Data Sheet

Customer:	
Product:	**Automotive Grade Multilayer Ceramic Chip Capacitor – MCF(A)..A Series**
Sizes.:	**0201/0402/0603/0805/1206/1210/1808/1812/2220**
Issued Date:	**08-Apr-25**
Edition:	**REV.A6**

Pb RoHS Compliant

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08-Apr-25	08-Apr-25	08-Apr-25	08-Apr-25	
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Automotive Grade Multilayer Ceramic Chip Capacitor



■Features

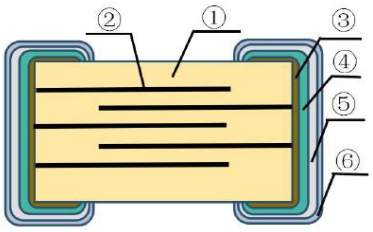
- There is high reliability on monolithic structure of laminated layers
- And its character of excellent soldering ability and soldering resistance ability is suitable for reflow soldering and peak soldering
- It includes high and stable capacitance
- This type of capacitor is a special electronic component for automobiles, which has passed all the experimental conditions set by the AEC-Q200 standard, and is more stable and safe during automobile use
- The materials used mainly include NPO with high temperature stability and X7R, X5R, X7S with high dielectric constant
- Executive StanDA (0.8)rd: GB/T 21041-2007；GB/T 21042-2007
- AEC-Q200 Compliance

■Applications

General Automotive Series, suitable for engine ECU drive modules, automatic transmission control modules, headlight control modules, central door lock control modules, ABS control modules, power window control modules, dashboard control modules, airbag control modules, automatic air control modules, electronical suspension control modules, entertainment system modules, and more.

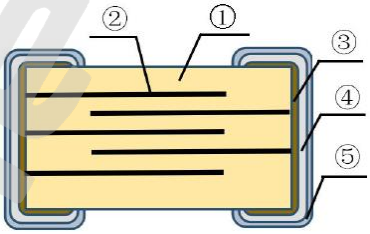
■Construction

Flexible Termination



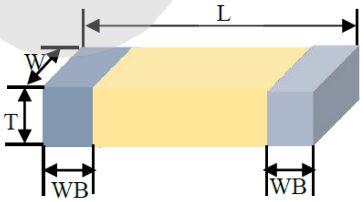
①	Ceramic Dielectric	④	Conductive Resin
②	Ni Electrode	⑤	Ni Coating
③	Cu Electrode	⑥	Sn Coating

Barrier Termaination



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
01	0201	0.60±0.03	0.30±0.03	0.30±0.03	C	0.15±0.05
		0.60±0.09	0.30±0.09	0.30±0.09	D	
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	E	0.25±0.10
		1.00±0.15	0.50±0.15	0.50±0.15	F	
		1.00±0.20	0.50±0.20	0.50±0.20	N	

Automotive Grade Multilayer Ceramic Chip Capacitor

Type	Size (Inch)	L	W	T		WB
03	0603	1.60±0.10	0.80±0.10	0.80±0.10	H	0.35±0.20
		1.60±0.20	0.80±0.20	0.80±0.20	B	
05	0805	2.00±0.20	1.25±0.20	0.80±0.20	B	0.50±0.20
				1.25±0.20	J	
06	1206	3.20±0.30	1.60±0.30	0.80±0.20	B	0.60±0.30
				1.25±0.20	J	
				1.60±0.30	L	
10	1210	3.20±0.30	2.50±0.30	1.25±0.20	J	0.60±0.30
				1.60±0.30	L	
				2.00±0.30	S	
				2.50±0.30	O	
08	1808	4.50±0.40	2.00±0.20	1.60±0.30	L	0.60±0.30
				2.00±0.30	S	
12	1812	4.50±0.40	3.20±0.30	1.25±0.20	J	0.60±0.30
				1.60±0.30	L	
				2.00±0.30	S	
				2.50±0.30	O	
20	2220	5.70±0.40	5.00±0.40	1.60±0.30	L	0.70±0.30
				2.00±0.30	S	

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..A Series

Capacitance & Voltage(X7R)

Dielectric		X7R												
EIA	Size	0402						0603						
Code	VDCW	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	200V 250V
121	120pF	E	E	E	E	E	E	H	H	H	H	H	H	H
151	150	E	E	E	E	E	E	H	H	H	H	H	H	H
181	180	E	E	E	E	E	E	H	H	H	H	H	H	H
221	220	E	E	E	E	E	E	H	H	H	H	H	H	H
271	270	E	E	E	E	E	E	H	H	H	H	H	H	H
331	330	E	E	E	E	E	E	H	H	H	H	H	H	H
391	390	E	E	E	E	E	E	H	H	H	H	H	H	H
471	470	E	E	E	E	E	E	H	H	H	H	H	H	H
561	560	E	E	E	E	E	E	H	H	H	H	H	H	H
681	680	E	E	E	E	E	E	H	H	H	H	H	H	H
102	1nF	E	E	E	E	E	E	H	H	H	H	H	H	H
122	1.2	E	E	E	E	E	E	H	H	H	H	H	H	H
152	1.5	E	E	E	E	E	E	H	H	H	H	H	H	H
182	1.8	E	E	E	E	E	E	H	H	H	H	H	H	H
222	2.2	E	E	E	E	E	E	H	H	H	H	H	H	H
272	2.7	E	E	E	E	E	E	H	H	H	H	H	H	H
332	3.3	E	E	E	E	E	E	H	H	H	H	H	H	H
392	3.9	E	E	E	E	E	E	H	H	H	H	H	H	H
472	4.7	E	E	E	E	E	E	H	H	H	H	H	H	H
562	5.6	E	E	E	E	E	E	H	H	H	H	H	H	H
682	6.8	E	E	E	E	E	E	H	H	H	H	H	H	H

Automotive Grade Multilayer Ceramic Chip Capacitor

Dielectric		X7R												
EIA	Size	0402						0603						
Code	VDCW	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	200V 250V
103	10nF	E	E	E	E	E	E	H	H	H	H	H	H	H
123	12	E	E	E	E	E		H	H	H	H	H	H	
153	15	E	E	E	E	E		H	H	H	H	H	H	
183	18	E	E	E	E	E		H	H	H	H	H	H	
223	22	E	E	E	E	E		H	H	H	H	H	H	
273	27	E	E	E	E	E		H	H	H	H	H	H	
333	33	E	E	E	E	E		H	H	H	H	H	H	
393	39	E	E	E	E	E		H	H	H	H	H	H	
473	47	E	E	E	E	E		H	H	H	H	H	H	
563	56	E	E	E	E	E		H	H	H	H	H	H	
683	68	E	E	E	E	E		H	H	H	H	H	H	

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCFA..A Series

Capacitance & Voltage(X7R)

