中国東莞·香港·深圳·杭州

Research And Development And Direct Selling Of High Voltage Chip Capacitor

HEC Holy Stone

SAMWHA SAMWHA

CERAMIC CAPACITOR X-REFERENCE GUIDE

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Honest Yangtze Enterprise HK Co., Ltd.

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Component Quick Reference

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Capacitance Availability Guide – Standard MLCC

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Capacitance Availability Guide

Vdc	Dielectric	0201	0402	0603	0805	1206	1210	1808	1812	1825	2220	2225
6.3v	NP0											
	X7R	100nF	1uF	2.2uF	10uF	22uF						
	X5R	2.2uF	10uF	47uF	100uF	100uF	220uF					
10V	NP0											
	X7R		100nF	2.2uF	10uF	22uF	47uF					
	X5R	1uF	10uF	22uF	47uF	47uF	100uF					
16V	NP0	100pF		1nF	12nF	47nF	100nF		120nF	100nF	120nF	120nF
	X7R	3.9nF	100nF	1uF	10uF	10uF	22uF					
	X5R		4.7uF	10uF	22uF	47uF	100uF					
25V	NP0	100pF		1nF	12nF	47nF	100nF		120nF	100nF	120nF	120nF
	X7R	2.2nF	47nF	1uF	4.7uF	10uF	22uF		22uF			
	X5R		2.2uF	10uF	22uF	47uF	22uF					
35V	NP0											
	X7R				2.2uF	10uF	10uF					
	X5R		2.2uF	10uF	10uF							
50V	NP0		820pF	1nF	12nF	47nF	100nF		120nF	100nF	120nF	120nF
	X7R		22nF	1uF	2.2uF	4.7uF	10uF		10uF	2.2uF	22uF	
	X5R			2.2uF	10uF	10uF	10uF					
100V	NP0			1nF	12nF	12nF	47nF		100nF	100nF	33nF	82nF
	X7R			100nF	100nF	2.2uF	4.7uF		2.2uF	1uF	10uF	
	X5R					2.2uF						
200V	NP0			560pF	3.9nF	10nF	6.8nF		27nF	100nF	33nF	33nF
	X7R				47nF	220nF	680nF	560nF	1.0uF	1uF	2.2uF	2.2uF
	X5R											
250V	NP0			560pF	3.9nF	10nF	6.8nF		27nF	100nF	33nF	33nF
	X7R				47nF	220nF	680nF	560nF	1.0uF	1uF	2.2uF	1uF
	X5R											
500V	NP0				3.9nF	4.7nF	12nF	2.4nF	8.2nF	100nF	27nF	15nF
	X7R				22nF	68nF	120nF	47nF	100nF	470nF	560nF	
	X5R											
630V	NP0					4.7nF	12nF	2.2nF	8.2nF	47nF	27nF	15nF
	X7R					47nF	68nF			330nF	470nF	
	X5R											
1KV	NP0				1.5nF	1nF	3.3nF	2.2nF	6.8nF		18nF	15nF
	X7R				2.2nF	22nF	47nF	47nF	100nF	100nF	220nF	100nF
	X5R											
2KV	NP0					390pF		1nF	1.5nF		22nF	10nF
	X7R					6.8nF	10nF	6.8nF	33nF	47nF	47nF	68nF
	X5R											
3KV	NP0					470pF		1nF	1.2nF		22nF	3.3nF
	X7R					1.2nF	2.7nF	5.6nF	10nF	18nF	18nF	47nF
	X5R											
4KV	NP0							220pF				
	X7R							1nF			10nF	4.7nF
	X5R											
5KV	NP0							47pF			120pF	
	X7R							1nF			4.7nF	
	X5R											

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Safety Certified SMD Capacitors								
Class	Vac	Dielectric	1808	1812	2208	2211	2220	2825
X1/Y2	250Vrms	NPO	2.0pF - 330pF	2.0pF - 680pF	2.0pF - 330pF	2.0pF - 1nF	2.0pF - 1.2nF	N/A
	250Vrms	X7R	150pF - 1nF	130pF - 1nF	36pF - 1nF	68pF - 2.7nF	100pF - 4.7nF	N/A
X2	250Vrms	NPO	2.0pF -1nF	N/A	N/A	N/A	N/A	N/A
	250Vrms	X7R	150pF - 2.2nF	330pF - 4.7nF	N/A	N/A	150pF - 33nF	47nF - 56nF
	305Vrms	X7R	N/A	N/A	N/A	N/A	150pF - 33nF	N/A

Safety Certified DISC Capacitors					
Class / TC	NPO	SL	Y5P	Y5U	Y5V
X1 : 400VAC Y2 : 250VAC	2.0pF - 10pF	8.0pF - 68pF	8.0pF - 1nF	1nF - 4.7nF	1nF - 1.5nF 2.2nF - 3.3nF 4.7nF - 10nF
X1 : 440VAC Y1 : 250VAC	2.0pF - 5.0pF	8.0pF - 68pF	33pF, 47pF, 100pF 150pF, 220pF, 330pF - 470pF, 680pF, 1nF	1nF - 4.7nF	NA
X1 : 440VAC Y1 : 400VAC	2.0pF - 5.0pF	8.0pF - 68pF	100pF, 150pF, 220pF, 330pF - 470pF, 680pF, 1nF	1nF - 4.7nF	NA

◆ All ranges are Lead (Pb) free

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ISO Certification

Plant	Certificated	Date	Organization	Registration No.
Taipei HQ/Lung Tan Factory	ISO 9001:2015	20 March, 2002	BVC	TWN3864491Q
Taipei HQ/Lung Tan Factory	ISO 14001:2015	29 May, 2003	BVC	TWN4046962E
Taipei HQ/Lung Tan Factory	IATF16949:2016	27 September, 2016	BVC	322006

ISO 9001:2015

ISO 9001 BUREAU VERITAS Certification

ISO 14001:2015

ISO 14001 BUREAU VERITAS Certification

IATF16949: 2016

IATF 16949 BUREAU VERITAS Certification

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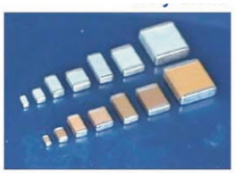
Multilayer Ceramic Chip Capacitors

[Middle Voltage Capacitors – NPO,X7R,100Vdc to 630Vdc]



MVC Series

Holy Stone high voltage products are designed and manufactured to meet the general requirements of international standards. The product offering is well suited for commercial and industrial applications and includes NP0 (C0G) and X7R characteristics in sizes 0603 to 2225 and with working voltages up to 630Vdc.

