



# Defense and Aerospace

**KEMET**  
CHARGED.™

## Ceramic High Voltage, High Temperature Capacitors

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## 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 |
|---------------------------------------------------|------------------|--------------|
| <b>MILITARY &amp; AEROSPACE</b>                   |                  |              |
| Avionics                                          | X                | X            |
| Radar Systems                                     | X                | X            |
| Telemetry, Data Tx/Rx                             |                  | X            |
| Control Systems                                   | X                |              |
| <b>MEDICAL</b>                                    |                  |              |
| .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            |
| <b>SEMICONDUCTOR</b>                              |                  |              |
| RF Tuning Networks                                |                  | X            |
| RF Power Supplies                                 |                  | X            |
| Semiconductor Manufacturing                       | X                |              |
| <b>SECURITY</b>                                   |                  |              |
| Handheld Scanners                                 |                  | X            |
| Intruder Detection Systems                        |                  | X            |
| Luggage Scanners                                  |                  | X            |
| Metal/Explosive Detector                          |                  | X            |
| <b>OTHER</b>                                      |                  |              |
| 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            |
| <b>POWER SUPPLY</b>                               |                  |              |
| HV Power Supply                                   | X                | X            |
| Power Station Equipment                           |                  | X            |
| Power Supply for Air Conditioner, Washing Machine |                  | X            |
| Inverter Power Supply-AC                          | X                |              |
| <b>TELECOM</b>                                    |                  |              |
| Base Station Power amps                           |                  | X            |
| Broadcasting Equipment                            |                  | X            |
| <b>MODEM</b>                                      |                  |              |
| DAA Modem                                         |                  | X            |
| xDSL Modem                                        |                  | X            |
| LAN, Router, HUB, Switches                        |                  | X            |
| RF Power Amplifiers                               |                  | X            |
| <b>INDUSTRIAL</b>                                 |                  |              |
| Oil Rigging, Down Hole, Mining                    | X                | X            |

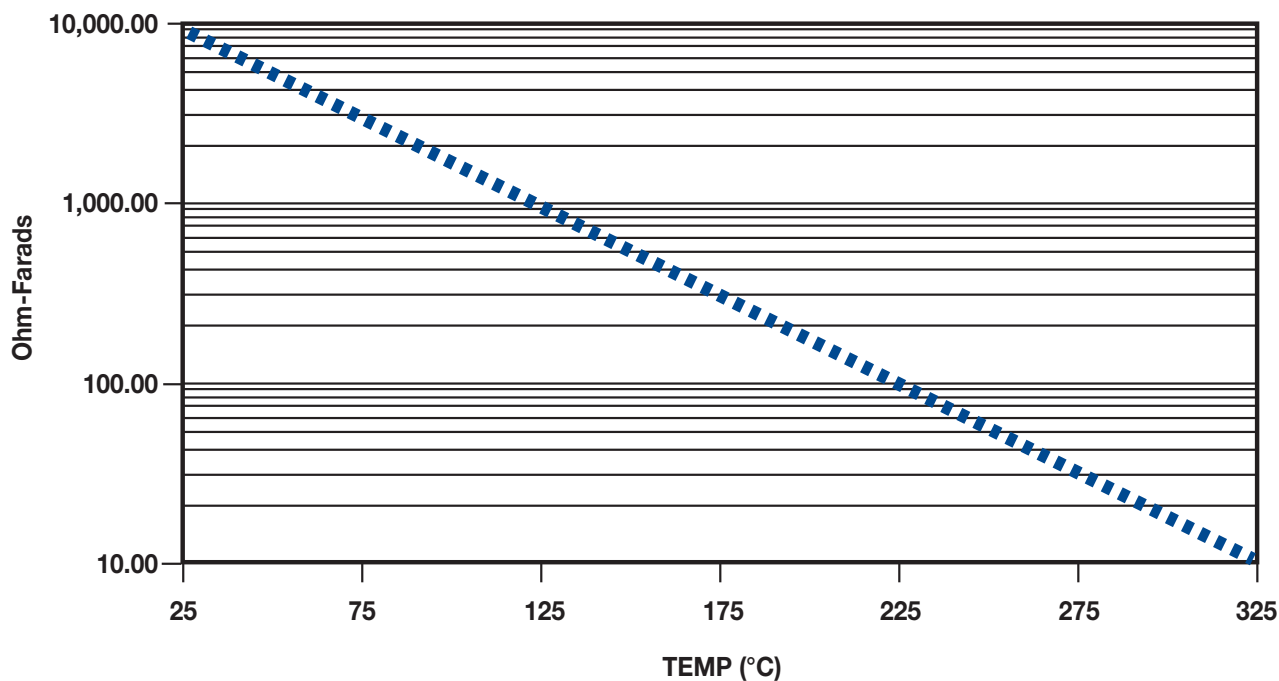
|                            | ELECTRICAL                                   |                                                                 |                                                  | ENVIRONMENTAL                                     | MECHANICAL              |
|----------------------------|----------------------------------------------|--------------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

## HIGH TEMPERATURE

|                             |                 |                                             |                                         |                  |              |
|-----------------------------|-----------------|---------------------------------------------|-----------------------------------------|------------------|--------------|
| Hi Temp (HT/HP)             | 100 to 200 VDC  | C0G: 22 pF-.100 μF<br>X7R:1000 pF-1.0μF     | C0G 0.15%<br>X7R Type 2.0%<br>X7R 2.50% | -55°C to + 200°C | Axial/Radial |
| Hi Temp Hi Volt (HV)        | 500 to 4000 VDC | C0G: 390 pF-.015 μF<br>X7R:1400 pF- .270 μF | C0G 0.15%<br>X7R Type 2.0%<br>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<br>X7R:100 pF- 6.8 μF   | C0G 0.15%<br>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<br>X7R:100 pF- 3.3 μF   | C0G 0.15%<br>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<br>X7R:100 pF- 3.3 μF   | C0G 0.15%<br>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<br>X7R:330 pF-1.2μF      | C0G 0.15%<br>X7R 2.50%                  | -55°C to + 200°C | Radial       |

