



**FEATURES:**

- Capacitance range: 0.1pF to 220uF
- Voltage range: 4V to 100V
- Terminations: 100% matte Tin (Sn), Palladium (Pd-Ag), Gold (Au) and Lead (Pb)
- Very low ESR in X7R/X5R (<10mΩ typical)
- Ceramic monolithic structure provides excellent reliability



**PART NUMBER STRUCTURE**

C	0805	COG	500	-	101	J	N	P	□ □											
Series	Size	Temperature Characteristic (Dielectric)	Rated Voltage		Capacitance	Tolerance	Termination	Packaging	Optional Thickness Identifier											
01005	0201	0402	0504	0603	0805	1206	1210	1812	2220	22212										

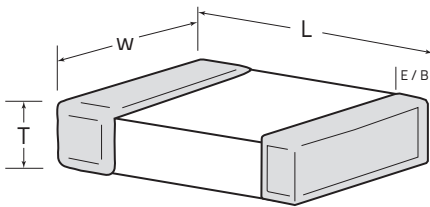
Example P/N: C0805COG500-101JNP

**Optional Thickness Identifier Codes:**

CODE:	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	6
DIMENSION:	.015	.020	.026	.030	.035	.040	.045	.050	.055	.060	.065	.070	.075	.080	.085	.090	.095	.100	.105	.110	.023

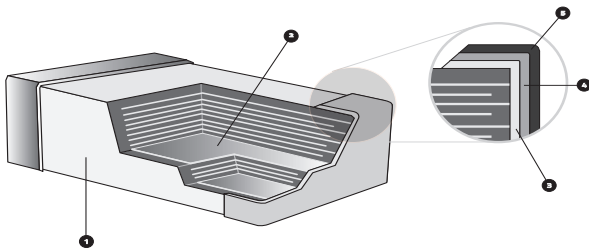
**DIMENSIONS**

Unit: inches (mm)



SIZE	L	W	T	MIN. E/B
01005	0.016 ± 0.0008 (0.4 ± 0.02)	0.008 ± 0.0008 (0.2 ± 0.02)	See Specific Value	0.002 (0.05)
0201	0.024 ± 0.002 (0.6 ± 0.05)	0.012 ± 0.002 (0.3 ± 0.05)	See Specific Value	0.002 (0.05)
0402	0.040 ± 0.002 (1.0 ± 0.05)	0.020 ± 0.002 (0.5 ± 0.05)	See Specific Value	0.004 (0.10)
0603	0.063 ± 0.006 (1.6 ± 0.15)	0.031 ± 0.0046 (0.8 ± 0.15)	See Specific Value	0.008 (0.20)
0805	0.08 ± 0.008 (2.0 ± 0.20)	0.050 ± 0.008 (1.25 ± 0.20)	See Specific Value	0.010 (0.25)
1206	0.126 ± 0.008 (3.2 ± 0.20)	0.063 ± 0.008 (1.6 ± 0.20)	See Specific Value	0.010 (0.25)
1210	0.126 ± 0.157 (3.2 ± 0.40)	0.098 ± 0.0118 (2.50 ± 0.30)	See Specific Value	0.010 (0.25)
1812	0.177 ± 0.012 (4.495 ± 0.30)	0.126 ± 0.012 (3.20 ± 0.30)	See Specific Value	0.010 (0.25)
2220	0.225 ± 0.016 (5.715 ± 0.41)	0.200 ± 0.006 (5.08 ± 0.41)	See Specific Value	0.010 (0.25)

**STRUCTURE**

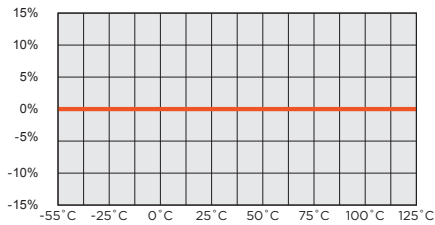


1	Ceramic Body (dielectric)	4	Nickel Plating
2	Inner Electrode	5	Tin Plating
3	Inner Termination		

## ELECTRICAL SPECIFICATIONS

### COG/COG

Typical Capacitance Change vs. Temperature

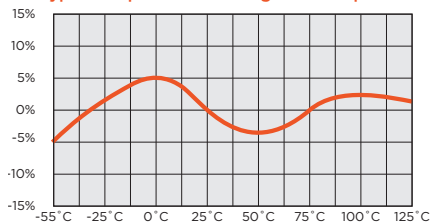


**Operating Temperature Range:**  
-55°C to +125°C  
**Temperature Coefficient:**  
0 ±30PPM/°C  
**Temperature Voltage Coefficient:**  
0 ±30PPM/°C  
**Insulation Resistance:**  
>1000 Ω-F or 10 GΩ, for values ≤ 0.047μF (whichever is less at 25°C, VDCW). For Capacitance values > 0.047μF, the 500 Ω-F rule applies. (The IR at 125°C is 10% of the value at 25°C)

**Ageing:**  
None  
**Withstanding Voltage:**  
>2.5 times VDCW  
**Capacitance Tolerance:**  
B, C, D, F, G, J, K  
**Dissipation Factor:**  
0.1% max

### X7R

Typical Capacitance Change vs. Temperature

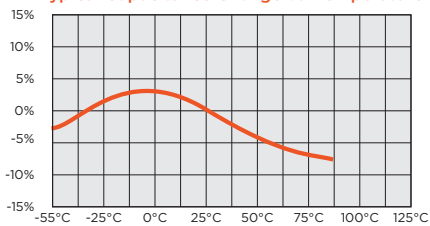


**Operating Temperature Range:**  
-55°C to +125°C  
**Temperature Coefficient:**  
0 ±15%Δ°C MAX.  
**Temperature Voltage Coefficient:**  
X7R not applicable  
**Insulation Resistance:**  
>100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)  
**Ageing:**  
2.5% per decade hour, typical  
**Withstanding Voltage:**  
>2.5 times VDCW  
**Capacitance Tolerance:**  
J, K, M

RATED VOLTAGE	D.F.	EXCEPTION OF D.F.	
≥50V	≤2.5%	≤3%	0201 (50V); 0603≥0.047μF 0805≥0.22μF; 1206≥0.47μF
		≤5%	0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF
25V	≤2.5%	≤5%	0201≥0.01μF; 0402≥0.33μF; 0805≥2.2μF 1206≥4.7μF; 1210≥22μF
		≤10%	
16V	≤3.5%	≤5%	0201≥0.01μF; 0402≥0.033μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF
		≤10%	0402≥0.47μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF
10V	≤5%	≤10%	0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF
6.3V	≤10%		

### X5R

Typical Capacitance Change vs. Temperature

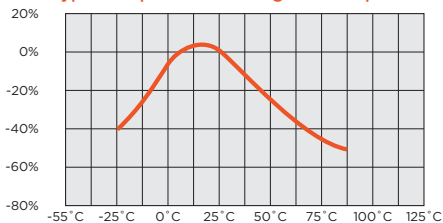


**Operating Temperature Range:**  
-55°C to +85°C  
**Temperature Coefficient:**  
0 ±15%Δ°C MAX.  
**Temperature Voltage Coefficient:**  
X7R not applicable  
**Insulation Resistance:**  
>100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)  
**Ageing:**  
2.5% per decade hour, typical  
**Withstanding Voltage:**  
>2.5 times VDCW  
**Capacitance Tolerance:**  
K, M

RATED VOLTAGE	D.F.	EXCEPTION OF D.F.	
≥50V	≤2.5%	≤3%	0201 (50V); 0603≥0.047μF 0805≥0.22μF; 1206≥0.47μF
		≤5%	0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF
25V	≤2.5%	≤5%	0201≥0.01μF; 0805≥1μF; 1210≥4.7μF
		≤10%	0402≥0.10μF; 0603≥0.33μF; 0805≥2.2μF 1206≥4.7μF; 1210≥22μF
16V	≤3.5%	≤5%	0201≥0.01μF; 0402≥0.033μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF
		≤10%	0402≥0.47μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF
≤10V	≤5%	≤10%	0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF
6.3V	≤10%		

### Z5U

Typical Capacitance Change vs. Temperature

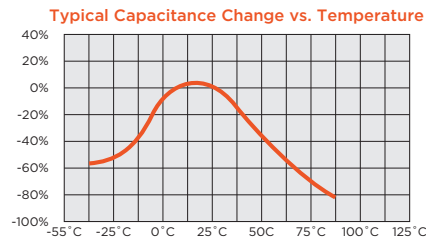


**Operating Temperature Range:**  
+10°C to +85°C  
**Temperature Coefficient:**  
+22% - 56%Δ°C MAX.  
**Insulation Resistance:**  
>100 Ω-F or 10 GΩ, whichever is less at 25°C, WDCV. (The IR at 125°C is 10% of the value at 25°C)  
**Ageing:**  
5% per decade hour, typical  
**Withstanding Voltage:**  
>2.5 times VDCW  
**Capacitance Tolerance:**  
M, Z

RATED VOLTAGE	D.F.	EXCEPTION OF D.F.	
≥50V	≤5%	≤9%	0603≥0.1μF; 0805≥0.47μF; 1206≥4.7μF;
25V	≤5%	≤9%	0402≥0.047μF; 0603≥0.1μF; 0805≥0.33μF; 1206≥1μF; 1210≥4.7μF
16V	≤9%	≤12.5%	0603≥2.2μF; 0805≥3.3μF; 1206≥10μF; 1210≥22μF; 1812≥47μF
10V	≤12.5%	≤16%	0603≥2.2μF; 0805≥3.3μF; 1206≥4.7μF; 1210≥10μF; 1812≥47μF
6.3V	≤16%		

