SPECIFICATION FOR APPROVAL

File No.: Q/FRK 0.GS.E.C82-C13

Product Name	Double sided metallized polypropylene film capacitor(Box-type)
Product Type	MMKP82
Product Code	C823C473JB0C000
Customer	
Customer Code	
Issue Date	2023-05

Xiamen Faratronic Co. Ltd.			Approved by Customer
Drafted	Checked	Approved	

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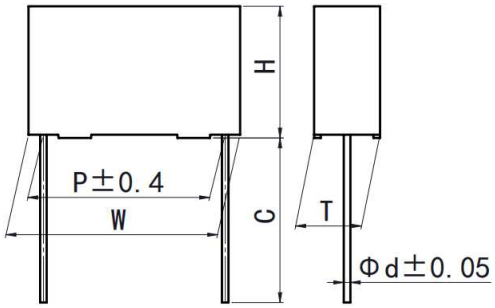
Version history

Current version	Date	Author	Change description

Double sided metallized polypropylene film capacitor (Box-type)

■ Outline Drawing



W±0.4, H±0.4, T±0.4

■ Features

- Double sided metallized polypropylene structure
- Low loss and small inherent temperature rise
- Negative temperature coefficient of capacitance
- Excellent active and passive flame resistant abilities

■ Typical Application

- Widely used in high voltage, high frequency and pulse circuit
- Electronic ballasts and compact lamps
- SNUBBER and SCR commutating circuits

■ Specifications

Reference Standard	GB/T 10190 (IEC 60384-16)					
Climatic Category	40/105/56					
Rated Temperature	85℃ for U_R (dc); 75℃ for U_R (ac)					
Operating Temperature Range	-40℃~105℃ (+85℃ to +105℃: decreasing factor 1.25% per ℃ for U_R (dc)) (+75℃ to +105℃: decreasing factor 1.35% per ℃ for U_R (ac))					
Rated Voltage	250V, 400V, 630V, 1 000V, 1 600V, 2 000V					
Capacitance Range	0.00022μF~3.9μF					
Capacitance Tolerance	±2% (G), ±3% (H), ±5% (J), ±10% (K), ±20% (M)					
Voltage Proof	1.60U_R (5s)					
Dissipation Factor	⩽10×10^{-4} (1kHz, 20℃)					
Insulation Resistance	R⩾100 000MΩ , C_N⩽0.33μF RC_N⩾30 000s, C_N>0.33μF (20℃, 100V,1min)					
Maximum Pulse Rise Time(dV/dt): 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 right value with U_R/U.	U_R(V)	dV/dt(V/us)				
		P=7.5	P=10.0	P=15.0	P=22.5	P=27.5
	250	1 200	1 000	550	250	200
	400	1 800	1 500	900	500	300
	630	3 200	3 200	2 500	1 500	900
	1 000	6 000	6 000	3 300	2 100	1 000
	1 600	--	--	6 000	3 000	2 000
	2 000	--	--	10 000	5 000	2 200

■ Part number system

The 15 digits part number is formed as follow:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	8	2												

