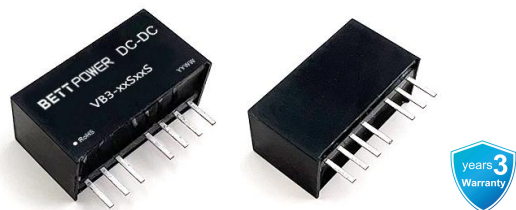


VB3-xxDxxS Series

DC-DC Converter | 3W | SIP8 | 4:1 Wide Input Voltage, Regulated Output | 1500VDC



Features

- SIP8 Package
- Operating Temperature Range: -40°C ~ +85°C
- 4:1 Wide Input Voltage Range
- Isolation Voltage: 1500VDC
- Full Load Efficiency: 82% (typ.)
- Input Under-voltage, Output Over-current, Output Short Circuit Protection
- Designed to meet IEC/EN/BS EN/UL 62368

Product Description



The VB3-xxDxxS series is an industrial-grade DC-DC converter module with 4:1 wide input voltage, regulated output. It features a compact SIP-8 plastic pin package, high efficiency, remote on/off control, and continuous short circuit protection. The small size and cost-effective design make this converter an ideal solution for communication equipment, instrumentation, and industrial electronics applications.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Typ.	Capacitive Load (μF) Max.*
		Nominal (Range)	Max.	Output Voltage (VDC)	Max. Current (mA)		
EN/UL pending	VB3-12D03S	12 (4.5~18)	20	±3.3	±379	79	1200
	VB3-12D05S	12 (4.5~18)	20	±5	±300	81	1000
	VB3-12D09S	12 (4.5~18)	20	±9	± 167	81	560
	VB3-12D12S	12 (4.5~18)	20	± 12	± 125	81	470
	VB3-12D15S	12 (4.5~18)	20	± 15	± 100	81	330
	VB3-12D24S	12 (4.5~18)	20	±24	±63	81	150
	VB3-24D03S	24 (9~36)	40	±3.3	±379	79	1200
	VB3-24D05S	24 (9~36)	40	±5	±300	81	1000
	VB3-24D09S	24 (9~36)	40	±9	±167	82	560
	VB3-24D12S	24 (9~36)	40	±12	±125	82	470
	VB3-24D15S	24 (9~36)	40	±15	±100	82	330
	VB3-24D24S	24 (9~36)	40	±24	±63	81	150

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Typ.	Capacitive Load (μF) Max.*
		Nominal (Range)	Max.	Output Voltage (VDC)	Max. Current (mA)		
EN/UL pending	VB3-48D03S	48 (18~75)	80	±3.3	±379	77	1200
	VB3-48D05S	48 (18~75)	80	±5	±300	79	1000
	VB3-48D09S	48 (18~75)	80	±9	± 167	80	560
	VB3-48D12S	48 (18~75)	80	±12	±125	82	470
	VB3-48D15S	48 (18~75)	80	±15	±100	82	330
	VB3-48D24S	48 (18~75)	80	±24	±63	82	150

Note:

- 1. The input voltage should not exceed the maximum value, otherwise it may cause permanent and irreparable damage;
- 2. The above efficiency values are measured at nominal input voltage and rated output load.
- 3. *The capacitive load for both positive and negative outputs is the same.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (Full Load/No-load)	12VDC Input	3.3V Output	--	264/10	271/20	mA
		Others	--	309/30	316/50	mA
	24VDC Input	3.3V Output	--	132/5	135/10	mA
		Others	--	154/15	158/25	mA
	48VDC Input	3.3V Output	--	68/5	69/10	mA
		5/9V Output	--	79/5	81/15	mA
		Others	--	76/5	78/15	mA
Reflected Ripple Current	12VDC Input		--	30	--	mA
	24VDC Input		--	55	--	mA
	48VDC Input		--	55	--	mA
Surge Voltage (1sec.max.)	12VDC Input		-0.7	--	25	VDC
	24VDC Input		-0.7	--	50	VDC
	48VDC Input		-0.7	--	100	VDC
Start-up Voltage	12VDC Input		--	--	4.5	VDC
	24VDC Input		--	--	9	VDC
	48VDC Input		--	--	18	VDC
Input Under-voltage Protection	12VDC Input		3.5	4	--	VDC
	24VDC Input		5.5	6.5	--	VDC
	48VDC Input		12	15.5	--	VDC
Ctrl	Turn on module		Ctrl pin open or pulled high (TTL2.7-12VDC)			
	Turn off module		Ctrl pin pulled low to GND (0-1.2VDC)			
Input Filter Type			Capacitance Filtering			
Hot Plug			Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%~100% load	Vo1	--	±1.0	±3.0	%
		Vo2	--	±3.0	±5.0	%
Line Regulation	Full load, input voltage from low limit to high limit	Vo1	--	±0.5	±1.0	%
		Vo2	--	±1.0	±2.0	%
Load Regulation	5% - 100% load		--	±1.0	±2.0	%
	0% - 100% load		--	±2.0	±4.0	%
Ripple & Noise	20MHz bandwidth, 100% load		--	80	150	mVp-p
Transient Recovery Time	25% load step change, nominal input voltage		--	0.5	2	ms
Transient Response Deviation	25% load step change, nominal input voltage	3.3/5V output	--	±5	±8	%
		Others	--	±3	±5	%

