Dersonic®
德信立業 創新開拓

薄膜電容器產品承認書
APPROVAL SPECIFICATIONS FOR FILM CAPACITORS

客戶 CUSTOMER	立創商城
客戶料號 CUSTOMER P/N	
規格描述 DESCRIPTION	MMKP82/1600V/47NF/J/F15/直脚/L22/18*16*10/ZNR
產品編碼 PART NUMBER	CFV3C473JG1H180HF100
日期 DATE	2026/6/6
文件編號 DOC. NO.	DEC-SA-WI010

德爾創承認欄 APPROVED BY DERSONIC			客戶承認欄 APPROVED BY CUSTOMER	
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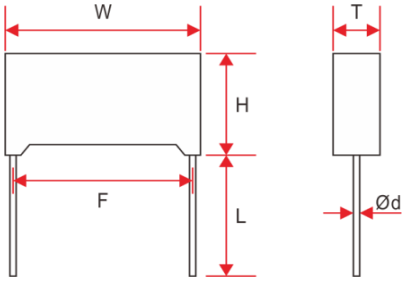
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請確保我們的產品安裝到您的產品上前，已根據您的需求進行了評估。
Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
請您在使用我們的產品時，不要偏離此標準。
You are requested not to use our product deviating from this specification.

薄膜電容器產品承認書
APPROVAL SPECIFICATIONS FOR FILM CAPACITORS

1. 技術指標
Specifications



- Comply with RoHS 2.0
- Halogen-free
- Comply with REACH
- Marking

ZNR
MMKP82
473J1600V

品號 Part No.		CFV3C473JG1H180HF100
規格描述 Description		MMKP82/1600V/47NF/J/F15/直脚/L22/18*16*10/ZNR
客戶料號 CUSTOMER P/N		
參考標準 Reference Standard		GB/T 10190 (IEC 60384-16)
氣候類別 Climatic Category		40/105/56
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 degree for rated voltage)
額定電壓 Rated Voltage, (U_R)		1600V
耐電壓 Voltage Proof		2560VDC 5s, PASS (Cut off Current 10mA, ARC＝OFF, Voltage raising time 5-10s)
電容量 Capacitance		47NF ±5% @ 1kHz 1.0V, 20.0℃
損耗角正切 Tangent of loss angle		0.001 max @ 1kHz 1.0V, 20.0℃ 0.002 max @ 10kHz, 1.0V, 20.0℃ 0.006 max @ 100kHz, 1.0V, 20.0℃
絕緣電阻 Insulation Resistance		100000MΩ min @ 100V 1min
最大脈沖爬升速率 Maximum Pulse Rise Time, (dV/dt)		6000V/us
尺寸 Dimensions	W	18.0 ±0.5mm
	H	16.0 ±0.5mm
	T	10.0 ±0.5mm
	F	15.00 ±1.0mm
	L	22.0 ±5.0mm
	Ød	0.8 ±0.1mm

注：若實際工作電壓U比額定電壓U_R低，電容器可工作在更高的dV/dt場合，這樣dV/dt允許值應爲上表值乘以U_R/U
Note: If the working voltage (U) is lower than the rated voltage (U_R), the capacitor can be worked at a higher dV/dt.
In this case, the maximum allowed dV/dt is obtain by multiplying the above value with U_R/U.

2. 範圍
Scope

本規格書適用電子設備用下列薄膜電容器。
This specification applies to the film capacitors for the electronic equipment with a following.

MMKP82型塑料外壳双面金属化聚丙烯膜电容器
MMKP82 type Double sided metallized polypropylene film capacitor (Box-type)

※ 薄膜電容器的基本結構
Film capacitor basic construction

<table>
<tr><td rowspan="2">
CL20, CL21, CL21X, CL23, CL23B, CL25, CBB20, CBB21(MPB), MKP21, MKP23, MKP25</td><td>
CL21, CBB21(MSB)</td><td>
CBB13(PPN)</td><td>
CBB81(PPS, PSB)</td></tr>
<tr><td>
MMKP82(＜400V)</td><td>
MMKP82(≥400V, PHB)</td><td>
MMKP84(≥2KV, PHB)</td></tr>
</table>



金屬化薄膜 Metallized film　　金屬箔 Metal foil　　雙面金屬化膜 Double-sided metallized film　　薄膜 Film

