

## 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

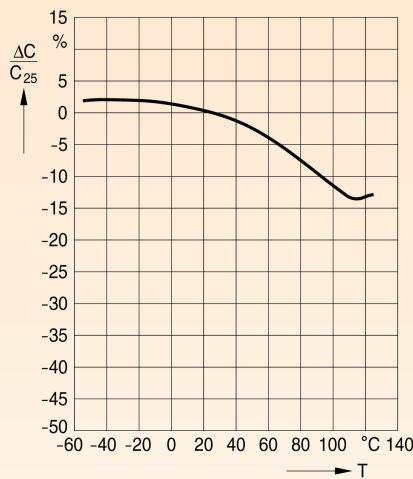
- Operating temperature range : X7R:  $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$ , X5R:  $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- Temperature coefficient:  $\Delta C$ :  $\pm 15\%$  maximum
- Capacitance Range: 100pF ~ 100uF
- Capacitance Tolerance:  $\pm 10\%$ ,  $\pm 20\%$ ,  $\pm 5\%$  (Test condition :  $C \leq 10\mu\text{F}$ ,  $1 \pm 0.2V_{\text{rms}}$ , 1KHz,  $C > 10\mu\text{F}$ ,  $0.5V \pm 0.2V_{\text{rms}}$ , 120Hz)
- Voltage Ratings: 6.3V, 10V, 16V, 25V, 50V, 100V, 250V, 500V, 1000V, 2000V&3000VDC
- Dissipation Factor: 2.5% Max ( $\geq 50V$ ), 3.5% Max (25V,16V), 5% Max(10V) (Test condition: same as capacitance)

Exception : see details at <http://www.hitano.com.tw/pdf/MLCCApproval.pdf>

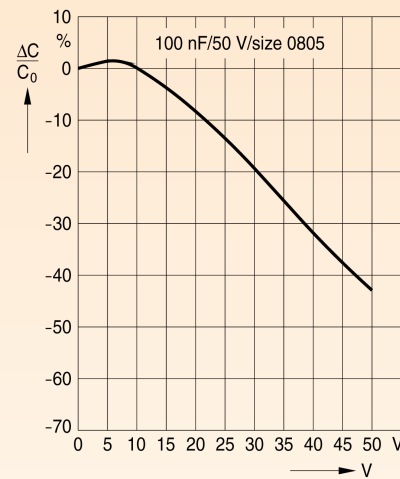
- Insulation resistance: 10,000 M $\Omega$  or 100  $\Omega$ -F min, whichever is less. (rated voltage applied at 25 $^{\circ}\text{C}$ )
- Dielectric strength: > 250% of rated voltage for 10~100V, 200% for 200&250V, 150% for 500V, 120% for  $\geq 1000V$

## Characteristics

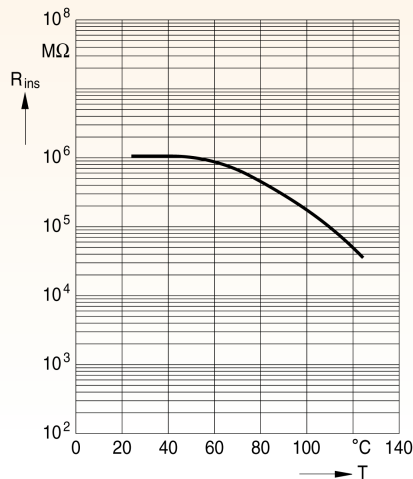
Capacitance change  $\Delta C/C_{25}$  versus temperature T (tolerance range)



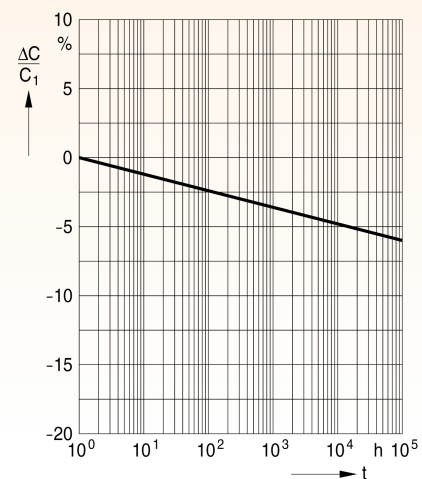
Capacitance change  $\Delta C/C_0$  versus superimposed dc voltage V



