

# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## APPLICATION

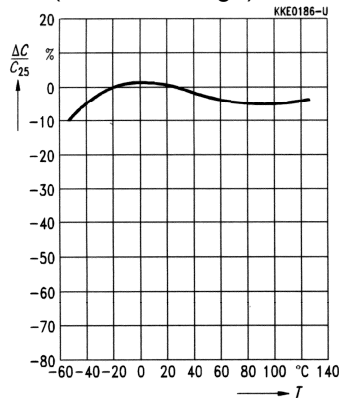
X7R/X5R dielectric properties: suited for by-pass and coupling purposes, filtering, frequency discrimination, DC blockage, and as voltage transient suppression elements.

## General Specification

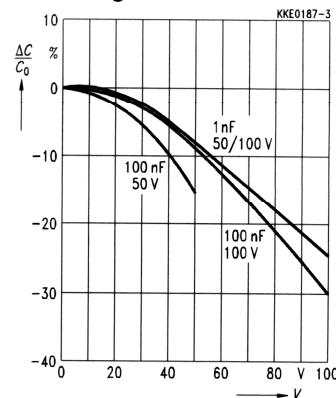
- **Operating temperature range** : X7R:  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$ , X5R:  $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- **Temperature coefficient**:  $\Delta C$ :  $\pm 15\%$  maximum
- **Capacitance Range**: 100pF ~ 100uF
- **Capacitance Tolerance**:  $\pm 10\%$ ,  $\pm 20\%$ ,  $\pm 5\%$  (Test condition :  $C \leq 10\mu\text{F}$ ,  $1 \pm 0.2\text{Vrms}$ , 1KHz,  $C > 10\mu\text{F}$ ,  $0.5\text{V} \pm 0.2\text{Vrms}$ , 120Hz)
- **Voltage Ratings**: 6.3V, 10V, 16V, 25V, 50V, 100V, 250V, 500V, 1000V, 2000V&3000VDC
- **Dissipation Factor**: 2.5% Max ( $\geq 50\text{V}$ ), 3.5% Max (25V,16V), 5% Max(10V) (Test condition: same as capacitance)
- **Insulation resistance**: 10,000 M $\Omega$  or 100  $\Omega$ -F min, whichever is less. (rated voltage applied at  $25^{\circ}\text{C}$ )
- **Dielectric strength**:  $> 250\%$  of rated voltage for 10~100V, 200% for 200&250V, 150% for 500V, 120% for  $\geq 1000\text{V}$

### Characteristics

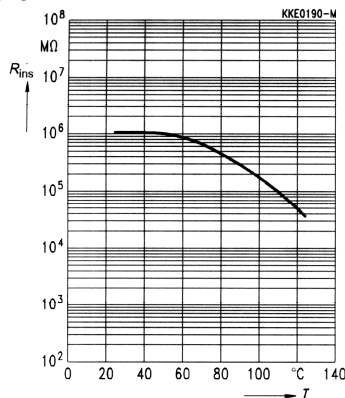
Capacitance change  $\Delta C/C_{25}$  versus temperature T (tolerance range)



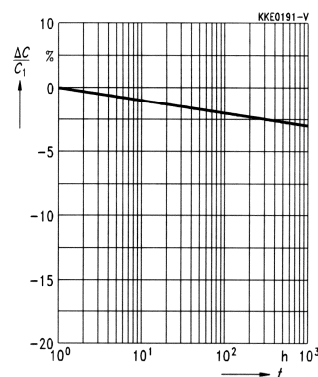
Capacitance change  $\Delta C/C_0$  versus superimposed dc voltage V



Insulation resistance  $R_{ins}$  versus Temperature T



Capacitance change  $\Delta C/C_1$  versus time (aging rate)



# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## SIZE AND VALUES AVAILABLE (X7R) 10V – 50V

