Shenzhen Hi-Link Electronic Co., Ltd.

15W-LO series ultra-thin Bare Board module power supply

15LO05E/15LO09E/15LO12E
15LO15E/15LO24E

Contents

1. Product Introduction

The **15LOXXE** ultra-thin series bare board module power supply is a specialized power supply developed by Hi-link for the smart grid industry, which meets the standards of the power industry. This series of power supplies has the advantages of ultra wide input voltage range, dual-use of AC and DC, wide operating temperature range, high EMS level, high reliability, and safe isolation. The product is safe and reliable, with good EMC performance. Suitable for smart grid applications with poor power quality and high reliability requirements, such as smart transmission and substation, it can be used in microcomputer protection equipment, bus voltage protection equipment, or equipment with high reliability requirements that require 110VDC input.

2. Product Model

MODEL	Size (mm)	Output power (W)	Output voltage (V)	Output current (mA)	Notes
HLK-15LO05E	87.5*50*22	15	5	3000	
HLK-15LO09E		15	9	1670	
HLK-15LO12E		15	12	1250	
HLK-15LO15E		15	15	1000	
HLK-15LO24E		15	24	625	

3. Product features

1. Ultra-thin, ultra-small, smallest volume in the industry;
2. Global universal input voltage (85~305Vac)
3. Low power consumption, green environmental protection, no-load loss<0.5W
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 with high cost-effectiveness
12. Work without external circuit
13. 1 year quality guarantee period

4. Environmental conditions

Items	Technical Parameters	Units	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 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	100-277	Vac	
Input voltage range	85-305	Vac	or DC 88-430Vdc
Maximum input current	≤0.4	A	
Input inrush current	≤34	A	
input frequency	44-440	mS	
Long-term reliability	MTBF≥100, 000	h	
External fuse recommended	2A/250Vac		Slow blow

Note: Tested at room temperature

5.2. Output features (5V/3000mA)

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	≥3300	mA	
Rated output current	3000	mA	
Voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥80	%	
Input high voltage efficiency	Vin=305Vac, Output full load ≥80	%	
Output ripple and noise (mVp-p)	≤120 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 130-150%	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 (9V/1670mA)

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	≥1870	mA	
Rated output current	1670	mA	
Voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥80	%	
Input high voltage efficiency	Vin=305Vac, Output full load ≥80	%	
Output ripple and noise (mVp-p)	≤120 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 130-150%	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 (12V/1250mA)

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	≥1450	mA	
Rated output current	1250	mA	
Voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥80	%	
Input high voltage efficiency	Vin=305Vac, Output full load ≥80	%	
Output ripple and noise (mVp-p)	≤120 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 130-150%	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

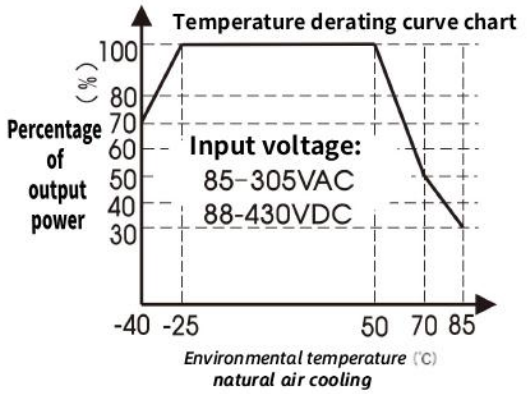
5.5. Output features (15V/1000mA)

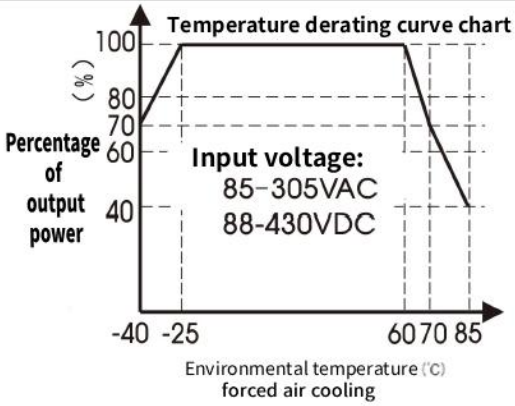
Items	Technical Parameters	Units	Notes
No-load rated output voltage	15±0.1	Vdc	
Full-load rated output voltage	15±0.2	Vdc	
Short time maximum output current	≥1200	mA	
Rated output current	1000	mA	
Voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥82	%	
Input high voltage efficiency	Vin=305Vac, Output full load ≥82	%	
Output ripple and noise (mVp-p)	≤120 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 130-150%	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

