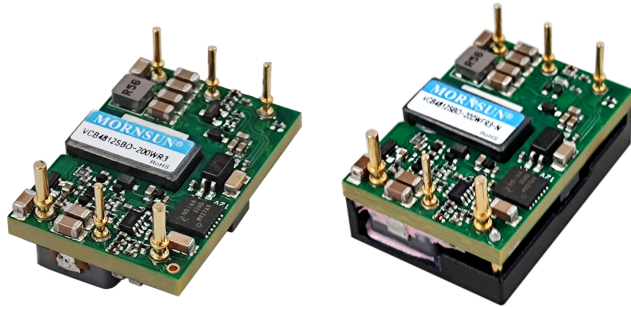


# DC/DC Converter

## VCB48\_SBO-200W(F)R3(-N) Series

# MORNSUN®

200W, isolated DC-DC converter  
Wide input and regulated single output



Patent Protection

RoHS



### FEATURES

- Wide input voltage range: 36-75VDC
- High efficiency up to 94%
- I/O isolation test voltage 1500VDC
- Input under-voltage protection, over-current protection, output short circuit, over-voltage, protection
- Operating ambient temperature range: -40°C to +85°C
- Industry standard package: 1/16 brick, meet DOSA standard

VCB48\_SBO-200W(F)R3(-N) series products output power of 200W, 2:1 wide voltage input range, efficiency up to 94%, 1500VDC conventional isolation voltage, allowed operating temperature -40°C to +85°C, with input under voltage protection, output over current, short circuit, over voltage protection functions. It is widely used in the field of communication, such as switch, repeater, intelligent communication gateway, GPS clock synchronization and 4G/5G base station related DC power supply equipment.

### Selection Guide

Certification	Part No. <sup>①</sup>	CTRL logic <sup>②</sup>	Input Voltage (VDC)		Output		Full Load Efficiency(%) <sup>④</sup> Min./Typ.	Max. Capacitive Load(μF)
			Nominal (Range)	Max. <sup>③</sup>	Voltage (VDC)	Current (mA) Max./Min.		
—	VCB4812SBO-200WR3	P	48 (36-75)	80	12	17000/0	92/94	6800
	VCB4812SBO-200WFR3							
	VCB4812SBO-200WR3-N	N						
	VCB4812SBO-200WFR3-N							

Notes:

- ① Use suffix "F" for heat sink;
- ② "P" indicates that Ctrl is positive logic, "N" indicates that Ctrl is negative logic;
- ③ The input voltage cannot exceed this value, otherwise, permanent damage may be caused;
- ④ The above efficiency values are measured at the input nominal voltage and output rated load.

### Input Specifications

Item		Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)		Nominal input voltage	--	4521/50	4619/100	mA
Reflected Ripple Current			--	200	--	
Surge Voltage (1sec. max.)			-0.7	--	100	VDC
Start-up Voltage			--	--	36	
Input Under-voltage Protection			30	32	--	
Start-up time		Nominal input voltage & constant resistance load	--	--	100	ms
Input Filter			LC filter			
Hot Plug			Unavailable			
Ctrl <sup>①</sup>	VCB4812SBO-200W(F)R3	Module turn-on	Ctrl pin pulled low to TTL(4.5-12VDC)			
		Module turn-off	Ctrl pin open or pulled high GND (0-1.2VDC)			
		Input current during shutdown	--	13	25	mA
	VCB4812SBO-200W(F)R3-N	Module turn-on	Ctrl pin pulled low to GND (0-1.2VDC)			
		Module turn-off	Ctrl pin open or pulled high (TTL 4.5-12VDC)			

# MORNSUN®

MORNSUN Guangzhou Science & Technology Co., Ltd.

2023.11.22-A/1

Page 1 of 7

MORNSUN Guangzhou Science & Technology Co., Ltd. reserves the copyright and right of final interpretation

	Input current during shutdown	--	13	25	mA
--	-------------------------------	----	----	----	----

Note: \*Ctrl control pin voltage is relative to input pin -Vin.

