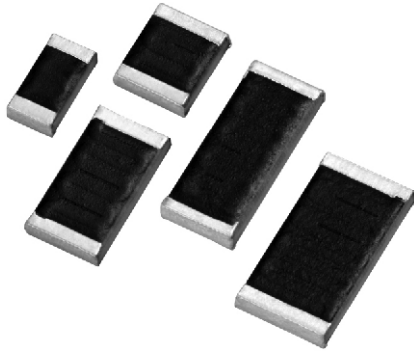


## Thick Film Chip Resistors, High Voltage



### FEATURES

- AEC-Q200 qualified
- Voltages up to 3000 V
- Automatic placement capability
- Termination style: 3-sided wraparound termination or single termination flip chip available
- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### LINKS TO ADDITIONAL RESOURCES



### STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | CASE SIZE | POWER RATING<br>$P_{70\text{ }^\circ\text{C}}$<br>W | MAX. WORKING VOLTAGE <sup>(2)</sup><br>V | RESISTANCE RANGE <sup>(1)</sup><br>$\Omega$ | TOLERANCE<br>$\pm \%$ | TEMPERATURE COEFFICIENT <sup>(3)</sup><br>$\pm \text{ppm}/^\circ\text{C}$ |
|--------------|-----------|---|--|---|-----------------------|---|
| 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
- <sup>(1)</sup> Resistance values calibrated at 10 V<sub>DC</sub>. Calibration at other voltages available upon request
- <sup>(2)</sup> Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less
- <sup>(3)</sup> 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 <sub>≡</sub> | 1000           | 1250           | 2000           | 2500           | 3000           |
| Insulation resistance      | $\Omega$       | $\geq 10^{11}$ | $\geq 10^{11}$ | $\geq 10^{11}$ | $\geq 10^{11}$ | $\geq 10^{11}$ |
| 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            |

**GLOBAL PART NUMBER INFORMATION**

Global Part Numbering: CRMA1210AF1K00FLET (preferred part number format)

|                     |                                      |                             |  |   |  |             |                  |  |                           |                  |          |          |          |          |          |          |          |
|---------------------|--------------------------------------|-----------------------------|--|---|--|-------------|------------------|--|---------------------------|------------------|----------|----------|----------|----------|----------|----------|----------|
| <b>C</b>            | <b>R</b>                             | <b>M</b>                    | <b>A</b>                               | <b>1</b>  | <b>2</b>   | <b>1</b>    | <b>0</b>         | <b>A</b>   | <b>F</b>                  | <b>1</b>         | <b>K</b> | <b>0</b> | <b>0</b> | <b>F</b> | <b>L</b> | <b>E</b> | <b>T</b> |
| <b>GLOBAL MODEL</b> | <b>SIZE</b>                          | <b>TERMINAL STYLE</b>       | <b>TERMINAL MATERIAL</b>               | <b>RESISTANCE VALUE</b>   |  |             | <b>TOLERANCE</b> | <b>TCR</b>   | <b>SOLDER TERMINATION</b> | <b>PACKAGING</b> |          |          |          |          |          |          |          |
| CRMA                | 1206<br>1210<br>2010<br>2510<br>2512 | A = 3-sided<br>B = top only | 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 |                           |                  |          |          |          |          |          |          |          |

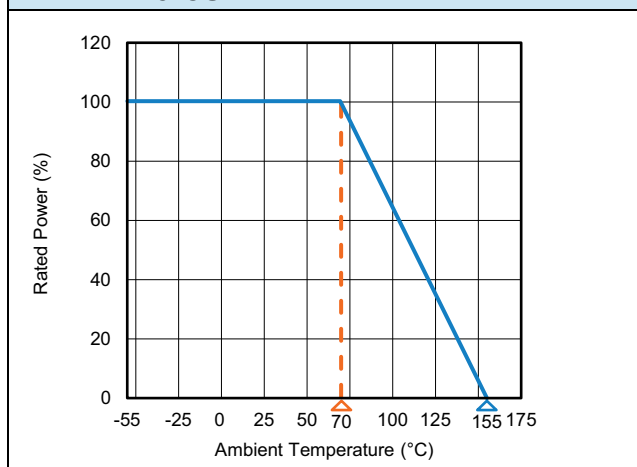
**Note**

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

**DIMENSIONS** in inches (millimeters)

| TERMINATION STYLE A<br>(3-SIDED WRAPAROUND) | TERMINATION STYLE B<br>(TOP CONDUCTOR ONLY) | MODEL    | LENGTH (L)                     | WIDTH (W)                      | THICKNESS (T)                  |
|---|---|----------|--------------------------------|--------------------------------|--------------------------------|
|   |   | CRMA1206 | 0.125 ± 0.006<br>(3.18 ± 0.15) | 0.063 ± 0.006<br>(1.60 ± 0.15) | 0.025 ± 0.004<br>(0.64 ± 0.10) |
|   |   | CRMA1210 | 0.125 ± 0.006<br>(3.18 ± 0.15) | 0.100 ± 0.006<br>(2.54 ± 0.15) | 0.025 ± 0.004<br>(0.64 ± 0.10) |
|   |   | CRMA2010 | 0.200 ± 0.006<br>(5.08 ± 0.15) | 0.100 ± 0.006<br>(2.54 ± 0.15) | 0.025 ± 0.004<br>(0.64 ± 0.10) |
|   |   | CRMA2510 | 0.250 ± 0.006<br>(6.35 ± 0.15) | 0.100 ± 0.006<br>(2.54 ± 0.15) | 0.025 ± 0.004<br>(0.64 ± 0.10) |
|   |   | CRMA2512 | 0.250 ± 0.006<br>(6.35 ± 0.15) | 0.126 ± 0.006<br>(3.20 ± 0.15) | 0.025 ± 0.004<br>(0.64 ± 0.10) |

| TYPE       | TERMINATION MATERIAL | TERMINATION STYLE    | TERMINATION STYLE / MATERIAL CODE | SOLDER TERMINATION CODE |
|------------|----------------------|----------------------|-----------------------------------|-------------------------|
| Solderable | Nickel barrier       | 3-sided (wraparound) | AF                                | E                       |
|            |                      | Top only (flip chip) | BF                                |                         |
| Solderable | Non-magnetic         | 3-sided (wraparound) | AG                                | E                       |
|            |                      | Top only (flip chip) | BG                                |                         |

**DERATING CURVE**

**MATERIAL SPECIFICATIONS**

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



| PERFORMANCE               |   |                                  |
|---------------------------|---|----------------------------------|
| TEST                      | CONDITIONS OF TEST  | TEST RESULTS (TYPICAL TEST LOTS) |
| Thermal shock             | -55 °C to +150 °C, 1000 cycles,<br>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,<br>3 directions, 12 h | ± (0.5 % + 0.0005 Ω)             |
| Load life                 | 1000 h at rated power, +70 °C,<br>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,<br>25 mm/s emergence          | ± (1.0 % + 0.0005 Ω)             |
| Moisture resistance       | MIL-STD-202, method 106, 0 % power,<br>7a and 7b not required     | ± (1.0 % + 0.0005 Ω)             |



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