DESCRIPTIONS

300W, AC-DC Brick Converter



RoHS

3 Years Warranty

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 reverse polarity protection, over-voltage/over-current/output short circuit protection
- Designed to meet UL/IEC62368 standards

APPLICATIONS

- Switching equipment
- Access equipment
- Mobile communications
- Microwave communications
- Optical transmission
- Routers

Selection Guide

Certification	Part No.	Output Power (W)	Nominal Output Voltage and Current(Vo/Io)	Efficiency at 230VAC (%) Typ.	Capacitive Load (uF) Max.
--	APBH300-12	300	12V/25A	92	4000
	APBH300-24		24V/12.5A	92	2000
	APBH300-28		28V/10.72A	92	2000

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

Specifications

Product Specifications	Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Specifications	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=300W	--	0.99	--	--

	Input Current	115VAC		--	--	4	A
		230VAC		--	--	2	
	Inrush Current	230VAC, Ta=25℃		--	--	40	
	THD*	Ta=25℃, Vin=115V, Pout=300W		--	8	--	%
		Ta=25℃, Vin=230V, Pout=300W		--	5	--	%
	Input Under-voltage Protection	Under-voltage protection start (Input voltage drops from high to low)		60	--	75	VAC
		Under-voltage protection release (Input voltage rises from low to high)		75	--	85	
	Hot Plug			Unavailable			
	Grounded Mode	PE is required for Al-Substrate application					
Output Specifications	Output Voltage Accuracy			--	±2	--	%
	Line Regulation	Full load		--	±0.5	--	
	Load Regulation			--	±1	--	
	Ripple & Noise*	20MHz bandwidth (peak-to-peak value) Load at room temperature 30% - 100%	12V	--	150	--	mV
			24V	--	240	--	
			28V	--	240	--	
	Load Dynamic Response	Overshoot amplitude	25% - 50% - 25% load, 50% - 75% - 50% load, slopes of 0.1A/us	--	--	5	%
		Recovery time		--	--	200	us
	Stand-by Power Consumption			--	1.5	3	W
	Minimum Load			0	--	--	%
	Hold-up Time			--	10	--	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 or clamp)			
		24VDC output		≤35VDC (Hiccup or clamp)			
		28VDC output		≤35VDC (Hiccup or clamp)			
	No-load Output Of Auxiliary Source	Maximum pulling current about 10mA, take HU- as for reference ground		10	12	15	V
	Over Temperature Protection	Over-temperature protection start (Al-Substrate temperature) until power off		105	--	115	℃
		Over-temperature protection recovery		Reset input			
	ENA Remote Control ON/OFF*	Enable control pin		ENA connect to HU- or Low-level (0-0.1VDC), output is normal			

				ENA disconnect or connect to High-level (10-15VDC), output turn off			
General Specifications	Isolation	Input - Output	Electric Strength Test for 1min., leakage current <5mA	3000	--	--	VAC
		Input - PE		1500	--	--	
		Output - PE		1500	--	--	
	Insulation Resistance	Input - Output	Test Voltage: 500VDC, Ta=25℃	100	--	--	MΩ
		Input - PE		100	--	--	
		Output - PE		100	--	--	
	Operating Temperature		Al-Substrate temperature	-40	--	+100	℃
	Storage Temperature			-40	--	+100	
	Storage Humidity			--	--	95	%RH
	Soldering Temperature		Wave-soldering	260 ± 5℃; time: 5 - 10s			
			Manual-welding	360 ± 10℃; time: 3 - 5s			
	Power Derating		Al-Substrate temperature	-40℃ to +100℃	--	--	--	%/℃
			Input voltage	85VAC - 110VAC	0.32	--	--	%/VAC
			Altitude	2000m - 5000m	6.67	--	--	%/Km
	Safety Class			CLASS I			
	MTBF		MIL-HDBK-217F@25℃	≥500,000 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	155g (Typ.)			
	Cooling method		Conduction heat dissipation, it is necessary to ensure that the product aluminum substrate surface temperature lower than 100℃.				

