

# SPECIFICATION

## MPX/X2-Series

## Spec. List

STE P/N	Specifications
X2P2102KN1B0130110050ES0	X2-102K-275VAC
X2P2222KN1B0130110050ES0	X2-222K-275VAC
X2P2472KN1B0130110050ES0	X2-472K-275VAC
X2Q2103KN1B0130110050ES0	X2-103K-305VAC
X2Q3103KN1B0130110050ES0	X2-103K-310VAC
X2Q2223KN1B0130110050ES0	X2-223K-305VAC
X2Q3223KN1B0130110050ES0	X2-223K-310VAC
X2P2333KN1B0130110050ES0	X2-333K-275VAC
X2Q2333KN1B0130110050ES0	X2-333K-305VAC
X2Q3333KN1B0130110050ES0	X2-333K-310VAC
X2Q2473KN1B0130110050ES0	X2-473K-305VAC
X2Q3473KN1B0130110050ES0	X2-473K-310VAC
X2P2683KN1B0130120060ES0	X2-683K-275VAC
X2Q3683KN1B0130120060ES0	X2-683K-310VAC
X2P2104KN1B0130120060ES0	X2-104K-275VAC
X2Q2104KN1B0130120060ES0	X2-104K-305VAC
X2Q3104KN1B0130120060ES0	X2-104K-310VAC
X2P2224KN1B0130150080ES0	X2-224K-275VAC
X2P2333KQ1B0180110050ES0	X2-333K-275VAC
X2Q2333KQ1B0180110050ES0	X2-333K-305VAC
X2P2473KQ1B0180110050ES0	X2-473K-275VAC
X2Q2473KQ1B0180110050ES0	X2-473K-305VAC
X2Q3473KQ1B0180110050ES0	X2-473K-310VAC
X2P2683KQ1B0180110050ES0	X2-683K-275VAC

<b>X2Q3683KQ1B0180110050ES0</b>	<b>X2-683K-310VAC</b>
<b>X2P2104KQ1B0180120060ES0</b>	<b>X2-104K-275VAC</b>
<b>X2Q2104KQ1B0180120060ES0</b>	<b>X2-104K-305VAC</b>
<b>X2P2154KQ1B0180120060ES0</b>	<b>X2-154K-275VAC</b>
<b>X2Q3154KQ1B0180120060ES0</b>	<b>X2-154K-310VAC</b>
<b>X2P2224KQ1B0180145085ES0</b>	<b>X2-224K-275VAC</b>
<b>X2Q2224KQ1B0180145085ES0</b>	<b>X2-224K-305VAC</b>
<b>X2Q3224KQ1B0180145085ES0</b>	<b>X2-224K-310VAC</b>
<b>X2Q2474KQ1B0180160100ES0</b>	<b>X2-474K-305VAC</b>
<b>X2P2684KT1B0265170085ES0</b>	<b>X2-684K-275VAC</b>
<b>X2Q2684KT1B0265170085ES0</b>	<b>X2-684K-305VAC</b>
<b>X2Q3684KT1B0265170085ES0</b>	<b>X2-684K-310VAC</b>
<b>X2P2824KT1B0265190100ES0</b>	<b>X2-824K-275VAC</b>
<b>X2Q2824KT1B0265190100ES0</b>	<b>X2-824K-305VAC</b>
<b>X2P2105KT1B0265170085ES0</b>	<b>X2-105K-275VAC</b>
<b>X2Q2105KT1B0265200110ES0</b>	<b>X2-105K-305VAC</b>
<b>X2P2125KT1B0265190100ES0</b>	<b>X2-125K-275VAC</b>
<b>X2Q2125KT1B0265220125ES0</b>	<b>X2-125K-305VAC</b>
<b>X2Q3125KT1B0265220125ES0</b>	<b>X2-125K-310VAC</b>
<b>X2P2155KT1B0265200110ES0</b>	<b>X2-155K-275VAC</b>
<b>X2Q2155KT1B0265220125ES0</b>	<b>X2-155K-305VAC</b>
<b>X2Q2105KV1B0320200110ES0</b>	<b>X2-105K-305VAC</b>
<b>X2Q2125KV1B0320200110ES0</b>	<b>X2-125K-305VAC</b>
<b>X2Q2155KV1B0320220130ES0</b>	<b>X2-155K-305VAC</b>
<b>X2Q3155KV1B0320220130ES0</b>	<b>X2-155K-310VAC</b>
<b>X2P2205KV1B0320220130ES0</b>	<b>X2-205K-275VAC</b>
<b>X2Q2225KV1B0320250140ES0</b>	<b>X2-225K-305VAC</b>

