Shenzhen Hailingke Electronics Co., Ltd.

5W Ultra-small Series Module Power Supply

5M03/5M05/5M09/5M12/5M24

Version: V2.5 Revision date: May 22, 2020

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1. Ultra-small series module power supply

5W ultra-small series power modules are small-sized, high-efficiency power modules designed by Hailingke Electronics for customers. They have a global input voltage range, Low temperature rise, low power consumption, high efficiency, high reliability, high safety isolation and other advantages. It has been widely used in smart home, automation control, communication equipment, Instruments and other industries.

2. Product model

model (MODEL)	Module housing size (mm)	Output Power (W)	The output voltage (V)	Output current (mA)	Remark 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	
HLK-5M24		5	twenty four	208	

3. Product Features

1. Ultra-thin, ultra-small, and the smallest volume in the industry
2. Universal input voltage (90~265Vac)
3. Low power consumption, green and environmentally friendly, no-load loss <0.1W
4. Low ripple and low noise
5. Good output short circuit and over current protection and self-recovery
6. High efficiency and 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 greater than 100,000 hours
10. Meet UL and CE requirements; product design meets EMC and safety test requirements
11. Use high-quality environmentally friendly waterproof thermal conductive glue for potting, moisture-proof and vibration-proof, meeting the waterproof and dustproof IP65 standard
12. Economical solution, high cost performance
13. Works without external circuit
14. 1 year quality warranty

4. Environmental conditions

project name	Technical indicators	unit	Remark
Working temperature	-25 to +60	ÿ	
Storage temperature	-40—+80	ÿ	
Relative humidity	5-95	%	
Cooling method	Natural cooling		
Atmospheric pressure	80-106	Kpa	
Altitude	ÿ2000	m	
vibration	Vibration coefficient 10~500Hz, 2G10min./1cycle, 60min.each along X,Y,Z axes		Meet the requirements of secondary road transportation Require

5. Electrical characteristics

5.1. Input characteristics

project name	skills requirement	unit	Remark
Rated input voltage	100-240	Vac	
Input voltage range	85-265	Vac or DC 70-350Vdc	
Maximum input current	ÿ0.2	A	
Input surge current	ÿ10	A	
Input slow start	ÿ50	mxD	
Long-term reliability	MTBF ÿ 100,000	h	
External fuse recommendation	1A/250Vac or 10ÿ wirewound resistor		Slow fuse

Note: Tested at room temperature

5.2. Output characteristics (3.3V/1500mA)

project name	skills requirement	Unit	Remarks
No-load rated output voltage	3.3±0.1	Vdc	
Full load rated output voltage	3.3±0.2	Vdc	
Short-time maximum output current	ÿ1800	mA	
Rated output current	1500	mA	
Voltage Regulation	±0.2	%	
Hello Elena	±0.5	%	
Input low voltage efficiency	Vin=115Vac, full load outputÿ69	%	
Input high voltage efficiency	Vin=230Vac, full load output ÿ70	%	
Output ripple and noise (mVp-p)	ÿ50 Rated input voltage, full output load. Using a 20MHz bandwidth oscilloscope, The load end is tested with 10uF and 0.1uF capacitors.	mV	
Switching overshoot amplitude	(Rated input voltage, output plus 10% load) ÿ5 %VO		
Output overcurrent protection	Output 110-150% of maximum load	A	
Output short circuit protection: Direct short circuit during normal output, automatically resume normal operation after the short circuit is removed			No damage to the whole machine

5.3. Output characteristics (5V/1000mA)

project name	skills requirement	Unit	Remarks
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	ÿ1200	mA	
Rated output current	1000	mA	
Voltage Regulation	±0.2	%	
Hello Elena	±0.5	%	

Input low voltage efficiency	Vin=115Vac, full load outputÿ69	%	
Input high voltage efficiency	Vin=230Vac, full load output ÿ70	%	
Output ripple and noise (mVp-p)	ÿ50 Rated input voltage, full output load. Using a 20MHz bandwidth oscilloscope, The load end is tested with 10uF and 0.1uF capacitors.	mV	
Switching overshoot amplitude	(Rated input voltage, output plus 10% load) ÿ5	%VO	
Output overcurrent protection	Output 110-150% of maximum load	A	
Output short circuit protection: Direct short circuit during normal output, automatically resume normal operation after the short circuit is removed			No damage to the whole machine

