

### 150W, AC-DC Brick Converter



RoHS



## FEATURES

- Ultra-wide 85 - 305VAC and 120 - 430VDC input voltage range
- Typical efficiency up to 92%, power factor up to 0.99
- International standard half brick package
- Compact size, high power density
- Over temperature protection, input under-voltage protection, output over-voltage/over-current/ short circuit protection
- Designed to meet UL/IEC62368 standards

LBH150-13BxxG series is a new generation product of Mornsun's ultra compact size and highly efficient green power converter. It is a standard half brick package size with ultra-wide input voltage, high efficiency, high reliability and reinforced isolation. The products are safe and reliable with good EMC performance, the safety specifications meet the international UL/IEC/EN62368 standards. They are widely used in switching equipment, access equipment, mobile communications, microwave communications, optical transmission, routers and other areas of the communication, as well as electronics and mechanical equipment etc. For harsh EMC environment, the application circuit in the datasheet is strongly recommended.

## Selection Guide

Part No.	Output Power (W)	Nominal Output Voltage and Current(Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
LBH150-13B12G	150	12V/12.5A	91	4000
LBH150-13B24G		24V/6.25A	92	1500
LBH150-13B28G		28V/5.36A	92	1500

Note: The product picture is for reference only. For details, please refer to the actual product.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC input	85	--	305	VAC
	DC input	120	--	430	VDC
Input Frequency		47	--	63	Hz
Power Factor*	50/60Hz, 115VAC/230VAC, Pout=150W	0.96	0.99	--	--
Input Current	115VAC	--	--	2	A
	230VAC	--	--	1	
Inrush Current	230VAC, Ta=25°C	--	--	30	
THD*	Ta=25°C, Vin=115/230V, Pout=150W	--	8	--	%
Input Under-voltage Protection	Under-voltage protection start (Input voltage drops from high to low)	60	--	75	VAC
	Under-voltage protection start (Input voltage rises from low to high)	70	--	85	
Recommended External Input Fuse		3.15A/300V, slow-blow, required			
Hot Plug		Unavailable			
Grounded Mode	PE is required for aluminum substrate application				

Note: \*The power factor and THD test result are based on recommended circuit.

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	Full load range	--	±2	--	%	
Line Regulation	Rated load	--	±0.5	--		
Load Regulation	0% - 100% load	--	±0.1	--		
Minimum Load		0	--	--		
Ripple & Noise*	20MHz bandwidth (peak-to-peak value)	12V	--	100	150	mV
		24V	--	200	250	

	Load at room temperature >20%	28V	--	200	300	
Temperature Coefficient			--	±0.02	--	%/°C
Stand-by Power Consumption			--	2	4	W
Hold-up Time	115VAC/230VAC		--	8	--	ms
Short Circuit Protection			Hiccup, continuous, self-recover			
Over-current Protection			120% Io, self-recover after fault disappear			
Over-voltage Protection	12VDC output		≤16VDC (Hiccup)			
	24VDC output		≤32VDC (Hiccup)			
	28VDC output		≤35VDC (Hiccup)			
No-load Output Of Auxiliary Source	Maximum pulling current about 10mA, take HU- as for reference ground (Internal resistor in series 1 kΩ)		8	12	15	V
Over Temperature Protection	Over-temperature protection start (Aluminum substrate temperature) until power off		105	--	115	°C
	Over-temperature protection recovery		Reset input			
ENA Remote Control ON/OFF	Enable control pin		ENA connect to HU- , output is normal			
			ENA disconnect to HU- , output turn off			

Note: \*The "parallel cable" method is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information.

## General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input - Output	Electric Strength Test for 1min., leakage current <10mA	3000	--	--	VAC
	Input - PE		1500	--	--	
	Output - PE		1500	--	--	
Insulation Resistance	Input - Output	Test Voltage: 500VDC, Ta=25°C	100	--	--	MΩ
	Input - PE		100	--	--	
	Output - PE		100	--	--	
Operating Temperature	Al-Substrate temperature		-40	--	+100	°C
Storage Temperature			-40	--	+100	
Storage Humidity	Non-condensing		--	--	95	%RH
Soldering Temperature	Wave-soldering		260 ± 5°C; time: 5 - 10s			
	Manual-welding		360 ± 10°C; time: 3 - 5s			
Power Derating	+90°C to +100°C (Al-Substrate temperature)		1.67	--	--	%/°C
	85VAC - 100VAC		1.33	--	--	%/VAC
Safety Standard			Design refer to UL/IEC/EN62368-1			
Safety Class			CLASS I			
MTBF	MIL-HDBK-217F@25°C		≥ 1000,000 h			

