Aillen®
EXPERT IN PASSIVE PARTS

# ALTERNATION HISTORY RECORDS 变更记录

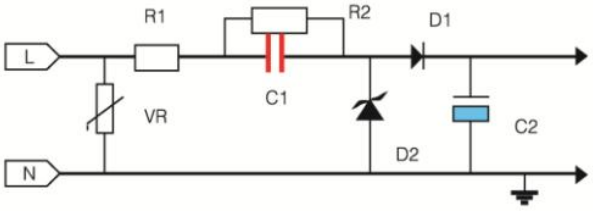
| Date<br>日期 | Version<br>版本 | Mark<br>标记 | Page<br>页码 | Description<br>描述 | Drafter<br>制定者 | Approver<br>审批者 |
|---|---|---|---|---|---|---|
| 2024-05-06 | A | / | / | First release 首次发行 | Doris Chang | / |

## 1.Feature

Metallized polypropylene non-induction construction;
Self-healing property ;
Excellent active and passive flame resistant abilities（conforming to UL94-0) ;
Withstanding over voltage stressing.

## 2.Applications

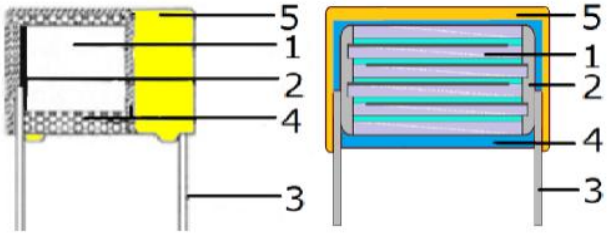
X2 class for interference suppression
Across the line applications
Capacitance divider where is series-connected with the mains in energy meters, LED drivers and control boards in white goods and home appliances
For the purpose of RC voltage divider, please choose “D” mark sub class model. (This“D” mark sub class model has the features of high stability in capacity and smaller in capacity drop, however it does not suitable for using crossing the line or as an EMI suppression filter)




Typical divider circuit

## 3.Product brief introduction

The MKP X2 capacitor series is wound from a metallized polypropylene film non-inductive structure, and is packaged with tinned coppered steel wire, plastic housing and flame retardant epoxy resin. Good self-healing properties and excellent flame retardancy, in line with UL94V-0 standards.




| Code | Part Name | Material Name |
|---|---|---|
| 1 | Dielectric | Metallized Polypropylene Film |
| 2 | Solder | Sn-Zn alloy |
| 3 | Terminal | CP wire ( Ø 0.8or0.6mm) |
| 4 | Sealed Material | Epoxy resin |
| 5 | Plastic Case | PBT |

## 4.Part Number System

MKP 474 K 310 A 15 L 20 0 Z5

- MKP — Product Type(4.1)
- 474 — Capacitance(4.2)
- K — Tolerance (4.3)
- 310 — Rated Voltage（4.4）
- A — Voltage Type (4.5)
- 15 — Lead Pitch (4.6)
- L — Lead Forming (4.7)
- 20 — Lead Length or Packaging Code (4.8)
- 0 — RoHS Symbol (4.9)
- Z5 — Dimensions(4.10)

4-1 Product Type

| Code | MKP |
|---|---|
| Type | X2 Metallized polypropylene film interference suppression capacitor |

4-2 Capacitance

| Code | 102 | 103 | 104 | 105 | 155 |
|---|---|---|---|---|---|
| Capacitance | 0.001μF | 0.01μF | 0.1μF | 1μF | 1.5μF |

4-3 Tolerance

| Code | K |
|---|---|
| Tolerance | ±10% |

4-4 Rated Voltage：

| Code | 275 | 310 | 350 |
|---|---|---|---|
| Voltage | 275V | 310V | 350V |

4-5 Voltage Type： A→AC

4-6 Lead Pitch

| Code | 08 | 10 | 15 | 22 | 27 | 31 |
|---|---|---|---|---|---|---|
| Pitch(mm) | 7.5mm | 10mm | 15mm | 22mm | 27mm | 31mm |

4-7 Lead Style

| Code | L | M | T | S |
|---|---|---|---|---|
| Lead Forming | Bulk | Cutting | Taping Hole space P0:12.7 mm | Taping Hole space P0:15.0mm |

