



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/X7S/X6S/X5R (<10mΩ typical)
- Ceramic monolithic structure provides excellent reliability



PART NUMBER STRUCTURE

C	0805	COG	500	-	101	J	N	P	□ □
Series	Size	Temperature Characteristic (Dielectric)	Rated Voltage		Capacitance	Tolerance	Termination	Packaging	Optional Thickness Identifier
01005			1st two digits are significant		(picofarads)	* B = ± 0.1pF	N = 100% matte Tin (Sn) over Nickel	D = Paper Tape (10" Reel)	Leave blank for standard thickness.
0201		COG	followed by number of zeroes.		1st two digits are significant,	* C = ± 0.25pF	* P = Palladium Silver	E = Embossed Tape (7" Reel)	Designate
0402		X7R			followed by number of zeroes. e.g:	* D = ± 0.5pF	* G = Gold over Nickel	P = Paper Tape (7" Reel)	"-" for Min.
0504		X7S	4R0 = 4.0 VDCW		101 = 100pF	F = ± 1%	Pb = 90% Tin (Sn) /10% Lead (Pb)	R = Paper Tape (13" Reel)	"*" for Max.
0603		X6S	6R3 = 6.3 VDCW		R denotes decimal	G = ± 2%	* Pd/Ag & Gold terminations have limited values & sizes available.	U = Embossed Tape (13" Reel)	followed by Thickness Code
0805		X5R	100 = 10 VDCW		6R8 = 6.8pF	J = ± 5%			e.g:
1206		Y5V	160 = 16 VDCW			K = ± 10%			- E (min. thickness of .026")
1210		Z5U	250 = 25 VDCW			M = ± 20%			* E (max. thickness of .026")
1812			500 = 50 VDCW			N = ± 30%			
2220			630 = 63 VDCW			Z = +80 - 20%			
22212			101 = 100 VDCW			* For values below 10pF only.			

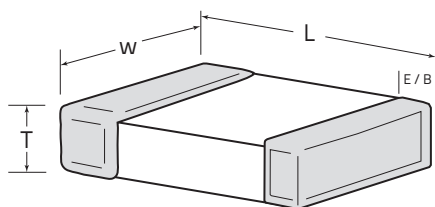
Example P/N: C0805COG500-101JNP

Optional Thickness Identifier Codes:

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

DIMENSIONS

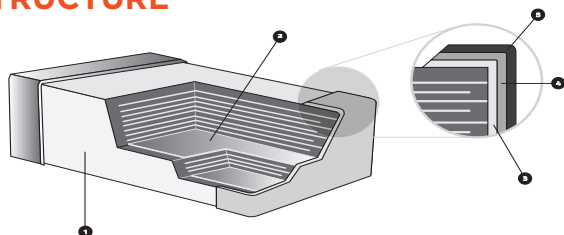
Unit: inches (mm)



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

* 0402 size in the X6S/X7S dielectric will have a dimensional tolerance of ±0.20mm

STRUCTURE

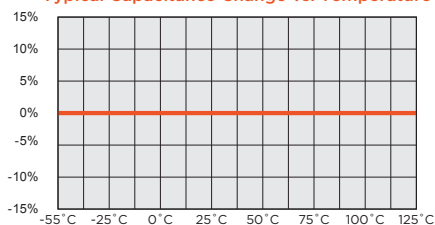


1	Ceramic Body (dielectric)	4	Nickel Plating
2	Inner Electrode	5	Tin Plating
3	Inner Termination		

ELECTRICAL SPECIFICATIONS

COG/COG

Typical Capacitance Change vs. Temperature



Operating Temperature Range:

-55°C to +125°C

Temperature Coefficient:

0 ±30PPM/°C

Temperature Voltage Coefficient:

0 ±30PPM/°C

Insulation Resistance:

>1000 Ω-F or 10 GΩ, for values ≤ 0.047μF (whichever is less at 25°C, VDCW).
For Capacitance values > 0.047μF, the 500 Ω-F rule applies. (The IR at 125°C is 10% of the value at 25°C)

Ageing:

None

Withstanding Voltage:

>2.5 times VDCW

Capacitance Tolerance:

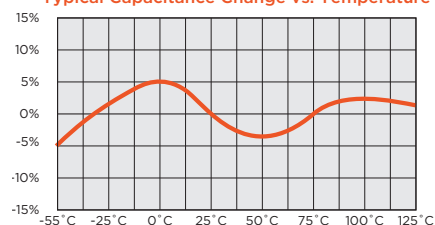
B,C,D,F,G,J,K

Dissipation Factor:

0.1% max

X7R

Typical Capacitance Change vs. Temperature



Operating Temperature Range:

-55°C to +125°C

Temperature Coefficient:

0 ±15%Δ°C MAX.

Temperature Voltage Coefficient:

X7R not applicable

Insulation Resistance:

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

Ageing:

2.5% per decade hour, typical

Withstanding Voltage:

>2.5 times VDCW

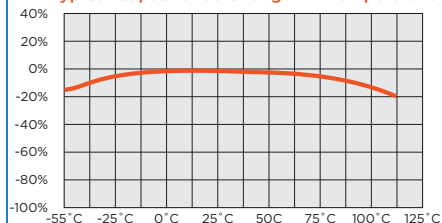
Capacitance Tolerance:

J,K,M

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

X7S

Typical Capacitance Change vs. Temperature



Operating Temperature Range:

-55°C to +125°C

Temperature Coefficient:

0 ±22%Δ°C MAX.

