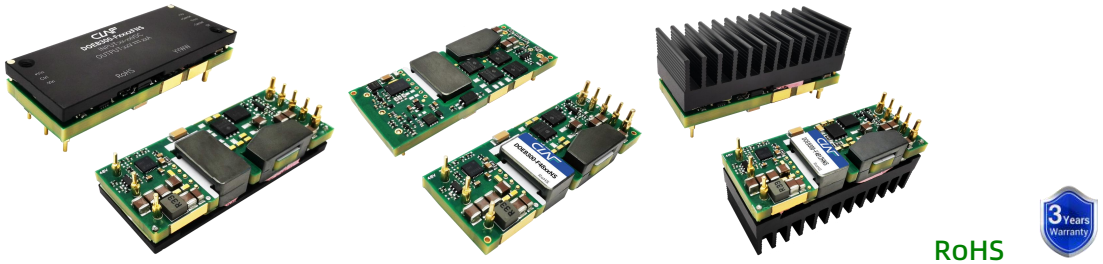
Descriptions

300W isolated，DC/DC Converter



RoHS

Features

- Wide input voltage range: 36-75 VDC
- High efficiency up to 93%
- I/O isolation test voltage 2250 VDC
- Operating ambient temperature range: -40℃ to +85℃
- Input under-voltage protection, output over-voltage, over-current, short circuit, over-temperature protection
- Industry standard package: 1/8 brick
- Meet EN62368 standards

Applications

- Battery power supply equipment
- Industrial control
- Electric power
- Instrumentation
- Communication
- Intelligent robot

Selection Guide

Certification	Part No.①	Input Voltage (VDC)		Output		Full Load Efficiency (%)Min./Typ.	Half Load Efficiency (%) Min./Typ.	Max. Capacitive Load(μF)	Min. Capacitive Load③(μF)
		Nominal (Range)	Max.②	Voltage (VDC)	Current (mA) Max./Min.				
--	DOEB300-F4812(F/H)NS	48 (36-75)	80	12	25000/0	91/93	91/93	10000	470
	DOEB300-F4815(F/H)NS			15	20000/0			7400	
	DOEB300-F4824(F/H)NS			24	12000/0			4300	
	DOEB300-F4828(F/H)NS			28	10700/0			3800	
	DOEB300-F4848(F/H)NS			48	62500/0	90/91.5	90/91.5	2200	

Notes:
① Suffix "F" means the product with aluminum base, "H" for the heat sink package;
② The input voltage should not exceed this value, otherwise permanent and unrecoverable damage may be caused;
③ In order to ensure the stability of output voltage, the output side of the product must be externally connected with a minimum capacitive load.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	Nominal input voltage	12/15/24/28V Output	--	6720	6868	mA
			48V Output	--	6830	6944	
	Reflected Ripple Current	Nominal input voltage		--	100	--	
	Surge Voltage (1sec. max.)			-0.7	--	100	VDC
	Start-up Voltage			--	--	36	
	Input Under-voltage Protection			31	--	36	
	Start-up Time	Nominal input voltage & constant resistance load		--	--	100	ms
	Input Filter			Pi filter			
	Hot Plug			Unavailable			
	Ctrl ①	Module turn-on		Ctrl pin pulled low to -Vin (0-1.2VDC)			
		Module turn-off		Ctrl pin open or pulled high (TTL 4.5-12VDC)			
		Ctrl Start-up Delay Time		--	30	50	ms
Output Specifications	Voltage Accuracy			--	--	±2	%
	Linear Regulation	Full load, input voltage from low voltage to high voltage		--	±0.2	±0.5	
	Load Regulation	5%-100% load		--	±0.5	±0.75	
	Transient Recovery Time	25% load step change, nominal input voltage, di/dt=2.5A/us		--	--	400	μs
	Transient Response Deviation			--	±2	±5	%
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise②	20MHZ, Nominal input voltage, 100% Io		--	100	250	mVp-p
	Trim			90	--	110	%Vo
	Sense			--	--	105	
	Over-temperature Protection	Product surface max. temperature		--	130	--	℃
	Over-voltage Protection	Input voltage range		110	125	130	%Vo
	Over-current Protection			110	140	170	%Io
	Short-circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	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
	Operating Temperature	See Fig. 1		-40	--	+85	℃
	Storage Temperature			-55	--	+125	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Pin Soldering Resistance Temperature	Wave soldering,10 seconds		--	--	260	℃
		Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
	Shock and Vibration Test			10-150Hz, 5G, 0.75mm. along X, Y and Z			

