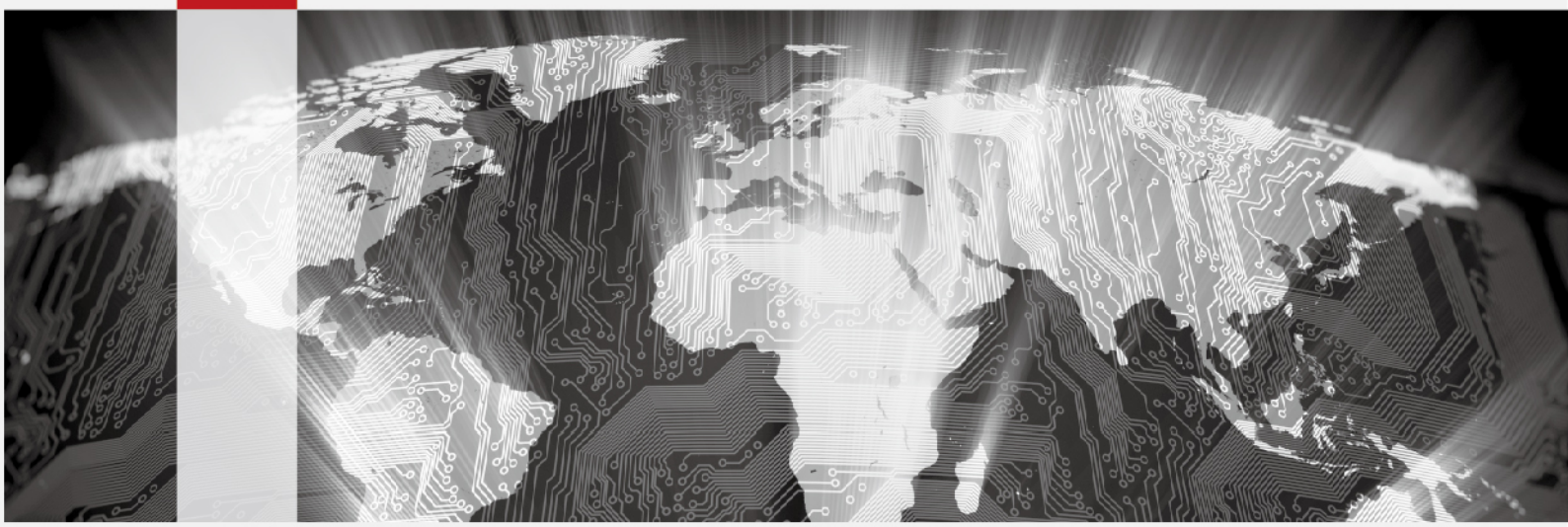
THE DATASHEET OF

0402B102K160CT



PSA PASSIVE SYSTEM ALLIANCE
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Multilayer Ceramic Capacitors

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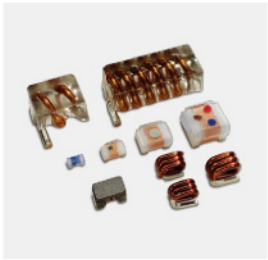
Product Portfolio

Multilayer Ceramic Capacitors

Chip Resistors

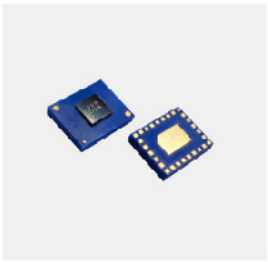
Disc Capacitors



Inductors

RF Filters

Antenna



Antenna Switch & Module

MOV & MLV

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: $\sqrt[6]{10} \fallingdotseq 1.46$ E12: $\sqrt[12]{10} \fallingdotseq 1.21$
E1 series resistance: 1Ω, 10Ω, 100Ω, 1000Ω, 10000Ω, 100000Ω

INDEX

*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	4
	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	0402, 0603, 0805, 1206,1210	1.0μF~100μF	6.3V, 10V, 16V, 25V, 50V, 100V	
	X5R	0201, 0402, 0603, 0805, 1206,1210	100pF~220μF	4V, 6.3V, 10V, 16V, 25V, 50V	
	Y5V	0402, 0603, 0805, 1206, 1210, 1812	0.01μF~100μF	6.3V, 10V, 16V, 25V, 50V, 100V	
Ultra-small Caps (01R5 series)	NPO	01005	0.2pF~100pF	10V, 25V, 50V	9
	X7R	01005	100pF~1000pF	10V	
	X5R	01005	1000pF~0.1μF	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	10
	X7R	0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	100pF~2.2μF	200V, 250V, 400V, 450V, 500V, 630V, 1kV, 2kV, 3kV, 4kV	
	Y5V	0805, 1206, 1210, 1812	0.01μF~0.68μF	200V, 250V	
High Voltage Caps (Surface Coating Type)	X7R	1206, 1210, 1808, 1812, 1825, 2220, 2225	150pF~0.018μF	2kV,2.5kV, 3kV, 4kV	13
Microwave Caps (RF series)	NPO	01005, 0201, 0402, 0603, 0805, 0505, 1111	0.1pF~1000pF	6.3V, 10V, 25V, 50V, 100V, 250V, 500V, 1500V	14
Microwave Caps Narrow Tolerance (UF series)	NPO	0402	0.05pF~3pF	25V, 50V	16
Automotive Hi-Q Caps Qualified to AEC-Q200 (RT series)	NPO	0402	0.1pF~56pF	25V, 50V	17
High Q & Low ESR Caps (HH series)	NPO	0201, 0402, 0603, 0805	0.3pF to 3300pF	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V	18
Automotive Capacitor Qualified to AEC-Q200 (MT series)	NPO	0201, 0402, 0603, 0805, 1206, 1210	0.1pF~0.047μF	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV	20
	X7R	0201, 0402, 0603, 0805, 1206, 1210	100pF~2.2μF	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1kV	
Automotive Soft Termination Caps Qualified to AEC-Q200 (ST series)	X7R	0603, 0805, 1210	1000pF~2.2μF	10V, 16V, 25V, 50V, 100V	22
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	23
	X7R	0201, 0402, 0603, 0805, 1206, 1210, 1812	100pF~2.2μF	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	26
	X8R	0402, 0603, 0805	100pF~0.047μF	10V, 16V, 25V, 50V	
Safety Certificated Caps X1/Y2 (S2 series)	NPO	1808, 1812, 2211	3pF~680pF	250Vac	28
	X7R	1808, 1812, 2220, 2211	100pF~4700pF	250Vac	
Safety Certificated Caps X2 (S3 series)	NPO	1808, 1812	3pF~1000pF	250Vac	29
	X7R	1808, 1812, 2220	150pF~0.022μF	250Vac	
Soft Termination Capacitors (SH series, Ag-poly)	NPO	0402, 0603, 0805,1206, 1210, 1808, 1812,1825,2220,2225	0.1pF~0.1μF	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1kV, 3kV	30
	X7R	0402, 0603, 0805,1206, 1210, 1808, 1812,1825,2220,2225	100pF~22μF	10V, 16V, 25V, 50V, 100V,200V, 250V, 500V, 630V, 1kV, 2kV, 3kV	
Soft Termination Capacitors (SG series, Cu-poly)	X7R	0603, 0805, 1206	100pF~1μF	10V, 16V, 25V, 50V, 100V,200V, 250V, 500V, 630V, 1kV, 2kV	36
Low Profile Caps (TT series)	X7R	0805, 1206, 1210	1.0μF~10μF	10V, 16V, 25V, 50V,100V,	37
	X5R	0402, 0603, 0805, 1206, 1210	0.22μF~47μF	6.3V, 10V, 16V, 25V	
	Y5V	0805, 1206, 1210	2.2μF~10μF	10V, 16V, 25V, 50V	
Feed Through (3-terminal) Caps (FT series)	X7R	0805	10nF~1μF	16V, 25V, 50V	38

■ HOW TO ORDER

Type of MLCC	0805	B	104	K	500	C	T
	Size	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
General Purpose MLCC Ultra-small MLCC Middle & High Voltage MLCC	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 R=X8R B=X7R A=X7S S=X6S X=X5R F=Y5V	Two significant digits followed by no. of zeros. And R is in place of decimal point. 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	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. 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 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	T=7” reeled Q=10” reeled G=13” reeled
High Vol. Cap. with Surface Coating						M= Cu/Ni/Sn Surface coating	
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	**RF** **Series** 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. S2=X1/Y2 safety class S3=X2 safety class TT=Low profile FT=Feed Through(3-terminal)	**03** **Size** 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				C=Cu/Ni/Sn	
Soft Termination MLCC	ST=Qualified to AEC-Q200 SH=With Ag polymer SG=With Cu polymer					C=Cu +Conductive resin /Ni /Sn	

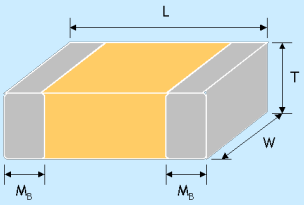
* The packaging code per each size of reel, please refer to following table "packaging style and quantity".
** Tolerance “P” & “Q” only for UF series items.

■ PACKAGING STYLE AND QUANTITY

Unit: pieces

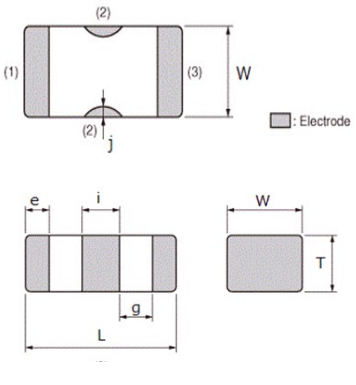
Size Inch (mm)	Thickness (mm)/Symbol		Paper tape		Plastic tape	
			7” reel	13” reel	7” reel	13” reel
01005 (0402)	0.20±0.02	V	20,000	-	40,000(W4P1)-	-
0201 (0603)	0.30±0.03	L	15,000	70,000	-	-
0402 (1005)	0.50±0.05	N	10,000	50,000	-	-
	0.50+0.02/-0.05	Q	10,000	50,000	-	-
	0.50±0.20	E	10,000	-	-	-
0603 (1608)	0.50±0.10	H	4,000	-	-	-
	0.80±0.07	S	4,000	15,000	-	-
	0.80+0.15/-0.10	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	-
	2.00±0.20	K	-	-	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	-
	2.00±0.20	K	-	-	1,000	-
	2.50±0.30	M	-	-	500	3,000
	2.80±0.30	U	-	-	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	-
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	0.10±0.03
	0201 (0603)	0.6±0.03	0.3±0.03	0.3±0.03	L	R	0.15±0.05
		0.6±0.05#2	0.3±0.05#2	0.3±0.05#2			
		0.6±0.09#3	0.3±0.09#3	0.3±0.09#3			0.15+0.1/-0.05
	0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	N	R	0.25 +0.05/-0.10
				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	0.40±0.15
		1.60+0.15/-0.10	0.80+0.15/-0.10	0.50±0.10	H	R / W	
				0.80+0.15/-0.10	X	R / W	
		1.60±0.20#1	0.80±0.20#1	0.8±0.20#1			
	0805 (2012)	2.00±0.15	1.25±0.10	0.50±0.10	H	R / W	0.50±0.20
				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	0.60±0.20 (0.5±0.25)***
				0.95±0.10	C	R	
				1.25±0.10	D	R	
		3.20±0.20		1.15±0.15	J	R	
			1.60±0.20	1.60±0.20	G	R	
				0.85±0.10	T	R / W	
		3.20 +0.30/-0.10	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	0.75±0.25
				0.85±0.10	T	R	
				1.25±0.10	D	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	0.75±0.25 (0.5±0.25)***
				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	0.75±0.25 (0.5±0.25)***
				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) 2.00±0.20 (K) 2.50±0.30 (M) 2.80±0.30 (U)		R	0.75±0.35
	2211 (5728)	5.70±0.40	2.80±0.30			R	0.85±0.35
	2220 (5750)	5.70±0.40	5.00±0.40			R	0.85±0.35
	2225 (5763)	5.70±0.40	6.30±0.40			R	0.85±0.35

* R = Reflow soldering process; W = Wave soldering process.
** For 1808/1812/1825_200V~4000V and safety certificated products.
*** For 1206_≧1000V, 1808/1812_200V~4000V and safety certificated products.
#1: For 0603/Cap≧10μF or 0603(≦6.3V)/Cap≧4.7μF or 0603(>10V)/Cap>1μF products.
#2: For 0201/ 0.1uF < Cap < 0.68uF products, Excluding 0201X334~474(≦6.3V) & 0201X224(≦10V)
#3: For 0201/Cap≧0.68μF products.
#4: For 1210(100V)/Cap>1μF or 1210(250V)/Cap>0.47μF or 1210(400V~630V)/Cap>0.22μF.
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)
	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	Y5V
Size	0201, 0402, 0603, 0805, 1206, 1210, 1812, 1825, 2220, 2225					
Capacitance range	0.1pF to 0.1μF	100pF to 47μF	1μF to 100μF	0.1μF to 100μF	100pF to 220μF	0.01μF to 100μF
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%)	M (±20%), Z (-20/+80%)
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	-25 to +85°C
Capacitance characteristic	±30ppm	±15%	±22%		±15%	+30/-80%
Termination	Ni/Sn (lead-free termination)					

#1: NP0, 0.1pF product only provide B tolerance

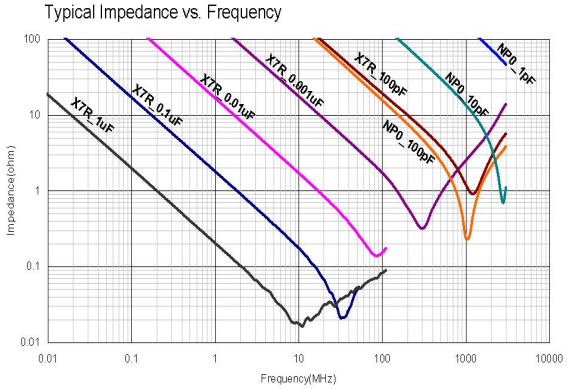
■ EXPLANATION OF PART NUMBERS

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

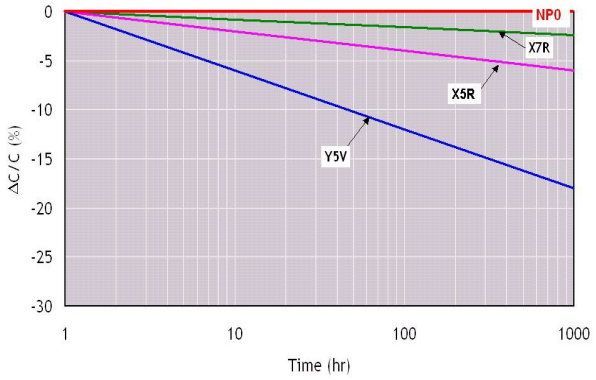
Please refer to page 2 "How to order" for more information.