Insulation Resistance:

>1000 Ω-F or 100 GΩ, whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)

Ageing:

2.5% per decade hour, typical

Withstanding Voltage:

>2.5 times VDCW

Capacitance Tolerance:

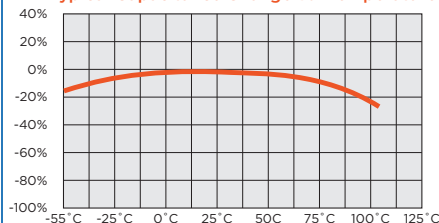
K,M

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

ELECTRICAL SPECIFICATIONS

X6S

Typical Capacitance Change vs. Temperature

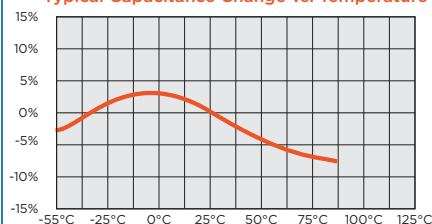


Operating Temperature Range:
-55°C to +105°C
Temperature Coefficient:
0 $\pm$ 22% Δ °C MAX.
Insulation Resistance:
100,000 M Ω min., or 1000 M Ω (@ +25°C, RVDV) per uF min. or 100GW, whichever is less
Ageing:
2.5% per decade hour, typical
Withstanding Voltage:
>2.5 times VDCW
Capacitance Tolerance:
K,M

RATED VOLTAGE	D.F.	EXCEPTION OF D.F.	
$\geq 50V$	$\leq 2.5\%$	$\leq 3\%$	0201 (50V); 0603 $\geq$ 0.047uF 0805 $\geq$ 0.22uF; 1206 $\geq$ 0.47uF
		$\leq 5\%$	0603 $\geq$ 1uF; 0805 $\geq$ 1uF; 1206 $\geq$ 4.7uF; 1210 $\geq$ 4.7uF
25V	$\leq 2.5\%$	$\leq 5\%$	0201 $\geq$ 0.01uF; 0805 $\geq$ 1uF; 1210 $\geq$ 4.7uF
		$\leq 10\%$	0402 $\geq$ 0.10uF; 0603 $\geq$ 0.33uF; 0805 $\geq$ 2.2uF 1206 $\geq$ 4.7uF; 1210 $\geq$ 22uF
16V	$\leq 3.5\%$	$\leq 5\%$	0201 $\geq$ 0.01uF; 0402 $\geq$ 0.033uF; 0805 $\geq$ 0.68uF; 1206 $\geq$ 2.2uF; 1210 $\geq$ 4.7uF
		$\leq 10\%$	0402 $\geq$ 0.47uF; 0603 $\geq$ 0.68uF; 0805 $\geq$ 2.2uF; 1206 $\geq$ 4.7uF; 1210 $\geq$ 22uF
$\leq 10V$	$\leq 5\%$	$\leq 10\%$	0402 $\geq$ 0.33uF; 0603 $\geq$ 0.33uF; 0805 $\geq$ 2.2uF; 1206 $\geq$ 2.2uF; 1210 $\geq$ 22uF
4V/6.3V	$\leq 10\%$		

X5R

Typical Capacitance Change vs. Temperature

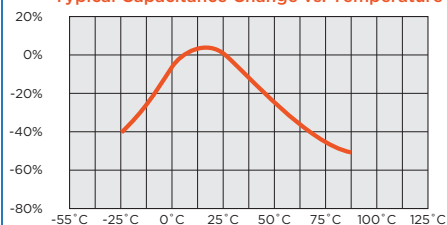


Operating Temperature Range:
-55°C to +85°C
Temperature Coefficient:
0 $\pm$ 15% Δ °C MAX.
Insulation Resistance:
>100 Ω -F or 10 G Ω , whichever is less at 25°C, VDCW. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
2.5% per decade hour, typical
Withstanding Voltage:
>2.5 times VDCW
Capacitance Tolerance:
K,M

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

Z5U

Typical Capacitance Change vs. Temperature

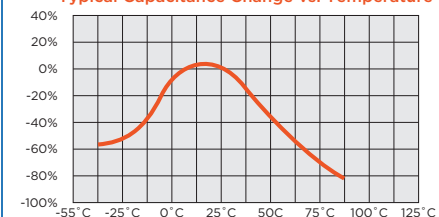


Operating Temperature Range:
+10°C to +85°C
Temperature Coefficient:
+22% - 56% Δ °C MAX.
Insulation Resistance:
>100 Ω -F or 10 G Ω , whichever is less at 25°C, VDCV. (The IR at 125°C is 10% of the value at 25°C)
Ageing:
5% per decade hour, typical
Withstanding Voltage:
>2.5 times VDCW
Capacitance Tolerance: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

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

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 G Ω , 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.	
$\geq 50V$	$\leq 5\%$	$\leq 9\%$	0603 $\geq$ 0.1uF; 0805 $\geq$ 0.47uF; 1206 $\geq$ 4.7uF;
25V	$\leq 5\%$	$\leq 9\%$	0402 $\geq$ 0.047uF; 0603 $\geq$ 0.1uF; 0805 $\geq$ 0.33uF; $\geq$ 1206 $\geq$ 1uF; 1210 $\geq$ 4.7uF
16V	$\leq 9\%$	$\leq 12.5\%$	0603 $\geq$ 2.2uF; 0805 $\geq$ 3.3uF; 1206 $\geq$ 10uF; 1210 $\geq$ 22uF; 1812 $\geq$ 47uF
10V	$\leq 12.5\%$	$\leq 16\%$	0603 $\geq$ 2.2uF; 0805 $\geq$ 3.3uF; 1206 $\geq$ 4.7uF; 1210 $\geq$ 10uF; 1812 $\geq$ 47uF
6.3V	$\leq 16\%$		

TEST PARAMETERS

Test parameters for Multilayer Ceramic Capacitors
- X7R, X7S, X6S, X5R and Y5V:

1KHz $\pm$ 100Hz at 1.0 $\pm$ 0.2 Vrms < 10uF (10 V min.)
1KHz $\pm$ 100Hz at 1.0 $\pm$ 0.1 Vrms < 10uF (6.3V max.)
120Hz $\pm$ 24Hz at 1.0 $\pm$ 0.1 Vrms $\geq$ 10uF

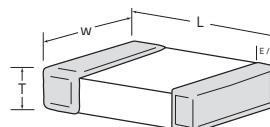
Test parameters for Multilayer Ceramic Capacitors
- COG:

1MHz $\pm$ 100KHz at 1.0 $\pm$ 0.2 Vrms $\leq$ 1000pF, 25°C
1KHz $\pm$ 100Hz at 1.0 $\pm$ 0.2 Vrms > 1000pF, 25°C

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

VOLTAGE AND CAPACITANCE RANGE

COG (COG) DIELECTRIC



Values that are typically available.

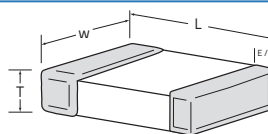
(All measurements in inches)

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

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

VOLTAGE AND CAPACITANCE RANGE

COG (COG) DIELECTRIC



Values that are typically available.