## ELECTRICAL SPECIFICATIONS

### Y5V



**Operating Temperature Range:**  
 -30°C to +85°C

**Temperature Coefficient:**  
 +22% - 82%Δ°C MAX.

**Insulation Resistance:**  
 >100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)

**Ageing:**  
 7% per decade hour, typical

**Withstanding Voltage:**  
 >2.5 times VDCW

**Capacitance Tolerance:**  
 M,Z

RATED VOLTAGE	D.F.	EXCEPTION OF D.F.	
≥50V	≤5%	≤9%	0603≥0.1uF; 0805≥0.47uF; 1206≥4.7uF;
25V	≤5%	≤9%	0402≥0.047uF; 0603≥0.1uF; 0805≥0.33uF; ≥1206≥1uF; 1210≥4.7uF
16V	≤9%	≤12.5%	0603≥2.2uF; 0805≥3.3uF; 1206≥10uF; 1210≥22uF; 1812≥47uF
10V	≤12.5%	≤16%	0603≥2.2uF; 0805≥3.3uF; 1206≥4.7uF; 1210≥10uF; 1812≥47uF
6.3V	≤16%		

## TEST PARAMETERS

Test parameters for Multilayer Ceramic Capacitors  
 - X7R, X5R and Y5V:

1KHz ± 100Hz at 1.0 ± 0.2 Vrms < 10uF (10 V min.)  
 1KHz ± 100Hz at 0.5 ± 0.1 Vrms < 10uF (6.3V max.)  
 120Hz ± 24Hz at 1.0 ± 0.1 Vrms ≥ 10uF

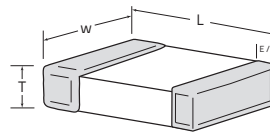
Test parameters for Multilayer Ceramic Capacitors  
 - COG:

1MHz ± 100KHz at 1.0 ± 0.2 Vrms ≤ 1000pF, 25°C  
 1KHz ± 100Hz at 1.0 ± 0.2 Vrms > 1000pF, 25°C

**NOTE:** To ensure proper capacitance readings, the voltage level must be held constant. The HP4284 and Agilent E4980 has a "ALC" (Automatic Level Control) function and should be switched to the "ON" position for accurate capacitance readings.

## VOLTAGE AND CAPACITANCE RANGE

### COG (COG) DIELECTRIC



Values that are typically available.

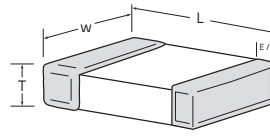
(All measurements in inches)

SIZE	01005				0201		0402			0504		0603		0805			1206		1210		1812			
T (max)	0.008				0.012		0.025			0.040		0.033		0.055			0.075		0.075		0.085			
VDCW (MAX)	6.3V	16V	25V	50V	25V	50V	25V	50V	100V	50V	100V	50V	100V	25V	50V	100V	50V	100V	50V	100V	50V	100V		
OR1	0.1pF																							
OR2	0.2pF																							
OR3	0.3pF																							
OR4	0.4pF																							
OR5	0.5pF																							
1R0	1.0pF																							
1R2	1.2																							
1R5	1.5																							
1R8	1.8																							
2R2	2.2																							
2R7	2.7																							
3R3	3.3																							
3R9	3.9																							
4R7	4.7																							
5R0	5.0																							
5R6	5.6																							
6R8	6.8																							
8R2	8.2																							
100	10pF																							
120	12																							
150	15																							
180	18																							
220	22																							

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.

**VOLTAGE AND CAPACITANCE RANGE**

**COG (COG) DIELECTRIC**



Values that are typically available.

(All measurements in inches)

SIZE	01005				0201		0402			0504		0603		0805			1206		1210		1812		2220 / 2221	
T (max)	0.008				0.012		0.025			0.040		0.033		0.055			0.075		0.075		0.085		0.108 / .108	
VDCW (MAX)	6.3V	16V	25V	50V	25V	50V	25V	50V	100V	50V	100V	50V	100V	25V	50V	100V	50V	100V	50V	100V	50V	100V	50V	100V
270	27																							
330	33																							
390	39																							
470	47																							
560	56																							
680	68																							
820	82																							
101	100pF																							
121	120																							
151	150																							
181	180																							
221	220																							
271	270																							
331	330																							
391	390																							
471	470																							
561	560																							
681	680																							
821	820																							
102	1000pF																							
122	1200																							
152	1500																							
182	1800																							
222	2200																							
272	2700																							
332	3300																							
392	3900																							
472	4700																							
562	5600																							
682	6800																							
822	8200																							
103	.01uF																							
123	.012																							
153	.015																							
183	.018																							
223	.022																							
273	.027																							
333	.033																							
393	.039																							
473	.047																							
563	.056																							
683	.068																							
823	.082																							
104	.100uF																							
124	.120																							
154	.150																							
184	.180																							
224	.220																							
274	.270																							
334	.330																							
394	.390																							
474	.470																							
564	.560																							
684	.680																							
824	.820																							

NOTE: Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.

**VOLTAGE AND CAPACITANCE RANGE**

**X7R DIELECTRIC**

Values that are typically available.

(All measurements in inches)

SIZE		01005		0201				0402				0504			0603					0805		
T (max)		0.008		0.012				0.025				0.040			0.038					0.058		
VDCW (MAX)		6.3V	10V	6.3V	10V	16V	25V	16V	25V	50V	100V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V
CAPACITANCE CODE	101																					
	121																					
	151																					
	181																					
	221																					
	271																					
	331																					
	391																					
	471																					
	561																					
	681																					
	821																					
	102																					
	122																					
	152																					
	182																					
	222																					
	272																					
	332																					
	392																					
	472																					
	562																					
	682																					
	822																					
	103																					
	123																					
	153																					
	183																					
	223																					
	273																					
	333																					

\* For values above 1uF, thickness may be greater than specified above.

T(max): 0603 - 0.040"  
 0805 - 0.060"

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.  
 All components manufactured with the X7R dielectric are also available as an X5R dielectric.

## VOLTAGE AND CAPACITANCE RANGE

### X7R DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE	0201			0402					0603						0805					
T (max)*	0.012			0.025					0.038						0.059					
VDCW (MAX)	4V	6.3V	10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V
393	.039																			
473	.047																			
563	.056																			
683	.068																			
823	.082																			
104	0.10uF	**	**	**																
124	.120																			
154	.150																			
184	.180																			
224	.220																			
274	.270																			
334	.330																			
394	.390																			
474	.470																			
564	.560																			
684	.680																			
824	.820																			
105	1.00uF																			
125	1.20																			
155	1.50																			
185	1.80																			
225	2.20																			
335	3.30																			
475	4.70																			
685	6.80																			
106	10.0uF																			
156	15.0uF																			35V
226	22.0uF																			
476	47.0uF																			
107	100.0uF																			

\* For values above 1uF, thickness may be greater than specified above.

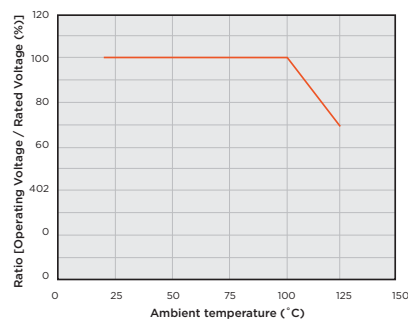
T(max): 0603 - 0.040"  
 0805 - 0.060"

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.

All components manufactured with the X7R dielectric are also available as an X5R dielectric.

\*\* RE: 0201, X7R, 0.1uF; When the operating temperature range is between 100°C and 125°C, it is recommended to apply the following voltage derating as shown in the diagram below.

### DERATING CURVE FOR 0201, 0.1UF, X7R ONLY



**VOLTAGE AND CAPACITANCE RANGE**

**X7R DIELECTRIC**

Values that are typically available.

(All measurements in inches)

SIZE		1206					1210					1812					2220 / 2221					
T (max)*		0.070					0.125					0.085					0.108 / 0.108					
VDCW (MAX)		10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	16V	25V	50V	100V	
CAPACITANCE CODE	102	1000pF																				
	122	1200																				
	152	1500																				
	182	1800																				
	222	2200																				
	272	2700																				
	332	3300																				
	392	3900																				
	472	4700																				
	562	5600																				
	682	6800																				
	822	8200																				
		103	.01uF																			
		123	.012																			
		153	.015																			
		183	.018																			
		223	.022																			
		273	.027																			
		333	.033																			
		393	.039																			
		473	.047																			
		563	.056																			
		683	.068																			
		823	.082																			
		104	.100uF																			
		124	.120																			
		154	.150																			
		184	.180																			
		224	.220																			
		274	.270																			
		334	.330																			

\* For values above 1uF, thickness may be greater than specified above.

T(max): 0603 - 0.040"  
 0805 - 0.060"

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available. All components manufactured with the X7R dielectric are also available as an X5R dielectric.

## VOLTAGE AND CAPACITANCE RANGE

### X7R DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		1206						1210						1812						2220 / 2221					
T (max)*		0.070						0.125						0.095						0.108 / 0.108					
VDCW (MAX)		6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	16V	25V	50V	100V		
CAPACITANCE CODE ↑ ↓	394	.390																							
	474	.470																							
	564	.560																							
	684	.680																							
	824	.820																							
	105	1.00uF																							
	125	1.20																							
	155	1.50																							
	185	1.80																							
	225	2.20																							
	335	3.30																							
	475	4.70																							
	685	6.80																							
	106	10.0uF																							
	156	15.0uF																				X7S/X7R	X7S/X7R	X7S/X7R	
	226	22.0uF																							
	476	47.0uF																							
107	100.0uF																								

\* For values above 1uF, thickness may be greater than specified above.

T(max): 1206 - 0.075"      1812 - 0.130"  
 1210 - 0.125"      2220 - 0.135"

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.  
 All components manufactured with the X7R dielectric are also available as an X5R dielectric.



