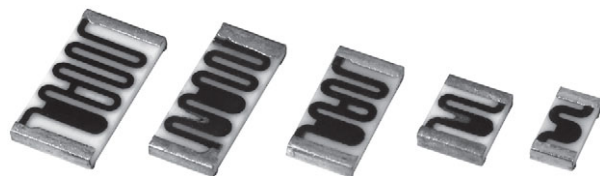


# Thick Film Chip Resistors, High Voltage



## LINKS TO ADDITIONAL RESOURCES



## ALTERNATIVE DEVICE - DLA DRAWINGS

- [03025 - CRHV1206](#)
- [03026 - CRHV2010](#)
- [03027 - CRHV2512](#)

### Note

\* This datasheet provides information about parts that are RoHS-compliant and /or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

## FEATURES

- High voltage up to 3000 V
- Outstanding stability < 0.5 %
- Flow solderable
- Custom sizes available
- Automatic placement capability
- Tape and reel packaging available
- Termination style: 3-sided wraparound termination or single termination flip chip standard; 5-sided wraparound termination available
- Internationally standardized sizes
- Suitable for solderable, epoxy bondable, or wire bondable applications
- Termination material: solder-coated nickel barrier or solder coated non-magnetic terminations standard; gold, palladium silver, platinum gold, platinum silver or platinum palladium gold terminations available
- Multiple styles, termination materials and configurations, allow wide design flexibility
- Epoxy bondable or wire bondable non-magnetic terminations available
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



Available

**RoHS\***  
Available

**HALOGEN**  
**FREE**

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | CASE SIZE | POWER RATING<br>$P_{70^{\circ}\text{C}}$<br>W | MAXIMUM WORKING VOLTAGE <sup>(1)</sup><br>V | RESISTANCE RANGE <sup>(2)</sup><br>$\Omega$ | TOLERANCE <sup>(3)</sup><br>$\pm \%$ | TEMPERATURE COEFFICIENT <sup>(4)</sup><br>(-55 °C to +155 °C)<br>$\pm \text{ppm}/^{\circ}\text{C}$ |
|--------------|-----------|-----------------------------------------------|---------------------------------------------|---------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------|
| CRHV1206     | 1206      | 0.30                                          | 1500                                        | 2M to 100M                                  | 0.5                                  | 100                                                                                                |
|              |           |                                               |                                             | 2M to 1G                                    | 1, 2, 5, 10, 20                      |                                                                                                    |
|              |           |                                               |                                             | 1.1G to 8G                                  | 2, 5, 10, 20                         |                                                                                                    |
| CRHV1210     | 1210      | 0.45                                          | 1750                                        | 4M to 100M                                  | 0.5                                  | 100                                                                                                |
|              |           |                                               |                                             | 4M to 1G                                    | 1, 2, 5, 10, 20                      |                                                                                                    |
|              |           |                                               |                                             | 1.1G to 10G                                 | 2, 5, 10, 20                         |                                                                                                    |
| CRHV2010     | 2010      | 0.50                                          | 2000                                        | 6M to 100M                                  | 0.5                                  | 100                                                                                                |
|              |           |                                               |                                             | 6M to 1G                                    | 1, 2, 5, 10, 20                      |                                                                                                    |
|              |           |                                               |                                             | 1.1G to 10G                                 | 2, 5, 10, 20                         |                                                                                                    |
|              |           |                                               |                                             | 11G to 35G                                  | 5, 10, 20                            |                                                                                                    |
| CRHV2510     | 2510      | 0.60                                          | 2500                                        | 10M to 100M                                 | 0.5                                  | 100                                                                                                |
|              |           |                                               |                                             | 10M to 1G                                   | 1, 2, 5, 10, 20                      |                                                                                                    |
|              |           |                                               |                                             | 1.1G to 10G                                 | 2, 5, 10, 20                         |                                                                                                    |
|              |           |                                               |                                             | 11G to 40G                                  | 5, 10, 20                            |                                                                                                    |
| CRHV2512     | 2512      | 1.0                                           | 3000                                        | 10M to 100M                                 | 0.5                                  | 100                                                                                                |
|              |           |                                               |                                             | 10M to 1G                                   | 1, 2, 5, 10, 20                      |                                                                                                    |
|              |           |                                               |                                             | 1.1G to 10G                                 | 2, 5, 10, 20                         |                                                                                                    |
|              |           |                                               |                                             | 11G to 50G                                  | 5, 10, 20                            |                                                                                                    |