## Mechanical Specifications

Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)	
Dimension	Horizontal package	63.14 x 60.60 x 12.70mm
Weight	Horizontal package	140g (Typ.)
Cooling Method	Conduction heat dissipation (Using from the Al-Substrate to additional heat radiation of the radiator cooling)	

## Electromagnetic Compatibility (EMC) (Based on recommended circuit)\*

Emissions	CE	CISPR32/EN55032 CLASS A
		CE102 GJB151B (See Fig. 2 for recommended circuit)
	RE	CISPR32/EN55032 CLASS A
		Harmonic current IEC/EN61000-3-2 CLASS A
Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV/Air ±8KV perf. Criteria A

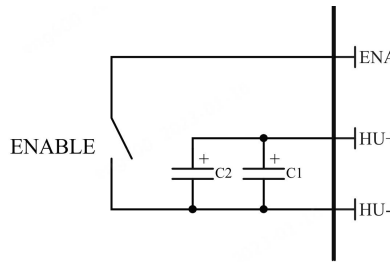
RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
EFT	IEC/EN61000-4-4	±2KV	perf. Criteria A
Surge	IEC/EN61000-4-5	line to line ±2KV/line to PE ±4KV	perf. Criteria A
CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
Voltage dip, short interruption and voltage variation	IEC/EN61000-4-11	0%, 70%	perf. Criteria B

Note: \*Except for CE102 of the CE, other EMC test results are based on recommended circuit 1.

### Instructions

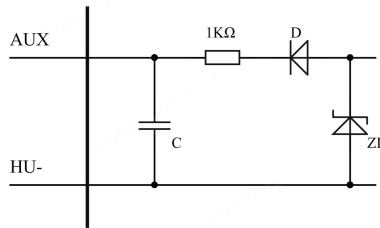
#### 1. ENA Remote Control Switch

The module has built-in ENA remote control switch function. This function can control ON/OFF of the output voltage when the input voltage is turned on. Short circuit ENA and HU-, and the output voltage is normal; ENA disconnect to HU-, and the output voltage turn off. The wiring diagram circuit is as follows:

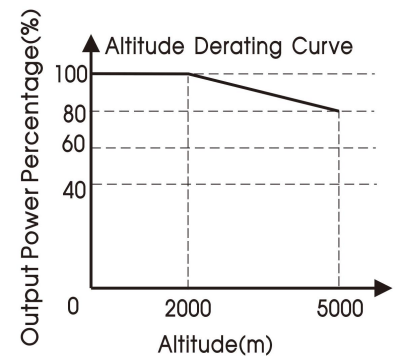
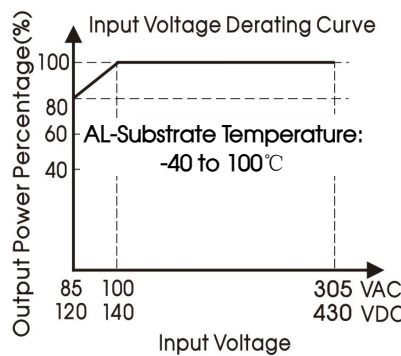
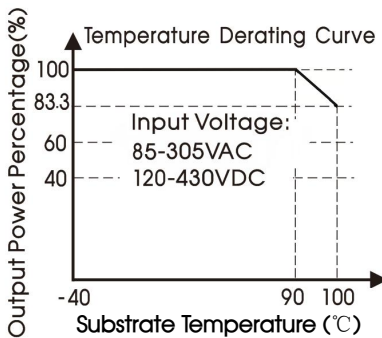


#### 2. Auxiliary Power Supply For External Signals ( AUX Terminal)

The module additionally provides 12V auxiliary source output, the reference ground is HU- and provides an auxiliary control power supply for the primary side control circuit. No load voltage 8-15V (Internal resistor in series 1 kΩ , maximum pulling current about 10mA).



