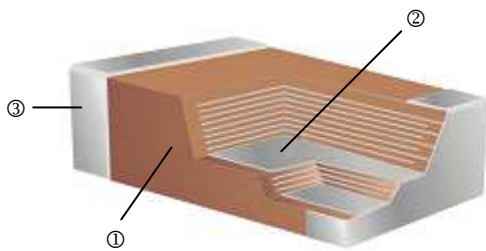


Multilayer Ceramic Chip Capacitor

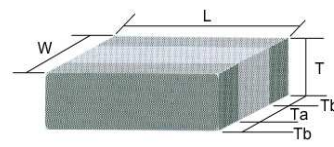
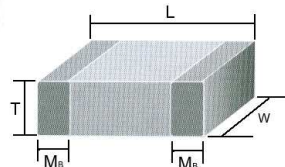
Features

- 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: Ag/Ni/Sn dielectric X7R, Y5V, X5R: Cu/Ni/Sn dielectric



Unit: mm

Dimensions

MC / MCHL / MCRF Type

Type	Size (Inch)	L	W	T / Symbol		M _B	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 ^{#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	10K	-
				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	4K	-
		1.60+0.15/-0.10	0.80+0.15/-0.10	0.50±0.10	H			
		1.60±0.20 ^{#1}	0.80±0.20 ^{#1}	0.80+0.15 / -0.10	X			
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
		2.00±0.20	1.25±0.20	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) ^{***}	4K	-
				0.95±0.10	C		-	3K
				1.25±0.10	D		-	3K
				1.15±0.15	J		-	3K
		3.20±0.20	1.60±0.20	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
							-	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
		3.20±0.40	2.50±0.30	1.60±0.20	G		-	2K
				2.00±0.20	K		-	1K
				2.50±0.30	M		-	1K
				1.25±0.10	D		-	2K
08	1808	4.50±0.40 (4.5+0.5/-0.3) ^{**}	2.03±0.25	1.40±0.15	F	0.75±0.25 (0.50±0.25) ^{***}	-	2K
				1.60±0.20	G		-	2K
				2.00±0.20	K		-	1K

Type	Size (Inch)	L	W	T / Symbol		M _B	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 (L×W)	Capacitance Tolerance	Packaging	Dielectric	Voltage (VDCW)	Capacitance
MC : General; Ultra-small Middle and High Voltage MCHL: High Q and Low ESR 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

■High Q and Low ESR Capacitors for MCHL Series

Capacitance & Voltage

Dielectric		NPO													
EIA	Size	0402				0603				0805					
Code	VDCW	16V	25V	50V	100V	16V	25V	50V	100V	50V	100V	200V	250V	500V	630V
0R5	0.5pF	N^	N^	N^	N^	S^	S^	S^	S^	B	B				
0R6	0.6	N^	N^	N^	N^	S^	S^	S^	S^	B	B				
0R7	0.7	N^	N^	N^	N^	S^	S^	S^	S^	B	B				
0R8	0.8	N^	N^	N^	N^	S^	S^	S^	S^	B	B				
0R9	0.9	N^	N^	N^	N^	S^	S^	S^	S^	B	B				
1R0	1.0	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
1R2	1.2	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
1R5	1.5	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
1R8	1.8	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
2R2	2.2	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
2R7	2.7	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
3R3	3.3	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
3R9	3.9	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
4R7	4.7	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
5R6	5.6	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
6R8	6.8	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
8R2	8.2	N^	N^	N^	N^	S^	S^	S^	S^	B	B	B	B	B	B
100	10	N	N	N	N	S	S	S	S	B	B	B	B	B	B
120	12	N	N	N	N	S	S	S	S	B	B	B	B	B	B
150	15	N	N	N	N	S	S	S	S	B	B	B	B	B	B
180	18	N	N	N	N	S	S	S	S	B	B	B	B	B	B
220	22	N	N	N	N	S	S	S	S	B	B	B	B	B	B
270	27	N	N	N	N	S	S	S	S	B	B	B	B	B	B
330	33	N	N	N	N	S	S	S	S	B	B	B	B	B	B
390	39	N	N	N	N	S	S	S	S	B	B	B	B	B	B
470	47	N	N	N	N	S	S	S	S	B	B	B	B	B	B
560	56	N	N	N	N	S	S	S	S	B	B	B	B	B	B
680	68	N	N	N	N	S	S	S	S	B	B	B	B	B	B
820	82	N	N	N	N	S	S	S	S	B	B	B	B	B	B
101	100	N	N	N	N	S	S	S	S	B	B	B	B	B	B
121	120	N	N	N	N	S	S	S	S	D	D	D	D	D	D
151	150	N	N	N	N	S	S	S	S	D	D	D	D	D	D
181	180	N	N	N	N	S	S	S	S			D	D	D	D
221	220	N	N	N	N	S	S	S	S			D	D	D	D
271	270	N	N	N		S	S	S	S			D	D	D	D
331	330	N	N	N		S	S	S	S			D	D	D	D
391	390	N	N	N		S	S	S	S			D	D	D	D
471	470	N	N	N		S	S	S	S						
561	560					S	S	S	S						
681	680					S	S	S	S						
821	820					S	S	S	S						
102	1000					S	S	S	S						
122	1200					X	X	X							
152	1500					X	X	X							
182	1800					X	X	X							
222	2200					X	X	X							
272	2700					X	X	X							
332	3300					X	X	X							

