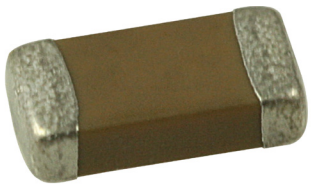
General Purpose Ceramic Capacitors (C Series)



Features:

- RoHS Compliant and Halogen Free
- 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)

Part Number Structure

C	0805	C0G	500	101	J	N	P	□□
Series	**Size**	**Temperature Characteristic (Dielectric)**	**Rated Voltage**	**Capacitance (picofarads)**	**Tolerance**	**Termination**	**Packaging**	***Optional Thickness Identifier***
	01005 0201 0402 0504 0603 0805 1206 1210 1812 2220 2221	C0G X7R X7S X6S X5R Y5V Z5U	1st two digits are significant followed by number of zeroes. 4R0 = 4.0 VDCW 6R3 = 6.3 VDCW 100 = 10 VDCW 160 = 16 VDCW 250 = 25 VDCW 500 = 50 VDCW 630 = 63 VDCW 101 = 100 VDCW	1st two digits are significant, followed by number of zeroes. **e.g:** 101 = 100pF R denotes decimal 6R8 = 6.8pF	* B = ± 0.1pF * C = ± 0.25pF * D = ± 0.5pF F = ± 1% G = ± 2% J = ± 5% K = ± 10% M = ± 20% N = ± 30% Z = +80 - 20% * For values below 10pF only.	N = 100% matte Tin (Sn) over Nickel * P = Palladium Silver * G = Gold over Nickel Pb = 90% Tin (Sn)/10% Lead (Pb) * Pd/Ag & Gold terminations have limited values & sizes available.	D = Paper Tape (10" Reel) E = Embossed Tape (7" Reel) P = Paper Tape (7" Reel) R = Paper Tape (13" Reel) U = Embossed Tape (13" Reel)	Leave blank for standard thickness. Designate "-" for Min. "*" for Max. followed by Thickness Code **e.g:**-E (min. thickness of .026") *E (max. thickness of .026")

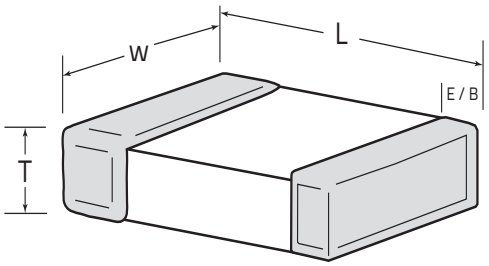
Example P/N: C0805C0G500-101JNP

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

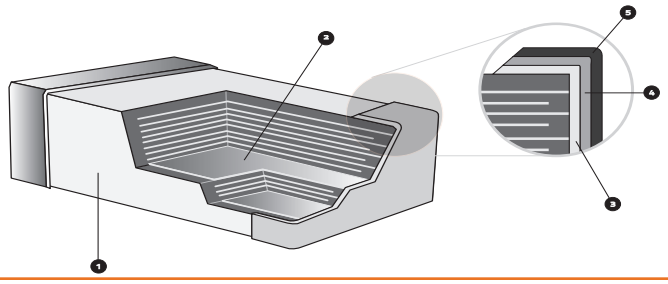
Dimensions

Unit: inches (mm)



Size	L	W	T	E/B
01005	0.016 ± 0.0008 (0.4 ± 0.02)	0.008 ± 0.0008 (0.2 ± 0.02)	See Specific Value	0.002 (min.) (0.05)
0201	0.024 ± 0.002 (0.6 ± 0.05)	0.012 ± 0.002 (0.3 ± 0.05)	See Specific Value	0.002 (min.) (0.20)
0402	0.040 ± 0.002 (1.0 ± 0.05)	0.020 ± 0.002 (0.5 ± 0.05)	See Specific Value	0.004 (min.) (0.10)
0603	0.063 ± 0.006 (1.6 ± 0.15)	0.031 ± 0.0046 (0.8 ± 0.15)	See Specific Value	0.008 (min.) (0.20)
0805	0.08 ± 0.008 (2.0 ± 0.20)	0.050 ± 0.008 (1.25 ± 0.20)	See Specific Value	0.020 ± 0.010 (0.508 ± 0.254)
1206	0.126 ± 0.008 (3.2 ± 0.20)	0.063 ± 0.008 (1.6 ± 0.20)	See Specific Value	0.020 ± 0.010 (0.508 ± 0.254)
1210	0.126 ± 0.008 (3.2 ± 0.20)	0.098 ± 0.008 (2.50 ± 0.20)	See Specific Value	0.020 ± 0.010 (0.508 ± 0.254)
1812	0.177 ± 0.012 (4.495 ± 0.30)	0.126 ± 0.012 (3.20 ± 0.30)	See Specific Value	0.024 ± 0.015 (0.6096 ± 0.381)
2220	0.225 ± 0.016 (5.715 ± 0.41)	0.200 ± 0.006 (5.08 ± 0.41)	See Specific Value	0.025 ± 0.015 (0.635 ± 0.381)

Structure



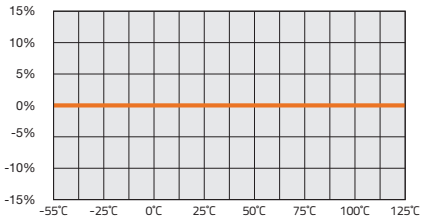
1	Ceramic Body (dielectric)	4	Nickel Plating
2	Inner Electrode	5	Tin Plating
3	Inner Termination		

General Purpose Ceramic Capacitors (C Series)