Dielectric		X7R											
EIA	Size	0805							1206				
Code	VDCW	≤10V	16V	25V	50V	100V	200V 250V	500V	≤25V	50V	100V	200V 250V	500V 630V
121	120pF	B	B	B	B	B	B	B	B	B	B	B	B
151	150	B	B	B	B	B	B	B	B	B	B	B	B
181	180	B	B	B	B	B	B	B	B	B	B	B	B
221	220	B	B	B	B	B	B	B	B	B	B	B	B
271	270	B	B	B	B	B	B	B	B	B	B	B	B
331	330	B	B	B	B	B	B	B	B	B	B	B	B
391	390	B	B	B	B	B	B	B	B	B	B	B	B
471	470	B	B	B	B	B	B	B	B	B	B	B	B
561	560	B	B	B	B	B	B	B	B	B	B	B	B
681	680	B	B	B	B	B	B	B	B	B	B	B	B
102	1nF	B	B	B	B	B	B	B	B	B	B	B	B
122	1.2	B	B	B	B	B	B	B	B	B	B	B	B
152	1.5	B	B	B	B	B	B	B	B	B	B	B	B
182	1.8	B	B	B	B	B	B	B	B	B	B	B	B
222	2.2	B	B	B	B	B	B	B	B	B	B	B	
272	2.7	B	B	B	B	B	B	B	B	B	B		
332	3.3	B	B	B	B	B	B		B	B	B		
392	3.9	B	B	B	B	B	B		B	B	B		
472	4.7	B	B	B	B	B	B		B	B	B		
562	5.6	B	B	B	B	B			B	B	B		
682	6.8	B	B	B	B	B			B	B	B		
103	10nF	B	B	B	B	B			B	B	B		
123	12	B	B	B	B	B			B	B	B		
153	15	B	B	B	B	B			B	B	B		
183	18	B	B	B	B	B			B	B	B		
223	22	B	B	B	B	B			B	B	B		
273	27	B	B	B	B	B			B	B	B		
333	33	B	B	B	B	B			B	B	B		
393	39	B	B	B	B	B			B	B	B		
473	47	B	B	B	B	B			B	B	B		
563	56	B	B	B	B	B			B	B	B		
683	68	B	B	B	B								
104	100nF												
224	220												

■The letter in cell is expressed the symbol of product thickness

Capacitance & Voltage(X5R)

Dielectric		X5R															
EIA	Size	0402				0603					0805						
Code	VDCW	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	
473	47nF					H	H	H	H	H							
563	56	E	E	E	E	H	H	H	H	H	B	B	B	B	B	B	
683	68	E	E	E	E	H	H	H	H	H	B	B	B	B	B		
104	100nF																

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Capacitance & Voltage(X7S)

Dielectric		X7S																
EIA	Size	0402					0603							0805				
Code	VDCW	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	200V 250V	≤10V	16V	25V	50V	100V
103	10nF	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
123	12	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
153	15	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
183	18	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
223	22	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
273	27	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
333	33	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
393	39	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
473	47	E	E	E	E	E	H	H	H	H	H	H	H	B	B	B	B	B
563	56	E	E	E	E	E	H	H	H	H	H	H		B	B	B	B	B
683	68	E	E	E	E	E	H	H	H	H	H	H		B	B	B	B	
104	100nF																	

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(NPO)

Dielectric		NPO													
EIA	Size	0201		0402			0603				0805				
Code	VDCW	25V	50V	25V	50V	100V	25V	50V	100V	200V 250V	25V	50V	100V	200V 250V	500V 630V
0R1	0.1pF	C	C	E	E	E	H	H	H	H					
0R2	0.2	C	C	E	E	E	H	H	H	H					
0R3	0.3	C	C	E	E	E	H	H	H	H					
0R5	0.5	C	C	E	E	E	H	H	H	H	B	B	B	B	B
1R0	1pF	C	C	E	E	E	H	H	H	H	B	B	B	B	B
1R2	1.2	C	C	E	E	E	H	H	H	H	B	B	B	B	B
1R5	1.5	C	C	E	E	E	H	H	H	H	B	B	B	B	B
1R8	1.8	C	C	E	E	E	H	H	H	H	B	B	B	B	B
2R0	2.0	C	C	E	E	E	H	H	H	H	B	B	B	B	B
2R2	2.2	C	C	E	E	E	H	H	H	H	B	B	B	B	B
2R7	2.7	C	C	E	E	E	H	H	H	H	B	B	B	B	B
3R0	3.0	C	C	E	E	E	H	H	H	H	B	B	B	B	B
3R3	3.3	C	C	E	E	E	H	H	H	H	B	B	B	B	B
3R6	3.6	C	C	E	E	E	H	H	H	H	B	B	B	B	B
3R9	3.9	C	C	E	E	E	H	H	H	H	B	B	B	B	B
4R7	4.7	C	C	E	E	E	H	H	H	H	B	B	B	B	B
5R0	5.0	C	C	E	E	E	H	H	H	H	B	B	B	B	B
5R6	5.6	C	C	E	E	E	H	H	H	H	B	B	B	B	B
6R0	6.0	C	C	E	E	E	H	H	H	H					
6R8	6.8	C	C	E	E	E	H	H	H	H	B	B	B	B	B
8R0	8.0	C	C	E	E	E	H	H	H	H	B	B	B	B	B
8R2	8.2	C	C	E	E	E	H	H	H	H	B	B	B	B	B
100	10pF	C	C	E	E	E	H	H	H	H	B	B	B	B	B
120	12	C	C	E	E	E	H	H	H	H	B	B	B	B	B
150	15	C	C	E	E	E	H	H	H	H	B	B	B	B	B
180	18	C	C	E	E	E	H	H	H	H	B	B	B	B	B
200	20	C	C	E	E	E	H	H	H	H					
220	22	C	C	E	E	E	H	H	H	H	B	B	B	B	B
270	27	C	C	E	E	E	H	H	H	H	B	B	B	B	B
300	30	C	C	E	E	E	H	H	H	H					

Automotive Grade Multilayer Ceramic Chip Capacitor

Dielectric		NPO														
EIA	Size	0201		0402			0603				0805				
Code	VDCW	25V	50V	25V	50V	100V	25V	50V	100V	200V 250V	25V	50V	100V	200V 250V	500V 630V
330	33	C	C	E	E	E	H	H	H	H	B	B	B	B	B
390	39	C	C	E	E	E	H	H	H	H	B	B	B	B	B
470	47	C	C	E	E	E	H	H	H	H	B	B	B	B	B
560	56	C	C	E	E	E	H	H	H	H	B	B	B	B	B
680	68	C	C	E	E	E	H	H	H	H	B	B	B	B	B
820	82	C	C	E	E	E	H	H	H	H	B	B	B	B	B
101	100pF	C	C	E	E	E	H	H	H	H	B	B	B	B	B
121	120	C		E	E		H	H	H	H	B	B	B	B	B
151	150	C		E	E		H	H	H	H	B	B	B	B	J
181	180	C		E	E		H	H	H	H	B	B	B	B	J
201	200	C		E	E		H	H	H	H					
221	220	C		E	E		H	H	H	H	B	B	B	B	J
271	270			E	E		H	H	H	H	B	B	B	B	J
331	330			E	E		H	H	H	H	B	B	B	B	J
391	390			E	E		H	H	H		B	B	B	B	
471	470			E	E		H	H	H		B	B	B	B	
561	560			E	E		H	H	H		B	B	B	B	
681	680			E	E		H	H	H		B	B	B	B	
821	820			E	E		H	H	H		B	B	B		
102	1nF			E	E		H	H	H		B	B	B		
152	1.5						H	H			B	B	B		
182	1.8						H	H			B	B	B		
222	2.2						H	H			B	B	B		
272	2.7						H	H			B	B			
332	3.3						H	H			B	B			
472	4.7										B	B			
562	5.6										B	B			
682	6.8										B	B			
103	10nF										J	J			

■The letter in cell is expressed the symbol of product thickness

Capacitance & Voltage(NPO)