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy	5%Io-100%Io	--	±2	±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(2.5A/us), nominal input voltage	--	--	400	μs
Transient response deviation		--	±2	±2.5	%Vo
Temperature Coefficient	Full load	--	--	±0.03	%/°C
Ripple & Noise <sup>①</sup>	20MHz,, 5%-100% load	--	100	140	mVp-p
Trim	Input voltage range	90	--	110	%Vo
Over-temperature Protection	Product surface max. temperature	--	125	--	°C
Over-voltage Protection	Input voltage range	110	125	130	%Vo
Over-current Protection		110	140	170	%Io
Short-circuit Protection		Hiccup, continuous, self-recovery			

Note:  
<sup>①</sup> According to the load working conditions of 0%-100% test, the load adjustment rate index is ±3%;  
<sup>②</sup> 0% - 5% load ripple & noise is less than or equal to 2.5%Vo. Ripple and noise are measured by the measurement method. For details, see the DC-DC (Wide Voltage) Module Power Application Guide;  
<sup>③</sup> If the short-circuit protection is triggered at high temperature, the over temperature protection may be triggered, which is normal.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	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, 100KHz/0.1V	--	4700	--	pF
Operating Temperature	See Figure 1	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Shock and Vibration Test		10-500Hz, 0.07g2/Hz, 10 Min. along X, Y and Z			
Switching Frequency	PWM mode	--	500	--	KHz
MTBF	MIL-HDBK-217F @25°C	1000	--	--	K hours

### Mechanical Specifications

Dimensions	VCB4812SBO-200WR3(-N)	33.02 x 22.86 x 12.0 mm
	VCB4812SBO-200WFR3(-N)	33.02 x 22.86 x 13.2 mm
Weight	VCB4812SBO-200WR3(-N)	15.6g (typ)
	VCB4812SBO-200WFR3(-N)	26.6g (typ)
Cooling Method	Natural air cooling or forced air cooling	

### Electromagnetic Compatibility (EMC)

EMI	CE	CISPR32/EN55032 CLASS A (See Fig. 4 for recommended circuits)/ CLASS B (See Fig. 5 for recommended circuits)
	RE	CISPR32/EN55032 CLASS A (See Fig. 4 for recommended circuits)/ CLASS B (See Fig. 5 for recommended circuits)
EMS	ESD	IEC/EN61000-4-2 Contact ±6KV, Air ±8KV perf.Criteria B

RS	IEC/EN61000-4-3	10V/m	(See Fig.5 for recommended circuits)	perf.Criteria B
EFT	IEC/EN61000-4-4	100kHz ±2KV	(See Fig. 5 for recommended circuits)	perf.Criteria B
Surge	IEC/EN61000-4-5	line to line ±2KV	(See Fig. 5 for recommended circuits)	perf.Criteria B
CS	IEC/EN61000-4-6	3Vr.m.s	(See Fig. 5 for recommended circuits)	perf.Criteria B