### Notes

- For non-standard sizes, lower values or higher power rating requirement, contact factory
- (1) Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less
- (2) Resistance values below 1 G $\Omega$  are calibrated at 100 V<sub>DC</sub>, and values of 1 G $\Omega$  and above are calibrated at 1000 V<sub>DC</sub>. Calibration at other voltages available upon request
- (3) Contact factory for tighter tolerances
- (4) Reference only: not for all values specified. Consult factory for your size and value. The TC for "AA" option is typically 200 ppm



## GLOBAL PART NUMBER INFORMATION

New Global Part Numbering: CRHV1206AF100MFKFB (preferred part number format)

| GLOBAL MODEL | SIZE                                 | TERMINAL STYLE                             | TERMINAL MATERIAL                                                                                                                                     | RESISTANCE VALUE                                                 | TOLERANCE                                                                      | TCR                                                                                                   | SOLDER TERMINATION                                                                         | PACKAGING                                                                                                                              |
|--------------|--------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| CRHV         | 1206<br>1210<br>2010<br>2510<br>2512 | A = 3-sided<br>B = top only<br>C = 5-sided | F = nickel barrier<br>G = non-magnetic<br>A = palladium silver<br>B = platinum gold<br>C = gold<br>D = platinum silver<br>E = platinum palladium gold | M = MΩ<br>G = GΩ<br>4M70 = 4.7 MΩ<br>10M0 = 10 MΩ<br>1G00 = 1 GΩ | D = ± 0.5 %<br>F = ± 1 %<br>G = ± 2 %<br>J = ± 5 %<br>K = ± 10 %<br>M = ± 20 % | K = 100 ppm<br>L = 150 ppm<br>N = 200 ppm<br>R = 250 ppm<br>M = 300 ppm<br>W = 350 ppm<br>P = 500 ppm | E = Sn100<br>F = Sn95/Ag5, HSD<br>N = No solder<br>S = Sn62/Pb36/Ag2, HSD<br>T = Sn90/Pb10 | 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 |

Historical Part Numbering: CRHV1206AF1006F100e2 (will continue to be accepted)

| CRHV             | 1206 | A          | F             | 1006             | F         | 100 | e2                 |
|------------------|------|------------|---------------|------------------|-----------|-----|--------------------|
| HISTORICAL MODEL | SIZE | TERM STYLE | TERM MATERIAL | RESISTANCE VALUE | TOLERANCE | TCR | SOLDER TERMINATION |

