

**Descriptions** 30W isolated, DC-DC Converter

**VDB30-W Series**

**Features**

- Ultra-Wide 4:1 input voltage range
- High efficiency up to 90%
- No-load power consumption as low as 0.096W
- I/O isolation test voltage 1.5K VDC
  - Input under-voltage protection, output short circuit, over-current, over-voltage, over-temperature protection
- Operating ambient temperature range: -40°C to +105°C
- Industry standard pin-out

**Applications**

- Industrial Control
- Electric Power
- Instrumentation
- Communication

**Selection Guide**

Part No.	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.		
VDB30-24S05W	24 (9-36)	40	5	6000/0	86/88	10000
VDB30-24S12W			12	2500/0	88/90	1500
VDB30-24S15W			15	2000/0	88/90	1000
VDB30-24S24W			24	1250/0	88/90	750
VDB30-24S28W			28	1071/0	88/90	750
VDB30-48S05W	48 (18-75)	80	5	6000/0	86/88	7200
VDB30-48S12W			12	2500/0	86/88	2000
VDB30-48S15W			15	2000/0	86/88	1500
VDB30-48S24W			24	1250/0	86/88	470
VDB30-48D12W			±12	±1250/0	86/88	2000
VDB30-48D15W			±15	±1000/0	86/88	1500
VDB30-48D24W			±24	±625/0	86/88	470

Note :

- ①Exceeding the maximum input voltage may cause permanent damage;
- ②Efficiency is measured in nominal input voltage and rated output load.

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**Specifications**

Product Specifications	Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Specifications	Input Current (full load / no-load)	Nominal input voltage	48Vin, Single output	--	710/8	735/15	mA
			24Vin, Single output	--	1420/4	1453/12	
			48Vin, Dual output	--	711/4	727/12	
	Reflected Ripple Current		48Vin, Single output	--	40	--	VDC
			24Vin, Single output	--	100	--	
			48Vin, Dual output	--	80	--	
	Surge Voltage (1sec. max.)		48Vin	-0.7	--	100	
			24Vin	-0.7	--	50	
	Start-up Voltage		48Vin	--	--	18	
		24Vin	--	--	9		
	Input under-voltage protection	48Vin	12	15.5	--		
		24Vin	5.5	7.5	--		
	Start-up Time	Nominal input voltage & constant resistance load	48Vin	--	10	--	ms
			24Vin	--	30	100	
Input Filter			Capacitance filter				
Hot Plug			Unavailable				
Ctrl <sup>®</sup>	Module on		Ctrl pin open or pulled high (TTL 3.5-12VDC)				
	Module off		Ctrl pin pulled low to GND (0-1.2VDC)				
	Input current when off		--	2	7	mA	
Output Specifications	Voltage Accuracy <sup>®</sup>	5%-100% load	--	±1	±3	%	
	Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5		
	Load Regulation <sup>®</sup>	5%-100% load	--	±0.5	±1		
	Transient Recovery Time	25% load step change	--	300	500	µs	
	Transient Response Deviation	25% load step change	--	±3	±8	%	
	Temperature Coefficient	Full load	--	--	±0.03	%/°C	
	Ripple & Noise <sup>®</sup>	20MHz bandwidth, normal input voltage 5%~100%	--	100	150	mV p-p	
	Trim	Single output only	90	--	110	%Vo	
	Over-temperature Protection	Max. Case Temperature	--	125	--	°C	
	Over-voltage Protection		110	--	160	%Vo	
Over-current Protection		110	170	260	%Io		
Short circuit Protection			Continuous, self-recovery				
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.		1500	--	--	VDC	

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General Specifications	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	48Vin, Single output	--	2000	--	pF
			24Vin, Single output	--	10	--	nF
			48Vin, Dual output	--	1000	--	nF
	Operating Temperature	See Fig. 1	48Vin	-40	--	+85	°C
		See Fig. 2	24Vin, Single output	-40	--	+105	
	Storage Temperature			-55	--	+125	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	+300	°C
	Vibration			10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency <sup>®</sup>	PWM mode	48Vin, Single output	--	270	--	kHz
24Vin, Single output			--	400	--		
48Vin, Dual output			--	300	--		
MTBF	MIL-HDBK-217F@25°C		1000	--	--	k hours	
Mechanical Specifications	Case Material	Aluminum alloy					
	Dimensions	25.40 × 25.40 × 11.70 mm					
	Weight	Single out					18.4 g
		Dual out					17.2 g
Cooling method	Free air convection						

