

Multilayer ceramic capacitors are available in a variety of physical sizes and configurations, including leaded devices and surface mounted chips. Leaded styles include molded and conformally coated parts with axial and radial leads. However, the basic capacitor element is similar for all styles. It is called a chip and consists of formulated dielectric materials which have been cast into thin layers, interspersed with metal electrodes alternately exposed on opposite

edges of the laminated structure. The entire structure is fired at high temperature to produce a monolithic block which provides high capacitance values in a small physical volume. After firing, conductive terminations are applied to opposite ends of the chip to make contact with the exposed electrodes. Termination materials and methods vary depending on the intended use.

TEMPERATURE CHARACTERISTICS

Ceramic dielectric materials can be formulated with a wide range of characteristics. The EIA standard for ceramic dielectric capacitors (RS-198) divides ceramic dielectrics into the following classes:

Class I: Temperature compensating capacitors, suitable for resonant circuit application or other applications where high Q and stability of capacitance characteristics are required. Class I capacitors have predictable temperature coefficients and are not affected by voltage, frequency or time. They are made from materials which are not ferro-electric, yielding superior stability but low volumetric efficiency. Class I capacitors are the most stable type available, but have the lowest volumetric efficiency.

Class II: Stable capacitors, suitable for bypass or coupling applications or frequency discriminating circuits where Q and stability of capacitance characteristics are not of a major importance. Class II capacitors have temperature characteristics of $\pm 15\%$ or less. They are made from materials which are ferro-electric, yielding higher volumetric efficiency but less stability. Class II capacitors are affected by temperature, voltage, frequency and time.

Class III: General purpose capacitors, suitable for by-pass coupling or other applications in which dielectric losses, high insulation resistance and stability of capacitance characteristics are of little or no importance. Class III capacitors are similar to Class II capacitors except for temperature characteristics, which are greater than $\pm 15\%$. Class III capacitors have the highest volumetric efficiency and poorest stability of any type.

KEMET leaded ceramic capacitors are offered in the three most popular temperature characteristics:

C0G: Class I, with a temperature coefficient of 0 ± 30 ppm per degree C over an operating temperature range of -55°C to $+125^\circ\text{C}$ (Also known as "NP0").

X7R: Class II, with a maximum capacitance change of $\pm 15\%$ over an operating temperature range of -55°C to $+125^\circ\text{C}$.

Z5U: Class III, with a maximum capacitance change of $+22\% - 56\%$ over an operating temperature range of $+10^\circ\text{C}$ to $+85^\circ\text{C}$.

Specified electrical limits for these three temperature characteristics are shown in Table 1.

SPECIFIED ELECTRICAL LIMITS

PARAMETER	TEMPERATURE CHARACTERISTICS		
	C0G	X7R	Z5U
Dissipation Factor: Measured at following conditions: C0G — 1 kHz and 1 vrms if capacitance > 1000 pF 1 MHz and 1 vrms if capacitance ≤ 1000 pF X7R — 1 kHz and 1 vrms* Z5U — 1 kHz and 0.5 vrms	0.15%	2.5%	4.0%
Dielectric Strength: 2.5 times rated DC voltage.	Pass Subsequent IR Test		
Insulation Resistance (IR): At rated DC voltage, whichever of the two is smaller	1,000 M Ω - μ F or 100 G Ω	1,000 M Ω - μ F or 100 G Ω	1,000 M Ω - μ F or 10 G Ω
Temperature Characteristics: Range, $^\circ\text{C}$ Capacitance Change without DC voltage	-55 to 125 0 ± 30 ppm/ $^\circ\text{C}$	-55 to 125 $\pm 15\%$	$+10$ to 85 $+22\%, -56\%$

* 1 MHz and 1 vrms if capacitance ≤ 100 pF on military product.

Table I

GENERAL SPECIFICATIONS

Working Voltage:	Axial	Radial
C0G	50 & 100 volts	100 & 200 volts
X7R	50 & 100 volts	50, 100 & 200 volts
Z5U	50 & 100 volts	50 & 100 volts

Temperature Characteristics:

C0G	0 ± 30 PPM/°C from - 55°C to + 125°C ⁽¹⁾
X7R	± 15% from - 55°C to + 125°C
Z5U	+ 22%; - 56% from + 10°C to + 85°C

Capacitance Tolerance:

C0G	± 5%, ± 10%, ± 20%
X7R	± 10%, ± 20%
Z5U	± 20%, - 20 + 80%, - 0 + 100%

Construction:

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

Lead Material:

Solder Coated Copper Clad Steel

Solderability:

EIA RS-198D, Method 302, Solder temperature - 230° ± 5°C. Dwell time in solder - 7 ± 1/2 seconds.

Terminal Strength:

EIA RS-198D, Method 303, Condition A (2.2 kg)

ELECTRICAL @ 25°C

Capacitance:

Within specified tolerance at 25°C and following test conditions.
C0G - Greater than 1000 pF with 1.0 vrms at 1 kHz.
- 1000 pF and less with 1.0 vrms at 1 MHz.
X7R - with 1.0 vrms at 1 kHz.
Z5U - with 0.5 vrms at 1 kHz.

Dissipation Factor:

At 25°C - same test conditions as capacitance.
C0G - 0.15% maximum
X7R - 2.5% maximum
Z5U - 4.0% maximum

Insulation Resistance:

EIA RS-198D, Method 104, Condition A
C0G - 100 gigohms or 1000 megohm x μF, whichever is less.
X7R - 100 gigohms or 1000 megohm x μF, whichever is less.
Z5U - 10 gigohms or 1000 megohm x μF, whichever is less.

Dielectric Withstanding Voltage:

EIA RS-198D, Method 103 (250% of rated voltage for 5 seconds, with current limited to 50mA)

ENVIRONMENTAL

Vibration:

EIA RS-198D, Method 304, Condition D (10-2000 Hz; 20g)

Shock:

EIA RS-198D, Method 305, Condition I (100g)

Life Test:

EIA RS-198D, Method 201, Condition D. Test Potential and Temperature.

C0G- 200% of rated voltage at + 125°C
X7R - 200% of rated voltage at + 125°C
Z5U - 200% of rated voltage at + 85°C

Post-Test Limits at + 25°C are:

Capacitance Change:

C0G - ± 3%, or 0.25 pF, whichever is greater.
X7R - ± 20% of initial value. ⁽²⁾
Z5U - ± 30% of initial value. ⁽²⁾

Dissipation Factor:

C0G - 0.25% maximum
X7R - 3.0% maximum
Z5U - 4.0% maximum

Insulation Resistance:

C0G - 10 gigohms or 100 megohm x μF, whichever is less.
X7R - 10 gigohms or 100 megohm x μF, whichever is less.
Z5U - 1 gigohm or 100 megohm x μF, whichever is less.