■ ELECTRICAL CHARACTERISTICS

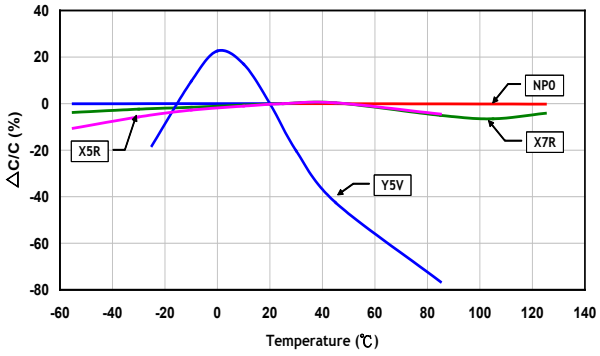
1) Frequency characteristics



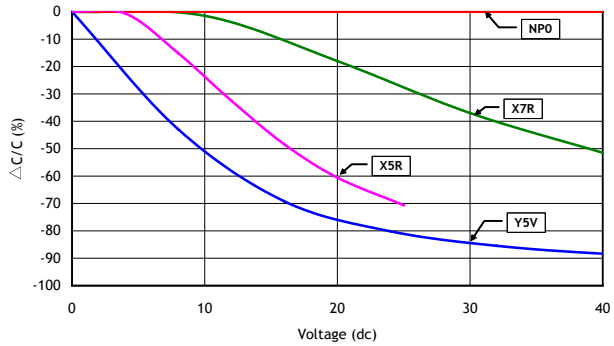
2) Capacitance Change - Typical aging rate



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
	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
	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
	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
	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
	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
	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
	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
	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
	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
	68pF (680)	L	L		N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	82pF (820)	L	L		N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	100pF (101)	L	L		N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	120pF (121)	L	L		N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	150pF (151)	L	L		N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	180pF (181)				N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	220pF (221)				N	N	S	S	A	A	A	B	B	B	C	C	C	D	D	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
	330pF (331)	L			N		S	S	A	A	A	B	B	B	C	C	C	D	D	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
	470pF (471)	L			N		S	S	B	B	B	B	B	B	C	C	C	D	D	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
	680pF (681)				N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	820pF (821)				N		S	S	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	1,000pF (102)				N		S	S	B	B	B	B	B	B	C	C	C	D	D	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
	1,500pF (152)						X	X	B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	1,800pF (182)						X		B	B	B	B	B	B	C	C	C	D	D	K	K	K	K	K	K
	2,200pF (222)						X		B	B	B	B	B	B	C	C	C	D	D	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
	3,300pF (332)						X		D	D	D	B	B	B	C	C	C	D	D	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
	4,700pF (472)						X		D	D	D	B	B	B	C	C	C	D	D	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
	6,800pF (682)						X		D	D	D	C	C	C	C	C	C	D	D	K	K	K	K	K	K
	8,200pF (822)						X		D	D		D	D	D	C	C	C	D	D	K	K	K	K	K	K
	0.010uF (103)						X		D	D		D	D	D	C	C	C	D	D	K	K	K	K	K	K
	0.012uF (123)								D	D		P	P	P	D	D	D	D	D	K	K	K	K	K	K
	0.015uF (153)								T	T		P	P	P	D	D	D	D	D	K	K	K	K	K	K
	0.018uF (183)								D	D		P	P	P	K	K	K	D	D	K	K	K	K	K	K
	0.022uF (223)								D	D		P	P	P	K	K	K	D	D	K	K	K	K	K	K
	0.027uF (273)											P	P		K	K	K	D	D	K	K	K	K	K	K
	0.033uF (333)											P	P	T	K	K	K	D	D	K	K	K	K	K	K
	0.039uF (393)											P	P		K	K	K	M	M	K	K	K	K	K	K
	0.047uF (473)											J	J		K	K	K	M	M	K	K	K	K	K	K
	0.056uF (563)											J	J					M	M	K	K	K	K	K	K
	0.068uF (683)											G	G					M	M	K	K	K	K	K	K
	0.082uF (823)											G	G					M	M	K	M	M	M	K	K
	0.10uF (104)											G	G					M	M	M	M	M	M	K	M
	0.12uF (124)																								
	0.27uF (274)																								

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

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	50	10 0	6.3 10 16	25	50	100	6.3 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	S	S	S	S	S	B	B	B	B																						
	120pF (121)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B																						
	150pF (151)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	180pF (181)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	220pF (221)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	270pF (271)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	330pF (331)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	390pF (391)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	470pF (471)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	560pF (561)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	680pF (681)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	820pF (821)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B																	
	1,000pF (102)	L	L	L	N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	1,200pF (122)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	1,500pF (152)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	1,800pF (182)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	2,200pF (222)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	2,700pF (272)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	3,300pF (332)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	3,900pF (392)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	4,700pF (472)	L	L		N	N	N	N	N	S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	5,600pF (562)	L	L		N	N	N	N		S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	6,800pF (682)	L			N	N	N	N		S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	8,200pF (822)	L			N	N	N	N		S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.010uF (103)	L	L		N	N	N	N		S	S	S	S	S	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.012uF (123)				N	N	N	N		S	S	S	S	X	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.015uF (153)				N	N	N	N		S	S	S	S	X	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.018uF (183)				N	N	N	N		S	S	S	S	X	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.022uF (223)	L			N	N	N	N		S	S	S	S	X	B	B	B	B	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.027uF (273)				N	N	N	N		S	S	S	S	X	B	B	B	D	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.033uF (333)				N	N	N	N		S	S	S	X	X	B	B	B	D	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.039uF (393)				N	N	N	N		S	S	S	X	X	B	B	B	D	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.047uF (473)				N	N	N	N		S	S	S	X	X	B	B	B	D	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.056uF (563)				N	N	N	E		S	S	S	X	X	B	B	B	D	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.068uF (683)				N	N	N	E		S	S	S	X	X	B	B	B	D	B	B	B	B	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.082uF (823)				N	N	N	E		S	S	S	X	X	B	B	B	D	B	B	B	D	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.10uF (104)				N	N	N	E		S	S	S	X	X	B	B	B	D	B	B	B	C	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.12uF (124)									S	S	X			B	B	B	I	B	B	B	D	C	C	C	C	C	D	D	D	K	K	K	K	K				
	0.15uF (154)									S	S	X			D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	K	K	K	K	K				
	0.18uF (184)									S	S	X			D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	K	K	K	K	K				
	0.22uF (224)				N	N	N			S	S	X	X		D	D	D	I	C	C	C	G	C	C	C	C	D	D	D	D	K	K	K	K	K				
	0.27uF (274)									X	X	X			D	D	I		C	C	D	G	C	C	C	C	G	D	D	D	K	K	K	K	K				
	0.33uF (334)									X	X	X	X		D	D	I		C	C	D	G	C	C	C	D	G	D	D	D	K	K	K	K	K				
	0.39uF (394)									X	X	X			D	D	I		C	J	P	G	C	C	C	D	M	D	D	D	K	K	K	K	K				
	0.47uF (474)				N	N				X	X	X	X		D	D	I	I	J	J	P	G	C	C	C	D	M	D	D	K	K	K	K	K	K				
	0.56uF (564)									X	X				D	D			J	J	P	P	D	D	D	D	M	D	D	K	K	K	K	K	K				
	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				
	0.82uF (824)									X	X				D	D			J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K				
	1.0uF (105)				N					X	X	X	X		D	D	I		J	J	P	P	D	D	D	D	K	D	K	K	K	K	K	K	K				
	1.5uF (155)														I	I			J	P				G	G	M	M			K	K	K	K	K	K				
	2.2uF (225)									X	X				I	I	I		J	P	P	P		G	G	M	M		M	M	K	K	K	K	K				
	3.3uF (335)																		P	P				G	G	M					K	K	K	K	K				
	4.7uF (475)									X					I	I			P	P	P		K	K	K	M	M				K	K	M	K					
	6.8uF (685)																															M	U	M					
	10uF (106)														I*				P	P			K	K	K	M						U	U	U					
	22uF (226)																		P*				M	M	M														
	47uF (476)																						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

Y5V Dielectric (0402, 0603, 0805 Size)

Dielectric		Y5V															
Size		0402					0603					0805					
Rated Voltage (VDC)		6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	100
Capacitance	0.010uF (103)		N	N	N	N		S	S	S	S		A	A	A	A	B
	0.015uF (153)		N	N	N	N		S	S	S	S		A	A	A	A	B
	0.022uF (223)		N	N	N	N		S	S	S	S		A	A	A	A	B
	0.033uF (333)		N	N	N	N		S	S	S	S		A	A	A	A	B
	0.047uF (473)		N	N	N			S	S	S	S		A	A	A	A	B
	0.068uF (683)		N	N	N			S	S	S	S		A	A	A	A	B
	0.10uF (104)		N	N	N			S	S	S	S		A	A	A	A	B
	0.15uF (154)		N					S	S	S	S		A	A	A	A	
	0.22uF (224)	N	N				S	S	S	S	S		A	A	A	A	
	0.33uF (334)	N	N					S	S	S			B	B	B	B	
	0.47uF (474)	N	N					S	S				B	B	B	B/D	
	0.68uF (684)							S	X				B	B	D	D	
	1.0uF (105)							S	X				B	B	D	D	
	1.5uF (155)							S					D	D			
	2.2uF (225)						S	S					D	D			
	3.3uF (335)												D	D			
	4.7uF (475)												D	D			
	6.8uF (685)												I				
	10uF (106)											I	I				
	22uF (226)																

Y5V Dielectric (1206, 1210, 1812 Size)

Dielectric		Y5V																			
Size		1206							1210							1812					
Rated Voltage (VDC)		6.3	10	16	25	35	50	100	6.3	10	16	25	35	50	100	10	16	25	50	100
Capacitance	0.010uF (103)		B	B	B		B	B							C					D
	0.015uF (153)		B	B	B		B	B							C					D
	0.022uF (223)		B	B	B		B	B							C					D
	0.033uF (333)		B	B	B		B	B							C					D
	0.047uF (473)		B	B	B		B	B							C					D
	0.068uF (683)		B	B	B		B	B							C					D
	0.10uF (104)		B	B	B		B	B		C	C	C		C	C	D	D	D	D	D
	0.15uF (154)		B	B	B		B	C		C	C	C		C	C	D	D	D	D	D
	0.22uF (224)		B	B	B		B	C		C	C	C		C	C	D	D	D	D	D
	0.33uF (334)		B	B	B		B			C	C	C		C	C	D	D	D	D	D
	0.47uF (474)		B	B	B		B			C	C	C		C		D	D	D	D	D
	0.68uF (684)		B	B	B		B			C	C	C		C		D	D	D	D	D
	1.0uF (105)		C	C	C		C			C	C	C		C		D	D	D	D	D
	1.5uF (155)		C	C	C					C	C	C				D	D	D	D	
	2.2uF (225)		C	C	C					C	C	C		G		D	D	D	D	
	3.3uF (335)		J	J	J					C	C	C				D	D	D	D	
	4.7uF (475)		J	J	J	J				C	C	D		G		D	D	D	D	
	6.8uF (685)		J	J						C	C	D				D	D	D	D	
	10uF (106)		J	J						D	D	G	K			D	D	D		
	22uF (226)		P							K	K									
	47uF (476)								K	K							M			
	100uF (107)								M											

X7S Dielectric

Dielectric		X7S																							
Size		0402				0603				0805					1206					1210				
Rated Voltage (VDC)		6.3	10	16	25	6.3	10	16	25	10	16	25	50	100	6.3	10	16	25	50	6.3	10	16	25	50
Capacitance	1.0μF (105)		E					X						I										
	1.5μF (155)																							
	2.2μF (225)	E	E					X	X															
	3.3μF (335)																							
	4.7μF (475)						X	X				I	I											
	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		6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	6.3	10	16	25	50	4	6.3	10	25	50
Capacitance	100pF (101)			L	L	L																									
	220pF (221)			L	L	L																									
	470pF (471)			L	L	L																									
	820pF (821)			L	L	L																									
	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								N																				
	0.033μF (333)	L	L						N		N																				
	0.047μF (473)	L	L						N		N																				
	0.068μF (683)	L	L				N	N	N		E																				
	0.082μF (823)	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*			N	N	N	N	N	X	X	X	X	X															
	0.33μF (334)	L					N	N	N			X	X	X	X																
	0.47μF (474)	L					N	N	N	N	E	X	X	X	X	X															
	0.68μF (684)						N	N				X	X	X	X																
	0.82μF (824)											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						
	4.7μF (475)						E*	E*	E*			X	X	X	X		I	I	I	I	I	P	P	P	P	P			K	K	
	6.8uF (685)																					P	P								
	10μF (106)						E*	E*				X	X	X*	X*		I	I	I	I	I	P	P	P	P	P		K	K	K	M
	22μF (226)						E*					X*	X*				I	I*	I*	I*		P	P	P	P			M	M	M	
	47μF (476)											X*					I*	I*				P	P	P*				M	M	M*	
	100μF (107)																I*					P						M*	M*		
	220μF (227)																										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.

X6S Dielectric

Dielectric		X6S																													
Size		0201				0402				0603					0805						1206					1210				
Rated Voltage (VDC)		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	0.10μF (104)	L	L	L	L																									
	0.15μF (154)																													
	0.22μF (224)	L	L*																											
	0.33μF (334)																													
	0.47μF (474)					E																								
	0.68μF (684)																													
	1.0μF (105)	L*				N	N	N	E																					
	1.5μF (155)																													
	2.2μF (225)					E	E	E			X	X	X	X																
	3.3μF (335)																													
	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 100pF	100pF & 1000pF	1000pF to 0.1μF
Capacitance tolerance**	Cap≤10pF: C (±0.25pF) Cap>10pF: J (±5%)	K (±10%), M (±20%)	
Rated voltage (WVDC)	16V, 25V, 50V	10V	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)		

■ EXPLANATION OF PART NUMBERS

01R5	N	100	J	160	C	T
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

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

SIZE		01R5
DIELECTRIC		X7R
RATED VOLTAGE (VDC)		10
Capacitance	100pF (101)	V
	120pF (121)	
	150pF (151)	V
	180pF (181)	
	220pF (221)	V
	270pF (271)	
	330pF (331)	V
	390pF (391)	
	470pF (471)	V
	560pF (561)	
	680pF (681)	
	820pF (821)	
	1,000pF (102)	V

SIZE		01R5	
DIELECTRIC		X5R	
RATED VOLTAGE (VDC)		6.3	10
Capacitance	1,000pF (102)	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
	0.015μF (153)		
	0.022μF (223)	V	
	0.033μF (333)	V	
	0.047μF (473)		
	0.068μF (683)		
	0.10μF (104)	V	

■ FEATURES

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

■ GENERAL ELECTRICAL DATA

Dielectric	NP0	X7R	Y5V
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225		0805, 1206, 1210, 1812
Capacitance	0.5pF to 0.1μF	100pF to 2.2μF	0.01μF to 0.68μF
Capacitance tolerance	Cap≤5pF: C (±0.25pF) 5pF<Cap<10pF: D (±0.5pF) Cap≥10pF: J (±5%), K (±10%)	K (±10%), M (±20%)	Z (-20/+80%)
Rated voltage (WVDC)	200V to 4000V		200V, 250V
DF/ Q	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	≤2.5%	≤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		-25 to +85°C
Capacitance characteristic	±30ppm	±15%	+30/-80%
Termination	Ni/Sn (lead-free termination)		

■ EXPLANATION OF PART NUMBERS

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

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

■ CAPACITANCE RANGE

Y5V Dielectric 200V to 250V

DIELECTRIC		Y5V							
SIZE		0805		1206		1210		1812	
RATED VOLTAGE (VDC)		200	250	200	250	200	250	200	250
Capacitance	0.010μF (103)	B	B	B	B	C	C	D	D
	0.015μF (153)	B	B	B	B	C	C	D	D
	0.022μF (223)	B	B	B	B	C	C	D	D
	0.033μF (333)	B	B	B	B	C	C	D	D
	0.047μF (473)	B	B	B	B	C	C	D	D
	0.068μF (683)	B	B	B	B	C	C	D	D
	0.10μF (104)			B	B	C	C	D	D
	0.15μF (154)			C	C	C	C	D	D
	0.22μF (224)							D	D
	0.33μF (334)							D	D
	0.47μF (474)							D	D
	0.68μF (684)							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.

