



SPECIFICATION FOR APPROVAL

File No.: Q/FRK 0.GS.E.C32-C14

Product Name	Metallized polypropylene film capacitor (Box-type)
Product Type	MKP21
Product Code	C323A334KB1C000
Customer	
Customer Code	
Issue Date	2023-05

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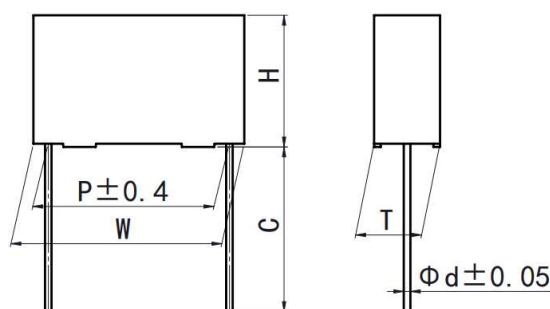


Version history

Current version	Date	Author	Change description

Metallized polypropylene film capacitor (Box-type)

■ Outline Drawing



$W \pm 0.4, H \pm 0.4, T \pm 0.4$

■ Features

- Metallized polypropylene structure
- Low loss at high frequency
- Small inherent temperature rise
- Plastic case (UL94 V-0) , Epoxy resin sealing

■ Typical application

- Widely used in high frequency, DC, AC and pulse circuits
- S-correction circuits for TV sets and monitors

■ Specifications

Reference Standard	GB/T 10190 (IEC 60384-16)						
Climatic Category	55/105/56						
Rated temperature	85°C						
Operating temperature	-55°C~105°C (+85°C to +105°C: decreasing factor 1.25% per °C for U_R)						
Rated Voltage	160Vdc(90Vac); 250Vdc(160Vac); 400Vdc(220Vac); 630Vdc(250Vac); 1 000Vdc(400Vac); 1 600Vdc(600Vac); 2 000Vdc(700Vac)						
Capacitance Range	0.00056~15.0μF						
Capacitance Tolerance	±2% (G), ±3% (H), ±5% (J), ±10% (K), ±20% (M)						
Voltage Proof	1.6 U_R (5s)						
Dissipation Factor	$\leq 10 \times 10^{-4}$ (20°C, 1kHz)						
Insulation Resistance	$R \geq 100\ 000\ \Omega$, $C_N \leq 0.33\ \mu F$ $RC_N \geq 30\ 000s$, $C_N > 0.33\ \mu F$ (20°C, 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=5.0	P=7.5	P=10.0	P=15.0	P=22.5	P=27.5
	160	110	310	190	110	65	55
	250	270	660	560	310	130	110
	400	440	900	780	600	300	130
	630	550	1500	1200	900	400	200
	1 000	--	--	2200	2 000	800	--
	1 600	--	--	--	4 500	1 800	--
2 000	--	--	--	9 500	4 500	--	

■ 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	3	2												

Digit 1 to 3 Series code

C32=MKP21

Digit 4 to 5 D.C. rated voltage

2C=160V 2E=250V 2G=400V

2J=630V 3A=1000V 3C=1600V

3D=2000V

Digit 6 to 8 Rated capacitance value

For example : 103=10×10³ pF= 0.01μF

Digit 9 Capacitance tolerance

G=±2%, H=±3%, J=±5%

K=±10%, M=±20%

Digit 10 Pitch

2=5.0mm 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

Table 1 Lead form and packaging code

Digit 12		Digit 13		Digit 14		Digit 15	
code	explanation	code	explanation	code	explanation	code	explanation
A	ammo-pack	2	F=5.0mm	0	straight	1	each cap. among two consecutive holes P3=12.7mm,H=18.5mm (For pitch=5.0/7.5mm)
		3	F=7.5mm				
		4	F=10.0mm				
		6	F=15.0mm				
C	straight lead “C” in the figure above	co	explanation	0		0	Length tolerance ±0.5mm Or standard length
		00	standard lead length (18mm~26mm)				
		45	lead length 4.5mm				

