

Data Sheet

Customer:

Product: Automotive Grade Chip Resistor (Wide Terminal) –
CRW..A Series

Size: 0508/0612/1020/1225

Issued Date: 29-Nov-24

Edition: REV.A7



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Automotive Grade Chip Resistor (Wide Terminal)-CRW..A Series



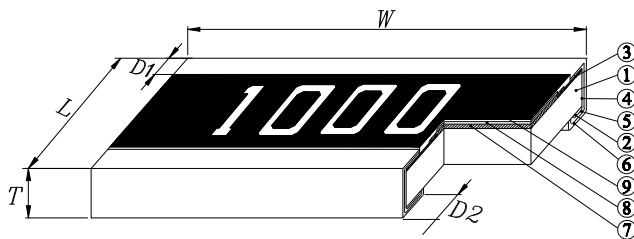
Scope

– This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

Features

- AEC-Q200 Qualified
- Highly reliable multilayer electrode construction
- Compatible with all soldering process
- 100% CCD inspection

Construction



Applications

- Automotive Industry
- Telecommunication Equipments
- Radio and Tape Recorders, TV Tuners
- Digital Cameras, Watches, Pocket Calculators
- Computers, Instruments
- Medical Equipment

| | | |
|---------------------|----------------------|----------------------|
| 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 |

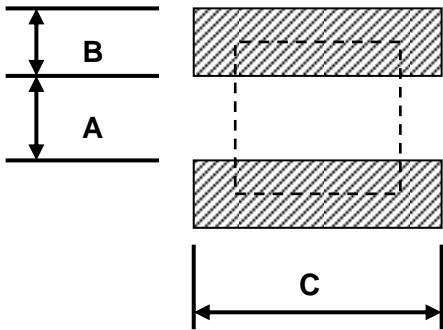
Dimensions

| Type | Size (Inch) | L (mm) | W (mm) | T (mm) | D1 (mm) | D2 (mm) |
|---------------|-------------|-----------|-----------|-----------|-----------|-----------|
| CRW08 | 0508 | 1.25±0.10 | 2.00±0.10 | 0.55±0.10 | 0.30±0.15 | 0.30±0.15 |
| CRW08(Jumper) | | | | | 0.20±0.15 | |
| CRW62 | 0612 | 1.55±0.10 | 3.00±0.15 | 0.55±0.10 | 0.25±0.15 | 0.40±0.15 |
| CRW62(Jumper) | | | | | | |
| CRW20 | 1020 | 2.45±0.15 | 5.00±0.10 | 0.60±0.15 | 0.35±0.20 | 0.70±0.20 |
| CRW20(Jumper) | | | | | 0.45±0.20 | |
| CRW25 | 1225 | 3.20±0.20 | 6.40±0.15 | 0.65±0.15 | 0.40±0.20 | 1.10±0.20 |
| CRW25(Jumper) | | | | | 0.50±0.20 | |

Part Numbering

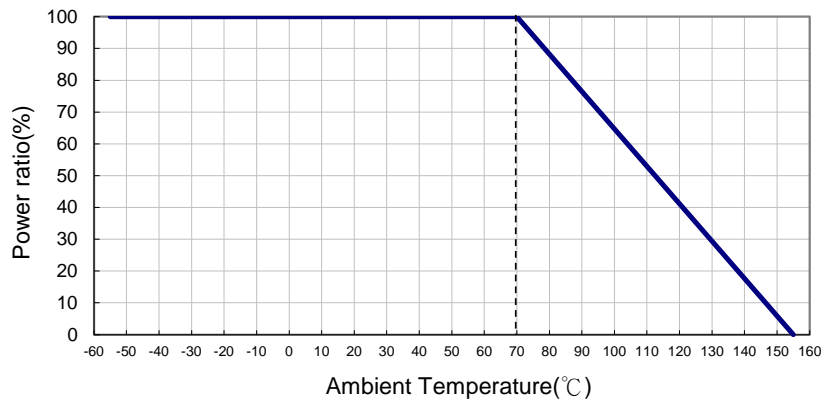
| | | | | | |
|---------------------|--|------------------------------|---|--------------------------------------|---|
| CRW | 25 | F | C | 4 | ---20R |
| Product Type | Dimensions | Resistance Tolerance | Function Code | Packaging Code | Resistance |
| CRW | 08: 0508 62: 0612 20: 1020 25: 1225 | D: ±0.5% F: ±1% J: ±5% | A: Automotive Grade C: High Power & Automotive Grade U: Ultra High Power & Automotive Grade | 4: 7" Reel 4Kpcs 7: 7" Reel 5Kpcs | -- -20R: 20Ω --- 1R2: 1.2Ω --- -0R: 0Ω “-“ to fill up 6 spaces |

