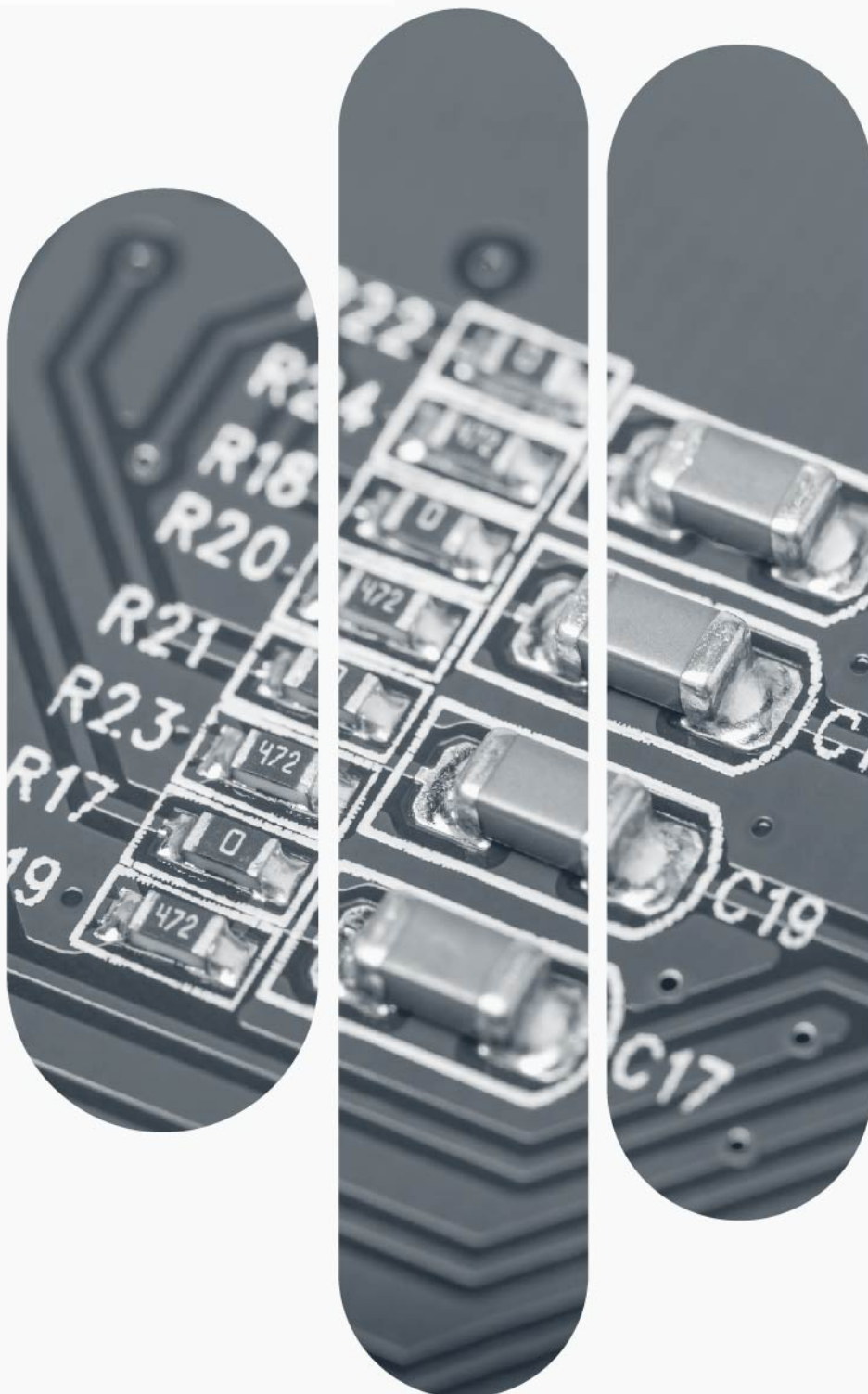


Multilayer Ceramic Capacitors

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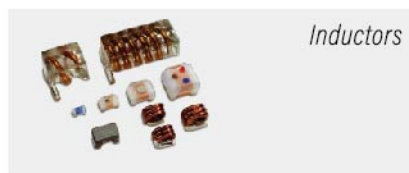
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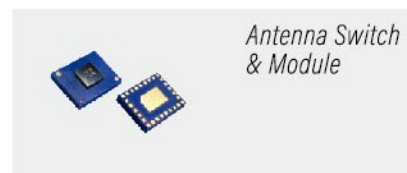
Product Portfolio



Multilayer Ceramic Capacitors



Inductors



Antenna Switch & Module



Chip Resistors



RF Filters



MOV & MLV



Disc Capacitors



Antenna



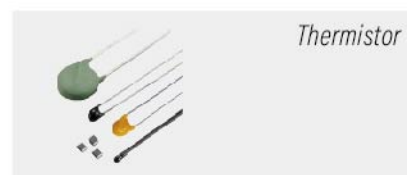
Film Capacitor



Fuse & ESD Protective



Tantalum Capacitor



Thermistor

IEC-63 Nominal Resistance/ Capacitance

E1	100																							
E3	100								220								470							
E6	100				150				220				330				470				680			
E12	100		120		150		180		220		270		330		390		470		560		680		820	
E24	100	110	120	130	150	160	180	200	220	240	270	300	330	360	390	430	470	510	560	620	680	750	820	910
E96	100	102	121	124	147	150	178	182	215	221	261	267	316	324	383	392	464	475	562	576	681	698	825	845
	105	107	127	130	154	158	187	191	226	232	274	280	332	340	402	412	487	499	590	604	715	732	866	887
	110	113	133	137	162	165	196	200	237	243	287	294	348	357	422	432	511	523	619	634	750	768	909	931
	115	118	140	143	169	174	205	210	249	255	301	309	365	374	442	453	536	549	649	665	787	806	953	976

E6: $\sqrt[6]{10} \approx 1.46$ E12: $\sqrt[12]{10} \approx 1.21$

E1 series resistance: 1Ω, 10Ω, 100Ω, 1000Ω, 10000Ω, 100000Ω

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*The specifications are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering.

*This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.



■ QUICK PRODUCT INFORMATION

Series	Dielectric	Size	Capacitance	Rated voltage	Page
General Purpose Caps (4V~100V)	NPO	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	0.1pF~0.1μF	10V, 16V, 25V, 50V, 100V	5
	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225	100pF~47μF	6.3V, 10V, 16V, 25V, 50V, 100V	
	X6S	0201, 0402, 0603, 0805, 1206,1210	0.1μF~100μF	6.3V, 10V, 16V, 25V, 50V, 100V	
	X7S	0201, 0402, 0603, 0805, 1206,1210	0.1μF~100μF	6.3V, 10V, 16V, 25V, 50V, 100V	
	X5R	0201, 0402, 0603, 0805, 1206,1210	100pF~220μF	4V, 6.3V, 10V, 16V, 25V, 50V	
Ultra-small Caps (01R5 series)	NPO	01005	0.2pF~220pF	16V, 25V, 50V	11
	X7R	01005	100pF~1000pF	10V	
	X5R	01005	100pF~0.1μF	4V, 6.3V,10V	
Middle & High Voltage Caps (200V~4kV)	NPO	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0.5pF~0.1μF	200V, 250V, 500V, 630V, 1kV, 2kV, 3kV, 4kV	12
	X7R	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	100pF~47μF	200V, 250V, 400V, 450V, 500V, 630V, 1kV, 2kV, 3kV, 4kV	
High Voltage Caps (Surface Coating Type)	NPO	1808, 1812	33pF~470pF	4kV	15
	X7R	1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225	150pF~0.047μF	2kV,2.5kV, 3kV, 4kV	
Microwave Caps (RF series)	NPO	01005, 0201, 0402, 0603, 0805, 0505, 1111	0.1pF~1000pF	6.3V, 10V, 25V, 50V, 100V, 250V, 500V, 1500V	16
	X8G	0402, 0603, 0805	0.1pF~82pF	200V, 250V, 500V	
Microwave Caps Narrow Tolerance (UF series)	NPO	0201, 0402	0.05pF~10pF	25V, 50V, 100V	17
Automotive Hi-Q Caps Qualified to AEC-Q200 (RT series)	NPO	0201, 0402, 0603	0.1pF~100pF	25V, 50V	19
High Q & Low ESR Caps (HH series)	NPO	0201, 0402, 0603, 0805	0.1pF to 3300pF	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V	20
Automotive Capacitor Qualified to AEC-Q200 (MT series)	X8G	0402, 0603, 0805, 1206, 1210	0.1pF~0.015μF	10V, 16V, 25V, 50V, 100V	22
	NPO	0201, 0402, 0603, 0805, 1206, 1210	0.1pF~0.047μF	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV ,1.25kV	
	X7R	0201, 0402, 0603, 0805, 1206, 1210	100pF~10μF	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV	
Automotive Soft Termination Caps Qualified to AEC-Q200 (ST series)	NPO	1210	100pF~33nF	630V, 1kV, 1.25kV	25
	X7R	0402, 0603, 0805, 1206 1210, 1812, 1825, 2220	220pF~22μF	10V, 16V, 25V, 50V, 100V, 1kV, 3kV	
Automotive Soft Termination Caps Qualified to AEC-Q200 & VW80808 (VT series)	X7R	0603, 0805, 1206, 1210	10nF~10μF	10V, 16V, 25V, 35V, 50V, 100V	28
Automotive Caps Without AEC-Q200 Certification (MG series)	NPO	0201, 0402, 0603, 0805, 1206, 1210, 1812	0.1pF~0.047μF	10V, 16V, 25V, 50V, 100V , 250V, 500V, 630V, 1kV	30
	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812	100pF~47μF	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV	
	X5R	0402, 0603, 0805, 1206, 1210	0.068μF~10μF	6.3V,10V,16V,25V	
High Temperature Caps (HT series)	X8G	0402, 0603, 0805, 1206, 1210	0.2pF~0.015μF	10V, 16V, 25V, 50V, 100V	33
Safety Certificated Caps X1/Y2 (S2 series)	NPO	1808, 1812, 2220, 2211	3pF~2200pF	UL & TUV: X1 310Vac & Y2 250Vac CQC : 250Vac	35
	X7R	1808, 1812, 2220, 2211	100pF~10nF		
Safety Certificated Caps X2 (S3 series)	NPO	1808, 1812	3pF~2700pF	UL & TUV: X1 310Vac & Y2 250Vac CQC : 250Vac	38
	X7R	1808, 1812, 2220	150pF~0.056μF		
Soft Termination Capacitors (SH series, Ag-poly)	NPO	0402, 0603, 0805,1206, 1210, 1808, 1812,1825,2220,2225	0.1pF~0.22μF	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV, 3kV	41
	X7R	0402, 0603, 0805,1206, 1210, 1808, 1812,1825,2220,2225	100pF~47μF	10V, 16V, 25V, 50V, 100V,200V, 250V, 500V, 630V, 1kV, 2kV, 3kV	
	X5R	0402, 0603, 0805,1206, 1210,	0.033μF to 10μF	6.3V, 10V, 16V, 25V, 50V	
	X7T	,2220	2.2uF	250V	
Soft Termination Capacitors (SG series, Cu-poly)	X7R	0603, 0805, 1206	100pF~10μF	10V, 16V, 25V, 50V, 100V,200V, 250V, 500V, 630V, 1kV, 2kV	48
Low Profile Caps (TT series)	X7R	0805, 1206, 1210	1.0μF~10μF	10V, 16V, 25V, 50V,100V,	49
	X5R	0402, 0603, 0805, 1206, 1210	0.22μF~47μF	6.3V, 10V, 16V, 25V	
Feed Through (3-terminal) Caps (FT series)	X7R	0805	10nF~1μF	10V, 16V, 25V, 50V	50
	X5R	0402	4.3μF	4V	
Mega Cap type (M series)	NPO	1210,1812,1825,2220,2225	1000pF~0.22μF	50V, 100V, 200V, 250V, 500V, 630V	51
	X7R	1210,1812,1825,2220,2225	0.01μF~47μF	50V, 100V, 200V, 250V, 500V, 630V	
	X7T	2220,	0.47μF~2.2μF	,450V,1000V	
Mega Cap type (V series)	X7R	2220,	47μF	100V	53

■ HOW TO ORDER

Type of MLCC	0805		B	104	K	500	C	T
General Purpose MLCC Ultra-small MLCC Middle & High Voltage MLCC	<u>Size</u>		<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging</u>
High Vol. Cap. with Surface Coating	Inch (mm) : 01R5(0402), 0201(0603), 0402(1005), 0603(1608), 0805(2012), 1206(3216), 1210(3225), 1808(4520), 1812(4532), 1825(4563), 2220(5750), 2225(5763)		N=NP0 G=X8G B=X7R A=X7S	Two significant digits followed by no. of zeros. And R is in place of decimal point.	A= ±0.05pF B= ±0.1pF C= ±0.25pF D= ±0.5pF F= ±1% G= ±2% J= ±5% K= ±10% M= ±20% Z=-20/+80% P=±0.02pF** Q=±0.03pF**	Two significant digits followed by no. of zeros. And R is in place of decimal point.	C=Cu/Ni/Sn M= Cu/Ni/Sn Surface coating	T=7" reeled Q=10" reeled G=13" reeled
Microwave MLCC Microwave-Narrow Tolerance Microwave-High reliability Automotive High-Q MLCC High Q / Low ESR MLCC Automotive MLCC High Temperature MLCC. Safety Certificated MLCC Low Profile MLCC Feed Through MLCC	<u>RF</u>	<u>03</u>	T=X7T P=X7P S=X6S X=X5R	R47=0.47pF 0R5=0.5pF 1R0=1pF 100=10pF 101=100pF 102=1000pF 103=0.01uF 104=0.1uF 105=1uF 106=10uF 107=100uF		4R0=4 Vdc 6R3=6.3 Vdc 100=10 Vdc 160=16 Vdc 250=25 Vdc 350=35 Vdc 500=50 Vdc 101=100 Vdc 201=200 Vdc 251=250 Vdc 401=400 Vdc 451=450 Vdc 501=500 Vdc 631=630 Vdc 102=1000 Vdc 12E=1250 Vdc 152=1500 Vdc 202=2000 Vdc 252=2500 Vdc 302=3000 Vdc 402=4000 Vdc 502=5000 Vdc 602=6000 Vdc	C=Cu/Ni/Sn	
	<u>Series</u>	<u>Size</u>						
	RF=Microwave UF=Microwave-Narrow Tolerance RH=Microwave-High reliability RT=Automotive High Q Caps Qualified to AEC-Q200 HH=High Q/ Low ESR MT=Automotive Cap. Qualified to AEC-Q200 MG=Automotive Cap. without AEC-Q200 HT=High Temperature Cap. TT=Low profile FT=Feed Through(3-terminal)	Inch : 02=01005 03=0201 15=0402 11=0505 18=0603 21=0805 22=1111 31=1206 32=1210 42=1808 43=1812 52=2211 55=2220 56=2225						
	ST=Qualified to AEC-Q200 VT=AEC-Q200 & VW80808 SH=With Ag polymer SG=With Cu polymer						C=Cu +Conductive resin /Ni /Sn M= Surface coating	
	S2=X1/Y2 safety class S3=X2 safety class						E=Soft termination Z=Soft termination +Surface Coating M=Surface Coating K= Non Coating	
Safety Certificated MLCC	S2=X1/Y2 Safety Class (Qualified to AEC-Q200)						Y= Auto_AECQ200 + Soft termination X= Auto_AECQ200 + Soft termination + Surface Coating	
Mega Cap type (M Series)	M1= Mega Cap. 1 chip M2= Mega Cap. 2 chips						B=3.60±0.35mm C=4.20±0.35mm F=6.00±0.35mm G=6.60±0.35mm S=5.00±0.50 mm T=6.40±0.30mm	L= L type lead M = M type lead ^{#1}
Mega Cap type (V Series)	V3= Mega Cap. 3 chips							

* The packaging code per each size of reel, please refer to following table "packaging style and quantity".

** Tolerance "P" & "Q" only for UF series items(Excluding RF15N1R0P101).

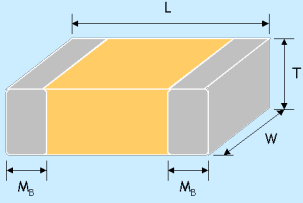
#1: M = Lead frame E 1.2mm (Size 2220 only)

■ PACKAGING STYLE AND QUANTITY

Unit: pieces

Size Inch (mm)	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7" reel	13" reel	7" reel	13" reel
01005 (0402)	0.20±0.02	V	20,000	-	40,000(W4P1)-	-
0201 (0603)	0.30±0.03	L	15,000	70,000	-	-
0402 (1005)	0.50±0.05	N	10,000	50,000	-	-
	0.50+0.02/-0.05	Q	10,000	50,000	-	-
	0.50±0.20	E	10,000	40,000	-	-
0603 (1608)	0.50±0.10	H	4,000	20,000	-	-
	0.80±0.07	S	4,000	15,000	-	-
	0.80±0.10	B	4,000	15,000	-	-
	0.80+0.15/-0.10	X	4,000	15,000	-	-
	0.80±0.20	X	4,000	15,000	-	-
0805 (2012)	0.50±0.10	H	4,000	15,000	-	-
	0.60±0.10	A	4,000	15,000	-	-
	0.80±0.10	B	4,000	15,000	-	-
	0.85±0.10	T	4,000	15,000	-	-
	1.25±0.10	D	-	-	3,000	10,000
	1.25±0.20	I	-	-	3,000	10,000
1206 (3216)	0.80±0.10	B	4,000	15,000	-	-
	0.85±0.10	T	4,000	15,000	-	-
	0.95±0.10	C	-	-	3,000	10,000
	1.15±0.15	J	-	-	3,000	10,000
	1.25±0.10	D	-	-	3,000	10,000
	1.60±0.20	G	-	-	2,000	10,000
	1.60+0.30/-0.10	P	-	-	2,000	9,000
1210 (3225)	0.85±0.10	T	-	-	3,000	10,000
	0.95±0.10	C	-	-	3,000	10,000
	1.25±0.10	D	-	-	3,000	10,000
	1.60±0.20	G	-	-	2,000	8,000
	2.00±0.20	K	-	-	1,000	6,000
	2.50±0.20	Z	-	-	1,000	6,000
	2.50±0.30	M	-	-	1,000	6,000
1808 (4520)	1.25±0.10	D	-	-	2,000	10,000
	1.40±0.15	F	-	-	2,000	10,000
	1.60±0.20	G	-	-	2,000	8,000
	2.00±0.20	K	-	-	1,000	6,000
1812 (4532)	1.25±0.10	D	-	-	1,000	5,000
	1.60±0.20	G	-	-	1,000	4,000
	2.00±0.20	K	-	-	1,000	3,000
	2.50±0.30	M	-	-	500	3,000
	2.80±0.30	U	-	-	500	1,500
1825 (4563) 2220 (5750) 2225 (5763)	1.60±0.20	G	-	-	1,000	-
	2.00±0.20	K	-	-	1,000	-
	2.50±0.30	M	-	-	500	-
	2.80±0.30	U	-	-	500	-
	3.10±0.30	R	-	-	-	1,000
0505 (1414)	1.15±0.15	J	-	-	3,000	-
1111 (2828)	≤ 1.78	G	-	-	2,000	-

■ SINGLE CHIP CAPACITORS

Outline	Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol	Soldering Method *	M _B (mm)	
	01R5 (0402)	0.4±0.02	0.2±0.02	0.2±0.02	V	R	0.07~0.13
	0201 (0603)	0.6±0.03	0.3±0.03	0.3±0.03	L	R	0.10~0.25
		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}			
	0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N	R	0.15~0.35
				0.50±0.02/-0.05	Q	R	
		1.00±0.20	0.50±0.20	0.5±0.20	E	R	
	0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07	S	R / W	0.25~0.60
		1.60+0.15/-0.10	0.80+0.15/-0.10	0.50±0.10	H	R / W	
				0.80±0.10	B	R / W	
				0.80+0.15/-0.10	X	R / W	
	0805 (2012)	2.00±0.15	1.25±0.10	0.50±0.10	H	R / W	0.30~0.70
				0.60±0.10	A	R / W	
				0.80±0.10	B	R / W	
				1.25±0.10	D	R	
		2.00±0.20	1.25±0.20	0.85±0.10	T	R / W	
				1.25±0.20	I	R	
	1206 (3216)	3.20±0.15	1.60±0.15	0.80±0.10	B	R / W	0.25~1.00
				0.95±0.10	C	R	
				1.25±0.10	D	R	
		3.20±0.20	1.60±0.20	1.15±0.15	J	R	
				0.85±0.10	T	R	
				1.60±0.20	G	R / W	
		3.20+0.30/-0.1 3.30+0.30/-0.1 ^{#5}	1.60 +0.30/-0.10	1.60+0.30/-0.10	P	R	
	1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	C	R	0.50~1.00
				0.85±0.10	T	R	
1.25±0.10				D	R		
2.50±0.20				Z	R		
3.20±0.40		2.50±0.30	1.60±0.20	G	R		
			2.00±0.20	K	R		
			2.50±0.30	M	R		
3.20±0.60 ^{#4}	2.50±0.50 ^{#4}	2.50±0.50 ^{#4}					
1808 (4520)	4.50±0.40 (4.5+0.5/-0.3)**	2.03±0.25	1.25±0.10	D	R	0.25~1.0	
			1.40±0.15	F	R		
			1.60±0.20	G	R		
			2.00±0.20	K	R		
1812 (4532)	4.50±0.40 (4.5+0.5/-0.3)**	3.20±0.30	1.25±0.10	D	R	0.25~1.0	
			1.60±0.20	G	R		
			2.00±0.20	K	R		
		3.20±0.40	2.50±0.30	M	R		
			2.80±0.30	U	R		
1825 (4563)	4.50±0.40	6.30±0.40	1.60±0.20 (G)		R	0.40~1.10	
2211 (5728)	5.70±0.40	2.80±0.30	2.00±0.20 (K)		R	0.50~1.20	
2220 (5750)	5.70±0.40	5.00±0.40	2.50±0.30 (M)		R	0.50~1.20	
2225 (5763)	5.70±0.40	6.30±0.40	2.80±0.30 (U)		R	0.50~1.20	
			3.10±0.30 (R)				

* Recommended soldering method : R = Reflow soldering process; W = Wave soldering process.

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

Excluding 0603X225(16V&25V),0603S225(6.3V&16V),0603X475(6.3V&16V),0603S475(4V&6.3V).

#2: For 0201/ 0.1uF < Cap < 0.68uF products, Excluding 0201X334~474(≤6.3V) & 0201X224(≤10V)

#3: For 0201X334~474(16V&25V),0201/Cap ≥ 0.68μF products, Excluding 0201X105*6R3=>(L:0.6±0.05,W:0.3±0.05,T:0.3±0.05).

#4: For 1210B(100)/Cap > 1uF or 1210B(200V & 250V)/Cap > 0.47μF or 1210B(400V~630V) /Cap > 0.22μF products.

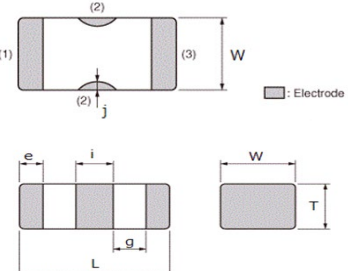
#5: For 1206B(100V)/Cap ≥ 1.2μF products.

#6: For 0402X475M6R3CT products.

#7 For 1206B183~223/1000V products.

The table only for General Purpose Series, Soft termination and others please refer to individual sheet for details.

■ Feed Through Type Capacitor

Outline	Size Inch (mm)	L (mm)	W (mm)	T (mm)/Symbol		e (mm)	g (mm)	i (mm)	J (mm)
	0402 (1005)	1.00±0.10	0.50±0.20	0.40±0.10	W	0.17±0.10	0.10 min	0.35±0.10	0.15±0.10
	0805 (2012)	2.00±0.20	1.25±0.10	0.85±0.10	T	0.30±0.20	0.40±0.20	0.60±0.20	0.25±0.20

Reflow soldering process only.

■ FEATURES

- * A wide selection of sizes is available (0201 to 2225).
- * High capacitance in given case size.
- * Capacitor with lead-free termination (pure Tin).

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	X7S	X6S	X5R
Size	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225				
Capacitance range	0.1pF to 0.1μF	100pF to 47μF	0.1μF to 100μF	0.1μF to 100μF	100pF to 220μF
Capacitance tolerance	Cap≤5pF ^{#1} : A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F(±1%), G (±2%), J (±5%), K (±10%)	J (±5%), K (±10%), M (±20%)	K (±10%), M (±20%)	K (±10%), M (±20%)	K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	4V, 6.3V, 10V, 16V, 25V, 50V, 100V			
Operating temperature	-55 to +125°C			-55 to +105°C	-55 to +85°C
Capacitance characteristic	±30ppm	±15%	±22%		±15%
Termination	Ni/Sn (lead-free termination)				

#1: NP0, 0.1pF and 5pF<Cap<10pF products need to check with sales if it can supply A (±0.05pF).

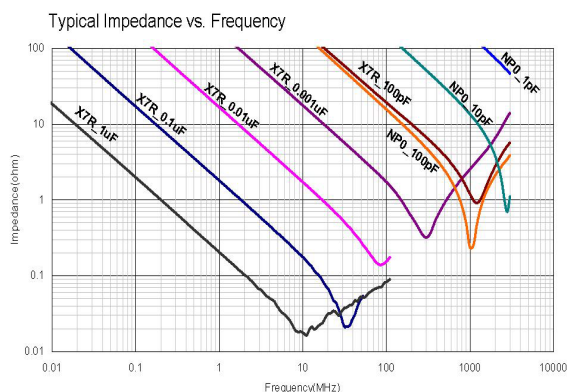
■ EXPLANATION OF PART NUMBERS

1206	B	104	K	500	C	I
<u>Size (Inch (mm))</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging style</u>
1206 (3216)	B=X7R	104=10x10 ⁴ =100nF	K= ±10%	500=50 VDC	C=Cu/Ni/Sn	T=7" reeled

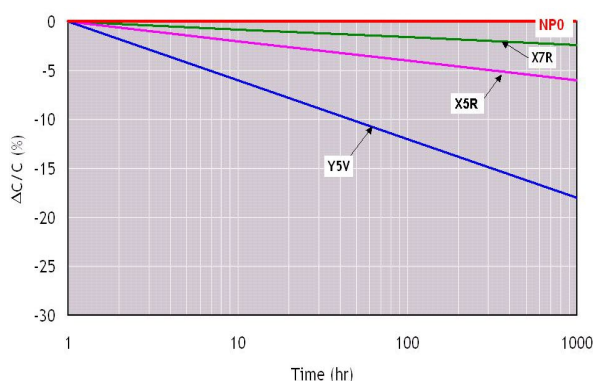
Please refer to page 2 "How to order" for more information.

■ ELECTRICAL CHARACTERISTICS

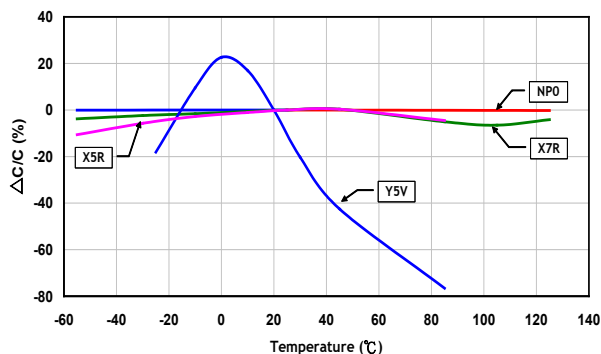
1) Frequency characteristics



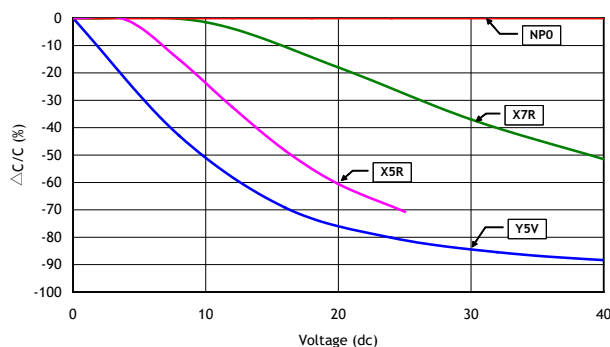
2) Capacitance Change - Typical aging rate



3) Temperature characteristics of capacitance (TCC)



4) DC Bias characteristics



All above typical electronic characteristics are for reference only.
Please contact with Walsin representative for detail information of any specific item.

