

Data Sheet

Customer:

Product: Automotive Grade Multilayer Ceramic Chip Capacitor
– MCF(A)..A Series

Sizes.: 0201/0402/0603/0805/1206/1210/1808/1812/2220

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Automotive Grade Multilayer Ceramic Chip Capacitor

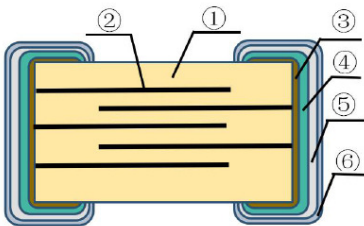


■Features

- Product is suitable for the sensing module on the automobile engines and drive, and the vehicle electronic terminal equipment
- AEC-Q200 Compliance

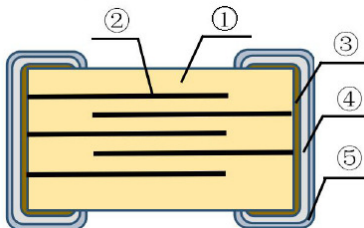
■Construction

Flexible Termination



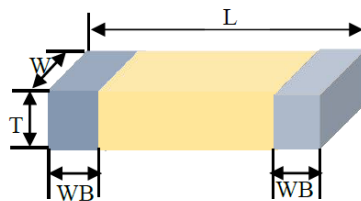
①	Ceramic Dielectric	④	Conductive Resin
②	Ni Electrode	⑤	Ni Coating
③	Cu Electrode	⑥	Sn Coating

Barrier Termination



①	Ceramic Dielectric	④	Ni Coating
②	Ni Electrode	⑤	Sn Coating
③	Cu Electrode		

■Dimensions



Unit: mm

Type	Size (Inch)	L	W	T	WB	Notes
01	0201	0.60±0.05	0.30±0.05	0.30±0.05	0.15±0.05	-
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	0.25±0.05	C<1uF
		1.00±0.15	0.50±0.15	0.50±0.15	0.25±0.05	1uF ≤ C < 10uF
03	0603	1.60±0.10	0.80±0.10	0.80±0.10	0.35±0.20	C ≤ 1uF
		1.60±0.20	0.80±0.20	0.80±0.20	0.35±0.20	C > 1uF
05	0805	2.00±0.20	1.25±0.20	0.80±0.20	0.50±0.20	C ≤ 0.47uF
				1.25±0.20	0.50±0.20	C > 0.47uF
06	1206	3.20±0.30	1.60±0.30	0.80±0.20	0.60±0.30	-
				1.25±0.20		
				1.60±0.30		
10	1210	3.20±0.30	2.50±0.30	≤ 2.80	0.60±0.30	-
08	1808	4.50±0.40	2.00±0.20	≤ 2.20	0.60±0.30	-
12	1812	4.50±0.40	3.20±0.30	≤ 3.50	0.60±0.30	-
20	2220	5.70±0.40	5.00±0.40	≤ 3.50	0.60±0.30	-

Part Numbering

MCF	05	K	T	B	500	105	A
Product Type	Dimensions (L×W)	Capacitance Tolerance	Packaging Code	Dielectric	Voltage (VDCW)	Capacitance	Function Code
MCFA:Flexible Termination MCF:Barrier Termination	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 08: 1808 12: 1812 20: 2220	A: ±0.05pF (Cap ≤ 10pF) B: ±0.1pF (Cap ≤ 10pF) C: ±0.25pF (Cap ≤ 10pF) D: ±0.5pF (Cap ≤ 10pF) F: ±1% G: ±2% J: ±5% K: ±10% M: ±20%	T: Taping Reel	N: NPO (COG) B: X7R BS: X7S X: X5R	6V3: 6.3V 100: 10V 160: 16V 250: 25V 500: 50V 101: 100V 251: 250V 501: 500V 631: 630V	0R1: 0.1pF 1R0: 1pF 100: 10pF 101: 100pF 102: 1nF 103: 10nF 104: 100nF 105: 1uF 106: 10uF 107: 100uF	A: Automotive Grade

General Capacitance & Voltage for MCFA Series

Capacitance & Voltage(0402)

EIA	Size	0402					
Dielectric		X7R					
Code	VDCW	6.3V	10V	16V	25V	50V	100V
101	100pF					0.5	0.5
121	120					0.5	0.5
151	150					0.5	0.5
181	180					0.5	0.5
221	220					0.5	0.5
271	270					0.5	0.5
331	330					0.5	0.5
391	390					0.5	0.5
471	470					0.5	0.5
561	560					0.5	0.5
681	680					0.5	0.5
102	1nF					0.5	0.5
122	1.2					0.5	0.5
152	1.5					0.5	0.5
182	1.8					0.5	0.5
222	2.2					0.5	0.5
272	2.7					0.5	0.5
332	3.3					0.5	0.5
392	3.9					0.5	0.5
472	4.7					0.5	0.5
562	5.6					0.5	0.5
682	6.8					0.5	0.5
103	10nF					0.5	
123	12				0.5	0.5	
153	15				0.5	0.5	
183	18				0.5	0.5	
223	22				0.5	0.5	
273	27				0.5	0.5	
333	33	0.5	0.5	0.5	0.5	0.5	
393	39	0.5	0.5	0.5	0.5	0.5	
473	47	0.5	0.5	0.5	0.5	0.5	
563	56	0.5	0.5	0.5	0.5	0.5	
683	68	0.5	0.5	0.5	0.5	0.5	
104	100nF	0.5	0.5	0.5	0.5	0.5	
224	220						
334	330						
474	470						
684	680						
105	1uF						
225	2.2						
335	3.3						
475	4.7						

List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCFA Series

Capacitance & Voltage(0603)