## Typical Characteristic Curve

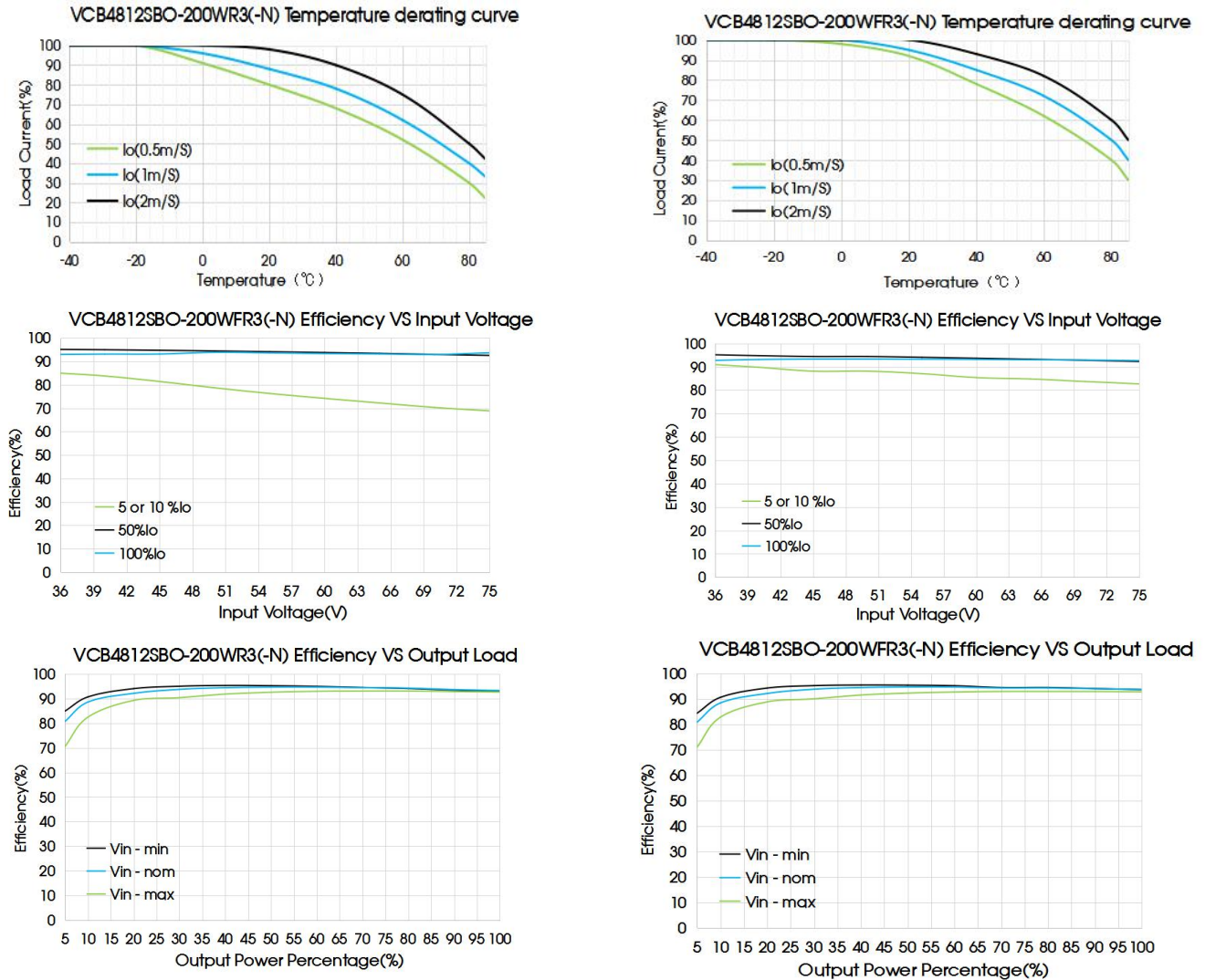


Fig.1

Note:

1. For reference only.
2. Temperature derating curve test conditions: the test board specifications are 138mm\*204mm\*2oz, 4 layers of boards.

## Design Reference

### 1. Ripple & Noise

All DC/DC converters of this series are tested according to the test circuit recommended in Figure 2 before leaving the factory.

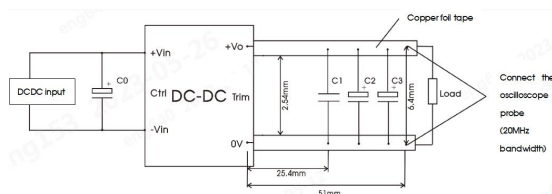


Fig.2

Capacitance Values	C0	C1	C2	C3
Output Voltage				
12V	220μF/100V	1μF/50V	10μF/50V	560μF/35V

## 2. Typical circuit

If the customer does not use our recommended circuit, the input must be connected with an electrolytic capacitor of at least 100 $\mu$ F to suppress the potential surge voltage generated by the input.

