100W isolated DC-DC converter
Wide input and regulated single output

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℃ to +85℃
- Industry standard package: 1/16 brick, meet DOSA standard

Patent Protection RoHS

EN62368-1 BS EN62368-1 UL62368

VCB48_SBO-100W(F)R3(-N) series of isolated 100W 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 safety operate ambient temperature of -40℃ to +85℃, 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 Logic②	Input Voltage (VDC)		Output		Full Load Efficiency④ (%) Min./Typ.	Capacitive Load (uF)Max.
			Nominal (Range)	Max.③	Voltage (VDC)	Current(mA) Max./Min.		
EN/BS EN/UL	VCB4805SBO-100WR3	P	48 (36-75)	80	05	20000/0	90/92	6000
	VCB4812SBO-100WR3				12	8333/0	90/92	2000
	VCB4828SBO-100WR3				28	3571/0	88/90	1000
	VCB4805SBO-100WFR3				05	20000/0	90/92	6000
	VCB4812SBO-100WFR3				12	8333/0	90/92	2000
	VCB4828SBO-100WFR3				28	3571/0	88/90	1000
	VCB4805SBO-100WR3-N	N			05	20000/0	90/92	6000
	VCB4812SBO-100WR3-N				12	8333/0	90/92	2000
	VCB4828SBO-100WR3-N				28	3571/0	88/90	1000
	VCB4805SBO-100WFR3-N				05	20000/0	90/92	6000
	VCB4812SBO-100WFR3-N				12	8333/0	90/92	2000
	VCB4828SBO-100WFR3-N				28	3571/0	88/90	1000

Notes:
① Product model suffix plus "F" for the heat sink package;
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	--	2265/10	2368/30	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

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Input Filter			Pi filter			
Hot Plug			Unavailable			
Ctrl①	VCB48_SBO-100W(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-100W(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: *The 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	μs
Transient Response Deviation	25% load step change	5V output	--	±3	±8	%Vo
		Others	--	±3	±7	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth, nominal input voltage, 5%-100% load		--	100	150	mVp-p
Trim			90	--	110	%Vo
Sense			--	--	105	
Over-voltage Protection	Input voltage range		110	125	160	
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	℃
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 Frequency①	PWM mode	--	300	--	kHz
MTBF	MIL-HDBK-217F@25℃	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-100WR3(-N)	33.02 x 22.86 x 9.75 mm
	VCB4805/12SBO-100WFR3(-N)	33.02 x 22.86 x 12.70 mm
	VCB4828SBO-100WR3(-N)	33.02 x 22.86 x 10.05 mm
	VCB4828SBO-100WFR3(-N)	33.02 x 22.86 x 13.00 mm
Weight	VCB48_SBO-100WR3(-N)	14.60g (Typ.)
	VCB48_SBO-100WFR3(-N)	21.40g (Typ.)

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Cooling method	Natural convection or forced air convection

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 ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria B
	EFT	IEC/EN61000-4-4 100kHz ±2kV (see Fig.4 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±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