4-8 Lead length or Packing Code

| Code | 35 | 50 | 10 | 15 | 20 | H6 | HF |
|---|---|---|---|---|---|---|---|
| Length(mm) | 3.5±0.5 | 5.0±0.5 | 10.0±1.0 | 15.0±1.0 | 18.0 Min | Taping Height H: 16.0 mm | Taping Height H: 18.5 mm |

4-9 RoHS Symbol

| Code | 0 | 1 | 2 |
|---|---|---|---|
| Meaning | Environmentally friendly products (in compliance with RoHS, Reach, and do not contain PAH or phthalates). | Non environment ally friendly | In addition to being compliant with the aforementioned environmentally friendly criteria “0”, it should also show that the amount of halogens contained in the product meets the criteria |

4-10 Dimensions Code

| Code | Z5 | | |
|---|---|---|---|
| Dimensions(mm) | W | H | T |
| | 18±1 | 16±0.5 | 10±0.5 |

## 5.Marking

| Marking Item | | | Example |
|---|---|---|---|
| Manufacturer Marking | Aillen | |   |
| Type Designation | MKP | | |
| Sub-Class Code | X2 | | |
| Capacitance,Tolerance | 474K | | |
| Rated Voltage | 310Vac | | |
| Climatic category | 40/110/56/B | | |
| Safety Organization Approved Marking | UL | | |
| | CQC | | |
| | ENEC | | |

## 6.Specification and test methods

6.1 Test condition: Unless otherwise specified, the standard range of atmospheric Conditions for marking measurements and test is conducted in the following ambient

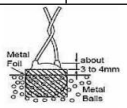
Ambient temperature : 15~35 ℃, Relative humidity: 25~75%.

If there may be any doubt on the results, measurements shall be made within the Following limits.

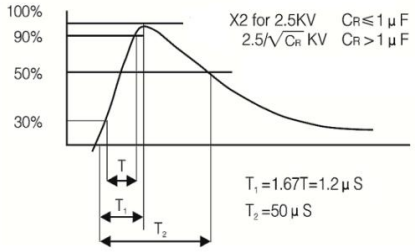
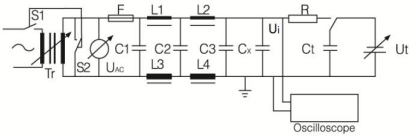
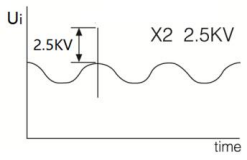
Temperature : 20±2℃ , Relative humidity :60~70%.

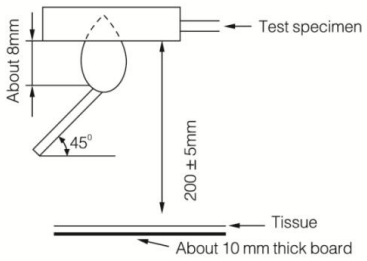
Default frequency of the related alternating current tests: 50Hz

