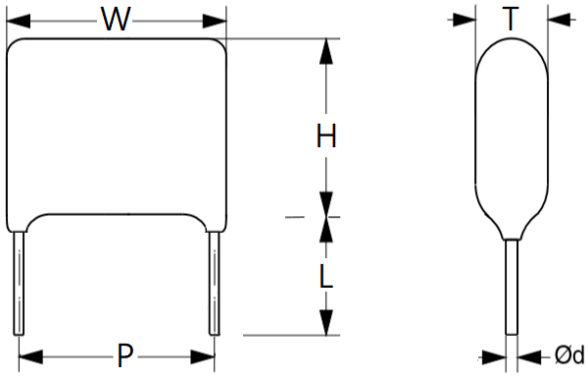
聚丙烯薄膜/箔電容器 (浸漬型) - SPPN series

Polypropylene Film/Foil Capacitor (Dipped)

■ **外形圖 Outline Drawing (For Example)**



■ **典型應用**

廣泛應用於高頻、直流和脈衝電路,

■ **Typical Applications**

Widely used in high frequency, DC and pulse circuits

■ **特徵**

聚丙烯薄膜/鋁箔徑向鍍錫引線，
捲繞電容器技術
卓越的頻率和溫度特性
即使在高頻下，損耗也非常小
阻燃環氧樹脂粉沫涂料（UL94V-0）

■ **Features**

Polypropylene film/Aluminum foil with radial leads
of tinned, Wound capacitor technology,
Excellent frequency and temperature characteristics
Very small loss even at high frequency
Flame retardant epoxy resin powder coating (UL94V-0)

■ **規格 Specifications**

參考標準 Reference Standard	GB/T 10188 (IEC 60384-13)			
氣候類別 Climatic Category	40/105/21			
額定溫度 Rated Temperature	85℃			
工作溫度範圍 Operating Temperature Range	-40℃~+105℃ (+85℃ to +105℃: decreasing factor 1.25% per ℃ for U_R)			
容值範圍 Capacitance Range	0.001μF ~ 0.1μF			
額定直流電壓 Rated (DC) Voltage	100Vdc	250Vdc	400Vdc	630Vdc
容值公差 Capacitance Tolerance	±5%(J)、±10%(K)			
耐電壓 Voltage Proof	U_R x 2 (Vdc) Test of 5 second			
損耗因素 Dissipation Factor	≤ 10 x 10^{-4} at 1kHz, (1Vrms Max. at 20℃)			
絕緣電阻 Insulation Resistance	C_R ≤ 0.1μF, IR ≥ 50,000MΩ C_R > 0.1μF, IR x C_R ≥ 5,000s		100Vdc, For 60sec / 20℃	

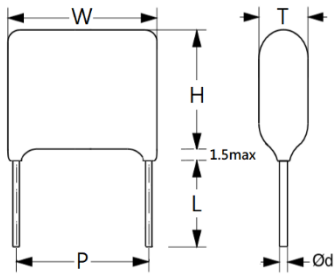
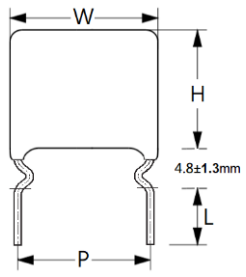
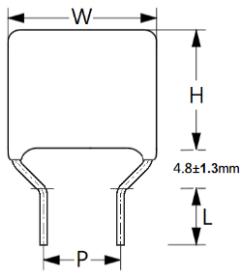
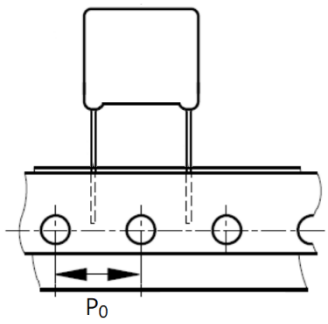
聚丙烯薄膜/箔電容器 (浸漬型) - SPPN series

Polypropylene Film/Foil Capacitor (Dipped)

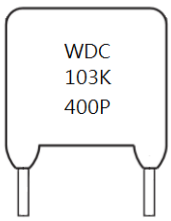
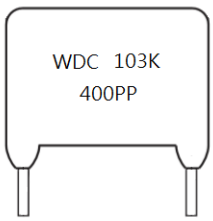
■ **產品代碼構成 Product code system (For Example)**

SPPN	L	103	K	0630	D	B	15	23
型號 Type	內部使用 Internal use	容值 Capacitance	公差 Tolerance	額定電壓 Rated Voltage	交直流 AC/DC	引線成形 Lead forming	引線間距 Lead Pitch	引線長度 Lead Length
SPPN= Polypropylene Film/Foil Capacitor (Dipped)	--	103 =10000pF =10nF =0.01μF	J=±5% K=±10% M=±20%	0063=63V 0100=100V 0250=250V 0400=400V 0630=630V 1000=1000V	D=DC A=AC	(表一) Shown as Table I	08=7.5mm 10=10mm 15=15mm 23=22.5mm 28=27.5mm	04=3.5mm 15=15mm 23=23mm

