

40W isolated DC-DC converter  
Wide input and regulated single output



Patent Protection **RoHS**



## FEATURES

- Wide input voltage range: 36V-75V
- Up to 89% efficiency
- I/O isolation test voltage 2250 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-40WR3(-N) series products output power of 40W, 2:1 wide voltage input range, efficiency of up to 89%, 2250VDC isolation voltage, allowed operating temperature -40°C to +85°C, with input under-voltage protection, output over-current, short circuit, over-voltage and over-temperature protection function. 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.	Ctrl <sup>③</sup>	Input Voltage (VDC)		Output		Full Load Efficiency <sup>②</sup> (%)Min./Typ.	Capacitive Load (μF) Max.
			Nominal (Range)	Max. <sup>①</sup>	Voltage (VDC)	Current(mA) Max./Min.		
--	VCB4803SBO-40WR3	P	48 (36-75)	80	3.3	8000/0	81/83	4700
	VCB4803SBO-40WR3-N	N						
	VCB4805SBO-40WR3	P			5	8000/0	85/87	6000
	VCB4805SBO-40WR3-N	N						
	VCB4812SBO-40WR3	P			12	3333/0	87/89	2000
	VCB4812SBO-40WR3-N	N						
	VCB4824SBO-40WR3	P			24	1670/0	86/88	470
	VCB4824SBO-40WR3-N	N						
	VCB4828SBO-40WR3	P			28	1430/0	86/88	440
	VCB4828SBO-40WR3-N	N						

Notes:

- ① Exceeding the maximum input voltage may cause permanent damage;
- ② Efficiency is measured in nominal input voltage and rated output load;
- ③ "P" indicates that Ctrl is a positive logic and "N" indicates that Ctrl is a negative logic.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load / no-load)	Nominal input voltage	3.3V Output	--	662/10	680/20	mA
		5V Output	--	947/10	980/20	
		12V Output	--	936/10	958/20	
		24V Output	--	948/10	970/20	
		28V Output	--	948/10	970/20	
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		C filter				

Hot Plug			Unavailable			
Ctrl*	Module on	VCB48xxSBO-40WR3	Ctrl pin open or pulled high (TTL 4.5-12VDC)			
		VCB48xxSBO-40WR3-N	Ctrl pin pulled low to GND (0-1.2VDC)			
	Module off	VCB48xxSBO-40WR3-N	Ctrl pin open or pulled high (TTL 4.5-12VDC)			
		VCB48xxSBO-40WR3	Ctrl pin pulled low to GND (0-1.2VDC)			
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 <sup>①</sup>	5%-100% load	--	±0.5	±1		
Transient Recovery Time	25% load step change, Nominal input voltage		--	200	500	μs
Transient Response Deviation	25% load step change, Nominal input voltage	3.3V Output	--	±5	±10	%Vo
		Other Output	--	±5	±8	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple & Noise <sup>②</sup>	20MHz bandwidth, 5%-100% load		--	100	200	mVp-p
Trim	Input voltage range	90	--	110	%Vo	
Sense		--	--	105		
Over-voltage Protection		110	125	160		
Over-current Protection		110	140	190	%Io	
Over-temperature protection		--	--	130	°C	
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.  
 ③At 3.3V output, 0% to 5% load ripple & noise is less than or equal to 200mV.

## 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.	2250	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig1.1	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Shock and Vibration Test		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency <sup>①</sup>	PWM mode	--	220	--	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.