6.2 Specification and test methods

<table>
<tr><th>No</th><th colspan="2">Item</th><th>Test method</th><th>Specification</th></tr>
<tr><td>1</td><td colspan="2">Appearance</td><td>The appearance shall be inspected by naked eyes.</td><td>No marked defect on appearance</td></tr>
<tr><td>2</td><td colspan="2">Dimensions</td><td>The dimensions shall be measured with slide calipers</td><td>Dimensions of capacitor and taping shall satisfy specified requirement.</td></tr>
<tr><td>3</td><td colspan="2">Marking</td><td>The marking shall be checked by 4x magnifying glass.</td><td>Legible marking</td></tr>
<tr><td>4</td><td colspan="2">Climatic category and passive flammability class</td><td>/</td><td>40/110/56/B</td></tr>
<tr><td>5</td><td colspan="2">Rated Temperature Range</td><td>/</td><td>-40℃~ 110℃</td></tr>
<tr><td>6</td><td colspan="2">Rated Voltage</td><td>/</td><td>275VAC、310VAC、350VAC</td></tr>
<tr><td>7</td><td colspan="2">Capacitance Range</td><td rowspan="2">The capacitance shall be measured at 25℃ with 1KHz 1±0.2 Vrms.</td><td>0.01μF~4.7μF</td></tr>
<tr><td>8</td><td colspan="2">Capacitance Tolerance</td><td>±10%(K)</td></tr>
<tr><td>9</td><td colspan="2">Dissipation Factor</td><td>The dissipation factor shall be measured at 25℃ with 1KHz 1±0.2 Vrms.</td><td>0.1%Max</td></tr>
<tr><td>10</td><td colspan="2">Insulation Resistance</td><td>The insulation resistance shall be measured with 100VDC within 60±5 sec of charging.</td><td>$C_R$≤0.33μF，IR≥15000MΩ<br>$C_R$＞0.33μF，IR·C≥5000S(MΩ·μF)</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Dielectric Strength (Voltage Proof)</td><td>Between Terminals</td><td>The capacitor should not be damaged when test voltages of table below are applied between the lead wires for 5 sec.<br><table><tr><th>Type</th><th>Test Voltage</th></tr><tr><td>X2</td><td>DC1333V/5s</td></tr></table></td><td rowspan="2">No failure</td></tr>
<tr><td>Between Terminals To Case:</td><td>First, the terminals of the capacitor should be connected together. Then, as shown in figure below, a metal foil should be closely wrapped around the body of the capacitor to the distance of about 3 to 4mm from each terminal. Then, the capacitor should be inserted into a container filled with metal balls of about 1mm diameter. Finally, ac voltage of table below is applied for 60 sec. between the capacitor lead wires and metal balls.<br><table><tr><th>Type</th><th>Test Voltage</th></tr><tr><td>X2</td><td>AC2100V/60s</td></tr></table> 
</td></tr>
</table>

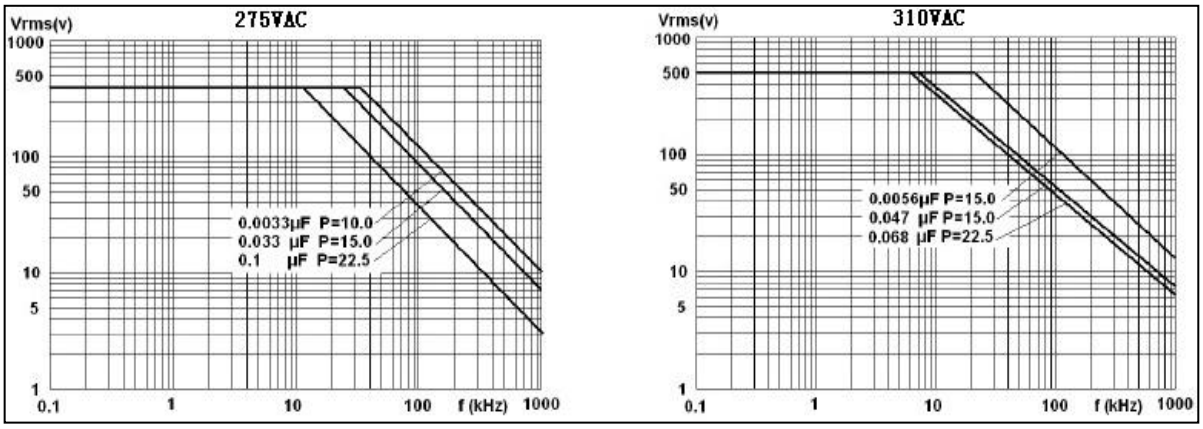
| No | Test items | Test method | Specification | |
|---|---|---|---|---|
| 12 | Robustness of Termination | The capacitor body shall be held in such a manner so that the axis of the lead is vertical.<br>The tensile force of 10N(for lead of Ø0.6～Ø0.8mm)shall be applied to the lead in a direction of its axis and acting in a direction away from the body of the capacitor for 10±1 seconds. | The capacitor shall be no broken and the lead shall be no loosened or cut off. | |
| 13 | Solderability of leads | The lead wire of a capacitor should be dipped Into molten solder for 2±0.5sec.<br>The depth of immersion is up to about 1.5 to 2.0mm from the root of lead wires. Temp.of solder:<br>Lead Free solder(Sn-3Ag-0.5Cu) 245±5℃<br>H63 Eutectic Solder 235±5℃ | A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed | |
| 14 | Resistance to Soldering heat | Temperature of solder bath 260±5℃.<br>The immersing depth of lead shall be a position 2-0.5mm from the seating plane, using a thermal screen. The thickness of the screen is 1.5±0.5mm.<br>The immersion time shall be 10±1 seconds.<br>Post-treatment:The capacitor shall be preserved at the standard atmospheric condition for 1 to 2 hours. | Appearance | No visible damage |
| | | | Capacitance Change | Within ±5% |
| | | | Dissipation Factor | Refer to Item 6.2.9 |
| | | | Voltage proof (between leads) | Refer to Item 6.2.11 |
| 15 | Solvent Resistance | The capacitor shall be immersed into isopropyl alcohol for 30±5 s | Appearance: No visible damage<br>Legible marking | |
| 16 | Damp heat steady state | The capacitor shall be stored for 56 days (1350±8hours) at a temperature of 40℃±2℃ and a relative humidity of （93±3）%.<br>Pre-treatment: the capacitor shall be stored at a temperature of 85℃±2℃ for 1 hour,and then the capacitor shall be recovered for 24±2 hours.<br>Post-treatment: the capacitor shall be stored for 1 to 2 hours at the standard atmospheric condition。(Temperature:15 to 35℃,Relative humidity:45 to 75%,Atmospheric pressure:86 to 106kPa) | Capacitance Change | Within ±5% |
| | | | Dissipation Factor | △tgδ≤0.005 (CR≤1.0μF)<br>△tgδ≤0.008 (CR>1.0μF) |
| | | | IR | IR≥50%Spec |
| | | | Voltage proof | Refer to Item 6.2.11 |

