

LHXX SERIES 5-25W, AC-DC CONVERTER

LH--- are high efficiency green power modules with various packaging provided by Mornsun. The features of this series are: wide input voltage, DC and AC all in one, high efficiency, high reliability, low loss, safety isolation etc. They are widely used in industrial, office and civil equipments. EMC and safety standards meet international standards IEC61000 UL60950 and IEC60950, and Multi-certificate is in processing.



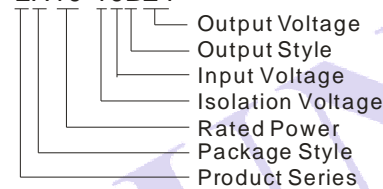
RoHS  us E235235

PRODUCT FEATURES

1. Universal Input :85 ~ 264VAC,50/60Hz
2. AC and DC all in one (input from the same terminal)
3. Low Ripple and Noise
4. Overload protection and short circuit protection
5. High efficiency, High power density
6. Low loss, green power
7. Multiple models available
8. industrial level specifications
9. 3 years warranty

MODEL SELECTION

LH10-10B24



PRODUCT PROGRAM

Approval	Model	Package	Power	Output (Vo1/Io1)	Output (Vo2/Io2)	Ripple and Noise (Typ.)	Efficiency (%) (Typ.)				
UL/CE	LH05-10B03	48.5X36X20.5mm	4W	3.3V/1250mA		50mV	70				
UL/CE	LH05-10B05			5V/1000mA			75				
UL/CE	LH05-10B09			9V/550mA			77				
UL/CE	LH05-10B12			12V/420mA			79				
UL/CE	LH05-10B15			15V/330mA			80				
UL/CE	LH05-10B24			24V/230mA			82				
	LH05-10A05		5W	5W	+5V/500mA		-5V/500mA	75			
	LH05-10A12				+12V/210mA		-12V/210mA	79			
	LH05-10A15				+15V/160mA		-15V/160mA	79			
	LH05-10A24				+24V/100mA		-24V/100mA	80			
	LH05-10C0505-01				5V/800mA		±5V/100mA	70			
	LH05-10C0512-01				5V/600mA		±12V/100mA	73			
	LH05-10C0515-01				5V/600mA		±15V/80mA	74			
	LH05-10C0524-01				5V/600mA		±24V/50mA	75			
	LH05-10D0505-01				5V/900mA		5V/100mA	71			
	LH05-10D0512-01				5V/750mA		12V/100mA	73			
	LH05-10D0515-01				5V/700mA		15V/100mA	73			
	LH05-10D0524-01				5V/600mA		24V/100mA	75			
UL/CE	LH10-10B03				55X45X21.0mm		6.6W	3.3V/2000mA		50mV	70
UL/CE	LH10-10B05							10W	5V/2000mA		
UL/CE	LH10-10B09	9V/1100mA		78							
UL/CE	LH10-10B12	12V/900mA		80							
UL/CE	LH10-10B15	15V/700mA		81							
UL/CE	LH10-10B24	24V/450mA		82							
UL/CE	LH10-10A05	+5V/1000mA	-5V/1000mA	76							
UL/CE	LH10-10A12	+12V/450mA	-12V/450mA	80							
UL/CE	LH10-10A15	+15V/350mA	-15V/350mA	81							
UL/CE	LH10-10A24	+24V/200mA	-24V/200mA	84							
	LH10-10C0512-02	5V/1000mA	±12V/200mA	75							
	LH10-10C0515-02	5V/900mA	±15V/200mA	75							
UL/CE	LH10-10D0505-02	5V/1800mA	5V/200mA	75							
UL/CE	LH10-10D0512-02	5V/1500mA	12V/200mA	79							
UL/CE	LH10-10D0515-02	5V/1400mA	15V/200mA	79							

