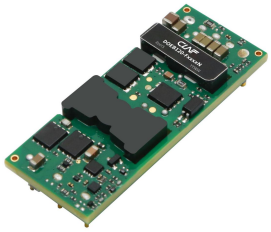
Descriptions

120W isolated，DC/DC Converter





RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Wide input voltage range: 36-75 VDC
- High efficiency up to 93.5%
- I/O isolation test voltage 2250 VDC
- Operating ambient temperature range: -40℃ to +100℃
- Input under-voltage protection, output short circuit, over-current, over-voltage protection, over-temperature protection
- Industry standard package: 1/8 brick
- Meet EN62368 standards

Applications

- Industrial control
- Electric power
- Instruments
- Communications

Selection Guide

Certification	Part No.①	Ctrl Logic②	Input Voltage (VDC)		Output		Full Load Efficiency④(%) Min./Typ.	Max. Capacitive Load(μF)
			Nominal (Range)	Max.③	Voltage (VDC)	Current (A) Max./Min.		
EN/BS EN	DOEB120-F4805(F)N	N	48 (36-75)	75	05	24.0/0	90.5/92.5	9600
	DOEB120-F4812(F)N				12	10.0/0	91.5/93.5	4000
	DOEB120-F4824(F)N				24	5.0/0	90.5/92.5	2000
	DOEB120-F4828(F)N				28	4.2/0	89.5/91.5	1800
	DOEB120-F4848(F)N				48	2.5/0	90/92	820

Notes:
①Use "F" suffix for heat sink mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
② "N" means negative logic;
③Exceeding the maximum input voltage may cause permanent damage;
④Efficiency is measured at nominal input voltage and rated output load;
⑤Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	Nominal input voltage	05V/24V	--	2703/20	2762/30	mA
			12V	--	2673/20	2732/30	
			28V	--	2677/30	2737/50	
			48V	--	2717/20	2778/30	
	Reflected Ripple Current	Nominal input voltage		--	30	--	
	Surge Voltage	Continuous		0	--	80	VDC
		Transient(100ms max.)		-0.7	--	100	
	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			
	Input Reverse Polarity Protection			Unavailable			
	Ctrl①	Module turn-on		Ctrl pin pulled low to GND (0-1.2VDC)			
		Module turn-off		Ctrl pin open or pulled high (TTL 3.5-12VDC)			
		Input current when switched off		--	3	10	mA
	Ctrl Start-up Delay Time			--	30	50	ms
Output Specifications	Voltage Accuracy	0%-100% load		--	±1	±3	%
	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, nominal input voltage, di/dt=2.5A/μs	28/48V	--	200	400	μs
			other	--	200	500	
	Transient Response Deviation	25% load step change, di/dt=2.5A/μs	05V	--	±6	±10	%
			other	--	±3	±5	
	Temperature Coefficient	Full load		--	--	±0.03	%/℃
	Ripple & Noise②	20MHz bandwidth, nominal input voltage, 5%-100% load	05V, 12V	--	120	150	mVp-p
			24V	--	125	--	
			28V	--	250	--	
			48V	--	150	250	
	Trim			90	--	110	%
	Sense			--	--	105	
	Over-temperature Protection③	Product surface max. temperature		--	135	--	℃
	Over-voltage Protection	Input voltage range		110	125	160	%Vo
	Over-current Protection			110	140	190	%Io
	Short-circuit Protection			Continuous, self-recovery, time≤3 seconds			

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
	Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	1000	--	pF
	Insulation type	Input-output	Basic insulation			
	Operating Temperature	See Fig. 1	-40	--	+100	℃
	Storage Temperature		-55	--	+125	
	Storage Humidity	Non-condensing	5	--	95	%RH
	Pin Soldering Resistance Temperature④	Soldering spot is 1.5mm away from the case, 10 seconds max.	--	--	+300	℃
		Wave soldering, maximum 10 seconds	255	260	265	
	Shock and Vibration Test		10-55Hz, 10G, 30Min. along X, Y and Z			
	Switching Frequency⑤	PWM mode	--	300	--	kHz
	Altitude		Altitude: ≤4000m, Atmospheric pressure: 60～110KPa			
	MTBF	Telcordia SR-332@25℃	2000	--	--	k hours
Mechanical Specifications	Dimensions	DOEB120-F4805/12/24/28N	58.42 x 22.86 x 9.69 mm			
		DOEB120-F4848N	58.42 x 22.86 x 9.86mm			
		DOEB120-F48xxFN	58.42 x 22.86 x 12.7mm			
	Weight	DOEB120-F48xxN	27.0g（Typ.）			
		DOEB120-F48xxFN	35.9g（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. Ripple & Noise at <5% load is 5%Vo max;

③The temperature of over-temperature protection of products with heat sink is subject to the internal device temperature;

④The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection;

⑤Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

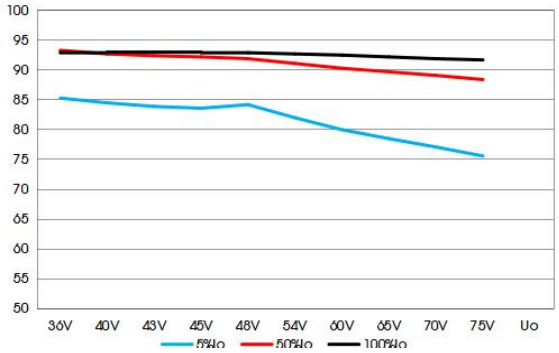
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (see Fig. 6-1 for recommended circuit) /CLASS B (see Fig. 6-2 for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (see Fig. 6-1 for recommended circuit) /CLASS B (see Fig. 6-2 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m (see Fig. 6-1 and Fig. 6-2 for recommended circuit)	perf. Criteria A
	EFT	IEC/EN61000-4-4	100KHz,±2KV (see Fig. 6-1 and Fig. 6-2 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV (see Fig. 6-1 and Fig. 6-2 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s (see Fig. 6-1 and Fig. 6-2 for recommended circuit)	perf. Criteria A