(All measurements in inches)

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

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

VOLTAGE AND CAPACITANCE RANGE

X7R DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		01005		0201				0402				0504			0603					0805		
T (max)		0.008		0.012				0.025				0.040			0.038					0.058		
VDCW (MAX)		6.3V	10V	6.3V	10V	16V	25V	16V	25V	50V	100V	25V	50V	100V	10V	16V	25V	50V	100V	25V	50V	100V
CAPACITANCE CODE	101	CAPACITANCE VALUE	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																			

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

T(max): 0603 - 0.040"

0805 - 0.060"

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

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

VOLTAGE AND CAPACITANCE RANGE

X7R DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		0201			0402					0603						0805					
T (max)*		0.012			0.025					0.038						0.059					
VDCW (MAX)		4V	6.3V	10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V
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																			
	685	6.80																			
	106	10.0uF																			
	156	15.0uF																		35V	
	226	22.0uF																			
	476	47.0uF																			
	107	100.0uF																			

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

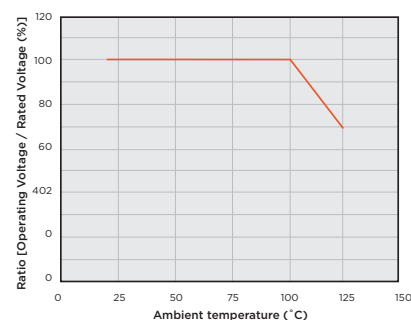
T(max): 0603 - 0.040"
0805 - 0.060"

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

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

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

DERATING CURVE FOR 0201, 0.1UF, X7R ONLY



VOLTAGE AND CAPACITANCE RANGE

X7R DIELECTRIC

Values that are typically available.

(All measurements in inches)

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

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

T(max): 0603 - 0.040"

0805 - 0.060"

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

VOLTAGE AND CAPACITANCE RANGE

X7R DIELECTRIC

Values that are typically available.

(All measurements in inches)

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

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

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

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

VOLTAGE AND CAPACITANCE RANGE

X7S DIELECTRIC (0201-0805)

Values that are typically available.

(All measurements in inches)

SIZE		0201				0402					0603					0805				
T (max)*		0.012				0.025					0.038					0.059				
VDCW (MAX)		4V	6.3V	10V	16V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE	104	CAPACITANCE VALUE	0.10uF																	
	224		0.22																	
	474		0.47																	
	105		1.00uF																	
	225		2.2																	
	475		4.7																	
	106		10.0uF																	
	226		22.0uF																	
	476		47.0uF																	
	107		100.0uF																	

X7S DIELECTRIC (1206-2220)

(All measurements in inches)

SIZE		1206					1210					1812				2220			
T (max)*		0.07					0.125					0.095				0.108			
VDCW (MAX)		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	16V	25V	50V	100V	16V	25V	50V	100V
CAPACITANCE CODE	104	CAPACITANCE VALUE	0.10uF																
	224		0.22																
	474		0.47																
	105		1.00uF																
	225		2.2																
	335		3.3																
	475		4.7																
	106		10.0uF																
	156		15.0uF																
	226		22.0uF																
	476		47.0uF																
	107		100.0uF																

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

T(max): 0603 - 0.040"

0805 - 0.060"

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

VOLTAGE AND CAPACITANCE RANGE

X6S DIELECTRIC (0201-0805)

Values that are typically available.

(All measurements in inches)

SIZE		0201				0402					0603						0805					
T (max)*		0.012				0.025					0.038						0.059					
VDCW (MAX)		4V	6.3V	10V	16V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	50V	4V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE 104 224 474 105 225 475 106 226 476 107	104	0.10uF																				
	224	0.22																				
	474	0.47																				
	105	1.00uF																				
	225	2.2																				
	475	4.7																				
	106	10.0uF																				
	226	22.0uF																				
	476	47.0uF																				
	107	100.0uF																				

X6S DIELECTRIC (1206-2220)

(All measurements in inches)

SIZE		1206					1210					1812				2220			
T (max)*		0.07					0.125					0.095				0.108			
VDCW (MAX)		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	16V	25V	50V	100V	16V	25V	50V	100V
CAPACITANCE CODE 104 224 474 105 225 335 475 106 156 226 476 107	104	0.10uF																	
	224	0.22																	
	474	0.47																	
	105	1.00uF																	
	225	2.2																	
	335	3.3																	
	475	4.7																	
	106	10.0uF																	
	156	15.0uF																	
	226	22.0uF																	
	476	47.0uF																	
	107	100.0uF																	

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

T(max): 0603 - 0.040"

0805 - 0.060"

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

VOLTAGE AND CAPACITANCE RANGE

X5R DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		01005		0201				0402				0603				0805				1206				1210		1812							
T (max)		0.008		0.0216				0.025				0.040				0.060				0.072				0.125		0.130							
VDCW (MAX)		6.3V	10V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	16V	25V	16V	25V
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																															
	153	.015																															
	223	.022																															
	333	.033																															
	393	.039																															
	473	.047																															
	104	0.10uF																															
	154	.150																															
	224	.220																															
	334	.330																															
	474	.470																															
	684	.680																															
	105	1.00uF																															
	125	1.20																															
	155	1.50																															
	185	1.80																															
	225	2.20																															
	335	3.30																															

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

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

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

VOLTAGE AND CAPACITANCE RANGE

X5R DIELECTRIC (0402-1206)

Values that are typically available.

(All measurements in inches)

SIZE		0201			0402				0603					0805						1206					
T (max)		0.0216			0.0335				0.040					0.060						0.072					
VDCW (MAX)		4V	6.3V	10V	4V	6.3V	10V	16V	4V	6.3V	10V	16V	25V	4V	6.3V	10V	16V	25V	35V	50V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE 395 475 685 106 156 226 476 107 157 227	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					1812				2220 / 2221				
T (max)		0.125					0.130				0.135				
VDCW (MAX)		6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	16V	25V	50V
CAPACITANCE CODE 395 475 685 106 156 226 476 107 157 227	395	3.90uF													
	475	4.70uF													
	685	6.80uF													
	106	10.0uF													
	156	15.0uF													
	226	22.0uF													
	476	47.0uF													
	107	100.0uF													
	157	150.0uF													
	227	220.0uF													

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

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

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

VOLTAGE AND CAPACITANCE RANGE

Z5U DIELECTRIC

Values that are typically available.

(All measurements in inches)

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

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

VOLTAGE AND CAPACITANCE RANGE

Z5U DIELECTRIC

Values that are typically available.

(All measurements in inches)

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

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

VOLTAGE AND CAPACITANCE RANGE

Y5V DIELECTRIC

Values that are typically available.

