

HV Series, Radial, Conformally Coated, High Temperature 200°C, 500 – 4,000 VDC (Industrial Grade)

Overview

KEMET's High Voltage and High Temperature 200°C HV Series radial conformally coated ceramic capacitors are designed specifically to withstand the severe shock and vibration conditions associated with deep-well and horizontal drilling activities and are well suited for use in aerospace engine compartments, geophysical probes, EV charging stations and defense applications.

Available in C0G and X7R dielectrics, these devices are well suited for timing, resonant, bypass, and decoupling applications.

Benefits

- Operating temperature range of -55°C to +200°C
- High shock and vibration capability
- Capacitance range from 270 pF – 2.2 µF in X7R
- Capacitance range from 12 pF – 0.047 µF in C0G
- DC voltage ratings of 500 V, 1 kV, 2 kV, 3 kV, 4 kV
- High thermal stability
- Encapsulation meets flammability standard UL 94 V-0
- High-temperature solder meets EIA RS-198, Method 302, Condition B



Applications

- Downhole exploration and mining
- Aerospace engine compartments
- Electric ballast
- Measuring equipment
- Inverter power supply

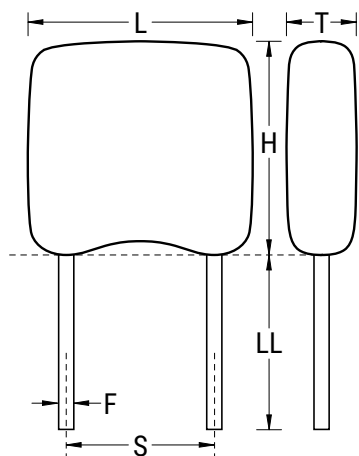
Ordering Information

| 10 | HV | 12 | N | 472 | K | N | M | |
|--|--------|--|----------------------------------|--|------------------------------------|--------------------------------------|---|---------------------|
| Voltage | Series | Style/Size | Dielectric | Capacitance Code (pF) | Capacitance Tolerance ¹ | Lead Wire Barrier Layer ² | Test Level | Packaging |
| 05 = 500 V 10 = 1,000 V 20 = 2,000 V 30 = 3,000 V 40 = 4,000 V | HV | 10 11 12 13 14 15 16 | B, W = X7R type N = COG (NP0) | Two significant digits and number of zeros | J = ±5% K = ±10% M = ±20% | N = Nickel C = Copper | Blank = No screening M = MIL-PRF-49467 Group A Screening | Blank = Waffle Tray |

¹ Additional capacitance tolerance offerings may be available. Contact KEMET for details.

² Please refer to the Construction section in the datasheet.

Dimensions – Inches (Millimeters)



| Series | Style/Size | Length (L) | Height (H) | Thickness (T) | Lead Spacing ±0.030 (S) | Lead Diameter (F) | Lead Length Minimum (LL) |
|--------|------------|---------------|---------------|---------------|-------------------------|--|--------------------------|
| HV | 10 | 0.250 (6.35) | 0.220 (5.59) | 0.150 (3.81) | 0.170 (4.32) | 0.025 +0.004/-0.002 (0.635 +0.102/-0.051) | 0.125 (3.175) |
| | 11 | 0.320 (8.13) | 0.300 (7.62) | 0.250 (6.35) | 0.200 (5.08) | | |
| | 12 | 0.420 (10.67) | 0.400 (10.16) | 0.250 (6.35) | 0.300 (7.62) | | |
| | 13 | 0.520 (13.21) | 0.500 (12.7) | 0.300 (7.62) | 0.400 (10.16) | | |
| | 14 | 0.620 (15.75) | 0.500 (12.7) | 0.300 (7.62) | 0.500 (12.7) | | |
| | 15 | 0.720 (18.29) | 0.700 (17.78) | 0.300 (7.62) | 0.600 (15.24) | | |
| | 16 | 0.820 (20.83) | 0.700 (17.78) | 0.350 (8.89) | 0.700 (17.78) | | |

Environmental Compliance

RoHS exemptions 7a & 7c-II apply to HV series parts that have nickel barrier layer leads.

All other parts are Not RoHS Compliant.

