

Radial Leads MLCC

Epoxy-coated radial-leaded multilayer ceramic capacitors

Features

- Small size with high capacitance; ammo packaging suitable for automatic insertion
- Epoxy resin coating for humidity resistance, mechanical strength and heat resistance
- Standard sizes with a choice of lead configurations
- RoHS compliant



Illustration based on the original product photo.

DIELECTRIC C0G · X7R · Y5V	TABULATED RATED VOLTAGES 25 / 50 / 100 V ④	TABULATED CAPACITANCE RANGE 0.5 pF – 10 μF ①	CASE SIZES 0603 – 3035
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How to order

CC4 A · Product type Radial leads	0603 B · Size code 0603	Y C · Dielectric Y5V	6104 D · Capacitance 104 = 6104 ⑤	M E · Tolerance ±20%	500 F · Rated voltage 50 V	P G · Packaging Tape (ammo)	F3 H · Lead spacing 5.08 mm
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Ordering example as given on the original sheet; positions A to H are explained in the tables below.

A · Product type		D · Capacitance (pF)		E · Tolerance			F · Rated voltage ④		
CC4	Radial leads	1R2	1.2 pF	B	±0.10 pF	K	±10%	160	16 V
B · Size code		100	10 pF	C	±0.25 pF	M	±20%	250	25 V
0603	0805	101	100 pF	D	±0.5 pF	S	+50% ~ -20%	500	50 V
1206	1210	102	1000 pF	F	±1.0%	Z	+80% ~ -20%	630	63 V
1812	2225	103	10000 pF	G	±2.0%	P	+100% ~ -0%	101	100 V
3035				J	±5.0%				
C · Dielectric				B, C, D for C < 10 pF. C0G: B, C, D, F, G, J, K, M · X7R: K, M, S, Z · Y5V: M, S, Z, P				H · Lead spacing (mm) ⑥	
N	C0G (NP0)	G · Packaging						F1	2.54
B	X7R	P	Tape (ammo)					F2	4.57
Y	Y5V	B	Bulk					F3	5.08
								F4	7.50

B, C, D for C < 10 pF. C0G: B, C, D, F, G, J, K, M · X7R: K, M, S, Z · Y5V: M, S, Z, P

Dielectric characteristics

	C0G (NP0) · N	X7R · B	Y5V · Y
Dielectric class	Class I (stable)	Class II	
Electrical properties	Negligible dependence of electrical properties on temperature, voltage, frequency and time	Predictable change of properties with temperature, voltage, frequency and time; ferroelectric dielectric with higher capacitance ranges than Class I	High dielectric constant; greater variation of properties with temperature and test conditions; very high capacitance per unit volume
Typical applications	Circuits requiring stable performance	Blocking, coupling, bypassing and discriminating elements	Bypassing and coupling applications, e.g. power-storage and memory circuits
Capacitance range ①	1 pF – 10 nF	100 pF – 1 μF	1 nF – 4.7 μF
Temperature characteristic	0 ±30 ppm/°C	±15%	+30% ~ -80%
Operating temperature range	-55 °C ~ +125 °C	-55 °C ~ +125 °C	-55 °C ~ +125 °C ②