◆ Features

- ❑ Special internal electrode design offers the highest voltage rating
- ❑ Surface mount suitable for wave and reflow soldering
- ❑ High reliability
- ❑ RoHS compliant

◆ Applications

- ❑ Suitable for LAN/WLAN interface, Back-Lighting Inverter, DC-DC Converters, Ballast, Modems and Power Supplies.

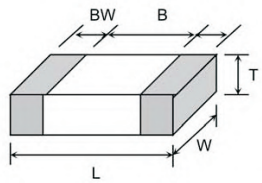
◆ Summary of Specifications

Operation Temperature	-55 ℃ ~ +125 ℃
Rated Voltage	100Vdc ~ 630Vdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class Ⅱ)
Dissipation Factor	NP0 : Q≧1000 , X7R : D.F.≦2.5%
Insulation Resistance	10GΩ or 500/CΩ, whichever is smaller
Aging	NP0 : 0% , X7R : Typically 1.0% per decade of time
Dielectric Strength	100V ≦ V < 500V : 200% Rated Voltage
	500V ≦ V < 1000V : 150% Rated Voltage
	1000V≦ V : 120% Rated Voltage

◆ How To Order

C	1206	X	102	K	631	T	E	X	Y
Product Code C: MLCC (Multilayer Ceramic Capacitor)	**Chip Size** Ex.: 0603 0805 1206 1210 1808 1812 1825 2220 2225	**Dielectric** Ex.: N: NP0 X: X7R	**Capacitance Unit : pF** Ex.: 2R0:2.0pF 100:10x10⁰ 471:47x10¹ 102:10x10²	**Tolerance** Ex.: C:+/-0.25pF D:+/-0.50pF J :+/- 5% K :+/-10% M:+/-20%	**Rated Voltage** Ex.: 101: 100Vdc 251: 250Vdc 501: 500Vdc 631: 630Vdc	**Packaging** Ex. T: T&R 7" R: T&R 13" B: Bulk	**Thickness (mm) (Optional)** Ex: E:1.60±0.20 F:2.0±0.20	**Special Requirement (Optional)** Ex.: O: Arc Prevention Coating X: Polymer Termination (Super Term) Z: Coating & Polymer Termination	**Suffix Code** Y

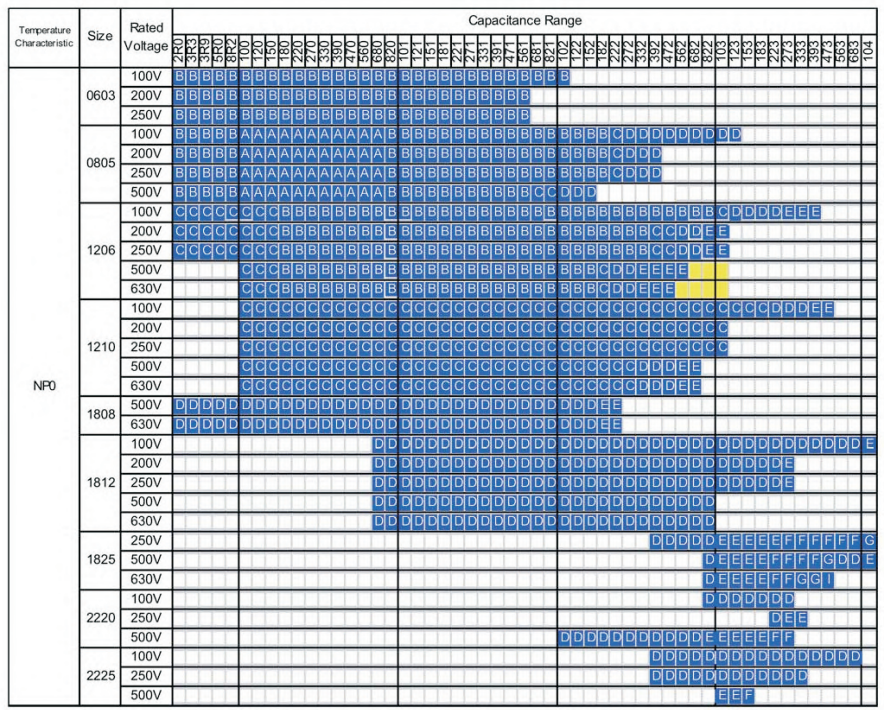
◆ Dimensions



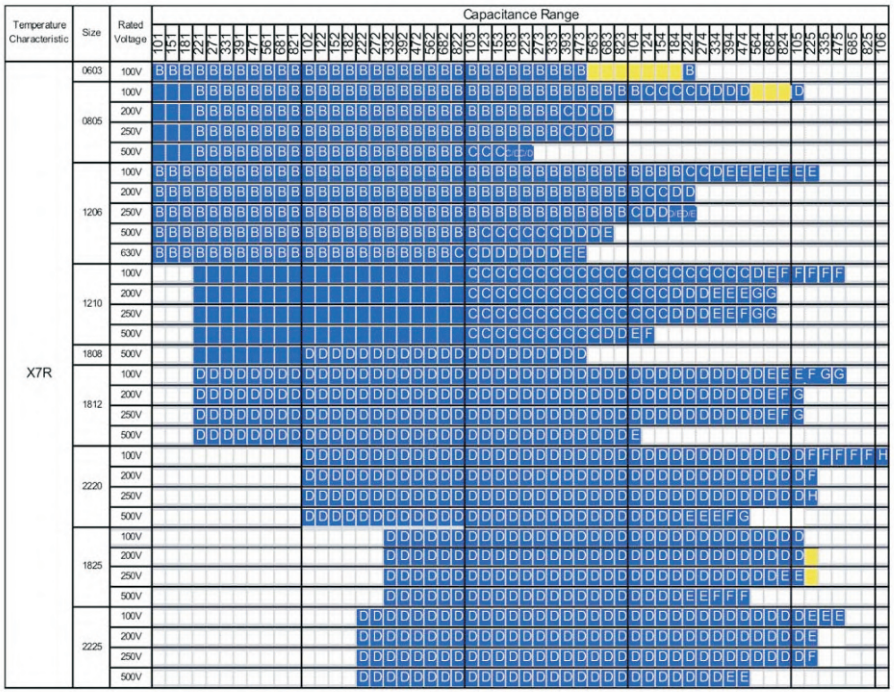
Unit : mm [inches]