EIA	Size	0603					
Dielectric		X7R					
Code	VDCW	6.3V	10V	16V	25V	50V	100V
101	100pF					0.8	0.8
121	120					0.8	0.8
151	150					0.8	0.8
181	180					0.8	0.8
221	220					0.8	0.8
271	270					0.8	0.8
331	330					0.8	0.8
391	390					0.8	0.8
471	470					0.8	0.8
561	560					0.8	0.8
681	680					0.8	0.8
102	1nF					0.8	0.8
122	1.2					0.8	0.8
152	1.5					0.8	0.8
182	1.8					0.8	0.8
222	2.2					0.8	0.8
272	2.7					0.8	0.8
332	3.3					0.8	0.8
392	3.9					0.8	0.8
472	4.7					0.8	0.8
562	5.6					0.8	0.8
682	6.8					0.8	0.8
103	10nF					0.8	0.8
123	12					0.8	0.8
153	15					0.8	0.8
183	18					0.8	0.8
223	22					0.8	0.8
273	27					0.8	0.8
333	33					0.8	0.8
393	39					0.8	0.8
473	47	0.8	0.8	0.8	0.8	0.8	0.8
563	56	0.8	0.8	0.8	0.8	0.8	0.8
683	68	0.8	0.8	0.8	0.8	0.8	0.8
104	100nF	0.8	0.8	0.8	0.8	0.8	0.8
224	220						
334	330						
474	470						
684	680						
105	1uF						
225	2.2						
335	3.3						
475	4.7						
685	6.8						
106	10uF						

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCFA Series

Capacitance & Voltage(0805)

EIA	Size	0805	
Dielectric		X7R	
Code	VDCW	50V	100V
101	100pF	0.8	0.8
121	120	0.8	0.8
151	150	0.8	0.8
181	180	0.8	0.8
221	220	0.8	0.8
271	270	0.8	0.8
331	330	0.8	0.8
391	390	0.8	0.8
471	470	0.8	0.8
561	560	0.8	0.8
681	680	0.8	0.8
102	1nF	0.8	0.8
122	1.2	0.8	0.8
152	1.5	0.8	0.8
182	1.8	0.8	0.8
222	2.2	0.8	0.8
272	2.7	0.8	0.8
332	3.3	0.8	0.8
392	3.9	0.8	0.8
472	4.7	0.8	0.8
562	5.6	0.8	0.8
682	6.8	0.8	0.8
103	10nF	0.8	0.8
123	12	0.8	0.8
153	15	0.8	0.8
183	18	0.8	0.8
223	22	0.8	0.8
273	27	0.8	0.8
333	33	0.8	0.8
393	39	0.8	0.8
473	47	0.8	0.8
563	56	0.8	0.8
683	68	0.8	1.25
104	100nF	0.8	1.25
224	220		
334	330		
474	470		
684	680		
105	1uF		
225	2.2		
335	3.3		
475	4.7		
685	6.8		
106	10uF		
226	22		

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCFA Series

Capacitance & Voltage(1206)

EIA	Size	1206	
Dielectric		X7R	
Code	VDCW	50V	100V
101	100pF		
121	120		
151	150	0.8	0.8
181	180	0.8	0.8
221	220	0.8	0.8
271	270	0.8	0.8
331	330	0.8	0.8
391	390	0.8	0.8
471	470	0.8	0.8
561	560	0.8	0.8
681	680	0.8	0.8
102	1nF	0.8	0.8
122	1.2	0.8	0.8
152	1.5	0.8	0.8
182	1.8	0.8	0.8
222	2.2	0.8	0.8
272	2.7	0.8	0.8
332	3.3	0.8	0.8
392	3.9	0.8	0.8
472	4.7	0.8	0.8
562	5.6	0.8	0.8
682	6.8	0.8	0.8
103	10nF	0.8	0.8
123	12	0.8	0.8
153	15	0.8	0.8
183	18	0.8	0.8
223	22	0.8	0.8
273	27	0.8	0.8
333	33	0.8	0.8
393	39	0.8	0.8
473	47	0.8	0.8
563	56	0.8	0.8
683	68	0.8	0.8
104	100nF	0.8	1.25
224	220		
334	330		
474	470		
684	680		
105	1uF		
225	2.2		
335	3.3		
475	4.7		
685	6.8		
106	10uF		
156	15		
226	22		

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCFA Series

Capacitance & Voltage(1210)

EIA Code	Size	1210 Dielectric		
		X7R		
	VDCW	25V	50V	100V
101	100pF			1.25
121	120			1.25
151	150			1.25
181	180			1.25
221	220			1.25
271	270			1.25
331	330			1.25
391	390			1.25
471	470			1.25
561	560			1.25
681	680			1.25
102	1nF			1.25
122	1.2			1.25
152	1.5			1.25
182	1.8			1.25
222	2.2			1.25
272	2.7			1.25
332	3.3			1.25
392	3.9			1.25
472	4.7			1.25
562	5.6			1.25
682	6.8			1.25
103	10nF			1.25
123	12			1.25
153	15			1.25
183	18			1.25
223	22			1.25
273	27			1.25
333	33			1.25
393	39			1.25
473	47			1.25
563	56			1.25
683	68			1.25
104	100nF			1.25
224	220			
334	330			
474	470			
684	680			
105	1uF			
225	2.2			
335	3.3			
475	4.7			
685	6.8			
106	10uF			
107	100			

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCF Series

Capacitance & Voltage(NPO)

