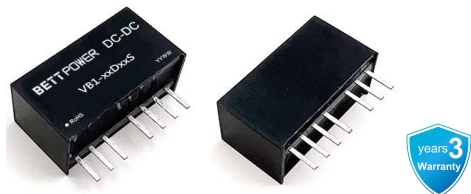


VB1-xxDxxS Series

DC-DC Converter | 1W | SIP8 | 4:1 Wide Input Voltage, Regulated Output | 1600VDC



Features

- SIP8 Package
- Operating Temperature Range: -40°C ~ +105°C
- 4:1 Wide Input Voltage Range
- Isolation Voltage: 1600VDC
- Input Under-voltage, Output Over-current, Output Short Circuit Protection
- Designed to meet IEC/EN/BS EN/UL 62368

Product Description



The VB1-xxDxxS series is an industrial-grade DC-DC converter module with 4:1 wide input voltage, regulated output, compact SIP-8 plastic pin package, high efficiency, meeting -40°C ~ +85°C operating temperature, and features remote on/off and continuous short circuit protection. The compact size and excellent cost 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	VB1-12D03S	12 (4.5~18)	20	±3.3	± 152	75	1200
	VB1-12D05S	12 (4.5~18)	20	±5	±100	76	1000
	VB1-12D09S	12 (4.5~18)	20	±9	±56	76	560
	VB1-12D12S	12 (4.5~18)	20	±12	±42	76	470
	VB1-12D15S	12 (4.5~18)	20	±15	±33	74	330
	VB1-12D24S	12 (4.5~18)	20	±24	±21	77	220
	VB1-24D03S	24 (9~36)	40	±3.3	±152	73	1200
	VB1-24D05S	24 (9~36)	40	±5	±100	75	1000
	VB1-24D09S	24 (9~36)	40	±9	±56	73	560
	VB1-24D12S	24 (9~36)	40	±12	±42	72	470
	VB1-24D15S	24 (9~36)	40	±15	±33	72	330
	VB1-24D24S	24 (9~36)	40	±24	±21	75	220

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	VB1-48D03S	48 (18~75)	80	±3.3	± 152	72	1200
	VB1-48D05S	48 (18~75)	80	±5	± 100	74	1000
	VB1-48D09S	48 (18~75)	80	±9	±56	75	560
	VB1-48D12S	48 (18~75)	80	±12	±42	75	470
	VB1-48D15S	48 (18~75)	80	±15	±33	74	330
	VB1-48D24S	48 (18~75)	80	±24	±21	76	220

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	--	113/8	116/15	mA
		15V Output	--	113/30	116/40	mA
		Others	--	110/20	113/40	mA
	24VDC Input	5V Output	--	56/5	57/10	mA
		24V Output	--	56/15	57/25	mA
		Others	--	58/10	60/20	mA
	48VDC Input	3.3V output	--	29/2	30/5	mA
		Others	--	28/5	29/10	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	3.5	--	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 Filter			
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	Vin=Min. to Max. @Full Load	Vo1	--	±0.5	±1.0	%
		Vo2	--	±1.0	±2.0	%
Load Regulation	5% - 100% Load		--	±1.0	±2.0	%
	0% - 5% Load		--	±2.0	±4.0	%
Ripple & Noise	20MHz bandwidth, 5%-100% load		--	50	100	mVp-p
Transient Recovery Time	25% Load Step Change, Nominal Input Voltage		--	0.5	2.0	%

Transient Response Deviation		--	±3.0	±5.0	%
Temperature Coefficient	Full load	--	±0.02	±0.03	%/°C
Over current Protection	Input Voltage Range	110	160	--	%Io
Short Circuit Protection	Input Voltage Range	Continuous, Self-Recovery			

Note:

1. Ripple & noise at 0%-5% load is $\leq 5\%$ Vo.
2. Ripple & noise are measured at 20MHz of bandwidth with a 10uF electrolytic capacitor and a 1uF ceramic capacitor connected in parallel 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		1600	--	--	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	12/24VDC Input	-40	--	105	°C
		48VDC Input	-40	--	85	°C
Storage Temperature			-55	--	125	°C
Storage Humidity	No condensation		--	--	95	%RH
Soldering Profile	Wave soldering		260±5°C; Time: 5 - 10s			
	Manual soldering		360±10°C; Time: 3 - 5s			
Switching Frequency	PWM Mode		--	300	--	kHz
MTBF	MIL-HDBK-217F@25°C		>1000Kh			

