



Surface Mount Multilayer Chip Capacitors



FEATURES

- Class 3 dielectric
- Four standard sizes
- High capacitance per unit volume
- Supplied in tape on reel
- For high frequency applications
- Ni-barrier with 100 % tin terminations.



**RoHS
COMPLIANT**

APPLICATIONS

- Consumer electronics
- Telecommunications
- Data processing
- Mobile applications

GENERAL SPECIFICATIONS

NOTE: Electrical characteristics values - temperature at 20 ± 1 °C, pressure at 86 to 106 Kpa and humidity at 63 to 67 % unless otherwise stated

Rated Voltage U_R (DC): 10 V; 16 V; 25 V; 50 V; 100 V

Capacitance Range: 0.01 μ F to 10 μ F

Tolerance on Capacitance:

After 1000 hours; ± 20 %; - 20 %/+ 80 %

Tan δ :

see Tests and requirements

Temperature Coefficient:

with no load applied; - 30 %/+ 85 %

Insulation Resistance after 120 seconds at U_R (DC):

R_{ins} 10 G Ω minimum or 500 Ω F minimum, whichever is less

Climatic Category (IEC 68): 25/85/21

Test Voltage (DC) for 1 minute: $2.5 \times U_R$

Ageing: typical 7 % per time decade

DIMENSIONS in inches [millimeters]					
	SIZE CODE	L	W	T MAX.	MB
	0402	0.040 \pm 0.002 [1.0 \pm 0.05]	0.020 \pm 0.002 [0.5 \pm 0.05]	0.022 [0.55]	0.010 + 0.002/- 0.004 [0.25 + 0.05/- 0.10]
	0603	0.063 + 0.006/- 0.004 [1.6 + 0.15/- 0.10]	0.030 + 0.006/- 0.004 [0.8 + 0.15/- 0.10]	0.038 [0.95]	0.015 \pm 0.006 [0.40 \pm 0.15]
	0805	0.080 \pm 0.008 [2.0 \pm 0.20]	0.050 \pm 0.008 [1.25 \pm 0.20]	0.058 [1.45]	0.020 \pm 0.008 [0.50 \pm 0.20]
	1206	0.125 + 0.012/- 0.004 [3.2 + 0.30/- 0.10]	0.063 + 0.012/- 0.004 [1.6 + 0.30/- 0.10]	0.075 [1.90]	0.025 \pm 0.008 [0.60 \pm 0.20]

ORDERING INFORMATION							
VJ0402	V	103	M	X	Q	C	W1BC
SIZE CODE	DIELECTRIC	CAPACITANCE	TOLERANCE	TERMINATION	VOLTAGE	PACKAGING	PROCESS CODE FOR VISHAY BCC MLCCS
0402 0603 0805 1206	V = Y5V	two significant digits followed by the number of zeros: 103 = 10000 pF	M = ± 20 % Z = - 20/+ 80 %	X = Ni-Barrier	Y = 6.3 V Q = 10 V J = 16 V X = 25 V A = 50 V B = 100 V	C = 7 inch reel/paper P = 13 inch reel/paper T = 7 inch reel/blister R = 13 inch reel/blister	

Class 3 Y5V 6.3/10/16/25/50/100 V

Vishay BCcomponents Surface Mount Multilayer Chip Capacitors



SELECTION CHART FOR 10/16/25/50 AND 100 V																						
DIELECTRIC		Y5V																				
EIA CAP CODE	EIA SIZE CAP	0402						0603					0805					1206				
		6.3V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V
102	1000 pF																					
122	1200																					
152	1500																					
182	1800																					
222	2200																					
272	2700																					
332	3300																					
392	3900																					
472	4700																					
562	5600																					
682	6800																					
822	8200																					
103	0.01 μF		N	N	N	N		S	S	S	S		A	A	A	A	B	B	B	B	B	B
123	0.012		N	N	N	N		S	S	S	S		A	A	A	A		B	B	B	B	
153	0.015		N	N	N	N		S	S	S	S		A	A	A	A	B	B	B	B	B	B
183	0.018		N	N	N	N		S	S	S	S		A	A	A	A		B	B	B	B	
223	0.022		N	N	N	N		S	S	S	S		A	A	A	A	B	B	B	B	B	B
273	0.027		N	N	N	N		S	S	S	S		A	A	A	A		B	B	B	B	
333	0.033		N	N	N	N		S	S	S	S		A	A	A	A	B	B	B	B	B	B
393	0.039		N	N	N			S	S	S	S		A	A	A	A		B	B	B	B	
473	0.047		N	N	N			S	S	S	S		A	A	A	A	B	B	B	B	B	B
563	0.056		N	N	N			S	S	S	S		A	A	A	A		B	B	B	B	
683	0.068		N	N	N			S	S	S	S		A	A	A	A	B	B	B	B	B	B
823	0.082		N	N	N			S	S	S	S		A	A	A	A		B	B	B	B	
104	0.1 μF	N	N	N	N			S	S	S	S		A	A	A	A	B	B	B	B	B	B
154	0.15		N					S	S	S	S		A	A	A	A	B	B	B	B	B	C
224	0.22		N					S	S	S			A	A	A	A		B	B	B	B	C
334	0.33	N						S	S	S			B	B	B	B		B	B	B	B	
474	0.47	N						S	S				B	B	B			B	B	B	B	
684	0.68	N						S	X				B	B	D			B	B	B	B	
105	1 μF	N						S	X				B	B	D			C	C	C	C	
155	1.5							S					D	D				C	C	C		
225	2.2							S					D	D				C	C	C		
335	3.3												D	D				J	J	J		
475	4.7												D	D				J	J	J		
685	6.8												I					J	J			
106	10 μF												I					J	J			
226	22 μF																	P				
336	33 μF																					
476	47 μF																					
686	68 μF																					
107	100 μF																					

