

# Multilayer Ceramic Chip Capacitor

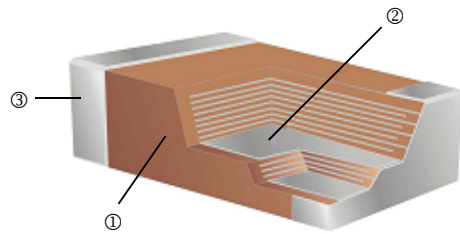
## MC Series

### Features

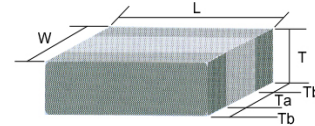
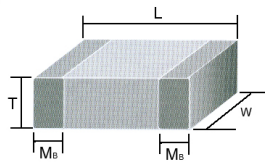
- Wide capacitance range, extremely compact size
- Low inductance of capacitor for high frequency application
- Excellent solderability and resistance to soldering heat, suitable for flow and reflow soldering
- Adaptable to high-speed surface mount assembly
- Conform to EIAJ-RC3402, and also compatible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



### Dimensions

MC / MCHL / 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	-
02	0402	1.00±0.05	0.50±0.05	0.50±0.05	N	0.25 +0.05 / -0.10	10K	-
03	0603	1.60±0.10	0.80±0.10	0.80±0.07	S	0.40±0.15	4K	-
		1.60 +0.15 / -0.10	0.80 +0.15 / -0.10	0.80 +0.05 / -0.10	X		4K	
05	0805	2.00±0.15	1.25±0.10	0.60±0.10	A	0.50±0.20	4K	-
				0.80±0.10	B		4K	-
		1.25±0.10	D	-	3K			
		0.85±0.10	T	4K	-			
06	1206	3.20±0.15	1.60±0.15	1.25±0.20	I	0.60±0.20	-	3K
				0.80±0.10	B		4K	-
		0.95±0.10	C	-	3K			
		1.25±0.10	D	-	3K			
06	1206	3.20±0.20	1.60±0.20	1.15±0.15	J	0.60±0.20	-	3K
				1.60±0.20	G		-	2K
		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	0.80±0.10	B	0.75±0.25	-	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					
08	1808	4.50±0.40	2.03±0.25	1.25±0.10	D	0.75±0.25	-	2K
				2.00±0.20	K		-	1K
12	1812	4.50±0.40	3.20±0.30	1.25±0.10	D	0.75±0.25	-	1K
				2.00±0.20	K		-	1K
		3.20±0.40	2.50±0.30	M	-		0.5K	



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
<b>Product Type</b> 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	<b>Dimensions (L×W)</b> 01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 08: 1808 12: 1812 43: 0612	<b>Capacitance Tolerance</b> 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%	<b>Packaging</b> T: Taping Reel	<b>Dielectric</b> N: NPO (COG) B: X7R F: Y5V X: X5R	<b>Voltage (VDCW)</b> 6V3: 6.3V 250: 25V 500: 50V 101: 100V 102: 1000V 202: 2000V 302: 3000V	<b>Capacitance</b> 3R9: 3.9pF 150: 15pF 181: 180pF 225: 2.2μF 476: 47μF 107: 100μF

### 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
0R5	0.5 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
0R6	0.6 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
0R7	0.7 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
0R8	0.8 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
0R9	0.9 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
1R0	1.0 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
1R2	1.2 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
1R5	1.5 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
1R8	1.8 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
2R2	2.2 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
2R7	2.7 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
3R3	3.3 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
3R9	3.9 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
4R7	4.7 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
5R6	5.6 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
6R8	6.8 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
8R2	8.2 pF	N^	N^	N^	N^	N^	S	S	S	S	S	A	A	A	A	A
100	10 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
120	12 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
150	15 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
180	18 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
220	22 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
270	27 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
330	33 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
390	39 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A



470	47 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
560	56 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
680	68 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
820	82 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
101	100 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
121	120 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
151	150 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
181	180 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
221	220 pF	N	N	N	N	N	S	S	S	S	S	A	A	A	A	A
271	270 pF	N	N	N	N		S	S	S	S	S	A	A	A	A	A
331	330 pF	N	N	N	N		S	S	S	S	S	A	A	A	A	A
391	390 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
471	470 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
561	560 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
681	680 pF	N	N	N	N		S	S	S	S	S	B	B	B	B	B
821	820 pF						S	S	S	S	S	B	B	B	B	B
102	1.0 nF						S	S	S	S	S	B	B	B	B	B
122	1.2 nF						X	X	X	X		B	B	B	B	B
152	1.5 nF						X	X	X	X		B	B	B	B	B
182	1.8 nF						X	X	X	X		B	B	B	B	B
222	2.2 nF						X	X	X	X		B	B	B	B	B
272	2.7 nF						X	X	X	X		D	D	D	D	D
332	3.3 nF						X	X	X	X		D	D	D	D	D
392	3.9 nF											D	D	D	D	D
472	4.7 nF											D	D	D	D	
562	5.6 nF											D^	D^			
682	6.8 nF											D^	D^			
822	8.2 nF											D^	D^			
103	10 nF											D^	D^			
123	12 nF											D^	D^			

- The letter in the cell is the product thickness
- The “^” mark represents product with Ag/Ni/Sn terminal

Capacitance & Voltage (NPO)

Dielectric		NPO													
EIA	Size	1206					1210					1812			
Code	VDCW	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	16V	50V	100V	
1R8	1.8 pF	B	B	B	B	B									
2R2	2.2 pF	B	B	B	B	B									
2R7	2.7 pF	B	B	B	B	B									
3R3	3.3 pF	B	B	B	B	B					C^				
3R9	3.9 pF	B	B	B	B	B					C^				
4R7	4.7 pF	B	B	B	B	B					C^				
5R6	5.6 pF	B	B	B	B	B					C^				
6R8	6.8 pF	B	B	B	B	B					C^				
8R2	8.2 pF	B	B	B	B	B					C^				
100	10 pF	B	B	B	B	B					C^				D^
120	12 pF	B	B	B	B	B					C^				D^
150	15 pF	B	B	B	B	B					C^				D^
180	18 pF	B	B	B	B	B					C^				D^
220	22 pF	B	B	B	B	B	C^	C^	C^	C^	C^				D^
270	27 pF	B	B	B	B	B	C^	C^	C^	C^	C^				D^



330	33 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
390	39 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
470	47 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
560	56 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
680	68 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
820	82 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
101	100 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
121	120 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
151	150 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
181	180 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
221	220 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
271	270 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
331	330 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
391	390 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
471	470 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
561	560 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
681	680 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
821	820 pF	B	B	B	B	B	C^	C^	C^	C^	C^					D^
102	1.0 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
122	1.2 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
152	1.5 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
182	1.8 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
222	2.2 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
272	2.7 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
332	3.3 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
392	3.9 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
472	4.7 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
562	5.6 nF	B	B	B	B	B	C^	C^	C^	C^	C^	D^	D^			D^
682	6.8 nF	C	C	C	C	C	C^	C^	C^	C^	C^	D^	D^			D^
822	8.2 nF	D	D	D	D	D	C^	C^	C^	C^	C^	D^	D^			D^
103	10 nF	D	D	D	D	D	C^	C^	C^	C^	C^	D^	D^			D^
123	12 nF	D^	D^				C^	C^	D^	D^	D^	D^	D^			D^
153	15 nF	D^	D^				C^	C^	D^	D^	D^	D^	D^			D^
183	18 nF	D^	D^											D^	D^	D^
223	22 nF	D^	D^											D^	D^	D^
273	27 nF	D^	D^											D^	D^	D^
333	33 nF	D^	D^											D^	D^	D^
393	39 nF	G^	G^													

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Capacitance & Voltage (X7R)

Dielectric		X7R															
EIA	Size	0402				0603					0805						
Code	VDCW	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V
101	100 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
121	120 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
151	150 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
181	180 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
221	220 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
271	270 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
331	330 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B