TYPE	L	W	T (max)	B (min)	BW (min)
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031 ±.004]	1.00 [.039]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049±.012]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.063±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.012]	2.60 [.102]	1.60 [.059]	0.30 [.012]
1808	4.60±0.30 [.181±.012]	2.00±0.20 [.079±.008]	2.20 [.087]	2.50 [.098]	0.30 [.012]
1812	4.60±0.30 [.181±.012]	3.20±0.30 [.126±.012]	3.00 [.118]	2.50 [.098]	0.30 [.012]
1825	4.60±0.30 [.181±.012]	6.35±0.40 [.250±.016]	3.40 [.118]	2.50 [.098]	0.30 [.012]
2220	5.70±0.40 [.220±.016]	5.00±0.40 [.197±.016]	3.00 [.118]	3.50 [.137]	0.30 [.012]
2225	5.70±0.40 [.220±.016]	6.35±0.40 [.250±.016]	3.00 [.118]	3.50 [.137]	0.30 [.012]

◆ Capacitance Range – NP0 / 100Vdc to 630Vdc



◆ Capacitance Range – X7R / 100Vdc to 630Vdc



- *The yellow indication denotes values that are under development. Please contact Holy Stone office for further details*
- *Other dimensions, capacitance values and voltages ratings are available on request. Please contact Holy Stone.*

◆ Thickness Specification

Symbol Code	O	A	B	C	D	E	F	G	H	I
Thickness(mm)	0.5±0.05	0.6±0.1	0.85±0.15	1.0+0.1/-0.05	1.25±0.20	1.6±0.2	2.0±0.2	2.4±0.2	2.8±0.2	3.2±0.2

▪ Specifications & Test Conditions please see P49~P52

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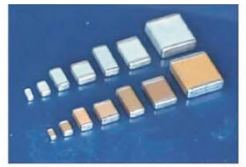
Multilayer Ceramic Chip Capacitors

[High Voltage Capacitors – NPO, X7R 1KVdc to 5KVdc]



HVC Series

Holy Stone high voltage products are designed and manufactured to meet the general requirements of international standards. The product offering is well suited for commercial and industrial applications and includes NP0 (C0G) and X7R characteristics in sizes 0805 to 2225 and with working voltages from 1KV up to 5KV.

◆ Features

- ❑ Special internal electrode design offers the highest voltage rating
- ❑ Surface mount suitable for wave and reflow soldering
- ❑ High reliability
- ❑ RoHS compliant

◆ Applications

- ❑ Suitable for LAN/WLAN interface, Back-Lighting Inverter, DC-DC Converters, Ballast, Modems and Power Supplies.

◆ Summary of Specifications

Operation Temperature	-55 ℃ ~ +125 ℃
Rated Voltage	1KVdc ~ 5KVdc
Temperature Coefficient	NP0 : ≤ ± 30ppm/ ℃ , -55 ℃ ~ +125 ℃ (EIA Class Ⅰ)
	X7R : ≤ ± 15% , -55 ℃ ~ +125 ℃ (EIA Class Ⅱ)
Dissipation Factor	NP0 : Q≧1000 , X7R : D.F.≦2.5%
Insulation Resistance	10GΩ or 500/CΩ, whichever is smaller
Aging	NP0: 0% , X7R : Typically 1.0% per decade of time
Dielectric Strength	100V ≦ V < 500V : 200% Rated Voltage
	500V ≦ V < 1000V : 150% Rated Voltage
	1000V≦ V : 120% Rated Voltage

◆ How To Order

C	1206	X	102	K	202	T	E	X	Y
Product Code C: MLCC (Multilayer Ceramic Capacitor)	**Chip Size** Ex.: 0603 0805 1206 1210 1808 1812 1825 2220 2225	**Dielectric** Ex.: N: NP0 X: X7R	**Capacitance Unit : pF** Ex.: 2R0:2.0pF 100:10×10⁰ 471:47×10¹ 102:10×10²	**Tolerance** Ex.: C:+/-0.25pF D:+/-0.50pF J :+/- 5% K :+/-10% M:+/-20%	**Rated Voltage** Ex.: 102: 1000Vdc 202: 2000Vdc 302: 3000Vdc 402: 4000Vdc 502: 5000Vdc	**Packaging** Ex. T: T&R 7" R: T&R 13" B: Bulk	**Thickness (mm) (Optional)** Ex: E:1.60±0.20 F:2.0±0.20	**Special Requirement (Optional)** Ex.: O: Arc Prevention Coating X: Polymer Termination (Super Term) Z: Z: Coating & Polymer Termination	**Suffix Code** Y

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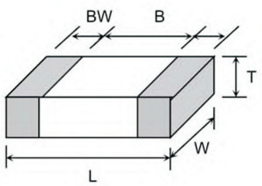
◆ Dimensions



Unit : mm [inches]

TYPE	L	W	T (max)	B (min)	BW (min)
0603	1.60±0.10 [.063±.004]	0.80±0.10 [.031 ±.004]	1.00 [.039]	0.40 [.016]	0.15 [.006]
0805	2.00±0.20 [.079±.012]	1.25±0.20 [.049±.012]	1.45 [.057]	0.70 [.028]	0.20 [.008]
1206	3.20±0.30 [.126±.012]	1.60±0.20 [.063±.012]	1.80 [.071]	1.50 [.059]	0.30 [.012]
1210	3.20±0.30 [.126±.012]	2.50±0.20 [.098±.012]	2.60 [.102]	1.60 [.059]	0.30 [.012]
1808	4.60±0.30 [.181±.012]	2.00±0.20 [.079±.008]	2.20 [.087]	2.50 [.098]	0.30 [.012]
1812	4.60±0.30 [.181±.012]	3.20±0.30 [.126±.012]	3.00 [.118]	2.50 [.098]	0.30 [.012]
1825	4.60±0.30 [.181±.012]	6.35±0.40 [.250±.016]	3.00 [.118]	2.50 [.098]	0.30 [.012]
2220	5.70±0.40 [.220±.016]	5.00±0.40 [.197±.016]	3.40 [.118]	3.50 [.137]	0.30 [.012]
2225	5.70±0.40 [.220±.016]	6.35±0.40 [.250±.016]	3.40 [.118]	3.50 [.137]	0.30 [.012]