3. 特點
Features

- 雙面金屬化聚丙烯膜
  Doublesidedmetallized polypropylene film
- 損耗小，內部溫升小
  Low loss and small inherent temperature rise
- 負電容量溫度系數
  Negative temperature coefficient of capacitance
- 優異的阻燃性能
  Excellent active and passive flame resistant abilities

4. 用途
Applications

- 廣泛應用於高壓高頻脈沖電路中
  Widely used in high voltage, high frequency and pulse circuit
- 電子鎮流器和節能燈中
  Electronic ballasts and compact lamps
- 吸收和 SCR 整流電路
  SNUBBER and SCR commutating circuits

5. 訂購方式
How to order

CFV	3C	473	J	G1	H	18	0H	F	100
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

① 產品類別
Product type

CFE: CBB13型无感箔式聚丙烯膜电容器
CBB13 type Polypropylene film/foil capacitor(Non-inductive)
CFF: CBB81型高压金属化聚丙烯膜/箔式电容器
CBB81 type High-voltage metallized polypropylene film/foil capacitor
CFC: CBB21型金属化聚丙烯膜电容器(浸渍型)
CBB21 type Metallized polypropylene film capacitor(dipped)
CFV: MMKP82型塑料外壳双面金属化聚丙烯膜电容器
MMKP82 type Double sided metallized polypropylene film capacitor (Box-type)

② 額定電壓
Rated DC voltage (U_R)

Code	1J	2A	2E	2G	2J	3A	3B	3C
U_R	63V	100V	250V	400V	630V	1kV	1.2kV	1600V

③ 電容量
Capacitance

三位數表示，單位pF。如：
Three-digit representation, in PF. ex.
473: ＝47*10＾3＝47000PF＝47NF

④ 容量偏差
Capacitance tolerance

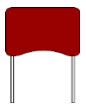
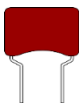
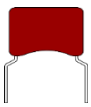
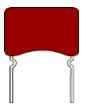
Code	F	G	H	J	K	L	M
Tol.	±1%	±2%	±3%	±5%	±10%	±15%	±20%

⑤ 導線成型方式
Lead format

※ 第一碼：腳距
First code: Lead spacing (F)

Code	F
C	5.08mm
D	7.5mm
E	10.0mm
G	15.0mm
J	22.5mm
L	27.5mm

※ 第二碼：腳型
Second code: Lead style

Code	1	A	0	4
Lead style				
Scope	未成型 Unformed	腳距改小 F make down	腳距改大 F enlarge	腳距不變 F unchanged

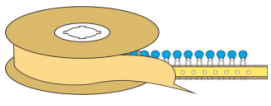
⑥ 包裝方式
Packing style

※ 散裝腳長
Lead length (L) for bulk packaging

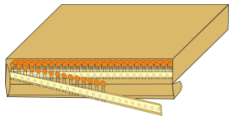
2: 3.0mm
3: 3.2mm
4: 3.5mm
5: 3.8mm
6: 4.0mm
8: 5.0mm
9: 6.0mm
V: 7mm
A: 8mm
B: 10.0mm
C: 12.0mm
E: 16.0mm
G: 20.0mm
I: 24.0mm
H: 22mm

※ 編帶包裝方式
Taping package style

T: 卷圓盤包裝 Reel packing



P: 折疊包裝 Ammo packing



⑦ 電容寬度
Body width (W)

Code	06	G5	07	I5	09	J5	11	L5
W	6.0mm	6.5mm	7.0mm	8.5mm	9.0mm	9.5mm	11mm	11.5mm
Code	12	16	17	18	24	25	29	30
W	12mm	16mm	17mm	18mm	24mm	25mm	29mm	30mm

⑧ 電容高度
Body height (H)

Code	01	02	03	04	05	06	07	08
H	5.0mm	5.5mm	6.0mm	6.5mm	7.0mm	7.5mm	8.0mm	8.5mm
Code	09	0A	0B	0C	0D	0E	0F	0G
H	9.0mm	9.5mm	10mm	11mm	12mm	13mm	14mm	15mm
Code	0H	0I	0J	0K	0L	0M	0N	0Z
H	16mm	17mm	18mm	19mm	20mm	21mm	22mm	24mm

⑨ 電容厚度
Body thickness (T)

