

Automotive Multilayer Chip Ceramic Capacitors

AEC-Q200 · Full specification (English)



Illustration; not a photograph of a specific part.

DIELECTRICS
C0G · X5R · X6R · X6S · X6T · X7R · X7S · X7T

CASE SIZES
0201 – 2220

RATED VOLTAGE
6.3 – 2000 V

CAPACITANCE
0.1 pF – 47 μ F

1. Capacitor and dielectric types ⑦

C0G: capacitors with this dielectric are Class I capacitors, including general-purpose and high-frequency C0G capacitors. Their electrical properties are the most stable and change very little with temperature, voltage and time. They are suited to applications that require low losses and high stability, such as filters, oscillators and timing circuits.

X7R, X7S, X7T, X5R, X6R, X6S, X6T: these dielectrics have a high dielectric constant; capacitors made with them are Class II capacitors, with higher capacitance than Class I. They have a semi-stable temperature characteristic and are used over a wide temperature range, in circuits such as DC blocking, decoupling, bypassing and frequency discrimination.

2. Product structure

No.	Name
1	Ceramic dielectric
2	Inner electrode
3	Outer electrode
4	Nickel layer
5	Tin layer

Chip capacitor, cut-away view (L length, W width, T thickness)

3. Part numbering ①

0805 1 · Size 0805	CG 2 · Dielectric C0G	3 3 · Digits 100 = 3 digits	101 4 · Capacitance 100 pF	J 5 · Tolerance $\pm 5\%$	500 6 · Rated voltage 50 V	N 7 · Termination Nickel barrier	T 8 · Packaging Taping	M 9 · Classification Automotive product
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Ordering example as given on the original sheet; positions 1 to 9 are explained in the tables below.

1 · Size code ②

Size code	0402	0603	0805	1206	1210	1808	1812	2220	2225	3035
L × W (inch)	0.04×0.02	0.06×0.03	0.08×0.05	0.12×0.06	0.12×0.10	0.18×0.08	0.18×0.12	0.22×0.20	0.22×0.25	0.3×0.35
L × W (mm)	1.00×0.50	1.60×0.80	2.00×1.25	3.20×1.60	3.20×2.50	4.50×2.00	4.50×3.20	5.70×5.00	5.70×6.30	7.60×9.00

2 · Dielectric ①

Code	CG	D	B	E	G	S	F	R	T
Dielectric	C0G	X5R	X7R	X7T	X7S	X6S	Y5V	X6R	X6T

3 · Number of digits ①

Total number of characters of the capacitance value in pF, e.g. 102 = 1000 = 4

4 · Nominal capacitance (pF)

Code	Value (pF)
0R5	0.5
1R0	1.0
102	10×10^2
224	22×10^4
...	...

The first two digits are significant figures; the third digit is the number of zeros; R = decimal point.

6 · Rated voltage (V)

Code	Value (V)
6R3	6.3
500	50×10^0
201	20×10^1
102	10×10^2
...	...

The first two digits are significant figures; the third digit is the number of zeros; R = decimal point.

5 · Capacitance tolerance

Code	B	C	D	F	G	J	K	M	Z
Tolerance	±0.1 pF	±0.25 pF	±0.5 pF	±1.0%	±2.0%	±5%	±10%	±20%	+80% -20%

Tolerances B, C and D apply only to capacitance values of 10 pF or less.

7 · Termination

Termination	Code
Silver termination (solderable)	S
Copper termination (solderable)	C
Nickel barrier termination (three-layer plated)	N

8 · Packaging

Code	B	T
Packaging	Bulk (bag)	Taping

9 · Classification

Code	M
Classification	Automotive product

Temperature characteristics ① ③

Dielectric	Reference temperature	Temperature coefficient / characteristic	Operating temperature range
C0G	20 °C	0 ±30 ppm/°C	-55 °C ~ +125 °C
X5R	20 °C	±15%	-55 °C ~ +85 °C
X7R	20 °C	±15%	-55 °C ~ +125 °C
X7T	20 °C	+22/-33%	-55 °C ~ +125 °C
X7S	20 °C	±22%	-55 °C ~ +125 °C
X6S	20 °C	±22%	-55 °C ~ +105 °C
X6R	20 °C	±15%	-55 °C ~ +105 °C

Class I: the nominal temperature coefficient and its tolerance are determined from the capacitance change between 20 °C and 85 °C. Class II: the nominal temperature characteristic is determined from the capacitance change over the operating temperature range relative to the capacitance at 20 °C.

4. Product capacitance range

0201 (0603)

Dielectric	C0G	X7R	X7S	X7T	X6R ⁽²⁾	X6S	X6T ⁽²⁾	X5R
Code Cap./VDC	50 25 16 10 6.3	50 25 16 10 6.3	50 25 16 10 6.3	50 25 16 10 6.3	50 25 16 10 6.3	50 25 16 10 6.3	50 25 16 10 6.3	50 25 16 10 6.3
0R1	0.1 pF	Z	Z	Z	Z	Z	Z	Z
0R2	0.2 pF	Z	Z	Z	Z	Z	Z	Z
0R3	0.3 pF	Z	Z	Z	Z	Z	Z	Z
0R4	0.4 pF	Z	Z	Z	Z	Z	Z	Z
0R5	0.5 pF	Z	Z	Z	Z	Z	Z	Z
0R6	0.6 pF	Z	Z	Z	Z	Z	Z	Z
0R7	0.7 pF	Z	Z	Z	Z	Z	Z	Z
0R8	0.8 pF	Z	Z	Z	Z	Z	Z	Z
0R9	0.9 pF	Z	Z	Z	Z	Z	Z	Z
1R0	1.0 pF	Z	Z	Z	Z	Z	Z	Z
1R1	1.1 pF	Z	Z	Z	Z	Z	Z	Z
1R2	1.2 pF	Z	Z	Z	Z	Z	Z	Z
1R3	1.3 pF	Z	Z	Z	Z	Z	Z	Z
1R5	1.5 pF	Z	Z	Z	Z	Z	Z	Z
1R6	1.6 pF	Z	Z	Z	Z	Z	Z	Z
1R8	1.8 pF	Z	Z	Z	Z	Z	Z	Z
2R0	2.0 pF	Z	Z	Z	Z	Z	Z	Z
2R2	2.2 pF	Z	Z	Z	Z	Z	Z	Z
2R4	2.4 pF	Z	Z	Z	Z	Z	Z	Z
2R7	2.7 pF	Z	Z	Z	Z	Z	Z	Z
3R0	3.0 pF	Z	Z	Z	Z	Z	Z	Z
3R3	3.3 pF	Z	Z	Z	Z	Z	Z	Z
3R6	3.6 pF	Z	Z	Z	Z	Z	Z	Z
3R9	3.9 pF	Z	Z	Z	Z	Z	Z	Z
4R0	4.0 pF	Z	Z	Z	Z	Z	Z	Z
4R3	4.3 pF	Z	Z	Z	Z	Z	Z	Z
4R7	4.7 pF	Z	Z	Z	Z	Z	Z	Z
5R0	5.0 pF	Z	Z	Z	Z	Z	Z	Z
5R1	5.1 pF	Z	Z	Z	Z	Z	Z	Z
5R6	5.6 pF	Z	Z	Z	Z	Z	Z	Z
6R0	6.0 pF	Z	Z	Z	Z	Z	Z	Z
6R2	6.2 pF	Z	Z	Z	Z	Z	Z	Z
6R8	6.8 pF	Z	Z	Z	Z	Z	Z	Z
7R0	7.0 pF	Z	Z	Z	Z	Z	Z	Z
7R5	7.5 pF	Z	Z	Z	Z	Z	Z	Z
8R0	8.0 pF	Z	Z	Z	Z	Z	Z	Z
8R2	8.2 pF	Z	Z	Z	Z	Z	Z	Z
9R0	9.0 pF	Z	Z	Z	Z	Z	Z	Z
9R1	9.1 pF	Z	Z	Z	Z	Z	Z	Z
100	10 pF	Z	Z	Z	Z	Z	Z	Z
220	22 pF	Z	Z	Z	Z	Z	Z	Z
330	33 pF	Z	Z	Z	Z	Z	Z	Z
390	39 pF	Z	Z	Z	Z	Z	Z	Z
470	47 pF	Z	Z	Z	Z	Z	Z	Z
680	68 pF	Z	Z	Z	Z	Z	Z	Z
101	100 pF	Z	Z	Z	Z	Z	Z	Z
181	180 pF		Z	Z	Z	Z	Z	Z
221	220 pF		Z	Z	Z	Z	Z	Z
241	240 pF		Z	Z	Z	Z	Z	Z
271	270 pF		Z	Z	Z	Z	Z	Z
331	330 pF		Z	Z	Z	Z	Z	Z
471	470 pF		Z	Z	Z	Z	Z	Z
681	680 pF		Z	Z	Z	Z	Z	Z
751	750 pF		Z	Z	Z	Z	Z	Z
102	1 nF		Z	Z	Z	Z	Z	Z
152	1.5 nF		Z	Z	Z	Z	Z	Z
222	2.2 nF		Z	Z	Z	Z	Z	Z
332	3.3 nF		Z	Z	Z	Z	Z	Z
472	4.7 nF		Z	Z	Z	Z	Z	Z
682	6.8 nF		Z	Z	Z	Z	Z	Z
103	10 nF		Z	Z	Z	Z	Z	Z
153	15 nF		Z	Z	Z	Z	Z	Z
223	22 nF		Z	Z	Z	Z	Z	Z
473	47 nF		Z	Z	Z	Z	Z	Z
863	86 nF ⁽³⁾		Z	Z	Z	Z	Z	Z
104	100 nF			Z	Z	Z	Z	Z
224	220 nF				Z	Z	Z	Z
474	470 nF					Z	Z	Z

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; blank = not listed.
For reference only; the actual range depends on the application requirements.