Characteristic Curve

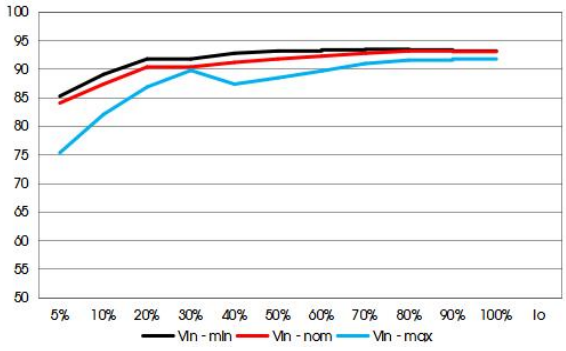
DOEB120-F4805(F)N

Efficiency Vs Input Voltage



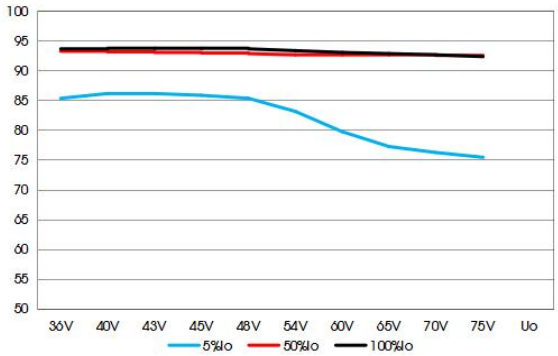
DOEB120-F4805(F)N

Efficiency Vs Output Load



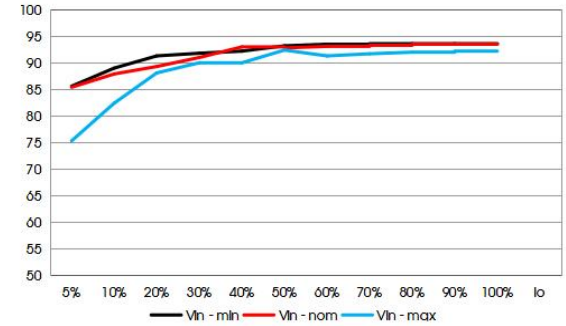
DOEB120-F4812(F)N

Efficiency Vs Input Voltage



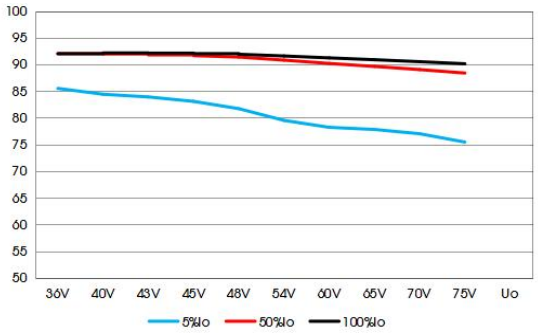
DOEB120-F4812(F)N

Efficiency Vs Output Load



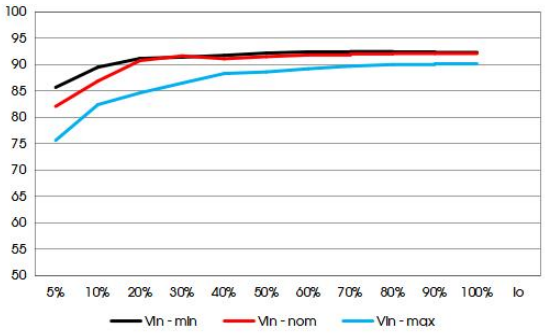
DOEB120-F4824(F)N

Efficiency Vs Input Voltage



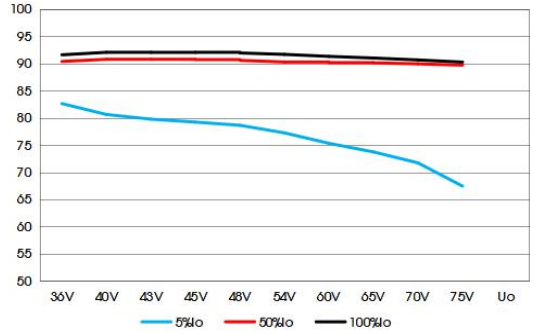
DOEB120-F4824(F)N

Efficiency Vs Output Load



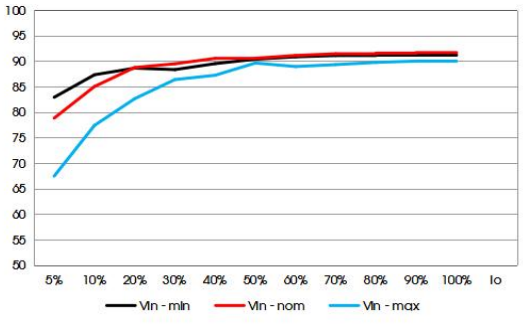
DOEB120-F4828(F)N

Efficiency Vs Input Voltage



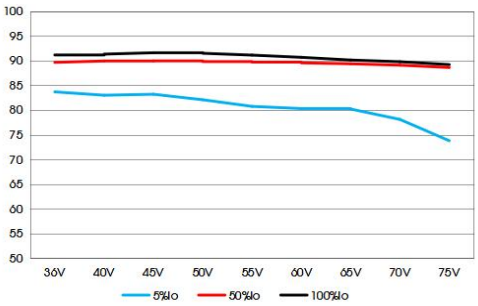
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Efficiency Vs Input Voltage