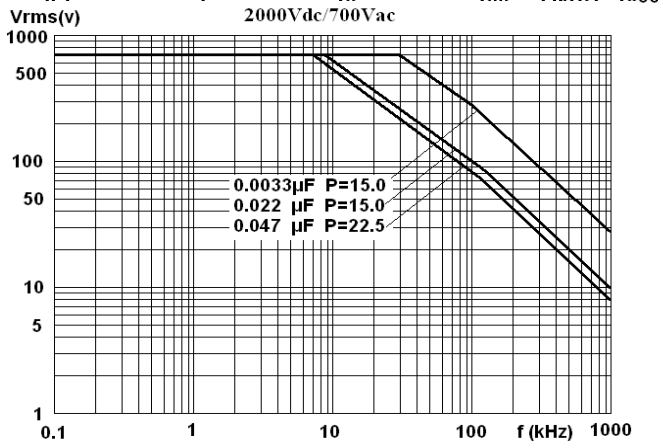
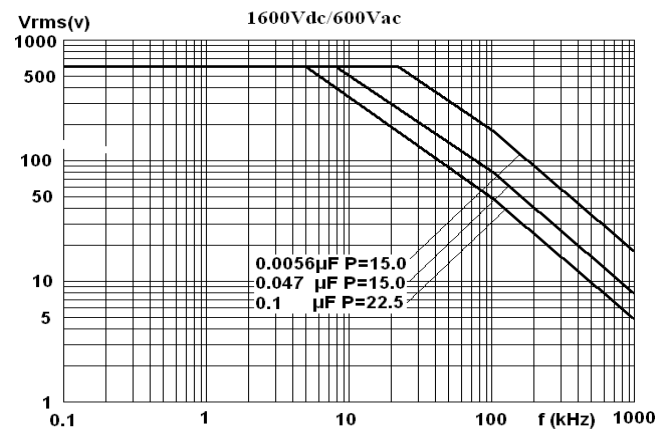
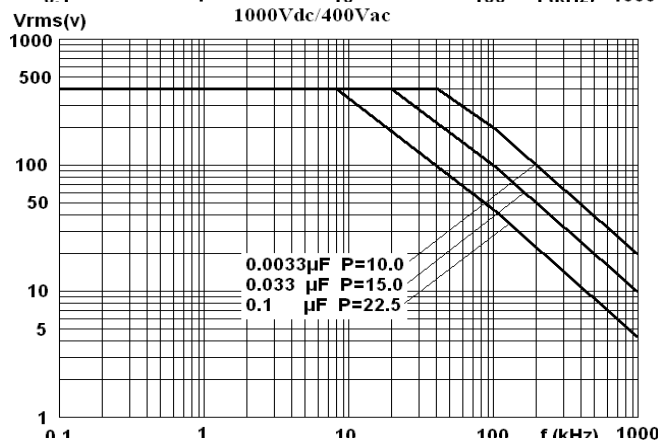
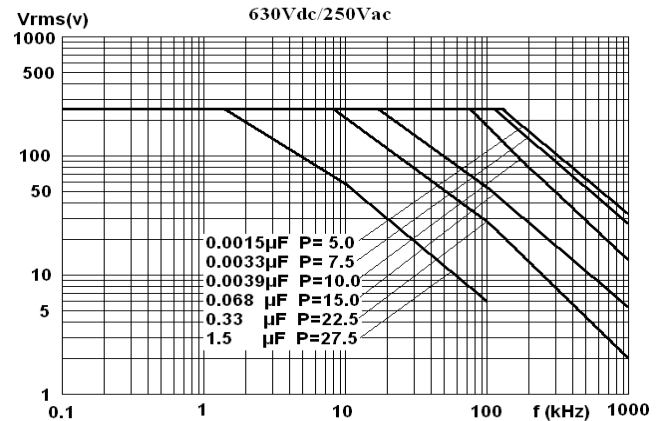