5.4. Output characteristics (9V/560mA)

project name	skills requirement	Unit	Remarks
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	ÿ680	mA	
Rated output current	560	mA	
Voltage Regulation	±0.2	%	
Hello Elena	±0.5	%	
Input low voltage efficiency	Vin=115Vac, full load outputÿ69	%	
Input high voltage efficiency	Vin=230Vac, full load output ÿ70	%	
Output ripple and noise (mVp-p)	ÿ70 Rated input voltage, full output load. Using a 20MHz bandwidth oscilloscope, The load end is tested with 10uF and 0.1uF capacitors.	mV	
Switching overshoot amplitude	(Rated input voltage, output plus 10% load) ÿ5	%VO	
Output overcurrent protection	Output 110-150% of maximum load	A	
Output short circuit protection: Direct short circuit during normal output, automatically resume normal operation after the short circuit is removed			No damage to the whole machine

5.5. Output characteristics (12V/450mA)

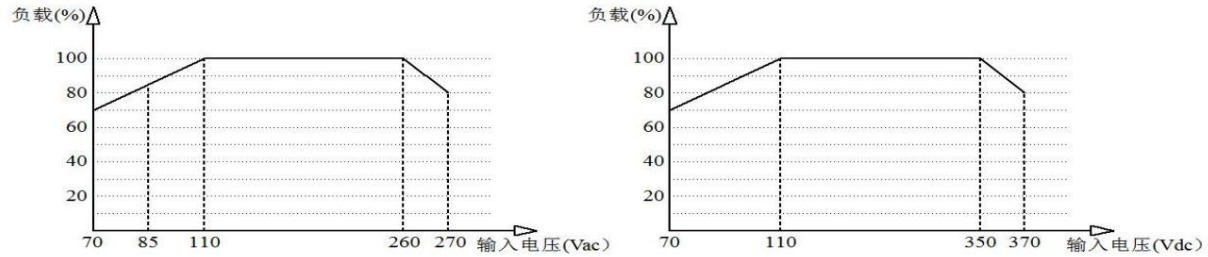
project name	skills requirement	Unit	Remarks
No-load rated output voltage	12.0±0.1	Vdc	

Full load rated output voltage	12.0±0.2	Vdc	
Short-time maximum output current	ÿ540	mA	
Rated output current	450	mA	
Voltage Regulation	±0.2	%	
Hello Elena	±0.5	%	
Input low voltage efficiency	Vin=115Vac, full load outputÿ69	%	
Input high voltage efficiency	Vin=230Vac, full load output ÿ70	%	
Output ripple and noise (mVp-p)	ÿ70 Rated input voltage, full output load. Using a 20MHz bandwidth oscilloscope, The load end is tested with 10uF and 0.1uF capacitors.	mV	
Switching overshoot amplitude	(Rated input voltage, output plus 10% load) ÿ5	%VO	
Output overcurrent protection	Output 110-150% of maximum load	A	
Output short circuit protection: Direct short circuit during normal output, automatically resume normal operation after the short circuit is removed			No damage to the whole machine