Electrical Specifications

NP0/C0G

Typical Capacitance Change vs. Temperature

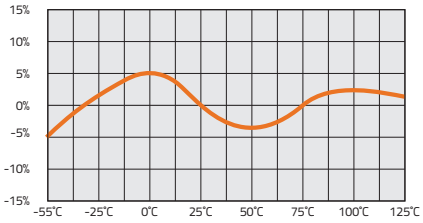


Operating Temperature Range:
-55°C to +125°C
Temperature Coefficient:
0 ±30PPM/°C
Temperature Voltage Coefficient:
0 ±30PPM/°C
Insulation Resistance:
>1000 Ω-F or 10 GΩ, for values ≤ 0.047uF (whichever is less at 25°C, WDCV).
For Capacitance values > 0.047uF, the 500 Ω-F rule applies. (The IR at 125°C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

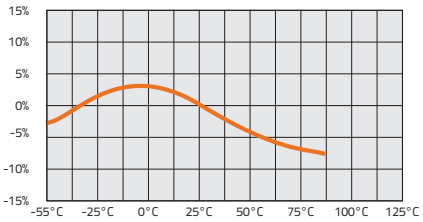


Operating Temperature Range:
-55°C to +125°C
Temperature Coefficient:
0 ±15%Δ°C MAX.
Temperature Voltage Coefficient:
X7R not applicable
Insulation Resistance:
>100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
2.5% per decade hour, typical
Withstanding 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≥0.047uF 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%		

X5R

Typical Capacitance Change vs. Temperature

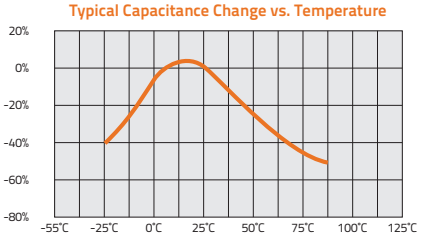


Operating Temperature Range:
-55°C to +85°C
Temperature Coefficient:
0 ±15%Δ°C MAX.
Temperature Voltage Coefficient:
X5R not applicable
Insulation Resistance:
>100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
2.5% per decade hour, typical
Withstanding Voltage:
>2.5 times VDCW
Capacitance Tolerance:
K,M

Rated Voltage	D.F.	Exception of D.F.	
≥50V	≤2.5%	≤3%	0201 (50V); 0603≥0.047uF 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%		

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≥0.1uF; 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%		

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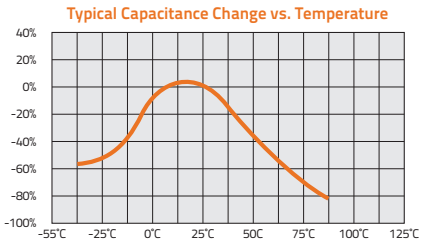
Rev. 01/2019-B

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, WDCV. (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, X6S, X7S, Z5U and Y5V: 1KHz ± 100Hz at 1.0 ± 0.2 Vrms < 10uF (10 V min.)
1KHz ± 100Hz at 1.0 ± 0.1 Vrms < 10uF (6.3V max.)
120Hz ± 24Hz at 1.0 ± 0.1 Vrms ≥ 10uF

Test parameters for Multilayer Ceramic Capacitors - NPO/C0G: 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

C0G (NP0) Dielectric

Values that are typically available.

(All measurements in inches)

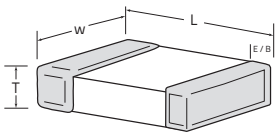
Size			01005 (± 0.0008)			0201 (± 0.002)		0402 (± 0.004)			0504 (± 0.008)		0603 (± 0.006)		0805 (± 0.008)			1206 (± 0.008)		1210 (±0.008)		1812 (±0.012)	
T (max)			0.008			0.012		0.025			0.040		0.033		0.055			0.070		0.075		0.085	
Min E/B			0.002			0.002		0.004			0.005		0.008		0.020 ± .010			0.020 ± .010		0.020 ± .010		0.024 ± .015	
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
CAPACITANCE CODE	CAPACITANCE VALUE																							
0R1	0.1pF																							
0R2	0.2pF																							
0R3	0.3pF																							
0R4	0.4pF																							
0R5	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.

General Purpose Ceramic Capacitors (C Series)

Voltage and Capacitance Range

C0G (NPO) Dielectric



Values that are typically available.

(All measurements in inches)

Size	01005 (± 0.0008)				0201 (± 0.002)		0402 (± 0.004)			0504 (± 0.008)		0603 (± 0.006)		0805 (± 0.008)			1206 (± 0.008)		1210 (±0.008)		1812 (±0.012)		2220 / 2221 (±0.016)	
L	0.016				0.024		0.040			0.053		0.063		0.080			0.126		0.126		0.177		0.225 / .225	
W	0.008				0.012		0.020			0.040		0.032		0.050			0.063		0.098		0.126		0.200 / .210	
T (max)	0.008				0.012		0.025			0.040		0.033		0.055			0.070		0.075		0.085		0.108 / .108	
Min E/B	0.002				0.002		0.004			0.005		0.008		0.020 ± .010			0.020 ± .010		0.020 ± .010		0.024 ± .015		0.025 ± .015	
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

CAPACITANCE CODE	CAPACITANCE VALUE
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

25V 50V

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.

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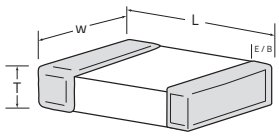
Rev. 01/2019-B

Voltage and Capacitance Range

X7R Dielectric



Values that are typically available.

