inch | 250±1.0 | 62±0.5 | 13.0±0.5 | 12.5±0.5 | 16.5±0.5 |



| Type | A (mm) | B (mm) | W (mm) | E (mm) | F (mm) | P0 (mm) | P1 (mm) | P2 (mm) | ΦD0 (mm) | T (mm) |
|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|-----------|
| HVRC06 | 1.90±0.10 | 3.50±0.20 | 8.00±0.20 | 1.75±0.10 | 3.50±0.05 | 4.00±0.10 | 4.00±0.05 | 2.00±0.05 | 1.50+0.1,-0 | 0.85±0.10 |

High Voltage Thick Film Chip Resistor

Marking

1% for 1206/2010/2512: 4 digits marking

Example:

| Resistance | 1MΩ | 4.99MΩ | 10MΩ |
|------------|------|--------|------|
| Marking | 1004 | 4994 | 1005 |

5% for 1206/2010/2512: 3 digits marking in E24

Example: 124=120KΩ 106=10MΩ (1st and 2nd are E24 code and 3rd 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 |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

Similar Products

| MPN | RS PRO Article | | |
|-------------------|----------------|----------|---------|
| | SSM | P Part | MPQ |
| RSPHVRC06FTEO1003 | 2567845 | 2567845P | 2567844 |
| RSPHVRC06FTEO1004 | 2567848 | 2567847P | 2567846 |
| RSPHVRC06FTEO1005 | 2567849 | 2567849P | 2567848 |
| RSPHVRC06FTEO1203 | 2572947 | 2572947P | 2572946 |
| RSPHVRC06FTEO1204 | 2572949 | 2572949P | 2572948 |
| RSPHVRC06FTEO1503 | 2572952 | 2572952P | 2572950 |
| RSPHVRC06FTEO1504 | 2572954 | 2572954P | 2572953 |
| RSPHVRC06FTEO1803 | 2572956 | 2572956P | 2572955 |
| RSPHVRC06FTEO2203 | 2572960 | 2572960P | 2572959 |
| RSPHVRC06FTEO2204 | 2572962 | 2572962P | 2572961 |
| RSPHVRC06FTEO2703 | 2572964 | 2572964P | 2572963 |
| RSPHVRC06FTEO2704 | 2572966 | 2572966P | 2572965 |
| RSPHVRC06FTEO3303 | 2572969 | 2572969P | 2572968 |
| RSPHVRC06FTEO3304 | 2572971 | 2572971P | 2572970 |
| RSPHVRC06FTEO3903 | 2572974 | 2572974P | 2572972 |
| RSPHVRC06FTEO3904 | 2572976 | 2572976P | 2572975 |
| RSPHVRC06FTEO4703 | 2572978 | 2572978P | 2572977 |
| RSPHVRC06FTEO4704 | 2572980 | 2572980P | 2572979 |
| RSPHVRC06FTEO5603 | 2572982 | 2572982P | 2572981 |
| RSPHVRC06FTEO5604 | 2572984 | 2572984P | 2572983 |
| RSPHVRC06FTEO6803 | 2572986 | 2572986P | 2572985 |
| RSPHVRC06FTEO6804 | 2572988 | 2572988P | 2572987 |
| RSPHVRC06FTEO8203 | 2572991 | 2572991P | 2572990 |
| RSPHVRC06FTEO8204 | 2572993 | 2572993P | 2572992 |