NP0 Dielectric 200V to 4000V

DIELECTRIC	NP0																																												
SIZE	0402		0603	0805				1206					1210				1808					1812						1825						2220						2225					
RATED VOLTAGE (VDC)	200	250	200, 250	200	250	500, 630	1000	200	250	500, 630	1000	1500, 2000	200, 250	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	2000	3000	4000	200, 250	500, 630	1000	2000	3000	4000	200, 250	500, 630	1000	2000	3000	4000
Capacitance																																													
0.5pF (0R5)	N	N	S	A	A	A	D																																						
1.0pF (1R0)	N	N	S	A	A	A	D																																						
1.2pF (1R2)	N	N	S	A	A	A	D																																						
1.5pF (1R5)	N	N	S	A	A	A	D	B	B	B	B	B																																	
1.8pF (1R8)	N	N	S	A	A	A	D	B	B	B	B	B																																	
2.2pF (2R2)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
2.7pF (2R7)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
3.3pF (3R3)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
3.9pF (3R9)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
4.7pF (4R7)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
5.6pF (5R6)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
6.8pF (6R8)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
8.2pF (8R2)	N	N	S	A	A	A	D	B	B	B	B	B					D	D	D	D	D																								
10pF (100)	N	N	S	A	A	A	D	B	B	B	B	B	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
12pF (120)	N	N	S	A	A	A	D	B	B	B	B	B	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
15pF (150)	N	N	S	A	A	A	D	B	B	B	B	B	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
18pF (180)	N	N	S	A	A	A	D	B	B	B	B	B	C	C	C	C	D	D	D	D	D	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
22pF (220)	N	N	S	A	A	A	D	B	B	B	B	B	C	C	C	C	D	D	D	D	G	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
27pF (270)	N	N	S	A	A	A	D	B	B	B	B	B	C	C	C	C	D	D	D	D	G	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
33pF (330)	N	N	S	A	A	A	D	B	B	B	B	C	C	C	C	C	D	D	D	D	K	D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
39pF (390)	N	N	S	A	A	A	D	B	B	B	B	C	C	C	C	C	D	D	D	D		D	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
47pF (470)	N	N	S	A	A	A	D	B	B	B	C	C	C	C	C	C	D	D	D	D		D	D	D	D	D	G	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
56pF (560)	N	N	S	A	A	A	D	B	B	B	C	D	C	C	C	D	D	D	D	D		D	D	D	D	D	G	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
68pF (680)	N		S	A	A	A	D	B	B	B	C	D	C	C	C	D	D	D	D	D		D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
82pF (820)	N		S	A	A	B	D	B	B	B	D	D	C	C	C	D	D	D	D	D		D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
100pF (101)	N		S	A	B	B	D	B	B	B	D	D	C	C	D	D	D	D	D	K		D	D	D	D	D		K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
120pF (121)			S	A	B	D	D	B	B	B	D	G	C	C	D	D	D	D	D	K		D	D	D	D	D		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
150pF (151)			S	B	D	D	D	B	B	B	D	G	C	C	D	G	D	D	K	K		D	D	D	D	D		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
180pF (181)			S	B	D	D	D	B	B	B	G	G	C	C	D	G	D	D	K	K		D	D	D	D	K		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
220pF (221)			S	D	D	D	D	B	B	B	G	G	C	C	G	G	D	D	K	K		D	D	D	D	K		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
270pF (271)			X	D	D	D	D	B	C	C	G	P	C	C	G	K	K	K	K	K		D	D	D	K	K		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
330pF (331)			X	D	D	D	D	B	C	C	G	P	C	C	G	K	K	K	K	K		D	D	D	K	K		K	K	K	K	K		K	K	K	K	M		K	K	K	K	K	
390pF (391)			X	D	D	D	D	B	C	C	G	P	C	C	G	M	K	K	K	K		D	D	D	K	K		K	K	K	K	K		K	K	K	K	M		K	K	K	K	K	
470pF (471)			X	D	D	I		C	C	C	G		C	C	G	M	K	K	K			D	D	K	K	K		K	K	K	K	K		K	K	K	K	M		K	K	K	K	K	
560pF (561)			X	D	D	I		C	D	D	G		C	C	G		K	K	K			D	D	K	K			K	K	K	K	K		K	K	K	K	M		K	K	K	K	K	
680pF (681)				D	D	I		C	D	D	G		C	C	G		K	K	K			D	D	K	K			K	K	K	K	M		K	K	K	K	M		K	K	K	K	K	
820pF (821)				D	D	I		C	G	G	G		C	C	G		K	K	D			D	D	K	K			K	K	K	K	M		K	K	K	K	M		K	K	K	M	M	
1,000pF (102)				D	D	I		C	G	G	G		D	D	G		K	K	G			D	D	K	K			K	K	K	K	M		K	K	K	K	M		K	K	K	M	M	
1,200pF (122)				D	D			C	G	G			D	D	G		K	G	G			D	D	K				K	K	K	K			K	K	M	M	M		K	K	K	M		
1,500pF (152)				D	D			D	G	G			D	D	K		K	G	K			D	D	K				K	K	K	M			K	K	M	M	M		K	K	K	M		
1,800pF (182)				D	D			D	G	G			D	D	M		K	K				D	D	K				K	K	K	M			K	K	M	M			K	K	K	M		
2,200pF (222)				D	D			D	G	G			D	D	M		K	K				D	D	K				K	K	K	M			K	K	M	M			K	K	K	M		
2,700pF (272)								D	G	G			D	D	M		K					D	D	K				K	K	K	M			K	K	M	M			K	K	K	M		
3,300pF (332)								D	G	G			D	D	M		K					D	D	K				K	K	K	M			K	K	M	M			K	K	K	M		
3,900pF (392)								D	G	G			D	D	M							D	D	M				K	K	M	M			K	K	M	M			K	K	K	M		
4,700pF (472)								D	G	G			G	G								D	D					K	K	M	M			K	K	M	M			K	K	K	M		
5,600pF (562)													G	G								D	D					K	K	M				K	K	M				K	K	M	M		
6,800pF (682)													G	G								D	D					K	K	M				K	K	M				K	K	M	M		
8,200pF (822)													G	G									D					K	K	M				K	K	M				K	K	M	M		
0.010µF (103)													G	K									D					K	K	M				K	K	M				K	K	M	M		
0.012µF (123)													M*	M									G					K	K					K	K					K	K				
0.015µF (153)													M	M									G					K	K					K	K					K	K				
0.018µF (183)													M										K					K	K					K	K					K	K				
0.022µF (223)													M										K					K	K					K	K					K	K				
0.027µF (273)																												K	K					K						K	K				
0.033µF (333)																												K	K					K						K	K				
0.039µF (393)																												K	M					K						K	K				
0.047µF (473)																												K						M						K	K				
0.056µF (563)																												M						M						M	M				
0.068µF (683)																												M						M						M	M				
0.082µF (823)																																								M					
0.1µF (104)																																								M					
0.12µF (124)																																													

* 1210 size/0.012uF/200V can provide “K” thickness.

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

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	2500, 3000	4000	200, 250	450	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		D	D	D																														
120pF (121)	X	B	B	B	D		D	D	D	D	D	D		D	D	D																														
150pF (151)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	D	K																									
180pF (181)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	D	K																									
220pF (221)	X	B	B	B	D		D	B	D	B	D	D		D	D	D	D	D	D	D	K																									
270pF (271)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	D	K	D	D	D	D	D	K	K						K						K						K
330pF (331)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	G	K	D	D	D	D	D	K	K						K						K						K
390pF (391)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	G	K	D	D	D	D	D	K	K						K						K						K
470pF (471)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	G	K	D	D	D	D	D	K	K						K						K						K
560pF (561)	X	B	B	B	D		D	D	D	D	D	D		D	D	D	D	D	D	G	K	D	D	D	D	D	K	K						K						K						K
680pF (681)	X	B	B	B	B		B	D	D	D	D	C		D	D	D	D	D	D	K	K	D	D	D	D	D	K	K						K						K						K
820pF (821)	X	B	B	B	D		D	D	D	D	D	C		D	D	D	D	D	D	K	K	D	D	D	D	D	K	K						K						K						K
1,000pF (102)	X	B	B	B	B		D	D	D	B	D	C		D	D	D	D	D	K	K	K	D	D	D	D	D	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
1,200pF (122)	X	B	B	B	D		D	D	G	G	G	C		D	D	M	D	D	K	K		D	D	D	D	D	K	M	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	M
1,500pF (152)	X	B	B	D	D		B	D	G	G	G	C		D	D	M	D	D	K	K		D	D	D	D	D	K	M	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	M
1,800pF (182)	X	B	B	D	D		D	D	G	G	G	C		D	D	M	D	D	K	K		D	D	D	D	D	D	M	K	K	K	K	K	M	K	K	K	K	K	M	K	K	K	K	K	M
2,200pF (222)	X	B	B	D	B		D	D	G	C	G	C		D	D	M	D	D	K	K		D	D	D	D	D	D		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
2,700pF (272)	X	B	B	D	D		D	D	G	G		C		D	D	M	D	D	K	K		D	D	D	D	D	D		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
3,300pF (332)	X	B	B	D	D		D	D	G	G		C		D	D	M	D	D	K	K		D	D	D	D	K	M		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
3,900pF (392)	X	B	B	D	D		D	D	G			C		D	G	M	D	D	K			D	D	D	D	K	M		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
4,700pF (472)	X	B	D	D	D		D	D	G			C		D	G	M	D	D	K			D	D	D	D	K	M		K	K	K	K	K		K	K	K	K	K		K	K	K	K	K	
5,600pF (562)	X	D	D	D	D		D	D	G			C		D	G	M	K	K	K			D	D	D	D	M	M		K	K	K	K	M		K	K	K	K	K		K	K	K	K	M	
6,800pF (682)	X	D	D	D	D		D	D	G			C		D	G	M	K	K	K			D	D	D	D	M	M		K	K	K	K	M		K	K	K	K	M		K	K	K	K	M	
8,200pF (822)	X	D	D	D	D		D	D	G			C		D	G	M	K	K	K			D	D	D	D	M			K	K	K	K	M		K	K	K	M	M		K	K	K	K	M	
0.010μF (103)	X	D	D	D	B		C	D	G			C		D	G	M*	K	K	K			D	D	D	D	M			K	K	K	K	M		K	K	K	M	M		K	K	K	K	M	
0.012μF (123)		D	D		D		D	G				C		D	G		K	K				D	D	D	K	M			K	K	K	M	U		K	K	K	M	U		K	K	K	M	M	
0.015μF (153)		D	D		D		D	G				C		D	G		K	K				D	D	D	K	M			K	K	K	M	U		K	K	K	M	U		K	K	K	M	M	
0.018μF (183)		D	D		D		D					C		D	G		K	K				D	D	D	M	M			K	K	K	M	U		K	K	K	U	U		K	K	K	M	U	
0.022μF (223)		D	D		D		G					C		D	G		K	K				D	D	D	M	M			K	K	K	M			K	K	K	U			K	K	K	M		
0.027μF (273)		D	D		D		G					C		G	G		K	K				D	D	D	M				K	K	K	U			K	K	K	U			K	K	K	M		
0.033μF (333)		D	D*		G		G					C		G	G		K	K				D	D	D	M				K	K	K	U			K	K	K	U			K	K	K	M		
0.039μF (393)		D			G		G					C		G	K		K	K				D	D	D	M				K	K	K	U			K	K	K	U			K	K	K	U		
0.047μF (473)		D			G		G					D		G	M		K	K				D	D	D	M				K	K	K	U			K	K	K	U			K	K	K	U		
0.056μF (563)		D			G		G					D		G			K	K				D	K	K	M				K	K	K				K	K	K	U			K	K	K	U		
0.068μF (683)		D			G	G						G		K			K					D	K	K	M				K	K	K				K	K	M				K	K	K			
0.082μF (823)		D*			G	G						G		K			K					D	K	K	M				K	K	M				K	K	M				K	K	K			
0.10μF (104)		D*			G	G						G		K								D	K	K	M				K	K	M				K	K	M				K	K	M			
0.12μF (124)					G							G	M									D	M	M					K	K					K	K	M				K	K	U			
0.15μF (154)					G							M	M									K	M	M					K	K					K	K	U				K	K	U			
0.18μF (184)					G							M	M									K	M	M					K	K					K	K	U				K	K	U			
0.22μF (224)					G							M	M									K	M	M					K	K					K	K	U				K	K	U			
0.27μF (274)												M	M									K	M	M*					K	K					K	K					K	K				
0.33μF (334)												M	M									K	M	M*					K	K					K	K					K	K				
0.39μF (394)												M										K	M	M*					K	K					K	K					K	K				
0.47μF (474)												M										K	M	M*					K	K					K	K					K	K				
0.56μF (564)												M										M	M						K	M					K	M					K	K				
0.68μF (684)												M										M	M						K						K	M					K					
0.82μF (824)																						M	U						K						K	U					K					
1.0μF (105)																						M	U						K						K	U					K					
1.5μF (155)																																			M						M					
2.2μF (225)																																			M						M					

*. 0805/Cap.0.082uF~0.1uF/200V only; 0805/Cap.0.033uF/500V only; 1210/Cap.0.01uF/1500V 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	X7R
Size	1206, 1210, 1808, 1812,1825, 2220, 2225
Capacitance	100pF to 0.018μF
Capacitance tolerance	K (±10%), M (±20%)
Rated voltage (WVDC)	2000V to 4000V
DF(Tan δ)	DF≤2.5%
Dielectric strength	1000~3000V: ≥1.2 x WVDC, 4000: ≥1.1 x WVDC
Operating temperature	-55 to +125°C
Capacitance characteristic	±15%
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

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

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

■ CAPACITANCE RANGE

DIELECTRIC		X7R										
SIZE		1206	1210	1808	1812		1825		2220		2225	
RATED VOLTAGE (VDC)		2500	2000	4000	3000	4000	3000	4000	3000	4000	3000	4000
Capacitance	100pF (101)											
	120pF (121)											
	150pF (151)			K								
	180pF (181)			K								
	220pF (221)			K								
	270pF (271)			K		K		K		K		K
	330pF (331)			K		K		K		K		K
	390pF (391)			K		K		K		K		K
	470pF (471)			K		K		K		K		K
	560pF (561)			K		K		K		K		K
	680pF (681)	D		K		K		K		K		K
	820pF (821)	D		K		K		K		K		K
	1,000pF (102)	D		K		K		K		K		K
	1,200pF (122)					M		M		M		M
	1,500pF (152)					M		M		M		M
	1,800pF (182)					M		M		M		M
	2,200pF (222)				M		K		K		K	
	2,700pF (272)				M		K		K		K	
	3,300pF (332)				M		K		K		K	
	3,900pF (392)						K		K		K	
	4,700pF (472)						K		K		K	
	5,600pF (562)		M				M		K		M	
	6,800pF (682)		M				M		M		M	
	8,200pF (822)		M				M		M		M	
	0.010μF (103)						M		M		M	
	0.012μF (123)						U		U		M	
	0.015μF (153)						U		U		M	
	0.018μF (183)						U		U		U	
	0.022μF (223)											
	0.033μF (333)											
	0.047μF (473)											
	0.056μF (563)											
	0.068μF (683)											
	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, 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	RF02 (01005): 0.2pF≤Cap≤1pF:< 700mΩ/pF; 1pF<Cap≤2pF:< 600mΩ; 2pF<Cap≤5pF:< 500mΩ; 5pF<Cap≤10pF:< 300mΩ; 10pF<Cap≤22pF:< 350mΩ RF03 (0201): 0.1pF≤Cap≤1pF:< 350mΩ/pF; 1pF<Cap≤5pF:< 300mΩ; 5pF<Cap≤22pF:< 250mΩ RF15 (0402): 0.1pF≤Cap≤1pF:< 350mΩ/pF; 1pF<Cap≤5pF:< 300mΩ; 5pF<Cap≤100pF:< 250mΩ RF11 (0505): 0.4pF≤Cap<1.0pF: < 1500mΩ; 1.0pF≤Cap<10pF: < 250mΩ; 10pF≤Cap≤100pF: < 200mΩ RF18 (0603): 0.1pF≤Cap≤1pF:< 1500mΩ; 1pF<Cap≤10pF:< 250mΩ; 10pF<Cap≤220pF:< 200mΩ RF21 (0805): 0.3pF≤Cap≤1pF: < 1500mΩ; 1pF<Cap≤10pF: < 250mΩ; 10pF<Cap≤220pF:< 200mΩ RF22 (1111): 0.6pF≤Cap<1pF: < 350mΩ; 1pF≤Cap<10pF: < 250mΩ; 10pF≤Cap≤100pF: < 200mΩ
Insulation resistance at Ur	≥10GΩ or RxC≥100Ω-F whichever is smaller.
Operating temperature	-55 to +125°C
Capacitance change	±30ppm/°C
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

RF	15	N	100	G	500	C	T
Series	**Size (Inch (mm))**	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
RF=Microwave	15=0402 (1005)	N=NP0	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

