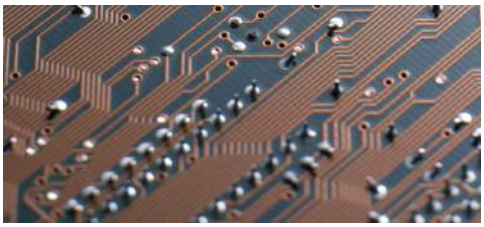
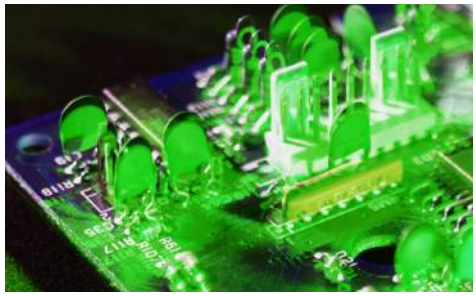
MULTI LAYER CERAMIC CAPACITORS








Ultra High Q, Low ESR Capacitors
High Q, Low ESR Capacitors
General Purpose Capacitors
0201 to 2220 case sizes
6.3 VDC to 3000 VDC
RoHS Compliant
HALOGEN Free

DESIGNING THE CUTTING EDGE

TABLE OF CONTENTS

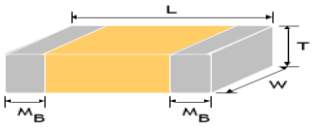
QUICK REFERENCE/PRODUCT SUMMARY

Series	Dielectric	Size	Capacitance	Voltage	Page
General Purpose (G Series)	NP0	0201, 0402, 0603, 0805 1206, 1210, 1808, 1812 1825, 2220, 2225	0.1pF ~ 100,000pF	6.3 ~ 3,000	5
	X7R	0201, 0402, 0603, 0805 1206, 1210, 1808, 1812 1825, 2220, 2225	100pF ~ 47µF	6.3 ~ 3,000	6
	Y5V	0402, 0603, 0805, 1206, 1210, 1812	10,000pF ~ 100µF	6.3 ~ 250	8
	X5R	0201, 0402, 0603, 0805, 1206, 1210	100pF ~ 100µF	6.3 ~ 50	8
Ultra High-Q, Low ESR (M Series)	NP0	0201, 0402, 0505, 0603, 0805	0.1pF ~ 180pF	6.3 ~ 500	10
High-Q, Low ESR (H Series)	NP0	0402, 0603, 0805	0.1pF ~ 3,300pF	6.3 ~ 630	13

HOW TO ORDER

0402	H	250	N	4R7	B	C	T
Size	Series	Rated Voltage	Dielectric	Capacitance	Tolerance	Termination	Packaging
0201 (0603) 0402 (1005) 0505 (1414) 0603 (1608) 0805 (2012) 1206 (3216) 1210 (3225) 1808 (4520) 1812 (4532) 1825 (4563) 2220 (5750) 2225 (5763)	G: General Purp./High Volt H: High-Q, Low ESR M: Ultra High-Q, Low ESR	6R3: 6.3V 100: 10V 160: 16V 250: 25V 500: 50V 101: 100V 201: 200V 251: 250V 501: 500V 631: 630V 102: 1,000V 202: 2,000V 302: 3,000V	N: NP0 X: X7R W: X5R Y: Y5V	R47: 0.47pF 0R5: 0.5pF 1R0: 1.0pF 100: 10pF 101: 100pF	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%	C: Cu/Ni/Sn	T: 7" Paper Tape U: 13" Paper Tape E: 7" Plastic Tape Q: 13" Plastic Tape Z or blank: Bulk

EXTERNAL DIMENSIONS

Outline	Case Size EIA (mm)	L (mm)	W (mm)	T (mm)	Soldering Method	M_B (mm)
	0201 (0603)	0.60 ±0.03	0.30 ±0.03	0.30 ±0.03	R	0.15 ±0.05
	0402 (1005)	1.00 ±0.05	0.50 ±0.05	0.50 ±0.05	R	0.25 +0.05/-0.1
				0.50 +0.02/-0.05		
		1.00 ±0.20	0.50 ±0.20	0.50 ±0.20		
	0505 (1414)	1.40 +0.33/-0.25	1.40 ±0.38	1.15 ±0.15	R/W	0.25 +0.25/-0.13
	0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07	R / W	0.40 ±0.15
		1.60 +0.15/-0.10	0.80+0.15/-0.10	0.50±0.10		
				0.80+0.15/-0.10		
		1.60 ±0.20	0.80±0.20	0.8±0.20		
	0805 (2012)	2.0 ±0.15	1.25 ±0.10	0.50±0.10	R / W	0.50 ±0.20
				0.60±0.10	R / W	
				0.80±0.10	R / W	
				1.25±0.10	R	
		2.0 ±0.20	1.25 ±0.20	0.85±0.10	R / W	
				1.25±0.20	R	
	1206 (3216)	3.2 ±0.15	1.6 ±0.15	0.8 ±0.10	R/W	0.6 ±0.20
				0.95 ±0.10	R	
				1.15 ±0.15	R	
		3.2 ±0.20		1.25 ±0.10	R	
			1.6 ±0.20	0.85 ±0.10	R	
				1.6 ±0.20	R/W	
		3.2 +0.3/-0.1	1.6 +0.3/-0.1	1.6 +0.3/-0.10	R	
	1210 (3225)	3.2 ±0.30	2.5 ±0.20	0.85 ±0.10	R	0.75 ±0.25
				1.25 ±0.10	R	
		3.2 ±0.40	2.5 ±0.30	1.6 ±0.20	R	
				2.0 ±0.20	R	
				2.5 ±0.30	R	
	1808 (4520)	4.5 ±0.40	2.03 ±0.25	1.4 ±0.15	R	0.75 ±0.25
				1.6 ±0.20	R	
				2.0 ±0.20	R	
	1812 (4532)	4.5 ±0.40	3.2 ±0.30	1.25 ±0.10	R	0.75 ±0.25
				1.6 ±0.20	R	
				2.0 ±0.20	R	
			3.2 ±0.40	2.5 ±0.30	R	
				2.8 ±0.30	R	
	1825 (4563)	4.6 ±0.30	6.3 ±0.40	2.0 ±0.20	R	>0.26
				2.5 ±0.30		
				2.8 ±0.30		
	2220 (5750)	5.7 ±0.40	5.0 ±0.40	2.0 ±0.20	R	>0.30
				2.5 ±0.30		
				2.8 ±0.30		
	2225 (5763)	5.7 ±0.40	6.3 ±0.40	2.0 ±0.20	R	>0.30
				2.5 ±0.30		
				2.8 ±0.30		

* R = Reflow soldering process; W = Wave soldering process

SIZE CODES/PACKAGING STYLE & QUANTITY

						Reel Quantity			
						Paper Tape		Embossed Plastic Tape	
Case Size	Size Code	Max. Thickness (mm)	Length (mm)	Width (mm)	Thickness (mm)	7" Reel	13" Reel	7" Reel	13" Reel
0201	AA	0.33	0.60 ±0.03	0.30 ±0.03	0.30 ±0.03	15,000	70,000	-	-
0402	BA	0.55	1.00 ±0.05	0.50 ±0.05	0.50 ±0.05	10,000	50,000	-	-
0402	BC	0.52	1.0 ±0.20	0.50 ±0.20	0.50 ±0.2	10,000	-	-	-
0505	LA	1.3	1.4 +0.33/-0.25	1.4 ±0.38	1.15 ±0.15	-	-	-	-
0603	CA	0.87	1.6 ±0.1	0.8 ±0.1	0.8±0.07	4,000	15,000	-	-
0603	CC	0.95	1.6 +0.15/-0.01	0.8 +0.15/-0.1	0.8 +0.15/-0.1	4,000	15,000	-	-
0805	DB	0.7	2.0 ±0.15	1.25 ±0.1	0.6 ±0.1	4,000	15,000	-	-
0805	DC	0.9	2.0 ±0.15	1.25 ±0.1	0.8 ±0.1	4,000	15,000	-	-
0805	DD	1.35	2.0 ±0.15	1.25 ±0.1	1.25 ±0.1	-	-	3,000	10,000
0805	DE	0.95	2.0 ±0.2	1.25 ±0.2	0.85 ±0.1	4,000	15,000	-	-
0805	DF	1.45	2.0 ±0.2	1.25 ±0.2	1.25 ±0.2	-	-	3,000	10,000
1206	EA	0.9	3.2 ±0.15	1.6 ±0.15	0.8 ±0.1	4,000	15,000	-	-
1206	EB	1.05	3.2 ±0.15	1.6 ±0.15	0.95 ±0.1	-	-	3,000	10,000
1206	EC	1.35	3.2 ±0.15	1.6 ±0.15	1.25 ±0.1	-	-	3,000	10,000
1206	ED	1.3	3.2 ±0.2	1.6 ±0.15	1.15 ±0.15	-	-	3,000	10,000
1206	EE	1.8	3.2 ±0.2	1.6 ±0.2	1.6 ±0.2	-	-	2,000	10,000
1206	EG	1.9	3.2 +0.3/-0.1	1.6 +0.3/-0.1	1.6 +0.3/-0.1	-	-	2,000	9,000
1210	FA	1.05	3.2 ±0.3	2.5 ±0.2	0.95 ±0.1	-	-	3,000	10,000
1210	FC	1.35	3.2 ±0.3	2.5 ±0.2	1.25 ±0.1	-	-	3,000	10,000
1210	FD	1.8	3.2 ±0.4	2.5 ±0.3	1.6 ±0.2	-	-	2,000	-
1210	FE	2.2	3.2 ±0.4	2.5 ±0.3	2.0 ±0.2	-	-	1,000	6,000
1210	FF	2.8	3.2 ±0.4	2.5 ±0.3	2.5 ±0.3	-	-	1,000	6,000
1808	GE	1.35	4.5 +0.5/-0.3	2.03 ±0.25	1.25 ±0.1	-	-	2,000	10,000
1808	GH	2.2	4.5 +0.5/-0.3	2.03 ±0.25	2.0 ±0.2	-	-	1,000	6,000
1812	HA	1.35	4.5 ±0.4	3.2 ±0.3	1.25 ±0.1	-	-	1,000	5,000
1812	HC	2.2	4.5 ±0.4	3.2 ±0.3	2.0 ±0.2	-	-	1,000	-
1825	IA	2.2	4.6 ±0.3	6.3 ±0.4	2.0 ±0.2	-	-	1,000	-
1825	IB	2.8	4.6 ±0.3	5.0 ±0.4	2.5 ±0.3	-	-	500	-
2220	JA	2.2	5.7 ±0.4	5.0 ±0.4	2.0 ±0.2	-	-	1,000	-
2220	JB	2.8	5.7 ±0.4	5.0 ±0.4	2.5 ±0.3	-	-	500	-
2220	JC	3.1	5.7 ±0.4	5.0 ±0.4	2.8 ±0.3	-	-	500	-
2225	KA	2.2	5.7 ±0.4	6.3 ±0.4	2.0 ±0.2	-	-	1,000	-
2225	KB	2.8	5.7 ±0.4	6.3 ±0.4	2.5 ±0.3	-	-	500	-
2225	KC	3.1	5.7 ±0.4	6.3 ±0.4	2.8 ±0.3	-	-	500	-

DESIGNER KITS

M Series – Ultra High-Q Designer Kits

0402 Multi-Layer Ultra High-Q Capacitors				
Capacitance (pF)	**Tolerance**	**Cap Code**	**Voltage (DC V)**	**Part Number**
0.2	±0.1pF (B)	0R2B	100	0402M101N0R2BCT
0.3	±0.05pF (A)	0R3A	100	0402M101N0R3ACT
0.5	±0.1pF (B)	0R5B	100	0402M101N0R5BCT
0.7	±0.1pF (B)	0R7B	100	0402M101N0R7BCT
0.9	±0.1pF (B)	0R9B	100	0402M101N0R9BCT
1.0	±0.1pF (B)	1R0B	100	0402M101N1R0BCT
1.2	±0.1pF (B)	1R2B	100	0402M101N1R2BCT
1.5	±0.1pF (B)	1R5B	100	0402M101N1R5BCT
2.0	±0.1pF (B)	2R0B	100	0402M101N2R0BCT
2.2	±0.1pF (B)	2R2B	100	0402M101N2R2BCT
2.7	±0.1pF (B)	2R7B	100	0402M101N2R7BCT
3.0	±0.1pF (B)	3R0B	100	0402M101N3R0BCT
3.9	±0.1pF (B)	3R9B	100	0402M101N3R9BCT
4.7	±0.1pF (B)	4R7B	100	0402M101N4R7BCT
5.6	±0.1pF (B)	5R6B	100	0402M101N5R6BCT
6.8	±0.1pF (B)	6R8B	100	0402M101N6R8BCT
8.2	±0.25pF (C)	8R2C	100	0402M101N8R2CCT
10	5% (J)	100J	100	0402M101N100JCT
50 Pieces of each value				