Dielectric		NPO														
EIA	Size	0201			0402		0603		0805				1206			
Code	VDCW	50V	50V	100V	50V	100V	50V	100V	250V	630V	50V	100V	250V	630V	1000V	
0R1	0.1pF	0.3	0.5	0.5												
0R2	0.2	0.3	0.5	0.5												
0R5	0.5	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
1R0	1pF	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
1R2	1.2	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
1R5	1.5	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
1R8	1.8	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
2R0	2.0	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
2R2	2.2	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
2R7	2.7	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
3R0	3.0	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
3R3	3.3	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
3R6	3.6	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
3R9	3.9	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
4R7	4.7	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
5R0	5.0	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
5R6	5.6	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
6R8	6.8	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
8R0	8.0	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
8R2	8.2	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
100	10pF	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
120	12	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
150	15	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
180	18	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
220	22	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
270	27	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
330	33	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
390	39	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
470	47	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
560	56	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
680	68	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
101	100pF	0.3	0.5	0.5	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
121	120		0.5		0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.25	1.25	
151	150		0.5		0.8	0.8	0.8	0.8	0.8	1.25	0.8	0.8	0.8	1.25	1.25	
181	180		0.5		0.8	0.8	0.8	0.8	0.8	1.25	0.8	0.8	0.8	1.25	1.25	
221	220		0.5		0.8	0.8	0.8	0.8	0.8	1.25	0.8	0.8	0.8	1.25	1.25	
271	270		0.5		0.8	0.8	0.8	0.8	0.8	1.25	0.8	0.8	0.8	1.25	1.25	
331	330		0.5		0.8	0.8	0.8	0.8	0.8	1.25	0.8	0.8	0.8	1.25	1.25	
391	390		0.5		0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	1.25	1.25	
471	470		0.5		0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	1.25	1.25	
561	560		0.5		0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	1.25	1.6	
681	680		0.5		0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	1.25	1.6	
102	1nF		0.5		0.8	0.8	0.8	0.8	0.8		0.8	0.8	0.8	1.6		
152	1.5				0.8		0.8				1.25	1.25	1.25			
182	1.8				0.8		0.8				1.25	1.25	1.25			
222	2.2				0.8		0.8				1.25	1.25	1.25			
272	2.7						0.8									
332	3.3						0.8									
392	3.9															

■ List of capacity and thickness of class I capacitors with specific voltage. Unit: mm

General Capacitance & Voltage for MCF Series

Capacitance & Voltage(NPO)

Dielectric		NPO											
EIA	Size	1210			1808			1812			2220		
Code	VDCW	250V	630V	1000V	250V	630V	1000V	250V	630V	1000V	250V	630V	1000V
1R0	1pF	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
1R2	1.2	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
1R5	1.5	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
1R8	1.8	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
2R0	2.0	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
2R2	2.2	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
2R7	2.7	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
3R0	3.0	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
3R3	3.3	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
3R6	3.6	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
3R9	3.9	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
4R7	4.7	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
5R0	5.0	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
5R6	5.6	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
6R8	6.8	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
8R0	8.0	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
8R2	8.2	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
100	10pF	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
120	12	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
150	15	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
180	18	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
220	22	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
270	27	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
330	33	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
390	39	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
470	47	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
560	56	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
680	68	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
101	100pF	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
121	120	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
151	150	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
181	180	1.25	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
221	220	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
271	270	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
331	330	1.25	1.25	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
391	390	1.25	1.25		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
471	470	1.25	1.25		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
561	560	1.25	1.25		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
681	680	1.25	1.25		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
102	1nF	1.25	1.6		1.6	1.6		1.6	1.6	2.0	1.6	1.6	1.6
152	1.5	1.25	1.7		1.6	1.6		1.6	1.6		1.6	1.6	2.0
182	1.8	1.25	2.0		1.6			1.6	1.6		1.6	1.6	2.0
222	2.2	1.6			1.6			1.6	1.6		1.6	1.6	
272	2.7	1.6			1.6			1.6	2.0		1.6	1.6	
332	3.3	1.6			1.6			1.6	2.0		1.6	1.6	
392	3.9				1.6			1.6	2.0		1.6	1.6	
472	4.7							1.6	2.0		1.6	1.6	
562	5.6							1.6			1.6	1.6	
682	6.8							1.6			1.6	1.6	
103	10nF										1.6		
153	15										1.6		

List of capacity and thickness of class I capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCF Series

Capacitance & Voltage(0402)

EIA	Size	0402						
Dielectric		X5R				X7S		
Code	VDCW	6.3V	10V	16V	25V	6.3V	10V	16V
101	100pF							
121	120							
151	150							
181	180							
221	220							
271	270							
331	330							
391	390							
471	470							
561	560							
681	680							
102	1nF							
122	1.2							
152	1.5							
182	1.8							
222	2.2							
272	2.7							
332	3.3							
392	3.9							
472	4.7							
562	5.6							
682	6.8							
103	10nF							
123	12							
153	15							
183	18							
223	22							
273	27							
333	33							
393	39							
473	47							
563	56							
683	68							
104	100nF							
224	220	0.5	0.5	0.5	0.5	0.5	0.5	0.5
334	330	0.5	0.5	0.5				
474	470	0.5	0.5	0.5				
684	680	0.5	0.5					
105	1uF	0.5	0.5					
225	2.2	0.5						
335	3.3							
475	4.7							

■ List of capacity and thickness of class I capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCF Series

Capacitance & Voltage(0603)

EIA	Size	0603														
Dielectric		X7R					X5R					X7S				
Code	VDCW	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	
101	100pF															
121	120															
151	150															
181	180															
221	220															
271	270															
331	330															
391	390															
471	470															
561	560															
681	680															
102	1nF															
122	1.2															
152	1.5															
182	1.8															
222	2.2															
272	2.7															
332	3.3															
392	3.9															
472	4.7															
562	5.6															
682	6.8															
103	10nF															
123	12															
153	15															
183	18															
223	22															
273	27															
333	33															
393	39															
473	47															
563	56															
683	68															
104	100nF															
224	220	0.8	0.8	0.8	0.8					0.8					0.8	
334	330						0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
474	470					0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
684	680					0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
105	1uF					0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
225	2.2					0.8	0.8	0.8								
335	3.3					0.8										
475	4.7					0.8										
685	6.8					0.8										
106	10uF					0.8										

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCF Series

Capacitance & Voltage(0805)

EIA	Size	0805														
		X7R				X5R				X7S						
Code	VDCW	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V
101	100pF															
121	120															
151	150															
181	180															
221	220															
271	270															
331	330															
391	390															
471	470															
561	560															
681	680															
102	1nF															
122	1.2															
152	1.5															
182	1.8															
222	2.2															
272	2.7															
332	3.3															
392	3.9															
472	4.7															
562	5.6															
682	6.8															
103	10nF															
123	12															
153	15															
183	18															
223	22															
273	27															
333	33															
393	39															
473	47															
563	56															
683	68															
104	100nF															
224	220			0.8	1.25											
334	330			0.8	1.25											
474	470	1.25	1.25	1.25	1.25											
684	680	1.25	1.25	1.25						1.25						
105	1uF	1.25	1.25	1.25						1.25	1.25	1.25	1.25	1.25	1.25	1.25
225	2.2					1.25	1.25	1.25	1.25			1.25	1.25	1.25	1.25	1.25
335	3.3					1.25	1.25	1.25	1.25							
475	4.7					1.25	1.25	1.25	1.25							
685	6.8					1.25	1.25									
106	10uF					1.25	1.25									
226	22					1.25										

