

SPECIFICATION FOR APPROVAL

Customer:

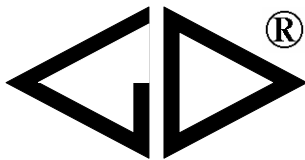
Type: **Box-type MKP61 Metallized Polypropylene Film
Interference Suppression Capacitor (X2 Class)**

Customer code:

Co. code:

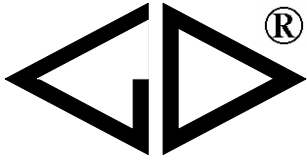
Date:

| | “√” | Signed by customer | Specification |
|------------------------|-----|--------------------|---------------|
| Approved | | | |
| Approved conditionally | | | |
| Rejected | | | |



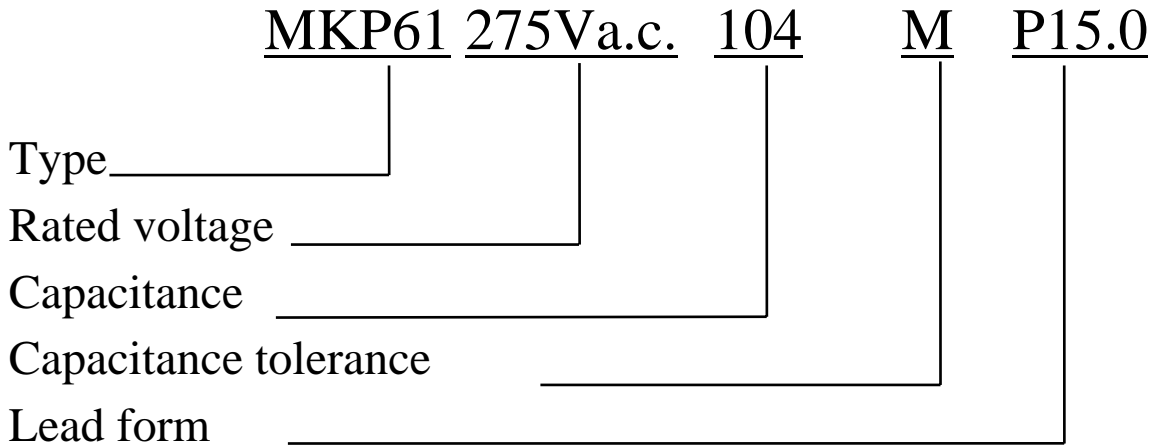
厦门法拉电子股份有限公司

XIAMEN FARATRONIC Co., Ltd.



**Box-type Metallized Polypropylene Film Interference
Suppression Capacitor (X2 Class)
(Type MKP61)**

Purchase Specification

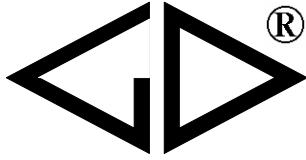


Capacitance tolerance:

| | | |
|------------------------------|------|------|
| Capacitance tolerance | ±10% | ±20% |
| Code | K | M |

Lead form:

| Code | P | P7.5 | P10.0 | P15.0 | P22.5 | P27.5 |
|------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
| Lead form | straight lead | Lead pitch 7.5mm | Lead pitch 10.0mm | Lead pitch 15.0mm | Lead pitch 22.5mm | Lead pitch 27.5mm |
| Note | Pitch in common use | | | | | |



Box-type Metallized Polypropylene Film Interference Suppression Capacitor (X2 Class) (Type MKP61)





1 Feature:

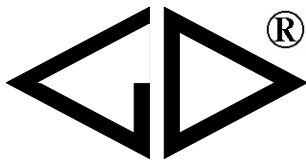
The capacitor is wound with polypropylene film as dielectric and the zinc, aluminum on the film which is evaporated on the vacuum as electrode. Radial lead, the capacitor is enveloped in a plastic box with insulation material filled. It can withstand overvoltage stressing and has excellent active and passive flame resistant abilities. As a X2 class capacitor, It is suitable for use in situation where failure of the capacitor could not lead to danger or electric shock such as across-the-line and interference suppression circuits of electronic equipment. It can endure impulse voltage of 2.5kV(suitable for $C_R \leq 1\mu\text{F}$; When $C_R > 1\mu\text{F}$, the capacitor can endure pulse voltage of $2.5/\sqrt{C_R}$ kV).

