PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

No.566-1, Kaoshi Rd., Yangmei, Taoyuan 32668, Taiwan (R.O.C.)

Tel : 886-3-4753355 Fax : 886-3-4854959

http://www.pdc.com.tw

Messrs. : 一般共用

Date : 2024/07/01

APPROVAL SHEET

Product Name : Anti-Bend General Purpose Multilayer Ceramic Chip Capacitors

Part No. : FP Series

Description : Anti-Bend Size 0402~2225, C0G/X7R, 25V~6000V

PREPARED BY	APPROVED BY

信昌電子陶瓷股份有限公司

PROSPERITY DIELECTRICS CO., LTD.

桃園市楊梅區高獅路 566-1 號 http://www.pdc.com.tw

Tel : 03-4753355 ext : **Fax : 03-4854959**

Contactor : _____ **Mobile :** _____

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

No.566-1, Kaoshi Rd., Yangmei, Taoyuan 32668, Taiwan (R.O.C.)

Tel : 886-3-4753355 Fax : 886-3-4854959

http://www.pdc.com.tw

SPECIFICATION

FOR

Product Name : Anti-Bend General Purpose Multilayer Ceramic Chip Capacitors

Part No. : FP Series

Description : Anti-Bend Size 0402~2225, C0G/X7R, 25V~6000V

SPEC. No. : FP-000-001-23
DATE : 2024/07/01

DRAWN BY	CHECEKED BY	APPROVED BY
Jane Hsiao	Yvens Chou	Jason Lin

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

1. INTRODUCTION

POSPERITY Multilayer Ceramic Chip Capacitors supplied in bulk or tape & reel package are ideally suitable for thick-film hybrid circuits and automatic surface mounting on any printed circuit boards.

FP series use a special material between nickel-barrier and ceramic body. It provides excellent performance to against bending stress occurred during process and provide more security for PCB process.

The nickel-barrier terminations are consisted of a nickel barrier layer over the silver metallization and then finished by electroplated solder layer to ensure the terminations have good solderability. The nickel barrier layer in terminations prevents the dissolution of termination when extended immersion in molten solder at elevated solder temperature.

2. FEATURES

a. High performance to withstanding 3~5mm of substrate bending test guarantee.
b. A wide selection of sizes is available.
c. High capacitance in given case size.
d. Capacitor with lead-free termination (pure Tin).
e. Reduction in PCB bend failure.
f. High reliability and stability.
g. RoHS & HALOGEN FREE.

3. APPLICATIONS

a. For general digital circuit.
b. For power supply bypass capacitors.
c. For consumer electronics.
d. For telecommunication.
e. DC to DC converter.

4. HOW TO ORDER

FP	32	X	225	K	101	E	G	G
PDC Family	Size	Dielectric	Capacitance	Tolerance	Rated Voltage	Packaging	Thickness	Control Code
Table 1	Table 2	Table 3	Table 4	Table 5	Table 6	Table 7	Table 8	Table 9

Table 1 PDC Family

Code	Description
FP	Anti-Bend General Purpose Product

Table 2 General Purpose

Code	Description	Code	Description	Code	Description
15	0402 (1005)	32	1210 (3225)	52	2211 (5728)
18	0603 (1608)	42	1808 (4520)	55	2220 (5750)
21	0805 (2012)	43	1812 (4532)	56	2225 (5763)
31	1206 (3216)	46	1825 (4563)		

Table 3 Dielectric Material Characteristics

Code	Description	Code	Description
N	C0G	X	X7R
B	X5R		

Table 4 Capacitance Rule Code

Code	Description	Code	Description
R47	0.47pF	102	$102=10x10^2=1000pF$
0R5	0.5pF	104	$104=10x10^4=100nF$
100	$100=10x10^0=10pF$	106	$106=10x10^6=10\mu F$

Table 5 Tolerance

Code	Description	Code	Description	Code	Description
A	±0.05 pF	I	-10% ~ 0%	Q	±0.03 pF
B	±0.10 pF	J	±5 %	Z	-20% ~ +80%
C	±0.25 pF	K	±10 %	X	+10% ~ +20%
D	±0.50 pF	L	0% ~ +10%		
F	±1 %	M	±20 %		
G	±2 %	N	-5% ~ +10%		
H	±3 %	P	±0.02 pF		

Table 6 Rated Voltage

Code	Description	Code	Description	Code	Description
6R3	6.3Vdc	251	250Vdc	252	2500Vdc
100	10Vdc	401	400Vdc	302	3000Vdc
160	16Vdc	501	500Vdc	352	3500Vdc
250	25Vdc	631	630Vdc	402	4000Vdc
500	50Vdc	102	1000Vdc	502	5000Vdc
101	100Vdc	152	1500Vdc	602	6000Vdc
201	200Vdc	202	2000Vdc		

Table 7 Packaging Type

Code	Description	Code	Description
B	Bulk	T	Tray package
E	Tape and 7" Reel, Embossed Tape	P	Tape and 7" Reel, Paper Tape
K	Tape and 10" Reel, Embossed Tape	D	Tape and 10" Reel, Paper Tape
L	Tape and 13" Reel, Embossed Tape	G	Tape and 13" Reel, Paper Tape

Table 8 Thickness Description

Code	Description	Code	Description	Code	Description
A	0.60 ± 0.10 mm	I	1.25 ± 0.20 mm	Q	0.50 +0.02/-0.05 mm
B	0.8 + 0.15/-0.10 mm	J	1.15 ± 0.15 mm	R	3.10 ± 0.30 mm
C	1.25 ± 0.10 mm	K	0.50 ± 0.20 mm	S	0.80 ± 0.07 mm
D	1.40 ± 0.15 mm	L	0.30 ± 0.03 mm	T	0.85 ± 0.10 mm
E	1.60 ± 0.20 mm	M	0.95 ± 0.10 mm	U	0.50 ± 0.10 mm
F	2.00 ± 0.20 mm	N	0.50 ± 0.05 mm	V	0.20 ± 0.02 mm
G	2.50 ± 0.30 mm	O	3.50 ± 0.20 mm	X	0.80 ± 0.10 mm
H	2.80 ± 0.30 mm	P	1.60 +0.3/-0.10 mm	Z	0.25 ± 0.03 mm

Table 9 Special Control Code

Code	Description	Code	Description
G	RoHS Compliant	H	High reliability

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

5. EXTERNAL DIMENSIONS

Size Inch (mm)	L (mm)	W (mm)	Code / T (mm)	M_B (mm)
0402(1005)	1.00±0.20	0.50±0.20	See No.4 Reference Table 8	0.25 +0.05/-0.10
0603(1608)	1.60±0.20	0.80±0.20		0.40±0.15
0805(2012)	2.10±0.20	1.25±0.20		0.50±0.20
1206(3216)	3.30±0.30	1.60±0.20 1.60 +0.30/-0.10# ▼1.60±0.40		0.60±0.20
1210(3225)	3.30±0.40	2.50±0.30 ▼2.50+0.35/-0.30		0.75±0.35
1808(4520)	4.60±0.50	2.00±0.25		0.75±0.35
1812(4532)	4.60±0.50	3.20±0.30		0.75±0.35
1825(4563)	4.60±0.50	6.30±0.40		0.75±0.35
2220(5750)	5.70±0.50	5.00±0.40		0.85±0.35
2225(5763)	5.70±0.50	6.30±0.40		0.85±0.35

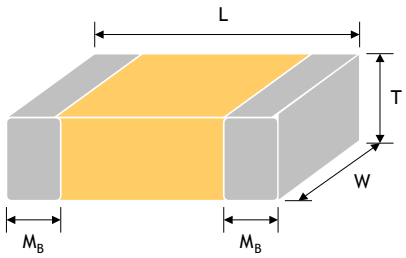


Fig. 5.1 The outline of MLCC

"#" For 1206 size P thickness products.

▼ For 1206/Cap.≥5.6μF & 1210/Cap.≥12μF products.

6. GENERAL ELECTRICAL DATA

Dielectric	C0G	X7R
Size	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225	0402, 0603, 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225
Rated voltage (WVDC)	10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 4KV,6KV	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 3.5KV, 4KV, 5KV
Capacitance range	0.1pF ~ 330nF	100pF ~ 22μF
Capacitance tolerance	Reference to Table 5	Reference to Table 5
Tan δ	Cap. Range: Cap.<30pF → Q Spec.: Q≥400+20C; Cap.≥30pF → Q≥1000	Reference to 8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS
Capacitance & Tan δ Test condition	For 25°C at ambient temperature	Preconditioning for Class II MLCC : Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement
	Cap.≤1000pF → 1.0±0.2Vrms, 1.0MHz±10%; Cap.>1000pF → 1.0±0.2Vrms, 1.0KHz±10%	Cap.≤10μF → 1.0±0.2Vrms, 1.0KHz±10%; Cap.>10μF → 0.5±0.2Vrms, 120Hz±20%
Insulation resistance	≥10GΩ or RxC≥500Ω-F, whichever is smaller	≥10GΩ or RxC≥100Ω-F, whichever is smaller
Operating temperature	-55°C to +125°C	-55°C to +125°C
Temperature coefficient	±30ppm/°C	±15%
Termination	Cu/Ag polymer/Ni/Sn (lead-free termination)	Cu/Ag polymer/Ni/Sn (lead-free termination)

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE

7-1. C0G

Dimension		0402					0603							0805									
Cap.(pF)	Code	10V	16V	25V	50V	100V	10V	16V	25V	50V	100V	200V	250V	10V	16V	25V	50V	100V	200V	250V	500V	630V	1000V
0.1	0R1	K	K	K	K																		
0.2	0R2	K	K	K	K																		
0.3	0R3	K	K	K	K		S	S	S	S													
0.4	0R4	K	K	K	K		S	S	S	S													
0.5	0R5	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
0.6	0R6	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
0.7	0R7	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
0.8	0R8	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
0.9	0R9	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
1.0	1R0	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
1.2	1R2	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
1.5	1R5	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
1.8	1R8	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
2.2	2R2	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
2.7	2R7	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
3.3	3R3	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
3.9	3R9	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
4.7	4R7	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
5.0	5R0	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
5.6	5R6	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
6.8	6R8	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
8.2	8R2	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
10	100	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
12	120	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
15	150	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
18	180	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
22	220	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
27	270	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
33	330	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
39	390	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
47	470	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
56	560	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
68	680	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	C
82	820	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	A	X	X	C
100	101	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	X	X	X	C
120	121	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	A	X	C	C	C
150	151	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	X	X	C	C	C
180	181	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	X	C	C	C	C
220	221	K	K	K	K	K	S	S	S	S	S	S	S	A	A	A	A	A	C	C	C	C	C
270	271	K	K	K	K		S	S	S	S	S	B	B	A	A	A	A	A	C	C	C	C	C
330	331	K	K	K	K		S	S	S	S	S	B	B	A	A	A	A	A	C	C	C	C	C
390	391	K	K	K	K		S	S	S	S	S	B	B	X	X	X	X	X	C	C	C	C	C
470	471	K	K	K	K		S	S	S	S	S	B	B	X	X	X	X	X	C	C	I	I	
560	561	K	K	K	K		S	S	S	S	S			X	X	X	X	X	C	C	I	I	
680	681	K	K	K	K		S	S	S	S	S			X	X	X	X	X	C	C	I	I	
820	821	K	K	K	K		S	S	S	S	S			X	X	X	X	X	C	C	I	I	
1000	102	K	K	K	K		S	S	S	S	S			X	X	X	X	X	C	C	I	I	
1200	122						B	B	B	B				X	X	X	X	X	C	C			
1500	152						B	B	B	B				X	X	X	X	X	C	C			
1800	182						B	B	B	B				X	X	X	X	X	C	C			
2200	222						B	B	B	B				X	X	X	X	X	C	C			
2700	272						B	B	B	B				C	C	C	C	C	C	C			
3300	332						B	B	B	B				C	C	C	C	C					
3900	392													C	C	C	C	C					
4700	472													C	C	C	C	C					
5600	562													C	C	C	C	C					
6800	682													C	C	C	C	C					
8200	822													C	C	C	C						
10000	103													C	C	C	C						

