750W, AC-DC Brick Converter

RoHS

FEATURES

- Ultra-wide 85 - 305VAC and 120 - 430VDC input voltage range
- Typical efficiency up to 92%, PF value up to 0.99
- International standard full brick package, aluminum substrate process
- PFC & DCDC converter integrated package
- Input under-voltage protection, over temperature protection, output short circuit/over-voltage/ over-current protection
- Output voltage adjustable
- Integrated parallel current sharing, status indication, remote control, auxiliary power supply, remote compensation function
- Designed to meet UL/IEC/EN62368, GB4943 standards

LBF750-13Bxx series is the Mornsun AC-DC brick package power supply. It features universal AC input and at the same time accepts DC input voltage, high power density, high efficiency, reinforced isolation. It offers good EMC performance compliant to CISPR32/EN55032, UL/IEC/EN62368 standards. The products are widely used in military, industrial control, data communication, network communication, server, vehicle/airborne/ship system and other industries. For extremely harsh EMC environment, we recommend using the application circuit show in Design Reference of this datasheet.

Selection Guide

Part No.	Output Power	Nominal Output Voltage and Current(Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.③
LBF750-13B12	696W	12V/58A	89	5000
LBF750-13B24	750W	24V/31.2A	91	4000
LBF750-13B28		28V/26.8A	91.5	3000
LBF750-13B48		48V/15.6A	92	1000
LBF750-13B54		54V/13.9A	92	820

Input Specifications③

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	115VAC	Room temperature, full load	PF≥0.99			
	230VAC		PF≥0.96			
Input Current	115VAC		--	--	10	A
	230VAC		--	--	5	
Inrush Current	Built-in inrush current suppression circuit, external 12Ω power resistor	115VAC	--	20	--	
		230VAC	--	40	--	
Input Under-voltage Protection	Under-voltage protection start		60	--	75	VAC
	Under-voltage protection release		75	--	85	
Remote Control Switch (ON/OFF)*	Power on		ON/OFF connect to COM or Low-level (0-1VDC) or left open			
	Power off		ON/OFF connect to AUX or High-level (3-14VDC)			
Recommended External Input Fuse			15A/300VAC, slow-blow, required			

Hot Plug		Unavailable
Note: *Remote Control Switch (ON/OFF) control the voltage of pin relative to pin COM.		

Output Specifications③

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			--	±2	--	%
Line Regulation	Full load		--	±0.5	--	
Load Regulation	10% -100% load		--	±0.5	--	
Ripple & Noise①	⩾10% Io, 20MHz bandwidth (peak-to-peak value)	12V	--	180	--	mV
		24V	--	180		
		28V	--	200		
		48V	--	340	--	
		54V	--	380	--	
Stand-by Power Consumption	Room temperature, 0% Io, 230VAC input voltage		--	3	--	W
Hold-up Time	115/230VACinput		--	8	--	ms
Minimum Load②			10	--	--	%
Output Voltage Adjustable (Trim)			90	--	110	%Vo
Output Voltage Remote (Sense)			--	--	105	
Parallel (PC)	PC to COM in parallel		Support direct parallel use, achieve N+1 parallel redundancy			
Current Staring Accuracy	Output >50% Io		--	--	5	%
Auxiliary Source Supply (AUX)	Io=50mA		10	--	14	V
IOG Status Indication	Normal output		Output: Pulse			
	Abnormal output		Output: High-level			
Short Circuit Protection			Hiccup or turn off, self-recover			
Over-current Protection			105% - 170% Io, self-recover			
Over-voltage Protection	12VDC output		⩽20VDC (Hiccup or clamp)			
	24VDC output		⩽35VDC (Hiccup or clamp)			
	28VDC output		⩽35VDC (Hiccup or clamp)			
	48VDC output		⩽63VDC (Hiccup or clamp)			
	54VDC output		⩽70VDC (Hiccup or clamp)			
Over Temperature Protection	Over-temperature protection start (Al-Substrate temperature) until power off		105	--	130	℃
	Over-temperature protection recovery		Power off, BOOST discharge, restart			

Note: 1. ①The "Tip and barrel method" is used for ripple and noise test, please refer to AC-DC Converter Application Notes for specific information;
2. ②The product is able to work stably at load of 0% - 10%;
3. ③The above specifications are tested based on the rated input voltage.

General Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input - Output	Electric Strength Test for 1min., leakage current <5mA	3000	--	--	VAC
	Input - PE		2500	--	--	
	Output - PE		1500	--	--	
Insulation Resistance	Input - Output	Ta=25±5℃, Relative humidity: <95%RH, non-condensing Testing voltage: 500VDC	100	--	--	MΩ
	Input - PE		100	--	--	
	Output - PE		100	--	--	
Al-Substrate Temperature			-40	--	+100	℃
Storage Temperature			-40	--	+100	
Storage Humidity		Non-condensing	--	--	95	%RH
Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s			
		Manual-welding	360 ± 10℃; time: 3 - 5s			

Switch Frequency			--	130	--	kHz
Power Derating	Al-Substrate Temperature	+50℃ to +100℃ (12V output)	0.88	--	--	%/℃
		+70℃ to +100℃ (other output)	0.67	--	--	
	Input voltage	85VAC - 150VAC	0.43	--	--	%/VAC
	Altitude	2000m - 5000m	6.67	--	--	℃/Km
Safety Standard			Design refer to UL/IEC/EN62368-1, GB4943.1			
Safety Class			CLASS I			
MTBF	MIL-HDBK-217F@25℃		≥500,000 h			

Mechanical Specifications

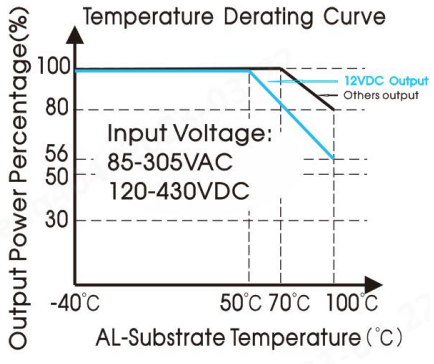
Case Material		Aluminum substrate+black plastic, flame-retardant and heat-resistant (UL94V-0)
Dimension	DIP	116.80 x 61.00 x 12.70mm
Weight	DIP	260g (Typ.)
Cooling method		Conduction heat dissipation, it is necessary to ensure that the product aluminum substrate surface temperature lower than 100℃.

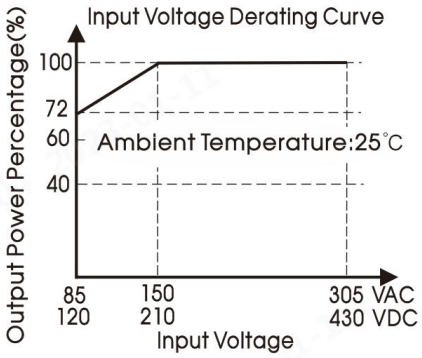
Electromagnetic Compatibility (EMC)*

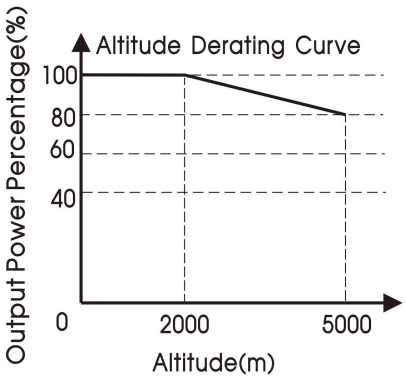
Emissions	CE	CISPR32/EN55032	CLASS A	
		CE102 GJB151B	(See Fig. 2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A	
	Harmonic current	EN61000-3-2	CLASS A	
	THD	EN61000-3-2	≤8%	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria A
	Surge	IEC/EN61000-4-5	Line to line ±1KV/line to PE ±2KV	perf. Criteria A
	CS	IEC/EN61000-4-6	10Vr.m.s	perf. Criteria A
	MS	IEC/EN61000-4-8	10A/m	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.

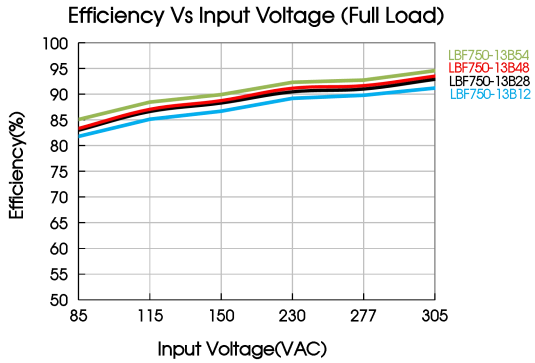
Product Characteristic Curve

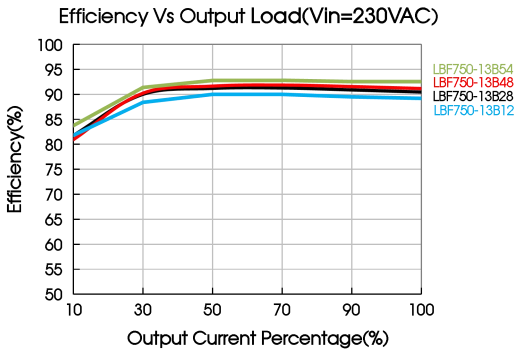






Note:
① With an AC input voltage between 85 - 150VAC/120 - 210VDC the output power must be derated as per the temperature derating curves;
② The temperature derating curve is a typical test value, the working condition is heat sink with air cooling.