Table 1A – HV 200°C Series X7R Waterfall

| Style | | HV10 | | | HV11 | | | HV12 | | | HV13 | | | |
|-------------|------------------|------|----|----|------|----|----|------|----|----|------|----|----|----|
| Voltage | | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 3k |
| Capacitance | Capacitance Code | | | | | | | | | | | | | |
| 270 pF | 271 | X | X | X | | | | | | | | | | |
| 330 pF | 331 | X | X | X | | | | | | | | | | |
| 390 pF | 391 | X | X | X | | | | | | | | | | |
| 470 pF | 471 | X | X | X | | | | | | | | | | |
| 560 pF | 561 | X | X | X | X | X | X | | | | | | | |
| 681 pF | 681 | X | X | X | X | X | X | | | | | | | |
| 820 pF | 821 | X | X | X | X | X | X | | | | | | | |
| 1,000 pF | 102 | X | X | X | X | X | X | | | | X | X | X | X |
| 1,200 pF | 122 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,500 pF | 152 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,800 pF | 182 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2,200 pF | 222 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 2,700 pF | 272 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 3,300 pF | 332 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 3,900 pF | 392 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 4,700 pF | 472 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 5,600 pF | 562 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 6,800 pF | 682 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 8,200 pF | 822 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 0.01 µF | 103 | X | X | | X | X | X | X | X | X | X | X | X | X |
| 0.012 µF | 123 | X | | | X | X | X | X | X | X | X | X | X | X |
| 0.015 µF | 153 | X | | | X | X | X | X | X | X | X | X | X | X |
| 0.018 µF | 183 | X | | | X | X | | X | X | X | X | X | X | X |
| 0.022 µF | 223 | X | | | X | X | | X | X | X | X | X | X | X |
| 0.027 µF | 273 | X | | | X | X | | X | X | X | X | X | X | X |
| 0.033 µF | 333 | X | | | X | X | | X | X | | X | X | X | |
| 0.039 µF | 393 | | | | X | X | | X | X | | X | X | X | |
| 0.047 µF | 473 | | | | X | X | | X | X | | X | X | X | |
| 0.056 µF | 563 | | | | X | X | | X | X | | X | X | X | |
| 0.068 µF | 683 | | | | X | X | | X | X | | X | X | X | |
| 0.082 µF | 823 | | | | X | X | | X | X | | X | X | X | |
| 0.1 µF | 104 | | | | X | | | X | X | | X | X | | |
| 0.12 µF | 124 | | | | X | | | X | X | | X | X | | |
| 0.15 µF | 154 | | | | X | | | X | X | | X | X | | |
| 0.18 µF | 184 | | | | X | | | X | | | X | X | | |
| 0.22 µF | 224 | | | | X | | | X | | | X | X | | |
| 0.27 µF | 274 | | | | X | | | X | | | X | X | | |
| 0.33 µF | 334 | | | | | | | X | | | X | X | | |
| 0.39 µF | 394 | | | | | | | | | | X | X | | |
| 0.47 µF | 474 | | | | | | | | | | X | | | |
| 0.56 µF | 564 | | | | | | | | | | X | | | |
| 0.68 µF | 684 | | | | | | | | | | X | | | |
| 0.82 µF | 824 | | | | | | | | | | X | | | |
| 0.1 µF | 105 | | | | | | | | | | X | | | |
| 0.033 µF | 333 | | | | | | | | | | | | | |
| 0.039 µF | 393 | | | | | | | | | | | | | |
| 0.047 µF | 473 | | | | | | | | | | | | | |
| 0.056 µF | 563 | | | | | | | | | | | | | |
| 0.068 µF | 683 | | | | | | | | | | | | | |
| 0.082 µF | 823 | | | | | | | | | | | | | |
| 0.1 µF | 104 | | | | | | | | | | | | | |
| Voltage | | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 3k |
| Style | | HV10 | | | HV11 | | | HV12 | | | HV13 | | | |

Table 1A – HV 200°C Series X7R Waterfall cont.

