

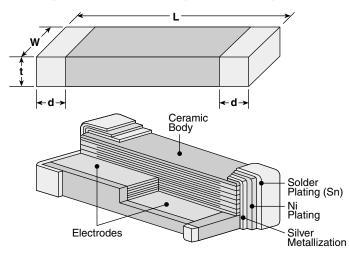
#### ceramic chip capacitors



#### features

- · High Q factor
- Low T.C.C.
- Available in high capacitance values (up to 100 μF)

#### dimensions and construction



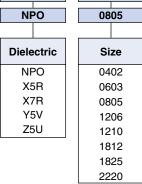
NPO

Case	Dimensions inches (mm)											
Size	L	W	t (Max.)	d								
0402	.039±.004	.02±.004	.021	.01±.006								
	(1.0±0.1)	(0.5±0.1)	(0.55)	(0.25±0.15)								
0603	.063±.006	.032±.006	.035	.014±.006								
	(1.6±0.15)	(0.81±0.15)	(0.9)	(0.35±0.15)								
0805	.079±.008	.049±.008	.051	.02±.01								
	(2.01±0.2)	(1.25±0.2)	(1.3)	(0.50±0.25)								
1206	.126±.008	.063±.008	.059	.02±.01								
	(3.2±0.2)	(1.6±0.2)	(1.5)	(0.5±0.25)								
1210	.126±.008	.098±.008	.067	.02±.01								
	(3.2±0.2)	(2.5±0.2)	(1.7)	(0.5±0.25)								
1812	.177±.012	.126±.008	.067	.024±.014								
	(4.5±0.3)	(3.2±0.2)	(1.7)	(0.61±0.36)								
1825	.177±.012	.252±.016	.067	.024±.014								
	(4.5±0.3)	(6.4±0.4)	(1.7)	(0.61±0.36)								
2220	.224±.016	.197±.016	.087	.025±.015								
	(5.7±0.4)	(5.0±0.4)	(2.2)	(0.64±0.39)								

#### ordering information

0805





0805	Н
Size	Voltage
0402	A = 10V
0603	C = 16V
0805	E = 25V
1206	H = 50V
1210	I = 100V
1812	J = 200V
1825	K = 6.3V
2220	

Н



טו
Packaging
TD: 7" paper tape
TE: 7" embossed plastic
TDB: 13" paper tape
TED: 13" embossed plastic

101
Capacitance
NPO, X5R,
X7R.Y5V:
, -
2 significant digits
+ no. of zeros.
"R" indicates
decimal point
decimal point

2 significant digits + no. of zeros

Z5U:

Tolerance
B: ±0.1pF
C: ±0.25pF
D: ±0.5pF
F: ±1%
G: ±2%
J: ±5%
K: ±10%
M: ±20%
Z: +8020%

For further information on packaging, please refer to Appendix B.

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

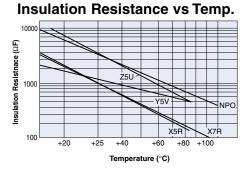
## ceramic chip capacitors

#### applications and ratings

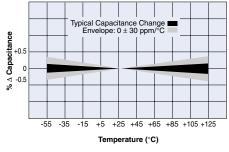
Dielectric	Capacitance Range	Capacitance Tolerance*	Voltage Ratings	Dissipation Factor	T.C.C.	Test Voltage	Operating Temperature	Insulation Resistance
NPO	0.5pF - 0.033μF	B: ±0.1pF (1.0pF ~ 8.2pF) C: ±0.25pF (1.0pF ~ 8.2pF) D: ±0.5pF (5.6pF ~ 8.2pF) F: ±1%, G: ±2% J: ±5%, K: ±10%	16V 25V 50V 100V 200V	For Values >30pF: 0.1% max., ≤30pF: Q = 400 + 20 x C DF = 1/Q C is in pF	0 ± 30 ppm/°C	1.0 ± 0.2 Vrms	-55°C to +125°C	+25°C 100,000M $\Omega$ min. or 1000 M $\Omega$ - μF min. whichever is less
X5R	0.027μF - 47μF	K: ±10%	6.3V 10V 16V 25V	6.3 = 7.3% 10 = 5.0% 16 = 3.5% 25 = 3.0%	±15% (0 VDC)	1.0 ± 0.2 Vrms	-55°C to +85°C	+25°C 100,000M $\Omega$ min. or 500 M $\Omega$ - μF min. whichever is less
X7R	100pF - 1.0μF	K: ±10%	10V 16V 25V 50V 100V 200V	For 50 & 100 volts 2.5% max. 25 = 3.0% 16 = 3.5%	±15% (0 VDC)	1.0 ± 0.2 Vrms	-55°C to +125°C	+25°C 100,000M $\Omega$ min. or 1000 M $\Omega$ - μF min. whichever is less
Y5V	2200pF - 4.7μF	Z: +80, -20%	10V 16V 25V 50V	16V & 25V = 7.0% 50V = 5.0%	+22% to -82% max.	1.0 ± 0.2 Vrms	-55°C to +125°C	+25°C 10,000M $\Omega$ min. or 1000 M $\Omega$ - $\mu$ F min. whichever is less
Z5U	0.01μF - 1.0μF	M: ±20% Z: +80, -20%	25V 50V	4.0% max.	+22% to -56% max.	0.5 ± 0.2 Vrms	-55°C to +125°C	+25°C 10,000M $\Omega$ min. or 1000 M $\Omega$ - μF min. whichever is less

