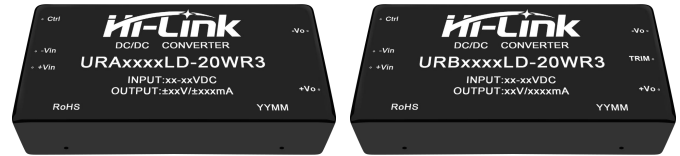


Typical Performance

- Ultra wide range input (4:1), output 20W
- Conversion efficiency 91% (Typ)
- Isolated voltage 1500Vdc
- Ultra-low standby power consumption: 0.036W
- Ultra-fast startup: 1ms (Typ)
- Operating temperature range: -40°C~+85°C
- Input undervoltage protection, output short circuit, overcurrent, overvoltage protection
- Metal shell, low output ripple
- International standard pins, PCB board in-line installation

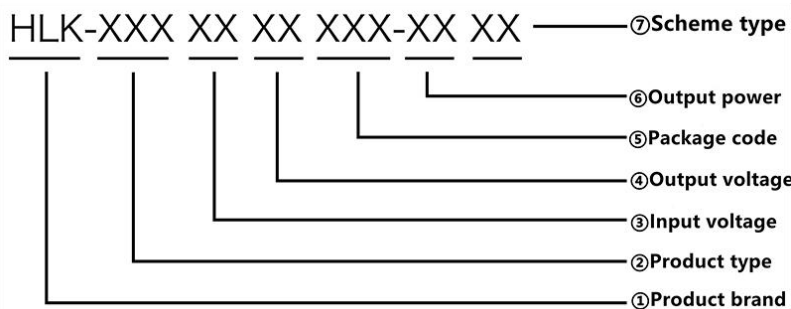
20W, ultra-wide voltage input,
isolated voltage regulator single/dual,
DIP package, DC-DC power module



RoHS

The output power of UR(A)B_LD-20WR3 series products is 20W, 4:1 wide voltage input range, efficiency up to 91%, 1500VDC conventional isolation voltage, allowable operating temperature -40°C to +85°C, with input under-voltage protection, Output overvoltage, overcurrent, short circuit protection function, bare metal meets CISPR32/EN55032CLASSA, widely used in medical, industrial control, electric power, instrumentation, communication, railway and other fields.

Product Coding Rules



Product List

Certificate	Product Module number ^①	Input Voltage range (Vdc)		Output Voltage/Current		Ripple and Noise	Maximum capacitive load	Efficiency @ full load
		Nominal value ^② (range value)	Max value	Output voltage (Vdc)	Output current (mA) (Max.Min.)	Full load (mVp-p) Typ/Max.	μF Max.	% (Min/TPY)
	URB2403LD-20WR3	24 (9~36)	40	3.3	5000/0	30/50	10000	86/88
	URB2405LD-20WR3			5	4000/0	30/50	10000	88/90
	URB2409LD-20WR3			9	2222/0	30/50	1600	88/90
	URB2412LD-20WR3			12	1666/0	50/80	1600	88/90
	URB2415LD-20WR3			15	1333/0	50/80	1000	89/91
	URB2424LD-20WR3			24	833/0	50/80	500	89/91

	URA2405LD-20WR3			±5	±2000/0	30/50	2000	85/87
	URA2409LD-20WR3			±9	±1111/0	50/80	800	86/88
	URA2412LD-20WR3			±12	±833/0	50/80	800	88/90
	URA2415LD-20WR3			±15	±666/0	50/80	600	88/90
	URA2424LD-20WR3			±24	±416/0	50/80	300	87/89
	URB4803LD-20WR3	48 (18-75)	80	3.3	5000/0	30/50	2500	80/82
	URB4805LD-20WR3			5	4000/0	30/50	2200	88/90
	URB4809LD-20WR3			9	2222/0	30/50	1600	88/90
	URB4812LD-20WR3			12	1666/0	50/80	680	87/89
	URB4815LD-20WR3			15	1333/0	50/80	470	88/90
	URB4824LD-20WR3			24	833/0	50/80	500	89/91
	URA4805LD-20WR3		80	±5	±2000/0	30/50	2000	84/86
	URA4809LD-20WR3			±9	±1111/0	50/80	2000	85/87
	URA4812LD-20WR3			±12	±833/0	50/80	800	88/90
	URA4815LD-20WR3			±15	±666/0	50/80	600	88/90
	URA4824LD-20WR3			±24	±416/0	50/80	300	87/89
	URB1D03LD-20WR	110 (40-160)	180	3.3	5000/0	30/50	10000	85/87
	URB1D05LD-20WR			5	4000/0	30/50	10000	86/88
	URB1D09LD-20WR			9	2222/0	30/50	1600	88/90
	URB1D12LD-20WR			12	1667/0	50/80	2200	88/90
	URB1D15LD-20WR			15	1333/0	50/80	1000	89/91
	URB1D24LD-20WR			24	833/0	50/80	470	89/91
	URA1D05LD-20WR			±5	±2000/0	30/50	4000	84/86
	URA1D09LD-20WR			±9	±1111/0	50/80	2000	85/87
	URA1D12LD-20WR			±12	±833/0	50/80	1000	88/90
	URA1D15LD-20WR			±15	±667/0	50/80	470	89/91
	URA1D24LD-20WR			±24	±416/0	50/80	220	89/91