| Style | | HV14 | | | | | HV15 | | | | | HV16 | | | | |
|-------------|------------------|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|
| Voltage | | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k |
| Capacitance | Capacitance Code | | | | | | | | | | | | | | | |
| 1,800 pF | 182 | | | | | | | | | | | | | | | |
| 2,200 pF | 222 | X | X | X | X | X | | | | | | | | | | |
| 2,700 pF | 272 | X | X | X | X | X | X | X | X | X | X | | | | | |
| 3,300 pF | 332 | X | X | X | X | X | X | X | X | X | X | | | | | |
| 3,900 pF | 392 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 4,700 pF | 472 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 5,600 pF | 562 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 6,800 pF | 682 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 8,200 pF | 822 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.01 µF | 103 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.012 µF | 123 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.015 µF | 153 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.018 µF | 183 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.022 µF | 223 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.027 µF | 273 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 0.033 µF | 333 | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| 0.039 µF | 393 | X | X | X | X | | X | X | X | X | | X | X | X | X | X |
| 0.047 µF | 473 | X | X | X | X | | X | X | X | X | | X | X | X | X | X |
| 0.056 µF | 563 | X | X | X | X | | X | X | X | X | | X | X | X | X | |
| 0.068 µF | 683 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 0.082 µF | 823 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 0.1 µF | 104 | X | X | X | | | X | X | X | | | X | X | X | X | |
| 0.12 µF | 124 | X | X | | | | X | X | X | | | X | X | X | | |
| 0.15 µF | 154 | X | X | | | | X | X | X | | | X | X | X | | |
| 0.18 µF | 184 | X | X | | | | X | X | X | | | X | X | X | | |
| 0.22 µF | 224 | X | X | | | | X | X | | | | X | X | | | |
| 0.27 µF | 274 | X | X | | | | X | X | | | | X | X | | | |
| 0.33 µF | 334 | X | X | | | | X | X | | | | X | X | | | |
| 0.39 µF | 394 | X | X | | | | X | X | | | | X | X | | | |
| 0.47 µF | 474 | X | X | | | | X | X | | | | X | X | | | |
| 0.56 µF | 564 | X | | | | | X | X | | | | X | X | | | |
| 0.68 µF | 684 | X | | | | | X | X | | | | X | X | | | |
| 0.82 µF | 824 | X | | | | | X | X | | | | X | X | | | |
| 1 µF | 105 | X | | | | | X | X | | | | X | X | | | |
| 1.2 µF | 125 | | | | | | X | | | | | X | | | | |
| 1.5 µF | 155 | | | | | | X | | | | | X | | | | |
| 1.8 µF | 185 | | | | | | X | | | | | X | | | | |
| 2.2 µF | 225 | | | | | | | | | | | X | | | | |
| Voltage | | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k |
| Style | | HV14 | | | | | HV15 | | | | | HV16 | | | | |

Table 1B – HV 200°C Series COG Waterfall

| Style | | HV10 | | | HV11 | | | | HV12 | | | | HV13 | | | |
|-------------|------------------|------|----|----|------|----|----|----|------|----|----|----|------|----|----|----|
| Voltage | | 500 | 1k | 2k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k |
| Capacitance | Capacitance Code | | | | | | | | | | | | | | | |
| 12 pf | 120 | X | X | X | | | | | | | | | | | | |
| 15 pf | 150 | X | X | X | | | | | | | | | | | | |
| 18 pf | 180 | X | X | X | | | | | | | | | X | X | X | X |
| 22 pf | 220 | X | X | X | X | X | X | X | | | | | X | X | X | X |
| 27 pf | 270 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 33 pf | 330 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 39 pf | 390 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 47 pf | 470 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 56 pf | 560 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 68 pf | 680 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 82 pf | 820 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 100 pf | 101 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 120 pf | 121 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 150 pf | 151 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 180 pf | 181 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 220 pf | 221 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 270 pf | 271 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 330 pf | 331 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 390 pf | 391 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 470 pf | 471 | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| 560 pf | 561 | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| 680 pf | 681 | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| 820 pf | 821 | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,000 pf | 102 | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,200 pf | 122 | X | X | | X | X | X | | X | X | X | X | X | X | X | X |
| 1,500 pf | 152 | X | X | | X | X | X | | X | X | X | X | X | X | X | X |
| 1,800 pf | 182 | X | | | X | X | X | | X | X | X | | X | X | X | X |
| 2,200 pf | 222 | X | | | X | X | X | | X | X | X | | X | X | X | X |
| 2,700 pf | 272 | X | | | X | X | X | | X | X | X | | X | X | X | X |
| 3,300 pf | 332 | | | | X | X | | | X | X | X | | X | X | X | X |
| 3,900 pf | 392 | | | | X | X | | | X | X | X | | X | X | X | X |
| 4,700 pf | 472 | | | | X | X | | | X | X | X | | X | X | X | X |
| 5,600 pf | 562 | | | | X | X | | | X | X | | | X | X | X | |
| 6,800 pf | 682 | | | | X | | | | X | X | | | X | X | X | |
| 8,200 pf | 822 | | | | X | | | | X | | | | X | X | | |
| 0.01 µF | 103 | | | | X | | | | X | | | | X | X | | |
| 0.012 µF | 123 | | | | | | | | | | | | X | X | | |
| 0.015 µF | 153 | | | | | | | | | | | | X | X | | |
| Voltage | | 500 | 1k | 2k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k |
| Style | | HV10 | | | HV11 | | | | HV12 | | | | HV13 | | | |

