



SPECIFICATION FOR APPROVAL

File No.: Q/FRK 0.GS.E023-V03

Product Name: Box-type metallized polyester film capacitor

Product Type: CL23

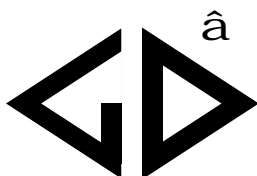
Product Code: _____

Customer: _____

Customer Code: _____

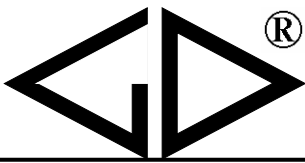
Issue Date: Apr. 2007

Xiamen Faratronic Co. Ltd.			Approved by Customer
Drafted	Checked	Approved	
Wang Yan	Zhang Shi Mei	Jiang Guo Ping	



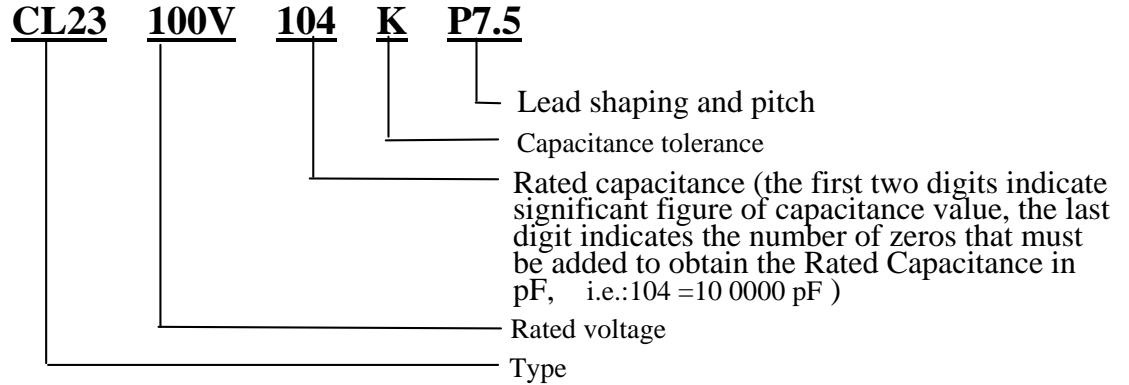
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® Box-type Metallized Polyester Film Capacitor (Type CL23)

Purchase Specification



1. Capacitance tolerance

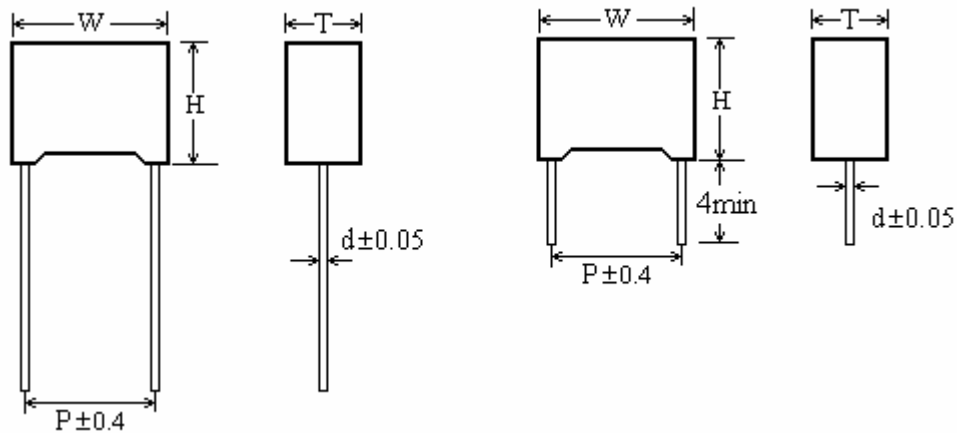
Tolerance	±5%	±10%	±20%
Code	J	K	M

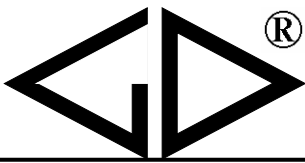
2. Lead form

Straight lead(Code: P)