Sizes, capacitance and voltage

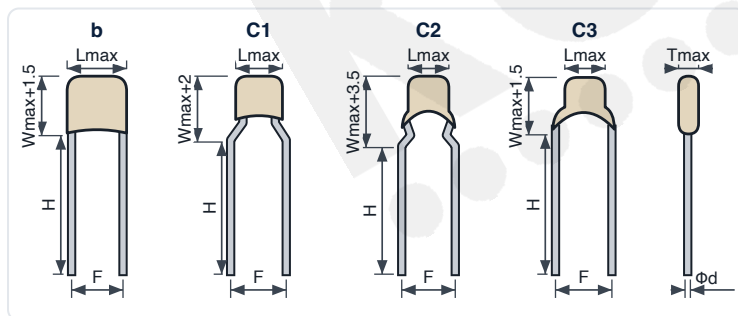
Dimensions by lead configuration ⑥

Size code	Shape	Dimensions (mm)				
		F (±0.5)	H (±1)	L max	W max	T max
0603	a	2.54	5.0	3.8	3.8	3.0
	b	2.54	10.0			
	c1	5.08	5.0 / 10.0			
	c2	5.08	5.0			
	c3	5.08	5.0 / 10.0			
	c1	7.5	5.0			
0805	a	2.54	5.0	4.2	3.8	3.8
	b	2.54	10.0			
	c1	5.08	5.0 / 10.0			
	c2	5.08	5.0			
	c3	5.08	5.0 / 10.0			
	c1	7.5	5.0			
1206	a	2.54	10.0	5.0	4.5	3.8
	b	3.50				
	c1	5.08				
1210	b	3.50	10.0	7.6	5.5	3.8
	c1	5.08				
1812	b	4.57	10.0	8.5	8.5	3.8
2225	b	5.50	10.0	10.5	9.5	4.2
3035	b	7.50	10.0	12.5	10.5	4.2

Capacitance range by rated voltage

Size code	Rated voltage	Capacitance range (pF code, see D)		
		C0G (N)	X7R (B)	Y5V (Y)
0603	25 V	0R5~102	101~224	102~224
	50 V	0R5~102	101~154	102~104
	100 V	0R5~102	101~683	102~104
0805	25 V	0R5~272	101~105	102~125
	50 V	0R5~222	101~105	102~105
	100 V	0R5~102	101~104	—
1206	25 V	0R5~562	101~225	102~125
	50 V	0R5~472	101~105	102~105
	100 V	0R5~332	101~154	—
1210	25 V	100~103	471~105	472~155
	50 V	100~103	471~105	472~205 ④
	100 V	5R0~103	101~105	—
1812	25 V	100~153	471~335	103~335
	50 V	100~103	471~225	103~225
	100 V	5R0~103	101~105	—
2225	25 V	100~473	102~475	103~475
	50 V	100~273	102~335	103~335
	100 V	5R0~273	101~105	103~205
3035	25 V	102~104	103~225	105~106
	50 V	102~473	103~225	105~685
	100 V	102~333	103~105	105~685

Capacitance ranges use the code of table D (R = decimal point; last digit = number of zeros), e.g. 0R5 = 0.5 pF, 101 = 100 pF. "5.0 / 10.0": H = 5.0 or 10.0. — : not listed. Other specifications are available on request; please contact us.



Lead configurations b, C1, C2, C3 and side view (dimensions in mm, as drawn in the source). No drawing is given for shape a.

Electrical characteristics

Item	C0G (NP0)	X7R	Y5V
Capacitance	Within the specified tolerance		
Dissipation factor	≤ 0.15%	≤ 3.5%	≤ 7.5% (below 220 nF) ≤ 10% (220 nF ~ 470 nF) ≤ 15% (470 nF ~ 1 μF)
Insulation resistance	C ≤ 10 nF: IR > 10000 MΩ C > 10 nF: R·C > 100 s	C ≤ 25 nF: IR > 4000 MΩ C > 25 nF: R·C > 100 s	
Voltage test	Test voltage: 2.5 × rated voltage; charging current not exceeding 50 mA; duration: 5 seconds ③		

Measurement conditions

Item	C0G (NP0)	X7R	Y5V
Frequency	1 MHz (C > 1 nF: 1 kHz)	1 kHz ③	
Test voltage	1 ±0.2 V DC		0.5 ±0.2 V DC
IR test voltage	Rated voltage; charging current not exceeding 50 mA		
Operating temperature range	−55 °C ~ +125 °C	−55 °C ~ +125 °C	−25 °C ~ +85 °C ②

Operating temperature range: the range of ambient temperature in which the capacitor can be operated continuously at rated voltage.