Letters indicate product thickness, please see packaging quantities



PACKAGING QUANTITIES					
THICKNESS CLASSIFICATION (mm)		AMOUNT PER REEL			
		Δ180 mm; 7 inch			
		0402	0603	0805	1206
N =	0.50 ± 0.05	Paper 10 Kp/Reel	-	-	-
S =	0.8 ± 0.07	-	Paper 4 Kp/Reel	-	-
X =	0.8 + 0.15/- 0.10	-	Paper 4 Kp/Reel	-	-
A =	0.6 ± 0.1	-	-	Paper 4 Kp/Reel	-
B =	0.8 ± 0.1	-	-	Paper 4 Kp/Reel	Paper 4 Kp/Reel
C =	0.95 ± 0.1	-	-	-	Plastic 3 Kp/Reel
D =	1.25 ± 0.1	-	-	Plastic 3 Kp/Reel	Plastic 3 Kp/Reel
J =	1.15 ± 0.15	-	-	-	Plastic 3 Kp/Reel
I =	1.25 ± 0.2	-	-	Plastic 3 Kp/Reel	-
P =	1.60 + 0.30/- 0.10	-	-	-	Plastic 2 Kp/Reel
G =	1.60 ± 0.2	-	-	-	Plastic 2 Kp/Reel

PACKAGING QUANTITIES					
THICKNESS CLASSIFICATION (mm)		AMOUNT PER REEL			
		Δ330 mm; 13 inch			
		0402	0603	0805	1206
N =	0.50 ± 0.05	Paper 50 Kp/Reel	-	-	-
S =	0.8 ± 0.07	-	Paper 15 Kp/Reel	-	-
X =	0.8 + 0.15/- 0.10	-	Paper 15 Kp/Reel	-	-
A =	0.6 ± 0.1	-	-	Paper 15 Kp/Reel	-
B =	0.8 ± 0.1	-	-	Paper 15 Kp/Reel	Paper 15 Kp/Reel
C =	0.95 ± 0.1	-	-	-	Plastic 10 Kp/Reel
D =	1.25 ± 0.1	-	-	Plastic 10 Kp/Reel	Plastic 10 Kp/Reel
J =	1.15 ± 0.15	-	-	-	Plastic 10 Kp/Reel
I =	1.25 ± 0.2	-	-	Plastic 10 Kp/Reel	-
P =	1.60 + 0.30/- 0.10	-	-	-	-
G =	1.60 ± 0.2	-	-	-	-

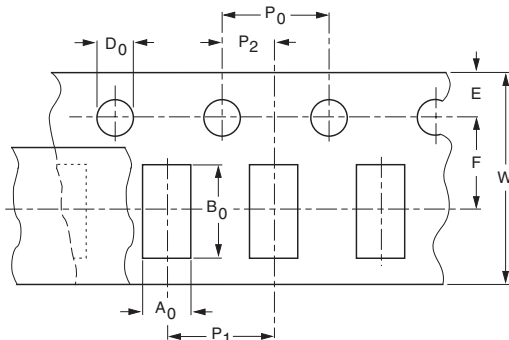
COVER TAPE (POLYESTER - ANTISTATIC)

PROPERTIES OF COVER TAPE	
PARAMETER	WIDTH
Breaking force	≥ 10.7 N
Elongation at break	≥ 63 %
Surface resistance	< 10 ¹⁰ Ω/sq.
Softening point	71 ± 5 °C
Thickness	62 μm

CARRIER TAPE (POLYCARBONATE)

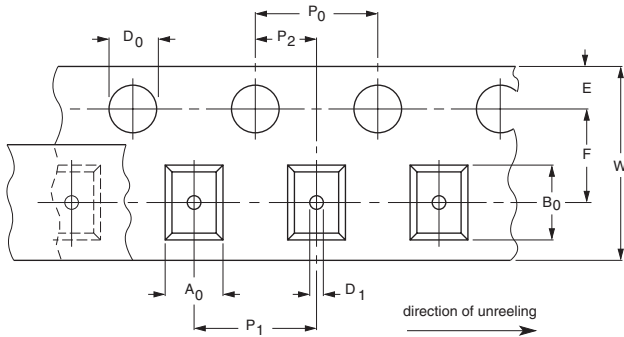
PROPERTIES OF CARRIER TAPE	
PARAMETER	WIDTH
Thickness	190 to 280 μm
Tensile strength at break	> 60 N/mm ²
Elongation at break	100 to 150 %
Surface resistance	> 10 ¹² Ω/sq.