<sup>\*</sup> Special tolerances available, please consult factory.

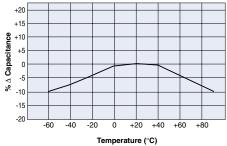
#### environmental applications



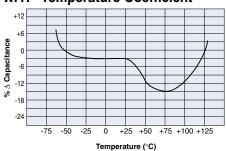
**NPO - Temperature Coefficient** 



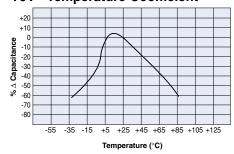
X5R - Temperature Coefficient



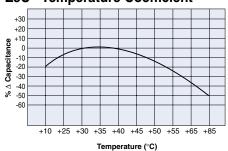




Y5V - Temperature Coefficient



**Z5U - Temperature Coefficient** 



Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.

#### ceramic chip capacitors

### NPO capacitance voltage availability

	Size	0402*			0603*			0805			12	06					
Capa pF	citance values µF Code	WVDC	16	25	50	50	100	50	100	200	25	50	100	200	50	200	500
0.47	R47																
0.56	R56																
0.68	R68																
0.82	R82																
1	1R0																
1.2	1R2PF																
1.5	1R5PF																
1.8 2.2	1R8PF 2R2PF																
2.7	2R7PF																
3.3	3R3PF																
3.9	3R9PF																
4.7	4R7PF																
5.6	5R6PF																
6.8	6R8PF																
8.2	8R2PF																
10 12	100PF 120PF																
15	150PF																
18	180PF																
22	220PF																
27	270PF																
33	330PF																
39	390PF																
47 56	470PF 560PF																
68	680PF																
82	820PF																
100	.0001 101PF																
120	.00012 121PF																
150	.00015 151PF																
180	.00018 181PF																
220	.00022 221PF .00027 271PF																
270 330	.00027 271PF .00033 331PF																
390	.00033 33111 .00039 391PF																
470	.00047 471PF																
560	.00056 561PF			]													
680	.00068 681PF																
820	.00082 821PF																
1000	.0010 102PF									1							
1200 1500	.0012 122PF .0015 152PF									-							
1800	.0015 152PF .0018 182PF																
2200	.0022 222PF																
2700	.0027 272PF																
3300	.0033 332PF								]								
3900	.0039 392PF																
4700	.0047 472PF																
5600 6800	.0056 562PF .0068 682PF																
8200	.0082 822PF									-							
10000	.010 103PF																
12000	.012 123PF																
15000	.015 153PF																
18000	.018 183PF																
22000	.022 223PF																
27000	.027 273PF																
33000	.033 333PF																
39000	.039 393PF							1		l			]				

<sup>\*</sup> IR and vapor phase solder only recommended

Capacitance tolerance available:

R47 ~ 8R2 = C:  $\pm 0.25$  pF, 5R6 ~ 8R2 = D  $\pm 0.5$  pF, 10 ~ 393 = J  $\pm 5\%$ , F  $\pm 1\%$ , G  $\pm 2\%$ 

Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications before you order and/or use.