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

■The "A" mark is expressed product with Ag/Ni/Sn terminations

Multilayer Ceramic Chip Capacitor

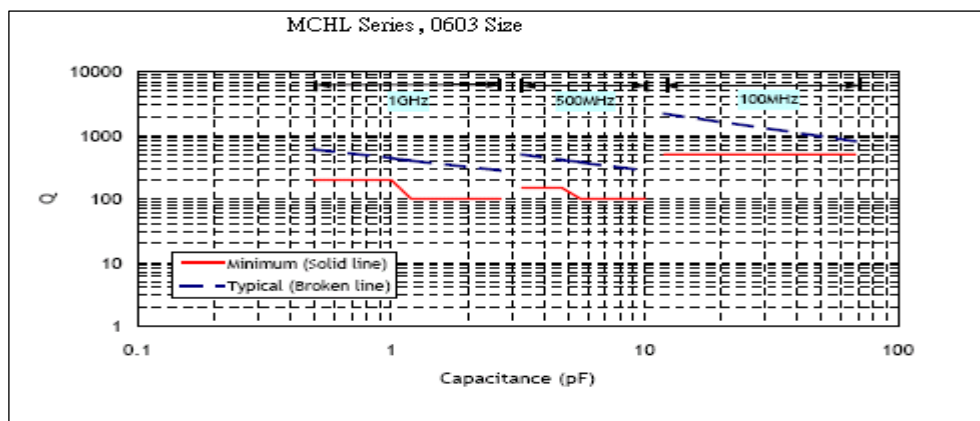
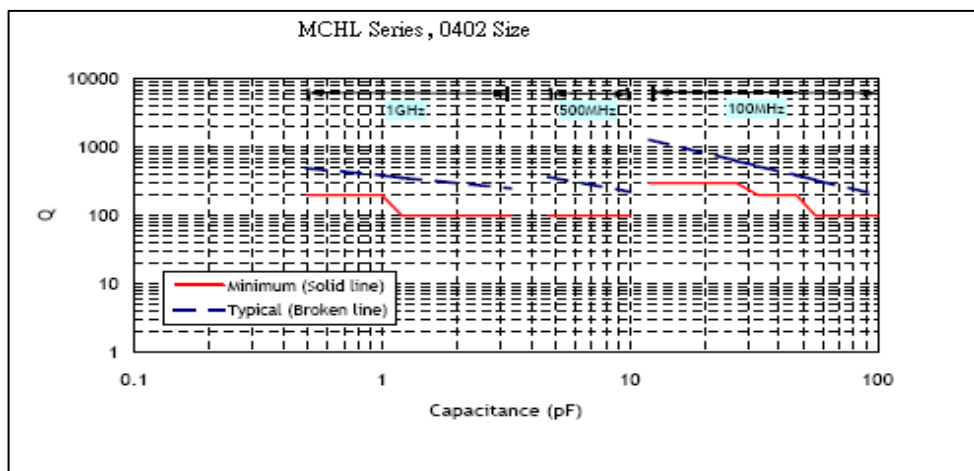
Electrical Data

Dielectric	NPO
Size	0402, 0603, 0805
Capacitance*	0402: 0.5pF ~ 470pF 0603: 0.5pF ~ 3300pF 0805: 0.5pF ~ 390pF
Capacitance tolerance	Cap ≤ 5pF: B(±0.1pF), C(±0.25pF) 5pF < Cap < 10pF: C(±0.25pF), D(±0.50pF) Cap ≥ 10pF: J(±5%)
Rated voltage (VDCW)	16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V
Q *	Cap < 30pF: Q ≥ 400 +20C Cap ≥ 30pF: Q ≥ 1000
Insulation resistance at Ur	≥ 10GΩ or RxC ≥ 100Ω·F whichever is smaller
Operating temperature	-55 to +125°C
Capacitance change	±30 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

Environmental Characteristics

Size	0402, 0603, 0805, 1206, 1210, 1812			
Dielectric	NP0	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