Insulation resistance  $R_{\text{ins}}$  versus Temperature T



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



## Size And Values Available (X7R) 10v~100v

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				2.50±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	100	10	16	25	50	100	10	16	25	50	100	16	25	50	100	25	50	100	25	50	100
100	pF				S				P	P				A	H					H										
120	pF				S				P	P				A	H					H										
150	pF				S				P	P				A	H					H										
180	pF				S				P	P				A	H					H										
220	pF				S				P	P				A	H					H	H									
270	pF				S				P	P				A	H					H	H									
330	pF				S				P	P				A	H					H	H									
390	pF				S				P	P				A	H					H	H									
470	pF				S				P	P				A	H					H	H									
560	pF				S				P	P				A	H					H	H									
680	pF				S				P	P				A	H					H	H									
820	pF				S				P	P				A	H					H	H									
1000	pF				S				P	P				A	H					H	H									
1200	pF				S				P	P				A	H					H	H									
1500	pF				S				P	P				A	H					H	H									
1800	pF				S				P	P				A	H					H	H									
2200	pF				S				P	P				A	H					H	H									
2700	pF				S				P	P				A	H					H	H									
3300	pF				S				P	P				A	H					H	H									
3900	pF				S				P	P				A	H					H	H									
4700	pF				S				P	P				A	H					H	H									
5600	pF				S				P	P				A	H					H	H									
6800	pF				S				P	P				A	H					H	H									
8200	pF				S				P	P				A	H					H	H									
10	nF		S	S	S				P	P				A	H					H	H									
12	nF		S	S					P					A	H					H	H									
15	nF		S	S					P					A	H					H	H									
18	nF		S	S					P					A	H					H	H									
22	nF		S	S					P					A	H					H	H									
27	nF		S						P					H	H					H	H									
33	nF	S	S	S					P					H	X					H	X									
39	nF								P					H	X					H	X									
47	nF	S	S	S					P	P				H	X					H	X									
56	nF								P	P				H	X					H	X									
68	nF	S	S						P	P				H	X					H	X									
82	nF								P	P				H	X					H	X									
100	nF	S	S						P	P	P			H	X					H	X				L		X	L		
150	nF								P	P	P			H	X	X				H	X	L			L		X	L		
220	nF	S							P	P	P			H	X	X				H	X	L			L		X	L		
330	nF								P	P				X	X	X				X	X	L			L		X	L		
470	nF								P	P				X	X				X	X	L	L			Z		X	L		
680	nF								P	P				X	X				X	X	L				Z		Z	L	Z	
1.0	uF								P	P				X	X	X				X	X	L			L	Z/G	Z	L/Z	Z	Z
2.2	uF													X	X					L	L	L			Z		Z	G	Z	Z
3.3	uF																							L	G		Z		Z	Z
4.7	uF																L	L	L					Z		L	Z		Z	G
10	uF																L	L	L					Z	G	Z/G		Z		
22	uF																							G		Z/G		G		

## Size And Values Available (X7R) 250V~3000V

Size		0805		1206			1210				1808			1812					2220					
(L)	mm	2.00±0.20		3.20±0.20			3.20±0.30				4.50±0.30			4.50±0.30					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					5.00±0.40					
(T)	mm	1.25±0.20		1.65±0.20			2.00±0.20				2.00±0.20			2.50±0.20					2.50±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					
Cap. \\ W.V.		250	500	250	500	1K	2K	250	500	1K	2K	1K	2K	3K	250	500	1K	2K	3K	250	500	1K	2K	3K
100	pF	H	H	H	X	X	X			L	L			L										
150	pF	H	H	H	X	X	X			L	L			L										
220	pF	H	H	H	X	X	X			L	L			L										
330	pF	H	H	H	X	X	X			L	L			L										
470	pF	H	H	H	X	X	X			L	L	L	L	L			L	L	L					
680	pF	H	H	H	X	X	X			L	L	L	L	Z			L	L	L					
1000	pF	H	H	H	X	X	X		L	L	L	L	L	Z			L	L	L			Z	Z	Z
1500	pF	H	H	H	X	L			L	L		L	L				L	L				Z	Z	Z
2200	pF	H	H	H	X	L			L	L		L	Z				L	Z				Z	Z	Z
3300	pF	H	H	H	X	L			L	L		L					L	Z				Z	Z	Z
4700	pF	H	H	H	X	L			L	L		L				L	L	Z				Z	Z	
6800	pF	H	H	H	X	L			L	L		L				L	L					Z	Z	
10	nF	H	X	H	X	L			L	L	L		L			L	Z					Z	Z	
15	nF	H	X	X	L				L	L						L	Z					Z		
22	nF	H		X	L				L	L						L	Z					Z		
33	nF	X		X	L				L	L						L						Z		
47	nF			X					L	L						L	L					Z		
68	nF			L					L							L	L					Z		
100	nF			L					L							L	L					Z		
150	nF								L							L						Z		
220	nF								L							L						Z		
330	nF								G							Z					Z			
470	nF								G							Z					Z			
680	nF															Z					Z			
1.0	uF															Z					Z			

## Size And Values Available (X5R) 6.3V~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±0.30					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					3.20±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.		6.3	10	6.3	10	16	6.3	10	16	25	6.3	10	16	25	6.3	10	16	25	50	6.3	10	16	25	16	25	50			
100	nF		S																										
220	nF	S	S																										
330	nF	S																											
470	nF	S	S		P																								
680	nF	S			P																								
1.0	uF	S	S		P	P			X	H/X																			
2.2	uF	S		P	P	P	X	X	X	H/X																			
3.3	uF						X	X																					
4.7	uF			P	P		X	X	X	H/X			L	L			Z	Z											
10	uF			*P			H/X	X	X		L	L	L	L			Z	Z	Z				Z/G		Z	G			
22	uF						*X				L	L	*L			Z/G	Z/G	G			G	G			G				
47	uF										*L	L			*G	*G				*G	*N			*G					
100	uF														*G					*U									

\*Available in 20% tolerance only.