



Defense and Aerospace

KEMET
CHARGED.™

Ceramic High Voltage, High Temperature Capacitors

| | KEMET Series | Page |
|---|--|-------|
| Performance Information | | 1-4 |
| High Temperature, High Voltage Axial/Radial | HT/HP | 5-7 |
| High Temperature, High Voltage Radial | HV | 8-9 |
| High Voltage Conformally Coated Radial | HV | 10-14 |
| High Voltage MIL-PRF-49467 (Equivalent) | HV | 15-17 |
| High Voltage Space Quality | HS | 18-22 |
| High Voltage Ceramic Chip | 1515/1812/1825/2020/ 2225/2520/3333//3530 4040/4540/5440/5550/6560 | 23-27 |
| High Voltage L & J Leaded | SM20/SM21/SM22/SM23 SM24/SM25/SM26/SM30/ SM31/SM33/SM34/SM35/SM36 | 28-32 |
| High Voltage Disc | D30/40/50/75/90/100/120 | 33-34 |
| High Voltage Disc Multiplier Stacks | D30/40/50/75/90/100/120 | 35 |

GENERAL SPECIFICATIONS

Working Voltage:

| | |
|-----|---|
| C0G | 50, 100, 200, 500, 1k, 2k, 3k, 4k, 5k, 7.5k, 10k, 15k, 20k |
| X7R | 50, 100, 200, 500, 1k, 2k, 3k, 4k, 5k, 7.5k, 10k, 15k, 20k, 30k, 40k, 50k |
| X5U | 3k, 4k, 5k, 7.5k, 10k, 15k, 20k |

Temperature Characteristics:

| | |
|-----|--|
| C0G | 0 + 30 PPM / °C from - 55°C to + 125°C (1) |
| X7R | + 15% from - 55°C to + 125°C |
| X5U | + 22%, -56% from -55°C to + 85°C |

Capacitance Tolerance:

| | |
|-----|--------------------------------------|
| C0G | +0.5pF, +1%, +2%, +5%, +10% |
| X7R | +10%, +20%, +80% / -20%, +100% / -0% |
| X5U | +10%, +20%, +80% / -20%, +100% / -0% |

Construction:

Epoxy encapsulated - meets flame test requirements of UL Standard 94V-0.
High-temperature solder - meets EIA RS-198, Method 302, Condition B (260°C for 10 seconds)

Termination Material:

Check individual Series: Part Number and Ordering Information for Termination Materials offered in each series.

Solderability:

MIL-STD 202, Method 208
(Test Method: ANSI/J-STD-002)
Test A for through-hole mount and surface mount leaded.
Test B for surface mount leadless components.

Terminal Strength:

MIL-STD 202, Method 208, Condition A (2.3kg or 5 lbs)

Resistance to Solvents:

MIL-STD 202, Method 215

Resistance to Soldering Heat:

MIL-STD 202, Method 210, Test Condition C

ELECTRICAL

Capacitance @ 25°C:

Within specified tolerance and following test conditions per MIL-STD 202, Method 305.
C0G, X7R & X5U
> 100pF with 1.0 vrms @ 1 kHz with 1.0 vrms
< 100pF with 1.0 vrms @ 1 MHz with 1.0 vrms

Dissipation Factor @ 25°C:

Same test conditions as capacitance.
C0G - 0.15% maximum
X7R - 2.5% maximum
X5U - 2.5% maximum

Insulation Resistance @25°C:

MIL-STD 202, Method 302
C0G & X7R:
100 gigohm or 1 gigohm x uF, whichever is less.
<500V test @ rated voltage, >1kV test @ 500V.
X5U:
10 gigohm or 100 megohm x uF, whichever is less.
<500V test @ rated voltage, >1kV test @ 500V.

Dielectric Withstanding Voltage:

MIL-STD 202, Method 301
<200V test @ 250% of rated voltage
500V to 1250V test @ 150% of rated voltage
>1251V test @ 120% of rated voltage

ENVIRONMENTAL

Vibration:

MIL-STD 202, Method 204, Condition D (20g)

Shock:

MIL-STD 202, Method 213, Condition I (100g)

Life Test:

MIL-STD 202, Method 108

<200V

C0G - 200% rated voltage @ +125°C
X7R - 200% rated voltage @ +125°C

>500V

C0G - rated voltage @ +125°C
X7R - rated voltage @ +125°C
X5U - rated voltage @ +85°C

Post Test Limits @ 25°C are:

Capacitance Change:

C0G (< 200V) - +3% or 0.25pF, whichever is greater.
C0G (> 500V) - +3% or 0.50pF, whichever is greater.
X7R - + 20% of initial value (2)

Dissipation Factor:

C0G - 0.25% maximum
X7R & X5U - 3.0% maximum

Insulation Resistance:

C0G & X7R:
100 gigohm or 1 gigohm x uF, whichever is less.
<500V test @ rated voltage, >1kV test @ 500V.

X5U:

10 gigohm or 100 megohm x uF, whichever is less.
<500V test @ rated voltage, >1kV test @ 500V.

Moisture Resistance:

MIL-STD 202, Method 106
Post Test Limits @ 25°C are:

Capacitance Change:

C0G (< 200V) - +3% or 0.25pF, whichever is greater.
C0G (> 500V) - +3% or 0.50pF, whichever is greater.
X7R - + 20% of initial value (2)

Dissipation Factor:

C0G - 0.25% maximum
X7R & X5U - 3.0% maximum

Insulation Resistance:

C0G & X7R:
100 gigohm or 1 gigohm x uF, whichever is less.
<500V test @ rated voltage, >1kV test @ 500V.

X5U:

10 gigohm or 100 megohm x uF, whichever is less.
<500V test @ rated voltage, >1kV test @ 500V.

Thermal Shock:

MIL-STD 202, Method 107, Condition A
C0G & X7R: -55°C to 125°C
X5U: -55°C to 85°C

- (1) +53 PPM -30 PPM/ °C from +25°C to -55°C, + 60 PPM below 10pF.
- (2) X7R & X5U dielectrics exhibit aging characteristics; therefore, it is highly recommended that capacitors be deaged for 2 hours at 150°C and stabilized at room temperature for 48 hours before capacitance measurements are made.

| | HIGH TEMPERATURE | HIGH VOLTAGE |
|---|------------------|--------------|
| MILITARY & AEROSPACE | | |
| Avionics | X | X |
| Radar Systems | X | X |
| Telemetry, Data Tx/Rx | | X |
| Control Systems | X | |
| MEDICAL | | |
| .5 to 1.5 Tesla MR1 & | | X |
| NM1 Tuning Coils | | X |
| 1 to 3 Tesla MR1 Gradient | | X |
| Coils & Magnetic Rings | | X |
| CT-Scanner | | X |
| Medical MRI | | X |
| X-Ray Generator | X | X |
| SEMICONDUCTOR | | |
| RF Tuning Networks | | X |
| RF Power Supplies | | X |
| Semiconductor Manufacturing | X | |
| SECURITY | | |
| Handheld Scanners | | X |
| Intruder Detection Systems | | X |
| Luggage Scanners | | X |
| Metal/Explosive Detector | | X |
| OTHER | | |
| LCD Backlight Inverter | | X |
| Electric Ballast for CFL | X | X |
| Electric Ballast for Fluorescent Lamp | X | X |
| Measurement Equipment | X | X |
| Microwave/Convection Ovens | X | X |
| POWER SUPPLY | | |
| HV Power Supply | X | X |
| Power Station Equipment | | X |
| Power Supply for Air Conditioner, Washing Machine | | X |
| Inverter Power Supply-AC | X | |
| TELECOM | | |
| Base Station Power amps | | X |
| Broadcasting Equipment | | X |
| MODEM | | |
| DAA Modem | | X |
| xDSL Modem | | X |
| LAN, Router, HUB, Switches | | X |
| RF Power Amplifiers | | X |
| INDUSTRIAL | | |
| Oil Rigging, Down Hole, Mining | X | X |

| | ELECTRICAL | | | ENVIRONMENTAL | MECHANICAL |
|----------------------------|--|---|--|---|-------------------------|
| | Voltage Range | Capacitance Range | Dissipation Factor | Operating Temperature Range | Configuration |
| HIGH VOLTAGE | | | | | |
| Radial Conformally Coated | | | | | |
| Std | C0G/X7R: 500 to 10k VDC | C0G:12 pF - .330μF X7R: 220 pF - 5.6 μF | C0G: 0.15% max X7R: 2.5% max | C0G: -55°C to + 125°C X7R: -55°C to + 125°C | Radial |
| Mil-PRF-49467 Equivalent | C0G/X7R: 600 to 5k VDC | C0G: 12 pF - .68 μF X7R: 27 pF - .47 μF | C0G: 0.15% max X7R: 2.5% max | C0G/X7R: -55°C to + 125°C | Radial |
| Space Quality | C0G/X7R: 500 to 10k VDC | C0G/X7R: 560 pF - 2.20μF | C0G: 0.15% max X7R: 2.5% max | C0G/X7R: -55°C to + 125°C | Radial |
| Ceramic Surface Mount Chip | | | | | |
| Military | C0G/X7R: 500 to 5k VDC | C0G: 12 pF- .10 μF X7R: 270 pF -2.50 μF | C0G: 0.15% max X7R: 2.5% max | C0G/X7R: -55°C to + 125°C | Chip |
| Leaded Chips J or L lead | C0G/X7R: 500 to 10k VDC | C0G: 12 pF-.330 μF X7R: 220 pF-5.6 μF | C0G: 0.15% max X7R: 2.5% max | C0G/X7R: -55°C to + 125°C | Leaded Chip J or L Lead |
| Disc | C0G/X5U: 3k to 20k VDC, X7R:3k to 50k VDC | C0G: 1.2 pF-236 pF X7R: 10 p -7400 pF X5U: 80 pF-17300 pF | C0G: 0.15% max X7R: 2.5% max X5U: 2.5% max | C0G/X7R: -55°C to + 125°C X5U: -55°C to + 85°C | Disc |
| Disc Stack | C0G/X7R/X5U: 5k to 20k VDC | C0G: 1.2 pF-141 pF X7R: 37 pF-4400 pF X5U: 80 pF-10400 pF | C0G: 0.15% max X7R: 2.5% max X5U: 2.5% max | C0G/X7R: -55°C to + 125°C X5U: -55°C to + 85°C | Disc Stack |