◆ Capacitance Range – NP0 / 1KVdc to 2KVdc

Temperature Characteristic	Size	Rated Voltage	2R0	3R3	3R9	5R0	8R2	100	120	150	180	220	270	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561	681	821
NP0	0805	1KV						B	B	B	B	B	B	B	B	B	C	C	C	C	D	D	D								
	1206	1KV						C	C	C	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	D	D	D	D	E
	1206	2KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E				
	1210	1KV						D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
	1808	1KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	E
	1808	2KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	F	G
	1812	1KV																D	D	D	D	D	D	D	D	D	D	D	D	D	D
	1812	2KV																D	D	D	D	D	D	D	D	D	E	E	E	F	F
	2220	1KV																													
	2225	1KV																													

Temperature Characteristic	Size	Rated Voltage	102	122	152	182	222	272	332	392	472	562	682	822	103	123	153	183	223	273	333	393	473	563	683
NP0	0805	1KV																							
	1206	1KV	E																						
	1206	2KV																							
	1210	1KV	D	D	E	E	E	F	G																
	1808	1KV	E	E	E	E	E																		
	1808	2KV	H																						
	1812	1KV	E	E	F	F	F	F	F	F	F	F	G												
	1812	2KV	F	F	F																				
	2220	1KV	D	D	D	D	D	D	D	D	D	D	D	E	E	F	G	I							
	2225	1KV													F	F	F								

◆ Capacitance Range – NP0 / 3KVdc to 5KVdc

Temperature Characteristic	Size	Rated Voltage	2R0	3R3	3R9	5R0	8R0	8R2	100	120	150	180	220	270	330	390	470	560	680	820	101	121	151	181	221	271	331	391	471	561	681	821	102	122	152	182	222
NP0	1206	3KV	D	D	D	D	D	D	D	D	D	D	D	E	E	E	E																				
	1808	3KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	F	F	F	F	F	F	F	F	F	F				
	1808	5KV	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F																				
	1812	3KV	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	E	E	E	E	E	E	E	F	F	G	H			
	2208	5KV	F	F	F	F	F	F	F	F	F	F	F	F	F	F																					
	2211	5KV	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F																		
	2220	5KV	D	D	D	D	D	D	D	D	D	D	D	D	E	E	E	E	E	E	E	E															

- ***The yellow indication denotes values that are under development. Please contact Holy Stone office for further details***
- ***Other dimensions, capacitance values and voltages ratings are available on request. Please contact Holy Stone.***

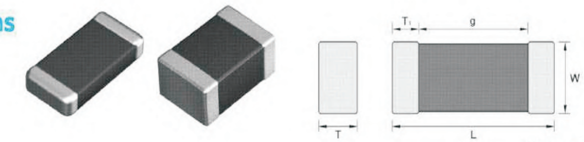
◆ Thickness Specification

Symbol Code	O	A	B	C	D	E	F	G	H	I
Thickness(mm)	0.5±0.05	0.6±0.1	0.85±0.15	1.0+0.1/-0.05	1.25±0.20	1.6±0.2	2.0±0.2	2.4±0.2	2.8±0.2	3.2±0.2

Holy Stone

SMD Type

Shape & Dimensions



(Unit : mm)

Code(inch)	Dimensions				T1(min)
	Length		Width		
	L	Tol(±)	W	Tol(±)	
0603(0201)	0.60	0.03	0.30	0.03	0.05
1005(0402)	1.00	0.05	0.50	0.05	0.05
1608(0603)	1.60	0.15	0.80	0.10	0.10
2012(0805)	2.00	0.20	1.25	0.15	0.10
3216(1206)	3.20	0.30	1.60	0.20	0.15
3225(1210)	3.20	0.40	2.50	0.25	0.15
4520(1808)	4.50	0.40	2.00	0.25	0.20
4532(1812)	4.50	0.40	3.20	0.30	0.20
5750(2220)	5.70	0.50	5.00	0.40	0.30

*1608 Size ≥ 10㎌ ⇒ W : 0.8±0.15, T : 0.8±0.15

How to Order(Product Identification)

CS 1608 X7R 104 K 160 N R B

1 2 3 4 5 6 7 8 9

1 Type

CS : SMD

SA : ARRAY

2 Size Code

This is expressed in tens of a millimeter.

The first two digits are the length, the last two digits are width.

Size(mm)	0603	1005	1608	2012	3216	3225	4520	4532	5750

3 Temperature Coefficient Code

Temperature Characteristice	Temperature Range	Capacitance Change or Temperature Coefficient	Operating Temperature Range
C0G	–55 to 125℃	0±30ppm/℃	–55 to 125℃
X7R	–55 to 125℃	±15%	–55 to 125℃
X5R	–55 to 85℃	±15%	–55 to 85℃
Y5V	–30 to 85℃	+22, –82%	–30 to 85℃

4 Capacitance Code(Pico Farads)

The nominal capacitance value in pF is expressed by three digit numbers.
The first two digits represents significant figures and the last digit denotes the number of zero
Ex.) 104 = 100000pF R denotes decimal 8R2 = 8.2pF

5 Capacitance Tolerance Code

Code	Tolerance	Code	Tolerance
B	±0.1pF	M	±20%
C	±0.25pF	P	+100, −0%
D	±0.5pF	Z	+80, −20%
F	±1.0%	H	+0.25/−0pF
G	±2.0%	I	+0/−0.25pF
J	±5%	U	+5/−0%
K	±10%	V	+0/−5%

6 Voltage Code

Code	6R3	100	160	250	500	101	201	251	631	302
Vol.	DC 6.3V	DC 10V	DC 16V	DC 25V	DC 50V	DC 100V	DC 200V	DC 250V	DC 630V	DC 3000V

7 Termination Code

Ex.) N : Ni-Sn(Nickel-Tin Plate)