Note:

1. Due to the limited space, the above is just a list of typical products. If you need products other than the list, please contact the sales department of our company.
2. The maximum capacitive load indicates the maximum capacitive load that can be connected to +Vo or -Vo. If it exceeds this value, the product will not be able to start normally.
3. If the input voltage exceeds the maximum value, it may cause permanent damage to the product.
4. The URB_LD-20WR3 single output series has a remote control terminal (CTRL) and an output voltage adjustment terminal (TRIM). The URA_LD-20WR3 dual output series has a remote control terminal (CTRL) but no voltage adjustment terminal (TRIM).

Test conditions: Unless otherwise specified, all parameter tests are measured under nominal input voltage, purely resistive rated load and 25°C room temperature.

Input Features

Items	Working conditions	Min.	Typ.	Max.	Unit
Input current (full load/ no load)	24VDC nominal input series, nominal input voltage	3.3V	-	782/20800/50	800/30
		5V/9V	-	926/25947/55	947/35
		12V	-	926/1.5947/15	947/2
		15V	-	916/1.5937/15	937/2
		24V	-	916/1.5937/20	937/2
		±5V/9V	-	968/25	992/35
		±12V	-	926/1.5947/15	947/2
		±15V	-	926/1.5947/55	937/2
		±24V	-	936/2	957/2
	48VDC nominal input series, nominal input voltage	3.3V	-	391/10	400/15
		5V/9V	-	463/12	474/18
		12V	-	458/1	469/1.5
		15V	-	458/1	469/1.5
		24V	-	458/1	469/1.5
		±5V	-	484/1	496/1.5
		±12V	-	458/1	469/1.5
		±15V	-	458/1	469/1.5
		±24V	-	468/2	478/2
	110VDC nominal input series, nominal input voltage	3.3V	-	173/1	177/2
		5V/9V	-	206/1	213/2
		12V	-	202/0.3	206/0.5
		15V	-	200/0.3	204/0.5
		24V	-	200/0.3	204/0.5
		±5V/9V	-	211/0.3	216/0.5
		±12V	-	202/0.3	206/0.5
		±15V	-	200/0.3	204/0.5
		±24V	-	200/0.3	204/0.5
Reflected Ripple	Nominal Input Series	-	40	-	mA
Impulse voltage (Isec.max)	24VDC Nominal Input Series	-0.7	-	50	VDC
	48VDC Nominal Input Series	-0.7	-	100	
	110VDC Nominal Input Series	-0.7	-	180	
Starting voltage	24VDC Nominal Input Series	-	-	9	
	48VDC Nominal Input Series	-	-	18	
	110VDC Nominal Input Series	-	-	40	
Input undervoltage protection	24VDC Nominal Input Series	5.5	6.5	-	
	48VDC Nominal Input Series	12	15.5	-	
	110VDC Nominal Input Series	30	34	-	
Start Time	Nominal input voltage and constant resistance	-	1	-	mS
Input filter type	PI Type				

Hot plug		No support			
Remote control terminal (Ctrl) *	Module on	Ctrl floating or connected to TTL high level			
	Module off	Ctrl is connected to GND or low level (0-1.2VDC)			
	Input current at shutdown	-	0	1	mA