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ General Capacitance & Voltage for MCF Series

Capacitance & Voltage(1206)

EIA	Size	1206									
		X7R						X5R			
Code	VDCW	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V
101	100pF										
121	120										
151	150										
181	180										
221	220										
271	270										
331	330										
391	390										
471	470										
561	560										
681	680										
102	1nF										
122	1.2										
152	1.5										
182	1.8										
222	2.2										
272	2.7										
332	3.3										
392	3.9										
472	4.7										
562	5.6										
682	6.8										
103	10nF										
123	12										
153	15										
183	18										
223	22										
273	27										
333	33										
393	39										
473	47										
563	56										
683	68										
104	100nF										
224	220					0.8	1.25				
334	330					0.8	1.6				
474	470					0.8	1.6				
684	680					0.8	1.6				
105	1uF	0.8	0.8	0.8	0.8	1.6	1.6				
225	2.2	1.6	1.6	1.6	1.6	1.6					
335	3.3	1.6	1.6	1.6	1.6						
475	4.7	1.6	1.6	1.6	1.6						
685	6.8							1.6	1.6	1.6	1.6
106	10uF							1.6	1.6	1.6	1.6
156	15							1.6	1.6	1.6	1.6
226	22							1.6	1.6	1.6	1.6

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■General Capacitance & Voltage for MCF Series

Capacitance & Voltage(1210 / 1808 / 1812)

EIA	Size	1210				1808			1812		
		X7R			X7S	X7R			X7R		
Code	VDCW	25V	50V	100V	2.5V	250V	630V	1000V	250V	630V	1000V
101	100pF					1.6	1.6	1.6	1.6	1.6	1.6
121	120					1.6	1.6	1.6	1.6	1.6	1.6
151	150					1.6	1.6	1.6	1.6	1.6	1.6
181	180					1.6	1.6	1.6	1.6	1.6	1.6
221	220					1.6	1.6	1.6	1.6	1.6	1.6
271	270					1.6	1.6	1.6	1.6	1.6	1.6
331	330					1.6	1.6	1.6	1.6	1.6	1.6
391	390					1.6	1.6	1.6	1.6	1.6	1.6
471	470					1.6	1.6	1.6	1.6	1.6	1.6
561	560					1.6	1.6	1.6	1.6	1.6	1.6
681	680					1.6	1.6	1.6	1.6	1.6	1.6
102	1nF					1.6	1.6	1.6	1.6	1.6	1.6
122	1.2					1.6	1.6	1.6	1.6	1.6	1.6
152	1.5					1.6	1.6	1.6	1.6	1.6	1.6
182	1.8					1.6	1.6	1.6	1.6	1.6	1.6
222	2.2					1.6	1.6	1.6	1.6	1.6	1.6
272	2.7					1.6	1.6	1.6	1.6	1.6	1.6
332	3.3					1.6	1.6	1.6	1.6	1.6	1.6
392	3.9					1.6	1.6	1.6	1.6	1.6	1.6
472	4.7					1.6	1.6	1.6	1.6	1.6	1.6
562	5.6					1.6	1.6	1.6	1.6	1.6	1.6
682	6.8					1.6	1.6	1.6	1.6	1.6	1.6
103	10nF					1.6	1.6	1.6	1.6	1.6	1.6
123	12					1.6	1.6	1.6	1.6	1.6	1.6
153	15					1.6	1.6	1.6	1.6	1.6	1.6
183	18								1.6	1.6	1.6
223	22								1.6	1.6	1.6
273	27								1.6	1.6	1.6
333	33								1.6	1.6	1.6
393	39								1.6	1.6	1.6
473	47								1.6	1.6	1.6
563	56								1.6	1.6	1.6
683	68								1.6	1.6	
104	100nF								1.6	2.0	
224	220	1.6	1.6	1.6							
334	330	1.6	1.6	1.6							
474	470	1.6	1.6	1.6							
684	680	1.6	1.6	1.6							
105	1uF	1.6	1.6	1.6							
225	2.2	1.6	1.6	1.6							
335	3.3	1.6	1.6	1.6							
475	4.7	1.6	1.6	1.6							
685	6.8										
106	10uF										
107	100				2.0						

■List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

■ Ultra-small 0201 Capacitors for MCF Series

Capacitance & Voltage(0201)

EIA Code	Size	0201						
		X7R				X7S		
Dielectric	VDCW	10V	16V	25V	50V	6.3V	10V	16V
101	100pF				0.3			
121	120				0.3			
151	150				0.3			
181	180				0.3			
221	220				0.3			
271	270				0.3			
331	330				0.3			
391	390				0.3			
471	470				0.3			
561	560				0.3			
681	680				0.3			
102	1nF				0.3			
122	1.2				0.3			
152	1.5				0.3			
182	1.8				0.3			
222	2.2				0.3			
272	2.7				0.3			
332	3.3				0.3			
392	3.9				0.3			
472	4.7				0.3			
562	5.6	0.3	0.3	0.3				
682	6.8	0.3	0.3	0.3				
103	10nF	0.3	0.3	0.3				
123	12							0.3
153	15							0.3
183	18							0.3
223	22							0.3
273	27							0.3
333	33					0.3	0.3	0.3
393	39					0.3	0.3	
473	47					0.3	0.3	
563	56							
683	68							
104	100nF							
224	220							
334	330							
474	470							
684	680							
105	1uF							
225	2.2							
335	3.3							
475	4.7							

■ List of capacity and thickness of class II capacitors with specific voltage. Unit: mm

