

75W isolated DC-DC converter  
Wide input and regulated single output



Patent Protection RoHS

## FEATURES

- Wide input voltage range: 36V-75V
- High efficiency up to 92%
- I/O isolation test voltage 1500 VDC
- Input under-voltage protection, output short circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40°C to +85°C
- Industry standard package: 1/16 brick, meet DOSA standard

VCB48\_SBO-75W(F)R3(-N) series of isolated 75W DC-DC converter products with an wide 2:1 input voltage range. They feature efficiencies up to 92%, input to output isolation is tested with 1500VDC and the converter safely operate ambient temperature of -40°C to +85°C, input under-voltage protection, output over-voltage, over-current, short-circuit protection. They are widely used in communication field, such as switches, repeaters, intelligent communication gateways, GPS synchronous clock and 4G/5G base station etc.

## Selection Guide

Certification	Part No. ①	Ctrl Logic ②	Input Voltage (VDC)		Output		Full Load Efficiency ④ (%) Min./Typ.	Capacitive Load (uF)Max.
			Nominal (Range)	Max. ③	Voltage (VDC)	Current(mA) Max./Min.		
-	VCB4805SBO-75WR3	P	48 (36-75)	80	05	15000/0	90/92	6000
	VCB4812SBO-75WR3	P			12	6250/0	90/92	2000
	VCB4828SBO-75WR3	P			28	2678/0	88/90	1000
	VCB4805SBO-75WFR3	P			05	15000/0	90/92	6000
	VCB4812SBO-75WFR3	P			12	6250/0	90/92	2000
	VCB4828SBO-75WFR3	P			28	2678/0	88/90	1000
	VCB4805SBO-75WR3-N	N			05	15000/0	90/92	6000
	VCB4812SBO-75WR3-N	N			12	6250/0	90/92	2000
	VCB4828SBO-75WR3-N	N			28	2678/0	88/90	1000
	VCB4805SBO-75WFR3-N	N			05	15000/0	90/92	6000
	VCB4812SBO-75WFR3-N	N			12	6250/0	90/92	2000
	VCB4828SBO-75WFR3-N	N			28	2678/0	88/90	1000

Notes:

- ① Product model suffix plus "F" for the heat sink package, such as applied to the heat sinks have better requirements of the occasion, we can choose with heat sink module;
- ② "P" means positive logic, "N" means negative logic;
- ③ Exceeding the maximum input voltage may cause permanent damage;
- ④ Efficiency is measured in nominal input voltage and rated output load.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	--	1699/10	1776/30	mA
Reflected Ripple Current		--	30	--	
Surge Voltage (1sec. max.)		-0.7	--	80	VDC
Start-up Voltage		--	--	36	
Input Under-voltage Protection		26	29	--	
Start-up Time	Nominal input voltage & constant resistance load	--	--	100	ms
Input Filter		Pi filter			

Hot Plug		Unavailable				
Ctrl <sup>①</sup>	VCB48_SBO-75W(F)R3	Module on	Ctrl pin open or pulled high (TTL 4.5-12VDC)			
		Module off	Ctrl pin pulled low to GND (0-1.2VDC)			
		Input current when off	--	3	10	mA
	VCB48_SBO-75W(F)R3-N	Module on	Ctrl pin pulled low to GND (0-1.2VDC)			
		Module off	Ctrl pin open or pulled high (TTL 4.5-12VDC)			
		Input current when off	--	3	10	mA

Note: ①The Ctrl pin voltage is referenced to input GND.

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy	5%-100% load	--	±1	±3	%Vo	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5		
Load Regulation	5%-100% load	--	±0.5	±0.75		
Transient Recovery Time	25% load step change	--	200	500	us	
Transient Response Deviation	25% load step change	5V output	--	±3	±8	%Vo
		Others	--	±3	±7	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple & Noise <sup>①</sup>	20MHz bandwidth, nominal input voltage, 5%-100% load	--	100	150	mVp-p	
Trim	Input voltage range	90	--	110	%Vo	
Sense		--	--	105		
Over-voltage Protection		110	125	160	%Vo	
Over-current Protection		110	140	190	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note:  
①Linear Regulation at 0%-100% load is ±3% max.  
②The "Tip and barrel" method is used for ripple and noise test, please refer to *DC-DC Converter Application Notes* for specific information. Ripple & Noise at <5% load is 5%Vo max, Ripple & Noise at 28V output is 2%Vo max.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig1	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Shock and Vibration Test		10-55Hz, 10G, 30Min. along X, Y and Z			
Switching Frequency <sup>①</sup>	PWM mode	--	300	--	kHz
MTBF	MIL-HDBK-217F@25°C	500	--	--	k hours

