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**Messrs. :** 一般共用

**Date :** 2019/11/11

# 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~4000V

PREPARED BY	APPROVED BY

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# 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~4000V**

**SPEC. No. : FP-000-001-15**

**DATE : 2019/11/11**

DRAWN BY	CHECEKED BY	APPROVED BY
<i>Jane Hsiao</i>	<i>Yvens Chou</i>	<i>Joseph Ling</i>

## 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

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

## 4. HOW TO ORDER

## 3. APPLICATIONS

- For general digital circuit.
- For power supply bypass capacitors.
- For consumer electronics.
- For telecommunication.
- DC to DC converter.

FP	32	X	225	K	101	E	G	G
<b>PDC Family</b>	<b>Size</b>	<b>Dielectric</b>	<b>Capacitance</b>	<b>Tolerance</b>	<b>Rated Voltage</b>	<b>Packaging</b>	<b>Thickness</b>	<b>Control Code</b>
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	F	Y5V

Table 4		Capacitance Rule Code	
Code	Description	Code	Description
R47	0.47pF	102	102=10x10 <sup>2</sup> =1000pF
0R5	0.5pF	104	104=10x10 <sup>4</sup> =100nF
100	100=10x10 <sup>0</sup> =10pF	106	106=10x10 <sup>6</sup> =10μF

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	201	200Vdc	152	1500Vdc
100	10Vdc	251	250Vdc	202	2000Vdc
160	16Vdc	401	400Vdc	302	3000Vdc
250	25Vdc	501	500Vdc	402	4000Vdc
500	50Vdc	631	630Vdc	502	5000Vdc
101	100Vdc	102	1000Vdc	602	6000Vdc

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
		Q	Surface Coating (Size 1206~2225)

## 5. EXTERNAL DIMENSIONS

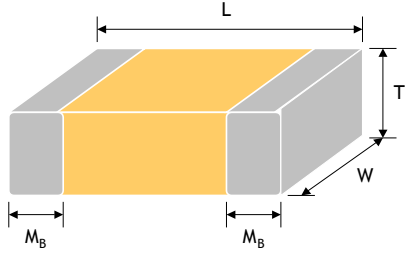
Size Inch (mm)	L (mm)	W (mm)	Code / T (mm)	M <sub>B</sub> (mm)	
0402(1005)	1.00±0.20	0.50±0.20	See No.4 Reference Table 8	0.25 +0.05/-0.10	
0603(1608)	1.60±0.20	0.80±0.20		0.40±0.15	
0805(2012)	2.10±0.20	1.25±0.20		0.50±0.20	
1206(3216)	3.30±0.30	1.60±0.20 1.60 +0.30/-0.10 <sup>#</sup>		0.60±0.20	
1210(3225)	3.30±0.40	2.50±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

<sup>#</sup> For 1206 size P thickness 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	6.3V, 10V, 16V, 25V, 50V, 100V, 200V, 250V, 500V, 630V, 1KV, 1.5KV, 2KV, 3KV, 4KV												
Capacitance range	0.1pF ~ 330nF	100pF ~ 22μF												
Capacitance tolerance	Reference to Table 5	Reference to Table 5												
Tan δ	<table border="1" style="width: 100%;"> <thead> <tr> <th>Cap. Range</th> <th>Q Spec.</th> </tr> </thead> <tbody> <tr> <td>Cap. &lt;30pF</td> <td>Q ≥ 400+20C</td> </tr> <tr> <td>Cap. ≥ 30pF</td> <td>Q ≥ 1000</td> </tr> </tbody> </table>	Cap. Range	Q Spec.	Cap. <30pF	Q ≥ 400+20C	Cap. ≥ 30pF	Q ≥ 1000	Reference to 8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS						
Cap. Range	Q Spec.													
Cap. <30pF	Q ≥ 400+20C													
Cap. ≥ 30pF	Q ≥ 1000													
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												
	<table border="1" style="width: 100%;"> <thead> <tr> <th>Cap. Range</th> <th>Test Condition</th> </tr> </thead> <tbody> <tr> <td>Cap. ≤ 1000pF</td> <td>1.0±0.2Vrms, 1.0MHz±10%</td> </tr> <tr> <td>Cap. &gt; 1000pF</td> <td>1.0±0.2Vrms, 1.0KHz±10%</td> </tr> </tbody> </table>	Cap. Range	Test Condition	Cap. ≤ 1000pF	1.0±0.2Vrms, 1.0MHz±10%	Cap. > 1000pF	1.0±0.2Vrms, 1.0KHz±10%	<table border="1" style="width: 100%;"> <thead> <tr> <th>Cap. Range</th> <th>Test Condition</th> </tr> </thead> <tbody> <tr> <td>Cap. ≤ 10μF</td> <td>1.0±0.2Vrms, 1.0KHz±10%</td> </tr> <tr> <td>Cap. &gt; 10μF</td> <td>0.5±0.2Vrms, 120Hz±20%</td> </tr> </tbody> </table>	Cap. Range	Test Condition	Cap. ≤ 10μF	1.0±0.2Vrms, 1.0KHz±10%	Cap. > 10μF	0.5±0.2Vrms, 120Hz±20%
Cap. Range	Test Condition													
Cap. ≤ 1000pF	1.0±0.2Vrms, 1.0MHz±10%													
Cap. > 1000pF	1.0±0.2Vrms, 1.0KHz±10%													
Cap. Range	Test Condition													
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)												