Size		0402				0603				0805				1206				1210			1812		2220		
(L)	mm	1.00±0.05				1.60±0.10				2.00±0.20				3.20±0.20				3.20±0.30			4.50±0.30		5.70±0.40		
(W)	mm	0.50±0.05				0.80±0.10				1.25±0.20				1.60±0.20				2.50±0.20			3.20±0.20		5.00±0.40		
(T)	mm	0.50±0.05				0.80±0.12				1.25±0.20				1.65±0.20				2.50±0.20			3.00±0.20		3.00±0.20		
(t)	mm	0.15~0.35				0.27~0.60				0.30~0.70				0.30~0.70				0.30~0.70			0.35~1.00		0.35~1.00		
Cap. \ W.V.		10	16	25	50	10	16	25	50	10	16	25	50	10	16	25	50	16	25	50	25	50	25	50	
100	pF				S				P				H												
120	pF				S				P				H												
150	pF				S				P				H												
180	pF				S				P				H												
220	pF				S				P				H				H								
270	pF				S				P				H				H								
330	pF				S				P				H				H								
390	pF				S				P				H				H								
470	pF				S				P				H				H								
560	pF				S				P				H				H								
680	pF				S				P				H				H								
820	pF				S				P				H				H								
1000	pF				S				P				H				H								
1200	pF				S				P				H				H								
1500	pF				S				P				H				H								
1800	pF				S				P				H				H								
2200	pF				S				P				H				H								
2700	pF				S				P				H				H								
3300	pF				S				P				H				H								
3900	pF				S				P				H				H								
4700	pF				S				P				H				H								
5600	pF				S				P				H				H								
6800	pF				S				P				H				H								
8200	pF				S				P				H				H								
10	nF			S	S				P				H				H								
12	nF			S					P				H				H								
15	nF			S					P				H				H								
18	nF			S					P				H				H								
22	nF			S	S				P				H				H								
27	nF			S					P				H				H								
33	nF			S					P				H				H								
39	nF			S					P				H				H								
47	nF		S	S	S				P	P			H				H								
56	nF		S						P	P			H				H								
68	nF		S						P	P			H				H								
82	nF		S						P	P			H				H								
100	nF	S	S	S	S				P	P	P		H				H						X		
150	nF					P	P	P	P			X	X	X			X						X		
220	nF	S	S			P	P	P	P			X	X	X			X						X		
330	nF					P	P	P	P			X	X	X			X	X					X		
470	nF					P	P	P	P			X	X	X			X	L					X		
680	nF					P	P					X	X	X		X	X	L					L/Z		
1.0	uF					P	P	P	P	X	X	X	X		X	X	L			L			L/Z	Z	
2.2	uF					P				X	X	X	X		L	L	L			Z			Z	Z	
3.3	uF																			G			G	Z	
4.7	uF									X	X	X			L	L	L			Z	G	Z	G	Z	
10	uF									X	*X				L	L	L			Z	Z/G	G	Z/G	Z	G
22	uF														I					G	G		Z/G		G

# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## SIZE AND VALUES AVAILABLE (X7R) 100V – 630V (Medium Voltage)

Size		0603			0805				1206					1210					1812					
(L)	mm	1.60±0.10			2.00±0.20				3.20±0.20					3.20±0.30					4.50±0.30					
(W)	mm	0.80±0.10			1.25±0.20				1.60±0.20					2.50±0.20					3.20±0.20					
(T)	mm	0.80±0.12			1.25±0.20				1.65±0.25					2.50±0.20					2.50±0.20					
(t)	mm	0.27~0.60			0.30~0.70				0.30~0.70					0.30~0.70					0.35~1.00					
Cap.\ W.V.		100	200	250	100	200	250	500	630	100	200	250	500	630	100	200	250	500	630	100	200	250	500	630
100	pF	P	P	P	H	H	H	H		H	H	H												
150	pF	P	P	P	H	H	H	H		H	H	H												
220	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X					
330	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
470	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
560	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
680	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
1000	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
1500	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
2200	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
3300	pF	P	P	P	H	H	H	H		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
4700	pF	P	P	P	H	H	H	X		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
5600	pF	P	P	P	H	H	H	X		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
6800	pF	P	P	P	H	H	H	X		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
10	nF	P	P	P	H	H	H	X		H	H	H	X	X	C	C	C	X	X	X	X	X	X	
15	nF	P	P	P	H	H	H	X		H	X	X	X	X	C	C	C	X	X	X	X	X	X	
22	nF	P			H	H	H	X		H	X	X	L	L	C	C	C	X	X	X	X	X	X	
33	nF	P			X	X	X			X	L	L	L	L	C	C	C	L	L	X	X	X	X	
47	nF	P			X	X	X			X	L	L	L	L	C	X	X	L	L	X	X	X	X	
56	nF	P			X	X	X			X	L	L	L	L	C	X	X	L	L	X	X	X	L	
68	nF	P			X	X	X			X	L	L			C	L	L	L/Z	L/Z	X	X	X	L	
100	nF	P			X	X				X	L	L			C	L	L	G	G	L	X	X	L	
150	nF				X					L					X	G	G	G	G	L	L	L	G	
220	nF				X					L					X	G	G			L	L	L	G	
330	nF									L					L	G	G			L	L	Z	G	
470	nF									L					L	G	G			L	L	Z	G	
680	nF									L					Z	G	G			Z	G	G		
1.0	uF									L					Z					Z	G	G		
1.5	uF									L					G					Z				
2.2	uF									L					G					G				
3.3	uF																			G				

# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## SIZE AND VALUES AVAILABLE (X7R) 100V – 630V (Medium Voltage)

Size		1825					2220					2225				
(L)	mm	4.50±0.30					5.70±0.40					5.70±0.40				
(W)	mm	6.30±0.40					5.00±0.40					6.30±0.40				
(T)	mm	2.50±0.30					3.00±0.20					3.00±0.20				
(t)	mm	0.35~1.00					0.35~1.00					0.35~1.00				
Cap.\\W.V		100	200	250	500	630	100	200	250	500	630	100	200	250	500	630
470	pF															
680	pF															
1000	pF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
1500	pF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
2200	pF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
3300	pF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
4700	pF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
6800	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
10	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
15	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
22	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
33	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
47	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
68	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
100	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
150	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
220	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
330	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
470	nF	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
560	nF	Z	Z	Z	Z	Z	Z	Z	Z	G	G	Z	Z	Z	Z	Z
680	nF	Z	Z	Z	G	G	Z	Z	Z	G	G	Z	Z	Z	Z	Z
1.0	uF	Z	Z	Z			Z	Z	Z	U	U	Z	Z	Z	G	G
2.2	uF	Z	G	G			Z	G	G			Z	G	G		
3.3	uF	Z					Z					Z	U	U		
4.7	uF	G					G					G				
6.8	uF	G					G					G				
10	uF	G					G					G				

Remark: Customized size and specification is available upon request. Please contact us for further details

# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## SIZE AND VALUES AVAILABLE (X7R) 1000V – 4000V (High Voltage)