Dielectric		C0G					X7R					X7S					X7T					X6R ¹²⁾					X6S					X5R				
Code	Cap. / V _{DC}	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3
0R1	0.1 pF	A	A	A	A	A																														
0R2	0.2 pF	A	A	A	A	A																														
0R3	0.3 pF	A	A	A	A	A																														
0R4	0.4 pF	A	A	A	A	A																														
0R5	0.5 pF	A	A	A	A	A																														
0R6	0.6 pF	A	A	A	A	A																														
0R7	0.7 pF	A	A	A	A	A																														
0R8	0.8 pF	A	A	A	A	A																														
0R9	0.9 pF	A	A	A	A	A																														
1R0	1.0 pF	A	A	A	A	A																														
1R1	1.1 pF	A	A	A	A	A																														
1R2	1.2 pF	A	A	A	A	A																														
1R3	1.3 pF	A	A	A	A	A																														
1R5	1.5 pF	A	A	A	A	A																														
1R6	1.6 pF	A	A	A	A	A																														
1R8	1.8 pF	A	A	A	A	A																														
2R0	2.0 pF	A	A	A	A	A																														
2R2	2.2 pF	A	A	A	A	A																														
2R4	2.4 pF	A	A	A	A	A																														
2R7	2.7 pF	A	A	A	A	A																														
3R0	3.0 pF	A	A	A	A	A																														
3R3	3.3 pF	A	A	A	A	A																														
3R6	3.6 pF	A	A	A	A	A																														

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Dielectric

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; blank = not listed.
For reference only; the actual range depends on the application requirements.

0805 (2012)

[illegible]

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; two letters (e.g. D/F) = both listed in the original chart; blank = not listed. For reference only; the actual range depends on the application requirements.

Dielectric		C0G									X7R										X7S										X7T													
Code	Cap. / V _{DC}	2000	1000	630	500	250	100	50	25	16	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3	
0R5	0.5 pF	D	D	D	D	D	D	D	D	D																																		
1R0	1.0 pF	D	D	D	D	D	D	D	D	D																																		
1R1	1.1 pF	D	D	D	D	D	D	D	D	D																																		
1R2	1.2 pF	D	D	D	D	D	D	D	D	D																																		
1R3	1.3 pF	D	D	D	D	D	D	D	D	D																																		
1R5	1.5 pF	D	D	D	D	D	D	D	D	D																																		
1R6	1.6 pF	D	D	D	D	D	D	D	D	D																																		
1R8	1.8 pF	D	D	D	D	D	D	D	D	D																																		
2R0	2.0 pF	D	D	D	D	D	D	D	D	D																																		
2R2	2.2 pF	D	D	D	D	D	D	D	D	D																																		
2R4	2.4 pF	D	D	D	D	D	D	D	D	D																																		
2R7	2.7 pF	D	D	D	D	D	D	D	D	D																																		
3R0	3.0 pF	D	D	D	D	D	D	D	D	D																																		
3R3	3.3 pF	D	D	D	D	D	D	D	D	D																																		
3R6	3.6 pF	D	D	D	D	D	D	D	D	D																																		
3R9	3.9 pF	D	D	D	D	D	D	D	D	D																																		
4R0	4.0 pF	D	D	D	D	D	D	D	D	D																																		
4R3	4.3 pF	D	D	D	D	D	D	D	D	D																																		
4R7	4.7 pF	D	D																																									

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1206 (3216) – part 2 of 2: X6R, X6S, X6T, X5R

[illegible]

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; two letters (e.g. F/H) = both listed in the original chart; blank = not listed. For reference only; the actual range depends on the application requirements.

1210 (3225) – part 1 of 2: C0G, X7R, X7S, X7T

[illegible]

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; two or three letters (e.g. H/G) = all listed in the original chart; blank = not listed. For reference only; the actual range depends on the application requirements.

1210 (3225) – part 2 of 2: X6R, X6S, X6T, X5R

Dielectric		X6R [®]											X6S											X6T [®]											X5R											
Code	Cap./V _{DC}	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3	
100	10 pF																																													
120	12 pF																																													
150	15 pF																																													
180	18 pF																																													
200	20 pF																																													
220	22 pF																																													
270	27 pF																																													
300	30 pF																																													
330	33 pF																																													
390	39 pF																																													
470	47 pF																																													
560	56 pF																																													
680	68 pF																																													
820	82 pF																																													
101	100 pF																																													
121	120 pF																																													
151	150 pF																																													
181	180 pF																																													
201	200 pF																																													
221	220 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
271	270 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
331	330 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
391	390 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
471	470 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
561	560 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
681	680 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; two or three letters (e.g. H/G) = all listed in the original chart; blank = not listed. For reference only; the actual range depends on the application requirements.

1812 (4532) – part 1 of 2: C0G, X7R, X7S, X7T

Dielectric		C0G					X7R										X7S										X7T												
Code	Cap. V _{DC}	2000	1000	630	500	250	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3	2000	1000	630	500	250	100	50	25	16	10	6.3
101	100 pF	F	F	F	F	F																																	
121	120 pF	F	F	F	F	F																																	
151	150 pF	F	F	F	F	F																																	
181	180 pF	F	F	F	F	F																																	
201	200 pF	F	F	F	F	F																																	
221	220 pF	F	F	F	F	F																																	
271	270 pF	F	F	F	F	F																																	
331	330 pF	F	F	F	F	F																																	
391	390 pF	F	F	F	F	F																																	
471	470 pF	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
561	560 pF	F	F	F	F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
681	680 pF	F	F	F	F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
821	820 pF	F	F	F	F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
102	1 nF	F	F	F	F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
222	2.2 nF				F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
332	3.3 nF				F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
472	4.7 nF				F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
562	5.6 nF				F	F	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
682	6.8 nF						H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
103	10 nF						H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	
153	15 nF					M	H	H	H	H	H	H	H	H	H	H	H	M	H	H	H	H	H	H	H	H	H	H	H	M	H	H	H	H	H	H	H	H	
223	22 nF						H	H	H	H	H	H	H	H	H	H	H		H	H	H	H	H	H	H	H	H	H		H	H	H	H	H	H	H	H	H	
333	33 nF						H	H	H	H	H	H	H	H	H	H	H		H	H	H	H	H	H	H	H	H	H		H	H	H	H	H	H	H	H	H	
473	47 nF						H	H	H	H	H	H	H	H	H	H	H		H	H	H	H	H	H	H	H	H	H		H	H	H	H	H	H	H	H	H	
563	56 nF																																						
683	68 nF						H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
104	100 nF						G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
224	220 nF						G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
334	330 nF						G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
474	470 nF																																						
684	680 nF																																						
105	1 μF																																						
225	2.2 μF																																						
475	4.7 μF																																						
106	10 μF																																						
226	22 μF																																						
476	47 μF																																						

1812 (4532) – part 2 of 2: X6R, X6S, X6T, X5R

[illegible]

Code = capacitance in pF (two significant digits + number of zeros; R = decimal point). Letters = thickness code T, see the Dimensions table; two letters (e.g. H/G) = both listed in the original chart; blank = not listed. For reference only; the actual range depends on the application requirements.

Dielectric		X7R										X7S										X7T									
Code	Cap. V _{DC}	2000	1000	630	500	450	250	200	100	50	25	2000	1000	630	500	450	250	200	100	50	25	2000	1000	630	500	450	250	200	100	50	25
101	100 pF																														
121	120 pF																														
151	150 pF																														
181	180 pF																														
201	200 pF																														
221	220 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
271	270 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
331	330 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
391	390 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
471	470 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
561	560 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
681	680 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
821	820 pF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
102	1 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
222	2.2 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
332	3.3 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
472	4.7 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
562	5.6 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
682	6.8 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
103	10 nF	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
153	15 nF	G	F/H	F/H	H	H	H	H	H	H	H	G	F/H	F/H	H	H	H	H	H	H	H	G	F/H	F/H	H	H	H	H	H	H	H
223	22 nF	G	H	H	H	H	H	H	H	H	H	G	H	H	H	H	H	H	H	H	H	G	H	H	H	H	H	H	H	H	H
333	33 nF	G	H	H	H	H	H	H	H	H	H	G	H	H	H	H	H	H	H	H	G	H	H	H	H	H					

[illegible]

KOME Automotive Multilayer Chip Ceramic Capacitors · Rev. 2026-10 · Specifications are subject to change without notice. 12 / 27

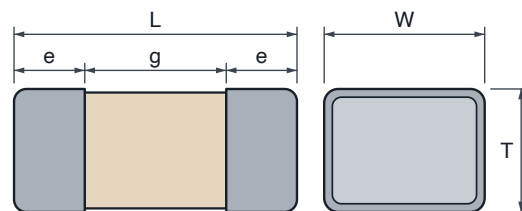
5. Dimensions

Chip sizes: 0201, 0402, 0603, 0805, 1206, 1210, 1812 and 2220. ②

*1 Dimensions of parts of this size with a capacitance of 1 μ F and above.

*2 Dimensions of parts of this size with a capacitance of 100 nF and above.

*3 Dimensions of parts of this size with a capacitance of 10 μ F and above.