(All measurements in inches)

SIZE		0201		0402				0603					0805					1206				1210				1812		
T (max)		0.012		0.025				0.038					0.058					0.070				0.096				0.085		
VDCW (MAX)		10V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	6.3V	10V	16V	25V	6.3V	10V	25V
CAPACITANCE CODE ↑ ↓ 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.
For values above 1uF, thickness may be greater than specified above.

VOLTAGE AND CAPACITANCE RANGE

Y5V DIELECTRIC

Values that are typically available.

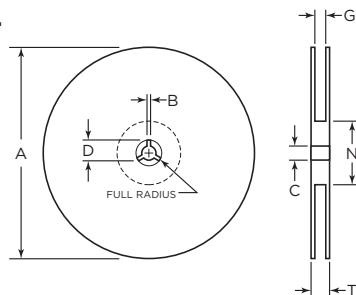
(All measurements in inches)

SIZE		0201		0402		0603					0805					1206				1210					1812		
T (max)		0.012		0.025		0.038					0.058					0.070				0.10					0.085		
VDCW (MAX)		10V	6.3V	10V	16V	6.3V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	10V	16V	25V	50V	6.3V	10V	16V	25V	50V	6.3V	10V	25V
CAPACITANCE CODE ↑ ↓	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																								
CAPACITANCE CODE ↑ ↓	CAPACITANCE VALUE	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.

TAPE & REEL SPECIFICATIONS

REEL

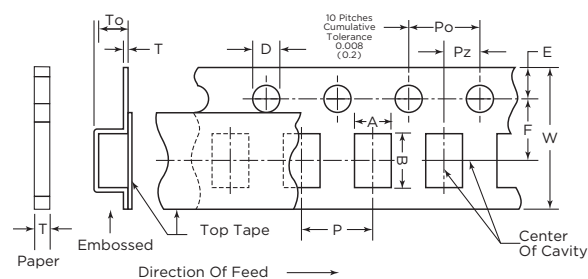


All tape and reel specifications must be adhered to per EIA-481-1-A.

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*	20,000*	15,000	5,000	3,000	2,000	2,000	1,000	1,000	1,000
Max Qty Per Reel	40,000*	20,000*	15,000	10,000	4,000	5,000	5,000	5,000	3,000	1,000

NOTE: ** Quantity dependent on thickness

*Smaller quantities may be available. Please contact us.

Paper Tape Carrier Dimensions (8mm)

Unit: mm (inch)

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

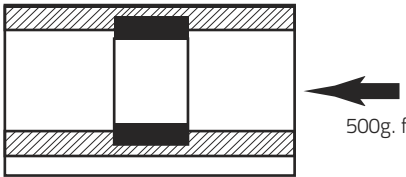
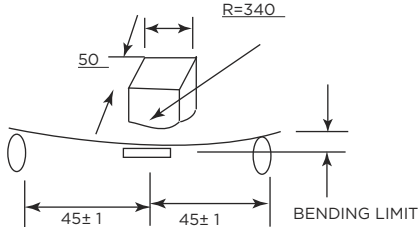
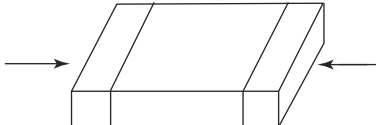
Embossed Carrier Dimensions (4mm, 8mm & 12mm)

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

ENVIRONMENTAL CHARACTERISTICS

NO	ITEM		PERFORMANCE		TEST CONDITION			
1	APPEARANCE		NO ABNORMAL EXTERIOR APPEARANCE		THROUGH MICROSCOPE (X10)			
2	INSULATION RESISTANCE		10,000M OR 500M μF PRODUCT WHICHEVER IS SMALLER (RATED VOLTAGE IS BELOW 16V: 10,000M OR 100M μF)		RATED VOLTAGE SHALL BE APPLIED. MEASUREMENT TIME IS 60 - 120 RATED VOLTAGE TIME 60 SEC .			
3	WITHSTANDING VOLTAGE		NO DIELECTRIC BREAKDOWN OR MECHANICAL BREAKDOWN		CLASS I : 300% OF THE RATED VOLTAGE FOR 1-5 SEC, CLASS II: 250% OF THE RATED VOLTAGE FOR 1-5 SEC IS APPLIED WITH LESS THAN 50mA CURRENT			
4	CAPACITANCE	CLASS I	WITHIN THE SPECIFIED TOLERANCE		CAPACITANCE	FREQUENCY	VOLTAGE	
					1,000pF AND BELOW	1MHz ±10%	0.5 - 5 Vrms	
					MORE THAN 1,000 pF	1kHz ± 10%		
		CLASS II	WITHIN THE SPECIFIED TOLERANCE		CAPACITANCE	FREQUENCY	VOLTAGE	
					4.7μF AND BELOW	1kHz ± 10%	1.0 ± 0.2Vrms	
					MORE THAN 4.7μF	120Hz ± 20%	1.0 ± 0.2Vrms	
5	Q	CLASS I	OVER 30pF : Q 1,000 LESS THAN 30pF: Q 400 +20C (C: CAPACITANCE)		CAPACITANCE	FREQUENCY	VOLTAGE	
					1,000pF AND BELOW	1MHz ±10%	0.5 - 5 Vrms	
					MORE THAN 1,000 pF	1kHz ± 10%		
6	DISSIPATION FACTOR (Tanθ CLASS II)	CLASS II	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%				