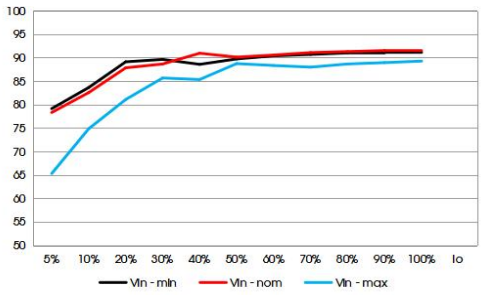
DOEB120-F4848(F)N

Efficiency Vs Input Voltage



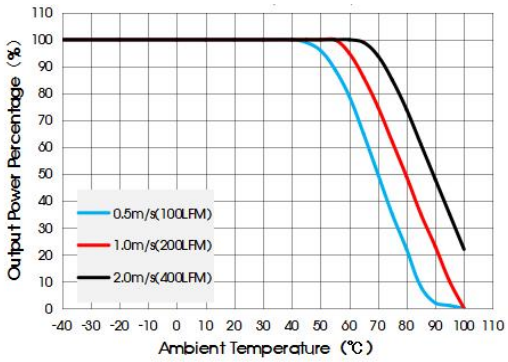
DOEB120-F4848(F)N

Efficiency Vs Input Voltage



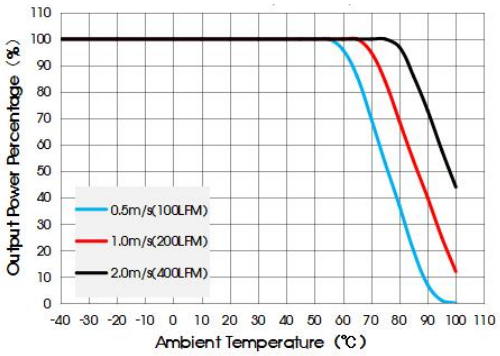
DOEB120-F4805N

Temperature Derating Curves(Vin=48V)



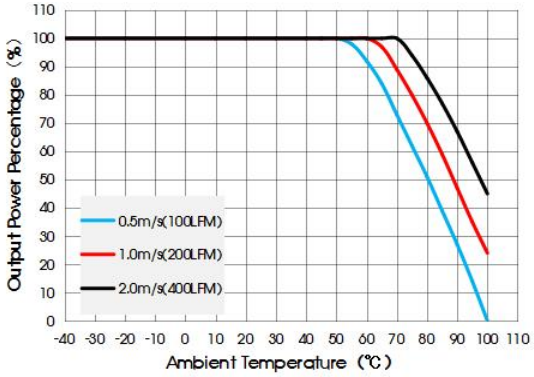
DOEB120-F4805FN

Temperature Derating Curves(Vin=48V)



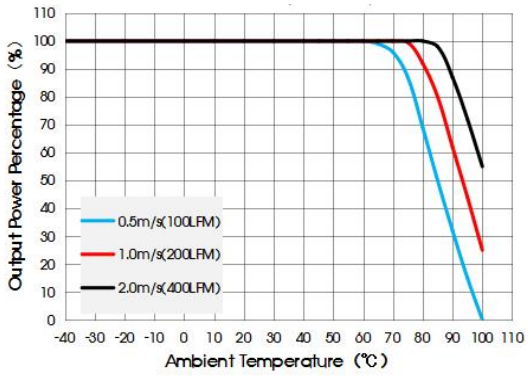
DOEB120-F4812N

Temperature Derating Curves(Vin=48V)



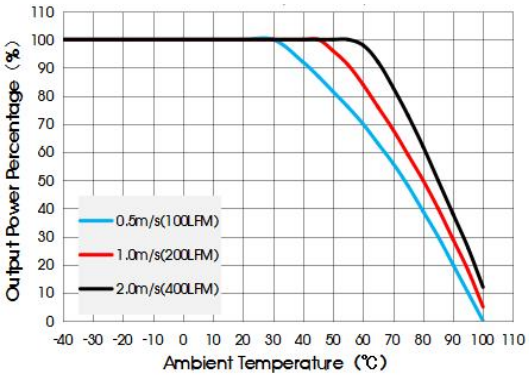
DOEB120-F4812FN

Temperature Derating Curves(Vin=48V)



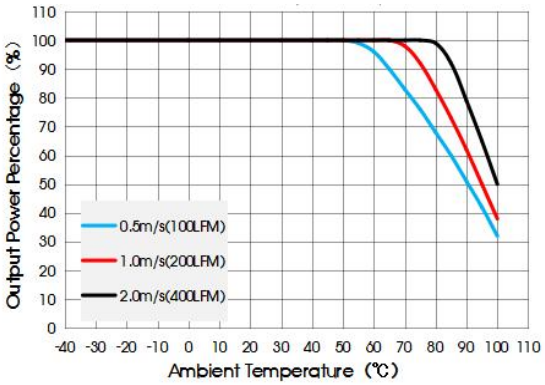
DOEB120-F4824N

Temperature Derating Curves(Vin=48V)



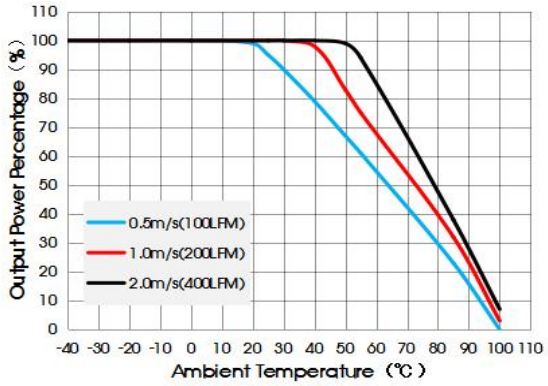
DOEB120-F4824FN

Temperature Derating Curves(Vin=48V)



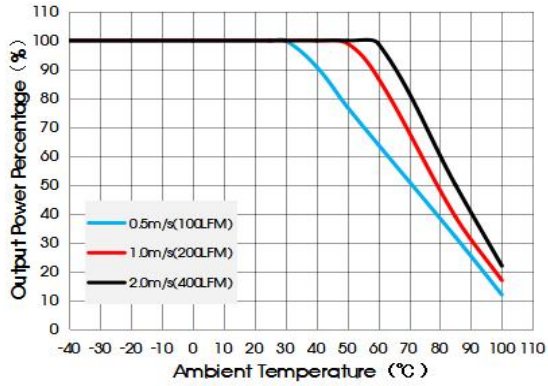
DOEB120-F4828N

Temperature Derating Curves(Vin=48V)