Additional Circuits Design Reference

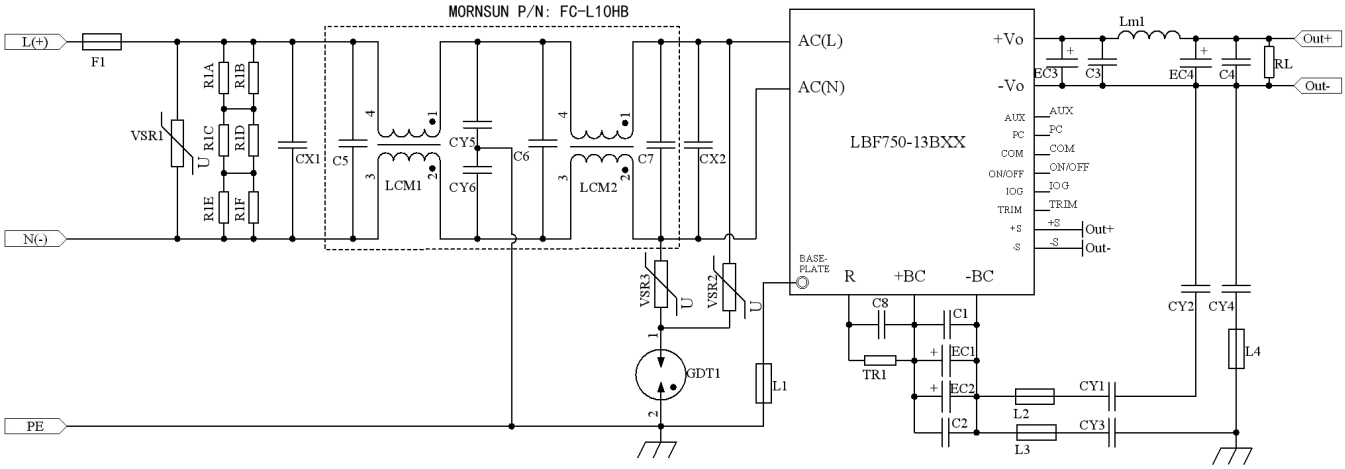


Fig. 1: Recommended circuit 1

Component		Recommended value	
F1		300VAC/15A, show-blow	
VSR1/VSR2/VSR3		S14K350/6000A	
R1A/R1B/R1C/R1D/R1E/R1F		240KΩ/1206	
CX1/CX2		225K/310VAC	
MORNSUN P/N: FC-L10HB*	C5/C6/C7	104K/310VAC	
	CY5/Cy6	Y2/222M/250VAC	
	LCM1	1.8mH	
	LCM2	500uH	
GDT1		800V/5KA	
L1/L2/L3/L4		4x3.1x2.6/47Ω/DCR 0.004Ω Max (suppressing high frequency beads)	
C1/C8		683K/630V	
C2		472K/2000V/1206	
TR1		12Ω/20W/wire-round resistor	
CY1/CY2		Y2/472M/250VAC	
EC1/EC2		420uF/450V (Aluminum Electrolytic Capacitor)	
CY3		Y2/222M/250VAC	
CY4		Y2/471M/250VAC	
Lm1		12V	0.33uH/0.35mΩ Max/80A(RKR0620)
		24V/28V/48V/54V	short-circuit or 0mΩ resistor
EC4		12V	6000uF/16V (Aluminum Electrolytic Capacitor)

EC3/EC4	24V/28V	2000uF/35V (Aluminum Electrolytic Capacitor)
	48V	1000uF/63V (Aluminum Electrolytic Capacitor)
	54V	820uF/100V (Aluminum Electrolytic Capacitor)
C3/C4	12V/24V/28V	106K/50V/1206
	48V/54V	225K/100V/1206
RL	12V	125Ω/3W
	24V/28V	0.5KΩ/3W
	48V/54V	2KΩ/3W
Note: *P/N: FC-L10HB (MORNSUN) is preferred, the effect of the self-built circuit is greatly affected by magnetic material and layout.		

Conducted Emission (CE102) Recommended Circuit

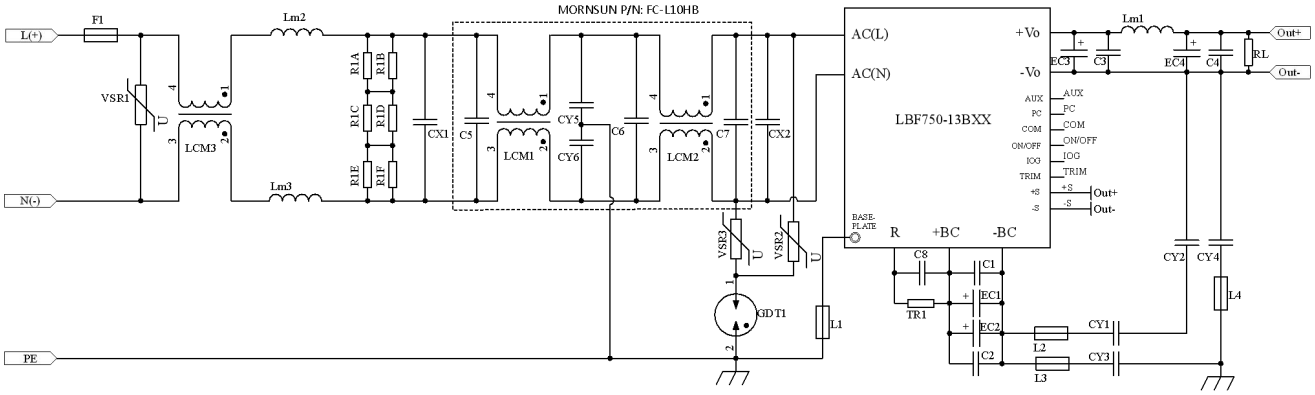
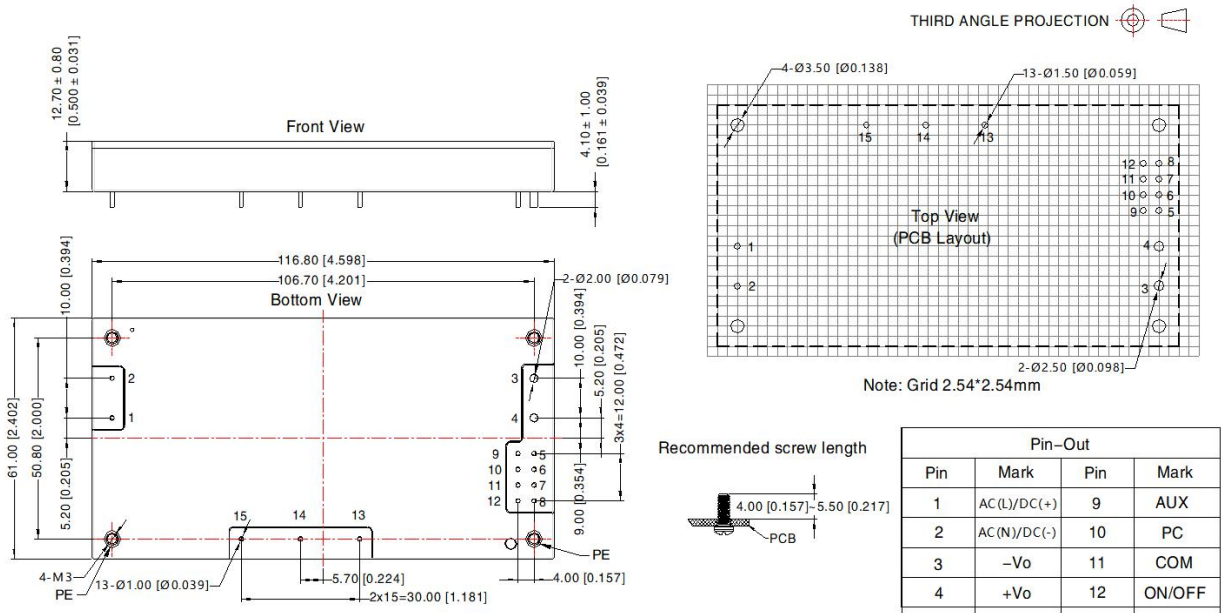


Fig. 2: Recommended circuit 2

Component	Recommended value
LCM3	5.6mH/Min: 4A
Lm2/Lm3	2mH/Min: 4A
CX1	225K/310VAC
CX2	335K/310VAC
Note: The external circuit component parameters are the same as those of the above recommended circuit 2.	