Moisture Resistance:

EIA RS-198D, Method 204, Condition A (10 cycles without applied voltage.

Post-Test Limits at + 25°C are:

Capacitance Change:

C0G - 3%, or 0.25 pF, whichever is greater.
X7R - ± 20% of initial value. ⁽²⁾
Z5U - ± 30% of initial value. ⁽²⁾

Dissipation Factor:

C0G - 0.25% maximum
X7R - 3.0% maximum
Z5U - 4.0% maximum

Insulation Resistance:

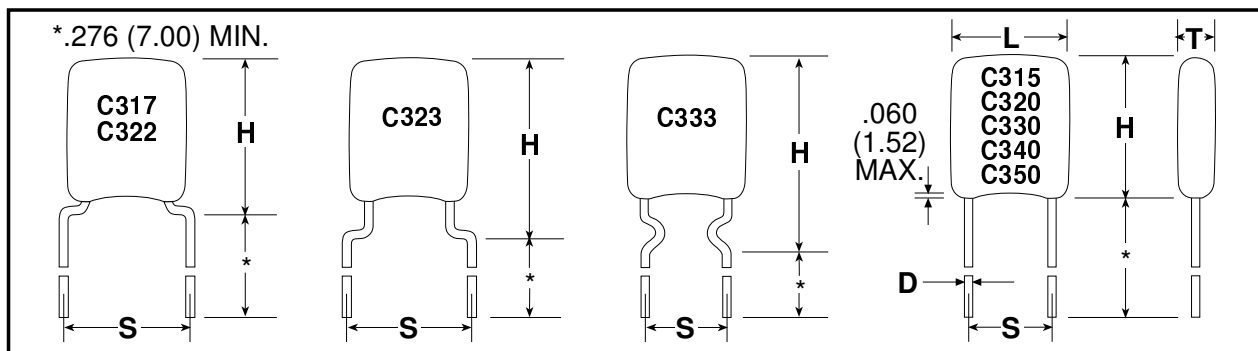
C0G - 10 gigohms or 100 megohm x μF, whichever is less.
X7R - 10 gigohms or 100 megohm x μF, whichever is less.
Z5U - 1 gigohm or 100 megohm x μF, whichever is less.

Thermal Shock:

EIA RS-198D, Method 202, Condition B (C0G & X7R: - 55°C to + 125°C; Z5U: - 55°C to + 85°C)

- (1) +53 ppm -30 ppm/°C from + 25°C to - 55°C, ± 60 ppm below 10 pF.
- (2) X7R & Z5U 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.

STANDARD LEAD CONFIGURATION — OUTLINE DRAWINGS



Drawings are not to scale. See table below for dimensions.

See page 9 for optional lead configurations.

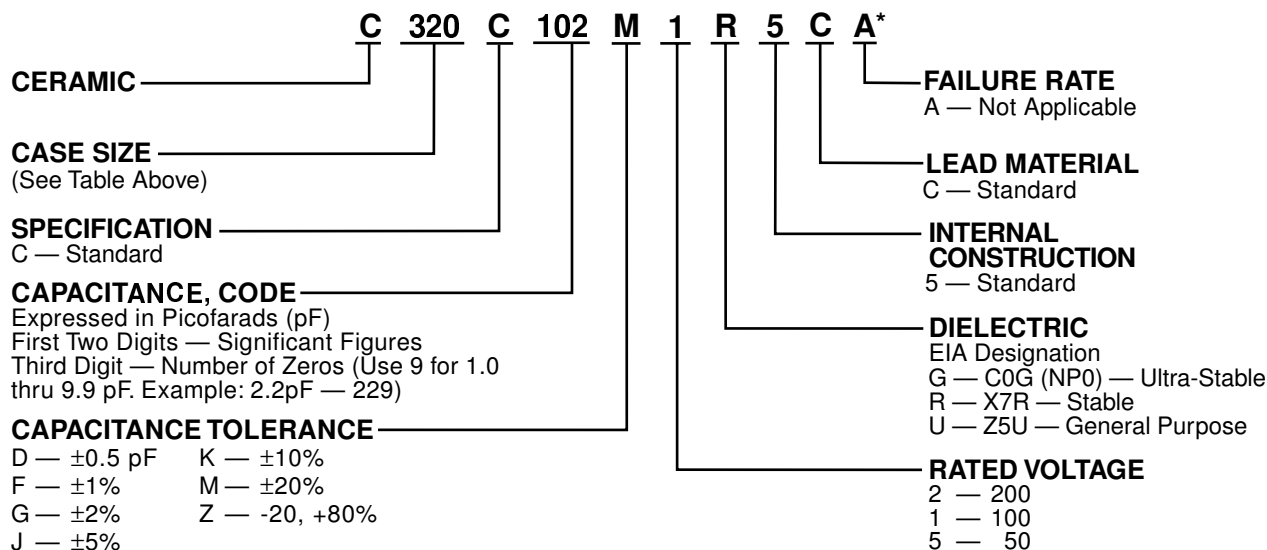
DIMENSIONS — INCHES & MILLIMETERS

CASE SIZE	L MAX.	H MAX.	T MAX.	S(1) ±.030	D +.004 - .001
C315	.150 (3.81)	.210 (5.33)	.100 (2.54)	.100 (2.54)	.020 (.51)
C317	.150 (3.81)	.230 (5.84)	.100 (2.54)	.200 (5.08)	.020 (.51)
C320	.200 (5.08)	.260 (6.60)	.125 (3.18)	.100 (2.54)	.020 (.51)
C322	.200 (5.08)	.260 (6.60)	.125 (3.18)	.200 (5.08)	.020 (.51)
C323	.200 (5.08)	.320 (8.13)	.125 (3.18)	.200 (5.08)	.020 (.51)
C330	.300 (7.62)	.360 (9.14)	.150 (3.81)	.200 (5.08)	.020 (.51)
C333	.300 (7.62)	.390 (9.91)	.150 (3.81)	.200 (5.08)	.020 (.51)
C340	.400 (10.16)	.460 (11.68)	.150 (3.81)	.200 (5.08)	.020 (.51)
C350	.500 (12.70)	.560 (14.22)	.200 (5.08)	.400 (10.16)	.025 (.64)

NOTE: 1 inch = 25.4 mm.

NOTE: (1) Measured at seating plane.

