

Data Sheet

Customer:

Product: Multilayer Ceramic Chip Capacitor – MC Series

Sizes.: 0201/0402/0603/0805/1206/1210/1808/1812/2220/2225

Issued Date: 10-Mar-25

Edition: REV.B7



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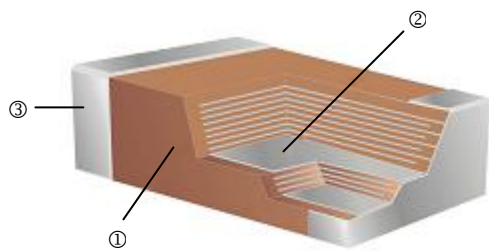
Multilayer Ceramic Chip Capacitor

■ Features

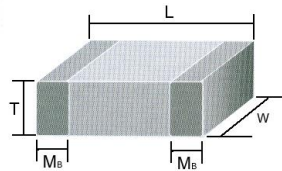
- Wide capacitance range, extremely compact size
- Low inductance of capacitor for high frequency application
- Excellent solderability and resistance to soldering heat, suitable for flow and reflow soldering
- Adaptable to high-speed surface mount assembly
- Conform to EIAJ-RC3402, and also compatible with EIA-RS198 and IEC PUB. 384-10



■ Construction



①	Ceramic Material	③	Termination:
②	Inner Electrodes		NPO, X7R, X5R : Cu/Ni /Sn dielectric



■ Dimensions

MC / MCRF Type

Unit: mm

Type	Size (Inch)	L	W	T / Symbol		M _B
01	0201	0.6±0.03	0.3±0.03	0.3±0.03	L	0.15±0.05
		0.6±0.05 ^{#2}	0.3±0.05 ^{#2}	0.3±0.05 ^{#2}		
		0.6±0.09 ^{#3}	0.3±0.09 ^{#3}	0.3±0.09 ^{#3}		
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	N	0.25 +0.05 / -0.10
				0.50±0.02/-0.05	Q	
		1.00±0.20	0.50±0.20	0.50±0.20	E	
03	0603	1.60±0.10	0.80±0.10	0.80±0.10	S	0.40±0.15
				0.50±0.10	H	
		1.60+0.15/-0.10	0.80+0.15/-0.10	0.80+0.15 / -0.10	X	
		1.60±0.20 ^{#1}	0.80±0.20 ^{#1}	0.80±0.20 ^{#1}		
05	0805	2.00±0.15	1.25±0.10	0.50±0.10	H	0.50±0.20
				0.60±0.15	A	
				0.80±0.10	B	
		2.00±0.20	1.25±0.20	1.25±0.10	D	
				0.85±0.10	T	
				1.25±0.20	I	
06	1206	3.20±0.15	1.60±0.15	0.80±0.10	B	0.60±0.20 (0.50±0.25) ^{***}
				0.95±0.10	C	
				1.25±0.10	D	
		3.20±0.20	1.60±0.20	1.15±0.15	J	
				1.60±0.20	G	
				0.85±0.10	T	
3.20+0.3 / -0.1	1.60+0.3 / -0.1	1.60+0.3 / -0.1	P			
10	1210	3.20±0.30	2.50±0.20	0.95±0.10	C	0.75±0.25
				0.85±0.10	T	
				1.25±0.10	D	
		3.20±0.40	2.50±0.30	1.60±0.20	G	
				2.00±0.20	K	
				2.50±0.30	M	
08	1808	4.50±0.40 (4.5+0.5/-0.3) ^{**}	2.03±0.25	1.25±0.10	D	0.75±0.25 (0.50±0.25) ^{***}
				1.40±0.15	F	
				1.60±0.20	G	
				2.00±0.20	K	

Unit: mm

Type	Size (Inch)	L	W	T / Symbol		M _B
12	1812	4.50±0.40 (4.5+0.5/-0.3)**	3.20±0.30	1.25±0.10	D	0.75±0.25 (0.50±0.25)***
				1.60±0.20	G	
				2.00±0.20	K	
			3.20±0.40	2.50±0.30	M	
				2.80±0.30	U	
20	2220	5.70±0.40	5.00±0.40	1.60±0.20	G	0.85±0.35
				2.00±0.20	K	
				2.50±0.30	M	
				2.80±0.30	U	
				3.10±0.30	R	
25	2225	5.70±0.40	6.30±0.40	1.60±0.20	G	0.85±0.35
				2.00±0.20	K	
				2.50±0.30	M	
				2.80±0.30	U	

** For 1808/1812: 200~3KV, ***For 1206:1KV~3KV; 1808/1812: 200~3KV

#1: For 0603 Cap ≥ 10uF or 0603 Cap ≥ 4.7uF (≤ 6.3V) or 0603 Cap > 1uF (> 10V) products :

#2: For 0201/Cap ≥ 0.68uF products :

#3: For 0201/Cap ≥ 1uF products

Part Numbering

MC	03	J	T	N	250	3R9
Product Type	Dimensions (LxW)	Capacitance Tolerance	Packaging	Dielectric	Voltage (VDCW)	Capacitance
MC : General; Ultra-small Middle and High Voltage MCRF: Ultra High Q and Low ESR (RF)	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 08: 1808 12: 1812 43: 0612 20: 2220 25: 2225	A: ±0.05pF (For"#" mark) B: ±0.1pF C: ±0.25pF D: ±0.5pF F: ±1% G: ±2% J: ±5% K: ±10% M: ±20% Z: +80/-20%	T: Taping Reel	N: NPO (COG) B: X7R X: X5R	6V3: 6.3V 250: 25V 500: 50V 101: 100V 102: 1000V 202: 2000V 302: 3000V 402: 4000V 502: 5000V 602: 6000V	3R9: 3.9pF 150: 15pF 181: 180pF 225: 2.2μF 476: 47μF 107: 100μF

Multilayer Ceramic Chip Capacitor

General Capacitance & Voltage

Capacitance & Voltage (NPO)

Dielectric		NPO																		
EIA	Size	0201				0402				0603					0805					
Code	VDCW	10V	16V	25V	50V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V
0R1	0.1pF	L	L	L [#]	L [#]	N	N	N	N											
0R2	0.2	L	L	L [#]	L [#]	N	N	N [#]	N [#]		S	S	S	S						
0R3	0.3	L	L	L [#]	L [#]	N	N	N	N [#]		S	S	S	S						
0R4	0.4	L	L	L [#]	L [#]	N	N	N	N [#]		S	S	S	S						
0R5	0.5	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
0R6	0.6	L	L	L	L [#]	N	N	N	N [#]	N	S	S	S	S	S	A	A	A	A	A
R65	0.65																		A [#]	A
0R7	0.7	L	L	L	L [#]	N	N	N	N [#]	N	S	S	S	S	S	A	A	A	A [#]	A
R75	0.75			L [#]																
0R8	0.8	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
0R9	0.9	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
1R0	1.0	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
1R1	1.1			L [#]					N [#]											
1R2	1.2	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
1R3	1.3								N [#]											
1R5	1.5	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
1R6	1.6			L [#]	L [#]				N [#]											
1R7	1.7								N [#]											
1R8	1.8	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
2R0	2.0				L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
2R2	2.2	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
2R4	2.4			L [#]					N [#]					S [#]						
2R5	2.5								N [#]											
2R7	2.7	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
2R8	2.8								N [#]											
3R0	3.0			L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
3R3	3.3	L	L	L	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
3R6	3.6				L [#]				N [#]											
3R9	3.9	L	L	L [#]	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
4R0	4.0					N	N	N	N [#]	N	S	S	S	S	S	A	A	A	A	A
4R3	4.3				L [#]															
4R7	4.7	L	L	L	L [#]	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
5R0	5.0					N	N	N	N [#]	N	S	S	S	S	S	A	A	A	A	A
5R6	5.6	L	L	L [#]	L	N	N	N	N [#]	N	S	S	S	S [#]	S	A	A	A	A	A
6R0	6.0			L [#]		N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
6R8	6.8	L	L	L	L	N	N	N [#]	N	N	S	S	S	S	S	A	A	A	A	A
7R0	7.0				L [#]	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
8R0	8.0					N	N	N	N [#]	N	S	S	S	S	S	A	A	A	A	A
8R2	8.2	L	L	L [#]	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
9R0	9.0					N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
100	10pF	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
120	12	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
150	15	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
180	18	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
220	22	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
270	27	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
330	33	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
390	39	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
470	47	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
560	56	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
680	68	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
820	82	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
101	100pF	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
121	120	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
151	150	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
181	180	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
221	220	L	L	L	L	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
271	270			L		N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
331	330					N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
391	390			L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
471	470			L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
561	560					N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
681	680					N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
821	820					N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
102	1000pF					N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
122	1200										X	X	X	X	X	B	B	B	B	B
152	1500										X	X	X	X	X	B	B	B	B	B
182	1800										X	X	X	X	X	B	B	B	B	B
222	2200										X	X	X	X	X	B	B	B	B	B
272	2700										X	X	X	X		D	D	D	D	D
332	3300										X	X	X	X		D	D	D	D	D
392	3900										X	X	X	X		D	D	D	D	D
472	4700										X	X	X	X		D	D	D	D	D
562	5600										X	X	X	X		D	D	D	D	D
682	6800										X	X	X	X		D	D	D	D	D
822	8200										X	X	X	X		D	D	D	D	D
103	0.01uF										X	X	X	X		D	D	D	D	D
123	0.012															T/D	T/D	T/D	D	D

Multilayer Ceramic Chip Capacitor

Dielectric		NPO																										
EIA	Size	1206					1210					1808			1812					2220			2225					
Code	VDCW	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V	25V	50V	100V	25V	50V	100V
104	0.10μF	G/P	G/P	G/P	G/P										M	M	M	M	M	M	M	M	M	M	M	K	K	M