Code	P7.5	P10.0	P15.0	P22.5	P27.5
Lead pitch	7.5mm	10.0mm	15.0mm	22.5mm	27.5mm
Note	Pitch in common use				

Product Outline Drawing





Box-type Metallized Polyester Film Capacitor (Type CL23)

1 Feature:

The capacitor is wound with polyester film as dielectric and the aluminum on the film which evaporated on the vacuum as electrode. Radical lead, the capacitor is enveloped in a plastic box with insulation material filled. It is excellent of electric property and suitable for D.C. , pulsatile and impulse circuits of electronic equipment.

2 Reference standards

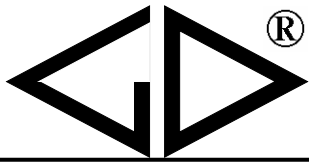
GB 2693 IEC 60384-1	Fixed capacitor for use in electronic equipment Part 1: General specification
GB 7332 IEC 60384-2	Fixed capacitor for use in electronic equipment Part 2: Sectional specification: Fixed metallized polyethylene- terephthalate film dielectric D.C. capacitors
Q/FRK0.463.026	Fixed capacitor for use in electronic equipment Sectional specification: Fixed box-type metallized polyethylene-terephthalate dielectric D.C. capacitors
Q/FRK0.463.027	Detail specification for electronic components: Fixed box-type metallized polyester film dielectric D.C. capacitors. Type CL23 Assessment level E
GB 2828	Sampling procedures and tables for lot-by-lot inspection by attributes
GB 2829	Sampling procedures and tables for periodic inspection by attributes
IEC 410	Sampling plans and procedures for inspection by attributes

3 Dimension: refer to table 1

4 Specification: refer to table 2

5 Quality Ensuring test (before shipment):

Inspection item (each batch)	Inspection level (GB 2828)	
	IL	AQL
1.Appearance inspection	S-4	2.5%
2.Dimensions		
1.Capacitance	II	1.0%
2.Tangent of the loss angle		
3.Dielectric strength		
4.Insulation resistance		
1.Solderability	S-3	2.5%



® Box-type Metallized Polyester Film Capacitor (Type CL23)

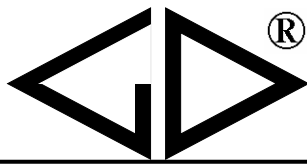
Table 1 Dimension

P=7.5

Unit:mm

(Capacitor Thickness)T	≤3.5	>3.5
(Lead Wire Dia.)d±0.05	0.5	0.6
Dimension Tolerance (W, H, T)	W+0.4/-0.7, H±0.4, T±0.4	

C (uF)	63VDC				100VDC				250VDC				400VDC				630VDC			
	W	H	T	P	W	H	T	P	W	H	T	P	W	H	T	P	W	H	T	P
0.0033																	10.5	8.5	3.5	7.5
0.0047																	10.5	8.5	3.5	7.5
0.0068																	10.5	8.5	3.5	7.5
0.010																	10.5	9.0	4.0	7.5
0.015													10.5	8.5	3.5	7.5	10.5	11.0	5.0	7.5
0.022													10.5	8.5	3.5	7.5	10.5	12.0	6.0	7.5
0.033													10.5	9.0	4.0	7.5				
0.047									10.5	8.5	3.5	7.5	10.5	11.0	5.0	7.5				
0.068									10.5	8.5	3.5	7.5	10.5	11.0	5.0	7.5				
0.10					10.5	8.5	3.5	7.5	10.5	9.0	4.0	7.5	10.5	12.0	6.0	7.5				
0.15					10.5	8.5	3.5	7.5	10.5	11.0	5.0	7.5								
0.22	10.5	8.5	3.5	7.5	10.5	9.0	4.0	7.5	10.5	12.0	6.0	7.5								
0.33	10.5	8.5	3.5	7.5	10.5	11.0	5.0	7.5												
0.47	10.5	9.0	4.0	7.5	10.5	12.0	6.0	7.5												
0.68	10.5	11.0	5.0	7.5																
1.0	10.5	12.0	6.0	7.5																



