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## 3W Ultra-small Power Module PM03/PM01/PM09/PM12



# Catalogue

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## 1. Ultra-small Power Module

3W ultra-small series of power module is a small volume, high efficiency module power supply designed by Hi-Link Electronics. With the global input voltage range, low temperature rise, low power consumption, high efficiency, high reliability, high security isolation and so on. Has been widely used in smart home, automation, communications equipment, instrumentation and other industries.

## 2. Product Model

| MODEL    | Dimension<br>(mm) | Output power<br>(W) | Output<br>voltage<br>(V) | Output<br>current<br>(mA) | Notes          |
|----------|-------------------|---------------------|--------------------------|---------------------------|----------------|
| HLK-PM03 | 34*20*15          | 3                   | 3.3                      | 1000                      |                |
| HLK-PM01 |                   | 3                   | 5                        | 600                       |                |
| HLK-PM09 |                   | 3                   | 9                        | 330                       | Need customize |
| HLK-PM12 |                   | 3                   | 12                       | 250                       |                |

## 3. Product Features

1. Ultra-thin, ultra-small, the industry's smallest volume;
2. Global universal input voltage (90 ~ 245Vac);
3. Low-power, green, no-load loss <0.1W;
4. Low ripple, low noise;
5. Good output short circuit and overcurrent protection and self recovery;
6. High efficiency, high power density;
7. Input and output isolation voltage 3000Vac;
8. 100% full load aging and testing;
9. High reliability, long life design, continuous working time is greater than 100,000 hours;
10. Meet UL, CE requirements; product design to meet EMC and safety testing requirement;
11. Using high-quality environmentally friendly waterproof plastic potting, moisture, vibration, water and dust to meet IP65 standards;
12. Economic solutions, cost-effective



13. No external circuit to work
14. 1 year quality guarantee period.

## 4. Environmental Conditions

| Project name         | Technical indicators                                                              | Unit | Notes                                                     |
|----------------------|-----------------------------------------------------------------------------------|------|-----------------------------------------------------------|
| Working temperature  | -25—+60                                                                           | ℃    |                                                           |
| Storage temperature  | -40—+80                                                                           | ℃    |                                                           |
| Relative humidity    | 5—95                                                                              | %    |                                                           |
| Thermal methods      | Natural cooling                                                                   |      |                                                           |
| Atmospheric pressure | 80—106                                                                            | Kpa  |                                                           |
| Altitude             | ≤2000                                                                             | m    |                                                           |
| Vibration            | Vibration coefficient<br>10~500Hz,2G10min./1cycle, 60min.each<br>along X,Y,Z axes |      | Meet the<br>second-class road<br>transport<br>requirement |

## 5. Electrical Characteristics

### 5.1. Input characteristics

| Project Name              | Technical Requirements | Unit | Notes        |
|---------------------------|------------------------|------|--------------|
| Rated input voltage       | 90-245                 | Vac  |              |
| Input voltage range       | 85-264                 | Vac  | Or 70-350Vdc |
| The maximum input current | ≤0.2                   | A    |              |
| Input inrush current      | ≤10                    | A    |              |
| The maximum input voltage | ≤270                   | Vac  |              |



|                               |                                                 |    |           |
|-------------------------------|-------------------------------------------------|----|-----------|
| Input soft start              | $\leq 50$                                       | mS |           |
| Input low voltage efficiency  | $V_{in}=110V_{ac}$ , output full load $\geq 69$ | %  |           |
| Input high voltage efficiency | $V_{in}=220V_{ac}$ , output full load $\geq 70$ | %  |           |
| Long-term reliability         | MTBF $\geq 100,000$                             | h  |           |
| External fuse recommended     | 0.5A/250Vac                                     |    | slow blow |