Note: 1. *The power factor and THD test result are based on recommended circuit 1.

2.*The "Tip and barrel" method is used for ripple and noise test.

3.If an optocoupler is used to control the ENA pin, please refer to the recommended solution in Instructions 1 (Page 4).

Electromagnetic Compatibility (EMC)

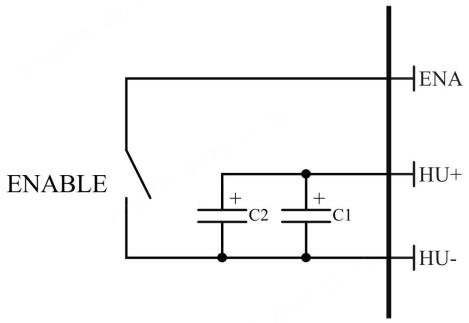
Electromagnetic Compatibility (EMC)	Emissions	CE	CISPR32/EN55032 CLASS A		
			CE102 GJB151B (Recommended circuit 2)		
		RE	CISPR32/EN55032 CLASS A		
		Harmonics	IEC/EN6100-3-2		perf. Criteria A
	Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV/Air ±8KV		perf. Criteria A
		RS	IEC/EN61000-4-3 10V/m		perf. Criteria A
		EFT	IEC/EN61000-4-4 ±4KV		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 variation	IEC/EN61000-4-11	70% Un, 25/30 cycle(50/60Hz)	perf. Criteria B

				40% Un，10/12 cycle(50/60Hz) 0% Un，1 cycle (Un is the maximum input nominal voltage)	
Note: *Except for CE102 of the CE, other EMC test results are based on recommended circuit 1.					

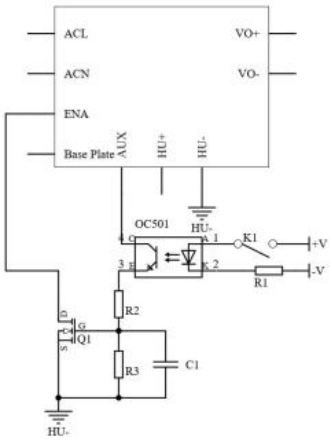
Instructions

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:



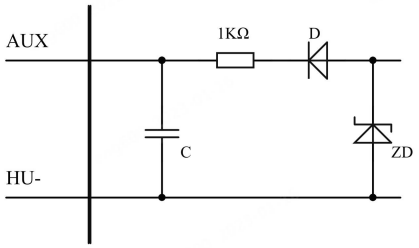
It can also be enabled by controlling whether the ENA pin is connected to a low level (0-0.1V) through an optocoupler. The wiring diagram is as follows:



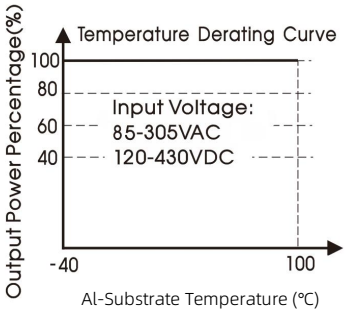
Part No.	Recommended value
R1	10kΩ
R2/R3	20kΩ
C1	100nF
Q1	Recommended NCE0102A of NCE POWER
OC501	Recommended OR-1008-TP-G-(GK) of Orient
U (External DC source)	10-15V

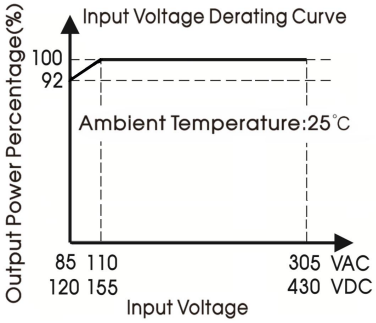
2.Auxiliary Power Supply For External Signals (AUX Terminal)

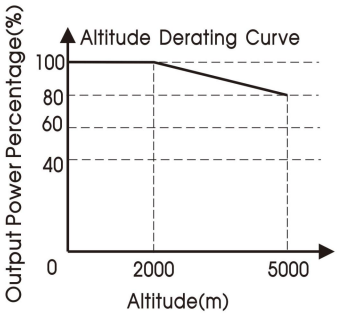
The module additionally provides 12V auxiliary source output, the reference ground is HU- and provides an auxiliary control power supply for the primary side control circuit. No load voltage10-15V (Internal resistor in series 1 kΩ, maximum pull-up current about 10mA).



