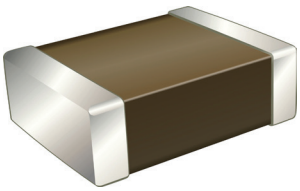


FEATURES:

- 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

RoHS Compliant | REACH Compliant | HF Halogen FREE | Conflict Minerals FREE 3TG

PART NUMBER STRUCTURE

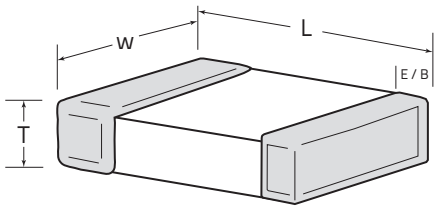
C	0805	C0G	500	-	101	J	N	P	☐☐
Series	**Size** 01005 0201 0402 0504 0603 0805 1206 1210 1812 2220 22212	**Temperature Characteristic (Dielectric)** C0G X7R X6S X5R Y5V Z5U	**Rated Voltage** 1st two digits are significant followed by number of zeroes. 4R0 = 4.0 VDCW 6R3 = 6.3 VDCW 100 = 10 VDCW 160 = 16 VDCW 250 = 25 VDCW 500 = 50 VDCW 630 = 63 VDCW 101 = 100 VDCW		**Capacitance** (picofarads) 1st two digits are significant, followed by number of zeroes. e.g: 101 = 100pF R denotes decimal 6R8 = 6.8pF	**Tolerance** * 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.	**Termination** 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.	**Packaging** 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)	**Optional Thickness Identifier** 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

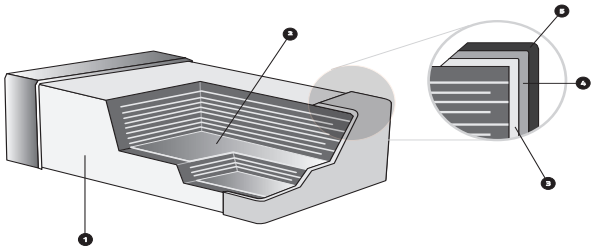
DIMENSIONS



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

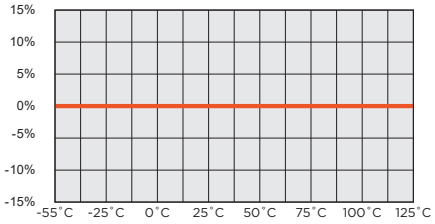


1	Ceramic Body (dielectric)	4	Nickel Plating
2	Inner Electrode	5	Tin Plating
3	Inner Termination		

ELECTRICAL SPECIFICATIONS

NP0/C0G

Typical Capacitance Change vs. Temperature

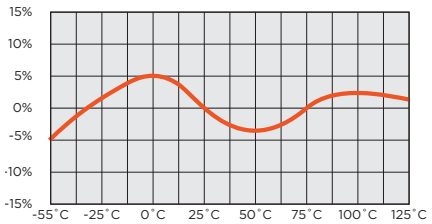


Operating Temperature Range:
-55°C to +125°C
Temperature Coefficient:
0 ±30PPM/°C
Temperature Voltage Coefficient:
0 ±30PPM/°C
Insulation Resistance:
>1000 Ω-F or 10 GΩ, for values ≤ 0.047uF (whichever is less at 25°C, WDCV).
For Capacitance values > 0.047uF, the 500 Ω-F rule applies. (The IR at 125°C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

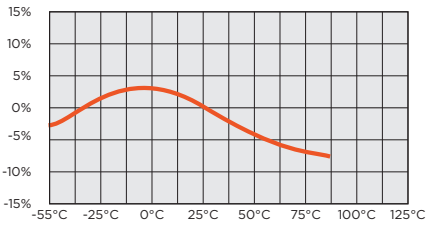


Operating Temperature Range:
-55°C to +125°C
Temperature Coefficient:
0 ±15%Δ°C MAX.
Temperature Voltage Coefficient:
X7R not applicable
Insulation Resistance:
>100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
2.5% per decade hour, typical
Withstanding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