Digit 1 to 3 Series code

C82=MMKP82

Digit 4 to 5 D.C. rated voltage

2E=250V 2G=400V 2J=630V

3A=1000V 3C=1600V 3D=2000V

Digit 6 to 8 Rated capacitance value

For example : 103=10×10^3 pF= 0.01μF

Digit 9 Capacitance tolerance

G=±2%, H=±3%

J=±5%, K=±10%, M=±20%

Digit 10 Pitch

3=7.5mm 4=10mm 6=15mm

9=22.5mm B=27.5mm

Digit 11 Internal use

Digit 12 to 15 Lead form and packaging code

Table1 Lead form and packaging code

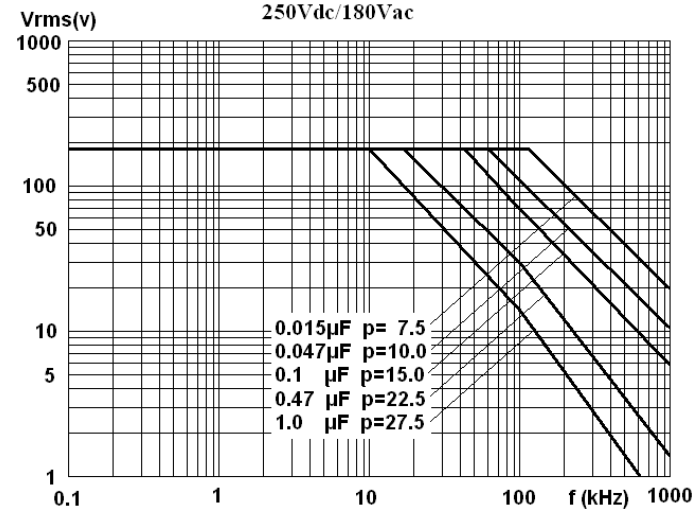
Digit 12		Digit 13		Digit 14		Digit 15	
code	explanation	code	explanation	code	explanation	code	explanation
A	ammo-pack	3 4 6	F=7.5mm F=10.0mm F=15.0mm	0	straight	1 5	Each cap. among two consecutive holes P3=12.7mm,H=18.5mm (For pitch=7.5mm) P3=25.4mm;H=18.5mm (For pitch=10/15mm)
C	straight lead "C" in the figure above	code	explanation			0	Length tolerance ±0.5mm Or standard length
		00	standard lead length (18mm~26mm)				
		45	lead length 4.5mm				
Note: Recommend short lead due to long lead could deform easily.							

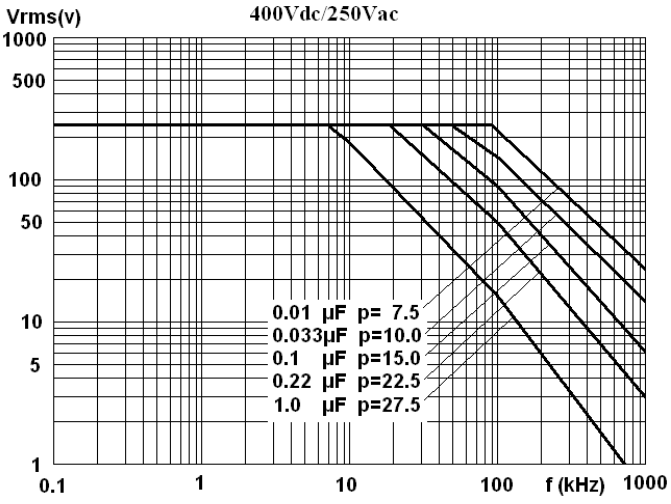
■ Dimensions(mm)

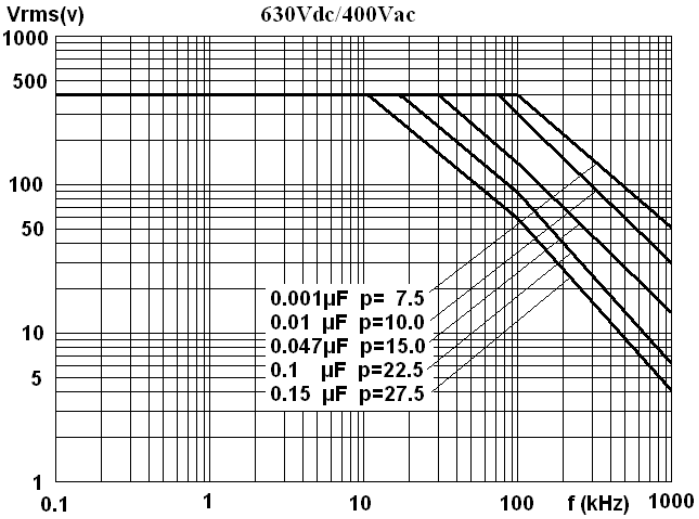
1 600Vdc(650Vac)						
CN (μF)	W	H	T	P	d	Part number
0.047	32.0	18.0	9.0	27.5	0.8	C823C473JB0C000