Automotive Grade Multilayer Ceramic Chip Capacitor

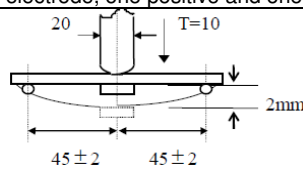
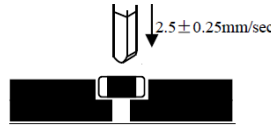
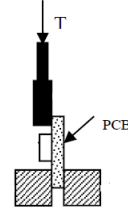
Environmental Characteristics

Item	Requirement	Test Method																																																																																																																																																	
Capacitance	Should be within the specified tolerance	Test Temperature: 25±3°C NPO: (Class I) Cap≤1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10% X7R/X7S/X5R: (Class II) Cap≤10uF 1.0±0.2Vrms, 1KHz±10% Cap>10uF 0.5±0.1Vrms, 120Hz±24Hz																																																																																																																																																	
IR	NPO: C ≤ 10nF, Ri ≥ 100000MΩ C > 10 nF, Ri · CR ≥ 1000S X7R/X7S: C ≤ 25nF, Ri ≥ 10000MΩ C > 25 nF, Ri · CR ≥ 100S	Measuring Voltage: Rated Voltage Duration: 60±5s Test Humidity: ≤ 75% Test Temperature: 25±3°C Test Current: ≤ 50mA																																																																																																																																																	
(DF, tanδ) Dissipation Factor	NPO: DF ≤ 0.1%, Cr ≥ 30pF, 1MHz±10%, 1±0.2Vrms DF ≤ 0.15%, Cr < 30pF, 1MHz±10%, 1±0.2Vrms X7R/X7S/X5R: <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Voltage</th> <th>DF</th> <th>0201</th> <th>0402</th> <th>0603</th> <th>0805</th> <th>1206</th> </tr> </thead> <tbody> <tr> <td>≥ 100V</td> <td>≤ 5%</td> <td>-</td> <td>≤ 10nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>≤ 680nF</td> </tr> <tr> <td rowspan="4">50V</td> <td>≤ 2.5%</td> <td>≤ 3.3nF</td> <td>≤ 10nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>≤ 680nF</td> </tr> <tr> <td>≤ 3.5%</td> <td>≤ 10nF</td> <td>-</td> <td>-</td> <td>-</td> <td>≤ 1uF</td> </tr> <tr> <td>≤ 5%</td> <td>-</td> <td>-</td> <td>-</td> <td>≤ 680nF</td> <td>-</td> </tr> <tr> <td>≤ 10%</td> <td>-</td> <td>≤ 1uF</td> <td>≤ 2.2uF</td> <td>≤ 4.7uF</td> <td>≤ 10uF</td> </tr> <tr> <td rowspan="4">25V</td> <td>≤ 2.5%</td> <td>≤ 3.3nF</td> <td>≤ 10nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>≤ 680nF</td> </tr> <tr> <td>≤ 3.5%</td> <td>≤ 10nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>-</td> <td>≤ 2.2uF</td> </tr> <tr> <td>≤ 5%</td> <td>-</td> <td>-</td> <td>-</td> <td>≤ 1uF</td> <td>-</td> </tr> <tr> <td>≤ 7.5%</td> <td>-</td> <td>-</td> <td>-</td> <td>≤ 2.2uF</td> <td>≤ 4.7uF</td> </tr> <tr> <td rowspan="4">16V</td> <td>≤ 2.5%</td> <td>≤ 3.3nF</td> <td>≤ 10nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>≤ 680nF</td> </tr> <tr> <td>≤ 3.5%</td> <td>≤ 15nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>-</td> <td>≤ 22uF</td> </tr> <tr> <td>≤ 5%</td> <td>≤ 47nF</td> <td>≤ 220nF</td> <td>≤ 680nF</td> <td>≤ 22uF</td> <td>-</td> </tr> <tr> <td>≤ 7.5%</td> <td>-</td> <td>-</td> <td>-</td> <td>≤ 4.7uF</td> <td>≤ 4.7uF</td> </tr> <tr> <td rowspan="4">10V</td> <td>≤ 2.5%</td> <td>≤ 3.3nF</td> <td>≤ 10nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>≤ 680nF</td> </tr> <tr> <td>≤ 3.5%</td> <td>≤ 15nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>-</td> <td>≤ 2.2uF</td> </tr> <tr> <td>≤ 5%</td> <td>≤ 47nF</td> <td>-</td> <td>≤ 680nF</td> <td>≤ 2.2uF</td> <td>-</td> </tr> <tr> <td>≤ 7.5%</td> <td>-</td> <td>≤ 1uF</td> <td>≤ 2.2uF</td> <td>≤ 4.7uF</td> <td>≤ 10uF</td> </tr> <tr> <td rowspan="4">≥ 6.3V</td> <td>≤ 2.5%</td> <td>≤ 3.3nF</td> <td>-</td> <td>≤ 150nF</td> <td>-</td> <td>≤ 680nF</td> </tr> <tr> <td>≤ 3.5%</td> <td>≤ 15nF</td> <td>≤ 100nF</td> <td>≤ 330nF</td> <td>-</td> <td>≤ 2.2uF</td> </tr> <tr> <td>≤ 5%</td> <td>≤ 47nF</td> <td>≤ 220nF</td> <td>≤ 680nF</td> <td>-</td> <td>-</td> </tr> <tr> <td>≤ 7.5%</td> <td>-</td> <td>≤ 1uF</td> <td>-</td> <td>10~22uF</td> <td>≤ 10uF</td> </tr> <tr> <td>≤ 10%</td> <td>≤ 4.7uF</td> <td>≤ 22uF</td> <td>≤ 47uF</td> <td>≤ 47uF</td> <td>≤ 100uF</td> </tr> </tbody> </table>	Voltage	DF	0201	0402	0603	0805	1206	≥ 100V	≤ 5%	-	≤ 10nF	≤ 100nF	≤ 330nF	≤ 680nF	50V	≤ 2.5%	≤ 3.3nF	≤ 10nF	≤ 100nF	≤ 330nF	≤ 680nF	≤ 3.5%	≤ 10nF	-	-	-	≤ 1uF	≤ 5%	-	-	-	≤ 680nF	-	≤ 10%	-	≤ 1uF	≤ 2.2uF	≤ 4.7uF	≤ 10uF	25V	≤ 2.5%	≤ 3.3nF	≤ 10nF	≤ 100nF	≤ 330nF	≤ 680nF	≤ 3.5%	≤ 10nF	≤ 100nF	≤ 330nF	-	≤ 2.2uF	≤ 5%	-	-	-	≤ 1uF	-	≤ 7.5%	-	-	-	≤ 2.2uF	≤ 4.7uF	16V	≤ 2.5%	≤ 3.3nF	≤ 10nF	≤ 100nF	≤ 330nF	≤ 680nF	≤ 3.5%	≤ 15nF	≤ 100nF	≤ 330nF	-	≤ 22uF	≤ 5%	≤ 47nF	≤ 220nF	≤ 680nF	≤ 22uF	-	≤ 7.5%	-	-	-	≤ 4.7uF	≤ 4.7uF	10V	≤ 2.5%	≤ 3.3nF	≤ 10nF	≤ 100nF	≤ 330nF	≤ 680nF	≤ 3.5%	≤ 15nF	≤ 100nF	≤ 330nF	-	≤ 2.2uF	≤ 5%	≤ 47nF	-	≤ 680nF	≤ 2.2uF	-	≤ 7.5%	-	≤ 1uF	≤ 2.2uF	≤ 4.7uF	≤ 10uF	≥ 6.3V	≤ 2.5%	≤ 3.3nF	-	≤ 150nF	-	≤ 680nF	≤ 3.5%	≤ 15nF	≤ 100nF	≤ 330nF	-	≤ 2.2uF	≤ 5%	≤ 47nF	≤ 220nF	≤ 680nF	-	-	≤ 7.5%	-	≤ 1uF	-	10~22uF	≤ 10uF	≤ 10%	≤ 4.7uF	≤ 22uF	≤ 47uF	≤ 47uF	≤ 100uF	NPO: (Class I) 1.0±0.2Vrms, 1MHz±10% X7R/X7S/X5R: (Class II) Cap ≤ 10uF 1.0±0.2Vrms, 1KHz±10% Cap > 10uF 0.5±0.1Vrms, 120Hz±24Hz
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Automotive Grade Multilayer Ceramic Chip Capacitor