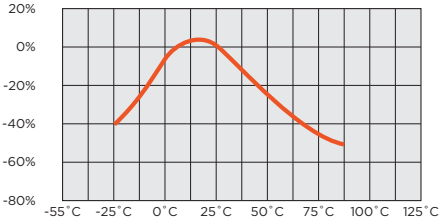


Operating Temperature Range:
-55°C to +85°C
Temperature Coefficient:
0 ±15%Δ°C MAX.
Temperature Voltage Coefficient:
X7R not applicable
Insulation Resistance:
>100 Ω-F or 10 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
2.5% per decade hour, typical
Withstanding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

RATED VOLTAGE	D.F.	EXCEPTION OF D.F.	
≥50V	≤2.5%	≤3%	0201 (50V); 0603≥0.047uF 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



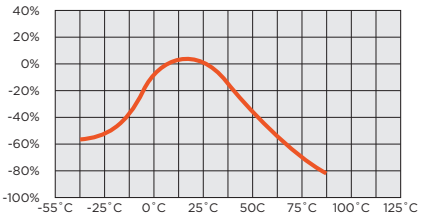
Operating Temperature Range:
+10°C to +85°C
Temperature Coefficient:
+22% - 56%Δ°C MAX.
Insulation Resistance:
>100 Ω-F or 10 GΩ, whichever is less at 25°C, WDCV. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
5% per decade hour, typical
Withstanding Voltage:
>2.5 times VDCW
Capacitance Tolerance: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

ELECTRICAL SPECIFICATIONS

Y5V

Typical Capacitance Change vs. Temperature



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%		

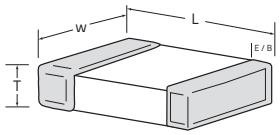
TEST PARAMETERS

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 - 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.

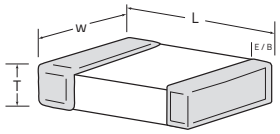
(All measurements in inches)

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	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.

VOLTAGE AND CAPACITANCE RANGE

C0G (NP0) DIELECTRIC



Values that are typically available.

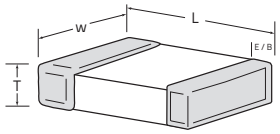
(All measurements in inches)

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)		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																	25V / 50V							
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 (± 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																					

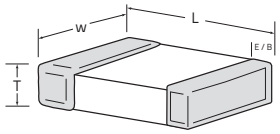
CAPACITANCE VALUE

* 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 (± 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	**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																			35V	
	685	6.80																				
	106	**10.0uF**																				
	156	15.0uF																				
	226	22.0uF																				
	476	47.0uF																				
	107	100.0uF																				

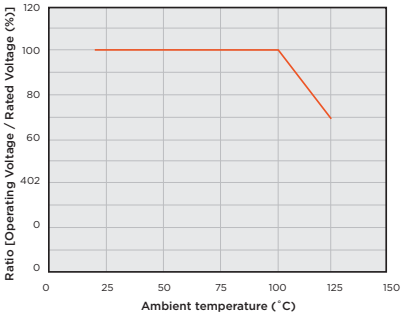
CAPACITANCE VALUE

* 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.

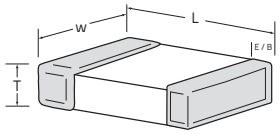
** RE: 0201, X7R, 0.1uF; When the operating temperature range is between 100˚C and 125˚C, it is recommended to apply the following voltage derating as shown in the diagram below.

DERATING CURVE FOR 0201, 0.1UF, X7R ONLY



VOLTAGE AND CAPACITANCE RANGE

X7R DIELECTRIC



Values that are typically available.