If it is required to further reduce the input/output ripple, the external input/output capacitors  $C_{in}$  and  $C_{out}$  can be increased or a capacitor with small series equivalent impedance value can be selected, but the capacitance value should not be greater than the maximum capacitive load of the product.

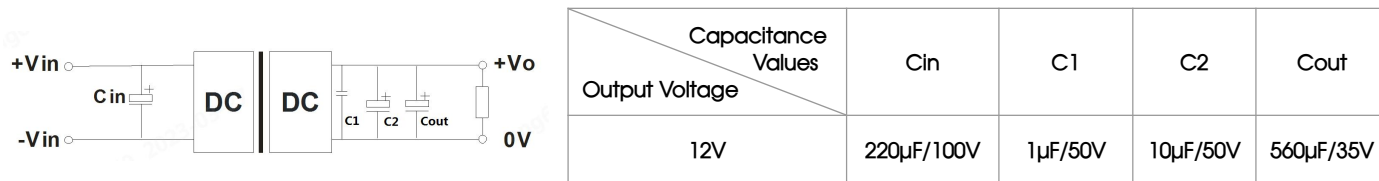
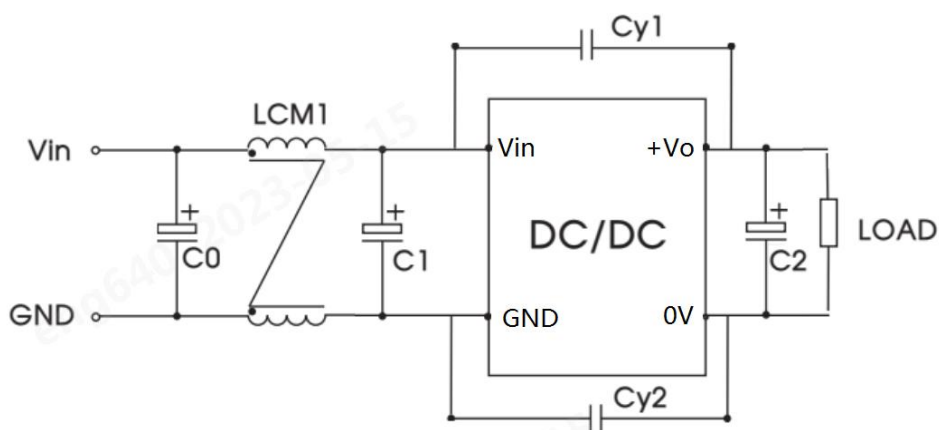