**DIELECTRIC COMPARISONS**

| Features                                   | Ultra Stable      | Semi-Stable<br>High Voltage | Semi-Stable<br>Hi-Temp | Temp/Volt<br>Dependent |
|--------------------------------------------|-------------------|-----------------------------|------------------------|------------------------|
| Dielectric Type                            | C0G (NPO)         | X7R                         | X7R type               | X5U                    |
| Temperature Coefficient                    | 0 $\pm$ 30ppm/°C  | $\pm$ 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<br>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

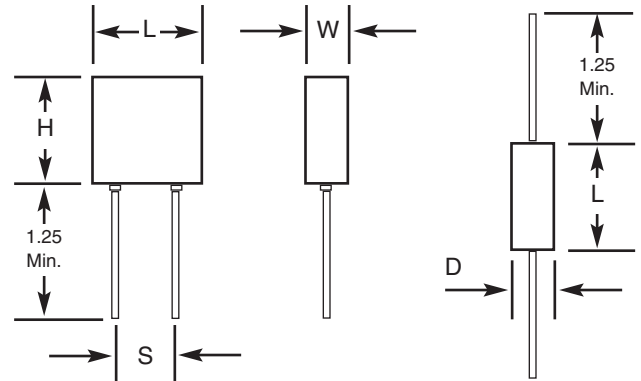
- Down Hole
- Industrial
- Harsh Environments

**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

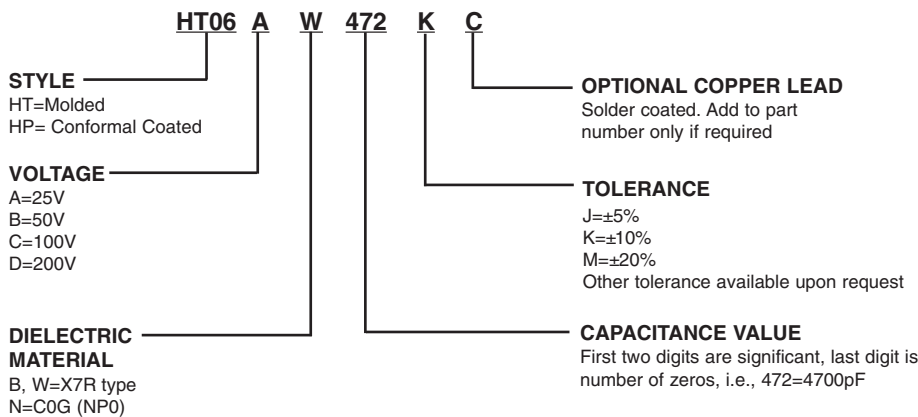
Molded (HT) and Conformal Coated (HP), Radial Lead Types

| Style | Sizes in Inches (mm) max |              |               | Lead Spacing<br>±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 |           | C0G         |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
|--------|-----------|-------------|-----|-------------|------|-------------|-----|--------------|-----|--------------|------|-----|-----|------|-----|-----|
| Series |           | HT/HP05     |     | HT/HP55     |      | HT/HP06     |     | HT/HP08      |     | HT/HP09      |      |     |     |      |     |     |
|        | 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) |      |     |     |      |     |     |
|        | 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) |      |     |     |      |     |     |
|        | Lead Dia. | .025 (.635) |     | .025 (.635) |      | .025 (.635) |     | .025 (.635)  |     | .025 (.635)  |      |     |     |      |     |     |
| Cap    | Cap Code  | VVDC        |     |             | VVDC |             |     | VVDC         |     |              | VVDC |     |     | VVDC |     |     |
|        |           | 50          | 100 | 200         | 50   | 100         | 200 | 50           | 100 | 200          | 50   | 100 | 200 | 50   | 100 | 200 |
| 1.0pF  | 109       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 1.2    | 129       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 1.5    | 159       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 1.8    | 189       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 2.2    | 229       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 2.7    | 279       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 3.3    | 339       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 3.9    | 399       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 4.7    | 479       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 5.6    | 569       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 6.8    | 689       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 8.2    | 829       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |
| 10     | 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       |             |     |             |      |             |     |              |     |              |      |     |     |      |     |     |



## COG & X7R DIELECTRIC

| Radial |           | C0G         |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
|--------|-----------|-------------|-----|-----|-------------|-----|-----|-------------|-----|-----|--------------|-----|-----|--------------|-----|-----|
| Series |           | HT/HP05     |     |     | HT/HP55     |     |     | HT/HP06     |     |     | HT/HP08      |     |     | HT/HP09      |     |     |
|        | 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) |     |     |
|        | 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)  |     |     |
|        | Lead Dia. | .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       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 1.2    | 129       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 1.5    | 159       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 1.8    | 189       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 2.2    | 229       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 2.7    | 279       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 3.3    | 339       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 3.9    | 399       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 4.7    | 479       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 5.6    | 569       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 6.8    | 689       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 8.2    | 829       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 10     | 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       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |

| Radial |           | X7R         |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
|--------|-----------|-------------|-----|-----|-------------|-----|-----|-------------|-----|-----|--------------|-----|-----|--------------|-----|-----|
| Series |           | HT/HP05     |     |     | HT/HP55     |     |     | HT/HP06     |     |     | HT/HP08      |     |     | HT/HP09      |     |     |
|        | 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) |     |     |
|        | 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)  |     |     |
|        | Lead Dia. | .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 |
| 100pF  | 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       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| .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       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 3.3    | 335       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 3.9    | 395       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |
| 4.7    | 475       |             |     |     |             |     |     |             |     |     |              |     |     |              |     |     |