## Contents

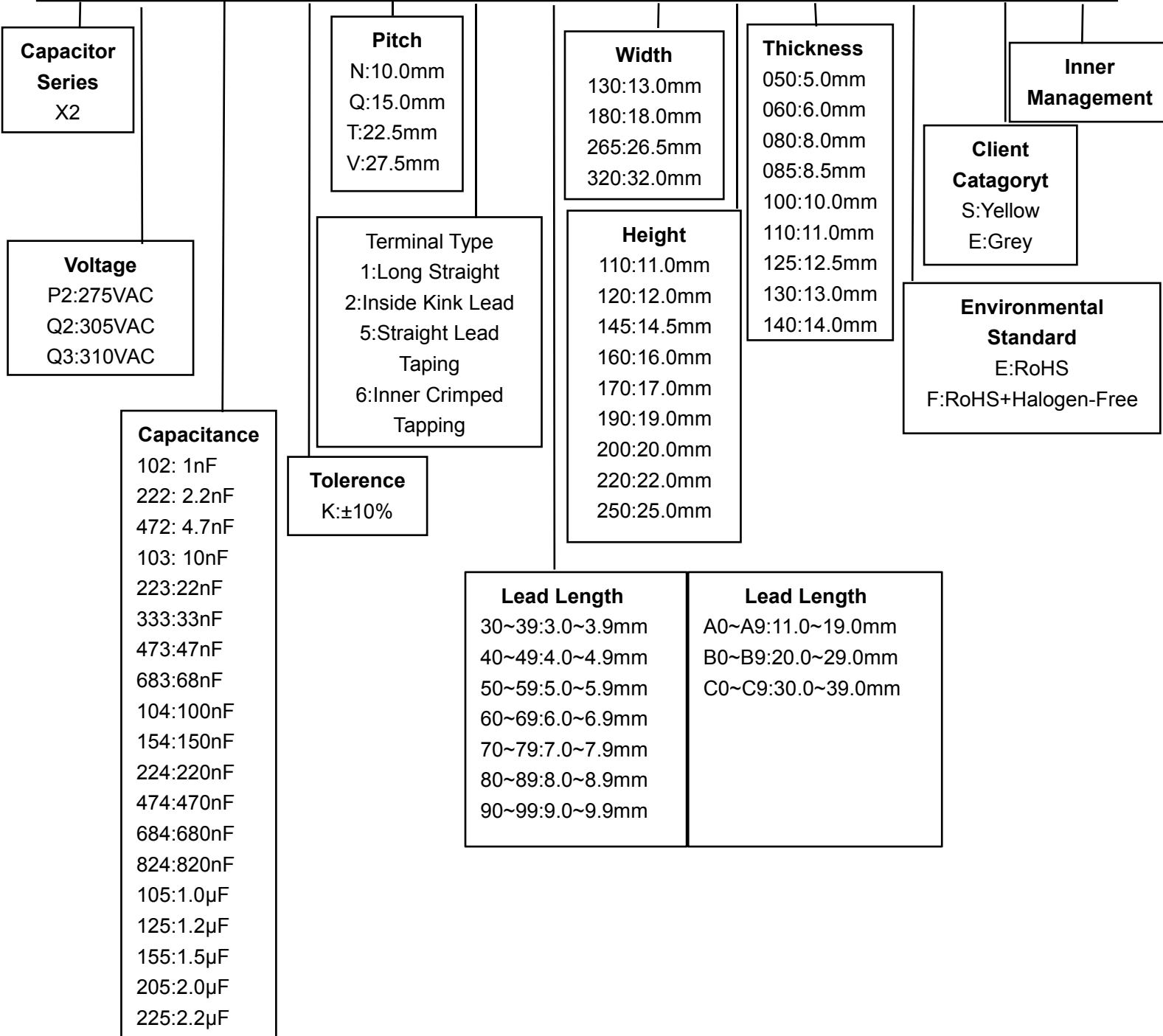
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## 1. Applications