**7. CAPACITANCE RANGE**

**7-1. C0G**

Dimension	Code	0402					0603							0805										
		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	A	A	A	A	A	A	A	A	A	A	A	C
0.6	0R6	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
0.7	0R7	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
0.8	0R8	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
0.9	0R9	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
1.0	1R0	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
1.2	1R2	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
1.5	1R5	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
1.8	1R8	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
2.2	2R2	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
2.7	2R7	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
3.3	3R3	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
3.9	3R9	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
4.7	4R7	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
5.0	5R0	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
5.6	5R6	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
6.8	6R8	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
8.2	8R2	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
10	100	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
12	120	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
15	150	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
18	180	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
22	220	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
27	270	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
33	330	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
39	390	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
47	470	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
56	560	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
68	680	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	A	A	C
82	820	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	A	X	X	C
100	101	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	A	X	X	X	C
120	121	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	A	X	C	C	C	C
150	151	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	A	X	C	C	C	C	C
180	181	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	X	C	C	C	C	C	C
220	221	K	K	K	K	K	S	S	S	S	S	S	A	A	A	A	A	C	C	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	C
330	331	K	K	K	K		S	S	S	S	S	B	B	A	A	A	A	A	C	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	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	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	C						
10000	103													C	C	C	C	C						

**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	
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	M
12	120	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M
15	150	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M
18	180	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M
22	220	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M
27	270	X	X	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M
33	330	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M	M	M
39	390	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M	M	M
47	470	X	X	X	X	X	X	X	X	M	M	M	M	M	M	M	M	M	M	M	M	M
56	560	X	X	X	X	X	X	X	M	C	C	M	M	M	M	M	M	M	M	M	C	C
68	680	X	X	X	X	X	X	X	M	C	C	M	M	M	M	M	M	M	M	M	C	C
82	820	X	X	X	X	X	X	X	C	C	C	M	M	M	M	M	M	M	M	M	C	C
100	101	X	X	X	X	X	X	X	C	C	C	M	M	M	M	M	M	M	M	M	C	C
120	121	X	X	X	X	X	X	X	C	E	E	M	M	M	M	M	M	M	M	M	C	C
150	151	X	X	X	X	X	X	X	C	E	E	M	M	M	M	M	M	M	M	M	C	E
180	181	X	X	X	X	X	X	X	E	E	E	M	M	M	M	M	M	M	M	M	C	E
220	221	X	X	X	X	X	X	X	E	E	E	M	M	M	M	M	M	M	M	M	E	E
270	271	X	X	X	X	M	M	M	E	P	P	M	M	M	M	M	M	M	M	E	F	F
330	331	X	X	X	X	M	M	M	E	P	P	M	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	M	E	G	G
470	471	X	X	X	M	M	M	M	E	P	P	M	M	M	M	M	M	M	M	E	G	G
560	561	X	X	X	M	C	C	C	E	E	E	M	M	M	M	M	M	M	M	E	G	G
680	681	X	X	X	M	C	C	C	E	E	E	M	M	M	M	M	M	M	M	E	G	G
820	821	X	X	X	M	E	E	E	E	E	E	M	M	M	M	M	M	M	M	E	G	G
1000	102	X	X	X	M	E	E	E	E	E	E	M	M	M	C	C	C	C	C	E	G	G
1200	122	X	X	X	M	E	E	E	E	E	E	M	M	M	C	C	C	C	C	E	F	F
1500	152	X	X	X	C	E	E	E	E	E	E	M	M	M	C	C	C	C	C	F	G	G
1800	182	X	X	X	C	E	E	E	E	E	E	M	M	M	C	C	C	C	C	G	G	G
2200	222	X	X	X	C	E	E	E	E	E	E	M	M	M	C	C	C	C	C	G		
2700	272	X	X	X	C	E	E	E	E	E	E	M	M	M	C	C	C	C	C	G		
3300	332	X	X	X	C	E	E	E	E	E	E	M	M	M	C	C	C	C	C	G		
3900	392	X	X	X	E	E	E	E	E	E	E	M	M	M	C	C	C	C	C	G		
4700	472	X	X	X	E	E	E	E	E	E	E	M	M	M	E	E	E	E	E			
5600	562	X	X	X	E	E	E	E	E	E	E	M	M	C	E	E	E	E	E			
6800	682	M	M	M	E	E	E	E	E	E	E	M	M	C	E	E	E	E	E			
8200	822	C	C	C	E	E	E	E	E	E	E	M	M	C	E	E	E	E	E			
10000	103	C	C	C	E	E	E	E	E	E	E	M	M	E	F	F	F	F	F			
12000	123	P	P	P								C	C	E								
15000	153	P	P	P								C	C	F								
18000	183	P	P	P								F	F	G								
22000	223	P	P	P								F	F	G								
27000	273	P	P									G	G									
33000	333	P	P									G	G									
39000	393	P	P									G	G									
47000	473																					
56000	563																					
68000	683																					