Dimensions and Recommended Layout



Pin-Out			
Pin	Mark	Pin	Mark
1	AC(L)/DC(+)	9	AUX
2	AC(N)/DC(-)	10	PC
3	-Vo	11	COM
4	+Vo	12	ON/OFF
5	-S	13	-BC
6	+S	14	+BC
7	Trim	15	R
8	IOG		

Note:
Unit: mm[inch]
Pin3, 4's diameter: 2.00[0.079]
Pin1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15's diameter: 1.00[0.039]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
Mounting hole screwing torque: Max 0.4 N・m

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210118;
2. 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;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. If product involves multi-brand materials and there are differences in color etc, please refer to the standards of each manufacturer;
8. 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

LBF750-13BXX Series Power Supply Application Manual

Content

1. Performance Characteristics And Appearance Pin Definition 8
1.1. Performance characteristics 8
1.2. Appearance pin definition 8
2. Instructions For Use 9
2.1. Input requirements 9
2.2. Output requirements 9
2.3. Remote compensation (+S, -S terminals) 9
2.4. Output voltage adjustment (Trim terminal) 10
2.5. Remote control switch (ON/OFF terminal) 11
2.6. Parallel operation (PC terminal) 12
2.7. Auxiliary power supply for external signals (AUX terminal) 13
2.8. IOG status indicator 13
2.9. Input under-voltage protection (UVP) 13
2.10. Output over-voltage protection (OVP) 13
2.11. Over-current/short circuit protection 13
2.12. Over-temperature protection 14
2.13. Output power derating 14
3. Test Waveform 15
3.1. Switch ON/OFF 15
3.2. Dynamic response 16
3.3. Output ripple and noise 16
3.4. Conductive and radiation (EMI) 17
4. Appearance Specifications 19
4.1. Manufacturing data/dimensions 19
4.2. Installation and disassembly methods 20
4.3. Cooling method 21

1. Performance Characteristics And Appearance Pin Definition

1. 1. Performance characteristics

- Ultra-wide 85 - 305VAC and 120 - 430VDC input voltage range
- Typical efficiency up to 92%, PF value: 0.99
- Integrated parallel current sharing, IOG status indication, remote control, auxiliary power supply, remote compensation function
- Input under-voltage protection, output short circuit, over-voltage, over-current protection, over temperature protection
- Designed to meet UL/IEC/EN62368, GB4943 standards
- International standard full brick package, aluminum substrate process
- Built-in capacitor: no electrolytic, only ceramic capacitor (high reliability)

1. 2. Appearance pin definition

Figure 1: Appearance pins

Terminal name	Terminal definition
AC(L)/DC(+)	AC input L line/DC input +
AC(N)/DC(-)	AC input N line/DC input -
-VO	Output voltage negative
+VO	Output voltage positive
-S	Output voltage negative end remote compensation
+S	Output voltage positive and remote compensation
TRIM	Output voltage adjustable terminal
IOG	Output status indicating terminal
AUX	Auxiliary power terminal for external signal
PC	Modules run in parallel

ON/OFF	Remote control switch
COM	Common terminal
-BC	- Boost terminal (external electrolytic capacitor negative terminal)
+BC	+ Boost terminal (external electrolytic capacitor positive terminal)
R	Terminals for external resistors that limit input surge current

2. Instructions For Use

2. 1. Input requirements

The AC input voltage and DC input voltage must be within the defined voltage range (refer to datasheet), otherwise the power supply may not work properly or even malfunction. There is no fuse inside the power module. For better protection, it is recommended that customers use a circuit breaker not greater than 15A.

To ensure the reliability of the product, hot plugging is prohibited.

2. 2. Output requirements

At any voltage value, the maximum output current and power must not exceed the rated value.

2. 3. Remote compensation (+S, -S terminals)

As shown in Figure 2, the +S and -S terminals are respectively connected to the load terminal (Vo+ and Vo-) through twisted-pair signal cables or differential signal cables (+S and -s) to compensate the line voltage drop between the module and the load. It should be noted that the +S and -S terminals must be connected to the load terminal through signal cables before the module is powered on, otherwise the module will enter over-voltage protection; If the remote compensation connection is not required, the +S and -S terminals can be shorted to the output positive and negative (+Vo and -Vo terminals) respectively.

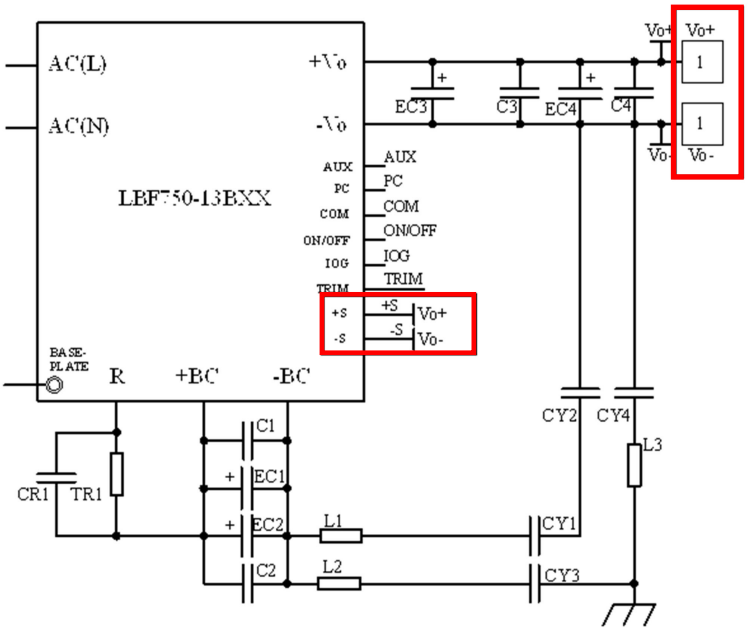


Figure 2: Schematic diagram of the remote compensation connection

2. 4. Output voltage adjustment (Trim terminal)

As shown in the wiring diagram in the red box in Figure 3, the output voltage of the module can be adjusted within ±10% of the rated output voltage by connecting the external resistor R1 and sliding rheostat RV. When the output voltage is higher than the adjustable range, it may cause output over-voltage protection. When the output voltage increases, reduce the output current to ensure that the maximum output power of the module stays within the specified range. When the output voltage is lowered, the maximum output current remains unchanged.

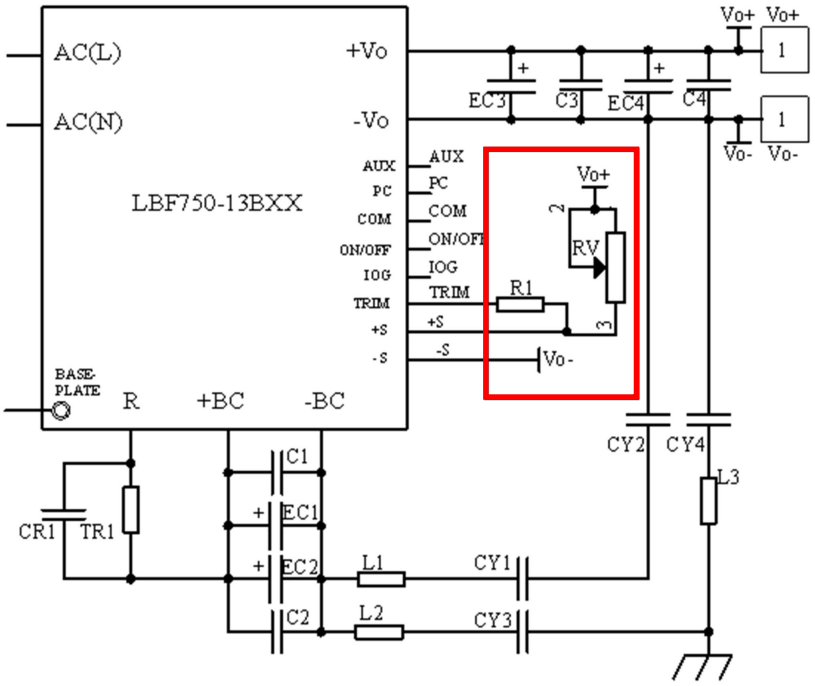


Figure 3: Schematic diagram of the output voltage regulation connection

Trim resistance calculation formula:
Up:

$$RZ = \frac{R4 \cdot \left[Voup - \frac{Vref \cdot (R3 + R4)}{R4} \right]}{Vref}$$

Note: R1 left open.
Down:

$$R1 = -\frac{R3 \cdot R4 \cdot Vref - R3 \cdot R4 \cdot Vodown}{R3 \cdot Vref + R4 \cdot Vref - R4 \cdot Vodown}$$

Note: RV short connection.

Vout	R3	R4	Vref
12V	10kΩ	2.629kΩ	2.5V
24V	33kΩ	3.83kΩ	2.5V
28V	24kΩ	2.35kΩ	2.5V
48V	100kΩ	5.4862kΩ	2.5V
54V	63kΩ	3.3kΩ	2.5V
Note: R3, R4 are built-in resistors, and Vref is internal reference.			

Recommended value of Trim resistor (adjustable slip RZ to achieve upper and lower output voltage regulation) :

Vout	R1	RV
12V	56kΩ	Sliding rheostat with adjustable range of 0-2.9kΩ
24V	220kΩ	Sliding rheostat with adjustable range of 0-8.6kΩ
28V	150kΩ	Sliding rheostat with adjustable range of 0-6.4kΩ
48V	750kΩ	Sliding rheostat with adjustable range of 0-23.2kΩ
54V	510kΩ	Sliding rheostat with adjustable range of 0-15.9kΩ
Note: When the sliding rheostat adjustment resistance exceeds the recommended adjustable range too much, the module will enter over-voltage protection.		

2. 5. Remote control switch (ON/OFF terminal)

Module built-in remote control switch function. This function can be realized in the input voltage on state control output on/off. The wiring diagram is shown in Figure 4. You can directly supply power to ON/OFF terminals through AUX terminals. When using external power supply to ON/OFF, the external power supply voltage does not exceed 15V. If the remote switch function is not used, hang ON/OFF or connect to COM or low level (0-1VDC).

