



Defense and Aerospace

KEMET
CHARGED.™

Ceramic High Voltage, High Temperature Capacitors

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High Voltage Conformally Coated Radial	HV	10-14
High Voltage MIL-PRF-49467 (Equivalent)	HV	15-17
High Voltage Space Quality	HS	18-22
High Voltage Ceramic Chip	1515/1812/1825/2020/ 2225/2520/3333//3530 4040/4540/5440/5550/6560	23-27
High Voltage L & J Leaded	SM20/SM21/SM22/SM23 SM24/SM25/SM26/SM30/ SM31/SM33/SM34/SM35/SM36	28-32
High Voltage Disc	D30/40/50/75/90/100/120	33-34
High Voltage Disc Multiplie Stacks	D30/40/50/75/90/100/120	35

GENERAL SPECIFICATIONS

Working Voltage:

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

Temperature Characteristics:

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

Capacitance Tolerance:

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

Construction:

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

Termination Material:

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

Solderability:

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

Terminal Strength:

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

Resistance to Solvents:

- MIL-STD 202, Method 215

Resistance to Soldering Heat:

- MIL-STD 202, Method 210, Test Condition C

ELECTRICAL

Capacitance @ 25°C:

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

Dissipation Factor @ 25°C:

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

Insulation Resistance @25°C:

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

Dielectric Withstanding Voltage:

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

ENVIRONMENTAL

Vibration:

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

Shock:

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

Life Test:

- MIL-STD 202, Method 108

<200V

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

>500V

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

Post Test Limits @ 25°C are:

- Capacitance Change:
 - C0G (< 200V) - +3% or 0.25pF, whichever is greater.
 - C0G (> 500V) - +3% or 0.50pF, whichever is greater.
 - X7R - + 20% of initial value (2)
- Dissipation Factor:
 - C0G - 0.25% maximum
 - X7R & X5U - 3.0% maximum
- Insulation Resistance:
 - C0G & X7R:
 - 100 gigohm or 1 gigohm x uF, whichever is less.
 - <500V test @ rated voltage, >1kV test @ 500V.
 - X5U:
 - 10 gigohm or 100 megohm x uF, whichever is less.
 - <500V test @ rated voltage, >1kV test @ 500V.

Moisture Resistance:

- MIL-STD 202, Method 106
- Post Test Limits @ 25°C are:
 - Capacitance Change:
 - C0G (< 200V) - +3% or 0.25pF, whichever is greater.
 - C0G (> 500V) - +3% or 0.50pF, whichever is greater.
 - X7R - + 20% of initial value (2)
 - Dissipation Factor:
 - C0G - 0.25% maximum
 - X7R & X5U - 3.0% maximum
 - Insulation Resistance:
 - C0G & X7R:
 - 100 gigohm or 1 gigohm x uF, whichever is less.
 - <500V test @ rated voltage, >1kV test @ 500V.
 - X5U:
 - 10 gigohm or 100 megohm x uF, whichever is less.
 - <500V test @ rated voltage, >1kV test @ 500V.

Thermal Shock:

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

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

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

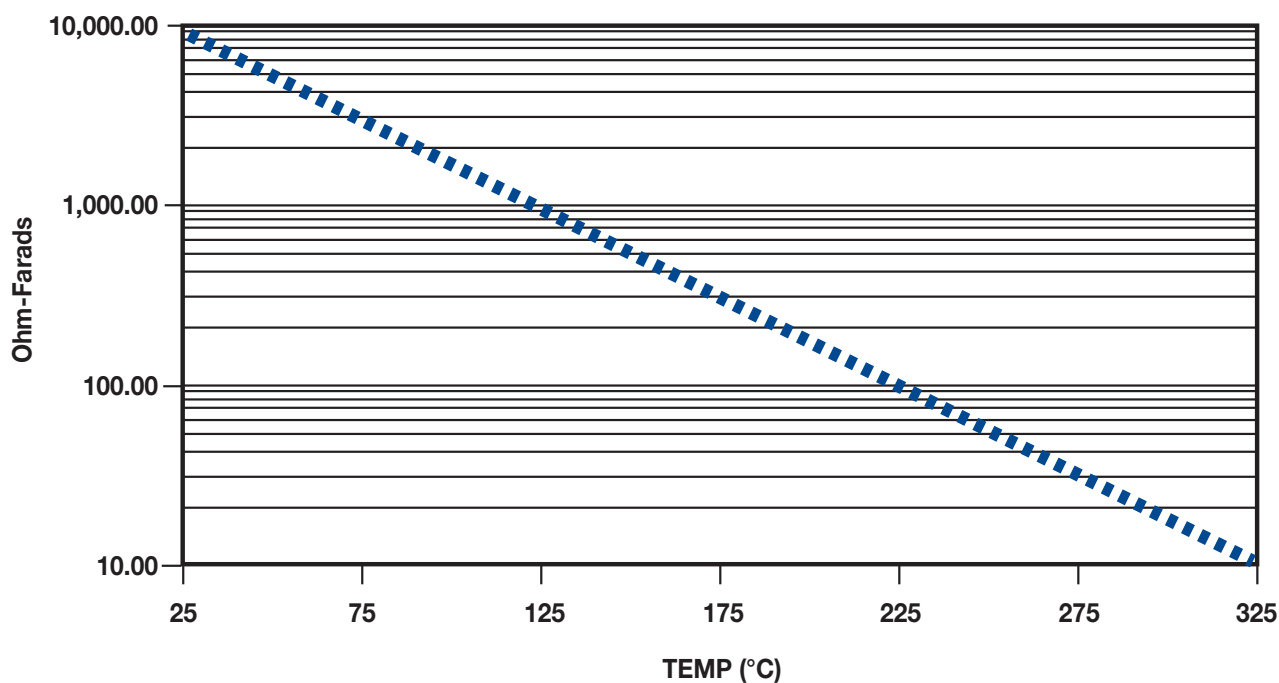
	ELECTRICAL			ENVIRONMENTAL	MECHANICAL
	Voltage Range	Capacitance Range	Dissipation Factor	Operating Temperature Range	Configuration
HIGH VOLTAGE					
Radial Conformally Coated					
Std	C0G/X7R: 500 to 10k VDC	C0G:12 pF - .330μF X7R: 220 pF - 5.6 μF	C0G: 0.15% max X7R: 2.5% max	C0G: -55°C to + 125°C X7R: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

HIGH TEMPERATURE

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

DIELECTRIC COMPARISONS

Features	Ultra Stable	Semi-Stable High Voltage	Semi-Stable Hi-Temp	Temp/Volt Dependent
Dielectric Type	C0G (NPO)	X7R	X7R type	X5U
Temperature Coefficient	0 $\pm$ 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 Expansion @ 25°C	9 X 10-6 IN/IN °C	11 X 10-6 IN/IN °C	11 X 10-6 IN/IN °C	11 X 10-6 IN/IN °C

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


FEATURES

The HT/HP Series is used in robust applications

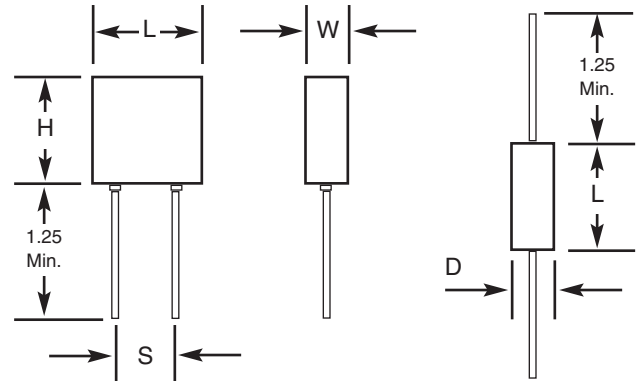
- Down Hole
- Industrial
- Harsh Environments

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

NOTE:

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

CAPACITOR OUTLINE DRAWING



DIMENSIONS

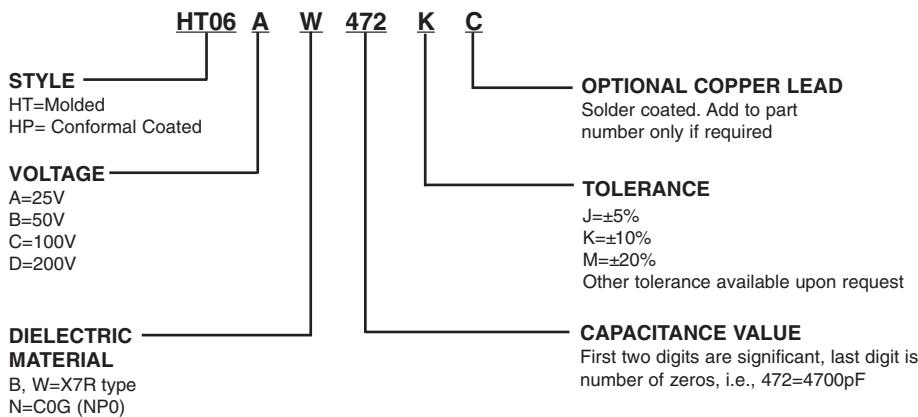
Molded (HT) and Conformal Coated (HP), Radial Lead Types

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

Tubular Case, Axial Lead Types

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

PART NUMBER AND ORDERING INFORMATION



MARKING

(HT05, HT55, HT11)
472K
KEC

(All other sizes)
HT06AW472K
KEC
Date Code

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

COG & X7R DIELECTRIC

Radial		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															
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	VVDC			VVDC			VVDC			VVDC			VVDC		
		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															
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6800	682															
8200	822															
.010uF	103															
.012	123															
.015	153															
.018	183															
.022	223															
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.047	473															
.056	563															
.068	683															
.082	823															
.10	104															
.12	124															
.15	154															

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															
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4.7	479															
5.6	569															
6.8	689															
8.2	829															
10	100															
12	120															
15	150															
18	180															
22	220															
27	270															
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39	390															
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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															
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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															

FEATURES

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

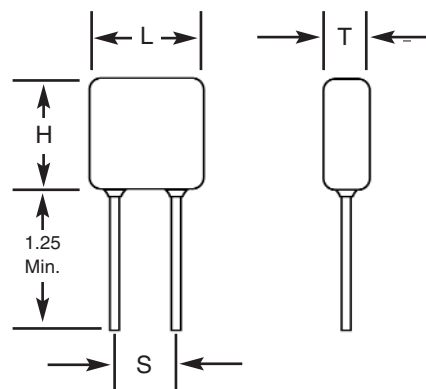
To be used in robust applications

- Down Hole
- Industrial
- Harsh Environments

NOTE:

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

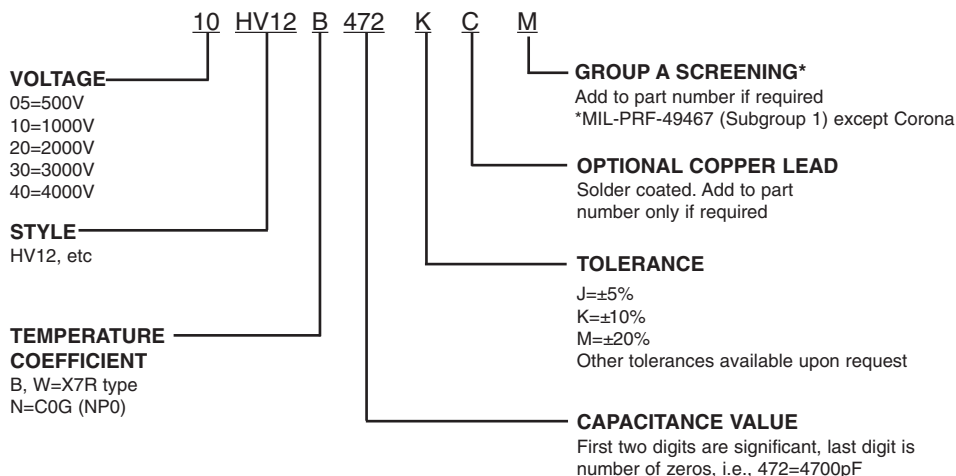
CAPACITOR OUTLINE DRAWING



DIMENSIONS

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

PART NUMBER AND ORDERING INFORMATION



MARKING

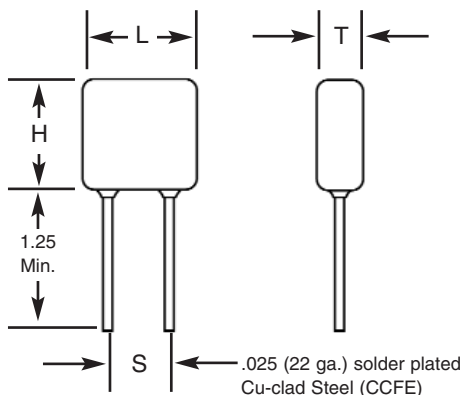
(HV10, HV11)
 472M
 KEC
 Date Code

(All other sizes)
 HV12B472M
 1kV
 KEC
 Date Code

COG DIELECTRIC

STYLE COG		HV10			HV11				HV12				HV13				HV14					HV15					HV16				
Cap	L max	.250 (6.35)			.320 (8.13)				.420 (10.67)				.520 (13.21)				.620 (15.75)					.720 (18.29)					.820 (20.83)				
	H max	.220 (5.59)			.300 (7.62)				.400 (10.16)				.500 (12.70)				.500 (12.70)					.700 (17.78)					.700 (17.78)				
	W max	.150 (3.81)			.250 (6.35)				.250 (6.35)				.300 (7.62)				.300 (7.62)					.300 (7.62)					.350 (8.89)				
	S ± .030	.170 (4.32)			.200 (5.08)				.300 (7.62)				.400 (10.16)				.500 (12.70)					.600 (15.24)					.700 (17.78)				
	Lead Dia. +.004/-.002	.025 (.635)			.025 (.635)				.025 (.635)				.025 (.635)				.025 (.635)					.025 (.635)					.025 (.635)				
	Cap Code	WVDC			WVDC				WVDC				WVDC				WVDC					WVDC					WVDC				
	pF	500	1k	2k	500	1k	2k	3k	500	1k	2k	3k	500	1k	2k	3k	500	1k	2k	3k	4k	500	1k	2k	3k	4k	500	1k	2k	3k	4k
12pF	120																														
15	150																														
18	180																														
22	220																														
27	270																														
33	330																														
39	390																														
47	470																														
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2700	272																														
3300	332																														
3900	392																														
4700	472																														
5600	562																														
6800	682																														
8200	822																														
.010uF	103																														
.012	123																														
.015	153																														

