Description

Metal bracket Capacitors Series is produced by environmental-friendly materials without lead and cadmium in order to achieve a unique structure of high reliability.The metal lead frame could absorb the heat and mechanical stress. ESR (equivalent series resistance), ESL (equivalent series inductance) is very small & suitable for high frequency operation of the rectifier power supply.

FEATURES

a.High reliability and stability.
b. Higher mechanical endurance.
c. Anti thermal stress and mechanical stress.
d. Improved vibration performance.
e. More capacitance without changing footprint.
f. RoHS & HALOGEN Compliant.

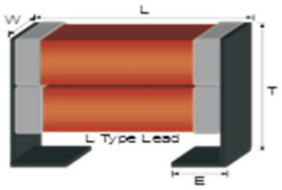
APPLICATIONS

a.DC to DC converter.
b. High voltage coupling/DC blocking.
c. Back-lighting inverters.
d. Snubbers in high frequency power converters.
e. Power supplies.
f. Surge protection.
g. Filtering, smoothing, and decoupling application.

HOW TO ORDER

2220	B	125	K	631	M	C	R
Size **Inch** (mm) **1210** (3225) **1808** (4520) **1812** (4532) **1825** (4563) **2211** (5728) **2220** (5750) **2225** (5763)	**Dielectric** **N**=NP0 **B**=X7R	**Capacitance** Two significant digits followed by no. of zeros. And R is in place of decimal point. eg.: 0R5=0.5pF 1R0=1.0pF 104= 100nF	**Tolerance** **J**=±5% **K**=±10% **M**=±20%	**Rated voltage** Two significant digits followed by no. of zeros. And R is in place of decimal point. **101**=100 VDC **631**=631VDC	**Category** **M**= Metal bracket (CT41M)	**Termination** **C**=2 chips (T:6.00+/-0.35mm)	**Packaging style** **R**=T&R

EXTERNAL DIMENSIONS

Size Inch (mm)	2220 (5750)	
L (mm)	6.00±0.50	
W (mm)	5.00±0.50	
T (mm)	6.00±0.35	
MB(mm)	1.70±0.15	The outline of Stacked Capacitors

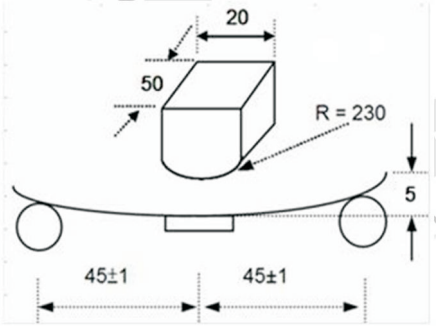
Dimension	Code	Rated Voltage							
		50V	100V	200V	250V	500V	630V	1000	1500
2220	C	476(M)	476(M)	475(M)	475(M)	105(M)	125(M)	684(M)	124(M)

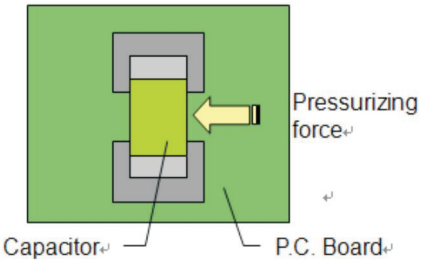
GENERAL ELECTRICAL DATA

Dielectric	X7R
Size	2220
Rated voltage (WVDC)	630V
Capacitance range	1.2uF
Capacitance tolerance	M(±20%)
Tan δ	≤2.5%
Capacitance & Tan δ Test condition	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
	1.0±0.2Vrms, 1.0KHz±10%, at 25°C ambient temperature
Insulation resistance	≥10GΩ or RxC≥100Ω-F, whichever is smaller
Operating temperature	-55°C to +125°C
Capacitance characteristic	±15%
Lead frame	L type lead