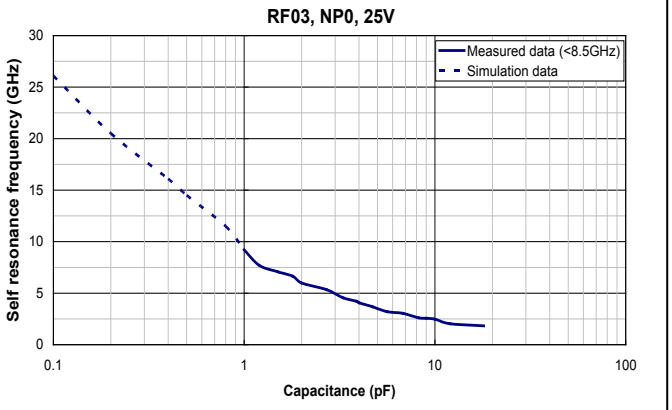


Fig. 3 Self resonance frequency vs. Capacitance (0201 size)

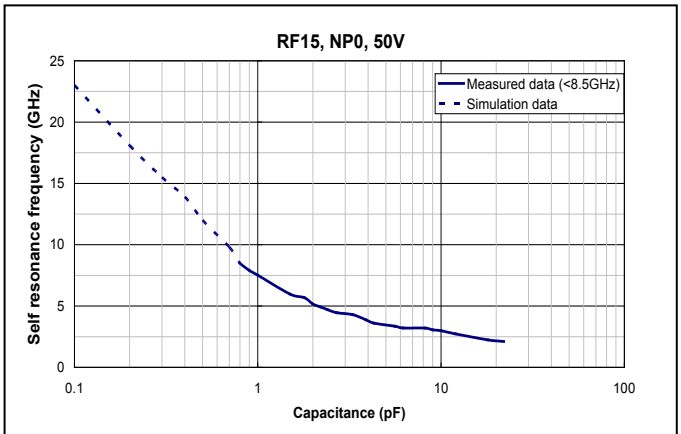


Fig. 4 Self resonance frequency vs. Capacitance (0402 size)

■ CAPACITANCE RANGE

DIELECTRIC		NP0																			X8G	
SIZE		01005		0201			0402				0603			0805				0505	1111		0805	
RATED VOLTAGE (VDC)		16	25	6.3 10 25	50	100	25	50	100	200	25 50	100	250	50	100	250	500	50 100 250	50 100 200 250 500	1500	250	500
Capacitance	0.1pF (0R1)			L	L	L	N	N	N	N	H	H	H									
	0.2pF (0R2)	V	V	L	L	L	N	N	N	N	H	H	H	A	A	A	A				A	A
	0.3pF (0R3)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T				T	T
	0.4pF (0R4)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J			T	T
	0.5pF (0R5)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J			T	T
	0.6pF (0R6)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	0.7pF (0R7)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	0.8pF (0R8)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	0.9pF (0R9)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	1.0pF (1R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	1.2pF (1R2)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	1.5pF (1R5)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	1.8pF (1R8)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	2.0pF (2R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	2.2pF (2R2)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	2.7pF (2R7)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	3.0pF (3R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	3.3pF (3R3)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	3.9pF (3R9)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	4.0pF (4R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	4.7pF (4R7)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	5.0pF (5R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	5.6pF (5R6)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	6.0pF (6R0)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	6.8pF (6R8)	V		L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	7.0pF (7R0)	V		L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	8.0pF (8R0)	V		L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	8.2pF (8R2)	V		L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	9.0pF (9R0)	V		L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	10pF (100)	V	V	L	L	L	N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	11pF (110)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	12pF (120)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	13pF (130)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	15pF (150)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	16pF (160)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	18pF (180)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	20pF (200)	V	V	L	L		N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	22pF (220)	V	V	L			N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	T
	24pF (240)			L			N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	
	27pF (270)			L			N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	
	30pF (300)			L			N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	
	33pF (330)			L			N	N	N	N	S	S	S	T	T	T	T	J	G	G	T	
	36pF (360)						N	N	N		S	S	S	T	T	T	T	J	G		T	
	39pF (390)						N	N	N		S	S	S	T	T	T	T	J	G		T	
	43pF (430)						N	N	N		S	S	S	T	T	T	T	J	G		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 ±0.02pF.
* Quality improvement of telephone calls for low power loss and better performance.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0
Size	0201, 0402
Capacitance	0.05pF to 3pF
Capacitance tolerance	P (±0.02pF), Q (±0.03pF), A (±0.05pF), B (±0.1pF)
Rated voltage (WVDC)	25V, 50V
Q	Q≥400+20C
Insulation resistance at Ur	≥10GΩ or RxC≥100Ω-F whichever is smaller.
Operating temperature	-55 to +125°C
Capacitance change	±30ppm/°C
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

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

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

■ GENERAL ELECTRICAL DATA

DIELECTRIC		NP0				
SIZE		0201		0402		Tolerance
RATED VOLTAGE (VDC)		25	50	25	50	
Capacitance	0.05pF (R05)	L	L	N	N	P, Q, A
	0.1pF (0R1)	L	L	N	N	P, Q, A
	0.2pF (0R2)	L	L	N	N	P, Q, A
	0.3pF (0R3)	L	L	N	N	P, Q, A
	0.4pF (0R4)	L	L	N	N	P, Q, A
	0.5pF (0R5)	L	L	N	N	P, Q, A
	0.6pF (0R6)	L	L	N	N	P, Q, A
	0.7pF (0R7)	L	L	N	N	P, Q, A
	0.8pF (0R8)	L	L	N	N	P, Q, A
	0.9pF (0R9)	L	L	N	N	P, Q, A
	1.0pF (1R0)	L	L	N	N	P, Q, A
	1.1pF (1R1)			N	N	A, B
	1.2pF (1R2)			N	N	A, B
	1.3pF (1R3)			N	N	A, B
	1.5pF (1R5)			N	N	A, B
	1.6pF (1R6)			N	N	A, B
	1.8pF (1R8)			N	N	A, B
	2.0pF (2R0)			N	N	A, B
	2.2pF (2R2)			N	N	A, B
	2.4pF (2R4)			N	N	A, B
	2.7pF (2R7)			N	N	A, B
	3.0pF (3R0)			N	N	A, B

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.
* High reliability: Qualified to AEC-Q200.
* Ultra low capacitance to 0.1pF; can offer high precision tolerance to ±0.05pF.

■ GENERAL ELECTRICAL DATA

Dielectric	NP0
Size	0402
Capacitance	0.1pF to 56pF
Capacitance tolerance	Please refer to the Capacitance range table.
Rated voltage (WVDC)	25V, 50V
Q	Cap<30pF:Q≥400+20C; Cap≥30pF:Q≥1000
Insulation resistance at Ur	≥10GΩ or RxC≥100Ω-F whichever is smaller.
Operating temperature	-55 to +125°C
Capacitance change	±30ppm/°C
Termination	Ni/Sn (lead-free termination)

■ EXPLANATION OF PART NUMBERS

RT	15	N	100	J	500	C	T
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=±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		0402		
RATED VOLTAGE (VDC)		25	50	
Capacitance	0.1pF (0R1)	N	N	B
	0.2pF (0R2)	N	N	A, B
	0.3pF (0R3)	N	N	A, B
	0.4pF (0R4)	N	N	A, B
	0.5pF (0R5)	N	N	A, B, C
	0.6pF (0R6)	N	N	A, B, C
	0.7pF (0R7)	N	N	A, B, C
	0.75pF (R75)	N	N	A, B, C
	0.8pF (0R8)	N	N	A, B, C
	0.9pF (0R9)	N	N	A, B, C
	1.0pF (1R0)	N	N	A, B, C
	1.1pF (1R1)	N	N	A, B, C
	1.2pF (1R2)	N	N	A, B, C
	1.3pF (1R3)	N	N	A, B, C
	1.5pF (1R5)	N	N	A, B, C
	1.6pF (1R6)	N	N	A, B, C
	1.8pF (1R8)	N	N	A, B, C
	2.0pF (2R0)	N	N	A, B, C
	2.2pF (2R2)	N	N	A, B, C
	2.4pF (2R4)	N	N	A, B, C
	2.7pF (2R7)	N	N	A, B, C
	3.0pF (3R0)	N	N	A, B, C
	3.3pF (3R3)	N	N	A, B, C
	3.6pF (3R6)	N	N	A, B, C
	3.9pF (3R9)	N	N	A, B, C
	4.0pF (4R0)	N	N	A, B, C
	4.3pF (4R3)	N	N	A, B, C
	4.7pF (4R7)	N	N	A, B, C
	5.0pF (5R0)	N	N	A, B, C
	5.1pF (5R1)	N	N	B, C, D
	5.6pF (5R6)	N	N	B, C, D

DIELECTRIC		NP0		Tolerance
SIZE		0402		
RATED VOLTAGE (VDC)		25	50	
Capacitance	6.0pF (6R0)	N	N	B, C, D
	6.2pF (6R2)	N	N	B, C, D
	6.7pF (6R7)	N	N	B, C, D
	6.8pF (6R8)	N	N	B, C, D
	7.0pF (7R0)	N	N	B, C, D
	7.5pF (7R5)	N	N	B, C, D
	8.0pF (8R0)	N	N	B, C, D
	8.2pF (8R2)	N	N	B, C, D
	9.0pF (9R0)	N	N	B, C, D
	9.1pF (9R1)	N	N	B, C, D
	10pF (100)	N	N	F, G, J
	11pF (110)	N	N	F, G, J
	12pF (120)	N	N	F, G, J
	13pF (130)	N	N	F, G, J
	15pF (150)	N	N	F, G, J
	16pF (160)	N	N	F, G, J
	18pF (180)	N	N	F, G, J
	20pF (200)	N	N	F, G, J
	22pF (220)	N	N	F, G, J
	24pF (240)	N	N	F, G, J
	27pF (270)	N	N	F, G, J
	30pF (300)	N	N	F, G, J
	33pF (330)	N	N	F, G, J
	36pF (360)	N	N	F, G, J
	39pF (390)	N	N	F, G, J
	43pF (430)	N	N	F, G, J
	47pF (470)	N	N	F, G, J
	51pF (510)	N		F, G, J
	56pF (560)	N		F, G, J

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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	0.3pF 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	T
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

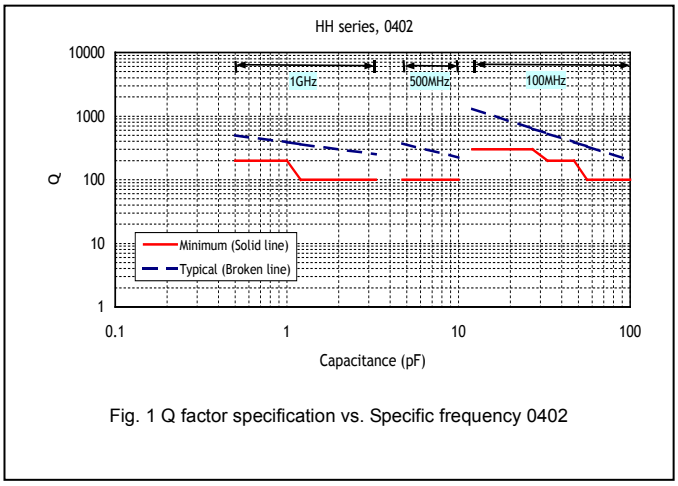

Fig. 1 Q factor specification vs. Specific frequency 0402

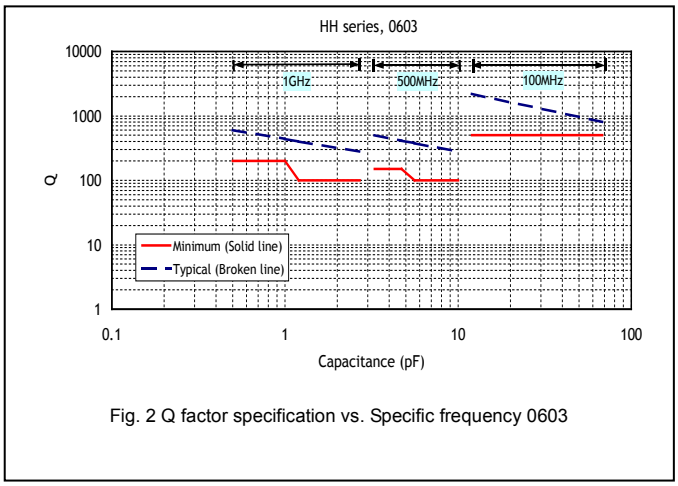

Fig. 2 Q factor specification vs. Specific frequency 0603

■ 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	NP0	X7R
Size	0201, 0402, 0603, 0805, 1206, 1210	
Capacitance range	0.1pF to 0.047uF	100pF to 2.2μF
Capacitance tolerance	Cap≤5pF:B,C; 5pF<Cap<10pF:C,D; Cap≥10pF:F, G, J	J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V, 250V, 500V, 630V, 1000V	
Operating temperature	-55 to +125°C	
Capacitance characteristic	±30ppm/°C	±15%
Termination	Ni/Sn (lead-free termination)	

■ EXPLANATION OF PART NUMBERS

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

■ CAPACITANCE RANGE: 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
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					
	1.5pF (1R5)	L	L	N	N	S	S	S	A	A	A	A	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				
	2.2pF (2R2)	L	L	N	N	S	S	S	A	A	A	A	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				
	3.3pF (3R3)	L	L	N	N	S	S	S	A	A	A	A	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				
	4.7pF (4R7)	L	L	N	N	S	S	S	A	A	A	A	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				
	6.8pF (6R8)	L	L	N	N	S	S	S	A	A	A	A	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				
	10pF (100)	L	L	N	N	S	S	S	A	A	A	A	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	C	C	C	C
	15pF (150)	L	L	N	N	S	S	S	A	A	A	A	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	C	C	C	C
	22pF (220)	L	L	N	N	S	S	S	A	A	A	A	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	D	C	C	C	C
	33pF (330)	L	L	N	N	S	S	S	A	A	A	A	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	D	C	C	C	C
	47pF (470)	L	L	N	N	S	S	S	A	A	A	A	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	D	C	C	C	C
	68pF (680)	L		N	N	S	S	S	A	A	A	A	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	D	C	C	C	C
	100pF (101)	L		N	N	S	S	S	A	A	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	D	C	C	C	D
	150pF (151)			N	N	S	S	S	A	A	D	D	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	G	C	C	C	D
	220pF (221)			N	N	S	S	S	A	A	D	D	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		B	B	D	I	B	B	C	D	D	G	C	C	C	G
	680pF (681)			N		S	S		B	B	D	I	B	B	C	D	D	G	C	C	C	G
	820pF (821)			N		S	S		B	B	D	I	B	B	C	G	G	G	C	C	C	G
	1,000pF (102)			N		S	S		B	B	D	I	B	B	C	G	G	G	C	D	D	G
	1,200pF (122)					X			B	B	D		B	B	C	G	G		C	D	D	
	1,500pF (152)					X			B	B	D		B	B	D	G	G		C	D	D	
	1,800pF (182)					X			B	B	D		B	B	D	G	G		C	D	D	
	2,200pF (222)					X			B	B	D		B	B	D	G	G		C	D	D	
	2,700pF (272)					X			D	D			B	B	D	G	G		C	D	D	
	3,300pF (332)					X			D	D			B	B	D	G	G		C	D	D	
	3,900pF (392)								D	D			B	B	D	G	G		C	D	D	
	4,700pF (472)								D	D			B	B	D	G	G		C	G		
	5,600pF (562)								D	D			B	B					C	G		
	6,800pF (682)								D	D			C	C					C	G		
	8,200pF (822)								D				D	D					C	G		
	0.010uF (103)								D				D	D					C	G		
	0.012uF (123)																		D			
	0.015uF (153)																		D			
	0.018uF (183)																		K			
	0.022uF (223)																		K			
	0.027uF (273)																		K			
	0.033uF (333)																		K			
	0.039uF (393)																		K			
	0.047uF (473)																		K			