Code	U	1	2	3	4	5	6	7
H	2.5mm	3mm	3.5mm	4mm	4.5mm	5mm	5.5mm	6mm
Code	8	9	A	B	C	D	E	F
H	6.5mm	7mm	7.5mm	8mm	8.5mm	9mm	9.5mm	10mm
Code	G	H	I	J	K	L	M	N
H	11mm	12mm	13mm	14mm	15mm	16mm	17mm	18mm

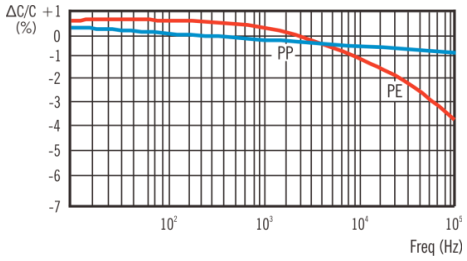
⑩ 標誌
Marking

見技術指標
See "Specifications"

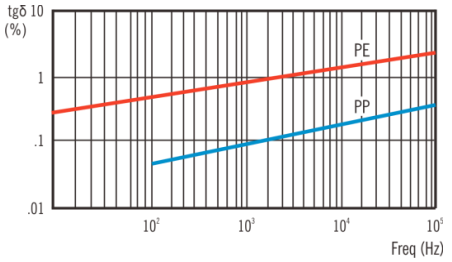
※ 典型薄膜電容器特性曲線
Characteristic curve of typical film capacitor