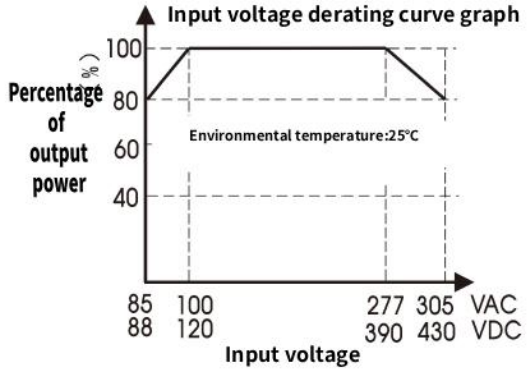
5.6. Output features (24V/625mA)

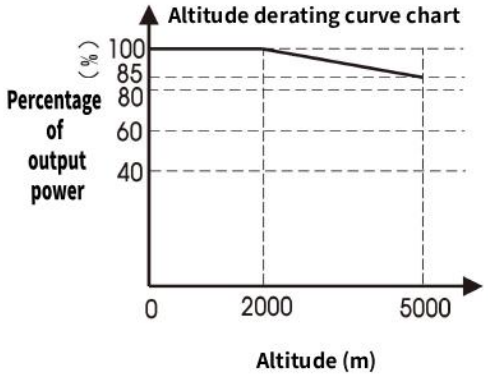
Items	Technical Parameters	Units	Notes
No-load rated output voltage	24.0±0.1	Vdc	
Full-load rated output voltage	24.0±0.2	Vdc	
Short time maximum output current	≥825	mA	
Rated output current	625	mA	
Voltage regulation	±0.2	%	
Load regulation	±0.5	%	
Input low voltage efficiency	Vin=115Vac, Output full load ≥82	%	
Input high voltage efficiency	Vin=305Vac, 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 130-150%	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. Product characteristic curve







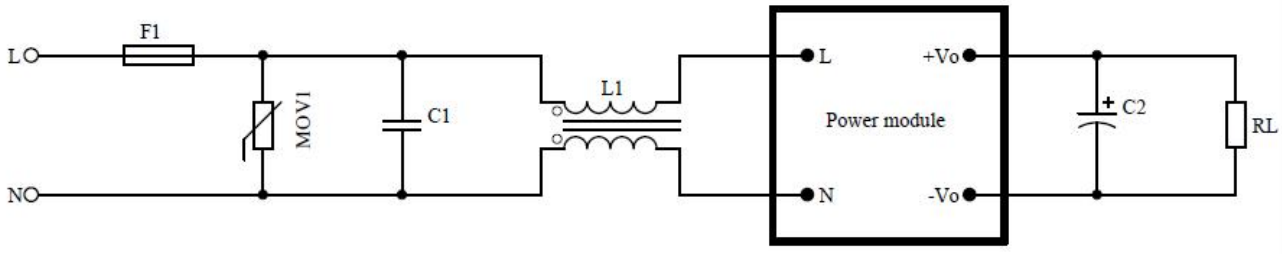


Note:

① For input voltages of 85-100VAC/277-305VAC/88-120VDC-390-430VDC, voltage derating should be performed based on temperature intervals;

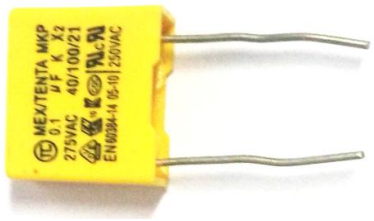
② This product is suitable for use in natural wind cooling environments.

8. Typical application circuit



Input part

Component number / recommended device	Functions	Recommended value
F1/Fuse	Protect the circuit from damage when the module is working wrong	2A/250Vac or 10 Ω wire wound resistor, Slow circuit breaker
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	Inductance: 10-30mH testing 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.