### Product Characteristic Curve



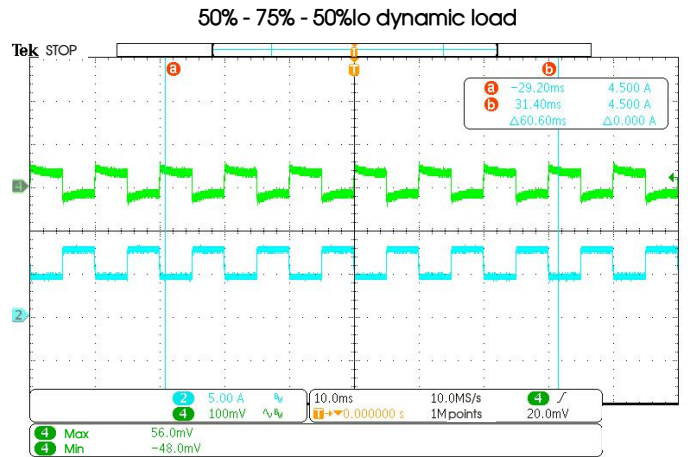
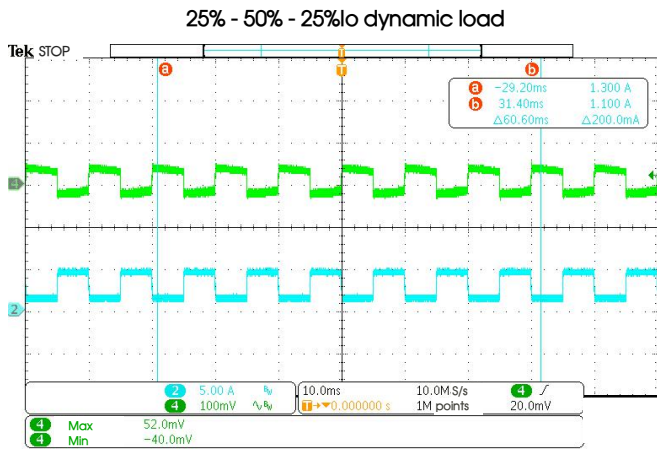
Note:

- ① With an AC input voltage between 85 - 100VAC/120 - 140VDC the output power must be derated as per the temperature derating curves;
- ② This product is suitable for applications using natural air cooling; for applications in closed environment please consult Mornsun FAE.

### Product Test Waveform

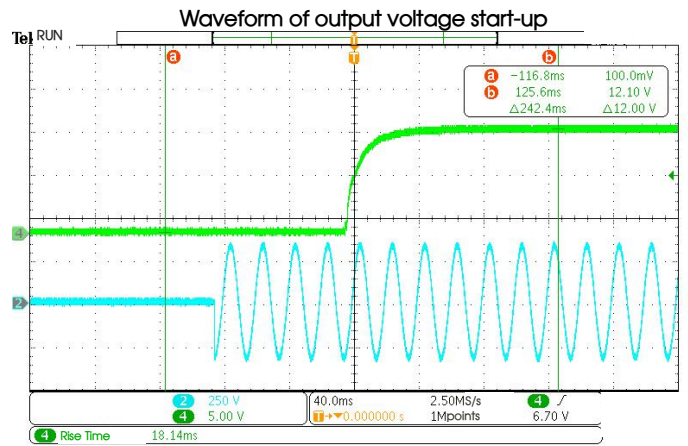
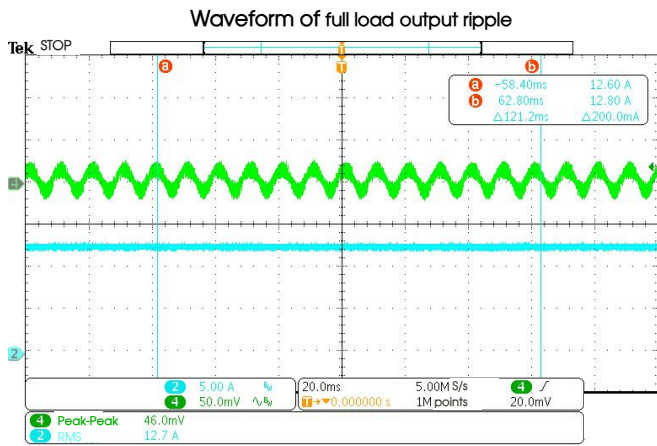
#### 1. Dynamic Response

Test conditions: Tc=25°C, Vin= 230VAC, Vout=12V, 20MHz bandwidth. Products are tested based on recommended circuit and the "parallel cable" method is used for test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor.