PP: 聚丙烯 polypropylene
PE: 聚酯 polyester

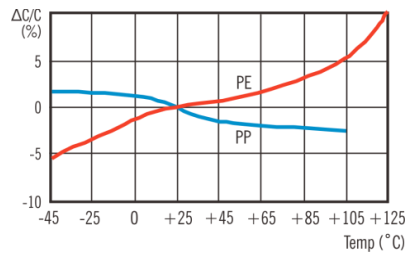
Frequency vs Capacitange



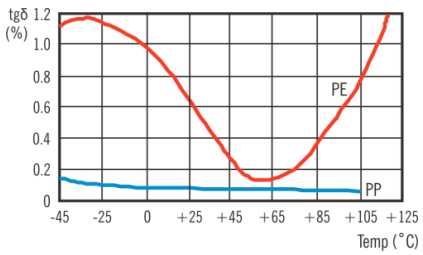
Frequency Vs tan δ



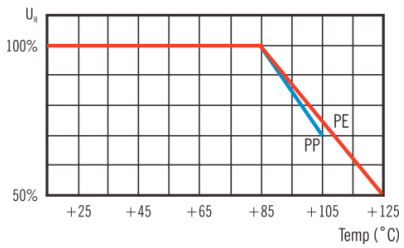
Temperature vs Capacitange



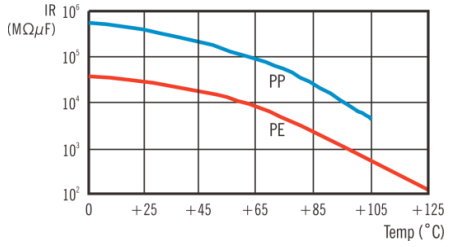
Temperature Vs tan δ



Temperature vs rated voltage



Temperature Vs Insulation resistance



6. 測量和試驗
Measurement and testing

試驗項目 Test items		性能要求 Requirements	測試方法 Test method
電容量 Capacitance (C_R)		在規定的誤差範圍內 Within the tolerance specified	1kHz (120Hz for C＞10uF) 1.0V @ 20℃
損耗角正切 Tangent of loss angle (tan δ)		0.001 max 0.002 max 0.006 max	1kHz (120Hz for C＞10uF) 1.0V @ 20℃ 10kHz 1.0V @ 20℃ 100kHz 1.0V @ 20℃
耐電壓 Voltage proof (TV)		無永久性擊穿或飛弧 No permanent breakdown or flashover	Between terminals： 1.6 times rated voltage, 5sec. Cut off Current 10mA, ARC＝OFF, Voltage raising time: 5～10sec, Pulse rise: ≤150V/us
絕緣電阻 Insulation resistance (IR)		100000MΩ min	在導線間施加100V(額定電壓小於100V時，使用10V)進行測量，時間不超過1分鐘。 The insulation resistance should be measured with a DC voltage not exceeding 100V (rated voltage is less than 100V tested by 10V) at normal temperature and humidity and less than 1 min. of charging.
引出端強度 Robustness of terminations		無斷線, 電容器無可見損壞 No wire breakage and no damage of capacitor	拉力 Tensile (test Ua1, Duration : 10s±1s) 彎曲 Bending (test Ub, 4*90°, duration : 2 times/bend) Lead wire diameter ≤0.8mm ＞0.8mm Tensile load 10N 20N Bending load 5N 10N
耐焊接熱 Resistance to soldering heat	Visually	No visible damage	IEC 60068-2-20, Test Tb, method 1 (solder bath) 焊接溫度 Solder temperature: 260±5℃ 焊接時間 Solder time: 5±0.5sec
	ΔC/C	3% max of the Initial value	
	tan δ	0.004 max of increased value	
可焊性 Solderability		導線必須有3/4以上的面積均勻附着焊錫 Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	IEC 60068-2-20, Test Ta, method 1 (solder bath) 焊接溫度 Solder temperature: 245±5℃ 焊接時間 Solder time: 3±0.5sec
溫度快速變化 Rapid change of temperature	Visually	No marked defect	IEC 60068-2-14, test Na 循環5次 Number of cycles: 5 在極限溫度下暴露30分鐘 Duration of exposure at the temperature limits: 30 min
	ΔC/C	3% max of the Initial value	
	tan δ	0.004 max of increased value	
	IR	50% min of the applicable limits	
振動 Vibration	Visually	No marked defect	IEC 60068-2-6, test Fc 振幅0.75mm，10Hz～50Hz; 總持續時間爲6h(臥式爲2h)。 0.75mm displacement，10Hz to 50Hz; The total duration shall be 6h (axial: 2h).
	ΔC/C	3% max of the Initial value	
	tan δ	0.004 max of increased value	
	IR	50% min of the applicable limits	
碰撞 Bump	Visually	No marked defect	IEC 60068-2-29, test Eb 加速度 Acceleration: 400m/s² ; 持續時間 Pulse duration: 6ms ; 次數 Time: 1000 電容器與安裝點之間的距離爲6mm±1mm The distance between the capacitor body and the mounting point shall be 6mm±1mm
	ΔC/C	3% max of the Initial value	
	tan δ	0.004 max of increased value	
	IR	50% min of the applicable limits	

試驗項目 Test items		性能要求 Requirements	測試方法 Test method
氣候順序 Climatic sequence	Visually	No marked defect	See IEC 60384-1, 4.21, with the following: 1) Dry heat, IEC 60068-2-2, test Bb, for 16h, using the upper category temperature 2) Damp heat, cyclic (first cycle), IEC 60068-2-30, test Db, for one cycle of 24h, using a temperature of 55°C (severity b). 3) Cold, IEC 60068-2-1, test Ab, for 2h, using the lower category temperature 4) Low air pressure, IEC 60068-2-13, test M, temperature of 15°C to 35°C and pressure 8kPa, The duration of the test shall be 1h. 5) while still at the specified low pressure and during the last 5min of the 1h period, the rated voltage shall he applied.
	ΔC/C	5% max of the Initial value	
	tan δ	0.005 max of increased value	
	IR	50% min of the applicable limits	
	TV	No permanent breakdown for rated voltage	
濕熱穩態 Damp Heat Steady State	Visually	No marked defect	IEC 60068-2-78, test Cab Temperature: 40±2°C Humidity: 90-95%RH Duration: 56 day No apply voltage.
	ΔC/C	5% max of the Initial value	
	tan δ	0.004 max of increased value	
	IR	50% min of the applicable limits	
	TV	No permanent breakdown for rated voltage	
耐久性 Endurance	Visually	No marked defect	IEC 60068-2-2, test Bb Temperature: 125±2°C Duration: 1000h+24/-0h Apply 125% rated voltage.
	ΔC/C	5% max of the Initial value	
	tan δ	0.005 max of increased value	
	IR	50% min of the applicable limits	
充電和放電 Charge and discharge	Visually	No marked defect	IEC 60384-2, 5.13 Test voltage: rated voltage Time: 1 Cycle per second at room temperature Cycle times: 10000 Dv/Dt: 100 V/μs Discharge resistor: $(220\times10^{-6}/C_R)\ \Omega$
	ΔC/C	5% max of the Initial value	
	tan δ	0.005 max of increased value	
	IR	50% min of the applicable limits	
浪湧 Surge		There shall be no permanent breakdown or flashover. If any three successive impulses are shown by the oscilloscope monitor to have had a waveform indicating that no self-healing breakdowns or flashovers have taken place in the capacitor, then no further impulses shall be applied and the capacitor shall be counted as conforming.	IEC 60384-1, 4.26 Voltage proof (>1.0uF, rated voltage) Each individual capacitor shall be subjected to a maximum of 24 impulses of the same polarity. The time between impulses shall be not less than 10 s.
阻燃試驗 Passive flammability test		The maximum burning time shall not be exceeded by any specimen. Burning droplets or glowing parts falling down shall not ignite the tissue paper.	IEC 60384-1, 4.38 Category of flammability: B Flame exposure time: 10s Maximum burning time: 10s