Widely used in across-the-line, interference suppression circuit.ect

## 2. Part Number Code

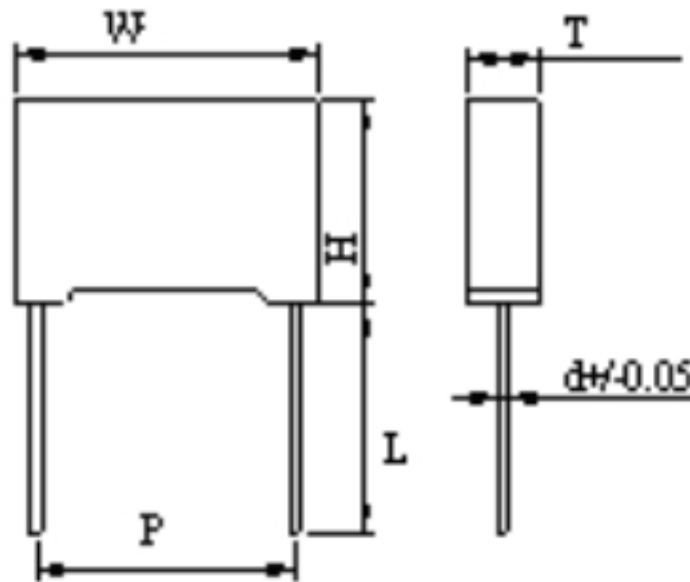
X2	P2	102	K	N	1	B0	130	110	050	E	S	0
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### 3. Electrical Characteristics

<b>Climatic Category</b>	40/110/56
<b>Operating Temperature Range</b>	-40°C ~ 110°C
<b>Rated Voltage</b>	275VAC/305VAC/310VAC
<b>Nominal Capacity</b>	0.001μF ~ 2.2μF
<b>Tolerance</b>	±10% (K)
<b>Dissipation Factor(tanδ)</b>	≤0.1%
<b>Withstand Voltage</b>	Between terminals to case: 2U <sub>R</sub> +1500VAC Minimum of 2000VAC
	Between terminals: 4.3U <sub>R</sub> (DC)/5S
<b>Insulation Resistance (I.R.)</b>	C <sub>R</sub> ≤0.33μF, IR≥15000MΩ C <sub>R</sub> >0.33μF, IR≥5000S Note: T[s]=I.R.[MΩ]*CN [μF]    20°C、100V、60S

### 4. Dimensions and Approval



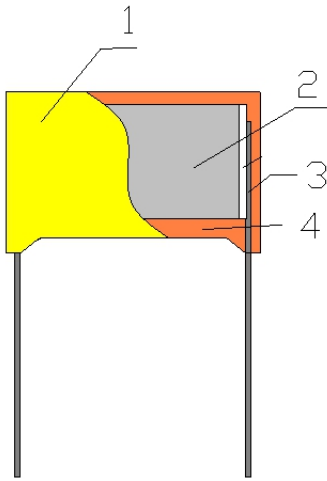
Specifications	L Min (mm)	W±0.5 (mm)	H±0.5 (mm)	T±0.5 (mm)	P±1.0 (mm)	d±0.05 (mm)	Product marking (See item 6 for details)
X2-102K-275VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 1
X2-222K-275VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 1
X2-472K-275VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 1

X2-103K-305VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 2
X2-103K-310VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 3
X2-223K-305VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 2
X2-223K-310VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 3
X2-333K-275VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 1
X2-333K-305VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 2
X2-333K-310VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 3
X2-473K-305VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 2
X2-473K-310VAC	20.0	13.0	11.0	5.0	10.0	0.6	Example 3
X2-683K-275VAC	20.0	13.0	12.0	6.0	10.0	0.6	Example 1
X2-683K-310VAC	20.0	13.0	12.0	6.0	10.0	0.6	Example 3
X2-104K-275VAC	20.0	13.0	12.0	6.0	10.0	0.6	Example 1
X2-104K-305VAC	20.0	13.0	12.0	6.0	10.0	0.6	Example 2
X2-104K-310VAC	20.0	13.0	12.0	6.0	10.0	0.6	Example 3
X2-224K-275VAC	20.0	13.0	15.0	8.0	10.0	0.6	Example 1
X2-333K-275VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 1
X2-333K-305VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 2
X2-473K-275VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 1
X2-473K-305VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 2
X2-473K-310VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 3
X2-683K-275VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 1
X2-683K-310VAC	20.0	18.0	11.0	5.0	15.0	0.8	Example 3
X2-104K-275VAC	20.0	18.0	12.0	6.0	15.0	0.8	Example 1
X2-104K-305VAC	20.0	18.0	12.0	6.0	15.0	0.8	Example 2
X2-154K-275VAC	20.0	18.0	12.0	6.0	15.0	0.8	Example 1
X2-154K-310VAC	20.0	18.0	12.0	6.0	15.0	0.8	Example 3
X2-224K-275VAC	20.0	18.0	14.5	8.5	15.0	0.8	Example 1
X2-224K-305VAC	20.0	18.0	14.5	8.5	15.0	0.8	Example 2
X2-224K-310VAC	20.0	18.0	14.5	8.5	15.0	0.8	Example 3