(表一) Table I

引線成形 Lead Forming			
B (Straight 23mm) or **K** (Short)	**R** (Inside Kink)	**U** (Vertical Kink)	**T** (Taping)
			

■ **標示 Marking (For Example)**

DC Marking	
Pitch 7.5mm	Pitch ≥ 10mm
	
1. WDC is a registered trademark of WINDAY	2. Capacitance: 0.01μF and Tolerance is K=±10%
3. Rated Voltage: 400V	4. P or PP for polypropylene film/foil capacitor

聚丙烯薄膜/箔電容器 (浸漬型) - SPPN series

Polypropylene Film/Foil Capacitor (Dipped)

■ Dimensions (mm)

100Vdc

Cap. μF	W	H	T	P	d	Part number
0.0010	9	8.5	4.5	6.5	0.6	SPPN_102+0100D*07**
0.0015	9	9.5	5.5	6.5	0.6	SPPN_152+0100D*07**
0.0018	9	9.5	5.5	6.5	0.6	SPPN_182+0100D*07**
0.0022	9	9.5	5.5	6.5	0.6	SPPN_222+0100D*07**
0.0027	9	9	5	6.5	0.6	SPPN_272+0100D*07**
0.0033	9	9	5.5	6.5	0.6	SPPN_332+0100D*07**
0.0039	9	9.5	5.5	6.5	0.6	SPPN_392+0100D*07**
0.0047	9	9	5	6.5	0.6	SPPN_472+0100D*07**
0.0056	9	9.5	5.5	6.5	0.6	SPPN_562+0100D*07**
0.0068	9	10	6	6.5	0.6	SPPN_682+0100D*07**
0.0075	10	9.5	6	7.5	0.6	SPPN_752+0100D*08**
0.0082	10	10	6	7.5	0.6	SPPN_822+0100D*08**
0.0091	10	10	6	7.5	0.6	SPPN_912+0100D*08**
0.010	10	10.5	6.5	7.5	0.6	SPPN_103+0100D*08**
0.012	10	11	7	7.5	0.6	SPPN_123+0100D*08**
0.015	12	10.5	6.5	8.5	0.6	SPPN_153+0100D*09**
0.018	12	10.5	7	8.5	0.6	SPPN_183+0100D*09**
0.022	12	11	7.5	8.5	0.6	SPPN_223+0100D*09**
0.027	12	12	8	8.5	0.6	SPPN_273+0100D*09**
0.033	13.5	11.5	7	10	0.6	SPPN_333+0100D*10**
0.039	13.5	12	7.5	10	0.6	SPPN_393+0100D*10**
0.047	13.5	12.5	8	10	0.6	SPPN_473+0100D*10**
0.056	13.5	13	8.5	10	0.6	SPPN_563+0100D*10**
0.068	17	13	7.5	13	0.6	SPPN_683+0100D*10**
0.082	17	13.5	8	13	0.6	SPPN_823+0100D*10**
0.10	17	14	8.5	13	0.6	SPPN_104+0100D*10**

250Vdc

Cap. μF	W	H	T	P	d	Part number
0.0010	12	9.5	5.5	8.5	0.6	SPPN_102+0250D*09**
0.0015	12	10	6.5	8.5	0.6	SPPN_152+0250D*09**
0.0018	12	10.5	6.5	8.5	0.6	SPPN_182+0250D*09**
0.0022	12	9.5	5.5	8.5	0.6	SPPN_222+0250D*09**
0.0027	12	10	6	8.5	0.6	SPPN_272+0250D*09**
0.0033	12	10	6	8.5	0.6	SPPN_332+0250D*09**
0.0039	12	10.5	6.5	8.5	0.6	SPPN_392+0250D*09**
0.0047	12	10	6	8.5	0.6	SPPN_472+0250D*09**
0.0056	12	10.5	6.5	8.5	0.6	SPPN_562+0250D*09**
0.0068	12	10.5	7	8.5	0.6	SPPN_682+0250D*09**
0.0075	13.5	10.5	6.5	10	0.6	SPPN_752+0250D*10**
0.0082	13.5	10.5	6.5	10	0.6	SPPN_822+0250D*10**
0.0091	13.5	10.5	6.5	10	0.6	SPPN_912+0250D*10**
0.010	13.5	11	7	10	0.6	SPPN_103+0250D*10**
0.012	18	11	6	14	0.6	SPPN_123+0250D*14**
0.015	18	11.5	6	14	0.6	SPPN_153+0250D*14**
0.018	18	11.5	6.5	14	0.6	SPPN_183+0250D*14**
0.022	18	12	7	14	0.6	SPPN_223+0250D*14**
0.027	18	13.5	7	14	0.6	SPPN_273+0250D*14**
0.033	18	14	7.5	14	0.6	SPPN_333+0250D*14**
0.039	18	14.5	8	14	0.6	SPPN_393+0250D*14**
0.047	18	15.5	8.5	14	0.6	SPPN_473+0250D*14**
0.056	22.5	16	8	19	0.8	SPPN_563+0250D*19**
0.068	22.5	16.5	8.5	19	0.8	SPPN_683+0250D*19**
0.082	22.5	17	9.5	19	0.8	SPPN_823+0250D*19**
0.10	22.5	18	10	19	0.8	SPPN_104+0250D*19**

