



FEATURES

- Universal 85 - 305VAC or 120 - 430VDC Input voltage
- Output voltage adjustable
- Wide operating temperature range: -40°C to +100°C Base plate
- Input under-voltage protection, output over-voltage/short circuit/over-current protection, over-temperature protection
- Active PFC, PFC value up to 0.98
- Integrated parallel current sharing, status indication, remote control, auxiliary power supply, remote compensation function.
- High I/O isolation test voltage up to 3000VAC
- Operating up to 5000m altitude
- 5 years warranty
- Safety according to IEC/UL/EN 62368, GB4943

LBF1000-13B28-NS is one of Mornsun's potting ultra-thin bricks AC-DC switching power supply, it is suitable for industrial and outdoor occasions where the application environment is relatively harsh. It features universal AC input and at the same time accepts DC input voltage, cost-effective, high efficiency, high reliability and double or reinforced insulation. These converters offer excellent EMC performance and meet IEC/UL/EN 62368, GB4943 standards and they are widely used in areas of industrial, LED, street light control, electricity, security, telecommunications, smart home, etc.

Selection Guide

Certification	Part No.	Rated Output Power (W)*	Nominal Output Voltage and Current (Vo/Io)	Output Voltage Adjustable Range (V)	Efficiency at 230VAC (%) Typ.*	Room Temperature Max. Capacitive Load (μF)	Low Temperature Max. Capacitive Load (μF)
CE (Pending)	LBF1000-13B28-NS	1008	28V/36A	14.0 - 33.6	91.5	5000	5000

Note: 1.*Under any conditions, the total power of the product should not exceed the rated output power, and the output current should not exceed the rated output current;

2.*Due to different working modes, the efficiency difference between 0.5% and 0.7% is normal.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Voltage Range	AC input		85	--	305	VAC
	DC input		120	--	430	VDC
Input Voltage Frequency			47	--	63	Hz
Input Current	115VAC		--	--	10.8	A
	230VAC		--	--	5.3	
Inrush Current	Built-in inrush current suppression circuit, external 10Ω resistor	115VAC	Cold start	--	20	23
		230VAC		--	40	46
Input Under-voltage Protection	Protection start		50	--	75	VAC
	Protection release		75	--	85	
Leakage Current	277VAC		<0.75 mA			
Power Factor	115VAC	Normal temperature, full load	PF ≥ 0.98			
	230VAC		PF ≥ 0.96			
Total Harmonic Ratio Of Input Current (THD)	Normal temperature, full load		≤10%			
Hot Plug			Unavailable			

Output Specifications*

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy*	Full load range	--	--	±2	%	
Line Regulation	Rated load	--	--	±1		
Load Regulation	0% - 100% load	--	--	±2		
Ripple & Noise*	25°C, 20MHz bandwidth (peak-to-peak value)	--	--	150	mV	
Hold-up Time	115/230VAC (output voltage 28V, main bus with external electrolytic capacitor, >=1500uF)	20	30	--	ms	
		20	30	--		
Output Over Voltage Protection		Vo≤40.6VDC (hiccup, clamp or shutdown)				
Short Circuit Protection	Recover time <5s after the short circuit disappear	Hiccup, continuous, self-recover				
Over-current Protection	Output voltage 14VDC-19VDC, output hiccup and constant current protection	42	--	47	A	
	Output voltage 19VDC-25VDC, output constant current protection	42	--	47		
	Output voltage 25VDC-33.6VDC, output constant current protection	31	--	47		
Over-temperature Protection	Input voltage 85VAC-170VAC Rated load (base plate temperature)	Protect start	95	--	125	°C
		Protect release	85	--	115	
	Input voltage 170VAC-305VAC Rated load (base plate temperature)	Protect start	110	--	140	
		Protect release	100	--	130	

Note: 1.*For all the above test items, please refer to our company standard "AC-DC Black Box Test Specification" for specific test specifications and methods;
2.*Output Voltage Accuracy: including setting error, line regulation, load regulation;
3.*The "Tip and barrel method" is used for ripple and noise test, output parallel 47uF electrolytic capacitor and 0.1uF ceramic capacitor, please refer to Enclosed Switching Power Supply Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Isolation Test	Input - ⊕	2500	--	--	VAC	
	Input - output	3000	--	--		
	Output - ⊕	1500	--	--		
Insulation Resistance	Input - ⊕	100	--	--	MΩ	
	Input - output	100	--	--		
	Output - ⊕	100	--	--		
Operating Temperature*	The max temperature refer to the Aluminum base of PCB	-40	--	+100	°C	
Storage Temperature*		-40	--	+85		
Operating Humidity	Non-condensing	20	--	90	%RH	
Storage Humidity		10	--	95		
Power Derating	Operating temperature derating		--	--	--	%/°C
	Input voltage derating*	85VAC<Vin≤170VAC	--	--	85	°C
		170VAC<Vin≤305VAC	--	--	100	
	Altitude derating	2000m-5000m	6.67	--	--	°C/Km
Output voltage derating	14VDC-28VDC	Maximum output power Po=Vo*36				
	28VDC-33.6VDC	Maximum output power 1008W				
Parallel Operation*	PC (2-6 PCS of the same product in parallel) maximum current ≥50%Io	5	--	10	%	
Remote Switch*	-ON/OFF, +ON/OFF, end use recommendation	Power on	2	--	10	mA
		Power off	--	--	0.15	mA
TRIM Output Voltage Adjustable Range*	230VAC input, full load range	14	--	33.6	V	
Remote Compensation	-S, +S	Compensation voltage should within the range of the voltage adjustable range.				

Status Indication	IOG/ENA (maximum sink current 5mA, maximum source voltage 35V)	Normal state	L
		Fault state	H
Safety Standard		Design refer to IEC/UL/EN 62368-1, GB4943.1	
Safety Class		CLASS I	
MTBF	MIL-HDBK-217F@25°C	≥500,000 h	
Pollution Degree	1		
Warranty	Aluminum substrate temperature: <100°C	5 years	

Note: 1.*In order to optimize the heat dissipation performance, should add a heat sink for heat dissipation, The surface of the heat sink must be coated with thermal grease;
2.*The max temperature is the base plate temperature;
3.* Parallel current sharing needs to adjust the output voltage of the product within ±2% accuracy through the trim pin. When 2-3pcs of the same product are paralleled, they can output at most 90% of the rated output current, current sharing accuracy can reach within 5%; 4-6pcs (same product) can output up to 85% of the rated output current when they are paralleled, and the current sharing accuracy can reach within 10%;
4.*Pay attention when the remote control is used with an external power supply. This module has a built-in MAX0.25W4.7K resistor. For details, see the schematic diagram in the application manual.
5.*The TRIM pin is pulled up to 3.3V by a built-in 1K resistor. When the external adjustment method is used, the input voltage between TRIM and COM should be greater than 0V and less than 3.3V.

Mechanical Specifications

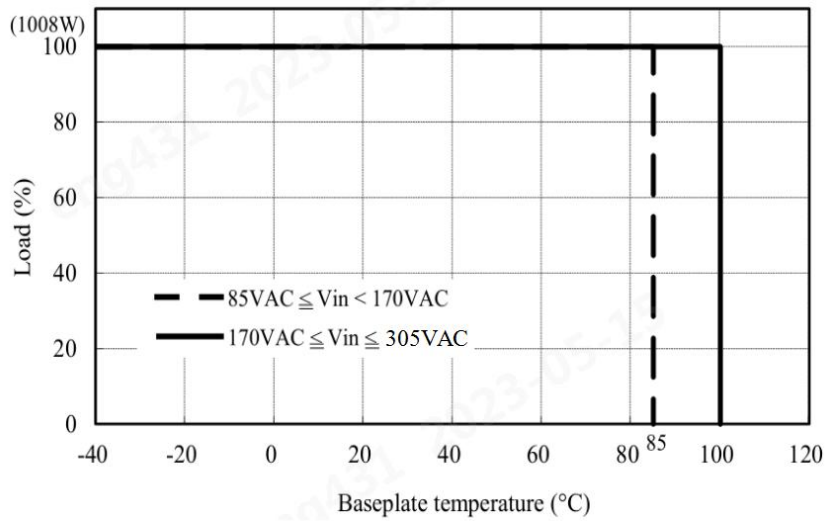
Case Material	Aluminum substrate+black Plastic(SABIC PC945)
Dimensions	160.00mm x 100.00mm x 13.40mm
Weight	530g (Typ.)
Cooling Method*	Conduction heat dissipation, it is necessary to ensure that the product aluminum substrate surface temperature lower than 100°C.

Note: *Cooling method refer to the Product Characteristic Curve.

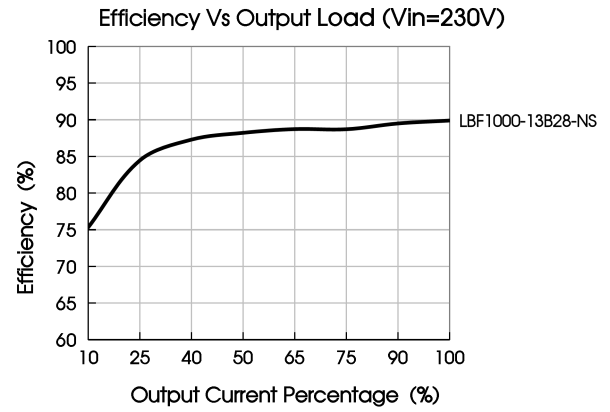
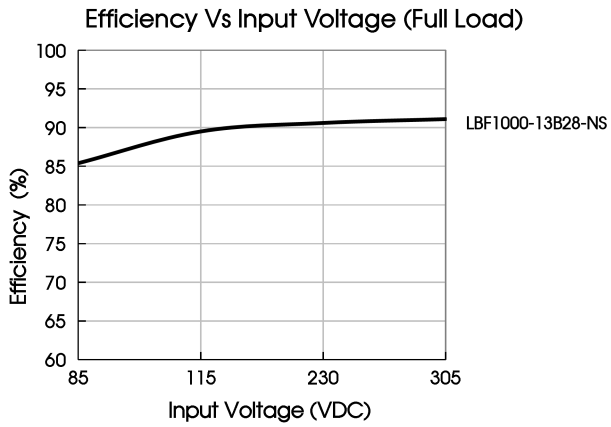
Electromagnetic Compatibility (EMC)