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 Mechanical</td><td>---</td><td>* No remarkable defect.
* Dimensions to conform to individual specification sheet.</td></tr>
<tr><td>2.</td><td>Capacitance</td><td rowspan="2">* Class II : 1.0±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>
<table>
<tr><td>Dielectric</td><td>Cap. Range</td><td>Q/D.F.</td></tr>
<tr><td>Class II (X7R)</td><td>Cap.220nF</td><td>D.F.≤2.5%</td></tr>
</table>
</td></tr>
<tr><td>4.</td><td>Temperature Coefficient</td><td>* With no electrical load.
<table>
<tr><td>T.C.</td><td>Operating Temp.</td></tr>
<tr><td>X7R</td><td>-55~125°C at 25°C</td></tr>
</table>
</td><td>
<table>
<tr><td>T.C.</td><td>Capacitance Change</td></tr>
<tr><td>X7R</td><td>Within ±15%</td></tr>
</table>
</td></tr>
<tr><td>5.</td><td>Dielectric Strength</td><td>* To apply 120% of rated voltage.
* Duration : 1 to 5 sec.
* Charge and discharge current less than 50mA.</td><td>* No evidence of damage or flash over during test.</td></tr>
<tr><td>6.</td><td>Insulation Resistance</td><td>
<table>
<tr><td>Rated Vol.(V)</td><td>Apply Voltage</td><td>Test Condition</td></tr>
<tr><td>>500</td><td>500Vdc</td><td>60 sec.</td></tr>
</table>
</td><td>
<table>
<tr><td>Dielectric</td><td>Requirements</td></tr>
<tr><td>Class II</td><td>≥10GΩ or RxC≥100Ω-F, whichever is smaller</td></tr>
</table>
</td></tr>
<tr><td>7</td><td>Temperature Cycle</td><td>* Conduct the five cycles according to the temperatures and time.
<table>
<tr><td>Step</td><td>Temp.(°C)</td><td>Time(min.)</td></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) : Perform 150 +0/-10°C for 1 hr and then set for 48±4 hrs at room temp.
* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</td><td>
<table>
<tr><td>Dielectric</td><td>Class II (X7R)</td></tr>
<tr><td>External Appearance</td><td>No remarkable damage</td></tr>
<tr><td>Cap. Change</td><td>Within ±7.5%</td></tr>
<tr><td>D.F.</td><td>≤150% of initial requirement</td></tr>
<tr><td>I.R.</td><td>≥100% of initial requirement</td></tr>
</table>
</td></tr>
<tr><td>8</td><td>Humidity (Damp Heat) Steady State</td><td>* Test temp. : 40±2°C.
* Humidity : 90~95% RH.
* Test time : 500 +24/-0hrs.
* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</td><td>
<table>
<tr><td>Dielectric</td><td>Class II (X7R)</td></tr>
<tr><td>External Appearance</td><td>No remarkable damage</td></tr>
<tr><td>Cap. Change</td><td>Within ±12.5%</td></tr>
<tr><td>D.F.</td><td>≤200% of initial requirement</td></tr>
<tr><td>I.R.</td><td>≥1GΩ or RxC≥50Ω-F, whichever is smaller.</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>No.</th><th>Item</th><th>Test Condition</th><th>Requirements</th></tr>
<tr><td>9.</td><td>Humidity (Damp Heat) Load</td><td>* Test temp. : 40±2°C.
* Humidity : 90~95%RH.
* Test time : 500 +24/-0hrs.
* To apply voltage : Rated voltage (500V max.).
* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</td><td><table><tr><td>Dielectric</td><td>Class II (X7R)</td></tr><tr><td>External Appearance</td><td>No remarkable damage</td></tr><tr><td>Cap. Change</td><td>Within ±12.5%</td></tr><tr><td>D.F.</td><td>≤200% of initial requirement</td></tr><tr><td>I.R.</td><td>≥500MΩor RxC≥25Ω-F, whichever is smaller</td></tr></table></td></tr>
<tr><td>10.</td><td>High Temperature Load (Endurance)</td><td>* Test temp. : 125±3°C.
* Apply voltage : 120% of rated voltage.
* Test time : 1000 +24/-0 hrs.
* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</td><td><table><tr><td>Dielectric</td><td>Class II (X7R)</td></tr><tr><td>External Appearance</td><td>No remarkable damage</td></tr><tr><td>Cap. Change</td><td>Within ±12.5%</td></tr><tr><td>D.F.</td><td>≤200% of initial requirement</td></tr><tr><td>I.R.</td><td>≥1GΩ or RxC≥50Ω-F, whichever is smaller</td></tr></table></td></tr>
<tr><td>11.</td><td>Resistance to Flexure of Substrate</td><td>* 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.
 

Unit : mm</td><td><table><tr><td>Dielectric</td><td>Class II (X7R)</td></tr><tr><td>External Appearance</td><td>No remarkable damage</td></tr><tr><td>Cap. Change</td><td>Within ±12.5%</td></tr></table>(This capacitance change means the change of capacitance under specified flexure of substrate from the capacitance measured before the test)</td></tr>
<tr><td>12.</td><td>Adhesive Strength of Termination</td><td>* Capacitors mounted on a substrate. A force of 10N applied perpendicular to the place of substrate and parallel the line joining the center of terminations for 10±1 second.
 