(1) The symbol + means capacitance tolerance (J=±5%, K=±10%)

(2) The symbol * means style of lead forming

(3) The symbol ** means the lead length

聚丙烯薄膜/箔電容器 (浸漬型) - SPPN series

Polypropylene Film/Foil Capacitor (Dipped)

■ Dimensions (mm)

400Vdc

Cap. μF	W	H	T	P	d	Part number
0.0010	13.5	10	6	10	0.6	SPPN_102+0400D*10**
0.0012	13.5	10.5	6.5	10	0.6	SPPN_122+0400D*10**
0.0015	13.5	10.5	6.5	10	0.6	SPPN_152+0400D*10**
0.0016	13.5	10	6	10	0.6	SPPN_162+0400D*10**
0.0018	13.5	10.5	6.5	10	0.6	SPPN_182+0400D*10**
0.002	13.5	9	5.5	10	0.6	SPPN_202+0400D*10**
0.0022	13.5	9.5	5.5	10	0.6	SPPN_222+0400D*10**
0.0024	13.5	9.5	5.5	10	0.6	SPPN_242+0400D*10**
0.0027	13.5	9.5	5.5	10	0.6	SPPN_272+0400D*10**
0.0030	13.5	9.5	6	10	0.6	SPPN_302+0400D*10**
0.0033	13.5	9.5	6	10	0.6	SPPN_332+0400D*10**
0.0036	15	11	5.5	11	0.6	SPPN_362+0400D*11**
0.0039	15	11	6	11	0.6	SPPN_392+0400D*11**
0.0043	15	11	6	11	0.6	SPPN_432+0400D*11**
0.0047	15	11.5	6	11	0.6	SPPN_472+0400D*11**
0.0051	15	11.5	6.5	11	0.6	SPPN_512+0400D*11**
0.0056	15	11.5	6.5	11	0.6	SPPN_562+0400D*11**
0.0062	15	12	6.5	11	0.6	SPPN_622+0400D*11**
0.0068	15	12	7	11	0.6	SPPN_682+0400D*11**
0.0075	15	12	7	11	0.6	SPPN_752+0400D*11**
0.0082	15	12.5	7	11	0.6	SPPN_822+0400D*11**
0.0091	15	12.5	7.5	11	0.6	SPPN_912+0400D*11**
0.010	15	13	8	11	0.6	SPPN_103+0400D*11**

630Vdc

Cap. μF	W	H	T	P	d	Part number
0.0010	15	10	6	11	0.6	SPPN_102+0630D*11**
0.0012	15	10.5	6.5	11	0.6	SPPN_122+0630D*11**
0.0015	15	10.5	6.5	11	0.6	SPPN_152+0630D*11**
0.0016	15	10.5	6	11	0.6	SPPN_162+0630D*11**
0.0018	15	11	6	11	0.6	SPPN_182+0630D*11**
0.002	15	11	6.5	11	0.6	SPPN_202+0630D*11**
0.0022	15	11	6.5	11	0.6	SPPN_222+0630D*11**
0.0024	15	11.5	6.5	11	0.6	SPPN_242+0630D*11**
0.0027	15	11.5	7	11	0.6	SPPN_272+0630D*11**
0.0030	15	11.5	7	11	0.6	SPPN_302+0630D*11**
0.0033	15	12	7	11	0.6	SPPN_332+0630D*11**
0.0036	15	12	7.5	11	0.6	SPPN_362+0630D*11**
0.0039	15	12.5	7.5	11	0.6	SPPN_392+0630D*11**
0.0043	15	12.5	8	11	0.6	SPPN_432+0630D*11**
0.0047	15	13	8	11	0.6	SPPN_472+0630D*11**
0.0051	18	11.5	6.5	14	0.6	SPPN_512+0630D*14**
0.0056	18	12	6.5	14	0.6	SPPN_562+0630D*14**
0.0062	18	12	7	14	0.6	SPPN_622+0630D*14**
0.0068	18	12.5	7	14	0.6	SPPN_682+0630D*14**
0.0075	18	12.5	7.5	14	0.6	SPPN_752+0630D*14**
0.0082	18	13	7.5	14	0.6	SPPN_822+0630D*14**
0.0091	18	14	7.5	14	0.6	SPPN_912+0630D*14**
0.010	18	14.5	7.5	14	0.6	SPPN_103+0630D*14**