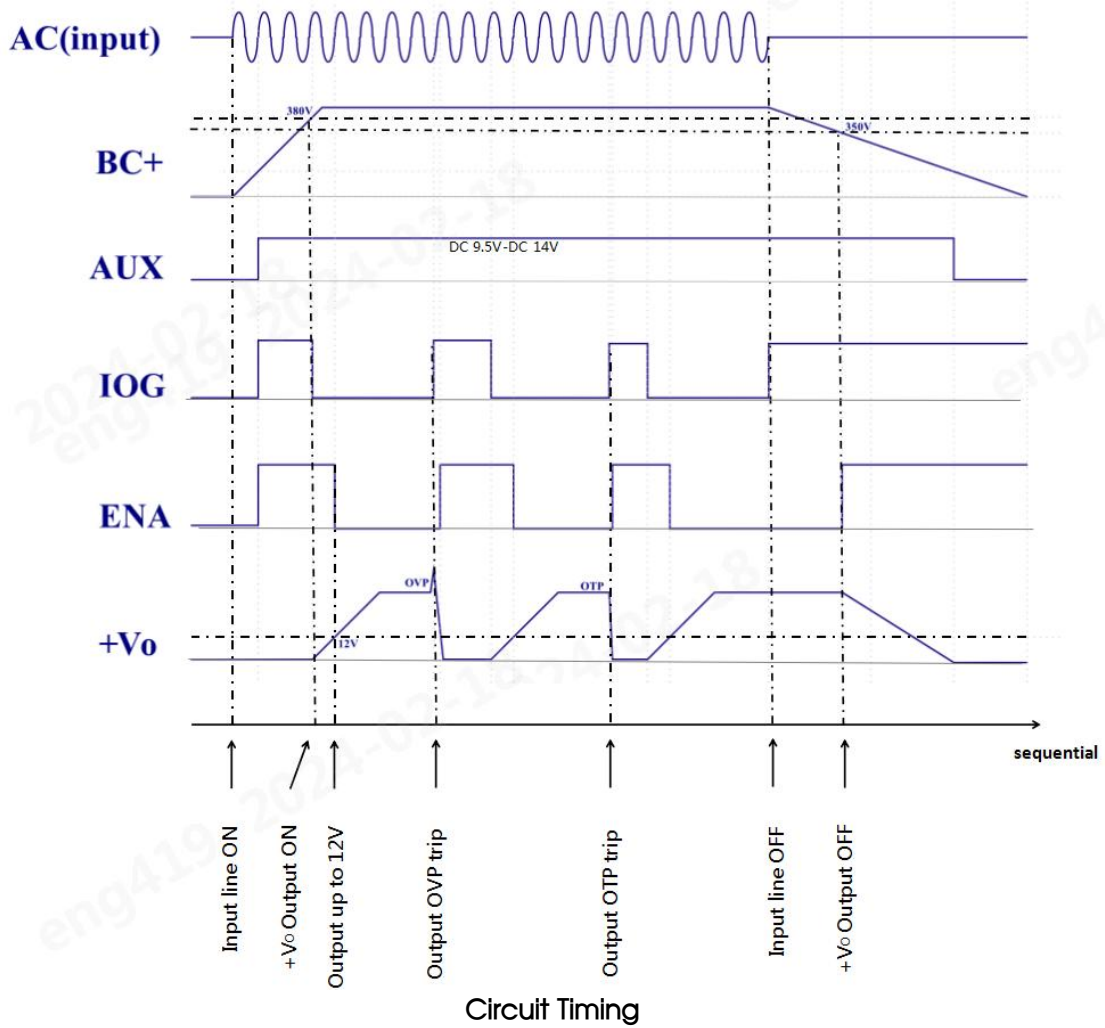
Emissions	CE	CISPR32/EN55032	CLASS A (Recommended external circuit 1)	
		GJB151B , CE102	(Recommended external circuit 2)	
	RE	CISPR32/EN55032	CLASS A (Recommended external circuit 1)	
		Harmonic current	IEC/EN61000-3-2	CLASS A (Recommended external circuit 1)
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV /Air ±8KV (Recommended external circuit 1)	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m (Recommended external circuit 1)	perf. Criteria A
	EFT (Input port)	IEC/EN61000-4-4	±2KV (Recommended external circuit 1)	perf. Criteria B
	Surge (Input port)	IEC/EN61000-4-5	line to line ±2KV/line to ground ±4KV (Recommended external circuit 1)	perf. Criteria B
	CS	IEC/EN61000-4-6	10Vr.m.s (Recommended external circuit 1)	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-11	0%, 70% (Recommended external circuit 1)	perf. Criteria B
	Intercom interference test	MS-SOP-DQC-007	(Recommended external circuit 1)	perf. Criteria B

Product Characteristic Curve

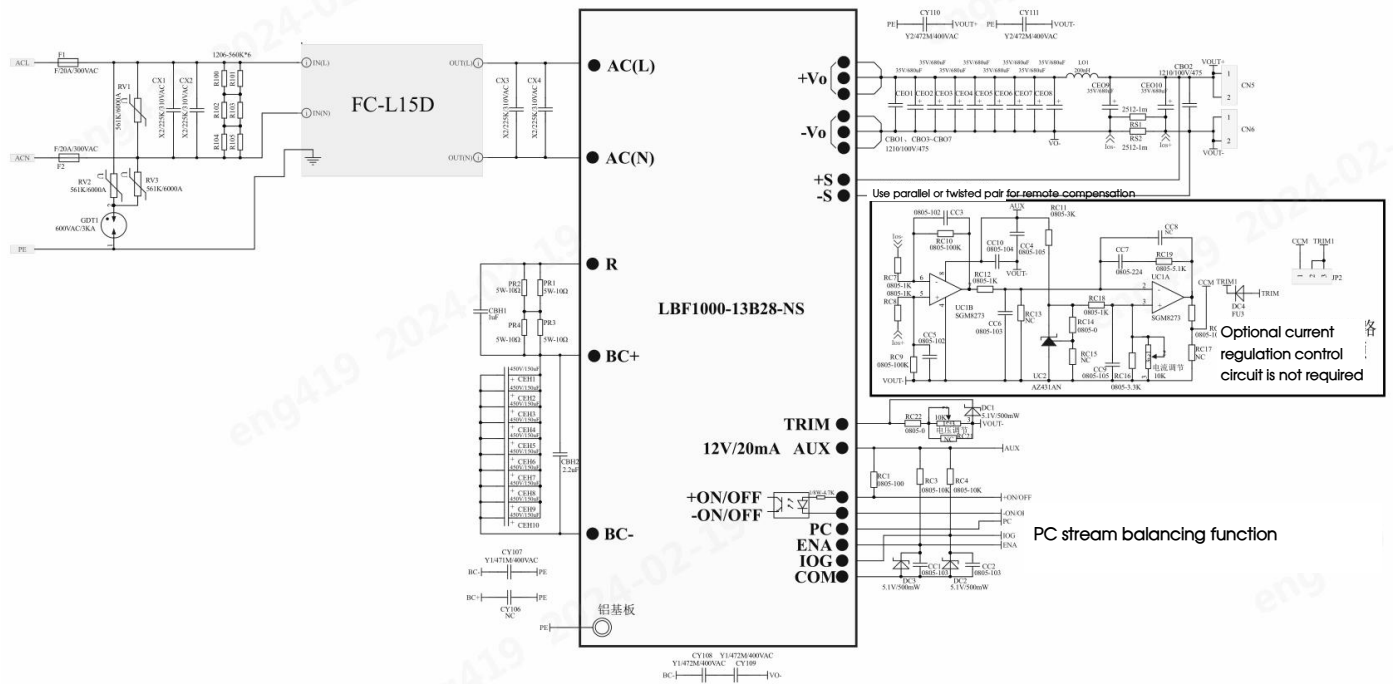


Note: This product is suitable for applications using in good conduction heat dissipation condition, for applications in closed environment please consult Mornsun FAE.