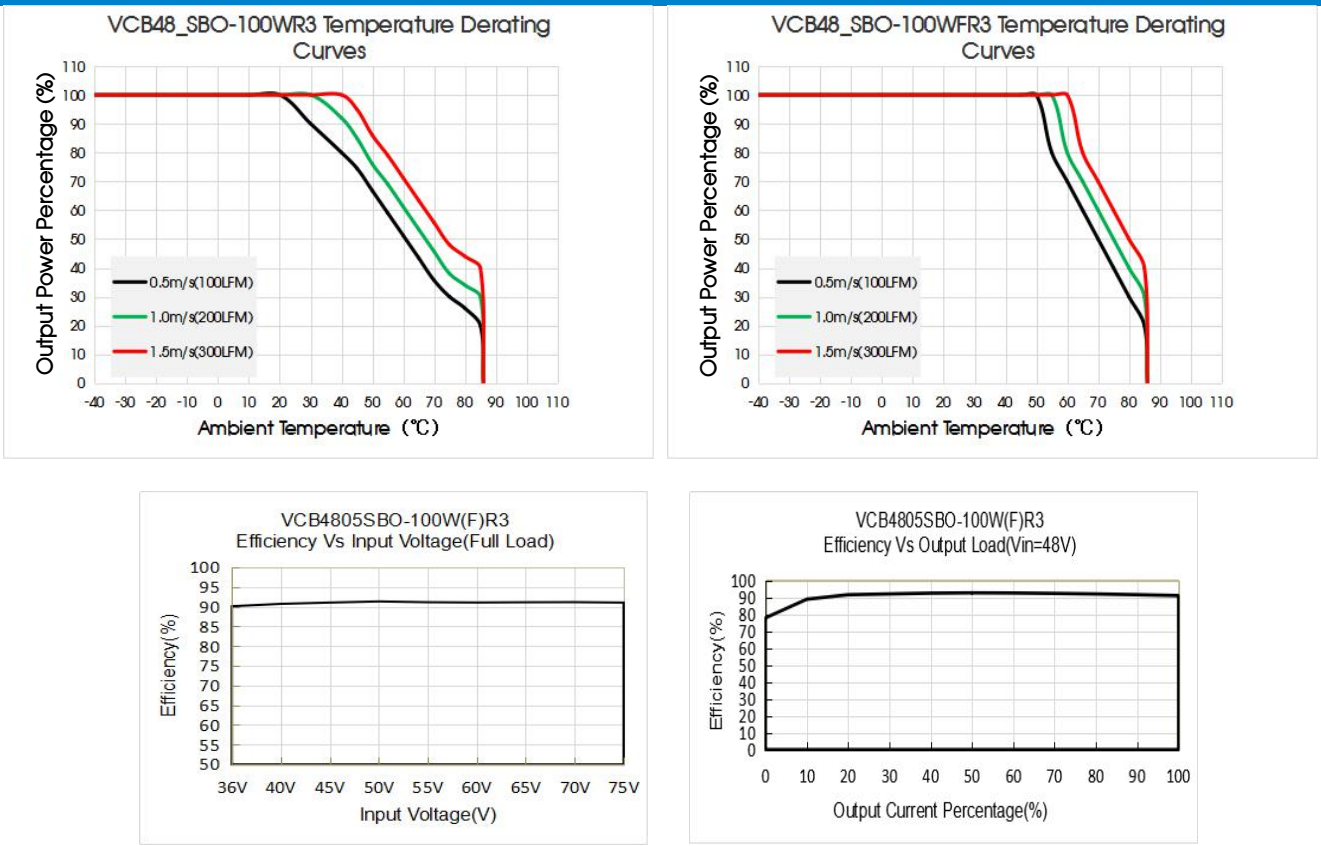
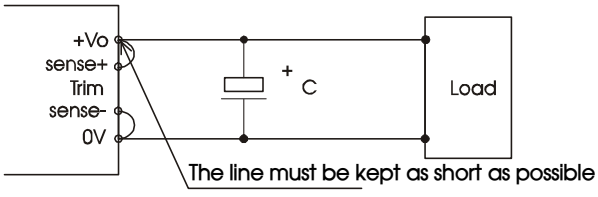


Fig.1

Note: For reference 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;
(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.

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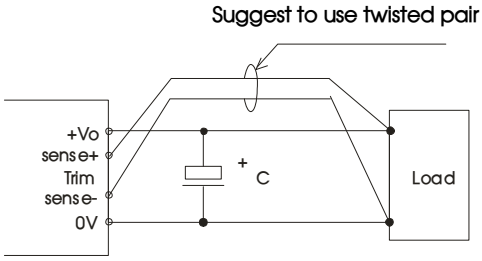
2. Remote Sense Connection used for Compensation



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.