## 2. Output Ripple And Start-up Waveform

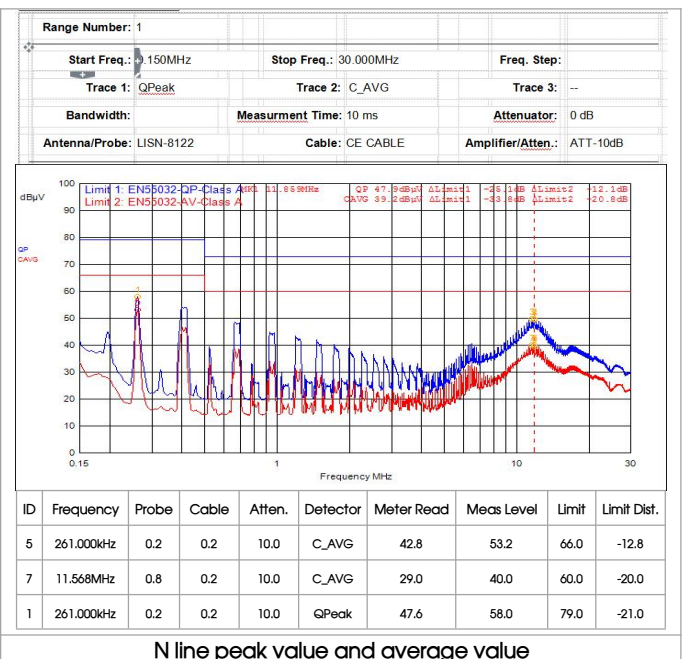
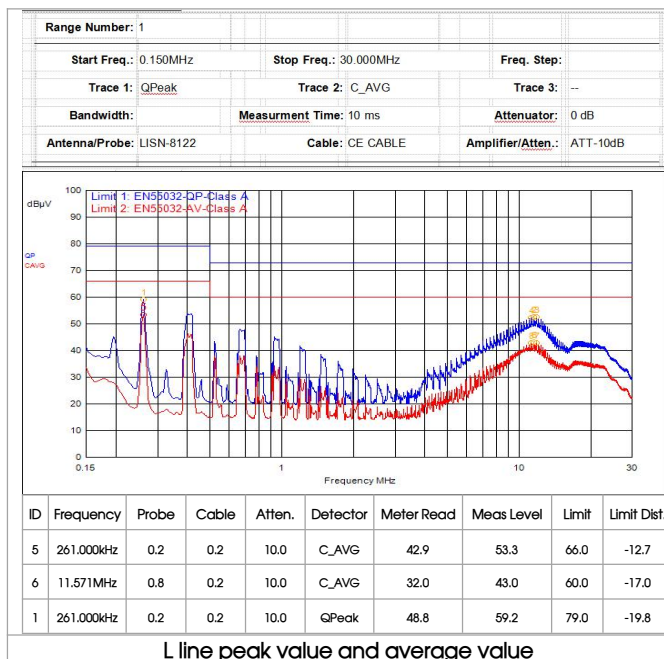
Test conditions:  $T_c=25^{\circ}\text{C}$ ,  $V_{in}=230\text{VAC}$ ,  $V_{out}=12\text{V}$ , 20MHz bandwidth. Products are tested based on recommended circuit and the "parallel cable" method is used for test, output parallel 10uF electrolytic capacitor and 1uF ceramic capacitor.



## 3. Conductive Waveform

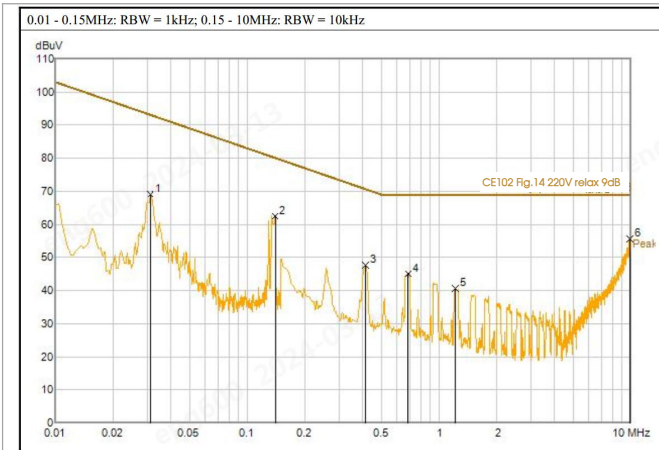
(1) Safety specifications: CISPR32/EN55032 CLASS A

Test conditions:  $T_c=25^{\circ}\text{C}$ ,  $V_{in}=230\text{VAC}$ ,  $P_{out}=150\text{W}$ , products are tested based on recommended circuit.