Temperature Coefficient	Full Load	--	±0.02	±0.03	%/℃
Over current Protection	Input Voltage Range	110	160	--	%
Short Circuit Protection	Input Voltage Range	Continuous short circuit, self-recovery			

Note: Ripple & noise are measured at 20MHz of bandwidth with a 10uF electrolytic capacitor and a 1uF ceramic capacitor connected inparallel at the output.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output, Test Time 1 minute, leakage current less than 1mA	1500	--	--	VDC
Insulation Resistance	Input-Output, Insulation Voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	See: Temperature Derating Curve	-40	--	85	℃
Storage Temperature		-55	--	125	℃
Storage Humidity	No condensation	--	--	95	%RH
Soldering method	Wave soldering	260±5℃; Time: 5 - 10s			
	Manual soldering	360±10℃; Time: 3 - 5s			
Switching frequency	Full load, nominal input voltage	--	300	--	kHz
Safety standard	Compliant with IEC/UL62368-1, IEC/EN60335-1, IEC/EN61558-1				
MTBF	MIL-HDBK-217F@25℃	>1000Kh			

Mechanical Specifications

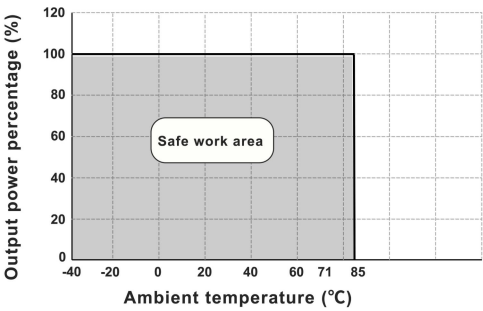
Case material	Black flame-retardant heat-resistant plastic (UL94V-0)
Mechanical dimensions	22.00 * 12.00 * 9.50 mm
Weight	4.8g (typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

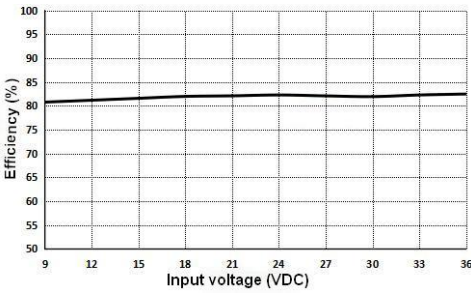
EMI	CE	CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2-②)			
	RE	CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2-②)			
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV			perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m			perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (Recommended circuit see Figure 2-①)			perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV (Recommended circuit see Figure 2-①)			perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s			perf. Criteria A

Product Characteristic Curve

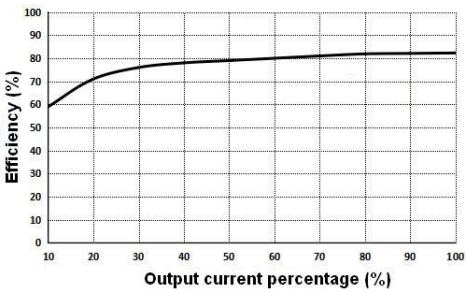
Temperature Derating Curve



Efficiency vs. Input Voltage (Full Load, VB3-24D05S)



Efficiency vs. Output Load (Vin=12V, VB3-24D05S)



Design Reference - Application circuit

Application circuit



(Figure 1)

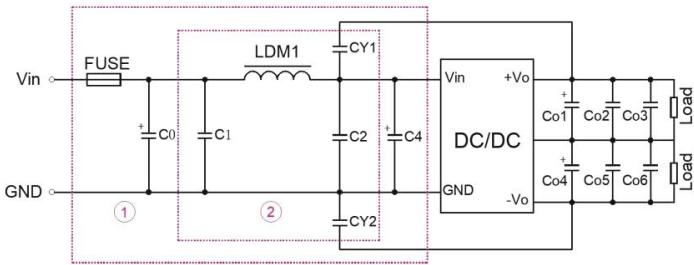
Recommended Capacitive Load Value Table

Vout(VDC)	C1(uF)	Co1(uF)	Co2(uF)	Co3(uF)
3.3/5/6VDC	100μF/100V	100uF/16V	10uF/50V	0.1uF/16V
9/12/15VDC	100μF/100V	47μF/25V	10μF/50V	0.1μF/25V
24/28VDC	100μF/100V	47μF/50V	10μF/50V	0.1μF/50V

All DC/DC converters in this series are tested before shipment according to the recommended application circuit (Figure 1). If further reduction of input and output ripple is required, external capacitors can be added to the input and output. Increase C1, Co1, Co2, Co3, Co4, Co5, Co6 or select capacitors with low equivalent series impedance. For each output, under safe and reliable operating conditions, the maximum capacitance of the filter capacitor must not exceed the maximum capacitive load of the product.