0603 Multi-Layer Ultra High-Q Capacitors				
Capacitance (pF)	**Tolerance**	**Cap Code**	**Voltage (DC V)**	**Part Number**
0.5	±0.1pF (B)	0R5B	250	0603M251N0R5BCT
0.6	±0.1pF (B)	0R6B	250	0603M251N0R6BCT
0.8	±0.1pF (B)	0R8B	250	0603M251N0R8BCT
1.0	±0.1pF (B)	1R0B	250	0603M251N1R0BCT
1.2	±0.1pF (B)	1R2B	250	0603M251N1R2BCT
1.5	±0.1pF (B)	1R5B	250	0603M251N1R5BCT
1.8	±0.1pF (B)	1R8B	250	0603M251N1R8BCT
2.2	±0.1pF (B)	2R2B	250	0603M251N2R2BCT
2.7	±0.1pF (B)	2R7B	250	0603M251N2R7BCT
3.3	±0.1pF (B)	3R3B	250	0603M251N3R3BCT
3.9	±0.1pF (B)	3R9B	250	0603M251N3R9BCT
4.7	±0.1pF (B)	4R7B	250	0603M251N4R7BCT
5.6	±0.25pF (C)	5R6C	250	0603M251N5R6CCT
6.8	±0.25pF (C)	6R8C	250	0603M251N6R8CCT
10	5% (J)	100J	250	0603M251N100JCT
22	5% (J)	220J	250	0603M251N220JCT
33	5% (J)	330J	250	0603M251N330JCT
47	5% (J)	470J	250	0603M251N470JCT
50 Pieces of each value				

H Series – High-Q Designer Kits

0402 Multi-Layer High-Q Capacitors				
Capacitance (pF)	**Tolerance**	**Cap Code**	**Voltage (DC V)**	**Part Number**
0.2	±0.1pF (B)	0R2B	50	0402H500N0R2BCT
0.3	±0.05pF (A)	0R3A	50	0402H500N0R3ACT
0.5	±0.1pF (B)	0R5B	50	0402H500N0R5BCT
0.7	±0.1pF (B)	0R7B	50	0402H500N0R7BCT
0.9	±0.1pF (B)	0R9B	50	0402H500N0R9BCT
1.0	±0.1pF (B)	1R0B	50	0402H500N1R0BCT
1.2	±0.1pF (B)	1R2B	50	0402H500N1R2BCT
1.5	±0.1pF (B)	1R5B	50	0402H500N1R5BCT
2.0	±0.1pF (B)	2R0B	50	0402H500N2R0BCT
2.2	±0.1pF (B)	2R2B	50	0402H500N2R2BCT
2.7	±0.1pF (B)	2R7B	50	0402H500N2R7BCT
3.0	±0.1pF (B)	3R0B	50	0402H500N3R0BCT
3.6	±0.1pF (B)	3R6B	50	0402H500N3R6BCT
4.7	±0.1pF (B)	4R7B	50	0402H500N4R7BCT
5.6	±0.1pF (B)	5R6B	50	0402H500N5R6BCT
6.8	±0.25pF (C)	6R8C	50	0402H500N6R8CCT
8.2	±0.25pF (C)	8R2C	50	0402H500N8R2CCT
10	5% (J)	100J	50	0402H500N100JCT
50 Pieces of each value				

0603 Multi-Layer High-Q Capacitors				
Capacitance (pF)	**Tolerance**	**Cap Code**	**Voltage (DC V)**	**Part Number**
0.5	±0.1pF (B)	0R5B	100	0603H101N0R5BCT
0.6	±0.1pF (B)	0R6B	100	0603H101N0R6BCT
0.8	±0.1pF (B)	0R8B	100	0603H101N0R8BCT
1.0	±0.1pF (B)	1R0B	100	0603H101N1R0BCT
1.2	±0.1pF (B)	1R2B	100	0603H101N1R2BCT
1.5	±0.1pF (B)	1R5B	100	0603H101N1R5BCT
1.8	±0.1pF (B)	1R8B	100	0603H101N1R8BCT
2.2	±0.1pF (B)	2R2B	100	0603H101N2R2BCT
2.4	±0.1pF (B)	2R4B	100	0603H101N2R4BCT
3.3	±0.1pF (B)	3R3B	100	0603H101N3R3BCT
3.9	±0.1pF (B)	3R9B	100	0603H101N3R9BCT
4.7	±0.1pF (B)	4R7B	100	0603H101N4R7BCT
5.6	±0.25pF (C)	5R6C	100	0603H101N5R6CCT
6.8	±0.25pF (C)	6R8C	100	0603H101N6R8CCT
10	5% (J)	100J	100	0603H101N100JCT
22	5% (J)	220J	100	0603H101N220JCT
33	5% (J)	330J	100	0603H101N330JCT
68	5% (J)	680J	100	0603H101N680JCT
50 Pieces of each value				

Our standard kits are listed above, however, different capacitance values/case sizes/and voltages are available.

Please contact Frontier Electronics or one of our authorized distributors for additional information.

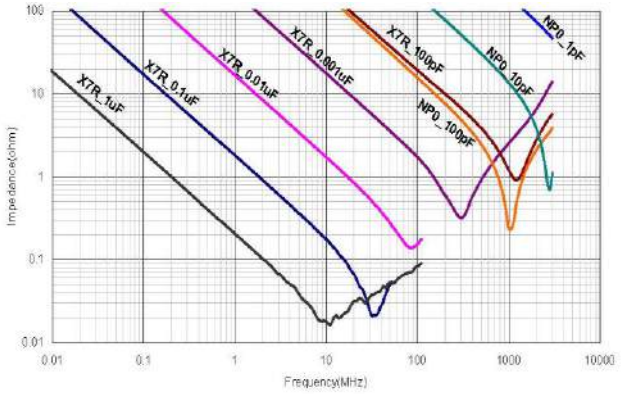
Part Number Description

1206	G	250	Y	101	Z	C	T
Size	Series	Voltage	Dielectric	Capacitance	Tolerance	Termination	Packaging
1206 (3216)	G (General Purpose)	250=25 VDC	Y=Y5V	101=100pF	Z=-20%/+80%	C=Cu/Ni/Sn	T=7" Paper Tape

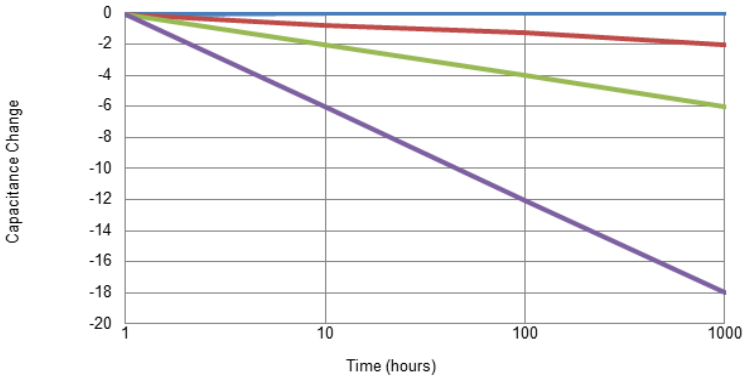
General Electrical Data

Dielectric	NP0	X7R	X5R	Y5V
Size	0201, 0402, 0603, 0805,1206 1210, 1808, 1812,1825, 2220, 2225	0201, 0402, 0603, 0805 1206,1210, 1808, 1812 1825, 2220, 2225	0201, 0402, 0603, 0805, 1206, 1210	0402, 0603, 0805, 1206, 1210, 1808, 1812
Capacitance range	0.1pF to 0.1μF	100pF to 47μF	100pF to 100μF	0.01μF to 100μF
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%)	K (±10%) M (±20%)	M (±20%) Z (-20/+80%)
Rated voltage (VDC)	6.3, 10, 16, 25, 50, 100, 200, 250, 500, 630, 1,000, 2,000, 3,000		6.3, 10, 16, 25, 50	6.3, 10, 16, 25, 50, 100, 200, 250
Operating temperature	-55 to +125°C		-55 to +85°C	-25 to +85°C
Capacitance characteristic	±30ppm	±15%	±15%	-0.375
Insulation resistance at Ur	Ur=200~630V: ≥10GΩ or RxC≥100Ω-F (whichever is lower) Ur=1000~3000V: ≥10GΩ			
Dielectric Strength	<200V: ≥2.5 x VDC 200~300V: ≥2 x VDC 500~999V: ≥1.5 x VDC 1000~3000V: ≥1.2 x VDC *Duration: 1 to 5 seconds *Charge and discharge current less than 50mA			
Termination	Ni/Sn (lead-free termination)			

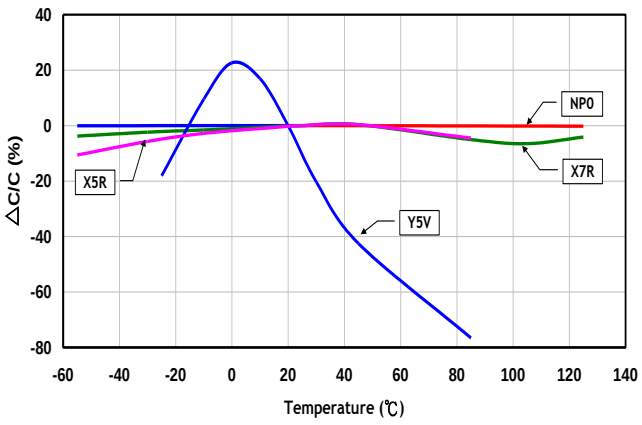
Electrical Characteristics



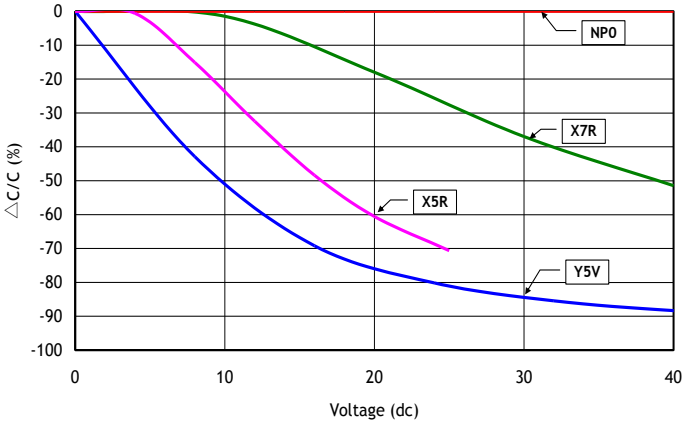
Impedance vs. Frequency (typical)