	Switching Frequency	PWM mode	--	330	--	kHz
	MTBF	MIL-HDBK-217F@25℃	--	2000	--	k hours
Mechanical Specifications	Shell Material	Aluminium alloy shell				
	Dimensions	DOEB300-F48xxNS	58.42 x 22.86 x10.7 mm			
		DOEB300-F48xxFNS	58.42 x 22.86 x 13.2 mm			
		DOEB300-F48xxHNS	58.42 x 22.86 x 25.9 mm			
	Weight	DOEB300-F48xxNS	30.5g(Typ.)			
		DOEB300-F48xxFNS	42g(Typ.)			
		DOEB300-F48xxHNS	61g(Typ.)			
	Cooling Method	Natural convection or forced air convection				

Note:

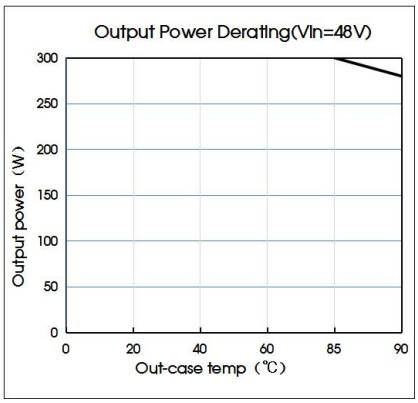
①The Ctrl pin voltage is referenced to input -Vin;

②The "parallel cable" method is used for Ripple and Noise test.

Electromagnetic Compatibility (EMC)

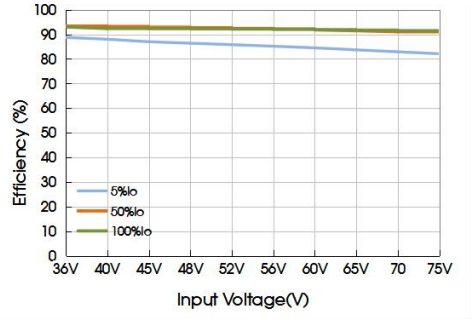
Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 6 for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig. 6 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m (see Fig. 6 for recommended circuit)	perf. Criteria B
	EFT	IEC/EN61000-4-4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