Recommend Land Pattern

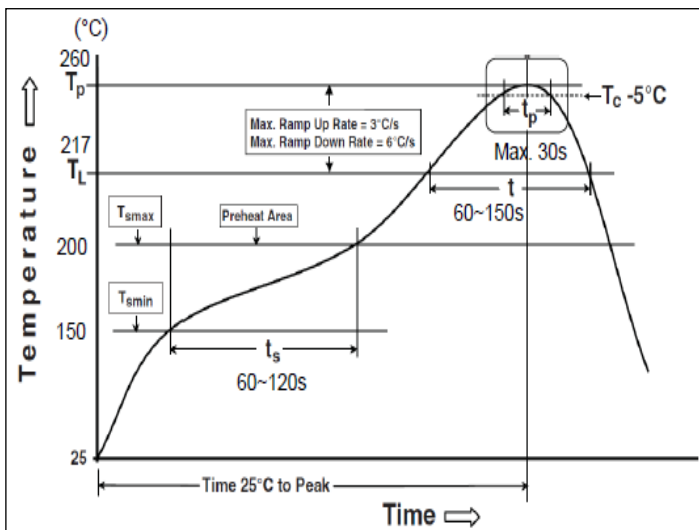


| Type | A (mm) | B (mm) | C (mm) |
|-------|--------|--------|--------|
| CRW08 | 0.55 | 0.90 | 2.00 |
| CRW62 | 0.70 | 0.80 | 3.20 |
| CRW20 | 1.00 | 1.20 | 5.00 |
| CRW25 | 1.00 | 2.00 | 7.00 |

Derating Curve

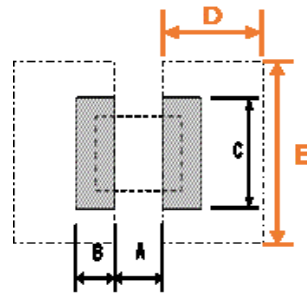
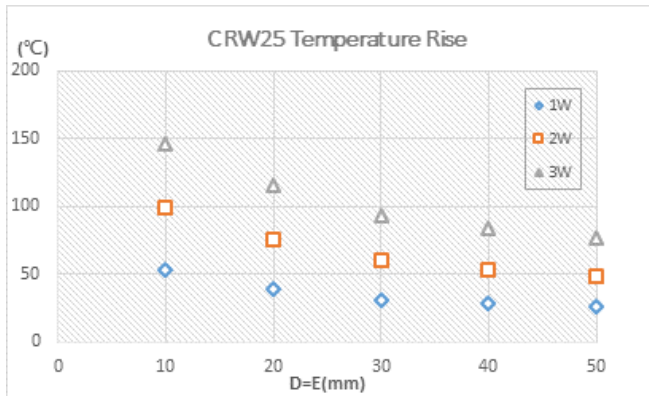


Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



| Reflow Profiles | |
|--|------------------|
| Profile Feature | Pb-Free Assembly |
| Preheat | |
| Min. Temperature (T _{sm}) | 150 °C |
| Max Temperature (T _{sm}) | 200 °C |
| Preheating time (t _s) from (T _{sm} to T _{sm}) | 60-120 seconds |
| Ramp-up rate (T _L to T _p) | 3 °C/second max. |
| Liquidous temperature (T _L) | 217 °C |
| Time (t _L) maintained above T _L | 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. |

Temperature Rise



*FR4 copper board, 35 μ m of copper pad thickness

Standard Electrical Specifications

| Item Type | Power Rating at 70°C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | TCR (PPM/°C) |
|--------------|----------------------|-----------------------|------------------------|-----------------------|----------------------------|---------------|-----------|--------------|
| | | | | | ±0.5% (E24,E96) | ±1% (E24,E96) | ±5% (E24) | |
| CRW08 (0508) | 0.75W | -55 ~ +155°C | 200V | 400V | 1 Ω – 9.76 Ω | | | ±150 |
| | | | | | 10 Ω – 1M Ω | | | ±100 |
| CRW62 (0612) | 1W | -55 ~ +155°C | 200V | 400V | 1 Ω – 1M Ω | | | ±100 |
| CRW20 (1020) | 1.5W | -55 ~ +155°C | 200V | 400V | 1 Ω – 9.76 Ω | | | ±150 |
| | | | | | 10 Ω – 1M Ω | | | ±100 |
| CRW25 (1225) | 2W | -55 ~ +155°C | 200V | 400V | 1 Ω – 29.4 Ω | | | ±200 |
| | | | | | 30 Ω – 1M Ω | | | ±100 |