## FEATURES

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

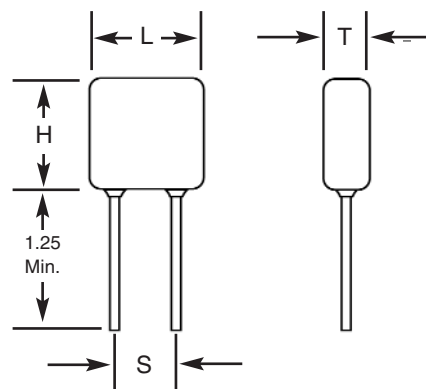
To be used in robust applications

- Down Hole
- Industrial
- Harsh Environments

### NOTE:

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

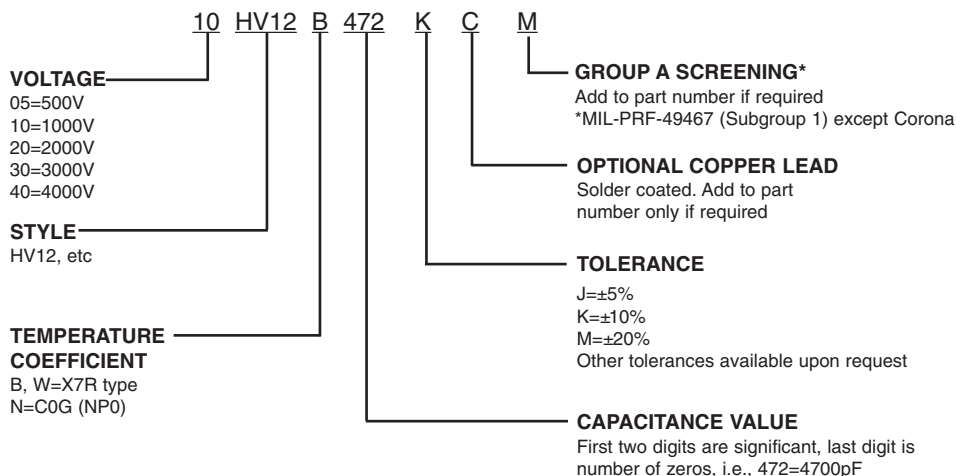
## CAPACITOR OUTLINE DRAWING



## DIMENSIONS

| Style | Sizes in Inches (mm) max. |              |               | Lead Spacing<br>±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

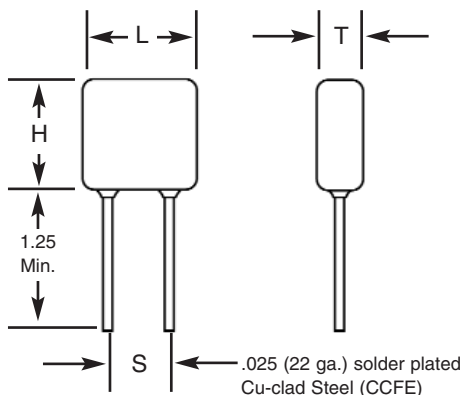
(HV10, HV11)  
 472M  
 KEC  
 Date Code

(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.<br>+.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                      |             |    |    |             |    |    |    |              |    |    |    |              |    |    |    |              |    |    |    |    |              |    |    |    |    |              |    |    |    |    |

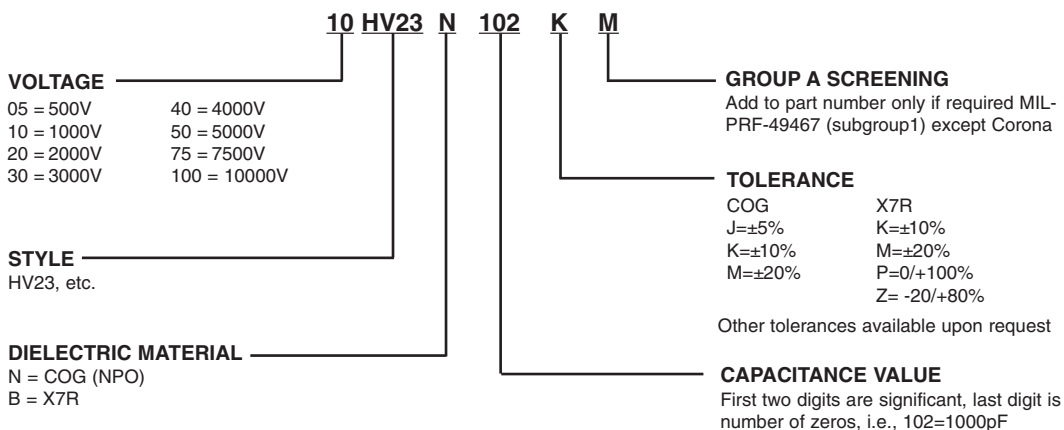
## CAPACITOR OUTLINE DRAWING



## DIMENSIONS

| Style | Sizes in Inches (mm) max. |              |               | Lead Spacing<br>±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         |

## COG DIELECTRIC

| STYLE  | COG                     | HV20         |    |    |    | HV21         |    |    |    | HV22         |    |    |    | HV23         |    |    |    |    | HV24         |    |    |    |    | HV25         |     |    |    |    | HV26         |    |     |    |    |    |    |    |  |
|--------|-------------------------|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|--------------|----|----|----|----|--------------|----|----|----|----|--------------|-----|----|----|----|--------------|----|-----|----|----|----|----|----|--|
| 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.<br>±.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 | 3k | 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 | 500 | 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                     |              |    |    |    |              |    |    |    |              |    |    |    |              |    |    |    |    |              |    |    |    |    |              |     |    |    |    |              |    |     |    |    |    |    |    |  |
| .082   | 823                     |              |    |    |    |              |    |    |    |              |    |    |    |              |    |    |    |    |              |    |    |    |    |              |     |    |    |    |              |    |     |    |    |    |    |    |  |
| .10    | 104                     |              |    |    |    |              |    |    |    |              |    |    |    |              |    |    |    |    |              |    |    |    |    |              |     |    |    |    |              |    |     |    |    |    |    |    |  |

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## X7R DIELECTRIC

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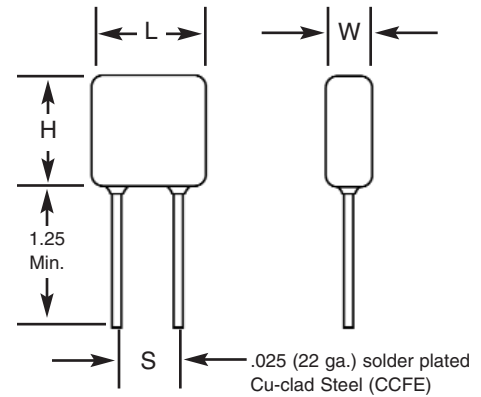


[illegible]