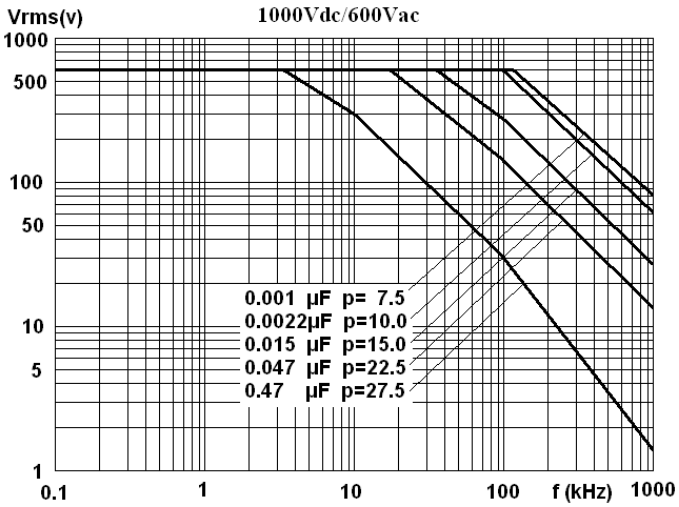
Note: 1. "-" =capacitance tolerance code, M=±20%,K=±10%,J=±5%, H=±3%, G=±2%
2. "****" =lead form and packaging code (refer to table 1)