Dielectric		NPO						
EIA	Size	1206						
Code	VDCW	25V	50V	100V	200V 250V	500V 630V	1000V	2000V
0R1	0.1pF							
0R2	0.2							
0R3	0.3							
0R5	0.5	B	B	B	B	J	J	
1R0	1pF	B	B	B	B	J	J	
1R2	1.2	B	B	B	B	J	J	
1R5	1.5	B	B	B	B	J	J	
1R8	1.8	B	B	B	B	J	J	
2R0	2.0	B	B	B	B	J	J	
2R2	2.2	B	B	B	B	J	J	
2R7	2.7	B	B	B	B	J	J	
3R0	3.0	B	B	B	B	J	J	
3R3	3.3	B	B	B	B	J	J	
3R6	3.6	B	B	B	B	J	J	
3R9	3.9	B	B	B	B	J	J	
4R7	4.7	B	B	B	B	J	J	
5R0	5.0	B	B	B	B	J	J	
5R6	5.6	B	B	B	B	J	J	
6R8	6.8	B	B	B	B	J	J	
8R0	8.0	B	B	B	B	J	J	
8R2	8.2	B	B	B	B	J	J	
100	10pF	B	B	B	B	J	J	L
120	12	B	B	B	B	J	J	L
150	15	B	B	B	B	J	J	L
180	18	B	B	B	B	J	J	L
220	22	B	B	B	B	J	J	L
270	27	B	B	B	B	J	J	L

Dielectric		NPO						
EIA	Size	1206						
Code	VDCW	25V	50V	100V	200V 250V	500V 630V	1000V	2000V
330	33	B	B	B	B	J	J	L
390	39	B	B	B	B	J	J	L
470	47	B	B	B	B	J	J	L
560	56	B	B	B	B	J	J	L
680	68	B	B	B	B	J	J	L
820	82	B	B	B	B	J	J	L
101	100pF	B	B	B	B	J	J	L
121	120	B	B	B	B	J	J	
151	150	B	B	B	B	J	J	
181	180	B	B	B	B	J	J	
221	220	B	B	B	B	J	J	
271	270	B	B	B	B	J	J	
331	330	B	B	B	B	J	J	
391	390	B	B	B	B	J	J	
471	470	B	B	B	B	J	J	
561	560	B	B	B	B	L	L	
681	680	B	B	B	B	L		
821	820	B	B	B	B	L		
102	1nF	B	B	B	B	L		
152	1.5	B	B	J	J			
182	1.8	B	B	J	J			
222	2.2	B	B	J	J			
272	2.7	B	B	J				
332	3.3	B	B	J				
472	4.7	B	B	J				
562	5.6	B	B					
682	6.8	B	B					
103	10nF	B	B					

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(NPO)

Dielectric		NPO								
EIA	Size	1210				1808				
Code	VDCW	200V 250V	500V 630V	1000V	2000V	200V 250V	500V 630V	1000V	2000V	3000V
1R0	1pF	J	J			L	L			
1R2	1.2	J	J			L	L			
1R5	1.5									
1R8	1.8	J	J			L	L			
2R0	2.0	J	J			L	L			
2R2	2.2	J	J			L	L			
2R7	2.7	J	J			L	L			
3R0	3.0	J	J			L	L			
3R3	3.3	J	J			L	L			
3R6	3.6	J	J			L	L			
3R9	3.9	J	J			L	L			
4R7	4.7	J	J			L	L			
5R0	5.0	J	J			L	L			
5R6	5.6	J	J			L	L			
6R8	6.8	J	J			L	L			
8R0	8.0									
8R2	8.2	J	J			L	L			
100	10pF	J	J	J	L	L	L	L	L	L
120	12	J	J	J	L	L	L	L	L	L
150	15	J	J	J	L	L	L	L	L	L

Dielectric		NPO								
EIA	Size	1210				1808				
Code	VDCW	200V 250V	500V 630V	1000V	2000V	200V 250V	500V 630V	1000V	2000V	3000V
180	18	J	J	J	L	L	L	L	L	L
220	22	J	J	J	L	L	L	L	L	L
270	27	J	J	J	L	L	L	L	L	L
330	33	J	J	J	L	L	L	L	L	L
390	39	J	J	J	L	L	L	L	L	L
470	47	J	J	J	L	L	L	L	L	L
560	56	J	J	J	L	L	L	L	L	L
680	68	J	J	J	L	L	L	L	L	L
820	82	J	J	J	L	L	L	L	L	L
101	100pF	J	J	L	L	L	L	L	L	L
121	120	J	J	L	L	L	L	L	L	L
151	150	J	J	L	L	L	L	L	L	L
181	180	J	J	L	L	L	L	L	L	L
221	220	J	J	L	L	L	L	L	L	L
271	270	J	J	L	S	L	L	L	L	S
331	330	J	J	L	S	L	L	L	L	S
391	390	J	J	L		L	L	L	L	
471	470	J	J	L		L	L	L	L	
561	560	J	J	L		L	L	S	S	
681	680	J	J	L		L	L	S	S	
821	820	J	J	L		L	L	S	S	
102	1nF	J	J	S		L	L	S	S	
152	1.5	J	L			L	L			
182	1.8	J	L			L	L			
222	2.2	L	S			L	L			
272	2.7	L				L	L			
332	3.3					L	L			
392	3.9					L				
472	4.7					L				

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(NPO)

Dielectric		NPO									
EIA	Size	1812					2220				
Code	VDCW	200V 250V	500V 630V	1000V	2000V	3000V	200V 250V	500V 630V	1000V	2000V	3000V
100	10pF	L	L	L	L	L	L	L	L	S	S
120	12	L	L	L	L	L	L	L	L	S	S
150	15	L	L	L	L	L	L	L	L	S	S
180	18	L	L	L	L	L	L	L	L	S	S
220	22	L	L	L	L	L	L	L	L	S	S
270	27	L	L	L	L	L	L	L	L	S	S
330	33	L	L	L	L	L	L	L	L	S	S
390	39	L	L	L	L	L	L	L	L	S	S
470	47	L	L	L	L	L	L	L	L	S	S
560	56	L	L	L	L	L	L	L	L	S	S
680	68	L	L	L	L	L	L	L	L	S	S
101	100pF	L	L	L	L	L	L	L	L	S	S
121	120	L	L	L	L	L	L	L	L	S	S
151	150	L	L	L	L	L	L	L	L	S	S
181	180	L	L	L	L	L	L	L	L	S	S
221	220	L	L	L	L	L	L	L	L	S	S

Dielectric		NPO									
EIA	Size	1812					2220				
Code	VDCW	200V 250V	500V 630V	1000V	2000V	3000V	200V 250V	500V 630V	1000V	2000V	3000V
271	270	L	L	L	L	S	L	L	L	S	S
331	330	L	L	L	L	S	L	L	L	S	S
391	390	L	L	L	L	S	L	L	L	S	S
471	470	L	L	L	L	S	L	L	L	S	S
561	560	L	L	S	S		L	L	L	S	S
681	680	L	L	S	S		L	L	L	S	S
821	820	L	L	S	S		L	L	L	S	S
102	1nF	L	L	S	S		L	L	L	S	S
152	1.5	L	L				L	L	S		
182	1.8	L	L				L	L	S		
222	2.2	L	L				L	L	S		
272	2.7	L	L				L	L			
332	3.3	L	L				L	L			
392	3.9										
472	4.7	S					L	L			
562	5.6	S					L				
682	6.8	S					L				
103	10nF	S					L				
153	15										