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-1. C0G

Dimension		1206										1210										
Cap.(pF)	Code	10V 16V 25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	10V 16V 25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V
1.0	1R0		X																			
1.2	1R2	X	X	X			X															
1.5	1R5	X	X	X	X	X	X	X	X	X	X											
1.8	1R8	X	X	X	X	X	X	X	X	X	X											
2.2	2R2	X	X	X	X	X	X	X	X	X	X											
2.7	2R7	X	X	X	X	X	X	X	X	X	X											
3.3	3R3	X	X	X	X	X	X	X	X	X	X											
3.9	3R9	X	X	X	X	X	X	X	X	X	X											
4.7	4R7	X	X	X	X	X	X	X	X	X	X											
5.0	5R0	X	X	X	X	X	X	X	X	X	X											
5.6	5R6	X	X	X	X	X	X	X	X	X	X											
6.8	6R8	X	X	X	X	X	X	X	X	X	X											
8.2	8R2	X	X	X	X	X	X	X	X	X	X											
10	100	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	F
12	120	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	F
15	150	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	F
18	180	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	F
22	220	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	F
27	270	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	F
33	330	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M	M	F
39	390	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M	M	F
47	470	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M	M	M	F
56	560	X	X	X	X	X	X	X	M	C	C	M	M	M	M	M	M	M	M	C	C	F
68	680	X	X	X	X	X	X	X	M	C	C	M	M	M	M	M	M	M	M	C	C	F
82	820	X	X	X	X	X	X	X	C	C	C	M	M	M	M	M	M	M	M	C	C	F
100	101	X	X	X	X	X	X	X	C	C	C	M	M	M	M	M	M	M	C	C	C	F
120	121	X	X	X	X	X	X	X	C	E	E	M	M	M	M	M	M	M	C	C	C	F
150	151	X	X	X	X	X	X	X	C	E	E	M	M	M	M	M	M	M	C	E	E	F
180	181	X	X	X	X	X	X	X	E	E	E	M	M	M	M	M	M	M	C	E	E	F
220	221	X	X	X	X	X	X	X	E	E	E	M	M	M	M	M	M	M	E	E	E	F
270	271	X	X	X	X	M	M	M	E	P	P	M	M	M	M	M	M	M	E	F	F	G
330	331	X	X	X	X	M	M	M	E	P	P	M	M	M	M	M	M	M	E	F	F	
390	391	X	X	X	X	M	M	M	E	P	P	M	M	M	M	M	M	M	E	G	G	
470	471	X	X	X	M	M	M	M	E	E	E	M	M	M	M	M	M	M	E	G	G	
560	561	X	X	X	M	C	C	C	E			M	M	M	M	M	M	M	E	G	G	
680	681	X	X	X	M	C	C	C	E			M	M	M	M	M	M	M	E	G	G	
820	821	X	X	X	M	E	E	E	E			M	M	M	M	M	M	M	E	G	G	
1000	102	X	X	X	M	E	E	E	E			M	M	M	C	C	C	C	E	G	G	
1200	122	X	X	X	M	E	E	E				M	M	M	C	C	C	C	E	F	F	
1500	152	X	X	X	C	E	E	E				M	M	M	C	C	C	C	F	G	G	
1800	182	X	X	X	C	E	E	E				M	M	M	C	C	C	C	G	G	G	
2200	222	X	X	X	C	E	E	E				M	M	M	C	C	C	C	G			
2700	272	X	X	X	C	E	E	E				M	M	M	C	C	C	C	G			
3300	332	X	X	X	C	E	E	E				M	M	M	C	C	C	C	G			
3900	392	X	X	X	E	E	E	E				M	M	M	C	C	C	C	G			
4700	472	X	X	X	E	E	E	E				M	M	M	E	E	E	E	G			
5600	562	X	X	X	E	E	E	E				M	M	C	E	E	E	E	G			
6800	682	M	M	M	E	E	E	C/E				M	M	C	E	E	E	E	G			
8200	822	C	C	C	E	E	E	E				M	M	C	E	E	E	E	G			
10000	103	C	C	C	E	E	E	E				M	M	E	F	F	F	F	G			
12000	123	P	P	P								C	C	E	F	F	F	F				
15000	153	P	P	P								C	C	F	F	F	F	F				
18000	183	P	P	P								F	F	F	F	F	F	F				
22000	223	P	P	P								F	F	F	F	F	F	F				
27000	273	P	P									F/G	F/G	F	F	F	G	G				
33000	333	P	P									F/G	F/G	F	F	F	G	G				
39000	393	P	P									F/G	F/G	F	F	F						
47000	473											F	F	F	F	F						
56000	563																					
68000	683																					

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-1. C0G

Dimension		1808												1812											
Cap.(pF)	Code	25V 50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V	6000V	10V 16V	25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V
1.0	1R0																									
1.2	1R2																									
1.5	1R5																									
1.8	1R8																									
2.2	2R2	C	C	C	C	C	C	C	C	C	C	C														
2.7	2R7	C	C	C	C	C	C	C	C	C	C	C														
3.3	3R3	C	C	C	C	C	C	C	C	C	C	C	C*													
3.9	3R9	C	C	C	C	C	C	C	C	C	C	C	C*													
4.7	4R7	C	C	C	C	C	C	C	C	C	C	C	C*													
5.0	5R0	C	C	C	C	C	C	C	C	C	C	C	C*													
5.6	5R6	C	C	C	C	C	C	C	C	C	C	C	C*													
6.8	6R8	C	C	C	C	C	C	C	C	C	C	C	C*													
8.2	8R2	C	C	C	C	C	C	C	C	C	C	C	C*													
10	100	C	C	C	C	C	C	C	C	C	C	C	C*	C	C	C	C	C	C	C	C	C	C	C	C	C
12	120	C	C	C	C	C	C	C	C	C	C	C	C*	C	C	C	C	C	C	C	C	C	C	C	C	C
15	150	C	C	C	C	C	C	C	C	C	C	C	C*	C	C	C	C	C	C	C	C	C	C	C	C	C
18	180	C	C	C	C	C	C	C	C	C	C	C	C*	C	C	C	C	C	C	C	C	C	C	C	C	C
22	220	C	C	C	C	C	C	C	C	C	C	E	C*	C	C	C	C	C	C	C	C	C	C	C	C	C
27	270	C	C	C	C	C	C	C	C	C	C	E	C*	C	C	C	C	C	C	C	C	C	C	C	C	C
33	330	C	C	C	C	C	C	C	C	C	C	F	C*	C	C	C	C	C	C	C	C	C	C	C	C	C*
39	390	C	C	C	C	C	C	C	C	C	C	F	E*	C	C	C	C	C	C	C	C	C	C	C	C	C*
47	470	C	C	C	C	C	C	C	C	C	C		E*	C	C	C	C	C	C	C	C	C	C	C	C	E*
56	560	C	C	C	C	C	C	C	C	C	C		E*	C	C	C	C	C	C	C	C	C	C	C	C	E*
68	680	C	C	C	C	C	C	C	C	C	C		F*	C	C	C	C	C	C	C	C	C	C	C	C	F*
82	820	C	C	C	C	C	C	C	C	C	C		F*	C	C	C	C	C	C	C	C	C	C	C	C	F*
100	101	C	C	C	C	C	C	C	C	C	F		F*	C	C	C	C	C	C	C	C	C	C	C	C	F*
120	121	C	C	C	C	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	C	C	C	G*
150	151	C	C	C	C	C	C	C	F	F	F			C	C	C	C	C	C	C	C	C	C	C	C	
180	181	C	C	C	C	C	C	C	F	F	F			C	C	C	C	C	C	C	C	C	C	C	F	
220	221	C	C	C	C	C	C	C	F	F	F			C	C	C	C	C	C	C	C	C	C	C	F	
270	271	C	C	C	C	C	C	F	F	F	F			C	C	C	C	C	C	C	C	C	F	F	F	
330	331	C	C	C	C	C	C	F	F	F	F			C	C	C	C	C	C	C	C	C	F	F	F	
390	391	C	C	C	C	C	C	F	F	F	F			C	C	C	C	C	C	C	C	C	F	F	F	
470	471	C	C	C	C	C	C	F	F	F	F			C	C	C	C	C	C	C	C	C	F	F	F	
560	561	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	C	F	F	F	
680	681	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	C	F	F	F	
820	821	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	C	F	F	G	
1000	102	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	C	F	F	G	
1200	122	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	C	F	F	H/R	
1500	152	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	C	F	F		
1800	182	C	C	C	C	C	C	F	F	F				C	C	C	C	C	C	C	C	F	F	F		
2200	222	C	C	C	C	C	C	F						C	C	C	C	C	C	C	C	E	F	F		
2700	272	C	C	C	C	C	C							C	C	C	C	C	C	C	C	F	G	G		
3300	332	C	C	C	C	C	C							C	C	C	C	C	C	C	C	F	G	G		
3900	392	C	C	C	C									C	C	C	C	C	C	C	C	G				
4700	472	C	C	C	C									C	C	C	C	C	C	C	C	F/G				
5600	562	C	C	E	E									C	C	C	C	C	C	C	C	G				
6800	682	C	C	E	E									C	C	C	C	C	C	C	C					
8200	822	C	E	F	F									C	C	C	C	C	C	C	C					
10000	103	C	E	F	F									C	C	C	C	C	C	C	C					
12000	123	E												C	C	C	C	E	E	E	E					
15000	153	E												C	C	C	C	E	E	E	E					
18000	183	F												C	C	C	E	F	F	F	F					
22000	223	F												C	C	C	E	F	F	F	F					
27000	273													C	E	E	F	G	G							
33000	333													C	E	E	F									
39000	393														F	F	G									
47000	473														F	F	G									
56000	563														G	G										
68000	683														G	G										
82000	823														G	G										
100000	104														G	G										
120000	124																									
150000	154																									

7. CAPACITANCE RANGE(Con.)

7-1. C0G

Dimension		1825										2220										
Cap.(pF)	Code	25V 50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	25V 50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V
10	100	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	
12	120	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	
15	150	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
18	180	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
22	220	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
27	270	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
33	330	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
39	390	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
47	470	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
56	560	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
68	680	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
82	820	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
100	101	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
120	121	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
150	151	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
180	181	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
220	221	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
270	271	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G
330	331	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	G
390	391	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
470	471	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
560	561	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
680	681	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
820	821	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
1000	102	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
1200	122	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	
1500	152	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	
1800	182	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F		
2200	222	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F		
2700	272	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F		
3300	332	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F		
3900	392	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F		
4700	472	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F		
5600	562	F	F	F	F	F	F	F				F	F	F	F	F	F	F				
6800	682	F	F	F	F	F	F	F				F	F	F	F	F	F	F				
8200	822	F	F	F	F	F	F	G				F	F	F	F	F	F	G				
10000	103	F	F	F	F	F	F	G				F	F	F	F	F	F	G				
12000	123	F	F	F	F	F	F					F	F	F	F	F	F					
15000	153	F	F	F	F	F	F					F	F	F	F	F	F					
18000	183	F	F	F	F	F	F					F	F	F	F	F	F					
22000	223	F	F	F	F	F	F					F	F	F	F	F	F					
27000	273	F	F	F	F	F	F					F	F	F	F	F	F					
33000	333	F	F	F	F	F	F					F	F	F	F	F	E/F					
39000	393	F	E	F	F	G	G					F	F	F	F	F	E/F					
47000	473	F	E	F	F							F	F	G	G	G	E/F					
56000	563	F	F	G	G							F	F	G	G		F					
68000	683	F	F	G	G							F	F	G	G		F					
82000	823	F	G									F	G				F					
100000	104	G	G									G	G				G					
120000	124																					
150000	154																					
180000	184																					
220000	224																					
270000	274																					
330000	334																					