Size		0805	1206		1210		1808			1812				1825				2220				2225			
(L)	mm	2.00±0.20	3.20±0.20		3.20±0.30		4.50±0.30			4.50±0.30				4.50±0.30				5.70±0.40				5.70±0.40			
(W)	mm	1.25±0.20	1.60±0.20		2.50±0.20		2.00±0.20			3.20±0.20				6.30±0.40				5.00±0.40				6.30±0.40			
(T)	mm	1.25±0.20	1.65±0.20		2.50±0.20		2.00±0.20			3.00±0.20				2.50±0.30				3.00±0.20				3.00±0.20			
(t)	mm	0.30~0.70	0.30~0.70		0.30~0.70		0.35~1.00			0.35~1.00				0.35~1.00				0.35~1.00				0.35~1.00			
Cap.\\W.V.		1K		1K	2K	1K	2K	3K	1K	2K	3K	4K	1K	2K	3K	4K	1K	2K	3K	4K	1K	2K	3K	4K	
100	pF	H	X	X																					
120	pF	H	X	X																					
150	pF	H	X	X			X	X	X																
180	pF	H	X	X			X	X	X																
220	pF	H	X	X			X	X	X																
270	pF	H	X	X	X	L	X	X	X	X	X	L	Z			Z					Z			Z	
330	pF	H	X	X	X	L	X	X	Z	X	X	L	Z			Z					Z			Z	
390	pF	H	X	X	X	L	X	X	Z	X	X	L	Z			Z					Z			Z	
470	pF	H	X	X	X	L	X	X	Z	X	X	L	Z			Z					Z			Z	
560	pF	H	X	X	X	L	X	X	Z	X	X	L	Z			Z					Z			Z	
680	pF	H	X	X	X	L	X	X	Z	X	X	Z	Z			Z					Z			Z	
820	pF	H	X	X	X	L	X	X	Z	X	X	Z	Z			Z					Z			Z	
1000	pF	H	X	X/L	X	L	X	X	Z	X	X	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	
1200	pF	H	X	L	X	Z	X	Z	Z	X	X	Z	G	Z	Z	Z	G	Z	Z	Z	G	Z	Z	Z	G
1500	pF	X	X	L	X	Z	X	Z	Z	X	X	Z	G	Z	Z	Z	G	Z	Z	Z	G	Z	Z	Z	G
1800	pF	X	X	L	X	Z	X	Z	Z	X	L	G	G	Z	Z	Z	G	Z	Z	Z	G	Z	Z	Z	G
2200	pF	X	X	L	X	Z	X	Z	Z	X	L	G		Z	Z	Z		Z	Z	Z		Z	Z	Z	
2700	pF	X	X	L	X	G	X	Z		X	L	G		Z	Z	Z		Z	Z	Z		Z	Z	Z	
3300	pF	X	X	L	X	G	X	Z		X	Z	G		Z	Z	Z		Z	Z	Z		Z	Z	Z	
3900	pF	X	X		L	G	X	Z		X	Z	G		Z	Z	Z		Z	Z	Z		Z	Z	Z	
4700	pF	X	X		L	G	X	Z		X	Z	G		Z	Z	Z		Z	Z	Z		Z	Z	Z	
5600	pF	X	X		L	G	Z	Z		X	G			Z	Z	G		Z	Z	Z		Z	Z	G	
6800	pF	X	X		L	G	Z	Z		X	G			Z	Z	G		Z	Z	G		Z	Z	G	
8200	pF	X	X		L	G	Z			X	G			Z	Z	G		Z	G	G		Z	Z	G	
10	nF		X		L		Z			X/L	G			Z	Z	G		Z	G	G		Z	Z	G	
12	nF		L		L		Z			Z				Z	G	U		Z	G	U		Z	G	G	
15	nF		L		L		Z			Z				Z	G	U		Z	G	U		Z	G	G	
18	nF		L		L		Z			G				Z	G	U		Z	U	U		Z	G	U	
22	nF		L		L		Z			G				Z	G			Z	U			Z	G		
27	nF				L		Z			G				Z	U			Z	U			Z	G		
33	nF				L		Z			G				Z	U			Z	U			Z	G		
39	nF				Z		Z			G				Z	U			Z	U			Z	U		
47	nF				G		Z			G				Z	U			Z	U			Z	U		
56	nF				G		Z			G				Z	U			Z	U			Z	U		
68	nF				G		Z			G				Z				G				Z			
82	nF									G				G				G				Z			
100	nF									G				G				G				G			
120	nF													U				G				U			
150	nF													U				U				U			
180	nF													U				U				U			
220	nF													U				U				U			
330	nF													U				U				U			
390	nF													U				U				U			

# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

**SIZE AND VALUES AVAILABLE (X5R) 6.3V – 50V \*Available in 20% tolerance only.**

Size		0402					0603					0805					1206						
<b>(L)</b>	mm	1.00±0.05					1.60±0.10					2.00±0.20					3.20±0.20						
<b>(W)</b>	mm	0.50±0.05					0.80±0.10					1.25±0.20					1.60±0.20						
<b>(T)</b>	mm	0.50±0.05					0.80±0.12					1.25±0.20					1.65±0.20						
<b>(t)</b>	mm	0.15~0.35					0.27~0.60					0.30~0.70					0.30~0.70						
<b>Cap./ W.V.</b>		6.3	10	16	25	50	4	6.3	10	16	25	50	4	6.3	10	16	25	50	6.3	10	16	25	50
100	nF			S	S	S																	
220	nF	S	S	S	S						P												
330	nF	S									P												
470	nF	S	S	S	S					P	P	P											
680	nF	S							P	P	P												
1.0	uF	S	S	S	S				P	P	P	P											L
2.2	uF	S	S	S	S			P	P	P	P	P		X	X	X	X	X					L
3.3	uF	S																			L	L	
4.7	uF	S	S					P	P	P	P			X	X	X	X	X			L	L	L
10	uF	*S	*S					*P	*P	*P	*P			X	X	X	X	X		L	L	L	L
22	uF							*P	*P	*P				*X	*X	*X	*X			*L	*L	*L	*L
47	uF													*X	*X	*X				*L	*L	*L	*L
100	uF													*X						*L	*L		