Note: ①Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

### Mechanical Specifications

Dimensions	VCB4805/12SBO-75WR3(-N)	33.02 x 22.86 x 9.75mm
	VCB4805/12SBO-75WFR3(-N)	33.02 x 22.86 x 12.70mm
	VCB4828SBO-75WR3(-N)	33.02 x 22.86 x 10.05mm
	VCB4828SBO-75WFR3(-N)	33.02 x 22.86 x 13.00mm
Weight	VCB48_SBO-75WR3(-N)	14.60g (Typ.)
	VCB48_SBO-75WFR3(-N)	21.40g (Typ.)
Cooling	Natural convection or forced air convection	

method

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS A (see Fig.4 for recommended circuit)/CLASS B (see Fig.5 for recommended circuit)
	RE	CISPR32/EN55032 CLASS A (see Fig.4 for recommended circuit)/CLASS B (see Fig.5 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact $\pm 6kV$ /Air $\pm 8kV$ perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m perf. Criteria B
	EFT	IEC/EN61000-4-4 100kHz $\pm 2kV$ (see Fig.4 for recommended circuit) perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line $\pm 2kV$ (see Fig.4 for recommended circuit) perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s perf. Criteria B

Temperature Derating Curve

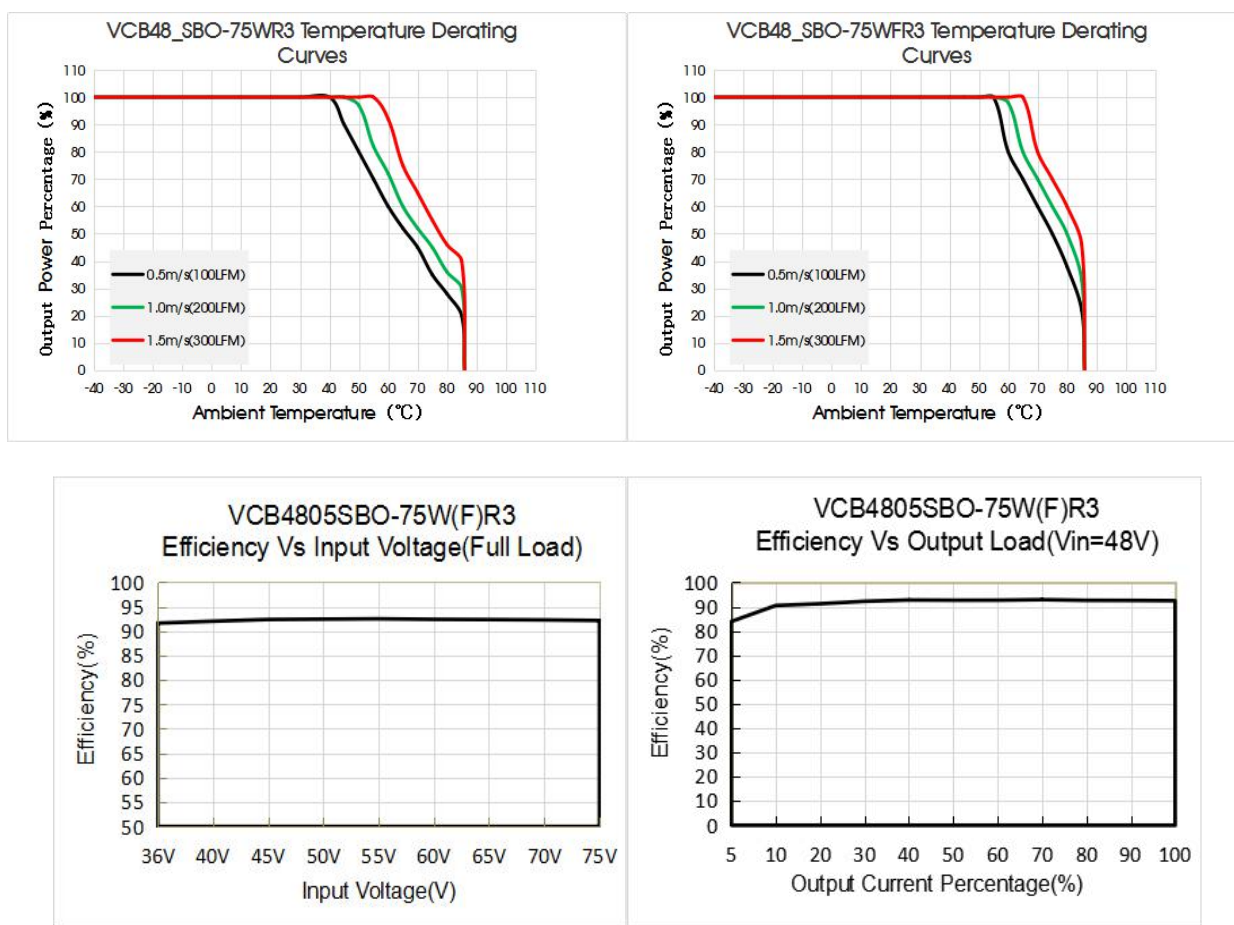
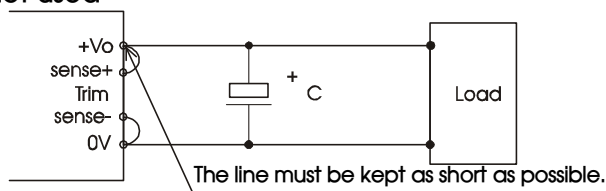