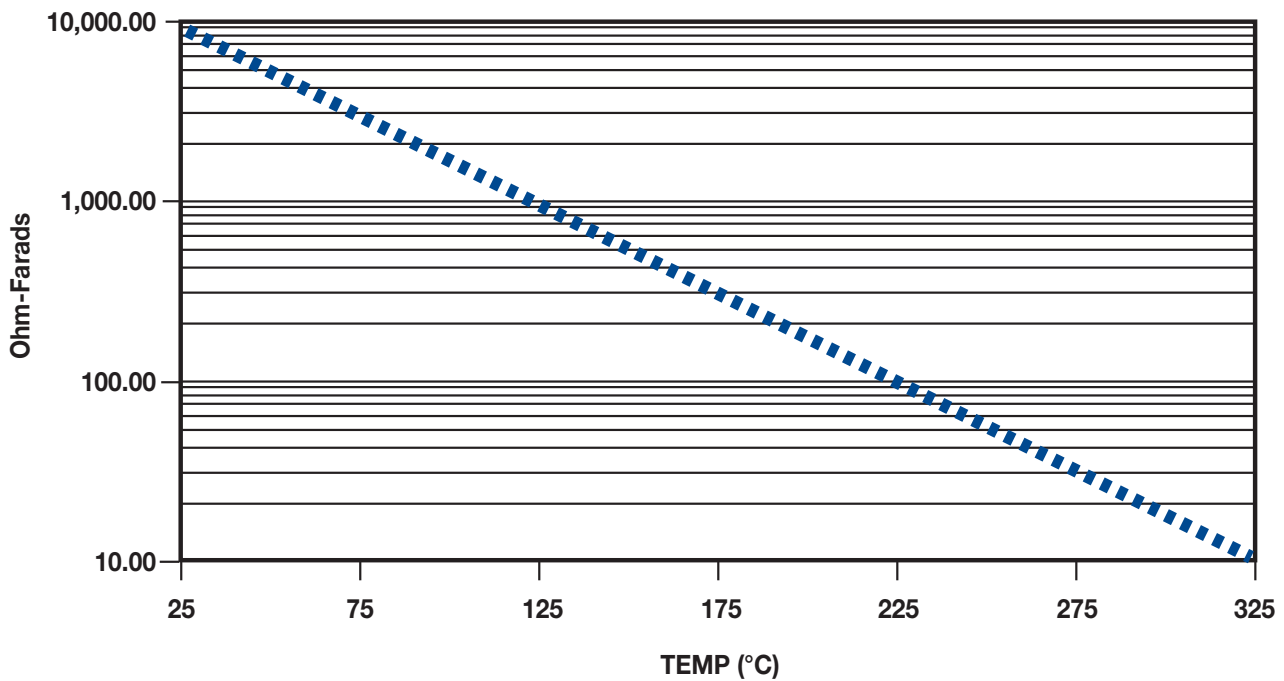
HIGH TEMPERATURE

| | | | | | |
|-----------------------------|-----------------|---|---|------------------|--------------|
| Hi Temp (HT/HP) | 100 to 200 VDC | C0G: 22 pF-.100 μF X7R:1000 pF-1.0μF | C0G 0.15% X7R Type 2.0% X7R 2.50% | -55°C to + 200°C | Axial/Radial |
| Hi Temp Hi Volt (HV) | 500 to 4000 VDC | C0G: 390 pF-.015 μF X7R:1400 pF- .270 μF | C0G 0.15% X7R Type 2.0% X7R 2.50% | -55°C to + 200°C | Radial |
| Ceramic Cased Capacitor | | | | | |
| Std 125°C (SCR/SRR/SCA/SRA) | 50 to 200 VDC | C0G: 1.0 pF- .12 μF X7R:100 pF- 6.8 μF | C0G 0.15% X7R 2.50% | -55°C to + 125°C | Axial/Radial |
| 200°C (ACR/ARR/ACA/ARA) | 50 to 100 VDC | C0G: 1.0 pF- .12 μF X7R:100 pF- 3.3 μF | C0G 0.15% X7R 2.50% | -55°C to + 200°C | Axial/Radial |
| 260°C (TCR/TRR/TCA/TRA) | 50 to 100 VDC | C0G: 1.0 pF- .12 μF X7R:100 pF- 3.3 μF | C0G 0.15% X7R 2.50% | -55°C to + 260°C | Axial/Radial |
| Hi Temp Hi Volt (VCR/VRR) | 500 to 5000 VDC | C0G: 10 pF-.056 μF X7R:330 pF-1.2μF | C0G 0.15% X7R 2.50% | -55°C to + 200°C | Radial |

DIELECTRIC COMPARISONS

| Features | Ultra Stable | Semi-Stable High Voltage | Semi-Stable Hi-Temp | Temp/Volt Dependent |
|---|-------------------|--------------------------|---------------------|---------------------|
| Dielectric Type | C0G (NPO) | X7R | X7R type | X5U |
| Temperature Coefficient | 0 ±30ppm/°C | ±15% | +15/-40% | +22-56% |
| Operating Temp. Range | -55 to +200°C | -55 to +125°C | -55 to +200°C | -55 to +125°C |
| Dissipation Factor | 0.1% max. | 2.5% max. | 2.0% max. | 2.5% max. |
| Aging Rate | None | -2.0% max/dec. hour | -2.0% max/dec. hour | -2.0% max/dec. hour |
| Voltage Range | 25 to 20k VDC | 50 to 50k VDC | 25 to 4k VDC | Up to 20K VDC |
| Standard Tolerance | J, K, M | K, M, P, Z | K, M, P, Z | M, P, Z |
| Coefficient of Thermal Expansion @ 25°C | 9 X 10-6 IN/IN °C | 11 X 10-6 IN/IN °C | 11 X 10-6 IN/IN °C | 11 X 10-6 IN/IN °C |

**TYPICAL INSULATION RESISTANCE VS. TEMP (C°)
FOR C0G, NPO & X7R DIELECTRICS**



FEATURES

The HT/HP Series is used in robust applications

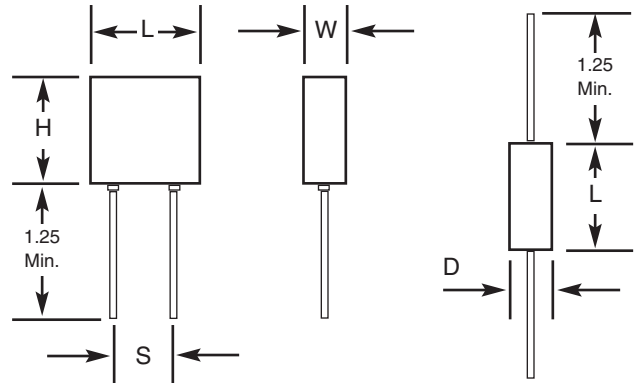
- Down Hole
- Industrial
- Harsh Environments

Where a Radial/Axial coated capacitor can withstand high temperatures (200°C).

NOTE:

Other tolerances, higher capacitance values, voltages, or special package configurations are available upon request.

CAPACITOR OUTLINE DRAWING



DIMENSIONS

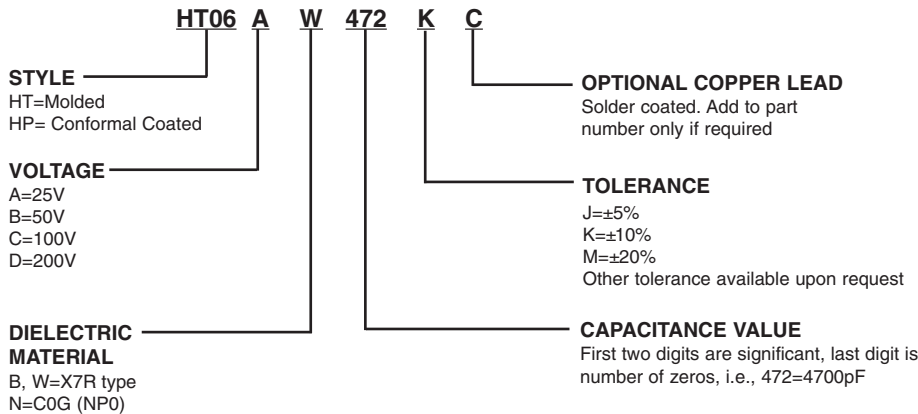
Molded (HT) and Conformal Coated (HP), Radial Lead Types

| Style | Sizes in Inches (mm) max | | | Lead Spacing ±0.030 (S) |
|-------|--------------------------|--------------|---------------|----------------------------|
| | Length (L) | Height (H) | Thickness (W) | |
| HT05 | .200 (5.08) | .200 (5.08) | .100 (2.54) | .100 (2.54) |
| HT55 | .200 (5.08) | .200 (5.08) | .100 (2.54) | .200 (5.08) |
| HT06 | .300 (7.62) | .300 (7.62) | .150 (3.81) | .200 (5.08) |
| HT08 | .500 (12.70) | .500 (12.70) | .250 (6.35) | .400 (10.16) |
| HT09 | .700 (17.78) | .400 (10.16) | .200 (5.08) | .500 (12.70) |

Tubular Case, Axial Lead Types

| Style | Sizes in Inches (mm) max | |
|-------|--------------------------|--------------|
| | Length (L) | Diameter (D) |
| HT11 | .170 (4.32) | .100 (2.54) |
| HT13 | .260 (6.60) | .135 (3.43) |
| HT14 | .400 (10.16) | .155 (3.94) |
| HT15 | .500 (12.70) | .200 (5.08) |
| HT16 | .750 (19.05) | .375 (9.52) |

PART NUMBER AND ORDERING INFORMATION



MARKING
(HT05, HT55, HT11)
472K
KEC

(All other sizes)
HT06AW472K
KEC
Date Code

For CONFORMAL COATED types, change style number to HPXX. HP dimensions will be reduced slightly.