391	390 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
471	470 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
561	560 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
681	680 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
821	820 pF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
102	1.0 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
122	1.2 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
152	1.5 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
182	1.8 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
222	2.2 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
272	2.7 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
332	3.3 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
392	3.9 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
472	4.7 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
562	5.6 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
682	6.8 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
822	8.2 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
103	10 nF	N	N	N	N		S	S	S	S	S		B	B	B	B	B
123	12 nF	N	N	N			S	S	S	S			B	B	B	B	B
153	15 nF	N	N	N			S	S	S	S			B	B	B	B	B
183	18 nF	N	N	N			S	S	S	S			B	B	B	B	B
223	22 nF	N	N	N			S	S	S	S			B	B	B	B	B
273	27 nF	N	N	N			S	S	S	S			B	B	B	B	D
333	33 nF	N	N	N			S	S	S	X			B	B	B	B	D
393	39 nF	N	N	N			S	S	S	X			B	B	B	B	D
473	47 nF	N	N	N			S	S	S	X			B	B	B	B	D
563	56 nF	N	N				S	S	S	X			B	B	B	B	D
683	68 nF	N	N				S	S	S	X			B	B	B	B	D
823	82 nF	N	N				S	S	S	X			B	B	B	B	D
104	100 nF	N	N				S	S	S	X			B	B	B	B	D
124	120 nF						S	X	X				D	D	D	D	
154	150 nF						S	X	X				D	D	D	D	
184	180 nF						S	X	X				D	D	D	D	
224	220 nF					X	S	X	X				D	D	D	D	
274	270 nF					X	X	X	X				D	D	D	I	
334	330 nF					X	X	X	X				D	D	D	I	
394	390 nF					X	X	X	X				D	D	D	I	
474	470 nF					X	X	X	X				D	D	D	I	
564	560 nF					X	X						D	D	D		
684	680 nF					X	X						D	D	D		
824	820 nF					X	X						D	D	D		
105	1.0 μF					X	X						D	D	D		
155	1.5 μF												I	I			
225	2.2 μF											I	I	I	I		
335	3.3 μF																
475	4.7 μF																

■ The letter in the cell is the product thickness



Capacitance & Voltage (X7R)

Dielectric		X7R															
EIA	Size	1206					1210					1812					
Code	VDCW	6.3V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V
101	100 pF																
121	120 pF																
151	150 pF		B	B	B	B	B										
181	180 pF		B	B	B	B	B										
221	220 pF		B	B	B	B	B										
271	270 pF		B	B	B	B	B										
331	330 pF		B	B	B	B	B										
391	390 pF		B	B	B	B	B										
471	470 pF		B	B	B	B	B										
561	560 pF		B	B	B	B	B										
681	680 pF		B	B	B	B	B										
821	820 pF		B	B	B	B	B										
102	1.0 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
122	1.2 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
152	1.5 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
182	1.8 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
222	2.2 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
272	2.7 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
332	3.3 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
392	3.9 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
472	4.7 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
562	5.6 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
682	6.8 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
822	8.2 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
103	10 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
123	12 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
153	15 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
183	18 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
223	22 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
273	27 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
333	33 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
393	39 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
473	47 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
563	56 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
683	68 nF		B	B	B	B	B	C	C	C	C	C	D	D	D	D	D
823	82 nF		B	B	B	B	D	C	C	C	C	C	D	D	D	D	D
104	100 nF		B	B	B	B	D	C	C	C	C	C	D	D	D	D	D
124	120 nF		B	B	B	B	D	C	C	C	C	C	D	D	D	D	D
154	150 nF		C	C	C	C	G	C	C	C	C	D	D	D	D	D	D
184	180 nF		C	C	C	C	G	C	C	C	C	D	D	D	D	D	D
224	220 nF		C	C	C	C	G	C	C	C	C	D	D	D	D	D	D
274	270 nF		C	C	C	D		C	C	C	C	G	D	D	D	D	D
334	330 nF		C	C	C	D		C	C	C	D	G	D	D	D	D	D
394	390 nF		C	C	J	P		C	C	C	D	M	D	D	D	D	D
474	470 nF		J	J	J	P		C	C	C	D	M	D	D	D	D	K
564	560 nF		J	J	J	P		D	D	D	D	M	D	D	D	D	K
684	680 nF		J	J	J	P		D	D	D	D	K	D	D	D	K	K
824	820 nF		J	J	J	P		D	D	D	D	K	D	D	D	K	K
105	1.0 µF		J	J	J	P		D	D	D	D	K	D	D	D	K	K
155	1.5 µF	J	J	J													K
225	2.2 µF	J	J	J	P				K	G						M	M









			0805 $\geq 0.68\mu\text{F}$ 1206 $\geq 2.2\mu\text{F}$ 1210 $\geq 4.7\mu\text{F}$			$\leq 12.5\%$	0402 $\geq 0.22\mu\text{F}$
		$\leq 10\%$	0603 $\geq 0.68\mu\text{F}$ 0805 $\geq 0.68\mu\text{F}$ 1206 $\geq 4.7\mu\text{F}$ 1210 $\geq 22\mu\text{F}$	16V (C $\geq 1.0\mu\text{F}$ )	$\leq 9.0\%$	$\leq 12.5\%$	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	$\leq 5.0\%$	$\leq 10\%$	0402 $\geq 0.33\mu\text{F}$ 0603 $\geq 0.33\mu\text{F}$ 0805 $\geq 2.2\mu\text{F}$ 1206 $\geq 2.2\mu\text{F}$ 1210 $\geq 22\mu\text{F}$	10V	$\leq 12.5\%$	$\leq 20\%$	0402 $\geq 0.47\mu\text{F}$
		$\leq 15\%$	0402 $\geq 1\mu\text{F}$				
6.3V	$\leq 10\%$	$\leq 15\%$	0603 $\geq 10\mu\text{F}$ 0805 $\geq 4.7\mu\text{F}$ 1210 $\geq 100\mu\text{F}$	6.3V	$\leq 20\%$	—	—
		$\leq 20\%$	0402 $\geq 2.2\mu\text{F}$				

### ■ 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	630	200	250	500	630	1000	2000	200	250	500	630	1000	2000	1000	2000	3000	200	250	500	630	1000	2000	3000		
0R5	0.5 pF	S	S	A	A	A	A																								
1R0	1.0 pF	S	S	A	A	A	A																								
1R2	1.2 pF	S	S	A	A	A	A																								
1R5	1.5 pF	S	S	A	A	A	A	B	B	B	B	B	B																		
1R8	1.8 pF	S	S	A	A	A	A	B	B	B	B	B	B																		
2R2	2.2 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
2R7	2.7 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
3R3	3.3 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
3R9	3.9 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
4R7	4.7 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
5R6	5.6 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
6R8	6.8 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
8R2	8.2 pF	S	S	A	A	A	A	B	B	B	B	B	B								D	D	D								
100	10 pF	S	S	A	A	A	A	B	B	B	B	B	B	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
120	12 pF	S	S	A	A	A	A	B	B	B	B	B	B	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
150	15 pF	S	S	A	A	A	A	B	B	B	B	B	B	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
180	18 pF	S	S	A	A	A	A	B	B	B	B	B	B	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
220	22 pF	S	S	A	A	A	A	B	B	B	B	B	B	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
270	27 pF	S	S	A	A	A	A	B	B	B	B	B	B	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
330	33 pF	S	S	A	A	A	A	B	B	B	B	B	C	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
390	39 pF	S	S	A	A	A	A	B	B	B	B	B	C	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
470	47 pF	S	S	A	A	A	A	B	B	B	B	C	C	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	C	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
560	56 pF	S	S	A	A	A	A	B	B	B	B	C	D	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	D	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
680	68 pF	S	S	A	A	A	A	B	B	B	B	C	D	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	D	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
820	82 pF	S	S	A	A	B	B	B	B	B	B	D	D	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C	D	D	D	D	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
101	100 pF	S	S	A	B	B	B	B	B	B	B	D	D	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	D	D	D	D	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
121	120 pF	S	S	A	B	D	D	B	B	B	B	D	G	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	D	D	D	D	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	
151	150 pF	S	S	B	D	D	D	B	B	B	B	D	G	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	D	G	D	K	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	D	D	