7. CAPACITANCE RANGE(Con.)

7-1. C0G

Dimension		2225										
Cap.(pF)	Code	25V 50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V
10	100	F	F	F	F	F	F	F	F	F	F	
12	120	F	F	F	F	F	F	F	F	F	F	
15	150	F	F	F	F	F	F	F	F	F	F	
18	180	F	F	F	F	F	F	F	F	F	F	
22	220	F	F	F	F	F	F	F	F	F	F	
27	270	F	F	F	F	F	F	F	F	F	F	F
33	330	F	F	F	F	F	F	F	F	F	F	F
39	390	F	F	F	F	F	F	F	F	F	F	F
47	470	F	F	F	F	F	F	F	F	F	F	F
56	560	F	F	F	F	F	F	F	F	F	F	F
68	680	F	F	F	F	F	F	F	F	F	F	F
82	820	F	F	F	F	F	F	F	F	F	F	F
100	101	F	F	F	F	F	F	F	F	F	F	F
120	121	F	F	F	F	F	F	F	F	F	F	F*
150	151	F	F	F	F	F	F	F	F	F	F	F*
180	181	F	F	F	F	F	F	F	F	F	F	F*
220	221	F	F	F	F	F	F	F	F	F	F	F*
270	271	F	F	F	F	F	F	F	F	F	F	F*
330	331	F	F	F	F	F	F	F	F	F	F	F*
390	391	F	F	F	F	F	F	F	F	F	F	F*
470	471	F	F	F	F	F	F	F	F	F	F	F*
560	561	F	F	F	F	F	F	F	F	F	F	F*
680	681	F	F	F	F	F	F	F	F	F	F	F*
820	821	F	F	F	F	F	F	F	F	F	F	F*
1000	102	F	F	F	F	F	F	F	F	F	F	G*
1200	122	F	F	F	F	F	F	F	F	F	F	
1500	152	F	F	F	F	F	F	F	F	F	F	
1800	182	F	F	F	F	F	F	F	F	F	F	
2200	222	F	F	F	F	F	F	F	F	F	F	
2700	272	F	F	F	F	F	F	F	F	F	G	
3300	332	F	F	F	F	F	F	F	F	F	G	
3900	392	F	F	F	F	F	F	F	F	F		
4700	472	F	F	F	F	F	F	F	F	F		
5600	562	F	F	F	F	F	F	F	F	F		
6800	682	F	F	F	F	F	F	F	F	F		
8200	822	F	F	F	F	F	F	F	G	G		
10000	103	F	F	F	F	F	F	G	G	G		
12000	123	F	F	F	F	F	F					
15000	153	F	F	F	F	F	F					
18000	183	F	F	F	F	F	F					
22000	223	F	F	F	F	F	F					
27000	273	F	F	F	F	F	F					
33000	333	F	F	F	F	F	F					
39000	393	F	F	F	F	F	F					
47000	473	F	F	F	F	F	F					
56000	563	F	F	G	G	G	G					
68000	683	F	F	G	G	G	G					
82000	823	F	F	G	G	G						
100000	104	F	G	G	G							
120000	124											
150000	154											
180000	184											
220000	224											
270000	274											
330000	334											

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-2. X7R

Dimension		0402						0603								0805										
Cap.(pF)	Code	6.3V	10V	16V	25V	50V	100V	6.3V	10V	16V	25V	50V	100V	200V	250V	6.3V	10V	16V	25V	50V	100V	200V	250V	500V	630V	1000V
100	101		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
120	121		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
150	151		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
180	181		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
220	221		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
270	271		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
330	331		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
390	391		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
470	471		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
560	561		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
680	681		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
820	821		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
1000	102		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
1200	122		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	X
1500	152		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	C
1800	182		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	C
2200	222		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	C
2700	272		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	
3300	332		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	
3900	392		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	X	X	
4700	472		K	K	K	K	K		S	S	S	S	S	B	B		C	C	C	C	C	C	C	C	C	
5600	562		K	K	K	K			S	S	S	S	S	B	B		C	C	C	C	C	C	C	C	C	
6800	682		K	K	K	K			S	S	S	S	S	B	B		C	C	C	C	C	C	C	C	C	
8200	822		K	K	K	K			S	S	S	S	S	B	B		C	C	C	C	C	C	C	C	C	
10000	103		K	K	K	K			S	S	S	S	S	B	B		C	C	C	C	C	C	C	C	C	
12000	123		K	K	K				S	S	S	S	B				C	C	C	C	C	C	C	C	C	
15000	153		K	K	K				S	S	S	S	B				C	C	C	C	C	C	C	C	C	
18000	183		K	K	K				S	S	S	S	B				C	C	C	C	C	C	C	C	C	
22000	223		K	K	K				S	S	S	S	B				C	C	C	C	C	C	C	C	C	
27000	273		K	K	K				S	S	S	S	B				C	C	C	C	C	C	C	C	C	
33000	333		K	K	K				S	S	S	B	B				C	C	C	C	C	C	C	C		
39000	393		K	K	K				S	S	S	B	B				C	C	C	C	C	C	C			
47000	473		K	K	K				S	S	S	B	B				C	C	C	C	C	C	C			
56000	563		K	K					S	S	S	B	B				C	C	C	C	C	C	C			
68000	683		K	K					S	S	S	B	B				C	C	C	C	C	C	C			
82000	823		K	K					S	S	S	B	B				C	C	C	C	C	C				
100000	104	K	K	K					S	S	S	B	B				C	C	C	C	C	C				
120000	124								S	S	B						C	C	C	C	I					
150000	154								S	S	B						C	C	C	C	I					
180000	184								S	S	B						C	C	C	C	I					
220000	224								S	S	B	B					C	C	C	C	I					
270000	274							B	B	B	B						I	I	I	I						
330000	334								B	B	B	B					I	I	I	I						
390000	394								B	B	B						I	I	I	I						
470000	474							B	B	B	B						I	I	I	I	I					
560000	564								B	B							I	I	I							
680000	684							B	B	B							I	I	I							
820000	824								B	B							I	I	I							
1000000	105							B	B	B	B						I	I	I	I						
1200000	125																									
1500000	155																I	I	I							
2200000	225							B	B							I	I	I	I							
4700000	475															I	I	I	I							
10000000	106															I	I									

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-2. X7R

Dimension		1206													1210										
Cap.(pF)	Code	6.3V	10V	16V	25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	10V	16V	25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V
100	101							C	C	C	C	C	C	C												
120	121							C	C	C	C	C	C	C												
150	151		C	C	C	C	C	C	C	C	C	C	C	C												
180	181		C	C	C	C	C	C	C	C	C	C	C	C												
220	221		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
270	271		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
330	331		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
390	391		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
470	471		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
560	561		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
680	681		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
820	821		C	C	C	C	C	C	C	C	C	C	C	C			M	M	M	M	M	M	M	M	M	M
1000	102		C	C	C	C	C	C	C	C	C	C	C	X/C	M	M	M	M	M	M	M	M	M	M	C	C
1200	122		C	C	C	C	C	C	C	C	C	C	E	E	M	M	M	M	M	M	M	M	M	M	E	E
1500	152		C	C	C	C	C	C	C	C	C	C	E	E	M	M	M	M	M	M	M	M	M	M	E	E
1800	182		C	C	C	C	C	C	C	C	C	C	E	E	M	M	M	M	M	M	M	M	M	M	E	E
2200	222		C	C	C	C	C	C	C	C	C	C	E	E	M	M	M	M	M	M	M	M	M	M	F	F/E
2700	272		C	C	C	C	C	C	C	C	C	C	E	E	M	M	M	M	M	M	M	M	M	M	F	G
3300	332		C	C	C	C	C	C	C	C	C	C	E	E	M	M	M	M	M	M	M	M	M	M	F	G
3900	392		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	M	G	G
4700	472		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	M	F/G	F/G
5600	562		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	M	G	G*
6800	682		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	M	G	G*
8200	822		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	M	G	G*
10000	103		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	C	G	G*
12000	123		C	C	C	C	C	C	C	C	C	E			M	M	M	M	M	M	M	M	M	C	G	
15000	153		C	C	C	C	C	C	C	C	C	E			M	M	M	M	M	M	M	M	M	E	G	
18000	183		C	C	C	C	C	C	C	C	C				M	M	M	M	M	M	M	C	C	E	G	
22000	223		C	C	C	C	C	C	C	E	E				M	M	M	M	M	M	M	C	C	E	G	
27000	273		C	C	C	C	C	C	C	E	E				M	M	M	M	M	M	M	C	C	E	G	
33000	333		C	C	C	C	C	E	E	E	E				M	M	M	M	M	M	M	E	E	E	G	
39000	393		C	C	C	C	C	E	E	E	E				M	M	M	M	M	M	M	E	E	F		
47000	473		C	C	C	C	C	E	E	E	E				M	M	M	M	M	C	C	E	E	G		
56000	563		C	C	C	C	C	E	E	E	E				M	M	M	M	M	C	C	E	E			
68000	683		C	C	C	C	C	E	E						M	M	M	M	M	E	E	F	F			
82000	823		C	C	C	C	C	E	E						M	M	M	M	M	E	E	F	F			
100000	104		C	C	C	C	C	E	E						M	M	M	M	M	E	E	F	F			
120000	124		C	C	C	C	C								M	M	M	M	M	E	E	G	G			
150000	154		M	M	M	M	E								M	M	M	M	C	E	E	G	G			
180000	184		M	M	M	M	E								M	M	M	M	C	E	E					
220000	224		M	M	M	M	E	E	E						M	M	M	M	C	C/E	C/E					
270000	274		M	M	M	C	E								M	M	M	M	E	F	F					
330000	334		M	M	M	C	E								M	M	M	C	E	F	F					
390000	394		M	M	J	P	E								M	M	M	C	G	G	G					
470000	474		J	J	J	P	E								M	M	M	C	G	G	G					
560000	564		J	J	J	P	P								C	C	C	C	G	G	G					
680000	684		J	J	J	P	P								C	C	C	C	F	G	G					
820000	824		J	J	J	P	P								C	C	C	C	F							
1000000	105		J	J	J	P	P								C	C	C	C	F							
1200000	125					P	P	E/P																		
1500000	155	J	J	J	J	P	P	E/P								F	E	G	G							
1800000	185					P	P	P																		
2200000	225	J	J	J	E/P	P	P									F	E	G	G							
2700000	275				P	P																				
3300000	335		P	P	P	P										F	E	G	G							
3900000	395				P	P																				
4700000	475	P	P	P	P	P									F	F	F	G	G							
5600000	565		P	P	P										G	G	G	G								
6800000	685		P	P	P										G	G	G	G								
8200000	825		P	P	P										G	G	G	G								
10000000	106	P	P	P	P										F	F	G	G								
12000000	126														G	G	G									
15000000	156														G	G	G									
18000000	186														G	G	G									
22000000	226		P												G	G	G									

* Surface coating only.