COG & X7R DIELECTRIC

| Radial COG | | | | | | | Radial X7R | | | | | | | | | |
|------------|-----------|-------------|-------------|-------------|--------------|--------------|------------|-----------|-------------|-------------|-------------|--------------|--------------|-------------|-----|-----|
| Series | | HT/HP05 | HT/HP55 | HT/HP06 | HT/HP08 | HT/HP09 | Series | | HT/HP05 | HT/HP55 | HT/HP06 | HT/HP08 | HT/HP09 | | | |
| Cap | W max | .200 (5.08) | .200 (5.08) | .300 (7.62) | .500 (12.70) | .700 (17.78) | Cap | W max | .200 (5.08) | .200 (5.08) | .300 (7.62) | .500 (12.70) | .700 (17.78) | | | |
| | H max | .200 (5.08) | .200 (5.08) | .300 (7.62) | .500 (12.70) | .400 (10.16) | | H max | .200 (5.08) | .200 (5.08) | .300 (7.62) | .500 (12.70) | .400 (10.16) | | | |
| | T max | .100 (2.54) | .100 (2.54) | .150 (3.81) | .250 (6.35) | .200 (5.08) | | T max | .100 (2.54) | .100 (2.54) | .150 (3.81) | .250 (6.35) | .200 (5.08) | | | |
| | S ±.030 | .100 (2.54) | .200 (5.08) | .200 (5.08) | .400 (10.16) | .500 (12.70) | | S ±.030 | .100 (2.54) | .200 (5.08) | .200 (5.08) | .400 (10.16) | .500 (12.70) | | | |
| | Lead Dia. | .025 (.635) | .025 (.635) | .025 (.635) | .025 (.635) | .025 (.635) | | Lead Dia. | .025 (.635) | .025 (.635) | .025 (.635) | .025 (.635) | .025 (.635) | .025 (.635) | | |
| Cap | Cap Code | WVDC | | | WVDC | | | WVDC | | | WVDC | | | WVDC | | |
| | | 50 | 100 | 200 | 50 | 100 | 200 | 50 | 100 | 200 | 50 | 100 | 200 | 50 | 100 | 200 |
| 1.0pF | 109 | | | | | | 100pF | 101 | | | | | | | | |
| 1.2 | 129 | | | | | | 120 | 121 | | | | | | | | |
| 1.5 | 159 | | | | | | 150 | 151 | | | | | | | | |
| 1.8 | 189 | | | | | | 180 | 181 | | | | | | | | |
| 2.2 | 229 | | | | | | 220 | 221 | | | | | | | | |
| 2.7 | 279 | | | | | | 270 | 271 | | | | | | | | |
| 3.3 | 339 | | | | | | 330 | 331 | | | | | | | | |
| 3.9 | 399 | | | | | | 390 | 391 | | | | | | | | |
| 4.7 | 479 | | | | | | 470 | 471 | | | | | | | | |
| 5.6 | 569 | | | | | | 560 | 561 | | | | | | | | |
| 6.8 | 689 | | | | | | 680 | 681 | | | | | | | | |
| 8.2 | 829 | | | | | | 820 | 821 | | | | | | | | |
| 10 | 100 | | | | | | 1000 | 102 | | | | | | | | |
| 12 | 120 | | | | | | 1200 | 122 | | | | | | | | |
| 15 | 150 | | | | | | 1500 | 152 | | | | | | | | |
| 18 | 180 | | | | | | 1800 | 182 | | | | | | | | |
| 22 | 220 | | | | | | 2200 | 222 | | | | | | | | |
| 27 | 270 | | | | | | 2700 | 272 | | | | | | | | |
| 33 | 330 | | | | | | 3300 | 332 | | | | | | | | |
| 39 | 390 | | | | | | 3900 | 392 | | | | | | | | |
| 47 | 470 | | | | | | 4700 | 472 | | | | | | | | |
| 56 | 560 | | | | | | 5600 | 562 | | | | | | | | |
| 68 | 680 | | | | | | 6800 | 682 | | | | | | | | |
| 82 | 820 | | | | | | 8200 | 822 | | | | | | | | |
| 100 | 101 | | | | | | .010uF | 103 | | | | | | | | |
| 120 | 121 | | | | | | .012 | 123 | | | | | | | | |
| 150 | 151 | | | | | | .015 | 153 | | | | | | | | |
| 180 | 181 | | | | | | .018 | 183 | | | | | | | | |
| 220 | 221 | | | | | | .022 | 223 | | | | | | | | |
| 270 | 271 | | | | | | .027 | 273 | | | | | | | | |
| 330 | 331 | | | | | | .033 | 333 | | | | | | | | |
| 390 | 391 | | | | | | .039 | 393 | | | | | | | | |
| 470 | 471 | | | | | | .047 | 473 | | | | | | | | |
| 560 | 561 | | | | | | .056 | 563 | | | | | | | | |
| 680 | 681 | | | | | | .068 | 683 | | | | | | | | |
| 820 | 821 | | | | | | .082 | 823 | | | | | | | | |
| 1000 | 102 | | | | | | .10 | 104 | | | | | | | | |
| 1200 | 122 | | | | | | .12 | 124 | | | | | | | | |
| 1500 | 152 | | | | | | .15 | 154 | | | | | | | | |
| 1800 | 182 | | | | | | .18 | 184 | | | | | | | | |
| 2200 | 222 | | | | | | .22 | 224 | | | | | | | | |
| 2700 | 272 | | | | | | .27 | 274 | | | | | | | | |
| 3300 | 332 | | | | | | .33 | 334 | | | | | | | | |
| 3900 | 392 | | | | | | .39 | 394 | | | | | | | | |
| 4700 | 472 | | | | | | .47 | 474 | | | | | | | | |
| 5600 | 562 | | | | | | .56 | 564 | | | | | | | | |
| 6800 | 682 | | | | | | .68 | 684 | | | | | | | | |
| 8200 | 822 | | | | | | .82 | 824 | | | | | | | | |
| .010uF | 103 | | | | | | 1.0 | 105 | | | | | | | | |
| .012 | 123 | | | | | | 1.2 | 125 | | | | | | | | |
| .015 | 153 | | | | | | 1.5 | 155 | | | | | | | | |
| .018 | 183 | | | | | | 1.8 | 185 | | | | | | | | |
| .022 | 223 | | | | | | 2.2 | 225 | | | | | | | | |
| .027 | 273 | | | | | | 2.7 | 275 | | | | | | | | |
| .033 | 333 | | | | | | 3.3 | 335 | | | | | | | | |
| .039 | 393 | | | | | | 3.9 | 395 | | | | | | | | |
| .047 | 473 | | | | | | 4.7 | 475 | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | |
| .082 | 823 | | | | | | | | | | | | | | | |
| .10 | 104 | | | | | | | | | | | | | | | |
| .12 | 124 | | | | | | | | | | | | | | | |
| .15 | 154 | | | | | | | | | | | | | | | |

FEATURES

The HV series not only withstands high temperatures (200°C), but also offers high voltage (500-4000 VDC)

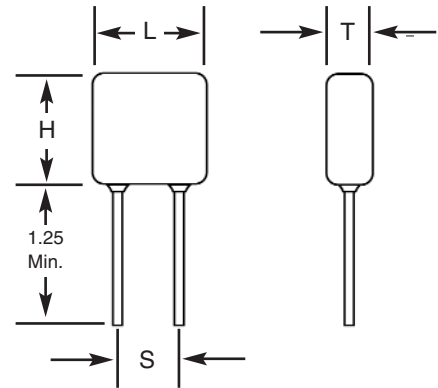
To be used in robust applications

- Down Hole
- Industrial
- Harsh Environments

NOTE:

Other tolerances, higher capacitance values, voltages, or special package configurations are available upon request.