High Voltage Thick Film Chip Resistor

| | | | |
|-------------------|---------|----------|---------|
| RSPHVRC0AFTEU1003 | 2572996 | 2572996P | 2572994 |
| RSPHVRC0AFTEU1004 | 2572998 | 2572998P | 2572997 |
| RSPHVRC0AFTEU1005 | 2573000 | 2573000P | 2572999 |
| RSPHVRC0AFTEU1203 | 2573002 | 2573002P | 2573001 |
| RSPHVRC0AFTEU1204 | 2573004 | 2573004P | 2573003 |
| RSPHVRC0AFTEU1205 | 2573007 | 2573007P | 2573006 |
| RSPHVRC0AFTEU1503 | 2573009 | 2573009P | 2573008 |
| RSPHVRC0AFTEU1504 | 2573012 | 2573012P | 2573010 |
| RSPHVRC0AFTEU1505 | 2573014 | 2573014P | 2573013 |
| RSPHVRC0AFTEU1803 | 2573016 | 2573016P | 2573015 |
| RSPHVRC0AFTEU1804 | 2573018 | 2573018P | 2573017 |
| RSPHVRC0AFTEU1805 | 2573020 | 2573020P | 2573019 |
| RSPHVRC0AFTEU2203 | 2573022 | 2573022P | 2573021 |
| RSPHVRC0AFTEU2204 | 2573024 | 2573024P | 2573023 |
| RSPHVRC0AFTEU2703 | 2573026 | 2573026P | 2573025 |
| RSPHVRC0AFTEU2704 | 2573029 | 2573029P | 2573028 |
| RSPHVRC0AFTEU3303 | 2573031 | 2573031P | 2573030 |
| RSPHVRC0AFTEU3304 | 2573033 | 2573033P | 2573032 |
| RSPHVRC0AFTEU3903 | 2573035 | 2573035P | 2573034 |
| RSPHVRC0AFTEU3904 | 2573037 | 2573037P | 2573036 |
| RSPHVRC0AFTEU4703 | 2573039 | 2573039P | 2573038 |
| RSPHVRC0AFTEU4704 | 2573041 | 2573041P | 2573040 |
| RSPHVRC0AFTEU5602 | 2573043 | 2573043P | 2573042 |
| RSPHVRC0AFTEU5603 | 2573045 | 2573045P | 2573044 |
| RSPHVRC0AFTEU5604 | 2573047 | 2573047P | 2573046 |
| RSPHVRC0AFTEU6802 | 2573049 | 2573049P | 2573048 |
| RSPHVRC0AFTEU6803 | 2573051 | 2573051P | 2573050 |
| RSPHVRC0AFTEU6804 | 2573053 | 2573053P | 2573052 |
| RSPHVRC0AFTEU8202 | 2573055 | 2573055P | 2573054 |
| RSPHVRC0AFTEU8203 | 2573057 | 2573057P | 2573056 |
| RSPHVRC0AFTEU8204 | 2573059 | 2573059P | 2573058 |
| RSPHVRC12FTET1003 | 2573061 | 2573061P | 2573060 |
| RSPHVRC12FTET1004 | 2573063 | 2573063P | 2573062 |
| RSPHVRC12FTET1005 | 2573065 | 2573065P | 2573064 |
| RSPHVRC12FTET1203 | 2573067 | 2573067P | 2573066 |
| RSPHVRC12FTET1204 | 2573069 | 2573069P | 2573068 |
| RSPHVRC12FTET1205 | 2573071 | 2573071P | 2573070 |
| RSPHVRC12FTET1503 | 2573073 | 2573073P | 2573072 |
| RSPHVRC12FTET1504 | 2573075 | 2573075P | 2573074 |
| RSPHVRC12FTET1505 | 2573077 | 2573077P | 2573076 |
| RSPHVRC12FTET1803 | 2573079 | 2573079P | 2573078 |
| RSPHVRC12FTET1804 | 2573081 | 2573081P | 2573080 |
| RSPHVRC12FTET1805 | 2573083 | 2573083P | 2573082 |
| RSPHVRC12FTET2203 | 2573085 | 2573085P | 2573084 |
| RSPHVRC12FTET2204 | 2573087 | 2573087P | 2573086 |
| RSPHVRC12FTET2703 | 2573089 | 2573089P | 2573088 |

High Voltage Thick Film Chip Resistor

| | | | |
|-------------------|---------|----------|---------|
| RSPHVRC12FTET2704 | 2573091 | 2573091P | 2573090 |
| RSPHVRC12FTET3303 | 2573093 | 2573093P | 2573092 |
| RSPHVRC12FTET3304 | 2573095 | 2573095P | 2573094 |
| RSPHVRC12FTET3902 | 2573097 | 2573097P | 2573096 |
| RSPHVRC12FTET3903 | 2573099 | 2573099P | 2573098 |
| RSPHVRC12FTET3904 | 2573101 | 2573101P | 2573100 |
| RSPHVRC12FTET4702 | 2573103 | 2573103P | 2573102 |
| RSPHVRC12FTET4703 | 2573105 | 2573105P | 2573104 |
| RSPHVRC12FTET4704 | 2573108 | 2573108P | 2573107 |
| RSPHVRC12FTET5602 | 2573110 | 2573110P | 2573109 |
| RSPHVRC12FTET5603 | 2573112 | 2573112P | 2573111 |
| RSPHVRC12FTET5604 | 2573114 | 2573114P | 2573113 |
| RSPHVRC12FTET6802 | 2573116 | 2573116P | 2573115 |
| RSPHVRC12FTET6803 | 2573118 | 2573118P | 2573117 |
| RSPHVRC12FTET6804 | 2573120 | 2573120P | 2573119 |
| RSPHVRC12FTET8202 | 2573122 | 2573122P | 2573121 |
| RSPHVRC12FTET8203 | 2573124 | 2573124P | 2573123 |
| RSPHVRC12FTET8204 | 2573126 | 2573126P | 2573125 |