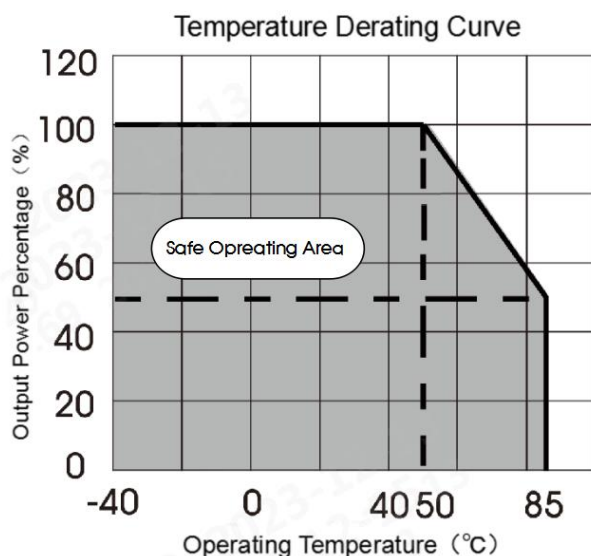
## Mechanical Specifications

Dimensions	33.02 x 22.86 x 8.10mm
Weight	9.5g (Typ.)
Cooling method	Natural convection or forced air convection

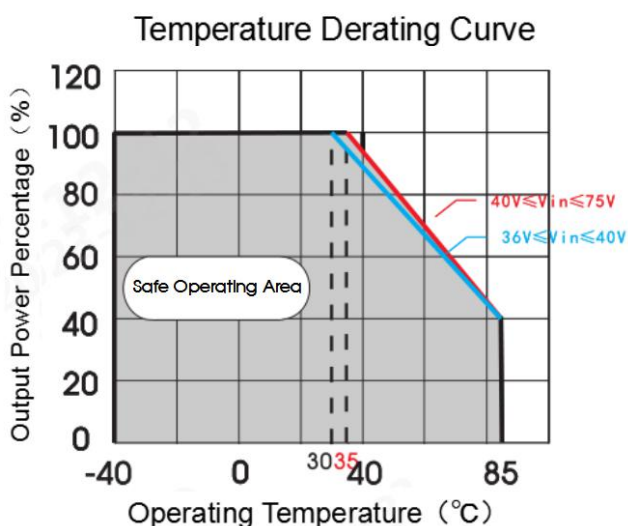
Electromagnetic Compatibility (EMC)

EMI	CE	CISPR32/EN55032	CLASS B (see Fig.3-①)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-①)	
EMS	ESD	IEC/EN61000-4-2	Contact $\pm 4\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m (with additional circuit)	perf. Criteria B
	EFT	IEC/EN61000-4-4	$\pm 2\text{KV}$ (see Fig.3-② for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line $\pm 2\text{KV}$ (see Fig.3-② for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria B

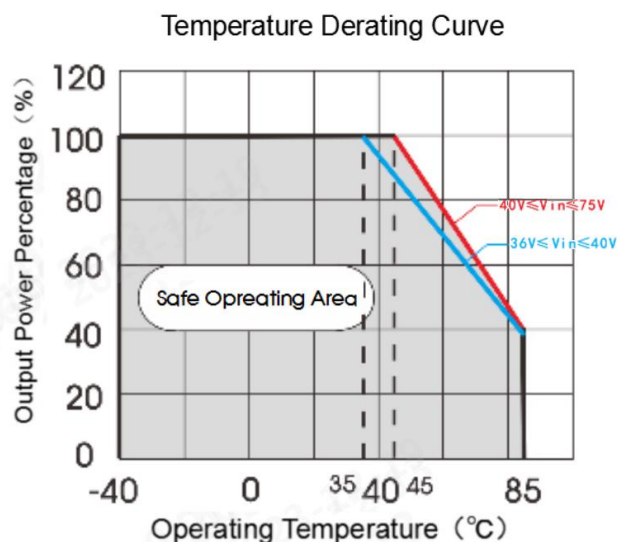
Temperature Derating Curve



VCB4803SBO-40WR3(-N), VCB4824SBO-40WR3(-N), VCB4828SBO-40WR3(-N)



VCB4805SBO-40WR3(-N)



VCB4812SBO-40WR3(-N)