**7. CAPACITANCE RANGE(Con.)**

**7-1. C0G**

Dimension		1808										1812														
Cap.(pF)	Code	25V 50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000	10V 16V	25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V		
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														
3.9	3R9	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														
5.0	5R0	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														
6.8	6R8	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														
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	C	E	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	C	E	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	C	F	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	C	F	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	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
56	560	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
68	680	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
82	820	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
100	101	C	C	C	C	C	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C	C	C	C	C
120	121	C	C	C	C	C	C	C	C	C	C	C	F	C	C	C	C	C	C	C	C	C	C	C	C	C
150	151	C	C	C	C	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C
180	181	C	C	C	C	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	C	C	C	F
220	221	C	C	C	C	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	C	C	C	F
270	271	C	C	C	C	C	C	C	F	F	F	F	C	C	C	C	C	C	C	C	C	C	C	C	F	F
330	331	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
390	391	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
470	471	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
560	561	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
680	681	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
820	821	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	G	G
1000	102	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	G	G
1200	122	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
1500	152	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	C	F	F	F	F
1800	182	C	C	C	C	C	C	F	F	F	F	F	C	C	C	C	C	C	C	C	C	E	F	F	F	F
2200	222	C	C	C	C	C	C	F					C	C	C	C	C	C	C	C	C	E	F	F	F	F
2700	272	C	C	C	C	C	C						C	C	C	C	C	C	C	C	C	F	G	G	G	G
3300	332	C	C	C	C	C	C						C	C	C	C	C	C	C	C	C	F	G	G	G	G
3900	392	C	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	C	G				
5600	562	C	C	E	E								C	C	C	C	C	C	C	C	C					
6800	682	C	C	E	E								C	C	C	C	C	C	C	C	C					
8200	822	C	E	F	F								C	C	C	C	C	C	C	C	C					
10000	103	C	E	F	F								C	C	C	C	C	C	C	C	C					
12000	123	E											C	C	C	C	E	E	E	E	E					
15000	153	E											C	C	C	C	E	E	E	E	E					
18000	183	F											C	C	C	E	F	F	F	F	F					
22000	223	F											C	C	C	E	F	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	F	F
12	120	F	F	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	F
18	180	F	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	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	F
470	471	F	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	F
680	681	F	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	F
1000	102	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	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	F	F
1800	182	F	F	F	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	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
3300	332	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
4700	472	F	F	F	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	F	F	F	F	F	F	F
6800	682	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
8200	822	F	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							
33000	333	F	F	F	F	F					F	F	F	F	F							
39000	393	F	E	F	F	G					F	F	F	F	F							
47000	473	F	E	F	F	G					F	F	G	G	G							
56000	563	F	F	G	G						F	F	G	G								
68000	683	F	F	G	G						F	F	G	G								
82000	823	F	G								F	G										
100000	104	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	
150	151	F	F	F	F	F	F	F	F	F	F	
180	181	F	F	F	F	F	F	F	F	F	F	
220	221	F	F	F	F	F	F	F	F	F	F	
270	271	F	F	F	F	F	F	F	F	F	F	
330	331	F	F	F	F	F	F	F	F	F	F	
390	391	F	F	F	F	F	F	F	F	F	F	
470	471	F	F	F	F	F	F	F	F	F	F	
560	561	F	F	F	F	F	F	F	F	F	F	
680	681	F	F	F	F	F	F	F	F	F	F	
820	821	F	F	F	F	F	F	F	F	F	F	
1000	102	F	F	F	F	F	F	F	F	F	F	
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											