Item	Requirement	Test Method															
DWV	No breakdown or damage on dielectric.	<p>Ur<100V: Measuring Voltage: NPO: 300% Rated voltage X7R/X7S:250% Rated voltage</p> <p>Duration: 1~5s Charge / Discharge Current: 50mA max.</p> <p>100 ≤ Ur ≤ 630: Force 200% Rated Voltage for 5 seconds. Max current should not exceed 50 mA.</p>															
High Temperature Exposure	NPO: ΔC/C: ≤±1% or ±1pF whichever is larger X7R/X7S/X5R: ΔC/C: -12.5~+12.5% DF & IR: Same as initial value	<p>Temperature: 125±2°C Voltage: without Duration: 1000h Recovery conditions: Room temperature Recovery Time: 24h (NPO) or 48h(X7R/X7S/X5R)</p>															
Temperature Cycle	NPO: ΔC/C: ≤±1% or ±1pF whichever is larger X7R/X7S/X5R: ΔC/C: -10~+10% DF & IR: Same as initial value No damage on surface.	<p>Up-category temperature, 1h ; Recovery time: 24±1h Initial Measurement Cycling Times: 1000 times, 1 cycle, 4 steps:</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C</td> <td>30min</td> </tr> <tr> <td>2</td> <td>20°C</td> <td>1min</td> </tr> <tr> <td>3</td> <td>125°C</td> <td>30min</td> </tr> <tr> <td>4</td> <td>20°C</td> <td>1min</td> </tr> </tbody> </table> <p>Recovery time after test: 24±2h</p>	Step	Temperature	Time	1	-55°C	30min	2	20°C	1min	3	125°C	30min	4	20°C	1min
Step	Temperature	Time															
1	-55°C	30min															
2	20°C	1min															
3	125°C	30min															
4	20°C	1min															
Temperature shock	NPO: ΔC/C: ≤±1% or ±1pF whichever is larger X7R/X7S/X5R: ΔC/C: -10~+10% DF & IR: Same as initial value No damage on surface.	<p>Up-category temperature, 1h ; Recovery time: 24±1h Initial Measurement Cycling Times: 1000 times: Recovery time after test: 24±2h</p>															
Destructive Physical Analysis	No defects or abnormalities	Accounting to EIA-469															
Biased Humidity	NPO: ΔC/C: ≤±2.5% or ±2.5pF whichever is larger X7R/X7S/X5R: ΔC/C: -12.5~+12.5% DF & IR: Same as initial value No damage on surface.	<p>At 140°C~150°C 1 hour, then keep for 24 ±1 hour at room temp. Test condition : 85±2 °C, 80~85% R.H. Add 100 KΩ resistor, applied Ur for 1,000 hours</p>															
Physical Dimension	Within the specified dimensions	Use caliper															
Appearance	No visible damage	Visual inspection															
Vibration	NPO: ΔC/C: ≤±1% or ±1pF whichever is larger X7R/X7S:ΔC/C: -10%~+10% DF / IR: Same to initial value Appearance: No visible damage	<p>5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8" x 5" PCB. 0.31" thick 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000 Hz.</p>															
Mechanical Shock	NPO: ΔC/C: ≤±1% or ±1pF whichever is larger X7R/X7S:ΔC/C: -10%~+10% DF / IR: Same to initial value Appearance: No visible damage	<p>Three shocks in each direction shall be applied along the three mutually perpendicular axes of the test specimen (18 shocks) Waveform: Half-sin Peak value: 1,500 g's Duration: 0.5 ms Velocity change: 4.7 m/s</p>															
Solderability	At least 95% of the terminal electrode is covered by new solder. Visual Appearance: No visible damage.	<p>Preheating conditions:80 to 120°C ; 10~30s.</p> <table border="1"> <tr> <td>Solder Temperature: 235±5°C (Sn/Pb:63/37) Duration: 2±0.5s</td> <td>Solder Temperature: 245±5°C (Lead-free) Duration: 3±0.3s</td> </tr> </table>	Solder Temperature: 235±5°C (Sn/Pb:63/37) Duration: 2±0.5s	Solder Temperature: 245±5°C (Lead-free) Duration: 3±0.3s													
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Life Test	NPO: ΔC/C: ≤±2.5% or ±2.5pF whichever is larger X7R/X7S/X5R: ΔC/C: ≤±12.5% DF: Same to initial value IR: NPO: Ri≥5000MΩ或 Ri·CR≥50S whichever is smaller X7R/X7S/X5R: Ri≥1000MΩ或 Ri·CR≥10S whichever is smaller Appearance: No visible damage.	<p>Applied Voltage: Ur < 100V : 2× Rated Voltage 100V≤Ur < 500V : 2× Rated Voltage 500V≤Ur≤630V : 1.5× Rated Voltage Duration: 1000h Temperature : 125°C Charge/ Discharge Current: 50mA max. Recovery Conditions: Room Temperature Recovery Time: 24h (NPO) or 48h(X7R/X7S/X5R)</p>															