2 Reference standards

| | |
|------------------------------|---|
| GB 2693 IEC 384-1 | Fixed capacitor for use in electronic equipment Part 1: General specification |
| GB/T 14472 IEC 384-14 | Fixed capacitor for use in electronic equipment Part 14: Sectional specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains |
| GB/T 14473 IEC 60384-14-1 | Fixed capacitor for use in electronic equipment Part 14 Blank detail specification: Fixed capacitors for electromagnetic interference suppression and connection to the supply mains Assessment level D |
| Q/FRK0.463.029 | Detail specification for electronic component Fixed plastic box-type metallized polypropylene film dielectric capacitors for electromagnetic interference suppression and connection to the supply mains type MKP 61 Assessment level D |
| GB 2828 | Sampling procedures and tables for lot-by-lot inspection by attributes |

3 Approved with the following countries:

| | | |
|---|-----------------------|--|
|  | CQC (China) | GB/T 14472-1998, 275VAC, 0.0047 μF ~2.2 μF Certificate No. : CQC03001002877 |
|  | ENEC-VDE (Germany) | EN 132400, IEC 60384-14, 275VAC, 0.0047 μF ~2.2 μF Certificate No. : 40007424 |
|  | UL (America) | UL1414, 250VAC, 0.0047 μF ~1.0 μF Certificate No. : E186600 |
|  | CUL (Canada) | CSA C22.2-1, 250VAC, 0.0047 μF ~1.0 μF Certificate No. : E186600 |



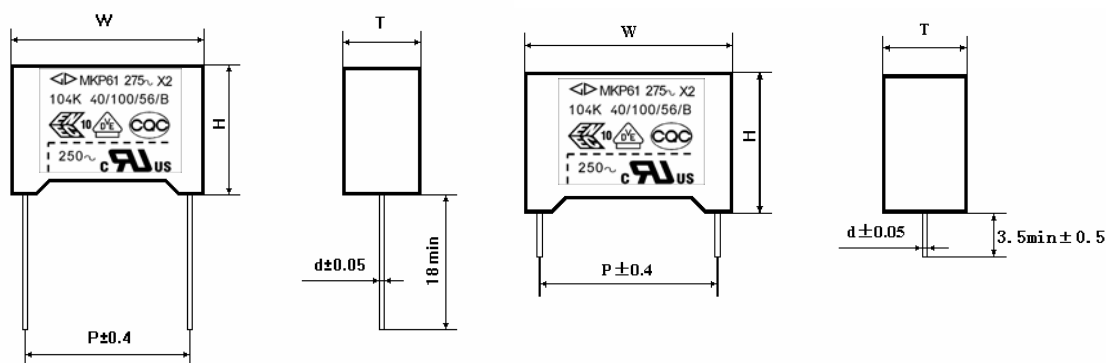
Box-type Metallized Polypropylene Film Interference Suppression Capacitor (X2 Class) (Type MKP61)