(2) Safety specifications: CE102 GJB151B

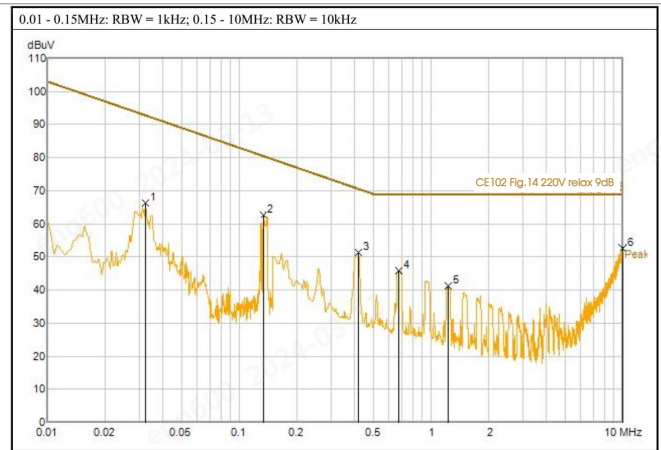
Test conditions: Tc=25°C, Vin=220VAC, Pout=150W, products are tested based on recommended circuit 2.



序号	频率 (MHz)	读值 (dBuV)	修正因子 (dB)	结果 (dBuV)	限值 (dBuV)	余量 (dB)	备注
1	0.0312	48.44	20.75	69.19	93.11	23.92	峰值
2	0.1396	42.43	20.05	62.48	80.09	17.61	峰值
3	0.414	27.6	20.03	47.63	70.64	23.01	峰值

Note: Result = Reading + Factor, Margin = Limit - Result

L line peak value



序号	频率 (MHz)	读值 (dBuV)	修正因子 (dB)	结果 (dBuV)	限值 (dBuV)	余量 (dB)	备注
1	0.0324	45.21	20.99	66.2	92.78	26.58	峰值
2	0.1332	42.57	20.14	62.71	80.5	17.79	峰值
3	0.418	31.33	20.12	51.45	70.56	19.11	峰值