(All measurements in inches)

Size			01005 (± 0.0008)		0201 (± 0.002)				**0402** (± 0.004)				0504 (± 0.008)			0603 (± 0.006)					0805 (± 0.008)		
L			0.016		0.024				0.040				0.053			0.063					0.080		
W			0.008		0.012				0.020				0.040			0.032					0.050		
T (max)			0.008		0.012				0.025				0.040			0.038					0.058		
Min E/B			0.002		0.002				0.004				0.005			0.008					0.020 ± .010		
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	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							■	■	■					■	■	■	■		■	■	■

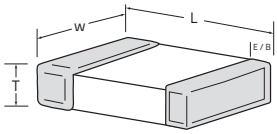
CAPACITANCE VALUE

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.

General Purpose Ceramic Capacitors (C Series)

Voltage and Capacitance Range

X7R Dielectric



Values that are typically available.

(All measurements in inches)

Size			0201 (± 0.002)			0402 (± 0.004)					0603 (± 0.006)						0805 (± 0.008)					
L			0.024			0.040					0.063						0.080					
W			0.012			0.020					0.032						0.050					
T (max)*			0.012			0.025					0.038						0.058					
Min E/B			0.002			0.004					0.008						0.020 ± .010					
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
CAPACITANCE CODE	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																■	■			
	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																				
	226	22.0uF																				
	476	47.0uF																				
	107	100.0uF																				

CAPACITANCE CODE / CAPACITANCE VALUE

* 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.

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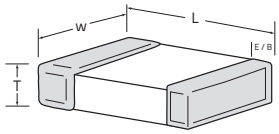
Voltage and Capacitance Range

X7R Dielectric



Values that are typically available.

(All measurements in inches)

Size			1206 (± 0.008)					1210 (±0.008)					1812 (±0.012)						2220 / 2221 °(±0.016)			
L			0.126					0.126					0.177						0.225 / .225			
W			0.063					0.098					0.126						0.200 / .210			
T (max)*			0.070					0.125					0.085						0.108 /.108			
Min E/B			0.020 ± .010					0.020 ± .010					.024 ± .015						00.025 ± .015			
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		CAPACITANCE VALUE																				
	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		■	■	■		■	■	■	■	■			■	■	■	■		■	■	■

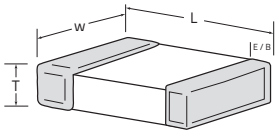
* For values above 1uF, thickness may be greater than specified above.
T(max): 1206 – 0.075" 1812 – 0.130"
1210 – 0.125" 2220 – 0.135"

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.

General Purpose Ceramic Capacitors (C Series)

Voltage and Capacitance Range

X7R Dielectric



Values that are typically available.

(All measurements in inches)

Size			1206 (± 0.008)						1210 (±0.008)						1812 (±0.012)						2220 / 2221 (±0.016)			
L			0.126						0.126						0.177						0.225 / .225			
W			0.063						0.098						0.126						0.200 / .210			
T (max)*			0.070						0.125						0.095						0.108 /.108			
Min E/B			0.020 ± .010						0.020 ± .010						0.024 ± .015						0.025 ± .015			
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	X7S	X7S
	226	22.0uF																						
	476	47.0uF																						
	107	100.0uF																						

CAPACITANCE VALUE

* 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.
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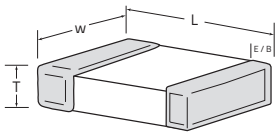
Voltage and Capacitance Range

X5R Dielectric



Values that are typically available.

(All measurements in inches)

Size	01005 (± 0.0008)	0201 (± 0.002)	0402 (± 0.004)	0603 (± 0.006)	0805 (± 0.008)	1206 (± 0.008)	1210 (±0.016)	1812 (±0.016)
L	0.016	0.024	0.040	0.063	0.080	0.126	0.126	0.177
W	0.008	0.012	0.020	0.032	0.050	0.063	0.098	0.126
T (max)	0.008	0.012	0.025	0.040	0.060	0.072	0.125	0.130
Min. E/B	0.002	0.002	0.004	0.008	0.020 ± .010	0.020 ± .010	0.020 ± .010	0.024 ± .015

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
CAPACITANCE CODE	CAPACITANCE VALUE																																
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								■	■					■	■						■	■							■	■	■	■

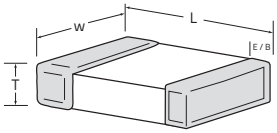
For values above 1uF, thickness may be greater than specified above.
T(max): 1206 – 0.075" 1812 – 0.130"
1210 – 0.125" 2220 – 0.135"

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.

General Purpose Ceramic Capacitors (C Series)

Voltage and Capacitance Range

X5R Dielectric (0402 - 1206)



Values that are typically available.

(All measurements in inches)

Size			0201 (± 0.002)			0402 (± 0.008)				0603 (± 0.006)					0805 (± 0.008)						1206 (± 0.008)				
L			0.024			0.040				0.063					0.080						0.126				
W			0.012			0.020				0.032					0.050						0.063				
T (max)			0.0216			0.0335				0.040					0.060						0.072				
Min E/B			0.002			0.004				0.008					0.020 ± .010						0.020 ± .010				
VDCW (MAX)			4V	6.3V	10V	4V	6.3V	10V	16V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE	CAPACITANCE VALUE																								
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 (±0.016)					1812 (±0.016)				2220 / 2221 (±0.016)			
L			0.126					0.177				0.225 / .225			
W			0.098					0.126				0.200 / .210			
T (max)			0.125					0.130				0.135			
Min E/B			0.020 ± .010					0.024 ± .015				0.025 ± .015			
VDCW (MAX)			6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	25V	50V
CAPACITANCE CODE	CAPACITANCE VALUE														
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.

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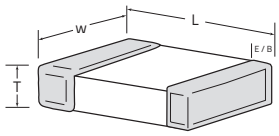
Rev. 01/2019-B

Voltage and Capacitance Range

Z5U Dielectric



Values that are typically available.