X2-474K-305VAC	20.0	18.0	16.0	10.0	15.0	0.8	Example 2
X2-684K-275VAC	20.0	26.5	17.0	8.5	22.5	0.8	Example 1
X2-684K-305VAC	20.0	26.5	17.0	8.5	22.5	0.8	Example 2
X2-684K-310VAC	20.0	26.5	17.0	8.5	22.5	0.8	Example 3
X2-824K-275VAC	20.0	26.5	19.0	10.0	22.5	0.8	Example 1
X2-824K-305VAC	20.0	26.5	19.0	10.0	22.5	0.8	Example 2
X2-105K-275VAC	20.0	26.5	17.0	8.5	22.5	0.8	Example 1
X2-105K-305VAC	20.0	26.5	20.0	11.0	22.5	0.8	Example 2
X2-125K-275VAC	20.0	26.5	19.0	10.0	22.5	0.8	Example 1
X2-125K-305VAC	20.0	26.5	22.0	12.5	22.5	0.8	Example 2
X2-125K-310VAC	20.0	26.5	22.0	12.5	22.5	0.8	Example 3
X2-155K-275VAC	20.0	26.5	20.0	11.0	22.5	0.8	Example 1
X2-155K-305VAC	20.0	26.5	22.0	12.5	22.5	0.8	Example 2
X2-105K-305VAC	20.0	32.0	20.0	11.0	27.5	0.8	Example 2
X2-125K-305VAC	20.0	32.0	20.0	11.0	27.5	0.8	Example 2
X2-155K-305VAC	20.0	32.0	22.0	13.0	27.5	0.8	Example 2
X2-155K-310VAC	20.0	32.0	22.0	13.0	27.5	0.8	Example 3
X2-205K-275VAC	20.0	32.0	22.0	13.0	27.5	0.8	Example 1
X2-225K-305VAC	20.0	32.0	25.0	14.0	27.5	0.8	Example 2



### 5. Construction



NO.	Name	Material	Percentage
1	Case	Plastic	10%
2	Core	Metallized polypropylene film	60%
3	Metal Pin	CP	10%
4	Sealing Material	Epoxy Resin	20%

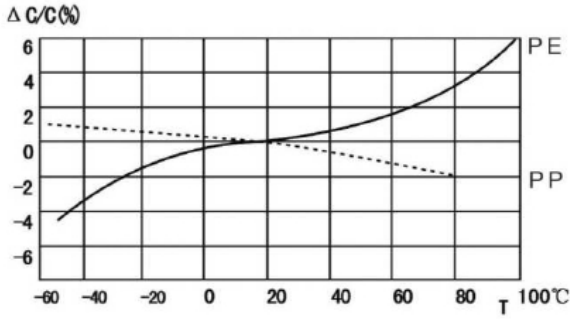
### 6. Marking

Product marking for the front and top of both sides.

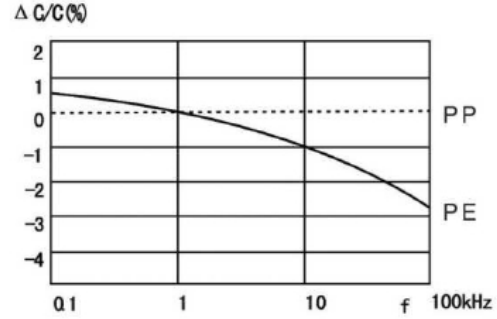
Positive	Item	
	Logogram	
	Type	MPX
	Rated Voltage	275VAC
	Sub-class of safety performance	X2
	Nominal capacitance	□□□
	Capacitance Tolerance	K (±10%)
	Climatic category	40/110/56
	Monogram safety recognized body	<ul style="list-style-type: none"> <li> :UL       :CQC</li> <li> :VDE     :EU</li> <li> :KTL</li> </ul>
Top	Item	
	Security signs(Seal)	
Example 1	Example 2	Example 3

