

Automotive Multilayer Chip Ceramic Capacitors

AEC-Q200 · Datasheet (condensed) — full specification available separately



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

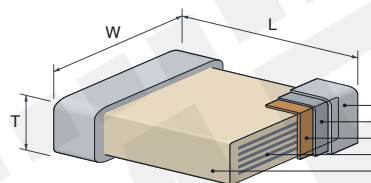
CAPACITANCE
0.1 pF – 47 μF

Capacitor and dielectric types ①

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.

Product structure



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

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

Part numbering ②

0805 1 · Size 0805	CG 2 · Dielectric C0G	3 3 · Digits 100 = 3 digits	101 4 · Capacitance 100 pF	J 5 · Tolerance ±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 ③

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 ②

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

3 · Number of digits ②

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 ② ④

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.

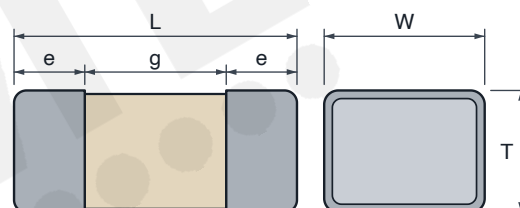
Dimensions

Chip sizes: 0201, 0402, 0603, 0805, 1206, 1210, 1812 and 2220. ③

*1 Dimensions of parts of this size with a capacitance of 1 μF 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 μF 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

Size	L (mm)	W (mm)	e (mm)	g min. (mm)	T (mm)	T code
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
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

Packaging (summary)

Bulk packaging

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

Tape packaging ③ ⑤

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 ≤ 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).

Tape, reel, label and outer-packaging details: full specification, section 7.

Capacitance range

0201 (0603)

[illegible]

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 [®]					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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[illegible]

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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.

1206 (3216) – part 1 of 2: C0G, X7R, X7S, X7T

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	D	D	D	D	D	D	D																																	
5R0	5.0 pF	D	D	D	D	D	D	D	D	D																																	
5R1	5.1 pF	D	D	D	D	D	D	D	D	D																																	
5R6	5.6 pF	D	D	D	D	D	D	D	D	D																																	
6R0	6.0 pF	D	D	D	D	D	D	D	D	D																																	
6R2	6.2 pF	D	D	D	D	D	D	D	D	D																																	
6R8	6.8 pF	D	D	D	D	D	D	D	D	D																																	
7R0	7.0 pF	D	D	D	D	D	D	D	D	D																																	
7R5	7.5 pF	D	D	D	D	D	D	D	D	D																																	
8R0	8.0 pF	D	D	D	D	D	D	D	D	D																																	
8R2	8.2 pF	D	D	D	D	D	D	D	D	D																																	
9R0	9.0 pF	D	D	D	D	D	D	D	D	D																																	
9R1	9.1 pF	D	D	D	D	D	D	D	D	D																																	
100	10 pF	D	D	D	D	D	D	D	D	D																																	
120	12 pF	D	D	D	D	D	D	D	D	D																																	
150	15 pF	D	D	D	D	D	D	D	D	D																																	

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

[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.

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	M		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	
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	
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	
563	56 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	
683	68 nF								G/M	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	
104	100 nF								G/M	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		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	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
474	470 nF								G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
684	680 nF								G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	H/G		G/M	G/M	H/G	H/G	H/G	H/G	H/G	H/G	H/G	
105	1 μF								G/M	G/M	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		
225	2.2 μF									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		
475	4.7 μF									G/M	G/M	G/M	G/M	G/M	G/M	G/M	G/M				G/M	G/M	G/M	G/M	G/M	G/M	G/M	G/M				G/M	G/M	G/M	G/M	G/M	G/M		
106	10 μF									G/M	G/M	G/M	G/M	G/M	G/M	G/M	G/M				G/M	G/M	G/M	G/M	G/M	G/M	G/M	G/M				G/M	G/M	G/M	G/M	G/M	G/M		
226	22 μF										G/M	G/M	G/M	G/M	G/M	G/M	G/M																G/M	G/M	G/M	G/M	G/M		
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]

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Electrical characteristics and reliability (summary)

Requirements only. The test conditions, measurement remarks and step tables of every item are given in section 6 of the full specification (clause numbers in the first column).

Electrical characteristics

Item (full spec. clause)	Dielectric	Requirement
6.3 Capacitance	C0G	Within the specified tolerance. A: ± 0.05 pF; B: ± 0.1 pF; C: ± 0.25 pF; D: ± 0.5 pF; J: $\pm 5\%$
	X7R, X7S, X7T, X5R, X6R, X6S, X6T	Within the specified tolerance. J: $\pm 5\%$; K: $\pm 10\%$; M: $\pm 20\%$
6.4 Dissipation factor	C0G	$C_p < 30$ pF: $Q \geq 400 + 20C_p$ $C_p \geq 30$ pF: $Q \geq 1000$
	X7R, X5R, X7T, X6S, X6R, X7S, X6T	DF limits: see the table below. ⑤
6.5 Insulation resistance	C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	$U_R \leq 50$ V: more than $10\text{ G}\Omega$ or $100\text{ }\Omega\cdot\text{F/CR}$, whichever is smaller.
	C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T	$U_R > 50$ V: more than $4\text{ G}\Omega$ or $100\text{ }\Omega\cdot\text{F/CR}$, whichever is smaller.