Design Reference - EMC Solutions - Recommended Circuits

EMC Recommended Circuit Design and Application



(Figure 2)

Recommended Parameter Table

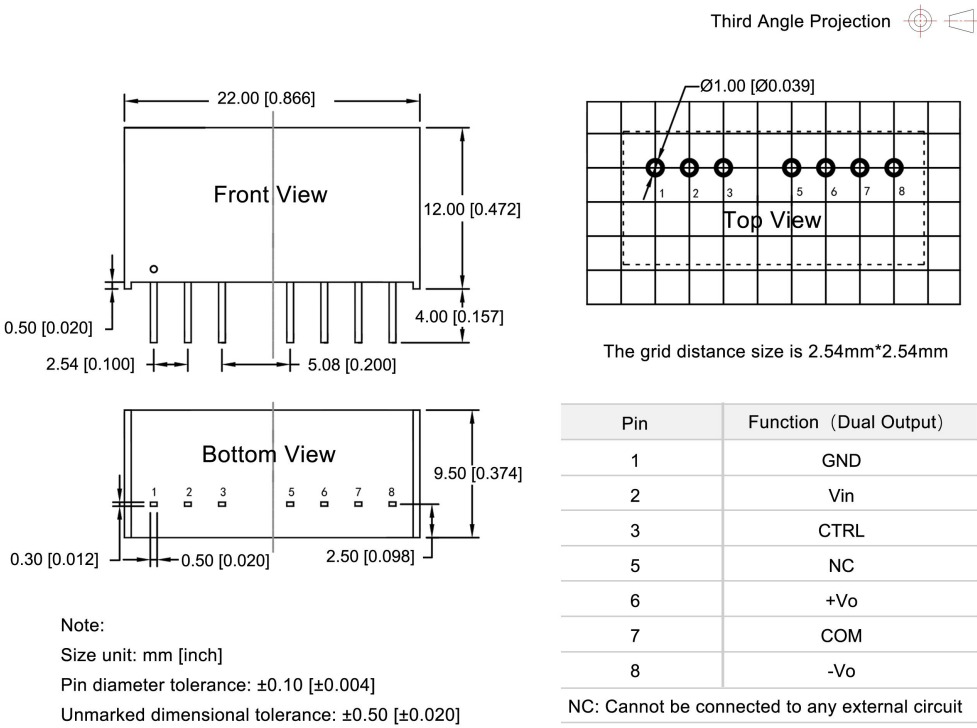
Input Voltage	Vin:12V	Vin:24V	Vin:48V
FUSE	Select according to the actual input current		
C0, C4	680uF/25V	330uF/50V	330uF/100V
C1, C2	4.7μF/50V		4.7μF/100V
LDM1	12μH		
Co1/Co2/Co3/ Co4/Co5/Co6	Refer to the capacitor parameters in Figure 1		
CY1, CY2	1nF/2kVAC		

Part ① is used for EMC testing;

Part ② is used for EMI filtering, can be selected as needed.

Dimensions and Recommended Layout

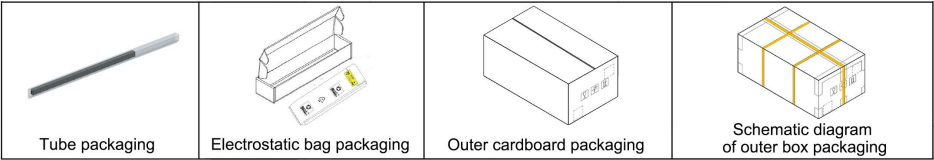
VB3-xxDxxS Dimensions and Recommended Layout



Packaging Information

Model series (Tube packaging)	Quantity per tube (pcs/ tube)	Quantity of electrostatic bag (pcs/ bag)	Quantity of inner box (pcs/ box)	Full box Quantity (pcs)
VB3-xxDxxS	23	230	920	3680

The schematic diagram of tube packaging is shown below:



Product precautions

1. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
2. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
3. The maximum capacitive load is tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, all indicators in this manual are measured at $T_a=25\text{ }^{\circ}\text{C}$, humidity<75% RH, nominal input voltage, and output rated load;
5. All indicator testing methods in this manual are based on our company's corporate standards;
6. Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel;
7. Product specifications are subject to change without prior notice.

Manufacturer contact information

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