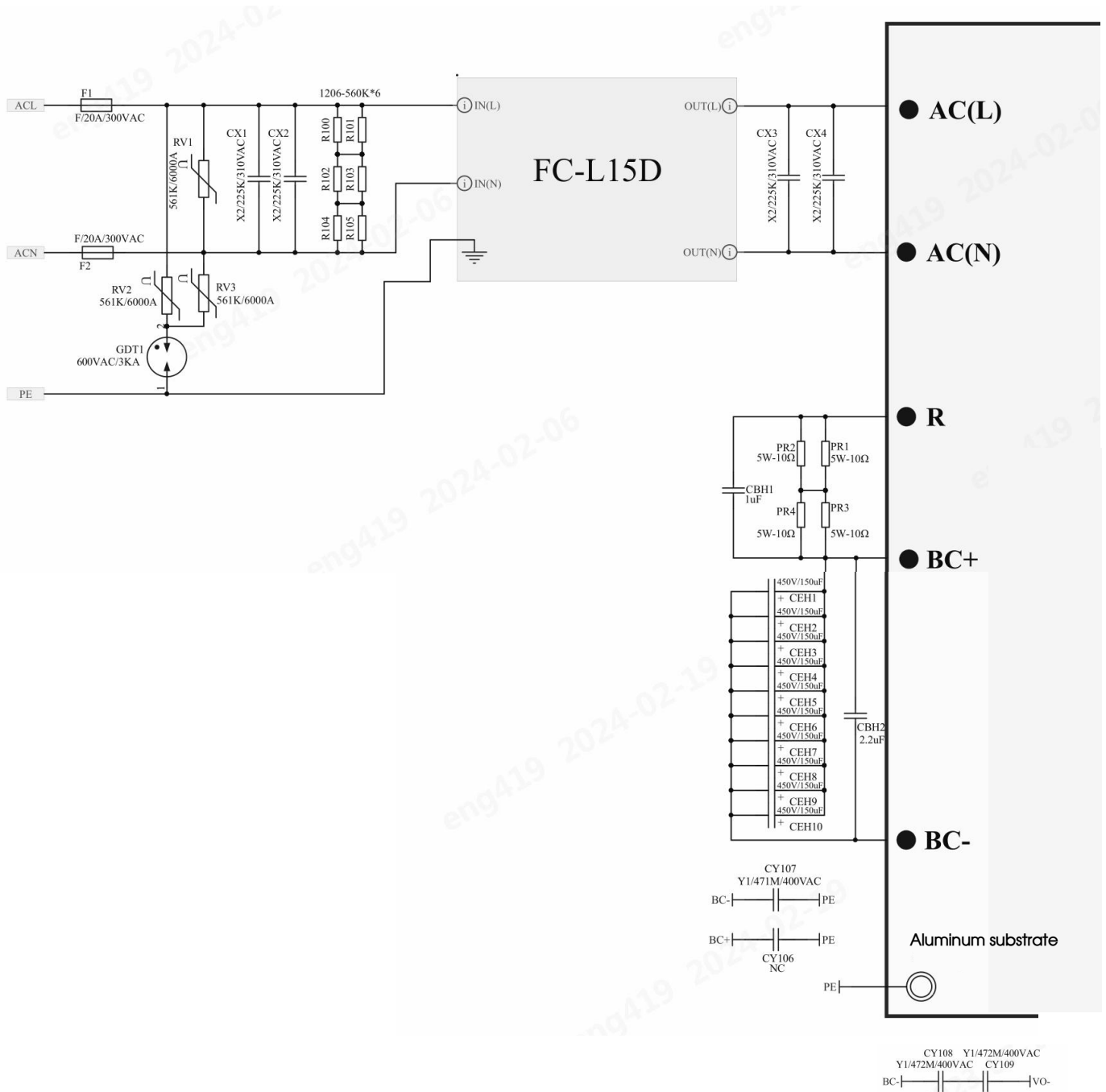


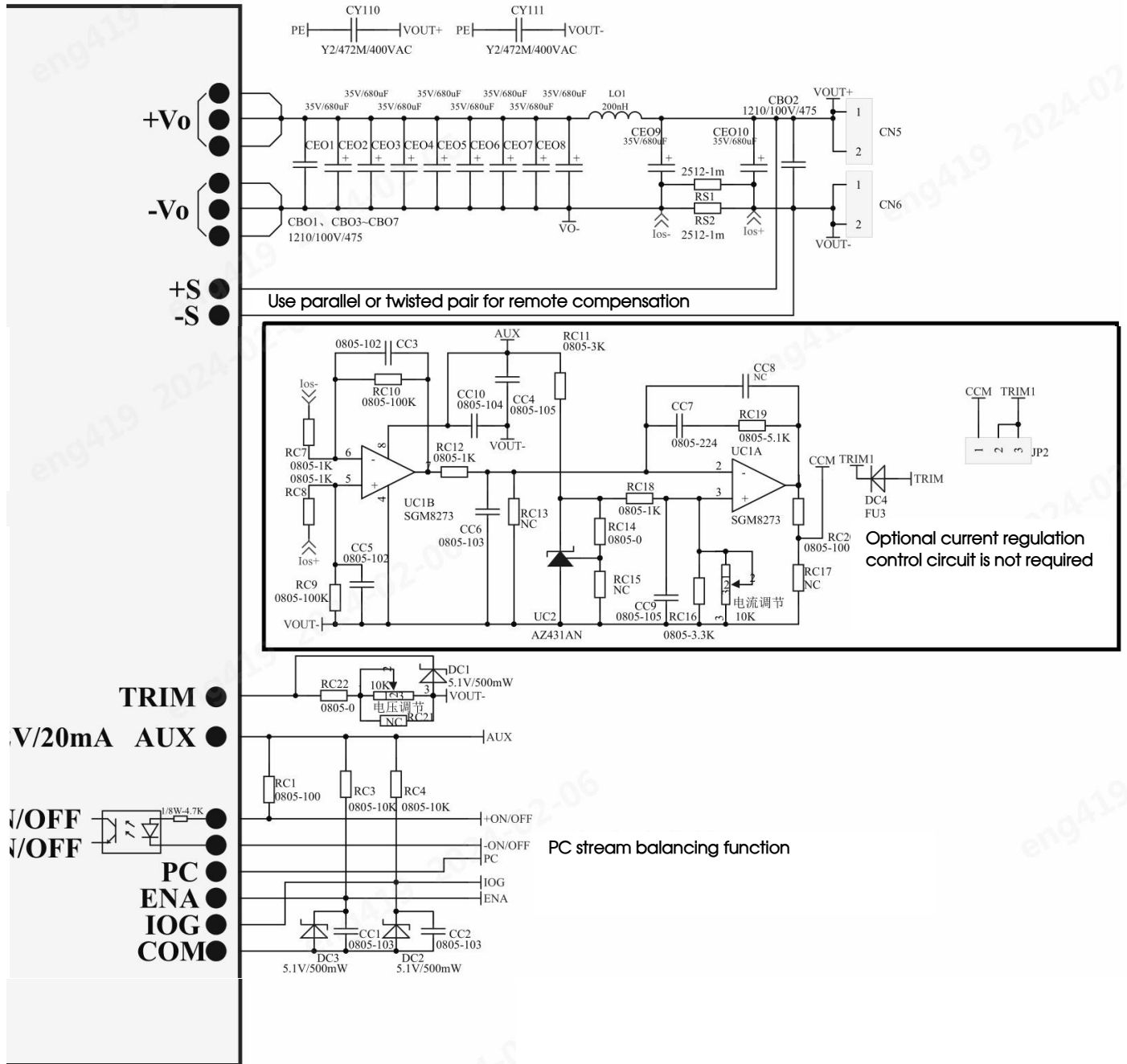


Recommended External Circuit



Note: The breakdown chart is as follows.





Component type	Recommended value
F1	300VAC/25A slow-blow
PR1/PR2/PR3/PR4	10Ω /5W/wire-round resistor
RV2/RV3	14D561K/6000A
CX1/CX2/CX3/CX4	X2/225K/310VAC
R100/R101/R102/R103/R104/R105	560K/1206
FC-L15D	FC-L15D
GDT1	600V/5KA
GDT5/GDT8	300V/1KA
CBH1	105K/630VDC(Film Capacitor)
CBH2	225K/630VDC((Film Capacitor)
CEH1/CEH2/CEH3/CEH4/CEH5/CEH6 CEH7/CEH8/CEH9/CEH10 (For conventional applications, the recommended total capacity is about 1500uf. If the output ripple voltage RMS value is required to generate grid, the capacity needs to be increased, see instructions below for the amount)	150uF/450V (electrolytic capacitor)
CEH1/CEH2/CEH3/CEH4/CEH5/CEH6 CEH7/CEH8	470uF/35V (electrolytic capacitor)
CEO1/CEO2/CEO3/CEO4/CEO5/CEO6 CEO7/CEO8/CEO9/CEO10	680uF/35V(electrolytic capacitor)
CY107	Y2/471K/250VAC
CY108/CY109/CY110/CY111	Y2/472M/250VAC
RS1/RS2	1mΩ /2W/2512
LO1	0.4uH/1.2mΩ /80A
CBO1/CBO2/CBO3/CBO4/CBO5/CBO6/CBO7	475K/100V/1210

Optional current regulation control circuit is not required, the recommended device selection list is as follows:

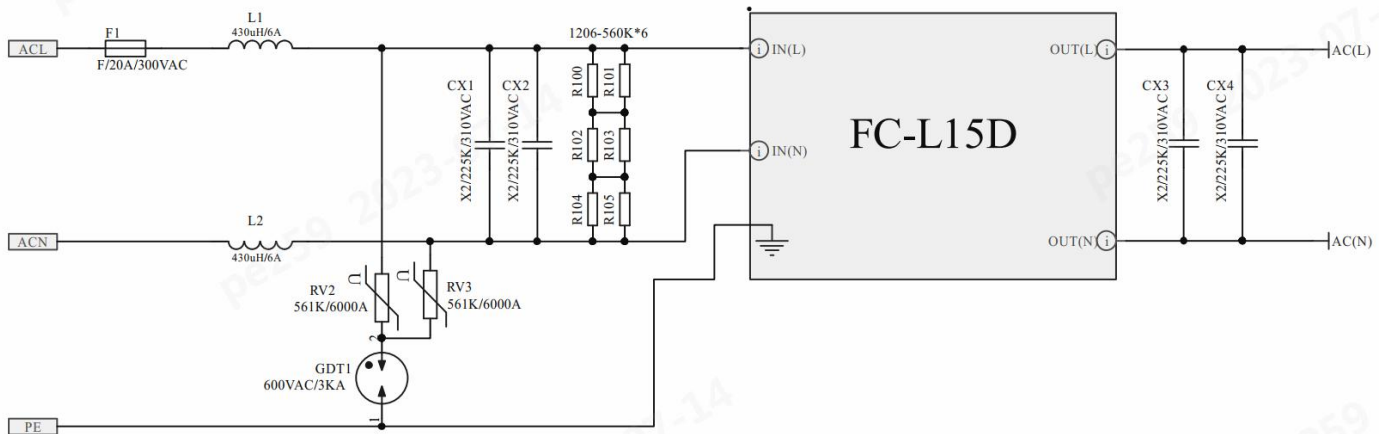
Component type	Recommended value
RC7, RC8, RC12, RC18	1KΩ /0805
RC9, RC10	100KΩ /0805
CC10	104K/50V/0805/X7R
CC1, CC2, CC6	103K/100V/0805/X7R
CC3, CC5	102K/250V/0805/X7R
CC4, CC9	105K/50V/0805/X7R
CC7	224K/50V/0805/X7R
RC14	0Ω /0805
RC1	100Ω /0805
RC20	10Ω /0805
RC3, RC4	10KΩ /0805
RC11	3KΩ /0805
RC16	3.3KΩ /0805

RC19	5.1KΩ/0805
RS1, RS2	1mΩ/2512
Voltage regulation, current regulation	10KΩ/1/2W
DC2, DC3	5.1V/200mW/SOD-323
DC4	40V/2A/SOD-123FL
UC1	SGM8273-2XS8G/TR/SOP-8 (same specification dual channel low noise high-precision operational amplifier can also be used)
UC2	TPR432B-S3TR/SOT-23 (devices with the same specification of 2.5V reference can also be used)

Note: JP2 in the schematic diagram is equivalent to using a jumper switch, when using a current regulation control circuit, it is necessary to short circuit CCM to TRIM1, if this function is not used, disconnect CCM from TRIM1.

Note: 1. The no-load ripple voltage of the product will slightly exceed the specification (150mV) after switching from load to no-load, which can be improved by connecting a dummy load (resistance value $\leq 1.4K\Omega$) in parallel with the external circuit.

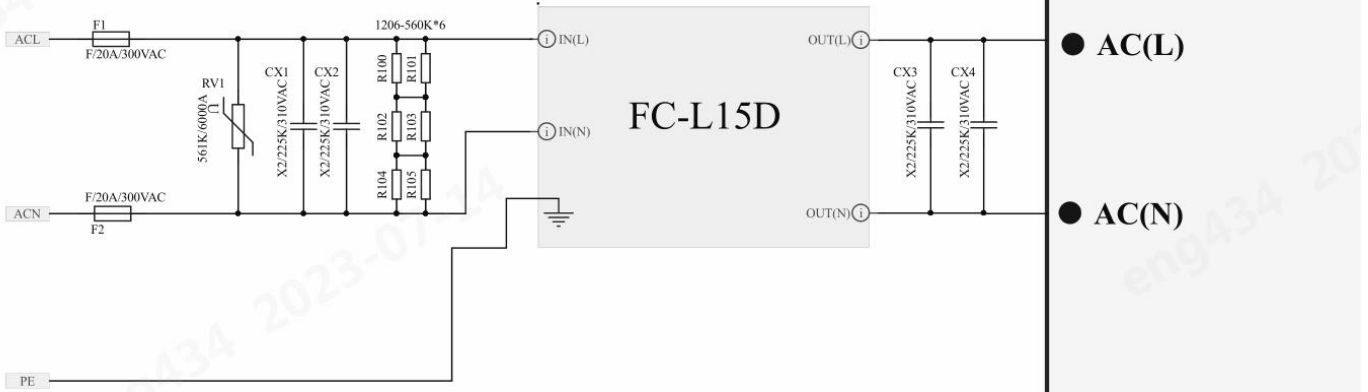
2. If there is a strict requirements on the output ripple voltage rms value, the single capacity of CEH1-CEH8 electrolytic capacitor should be increased to at least 470 uF (For routine use of CEH1-CEH10, use 150uF).