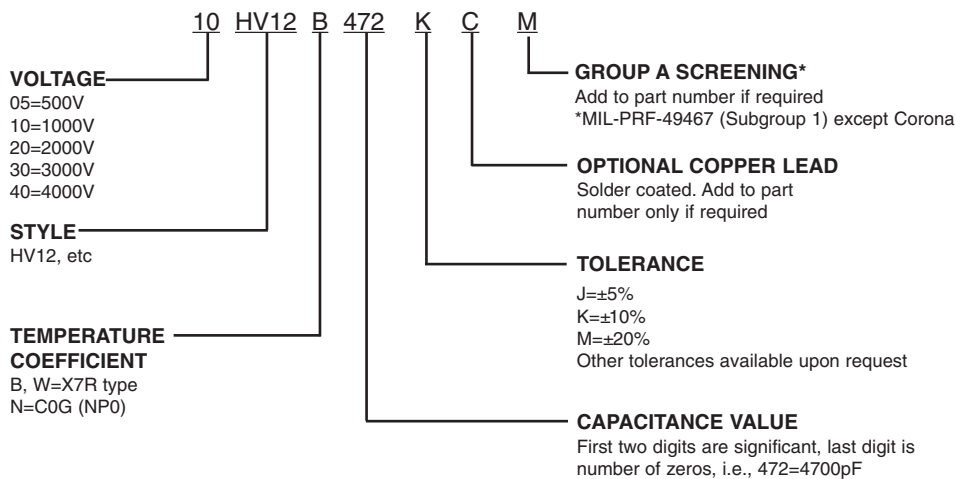
CAPACITOR OUTLINE DRAWING



DIMENSIONS

| Style | Sizes in Inches (mm) max. | | | Lead Spacing ±0.030 (S) |
|-------------|---------------------------|--------------|---------------|----------------------------|
| | Length (L) | Height (H) | Thickness (T) | |
| HV10 | .250 (6.35) | .220 (5.59) | .150 (3.81) | .170 (4.32) |
| HV11 | .320 (8.13) | .300 (7.62) | .250 (6.35) | .200 (5.08) |
| HV12 | .420 (10.67) | .400 (10.16) | .250 (6.35) | .300 (7.62) |
| HV13 | .520 (13.21) | .500 (12.70) | .300 (7.62) | .400 (10.16) |
| HV14 | .620 (15.75) | .500 (12.70) | .300 (7.62) | .500 (12.70) |
| HV15 | .720 (18.29) | .700 (17.78) | .300 (7.62) | .600 (15.24) |
| HV16 | .820 (20.83) | .700 (17.78) | .350 (8.89) | .700 (17.78) |

PART NUMBER AND ORDERING INFORMATION



MARKING

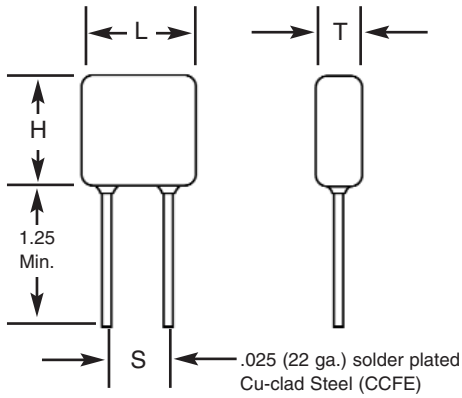
(HV10, HV11)
472M
KEC
Date Code

(All other sizes)
HV12B472M
1kV
KEC
Date Code

COG DIELECTRIC

| STYLE COG | | HV10 | | | HV11 | | | HV12 | | | HV13 | | | HV14 | | | HV15 | | | HV16 | | | | | | | | | | | |
|-----------|-----------------------|-------------|----|----|-------------|----|----|--------------|-----|----|--------------|----|-----|--------------|----|----|--------------|----|----|--------------|----|-----|----|----|----|----|-----|----|----|----|----|
| Cap | L max | .250 (6.35) | | | .320 (8.13) | | | .420 (10.67) | | | .520 (13.21) | | | .620 (15.75) | | | .720 (18.29) | | | .820 (20.83) | | | | | | | | | | | |
| | H max | .220 (5.59) | | | .300 (7.62) | | | .400 (10.16) | | | .500 (12.70) | | | .500 (12.70) | | | .700 (17.78) | | | .700 (17.78) | | | | | | | | | | | |
| | W max | .150 (3.81) | | | .250 (6.35) | | | .250 (6.35) | | | .300 (7.62) | | | .300 (7.62) | | | .300 (7.62) | | | .350 (8.89) | | | | | | | | | | | |
| | S ± .030 | .170 (4.32) | | | .200 (5.08) | | | .300 (7.62) | | | .400 (10.16) | | | .500 (12.70) | | | .600 (15.24) | | | .700 (17.78) | | | | | | | | | | | |
| | Lead Dia. +.004/-.002 | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | | | | | | | | | |
| | Cap Code | WVDC | | | WVDC | | | WVDC | | | WVDC | | | WVDC | | | WVDC | | | WVDC | | | | | | | | | | | |
| pF | | 500 | 1k | 2k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k |
| 12pF | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 | 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

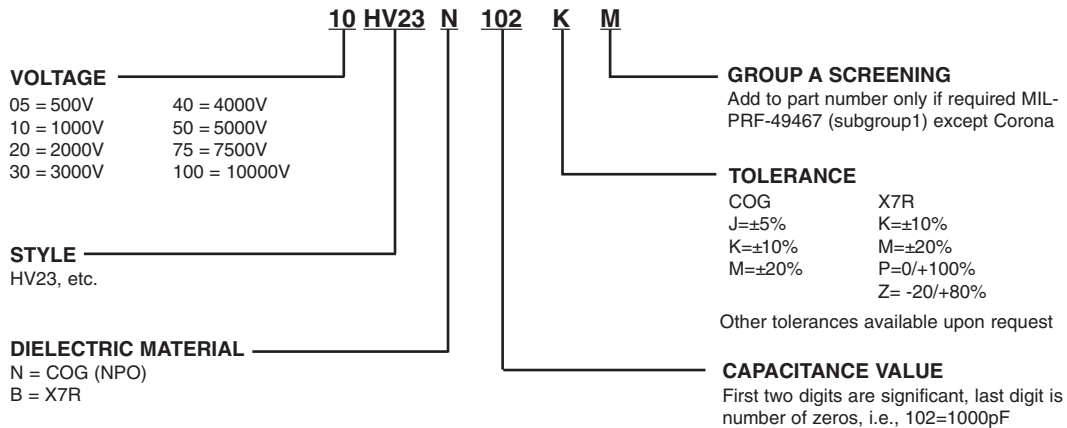
CAPACITOR OUTLINE DRAWING



DIMENSIONS

| Style | Sizes in Inches (mm) max. | | | Lead Spacing ±0.030 (S) |
|-------|---------------------------|--------------|---------------|----------------------------|
| | Length (L) | Height (H) | Thickness (T) | |
| HV20 | .250 (6.35) | .220 (5.59) | .200 (5.08) | .170 (4.32) |
| HV21 | .320 (8.13) | .280 (7.11) | .250 (6.35) | .220 (5.59) |
| HV22 | .370 (9.40) | .300 (7.62) | .250 (6.35) | .275 (6.98) |
| HV23 | .470 (11.94) | .400 (10.16) | .270 (6.89) | .375 (9.52) |
| HV24 | .570 (14.48) | .500 (12.70) | .270 (6.89) | .475 (12.06) |
| HV25 | .670 (17.02) | .600 (15.24) | .270 (6.89) | .575 (14.60) |
| HV26 | .770 (19.56) | .720 (18.29) | .270 (6.89) | .675 (17.14) |
| HV30 | .450 (11.43) | .220 (5.59) | .200 (5.08) | .300 (7.62) |
| HV31 | .550 (13.97) | .280 (7.11) | .250 (6.35) | .400 (10.16) |
| HV33 | .850 (21.59) | .400 (10.16) | .270 (6.89) | .700 (17.78) |
| HV34 | 1.050 (26.67) | .500 (12.70) | .270 (6.89) | .975 (24.76) |
| HV35 | 1.250 (31.75) | .600 (15.24) | .270 (6.89) | 1.175 (29.84) |
| HV36 | 1.450 (36.83) | .720 (18.29) | .270 (6.89) | 1.375 (34.92) |

PART NUMBER AND ORDERING INFORMATION



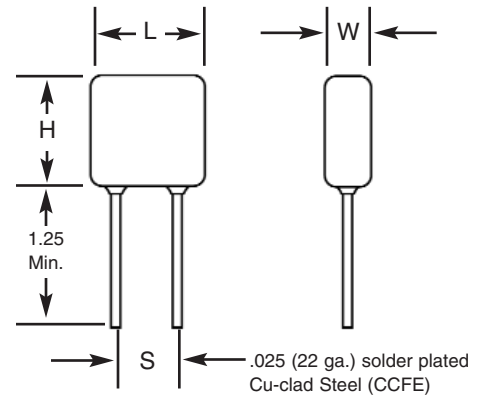
MARKING

| (HV20, HV21) | (All Other Sizes) |
|--------------|-------------------|
| 103K | HV24A103K |
| 1 kV | 1 kV |
| KEC | KEC |
| Date Code | Date Code |

FEATURES

1. Electrical characteristics and environmental information on these parts may be obtained by referring to MIL-PRF-49467.
2. All parts are conformal coated multilayer ceramic.
3. Designed to provide excellent long-term reliability.
4. Parts are Group A screened per MIL-PRF-49467 which includes 100% Corona testing and meet all other specification requirements.
5. Designed for surface, sea and airborne military and commercial high-reliability applications.
6. No IR degradation over life.
7. BR (X7R) V/TC is -40% at rated voltage and BZ (X7R) V/TC is -40% at 60% rated voltage.
8. BX characteristic (-25%) on BR parts is approximately 52% rated voltage.
9. 100% Non-destructive test by means of CSAM inspection available. SLAM available by special order.