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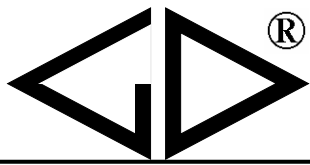
Table 1(Continued) Dimension

P=10.0, 15.0

Unit:mm

(Lead Pitch)P	10.0	15.0
(Lead Wire Dia.)d±0.05	0.6	0.8
Dimension Tolerance (W, H, T)	W+0.4/-0.7, H±0.4, T±0.4	

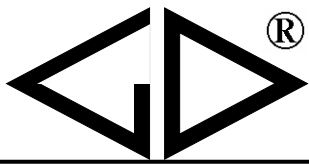
C (uF)	63VDC				100VDC				160VDC				250VDC				400VDC				630VDC				
	W	H	T	P	W	H	T	P	W	H	T	P	W	H	T	P	W	H	T	P	W	H	T	P	
0.0047																					13.0	9.0	4.0	10.0	
0.0068																						13.0	9.0	4.0	10.0
0.010																						13.0	9.0	4.0	10.0
0.015																13.0	9.0	4.0	10.0		13.0	11.0	5.0	10.0	
0.022																13.0	9.0	4.0	10.0		13.0	12.0	6.0	10.0	
0.033													13.0	9.0	4.0	10.0	13.0	11.0	5.0	10.0	18.0	11.0	5.0	15.0	
0.047													13.0	9.0	4.0	10.0	18.0	11.0	5.0	15.0	18.0	12.0	6.0	15.0	
0.068													13.0	9.0	4.0	10.0	18.0	11.0	5.0	15.0	18.0	13.5	7.5	15.0	
0.10					13.0	9.0	4.0	10.0	13.0	9.0	4.0	10.0	18.0	11.0	5.0	15.0	18.0	12.0	6.0	15.0					
0.15					13.0	9.0	4.0	10.0	13.0	11.0	5.0	10.0	18.0	11.0	5.0	15.0	18.0	13.5	7.5	15.0					
0.22	13.0	9.0	4.0	10.0	13.0	11.0	5.0	10.0	13.0	11.0	5.0	10.0	18.0	11.0	5.0	15.0									
0.33	13.0	9.0	4.0	10.0	18.0	11.0	5.0	15.0	18.0	11.0	5.0	15.0	18.0	12.0	6.0	15.0									
0.47	13.0	11.0	5.0	10.0	18.0	11.0	5.0	15.0	18.0	12.0	6.0	15.0													
0.68	18.0	11.0	5.0	15.0	18.0	12.0	6.0	15.0	18.0	13.5	7.5	15.0													
1.0	18.0	11.0	5.0	15.0	18.0	13.5	7.5	15.0	18.0	14.5	8.5	15.0													
1.5	18.0	12.0	6.0	15.0																					
2.2	18.0	13.5	7.5	15.0																					



® Box-type Metallized Polyester Film Capacitor (Type CL23)