Outline: length L, width W, thickness T, termination e, gap between terminations g

Size	L (mm)	W (mm)	e (mm)	g min. (mm)	T (mm)	T code
0201	0.60±0.03	0.30±0.03	0.1~0.2	0.2	0.30±0.03	Z
0201* ²	0.60-0.03/+0.1	0.30-0.03/+0.1	0.1~0.2	0.2	0.30-0.03/+0.1	Z
0402	1.00±0.10	0.50±0.10	0.15~0.3	0.4	0.50±0.10	A
0402* ²	1.00-0.05/+0.2	0.50-0.05/+0.2	0.15~0.3	0.4	0.50-0.05/+0.2	A
0603	1.60±0.10	0.80±0.10	0.2~0.6	0.5	0.80±0.10	C
0603* ¹	1.60±0.20* ¹	0.80±0.20* ¹	0.2~0.6	0.5	0.80±0.20* ¹	C
0603* ³	1.60-0/+0.3	0.80-0/+0.3	0.2~0.6	0.5	0.80-0/+0.3	C
0805	2.00±0.10	1.25±0.10	0.2~0.7	0.7	0.60±0.10	B
					0.85±0.10	D
					1.25±0.20	F
0805* ¹	2.00±0.20* ¹	1.25±0.20* ¹	0.2~0.7	0.7	0.60±0.10	B
					0.85±0.20	D
					1.25±0.20	F
1206	3.20±0.20	1.60±0.20	0.3~0.8	1.6	0.85±0.10	D
					1.00±0.10	E
					1.25±0.20	F
					1.60±0.20	H
1206* ¹	3.20±0.30* ¹	1.60±0.30* ¹	0.3~0.8	1.6	0.85±0.10	D
					1.00±0.10	E
					1.25±0.20	F
					1.60±0.30* ¹	H
1210	3.20±0.30	2.5±0.20	0.3~0.8	1.6	0.85±0.10	D
					1.25±0.20	F
					1.60±0.20	H
					2.00±0.20	G
					2.50±0.30	M
1210* ¹	3.20±0.40* ¹	2.5±0.30* ¹	0.3~0.8	1.6	0.85±0.10	D
					1.25±0.20	F
					1.60±0.30	H
					2.00±0.30	G
1812	4.50±0.30	3.2±0.30	0.3~1.5	2.5	1.25±0.20	F
					1.60±0.20	H
					2.00±0.20	G
					2.50±0.30	M

Size	L (mm)	W (mm)	e (mm)	g min. (mm)	T (mm)	T code
1812 ^{*1}	4.50±0.40 ^{*1}	3.2±0.40 ^{*1}	0.3~1.5	2.5	1.25±0.20	F
					1.60±0.20	H
					2.00±0.20	G
					2.50±0.30	M
2220	5.70±0.40	5.0±0.40	0.3~1.1	3.5	1.25±0.20	F
					1.60±0.20	H
					2.00±0.20	G
					2.50±0.30	M

6. Specifications and test conditions

6.1 Appearance ⑤

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	1/10L < L ≤ 1/8L, 1/10W < W ≤ 1/8W, 1/10T < T ≤ 1/8T (If any one of L, W or T does not conform, the part is judged non-conforming.)	Visual inspection.

6.2 Dimensions

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	Within the specified dimensions.	Measured with a micrometer.

6.3 Capacitance

Dielectric	Requirement	Test conditions
C0G	Within the specified tolerance. A: ±0.05 pF; B: ±0.1 pF; C: ±0.25 pF; D: ±0.5 pF; J: ±5%	1.0 ±0.2 Vrms, 1 MHz ±10% (C > 1000 pF: 1.0 ±0.2 Vrms, 1 kHz ±10%)
X7R, X7S, X7T, X5R, X6R, X6S, X6T	Within the specified tolerance. J: ±5%; K: ±10%; M: ±20%	1.0 ±0.2 Vrms, 1 kHz ±10% (Cp > 10 μF: 0.5 ±0.1 Vrms, 120 ±24 Hz)

Remark: test temperature 25 ±3 °C, test humidity < 70% RH. Class II dielectrics must be de-aged before measurement: heat-treat the capacitors at 150 +0/-10 °C for 1 hour and measure after 24 ±2 h. ③

6.4 Dissipation factor

Dielectric	Requirement	Test conditions
C0G	Cp < 30 pF: Q ≥ 400 + 20Cp Cp ≥ 30 pF: Q ≥ 1000	1.0 ±0.2 Vrms, 1 MHz ±10%, 25 °C (Cp > 1000 pF: 1.0 ±0.2 Vrms, 1 kHz ±10%)
X7R, X5R, X7T, X6S, X6R, X7S, X6T	DF limits: see the table below. ④	1.0 ±0.2 Vrms, 1 kHz ±10% (Cp > 10 μF: 0.5 ±0.1 Vrms, 120 ±24 Hz)

Remark: test temperature 25 ±3 °C, test humidity < 70% RH. Class II dielectrics must be de-aged before measurement: heat-treat the capacitors at 150 +0/-10 °C for 1 hour and measure after 24 ±2 h. ③

DF limits, Class II (X7R, X5R, X7T, X6S, X6R, X7S, X6T) ④

Size	Rated voltage U_R	Capacitance	DF
0201	/	$C \leq 0.01 \mu F$	$\leq 7\%$
		$C > 0.01 \mu F$	$\leq 10\%$
0402	$\leq 25 V$	$C \leq 0.47 \mu F$	$\leq 7\%$
		$C > 0.47 \mu F$	$\leq 10\%$
	$> 25 V$	$C \leq 0.1 \mu F$	$\leq 7\%$
		$C > 0.1 \mu F$	$\leq 10\%$
0603	$\leq 25 V$	$C \leq 0.47 \mu F$	$\leq 7\%$
		$C > 0.47 \mu F$	$\leq 10\%$
	$> 25 V$	$C \leq 0.1 \mu F$	$\leq 5\%$
		$0.1 \mu F < C \leq 0.22 \mu F$	$\leq 7\%$
		$C > 0.22 \mu F$	$\leq 10\%$

Size	Rated voltage U_R	Capacitance	DF
0805	$\leq 25 V$	$C \leq 1 \mu F$	$\leq 7\%$
		$C > 1 \mu F$	$\leq 10\%$
	$> 25 V$	$C \leq 0.47 \mu F$	$\leq 7\%$
		$C > 0.47 \mu F$	$\leq 10\%$
1206	$\leq 25 V$	$C < 2.2 \mu F$	$\leq 7\%$
		$2.2 \mu F \leq C < 47 \mu F$	$\leq 10\%$
	$> 25 V$	$C < 1 \mu F$	$\leq 7\%$
		$1 \mu F \leq C < 47 \mu F$	$\leq 10\%$
1210	/	$C < 2.2 \mu F$	$\leq 7\%$
		$2.2 \mu F \leq C < 47 \mu F$	$\leq 10\%$
1812	/	$C < 2.2 \mu F$	$\leq 7\%$
		$2.2 \mu F \leq C < 47 \mu F$	$\leq 10\%$
2220	/	$C < 2.2 \mu F$	$\leq 7\%$
		$2.2 \mu F \leq C < 47 \mu F$	$\leq 10\%$

"/": printed without a rated-voltage limit (all rated voltages).

6.5 Insulation resistance

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	$U_R \leq 50 V$: more than 10 G Ω or 100 $\Omega \cdot F/CR$, whichever is smaller.	$U_R \leq 50 V$: test voltage = U_R Charging time: 60 ± 5 s Temperature: 25 $^{\circ}C$
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	$U_R > 50 V$: more than 4 G Ω or 100 $\Omega \cdot F/CR$, whichever is smaller.	$U_R \leq 400 V$: test voltage = U_R $U_R > 400 V$: test voltage = 400 V Charging time: 60 ± 5 s Temperature: 25 $^{\circ}C$

Remark: test temperature 25 ± 3 $^{\circ}C$, test humidity < 70% RH.

6.6 Dielectric strength ④

Dielectric	Rated voltage range	Test method
C0G	$U_R \leq 50 V$	300% of rated voltage for 5 s; maximum current 50 mA
X7R, X7S, X7T, X5R, X6R, X6S, X6T	$U_R \leq 50 V$	250% of rated voltage for 5 s; maximum current 50 mA
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	$100 V \leq U_R < 500 V$	200% of rated voltage for 5 s; maximum current 50 mA
	$500 V \leq U_R < 2000 V$	150% of rated voltage for 5 s; maximum current 50 mA
	$U_R \geq 2000 V$	120% of rated voltage for 5 s; maximum current 30 mA

6.7 Temperature coefficient of capacitance ③ ⑤

Dielectric	Requirement	Test conditions
C0G	Temperature coefficient within ± 30 ppm/°C Capacitance drift within $\pm 0.2\%$ or ± 0.05 pF	Measure the capacitance at the temperatures of the step table below, in sequence. Pre-treatment: 140 ~ 150 °C for 1 hour; measure after 24 h. 1) C0G: the capacitance drift is calculated by dividing the difference between the maximum and minimum values measured in steps 1, 3 and 5. The temperature coefficient is determined with the capacitance measured in step 3 as reference. 2) X7R, X7S, X7T, X5R, X6R, X6S, X6T: the capacitance change over the temperature range, compared with the capacitance at 25 °C, shall be within the specified limits.
X7R, X5R, X6R	Capacitance change within $\pm 15\%$	
X7T, X6T	Capacitance change within $+22\%$, -33%	
X6S, X7S	Capacitance change within $\pm 22\%$	

Remark: test voltage < 0.5 V for 0201/223 and above, 0402/104 and above, 0603/334 and above, 0805/105 and above, 1206/1210 225 and above (capacitance codes, see 4 · Nominal capacitance).