(All measurements in inches)

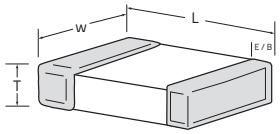
SIZE			1206 (± 0.008)					1210 (±0.008)					1812 (±0.012)						2220 / 2221 (±0.016)			
L			0.126					0.126					0.177						0.225 / .225			
W			0.063					0.098					0.126						0.200 / .210			
T (max)*			0.070					0.125					0.085						0.108 /.108			
Min E/B			0.020 ± .010					0.020 ± .010					.024 ± .015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

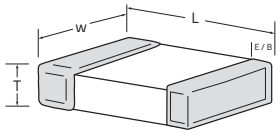
SIZE			1206 (± 0.008)						1210 (±0.008)						1812 (±0.012)						2220 / 2221 (±0.016)			
L			0.126						0.126						0.177						0.225 / .225			
W			0.063						0.098						0.126						0.200 / .210			
T (max)*			0.070						0.125						0.095						0.108 /.108			
Min E/B			0.020 ± .010						0.020 ± .010						0.024 ± .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																						

* 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)

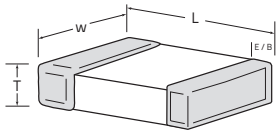
SIZE			01005 (±0.0008)		0201 (±0.002)					0402 (±0.004)						0603 (±0.006)						0805 (±0.008)					1206 (±0.008)				1210 (±0.016)		1812 (±0.016)	
L			0.016		0.024					0.040						0.063						0.080					0.126				0.126		0.177	
W			0.008		0.012					0.020						0.032						0.050					0.063				0.098		0.126	
T (max)			0.008		0.0216					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.

VOLTAGE AND CAPACITANCE RANGE

X5R DIELECTRIC (0402-1206)



Values that are typically available.

(All measurements in inches)

SIZE			0201 (± 0.002)			0402 (± 0.009)				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)

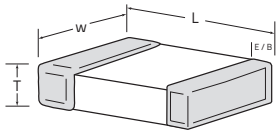
SIZE		1210 (±0.016)					1812 (±0.016)				2220 / 2221 (±0.016)			
L		0.126					0.177				0.225 / .225			
W		0.098					0.126				0.200 / .210			
T (max)		0.125					0.130				0.135			
Min E/B		0.020 ± .010					0.024 ± .015				0.025 ± .015			
VDCW (MAX)		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	25V	50V
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.

VOLTAGE AND CAPACITANCE RANGE

Z5U DIELECTRIC



Values that are typically available.

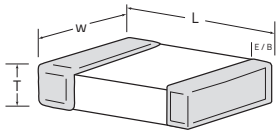
(All measurements in inches)

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	**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.

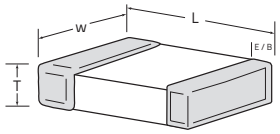
(All measurements in inches)

SIZE			0504 (± 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														

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)

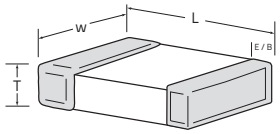
SIZE		0201 (± 0.002)	0402 (± 0.004)					0603 (± 0.006)					0805 (± 0.008)					1206 (± 0.008)				1210 (±0.016)				1812 (±0.016)		
L		0.024	0.040					0.063					0.080					0.126				0.126				0.177		
W		0.012	0.020					0.032					0.050					0.063				0.098				0.126		
T (max)		0.012	0.025					0.038					0.058					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.

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	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																										

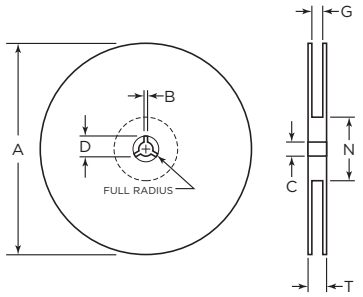
CAPACITANCE VALUE

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.

TAPE & REEL SPECIFICATIONS

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

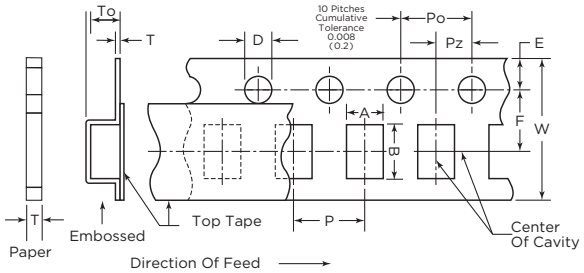
REEL



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.