5.6. Output characteristics (24V/210mA)

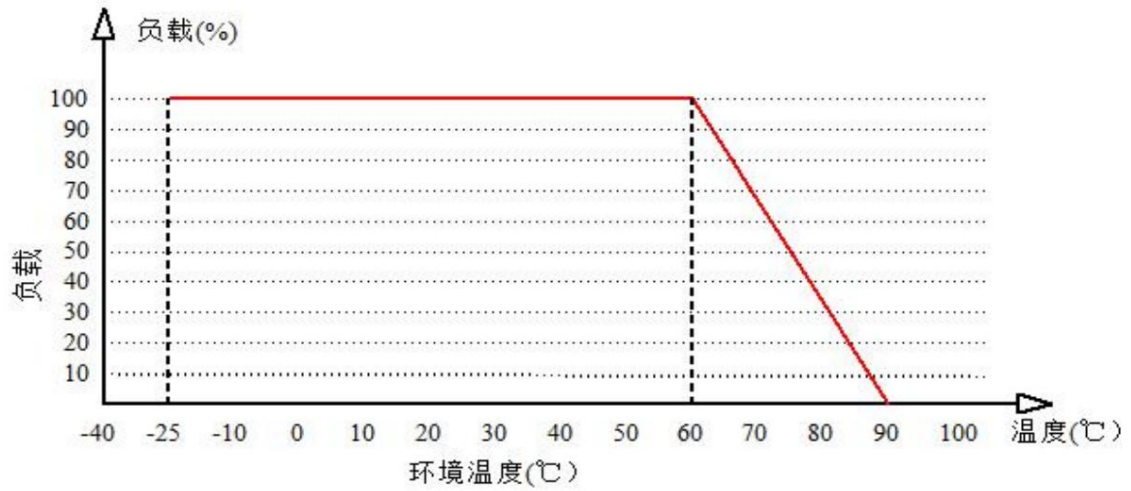
project name	skills requirement	Unit	Remarks
No-load rated output voltage	24±0.1	Vdc	
Full load rated output voltage	24±0.2	Vdc	
Short-time maximum output current	ÿ308	mA	
Rated output current	208	mA	
Voltage Regulation	±0.2	%	
Hello Elena	±0.5	%	
Input low voltage efficiency	Vin=115Vac, full load outputÿ69	%	
Input high voltage efficiency	Vin=230Vac, full load output ÿ70	%	
Output ripple and noise (mVp-p)	ÿ70 Rated input voltage, full output load. Using a 20MHz bandwidth oscilloscope, The load end is tested with 10uF and 0.1uF capacitors.	mV	
Switching overshoot amplitude	(Rated input voltage, output plus 10% load) ÿ5	%VO	
Output overcurrent protection	Output 110-150% of maximum load	A	
Output short circuit protection: Direct short circuit during normal output, automatically resume normal operation after the short circuit is removed			No damage to the whole machine

6. Input voltage and load characteristics

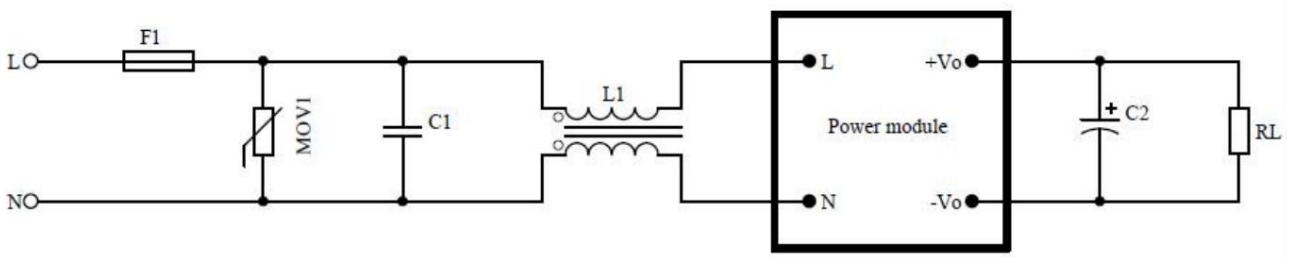


Input voltage and load characteristic curve

7. Derating curve



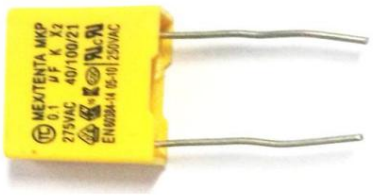
8. Typical application circuit



Input section

Component number/recommended device	effect	Recommended value

F1/Fuse	When the module is abnormal, the circuit is protected from damage	1A/250Vac or 10ÿ wirewound resistor, Slow fuse
MOV1/Varistor	Protects modules from damage during cumulative surges	10D561K
C1/X Safety capacitor	Filtering, safety protection (EMC certification)	0.1uF/275Vac
L1/Common mode inductor	EMI Filtering	Inductance: 10-30mH, test requirements: 1KHZ/0.3V Current:100-500mA



Safety capacitor

Common mode inductor

Remark:

ÿ Fuses and varistors are basic protection circuits (must be connected).