PAPER TAPE SPECIFICATIONS



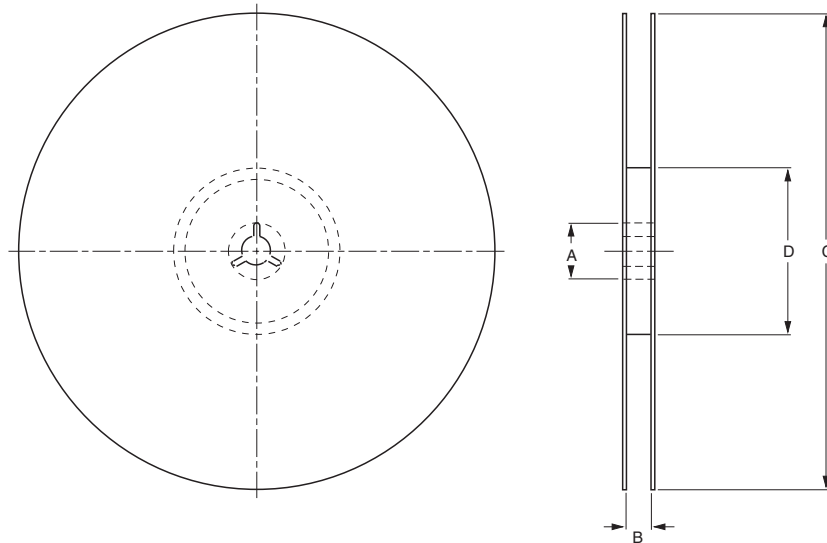
DIMENSIONS OF PAPER TAPE in millimeters								
SYMBOL	PRODUCT SIZE CODE							
	0402		0603		0805		1206	
	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.	SIZE	TOL.
A ₀	0.62	± 0.05	1.02	± 0.05	1.50	± 0.10	2.00	± 0.10
B ₀	1.12	± 0.05	1.82	± 0.05	2.30	± 0.10	3.50	± 0.10
W	8.00	± 0.10	8.00	± 0.10	8.00	± 0.10	8.00	± 0.10
E	1.75	± 0.05	1.75	± 0.05	1.75	± 0.05	1.75	± 0.10
F	3.50	± 0.05	3.50	± 0.05	3.50	± 0.05	3.50	± 0.05
D ₀	1.55	± 0.05	1.55	± 0.05	1.55	± 0.05	1.50	± 0.05
P ₀	4.00	± 0.10	4.00	± 0.10	4.00	± 0.10	4.00	± 0.10
P ₁	2.00	± 0.05	4.00	± 0.10	4.00	± 0.10	4.00	± 0.10
P ₂	2.00	± 0.05	2.00	± 0.05	2.00	± 0.05	2.00	± 0.05

BLISTER TAPE SPECIFICATIONS



DIMENSIONS OF BLISTER TAPE in millimeters			
DIMENSION	PRODUCT		TOLERANCE
	0805	1206	
A ₀	< 1.57	< 2.00	-
B ₀	< 2.45	< 3.60	-
W	8.00	8.00	± 0.10
E	1.75	1.75	± 0.10
F	3.50	3.50	± 0.05
D ₀	1.50	1.50	± 0.05
D ₁	1.00	1.00	± 0.10
P ₀	4.00	4.00	± 0.10
P ₁	4.00	4.00	± 0.10
P ₂	2.00	2.00	± 0.05

REEL SPECIFICATIONS



REEL DIMENSIONS AND TAPE WIDTH in millimeters		
	∅ 180 mm; 7 inch	∅ 330 mm; 13 inch
A	13.0 ± 1.0	13.0 ± 0.5
B	9.0 ± 1.0	9.0 ± 1.0
C	178.0 ± 1.0	330.0 ± 1.0
D	60.5 ± 1.0	100.0 ± 1.0

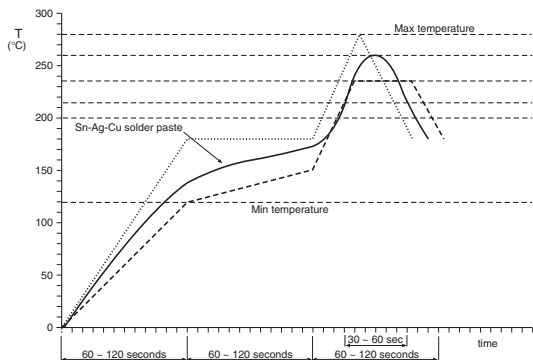
METHOD OF MOUNTING AND DIMENSIONS OF SOLDER LANDS

For normal use the capacitors may be mounted on printed-circuit boards or ceramic substrates by applying wave soldering and reflow soldering.

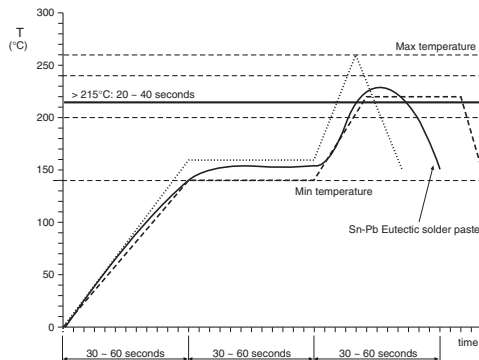
An improper combination of soldering, substrate and chip size can lead to a damaging of the component. The risk increases with the chip size and with temperature fluctuations (> 100 °C) Therefore, it is advised to use the smallest possible size and follow the dimensional recommendations given.