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

Capacitance & Voltage (X7R)

Dielectric		X7R																						
EIA	Size	0201					0402					0603					0805							
Code	VDCW	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V
101	100pF			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
121	120			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
151	150			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
181	180			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
221	220			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
271	270			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
331	330			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
391	390			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
471	470			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
561	560			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
681	680			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
821	820			L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
102	1000pF	L	L	L	L	L		N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
122	1200	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
152	1500	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
182	1800	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
222	2200	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
272	2700	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
332	3300	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
392	3900	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
472	4700	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
562	5600	L	L	L	L			N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
682	6800	L	L	L				N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
822	8200	L	L	L				N	N	N	N	N		S	S	S	S	S		B	B	B	B	B
103	0.01μF	L	L	L	L		N	N	N	N	N		S	S	S	S	S	S		B	B	B	B	B
123	0.012							N	N	N	N	N/E		S	S	S	S	X		B	B	B	B	B
153	0.015							N	N	N	N	N/E		S	S	S	S	X		B	B	B	B	B
183	0.018							N	N	N	N	N/E		S	S	S	S	X		B	B	B	B	B
223	0.022		L	L			N	N	N	N	N/E		S	S	S	S	X		B	B	B	B	B	
273	0.027							N	N	N	N	N/E		S	S	S	S	X		B	B	B	B	D
333	0.033							N	N	N	N	N/E		S	S	X	X	X		B	B	B	B	D
393	0.039							N	N	N	N	N/E		S	S	X	X	X		B	B	B	B	D
473	0.047							N	N	N	N	N/E		S	S	X	X	X		B	B	B	B	D
563	0.056							N	N	N	N	E		S	S	X	X	X		B	B	B	B	D
683	0.068							N	N	N	N	E		S	S	X	X	X		B	B	B	B	D
823	0.082							N	N	N	N	E		S	S	X	X	X		B	B	B	B/D	D
104	0.10μF						N	N	N	N	N	E		S	S	X	X	X		B	B	B	B/D	D
124	0.12													S	S	X				B	B	B	D	I
154	0.15													S	S	X	X			D	D	D	D	I
184	0.18													S	S	X				D	D	D	D	I
224	0.22						N	N	N	N				S	S	X	X			D	D	D	D/I	I
274	0.27												X	X	X	X			D	D	D	D	I	I
334	0.33												X	X	X	X	X			D	D	D	I	I
394	0.39												X	X	X	X				D	D	D	I	I
474	0.47						N	N					X	X	X	X	X			D	D	D	I	I
564	0.56												X	X	X					D	D	D	I	
684	0.68												X	X	X					D	D	D	I	
824	0.82												X	X	X					D	D	D	I	
105	1.0μF						N						X	X	X	X	X			D	D	D	I	
155	1.5																			I	I	I		
225	2.2												X	X	X					I	I	I	I	
335	3.3																							
475	4.7												X							I	I	I	I	
106	10																			I	I	I		

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

■"*" Means M tolerance only.

Multilayer Ceramic Chip Capacitor

Capacitance & Voltage (X7R)

Dielectric		X7R																							
EIA	Size	1206						1210						1812					2220			2225			
Code	VDCW	6.3V	10V	16V	25V	35V	50V	100V	6.3V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V	25V	50V	100V
101	100 pF				B		B	B																	
121	120				B		B	B																	
151	150		B	B	B		B	B																	
181	180		B	B	B		B	B																	
221	220		B	B	B		B	B			C	C	C												
271	270		B	B	B		B	B			C	C	C			D	D	D							
331	330		B	B	B		B	B			C	C	C			D	D	D							
391	390		B	B	B		B	B			C	C	C			D	D	D							
471	470		B	B	B		B	B			C	C	C			D	D	D							
561	560		B	B	B		B	B			C	C	C			D	D	D							
681	680		B	B	B		B	B			C	C	C			D	D	D							
821	820		B	B	B		B	B			C	C	C			D	D	D							
102	1000pF	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
122	1200	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
152	1500	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
182	1800	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
222	2200	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
272	2700	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
332	3300	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
392	3900	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
472	4700	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
562	5600	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
682	6800	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
822	8200	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
103	0.01μF	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
123	0.012	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
153	0.015	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
183	0.018	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
223	0.022	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
273	0.027	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
333	0.033	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
393	0.039	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
473	0.047	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
563	0.056	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
683	0.068	B	B	B			B	B			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
823	0.082	B	B	B			B	D			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
104	0.10μF	B	B	B			B	D			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
124	0.12	B	B	B			B	D			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
154	0.15	C	C	C			C	G			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
184	0.18	C	C	C			C	G			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
224	0.22	C	C	C			C	G			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
274	0.27	C	C	C			D	G			C	C	C	C	D	D	D	D	D	K	K	K	K	K	K
334	0.33	C	C	C			D	G			C	C	C	D	G	D	D	D	D	K	K	K	K	K	K
394	0.39	C	C	D			P	G			C	C	C	D	M	D	D	D	D	K	K	K	K	K	K
474	0.47	J	J	D/J			P	G			C	C	C	D	M	D	D	D	D	K	K	K	K	K	K
564	0.56	J	J	D/J			P	P			D	D	D	D	M	D	D	D	D	K	K	K	K	K	K
684	0.68	J	J	D/J			P	P			D	D	D	D	K	D	D	D	D	K	K	K	K	K	K
824	0.82	J	J	D/J			P	P			D	D	D	D	K	D	D	D	D	K	K	K	K	K	K
105	1.0μF	J	J	J			P	P			D	D	D	D	K	D	D	D	D	K	K	K	K	K	K
125	1.2				P		P	G/P					P	P/M	K/M				D	D	D	K	K	K	K
155	1.5	J	J	J	P		P	G/P			G	G	M	M					D	D	D	K	K	K	K
185	1.8				P		P	P					M	M					G	G	G	K	K	K	K
225	2.2	J	J	J	P		P	P			G	G/M	M	M					G	G	G	K	K	K	K
275	2.7												M	M					K	K	K	K	K	K	K
335	3.3		P	P	P						G	G/M	M	M					K	K	K	K	K	K	K
395	3.9												M	M	M					K	K	K	K	K	K
475	4.7	P	P	P	P		P				K	K	K/M	K/M	M				M	M	M	K	K	K	K
565	5.6												M	M					M	M		K	K	K	K
685	6.8												M	M					M	M		K	K	K	K
825	8.2												M	M					M	M		M	M	M	M
106	10	P	P	P	P	P					K	K	K/M	M					M	M		M	M	M	M
126	12																		M			U	U		K/M
156	15																		M			U	U		K/M
186	18																		M			U	U		
226	22	P	P	P*							M	M	M						M			U	U		
276	27																			U					

Multilayer Ceramic Chip Capacitor

Dielectric		X7R																								
EIA	Size	1206						1210						1812						2220			2225			
Code	VDCW	6.3V	10V	16V	25V	35V	50V	100V	6.3V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V	25V	50V	100V	
336	33																									
396	39																									
476	47								M	M																

■ The letter in cell is expressed the symbol of product thickness
■ "*" Means M tolerance only.

Capacitance & Voltage (X5R)

Dielectric		X5R																																		
EIA	Size	0201					0402					0603					0805					1206					1210									
Code	VDCW	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	35V	50V				
101	100 pF			L	L	L																														
150	151			L	L	L																														
220	221			L	L	L																														
330	331			L	L	L																														
470	471			L	L	L																														
680	681			L	L	L																														
102	1000pF	L	L	L	L	L																														
152	1500	L	L	L																																
222	2200	L	L	L																																
332	3300	L	L	L																																
472	4700	L	L	L																																
682	6800	L	L	L																																
103	0.01µF	L	L	L	L	L																														
153	0.015	L	L													N																				
223	0.023	L	L													N	N																			
273	0.027															N																				
333	0.033	L	L													N	N																			
393	0.039															N																				
473	0.047	L	L													N	N	N																		
563	0.056	L	L													N	N	N																		
683	0.068	L	L													N	N	N																		
823	0.082															N	N	N																		
104	0.10µF	L	L	L	L	L										N	N	N	N	E												S				
154	0.15															N	N	N	N																	
224	0.22															N	N	N	N	N	X	X	X	X	X											
274	0.27																				X	X	X													
334	0.33	L														N	N	N			X	X	X	X												
394	0.39																				X	X	X													
474	0.47	L														N	N	N/E	E	E	X	X	X	X	X											
684	0.68															N	N				X	X	X	X												
824	0.82																				X	X	X													
105	1.0µF	L*	L*	L*												N	N	N	N	E	X	X	X	X	X							D D D I P				
155	1.5																				X	X											I I I I I J J K K			
225	2.2	L*	L*													N	N	E	E	X	X	X	X	X*	I	I	I	I	I	J	J	P	P	K	K	
335	3.3																				X	X													I I I I I P P P P P K K K	
475	4.7															E	E			X	X	X*	X*		I	I	I	I	I	P	P	P	P	P	K K K	
685	6.8																																			P P
106	10µF															E*	E*			X	X	X	X*		I	I	I	I	I	P	P	P	P	P	K K K K M M	
226	22															E*				X*	X*				I	I*	I*	I*	P	P	P	P			M M M M M	
476	47																			X*					I*	I*		P	P	P*					M M M M*	
107	100																											P*							M* M* M*	
227	220																																		M*	

■ The letter in cell is expressed the symbol of product thickness
■ "*" Means M tolerance only.