181	180 pF	S	S	B	D	D	D	B	B	B	B	G	G	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	D	G	D	K	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	K
221	220 pF	S	S	D	D	D	D	B	B	B	B	G	G	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	G	G	D	K	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	D	K
271	270 pF			D	D	D	D	B	C	C	C	G		C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	G		K	K	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	K	K
331	330 pF			D	D	D	D	B	C	C	C	G		C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	G		K	K	K	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	K	K
391	390 pF			D	D	D	D	B	C	C	C	G		C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	G		K	K		D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D	K	K
471	470 pF			D				C	C	C	C	G		C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	G		K	K		D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K	K	K
561	560 pF			D				C	D	D	D			C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>			K	K		D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K	K	
681	680 pF			D				C	D	D	D			C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>			K	K		D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K	K	
821	820 pF			D				C	G	G	G			C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>	C <sup>A</sup>			K			D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K	K	
102	1.0 nF			D				C	G	G	G			D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>			K			D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K	K	
122	1.2 nF							C	G	G	G			D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>						D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K		
152	1.5 nF							D	G	G	G			D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>						D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	K		
182	1.8 nF							D	G	G	G			D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>						D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>			
222	2.2 nF							D	G	G	G			D <sup>A</sup>	D <sup>A</sup>								D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>			
272	2.7 nF													D <sup>A</sup>	D <sup>A</sup>								D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>			
332	3.3 nF													D <sup>A</sup>									D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>	D <sup>A</sup>			
392	3.9 nF													D <sup>A</sup>									D <sup>A</sup>						
472	4.7 nF																						D <sup>A</sup>						
562	5.6 nF																						D <sup>A</sup>						
682	6.8 nF																						D <sup>A</sup>						

- The letter in the cell is the product thickness
- The "A" mark represents product with Ag/Ni/Sn terminal

capacitance & Voltage (X7R 200V~3KV)

Dielectric		X7R																											
EIA	Size	0805				1206				1210				1808				1812											
Code	VDCW	200V	250V	500V	630V	200V	250V	500V	630V	1000V	2000V	200V	250V	500V	630V	1000V	1000V	2000V	3000V	200V	250V	500V	630V	1000V	2000V	3000V			
101	100 pF	B	B	B	B																								
121	120 pF	B	B	B	B																								
151	150 pF	B	B	B	B	D	D	D	D	D	D						D	D	D										
181	180 pF	B	B	B	B	D	D	D	D	D	D						D	D	D										
221	220 pF	B	B	B	B	D	D	D	D	D	D						D	D	D										
271	270 pF	B	B	B	B	D	D	D	D	D	D						D	D	D						D	D			
331	330 pF	B	B	B	B	D	D	D	D	D	D						D	D	K						D	D			
391	390 pF	B	B	B	B	D	D	D	D	D	D						D	D	K						D	D			
471	470 pF	B	B	B	B	D	D	D	D	D	D						D	D	K						D	D			
561	560 pF	B	B	B	B	D	D	D	D	D	D						D	D	K						D	D			
681	680 pF	B	B	B	B	D	D	D	D	D	D						D	D	K						D	D	K		
821	820 pF	B	B	B	B	D	D	D	D	D	G						D	D	K						D	D	K		
102	1.0 nF	B	B	B	B	D	D	D	D	D	G	C	C	D	D	D	D	K	K	D	D	D	D	D	D	D	K		
122	1.2 nF	B	B	B	B	D	D	D	D	D	G <sup>A</sup>	C	C	D	D	D	D	K		D	D	D	D	D	D	D			
152	1.5 nF	B	B	B	B	D	D	D	D	D	G <sup>A</sup>	C	C	D	D	D	D	K		D	D	D	D	D	D	D			
182	1.8 nF	B	B	B	B	D	D	D	D	D		C	C	D	D	D	D	K		D	D	D	D	D	D	D			
222	2.2 nF	B	B	B	B	D	D	D	D	D		C	C	D	D	D	D	K <sup>A</sup>		D	D	D	D	D	D	D			
272	2.7 nF	B	B	B	B	D	D	D	D	D		C	C	D	D	D	D			D	D	D	D	D	D	D			
332	3.2 nF	B	B	B	B	D	D	D	D	D		C	C	D	D	D	D			D	D	D	D	D	D	K			
392	3.9 nF	B	B	B	B	D	D	D	D	D		C	C	D	D	G	D			D	D	D	D	D	D	K			
472	4.7 nF	B	D			D	D	D	D	D		C	C	D	D	G	D			D	D	D	D	D	D	K			
562	5.6 nF	D	D			D	D	D	D	D		C	C	D	D	G	K			D	D	D	D	D	D				
682	6.8 nF	D	D			D	D	D	D	D		C	C	D	D	G	K			D	D	D	D	D	D				
822	8.2 nF	D	D			D	D	D	D	D		C	C	D	D	G	K			D	D	D	D	D	D				
103	10 nF	D	D			D	D	D	D	D		C	C	D	D	G	K			D	D	D	D	D	D				
123	12 nF	D				D	D	D	D			C	C	D	D					D	D	D	D	K					
153	15 nF	D				D	D	D	D			C	C	D	D					D	D	D	D	K					



183	18 nF	D					D	D	D	D									D	D	D	D				
223	22 nF	D					D	D	G	G									D	D	D	D				
273	27 nF						D	D	G	G									D	D	D	D				
333	33 nF						G	G	G	G									D	D	D	D				
393	39 nF						G	G											D	D	D	D				
473	47 nF						G	G											D	D	D	D				
563	56 nF						G	G											D	D	K	K				
683	68 nF						G	G											D	D	K	K				
823	82 nF						G	G											D	D	K	K				
104	100 nF						G	G											D	D	K	K				
124	120 nF										G	G							D	D						
154	150 nF										M	M							K	K						
184	180 nF										M	M							K	K						
224	220 nF										M	M							K	K						
274	270 nF										M	M							K	K						
334	330 nF										M	M							K	K						
394	390 nF										M	M							K	K						
474	470 nF										M	M							K	K						

- The letter in the cell is the product thickness
- The "A" mark represents product with Ag/Ni/Sn terminal

Capacitance & Voltage (Y5V 200V~250V)

Dielectric		Y5V							
EIA	Size	0805		1206		1210		1812	
Code	VDCW	200	250	200	250	200	250	200	250
103	10 nF	B	B	B	B	C	C	D	D
153	15 nF	B	B	B	B	C	C	D	D
223	22 nF	B	B	B	B	C	C	D	D
333	33 nF	B	B	B	B	C	C	D	D
473	47 nF	B	B	B	B	C	C	D	D
683	68 nF	B	B	B	B	C	C	D	D
104	100 nF			B	B	C	C	D	D
154	150 nF			C	C	C	C	D	D
224	220 nF							D	D
334	330 nF							D	D
474	470 nF							D	D
684	680 nF							D	D

- The letter in the cell is the product thickness



Electrical data

Dielectric	NPO	X7R	Y5V
Size	0603,0805,1206,1210,1808,1812	0805,1206,1210,1808,1812	0805,1206,1210,1812
Capacitance*	0.5pF~6800pF	100pF~0.47μF	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
Q*	Cap < 30pF: Q ≥ 400 +20C Cap ≥ 30pF: Q ≥ 1000	≥ 2.5%	≥ 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
- NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Cap ≤ 1000pF and 1.0±0.2Vrms, 1.0KHz±10% for Cap > 1000pF, 25°C ambient temperature
- X7R, X5R: Apply 1.0±0.2Vrms, 1.0KHz±10% at the condition of 20 °C ambient temperature
- \*\*\*Measured at 500V<sub>DC</sub> for 60 sec. for Ur > 500V<sub>DC</sub>

■ Ultra-small 0201 Capacitors

Capacitance & Voltage

EIA	Size	0201		
		NPO		
Code	VDCW	16V	25V	50V
0R3	0.3 pF		L^	L^
0R4	0.4 pF		L^	L^
0R5	0.5 pF		L^	L^
1R0	1.0 pF		L^	L^
1R2	1.2 pF		L^	L^
1R5	1.5 pF		L^	L^
1R8	1.8 pF		L^	L^
2R2	2.2 pF		L^	L^
2R7	2.7 pF		L^	L^
3R3	3.3 pF		L^	L^
3R9	3.9 pF		L^	L^
4R0	4.0 pF		L^	L^
4R7	4.7 pF		L^	L^
5R6	5.6 pF		L^	L^
6R8	6.8 pF		L^	L^
8R2	8.2 pF		L^	L^