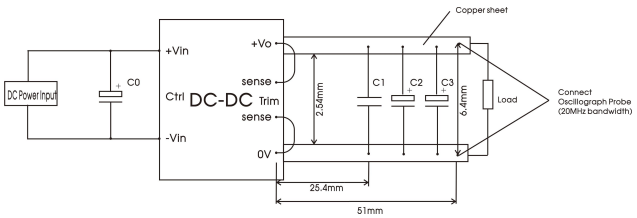


Fig. 2

Capacitors Value / Output Voltage	C0	C1	C2	C3
5VDC	100μF/100V	1μF/50V	10μF/50V	330μF/63V
12VDC				
28VDC				

2. Typical application

We recommended using Mornsun's EMC circuit, otherwise please ensure that at least a 100μF 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.

Fig. 3

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

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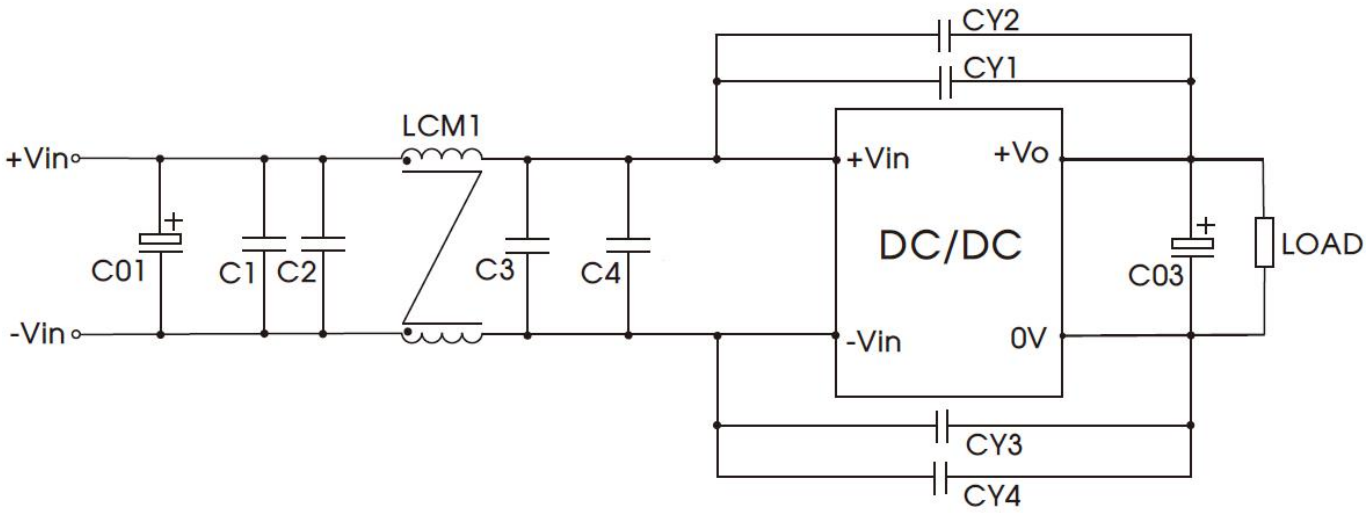
3. EMC compliance recommended circuit