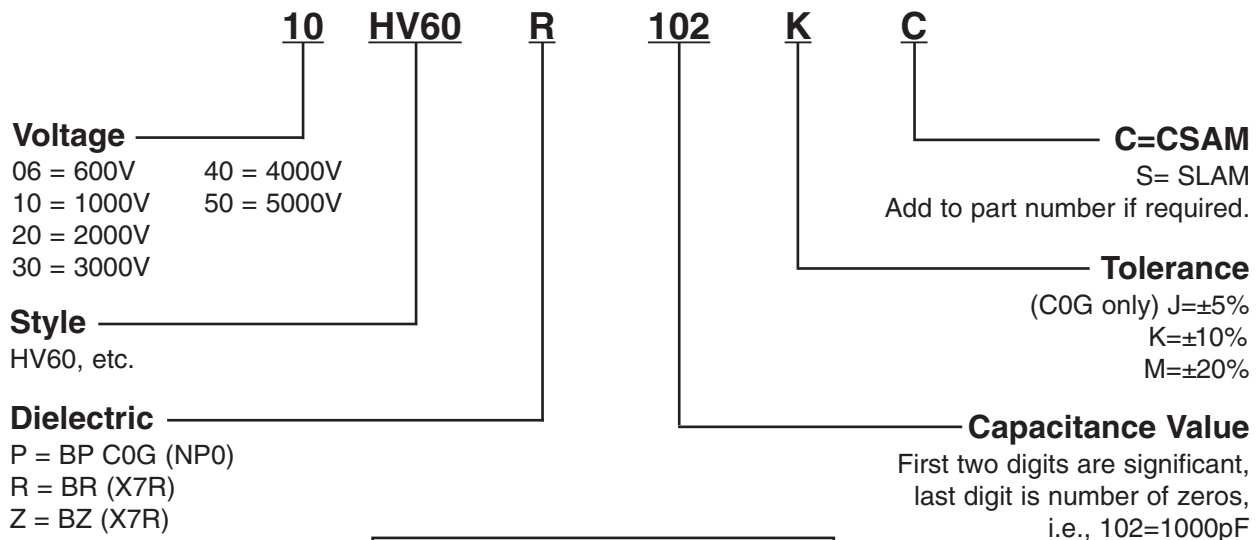
CAPACITOR OUTLINE DRAWING



DIMENSIONS

| Style | Sizes in Inches (mm) max. | | | Lead Spacing ±0.030 (S) |
|-------|---------------------------|--------------|---------------|----------------------------|
| | Length (L) | Height (H) | Thickness (W) | |
| HV60 | .250 (6.35) | .220 (5.59) | .200 (5.08) | .170 (4.32) |
| HV61 | .320 (8.13) | .280 (7.11) | .250 (6.35) | .220 (5.59) |
| HV62 | .370 (9.40) | .300 (7.62) | .250 (6.35) | .275 (6.98) |
| HV63 | .470 (11.94) | .400 (10.16) | .270 (6.86) | .375 (9.52) |
| HV64 | .570 (14.48) | .500 (12.70) | .270 (6.86) | .475 (12.06) |
| HV65 | .670 (17.02) | .600 (15.24) | .270 (6.86) | .575 (14.60) |
| HV66 | .770 (19.56) | .720 (18.29) | .270 (6.86) | .675 (17.14) |
| HV68 | 1.300 (33.02) | .600 (15.24) | .270 (6.86) | 1.175 (29.84) |
| HV69 | 1.500 (38.10) | .720 (18.29) | .270 (6.86) | 1.375 (34.92) |

PART NUMBER AND ORDERING INFORMATION



MARKING

| (HV60, HV61) | (All Other Sizes) |
|--------------|-------------------|
| 102K | HV63R102K |
| 1 kV | 1 kV |
| KEC | KEC |
| Date Code | Date Code |

COG DIELECTRIC

| STYLE | COG | HV60 | | | HV61 | | | HV62 | | | HV63 | | | | HV64 | | | | | HV65 | | | | | HV66 | | | | | | | | | | | | | |
|--------|-----|-------|-------|-------|---------|-----------------------|----------|------|-----|----|------|----|-----|----|------|----|-----|----|----|------|----|-----|----|----|------|----|----|----|----|----|----|----|----|----|----|----|----|--|
| | | W max | L max | T max | S ±.030 | Lead Dia. +.004/-0.02 | Cap Code | pF | 600 | 1k | 2k | 3k | 600 | 1k | 2k | 3k | 600 | 1k | 2k | 3k | 4k | 600 | 1k | 2k | 3k | 4k | 5k | 1k | 2k | 3k | 4k | 5k | 1k | 2k | 3k | 4k | 5k | |
| 12pF | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 | 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .018 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .022 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .027 | 273 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .033 | 333 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .039 | 393 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .047 | 473 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

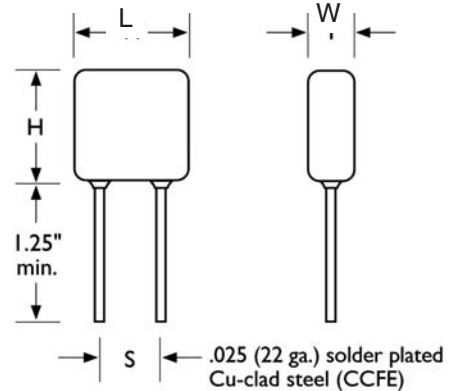
X7R DIELECTRIC

| STYLE X7R | HV60 | | | HV61 | | | HV62 | | | HV63 | | | | HV64 | | | | HV65 | | | HV66 | | | | HV68 | | | HV69 | | | | | | | | | | | | |
|-----------|-------|-------|-------|----------|------------------------|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | W max | L max | T max | S ± .030 | Lead Dia. ±.004/-0.002 | Cap Code | 600 | 1k | 2k | 3k | 600 | 1k | 2k | 3k | 600 | 1k | 2k | 3k | 4k | 600 | 1k | 2k | 3k | 4k | 5k | 1k | 2k | 3k | 4k | 5k | 1k | 2k | 3k | 4k | 5k | 3k | 4k | 5k | | |
| Cap | 270pF | 330 | 390 | 470 | 560 | 680 | 820 | 1000 | 1200 | 1500 | 1800 | 2200 | 2700 | 3300 | 3900 | 4700 | 5600 | 6800 | 8200 | .010uF | .012 | .015 | .018 | .022 | .027 | .033 | .039 | .047 | .056 | .068 | .082 | .10 | .12 | .15 | .18 | .22 | .27 | .33 | .39 | .47 |
| | 271 | 331 | 391 | 471 | 561 | 681 | 821 | 102 | 122 | 152 | 182 | 222 | 272 | 332 | 392 | 472 | 562 | 682 | 822 | 103 | 123 | 153 | 183 | 223 | 273 | 333 | 393 | 473 | 563 | 683 | 823 | 104 | 124 | 154 | 184 | 224 | 274 | 334 | 394 | 474 |

FEATURES

1. Similar to NASA Spec. SSQ 21113 (1, 2 & 5kV).
2. Conforms to MIL-PRF-49467. (Group A Screening, Subgroup 1)
3. 100% Corona tested.
4. No IR degradation over life.
5. High density, low DF ceramic.
6. Conservative and proven design is recommended for non-repairable applications such as spacecraft.
7. CSAM inspections are available and is recommended for space applications. SLAM available by special order.
8. Burn-in in a non-contaminating inert fluid available.