8 Packing Code

Ex.) R : Reel Type B : Bulk Type

9 Thickness Option

Size(mm)	Thickness(mm)		Code	Size(mm)	Thickness(mm)		Code
	t	Tol(±)			t	Tol(±)	
0603/1005	0.3	0.03	-	3216	1.15	0.15	E
1005	0.5	0.05	-	3216/3225	1.6	0.2	I
2012	0.6	0.1	A	3225	1.8	0.2	J
1608	0.8	0.1	B	3225/4532/5750	2	0.25	K
2012/3216	0.85	0.15	B	3225/4532/5750	2.5	0.25	L
2012	1.25	0.15	E				

Size(mm)	Code	Packaging	Size(mm)	Code	Packaging
0603/1005	-	Paper Taping	3216	E	Embossed Taping
1005	-	Paper Taping	3216/3225	I	Embossed Taping
2012	A	Paper Taping	3225	J	Embossed Taping
1608	B	Paper Taping	3225/4532/5750	K	Embossed Taping
2012/3216	B	Paper Taping	3225/4532/5750	L	Embossed Taping
2012	E	Embossed Taping			

Typical Performance Characteristics

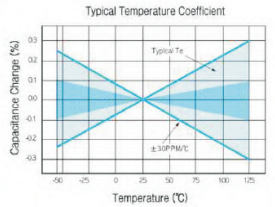
COG

Application

Suited for precision circuits, requiring stable dielectric characteristics, negligible dependence of capacitance and dissipation factor on time, voltage and frequency.

Dielectric Characteristics

Temperature Characteristic	0±30ppm/℃
Operating Temperature	−55~125℃
Capacitance Tolerance	>10pF : ±5%, ±10%,(±1%, ±2%, ±20%) ≤10pF : ±0.1pF, ±0.25pF, ±0.5pF
Dissipation Factor & Q	≥30pF : DF≤0.1%, Q≥1000 <30pF : Q≥400+20×C
Insulation Resistance	More than 10,000MΩ or 500ΩF (Whichever is smaller)
Dielectric Strength	>3×RVDC
Test Voltage	0.5 to 5Vrms(≤1000pF), 1±0.2Vrms(>1000pF)
Test Frequency	1±0.1MHz(≤1000pF), 1±0.1kHz(>1000pF)



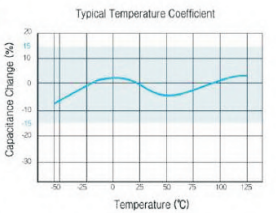
X7R

Application

Stable class II dielectric properties, suited for by-pass and coupling purposes, filtering, frequency discrimination, DC blockage, and as voltage transient suppression elements.

Dielectric Characteristics

Temperature Characteristic	±15%
Operating Temperature	−55~125℃
Capacitance Tolerance	±10%, ±20%,(±5%, +80~−20%)
Dissipation Factor & Q	50V Min. : 2.5% Max. 25V Min. : 3.0% Max. 16V Min. : 3.5% Max. 10V Min. : 5.0% Max. 6.3V Min. : 5.0% Max. Thin layer lange capacitors type 12.5% Max.
Insulation Resistance	More than 10,000MΩ or 500ΩF(Whichever is smaller) Thin layer lange capacitors type 50ΩF Min.
Dielectric Strength	>2.5×RVDC
Test Voltage	1±0.2Vrms(≤10μF) 0.5±0.1Vrms(>10μF)
Test Frequency	1±0.1kHz(≤10μF) 120±24Hz(>10μF)



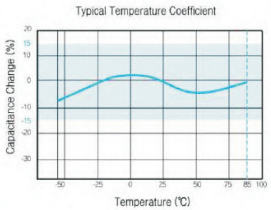
X5R

Application

Stable class II dielectric properties, suited for by-pass and coupling purposes, filtering, frequency discrimination, DC blockage, and as voltage transient suppression elements.

Dielectric Characteristics

Temperature Characteristic	±15%
Operating Temperature	−55~85℃
Capacitance Tolerance	±10%, ±20%,(±5%, +80~−20%)
Dissipation Factor & Q	50V Min. : 2.5% Max. 25V Min. : 3.0% Max. 16V Min. : 3.5% Max. 10V Min. : 5.0% Max. 6.3V Min. : 5.0% Max. Thin layer lange capacitors type 12.5% Max.
Insulation Resistance	More than 10,000MΩ or 500ΩF (Whichever is smaller) Thin layer lange capacitors type 50ΩF Min.
Dielectric Strength	>2.5×RVDC
Test Voltage	1±0.2Vrms(≤10㎌) 0.5±0.1Vrms(>10㎌)
Test Frequency	1±0.1kHz(≤10㎌) 120±24Hz(>10㎌)



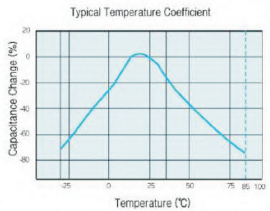
Y5V

Application

The Hi-K(Y5V) dielectrics deliver high capacitance density and are ideally suited for applications where space is at a premium, or as replacement for tantalum capacitors. Typically applications include use as by-pass or decoupling elements. Best performance is obtained at or near room temperature, with low DC bias.

Dielectric Characteristics

Temperature Characteristic	+22%~−82%
Operating Temperature	−30~85℃
Capacitance Tolerance	−20~+80%(±20%)
Dissipation Factor & Q	50V Min. : 5% Max. 25V Min. : 7% Max. 16V Min. : 9% Max. 10V Min. : 12.5% Max. 6.3V Min. : 15% Max. Thin layer lange capacitors type 20% Max.
Insulation Resistance	More than 10,000MΩ or 500ΩF(Whichever is smaller) Thin layer lange capacitors type 50ΩF Min.
Dielectric Strength	>2.5×RVDC
Test Voltage	1±0.2Vrms(≤10㎌) 0.5±0.1Vrms(>10㎌)
Test Frequency	1±0.1kHz(≤10㎌) 120±24Hz(>10㎌)