■ CAPACITANCE RANGE

NP0 Dielectric

Dielectric		NP0																										
Size		0201			0402			0603			0805			1206			1210			1812			1825		2220		2225	
Rated Voltage (VDC)		10 16 25	50	100	10 16 25 50	100		10 16 25 50	100		10 16	25 50	100	10 16	25 50	100	10 16	25 50	100	10 16 25 50	100	50	100	50	100	50	100	
Capacitance	0.1pF (0R1)	L	L	L	N*	N*																						
	0.2pF (0R2)	L	L	L	N	N																						
	0.3pF (0R3)	L	L	L	N	N	S*																					
	0.4pF (0R4)	L	L	L	N	N	S*																					
	0.5pF (0R5)	L	L	L	N	N	S	S	A	A	A																	
	0.6pF (0R6)	L	L	L	N	N	S	S	A	A	A																	
	0.7pF (0R7)	L	L	L	N	N	S	S	A	A	A																	
	0.8pF (0R8)	L	L	L	N	N	S	S	A	A	A																	
	0.9pF (0R9)	L	L	L	N	N	S	S	A	A	A																	
	1.0pF (1R0)	L	L	L	N	N	S	S	A	A	A																	
	1.2pF (1R2)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	1.5pF (1R5)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	1.8pF (1R8)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	2.0pF (2R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	2.2pF (2R2)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	2.7pF (2R7)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	3.0pF (3R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	3.3pF (3R3)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	3.9pF (3R9)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	4.0pF (4R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	4.7pF (4R7)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	5.0pF (5R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	5.6pF (5R6)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	6.0pF (6R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	6.8pF (6R8)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	7.0pF (7R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	8.0pF (8R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	8.2pF (8R2)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	9.0pF (9R0)	L	L	L	N	N	S	S	A	A	A	B	B	B														
	10pF (100)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	12pF (120)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	15pF (150)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	18pF (180)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	22pF (220)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	27pF (270)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	33pF (330)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	39pF (390)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	47pF (470)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	56pF (560)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	68pF (680)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	82pF (820)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	100pF (101)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	120pF (121)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	150pF (151)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	180pF (181)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	220pF (221)	L	L	L	N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	270pF (271)	L			N		S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	330pF (331)	L			N		S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	390pF (391)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	470pF (471)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	560pF (561)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	680pF (681)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	820pF (821)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	1,000pF (102)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	1,200pF (122)						X	X	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	1,500pF (152)						X	X	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	1,800pF (182)						X	X	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	2,200pF (222)						X	X	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	2,700pF (272)						X		D	D	D	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	3,300pF (332)						X		D	D	D	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	3,900pF (392)						X		D	D	D	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	4,700pF (472)						X		D	D	D	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	5,600pF (562)						X		D	D	D	B	B	B	C	C	C	D	D	K	K	K	K	K	K	K	K	
	6,800pF (682)						X		D	D	D	C	C	C	C	C	C	D	D	K	K	K	K	K	K	K	K	
	8,200pF (822)						X		D	D	D	D	D	D	C	C	C	D	D	K	K	K	K	K	K	K	K	
	0.010uF (103)						X		D	D	D	D	D	D	C	C	C	D	D	K	K	K	K	K	K	K	K	
	0.012uF (123)								D	D	D	P	P	P	D	D	D	D	D	K	K	K	K	K	K	K	K	
	0.015uF (153)								D	D	D	P	P	P	D	D	D	D	D	K	K	K	K	K	K	K	K	
	0.018uF (183)								D	D	D	P	P	P	K	K	K	D	D	K	K	K	K	K	K	K	K	
	0.022uF (223)								D	D	D	P	P	P	K	K	K	D	D	K	K	K	K	K	K	K	K	
	0.027uF (273)											P	P	P	K	K	K	D	D	K	K	K	K	K	K	K	K	
	0.033uF (333)											P	P	P	K	K	K	D	D	K	K	K	K	K	K	K	K	
	0.039uF (393)											P	P	P	K	K	K	M	M	K	K	K	K	K	K	K	K	
	0.047uF (473)											P	P	P	K	K	K	M	M	K	K	K	K	K	K	K	K	
	0.056uF (563)											P	P	P				M	M	K	K	K	K	K	K	K	K	

■ CAPACITANCE RANGE

X7R Dielectric

Dielectric		X7R																																							
Size	0201			0402						0603						0805				1206				1210					1812			1825		2220		2225					
Rated Voltage (VDC)	6.3 10 16	25	50	6.3	10	16	25	50	100	6.3 10	16	25	35	50	100	6.3 10 16	25	50	100	6.3 10 16	25	50	100	10 16	25	50	100	10	16	25	50	100	10 16 25	50	100	50 100	25 50	100	25 50	100	
Capacitance	100pF (101)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B																					
	120pF (121)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B																					
	150pF (151)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	180pF (181)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	220pF (221)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	270pF (271)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	330pF (331)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	390pF (391)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	470pF (471)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	560pF (561)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	680pF (681)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	820pF (821)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	1,000pF (102)	L	L	L	N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	1,200pF (122)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	1,500pF (152)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	1,800pF (182)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2,200pF (222)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	2,700pF (272)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	3,300pF (332)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	3,900pF (392)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	4,700pF (472)	L	L		N	N	N	N	N	N	S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	5,600pF (562)	L	L		N	N	N	N	N		S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	6,800pF (682)	L			N	N	N	N	N		S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	8,200pF (822)	L			N	N	N	N	N		S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	0.010uF (103)	L	L		N	N	N	N	N		S	S	S		S	S	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
	0.012uF (123)				N	N	N	N	N		S	S	S		S	X	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.015uF (153)				N	N	N	N	N		S	S	S		S	X	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.018uF (183)				N	N	N	N	N		S	S	S		S	X	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.022uF (223)	L			N	N	N	N	N		S	S	S		S	X	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.027uF (273)				N	N	N	N	N		S	S	S		S	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.033uF (333)				N	N	N	N	N		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.039uF (393)				N	N	N	N	N		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.047uF (473)				N	N	N	N	N		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.056uF (563)				N	N	N	N	E		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.068uF (683)				N	N	N	N	E		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.082uF (823)				N	N	N	N	E		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.10uF (104)				N	N	N	N	E		S	S	S		X	X	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	
	0.12uF (124)										S	S	X				B	B	B	I	B	B	B	D	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
	0.15uF (154)						N				S	S	X		X		D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	
	0.18uF (184)										S	S	X				D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	
0.22uF (224)				N	N	N	N			S	S	X		X		D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D		
0.27uF (274)										X	X	X				D	D	I	I	C	C	D	G	C	C	C	C	G	D	D	D	D	D	D	D	D	D	D	D		
0.33uF (334)				N	N					X	X	X		X		D	D	I	I	C	C	D	G	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D	D		
0.39uF (394)										X	X	X				D	D	I	I	C	J	P	G	C	C	C	D	M	D	D	D	D	D	D	D	D	D	D	D		
0.47uF (474)				N	N					X	X	X	X	X		D	D	I	I	J	J	P	G	C	C	C	D	M	D	D	D	D	D	D	D	D	D	D	D		
0.56uF (564)										X	X					D	D			J	J	P	P	D	D	D	D	M	D	D	D	D	D	D	D	D	D	D	D		
0.68uF (684)										X	X					D	D	I		J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K	K	K	K		
0.82uF (824)										X	X					D	D			J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K	K	K	K		
1.0uF (105)				N						X	X	X	X	X		D	D	I		J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K	K	K	K		
1.5uF (155)																I	I			J	P	P			G	G	M	M	D	K	K	K	K	K	K	K	K	K	K		
2.2uF (225)										X	X					I	I	I		J	P	P	P			G	G	M	M	G	M	M		K	K	K	K	K	K		
3.3uF (335)																				P	P	P				G	G	M		K	K			K	K	K	K	K	K		
4.7uF (475)										X						I	I			P	P	P			K	K	K	M	M		M	M			K	K	M	K			
6.8uF (685)																														M	M						M	M	M		
10uF (106)																I*				P	P				K	K	K	Z		M	M						M	R	U		
22uF (226)																				P*					M	M	M			M							U	R			
47uF (476)																																					R#				

1. The letter in cell is expressed the symbol of product thickness.

2. The letter in cell with “*” mark is expressed: 0805B106/16V M tol only, 1206B226/16V:M tol(20%) only; “#” mark is expressed: “2220B476: 25V only”.

3. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X7S Dielectric

Dielectric		X7S																						
Size		0201		0402		0603				0805					1206					1210				
Rated Voltage (VDC)		6.3	10	6.3	10	6.3	10	16	25	10	16	25	50	100	6.3	10	16	25	100	6.3	10	16	25	100
Capacitance	0.1μF (104)	L	L																					
	1.0μF (105)				E			X						I										
	1.5μF (155)																							
	2.2μF (225)			E	E				X										P					
	3.3μF (335)																							
	4.7μF (475)						X	X					I											M
	6.8μF (685)																							
	10μF (106)										I	I												
	22μF (226)																P*							
	47μF (476)														P*									
	100μF (107)																			M*				

1. The letter in cell is expressed the symbol of product thickness.

2. The letter in cell with " * " mark is expressed: "M tolerance"(20%) only

3. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X5R Dielectric

Dielectric		X5R																														
Size		0201					0402					0603						0805					1206					1210				
Rated Voltage (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	4	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	4	6.3	10 16	25	50
Capacitance	100pF (101)			L	L	L																										
	220pF (221)			L	L	L																										
	470pF (471)			L	L	L																										
	820pF (821)																															
	1000pF (102)		L	L	L	L																										
	2200pF (222)		L	L	L																											
	3300pF (332)		L	L	L																											
	4700pF (472)		L	L	L																											
	6800pF (682)		L	L	L																											
	0.010μF (103)	L	L	L	L	L																										
	0.022μF (223)	L	L	L	L					N	N																					
	0.033μF (333)	L	L	L					N		N																					
	0.047μF (473)	L	L	L	L		N	N	N		N																					
	0.068μF (683)	L	L	L			N	N	N		E																					
	0.10μF (104)	L	L	L	L		N	N	N	N	E																					
	0.15μF (154)						N	N	N	N																						
	0.22μF (224)	L	L	L	L		N	N	N	N	N [#]		X	X	X	X	X															
	0.33μF (334)	L	L	L	L		N	N	N				X	X	X	X																
	0.47μF (474)	L	L	L	L		N	N	N	N	E		X	X	X	X	X															
	0.68μF (684)						N	N					X	X	X	X																
	1.0μF (105)	L	L*	L*			N	N	N	N	E		X	X	X	X	X		D	D	D	I										
	1.5μF (155)												X	X				I	I	I	I			J	J				K			
	2.2μF (225)	L*	L*				N	N	E	E			X	X	X	X	X	I	I	I	I	I		J	J	P	P		K			
	3.3μF (335)												X	X				I	I	I	I			P	P	P	P					
	4.7μF (475)						E	E	E*				X	X	X	X		I	I	I	I	I	P	P	P	P	P		K	K		
6.8μF (685)																						P	P									
10μF (106)						E*	E*				X	X	X	X	X*		I	I	I	I	I	P	P	P	P	P		K	K	K	M	
22μF (226)						E*					X	X*	X*				I	I*	I*	I*		P	P	P	P			M	M	M		
47μF (476)											X	X*					I*	I*				P	P	P*				M	M	M*		
100μF (107)																	I*					P						M	M			
220μF (227)																						P*						M	M			

1. The letter in cell is expressed the symbol of product thickness.

2. The letter in cell with "*" mark is expressed: "M tolerance"(20%) only, the cell with "# " mark is extend to 63V.

3. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X6S Dielectric

Dielectric		X6S																													
Size		0201					0402					0603					0805					1206					1210				
Rated Voltage (VDC)		4	6.3	10	16	25	6.3	10	16	25	4	6.3	10	16	25	4	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	100
Capacitance	1000pF (102)																														
	1500pF (152)																														
	2200pF (222)			L																											
	3300pF (332)																														
	4700pF (472)			L																											
	6800pF (682)																														
	8200pF (822)																														
	0.010μF (103)																														
	0.015μF (153)	L	L	L																											
	0.022μF (223)	L	L	L																											
	0.033μF (333)	L	L	L																											
	0.047μF (473)	L	L	L																											
	0.068μF (683)	L	L	L																											
	0.082μF (823)	L	L	L																											
	0.10μF (104)		L	L	L	L	N																								
	0.15μF (154)																														
	0.22μF (224)		L	L*			N																								
	0.33μF (334)						N																								
	0.47μF (474)	L					N																								
	0.68μF (684)																														
	1.0μF (105)	L*	L*				N	N	N	E																					
	1.5μF (155)																														
	2.2μF (225)						E	E	E			X	X	X					I												
	3.3μF (335)																				I	I									
	4.7μF (475)											X	X	X	X	X						I	I								K
	6.8uF (685)																														
	10μF (106)						E*					X*	X*	X*	X*		I	I	I	I	I					P					
	22μF (226)											X*	X*				I*	I*	I*	I*			P	P*	P					M	
47μF (476)																I*	I*					P						M	M	M	
100μF (107)																I*												M*	M*		

1. The letter in cell is expressed the symbol of product thickness.
2. The letter in cell with " * " mark is expressed: "M tolerance"(20%) only
3. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High capacitance in unit size.
- * High precision dimensional tolerances.
- * Suitable used in high-accuracy automatic mounting machine.

■ GENERAL ELECTRICAL DATA

Size	01R5		
Dielectric	NP0	X7R	X5R
Capacitance*	0.2pF to 220pF	100pF & 1000pF	100pF to 0.1μF
Capacitance tolerance**	Cap≤5pF: A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF ^{#1} : A (±0.05pF), B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)	K (±10%), M (±20%)	
Rated voltage (WVDC)	16V, 25V, 50V	10V, 25V	6.3V, 10V
Operating temperature	-55 to +125°C	-55 to +125°C	-55 to +85°C
Capacitance change	±30ppm	±15%	
Termination	Ni/Sn (lead-free termination)		

#1: NP0, 0.1pF and 5pF<Cap<10pF products need to check with sales if it can supply A (±0.05pF) and Cap≥10pF "surface coating" products is only supply J (±5%),K (±10%), M (±20%)

■ EXPLANATION OF PART NUMBERS

01R5	N	100	J	160	C	I
Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
01R5 =01005 (0402)	N=NP0(C0G)	100=10x10 ⁰ =10pF	J=±5%	160=16 VDC	C=Cu/Ni/Sn	T=7" reeled

Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

SIZE		01R5		
DIELECTRIC		NP0		
RATED VOLTAGE (VDC)		16	25	50
Capacitance	0.2pF (0R2)	V	V	V
	0.3pF (0R3)	V	V	V
	0.4pF (0R4)	V	V	V
	0.5pF (0R5)	V	V	V
	1.0pF (1R0)	V	V	V
	1.5pF (1R5)	V	V	V
	2.0pF (2R0)	V	V	V
	3.0pF (3R0)	V	V	V
	4.0pF (4R0)	V	V	V
	5.0pF (5R0)	V	V	V
	6.0pF (6R0)	V	V	V
	7.0pF (7R0)	V	V	V
	8.0pF (8R0)	V	V	V
	9.0pF (9R0)	V	V	V
	10pF (100)	V	V	V
	12pF (120)	V	V	V
	15pF (150)	V	V	V
	18pF (180)	V	V	V
	22pF (220)	V	V	V
	27pF (270)	V	V	V
	33pF (330)	V	V	V
	39pF (390)	V	V	V
	47pF (470)	V	V	V
	56pF (560)	V	V	V
	68pF (680)	V	V	V
	82pF (820)	V	V	V
	100pF (101)	V	V	V
	120pF (121)	V	V	
	150pF (151)	V	V	
	180pF (181)	V	V	
	220pF (221)	V	V	

SIZE		01R5			
DIELECTRIC		X7R		X5R	
RATED VOLTAGE (VDC)		10	25	6.3	10
Capacitance	100pF (101)	V			V
	120pF (121)				
	150pF (151)	V			V
	180pF (181)				
	220pF (221)	V			V
	270pF (271)				
	330pF (331)	V			V
	390pF (391)				
	470pF (471)	V			V
	560pF (561)				
	680pF (681)				V
	820pF (821)				
	1,000pF (102)	V	V	V	V
	1,500pF (152)				V
	2,200pF (222)				V
	3,300pF (332)				V
	4,700pF (472)				V
	6,800pF (682)				V
	0.010μF (103)			V	V
	0.022μF (223)			V	
	0.033μF (333)			V	
	0.047μF (473)			V	
	0.068μF (683)			V	
	0.1μF (104)			V	V

- The letter in cell is expressed the symbol of product thickness.
- For more information about products with special capacitance or other data, please contact WTC local representative

■ FEATURES

- * High voltage in a given case size.
- * High stability and reliability.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	
Capacitance	0.5pF to 1μF	100pF to 2.2μF
Capacitance tolerance	Cap≤5pF ^{#1} : B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF A (±0.05pF), B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF ^{#1} : F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)	K (±10%), M (±20%)
Rated voltage (WVDC)	200V to 4000V	
DF/ Q	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	≤2.5%
Insulation resistance at Ur	Ur=200~630V: ≥10GΩ or RxC≥100Ω·F whichever is smaller Ur=1000~3000V: ≥10GΩ	
Dielectric strength	200~300V: ≥2 x WVDC 400V~450V: ≥1.2 x WVDC 500~999V: ≥1.5 x WVDC 1000~3000V: ≥1.2 x WVDC 4000: ≥1.1 x WVDC	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm	±15%
Termination	Ni/Sn (lead-free termination)	

#1: NP0, 0.1pF and 5pF<Cap<10pF products need to check with sales if it can supply A (±0.05pF) and Cap≥10pF "surface coating" products is only supply J (±5%), K (±10%), M (±20%)

■ EXPLANATION OF PART NUMBERS

<u>1808</u>	<u>N</u>	<u>100</u>	<u>J</u>	<u>202</u>	<u>C</u>	<u>I</u>
<u>Size (Inch (mm))</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging style</u>
1808 (4520)	N=NP0(C0G)	100=10x10 ⁰ =10pF	J=±5%	202=2000 VDC	C=Cu/Ni/Sn M=Surface coating, Cu/Ni/Sn	T=7" reeled

Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

NP0 Dielectric 200V to 4000

■ "+" mark only supply "surface coating" products

[illegible]

* 2225/Cap.0.082uF/500V only

1. The letter in cell is expressed the symbol of product thickness.
2. For more information about products with special capacitance or other data, please contact WTC local representative.

X7R Dielectric 200V to 4000V

☐ "+" mark only supply "surface coating" products

DIELECTRIC		X7R																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
SIZE		0603	0805		1206					1210				1808			1812					1825				2220				2225																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
RATED VOLTAGE (VDC)		200, 250	200, 250	500, 630	1000	200, 250	400, 450	500, 630	1000	1500	2000	2500	200, 250	400, 450	500, 630	1000	1500, 2000	500, 630	1000	1500, 2000	3000	4000	200, 250	500, 630	1000	1500, 2000	3000	4000	200, 250	500, 630	1000	1500, 2000	3000	4000	200, 250	500, 630	1000	1500	2000	3000	4000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
Capacitance	100pF (101)	X	B	B	B	D		D	D	D	D	D	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	120pF (121)	X	B	B	B	D		D	D	D	D	D	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	150pF (151)	X	B	B	B	D		D	D	D	D	D	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	180pF (181)	X	B	B	B	D		D	D	D	D	D	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	220pF (221)	X	B	B	B	D		B	D	B	D	D	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	270pF (271)	X	B	B	B	D		D	D	D	D	D	D																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

*. 0805/Cap.0.082uF~0.1uF/200V only; 0805/Cap.0.033uF/500V only; 1812/Cap.0.27uF~0.47uF/500V only.

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High voltage in a given case size.
- * High stability and reliability.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R
Size	1808, 1812	1206, 1210, 1808, 1812, 1825, 2211, 2220, 2225
Capacitance	33pF to 470pF	150pF to 0.018μF
Capacitance tolerance	J (±5%), K (±10%), M (±20%)	K (±10%), M (±20%)
Rated voltage (WVDC)	4000V	2000V to 4000V
Q/DF	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	DF≤2.5%
Dielectric strength	1000~3000V: ≥1.2 x WVDC, 4000: ≥1.1 x WVDC	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm	±15%
Termination	Ni/Sn (lead-free termination)	

■ EXPLANATION OF PART NUMBERS

1808	B	102	K	302	M	I
<u>Size (Inch (mm))</u> 1808 (4520)	<u>Dielectric</u> N=NP0 B=X7R	<u>Capacitance</u> 100=10x10 ² =1000pF	<u>Tolerance</u> K=±10%	<u>Rated voltage</u> 302=3000 VDC	<u>Termination</u> M= Surface coating, Cu/Ni/Sn	<u>Packaging style</u> T=7" reeled

Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

DIELECTRIC		NP0			X7R															
SIZE		1210	1808	1812	1206		1210		1808		1812			1825		2211	2220		2225	
RATED VOLTAGE (VDC)		4000	4000	4000	2000	2500	630	2000	3000	4000	3000	3500	4000	3000	4000	4000	3000	4000	3000	4000
Capacitance	33pF (330)		K	D																
	39pF (390)			D																
	47pF (470)			G																
	56pF (560)			G																
	68pF (680)			K																
	82pF (820)			K																
	100pF (101)			K																
	120pF (121)			M																
	150pF (151)								K	K										
	180pF (181)								K	K										
	220pF (221)								K	K										
	270pF (271)								K	K			K		K	K		K		K
	330pF (331)								K	K			K		K	K		K		K
	390pF (391)								K	K			K		K	K		K		K
	470pF (471)	G							K	K			K		K	K		K		K
	560pF (561)								K	K			K		K	K		K		K
	680pF (681)					D			K	K			K		K	K		K		K
	820pF (821)					D			K	K			K		K	K		K		K
	1,000pF (102)					D			K	K			K		K	K		K		K
	1,200pF (122)								K				M		M	M		M		M
	1,500pF (152)								K				M		M	M		M		M
	1,800pF (182)								K				M		M	M		M		M
	2,200pF (222)				G				K		M				K			K		K
	2,700pF (272)								K		M				K			K		K
	3,300pF (332)								K		M				K			K		K
	3,900pF (392)								K						K			K		K
	4,700pF (472)								K						K			K		K
	5,600pF (562)						M		K						M			K		M
	6,800pF (682)						M		K						M			M		M
	8,200pF (822)						M		K						M			M		M
	0.010μF (103)						M		K		K	M			M			M		M
	0.012μF (123)														U			U		M
	0.015μF (153)														U			U		M
	0.018μF (183)														U			U		U
	0.022μF (223)																			
	0.047μF (473)						G													
	0.10μF (104)																			

1. The letter in cell is expressed the symbol of product thickness.

2 For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * Ultra high Q and low ESR performance at high frequency.
- * Quality improvement of telephone calls for low power loss and better performance.

■ GENERAL ELECTRICAL DATA

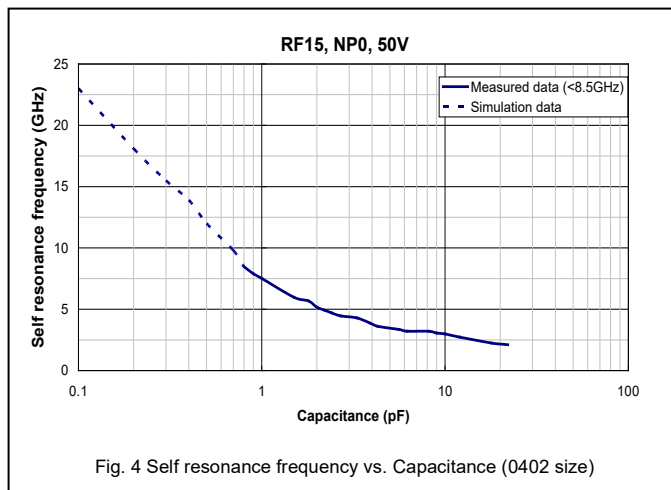
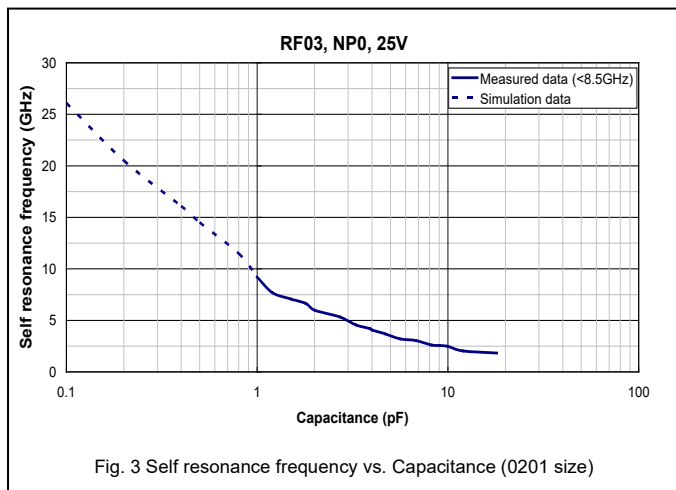
Dielectric	NP0, X8G																											
Size	01005, 0201, 0402, 0603, 0805, 0505, 1111																											
Capacitance	0.1pF to 1000pF																											
Capacitance tolerance	Cap≤5pF: A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)																											
Rated voltage (WVDC)	6.3V, 10V, 25V, 50V, 100V, 200V, 250V, 500V, 1500V																											
Q	01005, 0201, 0402/25V~50V: Cap<30pF: Q≥400+20C; Cap≥30pF: Q≥1000 0402/100V~200V, 0603, 0805, 0505, 1111: Cap<30pF:Q≥800+20C; Cap≥30pF: Q≥1400																											
ESR	<table><tr><td>RF02 (01005)</td><td>RF03 (0201)</td><td>RF15 (0402)</td><td>RF11 (0505)</td></tr><tr><td>0.2pF≤Cap≤1pF:< 700mΩ/pF</td><td>0.1pF≤Cap≤1pF:< 350mΩ/pF</td><td>0.1pF≤Cap≤1pF:< 350mΩ/pF</td><td>0.4pF≤Cap<1.0pF: < 1500mΩ</td></tr><tr><td>1pF<Cap≤2pF:< 600mΩ</td><td>1pF<Cap≤5pF:< 300mΩ</td><td>1pF<Cap≤5pF:< 300mΩ</td><td>1.0pF≤Cap<10pF: < 250mΩ</td></tr><tr><td>2pF<Cap≤5pF:< 500mΩ</td><td>5pF<Cap≤22pF:< 250mΩ</td><td>5pF<Cap≤100pF:< 250mΩ</td><td>10pF≤Cap≤100pF: < 200mΩ</td></tr><tr><td>5pF<Cap≤10pF:< 300mΩ</td><td></td><td></td><td></td></tr><tr><td>10pF<Cap≤22pF:< 350mΩ</td><td></td><td></td><td></td></tr></table>				RF02 (01005)	RF03 (0201)	RF15 (0402)	RF11 (0505)	0.2pF≤Cap≤1pF:< 700mΩ/pF	0.1pF≤Cap≤1pF:< 350mΩ/pF	0.1pF≤Cap≤1pF:< 350mΩ/pF	0.4pF≤Cap<1.0pF: < 1500mΩ	1pF<Cap≤2pF:< 600mΩ	1pF<Cap≤5pF:< 300mΩ	1pF<Cap≤5pF:< 300mΩ	1.0pF≤Cap<10pF: < 250mΩ	2pF<Cap≤5pF:< 500mΩ	5pF<Cap≤22pF:< 250mΩ	5pF<Cap≤100pF:< 250mΩ	10pF≤Cap≤100pF: < 200mΩ	5pF<Cap≤10pF:< 300mΩ				10pF<Cap≤22pF:< 350mΩ			
	RF02 (01005)	RF03 (0201)	RF15 (0402)	RF11 (0505)																								
	0.2pF≤Cap≤1pF:< 700mΩ/pF	0.1pF≤Cap≤1pF:< 350mΩ/pF	0.1pF≤Cap≤1pF:< 350mΩ/pF	0.4pF≤Cap<1.0pF: < 1500mΩ																								
	1pF<Cap≤2pF:< 600mΩ	1pF<Cap≤5pF:< 300mΩ	1pF<Cap≤5pF:< 300mΩ	1.0pF≤Cap<10pF: < 250mΩ																								
	2pF<Cap≤5pF:< 500mΩ	5pF<Cap≤22pF:< 250mΩ	5pF<Cap≤100pF:< 250mΩ	10pF≤Cap≤100pF: < 200mΩ																								
	5pF<Cap≤10pF:< 300mΩ																											
	10pF<Cap≤22pF:< 350mΩ																											
	<table><tr><td>RF18 (0603)</td><td>RF21 (0805)</td><td>RF22 (1111)</td></tr><tr><td>0.1pF≤Cap≤1pF:< 1500mΩ</td><td>0.3pF≤Cap≤1pF: < 1500mΩ</td><td>0.6pF≤Cap<1pF: < 350mΩ</td></tr><tr><td>1pF<Cap≤10pF:< 250mΩ</td><td>1pF<Cap≤10pF: < 250mΩ</td><td>1pF≤Cap<10pF: < 250mΩ</td></tr><tr><td>10pF<Cap≤220pF:< 200mΩ</td><td>10pF<Cap≤220pF:< 200mΩ</td><td>10pF≤Cap≤100pF: < 200mΩ</td></tr></table>				RF18 (0603)	RF21 (0805)	RF22 (1111)	0.1pF≤Cap≤1pF:< 1500mΩ	0.3pF≤Cap≤1pF: < 1500mΩ	0.6pF≤Cap<1pF: < 350mΩ	1pF<Cap≤10pF:< 250mΩ	1pF<Cap≤10pF: < 250mΩ	1pF≤Cap<10pF: < 250mΩ	10pF<Cap≤220pF:< 200mΩ	10pF<Cap≤220pF:< 200mΩ	10pF≤Cap≤100pF: < 200mΩ												
	RF18 (0603)	RF21 (0805)	RF22 (1111)																									
	0.1pF≤Cap≤1pF:< 1500mΩ	0.3pF≤Cap≤1pF: < 1500mΩ	0.6pF≤Cap<1pF: < 350mΩ																									
	1pF<Cap≤10pF:< 250mΩ	1pF<Cap≤10pF: < 250mΩ	1pF≤Cap<10pF: < 250mΩ																									
	10pF<Cap≤220pF:< 200mΩ	10pF<Cap≤220pF:< 200mΩ	10pF≤Cap≤100pF: < 200mΩ																									
Insulation resistance at Ur	≥10GΩ or RxC≥100Ω·F whichever is smaller.																											
Operating temperature	X8G:-55 to +150°C; NP0: -55 to +125°C																											
Capacitance change	±30ppm/°C																											
Termination	Ni/Sn (lead-free termination)																											

■ EXPLANATION OF PART NUMBERS

RF	15	G	100	G	201	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
RF=Microwave	15=0402 (1005)	G=X8G N=NP0	100=10x10 ⁰ =10pF	G=±2%	201=200 VDC	C=Cu/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ ELECTRICAL CHARACTERISTICS