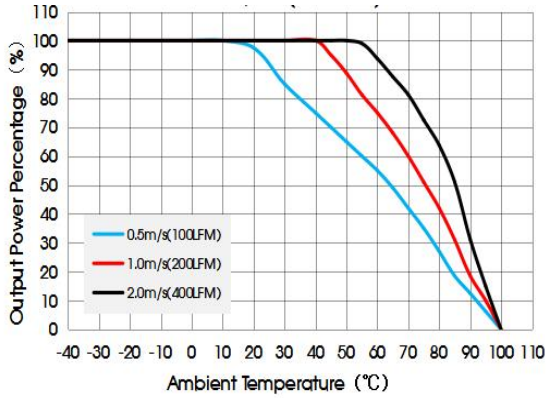
DOEB120-F4828FN

Temperature Derating Curves(Vin=48V)



DOEB120-F4848N

Temperature Derating Curves(Vin=48V)



DOEB120-F4848FN

Temperature Derating Curves(Vin=48V)

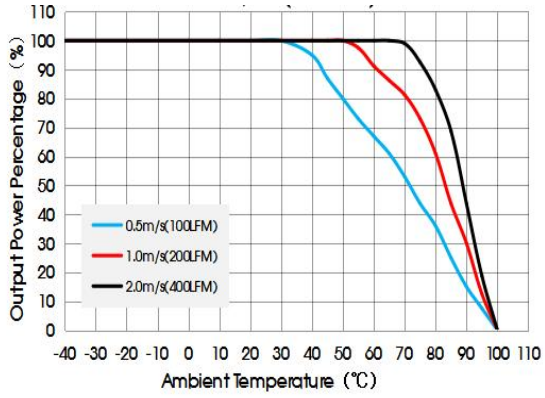


Fig. 1

Remote Sense Application

1. Remote Sense Connection if not used:

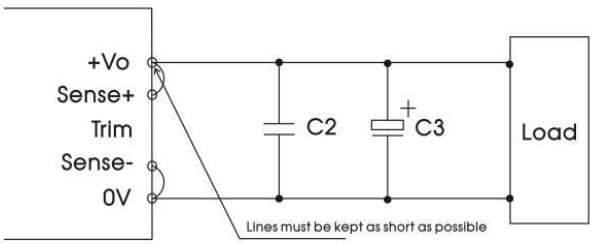


Fig. 2

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:

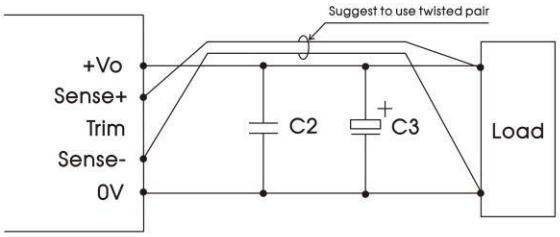


Fig. 3

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. Ripple & Noise

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 4.

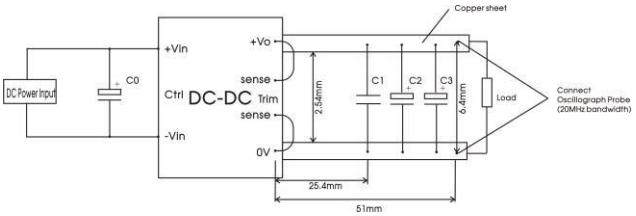


Fig. 4

Capacitors Value / Output Voltage	C0	C1	C2	C3
05/12VDC	100μF/100V	1μF/50V	10μF/50V	330μF/63V
24/28VDC				470μF/100V
48VDC				330μF/100V

2. Typical application

①All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 5.

②We recommended using 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.

③Input 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.