Note: *Ctrl control pin voltage is relative to input pin GND

Output Features

Items	Working and Test Conditions	+Vo1			-Vo2		
		Min.	Typ.	Max.	Min.	Typ.	Max.
Output load	Load percentage	0%	-	100%	0%	-	100%
Output Voltage Accuracy		-	±1.0%	±2.0%	-	±2.0%	±3.0%
Linear adjustment rate	Input voltage range	-	±0.2%	±0.5%	-	±1.5%	±2%
Load Regulation	20%~100% rated load, balanced load	-	±0.5%	±1%	-	±4.0%	±5.0%
Ripple & Noise	Pure resistive load, 20MHz bandwidth, peak-to-peak	-	50mVp-p	80mVp-p	-	50mVp-p	80mVp-p
Startup delay time		-	1ms	-	-	1ms	-
Output voltage regulation	Input voltage range	-	No adjustment end	-	-	No adjustment end	-
Dynamic Response Step Deviation	25% nominal load step	-	±3.0%	±5.0%	-	±3.0%	±5.0%
Dynamic response recovery time		-	300μs	500μs	-	300μs	500μs
Output overvoltage protection	Full voltage range input	110%Vo	-	160%Vo			
Output overcurrent protection	Full voltage range input	110%Io	150%Io	200%Io			
Output short circuit protection	Full voltage range input	sustainable, self-healing					

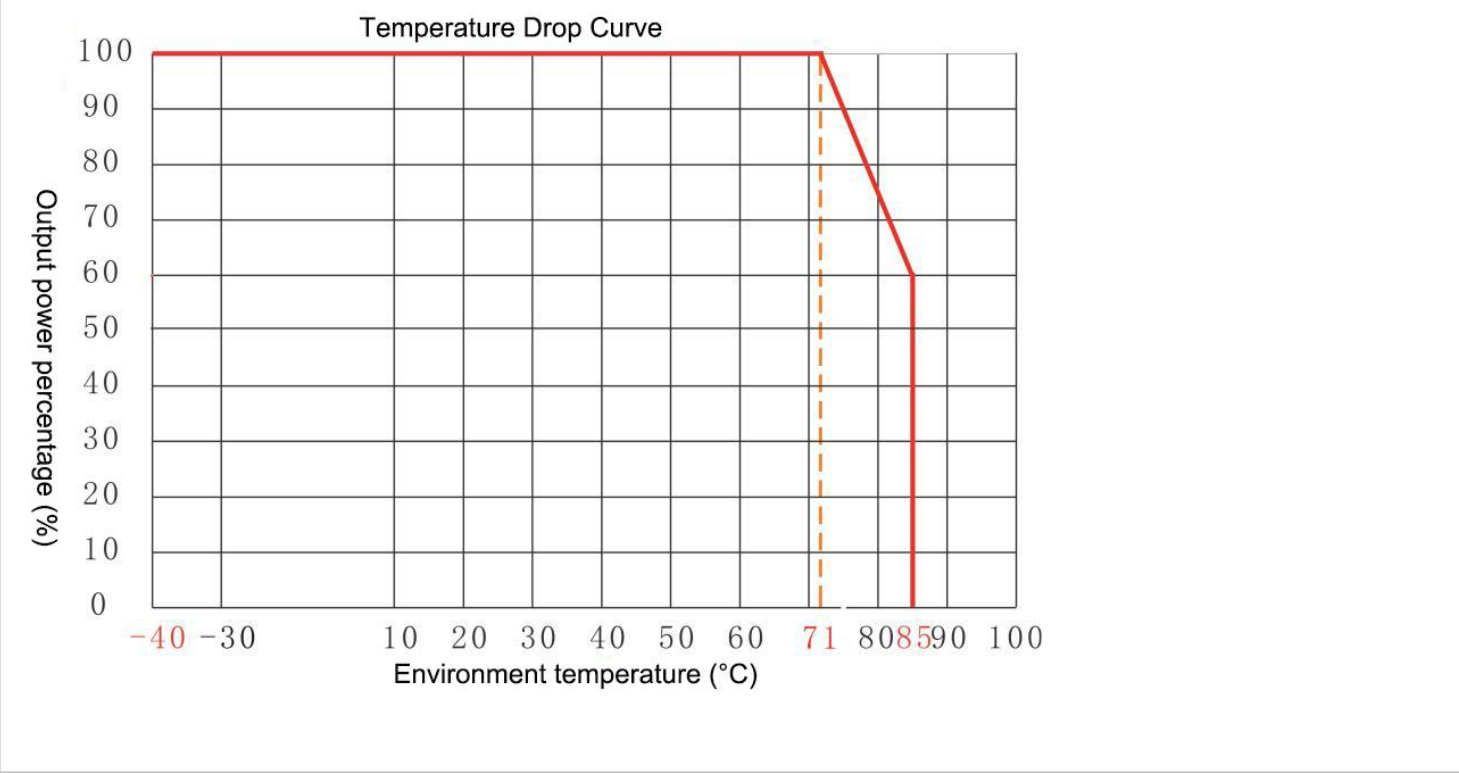
Note:

- ① For product models with output voltages of ±5VDC and ±9VDC, under 0%-5% load conditions, the maximum output voltage accuracy is ±5%;
- ② When tested under the working conditions of 0%-5% load, the index of the load adjustment rate is ±5%;
- ③ 0%-5% load ripple & noise less than or equal to 5% Vo. Ripple and noise test method Twisted pair test method, which can add capacitive load at the output to reduce light load ripple.

General characteristics

Items	Working conditions	Min.	Typ.	Max.	Unit
Insulation voltage	Input-output, test time is 1 minute, leakage current is less than 1mA	1500	--	--	VDC
Insulation resistance	Input-output, insulation voltage 500VDC	1000	--	--	MΩ
Isolation capacitor	Input-Output, 100KHz/0.1V	--	1000	--	pF
Operating temperature	Using the Reference Temperature Derating Curve	-40	--	+85	°C
Storage temperature		-40	--	+125	
Operating maximum case		--	--	+100	
Storage humidity	No condensation	5	--	95	%RH
Pin soldering temperature	The solder joint is 1.5mm away from the shell, 10s	--	--	+300	°C
On-off level	PWM Mode	--	250	--	KHz
Shock		10-55Hz,10G,30Min.alongX,Yand Z			
Shell material		Aluminum shell			
Minimum time between failures	MIL-HDBK-217F@25°C	--	2X10 ⁵	--	Hrs

Temperature characteristic curve



Reference design

1. Recommended test circuit

Generally recommended capacitors: C1: 47-100 μ F; C2, C3: 10-22 μ F.

All DC/DC converters in this series are tested according to the recommended test circuit (Figure 1) before leaving the factory. If it is required to further reduce the input and output ripple, the input and output external capacitors C1, C2 and C3 can be increased or capacitors with small series equivalent impedance values can be selected, but the capacitance value cannot be greater than the maximum capacitive load of the product.

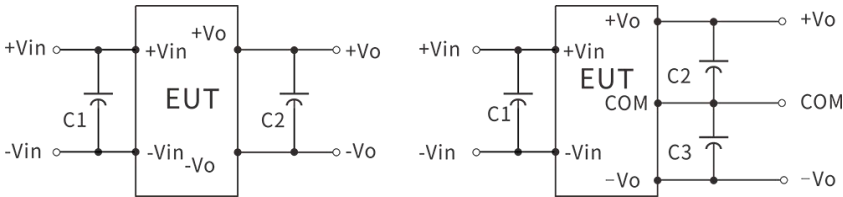
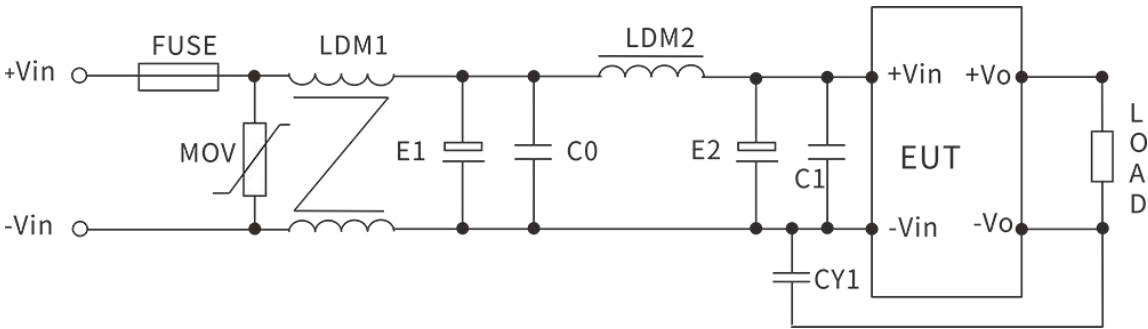