Note: Test at room temperature

## 5.2. Output characteristics (3.3V/1000mA)

| Project Name                      | Technical Requirements                                                                                                            | Unit            | Notes             |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| No-load rated output voltage      | $3.3 \pm 0.1$                                                                                                                     | Vdc             |                   |
| Full load rated output voltage    | $3.3 \pm 0.2$                                                                                                                     | Vdc             |                   |
| Short time maximum output current | $\geq 1200$                                                                                                                       | mA              |                   |
| Long time maximum output current  | $\geq 1000$                                                                                                                       | mA              |                   |
| Voltage regulation                | $\pm 0.2$                                                                                                                         | %               |                   |
| Load regulation                   | $\pm 0.5$                                                                                                                         | %               |                   |
| Output ripple and noise (mVp-p)   | $\leq 50$<br>Rated input voltage, output full load. With 20MHz bandwidth oscilloscope, Load side 10uF and 0.1uF capacitance test. | mV              |                   |
| Switch overshoot amplitude        | (Rated input voltage, output plus 10% load) $\leq 5$                                                                              | %V <sub>O</sub> |                   |
| Output over-current protection    | Output the maximum load of 150-200%                                                                                               | A               |                   |
| Output short circuit protection   | Direct output when the normal short-circuit, short circuit removed automatically resume normal work                               |                 | Undamaged machine |

### 5.3. Output characteristics(5V/600mA)

| Project Name                      | Technical Requirements                                                                                                      | Unit            | Notes                 |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|
| No-load rated output voltage      | 5.0±0.1                                                                                                                     | Vdc             |                       |
| Full load rated output voltage    | 5.0±0.2                                                                                                                     | Vdc             |                       |
| Short time maximum output current | ≥800                                                                                                                        | mA              |                       |
| Long time maximum output current  | ≥600                                                                                                                        | mA              |                       |
| Voltage regulation                | ±0.2                                                                                                                        | %               |                       |
| Load regulation                   | ±0.5                                                                                                                        | %               |                       |
| Output ripple and noise (mVp-p)   | ≤50<br>Rated input voltage, output full load. With 20MHz bandwidth oscilloscope, Load side 10uF and 0.1uF capacitance test. | mV              |                       |
| Switch overshoot amplitude        | (Rated input voltage, output plus 10% load) ≤5                                                                              | %V <sub>O</sub> |                       |
| Output over-current protection    | Output the maximum load of 150-200%                                                                                         | A               |                       |
| Output short circuit protection   | Direct output when the normal short-circuit, short circuit removed automatically resume normal work                         |                 | Undamage<br>d machine |

### 5.4. Output characteristics(9V/330mA)

| Project Name                 | Technical Requirements | Unit | Notes |
|------------------------------|------------------------|------|-------|
| No-load rated output voltage | 9.0±0.1                | Vdc  |       |
| Full load rated output       | 9.0±0.2                | Vdc  |       |