■ NP0: 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

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>Exception of D.F. ≤</th></tr> </thead> <tbody> <tr> <td rowspan="3">≥ 100V</td><td rowspan="3">2.5%</td><td>3% 1206 ≥ 0.047μF</td></tr> <tr> <td>5% 0603 ≥ 0.068μF; 0805 ≥ 0.1μF 1206 > 1μF; 1210 ≥ 2.2μF</td></tr> <tr> <td>10% 0805 > 0.22μF; 1210 ≥ 3.3μF</td></tr> <tr> <td rowspan="3">50V</td><td rowspan="3">2.5%</td><td>3% 0201(50V); 0603 ≥ 0.047μF 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr> <tr> <td>5% 0201 ≥ 0.01μF; 1210 ≥ 4.7μF</td></tr> <tr> <td>10% 0402 ≥ 0.1μF; 0603 > 0.1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr> <tr> <td>35V</td><td>3.5%</td><td>10% 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% 0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr> <tr> <td>7% 0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td></tr> <tr> <td>10% 0201 ≥ 0.1μF; 0402 ≥ 0.10μF; 0603 ≥ 0.47μF 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF</td></tr> <tr> <td>12.5% 0402 ≥ 0.47μF</td></tr> <tr> <td rowspan="2">16V</td><td rowspan="2">3.5%</td><td>5% 0201 ≥ 0.01μF; 0402 ≥ 0.033μF; 0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr> <tr> <td>10% 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% 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% 0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr> <tr> <td rowspan="2">6.3V</td><td rowspan="2">10%</td><td>15% 0201 ≥ 0.1μF; 0402 ≥ 1μF 0603 ≥ 10μF; 0805 ≥ 4.7μF 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr> <tr> <td>20% 0402 ≥ 2.2μF</td></tr> </tbody> </table> <p>Y5V:</p> <table border="1"> <thead> <tr> <th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr> </thead> <tbody> <tr> <td rowspan="2">≥ 50V</td><td rowspan="2">5%</td><td>7% 0603 ≥ 0.1μF; 0805 ≥ 0.47μF; 1206 ≥ 4.7μF</td></tr> <tr> <td>12.5% 1210 ≥ 6.8μF</td></tr> <tr> <td>35V</td><td>7%</td><td>—</td></tr> <tr> <td rowspan="2">25V</td><td rowspan="2">5%</td><td>7% 0402 ≥ 0.047μF; 0603 ≥ 0.1μF 0805 ≥ 0.33μF; 1206 ≥ 1μF 1210 ≥ 4.7μF</td></tr> <tr> <td>9% 0402 ≥ 0.068μF; 0603 ≥ 0.47μF 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr> <tr> <td rowspan="2">16V (C < 1.0μF)</td><td rowspan="2">7%</td><td>9% 0402 ≥ 0.068μF; 0603 ≥ 0.68μF</td></tr> <tr> <td>12.5% 0402 ≥ 0.22μF</td></tr> <tr> <td>16V (C ≥ 1.0μF)</td><td>9%</td><td>12.5% 0603 ≥ 2.2μF; 0805 ≥ 3.3μF 1206 ≥ 10μF; 1210 ≥ 22μF 1812 ≥ 47μF</td></tr> <tr> <td>10V</td><td>12.5%</td><td>20% 0402 ≥ 0.47μF</td></tr> <tr> <td>6.3V</td><td>20%</td><td>-</td></tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥ 100V	2.5%	3% 1206 ≥ 0.047μF	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	5% 0201 ≥ 0.01μF; 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 ≥ 0.1μF(0201/X7R ≥ 0.022μF); 0402 ≥ 0.22μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	5%	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; 0402 ≥ 1μF	6.3V	10%	15% 0201 ≥ 0.1μF; 0402 ≥ 1μF 0603 ≥ 10μF; 0805 ≥ 4.7μF 1206 ≥ 47μF; 1210 ≥ 100μF	20% 0402 ≥ 2.2μF	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%	-	<p>X7R, X5R, Y5V: (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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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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≥ 10GΩ or 100Ω ·F whichever is smaller Rated voltage: 200V~630V	To apply rated voltage(500V max.) for 60sec.																																															