Multilayer Ceramic Chip Capacitor

Environmental Characteristics

Size	0201, 0402, 0603, 0805, 1206, 1210, 1812, 2220, 2225		
Dielectric	NPO	X7R	X5R
Capacitance*	0.1pF~0.1μF	100pF~47μF	27nF~100μF
Capacitance tolerance	B(±0.1pF), C(±0.25pF), D(±0.5pF) F(±1%),G(±2%), J(±5%), K(±10%)	J (± 5%) K (±10%) M(±20%)	
Rated voltage (VDCW)	10V,16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V, 35V, 50V, 100V	
Q*	Cap<30pF: Q≥400 +20C Cap≥30pF: Q≥1000	Note 1	
Insulation resistance at Ur**	≥ 10GΩ or R×C≥ 500Ω×F Whichever is less		
Operating temperature	-55 to +125°C		-55 to 85°C
Capacitance change	±30 ppm	±15%	
Termination	Cu/Ni/Sn (lead-free termination)		

■**Measured at the condition of 30~70% related humidity

■NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap≤1000pF and 1.0±0.2Vrms, 1.0 KHz±10% for Cap>1000pF, 25°C ambient temperature

■X7R: Apply 1.0±0.2Vrms, 1.0KHz±10% at the condition of 25°C ambient temperature

■Preconditioning for Class II MLCC : Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.

Note 1:

X7R / X5R

Rated Vol.	D.F.	Exception of D.F.	
≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF
		≤ 3.5%	1206 ≥ 0.47μF; 1812 ≥ 4.7μF; 1825 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF
		≤ 5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 ≥ 1μF; 1210 ≥ 2.2μF
		≤ 10%	0805 > 0.22μF; 1210 ≥ 3.3μF
50V	≤ 2.5%	≤ 3%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF
		≤ 3.5%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF; 1210 ≥ 2.2μF; 1812 ≥ 4.7μF; 2220 ≥ 4.7μF; 2225 ≥ 4.7μF
		≤ 5%	0201 ≥ 0.01μF; 1210 ≥ 3.3μF
		≤ 10%	0402 ≥ 0.012μF; 0603 > 0.1μF; 0805 ≥ 1μF; 0805/X7R > 0.47μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
		≤ 12.5%	1206 = 10μF
35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
25V	≤ 3.5%	≤ 5%	0201 = 0.01μF; 0201/X7R ≥ 0.01μF; 0805 ≥ 1μF; 1210/X7R ≥ 10μF
		≤ 7%	0603 ≥ 0.33μF
		≤ 10%	0201 > 0.01μF; 0201/X7R ≥ 0.1μF; 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 10μF
		≤ 12.5%	0402 ≥ 0.47μF; 0805 = 10μF
16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF
		≤ 10%	0201 ≥ 0.01μF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.22μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF
10V	≤ 5.0%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.22μF; 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF
		≤ 12.5%	0805 = 10μF
		≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF
6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF; 1210 ≥ 100μF
		≤ 20%	0402 ≥ 2.2μF
4V	≤ 15%	-	-

Capacitance & Voltage (NPO 200V~6KV)

Dielectric		NPO																											
EIA	Size	1812								2220								2225											
Cod e	VDCW	200	250	500	1000	1500	2000	3000	4000	200	250	500	630	1000	1500	2000	3000	4000	200	250	500	630	1000	1500	2000	3000	4000		
0R5	0.5pF																												
1R0	1.0																												
1R2	1.2																												
1R5	1.5																												
1R8	1.8																												
2R2	2.2																												
2R7	2.7																												
3R3	3.3																												
3R9	3.9																												
4R7	4.7																												
5R6	5.6																												
6R8	6.8																												
8R2	8.2																												
100	10pF	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
120	12	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
150	15	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
180	18	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
220	22	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
270	27	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
330	33	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
390	39	D	D	D	D	D	D	D	D*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
470	47	D	D	D	D	D	D	D	D*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
560	56	D	D	D	D	D	D	D	D	G*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
680	68	D	D	D	D	D	D	D	D	G*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
820	82	D	D	D	D	D	D	D	D	K*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
101	100pF	D	D	D	D	D	D	D	D	K*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
121	120	D	D	D	D	D	D	D	D	M*	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K*		
151	150	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K*		
181	180	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K*		
221	220	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K*		
271	270	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K*		
331	330	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K*		
391	390	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	K*		
471	470	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	K*		
561	560	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	K*		
681	680	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	K*		
821	820	D	D	D	D	D	D	D	D	M	K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	K*		
102	1000pF	D	D	D	D	D	D	D	D	M	K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	M*		
122	1200	D	D	D	D	D	D	D	D	U/R	K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
152	1500	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
182	1800	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
222	2200	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
272	2700	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	M		
332	3300	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K	M		
392	3900	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
472	4700	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
562	5600	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
682	6800	D	D	D	D	D	D	D	D		K	K	K	K	K	K	K	K	K	K		K	K	K	K	K			
822	8200	D	D	D	D	D	D	D	D		K	K	K	K	K	M						K	K	K	K	M	M		
103	0.01uF	D	D	D							K	K	K	K	M							K	K	K	K	M	M		
123	0.012	G	G	G							K	K	K	K								K	K	K	K				
153	0.015	G	G	G							K	K	K	K								K	K	K	K				
183	0.018	K	K	K							K	K	K	K								K	K	K	K				
223	0.022	K	K	K							K	K	K	K								K	K	K	K				
273	0.027	M	M								K	K	K	K								K	K	K	K				
333	0.033										K	K	K	K								K	K	K	K				
393	0.039										K	K	M	K								K	K	K	K				
473	0.047										M	M	M	K								K	K	K	K				
563	0.056										M	M		M								M	M	M	M				
683	0.068										M	M		U								M	M	M	M				
823	0.082													U								M	M	M					
104	0.10uF													U								M	M						

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

■ "*" Surface coating only.

Multilayer Ceramic Chip Capacitor

Capacitance & Voltage (X7R 200V~5KV)

Dielectric		X7R																													
EIA	Size	0603						0805						1206						1210						1808					
Cod e	VDCW	200 250	200	250	500	630	1000	200 250	400 450	500 630	1000	1500	2000	2500	200	250	400 450	500 630	1000	1500	2000	500 630	1000	1500	2000	3000	4000				
101	100pF	X	B	B	B	B	B	D		D	D	D	D	D	D	D	D	D	D	D	D										
121	120	X	B	B	B	B	B	D		D	D	D	D	D	D	D	D	D	D	D	D										
151	150	X	B	B	B	B	B	D		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K*				
181	180	X	B	B	B	B	B	D		D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K*				
221	220	X	B	B	B	B	B	D		D	D	D	D	D	C	C		D	D	D	D/G	D	D	D	D	D	K*				
271	270	X	B	B	B	B	B	D		D	D	D	D	D	C	C		D	D	D	D/G	D	D	D	D	D	K*				
331	330	X	B	B	B	B	B	D		D	D	D	D	D	C	C		D	D	D	D/G	D	D	D	D	D	K*				
391	390	X	B	B	B	B	B	D		D	D	D	D	D	C	C		D	D	D	D/G	D	D	D	D	D	K*				
471	470	X	B	B	B	B	B	D		D	D	D	D	D	C	C		D	D	D	D/G	D	D	D	D	D	K*				
561	560	X	B	B	B	B	B	D		D	D	D	D	D	C	C		D	D	D	D/G	D	D	D	D	D	K*				
681	680	X	B	B	B	B	B	D		D	D	D	D	D*	C	C		D	D	D	D/G	D	D	D	D	D	K*				
821	820	X	B	B	B	B	B	D		D	D	D	D	D*	C	C		D	D	D	D/G	D	D	D	D	D	K*				
102	1000pF	X	B	B	B	B	B	D		D	D	D	B/D	D*	C	C		D	D	D	D/G	D	D	D	D/G	D	K*				
122	1200	X	B	B	B	B	B	D		D	D	D/G	G	G*	C	C		D	D	M	D/G	D	D	D	K	K	K				
152	1500	X	B	B	B	B	D	D		D	D	D/G	G	G*	C	C		D	D	M	K	D	D	D	K	K	K				
182	1800	X	B	B	B	B	D	D		D	D	D/G	G	G*	C	C		D	D	M	K	D	D	D	K	K	K				
222	2200	X	B	B	B	B	D	D		D	D	D/G	G	G*	C	C		D	D	M	K	D	D	D	K	K	K				
272	2700	X	B	B	B	B	D	D		D	D	D/G	G	G*	C	C		D	D	M	M	D	D	D	K	K	K				
332	3300	X	B	B	B	B	D	D		D	D	D/G	G	G*	C	C		D	D	M	M	D	D	D	K	K	K				
392	3900	X	B	B	B	B	D	D		D	D	D/G		G*	C	C		D	G	M	M	D	D	D	K	K	K*				
472	4700	X	B	B	D	D	D	D		D	D	D/G		G*	C	C		D	G	K/M	G/K/M	D	D	D	K	K	K*				
562	5600	X	B	B	D	D	D	D		D	D	D/G		C	C		D	G	M	M*	K	K	K	K	K	K*					
682	6800	X	B	B	D	D	D	D		D	D	D/G*		C	C		D	G	M	M*	K	K	K	K	K	K*					
822	8200	X	B	B	D	D	D	D		D	D	D/G*		C	C		D	G	M	M*	K	K	K*	K*	K*	K*					
103	0.010μF	X	D	D	D	D	D	D		D	D	D/G*		C	C		D	G	M	M*	K	K	K*	K*	K*	K*					
123	0.012		D	D	D	D		D		D	G			C	C		D	G	M		K	K									
153	0.015		D	D	D	D		D		D	G			C	C		D	G	M		K	K									
183	0.018		D	D	D	D		D		D	G			C	C		D	G	M		K	K									
223	0.022		D	D	D	D		D		D	G	G		C	C		D	G	M		K	K									
273	0.027		D	D	D	D		D		D	G			C	C		G	G	M		K	K									
333	0.033		D	D	D			G		G				C	C		G	G	M		K	K									
393	0.039		D	D				G		G				C	C		G	K			K	K									
473	0.047		D	D				G		G				D	D		G	M			K	K									
563	0.056		D	D				G		G				D	G		G				K	K									
683	0.068		D	D				G	G					G	G		G/K				K										
823	0.082		D					G	G					G	G		K				K										
104	0.10μF		D					G	G					G	G		K														
124	0.12							G						G	G	M	M														
154	0.15							G						M	M	M	M														
184	0.18							G						M	M	M															
224	0.22							G						M	M	M															
274	0.27													M	M	M															
334	0.33													M	M	M															
394	0.39													M	M																
474	0.47													M	M																
564	0.56													M	M																
684	0.68													M	M																
824	0.82																														
105	1uF																														

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

■ "*" Surface coating only.