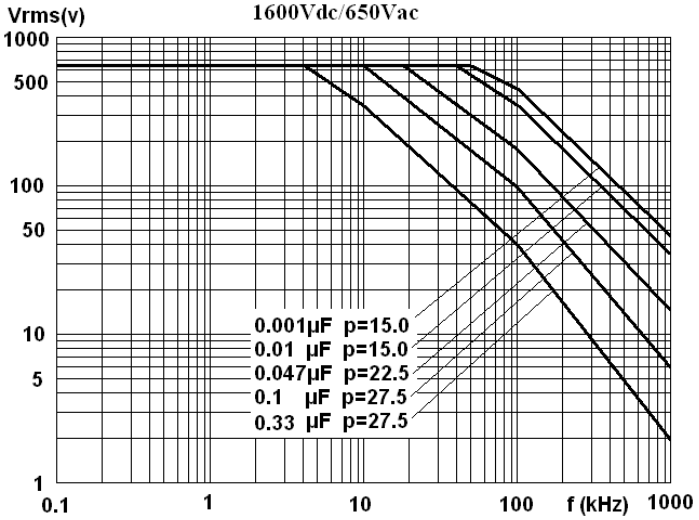
■ MAX. VOLTAGE(Vr.m.s) VERSUS FREQUENCY

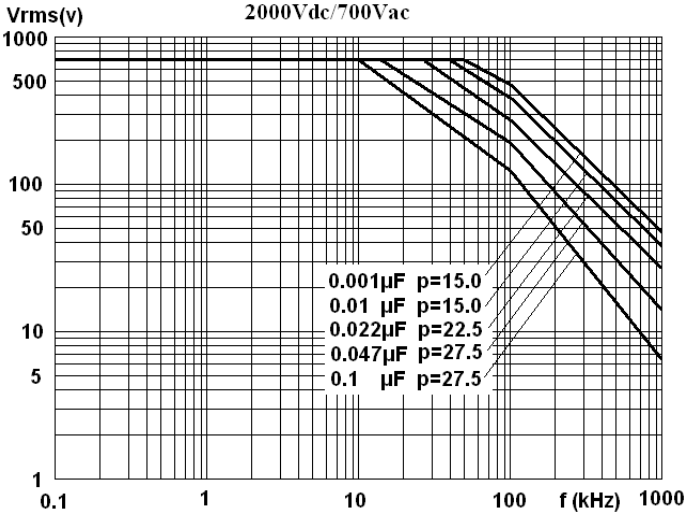






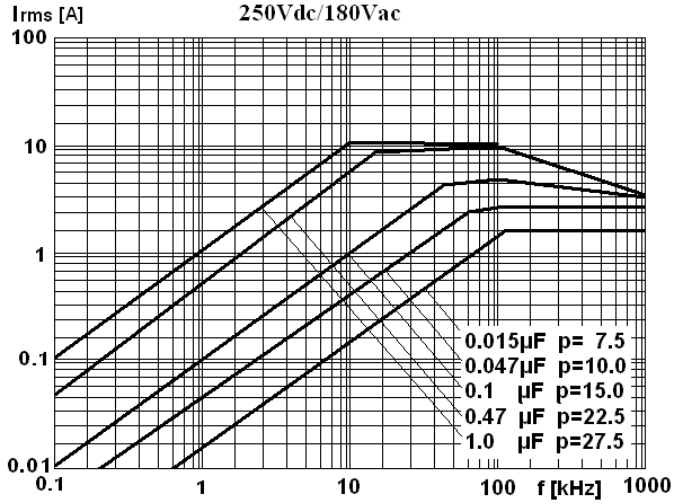


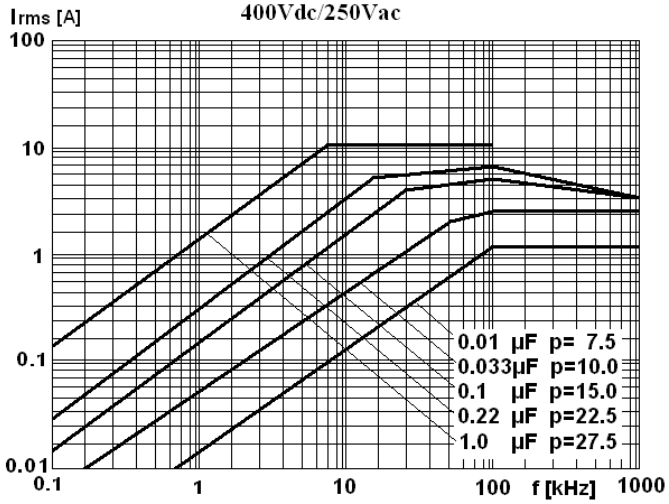


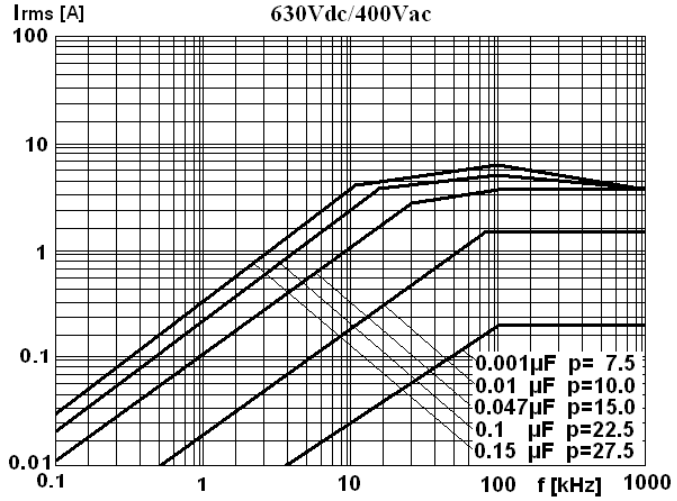


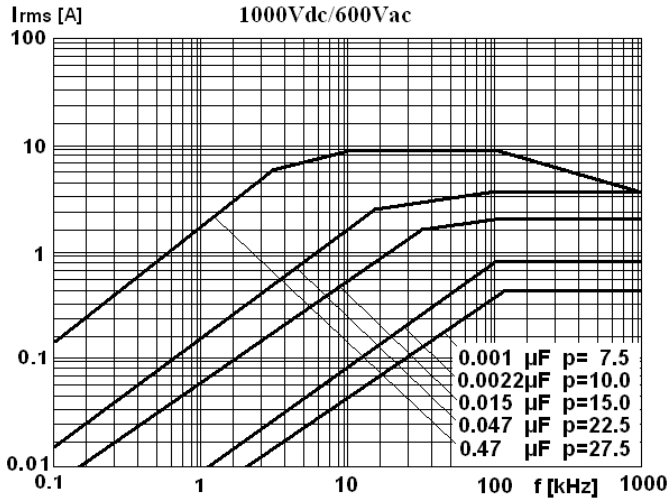