■ CAPACITANCE RANGE

DIELECTRIC		NP0																	X8G					
SIZE	01005		0201			0402				0603			0805				0505	1111		0402	0603	0805		
RATED VOLTAGE (VDC)	16	25	6.3 10	25	50	25	50	100	200	25 50	100	250	50	100	250	500	50 100 250	50 100 200 250 500	1500	200	250	250	500	
Capacitance	0.1pF (0R1)			L	L	L	N	N	N	N	H	H	H							N				
	0.2pF (0R2)	V	V	L	L	L	N	N	N	N	H	H	H	A	A	A	A			N			A	A
	0.3pF (0R3)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T			N	S	T	T	
	0.4pF (0R4)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J		N	S	T	T	
	0.5pF (0R5)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J		N	S	T	T	
	0.6pF (0R6)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	0.7pF (0R7)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	0.8pF (0R8)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	0.9pF (0R9)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	1.0pF (1R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	1.2pF (1R2)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	1.5pF (1R5)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	1.8pF (1R8)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	2.0pF (2R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	2.2pF (2R2)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	2.7pF (2R7)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	3.0pF (3R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	3.3pF (3R3)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	3.9pF (3R9)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	4.0pF (4R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	4.7pF (4R7)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	5.0pF (5R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	5.6pF (5R6)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	6.0pF (6R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	6.8pF (6R8)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	7.0pF (7R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	8.0pF (8R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	8.2pF (8R2)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	9.0pF (9R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	10pF (100)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	11pF (110)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	12pF (120)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	13pF (130)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	15pF (150)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	16pF (160)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	18pF (180)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	20pF (200)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	22pF (220)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	T
	24pF (240)			L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	
	27pF (270)			L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	
	30pF (300)			L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	
	33pF (330)			L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	N	S	T	
	36pF (360)						N	N	N		S	S	S	T	T	T	T	J	G			S	T	
	39pF (390)						N	N	N		S	S	S	T	T	T	T	J	G			S	T	
	43pF (430)						N	N	N		S	S	S	T	T	T	T	J	G			S	T	
	47pF (470)						N	N	N		S	S	S	T	T	T	T	J	G				T	
	56pF (560)						N	N	N		S	S	S	T	T	T	T	J	G				T	
	68pF (680)						N	N			S	S	S	T	T	T	T	J	G				T	
	82pF (820)						N	N			S	S	S	T	T	T		J	G				T	
	100pF (101)						N	N			S	S	S	T	T	T		J	G					
120pF (121)										S			T	T	T			G						
150pF (151)										S			T	T	T			G						
180pF (181)										S			T	T	T			G						
220pF (221)										S			T	T	T			G						
270pF (271)																		G						
330pF (331)																		G						
390pF (391)																		G						
470pF (471)																		G						
560pF (561)																		G						
680pF (681)																		G						
820pF (821)																		G						
1,000pF (102)																		G						

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High Q and low ESR performance at high frequency.
- * Ultra low capacitance to 0.05pF.
- * Can offer ultra-narrow tolerance to $\pm 0.02\text{pF}$.
- * Quality improvement of telephone calls for low power loss and better performance.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0
Size	0201, 0402
Capacitance	0.05pF to 10pF
Capacitance tolerance	P ($\pm 0.02\text{pF}$), Q ($\pm 0.03\text{pF}$), A ($\pm 0.05\text{pF}$), B ($\pm 0.1\text{pF}$); Cap $\geq 10\text{pF}$: F ($\pm 1\%$), G ($\pm 2\%$)
Rated voltage (WVDC)	25V, 50V, 100V
Q	$Q \geq 400 + 20C$
Insulation resistance at Ur	$\geq 10\text{G}\Omega$ or $R \times C \geq 100\Omega \cdot \text{F}$ whichever is smaller.
Operating temperature	-55 to +125°C
Capacitance change	$\pm 30\text{ppm}/^\circ\text{C}$
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

UF	15	N	R05	P	250	C	I
Series UF=Microwave with narrow-tolerance	Size (Inch (mm)) 15=0402 (1005)	Dielectric N=NP0	Capacitance R05=0.05pF	Tolerance P= $\pm 0.02\text{pF}$ Q= $\pm 0.03\text{pF}$	Rated voltage 250=25 VDC 500=50 VDC	Termination C=Cu/Ni/Sn	Packaging T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ GENERAL ELECTRICAL DATA

DIELECTRIC		NP0					Tolerance
SIZE	0201			0402			
RATED VOLTAGE (VDC)	25	50	100	25	50		
Capacitance	0.05pF (R05)	L	L		N	N	P, Q, A
	0.1pF (0R1)	L	L	L*	N	N	P, Q, A
	0.2pF (0R2)	L	L	L*	N	N	P, Q, A
	0.3pF (0R3)	L	L	L*	N	N	P, Q, A
	0.4pF (0R4)	L	L	L*	N	N	P, Q, A
	0.5pF (0R5)	L	L	L*	N	N	P, Q, A
	0.6pF (0R6)	L	L	L*	N	N	P, Q, A
	0.7pF (0R7)	L	L	L*	N	N	P, Q, A
	0.8pF (0R8)	L	L	L*	N	N	P, Q, A
	0.9pF (0R9)	L	L	L*	N	N	P, Q, A
	1.0pF (1R0)	L	L	L*	N	N	P, Q, A
	1.1pF (1R1)	L	L	L	N	N	P, Q, A, B
	1.2pF (1R2)	L	L	L	N	N	P, Q, A, B
	1.3pF (1R3)	L	L	L	N	N	A, B
	1.5pF (1R5)	L	L	L	N	N	A, B
	1.6pF (1R6)	L	L	L	N	N	A, B
	1.8pF (1R8)	L	L	L	N	N	A, B
	2.0pF (2R0)	L	L	L	N	N	A, B
	2.2pF (2R2)	L	L	L	N	N	A, B
	2.4pF (2R4)	L	L	L	N	N	A, B
	2.7pF (2R7)	L	L	L	N	N	A, B
	3.0pF (3R0)	L	L	L	N	N	A, B
	3.3pF (3R3)	L	L	L			A, B
	3.6pF (3R6)	L	L	L			A, B
	3.9pF (3R9)	L	L	L			A, B
	4.0pF (4R0)	L	L	L			A, B
	4.3pF (4R3)	L	L	L			A, B
	4.7pF (4R7)	L	L	L			A, B
	5.0pF (5R0)	L	L	L			A, B
	5.1pF (5R1)	L	L	L			A, B
	5.6pF (5R6)	L	L	L			A, B
	6.0pF (6R0)	L	L	L			A, B
	6.2pF (6R2)	L	L	L			A, B
	6.7pF (6R7)	L	L	L			A, B
	6.8pF (6R8)	L	L	L			A, B
	7.0pF (7R0)	L	L	L			A, B
7.5pF (7R5)	L	L	L			A, B	
8.0pF (8R0)	L	L	L			A, B	
8.2pF (8R2)	L	L	L			A, B	
9.0pF (9R0)	L	L	L			A, B	
9.1pF (9R1)	L	L	L			A, B	
10pF (100)	L	L	L			F, G	

1. The letter in cell is expressed the symbol of product thickness.

2. The letter in cell with " * " mark is expressed product not in "P"&"Q" tolerance; "A" tolerance only.

3. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High Q and low ESR performance at high frequency.
- * High reliability: Qualified to AEC-Q200.
- * Ultra low capacitance to 0.1pF; can offer high precision tolerance to $\pm 0.05\text{pF}$.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0
Size	0201, 0402, 0603
Capacitance	0.1pF to 100pF
Capacitance tolerance	Please refer to the Capacitance range table.
Rated voltage (WVDC)	25V, 50V
Q	Cap<30pF:Q $\geq 400+20C$; Cap $\geq 30\text{pF}$:Q ≥ 1000
Insulation resistance at Ur	$\geq 10\text{G}\Omega$ or Rx $C \geq 100\Omega \cdot \text{F}$ whichever is smaller.
Operating temperature	-55 to +125°C
Capacitance change	$\pm 30\text{ppm}/^\circ\text{C}$
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

<u>RT</u>	<u>15</u>	<u>N</u>	<u>100</u>	<u>J</u>	<u>500</u>	<u>C</u>	<u>I</u>
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
RT= Automotive Hi-Q	15=0402 (1005)	N=NP0 (C0G)	100=10x10 ⁰ =10pF	J= $\pm 5\%$	500=50 VDC	C= Cu+Conductive resin /Ni /Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

DIELECTRIC		NP0				Tolerance
SIZE		0201	0402		0603	
RATED VOLTAGE (VDC)		50	25	50	50	
Capacitance	0.1pF (0R1)		N	N		B
	0.2pF (0R2)	L	N	N		A, B
	0.3pF (0R3)	L	N	N	B	A, B
	0.4pF (0R4)	L	N	N	B	A, B
	0.5pF (0R5)	L	N	N	B	A, B, C
	0.6pF (0R6)	L	N	N	B	A, B, C
	0.7pF (0R7)	L	N	N	B	A, B, C
	0.75pF (R75)	L	N	N	B	A, B, C
	0.8pF (0R8)	L	N	N	B	A, B, C
	0.9pF (0R9)	L	N	N	B	A, B, C
	1.0pF (1R0)	L	N	N	B	A, B, C
	1.1pF (1R1)	L	N	N	B	A, B, C
	1.2pF (1R2)	L	N	N	B	A, B, C
	1.3pF (1R3)	L	N	N	B	A, B, C
	1.5pF (1R5)	L	N	N	B	A, B, C
	1.6pF (1R6)	L	N	N	B	A, B, C
	1.8pF (1R8)	L	N	N	B	A, B, C
	2.0pF (2R0)	L	N	N	B	A, B, C
	2.2pF (2R2)	L	N	N	B	A, B, C
	2.4pF (2R4)	L	N	N	B	A, B, C
	2.7pF (2R7)	L	N	N	B	A, B, C
	3.0pF (3R0)	L	N	N	B	A, B, C
	3.3pF (3R3)	L	N	N	B	A, B, C
	3.6pF (3R6)	L	N	N	B	A, B, C
	3.9pF (3R9)	L	N	N	B	A, B, C
	4.0pF (4R0)	L	N	N	B	A, B, C
	4.3pF (4R3)	L	N	N	B	A, B, C
	4.7pF (4R7)	L	N	N	B	A, B, C
	5.0pF (5R0)	L	N	N	B	A, B, C
	5.1pF (5R1)	L	N	N	B	B, C, D
	5.6pF (5R6)	L	N	N	B	B, C, D
	6.0pF (6R0)	L	N	N	B	B, C, D
	6.2pF (6R2)	L	N	N	B	B, C, D
	6.7pF (6R7)	L	N	N	B	B, C, D

DIELECTRIC		NP0				Tolerance
SIZE		0201	0402		0603	
RATED VOLTAGE (VDC)		50	25	50	50	
Capacitance	6.8pF (6R8)	L	N	N	B	B, C, D
	7.0pF (7R0)	L	N	N	B	B, C, D
	7.5pF (7R5)	L	N	N	B	B, C, D
	8.0pF (8R0)	L	N	N	B	B, C, D
	8.2pF (8R2)	L	N	N	B	B, C, D
	9.0pF (9R0)	L	N	N	B	B, C, D
	9.1pF (9R1)	L	N	N	B	B, C, D
	10pF (100)	L	N	N	B	F, G, J
	11pF (110)	L	N	N	B	F, G, J
	12pF (120)	L	N	N	B	F, G, J
	13pF (130)	L	N	N	B	F, G, J
	15pF (150)	L	N	N	B	F, G, J
	16pF (160)	L	N	N	B	F, G, J
	18pF (180)	L	N	N	B	F, G, J
	20pF (200)	L	N	N	B	F, G, J
	22pF (220)	L	N	N	B	F, G, J
	24pF (240)		N	N	B	F, G, J
	27pF (270)		N	N	B	F, G, J
	30pF (300)		N	N	B	F, G, J
	33pF (330)		N	N	B	F, G, J
	36pF (360)		N	N	B	F, G, J
	39pF (390)		N	N	B	F, G, J
	43pF (430)		N	N	B	F, G, J
	47pF (470)		N	N	B	F, G, J
	51pF (510)		N		B	F, G, J
	56pF (560)		N		B	F, G, J
	68pF (680)				B	F, G, J
	82pF (820)				B	F, G, J
	91pF (910)				B	F, G, J
	100pF (101)				B	F, G, J
	150pF (151)					
	220pF (221)					
	330pF (331)					

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High Q and low ESR performance at high frequency.
- * Quality improvement of telephone calls for low power loss and better performance.

■ GENERAL ELECTRICAL DATA

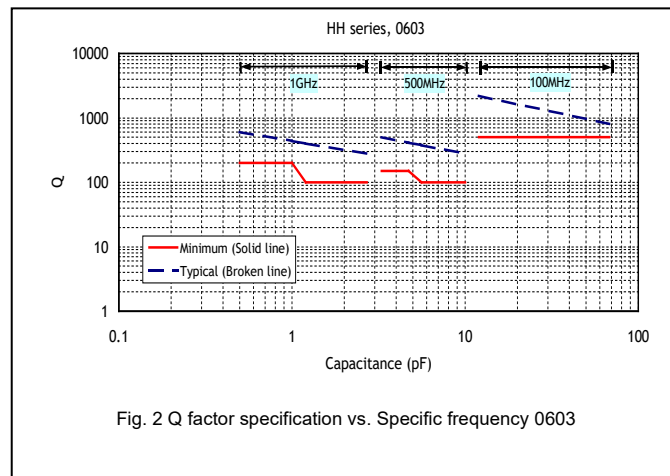
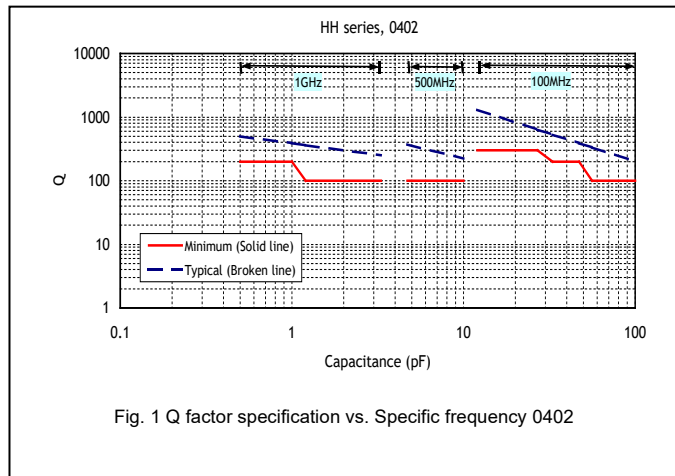
Dielectric	NP0
Size	0201, 0402, 0603, 0805
Capacitance	0.1pF to 3300pF
Capacitance tolerance	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V
Q	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000
Insulation resistance at Ur	≥10GΩ
Operating temperature	-55 to +125°C
Capacitance change	±30ppm
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

HH	15	N	100	G	500	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
HH=High Q/ Low ESR	15=0402 (1005)	N=NP0 (C0G)	100=10x10 ⁰ =10pF	G=±2%	500=50 VDC	C=Cu/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ ELECTRICAL CHARACTERISTICS



■ CAPACITANCE RANGE

DIELECTRIC		NP0															
SIZE		0201			0402				0603					0805			
Rated Voltage (VAC)		10 16	25 50	100	16	25	50	100	16	25	50	100	200	50	100	200 250	500 630
Capacitance	0.3pF (0R3)	L	L	L	N	N	N	N									
	0.4pF (0R4)	L	L	L	N	N	N	N									
	0.5pF (0R5)	L	L	L	N	N	N	N	S	S	S	S	S	B	B		
	0.6pF (0R6)	L	L	L	N	N	N	N	S	S	S	S	S	B	B		
	0.7pF (0R7)	L	L	L	N	N	N	N	S	S	S	S	S	B	B		
	0.8pF (0R8)	L	L	L	N	N	N	N	S	S	S	S	S	B	B		
	0.9pF (0R9)	L	L	L	N	N	N	N	S	S	S	S	S	B	B		
	1.0pF (1R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	1.2pF (1R2)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	1.5pF (1R5)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	1.8pF (1R8)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	2.0pF (2R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	2.2pF (2R2)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	2.7pF (2R7)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	3.0pF (3R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	3.3pF (3R3)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	3.9pF (3R9)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	4.0pF (4R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	4.7pF (4R7)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	5.0pF (5R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	5.6pF (5R6)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	6.0pF (6R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	6.8pF (6R8)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	7.0pF (7R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	8.0pF (8R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	8.2pF (8R2)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	9.0pF (9R0)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	10pF (100)	L	L	L	N	N	N	N	S	S	S	S	S	B	B	B	B
	12pF (120)	L	L	L	N	N	N	N	S	S	S	S		B	B	B	B
	15pF (150)	L	L	L	N	N	N	N	S	S	S	S		B	B	B	B
	18pF (180)	L	L	L	N	N	N	N	S	S	S	S		B	B	B	B
	22pF (220)	L	L	L	N	N	N	N	S	S	S	S		B	B	B	B
	27pF (270)	L	L	L	N	N	N	N	S	S	S	S		B	B	B	B
	33pF (330)	L	L	L	N	N	N	N	S	S	S	S		B	B	B	B
	39pF (390)				N	N	N	N	S	S	S	S		B	B	B	B
	47pF (470)				N	N	N	N	S	S	S	S		B	B	B	B
	56pF (560)				N	N	N	N	S	S	S	S		B	B	B	B
	68pF (680)				N	N	N	N	S	S	S	S		B	B	B	B
	82pF (820)				N	N	N	N	S	S	S	S		B	B	B	B
	100pF (101)				N	N	N	N	S	S	S	S		B	B	B	B
	120pF (121)				N	N	N	N	S	S	S	S		D	D	D	D
	150pF (151)				N	N	N	N	S	S	S	S		D	D	D	D
	180pF (181)				N	N	N	N	S	S	S	S				D	D
	220pF (221)				N	N	N	N	S	S	S	S				D	D
	270pF (271)				N	N	N		S	S	S	S				D	D
	330pF (331)				N	N	N		S	S	S	S				D	D
	390pF (391)				N	N	N		S	S	S	S				D	D
	470pF (471)				N	N	N		S	S	S	S					
	560pF (561)								S	S	S	S					
	680pF (681)								S	S	S	S					
	820pF (821)								S	S	S	S					
	1,000pF (102)								S	S	S	S					
	1,200pF (122)								X	X	X						
	1,500pF (152)								X	X	X						
	1,800pF (182)								X	X	X						
	2,200pF (222)								X	X	X						
	2,700pF (272)								X	X	X						
	3,300pF (332)								X	X	X						

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ GENERAL ELECTRICAL DATA

Dielectric	X8G	NP0	X7R
Size	0201, 0402, 0603, 0805, 1206, 1210		
Capacitance range	0.1pF to 0.015uF	0.1pF to 0.047uF	100pF to 10μF
Capacitance tolerance	Cap≤5pF ^{#1} : A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF ^{#1} : A (±0.05pF), B (±0.1pF), C (±0.25pF) D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)		J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1000V		
Operating temperature	-55 to +150°C	-55 to +125°C	
Capacitance characteristic	±30ppm/°C		±15%
Termination	Ni/Sn (lead-free termination)		

#1: X8G/NP0, 0.1pF product only provide B tolerance and 5pF<Cap<10pF products need to check with sales if it can supply A (±0.05pF)

■ EXPLANATION OF PART NUMBERS

MT	31	B	104	K	500	C	I
Series MT= Automotive (with AEC-Q200 qualification)	Size (Inch (mm)) 31=1206 (3216)	Dielectric B=X7R	Capacitance 104=10x10 ⁴ =0.1uF	Tolerance K=±10%	Rated voltage 500=50 VDC	Termination C=Cu/Ni/Sn	Packaging T=7" reeled

■ CAPACITANCE RANGE

X8G Dielectric

Dielectric		X8G					
Size		0402	0603	0805	1206	1210	
Rated Voltage (VDC)		10 16 25 50	10 16 25 50	10 16 25 50	100	10 16 25 50	10 16 25 50 100
Capacitance	0.1pF (0R1)	N*					
	0.2pF (0R2)	N					
	0.3pF (0R3)	N					
	0.4pF (0R4)	N					
	0.5pF (0R5)	N	S	A	A		
	0.6pF (0R6)	N	S	A	A		
	0.7pF (0R7)	N	S	A	A		
	0.8pF (0R8)	N	S	A	A		
	0.9pF (0R9)	N	S	A	A		
	1.0pF (1R0)	N	S	A	A		
	1.2pF (1R2)	N	S	A	A	B	
	1.5pF (1R5)	N	S	A	A	B	
	1.8pF (1R8)	N	S	A	A	B	
	2.2pF (2R2)	N	S	A	A	B	
	2.7pF (2R7)	N	S	A	A	B	
	3.3pF (3R3)	N	S	A	A	B	
	3.9pF (3R9)	N	S	A	A	B	
	4.7pF (4R7)	N	S	A	A	B	
	5.6pF (5R6)	N	S	A	A	B	
	6.8pF (6R8)	N	S	A	A	B	
	8.2pF (8R2)	N	S	A	A	B	
	10pF (100)	N	S	A	A	B	C
	12pF (120)	N	S	A	A	B	C
	15pF (150)	N	S	A	A	B	C
	18pF (180)	N	S	A	A	B	C
	22pF (220)	N	S	A	A	B	C
	27pF (270)	N	S	A	A	B	C
	33pF (330)	N	S	A	A	B	C
	39pF (390)	N	S	A	A	B	C
	47pF (470)	N	S	A	A	B	C
	56pF (560)	N	S	A	A	B	C
	68pF (680)	N	S	A	A	B	C
	82pF (820)	N	S	A	A	B	C
	100pF (101)	N	S	A	A	B	C
	120pF (121)	N	S	A	A	B	C
	150pF (151)	N	S	A	A	B	C
	180pF (181)	N	S	A	A	B	C
	220pF (221)	N	S	A	A	B	C
	270pF (271)	N	S	A	A	B	C
	330pF (331)	N	S	A	A	B	C
	390pF (391)	N	S	B	B	B	C
	470pF (471)	N	S	B	B	B	C
	560pF (561)	N	S	B	B	B	C
	680pF (681)	N	S	B	B	B	C
	820pF (821)	N	S	B	B	B	C
	1,000pF (102)	N	S	B	B	B	C
	1,200pF (122)		X	B	B	B	C
	1,500pF (152)		X	B	B	B	C
	1,800pF (182)		X	B	B	B	C
	2,200pF (222)		X	B	B	B	C
	2,700pF (272)		X	D	D	B	C
	3,300pF (332)		X	D	D	B	C
	3,900pF (392)			D	D	B	C
	4,700pF (472)			D	D	B	C
	5,600pF (562)			D		B	C
	6,800pF (682)			D		C	C
	8,200pF (822)			D		D	C
	0.010uF (103)			D		D	C
	0.012uF (123)						D
	0.015uF (153)						D

* X8G: 0.1pF product only provide B tolerance

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

X7R Dielectric

Dielectric		X7R																															
Size		0201			0402			0603			0805						1206						1210										
Rated Voltage (VDC)		10	16	50	10	25	100	10	16	25	50	100	10	16	25	50	100	200	500	10	25	50	100	200	500	10	16	25	50	100	200	500	1000
Capacitance	100pF (101)	L	L	L	N	N	N	S	S	S	B	B	B	B	B					D	D					D	D	D					
	120pF (121)	L	L	L	N	N	N	S	S	S	B	B	B	B	B					D	D					D	D	D					
	150pF (151)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	180pF (181)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	220pF (221)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	270pF (271)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	330pF (331)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	390pF (391)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	470pF (471)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	560pF (561)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					D	D	D					
	680pF (681)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					C	D	D					
	820pF (821)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D					C	D	D					
	1,000pF (102)	L	L	L	N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	1,200pF (122)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	1,500pF (152)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	1,800pF (182)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	2,200pF (222)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	2,700pF (272)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	3,300pF (332)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	D					
	3,900pF (392)	L	L		N	N		S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	C	C	D	G					
	4,700pF (472)	L	L		N	N		S	S	S	B	B	B	B	B	D	B	B	B	B	D	D	C	C	C	C	D	G					
	5,600pF (562)	L	L		N	N		S	S	S	B	B	B	B	D	D	B	B	B	B	D	D	C	C	C	C	D	G					
	6,800pF (682)	L			N	N		S	S	S	B	B	B	B	D	D	B	B	B	B	D	D	C	C	C	C	D	G					
	8,200pF (822)	L			N	N		S	S	S	B	B	B	B	D	D	B	B	B	B	D	D	C	C	C	C	D	G					
	0.010uF (103)	L			N	N		S	S	S	B	B	B	B	D	D	B	B	B	B	D	D	C	C	C	C	D	G					
	0.012uF (123)				N	N		S	S	X	B	B	B	B	D		B	B	B	B	D		C	C	C	C	D						
	0.015uF (153)				N	N		S	S	X	B	B	B	B	D		B	B	B	B	D		C	C	C	C	D						
	0.018uF (183)				N	N		S	S	X	B	B	B	B	D		B	B	B	B	D		C	C	C	C	D						
	0.022uF (223)				N	N		S	S	X	B	B	B	B	D		B	B	B	B	D		C	C	C	C	D						
	0.027uF (273)				N	N		S	S	X	B	B	B	D			B	B	B	B			C	C	C	C							
	0.033uF (333)				N	N		S	X	X	B	B	B	D			B	B	B	B			C	C	C	C							
	0.039uF (393)				N	N		S	X	X	B	B	B	D			B	B	B	B			C	C	C	C							
	0.047uF (473)				N	N		S	X	X	B	B	B	D			B	B	B	B			C	C	C	D							
	0.056uF (563)				N	N		S	X		B	B	B	D			B	B	B	B			C	C	C								
	0.068uF (683)				N	N		S	X		B	B	B	D			B	B	B	B			C	C	C								
	0.082uF (823)				N	N		S	X		B	B	B	D			B	B	B	D			C	C	C								
	0.10uF (104)				N	N		S	X	X	B	B	B	D			B	B	B	D			C	C	C								
	0.12uF (124)							X			B	B	D				B	B	B	D			C	C									
	0.15uF (154)							X	X		D	D					C	C	C	G			C	C									
	0.18uF (184)							X			D	D					C	C	C	G			C	C									
	0.22uF (224)							X	X		D	D					C	C	C	G			C	C									
	0.27uF (274)										D	I					C	C	D	P			C	C									
	0.33uF (334)							X	X		D	I					C	C	D	P			C	D									
	0.39uF (394)										D	I					C	J	P	P			C	D									
	0.47uF (474)										D	I					J	J	P	P			C	D									
	0.56uF (564)										D						J	J	P	P			D	D									
	0.68uF (684)										D	I					J	J	P	P			D	D									
	0.82uF (824)										D						J	J	P	P			D	D									
	1.0uF (105)							X			D	I					J	J	P	P			D	D									
	1.5uF (155)																			P			K*										
	2.2uF (225)											I								P	P		K*	M	M								
	4.7uF (475)																						M	M	M								
	10uF (106)																P						M*	M									

* 1210 size: Cap. 1.5 uF & 2.2uF_16V only & Cap. 10_25V only. *1206 size: Cap. 10uF_16V only

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

NP0 Dielectric

Dielectric		NP0																					
Size		0201		0402		0603			0805				1206						1210				
Rated Voltage (VDC)		10 16 25 50	100	10 16 25 50	100	10 16 25 50	100	200 250	10 16 25 50	100	200 250	500 630	10 16 25 50	100	200	250	500 630	1000	10 16 25 50 100	200 250	500 630	1000	1250
Capacitance	0.1pF (0R1)	L*	L*	N*	N*																		
	0.2pF (0R2)	L	L	N	N																		
	0.3pF (0R3)	L	L	N	N																		
	0.4pF (0R4)	L	L	N	N																		
	0.5pF (0R5)	L	L	N	N	S	S	S	A	A	A	A											
	0.6pF (0R6)	L	L	N	N	S	S	S	A	A	A	A											
	0.7pF (0R7)	L	L	N	N	S	S	S	A	A	A	A											
	0.8pF (0R8)	L	L	N	N	S	S	S	A	A	A	A											
	0.9pF (0R9)	L	L	N	N	S	S	S	A	A	A	A											
	1.0pF (1R0)	L	L	N	N	S	S	S	A	A	A	A											
	1.2pF (1R2)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B					
	1.5pF (1R5)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	1.8pF (1R8)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	2.2pF (2R2)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	2.7pF (2R7)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	3.3pF (3R3)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	3.9pF (3R9)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	4.7pF (4R7)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	5.6pF (5R6)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	6.8pF (6R8)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	8.2pF (8R2)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B				
	10pF (100)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C
	12pF (120)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C
	15pF (150)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C
	18pF (180)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C
	22pF (220)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	27pF (270)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	33pF (330)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	39pF (390)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	47pF (470)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	56pF (560)	L	L	N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	68pF (680)	L		N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C
	82pF (820)	L		N	N	S	S	S	A	A	A	B	B	B	B	B	B	B	D	C	C	C	C
	100pF (101)	L		N	N	S	S	S	A	A	B	B	B	B	B	B	B	B	D	C	C	C	D
	120pF (121)	L		N	N	S	S	S	A	A	B	D	B	B	B	B	B	B	D	C	C	C	D
	150pF (151)			N	N	S	S	S	A	A	D	D	B	B	B	B	B	B	D	C	C	C	D
	180pF (181)			N	N	S	S	S	A	A	D	D	B	B	B	B	B	B	G	C	C	C	D
	220pF (221)			N	N	S	S	S	A	A	D	D	B	B	B	B	B	B	G	C	C	C	G
	270pF (271)			N		S	S	X	A	A	D	D	B	B	B	C	C	G	C	C	C	G	
	330pF (331)			N		S	S	X	A	A	D	D	B	B	B	C	C	G	C	C	C	G	
	390pF (391)			N		S	S	X	B	B	D	D	B	B	B	C	C	G	C	C	C	G	
	470pF (471)			N		S	S	X	B	B	D	I	B	B	C	C	C	G	C	C	C	G	
	560pF (561)			N		S	S	X	B	B	D	I	B	B	C	D	D	G	C	C	C	G	
	680pF (681)			N		S	S	X	B	B	D	I	B	B	C	D	D	G	C	C	C	G	
	820pF (821)			N		S	S	X	B	B	D	I	B	B	C	G	G	G	C	C	C	G	
	1,000pF (102)			N		S	S	X	B	B	D	I	B	B	C	G	G	G	C	D	D	G	
	1,200pF (122)					X	X	X	B	B	D	I	B	B	C	G	G		C	D	D	K	
	1,500pF (152)					X	X	X	B	B	D	I	B	B	D	G	G		C	D	D	K	
	1,800pF (182)					X	X	X	B	B	D	I	B	B	D	G	G		C	D	D	K	
	2,200pF (222)					X	X		B	B	D	I	B	B	D	G	G		C	D	D	K	
2,700pF (272)					X	X		D	D	I		B	B	D	G	G		C	D	D	K		
3,300pF (332)					X	X		D	D	I		B	B	D	G	G		C	D	D	K		
3,900pF (392)					X	X		D	D	I		B	B	D	G	G		C	D	D	K		
4,700pF (472)					X	X		D	D	I		B	B	D	G	G		C	G	G	K		
5,600pF (562)					X	X		D	D			B	B	G	G	G		C	G	G	K		
6,800pF (682)					X	X		D	D			C	C	G	G	G		C	G	G	K		
8,200pF (822)					X	X		D	D			D	D	G	G	G		C	G	G	K		
0.010uF (103)					X	X		D	D			D	D	G	G	G		C	G	K	M	M	
0.012uF (123)									D	D								D	K	M	M		
0.015uF (153)									D	D								D	K	M	M		
0.018uF (183)									D	D								K		M			
0.022uF (223)									D	D								K		M			
0.027uF (273)																		K		M			
0.033uF (333)																		K		M			
0.039uF (393)																		K					
0.047uF (473)																		K					

* The letter in cell with " * " mark is expressed: "B" tolerance(±0.1pF) only

■ FEATURES

- * MLCC's terminations are with a soft & flexible polymer layer to withstand high bending stress in SMT.
- * High reliability: AEC-Q200.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R
Size	1210	0402, 0603, 0805, 1206, 1210, 1812, 2220
Capacitance	10pF to 33nF	220pF to 22μF
Capacitance tolerance	Cap≥10pF: F (±1%), G (±2%) J (±5%), K (±10%)	J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	630V, 1000V, 1250V	10V, 16V, 25V, 50V, 100V, 1000V, 3000V
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm/°C	±15%
Termination	Ni/Sn (lead-free termination)	

■ EXPLANATION OF PART NUMBERS

<u>ST</u>	<u>18</u>	<u>B</u>	<u>102</u>	<u>K</u>	<u>500</u>	<u>C</u>	<u>I</u>
<u>Series</u>	<u>Size (Inch (mm))</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging</u>
ST= Soft Termination MLCC for Automotive	18=0603 (1608)	B=X7R	102=10x10 ² =1000pF	K=±10%	500=50 VDC	C= Cu+Conductive resin /Ni /Sn M= Cu+Conductive resin /Ni /Sn + Surface Coating	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ PACKAGING DIMENSION AND QUANTITY

* Please refer to page 35 "PACKAGING DIMENSION AND QUANTITY" for more information.