Characteristic Curve



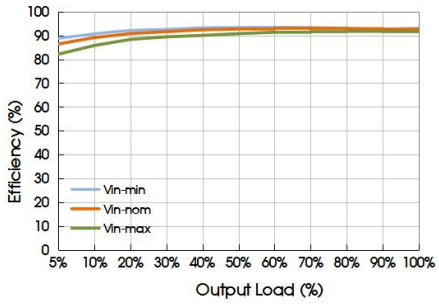
DOEB300-F4812(F/H)NS

Efficiency Vs Input Voltage



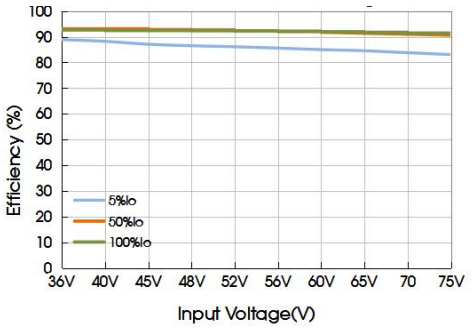
DOEB300-F4812(F/H)NS

Efficiency Vs Output Load



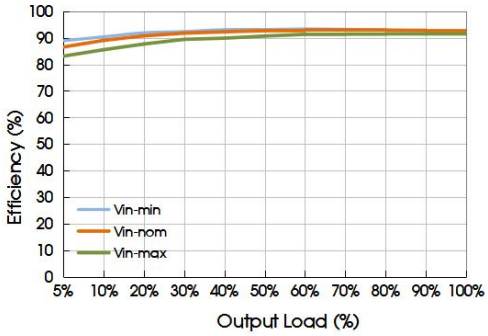
DOEB300-F4815(F/H)NS

Efficiency Vs Input Voltage



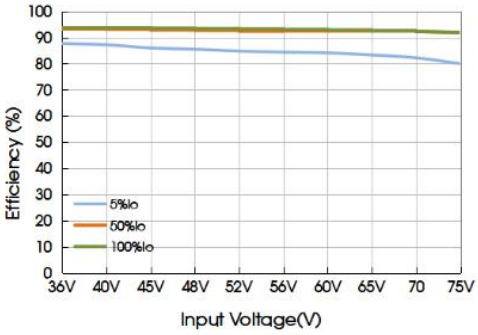
DOEB300-F4815(F/H)NS

Efficiency Vs Output Load



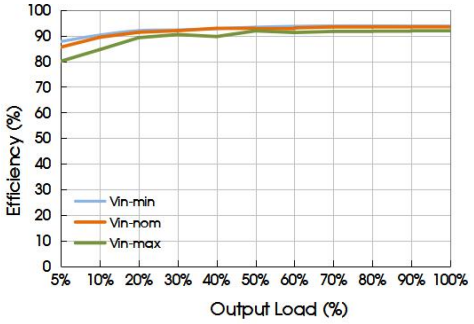
DOEB300-F4824(F/H)NS

Efficiency Vs Input Voltage



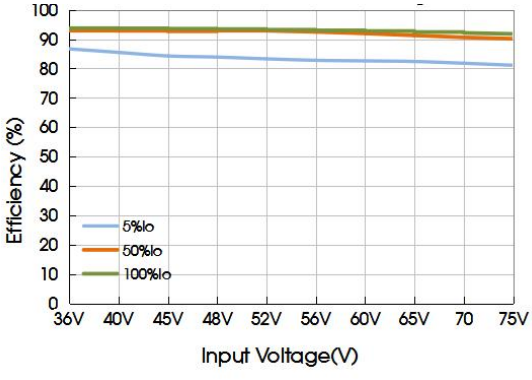
DOEB300-F4824(F/H)NS

Efficiency Vs Output Load



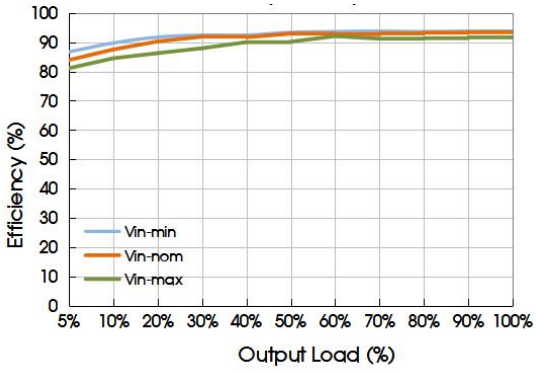
DOEB300-F4828(F/H)NS

Efficiency Vs Output Load



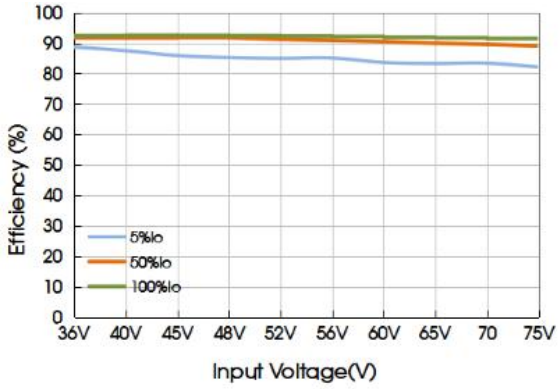
DOEB300-F4828(F/H)NS

Efficiency Vs Output Load



DOEB300-F4848(F/H)NS

Efficiency Vs Output Load



DOEB300-F4848(F/H)NS

Efficiency Vs Output Load

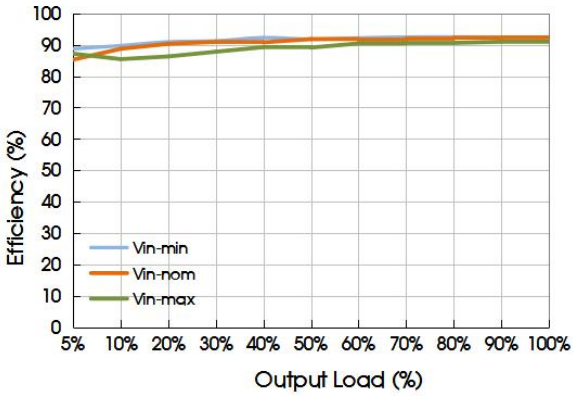


Fig. 1

Remote Sense Application

1. Remote Sense Connection if not used

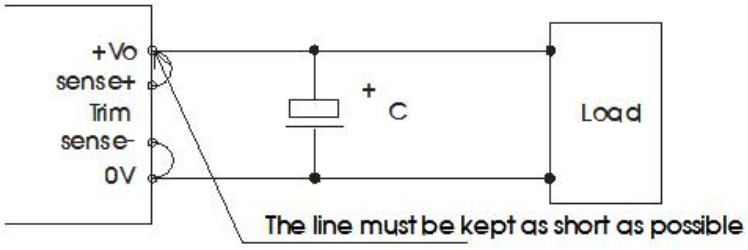


Fig. 2

Notes:

①If 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.

②The 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

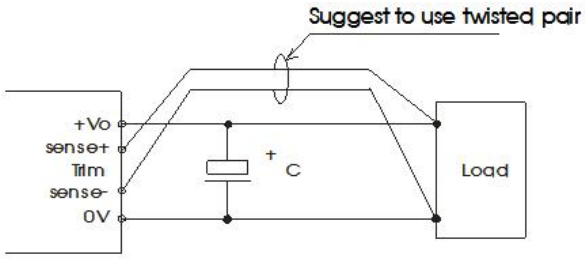


Fig. 3

Notes:

①Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.

②PCB-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.

④Note 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. 4.

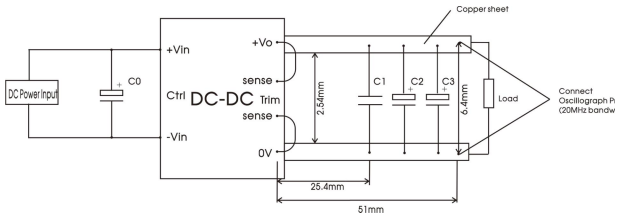


Fig. 4

Capacitors value / Output voltage	C0	C1	C2	C3
12V/15V//24V/ 28V/48VDC	100μF/ 100V	1μF/50V	10μF/50V	470μF/50V

2. Typical application

If the customer does not use the circuit recommended by our company, please be sure to parallel an electrolytic capacitor of at least 100uF (Cin) at the input end to suppress the possible surge voltage at the input end. At the output end, please be sure to parallel a solid-state capacitor greater than the minimum capacitive load capacity of 470uF (Cout) to stabilize the output working state of the product.

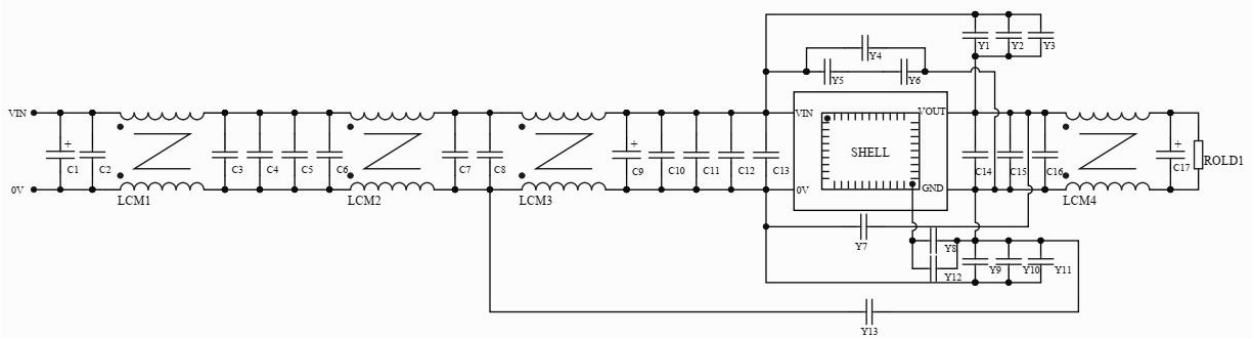


Fig. 5

Capacitors value / Output voltage	Cout(min.)	Cin
12V/15V//24V/ 28V/48VDC	470μF	100μF