Fig.1

Note: For preliminary evaluation only.

Remote Sense Application

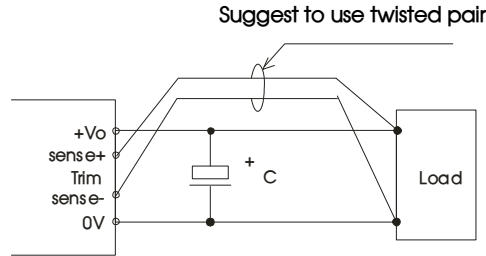
1. Remote Sense Connection if not used



Notes:

- (1) If the sense function is not used for remote regulation the user must connect the +Sense to +Vo and -Sense to 0V at the DC-DC converter pins and will compensate for voltage drop across pins only.
- (2) The connections between Sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

2. Remote Sense Connection used for Compensation



Notes:

- (1) Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.
- (2) PCB-tracks or cables/wires for Remote Sense must be kept as short as possible. Twisted pair or shielded wairs are suggested for remote compensation and must be kept as short as possible.
- (3) We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load in order to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range.
- (4) Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.

Design Reference

1. Ripple & Noise

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

Parameter explanation:

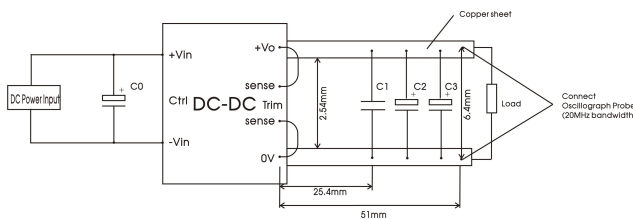


Fig. 2

Capacitors value	C0	C1	C2	C3
Output voltage				
5VDC				
12VDC	100uF/100V	1uF/50V	10uF/50V	330uF/63V
28VDC				

2. Typical application

We recommended using Mornsun's EMC circuit, otherwise please ensure that at least a 100uF electrolytic capacitors is connected at the input in order to ensure adequate voltage surge suppression and protection.

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

Parameter explanation:

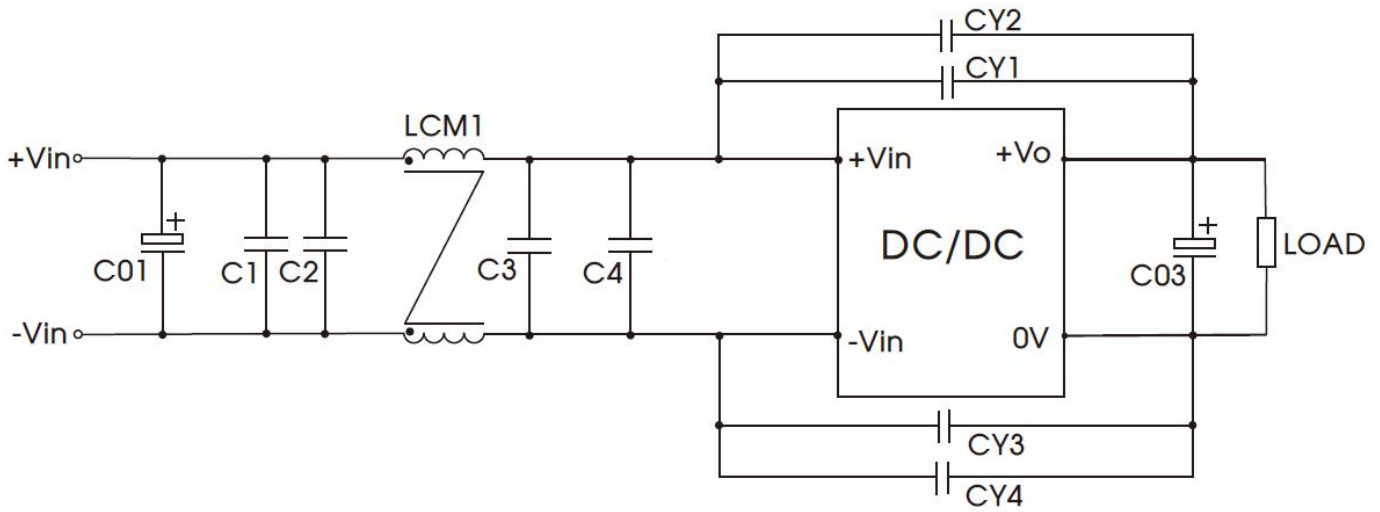


Fig. 3

Capacitors value	Cin	Cout
Output voltage		
5VDC		
12VDC	100uF/100V	330uF/63V
28VDC		

3. EMC compliance recommended circuit

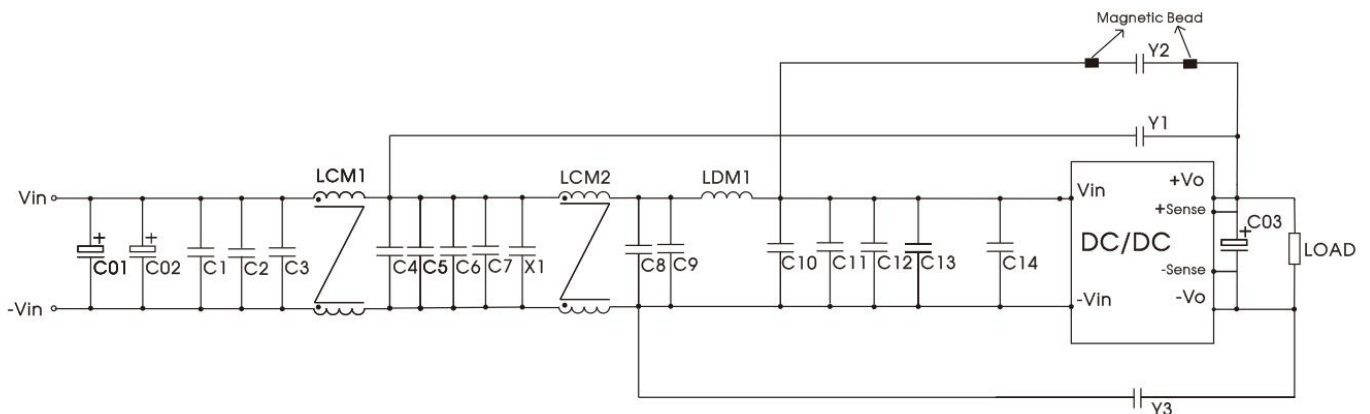
VCB4805/12/28SBO-75W(F)R3(-N)



C01	2000uF/100V electrolytic capacitor
C03	330uF/100V electrolytic capacitor
C1, C2, C3, C4	4.7uF/100V
CY1, CY2, CY3, CY4	222M/400V
LCM1	2.0mH, recommended to use MORNSUN P/N: FL2D-A2-202(C)