Capacitance & Voltage (X7R 200V~5KV)

Dielectric	EIA	Size	X7R																														
			1812								2220								2225														
Cod e	VDCW	200 250	450	500	630	1000	1500	2000	3000	3500	4000	200	250	500	630	1000	1500	2000	3000	4000	5000	200	250	500	630	1000	1500	2000	3000	4000	5000		
101	100pF																																
121	120																																
151	150																				D*												
181	180																				D*												
221	220																				D*												
271	270	D	D	D	D	D	D	D	K	D*	K*																				K*	K*	
331	330	D	D	D	D	D	D	D	K	D*	K*																				K*	K*	
391	390	D	D	D	D	D	D	D	K	D*	K*																				K*	K*	
471	470	D	D	D	D	D	D	D	K	D*	K*																				G	K*	K*
561	560	D	D	D	D	D	D	D	K	D*	K*																					K*	K*
681	680	D	D	D	D	D	D	D	K	D*	K*																					K*	K*
821	820	D	D	D	D	D	D	D	K	D*	K*																					K*	K*
102	1000pF	D	D	D	D	D	D	D	K	D*	K*	K	K	K	K	K	K	K	K	K	K*	K*	K	K	K	K	K	K	K	K	K	K*	K*
122	1200	D	D	D	D	D	D	D	K	D*	M*	K	K	K	K	K	K	K	K	M*	K*	K	K	K	K	K	K	K	K	K	M*	K*	
152	1500	D	D	D	D	D	D	D	K	D*	M*	K	K	K	K	K	K	K	K	M*	K*	K	K	K	K	K	K	K	K	K	M*	K*	
182	1800	D	D	D	D	D	D	D	M	D*	M*	K	K	K	K	K	K	K	K	M*	K*	K	K	K	K	K	K	K	K	K	M*	K*	
222	2200	D	D	D	D	D	D	D	M*	G*		K	K	K	K	K	K	K	K*		K*	K	K	K	K	K	K	K	K	K*		K*	
272	2700	D	D	D	D	D	D	D	M*	G*		K	K	K	K	K	K	K	K*		K*	K	K	K	K	K	K	K	K	K*		K*	
332	3300	D	D	D	D	D	K	K	M*	G*		K	K	K	K	K	K	K	K*		K*	K	K	K	K	K	K	K	K	K*		K*	
392	3900	D	D	D	D	D	K	K	M*	M*		K	K	K	K	K	K	K	K*		K*	K	K	K	K	K	K	K	K	K*		K*	
472	4700	D	D	D	D	D	K	K	M*	M*		K	K	K	K	K	K	K	K*		K/M*	K	K	K	K	K	K	K	K	K*		K/M*	
562	5600	D	D	D	D	D	M	M		M*		K	K	K	K	K	K	K	K*			K	K	K	K	K	K	K	M*				
682	6800	D	D	D	D	D	M	M		M*		K	K	K	K	K	K	K	M*			K	K	K	K	K	K	K	M*				
822	8200	D	D	D	D	D	M	M		M*		K	K	K	K	K	M	M	M*			K	K	K	K	K	K	K	M*				
103	0.010μF	D	D	D	D	D	G/K/M	G/K/M		M*		K	K	K	K	K	K/M	K/M	M*			K	K	K	K	K	K	K	M*				
123	0.012	D	D	D	D	K	G/K/M	M				K	K	K	K	K	M	M	U*			K	K	K	K	K	M	M	M*				
153	0.015	D	D	D	D	K	G/K/M	M				K	K	K	K	K	M	M	U*			K	K	K	K	K	M	M	M*				
183	0.018	D	D	D	D	M	G/K/M	M				K	K	K	K	K	U	U	U*			K	K	K	K	K	M	M	U*				
223	0.022	D	D	D	D	M	K/M	M				K	K	K	K	K	U	M/U				K	K	K	K	K	K/M	K/M	K*				
273	0.027	D	D	D	D	M						K	K	K	K	K	U	M/U				K	K	K	K	K	M	M					
333	0.033	D	D	D	D	M						K	K	K	K	K	U	U				K	K	K	K	K	M	M					
393	0.039	D	D	D	D	M						K	K	K	K	K	U	U				K	K	K	K	K	M	U					
473	0.047	D	D	D	D	M/K						K	K	K	K	K	U	U				K	K	K	K	K	M	U					
563	0.056	D	K	K	K	M						K	K	K	K	K	U	U				K	K	K	K	K	M	U					
683	0.068	D	K	K	K	M						K	K	K	K	K						K	K	K	K	K	M						
823	0.082	D	K	K	K	M						K	K	K	K	K						K	K	K	K	K	M						
104	0.10μF	D	K	K	K	M						K	K	K	K	K/M						K	K	K	K	M	M						
124	0.12	D	M	M	M							K	K	K	K	K/M						K	K	K	K	U							
154	0.15	K	M	M	M							K	K	K	K	U						K	K	K	K	U							
184	0.18	K	M	M	M							K	K	K	K	U						K	K	K	K	U							
224	0.22	K	M	M	M							K	K	K	K	U						K	K	K	K	U							
274	0.27	K	M	M								K	K	K	K							K	K	K	K	K/M/U							
334	0.33	K	M	M								K	K	K	K							K	K	K	K	K/M/U							
394	0.39	K	M	M								K	K	K	K							K	K	K	K								
474	0.47	K	M	M								K	K	K	K							K	K	K	K								
564	0.56	M	M									K	K	M	M							K	K	K	K								
684	0.68	M	M									K	K	M	M							K	K										
824	0.82	M	U									K	K	U	U							K	K										
105	1uF	M	U									K	K	U	U							K	K										
125	1.2											M	M									M	M										
155	1.5											M	M									M	M										
185	1.8											M	M									M	M										
225	2.2											M	M									M	M										
275	2.7																					M	M										

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

■ "*" Surface coating only.

Multilayer Ceramic Chip Capacitor

Electrical data

Dielectric	NPO	X7R
Size	0402,0603,0805,1206,1210,1808,1812,2220,2225	
Capacitance*	0.5pF~0.01μF	100pF~1.0μF
Capacitance tolerance	Reference to Part Numbering	Reference to Part Numbering
Rated voltage (VDCW)	200V to 5KV	
DF/Q	Cap<30pF: Q ≥ 400 +20C Cap ≥ 30pF: Q ≥ 1000	DF ≤ 2.5%
Insulation resistance at Ur	≥10GΩ or RxC ≥ 500Ω-F, whichever is smaller	≥10GΩ or RxC ≥ 100Ω-F, whichever is smaller
Dielectric Strength	200~300V: ≥ 2xVDCW 500~999V: ≥ 1.5xVDCW 1000~3000V: ≥ 1.2xVDCW	
Operating temperature	-55 to +125°C	
Capacitance change	±30 ppm	±15%
Termination	Cu/Ni/Sn (lead-free termination)	

■ Measured at the condition of 30~70% related humidity

■ NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap ≤ 1000pF and 1.0±0.2Vrms, 1.0KHz±10% for Cap > 1000pF, 25°C ambient temperature

■ X7R: Apply 1.0±0.2Vrms, 1.0KHz±10% at the condition of 25°C ambient temperature

■ Preconditioning for X7R: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement

Multilayer Ceramic Chip Capacitor

■ Ultra High Q & Low ESR Capacitors for MCRF Series

Capacitance & Voltage

Dielectric		NPO														
EIA	Size	0201				0402				0603			0805			
Code	VDCW	6.3V	10V	25V	50V	25V	50V	100V	200V	50V	100V	250V	50V	100V	250V	500V
0R1	0.1pF	L	L	L	L	N	N	N	N							
0R2	0.2	L	L	L	L	N	N	N	N							
0R3	0.3	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
0R4	0.4	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
0R5	0.5	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
0R6	0.6	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
0R7	0.7	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
0R8	0.8	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
0R9	0.9	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
1R0	1.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
1R2	1.2	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
1R5	1.5	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
1R8	1.8	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
2R0	2.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
2R2	2.2	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
2R7	2.7	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
3R0	3.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
3R3	3.3	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
3R9	3.9	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
4R0	4.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
4R7	4.7	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
5R0	5.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
5R6	5.6	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
6R0	6.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
6R8	6.8	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
7R0	7.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
8R2	8.2	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
9R0	9.0	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
100	10	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
110	11	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
120	12	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
130	13	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
150	15	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
160	16	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
180	18	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
200	20	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
220	22	L	L	L		N	N	N	N	S	S	S	T	T	T	T
240	24	L	L	L		N	N	N	N	S	S	S	T	T	T	T
270	27	L	L	L		N	N	N	N	S	S	S	T	T	T	T
300	30	L	L	L		N	N	N	N	S	S	S	T	T	T	T
330	33	L	L	L		N	N	N		S	S	S	T	T	T	T
360	36					N	N	N		S	S	S	T	T	T	T
390	39					N	N	N		S	S	S	T	T	T	T
430	43					N	N	N		S	S	S	T	T	T	T
470	47					N	N	N		S	S	S	T	T	T	T
560	56					N				S	S	S	T	T	T	T
680	68					N				S	S	S	T	T	T	T
820	82					N				S	S	S	T	T	T	T
101	100					N				S	S	S	T	T	T	T