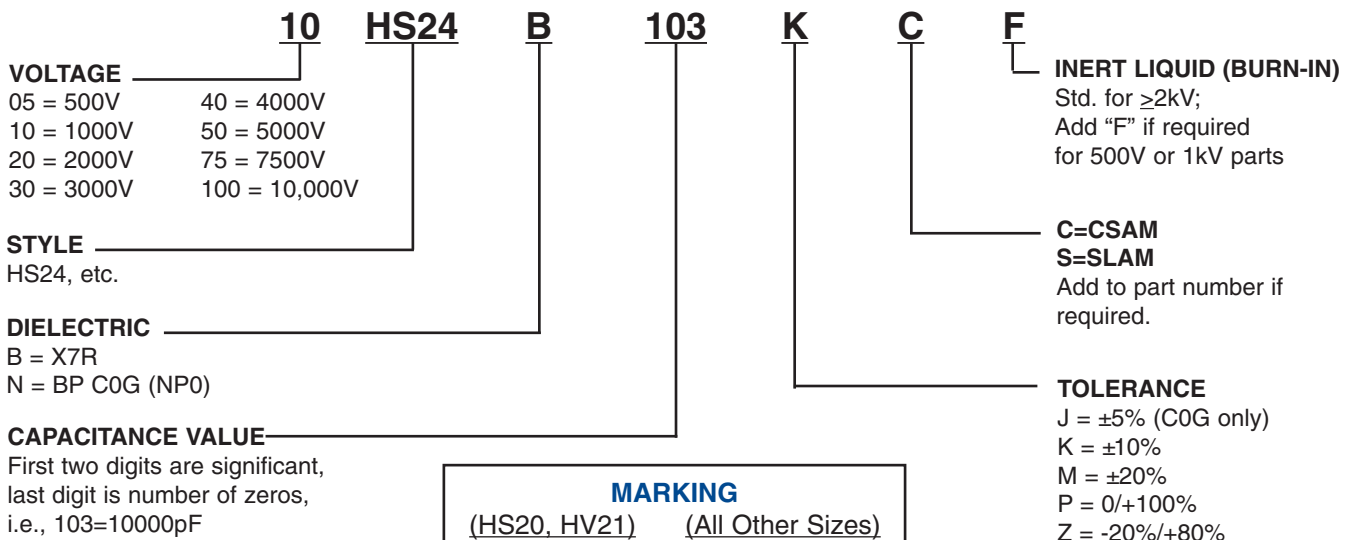
CAPACITOR OUTLINE DRAWING



DIMENSIONS

| Style | Sizes in Inches (mm) max. | | | Lead Spacing ±0.030 (S) |
|-------|---------------------------|--------------|---------------|----------------------------|
| | Length (L) | Height (H) | Thickness (W) | |
| HS20 | .250 (6.35) | .220 (5.59) | .200 (5.08) | .170 (4.32) |
| HS21 | .320 (8.13) | .280 (7.11) | .250 (6.35) | .220 (5.59) |
| HS22 | .370 (9.40) | .300 (7.62) | .250 (6.35) | .275 (6.98) |
| HS30 | .450 (11.43) | .220 (5.59) | .200 (5.08) | .300 (7.62) |
| HS23 | .470 (11.94) | .400 (10.16) | .270 (6.89) | .375 (9.52) |
| HS31 | .550 (13.97) | .280 (7.11) | .250 (6.35) | .400 (10.16) |
| HS24 | .570 (14.48) | .500 (12.70) | .270 (6.89) | .475 (12.06) |
| HS25 | .670 (17.02) | .600 (15.24) | .270 (6.89) | .575 (14.60) |
| HS26 | .770 (19.56) | .720 (18.29) | .270 (6.89) | .675 (17.14) |
| HS33 | .850 (21.59) | .400 (10.16) | .270 (6.89) | .700 (17.78) |
| HS34 | 1.050 (26.67) | .500 (12.70) | .270 (6.89) | .975 (24.76) |
| HS35 | 1.250 (31.75) | .600 (15.24) | .270 (6.89) | 1.175 (29.84) |
| HS36 | 1.450 (36.83) | .720 (18.29) | .270 (6.89) | 1.375 (34.92) |

PART NUMBER AND ORDERING INFORMATION



COG DIELECTRIC

| STYLE | COG | HS20 | | | HS21 | | | HS22 | | | HS23 | | | | HS24 | | | | | HS25 | | | | | HS26 | | | | | | | | | | |
|--------|-----------------------|-------------|----|----|-------------|----|----|-------------|----|----|--------------|----|----|----|--------------|----|----|----|----|--------------|-----|----|----|----|--------------|----|-----|----|----|----|----|----|--|--|--|
| | W max | .250 (6.35) | | | .320 (8.13) | | | .370 (9.40) | | | .470 (11.94) | | | | .570 (14.48) | | | | | .670 (17.02) | | | | | .770 (19.56) | | | | | | | | | | |
| | L max | .220 (5.59) | | | .280 (7.11) | | | .300 (7.62) | | | .400 (10.16) | | | | .500 (12.70) | | | | | .600 (15.24) | | | | | .720 (18.29) | | | | | | | | | | |
| | T max | .200 (5.08) | | | .250 (6.35) | | | .250 (6.35) | | | .270 (6.86) | | | | .270 (6.86) | | | | | .270 (6.86) | | | | | .270 (6.86) | | | | | | | | | | |
| | S ± .030 | .170 (4.32) | | | .220 (5.59) | | | .275 (6.98) | | | .375 (9.52) | | | | .475 (12.06) | | | | | .575 (14.60) | | | | | .675 (17.14) | | | | | | | | | | |
| | Lead Dia. +.004/-0.02 | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | | .025 (.635) | | | | | .025 (.635) | | | | | .025 (.635) | | | | | | | | | | |
| | Cap Code | WVDC | | | WVDC | | | WVDC | | | WVDC | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | | | | | | |
| Cap | pF | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k | | | |
| 10pF | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 | 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .018 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .022 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .027 | 273 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .033 | 333 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .039 | 393 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .047 | 473 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .082 | 823 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .10 | 104 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .12 | 124 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .15 | 154 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

COG DIELECTRIC

| STYLE COG | | HS30 | HS31 | | | | | HS33 | | | | | HS34 | | | | | HS35 | | | | | HS36 | | | | | | | | | | | | | | | | | | |
|-----------|--------------------------|--------------|--------------|----|------|----|-----|--------------|----|------|----|----|---------------|----|------|----|----|---------------|-----|------|----|----|---------------|----|------|-----|----|----|----|----|----|------|-----|-----|----|----|----|----|----|------|-----|
| Cap | L max | .450 (11.43) | .550 (13.97) | | | | | .850 (21.59) | | | | | 1.050 (26.67) | | | | | 1.250 (31.75) | | | | | 1.450 (36.83) | | | | | | | | | | | | | | | | | | |
| | W max | .220 (5.08) | .280 (7.11) | | | | | .400 (10.16) | | | | | .500 (12.70) | | | | | .600 (15.24) | | | | | .720 (18.29) | | | | | | | | | | | | | | | | | | |
| | T max | .200 (6.86) | .250 (6.35) | | | | | .270 (6.89) | | | | | .270 (6.89) | | | | | .270 (6.89) | | | | | .270 (6.89) | | | | | | | | | | | | | | | | | | |
| | S ±.030 | .300 (7.62) | .400 (10.16) | | | | | .700 (17.78) | | | | | .975 (24.76) | | | | | 1.175 (29.84) | | | | | 1.375 (34.92) | | | | | | | | | | | | | | | | | | |
| | Lead Dia. +.004/-.002 | .025 (.635) | .025 (.635) | | | | | .025 (.635) | | | | | .025 (.635) | | | | | .025 (.635) | | | | | .025 (.635) | | | | | | | | | | | | | | | | | | |
| | Cap Code | WVDC | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | | | | | | | | | | | | |
| | Cap | pF | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k | 7.5k | 500 | 1k | 2k | 3k | 4k | 5k | 7.5k | 10k | 500 | 1k | 2k | 3k | 4k | 5k | 7.5k | 10k |
| | 10pF | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 15 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 18 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 22 | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 27 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 | 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .018 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .022 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .027 | 273 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .033 | 333 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .039 | 393 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .047 | 473 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .082 | 823 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .10 | 104 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .12 | 124 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .15 | 154 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .18 | 184 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

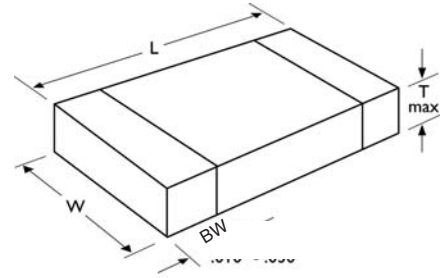
X7R DIELECTRIC

| STYLE X7R | | HS20 | | | HS21 | | | HS22 | | | HS23 | | | | HS24 | | | | | HS25 | | | | | HS26 | | | | | | |
|-----------|----------------------|-------------|----|----|-------------|----|----|-------------|----|----|--------------|----|----|----|--------------|----|----|----|----|--------------|----|----|----|----|--------------|-----|----|----|----|----|----|
| Cap | W max | .250 (6.35) | | | .320 (8.13) | | | .370(9.40) | | | .470 (11.94) | | | | .570 (14.48) | | | | | .670 (17.02) | | | | | .770 (19.56) | | | | | | |
| | L max | .220 (5.59) | | | .280 (7.11) | | | .300 (7.62) | | | .400 (10.16) | | | | .500 (12.70) | | | | | .600 (15.24) | | | | | .720 (18.29) | | | | | | |
| | T max | .200 (5.08) | | | .250 (6.35) | | | .250 (6.35) | | | .270 (6.86) | | | | .270 (6.86) | | | | | .270 (6.86) | | | | | .270 (6.86) | | | | | | |
| | S ±.030 | .170 (4.32) | | | .220 (5.59) | | | .275 (6.98) | | | .375 (9.52) | | | | .475 (12.06) | | | | | .575 (14.60) | | | | | .675 (17.14) | | | | | | |
| | Lead Dia. ±.004±.002 | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | .025 (.635) | | | | .025 (.635) | | | | | .025 (.635) | | | | | .025 (.635) | | | | | | |
| | Cap Code | WVDC | | | WVDC | | | WVDC | | | WVDC | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | | |
| | pF | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 500 | 1k | 2k | 3k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k |
| 270pF | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .018 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .022 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .027 | 273 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .033 | 333 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .039 | 393 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .047 | 473 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .082 | 823 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .10 | 104 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .12 | 124 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .15 | 154 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .18 | 184 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .22 | 224 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .27 | 274 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .33 | 334 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .39 | 394 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .47 | 474 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .56 | 564 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .68 | 684 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .82 | 824 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 | 105 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FEATURES

1. The ceramic chip capacitors described in this section are the types used in our other high voltage ceramic multilayer product lines.
2. Types BP, BR and BZ available as described in MIL-PRF-49467.
3. Group A and B screening per MIL-PRF-49467 available.
4. Ceramic chip capacitors are extremely sensitive to thermal shock damage during installation. Wherever possible, processes involving infrared or vapor phase soldering systems should be utilized.
5. Higher voltages available upon request
6. Where nickel barrier termination is required, end band length dimensions may exceed the standard dimension listed.