## 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.

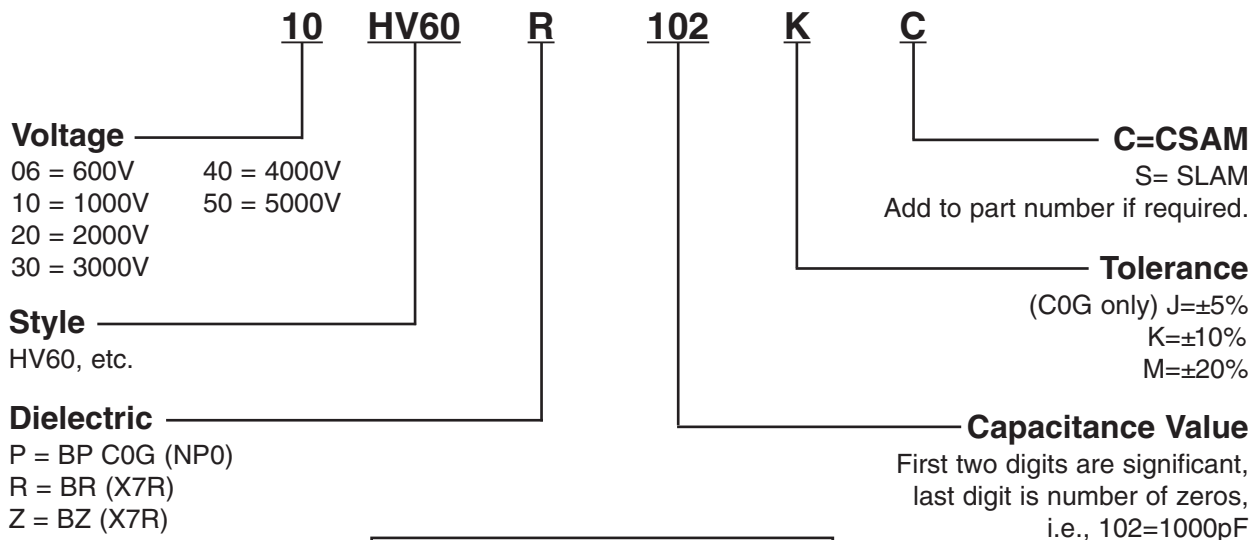
## CAPACITOR OUTLINE DRAWING



## DIMENSIONS

| Style | Sizes in Inches (mm) max. |              |               | Lead Spacing<br>±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         |

[illegible]

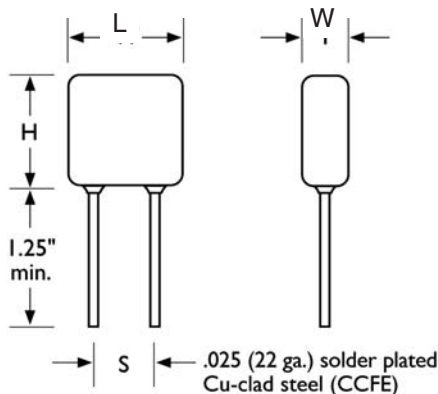
**X7R DIELECTRIC**

| STYLE <b>X7R</b>       | HV60        | HV61         | HV62         | HV63            | HV64               | HV65           | HV66           | HV68          | HV69          |
|------------------------|-------------|--------------|--------------|-----------------|--------------------|----------------|----------------|---------------|---------------|
| W max                  | .250 (6.35) | .320 (8.13)  | .370 (9.40)  | .470 (11.94)    | .570 (14.48)       | .670 (17.02)   | .770 (19.56)   | 1.300 (33.02) | 1.500 (38.10) |
| L max                  | .220 (5.59) | .280 (7.11)  | .300 (7.62)  | .400 (10.16)    | .500 (12.70)       | .600 (15.24)   | .720 (18.29)   | .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)    | .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)   | 1.175 (29.84) | 1.375 (34.92) |
| Lead Dia. ±.004/-0.002 | .025 (.635) | .025 (.635)  | .025 (.635)  | .025 (.635)     | .025 (.635)        | .025 (.635)    | .025 (.635)    | .025 (.635)   | .025 (.635)   |
| Cap Code               | WVDC        | WVDC         | WVDC         | WVDC            | WVDC               | WVDC           | WVDC           | WVDC          | WVDC          |
| pF                     | 600 1k 2k   | 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      | 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         |              |              |                 |                    |                |                |               |               |

## 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<br>±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

**VOLTAGE** 10 **HS24** **B** 103 **K** **C** **F**

05 = 500V      40 = 4000V  
 10 = 1000V    50 = 5000V  
 20 = 2000V    75 = 7500V  
 30 = 3000V    100 = 10,000V

**STYLE** \_\_\_\_\_  
 HS24, etc.

**DIELECTRIC** \_\_\_\_\_  
 B = X7R  
 N = BP C0G (NP0)

**CAPACITANCE VALUE** \_\_\_\_\_  
 First two digits are significant,  
 last digit is number of zeros,  
 i.e., 103=10000pF

**INERT LIQUID (BURN-IN)**  
 Std. for ≥2kV;  
 Add "F" if required  
 for 500V or 1kV parts

**C=CSAM**  
**S=SLAM**  
 Add to part number if  
 required.

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

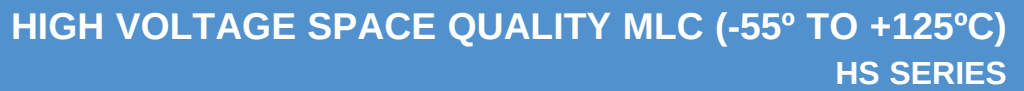
## MARKING

| (HS20, HV21) | (All Other Sizes) |
|--------------|-------------------|
| 103K         | HS24B103K         |
| 1 kV         | 1 kV              |
| KEC          | KEC               |
| Date Code    | Date Code         |

**COG DIELECTRIC**

| STYLE  | COG                   | 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 | 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                   |             |    |    |             |    |    |             |    |    |              |    |    |    |              |    |    |    |    |              |     |    |    |    |              |    |     |    |    |    |    |    |

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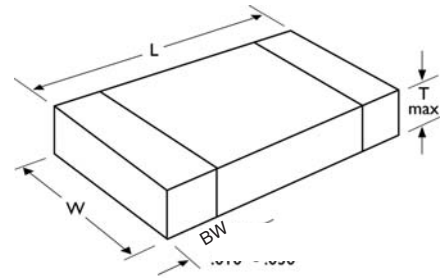