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

■ CAPACITANCE RANGE: X7R Dielectric

Dielectric		X7R																								
Size		0201			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	100	200 250	500 630	10 16	25	50	100	200 250	500 630	10 16 25 50	100	200 250	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	D	D
	1,200pF (122)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	D
	1,500pF (152)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	D
	1,800pF (182)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	D
	2,200pF (222)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	D
	2,700pF (272)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	D
	3,300pF (332)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	D
	3,900pF (392)	L	L		N	N	N	S	S	S	B	B	B	B	B	B	B	B	B	D	D	C	C	C	D	G
	4,700pF (472)	L	L		N	N	N	S	S	S	B	B	B	B	D	B	B	B	B	D	D	C	C	C	D	G
	5,600pF (562)	L	L		N	N	N	S	S	S	B	B	B	B	D	B	B	B	B	D	D	C	C	C	D	G
	6,800pF (682)	L			N	N	N	S	S	S	B	B	B	B	D	B	B	B	B	D	D	C	C	C	D	G
	8,200pF (822)	L			N	N	N	S	S	S	B	B	B	B	D	B	B	B	B	D	D	C	C	C	D	G
	0.010uF (103)	L			N	N	N	S	S	S	B	B	B	D	D	B	B	B	B	D	D	C	C	C	D	G
	0.012uF (123)				N	N		S	S	X	B	B	B	D		B	B	B	B	D		C	C	C	D	
	0.015uF (153)				N	N		S	S	X	B	B	B	D		B	B	B	B	D		C	C	C	D	
	0.018uF (183)				N	N		S	S	X	B	B	B	D		B	B	B	B	D		C	C	C	D	
	0.022uF (223)				N	N		S	S	X	B	B	B	D		B	B	B	B	D		C	C	C	D	
	0.027uF (273)				N	N		S	S		B	B	D			B	B	B	B			C	C	C		
	0.033uF (333)				N	N		S	X		B	B	D			B	B	B	B			C	C	C		
	0.039uF (393)				N	N		S	X		B	B	D			B	B	B	B			C	C	C		
	0.047uF (473)				N	N		S	X		B	B	D			B	B	B	B			C	C	D		
	0.056uF (563)				N			S	X		B	B	D			B	B	B	B			C	C			
	0.068uF (683)				N			S	X		B	B	D			B	B	B	B			C	C			
	0.082uF (823)				N			S	X		B	B	D			B	B	B	D			C	C			
	0.10uF (104)				N			S	X		B	B	D			B	B	B	D			C	C			
	0.12uF (124)							X			B	D				B	B	B	D			C				
	0.15uF (154)							X			D	D				C	C	C	G			C				
	0.18uF (184)							X			D	D				C	C	C	G			C				
	0.22uF (224)							X			D	D				C	C	C	G			C				
	0.27uF (274)										D					C	C	D				C				
	0.33uF (334)										D					C	C	D				C				
	0.39uF (394)										D					C	J	P				C				
	0.47uF (474)										D					J	J	P				C				
	0.56uF (564)										D					J	J	P				D				
	0.68uF (684)										D					J	J	P				D				
	0.82uF (824)										D					J	J	P				D				
	1.0uF (105)										D					J	J	P				D				
	1.5uF (155)																					K*				
	2.2uF (225)																					K*				

* 1210 size, Cap. 1.5~2.2uF_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.

■ 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	X7R
Size	0603, 0805, 1210
Capacitance	1000pF to 2.2μF
Capacitance tolerance	J (±5%), 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

ST	18	B	102	K	500	C	T
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging
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	T=7" reeled

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

■ PACKAGING DIMENSION AND QUANTITY

* Please refer to page 31 "PACKAGING DIMENSION AND QUANTITY " for more information.

■ CAPACITANCE RANGE

DIELECTRIC		X7R								
SIZE		0603				0805				1210
RATED VOLTAGE (VDC)		10	16	25	50	10	16	25	50	100
Capacitance	1,000pF (102)	S	S	S	S	D	D	D	D	
	1,200pF (122)	S	S	S	S	D	D	D	D	
	1,500pF (152)	S	S	S	S	D	D	D	D	
	1,800pF (182)	S	S	S	S	D	D	D	D	
	2,200pF (222)	S	S	S	S	D	D	D	D	
	2,700pF (272)	S	S	S	S	D	D	D	D	
	3,300pF (332)	S	S	S	S	D	D	D	D	
	3,900pF (392)	S	S	S	S	D	D	D	D	
	4,700pF (472)	S	S	S	S	D	D	D	D	
	5,600pF (562)	S	S	S	S	D	D	D	D	
	6,800pF (682)	S	S	S	S	D	D	D	D	
	8,200pF (822)	S	S	S	S	D	D	D	D	
	0.010μF (103)	S	S	S	S	D	D	D	D	
	0.012μF (123)	S	S	S	S	D	D	D	D	
	0.015μF (153)	S	S	S	S	D	D	D	D	
	0.018μF (183)	S	S	S	S	D	D	D	D	
	0.022μF (223)	S	S	S	S	D	D	D	D	
	0.027μF (273)	S	S	S	S	D	D	D	D	
	0.033μF (333)	S	S	S	X	D	D	D	D	
	0.039μF (393)	S	S	S	X	D	D	D	D	
	0.047μF (473)	S	S	S	X	D	D	D	D	
	0.056μF (563)	S	S	S	X	D	D	D	D	
	0.068μF (683)	S	S	S	X	D	D	D	D	
	0.082μF (823)	S	S	S	X	D	D	D	D	
	0.10μF (104)	S	S	S	X	D	D	D	D	
	0.12μF (124)	X	X	X						
	0.15μF (154)	X	X	X						
	0.18μF (184)	X	X	X						
	0.22μF (224)	X	X	X						
	2.2μF (225)									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: 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)		

■ EXPLANATION OF PART NUMBERS

MT	31	B	104	K	500	C	T
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
	0.068μF (683)		N															
	0.082μF (823)		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					
	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.

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						
	2.2pF (2R2)	L	L	N	N	S	S	S	A	A	A	A	A	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						
	3.3pF (3R3)	L	L	N	N	S	S	S	A	A	A	A	A	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						
	4.7pF (4R7)	L	L	N	N	S	S	S	A	A	A	A	A	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						
	6.8pF (6R8)	L	L	N	N	S	S	S	A	A	A	A	A	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						
	10pF (100)	L	L	N	N	S	S	S	A	A	A	A	A	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	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	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	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	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	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	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	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	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	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	D	C	C	C	C	D	D
	82pF (820)	L		N	N	S	S	S	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	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	D	C	C	C	D	D	D
	150pF (151)			N	N	S	S	S	A	A	B	D	D	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	G	C	C	C	D	D	D
	220pF (221)			N	N	S	S	S	A	A	D	D	D	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
	330pF (331)			N		S	S	X	A	A	D	D	D	B	B	B	C	C	G	C	C	C	G	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
	470pF (471)			N		S	S	X	B	B	D	D	I	B	B	C	C	C	G	C	C	C	G	D	D
	560pF (561)			N		S	S		B	B	D	D	I	B	B	C	D	D	G	C	C	C	G	D	D
	680pF (681)			N		S	S		B	B	D	D	I	B	B	C	D	D	G	C	C	C	G	D	D
	820pF (821)			N		S	S		B	B	D	D	I	B	B	C	G	G	G	C	C	C	G	D	D
	1,000pF (102)			N		S	S		B	B	D	D	I	B	B	C	G	G	G	C	D	D	G	D	D
	1,200pF (122)					X			B	B	D	D		B	B	C	G	G		C	D	D		D	D
	1,500pF (152)					X			B	B	D	D		B	B	D	G	G		C	D	D		D	D
	1,800pF (182)					X			B	B	D	D		B	B	D	G	G		C	D	D		D	D
	2,200pF (222)					X			B	B	D	D		B	B	D	G	G		C	D	D		D	D
	2,700pF (272)					X			D	D				B	B	D	G	G		C	D	D		D	D
	3,300pF (332)					X			D	D				B	B	D	G	G		C	D	D		D	D
	3,900pF (392)								D	D				B	B	D	G	G		C	D	D		D	D
	4,700pF (472)								D	D				B	B	D	G	G		C	G	G		D	D
	5,600pF (562)								D	D				B	B					C	G	G		D	D
	6,800pF (682)								D	D				C	C					C	G	G		D	D
	8,200pF (822)								D					D	D					C	G	G		D	D
	0.010uF (103)								D					D	D					C	G	K		D	D
	0.012uF (123)																			C	M	M		D	D
	0.015uF (153)																			C	M	M		D	D
	0.018uF (183)																			K				D	D
	0.022uF (223)																			K				D	D
	0.027uF (273)																			K				D	D
	0.033uF (333)																			K				D	D
	0.039uF (393)																			K					
	0.047uF (473)																			K					

* The letter in cell with " * " mark is expressed: "B" tolerance(±0.1pF) 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 25	50	10 16	25	50	6.3 10 16	25	50	100	10 16	25	50	100	200 250	500 650	10 16	25	50	100	200 250	500 630	10 16	25	50	100	200 250	500	1000	10 16 25	50	100	200 250					
Capacitance	100pF (101)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B					B	D					D	D	D									
	120pF (121)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B					B	D					D	D	D									
	150pF (151)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	180pF (181)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	220pF (221)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	270pF (271)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	330pF (331)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	390pF (391)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	470pF (471)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	560pF (561)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					D	D	D									
	680pF (681)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					C	D	D									
	820pF (821)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D					C	D	D									
	1,000pF (102)	L	L	L	N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	1,200pF (122)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	1,500pF (152)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	1,800pF (182)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	2,200pF (222)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	2,700pF (272)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	3,300pF (332)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	D	D	D	D	D					
	3,900pF (392)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	B	B	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D					
	4,700pF (472)	L	L		N	N	N	S	S	S	S	B	B	B	B	B	D	B	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D					
	5,600pF (562)	L	L		N	N	N	S	S	S	S	B	B	B	B	D	D	B	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D					
	6,800pF (682)	L			N	N	N	S	S	S	S	B	B	B	B	D	D	B	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D					
	8,200pF (822)	L			N	N	N	S	S	S	S	B	B	B	B	D	D	B	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D					
	0.010uF (103)	L			N	N	N	S	S	S	S	B	B	B	B	D	D	B	B	B	B	B	D	C	C	C	C	C	D	G	D	D	D	D					
	0.012uF (123)				N	N		S	S	S	X	B	B	B	B	D		B	B	B	B	B		C	C	C	C	C	D		D	D	D	D					
	0.015uF (153)				N	N		S	S	S	X	B	B	B	B	D		B	B	B	B	C		C	C	C	C	C	D		D	D	D	D					
	0.018uF (183)				N	N		S	S	S	X	B	B	B	B	D		B	B	B	B	C		C	C	C	C	C	D		D	D	D	D					
	0.022uF (223)				N	N		S	S	S	X	B	B	B	B	D		B	B	B	B	C		C	C	C	C	C	D		D	D	D	D					
	0.027uF (273)				N	N		S	S	S	X	B	B	B	D			B	B	B	B	C		C	C	C	C	C			D	D	D	D					
	0.033uF (333)				N	N		S	S	X	X	B	B	B	D			B	B	B	B	G		C	C	C	C	C			D	D	D	D					
	0.039uF (393)				N	N		S	S	X	X	B	B	B	D			B	B	B	B	G		C	C	C	C	C			D	D	D	D					
	0.047uF (473)				N	N		S	S	X	X	B	B	B	D			B	B	B	B	G		C	C	C	C	D			D	D	D	D					
	0.056uF (563)				N			S	S	X		B	B	B	D			B	B	B	B	G		C	C	C	C	D			D	D	D	D					
	0.068uF (683)				N			S	S	X		B	B	B	D			B	B	B	B	G		C	C	C	C	G			D	D	D	D					
	0.082uF (823)				N			S	S	X		B	B	B	D			B	B	B	D	G		C	C	C	C	G			D	D	D	D					
	0.10uF (104)				N			S	S	X		B	B	B	D			B	B	B	D	G		C	C	C	C	G			D	D	D	D					
	0.12uF (124)							S	X			D	D	D				B	B	B	D			C	C	C	C	G			D	D	D	D					
	0.15uF (154)							S	X	X		D	D	D				C	C	C	G			C	C	C	D	M			D	D	D	K					
	0.18uF (184)							S	X			D	D	D				C	C	C	G			C	C	C	D	M			D	D	D	K					
	0.22uF (224)							S	X	X		D	D	D				C	C	C	G			C	C	C	D	M			D	D	D	K					
	0.27uF (274)							X	X			D	D					C	C	D				C	C	C	G	M			D	D	D	K					
	0.33uF (334)							X	X	X		D	D					C	C	D				C	C	D	G	M			D	D	D	K					
	0.39uF (394)							X	X			D	D					C	J	P				C	C	D	M	M			D	D	D	K					
	0.47uF (474)							X	X			D	D					J	J	P				C	C	D	M	M			D	D	K	K					
	0.56uF (564)											D	D					J	J	P				D	D	D	M				D	D	K						
	0.68uF (684)											D	D					J	J	P				D	D	D	K				D	K	K						
	0.82uF (824)											D	D					J	J	P				D	D	D	K				D	K	K						
	1.0uF (105)											D	D					J	J	P				D	D	D	K				D	K	K						
	1.5uF (155)																	J	P					K	G								K						
	2.2uF (225)																	J	P					K	G								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/X8R characteristics

■ GENERAL ELECTRICAL DATA

Dielectric	X8G	X8R
Size	0402, 0603, 0805, 1206, 1210	
Capacitance	0.2pF to 0.015μF	100pF to 0.047μF
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%)	K (±10%), M (±20%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	
Q/DF*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	DF≤5%
Insulation resistance at Ur**	10GΩ or RxC≥500Ω-F whichever is smaller	
Operating temperature	-55 to +150°C	
Capacitance characteristic	±30ppm/°C	±15%
Termination	Ni/Sn (lead-free termination)	

■ EXPLANATION OF PART NUMBERS

HT	21	R	103	K	500	C	T
Series	**Size (Inch (mm))**	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
HT=High Temperature	21=0805 (2012)	R=X8R	103=10x10^3=10nF	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

X8R Dielectric 0402, 0603, 0805 Sizes

DIELECTRIC		X8R											
SIZE		0402				0603				0805			
RATED VOLTAGE (VDC)		10	16	25	50	10	16	25	50	10	16	25	50
Capacitance	100pF (101)	N	N	N	N	S	S	S	S	D	D	D	D
	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	D	D
	220pF (221)	N	N	N	N	S	S	S	S	D	D	D	D
	270pF (271)	N	N	N	N	S	S	S	S	D	D	D	D
	330pF (331)	N	N	N	N	S	S	S	S	D	D	D	D
	390pF (391)	N	N	N	N	S	S	S	S	D	D	D	D
	470pF (471)	N	N	N	N	S	S	S	S	D	D	D	D
	560pF (561)	N	N	N	N	S	S	S	S	D	D	D	D
	680pF (681)	N	N	N	N	S	S	S	S	D	D	D	D
	820pF (821)	N	N	N	N	S	S	S	S	D	D	D	D
	1,000pF (102)	N	N	N	N	S	S	S	S	D	D	D	D
	1,200pF (122)	N	N	N	N	S	S	S	S	D	D	D	D
	1,500pF (152)	N	N	N	N	S	S	S	S	D	D	D	D
	1,800pF (182)	N	N	N	N	S	S	S	S	D	D	D	D
	2,200pF (222)	N	N	N	N	S	S	S	S	D	D	D	D
	2,700pF (272)					S	S	S	S	D	D	D	D
	3,300pF (332)					S	S	S	S	D	D	D	D
	3,900pF (392)					S	S	S	S	D	D	D	D
	4,700pF (472)					S	S	S	S	D	D	D	D
	5,600pF (562)					S	S	S	S	D	D	D	D
	6,800pF (682)					S	S	S	S	D	D	D	D
	8,200pF (822)					S	S	S	S	D	D	D	D
	0.010μF (103)					S	S	S	S	D	D	D	D
	0.012μF (123)									D	D	D	D
	0.015μF (153)									D	D	D	D
	0.018μF (183)									D	D	D	D
	0.022μF (223)									D	D	D	D
	0.027μF (273)									D	D	D	D
	0.033μF (333)									D	D	D	D
	0.039μF (393)									D	D	D	D
	0.047μF (473)									D	D	D	D
	0.056μF (563)												
	0.068μF (683)												
	0.082μF (823)												
	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.