Note: Result = Reading + Factor, Margin = Limit - Result

N line peak value

## Additional Circuits Design Reference

### 1. Typical application

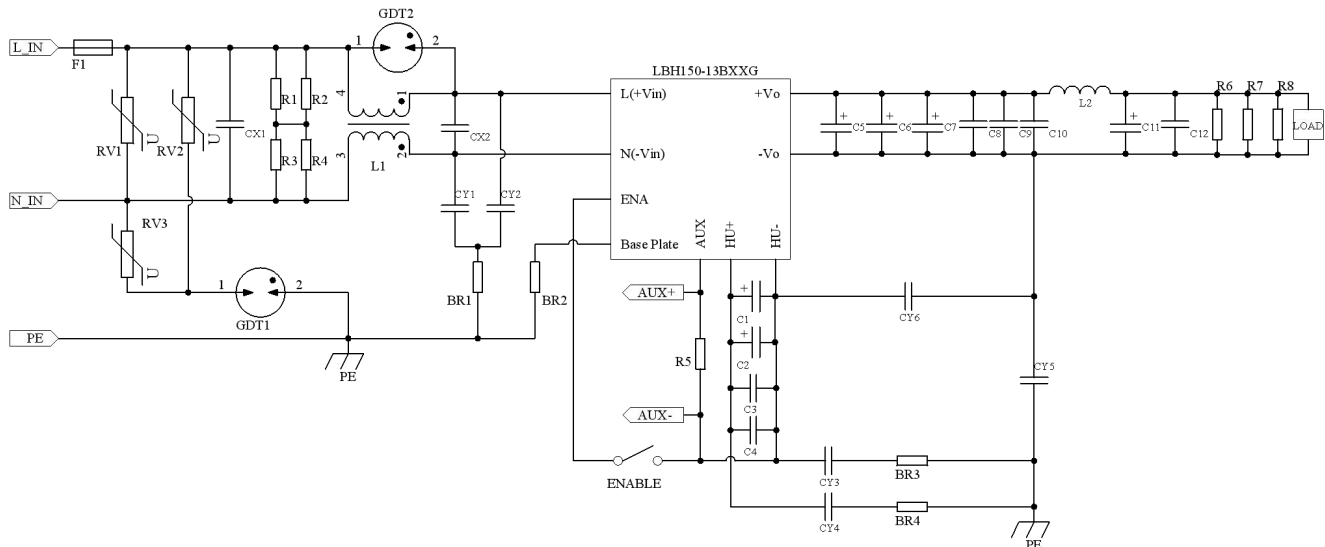


Fig. 1: Recommended circuit 1

Component		Recommended value
F1		3.15A/300VAC, slow-blow
L2		10mH/145mΩ, Max/3A (recommend MORNSUN P/N: FL2D-30-103)
C1/C2		82uF/450V (C1+C2≤200uF)*
CX1/CX2		474K/310VAC
R5		10KΩ/0603
C5/C6/C7	12V	1000uF/16V (solid-state capacitor)
	24V/28V	470uF/35V
C8/C9/C10/C12	12V	106K/1206/25V
	24V/28V	105K/1206/50V

L2	12V	0415/0.39uH/30A
	24V/28V	0415/0.8uH/15A
C11	12V	1000uF/25V
	24V/28V	470uF/35V
R6/R7/R8	12V	1KΩ /1206
	24V/28V	5.6KΩ /1206

Note: ① \*C1+C2 total value exceeds specifications, these is a risk of damage to the product;  
② R5/R6/R7 can be replaced by a single 2W plug-in wind-wound resistor with the same resistance as R5/R6/R7 after parallel equivalence.

EMC Component	
Component	Recommended value
RV1/RV2/RV3	S14K300/6KA
GDT1	600V/5KA
GDT2	300V/1KA
R1/R2/R3/R4	1MΩ /1206
CY1/CY2/CY3/CY4/CY6	Y1/102M/400VAC
CY5	Y1/222M/400VAC
BR1/BR2/BR3/BR4	47Ω /100MHz (Magnetic bead)
C3/C4	683K/1210