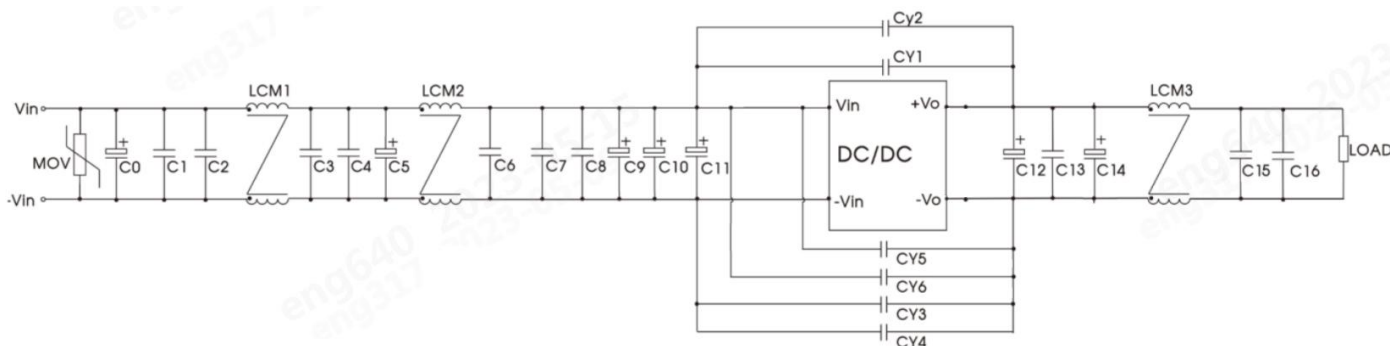
Fig.3

## 3. EMC compliance recommended circuit



C0	470 $\mu$ F/100V electrolytic capacitor
C1	100 $\mu$ F/100V electrolytic capacitor
C2	330 $\mu$ F/63V electrolytic capacitor
LCM1	TD2418-2mH/8A
CY1、CY2	2.2nF/400VAC safety standard Y capacitor

Fig.4

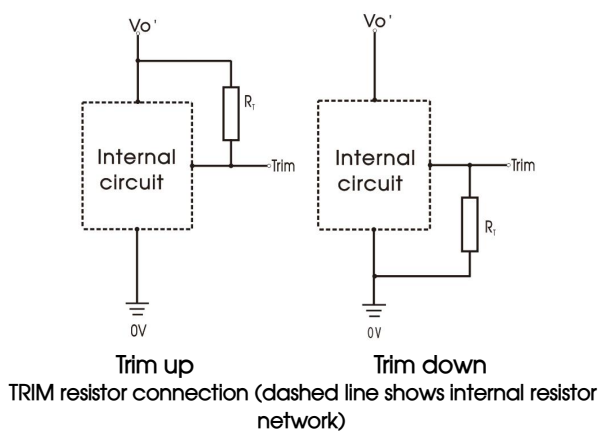




MOV	14D101K varistor
C0	680μF/100V electrolytic capacitor
C11	470μF/100V electrolytic capacitor
C12	470μF/63V electrolytic capacitor
C5、C9、C10	100μF/100V electrolytic capacitor
C14	470μF/35V solid-state capacitor
C1、C2、C3、C4、C6、C7、C8、C13、C15、C16	4.7μF/100V ceramic capacitance
LCM1	T25 x 15 x13/4mH/10mΩ max/10A
LCM2	T25 x 15 x13/4mH/10mΩ max/10A
LCM3	T26 x 26 x 12/130uH/4mΩ max/25A
CY4	1nF/400VAC safety standard Y capacitor
CY1、CY2、CY3、CY5、CY6	2.2nF/400VAC safety standard Y capacitor

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:

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

#### 5. Recommended solution for thermal test

During the application process, the thermal design of the product can be evaluated in combination with the product temperature derating curve, or the stable working range of the product can be determined by testing the temperature at point ABC in Figure 6. When the temperature at point ABC is lower than 125°C, the D point shell temperature of the product with F-type is lower than 115°C, it is the stable working range of the product.