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## FEATURES

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

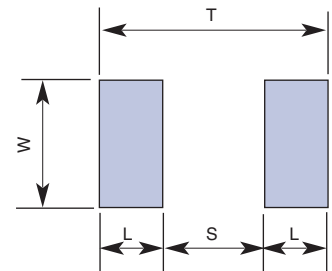


## DIMENSIONS

| Style | Length (L)<br>Inches (mm) | Width (W)<br>Inches (mm) | Thickness (T) max<br>Inches (mm) | Bandwidth (BW)<br>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**

**Style**  
1515, 2020, etc.

**Dielectric**  
B or R = X7R  
N = COG (NP0)

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

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

**B**

**472**

**M**

**202**

**P**

**M**

**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/SnPb 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

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## COG DIELECTRIC

[illegible]

### X7R DIELECTRIC

| STYLE X7R |            | 1515                   |    |    | 1812                     |    |    | 1825                  |    |    |    | 2020                  |    |    |    | 2225                 |    |    |    | 2520                  |    |    |    | 3333                 |    |    |    | 3530                 |    |    |    |    |
|-----------|------------|------------------------|----|----|--------------------------|----|----|-----------------------|----|----|----|-----------------------|----|----|----|----------------------|----|----|----|-----------------------|----|----|----|----------------------|----|----|----|----------------------|----|----|----|----|
|           | L          | .150±.015 (3.81 ± .38) |    |    | .180 ±.020(4.57 ±.51)    |    |    | .180 ±.020(4.57 ±.51) |    |    |    | .200 ±.020(5.08 ±.51) |    |    |    | .220 ±.020(5.59±.51) |    |    |    | .250 ±.020(6.35±.51)  |    |    |    | .330 ±.030(8.38±.76) |    |    |    | .350 ±.030(8.89±.76) |    |    |    |    |
|           | W          | .150±.015 (3.81 ± .38) |    |    | .120 ± .015 (3.05 ± .38) |    |    | .250 ±.020(6.35±.51)  |    |    |    | .200 ±.020(5.08 ±.51) |    |    |    | .250 ±.020(6.35±.51) |    |    |    | .200 ±.020(5.08 ±.51) |    |    |    | .330 ±.030(8.38±.76) |    |    |    | .300 ±.030(7.62±.76) |    |    |    |    |
|           | T max      | .140 (3.55)            |    |    | .100 (2.54)              |    |    | .160 (4.07)           |    |    |    | .180 (3.55)           |    |    |    | .200 (5.08)          |    |    |    | .180 (3.55)           |    |    |    | .220 (5.59)          |    |    |    | .220 (5.59)          |    |    |    |    |
|           | Band Width | .010 - .030"           |    |    | .010 - .040"             |    |    | .010 - .040"          |    |    |    | .010 - .040"          |    |    |    | .010 - .040"         |    |    |    | .030 - .060"          |    |    |    | .030 - .060"         |    |    |    | .030 - .060"         |    |    |    |    |
| Cap       | Cap Code   | WVDC                   |    |    | WVDC                     |    |    | WVDC                  |    |    |    | WVDC                  |    |    |    | WVDC                 |    |    |    | WVDC                  |    |    |    | WVDC                 |    |    |    | WVDC                 |    |    |    |    |
|           | pF         | 500                    | 1k | 2k | 500                      | 1k | 2k | 500                   | 1k | 2k | 3k | 500                   | 1k | 2k | 3k | 500                  | 1k | 2k | 3k | 500                   | 1k | 2k | 3k | 500                  | 1k | 2k | 3k | 500                  | 1k | 2k | 3k | 4k |
| 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        |                        |    |    |                          |    |    |                       |    |    |    |                       |    |    |    |                      |    |    |    |                       |    |    |    |                      |    |    |    |                      |    |    |    |    |

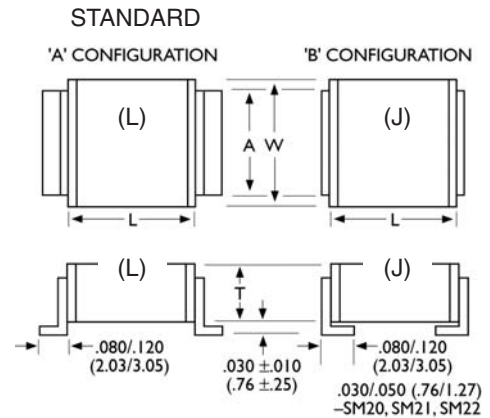
### X7R DIELECTRIC

| 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  | 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 |
| 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        |                       |    |    |    |    |                       |    |    |    |    |                       |     |    |    |    |                       |     |    |    |    |                       |    |     |    |    |    |    |    |