Automotive Grade Multilayer Ceramic Chip Capacitor

Item	Requirement	Test Method
Resistance to Soldering Heat	NPO: $\Delta C/C$: $\leq \pm 1\%$ or $\pm 1\text{pF}$ whichever is larger X7R/X7S/5X5R: $\Delta C/C$: $-15\% \sim +15\%$ DF / IR: Same to initial value Appearance : No visible damage. At least 95% of the terminal electrode is covered by new solder.	Preheating conditions: 100 to 200°C; 60~120s. Solder Temperature: 265±5°C Duration: 10±1s Clean the capacitor with solvent and examine it with a 10X(min.) microscope. Recovery Time: 24±2h Recovery condition: Room temperature
ESD	NPO/X7R/X7S: C&DF&IR: Same to initial value Appearance : No visible damage	Conditions: contact discharge Discharge voltage: 500V Each sample was subjected to two discharges at each electrode, one positive and one negative.
Resistance to Flexure of Substrate (Bending Strength)	NPO: $\Delta C/C$: $\leq \pm 1\%$ or $\pm 1\text{pF}$ whichever is larger X7R/X7S: $\Delta C/C$: $-10\% \sim +10\%$ DF / IR: Same to initial value Appearance: No visible damage	 <p>Test Board: Al₂O₃ or PCB Warp: 2mm Speed: 0.5mm/sec. Unit: mm The measurement should be made with the board in the bending position.</p>
Beam Load Test	≤ 0805 : thickness >0.5mm, 20N thickness $\leq 0.5\text{mm}$, 8N ≥ 1206 : thickness >1.25mm, 54N thickness $\leq 1.25\text{mm}$, 15N	Products in the process of testing the procelain body when fracture force must be greater than the minimum pressure. 
Terminal Strength(SMD)	NPO: $\Delta C/C$: $\leq \pm 0.5\%$ X7R/X7S: $\Delta C/C$: $-10\% \sim +10\%$ DF / IR: Same to initial value Appearance: No visible damage	Slowly put a T of force on the capacitor side porcelain body, and keep the 60+1 s 0402:4N 0603:10N >0603:17.7N 
Temperature Character	NPO: $\Delta C/C$: $\pm 0.2\%$ or $\pm 0.05\text{pF}$ X7R: $\Delta C/C$: $\pm 15\%$ X7S: $\Delta C/C$: $\pm 22\%$	At -55°C, 20°C, 125°C

■Storage Temperature: 5~40°C; Humidity: 20~70%RH

■Temperature Coefficient / Characteristics

Dielectric	Reference Temperature Point	Temperature Coefficient	Operation Temperature Range
NPO(COG)	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
X7S	20°C	±22%	-55°C ~125°C

Note : Nominal temperature coefficient and allowed tolerance of class I are decided by the changing of the capacitance between 20°C and 85°C.
 Nominal temperature coefficient of class II are decided by the temperature of 20°C

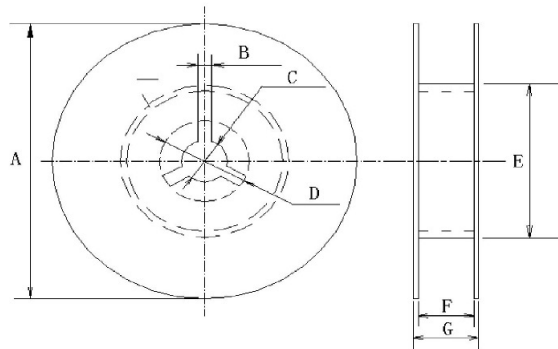
Automotive Grade Multilayer Ceramic Chip Capacitor

■Packaging

Packaging Quantity

Type	Thickness	Packaging (7" Reel)	
		Paper tape	Plastic tape
0201	0.30±0.05	15K	-
0402	0.50±0.05	10K	-
	0.50±0.15	10k	-
0603	0.80±0.10	4K	-
	0.80±0.20	4K	-
0805	0.80±0.20	4K	-
	1.25±0.20	-	3K
1206	0.80±0.20	4K	-
	1.25±0.20	-	3K
	1.60±0.30	-	2K
1210	≤ 2.80	-	T ≤ 1.80mm 2K
		-	T > 1.80mm 1K
1808	≤ 2.20	-	2K
1812	≤ 3.50	-	T ≤ 1.85mm 1K
		-	T > 1.85mm 0.5K
2220	≤ 3.50	-	0.5K