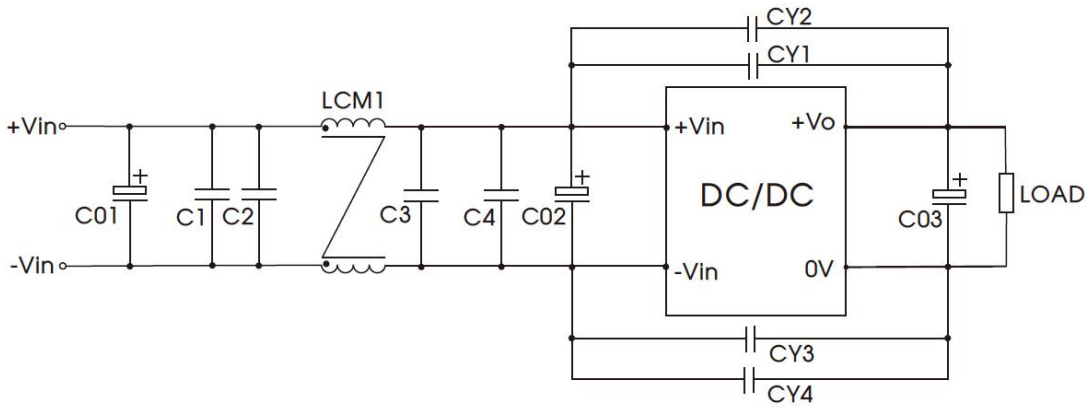


Fig. 5

Vout (VDC)	Cin	Cout
05/12	100uF/100V	330μF/63V
24/28		470μF/100V
48		330μF/100V

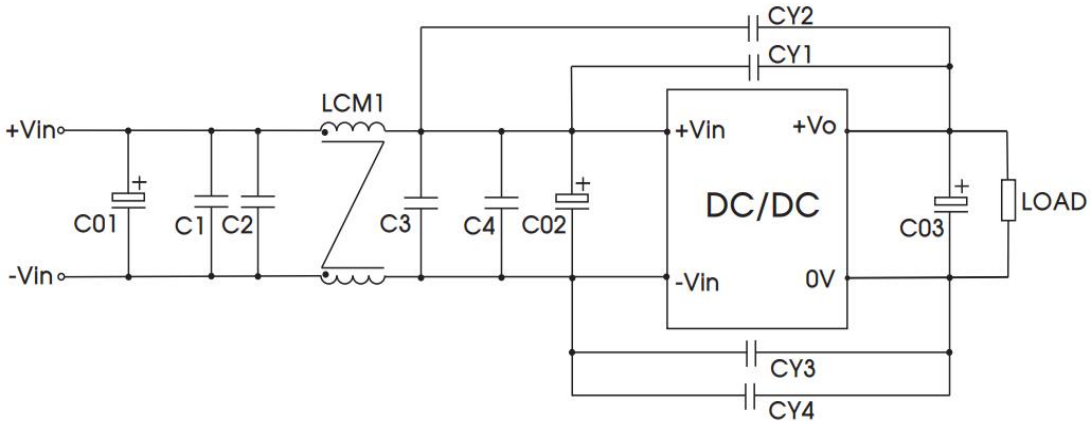
3. EMC compliance recommended circuit

DOEB120-F4805/12(F)N



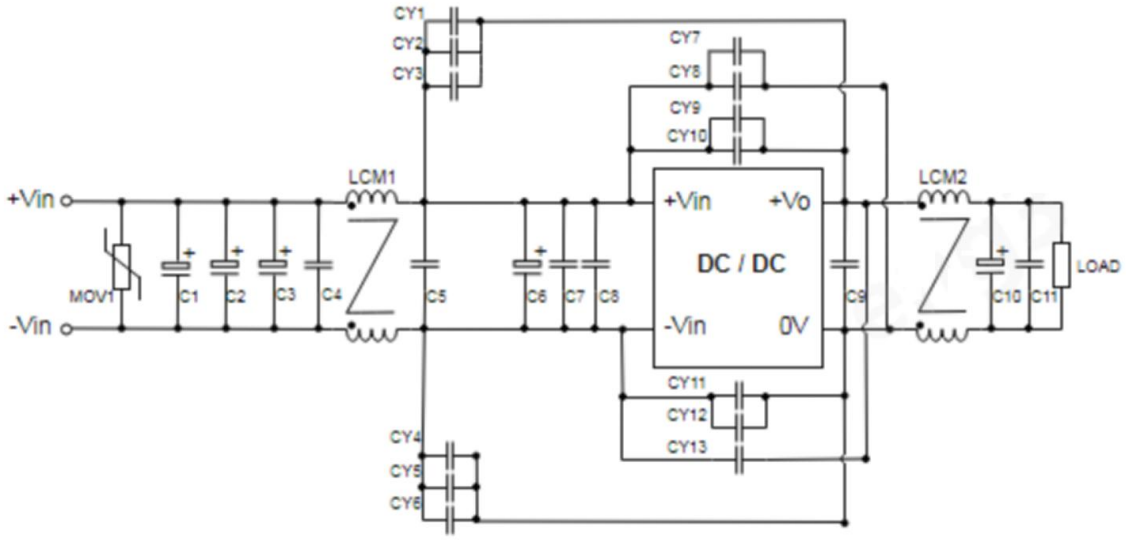
C01	470uF/100V (electrolytic capacitor)
C02	100uF/100V (electrolytic capacitor)
C03	330uF/63V (electrolytic capacitor)
C1, C2, C3, C4	4.7uF/100V
CY1, CY2, CY3, CY4	2.2nF/2KV
LCM1	2.0mH

DOEB120-F4824(F)N



C01	470uF/100V (electrolytic capacitor)
C02	100uF/100V (electrolytic capacitor)
C03	330uF/63V (electrolytic capacitor)
C1, C2, C3, C4	4.7uF/100V
CY1, CY2, CY3, CY4	2.2nF/2KV
LCM1	2.0mH

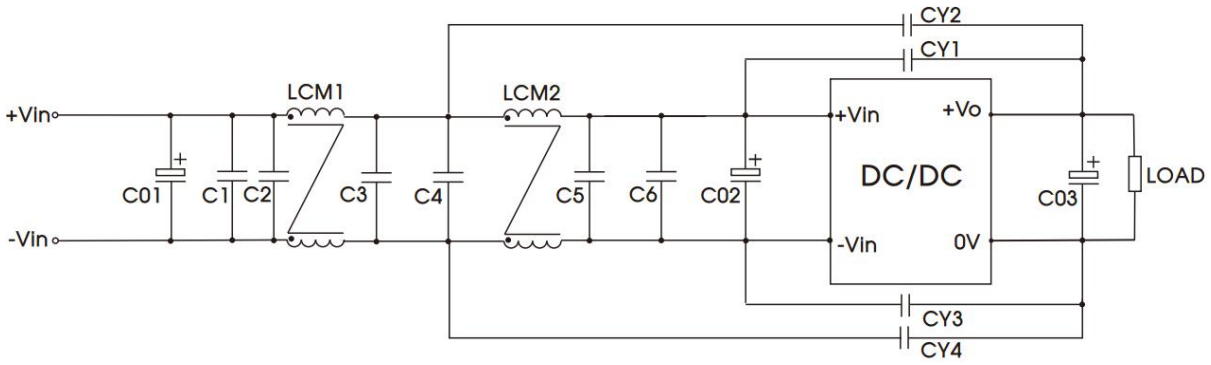
DOEB120-F4828/48(F)N



MOV1	20101 Voltage sensitive resistor
C1/C6	470uF/100V(electrolytic capacitor)
C2/C3/C10	150uF/100V(electrolytic capacitor)
C4/C5/C7/C8/C9/C11	4.7uF/100V*4 Ceramic capacitor
CY3/CY6/CY8/CY10/CY12	1nF/400VAC Safety Y capacitance
CY2/CY5/CY9/CY11/CY13	2.2nF/400VAC Safety Y capacitance
CY1/CY4	4.7nF/400VAC*2 Safety Y capacitance
CY7	4.7nF/400VAC Safety Y capacitance
LCM1	7.0mH
LCM2	200uH