## 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))

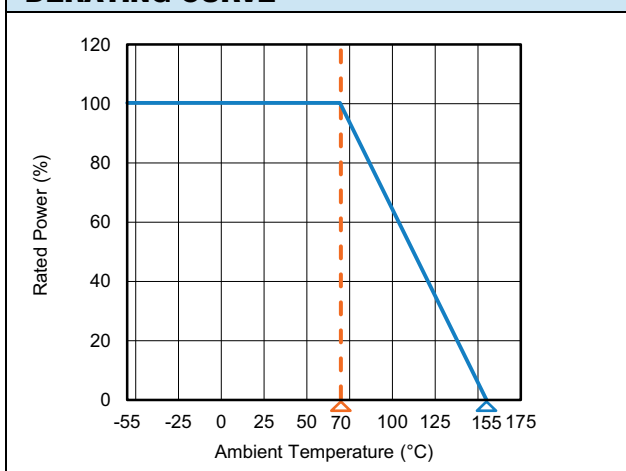
## MECHANICAL SPECIFICATIONS

|                   |                                                                                                                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resistive element | Ruthenium oxide                                                                                                                                                                           |
| Encapsulation     | Glass                                                                                                                                                                                     |
| Substrate         | 96 % alumina                                                                                                                                                                              |
| Termination       | Solder-coated nickel barrier or solder coated non-magnetic terminations standard. Gold, palladium silver, platinum gold, platinum silver, platinum palladium gold terminations available. |
| Solder finish     | Pure tin or tin/lead solder alloys standard. Tin/silver or tin/lead/silver solder alloys available.                                                                                       |

## ENVIRONMENTAL SPECIFICATIONS

|                       |                                                        |
|-----------------------|--------------------------------------------------------|
| Operating temperature | -55 °C to +155 °C                                      |
| Life                  | Less than 0.5 % change when tested at full rated power |
| Short time overload   | Less than 0.5 % ΔR                                     |

## DERATING CURVE

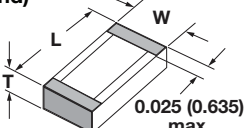
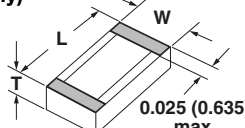
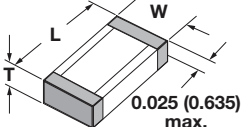


## Note

- Reference only: Not for all values specified. Consult factory for your size and value

## VOLTAGE COEFFICIENT OF RESISTANCE CHART

| SIZE     | VALUE (Ω)   | VCR (ppm/V) | FURTHER INSTRUCTIONS              |
|----------|-------------|-------------|-----------------------------------|
| CRHV1206 | 2M to 199M  | 25          | Values over 200M, consult factory |
| CRHV1210 | 4M to 200M  | 25          | Values over 200M, consult factory |
| CRHV2010 | 6M to 99M   | 15          | Values over 1G, consult factory   |
|          | 100M to 1G  | 20          |                                   |
| CRHV2510 | 10M to 99M  | 10          | Values over 1G, consult factory   |
|          | 100M to 1G  | 15          |                                   |
| CRHV2512 | 10M to 999M | 10          | Values over 5G, consult factory   |
|          | 1G to 5G    | 25          |                                   |

| DIMENSIONS in inches (millimeters)                                                                                                   |  |                                                                                                                                        |                                      |                                         |
|--------------------------------------------------------------------------------------------------------------------------------------|--|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------|
| <b>Termination Style A</b><br>(3-sided wraparound)  |  | <b>Termination Style B</b><br>(Top conductor only)  |                                      |                                         |
| <b>Termination Style C</b><br>(5-sided wraparound)  |  | <b>MODEL</b>                                                                                                                           | <b>LENGTH (L)</b><br>± 0.006 (0.152) | <b>WIDTH (W)</b><br>± 0.006 (0.152)     |
|                                                                                                                                      |  | CRHV1206                                                                                                                               | 0.125                                | 0.063                                   |
|                                                                                                                                      |  | CRHV1210                                                                                                                               | 0.125                                | 0.100                                   |
|                                                                                                                                      |  | CRHV2010                                                                                                                               | 0.200                                | 0.100                                   |
|                                                                                                                                      |  | CRHV2510                                                                                                                               | 0.250                                | 0.100                                   |
|                                                                                                                                      |  | CRHV2512                                                                                                                               | 0.250                                | 0.126                                   |
|                                                                                                                                      |  |                                                                                                                                        |                                      | <b>THICKNESS (T)</b><br>± 0.002 (0.051) |
|                                                                                                                                      |  |                                                                                                                                        |                                      | 0.025                                   |
|                                                                                                                                      |  |                                                                                                                                        |                                      | 0.025                                   |
|                                                                                                                                      |  |                                                                                                                                        |                                      | 0.025                                   |
|                                                                                                                                      |  |                                                                                                                                        |                                      | 0.025                                   |
|                                                                                                                                      |  |                                                                                                                                        |                                      | 0.025                                   |