High Power Rating Electrical Specifications

| Item Type | Power Rating at 70°C Jumper Rated Current | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | TCR (PPM/°C) |
|--------------|--|-----------------------|------------------------|-----------------------|------------------------------------|---------------|-----------|--------------|
| | | | | | ±0.5% (E24,E96) | ±1% (E24,E96) | ±5% (E24) | |
| CRW08 (0508) | 1W | -55 ~ +155°C | 200V | 400V | 1 Ω – 9.76 Ω | | | ±150 |
| | Jumper: 5A | | | | 10 Ω – 1M Ω | | | ±100 |
| CRW62 (0612) | 1.5W | -55 ~ +155°C | 200V | 400V | 1 Ω – 1M Ω | | | ±100 |
| | Jumper: 6A | | | | - 0 Ω (<10m Ω) | | | - |
| CRW20 (1020) | 2W | -55 ~ +155°C | 200V | 400V | 1 Ω – 9.76 Ω | | | ±150 |
| | Jumper: 10A | | | | 10 Ω – 1M Ω | | | ±100 |
| CRW25 (1225) | 3W | -55 ~ +155°C | 200V | 400V | 1 Ω – 29.4 Ω | | | ±200 |
| | Jumper: 12A | | | | 30 Ω – 1M Ω | | | ±100 |
| | | | | | - 0 Ω (<10m Ω) | | | - |

Ultra High Power Rating Electrical Specifications

| Type \ Item | Power Rating at 70°C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | TCR (PPM/°C) |
|--------------|----------------------|-----------------------|------------------------|-----------------------|------------------|---------------|-----------|--------------|
| | | | | | ±0.5% (E24,E96) | ±1% (E24,E96) | ±5% (E24) | |
| CRW62 (0612) | 2W | -55 ~ +155°C | 200V | 400V | 1Ω – 1MΩ | | | ±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.
 ■ Viking is capable of manufacturing the optional spec based on customer's requirement.

Environmental Characteristics

| Item | Requirement | Test Method |
|--|--|---|
| 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 |
| Short Time Overload | ±(1.0%+0.05Ω) | JIS-C-5201-1 4.13 IEC-60115-1 4.13 6.25*rated power or Max. Overload Voltage whichever is lower for 5 seconds Ultra High Power:5*rated power for 5 seconds |
| Insulation Resistance | ≥10G | JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute |
| Operational Life | ±(1.0%+0.10Ω) | MIL-STD-202 Method 108 Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion. |
| Biased Humidity | ±(1.0%+0.10Ω) | MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power. (≤ 100 V) |
| High Temperature Exposure | ±(1.0%+0.05Ω) | MIL-STD-202 Method 108 at +155°C for 1000 hrs |
| Board Flex | ±(1.0%+0.05Ω) | AEC-Q200-005 Bending once for 60 seconds 3mm |
| Solderability | 95% min. coverage | JIS-C-5201-1 4.17 IEC-60115-1 4.17 J-STD-002 245±5°C for 3 seconds |
| Resistance to Soldering Heat | ±(0.5%+0.05Ω) | MIL-STD-202 Method 210 260±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 Max. Operating Voltage 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 |

| Item | Requirement | Test Method |
|------------------------|--|---|
| Temperature Cycling | $\pm(0.5\%+0.05\Omega)$ | JESD22 Method JA-104 -55°C to +125°C, 1000 cycles |
| Mechanical Shock | $\pm(0.25\%+0.05\Omega)$ | MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6. |
| Vibration | $\pm(0.5\%+0.05\Omega)$ | MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz |
| ESD | $\pm(3\%+0.05\Omega)$ | 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. |
| Sulfur Test | $\Delta R \pm 1\%$ | EIA-977 (Condition A) 60 \pm 2°C, no power rating for 500 hrs. |

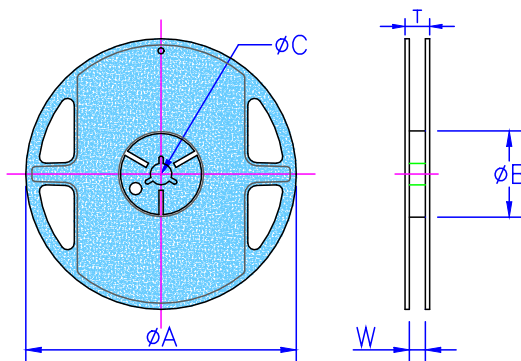
RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

* not include Jumper(0 Ω)

- **Storage Temperature: 15~28°C; Humidity < 80%RH**
- **Shelf Life: 2 years from production date.**