Recommended External Circuit 2

L1/L2	FD2D-60-431
<p>Note: 1. The rest of devices are same as above recommended external circuit 1. 2. L1 and L2 have been added to meet the conduction disturbance performance of low frequency conduction in the range of 9KHz -10MHz.</p>	

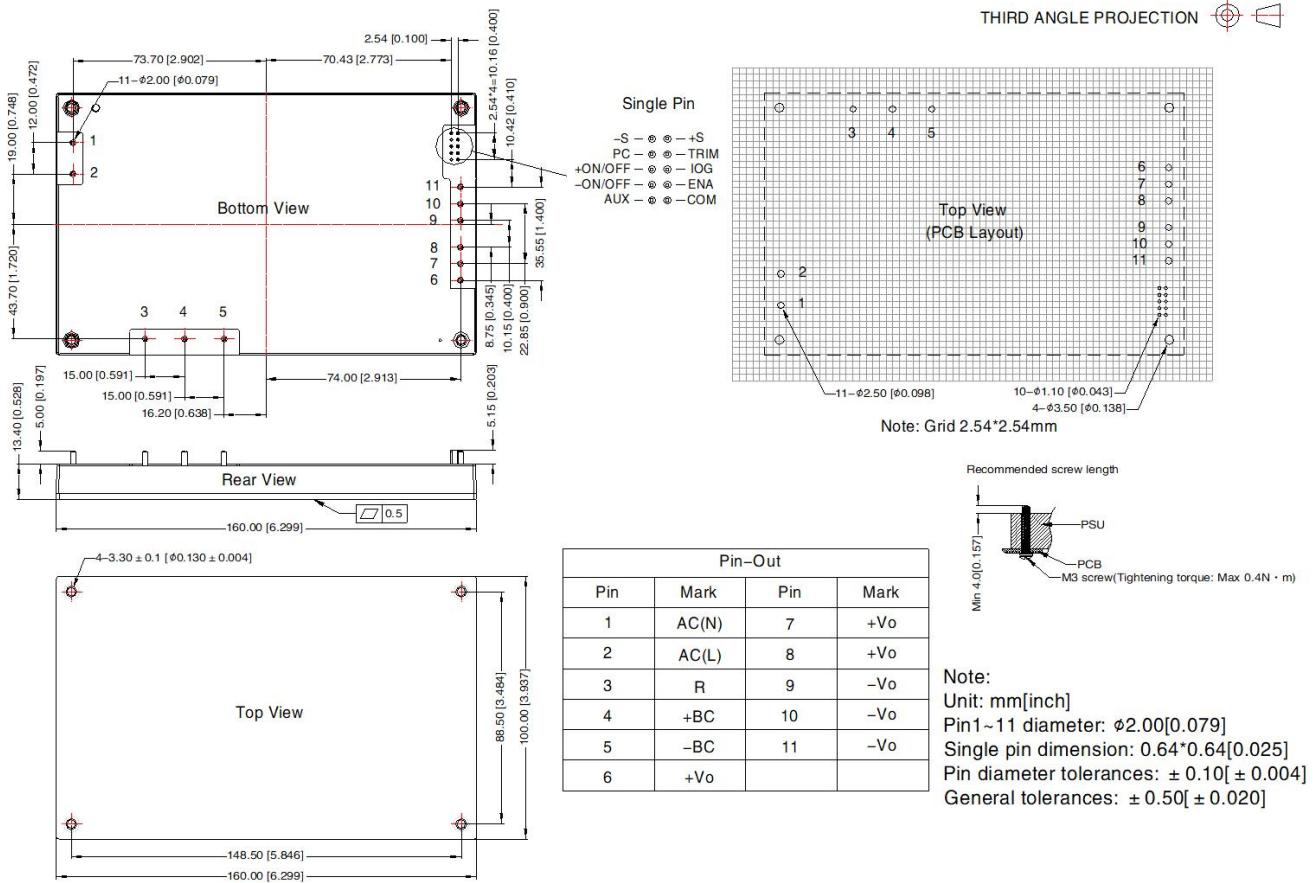
Note: Customer can choose MORNSUN filter module FC-L15D and FD2D-60-431 to replace the part of EMC circuit in the Recommended External Circuit, For more details, please consult the MORNSUN FAE.



Recommended External Circuit 3

- Note: 1. The rest of devices are same as above recommended external circuit 1.
2. Gas is removed from this circuit, and the discharge tube GDT1 is used to meet the needs of isolated voltage resistance.

Dimensions and Recommended Layout



Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210313;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. In order to improve the efficiency, there will be audible noise generated when work at light load, but it does not affect product performance and reliability;
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. The out case needs to be connected to PE (\perp) of system when the terminal equipment in operating;
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
9. The power supply is considered a component which will be installed into a terminal equipment. All EMC tests should be confirmed with the final equipment. Please consult our FAE for EMC test operation instructions.

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1. Performance characteristics and appearance pin definition



Figure 1: Appearance Pin

Appearance Pin (Port) Definition:

1	Input N line	-S	-Remote sensing terminal
2	Input L line	+S	+Remote sensing terminal
3	External inrush current limiting resistor terminal (R)	PC	Output current balance terminal
4	+Boosted voltage terminal (+BC)	TRIM	Output voltage trimming terminal
5	-Boosted voltage terminal (-BC)	+ON/OFF	+ON/OFF control terminal
6, 7, 8	+Output voltage (+Vo)	-ON/OFF	-ON/OFF control terminal
9, 10, 11	-Output voltage (-Vo)	IOG	Output status indicating terminal
COM	Common ground terminal	ENA	Power on signal terminal
AUX	Auxiliary power supply terminal for external circuits		

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 20A.

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 (VOUT+ and VOUT-) through twisted-pair signal cables or differential signal cables (+S and -S) to compensate the line voltage drop between the module and the load. If the remote compensation connection is not required, the +S and -S terminals can be floating.

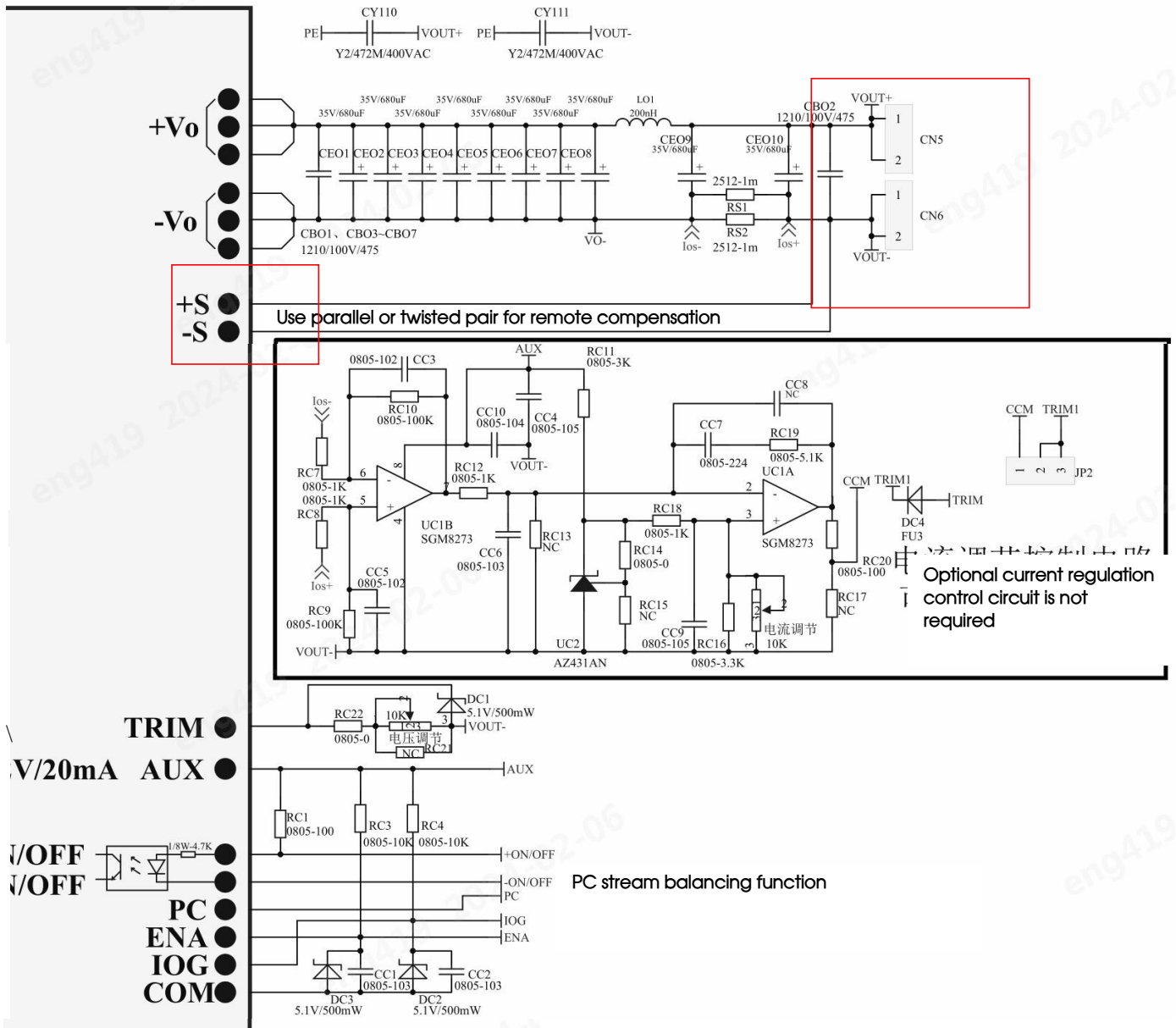


Figure 2: Schematic diagram of the remote compensation connection

Note: In the case of parallel machines or hot and cold backup, the remote compensation function cannot be used, otherwise the voltage anti backflow function will fail, and there may even be a risk of damage to the product.

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 voltage from 14V to 33.6V by connecting the external 10K adjustable resistor with TRIM and VOUT- terminals. 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.