Output part

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

Notes：

- A TVS tube can be connected between the C2 and RL loads in the output section to protect the downstream circuit in case of module abnormalities.

Model	Recommended value
HLK-15LO05E	SMBJ7.0A
HLK-15LO09E	SMBJ7.0A
HLK-15LO12E	SMBJ20A
HLK-15LO15E	SMBJ20A
HLK-15LO24E	SMBJ30A

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 design adopts UL certified 2A/250Vac slow break fuse
- 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℃ 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 Please refer to the application instructions for details

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 trace

ability 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.

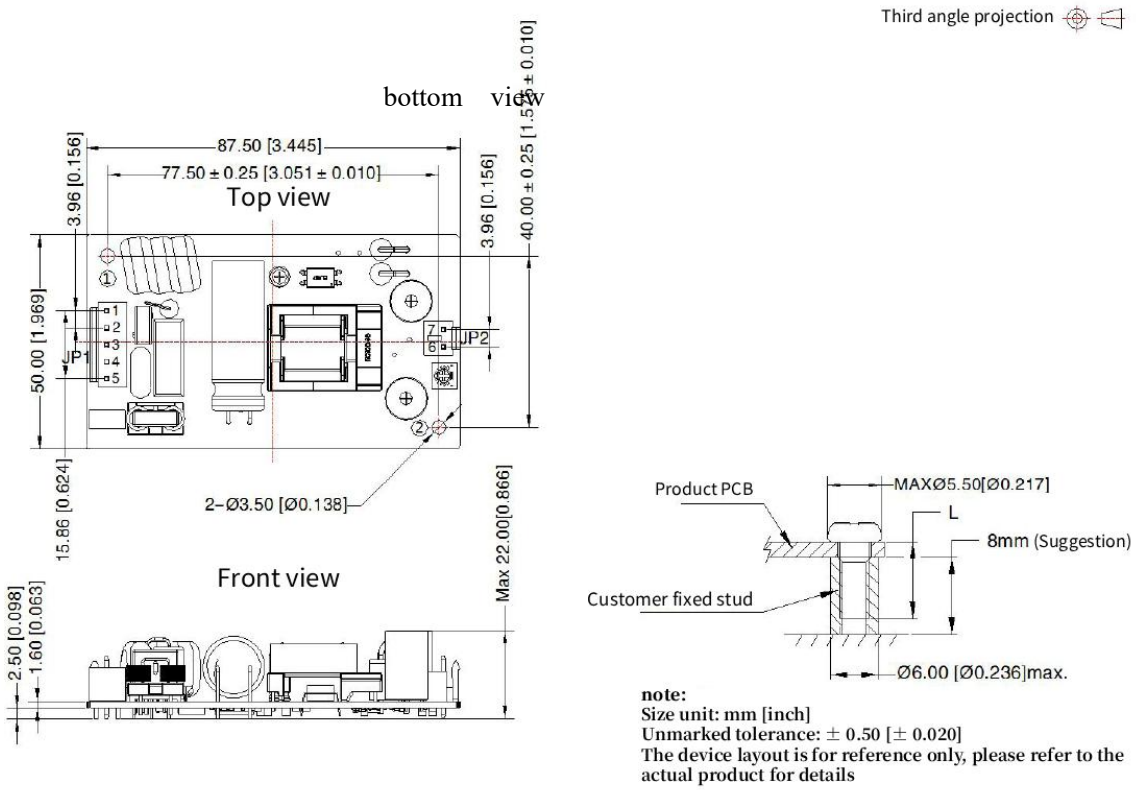
10.3 Transportation

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.

11. Overall dimensions



Pin Method			
Connector	Pin	Function	Client Connector
JP1	1	PE	Connector: JST VHR Connector terminal: JST SVH-21T-P1.1 or equivalent
	2	No Pin	
	3	AC(N)	
	4	No Pin	
	5	AC(L)	
JP2	6	+Vo	Connector: JST VHH Connector terminal: JST SVH-21T-P1.1 or equivalent
	7	-Vo	

Installation location	Screw specification	L(suggestion)	Torque(max)
①--②	M3	6mm	0.4N • m