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 MEASURE- MENT OF TEMPERATURE COEFFICIENT: ONE AT -25°C AND AT 85°C								
			COG/COG	0 ± 60 (±30)		STEP	TEMPERATURE (°C)							
				-150 ± 60		1	25 ± 2							
				-220 ± 60		2	MIN RATED TEMP ± 2							
				-330 ± 60		3	25 ± 2							
				-470 ± 60		4	MAX RATED TEMP ± 2							
				-750 ± 120		5	25 ± 2							
				+350 - -1000										
8	TEMPERATURE CHARACTERISTICS		CLASS II	CAPACITANCE CHANGE			STEP	TEMP. (°C) B	TEMP. (°C) F					
				CHAR.	CAP. CHANGE (%)									
					X	X7R				±15%				
				X6S		±22%								
				X5R		±15%								
				Y	Y5V	-82% ~ +22%								
					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: <table><tr><th>STEP</th><th>TEMP. (°C)</th><th>TIME (SEC.)</th></tr><tr><td>1</td><td>80-100</td><td>60</td></tr><tr><td>2</td><td>150-180</td><td>60</td></tr></table> MEASURE AT ROOM TEMP. AFTER COOLING FOR CLASS I : 24 ± 2 HOURS CLASS II : 48 ± 4 HOURS	STEP	TEMP. (°C)	TIME (SEC.)	1	80-100	60	2	150-180	60
		STEP	TEMP. (°C)	TIME (SEC.)										
		1	80-100	60										
		2	150-180	60										
		CAPACITANCE	CHARACTERISTIC			CAP. CHANGE								
			CLASS I			WITHIN ±2.5% OR ±0.25 pF WHICHEVER IS LARGER								
			CLASS II	X		WITHIN ±7.5%								
				Y		WITHIN ±20%								
QCLASS I	30 pF AND OVER: Q 1000 LESS THAN 30 pF: Q 400 + 20xC													
Tan CLASS II	TO SATISFY THE SPECIFIED INITIAL VALUE													
INSULATION RESISTANCE	TO SATISFY THE SPECIFIED INITIAL VALUE													
WITHSTANDING VOLTAGE	TO SATISFY THE SPECIFIED INITIAL VALUE													
13	VIBRATION TEST	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR		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								
			CLASS I			WITHIN ±2.5% OR ±0.25 pF WHICHEVER IS LARGER								
			CLASS II	X		WITHIN ±5%								
				Y		WITHIN ±20%								
		QCLASS I	30 pF AND OVER: Q 1000 LESS THAN 30 pF: Q 400 + 20xC											
		Tan CLASS II	TO SATISFY THE SPECIFIED INITIAL VALUE											
		INSULATION RESISTANCE	TO SATISFY THE SPECIFIED INITIAL VALUE											

ENVIRONMENTAL CHARACTERISTICS

NO	ITEM		PERFORMANCE				TEST CONDITION	
14	HUMIDITY (STEADY STATE)	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR				TEMPERATURE : 40±2 °C RELATIVE HUMIDITY: 90-95 %RH TEST TIME : 500 +12/-0 Hr. MEASURE AT ROOM TEMPERATURE AFTER COOLING FOR CLASS I : 24±2 Hr. CLASS II : 48±4 Hr. SEE (FIG.3)	
		CAPACITANCE	CHARACTERISTIC		CAPACITANCE CHANGE			
			CLASS I		WITHIN ±5% OR±0.5pF WHICHEVER IS LARGER			
			CLASS II	X	WITHIN ±12.5%			
				Y	WITHIN ±30%			
		QCLASS I	30pF AND OVER : Q 350 10 - 30pF : Q 275 + 2.5xC LESS THAN 10pF : Q 200 + 10xC					
		DISSIPATION FACTOR (Tanθ CLASS II)	X7R, X6S, X5R					
			Rated Voltage	D.F.	Exception of D.F.			
					≥50V	≤2.5%		≤3%
			≤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%			
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 1,000M OR 50M μF PRODUCT WHICHEVER IS SMALLER							

ENVIRONMENTAL CHARACTERISTICS

NO	ITEM		PERFORMANCE				TEST CONDITION		
15	MOISTURE RESISTANCE	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR					APPLIED VOLTAGE: RATED VOLTAGE TEMPERATURE : 40±2 °C RELATIVE HUMIDITY: 90-95%RH TEST TIME : 500 +12/-0 Hr. CURRENT APPLIED: 50mA MAX. MEASURING AT ROOM TEMPERATURE AFTER COOLING FOR CLASS I : 24±2 Hr. CLASS II : 48±4 Hr. SEE (FIG.3)	
		CAPACITANCE	CHARACTERISTIC		CAPACITANCE CHANGE				
			CLASS I		WITHIN ±7.5% OR±0.75pF WHICHEVER IS LARGER				
			CLASS II	X	WITHIN ±12.5%				
				Y	WITHIN ±30%				
		QCLASS I	30pF AND OVER : Q 200 30pF AND BELOW : Q 100 + 10/3xC						
		DISSIPATION FACTOR (Tanθ CLASS II)	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%								
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 100 M OR 25M μF PRODUCT, WHICHEVER IS SMALLER								

ENVIRONMENTAL CHARACTERISTICS

NO	ITEM	PERFORMANCE				TEST CONDITION					
16	HIGH TEMPERATURE RESISTANCE	APPEARANCE	NO MECHANICAL DAMAGE SHALL OCCUR				APPLIED VOLTAGE: 200% OF RATED VOLTAGE TEST TIME : 1000 +48/-0 Hr. CURRENT APPLIED: 50mA MAX.				
		CAPACITANCE	CHARACTERISTIC		CAP. CHANGE						
			CLASS I		WITHIN ±3% OR ±0.3pF, WHICHEVER IS LARGER						
			CLASS II	X	WITHIN ±12.5%					CHAR.	TEMP.
		Y		WITHIN ±30%		CLASS I	125 ±3 °C				
		QCLASS I	30pF AND OVER : Q 350 10 - 30 pF : Q 275 + 2.5xC LESS THAN 10pF :Q 200 + 10xC				CLASS II	X	125 ±3 °C		
						Y	85 ±3 °C				
		DISSIPATION FACTOR (Tanθ CLASS II)	X7R, X6S, X5R						(INITIAL VALUE MEASUREMENT) FOR CLASS II CAPACITORS, 200 % OF RATED VOLTAGE SHALL BE APPLIED FOR 1 HOUR AT THE MAXIMUM OPERATING TEMPERATURE, THEN KEEP IT AT ROOM TEMPERATURE FOR 48 ±4 HRS. SEE (FIG.3)		
			Rated Voltage	D.F.	Exception of D.F.						
					≥50V	≤2.5%	≤3%	0201 (50V); 0603≥0.047uF 0805≥0.22uF; 1206≥0.47uF			
					≤5%	0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥4.7uF					
	25V		≤2.5%	≤5%	0201≥0.01uF; 0805≥1uF; 1210≥4.7uF						
≤10%				0402≥0.10uF; 0603≥0.33uF; 0805≥2.2uF 1206≥4.7uF; 1210≥22uF							
16V	≤3.5%		≤5%	0201≥0.01uF; 0402≥0.033uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF							
			≤10%	0402≥0.47uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF							
10V	≤5%		≤10%	0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF							
6.3V	≤10%										
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%										
INSULATION RESISTANCE	MINIMUM INSULATION RESISTANCE: 1,000M OR 50M μF PRODUCT WHICHEVER IS SMALLER										