4 Quality Ensuring test (before shipment):

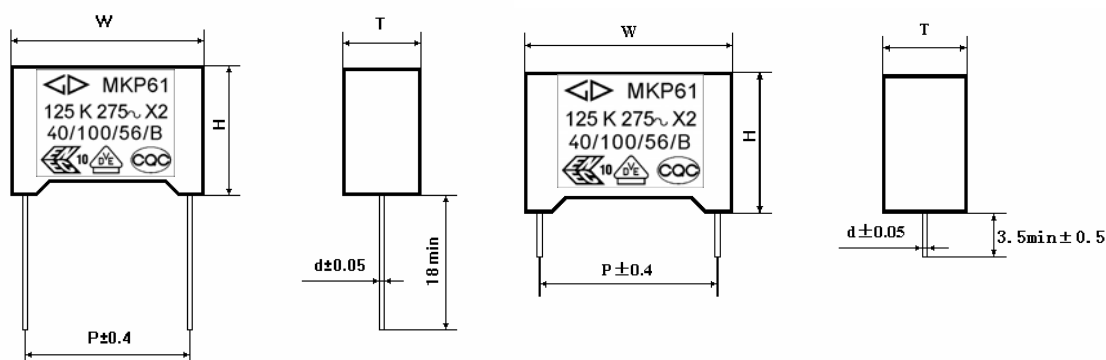
| Inspection item (each batch) | Inspection level (GB 2828) | |
|---------------------------------|----------------------------|-------|
| | IL | AQL |
| 1.Appearance inspection | II | 1.5% |
| 2.Dimensions | | |
| 1.Capacitance | II | 0.25% |
| 2.Tangent of the loss angle | | |
| 3.Dielectric strength | | |
| 4.Insulation resistance | | |
| 1.Solderability | S-3 | 2.5% |

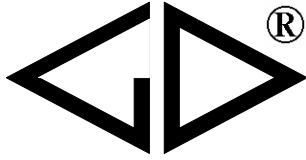
5 Dimensions and marking:

I ($C_R \leq 105$)



II ($C_R > 105$)





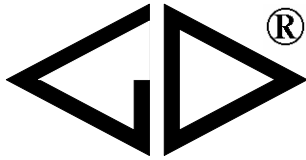
Box-type Metallized Polypropylene Film Interference Suppression Capacitor (X2 Class) (Type MKP61)

Dimensions:

unit: mm

| | | |
|-------------------------------|--------------------------|-----|
| 脚距 (Pitch) P | ≤10 | >10 |
| 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 | |

| 电容量 (μF) | 250/275VAC | | | | | | | | | | | |
|-------------|------------|------|-----|--------|------|------|--------|------|------|--------|------|------|
| | P=10.0 | | | P=15.0 | | | P=22.5 | | | P=27.5 | | |
| | | | | | | | | | | | | |
| 0.0047 | 13.0 | 9.0 | 4.0 | | | | | | | | | |
| 0.0056 | 13.0 | 9.0 | 4.0 | | | | | | | | | |
| 0.0068 | 13.0 | 9.0 | 4.0 | | | | | | | | | |
| 0.0082 | 13.0 | 9.0 | 4.0 | | | | | | | | | |
| 0.01 | 13.0 | 9.0 | 4.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.012 | 13.0 | 9.0 | 4.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.015 | 13.0 | 9.0 | 4.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.018 | 13.0 | 11.0 | 5.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.022 | 13.0 | 11.0 | 5.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.027 | 13.0 | 11.0 | 5.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.033 M | 13.0 | 11.0 | 5.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.033 K | 13.0 | 12.0 | 6.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.039 | 13.0 | 12.0 | 6.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.047 | 13.0 | 12.0 | 6.0 | 18.0 | 11.0 | 5.0 | | | | | | |
| 0.056 | | | | 18.0 | 12.0 | 6.0 | | | | | | |
| 0.068 | | | | 18.0 | 12.0 | 6.0 | | | | | | |
| 0.082 | | | | 18.0 | 12.0 | 6.0 | | | | | | |
| 0.1 M | | | | 18.0 | 12.0 | 6.0 | | | | | | |
| 0.1 K | | | | 18.0 | 13.5 | 7.5 | | | | | | |
| 0.12 | | | | 18.0 | 13.5 | 7.5 | 26.5 | 15.0 | 6.0 | | | |
| 0.15 | | | | 18.0 | 14.5 | 8.5 | 26.5 | 15.0 | 6.0 | | | |
| 0.18 M | | | | 18.0 | 16.0 | 10.0 | 26.5 | 15.0 | 6.0 | | | |
| 0.18 K | | | | 18.0 | 16.0 | 10.0 | 26.5 | 16.0 | 7.0 | | | |
| 0.22 | | | | 18.0 | 16.0 | 10.0 | 26.5 | 16.0 | 7.0 | | | |
| 0.27 | | | | | | | 26.5 | 17.0 | 8.5 | | | |
| 0.33 | | | | | | | 26.5 | 17.0 | 8.5 | | | |
| 0.39 | | | | | | | 26.5 | 18.5 | 10.0 | 32.0 | 18.0 | 9.0 |
| 0.47 | | | | | | | 26.5 | 18.5 | 10.0 | 32.0 | 18.0 | 9.0 |
| 0.56 | | | | | | | | | | 32.0 | 20.0 | 11.0 |
| 0.68 | | | | | | | | | | 32.0 | 20.0 | 11.0 |
| 0.82 | | | | | | | | | | 32.0 | 22.0 | 13.0 |
| 1.0 | | | | | | | | | | 32.0 | 22.0 | 13.0 |
| 1.2 | | | | | | | | | | 32.0 | 28.0 | 14.0 |
| 1.5 | | | | | | | | | | 32.0 | 28.0 | 14.0 |
| 1.8 | | | | | | | | | | 32.0 | 33.0 | 18.0 |
| 2.2 | | | | | | | | | | 32.0 | 33.0 | 18.0 |