## ceramic chip capacitors

### X5R capacitance voltage availability

Capacidance values  pF  ##  ##  ##  ##  ##  ##  ##  ##  ##	Size		0402 0603					0805				1206				1210				1812				2220	
100 150 220 330 470 680 680 10000 12000 15										6.0			25	6.0			05	+							
100 150 220 330 470 680 680 10000 12000 15	pF μF	6.3	10	16	6.3	10	16	25	6.3	10	16	25	6.3	10	16	25	6.3	10	16	25	6.3	10	16	25	6.3
220 330 470 680 1000 11000 11200 1500 1500 1500 1500 2200 22	100																								
330 470 680 1000 1200 1200 11500 1800 2200 2700 3300 3800 4700 680 6800 6800 6800 6800 6800 6800 68																									
470 680 1000 11200 1590 1590 1590 2200 2270 3300 3390 3390 3890 4700 6800 8200 8200 8200 8200 8200 8200 82	220																								
680   1000   1200   1500   1800   220	330																								
1000 1200 1500 1500 1600 2200 2700 3300 3300 3300 3300 3800 6800 6800 68	470 680																								
1200 1500 1500 2200 2700 3300 3900 4700 5600 6800 6800 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1000																								
1500 1800 2200 2200 2700 3300 3300 3300 3300 4700 6800 8200 0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.012 0.15 0.110 0.12 0.15 0.110 0.12 0.15 0.18 0.082 0.082 0.083 0.082 0.080 0.088 0.082 0.080 0.080 0.080 0.080 0.080 0.080 0.080 0.080 0.080 0.080 0.10 0.1	1200																								
1800 2200 2700 3300 3900 4700 5600 6800 8200 0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.088 0.082 0.10 0.15 0.18 0.22 0.27 0.27 0.33 0.47 0.56 0.88 0.88 0.82 0.10 0.11 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.88 0.88 0.88 0.88 0.88 0.88 0.88 0.8	1500																								
2200 2700 3300 3300 3300 4700 6800 8200 0.010 0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.11 0.12 0.15 0.18 0.10 0.10 0.12 0.15 0.18 0.10 0.10 0.12 0.15 0.18 0.088 0.082 0.10 0.10 0.11 0.12 0.15 0.18 0.18 0.18 0.19 0.19 0.19 0.19 0.19 0.10 0.10 0.11 0.11	1800																								
3300 3300 3300 3300 3300 3300 3300 330	2200																								
3900 4700 5600 6800 8200  0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.088 0.082 0.10 0.12 0.15 0.18 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 0.10 0.11 0.12 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.88 0.88 0.88 0.80 0.81 0.91 0.91 0.91 0.91 0.91 0.91 0.91 0.9	2700																								
4700 5600 6800 8200 0.010 0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.088 0.082 0.10 0.115 0.118 0.22 0.27 0.33 0.47 0.56 0.68 0.88 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 10 22 47																									
5600 6800 8200  0.010 0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.066 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.882 0.82 1.0 1.2 1.5 1.8 1.2 2.1 1.5 1.8 2.2 3.3 4.7 6.8 10 10 22	3900																								
6800 8200  0.010 0.012 0.015  0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 10 12 22 47	4700	1																				<u> </u>			
8200  0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.68 0.82 1.0 1.2 1.5 1.8 1.8 2.2 3.3 4.7 6.8 10 0.22 4.7	5600																								
0.010 0.012 0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	6800																								
0.012 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	8200	-	-					-	-											-	1	-	-	-	
0.015 0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.12 1.5 1.8 2.2 3.3 4.7 6.8 10 0 22 47																									
0.018 0.022 0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.0 1.2 1.5 1.8 2.2 2.3 3.3 4.7 6.8 10 2.2 3.3 4.7	0.012																								
0.022 0.023 0.033 0.039 0.047 0.056 0.068 0.088 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.013																								
0.027 0.033 0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.010																								
0.033 0.039 0.047 0.056 0.068 0.062 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 2.3 3.3 4.7	0.022																								
0.039 0.047 0.056 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.033																								
0.047 0.056 0.068 0.068 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.039																								
0.056 0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.047																								
0.082 0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22	0.056																								
0.10 0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.068																								
0.12 0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.082																								
0.15 0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47																									
0.18 0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22	0.12																								
0.22 0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.15																								
0.27 0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.18																								
0.33 0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22	0.22																								
0.47 0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22	0.2 <i>1</i>																				1	<u> </u>			
0.56 0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.33																								
0.68 0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.56																								
0.82 1.0 1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22	0.68																				1				
1.2 1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	0.82																								
1.5 1.8 2.2 3.3 4.7 6.8 10 22 47	1.0																				1				
1.8 2.2 3.3 4.7 6.8 10 22 47	1.2																								
2.2 3.3 4.7 6.8 10 22 47	1.5																								
3.3 4.7 6.8 10 22 47	1.8	-																			-	-			
4.7 6.8 10 22 47	2.2																								
6.8 10 22 47	3.3																								
10 22 47	4./ 6.0	+						-													1	-			
22 47	0.8 10																								
47	22																								
																					1				
100	100																								