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Temperature Characteristic of Capacitance	<table><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%	With no electrical load. <table><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> *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: <table><tr><td>0201</td><td>0402</td></tr><tr><td>Cap<0.1μF:1V</td><td>Cap<1μF: 1V</td></tr><tr><td>0.1μF≤Cap<1μF: 0.2V</td><td>Cap=1μF: 0.5V</td></tr><tr><td>Cap≥1μF: 0.1V</td><td>1μF<Cap<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<10μF: 1V</td></tr><tr><td>1μF<Cap≤4.7μF: 0.5V</td><td>Cap=10μF: 0.5V</td></tr><tr><td>Cap>4.7μF: 0.2V</td><td>Cap>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<Cap≤100μF: 0.5V</td><td>10μF<Cap≤100μF: 0.5V</td></tr><tr><td>Cap>100μF: 0.2V</td><td>Cap>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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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	<p>No remarkable damage.</p> <p>Cap change :</p> <p>NP0: within $\pm 5\%$ or 0.5pF whichever is larger</p> <p>X7R, X5R, X6S, X7S: within $\pm 12.5\%$</p> <p>Y5V: within $\pm 30\%$</p> <p>(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.</p> <p>*Before initial measurement (Class II only):</p> <p>To apply de-aging at 150°C for 1hr then set for 24\pm2 hrs at room temp.</p> <p>Measurement to be made after keeping at room temp. for 24\pm2 hrs.</p>															
Resistance to Soldering Heat	<p>No remarkable damage.</p> <p>Cap change:</p> <p>NP0: within $\pm 2.5\%$ or 0.25pF whichever is larger</p> <p>X7R, X5R, X6S, X7S: within $\pm 7.5\%$</p> <p>Y5V: within $\pm 20\%$</p> <p>Q/D.F., I.R. and dielectric strength: To meet initial requirements.</p> <p>25% max. leaching on each edge</p>	<p>Solder temperature: 260\pm5°C</p> <p>Dipping time: 10\pm1 sec</p> <p>Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder.</p> <p>*Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24\pm2 hrs at room temp.</p> <p>Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24\pm2 hrs at room temp</p>															
Temperature Cycle	<p>No remarkable damage.</p> <p>* Cap change :</p> <p>NP0: within $\pm 2.5\%$ or 0.25pF whichever is larger</p> <p>X7R, X5R, X6S, X7S: within $\pm 7.5\%$</p> <p>Y5V: within $\pm 20\%$</p> <p>* Q/D.F., I.R. and dielectric strength: To meet initial requirements</p>	<p>Conduct the five cycles according to the temperature and time.</p> <table border="1"> <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\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°C for 1hr then set for 24\pm2 hrs at room temp.</p> <p>Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24\pm2 hrs at room temp.</p>	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.</p> <p>Cap change:</p> <p>NP0: within ±5% or 0.5pF whichever is larger</p> <p>X7R, X5R: ≥10V**, within ±12.5%; ≤ 6.3V within ±25%; C≥ 1uF, within ±25%</p> <p>**10V: 0603≥ 4.7μF; 0402≥ 1μF; 0201≥ 0.1μF, within ±25%;</p> <p>Y5V: ≥10V, within ±30%; ≤ 6.3V, within +30/-40%</p> <p>Q/D.F. value:</p> <p>NP0: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q≥200+10C</p> <p>X7R, X5R:</p> <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th colspan="2">Exception of D.F. ≤</th></tr><tr><td rowspan="3">≥ 100V</td><td rowspan="3">3%</td><td>6%</td><td>1206 ≥ 0.47μF</td></tr><tr><td>7.5%</td><td>0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 > 1μF; 1210 ≥ 2.2μF</td></tr><tr><td>20%</td><td>0805 > 0.22μF; 1210 ≥ 3.3μF</td></tr><tr><td rowspan="3">≥ 50V</td><td rowspan="3">3%</td><td>6%</td><td>0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF</td></tr><tr><td>10%</td><td>0201 ≥ 0.01uF; 1210 ≥ 4.7μF</td></tr><tr><td>20%</td><td>0402 ≥ 0.1μF; 0603 > 0.1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td>35V</td><td>5%</td><td>20%</td><td>0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">5%</td><td>10%</td><td>0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF</td></tr><tr><td>14%</td><td>0603 ≥ 0.33μF; 1206 ≥ 4.7μF</td></tr><tr><td>15%</td><td>0201 ≥ 0.1μF; 0402 ≥ 0.10μF; 0603 ≥ 0.47μF 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF</td></tr><tr><td>20%</td><td>0402 ≥ 