Characteristic Curve



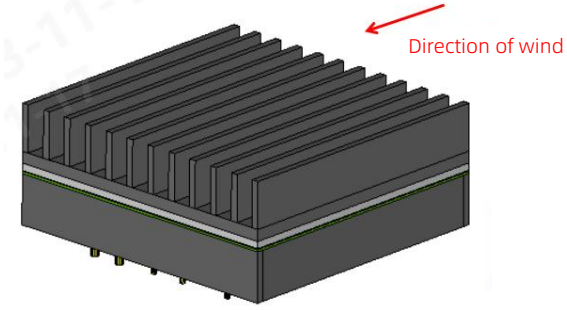




Note:

① With an AC input voltage between 85 - 110VAC/120 - 155VDC the output power must be derated as per the voltage derating curves;

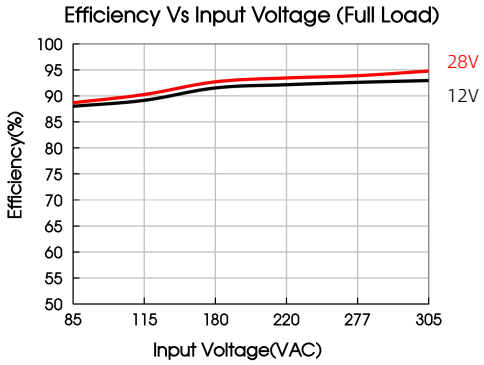
② The temperature derating curve is a typical test value, the working condition is heat sink with air cooling, and the temperature test point of Al-Substrate is at the center of it.

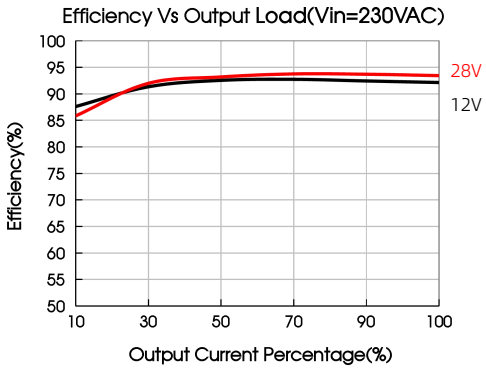


Note:

① Under ambient temperature of 25℃, input voltage of 115V, add heat sink and 1.2m/s wind blowing, when the surface temperature of the Al-Substrate is 100℃, the device temperature rise meets the requirement of temperature derating.

② Under ambient temperature of 25℃, input voltage of 230V, add heat sink and 0.6m/s wind blowing, when the surface temperature of the Al-Substrate is 100℃, the device temperature rise meets the requirement of temperature derating.