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(X7R)

Dielectric		X7R														
EIA	Size	0201		0402						0603						
Code	VDCW	≤25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	200V 250V
121	120pF	C	C													
151	150	C	C													
181	180	C	C													
221	220	C	C													
271	270	C	C													
331	330	C	C													
391	390	C	C													
471	470	C	C													
561	560	C	C													
681	680	C	C													
102	1nF	C	C													
122	1.2	C	C													
152	1.5	C	C													
182	1.8	C	C													
222	2.2	C	C													
272	2.7	C	C													
332	3.3	C	C													
392	3.9	C	C													
472	4.7	C	C													
562	5.6	C														
682	6.8	C														
103	10nF	C														

Dielectric		X7R														
EIA	Size	0201		0402						0603						
Code	VDCW	≤25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	200V 250V
123	12															
153	15															
183	18															
223	22															
273	27															
333	33															
393	39															
473	47															
563	56															
683	68															
104	100nF			F	F	F	F	F		H	H	H	H	H	H	
154	150									H	H	H	H	H		
224	220			F	F	F				H	H	H	H	H		
334	330									H	H	H	H			
474	470									H	H	H	H			
684	680									H	H	H	H			
105	1uF									H	H	H	H			

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(X7R)

Dielectric		X7R													
EIA	Size	0805							1206						
Code	VDCW	≤10V	16V	25V	50V	100V	200V 250V	500V	≤25V	50V	100V	200V 250V	500V 630V	1000V	2000V
121	120pF													J	J
151	150													J	J
181	180													J	J
221	220													J	J
271	270													J	J
331	330													J	J
391	390													J	J
471	470													J	J
561	560													J	J
681	680													J	J
102	1nF													J	J
122	1.2													J	J
152	1.5													J	J
182	1.8													J	J
222	2.2												J	J	J
272	2.7											B	J	J	
332	3.3nF							J				B	J	J	
392	3.9							J				B	J	J	
472	4.7							J				B	J	J	
562	5.6						B	J				J	J	J	
682	6.8						B	J				J	J	J	
103	10nF						B	J				J	J	J	
123	12						J					J	J		
153	15						J					J	J		
183	18						J					J	J		
223	22						J					J	J		
273	27						J					J	J		
333	33						J					J	J		

Dielectric		X7R												
EIA	Size	0805							1206					
Code	VDCW	≤10V	16V	25V	50V	100V	200V 250V	500V	≤25V	50V	100V	200V 250V	500V 630V	1000V	2000V
393	39											J			
473	47											J			
563	56											J			
683	68					J			B	B	J	J			
104	100nF	B	B	B	B	J			B	B	J	J			
224	220	B	B	B	B	J			B	B	J				
334	330	B	B	B	B				L	L	L				
474	470	J	J	J	J				L	L	L				
684	680	J	J	J	J				L	L	L				
105	1uF	J	J	J	J				L	L	L				
225	2.2	J	J	J					L	L					
335	3.3	J	J	J					L	L					
475	4.7	J	J						L	L					
685	6.8								L						
106	10uF								L						

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(X7R)

Dielectric		X7R											
EIA	Size	1210							1808				
Code	VDCW	25V	50V	100V	200V 250V	500V 630V	1000V	2000V	≤250V	500V 630V	1000V	2000V	3000V
121	120pF								L	L	L	L	L
151	150								L	L	L	L	L
181	180								L	L	L	L	L
221	220								L	L	L	L	L
271	270								L	L	L	L	L
331	330								L	L	L	L	L
391	390								L	L	L	L	L
471	470pF	J	J	J	J	J	J	J	L	L	L	L	L
561	560	J	J	J	J	J	J	J	L	L	L	L	L
681	680	J	J	J	J	J	J	J	L	L	L	L	L
102	1nF	J	J	J	J	J	J	J	L	L	L	L	L
122	1.2	J	J	J	J	J	J	J	L	L	L	L	L
152	1.5	J	J	J	J	J	J	J	L	L	L	L	L
182	1.8	J	J	J	J	J	J	J	L	L	L	L	L
222	2.2	J	J	J	J	J	J	J	L	L	L	L	L
272	2.7	J	J	J	J	J	J	J	L	L	L	L	L
332	3.3	J	J	J	J	J	J	J	L	L	L	L	
392	3.9	J	J	J	J	J	J	J	L	L	L	L	
472	4.7	J	J	J	J	J	J	J	L	L	L	L	
562	5.6	J	J	J	J	J	J	L	L	L	L	L	
682	6.8	J	J	J	J	J	L	L	L	L	L	L	
103	10nF	J	J	J	J	J	L	S	L	L	L	L	
123	12	J	J	J	J	J	L		L	L	L		
153	15	J	J	J	J	J	L		L	L	L		
183	18	J	J	J	J	J	L		L	L	L		
223	22	J	J	J	J	J	L		L	L	L		
273	27	J	J	J	J	L			L	L			
333	33	J	J	J	J	L			L	L			
393	39	J	J	J	J	L			L	L			
473	47	J	J	J	J	S			L	L			

Dielectric		X7R											
EIA	Size	1210							1808				
Code	VDCW	25V	50V	100V	200V 250V	500V 630V	1000V	2000V	≤250V	500V 630V	1000V	2000V	3000V
563	56	J	J	J	J				L				
683	68	J	J	J	J				L				
104	100nF	J	J	J	J				L				
224	220	L	L	L	L				L				
334	330	L	L	L					L				
474	470	L	L	L					L				
684	680	L	L	L									
105	1uF	L	L	L									
225	2.2	O	O	O									
335	3.3	O	O										
475	4.7	O	O										
685	6.8	O											
106	10uF	O											

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(X7R)

Dielectric		X7R											
EIA	Size	1812					2220						
Code	VDCW	≤250V	500V 630V	1000V	2000V	3000V	100V	200V 250V	500V	630V	1000V	2000V	3000V
121	120pF	L	L	L	L	L							
151	150	L	L	L	L	L							
181	180	L	L	L	L	L							
221	220	L	L	L	L	L							
271	270	L	L	L	L	L							
331	330	L	L	L	L	L							
391	390	L	L	L	L	L							
471	470	L	L	L	L	L							
561	560	L	L	L	L	L							
681	680	L	L	L	L	L							
102	1nF	L	L	L	L	L	L	L	L	L	L	L	L
122	1.2	L	L	L	L	L	L	L	L	L	L	L	L
152	1.5	L	L	L	L	L	L	L	L	L	L	L	L
182	1.8	L	L	L	L	L	L	L	L	L	L	L	L
222	2.2	L	L	L	L	L	L	L	L	L	L	L	L
272	2.7	L	L	L	L	L	L	L	L	L	L	L	L
332	3.3	L	L	L	L	L	L	L	L	L	L	L	L
392	3.9	L	L	L	L	L							
472	4.7	L	L	L	L	L	L	L	L	L	L	L	S
562	5.6	L	L	L	L	L	L	L	L	L	L	L	
682	6.8	L	L	L	L/O	O	L	L	L	L	L	L	
103	10nF	L	L	L	L/O	O	L	L	L	L	L	L	
123	12	L	L	L	L/O		L	L	L	L	L	L	
153	15	L	L	L			L	L	L	L	L	L	
183	18	L	L	L			L	L	L	L	L	L	
223	22	L	L	L			L	L	L	L	L	L	
273	27	L	L	L			L	L	L	L	L	L	
333	33	L	L	L			L	L	L	L	L	S	
393	39	L	L	L			L	L	L	L	L	S	
473	47	L	L	L			L	L	L	L	L	S	
563	56	L	L	L			L	L	L	L	L		
683	68	L	L										
104	100nF	L	O				L	L	L	L	S		
224	220	L					L	L	L	L			
334	330	S					L	L	L	L			
474	470	S					L	L	S	S			
684	680	S					L	L					
105	1uF	S					L	L					
106	10						S						