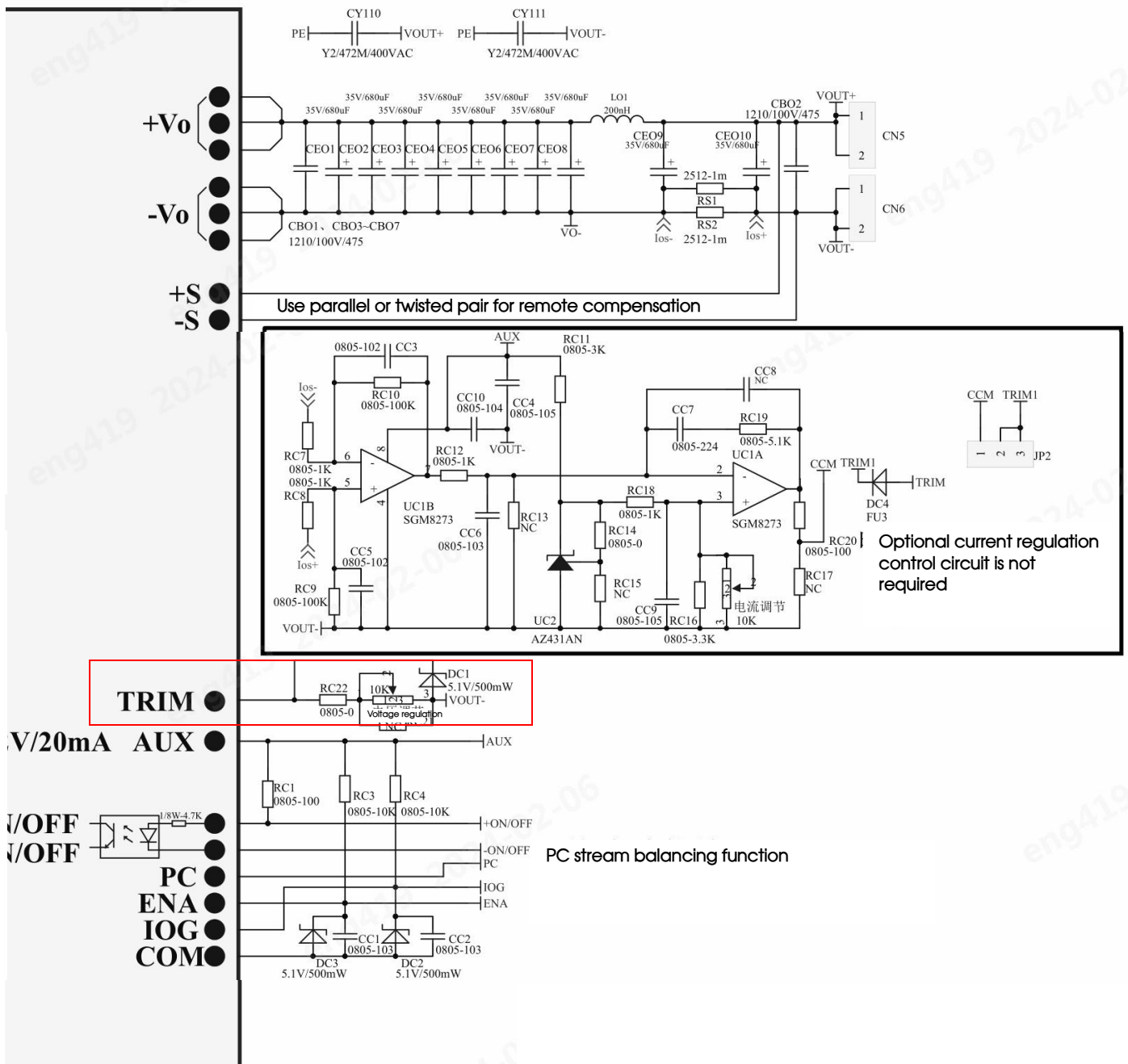


Figure 3: Schematic diagram of the output voltage regulation connection

when using adjustable resistors to adjust voltage, curve diagram of the corresponding relationship between power module TRIM pin terminal voltage and output voltage is shown in figure 4:

$$V_{out} = (V_{trim} - 0.3) \times \frac{34.1 - 13.5}{3 - 0.3} + 13.5$$

$$V_{trim} = 3.3 \times \frac{RC22 + R_{voltage_regulation}}{RC22 + R_{voltage_regulation} + RU} = 3.3 \times \frac{RC22 + R_{voltage_regulation}}{RC22 + R_{voltage_regulation} + 1K\Omega}$$

Note: RU is internal resistance of the module, 3.3 is internal power supply

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

V _{out}	RC22	R _{voltage regulation}
28V	0 Ω /0805	Sliding rheostat with adjustable range of 0-10k Ω

Note: When the sliding rheostat adjustment resistance exceeds the recommended adjustable range too much, the module will enter over-voltage protection.

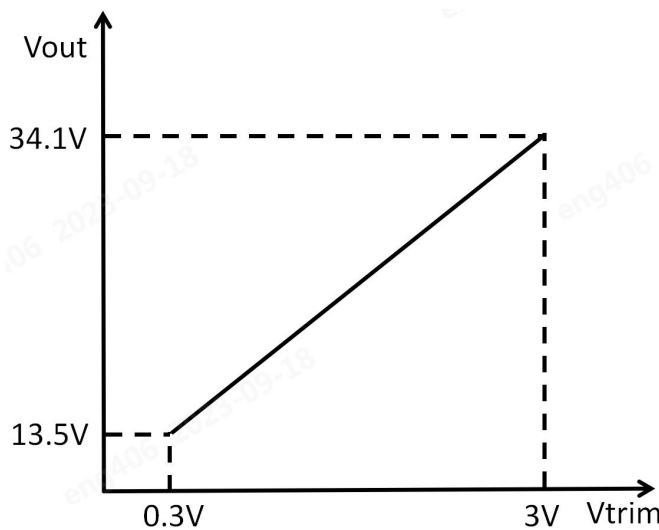


Figure 4: curve diagram of the corresponding relationship between V_{trim} and V_{out}

when the output is fixed, and no need for adjustment resistance, fixed resistor (RC22) can be directly connected, adapt the required output voltage by selecting the appropriate resistance value, power module TRIM pin terminal circuit connection diagram is shown in figure 5, TRIM pin terminal voltage relationship:

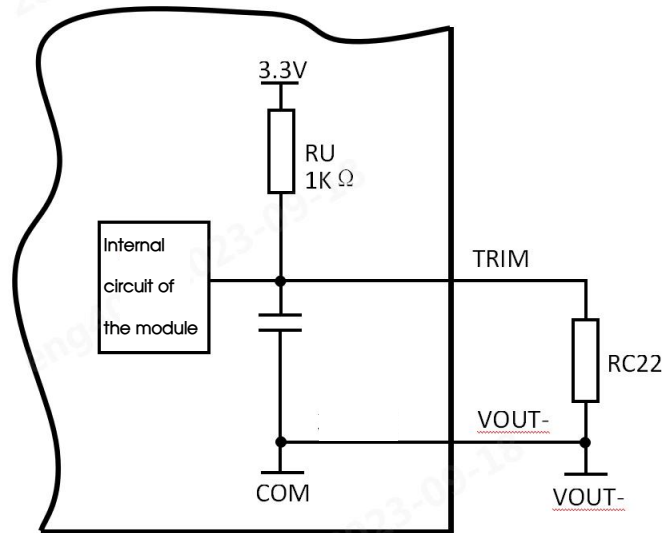


Figure 4: power module TRIM pin terminal circuit connection diagram

$$V_{out} = (V_{trim} - 0.3) \times \frac{34.1 - 13.5}{3 - 0.3} + 13.5$$

$$V_{trim} = 3.3 \times \frac{RC22}{RC22 + RU} = 3.3 \times \frac{RC22}{RC22 + 1K\Omega}$$

Typical output voltage 28V corresponds to a fixed resistance (RC22) value of around 2K, if the Trim PIN is suspended, the output voltage is around 34.5V.

2.5 Remote control switch (ON/OFF terminal)

The product with built-in remote control switch function. This function enables switching of the output to be controlled while the input voltage on. As shown in Figure 6, the remote control function shielding connection diagram, the ON/OFF signal terminal of this product with built-in isolation optocoupler in the power supply. If this function is not used, the customer can supply power to the +ON/OFF terminal via the AUX terminal through the current limiting resistor RC1. - The ON/OFF terminal is connected to the COM pin; if you need to use the ON/OFF function to achieve electrical isolation control, you can refer to the schematic diagram of the remote switch connection in Figure 7, and use the ON/OFF control signal isolated from the power supply to provide power supply connections for the ON/OFF terminal (The control signal cannot be reversed).

