

## Data Sheet

**Customer:**

**Product:** Multilayer Ceramic Chip Capacitor – MC Series

**Sizes.:** 0201/0402/0603/0805/1206/1210/1808/1812/0612

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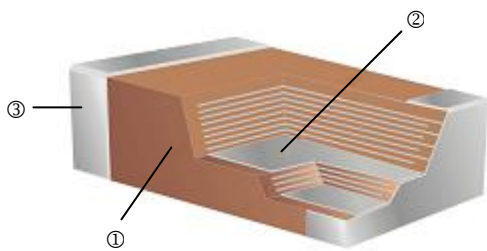
## Multilayer Ceramic Chip Capacitor

### ■ Features

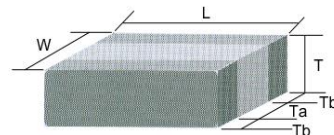
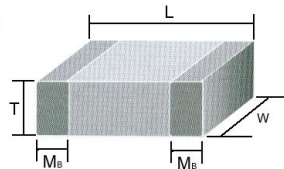
- Wide capacitance range, extremely compact size
- Low inductance of capacitor for high frequency application
- Excellent solderability and resistance to soldering heat, suitable for flow and reflow soldering
- Adaptable to high-speed surface mount assembly
- Conform to EIAJ-RC3402, and also compatible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



### ■ Construction



① Ceramic Material	③ Termination: NPO: Ag/Ni/Sn dielectric X7R, Y5V, X5R: Cu/Ni/Sn dielectric
② Inner Electrodes	



### ■ Dimensions

MC / MCRF Type

Unit: mm

Type	Size (Inch)	L	W	T / Symbol		Mb	Packaging (7" Reel)		
							Paper tape	Plastic tape	
01	0201	0.6±0.03	0.3±0.03	0.3±0.03	L	0.15±0.05	15K	-	
		0.6±0.05 <sup>#2</sup>	0.3±0.05 <sup>#2</sup>	0.3±0.05 <sup>#2</sup>					
		0.6±0.09 <sup>#3</sup>	0.3±0.09 <sup>#3</sup>	0.3±0.09 <sup>#3</sup>					
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	N Q E	0.25 +0.05 / -0.10	10K	-	
		1.00±0.20	0.50±0.20	0.50±0.20					
		1.60±0.10	0.80±0.10	0.80±0.10					
03	0603	1.60±0.15/-0.10	0.80±0.15/-0.10	0.50±0.10	H X	0.40±0.15	4K	-	
		1.60±0.20 <sup>#1</sup>	0.80±0.20 <sup>#1</sup>	0.80±0.15 / -0.10					
				0.80±0.20 <sup>#1</sup>					
05	0805	2.00±0.15	1.25±0.10	0.50±0.10	H	0.50±0.20	4K	-	
				0.60±0.15	A			-	
				0.80±0.10	B			-	
		1.25±0.10	D	-	3K				
		0.85±0.10	T	-	4K				
		1.25±0.20	I	-	3K				
06	1206	3.20±0.15	1.60±0.15	0.80±0.10	B	0.60±0.20 (0.50±0.25) <sup>***</sup>	4K	-	
				0.95±0.10	C			-	3K
				1.25±0.10	D			-	3K
		1.15±0.15	J	-	3K				
		1.60±0.20	G	-	2K				
		0.85±0.10	T	-	4K				
3.20±0.3 / -0.1	1.60±0.3 / -0.1	1.60±0.3 / -0.1	P	-	2K				
10	1210	3.20±0.30	2.50±0.20	0.95±0.10	C	0.75±0.25	-	3K	
				0.85±0.10	T			3K	
				1.25±0.10	D			3K	
		1.60±0.20	G	2K					
		2.00±0.20	K	1K					
		2.50±0.30	M	1K 0.5K					
08	1808	4.50±0.40 (4.5+0.5/-0.3) <sup>**</sup>	2.03±0.25	1.25±0.10	D	0.75±0.25 (0.50±0.25) <sup>***</sup>	-	2K	
				1.40±0.15	F			2K	
				1.60±0.20	G			2K	
				2.00±0.20	K			1K	

Type	Size (Inch)	L	W	T / Symbol		M <sub>B</sub>	Packaging (7" Reel)	
							Paper tape	Plastic tape
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)***	-	1K
				1.60±0.20	G		-	1K
				2.00±0.20	K		-	1K
			3.20±0.40	2.50±0.30	M		-	0.5K
				2.80±0.30	U		-	0.5K

\*\* 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

Low Inductance Capacitors for MCLI Type

Unit: mm

Type	Size (Inch)	L	W	T / Symbol		Ta min.	Tb min.	Packaging (7" Reel)	
								Paper tape	Plastic tape
MCLI43	0612	3.20±0.15	1.60±0.15	0.80±0.10	B	0.5	0.13	4K	-

**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) MCLI: Low Inductance	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 08: 1808 12: 1812 43: 0612	B: ±0.1pF (Cap ≤ 5pF) C: ±0.25pF (Cap ≤ 5pF) D: ±0.5pF (5pF < Cap < 10pF) F: ±1% G: ±2% J: ±5% K: ±10% M: ±20% Z: +80/-20%	T: Taping Reel	N: NPO (COG) B: X7R F: Y5V X: X5R	6V3: 6.3V 250: 25V 500: 50V 101: 100V 102: 1000V 202: 2000V 302: 3000V	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	0402					0603					0805				
Code	VDCW	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V
0R1	0.1pF	N	N	N	N											
0R2	0.2	N	N	N	N											
0R3	0.3	N	N	N	N		S	S	S	S						
0R4	0.4	N	N	N	N		S	S	S	S						
0R5	0.5	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
0R6	0.6	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
0R7	0.7	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
0R8	0.8	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
0R9	0.9	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
1R0	1.0	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
1R2	1.2	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
1R5	1.5	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
1R8	1.8	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
2R0	2.0	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
2R2	2.2	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
2R7	2.7	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
3R0	3.0	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
3R3	3.3	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
3R9	3.9	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
4R7	4.7	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	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
6R0	6.0	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
6R8	6.8	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
7R0	7.0	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	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	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
120	12	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
150	15	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
180	18	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
220	22	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
270	27	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
330	33	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
390	39	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
470	47	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
560	56	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
680	68	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
820	82	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
101	100pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
121	120	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
151	150	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
181	180	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
221	220	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
271	270	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	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B
471	470	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		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		B	B	B	B	B
222	2200						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*	T*	T*	T*	
153	0.015											T*	T*	T*	T*	
183	0.018											D*	D*	D*	D*	
223	0.022											D*	D*	D*	D*	

■The letter in cell is expressed the symbol of product thickness  
 ■The letter in cell with "\*" mark is expressed capacitance tolerance "J"(±5%) only

Capacitance & Voltage (NPO)

