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# 5W Ultra small series power module

5M03/5M05/5M09/5M12



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## 1. Ultra-small Series Power Module

The 5W ultra-small series module power supply is a small-volume, high-efficiency AC DC power module supply designed by Shenzhen Hi-Link Electronics Co.,Ltd. It has the advantages of global input voltage range, low temperature rise, low power consumption, high efficiency, high reliability and high safety isolation. It has been widely used in smart home, automation control, communications equipment, instrumentation and other industries.

## 2. Product Model

MODEL	Size (mm)	Output watt (W)	Output voltage (V)	Output current (mA)	Notes
HLK-5M03	38*23*18	5	3.3	1500	
HLK-5M05		5	5	1000	
HLK-5M09		5	9	560	
HLK-5M12		5	12	450	

## 3. Product features

1. Ultra-thin, ultra-small, smallest volume;
2. Global universal input voltage (90~245Vac)
3. Low power consumption, green environmental protection, no-load loss<0.1W
4. Low ripple, low noise
5. High output short circuit and over-current 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. Work without external circuit

14. 1 year quality guarantee period

#### 4. Environmental conditions

Items	Technical Parameters	Units	Notes
Working temperature	-25—+60	°C	
Storage temperature	-40—+80	°C	
Relative humidity	5—95	%	
Thermal methods	Natural cooling		
Atmospheric pressure	80—106	Kpa	
Altitude	≤2000	m	
Vibration	Vibration coefficient 10~500Hz,2G10min./1cycle, 60min.each along X,Y,Z axes		

#### 5. Electrical characteristics

##### 5.1. Input features

Items	Technical Parameters	Units	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	
Maximum input voltage	≤270	Vac	
Input start	≤50	mS	
Input low voltage	Vin=110Vac , Input full load ≥69	%	

efficiency			
Input high voltage efficiency	$V_{in}=220V_{ac}$ , Input full load $\geq 70$	%	
Long-term reliability	MTBF $\geq 100,000$	h	
External fuse recommended	1A/250Vac		

## 5.2. Output features (3.3V/1500mA)

Items	Technical Parameters	Units	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	$\geq 1800$	mA	
Long time maximum output current	$\geq 1500$	mA	
Voltage regulation	$\pm 0.2$	%	
Load regulation	$\pm 0.5$	%	
Output ripple and noise (mVp-p)	$\leq 50$ Rated input voltage, output full load. With 20MHz bandwidth oscilloscope, Load side 10uF and 0.1uF capacitance test.	mV	
Switching on/off overshoot amplitude	( Rated input voltage, output plus 10% load ) $\leq 5$	%V <sub>O</sub>	
Output over-current protection	Output maximum load 150-200%	A	
Output short circuit protection	Direct short circuit in normal output and automatic return to normal operation after removal of short circuit		No-damage to whole

			device
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### 5.3. Output features (5V/1000mA)

Items	Technical Parameters	Units	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	≥1200	mA	
Long time maximum output current	≥1000	mA	
voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Output ripple and noise(mVp-p)	≤50 Rated input voltage, full output load. Using 20MHz bandwidth oscilloscope,  Load side test with 10uF and 0.1uF capacitors	mV	
Switching on/off overshoot amplitude	( Rated input voltage, output plus 10% load ) ≤5	%V <sub>O</sub>	
Output overcurrent protection	Output maximum load 150-200%	A	
Output short circuit protection	Direct short circuit in normal output and automatic return to normal operation after removal of short circuit		No damage to the device