■ **CAPACITANCE RANGE**

NP0 Dielectric ■ "+" mark only supply "surface coating" products

Dielectric		NP0					
SIZE		1206		1210			1812
RATED VOLTAGE (VDC)		630	1000	630	1000	1250	3000
Capacitance	10pF (100)			C	C		
	12pF (120)			C	C		
	15pF (150)			C	C		
	18pF (180)			C	C		
	22pF (220)			C	C		
	27pF (270)			C	C		
	33pF (330)			C	C		
	39pF (390)			C	C		
	47pF (470)			C	C		
	56pF (560)			C	C		
	68pF (680)			C	C		
	82pF (820)			C	C		
	100pF (101)		B	C	C		D
	120pF (121)			C	C		
	150pF (151)			C	C		
	180pF (181)			C	C		
	220pF (221)			C	C		
	270pF (271)			C	C		
	330pF (331)			C	C		
	390pF (391)			C	C		
	470pF (471)			C	C		
	560pF (561)			C	D		
	680pF (681)			C	D		
	820pF (821)			C	G		
	1,000pF (102)			C	G		
	1,200pF (122)			C	G		
	1,500pF (152)			C	K		
	1,800pF (182)			C	K		
	2,200pF (222)			C	K		
	2,700pF (272)			C	M		
	3,300pF (332)			C	M		
	3,900pF (392)			D	M		
	4,700pF (472)			D	M		
	5,600pF (562)			D	M		
	6,800pF (682)			G	M		
	8,200pF (822)			G	M		
	0.010μF (103)			K	M	M	
	0.012μF (123)			K	M		
	0.015μF (153)			M	M		
	0.018μF (183)			M	M		
	0.022μF (223)			M	M		
	0.027μF (273)			M			
	0.033μF (333)			M			
	0.039μF (393)						
	0.047μF (473)						
	0.056μF (563)						
	0.068μF (683)						
	0.082μF (823)						
	0.10μF (104)						

■ CAPACITANCE RANGE

X7R Dielectric ■ "+" mark only supply "surface coating" products

DIELECTRIC		X7R																																			
SIZE	0402	0603					0805					1206					1210				1812				1825	2220											
RATED VOLTAGE (VDC)	16	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	10	16	25	50	100	1000	2000	3000	10	16	25	50	100	1000	2000	3000
Capacitance	10pF (100)																																				
	12pF (120)																																				
	15pF (150)																																				
	18pF (180)																																				
	22pF (220)																																				
	27pF (270)																																				
	33pF (330)																																				
	39pF (390)																																				
	47pF (470)																																				
	56pF (560)																																				
	68pF (680)																																				
	82pF (820)																																				
	100pF (101)																																				
	120pF (121)																																				
	150pF (151)																																				
	180pF (181)																																				
	220pF (221)																B	B		C	C	C															
	270pF (271)																B	B		C	C	C		D	D	D	K									K ⁺	
	330pF (331)																B	B		C	C	C		D	D	D	K									K ⁺	
	390pF (391)																B	B		C	C	C		D	D	D	K									K ⁺	
	470pF (471)																B	B		C	C	C		D	D	D	K									K ⁺	
	560pF (561)																B	B		C	C	C		D	D	D	K									K ⁺	
	680pF (681)																C	C	D ⁺	C	C	C		D	D	D	K									K ⁺	
	820pF (821)																C	C	D ⁺	C	C	C		D	D	D	K									K ⁺	
	1,000pF (102)		S	S	S	S	S	B	B	B	B	B					D	D	D ⁺					D	D	G	K				K	K	K	K	K	K	K ⁺
	1,200pF (122)		S	S	S	S	S	B	B	B	B	B					G	G	D ⁺					D	D	K	M				K	K	K	K	K	K	M ⁺
	1,500pF (152)		S	S	S	S	S	B	B	B	B	B					G	G	D ⁺					D	D	K	M				K	K	K	K	K	K	M ⁺
	1,800pF (182)		S	S	S	S	S	B	B	B	B	B					G	G	D ⁺					D	D	M ⁺	M				K	K	K	K	K	K	M ⁺
	2,200pF (222)		S	S	S	S	S	B	B	B	B	B					G	G	D ⁺					D	D	M ⁺					K	K	K	K	K	K	M ⁺
	2,700pF (272)		S	S	S	S	S	B	B	B	B	B					G	G	D ⁺					D	D	M ⁺					K	K	K	K	K	K	M ⁺
	3,300pF (332)		S	S	S	S	S	B	B	B	B	B					G	G	G ⁺					D	G	M ⁺					K	K	K	K	K	K	M ⁺
	3,900pF (392)		S	S	S	S	S	B	B	B	B	B					G	G	G ⁺					D	K	M ⁺					K	K	K	K	K	K	M ⁺
	4,700pF (472)		S	S	S	S	S	B	B	B	B	B					G	G	G ⁺					D	M	M ⁺					K	K	K	K	K	K	M ⁺
	5,600pF (562)		S	S	S	S	S	B	B	B	B	B					G	G						D		M ⁺					K	K	K	K	K	K	M ⁺
	6,800pF (682)		S	S	S	S	S	B	B	B	B	B					G	G						D		M ⁺					K	K	K	K	K	K	M ⁺
	8,200pF (822)		S	S	S	S	S	B	B	B	B	B					G	G						D		M ⁺					K	K	K	K	K	K	M ⁺
	0.010μF (103)		S	S	S	S	S	B	B	B	B	B					G	G						D		M ⁺					K	K	K	K	K	K	M ⁺
	0.012μF (123)		S	S	S	S		B	B	B	B	B													D						K	K	K	K	K	K	U ⁺
	0.015μF (153)		S	S	S	S		B	B	B	B	B													M	D					K	K	K	K	K	K	U ⁺
	0.018μF (183)		S	S	S	S		B	B	B	B	B													M	D					K	K	K	K	K	K	U ⁺
	0.022μF (223)		S	S	S	S		B	B	B	B	B													M	D					K	K	K	K	K	K	
	0.027μF (273)		S	S	S	S		B	B	B	B	D														D					K	K	K	K	K	K	
0.033μF (333)		S	S	S	X		B	B	B	B	D														D					K	K	K	K	K	K		
0.039μF (393)		S	S	S	X		B	B	B	B	D														D					K	K	K	K	K	K		
0.047μF (473)		S	S	S	X		B	B	B	B	D														D					K	K	K	K	K	K		
0.056μF (563)	E	S	S	S	X		B	B	B	B	D														D					K	K	K	K	K	K		
0.068μF (683)	E	S	S	S	X		B	B	B	B	D														D					K	K	K	K	K	K		
0.082μF (823)	E	S	S	S	X		B	B	B	B	D														D					K	K	K	K	K	K		
0.10μF (104)	E	S	S	S	X	X	B	B	B	B	D														D					K	K	K	K	K	K		
0.12μF (124)		X	X	X			B	B	B	D	D														D					K	K	K	K				
0.15μF (154)		X	X	X			D	D	D	D	D														D					K	K	K	K				
0.18μF (184)		X	X	X			D	D	D	D	D														D					K	K	K	K				
0.22μF (224)		X	X	X			D	D	D	D	D														D					K	K	K	K				
0.33μF (334)							I	I	I	I															D					K	K	K	K				
0.47μF (474)							I	I	I	I															D					K	K	K	K				
0.68μF (684)							I	I	I	I															D					K	K	K	K				
1μF (105)							I	I	I	I							P								D					K	K	K	K				
2.2μF (225)																	P	P												K	K	K	M				
4.7μF (475)																	P	P												K	K	K	M				
10μF (106)																														M	M	M	M				
15μF (156)																																					
22μF (226)																																					

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * MLCC's terminations are with a soft & flexible polymer layer to withstand high bending stress in SMT line.
- * AEC-Q200 qualified, 5mm bending strength guaranteed.
- * VW 80808 specification compliant.
- * Lead-free, RoHS compliant.

■ GENERAL ELECTRICAL DATA

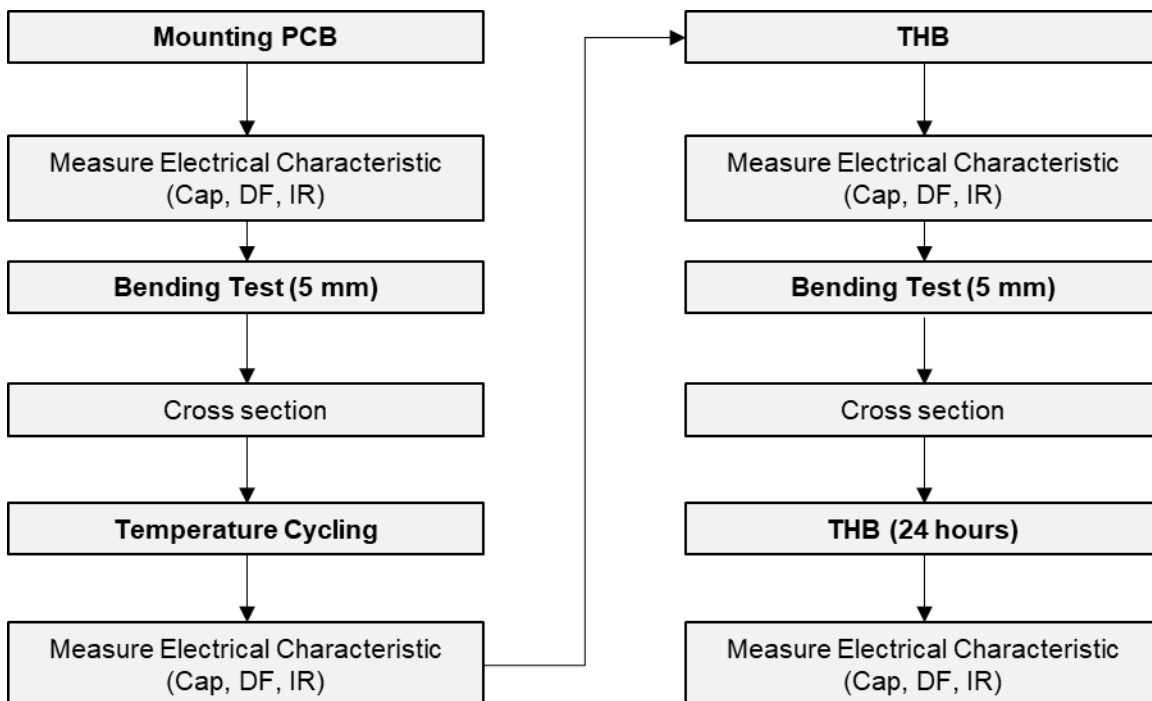
Dielectric	X7R
Size	0603,0805,1206,1210
Capacitance	10 nF to 10 uF
Capacitance tolerance	K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V
Operating temperature	-55 to +125°C
Capacitance characteristic	±15%
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

VT	18	B	104	K	500	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
ST= Soft Termination MLCC for Automotive (VT series) Qualified to AEC-Q200 & VW 80808	18=0603 (1608)	B=X7R	104=10x10 ⁴ =100nF	K=±10%	500=50 VDC	C= Cu+Conductive resin /Ni /Sn M= Cu+Conductive resin /Ni /Sn + Surface Coating	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ VW 80808 Specification Test Flowchart



■ CAPACITANCE RANGE

X7R Dielectric

Dielectric		X7R																						
SIZE		0603							0805							1206							1210	
RATED VOLTAGE (VDC)		10	16	25	25	50	100	250	10	16	25	35	50	100	250	10	16	25	35	50	100	250	50	100
Capacitance	0.010μF (103)	X	X	X	X	X	X		B	B	B	B	B	B										
	0.015μF (153)	X	X	X	X	X	X		B	B	B	B	B	B										
	0.022μF (223)	X	X	X	X	X	X		B	B	B	B	B	B										
	0.033μF (333)	X	X	X	X	X			B	B	B	B	B	D										
	0.047μF (473)	X	X	X	X	X			B	B	B	B	B	D										
	0.068μF (683)	X	X	X	X	X	X		B	B	B	B	B	D										
	0.10μF (104)	X	X	X	X	X	X		B	B	B	B	B	D										
	0.15μF (154)												D											
	0.22μF (224)												D											
	0.27μF (274)															P	P	P	P	P				
	0.33μF (334)															P	P	P	P	P				
	0.47μF (474)															P	P	P	P	P				
	0.68μF (684)															P	P	P	P	P				
	1.0μF (105)																		P	P				
	1.5μF (155)																							
	2.2μF (225)																							M
	3.3μF (335)																							
	4.7μF (475)																			P			M	M
6.8μF (685)																								
10μF (106)																						M		

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative

■ FEATURES

- * A wide selection of sizes is available (0402 to 1812).
- * High capacitance in given case size.
- * Capacitor with lead-free termination (pure Tin).
- * High reliability design with severe quality controls.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	X5R
Size	0201, 0402, 0603, 0805, 1206, 1210, 1812		
Capacitance range*	0.1pF to 0.047μF	100pF to 2.2μF	0.068μF to 10μF
Capacitance tolerance**	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF#1: A (±0.05pF),B (±0.1pF) , C (±0.25pF) D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)	J (±5%), K (±10%), M (±20%)	
Rated voltage (WVDC)	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630, 1000V		6.3V, 10V, 16V, 25V
Operating temperature	-55 to +125°C		-55 to +85°C
Capacitance characteristic	±30ppm/°C	±15%	
Termination	Ni/Sn (lead-free termination)		

#1: 5pF<Cap<10pF products need to check with sales if it can supply A (±0.05pF).

■ EXPLANATION OF PART NUMBERS

MT	31	B	104	K	500	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
MG= Automotive (without AEC-Q200 certification)	31=1206 (3216)	B=X7R	104=10x10 ⁴ =0.1uF	K=±10%	500=50 VDC	C=Cu/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

X5R Dielectric

Dielectric		X5R																
Size		0402			0603				0805				1206				1210	
Rated Voltage (VDC)		6.3	10	16	6.3	10	16	25	6.3	10	16	25	6.3	10	16	25	10	16
Capacitance	0.068μF (683)		N															
	0.10μF (104)		N	N														
	0.15μF (154)		N	N														
	0.22μF (224)	N	N	N				X										
	0.33μF (334)	N	N			X	X	X										
	0.47μF (474)	N				X	X	X										
	0.68μF (684)	N				X	X	X										
	1.0μF (105)				X	X	X	X										
	1.5μF (155)								I	I				J	J	P	K	K
	2.2μF (225)								I	I	I	I		J	J	P	K	K
	3.3μF (335)										I	I	P	P	P	P	K	K
	4.7μF (475)										I	I	P	P	P	P	K	K
	6.8uF (685)												P	P				
	10μF (106)												P	P				

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2. For more information about products with special capacitance or other data, please contact WTC local representative.

NP0 Dielectric

Dielectric		NP0																								
Size		0201		0402		0603			0805					1206						1210				1812		
Rated Voltage (VDC)		10 16 25 50	100	10 16 25 50	100	10 16 25 50	100	200 250	10 16 25 50	100	200	250	500 630	10 16 25 50	100	200	250	500 630	1000	10 16 25 50 100	200 250	500 630	1000	10 16 25 50	100	
Capacitance	0.1pF (0R1)	L*	L*	N*	N*																					
	0.2pF (0R2)	L	L	N	N																					
	0.3pF (0R3)	L	L	N	N																					
	0.4pF (0R4)	L	L	N	N																					
	0.5pF (0R5)	L	L	N	N	S	S	S	A	A	A	A	A													
	0.6pF (0R6)	L	L	N	N	S	S	S	A	A	A	A	A													
	0.7pF (0R7)	L	L	N	N	S	S	S	A	A	A	A	A													
	0.8pF (0R8)	L	L	N	N	S	S	S	A	A	A	A	A													
	0.9pF (0R9)	L	L	N	N	S	S	S	A	A	A	A	A													
	1.0pF (1R0)	L	L	N	N	S	S	S	A	A	A	A	A													
	1.2pF (1R2)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B								
	1.5pF (1R5)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B							
	1.8pF (1R8)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	2.2pF (2R2)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	2.7pF (2R7)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	3.3pF (3R3)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	3.9pF (3R9)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	4.7pF (4R7)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	5.6pF (5R6)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	6.8pF (6R8)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	8.2pF (8R2)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B						
	10pF (100)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	D	D
	12pF (120)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	D	D
	15pF (150)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	D	D
	18pF (180)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	B	C	C	C	C	D	D
	22pF (220)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	27pF (270)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	33pF (330)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	39pF (390)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	47pF (470)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	56pF (560)	L	L	N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	68pF (680)	L		N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	82pF (820)	L		N	N	S	S	S	A	A	A	A	A	B	B	B	B	B	B	D	C	C	C	C	D	D
	100pF (101)	L		N	N	S	S	S	A	A	A	A	B	B	B	B	B	B	B	D	C	C	C	D	D	D
	120pF (121)	L		N	N	S	S	S	A	A	A	B	D	B	B	B	B	B	B	D	C	C	C	D	D	D
	150pF (151)			N	N	S	S	S	A	A	B	D	D	B	B	B	B	B	B	D	C	C	C	D	D	D
	180pF (181)			N	N	S	S	S	A	A	B	D	D	B	B	B	B	B	B	G	C	C	C	D	D	D
	220pF (221)			N	N	S	S	S	A	A	D	D	D	B	B	B	B	B	B	G	C	C	C	G	D	D
	270pF (271)			N		S	S	X	A	A	D	D	D	B	B	B	C	C	G	C	C	C	G	D	D	D
	330pF (331)			N		S	S	X	A	A	D	D	D	B	B	B	C	C	G	C	C	C	G	D	D	D
	390pF (391)			N		S	S	X	B	B	D	D	D	B	B	B	C	C	G	C	C	C	G	D	D	D
	470pF (471)			N		S	S	X	B	B	D	D	I	B	B	C	C	C	G	C	C	C	G	D	D	D
	560pF (561)			N		S	S	X	B	B	D	D	I	B	B	C	D	D	G	C	C	C	G	D	D	D
	680pF (681)			N		S	S	X	B	B	D	D	I	B	B	C	D	D	G	C	C	C	G	D	D	D
	820pF (821)			N		S	S	X	B	B	D	D	I	B	B	C	D	G	G	G	C	C	C	G	D	D
	1,000pF (102)			N		S	S		B	B	D	D	I	B	B	C	D	G	G	G	C	D	D	G	D	D
	1,200pF (122)					X	X		B	B	D	D	I	B	B	C	D	G	G		C	D	D	K	D	D
	1,500pF (152)					X	X		B	B	D	D	I	B	B	D	D	G	G		C	D	D	K	D	D
	1,800pF (182)					X	X		B	B	D	D	I	B	B	D	D	G	G		C	D	D	K	D	D
	2,200pF (222)					X			B	B	D	D	I	B	B	D	D	G	G		C	D	D	K	D	D
2,700pF (272)					X			D	D	I	I		B	B	D	D	G	G		C	D	D	K	D	D	
3,300pF (332)					X			D	D	I	I		B	B	D	D	G	G		C	D	D	K	D	D	
3,900pF (392)								D	D	I	I		B	B	D	D	G	G		C	D	D	K	D	D	
4,700pF (472)								D	D	I	I		B	B	D	D	G	G		C	G	G	K	D	D	
5,600pF (562)								D	D				B	B	G	G				C	G	G	K	D	D	
6,800pF (682)								D	D				C	C	G	G				C	G	G	K	D	D	
8,200pF (822)								D	D				D	D	G	G				C	G	G	K	D	D	
0.010uF (103)								D	D				D	D	G	G				C	G	K	M	D	D	
0.012uF (123)								D	D											D	K	M	M	D	D	
0.015uF (153)								D	D											D	K	M	M	D	D	
0.018uF (183)								D	D											K	K			D	D	
0.022uF (223)								D	D											K	K			D	D	
0.027uF (273)																				K	K			D	D	
0.033uF (333)																				K	K			D	D	
0.039uF (393)																				K	K					
0.047uF (473)																				K	K					

* The letter in cell with "*" mark is expressed: "B" tolerance($\pm 0.1\text{pF}$) only.

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

X7R Dielectric

Dielectric		X7R																																						
Size		0201			0402			0603			0805					1206					1210					1812														
Rated Voltage (VDC)		10	16	50	10	16	50	6.3	10	16	25	50	100	10	16	25	50	100	200	250	500	630	1000	10	16	25	50	100	200	250	500	1000	10	16	25	50	100	200	250	3000
Capacitance	100pF (101)	L	L	L	N	N	S	S	S	S	B	B	B	B	B					B	D					D	D	D												
	120pF (121)	L	L	L	N	N	S	S	S	S	B	B	B	B	B					B	D					D	D	D												
	150pF (151)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D												
	180pF (181)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D												
	220pF (221)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D												
	270pF (271)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D											K	
	330pF (331)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D											K	
	390pF (391)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D											K	
	470pF (471)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D											K	
	560pF (561)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					D	D	D											K	
	680pF (681)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					C	D	D											K	
	820pF (821)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D					C	D	D											K	
	1,000pF (102)	L	L	L	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K		
	1,200pF (122)	L	L		N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K		
	1,500pF (152)	L	L		N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K		
	1,800pF (182)	L	L		N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	M		
	2,200pF (222)	L	L		N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	M		
	2,700pF (272)	L	L		N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	M		
	3,300pF (332)	L	L		N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	M		
	3,900pF (392)	L	L		N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D	M		
	4,700pF (472)	L	L		N	N	S	S	S	S	B	B	B	B	D	D	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D	M		
	5,600pF (562)	L	L		N	N	S	S	S	S	B	B	B	D	D	D	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D			
	6,800pF (682)	L			N	N	S	S	S	S	B	B	B	D	D	D	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D			
	8,200pF (822)	L			N	N	S	S	S	S	B	B	B	D	D	D	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D			
	0.010uF (103)	L			N	N	S	S	S	S	B	B	B	D	D	D	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D	D	D	D	D	D			
	0.012uF (123)				N		S	S	S	X	B	B	B	D			B	B	B	B	B		C	C	C	C	C	D		D	D	D	D	D	D	D	D			
	0.015uF (153)				N		S	S	S	X	B	B	B	D			B	B	B	B	C		C	C	C	C	C	D		D	D	D	D	D	D	D	D			
	0.018uF (183)				N		S	S	S	X	B	B	B	D			B	B	B	B	C		C	C	C	C	C	D		D	D	D	D	D	D	D	D			
	0.022uF (223)				N		S	S	S	X	B	B	B	D			B	B	B	B	C		C	C	C	C	C	D		D	D	D	D	D	D	D	D			
	0.027uF (273)				N		S	S	S	X	B	B	D				B	B	B	B	C		C	C	C	C	C			D	D	D	D	D	D	D	D			
	0.033uF (333)				N		S	S	X	X	B	B	D				B	B	B	B	G		C	C	C	C	C			D	D	D	D	D	D	D	D			
	0.039uF (393)				N		S	S	X	X	B	B	D				B	B	B	B	G		C	C	C	C	C			D	D	D	D	D	D	D	D			
	0.047uF (473)				N		S	S	X	X	B	B	D				B	B	B	B	G		C	C	C	C	D			D	D	D	D	D	D	D	D			
	0.056uF (563)				N		S	S	X		B	B	D				B	B	B	B	G		C	C	C	C	D			D	D	D	D	D	D	D	D			
	0.068uF (683)				N		S	S	X		B	B	D				B	B	B	B	G		C	C	C	C	G			D	D	D	D	D	D	D	D			
	0.082uF (823)				N		S	S	X		B	B	D				B	B	B	D	G		C	C	C	C	G			D	D	D	D	D	D	D	D			
	0.10uF (104)				N		S	S	X		B	B	D				B	B	B	D	G		C	C	C	C	G			D	D	D	D	D	D	D	D			
	0.12uF (124)						S	X			D	D					B	B	B	D			C	C	C	C	G			D	D	D	D	D	D	D				
	0.15uF (154)						S	X	X		D	D					C	C	C	G			C	C	C	D	M			D	D	D	D	K						
	0.18uF (184)						S	X			D	D					C	C	C	G			C	C	C	D	M			D	D	D	D	K						
	0.22uF (224)						S	X	X		D	D					C	C	C	G			C	C	C	D	M			D	D	D	D	K						
	0.27uF (274)						X	X			D	I					C	C	D				C	C	C	G	M			D	D	D	D	K						
	0.33uF (334)						X	X	X		D	I					C	C	D				C	C	D	G	M			D	D	D	D	K						
	0.39uF (394)						X	X			D	I					C	J	P				C	C	D	M	M			D	D	D	D	K						
	0.47uF (474)						X	X			D	I					J	J	P				C	C	D	M	M			D	D	K	K							
	0.56uF (564)										D						J	J	P				D	D	D	M				D	D	K								
	0.68uF (684)										D	I					J	J	P				D	D	D	K				D	K	K								
	0.82uF (824)										D						J	J	P				D	D	D	K				D	K	K								
	1.0uF (105)							X			D	I					J	J	P				D	D	D	K				D	K	K								
	1.5uF (155)																J	P					K	G										K						
	2.2uF (225)						X										J	P	P				K	G									M							
	4.7uF (475)												I						P						M															
	10uF (106)																P	P							M															
	22uF (226)																P							M	M															
	47uF (476)																P							M																

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * These products have no polarity.
- * Their electrostatic capacity temperature response is stable at 15% even in high temperature ranges (up to 150°C).
- * Larger capacity and smaller size (0402 size) with X8G characteristics

■ GENERAL ELECTRICAL DATA

Dielectric	X8G
Size	0402, 0603, 0805, 1206, 1210
Capacitance	0.2pF to 0.015μF
Capacitance tolerance*	Cap≤5pF: A (±0.05pF), B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V
Q/DF*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000
Insulation resistance at Ur**	10GΩ or RxC≥500Ω·F whichever is smaller
Operating temperature	-55 to +150°C
Capacitance characteristic	±30ppm/°C
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

<u>HT</u>	<u>21</u>	<u>R</u>	<u>103</u>	<u>K</u>	<u>500</u>	<u>C</u>	<u>I</u>
Series HT=High Temperature	Size (Inch (mm)) 21=0805 (2012)	Dielectric G=X8G	Capacitance 103=10x10 ³ =10nF	Tolerance K=±10%	Rated voltage 500=50 VDC	Termination C=Cu/Ni/Sn	Packaging T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

X8G Dielectric

DIELECTRIC		X8G																	
SIZE		0402				0603					0805					1206		1210	
RATED VOLTAGE (VDC)		10	16	25	50	10	16	25	50	100	10	16	25	50	100	10 16 25	50 100	10 16 25	50 100
Capacitance	0.1pF (0R1)																		
	0.2pF (0R2)	N	N	N	N														
	0.3pF (0R3)	N	N	N	N														
	0.4pF (0R4)	N	N	N	N														
	0.5pF (0R5)	N	N	N	N	S	S	S	S	S	A	A	A	A	A				
	1.0pF (1R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A				
	1.2pF (1R2)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	1.5pF (1R5)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	1.8pF (1R8)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	2.0pF (2R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	2.2pF (2R2)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	2.7pF (2R7)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	3.0pF (3R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	3.3pF (3R3)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	3.9pF (3R9)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	4.0pF (4R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	4.7pF (4R7)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	5.0pF (5R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	5.6pF (5R6)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	6.0pF (6R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	6.8pF (6R8)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	7.0pF (7R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	8.0pF (8R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	8.2pF (8R2)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	9.0pF (9R0)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B		
	10pF (100)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	12pF (120)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	15pF (150)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	18pF (180)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	22pF (220)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	27pF (270)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	33pF (330)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	39pF (390)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	47pF (470)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	56pF (560)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	68pF (680)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	82pF (820)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	100pF (101)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	120pF (121)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	150pF (151)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	180pF (181)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	220pF (221)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	270pF (271)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	330pF (331)	N	N	N	N	S	S	S	S	S	A	A	A	A	A	B	B	C	C
	390pF (391)	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	C	C
	470pF (471)	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	C	C
	560pF (561)	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	C	C
	680pF (681)	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	C	C
	820pF (821)	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	C	C
	1,000pF (102)	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	C	C
1,200pF (122)					X	X	X	X			B	B	B	B	B	B	B	C	C
1,500pF (152)					X	X	X	X			B	B	B	B	B	B	B	C	C
1,800pF (182)					X	X	X	X			B	B	B	B	B	B	B	C	C
2,200pF (222)					X	X	X	X			B	B	B	B	B	B	B	C	C
2,700pF (272)					X	X	X	X			D	D	D	D	D	B	B	C	C
3,300pF (332)					X	X	X	X			D	D	D	D	D	B	B	C	C
3,900pF (392)											D	D	D	D	D	B	B	C	C
4,700pF (472)											D	D	D	D	D	B	B	C	C
5,600pF (562)											D	D	D	D		B	B	C	C
6,800pF (682)											D	D	D	D		C	C	C	C
8,200pF (822)											D	D	D	D		D	D	C	C
0.010uF (103)											D	D	D	D		D	D	C	C
0.012uF (123)																		D	D
0.015uF (153)																		D	D

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High voltage in a given case size.
- * High stability and reliability.
- * RoHS compliant.