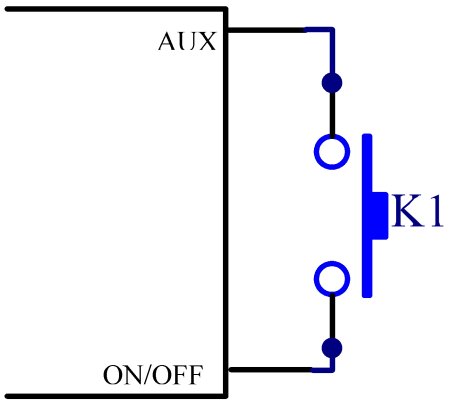


Figure 4: Schematic diagram of remote switch connection

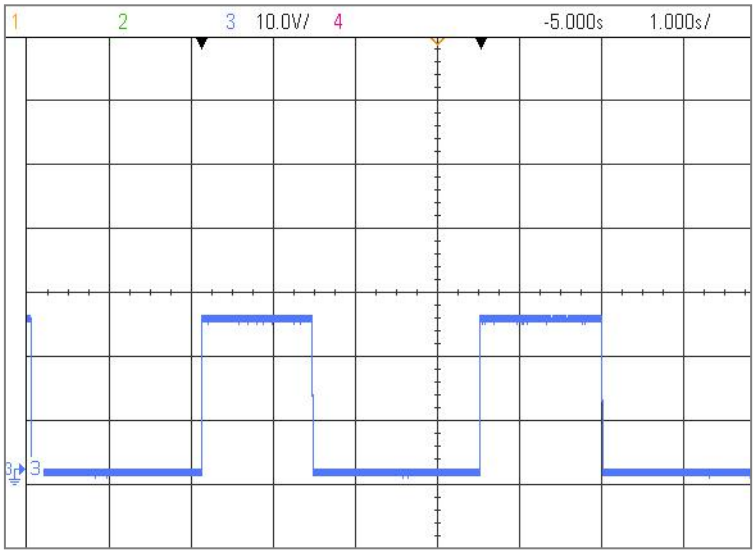


Figure 5: Output voltage diagram of ON/OFF function

2. 6. Parallel operation (PC terminal)

The PC terminal is a parallel current sharing bus. Parallel-connect the PC and COM terminals of each power module to equalize the output current between modules. At the output end of the power supply, the output cable width and length of each module should be as consistent as possible, and the line impedance should be as similar as possible. After the output filtering of a single module, a load bus is drawn from the load end. After the output filtering, each module accesses the load bus nearby through the load line of the same specification and length, and the mobility is optimal. Parallel operation connection is shown in Figure 6 below.

Power modules support 4+1 parallel redundancy.

When the system is used in parallel, the maximum load current cannot exceed the maximum output current of a single power module; otherwise, the entire parallel power system cannot start properly.

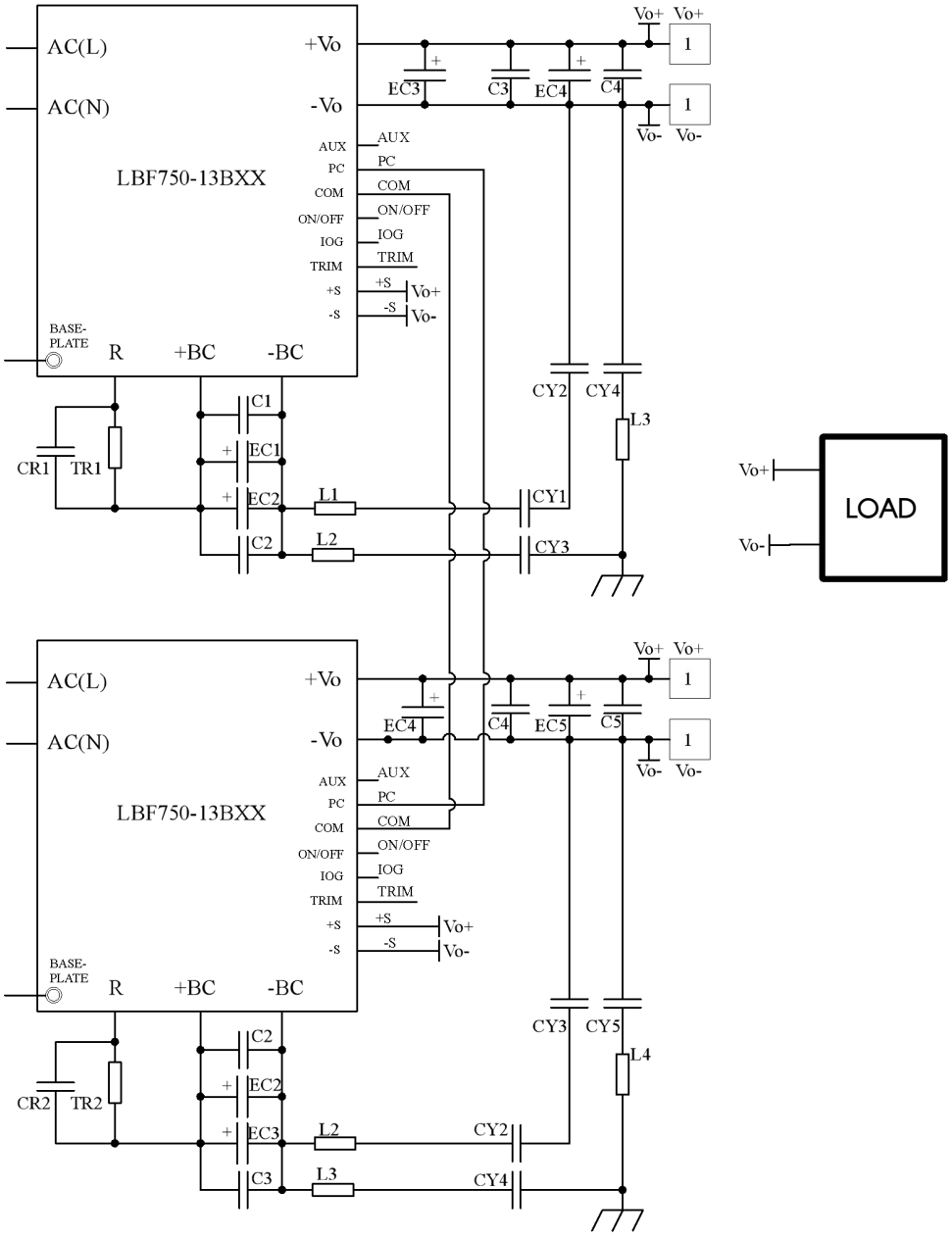


Figure 6: Diagram of parallel operation connection

2. 7. Auxiliary power supply for external signals (AUX terminal)

The AUX terminal output voltage ranges from DC10V to DC14V, and the maximum output current is 50mA. AUX terminal reference position COM terminal. Do not short-circuit the AUX terminal to a terminal other than the ON/OFF terminal. Otherwise, the power module may be damaged.

2. 8. IOG status indicator

The signal is the output signal of the module and the reference ground is the COM terminal. By monitoring the signal from IOG terminal to COM terminal, you can check whether the power module is working properly. Pulse signal when working normally, high level when working abnormally.

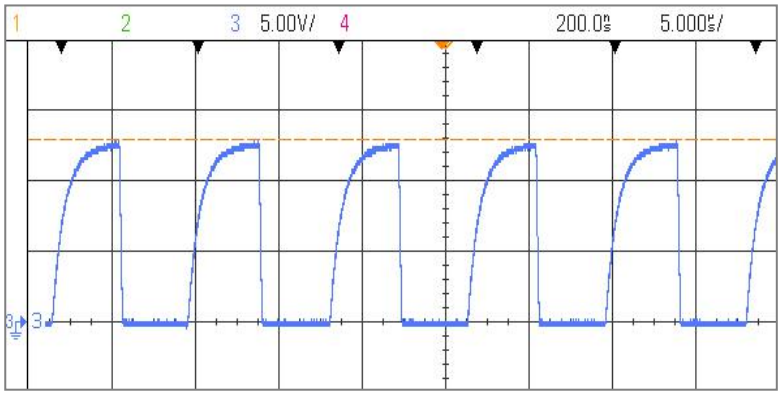


Figure 7: IOG status indication waveform in normal operation

Note: Normal output is "pulse", in case of failure, output "H" (maximum pull-down current is 5mA, maximum applied voltage is 35V).

2. 9. Input under-voltage protection (UVP)

When the input voltage is lower than the under-voltage protection set value, the module output is closed; When the input voltage is higher than the under-voltage protection power-on set value, the module output is normal. The under-voltage protection has a return difference, that is, the shutdown setting value is lower than the start-up setting value, so as to prevent the module from being affected by external interference or the transient drop of input voltage when starting itself and working normally.

2. 10. Output over-voltage protection (OVP)

This module has output clamp type output over-voltage protection function. When the output end of the module is over-voltage, the output voltage clamped at a fixed value or hiccup. After the fault is rectified, the module output automatically recovers to normal.

2. 11. Over-current/short circuit protection

This module is designed with over-current/short circuit protection circuit, which can withstand over-current or short circuit at the output end. In short circuit state, the module is in belch state (200ms at work, 2s at rest), as shown in Figure 8. In case of short circuit with load cutting, the module can enter the rest state after constant current for 1s, as shown in Figure 9; After the over-current and short circuit faults are eliminated, the module output automatically recovers to normal.