Table 2 Specification

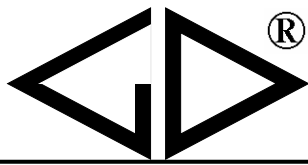
NO.	Item	Specification	Testing(GB 7332(IEC 60384-2))
1	Climatic Category	55/100/56	
	Rated Temperature	85°C	
	Category temperature range	-55°C ~+105°C (+85°C~+105°C, decreasing factor 1.25% per °C for V _R (DC))	
2	Rated voltage U _R	50,63,100,160,250,400,630(VDC)	
3	Capacitance	0.0033μF~2.2μF	
4	Capacitance tolerance	J(±5%), K(±10%), M(±20%)	Ref. item 4.2.2 1kHz, 3%U _R (V _{rms})max.
5	Tangent of the loss angle	tgδ≤0.01(1kHz) tgδ≤0.015(10kHz) tgδ≤0.030(100kHz, C≤0.1μF)	Ref. item 4.2.3 ≤3%U _R (V _{rms}) or 1 V _{rms} (whichever is the minor) 1kHz or 10kHz or 100kHz
6	Dielectric strength	There shall be no breakdown or flashover.	Ref. item 4.2.1 1.6U _R , 5s
7	Insulation resistance	U _R ≤100V, C≤0.33μF, ≥15 000MΩ C>0.33μF, ≥3 000s U _R >100V, C≤0.33μF, ≥30 000MΩ C>0.33μF, ≥10 000s	Ref. item 4.2.4 U _R ≤100V, Charging voltage 10V U _R >100V, Charging voltage 100V 20°C, measuring after applying voltage for 1 minute
8	Solderability	Terminals shall be examined under 8× to 12× linear magnifier and oblique light for evidence of good tinning. Solder shall encircle the terminals over the area tested and 95% of the soldered surfaces shall be covered with new solder at least. Pin holes, voids, unwetted or dewetted shall not be concentrated in one area.	Ref. item 4.5 Solder bath method Ta, method 1 Solder temperature: 245°C ±5°C Immersion time: 2.0s±0.5s
9	Initial measurement	Capacitance Tgδ: (same as No. 5)	
	Terminal strength	There shall be no evidence of deterioration.	Ref. item 4.3 Tension: 5N(Φd=0.5), 10N(Φd≥0.6) Bend: 2.5N(Φd=0.5), 5N(Φd≥0.6) The terminals shall be bent 2 times in each direction.
	Resistance to soldering heat	There shall be no evidence of deterioration and the marking shall be legible.	Ref. item 4.4 Solder bath method Tb, method 1A 260°C ±5°C, 10s±1s
	Final measurement	ΔC/C ≤±2%(relative to the initial value) Increase of tgδ: ≤0.003 (C≤1.0μF) ≤0.002 (C>1.0μF)	



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Table 2(continued) Specification

NO.	Item	Specification	Testing(GB 7332(IEC 60384-2))
10	Initial measurement	Capacitance Tgδ: (same as No. 5)	
	Rapid change of temperature	There shall be no evidence of deterioration.	Ref. item 4.6 $\theta_A = -55^\circ\text{C}$, $\theta_B = +100^\circ\text{C}$ 5 cycles, Duration: t=30min
	Vibration	There shall be no evidence of deterioration.	Ref. item 4.7 Amplitude 0.75mm or acceleration 98 m/s^2 (whichever is the smaller severity), f: 10Hz~500Hz. Three directions, 2h for each direction, total 6h.
	Bump	There shall be no evidence of deterioration.	Ref. item 4.8 4 000 times, Acceleration: 390 m/s^2 , Pulse duration: 6ms
	Final measurement	$\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of tgδ: ≤ 0.003 ($C \leq 1.0\mu\text{F}$) ≤ 0.002 ($C > 1.0\mu\text{F}$) IR: $\geq 50\%$ of the rated value (No.7)	
11	climate sequence	Initial measurement	Capacitance Tgδ: (same as No. 5)
		Dry heat	Ref. item 4.10.2 $+100^\circ\text{C}$, 16h
		Damp heat, cyclic	Ref. item 4.10.3 Test Db, Severity b, the first cycle
		Cold	Ref. item 4.10.4 -55°C , 2h
		Low air pressure	There shall be no permanent breakdown, flashover or other harmful deformation when applying U_R at the last 5 minute. Ref. item 4.10.5 $15^\circ\text{C} \sim 35^\circ\text{C}$, 8.5kPa, 1h
		Damp heat, cyclic	Applying U_R for 1 minute after the test finished. Ref. item 4.10.6 Test Db, Severity b, the other cycles
		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 tgδ: ≤ 0.005 ($C \leq 1.0\mu\text{F}$) ≤ 0.003 ($C > 1.0\mu\text{F}$) IR: $\geq 50\%$ of the rated value (NO.7)