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(X7S)

Dielectric		X7S															
EIA	Size	0201				0402					0603						
Code	VDCW	≤10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	200V 250V
121	120pF	C	C	C	C												
151	150	C	C	C	C												
181	180	C	C	C	C												
221	220	C	C	C	C												
271	270	C	C	C	C												
331	330	C	C	C	C												
391	390	C	C	C	C												
471	470	C	C	C	C												
561	560	C	C	C	C												
681	680	C	C	C	C												
102	1nF	C	C	C	C												
122	1.2	C	C	C	C												
152	1.5	C	C	C	C												
182	1.8	C	C	C	C												
222	2.2	C	C	C	C												
272	2.7	C	C	C	C												
332	3.3	C	C	C	C												
392	3.9	C	C	C	C												
472	4.7nF	C	C	C	C												
562	5.6	C	C	C													
682	6.8	C	C	C													
103	10nF	C	C	C													
123	12	C	C														
153	15	C	C														
183	18	C	C														
223	22	C	C														
273	27	C															
333	33	C															
393	39																
473	47																
563	56																
683	68																
104	100nF					F	F	F	F	F	H	H	H	H	H	H	
154	150										H	H	H	H	H		
224	220					F	F	F			H	H	H	H	H		
334	330										H	H	H	H			
474	470										H	H	H	H			
684	680										H	H	H	H			
105	1uF										H	H	H	H			

■The letter in cell is expressed the symbol of product thickness

Dielectric		X7S													
EIA	Size	0805							1206				1210		
Code	VDCW	≤10V	16V	25V	50V	100V	200V 250V	500V	≤25V	50V	100V	200V 250V	25V	50V	100V
103	10nF						B	J							
123	12						J								
153	15						J								
183	18						J								
223	22						J								
273	27						J								

Dielectric		X7S													
EIA	Size	0805							1206				1210		
Code	VDCW	≤10V	16V	25V	50V	100V	200V 250V	500V	≤25V	50V	100V	200V 250V	25V	50V	100V
333	33						J								
563	56														
683	68					J									
104	100nF	B	B	B	B	J			B	B	J	J			
224	220	B	B	B	B	J			B	B	J		L	L	L
334	330	B	B	B	B				L	L	L		L	L	L
474	470	J	J	J	J				L	L	L		L	L	L
684	680	J	J	J	J				L	L	L		L	L	L
105	1uF	J	J	J	J				L	L	L		L	L	L
225	2.2uF	J	J	J					L	L			O	O	O
335	3.3	J	J	J					L	L			O	O	
475	4.7	J	J						L	L			O	O	
685	6.8								L				O	O	
106	10uF								L				O		

■The letter in cell is expressed the symbol of product thickness

■General Capacitance & Voltage for MCF..A Series

Capacitance & Voltage(X5R)

Dielectric		X5R												
EIA	Size	0201				0402				0603				
Code	VDCW	≤10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V
121	120pF	C	C	C	C									
151	150	C	C	C	C									
181	180	C	C	C	C									
221	220	C	C	C	C									
271	270	C	C	C	C									
331	330	C	C	C	C									
391	390	C	C	C	C									
471	470	C	C	C	C									
561	560	C	C	C	C									
681	680	C	C	C	C									
102	1nF	C	C	C	C									
122	1.2	C	C	C	C									
152	1.5	C	C	C	C									
182	1.8	C	C	C	C									
222	2.2	C	C	C	C									
272	2.7	C	C	C	C									
332	3.3	C	C	C	C									
392	3.9	C	C	C	C									
472	4.7	C	C	C	C									
562	5.6	C	C	C										
682	6.8	C	C	C										
103	10nF	C	C	C										
123	12	C	C											
153	15	C	C											
183	18	C	C											
223	22	C	C											
273	27	C	C											
333	33	C	C											
393	39	C												
473	47	C												
563	56	D												
683	68	D												
104	100nF	D				F	F	F	F	H	H	H	H	H
224	220					F	F	F		H	H	H	H	H
334	330					F	F	F		H	H	H	H	H
474	470					F	F			H	H	H	H	H
684	680					F	F			H	H	H	H	H
105	1uF					F	F			H	H	H	H	
225	2.2									B	B	B		
335	3.3									B				
475	4.7									B				
106	10uF									B				

■The letter in cell is expressed the symbol of product thickness

Capacitance & Voltage(X5R)

Dielectric		X5R										
EIA	Size	0805						1206				
Code	VDCW	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V
563	56nF											
683	68						J					
104	100nF	B	B	B	B	B	J					
224	220	B	B	B	B	B	J					
334	330	B	B	B	B	B						
474	470	J	J	J	J	J						
684	680	J	J	J	J	J						
105	1uF	J	J	J	J	J						
225	2.2	J	J	J	J			L	L	L	L	L
335	3.3	J	J	J	J			L	L	L	L	L
475	4.7	J	J	J	J			L	L	L	L	
685	6.8	J	J					L	L	L	L	
106	10uF	J	J					L				
156	15							L				
226	22	J						L				

■The letter in cell is expressed the symbol of product thickness

■Environmental Characteristics

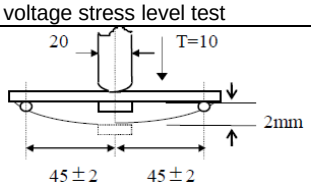
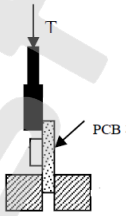
<table>
<tr><th>Item</th><th>Requirement</th><th>Test Method</th></tr>
<tr><td>Capacitance</td><td>Should be within the specified tolerance</td><td>Test Temperature: 25±3℃

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</td></tr>
<tr><td>IR</td><td>NPO: C≤10nF, Ri≥50000MΩ
C>10nF, Ri·CR≥500S

