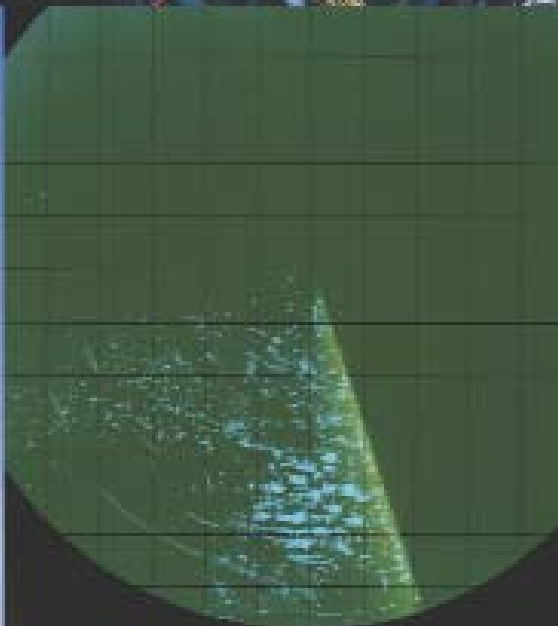
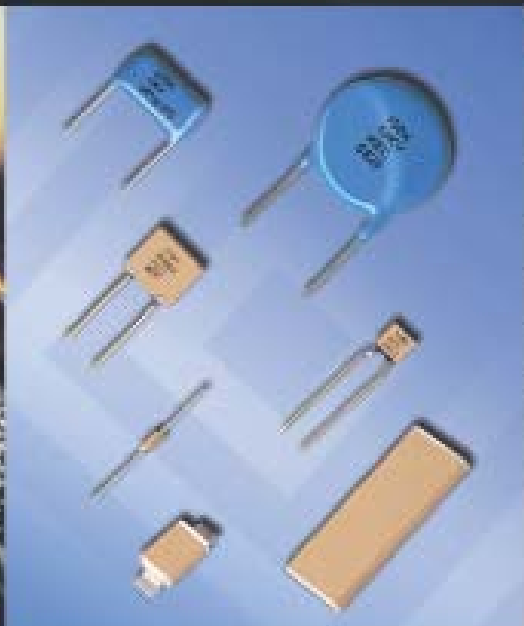
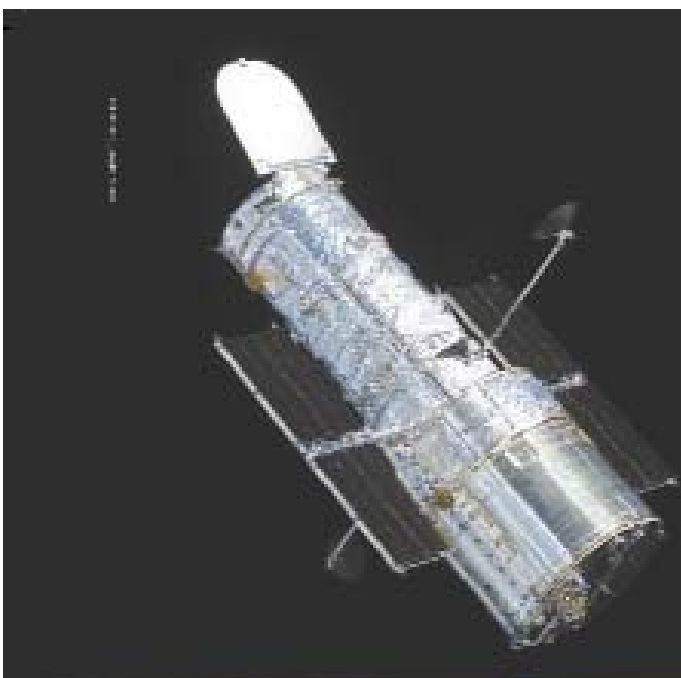




High Temperature High Voltage Ceramic Capacitors

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F-3106G 3/10

The Capacitance Company
KEMET
CHARGED.™

General Performance Characteristics	3-6
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HIGH TEMPERATURE CERAMIC CAPACITORS

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High Temperature, High Voltage Performance Characteristics

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	±5%, ±10%, ±20%, +80% / -20%, +100% / -0%
X5U	±5%, ±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

KEMET High Voltage Technical Summary

	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 pF - 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

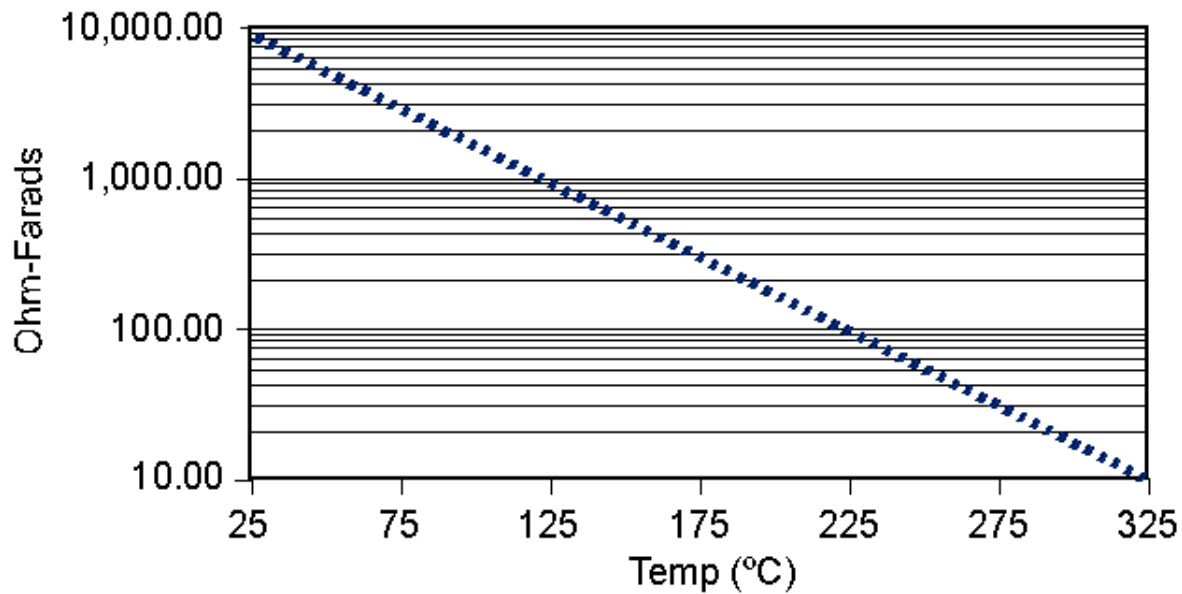
HIGH TEMPERATURE

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 (NP0)	X7R	X7R type	X5U
Temperature Coefficient	0 ±30ppm/°C	±15%	+15/-40%	+22-56%
Operating Temp. Range	-55 to +200°C	-55 to +125°C	-55 to +200°C	-55 to +125°C
Dissipation Factor	0.1% max.	2.5% max.	2.0% max.	2.5% max.
Aging Rate	None	-2.0% max/dec. hour	-2.0% max/dec. hour	-2.0% max/dec. hour
Voltage Range	25 to 20k VDC	50 to 50k VDC	25 to 4k VDC	Up to 20K VDC
Standard Tolerance	J, K, M	K, M, P, Z	K, M, P, Z	M, P, Z
Coefficient of Thermal Expansion @ 25°C	9 X 10-6 IN/IN °C	11 X 10-6 IN/IN °C	11 X 10-6 IN/IN °C	11 X 10-6 IN/IN °C

**TYPICAL INSULATION RESISTANCE VS. TEMP (°C)
FOR C0G, NP0 & X7R DIELECTRICS**



High Temperature (+200°C) Axial and Radial Ceramic Capacitors

HT/HP Series

FEATURES

The HT/HP Series is used in robust applications

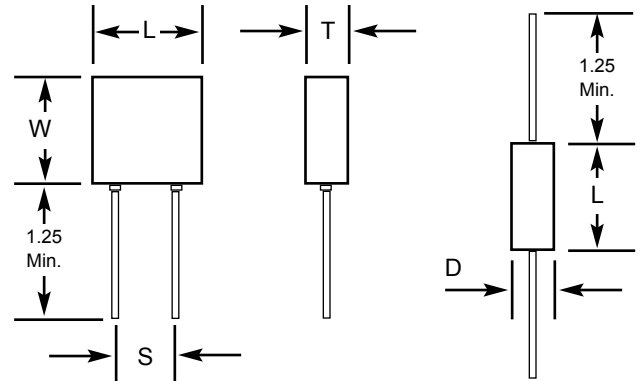
- Down Hole
- Industrial
- Harsh Environments

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

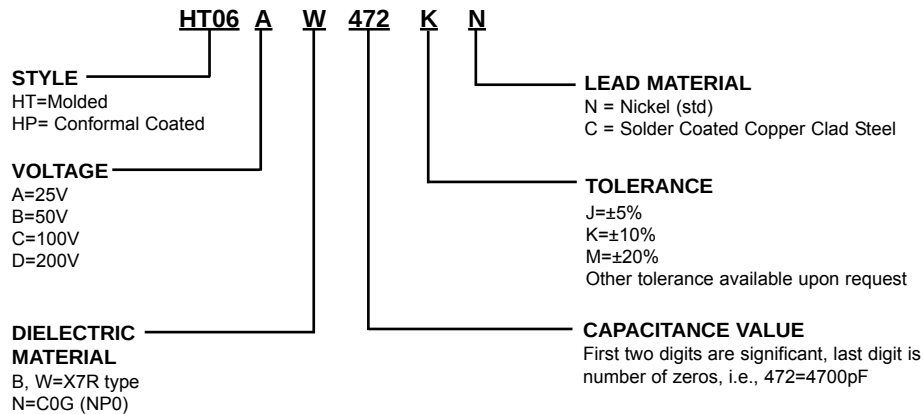
Molded (HT) and Conformal Coated (HP), Radial Lead Types

Style	Sizes in Inches (mm) max			Lead Spacing ±0.030 (S)
	Length (L)	Width (W)	Thickness (T)	
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.