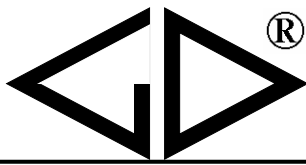
® Box-type Metallized Polyester Film Capacitor (Type CL23)

Table 2(continued) Specification

NO.	Item	Specification	Testing(GB 7332(IEC 60384-2))
12	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 $\text{tg}\delta$ (same as No. 5) ≤ 0.005 IR: $\geq 50\%$ of the rated value(NO.7)	Ref. item 4.11 Temperature: $40^\circ\text{C} \pm 2^\circ\text{C}$ Humidity: $93_{-3}^{+2}\%$ RH Duration: 56 days
13	Endurance	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 $\text{tg}\delta$: ≤ 0.003 ($C \leq 1.0\mu\text{F}$) ≤ 0.002 ($C > 1.0\mu\text{F}$) IR: $\geq 50\%$ of the rated value(NO.7)	Ref. item 4.12 2 000h $+85^\circ\text{C}, 1.25 \times U_R$ $+100^\circ\text{C}, 1.25 \times U_c$ ($U_c = 0.8U_R$)
14	Temperature characteristic	Measuring capacitance at test point b, d, f: Characteristic at lower category temperature -55°C : $-10\% \leq (C_b - C_d)/C_d \leq 0\%$ Characteristic at upper category temperature $+100^\circ\text{C}$: $0\% \leq (C_f - C_d)/C_d \leq +10\%$ I.R. (test at point f): $U_R \leq 100\text{V}$: $\geq 75 \text{ M}\Omega$ ($C \leq 0.33\mu\text{F}$) $\geq 25\text{s}$ ($C > 0.33\mu\text{F}$) $U_R > 100\text{V}$: $\geq 150 \text{ M}\Omega$ ($C \leq 0.33\mu\text{F}$) $\geq 50\text{s}$ ($C > 0.33\mu\text{F}$)	Ref. Item 4.2.6 Static method: The capacitors should be kept at the following temperature in turn: a. $(+20 \pm 2)^\circ\text{C}$ b. $(-55 \pm 2)^\circ\text{C}$ d. $(20 \pm 2)^\circ\text{C}$ f. $(+100 \pm 2)^\circ\text{C}$ g. $(+20 \pm 2)^\circ\text{C}$
15	Charging and discharging	$\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta$: ≤ 0.003 ($C \leq 1.0\mu\text{F}$) ≤ 0.002 ($C > 1.0\mu\text{F}$) IR: $\geq 50\%$ of the rated value(NO.7)	Ref. item 4.13 Times: 10 000 Duration of charging: 0.5s Duration of discharging: 0.5s Charging voltage: rated voltage Charging resistance: $220/C_R(\Omega)$ or current intensity $\leq 1\text{A}$ (whichever is the less current intensity) Discharging resistance: $R = U_R/(10 \times C_R \times dU/dt)$ C_R : rated capacitance (μF) dU/dt ($\text{V}/\mu\text{s}$): as specified in Appendix table 3

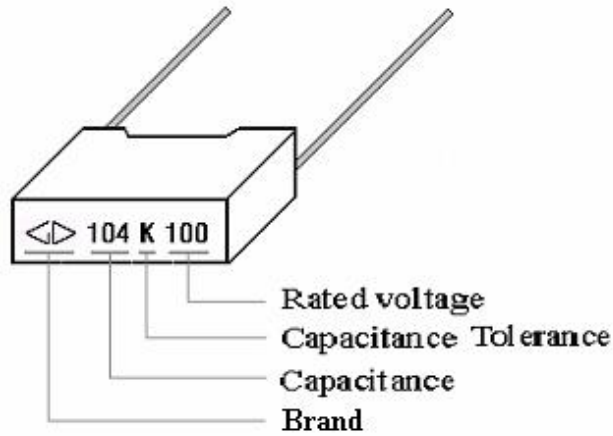
Appendix table 3: Maximum of rated pulse voltage slope $dU/dt(\text{V}/\mu\text{s})$