X7R/X7S/X5R: C≤25nF, Ri≥10000MΩ
C>25nF, Ri·CR≥100S</td><td>Measuring Voltage: Rated Voltage(Max 500V)
Duration: 60±5s
Test Humidity: ≦75%
Test Temperature: 25±3℃
Testing charge/discharge current: ≦50mA</td></tr>
<tr><td>(DF, tanδ)
Dissipation
Factor</td><td>NPO: (Class I)
Cr≥30pF：Q≥1000
Note：Q=1/DF</td><td>NPO: (Class I)
Cap≤1000pF 1.0±0.2Vrms, 1MHz±10%
Cap>1000pF 1.0±0.2Vrms, 1KHz±10%</td></tr>
<tr><td></td><td>X7R/X7S/X5R:
<table>
<tr><th>Voltage</th><th>DF</th><th>0201</th><th>0402</th><th>0603</th><th>0805</th><th>≧1206</th></tr>
<tr><td rowspan="2">≥100V</td><td>≤2.5%</td><td>-</td><td>≤10nF</td><td>≤100nF</td><td>≤100nF</td><td>≤100nF</td></tr>
<tr><td>≤5%</td><td>-</td><td>-</td><td>-</td><td>≤220nF</td><td>≤1uF</td></tr>
<tr><td rowspan="5">50V</td><td>≤2.5%</td><td>-</td><td>≤10nF</td><td>-</td><td>≤220nF</td><td>≤1uF</td></tr>
<tr><td>≤3.5%</td><td>≦3.3nF</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>≤5%</td><td>≤10nF</td><td>≤0.1uF</td><td>≤100nF</td><td>≤1uF</td><td>1μF≤C≤2.2μF</td></tr>
<tr><td>≤7.5%</td><td>-</td><td>-</td><td>≤1uF</td><td>-</td><td>≤4.7uF</td></tr>
<tr><td>≤10%</td><td>-</td><td>-</td><td>-</td><td>≤2.2uF</td><td>≤10uF</td></tr>
<tr><td rowspan="5">25V</td><td>≤2.5%</td><td>-</td><td>≤10nF</td><td>≤100nF</td><td>≤220nF</td><td>≤1μF</td></tr>
<tr><td>≦3.5%</td><td>≤3.3nF</td><td>≤100nF</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>≦5%</td><td>≤10nF</td><td>≤220nF</td><td><470nF</td><td>≤1μF</td><td>≤2.2μF</td></tr>
<tr><td>≦7.5%</td><td>-</td><td>-</td><td><1μF</td><td>≤2.2μF</td><td>≤4.7μF</td></tr>
<tr><td>≦10%</td><td>≤100nF</td><td>≤2.2μF</td><td>≤10μF</td><td>≤22μF</td><td>≤22μF</td></tr>
<tr><td rowspan="5">16V</td><td>≦2.5%</td><td>-</td><td>≤10nF</td><td>≤100nF</td><td>≤220nF</td><td><1μF</td></tr>
<tr><td>≦3.5%</td><td>≤3.3nF</td><td>≤100nF</td><td>≤330nF</td><td>-</td><td>-</td></tr>
<tr><td>≦5%</td><td>≤27nF</td><td>≤220nF</td><td>≤470nF</td><td>≤1μF</td><td>≤2.2μF</td></tr>
<tr><td>≦7.5%</td><td>-</td><td>-</td><td>≤1μF</td><td>≤2.2μF</td><td>≤4.7μF</td></tr>
<tr><td>≦10%</td><td>≤100nF</td><td>≤4.7μF</td><td>≤10μF</td><td>≤22μF</td><td>≤47μF</td></tr>
<tr><td rowspan="5">10V</td><td>≦2.5%</td><td>-</td><td>≤10nF</td><td>≤100nF</td><td>≤220nF</td><td><1μF</td></tr>
<tr><td>≦3.5%</td><td>≤3.3nF</td><td>≤100nF</td><td>≤330nF</td><td>-</td><td>-</td></tr>
<tr><td>≦5%</td><td>≤27nF</td><td>≤220nF</td><td>≤470nF</td><td>≤1μF</td><td>≤2.2μF</td></tr>
<tr><td>≦7.5%</td><td>-</td><td>≤1μF</td><td>≤1μF</td><td>≤2.2μF</td><td>≤4.7μF</td></tr>
<tr><td>≦10%</td><td>≤1μF</td><td>≤10μF</td><td>≤22μF</td><td>≤47μF</td><td>≤100μF</td></tr>
<tr><td rowspan="5">≦6.3V</td><td>≦2.5%</td><td>-</td><td>≤10nF</td><td>≤100nF</td><td>≤220nF</td><td>-</td></tr>
<tr><td>≦3.5%</td><td>≤3.3nF</td><td>≤100nF</td><td>≤330nF</td><td>-</td><td>≤1μF</td></tr>
<tr><td>≦5%</td><td>≤27nF</td><td>≤220nF</td><td>≤680nF</td><td>≤1μF</td><td>≤2.2μF</td></tr>
<tr><td>≦7.5%</td><td>-</td><td>≤1μF</td><td>-</td><td>4.7μF</td><td>≤10μF</td></tr>
<tr><td>≦10%</td><td>≤4.7μF</td><td>≤22μF</td><td>≤47μF</td><td>≤47μF</td><td>≤100μF</td></tr>
</table></td><td>X7R/X7S/X5R: (Class II)
The test method is the same as the capacity.</td></tr>
<tr><td>Dielectric
Withstanding
Voltage
(DWV)</td><td>No breakdown or damage on dielectric.</td><td>Ur<100V:
Measuring Voltage: NPO: 300% Ur
X7R/X7S:250% Ur
Duration: 1~5s
Charge / Discharge Current: 50mA max.
Ur=100V:
Test Voltage: 250% Ur Duration: 5s
Charge/ Discharge Current: 50mA max.
100V<Ur<500V:
Test Voltage: 200% Ur Duration: 5s
Charge/ Discharge Current: 50mA max.
500V≤Ur≤1000V:
Test Voltage: 150% Ur Duration: 5s
Charge/ Discharge Current: 50mA max.
1000V<Ur≤2000V:
Test Voltage: 120% Ur Duration: 5s
Charge/ Discharge Current: 50mA max.
Ur >2000V:
Force 120%Rated voltage for 5 seconds. Max..current should not exceed 10 mA.</td></tr>
<tr><td>Appearance</td><td>No visible damage</td><td>Visual inspection</td></tr>
<tr><td>Physical
Dimension</td><td>Within the specified dimensions</td><td>Use caliper</td></tr>
</table>