| TYPE                           | TERMINATION MATERIAL            | TERMINATION STYLE    | TERMINATION STYLE / MATERIAL CODE | SOLDER TERMINATION CODE                                |
|--------------------------------|---------------------------------|----------------------|-----------------------------------|--------------------------------------------------------|
| Solderable                     | Nickel barrier                  | 3-sided (wraparound) | AF                                | E or T (standard);<br>F or S (optional) <sup>(3)</sup> |
|                                |                                 | Top only (flip chip) | BF                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CF                                |                                                        |
|                                | Non-magnetic                    | 3-sided (wraparound) | AG                                | E or T (standard);<br>F or S (optional) <sup>(3)</sup> |
|                                |                                 | Top only (flip chip) | BG                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CE                                |                                                        |
| Epoxy bondable / solderable    | Platinum palladium gold         | 3-sided (wraparound) | AE                                | N (standard);<br>F or S (optional) <sup>(1)</sup>      |
|                                |                                 | Top only (flip chip) | BE                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CE                                |                                                        |
| Wire bondable / Epoxy bondable | Gold                            | 3-sided (wraparound) | AC                                | N                                                      |
|                                |                                 | Top only (flip chip) | BC                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CC                                |                                                        |
| Epoxy bondable                 | Palladium silver <sup>(2)</sup> | 3-sided (wraparound) | AA                                | N                                                      |
|                                |                                 | Top only (flip chip) | BA                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CA                                |                                                        |
|                                | Platinum gold                   | 3-sided (wraparound) | AB                                |                                                        |
|                                |                                 | Top only (flip chip) | BB                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CB                                |                                                        |
|                                | Platinum silver                 | 3-sided (wraparound) | AD                                |                                                        |
|                                |                                 | Top only (flip chip) | BD                                |                                                        |
|                                |                                 | 5-sided (wraparound) | CD                                |                                                        |

**Notes**

- (1) Use solder termination N for applications requiring epoxy bondable mounting, and solder terminations F or S for applications requiring solderable mounting
- (2) While not recommended, palladium silver terminations could be used for solderable applications when using a solder alloy containing silver. If the solder paste being used to solder the palladium silver terminated parts to the boards does not have a silver-based composition, then the silver in the terminations could begin to leach when it is exposed to liquidus non-silver-based solders, causing the potential for solderability and/or solder joint issues
- (3) Standard solder plating for the nickel barrier and non-magnetic parts is solder terminations E or T. Hot solder dipped terminations F or S are also available

| PERFORMANCE                    |                                                       |                                  |
|--------------------------------|-------------------------------------------------------|----------------------------------|
| TEST                           | CONDITIONS OF TEST                                    | TEST RESULTS (TYPICAL TEST LOTS) |
| Life                           | MIL-STD-202, method 108, 1000 h rated power at +70 °C | ≤ ± 0.5 %                        |
| High temperature exposure      | MIL-STD-202, method 108                               | ≤ ± 0.2 %                        |
| Low temperature operation      | MIL-PRF-55342, paragraph 4.8.5                        | ≤ ± 0.05 %                       |
| Resistance to bonding exposure | MIL-STD-202, methods 210                              | ≤ ± 0.1 %                        |
| Moisture resistance            | MIL-PRF-55342, paragraph 4.8.9                        | ≤ ± 0.06%                        |
| Solder mounting integrity      | MIL-PRF-55342, paragraph 4.8.13, 2 kg for 30 s        | No evidence of mechanical damage |
| Solderability                  | MIL-STD-202, method 208                               | 95 % coverage                    |

**Note**

- This summary is based on testing done on values up to 2 GΩ



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