Table 1B – HV 200°C Series COG Waterfall cont.

| Style | | HV14 | | | | | HV15 | | | | | HV16 | | | | |
|-------------|------------------|------|----|----|----|----|------|----|----|----|----|------|----|----|----|----|
| Voltage | | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k |
| Capacitance | Capacitance Code | | | | | | | | | | | | | | | |
| 68 pF | 680 | X | X | X | X | X | | | | | | | | | | |
| 82 pF | 820 | X | X | X | X | X | | | | | | | | | | |
| 100 pF | 101 | X | X | X | X | X | | | | | | X | X | X | X | X |
| 120 pF | 121 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 150 pF | 151 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 180 pF | 181 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 220 pF | 221 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 270 pF | 271 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 330 pF | 331 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 390 pF | 391 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 470 pF | 471 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 560 pF | 561 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 680 pF | 681 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 820 pF | 821 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,000 pF | 102 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,200 pF | 122 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,500 pF | 152 | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1,800 pF | 182 | X | X | X | X | | X | X | X | X | X | X | X | X | X | |
| 2,200 pF | 222 | X | X | X | X | | X | X | X | X | X | X | X | X | X | |
| 2,700 pF | 272 | X | X | X | X | | X | X | X | X | X | X | X | X | X | |
| 3,300 pF | 332 | X | X | X | X | | X | X | X | X | | X | X | X | X | |
| 3,900 pF | 392 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 4,700 pF | 472 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 5,600 pF | 562 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 6,800 pF | 682 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 8,200 pF | 822 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 0.01 µF | 103 | X | X | X | | | X | X | X | X | | X | X | X | X | |
| 0.012 µF | 123 | X | X | | | | X | X | X | | | X | X | X | | |
| 0.015 µF | 153 | X | X | | | | X | X | X | | | X | X | X | | |
| 0.018 µF | 183 | X | X | | | | X | X | X | | | X | X | X | | |
| 0.022 µF | 223 | X | X | | | | X | X | | | | X | X | X | | |
| 0.027 µF | 273 | | | | | | X | X | | | | X | X | | | |
| 0.033 µF | 333 | | | | | | X | X | | | | X | X | | | |
| 0.039 µF | 393 | | | | | | X | X | | | | X | X | | | |
| 0.047 µF | 473 | | | | | | X | X | | | | X | X | | | |
| Voltage | | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k |
| Style | | HV14 | | | | | HV15 | | | | | HV16 | | | | |

Packaging Quantities

| Style | Waffle Pack Quantity |
|-------|----------------------|
| HV 10 | 56 |
| HV 11 | 28 |
| HV 12 | 28 |
| HV 13 | 28 |
| HV 14 | 20 |
| HV 15 | 20 |
| HV 16 | 20 |