Standard atmospheric conditions	Ambient temperature	Relative humidity	Air pressure
Measuring and testing, unless otherwise specified	15 °C ~ 35 °C	45% ~ 75%	86 kPa ~ 106 kPa (860–1060 mbar)
Referee conditions, if the results are in doubt	25 °C ±1 °C	45% ~ 52%	86 kPa ~ 106 kPa (860–1060 mbar)

Reliability tests

Item	Requirement	Test conditions
Appearance	No abnormality; marking legible	Visual inspection
Capacitance	Within the permissible tolerance	Class I: 1 ±0.2 V; 1 MHz ±10% (C ≤ 1 nF), 1 kHz ±10% (C > 1 nF) Class II: 1 ±0.2 V; 1 MHz ±10% ③
Insulation resistance	Within the specified limit	Voltage: rated voltage Duration: 60 ±5 s Charge/discharge current < 50 mA
Withstanding voltage	Between terminals, and between terminals and body: no evidence of damage or flashover during the test	Voltage: 2.5 × rated voltage Duration: 2 s ③ Charge/discharge current < 50 mA
Resistance to soldering heat	No visible damage; marking legible Capacitance change $\Delta C/C$ — C0G: ≤ ±0.5% or ±0.5 pF · X7R: ≤ ±10% · Y5V: ≤ ±30%	Solder temperature: 260 ±5 °C Duration: 10 s Recovery time: 24 ±2 h
Solderability	Leads shall be covered with new solder	Solder temperature: 230 ±5 °C Duration: 2 s
Terminal strength	No abnormality such as broken leads or looseness	Bending force: 0.25 kg; duration: 5 s; repeated 2 times Bend through 90°, return to the initial position, then bend in the opposite direction
Temperature cycle	Appearance: no significant abnormality Capacitance change — Class I: ≤ 5% or ±0.5 pF; Class II: B, E ≤ ±12.5%, Y ≤ ±30% Dissipation factor — Class I: not more than twice the initial value; Class II: B, E ≤ ±5.0%, Y ≤ 12.5% (CR ≤ 0.1 μF), ≤ 15.0% (1 μF > CR > 0.1 μF), ≤ 17.5% (CR ≥ 1 μF) Insulation resistance ≥ 1000 MΩ or 50 MΩ·μF, whichever is smaller	Class I: recovery time 1 h under standard conditions after the test Class II: 1 h preconditioning at 150 +10 °C ⑨, followed by 48 ±4 h recovery under standard conditions Number of cycles: 5 (see Temperature cycle steps)
High temperature loading	Appearance: no significant abnormality Capacitance change — Class I: ±3% or ±0.3 pF, whichever is larger; Class II: B, E ≤ ±12.5%, Y ≤ ±30% Dissipation factor — Class I: not more than twice the initial value; Class II: B, E ≤ 5.0%, Y ≤ 12.5% (CR ≤ 0.1 μF), ≤ 15.0% (1 μF > CR > 0.1 μF), ≤ 17.5% (CR ≥ 1 μF) Insulation resistance ≥ 500 MΩ or 25 MΩ·μF, whichever is smaller	Temperature: C0G/X7R 125 °C; X5R ⑧, Y5V 85 °C Applied voltage: 1.5 × rated voltage Charge/discharge current < 50 mA Duration: 1000 h (+48 ~ 0 h) Recovery time: Class I 24 ±2 h; Class II 48 ±4 h

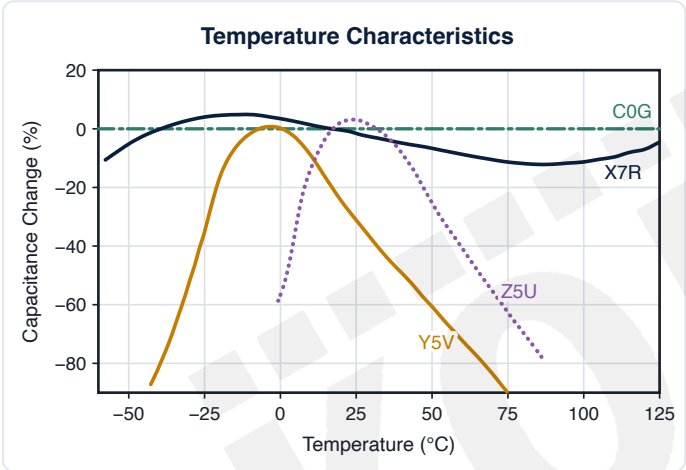
Reliability tests (continued)