ORDERING INFORMATION



*Part Number Example: C320C102M1R5CA (14 digits – no spaces)

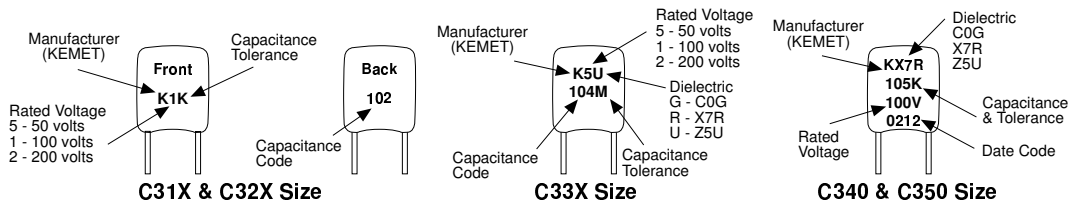
For packaging information, see pages 33 and 34.

OPTIONAL CONFIGURATIONS BY LEAD SPACING

The preferred lead wire configurations are shown on page 8. However, additional configurations are available. All available options, including those on page 8, are shown below grouped by lead spacing.

Lead Spacing .100" ± .030	C 3 1 5 	C 3 1 6 	C 3 2 0 	C 3 2 4 	C 3 2 6
	C 3 1 7 	C 3 1 8 	C 3 2 2 	C 3 2 3 	
Lead Spacing .200" ± .030	C 3 2 5 	C 3 2 7 	C 3 2 8 		
	C 3 3 0 	C 3 3 3 	C 3 3 5 	C 3 3 6 	C 3 4 0
Lead Spacing .250" ± .030	C 3 2 1 	C 3 3 1 	Lead Spacing .400" ± .030		C 3 5 0
					C 3 5 6

CAPACITOR MARKINGS



RATINGS & PART NUMBER REFERENCE: ULTRA-STABLE TEMPERATURE CHARACTERISTICS — C0G

CAPACITANCE	KEMET PART NUMBER
200 VOLT — C31X SIZE	
1.0 pF	C31(1)C109(3)2G5CA
1.5 pF	C31(1)C159(3)2G5CA
2.2 pF	C31(1)C229(3)2G5CA
2.7 pF	C31(1)C279(3)2G5CA
3.3 pF	C31(1)C339(3)2G5CA
3.9 pF	C31(1)C399(3)2G5CA
4.7 pF	C31(1)C479(3)2G5CA
5.6 pF	C31(1)C569(3)2G5CA
6.8 pF	C31(1)C689(3)2G5CA
8.2 pF	C31(1)C829(3)2G5CA
10 pF	C31(1)C100(3)2G5CA
12 pF	C31(1)C120(3)2G5CA
15 pF	C31(1)C150(3)2G5CA
18 pF	C31(1)C180(3)2G5CA
22 pF	C31(1)C220(3)2G5CA
27 pF	C31(1)C270(3)2G5CA
33 pF	C31(1)C330(3)2G5CA
39 pF	C31(1)C390(3)2G5CA
47 pF	C31(1)C470(3)2G5CA
56 pF	C31(1)C560(3)2G5CA
68 pF	C31(1)C680(3)2G5CA
82 pF	C31(1)C820(3)2G5CA
100 pF	C31(1)C101(3)2G5CA
120 pF	C31(1)C121(3)2G5CA
150 pF	C31(1)C151(3)2G5CA
180 pF	C31(1)C181(3)2G5CA
220 pF	C31(1)C221(3)2G5CA
270 pF	C31(1)C271(3)2G5CA
330 pF	C31(1)C331(3)2G5CA
390 pF	C31(1)C391(3)2G5CA
470 pF	C31(1)C471(3)2G5CA
200 VOLT — C32X SIZE	
1.0 pF	C32(2)C109(3)2G5CA
1.5 pF	C32(2)C159(3)2G5CA
2.2 pF	C32(2)C229(3)2G5CA
2.7 pF	C32(2)C279(3)2G5CA
3.3 pF	C32(2)C339(3)2G5CA
3.9 pF	C32(2)C399(3)2G5CA
4.7 pF	C32(2)C479(3)2G5CA
5.6 pF	C32(2)C569(3)2G5CA
6.8 pF	C32(2)C689(3)2G5CA
8.2 pF	C32(2)C829(3)2G5CA
10 pF	C32(2)C100(3)2G5CA
12 pF	C32(2)C120(3)2G5CA
15 pF	C32(2)C150(3)2G5CA
18 pF	C32(2)C180(3)2G5CA
22 pF	C32(2)C220(3)2G5CA
27 pF	C32(2)C270(3)2G5CA
33 pF	C32(2)C330(3)2G5CA
39 pF	C32(2)C390(3)2G5CA

CAPACITANCE	KEMET PART NUMBER
200 VOLT — C32X SIZE (Cont'd)	
47 pF	C32(2)C470(3)2G5CA
56 pF	C32(2)C560(3)2G5CA
68 pF	C32(2)C680(3)2G5CA
82 pF	C32(2)C820(3)2G5CA
100 pF	C32(2)C101(3)2G5CA
120 pF	C32(2)C121(3)2G5CA
150 pF	C32(2)C151(3)2G5CA
180 pF	C32(2)C181(3)2G5CA
220 pF	C32(2)C221(3)2G5CA
270 pF	C32(2)C271(3)2G5CA
330 pF	C32(2)C331(3)2G5CA
390 pF	C32(2)C391(3)2G5CA
470 pF	C32(2)C471(3)2G5CA
560 pF	C32(2)C561(3)2G5CA
680 pF	C32(2)C681(3)2G5CA
820 pF	C32(2)C821(3)2G5CA
1,000 pF	C32(2)C102(3)2G5CA
1,200 pF	C32(2)C122(3)2G5CA
1,500 pF	C32(2)C152(3)2G5CA
1,800 pF	C32(2)C182(3)2G5CA
2,200 pF	C32(2)C222(3)2G5CA
2,700 pF	C32(2)C272(3)2G5CA
3,300 pF	C32(2)C332(3)2G5CA
200 VOLT — C33X SIZE	
2,700 pF	C33(4)C272(3)2G5CA
3,300 pF	C33(4)C332(3)2G5CA
3,900 pF	C33(4)C392(3)2G5CA
4,700 pF	C33(4)C472(3)2G5CA
5,600 pF	C33(4)C562(3)2G5CA
6,800 pF	C33(4)C682(3)2G5CA
8,200 pF	C33(4)C822(3)2G5CA
.01 µF	C33(4)C103(3)2G5CA
.012 µF	C33(4)C123(3)2G5CA
.015 µF	C33(4)C153(3)2G5CA
.018 µF	C33(4)C183(3)2G5CA
200 VOLT — C340 SIZE	
.018 µF	C340C183(3)2G5CA
.022 µF	C340C223(3)2G5CA
.027 µF	C340C273(3)2G5CA
.033 µF	C340C333(3)2G5CA
.039 µF	C340C393(3)2G5CA
.047 µF	C340C473(3)2G5CA
200 VOLT — C350 SIZE	
.039 µF	C350C393(3)2G5CA
.047 µF	C350C473(3)2G5CA
.056 µF	C350C563(3)2G5CA
.068 µF	C350C683(3)2G5CA