Fig. 1.1

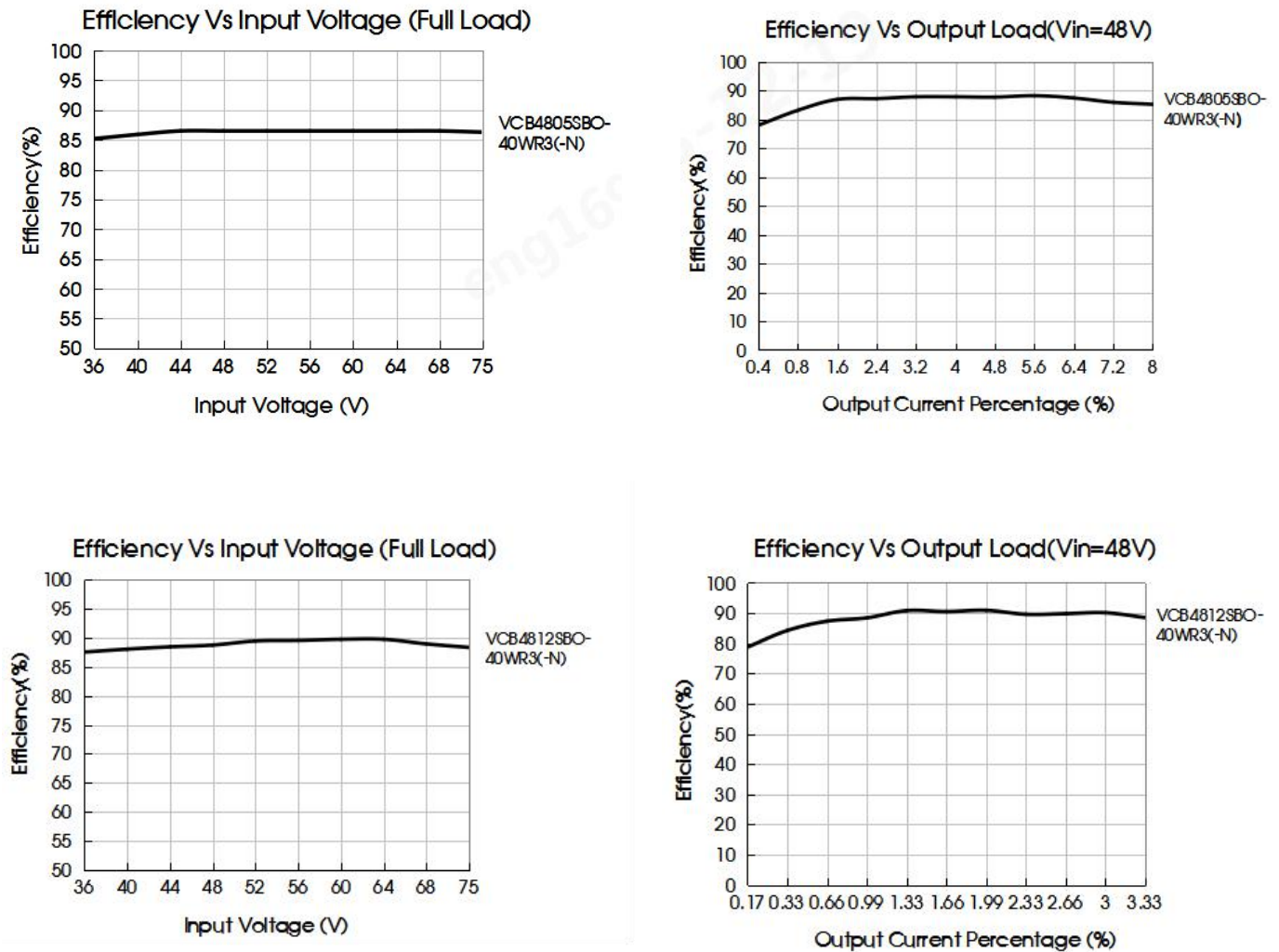
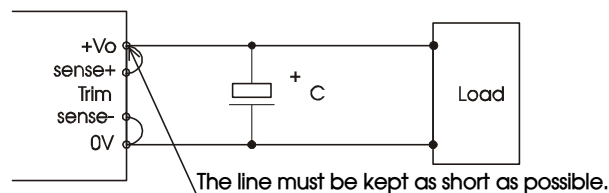


Fig. 1.2

## Remote Sense Application

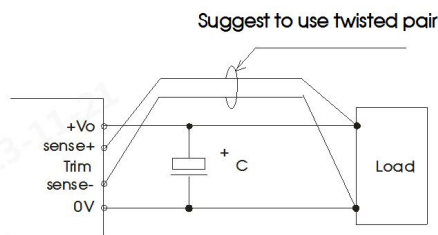
### 1. Remote Sense Connection if not used



#### 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 wires 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. Typical application

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

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values  $C_{in}$  and  $C_{out}$  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.