Note: sinusoidal wave-form, environment temperature ⩽ 85 ℃,internal temperature rise △T=10 ℃, p (pitch) in mm..

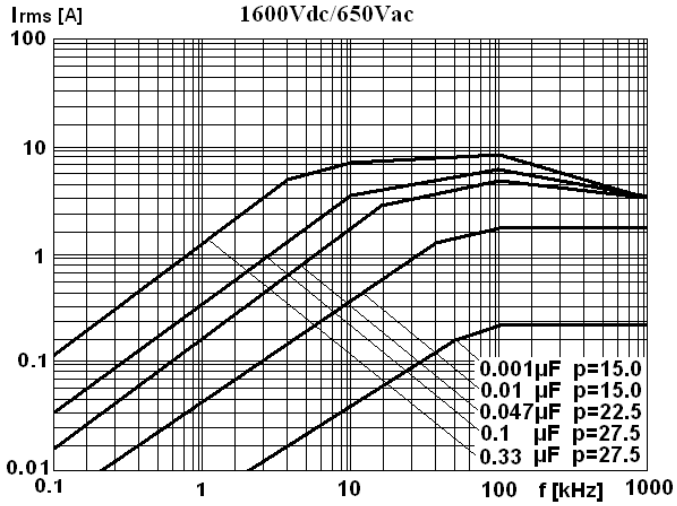
■ MAX. CURRENT(Ir.m.s) VERSUS FREQUENCY

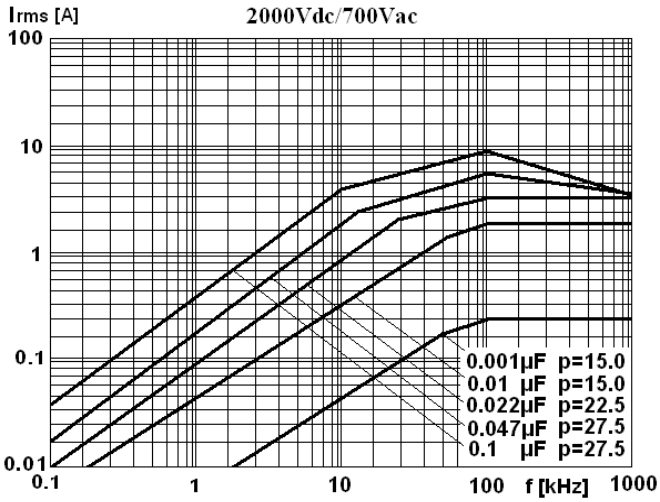












Note: sinusoidal wave-form,environment temperature≤85℃,internal temperature rise △T=10℃, p (pitch) in mm.