$U_R(\text{VDC})$ Pitch (P)	63	100	160	250	400	630
7.5	5	6	----	15	30	40
10.0	6	9	15	20	30	40
15.0	2.5	3	9	12	20	25



® Box-type Metallized Polyester Film Capacitor (Type CL23)

6 Marking:



Means of the rated capacitance mark:

Mark	102	103	104	224	105
uF	0.001	0.01	0.1	0.22	1.0

7 Packing and shipment:

7.1 Bulk packing

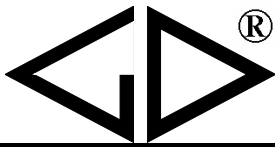
7.1.1 A certain quantity of capacitors and the qualified bill shall be packed with a plastic bag. Then put several plastic bags into one small packing box, sealed with adhesive paper. One big packing box includes four small packing box . Packing with small or big box depends on the customer's purchase quantity.

7.1.2 Big and small packing box refer to the following drawing.

7.2 Radial taping

Refer to the last page.

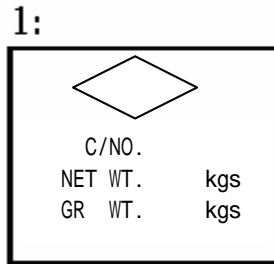
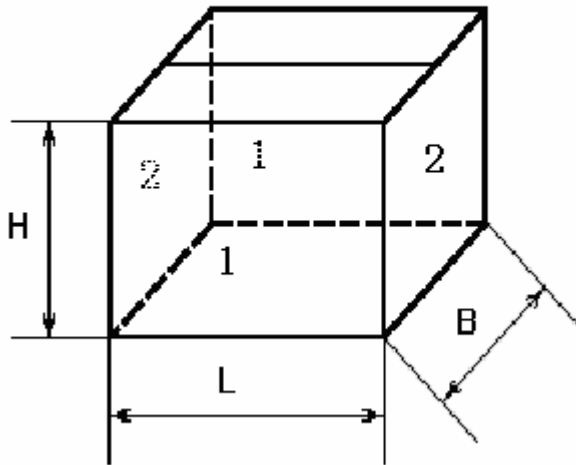
7.3 For the packing box with capacitors, any kinds of shipments are permitted. But the sprinkle of rain or snow and mechanical damage must avoid.



FILM CAPACITOR

Big packing box dimension drawing

L: 377mm B: 377mm H: 267mm

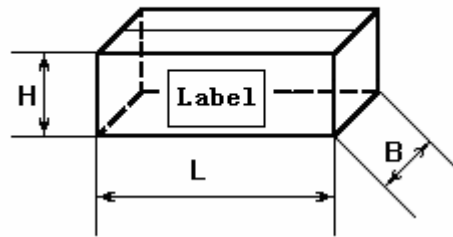


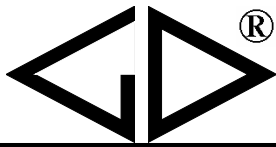
2:

FILM CAPACITOR				
TYPE	CAP.	W. V	TOL.	Q'TY
			± %	
			± %	
			± %	
			± %	

Small packing box dimension drawing:

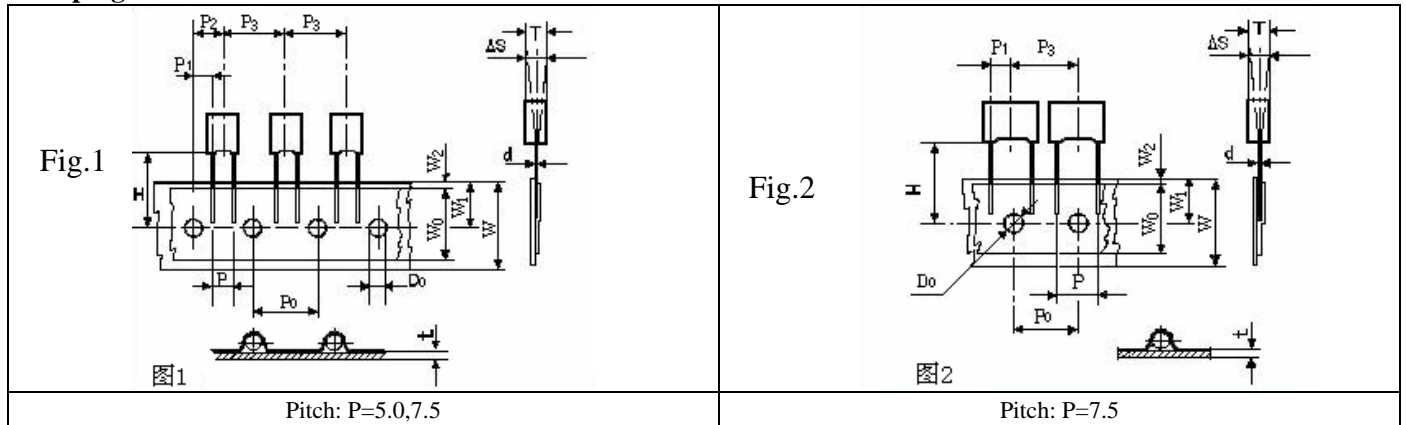
L: 353mm B: 175mm H: 118mm





8 Specification of radial tapping box type capacitors

■ Taping Outline



■ Dimensions of taping (mm)

Description	Code	Dimensions				Notes
		Pitch P=5.0	Pitch P=7.5	Pitch P=7.5	Tol.	
		Fig.1	Fig.1	Fig.2		
Lead wire dia.	d	0.5~0.6	0.6~0.8	0.6~0.8	±0.05	
Taping pitch	P ₃	12.7	12.7	12.7	±1.0	
Feed hole pitch	P ₀	12.7	12.7	12.7	±0.2	Max 1mm/(20×P ₀)
Center of wire	P ₁	3.85	2.6	3.75	±0.7	
Center of body	P ₂	6.35	6.35	12.7	±1.3	
Lead pitch	P	5.0	7.5	7.5	+0.6/0.1	
Component alignment	ΔS	0	0	0	±2.0	
Height of component from tape center	H	16.0	16.0	16.0	±0.5	
		16.5	16.5	16.5		
		18.5	18.5	18.5		
Carrier tape width	W	18.0	18.0	18.0	+1.0 -0.5	
Hold down tape width	W ₀	6.0min	6.0min	6.0min		
Hole position	W ₁	9.0	9.0	9.0	±0.5	
Hold down tape position	W ₂	3.0max	3.0max	3.0max		
Feed hole dia.	D ₀	4.0	4.0	4.0	±0.2	
Tape thickness	t	0.7	0.7	0.7	±0.2	

■ Quantity of packaging

Pitch P	Body thickness T	sale in domestic market ammo-pack	Export ammo-pack	
5.0	2.5	2 500	2 000	
	3.0	2 000	1 700	
	3.5	1 700	1 500	
	4.5	1 400	1 300	
	5.0	1 200	1 000	
	6.0	1 000	800	
	7.2/7.5	700	600	
Pitch P	Body thickness T	Reel-pack	---	
5.0	2.5	2 500	---	
	3.0	2 100	---	
	3.5	1 800	---	
	4.0	1 500	---	
	4.5	1 400	---	
	7.5	5.0	1 200	---
		6.0	1 000	---
7.2/7.5		800	---	

■ Dimensions of taping packing

Reel-Pack

圆盘包装

Ammo-Pack

弹带包装

Code	Size(mm)
A	52±3
B	260±3
C	335±3