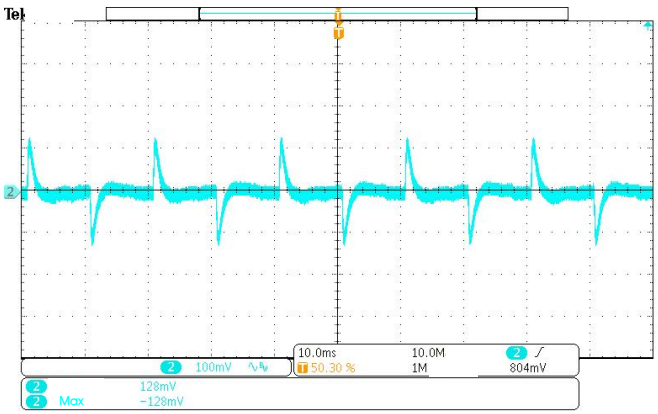


Product Characteristic Curve

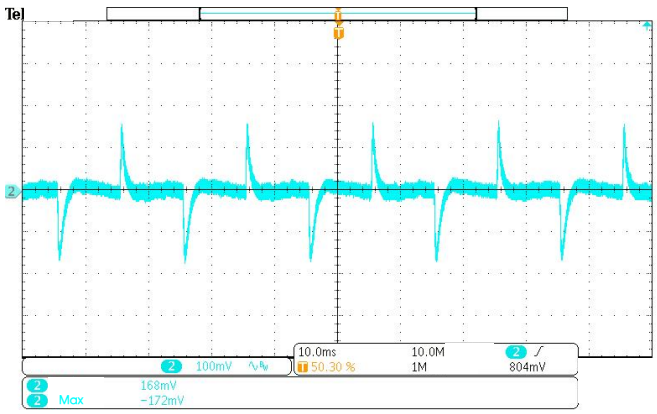
1.Dynamic Response

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

25% - 50% - 25%Io dynamic load



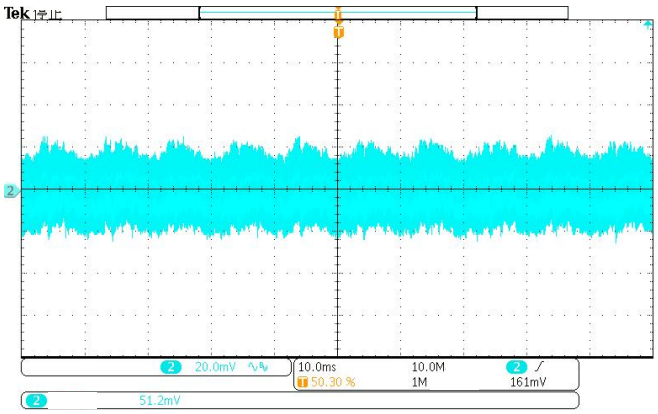
50% - 75% - 50%Io dynamic load



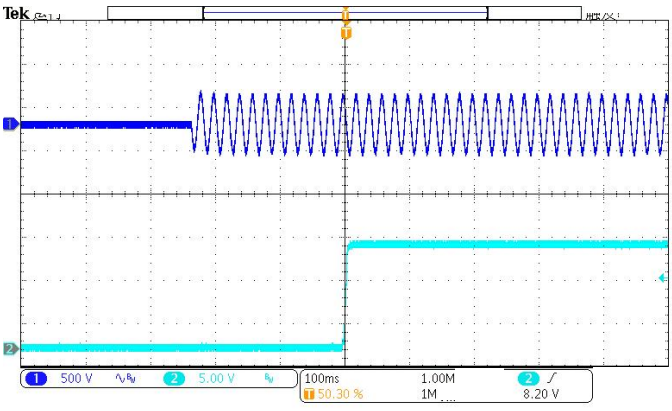
2. Output Ripple And Start-up Waveform

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

Full load output ripple



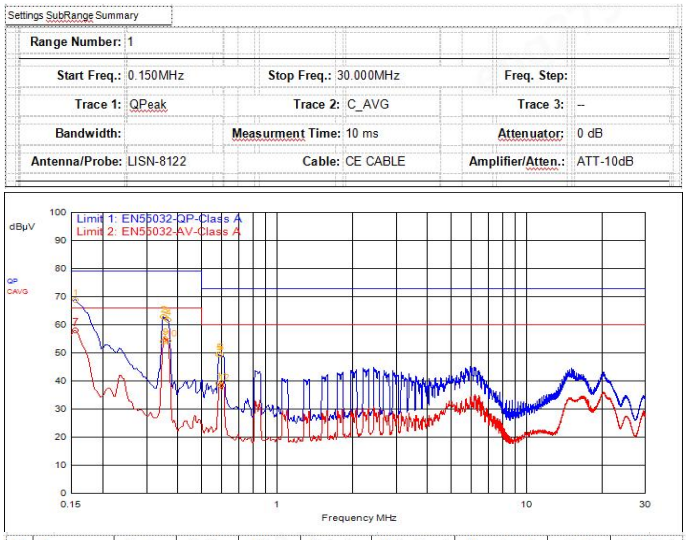
Output voltage start-up waveform



3.Conductive Waveform

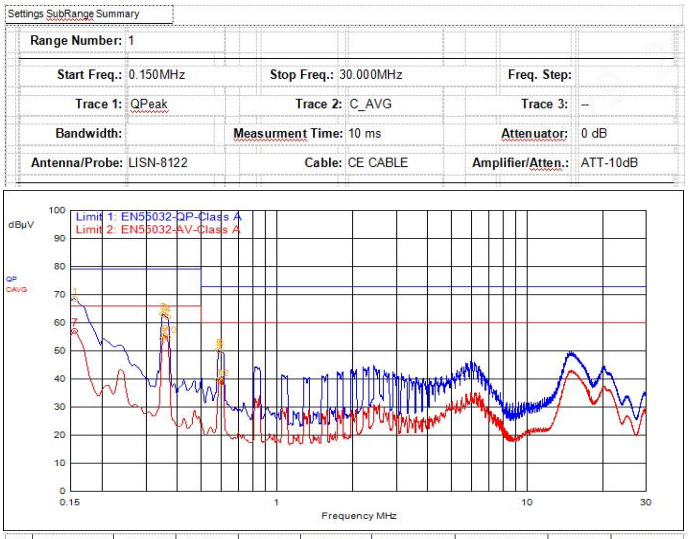
(1) Safety specifications: CISPR32/EN55032 CLASS A