Capacitance Change – Typical Aging Rate



Temperature Coefficient of Capacitance



DC Bias Characteristics

GENERAL PURPOSE & HIGH VOLTAGE (G SERIES) NP0 DIELECTRIC

		Tolerance	0201		0402		0603			0805			1206					1210					1808					1812						1825	2220	2225
			6.3 10 16 25	50	6.3 10 16 25 50	100	6.3 10 16 25 50	100	200 250	6.3 10 16 25 50 100	200 250	500 630	6.3 10 16 25 50 100	200 250	500 630	1K	2K	6.3 10 16 25 50 100	200 250	500 630	1K	2K	6.3 10 16 25 50 100	200 250 500 630	1K	2K	3K	6.3 10 16 25 50 100	200 250	500 630	1K	2K	3K	50	50 100 200 250 500 630	50 100 200
			DC VOLTS																																
0R1	0.1 pF		AA	AA																															
0R2	0.2 pF		AA	AA																															
0R3	0.3 pF		AA	AA																															
0R4	0.4 pF		AA	AA																															
0R5	0.5 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB																							
0R6	0.6 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB																							
0R7	0.7 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB																							
0R8	0.8 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB																							
0R9	0.9 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB																							
1R0	1.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB																							
1R2	1.2 pF	*A	AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA																		
1R5	1.5 pF	*B	AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA																		
1R8	1.8 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA																		
2R0	2.0 pF	C	AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA																		
2R2	2.2 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
2R7	2.7 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
3R0	3.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
3R3	3.3 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
3R9	3.9 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
4R0	4.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
4R7	4.7 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
5R0	5.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
5R6	5.6 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
6R0	6.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
6R8	6.8 pF	*C	AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
7R0	7.0 pF	D	AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
8R0	8.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
8R2	8.2 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
9R0	9.0 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA						GE	GE	GE	GE	GE								
100	10 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
120	12 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
150	15 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
180	18 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
220	22 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
270	27 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
330	33 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EB	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
390	39 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EA	EB	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
470	47 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EB	EB	FA	FA	FA	FA	FA	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
560	56 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EB	EC	FA	FA	FA	FA	FC	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
680	68 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DB	EA	EA	EA	EB	EC	FA	FA	FA	FA	FC	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
820	82 pF		AA	AA	BA	BA	CA	CA	CA	DB	DB	DC	EA	EA	EA	EC	EC	FA	FA	FA	FA	FC	GE	GE	GE	GE	GE	HA	HA	HA	HA	HA	HA	IC	JC	KA
101	100 pF		AA	AA	BA	BA	CA	CA	CA	DB	DC	DC	EA	EA	EA	EC	EC	FA	FA	FA	FC	FC	GE	GE	GE	GE	GH	HA	HA	HA	HA	HA	HA	IC	JC	KA
121	120 pF		AA	AA	BA	BA	CA	CA	CA	DB	DC	DD	EA	EA	EA	EC	EE	FA	FA	FA	FC	FC	GE	GE	GE	GE	GH	HA	HA	HA	HA	HA	HA	IC	JC	KA
151	150 pF				BA	BA	CA	CA	CA	DB	DD	DD	EA	EA	EA	EC	EE	FA	FA	FA	FC	FD	GE	GE	GE	GH	GH	HA	HA	HA	HA	HA	HA	IC	JC	KA
181	180 pF				BA	BA	CA	CA	CA	DB	DD	DD	EA	EA	EA	EE	EE	FA	FA	FA	FC	FD	GE	GE	GE	GH	GH	HA	HA	HA	HA	HA	HC	IC	JC	KA
221	220 pF				BA	BA	CA	CA	CA	DB	DD	DD	EA	EA	EA	EE	EE	FA	FA	FA	FD	FD	GE	GE	GE	GH	GH	HA	HA	HA	HA	HA	HC	IC	JC	KA
271	270 pF				BA		CA	CA	CC	DB	DD	DD	EA	EB	EB	EE		FA	FA	FA	FD		GH	GH	GH	GH	GH	HA	HA	HA	HA	HC	HC	IC	JC	KA
331	330 pF				BA		CA	CA	CC	DB	DD	DD	EA	EB	EB	EE		FA	FA	FA	FD		GH	GH	GH	GH	GH	HA	HA	HA	HA	HC	HC	IC	JC	KA
391	390 pF				BA		CA	CA	CC	DC	DD	DD	EA	EB	EB	EE		FA	FA	FA	FD		GH	GH	GH	GH		HA	HA	HA	HA	HC	HC	IC	JC	KA
471	470 pF				BA		CA	CA	CC	DC	DD	DF	EA	EB	EB	EE		FA	FA	FA	FD		GH	GH	GH	GH		HC	HC	HA	HC	HC	HC	IC	JC	KA
561	560 pF	*F			BA		CA	CA		DC	DD	DF	EA	EC	EC	EE		FA	FA	FA	FD		GH	GH	GH	GH		HA	HA	HA	HC	HC		IC	JC	KA
681	680 pF				BA		CA	CA		DC	DD	DF	EA	EC	EC	EE		FA	FA	FA	FD		GH	GH	GH	GH		HA	HA	HA	HC	HC		IC	JC	KA
821	820 pF	*G			BA		CA	CA		DC	DD	DF	EA	EE	EE	EE		FA	FA	FA	FD		GH	GH	GH			HA	HA	HA	HC	HC		IC	JC	KA
102	1,000 pF				BA		CA	CA		DC	DD	DF	EA	EE	EE	EE		FA	FC	FC	FD		GH	GH	GH			HA	HA	HA	HC	HC		IC	JC	KA
122	1,200 pF	J					CC	CC		DC	DD		EA	EE	EE			FA	FC	FC			GH	GH				HA	HA	HA	HC			IC	JC	KA
152	1,500 pF						CC	CC		DC	DD		EA	EE	EE			FA	FC	FC			GH	GH				HA	HA	HA	HC			IC	JC	KA
182	1,800 pF	K					CC			DC	DD		EA	EE	EE			FA	FC	FC			GH	GH				HA	HA	HA				IC	JC	KA
222	2,200 pF						CC			DC	DD		EA	EE	EE			FA	FC	FC			GH	GH				HA	HA	HA				IC	JC	KA
272	2,700 pF						CC			DD			EA	EE				FA	FC	FC								HA	HA	HA				IC	JC	KA
332	3,300 pF						CC			DD			EA	EE				FA	FC	FC								HA	HA	HA				IC	JC	KA
392	3,900 pF						CC			DD			EA	EE				FA	FC	FC								HA	HA					IC	JC	KA
472	4,700 pF						CC			DD			EA	EE				FA	FD									HA	HA					IC	JC	KA
562	5,600 pF						CC			DD			EA					FA	FD									HA	HA					IC	JC	KA
682	6,800 pF						CC			DD			EB					FA	FD									HA	HA					IC	JC	KA
822	8,200 pF						CC			DD			EC					FA	FD									HA						IC	JC	KA
103	10,000 pF						CC			DD			EC					FA	FD									HA						IC	JC	KA
123	12,000 pF									DE			EB					FC										HA						IC	JC	KA
153	15,000 pF									DE			EB					FC										HA						IC	JC	KA
183	18,000 pF									DD			EB															HA						IC	JC	KA
223	22,000 pF									DD			EB															HA						IC	JC	KA
273	27,000 pF												EB															HA						IC	JC	KA
333	33,000 pF												EB															HA						IC	JA	KA
393	39,000 pF												ED																					IC	JA	KA
563	56,000 pF												ED																							
683	68,000 pF												EE																							
823	82,000 pF												EE																							
104	100,000 pF												EE																							

* Tolerance available only for 100V and lower

The letter code in the cell indicates the dimensions and package quantity. The reference table is on page 4 of the catalog.

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GENERAL PURPOSE & HIGH VOLTAGE (G SERIES) X7R DIELECTRIC

		Tolerance	0201			0402		0603					0805						1206							1210							
			6.3 10 16	25	50	6.3 10 25 50	100	6.3 10 16	25	50	100	200 250	6.3 10 16 25	50	100	200 250	500 630	1K	6.3 10 16 25	50	100	200 250	500 630	1K	2K	6.3 10 16	25	50	100	200 250	500 630	1K	2K
			DC Volts																													
101	100 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC														
121	120 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC														
151	150 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC							
181	180 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC							
221	220 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC							
271	270 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC	FC	FC	FC	FC	FC	FC	FC	FC
331	330 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC	FC	FC	FC	FC	FC	FC	FC	FC
391	390 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC	FC	FC	FC	FC	FC	FC	FC	FC
471	470 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC	FC	FC	FC	FC	FC	FC	FC	FC
561	560 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC	FC	FC	FC	FC	FC	FC	FC	FC
681	680 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EC	FC	FC	FC	FC	FC	FC	FC	FC
821	820 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EE	FC	FC	FC	FC	FC	FC	FC	FC
102	1,000 pF		AA	AA	AA	BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FC
122	1,200 pF		AA	AA		BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DC	EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FF
152	1,500 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DD	EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FF
182	1,800 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DD	EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FF
222	2,200 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC	DD	EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FF
272	2,700 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC		EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FF
332	3,300 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC		EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FC	FF
392	3,900 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DC		EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FD	FF
472	4,700 pF		AA			BA	BA	CA	CA	CA	CA	CC	DC	DC	DC	DC	DD		EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FD	FF
562	5,600 pF		AA			BA		CA	CA	CA	CA	CC	DC	DC	DC	DD	DD		EA	EA	EA	EC	EC	EC	EE	FA	FA	FA	FA	FA	FC	FD	
682	6,800 pF		AA			BA		CA	CA	CA	CA	CC	DC	DC	DC	DD	DD		EA	EA	EA	EC	EC	EC		FA	FA	FA	FA	FA	FC	FD	
822	8,200 pF		AA			BA		CA	CA	CA	CA	CC	DC	DC	DC	DD	DD		EA	EA	EA	EC	EC	EC		FA	FA	FA	FA	FA	FC	FD	
103	10,000 pF		AA			BA		CA	CA	CA	CA	CC	DC	DC	DC	DD	DD		EA	EA	EA	EC	EC	EC		FA	FA	FA	FA	FA	FC	FD	
123	12,000 pF					BA		CA	CA	CA	CC		DC	DC	DC	DD	DD		EA	EA	EA	EC	EC	EE		FA	FA	FA	FA	FA	FC	FD	
153	15,000 pF	*J				BA		CA	CA	CA	CC		DC	DC	DC	DD	DD		EA	EA	EA	EC	EC	EE		FA	FA	FA	FA	FA	FC	FD	
183	18,000 pF					BA		CA	CA	CA	CC		DC	DC	DC	DD	DD		EA	EA	EA	EC	EC			FA	FA	FA	FA	FA	FC	FD	
223	22,000 pF	K				BA		CA	CA	CA	CC		DC	DC	DC	DD	DD		EA	EA	EA	EC	EE			FA	FA	FA	FA	FA	FD	FD	
273	27,000 pF					BA		CA	CA	CA	CC		DC	DC	DD	DD			EA	EA	EA	EC	EE			FA	FA	FA	FA	FA	FD		
333	33,000 pF	M				BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EA	EE	EE			FA	FA	FA	FA	FA	FD		
393	39,000 pF					BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EA	EE	EE			FA	FA	FA	FA	FA	FD		
473	47,000 pF					BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EA	EE	EE			FA	FA	FA	FA	FC	FD		
563	56,000 pF					BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EA	EE	EE			FA	FA	FA	FA	FC	FD		
683	68,000 pF					BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EA	EE				FA	FA	FA	FA	FD	FD		
823	82,000 pF					BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EC	EE				FA	FA	FA	FA	FD			
104	0.1 µF					BA		CA	CA	CC	CC		DC	DC	DD	DD			EA	EA	EC	EE				FA	FA	FA	FA	FD			
124	0.12 µF							CA	CC				DC	DD					EA	EA	EC					FA	FA	FA	FA	FD			
154	0.15 µF							CA	CC				DD	DD					EB	EB	EE					FA	FA	FA	FC	FF			
184	0.18 µF							CA	CC				DD	DD					EB	EB	EE					FA	FA	FA	FC	FF			
224	0.22 µF							CA	CC				DD	DD					EB	EB	EE					FA	FA	FA	FC	FF			
274	0.27 µF							CC	CC				DD	DF					EB	EC	EE					FA	FA	FA	FD	FF			
334	0.33 µF							CC	CC				DD	DF					EB	EC	EE					FA	FA	FC	FD	FF			
394	0.39 µF							CC	CC				DD	DF					EB	EG	EE					FA	FA	FC	FF	FF			
474	0.47 µF							CC	CC				DD	DF					ED	EG	EE					FA	FA	FC	FF	FF			
564	0.56 µF							CC					DD						ED	EG	EG					FA	FC	FC	FF				
684	0.68 µF							CC					DD						ED	EG	EG					FA	FC	FC	FE				
824	0.82 µF							CC					DD						ED	EG	EG					FA	FC	FC	FE				
105	1 µF							CC					DD	DF					ED	EG	EG					FA	FC	FC	FE				
155	1.5 µF							CC					DF						ED							FE	FD	FF	FF				
225	2.2 µF							CC					DF	DF					ED	EG	EG					FE	FD	FF	FF				
335	3.3 µF																		EG							FE	FD						
475	4.7 µF												DF						EG	EG						FE	FE	FF					
685	6.8 µF																																
106	10 µF												DF						EG							FE	FE	FF					
226	22 µF																		EG							FF	FF						
476	47 µF																									FF							

*J Tolerance available only for 100V and lower

The letter code in the cell indicates the dimensions and package quantity. The reference table is on page 4 of the catalog.