Capacitance tolerance available: ±10%



### ceramic chip capacitors

### X7R capacitance voltage availability

	Size		(	0402	k		(	0603	<b>k</b>				08	05		1206					1210				
Capac	citance v µF	alues Code	16	25	50	10	16	25	50	100	10	16	25	50	100	200	10	16	25	50	100	200	50	100	200
100	.0001	101PF																							
120	.00012	121PF																							
150	.00015	151PF																							
180	.00018	181PF																							
220	.00022	221PF																							
270	.00027	271PF																							
330	.00033	331PF																							
390	.00039	391PF																							
470	.00047	471PF																							
560	.00056	561PF																							
680	.00068	681PF																							
820	.00082	821PF																							
1000	.0010	102PF																							
1200	.0012	122PF																							
1500	.0015	152PF																							
1800	.0018	182PF																							
2200	.0022	222PF																							
2700	.0027	272PF																							
3300	.0033	332PF																							
3900	.0039	392PF																							
4700	.0033	472PF																							
5600	.0056	562PF																							
6800	.0068	682PF																							
8200	.0082	822PF																							
10000	.010	103PF																							
12000	.012	123PF																							
15000	.012	153PF																							
18000	.018	183PF																							
22000	.022	223PF																							
27000	.027	273PF																							
33000	.033	333PF																							
39000	.033	393PF																							
47000	.039	473PF								1						1									
56000	.056	563PF																							
68000	.068	683PF																							
82000	.082	823PF																							
100000	.100	104PF																							
120000	.120	124PF																							
150000	.150	154PF																							
180000	.180	184PF																							
220000	.220	224PF																							
270000	.270	274PF																							
330000	.330	334PF																							
390000	.390	394PF																							
470000	.470	474PF																							
560000	.560	564PF																							
680000	.680	684PF																							
1000000	1.00	105PF																							
1200000	1.20	125PF																							
1500000	1.50	155PF 185PF																							
1800000	1.80																								
2200000	2.20	225PF																							

<sup>\*</sup> IR and vapor phase solder only recommended

Capacitance tolerance available: ±10%



### ceramic chip capacitors

#### Y5V capacitance voltage availability

	Size		04	02*		06	03*			08	05		1206				1210
Capac	itance v	values Code	16	50	10	16	25	50	10	16	25	50	10	16	25	50	25
2200	.0022	222PF															
2700	.0027	272PF															
3300	.0033	332PF															
3900	.0039	392PF															
4700	.0047	472PF															
5600	.0056	562PF															
6800	.0068	682PF															
8200	.0082	822PF															
10000	.010	103PF															
12000	.012	123PF															
15000	.015	153PF															
18000	.018	183PF															
22000	.022	223PF															
27000	.027	273PF															
33000	.033	333PF															
39000	.039	393PF															
47000	.047	473PF															
56000	.056	563PF			1												
68000	.068	683PF															
82000	.082	823PF															
100000	.100	104PF															
120000	.120	124PF															
150000	.150	154PF															
180000	.180	184PF															
220000	.220	224PF															
270000	.270	274PF															
330000	.330	334PF															1
390000	.390	394PF															
470000	.470	474PF															1
560000	.560	564PF															1
680000	.680	684PF															_
820000	.820	824PF															1
1000000	1.0	105PF															1
1200000	1.2	125PF															
1500000	1.5	155PF															
1800000	1.8	185PF															
2200000	2.2	225PF															
2700000	2.2	275PF															
3300000	3.3	335PF															
3900000	3.9	395PF															
4700000	3.9 4.7	395PF 475PF															
5600000	4.7 5.6	475PF 565PF															
6800000	6.8	685PF	-														$\vdash$
10000000		106PF															
10000000	10	10025															

<sup>\*</sup> IR and vapor phase solder only recommended

Capacitance tolerance available: +80, -20%



## ceramic chip capacitors

#### **Z5U** capacitance voltage availability

	Size		06	03*	0805	1206	1210
Capac	itance v	/alues	25	50	F0	F0	E0
pF	μF	Code	25	50	50	50	50
2200	.0022	222PF					
2700	.0027	272PF					
3300	.0033	332PF					
3900	.0039	392PF					
4700	.0047	472PF					
5600	.0056	562PF					
6800	.0068	682PF					
8200	.0082	822PF					
10000	.010	103PF					
12000	.012	123PF					
15000	.015	153PF					
18000	.018	183PF					
22000	.022	223PF					
27000	.027	273PF					
33000	.033	333PF					
39000	.039	393PF					
47000	.047	473PF					
56000	.056	563PF					
68000	.068	683PF					
82000	.082	823PF					
100000	.100	104PF					
120000	.120	124PF					
150000	.150	154PF					
180000	.180	184PF					
220000	.220	224PF					
270000	.270	274PF					
330000	.330	334PF					
390000	.390	394PF					
470000	.470	474PF					
560000	.560	564PF					
680000	.680	684PF					
820000	.820	824PF					
1000000	1.0	105PF					
1500000	1.5	155PF					

<sup>\*</sup> IR and vapor phase solder only recommended

Capacitance tolerance: +80,-20%