## 7. Graph

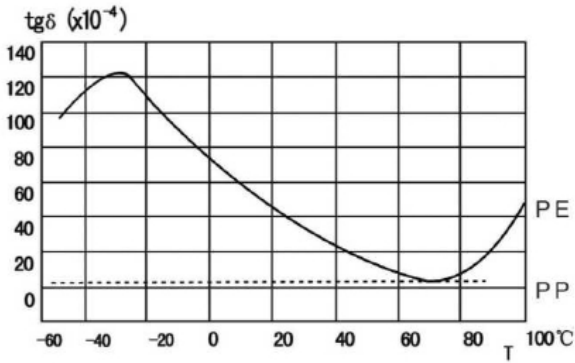
### 7.1 Rated Value & Characteristic



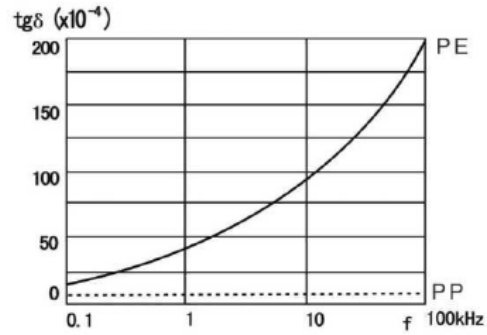
Capacitance vs. Temperature at 1kHz



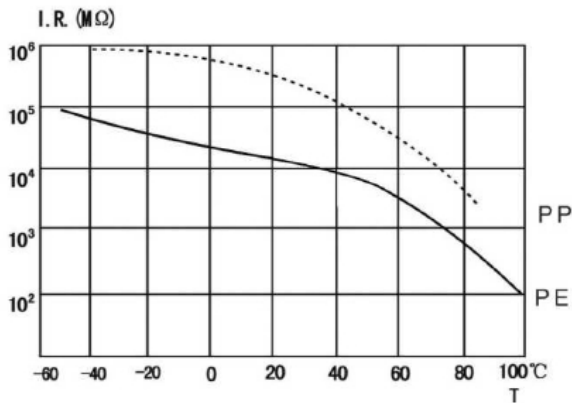
Capacitance vs. frequency (Room temperature)



Dissipation factor vs. temperature at 1kHz



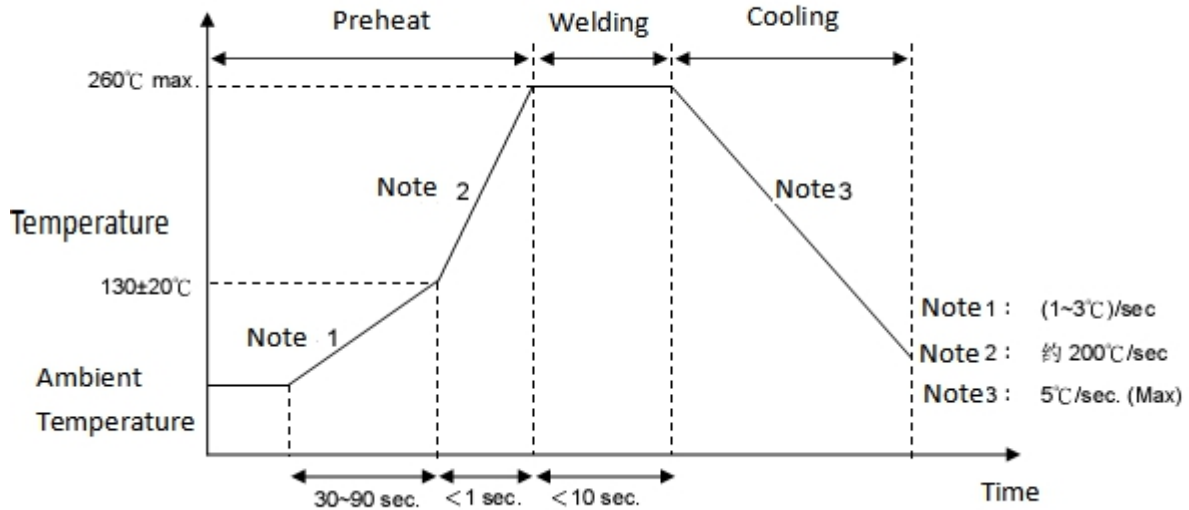
Dissipation factor vs. frequency (Room temperature)



I.R. vs. temperature

## 7.2 Soldering Condition

### Wave Soldering Graph



Note: Film capacitor is not suitable for reflow soldering welding, because it will cause thermal contraction and affect electrical performance.