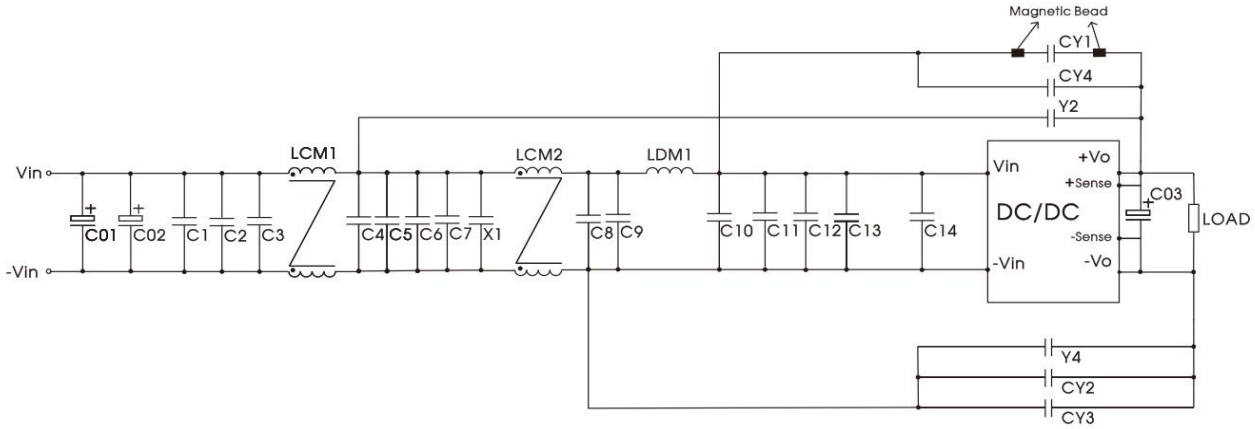
VCB4805/12/28SBO-100W(F)R3(-N)



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-100W(F)R3(-N)



C01、C02	1000μF/100V/electrolytic capacitor
C03	330μF/100V/electrolytic capacitor
C1、C2、C3、C4、C5、C6、C7、C8、C9、C10、C11、C12、C13、C14	4.7μF/100V
X1	0.22μF/250V
Y1、Y3、CY3、CY4	102M/400V
Y2	332M/400V
CY1、CY2	222M/400V
LCM1	60μH/TL15
LCM2	2.0μH, recommended to use MORNSUN P/N: FL2D-30-222
LDM1	12μH
MB	B40/T3.5*1.5*2.35HP (ACME)

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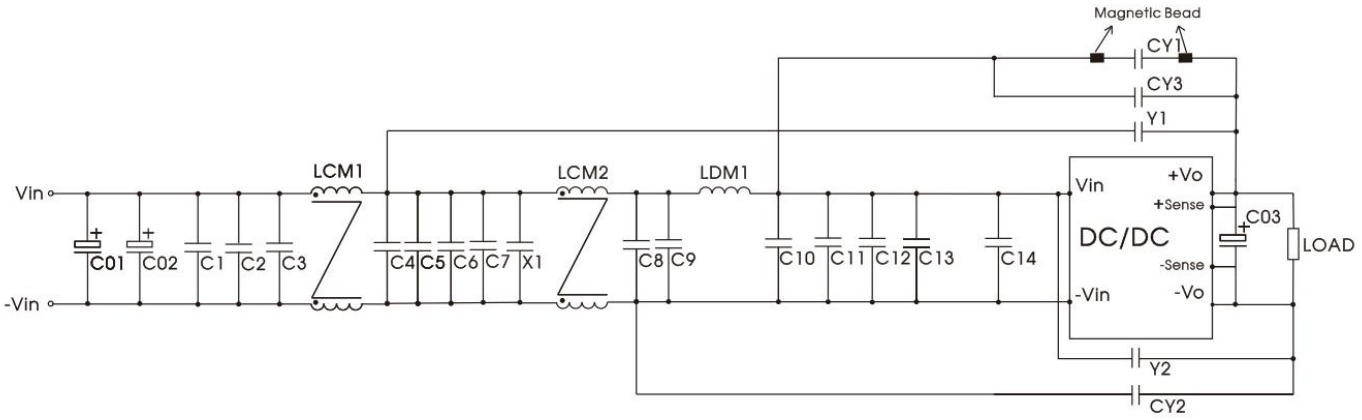
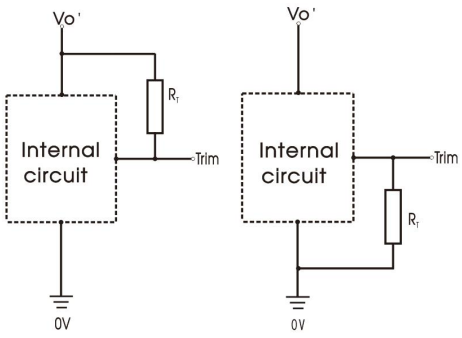
VCB4828SBO-100W(F)R3(-N)