Note:

- ①The Ctrl pin voltage is referenced to input GND;
- ②Output voltage accuracy for 0%-5% load is ±5% max;
- ③Load regulation for 0% -100% load increases to ±3%;
- ④0% -5% load ripple & noise less than or equal to 300mV/5% Vo; The testing method for ripple and noise adopts parallel line testing method;
- 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 B (see Fig.4-② for recommended circuit) CLASS A ( see Fig.5 for recommended circuit)					
	RE	CISPR32/EN55032 CLASS B (see Fig.4- ② for recommended circuit) CLASS A (see Fig.5 for recommended circuit)					
Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV			perf. Criteria B		
	RS	IEC/EN61000-4-3 10V/m			perf. Criteria B		
	EFT	48Vin, Single output	IEC/EN61000-4-4 ±2KV (see Fig.4-① for recommended circuit)			perf. Criteria B	
		24Vin, Single output	IEC/EN61000-4-4 ±2kV (see Fig.6-① for recommended circuit)			perf. Criteria A	
		48Vin, Dual output	IEC/EN61000-4-4 ±2kV			perf. Criteria B	
Surge	IEC/EN61000-4-5 line to line ±2KV			perf. Criteria B			
CS	Single output	IEC/EN61000-4-6 3 Vr.m.s		perf. Criteria B/A			

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Characteristic Curve

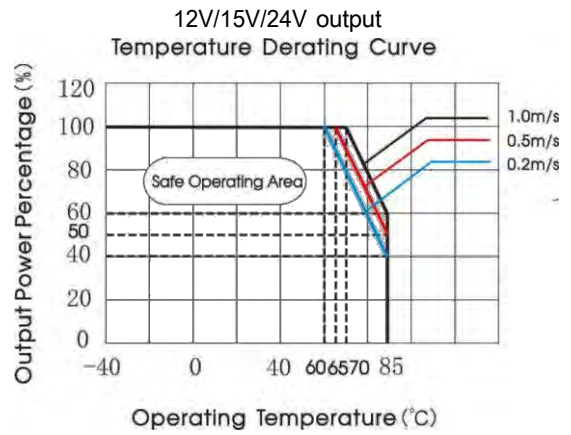
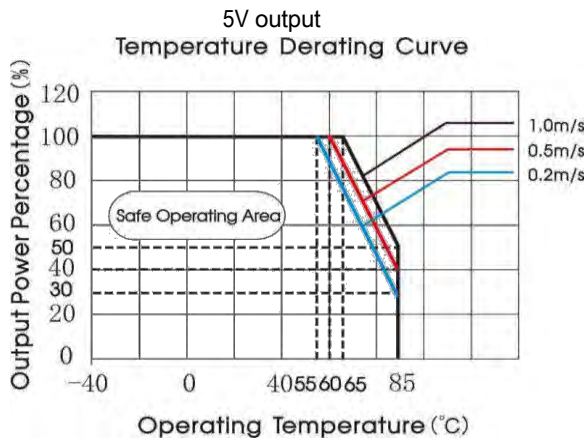
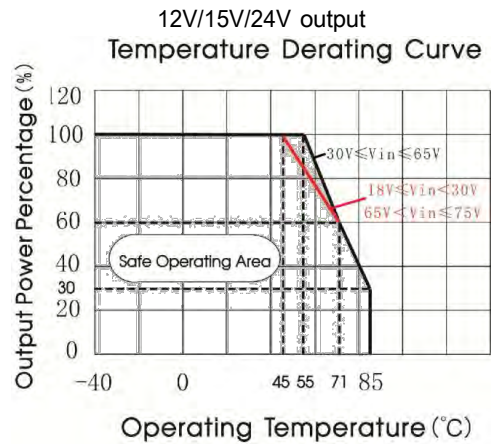
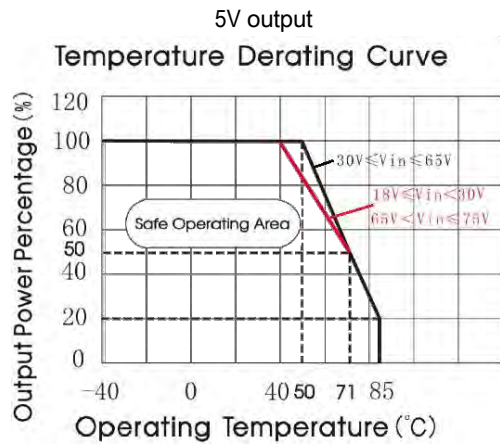
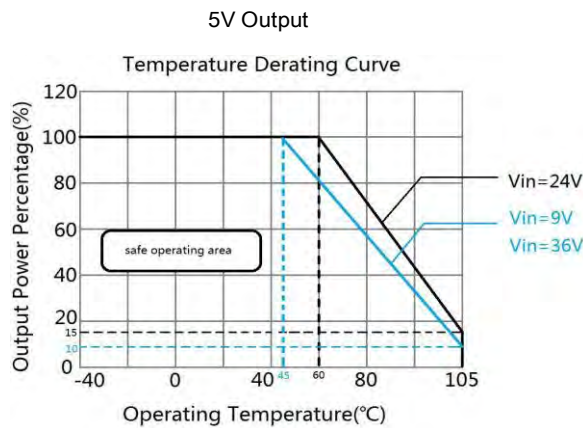