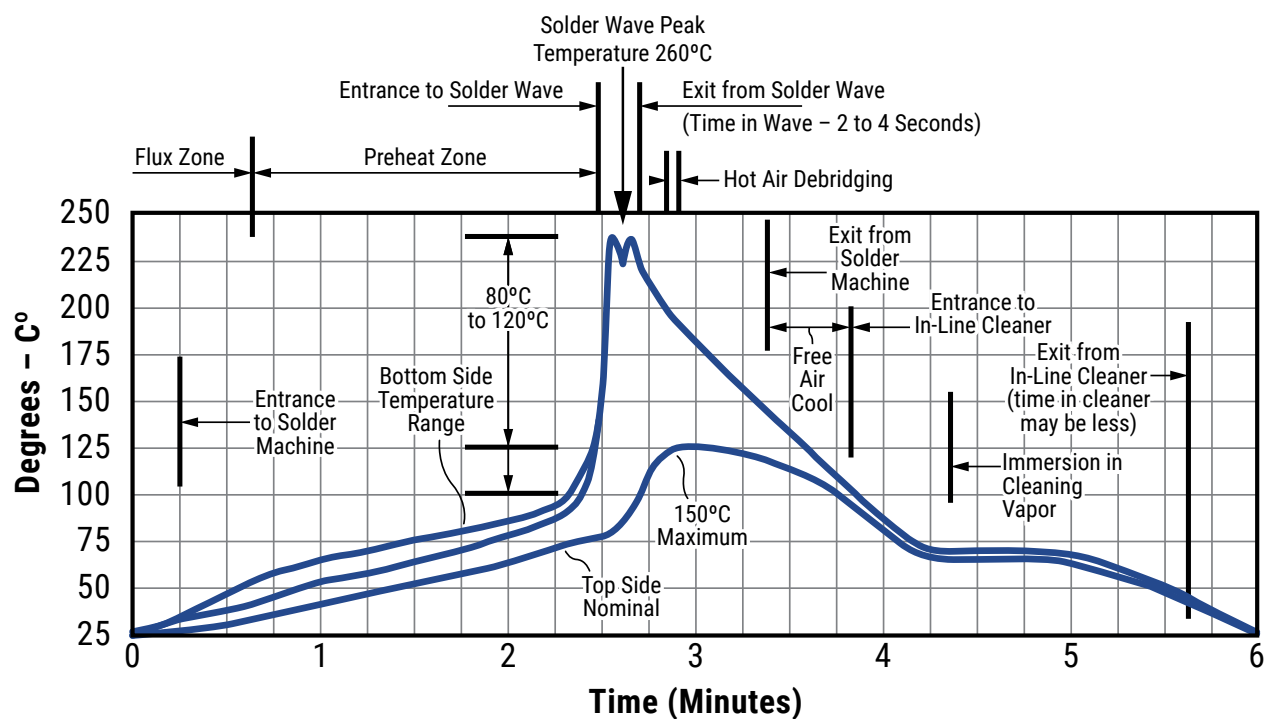
Soldering Process

Recommended Soldering Technique:

- Solder Wave
- Hand Soldering (Manual)

Recommended Soldering Profile:

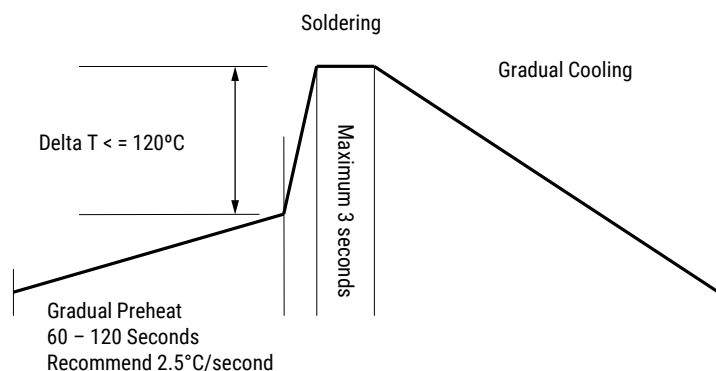
- Optimum Wave Solder Profile



Soldering Process cont.

- Hand Soldering (Manual)

Manual Solder Profile with Pre-heating



KEMET recommends following the guidelines and techniques outlined in technical bulletins F2103 and F9207.

Table 2 – Performance & Reliability: Test Methods and Conditions

| Stress | Reference | Test or Inspection Method | Limits | | | | | | | | | | |
|--|--------------------------|---|--|------------------|---|-------|---|-------|---|-------------------|---|--------|---------------------------------------|
| Visual & Mechanical | KEMET Internal | No defects that may affect performance (10X) | Dimensions according KEMET Spec Sheet | | | | | | | | | | |
| Capacitance (Cap) | "MIL-STD-202 Method 305" | C ≤ 100 pF: 1 MHz ± 100 kHz and 1.0 ±0.2 Vrms C > 100 pF: 1 kHz ±100 Hz and 1.0 ±0.2 Vrms | Dimensions according KEMET Spec Sheet | | | | | | | | | | |
| Dissipation Factor (DF) | KEMET Internal | C ≤ 100 pF: 1 MHz ± 100 kHz and 1.0 ±0.2 Vrms C > 100 pF: 1 kHz ±100 Hz and 1.0 ±0.2 Vrms | X7R: 2.5% C0G: 0.15% | | | | | | | | | | |
| Insulation Resistance (IR) | "MIL-STD-202 Method 302" | 500 VDC applied for 120 ±5 seconds at 25°C | Within Specification To obtain IR limit, divide MΩ-μF value by the capacitance and compare to GΩ limit. Select the lower of the two limits. 1,000 MΩ microfarads or 100 GΩ, whichever is less. | | | | | | | | | | |
| Temperature Coefficient of Capacitance (TCC) | KEMET Internal | Capacitance change with reference to +25°C and 0 VDC applied. * See part number specification sheet for voltage <table><tr><th>Step</th><th>Temperature (°C)</th></tr><tr><td>1</td><td>+25°C</td></tr><tr><td>2</td><td>-55°C</td></tr><tr><td>3</td><td>+25°C (Reference)</td></tr><tr><td>4</td><td>+125°C</td></tr></table> | Step | Temperature (°C) | 1 | +25°C | 2 | -55°C | 3 | +25°C (Reference) | 4 | +125°C | C0G: 0 ppm/°C ±30 ppm/°C X7R: ±15% |
| Step | Temperature (°C) | | | | | | | | | | | | |
| 1 | +25°C | | | | | | | | | | | | |
| 2 | -55°C | | | | | | | | | | | | |
| 3 | +25°C (Reference) | | | | | | | | | | | | |
| 4 | +125°C | | | | | | | | | | | | |