SOLDERING GRAPHS

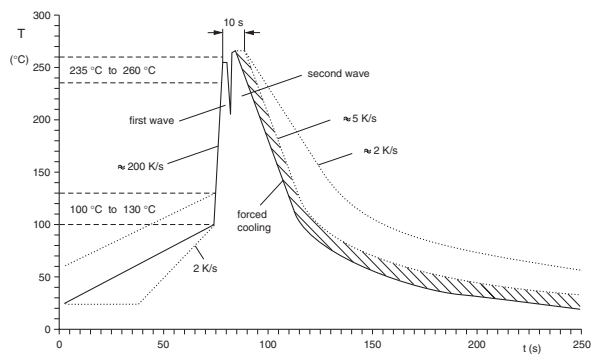
IR REFLOW WITH SnAgCu SOLDERING



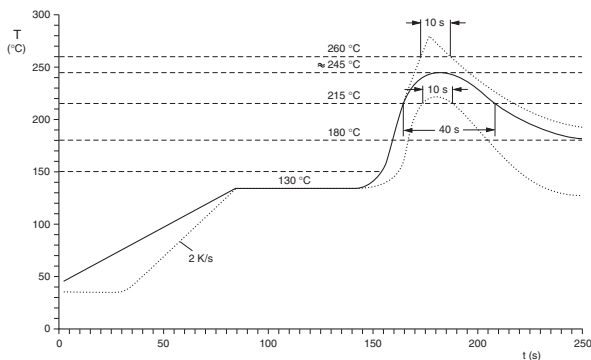
IR REFLOW WITH SnPb SOLDER



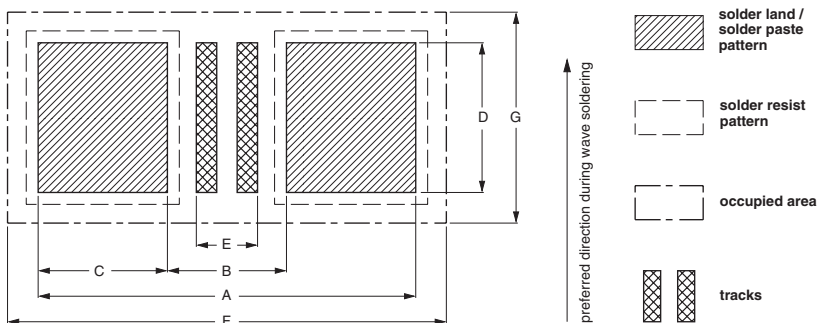
WAVE SOLDERING



REFLOW SOLDERING



RECOMMENDED DIMENSIONS OF SOLDER LANDS in millimeters





REFLOW SOLDERING									
SIZE CODE	FOOTPRINT DIMENSIONS in mm							PROCESSING REMARKS	PLACEMENT ACCURACY
	A	B	C	D	E	F	G		
0402	1.50	0.50	0.50	0.50	0.10	1.75	0.95	IR or hot plate soldering	± 0.15
0603	2.30	0.70	0.80	0.80	0.20	2.55	1.40		± 0.25
0805	2.80	1.00	0.90	1.30	0.40	3.08	1.85		± 0.25
1206	4.00	2.20	0.90	1.60	1.60	4.25	2.25		± 0.25

WAVE SOLDERING									
SIZE CODE	FOOTPRINT DIMENSIONS in mm							PROPOSED NUMBER AND DIMENSIONS OF DUMMY TRACKS (mm)	PLACEMENT ACCURACY (mm)
	A	B	C	D	E	F	G		
0603	2.40	1.00	0.70	0.80	0.20	3.10	1.90	1 x (0.2 x 0.8)	± 0.10
0805	3.20	1.40	0.90	1.30	0.36	4.10	2.50	1 x (0.3 x 1.3)	± 0.15
1206	4.80	2.30	1.25	1.70	1.25	5.90	3.20	3 x (0.25 x 1.7)	± 0.25

TEST CONDITIONS IN STATIC SOLDER BATH	
PARAMETER	DESCRIPTION
SOLDERABILITY	
95 % covered with smooth and bright solder coating	CECC requirement: 235 ± 5 °C for 2 ± 0.5 seconds IEC requirement: 215 ± 3 °C for 3 ± 0.3 seconds
RESISTANCE TO LEACHING	
10 % of the metallization of the edges of the head face may be missing (inner electrodes are not visible)	260 ± 5 °C for 30 ± 1 second

