



Shenzhen Hi-Link Electronic Co., Ltd.

5W DIY series AC-DC power module

**5LS03/5LS05/5LS09
5LS12/5LS15/5LS24**



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1. Ultra-small Series Power Module

The 5W LS 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 power (W)	Output voltage (V)	Output current (mA)	Notes
HLK-5LS03	26.4*17.5*10	3.3	3.3	1000	
HLK-5LS05		5	5	600	
HLK-5LS09			9	560	
HLK-5LS12			12	420	
HLK-5LS15			15	333	
HLK-5LS24			24	208	

3. Product features

1. Ultra-thin, ultra-small, smallest volume in the industry;
2. Global universal input voltage (85~265Vac)
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. Economic solutions, cost-effective
12. 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		Meets requirements for secondary road transportation

5. Electrical characteristics

5.1. Input features

Items	Technical Parameters	Units	Notes
Rated input voltage	100-240	Vac	
Input voltage range	85-265	Vac	or 120-350Vdc
The maximum input current	≤0.2	A	
Input inrush current	≤10	A	
Input low start	≤50	mS	
Long-term reliability	MTBF≥100, 000	h	
External fuse recommended	1A / 250Vac or 10Ω wire wound resistance		Slow blow

Note: Tested at room temperature

5.2. Output features (3.3V/1000mA)

Items	Technical Parameters	Units	Notes
No-load rated output voltage	3.3±0.1	Vdc	
Full-load rated output voltage	3.3±0.1	Vdc	
Short time maximum output current	≥1200	mA	
Rated output current	1000	mA	
Voltage regulation	±0.1	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥77	%	
Input high voltage efficiency	Vin=230Vac, Output full load ≥75	%	
Output ripple and noise (mVp-p)	≤150 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)≤ 5	%V _O	
Output over-current 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 whole device

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±0.1	Vdc	
Short time maximum output current	≥1200	mA	
Rated output current	1000	mA	
Voltage regulation	±0.1	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥78	%	
Input high voltage efficiency	Vin=230Vac, Output full load ≥77	%	
Output ripple and noise (mVp-p)	≤170 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) ≤ 5	%V _O	
Output over-current 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 whole 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±0.1	Vdc	
Short time maximum output current	≥720	mA	
Rated output current	560	mA	
Voltage regulation	±0.1	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥80	%	
Input high voltage efficiency	Vin=230Vac, Output full load ≥78	%	
Output ripple and noise (mVp-p)	≤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)≤ 5	%V _O	
Output over-current 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 whole device

5.5. Output features (12V/420mA)

Items	Technical Parameters	Units	Notes
No-load rated output voltage	12.0±0.3	Vdc	
Full-load rated output voltage	12.0±0.3	Vdc	
Short time maximum output current	≥570	mA	
Rated output current	420	mA	
Voltage regulation	±0.3	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥81	%	
Input high voltage efficiency	Vin=230Vac, Output full load ≥78	%	
Output ripple and noise (mVp-p)	≤100 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) ≤ 5	%Vo	
Output over-current 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 whole device

5.6. Output features (15V/333mA)

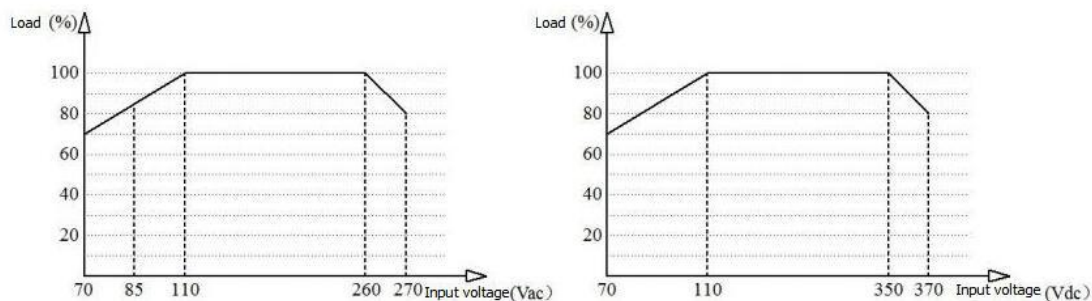
Items	Technical Parameters	Units	Notes
No-load rated output voltage	15±0.4	Vdc	