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-2. X7R

Dimension		1808							1812													
Cap.(pF)	Code	500V	630V	1000V	1500V	2000V	3000V	4000V	10V 16V 25V	50V	100V	200V	250V	400V	500V	630V	1000V	1500V	2000V	3000V	3500V	4000V
100	101																					
120	121																					
150	151	C	C	C	C	C	C	F*														
180	181	C	C	C	C	C	C	F*													C*	
220	221	C	C	C	C	C	C	F*													C*	
270	271	C	C	C	C	C	C	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
330	331	C	C	C	C	C	C	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
390	391	C	C	C	C	C	C	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
470	471	C	C	C	C	C	C	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
560	561	C	C	C	C	C	E	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
680	681	C	C	C	C	C	E	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
820	821	C	C	C	C	C	E	F*	C	C	C	C	C	C	C	C	C	C	C	C	C*	F*
1000	102	C	C	C	C	C	F	F*	C	C	C	C	C	C	C	C	C	C	C	E	C*	F*
1200	122	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	C	F	C*	G*
1500	152	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	C	F	C*	G*
1800	182	C	C	C	C	C	F		C	C	C	C	C	C	C	C	C	C	C	G	C*	G*
2200	222	C	C	C	E	E	F		C	C	C	C	C	C	C	C	C	C	C	G*	E*	
2700	272	C	C	C	F	F	F		C	C	C	C	C	C	C	C	C	C	C	G*	E*	
3300	332	C	C	C	F	F	F		C	C	C	C	C	C	C	C	C	E	E	G*	E*	
3900	392	C	C	C	F	F	F*		C	C	C	C	C	C	C	C	C	F	F	G*	F*	
4700	472	C	C	C	F	F	F*		C	C	C	C	C	C	C	C	C	F	F	G*	F*	
5600	562	C	C	C	F	F	F*		C	C	C	C	C	C	C	C	C	G	G		F*	
6800	682	C	C	C	F	F	F*		C	C	C	C	C	C	C	C	C	G	G		G*	
8200	822	C	C	C	F*	F*	F*		C	C	C	C	C	C	C	C	C	G	G		G*	
10000	103	C	C	C	F*	F*	F*		C	C	C	C	C	C	C	C	C	E/F/G	E/F/G		G*	
12000	123	E	E	E					C	C	C	C	C	C	C	C	C	E/F/G	G			
15000	153	E	E	E					C	C	C	C	C	C	C	C	C	E/F/G	G			
18000	183	F	F	F					C	C	C	C	C	C	C	C	E	E/F/G	G			
22000	223	F	F	F					C	C	C	C	C	C	C	C	E	F/G	G			
27000	273	F	F	F					C	C	C	C	C	C	C	C	F					
33000	333	F	F	F					C	C	C	C	C	C	C	C	F					
39000	393	F	F	F					C	C	C	C	C	C	C	C	G					
47000	473	F	F	F					C	C	C	C	C	C	C	C	F/G					
56000	563	F	F	F					C	C	C	C	C	C	E	E	G					
68000	683	F	F						C	C	C	C	C	C	E	E	G					
82000	823	F	F						C	C	C	C	C	C	E	E	G					
100000	104								C	C	C	C	C	C	E	E	G					
120000	124								C	C	C	C	C	C	F	F						
150000	154								C	C	C	C	C	C	F	F						
180000	184								C	C	C	C	C	C	G	G						
220000	224								C	C	C	C	C	C	G	G						
270000	274								C	C	C	E	E	E	G							
330000	334								C	C	C	E	E	E	G							
390000	394								C	C	C	F	F	F	G							
470000	474								C	C	C	F	F	F	G							
560000	564								C	C	C	G	G									
680000	684								C	C	C	G	G									
820000	824								C	C	C	G	G									
1000000	105								C	C	C	G	G									
1200000	125								C	C	C											
1500000	155								C	C	C											
1800000	185								E	E	E											
2200000	225								E	E	E											
2700000	275								F	F	F											
3300000	335								F	F	F											
3900000	395								F	F	F											
4700000	475								G	G	G											
5600000	565								G	G												
6800000	685								G	G												
8200000	825								G	G												
10000000	106								G	G												
12000000	126								G													
15000000	156								G													
18000000	186								G													
22000000	226								G													

* Surface coating only.

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-2. X7R

Dimension		1825											2220												
Cap.(pF)	Code	25V 50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V	25V 50V	100V	200V	250V	400V	500V	630V	1000V	1500V	2000V	3000V	4000V	5000V
100	101																								
120	121																								
150	151																								
180	181																								
220	221																								
270	271											F*												F*	F*
330	331											F*												F*	F*
390	391											F*												F*	F*
470	471											F*												F*	F*
560	561											F*												F*	F*
680	681											F*												F*	F*
820	821											F*												F*	F*
1000	102	F	F	F	F	F	F	F	F	F	F	F*	F	F	F	F	F	F	F	F	F	F	F	F*	F*
1200	122	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	F	F	F	G*	F*
1500	152	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	F	F	F	G*	F*
1800	182	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	F	F	F	G*	F*
2200	222	F	F	F	F	F	F	F	F	F	F*		F	F	F	F	F	F	F	F	F	F	F*		F*
2700	272	F	F	F	F	F	F	F	F	F	F*		F	F	F	F	F	F	F	F	F	F	F*		F*
3300	332	F	F	F	F	F	F	F	F	F	F*		F	F	F	F	F	F	F	F	F	F	F*		F*
3900	392	F	F	F	F	F	F	F	F	F	F*		F	F	F	F	F	F	F	F	F	F	F*		F*
4700	472	F	F	F	F	F	F	F	F	F	F*		F	F	F	F	F	F	F	F	F	F	F*		F/G*
5600	562	F	F	F	F	F	F	F	F	F	G*		F	F	F	F	F	F	F	F	F	F	F*		
6800	682	F	F	F	F	F	F	F	F	F	G*		F	F	F	F	F	F	F	F	F	F	G*		
8200	822	F	F	F	F	F	F	F	F	F	G*		F	F	F	F	F	F	F	F	G	G	G*		
10000	103	F	F	F	F	F	F	F	F	F	G*		F	F	F	F	F	F	F	F	F/G	F/G	G*		
12000	123	F	F	F	F	F	F	F	G	G	H*		F	F	F	F	F	F	F	F	G	G	H*		
15000	153	F	F	F	F	F	F	F	G	G	H*		F	F	F	F	F	F	F	F	G	G	H*		
18000	183	F	F	F	F	F	F	F	G	G	H*		F	F	F	F	F	F	F	F	H	H	H*		
22000	223	F	F	F	F	F	F	F	G	G			F	F	F	F	F	F	F	F	H	H			
27000	273	F	F	F	F	F	F	F	H	H			F	F	F	F	F	F	F	F	H	H			
33000	333	F	F	F	F	F	F	F	H	H			F	F	F	F	F	F	F	F	H	H			
39000	393	F	F	F	F	F	F	F	H	H			F	F	F	F	F	F	F	F	H	H			
47000	473	F	F	F	F	F	F	F	H	H			F	F	F	F	F	F	F	F	H	H			
56000	563	F	F	F	F	F	F	F	H				F	F	F	F	F	F	F	F	H	H			
68000	683	F	F	F	F	F	F	F					F	F	F	F	F	F	F	F					
82000	823	F	F	F	F	F	F	F					F	F	F	F	F	F	F	F					
100000	104	F	F	F	F	F	F	G					F	F	F	F	F	F	F	G					
120000	124	F	F	F	F	F	F						F	F	F	F	F	F	F	G					
150000	154	F	F	F	F	F	F						F	F	F	F	F	F	F	H					
180000	184	F	F	F	F	F	F						F	F	F	F	F	F	F	H					
220000	224	F	F	F	F	F	F						F	F	F	F	F	F	F	H					
270000	274	F	F	F	F	F	F						F	F	F	F	F	F	F	H					
330000	334	F	F	F	F	F	F						F	F	F	F	F	F	F	H					
390000	394	F	F	F	F	F	F						F	F	F	F	F	F	F						
470000	474	F	F	F	F	F	F						F	F	F	F	F	F	F						
560000	564	F	F	F	F	G	G						F	F	F	F	G	G	G						
680000	684	F	F	F	F								F	F	F	F	G	G	G						
820000	824	F	F	F	F								F	F	F	F	H	H	H						
1000000	105	F	F	F	F								F	F	F	F	H	H	H						
1200000	125	F	F	G									F	F	G	G									
1500000	155	F	F	G									F	F	G	G									
1800000	185	F	F	G									F	F	G	G									
2200000	225	F	F	G									F	F	G	G									
2700000	275	F	F										F	F											
3300000	335	F	F										F	F											
3900000	395	F	F										F	F											
4700000	475	F	F										F	F											
5600000	565	F	F										F	F											
6800000	685	F	F										F	F											
8200000	825	G	G										G	G											
10000000	106	G	G										G	G											
12000000	126												H	F/G											
15000000	156												H	G											
18000000	186												H	H											
22000000	226												H	R											
27000000	276												H												
33000000	336												H												
39000000	396												H												
47000000	476												R												

* Surface coating only.

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

7. CAPACITANCE RANGE(Con.)

7-2. X7R

Dimension		2225												
Cap.(pF)	Code	25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V	5000V
100	101													
120	121													
150	151													
180	181													
220	221													
270	271												F*	F*
330	331												F*	F*
390	391												F*	F*
470	471											E	F*	F*
560	561												F*	F*
680	681												F*	F*
820	821												F*	F*
1000	102	F	F	F	F	F	F	F	F	F	F	F	F*	F*
1200	122	F	F	F	F	F	F	F	F	F	F	F	G*	F*
1500	152	F	F	F	F	F	F	F	F	F	F	F	G*	F*
1800	182	F	F	F	F	F	F	F	F	F	F	F	G*	F*
2200	222	F	F	F	F	F	F	F	F	F	F	F*		F*
2700	272	F	F	F	F	F	F	F	F	F	F	F*		F*
3300	332	F	F	F	F	F	F	F	F	F	F	F*		F*
3900	392	F	F	F	F	F	F	F	F	F	F	F*		F*
4700	472	F	F	F	F	F	F	F	F	F	F	F*		F/G*
5600	562	F	F	F	F	F	F	F	F	F	F	G*		
6800	682	F	F	F	F	F	F	F	F	F	F	G*		
8200	822	F	F	F	F	F	F	F	F	F	F	G*		
10000	103	F	F	F	F	F	F	F	F	F	F	G*		
12000	123	F	F	F	F	F	F	F	F	G	G	G*		
15000	153	F	F	F	F	F	F	F	F	G	G	G*		
18000	183	F	F	F	F	F	F	F	F	G	G	H*		
22000	223	F	F	F	F	F	F	F	F	F/G	F/G	F*		
27000	273	F	F	F	F	F	F	F	F	G	G			
33000	333	F	F	F	F	F	F	F	F	G	G			
39000	393	F	F	F	F	F	F	F	F	G	H			
47000	473	F	F	F	F	F	F	F	F	G	H			
56000	563	F	F	F	F	F	F	F	F	G	H			
68000	683	F	F	F	F	F	F	F	F	G				
82000	823	F	F	F	F	F	F	F	F	G				
100000	104	F	F	F	F	F	F	F	G	G				
120000	124	F	F	F	F	F	F	F	H					
150000	154	F	F	F	F	F	F	F	H					
180000	184	F	F	F	F	F	F	F	H					
220000	224	F	F	F	F	F	F	F	H					
270000	274	F	F	F	F	F	F	F	F/G/H					
330000	334	F	F	F	F	F	F	F	F/G/H					
390000	394	F	F	F	F	F	F	F						
470000	474	F	F	F	F	F	F	F						
560000	564	F	F	F	F	F	F	F						
680000	684	F	F	F	F	F								
820000	824	F	F	F	F	F								
1000000	105	F	F	F	F	F								
1200000	125	F	F	F	G	G								
1500000	155	F	F	F	G	G								
1800000	185	F	F	F	G	G								
2200000	225	F	F	F	G	G								
2700000	275	F	F	F	G	G								
3300000	335	F	F	F										
3900000	395	F	F	F										
4700000	475	F	F	F										
5600000	565	F	F	F										
6800000	685	F	F	F										
8200000	825	G	G	G										
10000000	106	G	G	G										
12000000	126	F/G												
15000000	156	F/G												
18000000	186													
22000000	226													

* Surface coating only.

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>1.</td><td>Visual and Dimensions</td><td>---</td><td>* No remarkable defect.
* Dimensions to confirm to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td>* Class I :
Cap.≤1000pF, 1.0±0.2Vrms, 1MHz±10%.
Cap.>1000pF, 1.0±0.2Vrms, 1KHz±10%.
* Class II :
Cap.≤10μF, 1.0±0.2Vrms, 1KHz±10%**.
Cap.>10μF, 0.5±0.2Vrms, 120Hz±20%.