ENVIRONMENTAL CHARACTERISTICS

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

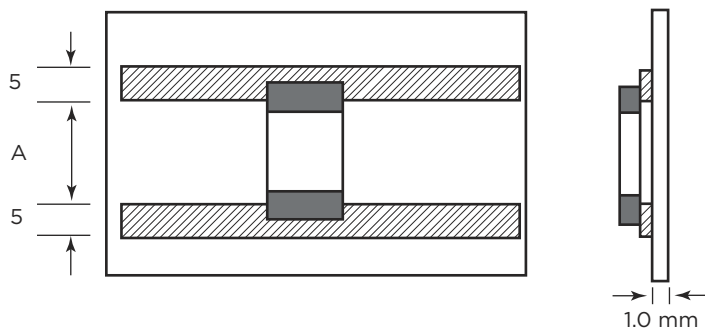
ENVIRONMENTAL CHARACTERISTICS

NO	ITEM	TEST CONDITION	REQUIREMENTS																																																																																																																				
18	HIGH TEMPERATURE Load-Endurance (Life Testing)	*Test Temperature: COG, X7R/X7S: 125±3°C X5R, Y5V: 85±3°C Test time: 1000+24/-0 hrs. Endurance or Life Test Voltage (RVLL) * All components are tested at 100% of rated voltage (Vr) for the below range:	• No remarkable damage. CAP CHANGE: COG: ±3.0% or ±0.3pF whichever Is larger X7R, X5R, X6S, X7S: ≥10V**, within ±12.5%; ≤6.3V within ±25%; **10V: 0603≥4.7μF; 0402≥1.0μF; 0201≥0.1μF, within ±25% Y5V≥10V, within ±30%; ≤6.3V, within +30/-40% Q/D.F. VALUE: COG: More than 30pF, Q≥350 10pF≤30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C																																																																																																																				
		<table><tr><th>SIZE</th><th>DIELECTRIC</th><th>RATED VOLTAGE</th><th>CAPACITANCE</th></tr><tr><td rowspan="2">0201</td><td rowspan="2">X5R/X7R/X6S</td><td>≤10V</td><td>C≥0.1μF</td></tr><tr><td>≥16V</td><td>C>0.1μF</td></tr><tr><td rowspan="6">0402</td><td rowspan="2">X5R</td><td>≤16V</td><td>C>0.1μF</td></tr><tr><td>25V, 50V</td><td>C≥0.1μF</td></tr><tr><td rowspan="2">X6S</td><td>6,3V, 10V</td><td>C>0.1μF</td></tr><tr><td>16V, 25V</td><td>C≥0.1μF</td></tr><tr><td rowspan="2">X7R/X7S/Y5V</td><td>25V</td><td>C≥0.1μF</td></tr><tr><td>35V</td><td>C≥0.1μF</td></tr><tr><td rowspan="4">0603</td><td rowspan="2">X5R/X7R/X6S/X7S</td><td>4V</td><td>C≥22μF</td></tr><tr><td>6.3V, 10V</td><td>C≥4.7μF</td></tr><tr><td>X5R/X7R/X6S</td><td>25V</td><td>C≥0.1μF</td></tr><tr><td>X7R</td><td>35V</td><td>C≥0.1μF</td></tr><tr><td rowspan="5">0805</td><td rowspan="3">X5R/X7R/X6S/X7S</td><td>4V</td><td>C≥47μF</td></tr><tr><td>6.3V</td><td>C≥22μF</td></tr><tr><td>10V, 50V</td><td>C≥10μF</td></tr><tr><td>X7R/X6S</td><td rowspan="2">16V, 25V</td><td>C≥10μF</td></tr><tr><td>X5R</td><td>C≥22μF</td></tr><tr><td>1206</td><td>X5R/X7R/X6S</td><td>≤6.3V</td><td>C≥47μF</td></tr><tr><td rowspan="2">1210</td><td>X5R/X7R/X6S</td><td>16V</td><td>C≥47μF</td></tr><tr><td>X7R</td><td>100V</td><td>C≥43.3μF</td></tr></table>	SIZE	DIELECTRIC	RATED VOLTAGE	CAPACITANCE	0201	X5R/X7R/X6S	≤10V	C≥0.1μF	≥16V	C>0.1μF	0402	X5R	≤16V	C>0.1μF	25V, 50V	C≥0.1μF	X6S	6,3V, 10V	C>0.1μF	16V, 25V	C≥0.1μF	X7R/X7S/Y5V	25V	C≥0.1μF	35V	C≥0.1μF	0603	X5R/X7R/X6S/X7S	4V	C≥22μF	6.3V, 10V	C≥4.7μF	X5R/X7R/X6S	25V	C≥0.1μF	X7R	35V	C≥0.1μF	0805	X5R/X7R/X6S/X7S	4V	C≥47μF	6.3V	C≥22μF	10V, 50V	C≥10μF	X7R/X6S	16V, 25V	C≥10μF	X5R	C≥22μF	1206	X5R/X7R/X6S	≤6.3V	C≥47μF	1210	X5R/X7R/X6S	16V	C≥47μF	X7R	100V	C≥43.3μF	X7R, X5R, X6S, X7S: <table><tr><th>RATED VOLTAGE</th><th>D.F.</th><th colspan="2">EXCEPTIONS OF D.F. ≤</th></tr><tr><td rowspan="3">≥100V</td><td rowspan="3">≤3%</td><td>≤6%</td><td>1206≥0.47μF</td></tr><tr><td>≤7.5%</td><td>0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF</td></tr><tr><td>≤20%</td><td>0805>2.2μF; 1210≤3.3μF</td></tr><tr><td rowspan="3">50V</td><td rowspan="3">≤3%</td><td>≤6%</td><td>0201(50V); 0603>0.047μF; 0805≥0.18μF; 1206≥0.47μF</td></tr><tr><td>≤10%</td><td>0201≥0.01μF; 1210≥3.3μF</td></tr><tr><td>≤20%</td><td>0402≥0.012μF; 0603>0.1μF; 0805≥1.0μF (0805/X7R>0.47μF); 1206≥2.2μF; 1210≥10μF</td></tr><tr><td>35V</td><td>≤5%</td><td>≤20%</td><td>0603≥1.0μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤5%</td><td>≤10%</td><td>0201=0.01μF; 0805≥1.0μF; 1210≥10μF</td></tr><tr><td>≤14%</td><td>0603≥0.33μF</td></tr><tr><td>≤15%</td><td>0201>0.01μF; 0402>0.10μF (0402/X7R≥0.056μF); 0603≥0.47μF; 0805≥2.2μF; 1206≥0.47μF; 1210≥22μF (1210/X5R≥10μF)</td></tr><tr><td>≤20%</td><td>0402≥0.47μF</td></tr><tr><td rowspan="2">16V</td><td rowspan="2">≤5%</td><td>≤10%</td><td>0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td></tr><tr><td>≤15%</td><td>0201≥0.01μF (0201/X7R≥0.022μF); 0402≥0.033μF 0603>0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤7.5%</td><td>≤15%</td><td>0201≥0.012μF; 0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td></tr><tr><td>≤20%</td><td>0201≥0.01μF; 0402≥1.0μF; 0603/X5R≥10μF; 01R5/x5R</td></tr><tr><td>6.3V</td><td>≤15%</td><td>≤30%</td><td>0201≥0.01μF; 0402≥1.0μF (0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td></tr><tr><td>4V</td><td>≤20%</td><td>-</td><td>-</td></tr></table>	RATED VOLTAGE	D.F.	EXCEPTIONS OF D.F. ≤		≥100V	≤3%	≤6%	1206≥0.47μF	≤7.5%	0603≥0.068μF; 0805>0.1μF; 1206≥1μF; 1210≥2.2μF	≤20%	0805>2.2μF; 1210≤3.3μF	50V	≤3%	≤6%	0201(50V); 0603>0.047μF; 0805≥0.18μF; 1206≥0.47μF	≤10%	0201≥0.01μF; 1210≥3.3μF	≤20%	0402≥0.012μF; 0603>0.1μF; 0805≥1.0μF (0805/X7R>0.47μF); 1206≥2.2μF; 1210≥10μF	35V	≤5%	≤20%	0603≥1.0μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥10μF	25V	≤5%	≤10%	0201=0.01μF; 0805≥1.0μF; 1210≥10μF	≤14%	0603≥0.33μF	≤15%	0201>0.01μF; 0402>0.10μF (0402/X7R≥0.056μF); 0603≥0.47μF; 0805≥2.2μF; 1206≥0.47μF; 1210≥22μF (1210/X5R≥10μF)	≤20%	0402≥0.47μF	16V	≤5%	≤10%	0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF	≤15%	0201≥0.01μF (0201/X7R≥0.022μF); 0402≥0.033μF 0603>0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF	10V	≤7.5%	≤15%	0201≥0.012μF; 0402≥0.22μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF	≤20%	0201≥0.01μF; 0402≥1.0μF; 0603/X5R≥10μF; 01R5/x5R	6.3V	≤15%	≤30%	0201≥0.01μF; 0402≥1.0μF (0402/X6S≥0.47μF); 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF	4V	≤20%	-	-
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ENVIRONMENTAL CHARACTERISTICS