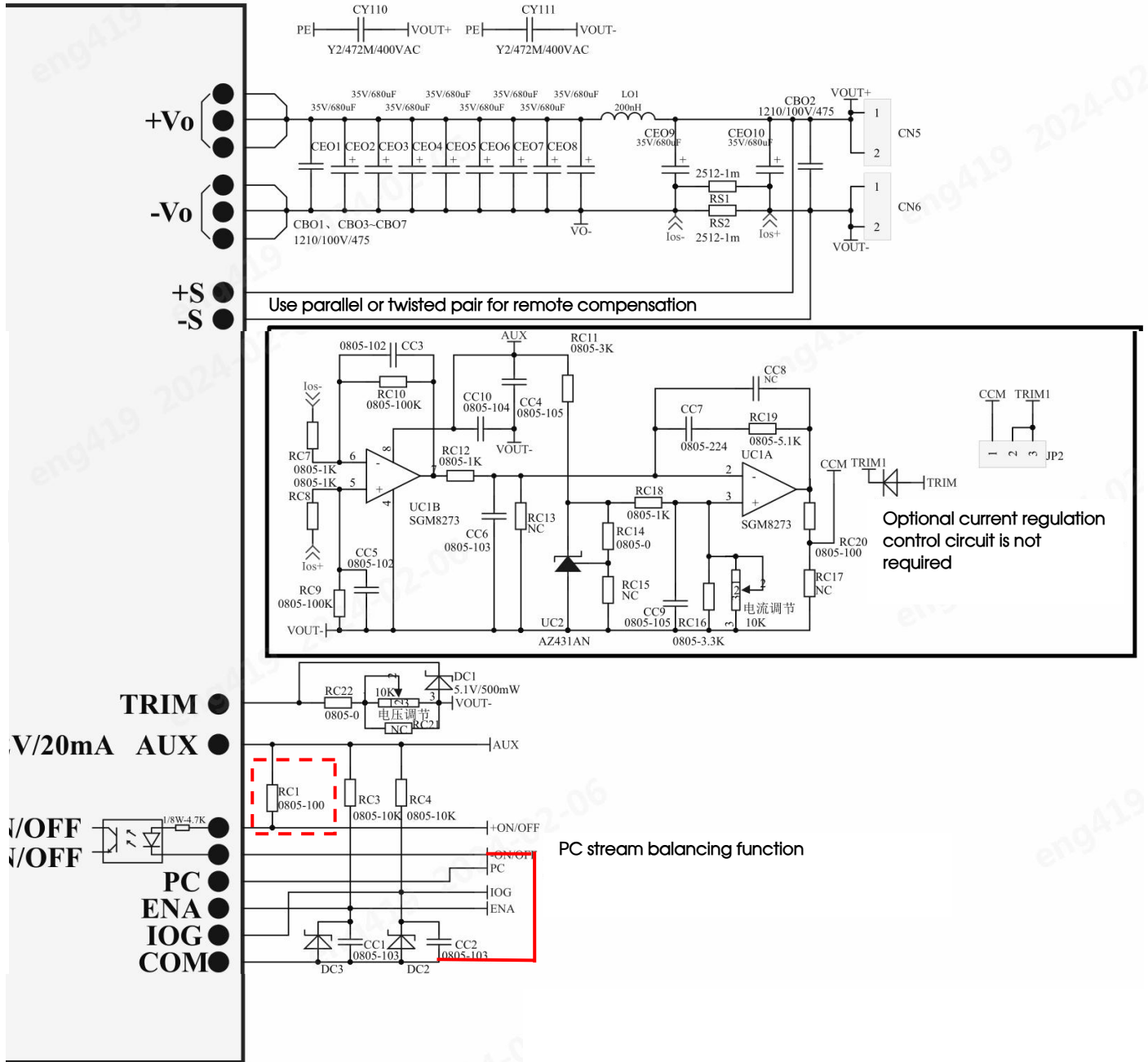


Figure 6: Remote function shielding connection diagram

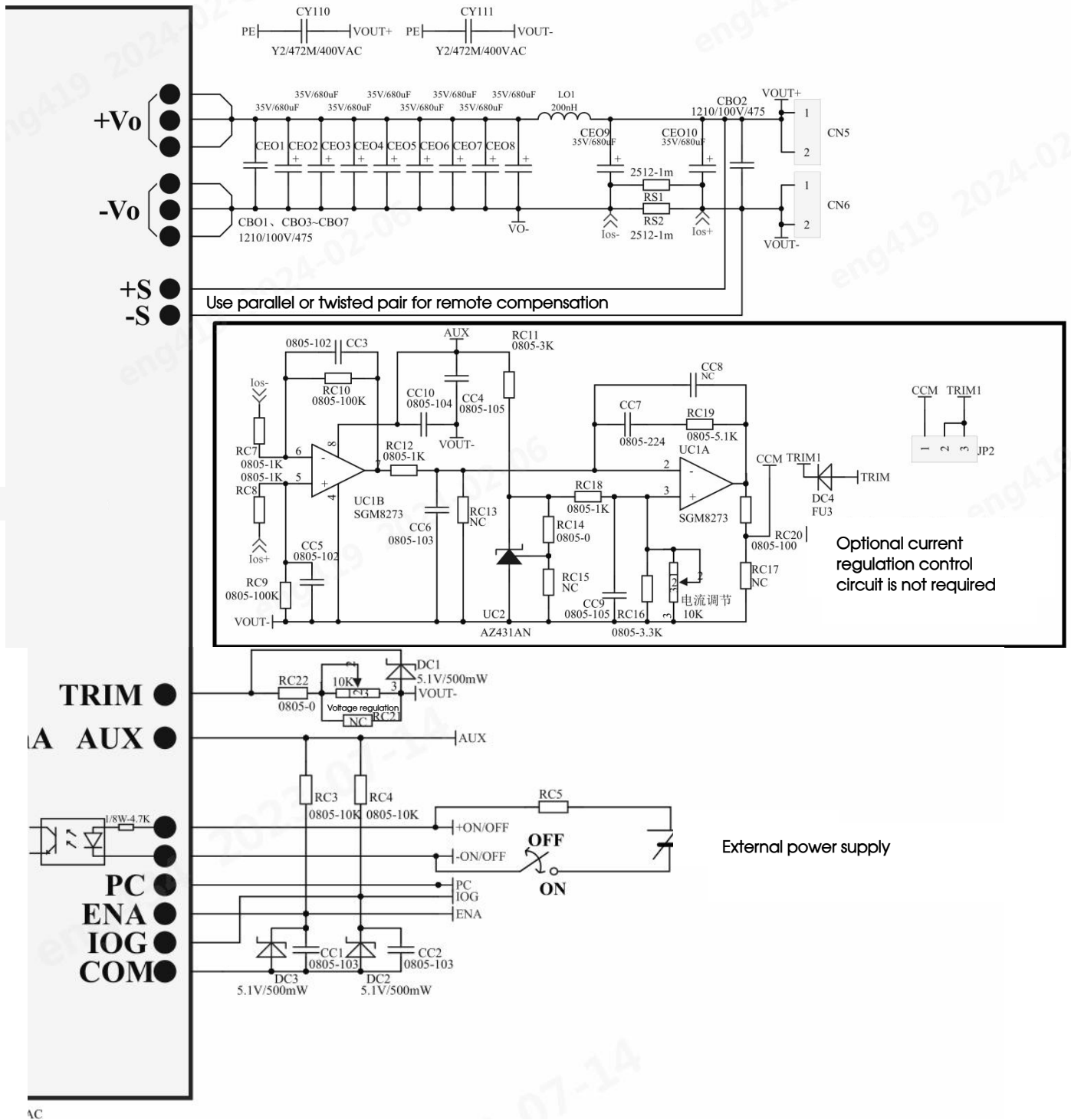


Figure 7: Schematic diagram of remote switch connection

Select the external voltage and external resistance, as the ON/OFF terminals current is shown below.

Table 1 Recommended ON/OFF terminal current

ON/OFF terminal current	Output Voltage
2-10mA	ON
<0.15mA	OFF

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 themobility is optimal.

Power modules support 2-6 parallel redundancy. Set the accuracy of the output voltage within $\pm 2\%$ precision when adjust the output voltage for parallel operation.

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.

Table 2 Condition for parallel operation

Parallel units	Maximum output current
2-3 units	90% of nominal output current
4-6 units	85% of nominal output current

2.7 Auxiliary power supply for external signals (AUX terminal)

The AUX terminal output voltage ranges from DC9.5V to DC14V, The AUX terminal keep current constant and reduce voltage when the output current is over 20mA. 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 Status indicator (IOG terminal)

This signal is located at the secondary output side and is an open drain output. 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. Low level when working normally, high level when working abnormally.

Note: Normal output is "low", when a fault occurs, the output is "high" (maximum pull-down current is 5mA, maximum applied voltage is 35V).

2.9 Power ON signal (ENA terminal)

This signal is located at the secondary output side and is an open drain output. the reference ground is the COM terminal. When output voltage goes over Typ. Output voltage threshold level 12V at start up, Power ON signal is "low level". "high level" when working abnormally.

Note: Normal output is "low", when a fault occurs, the output is "high" (maximum pull-down current is 5mA, maximum applied voltage is 35V).

2.10 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.

2.11 Output over-voltage protection (OVP)

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

2.12 Over-current circuit protection (OCP)

This module is designed with over-current/short circuit protection circuit, which can withstand over-current or short circuit at the output end. After the over-current and short circuit faults are eliminated, the module output automatically recovers to normal.

When the output voltage setting value less than 25V, Typ. constant current value is 45A; When the

output voltage setting value between 25V-34.1V, Typ. constant current value decreasing as the output voltage setting value increases, the relationship diagram is shown in Figure 8.

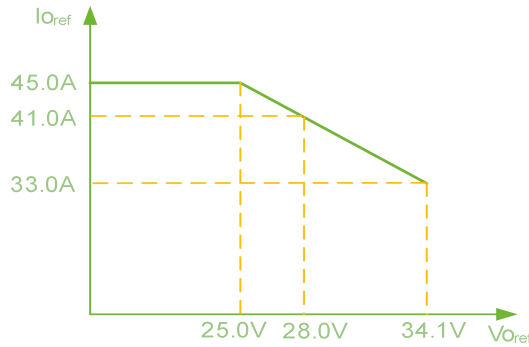


Figure 8: the relationship diagram between output voltage setting value and Typ. constant current value.

When the output voltage setting value less than 17V, OCP mode is hiccup mode Typ. 1s at work, 4s at rest; When the output voltage setting value more than 19V, OCP mode is Constant current mode; When the output voltage setting value between 17V and 19V, both states may exist.

Note: that continuous short circuit or overload condition, might result in power module damage.

2.13 Over-temperature protection (OTP)

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.

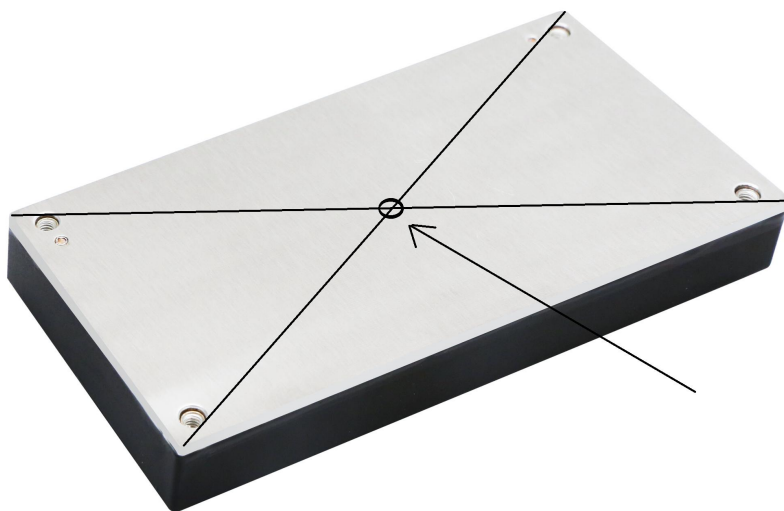


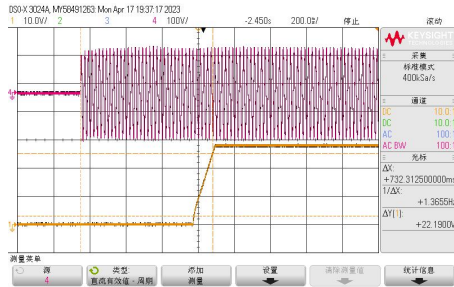
Figure 6: AL-Substrate temperature test point

3. Test waveform

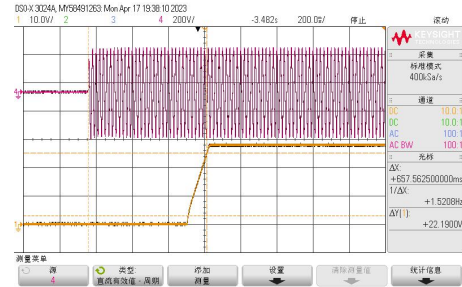
3.1 Startup and shutdown

Test conditions: Tc=25°C, LBF1000-13B28-NS products are tested based on recommended circuit 1,

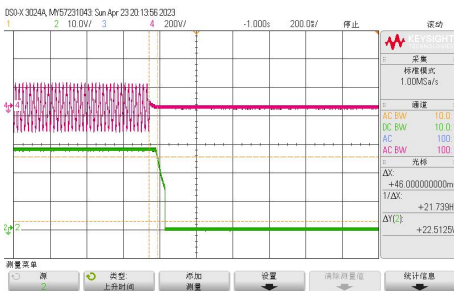
CEH1-CEH10=1500uF.



Vin=115VAC Full load start (start delay 732ms)



Vin=230VAC Full load start (start delay 657ms)



Vin=115VAC Full load shutdown (46ms)



Vin=230VAC Full load shutdown (46ms)

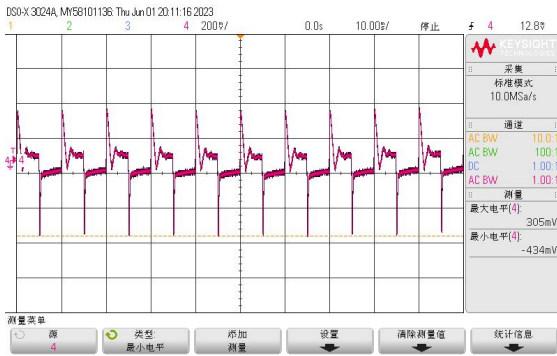
Note: The power OFF hold-up time is related to the CEH capacitance, and can be adjusted with reference to the following formula:

$$t = \frac{0.5 \cdot C_{EH} \cdot (U_1^2 - U_2^2)}{P_o}$$

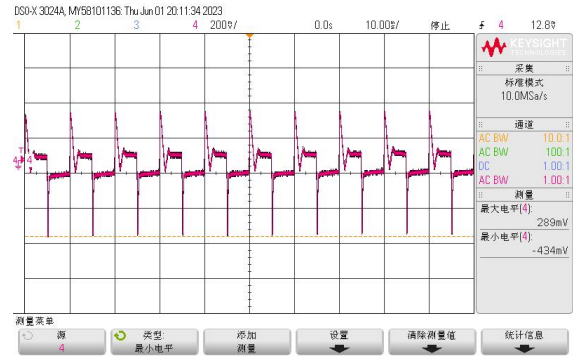
U1=410VDC, U2=325VDC, Po=1008W (based on actual power output).