** Test condition: 0.5±0.2Vrms，1KHz±10%</td><td>* Shall not exceed the limits given in the detailed spec.</td></tr>
<tr><td>3.</td><td>Q/D.F. (Dissipation Factor)</td><td>X7R:
0805=106(6.3V), 0603/475(6.3V)
X5R:
0201≧224 (6.3V,10V,16V)#1,
0402≧475 (6.3V,16V), 0402≧225(10V),
0603=106 (6.3V)
TT18X≧475(10V) , TT15X series
X6S:
0201/474(4V),0201≧104 (6.3V,10V#1),
0402≧225 (6.3V),
0402/475 (10V), 0603/106 (6.3V),
X7S:
0402/225(6.3V)

#1 Excluding
X5R/0201/105(6.3V);225(10V),
X6S/0201/104(10V)
(1.0±0.2Vrms，1KHz±10%)

Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</td><td> Class I :
<table><tr><th>Dielectric</th><th>Rated Vol.(V)</th><th>Q/D.F.</th><th>Remark</th></tr><tr><td rowspan="2">Class I</td><td rowspan="2">All</td><td>Q≥1000</td><td>Cap.≥30pF</td></tr><tr><td>Q≥400+20C</td><td>Cap.<30pF</td></tr></table>
* Class II :
<table><tr><th>Rated</th><th>D.F.≤</th><th colspan="2">Exception of D.F.≤</th></tr><tr><td rowspan="3">≥100V</td><td rowspan="3">≤2.5%</td><td>≤3.5%</td><td>0603≥0.047μF, 0805=0.1μF, 1206≥0.47μF, 1812≥4.7μF, 1825≥4.7μF, 2220≥4.7μF, 2225≥4.7μF</td></tr><tr><td>≤5%</td><td>0603≥0.068μF, 0805>0.1μF, 1206>1μF, 1210≥2.2μF</td></tr><tr><td>≤10%</td><td>0805>0.22μF, 1210≥3.3μF</td></tr><tr><td rowspan="3">50V</td><td rowspan="3">≤2.5%</td><td>≤3.5%</td><td>0201(50V), 0603≥0.047μF, 0805≥0.1μF, 1206≥0.47μF, 1210≥2.2μF, 1812≥4.7μF, 1825≥4.7μF, 2220≥4.7μF, 2225≥4.7μF</td></tr><tr><td>≤5%</td><td>0201≥0.01uF, 1210≥4.7μF</td></tr><tr><td>≤10%</td><td>0402≥0.1μF, 0603>0.1μF, 0805≥1μF, 1206≥2.2μF, 1210≥10μF</td></tr><tr><td>35V</td><td>≤3.5%</td><td>≤10%</td><td>0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td></tr><tr><td rowspan="4">25V</td><td rowspan="4">≤3.5%</td><td>≤5%</td><td>0201≥0.01μF, 0805≥1μF, 1210≥10μF</td></tr><tr><td>≤7%</td><td>0603≥0.33μF, 1206≥4.7μF</td></tr><tr><td>≤10%</td><td>0201≥0.1μF, 0402≥0.10μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥6.8μF, 1210≥22μF</td></tr><tr><td>≤12.5%</td><td>0402≥0.47μF</td></tr><tr><td rowspan="2">16V</td><td rowspan="2">≤3.5%</td><td>≤5%</td><td>0201≥0.01μF, 0402≥0.033μF, 0603≥0.15μF, 0805≥0.68μF, 1206≥2.2μF, 1210≥4.7μF</td></tr><tr><td>≤10%</td><td>0201≥0.1uF(0201/X7R≥0.022μF), 0402≥0.22uF, 0603≥0.68μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥22μF</td></tr><tr><td rowspan="2">10V</td><td rowspan="2">≤5%</td><td>≤10%</td><td>0201≥0.012μF, 0402≥0.33μF(0402/X7R≥0.22μF), 0603≥0.33μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥22μF</td></tr><tr><td>≤15%</td><td>0201≥0.1μF, 0402≥1μF</td></tr><tr><td rowspan="3">6.3V</td><td rowspan="3">≤10%</td><td>≤15%</td><td>0201≥0.1μF, 0402≥1μF, 0603≥10μF, 0805≥4.7μF, 1206≥47μF, 1210≥100μF</td></tr><tr><td>≤20%</td><td>0402≥2.2μF</td></tr><tr><td>4V</td><td>≤15%</td><td>---</td><td>---</td></tr></table></td></tr>
<tr><td>4.</td><td>Temperature Coefficient</td><td>* With no electrical load.
<table><tr><th>T.C.</th><th>Operating Temp.</th></tr><tr><td>C0G</td><td>-55~125°C at 25°C</td></tr><tr><td>X7R</td><td>-55~125°C at 25°C</td></tr></table>
* Measurement voltage for Class II :
<table><tr><th>Size</th><th>Cap. Range</th><th>Condition</th></tr><tr><td rowspan="3">0201</td><td>Cap.<0.1μF</td><td>1V</td></tr><tr><td>0.1μF≤Cap.<1μF</td><td>0.2V</td></tr><tr><td>Cap.≥1μF</td><td>0.1V</td></tr><tr><td rowspan="4">0402</td><td>Cap.<0.1μF</td><td>1V</td></tr><tr><td>Cap.=1μF</td><td>0.5V</td></tr><tr><td>1μF<Cap.<10μF</td><td>0.2V</td></tr><tr><td>Cap.≥10μF</td><td>0.1V</td></tr><tr><td rowspan="3">0603</td><td>Cap.≤1μF</td><td>1V</td></tr><tr><td>1μF<Cap.≤4.7μF</td><td>0.5V</td></tr><tr><td>Cap.>4.7μF</td><td>0.2V</td></tr><tr><td rowspan="3">0805</td><td>Cap.<10μF</td><td>1V</td></tr><tr><td>Cap.=10μF</td><td>0.5V</td></tr><tr><td>Cap.>10μF</td><td>0.2V</td></tr><tr><td rowspan="3">1206/1210</td><td>Cap.≤10μF</td><td>1V</td></tr><tr><td>10μF<Cap.≤100μF</td><td>0.5V</td></tr><tr><td>Cap.>100μF</td><td>0.2V</td></tr></table></td><td><table><tr><th>T.C.</th><th>Capacitance Change</th></tr><tr><td>C0G</td><td>Within ±30ppm/°C</td></tr><tr><td>X7R</td><td>Within ±15%</td></tr></table></td></tr>
</table>

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>5.</td><td>Insulation Resistance</td><td>
<table>
<tr><th>Rated Vol.(V)</th><th>Apply Voltage</th><th>Charge Time</th></tr>
<tr><td>≤100</td><td>1 times of U_R</td><td>Max. 120 sec.</td></tr>
<tr><td>200≤V≤500</td><td>1 times of U_R</td><td>60 sec.</td></tr>
<tr><td>>500</td><td>500Vdc</td><td>60 sec.</td></tr>
</table>
</td><td>
<table>
<tr><th>Dielectric</th><th>Capacitance Change</th></tr>
<tr><td>Class I</td><td>≥10GΩ or RxC≥500Ω-F, whichever is smaller</td></tr>
<tr><td>Class II</td><td>≥10GΩ or RxC≥100Ω-F, whichever is smaller</td></tr>
</table>
* Except (Class II) :
<table>
<tr><th>Rated voltage (X7R)</th><th>I.R.</th></tr>
<tr><td>≥100V : All X7R</td><td rowspan="8">≥10GΩ or RxC≥100Ω-F, whichever is smaller</td></tr>
<tr><td>50V : 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF, 1812≥10μF, 2220≥22μF</td></tr>
<tr><td>35V : 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td></tr>
<tr><td>25V : 0402≥1μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr>
<tr><td>16V : 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr>
<tr><td>10V : 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr>
<tr><td>6.3V; 4V</td></tr>
<tr><th>Rated voltage (X7R)</th><th>I.R.</th></tr>
<tr><td>100V : 1210≥3.3μF</td><td rowspan="8">RxC≥50Ω-F</td></tr>
<tr><td>50V : 0402≥0.1μF, 0603≥2.2μF, 0805≥10μF, 1206≥10μF</td></tr>
<tr><td>35V : 0603≥1μF</td></tr>
<tr><td>25V : 0201≥0.1μF, 0402≥2.2μF, 0603≥10μF, 0805≥10μF, 1206≥22μF</td></tr>
<tr><td>16V : 0603≥10μF, 0402≥1μF, 0201≥0.22μF</td></tr>
<tr><td>10V : 0201>0.1μF, 0402≥1μF, 0603≥10μF, 0805≥47μF</td></tr>
<tr><td>6.3V : 0201≥0.1μF, 0603>4.7μF, 0805≥47μF, 1206≥10μF</td></tr>
<tr><td>4V : 0603≥22μF, 0805≥47μF, 1206≥100μF</td></tr>
</table>
</td></tr>
<tr><td>6.</td><td>Dielectric Strength</td><td>
<table>
<tr><th>Rated Voltage</th><th>Condition</th></tr>
<tr><td>≤100</td><td>2.5 times of U_R</td></tr>
<tr><td>100<V≤250</td><td>2.0 times of U_R</td></tr>
<tr><td>250<V≤500</td><td>1.5 times of U_R</td></tr>
<tr><td>630≤V≤3000V</td><td>1.2 times of U_R</td></tr>
<tr><td>3000<V<5000V</td><td>1.1 times of U_R</td></tr>
<tr><td>≥5000V</td><td>1.0 times of U_R</td></tr>
</table>
* Duration : 1 to 5 sec.
Voltage ramp up rate ≤500Vdc/sec.
* Charge and discharge current less than 50mA.
* Test in insulating fluid for rated voltage ≥1KV products.
</td><td>* No evidence of damage or flash over during test.</td></tr>
<tr><td>7.</td><td>Solderability</td><td>* Solder temperature : 235±5°C for (0402~1210).
* Solder temperature : 245±5°C for (1808~2225).
* Dipping time : 2±0.5 sec.</td><td>* 75% min. coverage of all metalized area.</td></tr>
<tr><td>8.</td><td>Resistance to Soldering Heat</td><td>* Solder temperature : 260±5°C.
* Dipping time : 10±1 sec.
* Preheating : 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder.
* Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>* No remarkable damage.
* Cap. change :
C0G : Within ±2.5% or ±0.25pF, whichever is larger.
X7R : Within ±7.5%.
* D.F./Q, I.R : To meet initial requirements.
* 25% max. leaching on each edge.</td></tr>
<tr><td>9.</td><td>Temperature Cycle</td><td>* Conduct the five cycles according to the temperatures and time.
<table>
<tr><th>Step</th><th>Temp.(°C)</th><th>Time(min.)</th></tr>
<tr><td>1</td><td>Min. operating temp. +0/-3</td><td>30±3</td></tr>
<tr><td>2</td><td>Room temp.</td><td>2~3</td></tr>
<tr><td>3</td><td>Max. operating temp. +3/-0</td><td>30±3</td></tr>
<tr><td>4</td><td>Room temp.</td><td>2~3</td></tr>
</table>
* Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>* No remarkable damage.
* Cap. change :
C0G : Within ±2.5% or ±0.25pF, whichever is larger.
X7R : Within ±7.5%.
* D.F./Q :
C0G : Q≥100% of initial requirements.
X7R : D.F.≤150% of initial requirement.
* I.R. : ≥100% of initial requirement.</td></tr>
</table>