| No | Test items | Test method | Specification | |
|---|---|---|---|---|
| 18 | Endurance test(life) | The capacitor shall be subjected to three impulses as shown below.<br>  <br><br>Then the capacitors are placed at a temperature of 110℃for 1000 hours. Throughout the test, the capacitors are subjected 50Hz/60Hz，1.25URvoltages,except that once each hour the voltage is increased to 1000 Vrms for 0.1sec. Post-treatment:the capacitor shall be preserved for 24±2 hours at standard atmospheric condition. | Appearance | No visible damage |
| | | | Capacitance Change | Within±10% |
| | | | Dissipation Factor | △tgδ≤0.005 (CR≤1.0μF)<br>△tgδ≤0.008 (CR>1.0μF) |
| | | | IR | IR≥50%Spec |
| | | | Voltage proof | Refer to Item 6.2.112 |
| 19 | Flammability | The capacitor should be individually wrapped in at least one but not more than two complete layers of cheese-cloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The UAC should be maintained for 2 min. after the last discharge.<br>  <br><br>$C_{1,2}$:1uf±10% $C_3$:0.033uf±5% 10kV<br>$L_{1to4}$:1.5mH±20% 16A Rod core choke<br>Ct:3uf±5% 10kV R:100Ω±2%<br>Cx:Capacitor under test $U_{AC}$:UR±5%<br>F:Fuse,Rated 10A $U_R$:Rated Voltage<br>Ut:Voltage applied to Ct<br>  <br> | The cheese-cloth should not be on fire. | |

<table>
<tr><th>No</th><th>Test items</th><th>Test method</th><th>Specification</th></tr>
<tr><td>20</td><td>Passive flammability</td><td> 

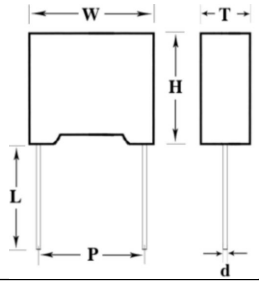
Length of flame:12mm<br>Gas burner: Length 35mm min.<br>Inside diameter:0.5±0.1mm<br>Outside diameter: 0.9mm min.<br>Gas: Butane gas purity 95% min.</td><td>Severity and Requirements
<table>
<tr><th rowspan="2">Flaming Ratings</th><th colspan="3">Severity Level<br>Flame is applied for a time (S) against the capacitor volumes range (mm)</th><th rowspan="2">Maximum flaming time(s)</th></tr>
<tr><th>250< Volumes ≤500</th><th>500< Volumes ≤1750</th><th>Volumes >1750</th></tr>
<tr><td>B</td><td>20</td><td>30</td><td>60</td><td>10</td></tr>
<tr><td>C</td><td>10</td><td>20</td><td>30</td><td>30</td></tr>
</table></td></tr>
</table>