■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R
Size	1808, 1812, 2220, 2211	1808, 1812, 2220, 2211
Capacitance	3pF to 2200pF	100pF to 10nF
Capacitance tolerance	Cap.<10pF: A (±0.05pF), B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap.≥10pF: F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)	J (±5%), K (±10%), M (±20%)
Rated voltage (WVAC)	UL & TUV : X1 310Vac & Y2 250Vac & All model 1500Vdc CQC : 250Vac	
Peak impulse voltage	5000V, 6000V	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm	±15%
Termination	Ni/Sn (lead-free termination)	
Certified number	TUV: R50195920, TUV: R50381780, UL: E182369	
Test standard	EN 60384-14 : 2023, IEC 60384-14 : 2023, UL 60384-14 (Ed 2.0)	

■ EXPLANATION OF PART NUMBERS

S2	42	N	100	J	502	K	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
S2=X1/Y2	42=1808 (4520)	N=NP0	100=10x10 ⁰ =10pF	J=±5%	502=5000V Impulse Voltage	E= Soft termination Z= Soft termination+Surface Coating M= Surface Coating K= Non Coating	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ PACKAGING DIMENSION AND QUANTITY (X1/Y2 & X2 Series)

Unit: pieces

Size Inch (mm)	L (mm)	W (mm)	M _B min(mm)	T (mm)/Symbol		7" Plastic tape
1808 (4520)	4.50+0.8/-0.3	2.00±0.25	0.25~0.75	1.25±0.10	D	2k
				1.40±0.15	F	2k
				1.60±0.20	G	2k
				2.00±0.20	K	1k
1812 (4532)	4.50+0.8/-0.3	3.20±0.40	0.25~0.75	1.25±0.10	D	1k
				1.40±0.15	F	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
2220 (5750)	5.70±0.40	5.00±0.40	0.30~0.90	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
2211 (5728)	5.70±0.40	2.80±0.30	0.30~0.90	2.00±0.20	K	1k
				2.50±0.30	M	0.5k
				2.80±0.30	U	0.5k

■ CAPACITANCE RANGE

NP0 Dielectric (1808 to 2211 Size)

DIELECTRIC		NP0								
Rated voltage		UL & TUV : X1 310Vac & Y2 250Vac & All model 1500Vdc					CQC: 250Vac			
SIZE		1808	1812	2211	2220	2211	1808	1812	2211	2211
PEAK IMPULSE VOLTAGE		5000				6000	5000			6000
Certificated		UL / TUV (IEC/EN 60384-14)					CQC (IEC 60384-14)			
Capacitance	3.0pF (3R0)	F					F			
	3.3pF (3R3)	F					F			
	4.0pF (4R0)	F		K		K	F		K	K
	4.7pF (4R7)	F		K		K	F		K	K
	5.0pF (5R0)	F		K		K	F		K	K
	5.6pF (5R6)	F		K		K	F		K	K
	6.0pF (6R0)	F		K		K	F		K	K
	6.8pF (6R8)	F		K		K	F		K	K
	7.0pF (7R0)	F		K		K	F		K	K
	8.0pF (8R0)	F		K		K	F		K	K
	8.2pF (8R2)	F		K		K	F		K	K
	9.0pF (9R0)	F					F			
	10pF (100)	F	D	K		K	F	D	K	K
	12pF (120)	F	D	K		K	F	D	K	K
	15pF (150)	F	D	K		K	F	D	K	K
	18pF (180)	F	D	K		K	F	D	K	K
	22pF (220)	F	D	K		K	F	D	K	K
	27pF (270)	F	D	K		K	F	D	K	K
	33pF (330)	F	D	K		K	F	D	K	K
	39pF (390)	G	D	K		K	G	D	K	K
	47pF (470)	G	D	K		K	G	D	K	K
	56pF (560)	G	D	K		K	G	D	K	K
	68pF (680)	G	D	K		M	G	D	K	M
	82pF (820)	G	D	K		M	G	D	K	M
	100pF (101)	K	D	K	K	U	K	D	K	U
	120pF (121)	K	D	M	K		K	D	M	
	130pF (131)	K	D		K		K	D		
	150pF (151)	K	D	M	K		K	D	M	
	160pF (161)	K	D	M	K		K	D	M	
	180pF (181)	K	D	M	K		K	D	M	
	220pF (221)	K	K	M	K		K	K	M	
	270pF (271)	K	K	M	K		K	K	M	
	300pF (301)	K	K		K			K		
	330pF (331)	K	K	M	K			K	M	
	390pF (391)		K	M	K			K	M	
	470pF (471)		K	M	K			K	M	
	560pF (561)		K	M	K				M	
	680pF (681)		K	M	K				M	
	720pF (721)		K	M	K					
	820pF (821)		K	M	K					
	1000pF (102)		M	M	K					
	1200pF (122)			U	K					
	1500pF (152)				M					
	1800pF (182)				M					
	2200pF (222)				U					
	2700pF (272)									

■ "+" mark only supply "surface coating" products

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ **CAPACITANCE RANGE**

X7R Dielectric (1808 to 2211Size)

DIELECTRIC		X7R							
Rated voltage		UL & TUV : X1 310Vac & Y2 250Vac & All model 1500Vdc				CQC : 250Vac			
SIZE		1808	1812	2211	2210	1808	1812	2211	2200
PEAK IMPULSE VOLTAGE		5000				5000			
Certificated		UL / TUV (IEC/EN 60384-14)				CQC (IEC 60384-14)			
Capacitance	100pF (101)	G		G		G		G	
	120pF (121)	G ⁺		G ⁺		G ⁺		G ⁺	
	130pF (131)			G ⁺				G ⁺	
	150pF (151)	G ⁺	G ⁺	G ⁺		G ⁺	G ⁺	G ⁺	
	160pF (161)	G ⁺			K ⁺	G ⁺			K ⁺
	180pF (181)	G ⁺	G ⁺	G ⁺	K ⁺	G ⁺	G ⁺	G ⁺	K ⁺
	220pF (221)	G ⁺	G ⁺	G ⁺	K ⁺	G ⁺	G ⁺	G ⁺	K ⁺
	270pF (271)	K ⁺	G ⁺	G ⁺	K ⁺	K ⁺	G ⁺	G ⁺	K ⁺
	300pF (301)								
	330pF (331)	K ⁺	G ⁺	G ⁺	K ⁺	K ⁺	G ⁺	G ⁺	K ⁺
	390pF (391)	K ⁺	G ⁺	G ⁺	K ⁺	K ⁺	G ⁺	G ⁺	K ⁺
	470pF (471)	K ⁺	G ⁺	K ⁺	K ⁺	K ⁺	G ⁺	K ⁺	K ⁺
	560pF (561)	K ⁺	G ⁺	K ⁺	K ⁺	K ⁺	G ⁺	K ⁺	K ⁺
	680pF (681)	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺
	720pF (721)				K ⁺				K ⁺
	820pF (821)	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺	K ⁺
	1000pF (102)	K ⁺	M ⁺	M ⁺	K ⁺	K ⁺	M ⁺	M ⁺	K ⁺
	1200pF (122)	K ⁺	M ⁺	M ⁺	M ⁺			M ⁺	M ⁺
	1500pF (152)	K ⁺	M ⁺	M ⁺	M ⁺			M ⁺	M ⁺
	1800pF (182)	K ⁺	M ⁺	M ⁺	M ⁺			M ⁺	M ⁺
	2200pF (222)		M ⁺	M ⁺	M ⁺			M ⁺	M ⁺
	2700pF (272)		M ⁺	U ⁺	M ⁺			U ⁺	M ⁺
	3300pF (332)		M ⁺	U ⁺	M ⁺				M ⁺
	3900pF (392)		M ⁺	U ⁺	M ⁺				M ⁺
	4700pF (472)		U ⁺	U ⁺	M ⁺				M ⁺
	5600pF (562)				M ⁺				
	6800pF (682)				M ⁺				
	8200pF (822)				U ⁺				
	0.010uF (103)				U ⁺				
	0.012uF (123)								
	0.015uF (153)								
	0.018uF (183)								
	0.022uF (223)								
	0.027uF (273)								
	0.033uF (333)								
	0.039uF (393)								
	0.047uF (473)								
	0.056uF (563)								
	0.068uF (683)								
	0.082uF (823)								
	0.1uF (104)								

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■ FEATURES

- * High voltage in a given case size.
- * High stability and reliability.
- * RoHS compliant.



■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R
Size	1808, 1812, 2220	
Capacitance*	3.0pF to 2700pF	150pF to 0.056uF
Capacitance tolerance	Cap.<10pF: A (±0.05pF), B (±0.1pF), C (±0.25pF), D (±0.5pF) Cap.≥10pF: F (±1%), G (±2%), J (±5%), K (±10%), M (±20%)	J (±5%), K (±10%), M (±20%)
Rated voltage (WVAC)	UL & TUV : X2 310Vac & All model 1500Vdc CQC : 250Vac	
Peak impulse voltage (X2)	2500V	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm	±15%
Termination	Ni/Sn (lead-free termination)	
Certified number	TUV: R50381780, UL: E182369, CQC20001280136	
Test standard	EN 60384-14 : 2023, IEC 60384-14 : 2023, UL 60384-14 : 2025 (Ed 3.0)	

■ EXPLANATION OF PART NUMBERS

<u>S3</u>	<u>42</u>	<u>N</u>	<u>100</u>	<u>J</u>	<u>252</u>	<u>K</u>	<u>I</u>
<u>Series</u>	<u>Size (Inch (mm))</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Termination</u>	<u>Packaging</u>
S3=X2	42=1808 (4520)	N=NP0	100=10x10 ⁰ =10pF	J=±5%	252=2500V Impulse Voltage	E= Soft termination Z= Soft termination+Surface Coating M= Surface Coating K= Non Coating	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ **CAPACITANCE RANGE**

NPO Dielectric (1808 to 1812Size)

DIELECTRIC		NP0			
Rated voltage		UL & TUV : X2 310Vac & All model 1500Vdc		CQC : 250Vac	
SIZE		1808	1808	1808	1812
PEAK IMPULSE VOLTAGE		2500		2500	
Certificated		UL / TUV (IEC/EN 60384-14)		CQC (IEC 60384-14)	
Capacitance	3.0pF (3R0)	F		F	
	3.3pF (3R3)				
	4.0pF (4R0)	F		F	
	4.7pF (4R7)				
	5.0pF (5R0)	F		F	
	5.6pF (5R6)				
	6.0pF (6R0)	F		F	
	6.8pF (6R8)				
	7.0pF (7R0)	F		F	
	8.0pF (8R0)	F		F	
	8.2pF (8R2)				
	9.0pF (9R0)	F		F	
	10pF (100)	F	D	F	D
	12pF (120)	F	D	F	D
	15pF (150)	F	D	F	D
	18pF (180)	F		F	
	22pF (220)	F	D	F	D
	27pF (270)	F	D	F	D
	33pF (330)	F	D	F	D
	39pF (390)	G	D	G	D
	47pF (470)	G	D	G	D
	56pF (560)	G	D	G	D
	68pF (680)	G	D	G	D
	82pF (820)	G	D	G	D
	100pF (101)	K	D	K	D
	120pF (121)	K	D	K	D
	130pF (131)				
	150pF (151)	K	D	K	D
	160pF (161)				
	180pF (181)	K	D	K	D
	220pF (221)	K	D	K	D
	270pF (271)	K	F	K	F
	300pF (301)				
	330pF (331)	K	F	K	F
	390pF (391)	K	F	K	F
	470pF (471)	K	G	K	G
	560pF (561)	K	K	K	K
	680pF (681)	K	K	K	K
	720pF (721)	K		K	
	820pF (821)	K	M	K	M
	1000pF (102)	K	M	K	M
	1200pF (122)	K	M		
	1500pF (152)	K	M		
	1800pF (182)		M		
	2200pF (222)		M		
	2700pF (272)		U		

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■ CAPACITANCE RANGE

X7R Dielectric (1808 to 2220Size)

DIELECTRIC		X7R				
Rated voltage		UL & TUV : X2 310Vac & All model 1500Vdc			CQC : 250Vac	
SIZE		1808	1808	1808	1808	
PEAK IMPULSE VOLTAGE		2500			2500	
Certificated		UL / TUV (IEC/EN 60384-14)			CQC (IEC 60384-14)	
Capacitance	100pF (101)					
	120pF (121)					
	130pF (131)					
	150pF (151)	G			G	
	160pF (161)	G			G	
	180pF (181)	G			G	
	220pF (221)	G			G	
	270pF (271)	G	G		G	G
	300pF (301)	G	G		G	G
	330pF (331)	G	G		G	G
	390pF (391)	G	G		G	G
	470pF (471)	G	G		G	G
	560pF (561)	G	G		G	G
	680pF (681)	G	G		G	G
	720pF (721)		G			G
	820pF (821)	G	G		G	G
	1000pF (102)	K	G		K	G
	1200pF (122)	K	G		K	G
	1500pF (152)	K	K		K	K
	1800pF (182)	K	K		K	K
	2200pF (222)	K	M		K	M
	2700pF (272)	K	M			M
	3300pF (332)	K	M			M
	3900pF (392)	K	M			M
	4700pF (472)	K	M			M
	5600pF (562)	K	M			M
	6800pF (682)	K	M			
	8200pF (822)	K	M			
	0.010uF (103)	K	M	M		M
	0.012uF (123)		M	M		M
	0.015uF (153)		M	M		M
	0.018uF (183)		M	M		M
	0.022uF (223)		U	U		U
	0.027uF (273)			U ⁺		U ⁺
	0.033uF (333)			U ⁺		U ⁺
	0.039uF (393)			U ⁺		U ⁺
	0.047uF (473)			U ⁺		U ⁺
	0.056uF (563)			U ⁺		U ⁺
	0.068uF (683)					
	0.082uF (823)					
	0.1uF (104)					

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■ FEATURES

* MLCC's terminations build a soft & flexible polymer layer to withstand high bending stress in SMT line.

* Available for any item in standard series range.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	X5R	X7T
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225			
Capacitance range	0.1pF to 0.22μF	100pF to 47μF	0.033μF to 10μF	2.2uF
Capacitance tolerance	Cap≤5pF ^{#1} : B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF ^{#1} : A (±0.05pF),B (±0.1pF) , C (±0.25pF),D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	K (±10%), M (±20%)		K (±10%), M (±20%)
Rated voltage (WVDC)	6.3V to 4000V			
Operating temperature	-55 to +125°C		-55 to +85°C	-55 to +125°C
Capacitance characteristic	±30ppm	±15%		+22% ~ -33%
Termination	Ni/Sn (lead-free termination)			

#1: NP0, 0.1pF and 5pF<Cap<10pF products need to check with sales if it can supply A (±0.05pF).

■ EXPLANATION OF PART NUMBERS

SH	31	N	100	J	501	C	T
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
SH=With Ag polymer	31=1206 (3216)	N=NP0(C0G)	100=10x10 ⁰ =10pF	J=±5%	501=500 VDC	C=Ag Polymer/Ni/Sn M=Surface coating, Cu/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ PACKAGING DIMENSION AND QUANTITY

Size	L(mm)	W(mm)	Thickness (mm)/Symbol	Paper tape		Plastic tape	
				7" reel	13" reel	7" reel	13" reel
0402 (1005)	1.00±0.20	0.50±0.20	0.50±0.20 E	10,000	40,000	-	-
0603 (1608)	1.60±0.20	0.80±0.10	0.80±0.07 S	4,000	15,000	-	-
	1.60±0.30	0.80±0.30	0.80±0.30 X	4,000	15,000	-	-
0805 (2012)	2.00±0.20	1.25±0.10	0.60±0.10 A	4,000	15,000	-	-
			0.80±0.10 B	4,000	15,000	-	-
			1.25±0.10 D	-	-	3,000	10,000
	2.00±0.30	1.25±0.30	1.25±0.30 I	-	-	3,000	10,000
1206 (3216)	3.20+0.4/-0.1	1.60±0.15	0.80±0.10 B	4,000	15,000	-	-
			0.95±0.10 C	-	-	3,000	10,000
			1.15±0.15 J	-	-	3,000	10,000
			1.25±0.10 D	-	-	3,000	10,000
	3.20+0.4/-0.1 3.30±0.30 ^{#2}	1.60±0.20	1.60±0.20 G	-	-	2,000	10,000
	3.20±0.50	1.60±0.50	1.60±0.50 P	-	-	2,000	9,000
1210 (3225)	3.20±0.40	2.50±0.20	0.95±0.10 C	-	-	3,000	10,000
			1.25±0.10 D	-	-	3,000	10,000
	3.20±0.60	2.50±0.50	1.60±0.20 G	-	-	2,000	8,000
			2.00±0.20 K	-	-	1,000	6,000
			2.50±0.50 M	-	-	1,000	6,000
	3.30±0.40	2.50±0.30	2.50±0.30 ^{#1}	-	-	1,000	6,000
1808 (4520)	4.50+0.60/-0.4	2.03±0.25	1.25±0.10 D	-	-	2,000	10,000
			1.60±0.20 G	-	-	2,000	8,000
			2.00±0.20 K	-	-	1,000	6,000
1812 (4532)	4.50+0.60/-0.4	3.20±0.30	1.25±0.10 D	-	-	1,000	5,000
			1.60±0.20 G	-	-	1,000	4,000
			2.00±0.20 K	-	-	1,000	3,000
		3.20±0.40	2.50±0.50 M	-	-	500	3,000
			2.80±0.30 U	-	-	500	1500
			3.10±0.30 R	-	-	500	-
1825 (4563)	4.50+0.6/-0.4	6.30±0.40	2.00±0.20 K	-	-	1,000	-
2220 (5750)	5.70±0.50	5.00±0.40	2.50±0.30 M	-	-	500	-
2225 (5763)	5.70±0.50	6.30±0.40	2.80±0.30 U	-	-	500	-
			3.10±0.30 R	-	-	-	1,000

#1 For 1210N563 to 1210N104/200V~250V & 1210B106/100V

#2 For 1206B183~223/1000V

■ CAPACITANCE RANGE

NP0 Dielectric (0402 to 1812 Size)

■ "+" mark only supply "surface coating" products

DIELECTRIC		NP0																																	
SIZE		0402		0603		0805				1206					1210				1808				1812												
RATED VOLTAGE (VDC)		10 16 25 50	100	10 16 25 50	100	10 16 25 50	100	200	250	500, 630	1000	10 16 25 50	100	200	250	500, 630	1000	1500, 2000	10 16 25 50 100	200, 250	500, 630	1000	1500, 2000	500, 630	1000	1500, 2000	3000	10 16 25 50 100	200, 250	500, 630	1000	1500, 2000	3000	4000	
Capacitance	0.1pF (0R1)	E*																																	
	0.2pF (0R2)	E																																	
	0.3pF (0R3)	E		S*																															
	0.4pF (0R4)	E		S*																															
	0.5pF (0R5)	E	E	S	S	S	A	A	A	A	A	D																							
	1.0pF (1R0)	E	E	S	S	S	A	A	A	A	A	D																							
	1.2pF (1R2)	E	E	S	S	S	A	A	A	A	A	D	B	B																					
	1.5pF (1R5)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B																
	1.8pF (1R8)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B																
	2.2pF (2R2)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	2.7pF (2R7)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	3.3pF (3R3)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	3.9pF (3R9)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	4.7pF (4R7)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	5.6pF (5R6)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	6.8pF (6R8)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	8.2pF (8R2)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	D	D	D	D												
	10pF (100)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	12pF (120)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	15pF (150)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	18pF (180)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	22pF (220)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	27pF (270)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	33pF (330)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	39pF (390)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	47pF (470)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	56pF (560)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	68pF (680)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	82pF (820)	E	E	S	S	S	A	A	A	A	B	D	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D
	100pF (101)	E	E	S	S	S	A	A	A	B	B	D	B	B	B	B	B	B	D	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D
	120pF (121)	E	E	S	S	S	A	A	A	B	D	D	B	B	B	B	B	D	G	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D
	150pF (151)	E	E	S	S	S	A	A	B	D	D	D	B	B	B	B	B	D	G	C	C	C	D	D	D	D	D	D	D	D	D	D	D	D	D
	180pF (181)	E	E	S	S	S	A	A	B	D	D	D	B	B	B	B	B	G	G	C	C	C	D	G	D	D	K	K	D	D	D	D	D	D	K
	220pF (221)	E	E	S	S	S	A	A	D	D	D	D	B	B	B	B	B	G	G	C	C	C	G	G	D	D	K	K	D	D	D	D	D	D	K
	270pF (271)	E		S	S	X	A	A	D	D	D	D	B	B	B	C	C	G	P	C	C	C	G	K	K	K	K	D	D	D	D	D	D	K	K
	330pF (331)	E		S	S	X	A	A	D	D	D	D	B	B	B	C	C	G	P	C	C	C	G	K	K	K	K	D	D	D	D	D	D	K	K
	390pF (391)	E		S	S	X	B	B	D	D	D	D	B	B	B	C	C	G	P	C	C	C	G	M	K	K	K	K	D	D	D	D	D	K	K
	470pF (471)	E		S	S	X	B	B	D	D	I		B	B	C	C	C	G		C	C	C	G	M	K	K	K	K	D	D	D	K	K	K	K
	560pF (561)	E		S	S		B	B	D	D	I		B	B	C	D	D	G		C	C	C	G		K	K	K		D	D	D	K	K	G	G
	680pF (681)	E		S	S		B	B	D	D	I		B	B	C	D	D	G		C	C	C	G		K	K	K		D	D	D	K	K	K	K
	820pF (821)	E		S	S		B	B	D	D	I		B	B	C	G	G	G		C	C	C	G		K	K	D		D	D	D	K	K	M	M
	1,000pF (102)	E		S	S		B	B	D	D	I		B	B	C	G	G	G		C	D	D	G		K	K	G		D	D	D	K	K	M	M
	1,200pF (122)			X			B	B	D	D			B	B	C	G	G	G		C	D	D	G		K	G			D	D	D	K	K	U	U
	1,500pF (152)			X			B	B	D	D			B	B	D	G	G	G		C	D	D	K		K	G			D	D	D	K	K		
	1,800pF (182)			X			B	B	D	D			B	B	D	G	G	G		C	D	D	M		K	K			D	D	D	K	K		
	2,200pF (222)			X			B	B	D	D			B	B	D	G	G	G		C	D	D	M		K	K			D	D	D	K	K		
	2,700pF (272)			X			D	D					B	B	D	G	G	G		C	D	D	M		K				D	D	D	K	M		
	3,300pF (332)			X			D	D					B	B	D	G	G	G		C	D	D	M		K				D	D	D	K	M		
	3,900pF (392)						D	D					B	B	D	G	G			C	D	D	M						D	D	D	M			
	4,700pF (472)						D	D					B	B	D	G	P			C	G	G	M						D	D	D	M			
	5,600pF (562)						D	D					B	B			P			C	G	G	M						D	D	D	M			
	6,800pF (682)						D	D					C	C			P			C	G	G	M						D	D	D				
	8,200pF (822)						D	D					C	D			P			C	G	G	M						D	C	D				
	0.010μF (103)						D						D	D			P			C	G	K	M						D	C	D				
	0.012μF (123)												P	P						D	K	K	M						D	G	G				
	0.015μF (153)												P	P						D	K	K	M						D	G	G				
	0.022μF (223)												P	P						K	K	K	M						D	K	K				
	0.033μF (333)												P							K	K	M							D	M	M				
	0.039μF (393)																																		

■ CAPACITANCE RANGE

NP0 Dielectric (1825 to 2225 Sizes)

DIELECTRIC		NP0																	
SIZE		1825						2220						2225					
RATED VOLTAGE (VDC)		100	200 250	500 630	1000	2000	3000	100	200 250	500 630	1000	2000	3000	100	200 250	500 630	1000	2000	3000
Capacitance	10pF (100)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	12pF (120)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	15pF (150)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	18pF (180)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	22pF (220)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	27pF (270)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	33pF (330)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	39pF (390)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	47pF (470)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	56pF (560)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	68pF (680)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	82pF (820)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	100pF (101)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	120pF (121)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	150pF (151)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	180pF (181)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	220pF (221)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	270pF (271)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	330pF (331)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K
	390pF (391)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K
	470pF (471)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K
	560pF (561)	K	K	K	K	K	K	K	K	K	K	K	M	K	K	K	K	K	K
	680pF (681)	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	K
	820pF (821)	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	M	M
	1,000pF (102)	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	M	M
	1,200pF (122)	K	K	K	K	K		K	K	K	M	M	M	K	K	K	K	M	
	1,500pF (152)	K	K	K	K	M		K	K	K	M	M	M	K	K	K	K	M	
	1,800pF (182)	K	K	K	K	M		K	K	K	M	M		K	K	K	K	M	
	2,200pF (222)	K	K	K	K	M		K	K	K	M	M		K	K	K	K	M	
	2,700pF (272)	K	K	K	K	M		K	K	K	M	M		K	K	K	K	M	
	3,300pF (332)	K	K	K	K	M		K	K	K	M	M		K	K	K	K	M	
	3,900pF (392)	K	K	K	M	M		K	K	K	M	M		K	K	K	K	M	
	4,700pF (472)	K	K	K	M	M		K	K	K	M	M		K	K	K	K	M	
	5,600pF (562)	K	K	K	M			K	K	K	M			K	K	K	M	M	
	6,800pF (682)	K	K	K	M			K	K	K	M			K	K	K	M	M	
	8,200pF (822)	K	K	K	M			K	K	K	M			K	K	K	M	M	
	0.010uF (103)	K	K	K	M			K	K	K	M			K	K	K	M	M	
	0.012uF (123)	K	K	K				K	K	K				K	K	K			
	0.015uF (153)	K	K	K				K	K	K				K	K	K			
	0.018uF (183)	K	K	K				K	K	K				K	K	K			
	0.022uF (223)	K	K	K				K	K	K				K	K	K			
	0.027uF (273)	K	K	K				K	K	K				K	K	K			
	0.033uF (333)	K	K	K				K	K	K				K	K	K			
	0.039uF (393)	K	K	K				K	K	M				K	K	K			
	0.047uF (473)	K	K	K				K	M	M				K	K	K			
	0.056uF (563)	K	M	K				K	M	M				K	M	M			
	0.068uF (683)	K	M	K				K	M	U				K	M	M			
	0.082uF (823)	M						M	M*	U				K	M	M*			
	0.1uF (104)	M						M	M*	U				M	M				
	0.12uF (124)								M*										
	0.18uF (184)								U*										
	0.22uF (224)								R*										

* 2225/Cap.0.082uF/500V only; 2220/Cap.0.27uF~0.47uF/500V only; 2220/Cap.0.082uF~0.22uF/200V only

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X7R Dielectric (0402 to 1812 Size, 10V~250V)