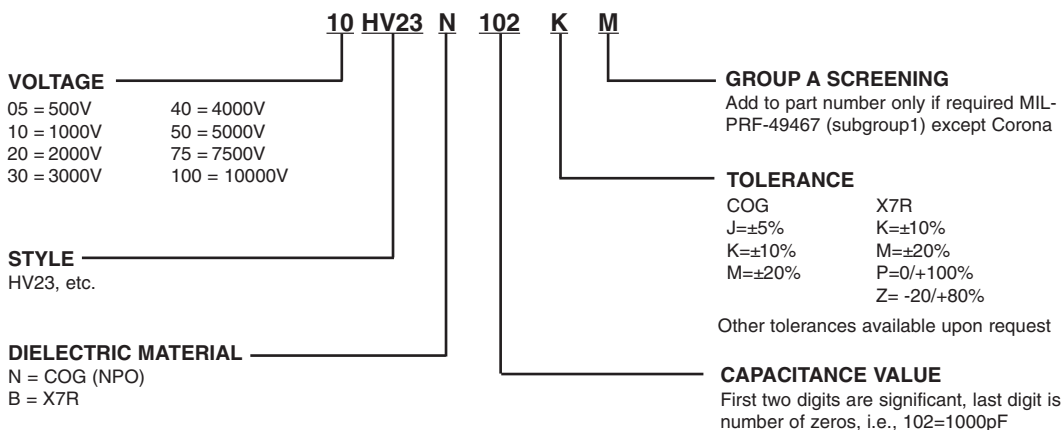
CAPACITOR OUTLINE DRAWING



DIMENSIONS

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

PART NUMBER AND ORDERING INFORMATION



MARKING

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

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. ±.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																																				
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.033	333																																				
.039	393																																				
.047	473																																				
.056	563																																				
.068	683																																				
.082	823																																				
.10	104																																				

COG DIELECTRIC

[illegible]

X7R DIELECTRIC

[illegible]

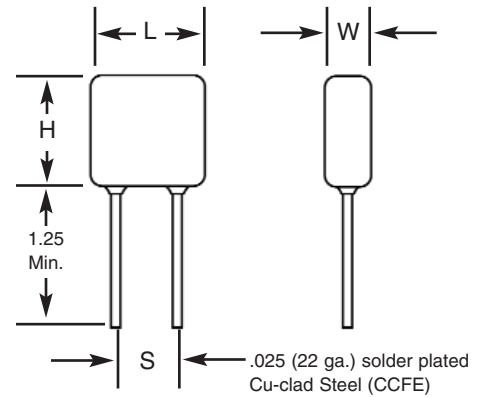
X7R DIELECTRIC

STYLE X7R	HV30	HV31	HV33	HV34	HV35	HV36
W max	.450 (11.43)	.550 (13.97)	.850 (21.59)	1.050 (26.67)	1.250 (31.75)	1.450 (36.83)
L max	.220 (5.59)	.280 (7.11)	.400 (10.16)	.500 (12.70)	.600 (15.24)	.720 (18.29)
T max	.200 (5.08)	.250 (6.35)	.270 (6.89)	.270 (6.89)	.270 (6.89)	.270 (6.89)
S ±.030	.300 (7.62)	.400 (10.16)	.700 (17.78)	.975 (24.76)	1.175 (29.84)	1.375 (34.92)
Lead Dia. +.004/-0.002	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)
Cap Code	WVDC	WVDC	WVDC	WVDC	WVDC	WVDC
Cap	pF	50 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				
150pF	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					
5.6	565					

