

40W, AC/DC converter



**UL** **US** **CE** **RoHS**

LH40 series is a 40W efficient environmental-protection AC-DC module power supply, which has advantages such as universal input voltage, accept either AC or DC input, high efficiency, high reliability, low power consumption and high safety isolation. The series products are widely used in industries such as industrial control, office.

Note: Please refer to Design Reference when module being used in a bad EMC environment.

## FEATURES

- Wide Input voltage range: 85~264VAC/100~370VDC
- Low standby power consumption: 0.5W, conversion efficiency up to 84%
- Output short circuit, over-current, over-voltage protection
- Meet IEC61000, UL60950 and EN60950 standards
- Mounting: PCB mounting, Chassis mounting, DIN-Rail mounting available

## Selection Guide

Certification	Part No.*	Output Power	Nominal Output Voltage and Current		Efficiency (230VAC, %/Typ.)	Max. Capacitive Load(μF)
			(Vo1/Io1)	(Vo2/Io2)		
UL/CE	LH40-10B03	26.4W	3.3VDC/8000mA	--	78	60000
	LH40-10B05		5VDC/8000mA	--	82	40000
	LH40-10B09		9VDC/4444mA	--	84	12000
	LH40-10B12		12VDC/3333mA	--	84	9000
	LH40-10B15		15VDC/2666mA	--	84	7000
	LH40-10B24		24VDC/1667mA	--	84	2000
-	LH40-10D0512-13	40W	5VDC/5000mA	12VDC/1250mA	82	10000/470
	LH40-10D0524-06		5VDC/5000mA	24VDC/625mA	82	10000/400
	LH40-10A05		+5VDC/4000mA	-5VDC/4000mA	82	±12000
	LH40-10A12		+12VDC/1666mA	-12VDC/1666mA	84	±4400
	LH40-10A15		+15VDC/1333mA	-15VDC/1333mA	84	±1000

Note:\*product model with a suffix of "A5" means chassis mounting and that with a suffix of "A6" indicates DIN-Rail mounting (e.g. LH40-10B05A5 means chassis mounting; LH40-10B05A6 means DIN-Rail mounting).

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	264	VAC
	DC input	100	--	370	VDC
Input frequency		47	--	440	Hz
Input current	115VAC	--	--	1.0	A
	230VAC	--	--	0.6	
Inrush current	115VAC	--	30	--	A
	230VAC	--	50	--	
Hot Plug		Unavailable			

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	LH40-10Bxx	Main output	--	±2	--	%
	LH40-10Axx	Main output / Secondary output	--	±2	--	
	LH40-10Dxx	Main output	--	±2	--	
		Secondary output	--	±5	--	

Line Regulation	LH40-10Bxx	--	±0.5	--	%	
	LH40-10Axx					
	LH40-10Dxx(Main output)					
	LH40-10Dxx(Secondary output)					
Load Regulation	LH40-10Bxx	--	±1	--	%	
	LH40-10Axx(Balance load)	--	±2	--		
	LH40-10Dxx(Balance load)	Main output	--	±2		--
		Secondary output	--	±5		--
Ripple & Noise*	20MHz bandwidth (peak-peak value)	--	50	100	mV	
Temperature Coefficient	Main output	--	±0.02	--	%/°C	
Stand-by Power Consumption		--	--	0.5	W	
Short Circuit Protection		Continuous, self-recovery				
Over-current Protection		≥110%Io self-recovery				
Over-voltage Protection	3.3V Output	--	--	5.5	V	
	5V Output	--	--	9		
	9V Output	--	--	14		
	12V Output	--	--	16		
	15V Output	--	--	24		
	24V Output	--	--	35		
Min. Load	LH40-10Bxx	0	--	--	%	
	LH40-10Axx (Balance load)	10	--	--		
	LH40-10Dxx (Balance load)	25	--	--		
Cross Regulation	LH40-10A05	--	±8	--	%	
	LH40-10A12/ LH40-10A15	--	±5	--		
	LH40-10Dxx	Main output	--	±1		--
		Secondary output	--	±7		--
Trim	LH40-10Bxx	--	--	±10		
Hold-up Time	115VAC input	--	15	--	ms	
	230VAC input	--	80	--		

Note: \* Ripple and noise are measured by "parallel cable" method, please see AC-DC Converter Application Notes for specific operation.