**Box-type Metallized Polypropylene Film Interference
Suppression Capacitor (X2 Class)
(Type MKP61)**

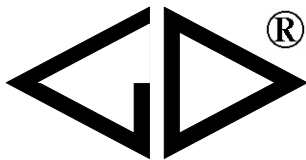
6 Specification:

(一) Rated Characteristic (Testing temperature: 20°C)

- (1) Rated voltage: 250/275V_{rms} 50/60Hz
- (2) Capacitance: 4700pF~2.2μF E12 series
- (3) Capacitance tolerance: K(±10%), M(±20%)
- (4) Tangent of the loss angle

| Capacitance | tgδ (max) | |
|----------------------------------|---------------------|---------------------|
| | test frequency | |
| | 1kHz | 10kHz |
| 4700pF < C _R ≤ 0.47μF | 10×10 ⁻⁴ | 20×10 ⁻⁴ |
| 0.47μF < C _R ≤ 1.0μF | 20×10 ⁻⁴ | 70×10 ⁻⁴ |
| C _R > 1.0μF | 30×10 ⁻⁴ | — |

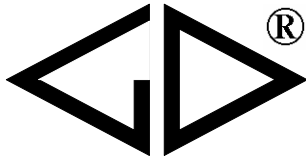
- (5) Dielectric strength:
 - ① Between terminals: 1183(Vd.c.), 2~5s
there shall be no permanent breakdown or harmful deformation.
 - ② Between terminal and enclosure: 2050(Va.c.), 2~5s
there shall be no permanent breakdown or harmful deformation.
- (6) Insurance resistance:
 - ① Between terminals: Measurement shall be carried out after applying 100V for 1min.
 C_R ≤ 0.33μF I.R. ≥ 15000MΩ,
 C_R > 0.33μF RC ≥ 5000s
 - ② Between terminal and enclosure: I.R. ≥ 30000MΩ, Measurement shall be carried out after applying 100V for 1min.
- (7) Climatic category: -40°C ~ +100°C



Box-type Metallized Polypropylene Film Interference Suppression Capacitor (X2 Class) (Type MKP61)