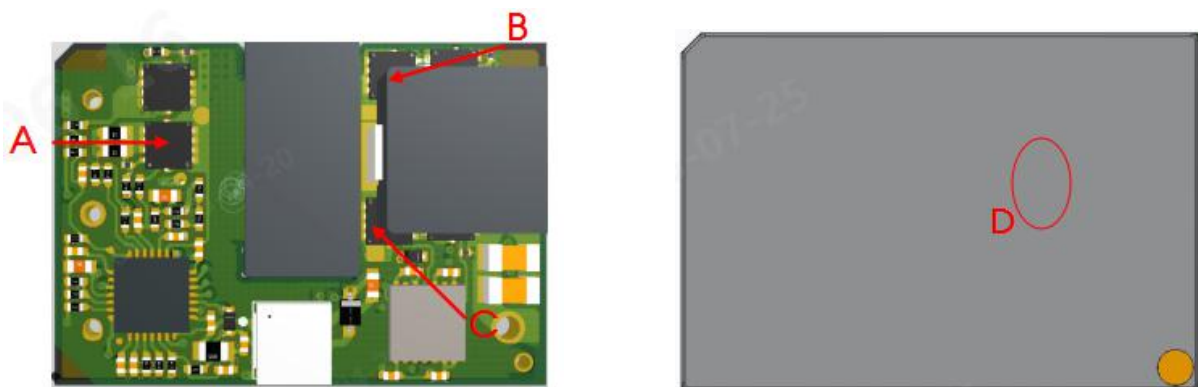
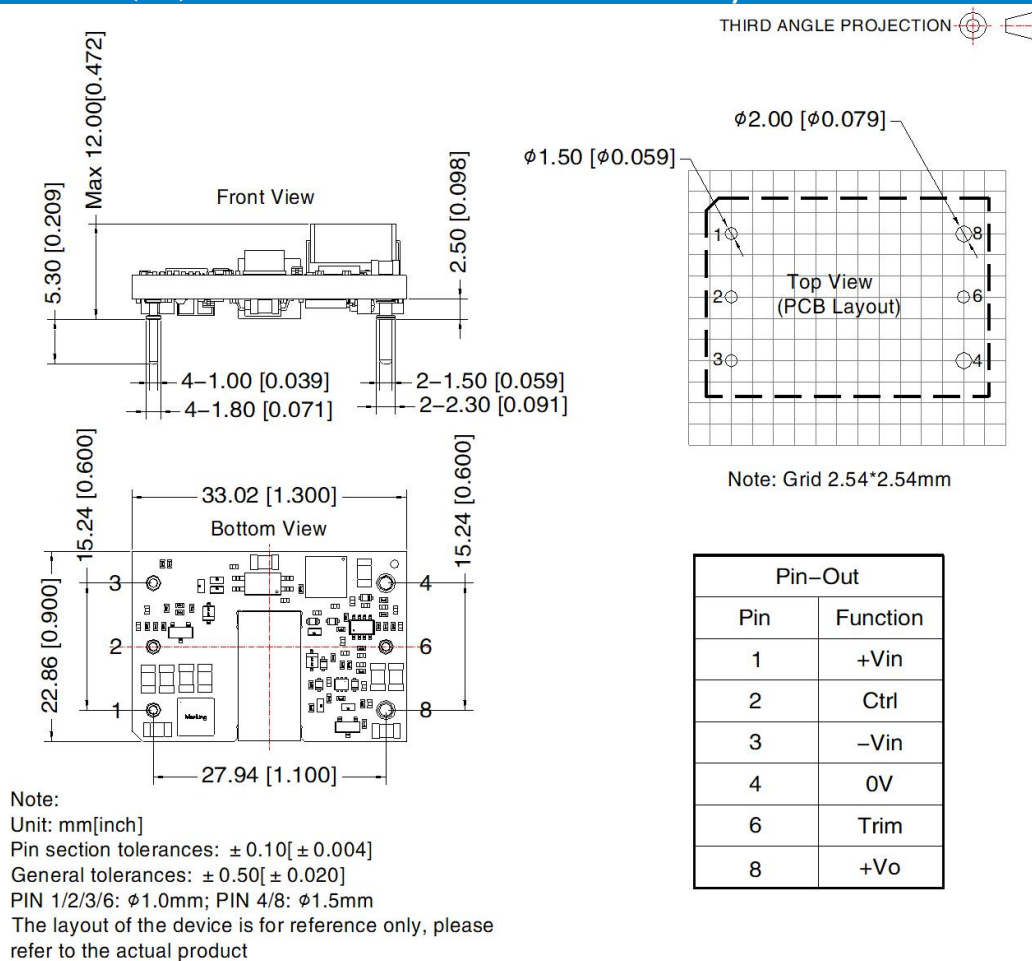