CAPACITANCE	KEMET PART NUMBER
100 VOLT — C31X SIZE	
120 pF	C31(1)C121(3)1G5CA
150 pF	C31(1)C151(3)1G5CA
180 pF	C31(1)C181(3)1G5CA
220 pF	C31(1)C221(3)1G5CA
270 pF	C31(1)C271(3)1G5CA
330 pF	C31(1)C331(3)1G5CA
390 pF	C31(1)C391(3)1G5CA
470 pF	C31(1)C471(3)1G5CA
560 pF	C31(1)C561(3)1G5CA
680 pF	C31(1)C681(3)1G5CA
820 pF	C31(1)C821(3)1G5CA
1,000 pF	C31(1)C102(3)1G5CA
100 VOLT — C32X SIZE	
680 pF	C32(2)C681(3)1G5CA
820 pF	C32(2)C821(3)1G5CA
1,000 pF	C32(2)C102(3)1G5CA
1,200 pF	C32(2)C122(3)1G5CA
1,500 pF	C32(2)C152(3)1G5CA
1,800 pF	C32(2)C182(3)1G5CA
2,200 pF	C32(2)C222(3)1G5CA
2,700 pF	C32(2)C272(3)1G5CA
3,300 pF	C32(2)C332(3)1G5CA
3,900 pF	C32(2)C392(3)1G5CA
4,700 pF	C32(2)C472(3)1G5CA
5,600 pF	C32(2)C562(3)1G5CA
100 VOLT — C33X SIZE	
3,300 pF	C33(4)C332(3)1G5CA
3,900 pF	C33(4)C392(3)1G5CA
4,700 pF	C33(4)C472(3)1G5CA
5,600 pF	C33(4)C562(3)1G5CA
6,800 pF	C33(4)C682(3)1G5CA
8,200 pF	C33(4)C822(3)1G5CA
.01 µF	C33(4)C103(3)1G5CA
.012 µF	C33(4)C123(3)1G5CA
.015 µF	C33(4)C153(3)1G5CA
.018 µF	C33(4)C183(3)1G5CA
.022 µF	C33(4)C223(3)1G5CA
.027 µF	C33(4)C273(3)1G5CA
100 VOLT — C340 SIZE	
.027 µF	C340C273(3)1G5CA
.033 µF	C340C333(3)1G5CA
.039 µF	C340C393(3)1G5CA
.047 µF	C340C473(3)1G5CA
.056 µF	C340C563(3)1G5CA
.068 µF	C340C683(3)1G5CA
100 VOLT — C350 SIZE	
.039 µF	C350C393(3)1G5CA
.047 µF	C350C473(3)1G5CA
.056 µF	C350C563(3)1G5CA
.068 µF	C350C683(3)1G5CA
.082 µF	C350C823(3)1G5CA
.1 µF	C350C104(3)1G5CA
.12 µF	C350C124(3)1G5CA

- NOTES:** (1) Case Sizes C315/C317 are identical electrically, but differ in lead spacing. See table of dimensions. Insert the appropriate symbol, "5" or "7" in the part number.
 (2) Case Sizes C320/C322/C323 are identical electrically. See table of dimensions. Insert the appropriate symbol, "0" or "2" or "3" in the part number.
 (3) Insert proper symbol for capacitance tolerance as follows:
 1.0 pF – 8.2 pF: D – ± 0.5pF
 10 pF – 22 pF: J – ±5%, K – ±10%
 27 pF – 47 pF: G – ±2%, J – ±5%, K – ±10%
 56 pF and up: F – ±1%, G – ±2%, J – ±5%
 (4) Case Sizes C330 and C333 are identical electrically. Insert the appropriate symbol "0" or "3" in the part number.

RATINGS & PART NUMBER REFERENCE: STABLE TEMPERATURE CHARACTERISTICS — X7R

CAPACITANCE	KEMET PART NUMBER
200 VOLT — C31X SIZE	
100 pF	C31(1)C101(3)2R5CA
120 pF	C31(1)C121(3)2R5CA
150 pF	C31(1)C151(3)2R5CA
180 pF	C31(1)C181(3)2R5CA
220 pF	C31(1)C221(3)2R5CA
270 pF	C31(1)C271(3)2R5CA
330 pF	C31(1)C331(3)2R5CA
390 pF	C31(1)C391(3)2R5CA
470 pF	C31(1)C471(3)2R5CA
560 pF	C31(1)C561(3)2R5CA
680 pF	C31(1)C681(3)2R5CA
820 pF	C31(1)C821(3)2R5CA
1,000 pF	C31(1)C102(3)2R5CA
1,200 pF	C31(1)C122(3)2R5CA
1,500 pF	C31(1)C152(3)2R5CA
1,800 pF	C31(1)C182(3)2R5CA
2,200 pF	C31(1)C222(3)2R5CA
200 VOLT — C32X SIZE	
1,000 pF	C32(2)C102(3)2R5CA
1,200 pF	C32(2)C122(3)2R5CA
1,500 pF	C32(2)C152(3)2R5CA
1,800 pF	C32(2)C182(3)2R5CA
2,200 pF	C32(2)C222(3)2R5CA
2,700 pF	C32(2)C272(3)2R5CA
3,300 pF	C32(2)C332(3)2R5CA
3,900 pF	C32(2)C392(3)2R5CA
4,700 pF	C32(2)C472(3)2R5CA
5,600 pF	C32(2)C562(3)2R5CA
6,800 pF	C32(2)C682(3)2R5CA
8,200 pF	C32(2)C822(3)2R5CA
.01 µF	C32(2)C103(3)2R5CA
.012 µF	C32(2)C123(3)2R5CA
.015 µF	C32(2)C153(3)2R5CA
.018 µF	C32(2)C183(3)2R5CA
.022 µF	C32(2)C223(3)2R5CA
200 VOLT — C33X SIZE	
.015 µF	C33(4)C153(3)2R5CA
.018 µF	C33(4)C183(3)2R5CA
.022 µF	C33(4)C223(3)2R5CA
.027 µF	C33(4)C273(3)2R5CA
.033 µF	C33(4)C333(3)2R5CA
.039 µF	C33(4)C393(3)2R5CA
.047 µF	C33(4)C473(3)2R5CA
.056 µF	C33(4)C563(3)2R5CA
.068 µF	C33(4)C683(3)2R5CA
.082 µF	C33(4)C823(3)2R5CA
.1 µF	C33(4)C104(3)2R5CA
200 VOLT — C340 SIZE	
.1 µF	C340C104(3)2R5CA
.12 µF	C340C124(3)2R5CA
.15 µF	C340C154(3)2R5CA
.18 µF	C340C184(3)2R5CA
.22 µF	C340C224(3)2R5CA
.27 µF	C340C274(3)2R5CA
200 VOLT — C350 SIZE	
.22 µF	C350C224(3)2R5CA
.27 µF	C350C274(3)2R5CA
.33 µF	C350C334(3)2R5CA
.39 µF	C350C394(3)2R5CA
.47 µF	C350C474(3)2R5CA