## 7.Typical graphs



## 8. Specification Sheet

1) Specification are subject to change without notice should a safety or technical concern arise regarding the product , please be sure to contact our sales offices
2) The sizes in the above table are all general specifications. If you need other specifications, please contact us
3) All Part numbers are provided in bulk.




| P/N | Rated voltage | Capacitance (μF) | Size（mm） | | | | |
|---|---|---|---|---|---|---|---|
| | | | W±0.5 | H±0.5 | T±0.5 | P±0.5 | Φd±0.05 |
| MKP103K310A10L200C2 | 310VAC | 0.010 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP123K310A10L200C2 | 310VAC | 0.012 | 13.0 | 10.0 | 5.0 | 10.0 | 0.60 |
| MKP153K310A10L200C2 | 310VAC | 0.015 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP183K310A10L200C2 | 310VAC | 0.018 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP223K310A10L200C1 | 310VAC | 0.022 | 13.0 | 9.0 | 4.0 | 10.0 | 0.60 |
| MKP223K310A10L200C2 | 310VAC | 0.022 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP333K310A10L200C2 | 310VAC | 0.033 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP333K310A15L200Z1 | 310VAC | 0.033 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP393K310A10L200C1 | 310VAC | 0.039 | 13.0 | 9.0 | 4.0 | 10.0 | 0.60 |
| MKP473K310A10L200C2 | 310VAC | 0.047 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP473K310A15L200Z1 | 310VAC | 0.047 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP563K310A10L200C2 | 310VAC | 0.056 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP563K310A15L200Z1 | 310VAC | 0.056 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP683K310A10L200C2 | 310VAC | 0.068 | 13.0 | 11.0 | 5.0 | 10.0 | 0.60 |
| MKP683K310A15L200Z1 | 310VAC | 0.068 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP823K310A10L200C3 | 310VAC | 0.082 | 13.0 | 12.0 | 6.0 | 10.0 | 0.60 |
| MKP823K310A15L200Z1 | 310VAC | 0.082 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP104K310A10L200C3 | 310VAC | 0.100 | 13.0 | 12.0 | 6.0 | 10.0 | 0.60 |
| MKP104K310A15L200Z1 | 310VAC | 0.100 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP104K310A15L200Z2 | 310VAC | 0.100 | 18.0 | 12.0 | 6.0 | 15.0 | 0.80 |
| MKP124K310A10L200C4 | 310VAC | 0.120 | 13.0 | 13.0 | 7.0 | 10.0 | 0.60 |
| MKP124K310A15L200Z1 | 310VAC | 0.120 | 18.0 | 11.0 | 5.0 | 15.0 | 0.60 |
| MKP154K310A10L200C3 | 310VAC | 0.150 | 13.0 | 12.0 | 6.0 | 10.0 | 0.60 |
| MKP154K310A10L200C5 | 310VAC | 0.150 | 13.0 | 14.0 | 8.0 | 10.0 | 0.60 |
| MKP154K310A15L200Z2 | 310VAC | 0.150 | 18.0 | 12.0 | 6.0 | 15.0 | 0.80 |
| MKP154K310A22L200E1 | 310VAC | 0.150 | 26.0 | 15.0 | 6.0 | 22.5 | 0.80 |