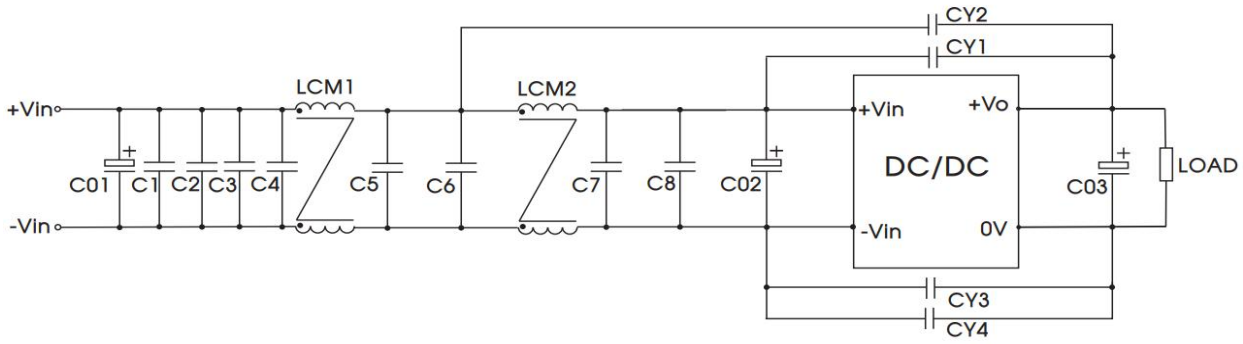
Fig. 6-1

DOEB120-F4805/12(F)N



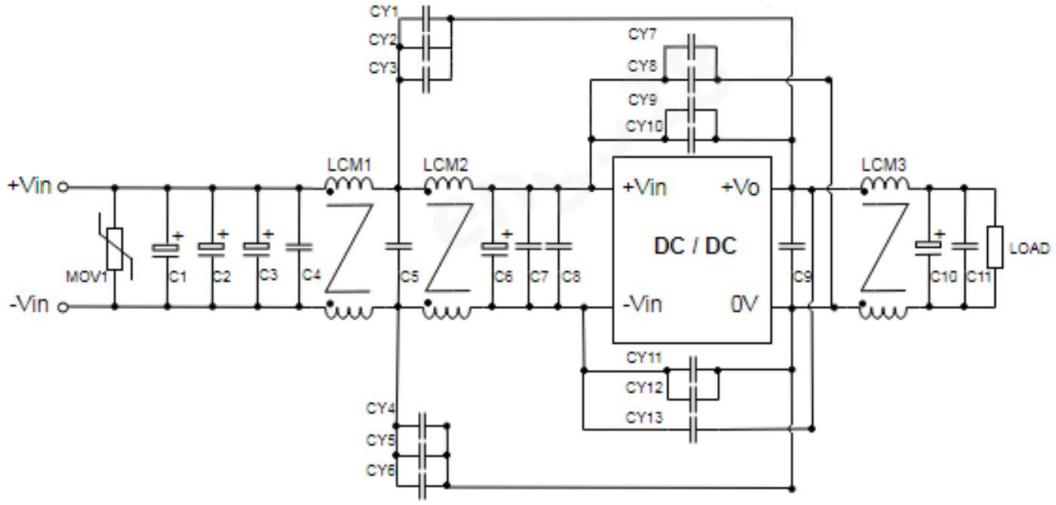
C01	470uF/100V (electrolytic capacitor)
C02	100uF/100V (electrolytic capacitor)
C03	330uF/63V (electrolytic capacitor)
C1、C2、C3、C4、C5、C6	4.7uF/100V
CY1、CY2、CY3、CY4	4.7nF/1.5KV
LCM1、LCM2	2.0mH

DOEB120-F4824(F)N



C01	470uF/100V (electrolytic capacitor)
C02	100uF/100V (electrolytic capacitor)
C03	330uF/63V (electrolytic capacitor)
C1、C2、C3、C4、C5、C6、C7、C8	4.7uF/100V
CY1、CY2、CY3、CY4	4.7nF/1.5KV
LCM1、LCM2	2.0mH

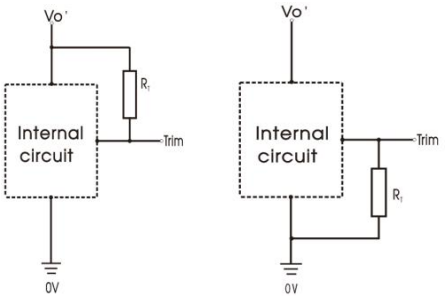
DOEB120-F4828/48(F)N



MOV1	20101 Voltage sensitive resistor
C1/C6	470uF/100V(electrolytic capacitor)
C2/C3/C10	150uF/100V(electrolytic capacitor)
C4/C5/C7/C8/C9/C11	4.7uF/100V*4 Ceramic capacitor
CY3/CY6/CY8/CY10/CY12	1nF/400VAC Safety Y capacitance
CY2/CY5/CY9/CY11/CY13	2.2nF/400VAC Safety Y capacitance
CY1/CY4	4.7nF/400VAC*2 Safety Y capacitance
CY7	4.7nF/400VAC Safety Y capacitance
LCM1	7.0mH
LCM2	12mH
LCM3	200uH

Fig. 6-2

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

When the output voltage is 12V, the up-regulated voltage is +10%, that is, the output voltage set to 13.2V:

$$\Delta\% = \left| \frac{12-13.2}{12} \right| * 100 = 10 \qquad R_T = \frac{5.11*12*(100+10)}{1.225*10} - \frac{511}{10} - 10.22 = 489K\Omega$$