GENERAL PURPOSE & HIGH VOLTAGE (G SERIES) X7R DIELECTRIC

		Tolerance	1808					1812							1825						2220						2225						
			6.3 10 16 25 50	100 200 250 500 630	1K	2K	3K	6.3 10 16 25	50 100	200 250	500 630	1K	2K	3K	10 16 25 50 100	200 250	500 630	1K	2K	3K	6.3 10 16 25 50	100	200 250	500 630	1K	2K 3K	6.3 10 16 25 50	100	200 250	500	630	1K	2K
			DC Volts																														
101	100 pF																																
121	120 pF																																
151	150 pF		GE	GE	GE	GE	GE																										
181	180 pF		GE	GE	GE	GE	GE																										
221	220 pF		GE	GE	GE	GE	GE																										
271	270 pF		GE	GE	GE	GE	GE	HA	HA	HA	HA	HA																					
331	330 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA																					
391	390 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA																					
471	470 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA																					
561	560 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA																					
681	680 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA	HC	HC																			
821	820 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA	HC	HC																			
102	1,000 pF		GE	GE	GE	GE	GH	HA	HA	HA	HA	HA	HA	HC	IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
122	1,200 pF		GE	GE	GE	GH	GH	HA	HA	HA	HA	HA	HA	HC	IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
152	1,500 pF		GE	GE	GE	GH	GH	HA	HA	HA	HA	HA	HA	HC	IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
182	1,800 pF		GE	GE	GE	GH		HA	HA	HA	HA	HA	HA	HD	IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
222	2,200 pF		GE	GE	GE	GH		HA	HA	HA	HA	HA	HA	HD	IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
272	2,700 pF		GE	GE	GE	GH		HA	HA	HA	HA	HA	HA	HD	IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
332	3,300 pF		GE	GE	GE	GH		HA	HA	HA	HA	HA	HC		IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
392	3,900 pF		GE	GE	GE	GH		HA	HA	HA	HA	HA	HC		IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
472	4,700 pF		GE	GE	GE	GH		HA	HA	HA	HA	HA	HC		IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
562	5,600 pF		GH	GH	GH	GH		HA	HA	HA	HA	HA			IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
682	6,800 pF		GH	GH	GH			HA	HA	HA	HA	HA			IA	IA	IA	IA	IA	IA	JA	JA	JA	JA	JA	JA	KA	KA	KA	KA	KA	KA	KA
822	8,200 pF		GH	GH	GH			HA	HA	HA	HA	HA			IA	IA	IA	IA	IA	IB	JA	JA	JA	JA	JA	JB	KA	KA	KA	KA	KA	KA	KA
103	10,000 pF		GH	GH	GH			HA	HA	HA	HA	HA			IA	IA	IA	IA	IA	IB	JA	JA	JA	JA	JA	JB	KA	KA	KA	KA	KA	KA	KA
123	12,000 pF		GH	GH	GH			HA	HA	HA	HA	HA			IA	IA	IA	IA	IB		JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	KA
153	15,000 pF	*J	GH	GH	GH			HA	HA	HA	HA	HC			IA	IA	IA	IA	IB		JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
183	18,000 pF		GH	GH	GH			HA	HA	HA	HA				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
223	22,000 pF	K	GH	GH	GH			HA	HA	HA	HA				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
273	27,000 pF		GH	GH	GH			HA	HA	HA	HA				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
333	33,000 pF	M	GH	GH	GH			HA	HA	HA	HA				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
393	39,000 pF		GH	GH	GH			HA	HA	HA	HA				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
473	47,000 pF		GH	GH				HA	HA	HA	HA				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
563	56,000 pF		GH	GH				HA	HA	HA	HC				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
683	68,000 pF		GH	GH				HA	HA	HA	HC				IA	IA	IA	IA			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
823	82,000 pF							HA	HA	HA	HC				IA	IA	IA	IB			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
104	0.1 µF							HA	HA	HA	HC				IA	IA	IA	IB			JA	JA	JA	JA	JA		KA	KA	KA	KA	KA	KA	
124	0.12 µF							HA	HA	HA	HD				IA	IA	IA				JA	JA	JA	JA	JB		KA	KA	KA	KA	KA		
154	0.15 µF							HA	HA	HC	HD				IA	IA	IA				JA	JA	JA	JA			KA	KA	KA	KA	KA		
184	0.18 µF							HA	HA	HC					IA	IA	IA				JA	JA	JA	JA			KA	KA	KA	KA	KA		
224	0.22 µF							HA	HA	HC					IA	IA	IA				JA	JA	JA	JA			KA	KA	KA	KA	KA		
274	0.27 µF							HA	HA	HC					IA	IA					JA	JA	JA	JA			KA	KA	KA	KA			
334	0.33 µF							HA	HA	HC					IA	IA					JA	JA	JA	JA			KA	KA	KA	KA			
394	0.39 µF							HA	HA	HC					IA	IA					JA	JA	JA	JA			KA	KA	KA	KA			
474	0.47 µF							HA	HC	HC					IA	IA					JA	JA	JA	JA			KA	KA	KA	KA			
564	0.56 µF							HA	HC	HD					IA	IA					JA	JA	JA				KA	KA	KA	KA			
684	0.68 µF							HA	HC	HD					IA	IA					JA	JA	JA				KA	KA	KA	KA			
824	0.82 µF							HA	HC	HD					IA	IA					JA	JA	JA				KA	KA	KA	KB			
105	1 µF							HA	HC	HD					IA	IA					JA	JA	JA				KA	KA	KA	KB			
155	1.5 µF							HC	HC	HD					IA						JA	JA	JB				KA	KA	KB				
225	2.2 µF							HD	HD						IA						JA	JA	JB				KA	KA	KB				
335	3.3 µF														IA						JA	JA					KA	KA					
475	4.7 µF														IA						JA	JB					KA						
685	6.8 µF																				JB	JC					KB						
106	10 µF																				JC	JC					KC						
226	22 µF																																
476	47 µF																																

*J Tolerance available only for 100V and lower

The letter code in the cell indicates the dimensions and package quantity. The reference table is on page 4 of the catalog.

GENERAL PURPOSE & HIGH VOLTAGE (G SERIES) Y5V DIELECTRIC

		Tolerance	0402				0603				0805						1206							1210							1812			
			6.3				6.3				6.3						6.3							6.3							6.3			
			10	16	25	50	10	16	25	50	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
			DC Volts																														
103	10,000 pF		BA	BA	BA	BA	CA	CA	CA	CA	DB	DB	DB	DB	DC	DC	EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
153	15,000 pF		BA	BA	BA	BA	CA	CA	CA	CA	DB	DB	DB	DB	DC	DC	EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
223	22,000 pF		BA	BA	BA	BA	CA	CA	CA	CA	DB	DB	DB	DB	DC	DC	EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
333	33,000 pF		BA	BA	BA	BA	CA	CA	CA	CA	DB	DB	DB	DB	DC	DC	EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
473	47,000 pF		BA	BA	BA		CA	CA	CA	CA	DB	DB	DB	DB	DC	DC	EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
683	68,000 pF		BA	BA	BA		CA	CA	CA	CA	DB	DB	DB	DB	DC	DC	EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
104	0.1 µF		BA	BA	BA		CA	CA	CA	CA	DB	DB	DB	DB	DC		EA	EA	EA	EA	EA	EA	EA	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
154	0.15 µF		BA	BA			CA	CA	CA	CA	DB	DB	DB	DB			EA	EA	EA	EA	EA	EB	EB	FA	FA	FA	FA	FA	FA	FA	HA	HA	HA	HA
224	0.22 µF		BA	BA			CA	CA	CA	CA	DB	DB	DB	DB			EA	EA	EA	EA	EA	EB		FA	FA	FA	FA	FA	FA		HA	HA	HA	HA
334	0.33 µF	*M	BA	BA			CA	CA	CA	CC	DC	DC	DC	DC			EA	EA	EA	EA	EA			FA	FA	FA	FA	FA	FA		HA	HA	HA	HA
474	0.47 µF		BA	BA			CA	CA	CA	CC	DC	DC	DC	DC			EA	EA	EA	EA	EA			FA	FA	FA	FA	FA			HA	HA	HA	HA
684	0.68 µF	Z	BA				CA	CC	CC		DC	DC	DD	DD			EA	EA	EA	EA	EA			FA	FA	FA	FA	FA			HA	HA	HA	HA
105	1 µF		BA				CA	CC	CC		DC	DC	DD	DD			EB	EB	EB	EB	ED			FA	FA	FA	FA	FA			HA	HA	HA	
155	1.5 µF						CA				DD	DD					EB	EB	EB	EB				FA	FA	FA	FA				HA	HA		
225	2.2 µF						CA	CC			DD	DD	DF				EB	EB	EB	EB	ED			FA	FA	FA	FA	FD			HA	HA		
335	3.3 µF										DD	DD					ED	ED	ED	ED				FA	FA	FA	FA				HA	HA		
475	4.7 µF						CC				DD	DD	DF				ED	ED	ED	ED	EG			FA	FA	FA	FC	FD			HA	HA		
685	6.8 µF										DF						ED	ED	ED					FA	FA	FA	FC	FE			HA	HA		
106	10 µF										DF	DF					ED	ED	ED	EG				FC	FC	FC	FD	FE			HA	HC		
226	22 µF										DF						EG	EG						FE	FE	FE					HD			
476	47 µF																EG							FE	FE						HD			
107	100 µF																							FF										

*M Tolerance available only for 100V and lower

GENERAL PURPOSE & HIGH VOLTAGE (G SERIES) X5R DIELECTRIC

		Tolerance	0201					0402					0603					0805					1206					1210				
			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	6.3	10	16	25	50
			DC Volts																													
101	100 pF		AA	AA	AA	AA	AA																									
221	220 pF		AA	AA	AA	AA	AA																									
471	470 pF		AA	AA	AA	AA	AA																									
102	1,000 pF		AA	AA	AA	AA	AA																									
222	2,200 pF		AA	AA	AA																											
472	4,700 pF		AA	AA	AA																											
103	10,000 pF		AA	AA	AA																											
273	27,000 pF		AA	AA				BA	BA	BA																						
333	33,000 pF		AA	AA				BA	BA	BA																						
393	39,000 pF		AA	AA				BA	BA	BA																						
473	47,000 pF		AA	AA				BA	BA	BA																						
563	56,000 pF		AA	AA				BA	BA	BA																						
683	68,000 pF		AA	AA				BA	BA	BA																						
823	82,000 pF		AA	AA				BA	BA	BA																						
104	0.1 µF	*J	AA	AA	AA	AA		BA	BA	BA	BA	BA																				
154	0.15 µF							BA	BA	BA	BA																					
224	0.22 µF	K	AA	AA				BA	BA	BA	BA	BA	CC	CC	CC	CC	CC															
274	0.27 µF												CC	CC	CC	CC																
334	0.33 µF	M						BA	BA				CC	CC	CC	CC																
394	0.39 µF												CC	CC	CC	CC																
474	0.47 µF		AA	AA				BA	BA	BC	BC	BC	CC	CC	CC	CC	CC															
684	0.68 µF							BA	BA				CC	CC	CC	CC																
824	0.82 µF												CC	CC	CC																	
105	1 µF		AA	AA				BA	BA	BA	BA		CC	CC	CC	CC	CC	DD	DD	DD	DD	DF										
155	1.5 µF												CC					DF	DF	DF			ED	ED	ED			FE	FE	FE		
225	2.2 µF		AA					BA	BA	BC	BC		CC	CC	CC	CC	CC	DF	DF	DF	DF	DF	ED	ED	ED	EG	EG	FE	FE	FE		
335	3.3 µF												CC	CC				DF	DF	DF	DF		EG	EG	EG	EG						
475	4.7 µF							BC	BC	BC			CC	CC	CC	CC		DF	DF	DF	DF	DF	EG	EG	EG	EG	EG	FE	FE	FE	FE	
685	6.8 µF																						EG	EG								
106	10 µF							BC	BC				CC	CC	CC	CC		DF	DF	DF	DF	DF	EG	EG	EG	EG	EG	FE	FE	FE	FE	FF
226	22 µF												CC	CC				DF	DF	DF			EG	EG	EG	EG		FF	FF	FF	FF	
476	47 µF																	DF	DF				EG	EG				FF	FF	FF		
107	100 µF																						EG					FF	FF			

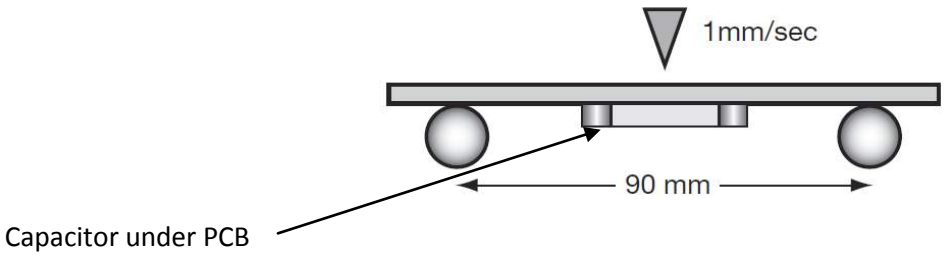
*J Tolerance available in 0201 case size only

The letter code in the cell indicates the dimensions and package quantity. The reference table is on page 4 of the catalog.