Tape and Reel

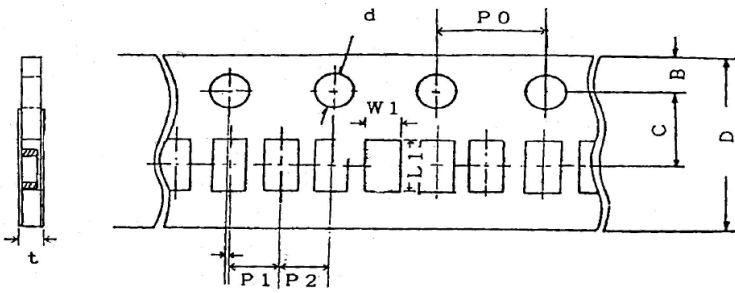


Unit: mm

Type	A	B	C	D	E	F	G
0201	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0402	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0603	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0805	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1206	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1210	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1808	330±2.0(13")	3.0	13.0±0.5	21.0±0.8	50 or more	12.6 max	13.6 max
1812	330±2.0(13")	3.0	13.0±0.5	21.0±0.8	50 or more	12.6 max	13.6 max
2220	330±2.0(13")	3.0	13.0±0.5	21.0±0.8	50 or more	12.6 max	13.6 max

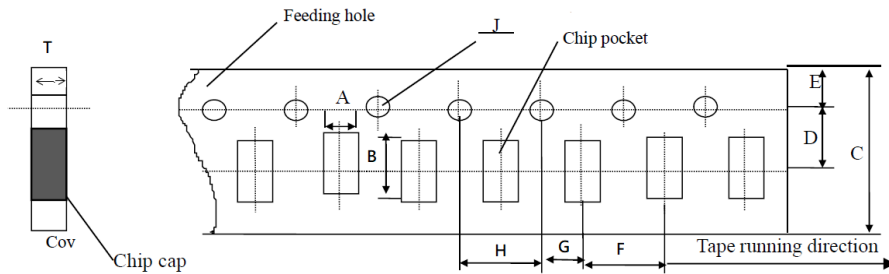
Automotive Grade Multilayer Ceramic Chip Capacitor

Paper Tape Size Specification



Unit: mm

Type	0201	0402
W1	0.37±0.10	0.65±0.10
L1	0.67±0.10	1.15±0.10
D	8.00±0.10	8.00±0.10
C	3.50±0.05	3.50±0.05
B	1.75±0.10	1.75±0.10
P1	2.00±0.05	2.00±0.05
P2	2.00±0.05	2.00±0.05
P0	4.00±0.10	4.00±0.10
d	1.50-0/+0.10	1.50-0/+0.10
t	0.80 Below	0.80 Below

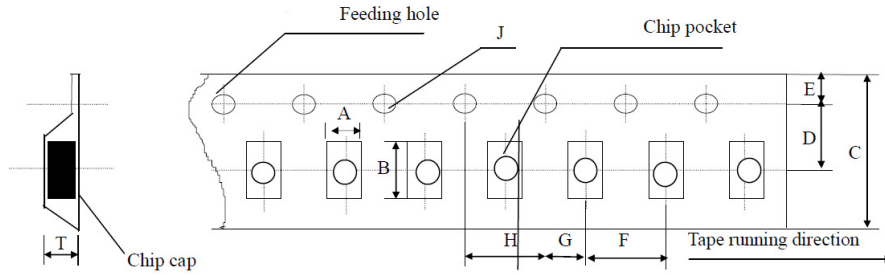


Unit: mm

Type	0603	0805	1206
A	1.10±0.10	1.45±0.15	1.80±0.20
B	1.90±0.10	2.30±0.15	3.40±0.20
C	8.00±0.10	8.00±0.15	8.00±0.20
D	3.50±0.05	3.50±0.05	3.50±0.05
E	1.75±0.10	1.75±0.10	1.75±0.10
F	4.00±0.10	4.00±0.10	4.00±0.10
G	2.00±0.10	2.00±0.10	2.00±0.10
H	4.00±0.10	4.00±0.10	4.00±0.10
J	1.50-0/+0.10	1.50-0/+0.10	1.50-0/+0.10
T	1.10 max	1.10 max	1.10 max

Automotive Grade Multilayer Ceramic Chip Capacitor

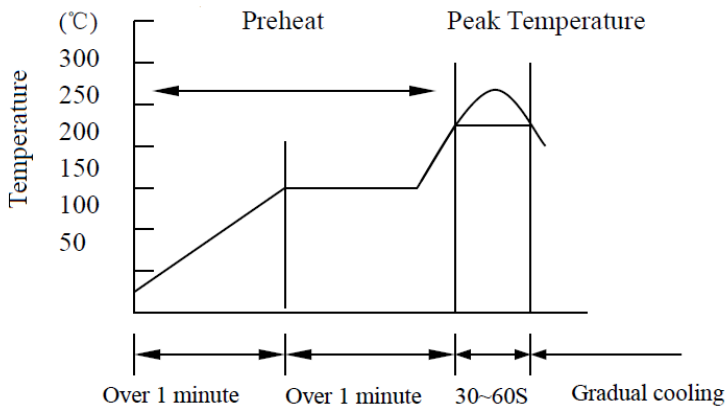
Plastic Tape Size Specification



Unit: mm

Type	0805	1206	1210	1808	1812	2220
A	1.55±0.20	1.95±0.20	2.70±0.10	2.20±0.10	3.66±0.10	6.20±0.10
B	2.35±0.20	3.60±0.20	3.42±0.10	4.95±0.10	4.95±0.10	6.70±0.10
C	8.00±0.20	8.00±0.20	8.00±0.10	12.00±0.10	12.00±0.10	12.00±0.10
D	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	8.00±0.10	8.00±0.10
G	2.00±0.10	2.00±0.10	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
H	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
J	1.50-0/+0.10	1.50-0/+0.10	1.55-0/+0.10	1.50-0/+0.10	1.55-0/+0.10	1.55-0/+0.10
T	1.50 Max	1.85 Max	3.20 Max	3.00 Max	4.00 Max	2.40±0.10

Recommended Soldering Profile



	Pb-Sn soldering	Lead-free soldering
Peak Temperature	230 ~ 250°C	240 ~ 260°C

Keep the temperature difference between soldering temperature and surface temperature of chips as: $T \leq 150^{\circ}\text{C}$ during preheating.