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

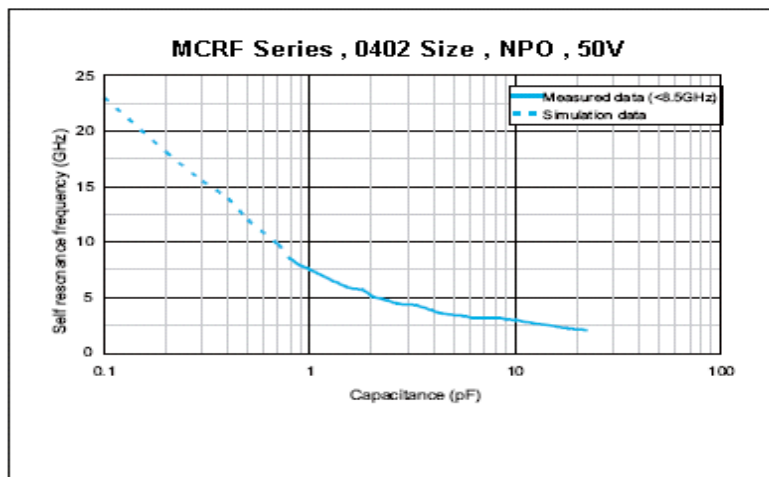
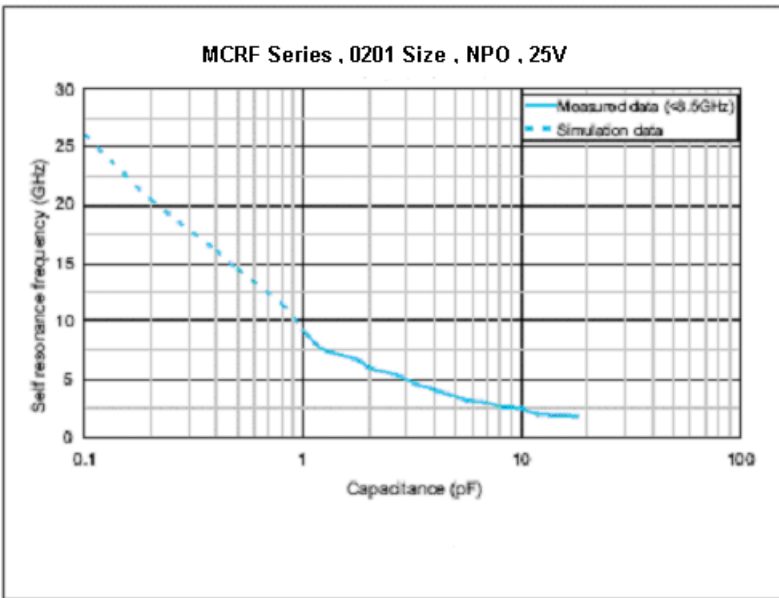
Multilayer Ceramic Chip Capacitor

Electrical Data

Dielectric	NPO
Size	0201, 0402, 0603, 0805
Capacitance*	0201: 0.1pF ~ 33pF, 0402: 0.1pF ~ 100pF 0603: 0.3pF ~ 100pF, 0805: 0.3pF ~ 100pF
Capacitance tolerance**	Cap ≤ 5pF: A(±0.05pF), B(±0.1pF), C(±0.25pF) 5pF < Cap < 10pF: B(±0.1pF), C(±0.25pF), D(±0.5pF) Cap ≥ 10pF: F(±1%), G(±2%), J(±5%)
Rated voltage (VDCW)	6.3V, 10V, 25V, 50V, 100V, 250V, 500V
Q *	Cap ≥ 30pF: Q ≥ 1000, Cap < 30pF: Q ≥ 400+20C;
Insulation resistance at Ur	≥ 10GΩ
Operating temperature	-55 to +125°C
Capacitance	±30 ppm; 0201 Cap ≥ 22pF, ±60 ppm
Termination	Ni/Sn (lead-free termination)

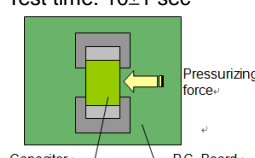
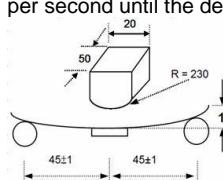
- **Measured at the conditions of 25°C ambient temperature and 30~70% related humidity
- Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap ≤ 1000pF; 1.0KHz±10% for Cap > 1000pF

Electrical characteristics



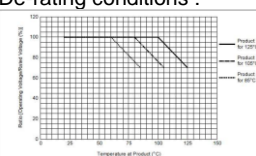
Environmental Characteristics

Item	Requirement	Test Method																																																														
External Appearance	No defects which may affect performance	Visual inspection & Dimension measurement																																																														
Capacitance(Cap.)	Within the specified tolerance that refers on page2	NPO: (Class I) Cap≤ 1000pF 1.0±0.2Vrms, 1MHz±10% Cap>1000pF 1.0±0.2Vrms, 1KHz±10%																																																														
Dissipation Factor (D.F.) or Quality factor (Q=1/D.F.)	<p>NPO: Cap≥ 30pF, Q≥ 1000; Cap<30pF, Q≥ 400+20C X7R, X5R:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th> <th>D.F.≤</th> <th colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="4">≥100V</td> <td rowspan="4">≤2.5%</td> <td>≤3%</td> <td>1206≥0.47μF</td> </tr> <tr> <td>≤3.5%</td> <td>1206≥0.47μF; 1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤5%</td> <td>0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805>0.22μF; 1210≥3.3μF</td> </tr> <tr> <td rowspan="5">50V</td> <td rowspan="5">≤2.5%</td> <td>≤3%</td> <td>0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤3.5%</td> <td>0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF; 1210≥2.2μF; 1812≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td> </tr> <tr> <td>≤5%</td> <td>0201≥0.01μF; 1210≥3.3μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.012μF; 0603>0.1μF; 0805≥1μF; 0805/X7R>0.47μF; 1210≥10μF</td> </tr> <tr> <td>≤12.5%</td> <td>1206=10μF</td> </tr> <tr> <td>35V</td> <td>≤3.5%</td> <td>≤10%</td> <td>0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <td>≤5%</td> <td>0201=0.01μF; 02011/X7R≥0.01μF; 0805≥1μF; 12101/X7R</td> </tr> <tr> <td>≤7%</td> <td>0603≥0.33μF</td> </tr> <tr> <td>≤10%</td> <td>0201>0.01μF; 0201/X7R≥0.1μF; 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤12.5%</td> <td>0402≥0.47μF; 0805=10μF</td> </tr> <tr> <td>≤5%</td> <td>0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td rowspan="3">10V</td> <td rowspan="3">≤5.0%</td> <td>≤10%</td> <td>0201≥0.01μF(0201/X7R≥0.022μF); 0402≥0.22μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td>≤12.5%</td> <td>0805=10μF</td> </tr> <tr> <td>≤15%</td> <td>0201≥0.1μF; 0402≥1μF; 0603≥10μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td rowspan="2">≤10%</td> <td>≤15%</td> <td>0201≥0.1μF; 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 120647μF; 1210≥100μF</td> </tr> <tr> <td>≤20%</td> <td>0402≥2.2μF</td> </tr> <tr> <td>4V</td> <td>≤15%</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Rated vol.	D.F.≤	Exception of D.F. ≤		≥100V	≤2.5%	≤3%	1206≥0.47μF	≤3.5%	1206≥0.47μF; 1812≥4.7μF; 1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤5%	0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF	≤10%	0805>0.22μF; 1210≥3.3μF	50V	≤2.5%	≤3%	0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF	≤3.5%	0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF; 1210≥2.2μF; 1812≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤5%	0201≥0.01μF; 1210≥3.3μF	≤10%	0402≥0.012μF; 0603>0.1μF; 0805≥1μF; 0805/X7R>0.47μF; 1210≥10μF	≤12.5%	1206=10μF	35V	≤3.5%	≤10%	0603≥1μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	25V	≤3.5%	≤5%	0201=0.01μF; 02011/X7R≥0.01μF; 0805≥1μF; 12101/X7R	≤7%	0603≥0.33μF	≤10%	0201>0.01μF; 0201/X7R≥0.1μF; 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥10μF	16V	≤3.5%	≤12.5%	0402≥0.47μF; 0805=10μF	≤5%	0201≥0.01μF; 0402≥0.033μF; 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF	10V	≤5.0%	≤10%	0201≥0.01μF(0201/X7R≥0.022μF); 0402≥0.22μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF	≤12.5%	0805=10μF	≤15%	0201≥0.1μF; 0402≥1μF; 0603≥10μF	6.3V	≤10%	≤15%	0201≥0.1μF; 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 120647μF; 1210≥100μF	≤20%	0402≥2.2μF	4V	≤15%	-	-	<p>X7R, X5R: (Class II) Cap≤10uF 1.0±0.2Vrms, 1KHz±10%** Cap>10uF 0.5±0.2Vrms, 120Hz±10%</p> <p>** Test condition: 0.5±0.2Vrms , 1KHz±10%</p> <p>X7R: 0805=106(6.3V,10V), 0603/475(6.3V) X5R: 0201 ≥ 224 (6.3V,10V,16V)#1 0402 ≥ 475 (6.3V,16V), 0402 ≥ 225(10V) 0603=106 (6.3V,10V), #1 Excluding X5R/0201/105(6.3V);225(10V), (1.0±0.2Vrms , 1KHz±10%)</p> <p>*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</p>
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Adhesive Strength of Termination	No remarkable damage or removal of the terminations	<p>Pressurizing force: 0201:2N 0402&0603:5N >0603:10N Test time: 10±1 sec</p> 																																																
Resistance to Flexure of Substrate (Substrate bending test)	<p>No remarkable damage.</p> <table border="1"> <thead> <tr> <th>Dielectric</th> <th>Cap. Change</th> </tr> </thead> <tbody> <tr> <td>NPO</td> <td>Within ±5.0% or ±0.5pF, whichever is larger</td> </tr> <tr> <td>X7R, X5R</td> <td>Within ±12.5%</td> </tr> <tr> <td>01R5 X5R</td> <td>Within ±25.0%</td> </tr> </tbody> </table> <p>This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test</p>	Dielectric	Cap. Change	NPO	Within ±5.0% or ±0.5pF, whichever is larger	X7R, X5R	Within ±12.5%	01R5 X5R	Within ±25.0%	<p>The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1mm per second until the deflection becomes 1mm.</p> 																																								
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Vibration Resistance	No remarkable damage Cap change and Q/D.F.: To meet initial spec	<p>Vibration frequency: 10~55Hz/min Total amplitude: 1.5mm Test time: 6hrs.(two hrs each in three mutually Perpendicular directions.) *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</p>																																																
Solderability	75% min. coverage of all metalized area. 95% min. coverage of all metalized area. (for 01R5)	<p>Solder temperature: 235±5°C for (01R5,0201~1210). Solder temperature : 245±5°C for (1808~2225). Dipping time: 2±0.5 sec.</p>																																																
Bending Test	<p>No remarkable damage.</p> <p>Cap change : NPO: within ±5% or 0.5pF whichever is larger X7R, X5R, X6S, X7S: within ±12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</p>	<p>The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. Measurement to be made after keeping at room temp. for 24±2 hrs.</p>																																																