SOFT (FLEXIBLE) TERMINATION

Soft Termination is available on most of our G Series Capacitors, 0805 case and larger. With up to 5mm of PCB flex, Soft Termination protects the MLCC from stress fractures with zero failures.

Measuring Method

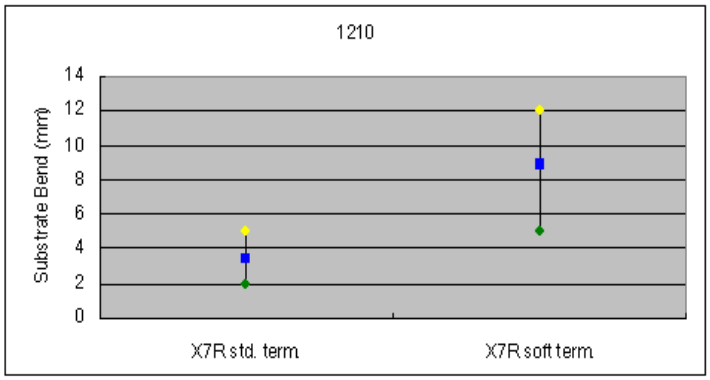


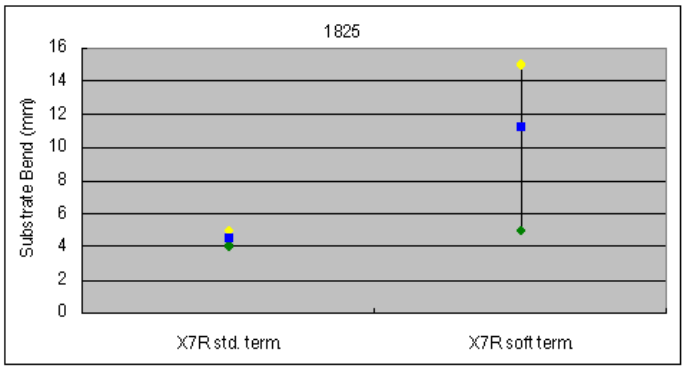
The test sample is soldered onto a PCB and the PCB is deflected, with deflection rate of 1mm/s until the capacitance change exceeds ±12.5%, which is considered a failing point.

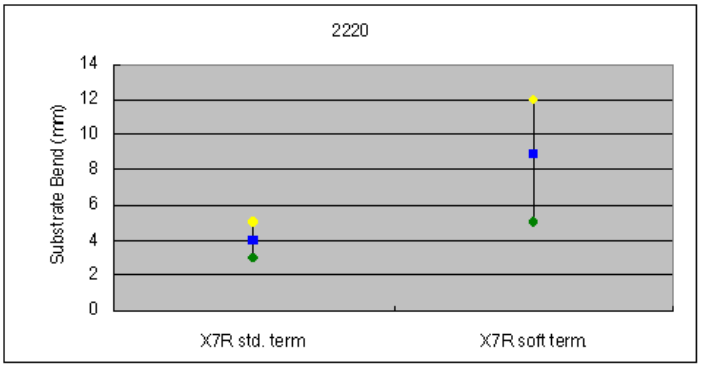
The table below summarizes the deflection results:

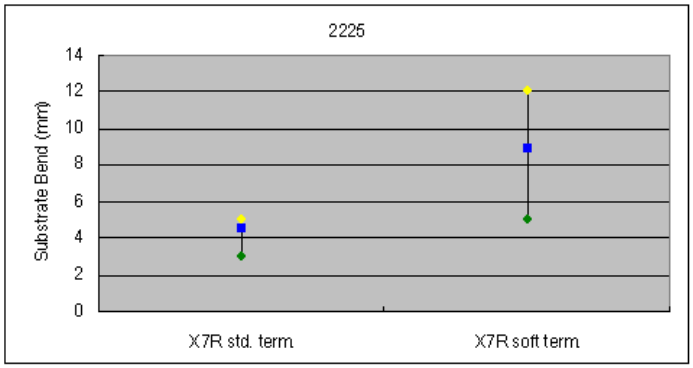
	Size: 1210		Size: 1812		Size: 1825		Size: 2220		Size: 2225	
	Std. Term	Soft Term	Std. Term	Soft Term	Std. Term	Soft Term	Std. Term	Soft Term	Std. Term	Soft Term
Max.	5	12	5	15	5	15	5	12	5	12
Min.	2	5	2	5	4	5	3	5	3	5
Avg.	3.5	9.9	3.5	9.9	4.5	11.2	4	8.9	4.5	8.9

Units in mm









- Please contact Frontier Electronics for additional information and product availability.

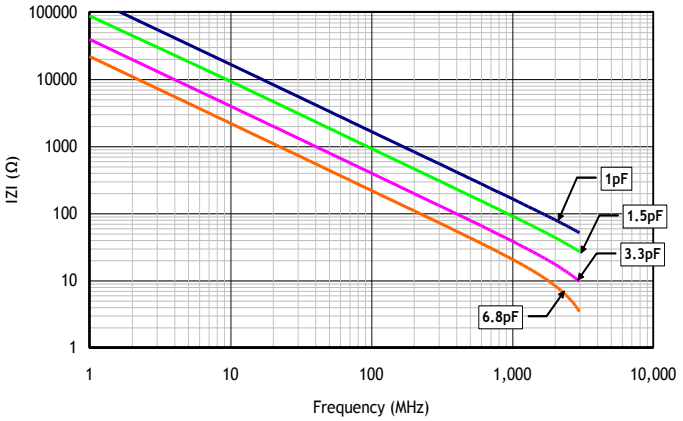
Part Number Description

0201	M	250	N	0R3	A	C	T
Size	Series	Voltage	Dielectric	Capacitance	Tolerance	Termination	Packaging
0201 (0603)	M (Ultra High Q, Low ESR)	250=25 VDC	N=NP0	0R3=0.3pF	A=±0.05pF	C=Cu/Ni/Sn	T=7" Paper Tape

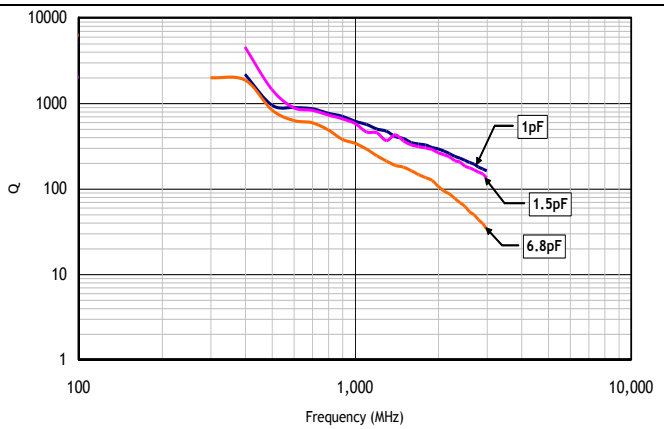
General Electrical Data

Dielectric	NP0
Size	0201, 0402, 0505, 0603, 0805
Capacitance	0.1pF to 180pF
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, 16V, 25V, 50V, 100V, 200V, 250V, 500V
Q	Cap≥30pF, Q≥1000 Cap<30pF,Q≥400+20C
Insulation resistance at Ur	≥10GΩ
Operating temperature	-55 to +125°C
Capacitance change	±30ppm/°C; 0201Cap≥22pF, ±60ppm/°C
Termination	Ni/Sn (lead-free termination)

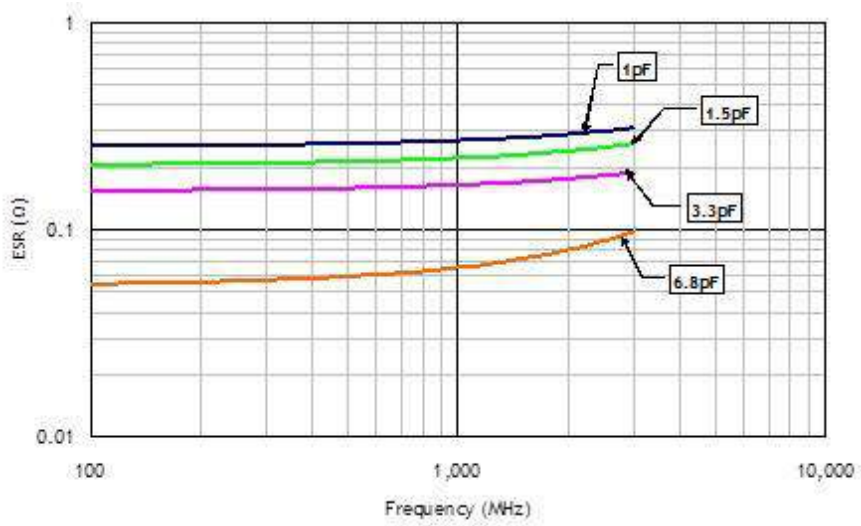
Electrical Characteristics



Impedance vs. Frequency

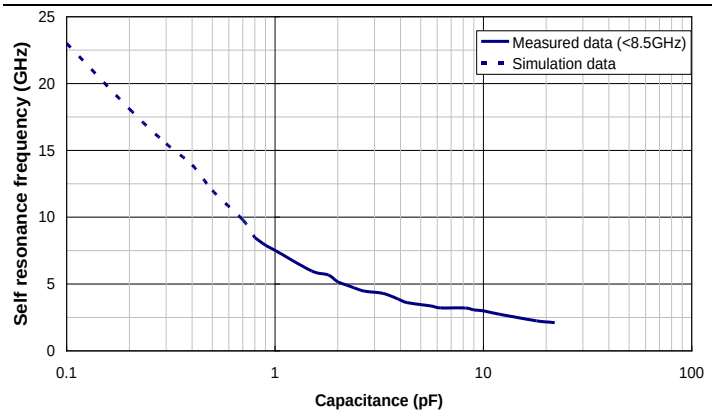


Q vs. Frequency

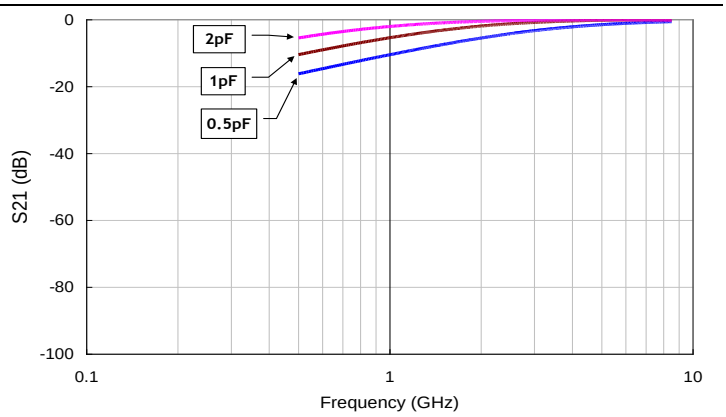


ESR vs. Frequency

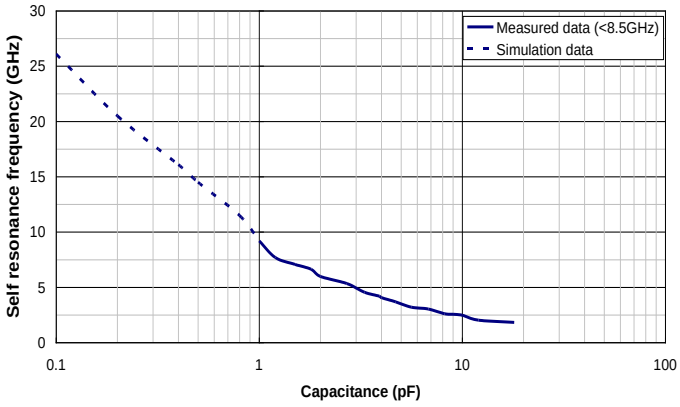
Electrical Characteristics



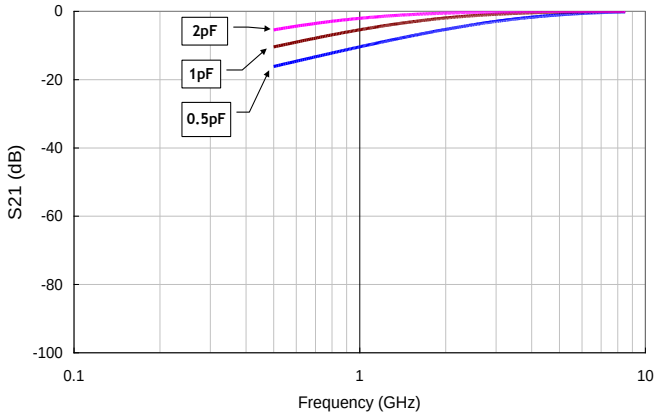
SRF vs. Capacitance (0201)