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

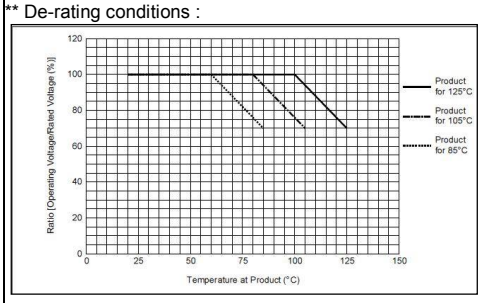
8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>10.</td><td>Humidity (Damp Heat) Steady State</td><td>* Test temp. : 40±2°C.
* Humidity : 90~95%RH.
* Test time : 500 +24/-0hrs.
* Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>* No remarkable damage.
* Cap. change :
C0G : Within ±5.0% or ±0.5pF, whichever is larger.
X7R : Within ±12.5% for ≥10V**, within ±25% for 6.3V.
**10V : Within ±25% for 0603≥4.7μF, 0402≥1μF.
* D.F./Q :
C0G : Q≥350 for Cap.>30pF, Q≥275+2.5C for 10pF≤Cap.≤30pF, Q≥200+10C for Cap.<10pF.
X7R : D.F.≤200% of initial requirement.
* I.R. : ≥10V, ≥1GΩ or R×C≥50Ω-F, whichever is smaller.
Except :
<table>
<tr><th>Rated voltage</th><th>I.R.</th></tr>
<tr><td>100V : All X7R; 1210≥3.3μF</td><td rowspan="8">≥1GΩ or RxC≥10Ω-F, whichever is smaller</td></tr>
<tr><td>50V : 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td></tr>
<tr><td>35V : 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td></tr>
<tr><td>25V : 0201≥0.1uF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr>
<tr><td>16V : 0201≥0.1uF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr>
<tr><td>10V : 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr>
<tr><td>6.3V; 4V; Size≥1812</td></tr>
</table></td></tr>
<tr><td>11.</td><td>Humidity (Damp Heat) Load</td><td>* Reflow solder the capacitors on a P.C. Board before test.
* Test temp. : 40±2°C (85±3°C for control code H).
* Humidity : 90~95% RH (85±5% for control code H).
* Test time : 500 +24/-0hrs.
* To apply voltage : Rated voltage (500Vdc max. for general purpose and 100Vdc max. for control code H)
* Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).</td><td>* No remarkable damage.
* Cap. change :
C0G : Within ±7.5% or ±0.75pF, whichever is larger.
X7R : Within ±12.5% for ≥10V**, within ±25% for 6.3V.
**10V : Within ±25% for 0603≥4.7μF, 0402≥1μF.
* D.F./Q :
C0G : Q≥350 for Cap.>30pF, Q≥275+2.5C for 10pF≤Cap.≤30pF, Q≥200+10C for Cap.<10pF.
X7R : ≤200% of initial requirement.
* I.R. : ≥10V, ≥500MΩ or RxC≥25Ω-F, whichever is smaller.
Except :
<table>
<tr><th>Rated voltage</th><th>I.R.</th></tr>
<tr><td>≥100V : All X7R; 1210≥3.3μF</td><td rowspan="8">≥500MΩ or RxC≥5Ω-F, whichever is smaller</td></tr>
<tr><td>50V : 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td></tr>
<tr><td>35V : 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td></tr>
<tr><td>25V : 0201≥0.1uF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr>
<tr><td>16V : 0201≥0.1uF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr>
<tr><td>10V : 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr>
<tr><td>6.3V; 4V; Size≥1812</td></tr>
</table></td></tr>
</table>

PSA 信昌電子陶瓷股份有限公司

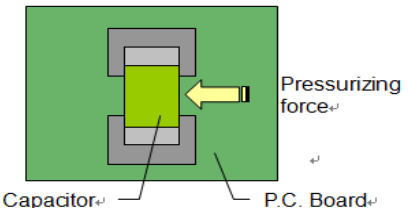
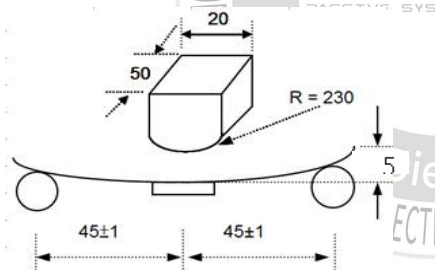
Prosperity Dielectrics Co., Ltd.

8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>12.</td><td>High Temperature Load (Endurance)</td><td>
* Test temp. : 125±3°C.
* To apply voltage :
(1) ≤6.3V or Cap.≥10μF : 150% of rated voltage.
(2) 10V≤Ur≤100V : 200% of rated voltage.
(3) 200V≤Ur≤500V : 150% of rated voltage.
(4) 630V : 120% of rated voltage.
(5) Ur≥1000V : 100% of rated voltage.
(6) 100% of rated voltage for below range :
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated</th><th>Capacitance</th></tr>
<tr><td>0201</td><td>X7R</td><td>≤10V</td><td>C≥0.1μF</td></tr>
<tr><td></td><td></td><td>≥16V</td><td>C>0.1μF</td></tr>
<tr><td>0402</td><td>X7R</td><td>6.3V, 10V, 16V, 25V</td><td>C≥1.0μF</td></tr>
<tr><td rowspan="3">0603</td><td rowspan="3">X7R</td><td>4V</td><td>C≥22μF</td></tr>
<tr><td>6.3V,10V</td><td>C≥4.7μF</td></tr>
<tr><td>25V, 35V</td><td>C≥1.0μF</td></tr>
<tr><td rowspan="3">0805</td><td rowspan="3">X7R</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 rowspan="2">1206</td><td rowspan="2">X7R</td><td>≤6.3V</td><td>C≥47μF</td></tr>
<tr><td>100V</td><td>C≥2.2μF</td></tr>
<tr><td rowspan="2">1210</td><td>X7R</td><td>16V</td><td>C≥47μF</td></tr>
<tr><td>X7R</td><td>≥100V</td><td>C≥3.3μF</td></tr>
<tr><td>2220</td><td>X7R</td><td>100V</td><td>C≥22μF</td></tr>
</table>
(7) 150% of rated voltage for below range :
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated Voltage</th><th>Capacitance</th></tr>
<tr><td>0201</td><td>X7R</td><td>16V</td><td>C≥0.022μF</td></tr>
<tr><td rowspan="2">0402</td><td rowspan="2">X7R</td><td>50V</td><td>C≥0.1μF</td></tr>
<tr><td>10~25V</td><td>C≥0.22μF</td></tr>
<tr><td rowspan="2">0603</td><td>X7R</td><td>≥50V</td><td>C≥0.082μF</td></tr>
<tr><td>X7R</td><td>10V,16V, 50V</td><td>C≥1.0μF</td></tr>
<tr><td rowspan="3">0805</td><td>X7R</td><td>10~50V</td><td>C≥4.7μF</td></tr>
<tr><td rowspan="2">X7R</td><td>50V</td><td>C≥0.47μF</td></tr>
<tr><td>≥100V</td><td>C≥0.12μF</td></tr>
<tr><td>1206</td><td>X7R</td><td>≥50V</td><td>C≥1.0μF</td></tr>
<tr><td rowspan="2">1210</td><td>X7R</td><td>≤100V</td><td>C≥1.0μF</td></tr>
<tr><td>X7R</td><td>>100V</td><td>C≥0.22μF</td></tr>
<tr><td rowspan="2">1812</td><td rowspan="2">X7R</td><td>≤50V</td><td>C≥4.7μF</td></tr>
<tr><td>100V</td><td>C≥1.0μF</td></tr>
<tr><td>1825
2220
2225</td><td>X7R</td><td>≥100V</td><td>C≥1.0μF</td></tr>
</table>
(8) 120% of rated voltage for below range :
<table>
<tr><th>Size</th><th>Dielectric</th><th>Rated Voltage</th><th>Capacitance</th></tr>
<tr><td>2220</td><td>X7R</td><td>≥100V</td><td>C≥15μF</td></tr>
</table>
* Test time : 1000 +24/-0 hrs.
* Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.
* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).
** De-rating conditions :


</td><td>
* No remarkable damage.
* Cap. change :
C0G : Within ±5.0% or ±0.5pF, whichever is larger.
X7R : Within ±12.5% for ≥10V**, within ±25% for 6.3V.
**10V : Within ±25% for 0603≥4.7μF, 0402≥1μF.
* D.F./Q :
C0G : Q≥350 for Cap.>30pF, Q≥275+2.5C for 10pF≤Cap.≤30pF, Q≥200+10C for Cap.<10pF.
X7R : D.F.≤200% of initial requirement.
* I.R. : ≥10V, ≥1GΩ or R×C≥50Ω-F, whichever is smaller.
Except :
<table>
<tr><th>Rated voltage</th><th>I.R.</th></tr>
<tr><td>100V : All X7R; 1210≥3.3μF</td><td rowspan="7">≥1GΩ or RxC≥10Ω-F, whichever is smaller</td></tr>
<tr><td>50V : 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF</td></tr>
<tr><td>35V : 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td></tr>
<tr><td>25V : 0201≥0.1uF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF</td></tr>
<tr><td>16V : 0201≥0.1uF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF</td></tr>
<tr><td>10V : 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF</td></tr>
<tr><td>6.3V; 4V; Size≥1812</td></tr>
</table>
</td></tr>
</table>

8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements
13.	**Adhesive Strength of Termination**	* Capacitors mounted on a substrate. A force of 5N(≤0603) or 10N(>0603) applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10±1 second.  	* No remarkable damage or removal of the terminations.
14.	**Bending Test**	* The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1mm per second until the deflection becomes 5mm for product size < 1808, 3mm for product size ≥ 1808.  Unit : mm	* No remarkable damage. Dielectric / Cap. Change Class I (C0G) / Within ±5.0% or ±0.5pF, whichever is larger Class II (X7R) / Within ±12.5% (This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test)
15.	**Vibration Resistance**	* Vibration frequency : 10~55 Hz/min. * Total amplitude : 1.5mm. * Test time : 6 hrs. (Two hrs each in three mutually perpendicular directions) * Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp. * Measurement to be made after keeping at room temp. for 24±2 hrs (Class I) or 48±4 hrs (Class II).	* No remarkable damage. * Cap. change and D.F./Q : To meet initial spec.

PSA 信昌電子陶瓷股份有限公司

Prosperity Dielectrics Co., Ltd.

9. PACKAGE DIMENSION AND QUANTITY

Size	Thickness (mm)	Paper tape		Plastic tape	
		7" reel	13" reel	7" reel	13" reel
0402(1005)	0.50±0.05	10k	50k	-	-
	0.50 +0.02/-0.05	10k	50k	-	-
	0.50±0.20	10k	-	-	-
0603(1608)	0.50±0.10	4k	-	-	-
	0.80±0.07	4k	15k	-	-
	0.80 +0.15/-0.10	4k	15k	-	-
0805(2012)	0.50±0.10	4k	15k	-	-
	0.60±0.10	4k	15k	-	-
	0.80±0.10	4k	15k	-	-
	0.85±0.10	4k	15k	-	-
	1.25±0.10	-	-	3k	10k
	1.25±0.20	-	-	3k	10k
1206(3216)	0.80±0.10	4k	15k	-	-
	0.85±0.10	4k	15k	-	-
	0.95±0.10	-	-	3k	10k
	1.15±0.15	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	10k
	1.60 +0.30/-0.10	-	-	2k	9k
1210(3225)	0.85±0.10	-	-	3k	10k
	0.95±0.10	-	-	3k	10k
	1.25±0.10	-	-	3k	10k
	1.60±0.20	-	-	2k	-
	2.00±0.20	-	-	1k	6k
	2.50±0.30	-	-	1k	6k
1808(4520)	1.25±0.10	-	-	2k	10k
	1.60±0.20	-	-	2k	8k
	2.00±0.20	-	-	1k	6k
1812(4532)	1.25±0.10	-	-	1k	5k
	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	3k
	2.80±0.30	-	-	0.5k	-
1825(4563)	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-
2220(5750)	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-
	3.10±0.30	-	-	-	1k
2225(5763)	1.60±0.20	-	-	1k	-
	2.00±0.20	-	-	1k	-
	2.50±0.30	-	-	0.5k	-
	2.80±0.30	-	-	0.5k	-