Size		1210					1812					2220				
<b>(L)</b>	mm	3.20±0.30					4.50±0.30					5.70±0.40				
<b>(W)</b>	mm	2.50±0.20					3.20±0.20					5.00±0.40				
<b>(T)</b>	mm	2.50±0.30					3.00±0.20					3.00±0.20				
<b>(t)</b>	mm	0.30~0.70					0.35~1.00					0.35~1.00				
<b>Cap./ W.V.</b>		4	6.3	10	16	25	50	4	6.3	10	16	25	10	16	25	50
1.0	uF															
2.2	uF						G									
3.3	uF															
4.7	uF						G									
10	uF			*C/Z	*C/Z	*C/G	G					G				G
22	uF			*C/G	*C/G	G					*G	*G			*G	
47	uF		*G	*G	*G				*G	*U				*G		
100	uF		*G	*G					*U	*U			*G			
220	uF	*G	*G													
330	uF	*G	*G													
470	uF						*U									

# CERAMIC CHIP CAPACITORS X7R/X5R DIELECTRIC

## Thickness Code & Standard Packing Q'ty per reel

Thickness Code	Chip Size	Chip Thickness	Max Tape Thickness	Q'ty of carboard tape in		Q'ty of Embosses tape in	
				7" reel	13" reel	7" reel	13" reel
S	0402	0.50±0.05 mm	0.60 mm	10,000	50,000	--	--
P	0603	0.80±0.10 mm	0.95 mm	4,000	15,000	--	--
A	0805	0.60±0.10 mm	0.75 mm	4,000	15,000	--	--
H		0.85±0.10 mm	0.95 mm	4,000	15,000	--	--
X		1.25±0.10 mm	1.80 mm	--	--	3,000	10,000
H	1206	0.85±0.10 mm	0.90 mm	4,000	15,000	--	--
C		0.95±0.10 mm	1.80 mm			3,000	10,000
X		1.25±0.10 mm	1.80 mm	--	--	3,000	10,000
L		1.65±0.20 mm	1.80 mm	--	--	2,000	--
C	1210	0.95±0.10 mm	1.80 mm			3,000	10,000
X		1.25±0.10 mm	1.80 mm	--	--	2,000	--
L		1.65±0.20 mm	1.80 mm	--	--	2,000	--
Z		2.00±0.20 mm	2.20 mm	--	--	2,000	--
G		2.50±0.20 mm	2.75 mm	--	--	1,000	--
X	1808	1.25±0.10 mm	1.80 mm	--	--	2,000	--
F		1.40±0.20 mm	1.80 mm	--	--	2,000	--
L		1.65±0.20 mm	1.80 mm	--	--	2,000	--
Z		2.00±0.20 mm	2.20 mm	--	--	1,000	--
X	1812	1.25±0.20 mm	1.80 mm	--	--	1,000	--
L		1.65±0.20 mm	1.80 mm			1,000	
Z		2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
U		2.80±0.30 mm	3.00 mm	--	--	500	--
Z	1825	2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
U		2.80±0.30 mm	3.00 mm	--	--	500	--
Z	2220	2.00±0.20 mm	2.20 mm	--	--	500	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
U		2.80±0.30 mm	3.00 mm	--	--	500	--
L	2211	1.65±0.20 mm	1.80 mm			1,000	
Z		2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--
Z	2225	2.00±0.20 mm	2.20 mm	--	--	1,000	--
G		2.50±0.20 mm	2.75 mm	--	--	500	--