EIA	Size	0201									
		X7R					X5R				
Code	VDCW	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
101	100 pF			L	L	L			L	L	L
121	120 pF			L	L	L			L	L	L
151	150 pF			L	L	L			L	L	L
181	180 pF			L	L	L			L	L	L
221	220 pF			L	L	L			L	L	L
271	270 pF			L	L	L			L	L	L
331	330 pF			L	L	L			L	L	L
391	390 pF			L	L	L			L	L	L
471	470 pF			L	L	L			L	L	L
561	560 pF			L	L	L			L	L	L
681	680 pF			L	L	L			L	L	L
821	820 pF			L	L	L			L	L	L
102	1 nF	L	L	L	L	L			L	L	L
152	1.5 nF	L	L	L					L	L	
222	2.2 nF	L	L	L					L	L	
272	2.7 nF	L	L	L					L	L	



100	10 pF		L^	L^
120	12 pF		L^	L^
150	15 pF		L^	L^
180	18 pF		L^	L^
220	22 pF		L^	L^
270	27 pF		L^	L^
330	33 pF		L^	L^
390	39 pF		L^	L^
470	47 pF		L^	L^
560	56 pF	L^	L^	
680	68 pF	L^	L^	
820	82 pF	L^	L^	
101	100 pF	L^	L^	

332	3.3 nF	L	L	L				L	L		
472	4.7 nF	L	L	L				L	L		
682	6.8 nF	L	L					L			
103	10 nF	L	L					L	L		
153	15 nF							L			
223	22 nF							L			
333	33 nF							L			
473	47 nF							L			
683	68 nF							L			
104	100 nF							L			

- The letter in the cell is the product thickness
- The “^” mark represents product with Ag/Ni/Sn terminal

Electrical Data

Size	0201		
Dielectric	NPO	X7R	X5R
Capacitance*	0.3pF~100pF	100pF~10nF	100pF~0.1μF
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
Tan δ/Q*	Cap < 30pF: Q ≥ 400 +20C Cap ≥ 30pF: Q ≥ 1000	Ur=50V: ≤ 3.0% Ur=16V, 25V: ≤ 3.5% Ur=10V: ≤ 5.0% Ur=6.3V: ≤ 10%	Ur=50V: ≤ 3.0% Ur=16V, 25V: ≤ 3.5% Ur=10V: ≤ 5.0% Ur=6.3V: ≤ 10%
Insulation resistance at Ur	≥ 10GΩ	≥ 10GΩ or R×C ≥ 500Ω×F Whichever is less	
Operating temperature	-55 to +125°C		-55 to +85°C
Capacitance change	±30 ppm	±15%	
Termination	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



■ High Q and Low ESR Capacitors for MCHL Series

Capacitance & Voltage

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



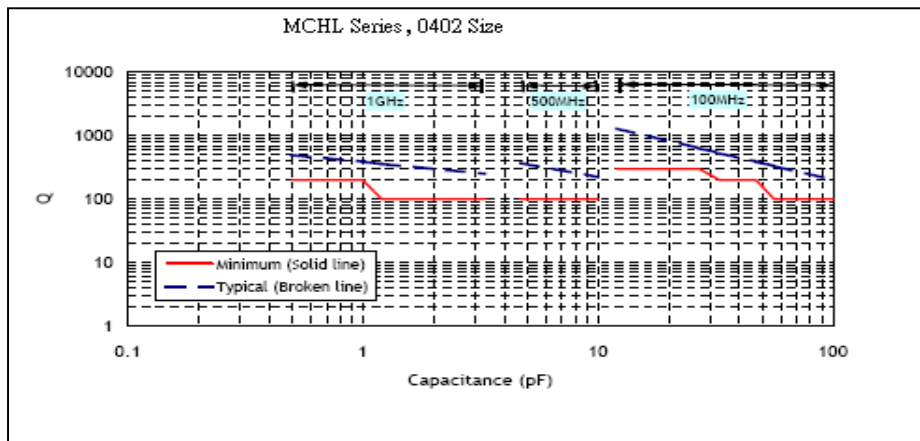
- The letter in the cell is the product thickness
- The “^” mark represents product with Ag/Ni/Sn terminal
- 0402, Capacitance<0.5pF: On request

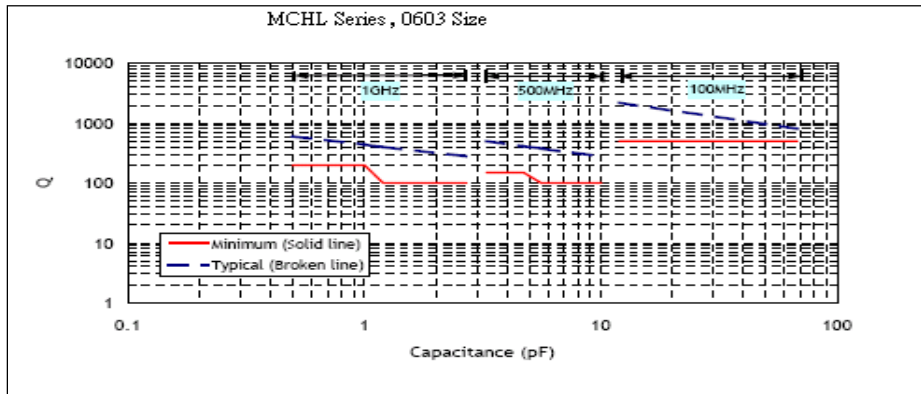
Electrical Data

Dielectric	NPO
Size	0402, 0603, 0805
Capacitance*	0402: 0.5pF ~ 470pF (<0.5pF: on requested) 0603: 0.5pF ~ 3300pF 0805: 0.5pF ~ 150pF
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
Q *	Cap<30pF: Q ≥ 400 +20C Cap ≥ 30pF: Q ≥ 1000
Insulation resistance at Ur	≥ 10GΩ
Operating temperature	-55 to +125°C
Capacitance change	±30 ppm
ESR	Cap<2.2pF: ≤1000mΩ @900±100MHz 2.2pF≤Cap≤470pF: ≤500mΩ @900±100MHz Cap>470pF: ≤500mΩ @60±10MHz
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





■ 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	100V	50V	100V	250V	50V	100V	250V
0R1	0.1 pF	L	L	L	N	N						
0R2	0.2 pF	L	L	L	N	N						
0R3	0.3 pF	L	L	L	N	N	S	S	S	T	T	T
0R4	0.4 pF	L	L	L	N	N	S	S	S	T	T	T
0R5	0.5 pF	L	L	L	N	N	S	S	S	T	T	T
0R6	0.6 pF	L	L	L	N	N	S	S	S	T	T	T
0R7	0.7 pF	L	L	L	N	N	S	S	S	T	T	T
0R8	0.8 pF	L	L	L	N	N	S	S	S	T	T	T
0R9	0.9 pF	L	L	L	N	N	S	S	S	T	T	T
1R0	1.0 pF	L	L	L	N	N	S	S	S	T	T	T
1R2	1.2 pF	L	L	L	N	N	S	S	S	T	T	T
1R5	1.5 pF	L	L	L	N	N	S	S	S	T	T	T
1R8	1.8 pF	L	L	L	N	N	S	S	S	T	T	T
2R2	2.2 pF	L	L	L	N	N	S	S	S	T	T	T
2R7	2.7 pF	L	L	L	N	N	S	S	S	T	T	T
3R3	3.3 pF	L	L	L	N	N	S	S	S	T	T	T
3R9	3.9 pF	L	L	L	N	N	S	S	S	T	T	T
4R7	4.7 pF	L	L	L	N	N	S	S	S	T	T	T
5R6	5.6 pF	L	L	L	N	N	S	S	S	T	T	T
6R8	6.8 pF	L	L	L	N	N	S	S	S	T	T	T
8R2	8.2 pF	L	L	L	N	N	S	S	S	T	T	T
100	10 pF	L	L	L	N	N	S	S	S	T	T	T
120	12 pF	L	L	L	N	N	S	S	S	T	T	T
150	15 pF	L	L	L	N	N	S	S	S	T	T	T
180	18 pF	L	L	L	N	N	S	S	S	T	T	T
220	22 pF				N		S	S	S	T	T	T
330	33 pF						S	S		T	T	T
390	39 pF						S	S		T	T	T
470	47 pF						S	S		T	T	T
560	56 pF									T	T	T
680	68 pF									T	T	T
820	82 pF									T	T	T
101	100 pF									T	T	T