■ Test Method And Performance

No.	Item		Performance	Test method(IEC 60384-16)
1	Solderability		Good quality of tinning	Solder temperature: 245℃ ±5℃ Immersion time: 2.0s±0.5s
2	Initial measurement		Capacitance Tgδ: 1kHz, C>1.0μF 10kHz, C≤1.0μF	
	Terminal strength (straight lead)		There shall be no visible damage	Tense: 0.50<d≤0.80, 10N 0.80<d≤1.25, 20N Bend: 0.50<d≤0.80, 5N 0.80<d≤1.25, 10N The terminals shall be bent 2 times in each direction
	Resistance to solder heat		There shall be no visible damage, legible marking	Solder temperature:260℃±5℃ Immersion time: 10s±1s
	Final measurement		ΔC/C ≤±2%(relative to the initial value) Increase of tgδ: ≤0.002 (10kHz,C≤1.0μF) ≤0.002 (1kHz, C>1.0μF)	
3	Initial measurement		Capacitance Tgδ(10kHz)	
	Rapid change of temperature		There shall be no evidence of deterioration.	θ_A=-40℃, θ_B =+105℃ 5 cycles Duration: t=30min
	Vibration(straight lead)		There shall be no evidence of deterioration.	Amplitude 0.75mm or acceleration 98m/s^2 (whichever is the smaller severity), f: 10Hz to 500Hz.Three directions, 2h for each direction, total 6h.
	Bump(straight lead)		There shall be no evidence of deterioration.	4 000 times, Acceleration: 390m/s^2,Pulse duration, 6ms
	Final measurement		There shall be no visible damage ΔC/C≤±2%(relative to the initial value) Increase of tgδ: ≤0.002 (10kHz) IR: ≥ 50% of the rated value	
4	Climate sequence	Initial measurement	Capacitance Tgδ: 10kHz	
		Dry heat		+105℃, 16h
		Damp heat, Cyclic		Test Db, Severity: b, the first cycle
		Cold		-40℃, 2h
		Low air pressure	There shall be no permanent breakdown, flashover or other harmful deformation when applying U_R at the last 1 minute.	15℃~35℃, 8.5kPa, 1h
		Damp heat, cyclic other	Applying U_R for 1 minute after 15 minutes the test finished .	Test Db, Severity b, the other cycles,
		Final measurement	There shall be no visible damage, legible marking ΔC/C ≤±3%(relative to the initial value) Increase of tgδ:≤0.003(10kHz) I.R.: ≥ 50% of the rated value	

No.	Item	Performance	Test method(IEC 60384-16)
5	Damp heat steady state	There shall be no visible damage, legible marking ΔC/C ≤±5%(relative to the initial value) Increase of tgδ:≤0.002 (10kHz) I.R.: ≥ 50% of the rated value	Temperature:40℃ ±2℃ Humidity: 93^{+2}_{-3} %RH Duration: 56 days
6	Endurance	There shall be no visible damage, legible marking ΔC/C ≤±5%(relative to the initial value) Increase of tgδ:≤0.0015 (10kHz) I.R.: ≥ 50% of the rated value	Temperature: +85℃ Voltage: 1.25×U_R(50Hz) Duration: 1 000h
7	Temperature characteristic	Measuring capacitance at test point b, d, f: Characteristic at lower category temperature -40℃: $0 \le (C_b-C_d)/C_d \le +3\%$ Characteristic at upper category temperature +105℃: $-4\% \le (C_f-C_d)/C_d \le 0$ I.R. (test at point f): IR≥2500MΩ $C_R \leqslant 0.33\mu F$ IR≥750s $C_R > 0.33\mu F$	Static method: The Capacitors should be kept at the following temperature in turn: a(20±2) ℃, b(–40±3) ℃, d(20±2) ℃, f(105±2) ℃, g(20±2) ℃
8	Charging and discharging	ΔC/C ≤±5%(relative to the initial value) increase of tgδ:≤0.005 (10kHz) I.R.: ≥ 50% of the rated value	Times: 10 000 Duration of charging: 0.5s Duration of discharging: 0.5s Charging voltage: rated voltage U_R Charging resistance: 220/C_R(Ω) Discharging resistance: $U_R \div C_R \div$ dV/dt(Ω) C_R: rated capacitance (μF) dV/dt value: see page9 table
9	Passive flammability	The flaming time of each capacitor shall not go beyond 30s after it is taken apart from the flame. Drop of each capacitor caused by flame shall not fire the tissue below	IEC 695-2-2 Needle flame test The category of passive flammability: C , Expose time in flame : 1 time Capacitor volume Exposing time V≤250mm^3 5s 250mm^3<V≤500mm^3 10s 500mm^3<V≤1750mm^3 20s V>1750mm^3 30s

■ Marking (For example)