## General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output	Test time: LH40-10Axx/ LH40-10Bxx/ LH40-10Dxx	3000	--	--	VAC
	Output-output	1min LH40-10Dxx	500	--	--	
Operating Temperature			-40	--	+70	°C
Storage Temperature			-40	--	+85	
Storage Humidity			--	--	95	%RH
Welding Temperature	Wave-soldering	260±5°C; time:5~10s				
	Manual-welding	360±10°C; time:3~5s				
Switching Frequency			--	65	--	kHz
Power Derating	-40°C to -30°C (LH40-10B03/05)		4.0	--	--	% / °C
	-40°C to -30°C (LH40-10B09/12/15)		3.0	--	--	
	-40°C to -30°C (LH40-10Dxx, LH40-10Axx)		5.0	--	--	
	+45°C to +70°C (LH40-10B03/05)		3.0	--	--	% / °C
	+55°C to +70°C (LH40-10B09/12/15)		3.7	--	--	
	+55°C to +70°C (LH40-10B24)		2.7	--	--	
	+50°C to +70°C (LH40-10Dxx, LH40-10Axx)		3	--	--	
Safety Standard			IEC60950/EN60950/UL60950			

Safety-regulated Certification	LH40-10Bxx series	EN60950/UL60950
Safety Class		CLASS II
MTBF		MIL-HDBK-217F@25°C >300,000 h

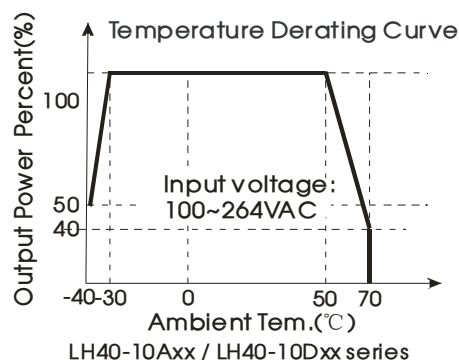
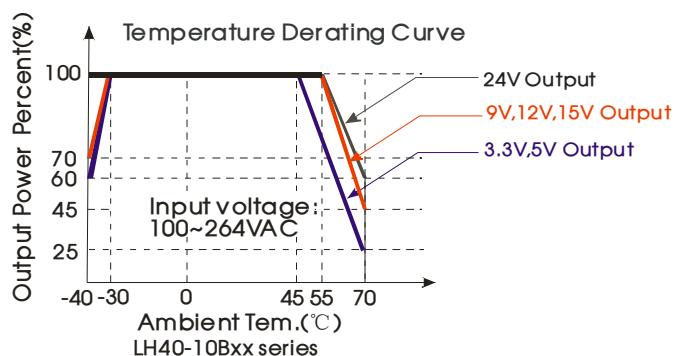
### Physical Specifications

Casing Material	Black flame-retardant and heat-resistant plastic (UL94-V0)	
Dimensions	Horizontal package	89.00*63.50*25.00 mm
	A5 chassis package	135.00*70.00*33.50 mm
	A6 DIN-rail package	137.00*70.00*39.00 mm
Weight	Horizontal package/A5 chassis package/A6 DIN-rail package	225.00g/310.00g/370.00g(Typ.)
Cooling Method	Free convection	