TEST PROCEDURES AND REQUIREMENTS																																																							
TEST	PROCEDURE	REQUIREMENTS																																																					
1) Visual and mechanical		<ul style="list-style-type: none"> No remarkable defect. Dimensions should confirm to individual specification sheet. 																																																					
2) Capacitance	Class I: NP0 Cap ≤ 1000 pF; 1.0 ± 0.2 V _{rms} ; 1 MHz ± 10 %	<ul style="list-style-type: none"> Shall not exceed the limits given in the detailed specification. 																																																					
3) Q/D.F (Dissipation Factor)	Cap > 1000 pF; 1.0 ± 0.2 V _{rms} ; 1 kHz ± 10 % Class II: X7R, X5R, Y5V Cap ≤ 10 μF; 1.0 ± 0.2 V _{rms} ; 1 kHz ± 10 % Cap > 10 μF; 0.5 ± 0.2 V _{rms} ; 120 Hz ± 20 %	NP0: Cap ≥ 30 pF: Q ≥ 1000 Cap < 30 pF: Q ≥ 400 + 20C. X7R, X5R: <table border="1"> <thead> <tr> <th>Rated Vol.</th> <th>D.F.</th> <th colspan="2">Exception of D.F.</th> </tr> </thead> <tbody> <tr> <td>≥ 50 V</td> <td>≤ 2.5 %</td> <td>≤ 3 %</td> <td>0603 ≥ 0.047μF, 0805 ≥ 0.18μF, 1206 ≥ 0.47μF</td> </tr> <tr> <td>25 V</td> <td>≤ 3.5 %</td> <td>≤ 5 % ≤ 7 %</td> <td>0805 ≥ 1μF, 1210 ≥ 10μF 0603 ≥ 0.33μF</td> </tr> <tr> <td>16 V</td> <td>≤ 3.5 %</td> <td>≤ 5 %</td> <td>0201 ≥ 0.0047μF, 0402 ≥ 0.033μF, 0603 ≥ 0.15μF, 0805 ≥ 0.68μF, 1206 ≥ 2.2μF</td> </tr> <tr> <td>10 V</td> <td>≤ 5.0 %</td> <td>–</td> <td>–</td> </tr> <tr> <td>6.3 V</td> <td>≤ 10 %</td> <td>≤ 15 %</td> <td>0805 ≥ 10μF</td> </tr> </tbody> </table> Y5V: <table border="1"> <thead> <tr> <th>Rated Vol.</th> <th>D.F.</th> <th colspan="2">Exception of D.F.</th> </tr> </thead> <tbody> <tr> <td>≥ 50 V</td> <td>≤ 5.0 %</td> <td>–</td> <td>–</td> </tr> <tr> <td>25 V</td> <td>≤ 5.0 %</td> <td>≤ 7 % ≤ 9 %</td> <td>0603 ≥ 0.1μF, 0805 ≥ 0.33μF, 1206 ≥ 1μF 0402 ≥ 0.068μF</td> </tr> <tr> <td>16 V (C < 1μF)</td> <td>≤ 7.0 %</td> <td>≤ 9 %</td> <td>0402 ≥ 0.068μF</td> </tr> <tr> <td>16 V (C ≥ 1μF)</td> <td>≤ 9.0 %</td> <td>–</td> <td>–</td> </tr> <tr> <td>≤ 10 V</td> <td>≤ 12.5</td> <td>–</td> <td>–</td> </tr> <tr> <td>≤ 6.3 V</td> <td>≤ 20 %</td> <td>–</td> <td>–</td> </tr> </tbody> </table>		Rated Vol.	D.F.	Exception of D.F.		≥ 50 V	≤ 2.5 %	≤ 3 %	0603 ≥ 0.047μF, 0805 ≥ 0.18μF, 1206 ≥ 0.47μF	25 V	≤ 3.5 %	≤ 5 % ≤ 7 %	0805 ≥ 1μF, 1210 ≥ 10μF 0603 ≥ 0.33μF	16 V	≤ 3.5 %	≤ 5 %	0201 ≥ 0.0047μF, 0402 ≥ 0.033μF, 0603 ≥ 0.15μF, 0805 ≥ 0.68μF, 1206 ≥ 2.2μF	10 V	≤ 5.0 %	–	–	6.3 V	≤ 10 %	≤ 15 %	0805 ≥ 10μF	Rated Vol.	D.F.	Exception of D.F.		≥ 50 V	≤ 5.0 %	–	–	25 V	≤ 5.0 %	≤ 7 % ≤ 9 %	0603 ≥ 0.1μF, 0805 ≥ 0.33μF, 1206 ≥ 1μF 0402 ≥ 0.068μF	16 V (C < 1μF)	≤ 7.0 %	≤ 9 %	0402 ≥ 0.068μF	16 V (C ≥ 1μF)	≤ 9.0 %	–	–	≤ 10 V	≤ 12.5	–	–	≤ 6.3 V	≤ 20 %	–	–
Rated Vol.	D.F.	Exception of D.F.																																																					
≥ 50 V	≤ 2.5 %	≤ 3 %	0603 ≥ 0.047μF, 0805 ≥ 0.18μF, 1206 ≥ 0.47μF																																																				
25 V	≤ 3.5 %	≤ 5 % ≤ 7 %	0805 ≥ 1μF, 1210 ≥ 10μF 0603 ≥ 0.33μF																																																				
16 V	≤ 3.5 %	≤ 5 %	0201 ≥ 0.0047μF, 0402 ≥ 0.033μF, 0603 ≥ 0.15μF, 0805 ≥ 0.68μF, 1206 ≥ 2.2μF																																																				
10 V	≤ 5.0 %	–	–																																																				
6.3 V	≤ 10 %	≤ 15 %	0805 ≥ 10μF																																																				
Rated Vol.	D.F.	Exception of D.F.																																																					
≥ 50 V	≤ 5.0 %	–	–																																																				
25 V	≤ 5.0 %	≤ 7 % ≤ 9 %	0603 ≥ 0.1μF, 0805 ≥ 0.33μF, 1206 ≥ 1μF 0402 ≥ 0.068μF																																																				
16 V (C < 1μF)	≤ 7.0 %	≤ 9 %	0402 ≥ 0.068μF																																																				
16 V (C ≥ 1μF)	≤ 9.0 %	–	–																																																				
≤ 10 V	≤ 12.5	–	–																																																				
≤ 6.3 V	≤ 20 %	–	–																																																				