## VOLTAGE AND CAPACITANCE RANGE

### X5R DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		01005		0201				0402					0603					0805					1206				1210		1812				
T (max)		0.008		0.0216				0.025					0.040					0.060					0.072				0.125		0.130				
VDCW (MAX)		6.3V	10V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	16V	25V	16V	25V
102	1000pF																																
122	1200																																
152	1500																																
182	1800																																
222	2200																																
272	2700																																
332	3300																																
392	3900																																
472	4700																																
562	5600																																
682	6800																																
822	8200																																
103	.01uF																																
153	.015																																
223	.022																																
333	.033																																
393	.039																																
473	.047																																
104	0.10uF																																
154	.150																																
224	.220																																
334	.330																																
474	.470																																
684	.680																																
105	1.00uF																																
125	1.20																																
155	1.50																																
185	1.80																																
225	2.20																																
335	3.30																																

\* For values above 1uF, thickness may be greater than specified above.

T(max): 1206 - 0.075"      1812 - 0.130"  
 1210 - 0.125"      2220 - 0.135"

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.  
 All components manufactured with the X7R dielectric are also available as an X5R dielectric.

## VOLTAGE AND CAPACITANCE RANGE

### X5R DIELECTRIC (0402-1206)

Values that are typically available.

(All measurements in inches)

SIZE		0201			0402				0603					0805					1206						
T (max)		0.0216			0.0335				0.040					0.060					0.072						
VDCW (MAX)		4V	6.3V	10V	4V	6.3V	10V	16V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE	395	3.90uF																							
	475	4.70uF																							
	685	6.80uF																							
	106	10.0uF																							
	156	15.0uF																							
	226	22.0uF																							
	476	47.0uF																							
	107	100.0uF																							
	157	150.0uF																							
	227	220.0uF																							

### X5R DIELECTRIC (1210-2221)

(All measurements in inches)

SIZE		1210					1812				2220 / 2221				
T (max)		0.125					0.130				0.135				
VDCW (MAX)		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE	395	3.90uF													
	475	4.70uF													
	685	6.80uF													
	106	10.0uF													
	156	15.0uF													
	226	22.0uF													
	476	47.0uF													
	107	100.0uF													
	157	150.0uF													
	227	220.0uF													

\* For values above 1uF, thickness may be greater than specified above.

T(max): 1206 - 0.075"      1812 - 0.130"  
 1210 - 0.125"      2220 - 0.135"

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.  
 All components manufactured with the X7R dielectric are also available as an X5R dielectric.

## VOLTAGE AND CAPACITANCE RANGE

### Z5U DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		0504		0603		0805		1206		1210		1812		2220 / 2221	
T (max)		0.040		0.038		0.058		0.070		0.075		0.085		0.108 / 0.108	
VDCW (MAX)		25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V
↑ CAPACITANCE CODE ↓	102	1000pF													
	122	1200													
	152	1500													
	182	1800													
	222	2200													
	272	2700													
	332	3300													
	392	3900													
	472	4700													
	562	5600													
	682	6800													
	822	8200													
	103	.01uF													
	123	.012													
	153	.015													
	183	.018													
	223	.022													
	273	.027													
	333	.033													
	393	.039													
473	.047														
563	.056														
683	.068														
823	.082														
104	.100uF														
124	.120														
154	.150														
184	.180														
224	.220														
274	.270														
334	.330														

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.

## VOLTAGE AND CAPACITANCE RANGE

### Z5U DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		0504		0603		0805		1206		1210		1812		2220 / 2221	
T (max)		0.040		0.038		0.058		0.070		0.075		0.085		0.108 /0.108	
VDCW (MAX)		25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V
CAPACITANCE CODE	394	.390													
	474	.470													
	564	.560													
	684	.680													
	824	.820													
	105	1.00uF													
	125	1.20													
	155	1.50													
	185	1.80													
	225	2.20													
	335	3.30													
	395	3.90													
	475	4.70													
	685	6.80													
	106	10.0uF													
	156	15.0uF													
	226	22.0uF													
476	47.0uF														
107	100.0uF														

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.  
 For values above 1uF, thickness may be greater than specified above.

## VOLTAGE AND CAPACITANCE RANGE

### Y5V DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		0201		0402			0603			0805			1206				1210				1812									
T (max)		0.012		0.025			0.038			0.058			0.070				0.096				0.085									
VDCW (MAX)		10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	25V		
↑ CAPACITANCE CODE ↓	102	1000pF																												
	122	1200																												
	152	1500																												
	182	1800																												
	222	2200																												
	272	2700																												
	332	3300																												
	392	3900																												
	472	4700																												
	562	5600																												
	682	6800																												
	822	8200																												
	↑ CAPACITANCE VALUE ↓	103	.01uF																											
		123	.012																											
		153	.015																											
		183	.018																											
		223	.022																											
		273	.027																											
333		.033																												
393		.039																												
473		.047																												
563		.056																												
↑ CAPACITANCE VALUE ↓	683	.068																												
	823	.082																												
	104	.100uF																												
	124	.120																												
	154	.150																												
	184	.180																												
	224	.220																												
	274	.270																												
334	.330																													

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available. For values above 1uF, thickness may be greater than specified above.

## VOLTAGE AND CAPACITANCE RANGE

### Y5V DIELECTRIC

Values that are typically available.

(All measurements in inches)

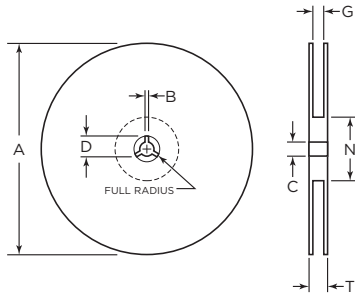
SIZE		0201			0402			0603					0805					1206				1210					1812		
T (max)		0.012			0.025			0.038					0.058					0.070				0.10					0.085		
VDCW (MAX)		10V			6.3V	10V	16V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	25V
CAPACITANCE CODE ↑	394	.390																											
	474	.470																											
	564	.560																											
	684	.680																											
	824	.820																											
	105	1.00uF																											
	125	1.20																											
	155	1.50																											
	185	1.80																											
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226	22.0uF																												
476	47.0uF																												
107	100.0uF																												

**NOTE:** Additional values may be available. Please contact us for more information. Due to demand and raw material fluctuations, specific values may not be available.  
 For values above 1uF, thickness may be greater than specified above.

**TAPE & REEL SPECIFICATIONS**

All tape and reel specifications must be adhered to per EIA-481-1-A.

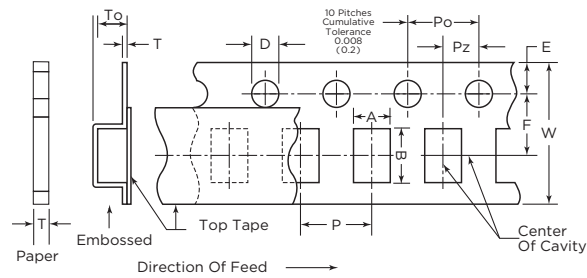
**REEL**



Unit: mm (inch)

Tape	B min	C	A (7")	A (13")	D min	N min	G	T max
4mm	2.0 (0.079)	13 ± 0.05 (0.512 ± 0.02)	178 ± 2.0 (7 ± 0.079)	-	21 ± 0.8 (0.82 ± 0.03)	50 (1.97)	5.0 ± 1.5 (0.196 ± 0.05)	8.0 max (0.315 max)
8mm	2.0 (0.07)	13 ± 0.05 (0.512 ± 0.02)	178 ± 2.0 (7 ± 0.079)	330 ± 2.0 (13 ± 0.08)	20.2 (0.795)	50 (1.97)	10 ± 1.5 (0.394 ± 0.059)	14.9 (0.587)
12mm	2.0 (0.07)	13 ± 0.05 (0.512 ± 0.02)	178 ± 2.0 (7 ± 0.079)	330 ± 2.0 (13 ± 0.08)	20.2 (0.795)	50 (1.97)	10 ± 1.5 (0.394 ± 0.059)	14.9 (0.587)

**TAPE**



**7" Reel Quantities \*\***

SIZE	01005 (E)	01005 (P)	0201	0402	0603	0805	1206	1210	1812	2221
Tape Size	4mm	8mm	8mm	8mm	8mm	8mm	8mm	8mm	12mm	12mm
Min Qty Per Reel	40,000*	20000*	15,000	5,000	3,000	2,000	2,000	1,000	1,000	1,000
Max Qty Per Reel	40,000*	20000*	15,000	10,000	4,000	5,000	5,000	5,000	3,000	1,000

NOTE: \*\* Quantity dependent on thickness  
 \*Smaller quantities may be available. Please contact us.