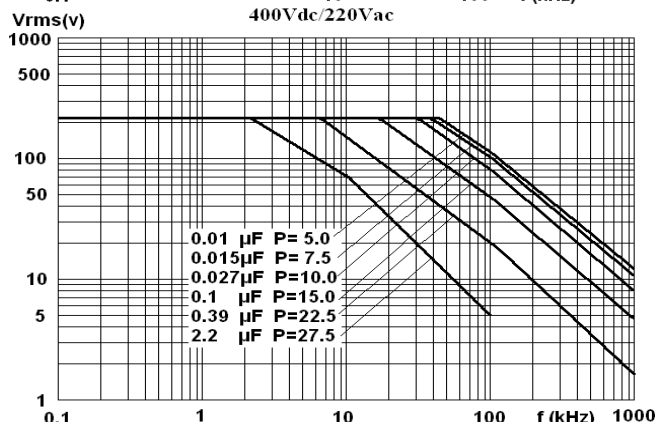
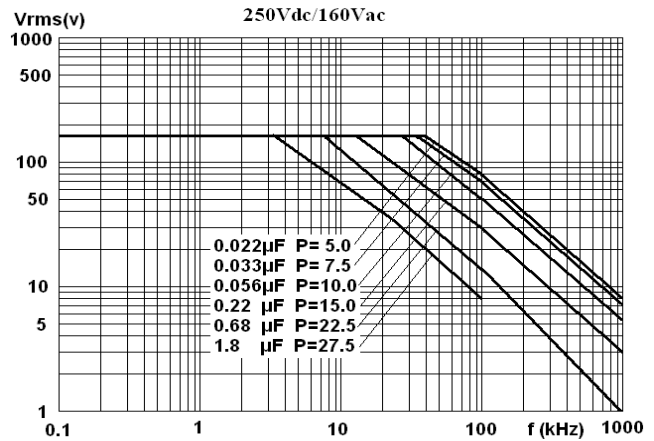
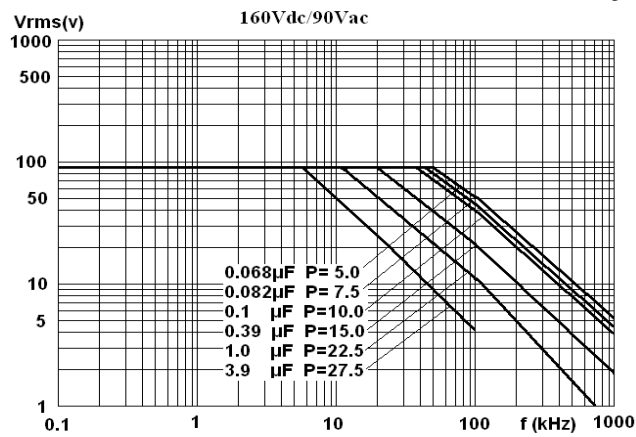
Note: Recommend short lead due to long lead could deform easily.