◁▷ 102J 1000

P≤10mm

◁▷ MMKP82
103J 1000

P>10mm

Marking Introduction:

◁▷	Brand	MMKP82	Type
1000	Rated voltage	102 103	Rated capacitance
J	Tolerance	–	–

■ Taping specification for box-type capacitors

▲ Outline Drawing

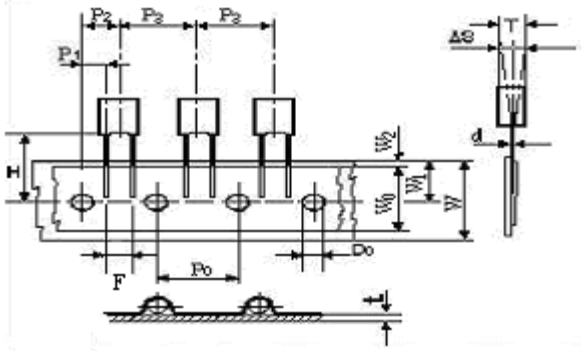


Fig.1 P=5.0、7.5mm

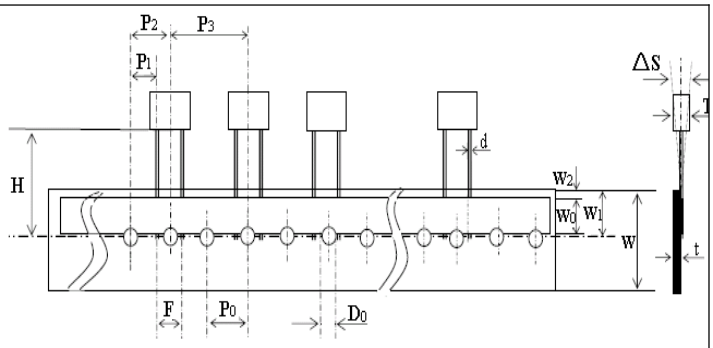


Fig.2 P=10.0、15.0mm

▲ Taping Dimensions(mm)

Technology index title	Code	Dimensions				
		P=5.0	P=7.5	P=10.0	P=15.0	Tolerance
Taping type	—	Fig 1	Fig 1	Fig2	Fig 2	——
Part number Digit12-15	Ammo-pack	A201	A301	A405	A605	
Taping pitch	P_3	12.7	12.7	25.4	25.4	±1.0
Feed hole pitch	P_0	12.7	12.7	12.7	12.7	±0.2
Center of wire	P_1	3.85	2.6	7.7	5.2	±0.7
Center of body	P_2	6.35	6.35	12.7	12.7	±1.3
Pitch of taping wire	F**	5.0	7.5	10.0	15.0	+0.6 -0.1
Component alignment	△S	0	0	0	0	±2.0
Height of component from tape center	H***	18.5	18.5	18.5	18.5	±0.5
Carrier tape width	W	18.0	18.0	18.0	18.0	+1.0 -0.5
Hold down tape width	W_0	6min	10min	10min	10min	——
Hole position	W_1	9.0	9.0	9.0	9.0	±0.5
Hold down tape sition	W_2	3max	3max	3max	3max	——
Feed hole dia.	D_0	4.0	4.0	4.0	4.0	±0.2
Tape thickness	t	0.7	0.7	0.7	0.9	±0.2

Note: * P_0=15mm is also available;
**F can be other lead spacing;
***H=16.5mm is available;