■ 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
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)					S	S	S	S	S	B	B	B	B	B	B	B	C	C
	680pF (681)					S	S	S	S	S	B	B	B	B	B	B	B	C	C
	820pF (821)					S	S	S	S	S	B	B	B	B	B	B	B	C	C
	1,000pF (102)					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, 2211	1808, 1812, 2220, 2211
Capacitance	3pF to 680pF	100pF to 4700pF
Capacitance tolerance	Cap.<10pF: D (±0.5pF) Cap.≥10pF: F (±1%), G (±2%), J (±5%), K (±10%)	K (±10%), M (±20%)
Rated voltage (WVAC)	250 Vac	
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 : 2013, IEC 60384-14 : 2013, UL 60384-14 (Ed 2.0)	

■ EXPLANATION OF PART NUMBERS

S2	42	N	100	J	502	C	T
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	C=Cu/Ni/Sn	T=7" reeled

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

■ CAPACITANCE RANGE

DIELECTRIC		NP0							
SIZE		1808		1812		2211			
PEAK IMPULSE VOLTAGE		5000		5000		5000		6000	
CERTIFICATED		TUV	UL	TUV	UL	TUV	UL	TUV	UL
Capacitance	3.0pF (3R0)	F	F						
	3.3pF (3R3)	F	F						
	3.9pF (3R9)	F	F						
	4.0pF (4R0)	F	F			K	K	K	K
	4.7pF (4R7)	F	F			K	K	K	K
	5.0pF (5R0)	F	F			K	K	K	K
	5.6pF (5R6)	F	F			K	K	K	K
	6.0pF (6R0)	F	F			K	K	K	K
	6.8pF (6R8)	F	F			K	K	K	K
	7.0pF (7R0)	F	F			K	K	K	K
	8.0pF (8R0)	F	F			K	K	K	K
	8.2pF (8R2)	F	F			K	K	K	K
	9.0pF (9R0)	F	F				K		K
	10pF (100)	F	F	D	D	K	K	K	K
	12pF (120)	F	F	D	D	K	K	K	K
	15pF (150)	F	F	D	D	K	K	K	K
	18pF (180)		F	D	D	K	K	K	K
	22pF (220)	F	F	D	D	K	K	K	K
	27pF (270)	F	F	D	D	K	K	K	K
	33pF (330)	F	F	D	D	K	K	K	K
	39pF (390)	G	G	D	D	K	K	K	K
	47pF (470)	G	G	D	D	K	K	K	K
	56pF (560)	G	G	D	D	K	K	K	K
	68pF (680)	G	G	D	D	K	K	M	M
	82pF (820)	G	G	D	D	K	K	M	M
	100pF (101)	K	K	D	D	K	K	U	U
	120pF (121)	K	K	D	D	M	M		
	130pF (131)	K	K	D	D		M		
	150pF (151)	K	K	D	D	M	M		
	160pF (161)	K	K	D	D	M	M		
	180pF (181)	K	K	D	D	M	M		
	220pF (221)	K	K	K	K	M	M		
	270pF (271)	K	K	K	K	M	M		
	300pF (301)			K	K		M		
	330pF (331)			K	K	M	M		
	390pF (391)			K	K	M	M		
	470pF (471)			K	K	M	M		
	560pF (561)					M	M		
	680pF (681)					M	M		

DIELECTRIC		X7R							
SIZE		1808		1812		2211		2220	
PEAK IMPULSE		5000		5000		5000		5000	
CERTIFICATED		TUV	UL	TUV	UL	TUV	UL	TUV	UL
Capacitance	100pF (101)	G	G						
	120pF (121)	G	G						
	130pF (131)		G			G	G		
	150pF (151)	G	G	G	G	G	G		
	160pF (161)		G		G		G		
	180pF (181)	G	G	G	G	G	G	K	K
	220pF (221)	G	G	G	G	G	G	K	K
	270pF (271)	K	K	G	G	G	G	K	K
	300pF (301)		K		G		G		K
	330pF (331)	K	K	G	G	G	G	K	K
	390pF (391)	K	K	G	G	G	G	K	K
	470pF (471)	K	K	G	G	K	K	K	K
	560pF (561)	K	K	G	G	K	K	K	K
	680pF (681)	K	K	K	K	K	K	K	K
	720pF (721)		K		K		K	K	K
	820pF (821)	K	K	K	K	K	K	K	K
	1,000pF (102)	K	K	M	M	M	M	K	K
	1,200pF (122)					M	M	M	M
	1,500pF (152)					M	M	M	M
	1,800pF (182)					M	M	M	M
	2,200pF (222)					M	M	M	M
	2,700pF (272)							M	M
	3,300pF (332)							M	M
	3,900pF (392)							M	M
	4,700pF (472)							M	M

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■ 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+0.5/-0.3	2.00±0.25	0.50±0.25	1.40±0.15	F	2,000
				1.60±0.20	G	1,000
				2.00±0.20	K	1,000
1812 (4532)	4.50+0.5/-0.3	3.20±0.30	0.50±0.25	1.60±0.20	G	1,000
				2.00±0.20	K	1,000
				2.50±0.30	M	500
2220 (5750)	5.70±0.40	5.00±0.40	0.60±0.30	2.00±0.20	K	1,000
				2.50±0.30	M	500
2211 (5728)	5.70±0.40	2.80±0.30	0.60±0.30	1.60±0.20	G	1,000
				2.00±0.20	K	1,000
				2.50±0.30	M	500

■ 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 1000pF	150pF to 0.022uF
Capacitance tolerance	Cap.<10pF: D (±0.5pF) Cap.≥10pF: F (±1%), G (±2%), J (±5%),K (±10%)	K (±10%), M (±20%)
Rated voltage (WVAC)	250 Vac	
Peak impulse voltage (X2)	2500V	
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 : 2013, IEC 60384-14 : 2013, UL 60384-14 (Ed 2.0)	

■ EXPLANATION OF PART NUMBERS

S3	42	N	100	J	252	C	T
Series	**Size (Inch (mm))**	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
S3=X2	42=1808 (4520)	N=NP0	100=10x10^0=10pF	J=±5%	252=2500V Impulse Voltage	C=Cu/Ni/Sn	T=7" reeled

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

■ CAPACITANCE RANGE

DIELECTRIC		NP0			
SIZE		1808		1812	
PEAK IMPULSE VOLTAGE		2500		2500	
CERTIFICATED		TUV	UL	TUV	UL
Capacitance	3.0pF (3R0)	F	F		
	3.3pF (3R3)		F		
	3.9pF (3R9)		F		
	4.0pF (4R0)	F	F		
	4.7pF (4R7)		F		
	5.0pF (5R0)	F	F		
	5.6pF (5R6)		F		
	6.0pF (6R0)	F	F		
	6.8pF (6R8)		F		
	7.0pF (7R0)	F	F		
	8.0pF (8R0)	F	F		
	8.2pF (8R2)		F		
	9.0pF (9R0)	F	F		
	10pF (100)	F	F	D	D
	12pF (120)	F	F	D	D
	15pF (150)	F	F	D	D
	18pF (180)	F	F		D
	22pF (220)	F	F	D	D
	27pF (270)	F	F	D	D
	33pF (330)	F	F	D	D
	39pF (390)	G	G	D	D
	47pF (470)	G	G	D	D
	56pF (560)	G	G	D	D
	68pF (680)	G	G	D	D
	82pF (820)	G	G	D	D
	100pF (101)	K	K	D	D
	120pF (121)	K	K	D	D
	130pF (131)		K		D
	150pF (151)	K	K	D	D
	160pF (161)		K		D
	180pF (181)	K	K	D	D
	220pF (221)	K	K	D	D
	270pF (271)	K	K	F	F
	300pF (301)		K		F
	330pF (331)	K	K	F	F
	390pF (391)	K	K	F	F
	470pF (471)	K	K	G	G
	560pF (561)	K	K	K	K
	680pF (681)	K	K	K	K
	720pF (721)		K		M
	820pF (821)	K	K	M	M
	1,000pF (102)	K	K	M	M

DIELECTRIC		X7R					
SIZE		1808		1812		2220	
PEAK IMPULSE VOLTAGE		2500		2500		2500	
CERTIFICATED		TUV	UL	TUV	UL	TUV	UL
Capacitance	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	G	G		
	820pF (821)	G	G	G	G		
	1,000pF (102)	K	K	G	G		
	1,200pF (122)	K	K	G	G		
	1,500pF (152)	K	K	K	K		
	1,800pF (182)	K	K	K	K		
	2,200pF (222)	K	K	M	M		
	2,700pF (272)			M	M		
	3,300pF (332)			M	M		
	3,900pF (392)			M	M		
	4,700pF (472)			M	M		
	5,600pF (562)			M	M		
	0.010μF (103)					M	M
	0.012μF (123)					M	M
	0.015μF (153)					M	M
	0.018μF (183)					M	M
	0.022μF (223)					U	U

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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	NP0	X7R
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	
Capacitance range	0.1pF to 0.1μF	100pF to 22μF
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%), K (±10%)	J (±5%), K (±10%), M (±20%)
Rated voltage (WVDC)	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1000V, 2000V, 3000V	
Operating temperature	-55 to +125℃	
Capacitance characteristic	±30ppm	±15%
Termination	Ni/Sn (lead-free termination)	

■ 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=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	-	-	-
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	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	10,000
			2.00±0.20	K	-	-	1,000	6,000
			2.50±0.50	M	-	-	1,000	6,000
1808 (4520)	4.50+0.60/-0.4	2.03±0.25	1.25±0.10	D	-	-	2,000	-
			2.00±0.20	K	-	-	1,000	-
1812 (4532)	4.50+0.60/-0.4	3.20±0.30	1.25±0.10	D	-	-	1,000	-
			2.00±0.20	K	-	-	1,000	-
		3.20±0.40	2.50±0.50	M	-	-	500	3,000
1825 (4563)	4.50+0.6/-0.4	6.30±0.40	2.00±0.20	K	-	-	1000	-
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	-

Unit: pieces

■ CAPACITANCE RANGE

NP0 Dielectric (0402 to 1812 Size)

DIELECTRIC		NP0																															
SIZE		0402		0603			0805						1206							1210					1808				1812					
RATED VOLTAGE (VDC)		10 16 25 50	100	10 16 25 50	100	200, 250	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
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
	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
	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
	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
	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
	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
	33pF (330)	E	E	S	S	S	A	A	A	A	A	D	B	B	B	B	B	B	C	C	C	C	C	C	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	C	C	C	C	C	C	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	C	C	C	C	C	C	C	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	C	D	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	C	D	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	D	D	C	C	C	C	D	D	D	D	D	D	D	D	D	DD	D
	100pF (101)	E	E	S	S	S	A	A	A	B	B	D	B	B	B	B	B	D	D	C	C	C	D	D	D	D	D	K	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	K	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	G	D	D	K	K	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	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	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	K	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	K	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		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		D	D	D	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	
	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	
	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	
	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	
	1,200pF (122)			X			B	B	D	D			B	B	C	G	G			C	D	D	G		K	G			D	D	D	K		
	1,500pF (152)			X			B	B	D	D			B	B	D	G	G			C	D	D	K		K	G			D	D	D	K		
	1,800pF (182)			X			B	B	D	D			B	B	D	G	G			C	D	D	M		K	K			D	D	D	K		
	2,200pF (222)			X			B	B	D	D			B	B	D	G	G			C	D	D	M		K	K			D	D	D	K		
	2,700pF (272)			X			D	D					B	B	D	G	G			C	D	D	M		K				D	D	D	K		
	3,300pF (332)			X			D	D					B	B	D	G	G			C	D	D	M		K				D	D	D	K		
	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	G			C	G								D	D	D			
	5,600pF (562)						D	D					B	B						C	G								D	D	D			
	6,800pF (682)						D	D					C	C						C	G								D	D	D			
	8,200pF (822)						D						D	D						C	G								D		D			
	0.010μF (103)						D						D	D						C	G								D		D			
	0.012μF (123)												P	P						D									D		G			
	0.015μF (153)												P	P						D									D		G			
	0.022μF (223)												P	P															D		K			
	0.033μF (333)												P																D					
	0.039μF (393)												P																					

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

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	
	0.012μF (123)	K	K	K				K	K	K				K	K	K			
	0.015μF (153)	K	K	K				K	K	K				K	K	K			
	0.018μF (183)	K	K	K				K	K	K				K	K	K			
	0.022μF (223)	K	K	K				K	K	K				K	K	K			
	0.027μF (273)	K	K	K				K	K					K	K	K			
	0.033μF (333)	K	K	K				K	K					K	K	K			
	0.039μF (393)	K	K	M				K	K					K	K	K			
	0.047μF (473)	K	K					K	M					K	K	K			
	0.056μF (563)	K	M					K	M					K	M	M			
	0.068μF (683)	K	M					K	M					K	M	M			
	0.082μF (823)	M						M						K	M				
	0.1μF (104)	M						M						M	M				
	0.12μF (124)																		
	0.18μF (184)																		
	0.22μF (224)																		

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									
	180pF (181)	E	E	E	E	S	S	S	S	X	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									
	270pF (271)	E	E	E	E	S	S	S	S	X	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									
	390pF (391)	E	E	E	E	S	S	S	S	X	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									
	560pF (561)	E	E	E	E	S	S	S	S	X	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									
	820pF (821)	E	E	E	E	S	S	S	S	X	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	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	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	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	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	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	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	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	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	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	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	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	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	C	C	C	C	C	D	D	D	D
	0.012μF (123)	E	E			S	S	S	X		D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.015μF (153)	E	E			S	S	S	X		D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.018μF (183)	E	E			S	S	S	X		D	D	D	D	D	D	D	D	D	C	C	C	C	C	D	D	D	D
	0.022μF (223)	E	E			S	S	S	X		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	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	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	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	G	C	C	C	C	D	D	D	D	D
	0.056μF (563)	E				S	S	X	X		D	D	D	D	D	D	D	D	G	C	C	C	C	D	D	D	D	D
	0.068μF (683)	E				S	S	X	X		D	D	D	D	D	D	D	D	G	C	C	C	C	G	D	D	D	D
	0.082μF (823)	E				S	S	X	X		D	D	D	D	D	D	D	D	G	C	C	C	C	G	D	D	D	D
	0.10μF (104)	E				S	S	X	X		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		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				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				I	I			J	J	P	P		D	D	D	K		D	K	K	M
	1.5μF (155)										I				J	P				K	G	M	M				K	
	2.2μF (225)										I				J	P	P			K	G	M	M			M	M	
	3.3μF (335)														P	P				K	G	M						
	4.7μF (475)										I				P	P				K	K							
	10μF (106)														P	P				K	M							
	22μF (226)														P					M								
	47μF (476)																											

1. The letter in cell is expressed the symbol of product thickness.
2. 0805 size, Cap. 4.7uF_16V only, 0805 size, Cap. 0.082~0.1uF_200V only, 1206 size, Cap.22uF_10V only.
3. 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		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				D	D	G		K	K			D	M		
	0.022μF (223)	D	D		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			
	0.15μF (154)																	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)																				

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	2000	3000
Capacitance	1,000pF (102)	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
	1,500pF (152)	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
	2,200pF (222)	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
	3,300pF (332)	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
	4,700pF (472)	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	M
	6,800pF (682)	K	K	K	K	K	M	K	K	K	K	K	K	M	K	K	K	K	M
	8,200pF (822)	K	K	K	K	K	M	K	K	K	K	K	M	M	K	K	K	K	M
	0.010μF (103)	K	K	K	K	K	M	K	K	K	K	K	M	M	K	K	K	K	M
	0.012μF (123)	K	K	K	K	M	U	K	K	K	K	K	M	U	K	K	K	M	M
	0.015μF (153)	K	K	K	K	M	U	K	K	K	K	K	M	U	K	K	K	M	M
	0.018μF (183)	K	K	K	K	M	U	K	K	K	K	K	U	U	K	K	K	M	U
	0.022μF (223)	K	K	K	K	M		K	K	K	K	K	U		K	K	K	M	
	0.027μF (273)	K	K	K	K	U		K	K	K	K	K	U		K	K	K	M	
	0.033μF (333)	K	K	K	K	U		K	K	K	K	K	U		K	K	K	M	
	0.039μF (393)	K	K	K	K	U		K	K	K	K	K	U		K	K	K	U	
	0.047μF (473)	K	K	K	K	U		K	K	K	K	K	U		K	K	K	U	
	0.056μF (563)	K	K	K	K			K	K	K	K	K	U		K	K	K	U	
	0.068μF (683)	K	K	K	K			K	K	K	K	M			K	K	K		
	0.082μF (823)	K	K	K	M			K	K	K	K	M			K	K	K		
	0.10μF (104)	K	K	K	M			K	K	K	K	M			K	K	M		
	0.12μF (124)	K	K	K				K	K	K	K	M			K	K	U		
	0.15μF (154)	K	K	K				K	K	K	K	U			K	K	U		
	0.18μF (184)	K	K	K				K	K	K	K	U			K	K	U		
	0.22μF (224)	K	K	K				K	K	K	K	U			K	K	U		
	0.27μF (274)	K	K	K				K	K	K	K				K	K			
	0.33μF (334)	K	K	K				K	K	K	K				K	K			
	0.39μF (394)	K	K	K				K	K	K	K				K	K			
	0.47μF (474)	K	K	K				K	K	K	K				K	K			
	0.56μF (564)	K	M	M				K	K	K	M				K	K			
	0.68μF (684)	K						K	K	K	M								
	0.82μF (824)	K						K	K	K	U								
	1.0μF (105)	K						K	K	K	U								
	1.5μF (155)							K	K	M									
	2.2μF (225)							K	K	M									
	3.3μF (335)							K	K										
	4.7μF (475)							K	M										
	6.8μF (685)							M	U										
	10μF (106)							U	U										

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 1μF
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	T
Series	**Size (Inch (mm))**	**Dielectric**	**Capacitance**	**Tolerance**	**Rated voltage**	**Termination**	**Packaging**
SG=With Cu polymer	31=1206 (3216)	B=X7R	104=10x10^4 =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.