Dielectric		NPO													
EIA Code	Size	1206					1210					1812			
	VDCW	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	16V	25V	50V	100V
1R2	1.2 pF	B	B	B	B	B									
1R5	1.5	B	B	B	B	B									
1R8	1.8	B	B	B	B	B									
2R2	2.2	B	B	B	B	B									
2R7	2.7	B	B	B	B	B									
3R3	3.3	B	B	B	B	B									
3R9	3.9	B	B	B	B	B									
4R7	4.7	B	B	B	B	B									
5R6	5.6	B	B	B	B	B									
6R8	6.8	B	B	B	B	B									
8R2	8.2	B	B	B	B	B									
100	10pF	B	B	B	B	B	C	C	C	C	C	D	D	D	D
120	12	B	B	B	B	B	C	C	C	C	C	D	D	D	D
150	15	B	B	B	B	B	C	C	C	C	C	D	D	D	D
180	18	B	B	B	B	B	C	C	C	C	C	D	D	D	D
220	22	B	B	B	B	B	C	C	C	C	C	D	D	D	D
270	27	B	B	B	B	B	C	C	C	C	C	D	D	D	D
330	33	B	B	B	B	B	C	C	C	C	C	D	D	D	D
390	39	B	B	B	B	B	C	C	C	C	C	D	D	D	D
470	47	B	B	B	B	B	C	C	C	C	C	D	D	D	D
560	56	B	B	B	B	B	C	C	C	C	C	D	D	D	D
680	68	B	B	B	B	B	C	C	C	C	C	D	D	D	D
820	82	B	B	B	B	B	C	C	C	C	C	D	D	D	D
101	100pF	B	B	B	B	B	C	C	C	C	C	D	D	D	D
121	120	B	B	B	B	B	C	C	C	C	C	D	D	D	D
151	150	B	B	B	B	B	C	C	C	C	C	D	D	D	D
181	180	B	B	B	B	B	C	C	C	C	C	D	D	D	D
221	220	B	B	B	B	B	C	C	C	C	C	D	D	D	D
271	270	B	B	B	B	B	C	C	C	C	C	D	D	D	D
331	330	B	B	B	B	B	C	C	C	C	C	D	D	D	D
391	390	B	B	B	B	B	C	C	C	C	C	D	D	D	D
471	470	B	B	B	B	B	C	C	C	C	C	D	D	D	D
561	560	B	B	B	B	B	C	C	C	C	C	D	D	D	D
681	680	B	B	B	B	B	C	C	C	C	C	D	D	D	D
821	820	B	B	B	B	B	C	C	C	C	C	D	D	D	D
102	1000pF	B	B	B	B	B	C	C	C	C	C	D	D	D	D
122	1200	B	B	B	B	B	C	C	C	C	C	D	D	D	D
152	1500	B	B	B	B	B	C	C	C	C	C	D	D	D	D
182	1800	B	B	B	B	B	C	C	C	C	C	D	D	D	D
222	2200	B	B	B	B	B	C	C	C	C	C	D	D	D	D
272	2700	B	B	B	B	B	C	C	C	C	C	D	D	D	D
332	3300	B	B	B	B	B	C	C	C	C	C	D	D	D	D
392	3900	B	B	B	B	B	C	C	C	C	C	D	D	D	D
472	4700	B	B	B	B	B	C	C	C	C	C	D	D	D	D
562	5600	B	B	B	B	B	C	C	C	C	C	D	D	D	D
682	6800	C	C	C	C	C	C	C	C	C	C	D	D	D	D
822	8200	D	D	D	D	D	C	C	C	C	C	D	D	D	D
103	0.01uF	D	D	D	D	D	C	C	C	C	C	D	D	D	D
123	0.012	P	P	P	P	P	D	D	D	D	D	D	D	D	D
153	0.015	P	P	P	P	P	D	D	D	D	D	D	D	D	D
183	0.018	P	P	P	P	P	K	K	K	K	K	D	D	D	D
223	0.022	P	P	P	P	P	K	K	K	K	K	D	D	D	D
273	0.027	P	P	P	P	P	K	K	K	K	K	D	D	D	D
333	0.033	P	P	P	P	P	K	K	K	K	K	D	D	D	D
393	0.039	P	P	P	P	P						M	M	M	M
473	0.047	J*	J*	J*	J*	J*						M	M	M	M
563	0.056	J*	J*	J*	J*	J*						M	M	M	M
683	0.068	G*	G*	G*	G*	G*						M	M	M	M
823	0.082	G*	G*	G*	G*	G*						M	M	M	M
104	0.10uF	G*	G*	G*	G*	G*						M	M	M	M

- The letter in cell is expressed the symbol of product thickness
- The letter in cell with "\*" mark is expressed capacitance tolerance "J"(±5%) only

Capacitance & Voltage (X7R)

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

■The letter in cell with "\*" mark is expressed product not in 10% (code "K") tolerance

Capacitance & Voltage (X7R)

Dielectric		X7R																	
EIA	Size	1206						1210						1812					
Code	VDCW	6.3V	10V	16V	25V	35V	50V	100V	6.3V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V
151	150 pF		B	B	B		B	B											
181	180		B	B	B		B	B											
221	220		B	B	B		B	B											
271	270		B	B	B		B	B											
331	330		B	B	B		B	B											
391	390		B	B	B		B	B											
471	470		B	B	B		B	B											
561	560		B	B	B		B	B											
681	680		B	B	B		B	B											
821	820		B	B	B		B	B											
102	1000pF		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
122	1200		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
152	1500		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
182	1800		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
222	2200		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
272	2700		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
332	3300		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
392	3900		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
472	4700		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
562	5600		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
682	6800		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
822	8200		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
103	0.01μF		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
123	0.012		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
153	0.015		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
183	0.018		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
223	0.022		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
273	0.027		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
333	0.033		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
393	0.039		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
473	0.047		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
563	0.056		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
683	0.068		B	B	B		B	B		C	C	C	C	C	D	D	D	D	D
823	0.082		B	B	B		B	D		C	C	C	C	C	D	D	D	D	D
104	0.10μF		B	B	B		B	D		C	C	C	C	C	D	D	D	D	D
124	0.12		B	B	B		B	D		C	C	C	C	C	D	D	D	D	D
154	0.15		C	C	C		C	G		C	C	C	C	D	D	D	D	D	D
184	0.18		C	C	C		C	G		C	C	C	C	D	D	D	D	D	D
224	0.22		C	C	C		C	G		C	C	C	C	D	D	D	D	D	D
274	0.27		C	C	C		D	G		C	C	C	C	G	D	D	D	D	D
334	0.33		C	C	C		D	G		C	C	C	D	G	D	D	D	D	D
394	0.39		C	C	J		P	G		C	C	C	D	M	D	D	D	D	D
474	0.47		J	J	J		P	G		C	C	C	D	M	D	D	D	D	K
564	0.56		J	J	J		P	P		D	D	D	D	M	D	D	D	D	K
684	0.68		J	J	J		P	P		D	D	D	D	K	D	D	D	K	K
824	0.82		J	J	J		P	P		D	D	D	D	K	D	D	D	K	K
105	1.0μF		J	J	J		P	P		D	D	D	D	K	D	D	D	K	K
155	1.5	J	J	J	P						K	G	M	M					K
225	2.2	J	J	J	P		P	P			K	G	M	M				M	M
335	3.3		P	P	P						K	G	M						
475	4.7	P	P	P	P		P				K	K	K	M	M				
106	10	P	P	P	P	P					K	K	K	M					
226	22	P	P	P*							M	M	M						
476	47									M	M								

- The letter in cell is expressed the symbol of product thickness
- The letter in cell with "\*" mark is expressed product not in 10% (code "K") tolerance

Capacitance & Voltage (X5R)

Dielectric		X5R																													
EIA	Size	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	50V
273	0.027μF			N																											
333	0.033			N																											
393	0.039			N																											
473	0.047	N	N	N																											
563	0.056	N	N	N																											
683	0.068	N	N	N																											
823	0.082	N	N	N																											
104	0.10μF	N	N	N	N	N																									
154	0.15	N	N	N	N																										
224	0.22	N	N	N	N	N										X	X														
274	0.27															X	X	X													
334	0.33	N	N				X	X	X	X																					
394	0.39										X	X	X																		
474	0.47	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	N	N	N	N	E	X	X	X	X	X		D	D	D	I															
155	1.5						X						I	I	I	I			J	J						K	K				
225	2.2	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			P	P	P	P										
475	4.7	E*	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		
226	22						X*	X*				I	I*	I*	I*			P	P	P	P			M	M	M	M				
476	47						X*					I*	I*					P	P	P*				M	M	M	M*				
107	100											I*						P						M	M						

- The letter in cell is expressed the symbol of product thickness
- The letter in cell with "\*" mark is expressed product not in 10% (code "K") tolerance

Capacitance & Voltage (Y5V)

Dielectric		Y5V																																	
EIA	Size	0402					0603					0805					1206					1210					1812								
Code	VDCW	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	100	6.3	10	16	25	50	100	6.3	10	16	25	35	50	100	10	16	25	50	100
103	0.010μF		N	N	N	N		S	S	S	S		A	A	A	A	B		B	B	B	B	B						C					D	
153	0.015		N	N	N	N		S	S	S	S		A	A	A	A	B		B	B	B	B	B						C					D	
223	0.022		N	N	N	N		S	S	S	S		A	A	A	A	B		B	B	B	B	B						C					D	
333	0.033		N	N	N	N		S	S	S	S		A	A	A	A	B		B	B	B	B	B						C					D	
473	0.047		N	N	N			S	S	S	S		A	A	A	A	B		B	B	B	B	B						C					D	
683	0.068		N	N	N			S	S	S	S		A	A	A	A	B		B	B	B	B	B						C					D	
104	0.10μF		N	N	N			S	S	S	S		A	A	A	A	B		B	B	B	B	B		C	C	C		C	C	D	D	D	D	
154	0.15		N	N				S	S	S	S		A	A	A	A			B	B	B	B	C		C	C	C		C	C	D	D	D	D	
224	0.22	N	N	N				S	S	S	S		A	A	A	A			B	B	B	B	C		C	C	C		C	C	D	D	D	D	
334	0.33	N	N	N				S	S	S	X		B	B	B	B			B	B	B	B			C	C	C		C	C	D	D	D	D	
474	0.47	N	N	N				S	S	X	X		B	B	B	B			B	B	B	B			C	C	C		C		D	D	D	D	
684	0.68	N						S	X	X			B	B	D	D			B	B	B	B			C	C	C		C		D	D	D	D	
105	1.0μF	N	N					S	X	X			B	B	D	D			C	C	C	C			C	C	C		C		D	D	D	D	
155	1.5							S					D	D					C	C	C				C	C	C			D	D	D	D		
225	2.2						S	S	X				D	D	I				C	C	C	J			C	C	C		G		D	D	D	D	
335	3.3												D	D					J	J	J				C	C	C			D	D	D	D		
475	4.7						X	X					D	D	I				J	J	J	P			C	C	D		G		D	D	D	D	
685	6.8												I						J	J					C	C	D		K		D	D	D	D	
106	10μF											I	I	I					J	J	P				D	D	G	K	K		D	D	D		
226	22μF											I	I						P	P					K	K									
476	47μF																		P						K	K							M		
107	100μF																								M										