■ The letter in the cell is the product thickness



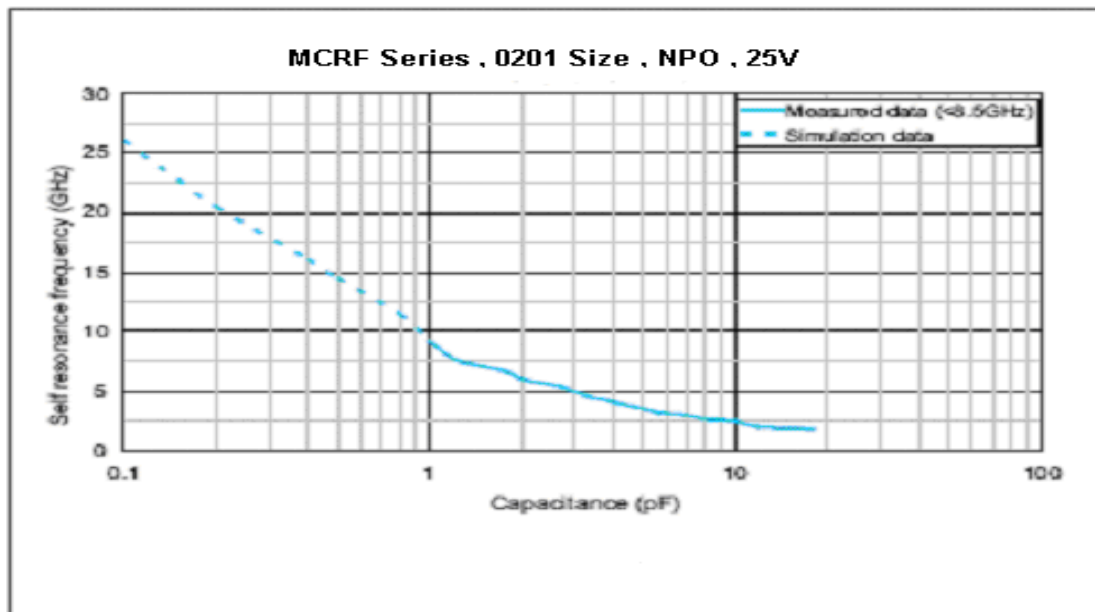


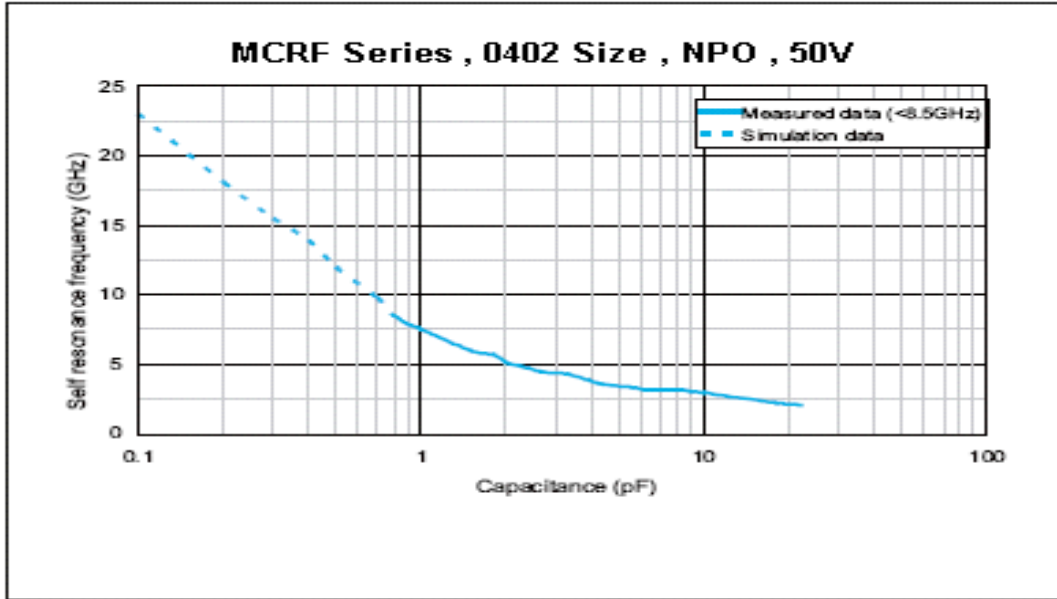
Electrical Data

Dielectric Size	NPO 0201, 0402, 0603, 0805
Capacitance*	0201: 0.1pF ~ 18pF, 0402: 0.1pF ~ 22pF 0603: 0.3pF ~ 47pF, 0805: 0.3pF ~ 100pF
Capacitance tolerance**	Cap $\leq$ 5pF: A( $\pm$ 0.05pF), B( $\pm$ 0.1pF), C( $\pm$ 0.25pF) 5pF<Cap<10pF: B( $\pm$ 0.1pF), C( $\pm$ 0.25pF), D( $\pm$ 0.5pF) Cap $\geq$ 10pF: E(+1%), C(+2%), J(+5%)
Rated voltage (VDCW)	6.3V, 10V, 25V, 50V, 100V, 250V
Q *	Cap $\geq$ 30pF: Q $\geq$ 1000, Cap<30pF: Q $\geq$ 400+20C;
Insulation resistance at Ur	$\geq$ 10G $\Omega$
Operating temperature	-55 to +125°C
Capacitance	$\pm$ 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 $\pm$ 0.2Vrms, 1.0MHz $\pm$ 10% for Cap $\leq$ 1000pF; 1.0KHz $\pm$ 10% for Cap>1000pF

Electrical characteristics





### ■ Low Inductance Capacitors for MCLI Series

#### Capacitance & Voltage

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

■ The letter in the cell is the product thickness



General Electrical data

Dielectric	X7R
Size	0612
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



**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		
Dissipation Factor (D.F.) or Quality factor (Q=1/D.F.)	NPO: Cap≥30pF, Q≥1000; Cap<30pF, Q≥400+20C X7R, X5R:		
	Rated vol.	D.F. ≤	Exception of D.F. ≤
	≥50V	2.5%	3% 0201(50V); 0603≥0.047μF 0805≥0.18μF; 1206≥0.47μF
	25V	3.5%	5% 0805≥1μF; 1210≥10μF
			7% 0603≥0.33μF; 1206≥4.7μF
			10% 0402≥0.10μF; 0603≥0.47μF 0805≥2.2μF; 1206≥6.8μF
	16V	3.5%	5% 0402≥0.033μF; 0603≥0.15μF 0805≥0.68μF; 1206≥2.2μF 1210≥4.7μF
			10% 0603≥0.68μF; 0805≥2.2μF 1206≥4.7μF; 1210≥22μF
	10V	5%	10% 0402≥0.33μF; 0603≥0.33μF 0805≥2.2μF; 1206≥2.2μF 1210≥22μF
			15% 0201≥0.1μF; 0402≥1μF
	6.3V	10%	15% 0603≥10μF; 0805≥4.7μF 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	
35V	7%	—	
25V	5%	7% 0402≥0.047μF; 0603≥0.1μF 0805≥0.33μF; 1206≥1μF 1210≥0.47μF	
		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%	-	
Dielectric Strength	No evidence of damage or flash over during test	To apply voltage(≤100V) 250% Duration: 1 to 5sec Charge and discharge current less than 50mA  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	
Item	Requirement	Test Method	