Appendix I

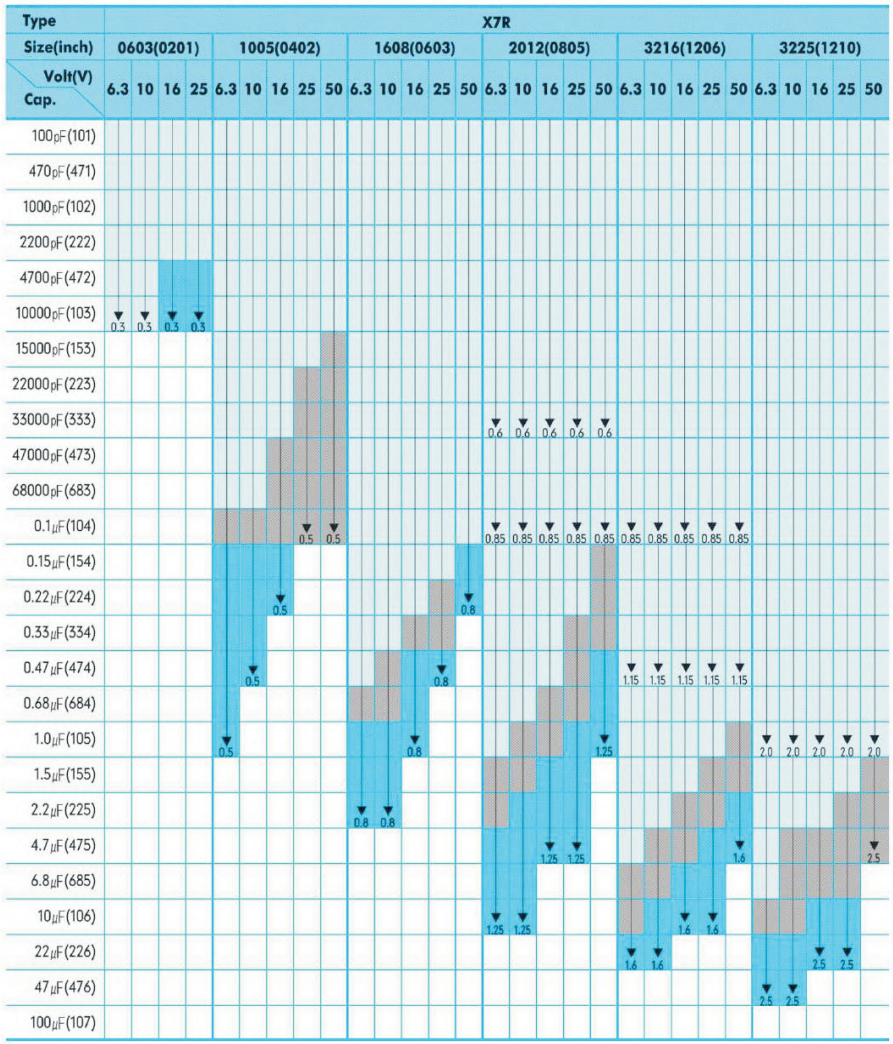
C0G−Temperature Compensating Type(0603~3216)

Type	C0G									
Size(inch)	0603(0201)		1005(0402)		1608(0603)		2012(0805)		3216(1206)	
Volt(V) / Cap.	25	50	25	50	25	50	25	50	25	50
0.5㎊(0R5)										
1㎊(010)										
2㎊(020)										
3㎊(030)										
4㎊(040)										
5㎊(050)										
6㎊(060)										
7㎊(070)										
8㎊(080)										
9㎊(090)										
10㎊(100)										
12㎊(120)										
15㎊(150)										
18㎊(180)										
22㎊(220)										
27㎊(270)										
33㎊(330)										
39㎊(390)										
47㎊(470)										
56㎊(560)										
68㎊(680)										
82㎊(820)										
100㎊(101)										
120㎊(121)										
150㎊(151)										
180㎊(181)										
220㎊(221)		0.3								
270㎊(271)										
330㎊(331)										
390㎊(391)										
470㎊(471)										
560㎊(561)										
680㎊(681)										
820㎊(821)										
1000㎊(102)	0.3									
1200㎊(122)										
1500㎊(152)									1.15	1.15
1800㎊(182)										
2200㎊(222)							0.6	0.6		
2700㎊(272)										
3300㎊(332)										
3900㎊(392)										
4700㎊(472)										
5600㎊(562)										
6800㎊(682)										
8200㎊(822)				0.5						
10000㎊(103)			0.5		0.8	0.8				
12000㎊(123)										
15000㎊(153)										
18000㎊(183)										
22000㎊(223)										
27000㎊(273)										
33000㎊(333)							1.25	1.25		
47000㎊(473)										
56000㎊(563)										
68000㎊(683)										
82000㎊(823)										
0.1㎌(104)									1.60	1.60

Temperature Compensating Type : Dissipation Factor Page 22 (No.5)