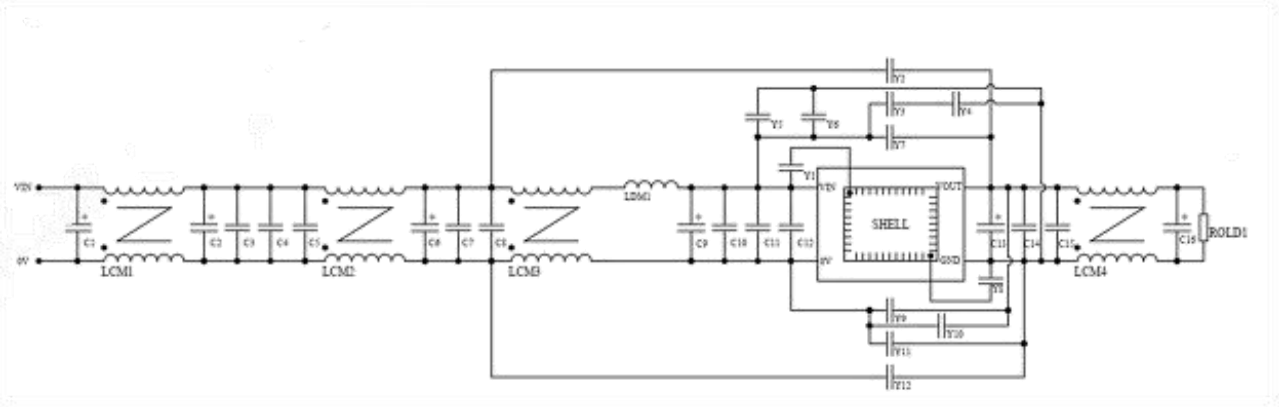
3. EMC compliance recommended circuit

DOEB300-F4812/15(F/H)NS



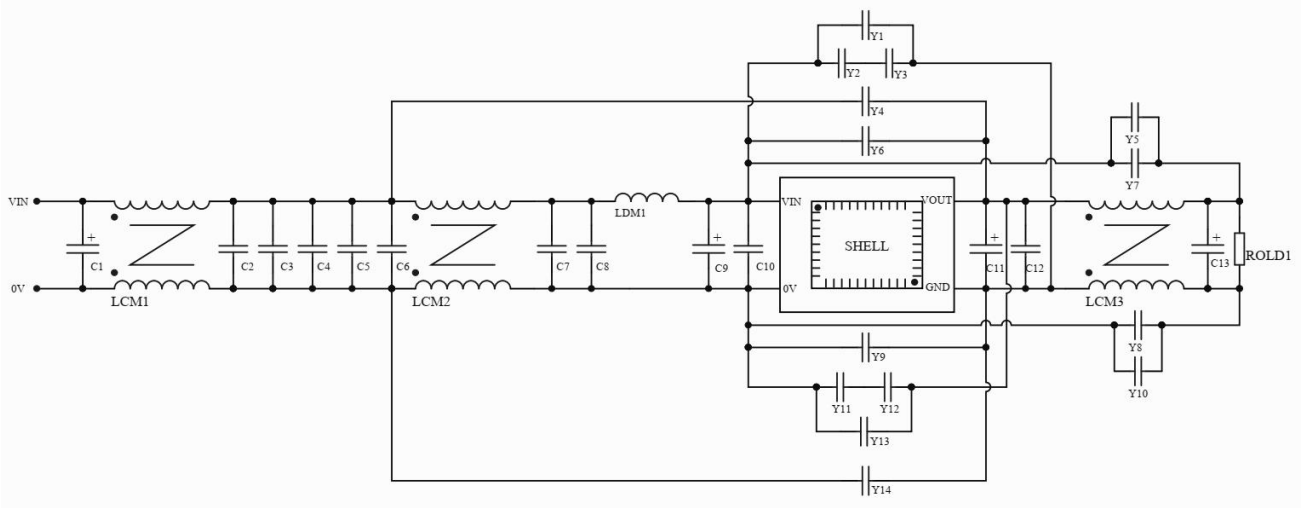
Device	Parameters
C1	100uF/200V
C2/C3/C7/C10	225K/250V
C4/C5/C11/C12/C13/C14/C15/C16	105K/100V
C6/C8	225K/450V,Film capacitor
C9	470uF/100V
C17	330uF/63V
Y1/Y4/Y8/Y11	100pF/400VAC
Y2/Y3/Y9/Y10	4.7nF/400VAC
Y5/Y6	1nF/400VAC
Y7	2.2nF/400VAC
Y12/Y13	220pF/400VAC
LCM1	90uH
LCM2	200uH
LCM3	10mH
LCM4	1mH