Insulation Resistance	<p>10GΩ or R×C≥500Ω-F Whichever is smaller X7R, X5R, Y5V:</p> <table border="1"> <tr> <th>Rated Voltage</th> <th>Insulation Resistance</th> </tr> <tr> <td>100V: X7R</td> <td rowspan="4">RxC ≥ 100Ω-F</td> </tr> <tr> <td>16V: 0402≥0.22uF</td> </tr> <tr> <td>10V: 0201≥47nF;0402≥0.47uF;0603≥0.47uF 0805≥2.2uF;1206≥4.7uF;1210≥47uF</td> </tr> <tr> <td>6.3V</td> </tr> </table>	Rated Voltage	Insulation Resistance	100V: X7R	RxC ≥ 100Ω-F	16V: 0402≥0.22uF	10V: 0201≥47nF;0402≥0.47uF;0603≥0.47uF 0805≥2.2uF;1206≥4.7uF;1210≥47uF	6.3V	To apply rated voltage for max. 120sec													
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<p>≥10GΩ or 100Ω-F whichever is smaller Rated voltage: 200V~630V</p>	To apply rated voltage(500V max.) for 60sec.																					
<p>≥10GΩ Rated voltage: &gt;630V</p>	To apply 500V for 60sec.																					
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>	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
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Adhesive Strength of Termination	No remarkable damage or removal of the terminations	<p>Pressurizing force: 0201:2N 0402&amp;0603:5N&gt;0603:10N Test time: 10±1 sec</p>																				
Vibration Resistance	No remarkable damage Cap change and Q/D.F.: To meet initial spec	<p>Vibration frequency: 10~55Hz/min Total amplitude: 1.5mm Test time: 6hrs.(tow hrs each in three mutually Perpendicular directions.)</p>																				
Solderability	95% min. coverage of all metalized area.	<p>Solder temperature: 235±5°C Dipping time: 2±0.5 sec.</p>																				
Bending Test	<p>No remarkable damage Cap change: NPO: within±5% or 0.5pF whichever is larger X7R, X5R: within±12.5% Y5V: within±30% (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 1mm per second until the deflection becomes 1mm and then the pressure shall be maintained for 5±1sec. Measurement to be made after keeping at room temp. for 24±2hrs(Class I) or 48±4hrs(Class II) (Thickness&gt;1.0mm, Thickness≤1.0mm)</p>																				
Resistance to Soldering Heat	<p>No remarkable damage Cap change: NPO: within±2.5% or 0.25pF whichever is larger X7R, X5R: Within±7.5% Y5V: within±20% Q/D.F., I.R. and dielectric strength: To meet initial requirements. 25%max. leaching on each edge.</p>	<p>Solder temperature: 270±5°C Dipping time: 10±1sec Preheating: 120 to 150°C for 1minute before immerse the capacitor in a eutectic solder. Before initial measurement(Class II only): Perform 150+0/-10°C for 1hr and then set for 48±4hrs at room temp. Measurement to be made after keep at room temp. for 24±2 hrs.(Class I) or 48±4 hrs.(Class II).</p>																				
Temperature Cycle	<p>No remarkable damage. Cap change: NPO: within±2.5% or 0.25pF whichever is larger X7R, X5R: within±7.5% Y5V: within±20% 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"> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min)</th> </tr> <tr> <td>1</td> <td>Min. operating temp.+0/-3</td> <td>30±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±3</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>2-3</td> </tr> </table> <p>Before initial measurement(Cass II only): Perform 150+0/-10°C for 1hr and then set for 48±4 hrs at room temp. Measurement to be made after keeping at room temp. for 24±2 hrs.(Class I) or 48±4 hrs.(Class II).</p>	Step	Temp.(°C)	Time(min)	1	Min. operating temp.+0/-3	30±3	2	Room temp	2-3	3	Max. operating temp.+3/-0	30±3	4	Room temp.	2-3					
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Item	Requirement	Test Method																				