C0G & X7R DIELECTRIC

C0G RADIAL																		
STYLE		HT/HP 05			HT/HP 55			HT/HP 06			HT/HP 08			HT/HP 09				
Cap	L MAX	.200 (5.08)			.200 (5.08)			.300 (7.62)			.500 (12.70)			.700 (17.78)				
	W 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 Code	WVDC			WVDC			WVDC			WVDC			WVDC				
		50	100	200	50	100	200	50	100	200	50	100	200	50	100	200		
22pF	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																	
.010 uF	103																	
0.012	123																	
0.015	153																	
0.018	183																	
0.022	223																	
0.027	273																	
0.033	333																	
0.039	393																	
0.047	473																	
0.056	563																	
0.068	683																	
0.082	823																	
0.10	104																	
0.12	124																	

X7R RADIAL																		
STYLE		HT/HP 05			HT/HP 55			HT/HP 06			HT/HP 08			HT/HP 09				
	L MAX	.200 (5.08)			.200 (5.08)			.300 (7.62)			.500 (12.70)			.700 (17.78)				
	W 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 Code	WVDC			WVDC			WVDC			WVDC			WVDC				
Cap		50	100	200	50	100	200	50	100	200	50	100	200	50	100	200		
1000pF	102																	
1200	122																	
1500	152																	
1800	182																	
2200	222																	
2700	272																	
3300	332																	
3900	392																	
4700	472																	
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0.056	563																	
0.068	683																	
0.082	823																	
0.10	104																	
0.12	124																	
0.15	154																	
0.18	184																	
0.22	224																	
0.27	274																	
0.33	334																	
0.39	394																	
0.47	474																	
0.56	564																	
0.68	684																	
0.82	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																	

High Temperature (+200°C) Axial and Radial Ceramic Capacitors HT/HP Series

C0G & X7R DIELECTRIC

COG AXIAL																
STYLE		HT/HP 11			HT/HP 13			HT/HP 14			HT/HP 15			HT/HP 16		
Cap	L MAX	.170 (4.32)			.260 (6.60)			.400 (10.16)			.500 (12.70)			.750 (19.05)		
	D MAX	.100 (2.54)			.135 (3.43)			.155 (3.94)			.200 (5.08)			.375 (9.52)		
	Lead Dia.	.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)		
	Cap Code	WVDC			WVDC			WVDC			WVDC			WVDC		
		50	100	200	50	100	200	50	100	200	50	100	200	50	100	200
5.6pF	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															
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390	391															
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5600	562															
6800	682															
8200	822															
.010 uF	103															
0.012	123															
0.015	153															
0.018	183															
0.022	223															
0.027	273															
0.033	333															
0.039	393															
0.047	473															
0.056	563															
0.068	683															
0.082	823															
0.10	104															

X7R AXIAL																
STYLE		HT/HP 11			HT/HP 13			HT/HP 14			HT/HP 15			HT/HP 16		
Cap	L MAX	.170 (4.32)			.260 (6.60)			.400 (10.16)			.500 (12.70)			.750 (19.05)		
	D MAX	.100 (2.54)			.135 (3.43)			.155 (3.94)			.200 (5.08)			.375 (9.52)		
	Lead Dia.	.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)		
	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															
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2700	272															
3300	332															
3900	392															
4700	472															
5600	562															
6800	682															
8200	822															
.010uF	103															
0.012	123															
0.015	153															
0.018	183															
0.022	223															
0.027	273															
0.033	333															
0.039	393															
0.047	473															
0.056	563															
0.068	683															
0.082	823															
0.1	104															
0.12	124															
0.15	154															
0.18	184															
0.22	224															
0.27	274															
0.33	334															
0.39	394															
0.47	474															
0.56	564															
0.68	684															
0.82	824															
1.0	105															
1.2	125															
1.5	155															
1.8	185															
2.2	225															
2.7	275															

FEATURES

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

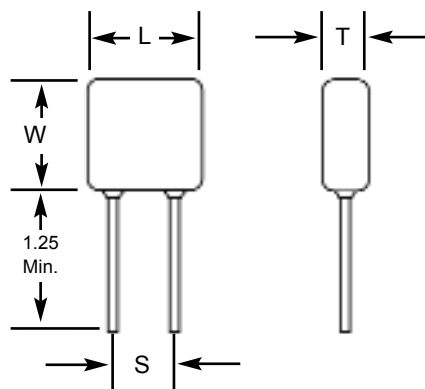
To be used in robust applications

- Down Hole
- Industrial
- Harsh Environments

NOTE:

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

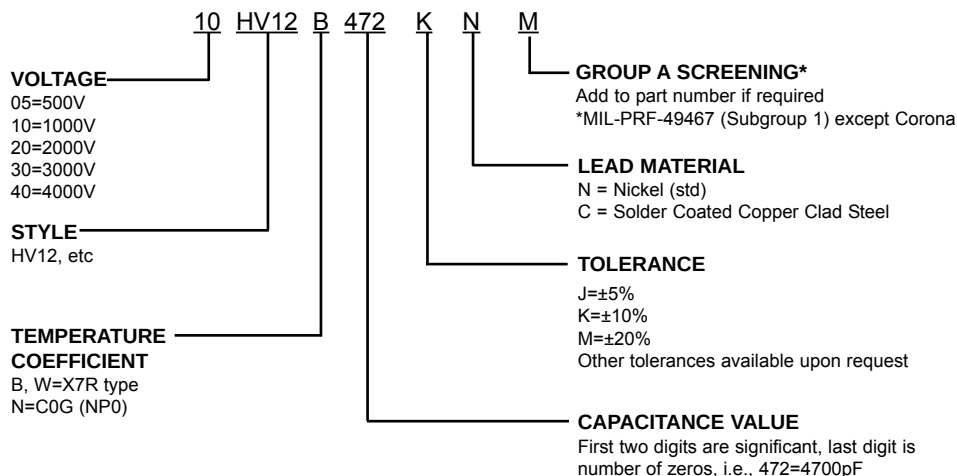
CAPACITOR OUTLINE DRAWING



DIMENSIONS

Style	Sizes in Inches (mm) max.			Lead Spacing ±0.030 (S)
	Length (L)	Width (W)	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

High Temperature (+200°C), High Voltage Radial Ceramic Capacitors HV Series

C0G DIELECTRIC

STYLE		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)				
	W MAX	.220 (5.59)			.300 (7.62)				.400 (10.16)				.500 (12.70)				.500 (12.70)					.700 (17.78)					.700 (17.78)				
	T 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. +0.004/-0.002	.025 (.635)			.025 (.635)				.025 (.635)				.025 (.635)				.025 (.635)					.025 (.635)					.025 (.635)				
	Cap Code	WVDC			WVDC				WVDC				WVDC				WVDC					WVDC					WVDC				
		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																														
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4700	472																														
5600	562																														
6800	682																														
8200	822																														
0.01uF	103																														
0.012	123																														
0.015	153																														

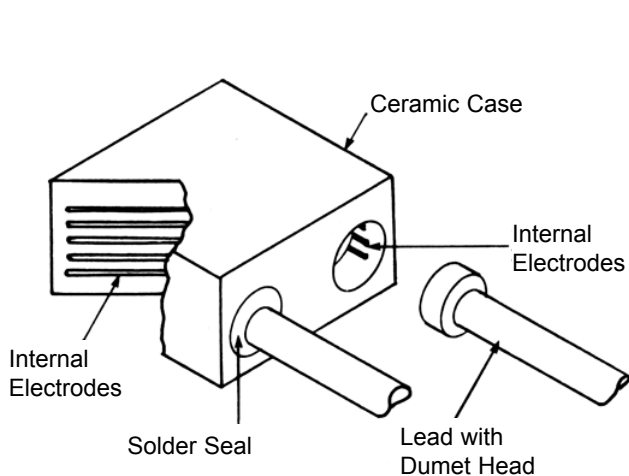
High Temperature Ceramic Cased Capacitors C³

C3 GENERAL INFORMATION

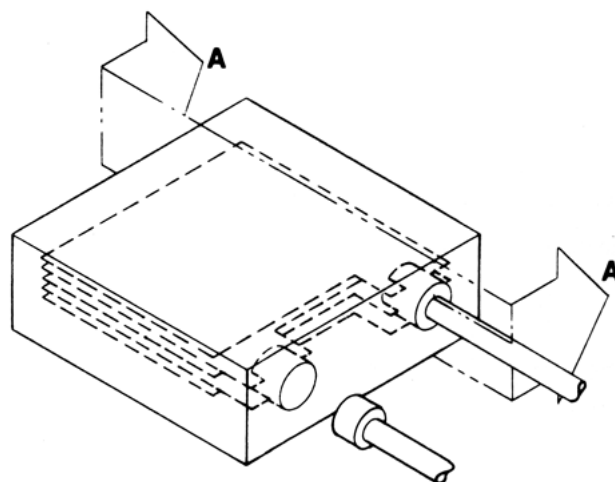
Monolithic ceramic capacitors are capable of withstanding and operating at temperatures up to +260°C when properly designed and manufactured for this application. A design has been developed which is ideal for operation at these high temperatures. This design is a Ceramic Cased Capacitor (C³) as described in PATENT #4,931,899.