**7. CAPACITANCE RANGE(Con.)**

**7-2. X7R**

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

**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	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	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	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	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	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	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	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	M	
1000	102		C	C	C	C	C	C	C	C	C	C	C	C	M	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	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	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	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	M	F	F	
2700	272		C	C	C	C	C	C	C	C	C	C	E	E	M	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	M	F	G	
3900	392		C	C	C	C	C	C	C	C	C	C	E	E	M	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	E	M	M	M	M	M	M	M	M	M	M	M	G	G	
5600	562		C	C	C	C	C	C	C	C	C	C	E	E	M	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	E	M	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	E	M	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	E	M	M	M	M	M	M	M	M	M	M	M	C		
12000	123		C	C	C	C	C	C	C	C	C	C	E		M	M	M	M	M	M	M	M	M	M	C			
15000	153		C	C	C	C	C	C	C	C	C	E			M	M	M	M	M	M	M	M	M	M	E			
18000	183		C	C	C	C	C	C	C	C	C	E			M	M	M	M	M	M	M	M	C	C	E			
22000	223		C	C	C	C	C	C	C	C	E	E			M	M	M	M	M	M	M	M	C	C	E			
27000	273		C	C	C	C	C	C	C	E	E				M	M	M	M	M	M	M	M	C	C	E			
33000	333		C	C	C	C	C	E	E	E	E				M	M	M	M	M	M	M	E	E	E				
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	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							
150000	154		M	M	M	M	E								M	M	M	M	C	E	E							
180000	184		M	M	M	M	E								M	M	M	M	C	E	E							
220000	224		M	M	M	M	E								M	M	M	M	C	E	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																											
1500000	155	J	J	J	P	P										F	E	G	G									
1800000	185																											
2200000	225	J	J	J	P	P										F	E	G	G									
2700000	275																											
3300000	335		P	P	P											F	E	G	G									
3900000	395																											
4700000	475	P	P	P	P											F	F	F	G									
10000000	106	P	P	P	P											F	F	G	G									
22000000	226		P													G												

\* Surface coating only.