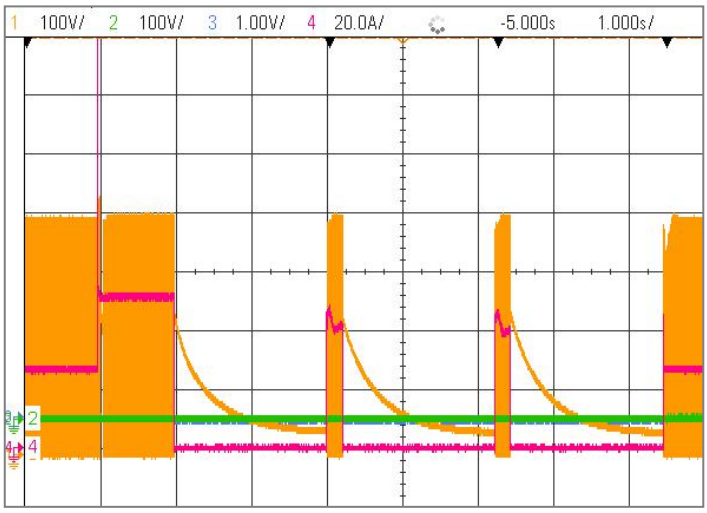


Figure 8: Waveform diagram, full load and short circuit switching

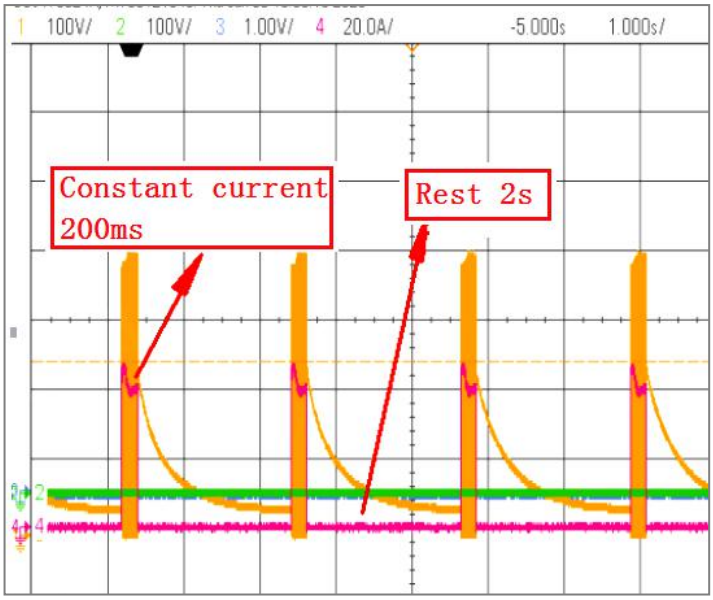


Figure 9: Short circuit waveform diagram

Note: Red indicates the output current.

2. 12. Over-temperature protection

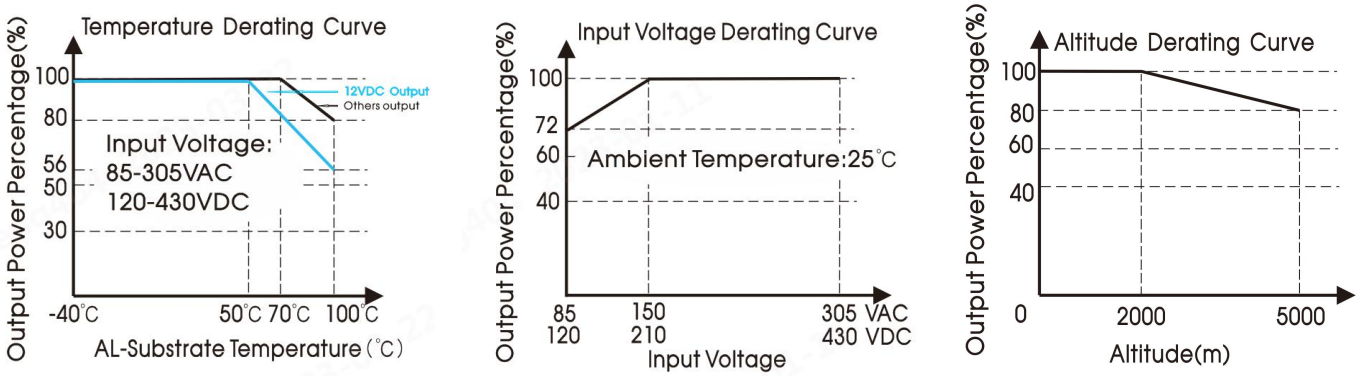
The built-in over-temperature protection circuit of the module prevents the module from being damaged due to excessive temperature rise such as overload and short circuit. When the temperature of the module shell exceeds the set value of over-temperature protection, the output of the module automatically closes. You need to power off and reset to restore the system.

2. 13. Output power derating

When the input voltage is greater than 150VAC (or 210VDC), only need to derate according to the temperature derating curve.

When the input voltage is lower than 150VAC (or 210VDC), the output power will be derated according to the following input voltage derating curve after temperature derating;

The temperature derating curve is a typical test value, the working condition is heat sink with air cooling.



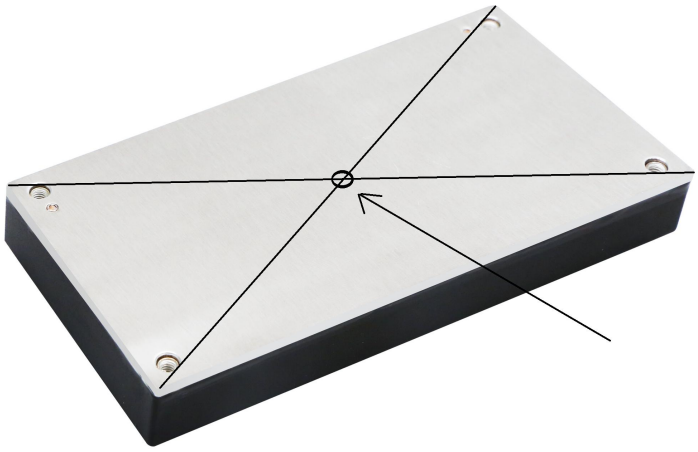


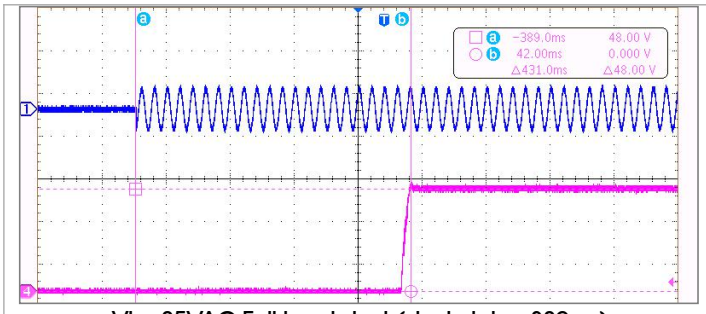
Figure 10: AL-Substrate temperature test point

Note: The test point of Al-Substrate temperature is the temperature of the center point of the substrate.

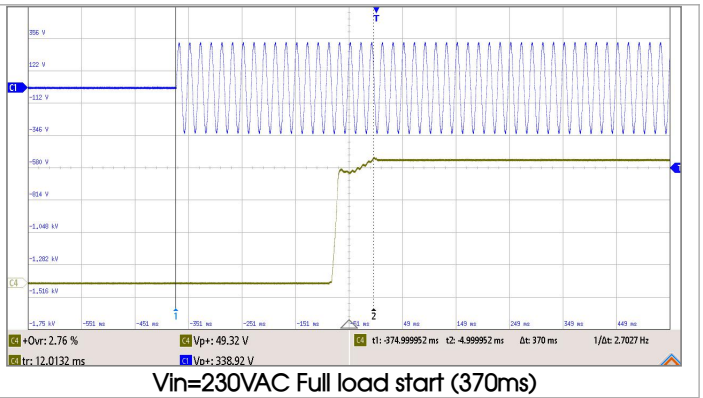
3. Test Waveform

3. 1. Switch ON/OFF

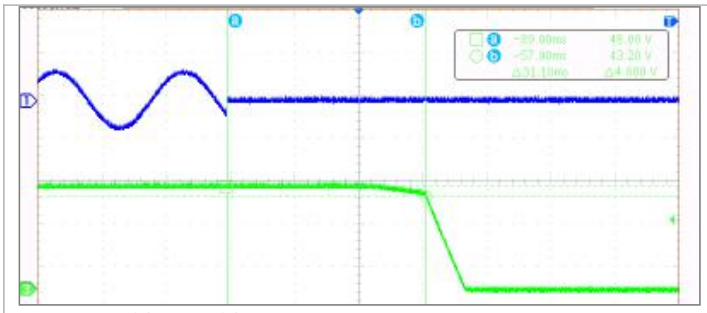
Test conditions: Tc=25℃, LBF750-13B48 products are tested based on recommended circuit 1, EC1/EC2=360~420uF.