(1) The symbol + means capacitance tolerance (J=±5%, K=±10%)

(2) The symbol * means style of lead forming

(3) The symbol ** means the lead length

■ 檢驗要求 Inspection requirements

<table>
<tr><th>試驗項目
Test items</th><th>性能要求
Performance requirements</th><th>試驗條件
Conditions of test</th></tr>
<tr><td rowspan="2">4.2.1 耐電壓
Voltage proof</td><td rowspan="2">無擊穿或飛弧
Shall be no abnormality</td><td>引線間 Between terminals
U_R x 2 (Vdc) Test of 5 second</td></tr>
<tr><td>引線與外盒間 Between terminal and enclosure
U_R×200%, Minimum 400Vdc, Test of 5 second</td></tr>
<tr><td>4.2.2 電容量
Capacitance</td><td>在規定偏差範圍內
Within the tolerance specified</td><td>1kHz, 1Vrms Max. at 20℃</td></tr>
<tr><td>4.2.3 損耗角正切
Dissipation Factor</td><td>≤ 10 x 10^{-4} at 1kHz</td><td>1Vrms Max. at 20℃</td></tr>
<tr><td>4.2.4 絕緣電阻
Insulation resistance</td><td>C_R ≤ 0.1μF, IR ≥ 50,000MΩ
C_R > 0.1μF, IR x C_R ≥ 5,000s</td><td>100Vdc, For 60sec / 20℃</td></tr>
<tr><td rowspan="7">4.3 引出端強度
Robustness of terminations</td><td rowspan="7">無斷線, 電容器無可見損壞
No wire breakage and no damage of capacitor</td><td>拉力 Tensile U_{a1} (Duration : 10s±1s)</td></tr>
<tr><td>線徑 Wire diameter | 負載 Load</td></tr>
<tr><td>d ≤ 0.8mm | 10N (±10%)</td></tr>
<tr><td>d ≤ 1.25mm | 20N (±10%)</td></tr>
<tr><td>彎曲 Bending U_b (4*90 °,duration : 2 times/bend)</td></tr>
<tr><td>Wire diameter | Load</td></tr>
<tr><td>d ≤ 0.8mm | 5N (±10%)
d ≤ 1.25mm | 10N (±10%)</td></tr>
<tr><td>4.4 耐焊接熱
Resistance to soldering heat</td><td>(1) 無可見損壞 No visible damage
(2) △C/C ≤ 2% of the initial value</td><td>焊接溫度 Solder temperature: 260±5℃
焊接時間 Solder time: 5±0.5sec</td></tr>
<tr><td>4.5 可焊性
Solderability</td><td rowspan="4">應目視檢查電容器, 並無可見損壞
The capacitors shall be visually examined and there shall be no visible damage.

最後測量 Final inspection
(1) △C/C ≤ 2% of the initial value</td><td>焊接溫度 Solder temperature: 235±5℃
焊接時間 Solder time: 2±0.5sec</td></tr>
<tr><td>4.6 溫度快速變化
Rapid change of temperature</td><td>下限溫度 Lower category temperature: -40℃
上限溫度 Upper category temperature: 85℃
循環次數 Number of cycles: 5 times
持續時間 Duration t1 = 30 min</td></tr>
<tr><td>4.7 振動
Vibration</td><td>頻率範圍 Frequency range: 10~55Hz
振幅軸向 Course: X、Y、Z (axis)
持續時間 2h / axis (6h in total)
位移振幅 Displacement amplitude: 0.75mm</td></tr>
<tr><td>4.8 碰撞
Bump</td><td>加速度 Acceleration: 400m/s^2, 4000 times
脈沖持續時間 Pulse duration: 6ms</td></tr>
</table>