C01、C02	1000μF/100V/electrolytic capacitor
C03	330μF/100V/electrolytic capacitor
C1、C2、C3、C4、C5、C6、C7、C8、C9、C10、C11、C12、C13、C14	4.7μF/100V
X1	0.22μF/250V
Y1、CY3	102M/400V
Y2、CY2	332M/400V
CY1	222M/400V
LCM1	60μH/TL15
LCM2	2.0μH, recommended to use MORNSUN P/N: FL2D-30-222
LDM1	12μH
MB	B40/T3.5*1.5*2.35HP (ACME)

Fig.5

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



Trim up Trim down

TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

Trim up

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

Trim down

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

Note:

RT = 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

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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 raliable 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.

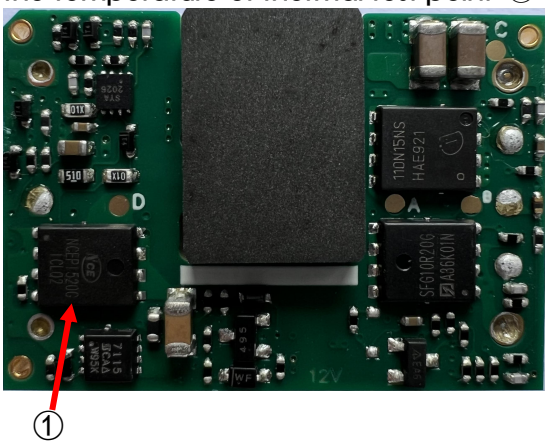


Fig. 6

Note：

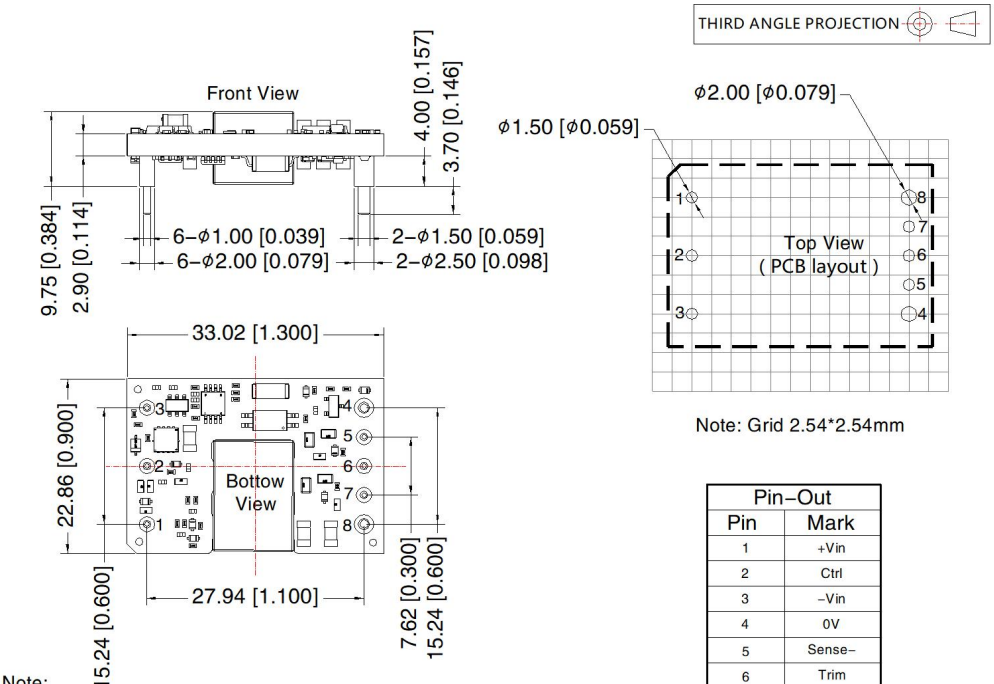
1、The temperature of the negative logic series Thermal Test Point ① cannot exceed 130℃. Othewise, the product will trigger the protection due to excessive temperature and can not work properly.