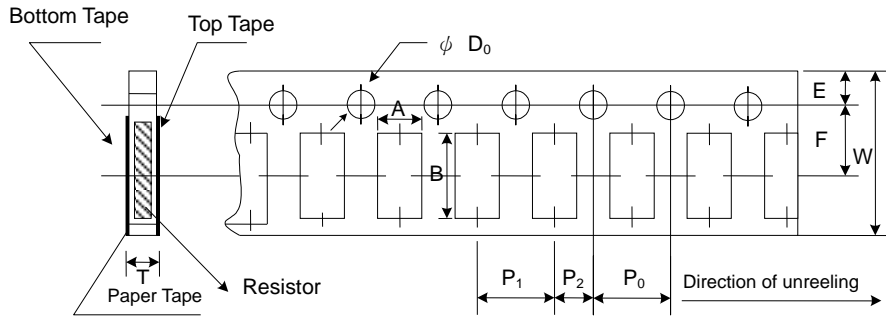
■ Packaging

Reel Specifications & Packaging Quantity



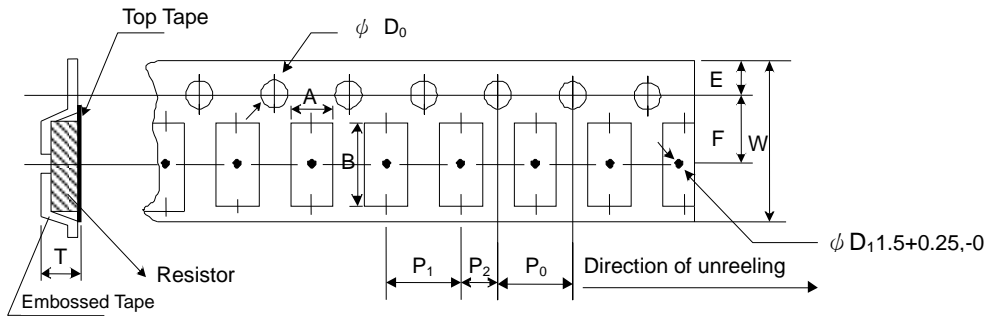
| Type | Packaging Quantity | | Tape Width | Reel Diameter | øA (mm) | øB (mm) | øC (mm) | W (mm) | T (mm) |
|----------------|--------------------|----|------------|---------------|-----------------|---------------------|----------------|----------------|----------------|
| CRW08 CRW62 | Paper | 5K | 8mm | 7 inch | 178.5 \pm 1.5 | 60 ^{+1/-0} | 13.0 \pm 0.2 | 9.0 \pm 0.5 | 12.5 \pm 0.5 |
| CRW20 CRW25 | Embossed | 4K | 12mm | 7 inch | 178.5 \pm 1.5 | 60 ^{+1/-0} | 13.0 \pm 0.5 | 13.0 \pm 0.5 | 15.5 \pm 0.5 |

Paper Tape Specifications



| Type | A (mm) | B (mm) | W (mm) | E (mm) | F (mm) | P ₀ (mm) | P ₁ (mm) | P ₂ (mm) | ΦD ₀ (mm) | T (mm) |
|-------|-----------|-----------|----------|-----------|-----------|---------------------|---------------------|---------------------|----------------------|-----------|
| CRW08 | 1.60±0.10 | 2.40±0.20 | 8.0±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 |
| CRW62 | 1.90±0.10 | 3.50±0.20 | 8.0±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 |

Embossed Plastic Tape Specifications



| Type | A (mm) | B (mm) | W (mm) | E (mm) | F (mm) | P ₀ (mm) | P ₁ (mm) | P ₂ (mm) | ΦD ₀ (mm) | T (mm) |
|-------|-----------|-----------|-----------|-----------|----------|---------------------|---------------------|---------------------|----------------------|-----------|
| CRW20 | 2.80±0.15 | 5.40±0.20 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.55+0.10 | 1.00±0.20 |
| CRW25 | 3.50±0.10 | 6.70±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.55+0.10 | 1.00±0.20 |

■ Marking

1% for 0508/0612/1020/1225: 4 digits marking

Example:

| | | | |
|------------|------|------|------|
| Resistance | 20Ω | 100Ω | 1KΩ |
| Marking | 20R0 | 1000 | 1001 |

5% for 0508/0612/1020/1225: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (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 |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|-----------------|--------------|----------------------------|--|
| Version A | Oct 30, 2020 | - | - New product release |
| Version A1 | Nov 23, 2020 | - | Increase 1020/0508/0612 size and High power specifications |
| Version A2 | Mar 10, 2021 | - | - Increase 1020/0508/0612 Standard Electrical Specifications - Modify Soldering Condition |
| Version A3 | Nov 15, 2021 | - | - Increase the shelf life description |
| Version A4 | Feb 15, 2022 | - | - Derating Curve changes the temperature range |
| Version A5 | Jun 15, 2022 | - | - Modify Soldering Condition |
| Version A6 | Jul 08, 2024 | - | - Modify the descriptions in the Features |
| Version A7 | Nov 29, 2024 | - | - Increase 0612 Ultra High Power |