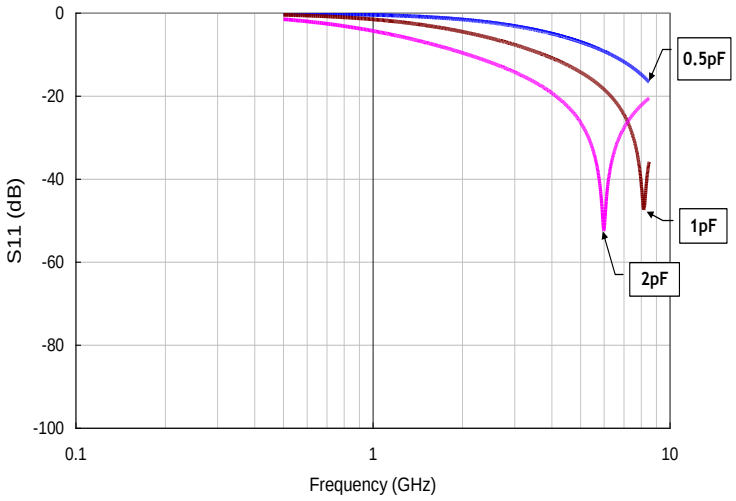
S21 vs. Frequency (0201)



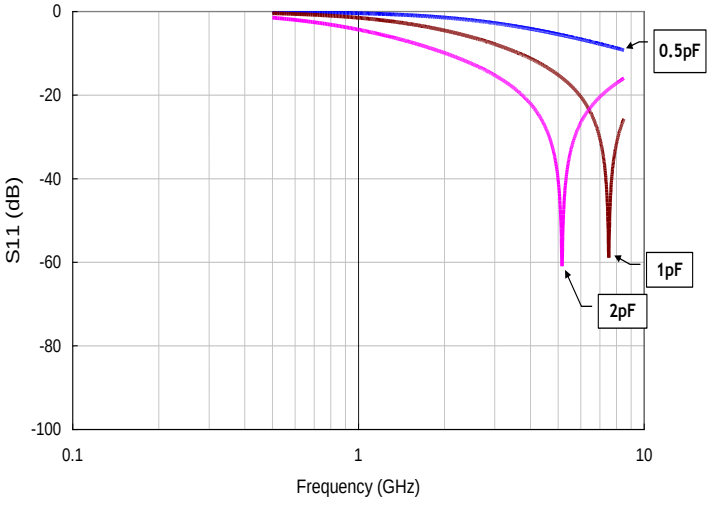
SRF vs. Capacitance (0402)



S21 vs. Frequency (0402)



S11 vs. Frequency (0201)



S21 vs. Frequency (0402)

ULTRA HIGH-Q, LOW ESR (M SERIES) NP0 DIELECTRIC, 1+ GHz

		Tolerance	0201			0402				0505			0603				0805				
			6.3 10 16	25	50	6.3 10 16	25	50 100	200	25	50 100	200 250	6.3 10 16	25	50 100	200 250	6.3 10 16	25	50 100	200 250	500
			DC Volts																		
0R1	0.1 pF	A B C	AA	AA	AA	BA	BA	BA	BA												
0R2	0.2 pF		AA	AA	AA	BA	BA	BA	BA												
0R3	0.3 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
0R4	0.4 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
0R5	0.5 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
0R6	0.6 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
0R7	0.7 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
R75	0.75 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
0R8	0.8 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
0R9	0.9 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
1R0	1.0 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
1R2	1.2 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
1R3	1.3 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
1R4	1.4 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
1R5	1.5 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
1R6	1.6 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
1R8	1.8 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
2R0	2.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
2R1	2.1 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
2R2	2.2 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
2R4	2.4 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
2R7	2.7 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
3R0	3.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
3R3	3.3 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
3R6	3.6 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
3R9	3.9 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
4R0	4.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
4R3	4.3 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
4R7	4.7 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
5R0	5.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
5R6	5.6 pF	B C D	AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
6R0	6.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
6R2	6.2 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
6R8	6.8 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
7R0	7.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
7R5	7.5 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
8R0	8.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
8R2	8.2 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
9R0	9.0 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
100	10 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
110	11 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
120	12 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
130	13 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
150	15 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
160	16 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
180	18 pF		AA	AA	AA	BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
200	20 pF		AA	AA	AA	BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
220	22 pF		AA	AA		BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
240	24 pF		AA	AA		BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
270	27 pF		AA	AA		BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
300	30 pF		AA	AA		BA	BA	BA	BA				CA	CA	CA	CA	DE	DE	DE	DE	DE
330	33 pF	F G J	AA	AA		BA	BA	BA	BA	LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
360	36 pF					BA	BA	BA					CA	CA	CA	CA	DE	DE	DE	DE	DE
390	39 pF					BA	BA	BA		LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
430	43 pF					BA	BA	BA					CA	CA	CA	CA	DE	DE	DE	DE	DE
470	47 pF					BA	BA	BA		LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
510	51 pF					BA	BA	BA					CA	CA	CA	CA	DE	DE	DE	DE	DE
560	56 pF					BA	BA	BA		LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
680	68 pF					BA	BA			LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	DE
750	75 pF					BA	BA						CA	CA	CA	CA	DE	DE	DE	DE	DE
820	82 pF					BA	BA			LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	
910	91 pF					BA	BA						CA	CA	CA	CA	DE	DE	DE	DE	
101	100 pF					BA	BA			LA	LA	LA	CA	CA	CA	CA	DE	DE	DE	DE	
121	120 pF									LA	LA	LA									
151	150 pF									LA	LA	LA									
181	180 pF									LA	LA	LA									

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The letter code in the cell indicates the dimensions and package quantity. The reference table is on page 4 of the catalog.

HIGH-Q, LOW ESR (H SERIES) NP0 DIELECTRIC, UP TO 1GHz

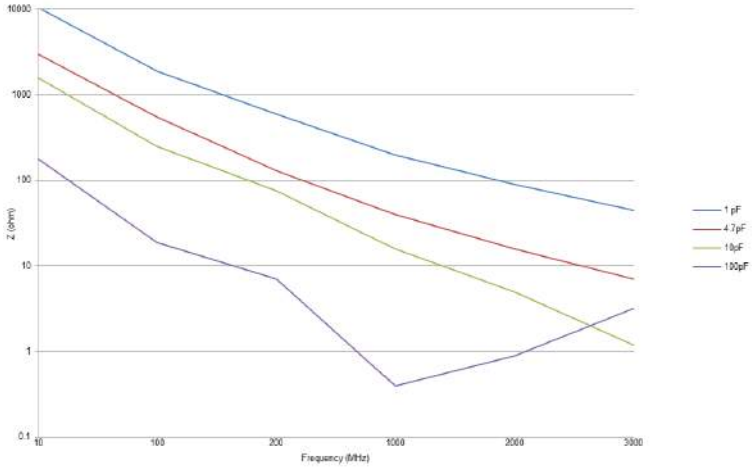
Part Number Description

0402	H	250	N	0R3	A	C	T
Size	Series	Voltage	Dielectric	Capacitance	Tolerance	Termination	Packaging
0201 (0603)	H (High Q, Low ESR)	250=25 VDC	N=NP0	0R3=0.3pF	A=±0.05pF	C=Cu/Ni/Sn	T=7" Paper Tape

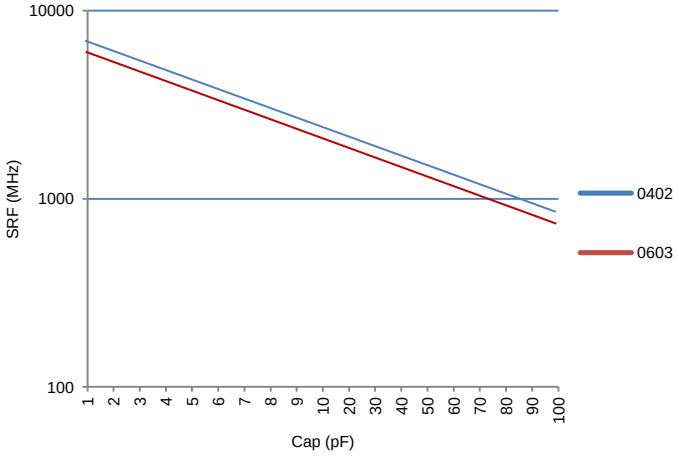
General Electrical Data

Dielectric	NP0
Size	0402, 0603,0805
Capacitance	0402: 0.1pF to 470pF 0603: 0.5pF to 3,300pF 0805: 0.5pF to 390pF
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)	6.3V, 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)

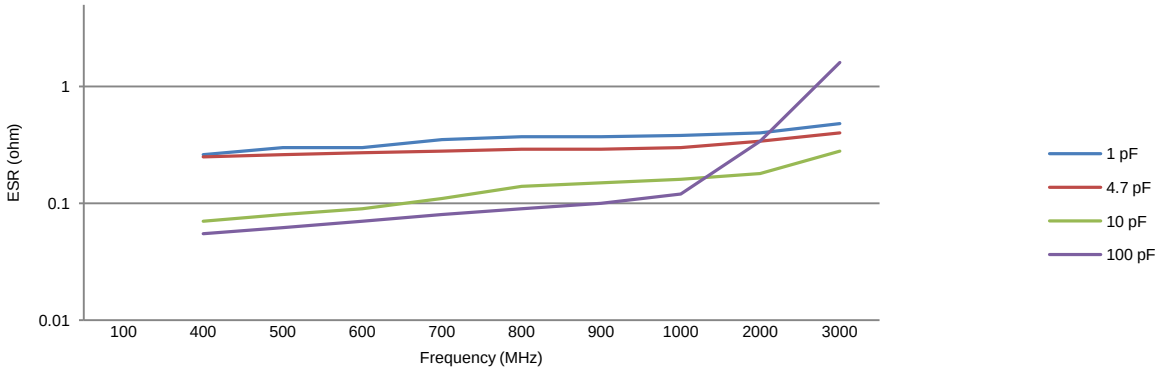
Electrical Characteristics



Impedance vs. Frequency



SRF vs. Capacitance



ESR vs. Frequency

HIGH-Q, LOW ESR (H SERIES) NP0 DIELECTRIC, UP TO 1GHz

		Tolerance	0402				0603				0805					
			6.3 10 16	25	50	100	6.3 10 16	25	50	100	6.3 10 16	25	50	100	200 250	500 630
			DC Volts													
0R1	0.1 pF		BA	BA	BA	BA										
0R2	0.2 pF		BA	BA	BA	BA										
0R3	0.3 pF		BA	BA	BA	BA										
0R4	0.4 pF		BA	BA	BA	BA										
R47	0.47 pF		BA	BA	BA	BA										
0R5	0.5 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC		
0R6	0.6 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC		
0R7	0.7 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC		
0R8	0.8 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC		
0R9	0.9 pF	B	BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC		
1R0	1.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
1R2	1.2 pF	C	BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
1R3	1.3 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
1R5	1.5 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
1R8	1.8 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
2R0	2.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
2R2	2.2 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
2R4	2.4 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
2R7	2.7 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
3R0	3.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
3R3	3.3 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
3R6	3.6 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
3R9	3.9 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
4R0	4.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
4R3	4.3 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
4R7	4.7 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
5R0	5.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
5R6	5.6 pF	C	BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
6R0	6.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
6R8	6.8 pF	D	BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
7R0	7.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
7R5	7.5 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
8R0	8.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
8R2	8.2 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
9R0	9.0 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
100	10 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
120	12 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
150	15 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
180	18 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
200	20 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
220	22 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
270	27 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
330	33 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
390	39 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
430	43 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
470	47 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
560	56 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
620	62 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
680	68 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
820	82 pF		BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
101	100 pF	F	BA	BA	BA	BA	CA	CA	CA	CA	DC	DC	DC	DC	DC	DC
121	120 pF		BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
151	150 pF	G	BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
181	180 pF		BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
221	220 pF	J	BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
271	270 pF		BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
331	330 pF		BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
391	390 pF		BA	BA	BA	BA	CA	CA	CA	CA	DD	DD	DD	DD	DD	DD
471	470 pF		BA	BA	BA	BA	CA	CA	CA	CA						
561	560 pF						CA	CA	CA	CA						
681	680 pF						CA	CA	CA	CA						
821	820 pF						CA	CA	CA	CA						
102	1,000 pF						CA	CA	CA	CA						
122	1,200 pF						CA	CC	CC							
152	1,500 pF						CA	CC	CC							
182	1,800 pF						CA	CC	CC							
222	2,200 pF						CA	CC	CC							
272	2,700 pF						CA	CC	CC							
332	3,300 pF						CA	CC	CC							