(二) 、 Characteristics testing

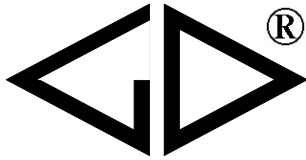
| NO. | Item | Specification | Testing Method (IEC 384-14) | |
|-----|--|--|--|---------------------|
| 1 | Dielectric strength | | Ref.item 4.2.1 | |
| | Between terminals | There shall be no permanent breakdown or flashover | 1 183Vd.c., 2~5s | |
| | Between terminal and enclosure | There shall be no permanent breakdown or flashover | 2 050Va.c., 50/60Hz, 2~5s | |
| 2 | I.R. | $C_R \leq 0.33\mu\text{F}$ I.R. $\geq 15000\text{M}\Omega$ $C_R > 0.33\mu\text{F}$ RC $\geq 5\ 000\text{s}$ | Ref.item 4.2.5 Charging voltage: 100Vd.c. Measuring after charging for 1min | |
| | Between terminal and enclosure | I.R. $\geq 30\ 000\text{M}\Omega$ | | |
| 3 | Capacitance | K($\pm 10\%$), M($\pm 20\%$) | Ref. item 4.2.2 1kHz, 5Vrms max. | |
| 4 | Tangent of the loss angle (Tg δ) | Capacitance | tg δ (max) | |
| | | | 1kHz | 10kHz |
| | | $4\ 700\text{pF} < C_R \leq 0.47\mu\text{F}$ | 10×10^{-4} | 20×10^{-4} |
| | | $0.47\mu\text{F} < C_R \leq 1.0\mu\text{F}$ | 20×10^{-4} | 70×10^{-4} |
| | $C_R > 1.0\mu\text{F}$ | 30×10^{-4} | - | |
| 5 | Solderability | Terminals shall be examined by 8 \times to 12 \times linear magnifier in oblique light. Solder shall cover the tested terminals. Beyond 95% of the dipped terminals shall be covered with new solder. Pin holes and voids not wetted or fallen off shall not be collected in one area. | Ref. item 4.5 Solder bath method Ta, method 1 Soldering temperature: 235 $\pm 5^\circ\text{C}$ Dipping time: 2.0 $\pm 0.5\text{S}$ | |
| 6 | Terminal strength | There shall be no visible damage | Ref. item 4.3 Tense: 10N Bend: 5N, The terminals shall be bent 2 times in each direction | |
| 7 | Resistance to soldering heat | There shall be no visible damage $\Delta\text{C}/\text{C} \leq \pm 5\%$ (relative to the initial value) | Ref. item 4.4 Solder bath method Tb, method 1A 260 $\pm 5^\circ\text{C}$, 10 $\pm 1\text{S}$ | |
| 8 | Solvent resistance of the marking | The marking shall be legible | Ref. item.4.20 Method 1 | |
| 9 | Rapid change of temperature | There shall be no visible damage | Ref. item 4.6, $\theta_A = -40^\circ\text{C}$, $\theta_B = +100^\circ\text{C}$ Duration: t=30min, 5 cycles | |
| | Vibration | There shall be no visible damage | Ref. item 4.7 Amplitude: 0.75mm or acceleration: 98m/s ² (whichever is the smaller severity) Frequency: 10~500Hz, Three directions, altogether 6h | |
| | Bump | | Ref. item 4.8 4 000 times, Acceleration: 390m/s ² Duration: 6ms | |
| | Final measurement | There shall be no visible damage $\Delta\text{C}/\text{C} \leq \pm 5\%$ (relative to the initial value) | Ref. item 4.8.2 | |



Box-type Metallized Polypropylene Film Interference Suppression Capacitor (X2 Class) (Type MKP61)