Step	C0G, X7R, X7T	X6S	X5R
1	25 ± 2	25 ± 2	25 ± 2
2	-55 ± 3	-55 ± 3	-55 ± 3
3	25 ± 2	25 ± 2	25 ± 2
4	125 ± 3	105 ± 3	85 ± 3
5	25 ± 2	25 ± 2	25 ± 2

Temperatures in °C.

6.8 Solderability of terminations

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	At least 95% coverage of both terminations; less than 5% pinholes or rough spots.	Solder temperature: 245 ± 5 °C Dipping time: 2 ± 1 s Both terminations completely immersed in the solder.

6.9 Resistance to leaching ⑦

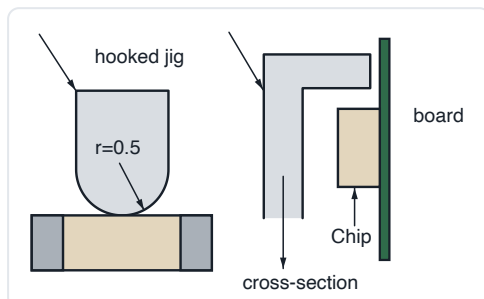
Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	At least 95% coverage of both terminations; less than 5% pinholes or rough spots. No visible damage (no cracks).	Preheating: 120 ~ 150 °C / 60 s Solder temperature: 270 ± 5 °C Dipping time: 10 ± 1 s Both terminations completely immersed in the solder.

6.10 High-temperature storage

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change: C0G: within $\pm 5\%$ or ± 0.5 pF, whichever is larger; X7R, X7S, X7T, X5R, X6R, X6S, X6T: within $\pm 10\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Keep the product at the maximum rated temperature for 1000 hours. Measure within 24 ± 4 h after the end of the test.

6.11 Adhesion ⑦

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance: meets the initial specification. 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Reflow-solder the capacitor onto a P.C. board. Apply a pushing force of 17.7 N (6 N for size 0402) gradually, without shock, at the centre of the specimen, in a direction parallel to the P.C. board. Holding time: 10 ±1 s (1.8 kgf = 17.7 N).



Adhesion test: hooked jig ($r = 0.5$) on the chip mounted on the board, cross-section

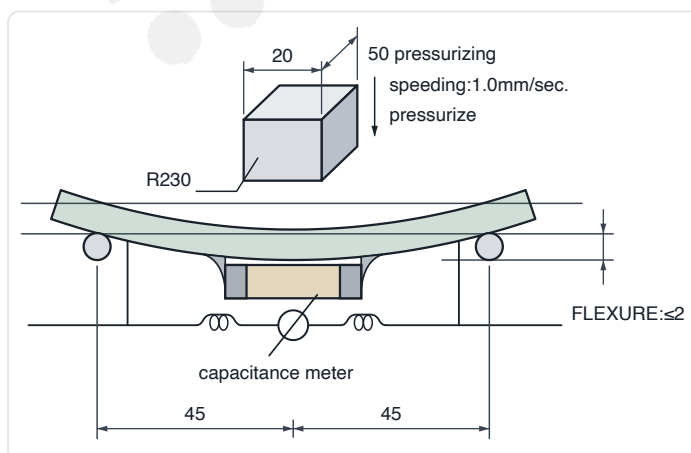
6.12 ESD ⑥

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	1. Capacitance change: C0G/M3L: within ±5% or ±0.5 pF, whichever is larger; X7R, X7S, X7T, X5R, X6R, X6S, X6T: within ±10% 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Per AEC-Q200-002

6.13 Bending ④ ⑦

Dielectric	Requirement	Test conditions
C0G	No visible damage Capacitance change within ±5.0% or ±0.5 pF, whichever is larger.	Solder the capacitor onto the test substrate and place it on the test stand. Press the middle of the substrate with the pressing rod at about 1.0 mm/s until the deflection reaches 2.0 mm, and hold for 60 s.
X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage Capacitance change ≤ ±10%	

Remark: test board thickness: 0201/0402: 1.0 mm; 0603/0805/1206: 1.6 mm.



Bending test fixture (dimensions in mm as drawn): pressing rod R230, supports 45 + 45, flexure ≤ 2, capacitance meter connected

6.14 DPA (destructive physical analysis)

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	Confirm whether there are defects in the internal design of the product: good electrode continuity, uniform electrode thickness, good connection of internal and external electrodes, same thickness of the upper and lower cover layers.	Sample ground on its side (LT face).

6.15 Resistance to soldering heat ③

Dielectric	Requirement	Test conditions
C0G	No visible damage 1. Capacitance change within $\pm 2.5\%$ or ± 0.25 pF, whichever is larger. 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Soldering temperature: 270 ± 5 °C Preheating: $120 \sim 150$ °C, 60 s Dipping time: 10 ± 1 s Measure after 24 ± 2 h (C0G) or 48 ± 4 h (X7R, X7S, X7T, X5R, X6R, X6S, X6T) at room temperature. Recovery under the standard conditions after the test.
X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change within $\pm 7.5\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.	*Initial measurement of high-dielectric-constant types: heat treatment at $140 \sim 150$ °C for 1 h, then 48 ± 4 h at room temperature; then perform the initial measurement.

6.16 Temperature cycle

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change: C0G: within $\pm 5\%$ or ± 0.5 pF, whichever is larger; X7R, X7S, X7T, X5R, X6R, X6S, X6T: within $\pm 10\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.	5 cycles of the steps in the table below; transfer time not more than 1 min. Measure after 24 ± 2 h (C0G) or 48 ± 4 h (X7R, X7S, X7T, X5R, X6R, X6S, X6T) at room temperature.

Step	Temperature	Time
1	Lower category temperature $+0/-3$ °C	30 min
2	25 °C	2~3 min
3	Upper category temperature $+3/-0$ °C	30 min
4	25 °C	2~3 min

6.17 Temperature shock ⑦

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change: C0G: within $\pm 5\%$ or ± 0.5 pF, whichever is larger; X7R, X7S, X7T, X5R, X6R, X6S, X6T: within $\pm 10\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Place the mounted capacitors in the test chamber and perform 1000 cycles of the following steps: -55 °C (30 min) $\rightarrow$ 125 °C (30 min); transfer time not more than 1 minute. C0G: measure after 6 ~ 24 h at room temperature. X7R, X7S, X7T, X5R, X6R, X6S, X6T: measure after 24 ± 2 h at room temperature.

6.18 Vibration ⑥ ⑦

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change: C0G: within $\pm 5\%$ or ± 0.5 pF, whichever is larger; X7R, X7S, X7T, X5R, X6R, X6S, X6T: within $\pm 10\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Reflow-solder the capacitors onto a P.C. board as shown in Appendix 2 before testing. Applied force: 5 G max. Frequency: $10 \sim 2,000$ Hz Reciprocating sweep time: 20 min Cycles: 12 cycles in each of 3 mutually perpendicular directions.

6.19 Rupture strength ④

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	Minimum breaking force: 0402: ≥ 1.2 kgf 0603: ≥ 3.0 kgf 0805 (≤ 0.85 mm): ≥ 4.0 kgf 0805 (1.25 mm): ≥ 7.0 kgf 1206 (< 1.25 mm): ≥ 4.0 kgf 1206 (≥ 1.25 mm): ≥ 6.0 kgf	Fix the chip capacitor in the test die and apply pressure at 1 mm/s with a tension tester until the capacitor breaks.

6.20 Moisture resistance, steady state ③

Dielectric	Requirement	Test conditions
C0G	No visible damage 1. Capacitance change within $\pm 5\%$ or ± 0.5 pF, whichever is larger. 2. $C_p < 10$ pF: $Q \geq 200 + 10C_p$ $10 \leq C_p < 30$ pF: $Q \geq 275 + 2.5C_p$ $C_p \geq 30$ pF: $Q \geq 350$ 3. IR: ≥ 1000 M Ω or $R \cdot C \geq 10$ $\Omega \cdot F$, whichever is smaller.	Test temperature: 40 ± 2 °C Humidity: 90 ~ 95% RH Test time: 500 ± 12 h Measure after 24 ± 2 h (C0G) or 48 ± 4 h (X7R, X7S, X7T, X5R, X6R, X6S, X6T) at room temperature. *Initial measurement of high-dielectric-constant types: heat treatment at $140 \sim 150$ °C for 1 h, then 48 ± 4 h at room temperature; then perform the initial measurement.
X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change within $\pm 12.5\%$ 2. DF: not more than 2 times the initial value 3. IR: ≥ 1000 M Ω or $R \cdot C \geq 10$ $\Omega \cdot F$, whichever is smaller.	

6.21 Damp heat with load ⑥ ⑧

Dielectric	Requirement	Test conditions
C0G	No visible damage 1. Capacitance change $\leq \pm 5\%$ or ± 0.5 pF, whichever is larger. 2. DF: $C_p < 30$ pF: $Q \geq 100 + 10/3 \cdot C_p$ $C_p \geq 30$ pF: $Q \geq 200$ 3. IR: ≥ 500 M Ω or $R \cdot C \geq 25$ $\Omega \cdot F$, whichever is smaller.	Test temperature: 85 ± 2 °C Test humidity: 85% RH Applied voltage: rated voltage and 1.5 V Charge/discharge current: 50 mA or lower Test time: 1000 ± 48 h Reflow-solder the capacitors onto a P.C. board as shown in Appendix 2 before testing. Measure after 24 ± 2 h (Class 1: C0G), or after a pre-treatment at 150 °C for 1 h and then 48 ± 4 h (Class 2: X7R, X7S, X7T, X5R, X6R, X6S, X6T), at room temperature.
X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change $\leq \pm 12.5\%$ 2. DF: not more than 2 times the initial value 3. IR: ≥ 500 M Ω or $R \cdot C \geq 25$ $\Omega \cdot F$, whichever is smaller.	*Initial measurement (Class 2): pre-treatment at 150 °C for 1 h, then 48 ± 4 h at room temperature; then measure the initial capacitance.