■ Dimensions (mm)

1 000Vdc(400Vac)						
C_N (μF)	W	H	T	P	d	Part number
0.33	32.0	22.0	13.0	27.5	0.8	C323A334JB1C000

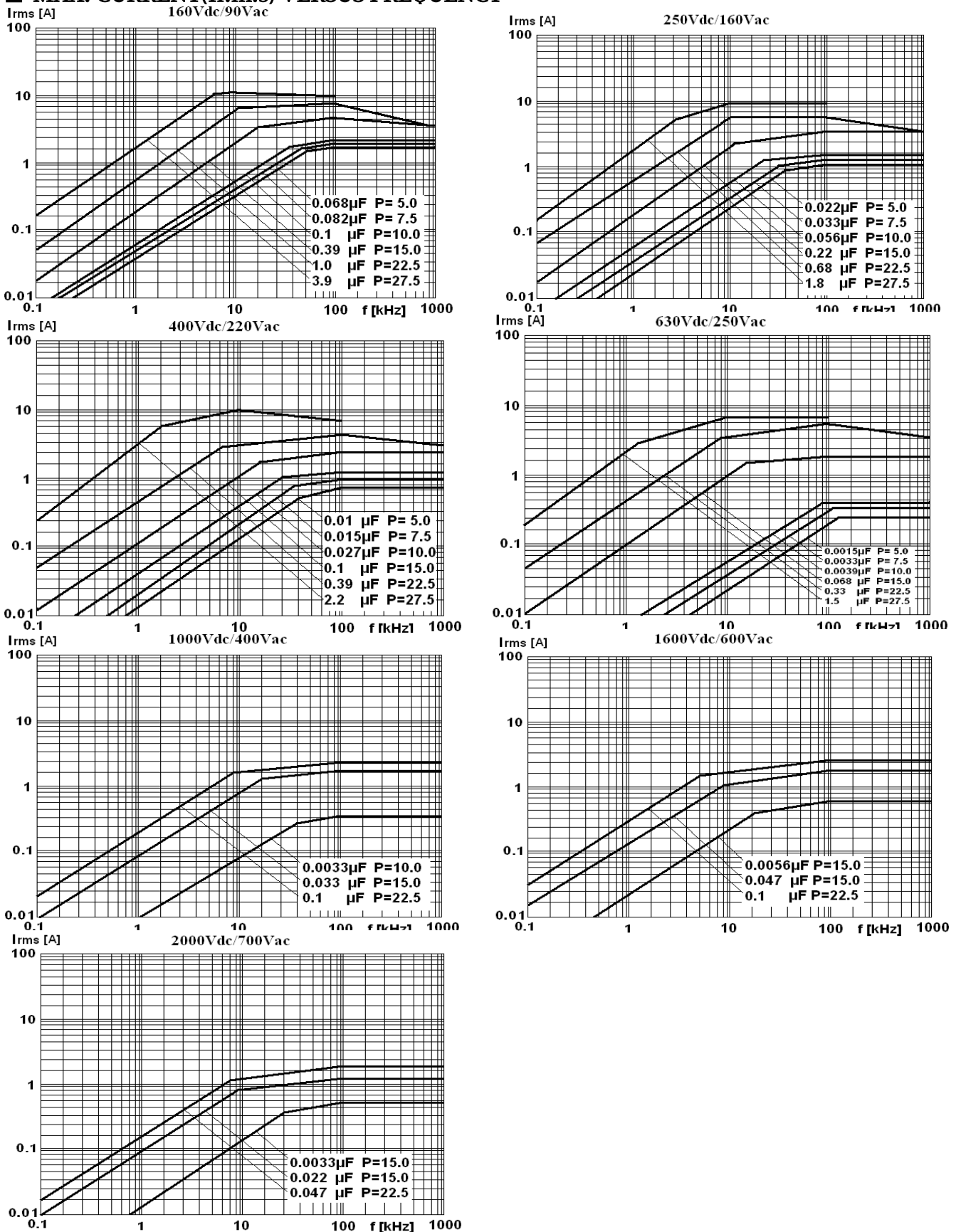
- Note:
1. “-” =capacitance tolerance code, M= $\pm 20\%$,K= $\pm 10\%$,J= $\pm 5\%$, H= $\pm 3\%$,G= $\pm 2\%$
 2. “****” =lead form and packaging code (refer to table 1).

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



Note: sinusoidal wave-form, environment temperature $\leq 85^{\circ}\text{C}$, internal temperature rise $\Delta T=10^{\circ}\text{C}$, p (pitch) in mm..