Full-load rated output voltage	15±0.4	Vdc	
Short time maximum output current	≥460	mA	
Rated output current	333	mA	
Voltage regulation	±0.4	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥84	%	
Input high voltage efficiency	Vin=230Vac, Output full load ≥82	%	
Output ripple and noise (mVp-p)	≤150 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) ≤ 5	%Vo	
Output over-current 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 whole device

5.7. Output features (24V/208mA)

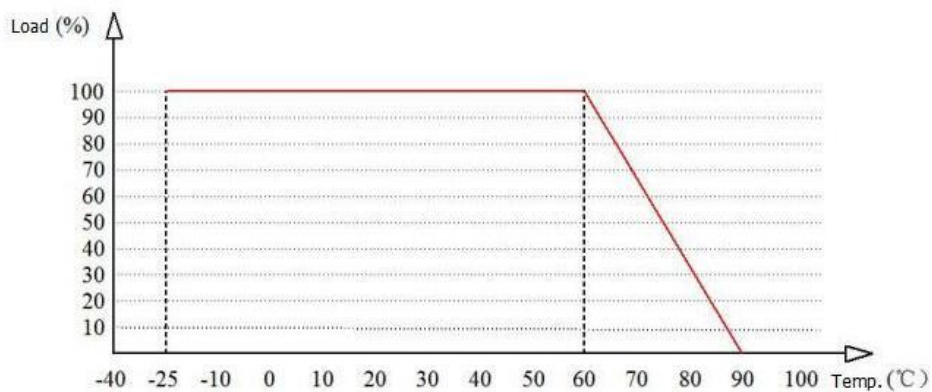
Items	Technical Parameters	Units	Notes
No-load rated output voltage	24.0±0.2	Vdc	
Full-load rated output voltage	24.0±0.2	Vdc	
Short time maximum output current	≥304	mA	
Rated output current	208	mA	
Voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥85	%	
Input high voltage efficiency	Vin=230Vac, Output full load ≥82	%	
Output ripple and noise (mVp-p)	≤100 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) ≤ 5	%V _O	
Output over-current 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 whole device

6. Input voltage and load characteristics

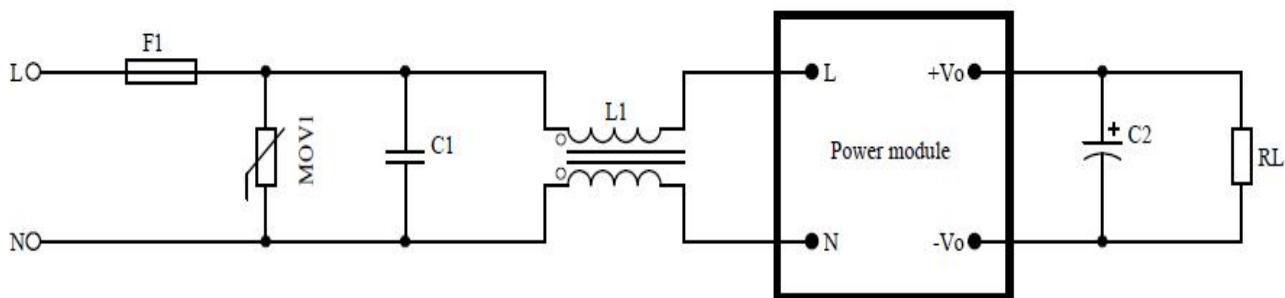


Input voltage and load characteristic curve

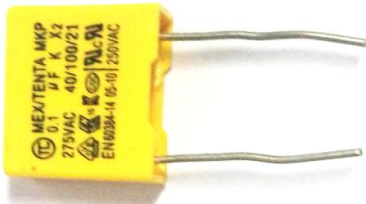
7. Working environment temperature and load characteristics



8. Typical application circuit



8.1 Input parts

Component number / recommended device	Functions	Recommended value
F1/ Fuse	Protect the circuit from damage when the module is working wrong	1A/250Vac, Or a 10Ω wire-wound resistor, Slow fuse
MOV1/Varistor	The cumulative surge is to protect the module from damage	10D561K
C1/ X Safety capacitance	Filtering, safety protection (EMC certification)	0.1uF/275Vac
L1/Common-mode inductance	EMI filtering	Sensible value: 10-30mH Test requirements: 1KHZ / 0.3V current: 100-500mA
		