**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	4000V	
100	101																					
120	121																					
150	151	C	C	C	C	C	C	F*														
180	181	C	C	C	C	C	C	F*														
220	221	C	C	C	C	C	C	F*														
270	271	C	C	C	C	C	C	F*		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	F*
390	391	C	C	C	C	C	C	F*		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	F*
560	561	C	C	C	C	C	E	F*		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	F*
820	821	C	C	C	C	C	E	F*		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	F*
1200	122	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	C	C	F	G*
1500	152	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	C	C	F	G*
1800	182	C	C	C	C	C	F			C	C	C	C	C	C	C	C	C	C	C	G	G*
2200	222	C	C	C	E	E	F			C	C	C	C	C	C	C	C	C	C	C	G*	
2700	272	C	C	C	F	F	F			C	C	C	C	C	C	C	C	C	C	C	G*	
3300	332	C	C	C	F	F	F			C	C	C	C	C	C	C	C	C	E	E	G*	
3900	392	C	C	C	F	F				C	C	C	C	C	C	C	C	F	F			
4700	472	C	C	C	F	F				C	C	C	C	C	C	C	C	F	F			
5600	562	C	C	C	F	F				C	C	C	C	C	C	C	C	G	G			
6800	682	C	C	C	F	F				C	C	C	C	C	C	C	C	G	G			
8200	822	C	C	C						C	C	C	C	C	C	C	C	G	G			
10000	103	C	C	C						C	C	C	C	C	C	C	C	G	G			
12000	123	E	E	E						C	C	C	C	C	C	C						
15000	153	E	E	E						C	C	C	C	C	C	C						
18000	183	F	F	F						C	C	C	C	C	C	C	E					
22000	223	F	F	F						C	C	C	C	C	C	C	E					
27000	273	F	F	F						C	C	C	C	C	C	C	F					
33000	333	F	F	F						C	C	C	C	C	C	C	F					
39000	393	F	F	F						C	C	C	C	C	C	C	G					
47000	473	F	F	F						C	C	C	C	C	C	C	G					
56000	563	F	F	F						C	C	C	C	C	E	E	G					
68000	683	F	F							C	C	C	C	C	E	E	G					
82000	823	F	F							C	C	C	C	C	E	E	G					
100000	104									C	C	C	C	C	E	E	G					
120000	124									C	C	C	C	C	F	F						
150000	154									C	C	C	C	C	F	F						
180000	184									C	C	C	C	C	G	G						
220000	224									C	C	C	C	C	G	G						
270000	274									C	C	E	E	E	G							
330000	334									C	C	E	E	E	G							
390000	394									C	C	F	F	F	G							
470000	474									C	C	F	F	F	G							
560000	564									C	C	G	G									
680000	684									C	C	G	G									
820000	824									C	C	G	G									
1000000	105									C	C	G	G									
1200000	125									C	C											
1500000	155									C	C											
1800000	185									E	E											
2200000	225									E	E											
2700000	275									F	F											
3300000	335									F	F											
3900000	395									F	F											
4700000	475									G	G											
5600000	565									G												
6800000	685									G												
8200000	825									G												
10000000	106									G												

\* Surface coating only.

**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
100	101																							
120	121																							
150	151																							
180	181																							
220	221																							
270	271											F*												F*
330	331											F*												F*
390	391											F*												F*
470	471											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	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*
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*
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*
2200	222	F	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	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	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	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	F*
5600	562	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	F	F	F	F*
6800	682	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	F	F	F	G*
8200	822	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	G	G	G	G*
10000	103	F	F	F	F	F	F	F	F	F	F	G*	F	F	F	F	F	F	F	F	G	G	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	F	G			
120000	124	F	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	F	H			
180000	184	F	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	F	H			
270000	274	F	F	F	F	F	F						F	F	F	F	F	F	F	F				
330000	334	F	F	F	F	F	F						F	F	F	F	F	F	F	F				
390000	394	F	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	F				
560000	564	F	F	F	F	G	G						F	F	F	F								
680000	684	F	F	F	F								F	F	F	F								
820000	824	F	F	F	F								F	F	F	F								
1000000	105	F	F	F	F								F	F	F	F								
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											
15000000	156												H											
18000000	186												H											
22000000	226												H											

\* Surface coating only.

**7. CAPACITANCE RANGE(Con.)**

**7-2. X7R**

Dimension		2225											
Cap.(pF)	Code	25V	50V	100V	200V	250V	500V	630V	1000V	1500V	2000V	3000V	4000V
100	101												
120	121												
150	151												
180	181												
220	221												
270	271												F*
330	331												F*
390	391												F*
470	471												F*
560	561												F*
680	681												F*
820	821												F*
1000	102	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*
1500	152	F	F	F	F	F	F	F	F	F	F	F*	G*
1800	182	F	F	F	F	F	F	F	F	F	F	F*	G*
2200	222	F	F	F	F	F	F	F	F	F	F	F*	
2700	272	F	F	F	F	F	F	F	F	F	F	F*	
3300	332	F	F	F	F	F	F	F	F	F	F	F*	
3900	392	F	F	F	F	F	F	F	F	F	F	F*	
4700	472	F	F	F	F	F	F	F	F	F	F	F*	
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	G	G		
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					
330000	334	F	F	F	F	F	F	F					
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												
15000000	156												
18000000	186												
22000000	226												

\* Surface coating only.