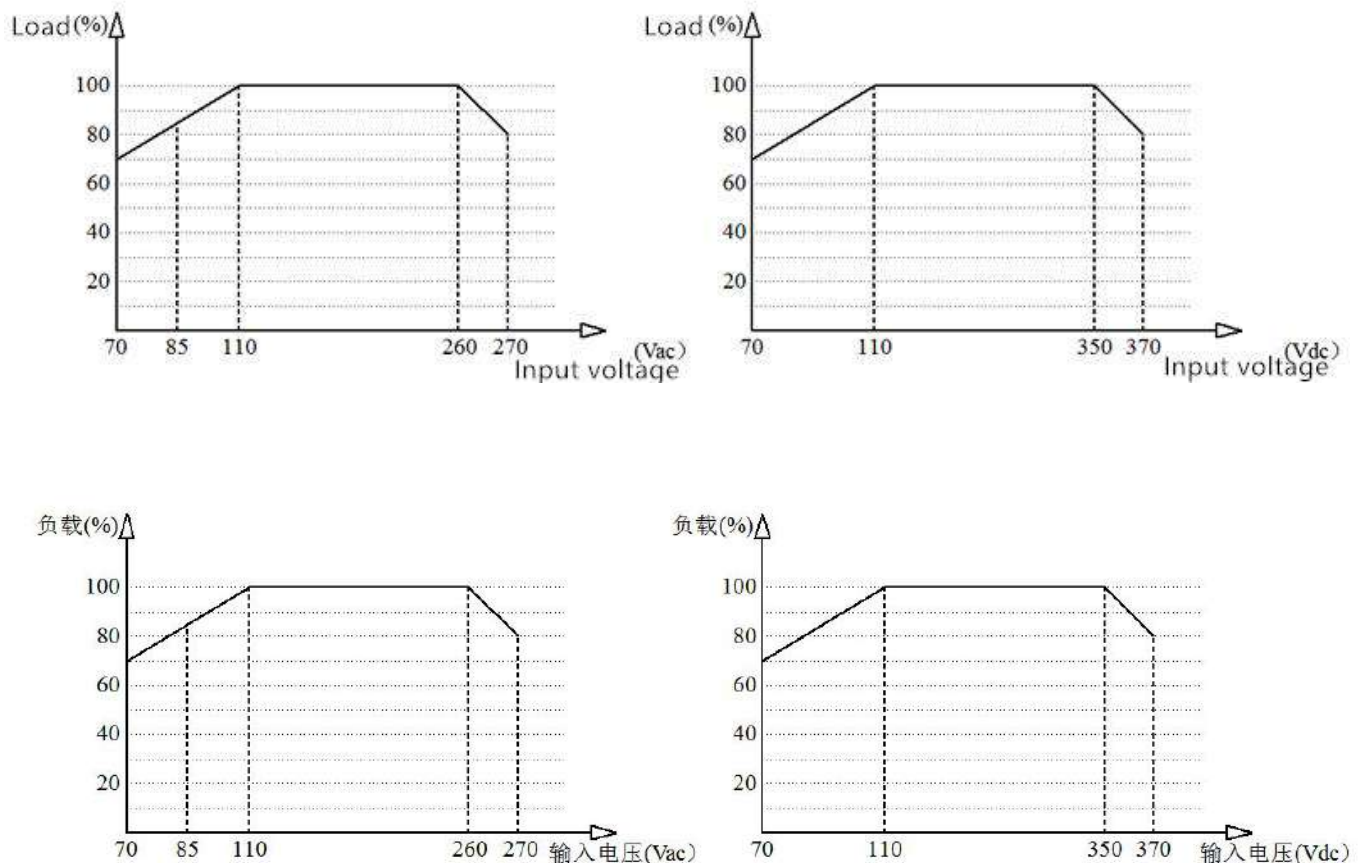
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|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| voltage                           |                                                                                                                                   |                 |                   |
| Short time maximum output current | $\geq 450$                                                                                                                        | mA              |                   |
| Long time maximum output current  | $\geq 330$                                                                                                                        | mA              |                   |
| Voltage regulation                | $\pm 0.2$                                                                                                                         | %               |                   |
| Load regulation                   | $\pm 0.5$                                                                                                                         | %               |                   |
| Output ripple and noise (mVp-p)   | $\leq 70$<br>Rated input voltage, output full load. With 20MHz bandwidth oscilloscope, Load side 10uF and 0.1uF capacitance test. | mV              |                   |
| Switch overshoot amplitude        | (Rated input voltage, output plus 10% load) $\leq 5$                                                                              | %V <sub>O</sub> |                   |
| Output over-current protection    | Output the maximum load of 110-150%                                                                                               | A               |                   |
| Output short circuit protection   | Direct output when the normal short-circuit, short circuit removed automatically resume normal work                               |                 | Undamaged machine |

### 5.5. Output characteristics(12V/250mA)

| Project Name                      | Technical Requirements | Unit | Notes |
|-----------------------------------|------------------------|------|-------|
| No-load rated output voltage      | $12.0 \pm 0.1$         | Vdc  |       |
| Full load rated output voltage    | $12.0 \pm 0.2$         | Vdc  |       |
| Short time maximum output current | $\geq 350$             | mA   |       |
| Long time maximum output current  | $\geq 250$             | mA   |       |
| Voltage regulation                | $\pm 0.2$              | %    |       |
| Load regulation                   | $\pm 0.5$              | %    |       |