DOEB300-F4824/28(F/H)NS



Device	Parameters
C1	100uF/200V
C2/C9	1000uF/63V
C3/C10/C14	225k/250V
C4/C8/C11/C15	101/100V
C5/C12	225K/450V, Film capacitor
C6	82uF/63V
C7	225k/250V
C13/C16	330uF/63V
Y1/Y6/Y7/Y8/Y9/Y11	100pF/400VAC
Y2/Y12	2.2nF/400VAC
Y3/Y4	1nF/400VAC
Y5/Y10	3.3nF/400VAC
LDM1	0.47uH, Differential inductance
LCM1	90uH
LCM2	4.7mH
LCM3	200uH
LCM4	1.4mH

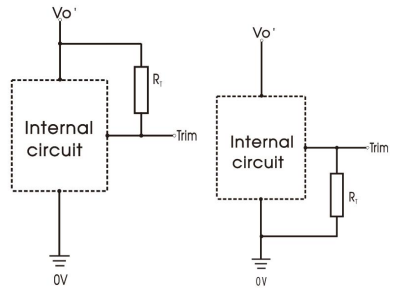
DOEB300-F4848(F/H)NS



Device	Parameters
C1/C9	1000uF/100V
C2/C6/C7	225K/100V
C3/C8/C4	103K/100V
C5	222k/100V
C10	101/100V
C11	330uF/63V
C12	225K/250V
C13	220uF/63V
Y1/Y4/Y5/Y8/Y13/Y14	1nF/400VAC
Y2/Y7	2.2nF/400VAC
Y3/Y6/Y9/Y10/Y12	100pF/400VAC
Y11	220pF/400VAC
LCM1	10mH
LCM2	1.0mH
LCM3	4.7mH
LDM1	0.15uH, Differential inductance

Fig. 6

4. Trim function for output voltage adjustment (open if unused)



Trim up Trim down

Fig. 7

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

5. Recommended solution for thermal testing

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 in Figure 8-1/Figure 8-2 (model with radiator, test at the same point). The temperature of point ABC in Figure 8-1 is belowe125 ℃ , which is the stable working range of DOEB300-F4812/15/24/28(F/H)NS; The temperature of point ABCD in Figure 8-2 is belowe125 ℃, which is the stable working range of DOEB300-F4848(F/H)NS.

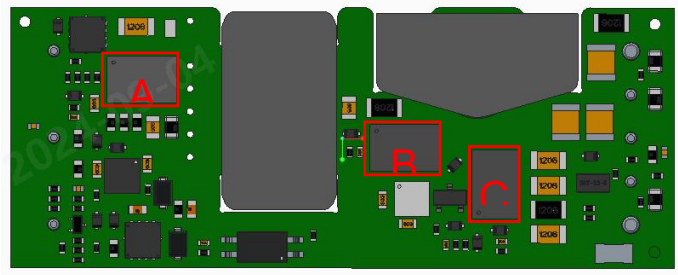


Fig. 8-1

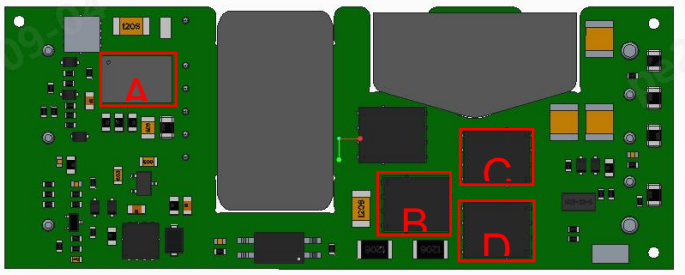


Fig. 8-2

6. Reflection ripple current test

The input reflected ripple current should be tested according to the peripheral circuit in Fig. 9

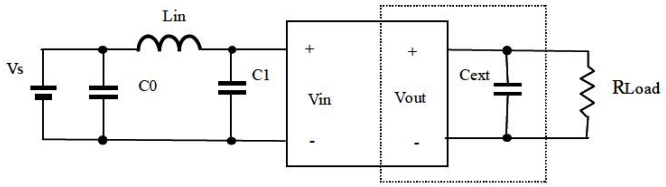


Fig. 9

Device	Parameter
C0	220μF/100V
Lin	10uH
C1/Cext	470μF/100V

7. Safety Specification

The input is considered as safety extra low voltage (ES1/SELV) if one of the following conditions is met.