UL/CE	LH10-10D0524-02			5V/1000mA	24V/200mA		81			
Approval	Model	Package	Power	Output (Vo1/Io1)	Output (Vo2/Io2)	Ripple and Noise (Typ.)	Efficiency (%) (Typ.)			
UL/CE	LH15-10B03	62x45x22.5mm	9.9W	3.3V/3000mA		50mV	73			
UL/CE	LH15-10B05			5V/2800mA			76			
UL/CE	LH15-10B09			9V/1600mA			78			
UL/CE	LH15-10B12			12V/1250mA			80			
UL/CE	LH15-10B15			15V/1000mA			80			
UL/CE	LH15-10B24			24V/625mA			84			
UL/CE	LH15-10B48			48V/320mA			85			
	LH15-10A05		15W		+5V/1500mA	-5V/1500mA		76		
	LH15-10A12				+12V/650mA	-12V/650mA		81		
	LH15-10A15				+15V/500mA	-15V/500mA		83		
	LH15-10C0505-05				5V/2000mA	±5V/500mA		75		
	LH15-10C0512-02				5V/2000mA	±12V/200mA		77		
	LH15-10C0515-02				5V/1800mA	±15V/200mA		78		
	LH15-10C0524-01				5V/2000mA	±24V/100mA		78		
	LH15-10D0505-08				5V/2200mA	5V/800mA		76		
	LH15-10D0512-04				5V/2000mA	12V/400mA		80		
	LH15-10D0515-03				5V/2000mA	15V/300mA		80		
	LH15-10D0524-02				5V/2000mA	24V/200mA		81		
UL/CE	LH20-10B03				70x48x23.5mm	20W	3.3V/4100mA		50mV	73
UL/CE	LH20-10B05						5V/3500mA			75
UL/CE	LH20-10B12	12V/1600mA		81						
UL/CE	LH20-10B15	15V/1300mA		83						
UL/CE	LH20-10B24	24V/850mA		85						
	LH20-10A05	+5V/2000mA	-5V/2000mA				75			
	LH20-10A12	+12V/830mA	-12V/830mA				82			
	LH20-10A15	+15V/650mA	-15V/650mA				83			
	LH20-10C0512-04	5V/2000mA	±12V/400mA				75			
	LH20-10C0515-03	5V/2000mA	±15V/300mA				76			
	LH20-10C0524-02	5V/2000mA	±24V/200mA				77			
	LH20-10D0512-06	5V/2500mA	12V/600mA				75			
	LH20-10D0524-03	5V/2500mA	24V/300mA				77			
UL/CE	LH25-10B05	70x48x23.5mm	25W	5V/4100mA				50mV		74
UL/CE	LH25-10B12			12V/2100mA		82				
UL/CE	LH25-10B15			15V/1600mA		83				
UL/CE	LH25-10B24			24V/1100mA		85				
UL/CE	LH25-10B48			48V/500mA		87				

Remarks :

1. Ripple and Noise were measured by the method of parallel lines;
2. Unless otherwise specified, all specifications above are measured at rated input voltage and rated output load, Ta=25°C, humidity < 75%;
3. All specifications stated in this datasheet are subject to the above listed models only. For specifications of non-standard models, please contact our technical support team.

INPUT SPECIFICATIONS

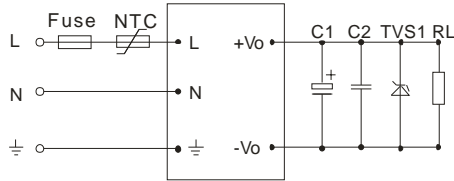
Input voltage range	85 ~ 264VAC, 120 ~ 370VDC	
Input frequency	47 ~ 63Hz	
Input current	LH05 models LH10 models LH15 models LH20 models LH25 models	110VAC 230VAC 120mA , typ 70mA , typ 230mA , typ 120mA , typ 250mA , typ 140mA , typ 330mA , typ 180mA , typ 420mA , typ 230mA , typ
Inrush current	LH05 models LH10 models LH15 models LH20/LH25 models	110VAC 230VAC 10A, typ 20A, typ 10A, typ 20A, typ 10A, typ 20A, typ 16A, typ 30A, typ
External input fuse(recommended)	LH05 models LH10/LH15 models LH20/LH25 models	1A/250V slow blow 2A/250V slow blow 3.15A/250V slow blow