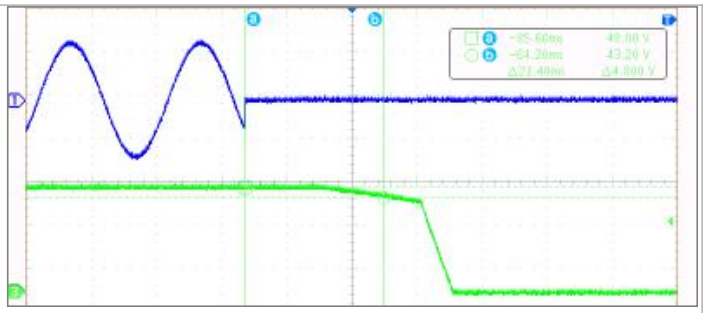
Vin=85VAC Full load start (start delay 389ms)



Vin=230VAC Full load start (370ms)



Vin=115VAC Full load shutdown (31.1ms)



Vin=230VAC Full load shutdown (21.4ms)

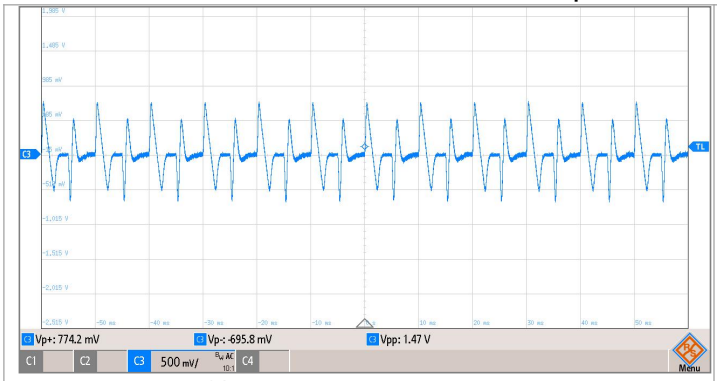
Note: The power OFF hold-up time is related to the EC capacitance, and can be adjusted with reference to the following formula:

$$t = \frac{0.5 \cdot C_{EC} \cdot (U1^2 - U2^2)}{P_O}$$

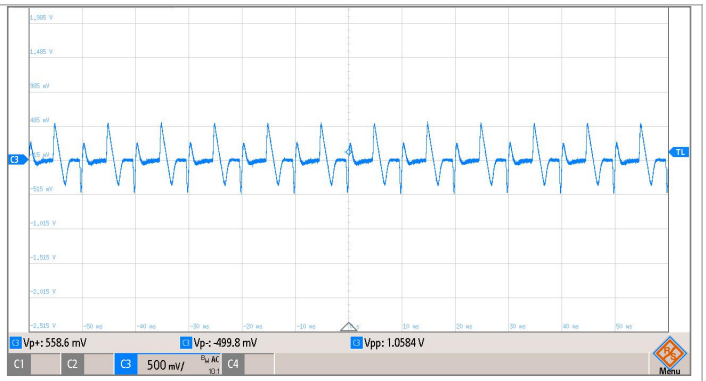
U1=396VDC, U2=309VDC, Po=750W (based on actual power output).

3. 2. Dynamic response

Test conditions: Tc=25℃, LBF750-13B48 products are tested based on recommended circuit 1.



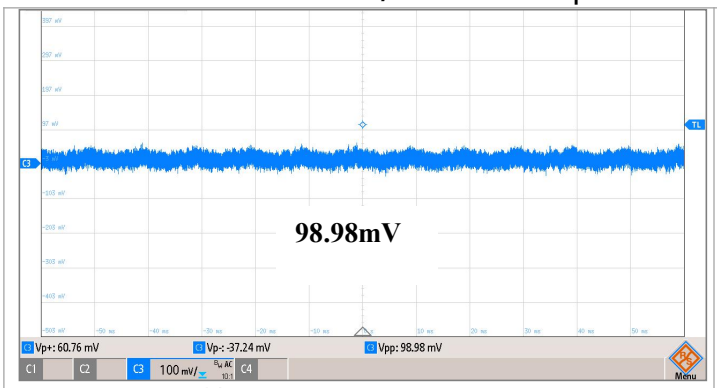
Vin-nor 10%-100% dynamic



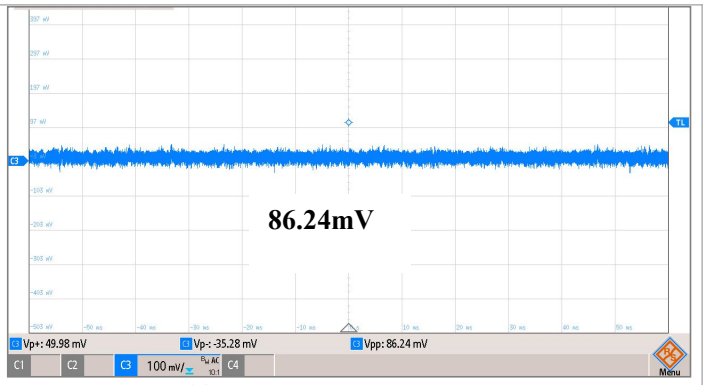
Vin-min 10%-100% dynamic

3. 3. Output ripple and noise

Test conditions: Tc=25℃, LBF750-13B28 products are tested based on recommended circuit 1.



Vin-nor full load ripple noise

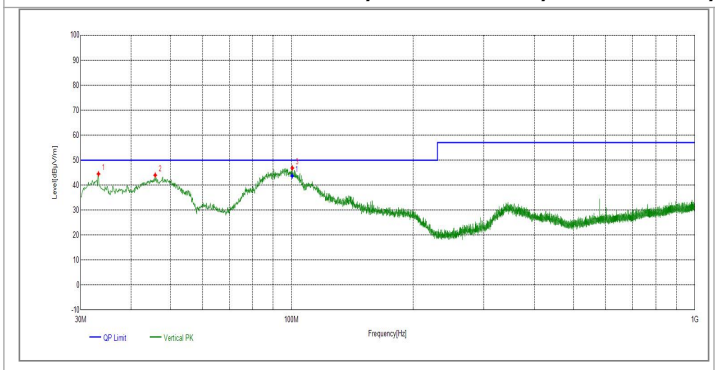


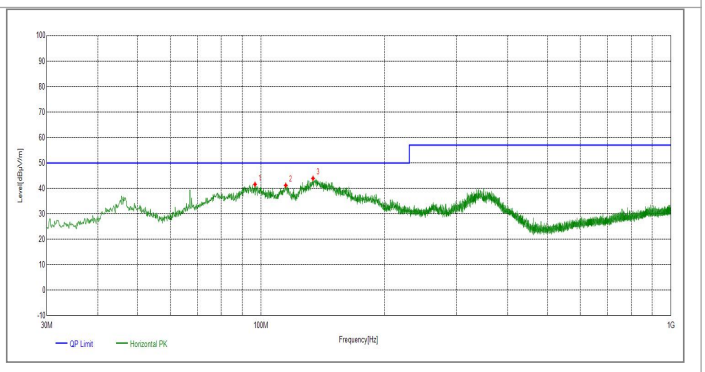
Vin-min full load ripple noise

3. 4. Conductive and radiation (EMI)

(1) Radiation (RE)：
Safety specifications: CISPR32/EN55032　CLASS A

RE Tc=25℃, Vin=115VAC, Pout= 640W, based on recommended circuit 1 test





Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
33.2013	Vertical	20.46	24.03	44.49	50.00	5.51	PK	100	138	PASS
45.9096	Vertical	20.82	23.16	43.98	50.00	6.02	PK	100	190	PASS
100.4290	Vertical	20.03	26.82	46.85	50.00	3.15	PK	100	203	PASS

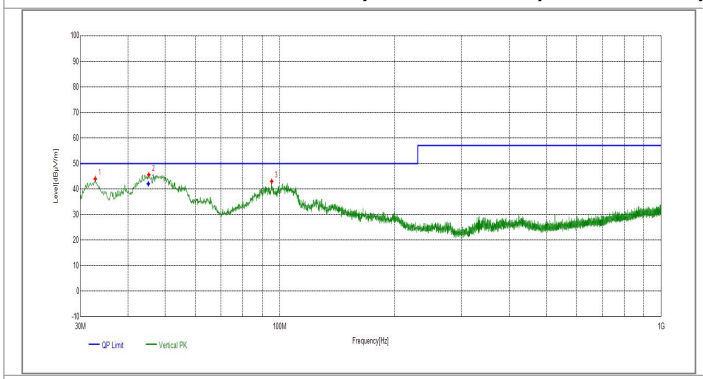
Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
100.3070	Vertical	20.03	43.68	50.00	6.32	280	203	PASS

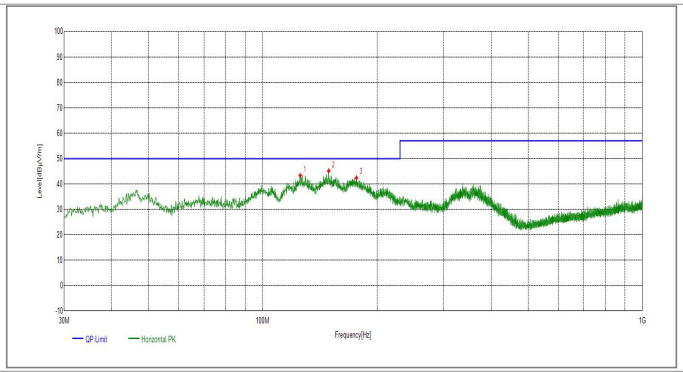
Vertical waveform and reading point

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
96.6457	Horizontal	19.57	22.02	41.59	50.00	8.41	PK	100	118	PASS
114.8835	Horizontal	18.32	22.88	41.20	50.00	8.80	PK	100	111	PASS
133.8974	Horizontal	16.32	27.61	43.93	50.00	6.07	PK	100	92	PASS

Horizontal waveform and reading point

RE Tc=25℃, Vin=230VAC, Pout=750W, based on recommended circuit 1 test





Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
32.8133	Vertical	20.42	23.56	43.98	50.00	6.02	PK	100	196	PASS
45.3275	Vertical	20.86	24.71	45.57	50.00	4.43	PK	100	242	PASS
95.1905	Vertical	19.35	23.63	42.98	50.00	7.02	PK	100	229	PASS

Final Data List								
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail
45.1989	Vertical	20.85	42.03	50.00	7.97	220	242	PASS

Vertical waveform and reading point

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Height [cm]	Angle deg	Pass/Fail
125.5546	Horizontal	17.16	26.21	43.37	50.00	6.63	PK	100	245	PASS
149.2249	Horizontal	15.83	29.30	44.93	50.00	5.07	PK	100	239	PASS
176.4846	Horizontal	16.79	25.60	42.39	50.00	7.61	PK	100	258	PASS