Humidity (steady state)	<p>No remarkable damage. Cap change: NPO: within±5% or 0.5pF whichever is large X7R, X5R: ≥10V, within±12.5%; 6.3V, within±25% Y5V: ≥10V, within±30%; 6.3V, within±30/-40% Q/D.F. value: NPO: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q≥200+10C</p> <p>X7R, X5R:</p> <table border="1" data-bbox="370 615 953 1020"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td>≥50V</td> <td>3.0%</td> <td>6%</td> <td>0201(50V);0603≥0.047μF 0805≥0.18μF;1206≥0.47μF</td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">5.0%</td> <td>10%</td> <td>0805≥1μF;1210≥10μF</td> </tr> <tr> <td>14%</td> <td>0603≥0.33μF;1206≥4.7μF</td> </tr> <tr> <td>15%</td> <td>0402≥0.1μF;0603≥0.47μF 0805≥2.2μF;1206≥6.8μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">5%</td> <td>10%</td> <td>0603≥0.15μF;0603≥0.68μF 1206≥2.2μF;1210≥4.7μF</td> </tr> <tr> <td>15%</td> <td>0402≥0.033μF;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>0402≥0.33μF;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>0402≥2.2μF;0603≥10μF 0805≥4.7μF;1210≥100μF</td> </tr> </tbody> </table> <p>Y5V:</p> <table border="1" data-bbox="370 1100 953 1507"> <thead> <tr> <th>Rated vol.</th> <th>D.F. ≤</th> <th colspan="2">Exception of D.F. ≤</th> </tr> </thead> <tbody> <tr> <td>≥50 V</td> <td>7.5%</td> <td>10%</td> <td>0603≥0.1μF;0805≥0.47μF 1206≥4.7μF</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&lt;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≥.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> </tbody> </table> <p>I.R.: ≥10V 1GΩ or 50Ω-F whichever is smaller. Class II (X7R, X5R, Y5V)</p> <table border="1" data-bbox="370 1608 964 1757"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V:X7R</td> <td rowspan="5">Rx C ≥ 10Ω-F</td> </tr> <tr> <td>16V:0402≥0.22μF</td> </tr> <tr> <td>10V:0201≥47nF;0402≥0.47μF 0603≥0.47μF;0805≥2.2μF 1206≥4.7μF;1210≥47μF</td> </tr> <tr> <td>6.3V</td> </tr> </tbody> </table>	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥50V	3.0%	6%	0201(50V);0603≥0.047μF 0805≥0.18μF;1206≥0.47μF	25V	5.0%	10%	0805≥1μF;1210≥10μF	14%	0603≥0.33μF;1206≥4.7μF	15%	0402≥0.1μF;0603≥0.47μF 0805≥2.2μF;1206≥6.8μF	16V	5%	10%	0603≥0.15μF;0603≥0.68μF 1206≥2.2μF;1210≥4.7μF	15%	0402≥0.033μF;0603≥0.68μF 0805≥2.2μF;1206≥4.7μF 1210≥22μF	10V	7.5%	15%	0402≥0.33μF;0603≥0.33μF 0805≥2.2μF;1206≥2.2μF 1210≥22μF	20%	0201≥0.1μF;0402≥1μF	6.3V	15%	30%	0402≥2.2μF;0603≥10μF 0805≥4.7μF;1210≥100μF	Rated vol.	D.F. ≤	Exception of D.F. ≤		≥50 V	7.5%	10%	0603≥0.1μF;0805≥0.47μF 1206≥4.7μF	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≥.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	Rx C ≥ 10Ω-F	16V:0402≥0.22μF	10V:0201≥47nF;0402≥0.47μF 0603≥0.47μF;0805≥2.2μF 1206≥4.7μF;1210≥47μF	6.3V	<p>Test temp: 40±2°C Humidity: 90~95% RH Test time: 500+24/-0hrs Measurement to be made after keeping at room temp. for 24±2hrs.(Class I) or 48±4 hrs.(Class II).</p>
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Humidity load	No remarkable damage. Cap change: NPO: $\pm 7.5\%$ or $0.75\text{pF}$ whichever is larger X5R, X5R: $\geq 10\text{V}$ , within $\pm 12.5\%$ ; $6.3\text{V}$ , within $\pm 25\%$ Y5V: $\geq 10\text{V}$ , within $\pm 30\%$ ; $6.3\text{V}$ , within $+30/-40\%$ Q/D.F. value: NPO: $C \geq 30\text{pF}, Q \geq 200$ ; $C < 30\text{pF}, Q \geq 100 + 10/3C$ X7R, X5R:																																					
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Item	Requirement	Test Method																																																																																																																
High Temperature Load (Endurance)	<p>No remarkable damage. Cap change: NPO: <math>\pm 3\%</math> or <math>\pm 0.3F</math> whichever is larger X7R, X5R: <math>\geq 10V</math>, within <math>\pm 12.5\%</math>; 6.3V, within <math>+30/-40\%</math> Q/D.F. value: NPO: More than 30pF, <math>Q \geq 350</math> <math>10pF \leq C &lt; 30pF</math>, <math>Q \geq 275 + 2.5C</math> Less than 10pF, <math>Q \geq 200 + 10C</math> X7R, X5R:</p> <table border="1"> <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><math>\geq 50V</math></td> <td>3.0%</td> <td>6%</td> <td>0201(50V); 0603 <math>\geq 0.047\mu F</math> 0805 <math>\geq 0.18\mu F</math>; 1206 <math>\geq 0.47\mu F</math></td> </tr> <tr> <td rowspan="3">25V</td> <td rowspan="3">5.0%</td> <td>10%</td> <td>0805 <math>\geq 1\mu F</math>; 1210 <math>\geq 10\mu F</math></td> </tr> <tr> <td>14%</td> <td>0603 <math>\geq 0.33\mu F</math>; 1206 <math>\geq 4.7\mu F</math></td> </tr> <tr> <td>15%</td> <td>0402 <math>\geq 0.10\mu F</math>; 0603 <math>\geq 0.47\mu F</math> 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 6.8\mu F</math></td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">5%</td> <td>10%</td> <td>0603 <math>\geq 0.15\mu F</math>; 0805 <math>\geq 0.68\mu F</math> 1206 <math>\geq 2.2\mu F</math>; 1210 <math>\geq 4.7\mu F</math></td> </tr> <tr> <td>15%</td> <td>0402 <math>\geq 0.033\mu F</math>; 0603 <math>\geq 0.68\mu F</math> 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 4.7\mu F</math> 1210 <math>\geq 22\mu F</math></td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">7.5%</td> <td>15%</td> <td>0402 <math>\geq 0.33\mu F</math>; 0603 <math>\geq 0.33\mu F</math> 0805 <math>\geq 2.2\mu F</math>; 1206 <math>\geq 2.2\mu F</math> 1210 <math>\geq 22\mu F</math></td> </tr> <tr> <td>20%</td> <td>0201 <math>\geq 0.1\mu F</math>; 0402 <math>\geq 1\mu F</math></td> </tr> <tr> <td>6.3V</td> <td>15%</td> <td>30%</td> <td>0402 <math>\geq 2.2\mu F</math>; 0603 <math>\geq 10\mu F</math> 0805 <math>\geq 4.7\mu F</math>; 1210 <math>\geq 100\mu F</math></td> </tr> </tbody> </table> <p style="text-align: center;">Y5V:</p> <table border="1"> <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><math>\geq 50V</math></td> <td>7.5%</td> <td>10%</td> <td>0603 <math>\geq 0.1\mu F</math>; 0805 <math>\geq 0.47\mu F</math> 1206 <math>\geq 4.7\mu F</math></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 <math>\geq 0.047\mu F</math>; 0603 <math>\geq 0.1\mu F</math> 0805 <math>\geq 0.33\mu F</math>; 1206 <math>\geq 1\mu F</math> 1210 <math>\geq 4.7\mu F</math></td> </tr> <tr> <td>15%</td> <td>0402 <math>\geq 0.068\mu F</math>; 0603 <math>\geq 0.47\mu F</math> 1206 <math>\geq 4.7\mu F</math>; 1210 <math>\geq 22\mu F</math></td> </tr> <tr> <td rowspan="2">16V (C &lt; 1.0<math>\mu F</math>)</td> <td rowspan="2">10%</td> <td>12.5%</td> <td>0402 <math>\geq 0.068\mu F</math>; 0603 <math>\geq 0.68\mu F</math></td> </tr> <tr> <td>20%</td> <td>0402 <math>\geq 0.22\mu F</math></td> </tr> <tr> <td>16V (C <math>\geq 1.0\mu F</math>)</td> <td>12.5%</td> <td>20%</td> <td>0603 <math>\geq 2.2\mu F</math>; 0805 <math>\geq 3.3\mu F</math> 1206 <math>\geq 10\mu F</math>; 1210 <math>\geq 22\mu F</math> 1812 <math>\geq 47\mu F</math></td> </tr> <tr> <td>10V</td> <td>20%</td> <td>30%</td> <td>0402 <math>\geq 0.47\mu F</math></td> </tr> <tr> <td>6.3V</td> <td>30%</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p style="text-align: center;">I.R.: <math>\geq 10V</math> 1G<math>\Omega</math> or 50Q-F whichever is smaller Class II (X7R, X5R, Y5V)</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>Insulation Resistance</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="5" style="text-align: center;">RxC <math>\geq 10Q \cdot F</math></td> </tr> <tr> <td>16V: 0402 <math>\geq 0.22\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.	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Size	Dielectric	Rated voltage	Capacitance range																																																																																																															
0603	X5R	10V, 16V	C $\geq 1.0\mu F$																																																																																																															
0805	X5R	10V	C $\geq 4.7\mu F$																																																																																																															
			T = 0.85 $\pm$ 0.1mm																																																																																																															
1206	X5R	10V	C $\geq 4.7\mu F$ & T = 0.85 $\pm$ 0.1mm																																																																																																															



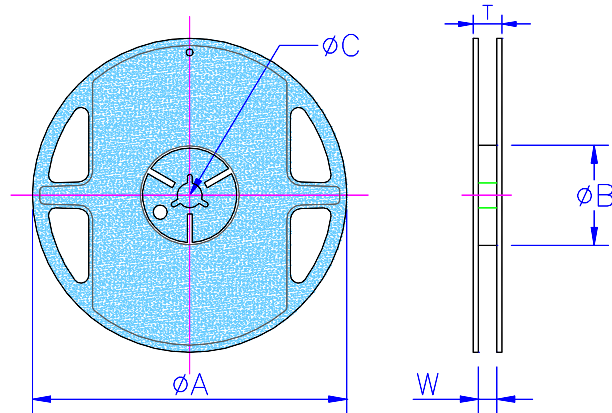


Packaging Quantity

Unit: mm

Type	Thickness / Symbol		Packaging (7" Reel)	
			Paper tape	Plastic tape
0201	0.30±0.03	L	15K	-
0402	0.50±0.05	N	10K	-
0603	0.80±0.07	S	4K	-
	0.80 +0.15 / -0.10	X	4K	-
0805	0.60±0.10	A	4K	-
	0.80±0.10	B	4K	-
	0.85±0.10	T	4K	-
	1.25±0.10	D	-	3K
1206	1.25±0.20	I	-	3K
	0.80±0.10	B	4K	-
	0.95±0.10	C	-	3K
	1.15±0.15	J	-	3K
	1.25±0.10	D	-	3K
	1.60±0.20	G	-	2K
1210	1.60 +0.30 / -0.10	P	-	2K
	0.95±0.10	C	-	3K
	1.25±0.10	D	-	3K
	1.60±0.20	G	-	2K
	2.00±0.20	K	-	1K
1808	2.50±0.30	M	-	1K
	1.25±0.10	D	-	2K
	2.00±0.20	K	-	1K
1812	1.25±0.10	D	-	1K
	2.00±0.20	K	-	1K
	2.50±0.30	M	-	0.5K
0612	0.80±0.10	B	4K	-

Tape and Reel



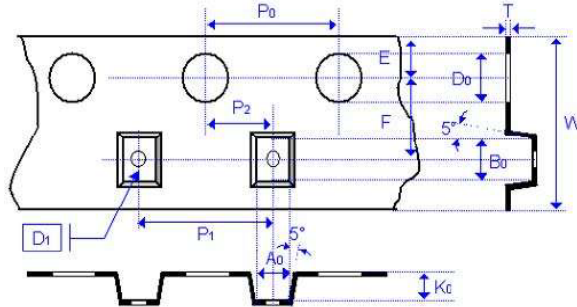
Unit: mm

Type	Chip Size
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	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")