## 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'.

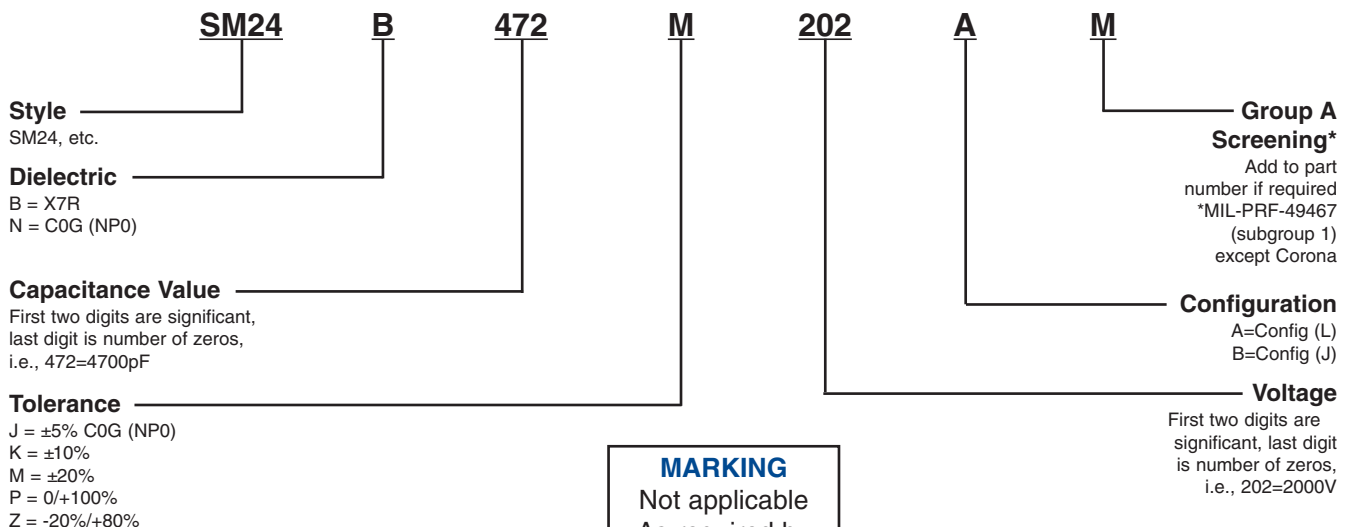
## CAPACITOR OUTLINE DRAWING



## DIMENSIONS

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

## PART NUMBER AND ORDERING INFORMATION



| STYLE |           | COG                  | SM20 |    |     |                      | SM21 |    |     |                          | SM22 |    |     |                        | SM23 |    |    |     |                         | SM24 |    |    |    |                         | SM25 |    |    |    |                         | SM26 |    |    |    |    |    |
|-------|-----------|----------------------|------|----|-----|----------------------|------|----|-----|--------------------------|------|----|-----|------------------------|------|----|----|-----|-------------------------|------|----|----|----|-------------------------|------|----|----|----|-------------------------|------|----|----|----|----|----|
| Cap   | L         | .150±.015(3.31 ±.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(3.31 ±.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                    |      |    |    |    |    |    |
| pF    | 500       | 1k                   | 2k   | 3k | 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                      | 500  | 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       |                      |      |    |     |                      |      |    |     |                          |      |    |     |                        |      |    |    |     |                         |      |    |    |    |                         |      |    |    |    |                         |      |    |    |    |    |    |



[illegible]

### X7R DIELECTRIC

| STYLE  | X7R       | SM20                 | SM21                 | SM22                   | SM23                   | SM24                    | SM25                    | SM26                    |
|--------|-----------|----------------------|----------------------|------------------------|------------------------|-------------------------|-------------------------|-------------------------|
| Cap    | 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                    |
|        | 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      | 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       |                      |                      |                        |                        |                         |                         |                         |

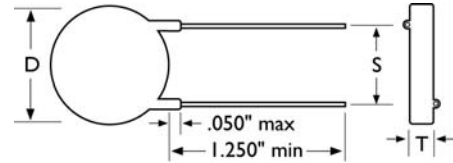
**X7R DIELECTRIC**

| STYLE <b>X7R</b> | SM30                   | SM31                   | SM33                    | SM34                      | SM35                      | SM36                        |
|------------------|------------------------|------------------------|-------------------------|---------------------------|---------------------------|-----------------------------|
| L                | .300 ±.030 (7.62±.76)  | .400 ±.030(10.20 ±.76) | .700 ±.030 (17.08 ±.76) | .900 ±.030 (22.90 ±.76)   | 1.100 ±.030 (27.90 ±.76)  | 1.350 ±.030 (33.00 ±.76)    |
| W                | .150 ±.015 (3.31 ±.38) | .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            | .140 (3.55)            | .130 (3.30)            | .180 (4.57)             | .220 (5.59)               | .220 (5.59)               | .220 (5.59)                 |
| Tab A max        | .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                        |
| Cap pF           | 500 1k 2k 3k 4k        | 500 1k 2k 3k 4k 5k     | 500 1k 2k 3k 4k 5k 7k   | 500 1k 2k 3k 4k 5k 7k 10k | 500 1k 2k 3k 4k 5k 7k 10k | 500 1k 2k 3k 4k 5k 7.5k 10k |
| 150p             | 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                    |                        |                         |                           |                           |                             |
| .010u            | 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                    |                        |                         |                           |                           |                             |
| 3.3              | 335                    |                        |                         |                           |                           |                             |
| 3.9              | 395                    |                        |                         |                           |                           |                             |
| 4.7              | 475                    |                        |                         |                           |                           |                             |
| 5.6              | 565                    |                        |                         |                           |                           |                             |

## FEATURES

Disc ceramic capacitors made under strict quality control procedures are a reliable component. Special attention is given to the ceramic pressing operation to assure high and uniform ceramic density. These parts are manufactured for the quality conscious customer. Parts are available screened to MIL-PRF-49467 established reliability specification.

## CAPACITOR OUTLINE DRAWING



## INSTALLATION

Higher-voltage parts may require further encapsulation to prevent surface breakdown. Parts should be cleaned and oven dried at 85°C before further encapsulation. Silicone rubbers or an epoxy may be used. De-airing of encapsulants is recommended. We recommend that a heat sink be attached to the lead between the soldering iron and the capacitor during installation soldering. Testing of higher-voltage parts before encapsulation may be done in a suitable dielectric fluid such as Freon.

## DIELECTRIC COMPARISON

| CERAMIC TYPE                                | C0G (NP0)                                              | X7R                                                    | X5U                                                    |
|---------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Dissipation Factor                          | 0.1%                                                   | 2.5%                                                   | 2.5%                                                   |
| Temperature Coefficient                     | ±30ppm/°C                                              | ±15%                                                   | +22% -56%                                              |
| Voltage Coefficient                         | 0                                                      | -20%                                                   | N/A                                                    |
| Dielectric Withstanding Voltage Test        | 3 to 15kV at 1.5x rated,<br>20 to 50kV at rated +10kV  | 3 to 15kV at 1.5x rated,<br>20 to 50kV at rated +10kV  | 3 to 15kV at 1.5x rated,<br>20 to 50kV at rated +10kV  |
| Insulation Resistance (25°C)                | 100k megohms or<br>1k megohms-μF,<br>whichever is less | 100k megohms or<br>1k megohms-μF,<br>whichever is less | 10k megohms or<br>100 megohms-μF,<br>whichever is less |
| Operating Temperature Range (rated voltage) | -55°C to +125°C                                        | -55°C to +125°C                                        | -55°C to +85°C                                         |

**Thickness:**  
**Inches (mm) max.**  
 3kV = 0.15 (3.81)  
 5kV = 0.20 (5.08)  
 7.5kV = 0.28 (7.11)  
 10kV = 0.35 (8.89)  
 15kV = 0.45 (11.43)  
 20kV = 0.55 (13.97)  
 30kV = 0.95 (24.13)  
 40kV = 1.20 (30.48)  
 50kV = 1.50 (38.10)