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APPENDIX I: RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th></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 conform to individual specification sheet</td></tr>
<tr><td>2</td><td>Capacitance</td><td></td><td>* Shall not exceed the limits given in the detailed spec</td></tr>
<tr><td>3</td><td>Q/ DF (Dissipation Factor)</td><td>Class I: NP0Class I: NP0
Caps≤1,000pF 1.0±0.2Vrms, 1MHz±10%
Cap>1,000pF 1.0±0.2Vrms, 1KHz±10%

Class II: X7R, X5R,Y5V
Caps≤10μF, 1.0±0.2Vrms, 1kHz±10% **
Cap>10μF, 0.5±0.2Vrms, 120Hz±20%

** Test condition: 0.5±0.2Vrms, 1KHz±10%
X7R: 0603≥225 (10V), 0805=106 (6.3V&10V)
X5R: 0201≥224 (6.3V), 0402≥475 (6.3V),
0402≥225(10V),0603=106 (6.3V)</td><td>NP0: Cap≥30pF, Q≥1000, Cap<30pF,Q≥400+20C
X7R, X5R:
<table>
<tr><th>Rated voltage (DCV)</th><th>D.F. ≤</th><th colspan="2">Exception of D.F. ≤</th></tr>
<tr><td rowspan="2">≥ 50V</td><td rowspan="2">≤ 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>1210 ≥ 4.7μF</td></tr>
<tr><td>35V</td><td>≤3.5%</td><td>≤10%</td><td>0603≥1μF, 0805≥1μF,1206≥2.2μF, 1210≥10μF</td></tr>
<tr><td rowspan="3">25V</td><td rowspan="3">≤3.5%</td><td>≤10%</td><td>0805≥2.2μF, 1210≥10μF</td></tr>
<tr><td>≤5%</td><td>0201≥0.01μF,0805≥1μF, 1210≥10μF</td></tr>
<tr><td>≤7%</td><td>0603≥0.33μF, 1206≥4.7μF</td></tr>
<tr><td rowspan="2">16V</td><td rowspan="2">≤3.5%</td><td>≤10%</td><td>0402≥0.10μF,0603≥0.47μF, 0805≥2.2μF,</td></tr>
<tr><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 rowspan="2">10V</td><td rowspan="2">≤5%</td><td>≤10%</td><td>0402≥ 0.22uF, 0603≥0.68μF,0805≥2.2μF, 1206≥4.7μF,
1210≥22μF</td></tr>
<tr><td>≤10%</td><td>0201≥0.012μF,0402≥0.33μF,0603≥0.33μF,0805≥2.2μF,
1206≥2.2μF,1210≥22μF</td></tr>
<tr><td rowspan="2">6.3V</td><td rowspan="2">≤10%</td><td>≤15%</td><td>0201≥0.1μF, 0402≥1μF</td></tr>
<tr><td>≤15%</td><td>0201≥0.1μF,0402≥1μF,0603≥10μF, 0805≥4.7μF,
1206≥47μF :1210≥100μF</td></tr>
<tr><td>4V</td><td>≤15%</td><td>≤20%</td><td>0402≥2.2μF</td></tr>
<tr><td></td><td></td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated voltage</th><th>D.F. ≤</th><th colspan="2">Exception of D.F.≤</th></tr>
<tr><td>≥50V</td><td>≤5%</td><td>≤7%</td><td>0603≥0.1μF, 0805≥0.47μF, 1206≥4.7μF, Cap≥1μF</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,
Cap≥1μF</td></tr>
<tr><td>16V
(C<1.0μF)</td><td>≤7%</td><td>≤9%
≤12.5%</td><td>0402≥0.068μF, 0603≥0.68μF
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, Cap≥1μF</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>4</td><td>Dielectric Strength</td><td>*To apply voltage(≤100V) 250%.
*Duration: 1 to 5 sec.
*Charge & discharge current less than 50mA.

*To apply voltage:
200V ~300V & LD series ≥2 times V DC
500V ~ 999V ≥1.5 times V DC
1000V ~ 3000V ≥1.2 times V DC
*Cut-off, set at 10mA
*TEST= 15 sec. *RAMP=0</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 lower.
Class II (X7R, X7E, X5R, Y5V):
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: X7R</td><td rowspan="6">10GΩ or RxC≥100 Ω-F whichever is lower.</td></tr>
<tr><td>50V:0603≥1μF,0805≥1μF, 1206≥2.2μF, 1210≥4.7μF</td></tr>
<tr><td>35V:0805≥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: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>
</table></td></tr>
<tr><td></td><td></td><td>Rated Voltage:
200V ~ 630V</td><td>To apply rated voltage (500V max.) for 60 sec.</td><td>>10GΩ or 100Ω-F whichever is lower.</td></tr>
<tr><td></td><td></td><td>>630V</td><td>To apply 500V for 60sec.</td><td>>10GΩ</td></tr>
<tr><td>6</td><td>Temperature Coefficient</td><td>With no electrical load.</td><td>
<table>
<tr><th>T.C.</th><th>Operating Temp</th></tr>
<tr><td>NP0 (C0G)
NP0 (C0H)
NP0 (C0J)
X7R</td><td>-55~125°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>
<table>
<tr><th>T.C.</th><th>Capacitance Change</th></tr>
<tr><td>NP0 (C0G)</td><td>Within ±30ppm/°C</td></tr>
<tr><td>NP0 (C0H)</td><td>Within ±60ppm/°C</td></tr>
<tr><td>NP0 (C0J)</td><td>Within ±120ppm/°C</td></tr>
<tr><td>X7R</td><td>Within ±15%</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 :
0201: 2N
0402 & 0603: 5N
>0603: 10N
Test time : 10 ±1 sec</td><td> No remarkable damage or removal of the terminations.</td></tr>
</table>

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<table>
<tr><th></th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>8</td><td>Vibration Resistance</td><td>* Vibration frequency: 10~55 Hz/min.
* Total amplitude: 1.5mm
* Test time: 6 hours (Two hrs each in three mutually perpendicular directions)
* Measurement to be made after keeping at room temp. for 24±2 hours</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.</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 approximately 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5±1 sec.
Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td> No remarkable damage.
* Capacitance change :
NP0: within ±5% or 0.5pF whichever is larger
X7R, X7E, X5R: 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 immersing the capacitor in an eutectic solder.
* Before initial measurement (Class II only):
Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Capacitance change:
NP0: within ±2.5% or 0.25pF whichever is larger
X7R, X7E, X5R: 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):
Perform 150+0/-10°C for 1 hr and then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Capacitance change
NP0: within ±2.5% or 0.25pF whichever is larger
X7R, X7E, X5R: within ±7.5%
Y5V: within ±20%
* Q/D.F., I.R. and dielectric strength: To meet initial requirements.</td></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): Perform 150 +0/-10°C for 1 hr and then set for 24±2 hrs. at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs.</td><td>* No remarkable damage.
* Cap change: NP0: within ±5% or 0.5pF whichever is larger
X7R, X7E, X5R: ≥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: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C,Less than 10pF Q≥200+10C

X7R, X5R:
<table>
<tr><th>Rated voltage</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></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>1210≥4.7μF</td></tr>
<tr><td>≤20%</td><td>0603≥1μF; 0805≥1μF; 1206≥2.2μF; 1210≥10μF</td></tr>
<tr><td>35V</td><td>≤5%</td><td>≤20%</td><td>0805≥2.2μF;1210≥10μF</td></tr>
<tr><td rowspan="3">25V</td><td rowspan="3">≤5%</td><td>≤10%</td><td>0201≥0.01μF;0805≥1μF; 1210≥10μF</td></tr>
<tr><td>≤14%</td><td>0603≥0.33μF;1206≥4.7μF</td></tr>
<tr><td>≤15%</td><td>6≥6.8μF1210≥22μF</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;0402≥0.033μF;0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td></tr>
<tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201≥0.012μF; 0402≥0.33μF; 0603≥0.33μF;0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td></tr>
<tr><td>≤20%</td><td>0201≥0.1μF ;0402≥1μF</td></tr>
<tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF; 1206≥47μF;1210≥100μF</td></tr>
<tr><td>4V</td><td>≤20%</td><td>---</td><td>---</td></tr>
</table>
Y5V:
<table>
<tr><th>Rated voltage</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr>
<tr><td>≥50V</td><td>≤7.5%</td><td>≤10%</td><td>0603≥0.1μF; 0805≥0.47μF; 1206≥4.7μF; Cap≥1μF</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; Cap≥1μF</td></tr>
<tr><td>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 rowspan="2">≤12.5%</td><td>≤20%</td><td>0603≥2.2μF;0805≥3.3μF;1206≥10μF;1210≥22μF; 1812≥47μF; Cap≥1μF</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 lower.
Class II (X7R, X7E, X5R, Y5V)
<table>
<tr><th>Rated voltage</th><th>Insulation Resistance</th></tr>
<tr><td>100V: X7R</td><td rowspan="5">1GΩ or RxC≥10 Ω-F whichever is lower.</td></tr>
<tr><td>50V:0603≥1μF;0805≥1μF; 206≥2.2μF;1210≥4.7μF</td></tr>
<tr><td>25V:0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF</td></tr>
<tr><td>16V: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>
</table></td></tr>
</table>

APPENDIX I: RELIABILITY TEST CONDITIONS AND REQUIREMENTS

14 Humidity (Damp Heat) Load

Test Condition

* Test temp.: 40±2°C
* Humidity: 90~95%RH
* Test time: 500+24/-0 hrs.
* Voltage :
  Rated voltage.(Max.500V)
* Before initial measurement (Class II only): To apply test voltage for 1hr at 40°C and then set for 24±2 hrs at room temp.* Measurement to be made after keeping at room temp. for 24±2 hrs.

Requirements

* No remarkable damage.