6.22 Life test ④ ⑧

Dielectric	Requirement	Test conditions
C0G	No visible damage 1. Capacitance change $\leq \pm 5\%$ or ± 0.5 pF, whichever is larger. 2. $Q \geq 350$ ($C_p \geq 30$ pF) $Q \geq 275 + (2.5 \cdot C_p)$ (10 pF $\leq C_p < 30$ pF) $Q \geq 200 + 10 \cdot C_p$ ($C_p < 10$ pF) 3. IR: ≥ 1000 M Ω or $R \cdot C \geq 5$ $\Omega \cdot F$, whichever is smaller.	Test temperature: maximum operating temperature ± 3 °C Voltage: $U_R < 100$ V: 150% of the rated voltage (*see remark) Test time: 1000 h Measure after 24 ± 2 h (C0G), or after a pre-treatment at 150 °C for 1 h and then 48 ± 4 h (X7R, X7S, X7T, X5R, X6R, X6S, X6T), at room temperature. *Initial measurement of high-dielectric-constant types: apply 150% of the rated DC voltage for one hour at the maximum operating temperature ± 3 °C, remove the voltage and leave for 48 ± 4 h at room temperature; then perform the initial measurement.
X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change $\leq \pm 12.5\%$ 2. DF: not more than 2 times the initial value 3. IR: ≥ 1000 M Ω or $R \cdot C \geq 5$ $\Omega \cdot F$, whichever is smaller.	

Remarks: this reliability test applies only to standard products, not to medium- and high-voltage products. *Tested at $1 \times$ rated voltage: 0201/104 and above; 0402/104 and above; 0603/105 and above; 0805/225 and above; 1206/475 and above; 1210/225 and above.

6.23 Mechanical impact ⑥

Dielectric	Requirement	Test conditions
C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	No visible damage 1. Capacitance change: C0G: within $\pm 5\%$ or ± 0.5 pF, whichever is larger; X7R, X7S, X7T, X5R, X6R, X6S, X6T: within $\pm 10\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.	Fix the chip capacitor on the tension tester; impact from three directions (X, Y, Z). Pulse: half-sine Duration: 0.5 ms Peak acceleration: 1500 g

7. Packaging

7.1 Bulk packaging

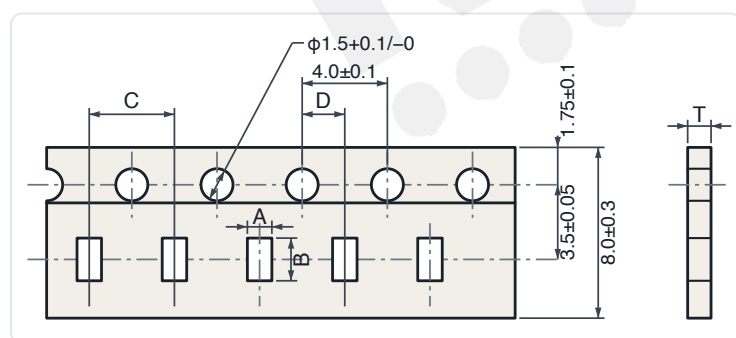
Standard packing: 10000 pcs (10 Kpcs) per bag; other quantities according to customer request.

7.2 Tape packaging ② ④

Size	Chip size (mm)			Quantity (pcs/reel)	
	L	W	T	Paper tape	Plastic tape
0201	0.6	0.3	0.3	15,000	—
0402	1.0	0.5	0.5	10,000	—
0603	1.6	0.8	0.8	4,000	—
0805	2.0	1.25	≤ 0.85	4,000	—
			> 0.85	—	3,000
1206	3.2	1.6	≤ 0.85	4,000	—
			$0.85 < T \leq 1.25$	—	3,000
			1.6	—	2,000
1210	3.2	2.5	≤ 2.0	—	2,000
			> 2.0	—	1500
1812	4.6	3.2	≤ 2.0	—	1,000
			> 2.0	—	1000
2220	5.7	5.0	≤ 1.25	—	1,000
			> 1.25	—	500

— = not offered in this reel / tape type (printed as "N/A" in the KOMÉ original).

7.2.1 Paper tape dimensions

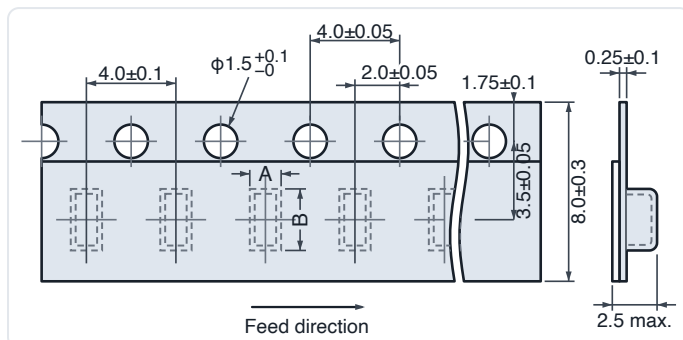


Paper tape (8 mm): top view and side view, dimensions as drawn in the source

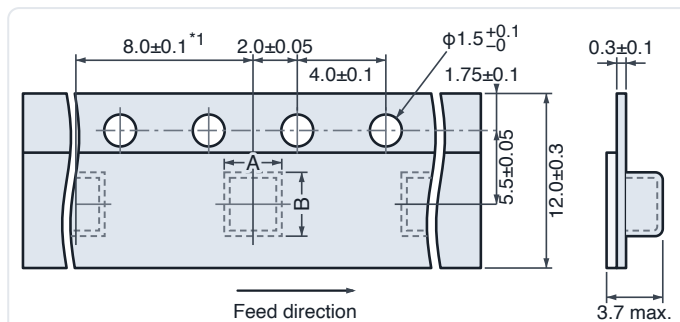
Type	A	B	C	D	T
0201	0.36 $\pm$ 0.03	0.67 $\pm$ 0.03	2.0 $\pm$ 0.10	2.0 $\pm$ 0.05	0.42 max.
0402	0.65 $\pm$ 0.10	1.15 $\pm$ 0.10	2.0 $\pm$ 0.05	2.0 $\pm$ 0.05	0.8 max.
0603	1.05 $\pm$ 0.10	1.85 $\pm$ 0.10	4.0 $\pm$ 0.10	2.0 $\pm$ 0.10	1.1 max.
0805	1.55 $\pm$ 0.15	2.3 $\pm$ 0.15	4.0 $\pm$ 0.10	2.0 $\pm$ 0.10	1.1 max.
1206	1.95 $\pm$ 0.15	3.5 $\pm$ 0.15	4.0 $\pm$ 0.10	2.0 $\pm$ 0.10	1.1 max.

Unit: mm

7.2.2 Embossed (plastic) tape dimensions ⑨



8 mm wide tape, 4 mm pitch

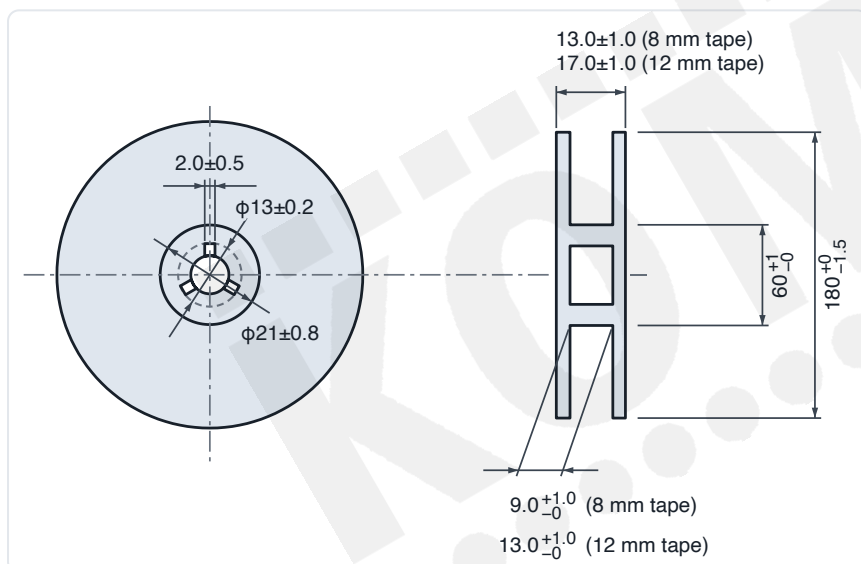


12 mm wide tape, 8 mm / 4 mm pitch

Size	A	B
0805	1.45±0.20	2.25±0.20
1206	1.95±0.20	3.50±0.20
1210	2.90±0.20	3.60±0.20
1812	3.60±0.20	4.90±0.20
2220	5.40±0.20	6.10±0.20