**Lead Type:** Solder plated, copper-clad steel (CCFE)-  
 D30, D40: 0.025" (22GA)  
 D50 & Larger: 0.032" (20GA)

## PART NUMBER AND ORDERING INFORMATION

**30**  
**Voltage**  
 30 = 3000V  
 100 = 10,000V  
 etc.

**D50**  
**Style**  
 D50, etc.

**W**  
**Dielectric**  
 N = C0G (NP0)  
 W = X7R  
 Y = X5U

**122**  
**Capacitance Value**  
 First two digits are significant,  
 last digit is number of zeroes,  
 i.e., 472=4700pF

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

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

**Q**  
**No Leads**  
 Add to part number if required

**MARKING**

| (D30)     | (All Other Sizes) |
|-----------|-------------------|
| 301M      | D50W122M          |
| 3kV       | 3kV               |
| KEC       | KEC               |
| Date Code | Date Code         |

## 3K VDC

| Disc Style | D Max. | S ±.030 | COG (NP0) |       | X7R    |        | X5U     |         |
|------------|--------|---------|-----------|-------|--------|--------|---------|---------|
|            |        |         | Min.      | Max.  | Min.   | Max.   | Min.    | Max.    |
| D30        | .30    | .250    | 7.8pF     | 9.6pF | 250pF  | 300pF  | 520pF   | 700pF   |
| D40        | .40    | .250    | 20pF      | 25pF  | 630pF  | 770pF  | 1300pF  | 1800pF  |
| D50        | .50    | .375    | 36pF      | 44pF  | 1100pF | 1400pF | 2400pF  | 3200pF  |
| D75        | .75    | .375    | 80pF      | 98pF  | 2500pF | 3100pF | 5300pF  | 7200pF  |
| D90        | .90    | .500    | 123pF     | 150pF | 3800pF | 4700pF | 8200pF  | 11000pF |
| D100       | 1.00   | .500    | 145pF     | 178pF | 4600pF | 5600pF | 9700pF  | 13000pF |
| D120       | 1.20   | .500    | 193pF     | 236pF | 6000pF | 7400pF | 12900pF | 17300pF |

## 5K VDC

|      |      |      |       |       |        |        |        |         |
|------|------|------|-------|-------|--------|--------|--------|---------|
| D30  | .30  | .250 | 4.7pF | 5.7pF | 150pF  | 180pF  | 310pF  | 420pF   |
| D40  | .40  | .250 | 12pF  | 15pF  | 380pF  | 460pF  | 810pF  | 1100pF  |
| D50  | .50  | .375 | 21pF  | 26pF  | 670pF  | 820pF  | 1400pF | 1900pF  |
| D75  | .75  | .375 | 48pF  | 59pF  | 1500pF | 1800pF | 3200pF | 4300pF  |
| D90  | .90  | .500 | 74pF  | 90pF  | 2300pF | 2800pF | 4900pF | 6600pF  |
| D100 | 1.00 | .500 | 87pF  | 107pF | 2700pF | 3300pF | 5800pF | 7800pF  |
| D120 | 1.20 | .500 | 116pF | 141pF | 3600pF | 4400pF | 7700pF | 10400pF |

## 7.5K VDC

|      |      |      |       |       |        |        |        |        |
|------|------|------|-------|-------|--------|--------|--------|--------|
| D30  | .30  | .250 | 3.1pF | 3.8pF | 100pF  | 120pF  | 210pF  | 280pF  |
| D40  | .40  | .250 | 8.1pF | 9.9pF | 250pF  | 310pF  | 540pF  | 720pF  |
| D50  | .50  | .375 | 14pF  | 17pF  | 450pF  | 550pF  | 950pF  | 1300pF |
| D75  | .75  | .375 | 32pF  | 39pF  | 1000pF | 1200pF | 2100pF | 2900pF |
| D90  | .90  | .500 | 49pF  | 60pF  | 1500pF | 1900pF | 3300pF | 4400pF |
| D100 | 1.00 | .500 | 58pF  | 71pF  | 1800pF | 2200pF | 3900pF | 5200pF |
| D120 | 1.20 | .500 | 77pF  | 94pF  | 2400pF | 3000pF | 5100pF | 6900pF |

## 10K VDC

|      |      |      |        |        |        |        |        |        |
|------|------|------|--------|--------|--------|--------|--------|--------|
| D30  | .30  | .250 | 2.4pF  | 2.9pF  | 70pF   | 90pF   | 160pF  | 210pF  |
| D40  | .40  | .250 | 6.1pF  | 7.4pF  | 190pF  | 230pF  | 400pF  | 540pF  |
| D50  | .50  | .375 | 10.7pF | 13.1pF | 330pF  | 410pF  | 710pF  | 960pF  |
| D75  | .75  | .375 | 24pF   | 29pF   | 750pF  | 920pF  | 1600pF | 2200pF |
| D90  | .90  | .500 | 37pF   | 45pF   | 1200pF | 1400pF | 2500pF | 3300pF |
| D100 | 1.00 | .500 | 44pF   | 53pF   | 1400pF | 1700pF | 2900pF | 3900pF |
| D120 | 1.20 | .500 | 58pF   | 71pF   | 1800pF | 2200pF | 3900pF | 5200pF |

## 15K VDC

|      |      |      |       |       |        |        |        |        |
|------|------|------|-------|-------|--------|--------|--------|--------|
| D30  | .30  | .250 | 1.6pF | 1.9pF | 50pF   | 60pF   | 100pF  | 140pF  |
| D40  | .40  | .250 | 4.0pF | 4.9pF | 130pF  | 150pF  | 270pF  | 360pF  |
| D50  | .50  | .375 | 7.1pF | 8.7pF | 220pF  | 270pF  | 480pF  | 640pF  |
| D75  | .75  | .375 | 16pF  | 20pF  | 500pF  | 610pF  | 1100pF | 1400pF |
| D90  | .90  | .500 | 25pF  | 30pF  | 770pF  | 940pF  | 1600pF | 2200pF |
| D100 | 1.00 | .500 | 29pF  | 36pF  | 910pF  | 1100pF | 1900pF | 2600pF |
| D120 | 1.20 | .500 | 39pF  | 47pF  | 1200pF | 1500pF | 2600pF | 3500pF |