Item	Requirement	Test conditions
Solvent resistance	Legible marking; no defects or abnormalities in appearance	Solvent temperature: 23 ±5 °C Immerse the sample in the solvent for 1 min, take it out and brush the marked surface 10 times; repeat 3 times ⑨

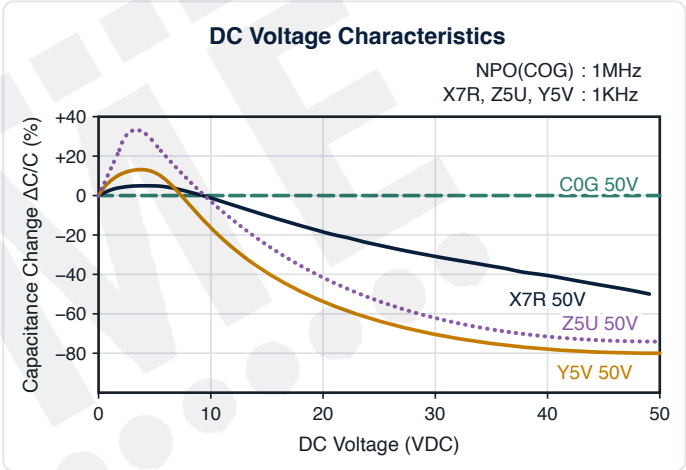
Temperature cycle steps ⑧

Step	Temperature (°C)			Time (min)
	C0G/X7R	X5R	Y5V	
1	Room temperature			2~3
2	-55	-25	+10	30
3	Room temperature			2~3
4	+125	+85	+85	30
5	Room temperature			2~3

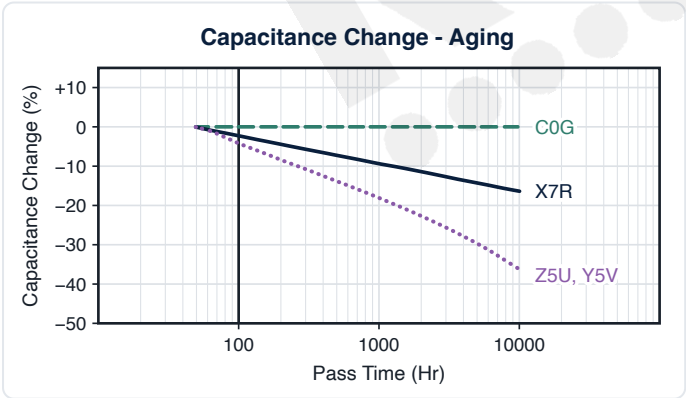
Characteristic curves (typical)



Capacitance change vs temperature



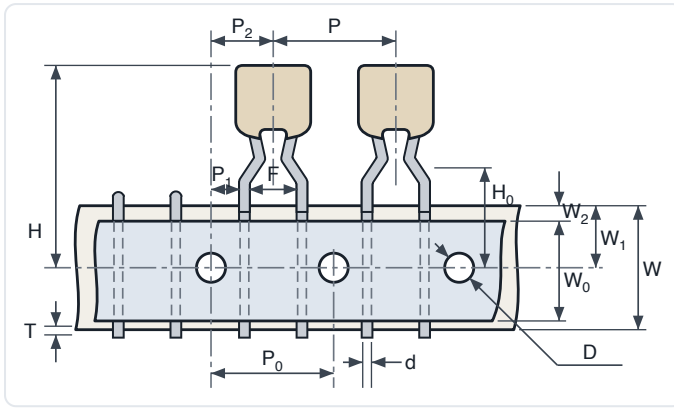
Capacitance change vs DC voltage, 50 V parts (C0G at 1 MHz; X7R, Z5U, Y5V at 1 kHz)