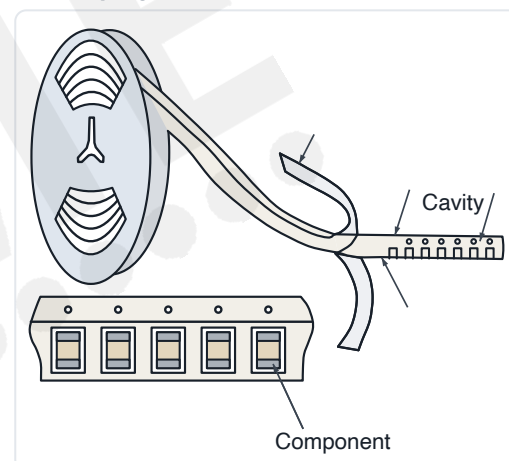
Unit: mm

7.2.3 Reel dimensions



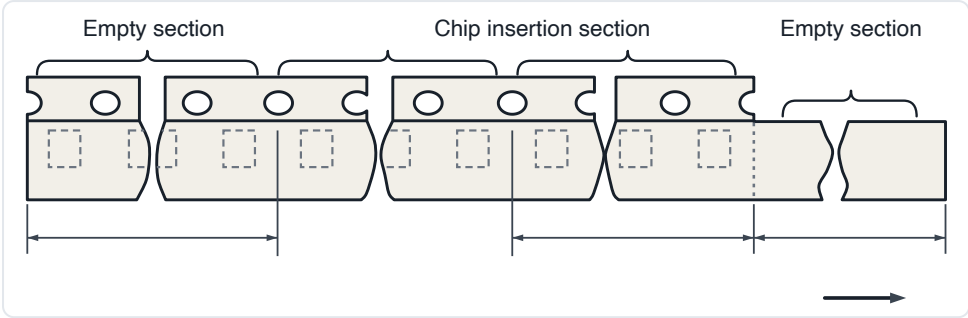
Reel, front view and side view

7.2.4 Taping



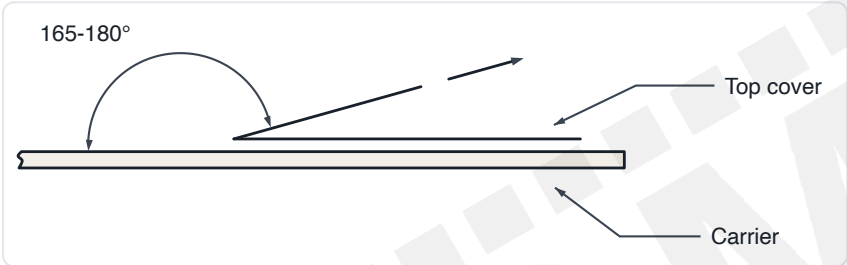
Components in the cavities of the carrier tape

7.2.5 Taping method



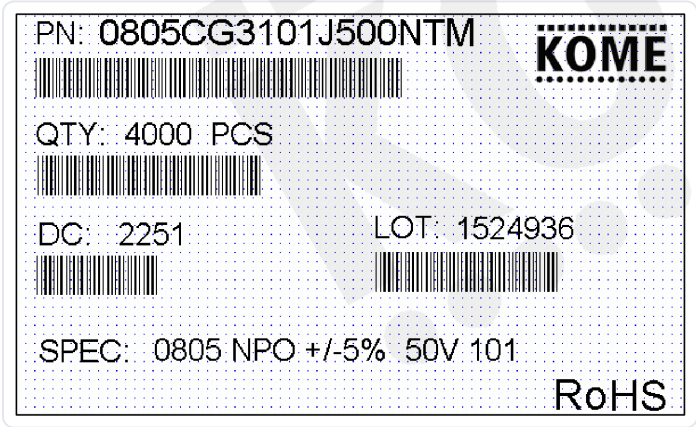
Leader and trailer: empty sections and chip insertion section

- (1) The tape is wound clockwise. The sprocket holes are on the right when the tape is pulled towards the user.
- (2) The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches. ⑦
- (3) A leader and empty tape sections are provided at the ends of the tape as shown above.
- (4) Missing capacitors: within 0.1% of the quantity per reel or 1 pc, whichever is greater, and not consecutive.
- (5) The top tape and bottom tape shall not protrude beyond the edges of the tape and shall not cover the sprocket holes.
- (6) Cumulative tolerance of the sprocket holes over 10 pitches: ±0.3 mm.
- (7) Peel-off force of the top tape: 0.1 to 0.6 N, in the direction shown below. ⑦



Peel-off direction: top cover tape peeled at 165–180° from the carrier tape

7.2.6 Reel label



Sample reel label (excerpt of the original sheet)

Label field	Example (as printed on the sample label)
PN	0805CG3101J500NTM
QTY	4000 PCS
DC	2251
LOT	1524936
SPEC	0805 NPO +/-5% 50V 101

PN, QTY, DC and LOT are each followed by a barcode; the label also carries the KOME logo and the RoHS mark.

Part number on the label (PN), positions as in section 3:

1	2	3	4	5	6	7	8	9
0805	CG	3	101	J	500	N	T	M
Size	Dielectric	Digits	Capacitance	Tolerance	Rated voltage	Termination	Packaging	Automotive

7.2.7 Outer packaging

7.2.7.1 Carton

7.2.7.1.1 Carton size	L	W	H
Dimensions	41.0 cm	38.5 cm	20.2 cm

7.2.7.1.2 Quantity: 240 Kpcs per carton.

1 inner box = 40,000 pcs; 1 carton = 40,000 pcs × 6 inner boxes = 240,000 pcs.

RoHS label applied according to customer request.

7.2.7.2 Inner box

7.2.7.2.1 Inner box size	L	W	H
Dimensions	18.5 cm	6.5 cm	19 cm

7.2.7.2.2 Quantity: 40 Kpcs per box.

1 reel = 4,000 pcs; 1 inner box = 4,000 pcs × 10 reels = 40,000 pcs.

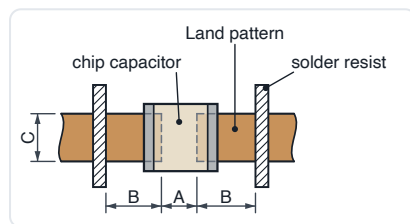
8. Precautions for use

8.1 PCB design

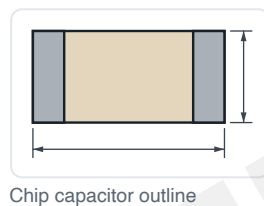
8.1.1 Land pattern design ②

The following drawings and tables show examples of recommended land patterns that prevent excessive solder (fillets higher than the component terminations). Examples of incorrect pattern designs are also shown.

Recommended land dimensions for typical chip capacitor land patterns on PCBs:



Land pattern: chip capacitor, land pattern, solder resist



Chip capacitor outline

Wave soldering (unit: mm)

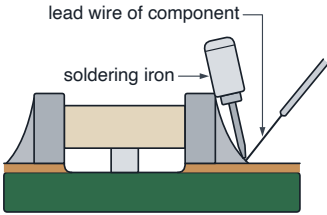
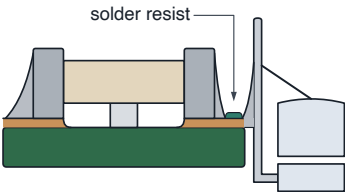
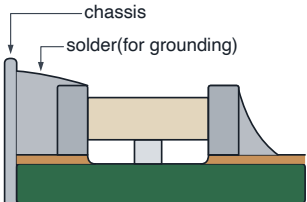
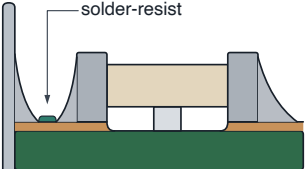
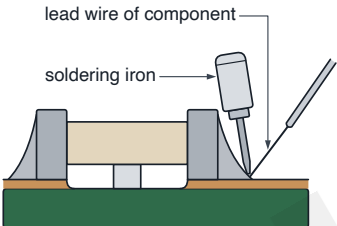
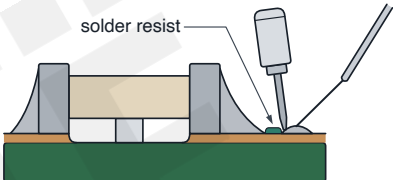
Size		0603	0805	1206
Chip size	L	1.6	2.0	3.2
	W	0.8	1.25	1.6
A		0.8~1.0	1.0~1.4	1.8~2.5
B		0.5~0.8	0.8~1.5	0.8~1.7
C		0.6~0.8	0.9~1.2	1.2~1.6

Reflow soldering (unit: mm)

Size		0201	0402	0603	0805	1206	1210	1812	2220
Chip size	L	0.6	1.0	1.6	2.00	3.2	3.2	4.5	5.7
	W	0.3	0.5	0.8	1.25	1.6	2.5	3.2	5.0
A		0.20~0.25	0.35~0.45	0.6~0.8	0.8~1.2	1.8~2.5	1.8~2.5	2.5~3.4	4.0~4.6
B		0.20~0.30	0.40~0.50	0.6~0.8	0.8~1.2	1.0~1.5	1.0~1.5	1.8~2.0	2.0~2.2
C		0.25~0.35	0.45~0.55	0.6~0.8	0.9~1.6	1.2~2.0	1.6~3.2	2.3~3.5	3.5~4.8

Excess solder can affect the ability of chips to withstand mechanical stress. Therefore, take proper precautions when designing land patterns.