0.47μF</td></tr><tr><td rowspan="2">16V</td><td rowspan="2">5%</td><td>10%</td><td>0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF</td></tr><tr><td>15%</td><td>0201 ≥ 0.01μF (0201/X7R ≥ 0.022μF); 0402 ≥ 0.33μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">7.5%</td><td>15%</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>20%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF</td></tr><tr><td>6.3V</td><td>15%</td><td>30%</td><td>0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF 1206 ≥ 47μF; 1210 ≥ 100μF</td></tr></table> <p>Y5V:</p> <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th colspan="2">Exception of D.F. ≤</th></tr><tr><td rowspan="2">≥ 50V</td><td rowspan="2">7.5%</td><td>10%</td><td>0603 ≥ 0.1μF; 0805 ≥ 0.47μF; 1206 ≥ 4.7uF</td></tr><tr><td>20%</td><td>1210 ≥ 6.8μF</td></tr><tr><td>35V</td><td>10%</td><td>—</td><td>—</td></tr><tr><td rowspan="2">25V</td><td rowspan="2">7.5%</td><td>10%</td><td>0402 ≥ 0.047μF; 0603 ≥ 0.1μF; 0805 ≥ 0.33μF; 1206 ≥ 1μF; 1210 ≥ 4.7μF</td></tr><tr><td>15%</td><td>0402 ≥ 0.068μF; 0603 ≥ 0.47μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF</td></tr><tr><td rowspan="2">16V (C < 1.0μF)</td><td rowspan="2">10%</td><td>12.5%</td><td>0402 ≥ 0.068μF; 0603 ≥ 0.68μF</td></tr><tr><td>20%</td><td>0402 ≥ 0.22μF</td></tr><tr><td>16V (C ≥ 1.0μF)</td><td>12.5%</td><td>20%</td><td>0603 ≥ 2.2μF; 0805 ≥ 3.3μF; 1206 ≥ 10μF; 1210 ≥ 22μF; 1812 ≥ 47μF</td></tr><tr><td>10V</td><td>20%</td><td>30%</td><td>0402 ≥ 0.47μF</td></tr><tr><td>6.3V</td><td>30%</td><td>-</td><td>-</td></tr></table> <p>I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.</p> <p>Class II (X7R, X5R, Y5V)</p> <table><tr><th>Rated Voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: X7R</td><td rowspan="7">10GΩ or RxC ≥ 10Ω-F Whichever is 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 vol.	D.F. ≤	Exception of D.F. ≤		≥ 100V	3%	6%	1206 ≥ 0.47μF	7.5%	0603 ≥ 0.068μF; 0805 > 0.1μF; 1206 > 1μF; 1210 ≥ 2.2μF	20%	0805 > 0.22μF; 1210 ≥ 3.3μF	≥ 50V	3%	6%	0201(50V); 0603 ≥ 0.047μF; 0805 ≥ 0.18μF; 1206 ≥ 0.47μF	10%	0201 ≥ 0.01uF; 1210 ≥ 4.7μF	20%	0402 ≥ 0.1μF; 0603 > 0.1μF; 0805 ≥ 1μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	35V	5%	20%	0603 ≥ 1μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 10μF	25V	5%	10%	0201 ≥ 0.01μF; 0805 ≥ 1μF; 1210 ≥ 10μF	14%	0603 ≥ 0.33μF; 1206 ≥ 4.7μF	15%	0201 ≥ 0.1μF; 0402 ≥ 0.10μF; 0603 ≥ 0.47μF 0805 ≥ 2.2μF; 1206 ≥ 6.8μF; 1210 ≥ 22μF	20%	0402 ≥ 0.47μF	16V	5%	10%	0603 ≥ 0.15μF; 0805 ≥ 0.68μF; 1206 ≥ 2.2μF; 1210 ≥ 4.7μF	15%	0201 ≥ 0.01μF (0201/X7R ≥ 0.022μF); 0402 ≥ 0.33μF; 0603 ≥ 0.68μF; 0805 ≥ 2.2μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	10V	7.5%	15%	0201 ≥ 0.012μF; 0402 ≥ 0.33μF (0402/X7R ≥ 0.22μF) 0603 ≥ 0.33μF; 0805 ≥ 2.2μF; 1206 ≥ 2.2μF; 1210 ≥ 22μF	20%	0201 ≥ 0.1μF; 0402 ≥ 1μF	6.3V	15%	30%	0201 ≥ 0.1μF; 0402 ≥ 1μF; 0603 ≥ 10μF; 0805 ≥ 4.7μF 1206 ≥ 47μF; 1210 ≥ 100μF	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥ 50V	7.5%	10%	0603 ≥ 0.1μF; 0805 ≥ 0.47μF; 1206 ≥ 4.7uF	20%	1210 ≥ 6.8μF	35V	10%	—	—	25V	7.5%	10%	0402 ≥ 0.047μF; 0603 ≥ 0.1μF; 0805 ≥ 0.33μF; 1206 ≥ 1μF; 1210 ≥ 4.7μF	15%	0402 ≥ 0.068μF; 0603 ≥ 0.47μF; 1206 ≥ 4.7μF; 1210 ≥ 22μF	16V (C < 1.0μF)	10%	12.5%	0402 ≥ 0.068μF; 0603 ≥ 0.68μF	20%	0402 ≥ 0.22μF	16V (C ≥ 1.0μF)	12.5%	20%	0603 ≥ 2.2μF; 0805 ≥ 3.3μF; 1206 ≥ 10μF; 1210 ≥ 22μF; 1812 ≥ 47μF	10V	20%	30%	0402 ≥ 0.47μF	6.3V	30%	-	-	Rated Voltage	Insulation Resistance	100V: X7R	10GΩ or RxC ≥ 10Ω-F Whichever is 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.: 40±2°C</p> <p>Humidity: 90~95%RH</p> <p>Test time: 500+24/-0hrs.</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> <p>Cap. / DF(Q) / I.R. Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</p>
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Multilayer Ceramic Chip Capacitor