(All measurements in inches)

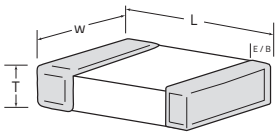
Size	0504 (± 0.008)		0603 (± 0.006)		0805 (± 0.008)		1206 (± 0.008)		1210 (±0.016)		1812 (±0.016)		2220 / 2221 (±0.016)	
L	0.050		0.063		0.080		0.126		0.126		0.177		0.225 / .225	
W	0.040		0.032		0.050		0.063		0.098		0.126		0.200 / .210	
T (max)	0.040		0.038		0.058		0.070		0.075		0.085		0.108 /.108	
Min E/B	0.005		0.008		0.020 ± .010		0.020 ± .010		0.020 ± .010		0.024 ± .015		0.025 ± .015	
VDCW (MAX)	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V	25V	50V
CAPACITANCE CODE / CAPACITANCE VALUE														
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.

General Purpose Ceramic Capacitors (C Series)

Voltage and Capacitance Range

Z5U Dielectric



Values that are typically available.

(All measurements in inches)

Size			0504 (± 0.008)		0603 (± 0.006)		0805 (± 0.008)		1206 (± 0.008)		1210 (±0.016)		1812 (±0.016)		2220 / 2221 (±0.016)	
L			0.050		0.063		0.080		0.126		0.126		0.177		0.225 / .225	
W			0.040		0.032		0.050		0.063		0.098		0.126		0.200 / .210	
T (max)			0.040		0.038		0.058		0.070		0.075		0.085		0.108 /.108	
Min E/B			0.005		0.008		0.020 ± .010		0.020 ± .010		0.020 ± .010		0.024 ± .015		0.025 ± .015	
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														

CAPACITANCE VALUE

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.

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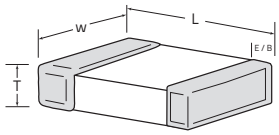
Rev. 01/2019-B

Voltage and Capacitance Range

Y5V Dielectric



Values that are typically available.

(All measurements in inches)

Size			0201 (± 0.002)	0402 (± 0.004)					0603 (± 0.006)						0805 (± 0.008)					1206 (± 0.008)				1210 (±0.016)				1812 (±0.016)		
L			0.024	0.040					0.063						0.080					0.126				0.126				0.177		
W			0.012	0.020					0.032						0.050					0.063				0.098				0.126		
T (max)			0.012	0.025					0.038						0.058					0.070				0.096				0.085		
Min E/B			0.002	0.004					0.008						0.020 ± .010					0.020 ± .010				0.020 ± .010				0.024 ± .015		
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					■	■																						
	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		■	■						■	■				■	■	■			■	■			■	■				

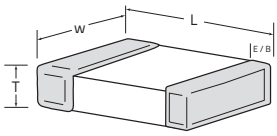
CAPACITANCE VALUE

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.

General Purpose Ceramic Capacitors (C Series)

Voltage and Capacitance Range

Y5V Dielectric



Values that are typically available.

(All measurements in inches)

Size	0201 (± 0.002)	0402 (± 0.004)			0603 (± 0.006)					0805 (± 0.008)					1206 (± 0.008)				1210 (±0.016)					1812 (±0.016)		
L	0.024	0.040			0.063					0.080					0.126				0.126					0.177		
W	0.012	0.020			0.032					0.050					0.063				0.098					0.126		
T (max)	0.012	0.025			0.038					0.058					0.070				0.10					0.085		
Min E/B	0.002	0.004			0.008					0.020 ± .010					0.020 ± .010				0.020 ± .010					0.024 ± .015		
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	CAPACITANCE VALUE																									
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.

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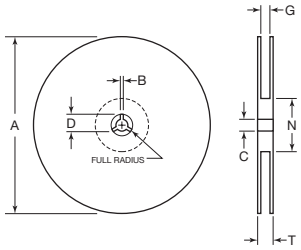
Tape and Reel Specifications

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

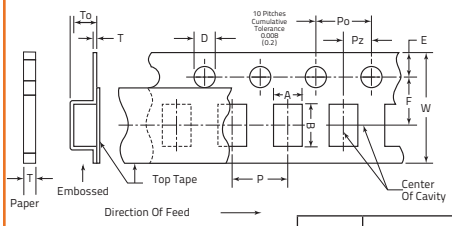


Reel Dimensions

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)

Taping Specifications



7 in. 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	0.25 ± 0.05 (0.010 ± .002)	0.45 ± 0.05 (0.018 ± .002)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 - 0.0 (.039 ± .002) - .000	1.5 + 0.1 (.064 +.004)	1.15 MAX (.045 MAX)	2.0 ± 0.05 (.079 ± .002)
0201	0.37 ± 0.05 (0.014 ± .002)	0.67 ± 0.05 (0.026 ± .002)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 - 0.0 (.039 ± .002) - .000	1.5 + 0.1 (.064 +.004)	1.15 MAX (.045 MAX)	2.0 ± 0.05 (.079 ± .002)
0402	0.65 ± 0.1 (.026 ± .004)	1.10 ± 0.2 (.043 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 - 0.0 (.039 ± .002) - .000	1.5 + 0.1 (.064 +.004)	1.15 MAX (.045 MAX)	2.0 ± 0.05 (.079 ± .002)
0603	1.10 ± 0.2 (.043 ± .008)	1.90 ± 0.2 (.075 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 - 0.0 (.039 ± .002) - .000	1.5 + 0.1 (.064 +.004)	1.15 MAX (.045 MAX)	4.0 ± 0.1 (.157 ± .004)
0805	1.16 ± 0.2 (.046 ± .008)	2.4 ± 0.2 (.095 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 - 0.0 (.039 ± .002) - .000	1.5 + 0.1 (.064 +.004)	1.15 MAX (.045 MAX)	4.0 ± 0.1 (.157 ± .004)
1206	2.0 ± 0.2 (.079 ± .008)	3.6 ± 0.2 (.142 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± 0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 - 0.0 (.039 ± .002) - .000	1.5 + 0.1 (.064 +.004)	1.15 MAX (.045 MAX)	4.0 ± 0.1 (.157 ± .004)