Unit : pcs

9. PACKAGE DIMENSION AND QUANTITY

9.1. EMBOSSED TAPE DIMENSIONS

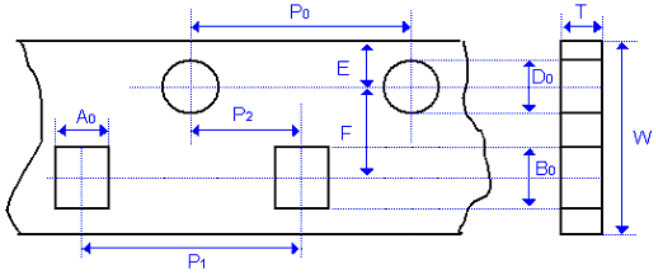


Fig. 9.1 The dimension of paper tape

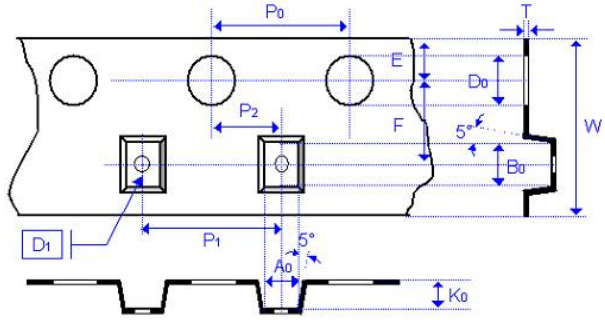


Fig. 9.2 The dimension of plastic tape

Size	0402		0603		0805	
Chip Thickness	0.50±0.05	0.50±0.10	0.80±0.07	0.80 +0.15/-0.1	0.80±0.10	1.25±0.10 1.25±0.20
A_0	0.70±0.20	0.70±0.20	1.00 +0.05/-0.1	1.02 +0.05/-0.1	1.50±0.10	<1.65
B_0	1.20±0.20	1.20±0.20	1.80±0.10	1.80±0.10	2.30±0.10	<2.40
T	≤0.80	≤0.80	0.95±0.05	0.97±0.05	0.95±0.05	0.23±0.05
K_0	-	-	-	-	-	<2.50
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.10	40.00±0.10	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_1	2.00±0.05	2.00±0.05	4.00±0.10	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	2.00±0.05	2.00±0.05
D_0	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.50 +0.10/-0
D_1	-	-	-	-	-	1.00±0.10
E	1.75±0.05	1.75±0.05	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	3.50±0.05	3.50±0.05
Unit :	mm	mm	mm	mm	mm	mm

Size	1206			1210		1808	
Chip Thickness	0.80±0.10	0.95±0.10 1.25±0.10	1.60±0.20 1.60+0.3/-0.1	0.95±0.10 1.25±0.10 1.60±0.20	2.50±0.30	1.25±0.10 1.60±0.20	2.00±0.20
A_0	2.00±0.10	<2.00	<2.50	<3.05	<3.20	<2.50	<2.50
B_0	3.50±0.50	<3.70	<4.00	<3.80	<4.00	<5.30	<5.30
T	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.23±0.05	0.25±0.05	0.25±0.05
K_0	-	<2.50	<2.50	<2.50	<3.50	<2.50	<2.50
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	12.00±0.20	12.00±0.20
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.0±0.20	40.0±0.20
P_1	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	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	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.55±0.05	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/- 0	1.50 +0.10/-0	1.50±0.10/-0	1.50+0.10/-0
D_1	-	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.05	5.50±0.05
Unit :	mm	mm	mm	mm	mm	mm	mm

9. PACKAGE DIMENSION AND QUANTITY

Size	1812		1825		2220		
Chip Thickness	1.25±0.10 1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30	1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30	1.40±0.15 1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30	3.10±0.30
A_0	<3.90	<3.90	<6.80	<6.80	<5.80	<6.80	<5.60
B_0	<5.30	<5.30	<5.30	<5.30	<6.50	<6.50	<6.50
T	0.25±0.05	0.25±0.05	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10	0.30±0.10
K_0	<2.50	<3.00	<2.50	<3.10	<2.50	<3.10	<4.20
W	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20	12.00±0.20
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_1	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P_2	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D_0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0	1.50 +0.10/-0
D_1	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05	5.50±0.05
Unit :	mm	mm	mm	mm	mm	mm	mm

Size	2225	
Chip Thickness	1.60±0.20 2.00±0.20	2.50±0.30 2.80±0.30
A_0	<6.80	<6.80
B_0	<6.50	<6.50
T	0.30±0.10	0.30±0.10
K_0	<2.50	<3.10
W	12.00±0.20	12.00±0.20
P_0	4.00±0.10	4.00±0.10
$10xP_0$	40.00±0.20	40.00±0.20
P_1	8.00±0.10	8.00±0.10
P_2	2.00±0.05	2.00±0.05
D_0	1.50 +0.10/-0	1.50 +0.10/-0
D_1	1.50±0.10	1.50±0.10
E	1.75±0.10	1.75±0.10
F	5.50±0.05	5.50±0.05
Unit :	mm	mm

9. PACKAGE DIMENSION AND QUANTITY

9.2. REEL DIMENSIONS

Size	0201, 0402, 0603, 0805, 1206, 1210		1808, 1812, 1825,2220,2225	2220, 2225
Reel size	7”	13”	7”	13”
C	13.0 +0.5/-0.2	13.0 +0.7/-0.3	13.0 +0.5/-0.2	13.5 ±0.5
W_1	8.4+1.5	8.4+1.5	12.4 +2.0/-0	12.4 +2.0/-0
W	14.4max	14.4max	shall accommodate tape width without interference	
A	178.0 ±0.10	330.0 ±1.0	178.0 ±0.10	330.0 ±1.0
N	60.0 +1.0/-0	100 ±1.0	60.0 +1.0/-0	100 ±1.0

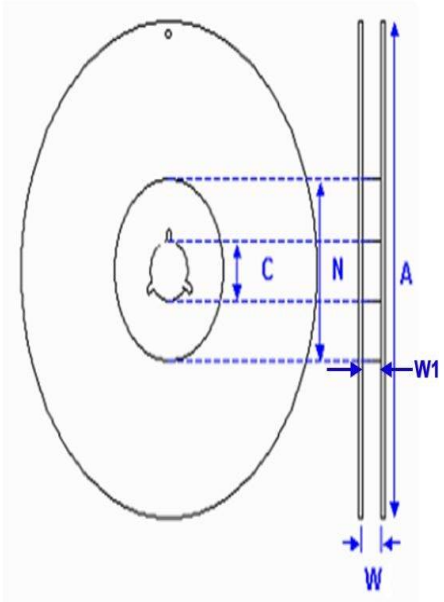


Fig. 9.3 The dimension of reel

10. APPLICATION NOTES

STORAGE

To prevent the damage of solderability of terminations, the following storage conditions are recommended :

Indoors under 5 ~ 40°C and 20% ~ 70% RH.

No harmful gases containing sulfuric acid, ammonia, hydrogen sulfide or chlorine.

Packaging should not be opened until the capacitors are required for use. If opened, the pack should be re-sealed as soon as is practicable. Taped product should be stored out of direct sunlight, which might promote deterioration in tape or adhesion performance. The product is recommended to be used within 12 months after shipment and checked the solderability before use.

HANDLING

Chip capacitors are dense, hard, brittle, and abrasive materials. They are liable to suffer mechanical damage, in the form of cracks or chips. Chip Capacitors should be handled with care to avoid contamination or damage. To use vacuum or plastic tweezers to pick up or plastic tweezers is recommended for manual placement. Tape and reeled packages are suitable for automatic pick and placement machine.

PREHEAT

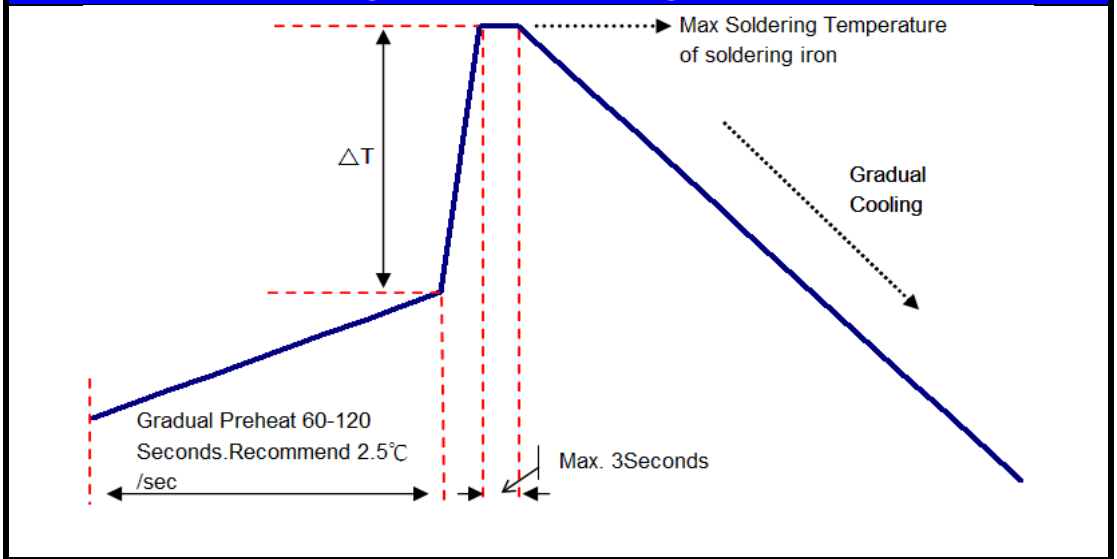
In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required. The rate of preheat should not exceed 3°C per second.

SOLDERING

Use mildly activated rosin fluxes do not use activated flux. The amount of solder in each solder joint should be controlled to prevent the damage of chip capacitors caused by the stress between solder, chips, and substrate.

a.) Hand soldering :

Fig. 10.1 Hand Soldering Profile



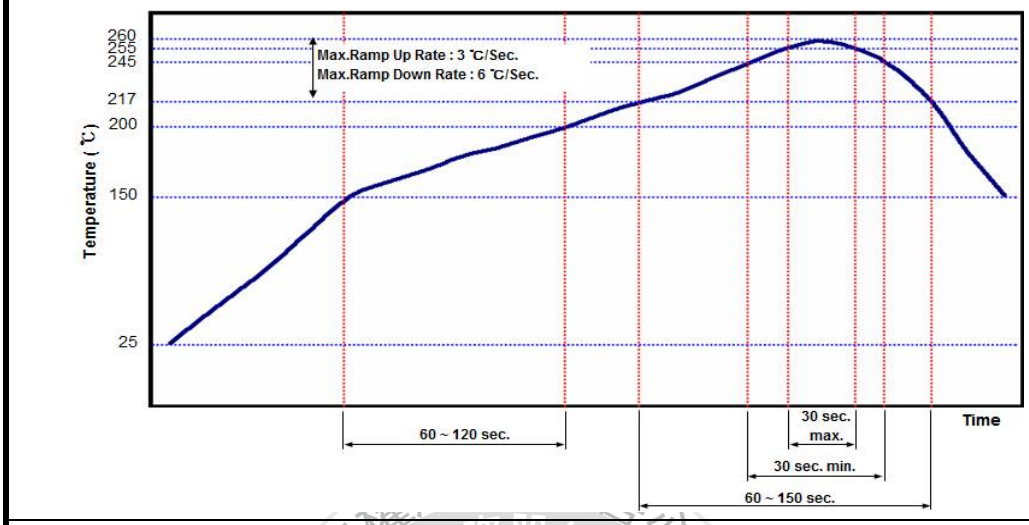
Chip Size	Pre-Heat temp.	ΔT	Max. soldering iron temp.
≤1206	≥150°C	≤150°C	≤350°C
1210~2225	≥150°C	≤130°C	≤280°C

* Soldering iron tip diameter ≤1.0 mm and wattage max. 20W.
* The Capacitors shall be pre-heated and that the temperature gradient between the devices and the tip of the soldering iron.
* The required amount of solder shall be melted on the soldering tip.
* The tip of iron should not contact the ceramic body directly.
* The Capacitors shall be cooled gradually at room temperature after soldering.
* Forced air cooling is not allowed.