**Multilayer Ceramic Chip Capacitor**

**Environmental Characteristics**

Size	0402, 0603, 0805, 1206, 1210, 1812			
Dielectric	NPO	X7R	X5R	Y5V
Capacitance*	0.1pF~0.1μF	100pF~47μF	27nF~100μF	10nF~100μF
Capacitance tolerance	Cap ≤ 5pF: B (±0.1pF), C (±0.25pF) 5pF < Cap < 10pF: C (±0.25pF), D (±0.50pF) Cap ≥ 10pF: J (±5%)	J (± 5%) K (±10%)		M (±20%) Z (-20 / +80%)
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	-25 to +85°C
Capacitance change	±30 ppm	±15%		+30/-80%
Termination	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
- Y5V: Apply 1.0±0.2Vrms, 1.0 KHz±10% at the condition of 20°C ambient temperature

**Note 1:**

**X7R / X5R**

Rated Vol.	D.F.	Exception of D.F.	
≥ 100V	≤ 2.5%	≤ 3%	1206 ≥ 0.47μF
		≤ 5%	0805 > 0.1μF; 0603 0.068μF 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
		≤ 5%	0201 ≥ 0.01uF; 1210 ≥ 4.7μF
		≤ 10%	0402 ≥ 0.1μF; 0603 > 0.1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
35V	≤ 3.5%	≤ 10%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF
25V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF
		≤ 7%	0603 ≥ 0.33μF; 1206 ≥ 4.7μF
		≤ 10%	0201 ≥ 0.1μF; 0402 ≥ 0.10μF; 0603 ≥ 0.47μF; 0805 ≥ 2.2μF; 1206 ≥ 6.8μF ; 1210 ≥ 22μF
		≤ 12.5%	0402 ≥ 0.47μF
16V	≤ 3.5%	≤ 5%	0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF
		≤ 10%	0201 ≥ 0.1uF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.22uF; 0603 ≥ ; 1206 ≥ 4.7μF; 1210 ≥ 22μF
10V	≤ 5.0%	≤ 10%	0201 ≥ 0.012μF; 0402 ≥ 0.33μF(0402/X7R ≥ 0.22μF); 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF
		≤ 15%	0201 ≥ 0.1μF
6.3V	≤ 10%	≤ 15%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF; 1206 ≥ 47μF ; 1210 ≥ 100μF
		≤ 20%	0402 ≥ 2.2μF

**Y5V**

Rated vol.	D.F.	Exception of D.F.	
≥ 50V	≤ 5%	≤ 7%	0603 ≥ 0.1μF; 0805 ≥ 0.47μF; 1206 ≥ 4.7μF
		≤ 12.5%	1210 ≥ 6.8μF
35V	≤ 7%	---	---
25V	≤ 5%	≤ 7%	0402 ≥ 0.047μF; 0603 ≥ 0.1μF; 0805 ≥ 0.33μF; 1206 ≥ 1μF; 1210 ≥ 4.7μF
		≤ 9%	0402 ≥ 0.068μF; 0603 ≥ 0.47μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF
16V (C < 1.0μF)	≤ 7%	≤ 9%	0402 ≥ 0.068μF; 0603 ≥ 0.68μF
		≤ 12.5%	0402 ≥ 0.22μF
16V (C ≥ 1.0μF)	≤ 9%	≤ 12.5%	0603 ≥ 2.2μF; 0805 ≥ 3.3μF; 1206 ≥ 10μF; 1210 ≥ 22μF; 1812 ≥ 47μF
10V	≤ 12.5%	≤ 20%	0402 ≥ 0.47μF
6.3V	≤ 20%	---	---

**Multilayer Ceramic Chip Capacitor**

**■ Middle and High Voltage**

Capacitance & Voltage (NPO 200V~3KV)

Dielectric		NPO																																	
EIA	Size	0603		0805				1206					1210					1808					1812												
Code	VDCW	200	250	200	250	500	1000	200	250	500	630	1000	1500	2000	200	250	500	630	1000	1500	2000	500	1000	1500	2000	3000	200	250	500	1000	1500	2000	3000		
0R5	0.5pF	S	S	A	A	A	D																												
1R0	1.0	S	S	A	A	A	D																												
1R2	1.2	S	S	A	A	A	D																												
1R5	1.5	S	S	A	A	A	D	B	B	B	B	B	B																						
1R8	1.8	S	S	A	A	A	D	B	B	B	B	B	B									D													
2R2	2.2	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
2R7	2.7	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
3R3	3.3	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
3R9	3.9	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
4R7	4.7	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
5R6	5.6	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
6R8	6.8	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
8R2	8.2	S	S	A	A	A	D	B	B	B	B	B	B									D	D	D	D	D									
100	10pF	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
120	12	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
150	15	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
180	18	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
220	22	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
270	27	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
330	33	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
390	39	S	S	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
470	47	S	S	A	A	A	D	B	B	B	B	C	C	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	
560	56	S	S	A	A	A	D	B	B	B	B	C	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
680	68	S	S	A	A	A	D	B	B	B	B	C	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
820	82	S	S	A	A	B	D	B	B	B	B	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
101	100pF	S	S	A	B	B	D	B	B	B	B	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
121	120	S	S	A	B	D	D	B	B	B	B	D	G	C	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	
151	150	S	S	B	D	D	D	B	B	B	B	D	G	C	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D	D	D	D	D	
181	180	S	S	B	D	D	D	B	B	B	B	G	G	C	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D	D	D	D	D	
221	220	S	S	D	D	D	D	B	B	B	B	G	G	C	C	C	C	C	C	G	G	D	D	D	D	D	D	D	D	D	D	D	D	D	
271	270	X	X	D	D	D	D	B	C	C	C	G	P	C	C	C	C	C	G	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
331	330	X	X	D	D	D	D	B	C	C	C	G	P	C	C	C	C	C	G	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
391	390	X	X	D	D	D	D	B	C	C	C	G	P	C	C	C	C	C	G	M	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
471	470	X	X	D	D	I		C	C	C	C	G		C	C	C	C	C	G	M	K	K	K	K	K	K	K	K	K	K	K	K	K	K	
561	560			D	D	I		C	D	D	D	G		C	C	C	C	C	G		K	K	K	K	K	K	K	K	K	K	K	K	K	K	
681	680			D	D	I		C	D	D	D	G		C	C	C	C	C	G		K	K	K	K	K	K	K	K	K	K	K	K	K	K	
821	820			D	D	I		C	G	G	G	G		C	C	C	C	C	G		K	K													
102	1000pF			D	D	I		C	G	G	G	G		D	D	D	D	G		K	K														
122	1200			D	D			C	G	G	G			D	D	D	D			K															
152	1500			D	D			D	G	G	G			D	D	D	D			K															
182	1800			D	D			D	G	G	G			D	D	D	D			K															
222	2200			D	D			D	G	G	G			D	D	D	D			K															
272	2700							D	G					D	D	D	D																		
332	3300							D	G					D	D	D	D																		
392	3900							D	G					D	D	D	D																		
472	4700							D	G					G	G																				
562	5600													G	G																				
682	6800													G	G																				
822	8200													G	G																				
103	0.01uF													G	G																				

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

**Multilayer Ceramic Chip Capacitor**

Capacitance & Voltage (X7R 200V~3KV)