Table 2 – Performance & Reliability: Test Methods and Conditions cont.

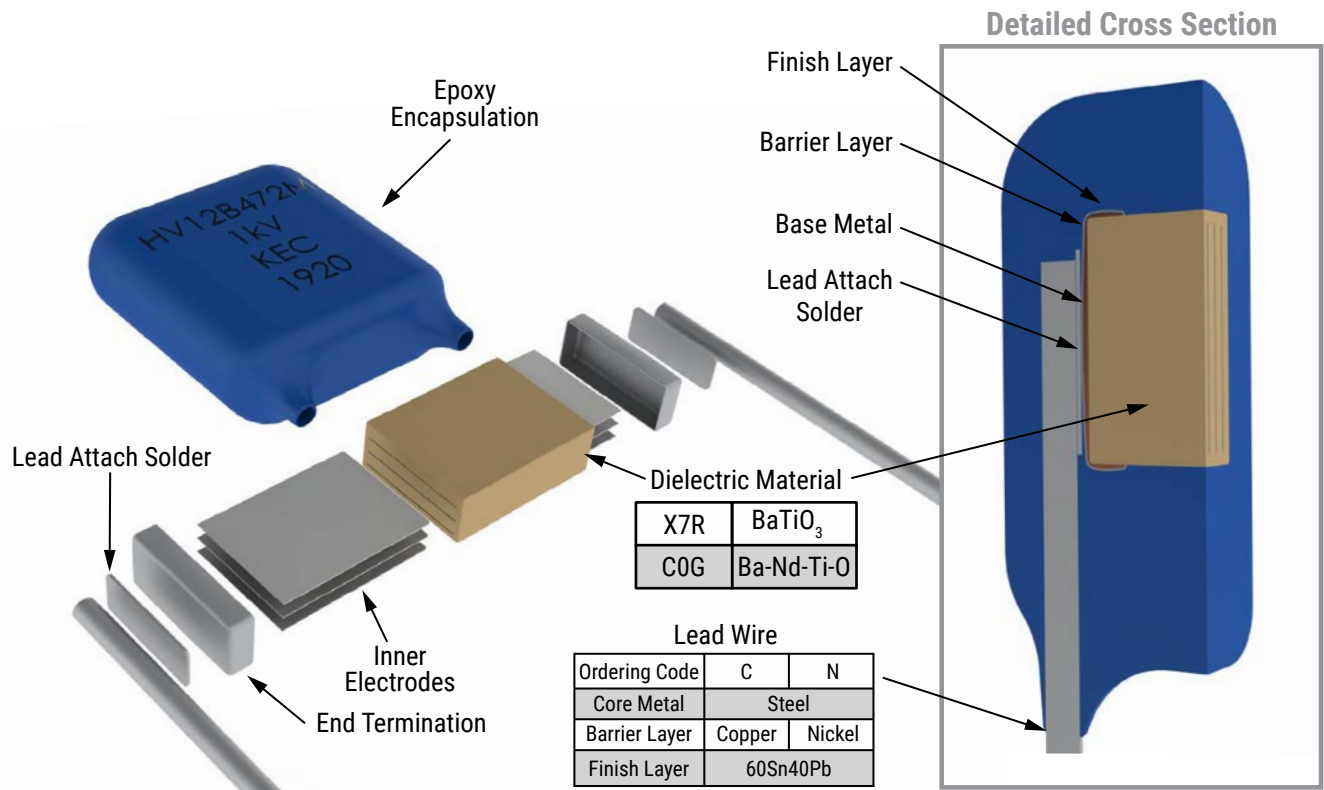
| | | | |
|---|--------------------------|---|---|
| Dielectric Withstanding Voltage (DWV) | KEMET Internal | 150% of rated voltage for voltage rating of $500\text{ V} \leq V < 1,000\text{ V}$ 120% of rated voltage for voltage rating of $\geq 1,000\text{ V}$ (5 \pm 1 seconds and charge/discharge not exceeding 50 mA at 25°C) | Withstand test voltage without insulation breakdown or damage. |
| Aging Rate (Maximum % Capacitance Loss/Decade Hour) | KEMET Internal | Capacitance measurements (including tolerance) are indexed to a referee time of 48 or 1,000 hours. Please refer to a part number specific datasheet for referee time details. | Please refer to a part number specification sheet for specific Aging rate |
| Terminal Strength | MIL-STD-202 Method 211 | Applied force: 5 pounds (2.3 kg) | No evidence of mechanical damage |
| Solderability | MIL-STD-202 Method 208 | Condition: 4 hours \pm 15 minutes at 155°C dry bake apply all methods Test 245 \pm 5°C (SnPb & Pb-Free) | Visual Inspection. 95% coverage on termination. No leaching |
| Temperature Cycling | JESD22 Method JA-104 | 1,000 cycles (-55°C to $+200^{\circ}\text{C}$) 2 - 3 cycles per hour Soak Time: 1 or 5 minutes | Measurement at 24 hours \pm 4 hours after test conclusion. Cap: Initial Limit DF: Initial Limit IR: Initial Limit |