OUTPUT SPECIFICATIONS		
Voltage set accuracy		±2% (main output)
Input variation		±0.5% (main output) ±1.5% (supplement output)
Load variation (10-100%)	Single output models Dual output models (balanced load) Isolated triple output (balanced load) Isolated and separated twin output (balanced load)	±1% ±2% Vo1: ±3% (main output) ±Vo2: ±5% (supplement output) Vo1: ±3% (main output) Vo2: ±5% (supplement output)
Minimum load	single output models Dual output models Isolated and separated twin output Isolated triple output	0% 10% (main output) 10% (main output) 10% (main output)
Ripple & noise(p-p)	20MHz Bandwidth	≤100mV (main output)
Short circuit protection		Continuous, and auto resume
Over current protection		≥110% I _o
Over output voltage protection	3.3 / 5VDC models 9VDC models 12 / 15VDC models 24VDC models 48VDC models	≤7.5VDC ≤12VDC ≤20VDC ≤30VDC ≤60VDC

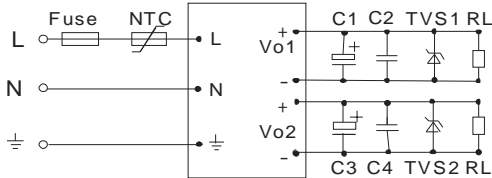
COMMON SPECIFICATIONS		
Temperature ranges	Operating : Power derating above 55°C: LH20-10B05 above 50°C: Storage: Case temperature:	-25°C ~ +70 °C 3.75% / °C 2.25% / °C -25°C ~ +105 °C +90°C (max)
Hold-up time	(Vin=230VAC)	80ms (typ)
Humidity (non condensing)		85% (max)
Temperature coefficient		0.02%/°C (main output) 0.15%/°C (supplement output)
Switching frequency		150kHz (max)
I/O-isolation voltage		3000VAC/1Min
Leakage current		0.3mA RMS typ. 230VAC/50Hz
EMI/RFI conducted		EN55022, level B
EMC compliance	Electrostatic discharge ESD RF field susceptibility Electrical fast transients/bursts on mainsline Surge	IEC/EN 61000-4-2 level 3 6KV/8KV IEC/EN 61000-4-3 IEC/EN 61000-4-4 level 3 2KV IEC/EN 61000-4-5 level 3 1KV / 2KV
Safety standards		IEC60950, EN60950, UL60950
Safety approvals		EN60950, IEC60950, UL60950
Safety Class		CLASS I (LH15 models single output: CLASS II)
Case material		UL 94V-0
Install		PCB
MTBF		>300,000h @25°C

TYPICAL APPLICATIONS

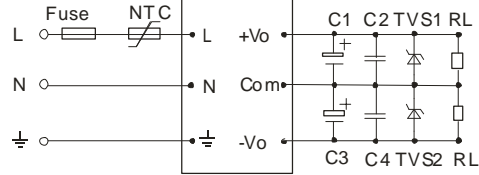
LH**-10B**(Single Output)



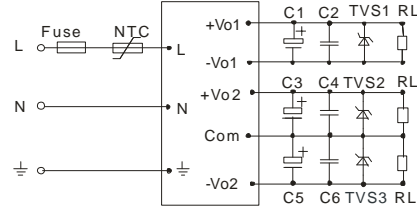
LH**-10D**(Isolate Twin Output)



LH**-10A**(Dual Output)



LH**-10C**(Triple Output)