$V_{in}$	48V
$C_{in}$	100 $\mu$ F/100V
C1	1 $\mu$ F/50V
C2	10 $\mu$ F/50V
$C_{out}$	330 $\mu$ F/63V

Fig. 2

### 2. EMC compliance recommended circuit

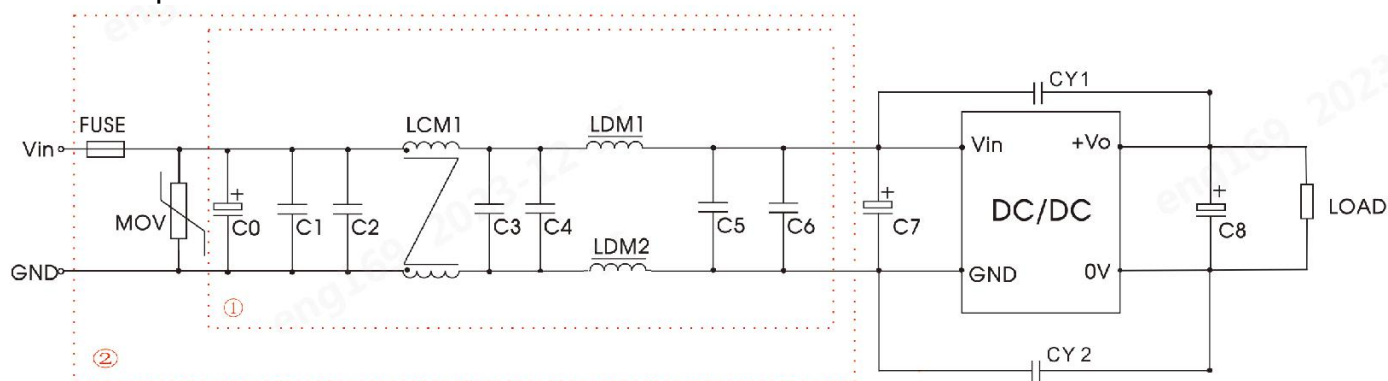
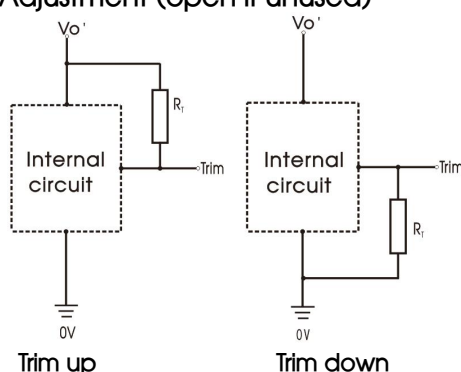


Fig. 3

Parameter :

Model	Vo:3.3V/5V/12V/24V/28V
FUSE	According to the customer's actual input current selection
MOV	14D101K
C0	680uF/100V
C1, C2, C3 C4, C5, C6	4.7uF/100V
C7	330μF/100V
C8	Refer to Fig.2 of Cout
LCM1	4.7mH (recommended our company model: FL2D-30-4722 )
LDM1, LDM1	4.7uH/6.5A
CY1, CY2	2.2nF/3KV

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



TRIM resistor connection (dashed line shows internal resistor network)  
Fig. 4

Trim Resistance calculation formula: :

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

### 4. Thermal testing pilot

The thermal element is installed on the top surface of the product and dissipated heat into the surrounding environment by conduction, convection and radiation, it need to adequate heat dissipation conditions to ensure reliable operation of the product. By measuring the temperature of the thermal test point ① in Fig.5, it can be verified whether the heat dissipation conditions are met.