2. Conducted emission (CE102) recommended circuit

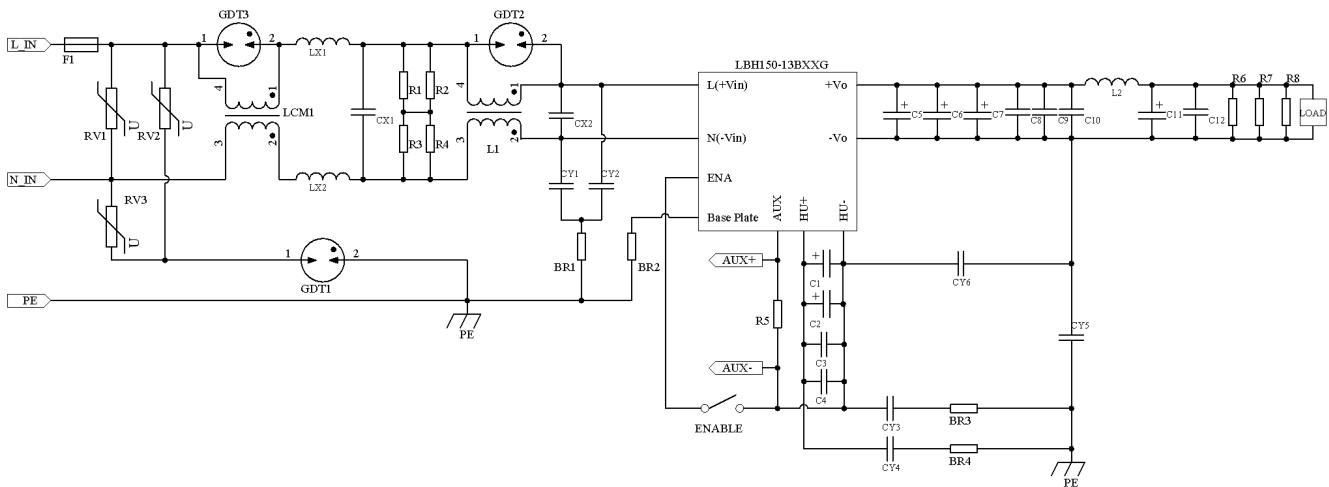


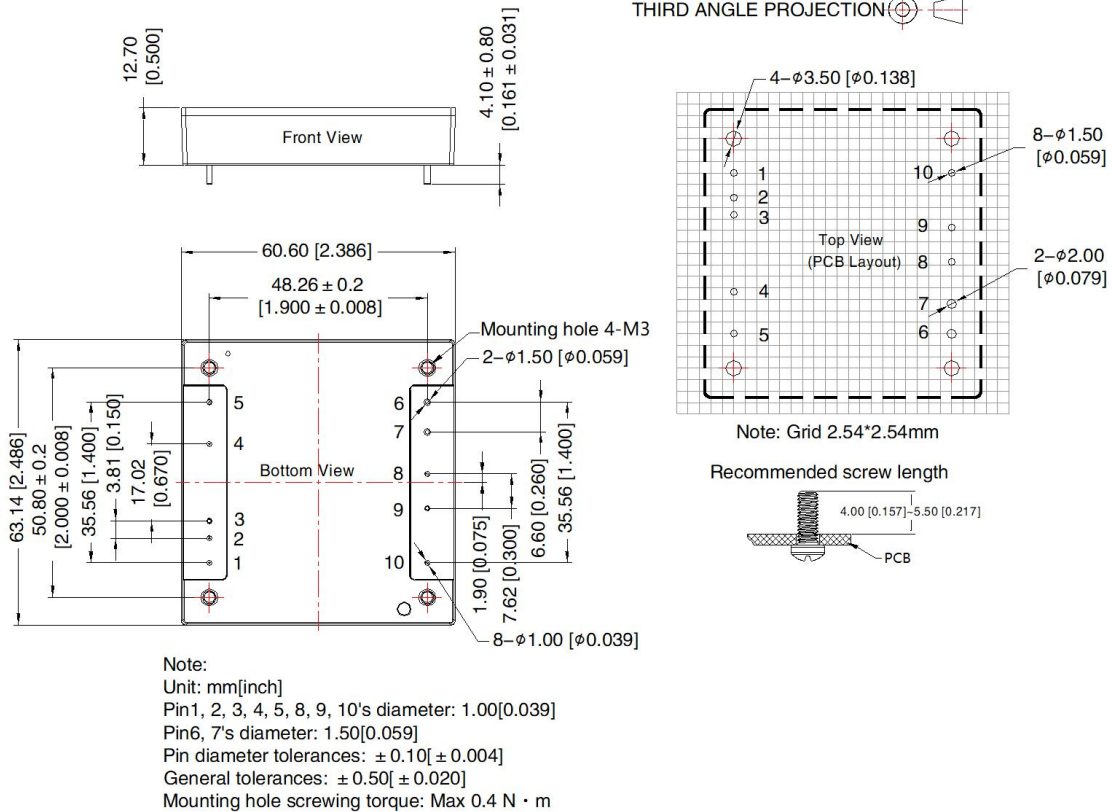
Fig. 2: Recommended circuit 2

Component	Recommended value
GDT3	300V/1KA
LX1/LX2	2mH/Min; 2A (recommend MORNSUN P/N: FD2D-20-202 )
LCM1	5.6mH/Min; 2A (recommend MORNSUN P/N: FL2D-20-562)

Note: The external circuit component parameters are the same as those of the above recommended circuit 1;

3. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Pin description					
1	NC	Open	6	+Vo	Positive DC output
2	NC	Open	7	-Vo	Negative DC output
3	AUX	Output of auxiliary source, reference HU-	8	L(+Vin)	AC input Line/Positive DC input
4	HU-	Keep the capacitor voltage negative	9	ENA	Switch enable pin
5	HU+	Keep the capacitor voltage positive	10	N(-Vin)	AC input Neutral/Negative DC input

- Note:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200069;
  - If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
  - Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75% with nominal input voltage and rated output load;
  - All index testing methods in this datasheet are based on our company corporate standards;
  - We can provide product customization service, please contact our technicians directly for specific information;
  - Products are related to laws and regulations: see "Features" and "EMC";
  - Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China  
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com