**Paper Tape Carrier Dimensions (8mm)**

Unit: mm (inch)

Size (inches)	A	B	W	F	E	Po	Pz	D	t	P
01005	$\frac{0.25 \pm 0.05}{(0.010 \pm 0.002)}$	$\frac{0.45 \pm 0.05}{(0.018 \pm 0.002)}$	$\frac{8.0 \pm 0.2}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{-0.0}$ $\frac{-0.0}{(0.039 \pm 0.002)}$ $-0.000$	$\frac{1.5 \pm 0.1}{(0.064 \pm .004)}$	$\frac{1.15 \text{ max}}{(0.045 \text{ max})}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$
0201	$\frac{0.37 \pm 0.05}{(0.014 \pm 0.002)}$	$\frac{0.67 \pm 0.05}{(0.026 \pm 0.002)}$	$\frac{8.0 \pm 0.2}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{-0.0}$ $\frac{-0.0}{(0.039 \pm 0.002)}$ $-0.000$	$\frac{1.5 \pm 0.1}{(0.064 \pm .004)}$	$\frac{1.15 \text{ max}}{(0.045 \text{ max})}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$
0402	$\frac{0.65 \pm 0.1}{(0.026 \pm 0.004)}$	$\frac{1.10 \pm 0.2}{(0.043 \pm 0.008)}$	$\frac{8.0 \pm 0.2}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{-0.0}$ $\frac{-0.0}{(0.039 \pm 0.002)}$ $-0.000$	$\frac{1.5 \pm 0.1}{(0.064 \pm .004)}$	$\frac{1.15 \text{ max}}{(0.045 \text{ max})}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$
0603	$\frac{1.10 \pm 0.2}{(0.043 \pm 0.008)}$	$\frac{1.90 \pm 0.2}{(0.075 \pm 0.008)}$	$\frac{8.0 \pm 0.2}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{-0.0}$ $\frac{-0.0}{(0.039 \pm 0.002)}$ $-0.000$	$\frac{1.5 \pm 0.1}{(0.064 \pm .004)}$	$\frac{1.15 \text{ max}}{(0.045 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
0805	$\frac{1.16 \pm 0.2}{(0.046 \pm 0.008)}$	$\frac{2.4 \pm 0.2}{(0.095 \pm 0.008)}$	$\frac{8.0 \pm 0.2}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{-0.0}$ $\frac{-0.0}{(0.039 \pm 0.002)}$ $-0.000$	$\frac{1.5 \pm 0.1}{(0.064 \pm .004)}$	$\frac{1.15 \text{ max}}{(0.045 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
1206	$\frac{2.0 \pm 0.2}{(0.079 \pm 0.008)}$	$\frac{3.6 \pm 0.2}{(0.142 \pm 0.008)}$	$\frac{8.0 \pm 0.2}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{-0.0}$ $\frac{-0.0}{(0.039 \pm 0.002)}$ $-0.000$	$\frac{1.5 \pm 0.1}{(0.064 \pm .004)}$	$\frac{1.15 \text{ max}}{(0.045 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$

**Embossed Carrier Dimensions (4mm, 8mm & 12mm)**

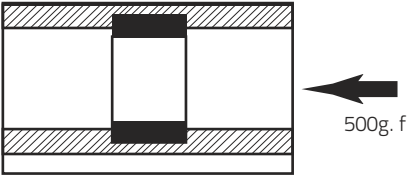
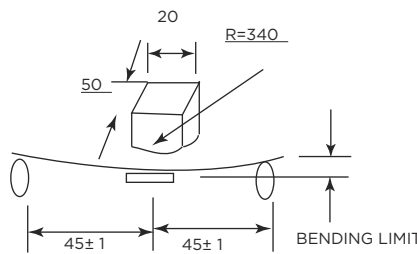

Size (inches)	A	B	W	F	E	Po	Pz	D	To	T	P
01005	$\frac{0.23}{(0.009)}$	$\frac{0.43}{(0.016)}$	$\frac{4.0 \pm 0.05}{(0.157 \pm 0.002)}$	$\frac{1.8 \pm 0.02}{(0.070 \pm 0.001)}$	$\frac{0.9 \pm 0.05}{(0.035 \pm 0.002)}$	$\frac{2.0 \pm 0.04}{(0.079 \pm 0.001)}$	$\frac{2.00}{(0.079)}$	$\frac{0.8 \pm 0.04}{(0.031 \pm 0.001)}$	$\frac{0.5 \text{ max}}{(0.019 \text{ max})}$	$\frac{0.15 - 0.4}{(0.005 - 0.015)}$	$\frac{1.00}{(0.039)}$
0603	$\frac{1.05 \pm 0.15}{(0.042 \pm 0.006)}$	$\frac{1.90 \pm 0.15}{(0.075 \pm 0.006)}$	$\frac{8.0 \pm 0.3}{(0.315 \pm 0.012)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$	$\frac{1.5 \pm 0.1}{-0.0}$ $\frac{-0.0}{(0.06 \pm 0.004)}$ $-0.000$	$\frac{0.75 \text{ max}}{(0.03 \text{ max})}$	$\frac{0.6 \text{ max}}{(0.024 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
0805	$\frac{1.48 \pm 0.2}{(0.058 \pm 0.008)}$	$\frac{2.3 \pm 0.3}{(0.091 \pm 0.008)}$	$\frac{8.0 \pm 0.3}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$	$\frac{1.5 \pm 0.1}{-0.0}$ $\frac{-0.0}{(0.06 \pm 0.004)}$ $-0.000$	$\frac{2.5 \text{ max}}{(0.098 \text{ max})}$	$\frac{0.6 \text{ max}}{(0.024 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
1206	$\frac{2.0 \pm 0.2}{(0.079 \pm 0.008)}$	$\frac{3.6 \pm 0.3}{(0.142 \pm 0.008)}$	$\frac{8.0 \pm 0.3}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$	$\frac{1.5 \pm 0.1}{-0.0}$ $\frac{-0.0}{(0.06 \pm 0.004)}$ $-0.000$	$\frac{2.5 \text{ max}}{(0.098 \text{ max})}$	$\frac{0.6 \text{ max}}{(0.024 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
1210	$\frac{2.9 \pm 0.2}{(0.114 \pm 0.008)}$	$\frac{3.6 \pm 0.3}{(0.142 \pm 0.008)}$	$\frac{8.0 \pm 0.3}{(0.315 \pm 0.008)}$	$\frac{3.5 \pm 0.1}{(0.138 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$	$\frac{1.5 \pm 0.1}{-0.0}$ $\frac{-0.0}{(0.06 \pm 0.004)}$ $-0.000$	$\frac{2.5 \text{ max}}{(0.098 \text{ max})}$	$\frac{0.6 \text{ max}}{(0.024 \text{ max})}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$
1812	$\frac{3.6 \pm 0.2}{(0.142 \pm 0.008)}$	$\frac{4.9 \pm 0.3}{(0.193 \pm 0.008)}$	$\frac{12.0 \pm 0.3}{(0.472 \pm 0.012)}$	$\frac{5.6 \pm 0.1}{(0.221 \pm 0.004)}$	$\frac{1.75 \pm 0.1}{(0.069 \pm 0.004)}$	$\frac{4.0 \pm 0.1}{(0.157 \pm 0.004)}$	$\frac{2.0 \pm 0.05}{(0.079 \pm 0.002)}$	$\frac{1.5 \pm 0.1}{-0.0}$ $\frac{-0.0}{(0.06 \pm 0.004)}$ $-0.000$	$\frac{3.8 \text{ max}}{(0.150 \text{ max})}$	$\frac{0.6 \text{ max}}{(0.024 \text{ max})}$	$\frac{8.0 \pm 0.1}{(0.315 \pm 0.004)}$

## ENVIRONMENTAL CHARACTERISTICS

NO	ITEM		PERFORMANCE	TEST CONDITION					
1	APPEARANCE		NO ABNORMAL EXTERIOR APPEARANCE	THROUGH MICROSCOPE (X10)					
2	INSULATION RESISTANCE		10,000M OR 500M $\mu$ F PRODUCT WHICHEVER IS SMALLER (RATED VOLTAGE IS BELOW 16V: 10,000M OR 100M $\mu$ F)	RATED VOLTAGE SHALL BE APPLIED. MEASUREMENT TIME IS 60 - 120 RATED VOLTAGE TIME 60 SEC .					
3	WITHSTANDING VOLTAGE		NO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN	CLASS I : 300% OF THE RATED VOLTAGE FOR 1-5 SEC. CLASS II: 250% OF THE RATED VOLTAGE FOR 1-5 SEC IS APPLIED WITH LESS THAN 50mA CURRENT					
4	CAPACITANCE	CLASS I	WITHIN THE SPECIFIED TOLERANCE	CAPACITANCE	FREQUENCY	VOLTAGE			
				1,000pF AND BELOW	1MHZ $\pm$ 10%	0.5 - 5 Vrms			
		MORE THAN 1,000 pF		1kHz $\pm$ 10%					
		CLASS II		CAPACITANCE	FREQUENCY	VOLTAGE			
4.7 $\mu$ F AND BELOW	1kHz $\pm$ 10%		1.0 $\pm$ 0.2Vrms						
			MORE THAN 4.7 $\mu$ F	120HZ $\pm$ 20%	1.0 $\pm$ 0.2Vrms				
5	Q	CLASS I	OVER 30pF : Q 1,000 LESS THAN 30pF : Q 400 +20C (C: CAPACITANCE)	CAPACITANCE	FREQUENCY	VOLTAGE			
				1,000pF AND BELOW	1MHZ $\pm$ 10%	0.5 - 5 Vrms			
				MORE THAN 1,000 pF	1kHz $\pm$ 10%				
6	DISSIPATION FACTOR (Tan $\theta$ CLASS II)	CLASS II	<b>X7R, X6S, X5R</b>						
			<b>Rated Voltage</b>	<b>D.F.</b>	<b>Exception of D.F.</b>				
			$\geq$ 50V	$\leq$ 2.5%	$\leq$ 3%	0201 (50V); 0603 $\geq$ 0.047 $\mu$ F 0805 $\geq$ 0.22 $\mu$ F; 1206 $\geq$ 0.47 $\mu$ F			
					$\leq$ 5%	0603 $\geq$ 1 $\mu$ F; 0805 $\geq$ 1 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F			
			25V	$\leq$ 2.5%	$\leq$ 5%	0201 $\geq$ 0.01 $\mu$ F; 0805 $\geq$ 1 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F			
					$\leq$ 10%	0402 $\geq$ 0.10 $\mu$ F; 0603 $\geq$ 0.33 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F			
			16V	$\leq$ 3.5%	$\leq$ 5%	0201 $\geq$ 0.01 $\mu$ F; 0402 $\geq$ 0.033 $\mu$ F; 0805 $\geq$ 0.68 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F			
					$\leq$ 10%	0402 $\geq$ 0.47 $\mu$ F; 0603 $\geq$ 0.68 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 22 $\mu$ F			
			10V	$\leq$ 5%	$\leq$ 10%	0402 $\geq$ 0.33 $\mu$ F; 0603 $\geq$ 0.33 $\mu$ F; 0805 $\geq$ 2.2 $\mu$ F; 1206 $\geq$ 2.2 $\mu$ F; 1210 $\geq$ 22 $\mu$ F			
			6.3V	$\leq$ 10%					
						<b>Y5V, Z5U</b>			
			<b>Rated Voltage</b>	<b>D.F.</b>	<b>Exception of D.F.</b>				
			$\geq$ 50V	$\leq$ 5%	$\leq$ 9%	0603 $\geq$ 0.1 $\mu$ F; 0805 $\geq$ 0.47 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F;			
			25V	$\leq$ 5%	$\leq$ 9%	0402 $\geq$ 0.047 $\mu$ F; 0603 $\geq$ 0.1 $\mu$ F; 0805 $\geq$ 0.33 $\mu$ F; 1206 $\geq$ 1 $\mu$ F; 1210 $\geq$ 4.7 $\mu$ F			
$\leq$ 12.5%	0603 $\geq$ 2.2 $\mu$ F; 0805 $\geq$ 3.3 $\mu$ F; 1206 $\geq$ 10 $\mu$ F; 1210 $\geq$ 22 $\mu$ F; 1812 $\geq$ 47 $\mu$ F								
16V	$\leq$ 9%	$\leq$ 16%	0603 $\geq$ 2.2 $\mu$ F; 0805 $\geq$ 3.3 $\mu$ F; 1206 $\geq$ 4.7 $\mu$ F; 1210 $\geq$ 10 $\mu$ F; 1812 $\geq$ 47 $\mu$ F						
10V	$\leq$ 12.5%	$\leq$ 16%							
6.3V	$\leq$ 16%								