7. 使用薄膜電容器的注意事項
Caution items in using plastic film capacitors

7.1. 工作電壓
Operation voltage

薄膜電容器的選用取決於施加的最高電壓，並受施加的電壓波形、電流波形、頻率、環境溫度（電容器表面溫度）、電容量等因數的影響。使用前請先檢查電容器兩端的電壓波形、電流波形和頻率是否在額定值內。

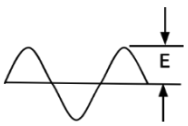
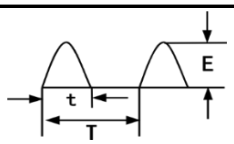
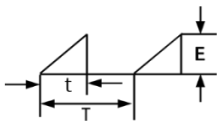
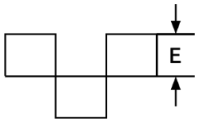
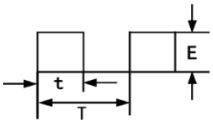
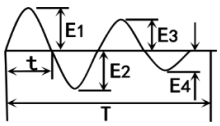
The plastic film capacitor varies in the maximum applicable voltage depending on the applied voltage waveform, current waveform, frequency, ambient temperature (capacitor surface temperature), capacitance value ,etc. Be sure to use capacitors within the specified values by checking the voltage waveform, current waveform, and frequency applied to them (In the application of high frequency, the permissible voltage varies with the type of the capacitor. For detail see the specification).

如果將本產品使用在交流場合，請與我公司工程師確認；否則可能造成電容器燒毀。
If this product is used at AC circuits, please confirm with our engineer; Otherwise it may cause the capacitor to burn.

CL21X、MKP25系列電容不適合用於交流場合。
CL21X, MKP25 series isn't suitable for AC applications.

7.2. 各種波形的有效值換算關系
Calculation of rms in various waveforms

不同的波形有效值按下面的公式計算。
In each waveform, calculate the rms value in the following formula.

Type	1	2	3	4
波形 Waveform				
有效值 RMS	$\frac{E}{\sqrt{2}}$	$\frac{E}{\sqrt{2}}$	$\frac{E}{\sqrt{T/2t}}$	$\frac{E}{\sqrt{3}}$
Type	5	6	7	8
波形 Waveform				
有效值 RMS	$\frac{E}{\sqrt{T/3t}}$	E	$\frac{E}{\sqrt{T/t}}$	$\sqrt{\frac{t}{2T}(E_1^2+E_2^2+E_3^2+E_4^2)}$

7.3. 電容器充放電
Charging and discharging

由於電容器充放電電流取決於電容量和電壓上升速率的乘積，即使是低電壓充放電，也可能產生大的瞬間充放電電流，這可能會導致電容器性能的損害，比如說短路或開路。當進行充放電時，請串聯一個20Ω/V～1 000Ω/V或更高的限流電阻，將充放電電流限制在規定的範圍內。

Because the charging and discharging current of capacitor is obtained by the product of voltage rise rate (dv/dt) and capacitance, low voltage charging and discharging may also cause deterioration of capacitor such as shorting and open due to sudden charging and discharging current. When charging and discharging, pass though a resistance of 20Ω/V to 1 000Ω/V or more to limit current.

