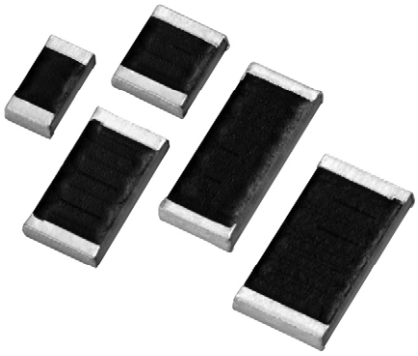
# Thick Film Chip Resistors, High Voltage



## FEATURES

- AEC-Q200 qualified
- Voltages up to 3000 V
- Automatic placement capability
- Termination style: 3-sided wraparound termination
- Tape and reel packaging available
- Internationally standardized sizes, custom sizes available
- Termination material: solder-coated nickel barrier or solder coated non-magnetic terminations standard
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

## LINKS TO ADDITIONAL RESOURCES

3D Models

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | CASE SIZE | POWER RATING $P_{70\,°C}$ W | MAX. WORKING VOLTAGE (2) V | RESISTANCE RANGE (1) Ω | TOLERANCE ± % | TEMPERATURE COEFFICIENT (3) ± ppm/°C |
|---|---|---|---|---|---|---|
| CRMA1206 | 1206 | 0.30 | 1000 | 150 to 15M | 0.5, 1, 2, 5, 10 | 100 |
| CRMA1210 | 1210 | 0.35 | 1250 | 300 to 20M | 0.5, 1, 2, 5, 10 | 100 |
| CRMA2010 | 2010 | 0.50 | 2000 | 500 to 40M | 0.5, 1, 2, 5, 10 | 100 |
| CRMA2510 | 2510 | 0.80 | 2500 | 1K to 60M | 0.5, 1, 2, 5, 10 | 100 |
| CRMA2512 | 2512 | 1.0 | 3000 | 1K to 75M | 0.5, 1, 2, 5, 10 | 100 |

**Notes**

- For non-standard sizes, lower values or higher power rating requirement, contact factory

(1) Resistance values calibrated at 10 $V_{DC}$. Calibration at other voltages available upon request

(2) Continuous working voltage shall be $\sqrt{P \times R}$ or maximum working voltage, whichever is less

(3) Reference only: not for all values specified. Consult factory for your size and value

## TECHNICAL SPECIFICATIONS

| PARAMETER | UNIT | CRMA1206 | CRMA1210 | CRMA2010 | CRMA2510 | CRMA2512 |
|---|---|---|---|---|---|---|
| Rated dissipation at 70 °C | W | 0.30 | 0.35 | 0.50 | 0.80 | 1.0 |
| Limiting element voltage | V≅ | 1000 | 1250 | 2000 | 2500 | 3000 |
| Insulation resistance | Ω | ≥ $10^{11}$ | ≥ $10^{11}$ | ≥ $10^{11}$ | ≥ $10^{11}$ | ≥ $10^{11}$ |
| Category temperature range | °C | -55 to +155 | -55 to +155 | -55 to +155 | -55 to +155 | -55 to +155 |
| Weight/1000 (typical) | g | 12.2 | 19.6 | 32.2 | 39.8 | 49.7 |
| VCR (typical) | ppm/V | < 2 | < 2 | < 2 | < 2 | < 2 |



For technical questions, contact: te1resistors@vishay.com

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## GLOBAL PART NUMBER INFORMATION

**Global Part Numbering: CRMA1210AF1K00FLET (preferred part number format)**

| C | R | M | A | 1 | 2 | 1 | 0 | A | F | 1 | K | 0 | 0 | F | L | E | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

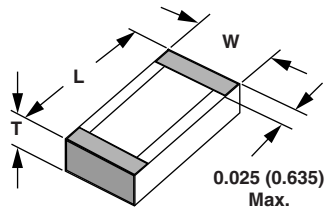
| GLOBAL MODEL | SIZE | TERMINAL STYLE | TERMINAL MATERIAL | RESISTANCE VALUE | TOLERANCE | TCR | SOLDER TERMINATION | PACKAGING |
|---|---|---|---|---|---|---|---|---|
| **CRMA** | **1206**<br>**1210**<br>**2010**<br>**2510**<br>**2512** | **A** = 3-sided | **F** = nickel barrier<br>**G** = non-magnetic | **R** = Ω<br>**K** = kΩ<br>**M** = MΩ<br>**110R** = 110 Ω<br>**49K9** = 49.9 kΩ<br>**10M0** = 10 MΩ | **D** = ± 0.5 %<br>**F** = ± 1 %<br>**G** = ± 2 %<br>**J** = ± 5 %<br>**K** = ± 10 % | **K** = 100 ppm | **E** = Sn100 | **B** = bulk (250 pcs max.)<br>**F** = T / R (full reel)<br>**1** = T / R (1000 pcs)<br>**5** = T / R (500 pcs)<br>**T** = T / R (250 pcs min.)<br>**W** = waffle tray |