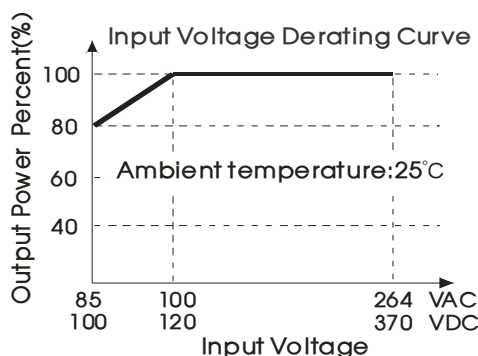
### EMC Specifications

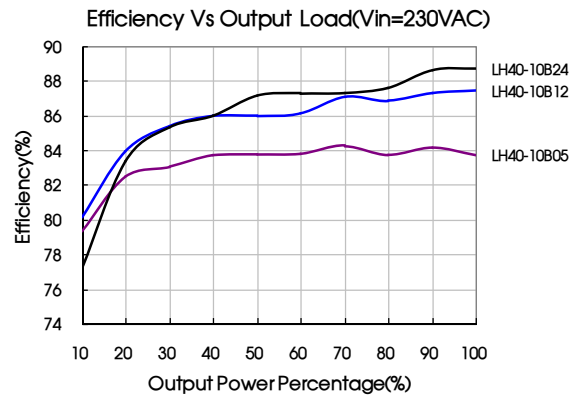
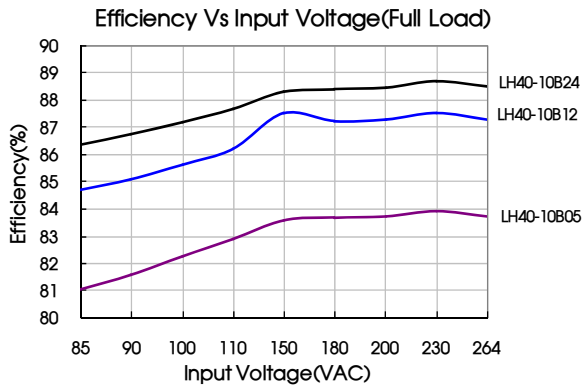
EMI	CE	CISPR22/EN55022, CLASS B		
	RE	CISPR22/EN55022, CLASS B		
EMS	ESD	IEC/EN61000-4-2	±6KV/8KV Perf. Criteria B	
	RS	IEC/EN61000-4-3	10V/m perf. Criteria A	
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B
		IEC/EN61000-4-4	±4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±1KV/2KV	perf. Criteria B
		IEC/EN61000-4-5	±2KV/4KV (See Fig. 4 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	PFM	IEC/EN61000-4-8	10A/m	perf. Criteria A
Voltage dips, short interruptions and voltage variations immunity		IEC/EN61000-4-11	0%-70% perf. Criteria B	

### Product Characteristic Curve



- Note: ① Input voltage should be derated based on temperature derating when it is 85-100VAC/100-120VDC;  
 ② This product is suitable for use in natural air cooling environments, if in a closed environment, please contact our company's FAE.