| Biased Humidity | "MIL-STD-202 Method 103" | Load Humidity: 1,000 hours 85°C/85% RH and rated voltage. Low Volt Humidity: 1,000 hours 85°C/85% RH and 1.5 V. | Measurement at 24 hours \pm 4 hours after test conclusion. Within Post Environmental Limits For C0G dielectric: Cap: $\pm 0.3\%$ or $\pm 0.25\text{ pF}$ shift IR: 10% of Initial Limit DF Limits Maximum: 0.5% For X7R dielectric: Cap: $\pm 20\%$ shift IR: 10% of Initial Limit DF Limits Maximum: 3% |
| High Temperature Life | MIL-STD-202 Method 108 | 1,000 hours at 200°C with rated voltage applied. | Measurement at 24 hours \pm 4 hours after test conclusion. Within Post Environmental Limits For C0G dielectric: Cap: $\pm 0.3\%$ or $\pm 0.25\text{ pF}$ shift IR: 10% of Initial Limit DF Limits Maximum: 0.5% |
| Storage Life | | Unpowered 1,000 hours at 200°C. | For X7R dielectric: Cap: $\pm 20\%$ shift IR: 10% of Initial Limit DF Limits Maximum: 3% |
| Vibration | MIL-STD-202 Method 204 | 5 g's for 20 minutes, 12 cycles each of 3 orientations. Test from 10 – 2,000 Hz | Cap: Initial Limit DF: Initial Limit IR: Initial Limit |
| Mechanical Shock | MIL-STD-202 Method 213 | 100 g's 6 ms Half-sine, Velocity Change 12.3 feet/second (Condition C) | Cap: Initial Limit DF: Initial Limit IR: Initial Limit |
| Resistance to Solvents | MIL-STD-202 Method 215 | Add Aqueous wash chemical OKEMCLEAN (A 6% concentrated Oakite cleaner) or equivalent. Do not use banned solvents | Capacitors shall be visually examined for evidence of mechanical damage and marking. |