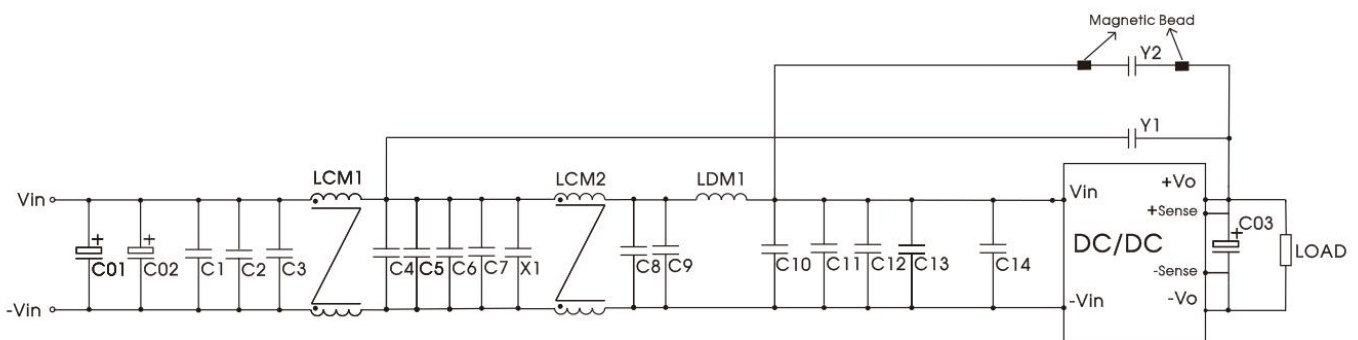
Fig. 4

VCB4805/12SBO-75W(F)R3(-N)



C01, C02	1000uF/100V/electrolytic capacitor
C03	330uF/100V/electrolytic capacitor
C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14	4.7uF/100V
X1	0.22uF/250V
Y1, Y3	102M/400V
Y2	222M/400V
LCM1	60uH/TL15
LCM2	2.0uH, recommended to use MORNSUN P/N: FL2D-30-222
LDM1	12uH
MB	B40/T3.5*1.5*2.35HP (ACME)

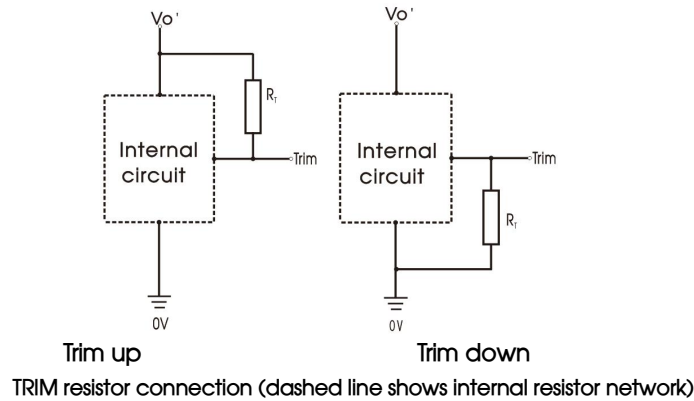
VCB4828SBO-75W(F)R3(-N)



C01, C02	1000uF/100V/electrolytic capacitor
C03	330uF/100V/electrolytic capacitor
C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14	4.7uF/100V
X1	0.22uF/250V
Y1	102M/400V
Y2	222M/400V
LCM1	60uH/TL15
LCM2	2.0uH, recommended to use MORNSUN P/N: FL2D-30-222
LDM1	12uH
C01, C02	1000uF/100V/electrolytic capacitor
MB	B40/T3.5*1.5*2.35HP (ACME)

Fig. 5

4. Trim Function for Output Voltage Adjustment (open if unused)



Calculating Trim resistor values:  
Trim up

$$R_T = \left( \frac{5.11V_{nom}(100 + \Delta\%)}{1.225\Delta\%} - \frac{511}{\Delta\%} - 10.22 \right) (k\Omega)$$

Trim down

$$R_T = \left( \frac{511}{\Delta\%} \right) - 10.22 (k\Omega)$$

Note:

$R_T$  = Trim Resistor value

$$\Delta\% = \left| \frac{V_{nom} - V_{out}}{V_{nom}} \right| \times 100$$

$V_{nom}$  = nominal output voltage

$V_{out}$  = desired output voltage

5. Thermal test point

The thermal element is installed on the top surface of the product and dissipates heat to the surrounding environment by conduction, convection and radiation, sufficient cooling conditions shall be provided to ensure reliable operation of the product. It can be verified that cooling conditions are met by measuring the temperature of thermal test point ① in Fig.6.