DIELECTRIC		X7R																											
SIZE		0402				0603					0805				1206					1210					1812				
RATED VOLTAGE (VDC)		10 16	25	50	100	10 16	25	50	100	200 250	10 16 25	50	100	200 250	10 16	25	50	100	200 250	10 16	25	50	100	200 250	10 16 25	50	100	200 250	
Capacitance	100pF (101)	E	E	E	E	S	S	S	S	X	D	D	D	D															
	120pF (121)	E	E	E	E	S	S	S	S	X	D	D	D	D															
	150pF (151)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	180pF (181)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	220pF (221)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	270pF (271)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	330pF (331)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	390pF (391)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	470pF (471)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	560pF (561)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	680pF (681)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	820pF (821)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D									
	1,000pF (102)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	1,200pF (122)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	1,500pF (152)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	1,800pF (182)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	2,200pF (222)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	2,700pF (272)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	3,300pF (332)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	3,900pF (392)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	4,700pF (472)	E	E	E	E	S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	5,600pF (562)	E	E	E		S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	6,800pF (682)	E	E	E		S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	8,200pF (822)	E	E	E		S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.010μF (103)	E	E	E		S	S	S	S	X	D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.012μF (123)	E	E	E		S	S	S	X		D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.015μF (153)	E	E	E		S	S	S	X		D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.018μF (183)	E	E	E		S	S	S	X		D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.022μF (223)	E	E	E		S	S	S	X		D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.027μF (273)	E	E			S	S	S	X		D	D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.033μF (333)	E	E			S	S	X	X		D	D	D	D	D	D	D	D	D	G	C	C	C	C	C	D	D	D	D
	0.039μF (393)	E	E			S	S	X	X		D	D	D	D	D	D	D	D	D	G	C	C	C	C	C	D	D	D	D
	0.047μF (473)	E	E			S	S	X	X		D	D	D	D	D	D	D	D	D	G	C	C	C	C	D	D	D	D	D
	0.056μF (563)	E	E			S	S	X	X		D	D	D	D	D	D	D	D	D	G	C	C	C	C	D	D	D	D	D
	0.068μF (683)	E	E			S	S	X	X		D	D	D	D	D	D	D	D	D	G	C	C	C	C	G	D	D	D	D
	0.082μF (823)	E	E			S	S	X	X		D	D	D	D*	D	D	D	D	D	G	C	C	C	C	G	D	D	D	D
	0.10μF (104)	E	E			S	S	X	X		D	D	D	D*	D	D	D	D	D	G	C	C	C	C	G	D	D	D	D
	0.12μF (124)					S	X				D	D	I		D	D	D	D			C	C	C	C	G	D	D	D	D
	0.15μF (154)					S	X				D	D	I		C	C	C	G			C	C	C	D	M	D	D	D	K
	0.18μF (184)					S	X				D	D	I		C	C	C	G			C	C	C	D	M	D	D	D	K
	0.22μF (224)					S	X	X			D	D	I		C	C	C	G	G		C	C	C	D	M	D	D	D	K
	0.27μF (274)					X	X				I	I			C	C	D	G			C	C	C	G	M	D	D	D	K
	0.33μF (334)					X	X	X			I	I			C	C	D	G			C	C	C	G	M	D	D	D	K
	0.39μF (394)					X	X				I	I			J	J	P	G			C	C	C	M	M	D	D	D	K
	0.47μF (474)					X	X				I	I	I		J	J	P	G			C	C	C	M	M	D	D	K	K
	0.56μF (564)					X					I				J	J	P	P			D	D	D	M	M	D	D	K	M
	0.68μF (684)					X					I				J	J	P	P			D	D	D	K	M	D	K	K	M
0.82μF (824)					X					I				J	J	P	P			D	D	D	K		D	K	K	M	
1.0μF (105)					X	X	X			I	I			J	J	P	P			D	D	D	K		D	K	K	M	
1.5μF (155)										I				J	P	P	P			K	G	M	M		D	K	K		
2.2μF (225)					X*					I				J	P	P	P			K	G	M	M		G	M	M		
3.3μF (335)														P	P	P				K	G	M			K	K			
4.7μF (475)										I				P	P	P				K	K	M	M		M	M			
10μF (106)										I*				P	P					K	M	M	M		M	M			
22μF (226)														P						M	M				M				
47μF (476)																													

* 0603 size: Cap. 2.2μF_10V only, 0805 size: Cap. 10μF_10V only, Cap. 0.082~0.1μF_200V only,

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X7R Dielectric (0805 to 1812 Size, 500V~3000V)

DIELECTRIC		X7R																			
SIZE		0805			1206					1210				1808				1812			
RATED VOLTAGE (VDC)		500	630	1000	500	630	1000	1500	2000	500	630	1000	1500, 2000	500, 630	1000	1500 2000	2500 3000	500 630	1000	1500 2000	3000
Capacitance	100pF (101)	B	B	B	D	D	D	D	D	D	D	D	D								
	120pF (121)	B	B	B	D	D	D	D	D	D	D	D	D								
	150pF (151)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	D				
	180pF (181)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	D				
	220pF (221)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	D				
	270pF (271)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	K
	330pF (331)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K	D	D	D	K
	390pF (391)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K	D	D	D	K
	470pF (471)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K	D	D	D	K
	560pF (561)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K	D	D	D	K
	680pF (681)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K	D	D	D	K
	820pF (821)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	D	K	D	D	D	K
	1,000pF (102)	B	B	B	D	D	D	D	D	D	D	D	D	D	D	K	K	D	D	D	K
	1,200pF (122)	B	B	B	D	D	D	G	G	D	D	D	M	D	D	K	K	D	D	D	K
	1,500pF (152)	B	B	D	D	D	D	G	G	D	D	D	M	D	D	K	K	D	D	D	K
	1,800pF (182)	B	B	D	D	D	D	G	G	D	D	D	M	D	D	K	K	D	D	D	M
	2,200pF (222)	B	B	D	D	D	D	G	G	D	D	D	M	D	D	K		D	D	D	M
	2,700pF (272)	B	B		D	D	D	G	G	D	D	D	M	D	D	K		D	D	D	M
	3,300pF (332)	B	B		D	D	D	G	G	D	D	D	M	D	D	K		D	D	K	M
	3,900pF (392)	B	B		D	D	D	G		D	D	G	M	D	D	K		D	D	K	M
	4,700pF (472)	D	D		D	D	D	G		D	D	G	M	D	D	K		D	D	K	M
	5,600pF (562)	D	D		D	D	D	G		D	D	G	M	K	K	K		D	D	M	M
	6,800pF (682)	D	D		D	D	D	G		D	D	G	M	K	K	K		D	D	M	M
	8,200pF (822)	D	D		D	D	D	G		D	D	G	M	K	K			D	D	M	
	0.010μF (103)	D	D		D	D	D	G		D	D	G	M	K	K			D	D	M	
	0.012μF (123)	D	D		D	D	G			D	D	G		K	K			D	K		
	0.015μF (153)	D	D		D	D	G			D	D	G		K	K			D	K		
	0.018μF (183)	D	D		D	D	G			D	D	G		K	K			D	M		
	0.022μF (223)	D	D		G	G	G			D	D	G		K	K			D	M		
	0.027μF (273)	D	D		G	G				G	G	G		K	K			D	M		
	0.033μF (333)	D			G	G				G	G	G		K	K			D	M		
	0.039μF (393)				G	G				G	G	K		K	K			D	M		
	0.047μF (473)				G	G				G	G	M		K	K			D	M		
	0.056μF (563)				G	G				G	G			K	K			K	M		
	0.068μF (683)									K	K			K				K	M		
	0.082μF (823)									K	K			K				K	M		
	0.10μF (104)									K	K							K	M		
	0.12μF (124)									M	M							M			
	0.15μF (154)									M	M							M			
	0.18μF (184)																	M			
	0.22μF (224)																	M			
	0.27μF (274)																	M*			
	0.33μF (334)																	M*			
	0.39μF (394)																	M*			
	0.47μF (474)																	M*			
	0.56μF (564)																				
	0.68μF (684)																				
	0.82μF (824)																				
	1.00μF (105)																				

* 1812/Cap.0.27uF~0.47uF/500V only.

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X7R Dielectric (1825 to 2225 Sizes)

DIELECTRIC		X7R																			
SIZE		1825						2220								2225					
RATED VOLTAGE (VDC)		250	500	630	1000	2000	3000	25	50	100	250	500 630	1000	1500 2000	3000	500	630	1000	1500	2000	3000
Capacitance	1,000pF (102)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	1,200pF (122)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	1,500pF (152)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	1,800pF (182)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	2,200pF (222)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	2,700pF (272)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	3,300pF (332)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	3,900pF (392)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	4,700pF (472)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	5,600pF (562)	K	K	K	K	K	M	K	K	K	K	K	K	K	K	K	K	K	K	K	M
	6,800pF (682)	K	K	K	K	K	M	K	K	K	K	K	K	K	M	K	K	K	K	K	M
	8,200pF (822)	K	K	K	K	K	M	K	K	K	K	K	K	M	M	K	K	K	K	K	M
	0.010μF (103)	K	K	K	K	K	M	K	K	K	K	K	K	M	M	K	K	K	K	K	M
	0.012μF (123)	K	K	K	K	M	U	K	K	K	K	K	K	M	U	K	K	K	M	M	M
	0.015μF (153)	K	K	K	K	M	U	K	K	K	K	K	K	M	U	K	K	K	M	M	M
	0.018μF (183)	K	K	K	K	M	U	K	K	K	K	K	K	U	U	K	K	K	M	M	U
	0.022μF (223)	K	K	K	K	M		K	K	K	K	K	K	U		K	K	K	M	M	
	0.027μF (273)	K	K	K	K	U		K	K	K	K	K	K	U		K	K	K	M	M	
	0.033μF (333)	K	K	K	K	U		K	K	K	K	K	K	U		K	K	K	M	M	
	0.039μF (393)	K	K	K	K	U		K	K	K	K	K	K	U		K	K	K	M	U	
	0.047μF (473)	K	K	K	K	U		K	K	K	K	K	K	U		K	K	K	M	U	
	0.056μF (563)	K	K	K	K			K	K	K	K	K	K	U		K	K	K	M	U	
	0.068μF (683)	K	K	K	K			K	K	K	K	K	M			K	K	K	M		
	0.082μF (823)	K	K	K	M			K	K	K	K	K	M			K	K	K	M		
	0.10μF (104)	K	K	K	M			K	K	K	K	K	M			K	K	M	M		
	0.12μF (124)	K	K	K				K	K	K	K	K	M			K	K	U			
	0.15μF (154)	K	K	K				K	K	K	K	K	U			K	K	U			
	0.18μF (184)	K	K	K				K	K	K	K	K	U			K	K	U			
	0.22μF (224)	K	K	K				K	K	K	K	K	U			K	K	U			
	0.27μF (274)	K	K	K				K	K	K	K	K				K	K				
	0.33μF (334)	K	K	K				K	K	K	K	K				K	K				
	0.39μF (394)	K	K	K				K	K	K	K	K				K	K				
	0.47μF (474)	K	K	K				K	K	K	K	K	U			K	K				
	0.56μF (564)	K	M	M				K	K	K	K	M				K	K				
	0.68μF (684)	K						K	K	K	K	M									
	0.82μF (824)	K						K	K	K	K	U									
	1.0μF (105)	K						K	K	K	K	U									
	1.5μF (155)							K	K	K	M										
	2.2μF (225)							K	K	K	M										
	3.3μF (335)							K	K	K											
	4.7μF (475)							K	K	M											
	6.8μF (685)							M	M	M											
	10μF (106)							M	M	M											
	22μF (226)							U	U	R											
	47μF (476)							R													

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X5R Dielectric (0402 to 1210 Sizes)

Dielectric		X5R																							
Size		0402				0603					0805					1206					1210				
Rated Voltage		6.3	10	16	25	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50
Capacitance	0.033μF (333)			E																					
	0.047μF (473)			E																					
	0.068μF (683)		E	E																					
	0.10μF (104)	E	E	E	E																				
	0.15μF (154)	E	E	E	E																				
	0.22μF (224)	E	E	E	E			X	X																
	0.33μF (334)	E	E			X	X	X	X																
	0.47μF (474)	E	E				X	X	X																
	0.68μF (684)	E	E			X	X	X	X																
	1.0μF (105)	E	E			X	X	X	X			I	I	I											
	1.5μF (155)					X					I	I	I	I			J	J				K	K		
	2.2μF (225)					X	X	X			I	I	I	I			J	J	P			K	K		
	3.3μF (335)					X					I	I	I	I			P	P	P						
	4.7μF (475)					X	X								I	P	P	P	P			K	K	K	
	6.8uF (685)															P	P								
10μF (106)										I	I	I	I		P	P	P	P		K	K	K			
22μF (226)																									

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ CAPACITANCE RANGE

X7T Dielectric (2220 Sizes)

Dielectric		X7T			
Size		2220			
Rated Voltage (VDC)		250	500	630	1000
Capacitance	1.0μF (105)				
	1.5μF (155)				
	2.2μF (225)	M			
	3.3μF (335)				
	4.7μF (475)				
	6.8μF (685)				
	10μF (106)				
	22μF (226)				

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * MLCC's terminations build a soft & flexible polymer layer to withstand high bending stress in SMT line.
- * Available for any item in standard series range.

■ GENERAL ELECTRICAL DATA

Dielectric	X7R
Size	0603, 0805, 1206
Capacitance	100pF to 10μF
Capacitance tolerance	K (±10%), M (±20%)
Rated voltage (WVDC)	10V to 2000V
Operating temperature	-55 to +125°C
Capacitance characteristic	±15%
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

SG	31	B	104	K	500	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
SG=With Cu polymer	31=1206 (3216)	B=X7R	104=10×10 ⁴ =100nF	J=±5%	500=50 VDC	C=Cu Polymer/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE (SG Series)

DIELECTRIC		X7R																											
SIZE		0603						0805										1206											
RATED VOLTAGE (VDC)		10	16	25	50	100	200	250	10	16	25	50	100	200	250	500	630	1000	10	16	25	50	100	200 250	400 450	500 630	1000	1500	2000
Capacitance	100pF (101)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B						D		D	D	D	D
	120pF (121)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B						D		D	D	D	D
	150pF (151)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	180pF (181)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	220pF (221)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	270pF (271)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	330pF (331)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	390pF (391)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	470pF (471)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	560pF (561)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	680pF (681)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	D	D
	820pF (821)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	G	G
	1,000pF (102)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	G	G
	1,200pF (122)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	G	G
	1,500pF (152)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	G	G
	1,800pF (182)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	G	G
	2,200pF (222)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B	D	D	D	D	D	D		D	D	G	G
	2,700pF (272)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B		D	D	D	D	D		D	D	G	G
	3,300pF (332)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B		D	D	D	D	D		D	D	G	G
	3,900pF (392)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	B	B	B		D	D	D	D	D		D	D	G	
	4,700pF (472)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	D	G	
	5,600pF (562)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	D	G	
	6,800pF (682)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	D	G	
	8,200pF (822)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	D	G	
	0.010μF (103)	S	S	S	S	S	X	X	D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	D	G	
	0.012μF (123)	S	S	S	S	S	X		D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	G		
	0.015μF (153)	S	S	S	S	S	X		D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D	G		
	0.018μF (183)	S	S	S	S	S	X		D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		D			
	0.022μF (223)	S	S	S	S	S	X		D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		G			
	0.027μF (273)	S	S	S	S	S	X		D	D	D	D	D	D	D	D	D	D		D	D	D	D	D		G			
	0.033μF (333)	S	S	S	S	X	X		D	D	D	D	D	D	D	D	D			D	D	D	D	D		G			
	0.039μF (393)	S	S	S	S	X	X		D	D	D	D	D	D	D	D				D	D	D	D	D		G			
	0.047μF (473)	S	S	S	S	X	X		D	D	D	D	D	D	D	D				D	D	D	D	D		G		G	
	0.056μF (563)	S	S	S	S	X	X		D	D	D	D	D	D	D	D				D	D	D	D	D		G		G	
	0.068μF (683)	S	S	S	S	X	X		D	D	D	D	D	D	D	D				D	D	D	D	D		G			
	0.082μF (823)	S	S	S	S	X	X		D	D	D	D	D	D	D					D	D	D	D	D		G		G	
	0.10μF (104)	S	S	S	S	X	X		D	D	D	D	D	D	D					D	D	D	D	D		G		G	
	0.12μF (124)	S	S	S	X				D	D	D	D	I							D	D	D	D	D					
	0.15μF (154)	S	S	S	X				D	D	D	D	I							C	C	C	C	G					
	0.18μF (184)	S	S	S	X				D	D	D	D	I							C	C	C	C	G					
0.22μF (224)	S	S	S	X	X			D	D	D	D	I							C	C	C	C	G						
0.27μF (274)	X	X	X					I	I	I	I								C	C	C	D	G						
0.33μF (334)	X	X	X					I	I	I	I								C	C	C	D	G						
0.39μF (394)	X	X	X					I	I	I	I								C	C	J	P	G						
0.47μF (474)	X	X	X					I	I	I	I								J	J	J	P	G						
0.56μF (564)	X	X						I	I	I									J	J	J	P	P						
0.68μF (684)	X	X						I	I	I									J	J	J	P	P						
0.82μF (824)	X	X						I	I	I									J	J	J	P	P						
1.0μF (105)	X	X	X					I	I	I	I								J	J	J	P							
1.5μF (155)								I	I	I									J	J	P								
2.2μF (225)								I	I	I									J	J	P								
3.3μF (335)																			P	P	P								
4.7μF (475)																			P	P	P								
10μF (106)																			P										

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * Standard size with thin thickness.
- * Small size with high capacitance.
- * Capacitor with lead-free termination (pure Tin).

■ GENERAL ELECTRICAL DATA

Dielectric	X7R	X5R
Size	0402, 0603, 0805, 1206, 1210	
Capacitance range	1.0μF to 10μF	0.22μF to 47μF
Capacitance tolerance	K (±10%), M (±20%)	
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V
DF(Tan δ)*	16V, 10V: ≤10.0% 6.3V: ≤15.0%	
Insulation resistance at Ur	RxC≥100ΩxF	
Operating temperature	-55 to +125°C	-55 to +85°C
Capacitance characteristic	±15%	
Termination	Ni/Sn (lead-free termination)	

■ EXPLANATION OF PART NUMBERS

TT	31	X	225	K	100	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
TT=Low profile	31=1206 (3216)	X=X5R	225=22x10 ⁵ =2.2μF	K=±10%	100=10 VDC	C=Cu/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ CAPACITANCE RANGE

Dielectric		X5R															
Size		0402		0603		0805				1206					1210		
Rated voltage (VDC)		6.3	25	10	16	6.3	10	16	25	6.3	10	16	25	50	10	16	25
Capacitance	0.22uF (224)		L	H	H												
	0.47uF (474)	L	L														
	1.0uF (105)	L		H	H		T	T	T		T	T	T	T			
	1.5uF (155)						T	T			T	T	T				
	2.2uF (225)	L				T	T	T	T		T	T	T				
	3.3uF (335)										T	T	T		T		
	4.7uF (475)	L		H		T	T	T	T		T	T	T		T		
	6.8uF (685)																
	10uF (106)					T	T	T		J	J		T		T		T
	22uF (226)					T	T			T		T				T	
47uF (476)									T								

Dielectric		X7R									
Size		0805			1206			1210			
Rated voltage (VDC)		10	16	25	10	25	50	100			
Capacitance	1.0μF (105)					T					
	1.5μF (155)										
	2.2μF (225)		T	T			T			K	
	3.3μF (335)										
	4.7μF (475)	T				T					
	6.8μF (685)										
	10μF (106)				T						
	22μF (226)										

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

- * High density mounting due to mounting space saving.
- * Mounting cost saving.
- * Increased throughput

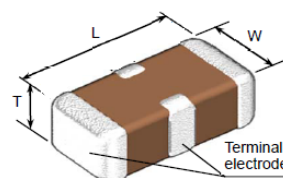
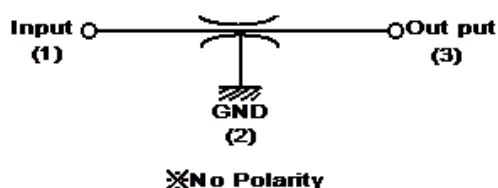
■ EXPLANATION OF PART NUMBERS

FT	21	B	105	M	160	C	I
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging style
FT= Feed Through Capacitor	21=0805 (2012)	B=X7R	105=10x10 ⁵ =1uF	M=±20%	160=16 VDC	C=Cu/Ni/Sn	T=7" reeled

* Please refer to page 2 "How to order" for more information.

■ RATED VALUE

a) Equivalent Circuit



b) Capacitance Ranges

Walsin Part NO.	Nominal Capacitance	Capacitance Tolerance	DC Rated Voltage	Rated Current (mA)	DC Resistance	Insulation Resistance	Operating Temp. Range
FT15X435M4R0CT	4.3 uF	±20%	DC4 V	2A(DC)	0.03Ω max	25MΩ min	-55 to 85°C
FT15B105M4R0CT	1 uF	±20%	DC4 V	2A(DC)	0.03Ω max	25MΩ min	-55 to 125°C
FT21B103M101CT	10 nF	±20%	DC100 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B103M500CT	10 nF	±20%	DC50 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B223M500CT	22 nF	±20%	DC50 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B473M500CT	47 nF	±20%	DC50 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B104M250CT	0.1 uF	±20%	DC25 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B224M160CT	0.22 uF	±20%	DC16 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B474K160CT	0.47 uF	±10%	DC16 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B474M160CT	0.47 uF	±20%	DC16 V	2A(DC)	0.03Ω max	1000MΩ min	-55 to 125°C
FT21B105M160CT	1 uF	±20%	DC16 V	4A(DC)	0.02Ω max	500MΩ min	-55 to 125°C

■ CAPACITANCE RANGE

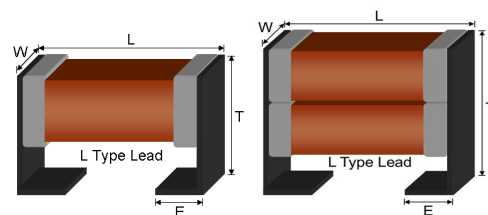
SIZE Inch (mm)		FT15 0402(1005)	FT21 0805 (2012)					FT15 0402(1005)
DIELECTRIC		X7R						X5R
RATED VOLTAGE (VDC)		4	10	16	25	50	100	4
Capacitance	10nF (103)			T	T	T	T	
	22nF (223)			T	T	T		
	47nF (473)			T	T	T		
	0.10μF (104)			T	T			
	0.22μF (224)			T				
	0.47μF (474)			T				
	1μF (105)	W		T				
	4.3uF (435)							W

1. The letter in cell is expressed the symbol of product thickness.

2. For more information about products with special capacitance or other data, please contact WTC local representative.

■ FEATURES

1. Higher mechanical endurance.
2. Anti thermal stress and mechanical stress.
3. Improved vibration performance.
4. More capacitance without changing footprint.



■ EXPLANATION OF PART NUMBERS

<u>M</u>	<u>2</u>	<u>55</u>	<u>B</u>	<u>106</u>	<u>K</u>	<u>500</u>	<u>F</u>	<u>L</u>
<u>Series</u>	<u>Number</u>	<u>Size (Inch (mm))</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Thickness</u>	<u>Control code</u>
M= Mega Cap. (Stacked Capacitors)	2=2 chips	55=2220 (5750)	B=X7R	106=10x10 ⁶ =10uF	K=±10%	500=50 VDC	F=6.0±0.35mm	L= L type lead M = M type lead**

* Please refer to page 2 "How to order" for more information.

** M = Lead frame E 1.2mm (Size 2220 only)

■ CAPACITANCE RANGE

NP0 Dielectric (M Series)

DIELECTRIC				NP0																								
SIZE		1210			1812						1825						2220						2225					
RATED VOLTAGE (VDC)		50	100	200 250 500 630	50	100	200 250	500 630	50 100	200 250	500	600	50 100	200 250	500	600	50 100 200 250	500	630									
Stacked		1	1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2		
Capacitance	1,000pF (102)	B	B	B																								
	0.010uF (103)	B	B	B	B		B		B		B		B		B		B		B		B		B		B			
	0.012uF (123)	B	B		B		B		B		B		B		B		B		B		B		B		B			
	0.015uF (153)	B	B		B		B		B		B		B		B		B		B		B		B		B			
	0.018uF (183)	B	B		B		B		B		B		B		B		B		B		B		B		B			
	0.022uF (223)	B	B		B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*		
	0.027uF (273)	B			B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*	B	F*		
	0.033uF (333)	B			B	F*	B	F*		F*	F*	B	F*	B	F*	B	F*		F*	F*	B	F*	B	F*	B	F*		
	0.039uF (393)	B			B	F*	B	F*		F*	F*	B	F*	B	F*	B	F*		F*	F*	B	F*	B	F*	B	F*		
	0.047uF (473)				B	F*	B	F*		F*	F*	B	F*	B	F*	B	F*		F*	F*	B	F*	B	F*	B	F*		
	0.056uF (563)				B	F*		F*		F*	F*	B	F*	B	F*		F*		F*	F*	B	F*	B	F*	B	F*		
	0.068uF (683)				B	F*		F*		F*	F*	B	F*	B	F*		F*		F*	F*	B	F*	B	F*	B	F*		
	0.082uF (823)				B	F*		F*		F*	F*	B	F*		F*		F*		F*	F*	B	F*	B	F*		F*		
	0.10uF (104)				B	F*		F*		F*	F*	B	F*		F*		F*		F*	F*	B	F*		F*		F*		
	0.12uF (124)					F*				F*	F*				F*	F*						F*		F*		F*		
	0.15uF (154)					F*				F*					F*							F*		F*				
0.18uF (184)					F*				F*					F*							F*		F*					
0.22uF (224)					F*				F*					F*							F*							

1. The letter in cell is expressed the symbol of product thickness (B=3.60±0.35mm, C=4.20±0.35mm, F=6.00±0.35mm, G=6.60±0.35mm)

2. The letter in cell with " * " mark is expressed Capacitance M tolerance"(20%) only".

3. 1210 size can provide E12 capacitance for NP0/50V~630/102~103 & X7R/500V~630/103~104.

X7R Dielectric (M Series)

DIELECTRIC					X7R																																	
SIZE		1210				1812								1825								2220								2255								
RATED VOLTAGE (VDC)		50	100	200 250	500 630	50	100	200 250	500	630	50	100	200 250	500	630	50	100	200 250	500	630	50	100	200 250	500	630	50	100	200 250	500	630	50	100	200 250	500	630			
Stacked		1	1	1	1	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2			
Capacitance	0.01uF (103)				B																																	
	0.10uF (104)	B	B	B	B					B		B		B				B		B					B									B				
	0.12uF (124)	B	B	B						B		B		B				B		B				B										B				
	0.15uF (154)	B	B	B						B		B		B				B		B				B										B				
	0.18uF (184)	B	B	B						B		B		B				B		B				B										B				
	0.22uF (224)	B	B	B						B	F*	B	F*	B	F*			B	F*	B	F*	B	F*		B	F*								B	F*			
	0.27uF (274)	B	B	B						B	F*	B	F*	B	F*			B	F*	B	F*	B	F*		B	F*								B	F*			
	0.33uF (334)	B	B	B						B	F*	B	F*	B	F*			B	F*	B	F*	B	F*		B	F*								B	F*			
	0.39uF (394)	B	B	B						B	F*	B	F*	B	F*			B	F*	B	F*	B	F*		B	F*								B	F*			
	0.47uF (474)	B	B	B						B	F*	B	F*	B	F*			B	F*	B	F*	B	F*		B	F*								B	F*			
	0.56uF (564)	B	B	B						B	F*		F*					B	F*	B	F*	B	F*			F*								B	F*			
	0.68uF (684)	B	B	B						B	F*		F*					B	F*		F*	F*				F*									F*			
	0.82uF (824)	B	B							B	F*		F*					B	F*		F*	F*				F*									F*			
	1.0uF (105)	B	B			B		B		B	F*		F*				B		B	F*		F*	F*	B		B		B					F*	B		B		F*
	1.2uF (125)	B	B			B		B			F*						B			F*		F*	F*	B		B		B					B		B		F*	
	1.5uF (155)	B	B			B		B			F*						B			F*				B		B		B					B		B			
	1.8uF (185)	B	B			B		B			F*						B			F*				B		B		B					B		B			
	2.2uF (225)	B	B			B	F*	B	F*		F*						B	F*		F*				B	F*	B	F*	B	F*			B	F*	B	F*			
	2.7uF (275)	B	B			B	F*	B	F*								B	F*						B	F*	B	F*		F*			B	F*	B	F*			
	3.3uF (335)	B	B			B	F*	B	F*								B	F*						B	F*	B	F*		F*			B	F*		F*			
	3.9uF (395)	B				B	F*	B	F*								B	F*						B	F*	B	F*		F*			B	F*		F*			
	4.7uF (475)	B				B	F*	B	F*								B	F*						B	F*	B	F*		F*			B	F*		F*			
	5.6uF (565)					B	F*		F*								B	F*						B	F*	B	F*					B	F*		F*			
	6.8uF (685)					B	F*		F*								B	F*						B	F*	B	F*					B	F*					
	8.2uF (825)					B	F*		F*								B	F*						B	F*	B	F*					B	F*					
	10uF (106)					B	F*		F*								B	F*						B	F*	B	F*					B	F*					
	12uF (126)						F*											F*						C	F*		F*						F*					
	15uF (156)						F*											F*						C	F*		F*						F*					
	18uF (186)						F*											F*						C	F*		F*						F*					
	22uF (226)						F*											F*						C	F*		F*						F*					
	27uF (276)																								G*													
	33uF (336)																								G*													
	39uF (396)																								G*													
	47uF (476)																								G*													

- The letter in cell is expressed the symbol of product thickness (B=3.60±0.35mm, C=4.20±0.35mm, F=6.00±0.35mm, G=6.60±0.35mm)
- The letter in cell with " * " mark is expressed Capacitance M tolerance"(20%) only".
- 1210 size can provide E12 capacitance for NP0/50V~630/102~103 & X7R/500V~630/103~104.

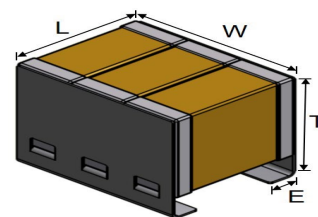
X7T Dielectric (M Series)

DIELECTRIC		X7T			
SIZE		2220			
RATED VOLTAGE (VDC)		450		1000	
Stacked		1	2	1	2
Capacitance	0.10uF (104)				
	0.22uF (224)				
	0.47uF (474)				T*
	0.56uF (564)				
	0.82uF (824)				
	1.0uF (105)				
	2.2uF (225)		S*		

- The letter in cell is expressed the symbol of product thickness (S=5.00±0.50 mm, T=6.40±0.50mm)
- The letter in cell with " * " mark is expressed Capacitance M tolerance"(20%) only".

■ FEATURES

1. Higher mechanical endurance.
2. Anti thermal stress and mechanical stress.
3. Improved vibration performance.
4. More capacitance without changing footprint.