Item	Requirement	Test Method																																																		
Humidity load	No remarkable damage. Cap change: NP0: $\pm 7.5\%$ or $0.75\mu\text{F}$ 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 $\pm 25\%$ $^{**}10\text{V}$: 0603 $4.7\mu\text{F}$; 0402 $1\mu\text{F}$; 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: C $\geq 30\mu\text{F}$, Q ≥ 200 ; C $< 30\mu\text{F}$, Q $\geq 100+10/3\text{C}$ X7R, X5R:	Test temp. : $40\pm 2^\circ\text{C}$ 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°C for 1hr then set for 24 ± 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 ± 2 hrs at room temp.																																																		
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	$\geq 100\text{V}$	3%	6%	$1206 \geq 0.47\mu\text{F}$																																																
			7.5%	$0603 \geq 0.068\mu\text{F}$; $0805 > 0.1\mu\text{F}$; $1206 > 1\mu\text{F}$; $1210 \geq 2.2\mu\text{F}$																																																
			20%	$0805 > 0.22\mu\text{F}$; $1210 \geq 3.3\mu\text{F}$																																																
	$\geq 50\text{V}$	3%	6%	$0201(50\text{V})$; $0603 \geq 0.047\mu\text{F}$; $0805 \geq 0.18\mu\text{F}$; $1206 \geq 0.47\mu\text{F}$																																																
			10%	$0201 \geq 0.01\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$																																																
			20%	$0402 \geq 0.1\mu\text{F}$; $0603 > 0.1\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$																																																
	35V	5%	20%	$0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$																																																
	25V	5%	10%	$0201 \geq 0.01\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1210 \geq 10\mu\text{F}$																																																
			14%	$0603 \geq 0.33\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$																																																
			15%	$0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.10\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 6.8\mu\text{F}$; $1210 \geq 22\mu\text{F}$																																																
			20%	$0402 \geq 0.47\mu\text{F}$																																																
	16V	5%	10%	$0603 \geq 0.15\mu\text{F}$; $0805 \geq 0.68\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$																																																
15%			$0201 \geq 0.01\mu\text{F}$ ($0201/\text{X7R} \geq 0.022\mu\text{F}$); $0402 \geq 0.33\mu\text{F}$; $0603 \geq 0.68\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$																																																	
10V	7.5%	15%	$0201 \geq 0.012\mu\text{F}$; $0402 \geq 0.33\mu\text{F}$ ($0402/\text{X7R} \geq 0.22\mu\text{F}$); $0603 \geq 0.33\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 22\mu\text{F}$																																																	
		20%	$0201 \geq 0.1\mu\text{F}$; $0402 \geq 1\mu\text{F}$																																																	
6.3V	15%	30%	$0201 \geq 0.1\mu\text{F}$; $0402 \geq 1\mu\text{F}$; $0603 \geq 10\mu\text{F}$; $0805 \geq 4.7\mu\text{F}$; $1206 \geq 47\mu\text{F}$; $1210 \geq 100\mu\text{F}$																																																	
Y5V:	<table><tr><th>Rated vol.</th><th>D.F. \leq</th><th colspan="2">Exception of D.F. \leq</th></tr><tr><td rowspan="2">$\geq 50\text{V}$</td><td rowspan="2">7.5%</td><td>10%</td><td>$0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$</td></tr><tr><td>20%</td><td>$1210 \geq 6.8\mu\text{F}$</td></tr><tr><td>35V</td><td>10%</td><td>—</td><td>—</td></tr><tr><td rowspan="2">25V</td><td rowspan="2">7.5%</td><td>10%</td><td>$0402 \geq 0.047\mu\text{F}$; $0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.33\mu\text{F}$; $1206 \geq 1\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$</td></tr><tr><td>15%</td><td>$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$</td></tr><tr><td>16V (C $< 1.0\mu\text{F}$)</td><td>10%</td><td>12.5%</td><td>$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.68\mu\text{F}$</td></tr><tr><td rowspan="2">16V (C $\geq 1.0\mu\text{F}$)</td><td rowspan="2">12.5%</td><td>20%</td><td>$0603 \geq 2.2\mu\text{F}$; $0805 \geq 3.3\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 22\mu\text{F}$; $1812 \geq 47\mu\text{F}$</td></tr><tr><td>30%</td><td>$0402 \geq 0.47\mu\text{F}$</td></tr><tr><td>10V</td><td>20%</td><td>30%</td><td>$0402 \geq 0.47\mu\text{F}$</td></tr><tr><td>6.3V</td><td>30%</td><td>-</td><td>-</td></tr></table>	Rated vol.	D.F. \leq	Exception of D.F. \leq		$\geq 50\text{V}$	7.5%	10%	$0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$	20%	$1210 \geq 6.8\mu\text{F}$	35V	10%	—	—	25V	7.5%	10%	$0402 \geq 0.047\mu\text{F}$; $0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.33\mu\text{F}$; $1206 \geq 1\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$	15%	$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$	16V (C $< 1.0\mu\text{F}$)	10%	12.5%	$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.68\mu\text{F}$	16V (C $\geq 1.0\mu\text{F}$)	12.5%	20%	$0603 \geq 2.2\mu\text{F}$; $0805 \geq 3.3\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 22\mu\text{F}$; $1812 \geq 47\mu\text{F}$	30%	$0402 \geq 0.47\mu\text{F}$	10V	20%	30%	$0402 \geq 0.47\mu\text{F}$	6.3V	30%	-	-													
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I.R.: $\geq 10\text{V}$, 500M Ω or 25 $\Omega\text{-F}$ whichever is smaller. Class II (X7R, X5R, Y5V)	<table><tr><th>Rated Voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: X7R</td><td rowspan="7">500MΩ or RxC $\geq 5\Omega\text{-F}$ Whichever is smaller</td></tr><tr><td>50V: $0402 > 0.01\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$</td></tr><tr><td>35V: $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td></tr><tr><td>25V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td></tr><tr><td>16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$</td></tr><tr><td>10V: $0201 \geq 47\text{nF}$; $0402 \geq 0.47\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 47\mu\text{F}$</td></tr><tr><td>6.3V</td></tr></table>	Rated Voltage	Insulation Resistance	100V: X7R	500M Ω or RxC $\geq 5\Omega\text{-F}$ Whichever is smaller	50V: $0402 > 0.01\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 1\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$	35V: $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$	25V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$	16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 1\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$	10V: $0201 \geq 47\text{nF}$; $0402 \geq 0.47\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 47\mu\text{F}$	6.3V																																									