■ PACKAGING DIMENSION AND QUANTITY

* Please refer to page 30 "PACKAGING DIMENSION AND QUANTITY" 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	D	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	D	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	D	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		D	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		D	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		D	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	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	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	X			D	D	D	D	D	D	D	D	D		D	D	D	D	D	D		D			
	0.022μF (223)	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	X			D	D	D	D	D	D	D	D	D		D	D	D	D	D	D		G			
	0.033μF (333)	S	S	S	X	X			D	D	D	D	D	D	D	D			D	D	D	D	D	G		G			
	0.039μF (393)	S	S	S	X	X			D	D	D	D	D	D	D				D	D	D	D	D	G		G			
	0.047μF (473)	S	S	S	X	X			D	D	D	D	D	D	D				D	D	D	D	D	G		G			
	0.056μF (563)	S	S	S	X	X			D	D	D	D	D	D	D				D	D	D	D	D	G		G			
	0.068μF (683)	S	S	S	X	X			D	D	D	D	D	D	D				D	D	D	D	D	G	G				
	0.082μF (823)	S	S	S	X	X			D	D	D	D	D	D					D	D	D	D	D	G	G				
	0.10μF (104)	S	S	S	X	X			D	D	D	D	D	D					D	D	D	D	D	G	G				
	0.12μF (124)	S	S	X					D	D	D	D	I						D	D	D	D	D						
	0.15μF (154)	S	S	X					D	D	D	D	I						C	C	C	C	G						
	0.18μF (184)	S	S	X					D	D	D	D	I						C	C	C	C	G						
	0.22μF (224)	S	S	X					D	D	D	D	I						C	C	C	C	G						
	0.27μF (274)								I	I	I	I							C	C	C	D	G						
	0.33μF (334)								I	I	I	I							C	C	C	D	G						
	0.39μF (394)								I	I	I	I							C	C	J	P	G						
	0.47μF (474)								I	I	I	I							J	J	J	P	G						
	0.56μF (564)								I	I	I								J	J	J	P	P						
	0.68μF (684)								I	I	I								J	J	J	P	P						
	0.82μF (824)								I	I	I								J	J	J	P	P						
	1.0μF (105)																		J	J	J	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	Y5V
Size	0402, 0603, 0805, 1206, 1210		
Capacitance range	1.0μF to 10μF	0.22μF to 47μF	2.2μF to 10μF
Capacitance tolerance	K (±10%), M (±20%)		Z (-20/+80%)
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V	6.3V, 10V, 16V, 25V	10V, 16V, 25V, 50V
DF(Tan δ)*	16V, 10V: ≤10.0% 6.3V: ≤15.0%		50V: ≤7% 25V: ≤9% 16V, 10V: ≤12.5%
Insulation resistance at Ur	RxC≥100ΩxF		
Operating temperature	-55 to +125°C	-55 to +85°C	-25 to +85°C
Capacitance characteristic	±15%		+30/-80%
Termination	Ni/Sn (lead-free termination)		

■ EXPLANATION OF PART NUMBERS

TT	31	X	225	K	100	C	T
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														
	1.0μF (105)	L		H	H		T	T	T		T	T	T				
	1.5μF (155)						T	T			T	T	T				
	2.2μF (225)	L				T	T	T	T		T	T	T				
	3.3μF (335)										T	T	T		T		
	4.7μF (475)			H		T	T	T	T		T	T	T		T		
	6.8μF (685)																
	10μF (106)					T	T	T		J	T		T		T		T
	22μF (226)					T	T			T		T				T	
	47μF (476)									T							

Dielectric		X7R						Y5V								
Size		0805		1206			1210	0805				1206				1210
Rated voltage (VDC)		10	16, 25	10	25	50	100	10	16	25	50	10	16	25	50	10
Capacitance	1.0μF (105)				T											
	1.5μF (155)															
	2.2μF (225)		T			T	K		T			T	T	T	T	
	3.3μF (335)							T								
	4.7μF (475)	T			T			T				T	T			
	6.8μF (685)											T				
	10μF (106)			T								T				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

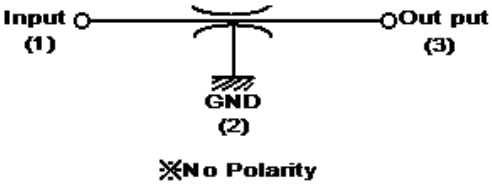
■ EXPLANATION OF PART NUMBERS

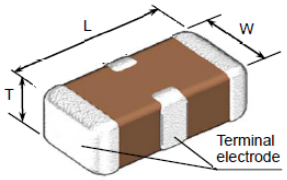
FT	21	B	105	M	160	C	T
Series	Size (Inch (mm))	Dielectric	Capacitance	Tolerance	Rated voltage	Termination	Packaging style
FT= Feed Through Capacitor	21=0805 (2012)	B=X7R	105=10x105 =1uF	M=±20%	500=50 VDC	C=Cu/Ni/Sn	T=7" reeled

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

■ RATED VALUE

a) Equivalent Circuit





b) Capacitance Ranget

Walsin Part NO.	Nominal Capacitance	Capacitance Tolerance	DC Rated Voltage	Rated Current (mA)	DC Resistance	Insulation Resistance	Operating Temp. Range
FT21B103M500CT	10 nF	±20%	DC50 V	2A(DC)	0.03Ωmax	1000MΩmin	-55 to 125°C
FT21B223M500CT	22 nF	±20%	DC50 V	2A(DC)	0.03Ωmax	1000MΩmin	-55 to 125°C
FT21B473M500CT	47 nF	±20%	DC50 V	2A(DC)	0.03Ωmax	1000MΩmin	-55 to 125°C
FT21B104M250CT	0.1 uF	±20%	DC25 V	2A(DC)	0.03Ωmax	1000MΩmin	-55 to 125°C
FT21B224M160CT	0.22 uF	±20%	DC16 V	2A(DC)	0.03Ωmax	1000MΩmin	-55 to 125°C
FT21B474M160CT	0.47 uF	±20%	DC16 V	2A(DC)	0.03Ωmax	1000MΩmin	-55 to 125°C
FT21B105M160CT	1 uF	±20%	DC16 V	4A(DC)	0.02Ωmax	500MΩmax	-55 to 125°C

■ CAPACITANCE RANGE

DIELECTRIC		X7R			
SIZE		0805			
RATED VOLTAGE (VDC)		10	16	25	50
Capacitance	10nF (103)	T	T	T	T
	22nF (223)	T	T	T	T
	47nF (473)	T	T	T	T
	0.10μF (104)	T	T	T	
	0.22μF (224)	T	T		
	0.47μF (474)	T	T		
	1μF (105)	T	T		

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.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>1.</td><td>Visual and Mechanical</td><td>---</td><td>* No remarkable defect.
* Dimensions to conform to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td>Class I: (NP0,X8G)
≦ 1000pF, 1.0±0.2Vrms, 1MHz±10%
＞1000pF, 1.0±0.2Vrms, 1KHz±10%

Class II: (X7R, X7E, X6S, X5R,X7S, Y5V, X8R)

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: 0805=106(6.3V), 0603/475(6.3V)
X5R: 01R5(≤6.3V), 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#1),
0402≧225 (6.3V), 0402/475 (10V),
0603/106 (6.3V),
X7S: 0402/225(6.3V)

#1 Excluding
X5R/0201/105(6.3V);225(10V),0402X475M6R3
X6S/0201/104(10V)
(1.0±0.2Vrms, 1KHz±10%)

* Before initial measurement (Class II only):
To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room condition**.</td><td>* Shall not exceed the limits given in the detailed spec.</td></tr>
<tr><td>3.</td><td>Q/ D.F.
(Dissipation Factor)</td><td></td><td>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

X8R: D.F. ≤5%

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="3">≧100V</td><td rowspan="3">≦2.5%</td><td>≦3%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦5%</td><td>0603≧0.068μF; 0805＞0.1μF; 1206≧1μF; 1210≧2.2μF; TT series</td></tr>
<tr><td>≦10%</td><td>0805>0.22μF; 1210≧3.3μF</td></tr>
<tr><td rowspan="4">50V</td><td rowspan="4">≦2.5%</td><td>≦3%</td><td>0201(50V); 0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦5%</td><td>0201≧0.01uF; 1210≧3.3μF</td></tr>
<tr><td>≦10%</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>≦12.5%</td><td>1206≧10μF</td></tr>
<tr><td>35V</td><td>≦3.5%</td><td>≦10%</td><td>0603≧1μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦3.5%</td><td>≦5%</td><td>0201≧0.01μF; 0805≧1μF; 1210≧10μF*</td></tr>
<tr><td>≦7%</td><td>0603≧0.33μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.1μF; 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>≦12.5%</td><td>0402≧0.47μF; 0805/X5R=10μF</td></tr>
<tr><td rowspan="3">16V</td><td rowspan="3">≦3.5%</td><td>≦5%</td><td>0201≧0.01μF; 0402≧0.033μF; 0603≧0.15μF;
0805≧0.68μF; 1206≧2.2μF; 1210≧4.7μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.1uF(0201/X7R≧0.022μF); 0402≧0.22uF;
0603>0.47μF; 0805≧2.2μF; 1206≧4.7μF; 1210≧22μF; TT series</td></tr>
<tr><td>≦12.5%</td><td>0402/X5R≧1μF; 0805/X5R=10μF</td></tr>
<tr><td rowspan="3">10V</td><td rowspan="3">≦5%</td><td>≦10%</td><td>0201≧0.012μF; 0402≧0.22μF; TT series
0603≧0.33μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧22μF; 01R5/X5R</td></tr>
<tr><td>≦12.5%</td><td>0805/X5R=10μF</td></tr>
<tr><td>≦15%</td><td>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%</td><td>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%</td><td>0402≧2.2μF</td></tr>
<tr><td>4V</td><td>≦15%</td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F. ≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">≦5%</td><td>≦7%</td><td>0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF; TT series</td></tr>
<tr><td>≦12.5%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦7%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦5%</td><td>≦7%</td><td>0402≧0.047μF; 0603≧0.1μF; 0805≧0.33μF; 1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦9%</td><td>0402≧0.068μF; 0603≧0.47μF; 1206≧4.7μF; 1210≧22μF; TT series</td></tr>
<tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">≦7%</td><td>≦9%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦12.5%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>≦9%</td><td>≦12.5%</td><td>0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF;
1812≧47μF; TT series</td></tr>
<tr><td>10V</td><td>≦12.5%</td><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦20%</td><td>---</td><td>---</td></tr>
</table></td></tr>
<tr><td>4a.</td><td>Dielectric Strength</td><td>*To apply voltage:
≦100V: 250% of 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.</td><td> No evidence of damage or flash over during test.</td></tr>
<tr><td>4b.</td><td>Dielectric Strength
(for X1/Y2 & X2)</td><td>* To apply 1500 VAC voltage.
* Duration: 60 sec.</td><td>* No evidence of damage or flash over during test.</td></tr>
<tr><td>5.</td><td>Insulation Resistance</td><td>To apply rated voltage for max. 120 sec.</td><td>10GΩ or RxC≧500Ω-F whichever is smaller.
Class II (X7R, X6S, X5R, X7S,Y5V)
<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: 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>All X6S items, All X7S items, X5R/01R5</td><td rowspan="2">RxC≧50 Ω-F</td></tr>
<tr><td>100V: 1210≥3.3μF, 50V: 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>
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.</td></tr>
</table>

** "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.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>6.</td><td>Temperature Coefficient</td><td>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>X8R</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>
<tr><td>Y5V</td><td>-25~ 85°C at 20°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</td></tr>
<tr><td></td><td>Cap≥1μF: 0.1V</td></tr>
<tr><td></td><td rowspan="2">0201X104/16V: 0.5V
0201X224/10V: 0.5V</td></tr>
<tr><td></td></tr>
<tr><th>0402</th><th>0603</th></tr>
<tr><td>Cap<1μF: 1V</td><td>Cap<1μF: 1V</td></tr>
<tr><td>Cap=1μF: 0.5V**
0402B224-16V: 0.5V
0402B474-10V: 0.5V
0402X475M6R3: 0.5V</td><td>1μF≤Cap≤4.7μF: 0.5V</td></tr>
<tr><td>1μF<Cap<10μF: 0.2V
**0402B105M6R3V: 0.2V</td><td>Cap>4.7μF: 0.2V</td></tr>
<tr><td>Cap≥10μF: 0.1V</td><td></td></tr>
<tr><th>0805</th><th>1206/1210</th></tr>
<tr><td>Cap<10μF: 1V</td><td>Cap≤10μF: 1V</td></tr>
<tr><td>Cap=10μF: 0.5V</td><td>10μF<Cap≤100μF: 0.5V</td></tr>
<tr><td>Cap>10μF: 0.2V</td><td>Cap>100μF: 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**.</td><td>
<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>X8R</td><td>Within ±15%</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>
<tr><td>Y5V</td><td>Within +30%/-80%</td></tr>
</table>
</td></tr>
<tr><td>7.</td><td>Adhesive Strength of Termination</td><td>*Pressurizing force:
01005:1N, 0201:2N, 0402 to 0603:5N,
>0603: 10N
Test time：10 ±1 sec</td><td> No remarkable damage or removal of the terminations.</td></tr>
<tr><td>8.</td><td>Vibration Resistance</td><td>*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**.</td><td>* No remarkable damage.
* Cap change and Q/D.F.: To meet initial spec.</td></tr>
<tr><td>9.</td><td>Solderability</td><td>* Solder temperature: 235±5°C
* Dipping time: 2±0.5 sec.</td><td>95% MIN. coverage of all metalized area.**
**SH series: 75% MIN. coverage of all metalized area.</td></tr>
<tr><td>10.</td><td>Bending Test</td><td>*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.
**ST series follow AEC-Q200-005: Board Flex test condition.</td><td>* No remarkable damage.
* Cap change:
NP0,X8G: within ±5% or 0.5pF whichever is larger
X7R, X7S, X6S, X5R,X8R: within ±12.5% ,
Y5V: within ±30%
(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test.)</td></tr>
<tr><td>11.</td><td>Resistance to Soldering Heat</td><td>* 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**.</td><td>* No remarkable damage.
* Cap change:
NP0,X8G: within ±2.5% or 0.25pF whichever is larger
X7R, X7S, X6S, X5R,X8R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.
* 25% max. leaching on each edge.</td></tr>
<tr><td>12.</td><td>Temperature Cycle</td><td>* 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**.</td><td>* No remarkable damage.
* Cap change:
NP0,X8G: within ±2.5% or 0.25pF whichever is larger
X7R, X7S, X6S, X5R,X8R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></tr>
</table>