(continued)

| NO. | Item | Specification | Testing Method (IEC 384-14) |
|----------------------------|-------------------------|--|--|
| 10 climatic sequence | Initial measurement | | Ref. item 4.11 |
| | Dry heat | | +100°C, 16h |
| | Damp heat, cyclic | | Test Db, Severity:b, the first cycle |
| | Cold | | -40°C, 2h |
| | Damp heat, cyclic | | Test Db, Severity:b, the other cycles |
| | Final measurement | There shall be no visible damage, legible marking $\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta$: $C_R \leq 1\mu\text{F}$; ≤ 0.008 (10kHz) $C_R > 1\mu\text{F}$; ≤ 0.005 (1kHz) Dielectric strength(No.1): there shall be no permanent breakdown or flashover I.R.: $\geq 50\%$ of the rated value (No.2) | |
| 11 | Damp heat, steady state | There shall be no visible damage and the marking shall be legible $\Delta C/C \leq \pm 5\%$ (relative to the initial value) Increase of $\text{tg}\delta$: $C_R \leq 1\mu\text{F}$; ≤ 0.008 (10kHz) $C_R > 1\mu\text{F}$; ≤ 0.005 (1kHz) Dielectric strength(No.1): there shall be no permanent breakdown or flashover I.R.: $\geq 50\%$ of the rated value (No.2) | Ref.item.4.12 Temperature: $40 \pm 2^\circ\text{C}$ Humidity: $93 \pm 2\% \text{RH}$ Duration: 56days |
| 12 | Impulse voltage | There are three or more waveforms which indicate that no self-heating breakdown have occurred when it is monitored by the monitor | Ref. item 4.13 Each individual capacitor shall be subjected to 24 impulses of the same polarity (when any three successive impulses are shown by the monitor to have a wave form indicating that no self-heating breakdown have taken place the impulses can be stopped), the time between impulses shall not be less than 10S, and the peak value of the voltage impulse: 2.5kV (suitable for $C_R \leq 1\mu\text{F}$; When $C_R > 1\mu\text{F}$, the capacitor can endure pulse voltage value is $2.5/\sqrt{C_R}$ kV) |
| | Endurance | There shall be no visible damage, legible marking $\Delta C/C \leq \pm 10\%$ (relative to the initial value) Increase of $\text{tg}\delta$: $C_R \leq 1\mu\text{F}$; ≤ 0.008 (10kHz) $C_R > 1\mu\text{F}$; ≤ 0.005 (1kHz) Dielectric strength(No.1) : There shall be no breakdown or flashover I.R.: $\geq 50\%$ of the rated value (No.2) | Ref. item 4.14 +100°C, 344V a.c., 1 000h The voltage shall be subjected to 1000Vrms for 0.1s every one hour during test. |

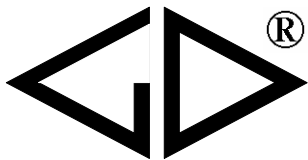


**Box-type Metallized Polypropylene Film Interference
Suppression Capacitor (X2 Class)
(Type MKP61)**

(continued)