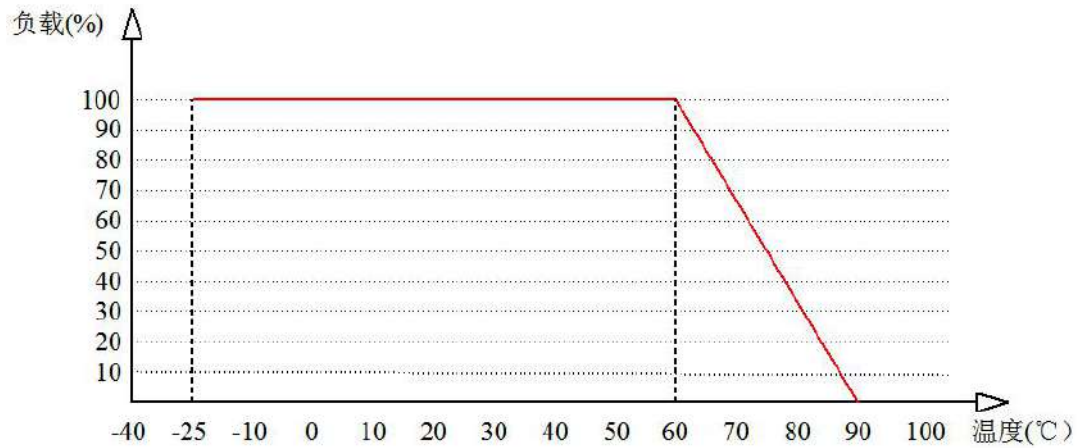
|                                 |                                                                                                                                   |                 |                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------|
| Output ripple and noise (mVp-p) | $\leq 70$<br>Rated input voltage, output full load. With 20MHz bandwidth oscilloscope, Load side 10uF and 0.1uF capacitance test. | mV              |                   |
| Switch overshoot amplitude      | (Rated input voltage, output plus 10% load) $\leq 5$                                                                              | %V <sub>O</sub> |                   |
| Output over-current protection  | Output the maximum load of 110-150%                                                                                               | A               |                   |
| Output short circuit protection | Direct output when the normal short-circuit, short circuit removed automatically resume normal work                               |                 | Undamaged machine |

## 6. Input voltage and load characteristics

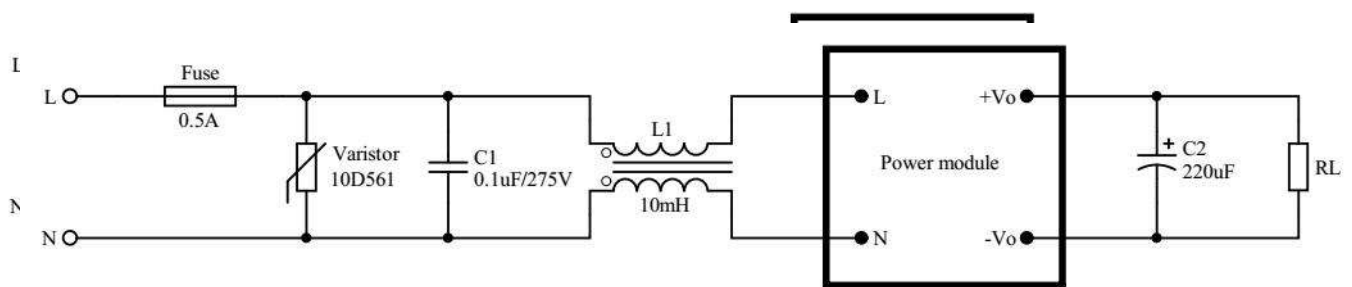


Input voltage and load characteristics curve

## 7. Working Environment Temperature And Load Characteristics

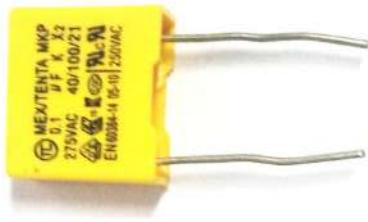


## 8. Typical Application Circuit



### Input section

| Component number/<br>Recommended device | Function                                                     | Value                                 |
|-----------------------------------------|--------------------------------------------------------------|---------------------------------------|
| Fuse                                    | protect the circuit from damage when the module is abnormal. | 0.5A/250Vac, slow blow                |
| Varistor                                | Protect the module do not damaged in the accumulative surge  | 10D561K                               |
| C1/Safety capacitor                     | Filtering safety protection (EMC certification)              | 0.1uF/275Vac                          |
| L1/Common mode choke                    | EMI filtering                                                | Sense value 10-15mH, current 70-500mA |



Safety capacitor



Common mode choke

Note:

- Fuses and varistor for the basic protection circuit (Received).
- To pass certification, safety capacitor and common mode inductance can not be omitted.

## Output section

| Component number/<br>Recommended device | Function                                                    | Value                                                                            |
|-----------------------------------------|-------------------------------------------------------------|----------------------------------------------------------------------------------|
| C2/ Filtering capacitor                 | Filtering, the output AC signal can be maintain within 30mV | Aluminum electrolytic capacitors, capacitance range 100-220uF, Pressure drop>75% |
| RL/ Load                                | Load                                                        |                                                                                  |

Note: C2 filtering capacitor can bring down the output signal from the original 50mV to less than 30mV.