ÿ If certification is required, safety capacitors and common-mode inductors cannot be omitted.

Output section

Component number/recommended device	effect	Recommended value
C2/Filter capacitor	After adding this capacitor, the user can adjust the output The ripple voltage	Aluminum electrolytic capacitor, capacitance 100-220uF, resistant Voltage drop is greater than 75%
RL/Load	load	

9. Safety features

9.1. Authentication

The product design complies with UL and CE safety certification requirements. (UL and CE certifications are done by the customer themselves and need to be designed according to the reference circuit.)

9.2. Safety and electromagnetic compatibility:

ÿ The input end is designed with UL certified 1A/250Vac slow-blow fuse or 10ÿ wirewound resistor;

ÿ The PCB board is made of double-sided copper-clad board, and the material fire protection grade is 94-V0;

ÿ Safety standards comply with UL1012, EN60950, UL60950

ÿ Insulation voltage I/PO/P: 2500Vac

ÿ Insulation resistance I/PO/P>100M Ohms/500Vdc 25ÿ 70% RH

ÿ Conduction and radiation comply with EN55011, EN55022 (CISPR22)

ÿ Electrostatic discharge IEC/EN 61000-4-2 level 4 8kV/15kV

ÿ RF radiated immunity IEC/EN 61000-4-3 See application notes for details

10. Marking, packaging, transportation and storage

10.1. Logo

10.1.1. Product Logo

A unique barcode is affixed to the appropriate location of the product to ensure the production date, product batch, etc. of each product

Information traceability: Its content complies with national and industry standards.

10.1.2 Packaging marking

The product packaging box shall be marked with the manufacturer's name, address, zip code, product model, and year, month, and day of manufacture;

It is marked with transportation signs such as "upward", "moisture-proof" and "handle with care", and all signs comply with the provisions of GB 191.

10.2. Packaging

The product is packaged in a special blister box with anti-vibration function and complies with GB 3873 regulations.

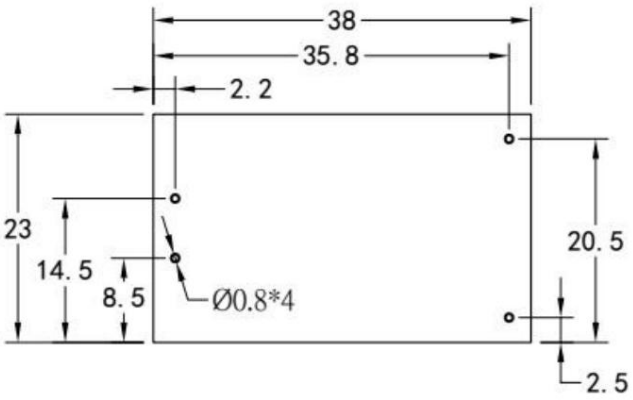
10.3. Transportation

The packaged products can be transported by any means of transportation. There should be a canopy during transportation and there should be no severe vibration, impact, etc.

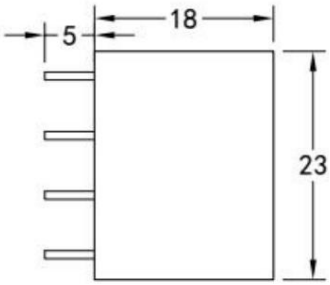
10.4. Storage

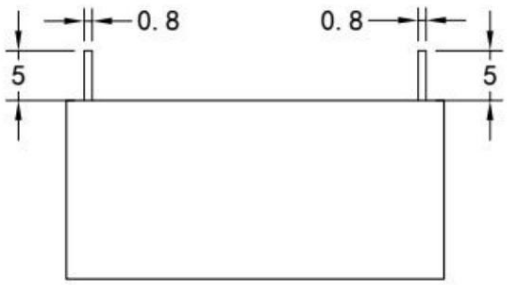
Product storage should comply with the requirements of GB 3873.

11 Dimensions and weight



Pin Function	
1	AC
2	AC
3	-V0
4	+V0
Weight: 32±2g	





Dimensional error:

1. Length, width, height and pin spacing error ±8%
2. Pin length error ±1mm
3. Pin diameter error -0.2mm

单位：毫米（mm）