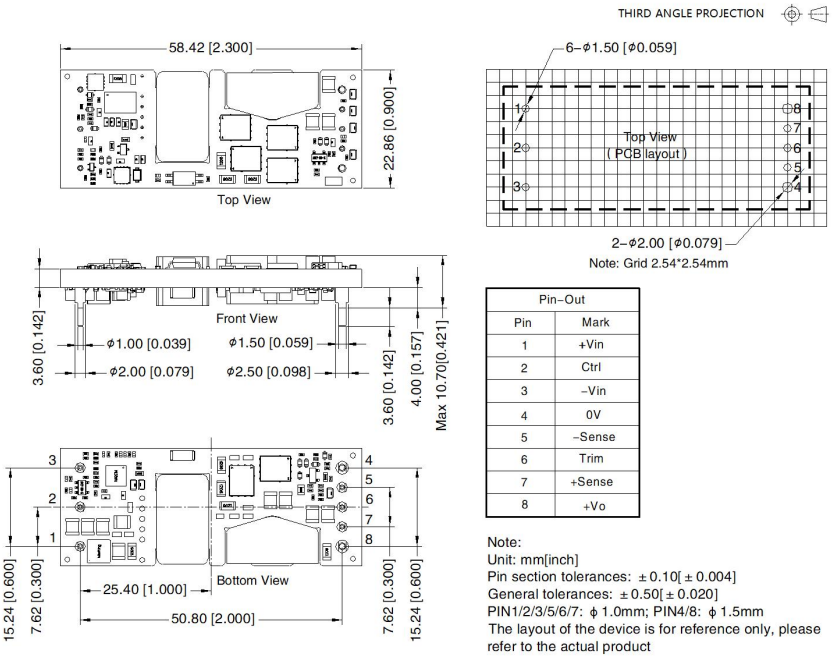
①The input source provides double or reinforced insulation from the AC mains according to IEC/EN/UL 62368-1;

②The input source provides basic or supplementary insulation from the AC mains and product's output is reliably connected to protective earth according to IEC/EN/UL 62368-1;

③The input source is reliably connected to protective earth and provides basic or supplementary insulation according to IEC/EN/UL 62368-1 and the maximum input source voltage is 60Vdc.