8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

No.	Item	Test Condition	Requirements																																																																										
1.	Visual and Dimensions	---	* No remarkable defect. * Dimensions to confirm to individual specification sheet.																																																																										
2.	Capacitance		* Shall not exceed the limits given in the detailed spec.																																																																										
3.	Q/D.F. (Dissipation Factor)	* Class I : Cap.≤1000pF, 1.0±0.2Vrms, 1KHz±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%. X7R : 0805=106(6.3V&10V), 0603=475(6.3V).	* Class I : <table border="1"> <thead> <tr> <th>Dielectric</th> <th>Rated Vol.(V)</th> <th>Q/D.F.</th> <th>Remark</th> </tr> </thead> <tbody> <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.&lt;30pF</td> </tr> </tbody> </table> * Class II : <table border="1"> <thead> <tr> <th>Rated</th> <th>D.F.≤</th> <th colspan="2">Exception of D.F.≤</th> </tr> </thead> <tbody> <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&gt;0.1μF, 1206&gt;1μF, 1210≥2.2μF</td> </tr> <tr> <td>≤10%</td> <td>0805&gt;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≥0.01μF, 1210≥4.7μF</td> </tr> <tr> <td>≤10%</td> <td>0402≥0.1μF, 0603&gt;0.1μF, 0805≥1μF, 1206≥2.2μF, 1210≥10μF</td> </tr> <tr> <td rowspan="3">35V</td> <td rowspan="3">≤3.5%</td> <td>≤10%</td> <td>0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF</td> </tr> <tr> <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 rowspan="3">25V</td> <td rowspan="3">≤3.5%</td> <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>≤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 rowspan="3">16V</td> <td rowspan="3">≤3.5%</td> <td>≤10%</td> <td>0201≥0.1μF(0201/X7R≥0.022μF), 0402≥0.22μF, 0603≥0.68μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥22μF</td> </tr> <tr> <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">10V</td> <td rowspan="3">≤5%</td> <td>≤10%</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>---</td> <td>---</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>---</td> <td>---</td> </tr> <tr> <td rowspan="3">4V</td> <td rowspan="3">≤15%</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Dielectric	Rated Vol.(V)	Q/D.F.	Remark	Class I	All	Q≥1000	Cap.≥30pF	Q≥400+20C	Cap.<30pF	Rated	D.F.≤	Exception of D.F.≤		≥100V	≤2.5%	≤3.5%	0603≥0.047μF, 0805=0.1μF, 1206≥0.47μF, 1812≥4.7μF, 1825≥4.7μF, 2220≥4.7μF, 2225≥4.7μF	≤5%	0603≥0.068μF, 0805>0.1μF, 1206>1μF, 1210≥2.2μF	≤10%	0805>0.22μF, 1210≥3.3μF	50V	≤2.5%	≤3.5%	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	≤5%	0201≥0.01μF, 1210≥4.7μF	≤10%	0402≥0.1μF, 0603>0.1μF, 0805≥1μF, 1206≥2.2μF, 1210≥10μF	35V	≤3.5%	≤10%	0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF	≤5%	0201≥0.01μF, 0805≥1μF, 1210≥10μF	≤7%	0603≥0.33μF, 1206≥4.7μF	25V	≤3.5%	≤10%	0201≥0.1μF, 0402≥0.10μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥6.8μF, 1210≥22μF	≤12.5%	0402≥0.47μF	≤5%	0201≥0.01μF, 0402≥0.033μF, 0603≥0.15μF, 0805≥0.68μF, 1206≥2.2μF, 1210≥4.7μF	16V	≤3.5%	≤10%	0201≥0.1μF(0201/X7R≥0.022μF), 0402≥0.22μF, 0603≥0.68μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥22μF	≤10%	0201≥0.012μF, 0402≥0.33μF(0402/X7R≥0.22μF), 0603≥0.33μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥22μF	≤15%	0201≥0.1μF, 0402≥1μF	10V	≤5%	≤10%	0201≥0.1μF, 0402≥1μF, 0603≥10μF, 0805≥4.7μF, 1206≥47μF, 1210≥100μF	≤20%	0402≥2.2μF	---	---	6.3V	≤10%	≤15%	0201≥0.1μF, 0402≥1μF, 0603≥10μF, 0805≥4.7μF, 1206≥47μF, 1210≥100μF	≤20%	0402≥2.2μF	---	---	4V	≤15%	---	---
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8. RELIABILITY TEST CONDITIONS AND REQUIREMENTS