■ Soldering suggestions

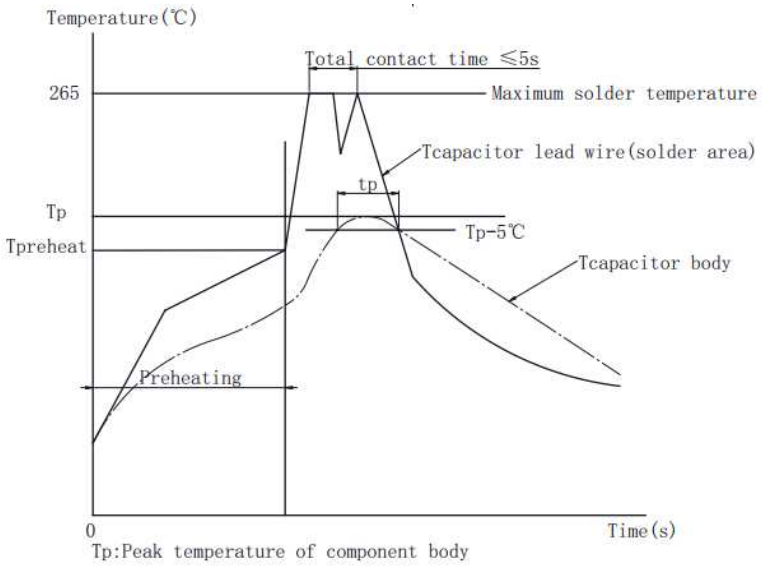
▲ Manual soldering

Max. temperature: 350℃, time: 3s

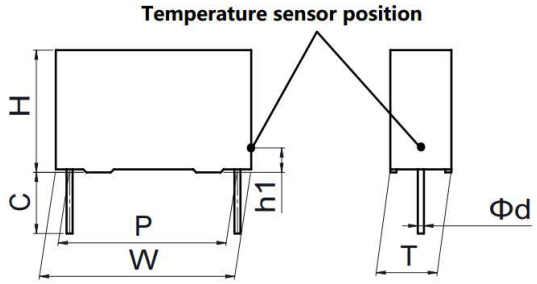
▲ Wave soldering

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.

The typical soldering profile is as below:



▲ 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.

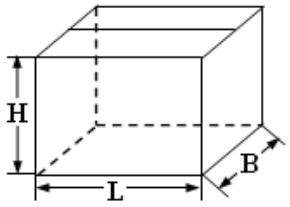


Note: If re-working or dipping twice is necessary, it should be done after the capacitor returns to the normal temperature.

Temperature sensor position (Tcapacitor body)	The capacitor body surface of lead side, capacitor height position from PCB: h1=2～3mm		
Maximum capacitor body temperature Tp(℃)	OPP film P≤15mm	OPP film P>15mm	PET film
	115	120	125
Maximum capacitor lead wire temperature (℃)	265	265	265
Maximum capacitor body heating time tp=Tp-5℃	30s		

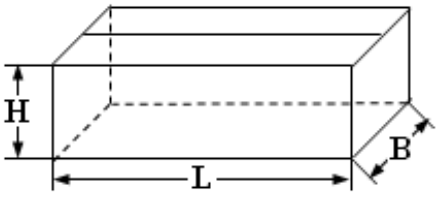
■ Packing box sizes(mm)(example)

1. Out packing box for bulk



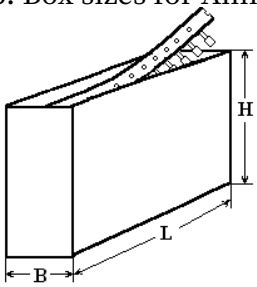
L:375±5
B:375±5
H:265±5

2. Inner packing box for bulk



L:355±3
B:175±3
H:118±3

3. Box sizes for Ammo-pack



L:350±3
B:50±3
H:260±3

■ Storage conditions

▲ It must be noted that the solderability of the terminals may be deteriorated when stored in an atmosphere filled with moisture, dust, or a reactive oxidizing gas.(hydrogen chloride, hydrogen sulfide, sulfuric acid,etc.)

▲ It shouldn’t be located in particularly high temperature and high humidity, it must submit to the following conditions(unchanging primal package):

Temperature：-40℃ to 35℃

Humidity：Average per year≤70%RH;

For 30 full days randomly distributed throughout the year≤80%RH

Storage time for tinned lead wire:（from the date marked on the capacitor’s body or the label glued to the package）:

Bulk(packed with plastic bag): ≤24 months ;

Taping and line up: ≤12 months