■ EXPLANATION OF PART NUMBERS

<u>V</u>	<u>3</u>	<u>55</u>	<u>B</u>	<u>476</u>	<u>K</u>	<u>101</u>	<u>G</u>	<u>M</u>
<u>Series</u>	<u>Number</u>	<u>Size (Inch (mm))</u>	<u>Dielectric</u>	<u>Capacitance</u>	<u>Tolerance</u>	<u>Rated voltage</u>	<u>Thickness</u>	<u>Control code</u>
V= Mega Cap (Vertical Stacked Capacitors)	3=3 chips	55=2220 (5750)	B=X7R	476=47x10 ⁶ =47uF	K=±10%	101=100 VDC	G=6.60±0.35mm	M = M type lead**

* Please refer to page 2 "How to order" for more information.

** M = Lead frame E 1.2mm (Size 2220 only)

■ CAPACITANCE RANGE

X7R Dielectric (V Series)

DIELECTRIC		X7R
SIZE		2220
RATED VOLTAGE (VDC)		100
Stacked		3
Capacitance	10uF (106)	
	12uF (126)	
	15uF (156)	
	18uF (186)	
	22uF (226)	
	27uF (276)	
	33uF (336)	
	39uF (396)	
	47uF (476)	G*

1. The letter in cell is expressed the symbol of product thickness (B=3.60±0.35mm, C=4.20±0.35mm, F=6.00±0.35mm, G=6.60±0.35mm)

2. The letter in cell with " * " mark is expressed Capacitance M tolerance"(20%) only".

No.	Item	Test Condition	Requirements																																										
1.	Visual and Mechanical	---	* No remarkable defect. * Dimensions to conform to individual specification sheet.																																										
2.	Capacitance	* Test temp.: Room Temperature.	* Shall not exceed the limits given in the detailed spec.																																										
3.	Q/ D.F. (Dissipation Factor)	Class I: (NP0,X8G) ≤ 1000pF, 1.0±0.2Vrms, 1MHz±10% > 1000pF, 1.0±0.2Vrms, 1KHz±10% Class II: (X7R, X6S, X5R, X7S) C≤10μF, 1.0±0.2Vrms, 1KHz±10% ** C > 10μF, 0.5±0.2Vrms, 120Hz±20% ** Test condition: 0.5±0.2Vrms , 1KHz±10% X7R: 0603/475(6.3V) X5R: 01R5(≤6.3V) #1, 0201≥224 (6.3V,10V,16V)#1, 0402≥475 (6.3V,16V), 0402≥225(10V), 0603=106 (6.3V) TT18X≥475(10V) , TT15X series X6S: 0201/474(4V), 0201>104 (6.3V,10V), 0402≥225 (6.3V),0402/475 (10V), 0603/106 (6.3V), X7S: 0402/225(6.3V) #1 Excluding X5R/01R5/103(6.3V);X5R/0201/105(6.3V);225(10V) ,0402X475M6R3, (1.0±0.2Vrms , 1KHz±10%) #1 Excluding * Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**.	NP0, X8G: Cap≥30pF, Q≥1000; Cap<30pF,Q≥400+20C^{#2} #2.RF series: 0402(≥100V),0603 to 1111: Cap<30pF:Q≥800+20C;Cap≥30pF:Q≥1400 X7R, X6S, X5R, X7S: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥100V</td><td rowspan="4">≤2.5%</td><td>≤3% 1206≥0.47μF</td></tr><tr><td>≤3.5% 1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td></tr><tr><td>≤5% 0603≥0.068μF; 0805 > 0.1μF; 1206≥1μF; 1210≥2.2μF; TT series</td></tr><tr><td>≤10% 0805>0.22μF; 1210≥3.3μF</td></tr><tr><td rowspan="4">50V & 63V</td><td rowspan="4">≤2.5%</td><td>≤3% 0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td></tr><tr><td>≤3.5% 1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF</td></tr><tr><td>≤5% 0201≥0.01μF; 0402≥0.012μF; 1210≥3.3μF</td></tr><tr><td>≤10% 0402≥0.047μF; 0603>0.1μF; 0805≥1μF(0805/X7R>0.47μF); 1206≥2.2μF; 1210≥10μF;TT series</td></tr><tr><td rowspan="2">35V</td><td rowspan="2">≤3.5%</td><td>≤12.5% 1206/X5R=10μF</td></tr><tr><td>≤10% 0603≥1μF(0603B=0.47uF); 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td></tr><tr><td rowspan="3">25V</td><td rowspan="3">≤3.5%</td><td>≤5% 0201≥0.01μF(0201/X5R=0.01μF); 0805≥1μF; 1210≥10μF*</td></tr><tr><td>≤7% 0603≥0.33μF</td></tr><tr><td>≤10% 0201≥0.1μF(0201/X5R>0.01μF);0402≥0.10μF(0402/X7R≥0.056μF);TT series; 0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF(1210/X5R≥10μF)*</td></tr><tr><td rowspan="4">16V</td><td rowspan="4">≤3.5%</td><td>≤12.5% 0402≥0.33μF; 0805/X5R/X6S=10μF</td></tr><tr><td>≤5% 0201≥0.01μF(0201/X5R=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/X5R>0.01μF;0201/X7R≥0.022μF); 1210≥22μF;TT series 0402≥0.22uF(0402/X7R≥0.15μF);0603>0.47μF;0805≥2.2μF;1206≥4.7μF</td></tr><tr><td>≤12.5% 0402/X5R≥1μF; 0402/X6S=1μF; 0805/X5R/X6S=10μF</td></tr><tr><td rowspan="3">10V</td><td rowspan="3">≤5%</td><td>≤10% 0201≥0.012μF; 0402≥0.22μF(0402/X7R≥0.15μF); 0603≥0.33μF; TT series</td></tr><tr><td>≤12.5% 0805/X5R/X6S=10μF</td></tr><tr><td>≤15% 0201≥0.1μF(0201/X5R>0.1μF); 0402≥1μF;0603/X5R≥10μF</td></tr><tr><td rowspan="2">6.3V</td><td rowspan="2">≤10%</td><td>≤15% 0201≥0.1μF(0201/X5R>0.1μF); 0402≥1μF(0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF; TT series</td></tr><tr><td>≤20% 0402≥2.2μF</td></tr><tr><td>4V</td><td>≤15%</td><td>---</td></tr></table>	Rated vol.	D.F.≤	Exception of D.F. ≤	≥100V	≤2.5%	≤3% 1206≥0.47μF	≤3.5% 1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤5% 0603≥0.068μF; 0805 > 0.1μF; 1206≥1μF; 1210≥2.2μF; TT series	≤10% 0805>0.22μF; 1210≥3.3μF	50V & 63V	≤2.5%	≤3% 0201(50V); 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF	≤3.5% 1812≥4.7μF;1825≥4.7μF; 2220≥4.7μF; 2225≥4.7μF	≤5% 0201≥0.01μF; 0402≥0.012μF; 1210≥3.3μF	≤10% 0402≥0.047μF; 0603>0.1μF; 0805≥1μF(0805/X7R>0.47μF); 1206≥2.2μF; 1210≥10μF;TT series	35V	≤3.5%	≤12.5% 1206/X5R=10μF	≤10% 0603≥1μF(0603B=0.47uF); 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	25V	≤3.5%	≤5% 0201≥0.01μF(0201/X5R=0.01μF); 0805≥1μF; 1210≥10μF*	≤7% 0603≥0.33μF	≤10% 0201≥0.1μF(0201/X5R>0.01μF);0402≥0.10μF(0402/X7R≥0.056μF);TT series; 0603≥0.47μF; 0805≥2.2μF;1206≥4.7μF;1210≥22μF(1210/X5R≥10μF)*	16V	≤3.5%	≤12.5% 0402≥0.33μF; 0805/X5R/X6S=10μF	≤5% 0201≥0.01μF(0201/X5R=0.01μF);0402≥0.033μF; 0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF	≤10% 0201≥0.1μF(0201/X5R>0.01μF;0201/X7R≥0.022μF); 1210≥22μF;TT series 0402≥0.22uF(0402/X7R≥0.15μF);0603>0.47μF;0805≥2.2μF;1206≥4.7μF	≤12.5% 0402/X5R≥1μF; 0402/X6S=1μF; 0805/X5R/X6S=10μF	10V	≤5%	≤10% 0201≥0.012μF; 0402≥0.22μF(0402/X7R≥0.15μF); 0603≥0.33μF; TT series	≤12.5% 0805/X5R/X6S=10μF	≤15% 0201≥0.1μF(0201/X5R>0.1μF); 0402≥1μF;0603/X5R≥10μF	6.3V	≤10%	≤15% 0201≥0.1μF(0201/X5R>0.1μF); 0402≥1μF(0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF; TT series	≤20% 0402≥2.2μF	4V	≤15%	---
Rated vol.	D.F.≤	Exception of D.F. ≤																																											
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		≤20% 0402≥2.2μF																																											
4V	≤15%	---																																											
4a.	Dielectric Strength	*To apply voltage: ≤100V: 250% of rated voltage. (RF02:300% rated voltage) 200V ~ 300V: 200% of rated voltage. 400V ~ 450V: 120% of rated voltage. 500V ~ 999V: 150% of rated voltage. 1000V ~ 3000V: 120% of rated voltage. 4000V: 110% of rated voltage. *Duration: 1 to 5 sec. *Charge & discharge current less than 50mA. * For high voltage product over 1000 Vdc, it is required to immerse the chip in an isolation fluid to prevent possible arcing while testing	* No evidence of damage or flash over during test.																																										
4b.	Dielectric Strength (for X1/Y2 & X2)	* To apply 1500 VAC voltage. * Duration: 60 sec.	* No evidence of damage or flash over during test.																																										
5.	Insulation Resistance	* Test temp.: Room Temperature. * To apply rated voltage for max. 120 sec.	10GΩ or RxC≥500Ω·F whichever is smaller. Class II (X7R, X6S, X5R, X7S) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: X7R</td><td rowspan="7">10GΩ or RxC≥100 Ω·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: 0603B=0.47μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td></tr><tr><td>25V: 0402≥1μF; 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≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td></tr><tr><td>6.3V; 4V; TT series; Size≥1812</td></tr><tr><td colspan="2">All X6S items, All X7S items, X5R/01R5</td><td rowspan="2">RxC≥50 Ω·F</td></tr><tr><td colspan="2">100V: 1210≥3.3μF, 50V& 63V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF;1206≥10μF / 35V: 0603≥1μF / 25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF;1206≥22μF / 16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF / 10V: 0201>0.1μF, 0402≥1μF; 0603≥10μF; 0805≥47μF; TT21>4.7μF / 6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF;1206≥10μF; TT15>1.0μF / 4V:0603≥22μF; 0805≥47μF; 1206≥100μF</td></tr></table> <table><tr><td>Rated Voltage: 200V ~ 630V</td><td>To apply rated voltage (500V max.) for 60 sec.</td><td>>10GΩ or 100Ω·F whichever is smaller.</td></tr><tr><td>Rated Voltage: >630V</td><td>To apply 500V for 60sec.</td><td>>10GΩ or 100Ω·F whichever is smaller.</td></tr></table>	Rated voltage	Insulation Resistance	100V: X7R	10GΩ or RxC≥100 Ω·F whichever is smaller.	50V: 0402>0.01μF; 0603≥1μF;0805≥1μF; 1206≥4.7μF; 1210≥4.7μF	35V: 0603B=0.47μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	25V: 0402≥1μF; 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≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF	6.3V; 4V; TT series; Size≥1812	All X6S items, All X7S items, X5R/01R5		RxC≥50 Ω·F	100V: 1210≥3.3μF, 50V& 63V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF;1206≥10μF / 35V: 0603≥1μF / 25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF;1206≥22μF / 16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF / 10V: 0201>0.1μF, 0402≥1μF; 0603≥10μF; 0805≥47μF; TT21>4.7μF / 6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF;1206≥10μF; TT15>1.0μF / 4V:0603≥22μF; 0805≥47μF; 1206≥100μF		Rated Voltage: 200V ~ 630V	To apply rated voltage (500V max.) for 60 sec.	>10GΩ or 100Ω·F whichever is smaller.	Rated Voltage: >630V	To apply 500V for 60sec.	>10GΩ or 100Ω·F whichever is smaller.																					
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100V: 1210≥3.3μF, 50V& 63V: 0402≥0.1μF; 0603≥2.2μF; 0805≥10μF;1206≥10μF / 35V: 0603≥1μF / 25V: 0201≥0.1μF; 0402≥2.2μF; 0603≥10μF; 0805≥10μF;1206≥22μF / 16V: 0603≥10μF; 0402≥1μF; 0201≥0.22μF / 10V: 0201>0.1μF, 0402≥1μF; 0603≥10μF; 0805≥47μF; TT21>4.7μF / 6.3V: 0201≥0.1μF; 0402≥1μF; 0603>4.7μF; 0805≥47μF;1206≥10μF; TT15>1.0μF / 4V:0603≥22μF; 0805≥47μF; 1206≥100μF																																													
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** "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

This Reliability Test Conditions and Requirements only for General Purpose series, please refer to individual sheet for other products information.

No.	Item	Test Condition	Requirements																																																																														
6.	Temperature Coefficient	With no electrical load. <table><tr><th>T.C.</th><th>Operating Temp</th></tr><tr><td>NPO (C0G)</td><td>-55~125°C at 25°C</td></tr><tr><td>X8G</td><td>-55~150°C at 25°C</td></tr><tr><td>X7R</td><td>-55~125°C at 25°C</td></tr><tr><td>X7S</td><td>-55~125°C at 25°C</td></tr><tr><td>X6S</td><td>-55~105°C at 25°C</td></tr><tr><td>X5R</td><td>-55~ 85°C at 25°C</td></tr></table> *Measurement voltage for Class II: <table><tr><th>01005</th><th>0201</th></tr><tr><td>Cap≤0.01μF: 0.5V**</td><td>Cap<0.1μF: 1V*</td></tr><tr><td>Cap>0.01μF: 0.2V</td><td>0.1μF≤Cap<1μF: 0.2V*¹</td></tr><tr><td>**01R5B102/25V: 1V</td><td>Cap≥1μF: 0.1V*²</td></tr><tr><td colspan="2">*0201X273~823/6.3V~16V & 0201X473/25V & 0201S273~823/6.3V~10V: 0.5V</td></tr><tr><td colspan="2">**0201X104/6.3V~25V & 0201X224-334/16V~25V: 0.5V</td></tr><tr><td colspan="2">0201X224/10V & 0201X334-474/6.3V~10V & 0201B104/6.3V~10V & 0201S104/6.3V~16V & 0201S224/6.3V: 0.3V</td></tr><tr><td colspan="2">*0201X105/6.3V~10V: 0.3V</td></tr><tr><th>0402</th><th>0603</th></tr><tr><td>Cap<1μF: 1V*³</td><td>Cap<1μF: 1V</td></tr><tr><td>Cap=1μF: 0.5V*⁴</td><td>1μF≤Cap≤4.7μF: 0.5V*⁶</td></tr><tr><td>1μF<Cap<10μF: 0.2V*⁵</td><td>Cap>4.7μF: 0.2V*⁷</td></tr><tr><td>Cap≥10μF: 0.1V</td><td></td></tr><tr><td>**0402B224-16V: 0.5V</td><td>**0603B105/35V: 1V</td></tr><tr><td>0402B334/474-6.3V&10V: 0.5V</td><td>*70603X106/10V: 0.5V</td></tr><tr><td>0402S334/474-6.3V: 0.5V</td><td>0603S226/6.3V: 0.1V</td></tr><tr><td>*0402B105/6R3V: 0.2V</td><td></td></tr><tr><td>*50402X225/475-6.3V: 0.5V</td><td></td></tr><tr><th>0805</th><th>1206/1210</th></tr><tr><td>Cap<10μF: 1V*⁸</td><td>Cap≤10μF: 1V</td></tr><tr><td>Cap=10μF: 0.5V</td><td>10μF<Cap≤100μF: 0.5V*⁹</td></tr><tr><td>Cap>10μF: 0.2V</td><td>Cap>100μF: 0.2V</td></tr><tr><td>*⁸0805B475/6.3V~25V: 0.5V</td><td>*⁹1206X107-6.3V: 0.2V</td></tr><tr><td></td><td>1206A476-6.3V: 0.1V</td></tr><tr><td></td><td>1210S107-6.3V: 0.2V</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 condition**.	T.C.	Operating Temp	NPO (C0G)	-55~125°C at 25°C	X8G	-55~150°C at 25°C	X7R	-55~125°C at 25°C	X7S	-55~125°C at 25°C	X6S	-55~105°C at 25°C	X5R	-55~ 85°C at 25°C	01005	0201	Cap≤0.01μF: 0.5V**	Cap<0.1μF: 1V*	Cap>0.01μF: 0.2V	0.1μF≤Cap<1μF: 0.2V* ¹	**01R5B102/25V: 1V	Cap≥1μF: 0.1V* ²	*0201X273~823/6.3V~16V & 0201X473/25V & 0201S273~823/6.3V~10V: 0.5V		**0201X104/6.3V~25V & 0201X224-334/16V~25V: 0.5V		0201X224/10V & 0201X334-474/6.3V~10V & 0201B104/6.3V~10V & 0201S104/6.3V~16V & 0201S224/6.3V: 0.3V		*0201X105/6.3V~10V: 0.3V		0402	0603	Cap<1μF: 1V* ³	Cap<1μF: 1V	Cap=1μF: 0.5V* ⁴	1μF≤Cap≤4.7μF: 0.5V* ⁶	1μF<Cap<10μF: 0.2V* ⁵	Cap>4.7μF: 0.2V* ⁷	Cap≥10μF: 0.1V		**0402B224-16V: 0.5V	**0603B105/35V: 1V	0402B334/474-6.3V&10V: 0.5V	*70603X106/10V: 0.5V	0402S334/474-6.3V: 0.5V	0603S226/6.3V: 0.1V	*0402B105/6R3V: 0.2V		*50402X225/475-6.3V: 0.5V		0805	1206/1210	Cap<10μF: 1V* ⁸	Cap≤10μF: 1V	Cap=10μF: 0.5V	10μF<Cap≤100μF: 0.5V* ⁹	Cap>10μF: 0.2V	Cap>100μF: 0.2V	* ⁸ 0805B475/6.3V~25V: 0.5V	* ⁹ 1206X107-6.3V: 0.2V		1206A476-6.3V: 0.1V		1210S107-6.3V: 0.2V	<table><tr><th>T.C.</th><th>Capacitance Change</th></tr><tr><td>NPO (C0G)</td><td>Within ±30ppm/°C</td></tr><tr><td>X8G</td><td>Within ±30ppm/°C</td></tr><tr><td>X7R</td><td>Within ±15%</td></tr><tr><td>X7S</td><td>Within ±22%</td></tr><tr><td>X6S</td><td>Within ±22%</td></tr><tr><td>X5R</td><td>Within ±15%</td></tr></table>	T.C.	Capacitance Change	NPO (C0G)	Within ±30ppm/°C	X8G	Within ±30ppm/°C	X7R	Within ±15%	X7S	Within ±22%	X6S	Within ±22%	X5R	Within ±15%
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7.	Adhesive Strength of Termination	*Pressurizing force: 01005:1N, 0201:2N, 0402 to 0603:5N, >0603: 10N *Test time : 10 ±1 sec	* No remarkable damage or removal of the terminations.																																																																														
8.	Vibration Resistance	*Vibration frequency: 10~55 Hz/min. *Total amplitude: 1.5mm *Test time: 6 hrs.(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 condition**. *Cap./DF(Q) Measurement to be made after de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**.	* No remarkable damage. * Cap change and Q/D.F.: To meet initial spec.																																																																														
9.	Solderability	* Solder temperature: 235±5°C(0201~1210). * Solder temperature: 245±5°C(1808~2225). * Dipping time: 2±0.5 sec.	95% MIN. coverage of all metalized area.**																																																																														
10.	Bending Test	*The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm & SH,SG,ST** series: 5 mm and then the pressure shall be maintained for 5±1 sec. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**. *Measurement to be made after keeping at room condition** for 24±2 hrs. **Safety Certified Cap with soft termination: 3 mm **ST series follow AEC-Q200-005: Board Flex test condition.	* No remarkable damage. * Cap change: NP0, X8G: within ±5% or 0.5pF whichever is larger X7R, X7S, X6S, X5R : within ±12.5% , (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)																																																																														
11.	Resistance to Soldering Heat	* Solder temperature: 260±5°C * Dipping time: 10±1 sec * Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder. * Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**. * 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 condition**.	* No remarkable damage. * Cap change: NP0, X8G: within ±2.5% or 0.25pF whichever is larger X7R, X7S, X6S, X5R : within ±7.5% * Q/D.F., I.R. and dielectric strength: To meet initial requirements. * 25% max. leaching on each edge.																																																																														
12.	Temperature Cycle	* Conduct the five cycles according to the temperatures and time. <table><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> * Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**. * 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 condition**.	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	* No remarkable damage. * Cap change: NP0,X8G: within ±2.5% or 0.25pF whichever is larger X7R, X7S, X6S, X5R : within ±7.5% * Q/D.F., I.R. and dielectric strength: To meet initial requirements.																																																															
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** "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

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No.	Item	Test Condition	Requirements																																																																						
13.	Humidity (Damp Heat) Steady State	* Test temp.: 40±2°C * Humidity: 90~95%RH * Test time: 500+24/-0hrs. * Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**. * 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 condition**.	* No remarkable damage. * Cap change: NP0, X8G: within ±5% or 0.5pF whichever is larger X7R, X7S, X6S, X5R : ≥10V**, within ±12.5%; 6.3V within ±25%; TT series, within ±25% **10V: 0603±4.7μF; 0402±1μF; 0201±0.1μF, within ±25%; * Q/D.F. value: NP0, X8G: More than 30pF Q≥350, 10pF≤C<30pF, Q≥275+2.5C, Less than 10pF Q≥200+10C X7R, X6S, X5R, X7S: <table><tr><th>Rated vol.</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><tr><td rowspan="4">≥100V</td><td rowspan="4">≤3%</td><td>≤6%</td><td>1206±0.47μF</td></tr><tr><td>≤7%</td><td>1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF</td></tr><tr><td>≤7.5%</td><td>0603±0.068μF; 0805 > 0.1μF; 1206±1μF; 1210±2.2μF; TT series</td></tr><tr><td>≤20%</td><td>0805 > 0.22μF; 1210±3.3μF</td></tr><tr><td rowspan="4">50V & 63V</td><td rowspan="4">≤3%</td><td>≤6%</td><td>0201(50V); 0603±0.047μF; 0805±0.18μF; 1206±0.47μF</td></tr><tr><td>≤7%</td><td>1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF</td></tr><tr><td>≤10%</td><td>0201±0.01uF; 1210±3.3μF</td></tr><tr><td>≤20%</td><td>0402±0.012μF; 0603>0.1μF; 0805±1μF(0805/X7R>0.47μF); 1206±2.2μF; 1210±10μF; TT series</td></tr><tr><td rowspan="2">35V</td><td rowspan="2">≤5%</td><td>≤20%</td><td>0603±1μF; 0805±2.2μF; 1206±2.2μF; 1210±10μF</td></tr><tr><td>≤15%</td><td>0603B=0.47uF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤5%</td><td>≤10%</td><td>0201±0.01μF(0201/X5R=0.01μF); 0805±1μF; 1210±10μF*</td></tr><tr><td>≤14%</td><td>0603±0.33μF</td></tr><tr><td>≤15%</td><td>0201±0.1μF(0201/X5R>0.01μF); 0603±0.47μF; TT series 0402±0.10μF(0402/X7R±0.056μF); 0805±2.2μF; 1206±4.7μF; 1210±22μF(1210/X5R±10μF)*;</td></tr><tr><td>≤20%</td><td>0402±0.33μF</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±0.033μF; 0603>0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201±0.012μF; 0402±0.22μF(0402/X7R±0.15μF); 0603±0.33μF; 0805±2.2μF; 1206±2.2μF; 1210±22μF</td></tr><tr><td>≤20%</td><td>0201±0.1μF; 0402±1μF; 0603/X5R±10μF; TT series; 01R5/X5R</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201±0.1μF; 0402±1μF(0402/X6S±0.47μF); 0603±10μF; 0805±4.7μF; 1206±47μF; 1210±100μF; TT series</td></tr><tr><td>4V</td><td>≤20%</td><td>---</td><td>---</td></tr></table> * I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller. Class II (X7R, X6S, X5R, X7S) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R; 1210±3.3μF</td><td rowspan="7">1GΩ or RxC≥10 Ω-F whichever is smaller.</td></tr><tr><td>50V& 63V: 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±0.1uF; 0402±0.22μF; 0603±1μF; 0805±2.2μF; 1206±10μF; 1210±47μF</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 ; 4V ; TT series ; All X6S/X7S items; Size≥1812; X5R/01R5</td></tr></table>	Rated vol.	D.F.≤	Exception of D.F.≤		≥100V	≤3%	≤6%	1206±0.47μF	≤7%	1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF	≤7.5%	0603±0.068μF; 0805 > 0.1μF; 1206±1μF; 1210±2.2μF; TT series	≤20%	0805 > 0.22μF; 1210±3.3μF	50V & 63V	≤3%	≤6%	0201(50V); 0603±0.047μF; 0805±0.18μF; 1206±0.47μF	≤7%	1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF	≤10%	0201±0.01uF; 1210±3.3μF	≤20%	0402±0.012μF; 0603>0.1μF; 0805±1μF(0805/X7R>0.47μF); 1206±2.2μF; 1210±10μF; TT series	35V	≤5%	≤20%	0603±1μF; 0805±2.2μF; 1206±2.2μF; 1210±10μF	≤15%	0603B=0.47uF	25V	≤5%	≤10%	0201±0.01μF(0201/X5R=0.01μF); 0805±1μF; 1210±10μF*	≤14%	0603±0.33μF	≤15%	0201±0.1μF(0201/X5R>0.01μF); 0603±0.47μF; TT series 0402±0.10μF(0402/X7R±0.056μF); 0805±2.2μF; 1206±4.7μF; 1210±22μF(1210/X5R±10μF)*;	≤20%	0402±0.33μF	16V	≤5%	≤10%	0603±0.15μF; 0805±0.68μF; 1206±2.2μF; 1210±4.7μF	≤15%	0201±0.01μF(0201/X7R±0.022μF); 0402±0.033μF; 0603>0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series	10V	≤7.5%	≤15%	0201±0.012μF; 0402±0.22μF(0402/X7R±0.15μF); 0603±0.33μF; 0805±2.2μF; 1206±2.2μF; 1210±22μF	≤20%	0201±0.1μF; 0402±1μF; 0603/X5R±10μF; TT series; 01R5/X5R	6.3V	≤15%	≤30%	0201±0.1μF; 0402±1μF(0402/X6S±0.47μF); 0603±10μF; 0805±4.7μF; 1206±47μF; 1210±100μF; TT series	4V	≤20%	---	---	Rated voltage	Insulation Resistance	100V: All X7R; 1210±3.3μF	1GΩ or RxC≥10 Ω-F whichever is smaller.	50V& 63V: 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±0.1uF; 0402±0.22μF; 0603±1μF; 0805±2.2μF; 1206±10μF; 1210±47μF	10V: 0201±47nF; 0402±0.47μF; 0603±0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±47μF	6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812; X5R/01R5
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		≤7.5%	0603±0.068μF; 0805 > 0.1μF; 1206±1μF; 1210±2.2μF; TT series																																																																						
		≤20%	0805 > 0.22μF; 1210±3.3μF																																																																						
50V & 63V	≤3%	≤6%	0201(50V); 0603±0.047μF; 0805±0.18μF; 1206±0.47μF																																																																						
		≤7%	1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF																																																																						
		≤10%	0201±0.01uF; 1210±3.3μF																																																																						
		≤20%	0402±0.012μF; 0603>0.1μF; 0805±1μF(0805/X7R>0.47μF); 1206±2.2μF; 1210±10μF; TT series																																																																						
35V	≤5%	≤20%	0603±1μF; 0805±2.2μF; 1206±2.2μF; 1210±10μF																																																																						
		≤15%	0603B=0.47uF																																																																						
25V	≤5%	≤10%	0201±0.01μF(0201/X5R=0.01μF); 0805±1μF; 1210±10μF*																																																																						
		≤14%	0603±0.33μF																																																																						
		≤15%	0201±0.1μF(0201/X5R>0.01μF); 0603±0.47μF; TT series 0402±0.10μF(0402/X7R±0.056μF); 0805±2.2μF; 1206±4.7μF; 1210±22μF(1210/X5R±10μF)*;																																																																						
		≤20%	0402±0.33μF																																																																						
16V	≤5%	≤10%	0603±0.15μF; 0805±0.68μF; 1206±2.2μF; 1210±4.7μF																																																																						
		≤15%	0201±0.01μF(0201/X7R±0.022μF); 0402±0.033μF; 0603>0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series																																																																						
10V	≤7.5%	≤15%	0201±0.012μF; 0402±0.22μF(0402/X7R±0.15μF); 0603±0.33μF; 0805±2.2μF; 1206±2.2μF; 1210±22μF																																																																						
		≤20%	0201±0.1μF; 0402±1μF; 0603/X5R±10μF; TT series; 01R5/X5R																																																																						
6.3V	≤15%	≤30%	0201±0.1μF; 0402±1μF(0402/X6S±0.47μF); 0603±10μF; 0805±4.7μF; 1206±47μF; 1210±100μF; TT series																																																																						
4V	≤20%	---	---																																																																						
Rated voltage	Insulation Resistance																																																																								
100V: All X7R; 1210±3.3μF	1GΩ or RxC≥10 Ω-F whichever is smaller.																																																																								
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10V: 0201±47nF; 0402±0.47μF; 0603±0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±47μF																																																																									
6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812; X5R/01R5																																																																									

** "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

This Reliability Test Conditions and Requirements only for General Purpose series, please refer to individual sheet for other products information.