### Iron Soldering Condition

Item	Condition
Temperature of soldering copper bit	360°C (max.)
Soldering duration	3sec (max.)
Space between soldering position and coating layer	2mm (min.)

## 8. Safety Certificate

Approval	Organization	Safety Standards	Certificate No.	Capacity Range(μF)	Rated Voltage
USA Canada	UL/CUL	UL60384-14	E208107	0.001~2.2	250VAC 275VAC 305VAC 310VAC
Germany	VDE	EN60384-14	40034679	0.001~2.2	
EU	ENEC	EN60384-14	40034679	0.001~2.2	
Korea	KTL	K60384	SU03031-12001B	0.1 以下	
			SU03031-12002B	0.1 以上~0.33	
			SU03031-12003C	0.33 以上~1.0	
			SU03031-12004C	1.0 以上~2.2	
China	CQC	GB/T 6346.14-2015	CQC19001213200	0.001~2.2	

## 9. Reliability Test Methods and Requirements

NO.	Item	Specifications	Test conditions / Methods									
1	Creep Age Distance and Clearance	<table border="1"> <thead> <tr> <th>The range of voltage</th> <th>Creep age distance</th> <th>Clearance</th> </tr> </thead> <tbody> <tr> <td>250VAC &lt; U<sub>R</sub> ≤ 500VAC</td> <td>&gt; 4.0mm</td> <td>&gt; 3.0mm</td> </tr> <tr> <td>130VAC &lt; U<sub>R</sub> ≤ 250VAC</td> <td>&gt; 3.0mm</td> <td>&gt; 2.5mm</td> </tr> </tbody> </table>	The range of voltage	Creep age distance	Clearance	250VAC < U <sub>R</sub> ≤ 500VAC	> 4.0mm	> 3.0mm	130VAC < U <sub>R</sub> ≤ 250VAC	> 3.0mm	> 2.5mm	For the measurement between Terminals.
The range of voltage	Creep age distance	Clearance										
250VAC < U <sub>R</sub> ≤ 500VAC	> 4.0mm	> 3.0mm										
130VAC < U <sub>R</sub> ≤ 250VAC	> 3.0mm	> 2.5mm										
2	Robustness of Terminals	Pin No visible damage	<p>Apply a specified weight to one lead of the sample, bent ±90°, 2 times.</p> <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Bending Test Apply force(N)</th> </tr> </thead> <tbody> <tr> <td>0.5 &lt; D ≤ 0.8</td> <td>5 ± 10%</td> </tr> </tbody> </table> <p>Gradually apply the specified force and keep the unit fixed for 10 ± 1 sec.</p> <table border="1"> <thead> <tr> <th>Terminal diameter (mm)</th> <th>Force (N)</th> </tr> </thead> <tbody> <tr> <td>0.5 &lt; d ≤ 0.8</td> <td>10 ± 10%</td> </tr> </tbody> </table>	Terminal diameter (mm)	Bending Test Apply force(N)	0.5 < D ≤ 0.8	5 ± 10%	Terminal diameter (mm)	Force (N)	0.5 < d ≤ 0.8	10 ± 10%	
Terminal diameter (mm)	Bending Test Apply force(N)											
0.5 < D ≤ 0.8	5 ± 10%											
Terminal diameter (mm)	Force (N)											
0.5 < d ≤ 0.8	10 ± 10%											
3	Solderability	Lead wire shall be soldered with uniform coating on the axial direction over 95% of the circumferential direction.	245 ± 3 °C, 3 ± 0.3s. Solder composition: Sn96.5Ag3.0Cu0.5									
4	Resistance To Soldering Heat	Pin No visible damage.	260 ± 5 °C; 10 ± 0.5S.									
5	Marking Solvent	Clearly marked, no visible damage.	Immersion for 5 ± 0.5 min. in a mixture of 70 ± 5% 1,1,2-trichlorotrifluoroethane and 30 ± 5% isopropanol at 23 ± 5 °C Wipe 10 times with absorbent cotton.									