2、Positive logic series without over-temperature protection function, the temperature of Thermal Test Point ① cannot exceed 130℃. Othewise, 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

VCB4805(12)SBO-100WR3(-N) Dimensions and Recommended Layout



Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	+Vin
2	Ctrl
3	–Vin
4	0V
5	Sense–
6	Trim
7	Sense+
8	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
PIN1/2/3/5/6/7: ϕ 1.0mm; PIN4/8: ϕ 1.5mm
The layout of the device is for reference only, please refer to the actual product

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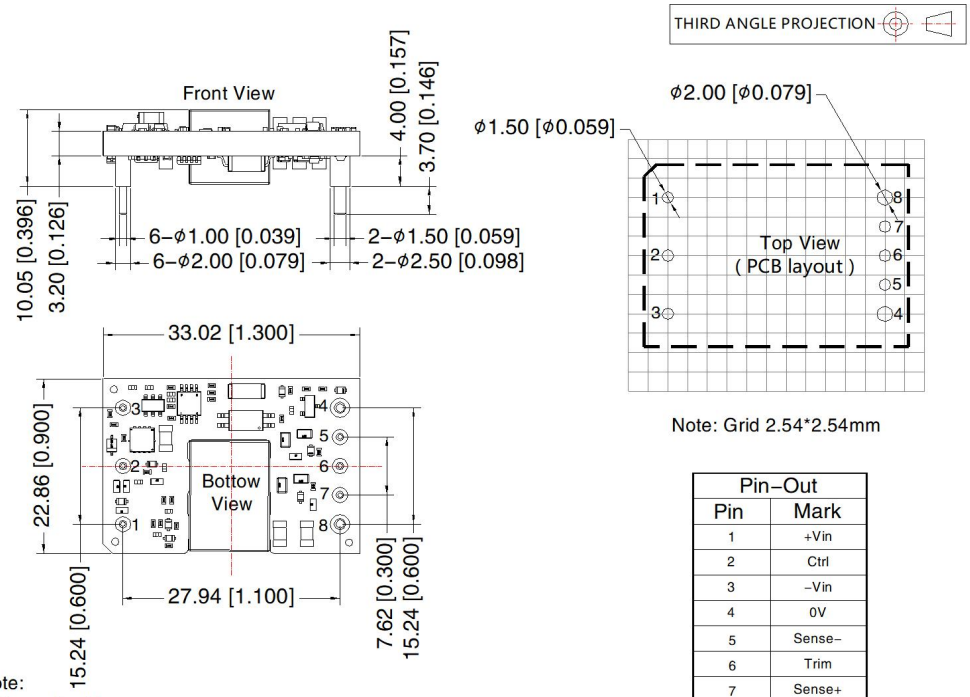
VCB4828SBO-100WR3(-N) Dimensions and Recommended Layout