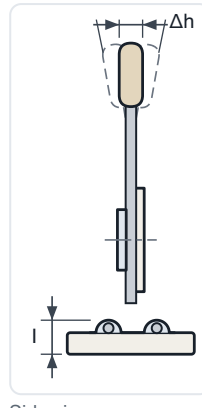
Capacitance change vs time (aging)

Curves are reproduced from the source datasheet and show typical behaviour. Z5U is shown in the source but is not listed under How to order. ⑧

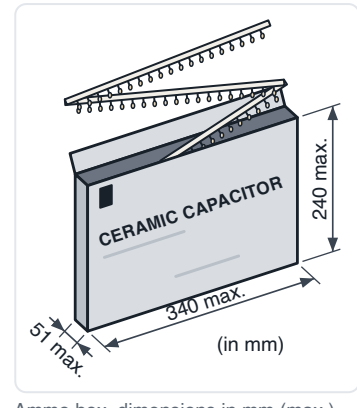
Packaging



Ammo taping, front view



Side view



Ammo box, dimensions in mm (max.)

Symbol	P	P0	P1	P2	d	Δh	W	W0	W1	W2	H	H0	I	D	T
Dimension (mm)	12.7	12.7	3.85 5.1	6.35	0.5	0	18.5	13	9	3.0	32.25	15-20	1.42	4.0	0.7
Tolerance	±1	±0.8	±0.7	±1.3	±0.1	±1	±1	±1	±0.5	max.	max.	±0.5	max.	max.	max.

P1 by lead spacing ⑦: P1 = 5.1 ±0.7 for 2.54 mm lead spacing; P1 = 3.75 ±0.7 for 5.08 mm lead spacing.

Packaging quantity

Packaging	Quantity
Ammo pack	2500 pcs
Bulk	1000 pcs / 500 pcs

Packaging can be supplied according to customer requirements.

Notes

- ① Capacitance ranges: the general ranges under Dielectric characteristics (C0G 1 pF – 10 nF, X7R 100 pF – 1 μF, Y5V 1 nF – 4.7 μF) are narrower than the size table (0R5 – 104, 101 – 475, 102 – 106), and the Y5V dissipation-factor limits stop at 1 μF — subject to manufacturer confirmation.
- ② Y5V operating temperature range is given as –55 °C ~ +125 °C under Dielectric characteristics but –25 °C ~ +85 °C under Measurement conditions — subject to manufacturer confirmation.
- ③ The withstanding-voltage duration is 5 seconds under Electrical characteristics but 2 s under Reliability tests; the Class II measuring frequency is 1 kHz under Measurement conditions but 1 MHz ±10% under Reliability tests — subject to manufacturer confirmation.
- ④ Rated voltages 16 V (160) and 63 V (630) are listed under How to order but have no capacitance ranges; for 1210 Y5V the 50 V range (472~205) is higher than the 25 V range (472~155) — subject to manufacturer confirmation.
- ⑤ Capacitance code: only three 4-character examples are given (104 = 6104, 103 = 5103, 101 = 3101); the 4-character form of other values (e.g. 1R2) is not stated — subject to manufacturer confirmation.
- ⑥ Size table: lead spacings 3.50 mm (1206, 1210) and 5.50 mm (2225) have no code in table H; shape c1 is listed twice for 0603 and 0805 (second line F 7.5); lead diameter Φd is given only as taping dimension d (0.5 ±0.1) — subject to manufacturer confirmation.
- ⑦ Taping P1 is printed as 3.85 in the taping table but as 3.75 ±0.7 in the notes for 5.08 mm lead spacing — subject to manufacturer confirmation.
- ⑧ X5R and class “E” (reliability tests) and Z5U (characteristic curves) are not listed under How to order (N, B and Y only); the Y5V temperature curve also falls below the –80% limit given under Dielectric characteristics — subject to manufacturer confirmation.
- ⑨ Reliability tests: the Class II preconditioning temperature is printed as “150 +10 °C” (tolerance incomplete); for solvent resistance the solvent is not named and the brushing material is printed as “pledge” — subject to manufacturer confirmation.