No.	Item	Test Condition	Requirements																																																																					
14	Humidity (Damp Heat) Load	*Test temp. : 40±2°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 condition**. * 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 condition**.	* No remarkable damage. Cap change: NP0, X8G: ±7.5% or 0.75pF whichever is larger. X7R, X7S, X6S, X5R : ≥10V**within ±12.5%; 6.3V within ±25%; TT series, within ±25% **10V: 0603±4.7μF; 0402±1μF; 0201±0.1μF, within ±25%; Q/D.F. value: NP0, X8G: C≥30pF, Q≥200; C<30pF, Q≥100+10/3C X7R, X6S, X5R, X7S: <table><tr><th>Rated vol.</th><th>D.F. ≤</th><th>Exception of D.F. ≤</th></tr><tr><td rowspan="4">≥100V</td><td rowspan="4">≤3%</td><td>≤6%</td><td>1206±0.47μF</td></tr><tr><td>≤7%</td><td>1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF</td></tr><tr><td>≤7.5%</td><td>0603±0.068μF; 0805 > 0.1μF; 1206±1μF; 1210±2.2μF; TT series</td></tr><tr><td>≤20%</td><td>0805 > 0.22μF; 1210±3.3μF</td></tr><tr><td rowspan="4">50V & 63V</td><td rowspan="4">≤3%</td><td>≤6%</td><td>0201(50V); 0603±0.047μF; 0805±0.18μF; 1206±0.47μF</td></tr><tr><td>≤7%</td><td>1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF</td></tr><tr><td>≤10%</td><td>0201±0.01uF; 1210±3.3μF</td></tr><tr><td>≤20%</td><td>0402±0.012μF; 0603>0.1μF; 0805±1μF (0805/X7R>0.47μF); 1206±2.2μF; 1210±10μF; TT series</td></tr><tr><td rowspan="2">35V</td><td rowspan="2">≤5%</td><td>≤20%</td><td>0603±1μF; 0805≥2.2μF; 1206±2.2μF; 1210±10μF</td></tr><tr><td>≤15%</td><td>0603B=0.47uF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤5%</td><td>≤10%</td><td>0201±0.01μF (0201/X5R=0.01μF); 0805±1μF; 1210±10μF*</td></tr><tr><td>≤14%</td><td>0603±0.33μF</td></tr><tr><td>≤15%</td><td>0201±0.1μF (0201/X5R>0.01μF); 0603±0.47μF; TT series</td></tr><tr><td>≤20%</td><td>0402±0.10μF (0402/X7R±0.056μF); 0805±2.2μF; 1206±4.7μF; 1210±22μF (1210/X5R±10μF)*;</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±0.033μF; 0603>0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201±0.012μF; 0402±0.22μF (0402/X7R±0.15μF); 0603±0.33μF; 0805±2.2μF; 1206±2.2μF; 1210±22μF</td></tr><tr><td>≤20%</td><td>0201±0.1μF; 0402±1μF; 0603/X5R±10μF; TT series; 01R5/X5R</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201±0.1μF; 0402±1μF (0402/X6S±0.47μF); 0603±10μF; 0805±4.7μF; 1206±47μF; 1210±100μF; TT series</td></tr><tr><td>4V</td><td>≤20%</td><td>---</td><td>---</td></tr></table> *I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is smaller. Class II (X7R, X7S, X6S, X5R) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R; 1210±3.3μF</td><td rowspan="7">500MΩ or RxC≥5 Ω-F whichever is smaller.</td></tr><tr><td>50V& 63V: 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±0.1uF; 0402±0.22μF; 0603±1μF; 0805±2.2μF; 1206±10μF; 1210±47μF</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 ; 4V ; TT series ; All X6S/X7S items; Size≥1812; X5R/01R5</td></tr></table>	Rated vol.	D.F. ≤	Exception of D.F. ≤	≥100V	≤3%	≤6%	1206±0.47μF	≤7%	1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF	≤7.5%	0603±0.068μF; 0805 > 0.1μF; 1206±1μF; 1210±2.2μF; TT series	≤20%	0805 > 0.22μF; 1210±3.3μF	50V & 63V	≤3%	≤6%	0201(50V); 0603±0.047μF; 0805±0.18μF; 1206±0.47μF	≤7%	1812±4.7μF; 1825±4.7μF; 2220±4.7μF; 2225±4.7μF	≤10%	0201±0.01uF; 1210±3.3μF	≤20%	0402±0.012μF; 0603>0.1μF; 0805±1μF (0805/X7R>0.47μF); 1206±2.2μF; 1210±10μF; TT series	35V	≤5%	≤20%	0603±1μF; 0805≥2.2μF; 1206±2.2μF; 1210±10μF	≤15%	0603B=0.47uF	25V	≤5%	≤10%	0201±0.01μF (0201/X5R=0.01μF); 0805±1μF; 1210±10μF*	≤14%	0603±0.33μF	≤15%	0201±0.1μF (0201/X5R>0.01μF); 0603±0.47μF; TT series	≤20%	0402±0.10μF (0402/X7R±0.056μF); 0805±2.2μF; 1206±4.7μF; 1210±22μF (1210/X5R±10μF)*;	16V	≤5%	≤10%	0603±0.15μF; 0805±0.68μF; 1206±2.2μF; 1210±4.7μF	≤15%	0201±0.01μF (0201/X7R±0.022μF); 0402±0.033μF; 0603>0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±22μF; TT series	10V	≤7.5%	≤15%	0201±0.012μF; 0402±0.22μF (0402/X7R±0.15μF); 0603±0.33μF; 0805±2.2μF; 1206±2.2μF; 1210±22μF	≤20%	0201±0.1μF; 0402±1μF; 0603/X5R±10μF; TT series; 01R5/X5R	6.3V	≤15%	≤30%	0201±0.1μF; 0402±1μF (0402/X6S±0.47μF); 0603±10μF; 0805±4.7μF; 1206±47μF; 1210±100μF; TT series	4V	≤20%	---	---	Rated voltage	Insulation Resistance	100V: All X7R; 1210±3.3μF	500MΩ or RxC≥5 Ω-F whichever is smaller.	50V& 63V: 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±0.1uF; 0402±0.22μF; 0603±1μF; 0805±2.2μF; 1206±10μF; 1210±47μF	10V: 0201±47nF; 0402±0.47μF; 0603±0.47μF; 0805±2.2μF; 1206±4.7μF; 1210±47μF	6.3V ; 4V ; TT series ; All X6S/X7S items; Size≥1812; X5R/01R5
Rated vol.	D.F. ≤	Exception of D.F. ≤																																																																						
≥100V	≤3%	≤6%	1206±0.47μF																																																																					
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25V	≤5%	≤10%	0201±0.01μF (0201/X5R=0.01μF); 0805±1μF; 1210±10μF*																																																																					
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16V	≤5%	≤10%	0603±0.15μF; 0805±0.68μF; 1206±2.2μF; 1210±4.7μF																																																																					
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10V	≤7.5%	≤15%	0201±0.012μF; 0402±0.22μF (0402/X7R±0.15μF); 0603±0.33μF; 0805±2.2μF; 1206±2.2μF; 1210±22μF																																																																					
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6.3V	≤15%	≤30%	0201±0.1μF; 0402±1μF (0402/X6S±0.47μF); 0603±10μF; 0805±4.7μF; 1206±47μF; 1210±100μF; TT series																																																																					
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** "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

This Reliability Test Conditions and Requirements only for General Purpose series, please refer to individual sheet for other products information.

No.	Item	Test Condition	Requirements																																																																																																																																																																																													
15.	High Temperature Load (Endurance)	*Test temp. : X8G : 150±3°C NP0, X7R/ X7S: 125±3°C X6S: 105±3°C X5R: 85±3°C *Test time: 1000+24/-0 hrs**. **Excluding RH,UF series 2000+24/-0 hrs. *To apply voltage: (1) 100% of rated voltage for below range. <table><tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance</th></tr><tr><td>01R5</td><td>X5R</td><td>≐10V</td><td>C=0.1μF</td></tr><tr><td rowspan="2">0201</td><td rowspan="2">X5R/X7R/ X6S/X7S</td><td>≐10V</td><td>C≧0.1μF</td></tr><tr><td>≧16V</td><td>C >0.1μF</td></tr><tr><td rowspan="6">0402</td><td rowspan="3">X5R</td><td>≐16V</td><td>C >1.0μF</td></tr><tr><td>25V,50V</td><td>C≧1.0μF</td></tr><tr><td>63V</td><td>C≧0.22μF</td></tr><tr><td rowspan="3">X6S</td><td>6.3V,10V</td><td>C >1.0μF</td></tr><tr><td>16V,25V</td><td>C≧1.0μF</td></tr><tr><td>6.3V,10V</td><td>C≧1.0μF</td></tr><tr><td rowspan="4">0603</td><td rowspan="2">X5R/X7R/ X6S/X7S</td><td>4V</td><td>C≧22μF</td></tr><tr><td>6.3V,10V</td><td>C≧4.7μF^{#1}</td></tr><tr><td rowspan="2">X5R/X6S/X7S</td><td>25V</td><td>C≧1.0μF</td></tr><tr><td>35V</td><td>C≧1.0μF</td></tr><tr><td rowspan="6">0805</td><td rowspan="4">X5R/X7R/ X6S/X7S</td><td>4V</td><td>C≧47μF</td></tr><tr><td>6.3V</td><td>C≧22μF</td></tr><tr><td>10V,50V</td><td>C≧10μF</td></tr><tr><td>16V</td><td>C >10μF</td></tr><tr><td rowspan="2">X6S</td><td>25V</td><td>C≧10μF</td></tr><tr><td>16V,25V</td><td>C≧10μF</td></tr><tr><td>1206</td><td>X5R/X7R/X6S</td><td>≦6.3V</td><td>C≧47μF</td></tr><tr><td rowspan="2">1210</td><td rowspan="2">X5R/X7R/X6S</td><td>16V</td><td>C≧47μF</td></tr><tr><td>100V</td><td>C≧3.3μF</td></tr><tr><td>TT15</td><td>X5R</td><td>6.3V</td><td>C >1.0μF</td></tr><tr><td>TT21</td><td>X5R/X7R/X6S</td><td>≦10V</td><td>C≧10μF</td></tr></table> **1WV items must follow de-rating conditions #1. 0603X475.106/(10V) & 0603S106/(4V&6.3V):150% of rated voltage (2)150% of rated voltage for below range. <table><tr><th>Size</th><th>Dielectric</th><th>Rated voltage</th><th>Capacitance</th></tr><tr><td rowspan="2">0201</td><td rowspan="2">X5R/X6S</td><td>16V/25V</td><td>C=0.1μF</td></tr><tr><td>16V</td><td>C≧0.022μF</td></tr><tr><td rowspan="2">0402</td><td rowspan="2">X5R/X7R/X6S</td><td>50V</td><td>C>0.01μF</td></tr><tr><td>10~25V</td><td>C≧0.22μF</td></tr><tr><td rowspan="6">0603</td><td rowspan="3">X7S</td><td>50V~100V</td><td>C>0.22μF</td></tr><tr><td>50V</td><td>C>0.1μF</td></tr><tr><td>25V</td><td>C=1.0μF</td></tr><tr><td rowspan="3">X5R</td><td>50V</td><td>C≧1.0μF</td></tr><tr><td>10V,16V</td><td>C≧1.0μF</td></tr><tr><td>100V</td><td>C≧0.47μF</td></tr><tr><td rowspan="4">0805</td><td rowspan="4">X5R/X7R/ X6S/X7S</td><td>50V</td><td>C≧0.68μF</td></tr><tr><td>35V</td><td>C≧2.2μF</td></tr><tr><td>10~25V</td><td>C≧4.7μF</td></tr><tr><td>100V</td><td>C≧1.0μF</td></tr><tr><td rowspan="4">1206</td><td rowspan="4">X7R</td><td>50V</td><td>C≧2.2μF</td></tr><tr><td>100V</td><td>C >1.0μF</td></tr><tr><td>50V</td><td>C=4.7μF</td></tr><tr><td>50V</td><td>C=4.7μF</td></tr><tr><td rowspan="2">1210</td><td rowspan="2">X5R/X7R/ X6S/X7S</td><td>50V~100V</td><td>C≧2.2μF</td></tr><tr><td>50V</td><td>C≧2.2μF</td></tr><tr><td rowspan="2">1812</td><td rowspan="2">X7R</td><td>≦50V</td><td>C≧4.7μF</td></tr><tr><td>100V</td><td>C≧1.0μF</td></tr><tr><td>1825 2220 2225</td><td>X7R</td><td>100V~250V</td><td>C≧1.0μF^{#2}</td></tr></table> #2. 2220B126~226/(100V):120% of rated voltage. (3) ≦6.3V or C≧10μF or TT series:150% of rated voltage. (4) 10V~250V: 200% of rated voltage. Excluding 1812N104/(250V):100% of rated voltage. 0201S/393~823/(10V) & 0603B474/(35V) & 1206N473.563.104/(100V) :150% of rated voltage. (5) 400V~450V: 120% of rated voltage. (6) 500V: 150% of rated voltage. (7) 630V~3000V: 120% of rated voltage. Excluding 1210B103/(2KV) & 1808B102/(3KV)(T:1.25mm) & 1206B183~223/(1KV) :110% of rated voltage; 1210N223/(1KV) & 1812N472~562/(1KV) & 1812N122~332/(2KV) & 1812N330~12/(4KV):100% of rated voltage. (8) Ur=3.5KV&4KV: 110% of rated voltage. *Before initial measurement (Class II only): To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition*. *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 condition**.	Size	Dielectric	Rated voltage	Capacitance	01R5	X5R	≐10V	C=0.1μF	0201	X5R/X7R/ X6S/X7S	≐10V	C≧0.1μF	≧16V	C >0.1μF	0402	X5R	≐16V	C >1.0μF	25V,50V	C≧1.0μF	63V	C≧0.22μF	X6S	6.3V,10V	C >1.0μF	16V,25V	C≧1.0μF	6.3V,10V	C≧1.0μF	0603	X5R/X7R/ X6S/X7S	4V	C≧22μF	6.3V,10V	C≧4.7μF ^{#1}	X5R/X6S/X7S	25V	C≧1.0μF	35V	C≧1.0μF	0805	X5R/X7R/ X6S/X7S	4V	C≧47μF	6.3V	C≧22μF	10V,50V	C≧10μF	16V	C >10μF	X6S	25V	C≧10μF	16V,25V	C≧10μF	1206	X5R/X7R/X6S	≦6.3V	C≧47μF	1210	X5R/X7R/X6S	16V	C≧47μF	100V	C≧3.3μF	TT15	X5R	6.3V	C >1.0μF	TT21	X5R/X7R/X6S	≦10V	C≧10μF	Size	Dielectric	Rated voltage	Capacitance	0201	X5R/X6S	16V/25V	C=0.1μF	16V	C≧0.022μF	0402	X5R/X7R/X6S	50V	C>0.01μF	10~25V	C≧0.22μF	0603	X7S	50V~100V	C>0.22μF	50V	C>0.1μF	25V	C=1.0μF	X5R	50V	C≧1.0μF	10V,16V	C≧1.0μF	100V	C≧0.47μF	0805	X5R/X7R/ X6S/X7S	50V	C≧0.68μF	35V	C≧2.2μF	10~25V	C≧4.7μF	100V	C≧1.0μF	1206	X7R	50V	C≧2.2μF	100V	C >1.0μF	50V	C=4.7μF	50V	C=4.7μF	1210	X5R/X7R/ X6S/X7S	50V~100V	C≧2.2μF	50V	C≧2.2μF	1812	X7R	≦50V	C≧4.7μF	100V	C≧1.0μF	1825 2220 2225	X7R	100V~250V	C≧1.0μF ^{#2}	*No remarkable damage. Cap change: NP0, X8G: ±3.0% or ±0.3pF whichever is larger X7R, X7S, X6S, X5R : ≥10V**within ±12.5%; 6.3V within ±25%; TT series,within ±25% **10V: 0603≧4.7μF; 0402≧1μF; 0201≧0.1μF, within ±25%; Q/D.F.value: NP0, X8G: More than 30pF, Q≧350; 10pF≦C<30pF, Q≧275+2.5C; Less than 10pF, Q≧200+10C X7R, X6S, X5R, X7S: <table><tr><th>Rated vol.</th><th>D.F.≦</th><th>Exception of D.F.≦</th></tr><tr><td rowspan="4">≥100V</td><td rowspan="4">≦3%</td><td>≦6% 1206≧0.47μF</td></tr><tr><td>≦7% 1812≧4.7μF;1825≧4.7μF; 2220≧4.7μF; 2225≧4.7μF</td></tr><tr><td>≦7.5% 0603≧0.068μF;0805 > 0.1μF;1206≧1μF;1210≧2.2μF;TT series</td></tr><tr><td>≦20% 0805 > 0.22μF;1210≧3.3μF</td></tr><tr><td rowspan="4">50V & 63V</td><td rowspan="4">≦3%</td><td>≦6% 0201(50V);0603≧0.047μF;0805≧0.18μF;1206≧0.47μF</td></tr><tr><td>≦7% 1812≧4.7μF;1825≧4.7μF; 2220≧4.7μF; 2225≧4.7μF</td></tr><tr><td>≦10% 0201≧0.01μF; 0402≧0.012μF;1210≧3.3μF</td></tr><tr><td>≦20% 0402≧0.047μF;0603>0.1μF;0805≧1μF(0805/X7R>0.47μF); 1206≧2.2μF;1210≧10μF; TT series</td></tr><tr><td rowspan="2">35V</td><td rowspan="2">≦5%</td><td>≦20% 0603≧1μF;0805≧2.2μF;1206≧2.2μF;1210≧10μF</td></tr><tr><td>≦15% 0603B=0.47uF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10% 0201≧0.01μF(0201/X5R=0.01μF);0805≧1μF;1210≧10μF*</td></tr><tr><td>≦14% 0603≧0.33μF</td></tr><tr><td>≦15% 0201≧0.1μF(0201/X5R>0.01μF); 0603≧0.47μF;TTseries 0402≧0.10μF(0402/X7R≧0.056μF);0805≧2.2μF; 1206≧4.7μF;1210≧22μF(1210/X5R≧10μF)*;</td></tr><tr><td>≦20% 0402≧0.33μF</td></tr><tr><td rowspan="2">16V</td><td rowspan="2">≦5%</td><td>≦10% 0603≧0.15μF;0805≧0.68μF;1206≧2.2μF;1210≧4.7μF</td></tr><tr><td>≦15% 0201≧0.01μF(0201/X7R≧0.022μF);0402≧0.033μF; 0603>0.47μF;0805≧2.2μF;1206≧4.7μF;1210≧22μF;TT series</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≦7.5%</td><td>≦15% 0201≧0.012μF;0402≧0.22μF(0402/X7R≧0.15μF); 0603≧0.33μF;0805≧2.2μF;1206≧2.2μF;1210≧22μF</td></tr><tr><td>≦20% 0201≧0.1μF;0402≧1μF;0603/X5R≧10μF;TT series;01R5/X5R</td></tr><tr><td>6.3V</td><td>≦15%</td><td>≦30% 0201≧0.1μF;0402≧1μF(0402/X6S≧0.47μF); 0603≧10μF;0805≧4.7μF;1206≧47μF;1210≧100μF;TT series</td></tr><tr><td>4V</td><td>≦20%</td><td>---</td></tr></table> *I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller. Class II (X7R, X7S, X6S, X5R) <table><tr><th>Rated voltage</th><th>Insulation Resistance</th></tr><tr><td>100V: All X7R;1210≧3.3μF</td><td rowspan="7">1GΩ or RxC≧10 Ω-F whichever is smaller.</td></tr><tr><td>50V& 63V: 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≧0.1μF;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≧0.47μF;0603≧0.47μF;0805≧2.2μF; 1206≧4.7μF;1210≧47μF</td></tr><tr><td>6.3V ; 4V ; TT series ; All X6S/X7S items; Size≧1812; X5R/01R5</td></tr></table>	Rated vol.	D.F.≦	Exception of D.F.≦	≥100V	≦3%	≦6% 1206≧0.47μF	≦7% 1812≧4.7μF;1825≧4.7μF; 2220≧4.7μF; 2225≧4.7μF	≦7.5% 0603≧0.068μF;0805 > 0.1μF;1206≧1μF;1210≧2.2μF;TT series	≦20% 0805 > 0.22μF;1210≧3.3μF	50V & 63V	≦3%	≦6% 0201(50V);0603≧0.047μF;0805≧0.18μF;1206≧0.47μF	≦7% 1812≧4.7μF;1825≧4.7μF; 2220≧4.7μF; 2225≧4.7μF	≦10% 0201≧0.01μF; 0402≧0.012μF;1210≧3.3μF	≦20% 0402≧0.047μF;0603>0.1μF;0805≧1μF(0805/X7R>0.47μF); 1206≧2.2μF;1210≧10μF; TT series	35V	≦5%	≦20% 0603≧1μF;0805≧2.2μF;1206≧2.2μF;1210≧10μF	≦15% 0603B=0.47uF	25V	≦5%	≦10% 0201≧0.01μF(0201/X5R=0.01μF);0805≧1μF;1210≧10μF*	≦14% 0603≧0.33μF	≦15% 0201≧0.1μF(0201/X5R>0.01μF); 0603≧0.47μF;TTseries 0402≧0.10μF(0402/X7R≧0.056μF);0805≧2.2μF; 1206≧4.7μF;1210≧22μF(1210/X5R≧10μF)*;	≦20% 0402≧0.33μF	16V	≦5%	≦10% 0603≧0.15μF;0805≧0.68μF;1206≧2.2μF;1210≧4.7μF	≦15% 0201≧0.01μF(0201/X7R≧0.022μF);0402≧0.033μF; 0603>0.47μF;0805≧2.2μF;1206≧4.7μF;1210≧22μF;TT series	10V	≦7.5%	≦15% 0201≧0.012μF;0402≧0.22μF(0402/X7R≧0.15μF); 0603≧0.33μF;0805≧2.2μF;1206≧2.2μF;1210≧22μF	≦20% 0201≧0.1μF;0402≧1μF;0603/X5R≧10μF;TT series;01R5/X5R	6.3V	≦15%	≦30% 0201≧0.1μF;0402≧1μF(0402/X6S≧0.47μF); 0603≧10μF;0805≧4.7μF;1206≧47μF;1210≧100μF;TT series	4V	≦20%	---	Rated voltage	Insulation Resistance	100V: All X7R;1210≧3.3μF	1GΩ or RxC≧10 Ω-F whichever is smaller.	50V& 63V: 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≧0.1μF;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≧0.47μF;0603≧0.47μF;0805≧2.2μF; 1206≧4.7μF;1210≧47μF	6.3V ; 4V ; TT series ; All X6S/X7S items; Size≧1812; X5R/01R5
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		50V	C=4.7μF																																																																																																																																																																																													
		50V	C=4.7μF																																																																																																																																																																																													
1210	X5R/X7R/ X6S/X7S	50V~100V	C≧2.2μF																																																																																																																																																																																													
		50V	C≧2.2μF																																																																																																																																																																																													
1812	X7R	≦50V	C≧4.7μF																																																																																																																																																																																													
		100V	C≧1.0μF																																																																																																																																																																																													
1825 2220 2225	X7R	100V~250V	C≧1.0μF ^{#2}																																																																																																																																																																																													
Rated vol.	D.F.≦	Exception of D.F.≦																																																																																																																																																																																														
≥100V	≦3%	≦6% 1206≧0.47μF																																																																																																																																																																																														
		≦7% 1812≧4.7μF;1825≧4.7μF; 2220≧4.7μF; 2225≧4.7μF																																																																																																																																																																																														
		≦7.5% 0603≧0.068μF;0805 > 0.1μF;1206≧1μF;1210≧2.2μF;TT series																																																																																																																																																																																														
		≦20% 0805 > 0.22μF;1210≧3.3μF																																																																																																																																																																																														
50V & 63V	≦3%	≦6% 0201(50V);0603≧0.047μF;0805≧0.18μF;1206≧0.47μF																																																																																																																																																																																														
		≦7% 1812≧4.7μF;1825≧4.7μF; 2220≧4.7μF; 2225≧4.7μF																																																																																																																																																																																														
		≦10% 0201≧0.01μF; 0402≧0.012μF;1210≧3.3μF																																																																																																																																																																																														
		≦20% 0402≧0.047μF;0603>0.1μF;0805≧1μF(0805/X7R>0.47μF); 1206≧2.2μF;1210≧10μF; TT series																																																																																																																																																																																														
35V	≦5%	≦20% 0603≧1μF;0805≧2.2μF;1206≧2.2μF;1210≧10μF																																																																																																																																																																																														
		≦15% 0603B=0.47uF																																																																																																																																																																																														
25V	≦5%	≦10% 0201≧0.01μF(0201/X5R=0.01μF);0805≧1μF;1210≧10μF*																																																																																																																																																																																														
		≦14% 0603≧0.33μF																																																																																																																																																																																														
		≦15% 0201≧0.1μF(0201/X5R>0.01μF); 0603≧0.47μF;TTseries 0402≧0.10μF(0402/X7R≧0.056μF);0805≧2.2μF; 1206≧4.7μF;1210≧22μF(1210/X5R≧10μF)*;																																																																																																																																																																																														
		≦20% 0402≧0.33μF																																																																																																																																																																																														
16V	≦5%	≦10% 0603≧0.15μF;0805≧0.68μF;1206≧2.2μF;1210≧4.7μF																																																																																																																																																																																														
		≦15% 0201≧0.01μF(0201/X7R≧0.022μF);0402≧0.033μF; 0603>0.47μF;0805≧2.2μF;1206≧4.7μF;1210≧22μF;TT series																																																																																																																																																																																														
10V	≦7.5%	≦15% 0201≧0.012μF;0402≧0.22μF(0402/X7R≧0.15μF); 0603≧0.33μF;0805≧2.2μF;1206≧2.2μF;1210≧22μF																																																																																																																																																																																														
		≦20% 0201≧0.1μF;0402≧1μF;0603/X5R≧10μF;TT series;01R5/X5R																																																																																																																																																																																														
6.3V	≦15%	≦30% 0201≧0.1μF;0402≧1μF(0402/X6S≧0.47μF); 0603≧10μF;0805≧4.7μF;1206≧47μF;1210≧100μF;TT series																																																																																																																																																																																														
4V	≦20%	---																																																																																																																																																																																														
Rated voltage	Insulation Resistance																																																																																																																																																																																															
100V: All X7R;1210≧3.3μF	1GΩ or RxC≧10 Ω-F whichever is smaller.																																																																																																																																																																																															
50V& 63V: 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≧0.1μF;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≧0.47μF;0603≧0.47μF;0805≧2.2μF; 1206≧4.7μF;1210≧47μF																																																																																																																																																																																																
6.3V ; 4V ; TT series ; All X6S/X7S items; Size≧1812; X5R/01R5																																																																																																																																																																																																
16.	ESR	For Microwave- Series only, refer to data sheet.																																																																																																																																																																																														

** "Room condition" Temperature: 15 to 35°C, Relative humidity: 25 to 75%, Atmospheric pressure: 86 to 106kPa.

■ Constructions

No.	Name	NPO,X8G	X7R,X7S,X6S,X5R
①	Ceramic material	CaZrO ₃ based	BaTiO ₃ based
②	Inner electrode	Ni	
③	Termination	Inner layer	Cu
④		Middle layer	Ni
⑤		Outer layer	Sn

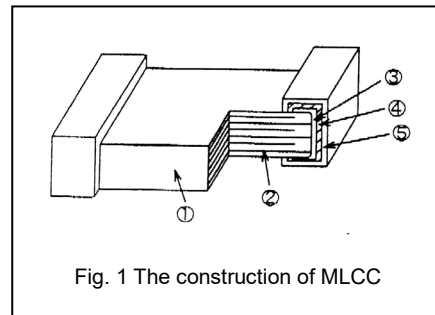


Fig. 1 The construction of MLCC

■ Storage and handling conditions

- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions; MSL Level 1.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.

■ Recommended soldering conditions

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N₂ within oven are recommended.

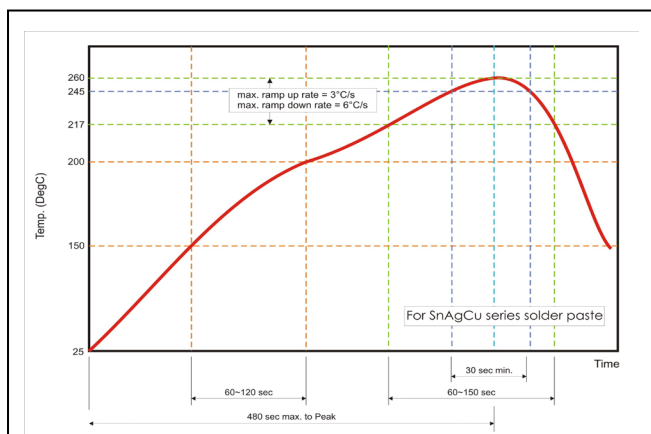


Fig. 2 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

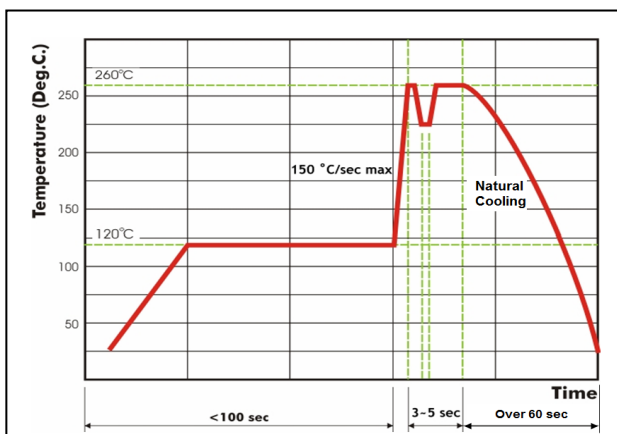


Fig. 3 Recommended wave soldering profile for SMT process with SnAgCu series solder.

[illegible]

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