<table>
<tr><th>Item</th><th>Requirement</th><th>Test Method</th></tr>
<tr><td>Destructive Physical Analysis</td><td>No defects or abnormalities</td><td>Accounting to EIA-469</td></tr>
<tr><td>Temperature Cycle</td><td>NPO: ΔC/C: ≤±2.5% or ±0.25pF whichever is larger
X7R/X7S/X5R: ΔC/C: ≤±12.5%
DF & IR: Same as initial value
No damage on surface.</td><td>Cycling Times: 1000 times.
A cycle is divided into the following 4 steps:
Step1：Lower limit temperature :-55℃；30 minutes；
Step2：Normal temperature :20℃；1 minutes；
Step3：Upper limit temperature :125℃；30 minutes；
Step4：Normal temperature :20℃；1 minute.</td></tr>
<tr><td>Biased Humidity</td><td>NPO: ΔC/C: ≤±3.0% or ±0.3pF whichever is larger
X7R/X7S/X5R: ΔC/C: ≤±12.5%
DF & IR: Same as initial value
No damage on surface.</td><td>Temperature: 85℃
Humidity: 80~85%RH
Voltage:
Ur＜1000V：Rated Voltage
Ur≥1000V：1000V
Duration: 1000h</td></tr>
<tr><td>Life Test</td><td>NPO: ΔC/C: ≤±2.5% or ±0.25pF whichever is larger
X7R/X7S/X5R: ΔC/C: ≤±15%
DF: Same to initial value
IR: NPO: Ri≥5000MΩ or Ri•CR≥50S whichever is smaller
X7R/X7S/X5R: Ri≥1000MΩ or Ri•CR≥10S whichever is smaller
Appearance: No visible damage.</td><td>Duration：1000h
Temperature：Up- category temp.
Charge/ Discharge Current：50mA max
Voltage：
①Ur<500V：
Class I： 2.0Ur
Class II： Shown in the table below
<table>
<tr><th>Cap.</th><th>Applied Voltage</th><th>Cap.</th><th>Applied Voltage</th></tr>
<tr><td>220nF≥0201≥10nF</td><td rowspan="6">1.5Ur</td><td>0201＜10nF</td><td rowspan="6">2.0Ur</td></tr>
<tr><td>2.2uF≥0402≥47nF</td><td>0402＜47nF</td></tr>
<tr><td>4.7uF≥0603≥220nF</td><td>0603＜220nF</td></tr>
<tr><td>10uF≥0805≥0.47uF</td><td>0805＜0.47uF</td></tr>
<tr><td>22uF≥1206≥1uF</td><td>1206＜1uF</td></tr>
<tr><td>22uF≥1210≥1uF</td><td>1210＜1uF</td></tr>
</table>
In addition to the above table, apply voltage at 1.0Ur.
② 500V≤Ur≤630V：1.2 Ur
③ Ur>630V：1.0Ur</td></tr>
<tr><td>High Temperature Exposure</td><td>NPO: ΔC/C: ≤±2.5% or ±0.25pF whichever is larger
X7R/X7S/X5R: ΔC/C: ≤±12.5%
DF & IR:Same as initial value
Appearance：No visible damage</td><td>Temperature: 125℃
Voltage: Apply no voltage
Duration: 1000h
Recovery conditions: Room temperature
Recovery Time: 24h (NPO) or 48h(X7R/X7S/X5R)</td></tr>
<tr><td>Vibration</td><td>NPO: ΔC/C: ≤±2.5% or ±0.25pF whichever is larger
X7R/X7S:ΔC/C: -12.5%~+12.5%
DF / IR: Same to initial value
Appearance: No visible damage</td><td>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.</td></tr>
<tr><td>Mechanical Shock</td><td>NPO: ΔC/C: ≤±2.5% or ±0.25pF whichever is larger
X7R/X7S:ΔC/C: -12.5%~+12.5%
DF / IR: Same to initial value
Appearance: No visible damage</td><td>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</td></tr>
<tr><td>Solderability</td><td>At least 95% of the terminal electrode is covered by new solder.
Visual Appearance: No visible damage.</td><td>Preheating conditions:80 to 120℃; 10~30s.
Solder Temperature: 245±5℃(Lead-free)
Duration: 3±0.3s</td></tr>
<tr><td>Resistance to Soldering Heat</td><td>NPO: ΔC/C: ≤±2.5% or ±0.25pF whichever is larger
X7R/X7S/5X5R: ΔC/C: ±15%
DF / IR: Same to initial value
Appearance：No visible damage. At least 95% of the terminal electrode is covered by new solder.</td><td>Preheating conditions: 100 to 200℃; 60~120s.
Solder Temperature: 265±5℃
Duration: 10±1s
Clean the capacitor with solvent and examine it with a 10X(min.) microscope.
Recovery Time: 24±2h
Recovery condition: Room temperature</td></tr>
<tr><td>ESD</td><td>NPO/X7R/X7S:
C&DF&IR: Same to initial value
Appearance：No visible damage</td><td>ESD electrostatic discharge test was carried out according to AEC-Q200-002 method：
Discharge voltage: 2kV~22kV according to 2kV step test.
Each sample is subjected to two discharges per electrode, one positive and one negative grade.
After the sample meets the requirements of the</td></tr>
</table>

Item	Requirement	Test Method
		acceptance criteria after passing the specified level of voltage, the original sample is used to enter the next voltage stress level test
Bending Strength	NPO: ΔC/C: ≤±5.0% or ±0.5pF whichever is larger X7R/X7S:ΔC/C: -12.5%~+12.5% DF / IR: Same to initial value Appearance: No visible damage	 Test Board: Al2O3 or PCB Warp: ≥2mm Speed: 1mm/sec. Unit: mm Hold time: 60 sec The measurement should be made with the board in the bending position.
Terminal Strength(SMD)	NPO: ΔC/C: ≤±5% or ±0.5pF , whichever is larger X7R/X7S:ΔC/C: -12.5%~+12.5% 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 ≤ 0402:2N 0603:10N >0603:17.7N 
Temperature Character	NPO: ΔC/C: ±30ppm X7R: ΔC/C ±15% X7S:ΔC/C: ±22% X5R:ΔC/C: ±15%	The electrical properties of the product are measured at three temperature points of lower limit temperature, 25°C and upper limit temperature.

■Pre-conditioning (for Class II capacitors only): Preheat at 140°C to 150°C for 1 hour ±10 minutes, then store at room temperature for 24±2h

■Post-test treatment (for Class II capacitors only): Preheat at 140°C to 150°C for 1 hour ±10 minutes, then store at room temperature for 24 ±2h

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

■Shelf life: 1 years Max

■Temperature Coefficient / Characteristics

Dielectric	Reference Temperature Point	Temperature Coefficient	Operation Temperature Range
NPO(COG)	25℃	0±30 ppm/℃	-55℃~125℃
X5R	25℃	±15%	-55℃~85℃
X7R	25℃	±15%	-55℃~125℃
X7S	25℃	±22%	-55℃~125℃

■Packaging

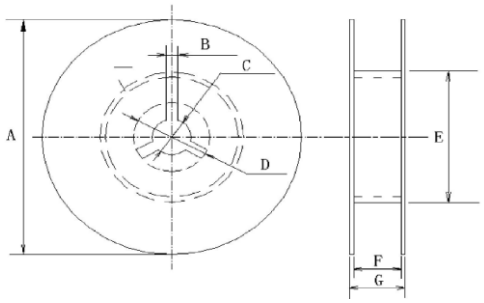
Packaging Quantity

Type	Thickness (T)	Packaging (7" Reel)	
		Paper tape	Plastic tape
0201	C/D	15K	-
0402	E/F/N	10K	-
0603	B/H	4K	-
0805	B	4K	-
	J	-	3K
1206	B	4K	-
	J	-	3K
	L	-	2K
1210	J/L	-	2K
	O		1K

Automotive Grade Multilayer Ceramic Chip Capacitor

Type	Thickness (T)	Packaging (7" Reel)	
		Paper tape	Plastic tape
1808	L/S	-	2K
1812	L	-	1K
	S		0.5K
2220	L/S	-	0.5K

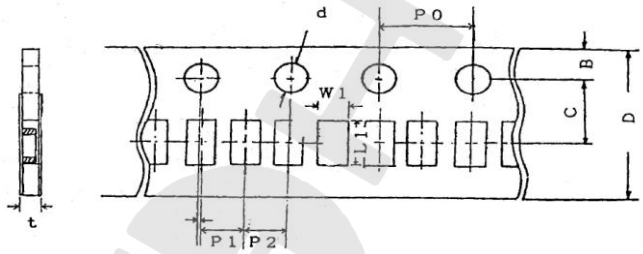
Tape and Reel



Unit: mm

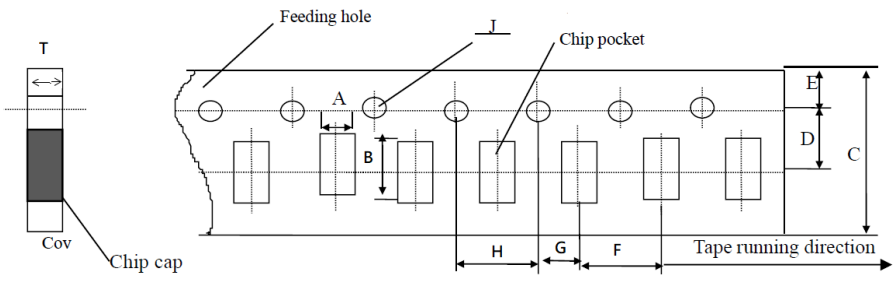
Type	A	B	C	D	E	F	G
0201	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0402	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0603	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
0805	178±2.0(7")	3.0	13.0±0.5	21.0±0.8	50 or more	10.0±1.5	12 max
1206	178±2.0(7")	3.0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