CERAMIC CHIP OUTLINE DRAWING

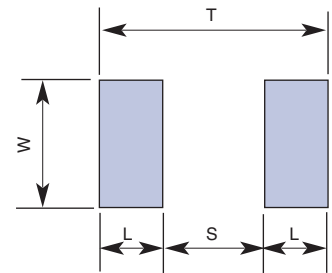


DIMENSIONS

| Style | Length (L) Inches (mm) | Width (W) Inches (mm) | Thickness (T) max Inches (mm) | Bandwidth (BW) Inches |
|-------|---------------------------|--------------------------|----------------------------------|--------------------------|
| 1515 | .150 ±.015 (3.81 ±.38) | .150 ±.015 (3.81 ±.38) | .140 (3.55) | .010 - .030" |
| 1812 | .180 ±.020 (4.57 ±.51) | .120 ±.015 (3.05 ±.38) | .100 (2.54) | .010 - .040" |
| 1825 | .180 ±.020 (4.57 ±.51) | .250 ±.020 (6.35 ±.51) | .160 (4.07) | .010 - .040" |
| 2020 | .200 ±.020 (5.08 ±.51) | .200 ±.020 (5.08 ±.51) | .180 (3.55) | .010 - .040" |
| 2225 | .220 ±.020 (5.59 ±.51) | .250 ±.020 (6.35 ±.51) | .200 (5.08) | .010 - .040" |
| 2520 | .250 ±.020 (6.35 ±.51) | .200 ±.020 (5.08 ±.51) | .180 (4.57) | .030 - .060" |
| 3333 | .330 ±.030 (8.38 ±.76) | .330 ±.030 (8.38 ±.76) | .220 (5.59) | .030 - .060" |
| 3530 | .350 ±.030 (8.89 ±.76) | .300 ±.030 (7.62 ±.76) | .220 (5.59) | .030 - .060" |
| 4040 | .400 ±.030 (10.2 ±.76) | .400 ±.030 (10.2 ±.76) | .220 (5.59) | .030 - .060" |
| 4540 | .450 ±.030 (11.43 ±.76) | .400 ±.030 (10.2 ±.76) | .220 (5.59) | .030 - .060" |
| 5440 | .540 ±.030 (13.7 ±.76) | .400 ±.030 (10.2 ±.76) | .220 (5.59) | .030 - .060" |
| 5550 | .550 ±.030 (14.0 ±.76) | .500 ±.030 (12.7 ±.76) | .220 (5.59) | .030 - .060" |
| 6560 | .650 ±.030 (16.5 ±.76) | .600 ±.030 (15.2 ±.76) | .220 (5.59) | .030 - .060" |

RECOMMENDED SOLDER PAD PATTERN DIMENSIONS

| Chip Size | T (Total Length) | | S (Separation) | | W (Pad Width) | | L (Pad Length) | |
|-----------|------------------|-------|----------------|-------|---------------|-------|----------------|-------|
| | mm | in. | mm | in. | mm | in. | mm | in. |
| 1515 | 5.20 | 0.205 | 1.90 | 0.075 | 4.34 | 0.171 | 1.65 | 0.065 |
| 1812 | 5.90 | 0.232 | 2.30 | 0.091 | 3.70 | 0.146 | 1.80 | 0.071 |
| 1825 | 5.90 | 0.232 | 2.30 | 0.091 | 6.90 | 0.272 | 1.80 | 0.071 |
| 2020 | 6.50 | 0.256 | 2.80 | 0.110 | 5.62 | 0.221 | 1.85 | 0.073 |
| 2225 | 7.00 | 0.276 | 3.30 | 0.130 | 6.80 | 0.268 | 1.85 | 0.073 |
| 2520 | 8.68 | 0.342 | 4.98 | 0.196 | 5.62 | 0.221 | 1.85 | 0.073 |
| 3333 | 10.91 | 0.430 | 7.11 | 0.280 | 9.27 | 0.365 | 1.90 | 0.075 |
| 3530 | 11.51 | 0.453 | 7.61 | 0.300 | 8.51 | 0.335 | 1.95 | 0.077 |
| 4040 | 12.88 | 0.507 | 8.88 | 0.350 | 11.05 | 0.435 | 2.00 | 0.079 |
| 4540 | 14.21 | 0.559 | 10.15 | 0.400 | 11.05 | 0.435 | 2.03 | 0.080 |
| 5440 | 16.51 | 0.650 | 10.41 | 0.410 | 11.05 | 0.435 | 3.05 | 0.120 |
| 5550 | 18.92 | 0.745 | 12.82 | 0.505 | 13.59 | 0.535 | 3.05 | 0.120 |
| 6560 | 19.80 | 0.780 | 13.20 | 0.520 | 16.13 | 0.635 | 3.30 | 0.130 |



PART NUMBER AND ORDERING INFORMATION

4540 B 472 M 202 P M

Style
1515, 2020, etc.

Dielectric
B or R = X7R
N = C0G (NP0)

Capacitance Value
First two digits are significant,
last digit is number of zeros,
i.e., 472=4700pF

Tolerance
J = ±5% C0G (NP0)
K = ±10%
M = ±20%
P = 0/+100%
Z = -20%/+80%

Group A Screening*
Add to part number if required
*MIL-PRF-49467
(subgroup 1)
except Corona

Terminal Material
P = PdAg
S = Ag
E = Ag/Ni/Sn/Pb Plate
C = Ag/Ni/Sn Plate

Voltage
First two digits are significant,
last digit is number of zeros,
i.e., 202=2000V

MARKING
Not applicable
As required by customer only.

COG DIELECTRIC

Table with columns for STYLE COG (1515, 1812, 1825, 2020, 2225, 2520, 3333, 3530) and rows for L, W, T max, Band Width, Cap pF, and various voltage ratings (10pF to .10 uF).

COG DIELECTRIC

| STYLE COG | | 4040 | | | | | 4540 | | | | | 5440 | | | | | 5550 | | | | | 6560 | | | | | | | |
|-----------|-------------|-----------------------|----|----|----|----|-----------------------|----|----|----|----|-----------------------|-----|----|----|----|-----------------------|-----|----|----|----|-----------------------|----|-----|----|----|----|----|----|
| | | L | | | | | L | | | | | L | | | | | L | | | | | L | | | | | | | |
| | W | .400 ±.030(10,20±.76) | | | | | .450 ±.030(11,43±.76) | | | | | .540 ±.030(13,70±.76) | | | | | .550 ±.030(14,00±.76) | | | | | .650 ±.030(16,50±.76) | | | | | | | |
| | T max | .220 (5,59) | | | | | .220 (5,59) | | | | | .220 (5,59) | | | | | .220 (5,59) | | | | | .220 (5,59) | | | | | | | |
| | Band Width | .030 - .060" | | | | | .030 - .060" | | | | | .030 - .060" | | | | | .030 - .060" | | | | | .030 - .060" | | | | | | | |
| Cap | Cap Code pF | WVDC | | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | | | |
| | | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k |
| 10pF | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 120 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 150 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | 180 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 220 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | 270 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 330 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | 390 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 470 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | 560 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 680 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 82 | 820 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 101 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 120 | 121 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 150 | 151 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 | 181 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .018 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .022 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .027 | 273 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .033 | 333 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .039 | 393 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .047 | 473 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .082 | 823 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .10 | 104 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

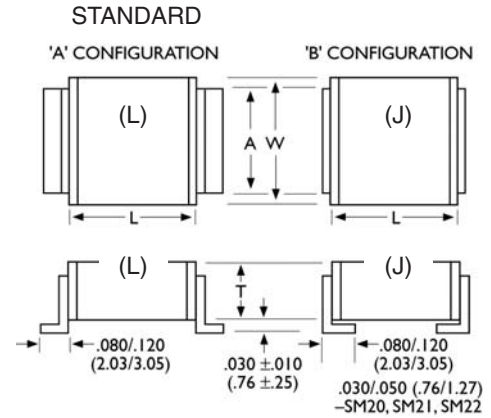
X7R DIELECTRIC

| STYLE X7R | | 4040 | | | | | 4540 | | | | | 5440 | | | | | 5550 | | | | | 6560 | | | | | | |
|-----------|------------|-----------------------|----|----|----|------|-----------------------|----|----|----|------|-----------------------|----|----|----|------|-----------------------|----|----|----|------|-----------------------|-----|----|----|----|----|----|
| Cap | L | .400 ±.030(10,20±.76) | | | | | .450 ±.030(11,43±.76) | | | | | .540 ±.030(13,70±.76) | | | | | .550 ±.030(14,00±.76) | | | | | .650 ±.030(16,50±.76) | | | | | | |
| | W | .400 ±.030(10,20±.76) | | | | | .400 ±.030(10,20±.76) | | | | | .400 ±.030(10,20±.76) | | | | | .500 ±.030(10,20±.76) | | | | | .600 ±.030(15,20±.76) | | | | | | |
| | T max | .220 (5,59) | | | | | .220 (5,59) | | | | | .220 (5,59) | | | | | .220 (5,59) | | | | | .220 (5,59) | | | | | | |
| | Band Width | .030 - .060* | | | | | .030 - .060* | | | | | .030 - .060* | | | | | .030 - .060* | | | | | .030 - .060* | | | | | | |
| Cap Code | WVDC | | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | WVDC | | | | | | | |
| pF | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 500 | 1k | 2k | 3k | 4k | 5k | 500 | 1k | 2k | 3k | 4k | 5k |
| 220pF | 221 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 271 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 330 | 331 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 391 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 471 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 561 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 681 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 821 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1000 | 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1200 | 122 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1500 | 152 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1800 | 182 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2200 | 222 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2700 | 272 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3300 | 332 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3900 | 392 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4700 | 472 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5600 | 562 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6800 | 682 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8200 | 822 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .010uF | 103 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .012 | 123 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .015 | 153 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .018 | 183 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .022 | 223 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .027 | 273 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .033 | 333 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .039 | 393 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .047 | 473 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .056 | 563 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .068 | 683 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .082 | 823 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .10 | 104 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .12 | 124 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .15 | 154 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .18 | 184 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .22 | 224 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .27 | 274 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .33 | 334 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .39 | 394 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .47 | 474 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .56 | 564 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .68 | 684 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| .82 | 824 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 | 105 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 | 125 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.5 | 155 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.8 | 185 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 225 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

FEATURES

1. Silver plated copper alloy terminal for easy soldering.
2. Mounting tabs are designed to minimize the effect of thermal stress introduced by the differences in coefficient of thermal expansion between the capacitor and the mounting surface.
3. Low ESR.
4. High current discharge capability.
5. Group A and B screening per MIL-PRF-49467 available .
6. Standard lead configuration is 'B'.(J) If lead configuration is left out of part number the lead style is assumed to be 'B'.