NO.	Item	Specifications	Test conditions / Methods									
6	Temperature Cycle	1) Appearance No visible damage. 2) Change rate of capacitance: $\leq \pm 5\%$ 3) Dissipation factor: $\leq 0.008$ ( $C_R \leq 1.0\mu F$ ) $\leq 0.005$ ( $C_R > 1.0\mu F$ ) 4) According to initial conditions test voltage no breakdown and fly arc. 5) $IR \geq$ Initial value 50%.	The capacitor shall be subjected to 5 temperature cycles <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td align="center">1</td> <td align="center">-40+0/-3</td> <td align="center">30</td> </tr> <tr> <td align="center">2</td> <td align="center">110+3/-0</td> <td align="center">30</td> </tr> </tbody> </table>	Step	Temperature (°C)	Time (min)	1	-40+0/-3	30	2	110+3/-0	30
Step	Temperature (°C)	Time (min)										
1	-40+0/-3	30										
2	110+3/-0	30										
7	Vibration	Appearance No visible damage	10~55Hz, 0.75mm, 10Hz→55Hz→10Hz. 1min Apply for a total of 6 hours, 2 hrs each in 3 mutually perpendicular directions.									
8	Collision or Impact	1) Appearance No visible damage 2) Change rate of capacitance: $\leq \pm 5\%$ 3) Dissipation factor: $\leq 0.008$ ( $C_R \leq 1.0\mu F$ ) $\leq 0.005$ ( $C_R < 1.0\mu F$ ) 4) According to initial conditions test voltage no breakdown and fly arc. 5) $IR \geq$ Initial value 50%.	1000 times or 4000 times, acceleration $400m/s^2$ , pulse duration 6ms.									
9	Damp Heat, Humidity Steady State	1) Appearance No visible damage. 2) Change rate of capacitance: $\leq \pm 5\%$ . 3) Dissipation factor: $\leq 0.008$ ( $C_R \leq 1.0\mu F$ ) $\leq 0.005$ ( $C_R > 1.0\mu F$ ) 4) According to initial conditions test voltage no breakdown and fly arc. 5) $IR \geq$ Initial value 50%.	No voltage applied: $40 \pm 2^\circ C$ , 90~95%RH, 56 days.									
10	Pulse Voltage	Test of capacitor shall be no permanent breakdown and arcing.	Applied voltage: $C_R \leq 1.0\mu F$ , 2.5KVDC $C_R > 1.0\mu F$ , $2.5/\sqrt{C_R}$ Pulse frequency: 24 times Time period: Charging 9S, 2s discharge									
11	Life Test	1) Appearance No visible damage 2) Change rate of capacitance: $\leq \pm 10\%$ 3) Dissipation factor: $\leq 0.008$ ( $C_R \leq 1.0\mu F$ ) $\leq 0.005$ ( $C_R > 1.0\mu F$ ) 4) According to initial conditions test voltage no breakdown and fly arc. 5) $IR \geq$ Initial value 50%.	$110 \pm 3^\circ C$ , $1.25U_R$ , 1000 hours, the interval not less than the capacitor 25mm, Voltage shall be increased every 1 hour to 1000VAC, duration is 0.1s, the voltage across a $47\Omega \pm 5\%$ resistor applied to each capacitor.									

NO.	Item	Specifications	Test conditions / Methods																												
12	Passive Flammability	The burning time shall not be exceeded the standard. The tissue paper shall not ignite.	<p>The capacitor under test shall be held in the flame in the position which best promotes burning. Each specimen shall be exposed once in the flame. Specifically as follows: Level B requirements:</p> <table border="1"> <thead> <tr> <th rowspan="2">Class</th> <th colspan="4">Capacitor volume (mm<sup>3</sup>) Apply flame time (S)</th> <th rowspan="2">Maximum burning time (S)</th> </tr> <tr> <th>Volume &lt;250</th> <th>250&lt; Volume ≤500</th> <th>500&lt; Volume ≤1750</th> <th>Volume &gt;1750</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>15</td> <td>30</td> <td>60</td> <td>120</td> <td>3</td> </tr> <tr> <td>B</td> <td>10</td> <td>20</td> <td>30</td> <td>60</td> <td>10</td> </tr> <tr> <td>C</td> <td>5</td> <td>10</td> <td>20</td> <td>30</td> <td>30</td> </tr> </tbody> </table>	Class	Capacitor volume (mm <sup>3</sup> ) Apply flame time (S)				Maximum burning time (S)	Volume <250	250< Volume ≤500	500< Volume ≤1750	Volume >1750	A	15	30	60	120	3	B	10	20	30	60	10	C	5	10	20	30	30
Class	Capacitor volume (mm <sup>3</sup> ) Apply flame time (S)				Maximum burning time (S)																										
	Volume <250	250< Volume ≤500	500< Volume ≤1750	Volume >1750																											
A	15	30	60	120	3																										
B	10	20	30	60	10																										
C	5	10	20	30	30																										
13	Active Flammability	The cheese-cloth shall not be on fire.	<p><math>U=U_R, U1=2.5KV</math>            Each sample shall be subjected to an energy storage capacitor 20 times, each interval between two discharge 5S.</p>																												
14	Charge and Discharge Test	1) Capacity change rate: $\leq\pm 20\%$ 2) DF loss angle increase: $\leq 0.8\%$ 3) IR: $>3000M\Omega$	<p>Applied Voltage: <math>\sqrt{2} U_R</math> .            Charge and discharge for 10,000 cycles (one charge and one discharge for one cycle).            Its rate is about 1 time / s.</p>																												