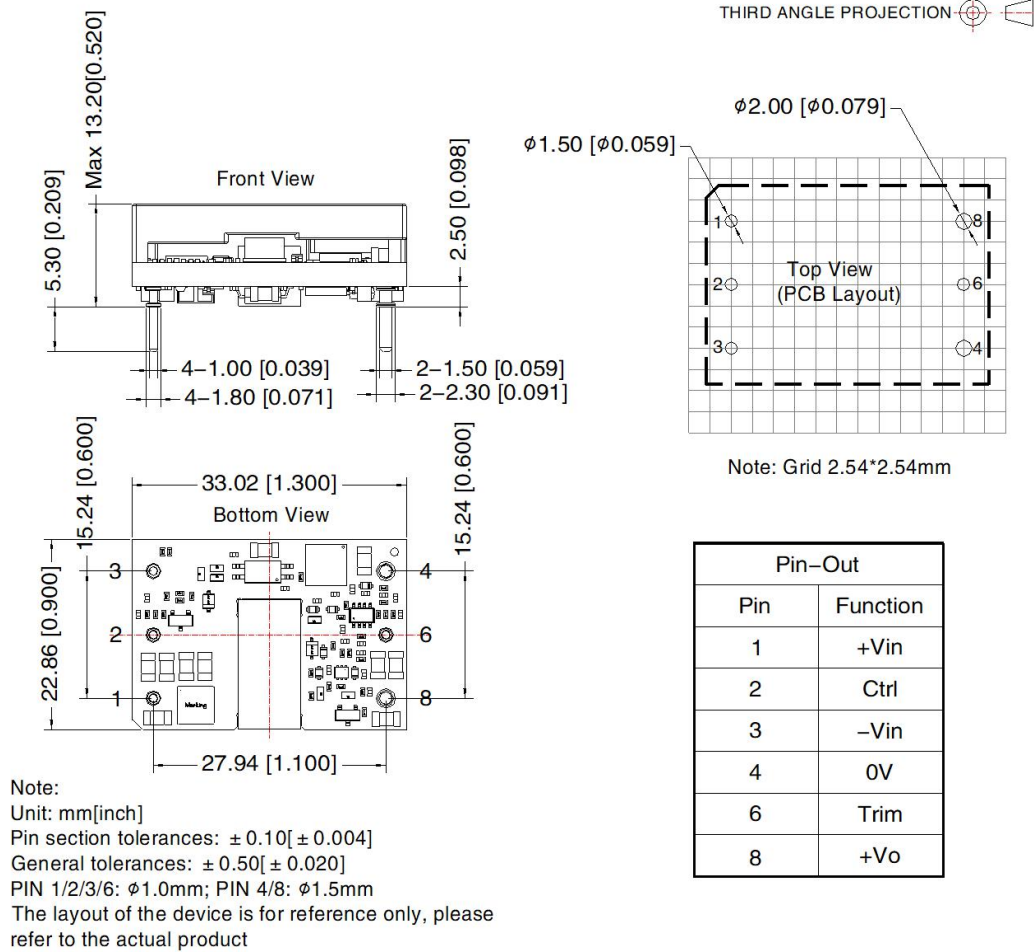
Fig.6

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.cn](http://www.mornsun.cn)

## VCB4812SBO-200WR3(-N) Dimensions and Recommended Layout



VCB4812SBO-200WFR3(-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: 58210102;
2. The maximum capacitive load is tested in the input voltage range and under full load condition;
3. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the data sheet;
4. The maximum capacitive load offered were tested at nominal input voltage and full load;
5. Unless otherwise specified, parameters in this data sheet 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 test methods in this manual are based on the enterprise standards of the company;
7. We can provide product customization, specific needs can directly contact our technical staff;
8. The product involves laws and regulations: see "Product Features" and "EMC Features";
9. After scrapping, our products shall be classified and stored in accordance with ISO14001 and relevant environmental laws and regulations, and handed over to 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](mailto:info@mornsun.cn) [www.mornsun-power.com](http://www.mornsun-power.com)