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Resistance to Soldering Heat	No remarkable damage. Cap change: NP0: within $\pm 2.5\%$ or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within $\pm 7.5\%$ Q/D.F., I.R. and dielectric strength: To meet initial requirements. 25% max. leaching on each edge	Solder temperature: 260 \pm 5 $^{\circ}$ C Dipping time: 10 \pm 1 sec Preheating: 120 to 150 $^{\circ}$ C for 1 minute before immerse the capacitor in a eutectic solder. Before initial measurement (Class II only): To apply de-aging at 150 $^{\circ}$ C for 1hr then set for 24 \pm 2 hrs at room temp. Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150 $^{\circ}$ C for 1hr then set for 24 \pm 2 hrs at room temp Measurement to be made after keeping at room temp. for 48 \pm 4 hrs (Class II).															
Temperature Cycle	No remarkable damage. Cap change : NP0: within $\pm 2.5\%$ or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within $\pm 7.5\%$ Q/D.F., I.R. and dielectric strength: To meet initial requirements Q for COG : To meet initial requirements. D.F.(Class II) : $\leq 150\%$ of initial requirement. I.R. : To meet initial requirements.	Conduct the five cycles according to the temperature and time. <table border="1"> <thead> <tr> <th>Step</th> <th>Temp.($^{\circ}$C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp.+0/-3</td> <td>30\pm3</td> </tr> <tr> <td>2</td> <td>Room temp</td> <td>2-3</td> </tr> <tr> <td>3</td> <td>Max. operating temp.+3/-0</td> <td>30\pm3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2-3</td> </tr> </tbody> </table> <p>Before initial measurement (Class II only): To apply de-aging at 150$^{\circ}$C for 1hr then set for 24\pm2 hrs at room temp. Measurement to be made after keeping at room temp. for 48\pm4 hrs (Class II).</p>	Step	Temp.($^{\circ}$ C)	Time(min)	1	Min. operating temp.+0/-3	30 \pm 3	2	Room temp	2-3	3	Max. operating temp.+3/-0	30 \pm 3	4	Room temp.	2-3
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Humidity (steady state)	No remarkable damage. Cap change: NP0: within $\pm 5\%$ or 0.5pF whichever is larger X7R, X5R: $\geq 10V^{**}$, within $\pm 12.5\%$; $\leq 6.3V$ within $\pm 25\%$; $C \geq 1\mu F$, within $\pm 25\%$ **10V: 0603\geq 4.7μF;0402\geq 1μF;0201\geq 0.1μF, within $\pm 25\%$; Q/D.F. value: NP0: More than 30pF Q \geq 350, 10pF $\leq C \leq$ 30pF, Q \geq 275+2.5C Less than 10pF Q \geq 200+10C D.F. : $\leq 200\%$ of initial requirement. I.R.: $\geq 10V$, 1G Ω or 50 Ω -F whichever is smaller. Class II (X7R, X5R,) <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: X7R;1210\geq3.3μF</td> <td rowspan="8">$\geq 1G\Omega$ or RxC\geq10Ω-F Whichever is smaller</td> </tr> <tr> <td>50V: 0402\geq0.01μF;0603\geq1μF;0805\geq1μF; 1206\geq4.7μF;1210\geq4.7μF</td> </tr> <tr> <td>35V: 0603\geq1μF;0805\geq2.2μF; 1206\geq 2.2μF;1210\geq 10μF</td> </tr> <tr> <td>25V: 0201\geq 0.1μF; 0402\geq0.22μF; 0603\geq2.2μF;0805\geq2.2μF; 1206\geq10μF;1210\geq10μF</td> </tr> <tr> <td>16V: 0201\geq0.1μF;0402\geq0.22μF;0603\geq1μF; 0805\geq2.2μF;1206\geq10μF;1210\geq47μF</td> </tr> <tr> <td>10V: 0201\geq47nF;0402\geq0.47μF;0603\geq0.47μF 0805\geq2.2μF;1206\geq4.7μF;1210\geq47μF</td> </tr> <tr> <td>6.3V</td> </tr> </tbody> </table>	Rated Voltage	Insulation Resistance	100V: X7R;1210 \geq 3.3 μF	$\geq 1G\Omega$ or RxC \geq 10 Ω -F Whichever is smaller	50V: 0402 \geq 0.01 μF ;0603 \geq 1 μF ;0805 \geq 1 μF ; 1206 \geq 4.7 μF ;1210 \geq 4.7 μF	35V: 0603 \geq 1 μF ;0805 \geq 2.2 μF ; 1206 \geq 2.2 μF ;1210 \geq 10 μF	25V: 0201 \geq 0.1 μF ; 0402 \geq 0.22 μF ; 0603 \geq 2.2 μF ;0805 \geq 2.2 μF ; 1206 \geq 10 μF ;1210 \geq 10 μF	16V: 0201 \geq 0.1 μF ;0402 \geq 0.22 μF ;0603 \geq 1 μF ; 0805 \geq 2.2 μF ;1206 \geq 10 μF ;1210 \geq 47 μF	10V: 0201 \geq 47nF;0402 \geq 0.47 μF ;0603 \geq 0.47 μF 0805 \geq 2.2 μF ;1206 \geq 4.7 μF ;1210 \geq 47 μF	6.3V	Test temp.: 40 \pm 2 $^{\circ}$ C Humidity: 90~95%RH Test time: 500+24/-0hrs. Before initial measurement (Class II only): To apply de-aging at 150 $^{\circ}$ C for 1hr then set for 24 \pm 2 hrs at room temp. Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150 $^{\circ}$ C for 1hr then set for 24 \pm 2 hrs at room temp. Measurement to be made after keeping at room temp. for 48 \pm 4 hrs (Class II).					
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Humidity load		No remarkable damage. Cap change: NP0: $\pm 7.5\%$ or 0.75pF whichever is larger. X7R/X5R : Within $\pm 12.5\%$ for $\geq 10V^{**}$, within $\pm 25\%$ for 6.3V. **10V : Within $\pm 25\%$ for 0603\geq4.7μF, 0402\geq1μF, 0201\geq0.1μF. Q/D.F. value: NP0: C \geq 30pF,Q \geq 200;C \leq 30pF, Q \geq 100+10/3C X7R: $\leq 7.5\%$ X5R: $\leq 20\%$ I.R.: NP0, X7R: $\geq 500M\Omega$ or RxC $\geq 25\Omega$ -F whichever is smaller. X5R: RxC $\geq 5\Omega$ -F. D.F. : $\leq 200\%$ of initial requirement. I.R.: $\geq 10V$, 500M Ω or 25 Ω -F whichever is smaller.	Test temp. : 40 \pm 2 $^{\circ}$ C Humidity : 90~95%RH Test time : 500+24/-0 hrs. To apply voltage : Rated voltage (MAX. 500V) Before initial measurement (Class II only): To apply de-aging at 150 $^{\circ}$ C for 1hr then set for 24 \pm 2 hrs at room temp. Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150 $^{\circ}$ C for 1hr then set for 24 \pm 2 hrs at room temp. Measurement to be made after keeping at room temp. for 48 \pm 4 hrs (Class II).														