**ENVIRONMENTAL CHARACTERISTICS**

NO	ITEM		PERFORMANCE		TEST CONDITION				
			CHARACTERISTIC	TEMP. COEFFICIENT (PPM/°C)	THESE SYMMETRICAL TOLERANCE APPLY TO 2 POINT MEASUREMENT OF TEMPERATURE COEFFICIENT: ONE AT -25°C AND AT 85°C				
7	CAPACITANCE TEMPERATURE COEFFICIENT	CLASS I	COG/COG	0 ± 60 (±30)	STEP	TEMPERATURE (°C)			
				-150 ± 60	1	25 ± 2			
				-220 ± 60	2	MIN RATED TEMP ± 2			
				-330 ± 60	3	25 ± 2			
				-470 ± 60	4	MAX RATED TEMP ± 2			
				-750 ± 120	5	25 ± 2			
				+350 - -1000					
8	TEMPERATURE CHARACTERISTICS	CLASS II	CAPACITANCE CHANGE		STEP	TEMP. (°C) B	TEMP. (°C) F		
			CHAR.	CAP. CHANGE (%)				1	25 ± 2
			X	X7R	±15%	2	-55 ± 2	-25 ± 2	
				X6S	±22%	3	25 ± 2	25 ± 2	
				X5R	±15%	4	125 ± 2	85 ± 2	
				Y5V	-82% - +22%	5	25 ± 2	25 ± 2	
				Y	Z5U	-56% - +22%			
								$\frac{C2 - C1}{C1} \times 100\%$ C1: CAPACITANCE AT STANDARD TEMPERATURE (25°C) C2: CAPACITANCE AT EACH TEMPERATURE	
9	ADHESIVE STRENGTH OF TERMINATION	NO INDICATION OF PEELING SHALL OCCUR ON THE TERMINAL ELECTRODE			A 500g.f PRESSURE SHALL BE APPLIED FOR 10±1 SECOND 				
10	BENDING STRENGTH	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCURE			BENDING SHALL BE APPLIED TO THE LIMIT (1mm) WITH 0.3mm/SEC			
		CAPACITANCE	CHARACTER	CHANGE OF CAPACITANCE					
			CLASS I	WITHIN ±5% OR ±0.5pF WHICHEVER IS LARGER					
			CLASS II	X (X7R, X6S, X5R)	WITHIN ±12.5%				
	Y (Y5V, Z5U)	WITHIN ±30%							
11	SOLDERABILITY	MORE THAN 75% OF THE TERMINAL SURFACE IS TO BE SOLDERED NEWLY, SO METAL PART (A) DOES NOT COME OUT OR DISSOLVE 			SOLDER TEMPERATURE: 245 ± 5 °C SOLDER: Sn_Ag3_0.5Cu FLUX: RMA Type PRE-HEATING: AT 80 - 120 °C FOR 10 - 30 SEC.				

## ENVIRONMENTAL CHARACTERISTICS

NO	ITEM	PERFORMANCE	TEST CONDITION									
12	RESISTANCE TO SOLDERING HEAT	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR									
		CAPACITANCE	CHARACTERISTIC	CAP. CHANGE								
			CLASS I	WITHIN ±2.5% OR ±0.25 pF WHICHEVER IS LARGER								
			CLASS II	X	WITHIN ±7.5%							
				Y	WITHIN ±20%							
		QCLASS I	30 pF AND OVER: Q 1000 LESS THAN 30 pF: Q 400 + 20xC									
		Tan CLASS II	TO SATISFY THE SPECIFIED INITIAL VALUE									
		INSULATION RESISTANCE	TO SATISFY THE SPECIFIED INITIAL VALUE									
WITHSTANDING VOLTAGE	TO SATISFY THE SPECIFIED INITIAL VALUE											
13	VIBRATION TEST	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR									
		CAPACITANCE	CHARACTERISTIC	CAP. CHANGE								
			CLASS I	WITHIN ±2.5% OR ±0.25 pF WHICHEVER IS LARGER								
			CLASS II	X	WITHIN ±5%							
				Y	WITHIN ±20%							
		QCLASS I	30 pF AND OVER: Q 1000 LESS THAN 30 pF: Q 400 + 20xC									
		Tan CLASS II	TO SATISFY THE SPECIFIED INITIAL VALUE									
INSULATION RESISTANCE	TO SATISFY THE SPECIFIED INITIAL VALUE											
			<p>DIP : SOLDER TEMPERATURE OF 270± 5 °C  DIP TIME :10±1 SEC.  EACH TERMINATION SHALL BE FULLY IMMERSSED AND PREHEATED AS FOLLOWING:</p> <table border="1"> <thead> <tr> <th>STEP</th> <th>TEMP. (°C)</th> <th>TIME (SEC.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>80-100</td> <td>60</td> </tr> <tr> <td>2</td> <td>150-180</td> <td>60</td> </tr> </tbody> </table> <p>MEASURE AT ROOM TEMP. AFTER COOLING FOR  CLASS I : 24 ± 2 HOURS  CLASS II : 48 ± 4 HOURS</p>	STEP	TEMP. (°C)	TIME (SEC.)	1	80-100	60	2	150-180	60
STEP	TEMP. (°C)	TIME (SEC.)										
1	80-100	60										
2	150-180	60										
			<p>THE CAPACITOR SHALL BE SUBJECTED TO A HARMONIC MOTION HAVING A TOTAL AMPLITUDE of 1.5mm</p> <p>THE ENTIRE FREQUENCY RANGE, FROM 10 TO 55Hz AND RETURN TO 10Hz SHALL BE TRAVERSED IN 1 MINUTE.</p> <p>THIS CYCLE SHALL BE PERFORMED 2 HOURS IN EACH THREE MUTUALLY PERPENDICULAR DIRECTION, FOR TOTAL PERIOD of 6 HOURS.</p>									

**ENVIRONMENTAL CHARACTERISTICS**

NO	ITEM	PERFORMANCE	TEST CONDITION			
14	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR	TEMPERATURE : 40±2 °C RELATIVE HUMIDITY: 90-95 %RH TEST TIME : 500 +12/-0 Hr.  MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR CLASS I : 24±2 Hr. CLASS II : 48±4 Hr.  SEE (FIG.3)			
	CAPACITANCE	CHARACTERISTIC		CAPACITANCE CHANGE		
		CLASS I		WITHIN ±5% OR±0.5pF WHICHEVER IS LARGER		
		CLASS II		X	WITHIN ±12.5%	
				Y	WITHIN ±30%	
	QCLASS I	30pF AND OVER : Q 350 10 - 30pF : Q 275 + 2.5xC LESS THAN 10pF : Q 200 + 10xC				
	DISSIPATION FACTOR (Tanθ CLASS II)	<b>X7R, X6S, X5R</b>				
		Rated Voltage		D.F.	Exception of D.F.	
		≥50V		≤2.5%	≤3%	0201 (50V); 0603≥0.047uF 0805≥0.22uF; 1206≥0.47uF
					≤5%	0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥4.7uF
25V		≤2.5%	≤5%	0201≥0.01uF; 0805≥1uF; 1210≥4.7uF		
			≤10%	0402≥0.10uF; 0603≥0.33uF; 0805≥2.2uF 1206≥4.7uF; 1210≥22uF		
16V		≤3.5%	≤5%	0201≥0.01uF; 0402≥0.033uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF		
			≤10%	0402≥0.47uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF		
10V		≤5%	≤10%	0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF		
6.3V		≤10%				
<b>Y5V, Z5U</b>						
Rated Voltage	D.F.	Exception of D.F.				
≥50V	≤5%	≤9%	0603≥0.1uF; 0805≥0.47uF; 1206≥4.7uF;			
25V	≤5%	≤9%	0402≥0.047uF; 0603≥0.1uF; 0805≥0.33uF; 1206≥1uF; 1210≥4.7uF			
		≤12.5%	0603≥2.2uF; 0805≥3.3uF; 1206≥10uF; 1210≥22uF; 1812≥47uF			
16V	≤9%	≤16%	0603≥2.2uF; 0805≥3.3uF; 1206≥4.7uF; 1210≥10uF; 1812≥47uF			
10V	≤12.5%					
6.3V	≤16%					
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 1,000M OR 50M μF PRODUCT WHICHEVER IS SMALLER					