** "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.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>13.</td><td>Humidity
(Damp Heat)
Steady State</td><td>* 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**.</td><td>* No remarkable damage.
* Cap change: NP0, X8G: within ±5% or 0.5pF whichever is larger
X7R, X7S, X6S, X5R, X8R: ≥10V**,within ±12.5%;6.3V within ±25%;TT series,within ±25%
**10V:0603≧4.7μF;0402≧1μF;0201≧0.1μF, within ±25%;
Y5V: ≥10V, within ±30%; 6.3V, within +30/-40%
* Q/D.F. value:
NP0, X8R: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C,Less than 10pF Q≥200+10C
X8R: ≤7.5%

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="3">≧100V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦7.5%</td><td>0603≧0.068μF; 0805>0.1μF; 1206≧1μF; 1210≧2.2μF; TT series</td></tr>
<tr><td>≦20%</td><td>0805>0.22μF; 1210≧3.3μF</td></tr>
<tr><td rowspan="3">50V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>0201(50V); 0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.01uF; 1210≧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>35V</td><td>≦5%</td><td>≦20%</td><td>0603≧1μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10%</td><td>0201≧0.01μF; 0805≧1μF; 1210≧10μF*</td></tr>
<tr><td>≦14%</td><td>0603≧0.33μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF; 0402≧0.1μF&(0402/X7R≧0.056μF); 0603≧0.47μF;
0805≧2.2μF;1206≧4.7μF;1210≧22μF(1210X5R≧10μF)*; TT series</td></tr>
<tr><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≦5%</td><td>≦10%</td><td>0603≧0.15μF; 0805≧0.68μF; 1206≧2.2μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.01μF(0201/X7R≧0.022μF); 0402≧0.033μF;
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;
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>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF; TT series</td></tr>
<tr><td>≦20%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦10%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0402≧0.047μF; 0603≧0.1μF; 0805≧0.33μF;
1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0402≧0.068μF; 0603≧0.47μF; 1206≧4.7μF;
1210≧22μF; TT series</td></tr>
<tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">≦10%</td><td>≦12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>≦12.5%</td><td>≦20%</td><td>0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF;
1812≧47μF; TT series</td></tr>
<tr><td>10V</td><td>≦20%</td><td>≦30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦30%</td><td>---</td><td>---</td></tr>
</table>
* I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.

Class II (X7R, X6S, X5R,X7S, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: All X7R; 1210≧3.3μF</td><td rowspan="6">1GΩ or RxC≧10 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: 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; 01R5/X5R</td></tr>
</table></td></tr>
</table>

** "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.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>14</td><td>Humidity
(Damp Heat)
Load</td><td>*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**.</td><td>
* No remarkable damage.
Cap change: NP0, X8G: ±7.5% or 0.75pF whichever is larger.
X7R, X7S, X6S, X5R,X8R: ≥10V**within ±12.5%;6.3V within ±25%;TT series,within ±25%
**10V:0603≧4.7μF;0402≧1μF;0201≧0.1μF, within ±25%;
Y5V: ≥10V, within ±30%; 6.3V, within +30/-40%
Q/D.F. value: NP0, X8G: C≥30pF, Q≥200; C<30pF, Q≥100+10/3C
X8R: ≤7.5%
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="3">≧100V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦7.5%</td><td>0603≧0.068μF; 0805>0.1μF; 1206≧1μF; 1210≧2.2μF; TT series</td></tr>
<tr><td>≦20%</td><td>0805>0.22μF; 1210≧3.3μF</td></tr>
<tr><td rowspan="3">50V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>0201(50V); 0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.01uF; 1210≧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>35V</td><td>≦5%</td><td>≦20%</td><td>0603≧1μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10%</td><td>0201≧0.01μF; 0805≧1μF; 1210≧10μF*</td></tr>
<tr><td>≦14%</td><td>0603≧0.33μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF; 0402≧0.1μF&(0402/X7R≧0.056μF); 0603≧0.47μF;
0805≧2.2μF;1206≧4.7μF;1210≧22μF(1210X5R≧10μF)*; TT series</td></tr>
<tr><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≦5%</td><td>≦10%</td><td>0603≧0.15μF; 0805≧0.68μF; 1206≧2.2μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.01μF(0201/X7R≧0.022μF); 0402≧0.033μF;
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;
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>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF; TT series</td></tr>
<tr><td>≦20%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦10%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0402≧0.047μF; 0603≧0.1μF; 0805≧0.33μF; 1206≧1μF;
1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0402≧0.068μF; 0603≧0.47μF; 1206≧4.7μF; 1210≧22μF;
TT series</td></tr>
<tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">≦10%</td><td>≦12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>≦12.5%</td><td>≦20%</td><td>0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF;
1812≧47μF; TT series</td></tr>
<tr><td>10V</td><td>≦20%</td><td>≦30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is smaller.
Class II (X7R, X7S, X6S, X5R, Y5V)
<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: 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; 01R5/X5R</td></tr>
</table>
</td></tr>
</table>

** "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.

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>15.</td><td>High Temperature Load (Endurance)</td><td>
*Test temp. :
X8G, X8R: 150±3°C
NP0, X7R/ X7S: 125±3°C
X6S: 105±3°C
X5R, Y5V: 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>0201</td><td>X5R/X7R/X6S</td><td>≦10V</td><td>C≧0.1μF</td></tr>
<tr><td></td><td></td><td>≧16V</td><td>C>0.1μF</td></tr>
<tr><td rowspan="5">0402</td><td>X5R</td><td>≦16V</td><td>C>1.0μF</td></tr>
<tr><td></td><td>25V,50V</td><td>C≧1.0μF</td></tr>
<tr><td rowspan="2">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>X7R/X7S/Y5V</td><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</td></tr>
<tr><td>X5R/X6S/X7S</td><td>25V</td><td>C≧1.0μF</td></tr>
<tr><td>X7R</td><td>35V</td><td>C≧1.0μF</td></tr>
<tr><td rowspan="5">0805</td><td rowspan="3">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>X7R/X6S/X7S</td><td rowspan="2">16V,25V</td><td>C≧10μF</td></tr>
<tr><td>X5R</td><td>C≧22μF</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>X5R/X7R/X6S</td><td>16V</td><td>C≧47μF</td></tr>
<tr><td>X7R</td><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>TT18</td><td>Y5V</td><td>6.3V,10V</td><td>C≧2.2μF</td></tr>
<tr><td rowspan="2">TT21</td><td>Y5V</td><td>6.3V</td><td>C≧10μF</td></tr>
<tr><td>X5R/X7R/X6S</td><td>≦10V</td><td>C≧10μF</td></tr>
<tr><td>TT31</td><td>Y5V</td><td>6.3V</td><td>C≧22μF</td></tr>
</table>
**1WV items must follow de-rating conditions

(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>X5R/X6S</td><td>16V/25V</td><td>C=0.1μF</td></tr>
<tr><td>X7R</td><td>16V</td><td>C≧0.022μF</td></tr>
<tr><td rowspan="3">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>Y5V</td><td>16V</td><td>C≧0.47μF</td></tr>
<tr><td rowspan="5">0603</td><td>X7S</td><td>50V~100V</td><td>C>0.22μF</td></tr>
<tr><td rowspan="2">X7R</td><td>50V</td><td>C>0.1μF</td></tr>
<tr><td>25V</td><td>C=1.0μF</td></tr>
<tr><td>X5R</td><td>50V</td><td>C≧1.0μF</td></tr>
<tr><td>X5R/X7R/
X6S/X7S</td><td>10V,16V</td><td>C≧1.0μF</td></tr>
<tr><td>Y5V</td><td>16V</td><td>C≧2.2μF</td></tr>
<tr><td rowspan="5">0805</td><td rowspan="4">X5R/X7R/
X6S/X7S</td><td>100V</td><td>C≧0.47μF</td></tr>
<tr><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>Y5V</td><td>16V</td><td>C≧4.7μF</td></tr>
<tr><td rowspan="4">1206</td><td rowspan="2">X7R</td><td>100V</td><td>C≧1.0μF</td></tr>
<tr><td>50V</td><td>C=4.7μF</td></tr>
<tr><td rowspan="2">X5R/X6S/X7S</td><td>100V</td><td>C>1.0μF</td></tr>
<tr><td>50V</td><td>C=4.7μF</td></tr>
<tr><td>1210</td><td>X5R/X7R/
X6S/X7S</td><td>50V~100V</td><td>C≧2.2μF</td></tr>
<tr><td>1825
2220
2225</td><td>X7R</td><td>100V~250V</td><td>C≧1.0μF</td></tr>
</table>
(3) ≦6.3V or C≧10μF or TT series:150% of rated voltage.
(4) 10V~250V: 200% of rated voltage.
(5) 400V~450V: 120% of rated voltage.
(6) 500V: 150% of rated voltage.
(7) 630~3000V: 120% of rated voltage.
(8) Ur=4000V: 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**.
</td><td>
* No remarkable damage.
Cap change: NP0, X8G: ±3.0% or ±0.3pF whichever is larger
X7R, X7S, X6S, X5R, X8R: ≥10V**within ±12.5%; 6.3V within ±25%; TT series,within ±25%
**10V: 0603≧4.7μF; 0402≧1μF; 0201≧0.1μF, within ±25%;
Y5V: ≥10V, within ±30%; 6.3V, within +30/-40%
Q/D.F.value: NP0, X8G: More than 30pF, Q≥350; 10pF≤C<30pF, Q≥275+2.5C;
Less than 10pF, Q≥200+10C

X8R: ≤7.5%
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="3">≧100V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>1206≧0.47μF</td></tr>
<tr><td>≦7.5%</td><td>0603≧0.068μF; 0805>0.1μF; 1206≧1μF; 1210≧2.2μF; TT series</td></tr>
<tr><td>≦20%</td><td>0805>0.22μF; 1210≧3.3μF</td></tr>
<tr><td rowspan="3">50V</td><td rowspan="3">≦3%</td><td>≦6%</td><td>0201(50V); 0603≧0.047μF; 0805≧0.18μF; 1206≧0.47μF</td></tr>
<tr><td>≦10%</td><td>0201≧0.01uF; 1210≧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>35V</td><td>≦5%</td><td>≦20%</td><td>0603≧1μF; 0805≧2.2μF; 1206≧2.2μF; 1210≧10μF</td></tr>
<tr><td rowspan="4">25V</td><td rowspan="4">≦5%</td><td>≦10%</td><td>0201≧0.01μF; 0805≧1μF; 1210≧10μF*</td></tr>
<tr><td>≦14%</td><td>0603≧0.33μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.1μF; 0402≧0.1μF&(0402/X7R≧0.056μF); 0603≧0.47μF;
0805≧2.2μF;1206≧4.7μF;1210≧22μF(1210X5R≧10μF)*; TT series</td></tr>
<tr><td>≦20%</td><td>0402≧0.47μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≦5%</td><td>≦10%</td><td>0603≧0.15μF; 0805≧0.68μF; 1206≧2.2μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0201≧0.01μF(0201/X7R≧0.022μF); 0402≧0.033μF;
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;
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>
Y5V:
<table>
<tr><th>Rated vol.</th><th>D.F.≦</th><th colspan="2">Exception of D.F.≦</th></tr>
<tr><td rowspan="2">≧50V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0603≧0.1μF; 0805≧0.47μF; 1206≧4.7μF; TT series</td></tr>
<tr><td>≦20%</td><td>1210≧6.8μF</td></tr>
<tr><td>35V</td><td>≦10%</td><td>---</td><td>---</td></tr>
<tr><td rowspan="2">25V</td><td rowspan="2">≦7.5%</td><td>≦10%</td><td>0402≧0.047μF; 0603≧0.1μF; 0805≧0.33μF;
1206≧1μF; 1210≧4.7μF</td></tr>
<tr><td>≦15%</td><td>0402≧0.068μF; 0603≧0.47μF; 1206≧4.7μF;
1210≧22μF; TT series</td></tr>
<tr><td rowspan="2">16V
(C<1.0μF)</td><td rowspan="2">≦10%</td><td>≦12.5%</td><td>0402≧0.068μF; 0603≧0.68μF</td></tr>
<tr><td>≦20%</td><td>0402≧0.22μF</td></tr>
<tr><td>16V
(C≧1.0μF)</td><td>≦12.5%</td><td>≦20%</td><td>0603≧2.2μF; 0805≧3.3μF; 1206≧10μF; 1210≧22μF;
1812≧47μF; TT series</td></tr>
<tr><td>10V</td><td>≦20%</td><td>≦30%</td><td>0402≧0.47μF</td></tr>
<tr><td>6.3V</td><td>≦30%</td><td>---</td><td>---</td></tr>
</table>
*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is smaller.
Class II (X7R, X7S, X6S, X5R, Y5V)
<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: 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; 01R5/X5R</td></tr>
</table>
</td></tr>
<tr><td>16.</td><td>ESR</td><td>For RF Series only, refer to data sheet.</td><td>----</td></tr>
</table>

** "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.

■ Constructions

No.	Name		NPO,X8G	X7R,X7S,X6S,X5R,Y5V,X8R
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	

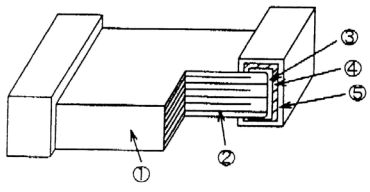


Fig. 1 The construction of MLCC

■ 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:

a. 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.)

b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.

c. 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 N_2 within oven are recommended.

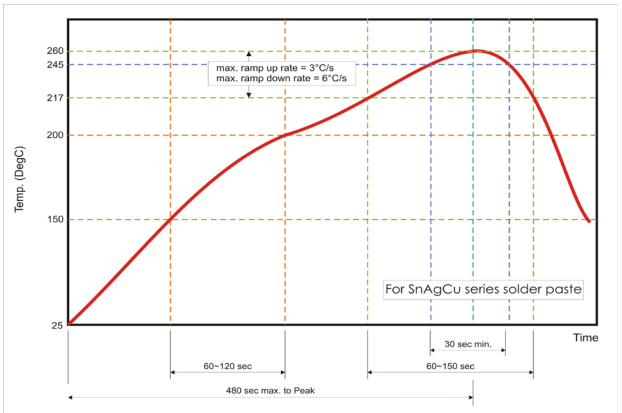


Fig. 2 Recommended reflow soldering profile for SMT process with SnAgCu series solder paste.

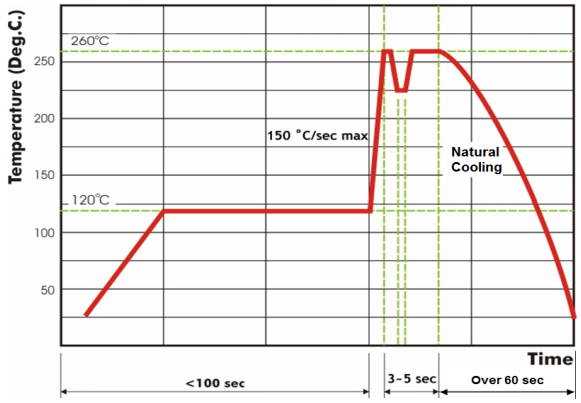


Fig. 3 Recommended wave soldering profile for SMT process with SnAgCu series solder.

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