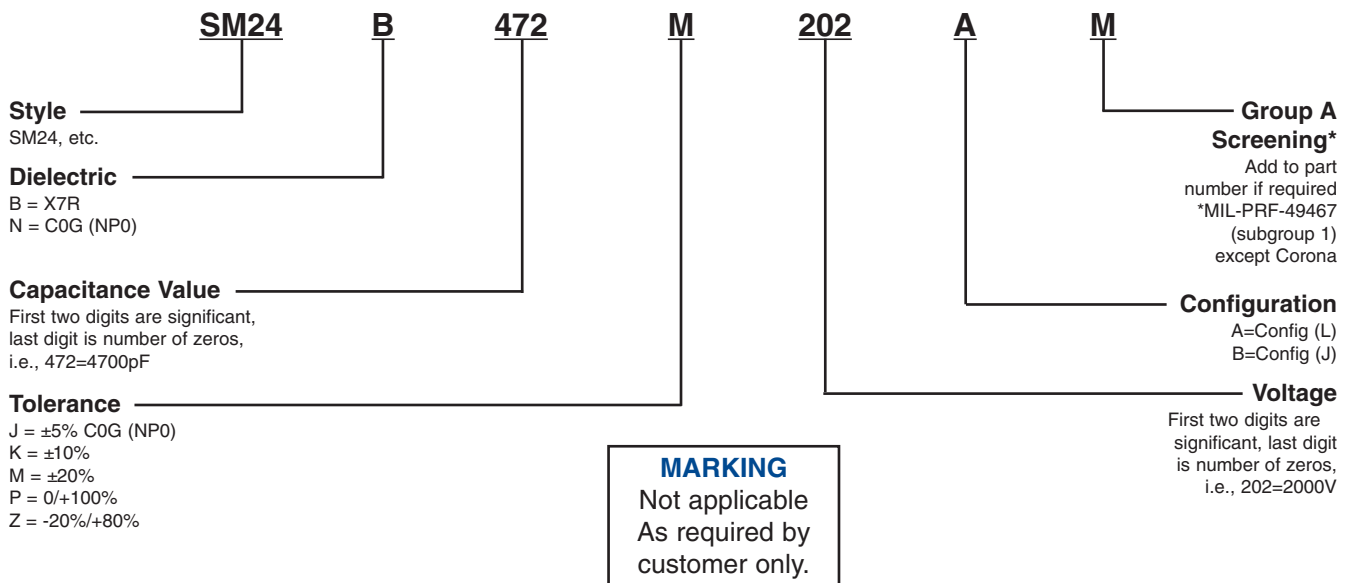
CAPACITOR OUTLINE DRAWING



DIMENSIONS

| Style | Length (L) Inches (mm) | Width (W) Inches (mm) | Thickness (T) max Inches (mm) | Tab (A) max Inches (mm) |
|-------|------------------------------------|-----------------------------------|----------------------------------|----------------------------|
| SM20 | .150 \pm .015 (3.81 \pm .38) | .150 \pm .015 (3.81 \pm .38) | .130 (3.30) | .100 (2.54) |
| SM21 | .200 \pm .020 (5.08 \pm .51) | .200 \pm .020 (5.08 \pm .51) | .180 (4.57) | .100 (2.54) |
| SM22 | .250 \pm .020 (6.35 \pm .51) | .200 \pm .020 (5.08 \pm .51) | .180 (4.57) | .100 (2.54) |
| SM23 | .350 \pm .030 (8.89 \pm .76) | .300 \pm .030 (7.62 \pm .76) | .220 (5.59) | .200 (5.08) |
| SM24 | .450 \pm .030 (11.43 \pm .76) | .400 \pm .030 (10.20 \pm .76) | .220 (5.59) | .300 (7.62) |
| SM25 | .550 \pm .030 (14.00 \pm .76) | .500 \pm .030 (12.70 \pm .76) | .220 (5.59) | .400 (10.2) |
| SM26 | .650 \pm .030 (16.50 \pm .76) | .600 \pm .030 (15.20 \pm .76) | .220 (5.59) | .500 (12.7) |
| SM30 | .300 \pm .030 (7.62 \pm .76) | .150 \pm .015 (3.81 \pm .38) | .140 (3.55) | .100 (2.54) |
| SM31 | .400 \pm .030 (10.20 \pm .76) | .200 \pm .020 (5.08 \pm .51) | .130 (3.30) | .100 (2.54) |
| SM33 | .700 \pm .030 (17.08 \pm .76) | .300 \pm .030 (7.62 \pm .76) | .180 (4.57) | .200 (5.08) |
| SM34 | .900 \pm .030 (22.90 \pm .76) | .400 \pm .030 (10.20 \pm .76) | .220 (5.59) | .300 (7.62) |
| SM35 | 1.100 \pm .030 (27.90 \pm .76) | .500 \pm .030 (12.70 \pm .76) | .220 (5.59) | .400 (10.2) |
| SM36 | 1.350 \pm .030 (33.00 \pm .76) | .600 \pm .030 (15.20 \pm .76) | .220 (5.59) | .500 (12.7) |

PART NUMBER AND ORDERING INFORMATION



X7R DIELECTRIC

| STYLE X7R | SM20 | SM21 | SM22 | SM23 | SM24 | SM25 | SM26 |
|-----------|----------------------|----------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| L | .150±.015 (3.81±.38) | .200±.020(5.08 ±.51) | .250 ±.020 (6.35 ±.51) | .350 ±.030 (8.89 ±.76) | .450 ±.030 (11.43 ±.76) | .550 ±.030 (14.00 ±.76) | .650 ±.030 (16.50 ±.76) |
| W | .150±.015 (3.81±.38) | .200±.020(5.08 ±.51) | .200 ±.020(5.08 ±.51) | .300 ±.030 (7.62 ±.76) | .400 ±.030 (10.20 ±.76) | .500 ±.030 (12.70 ±.76) | .600 ±.030 (15.20 ±.76) |
| T max | .130 (3.30) | .180 (4.57) | .180 (4.57) | .220 (5.59) | .220 (5.59) | .220 (5.59) | .220 (5.59) |
| Tab A max | .100 (2.54) | .100 (2.54) | .100 (2.54) | .200 (5.08) | .300 (7.62) | .400 (10.20) | .500 (12.70) |
| Cap Code | WVDC | WVDC | WVDC | WVDC | WVDC | WVDC | WVDC |
| Cap | pF | 500 1k 2k | 500 1k 2k 3k | 500 1k 2k 3k | 500 1k 2k 3k 4k | 500 1k 2k 3k 4k 5k | 500 1k 2k 3k 4k 5k |
| 270pF | 271 | | | | | | |
| 330 | 331 | | | | | | |
| 390 | 391 | | | | | | |
| 470 | 471 | | | | | | |
| 560 | 561 | | | | | | |
| 680 | 681 | | | | | | |
| 820 | 821 | | | | | | |
| 1000 | 102 | | | | | | |
| 1200 | 122 | | | | | | |
| 1500 | 152 | | | | | | |
| 1800 | 182 | | | | | | |
| 2200 | 222 | | | | | | |
| 2700 | 272 | | | | | | |
| 3300 | 332 | | | | | | |
| 3900 | 392 | | | | | | |
| 4700 | 472 | | | | | | |
| 5600 | 562 | | | | | | |
| 6800 | 682 | | | | | | |
| 8200 | 822 | | | | | | |
| .010uF | 103 | | | | | | |
| .012 | 123 | | | | | | |
| .015 | 153 | | | | | | |
| .018 | 183 | | | | | | |
| .022 | 223 | | | | | | |
| .027 | 273 | | | | | | |
| .033 | 333 | | | | | | |
| .039 | 393 | | | | | | |
| .047 | 473 | | | | | | |
| .056 | 563 | | | | | | |
| .068 | 683 | | | | | | |
| .082 | 823 | | | | | | |
| .10 | 104 | | | | | | |
| .12 | 124 | | | | | | |
| .15 | 154 | | | | | | |
| .18 | 184 | | | | | | |
| .22 | 224 | | | | | | |
| .27 | 274 | | | | | | |
| .33 | 334 | | | | | | |
| .39 | 394 | | | | | | |
| .47 | 474 | | | | | | |
| .56 | 564 | | | | | | |
| .68 | 684 | | | | | | |
| .82 | 824 | | | | | | |
| 1.0 | 105 | | | | | | |
| 1.2 | 125 | | | | | | |
| 1.5 | 155 | | | | | | |
| 1.8 | 185 | | | | | | |
| 2.2 | 225 | | | | | | |
| 2.7 | 275 | | | | | | |

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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