Examples of good and bad solder application:

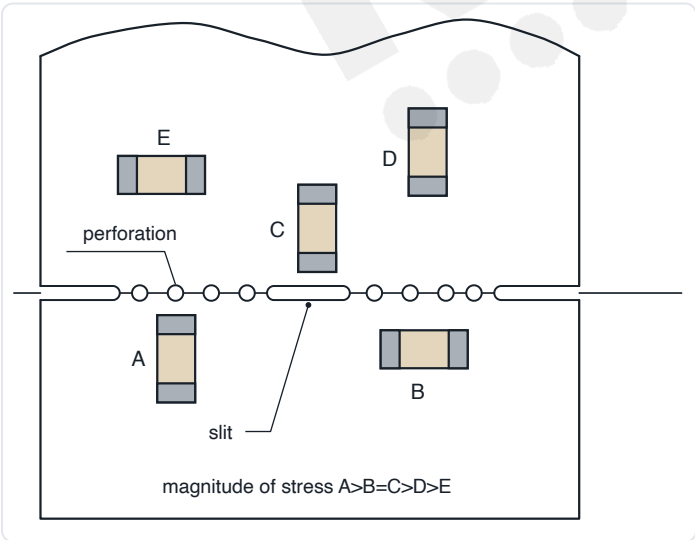
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand soldering of leaded components near mounted components		

8.1.2 Pattern configurations

The following are examples of good and bad capacitor layouts. SMD capacitors should be located so as to minimise any mechanical stress from board warp or deflection.

	Not recommended	Recommended
Deflection of the board		

When laying out capacitors on a breakaway PC board, note that the mechanical stress depends on the capacitor layout. The example below shows recommendations for better design.



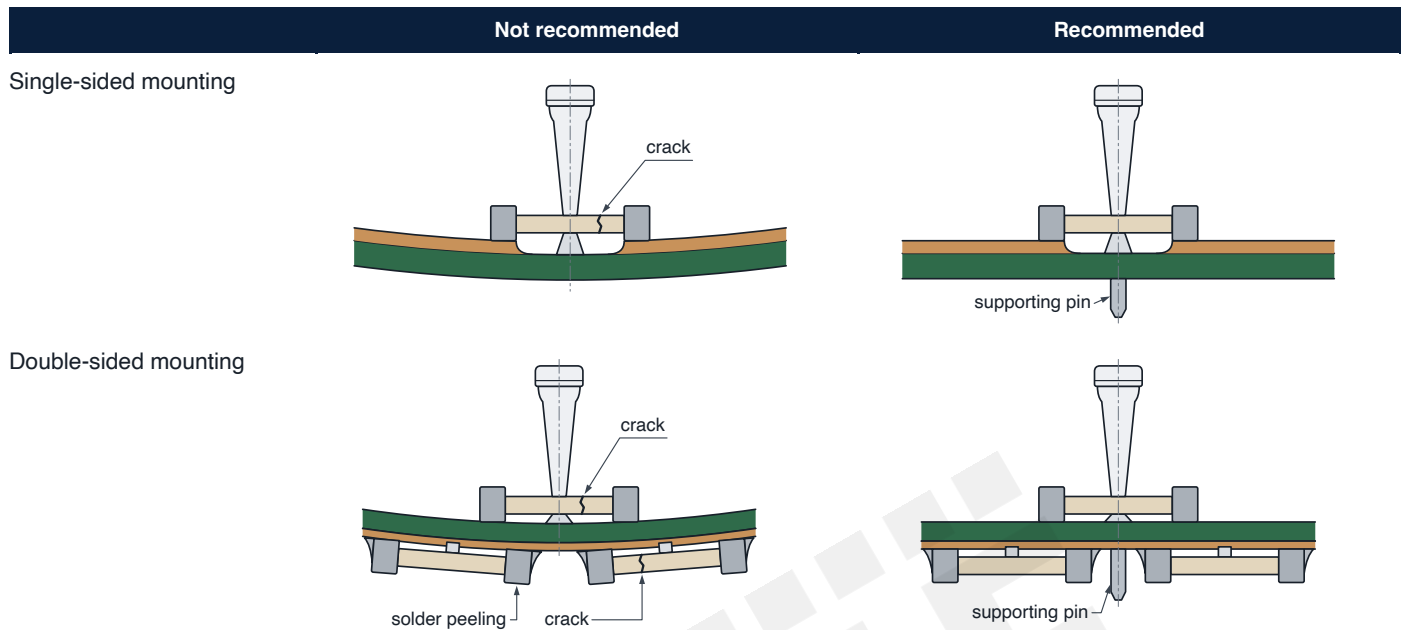
Capacitor positions A–E relative to the perforation and the slit; magnitude of stress $A > B = C > D > E$

When breaking PC boards along their perforations, the mechanical stress on the capacitors varies with the method used. The following methods are listed in order from least to most stressful: push-back, slit, V-grooving and perforation. Any SMD capacitor layout should therefore also take the PCB splitting procedure into account.

8.2 Automatic placement

Adjustment of the mounting machine:

- (1) Excessive impact load should not be imposed on the capacitors when they are mounted on the PC board.
- (2) The suction nozzles and positioning claws of the mouter must be inspected, maintained and replaced periodically.

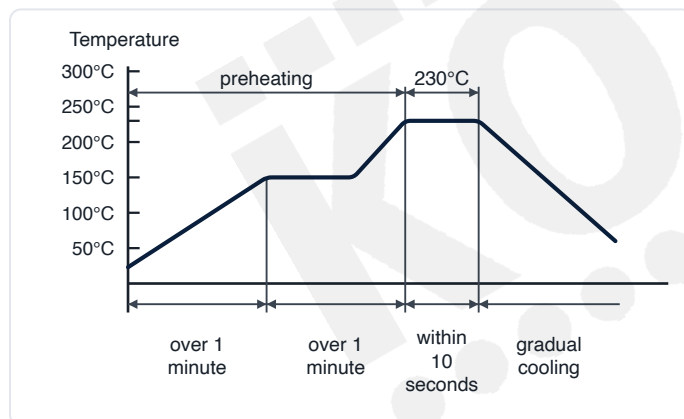


8.3 Recommended soldering profiles

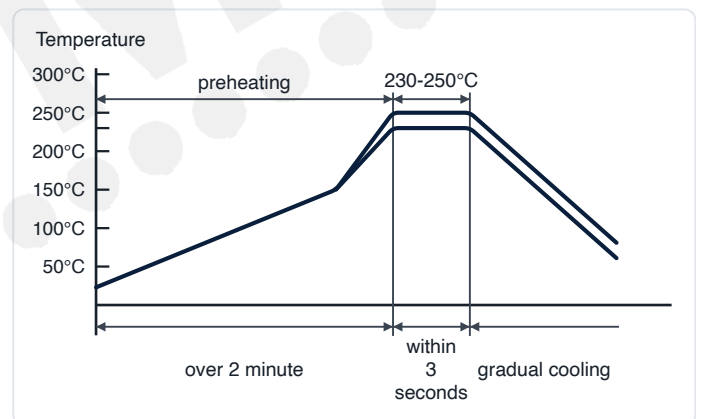
8.3.1 Notes

- (1) Reflow soldering is recommended for these products.
- (2) Larger case sizes are suitable for reflow soldering.

8.3.2 Sn-Pb soldering profiles



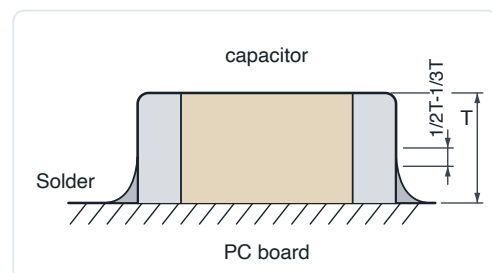
Reflow soldering (Sn-Pb)



Wave soldering (Sn-Pb) ⑩

Caution (reflow soldering):

- (1) Ideally, the solder fillet height is 1/2 to 1/3 of the capacitor thickness, as shown.
- (2) Excessive dwell times can impair solderability; keep the soldering time as close to the recommended times as possible.



Solder fillet height 1/2T-1/3T

Caution (wave soldering) ⑩:

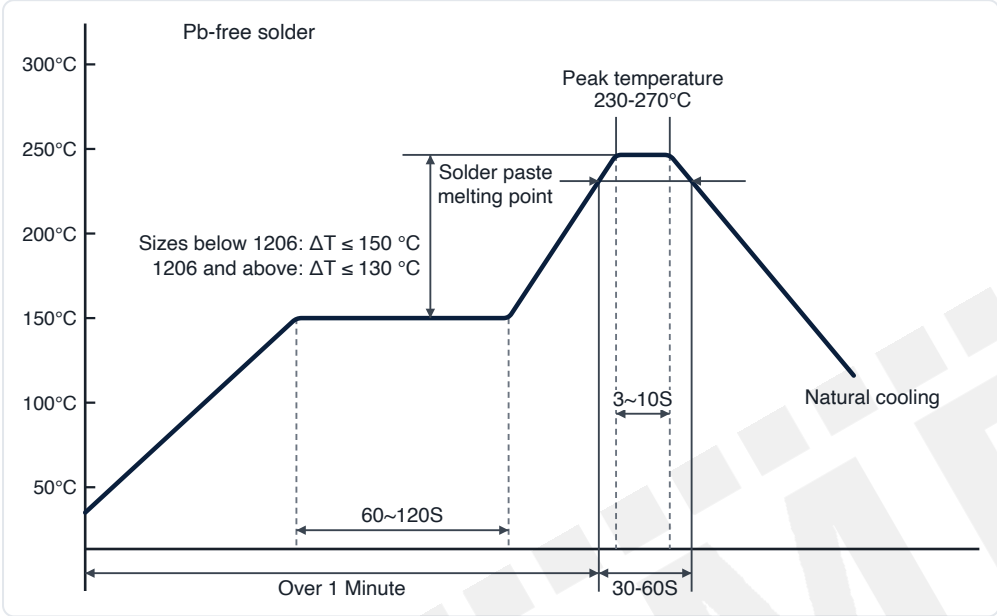
- (1) Make sure the capacitors are preheated sufficiently.
- (2) The temperature difference between the capacitor and the molten solder should not be greater than 100 to 130 °C.
- (3) Cooling after soldering should be as gradual as possible.