Multilayer Ceramic Chip Capacitor

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<p>High Temperature Load (Endurance)</p>	<p>No remarkable damage. Cap change: NP0: ±3.0% or ±0.3pF whichever is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤ 6.3V within ±25%; TT series & C≥ 1uF, within ±25% **10V: 0603 ≥ 4.7μF;0402 ≥ 1μF;0201 ≥ 0.1μF, within ±25%; Q/D.F. value: NP0: More than 30pF, Q≥350 10pF≤C<30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C</p> <p>D.F.(Class II) : ≤200% of initial requirement. I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.</p> <p>Class II (X7R, X5R,)</p> <table border="1" data-bbox="320 1339 863 1641"> <tr> <th>Rated Voltage</th> <th>Insulation Resistance</th> </tr> <tr> <td>100V: X7R; 1210≥3.3μF</td> <td rowspan="7">500MQ or RxC ≥ 5Ω-F Whichever smaller</td> </tr> <tr> <td>50V: 0402>0.01μF;0603≥1μF;0805≥1μF; 1206≥4.7μF;1210≥4.7μF</td> </tr> <tr> <td>35V: 0603≥1μF;0805≥2.2μF; 1206≥ 2.2μF;1210≥ 10μF</td> </tr> <tr> <td>25V: 0201 ≥ 0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF</td> </tr> <tr> <td>16V: 0201≥0.1μF,0402≥0.22μF;0603≥1μF; 0805≥2.2μF;1206≥10μF;1210≥47μF</td> </tr> <tr> <td>10V: 0201≥47nF;0402≥0.47uF;0603≥0.47uF 0805≥2.2uF;1206≥4.7uF;1210≥47uF</td> </tr> <tr> <td>6.3V</td> </tr> </table>	Rated Voltage	Insulation Resistance	100V: X7R; 1210≥3.3μF	500MQ or RxC ≥ 5Ω-F Whichever smaller	50V: 0402>0.01μF;0603≥1μF;0805≥1μF; 1206≥4.7μF;1210≥4.7μF	35V: 0603≥1μF;0805≥2.2μF; 1206≥ 2.2μF;1210≥ 10μF	25V: 0201 ≥ 0.1uF; 0402≥0.22μF; 0603≥2.2μF;0805≥2.2μF; 1206≥10μF;1210≥10μF	16V: 0201≥0.1μF,0402≥0.22μF;0603≥1μF; 0805≥2.2μF;1206≥10μF;1210≥47μF	10V: 0201≥47nF;0402≥0.47uF;0603≥0.47uF 0805≥2.2uF;1206≥4.7uF;1210≥47uF	6.3V	<p>Test temp. : NP0, X7R: 125±3°C X5R,: 85±3°C To apply voltage: (1) ≤ 6.3V or C ≥ 10μF :150% of rated Voltage. (2) 10V ≤ Ur<50V: 200% of rated voltage. (3) 200V≤Ur≤500V : 150% of rated voltage. (4) =630V: 120% of rated voltage. (5) 100% of rated voltage for below range.</p> <table border="1" data-bbox="1062 819 1522 1200"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated voltage</th> <th>Capacitance range</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0201</td> <td rowspan="2">X5R,X7R</td> <td>≤ 10V</td> <td>C ≥ 0.1uF</td> </tr> <tr> <td>≥ 16V</td> <td>C > 0.1μF</td> </tr> <tr> <td>0402</td> <td>X5R,X7R,</td> <td>6.3V,10V 16V,25V</td> <td>C ≥ 1.0uF</td> </tr> <tr> <td>0603</td> <td>X5R,X7R</td> <td>6.3V,10V 25V,35V</td> <td>C ≥ 4.7uF C ≥ 1.0uF</td> </tr> <tr> <td rowspan="2">0805</td> <td rowspan="2">X5R,X7R</td> <td>4V</td> <td>C ≥ 47μF</td> </tr> <tr> <td>6.3V 10V-50V</td> <td>C ≥ 22uF C ≥ 10uF</td> </tr> <tr> <td rowspan="2">1206</td> <td>X5R,X7R</td> <td>6.3V</td> <td>C ≥ 47uF</td> </tr> <tr> <td>NPO</td> <td>3000V</td> <td>C ≥ 1.5pF</td> </tr> <tr> <td rowspan="2">1210</td> <td>X5R,X7R</td> <td>16V</td> <td>C ≥ 47uF</td> </tr> <tr> <td>X7R</td> <td>100V</td> <td>C ≥ 3.3uF</td> </tr> </tbody> </table> <p>(6) 150% of rated voltage for below range</p> <table border="1" data-bbox="1062 1223 1522 1671"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated voltage</th> <th>Capacitance range</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0201</td> <td>X5R,X7R</td> <td>16V,25V</td> <td>C ≥ 0.1uF</td> </tr> <tr> <td>X7R</td> <td>16V</td> <td>C > 0.022μF</td> </tr> <tr> <td rowspan="2">0402</td> <td rowspan="2">X5R,X7R,</td> <td>50V</td> <td>C ≥ 0.1uF</td> </tr> <tr> <td>10~25V</td> <td>C ≥ 0.022uF</td> </tr> <tr> <td rowspan="2">0603</td> <td>X7R</td> <td>≥50V</td> <td>C ≥ 0.082uF</td> </tr> <tr> <td>X5R,X7R,</td> <td>10V,16V,50V</td> <td>C ≥ 1.0uF</td> </tr> <tr> <td rowspan="2">0805</td> <td>X5R,X7R</td> <td>10V-50V</td> <td>C ≥ 4.7uF</td> </tr> <tr> <td>X5R,X7R</td> <td>50V 100V</td> <td>C ≥ 0.47uF C ≥ 0.12uF</td> </tr> <tr> <td>1206</td> <td>X5R,X7R</td> <td>≥50V</td> <td>C ≥ 1.0uF</td> </tr> <tr> <td rowspan="2">1210</td> <td>X5R,X7R</td> <td>≤100V</td> <td>C ≥ 1.0uF</td> </tr> <tr> <td>X7R</td> <td>>100V</td> <td>C ≥ 0.22uF</td> </tr> <tr> <td rowspan="2">1812</td> <td rowspan="2">X7R</td> <td>≤50V</td> <td>C ≥ 4.7μF</td> </tr> <tr> <td>100V</td> <td>C ≥ 1.0μF</td> </tr> <tr> <td>2220</td> <td rowspan="2">X7R</td> <td rowspan="2">≥100V</td> <td rowspan="2">C ≥ 1.0μF</td> </tr> <tr> <td>2225</td> </tr> </tbody> </table> <p>(7)120% of rated voltage for below range :</p> <table border="1" data-bbox="1062 1715 1522 1783"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated voltage</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>2220</td> <td>X7R</td> <td>≥100V</td> <td>C ≥ 15μF</td> </tr> </tbody> </table> <p>Test time : 1000 +24/-0 hrs. 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De-rating conditions :</p> 	Size	Dielectric	Rated voltage	Capacitance range	0201	X5R,X7R	≤ 10V	C ≥ 0.1uF	≥ 16V	C > 0.1μF	0402	X5R,X7R,	6.3V,10V 16V,25V	C ≥ 1.0uF	0603	X5R,X7R	6.3V,10V 25V,35V	C ≥ 4.7uF C ≥ 1.0uF	0805	X5R,X7R	4V	C ≥ 47μF	6.3V 10V-50V	C ≥ 22uF C ≥ 10uF	1206	X5R,X7R	6.3V	C ≥ 47uF	NPO	3000V	C ≥ 1.5pF	1210	X5R,X7R	16V	C ≥ 47uF	X7R	100V	C ≥ 3.3uF	Size	Dielectric	Rated voltage	Capacitance range	0201	X5R,X7R	16V,25V	C ≥ 0.1uF	X7R	16V	C > 0.022μF	0402	X5R,X7R,	50V	C ≥ 0.1uF	10~25V	C ≥ 0.022uF	0603	X7R	≥50V	C ≥ 0.082uF	X5R,X7R,	10V,16V,50V	C ≥ 1.0uF	0805	X5R,X7R	10V-50V	C ≥ 4.7uF	X5R,X7R	50V 100V	C ≥ 0.47uF C ≥ 0.12uF	1206	X5R,X7R	≥50V	C ≥ 1.0uF	1210	X5R,X7R	≤100V	C ≥ 1.0uF	X7R	>100V	C ≥ 0.22uF	1812	X7R	≤50V	C ≥ 4.7μF	100V	C ≥ 1.0μF	2220	X7R	≥100V	C ≥ 1.0μF	2225	Size	Dielectric	Rated voltage	Capacitance	2220	X7R	≥100V	C ≥ 15μF
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0603	X7R	≥50V	C ≥ 0.082uF																																																																																																												
	X5R,X7R,	10V,16V,50V	C ≥ 1.0uF																																																																																																												
0805	X5R,X7R	10V-50V	C ≥ 4.7uF																																																																																																												
	X5R,X7R	50V 100V	C ≥ 0.47uF C ≥ 0.12uF																																																																																																												
1206	X5R,X7R	≥50V	C ≥ 1.0uF																																																																																																												
1210	X5R,X7R	≤100V	C ≥ 1.0uF																																																																																																												
	X7R	>100V	C ≥ 0.22uF																																																																																																												
1812	X7R	≤50V	C ≥ 4.7μF																																																																																																												
		100V	C ≥ 1.0μF																																																																																																												
2220	X7R	≥100V	C ≥ 1.0μF																																																																																																												
2225																																																																																																															
Size	Dielectric	Rated voltage	Capacitance																																																																																																												
2220	X7R	≥100V	C ≥ 15μF																																																																																																												