Dielectric		X7R																										
EIA	Size	0603					0805					1206					1210				1808				1812			
Code	VDCW	200V 250V	200V	250V	500V 630V	1000V	200V 250V	500V 630V	1000V	1500V	2000V	200V 250V	500V 630V	1000V	1500V 2000V	500V 630V	1000V	1500V 2000V	3000V	200V 250V	500V 630V	1000V	1500V 2000V	3000V				
101	100pF	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D										
121	120	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D										
151	150	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D										
181	180	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D										
221	220	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D										
271	270	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D				D	D	K				
331	330	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K			D	D	K				
391	390	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K			D	D	K				
471	470	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K			D	D	K				
561	560	X	B	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K			D	D	K				
681	680	X	B	B	B	B	D	D	D	D	D	C	D	D	D	D	D	D	K			D	D	K				
821	820	X	B	B	B	B	D	D	D	D	D	C	D	D	D	D	D	D	K			D	D	K				
102	1000pF	X	B	B	B	B	D	D	D	D	D	C	D	D	D	D	D	K	K	D	D	D	D	K				
122	1200	X	B	B	B	B	D	D	D	G	G	C	D	D	M	D	D	K	K	D	D	D	D	K				
152	1500	X	B	B	B	D	D	D	D	G	G	C	D	D	M	D	D	K	K	D	D	D	D	K				
182	1800	X	B	B	B	D	D	D	D	G	G	C	D	D	M	D	D	K	K	D	D	D	G	M				
222	2200	X	B	B	B	D	D	D	D	G	G	C	D	D	M	D	D	K		D	D	D	G	M				
272	2700	X	B	B	B	B	D	D	D	G	G	C	D	D	M	D	D	K		D	D	D	G	M				
332	3300	X	B	B	B	B	D	D	D	G	G	C	D	D	M	D	D	K		D	D	D	K	M				
392	3900	X	B	B	B	B	D	D	D	G		C	D	G	M	D	D	K		D	D	D	K					
472	4700	X	B	B	D		D	D	D	G		C	D	G	M	D	D	K		D	D	D	K					
562	5600	X	D	D	D		D	D	D	G		C	D	G		K	K	K		D	D	D	M					
682	6800	X	D	D	D		D	D	D	G		C	D	G		K	K			D	D	D	M					
822	8200	X	D	D	D		D	D	D			C	D	G		K	K			D	D	D	M					
103	0.010μF	X	D	D	D		D	D	D			C	D	G		K	K			D	D	D	M					
123	0.012		D	D	D		D	D	G			C	D	G		K	K			D	D	K						
153	0.015		D	D	D		D	D	G			C	D	G		K	K			D	D	K						
183	0.018		D	D	D		D	D				C	D	G		K	K			D	D	M						
223	0.022		D	D	D		D	G				C	D	G		K	K			D	D	M						
273	0.027		D	D			D	G				C	G			K	K			D	D	M						
333	0.033		D	D			G	G				C	G			K	K			D	D	M						
393	0.039		D	D			G	G				C	G			K	K			D	D	M						
473	0.047		D	D			G	G				D	G			K	K			D	D	M						
563	0.056		D	D			G	G				D	G			K				D	K	M						
683	0.068		D				G					G	K			K				D	K	M						
823	0.082		D				G					G	K							D	K	M						
104	0.10μF		D				G					G	K							D	K	M						
124	0.12											G								D	M							
154	0.15											M								K	M							
184	0.18											M								K	M							
224	0.22											M								K	M							
274	0.27											M								K								
334	0.33											M								K								
394	0.39											M								K								
474	0.47											M								K								
564	0.56																			M								
684	0.68																			M								
824	0.82																			M								
105	1μF																			M								

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

**Multilayer Ceramic Chip Capacitor**

Capacitance & Voltage (Y5V 200V~250V)

Dielectric		Y5V							
EIA	Size	0805		1206		1210		1812	
Code	VDCW	200	250	200	250	200	250	200	250
103	0.010μF	B	B	B	B	C	C	D	D
153	0.015	B	B	B	B	C	C	D	D
223	0.022	B	B	B	B	C	C	D	D
333	0.033	B	B	B	B	C	C	D	D
473	0.047	B	B	B	B	C	C	D	D
683	0.068	B	B	B	B	C	C	D	D
104	0.10μF			B	B	C	C	D	D
154	0.15			C	C	C	C	D	D
224	0.22							D	D
334	0.33							D	D
474	0.47							D	D
684	0.68							D	D

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

Electrical data

Dielectric	NP0	X7R	Y5V
Size	0603,0805,1206,1210,1808,1812		0805,1206,1210,1812
Capacitance*	0.5pF~0.01μF		0.01uF~0.68μF
Capacitance tolerance	Cap ≤ 5pF: C (±0.25pF) 5pF < Cap < 10pF: D (±0.50pF) Cap ≥ 10pF: J (±5%), K (±10%)		K (±10%) M (±20%) Z (-20 / +80%)
Rated voltage (VDCW)	200V to 3KV		200V, 250V
DF/Q	Cap < 30pF: Q ≥ 400 +20C Cap ≥ 30pF: Q ≥ 1000		DF ≤ 5%
Insulation resistance at Ur	Ur=200~630V: ≥ 10GΩ or R×C ≥ 100Ω·F Whichever is smaller Ur=1000~3000V: ≥ 10GΩ		
Dielectric Strength	200~300V: ≥ 2×VDCW 500~999V: ≥ 1.5×VDCW 1000~3000V: ≥ 1.2×VDCW		
Operating temperature	-55 to +125°C		-25 to +85°C
Capacitance change	±30 ppm		±15% +30/-80%
Termination	Ni/Sn (lead-free termination)		

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

■ NP0: 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, X5R: Apply 1.0±0.2Vrms, 1.0KHz±10% at the condition of 25°C ambient temperature

■ Y5V: Apply 1.0±0.2Vrms, 1.0KHz±10% at the condition of 20°C ambient temperature

**Multilayer Ceramic Chip Capacitor**

**Ultra-small 0201 Capacitors**

Capacitance & Voltage

EIA	Size	0201		
		Dielectric		NPO
		Code	VDCW	16V
0R1	0.1pF	L	L	L
0R2	0.2	L	L	L
0R3	0.3	L	L	L
0R4	0.4	L	L	L
0R5	0.5	L	L	L
0R6	0.6	L	L	L
0R7	0.7	L	L	L
0R8	0.8	L	L	L
0R9	0.9	L	L	L
1R0	1.0	L	L	L
1R2	1.2	L	L	L
1R5	1.5	L	L	L
1R8	1.8	L	L	L
2R2	2.2	L	L	L
2R7	2.7	L	L	L
3R0	3.0	L	L	L
3R3	3.3	L	L	L
3R9	3.9	L	L	L
4R0	4.0	L	L	L
4R7	4.7	L	L	L
5R0	5.0	L	L	L
5R6	5.6	L	L	L
6R0	6.0	L	L	L
6R8	6.8	L	L	L
7R0	7.0	L	L	L
8R2	8.2	L	L	L
9R0	9.0	L	L	L
100	10	L	L	L
120	12	L	L	L
150	15	L	L	L
180	18	L	L	L
220	22	L	L	L
270	27	L	L	L
330	33	L	L	L
390	39	L	L	L
470	47	L	L	L
560	56	L	L	L
680	68	L	L	L
820	82	L	L	L
101	100	L	L	L
121	120	L	L	L
151	150	L	L	L
271	270	L	L	L
331	330	L	L	L
391	390	L	L	L
471	470	L	L	L
561	560	L	L	L

EIA	Size	0201											
		Dielectric		X7R					X5R				
		Code	VDCW	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
101	100pF			L	L	L				L	L	L	
121	120			L	L	L				L	L	L	
151	150			L	L	L				L	L	L	
181	180			L	L	L				L	L	L	
221	220			L	L	L				L	L	L	
271	270			L	L	L				L	L	L	
331	330			L	L	L				L	L	L	
391	390			L	L	L				L	L	L	
471	470			L	L	L				L	L	L	
561	560			L	L	L				L	L	L	
681	680			L	L	L				L	L	L	
821	820			L	L	L				L	L	L	
102	1000	L	L	L	L	L		L	L	L	L	L	
122	1200	L	L	L	L	L							
152	1500	L	L	L	L	L		L	L				
182	1800	L	L	L	L	L							
222	2200	L	L	L	L	L		L	L				
272	2700	L	L	L	L	L		L	L				
332	3300	L	L	L	L	L		L	L				
392	3900	L	L	L	L	L							
472	4700	L	L	L	L	L		L	L				
562	5600	L	L	L	L	L							
682	6800	L	L	L	L	L		L					
822	8200	L	L	L	L	L							
103	0.010μF	L	L	L	L	L	L	L	L	L	L	L	
153	0.015						L	L					
223	0.022		L				L	L					
273	0.027						L	L					
333	0.033						L	L					
393	0.039						L	L					
473	0.047						L	L	L				
563	0.056						L	L					
683	0.068						L	L					
823	0.082						L	L					
104	0.100						L	L	L	L			
224	0.220						L	L	L*				
474	0.470						L	L					
105	1μF						L	L*					
225	2.2						L*	L*					

- The letter in cell is expressed the symbol of product thickness
- The letter in cell with "\*" mark is expressed product not in 10% (code "K") tolerance

Electrical Data

Size	0201			
	Dielectric	NPO	X7R	X5R
Capacitance*		0.1pF~560pF	100pF~22nF	100pF~2.2μF
Capacitance tolerance		Cap ≤ 5pF: C (±0.25pF) 5pF < Cap < 10pF: D (±0.50pF) Cap ≥ 10pF: J (±5%)	J (±5%) K (±10%)	K (±10%) M (±20%)
Rated voltage (VDCW)		16V, 25V, 50V	6.3V, 10V, 16V, 25V, 50V	6.3V, 10V, 16V, 25V, 50V
Operating temperature		-55 to +125°C		-55 to +85°C
Capacitance change		±30 ppm	±15%	
Termination		Ni/Sn (lead-free termination)		