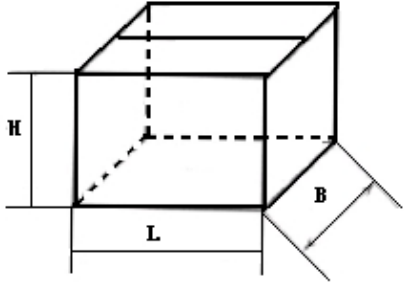
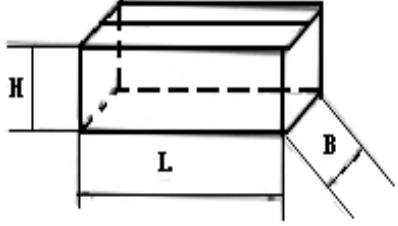
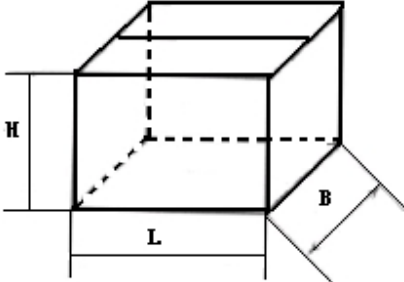
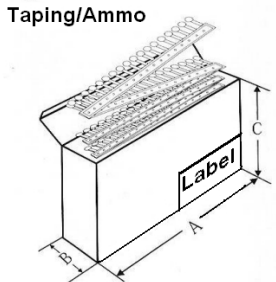
## 10. Storage Conditions

- 10.1 Storage Temperature:  $\leq 35^\circ C$ .
- 10.2 Relative Humidity:  $\leq 70\%$  RH.
- 10.3 Keep away from corrosive atmosphere and sunlight.
- 10.4 Period : 1 year.

## 11. Environmental Compliance:

- RoHS Compliance
- REACH Compliance

## 12. Packaging

External Packaging (Bulk)	Internal Packaging (Bulk)
	
External Packaging (Taping)	Internal Packaging (Taping)
	

Dimension Description (cm)					
External Packaging (Bulk)			Internal Packaging (Bulk)		
L	B	H	L	B	H
41.0	29.0	16.0	18.6	27.3	12.6
External Packaging (Taping)			Internal Packaging (Taping)		
L	B	H	B	A	C
54.0	36.0	26.3	4.4	33.5	26.2

**SPQ Reference**

Type	Specification	Pitch	SPQ
<b>Bulk</b>	All Specification	P=5 Series	1000
	All Specification	P=7.5 Series	500
	All Specification	P=10 T=6	500
	All Specification	P=15, T=6/7.5	500
	All Specification	P=22.5 T=6/7/8.5/10/11/12.5/13	200
	All Specification	P=27.5 T=11/13/14	100
<b>Taping</b>	All Specification	P=5	1000
	B3 10*9*4 B4 10*11*5	P=7.5	1000
	B5 10*12*6 B9 10*16*6 B10 10*15*8	P=7.5	500
	C1 13*11*5	P=10 12.7/15 Taping	500
	C3 13*12*6	P=10 12.7/12.7 Taping	400
	C3 13*12*6	P=10 15 Taping	500
	D2 18*12*6	P=15	300
	D5 18*16*10	P=15	250
	C8 13*15*8	P=10 12.7 Taping	300
	C8 13*15*8	P=10 15 Taping	500

Note: The above is for reference only, the actual packing number of braided tape shall prevail.