### 5.4. Output features (9V/560mA)

Items	Technical Parameters	Units	Notes
No-load rated output voltage	9.0±0.1	Vdc	

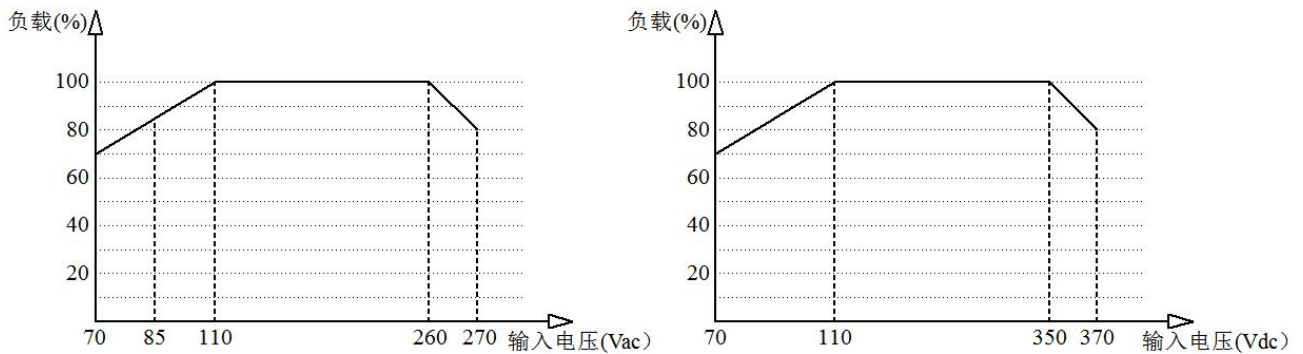
Full load rated output voltage	9.0±0.2	Vdc	
Short-time maximum output current	≥680	mA	
Long time maximum output current	≥560	mA	
voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Output ripple and noise(mVp-p)	≤70 Rated input voltage, full output load. Using 20MHz bandwidth oscilloscope, Load side and 10uF and 0.1uF capacitors are tested.	mV	
Switching on/off overshoot amplitude	( Rated input voltage, output plus 10% load ) ≤5	%V <sub>O</sub>	
Output overcurrent protection	Output maximum load 150-200%	A	
Output short circuit protection	Direct short circuit in normal output and automatic return to normal operation after removal of short circuit		No damage to the device

### 5.5. Output features (12V/450mA)

Items	Technical Parameters	Units	Notes
No-load rated output voltage	12.0±0.1	Vdc	
Full load rated output voltage	12.0±0.2	Vdc	
Short-time maximum output current	≥540	mA	
Long time maximum output current	≥450	mA	
voltage regulation	±0.2	%	

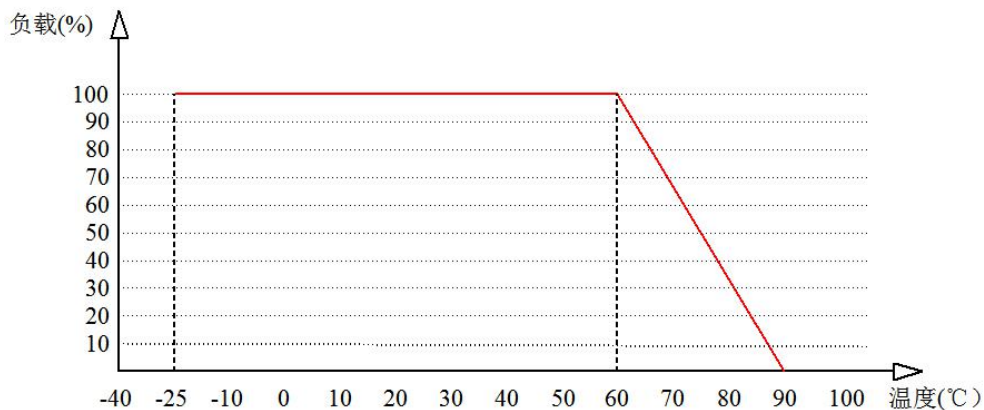
Load regulation	$\pm 0.5$	%	
Output ripple and noise(mVp-p)	$\leq 70$ Rated input voltage, full output load. Using 20MHz bandwidth oscilloscope, Load side and 10uF and 0.1uF capacitors are tested.	mV	
Switching on/off overshoot amplitude	( Rated input voltage, output plus 10% load ) $\leq 5$	%V <sub>O</sub>	
Output overcurrent protection	Output maximum load 110-150%	A	
Output short circuit protection	Direct short circuit in normal output and automatic return to normal operation after removal of short circuit		No damage to the device