- \*\*Measured at 30~70% related humidity
- NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% at the condition of 25°C ambient temperature
- X7R, X5R: Apply 1.0±0.2Vrms, 1.0KHz±10% at the condition of 25°C ambient temperature

**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	L	N	N	N	N	S	S	S	T	T	T	T
240	24	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
270	27	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
300	30	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
330	33	L	L	L	L	N	N	N	N	S	S	S	T	T	T	T
360	36					N	N	N	N	S	S	S	T	T	T	T
390	39					N	N	N	N	S	S	S	T	T	T	T
430	43					N	N	N	N	S	S	S	T	T	T	T
470	47					N	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

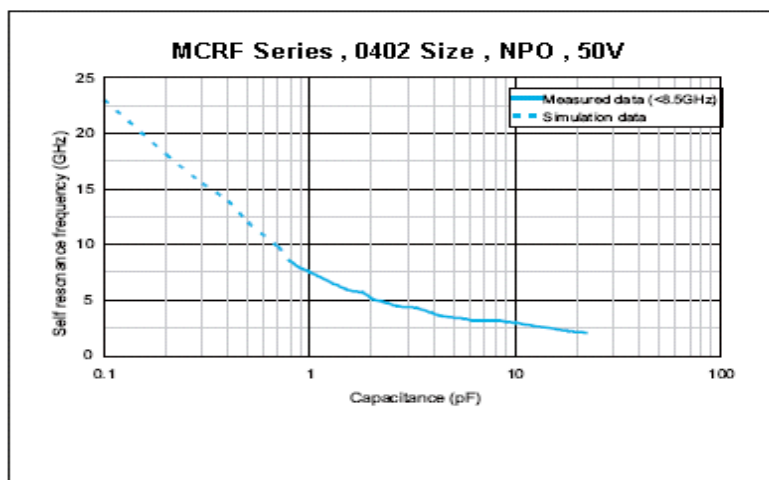
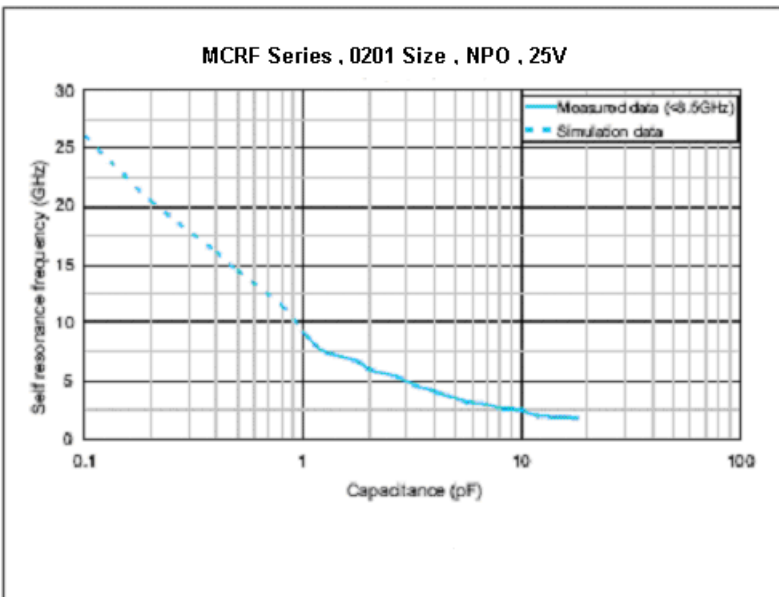
**Multilayer Ceramic Chip Capacitor**

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



**Multilayer Ceramic Chip Capacitor**

**Low Inductance Capacitors for MCLI Series**

Capacitance & Voltage

Dielectric		X7R
EIA	Size	0612
Code	VDCW	50V
103	10nF	B
123	12	B
153	15	B
183	18	B
223	22	B
273	27	B
333	33	B
393	39	B
473	47	B
563	56	B
683	68	B
823	82	B
104	100	B
124	120	B
154	150	B

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

General Electrical data

Size	0612
Dielectric	X7R
Capacitance*	10nF~150nF
Capacitance tolerance	K (±10%) M (±20%)
Rated voltage (WVDC)	50V
Tan δ *	≤2.5%
Insulation resistance at Ur	≥ 10GΩ or R×C≥ 500Ω×F Whichever is less
Operating temperature	-55 to +125°C
Capacitance change	±15%
Termination	Ni/Sn (lead-free termination)
ESL	500pH

■ \*\*Measured at 1.0±0.2Vrms, 1.0KHz±10%, 30~70% related humidity, 25°C ambient temperature



**Multilayer Ceramic Chip Capacitor**

**■ 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&lt;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="3">≥ 100V</td> <td rowspan="3">2.5%</td> <td>3%</td> <td>1206 ≥ 0.047μF</td> </tr> <tr> <td>5%</td> <td>0603 ≥ 0.068μF; 0805 ≥ 0.1μF 1206 &gt; 1μF; 1210 ≥ 2.2μF</td> </tr> <tr> <td>10%</td> <td>0805 &gt; 0.22μF; 1210 ≥ 3.3μF</td> </tr> <tr> <td rowspan="3">50V</td> <td rowspan="3">2.5%</td> <td>3%</td> <td>0201(50V); 0603 ≥ 0.047μF 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td> </tr> <tr> <td>5%</td> <td>0201 ≥ 0.01μF; 1210 ≥ 4.7μF</td> </tr> <tr> <td>10%</td> <td>0402 ≥ 0.1μF; 0603 &gt; 0.1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 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="4">25V</td> <td rowspan="4">3.5%</td> <td>5%</td> <td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td> </tr> <tr> <td>7%</td> <td>0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>10%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 0.10μF; 0603 ≥ 0.47μF 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF</td> </tr> <tr> <td>12.5%</td> <td>0402 ≥ 0.47μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">3.5%</td> <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>10%</td> <td>0201 ≥ 0.1μF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.22μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">5%</td> <td>10%</td> <td>0201 ≥ 0.012μF; 0402 ≥ 0.33μF(0402/X7R ≥ 0.22μF) 0603 ≥ 0.33μF; 0805 ≥ 2.2μF 1206 ≥ 2.2μF; 1210 ≥ 22μF</td> </tr> <tr> <td>15%</td> <td>0201 ≥ 0.1μF; 0402 ≥ 1μF</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 1206 ≥ 47μF; 1210 ≥ 100μF</td> </tr> <tr> <td>20%</td> <td>0402 ≥ 2.2μF</td> </tr> </tbody> </table> <p>Y5V:</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="2">≥ 50V</td> <td rowspan="2">5%</td> <td>7%</td> <td>0603 ≥ 0.1μF; 0805 ≥ 0.47μF; 1206 ≥ 4.7μF</td> </tr> <tr> <td>12.5%</td> <td>1210 ≥ 6.8μF</td> </tr> <tr> <td>35V</td> <td>7%</td> <td>—</td> <td>—</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2">5%</td> <td>7%</td> <td>0402 ≥ 0.047μF; 0603 ≥ 0.1μF 0805 ≥ 0.33μF; 1206 ≥ 1μF 1210 ≥ 4.7μF</td> </tr> <tr> <td>9%</td> <td>0402 ≥ 0.068μF; 0603 ≥ 0.47μF 1206 ≥ 4.7μF; 1210 ≥ 22μF</td> </tr> <tr> <td rowspan="2">16V (C &lt; 1.0μF)</td> <td rowspan="2">7%</td> <td>9%</td> <td>0402 ≥ 0.068μF; 0603 ≥ 0.68μF</td> </tr> <tr> <td>12.5%</td> <td>0402 ≥ 0.22μF</td> </tr> <tr> <td>16V (C ≥ 1.0μF)</td> <td>9%</td> <td>12.5%</td> <td>0603 ≥ 2.2μF; 0805 ≥ 3.3μF 1206 ≥ 10μF; 1210 ≥ 22μF 1812 ≥ 47μF</td> </tr> <tr> <td>10V</td> <td>12.5%</td> <td>20%</td> <td>0402 ≥ 0.47μF</td> </tr> <tr> <td>6.3V</td> <td>20%</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Rated vol.	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Dielectric Strength	No evidence of damage or flash over during test	<p>To apply voltage(≤ 100V) 250% Duration: 1 to 5sec Charge and discharge current less than 50mA</p> <p>To apply voltage: 200V~300V ≥ 2 time VDC 500V~999V ≥ 1.5 time VDC 1000V~3000V ≥ 1.2 time VDC Cut-off, set at 10mA TEST=15 sec. RAMP=0</p>																																																																																										