NO	ITEM	TEST CONDITION	REQUIREMENTS																																																																																																																																		
18	HIGH TEMPERATURE Load-Endurance (Life Testing)	(3) 150% of rated voltage for below range.	No remarkable damage. CAP CHANGE: COG: $\pm 3.0\%$ or $\pm 0.3\text{pF}$ whichever Is larger X7R, X5R, X6S, X7S: $\geq 10\text{V}^{**}$, within $\pm 12.5\%$; $\leq 6.3\text{V}$ within $\pm 25\%$; $^{**}10\text{V}$: $0603 \geq 4.7\mu\text{F}$; $0402 \geq 1.0\mu\text{F}$; $0201 \geq 0.1\mu\text{F}$, within $\pm 25\%$ $\text{Y5V} \geq 10\text{V}$, within $\pm 30\%$; $\leq 6.3\text{V}$, within $+30\%$ /-40% Q/D.F. VALUE: COG: More than 30pF, $\text{Q} \geq 350$ $10\text{pF} \leq 30\text{pF}$, $\text{Q} \geq 275 + 2.5\text{C}$ Less than 10pF, $\text{Q} \geq 200 + 10\text{C}$																																																																																																																																		
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VALUE: COG: More than 30pF, $\text{Q} \geq 350$ $10\text{pF} \leq 30\text{pF}$, $\text{Q} \geq 275 + 2.5\text{C}$ Less than 10pF, $\text{Q} \geq 200 + 10\text{C}$ Y5V: <table><tr><th>RATED VOLTAGE</th><th>D.F.</th><th colspan="2">EXCEPTIONS OF D.F. $\leq$</th></tr><tr><td rowspan="2">$\geq 0\text{V}$</td><td rowspan="2">$\leq 7.5\%$</td><td>$\leq 10\%$</td><td>$0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$</td></tr><tr><td>$\leq 20\%$</td><td>$1210 \geq 6.8\mu\text{F}$</td></tr><tr><td>35V</td><td>$\leq 10\%$</td><td>-</td><td>-</td></tr><tr><td rowspan="2">25V</td><td rowspan="2">$\leq 7.5\%$</td><td>$\leq 10\%$</td><td>$0402 \geq 0.047\mu\text{F}$; $0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.33\mu\text{F}$; $1206 \geq 1.0\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$</td></tr><tr><td>$\leq 15\%$</td><td>$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$</td></tr><tr><td rowspan="2">16V ($\text{C} < 1.0\mu\text{F}$)</td><td rowspan="2">$\leq 10\%$</td><td>$\leq 12.5\%$</td><td>$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.68\mu\text{F}$</td></tr><tr><td>$\leq 20\%$</td><td>$0402 \geq 0.22\mu\text{F}$</td></tr><tr><td>16V ($\text{C} \geq 1.0\mu\text{F}$)</td><td>$\leq 12.5\%$</td><td>$\leq 20\%$</td><td>$0603 \geq 2.2\mu\text{F}$; $0805 \geq 3.3\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 22\mu\text{F}$; $1812 \geq 47\mu\text{F}$</td></tr><tr><td>10V</td><td>$\leq 20\%$</td><td>$\leq 30\%$</td><td>$0402 \geq 0.47\mu\text{F}$</td></tr><tr><td>6.3V</td><td>$\leq 30\%$</td><td>-</td><td>-</td></tr></table> *I.R.: $\geq 10\text{V}$, 1GΩ or 50Ω·F whichever Is smaller. Class II (X7R, X5R, X6S, X7S, Y5V) <table><tr><th>RATED VOLTAGE</th><th>INSULATION RESISTANCE</th></tr><tr><td>100V: All X7R; $1210 \geq 3.3\mu\text{F}$</td><td rowspan="6">1GΩ or apply $\geq 10\Omega \cdot \text{F}$ rule, whichever is smaller.</td></tr><tr><td>50V: $0402 \geq 0.01\mu\text{F}$; $0603 \geq 1.0\mu\text{F}$; $0805 \geq 1.0\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$</td></tr><tr><td>35V: $0603 \geq 1.0\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td></tr><tr><td>25V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$</td></tr><tr><td>16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 1.0\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$</td></tr><tr><td>10V: $0201 \geq 47\text{nF}$; $0402 \geq 0.47\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 47\mu\text{F}$</td></tr><tr><td>6.3V; 4V : All X6S/X7S items, Size ≥ 1812</td><td></td></tr></table>				RATED VOLTAGE	D.F.	EXCEPTIONS OF D.F. $\leq$		$\geq 0\text{V}$	$\leq 7.5\%$	$\leq 10\%$	$0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$	$\leq 20\%$	$1210 \geq 6.8\mu\text{F}$	35V	$\leq 10\%$	-	-	25V	$\leq 7.5\%$	$\leq 10\%$	$0402 \geq 0.047\mu\text{F}$; $0603 \geq 0.1\mu\text{F}$; $0805 \geq 0.33\mu\text{F}$; $1206 \geq 1.0\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$	$\leq 15\%$	$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 22\mu\text{F}$	16V ($\text{C} < 1.0\mu\text{F}$)	$\leq 10\%$	$\leq 12.5\%$	$0402 \geq 0.068\mu\text{F}$; $0603 \geq 0.68\mu\text{F}$	$\leq 20\%$	$0402 \geq 0.22\mu\text{F}$	16V ($\text{C} \geq 1.0\mu\text{F}$)	$\leq 12.5\%$	$\leq 20\%$	$0603 \geq 2.2\mu\text{F}$; $0805 \geq 3.3\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 22\mu\text{F}$; $1812 \geq 47\mu\text{F}$	10V	$\leq 20\%$	$\leq 30\%$	$0402 \geq 0.47\mu\text{F}$	6.3V	$\leq 30\%$	-	-	RATED VOLTAGE	INSULATION RESISTANCE	100V: All X7R; $1210 \geq 3.3\mu\text{F}$	1GΩ or apply $\geq 10\Omega \cdot \text{F}$ rule, whichever is smaller.	50V: $0402 \geq 0.01\mu\text{F}$; $0603 \geq 1.0\mu\text{F}$; $0805 \geq 1.0\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 4.7\mu\text{F}$	35V: $0603 \geq 1.0\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 2.2\mu\text{F}$; $1210 \geq 10\mu\text{F}$	25V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 2.2\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 10\mu\text{F}$	16V: $0201 \geq 0.1\mu\text{F}$; $0402 \geq 0.22\mu\text{F}$; $0603 \geq 1.0\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 10\mu\text{F}$; $1210 \geq 47\mu\text{F}$	10V: $0201 \geq 47\text{nF}$; $0402 \geq 0.47\mu\text{F}$; $0603 \geq 0.47\mu\text{F}$; $0805 \geq 2.2\mu\text{F}$; $1206 \geq 4.7\mu\text{F}$; $1210 \geq 47\mu\text{F}$	6.3V; 4V : All X6S/X7S items, Size ≥ 1812																																																																																		
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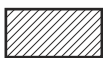
ADHESIVE STRENGTH OF TERMINATION