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7.	Solderability	<p>* Solder temperature : 235±5°C for (0402~1210).                  * Solder temperature : 245±5°C for (1808~2225).                  * Dipping time : 2±0.5 sec.</p>	<p>* 75% min. coverage of all metalized area.</p>																																							
8.	Resistance to Soldering Heat	<p>* 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).</p>	<p>* 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.</p>																																							
9.	Temperature Cycle	<p>* Conduct the five cycles according to the temperatures and time.</p> <table border="1"> <thead> <tr> <th>Step</th> <th>Temp.(°C)</th> <th>Time(min.)</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>* 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).</p>	Step	Temp.(°C)	Time(min.)	1	Min. operating temp. +0/-3	30±3	2	Room temp.	2~3	3	Max. operating temp. +3/-0	30±3	4	Room temp.	2~3	<p>* 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.</p>																								
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10.	Humidity (Damp Heat) Steady State	* 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).	* No remarkable damage. * Cap. change : COG : 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 : COG : 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 RxC≥50Ω-F, whichever is smaller. Except : <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>I.R.</th> </tr> </thead> <tbody> <tr> <td>100V : All X7R; 1210≥3.3μF</td> <td rowspan="6">≥1GΩ or RxC≥10Ω-F, whichever is smaller</td> </tr> <tr> <td>50V : 0402&gt;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≥0.1μF, 0402≥0.22μF, 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 colspan="2">6.3V; 4V; Size≥1812</td> </tr> </tbody> </table>	Rated voltage	I.R.	100V : All X7R; 1210≥3.3μF	≥1GΩ or RxC≥10Ω-F, whichever is smaller	50V : 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF	35V : 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF	25V : 0201≥0.1μF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF	16V : 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF	10V : 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF	6.3V; 4V; Size≥1812	
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11.	Humidity (Damp Heat) Load	* 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).	* No remarkable damage. * Cap. change : COG : 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 : COG : 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 border="1"> <thead> <tr> <th>Rated voltage</th> <th>I.R.</th> </tr> </thead> <tbody> <tr> <td>≥100V : All X7R; 1210≥3.3μF</td> <td rowspan="6">≥500MΩ or RxC≥5Ω-F, whichever is smaller</td> </tr> <tr> <td>50V : 0402&gt;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≥0.1μF, 0402≥0.22μF, 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 colspan="2">6.3V; 4V; Size≥1812</td> </tr> </tbody> </table>	Rated voltage	I.R.	≥100V : All X7R; 1210≥3.3μF	≥500MΩ or RxC≥5Ω-F, whichever is smaller	50V : 0402>0.01μF, 0603≥1μF, 0805≥1μF, 1206≥4.7μF, 1210≥4.7μF	35V : 0603≥1μF, 0805≥2.2μF, 1206≥2.2μF, 1210≥10μF	25V : 0201≥0.1μF, 0402≥0.22μF, 0603≥2.2μF, 0805≥2.2μF, 1206≥10μF, 1210≥10μF	16V : 0201≥0.1μF, 0402≥0.22μF, 0603≥1μF, 0805≥2.2μF, 1206≥10μF, 1210≥47μF	10V : 0201≥47nF, 0402≥0.47μF, 0603≥0.47μF, 0805≥2.2μF, 1206≥4.7μF, 1210≥47μF	6.3V; 4V; Size≥1812	