TEST PROCEDURES AND REQUIREMENTS										
TEST	PROCEDURE		REQUIREMENTS							
4) Dielectric strength	<ul style="list-style-type: none"> To apply voltage ($\leq 50V$) 250%. Duration: 1 to 5 seconds. Charge and discharge current less than 50 mA. 		<ul style="list-style-type: none"> No evidence of damage or flash-over during test. 							
	<ul style="list-style-type: none"> To apply voltage: <table border="0"> <tr> <td>100V</td> <td>≥ 3 times V DC</td> </tr> <tr> <td>200V ~ 300V</td> <td>≥ 2 times V DC</td> </tr> <tr> <td>500V ~ 999V</td> <td>≥ 1.5 times V DC</td> </tr> <tr> <td>1000V ~ 3000V</td> <td>≥ 1.2 times V DC</td> </tr> </table> Cut-off, set at 10mA TEST = 15 seconds RAMP = 0 				100V	≥ 3 times V DC	200V ~ 300V	≥ 2 times V DC	500V ~ 999V	≥ 1.5 times V DC
100V	≥ 3 times V DC									
200V ~ 300V	≥ 2 times V DC									
500V ~ 999V	≥ 1.5 times V DC									
1000V ~ 3000V	≥ 1.2 times V DC									
5) Insulation resistance	To apply rated voltage for max. 120 seconds		≥ 10 G Ω or R x C $\geq 500\Omega$ F whichever is smaller.							
	Rated voltage: 100 ~ 500V	To apply rated voltage for 60 seconds	≥ 10 G Ω .							
	Rated voltage: > 500V	To apply 500V for 60 seconds	≥ 10 G Ω .							
6) Temperature coefficient	With no electrical load:									
	T.C.	Operating Temp	T.C.	Capacitance Change						
	NP0 (C0G)	- 55 ~ 125 °C at 25 °C	NP0 (C0G)	Within ± 30 ppm/°C						
	NP0 (C0J)	- 55 ~ 125 °C at 25 °C	NP0 (C0J)	Within ± 120 ppm/°C						
	X7R	- 55 ~ 125 °C at 25 °C	X7R	Within ± 15 %						
	X5R	- 55 ~ 85 °C at 25 °C	X5R	Within ± 15 %						
	Y5V	- 25 ~ 85 °C at 20 °C	Y5V	Within + 30 %/- 80 %						
7) Adhesive strength of termination	<ul style="list-style-type: none"> Pressurizing force: <table border="0"> <tr> <td>0201: 2N</td> </tr> <tr> <td>0402 and 0603: 5 N</td> </tr> <tr> <td>> 0603: 10 N</td> </tr> </table> Test time 10 ± 1 second. 		0201: 2N	0402 and 0603: 5 N	> 0603: 10 N	<ul style="list-style-type: none"> No remarkable damage or removal of the terminations. 				
0201: 2N										
0402 and 0603: 5 N										
> 0603: 10 N										
8) Vibration resistance	<ul style="list-style-type: none"> Vibration frequency: 10 to 55 Hz/minute. Total amplitude: 1.5 mm. Test time: 6 hours (2 hours each in 3 mutually perpendicular directions). 		<ul style="list-style-type: none"> No remarkable damage. Capacitance change and Q/D.F.: To meet initial specification. 							
9) Solderability	<ul style="list-style-type: none"> Solder temperature: 235 ± 5 °C. Dipping time: 2 ± 0.5 seconds. 		95 % minimum coverage of all metallized area.							
10) Bending test	<ul style="list-style-type: none"> The middle part of the substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 ± 1 seconds. Measurement to be made after keeping at room temperature for 24 ± 2 hours. 		<ul style="list-style-type: none"> No remarkable damage Capacitance change: <table border="0"> <tr> <td>NP0: within ± 5.0 % or ± 0.5 pF whichever is larger.</td> </tr> <tr> <td>X7R, X5R: within ± 12.5 %</td> </tr> <tr> <td>Y5V: within ± 30 %</td> </tr> </table> (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test) 		NP0: within ± 5.0 % or ± 0.5 pF whichever is larger.	X7R, X5R: within ± 12.5 %	Y5V: within ± 30 %			
NP0: within ± 5.0 % or ± 0.5 pF whichever is larger.										
X7R, X5R: within ± 12.5 %										
Y5V: within ± 30 %										
11) Resistance to soldering heat	<ul style="list-style-type: none"> Solder temperature: 270 ± 5 °C. Dipping time: 10 ± 1 second. Preheating: 120 to 150 °C for 1 minute before immerse the capacitor in a eutectic solder. Before initial measurement (Class II only): Perform $150 \pm 0/- 10$ °C for 1 hour and then set for 48 ± 4 hrs at room temperature. Measurement to be made after keeping at room temperature for 24 ± 2 hours (Class I) or 48 ± 4 hours (Class II). 		<ul style="list-style-type: none"> No remarkable damage Capacitance change: <table border="0"> <tr> <td>NP0: within ± 2.5 % or ± 0.25 pF whichever is larger.</td> </tr> <tr> <td>X7R, X5R: within ± 7.5 %</td> </tr> <tr> <td>Y5V: within ± 20 %</td> </tr> </table> Q/D.F., I.R. and dielectric strength: To meet initial requirements. 25 % maximum leaching on each edge. 		NP0: within ± 2.5 % or ± 0.25 pF whichever is larger.	X7R, X5R: within ± 7.5 %	Y5V: within ± 20 %			
NP0: within ± 2.5 % or ± 0.25 pF whichever is larger.										
X7R, X5R: within ± 7.5 %										
Y5V: within ± 20 %										