</td><td>* No remarkable damage or removal of the terminations.</td></tr>
<tr><td>13.</td><td>Vibration</td><td>* Vibration frequency : 10~55 Hz/min.
* Total amplitude : 1.5mm.
* Test time : 6 hrs. (Two hrs each in three mutually perpendicular directions)
* Measurement to be made after keeping at room temp. for 48±4 hrs (Class II).</td><td><table><tr><td>Dielectric</td><td>Class II (X7R)</td></tr><tr><td>External Appearance</td><td>No remarkable damage</td></tr><tr><td>Cap. Change</td><td>Within the specified tolerance</td></tr><tr><td>D.F.</td><td>≤100% of initial requirement</td></tr><tr><td>I.R.</td><td>≥100% of initial requirement</td></tr></table></td></tr>
</table>

PACKAGE DIMENSION AND QUANTITY

PACKAGE QUANTITY

PDC Family & Size	Thickness (mm)	Plastic tape
		13" reel
FE1A	ALL	1.5k
FE1C	ALL	1.5k
FE2C	ALL	0.5
FE1H	ALL	1k
FE2H	ALL	0.5k
For other chip size, please contact the us		

8.2. EMBOSSED TAPE DIMENSIONS

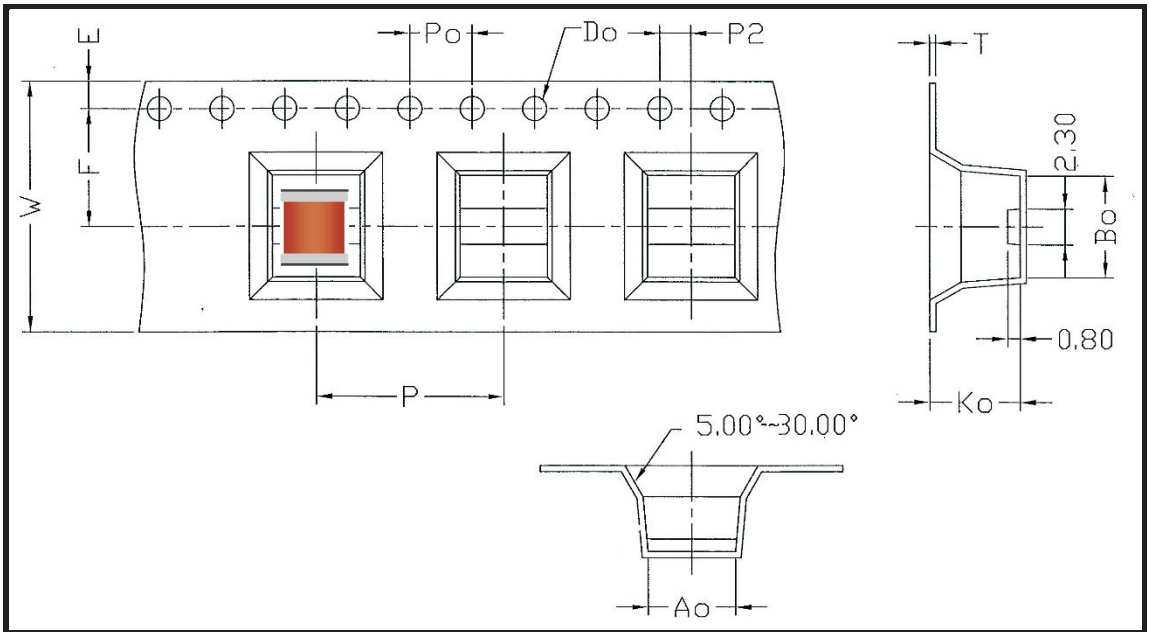


Fig. 8.1 The dimension of plastic tape

Size	FE1A	FE1C	FE2C	FE1H	FE2H
Chip Thickness	3.00±0.35	3.60±0.35	6.00±0.35 6.60±0.35	3.60±0.35 4.20±0.35	6.00±0.35 6.60±0.35
W	12.00±0.30	16.00±0.30	16.00±0.30	16.00±0.30	16.00±0.30
E	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10
F	5.50±0.10	7.50±0.10	7.50±0.10	7.50±0.10	7.50±0.10
P	8.00±0.10	8.00±0.10	12.00±0.10	12.00±0.10	12.00±0.10
P_0	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
10xP0	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20	40.00±0.20
P_2	2.00±0.10	2.00±0.10	2.00±0.10	2.00±0.10	2.00±0.10
D_0	Ø1.50 +0.10/-0	Ø1.50 +0.10/-0	Ø1.50 +0.10/-0	Ø1.50 +0.10/-0	Ø1.50 +0.10/-0
T	0.40±0.05	0.40±0.05	0.40±0.05	0.40±0.05	0.50±0.05
A_0	3.00±0.10	3.52±0.10	5.70±0.10	5.70±0.10	5.60±0.10
B_0	3.82±0.10	5.08±0.10	6.60±0.10	6.45±0.10	6.60±0.10
K_0	3.40±0.10	3.14±0.10	7.00±0.10	3.75±0.10	7.00±0.10
Unit :	mm	mm	mm	mm	mm

* For other chip size, please contact the us .