| MKP184K310A15L200Z2 | 310VAC | 0.180 | 18.0 | 12.0 | 6.0 | 15.0 | 0.80 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MKP184K310A22L200E1 | 310VAC | 0.180 | 26.0 | 15.0 | 6.0 | 22.5 | 0.80 |
| MKP224K310A10L200C5 | 310VAC | 0.220 | 13.0 | 14.0 | 8.0 | 10.0 | 0.60 |
| MKP224K310A15L200Z2 | 310VAC | 0.220 | 18.0 | 12.0 | 6.0 | 15.0 | 0.80 |
| MKP224K310A15L200Z18 | 310VAC | 0.220 | 18.0 | 13.0 | 7.0 | 15.0 | 0.80 |
| MKP224K310A15L200Z3 | 310VAC | 0.220 | 18.0 | 13.5 | 7.5 | 15.0 | 0.80 |
| MKP224K310A22L200E1 | 310VAC | 0.220 | 26.5 | 15.0 | 6.0 | 22.5 | 0.80 |
| MKP334K310A10L200C51 | 310VAC | 0.330 | 13.0 | 16.0 | 8.0 | 10.0 | 0.60 |
| MKP334K310A15L200Z4 | 310VAC | 0.330 | 18.0 | 14.5 | 8.5 | 15.0 | 0.80 |
| MKP334K310A15L200Z41 | 310VAC | 0.330 | 18.0 | 15.5 | 8.0 | 15.0 | 0.80 |
| MKP334K310A15L200Z51 | 310VAC | 0.330 | 18.0 | 18.5 | 5.5 | 15.0 | 0.80 |
| MKP334K310A22L200E1 | 310VAC | 0.330 | 26.5 | 15.0 | 6.0 | 22.5 | 0.80 |
| MKP334K310A22L200E2 | 310VAC | 0.330 | 26.5 | 16.5 | 7.0 | 22.5 | 0.80 |
| MKP394K310A15L200Z61 | 310VAC | 0.390 | 18.0 | 17.0 | 8.0 | 15.0 | 0.80 |
| MKP394K310A22L200E2 | 310VAC | 0.390 | 26.0 | 16.5 | 7.0 | 22.5 | 0.80 |
| MKP474K310A15L200Z4 | 310VAC | 0.470 | 18.0 | 14.5 | 8.5 | 15.0 | 0.80 |
| MKP474K310A15L200Z5 | 310VAC | 0.470 | 18.0 | 16.0 | 10.0 | 15.0 | 0.80 |
| MKP474K310A15L200Z22 | 310VAC | 0.470 | 18.0 | 18.0 | 9.0 | 15.0 | 0.80 |
| MKP474K310A22L200E2 | 310VAC | 0.470 | 26.5 | 16.5 | 7.0 | 22.5 | 0.80 |
| MKP564K310A15L150Z7 | 310VAC | 0.560 | 18.0 | 19.0 | 10.0 | 15.0 | 0.80 |
| MKP564K310A22L200E2 | 310VAC | 0.560 | 26.0 | 16.5 | 7.5 | 22.5 | 0.80 |
| MKP684K310A15L200Z5 | 310VAC | 0.680 | 18.0 | 16.0 | 10.0 | 15.0 | 0.80 |
| MKP684K310A15L200Z7 | 310VAC | 0.680 | 18.0 | 19.0 | 11.0 | 15.0 | 0.80 |
| MKP684K310A22L200E3 | 310VAC | 0.680 | 26.5 | 17.0 | 8.5 | 22.5 | 0.80 |
| MKP824K310A22L200E31 | 310VAC | 0.820 | 26.5 | 18.0 | 9.0 | 22.5 | 0.80 |
| MKP824K310A22L200E5 | 310VAC | 0.820 | 26.5 | 20.0 | 11.0 | 22.5 | 0.80 |
| MKP105K310A15L200Z7 | 310VAC | 1.0 | 18.0 | 19.0 | 11.0 | 15.0 | 0.80 |
| MKP105K310A22L200E4 | 310VAC | 1.0 | 26.5 | 19.0 | 10.0 | 22.5 | 0.80 |
| MKP105K310A27L200F1 | 310VAC | 1.0 | 31.5 | 19.5 | 10.8 | 27.5 | 0.80 |
| MKP155K310A22L200E6 | 310VAC | 1.5 | 26.5 | 22.0 | 12.0 | 22.5 | 0.80 |
| MKP155K310A27L200F2 | 310VAC | 1.5 | 31.0 | 22.0 | 13.0 | 27.5 | 0.80 |
| MKP225K310A22L200E24 | 310VAC | 2.2 | 26.0 | 25.0 | 15.0 | 22.5 | 0.80 |
| MKP225K310A27L200F3 | 310VAC | 2.2 | 31.0 | 25.0 | 14.0 | 27.5 | 0.80 |
| MKP335K310A27L270F48 | 310VAC | 3.3 | 32.0 | 30.0 | 16.0 | 27.5 | 0.80 |
| MKP335K310A27L200F41 | 310VAC | 3.3 | 32.0 | 28.0 | 17.0 | 27.5 | 0.80 |
| MKP475K310A27L200F8 | 310VAC | 4.7 | 32.0 | 33.0 | 18.0 | 27.5 | 0.80 |
| MKP475K310A27L200F15 | 310VAC | 4.7 | 31.0 | 37.0 | 22.0 | 27.5 | 0.80 |