Item	Requirement	Test Method																																														
Insulation Resistance	10GΩ or R×C≥ 500Ω-F Whichever is smaller X7R, X5R, Y5V:	To apply rated voltage for max. 120sec  *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.																																														
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Temperature Characteristic of Capacitance	<table border="1"> <tr> <th>T.C.</th> <th>Capacitance Change</th> </tr> <tr> <td>NPO</td> <td>±30 (ppm/°C)</td> </tr> <tr> <td>X7R</td> <td>±15%</td> </tr> <tr> <td>X5R</td> <td>±15%</td> </tr> <tr> <td>Y5V</td> <td>+30%~-80%</td> </tr> </table>	T.C.	Capacitance Change	NPO	±30 (ppm/°C)	X7R	±15%	X5R	±15%	Y5V	+30%~-80%	<p>With no electrical load.</p> <table border="1"> <tr> <th>T.C.</th> <th>Operating Temp</th> </tr> <tr> <td>NPO</td> <td>-55 ~ 125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55 ~ 125°C at 25°C</td> </tr> <tr> <td>X5R</td> <td>-55 ~ 85°C at 25°C</td> </tr> <tr> <td>Y5V</td> <td>-25 ~ 85°C at 20°C</td> </tr> </table> <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. * Measurement voltage for Class II:</p> <table border="1"> <tr> <td>0201</td> <td>0402</td> </tr> <tr> <td>Cap&lt;0.1μF:1V</td> <td>Cap&lt;1μF: 1V</td> </tr> <tr> <td>0.1μF≤Cap&lt;1μF: 0.2V</td> <td>Cap=1μF: 0.5V</td> </tr> <tr> <td>Cap≥1μF: 0.1V</td> <td>1μF&lt;Cap&lt;10μF: 0.2V</td> </tr> <tr> <td></td> <td>Cap≥10μF: 0.1V</td> </tr> <tr> <td>0603</td> <td>0805</td> </tr> <tr> <td>Cap≤1μF: 1V</td> <td>Cap&lt;10μF: 1V</td> </tr> <tr> <td>1μF&lt;Cap≤4.7μF: 0.5V</td> <td>Cap=10μF: 0.5V</td> </tr> <tr> <td>Cap&gt;4.7μF: 0.2V</td> <td>Cap&gt;10μF: 0.2V</td> </tr> <tr> <td>1206</td> <td>1210</td> </tr> <tr> <td>Cap≤10μF: 1V</td> <td>Cap≤10μF: 1V</td> </tr> <tr> <td>10μF&lt;Cap≤100μF: 0.5V</td> <td>10μF&lt;Cap≤100μF: 0.5V</td> </tr> <tr> <td>Cap&gt;100μF: 0.2V</td> <td>Cap&gt;100μF: 0.2V</td> </tr> </table>	T.C.	Operating Temp	NPO	-55 ~ 125°C at 25°C	X7R	-55 ~ 125°C at 25°C	X5R	-55 ~ 85°C at 25°C	Y5V	-25 ~ 85°C at 20°C	0201	0402	Cap<0.1μF:1V	Cap<1μF: 1V	0.1μF≤Cap<1μF: 0.2V	Cap=1μF: 0.5V	Cap≥1μF: 0.1V	1μF<Cap<10μF: 0.2V		Cap≥10μF: 0.1V	0603	0805	Cap≤1μF: 1V	Cap<10μF: 1V	1μF<Cap≤4.7μF: 0.5V	Cap=10μF: 0.5V	Cap>4.7μF: 0.2V	Cap>10μF: 0.2V	1206	1210	Cap≤10μF: 1V	Cap≤10μF: 1V	10μF<Cap≤100μF: 0.5V	10μF<Cap≤100μF: 0.5V	Cap>100μF: 0.2V	Cap>100μF: 0.2V
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Cap<0.1μF:1V	Cap<1μF: 1V																																															
0.1μF≤Cap<1μF: 0.2V	Cap=1μF: 0.5V																																															
Cap≥1μF: 0.1V	1μF<Cap<10μF: 0.2V																																															
	Cap≥10μF: 0.1V																																															
0603	0805																																															
Cap≤1μF: 1V	Cap<10μF: 1V																																															
1μF<Cap≤4.7μF: 0.5V	Cap=10μF: 0.5V																																															
Cap>4.7μF: 0.2V	Cap>10μF: 0.2V																																															
1206	1210																																															
Cap≤10μF: 1V	Cap≤10μF: 1V																																															
10μF<Cap≤100μF: 0.5V	10μF<Cap≤100μF: 0.5V																																															
Cap>100μF: 0.2V	Cap>100μF: 0.2V																																															
Adhesive Strength of Termination	No remarkable damage or removal of the terminations	Pressurizing force: 0201:2N 0402&0603:5N>0603:10N Test time: 10±1 sec																																														
Vibration Resistance	No remarkable damage Cap change and Q/D.F.: To meet initial spec	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. *Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.																																														
Solderability	95% min. coverage of all metalized area.	Solder temperature: 235±5°C Dipping time: 2±0.5 sec.																																														

**Multilayer Ceramic Chip Capacitor**

Item	Requirement	Test Method															
Bending Test	No remarkable damage. Cap change : NP0: within $\pm 5\%$ or 0.5pF whichever is larger X7R, X5R, X6S, X7S: within $\pm 12.5\%$ Y5V: within $\pm 30\%$ (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)	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 $5\pm 1$ sec. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24 $\pm$ 2 hrs at room temp. Measurement to be made after keeping at room temp. for 24 $\pm$ 2 hrs.															
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 $\pm 7.5\%$ Y5V: within $\pm 20\%$ Q/D.F., I.R. and dielectric strength: To meet initial requirements. 25% max. leaching on each edge	Solder temperature: 260 $\pm$ 5°C Dipping time: 10 $\pm$ 1 sec Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. *Before initial measurement (Class II only): To apply de-aging at 150°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°C for 1hr then set for 24 $\pm$ 2 hrs at room temp															
Temperature Cycle	No remarkable damage. * Cap change : NP0: within $\pm 2.5\%$ or 0.25pF whichever is larger X7R, X5R, X6S, X7S: within $\pm 7.5\%$ Y5V: within $\pm 20\%$ * Q/D.F., I.R. and dielectric strength: To meet initial requirements	Conduct the five cycles according to the temperature and time. <table border="1" data-bbox="991 757 1473 925"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp.+0/-3</td> <td>30<math>\pm</math>3</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<math>\pm</math>3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2-3</td> </tr> </tbody> </table> Before initial measurement (Class II only): To apply de-aging at 150°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°C for 1hr then set for 24 $\pm$ 2 hrs at room temp.	Step	Temp.(°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
Step	Temp.(°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															