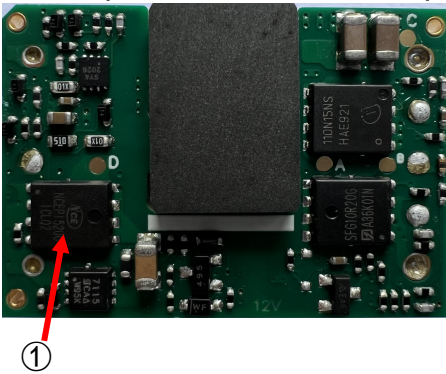


Fig. 6

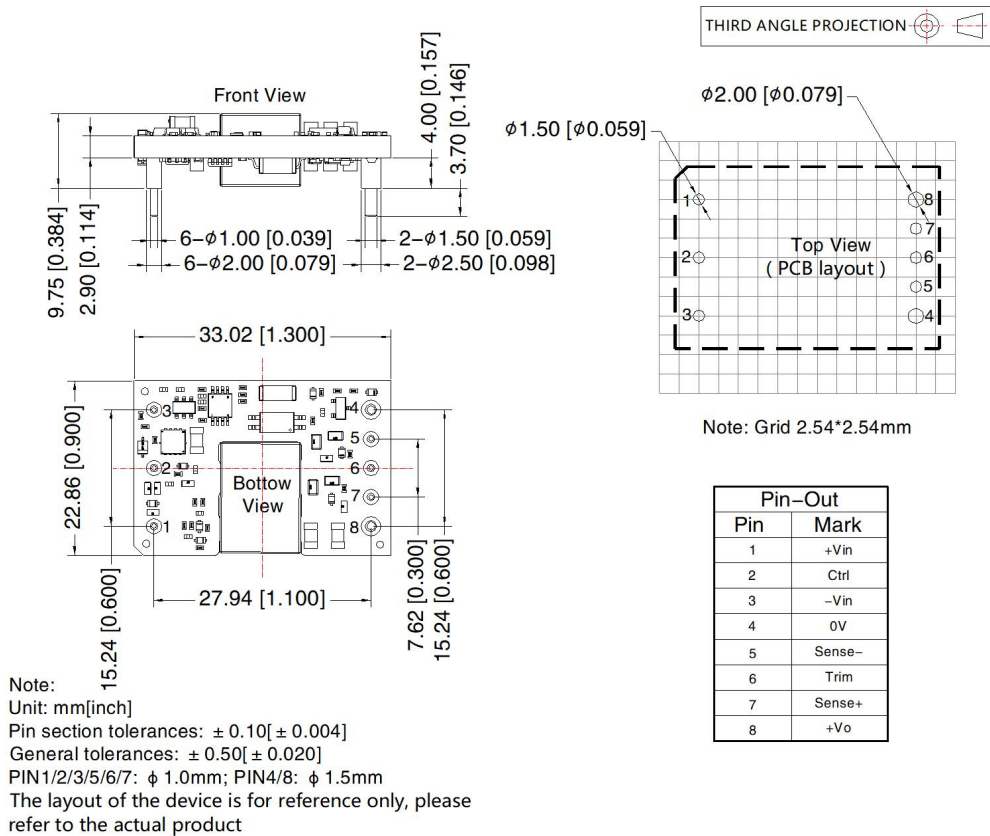
Note:

1. The temperature of the negative logic series Thermal Test Point ① cannot exceed 130°C. Otherwise, the product will trigger the protection due to excessive temperature and can not work properly.
2. Positive logic series without over-temperature protection function, the temperature of Thermal Test Point ① cannot exceed 130°C. Otherwise, the product will be damaged due to excessive temperature.