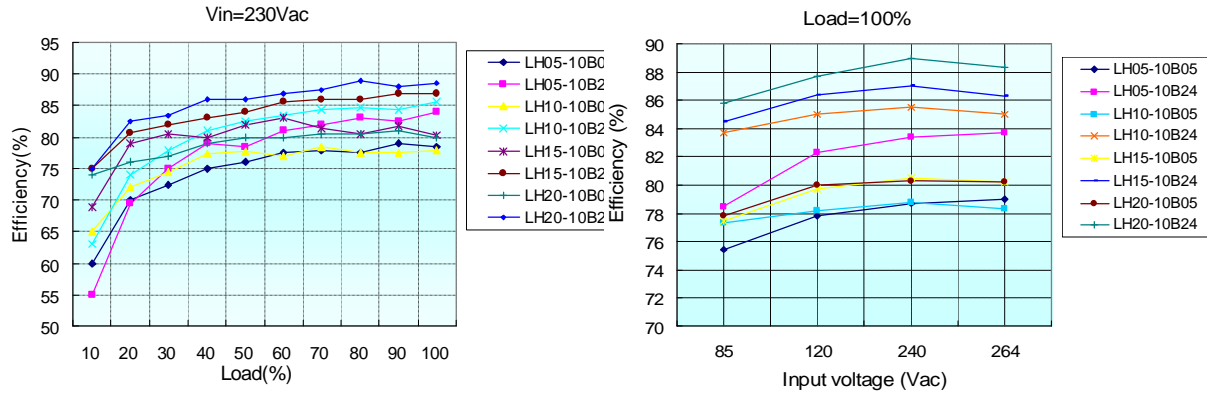
EXTERNAL CAPACITORS TYPICAL VALUE(Unit: mF)

MODEL	C1	C3	C5	MODEL	C1	C3	C5
LH05-10B03	330			LH15-10B03	680		
LH05-10B05	330			LH15-10B05	680		
LH05-10B09	120			LH15-10B09	470		
LH05-10B12	120			LH15-10B12	220		
LH05-10B15	68			LH15-10B15	220		
LH05-10B24	68			LH15-10B24	68		
				LH15-10B48	33		
LH05-10A05	120	120		LH15-10A05	470	470	
LH05-10A12	68	68		LH15-10A12	220	220	
LH05-10A15	47	47		LH15-10A15	120	120	
LH05-10A24	10	10					
LH05-10C0505-01	220	22	22	LH15-10C0505-05	470	220	220
LH05-10C0512-01	120	22	22	LH15-10C0512-02	470	120	120
LH05-10C0515-01	120	22	22	LH15-10C0515-02	470	120	120
LH05-10C0524-01	120	22	22	LH15-10C0524-01	470	120	120
LH05-10D0505-01	220	22		LH15-10D0505-08	470	470	
LH05-10D0512-01	220	22		LH15-10D0512-04	470	220	
LH05-10D0515-01	120	22		LH15-10D0515-03	470	120	
LH05-10D0524-01	120	22		LH15-10D0524-02	470	47	
LH10-10B03	470						
LH10-10B05	330			LH20-10B03	330		
LH10-10B09	120			LH20-10B05	330		
LH10-10B12	120			LH20-10B12	220		
LH10-10B15	120			LH20-10B15	220		
LH10-10B24	68			LH20-10B24	220		
LH10-10A05	220	220		LH20-10A05	470	470	
LH10-10A12	120	120		LH20-10A12	120	120	
LH10-10A15	47	47		LH20-10A15	68	68	
LH10-10A24	33	33					
				LH20-10C0512-04	330	120	120
LH10-10C0512-02	220	68	68	LH20-10C0515-03	330	120	120
LH10-10C0515-02	220	47	47	LH20-10C0524-02	330	47	47
LH10-10D0505-02	220	68		LH20-10D0512-06	330	220	
LH10-10D0512-02	220	68					
LH10-10D0515-02	220	47		LH20-10D0524-03	330	120	
LH10-10D0524-02	220	47		LH25-10B05	330		
				LH25-10B12	330		
				LH25-10B15	330		
				LH25-10B24	120		
				LH25-10B48	68		

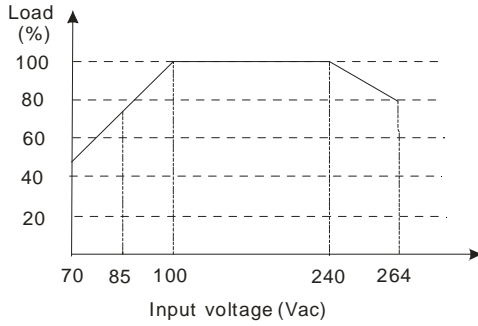
Remark:

- Output filtering capacitors C1, C2 and C3 are electrolytic capacitors, It is recommended to use high frequency and low impedance electrolytic capacitors. For capacitance and current of capacitor please refer to manufacture's datasheet. Voltage derating of capacitor should be 80% or above. C2,C4,C6 are use to filter high frequency noise. TVS is recommended component to protect post-circuits (if converter fails).
- External input NTC is recommended to use 5D-9 (Only LH10 models and LH15 models)

TYPICAL EFFICIENCY CURVE

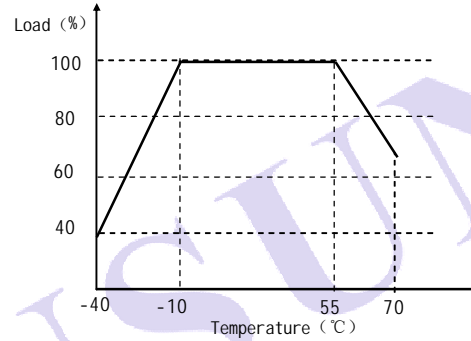


INPUT VOLTAGE VS LOAD

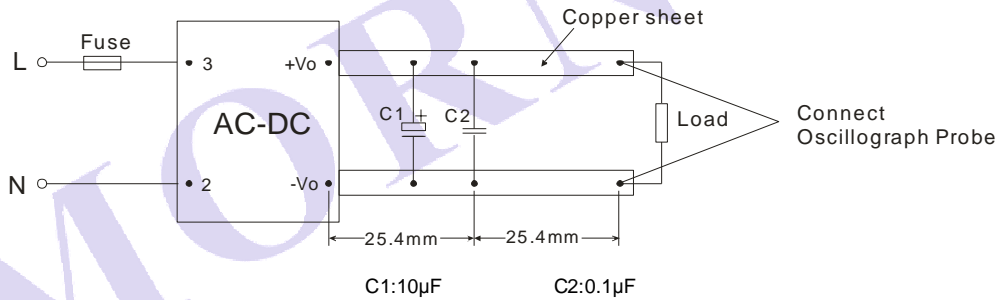


*Note: When input DC, Vdc=1.414Vac-20Vdc.

TEMPERATURE VS LOAD

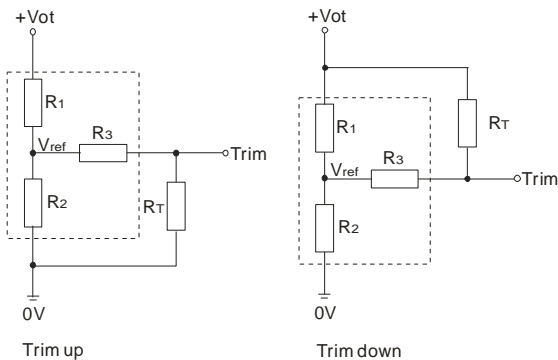


PARALLEL LINES MEASURE



TRIM APPLICATION & TRIM CALCULATION

Application circuit for TRIM
(Part in broken line is the interior of models)



Formula for resistance of Trim

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_{ot} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$$

Note: Value for R1, R2, R3, and Vref refer to the following table.

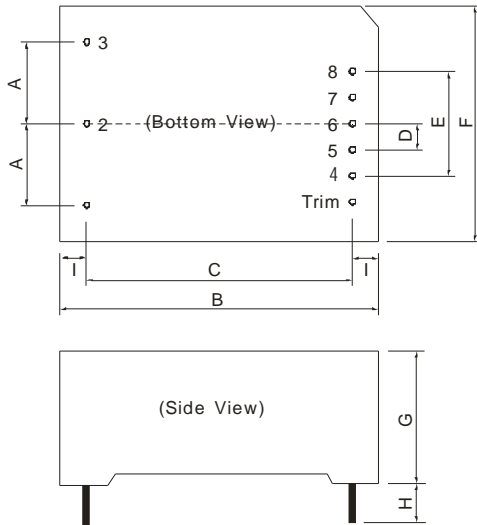
R_T: Resistance of Trim

a: User-defined parameter, no actual meanings.