PACKAGE DIMENSION AND QUANTITY

REEL DIMENSIONS

Reel size	13”
A	330.0±0.50mm
B	2.00±0.50mm
C	13.00+0.50/-0.20mm
T	2.00+0.50/-0.20 mm

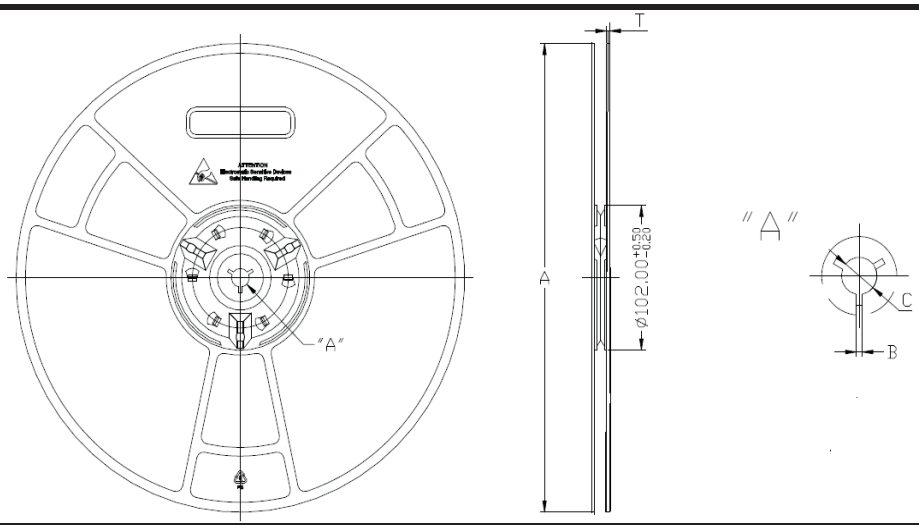
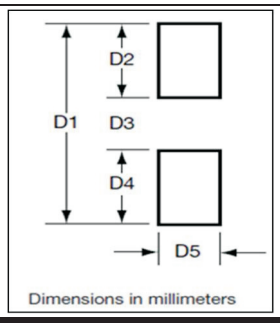


Fig. 9.2 The dimension of reel

FOOTPRINT DIMENSIONS

Size	1210	1812	1825	2220	2225	Fig. 10.1 Illustration of Footprint
D1	4.90	6.80	6.80	8.40	8.40	
D2	1.40	1.60	1.60	2.20	2.20	
D3	2.10	3.60	3.60	4.00	4.00	
D4	1.40	1.60	1.60	2.20	2.20	
D5	2.80	3.80	6.80	5.50	6.80	

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

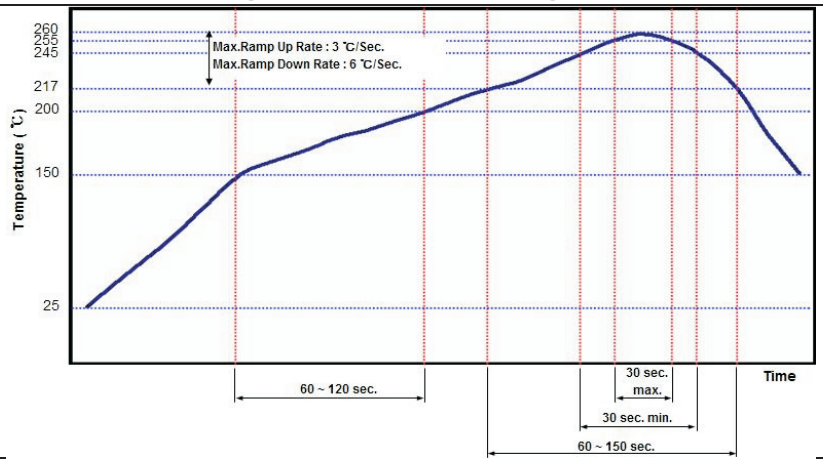
In order to minimize the risk of thermal shock during soldering, a carefully controlled preheat is required. The rate of preheat should not exceed 3°C per second.

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.) Reflow soldering :

Fig. 8.1 Reflow soldering profile



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

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.