CAPACITANCE	KEMET PART NUMBER
100 VOLT — C31X SIZE	
820 pF	C31(1)C821(3)1R5CA
1,000 pF	C31(1)C102(3)1R5CA
1,200 pF	C31(1)C122(3)1R5CA
1,500 pF	C31(1)C152(3)1R5CA
1,800 pF	C31(1)C182(3)1R5CA
2,200 pF	C31(1)C222(3)1R5CA
2,700 pF	C31(1)C272(3)1R5CA
3,300 pF	C31(1)C332(3)1R5CA
3,900 pF	C31(1)C392(3)1R5CA
4,700 pF	C31(1)C472(3)1R5CA
5,600 pF	C31(1)C562(3)1R5CA
6,800 pF	C31(1)C682(3)1R5CA
8,200 pF	C31(1)C822(3)1R5CA
.01 µF	C31(1)C103(3)1R5CA
100 VOLT — C32X SIZE	
4,700 pF	C32(2)C472(3)1R5CA
5,600 pF	C32(2)C562(3)1R5CA
6,800 pF	C32(2)C682(3)1R5CA
8,200 pF	C32(2)C822(3)1R5CA
.01 µF	C32(2)C103(3)1R5CA
.012 µF	C32(2)C123(3)1R5CA
.015 µF	C32(2)C153(3)1R5CA
.018 µF	C32(2)C183(3)1R5CA
.022 µF	C32(2)C223(3)1R5CA
.027 µF	C32(2)C273(3)1R5CA
.033 µF	C32(2)C333(3)1R5CA
.039 µF	C32(2)C393(3)1R5CA
.047 µF	C32(2)C473(3)1R5CA
.056 µF	C32(2)C563(3)1R5CA
.068 µF	C32(2)C683(3)1R5CA
.082 µF	C32(2)C823(3)1R5CA
.1 µF	C32(2)C104(3)1R5CA
100 VOLT — C33X SIZE	
.068 µF	C33(4)C683(3)1R5CA
.082 µF	C33(4)C823(3)1R5CA
.1 µF	C33(4)C104(3)1R5CA
.12 µF	C33(4)C124(3)1R5CA
.15 µF	C33(4)C154(3)1R5CA
.18 µF	C33(4)C184(3)1R5CA
.22 µF	C33(4)C224(3)1R5CA
.27 µF	C33(4)C274(3)1R5CA
.33 µF	C33(4)C334(3)1R5CA
.39 µF	C33(4)C394(3)1R5CA
.47 µF	C33(4)C474(3)1R5CA
100 VOLT — C340 SIZE	
.47 µF	C340C474(3)1R5CA
.56 µF	C340C564(3)1R5CA
.68 µF	C340C684(3)1R5CA
.82 µF	C340C824(3)1R5CA
1.0 µF	C340C105(3)1R5CA
100 VOLT — C350 SIZE	
.68 µF	C350C684(3)1R5CA
.82 µF	C350C824(3)1R5CA
1.0 µF	C350C105(3)1R5CA
1.2 µF	C350C125(3)1R5CA

CAPACITANCE	KEMET PART NUMBER
50 VOLT — C31X SIZE	
3,300 pF	C31(1)C332(3)5R5CA
3,900 pF	C31(1)C392(3)5R5CA
4,700 pF	C31(1)C472(3)5R5CA
5,600 pF	C31(1)C562(3)5R5CA
6,800 pF	C31(1)C682(3)5R5CA
8,200 pF	C31(1)C822(3)5R5CA
.01 µF	C31(1)C103(3)5R5CA
.012 µF	C31(1)C123(3)5R5CA
.015 µF	C31(1)C153(3)5R5CA
.018 µF	C31(1)C183(3)5R5CA
.022 µF	C31(1)C223(3)5R5CA
.027 µF	C31(1)C273(3)5R5CA
.033 µF	C31(1)C333(3)5R5CA
50 VOLT — C32X SIZE	
.012 µF	C32(2)C123(3)5R5CA
.015 µF	C32(2)C153(3)5R5CA
.018 µF	C32(2)C183(3)5R5CA
.022 µF	C32(2)C223(3)5R5CA
.027 µF	C32(2)C273(3)5R5CA
.033 µF	C32(2)C333(3)5R5CA
.039 µF	C32(2)C393(3)5R5CA
.047 µF	C32(2)C473(3)5R5CA
.056 µF	C32(2)C563(3)5R5CA
.068 µF	C32(2)C683(3)5R5CA
.082 µF	C32(2)C823(3)5R5CA
.1 µF	C32(2)C104(3)5R5CA
.12 µF	C32(2)C124(3)5R5CA
.15 µF	C32(2)C154(3)5R5CA
.18 µF	C32(2)C184(3)5R5CA
.22 µF	C32(2)C224(3)5R5CA
.27 µF	C32(2)C274(3)5R5CA
50 VOLT — C33X SIZE	
.15 µF	C33(4)C154(3)5R5CA
.18 µF	C33(4)C184(3)5R5CA
.22 µF	C33(4)C224(3)5R5CA
.27 µF	C33(4)C274(3)5R5CA
.33 µF	C33(4)C334(3)5R5CA
.39 µF	C33(4)C394(3)5R5CA
.47 µF	C33(4)C474(3)5R5CA
.56 µF	C33(4)C564(3)5R5CA
.68 µF	C33(4)C684(3)5R5CA
.82 µF	C33(4)C824(3)5R5CA
1.0 µF	C33(4)C105(3)5R5CA
50 VOLT — C340 SIZE	
1.2 µF	C340C125(3)5R5CA
1.5 µF	C340C155(3)5R5CA
1.8 µF	C340C185(3)5R5CA
2.2 µF	C340C225(3)5R5CA
50 VOLT — C350 SIZE	
2.2 µF	C350C225(3)5R5CA
2.7 µF	C350C275(3)5R5CA
3.3 µF	C350C335(3)5R5CA
3.9 µF	C350C395(3)5R5CA
4.7 µF	C350C475(3)5R5CA

NOTES: (1) Case Sizes C315/C317 are identical electrically, but differ in lead spacing. See table of dimensions. Insert the appropriate symbol, "5" or "7" in the part number.
(2) Case Sizes C320/C322/C323 are identical electrically. See table of dimensions. Insert the appropriate symbol, "0" or "2" or "3" in the part number.
(3) Insert proper symbol for capacitance tolerance as follows: K – ±10%, M – ±20%
(4) Case Sizes C330 and C333 are identical electrically. Insert the appropriate symbol "0" or "3" in the part number.