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			

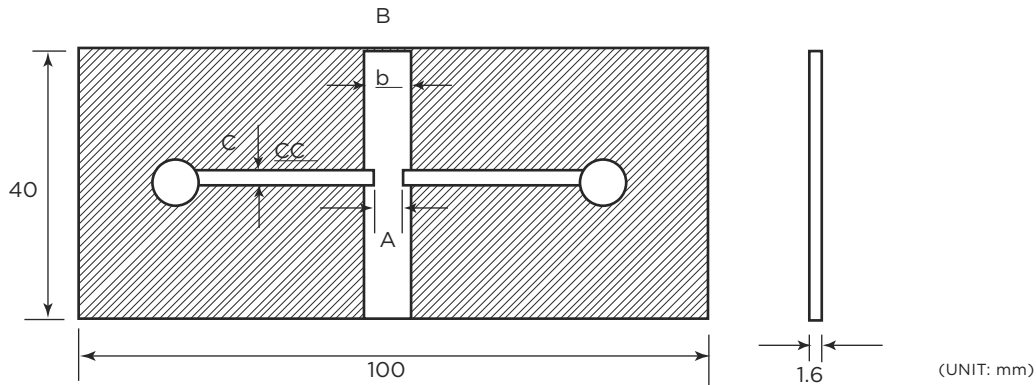


Material: Alumina Substrate (Al₂O₃ 95% Min) or Glass Epoxy Substrate



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

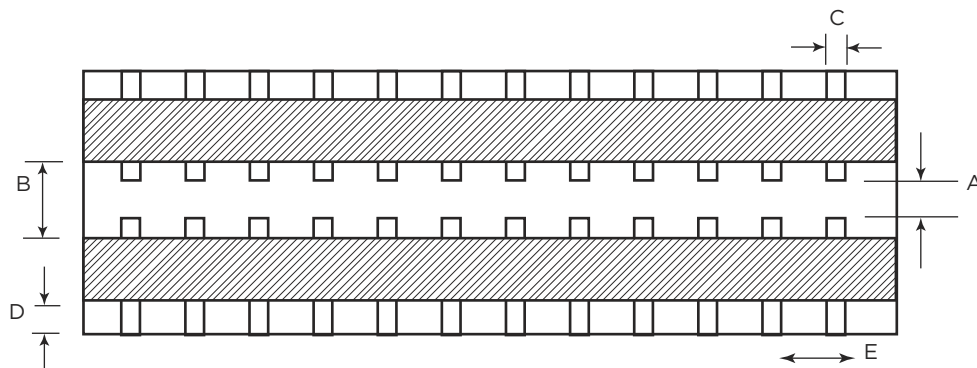


COPPER FOIL (t = 0.035mm)



SOLDER RESIST

TEST SUBSTRATE



(UNIT: mm)

CODE	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