7.4. 因薄膜振動產生的翁鳴聲
Buzzing noise

電容器的嗡鳴聲是由於電容器薄膜受到兩電極間庫侖力的作用，產生的振動而發出的聲音，施加的電壓和頻率波形失真越嚴重，所產生的嗡鳴聲越大。但這種嗡鳴聲對電容器不會產生任何破壞作用。

Any buzzing noise produced by capacitor is caused by the vibration of the film due to the coulomb force that is generated between the electrodes with opposite poles. If the wave-form with a high distortion rate or frequency is applied across the capacitor, the buzzing noise will become louder. But the buzzing noise is of no damage to capacitor.

7.5. 表面溫升(ΔT)

Surface overtemperature ΔT

當電容器用於交流及脈沖場合時，流經電容器的電流使其發熱，如果發熱量過大，會導致電容器短路甚至燃燒。所以流經電容器的電流不能超過產品目錄所規定的最大數值及電容器在加載時監測溫升就顯得尤爲必要。

When capacitor is used in A.C. or pulse applications, the current that flows through the capacitor makes it heat up. If the capacitor heats up too much it might deteriorate causing a short circuit or fire. The limits described in the catalogue are not exceeded and it's necessary to check temperature on the capacitor when it`s working.

測量電容器表面溫升的方法如圖1，被測試電容器必須施加交流(工作頻率)、脈沖電壓。

Method for determining the surface overtemperature of the capacitor is showed in fig.1. The capacitor being tested must be supplied by A.C. or pulse voltage and frequency.

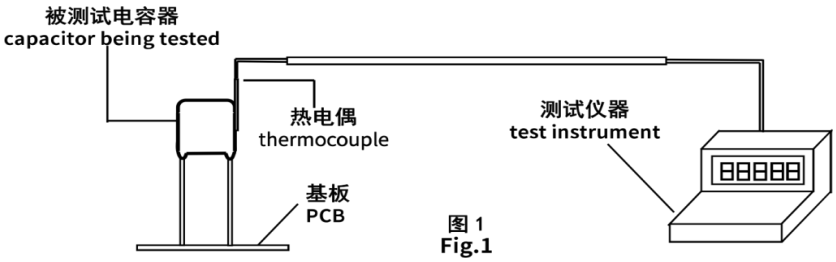
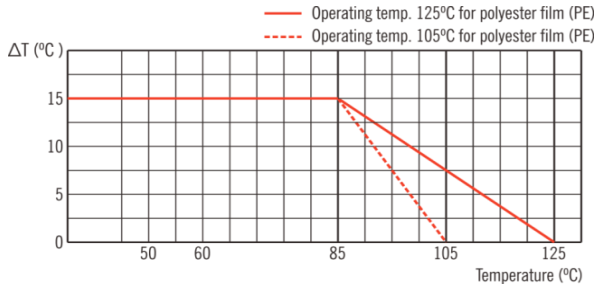
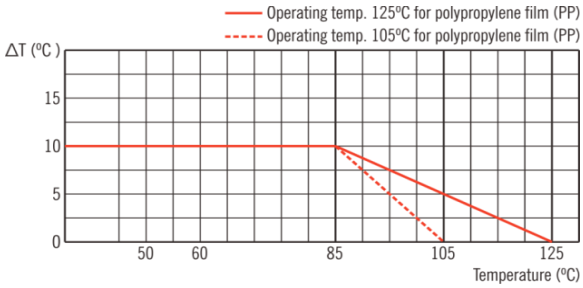


图 1
Fig.1

各型號電容表面允許的最大溫升

Maximum self temperature rise for all series





注：如果有超出要求的請聯系我們技術工程師。

Note: If you need the temperature more than above, please contact our engineers.

7.6. 阻燃性

Passive flammability

盡管在薄膜電容器外封裝中使用了耐火性阻燃材料--阻燃環氧樹脂或塑殼，但外部的持續高溫或火焰仍可使電容器芯子變形而產生外封裝破裂，導致電容器芯子熔化或燃燒。

Although flame retardation epoxy resin or plastic case is used in the coating or encapsulating of plastic film capacitor, continuous outer high temperature or firing will break the coating layer or plastic case of the capacitor, and may lead to melting and firing of the capacitor element.

7.7. 幾種特殊工作環境

Special working conditions

1) 如果長時間使用在高濕環境下，電容器可能會吸收潮氣、電極被氧化，導致電容器損壞。如果在AC條件下使用，高濕環境將會加劇電暈的影響，從而引起電容值下降、損耗值增加。

If used for a long time in a humid ambient, the capacitor might absorb humidity and oxidize the electrodes causing breakage of the capacitor. If case of AC application, high humidity would increase the corona effect. This phenomenon causes a drop in the capacitance value.