The advantages of the C³ construction at 125°C, 200°C and 260°C are:

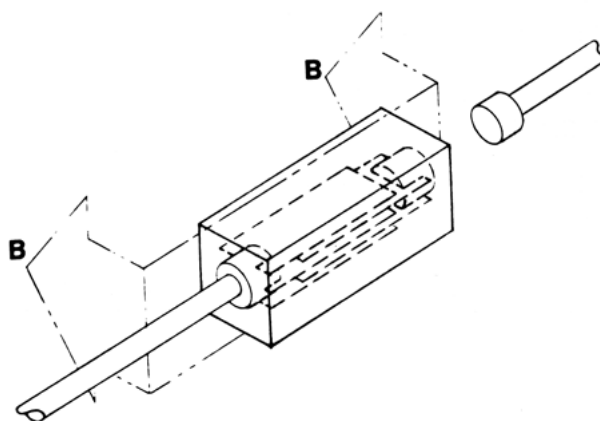
- Uniform coefficient of linear expansion eliminates chip cracking during thermal shock.
- No "pull-away" of epoxy potting from epoxy case at elevated temperatures.
- Resistant to moisture penetration.
- Superior volumetric efficiency



Radial C³ - One Lead Removed



Radial C³ - Capacitor Internal Construction



Axial C³ - One Lead Removed

COG

COG (NP0) capacitors which exhibit little change in capacitance with variations in temperature, are used in RF oscillators, precision timing circuits, wave filters and other circuits requiring a predictable linear temperature coefficient.

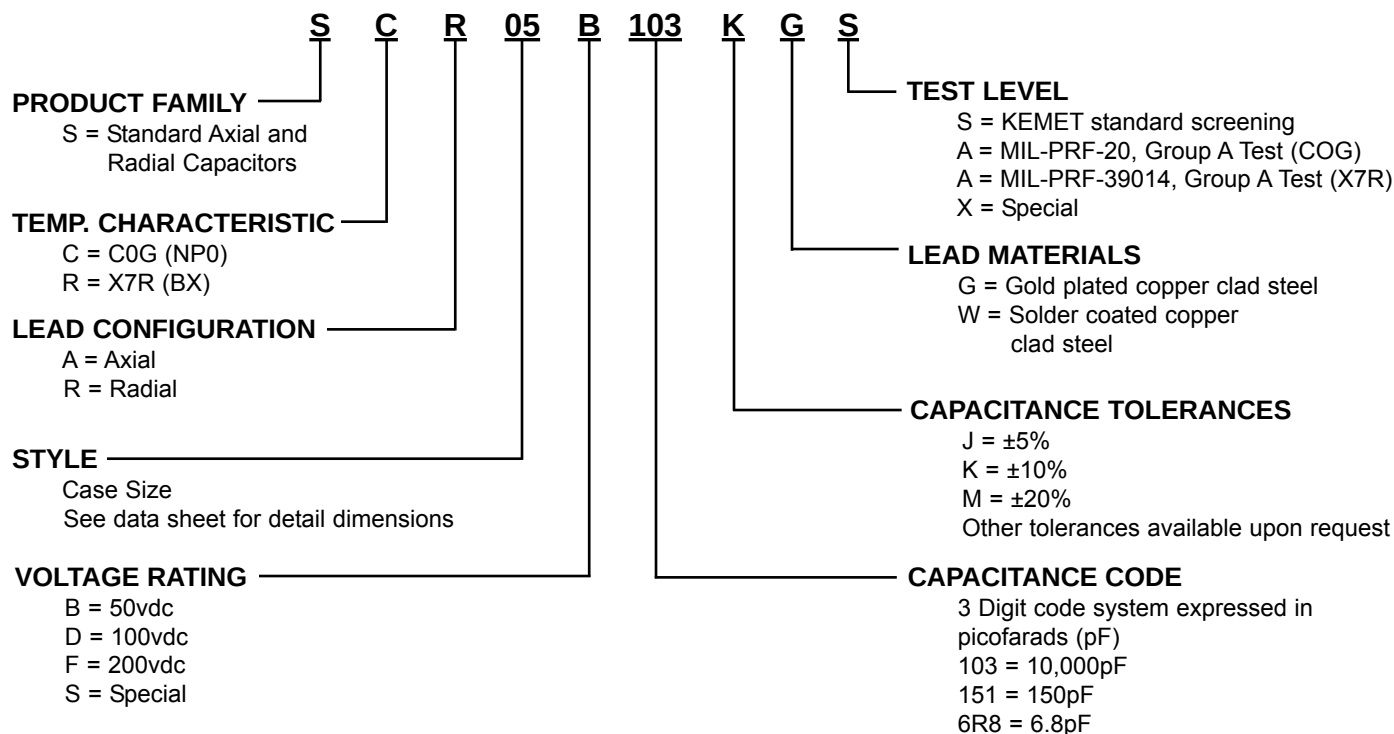
X7R

BX and X7R capacitors are used in coupling circuits (IF and RF); for bypassing and decoupling in computers and stereo systems; power supply line filtering and frequency discrimination.

INSTALLATION:

Parts should be soldered using a heat sink between the soldering point and the part using a soldering iron rated between 18-30 watts. Soldering temperature should not exceed +300°C. For wave soldering, the parts should be slowly heated to +150°C and, after soldering, be allowed to cool down slowly to +90°C to preclude thermal shocking of the parts.

PART NUMBER AND ORDERING INFORMATION



MARKING

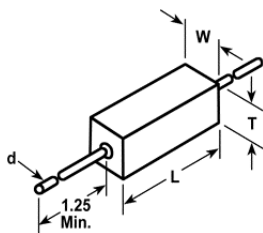
Manufacturer's ID	KEC
Capacitance	106J
Voltage	50V
Date Code	123

Note: Solderability testing is not required for gold leaded parts.

High Temperature Standard (+125°C) Axial and Radial Ceramic Cased Capacitors (C³) SCR/SCA Series

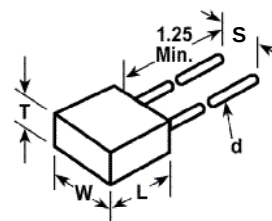
AXIAL

All Dimensions
in Inches (mm)



RADIAL

All Dimensions
in Inches (mm)

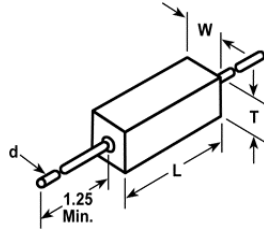


C0G DIELECTRIC

AXIAL															RADIAL																		
STYLE		16			25			39			50			69			05			06			07			08			09				
Cap	L MAX	.170 (4.32)			.270 (6. 86)			.400 (10.16)			.520 (13.21)			.720 (18.29)			.200 (5.08)			.300 (7.62)			.300 (7.62)			.500 (12.70)			.500 (12.70)				
	W MAX	.080 (2.03)			.100 (2.54)			.150 (3.81)			.265 (6.73)			.370 (9.40)			.200 (5.08)			.300 (7.62)			.300 (7.62)			.500 (12.70)			.500 (12.70)				
	T MAX	.080 (2.03)			.100 (2.54)			.150 (3.81)			.160 (4.06)			.160 (4.06)			.100 (2.54)			.100 (2.54)			.150 (3.81)			.100 (2.54)			.150 (3.81)				
	S	---			---			---			---			---			.200 ± .030 (5.08 ±.76)			.200 ± .030 (5.08 ±.76)			.200 ± .030 (5.08 ±.76)			.400 ± .030 (10.16 ± .76)			.400 ± .030 (10.16 ± .76)				
	d	.020 ± .002 (.508 ± .051)			.020 ± .002 (.508 ± .051)			.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)			.020 ± .002 (.508 ± .051)			.020 ± .002 (.508 ± .051)			.020 ± .002 (.508 ± .051)			.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)				
	Cap Code	WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC	
	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200			
5.6pF	569																																
6.8	689																																
8.2	829																																
10	100																																
12	120																																
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1200	122																																
1500	152																																
1800	182																																
2200	222																																