Multilayer Ceramic Chip Capacitor

■Packaging

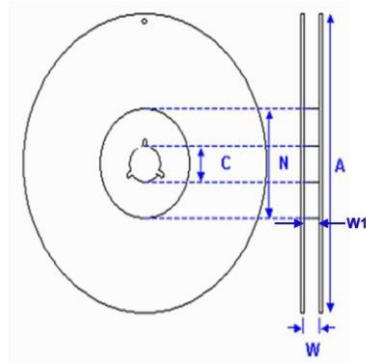
Packaging Quantity

Unit: mm

Type	Thickness / Symbol		Packaging (7" Reel)		Packaging (13" Reel)
			Paper tape	Plastic tape	Plastic tape
0201	0.30±0.03	L	15K	-	-
	0.30±0.05	L	15K	-	-
	0.30±0.09	L	15K	-	-
0402	0.50±0.05	N	10K	-	-
	0.5+0.02/-0.05	Q	10K	-	-
	0.50±0.20	E	10K	-	-
0603	0.50±0.10	H	4K	-	-
	0.80±0.10	S	4K	-	-
	0.80 +0.15 / -0.10	X	4K	-	-
0805	0.50±0.10	H	4K	-	-
	0.60±0.10	A	4K	-	-
	0.80±0.10	B	4K	-	-
	0.85±0.10	T	4K	-	-
	1.25±0.10	D	-	3K	-
1206	1.25±0.20	I	-	3K	-
	0.80±0.10	B	4K	-	-
	0.85±0.10	T	4K	-	-
	0.95±0.10	C	-	3K	-
	1.15±0.15	J	-	3K	-
	1.25±0.10	D	-	3K	-
	1.60±0.20	G	-	2K	-
1210	1.60 +0.30 / -0.10	P	-	2K	-
	0.85±0.10	T	-	3K	-
	0.95±0.10	C	-	3K	-
	1.25±0.10	D	-	3K	-
	1.60±0.20	G	-	2K	-
	2.00±0.20	K	-	1K	-
1808	2.50±0.30	M	-	1K 0.5K	-
	1.25±0.10	D	-	2K	-
	1.10±0.15	F	-	2K	-
	1.60±0.20	G	-	2K	-
1812	2.00±0.20	K	-	1K	-
	2.80±0.30	U	-	0.5K	-
	2.50±0.30	M	-	0.5K	-
	2.00±0.20	K	-	1K	-
	1.60±0.20	G	-	1K	-
2220	3.10±0.30	R	-	-	1K
	2.80±0.30	U	-	0.5K	-
	2.50±0.30	M	-	0.5K	-
	2.00±0.20	K	-	1K	-
	1.60±0.20	G	-	1K	-
2225	2.80±0.30	U	-	0.5K	-
	2.50±0.30	M	-	0.5K	-
	2.00±0.20	K	-	1K	-
	1.60±0.20	G	-	1K	-

Multilayer Ceramic Chip Capacitor

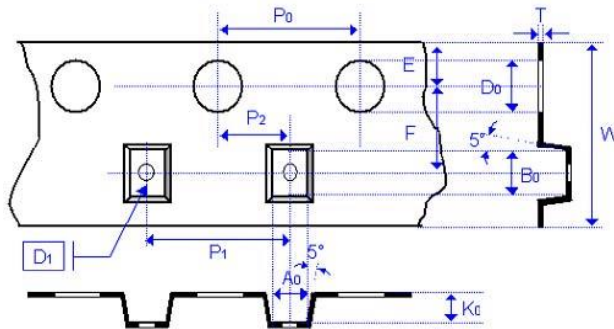
Tape and Reel



Unit: mm

Type	Chip Size		
	0201,0402,0603,0805,1206,1210	1808,1812,2220,2225	2220 (Only for Thickness:R)
Reel size	7"	7"	13"
C	13.0+0.5/-0.2	13.0+0.5/-0.2	13.5±0.5
W1	8.4+1.5	12.2+2.0/-0	12.2+2.0/-0
W	14.4max	shall accommodate tape width without interference	
A	178.0±0.10	178.0±0.10	330.0±1.0
N	60.0+1.0/-0	60.0+1.0/-0	100±1.0

Plastic Tape Size Specification



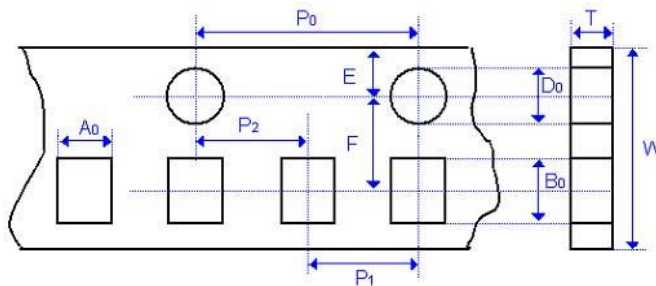
Unit: mm

Type	0805		1206				1210					1808				1812							
	D	I	C	J	D	G	P	T	C	D	G	K	M	D	F	G	K	D	F	G	K	M	U
A ₀	<1.80		<2.00		<2.50		<3.05	<3.05	<3.20		<2.50		<3.90										
B ₀	<2.70		<3.70		<4.00		<3.80	<3.80	<4.00		<5.30		<5.30										
T	0.23±0.05		0.23±0.05		0.23±0.05		0.23±0.10	0.23±0.05	0.23±0.05		0.25±0.05		0.25±0.05										
K ₀	<2.50		<2.50		<2.50		<1.50	<2.50	<3.50		<2.50		<2.50					<2.50				<3.00	
W	8.00±0.10		8.00±0.10		8.00±0.10		8.00±0.20	8.00±0.10	8.00±0.10		12.0±0.20		12.0±0.20										
P ₀	4.00±0.10		4.00±0.10		4.00±0.10		4.00±0.10	4.00±0.10	4.00±0.10		4.00±0.10		4.00±0.10										
P ₁	4.00±0.10		4.00±0.10		4.00±0.10		4.00±0.10	4.00±0.10	4.00±0.10		4.00±0.10		8.00±0.10										
P ₂	2.00±0.05		2.00±0.05		2.00±0.05		2.00±0.05	2.00±0.05	2.00±0.05		2.00±0.05		2.00±0.05										
D ₀	1.50+0.1/-0		1.50+0.1/-0		1.50+0.1/-0		1.50+0.1/-0	1.50+0.1/-0	1.50+0.1/-0		1.50+0.1/-0		1.50+0.1/-0										
D ₁	1.00±0.10		1.00±0.10		1.50±0.10		1.00±0.10	1.50±0.10	1.00±0.10		1.50±0.10		1.50±0.10										
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		1.75±0.10		1.75±0.10										
F	3.50±0.05		3.50±0.05		5.50±0.05		3.50±0.05	5.50±0.05	3.50±0.05		5.50±0.05		5.50±0.05										

Multilayer Ceramic Chip Capacitor

Type	2220					2225			
Thickness	F	G	K	M	U	G	K	M	U
A ₀	<5.80		<6.80			<6.80			
B ₀	<6.50					<6.50			
T	0.30±0.10					0.30±0.10			
K ₀	<2.50		<3.10			<2.50		<3.10	
W	12.00±0.20					12.00±0.20			
P ₀	4.00±0.10					4.00±0.10			
P ₁	8.00±0.10					8.00±0.10			
P ₂	2.00±0.05					2.00±0.05			
D ₀	1.50 +0.10/-0					1.50 +0.10/-0			
D ₁	1.50±0.10					1.50±0.10			
E	1.75±0.10					1.75±0.10			
F	5.50±0.05					5.50±0.05			

Paper Tape Size Specification



Unit: mm

Type	0201	0402		0603			0805				1206/0612	
Thickness	L	N	E	S	H	X	A	H	B	T	B	T
A ₀	0.40±0.10	0.70±0.20		1.05±0.30			1.50±0.20		1.50±0.20		2.00±0.10	
B ₀	0.70±0.10	1.20±0.20		1.80±0.30			2.30±0.20		2.30±0.20		3.50±0.50	
T	≤0.55	≤0.80		≤1.20			≤1.15		0.95±0.05		0.95±0.05	
W	8.00±0.30	8.00±0.30		8.00±0.30			8.00±0.10		8.00±0.10		8.00±0.10	
P ₀	4.00±0.10	4.00±0.10		4.00±0.10			4.00±0.10		4.00±0.10		4.00±0.10	
P ₁	2.00±0.05	2.00±0.05		4.00±0.10			4.00±0.10		4.00±0.10		4.00±0.10	
P ₂	2.00±0.05	2.00±0.05		2.00±0.05			2.00±0.05		2.00±0.05		2.00±0.05	
D ₀	1.50+0.1/-0	1.50+0.1/-0		1.50+0.1/-0			1.55±0.05		1.50 +0.10/-0		1.50+0.10/-0	
E	1.75±0.10	1.75±0.10		1.75±0.10			1.75±0.05		1.75±0.05		1.75±0.10	
F	3.50±0.05	3.50±0.05		3.50±0.05			3.50±0.05		3.50±0.05		3.50±0.05	

REVISION HISTORY

<u>REVISION</u>	<u>DATE</u>	<u>CHANGE NOTIFICATION</u>	<u>DESCRIPTION</u>
Version B7	Mar 10 ,2025		<ul style="list-style-type: none">-Add NPO Size 0201/0402/1808/2220/2225 specifications-Modify the NPO Size 0603/0805/1206/1210/1812 specifications-Add X7R Size 0201/2220/2225 specifications-Modify the X7R 0402/0603/0805/1206/1210/1808/1812 specifications-Add X5R 0201 specifications-Modify the X5R 0402/0603/1206/1210 specifications-Modify the Environmental Characteristics-Modify the Packaging specifications