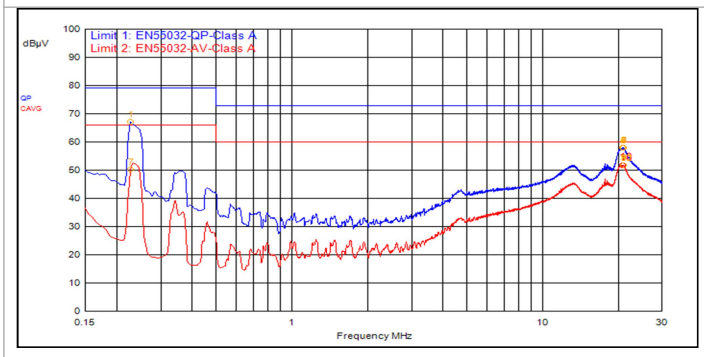
Horizontal waveform and reading point

The test results meet CLASS A standards

(2) Conductive (CE)：

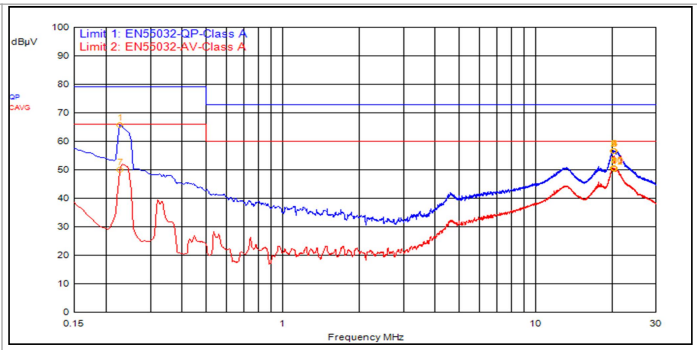
Safety specifications: CISPR32/EN55032　CLASS A

CE Tc=25℃, Vin=115VAC, Pout= 640W, based on recommended circuit 1 test



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
10	20.976MHz	1.0	0.2	10.0	C_AVG	40.6	51.8	60.0	-8.2
12	21.015MHz	1.0	0.2	10.0	C_AVG	40.5	51.7	60.0	-8.3
8	21.000MHz	1.0	0.2	10.0	C_AVG	40.5	51.7	60.0	-8.3
11	21.036MHz	1.0	0.2	10.0	C_AVG	40.4	51.6	60.0	-8.4
9	21.132MHz	1.0	0.2	10.0	C_AVG	40.4	51.6	60.0	-8.4
1	228.000kHz	0.2	0.2	10.0	QPeak	56.7	67.1	79.0	-11.9

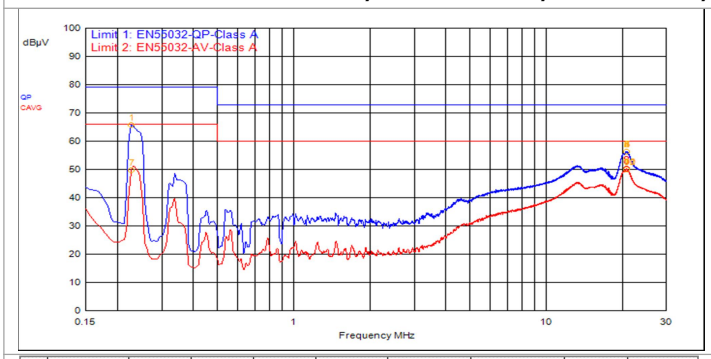
L line



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
11	20.415MHz	1.0	0.2	10.0	C_AVG	39.3	50.6	60.0	-9.4
9	20.502MHz	1.0	0.2	10.0	C_AVG	39.3	50.6	60.0	-9.4
8	20.409MHz	1.0	0.2	10.0	C_AVG	39.3	50.5	60.0	-9.5
10	20.511MHz	1.0	0.2	10.0	C_AVG	39.3	50.5	60.0	-9.5
12	20.565MHz	1.0	0.2	10.0	C_AVG	39.2	50.4	60.0	-9.6
1	228.000kHz	0.2	0.2	10.0	QPeak	55.4	65.8	79.0	-13.2

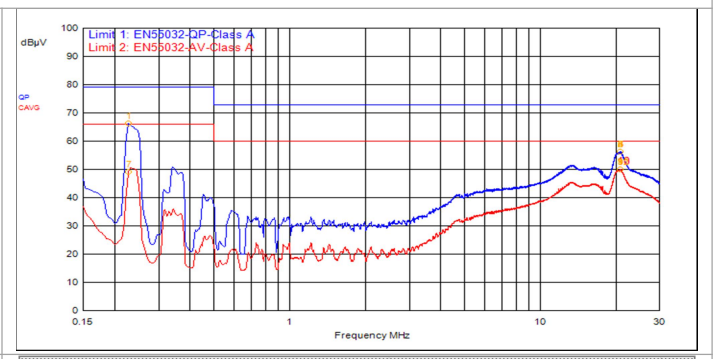
N line

CE Tc=25℃, Vin=230VAC, Pout=750W, based on recommended circuit 1 test



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
8	20.955MHz	1.0	0.2	10.0	C_AVG	39.0	50.2	60.0	-9.8
9	20.964MHz	1.0	0.2	10.0	C_AVG	38.9	50.1	60.0	-9.9
11	20.943MHz	1.0	0.2	10.0	C_AVG	38.9	50.1	60.0	-9.9
10	20.937MHz	1.0	0.2	10.0	C_AVG	38.9	50.1	60.0	-9.9
12	20.931MHz	1.0	0.2	10.0	C_AVG	38.8	50.0	60.0	-10.0
1	228.000kHz	0.2	0.2	10.0	QPeak	55.4	65.8	79.0	-13.2

L line



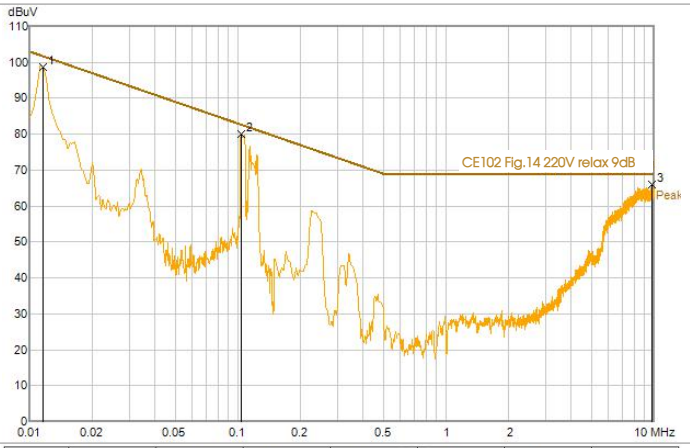
ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
10	20.958MHz	1.0	0.2	10.0	C_AVG	38.9	50.1	60.0	-9.9
8	20.883MHz	1.0	0.2	10.0	C_AVG	38.8	50.0	60.0	-10.0
12	20.964MHz	1.0	0.2	10.0	C_AVG	38.8	50.0	60.0	-10.0
9	20.865MHz	1.0	0.2	10.0	C_AVG	38.7	49.9	60.0	-10.1
11	20.910MHz	1.0	0.2	10.0	C_AVG	38.7	49.9	60.0	-10.1
1	228.000kHz	0.2	0.2	10.0	QPeak	55.8	66.2	79.0	-12.8

N line

The test results meet the EN55032 CLASS A standard

Safety specifications: CE102　GJB151B

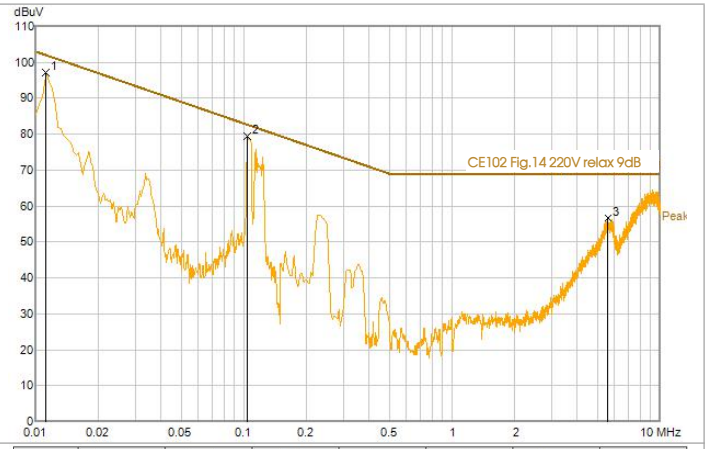
CE Tc=25℃, Vin=220VAC, Pout=750W, based on recommended circuit 2 test



SN	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Note
1	0.0116	70.29	28.47	98.76	101.71	2.95	Peak value
2	0.1036	59.83	20.25	80.08	82.68	2.6	Peak value
3	9.738	45.86	20.1	65.96	69	3.04	Peak value

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

L line



SN	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Note
1	0.0112	68.46	28.72	97.18	102.02	4.84	Peak value
2	0.1036	59.18	20.25	79.43	82.68	3.25	Peak value
3	5.594	36.69	20	56.69	69	12.31	Peak value