3.2 Dynamic response

Test conditions: $T_c=25^{\circ}\text{C}$, current rate slope 0.1A/us, LBF1000-13B28-NS products are tested based on recommended circuit 1.



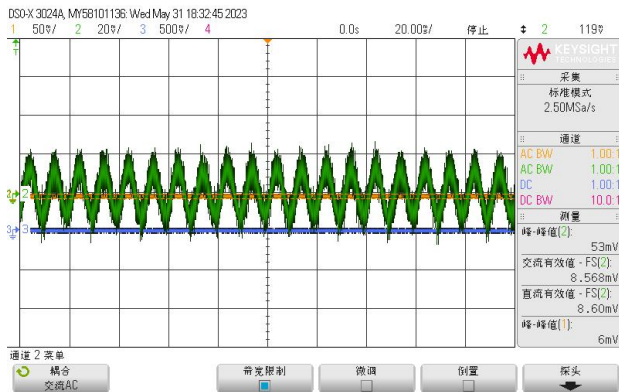
$V_{in}=115\text{VAC}$ 10%-100% dynamic



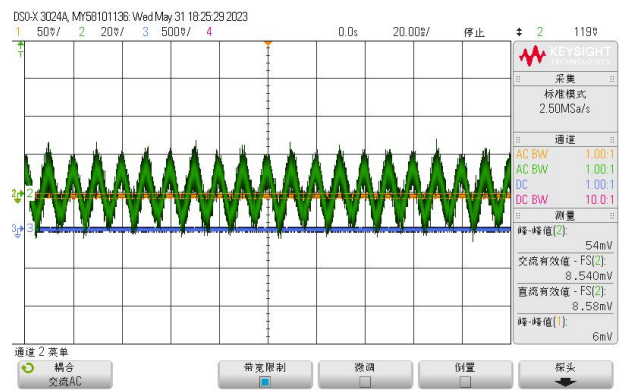
$V_{in}=230\text{VAC}$ 10%-100% dynamic

3.3 Output ripple and noise

Test conditions: $T_c=25^{\circ}\text{C}$, 20M bandwidth (peak to peak value) LBF1000-13B28-NS products are tested based on recommended circuit 4.



$V_{in}=115\text{VAC}$ full load ripple noise (53mV)/ripple RMS value (8.5mV)



$V_{in}=230\text{VAC}$ full load ripple noise (54mV)/ripple RMS value (8.5mV)

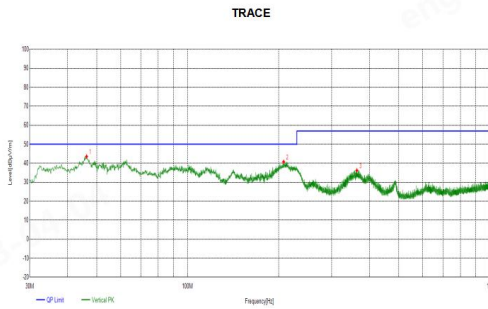
3.4 Conductive and radiation

(1) Radiation (RE)

Safety specifications: CISPR32/EN55032 CLASS A

RE Tc=25°C, Vin=115VAC, Pout=1008W, based on recommended circuit 1 test

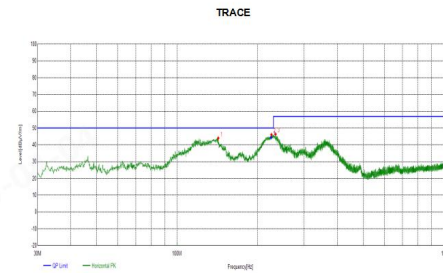
Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBuV/m]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
46.2976	Vertical	14.24	29.29	43.53	50.00	6.47	PK	100	234	PASS
207.9158	Vertical	11.77	28.98	40.75	50.00	9.25	PK	100	82	PASS
363.4223	Vertical	16.84	19.39	36.23	57.00	20.77	PK	100	227	PASS



Vertical waveform and reading point

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBuV/m]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
142.8223	Horizontal	13.98	30.05	44.03	50.00	5.97	PK	100	67	PASS
225.9596	Horizontal	12.41	33.67	46.08	50.00	3.92	PK	100	82	PASS
234.1084	Horizontal	12.70	33.69	46.39	57.00	10.61	PK	100	97	PASS

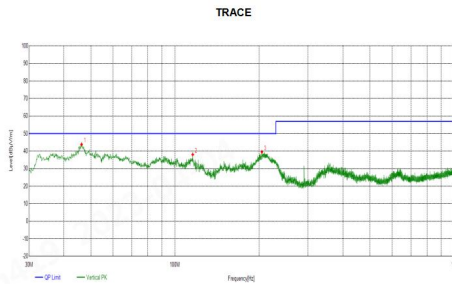
Final Data List										
Frequency [MHz]	Polarity	Factor [dB]	QP Value [dBuV/m]	QP Limit [dBuV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Pass/Fail		
225.5476	Horizontal	12.40	44.43	50.00	5.57	110	82	PASS		



Horizontal waveform and reading point

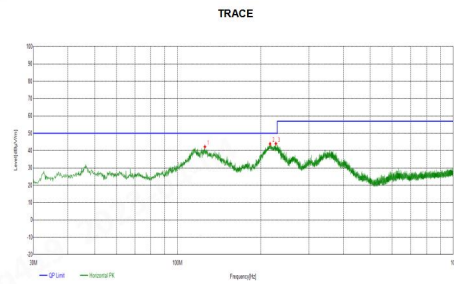
RE Tc=25°C, Vin=230VAC, Pout=1008W, based on recommended circuit 1 test

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBuV/m]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
46.2976	Vertical	14.24	29.59	43.83	50.00	6.17	PK	100	125	PASS
115.8536	Vertical	12.02	26.04	38.06	50.00	11.94	PK	100	208	PASS
204.9085	Vertical	11.66	27.83	39.49	50.00	10.51	PK	100	48	PASS



Vertical waveform and reading point

Suspected List										
Frequency [MHz]	Polarity	Factor [dB]	Reading [dBuV/m]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect or	Height [cm]	Angle deg	Pass/Fail
125.6516	Horizontal	12.63	29.59	42.22	50.00	7.78	PK	100	189	PASS
216.5497	Horizontal	12.08	31.82	43.90	50.00	6.10	PK	100	21	PASS
227.3177	Horizontal	12.46	31.58	44.04	50.00	5.96	PK	100	74	PASS



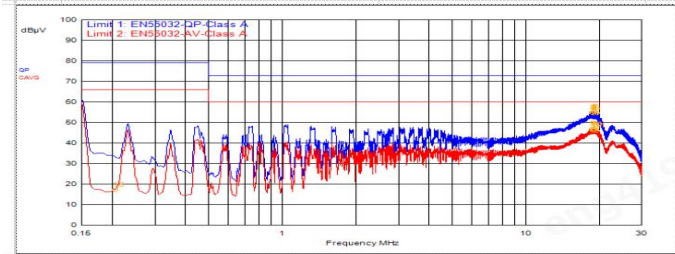
Horizontal waveform and reading point

The test results meet CLASS A standards

(2) Conductive (CE)

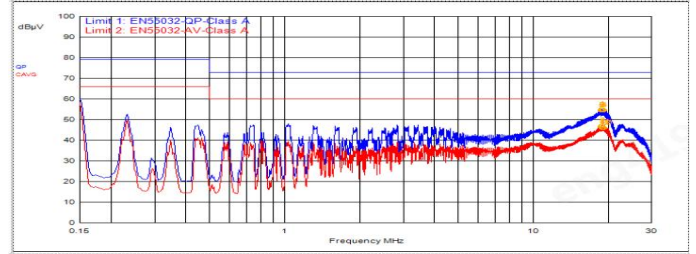
Safety specifications: CISPR32/EN55032 CLASS A

CE Tc=25°C, Vin=115VAC, Pout=1008W, based on recommended circuit 1 test



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
14	150.000kHz	0.1	0.2	10.0	C_AVG	49.6	59.9	66.0	-6.1
7	19.074MHz	1.0	0.2	10.0	C_AVG	35.7	46.9	60.0	-13.1
9	18.780MHz	1.0	0.2	10.0	C_AVG	35.7	46.8	60.0	-13.2
8	19.365MHz	1.0	0.2	10.0	C_AVG	35.6	46.7	60.0	-13.3
10	18.945MHz	1.0	0.2	10.0	C_AVG	35.3	46.5	60.0	-13.5
12	19.002MHz	1.0	0.2	10.0	C_AVG	34.8	46.0	60.0	-14.0
11	19.656MHz	1.0	0.2	10.0	C_AVG	34.7	45.9	60.0	-14.1
1	19.074MHz	1.0	0.2	10.0	QPeak	44.0	55.1	73.0	-17.9
2	19.365MHz	1.0	0.2	10.0	QPeak	43.9	55.1	73.0	-17.9
3	18.780MHz	1.0	0.2	10.0	QPeak	43.8	54.9	73.0	-18.1
4	18.945MHz	1.0	0.2	10.0	QPeak	43.5	54.7	73.0	-18.3
5	19.656MHz	1.0	0.2	10.0	QPeak	43.5	54.7	73.0	-18.3
6	19.002MHz	1.0	0.2	10.0	QPeak	43.5	54.7	73.0	-18.3