■ **檢驗要求 Inspection requirements**

試驗項目 Test items	性能要求 Performance requirements	試驗條件 Conditions of test
4.10 氣候序列 Climatic sequence	(1) No visible damage (2) △C/C ≤ 2 % of the Initial value (3) tanδ ≤ 140% of the initial value (4) IR ≥ 50% of the applicable limits (5) Voltage proof : U_R x 1.0	乾熱 Dry Heat 上限溫度 Upper Temperature: +85℃, 16Hrs 循環濕熱 Damp heat, cyclic, Test Db, first cycle
		寒冷 Cold 下限溫度 Lower Temperature: -40℃, 2Hrs 循環濕熱 Damp heat, cyclic, Test Db, remaining cycle
4.11 濕熱穩態 Damp Heat Steady State	(1) No visible damage, Legible marking (2) Voltage proof : U_R x 1.0 (3) △C/C ≤ 2 % of the Initial value (4) tanδ ≤ 140% of the initial value (5) IR ≥ 50% of the applicable limits	溫度+40°C, 濕度 93%, 21 天 +40°C and 93% RH, 21 days
4.12 耐久性 Endurance	(1) No visible damage, Legible marking (2) △C/C ≤ 2 % of the initial value (3) tanδ ≤ 0.001 or ≤ 140% of the initial value (4) IR ≥ 50% of the applicable limits	實驗電壓 U_R x 150%, 實驗溫度 Temperature: +85°C 實驗時間 Time: 1000Hrs

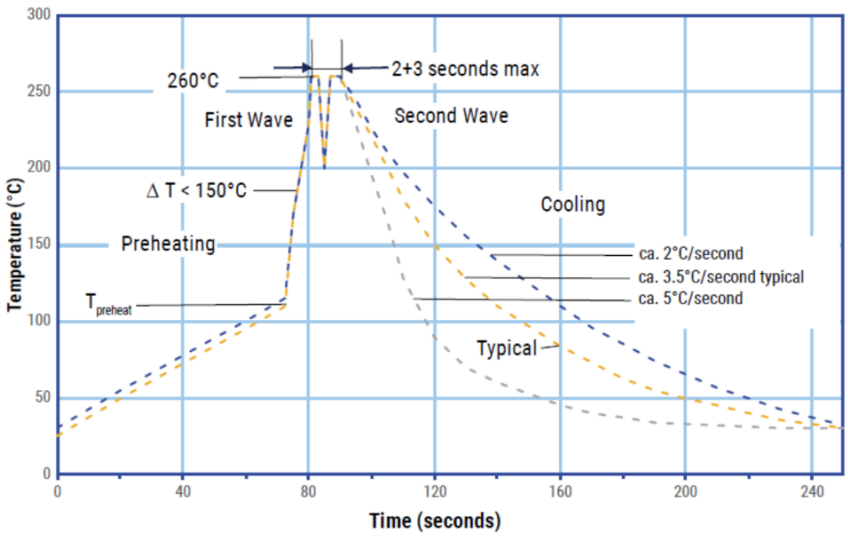
■ 薄膜电容器焊接指南 Soldering Guidelines for Film Capacitors

聚丙烯膜電容器對熱特別敏感 (聚丙烯膜的熔點為 160°C ~ 170°C)，波峰焊可能具有破壞性，尤其是對於小型聚丙烯膜電容器 (引線間距為 5 mm 至 15 mm)，焊接過程中必須非常小心。
一般來說，IEC 出版物 61760–1 第 2 版中的波峰焊接曲線可作為成功焊接的可靠指南。(請參見圖 1)
Polypropylene capacitors are especially sensitive to heat (the melting point of polypropylene is 160 – 170°C).
Wave soldering can be destructive, especially for mechanically small polypropylene capacitors (with lead spacing of 5 – 15 mm), and great care must be taken during soldering. In general, the wave soldering curve from IEC Publication 61760–1 Edition 2 serves as a solid guideline for successful soldering. See Figure 1.

通孔的薄膜电容器不建議採用回流焊。將電容器暴露在超過上述建議限值可能會導致電容器退化或永久性損壞。
Reflow soldering is not recommended for through-hole film capacitors. Exposing capacitors to a soldering profile in excess of the recommended limits may result in degradation or permanent damage to the capacitors.

請勿將聚丙烯膜電容器通過粘合劑固化爐來固化表面安裝部件的樹脂，須在表面安裝零件固化後插入通孔零件。
如果通孔部件必須通過粘合劑固化過程，請咨詢 WINDAY，討論烘箱中的實際溫度分布。
建議最多進行兩次焊接循環。在第二次焊接循環之前，請留出時間使電容器表面溫度恢復到正常溫度。
Do not place the polypropylene capacitor through an adhesive curing oven to cure resin for surface mount components. Insert through-hole parts after curing the surface mount parts. Contact WINDAY to discuss the actual temperature profile in the oven, if through-hole components must pass through the adhesive curing process.
A maximum two soldering cycles is recommended.
Allow time for the capacitor surface temperature to return to normal before the second soldering cycle.