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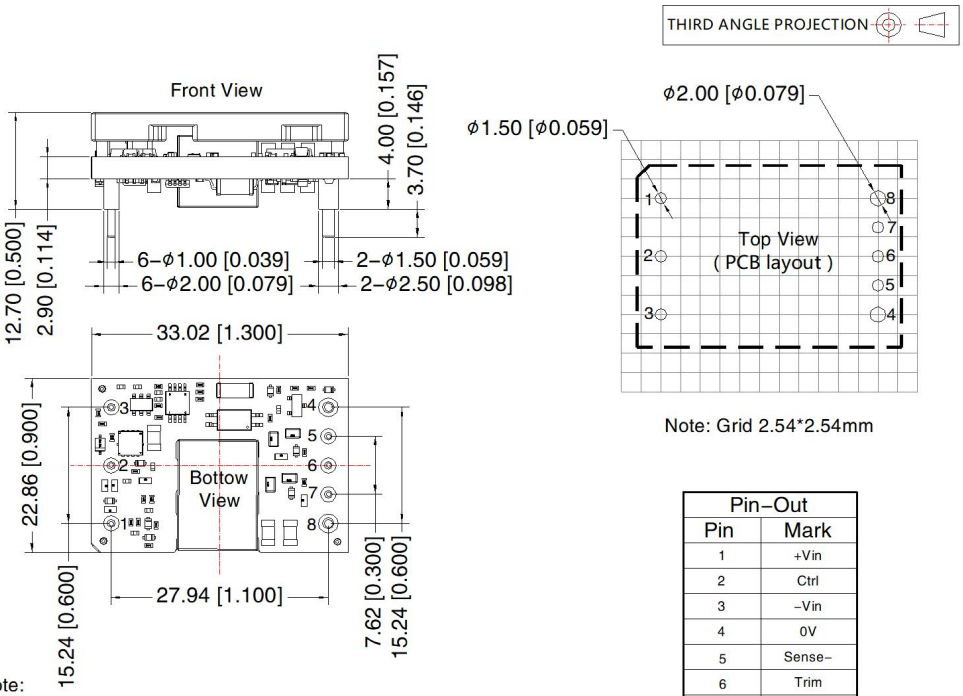
VCB4805(12)SBO-100WFR3(-N) Dimensions and Recommended Layout



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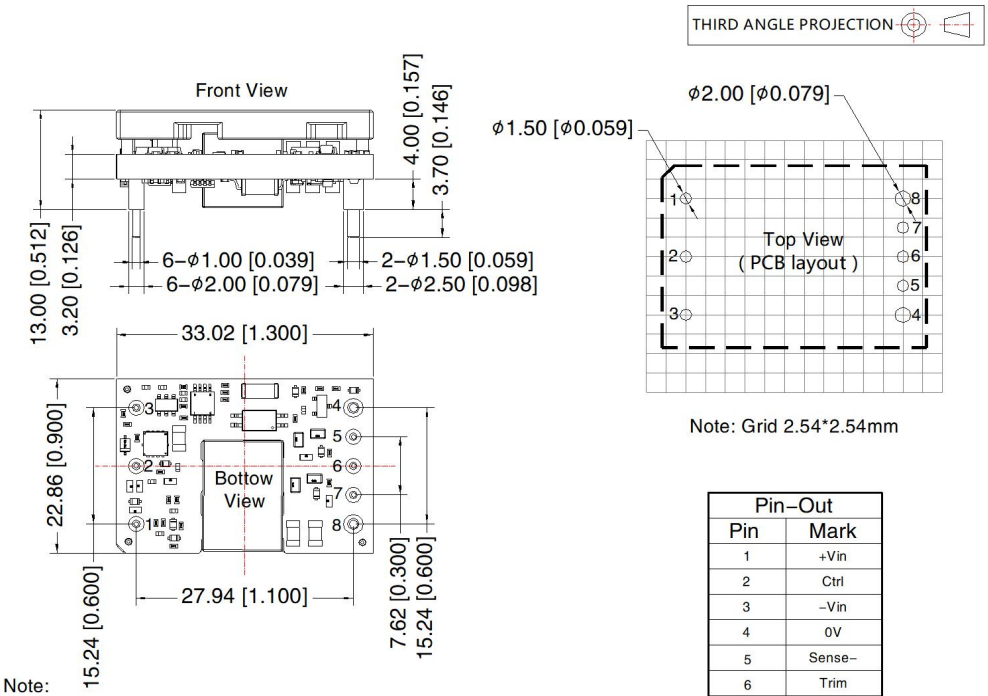
VCB4828SBO-100WFR3(-N) Dimensions and Recommended Layout



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Note:
1. For additional information on Product Packaging please refer to 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 losd, 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 Ta=25℃, 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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