## ENVIRONMENTAL CHARACTERISTICS

NO	ITEM	PERFORMANCE	TEST CONDITION			
15	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR	APPLIED VOLTAGE: RATED VOLTAGE TEMPERATURE : 40±2 °C RELATIVE HUMIDITY: 90-95%RH TEST TIME : 500 +12/-0 Hr. CURRENT APPLIED: 50mA MAX.  MEASURING AT ROOM TEMPERATURE AFTER COOLING FOR CLASS I : 24±2 Hr. CLASS II : 48±4 Hr.  SEE (FIG.3)			
	CAPACITANCE	CHARACTERISTIC		CAPACITANCE CHANGE		
		CLASS I		WITHIN ±7.5% OR±0.75pF WHICHEVER IS LARGER		
		CLASS II		X	WITHIN ±12.5%	
	Y			WITHIN ±30%		
	QCLASS I	30pF AND OVER : Q 200 30pF AND BELOW : Q 100 + 10/3xC				
	DISSIPATION FACTOR (Tanθ CLASS II)	<b>X7R, X6S, X5R</b>				
		Rated Voltage		D.F.	Exception of D.F.	
		≥50V		≤2.5%	≤3%	0201 (50V); 0603≥0.047uF 0805≥0.22uF; 1206≥0.47uF
					≤5%	0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥4.7uF
25V		≤2.5%	≤5%	0201≥0.01uF; 0805≥1uF; 1210≥4.7uF		
			≤10%	0402≥0.10uF; 0603≥0.33uF; 0805≥2.2uF 1206≥4.7uF; 1210≥22uF		
16V		≤3.5%	≤5%	0201≥0.01uF; 0402≥0.033uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF		
			≤10%	0402≥0.47uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF		
10V		≤5%	≤10%	0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF		
6.3V	≤10%					
<b>Y5V, Z5U</b>						
Rated Voltage	D.F.	Exception of D.F.				
≥50V	≤5%	≤9%	0603≥0.1uF; 0805≥0.47uF; 1206≥4.7uF;			
25V	≤5%	≤9%	0402≥0.047uF; 0603≥0.1uF; 0805≥0.33uF; 1206≥1uF; 1210≥4.7uF			
		≤12.5%	0603≥2.2uF; 0805≥3.3uF; 1206≥10uF; 1210≥22uF; 1812≥47uF			
16V	≤9%	≤16%	0603≥2.2uF; 0805≥3.3uF; 1206≥4.7uF; 1210≥10uF; 1812≥47uF			
6.3V	≤16%					
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 100 M OR 25M μF PRODUCT, WHICHEVER IS SMALLER					

**ENVIRONMENTAL CHARACTERISTICS**

NO	ITEM	PERFORMANCE	TEST CONDITION			
16	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR	APPLIED VOLTAGE: 200% OF RATED VOLTAGE TEST TIME : 1000 +48/-0 Hr. CURRENT APPLIED: 50mA MAX.			
	CAPACITANCE	CHARACTERISTIC		CAP. CHANGE		
		CLASS I		WITHIN ±3% OR ±0.3pF, WHICHEVER IS LARGER		
		CLASS II		X	WITHIN ±12.5%	
	Y		WITHIN ±30%			
	QCLASS I	30pF AND OVER : Q 350 10 - 30 pF : Q 275 + 2.5xC LESS THAN 10pF :Q 200 + 10xC	CLASS I 125 ±3 °C			
	DISSIPATION FACTOR (Tanθ CLASS II)	<b>X7R, X6S, X5R</b>		(INITIAL VALUE MEASUREMENT) FOR CLASS II CAPACITORS, 200 % OF RATED VOLTAGE SHALL BE APPLIED FOR 1 HOUR AT THE MAXIMUM OPERATING TEMPERATURE, THEN KEEP IT AT ROOM TEMPERATURE FOR 48 ±4 HRS.  SEE (FIG.3)		
		Rated Voltage	D.F.		Exception of D.F.	
		≥50V	≤2.5%		≤3%	0201 (50V); 0603≥0.047uF 0805≥0.22uF; 1206≥0.47uF
					≤5%	0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥4.7uF
25V		≤2.5%	≤5%		0201≥0.01uF; 0805≥1uF; 1210≥4.7uF	
			≤10%		0402≥0.10uF; 0603≥0.33uF; 0805≥2.2uF 1206≥4.7uF; 1210≥22uF	
16V		≤3.5%	≤5%		0201≥0.01uF; 0402≥0.033uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF	
			≤10%		0402≥0.47uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF	
10V		≤5%	≤10%		0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF	
6.3V		≤10%				
<b>Y5V, Z5U</b>						
Rated Voltage	D.F.	Exception of D.F.				
≥50V	≤5%	≤9%	0603≥0.1uF; 0805≥0.47uF; 1206≥4.7uF;			
25V	≤5%	≤9%	0402≥0.047uF; 0603≥0.1uF; 0805≥0.33uF; 1206≥1uF; 1210≥4.7uF			
16V	≤9%	≤12.5%	0603≥2.2uF; 0805≥3.3uF; 1206≥10uF; 1210≥22uF; 1812≥47uF			
10V	≤12.5%	≤16%	0603≥2.2uF; 0805≥3.3uF; 1206≥4.7uF; 1210≥10uF; 1812≥47uF			
6.3V	≤16%					
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 1,000M OR 50M μF PRODUCT WHICHEVER IS SMALLER					

## ENVIRONMENTAL CHARACTERISTICS

NO	ITEM	PERFORMANCE	TEST CONDITION																																																																					
17	TEMPERATURE CYCLE	<p>APPEARANCE: NO MECHANICAL DAMAGE SHALL OCCUR</p> <p>CHARACTERISTIC: CAP. CHANGE</p> <p>CLASS I: WITHIN ±2.5% OR ±0.25pF WHICHEVER IS LARGER</p> <p>CLASS II X: WITHIN ±7.5%</p> <p>CLASS II Y: WITHIN ±20%</p> <p>QCLASS I: 30 pF AND OVER : Q 1000 LESS THAN 30pF:Q 400 +20xC</p> <p><b>X7R, X6S, X5R</b></p> <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>D.F.</th> <th colspan="2">Exception of D.F.</th> </tr> </thead> <tbody> <tr> <td rowspan="2">≥50V</td> <td rowspan="2">≤2.5%</td> <td>≤3%</td> <td>0201 (50V); 0603≥0.047uF 0805≥0.22uF; 1206≥0.47uF</td> </tr> <tr> <td>≤5%</td> <td>0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥4.7uF</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2">≤2.5%</td> <td>≤5%</td> <td>0201≥0.01uF; 0805≥1uF; 1210≥4.7uF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.10uF; 0603≥0.33uF; 0805≥2.2uF 1206≥4.7uF; 1210≥22uF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤3.5%</td> <td>≤5%</td> <td>0201≥0.01uF; 0402≥0.033uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.47uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF</td> </tr> <tr> <td>10V</td> <td>≤5%</td> <td>≤10%</td> <td>0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF</td> </tr> <tr> <td>6.3V</td> <td>≤10%</td> <td></td> <td></td> </tr> </tbody> </table> <p><b>Y5V, Z5U</b></p> <table border="1"> <thead> <tr> <th>Rated Voltage</th> <th>D.F.</th> <th colspan="2">Exception of D.F.</th> </tr> </thead> <tbody> <tr> <td>≥50V</td> <td>≤5%</td> <td>≤9%</td> <td>0603≥0.1uF; 0805≥0.47uF; 1206≥4.7uF;</td> </tr> <tr> <td>25V</td> <td>≤5%</td> <td>≤9%</td> <td>0402≥0.047uF; 0603≥0.1uF; 0805≥0.33uF; 1206≥1uF; 1210≥4.7uF</td> </tr> <tr> <td>16V</td> <td>≤9%</td> <td>≤12.5%</td> <td>0603≥2.2uF; 0805≥3.3uF; 1206≥10uF; 1210≥22uF; 1812≥47uF</td> </tr> <tr> <td>10V</td> <td>≤12.5%</td> <td>≤16%</td> <td>0603≥2.2uF; 0805≥3.3uF; 1206≥4.7uF; 1210≥10uF; 1812≥47uF</td> </tr> <tr> <td>6.3V</td> <td>≤16%</td> <td></td> <td></td> </tr> </tbody> </table> <p>INSULATION RESISTANCE: TO SATISFY THE SPECIFIED INITIAL VALUE</p>	Rated Voltage	D.F.	Exception of D.F.		≥50V	≤2.5%	≤3%	0201 (50V); 0603≥0.047uF 0805≥0.22uF; 1206≥0.47uF	≤5%	0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥4.7uF	25V	≤2.5%	≤5%	0201≥0.01uF; 0805≥1uF; 1210≥4.7uF	≤10%	0402≥0.10uF; 0603≥0.33uF; 0805≥2.2uF 1206≥4.7uF; 1210≥22uF	16V	≤3.5%	≤5%	0201≥0.01uF; 0402≥0.033uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF	≤10%	0402≥0.47uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF	10V	≤5%	≤10%	0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF	6.3V	≤10%			Rated Voltage	D.F.	Exception of D.F.		≥50V	≤5%	≤9%	0603≥0.1uF; 0805≥0.47uF; 1206≥4.7uF;	25V	≤5%	≤9%	0402≥0.047uF; 0603≥0.1uF; 0805≥0.33uF; 1206≥1uF; 1210≥4.7uF	16V	≤9%	≤12.5%	0603≥2.2uF; 0805≥3.3uF; 1206≥10uF; 1210≥22uF; 1812≥47uF	10V	≤12.5%	≤16%	0603≥2.2uF; 0805≥3.3uF; 1206≥4.7uF; 1210≥10uF; 1812≥47uF	6.3V	≤16%			<p>CAPACITORS SHALL BE SUBJECTED TO FIVE CYCLES OF THE TEMPERATURE CYCLE AS FOLLOWING</p> <table border="1"> <thead> <tr> <th>STEP</th> <th>TEMP.(°C)</th> <th>TIME (MIN)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>MIN. RATED TEMP. +0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25</td> <td>2 - 3</td> </tr> <tr> <td>3</td> <td>MAX. RATED TEMP. +3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>25</td> <td>2 - 3</td> </tr> </tbody> </table> <p>MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR CLASS I : 24±2 Hr. CLASS II : 48±4 Hr. SEE(FIG.3)</p>	STEP	TEMP.(°C)	TIME (MIN)	1	MIN. RATED TEMP. +0/-3	30	2	25	2 - 3	3	MAX. RATED TEMP. +3/-0	30	4	25	2 - 3
	Rated Voltage	D.F.	Exception of D.F.																																																																					
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## ENVIRONMENTAL CHARACTERISTICS