When the output voltage is 12V, the down-regulated voltage is -10%, that is, the output voltage set to 10.8V:

$$\Delta\% = \left| \frac{12-10.8}{12} \right| * 100 = 10 \qquad R_T = \frac{511}{10} - 10.22 = 40.88K\Omega$$

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

6. Recommended solution for thermal testing

During the application process, the thermal design of the product can be evaluated in combination with the temperature derating curve of the product, or it can be determined by testing the temperature at the hot test point in Fig. 7 (Product with heat sink, test at the same point). It is an safe operating area for DOEB120-F4805/12(F)N if the temperature lower than 125℃ at point A. It is an safe operating area for DOEB120-F4824/28(F)N if the temperature lower than 130℃ at point B. It is an safe operating area for DOEB120-F4848(F)N if the temperature lower than 135℃ at point C.

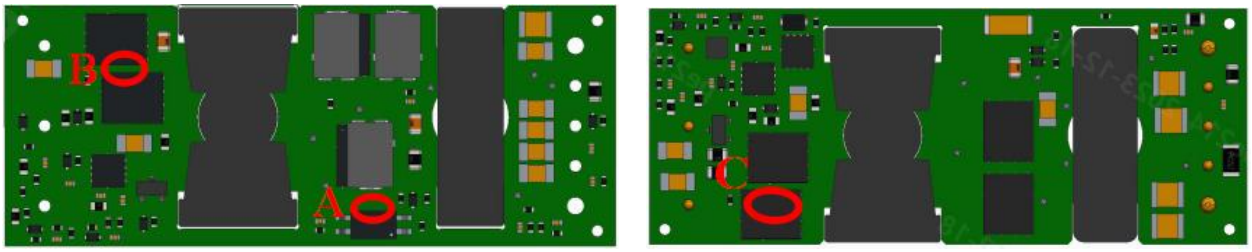
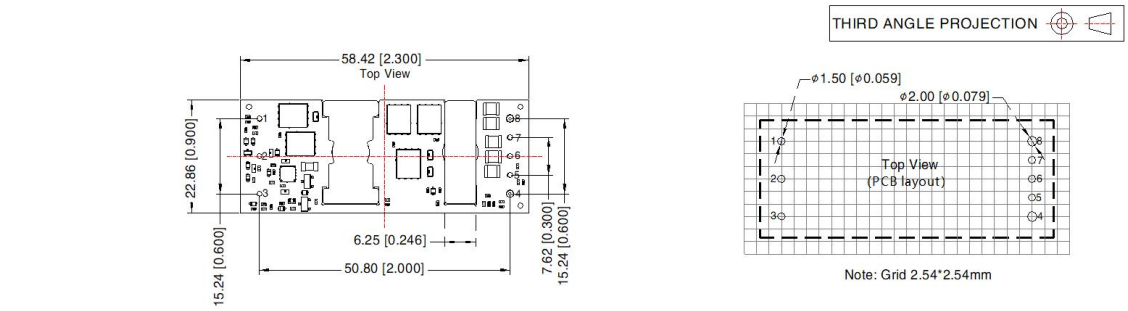


Fig. 7

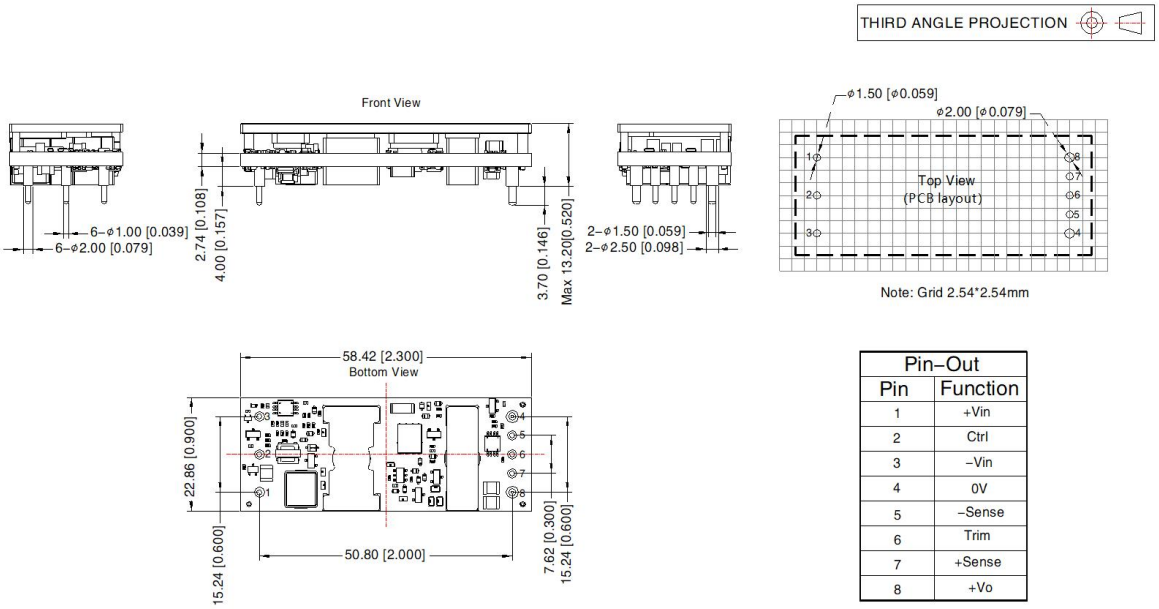
DOEB120-F4805/12/24/28N Dimensions and Recommended Layout