Storage & Handling

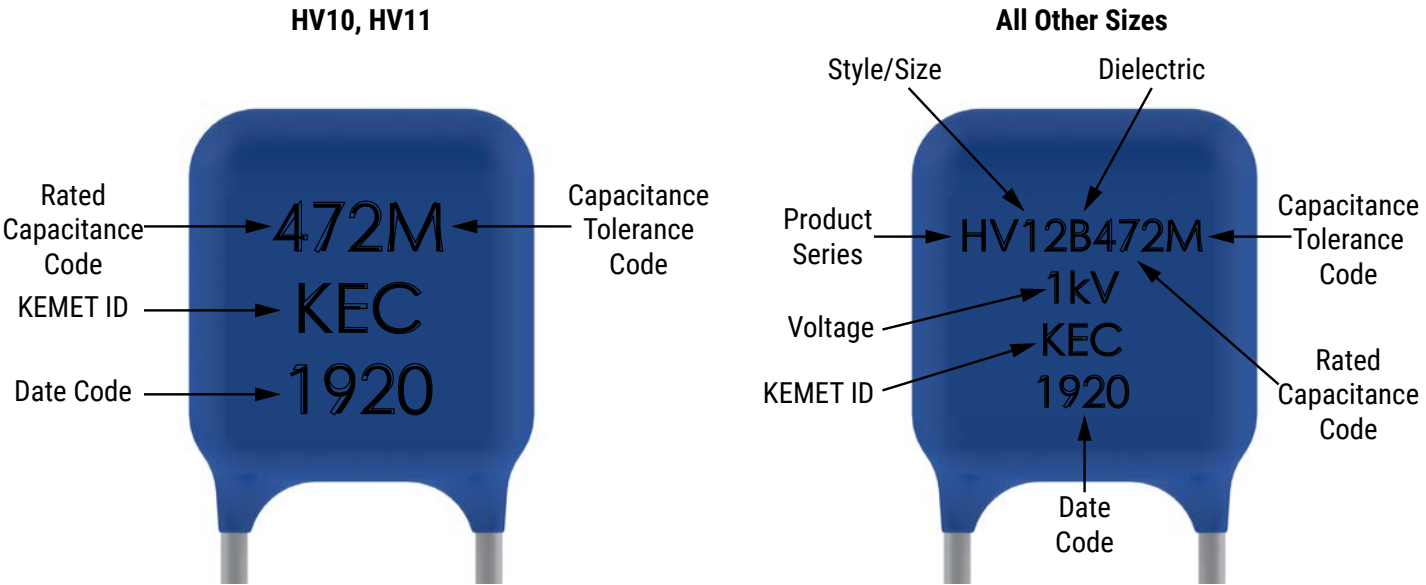
The un-mounted storage life of a leaded ceramic capacitor is dependent upon storage and atmospheric conditions as well as packaging materials. While the ceramic chips enveloped under the epoxy coating themselves are quite robust in most environments, solderability of the wire lead on the final epoxy-coated product will be degraded by exposure to high temperatures, high humidity, corrosive atmospheres, and long term storage. In addition, packaging materials will be degraded by high temperature and exposure to direct sunlight—reels may soften or warp, and tape peel force may increase.

KEMET recommends storing the un-mounted capacitors in their original packaging, in a location away from direct sunlight, and where the temperature and relative humidity do not exceed 40 degrees centigrade and 70% respectively. For optimum solderability, capacitor stock should be used promptly, preferably within 18 months of receipt. For applications requiring pre-tinning of components, storage life may be extended if solderability is verified. Before cleaning, bonding or molding these devices, it is important to verify that your process does not affect product quality and performance. KEMET recommends testing and evaluating the performance of a cleaned, bonded or molded product prior to implementing and/or qualifying any of these processes.

Construction



Marking



| Date Code | |
|----------------------------------|---|
| 19 | 20 |
| Manufacturing Year: 19 = 2019 | Manufacturing Week: 20 = Week 20 (of manufacturing calendar year) |

KEMET Electronics Corporation Sales Offices

For a complete list of our global sales offices, please visit www.kemet.com/sales.

Disclaimer

YAGEO Corporation and its affiliates do not recommend the use of commercial or automotive grade products for high reliability applications or manned space flight.

All product specifications, statements, information and data (collectively, the "Information") in this datasheet are subject to change. The customer is responsible for checking and verifying the extent to which the Information contained in this publication is applicable to an order at the time the order is placed. All Information given herein is believed to be accurate and reliable, but it is presented without guarantee, warranty, or responsibility of any kind, expressed or implied.

Statements of suitability for certain applications are based on KEMET Electronics Corporation's ("KEMET") knowledge of typical operating conditions for such applications, but are not intended to constitute – and KEMET specifically disclaims – any warranty concerning suitability for a specific customer application or use. The Information is intended for use only by customers who have the requisite experience and capability to determine the correct products for their application. Any technical advice inferred from this Information or otherwise provided by KEMET with reference to the use of KEMET's products is given gratis, and KEMET assumes no obligation or liability for the advice given or results obtained.

Although KEMET designs and manufactures its products to the most stringent quality and safety standards, given the current state of the art, isolated component failures may still occur. Accordingly, customer applications which require a high degree of reliability or safety should employ suitable designs or other safeguards (such as installation of protective circuitry or redundancies) in order to ensure that the failure of an electrical component does not result in a risk of personal injury or property damage.

Although all product-related warnings, cautions and notes must be observed, the customer should not assume that all safety measures are indicated or that other measures may not be required.