## 9.Taping specification：

9-1 Outline Drawing

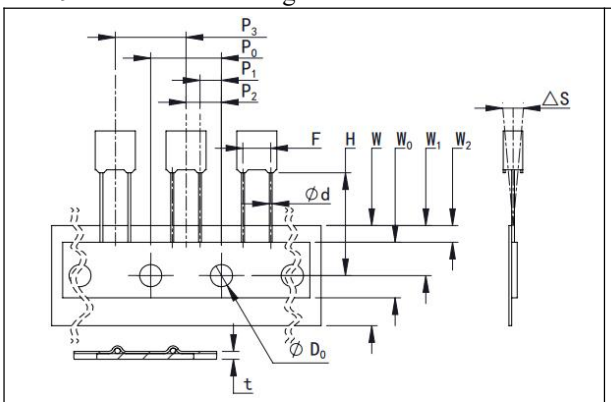



Fig.1

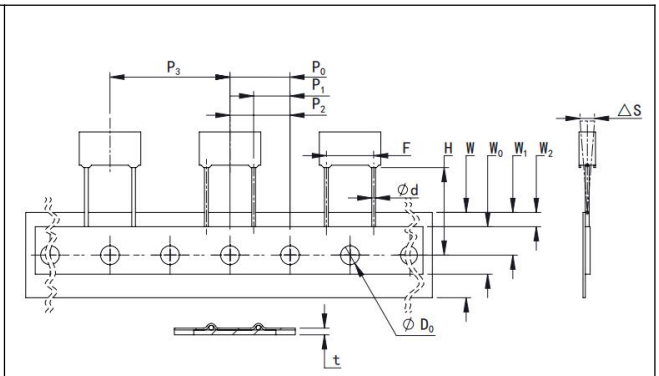
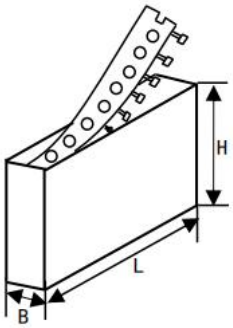



Fig.2

9-2 Taping & Box Dimensions(mm)

| Mark | Taping Dimensions(mm) | | | | |
|---|---|---|---|---|---|
| | P=5.0 | P=7.5 | P=10.0 | P=15.0 | Tolerate |
| Type | Fig.1 | Fig.1 | Fig. 2 | Fig. 2 | / |
| P3 | 12.7 | 12.7 | 25.4 | 25.4 | ±1.0 |
| P0 | 12.7 | 12.7 | 12.7 | 12.7 | ±0.3 |
| P1 | 3.85 | 2.6 | 7.7 | 5.2 | ±0.7 |
| P2 | 6.35 | 6.35 | 12.7 | 12.7 | ±1.3 |
| F | 5 | 7.5 | 10 | 15 | +0.6/-0.1 |
| ΔS | 0 | 0 | 0 | 0 | ±2.0 |
| H | 18.5 | 18.5 | 18.5 | 18.5 | ±0.5 |
| H0 | 16 | 16 | 16 | 16 | ±0.5 |
| W | 18 | 18 | 18 | 18 | +1/-0.5 |
| W0 | 8min | 10min | 10min | 10min | / |
| W1 | 9 | 9 | 9 | 9 | ±0.5 |
| W2 | 3max | 3max | 3max | 3max | / |
| D0 | 4 | 4 | 4 | 4 | ±0.2 |
| t | 0.7 | 0.7 | 0.7 | 0.7 | ±0.2 |
| Note: If you need other taping,please contact us. | | | | | |




L=335±3mm
B=55/50±3mm
H=265/350±3mm