Test conditions: Tc=25℃, Vin= 230VAC, Vout=12V, products are tested based on recommended circuit 1.



ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
7	156.000kHz	0.1	0.2	10.0	C_AVG	47.7	58.1	66.0	-7.9
1	156.000kHz	0.1	0.2	10.0	QPeak	58.7	69.0	79.0	-10.0
9	357.000kHz	0.2	0.2	10.0	C_AVG	44.5	54.9	66.0	-11.1
10	366.000kHz	0.2	0.2	10.0	C_AVG	44.0	54.4	66.0	-11.6

L line peak value and average value

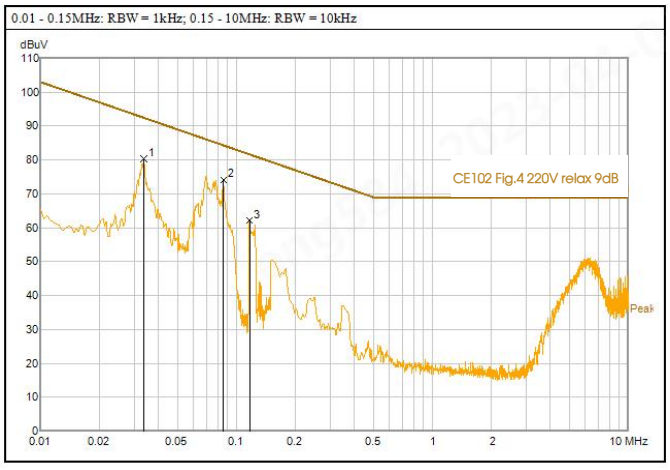


ID	Frequency	Probe	Cable	Atten.	Detector	Meter Read	Meas Level	Limit	Limit Dist.
7	156.000kHz	0.1	0.2	10.0	C_AVG	46.8	57.1	66.0	-8.9
1	156.000kHz	0.1	0.2	10.0	QPeak	58.3	68.6	79.0	-10.4
9	357.000kHz	0.2	0.2	10.0	C_AVG	44.9	55.3	66.0	-10.7
10	366.000kHz	0.2	0.2	10.0	C_AVG	44.4	54.8	66.0	-11.2