FEATURES

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

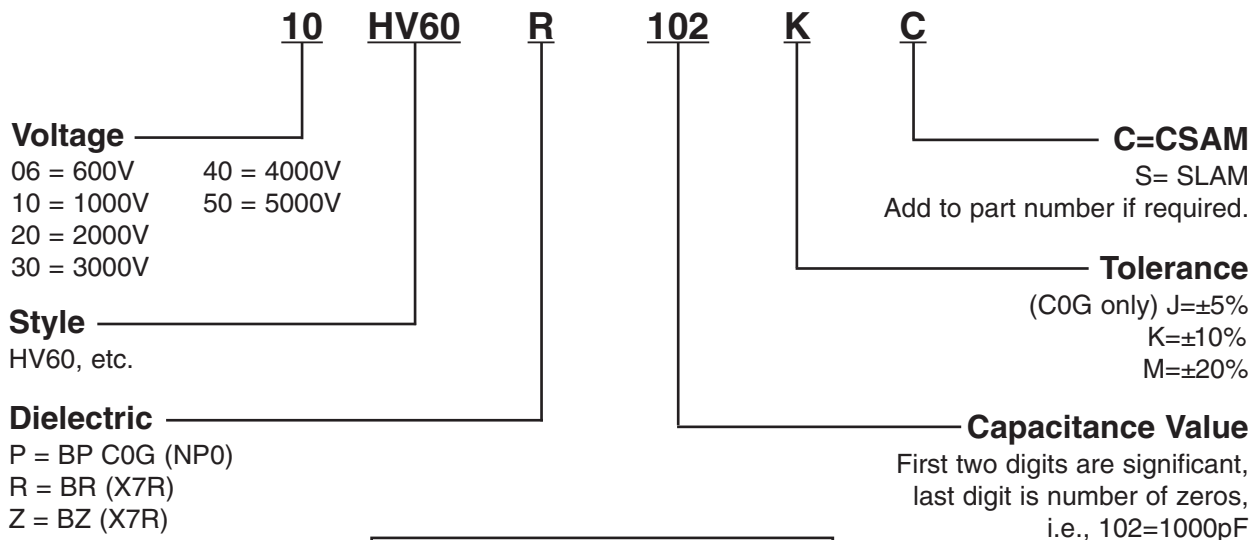
CAPACITOR OUTLINE DRAWING



DIMENSIONS

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

PART NUMBER AND ORDERING INFORMATION



MARKING

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

COG DIELECTRIC

STYLE	COG	HV60			HV61				HV62				HV63					HV64					HV65					HV66				
	W max	.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	Cap Code	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
12pF	120																															
15	150																															
18	180																															
22	220																															
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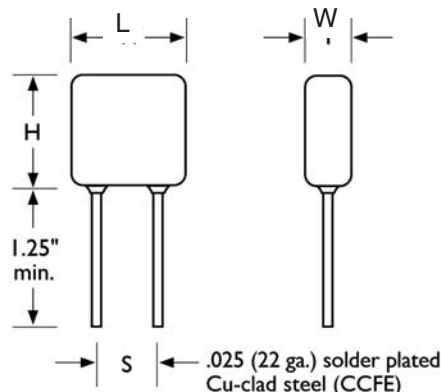
X7R DIELECTRIC

STYLE X7R	HV60	HV61	HV62	HV63	HV64	HV65	HV66	HV68	HV69
Cap	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)
	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)
	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)
	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)
	Lead Dia. ±.004-.002	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)	.025 (.635)
	Cap Code pF	WVDC	WVDC	WVDC	WVDC	WVDC	WVDC	WVDC	WVDC
		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
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 ±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%

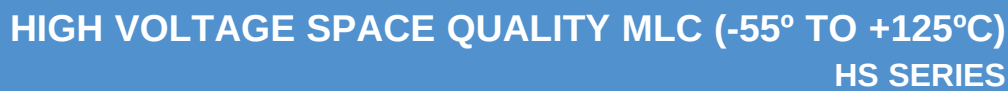
MARKING

(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																															
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5600	562																															
6800	682																															
8200	822																															
.010uF	103																															
.012	123																															
.015	153																															
.018	183																															
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.056	563																															
.068	683																															
.082	823																															
.10	104																															
.12	124																															
.15	154																															

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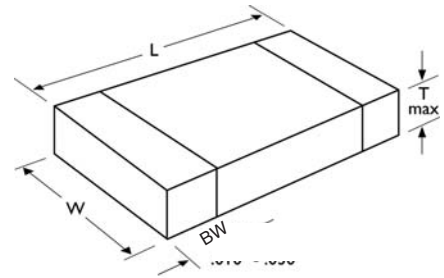
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FEATURES

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

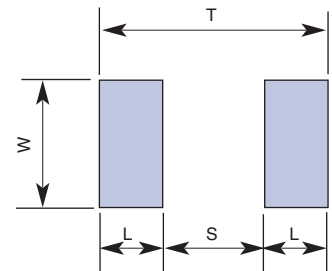


DIMENSIONS

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

RECOMMENDED SOLDER PAD PATTERN DIMENSIONS

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



PART NUMBER AND ORDERING INFORMATION

4540

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

STYLE COG		4040					4540					5440					5550					6560							
	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	Cap Code pF	WVDC					WVDC					WVDC					WVDC					WVDC							
		500	1k	2k	3k	4k	500	1k	2k	3k	4k	5k	500	1k	2k	3K	4k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k
10pF	100																												
12	120																												
15	150																												
18	180																												
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X7R DIELECTRIC