■ 波峰焊建議 Wave Soldering Recommendations (Figure 1)



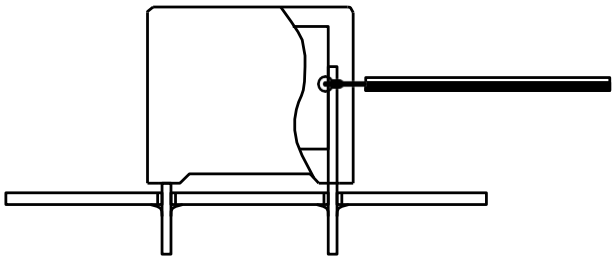
■ 波峰焊建議 Wave Soldering Recommendations (Continue)

1. 該表顯示了焊接過程的最高設置溫度 The tables indicates the maximum set-up temperature of the soldering process

介電薄膜材料 Dielectric Film Material	最高預熱溫度 Max. Preheat Temperature		最高峰值焊接溫度 Max. Peak Soldering Temperature	
	Pitch ≤ 15 mm	**Pitch > 15 mm**	**Pitch ≤ 15 mm**	**Pitch > 15 mm**
聚乙酯膜 Polyester	130°C	130°C	270°C	270°C
聚丙烯膜 Polypropylene	110°C	130°C	260°C	270°C

2. 電容器內部測得的最高溫度 The maximum temperature measured inside the capacitor

介電薄膜材料 Dielectric Film Material	元件內部測得的最高溫度 Maximum Temperature Measured Inside the Element
聚乙酯膜 Polyester	160°C
聚丙烯膜 Polypropylene	110°C



設置溫度，使元件內的最高溫度低於極限：

Set the temperature so that inside the element the maximum temperature is below the limit.

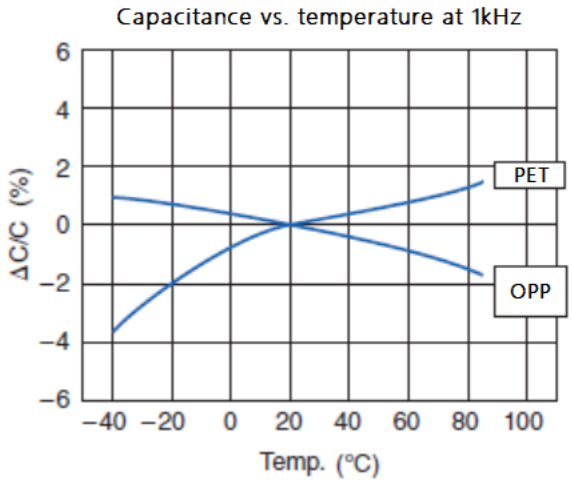
■ 儲存條件和期限 Storage conditions and duration

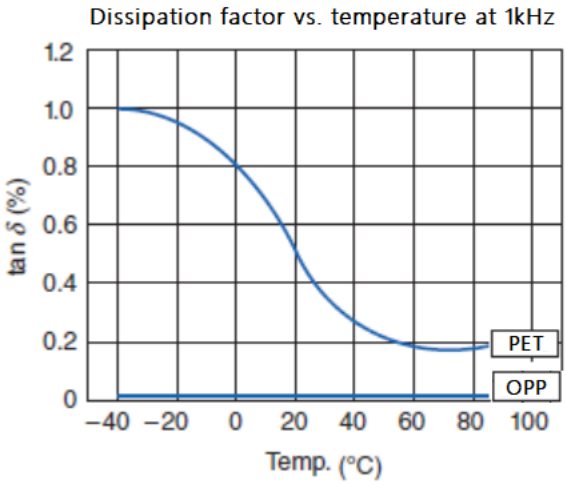
包裝好的電容器應存放在清潔、通風、乾燥的庫房內，不靠近熱源，不受陽光直射，嚴禁與化學試劑、酸和有害氣體一起儲存。T_{stg} = +5°C 至+35°C，最大相對濕度為 75%，無冷凝，儲存一年。

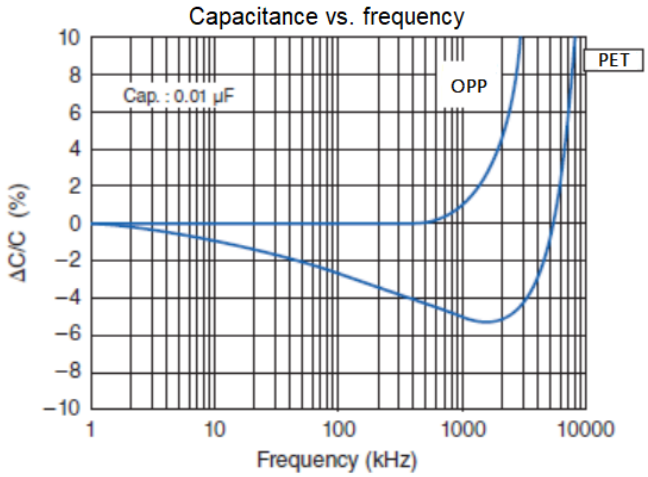
Packaged capacitors should be kept in clean, ventilated, dry coffers, not near the heat source, not subject to direct sunlight, is strictly prohibited and chemical reagents, acid and harmful gas storage together.