Paper Tape Size Specification



Unit: mm

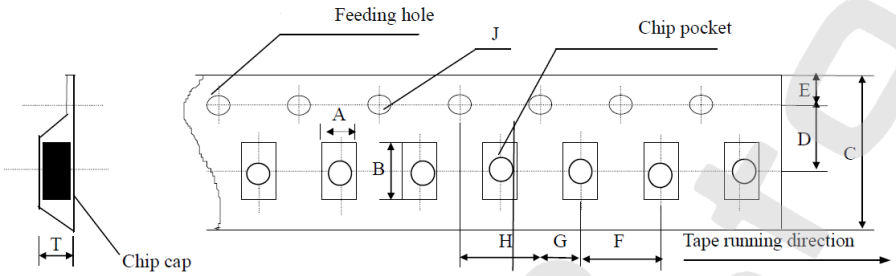
Type	W1	L1	D	C	B	P1	P2	P0	d	t
0201	0.37±0.10	0.67±0.10	8.00±0.10	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.00±0.10	1.50-0/+0.10	0.80 Below
0402	0.65±0.10	1.15±0.10	8.00±0.10	3.50±0.05	1.75±0.10	2.00±0.05	2.00±0.05	4.00±0.10	1.50-0/+0.10	0.80 Below



Unit: mm

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

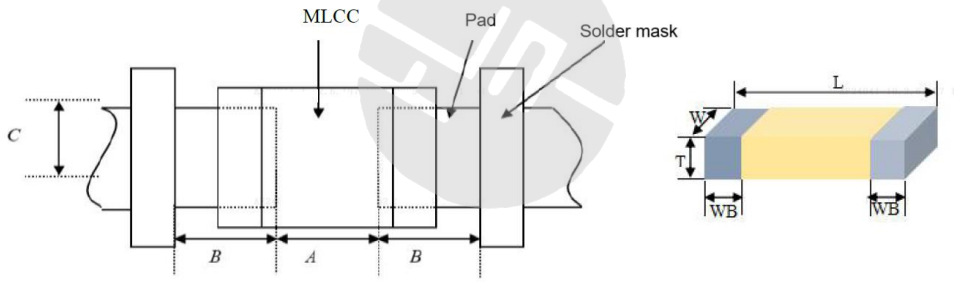
Plastic Tape Size Specification



Unit: mm

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

■Recommended pad design



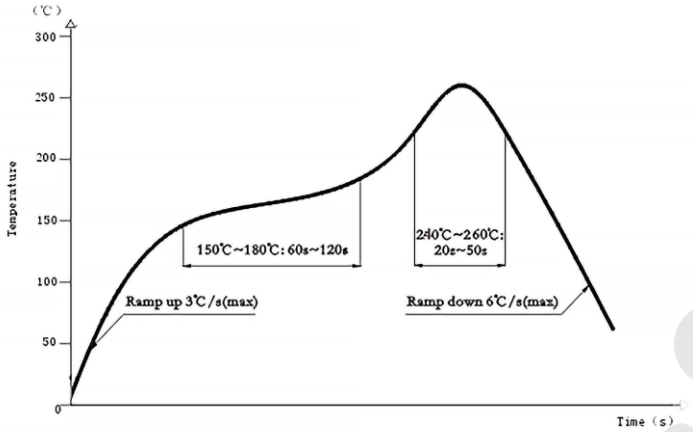
Type	Size (Inch)	L	W	A	B	C
01	0201	0.60±0.03	0.30±0.03	0.20~0.25	0.20~0.30	0.20~0.35
		0.60±0.09	0.30±0.09	0.23~0.30	0.25~0.35	0.30~0.40
02	0402	1.00±0.05	0.50±0.05	0.30~0.50	0.35~0.45	0.40~0.60
		1.00±0.15	0.50±0.15	0.40~0.60	0.40~0.50	0.50~0.70
		1.00±0.20	0.50±0.20			
03	0603	1.60±0.10	0.80±0.10	0.60~0.80	0.60~0.70	0.60~0.80
		1.60±0.20	0.80±0.20	0.70~0.90	0.70~0.80	0.80~1.00
05	0805	2.00±0.20	1.25±0.20	1.00~1.40	0.60~0.80	1.20~1.40

Automotive Grade Multilayer Ceramic Chip Capacitor

Type	Size (Inch)	L	W	A	B	C
06	1206	3.20±0.30	1.60±0.30	1.90~2.10	1.00~1.30	1.60~1.90
10	1210	3.20±0.30	2.50±0.30	2.00~2.40	1.00~1.30	2.50~2.80
08	1808	4.50±0.40	2.00±0.20	2.50~3.50	1.00~1.80	2.30~3.50
12	1812	4.50±0.40	3.20±0.30	2.50~3.50	1.00~1.80	2.30~3.50

■Recommended Soldering Profile

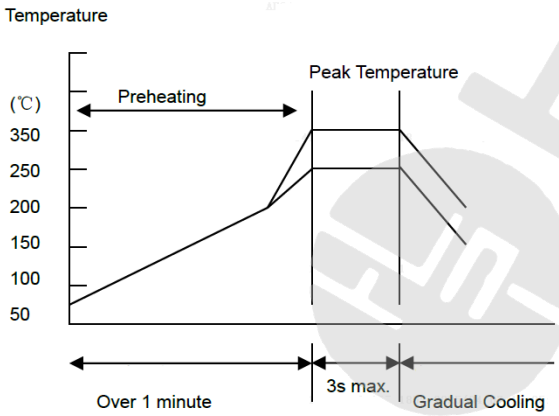
Re-flow soldering



■While in preheating, please keep the temperature difference between soldering temperature and surface temperature of chips as: T≤150℃.

Item	Suggestions
Preheating	△≤130℃
Temperature of soldering iron head	Highest temperature:350℃
Power of soldering iron	20W at the highest
Diameter of soldering iron head	1mm recommended
Soldering time	3s at the longest
Solder paste amount	≤1/2 chip thickness
Restricted conditions	Please avoid the direct contact between soldering iron head and ceramic components

Hand soldering



REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A6	Apr 08,2025		-Modify the descriptions of Features and Applications. -Modify the dimensions specifications for 0201/0402/1812/2220. -Modify the specifications for MCFA..A_X7R 0603/0805/1206. -Modify the specifications for MCFA..A_X5R 0603/0805. -Modify the specifications for MCFA..A_X7S 0402/0603/0805 -Modify the specifications for all sizes of MCF..A_NPO/X7R/X7S/X5R. -Modify the reliability test content. -Modify the Temperature Coefficient / Characteristics content. -Modify the packaging specifications for 1808/1812/2220. -Add recommended pad design -Modify the Recommended Soldering Profile. -Add Shelf life.