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X7R DIELECTRIC

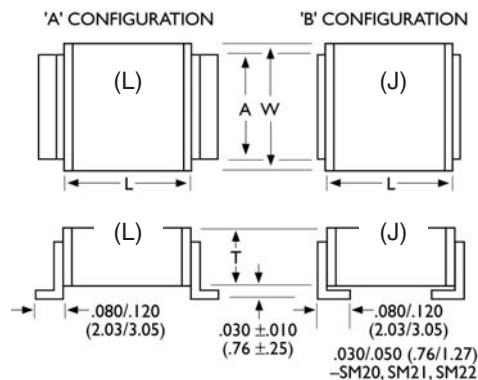
STYLE X7R		4040					4540					5440					5550					6560							
Cap	L	.400 ±.030(10,20±.76)					.450 ±.030(11,43±.76)					.540 ±.030(13,70±.76)					.550 ±.030(14,00±.76)					.650 ±.030(16,50±.76)							
	W	.400 ±.030(10,20±.76)					.400 ±.030(10,20±.76)					.400 ±.030(10,20±.76)					.500 ±.030(10,20±.76)					.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																												
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.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

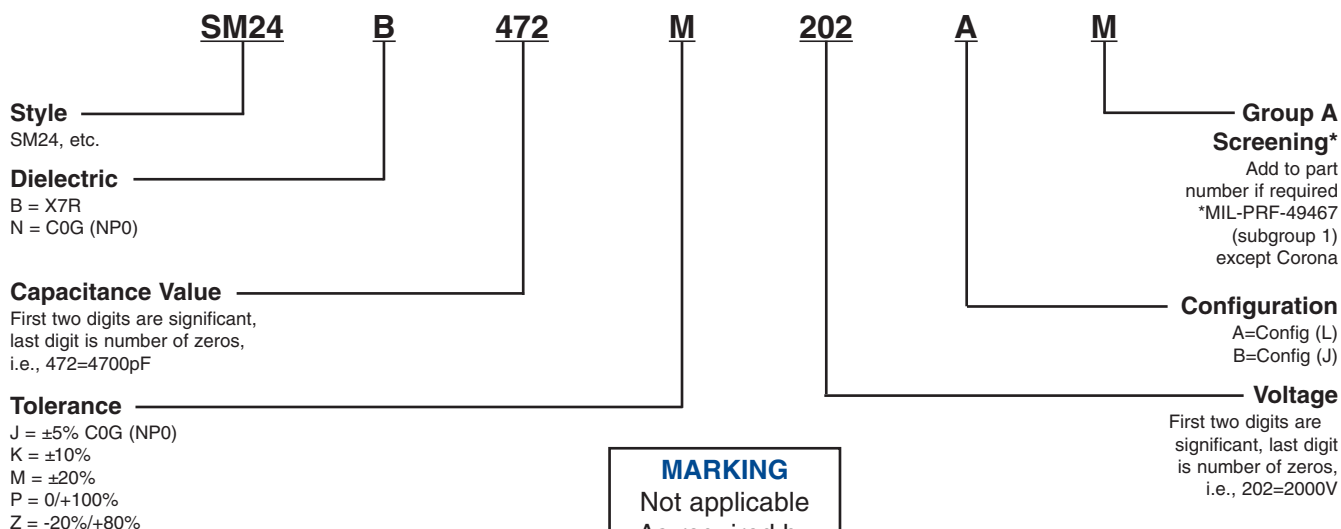
STANDARD



DIMENSIONS

Style	Length (L) Inches (mm)	Width (W) Inches (mm)	Thickness (T) max Inches (mm)	Tab (A) max 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



MARKING

Not applicable
As required by customer only.