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

Size (inches)	A	B	W	F	E	Po	Pz	D	To	T	P
01005	0.23 (0.009)	0.43 (0.016)	4.0 ± 0.05 (0.157 ± 0.002)	1.8 ± 0.02 (0.070 ± 0.001)	0.9 ± 0.05 (0.035 ± 0.002)	2.0 ± 0.04 (0.079 ± 0.001)	2.00 (0.079)	0.8 ± 0.04 (0.031 ± 0.001)	0.5 max (0.019 max)	0.15 ~0.4 (0.005 ~0.015)	1.00 (0.039)
0805	1.48 ± 0.2 (.058 ± .008)	2.3 ± 0.2 (.091 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 +.004) - .000	2.5 MAX (.098 MAX)	0.6 MAX (.024 MAX)	4.0 ± 0.1 (.157 ± .004)
1206	2.0 ± 0.2 (.079 ± .008)	3.6 ± 0.2 (.142 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 +.004) - .000	2.5 MAX (.098 MAX)	0.6 MAX (.024 MAX)	4.0 ± 0.1 (.157 ± .004)
1210	2.9 ± 0.2 (.114 ± .008)	3.6 ± 0.2 (.142 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .0.1 (.138 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 +.004) - .000	2.5 MAX (.098 MAX)	0.6 MAX (.024 MAX)	4.0 ± 0.1 (.157 ± .004)
1812	3.6 ± 0.2 (.142 ± .008)	4.9 ± 0.2 (.193 ± .008)	12.0 ± 0.3 (.472 ± .012)	5.6 ± .0.1 (.221 ± .004)	1.75 ± 0.1 (.069 ± .004)	4.0 ± 0.1 (.157 ± .004)	2.0 ± 0.05 (.079 ± .002)	1.5 + 0.1 - 0.0 (.06 +.004) - .000	3.8 MAX (.150 MAX)	0.6 MAX (.024 MAX)	8.0 ± 0.1 (.315 ± .004)

Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th>PERFORMANCE</th><th colspan="3">TEST CONDITION</th></tr>
<tr><td>1</td><td colspan="2">APPEARANCE</td><td>NO ABNORMAL EXTERIOR APPEARANCE</td><td colspan="3">THROUGH MICROSCOPE (X10)</td></tr>
<tr><td>2</td><td colspan="2">INSULATION RESISTANCE</td><td>10,000M OR 500M μF PRODUCT WHICHEVER IS SMALLER (RATED VOLTAGE IS BELOW 16V: 10,000M OR 100M μF)</td><td colspan="3">RATED VOLTAGE SHALL BE APPLIED. MEASUREMENT TIME IS 60 - 120 RATED VOLTAGE TIME 60 SEC .</td></tr>
<tr><td>3</td><td colspan="2">WITHSTANDING VOLTAGE</td><td>NO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN</td><td colspan="3">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 50 mA CURRENT</td></tr>
<tr><td rowspan="6">4</td><td rowspan="6">CAPACITANCE</td><td rowspan="3">CLASS I</td><td rowspan="3">WITHIN THE SPECIFIED TOLERANCE</td><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td>1,000pF AND BELOW</td><td>1MHz ±10%</td><td rowspan="2">0.5 ~ 5 Vrms</td></tr>
<tr><td>MORE THAN 1,000 pF</td><td>1kHz ± 10%</td></tr>
<tr><td rowspan="3">CLASS II</td><td rowspan="3">WITHIN THE SPECIFIED TOLERANCE</td><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td>10μF AND BELOW</td><td>1kHz ± 10%</td><td>1.0 ± 0.2Vrms</td></tr>
<tr><td>MORE THAN 10μF</td><td>120Hz ± 20%</td><td>0.5 ± 0.1Vrms</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Q</td><td rowspan="3">CLASS I</td><td rowspan="3">OVER 30pF : Q 1,000
LESS THAN 30pF: Q 400
+20C
(C: CAPACITANCE)</td><td>CAPACITANCE</td><td>FREQUENCY</td><td>VOLTAGE</td></tr>
<tr><td>1,000pF AND BELOW</td><td>1MHz ±10%</td><td rowspan="2">0.5 ~ 5 Vrms</td></tr>
<tr><td>MORE THAN 1,000 pF</td><td>1kHz ± 10%</td></tr>
<tr><td>6</td><td>DISSIPATION FACTOR (TanΘ CLASS II)</td><td>CLASS II</td><td colspan="4">
X7R, X6S, X5R
<table>
<tr><th>Rated Voltage</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≥0.047uF
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>
</table>
Y5V, Z5U
<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>≤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 colspan="2"></td></tr>
</table>
</td></tr>
</table>

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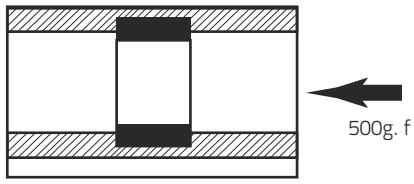
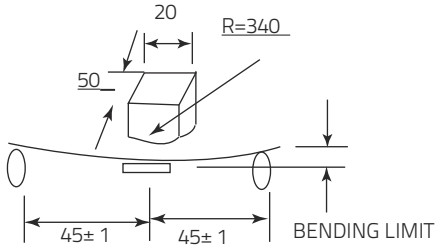
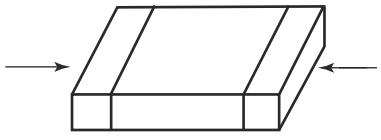
Rev. 01/2019-B

Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="3">PERFORMANCE</th><th colspan="2">TEST CONDITION</th></tr>
<tr><td rowspan="8">7</td><td rowspan="8">CAPACITANCE TEMPERATURE COEFFICIENT</td><td rowspan="8">CLASS I</td><td>CHARACTERISTIC</td><td colspan="2">TEMP. COEFFICIENT (PPM/°C)</td><td colspan="2">THESE SYMMETRICAL TOLERANCE APPLY TO 2 POINT MEASUREMENT OF TEMPERATURE COEFFICIENT: ONE AT -25°C AND AT 85°C</td></tr>
<tr><td rowspan="7">COG/NPO</td><td colspan="2">0 ± 60 (±30)</td><td>STEP</td><td>TEMPERATURE (°C)</td></tr>
<tr><td colspan="2">–150 ± 60</td><td>1</td><td>25 ± 2</td></tr>
<tr><td colspan="2">-220 ± 60</td><td>2</td><td>MIN RATED TEMP ± 2</td></tr>
<tr><td colspan="2">–330 ± 60</td><td>3</td><td>25 ± 2</td></tr>
<tr><td colspan="2">–470 ± 60</td><td>4</td><td>MAX RATED TEMP ± 2</td></tr>
<tr><td colspan="2">–750 ± 120</td><td>5</td><td>25 ± 2</td></tr>
<tr><td colspan="2">+350 ~ –1000</td><td colspan="2"></td></tr>
<tr><td>8</td><td colspan="2">TEMPERATURE CHARACTERISTICS</td><td>CLASS II</td><td colspan="2">CAPACITANCE CHANGE
CHAR. | CAP. CHANGE (%)
X | X7R | ±15%
X | X6S | ±22%
X | X5R | ±15%
Y | Y5V | -82% ~ +22%
Y | Z5U | -56% ~ +22%</td><td colspan="2">STEP | TEMP. (°C) B | TEMP. (°C) F
1 | 25 ± 2 | 25 ± 2
2 | -55 ± 2 | -25 ± 2
3 | 25 ± 2 | 25 ± 2
4 | 125 ± 2 | 85 ± 2
5 | 25 ± 2 | 25 ± 2
C2 - C1 / C1 X 100%
C1: CAPACITANCE AT STANDARD TEMPERATURE (25°C)
C2: CAPACITANCE AT EACH TEMPERATURE</td></tr>
<tr><td>9</td><td colspan="2">ADHESIVE STRENGTH OF TERMINATION</td><td colspan="3">NO INDICATION OF PEELING SHALL OCCUR ON THE TERMINAL ELECTRODE</td><td colspan="2">A 500g.f PRESSURE SHALL BE APPLIED FOR 10±1 SECOND
 
500g. f</td></tr>
<tr><td rowspan="5">10</td><td rowspan="5">BENDING STRENGTH</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCURE</td><td colspan="2" rowspan="5">BENDING SHALL BE APPLIED TO THE LIMIT (1mm) WITH 0.3mm/SEC
 
20 R=340 50 45± 1 45± 1 BENDING LIMIT</td></tr>
<tr><td rowspan="4">CAPACITANCE</td><td>CHARACTER</td><td colspan="2">CHANGE OF CAPACITANCE</td></tr>
<tr><td colspan="2">CLASS I</td><td>WITHIN ±5% OR ±0.5pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X (X7R, X6S, X5R)</td><td>WITHIN ±12.5%</td></tr>
<tr><td>Y (Y5V,Z5U)</td><td>WITHIN ±30%</td></tr>
<tr><td>11</td><td colspan="2">SOLDERABILITY</td><td colspan="3">MORE THAN 95% OF THE TERMINAL SURFACE IS TO BE SOLDERED NEWLY, SO METAL PART (A) DOES NOT COME OUT OR DISSOLVE
  </td><td colspan="2">SOLDER TEMPERATURE : 230 ± 5 °C
SOLDER: H63A
FLUX: ROSIN
PRE-HEATING: AT 80 ~ 120 °C FOR 10 ~ 30 SEC.</td></tr>
</table>

Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="3">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="9">12</td><td rowspan="9">RESISTANCE TO SOLDERING HEAT</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="9">DIP : SOLDER TEMPERATURE OF 270± 5 ˚C
DIP TIME :10±1 SEC.
EACH TERMINATION SHALL BE FULLY IMMERSED AND PREHEATED AS FOLLOWING:

STEP | TEMP. (˚C) | TIME (SEC.)
1 | 80~100 | 60
2 | 150~180 | 60

MEASURE AT ROOM TEMP. AFTER COOLING FOR
CLASS I : 24 ± 2 HOURS
CLASS II : 48 ± 4 HOURS</td></tr>
<tr><td rowspan="4">CAPACITANCE</td><td>CHARACTERISTIC</td><td colspan="2">CAP. CHANGE</td></tr>
<tr><td>CLASSS I</td><td colspan="2">WITHIN ±2.5% OR ±0.25 pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td>WITHIN ±7.5%</td></tr>
<tr><td>Y</td><td>WITHIN ±20%</td></tr>
<tr><td>QCLASS I</td><td colspan="3">30 pF AND OVER: Q 1000
LESS THAN 30 pF: Q 400 + 20xC</td></tr>
<tr><td>Tan
CLASS II</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VLUE</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VLUE</td></tr>
<tr><td>WITHSTANDING VOLTAGE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VLUE</td></tr>
<tr><td rowspan="9">13</td><td rowspan="9">VIBRATION TEST</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="9">THE CAPACITOR SHALL BE SUBJECTED TO A HARMONIC MOTION HAVING A TOTAL AMPLITUDE of 1.5mm.