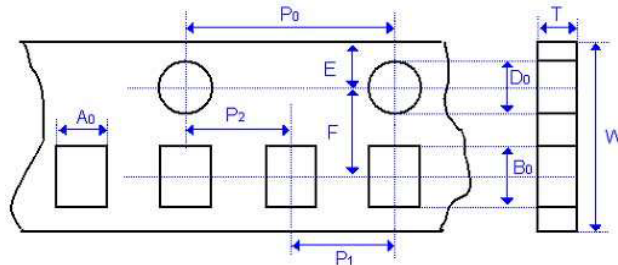
Plastic Tape Size Specification



Unit: mm

Type	0805		1206			1210				1808		1812				
	D	I	C	J	D	G	P	C	D	G	K	M	D	K	M	
A <sub>0</sub>	<1.57		<1.85			<1.95		<2.97				<2.97	<2.35			<3.81
B <sub>0</sub>	<2.40		<3.46			<3.67		<3.73				<3.73	<4.98	<5.00		<5.30
T	0.23±0.05		0.23±0.05			0.23±0.05		0.23±0.05				0.23±0.05	0.25±0.05			0.25±0.05
K <sub>0</sub>	<2.50		<2.50			<2.50		<2.50				<3.00	<2.50			<2.50
W	8.00±0.10		8.00±0.10			8.00±0.10		8.00±0.10				8.00±0.10	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±0.05			2.00±0.05
D <sub>0</sub>	1.50±0.05		1.50±0.05			1.50±0.05		1.50±0.05				1.50±0.05	1.50±0.05			1.50±0.05
D <sub>1</sub>	1.00±0.10		1.00±0.10			1.00±0.10		1.00±0.10				1.00±0.10	1.00±0.10			1.00±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	3.50±0.05			5.50±0.05

Paper Tape Size Specification





Unit: mm

Type	0201	0402	0603		0805		1206/0612
Thickness	L	N	S	X	A	B	B
A <sub>0</sub>	0.45±0.05	0.62±0.05	1.02±0.05		1.50±0.10	1.50±0.10	2.00±0.10
B <sub>0</sub>	0.75±0.05	1.12±0.05	1.82±0.05		2.30±0.10	2.30±0.10	3.50±0.10
T	0.60±0.05	0.60±0.05	0.95±0.05		0.75±0.05	0.95±0.05	0.95±0.05
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

## ■ RS stock number cross reference

Article	MPN	Description
7704119	MC02KTB160102	Capacitor MLCC 0402 X7R 16V 1nF (reel)
7704112	MC02KTB160222	Capacitor MLCC 0402 X7R 16V 2.2nF (reel)
7704116	MC02KTB160472	Capacitor MLCC 0402 X7R 16V 4.7nF (reel)
7704125	MC02KTB160682	Capacitor MLCC 0402 X7R 16V 6.8nF (reel)
7704128	MC02KTB160103	Capacitor MLCC 0402 X7R 16V 10nF (reel)
7704122	MC02KTB500102	Capacitor MLCC 0402 X7R 50V 1nF (reel)
7704131	MC02KTB500222	Capacitor MLCC 0402 X7R 50V 2.2nF (reel)
7704134	MC02KTB500472	Capacitor MLCC 0402 X7R 50V 4.7nF (reel)
7704138	MC02KTB500682	Capacitor MLCC 0402 X7R 50V 6.8nF (reel)
7704147	MC02KTB500103	Capacitor MLCC 0402 X7R 50V 10nF (reel)
7704140	MC03KTB160102	Capacitor MLCC 0603 X7R 16V 1nF (reel)
7704144	MC03JTN160102	Capacitor MLCC 0603 COG 16V 1nF (reel)
7704153	MC03KTB160222	Capacitor MLCC 0603 X7R 16V 2.2nF (reel)
7704156	MC03JTN160222	Capacitor MLCC 0603 COG 16V 2.2nF (reel)
7704150	MC03KTB160472	Capacitor MLCC 0603 X7R 16V 4.7nF (reel)
7704169	MC03KTB160682	Capacitor MLCC 0603 X7R 16V 6.8nF (reel)
7704162	MC03KTB160103	Capacitor MLCC 0603 X7R 16V 10nF (reel)
7704166	MC03KTB500102	Capacitor MLCC 0603 X7R 50V 1nF (reel)
7704175	MC03JTN500102	Capacitor MLCC 0603 COG 50V 1nF (reel)
7704178	MC03KTB500222	Capacitor MLCC 0603 X7R 50V 2.2nF (reel)
7704172	MC03JTN500222	Capacitor MLCC 0603 COG 50V 2.2nF (reel)
7704181	MC03KTB500472	Capacitor MLCC 0603 X7R 50V 4.7nF (reel)
7704184	MC03KTB500682	Capacitor MLCC 0603 X7R 50V 6.8nF (reel)
7704188	MC03KTB500103	Capacitor MLCC 0603 X7R 50V 10nF (reel)
7704197	MC03KTB101102	Capacitor MLCC 0603 X7R 100V 1nF (reel)
7704190	MC03KTB101222	Capacitor MLCC 0603 100V 2.2nF (reel)



7704194	MC03KTB101472	Capacitor MLCC 0603 100V 4.7nF (reel)
7704204	MC03KTB101682	Capacitor MLCC 0603 100V 6.8nF (reel)
7704207	MC03KTB101103	Capacitor MLCC 0603 X7R 100V 10nF (reel)
7704201	MC05KTB160102	Capacitor MLCC 0805 X7R 16V 1nF (reel)
7704210	MC05JTN160102	Capacitor MLCC 0805 COG 16V 1nF (reel)
7704213	MC05KTB160222	Capacitor MLCC 0805 X7R 16V 2.2nF (reel)
7704217	MC05JTN160222	Capacitor MLCC 0805 COG 16V 2.2nF (reel)
7704226	MC05KTB160472	Capacitor MLCC 0805 X7R 16V 4.7nF (reel)
7704229	MC05JTN160472	Capacitor MLCC 0805 COG 16V 4.7nF (reel)
7704223	MC05JTN160682	Capacitor MLCC 0805 COG 16V 6.8nF (reel)
7704232	MC05KTB160682	Capacitor MLCC 0805 X7R 16V 6.8nF (reel)
7704235	MC05KTB160103	Capacitor MLCC 0805 X7R 16V 10nF (reel)
7704239	MC05JTN160103	Capacitor MLCC 0805 COG 16V 10nF (reel)
7704248	MC05KTB500102	Capacitor MLCC 0805 X7R 50V 1nF (reel)
7704241	MC05JTN500102	Capacitor MLCC 0805 COG 50V 1nF (reel)
7704245	MC05KTB500222	Capacitor MLCC 0805 X7R 50V 2.2nF (reel)
7704254	MC05JTN500222	Capacitor MLCC 0805 COG 50V 2.2nF (reel)
7704257	MC05KTB500472	Capacitor MLCC 0805 X7R 50V 4.7nF (reel)
7704251	MC05JTN500472	Capacitor MLCC 0805 COG 50V 4.7nF (reel)
7704260	MC05KTB500682	Capacitor MLCC 0805 X7R 50V 6.8nF (reel)
7704263	MC05JTN500682	Capacitor MLCC 0805 COG 50V 6.8nF (reel)
7704267	MC05KTB500103	Capacitor MLCC 0805 X7R 50V 10nF (reel)
7704276	MC05JTN500103	Capacitor MLCC 0805 COG 50V 10nF (reel)
7704279	MC05KTB101102	Capacitor MLCC 0805 X7R 100V 1nF (reel)
7704273	MC05JTN101102	Capacitor MLCC 0805 COG 100V 1nF (reel)
7704282	MC05KTB101222	Capacitor MLCC 0805 100V 2.2nF (reel)
7704285	MC05JTN101222	Capacitor MLCC 0805 100V 2.2nF (reel)
7704289	MC05KTB101472	Capacitor MLCC 0805 100V 4.7nF (reel)
7704298	MC05KTB101682	Capacitor MLCC 0805 100V 6.8nF (reel)
7704291	MC05KTB101103	Capacitor MLCC 0805 X7R 100V 10nF (reel)