Figure 1

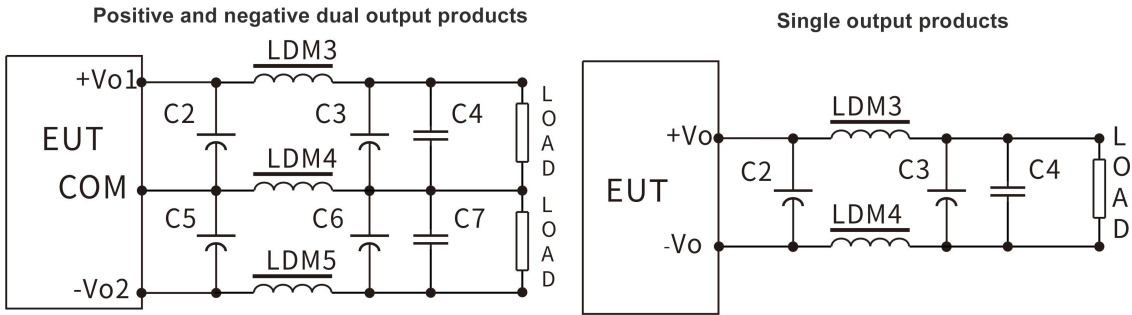
2. EMC solution - recommended circuit parameters:



Parameter recommendation

Accessories code	24V input	48V input	110V input
FUSE	Access the corresponding fuse according to customer needs		
MOV Varistor	14D560K	14D101K	14D201K
LDM1Common Mode Inductance	10mH	15mH	30mH
E1, E2 Electrolytic capacitor	100 μ F/50V	100 μ F/100V	63 μ F/200V
C0, C1 Ceramic capacitors	1 μ F/50V	1 μ F/100V	0.47 μ F/250V
LDM2 Differential Mode Inductance	10 μ H	15 μ H	68 μ H
CY1 safety Y2 capacitor	1nF/250Vac		

3. Recommended circuit for output filter peripheral



When the requirements for ripple & noise are general, it is recommended to use only C2 and C5 for the periphery; when the requirements for ripple & noise are strict, the circuit shown above is recommended.

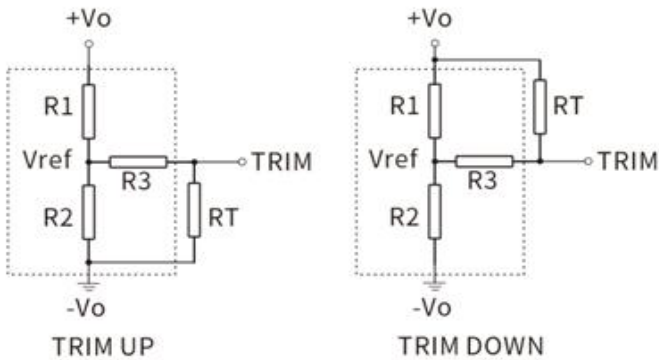
Note:

1. C2, C3, C5, C6 use high-frequency low-resistance electrolytic capacitors, and the total capacity cannot exceed the maximum capacitive load marked in the manual, otherwise the module will not be able to start normally.
2. When the capacitive load is used, the minimum load of 3% must be guaranteed, otherwise the module output will be abnormal.
3. LDM5 is only used for dual output products.

Parameter recommendation:

Accessories code	3.3V output	±5V or 5V output	±9V/12V or 9V/12V output	±15V or 15V output	±24V or 24V output
LDM3 inductance	0.47μH	1μH	2.2μH	2.2μH	4.7μH
LDM4 inductance	0.47μH	1μH	2.2μH	2.2μH	4.7μH
LDM5 inductance	-	1μH	2.2μH	2.2μH	4.7μH
C2, C3 electrolytic capacitor	220μF	220μF	100μF	100μF	68μF
C5, C6 electrolytic capacitor	220μF	220μF	100μF	100μF	68μF
C4, C7 ceramic capacitors	1μF/50V				

4. The use of Trim and the calculation of Trim resistance



Calculation formula of Trim resistance

$$\begin{aligned} \text{UP: } RT &= \frac{\textcircled{R} * R2}{R2 - \textcircled{R}} - R3 & \textcircled{R} &= \frac{V_{\text{ref}}}{V_o - V_{\text{ref}}} * R1 \\ \text{down: } RT &= \frac{\textcircled{R} * R1}{R1 - \textcircled{R}} - R3 & \textcircled{R} &= \frac{V_o - V_{\text{ref}}}{V_{\text{ref}}} * R2 \end{aligned}$$

RT is TRIM resistance

Ⓜ is a custom parameter, with no real meaning

Trim's use circuit (dotted box is inside the product)