| NO. | Item | Specification | Testing Method (IEC 384-14) | | | | | | | | |
|----------------------------------|--------------------------|---|--|------------------|---------------|---------------------------------|-----|----------------------------------|-----|-------------------------|-----|
| 13 | Charging and discharging | $\Delta C/C \leq \pm 10\%$ (relative to the initial value) Increase of $\text{tg}\delta$: $C_R \leq 1\mu\text{F}$; ≤ 0.008 (10kHz) $C_R > 1\mu\text{F}$; ≤ 0.005 (1kHz) I.R.: $\geq 50\%$ of the rated value (No.2) | Ref. item 4.15 Times: 10 000 Duration of charging: 0.5s Duration of discharging: 0.5s Charging voltage: 550Vd.c. Charging resistance: $220/C_R(\Omega)$ or the current $\leq 1.0\text{A}$ (whichever is the minor) Discharging resistance: $R = \frac{550}{C_R \times dU/dt} = \frac{5.50}{C_R}(\Omega)$ C_R : Capacitance (μF) $dU/dt(\text{V}/\mu\text{s})$: 100V/ μs | | | | | | | | |
| 14 | Passive flammability | The flaming time of each capacitor shall not go beyond 10s after it is taken apart from the flame. Drop of each capacitor caused by flame shall not fire the tissue below. | Ref. item 4.17 Needle flame test The category of flammability: B Expose time : 1 time <table border="0" style="width: 100%;"> <tr> <td style="text-align: right;">Capacitor Volume</td> <td style="text-align: right;">Exposing time</td> </tr> <tr> <td style="text-align: right;">$250 < V(\text{mm}^3) \leq 500$</td> <td style="text-align: right;">20s</td> </tr> <tr> <td style="text-align: right;">$500 < V(\text{mm}^3) \leq 1750$</td> <td style="text-align: right;">30s</td> </tr> <tr> <td style="text-align: right;">$V(\text{mm}^3) > 1750$</td> <td style="text-align: right;">60s</td> </tr> </table> | Capacitor Volume | Exposing time | $250 < V(\text{mm}^3) \leq 500$ | 20s | $500 < V(\text{mm}^3) \leq 1750$ | 30s | $V(\text{mm}^3) > 1750$ | 60s |
| Capacitor Volume | Exposing time | | | | | | | | | | |
| $250 < V(\text{mm}^3) \leq 500$ | 20s | | | | | | | | | | |
| $500 < V(\text{mm}^3) \leq 1750$ | 30s | | | | | | | | | | |
| $V(\text{mm}^3) > 1750$ | 60s | | | | | | | | | | |

7、 Packing and shipment:



Box-type Metallized Polypropylene Film Interference Suppression Capacitor (X2 Class) (Type MKP61)

7.1 Bulk packing

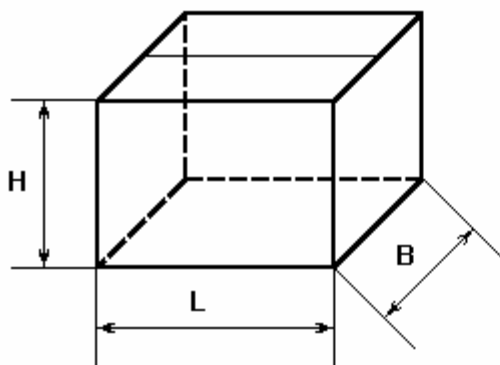
7.1.1 The capacitors shall be packed with plastic bag, which contains a qualified bill in the plastic bag(min. package). Then several plastic bags are put into a small packing box sealed with adhesive paper. A big packing box comprises four small packing boxes. Packing with small or big box depends on the customer's purchase quantity.

7.1.2 The dimensions of packing boxes refer to the drawing in the following page.

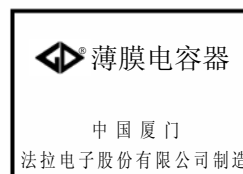
7.2 For the packing box with capacitors, all kinds of shipments are permitted. but the sprinkle of rain or snow and mechanical damage must be avoided.

Big packing box dimension drawing

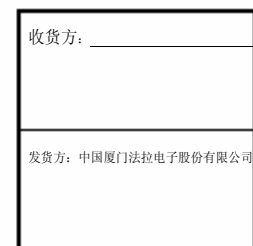
L: 377mm B: 377mm H: 267mm



Plane Drawing

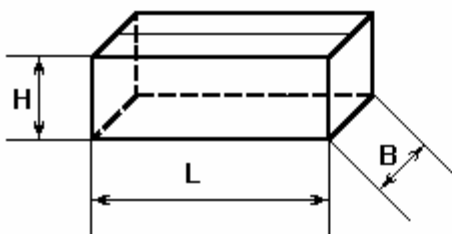


Overlook Drawing

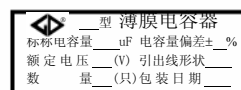


Small packing box dimension drawing:

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



Plane Drawing



Overlook Drawing