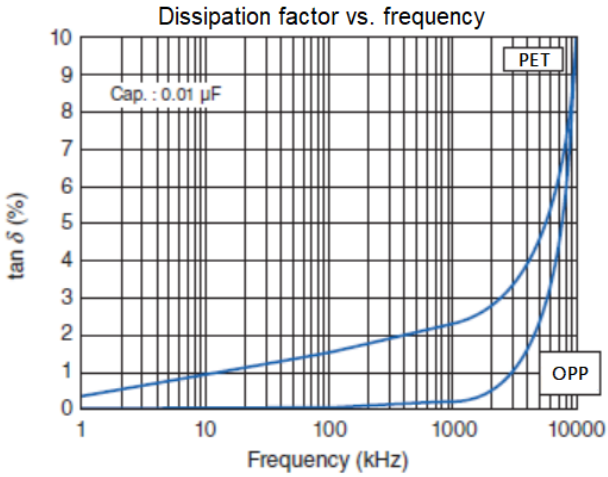
T_{stg} = +5°C to +35°C with relative humidity of maximum 75% without condensation, storage for one year.

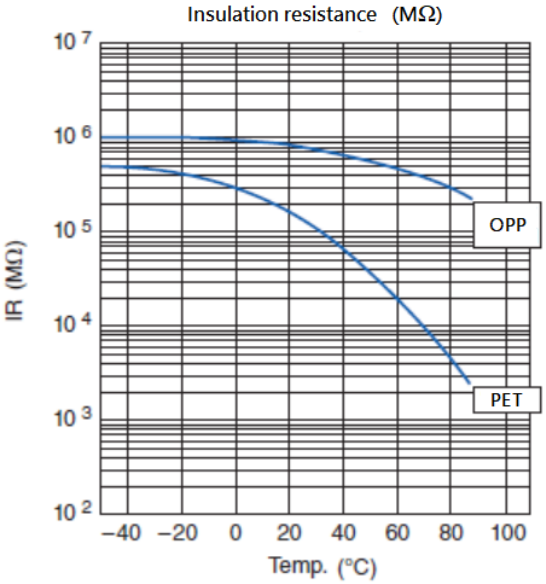
■ 典型圖 Typical graphs





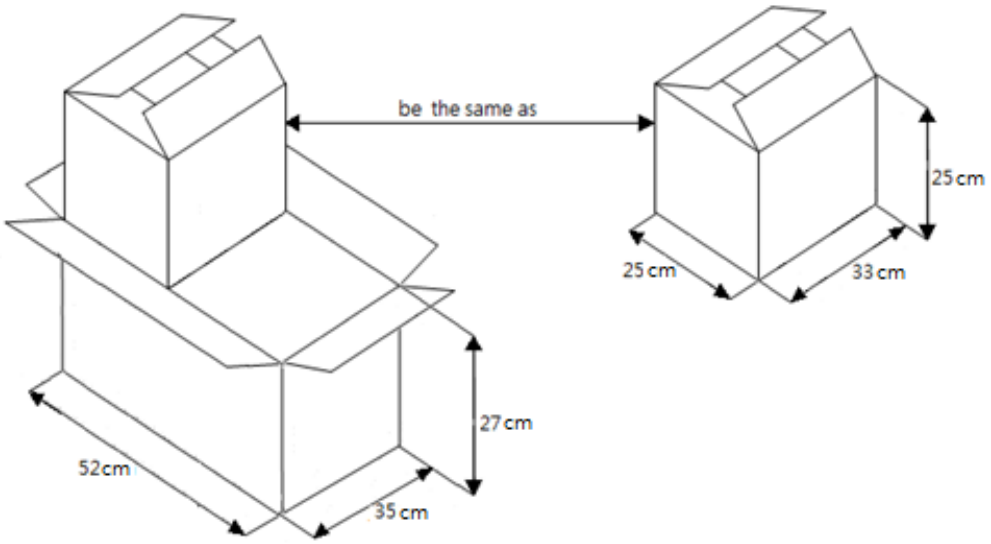






PET :	聚乙酯膜 Polyester film capacitor
OPP :	聚丙烯膜 Polypropylene film capacitor

■ 包裝 Packaging

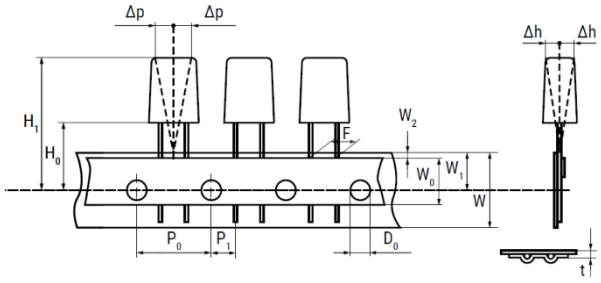
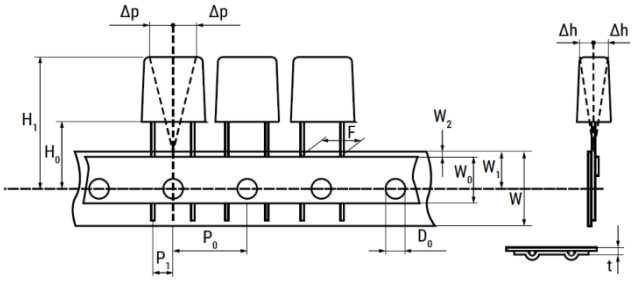
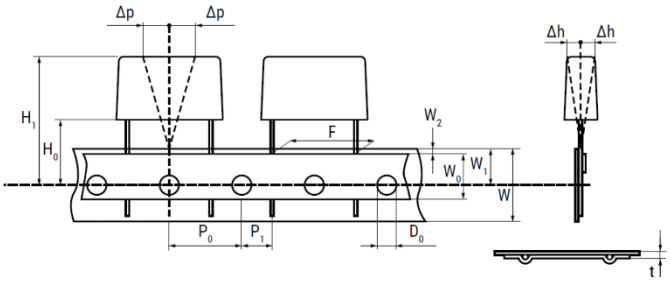
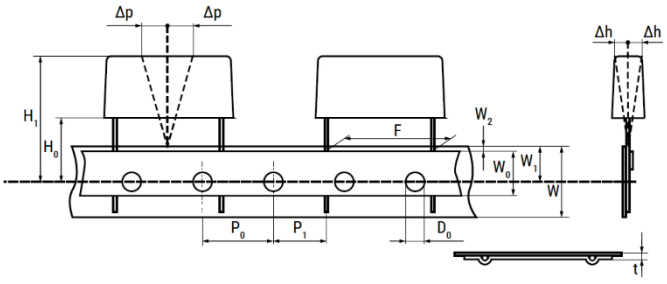


腳距 Pitch (mm)	Pcs / Bag	Pcs / 內紙箱 Inner carton (L33:cm XH:25cm X T:25cm)	Pcs / 外紙箱 Out box (L52:cm XH:27cm X T:35cm)
5~10	1000	10000	20000
15	500	5000	10000
20	300 or 500	3000 or 5000	6000 or 10000
22.5	300	3000	6000
27.5	200	2000	4000
≥27.5	100	1000	2000

聚丙烯薄膜/箔電容器 (浸漬型) - SPPN series

Polypropylene Film/Foil Capacitor (Dipped)

■ **引線編帶 Lead Taping (IEC 60286-2)** Table II

間距 Lead Spacing 5 mm	間距 Lead Spacing 7.5 mm
	