TEST PROCEDURES AND REQUIREMENTS				
TEST	PROCEDURE		REQUIREMENTS	
12) Temperature cycle	<ul style="list-style-type: none"> Conduct the 5 cycles according to the temperatures and time. 		<ul style="list-style-type: none"> No remarkable damage Capacitance change: <ul style="list-style-type: none"> NP0: within $\pm 2.5\%$ or ± 0.25 pF whichever is larger. X7R, X5R: within $\pm 7.5\%$ Y5V: within $\pm 20\%$ Q/D.F., I.R. and dielectric strength: To meet initial requirements. 	
	Step	Temperature (°C)		Time (min.)
	1	Min. operating temp. + 0/- 3		30 \pm 3
	2	Room temperature		2 ~ 3
	3	Min. operating temp. + 3/- 0		30 \pm 3
4	Room temperature	2 ~ 3		
13) Humidity (steady state)	<ul style="list-style-type: none"> Test temperature: 40 \pm 2 °C. Humidity: 90 ~ 95 % RH. Test time: 500 + 24/- 0 hours. Measurement to be made after keeping at room temperature for 24 \pm 2 hours (Class I) or 48 \pm 4 hours (Class II). 		<ul style="list-style-type: none"> No remarkable damage Capacitance change: <ul style="list-style-type: none"> NP0: within $\pm 5.0\%$ or ± 0.5 pF whichever is larger. X7R, X5R: ≥ 10V, within $\pm 12.5\%$ 6.3V, within $\pm 25\%$ Y5V: within $\pm 30\%$ Q/D.F. value: NP0: Cap ≥ 30 pF: Q ≥ 350 10pF \leq Cap < 30 pF: Q $\geq 275 + 2.5$C Cap < 10pF: Q $\geq 200 + 10$C 	
	Rated Vol.	D.F.	Exception of D.F.	
	≥ 50 V	$\leq 3.0\%$	$\leq 6\%$ 0603 $\geq 0.047\mu$ F, 0805 $\geq 0.18\mu$ F, 1206 $\geq 0.47\mu$ F	
	25 V	$\leq 5.0\%$	$\leq 10\%$ 0805 $\geq 1\mu$ F, 1210 $\geq 10\mu$ F $\leq 14\%$ 0603 $\geq 0.33\mu$ F	
	16 V	$\leq 5.0\%$	$\leq 10\%$ 0402 $\geq 0.033\mu$ F, 0603 $\geq 0.15\mu$ F, 0805 $\geq 0.68\mu$ F, 1206 $\geq 2.2\mu$ F	
	10 V	$\leq 7.5\%$	$\leq 15\%$ 0402 $\geq 0.056\mu$ F, 0603 $\geq 0.33\mu$ F, 0805 $\geq 2.2\mu$ F, 1206 $\geq 2.2\mu$ F	
	6.3 V	$\leq 15\%$	$\leq 30\%$ 0805 $\geq 10\mu$ F	
	Y5V:			
	Rated Vol.	D.F.	Exception of D.F.	
	≥ 50 V	$\leq 7.5\%$	– –	
	25 V	$\leq 7.5\%$	$\leq 10\%$ 0603 $\geq 0.1\mu$ F, 0805 $\geq 0.33\mu$ F, 1206 $\geq 1\mu$ F $\leq 12.5\%$ 0402 $\geq 0.068\mu$ F	
	16 V (C $< 1\mu$ F)	$\leq 10\%$	$\leq 12.5\%$ 0402 $\geq 0.068\mu$ F	
	16 V (C $\geq 1\mu$ F)	$\leq 12.5\%$	– –	
	10 V	$\leq 15\%$	– –	
	≤ 6.3 V	$\leq 30\%$	– –	
	<ul style="list-style-type: none"> I.R.: $\geq 1G\Omega$ or R x C $\geq 50\Omega$F whichever is smaller 			