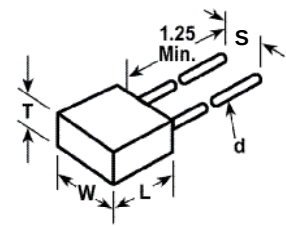
AXIAL

All Dimensions
in Inches (mm)



RADIAL

All Dimensions
in Inches (mm)



X7R DIELECTRIC

AXIAL																RADIAL																	
STYLE		16			25			39			50			69			05			06			07			08			09				
Cap	L MAX	.170 (4.32)			.270 (6.86)			.400 (10.16)			.520 (13.21)			.720 (18.29)			.200 (5.08)			.300 (7.62)			.300 (7.62)			.500 (12.70)			.500 (12.70)				
	W MAX	.080 (2.03)			.100 (2.54)			.150 (3.81)			.265 (6.73)			.370 (9.40)			.200 (5.08)			.300 (7.62)			.300 (7.62)			.500 (12.70)			.500 (12.70)				
	T MAX	.080 (2.03)			.100 (2.54)			.150 (3.81)			.160 (4.06)			.160 (4.06)			.100 (2.54)			.100 (2.54)			.150 (3.81)			.100 (2.54)			.150 (3.81)				
	S	---			---			---			---			---			.200 ± .030 (5.08 ± .76)			.200 ± .030 (5.08 ± .76)			.200 ± .030 (5.08 ± .76)			.400 ± .030 (10.16 ± .76)			.400 ± .030 (10.16 ± .76)				
	d	.020 ± .002 (.508 ± .051)			.020 ± .002 (.508 ± .051)			.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)			.020 ± .002 (.508 ± .051)			.020 ± .002 (.508 ± .051)			.020 ± .002 (.508 ± .051)			.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)				
	Cap Code	WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC			WVDC	
	50	100	200	50	100	200	50	100	200	50	100	200	50	100	200	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																																
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2200	222																																
2700	272																																
3300	332																																
3900	392																																
4700	472																																
5600	562																																
6800	682																																
8200	822																																
0.01 μF	103																																
0.012	123																																
0.015	153																																
0.018	183																																
0.022	223																																
0.027	273																																
0.033	333																																
0.039	393																																

High Temperature Standard (+200°C) Axial and Radial Ceramic Cased Capacitors (C³) ACR/ARR/ACA/ARA Series

High temperature ceramic cased capacitors, with a new, unique design concept, are ideally suited for continuous operation up to +200°C. Problems associated with epoxy cased/epoxy potted capacitors, such as material deterioration, cracks in cases and potted areas, are nonexistent, even at +200°C.

C0G

C0G (NPO) capacitors, which exhibit little change in capacitance with variations in temperature, are used in RF oscillators, precision timing circuits, wave filters, and other circuits requiring a predictable linear temperature coefficient.

X7R

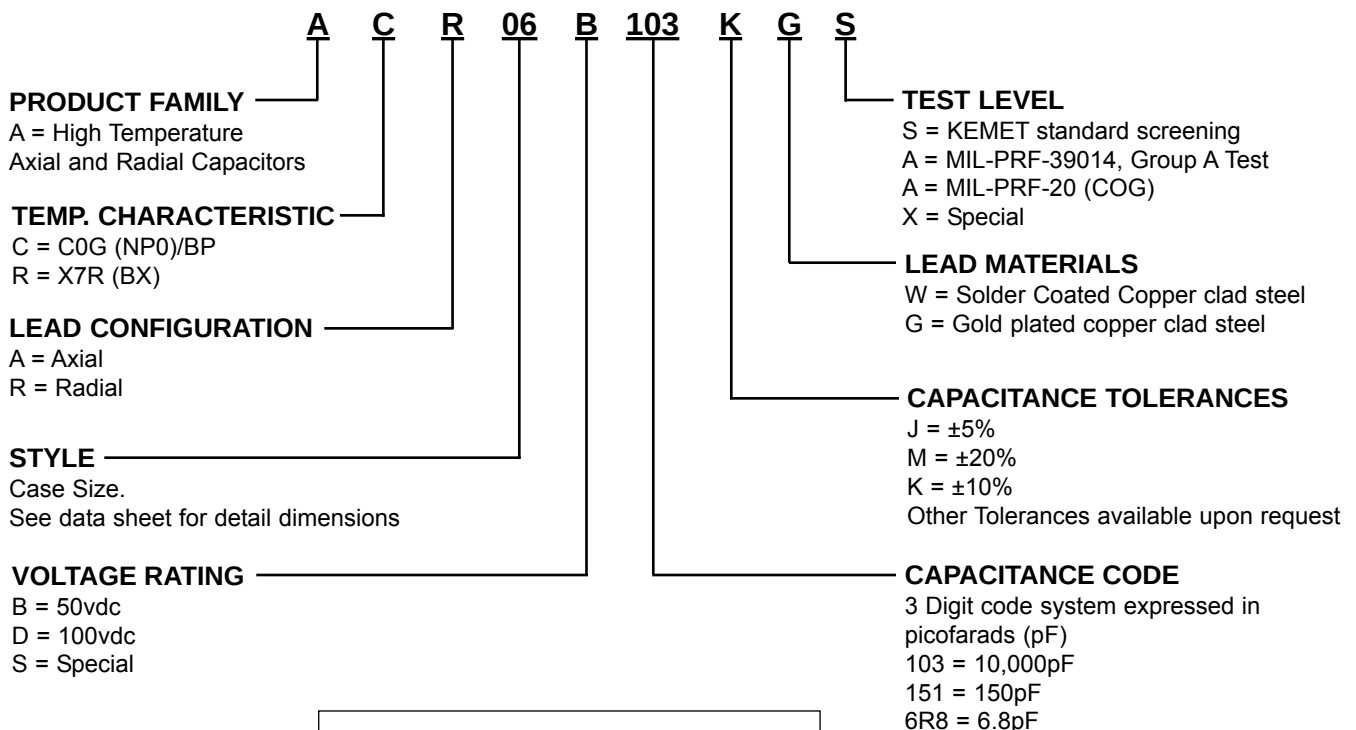
Specially formulated X7R ceramic materials result in a retention of 40% of the +25°C capacitance. Dissipation factor drops from 1.25% at +25°C to 0.1% at +200°C. At +120°C the ceramic undergoes a transformation (crystalline inversion) resulting in the material changing from ferroelectric to paraelectric - no piezoelectric behavior.

Typical applications include oil well logging (down hole), jet engine controls and geophysical pressure probes.

INSTALLATION:

Parts should be soldered using a heat sink between the soldering point and the part using a soldering iron rated between 18-30 watts. Soldering temperature should not exceed +300°C.

PART NUMBER AND ORDERING INFORMATION

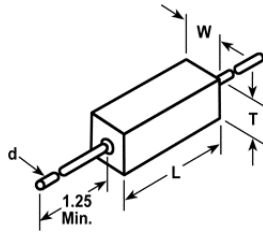


MARKING

Manufacturer's ID	KEC
Capacitance	106J
Voltage	50V
Date Code	123

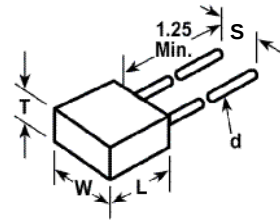
AXIAL

All Dimensions
in Inches (mm)



RADIAL

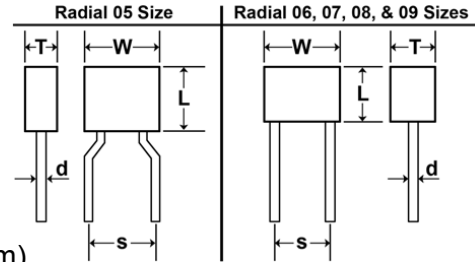
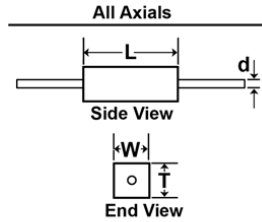
All Dimensions
in Inches (mm)



C0G DIELECTRIC

AXIAL										RADIAL											
STYLE		16		25		39		50		69		05		06		07		08		09	
Cap	L _{MAX}	.170 (4.32)		.270 (6.86)		.400 (10.16)		.520 (13.21)		.720 (18.29)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)	
	W _{MAX}	.080 (2.03)		.100 (2.54)		.150 (3.81)		.265 (6.73)		.370 (9.40)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)	
	T _{MAX}	.080 (2.03)		.100 (2.54)		.150 (3.81)		.160 (4.06)		.160 (4.06)		.100 (2.54)		.100 (2.54)		.150 (3.81)		.100 (2.54)		.150 (3.81)	
	S	---		---		---		---		---		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.400 ± .030 (10.16 ± .76)		.400 ± .030 (10.16 ± .76)	
	d	.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)	
	Cap Code	WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC	
		50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
5.6pF	569																				
6.8	689																				
8.2	829																				
10	100																				
12	120																				
15	150																				
18	180																				
22	220																				
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6800	682																				
8200	822																				
0.01 μF	103																				
0.012	123																				
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0.018	183																				
0.022	223																				
0.027	273																				
0.033	333																				
0.039	393																				
0.047	473																				
0.056	563																				
0.068	683																				
0.082	823																				
0.10	104																				
0.12	124																				
0.15	154																				