RATINGS & PART NUMBER REFERENCE

GENERAL PURPOSE TEMPERATURE CHARACTERISTIC — Z5U

CAPACITANCE	KEMET PART NUMBER
100 VOLT — C31X SIZE	
1,000 pF	C31(1)C102(3)1U5CA
1,200 pF	C31(1)C122(3)1U5CA
1,500 pF	C31(1)C152(3)1U5CA
1,800 pF	C31(1)C182(3)1U5CA
2,200 pF	C31(1)C222(3)1U5CA
2,700 pF	C31(1)C272(3)1U5CA
3,300 pF	C31(1)C332(3)1U5CA
3,900 pF	C31(1)C392(3)1U5CA
4,700 pF	C31(1)C472(3)1U5CA
5,600 pF	C31(1)C562(3)1U5CA
6,800 pF	C31(1)C682(3)1U5CA
8,200 pF	C31(1)C822(3)1U5CA
.01 µF	C31(1)C103(3)1U5CA
.012 µF	C31(1)C123(3)1U5CA
.015 µF	C31(1)C153(3)1U5CA
.018 µF	C31(1)C183(3)1U5CA
100 VOLT — C32X SIZE	
.01 µF	C32(2)C103(3)1U5CA
.012 µF	C32(2)C123(3)1U5CA
.015 µF	C32(2)C153(3)1U5CA
.018 µF	C32(2)C183(3)1U5CA
.022 µF	C32(2)C223(3)1U5CA
.027 µF	C32(2)C273(3)1U5CA
.033 µF	C32(2)C333(3)1U5CA
.039 µF	C32(2)C393(3)1U5CA
.047 µF	C32(2)C473(3)1U5CA
.056 µF	C32(2)C563(3)1U5CA
.068 µF	C32(2)C683(3)1U5CA
.082 µF	C32(2)C823(3)1U5CA
.1 µF	C32(2)C104(3)1U5CA
.12 µF	C32(2)C124(3)1U5CA
.15 µF	C32(2)C154(3)1U5CA
100 VOLT — C33X SIZE	
.01 µF	C33(4)C104(3)1U5CA
.12 µF	C33(4)C124(3)1U5CA
.15 µF	C33(4)C154(3)1U5CA
.18 µF	C33(4)C184(3)1U5CA
.22 µF	C33(4)C224(3)1U5CA
.27 µF	C33(4)C274(3)1U5CA
.33 µF	C33(4)C334(3)1U5CA
.39 µF	C33(4)C394(3)1U5CA
.47 µF	C33(4)C474(3)1U5CA
100 VOLT — C340 SIZE	
.47 µF	C340C474(3)1U5CA
.56 µF	C340C564(3)1U5CA
.68 µF	C340C684(3)1U5CA
.82 µF	C340C824(3)1U5CA
1.0 µF	C340C105(3)1U5CA
1.2 µF	C340C125(3)1U5CA
1.5 µF	C340C155(3)1U5CA
100 VOLT — C350 SIZE	
1.0 µF	C350C105(3)1U5CA
1.2 µF	C350C125(3)1U5CA
1.5 µF	C350C155(3)1U5CA
1.8 µF	C350C185(3)1U5CA
2.2 µF	C350C225(3)1U5CA

CAPACITANCE	KEMET PART NUMBER
50 VOLT — C31X SIZE	
4,700 pF	C31(1)C472(3)5U5CA
5,600 pF	C31(1)C562(3)5U5CA
6,800 pF	C31(1)C682(3)5U5CA
8,200 pF	C31(1)C822(3)5U5CA
.01 µF	C31(1)C103(3)5U5CA
.012 µF	C31(1)C123(3)5U5CA
.015 µF	C31(1)C153(3)5U5CA
.018 µF	C31(1)C183(3)5U5CA
.022 µF	C31(1)C223(3)5U5CA
.027 µF	C31(1)C273(3)5U5CA
.033 µF	C31(1)C333(3)5U5CA
.039 µF	C31(1)C393(3)5U5CA
.047 µF	C31(1)C473(3)5U5CA
.056 µF	C31(1)C563(3)5U5CA
.068 µF	C31(1)C683(3)5U5CA
.082 µF	C31(1)C823(3)5U5CA
.1 µF	C31(1)C104(3)5U5CA
50 VOLT — C32X SIZE	
.027 µF	C32(2)C273(3)5U5CA
.033 µF	C32(2)C333(3)5U5CA
.039 µF	C32(2)C393(3)5U5CA
.047 µF	C32(2)C473(3)5U5CA
.056 µF	C32(2)C563(3)5U5CA
.068 µF	C32(2)C683(3)5U5CA
.082 µF	C32(2)C823(3)5U5CA
.1 µF	C32(2)C104(3)5U5CA
.12 µF	C32(2)C124(3)5U5CA
.15 µF	C32(2)C154(3)5U5CA
.18 µF	C32(2)C184(3)5U5CA
.22 µF	C32(2)C224(3)5U5CA
.27 µF	C32(2)C274(3)5U5CA
.33 µF	C32(2)C334(3)5U5CA
.39 µF	C32(2)C394(3)5U5CA
.47 µF	C32(2)C474(3)5U5CA
.56 µF	C32(2)C564(3)5U5CA
50 VOLT — C33X SIZE	
.27 µF	C33(4)C274(3)5U5CA
.33 µF	C33(4)C334(3)5U5CA
.39 µF	C33(4)C394(3)5U5CA
.47 µF	C33(4)C474(3)5U5CA
.56 µF	C33(4)C564(3)5U5CA
.68 µF	C33(4)C684(3)5U5CA
.82 µF	C33(4)C824(3)5U5CA
1.0 µF	C33(4)C105(3)5U5CA
1.2 µF	C33(4)C125(3)5U5CA
1.5 µF	C33(4)C155(3)5U5CA
1.8 µF	C33(4)C185(3)5U5CA
2.2 µF	C33(4)C225(3)5U5CA
50 VOLT — C340 SIZE	
2.2 µF	C340C225(3)5U5CA
2.7 µF	C340C275(3)5U5CA
3.3 µF	C340C335(3)5U5CA
3.9 µF	C340C395(3)5U5CA
4.7 µF	C340C475(3)5U5CA
50 VOLT — C350 SIZE	
3.9 µF	C350C395(3)5U5CA
4.7 µF	C350C475(3)5U5CA
5.6 µF	C350C565(3)5U5CA
6.8 µF	C350C685(3)5U5CA