N line peak value and average value

(2) Safety specifications: CE102 GJB151B

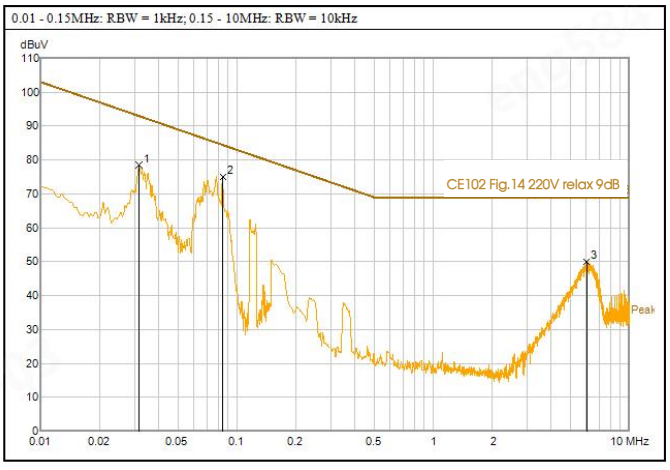
Test conditions: Tc=25℃, Vin= 230VAC, Vout=12V, products are tested based on recommended circuit 2.



SN	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Level (dBuV)	Margin (dB)	Note
1	0.0336	59.82	20.67	86.49	92.47	11.98	Peak value
2	0.0856	54.06	20.06	74.12	84.34	10.22	Peak value
3	0.1164	42.17	19.99	62.16	81.67	19.51	Peak value

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

L line peak value



SN	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Level (dBuV)	Margin (dB)	Note
1	0.0316	55.93	22.53	78.46	93	14.54	Peak value
2	0.0844	54.6	20.43	75.03	84.46	9.43	Peak value
3	6.05	30.07	20.01	50.08	69	18.92	Peak value