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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 $\pm 25\%$ $^{**}10\text{V}$: 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 ≥ 350 10pF \leq C $<$ 30pF, Q $\geq 275+2.5\text{C}$ Less than 10pF, Q $\geq 200+10\text{C}$ X7R, X5R:					
	Rated vol.	D.F. \leq	Exception of D.F. \leq			
	$\geq 100\text{V}$	3%	6%	1206 $\geq 0.47\mu\text{F}$		
			7.5%	0603 $\geq 0.068\mu\text{F}$; 0805 $> 0.1\mu\text{F}$; 1206 $> 1\mu\text{F}$; 1210 $\geq 2.2\mu\text{F}$		
			20%	0805 $> 0.22\mu\text{F}$; 1210 $\geq 3.3\mu\text{F}$		
	$\geq 50\text{V}$	3%	6%	0201(50V); 0603 $\geq 0.047\mu\text{F}$; 0805 $\geq 0.18\mu\text{F}$; 1206 $\geq 0.47\mu\text{F}$		
			10%	0201 $\geq 0.01\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$		
			20%	0402 $\geq 0.1\mu\text{F}$; 0603 $> 0.1\mu\text{F}$; 0805 $\geq 1\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$		
	35V	5%	20%	0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$		
	25V	5%	10%	0201 $\geq 0.01\mu\text{F}$; 0805 $\geq 1\mu\text{F}$; 1210 $\geq 10\mu\text{F}$		
			14%	0603 $\geq 0.33\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$		
			15%	0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.10\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$ 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 6.8\mu\text{F}$; 1210 $\geq 22\mu\text{F}$		
			20%	0402 $\geq 0.47\mu\text{F}$		
	16V	5%	10%	0603 $\geq 0.15\mu\text{F}$; 0805 $\geq 0.68\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$		
			15%	0201 $\geq 0.01\mu\text{F}$ (0201/X7R $\geq 0.022\mu\text{F}$); 0402 $\geq 0.33\mu\text{F}$; 0603 $\geq 0.68\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$		
	10V	7.5%	15%	0201 $\geq 0.012\mu\text{F}$; 0402 $\geq 0.33\mu\text{F}$ (0402/X7R $\geq 0.22\mu\text{F}$); 0603 $\geq 0.33\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 22\mu\text{F}$		
			20%	0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$		
	6.3V	15%	30%	0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 1\mu\text{F}$; 0603 $\geq 10\mu\text{F}$; 0805 $\geq 4.7\mu\text{F}$ 1206 $\geq 47\mu\text{F}$; 1210 $\geq 100\mu\text{F}$		
Y5V:						
Rated vol.	D.F. \leq	Exception of D.F. \leq				
$\geq 50\text{V}$	7.5%	10%	0603 $\geq 0.1\mu\text{F}$; 0805 $\geq 0.47\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$			
		20%	1210 $\geq 6.8\mu\text{F}$			
35V	10%	—	—			
25V	7.5%	10%	0402 $\geq 0.047\mu\text{F}$; 0603 $\geq 0.1\mu\text{F}$; 0805 $\geq 0.33\mu\text{F}$; 1206 $\geq 1\mu\text{F}$; 1210 $\geq 4.7\mu\text{F}$			
		15%	0402 $\geq 0.068\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 22\mu\text{F}$			
16V (C $< 1.0\mu\text{F}$)	10%	12.5%	0402 $\geq 0.068\mu\text{F}$; 0603 $\geq 0.68\mu\text{F}$			
16V (C $\geq 1.0\mu\text{F}$)	12.5%	20%	0402 $\geq 0.22\mu\text{F}$			
		20%	0603 $\geq 2.2\mu\text{F}$; 0805 $\geq 3.3\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 22\mu\text{F}$; 1812 $\geq 47\mu\text{F}$			
10V	20%	30%	0402 $\geq 0.47\mu\text{F}$			
6.3V	30%	-	-			
I.R.: $\geq 10\text{V}$, 1G Ω or 50 Ω -F whichever is smaller.						
Class II (X7R, X5R, Y5V)						
Rated Voltage			Insulation Resistance			
100V: X7R			500M Ω or RxC $\geq 5\Omega$ -F Whichever is smaller			
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 $\geq 4.7\mu\text{F}$						
35V: 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 2.2\mu\text{F}$; 1210 $\geq 10\mu\text{F}$						
25V: 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.22\mu\text{F}$; 0603 $\geq 2.2\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 10\mu\text{F}$						
16V: 0201 $\geq 0.1\mu\text{F}$; 0402 $\geq 0.22\mu\text{F}$; 0603 $\geq 1\mu\text{F}$; 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 10\mu\text{F}$; 1210 $\geq 47\mu\text{F}$						
10V: 0201 $\geq 47\text{nF}$; 0402 $\geq 0.47\mu\text{F}$; 0603 $\geq 0.47\mu\text{F}$ 0805 $\geq 2.2\mu\text{F}$; 1206 $\geq 4.7\mu\text{F}$; 1210 $\geq 47\mu\text{F}$						
6.3V						
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) 10V \leq Ur $<$ 500V: 200% of rated voltage. (3) 500V: 150% of rated voltage. (4) Ur \geq 630V: 120% of rated voltage. (5) 100% of rated voltage for below range.						
Size	Dielectric	Rated voltage	Capacitance range			
0201	X5R, X7R	$\leq 10\text{V}$	C $\geq 0.1\mu\text{F}$			
		$\geq 16\text{V}$	C $> 0.1\mu\text{F}$			
0402	X5R, X7R, Y5V	6.3V, 10V, 16V, 25V	C $\geq 1.0\mu\text{F}$			
0603	X5R, X7R	6.3V, 10V, 25V, 35V	C $\geq 4.7\mu\text{F}$			
			C $\geq 1.0\mu\text{F}$			
0805	X5R, X7R	6.3V	C $\geq 22\mu\text{F}$			
		10V~50V	C $\geq 10\mu\text{F}$			
1206	X5R, X7R	6.3V	C $\geq 47\mu\text{F}$			
		NPO	C $\geq 1.5\mu\text{F}$			
1210	X5R, X7R	16V	C $\geq 47\mu\text{F}$			
		X7R 100V	C $\geq 3.3\mu\text{F}$			
(6) 150% of rated voltage for below range						
Size	Dielectric	Rated voltage	Capacitance range			
0201	X5R, X7R	16V, 25V	C $\geq 0.1\mu\text{F}$			
		X7R 16V	C $> 0.022\mu\text{F}$			
0402	X5R, X7R, Y5V	50V	C $\geq 1.0\mu\text{F}$			
		10~25V	C $\geq 0.022\mu\text{F}$			
0603	X7R	16V	C $\geq 0.47\mu\text{F}$			
		50V	C $\geq 0.1\mu\text{F}$			
		10V, 16V, 50V	C $\geq 1.0\mu\text{F}$			
0805	X5R, X7R	16V	C $\geq 2.2\mu\text{F}$			
		10V~50V	C $\geq 4.7\mu\text{F}$			
		50V	C $\geq 2.2\mu\text{F}$			
1206	X5R, X7R	100V	C $\geq 1.0\mu\text{F}$			
1210	X5R, X7R	50V~100V	C $\geq 2.2\mu\text{F}$			