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	pF	WVDC				WVDC				WVDC					WVDC					WVDC					WVDC					WVDC						
		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																																				
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330	331																																				
390	391																																				

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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

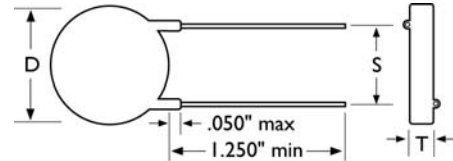
STYLE X7R	SM30	SM31	SM33	SM34	SM35	SM36
L	.300 ±.030 (7.62±.76)	.400 ±.030(10.20 ±.76)	.700 ±.030 (17.08 ±.76)	.900 ±.030 (22.90 ±.76)	1.100 ±.030 (27.90 ±.76)	1.350 ±.030 (33.00 ±.76)
W	.150 ±.015 (3.31 ±.38)	.200 ±.020(5.08 ±.51)	.300 ±.030(7.62 ±.76)	.400 ±.030(10.20 ±.76)	.500 ±.030(12.70 ±.76)	.600 ±.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, 20 to 50kV at rated +10kV	3 to 15kV at 1.5x rated, 20 to 50kV at rated +10kV	3 to 15kV at 1.5x rated, 20 to 50kV at rated +10kV
Insulation Resistance (25°C)	100k megohms or 1k megohms-μF, whichever is less	100k megohms or 1k megohms-μF, whichever is less	10k megohms or 100 megohms-μF, 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

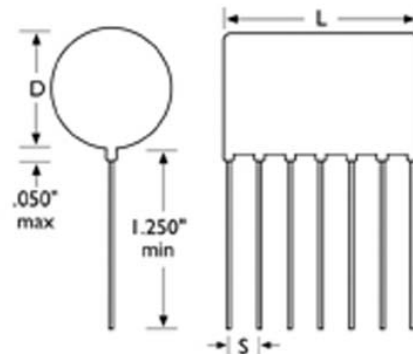
Disc Style	D Max.	S ±.030	30kVDC X7R		40kVDC X7R		50kVDC X7R	
			Min.	Max.	Min.	Max.	Min.	Max.
D30	.30	.250	20pF	30pF	18pF	22pF	10pF	20pF
D40	.40	.250	60pF	80pF	50pF	60pF	40pF	50pF
D50	.50	.375	110pF	140pF	80pF	100pF	70pF	80pF
D75	.75	.375	250pF	310pF	190pF	230pF	150pF	180pF
D90	.90	.500	380pF	470pF	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.

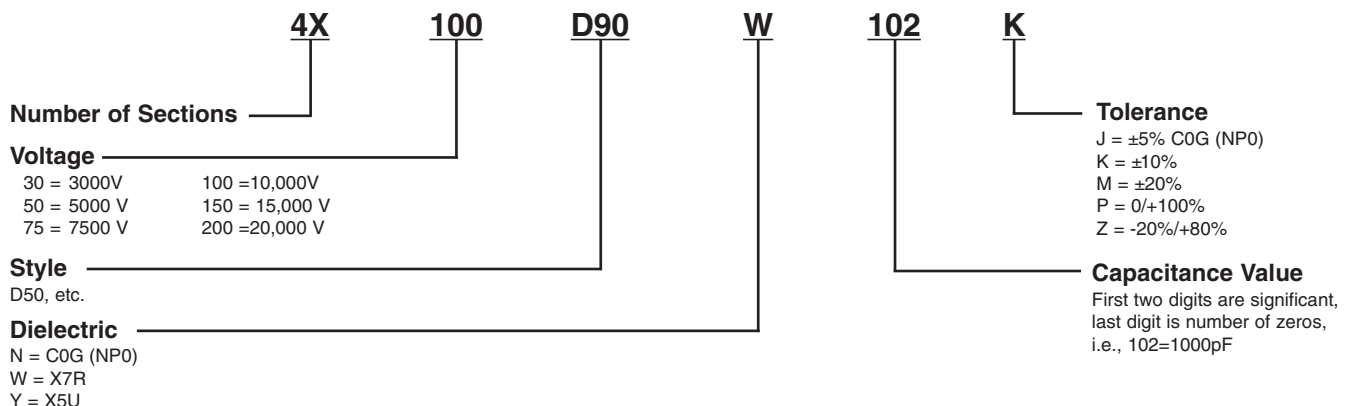
CAPACITOR OUTLINE DRAWING



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