在AC應用情況下，如果超出下表的條件，影響將會更嚴重，對詳細的信息請聯系我們技術工程師。

In case of working condition in AC application more severe than following table, please contact our engineers for detailed information.

	工作溫度 Working Temperature	相對濕度 Relative Humidity
年平均 Average for year	25˚C	0.7
連續2周 2 weeks continuously	30˚C	0.9

2) PCB板組裝：灌膠

PCB Assembling: Filling with Resin

如果電容器有被灌樹脂，下列的情況將可能會發生:

If the capacitor is placed in resin, the following situations might occur:

a) 樹脂裏的溶劑可能會影響電容器的特性;

The solvent contained the resin might deteriorate the characteristics of the capacitor;

b) 在聚合過程中產生的熱將會損壞電容器。

The heat generated during the polymerizations might damage the capacitor.

3) PCB板組裝：紅膠固化

PCB Assembling: Adhesive curing oven

因爲過高的溫度會有可能損害電容器，我們建議產品的插件動作在紅膠固化工序後進行。當必須提前時，請評估所使用的紅膠固化溫度曲線是否適合插件產品。

Because the high temperature of adhesive curing will damage the capacitors, so we suggest that leaded parts must be fixed after the adhesive curing process. When must be ahead, please estimate if the curing curve is suitable for capacitors.

7.8. 焊接

Soldering

插件產品僅適合做波峰焊接。

Plug parts only suitable for wave soldering.

爲達到更好的可焊性，我們建議遵照下列的標準。

In order to obtain a good solderability, we suggest to observe the following rules.

※ 手動焊接, 最高溫度350˚C，時間不超過3s

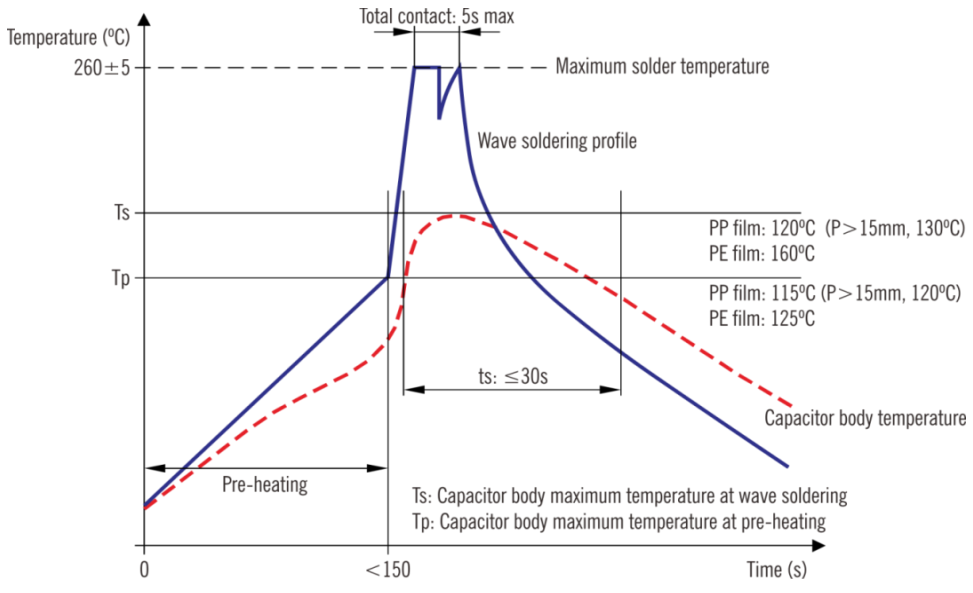
Manual soldering, Max. temperature: 350˚C, time: ≤3s

※ 波峰焊

Wave soldering

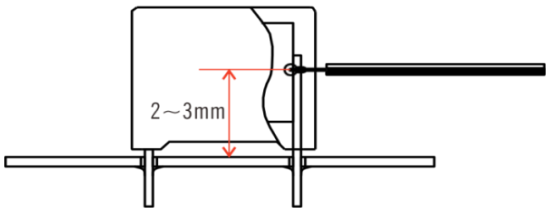
波峰焊工藝過程中有較多因素對薄膜電容器受熱有影響，如：預熱溫度、預熱時間、錫爐溫度、過錫爐時間、其他熱源影響等。

There are many factors affecting the heating of film capacitor during the wave soldering process, such as: preheating temperature, preheating time, soldering temperature, soldering time, other heat sources influence and so on.



