

Thick Film Chip Resistors, High Voltage



LINKS TO ADDITIONAL RESOURCES



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



Available
RoHS*
Available
**HALOGEN
FREE**

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

STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL | CASE SIZE | POWER RATING $P_{70^{\circ}\text{C}}$ W | MAXIMUM WORKING VOLTAGE ⁽¹⁾ V | RESISTANCE RANGE ⁽²⁾ Ω | TOLERANCE ⁽³⁾ $\pm \%$ | TEMPERATURE COEFFICIENT ⁽⁴⁾ (-55 °C to +155 °C) $\pm \text{ppm}/^{\circ}\text{C}$ |
|--------------|-----------|-----------------------------------------------|---------------------------------------------|---------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------|
| 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 Ω are calibrated at 100 V_{DC}, and values of 1 G Ω and above are calibrated at 1000 V_{DC}. 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 1210 2010 2510 2512 | A = 3-sided B = top only C = 5-sided | F = nickel barrier G = non-magnetic A = palladium silver B = platinum gold C = gold D = platinum silver E = platinum palladium gold | M = MΩ G = GΩ 4M70 = 4.7 MΩ 10M0 = 10 MΩ 1G00 = 1 GΩ | D = ± 0.5 % F = ± 1 % G = ± 2 % J = ± 5 % K = ± 10 % M = ± 20 % | K = 100 ppm L = 150 ppm N = 200 ppm R = 250 ppm M = 300 ppm W = 350 ppm P = 500 ppm | E = Sn100 F = Sn95/Ag5, HSD N = No solder S = Sn62/Pb36/Ag2, HSD T = Sn90/Pb10 | B = bulk (250 pcs max.) F = T/R (full reel) 1 = T/R (1000 pcs) 5 = T/R (500 pcs) T = T/R (250 pcs min.) W = waffle tray |

Historical Part Numbering: CRHV1206AF100F100e2 (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)

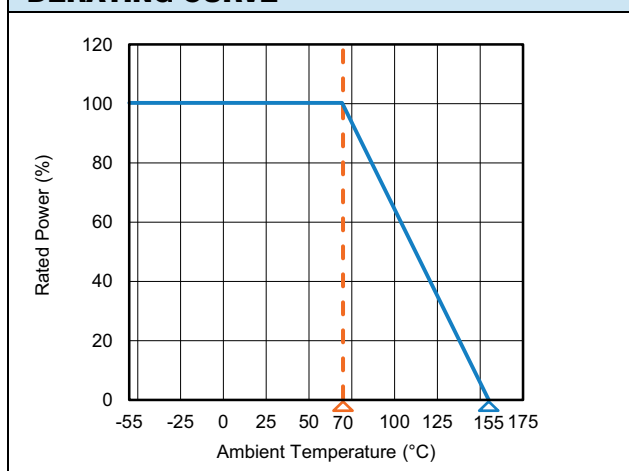
MECHANICAL SPECIFICATIONS

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



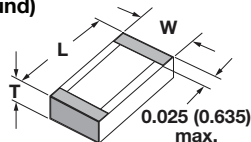
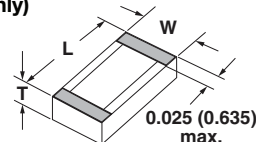
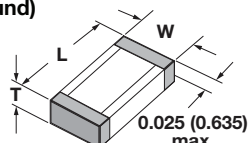
Note

- 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)

Termination Style A
(3-sided wraparound)

Termination Style B
(Top conductor only)

Termination Style C
(5-sided wraparound)


| MODEL | LENGTH (L) ± 0.006 (0.152) | WIDTH (W) ± 0.006 (0.152) | THICKNESS (T) ± 0.002 (0.051) |
|----------|-------------------------------|------------------------------|----------------------------------|
| CRHV1206 | 0.125 | 0.063 | 0.025 |
| CRHV1210 | 0.125 | 0.100 | 0.025 |
| CRHV2010 | 0.200 | 0.100 | 0.025 |
| CRHV2510 | 0.250 | 0.100 | 0.025 |
| CRHV2512 | 0.250 | 0.126 | 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); F or S (optional) ⁽³⁾ |
| | | Top only (flip chip) | BF | |
| | | 5-sided (wraparound) | CF | |
| | Non-magnetic | 3-sided (wraparound) | AG | E or T (standard); F or S (optional) ⁽³⁾ |
| | | Top only (flip chip) | BG | |
| | | 5-sided (wraparound) | CG | |
| Epoxy bondable / solderable | Platinum palladium gold | 3-sided (wraparound) | AE | N (standard); F or S (optional) ⁽¹⁾ |
| | | 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 ⁽²⁾ | 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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