Cap change:
NP0: ±7.5% or 0.75pF whichever is larger.
X7R, X7E, X5R: ≥10V**,within ±12.5%;6.3V 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: C≥30pF,Q≥200;C<30pF, Q≥100+10/3C

X7R, X5R:

Rated voltage	D.F.≤	Exception of D.F. ≤	
≥50V	≤3%	≤6%	0201(50V);0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF
		≤10%	1210≥4.7μF
		≤20%	0603≥1μF; 0805≥1μF; 1206≥2.2μF; 1210≥10μF
35V	≤5%	≤20%	0805≥2.2μF;1210≥10μF
25V	≤5%	≤10%	0201≥0.01μF;0805≥1μF; 1210≥10μF
		≤14%	0603≥0.33μF;1206≥4.7μF
		≤15%	0402≥0.10μF;0603≥0.47μF;0805≥2.2μF; 1206≥6.8μF;1210≥22μF
16V	≤5%	≤10%	0603≥0.15μF;0805≥0.68μF;1206≥2.2μF;1210≥4.7μF
		≤15%	0201≥0.01μF;0402≥0.033μF;0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF
10V	≤7.5 %	≤15%	0201≥0.012μF;0402≥0.33μF; 0603≥0.33μF;0805≥2.2μF; 1206≥2.2μF; 1210≥22μF
		≤20%	0201≥0.1μF ;0402≥1μF
6.3V	≤15%	≤30%	0201≥0.1μF;0402≥1μF;0603≥10μF; 0805≥4.7μF;1206≥47μF;1210≥100μF
4V	≤20%	---	---

Y5V:

Rated voltage	D.F.≤	Exception of D.F.≤	
≥50V	≤7.5%	≤10%	0603≥0.1μF; 0805≥0.47μF;1206≥4.7μF; Cap≥1μF
35V	≤10%	---	---
25V	≤7.5%	≤10%	0402≥0.047μF;0603≥0.1μF;0805≥0.33μF;1206≥1μF; 1210≥4.7μF
		≤15%	0402≥0.068μF;0603≥0.47μF;1206≥4.7μF;1210≥22μF; Cap≥1μF
16V (C<1.0μF)	≤10%	≤12.5%	0402≥0.068μF; 0603≥0.68μF
		≤20%	0402≥0.22μF
16V (C≥1.0μF)	≤12.5%	≤20%	0603≥2.2μF;0805≥3.3μF;1206≥10μF;1210≥22μF;1812≥47μF; Cap≥1μF
10V	≤20%	≤30%	0402≥0.47μF
6.3V	≤30%	---	---

*I.R.: ≥10V, 500MΩ or 25 Ω-F whichever is lower. Class II (X7R, X7E, X5R, Y5V)

Rated voltage	Insulation Resistance
100V: X7R 50V:0603≥1μF;0805≥1μF; 1206≥2.2μF;1210≥4.7μF 25V:0402≥1μF;0603≥2.2μF;0805≥2.2μF;1206≥10μF;1210≥10μF 16V:0402≥0.22μF;0603≥1μF;0805≥2.2μF;1206≥10μF;1210≥47μF 10V:0201≥47nF;0402≥0.47μF;0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF	500MΩ or RxC≥5 Ω-F whichever is lower.

15 High Temperature Load (Endurance)

Test Condition

*Test temp. :
NP0, X7R/X7E: 125±3°C
X5R, Y5V: 85±3°C
*Test time: 1000+24/-0 hrs.
*To apply voltage:
(1) 6.3V or C≥10μF 150% of rated voltage:
(2) 10V≤Ur<500V: 200% of rated voltage.
(3) 500V: 150% of rated voltage.
(4) Ur≥630V: 120% of rated voltage.(5) 100% of rated voltage for below range:

Size	Dielectric	Rated voltage
0201	X5R/X7R	6.3V,10V
0402	X5R/X7R	6.3V,10V
0603	X5R/X7R	6.3V,10V
0805	X5R/X7R	6.3V
1206	X5R/X7R NP0	6.3V 3000V

(6)150% of rated voltage for below range:

Size	Dielectric	Rated voltage	Capacitance Range
0402	X5R/X7R	10V,16V,25V	C≥0.22μF
	Y5V	16V	C≥0.47μF
0603	X5R/X7R	10V,16V	C≥1.0μF
	Y5V	16V	C≥2.2μF
0805	X5R/X7R	10V	C≥4.7μF
	Y5V	16V	C≥4.7μF

*Before initial measurement (Class II only):
To apply test voltage for 1hr at test temp. and then set for 24±2 hrs at room temp.

*Measurement to be made after keeping at room temp. for 24±2 hrs.

Requirements

* No remarkable damage.

Cap change:
NP0: ±3.0% or ±0.3pF whichever is larger
X7R, X7E, X5R: ≥10V**,within ±12.5%;6.3V 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: More than 30pF, Q≥350; 10pF≤C<30pF, Q≥275+2.5C; Less than 10pF, Q≥200+10C

X7R, X5R:

Rated voltage	D.F.≤	Exception of D.F.≤	
≥50V	≤3%	≤6%	0201(50V);0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF
		≤10%	1210≥4.7μF
		≤20%	0603≥1μF; 0805≥1μF; 1206≥2.2μF; 1210≥10μF
35V	≤5%	≤20%	0805≥2.2μF;1210≥10μF
25V	≤5%	≤10%	0201≥0.01μF;0805≥1μF; 1210≥10μF
		≤14%	0603≥0.33μF;1206≥4.7μF
		≤15%	0402≥0.10μF;0603≥0.47μF;0805≥2.2μF; 1206≥6.8μF;1210≥22μF
16V	≤5%	≤10%	0603≥0.15μF;0805≥0.68μF; 1206≥2.2μF;1210≥4.7μF
		≤15%	0201≥0.01μF;0402≥0.033μF; 0603≥0.68μF;0805≥2.2μF; 1206≥4.7μF; 1210≥22μF
10V	≤7.5%	≤15%	0201≥0.012μF;0402≥0.33μF; 0603≥0.33μF;0805≥2.2μF; 1206≥2.2μF; 1210≥22μF
		≤20%	0201≥0.1μF ;0402≥1μF
6.3V	≤15%	≤30%	0201≥0.1μF;0402≥1μF; 0603≥10μF;0805≥4.7μF; 1206≥47μF; 1210≥100μF
4V	≤20%	--	--

X7R:DF≤3%
Y5V:

Rated voltage	D.F.≤	Exception of D.F.≤	
≥50V	≤7.5%	≤10%	0603≥0.1μF; 0805≥0.47μF;1206≥4.7μF;Cap≥1μF
25V	≤7.5%	≤10%	0402≥0.047μF;0603≥0.1μF; 0805≥0.33μF;1206≥1μF; 1210≥4.7μF
		≤15%	0402≥0.068μF;0603≥0.47μF; 1206≥4.7μF;1210≥22μF;Cap≥1μF
16V (C<1.0μF)	≤10%	≤12.5%	0402≥0.068μF; 0603≥0.68μF
		≤20%	0402≥0.22μF
16V (C≥1.0μF)	≤12.5%	≤20%	0603≥2.2μF;0805≥3.3μF;1206≥10μF; 1210≥22μF;1812≥47μF;Cap≥1μF
10V	≤20%	≤30%	0402≥0.47μF
6.3V	≤30%	---	---

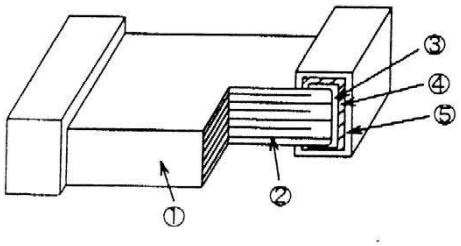
*I.R.: ≥10V, 1GΩ or 50 Ω-F whichever is lower.

Class II (X7R, X7E, X5R, Y5V):

Rated voltage	Insulation Resistance
100V: X7R 50V:0603≥1μF;0805≥1μF; 1206≥2.2μF;1210≥4.7μF 25V:0402≥1μF;0603≥2.2μF; 0805≥2.2μF;1206≥10μF;1210≥10μF 16V:0402≥0.22μF;0603≥1μF; 0805≥2.2μF;1206≥10μF;1210≥47μF 10V:0201≥47nF;0402≥0.47μF; 0603≥0.47μF;0805≥2.2μF; 1206≥4.7μF;1210≥47μF 6.3V ; 4V	1GΩ or RxC≥10 Ω-F whichever is lower.

APPENDIX II: GENERAL INFORMATION

	Name		NP0/X7R	NPO/X7R/X5R/Y5V
1	Ceramic material		$BaTiO_3$ based	
2	Inner electrode		Ni	
3	Termination	Inner layer	Cu	
4		Middle layer	Ni	
5		Outer layer	Sn	



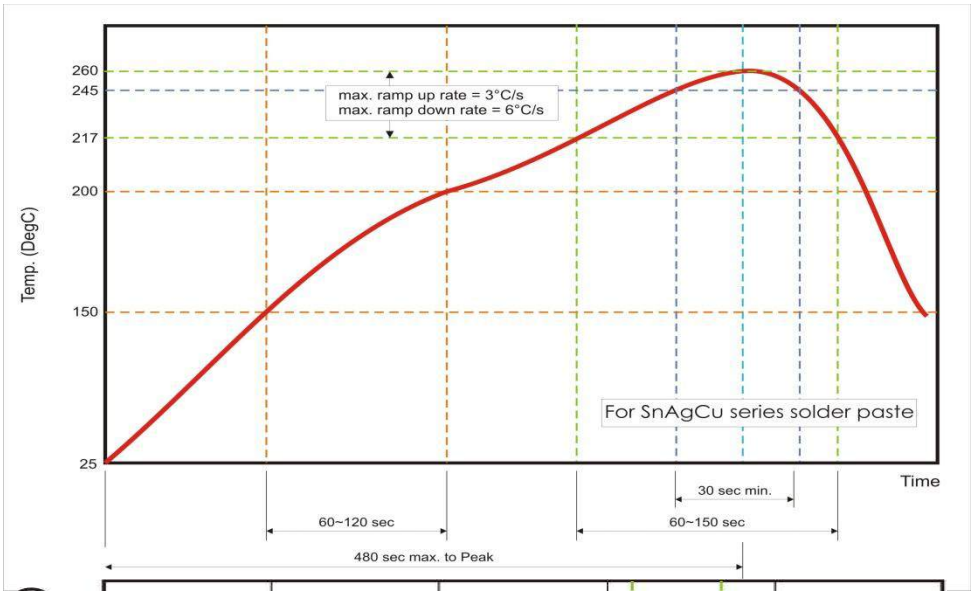
Storage and handling

1) Products should be stored at 5 to 40°C ambient temperatures and 20 to 70% relative humidity. .
2) It is recommended that the product be used within one year from shipment. After one year from shipment, solderability should be checked.

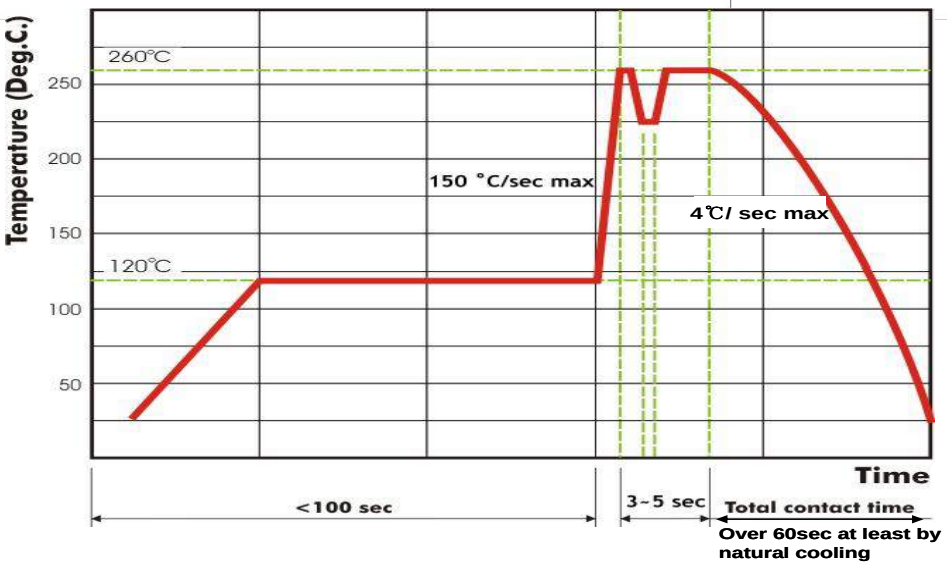
Cautions

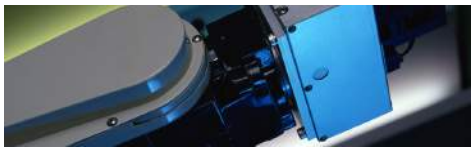
1) Corrosive gas reacts with the terminal electrodes of capacitors. Do not store capacitors in the proximity of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.) otherwise there may be solderability issues.
2) In a corrosive atmosphere, solderability might be degraded, and/or silver migration may occur which can cause lower reliability.
3) Dewing caused by rapid humidity changes and/or photochemical changes of the terminal electrode caused by direct contact with sunlight can affect the solderability and electrical performance. Do not store capacitors under direct sunlight or in dewing conditions.

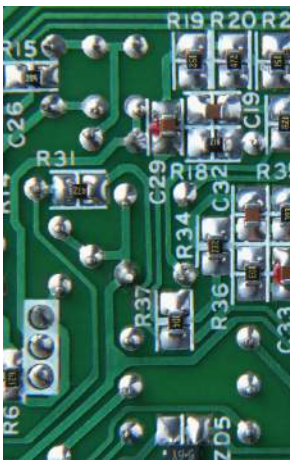
Recommended **reflow** profile for SnAgCu solder paste:



Recommended **wave** profile for SnAgCu solder paste:







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