Multilayer Ceramic Chip Capacitor

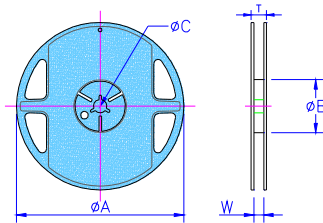
■Packaging

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
	1.25±0.20	I	-	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
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	-

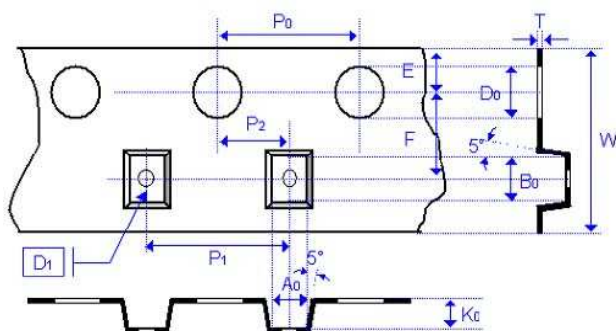
Tape and Reel



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")

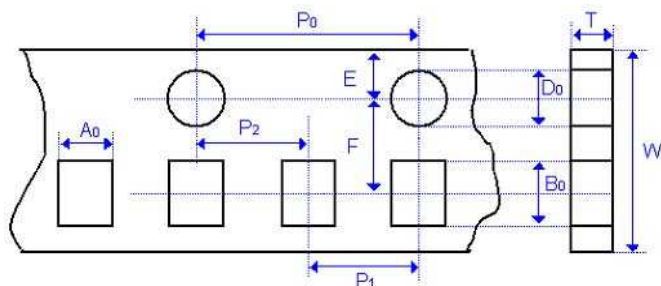
Plastic Tape Size Specification



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 ₀	<1.80		<200			<2.30		<3.05		<3.05			<3.20		<2.50		<3.90								
B ₀	<2.70		<3.70			<4.00		<3.80		<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			0.23±0.10		0.25±0.10		0.25±0.10								
K ₀	<2.50		<2.50			<2.50		<1.50		<2.50			<3.00		<2.50		<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			8.00±0.20		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±0.10		2.00±0.05								
D ₀	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		1.50+0.1/-0								
D ₁	1.00±0.10		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		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		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 ₀	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 ₀	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 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	1.55±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	