High Temperature Standard (+200°C) Axial and Radial Ceramic Cased Capacitors (C³) ARR/ARA Series



X7R DIELECTRIC - All Dimensions in Inches (mm)

AXIAL											RADIAL										
STYLE		16		25		39		50		69		05		06		07		08		09	
Cap	L MAX	.170 (4.32)		.270 (6.86)		.400 (10.16)		.520 (13.21)		.720 (18.29)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)	
	W MAX	.080 (2.03)		.100 (2.54)		.150 (3.81)		.265 (6.73)		.370 (9.40)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)	
	T MAX	.080 (2.03)		.100 (2.54)		.150 (3.81)		.160 (4.06)		.160 (4.06)		.100 (2.54)		.100 (2.54)		.150 (3.81)		.100 (2.54)		.150 (3.81)	
	s	---		---		---		---		---		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.400 ± .030 (10.16 ± .76)		400 ± .030 (10.16 ± .76)	
	d	.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)	
	Cap Code	WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC	
		50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
100pF	101																				
120	121																				
150	151																				
180	181																				
220	221																				
270	271																				
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3300	332																				
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6800	682																				
8200	822																				
0.01 μF	103																				
0.012	123																				
0.015	153																				
0.018	183																				
0.022	223																				
0.027	273																				
0.033	333																				
0.039	393																				
0.047	473																				
0.056	563																				
0.068	683																				
0.082	823																				
0.10	104																				
0.12	124																				
0.15	154																				
0.18	184																				
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0.27	274																				
0.33	334																				
0.39	394																				
0.47	474																				
0.56	564																				
0.68	684																				
0.82	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																				

High temperature ceramic cased capacitors, with a new, unique design concept, are ideally suited for continuous operation up to +260°C. Problems associated with epoxy cased/epoxy potted capacitors, such as material deterioration, cracks in cases and potted areas, are nonexistent, even at +260°C.

C0G

C0G (NP0) capacitors, which exhibit little change in capacitance with variations in temperature, are used in RF oscillators, precision timing circuits, wave filters, and other circuits requiring a predictable linear temperature coefficient.

X7R

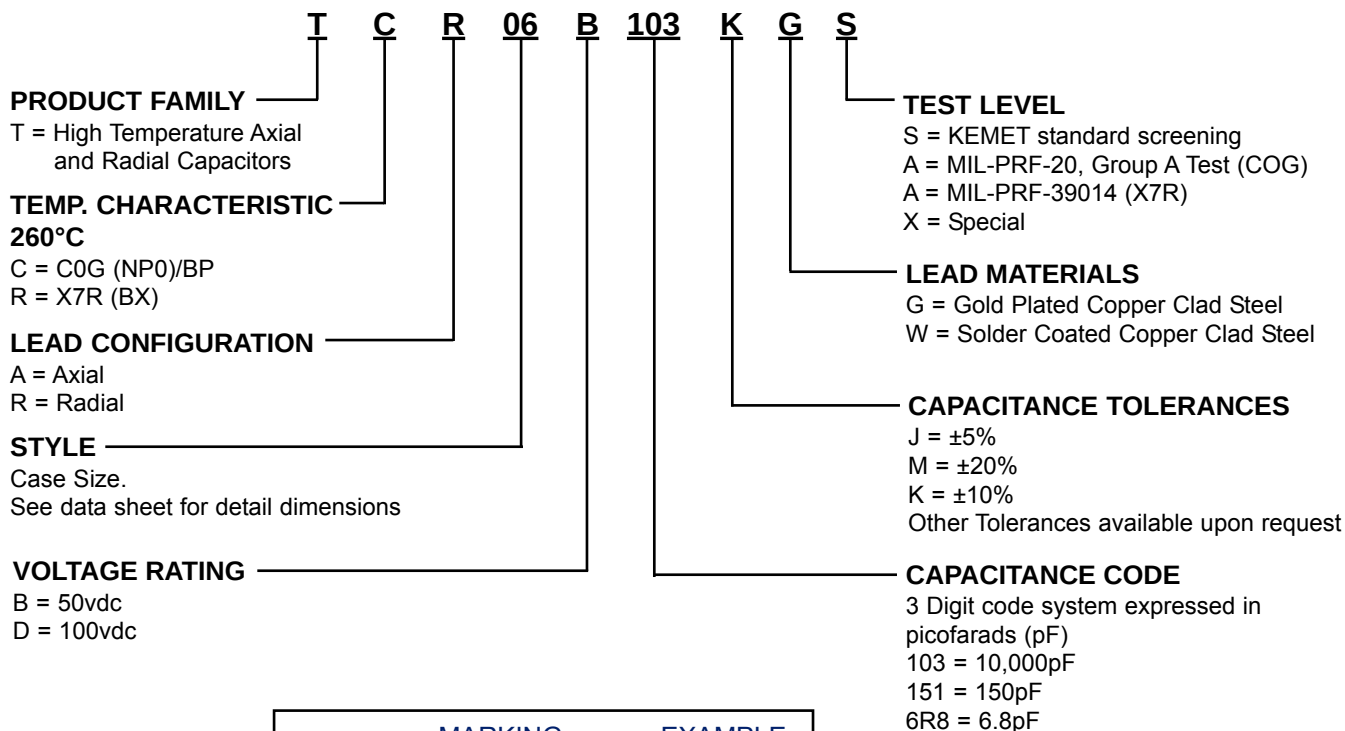
Conventional X7R materials lose up to 75% of the +25°C capacitance. Dissipation factor drops from 1.25% at +25°C to 0.2% at +260°C. At +120°C the ceramic undergoes a transformation (crystalline inversion) resulting in the material changing from ferroelectric to paraelectric - no piezoelectric behavior.

Typical applications include oil well logging (down hole), jet engine controls and geophysical pressure probes.

INSTALLATION:

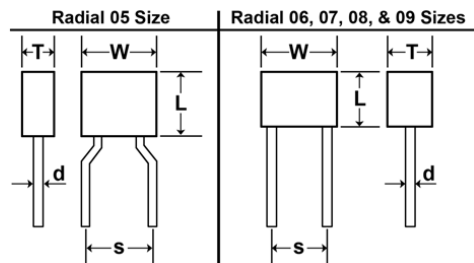
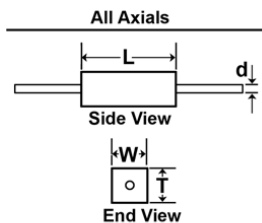
Parts should be soldered using a heat sink between the soldering point and the part using a soldering iron rated 18-30 watts. Remove all traces of flux or other contamination resulting from the soldering operation. An intermittent conducting path between the leads, at high voltage, could cause breakdown. Soldering temperature should not exceed +300°C.

PART NUMBER AND ORDERING INFORMATION



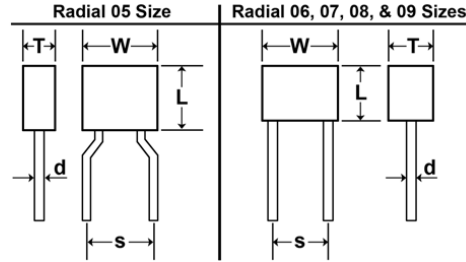
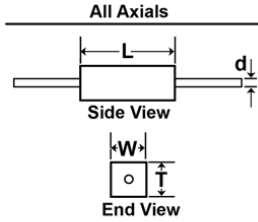
MARKING	EXAMPLE
Manufacturer's ID	KEC
Capacitance	106J
Voltage	50V
Date Code	123
Red dot = +260°C	•

High Temperature (+260°C) Axial and Radial Ceramic Cased Capacitors (C³) TCR/TCA Series



C0G DIELECTRIC

AXIAL												RADIAL											
STYLE		16		25		39		50		69		05		06		07		08		09			
Cap	L _{MAX}	.170 (4.32)		.270 (6.86)		.400 (10.16)		.520 (13.21)		.720 (18.29)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)			
	W _{MAX}	.080 (2.03)		.100 (2.54)		.150 (3.81)		.265 (6.73)		.370 (9.40)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)			
	T _{MAX}	.080 (2.03)		.100 (2.54)		.150 (3.81)		.160 (4.06)		.160 (4.06)		.100 (2.54)		.100 (2.54)		.150 (3.81)		.100 (2.54)		.150 (3.81)			
	s	---		---		---		---		---		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.400 ± .030 (10.16 ± .76)		.400 ± .030 (10.16 ± .76)			
	d	.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)			
	Cap Code																						
		50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100		
	5.6pF	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																						
0.01 μF	103																						
0.012	123																						
0.015	153																						
0.018	183																						
0.022	223																						
0.027	273																						
0.033	333																						
0.039	393																						
0.047	473																						
0.056	563																						
0.068	683																						
0.082	823																						
0.10	104																						
0.12	124																						
0.15	154																						