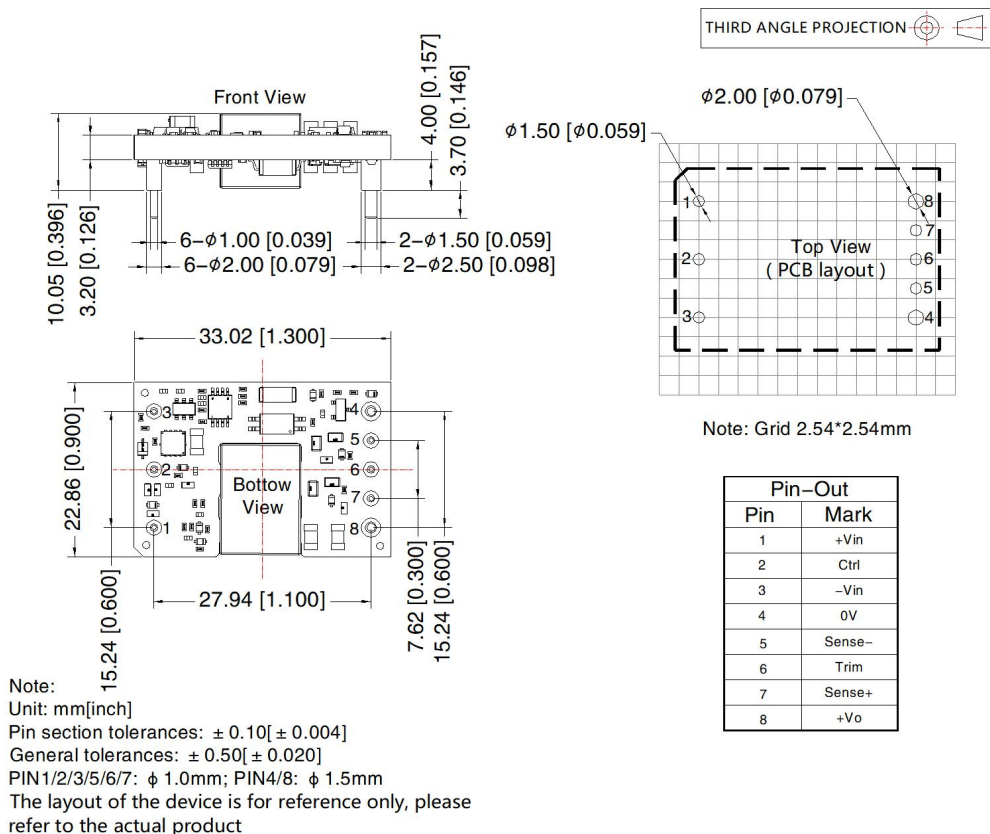
6. The products do not support parallel connection of their output