Appendix II

X7R-High Dielectric Constant Type(0603~3225) & Thin Layer Large-Capacitance Type

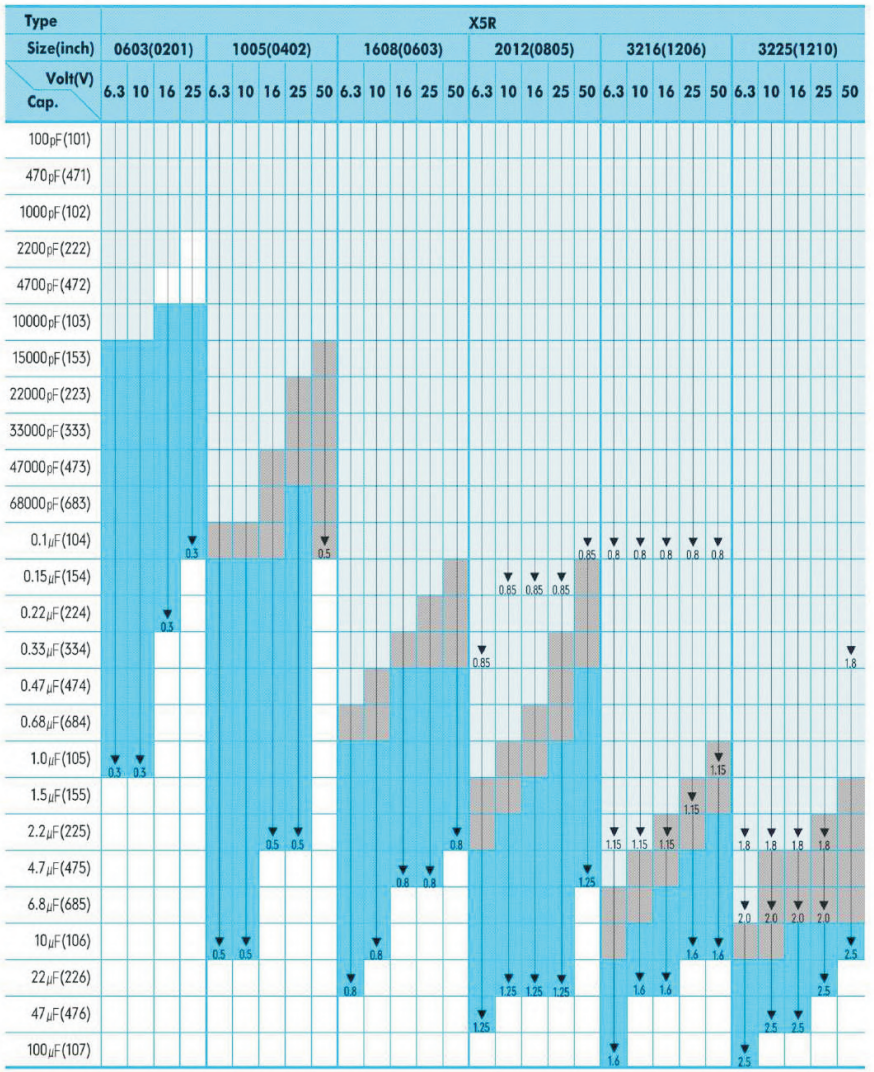


General Type : Dissipation Factor Page 22(No.5)

*General Type : Dissipation Factor Page 22(No.5)

Thin Layer Large-Capacitance Type : Dissipation Factor Page 22(No.5)

X5R-High Dielectric Constant Type(0603~3225) & Thin Layer Large-Capacitance Type



General Type : Dissipation Factor Page 22(No.5)

*General Type : Dissipation Factor Page 22(No.5)

Thin Layer Large-Capacitance Type : Dissipation Factor Page 22(No.5)

Y5V-High Dielectric Constant Type(0603~3225) & Thin Layer Large-Capacitance Type

Type	Y5V																									
Size(inch)	1005(0402)					1608(0603)					2012(0805)					3216(1206)					3225(1210)				
Volt(V) / Cap.	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
1000pF(102)																									
2200pF(222)																									
4700pF(472)																									
10000pF(103)																									
15000pF(153)																									
22000pF(223)					0.5																				
33000pF(333)																									
47000pF(473)																									
68000pF(683)																									
0.1μF(104)				0.5																					
0.15μF(154)																									
0.22μF(224)										0.8															
0.33μF(334)																									
0.47μF(474)			0.5						0.8																
0.68μF(684)																									
1.0μF(105)	0.5	0.5												1.25					1.15	1.15					
1.5μF(155)																									
2.2μF(225)								0.8								1.15	1.15	1.15							
3.3μF(335)							0.8														1.8	1.8	1.8	1.8	
4.7μF(475)						0.8							1.25	1.25							1.8				
6.8μF(685)																									2.0
10μF(106)											1.25	1.25									2.0	2.0		2.0	2.5
22μF(226)																							2.0		
47μF(476)																									
100μF(107)																1.6	1.6	1.6	1.6	1.6	2.5	2.5			

General Type : Dissipation Factor Page 22(No.5)

*General Type : Dissipation Factor Page 22(No.5)

Thin Layer Large-Capacitance Type : Dissipation Factor Page 22(No.5)

Appendix I

C0G-Temperature Compensating Type(0603~3216)

Type	C0G									
Size(inch)	0603(0201)		1005(0402)		1608(0603)		2012(0805)		3216(1206)	
Volt(V) / Cap.	25	50	25	50	25	50	25	50	25	50
0.5pF(0R5)										
1pF(010)										
2pF(020)										
3pF(030)										
4pF(040)										
5pF(050)										
6pF(060)										
7pF(070)										
8pF(080)										
9pF(090)										
10pF(100)										
12pF(120)										
15pF(150)										
18pF(180)										
22pF(220)										
27pF(270)										
33pF(330)										
39pF(390)										
47pF(470)										
56pF(560)										
68pF(680)										
82pF(820)										
100pF(101)										
120pF(121)										
150pF(151)										
180pF(181)										
220pF(221)		0.3								
270pF(271)										
330pF(331)										
390pF(391)										
470pF(471)										
560pF(561)										
680pF(681)										
820pF(821)										
1000pF(102)	0.3									
1200pF(122)										
1500pF(152)									1.15	1.15
1800pF(182)										
2200pF(222)							0.6	0.6		
2700pF(272)										
3300pF(332)										
3900pF(392)										
4700pF(472)										
5600pF(562)										
6800pF(682)										
8200pF(822)				0.5						
10000pF(103)			0.5		0.8	0.8				
12000pF(123)										
15000pF(153)										
18000pF(183)										
22000pF(223)										
27000pF(273)										
33000pF(333)							1.25	1.25		
47000pF(473)										
56000pF(563)										
68000pF(683)										
82000pF(823)										
0.1μF(104)									1.60	1.60

Temperature Compensating Type : Dissipation Factor Page 22 (No.5)

How to Order(Product Identification)

CS 4532 X7R 471 K 302 N R K

1 2 3 4 5 6 7 8 9

1 Type
CS : SMD

2 Size Code

Size(mm)	1608	2012	3216	3225	4520	4532	5750	7566	9595

3 Dielectric (Temp. Coefficient)
COG, X7R

4 Capacitance
1st two digits are value, 3rd digit denotes number of zeros;
331 = 330pF, 104 = 100000pF, 8R2 = 8.2pF

5 Tolerance

Code	Tolerance	Code	Tolerance
B	±0.1pF	C	±0.25pF
D	±0.50pF	F	±1%
G	±2%	J	±5%
K	±10%	M	±20%
Z	+80~-20%		

6 Rated Voltage Code
1st two digits are value, 3rd digit denotes number of zeros; 302 = 3,000V, 502 = 5,000V, 722 = 7,200V