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

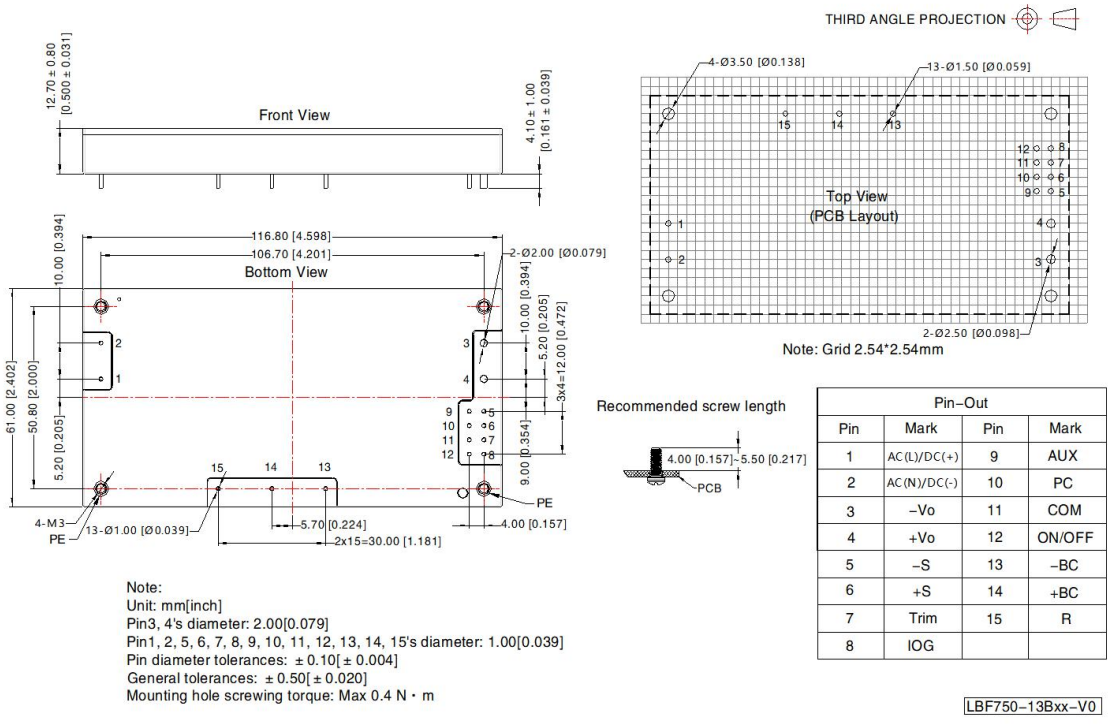
N line

The test results meet the CE102 GJB151B standard

4. Appearance Specifications

4. 1. Manufacturing data/dimensions

Length: 116.8mm±0.5mm
Width: 61.0mm±0.5mm
Height: 12.7mm±0.5mm
Terminal length: 4.1mm±0.5mm
Weight: 260g±10%g



Pin-Out			
Pin	Mark	Pin	Mark
1	AC(L)/DC(+)	9	AUX
2	AC(N)/DC(-)	10	PC
3	-Vo	11	COM
4	+Vo	12	ON/OFF
5	-S	13	-BC
6	+S	14	+BC
7	Trim	15	R
8	IOG		

Figure 11: Manufacturing data/size diagram

4. 2. Installation and disassembly methods

Installation method: Place the heat sink on the aluminum base plate and fasten the heat sink to the product using four screws.

Removing method: Use a tool to separate the four screws from the heat sink.

Maximum mounting hole tightening torque: 0.4N.m.

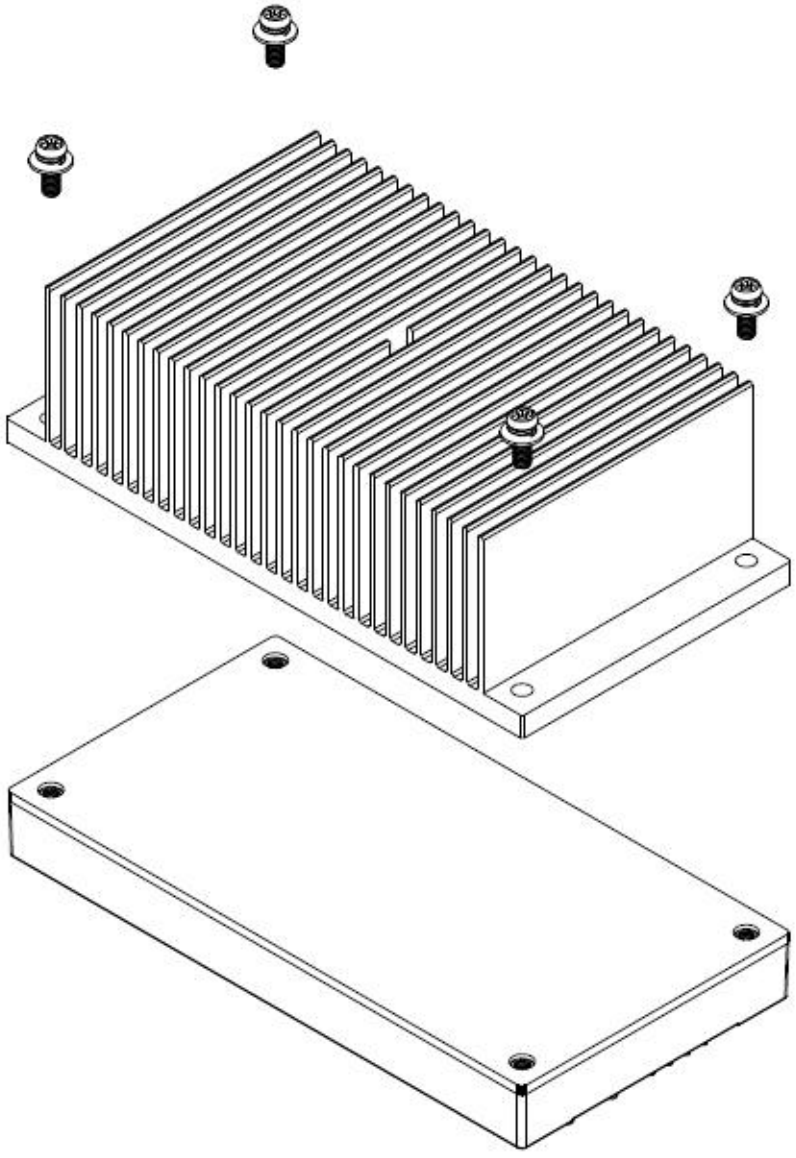


Figure 12: Installation and disassembly of product and heat sink

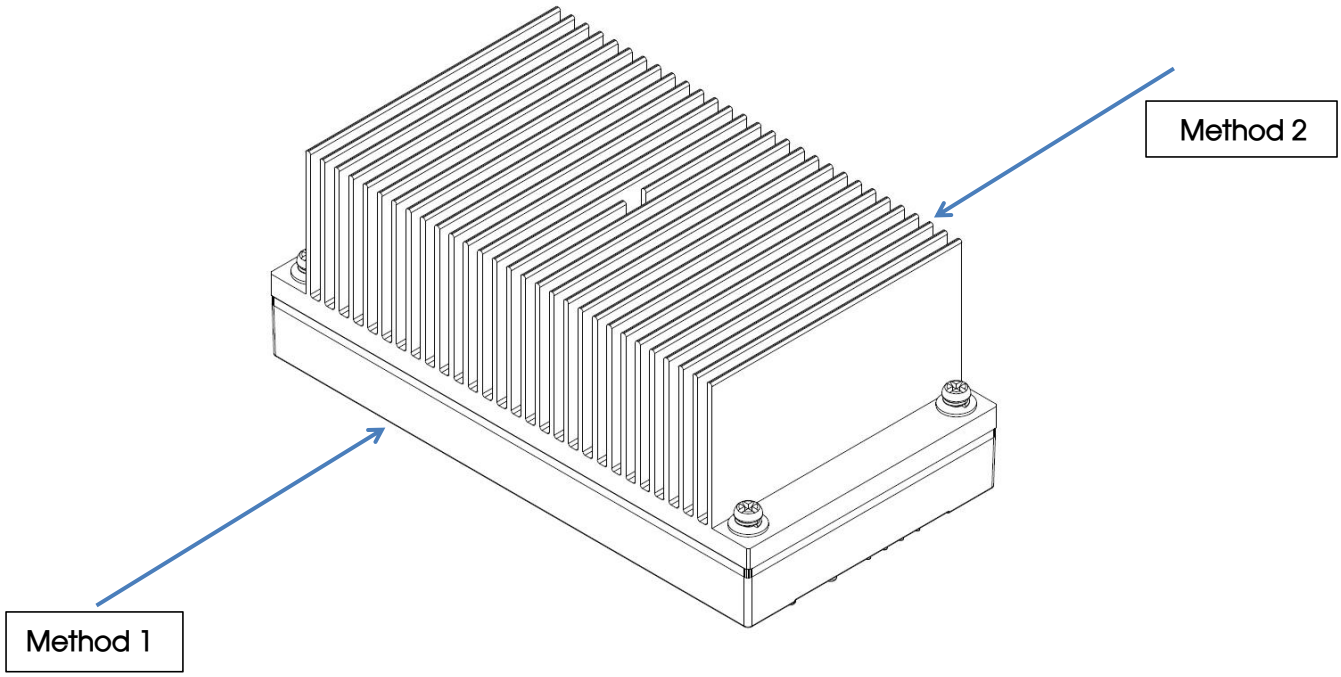


Figure 13: Schematic diagram of finished product after installation and instruction of wind direction

4. 3. Cooling method

Heat dissipation method	Surface heat sink	□
	Natural cooling	□
	Conduction heat dissipation	■
	In this document, "■" indicates selected, and "□" indicates not selected	

For more details, please consult the MORNSUN FAE.