DF limits, Class II (X7R, X5R, X7T, X6S, X6R, X7S, X6T) ⑤

Size	Rated voltage U_R	Capacitance	DF	Size	Rated voltage U_R	Capacitance	DF
0201	/	$C \leq 0.01\text{ }\mu\text{F}$	$\leq 7\%$	0805	≤ 25 V	$C \leq 1\text{ }\mu\text{F}$	$\leq 7\%$
		$C > 0.01\text{ }\mu\text{F}$	$\leq 10\%$			$C > 1\text{ }\mu\text{F}$	$\leq 10\%$
0402	≤ 25 V	$C \leq 0.47\text{ }\mu\text{F}$	$\leq 7\%$		> 25 V	$C \leq 0.47\text{ }\mu\text{F}$	$\leq 7\%$
		$C > 0.47\text{ }\mu\text{F}$	$\leq 10\%$			$C > 0.47\text{ }\mu\text{F}$	$\leq 10\%$
	> 25 V	$C \leq 0.1\text{ }\mu\text{F}$	$\leq 7\%$	1206	≤ 25 V	$C < 2.2\text{ }\mu\text{F}$	$\leq 7\%$
		$C > 0.1\text{ }\mu\text{F}$	$\leq 10\%$			$2.2\text{ }\mu\text{F} \leq C < 47\text{ }\mu\text{F}$	$\leq 10\%$
0603	≤ 25 V	$C \leq 0.47\text{ }\mu\text{F}$	$\leq 7\%$		> 25 V	$C < 1\text{ }\mu\text{F}$	$\leq 7\%$
		$C > 0.47\text{ }\mu\text{F}$	$\leq 10\%$			$1\text{ }\mu\text{F} \leq C < 47\text{ }\mu\text{F}$	$\leq 10\%$
	> 25 V	$C \leq 0.1\text{ }\mu\text{F}$	$\leq 5\%$	1210	/	$C < 2.2\text{ }\mu\text{F}$	$\leq 7\%$
		$0.1\text{ }\mu\text{F} < C \leq 0.22\text{ }\mu\text{F}$	$\leq 7\%$			$2.2\text{ }\mu\text{F} \leq C < 47\text{ }\mu\text{F}$	$\leq 10\%$
		$C > 0.22\text{ }\mu\text{F}$	$\leq 10\%$	1812	/	$C < 2.2\text{ }\mu\text{F}$	$\leq 7\%$
						$2.2\text{ }\mu\text{F} \leq C < 47\text{ }\mu\text{F}$	$\leq 10\%$
				2220	/	$C < 2.2\text{ }\mu\text{F}$	$\leq 7\%$
						$2.2\text{ }\mu\text{F} \leq C < 47\text{ }\mu\text{F}$	$\leq 10\%$

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

Electrical characteristics (continued)

Item (full spec. clause)	Dielectric	Requirement
6.6 Dielectric strength ⑤	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	$100\text{ V} \leq U_R < 500\text{ V}$: 200% of rated voltage for 5 s; maximum current 50 mA
		$500\text{ V} \leq U_R < 2000\text{ V}$: 150% of rated voltage for 5 s; maximum current 50 mA
6.7 Temperature coefficient of capacitance ④ ⑪		$U_R \geq 2000\text{ V}$: 120% of rated voltage for 5 s; maximum current 30 mA
	C0G	Temperature coefficient within $\pm 30\text{ ppm/}^\circ\text{C}$ Capacitance drift within $\pm 0.2\%$ or $\pm 0.05\text{ pF}$
	X7R, X5R, X6R	Capacitance change within $\pm 15\%$
	X7T, X6T	Capacitance change within $+22\%$, -33%
	X6S, X7S	Capacitance change within $\pm 22\%$

Reliability tests

Item (full spec. clause)	C0G	X7R, X7S, X7T, X5R, X6R, X6S, X6T
6.8 Solderability of terminations	At least 95% coverage of both terminations; less than 5% pinholes or rough spots.	
6.9 Resistance to leaching ①	At least 95% coverage of both terminations; less than 5% pinholes or rough spots. No visible damage (no cracks).	