**Note**

- For additional information on packaging, refer to the Surface Mount Resistor Packaging document (www.vishay.com/doc?31543)

## DIMENSIONS in inches (millimeters)

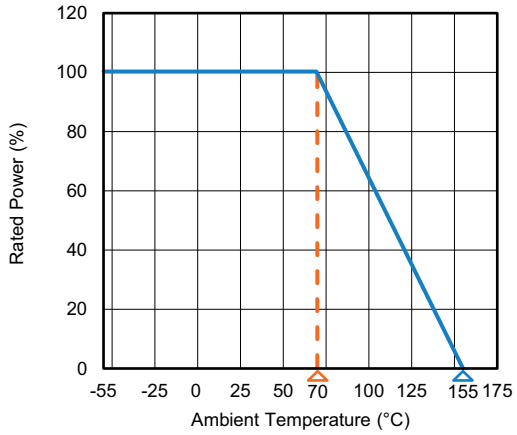
**TERMINATION STYLE A (3-SIDED WRAPAROUND)**




| MODEL | LENGTH (L) | WIDTH (W) | THICKNESS (T) |
|---|---|---|---|
| CRMA1206 | 0.125 ± 0.006 (3.18 ± 0.15) | 0.063 ± 0.006 (1.60 ± 0.15) | 0.025 ± 0.004 (0.64 ± 0.10) |
| CRMA1210 | 0.125 ± 0.006 (3.18 ± 0.15) | 0.100 ± 0.006 (2.54 ± 0.15) | 0.025 ± 0.004 (0.64 ± 0.10) |
| CRMA2010 | 0.200 ± 0.006 (5.08 ± 0.15) | 0.100 ± 0.006 (2.54 ± 0.15) | 0.025 ± 0.004 (0.64 ± 0.10) |
| CRMA2510 | 0.250 ± 0.006 (6.35 ± 0.15) | 0.100 ± 0.006 (2.54 ± 0.15) | 0.025 ± 0.004 (0.64 ± 0.10) |
| CRMA2512 | 0.250 ± 0.006 (6.35 ± 0.15) | 0.126 ± 0.006 (3.20 ± 0.15) | 0.025 ± 0.004 (0.64 ± 0.10) |

| TYPE | TERMINATION MATERIAL | TERMINATION STYLE | TERMINATION STYLE / MATERIAL CODE | SOLDER TERMINATION CODE |
|---|---|---|---|---|
| Solderable | Nickel barrier | 3-sided (wraparound) | AF | E |
| Solderable | Non-magnetic | 3-sided (wraparound) | AG | E |

## DERATING CURVE




## MATERIAL SPECIFICATIONS

| | |
|---|---|
| Resistive element | Ruthenium oxide |
| Encapsulation | Epoxy |
| Substrate | 96 % alumina |
| Termination | Solder-coated nickel barrier |
| Solder finish | Pure tin standard |



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| PERFORMANCE | | |
|---|---|---|
| **TEST** | **CONDITIONS OF TEST** | **TEST RESULTS (TYPICAL TEST LOTS)** |
| Thermal shock | -55 °C to +150 °C, 1000 cycles, 15 min at each extreme | ± (1.0 % + 0.05 Ω) |
| High temperature exposure | 1000 h at +170 °C | ± (1.0 % + 0.05 Ω) |
| Bias humidity | +85 °C, 85 % RH, 10 % bias, 1000 h | ± (1.0 % + 0.0005 Ω) |
| Mechanical shock | 100 *g*'s for 6 ms, 5 pulses | ± (0.5 % + 0.0005 Ω) |
| Vibration | Frequency varied 10 Hz to 2000 Hz in 1 min, 3 directions, 12 h | ± (0.5 % + 0.0005 Ω) |
| Load life | 1000 h at rated power, +70 °C, 1.5 h "ON", 0.5 h "OFF" | ± (1.0 % + 0.0005 Ω) |
| Resistance to solder heat | +260 °C solder, 10 s to 12 s dwell, 25 mm/s emergence | ± (1.0 % + 0.0005 Ω) |
| Moisture resistance | MIL-STD-202, method 106, 0 % power, 7a and 7b not required | ± (1.0 % + 0.0005 Ω) |



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