Fig. 5

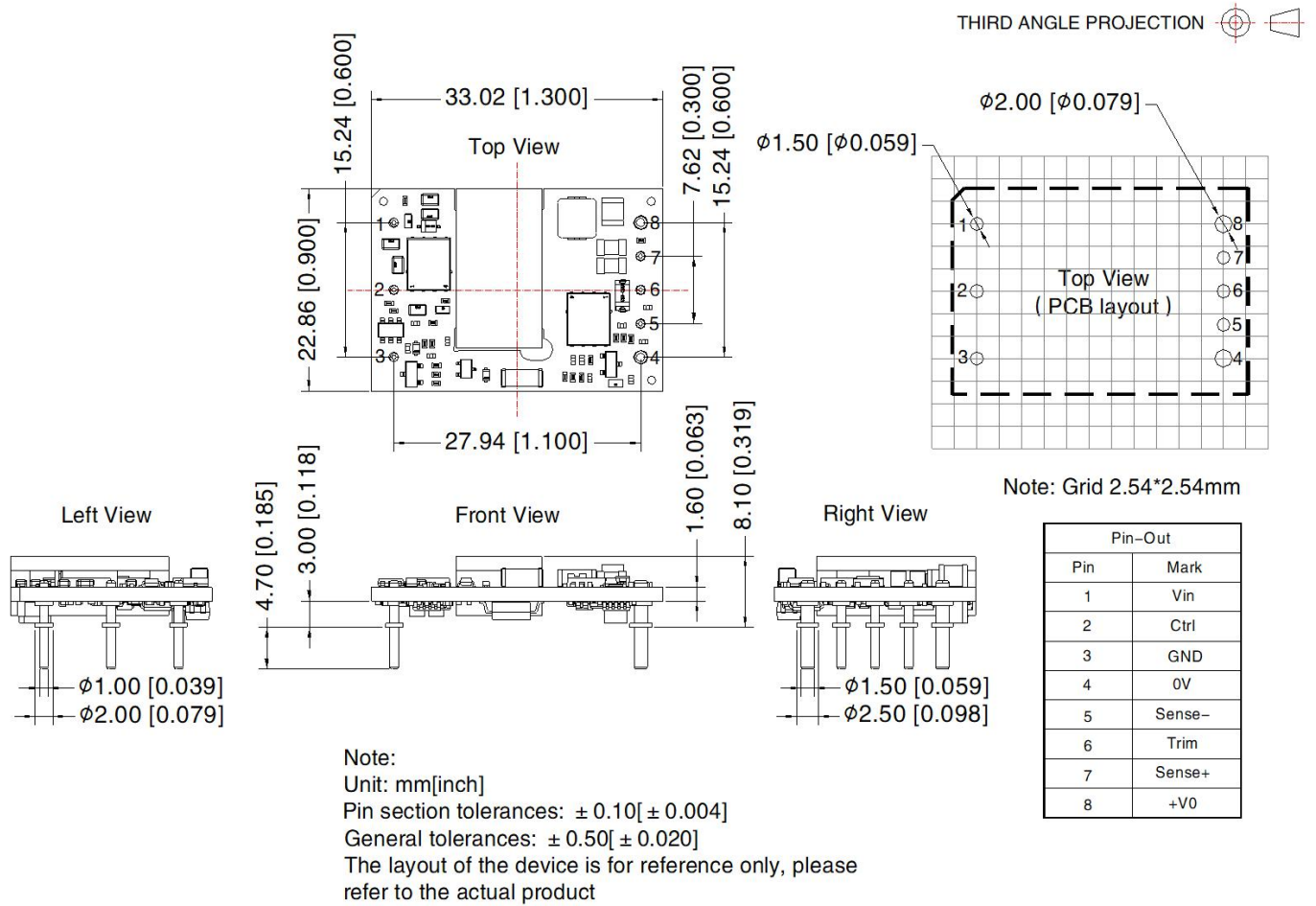
Note:

The temperature of thermal test point ① should generally not above 130°C, otherwise, the product will trigger protection due to excessive temperature and cannot work properly.

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

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

## 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 offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on company corporate standards;
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. 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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