### Design Reference

#### 1. Typical application circuit

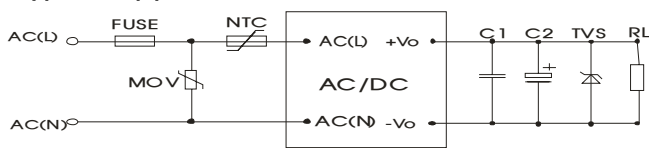


Fig. 1: LH40-10B\*\*Typical application circuit

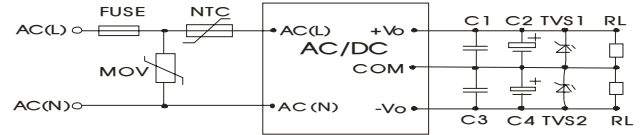


Fig. 2: LH40-10A\*\*Typical application circuit

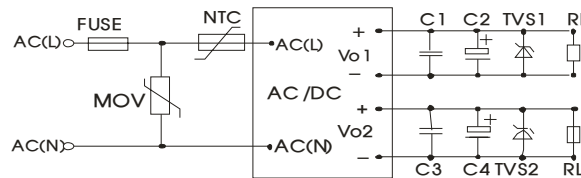


Fig. 3: LH40-10D\*\*Typical application circuit

Model	C2(uF)	C4(uF)	C6(uF)	C1, C3, C5 (uF)	TVS 1	TVS 2
LH40-10B03	680	--	--	1	SMBJ7.0A	--
LH40-10B05	680	--	--	1	SMBJ7.0A	--
LH40-10B09	330	--	--	1	SMBJ12A	--
LH40-10B12	220	--	--	1	SMBJ20A	--
LH40-10B15	220	--	--	1	SMBJ20A	--
LH40-10B24	120	--	--	1	SMBJ30A	--
LH40-10D0512-13	680	220	--	1	SMBJ7.0A	SMBJ20A
LH40-10D0524-06	680	120	--	1	SMBJ7.0A	SMBJ30A
LH40-10A05	680	680	--	1	SMBJ7.0A	SMBJ7.0A
LH40-10A12	220	220	--	1	SMBJ20A	SMBJ20A
LH40-10A15	220	220	--	1	SMBJ20A	SMBJ20A

Note: Output filtering capacitor C2 is electrolytic capacitor, it is recommended to apply electrolytic capacitor with high frequency and low resistance. For capacitance and current of capacitor please refer to manufacture's datasheet. Capacitance withstand voltage derating should be 80% or above. C1 is ceramic capacitor, which is used to filter high-frequency noise. TVS is a recommended component to protect post-circuits if converter fails. External input FUSE model is recommended to use 3.15A/250VAC, slow fusing. External input NTC model is recommended to use 5D-9. External input MOV model is recommended to use S10K300.

#### 2. EMC solution-recommended circuit

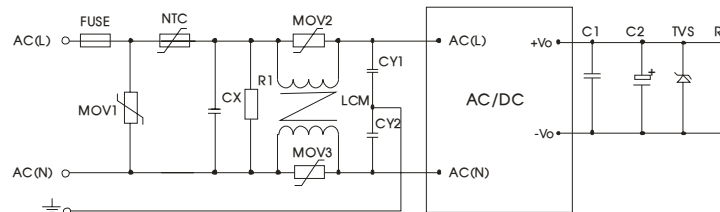


Fig 4 (Output external circuit refer to the typical application circuit)

EMC solution-recommended circuit PCB layout

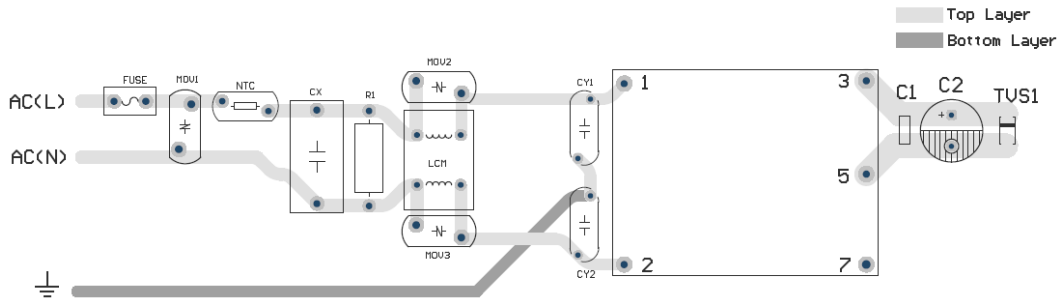
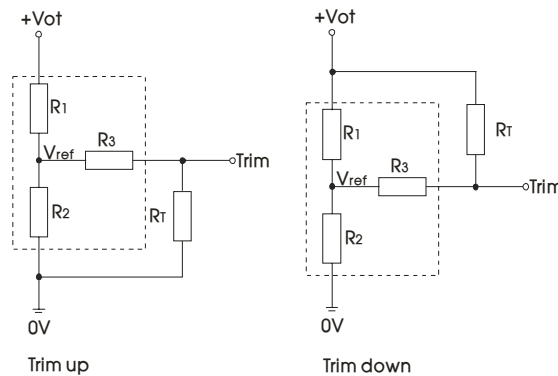