THE ENTIRE FREQUENCY RANGE, FROM 10 TO 55Hz AND RETURN TO 10Hz SHALL BE TRAVERSED IN 1 MINUTE.

THIS CYCLE SHALL BE PERFORMED 2 HOURS IN EACH THREE MUTUALLY PERPENDICULAR DIRECTION, FOR TOTAL PERIOD of 6 HOURS.</td></tr>
<tr><td rowspan="4">CAPACITANCE</td><td>CHARACTERISTIC</td><td colspan="2">CAP. CHANGE</td></tr>
<tr><td>CLASSS I</td><td colspan="2">WITHIN ±2.5% OR ±0.25 pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td>WITHIN ±5%</td></tr>
<tr><td>Y</td><td>WITHIN ±20%</td></tr>
<tr><td>QCLASS I</td><td colspan="3">30 pF AND OVER: Q 1000
LESS THAN 30 pF: Q 400 + 20xC</td></tr>
<tr><td>Tan
CLASS II</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
</table>

Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="6">14</td><td rowspan="6">HUMIDITY (STEADY STATE)</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="6">TEMPERATURE : 40±2 ℃
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)</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td>CAPACITANCE CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td>WITHIN ±5% OR±0.5pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td>WITHIN ±12.5%</td></tr>
<tr><td>Y</td><td>WITHIN ±30%</td></tr>
<tr><td>QCLASS I</td><td colspan="3">30pF AND OVER : Q 350
10 ~ 30pF : Q 275 + 2.5xC
LESS THAN 10pF : Q 200 + 10xC</td></tr>
<tr><td>DISSIPATION FACTOR (Tan Θ CLASS II)</td><td colspan="3">
X7R, X6S, X5R
<table>
<tr><th>Rated Voltage</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≥0.047uF
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>
</table>
Y5V, Z5U
<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>≤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 colspan="2"></td></tr>
</table>
</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">MINIMUM INSULATION RESISTANCE:
1,000 M OR 50M .μF PRODUCT
WHICHEVER IS SMALLER</td></tr>
</table>

Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="3">ITEM</th><th colspan="3">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="6">15</td><td rowspan="6">MOISTURE RESISTANCE</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="6">APPLIED VOLTAGE:
RATED VOLTAGE
TEMPERATURE : 40±2 ℃
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)</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td>CAPACITANCE CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td>WITHIN ±7.5% OR±0.75pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td>WITHIN ±12.5%</td></tr>
<tr><td>Y</td><td>WITHIN ±30%</td></tr>
<tr><td>QCLASS I</td><td colspan="3">30pF AND OVER : Q 200
30pF AND BELOW : Q 100 + 10/3xC</td></tr>
<tr><td>DISSIPATION FACTOR (Tan Θ CLASS II)</td><td colspan="3">
X7R, X6S, X5R
<table>
<tr><th>Rated Voltage</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≥0.047uF
0805≥0.22uF; 1206≥0.47uF</td></tr>
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<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>
</table>
Y5V, Z5U
<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>≤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;
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<tr><td>6.3V</td><td>≤16%</td><td colspan="2"></td></tr>
</table>
</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">MINIMUM INSULATION RESISTANCE:
100 M OR 25M .μF PRODUCT,
WHICHEVER IS SMALLER</td></tr>
</table>

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Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="3">ITEM</th><th colspan="4">PERFORMANCE</th><th colspan="3">TEST CONDITION</th></tr>
<tr><td rowspan="8">16</td><td rowspan="8">HIGH TEMPERATURE RESISTANCE</td><td>APPEARANCE</td><td colspan="4">NO MECHANICAL DAMAGE SHALL OCCUR</td><td colspan="3" rowspan="3">APPLIED VOLTAGE:
150% OF RATED VOLTAGE
TEST TIME : 1000 +48/-0 Hr.
CURRENT APPLIED: 50mA MAX.</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td colspan="2">CAP. CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td colspan="2">WITHIN ±3% OR
±0.3pF, WHICHEVER IS
LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td colspan="2">WITHIN ±12.5%</td><td>CHAR.</td><td colspan="2">TEMP.</td></tr>
<tr><td>Y</td><td colspan="2">WITHIN ±30%</td><td>CLASS I</td><td colspan="2">125 ±3 ˚C</td></tr>
<tr><td>QCLASS I</td><td colspan="4">30pF AND OVER : Q 350
10 - 30 pF : Q 275 + 2.5xC
LESS THAN 10pF :Q 200 + I0xC</td><td rowspan="2">CLASS II</td><td>X</td><td>125 ±3 ˚C</td></tr>
<tr><td rowspan="2">DISSIPATION FACTOR (Tan Θ CLASS II)</td><td colspan="4" rowspan="2">X7R, X6S, X5R
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%

Y5V, Z5U
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%</td><td colspan="3" rowspan="2">(INITIAL VALUE MEASUREMENT)
FOR CLASS II CAPACITORS, 150 %
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)</td></tr>
<tr><td>Y</td><td>85 ±3 ˚C</td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="4">MINIMUM INSULATION RESISTANCE:
1,000M OR 50M.µF PRODUCT
WHICHEVER IS SMALLER</td><td colspan="3"></td></tr>
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Environmental Test Criteria