Item (full spec. clause)	C0G	X7R, X7S, X7T, X5R, X6R, X6S, X6T
6.10 High-temperature storage	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.	
6.11 Adhesion ①	No visible damage 1. Capacitance: meets the initial specification. 2. DF: meets the initial specification. 3. IR: meets the initial specification.	
6.12 ESD ⑫ Per AEC-Q200-002	1. Capacitance change: C0G/M3L: 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.	
6.13 Bending ⑤ ①	No visible damage Capacitance change within $\pm 5.0\%$ or ± 0.5 pF, whichever is larger.	No visible damage Capacitance change $\leq \pm 10\%$
6.14 DPA (destructive physical analysis)	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.	
6.15 Resistance to soldering heat ④	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.	No visible damage 1. Capacitance change within $\pm 7.5\%$ 2. DF: meets the initial specification. 3. IR: meets the initial specification.
6.16 Temperature cycle	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.	
6.17 Temperature shock ①		
6.18 Vibration ⑫ ①		
6.19 Rupture strength ⑤	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	
6.20 Moisture resistance, steady state ④	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.	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 ⑫ ⑬	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.	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.
6.22 Life test ⑤ ⑬	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.	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.
6.23 Mechanical impact ⑫	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.	

A requirement spanning both columns applies to all dielectrics (C0G, X7R, X7S, X7T, X5R, X6R, X6S, X6T). Remark: 6.22 applies only to standard products, not to medium- and high-voltage products.

Further documents

This datasheet is a summary. Test conditions (section 6), packaging details (section 7) and precautions for use (section 8): see the full specification (Automotive Multilayer Chip Ceramic Capacitors — AEC-Q200 · Full specification). Clause numbers quoted in this datasheet are those of the full specification.

See also the MLCC Application Notes (packaging, mounting, soldering, handling and storage of KOMÉ multilayer chip ceramic capacitors).

Notes

- ① The Chinese text differs from the English in: the dielectric descriptions (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.”). The English is printed — subject to manufacturer confirmation.
- ② 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 chart and no requirements in section 6 of the full specification — subject to manufacturer confirmation.
- ③ Sizes: the size-code table (part numbering, position 1) lists 0402 to 3035 (no 0201), while the capacitance ranges, the dimensions and tape packaging cover 0201 to 2220; the Chinese size list of the dimensions ends at 1812 while the English list includes 2220; the length of size 1812 is $4.50\pm 0.30\text{ mm}$ in the dimensions table and 4.5 mm in the land-pattern table (8.1.1), but 4.6 mm in the tape-packaging table — subject to manufacturer confirmation.
- ④ Reference temperature: $20\text{ }^{\circ}\text{C}$ in the temperature-characteristics table, $25\text{ }^{\circ}\text{C}$ in 6.7. De-ageing of Class II parts is given as $150\text{ }^{\circ}\text{C}$ for 1 h then $24\pm 2\text{ h}$ (6.3, 6.4), $140\sim 150\text{ }^{\circ}\text{C}$ for 1 h then 24 h (6.7), $140\sim 150\text{ }^{\circ}\text{C}$ for 1 h then $48\pm 4\text{ h}$ (6.15, 6.20), $150\text{ }^{\circ}\text{C}$ for 1 h then $48\pm 4\text{ h}$ (6.21, 6.22) and $150\text{ }^{\circ}\text{C}$ for 1 h (8.5) — subject to manufacturer confirmation.
- ⑤ Ranges not covered: the DF limits (6.4) end below $47\text{ }\mu\text{F}$ (“ $2.2\text{ }\mu\text{F} \leq C < 47\text{ }\mu\text{F}$ ”) for 1206 to 2220, while the capacitance range charts list $47\text{ }\mu\text{F}$ (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 the capacitance range charts list 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; the tape-packaging table gives no 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.
- ⑥ 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.
- ⑦ 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.
- ⑧ 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.
- ⑨ 1206: code 205 ($2\text{ }\mu\text{F}$) is printed between 105 and 225; all other codes of $1\text{ }\mu\text{F}$ and above in this chart (105, 225, 475, 106, 226, 476) are E6 values, $2\text{ }\mu\text{F}$ is not — subject to manufacturer confirmation.
- ⑩ 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.
- ⑪ 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.
- ⑫ 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.
- ⑬ 6.21 and 6.22: for Class II the Chinese adds a pre-treatment at $150\text{ }^{\circ}\text{C}$ for 1 h before the $48\pm 4\text{ h}$ recovery, which the English omits; it is printed. For the initial measurement of 6.21 only the Chinese gives a procedure ($150\text{ }^{\circ}\text{C}$ for 1 h, then $48\pm 4\text{ h}$); 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 $150\text{ }^{\circ}\text{C}$ heat treatment for 1 h instead — subject to manufacturer confirmation. Revision instruction dated 2026-10-13 (no manufacturer document; manufacturer confirmation pending): $48\pm 4\text{ h}$ is kept and the $150\text{ }^{\circ}\text{C} / 1\text{ h}$ 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.