7 Plating
Ni / Sn Plated

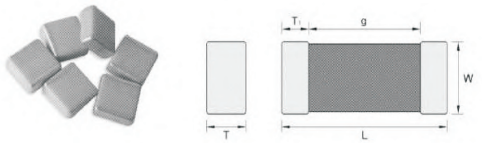
8 Packing
B : Bulk Pack R : Reel Pack C : Case Box

9 Thickness Option

Size(mm)	Thickness(mm)		Code	Size(mm)	Thickness(mm)		Code
	t	Tol(±)			t	Tol(±)	
0603/1005	0.3	0.03	-	3216	1.15	0.15	E
1005	0.5	0.05	-	3216/3225	1.6	0.2	I
2012	0.6	0.1	A	3225	1.8	0.2	J
1608	0.8	0.1	B	3225/4532/5750	2	0.25	K
2012/3216	0.85	0.15	B	3225/4532/5750	2.5	0.25	L
2012	1.25	0.15	E				

Size(mm)	Code	Packaging	Size(mm)	Code	Packaging
0603/1005	-	Paper Taping	3216	E	Embossed Taping
1005	-	Paper Taping	3216/3225	I	Embossed Taping
2012	A	Paper Taping	3225	J	Embossed Taping
1608	B	Paper Taping	3225/4532/5750	K	Embossed Taping
2012/3216	B	Paper Taping	3225/4532/5750	L	Embossed Taping
2012	E	Embossed Taping			

Shape & Dimensions



(Unit : mm)

Code	Dimensions				
	Length		Width		T1(min)
	L	Tol(±)	W	Tol(±)	
1608(0603)	1.60	0.15	0.80	0.10	0.10
2012(0805)	2.00	0.20	1.25	0.15	0.10
3216(1206)	3.20	0.30	1.60	0.20	0.15
3225(1210)	3.20	0.40	2.50	0.25	0.15
4520(1808)	4.50	0.40	2.00	0.25	0.20
4532(1812)	4.50	0.40	3.20	0.30	0.20
5750(2220)	5.70	0.50	5.00	0.40	0.30
7566(3026)	7.50	0.50	6.60	0.50	0.30
9595(3838)	9.50	0.50	9.50	0.50	0.30

*1608 Size ≥ 10㎌ ⇒ W : 0.8±0.15, T : 0.8±0.15

Typical Performance Characteristics

Dielectric Characteristics	COG(NPO)	X7R
Dielectric Classification	Ultra Stable	Stable
Rated temperature range	-55℃ to +125℃	-55℃ to +125℃
TCC(Temperature Characteristics Coefficient)	0±30ppm	±15%
Dissifation Factor(tan δ)	C≥30pF : Q≥1,000 (DF:≤ 0.1%) C<30pF : Q≥400+20C(DF: ≤1/(400+20C)	2.5% Max.
IR(Insulation Resistance)	500V Below : Rated voltage 2Min 500V Above : 500V 2Min More than 10,000 MΩ	500V Below:Rated voltage 2Min 500V Above:500V 2Min -DC100V~1KV :C≥0.01㎌:More than 100MΩ㎌ :C<0.01㎌:More than 10,000MΩ -DC2~3KV:More than6,000 MΩ
Capacitance Tolerance	〈10pF : ±0.25pF, ±0.5pF ≥10pF : ±5%, ±0%	±10%, ±20%
Dielectric strength	630V:150% Rated Voltage 1kV~7.2kV:120% Rated Voltage	100V:150% Rated Voltage 630V:150% Rated Voltage 1kV~7.2kV: 120% Rated Voltage
Aging characteristics	0%	2.5% per decade hr, typical

Appendix High Voltage Type(100V~3000V)

COG-Temperature Compensation Type

High voltage type

Type	COG																															
Size(inch)	1608(0603)		2012(0805)		3216(1206)					3225(1210)					4520(1808)						4532(1812)						7066(3026)		9595(3838)			
Volt(V) / Cap.	100	250	100	250	100	250	630	1000	2000	100	250	630	1000	2000	100	250	630	1000	2000	3000	100	250	630	1000	2000	3000	3000	4000	3000	4000	5000	7000
4.7pF(4R7)																																
5pF(050)																																
7pF(070)																																
8pF(080)																																
9pF(090)																																
10pF(100)																																
12pF(120)																																
15pF(150)																																
18pF(180)																																
22pF(220)																																
47pF(470)																																
56pF(560)																																
68pF(680)																																
82pF(820)																																
100pF(101)																																
180pF(180)																																
220pF(221)																																
330pF(331)																																
470pF(471)																																
560pF(561)																																
680pF(681)																																
1000pF(102)																																
1500pF(152)																																
2200pF(222)																																
2700pF(272)																																
3300pF(332)																																
4700pF(472)																																
5600pF(562)																																
6800pF(682)																																
10000pF(103)																																
15000pF(153)																																
22000pF(223)																																
33000pF(333)																																

SMD Type-High Voltage

SAMWHA

X7R-High Dielectric Type

High voltage type

Type	X7R																									
Size(inch)	1608(0603)		2012(0805)		3216(1206)					3225(1210)					4520(1808)						4532(1812)					
Volt(V) / Cap.	100	250	100	250	100	250	630	1000	2000	100	250	630	1000	2000	100	250	630	1000	2000	3000	100	250	630	1000	2000	3000
220pF(221)																										
330pF(331)																										
470pF(471)																										
680pF(681)																										
1000pF(102)																										
1500pF(152)																										
2200pF(222)																										
3300pF(332)																										
4700pF(472)																										
5600pF(562)																										
6800pF(682)																										
10000pF(103)																										
15000pF(153)																										
18000pF(183)																										
22000pF(223)																										
33000pF(333)																										
47000pF(473)																										
68000pF(683)																										
0.1µF(104)																										
0.15µF(154)																										
0.22µF(224)																										
0.33µF(334)																										
0.47µF(474)																										
0.68µF(684)																										
1.0µF(105)																										
2.2µF(225)																										

Size	Vr(V)	100pF	470pF	1.0nF	2.2nF	10nF	47nF	100nF	150nF
3026	3,000								
	4,000								
3838	3,000								
	4,000								
	5,000								
	7,000								