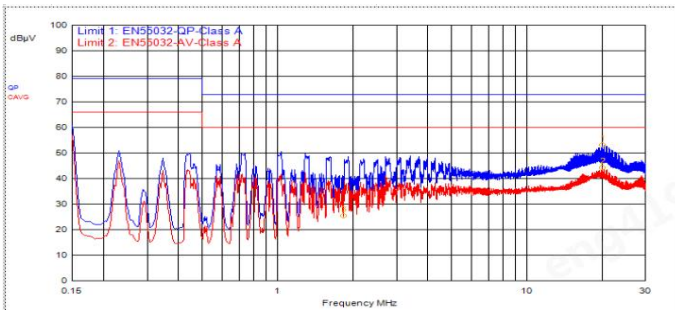
L line



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
13	150.000kHz	0.1	0.2	10.0	C_AVG	48.0	58.3	66.0	-7.7
7	19.020MHz	1.0	0.2	10.0	C_AVG	35.9	47.1	60.0	-12.9
11	18.729MHz	1.0	0.2	10.0	C_AVG	35.4	46.5	60.0	-13.5
8	18.891MHz	1.0	0.2	10.0	C_AVG	35.3	46.5	60.0	-13.5
10	19.077MHz	1.0	0.2	10.0	C_AVG	34.9	46.1	60.0	-13.9
9	19.311MHz	1.0	0.2	10.0	C_AVG	34.9	46.0	60.0	-14.0
12	18.948MHz	1.0	0.2	10.0	C_AVG	34.7	45.9	60.0	-14.1
1	19.020MHz	1.0	0.2	10.0	QPeak	43.9	55.1	73.0	-17.9
2	18.891MHz	1.0	0.2	10.0	QPeak	43.5	54.7	73.0	-18.3
3	19.311MHz	1.0	0.2	10.0	QPeak	43.4	54.6	73.0	-18.4
4	19.077MHz	1.0	0.2	10.0	QPeak	43.4	54.6	73.0	-18.4
5	18.729MHz	1.0	0.2	10.0	QPeak	43.4	54.5	73.0	-18.5
6	18.948MHz	1.0	0.2	10.0	QPeak	43.3	54.5	73.0	-18.5

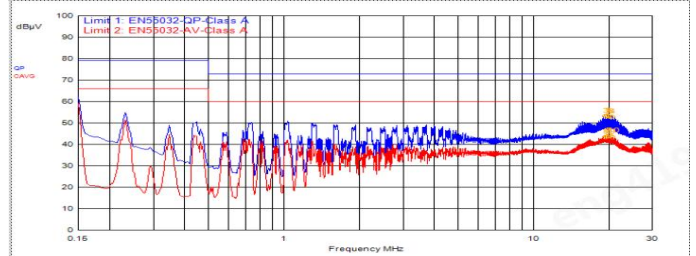
N line

CE Tc=25°C, Vin=230VAC, Pout=1008W, based on recommended circuit 1 test



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
4	150.000kHz	0.1	0.2	10.0	C_AVG	46.8	57.1	66.0	-8.9
2	20.238MHz	1.0	0.2	10.0	C_AVG	33.1	44.3	60.0	-15.7
1	20.238MHz	1.0	0.2	10.0	QPeak	41.9	53.1	73.0	-19.9
3	1.836MHz	0.3	0.2	10.0	C_AVG	14.7	25.3	60.0	-34.7

L line



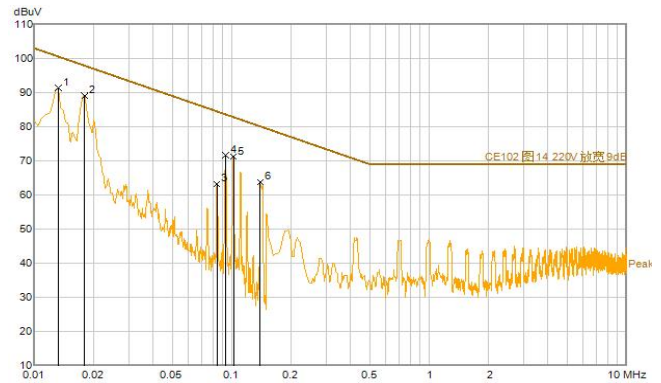
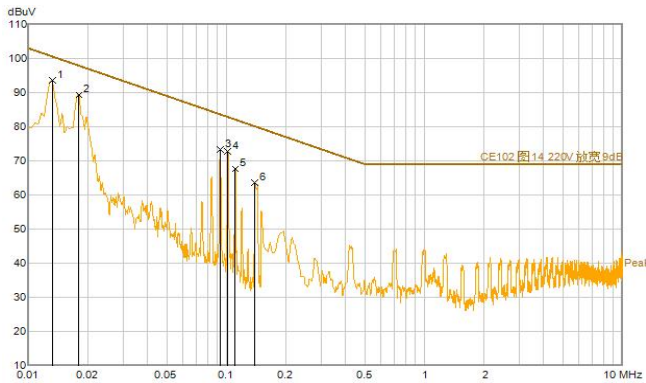
ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
11	150.000kHz	0.1	0.2	10.0	C_AVG	48.8	59.1	66.0	-6.9
7	20.064MHz	1.0	0.2	10.0	C_AVG	32.7	43.9	60.0	-16.1
10	20.355MHz	1.0	0.2	10.0	C_AVG	32.7	43.9	60.0	-16.1
6	19.776MHz	1.0	0.2	10.0	C_AVG	32.6	43.7	60.0	-16.3
8	19.488MHz	1.0	0.2	10.0	C_AVG	32.4	43.5	60.0	-16.5
9	20.643MHz	1.0	0.2	10.0	C_AVG	32.1	43.3	60.0	-16.7
1	19.776MHz	1.0	0.2	10.0	QPeak	42.3	53.5	73.0	-19.5
2	20.064MHz	1.0	0.2	10.0	QPeak	42.0	53.2	73.0	-19.8
3	19.488MHz	1.0	0.2	10.0	QPeak	41.9	53.1	73.0	-19.9
4	20.643MHz	1.0	0.2	10.0	QPeak	41.8	53.0	73.0	-20.0
5	20.355MHz	1.0	0.2	10.0	QPeak	41.8	53.0	73.0	-20.0

N line

The test results meet the EN55032 CLASS A standard

Safety specifications: CE102 GJB151B

CE Tc=25°C, Vin=220VAC, Pout=1008W, based on recommended circuit 2 test



Serial Number	Frequency (MHz)	Read value (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.0132	63.8	27.57	91.37	100.59	9.22	Peak
2	0.018	63.78	25.4	89.18	97.89	8.71	Peak
3	0.084	42.84	20.43	63.27	84.5	21.23	Peak
4	0.0928	51.25	20.34	71.59	83.64	12.05	Peak
5	0.102	50.98	20.26	71.24	82.82	11.58	Peak
6	0.1392	43.68	20.12	63.8	80.11	16.31	Peak

Serial Number	Frequency (MHz)	Read value (dBuV)	Correction factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.0132	66.13	27.57	93.7	100.59	6.89	Peak
2	0.018	63.99	25.4	89.39	97.89	8.5	Peak
3	0.0928	53.05	20.34	73.39	83.64	10.25	Peak
4	0.1016	52.49	20.26	72.75	82.85	10.1	Peak
5	0.1108	47.51	20.22	67.73	82.1	14.37	Peak
6	0.1392	43.47	20.12	63.59	80.11	16.52	Peak

L line

N line

The test results meet the CE102 GJB151B standard

4. Appearance specifications

4.1 Manufacturing data/dimensions

Length: 160.00mm±0.5mm

Width: 100.00mm±0.5mm

Height: 13.40mm±0.5mm

Terminal length: 5.0mm±0.5mm

Weight: 530g±30g

THIRD ANGLE PROJECTION 

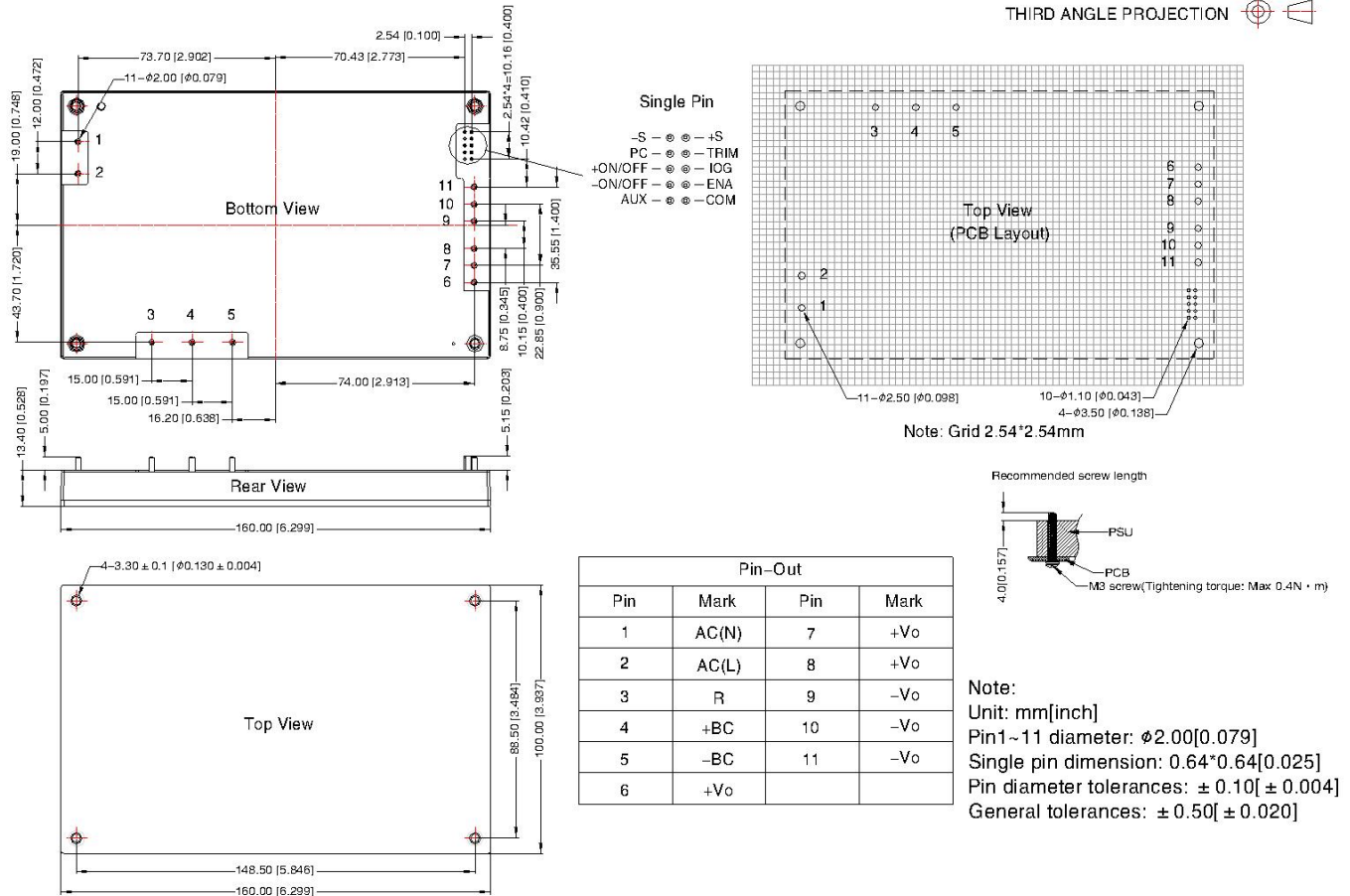


Figure 7: Manufacturing data/size diagram

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.

4.3 Cooling method

Heat dissipation method	Surface heat sink	<input type="checkbox"/>
	Natural cooling	<input type="checkbox"/>
	Conduction heat dissipation	<input checked="" type="checkbox"/>
	In this document, "■" indicates selected, and "□" indicates not selected	

For more details, please consult the MORNSUN FAE.