X7R DIELECTRIC

AXIAL											RADIAL											
STYLE		16		25		39		50		69		05		06		07		08		09		
Cap	L _{MAX}	.170 (4.32)		.270 (6.86)		.400 (10.16)		.520 (13.21)		.720 (18.29)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)		
	W _{MAX}	.080 (2.03)		.100 (2.54)		.150 (3.81)		.265 (6.73)		.370 (9.40)		.200 (5.08)		.300 (7.62)		.300 (7.62)		.500 (12.70)		.500 (12.70)		
	T _{MAX}	.080 (2.03)		.100 (2.54)		.150 (3.81)		.160 (4.06)		.160 (4.06)		.100 (2.54)		.100 (2.54)		.150 (3.81)		.100 (2.54)		.150 (3.81)		
	S	---		---		---		---		---		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.200 ± .030 (5.08 ± .76)		.400 ± .030 (10.16 ± .76)		.400 ± .030 (10.16 ± .76)		
	d	.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.020 ± .002 (.508 ± .051)		.025 ± .002 (.635 ± .051)		.025 ± .002 (.635 ± .051)		
Cap Code	WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC		WVDC	
	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100	50	100
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																					
0.01 μF	103																					
0.012	123																					
0.015	153																					
0.018	183																					
0.022	223																					
0.027	273																					
0.033	333																					
0.039	393																					
0.047	473																					
0.056	563																					
0.068	683																					
0.082	823																					
0.10	104																					
0.12	124																					
0.15	154																					
0.18	184																					
0.22	224																					
0.27	274																					
0.33	334																					
0.39	394																					
0.47	474																					
0.56	564																					
0.68	684																					
0.82	824																					
1.0	105																					
1.2	125																					
1.5	155																					
1.8	185																					
2.0	205																					
2.2	225																					
2.7	275																					
3.3	335																					
3.9	395																					

High Temperature (+200°C), High Voltage Radial Ceramic Cased Capacitors (C³) VCR/VRR Series

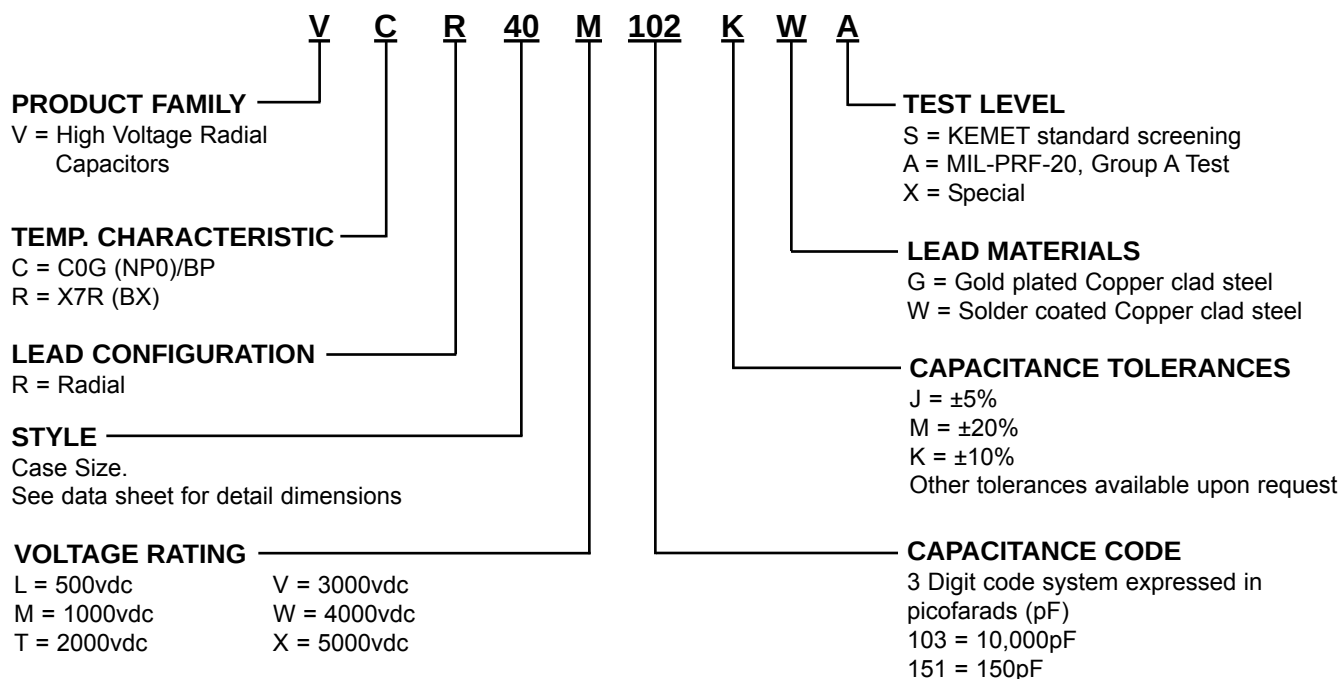
Ceramic cased capacitors, with a new, unique design concept which eliminates potential problems associated with conventional epoxy cased epoxy potted capacitors.

Major application is high voltage power supplies. High voltage capacitors are also utilized on high voltage meter multiplier and RF circuits.

INSTALLATION:

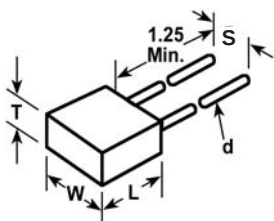
Parts should be soldered using a heat sink between the soldering point and the part using a soldering iron rated 18-30 watts. Remove all traces of flux or other contamination resulting from the soldering operation. An intermittent conducting path between the leads, at high voltage, could cause breakdown. Soldering temperature should not exceed +300°C.

PART NUMBER AND ORDERING INFORMATION



MARKING	EXAMPLE
Manufacturer's ID	KEC
Capacitance	106J
Voltage	500V
Date Code	123

RADIAL
All Dimensions
in Inches (mm)



C0G DIELECTRIC

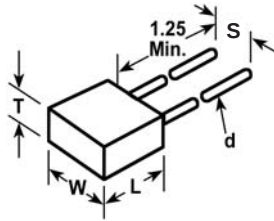
STYLE		07				40					50						60						70						80					
L _{MAX}		.300 (7.62)				.350 (8.89)					.520 (13.20)						.550 (13.97)						.650 (16.51)						.750 (19.05)					
W _{MAX}		.300 (7.62)				.400 (10.16)					.500 (12.70)						.600 (15.24)						.700 (17.78)						.800 (20.32)					
T _{MAX}		.150 (3.81)				.275 (6.98)					.300 (7.62)						.375 (9.52)						.375 (9.52)						.375 (9.52)					
S		.200 ± .030 (5.08 ± .76)				.250 ± .030 (6.35 ± .76)					.400 ± .030 (10.16 ± .76)						.400 ± .030 (10.16 ± .76)						.500 ± .030 (12.70 ± .76)						.600 ± .030 (15.24 ± .76)					
d		.025 ± .002 (.635 ± .051)				.025 ± .002 (.635 ± .051)					.025 ± .002 (.635 ± .051)						.032 ± .004 (.813 ± .102)						.032 ± .004 (.813 ± .102)						.032 ± .004 (.813 ± .102)					
Cap	Cap Code	WVDC			WVDC					WVDC						WVDC						WVDC						WVDC						
		500	1k	2k	500	1k	2k	3k	4k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k	
10 pF	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																																	
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0.018	183																																	
0.022	223																																	
0.027	273																																	
0.033	333																																	
0.039	393																																	
0.047	473																																	
0.056	563																																	

High Temperature (+200°C), High Voltage Axial and Radial Ceramic Cased Capacitors (C³)

VRR Series

RADIAL

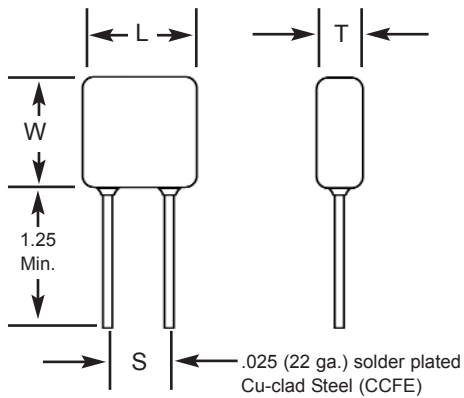
All Dimensions
in Inches (mm)



X7R DIELECTRIC

STYLE		07			40					50					60					70					80								
L _{MAX}		.300 (7.62)			.350 (8.89)					.520 (13.20)					.550 (13.97)					.650 (16.51)					.750 (19.05)								
W _{MAX}		.300 (7.62)			.400 (10.16)					.500 (12.70)					.600 (15.24)					.700 (17.78)					.800 (20.32)								
T _{MAX}		.150 (3.81)			.275 (6.98)					.300 (7.62)					.375 (9.52)					.375 (9.52)					.375 (9.52)								
S		.200 ± .030 (5.08 ± .76)			.250 ± .030 (6.35 ± .76)					.400 ± .030 (10.16 ± .76)					.400 ± .030 (10.16 ± .76)					.500 ± .030 (12.70 ± .76)					.600 ± .030 (15.24 ± .76)								
d		.025 ± .002 (.635 ± .051)			.025 ± .002 (.635 ± .051)					.025 ± .002 (.635 ± .051)					.032 ± .004 (.813 ± .102)					.032 ± .004 (.813 ± .102)					.032 ± .004 (.813 ± .102)								
Cap	Cap Code	WVDC			WVDC					WVDC					WVDC					WVDC					WVDC								
		500	1k	2k	500	1k	2k	3k	4k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k	500	1k	2k	3k	4k	5k
330pF	331																																
390	391																																
470	471																																
560	561																																
680	681																																
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0.39	394																																
0.47	474																																
0.56	564																																
0.68	684																																
0.82	824																																
1.0	105																																
1.2	125																																