Unit: mm (inch)

Paper Tape Carrier Dimensions (8mm)

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)

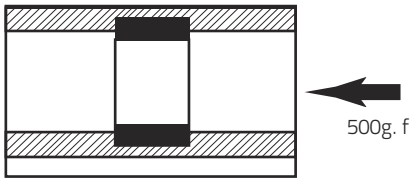
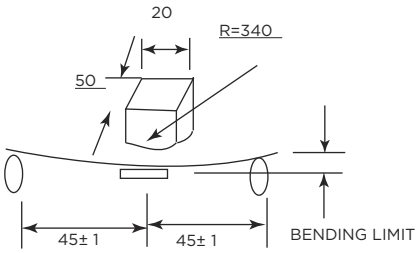
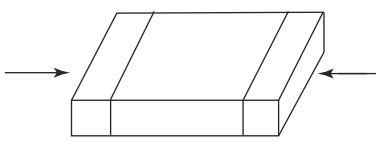
Size (inches)	A	B	W	F	E	Po	Pz	D	To	T	P
01005	0.23 (0.009)	0.43 (0.016)	4.0 ± 0.05 (0.157 ± 0.002)	1.8 ± 0.02 (0.070 ± 0.001)	0.9 ± 0.05 (0.035 ± 0.002)	2.0 ± 0.04 (0.079 ± 0.001)	2.00 (0.079)	0.8 ± 0.04 (0.031 ± 0.001)	0.5 max (0.019 max)	0.15 -0.4 (0.005 -0.015)	1.00 (0.039)
0805	1.48 ± 0.2 (.058 ± .008)	2.3 ± 0.2 (.091 ± .008)	8.0 ± 0.2 (.315 ± .008)	3.5 ± .01 (.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 ± .01 (.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 ± .01 (.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 ± .01 (.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 CHARACTERISTICS

<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 50mA CURRENT</td></tr>
<tr><td rowspan="5">4</td><td rowspan="5">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>

ENVIRONMENTAL CHARACTERISTICS

NO	ITEM		PERFORMANCE		TEST CONDITION	
7	CAPACITANCE TEMPERATURE COEFFICIENT	CLASS I	CHARACTERISTIC	TEMP. COEFFICIENT (PPM/°C)	THESE SYMMETRICAL TOLERANCE APPLY TO 2 POINT MEASUREMENT OF TEMPERATURE COEFFICIENT: ONE AT -25°C AND AT 85°C	
			COG/NPO	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		

NO	ITEM		PERFORMANCE			TEST CONDITION		
8	TEMPERATURE CHARACTERISTICS	CLASS II	CAPACITANCE CHANGE			STEP	TEMP. (°C) B	TEMP. (°C) F
			CHAR.		CAP. CHANGE (%)	1	25 ± 2	25 ± 2
			X	X7R	±15%	2	-55 ± 2	-25 ± 2
				X6S	±22%	3	25 ± 2	25 ± 2
				X5R	±15%	4	125 ± 2	85 ± 2
			Y	Y5V	-82% ~ +22%	5	25 ± 2	25 ± 2
				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			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
		CAPACITANCE	CHARACTERISTIC		CAP. CHANGE	
			CLASSS 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			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.
		CAPACITANCE	CHARACTERISTIC		CAP. CHANGE	
			CLASSS 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			

ENVIRONMENTAL CHARACTERISTICS

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="4">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="5">14</td><td rowspan="5">HUMIDITY (STEADY STATE)</td><td>APPEARANCE</td><td colspan="4">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="5">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)</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td colspan="2">CAPACITANCE CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td colspan="2">WITHIN ±5% OR±0.5pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td colspan="2">WITHIN ±12.5%</td></tr>
<tr><td>Y</td><td colspan="2">WITHIN ±30%</td></tr>
<tr><td>QCLASS I</td><td colspan="4">30pF AND OVER : Q 350
10 - 30pF : Q 275 + 2.5xC
LESS THAN 10pF : Q 200 + 10xC</td></tr>
<tr><td>DISSIPATION FACTOR (TanΘ 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>
<tr><td>INSULATION RESISTANCE</td><td colspan="4">MINIMUM INSULATION RESISTANCE:
1,000M OR 50M μF PRODUCT WHICHEVER IS SMALLER</td></tr>
</table>