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

N line peak value

Additional Circuits Design Reference

1.Typical application

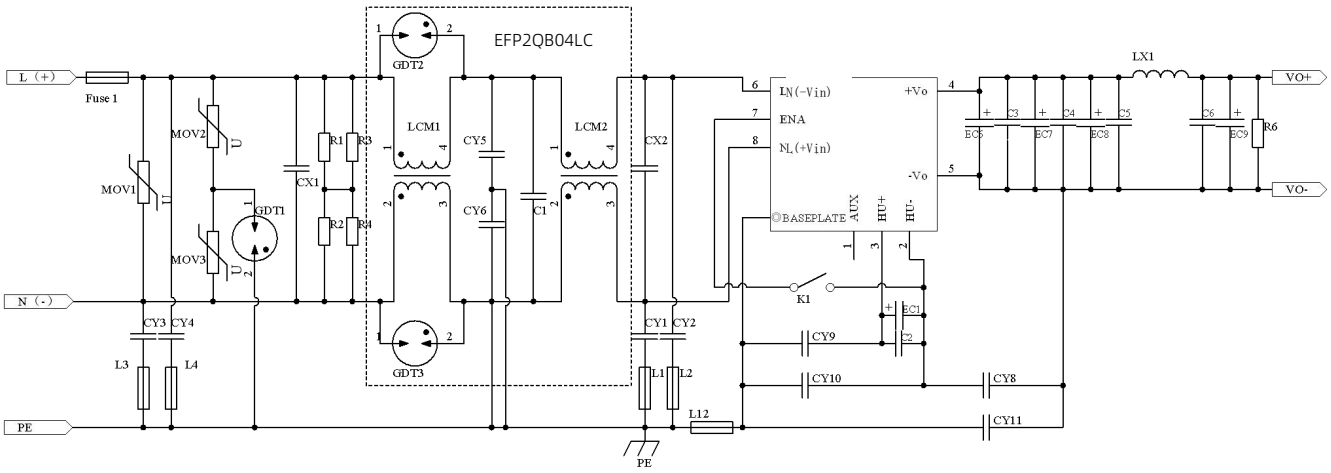


Fig. 1: Recommended circuit 1

Component		Recommended value
Fuse1		300VAC/6.3A, show-blow
MOV1/MOV2/MOV3		S10K350/3500A
R1/R2/R3/R4		510KΩ/1206
CX1		155K/310VAC
CX2		225K/310VAC
P/N: EFP2QB04LC*	C1	Y2/103M/300VAC
	CY5/CY6	Y1/222M/400VAC
	LCM1	5mH
	LCM2	100uH
GDT1		3600V/3KA
GDT2/GDT3		90V/500A/3216
L1/L2/L3/L4/L12		4x3.1x2.6/47Ω/DCR 0.004Ω Max (Suppressing high frequency bead)
CY8/CY10/CY11		Y1/102M/400VAC
CY1/CY2/CY3/CY4/CY9		Y1/222M/400VAC
EC1	85VAC-264VAC input	300uF/450V (Aluminum electrolytic capacitor)
	85VAC-305VAC input	470uF/450V (Aluminum electrolytic capacitor)
C2		683K/630V
LX1		0615/0.8uH/1.8mΩMax/60A
EC6/EC7/EC8/EC9	12V	1500uF/25V (Solid-state capacitor)
	24V/28V	680uF/35V (Solid-state capacitor))

C3/C4/C5/C6		106K/50V/1206
R6**	12V	240Ω/2W
	24V	1kΩ/2W
	28V	1.5kΩ/2W

Note:

①All recommended circuit components must be connected.

②* P/N: EFP2QB04LC is preferred, the effect of the self-built circuit is greatly affected by magnetic material and layout.

③**R6 can be replaced by four 1206 resistors in parallel, and the resistance value after parallel equivalence is the same as the recommended value of R6.

④L1/L2/L3/L4/L12(P/N: 12040006), LX1 (P/N: 12050530) .