Reference:

Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	30	18.261	84.5	1.25
5	45.3	14.778	84.5	1.25
9	30	11.441	120	2.5
12	56	14.571	84.5	2.5
15	56	11.218	154	2.5
24	84.5	9.791	84.5	2.5

5. Ripple and noise test

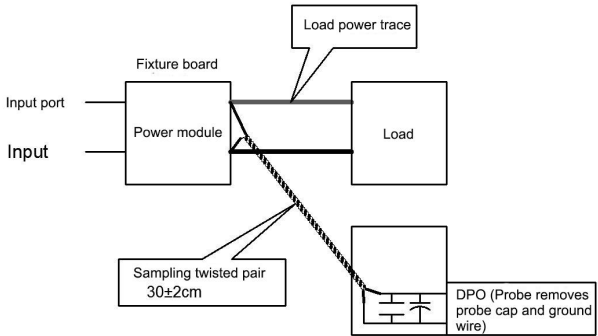
(Twisted pair method, 20MHZ bandwidth)

Testing method:

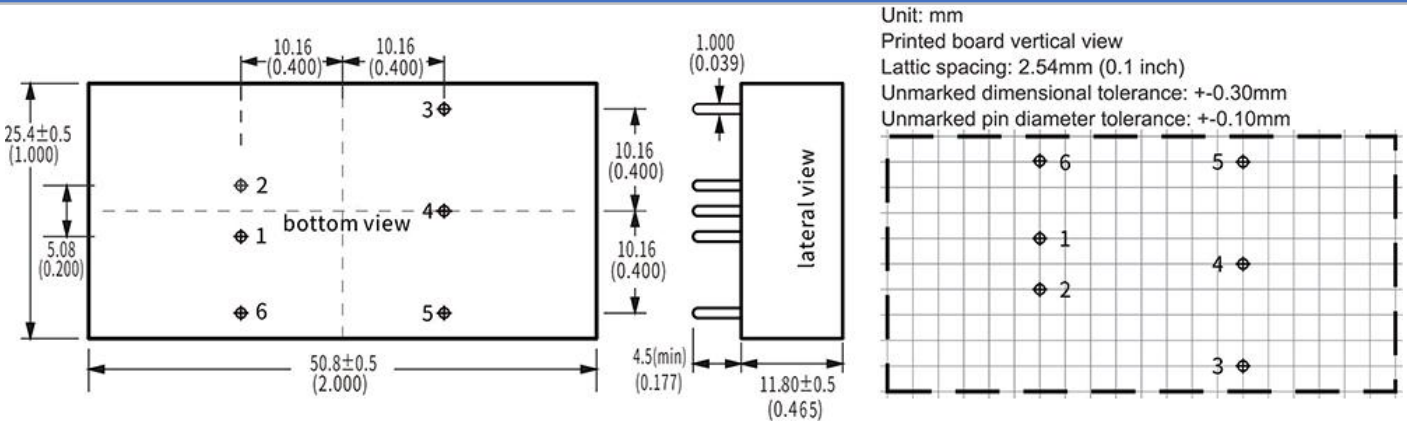
(1) Ripple noise is connected by 12# twisted pair. The oscilloscope bandwidth is set to 20MHz, 100M bandwidth probe, and 0.1uF polypropylene capacitor and 47uF high frequency low resistance electrolytic capacitor are connected in parallel on the probe end. The oscilloscope sampling uses Sample sampling mode.

(2) Schematic diagram of output ripple&noise test:

Connect the power input terminal to the input power supply terminal. The power output is connected to the electronic load through the fixture board. The test uses a 30cm ± 2 cm sampling line to sample directly from the power output port. The power line selects the insulated wire with the corresponding wire diameter according to the magnitude of the output current.



Package size and pin function diagram



Pin	1	2	3	4	5	6
Single phase	-Vin	+Vin	+Vo	Trim	GND	CTRL
	input negative	input positive	output positive	Voltage regulator	output GND	remote control
Dual phase	-Vin	+Vin	+Vo1	COM	-Vo2	CTRL
	input negative	input positive	output positive 1	public	output negative 2	remote control

Note: If the definition of each pin of the power module is inconsistent with the selection manual, the label on the physical label shall prevail.

Package description

Package code	LxWxH	
B3(C)	50.8X25.4X11.8mm	2.000X1.000X0.465 inch

Contact

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518131

Website: www.hlktech.net

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