Fig 5

Suggestions for safety regulation and wiring width: wire width ≥3mm, distance between wires ≥6mm, and distance between wire and ground ≥6mm

Element model	Recommended value
MOV1	S14K350
MOV2, MOV3	S07K350
CX	0.15μF/300VAC
CY1	2.2nF/400VAC
CY2	2.2nF /400VAC
R1	1MΩ/2W
LCM	2.2 mH, recommended to use MORNSUN's FL2D-10-222;
NTC	5D-14
FUSE	3.15A/250V, slow fusing, necessary

3. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

up:  $R_T = \frac{\alpha R_2}{R_2 - \alpha} - R_3$        $\alpha = \frac{V_{ref}}{V_{ot} - V_{ref}} \cdot R_1$

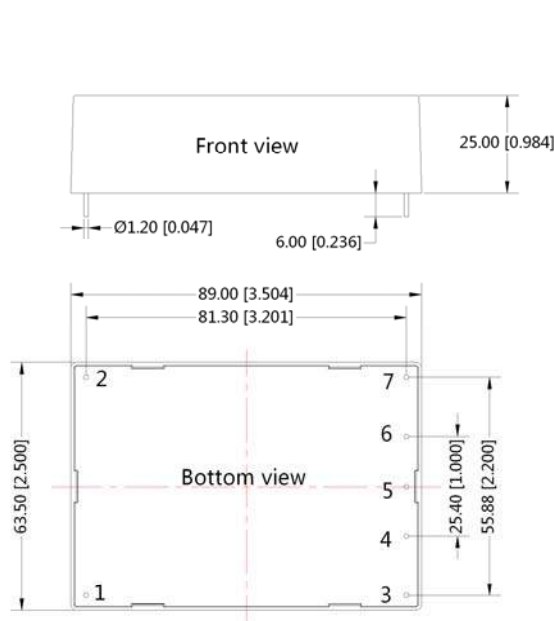
down:  $R_T = \frac{\alpha R_1}{R_1 - \alpha} - R_3$        $\alpha = \frac{V_{ot} - V_{ref}}{V_{ref}} \cdot R_2$

$R_T$  is Trim resistance,  $\alpha$  is a self-defined parameter, with no real meaning.

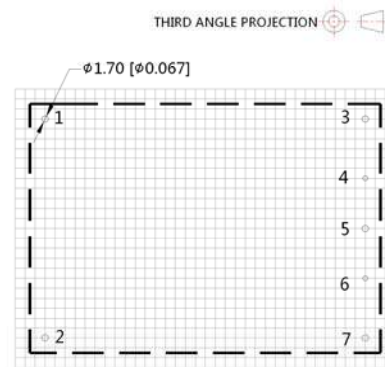
Vout	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)	Vot(V)
3.3V	2	1.2	1	1.24	Output voltage after regulation, variation ≤ ±10%
5V	3.3	3.3	1	2.5	
9V	4.7	1.8	1	2.5	
12V	3.83	1	1	2.5	
15V	4.99	1	1	2.5	
24V	8.66	1	1	2.5	

4. For more information about Mornsun EMC Filter products, please visit [www.mornsun-power.com](http://www.mornsun-power.com) to download the Selection Guide of EMC Filter

Dimensions and Recommended Layout



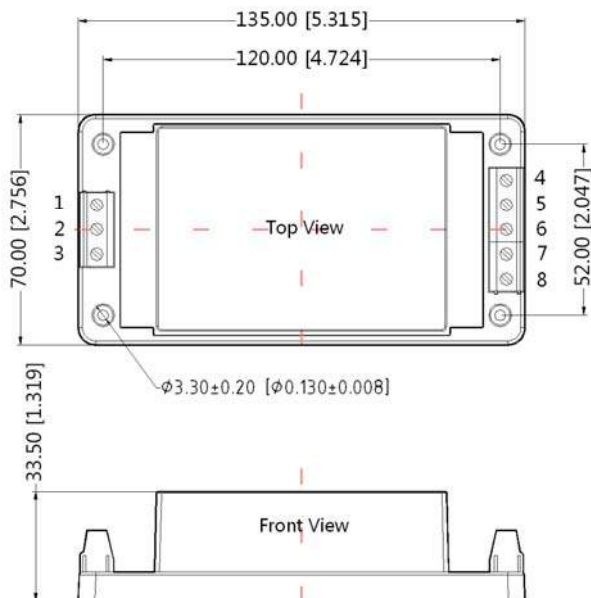
Note:  
Unit :mm[inch]  
Pin diameter tolerances :±0.10[±0.004]  
General tolerances:±0.50[±0.020]