Vo(V)	3.3	5	12	15	24	48
Resistance						
R1(KΩ)	2	3.3	3.8	7.5	8.6	1.2
R2(KΩ)	1.2	3.3	1	1.5	1	22
R3(KΩ)	1	1	1	1	1	1.2
Vref(V)	1.24	2.5	2.5	2.5	2.5	2.5
Vot(V)	Output voltage of Trim, variation ≤ ±10%					

OUTLINE AND DIMENSIONS

First Angle Projection



Note:
 Unit: mm
 Pin section: 1.00mm
 Pin length(H): ≥ 6.00 mm
 Pin tolerances: ± 0.1 mm
 General tolerances: ± 0.5 mm

OUTLINE AND DIMENSIONS

NO.	LH05	LH10	LH15	LH20	LH25
A	12.5	17.5	17.5	20.0	20.0
B	48.5	55.0	62.0	70.0	70.0
C	40.5	47.0	54.0	62.0	62.0
D	4.0	5.0	5.0	5.75	5.75
E	16.0	20.0	20.0	23.0	23.0
F	36.0	45.0	45.0	48.0	48.0
G	20.5	21.0	22.5	23.5	23.5
I	4.0	4.0	4.0	4.0	4.0

FOOTPRINT DETAILS

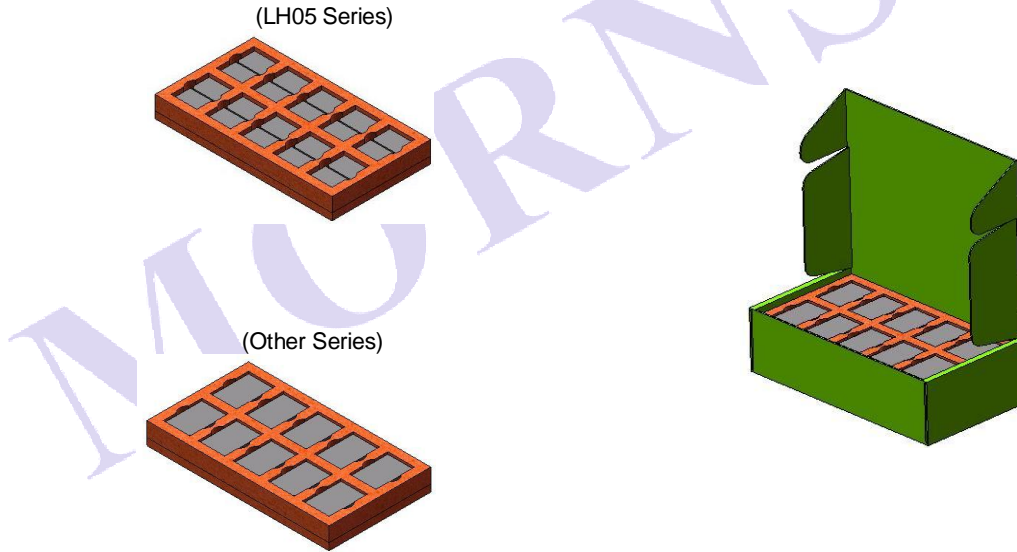
Pin	LHXX-10B	LHXX-10A	LHXX-10C	LHXX-10D
1	\perp	\perp	\perp	\perp
2	AC(N)	AC(N)	AC(N)	AC(N)
3	AC(L)	AC(L)	AC(L)	AC(L)
4	-Vo	-Vo	-Vo1	-Vo1
5	No Pin	No Pin	+Vo1	+Vo1
6	No Pin	COM	-Vo2	No Pin
7	No Pin	No Pin	COM	-Vo2
8	+Vo	+Vo	+Vo2	+Vo2
Trim	Trim**	No Pin	No Pin	No Pin

There is no pin "1" \perp on LH15-10BXX
 Trim**: Only fo LH20/25-10BXX series.

MODLES WEIGHT

WEIGHT (Typ.)	LH05	LH10	LH15	LH20	LH25
	50g	70g	80g	120g	120g

PACKAGE DIAGRAM



Package box: L*W*H=355*192*93mm

Package quantity: 20pcs (LH05 series: 40pcs)