## 9. Safety Features

### 9.1. Certification

The product design meet UL, CE safety certification requirements. (Though the UL and CE certificates need to be done by client)

### 9.2. Safety and electromagnetic compatibility:

- Design of Input end fulfills the 0.5A security of UL certification;
- PCB board designed as double-sided copper clad plate, the material fireproof rating 94-V0 level;
- Safety standard in line with UL1012, EN60950, UL60950



- Insulation Voltage I/P-O/P:2500Vac
- Insulation Resistor I/P-O/P>100M Ohms/500Vdc 25℃ 70% RH
- Conductivity and Radiation meet EN55011, EN55022 (CISPR22)
- Electrostatic discharge IEC/EN 61000-4-2 level 4 8kV/15kV
- RF Radiation Immunity meet the standard IEC/EN 61000-4-3 (Check details in Application Notes)

### **9.3. Temperature safety design:**

The maximum temperature rise of the power supply capacitor, main converter and other inner surfaces at room temperature does not exceed 90 °C; the maximum temperature rise of the shell surface does not exceed 60 °C.

## **10. Marking, Packaging, Transportation, Storage**

### **10.1. Marking**

#### **10.1.1.Product marking**

Place the product's unique bar code logo in the proper location on the product to ensure trace ability of each product's production date, product batch, and more. Its content in line with national standards, industry standards.

#### **10.1.2.Package marking**

Product box marked with the name of the manufacturer, site, zip code, product model, factory year, month, day;

Marked with "up", "moisture-proof" and "carefree" and other transport signs, all signs are in line with the provisions of GB 191.

### **10.2. Products**



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Products using special plastic boxes separated packaging, with anti-vibration function, and in line with the provisions of GB 3873.

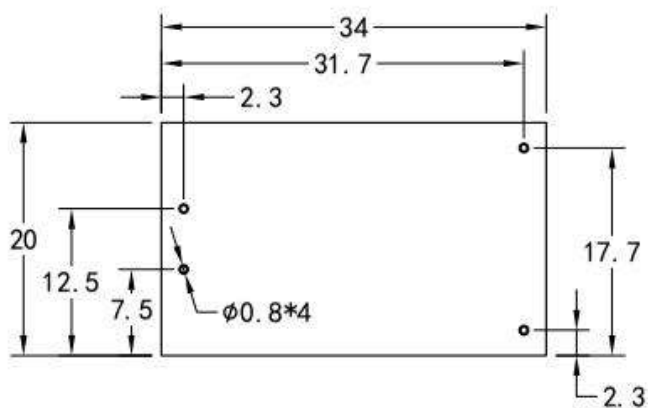
### **10.3. Packaging**

Packaged products can be transported by any means of transportation, should be awning in transit, there should be no violent vibration, impact, etc.

### **10.4. Storage**

Product storage should be consistent with the provisions of GB 3873.

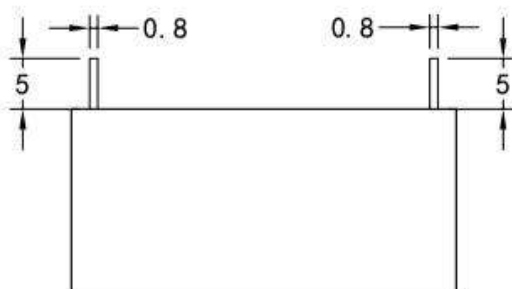
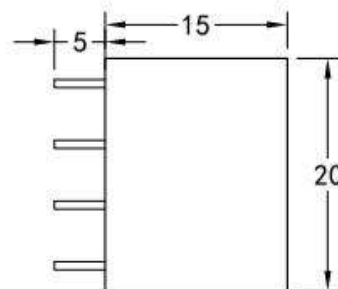
## **11. Overall Dimensions And Weight**



Pin function

|   |     |
|---|-----|
| 1 | AC  |
| 2 | AC  |
| 3 | -Vo |
| 4 | +Vo |

Weight: 20±1g



Dimensions Variation:

1. Pin Spacing Variation
2. Pin Length Variation  $\pm 0.5\text{mm}$
3. Pin Diameter Variation-0.2mm

单位: 毫米 (mm)