2. Conducted Emission (CE102) Recommended Circuit

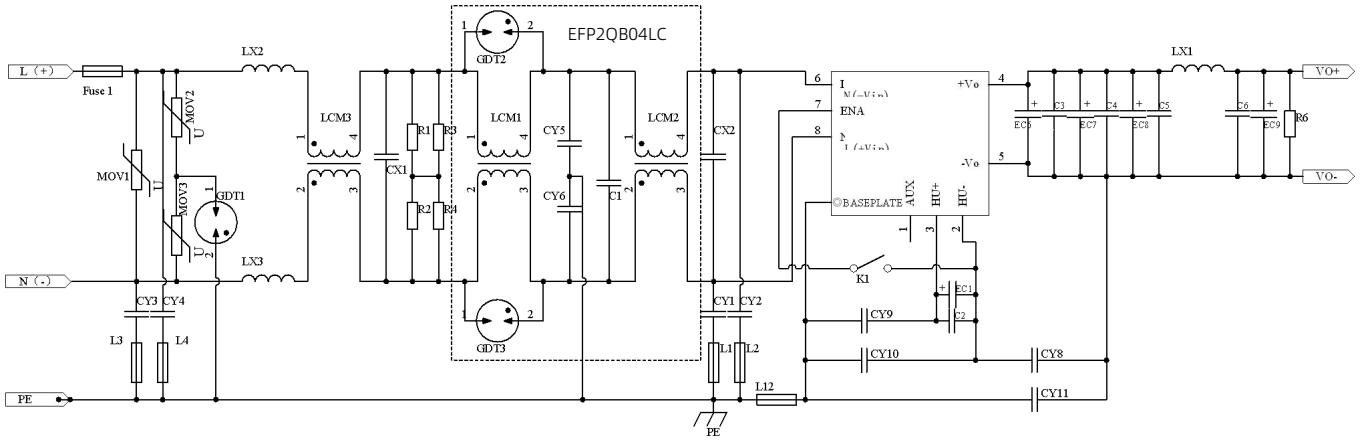


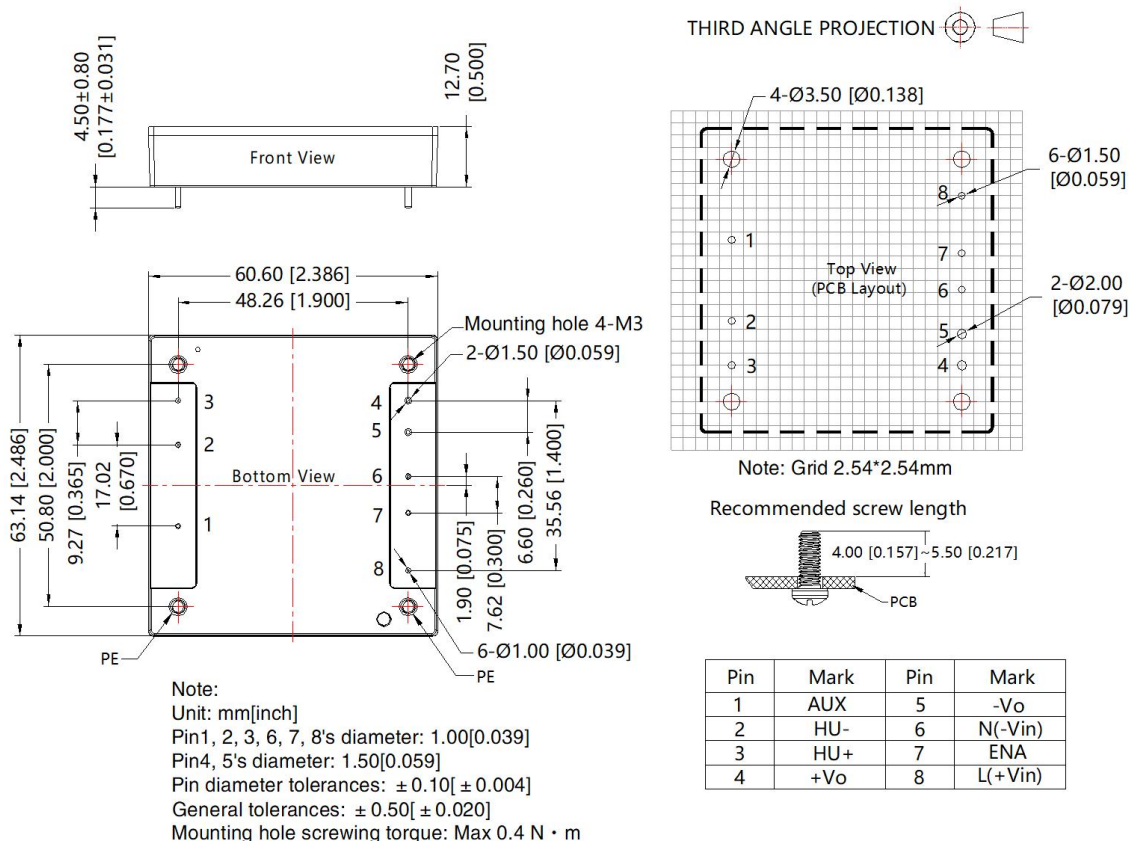
Fig. 2: Recommended circuit 2

Component	Recommended value
LX2/LX3	300uH/Min: 2A, recommend P/N:EFLD2D-2-301
LCM3	10mH/Min: 2A, recommend P/N:EFLC2D-2-103

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

2. LX2/LX3 (P/N: EFLD2D-2-301), LCM3 (P/N: EFLC2D-2-103) quotation is available.

Dimensions and Recommended Layout



Pin	Mark	Pin	Mark
1	AUX	5	-Vo
2	HU-	6	N(-Vin)
3	HU+	7	ENA
4	+Vo	8	L(+Vin)

Note:
Unit: mm[inch]
Pin1, 2, 3, 6, 7, 8's diameter: 1.00[0.039]
Pin4, 5's diameter: 1.50[0.059]
Pin diameter tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]
Mounting hole screwing torque: Max 0.4 N・m

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

Note:

1. 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;
2. 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;
3. All index testing methods in this datasheet are based on our company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.