Fig. 1 VDB30-48SxxW characteristic curve



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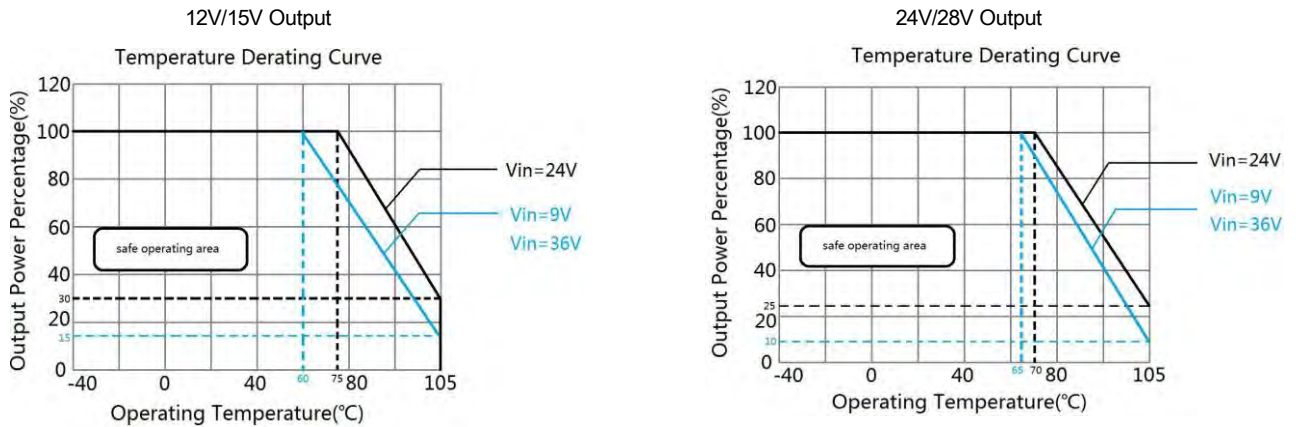
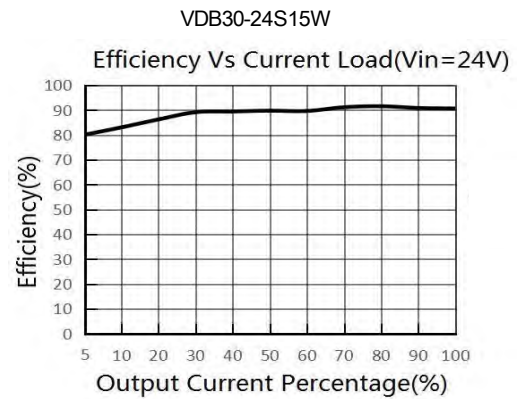
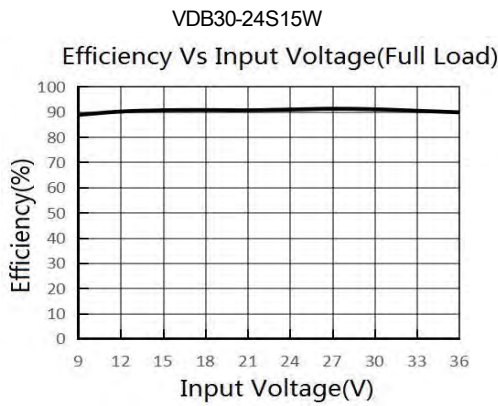


Fig. 2 VDB30-24SxxW characteristic curve

Noted: Test PCB: 160x50mm, 2oz, triple layer



## Design Reference

### 1. Typical application

①All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 3.