Hand soldering

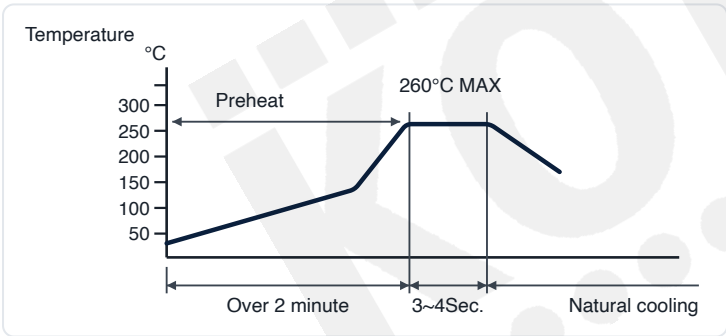
Preheating	Iron tip temperature	Iron power	Tip diameter	Soldering time	Amount of solder	Restriction
$\Delta T \leq 130\text{ }^{\circ}\text{C}$	350 $^{\circ}\text{C}$ max.	20 W max.	1 mm recommended	5 s max.	$\leq 1/2$ of chip thickness	Do not touch the ceramic body directly with the iron tip.

Caution: (1) Use a 20 W soldering iron with a maximum tip diameter of 1.0 mm. (2) The soldering iron should not directly touch the capacitor.

8.3.3 Pb-free soldering profiles ⑩



Reflow soldering (Pb-free)



Wave soldering

8.4 Handling

Breakaway PC boards (splitting along perforations):

- (1) When splitting the PC board after mounting capacitors and other components, take care not to subject the board to deflection or twisting stress.
- (2) Board separation should not be done manually, but with appropriate devices.

8.5 Storage ⑪

- (1) Storage conditions: temperature 5 ~ 40 $^{\circ}\text{C}$; humidity $\leq 70\%$ RH.
- (2) Do not open the tape until the parts are to be used, and use them within one year of the date printed on the reel.
- (3) Use the chips within 3 months after the tape is opened.
- (4) The capacitance of high-dielectric-constant capacitors (X7R, X5R, X7T, X6S, X7S, X6R, X6T) decreases gradually with time; take this into account in circuit design. If such a capacitance reduction occurs, a heat treatment at 150 $^{\circ}\text{C}$ for 1 hour will return the capacitance to its initial value.

Notes

① Part numbering: position 3 is printed only as "NO. OF total character (102=1000=4)", with no Chinese label; tolerance code A ($\pm 0.05\text{ pF}$, in 6.3) is not listed under position 5; codes R (X6R) and T (X6T) in position 2 added per revision instruction dated 2026-10-13 (manufacturer confirmation pending); the temperature-characteristics table has an X6R row but no X6T row; the Y5V row of the temperature-characteristics table is deleted per revision instruction dated

2026-10-13 (manufacturer confirmation pending); code F (Y5V) is still printed in position 2 and has no capacitance range in section 4 and no requirements in section 6 — subject to manufacturer confirmation.

② Sizes: the size-code table (section 3, position 1) lists 0402 to 3035 (no 0201), while sections 4, 5 and 7 cover 0201 to 2220; the Chinese size list in section 5 ends at 1812 while the English list includes 2220; the length of size 1812 is 4.50 ± 0.30 mm in section 5 and 4.5 mm in the land-pattern table (8.1.1), but 4.6 mm in the tape-packaging table (7.2) — subject to manufacturer confirmation.

③ Reference temperature: 20 °C in the temperature-characteristics table, 25 °C in 6.7. De-ageing of Class II parts is given as 150 $\pm 0/-10$ °C for 1 h then 24 ± 2 h (6.3, 6.4), 140 ~ 150 °C for 1 h then 24 h (6.7), 140 ~ 150 °C for 1 h then 48 ± 4 h (6.15, 6.20), 150 °C for 1 h then 48 ± 4 h (6.21, 6.22) and 150 °C for 1 h (8.5) — subject to manufacturer confirmation.

④ Ranges not covered: the DF limits (6.4) end below 47 μF (" $2.2 \mu\text{F} \leq C < 47 \mu\text{F}$ ") for 1206 to 2220, while section 4 lists 47 μF (code 476) for these sizes; 6.6 gives no test for rated voltages above 50 V and below 100 V, and 6.22 gives a test voltage only for rated voltages below 100 V, while section 4 lists ratings up to 2000 V; 6.19 gives no breaking force for 0805 thicker than 0.85 mm and thinner than 1.25 mm, for 0201 or for sizes above 1206; 7.2 gives no tape quantity for 1206 thicker than 1.25 mm and thinner than 1.6 mm; the remarks of 6.7 and 6.22 name sizes up to 1210 and the test-board thickness in 6.13 sizes up to 1206 (no 1812, 2220) — subject to manufacturer confirmation.

⑤ 6.1: the criterion is printed as " $1/10L < L \leq 1/8L$...", a dimension compared with a fraction of itself. 6.7: the English C0G drift calculation does not say what the difference of steps 1, 3 and 5 is divided by; the Chinese says the step-3 capacitance is divided by that difference. The 6.7 step table has columns only for C0G/X7R/X7T, X6S and X5R; no step temperatures are given for X7S, X6R and X6T — subject to manufacturer confirmation.

⑥ Test details not given: 6.12 (ESD) names a dielectric "M3L" that appears nowhere else and gives no test voltage or other condition beyond "Per AEC-Q200-002"; 6.18 and 6.21 refer to a P.C. board "shown in Appendix 2", which is not part of the document; 6.23 does not state the number of impacts per direction — subject to manufacturer confirmation.

⑦ The Chinese text differs from the English in: section 1 (C0G "standard and medium/high-voltage" products; Class II "wide capacitance range, circuits with lower stability requirements"); the titles of 6.9 (solder resistance) and 6.13 (termination bond strength); 6.11 (capacitance "meets the specification"); 6.17 (the Class II recovery line names only X7R, X5R, X7T and X6S); 6.18 (applied force " $\leq 5\text{g/s}$ " instead of "5G max."); 7.2.5 (2) (a leader of at least 5 pitches at the start of the tape) and (7) (peel torque). The English is printed — subject to manufacturer confirmation.

⑧ 6.21 and 6.22: for Class II the Chinese adds a pre-treatment at 150 °C for 1 h before the 48 ± 4 h recovery, which the English omits; it is printed. For the initial measurement of 6.21 only the Chinese gives a procedure (150 °C for 1 h, then 48 ± 4 h); it is printed. For the initial measurement of 6.22 the English (150% of the rated DC voltage for 1 h at the maximum operating temperature) is printed; the Chinese gives a 150 °C heat treatment for 1 h instead — subject to manufacturer confirmation. Revision instruction dated 2026-10-13 (no manufacturer document; manufacturer confirmation pending): 48 ± 4 h is kept and the 150 °C / 1 h treatment is done before the test; whether the 6.21 recovery sentence (Chinese: after the test) is to be reworded is not stated, so it is printed as in the source — subject to manufacturer confirmation.

⑨ Tape drawings: in 7.2.2 the pitch " 8.0 ± 0.1 " carries a note mark "*" with no note, and the sprocket-hole pitch is 4.0 ± 0.05 in the 8 mm drawing but 4.0 ± 0.1 in the 12 mm drawing — subject to manufacturer confirmation.

⑩ Soldering: the temperature difference is "not greater than 100 to 130 °C" in the wave-soldering caution, $\Delta T \leq 130$ °C for hand soldering, and $\Delta T \leq 150$ °C (below 1206) / ≤ 130 °C (1206 and above) in the Pb-free reflow profile. There are two wave-soldering profiles: 230-250 °C within 3 s (8.3.2, Sn-Pb) and 260 °C max., 3~4 s (after 8.3.3, not labelled Sn-Pb or Pb-free) — subject to manufacturer confirmation.

⑪ 8.5 (4) printed only X7R, X5R, X7T and X6S; X7S, X6R and X6T added per revision instruction dated 2026-10-13 (manufacturer confirmation pending). The page numbers of the table of contents do not match the pages for sections 1–3 and 5–8 (only section 4 matches) and are not reproduced — subject to manufacturer confirmation.

⑫ X6R and X6T: capacitance ranges are charted for these dielectrics, and codes R (X6R) and T (X6T) are in the part numbering, but the temperature-coefficient table lists X6R and not X6T — subject to manufacturer confirmation.

⑬ 0201 and 0402: code 863 (86 nF) is printed between 473 and 104. The 86 nF value is not listed in the E3, E6, E12, E24, E48, E96 or E192 series in the referenced preferred-value table; confirmation of the intended value, tolerance and availability is required from the manufacturer.

⑭ 1206: codes 101, 121, 151 and 181 are printed a second time after 201; the second 101 has no C0G 2000 V entry, the other repeated rows are identical — subject to manufacturer confirmation.

⑮ 1206: code 205 (2 μF) is printed between 105 and 225; all other codes of 1 μF and above in this chart (105, 225, 475, 106, 226, 476) are E6 values, 2 μF is not — subject to manufacturer confirmation.

⑯ 1210: code 374 (370 nF) is printed between 334 and 474. The 370 nF value belongs to E192; confirmation of the intended value, tolerance and availability is required from the manufacturer.