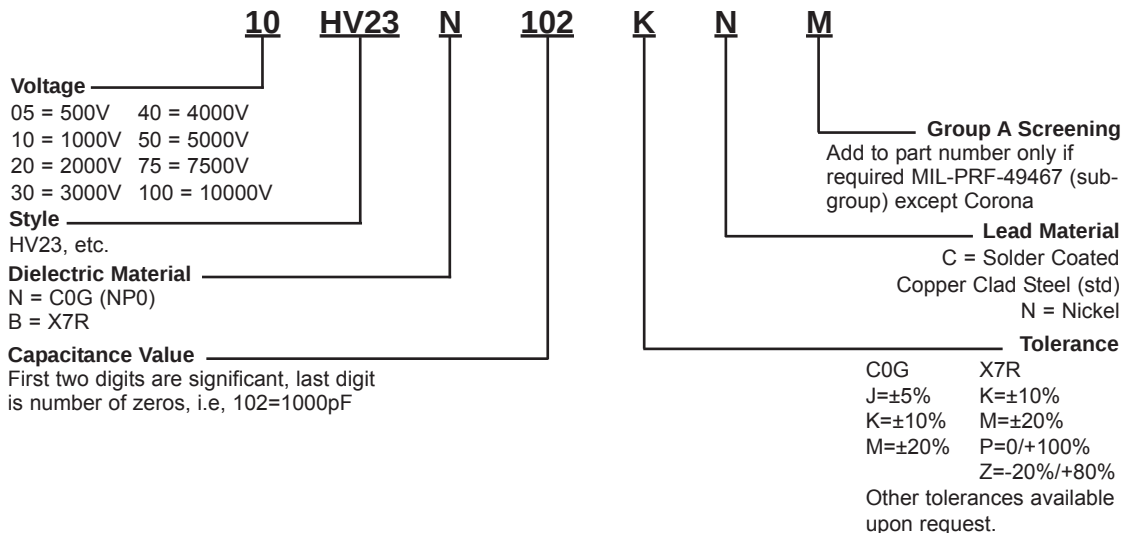
CAPACITOR OUTLINE DRAWING



DIMENSIONS

Style	Sizes in Inches (mm) max.			Lead Spacing ±0.030 (S)
	Length (L)	Width (W)	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

27

COG DIELECTRIC

[illegible]

X7R DIELECTRIC

[illegible]

X7R DIELECTRIC

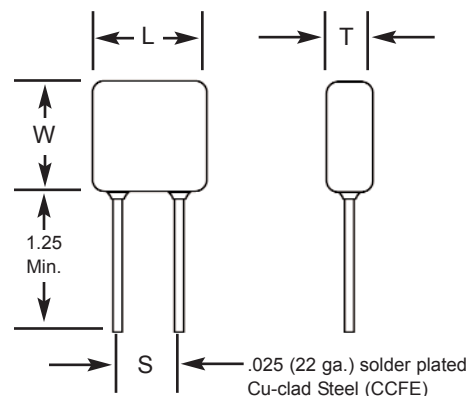
[illegible]

High Voltage MIL-PRF-49467 (Equivalent) HV Series

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.

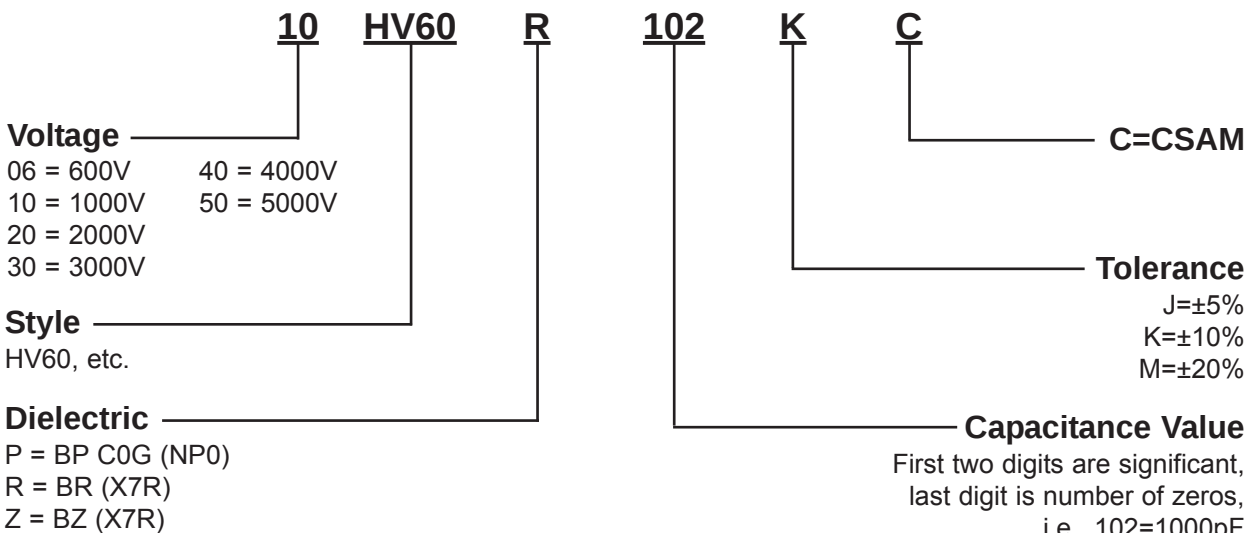
CAPACITOR OUTLINE DRAWING



DIMENSIONS

Style	Sizes in Inches (mm) max.			Lead Spacing ±0.030 (S)
	Length (L)	Width (W)	Thickness (T)	
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]

High Voltage MIL-PRF-49467 (Equivalent) HV Series

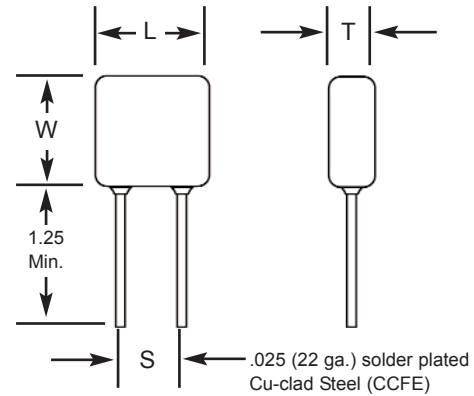
X7R DIELECTRIC

STYLE		HV60			HV61			HV62			HV63			HV64					HV65					HV66					HV 68			HV 69							
Cap	L 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)							
	W 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. +0.004/-0.002	.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)					.025 (.635)					.025 (.635)					0.025 (.635)			0.025 (.635)							
	Cap Code	WVDC			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	3k	4k	5k
270pF	271																																						
330	331																																						
390	391																																						
470	471																																						
560	561																																						
680	681																																						
820	821																																						
1000	102																																						
1200	122																																						
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8200	822																																						
0.01uF	103																																						
0.012	123																																						
0.015	153																																						
0.018	183																																						
0.022	223																																						
0.027	273																																						
0.033	333																																						
0.039	393																																						
0.047	473																																						
0.056	563																																						
0.068	683																																						
0.082	823																																						
0.10	104																																						

FEATURES

1. Conforms to MIL-PRF-49467. (Group A Screening, Subgroup 1)
2. 100% Corona tested.
3. No IR degradation over life.
4. High density, low DF ceramic.
5. Conservative and proven design is recommended for non-repairable applications such as spacecraft.
6. CSAM inspection is available and is recommended for space applications.
7. Burn-in in a non-contaminating inert fluid is standard for $\geq 2\text{KV}$; optional for 500V or 1 KV parts.

CAPACITOR OUTLINE DRAWING



DIMENSIONS

Style	Sizes in Inches (mm) max.			Lead Spacing ± 0.030 (S)
	Length (L)	Width (W)	Thickness (T)	
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 $\geq 2\text{kV}$;
 Add "F" if required
 for 500V or 1kV parts

C=CSAM

TOLERANCE
 J = $\pm 5\%$
 K = $\pm 10\%$
 M = $\pm 20\%$
 P = 0/+100%
 Z = -20%/+80%

MARKING

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

High Voltage Space Quality MLC (-55° to +125°C) HS Series

C0G DIELECTRIC

STYLE		HS 20			HS 21			HS 22			HS 23				HS 24					HS 25					HS 26							
Cap	L MAX	.250 (6.35)			.320 (8.13)			.370 (9.40)			.470 (11.94)				.570 (14.48)					.670 (17.02)					.770 (19.56)							
	W 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. +0.004/-0.002	.025 (.635)			.025 (.635)			.025 (.635)			.025 (.635)				.025 (.635)					.025 (.635)					.025 (.635)							
		WVDC			WVDC			WVDC			WVDC				WVDC					WVDC					WVDC							
	Cap Code	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
12pF	120																															
15	150																															
18	180																															
22	220																															
27	270																															
33	330																															
39	390																															
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5600	562																															
6800	682																															
8200	822																															
0.010uF	103																															
0.012	123																															
0.015	153																															
0.018	183																															
0.022	223																															
0.027	273																															
0.033	333																															
0.039	393																															
0.047	473																															
0.056	563																															
0.068	683																															
0.082	823																															
0.10	104																															
0.12	124																															
0.15	154																															

COG DIELECTRIC

[illegible]

X7R DIELECTRIC

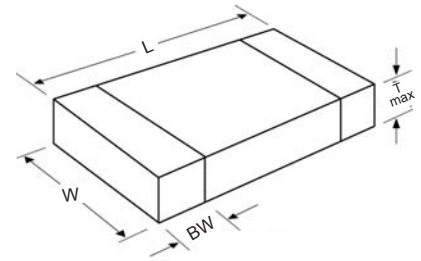
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High Voltage Ceramic Chip (+125°C) Military Equivalent

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 available as described in MIL-PRF-49467.
3. Group A and B screening per MIL-PRF-49467 available. - TCVC exceptions apply.
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, bandwidth dimensions may exceed the standard dimension listed.