- NOTES:** (1) Case Sizes C315/C317 are identical electrically, but differ in lead spacing. See table of dimensions. Insert the appropriate symbol, "5" or "7" in the part number.
- (2) Case Sizes C320/C322/C323 are identical electrically. See table of dimensions. Insert the appropriate symbol, "0" or "2" or "3" in the part number.
- (3) Insert proper symbol for capacitance tolerance as follows:
M — ±20%
Z — +80%, -20%
- (4) Case Sizes C330 and C333 are identical electrically. Insert the appropriate symbol "0" or "3" in the part number.

Ceramic Radial Lead Tape and Reel Packaging

KEMET offers standard reeling of Molded and Conformally Coated Radial Leaded Ceramic Capacitors for automatic insertion per EIA specification RS-468. Parts are taped to a tagboard carrier strip, and wound on a reel as shown in Figure 1. Kraft paper interleaving is inserted between the layers of capacitors on the reel. Ammopack is also available, with the same lead tape configuration and package quantities.

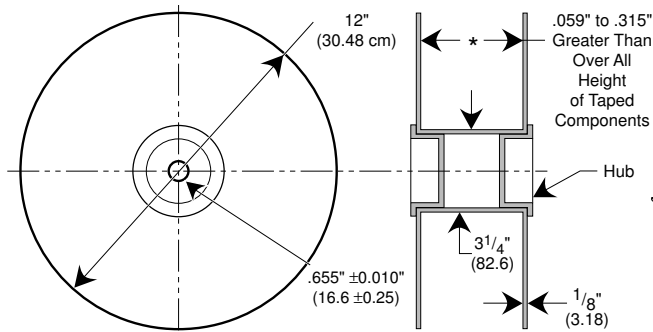


Figure 3: Standard Reel

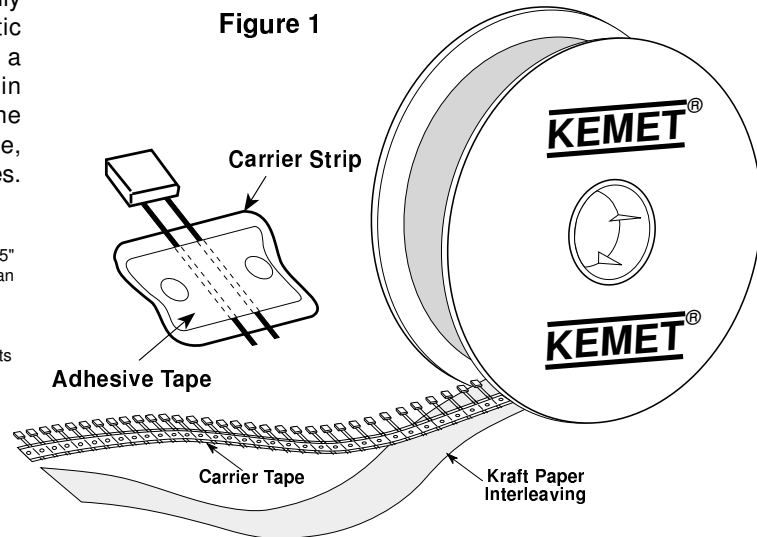


Figure 1

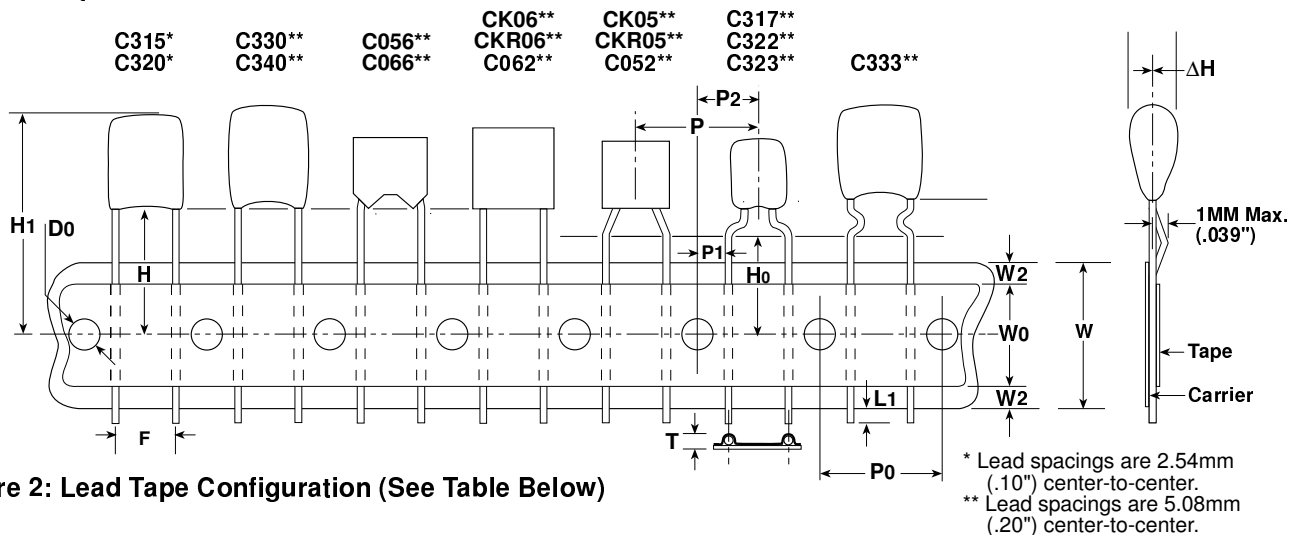


Figure 2: Lead Tape Configuration (See Table Below)

Ceramic Radial Tape and Reel Dimensions in Millimeters & (Inches)