因爲過熱有可能會損害電容器，我們建議關注電容器最高溫度以及耐熱時間，用熱電偶檢測電容本體最高溫度Ts.

Because overheating could damage the capacitor, we recommend paying attention to the maximum capacitor temperature and heating time, use temperature sensor to detect the maximum capacitor body temperature (Ts).



如果需要焊接兩次，第二焊接必須等到電容器恢復到常溫。

If re-working or dipping twice is necessary, it should be done after the capacitor returns to the normal temperature.

8. 貯存條件

Storage conditions

包裝好的電容器應存放在清潔、通風、幹燥的庫房內，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。

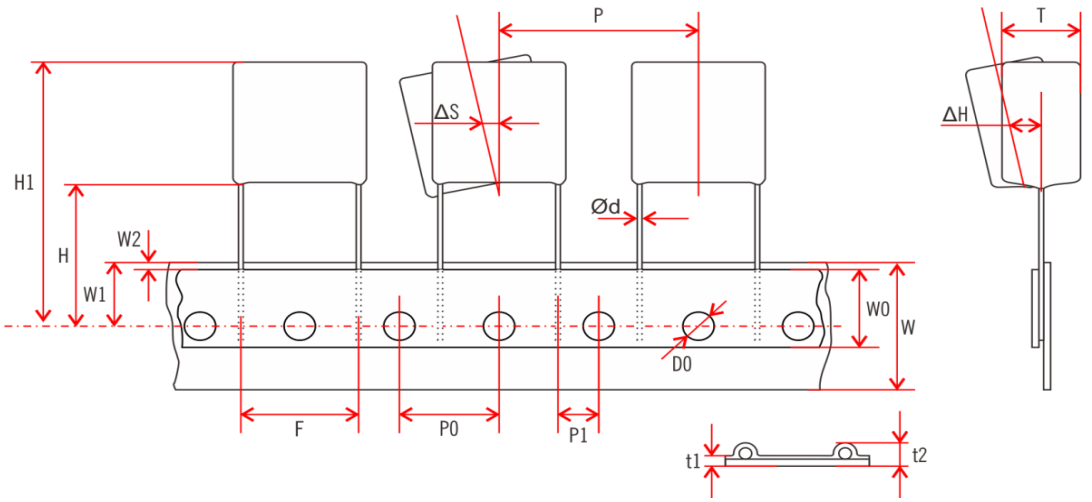
Packaged capacitors should be kept in clean, ventilated, dry coffers, not near the heat source, not subject to direct sunlight, is strictly prohibited and chemical reagents, acid and harmful gas storage together.

儲存條件如下表所示：

Storage conditions are shown in the following table:

溫度 Temperature	相對濕度 Relative humidity	儲存年限 Storage time
-5℃～35℃	≤75% RH	12 month

9. 編帶規格
Taping specifications



Item		Symbol	Specification (mm)	Remarks
Lead-wire diameter		Ød	0.8±0.1	
Pitch of component		P	25.4±1.0	
Feed hole pitch		P0	12.7±0.3	Cumulative pitch error: 1.0mm/20 pitch
Feed hole center to lead		P1	5.2±0.3	
Hole center to component center		P2		
Lead-to-lead distance		F	15±1.0	
Component alignment		Δh	≤2.0	
Deviation along tape, Left or right		ΔS	≤1.3	
Tape width		W	18.0+1.0/-0.5	
Hold-down tape width		W0	≥7.0	
Hole position		W1	9.0+0.75/-0.5	
Hole-down tape position		W2	≤3.0	
Height of component from tape center	Straight lead	H	20.0+0/-2.0	
	Kinked lead	H0	16.0±0.5	
Component height		H1	≤40	
Feed hole diameter		D0	4.0±0.3	
Total tape thickness		t1	≤0.9	Ground paper: 0.5±0.1mm
Total thickness, tape and lead wire		t2	≤1.5	
Length of snipped		L	≤11.0	