CERAMIC CHIP OUTLINE DRAWING

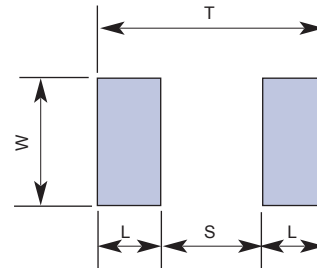


DIMENSIONS

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	5.390	0.232	2.30	0.091	3.70	0.146	1.80	0.071
1825	5.90	0.232	2.30	0.091	6.90	0.272	1.80	0.071
2020	6.50	0.256	2.80	0.110	5.62	0.221	1.85	0.073
2225	7.00	0.276	3.30	0.130	6.80	0.268	1.85	0.073
2520	8.68	0.342	4.98	0.196	5.62	0.221	1.85	0.073
3333	10.91	0.430	7.11	0.280	9.27	0.365	1.90	0.075
3530	11.51	0.453	7.61	0.300	8.51	0.335	1.95	0.077
4040	12.88	0.507	8.88	0.350	11.05	0.435	2.00	0.079
4540	14.21	0.559	10.15	0.400	11.05	0.435	2.03	0.080
5440	16.51	0.650	10.41	0.410	11.05	0.435	3.05	0.120
5550	18.92	0.745	12.82	0.505	13.59	0.535	3.05	0.120
6560	19.80	0.780	13.20	0.520	16.13	0.635	3.30	0.130



PART NUMBER AND ORDERING INFORMATION

4540 B 472 M 202 P M

Style
1515, 2020, etc.

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

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

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

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

Terminal Material
P = PdAg
S = Ag
E = Ag/Ni/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.

C0G DIELECTRIC

STYLE		1515	1812	1825	2020	2225	2520	3333	3530
Cap	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 (4.57)	.200 (5.08)	.180(4.57)	.220 (5.59)	.220 (5.59)
	Band Width	0.010-0.030	0.010-0.040	0.010-0.040	0.010-0.040	0.010-0.040	0.030-0.060	0.030-0.060	0.030-0.060
	Cap Code	WVDC				WVDC			
		500 1k 2k 3k	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	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								
0.010uF	103								
0.012	123								
0.015	153								
0.018	183								
0.022	223								

High Voltage Ceramic Chip (+125°C) Military Equivalent

COG DIELECTRIC

STYLE		4040					4540					5440					5550					6560							
Cap	L	.400 ± .030 (10.16 ± .76)					.450 ± .030 (11.43 ± .76)					0.540 ± .030 (13.72 ± .76)					.550 ± .030 (13.97 ± .76)					.650 ± .030 (16.51 ± .76)							
	W	.400 ± .030 (10.16 ± .76)					.400 ± .030 (10.16 ± .76)					.400 ± .030 (10.16 ± .76)					.500 ± .030 (12.70 ± .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	0.030 - 0.060					0.030 - 0.060					0.030 - 0.060					0.030 - 0.060					0.030 - 0.060							
	Cap Code	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
15pF	150																												
18	180																												
22	220																												
27	270																												
33	330																												
39	390																												
47	470																												
56	560																												
68	680																												
82	820																												
100	101																												
120	121																												
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2200	222																												
2700	272																												
3300	332																												
3900	392																												
4700	472																												
5600	562																												
6800	682																												
8200	822																												
0.010uF	103																												
0.012	123																												
0.015	153																												
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0.033	333																												
0.039	393																												
0.047	473																												
0.056	563																												
0.068	683																												
0.082	823																												
0.10	104																												

X7R DIELECTRIC

[illegible]

X7R DIELECTRIC

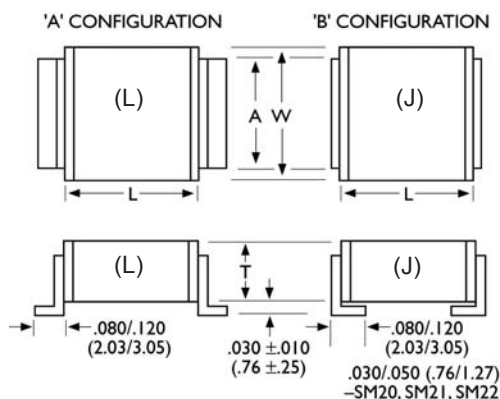
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FEATURES

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

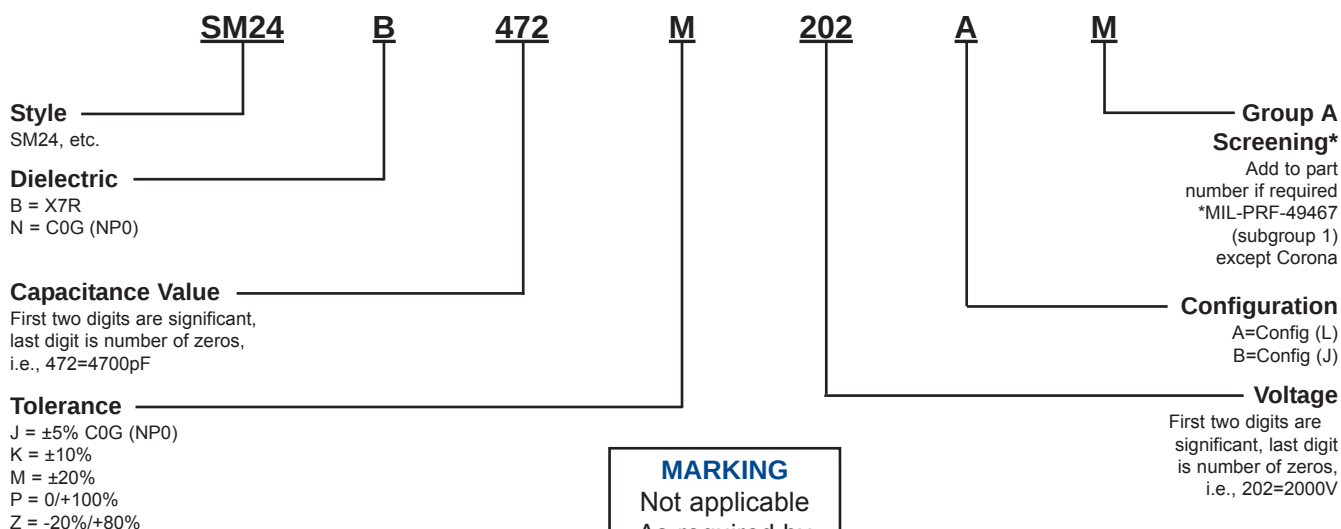
STANDARD



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



C0G DIELECTRIC

45

COG DIELECTRIC

[illegible]

High Voltage L and J Leaded Ceramic Capacitor SM Series

X7R DIELECTRIC

STYLE		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	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							
0.01uF	103							
0.012	123							
0.015	153							
0.018	183							
0.022	223							
0.027	273							
0.033	333							
0.039	393							
0.047	473							
0.056	563							
0.068	683							
0.082	823							
0.10	104							
0.12	124							
0.15	154							
0.18	184							
0.22	224							
0.27	274							
0.33	334							
0.39	394							
0.47	474							
0.56	564							
0.68	684							
0.82	824							
1.0	105							
1.2	125							
1.5	155							
1.8	185							
2.2	225							
2.7	275							

X7R DIELECTRIC

STYLE	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 (10.20 ± .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
	500 1k 2k 3k 4k	500 1k 2k 3k 4k 5k	500 1k 2k 3k 4k 5k 7.5k	500 1k 2k 3k 4k 5k 7.5k 10k	500 1k 2k 3k 4k 5k 7.5k 10k	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					
0.01uF	103					
0.012	123					
0.015	153					
0.018	183					
0.022	223					
0.027	273					
0.033	333					
0.039	393					
0.047	473					
0.056	563					
0.068	683					
0.082	823					
0.10	104					
0.12	124					
0.15	154					
0.18	184					
0.22	224					
0.27	274					
0.33	334					
0.39	394					
0.47	474					
0.56	564					
0.68	684					
0.82	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					



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