TEST PROCEDURES AND REQUIREMENTS					
TEST	PROCEDURE	REQUIREMENTS			
14) Humidity load (damp heat)	<ul style="list-style-type: none"> • Test temperature: 40 ± 2 °C. • Humidity: 90 ~ 95 % RH. • Test time: 500 + 24/- 0 hours. • To apply voltage: rated voltage (Max 500V). • Measurement to be made after keeping at room temperature for 24 ± 2 hours (Class I) or 48 ± 4 hours (Class II). 	<ul style="list-style-type: none"> • No remarkable damage • Capacitance change: NP0: within ± 7.5 % or ± 0.75 pF whichever is larger. X7R, X5R: $\geq 10V$, within ± 12.5 % 6.3V, with ± 25 % Y5V: $\geq 10V$, within ± 30 % 6.3V, within + 30 to - 40 % • Q/D.F. value: NP0: Cap ≥ 30 pF: Q ≥ 200 Cap < 30 pF: Q $\geq 100 + 10/3C$ X7R, X5R: 			
		Rated Vol.	D.F.	Exception of D.F.	
		≥ 50 V	≤ 3.0 %	≤ 6 %	0603 $\geq 0.047\mu F$, 0805 $\geq 0.18\mu F$, 1206 $\geq 0.47\mu F$
		25 V	≤ 5.0 %	≤ 10 %	0805 $\geq 1\mu F$, 1210 $\geq 10\mu F$
				≤ 14 %	0603 $\geq 0.33\mu F$
		16 V	≤ 5.0 %	≤ 10 %	0402 $\geq 0.033\mu F$, 0603 $\geq 0.15\mu F$, 0805 $\geq 0.68\mu F$, 1206 $\geq 2.2\mu F$
		10 V	≤ 7.5 %	≤ 15 %	0402 $\geq 0.056\mu F$, 0603 $\geq 0.33\mu F$, 0805 $\geq 2.2\mu F$, 1206 $\geq 2.2\mu F$
		6.3 V	≤ 15 %	≤ 30 %	0805 $\geq 10\mu F$
		Y5V:			
		Rated Vol.	D.F.	Exception of D.F.	
		≥ 50 V	≤ 7.5 %	-	-
		25 V	≤ 7.5 %	10 %	0603 $\geq 0.1\mu F$, 0805 $\geq 0.33\mu F$, 1206 $\geq 1\mu F$
				12.5 %	0402 $\geq 0.068\mu F$
		16 V (C < 1 μF)	≤ 10 %	-	-
		16 V (C $\geq 1\mu F$)	≤ 12.5	-	-
		10 V	≤ 15 %	-	-
		6.3 V	≤ 30 %	-	-
• I.R.: $\geq 500M\Omega$ or R x C $\geq 25\Omega F$ whichever is smaller					
15) High temperature load (endurance)	<ul style="list-style-type: none"> • Test temperature: NP0, X7R: 125 ± 3 °C X5R, Y5V: 85 ± 3 °C. • To apply voltage: (1) 6.3V or C $\geq 10\mu F$ (for X7R, X5R): 150% of rated voltage. (2) 6.3V < V < 500V and C < 10μF (for X7R, X5R): 200% of rated voltage. (3) 500V: 150% of rated voltage. (4) V $\geq 630V$: 120% of rated voltage. (Max. 3600V) • Test time: 1000 + 24/- 0 hours. • Measurement to be made after keeping at room temperature for 24 ± 2 hours (Class I) or 48 ± 4 hours (Class II). 	<ul style="list-style-type: none"> • No remarkable damage • Capacitance change: NP0: within ± 3.0 % or ± 0.3 pF whichever is larger. X7R, X5R: $\geq 10V$, within ± 12.5 % 6.3V, with ± 25 % Y5V: $\geq 10V$, within ± 30 % 6.3V, within + 30 to - 40 % • Q/D.F. value: NP0: Cap ≥ 30 pF: Q ≥ 350 10pF \leq Cap < 30 pF: Q $\geq 275 + 2.5C$ Cap < 10pF: Q $\geq 200 + 10C$ X7R, X5R: 			
		Rated Vol.	D.F.	Exception of D.F.	
		≥ 50 V	≤ 3.0 %	≤ 6 %	0603 $\geq 0.047\mu F$, 0805 $\geq 0.18\mu F$, 1206 $\geq 0.47\mu F$
		25 V	≤ 5.0 %	≤ 10 %	0805 $\geq 1\mu F$, 1210 $\geq 10\mu F$
				≤ 14 %	0603 $\geq 0.33\mu F$
		16 V	≤ 5.0 %	≤ 10 %	0402 $\geq 0.033\mu F$, 0603 $\geq 0.15\mu F$, 0805 $\geq 0.68\mu F$, 1206 $\geq 2.2\mu F$
		10 V	≤ 7.5 %	≤ 15 %	0402 $\geq 0.056\mu F$, 0603 $\geq 0.33\mu F$, 0805 $\geq 2.2\mu F$, 1206 $\geq 2.2\mu F$
		6.3 V	≤ 15 %	≤ 30 %	0805 $\geq 10\mu F$
		Y5V:			
		Rated Vol.	D.F.	Exception of D.F.	
		≥ 50 V	≤ 7.5 %	-	-
		25 V	≤ 7.5 %	10 %	0603 $\geq 0.1\mu F$, 0805 $\geq 0.33\mu F$, 1206 $\geq 1\mu F$
				12.5 %	0402 $\geq 0.068\mu F$
		16 V (C < 1 μF)	≤ 10 %	-	-
		16 V (C $\geq 1\mu F$)	≤ 12.5	-	-
		≤ 10 V	≤ 15 %	-	-
		6.3 V	≤ 30 %	-	-
• I.R.: $\geq 1G\Omega$ or R x C $\geq 50\Omega F$ whichever is smaller					



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.