Pin-Out	
Pin	Function
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

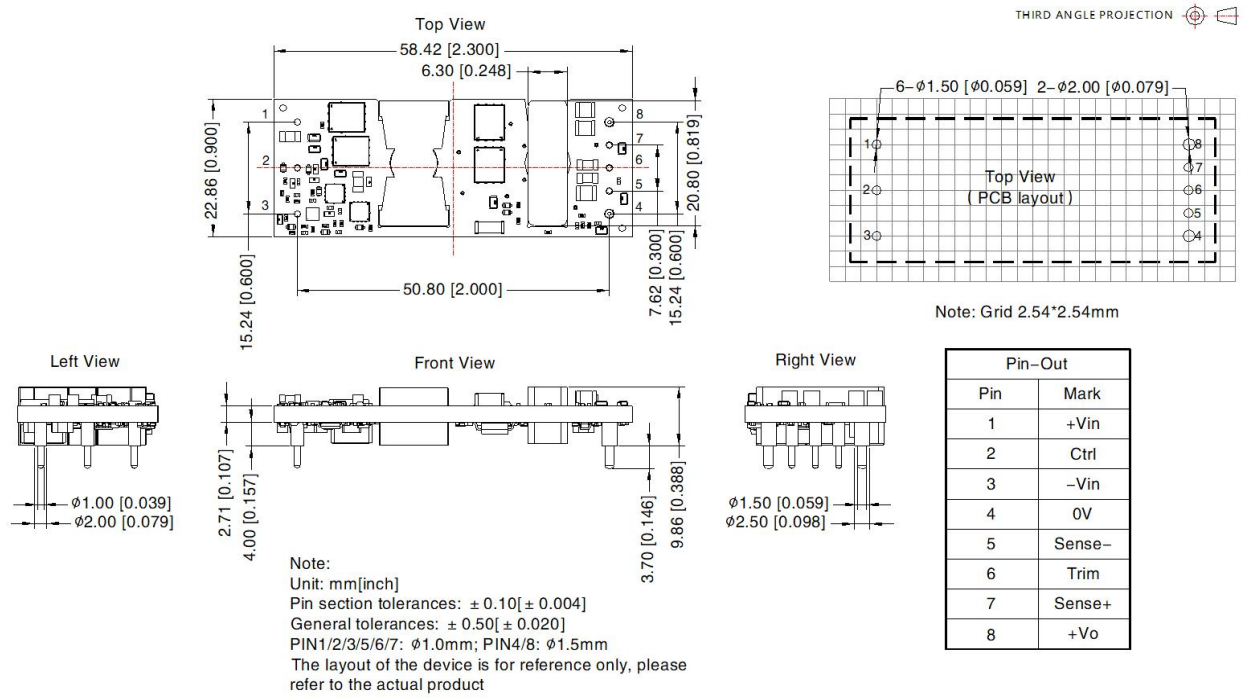
DOEB120-F4805/12/24/28FN Dimensions and Recommended Layout



Pin-Out	
Pin	Function
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

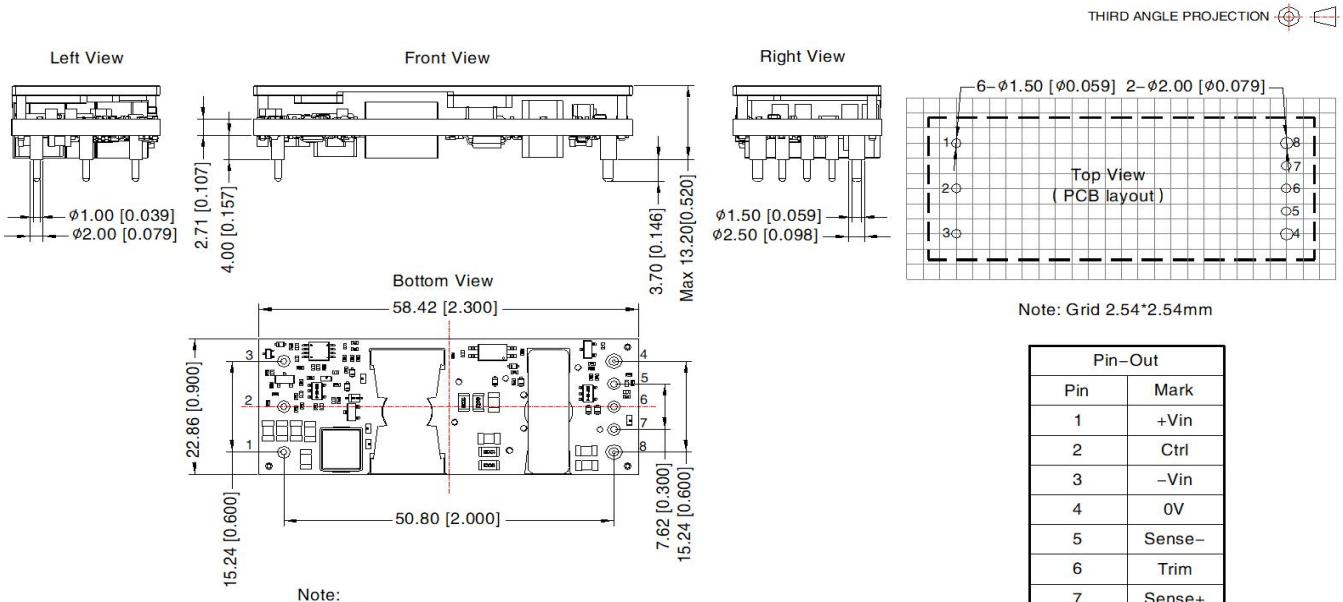
DOEB120-F4848N Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
PIN1/2/3/5/6/7: ø1.0mm; PIN4/8: ø1.5mm
The layout of the device is for reference only, please refer to the actual product

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

DOEB120-F4848FN Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]
PIN1/2/3/5/6/7: ø1.0mm; PIN4/8: ø1.5mm
The layout of the device is for reference only, please refer to the actual product

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

Notes:

1. We suggest to use module at load of over 5%, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
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 Ta=25℃, 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;
8. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.