②Input 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.

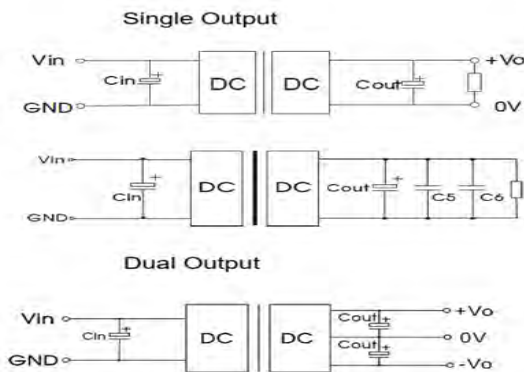


Fig. 3

Model	Vout (VDC)	Cin (μF)	Cout (μF)	C5/C6
VDB30-48SxxW	5/12/15	100	100	--
	24		47	--
VDB30-24SxxW	5	100uF/50V	470uF/50V	10uF/16V
	12/15			10uF/25V
	24/28			10uF/50V

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2. EMC compliance circuit

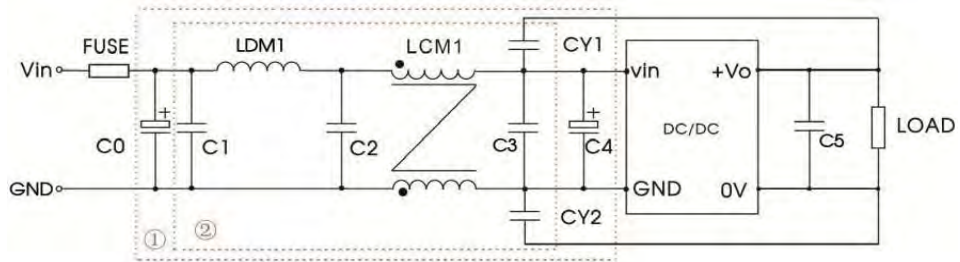


Fig. 4

Notes: We use Part ① in Fig. 4 for Immunity tests and Part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	Vin:48V
FUSE	Choose according to actual input current
C0, C4	470μF/100V
C1	10μF/100V
LDM1	22uH/3A
C2	22uF/100V
LCM1	10mH
C3	22uF/100V
C5	Refer to the Cout in Fig.3
CY1, CY2	1nF/2KV

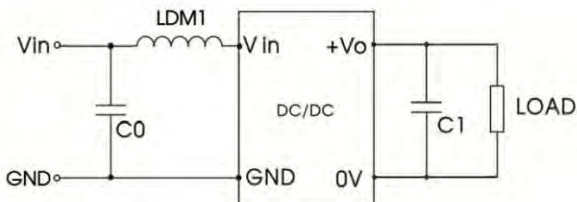


Fig. 5

Parameter description:

Model	Vin:48V
C0	4.7μF/100V
LDM1	22uH/3A
C1	Refer to the Cout in Fig.3

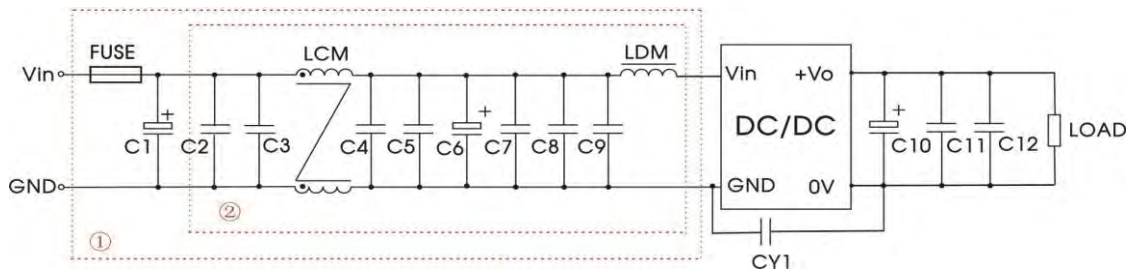


Fig. 6

Notes: We use Part ① in Fig. 6 for Immunity tests and Part ② for Emissions test. Selecting based on needs.