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



Note: sinusoidal wave-form, environment temperature $\leq 85^{\circ}\text{C}$, internal temperature rise $\Delta T=10^{\circ}\text{C}$, 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°C±5°C 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	Tension: 0.6≤φd≤0.8mm, 10N φd=1.0mm, 20N Bend: 0.6≤φd≤0.8mm, 5N φd=1.0mm, 10N The terminals shall be bent 2 times in each direction.
	Resistance to solder heat	There shall be no visible damage	Solder temperature:260°C±5°C Immersion time: 10s±1s
	Final measurement	Δ C/C ≤ ± 3 % (relative to the initial value) Increase of tgδ: ≤0.004 (10kHz,C≤1.0μF) ≤0.004 (1kHz,C>1.0μF)	
3	Initial measurement	Capacitance Tgδ:1kHz, C>1.0μF 10kHz, C≤1.0μF	
	Rapid change of temperature	There shall be no evidence of deterioration.	θ _A =-55°C, θ _B =+105°C 5 cycles, Duration: t=30min
3	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	Δ C/C ≤ ± 3 % (relative to the initial value) Increase of tgδ: ≤0.004 (10kHz, C≤1.0μF) ≤0.004 (1kHz, C>1.0μF) IR: ≥ 50% of the rated value	
4	climate sequence	Initial measurement	Capacitance Tgδ:1kHz, C>1.0μF 10kHz, C≤1.0μF
		Dry heat	+105°C, 16h
		Damp heat, Cyclic	Test Db, Severity: b, the first cycle
		Cold	-55°C, 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°C~35°C, 8.5kPa, 1h,
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No.	Item		Performance	Test method(IEC 60384-16)
4	climate sequence (continue)	Damp heat, cyclic other		Test Db, Severity b, the other cycles, Applying U_R for 1 minute after the test finished.
		Final measurement	There shall be no evidence of deterioration and the marking shall be legible. $\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta$: ≤ 0.005 (10kHz, $C \leq 1.0\mu\text{F}$) ≤ 0.005 (1kHz, $C > 1.0\mu\text{F}$) IR: $\geq 50\%$ of the rated value	
5	Damp heat steady state		There shall be no evidence of deterioration and the marking shall be legible. $\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta \leq 0.002$ (1kHz) IR: $\geq 50\%$ of the rated value	Temperature: 40°C $\pm 2^\circ\text{C}$ Humidity: $93 \pm 3\%$ RH Duration: 56 days
6	Endurance		$\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta$: ≤ 0.004 (10kHz, $C \leq 1.0\mu\text{F}$) ≤ 0.004 (1kHz, $C > 1.0\mu\text{F}$) IR: $\geq 50\%$ of the rated value	Temperature: +85°C Voltage: $1.25 \times U_R$ Duration: 1 000h
7	Temperature characteristic		Measuring capacitance at test point b, d, f: Characteristic at lower category temperature -40°C: $0 \leq (C_b - C_d)/C_d \leq +3\%$ Characteristic at upper category temperature +85°C: $-3.25\% \leq (C_f - C_d)/C_d \leq 0$	Static method: The capacitors should be kept at the following temperature in turn: a. (+20 ± 2) °C, b. (-40 ± 2) °C, d. (20 ± 2) °C, f. (+85 ± 2) °C, g. (+20 ± 2) °C
8	Charging and discharging		$\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta$: ≤ 0.005 (10kHz, $C \leq 1.0\mu\text{F}$) ≤ 0.005 (1kHz, $C > 1.0\mu\text{F}$) IR: $\geq 50\%$ 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: $220/C_N$ (Ω) Discharging resistance: $U_R \div C_N \div dv/dt$ (Ω) C_N : rated capacitance (μF) dv/dt value: see P2

■ Marking (For example)

103J 630
P=5mm

 103J 630
P=7.5mm&P=10mm

 MKP21
104J 630
P ≥ 15 mm



Marking Introduction:

	Brand	MKP21	Type
630	Rated voltage	103/104	Rated capacitance
J	Tolerance	-	-

■ Taping specification for box-type capacitors

▲ Outline Drawing

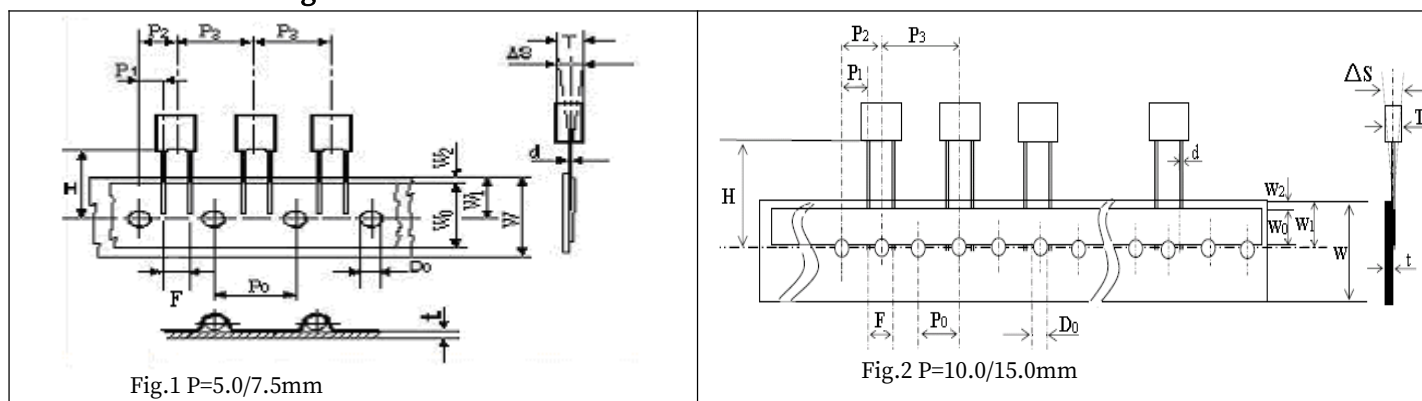


Fig.1 P=5.0/7.5mm

Fig.2 P=10.0/15.0mm

▲ Taping Dimensions(mm)