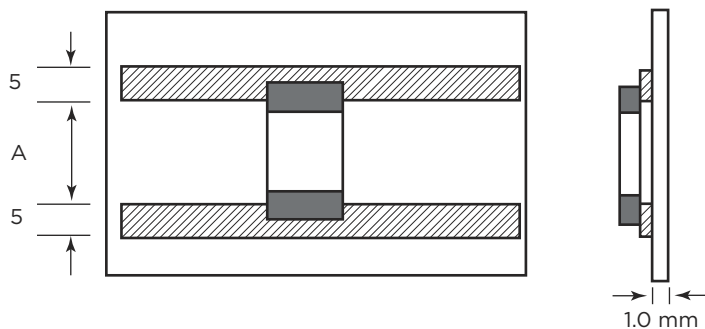
NO	ITEM	TEST CONDITION	REQUIREMENTS																																																																																																																			
18	HIGH TEMPERATURE Load-Endurance (Life Testing)	<p>*Test Temperature: COG, X7R/X7S: 125±3°C X5R, Y5V: 85±3°C Test time: 1000+24/-0 hrs. <b>Endurance or Life Test Voltage (RVLL)</b> * All components are tested at 100% of rated voltage (Vr) for the below range:</p> <table border="1"> <thead> <tr> <th>SIZE</th> <th>DIELECTRIC</th> <th>RATED VOLTAGE</th> <th>CAPACITANCE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0201</td> <td rowspan="2">X5R/X7R/X6S</td> <td>≤10V</td> <td>C≥0.1µF</td> </tr> <tr> <td>≥16V</td> <td>C&gt;0.1µF</td> </tr> <tr> <td rowspan="6">0402</td> <td rowspan="2">X5R</td> <td>≤16V</td> <td>C&gt;0.1µF</td> </tr> <tr> <td>25V, 50V</td> <td>C≥0.1µF</td> </tr> <tr> <td rowspan="2">X6S</td> <td>6.3V, 10V</td> <td>C&gt;0.1µF</td> </tr> <tr> <td>16V, 25V</td> <td>C≥0.1µF</td> </tr> <tr> <td rowspan="2">X7R/X7S/Y5V</td> <td>25V</td> <td>C≥0.1µF</td> </tr> <tr> <td>35V</td> <td>C≥0.1µF</td> </tr> <tr> <td rowspan="3">0603</td> <td rowspan="2">X5R/X7R/X6S/X7S</td> <td>4V</td> <td>C≥22µF</td> </tr> <tr> <td>6.3V, 10V</td> <td>C≥4.7µF</td> </tr> <tr> <td>X5R/X7R/X6S</td> <td>25V</td> <td>C≥0.1µF</td> </tr> <tr> <td>X7R</td> <td>35V</td> <td>C≥0.1µF</td> </tr> <tr> <td rowspan="4">0805</td> <td rowspan="3">X5R/X7R/X6S/X7S</td> <td>4V</td> <td>C≥47µF</td> </tr> <tr> <td>6.3V</td> <td>C≥22µF</td> </tr> <tr> <td>10V, 50V</td> <td>C≥10µF</td> </tr> <tr> <td>X7R/X6S</td> <td>16V, 25V</td> <td>C≥10µF</td> </tr> <tr> <td>X5R</td> <td></td> <td>C≥22µF</td> </tr> <tr> <td>1206</td> <td>X5R/X7R/X6S</td> <td>≤6.3V</td> <td>C≥47µF</td> </tr> <tr> <td rowspan="2">1210</td> <td rowspan="2">X5R/X7R/X6S</td> <td>16V</td> <td>C≥47µF</td> </tr> <tr> <td>X7R</td> <td>100V</td> <td>C≥43.3µF</td> </tr> </tbody> </table> <p>*Any items outside this range or with a different dielectric will hold the following test conditions: (1) ≤ 6.3V or C ≥ 10µF : 150% of rated voltage. (2) 10V ≤ Vr ≤ 100V: 200% of rated voltage.</p>	SIZE	DIELECTRIC	RATED VOLTAGE	CAPACITANCE	0201	X5R/X7R/X6S	≤10V	C≥0.1µF	≥16V	C>0.1µF	0402	X5R	≤16V	C>0.1µF	25V, 50V	C≥0.1µF	X6S	6.3V, 10V	C>0.1µF	16V, 25V	C≥0.1µF	X7R/X7S/Y5V	25V	C≥0.1µF	35V	C≥0.1µF	0603	X5R/X7R/X6S/X7S	4V	C≥22µF	6.3V, 10V	C≥4.7µF	X5R/X7R/X6S	25V	C≥0.1µF	X7R	35V	C≥0.1µF	0805	X5R/X7R/X6S/X7S	4V	C≥47µF	6.3V	C≥22µF	10V, 50V	C≥10µF	X7R/X6S	16V, 25V	C≥10µF	X5R		C≥22µF	1206	X5R/X7R/X6S	≤6.3V	C≥47µF	1210	X5R/X7R/X6S	16V	C≥47µF	X7R	100V	C≥43.3µF	<p>• No remarkable damage. CAP CHANGE: COG: ±3.0% or ±0.3pF whichever is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; **10V: 0603≥4.7µF; 0402≥1.0µF; 0201≥0.1µF, within ±25% Y5V≥10V, within ±30%; ≤6.3V, within +30/-40% Q/D.F. VALUE: COG: More than 30pF, Q≥350 10pF≤30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C</p> <p><b>X7R, X5R, X6S, X7S:</b></p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>D.F.</th> <th colspan="2">EXCEPTIONS OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥100V</td> <td rowspan="3">≤3%</td> <td>≤6%</td> <td>1206≥0.47µF</td> </tr> <tr> <td>≤7.5%</td> <td>0603≥0.068µF; 0805&gt;0.1µF; 1206≥1µF; 1210≥2.2µF</td> </tr> <tr> <td>≤20%</td> <td>0805&gt;2.2µF; 1210≤3.3µF</td> </tr> <tr> <td rowspan="2">50V</td> <td rowspan="2">≤3%</td> <td>≤6%</td> <td>0201(50V); 0603&gt;0.047µF; 0805≥0.18µF; 1206≥0.47µF</td> </tr> <tr> <td>≤10%</td> <td>0201≥0.01µF; 1210≥3.3µF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤5%</td> <td>≤20%</td> <td>0402≥0.012µF; 0603&gt;0.1µF; 0805≥1.0µF (0805/X7R&gt;0.47µF); 1206≥2.2µF; 1210≥10µF</td> </tr> <tr> <td>≤20%</td> <td>0603≥1.0µF; 0805≥2.2µF; 1206≥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≥1.0µF; 1210≥10µF</td> </tr> <tr> <td>≤14%</td> <td>0603≥0.33µF</td> </tr> <tr> <td>≤15%</td> <td>0201&gt;0.01µF; 0402&gt;0.10µF (0402/X7R≥0.056µF); 0603&gt;0.47µF; 0805≥2.2µF; 1206≥0.47µF; 1210≥22µF (1210/X5R≥10µF)</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 (0201/X7R≥0.022µF); 0402≥0.033µF 0603&gt;0.47µF; 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≥0.22µF; 0603≥0.33µF; 0805≥2.2µF; 1206≥2.2µF; 1210≥22µF</td> </tr> <tr> <td>≤20%</td> <td>0201≥0.01µF; 0402≥1.0µF; 0603/X5R≥10µF; 01R5/X5R</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30%</td> <td>0201≥0.01µF; 0402≥1.0µF (0402/X6S≥0.47µF); 0603≥10µF; 0805≥4.7µF; 1206≥47µF; 1210≥100µF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	RATED VOLTAGE	D.F.	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## ENVIRONMENTAL CHARACTERISTICS