間距 Lead Spacing 10 - 15 mm	**間距 Lead Spacing 22.5 - 27.5 mm**
	

■ **編帶規格 Taping Specification**

尺寸單位 Dimensions in mm								
引線間距 Lead Spacing	+0.8/-0.2	F	5	7.5	10	15	22.5	27.5
載帶寬度 Carrier Tape Width	+1/-0.5	W	18	18	18	18	18	18
膠帶寬度 Hold-down Tape Width	Minimum	W_0	9.5	9.5	9.5	9.5	9.5	9.5
鏈孔位置 Position of Sprocket Hole	±0.5	W_1	9	9	9	9	9	9
帶與帶距 Distance Between Tapes	Minimum	W_2	3	3	3	3	3	3
鏈孔直徑 Sprocket Hole Diameter	±0.2	D_0	4	4	4	4	4	4
進料孔距 Feed Hole Lead Spacing	±0.2(1)	P_0(3)	12.7	12.7	12.7	12.7	12.7	12.7
引線-鏈孔 Distance Lead-Feed Hole	±0.7	P_1	3.85	3.75	7.7	5.2	7.8	5.3
平面偏差 Deviation Tape - Plane	Minimum	Δp	1.3	1.3	1.3	1.3	1.3	1.3
橫向偏差 Lateral Deviation	±2	Δh	2	2	2	2	2	2
總厚度 Total Thickness	±0.2	T	0.7	0.7	0.7	0.7	0.7	0.7
鏈孔-本體 Sprocket Hole/Cap Body	±0.5	H_0(2)	18.5	18.5	18.5	18.5	18.5	18.5

(1) 最大累計進料孔誤差，每20個零件 1mm / Maximum cumulative feed hole error, 1 mm per 20 parts.

(2) 16.5 mm 可根據要求提供 / 16.5 mm available on request.

(3) 15.0 mm 可根據要求提供 / 15.0 mm available on request (F ≥ 10mm).