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High Temperature Load (Endurance)	<p>* Test temp. : 125±3°C.</p> <p>* To apply voltage :</p> <p>(1) ≤6.3V or Cap.≥10μF : 150% of rated voltage.</p> <p>(2) 10V≤Ur&lt;100V : 200% of rated voltage.</p> <p>(3) 200V≤Ur≤500V : 150% of rated voltage.</p> <p>(4) 630V : 120% of rated voltage.</p> <p>(5) Ur≥1000V : 100% of rated voltage.</p> <p>(6) 100% of rated voltage for below range :</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td rowspan="2">0201</td> <td rowspan="2">X7R</td> <td>≤10V</td> <td>C≥0.1μF</td> </tr> <tr> <td>≥16V</td> <td>C&gt;0.1μF</td> </tr> <tr> <td rowspan="3">0402</td> <td rowspan="3">X7R</td> <td>6.3V, 10V, 16V, 25V</td> <td>C≥1.0μF</td> </tr> <tr> <td>4V</td> <td>C≥22μF</td> </tr> <tr> <td>6.3V,10V, 25V, 35V</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>1206</td> <td>X7R</td> <td>≤6.3V</td> <td>C≥47μF</td> </tr> <tr> <td rowspan="2">1210</td> <td rowspan="2">X7R</td> <td>16V</td> <td>C≥47μF</td> </tr> <tr> <td>≥100V</td> <td>C≥3.3μF</td> </tr> </tbody> </table> <p>(7) 150% of rated voltage for below range :</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated Voltage</th> <th>Capacitance</th> </tr> </thead> <tbody> <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 rowspan="2">X7R</td> <td>≥50V</td> <td>C≥0.082μF</td> </tr> <tr> <td>10V,16V, 50V</td> <td>C≥1.0μF</td> </tr> <tr> <td rowspan="3">0805</td> <td rowspan="3">X7R</td> <td>10~50V</td> <td>C≥4.7μF</td> </tr> <tr> <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 rowspan="2">X7R</td> <td>≤100V</td> <td>C≥1.0μF</td> </tr> <tr> <td>&gt;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</td> <td rowspan="3">X7R</td> <td rowspan="3">≥100V</td> <td rowspan="3">C≥1.0μF</td> </tr> <tr> <td>2220</td> </tr> <tr> <td>2225</td> </tr> </tbody> </table> <p>(8) 120% of rated voltage for below range :</p> <table border="1"> <thead> <tr> <th>Size</th> <th>Dielectric</th> <th>Rated Voltage</th> <th>Capacitance</th> </tr> </thead> <tbody> <tr> <td>2220</td> <td>X7R</td> <td>≥100V</td> <td>C≥15μF</td> </tr> </tbody> </table> <p>* Test time : 1000 +24/-0 hrs.</p> <p>* Before initial measurement (Class II only) : To apply de-aging at 150°C for 1hr then set for 24±2 hrs at room temp.</p> <p>* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</p> <p>** De-rating conditions :</p>	Size	Dielectric	Rated	Capacitance	0201	X7R	≤10V	C≥0.1μF	≥16V	C>0.1μF	0402	X7R	6.3V, 10V, 16V, 25V	C≥1.0μF	4V	C≥22μF	6.3V,10V, 25V, 35V	C≥1.0μF	0603	X7R	4V	C≥22μF	6.3V,10V	C≥4.7μF	25V, 35V	C≥1.0μF	0805	X7R	4V	C≥47μF	6.3V	C≥22μF	10V~50V	C≥10μF	1206	X7R	≤6.3V	C≥47μF	1210	X7R	16V	C≥47μF	≥100V	C≥3.3μF	Size	Dielectric	Rated Voltage	Capacitance	0201	X7R	16V	C≥0.022μF	0402	X7R	50V	C≥0.1μF	10~25V	C≥0.22μF	0603	X7R	≥50V	C≥0.082μF	10V,16V, 50V	C≥1.0μF	0805	X7R	10~50V	C≥4.7μF	50V	C≥0.47μF	≥100V	C≥0.12μF	1206	X7R	≥50V	C≥1.0μF	1210	X7R	≤100V	C≥1.0μF	>100V	C≥0.22μF	1812	X7R	≤50V	C≥4.7μF	100V	C≥1.0μF	1825	X7R	≥100V	C≥1.0μF	2220	2225	Size	Dielectric	Rated Voltage	Capacitance	2220	X7R	≥100V	C≥15μF	<p>* No remarkable damage.</p> <p>* Cap. change :</p> <p>C0G : Within ±5.0% or ±0.5pF, whichever is larger.</p> <p>X7R : Within ±12.5% for ≥10V**, within ±25% for 6.3V.</p> <p>**10V : Within ±25% for 0603≥4.7μF, 0402≥1μF.</p> <p>* D.F./Q :</p> <p>C0G : Q≥350 for Cap.&gt;30pF, Q≥275+2.5C for 10pF≤Cap.≤30pF, Q≥200+10C for Cap.&lt;10pF.</p> <p>X7R : D.F.≤200% of initial requirement.</p> <p>* I.R. : ≥10V, ≥1GΩ or R×C≥50Ω-F, whichever is smaller.</p> <p>Except :</p> <table border="1"> <thead> <tr> <th>Rated voltage</th> <th>I.R.</th> </tr> </thead> <tbody> <tr> <td>100V : All X7R; 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