ENVIRONMENTAL CHARACTERISTICS

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="4">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="11">15</td><td rowspan="11">MOISTURE RESISTANCE</td><td>APPEARANCE</td><td colspan="4">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="11">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)</td></tr>
<tr><td rowspan="4">CAPACITANCE</td><td colspan="2">CHARACTERISTIC</td><td colspan="2">CAPACITANCE CHANGE</td></tr>
<tr><td colspan="2">CLASS I</td><td colspan="2">WITHIN ±7.5% OR±0.75pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td colspan="2">WITHIN ±12.5%</td></tr>
<tr><td>Y</td><td colspan="2">WITHIN ±30%</td></tr>
<tr><td>QCLASS I</td><td colspan="4">30pF AND OVER : Q 200
30pF AND BELOW : Q 100 + 10/3xC</td></tr>
<tr><td rowspan="2">DISSIPATION FACTOR (TanΘ 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>
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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="4">MINIMUM INSULATION RESISTANCE:
100 M OR 25M μF PRODUCT, WHICHEVER IS SMALLER</td></tr>
</table>

ENVIRONMENTAL CHARACTERISTICS

<table>
<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="4">PERFORMANCE</th><th colspan="3">TEST CONDITION</th></tr>
<tr><td rowspan="11">16</td><td rowspan="11">HIGH TEMERATURE RESISTANCE</td><td>APPEARANCE</td><td colspan="4">NO MECHANICAL DAMAGE SHALL OCCUR</td><td colspan="3" rowspan="3">APPLIED VOLTAGE:
200% OF RATED VOLTAGE
TEST TIME : 1000 +48/-0 Hr.
CURRENT APPLIED: 5OmA MAX.</td></tr>
<tr><td rowspan="3">CAPACITANCE</td><td>CHARACTERISTIC</td><td colspan="3">CAP. CHANGE</td></tr>
<tr><td>CLASS I</td><td colspan="3">WITHIN ±3% OR
±0.3pF, WHICHEVER IS
LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td colspan="3">WITHIN ±12.5%</td><td>CHAR.</td><td>TEMP.</td></tr>
<tr><td>Y</td><td colspan="3">WITHIN ±30%</td><td>CLASS I</td><td>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>DISSIPATION FACTOR (TanΘ 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
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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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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)</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></tr>
</table>

ENVIRONMENTAL CHARACTERISTICS

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<tr><th>NO</th><th colspan="2">ITEM</th><th colspan="4">PERFORMANCE</th><th>TEST CONDITION</th></tr>
<tr><td rowspan="11">17</td><td rowspan="11">TEMERATURE CYCLE</td><td>APPEARANCE</td><td colspan="4">NO MECHANICAL DAMAGE SHALL OCCUR</td><td rowspan="2">CAPACITORS SHALL BE SUBJECTED TO FIVE CYCLES OF THE TEMPERATURE CYCLE AS FOLLOWING
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</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 ±2.5%
OR ±0.25pF WHICHEVER IS LARGER</td></tr>
<tr><td rowspan="2">CLASS II</td><td>X</td><td colspan="2">WITHIN ±7.5%</td></tr>
<tr><td>Y</td><td colspan="2">WITHIN ±20%</td></tr>
<tr><td>QCLASS I</td><td colspan="4">30 pF AND OVER : Q 1000
LESS THAN 3OpF:Q 400 +20xC</td><td rowspan="7">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="6">TAN
CLASS II</td><td colspan="4">X7R, X6S, X5R
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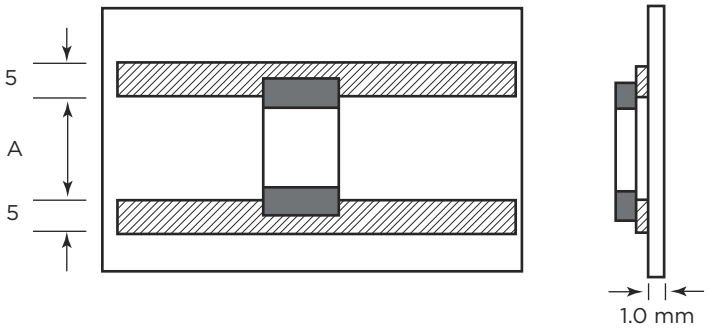
</table></td></tr>
<tr><td>INSULATION RESISTANCE</td><td colspan="4">TO SATISFY THE SPECIFIED INITIAL VALUE</td></tr>
</table>