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

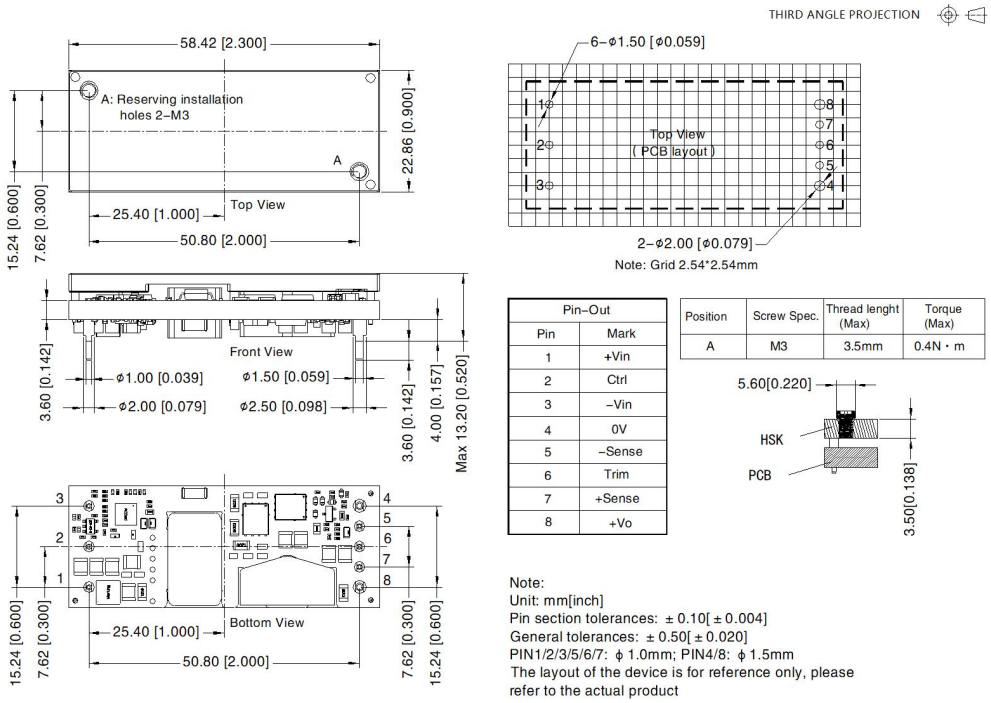
Dimensions and Recommended Layout



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: ϕ1.0mm; PIN4/8: ϕ1.5mm
The layout of the device is for reference only, please refer to the actual product

F Dimension

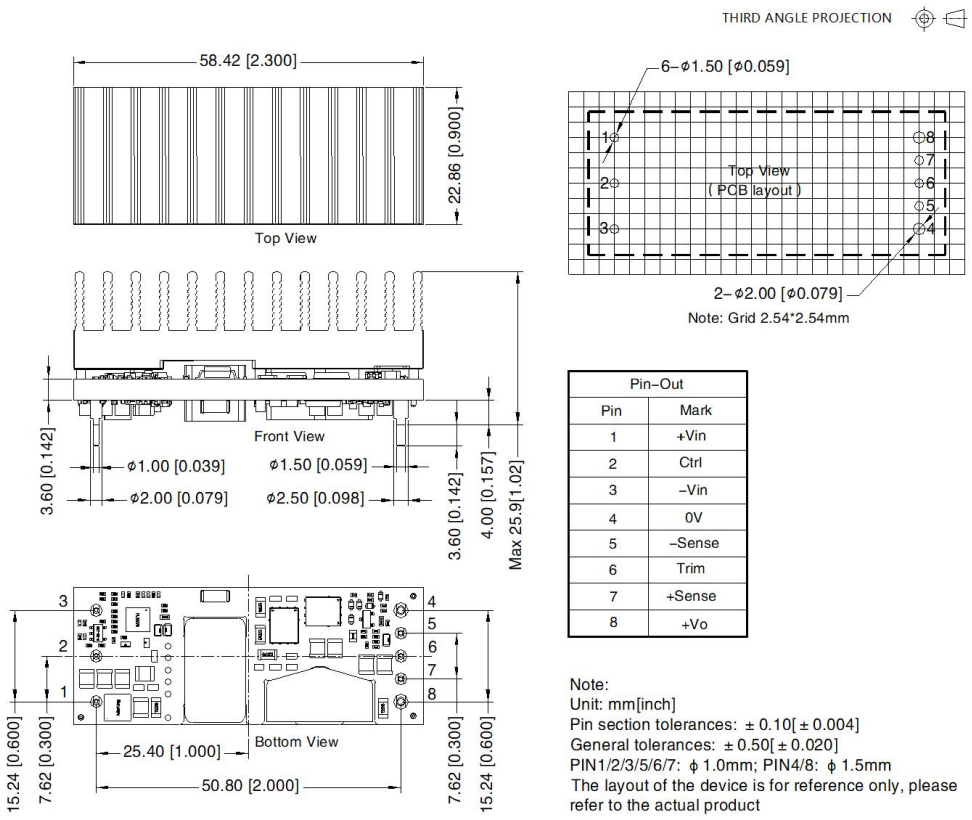


Pin-Out	
Pin	Mark
1	+Vin
2	Ctrl
3	-Vin
4	0V
5	-Sense
6	Trim
7	+Sense
8	+Vo

Position	Screw Spec.	Thread lenght (Max)	Torque (Max)
A	M3	3.5mm	0.4N · m

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

H Dimension



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

Notes:

1. We suggest to use module at load of over 10%, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
2. If the product works below the minimum required load, it is not guaranteed that the product performance meets all performance indicators in this manual
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.