## 6. Input voltage and load characteristics



Input voltage and load characteristic curve

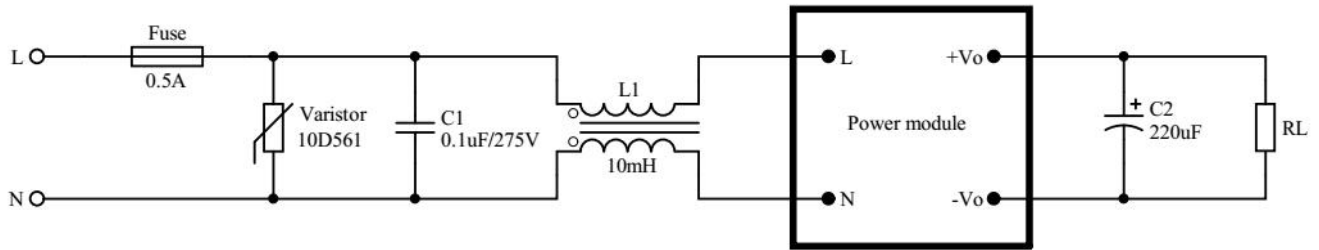
## 7. Working environment temperature and load characteristics





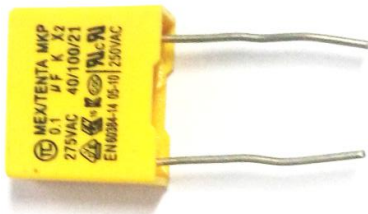
Environmental temperature and load characteristic curve

## 8. Typical application circuit



### Input parts

Component number / recommended device	Functions	Recommended value
Fuse	Protect the circuit from damage when the module is working wrong	0.5A/250Vac , Slow fuse
Varistor	The cumulative surge is to protect the module from damage	10D561K
C1/Safety capacitance	Filtering, safety protection ( EMC certification )	0.1uF/275Vac
L1/Common-mode inductance	EMI filtering	Sensible value 10-15mH , current 70-500mA



Safety capacitance



Common-mode inductance

Notes:

- Fuse and varistor are basic protective circuits.
- If you need to pass the authentication/certification, the Safety capacitance and common-mode inductance could not be omitted.

### Output parts

Component number / recommended device	Functions	Recommended value
C2/filter capacitor	output ripple can be controlled in 30mV after adding this capacitor	Aluminium electrolytic capacitance, capacity 100-220 UF, voltage reduction greater than 75%
RL/Load	Load	

Note: C2 filter capacitor can reduce the output ripple from the original 50mV to the 30mV.

## 9. Safety characteristic

### 9.1. Certification

The module meets UL and CE requirements and it is CE and RoHs certified by Hi-Link Electronic.

### 9.2. Safety and electromagnetic compatibility

- The input design adopts UL certification 0.5A insurance
- The PCB board is made of double-sided copper clad foil, and the material fire resistance grade is 94-V0 grade
- Safety standard meets UL1012,EN60950,UL60950
- Insulation voltage I/P-O/P:2500Vac
- Insulation resistance I/P-O/P>100M Ohms/500Vdc 25°C 70% RH
- Conduction and radiation meet EN55011, EN55022 (CISPR22)
- Electrostatic discharge IEC/EN 61000-4-2 level 4 8kV/15kV
- Radio frequency radiation immunity IEC/EN 61000-4-3

### 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**

The product's unique bar code mark is attached to the appropriate location of the product to ensure traceability of the date of manufacture, product batch, etc. of each product. Its content meets the requirements of national standards and industry standards.

#### **10.1.2. Packing 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**

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

### **10.3. Package**

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 must meet the requirements of GB3873.

### 11. Dimensions and weight