<table>
<tr><th>NO</th><th colspan="4">ITEM</th><th colspan="3">PERFORMANCE</th><th colspan="3">TEST CONDITION</th></tr>
<tr><td rowspan="11">17</td><td rowspan="11">TEMPERATURE CYCLE</td><td>APPEARANCE</td><td colspan="3">NO MECHANICAL DAMAGE SHALL OCCUR</td><td colspan="3" rowspan="3">CAPACITORS SHALL BE SUBJECTED TO FIVE CYCLES OF THE TEMPERATURE CYCLE AS FOLLOWING</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td>CAP. CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td>WITHIN ±2.5%
OR ±0.25pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td>WITHIN ±7.5%</td><td>STEP</td><td>TEMP.(℃)</td><td>TIME (MIN)</td></tr>
<tr><td>Y</td><td>WITHIN ±20%</td><td rowspan="2">1</td><td rowspan="2">MIN.
RATED TEMP.
+0/–3</td><td rowspan="2">30</td></tr>
<tr><td>QCLASS I</td><td colspan="3">30 pF AND OVER : Q 1000
LESS THAN 30pF:Q 400 +20xC</td></tr>
<tr><td>2</td><td>25</td><td>2 ~ 3</td></tr>
<tr><td rowspan="3">TAN
CLASS II</td><td colspan="3" rowspan="3">X7R, X6S, X5R
<table><tr><th>Rated Voltage</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≥0.047uF
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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;
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1812≥47uF</td></tr><tr><td>6.3V</td><td>≤16%</td><td colspan="2"></td></tr></table></td><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>
<tr><td>INSULATION RESISTANCE</td><td colspan="3">TO SATISFY THE SPECIFIED INITIAL VALUE</td><td colspan="3">MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR
CLASS I : 24±2 Hr.
CLASS II : 48±4 Hr.
SEE(FIG.3)</td></tr>
</table>

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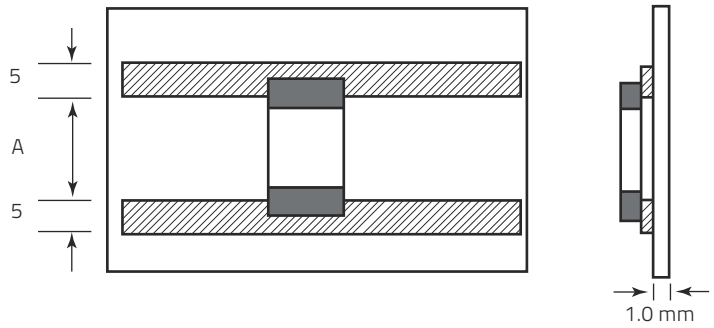
Adhesive Strength of Termination

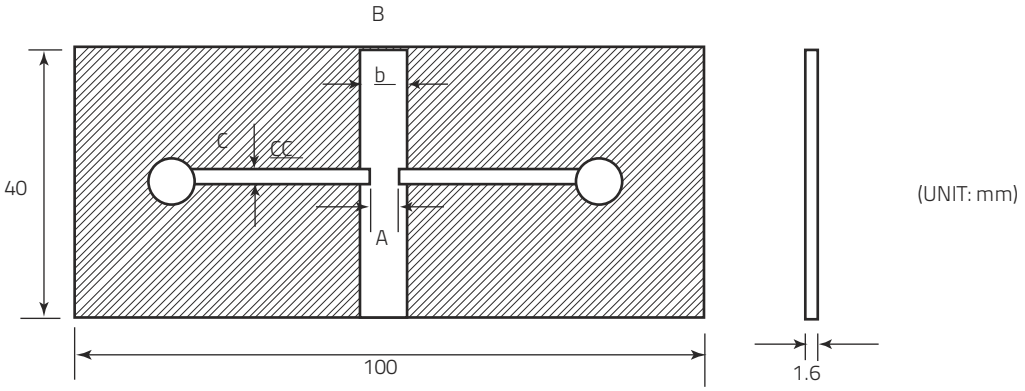


CODE	DIMENSION (mm)	A (mm)	CODE	DIMENSION (mm)	A (mm)
01005 (0402)	0.40 x 0.20	0.12	1206 (3216)	3.2 x 1.6	2.2
0201 (0603)	0.61 x 0.31	0.2	1210 (3225)	3.2 x 2.5	2.2
0402 (1005)	1.0 x 0.5	0.4	1812 (4532)	4.5 x 3.2	3.5
0603 (1608)	1.6 x 0.8	1.0	2220 (5750)	5.7 x 5.08	4.7
0805 (2012)	2.0 x 1.25	1.2			

MATERIAL: ALUMINA SUBSTRATE (Al2O3 95% min) OR GLASS EPOXY SUBSTRATE

COPPER FOIL (t = 0.035mm)

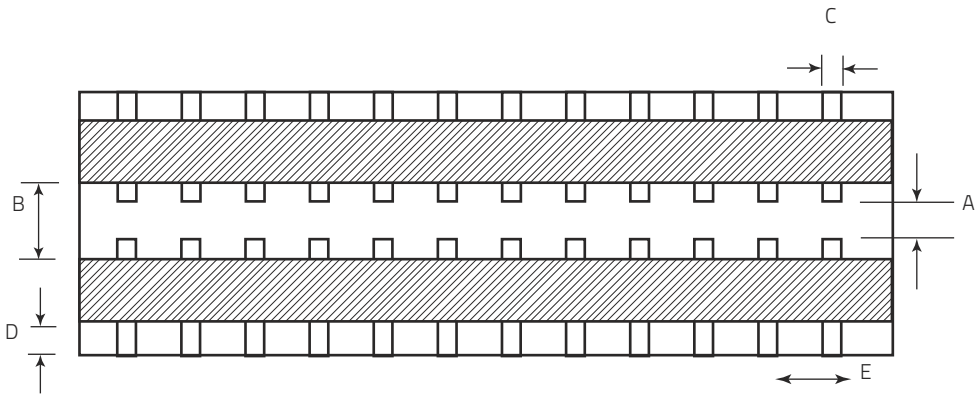
Substrate Bending Strength



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

MATERIAL: GLASS EPOXY SUBSTRATE COPPER FOIL (t = 0.035mm) SOLDER RESIST

Test Substrate



(UNIT: mm)

CODE	DIEMNSION (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

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