Technology index title	Code	Dimensions				Tolerance
		P=5.0	P=7.5	P=10.0	P=15.0	
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	± 0.3
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	ΔS	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 position	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	0.7	± 0.2

Note: * $P_0=15\text{mm}$ is also available;
 **F can be other lead spacing;
 ***H=16.5mm is available;

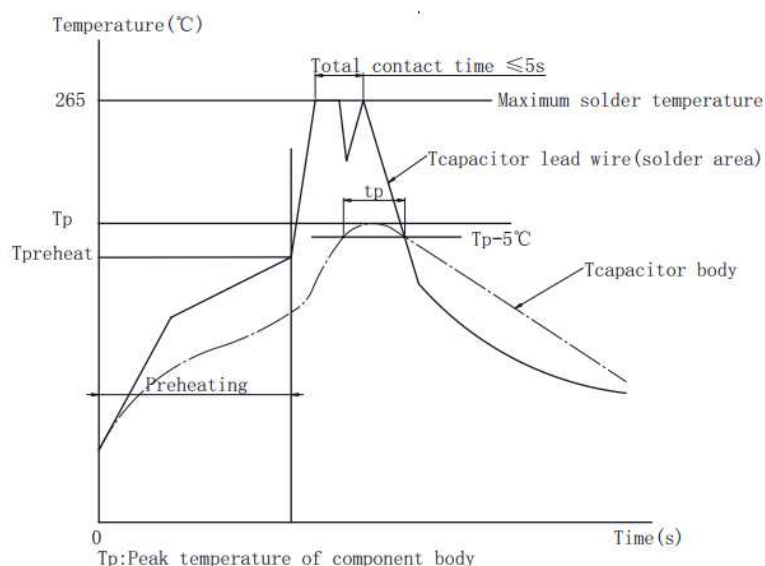
■ Soldering suggestions
▲ Manual soldering

Max. temperature: 350°C, time: 3s

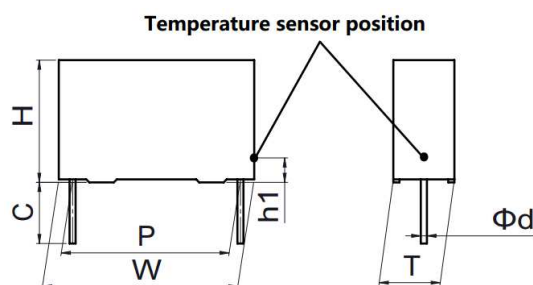
▲ Wave soldering

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.

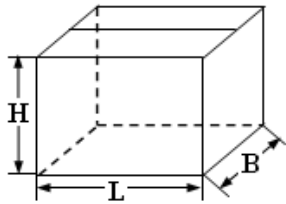


Note: If re-working or dipping twice is necessary, it should be done after the capacitor returns to the normal temperature.

Temperature sensor position ($T_{capacitor\ body}$)	The capacitor body surface of lead side, capacitor height position from PCB: $h_1=2\sim 3\text{mm}$		
Maximum capacitor body temperature $T_p(^{\circ}\text{C})$	OPP film $P\leq 15\text{mm}$	OPP film $P>15\text{mm}$	PET film
	115	120	125
Maximum capacitor lead wire temperature ($^{\circ}\text{C}$)	265	265	265
Maximum capacitor body heating time $t_p=T_p-5^{\circ}\text{C}$	30s		

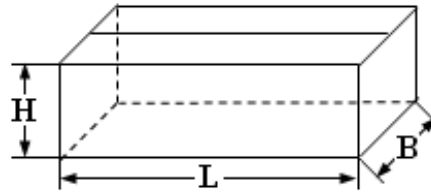
■ Packing box sizes(mm)(example)

1. Out packing box for bulk



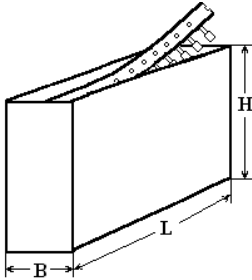
L:375±5
B:375±5
H:265±5

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 °C to 35 °C

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