Item	Requirement	Test Method																																																																																																		
Humidity (steady state)	<p>No remarkable damage. Cap change: NP0: within <math>\pm 5\%</math> or 0.5pF whichever is larger X7R, X5R: <math>\geq 10V^{**}</math>, within <math>\pm 12.5\%</math>; <math>\leq 6.3V</math> within <math>\pm 25\%</math>; <math>C \geq 1\mu F</math>, within <math>\pm 25\%</math> <b>**10V:</b> 0603 <math>\geq 4.7\mu F</math>; 0402 <math>\geq 1\mu F</math>; 0201 <math>\geq 0.1\mu F</math>, within <math>\pm 25\%</math>; Y5V: <math>\geq 10V</math>, within <math>\pm 30\%</math>; <math>\leq 6.3V</math>, within <math>+30/-40\%</math> Q/D.F. value: NP0: More than 30pF <math>Q \geq 350</math>, <math>10pF \leq C \leq 30pF</math>, <math>Q \geq 275 + 2.5C</math> Less than 10pF <math>Q \geq 200 + 10C</math> X7R, X5R:</p> <table border="1" data-bbox="284 488 1061 1126"> <thead> <tr> <th>Rated vol.</th> <th>D.F. <math>\leq</math></th> <th colspan="2">Exception of D.F. <math>\leq</math></th> </tr> </thead> <tbody> <tr> <td rowspan="3"><math>\geq 100V</math></td> <td rowspan="3">3%</td> <td>6%</td> <td>1206 <math>\geq 0.47\mu F</math></td> </tr> <tr> <td>7.5%</td> <td>0603 <math>\geq 0.068\mu F</math>; 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Class II (X7R, X5R, Y5V)</p> <table border="1" data-bbox="284 1675 1061 1977"> <thead> <tr> <th>Rated Voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">10G<math>\Omega</math> or RxC <math>\geq 10\Omega</math>-F Whichever is smaller</td> </tr> <tr> <td>50V: 0402 <math>&gt; 0.01\mu F</math>; 0603 <math>\geq 1\mu F</math>; 0805 <math>\geq 1\mu F</math>; 1206 <math>\geq 4.7\mu F</math>; 1210 <math>\geq 4.7\mu F</math></td> </tr> <tr> <td>35V: 0603 <math>\geq 1\mu F</math>; 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 2.2\mu F</math>; 1210 <math>\geq 10\mu F</math></td> </tr> <tr> <td>25V: 0201 <math>\geq 0.1\mu F</math>; 0402 <math>\geq 0.22\mu F</math>; 0603 <math>\geq 2.2\mu F</math>; 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 10\mu F</math>; 1210 <math>\geq 10\mu F</math></td> </tr> <tr> <td>16V: 0201 <math>\geq 0.1\mu F</math>; 0402 <math>\geq 0.22\mu F</math>; 0603 <math>\geq 1\mu F</math>; 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 10\mu F</math>; 1210 <math>\geq 47\mu F</math></td> </tr> <tr> <td>10V: 0201 <math>\geq 47nF</math>; 0402 <math>\geq 0.47\mu F</math>; 0603 <math>\geq 0.47\mu F</math>; 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 4.7\mu F</math>; 1210 <math>\geq 47\mu F</math></td> </tr> <tr> <td>6.3V</td> </tr> </tbody> </table>	Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$		$\geq 100V$	3%	6%	1206 $\geq 0.47\mu F$	7.5%	0603 $\geq 0.068\mu F$ ; 0805 $> 0.1\mu F$ ; 1206 $> 1\mu F$ ; 1210 $\geq 2.2\mu F$	20%	0805 $> 0.22\mu F$ ; 1210 $\geq 3.3\mu F$	$\geq 50V$	3%	6%	0201(50V); 0603 $\geq 0.047\mu F$ ; 0805 $\geq 0.18\mu F$ ; 1206 $\geq 0.47\mu F$	10%	0201 $\geq 0.01\mu F$ ; 1210 $\geq 4.7\mu F$	20%	0402 $\geq 0.1\mu F$ ; 0603 $> 0.1\mu F$ ; 0805 $\geq 1\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 10\mu F$	35V	5%	20%	0603 $\geq 1\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 10\mu F$	25V	5%	10%	0201 $\geq 0.01\mu F$ ; 0805 $\geq 1\mu F$ ; 1210 $\geq 10\mu F$	14%	0603 $\geq 0.33\mu F$ ; 1206 $\geq 4.7\mu F$	15%	0201 $\geq 0.1\mu F$ ; 0402 $\geq 0.10\mu F$ ; 0603 $\geq 0.47\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 6.8\mu F$ ; 1210 $\geq 22\mu F$	20%	0402 $\geq 0.47\mu F$	16V	5%	10%	0603 $\geq 0.15\mu F$ ; 0805 $\geq 0.68\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 4.7\mu F$	15%	0201 $\geq 0.01\mu F$ (0201/X7R $\geq 0.022\mu F$ ); 0402 $\geq 0.33\mu F$ ; 0603 $\geq 0.68\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 4.7\mu F$ ; 1210 $\geq 22\mu F$	10V	7.5%	15%	0201 $\geq 0.012\mu F$ ; 0402 $\geq 0.33\mu F$ (0402/X7R $\geq 0.22\mu F$ ); 0603 $\geq 0.33\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 22\mu F$	20%	0201 $\geq 0.1\mu F$ ; 0402 $\geq 1\mu F$	6.3V	15%	30%	0201 $\geq 0.1\mu F$ ; 0402 $\geq 1\mu F$ ; 0603 $\geq 10\mu F$ ; 0805 $\geq 4.7\mu F$ ; 1206 $\geq 47\mu F$ ; 1210 $\geq 100\mu F$	Rated vol.	D.F. $\leq$	Exception of D.F. $\leq$		$\geq 50V$	7.5%	10%	0603 $\geq 0.1\mu F$ ; 0805 $\geq 0.47\mu F$ ; 1206 $\geq 4.7\mu F$	20%	1210 $\geq 6.8\mu F$	35V	10%	-	-	25V	7.5%	10%	0402 $\geq 0.047\mu F$ ; 0603 $\geq 0.1\mu F$ ; 0805 $\geq 0.33\mu F$ ; 1206 $\geq 1\mu F$ ; 1210 $\geq 4.7\mu F$	15%	0402 $\geq 0.068\mu F$ ; 0603 $\geq 0.47\mu F$ ; 1206 $\geq 4.7\mu F$ ; 1210 $\geq 22\mu F$	16V (C < 1.0 $\mu F$ )	10%	12.5%	0402 $\geq 0.068\mu F$ ; 0603 $\geq 0.68\mu F$	20%	0402 $\geq 0.22\mu F$	16V (C $\geq 1.0\mu F$ )	12.5%	20%	0603 $\geq 2.2\mu F$ ; 0805 $\geq 3.3\mu F$ ; 1206 $\geq 10\mu F$ ; 1210 $\geq 22\mu F$ ; 1812 $\geq 47\mu F$	10V	20%	30%	0402 $\geq 0.47\mu F$	6.3V	30%	-	-	Rated Voltage	Insulation Resistance	100V: X7R	10G $\Omega$ or RxC $\geq 10\Omega$ -F Whichever is smaller	50V: 0402 $> 0.01\mu F$ ; 0603 $\geq 1\mu F$ ; 0805 $\geq 1\mu F$ ; 1206 $\geq 4.7\mu F$ ; 1210 $\geq 4.7\mu F$	35V: 0603 $\geq 1\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 2.2\mu F$ ; 1210 $\geq 10\mu F$	25V: 0201 $\geq 0.1\mu F$ ; 0402 $\geq 0.22\mu F$ ; 0603 $\geq 2.2\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 10\mu F$ ; 1210 $\geq 10\mu F$	16V: 0201 $\geq 0.1\mu F$ ; 0402 $\geq 0.22\mu F$ ; 0603 $\geq 1\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 10\mu F$ ; 1210 $\geq 47\mu F$	10V: 0201 $\geq 47nF$ ; 0402 $\geq 0.47\mu F$ ; 0603 $\geq 0.47\mu F$ ; 0805 $\geq 2.2\mu F$ ; 1206 $\geq 4.7\mu F$ ; 1210 $\geq 47\mu F$	6.3V	<p>Test temp.: <math>40 \pm 2^\circ C</math> Humidity: 90~95%RH Test time: 500+24/-0hrs. Before initial measurement (Class II only): To apply de-aging at <math>150^\circ C</math> for 1hr then set for <math>24 \pm 2</math> hrs at room temp. Cap. / DF(Q) / I.R. Measurement to be made after de-aging at <math>150^\circ C</math> for 1hr then set for <math>24 \pm 2</math> hrs at room temp.</p>
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Item	Requirement	Test Method																																																																																																		
Humidity load	<p>No remarkable damage.                      Cap change:                      NP0: <math>\pm 7.5\%</math> or <math>0.75\text{pF}</math> whichever is larger.                      X7R, X5R, X6S, X7S: <math>\geq 10\text{V}^{**}</math>, within <math>\pm 12.5\%</math>; <math>\leq 6.3\text{V}</math> within <math>\pm 25\%</math>;                      TT series &amp; C<math>\geq 1\mu\text{F}</math>, within <math>\pm 25\%</math>                      **10V: 0603 <math>4.7\mu\text{F}</math>; 0402 <math>1\mu\text{F}</math>; 0201 <math>\geq 0.1\mu\text{F}</math>, within <math>\pm 25\%</math>;                      Y5V: <math>\geq 10\text{V}</math>, within <math>\pm 30\%</math>; <math>\leq 6.3\text{V}</math>, within <math>+30\%</math>-<math>40\%</math>                      Q/D.F. value:                      NP0: C<math>\geq 30\text{pF}</math>, Q<math>\geq 200</math>; C<math>&lt; 30\text{pF}</math>, Q<math>\geq 100+10/3\text{C}</math>                      X7R, X5R:</p> <table border="1" data-bbox="284 454 1058 1088"> <thead> <tr> <th>Rated vol.</th> <th>D.F. <math>\leq</math></th> <th colspan="2">Exception of D.F. <math>\leq</math></th> </tr> </thead> <tbody> <tr> <td rowspan="3"><math>\geq 100\text{V}</math></td> <td rowspan="3">3%</td> <td>6%</td> <td>1206 <math>\geq 0.47\mu\text{F}</math></td> </tr> <tr> <td>7.5%</td> <td>0603 <math>\geq 0.068\mu\text{F}</math>; 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Class II (X7R, X5R, Y5V)</p> <table border="1" data-bbox="284 1637 1058 1939"> <thead> <tr> <th>Rated Voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">500M<math>\Omega</math> or RxC <math>\geq 5\ \Omega\text{-F}</math> Whichever is smaller</td> </tr> <tr> <td>50V: 0402 <math>&gt; 0.01\mu\text{F}</math>; 0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 1\mu\text{F}</math>; 1206 <math>\geq 4.7\mu\text{F}</math>; 1210 <math>\geq 4.7\mu\text{F}</math></td> </tr> <tr> <td>35V: 0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 2.2\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td>25V: 0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 0.22\mu\text{F}</math>; 0603 <math>\geq 2.2\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 10\mu\text{F}</math>; 1210 <math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td>16V: 0201 <math>\geq 0.1\mu\text{F}</math>; 0402 <math>\geq 0.22\mu\text{F}</math>; 0603 <math>\geq 1\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 10\mu\text{F}</math>; 1210 <math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>10V: 0201 <math>\geq 47\text{nF}</math>; 0402 <math>\geq 0.47\mu\text{F}</math>; 0603 <math>\geq 0.47\mu\text{F}</math>; 0805 <math>\geq 2.2\mu\text{F}</math>; 1206 <math>\geq 4.7\mu\text{F}</math>; 1210 <math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>6.3V</td> </tr> </tbody> </table>	Rated vol.	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To apply voltage :                      Rated voltage (MAX. 500V)                      Before initial measurement (Class II only): To apply de-aging at <math>150^\circ\text{C}</math> for 1hr then set for <math>24\pm 2</math> hrs at room temp.                      Cap. / DF(Q) / I.R. Measurement to be made after de-aging at <math>150^\circ\text{C}</math> for 1hr then set for <math>24\pm 2</math> hrs at room temp.</p>
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50V: 0402 $> 0.01\mu\text{F}$ ; 0603 $\geq 1\mu\text{F}$ ; 0805 $\geq 1\mu\text{F}$ ; 1206 $\geq 4.7\mu\text{F}$ ; 1210 $\geq 4.7\mu\text{F}$																																																																																																				
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6.3V																																																																																																				