ADHESIVE STRENGTH OF TERMINATION

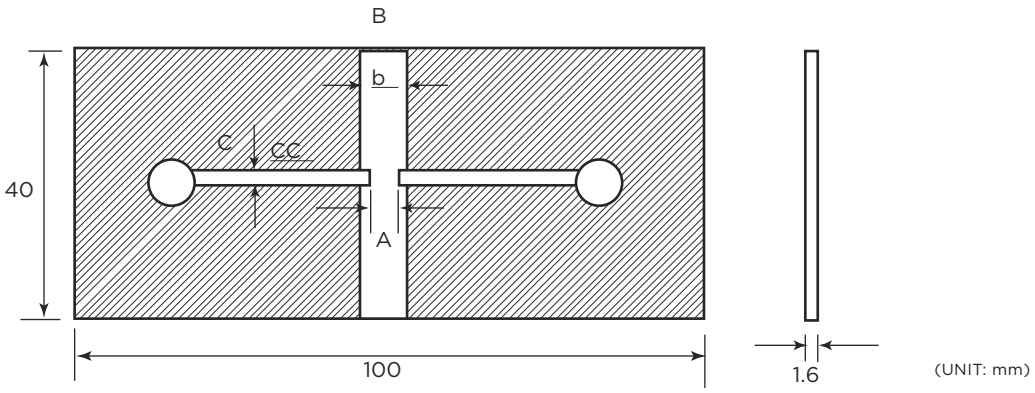


CODE	DIMENSION (mm)	A (mm)	CODE	DIMENSION (mm)	A (mm)
01005 (0402)	0.40 x 0.20	0.12	1206 (3216)	3.2 x 1.6	2.2
0201 (0603)	0.61 x 0.31	0.2	1210 (3225)	3.2 x 2.5	2.2
0402 (1005)	1.0 x 0.5	0.4	1812 (4532)	4.5 x 3.2	3.5
0603 (1608)	1.6 x 0.8	1.0	2220 (5750)	5.7 x 5.08	4.7
0805 (2012)	2.0 x 1.25	1.2			

Material: Alumina Substrate (Al203 95% Min) or Glass Epoxy Substrate

Copper Foil (T = 0.035mm)

SUBSTRATE BENDING STRENGTH

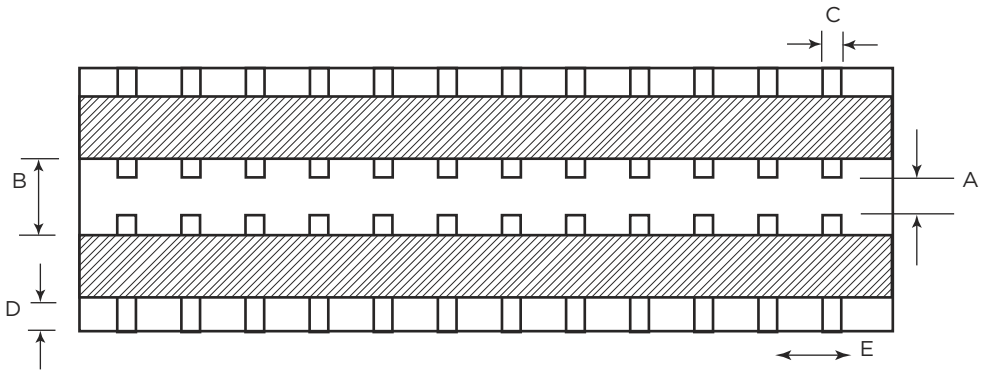


(UNIT: mm)

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	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