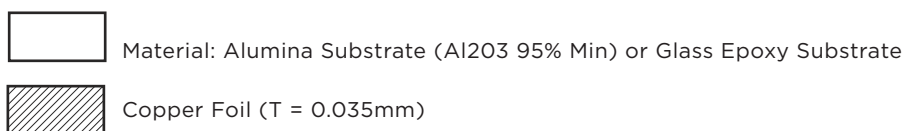
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<p>* Before initial measurement (Class II only): To apply de-aging at 150 °C for 1 hr then set for 24<math>\pm</math>2 hrs at room temp</p> <p>* Cap./DF(Q)/I.R. Measurement to be made after de-aging at 150 °C for 1hr then set for 24<math>\pm</math>2hrs at room temp.</p> <p>** De-rating conditions:</p>			<p><b>Y5V:</b></p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>D.F.</th> <th colspan="2">EXCEPTIONS OF D.F. <math>\leq</math></th> </tr> </thead> <tbody> <tr> <td rowspan="2"><math>\geq 0\text{V}</math></td> <td rowspan="2"><math>\leq 7.5\%</math></td> <td><math>\leq 10\%</math></td> <td>0603<math>\geq 0.1\mu\text{F}</math>; 0805<math>\geq 0.47\mu\text{F}</math>; 1206<math>\geq 4.7\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 20\%</math></td> <td>1210<math>\geq 6.8\mu\text{F}</math></td> </tr> <tr> <td>35V</td> <td><math>\leq 10\%</math></td> <td>-</td> <td>-</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2"><math>\leq 7.5\%</math></td> <td><math>\leq 10\%</math></td> <td>0402<math>\geq 0.047\mu\text{F}</math>; 0603<math>\geq 0.1\mu\text{F}</math>; 0805<math>\geq 0.33\mu\text{F}</math>; 1206<math>\geq 1.0\mu\text{F}</math>; 1210<math>\geq 4.7\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 15\%</math></td> <td>0402<math>\geq 0.068\mu\text{F}</math>; 0603<math>\geq 0.47\mu\text{F}</math>; 1206<math>\geq 4.7\mu\text{F}</math>; 1210<math>\geq 22\mu\text{F}</math></td> </tr> <tr> <td rowspan="2">16V (C<math>&lt; 1.0\mu\text{F}</math>)</td> <td rowspan="2"><math>\leq 10\%</math></td> <td><math>\leq 12.5\%</math></td> <td>0402<math>\geq 0.068\mu\text{F}</math>; 0603<math>\geq 0.68\mu\text{F}</math></td> </tr> <tr> <td><math>\leq 20\%</math></td> <td>0402<math>\geq 0.22\mu\text{F}</math></td> </tr> <tr> <td>16V (C<math>\geq 1.0\mu\text{F}</math>)</td> <td><math>\leq 12.5\%</math></td> <td><math>\leq 20\%</math></td> <td>0603<math>\geq 2.2\mu\text{F}</math>; 0805<math>\geq 3.3\mu\text{F}</math>; 1206<math>\geq 10\mu\text{F}</math>; 1210<math>\geq 22\mu\text{F}</math>; 1812<math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>10V</td> <td><math>\leq 20\%</math></td> <td><math>\leq 30\%</math></td> <td>0402<math>\geq 0.47\mu\text{F}</math></td> </tr> <tr> <td>6.3V</td> <td><math>\leq 30\%</math></td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>*I.R.: <math>\geq 10\text{V}</math>, 1G<math>\Omega</math> or 50Q-F whichever is smaller. Class II (X7R, X5R, X6S, X7S, Y5V)</p> <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: All X7R; 1210<math>\geq 3.3\mu\text{F}</math></td> <td rowspan="7">1G<math>\Omega</math> or apply <math>\geq 10\Omega\text{-F}</math> rule, whichever is smaller.</td> </tr> <tr> <td>50V: 0402<math>&gt; 0.01\mu\text{F}</math>; 0603<math>\geq 1.0\mu\text{F}</math>; 0805<math>\geq 1.0\mu\text{F}</math>; 1206<math>\geq 4.7\mu\text{F}</math>; 1210<math>\geq 4.7\mu\text{F}</math></td> </tr> <tr> <td>35V: 0603<math>\geq 1.0\mu\text{F}</math>; 0805<math>\geq 2.2\mu\text{F}</math>; 1206<math>\geq 2.2\mu\text{F}</math>; 1210<math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td>25V: 0201<math>\geq 0.1\mu\text{F}</math>; 0402<math>\geq 0.22\mu\text{F}</math>; 0603<math>\geq 2.2\mu\text{F}</math>; 0805<math>\geq 2.2\mu\text{F}</math>; 1206<math>\geq 10\mu\text{F}</math>; 1210<math>\geq 10\mu\text{F}</math></td> </tr> <tr> <td>16V: 0201<math>\geq 0.1\mu\text{F}</math>; 0402<math>\geq 0.22\mu\text{F}</math>; 0603<math>\geq 1.0\mu\text{F}</math>; 0805<math>\geq 2.2\mu\text{F}</math>; 1206<math>\geq 10\mu\text{F}</math>; 1210<math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>10V: 0201<math>\geq 47\text{nF}</math>; 0402<math>\geq 0.47\mu\text{F}</math>; 0603<math>\geq 0.47\mu\text{F}</math>; 0805<math>\geq 2.2\mu\text{F}</math>; 1206<math>\geq 4.7\mu\text{F}</math>; 1210<math>\geq 47\mu\text{F}</math></td> </tr> <tr> <td>6.3V; 4V : All X6S/X7S items, Size<math>\geq 1812</math></td> </tr> </tbody> </table>	RATED VOLTAGE	D.F.	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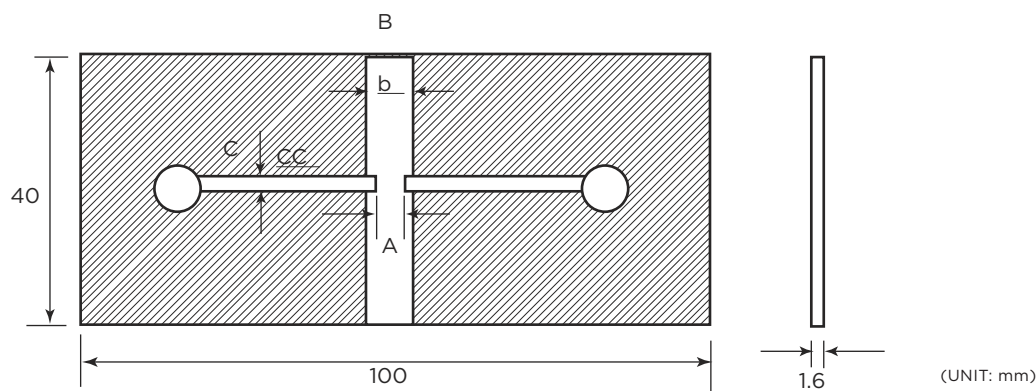
## ADHESIVE STRENGTH OF TERMINATION



CODE	DIMENSION (mm)	A (mm)	CODE	DIMENSION (mm)	A (mm)
01005 (0402)	0.40 x 0.20	0.12	1206 (3216)	3.2 x 1.6	2.2
0201 (0603)	0.61 x 0.31	0.2	1210 (3225)	3.2 x 2.5	2.2
0402 (1005)	1.0 x 0.5	0.4	1812 (4532)	4.5 x 3.2	3.5
0603 (1608)	1.6 x 0.8	1.0	2220 (5750)	5.7 x 5.08	4.7
0805 (2012)	2.0 x 1.25	1.2			



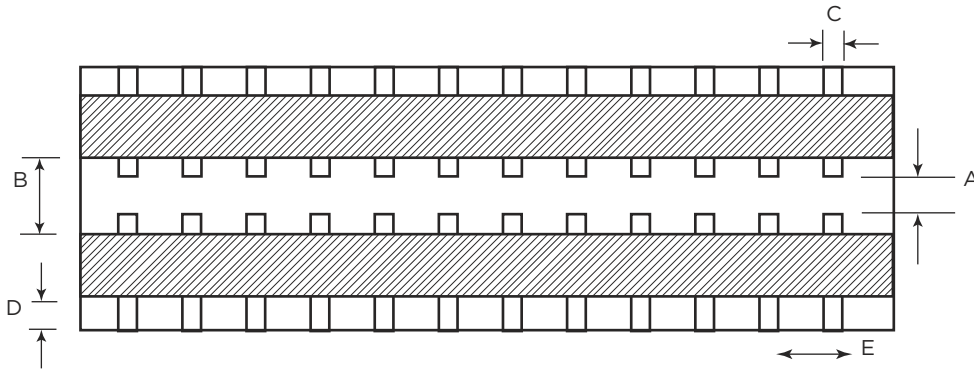
## SUBSTRATE BENDING STRENGTH



CODE	DIMENSION (mm)	A (mm)	B (mm)	C (mm)
01005 (0402)	0.40 x 0.20	0.12	0.7	0.20
0201 (0603)	0.61 x 0.31	0.2	1.0	0.4
0402 (1005)	1.0 x 0.5	0.4	1.4	0.5
0603 (1608)	1.6 x 0.8	1.0	3.0	1.0
0805 (2012)	2.0 x 1.25	1.2	4.0	1.65
1206 (3216)	3.2 x 1.6	2.2	5.0	2.0
1210 (3225)	3.2 x 2.5	2.2	5.0	3.2
1812 (4532)	4.5 x 3.2	3.5	7.0	4.0
2220 (5750)	5.7 x 5.08	4.7	8.5	5.0



**TEST SUBSTRATE**



(UNIT: mm)

CODE	DIMENSION (MM)	A	B	C	D	E
0201 (0603)	0.61 x 0.31	0.2	1.0	0.4	7.5	3.6
0402 (1005)	1.0 x 0.5	0.4	1.4	0.5	7.5	3.8
0603 (1608)	1.6 x 0.8	1.0	3.0	0.7	7.5	4.0
0805 (2012)	2.0 x 1.25	1.2	4.0	1.0	7.5	4.2
1206 (3216)	3.2 x 1.6	2.2	5.0	1.3	7.5	4.6
1210 (3225)	3.2 x 2.5	2.2	5.0	2.0	7.5	5.5
1812 (4532)	4.5 x 3.2	3.5	7.0	2.7	7.5	6.2
2220 (5750)	5.7 x 5.08	4.7	8.5	3.4	7.5	7.0

MATERIAL: GLASS EPOXY SUBSTRATE



COPPER FOIL ( t = 0.035mm)



SOLDER RESIST