10. APPLICATION NOTES

b.) Reflow soldering :

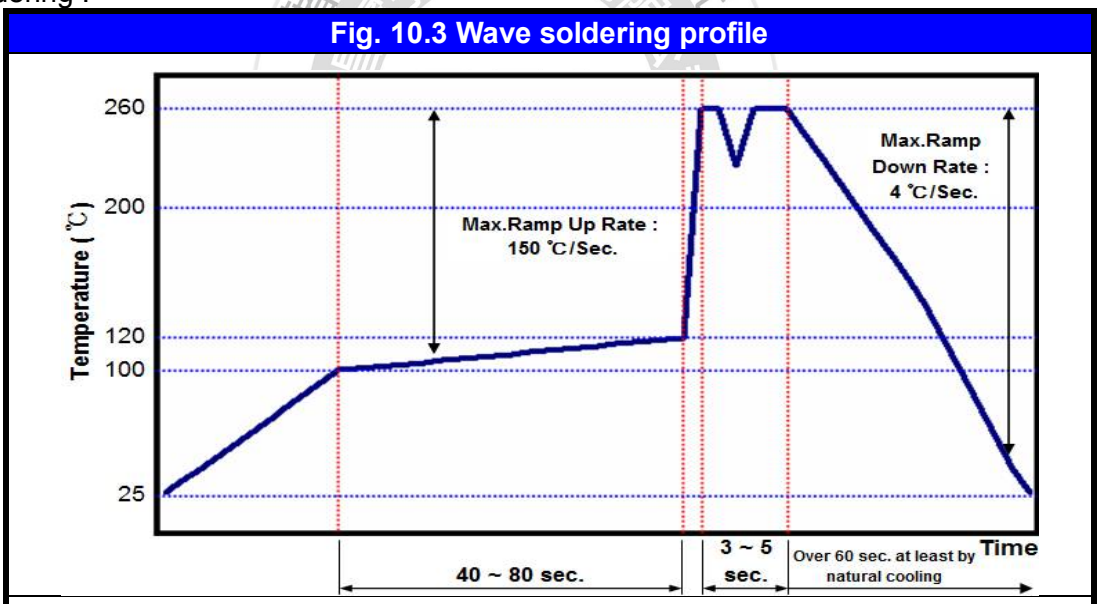
Fig. 10.2 Reflow soldering profile



For Sn/Ag/Cu Series solder paste (Pb-Free)

c.) Wave soldering :

Fig. 10.3 Wave soldering profile



For Sn/Ag/Cu Series solder paste (Pb-Free)

Soldering conditions :

Class I :

Size Inch (mm)	Temper. Cher.	Capacitance	Condition	
			Wave	Reflow
≤0402 (1005)	Class I	All	X	O
0603 (1608)	Class I	All	O	O
0805 (2012)	Class I	All	O	O
1206 (3216)	Class I	Thickness ≤ 0.95mm	O	O
		Thickness >0.95mm	X	O
≥1210 (3225)	Class I	All	X	O
Coating Products	All	All	X	O

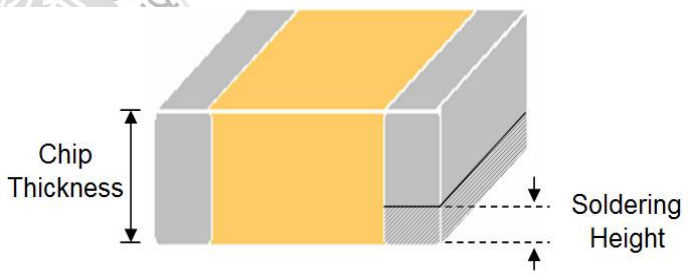
10. APPLICATION NOTES

Soldering conditions :
Class II :

Size Inch (mm)	Temper. Cher.	Capacitance	Condition	
			Wave	Reflow
≤0402 (1005)	Class II	All	X	O
0603 (1608)	Class II	Cap. <2.2μF	O	O
		Cap. ≥2.2μF	X	O
0805 (2012)	Class II	Thickness ≤ 0.95mm	O	O
		Thickness > 0.95mm	X	O
1206 (3216)	Class II	Thickness ≤ 0.95mm	O	O
		Thickness > 0.95mm	X	O
≥1210 (3225)	Class II	All	X	O
Coating Products	All	All	X	O

Soldering height :

The solder climbing minimum height is suggesting to 25% of chip thickness or 500um whichever is less.
(Reference from IPC-610E)



COOLING

After soldering, cool the chips and the substrate gradually to room temperature. Natural cooling in air is recommended to minimize stress in the solder joint.

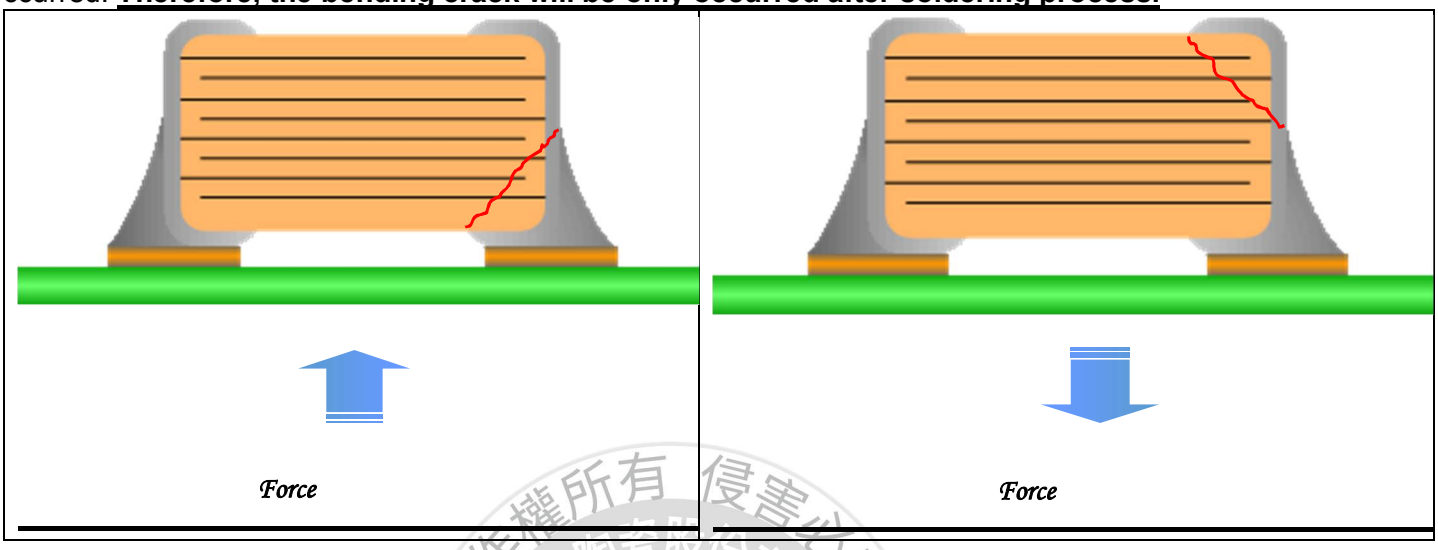
CLEANING

All flux residues must be removed by using suitable electronic-grade vapor-cleaning solvents to eliminate contamination that could cause electrolytic surface corrosion. Good results can be obtained by using ultrasonic cleaning of the solvent. The choice of the proper system is depends upon many factors such as component mix, flux, and solder paste and assembly method. The ability of the cleaning system to remove flux residues and contamination from under the chips is very important.

Surface coating products are not suitable cleaning/washing by solvent

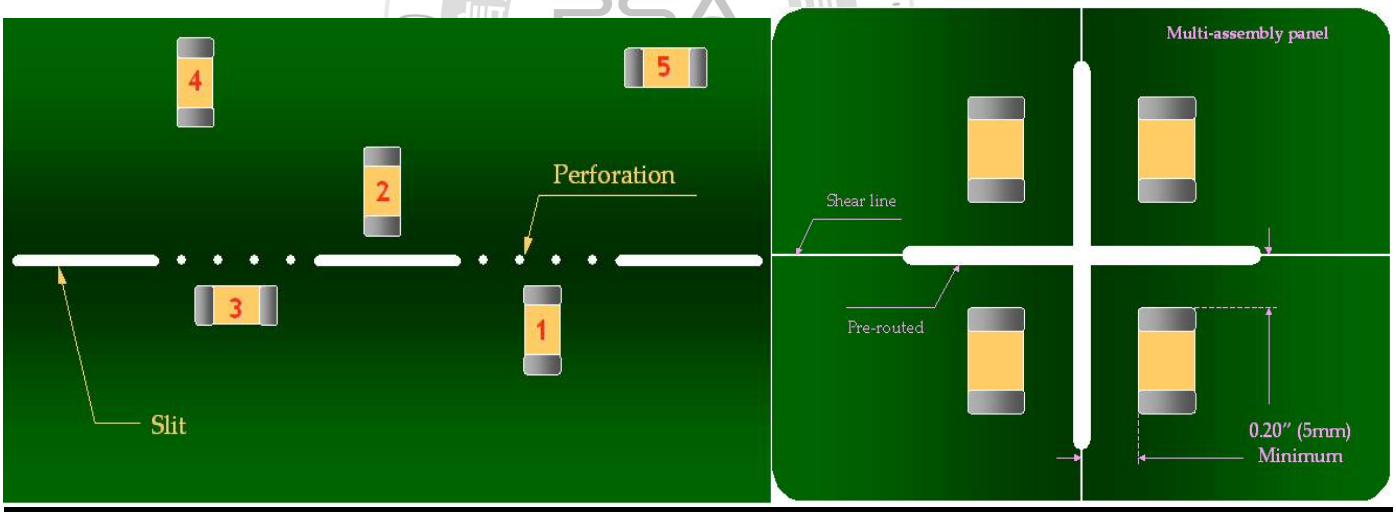
11. Typical Bending Cracks of MLCC

MLCC ceramic body is consisted of rigidity material. It will be suffered compressive and tensional stress when the carried board is bended. If the suffered stress is over ceramic body strength, the bending crack is occurred. **Therefore, the bending crack will be only occurred after soldering process.**



12. The stress v.s. position on PCB during bending

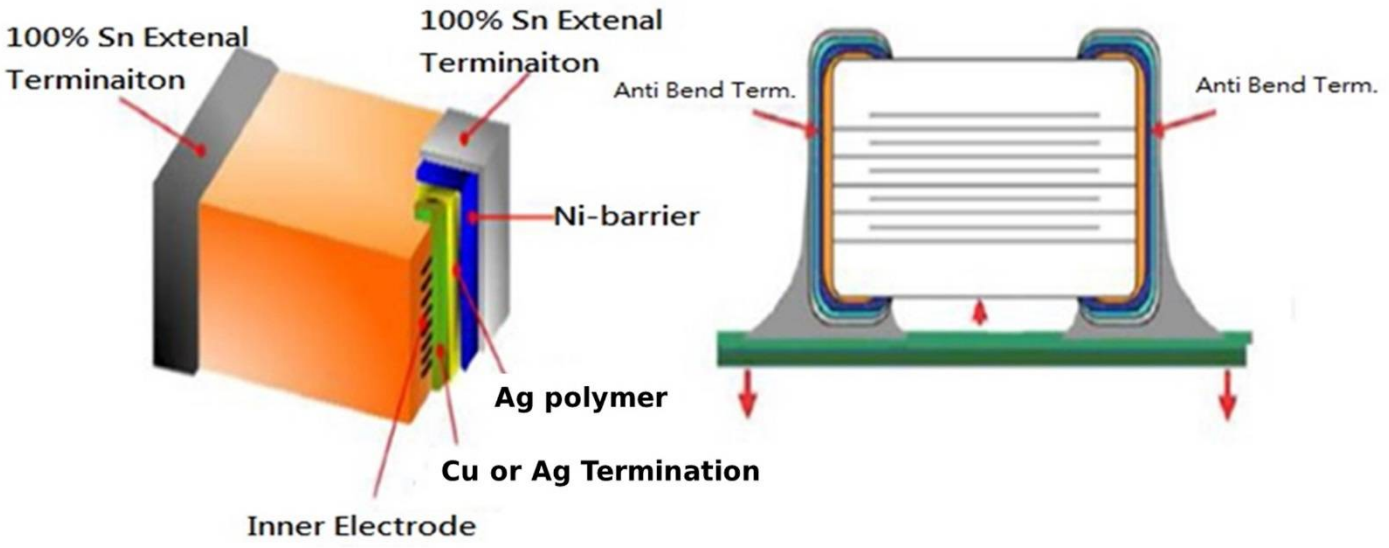
Chip mounting close to board separation point



Magnitude of stress 1 > 2 ≈ 3 > 4 > 5

13. Structure

PDC soft termination series is added a special termination material(Ultra-Buffer or Anti-Bend)between ceramic body and Ni-barrier that can absorb mechanical stress to prevent bending crack occurred



14. Illustration of Bending Test