Item	Requirement	Test Method																																																																																										
High Temperature Load (Endurance)	No remarkable damage. Cap change: NP0: $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever is larger X7R, X5R, X6S, X7S: $\geq 10\text{V}^{**}$ , within $\pm 12.5\%$ ; $\leq 6.3\text{V}$ within $\pm 25\%$ ; TT series & $C \geq 1\mu\text{F}$ , within $\pm 25\%$ <b>**10V:</b> 0603 $\geq 4.7\mu\text{F}$ ; 0402 $\geq 1\mu\text{F}$ ; 0201 $\geq 0.1\mu\text{F}$ , within $\pm 25\%$ ; Y5V: $\geq 10\text{V}$ , within $\pm 30\%$ ; $\leq 6.3\text{V}$ , within $+30/-40\%$ Q/D.F. value: NP0: More than 30pF, $Q \geq 350$ $10\text{pF} \leq C < 30\text{pF}$ , $Q \geq 275 + 2.5C$ Less than 10pF, $Q \geq 200 + 10C$ X7R, X5R:	Test temp. : NP0, X7R: $125 \pm 3^\circ\text{C}$ X5R, Y5V: $85 \pm 3^\circ\text{C}$ To apply voltage: (1) $\leq 6.3\text{V}$ or $C \geq 10\mu\text{F}$ : 150% of rated voltage. (2) $10\text{V} \leq U_r < 500\text{V}$ : 200% of rated voltage. (3) 500V: 150% of rated voltage. (4) $U_r \geq 630\text{V}$ : 120% of rated voltage. (5) 100% of rated voltage for below range.																																																																																										
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**Multilayer Ceramic Chip Capacitor**

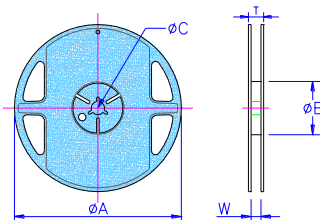
**■Packaging**

Packaging Quantity

Unit: mm

Type	Thickness / Symbol		Packaging (7" Reel)	
			Paper 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	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
	1.60 +0.30 / -0.10	P	-	2K
1210	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
	2.50±0.30	M	-	1K 0.5K
1808	1.25±0.10	D	-	2K
	1.10±0.15	F	-	2K
	1.60±0.20	G	-	2K
	2.00±0.20	K	-	1K
1812	1.25±0.10	D	-	1K
	1.60±0.20	G	-	1K
	2.00±0.20	K	-	1K
	2.50±0.30	M	-	0.5K
	2.80±0.30	U	-	0.5K
0612	0.80±0.10	B	4K	-

Tape and Reel

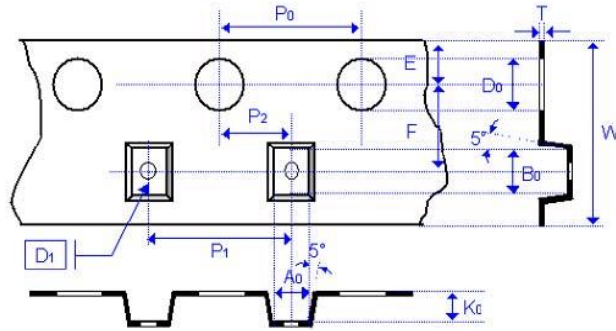


Unit: mm

Type	Chip Size							
	0201	0402	0603	0805	1206/0612	1210	1808	1812
φC	13.0±1.0	13.0±1.0	13.0±1.0	13.0±1.0	13.0±1.0	13.0±1.0	13.0±1.0	13.0±1.0
W	9.0±1.0	9.0±1.0	9.0±1.0	9.0±1.0	9.0±1.0	9.0±1.0	13.5±1.0	13.5±1.0
φA	178±1.0(7")	178±1.0(7")	178±1.0(7")	178±1.0(7")	178±1.0(7")	178±1.0(7")	178±1.0(7")	178±1.0(7")
φB	60.5±1.0(7")	60.5±1.0(7")	60.5±1.0(7")	60.5±1.0(7")	60.5±1.0(7")	60.5±1.0(7")	80.0±1.0(7")	80.0±1.0(7")

**Multilayer Ceramic Chip Capacitor**

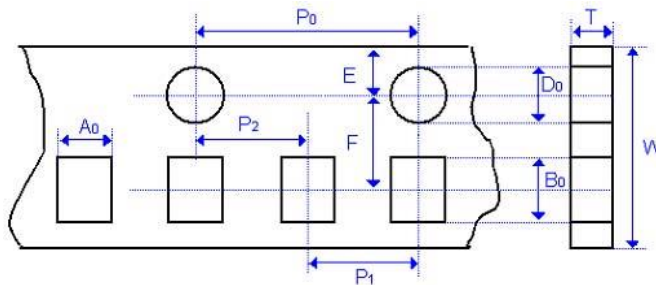
Plastic Tape Size Specification



Unit: mm

Type	0805		1206				1210					1808				1812							
Thickness	D	I	C	J	D	G	P	T	C	D	G	K	M	D	F	G	K	D	F	G	K	M	U
A <sub>0</sub>	<1.80		<200			<2.30		<3.05					<3.20					<3.90					
B <sub>0</sub>	<2.70		<3.70			<4.00		<3.80					<3.95					<5.30					<5.30
T	0.23±0.10		0.23±0.10			0.23±0.10		0.23±0.10					0.23±0.10					0.25±0.10					0.25±0.10
K <sub>0</sub>	<2.50		<2.50			<2.50		<1.50					<2.50					<2.50					<3.50
W	8.00±0.20		8.00±0.20			8.00±0.20		8.00±0.20					8.00±0.20					12.0±0.20					12.0±0.20
P <sub>0</sub>	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 <sub>1</sub>	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 <sub>2</sub>	2.00±0.05		2.00±0.05			2.00±0.05		2.00±0.05					2.00±0.05					2.00±0.10					2.00±0.05
D <sub>0</sub>	1.50+0.1/-0		1.50±0.05			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 <sub>1</sub>	1.00±0.10		1.00±0.10			1.00±0.10		1.00±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
F	3.50±0.05		3.50±0.05			3.50±0.05		3.50±0.05					3.50±0.05					5.50±0.10					5.50±0.10

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 <sub>0</sub>	0.39±0.07	0.70±0.20		1.05±0.30			1.50±0.20		1.50±0.20		1.90±0.50	
B <sub>0</sub>	0.69±0.07	1.20±0.20		1.80±0.30			2.30±0.20		2.30±0.20		3.50±0.50	
T	≤ 0.50	≤ 0.80		≤ 1.20			≤ 1.15		≤ 1.30		≤ 1.30	
W	8.00±0.10	8.00±0.10		8.00±0.10			8.00±0.10		8.00±0.10		8.00±0.10	
P <sub>0</sub>	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 <sub>1</sub>	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 <sub>2</sub>	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 <sub>0</sub>	1.55±0.05	1.55±0.05		1.55±0.05			1.55±0.05		1.55±0.05		1.50±0.05	
E	1.75±0.05	1.75±0.05		1.75±0.05			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	



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