Safety capacitance		Common-mode inductance

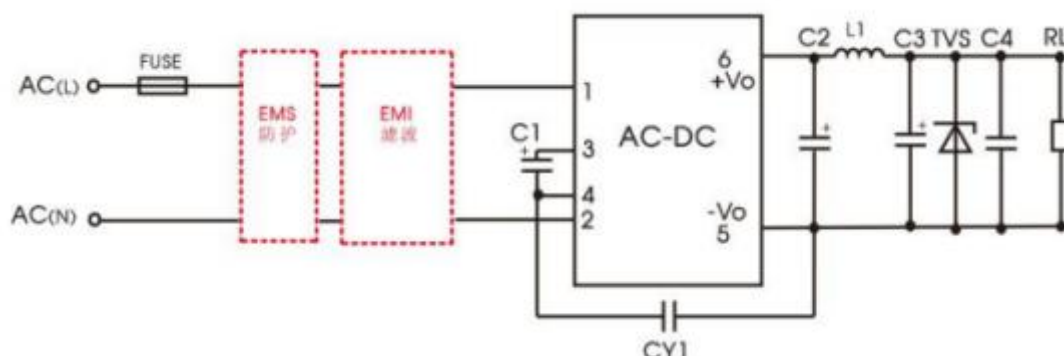
Notes:

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

8.2 Output parts

Component number / recommended device	Functions	Recommended value
C2/filter capacitor	Filter, after adding this capacitor, the user can adjust the ripple voltage of the output	Aluminium electrolytic capacitance, capacity 100-220 UF, voltage reduction greater than 75%
RL/Load	Load	

8.3 Peripheral overall scheme design



LS05(-F) series peripheral device selection reference (excluding EMC devices)

MODEL	C1	C2 (must connect)	L1	C3 (must connect)	C4	CY1 (must connect)	TVS tube		
	(must connect)		(must connect)						
HLK-5LS03	10uF/450V(-25°C to +85°C,85-305VAC input; -40 ° C to +85 ° C,165-305VAC input)22uF/450V(-40 ° C to +85 ° C,85-305VAC input)	820uF/6.3V(Solid State capacitor)	4.7uH/60mΩ/2.2A	100uF/35V	0.1uF/50V	0.1nF/400VAC	SMBJ7.0A		
HLK-5LS05		470uF/16V(Solid State capacitor)		47uF/35V				SMBJ12A	
HLK5LS09		270uF/16V(Solid State capacitor)					SMBJ20A		
HLK-5LS12		220uF/35V							SMBJ30A
HLK-5LS15									
HLK5LS24									

LS series peripheral overall scheme design

Notes:

- C1: AC input, C1 is the input filter electrolytic capacitor (must be connected externally); When DC is input, C1 is a large filter capacitor in the EMC filter (must be connected externally); An electrolytic capacitor with ripple current > 200mA@100KHz is recommended.
- C3 is the output filter electrolytic capacitor (must be connected externally), and C2, L1 to form a Pi filter circuit, it is recommended to use high frequency low resistance electrolytic capacitor (low temperature -40°C C3 ESR ≤ 1.1 Ω) or solid state capacitor, C2 can use electrolytic capacitor in room temperature and high temperature environment application. For capacity and rated ripple current, refer to the technical specifications provided by each manufacturer. Capacitor withstand voltage derating to at least 80%. C4 is a ceramic capacitor to filter out high-frequency noise.
- TVS tube in the module abnormal protection of the post-stage circuit, recommended to use, specification selection is about 1.2 times the output voltage.

9.Safety characteristic

9.1 Certification

Product design meets UL and CE safety certification requirements. (The UL and CE certifications are made by the customer and need to be designed according to the reference circuit.)

9.2 Safety and electromagnetic compatibility

- The input is designed with UL listed 1A/250Vac slow blow fuses or 10 Ω wire-wound resistors.
- 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

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 Packaging

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

10.3 Transportation

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.