Note : Grid 2.54\*2.54mm

Pin-Out			
Pin	LH40-10A	LH40-10B	LH40-10D
1	AC(L)	AC(L)	AC(L)
2	AC(N)	AC(N)	AC(N)
3	+Vo	+Vo	+Vo2
4	No Pin	No Pin	+Vo1
5	COM	-Vo	-Vo2
6	No Pin	No Pin	-Vo1
7	-Vo	Trim	No Pin

A5 Chassis Package Dimensions



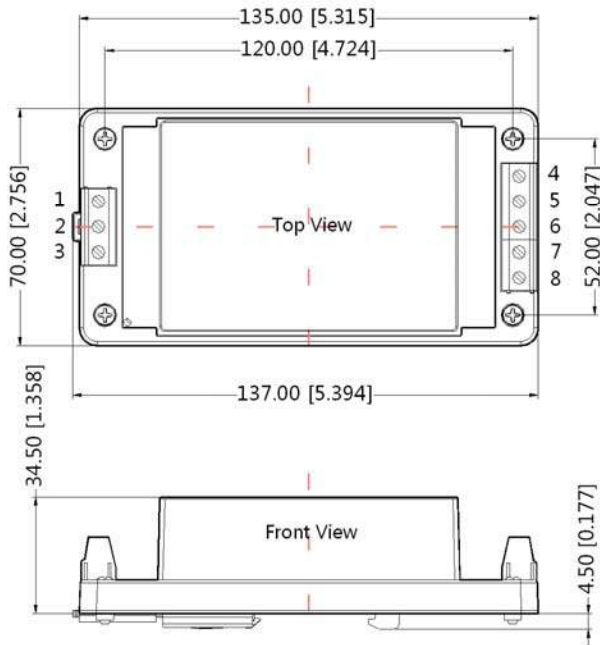
THIRD ANGLE PROJECTION

Pin-Out			
Pin	LH40-10A	LH40-10B	LH40-10D
1	AC(L)	AC(L)	AC(L)
2	AC(N)	AC(N)	AC(N)
3	NC	NC	NC
4	+Vo	+Vo	+Vo2
5	NC	NC	+Vo1
6	COM	-Vo	-Vo2
7	NC	NC	-Vo1
8	-Vo	Trim	NC

Note:  
Unit:mm[inch]  
Wire range:24~12 AWG  
General tolerances:±1.00[±0.040]

A6 DIN-rail Package Dimensions

THIRD ANGLE PROJECTION 



Pin-Out			
Pin	LH40-10A	LH40-10B	LH40-10D
1	AC(L)	AC(L)	AC(L)
2	AC(N)	AC(N)	AC(N)
3	NC	NC	NC
4	+Vo	+Vo	+Vo2
5	NC	NC	+Vo1
6	COM	-Vo	-Vo2
7	NC	NC	-Vo1
8	-Vo	Trim	NC

Note:  
Unit:mm[inch]  
Installed on DIN RAIL TS35  
Wire range:24~12 AWG  
General tolerances:±1.00[±0.040]

Notes:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58220021(Horizontal package), 58220031(A5/A6 package);
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75% when inputting nominal voltage and outputting rated load;
3. All index testing methods in this datasheet are based on our Company's corporate standards;
4. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technician for specific information;
5. We can provide product customization service;
6. Specifications of this product are subject to changes without prior notice.

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