Dimension	Symbol	Nominal mm (inch)	Tolerance mm (inch)	Dimension	Symbol	Nominal mm (inch)	Tolerance mm (inch)
Sprocket Hole Diameter	Do	4.0 (.157)	± 0.2 (.008)	Height to Seating Plane (formed leads) (2)	H0	C7301 C7303 16.0 (.630) 18.0 (.709)	C7301 C7303 ±0.5 (.020) Minimum
Sprocket Hole Pitch	P0	12.7 (.500)	± 0.3 (.012)	Component Alignment	Δh	4.0 (.157)	±0.2 (.008)
Component Pitch	P	12.7 (.500)	± 0.3 (.012)	Lead Protrusion	L1	1.0 (.039)	Maximum
Lead Spacing (1)	F	5.08 (.20) 2.54 (.10)	+0.6 -0.2 (+.024 -.008)	Composite Tape Thickness	t	0.7 (.051)	±0.2 (.008)
Sprocket Hole Center to Lead Center (1)	P1	3.81 (.150) 5.08 (.200)	± 0.7 (.028)	Overall Tape and Lead Thickness	T	1.5 (.059)	Maximum
Sprocket Hole Center to Component Center	P2	6.35 (.250)	± 1.3 (.051)	Carrier Tape Width	W	18.0 (.709)	+1.0 - 0.5 (+.039 -.020)
Height to Seating Plane (straight leads) (2)	H	C7301 C7303 16.0 (.630) 18.0 (.709)	C7301 C7303 ±0.5 (.020) Minimum	Hold-Down Tape Width	W0	5.0 (.197)	Minimum
Component Height Above Tape Center	H1	32.2 (1.27)	Maximum	Hold-Down Tape Location	W2	3.0 (.118)	Maximum

(1) Measured at the egress from the carrier tape, on the component side.

(2) Determined by a 4 digit suffix placed at the end of the part number, as follows:

7301 = Recommended for parts with formed leads.

7303 = Recommended for parts with straight leads.

Example: C322C104K5R5CA7301

Example: C320C104K5R5CA7303

CERAMIC PACKAGING					
KEMET Number	Military Style	Military Specification	Standard (1) Bulk Quantity	Standard Reel Quantity	Reel Size
C114C-K-G	CK12, CC75	MIL-C-11015/ MIL-PRF-20	200/Box	5000	12"
C124C-K-G	CK13, CC76		200/Box	5000	12"
C192C-K-G	CK14, CC77		100/Box	3000	12"
C202C-K	CK15		25/Box	500	12"
C222C-K	CK16		10/Tray	300	12"
C052C-K-G	CK05, CC05		100/Bag	2000	12"
C062C-K-G	CK06, CC06		100/Bag	1500	12"
C114G	CCR75	MIL-PRF-20	200/Box	5000	12"
C124G	CCR76		200/Box	5000	12"
C192G	CCR77		100/Box	3000	12"
C202G	CC78-CCR78		25/Box	500	12"
C222G	CC79-CCR79		10/Tray	300	12"
C052/56G	CCR05		100/Bag	1700	12"
C062/66G	CCR06		100/Bag	1500	12"
C512G	CC07-CCR07		Footnote (2)	N/A	N/A
C522G	CC08-CCR08		Footnote (2)	N/A	N/A
C114T	CKR11	MIL-PRF-39014	200/Box	5000	12"
C124T	CKR12		200/Box	5000	12"
C192T	CKR14		100/Box	3000	12"
C202T	CKR15		25/Box	500	12"
C222T	CKR16		10/Tray	300	12"
C052/56T	CKR05		100/Bag	1700	12"
C062/66T	CKR06		100/Bag	1500	12"
C31X			500/Bag	2500	12"
C32X			500/Bag	2500	12"
C33X			250/Bag	1500	12"
C340			100/Bag	1000	12"
C350			50/Bag	N/A	N/A
C410			300/Box	5000	12"
C412			200/Box	5000	12"
C420			300/Box	5000	12"
C430			200/Box	2500	12"
C440			200/Box	2500	12"
C512	N/A	N/A	Footnote (2)	N/A	N/A
C522	N/A	N/A	Footnote (2)	N/A	N/A

NOTE: (1) Standard packaging refers to number of pieces per bag, box, tray or vial.

(2) Quantity varies. For further details, please consult the factory.

Legislative Compliance - Commercial



Legislative Compliance Status by Product Type - Commercial Product

Status of Military Products under development

KEMET warrants this information as correct for current manufacturing as of the revision date at right.

Rev. B, 23 Aug 04

Type	Commercial Product	Series	Series Image	RoHS / ELV ¹ Compliant Version Available	Banned Material Content					
					Lead (Pb) ²	Cadmium (Cd)	Mercury (Hg)	Hexavalent Chromium (Cr ⁶⁺)	Polybrominated Bi- phenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Surface Mount	Multi-Layer Ceramic	Cxxxx		yes	•	Free	Free	Free	Free	Free
	Tantalum MnO ₂	T491, T494, T495, T496, T510		yes	•	Free	Free	Free	Free	Free
	Tantalum MnO ₂ - Commercial Off The Shelf (COTS)	T493		yes	•	Free	Free	Free	Free	Free
	Organic Polymer	T520, T530		yes	•	Free	Free	Free	Free	Free
	High Temp Organic Polymer	T525		yes	•	Free	Free	Free	Free	Free
	Aluminum	A700		yes	•	Free	Free	Free	Free	Free
Ceramic Leaded	Aximax Conformally Coated Axial	C4xx		yes	•	Free	Free	Free	Free	Free
	Golden Max Conformally Coated Radial	C3xx		yes	•	Free	Free	Free	Free	Free
	Commercial Molded Radial	C052, C062, C512, C522		Compliant 2005	•	Free	Free	Free	Free	Free
	Commercial Molded Axial	C114, C124, C192, C202, C222		Compliant 2005	•	Free	Free	Free	Free	Free
Tantalum Leaded	Hermetic Sealed	T1xx, T2xx		Compliant 2005	•	Free	Free	Free	Free	Free
	Molded Axial	T322, T323		Compliant 2005	•	Free	Free	Free	Free	Free
	Molded Radial	T330, T340, T370, T378		Compliant 2005	•	Free	Free	Free	Free	Free
	Dipped Radial	T35x, T36x, T39x		Compliant 2005	•	Free	Free	Free	Free	Free
	Wet Tantalum	T190, T191, T192, T195, T197, T198		Compliant 2005	•	Free	Free	Free	Free	Free

¹ RoHS = Restriction on the use of Certain Hazardous Substances in Electrical and Electronic Equipment (European Union directive 2002/ 95/ EC)
and ELV = End of Life Vehicles (European Union directive 2000/ 53/ EC).

² For lead-free status, refer to the "Lead-Free Termination Status" section.