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

VCB4805(12)SBO-75WR3(-N) Dimensions and Recommended Layout

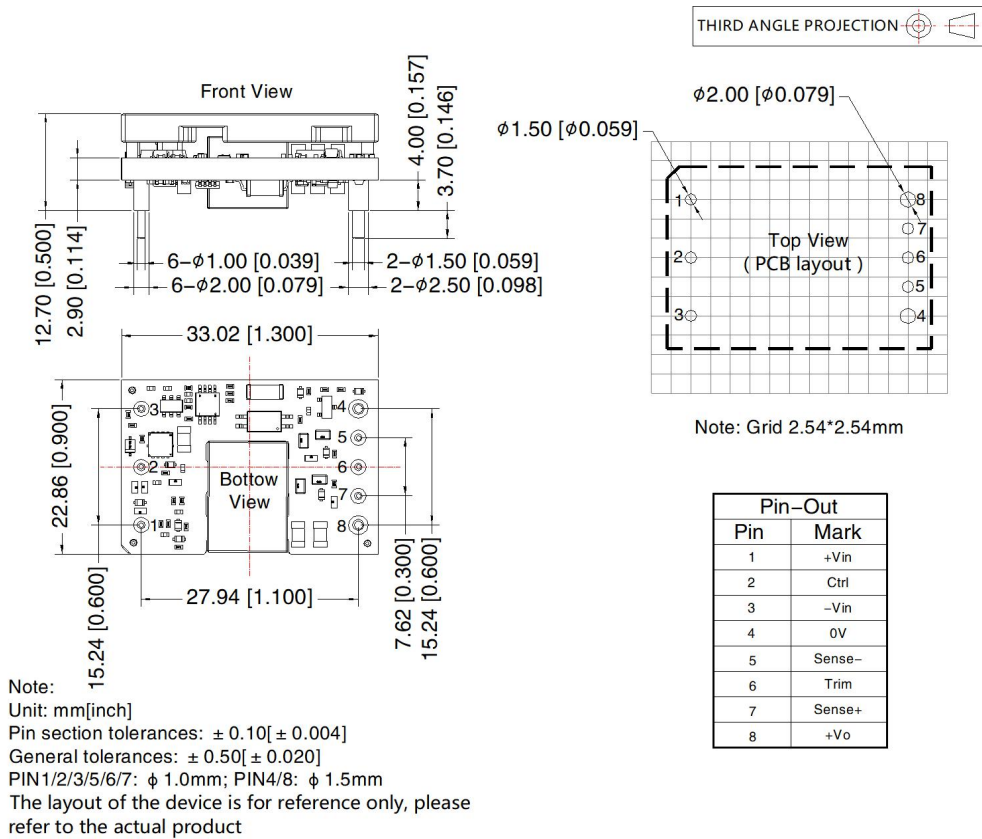


VCB4828SBO-75WR3(-N) Dimensions and Recommended Layout

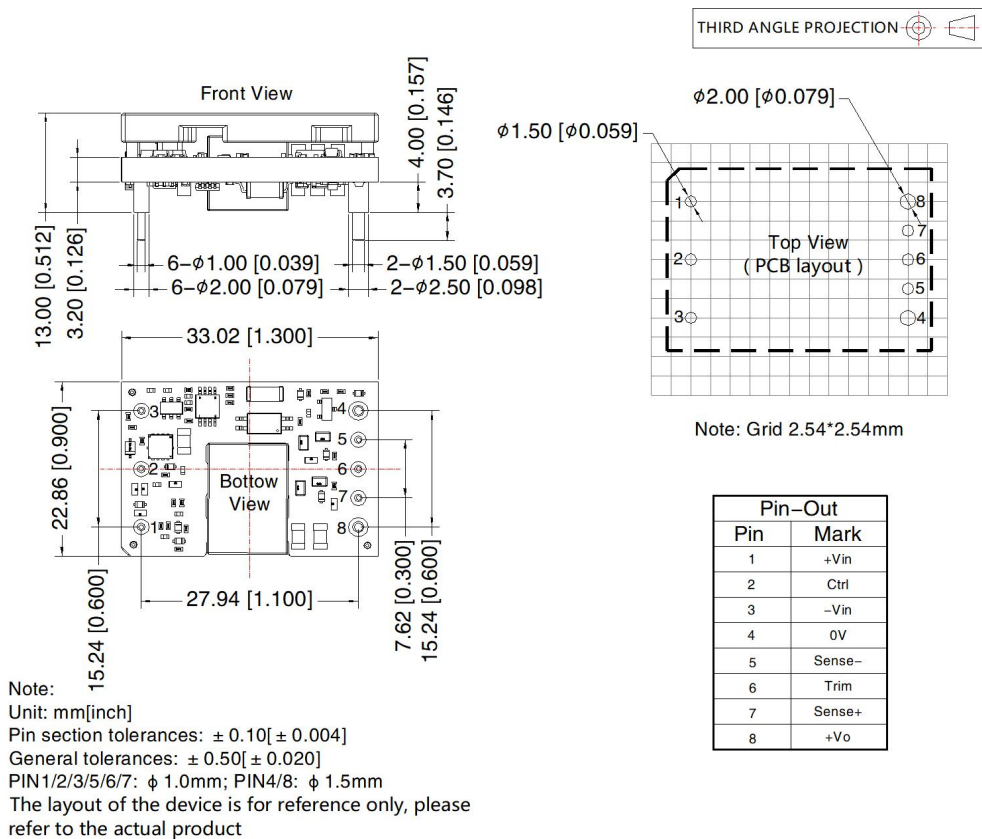




VCB4805(12)SBO-75WFR3(-N) Dimensions and Recommended Layout



VCB4828SBO-75WFR3(-N) Dimensions and Recommended Layout



Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200055;
2. It is recommended to use at more than 10% load. If the load is lower than 10%, the ripple of the product may exceed the specifications, but the reliability of the product is not affected.
3. If the product operates under the minimum required load, the product performance cannot be guaranteed to meet all performance indicators in this manual.
4. The maximum capacitive load offered were tested at input voltage range and full load;
5. 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;
6. All index testing methods in this datasheet are based on company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Products are related to laws and regulations: see "Features" and "EMC";
9. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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