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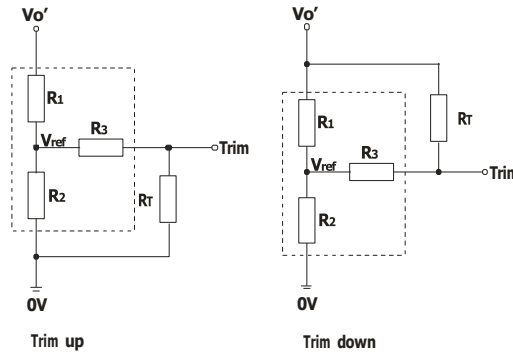
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Parameter description:

Components	Vin: 24VDC
FUSE	Choose according to actual input current
C1	1000uF/50V
C2/C3/C4/C5/ C7/C8/C9	4.7uF/50V
LCM	350uH*2
C6	220uF/50V
LDM	2.2uH
C10	Refer to the Cout in Fig.3
C11/C12	Refer to the C5, C6 in Fig.3
CY1	Y2/222K/250VAC
Note: The Part Ⓢ of the circuit can be simplified, and ClassA can be satisfied by removing the LCM.	

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



TRIM resistor connection (dashed line shows internal resistor network)

Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$R_T$  is Trim resistance

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

$a$  is a self-defined parameter, with no real meaning.

Model	Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
VDB30-24SxxW	5	2.87	2.87	5.6	2.5
	12	10.91	2.87	15	2.5
	15	14.35	2.87	15	2.5
	24	24.77	2.87	17.4	2.5
	28	29.41	2.87	17.4	2.5
VDB30-48SxxW	5	8.832	2.87	10	1.24
	12	11.00	2.87	8.2	2.5
	15	14.40	2.87	10	2.5
	24	24.87	2.87	7.5	2.5

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

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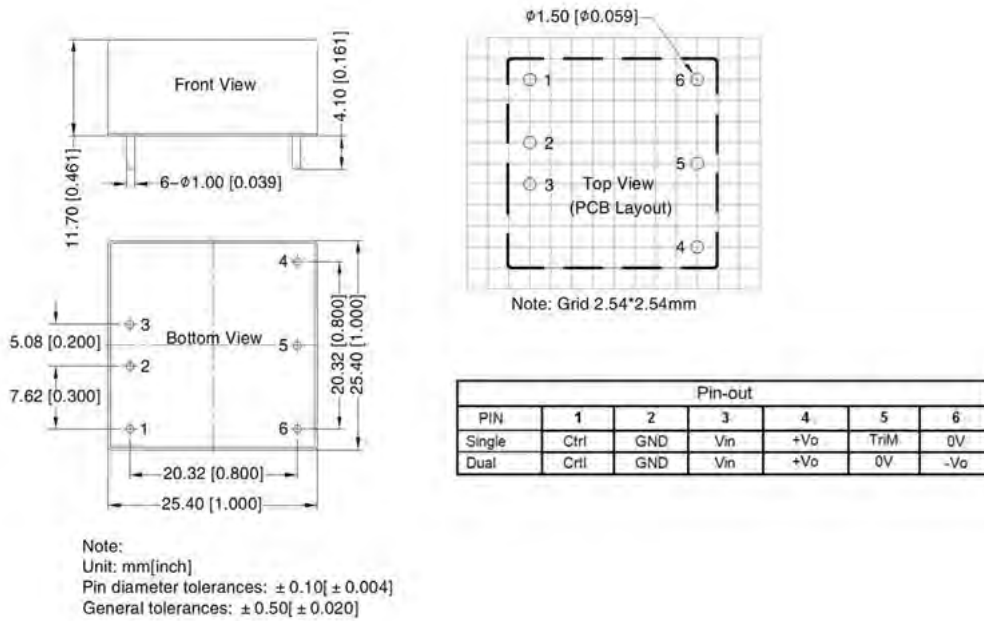
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## Dimensions and Recommended Layout



### Note:

1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. 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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