## 20K VDC

|      |      |      |       |       |       |        |        |        |
|------|------|------|-------|-------|-------|--------|--------|--------|
| D30  | .30  | .250 | 1.2pF | 1.4pF | 37pF  | 45pF   | 80pF   | 110pF  |
| D40  | .40  | .250 | 3.0pF | 3.7pF | 100pF | 120pF  | 200pF  | 270pF  |
| D50  | .50  | .375 | 5.3pF | 6.5pF | 170pF | 200pF  | 360pF  | 480pF  |
| D75  | .75  | .375 | 12pF  | 15pF  | 380pF | 460pF  | 800pF  | 1100pF |
| D90  | .90  | .500 | 18pF  | 22pF  | 580pF | 700pF  | 1200pF | 1600pF |
| D100 | 1.00 | .500 | 22pF  | 27pF  | 680pF | 830pF  | 1500pF | 2000pF |
| D120 | 1.20 | .500 | 29pF  | 35pF  | 910pF | 1100pF | 1900pF | 2600pF |

## 30K, 40K & 50K VDC

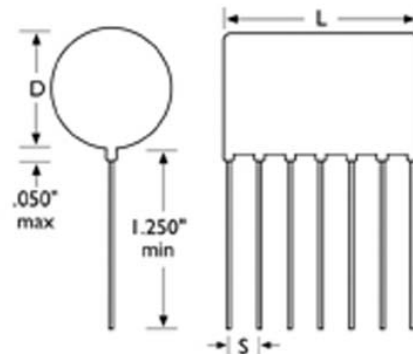
| Disc Style | D Max. | S ±.030 | 30kVDC X7R |       | 40kVDC X7R |       | 50kVDC X7R |       |
|------------|--------|---------|------------|-------|------------|-------|------------|-------|
|            |        |         | Min.       | Max.  | Min.       | Max.  | Min.       | Max.  |
| D30        | .30    | .250    | 20pF       | 30pF  | 18pF       | 22pF  | 10pF       | 20pF  |
| D40        | .40    | .250    | 60pF       | 80pF  | 50pF       | 60pF  | 40pF       | 50pF  |
| D50        | .50    | .375    | 110pF      | 140pF | 80pF       | 100pF | 70pF       | 80pF  |
| D75        | .75    | .375    | 250pF      | 310pF | 190pF      | 230pF | 150pF      | 180pF |
| D90        | .90    | .500    | 380pF      | 470pF | 290pF      | 350pF | 230pF      | 280pF |
| D100       | 1.00   | .500    | 460pF      | 560pF | 340pF      | 420pF | 270pF      | 330pF |
| D120       | 1.20   | .500    | 600pF      | 740pF | 450pF      | 550pF | 360pF      | 440pF |

## FEATURES

1. Special lead configurations available.
2. Custom designs are available upon request.

D dimension - See previous page for capacitance/voltage desired and resulting diameter.

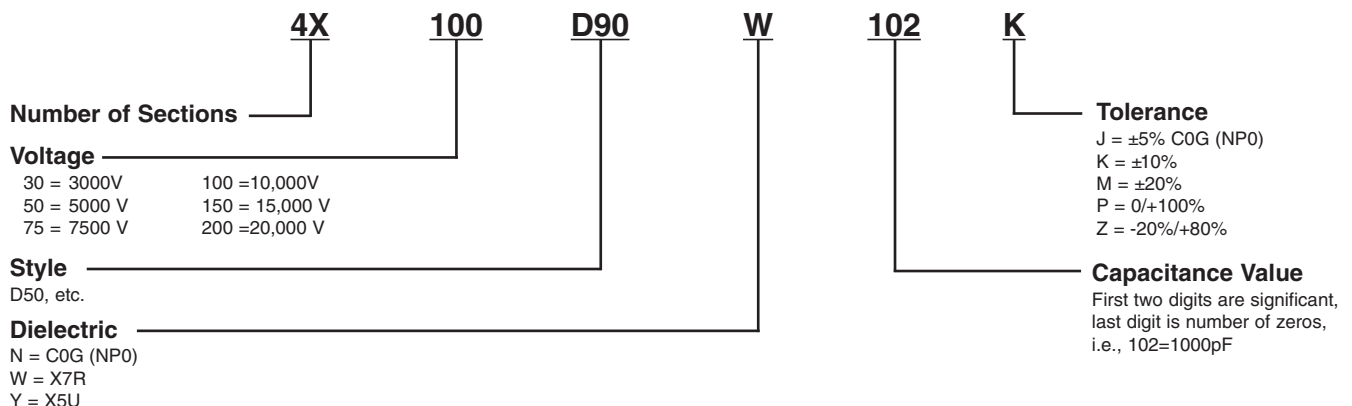
## CAPACITOR OUTLINE DRAWING



## L DIMENSION INCHES (MM) MAX.

| Number of Selections | Voltage per Section |              |              |              |              |
|----------------------|---------------------|--------------|--------------|--------------|--------------|
|                      | 5k VDC              | 7.5k VDC     | 10k VDC      | 15k VDC      | 20k VDC      |
| 2                    | .40 (10.16)         | .50 (12.70)  | .60 (15.24)  | .90 (22.86)  | 1.00 (25.40) |
| 3                    | .55 (13.97)         | .70 (17.78)  | .85 (21.59)  | 1.15 (29.21) | 1.55 (39.07) |
| 4                    | .70 (17.78)         | .85 (21.59)  | 1.10 (27.94) | 1.45 (36.83) | 1.90 (48.26) |
| 5                    | .80 (20.32)         | 1.10 (27.94) | 1.30 (33.02) | 1.80 (45.72) | 2.30 (58.42) |
| 6                    | .95 (24.13)         | 1.30 (33.02) | 1.55 (39.07) | 2.15 (54.61) | 2.75 (69.85) |
| S ±0.030 (±.76)      | .13 (3.30)          | .18 (4.57)   | .23 (5.84)   | .33 (8.35)   | .43 (10.92)  |

## PART NUMBER AND ORDERING INFORMATION



## MARKING

| (D30)     | (All Other Sizes) |
|-----------|-------------------|
| 301M      | 4XD50W122M        |
| 3kV       | 3kV               |
| KEC       | KEC               |
| Date Code | Date Code         |