Mechanical Specifications

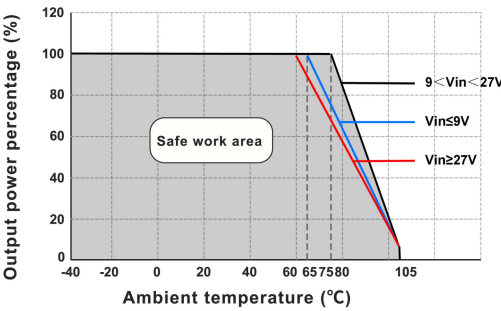
Case Material	Black plastic; flame-retardant and heat-resistant (UL 94V-0 rated)
Mechanical Dimensions	22.00 * 12.00 * 9.50 mm
Weight	4.8g(typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

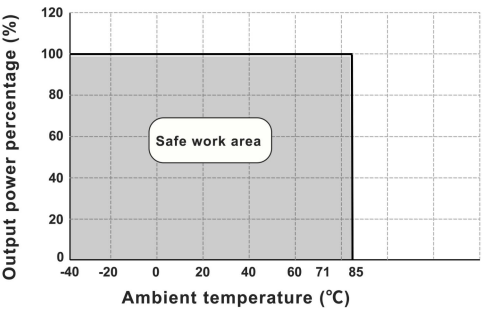
EMI	CE	CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2-②)			
	RE	CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2-②)			
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV			perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m			perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (Recommended circuit see Figure 2-①)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

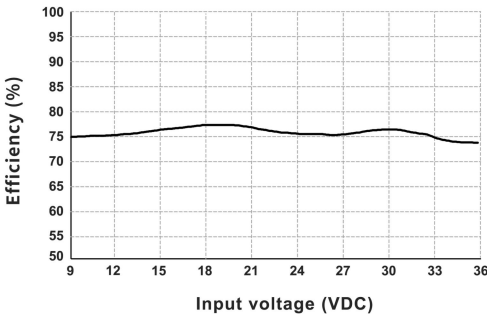
Temperature Derating Curve (12/24V Input)



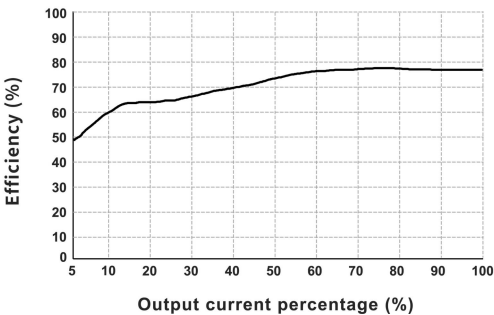
Temperature Derating Curve (48V Input)



Efficiency VS Input Voltage (Full Load, VB1-24D05S)

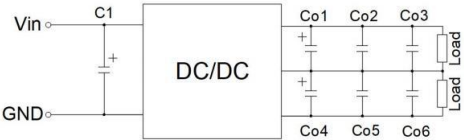


Efficiency VS Output Load (Vin=24V, VB1-24D05S)



Design Reference - Application circuit

Application circuit



(Figure 1)

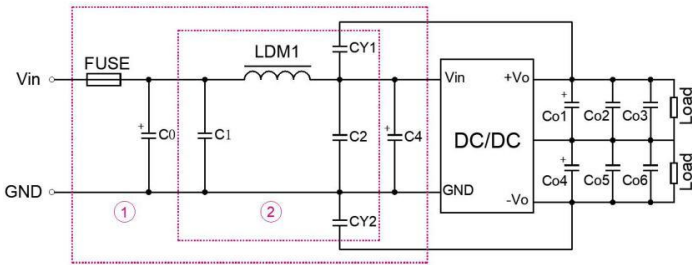
Recommended Capacitive Load Value Table

Vout	C1	Co1/Co4	Co2/Co5	Co3/Co6
3.3/5VDC	100μF/100V	100μF/16V	10μF/50V	0.1μF/16V
9/12/15VDC	100μF/100V	100μF/25V	10μF/50V	0.1μF/25V
24VDC	100μF/100V	100μF/50V	10μF/50V	0.1μF/50V

All DC/DC converters in this series are tested according to the recommended test circuit (Figure 1) before leaving the factory. To further reduce input and output ripple, the external capacitors C1, Co1, Co2, Co3, Co4, Co5, Co6 can be increased or capacitors with low series equivalent impedance can be selected. 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

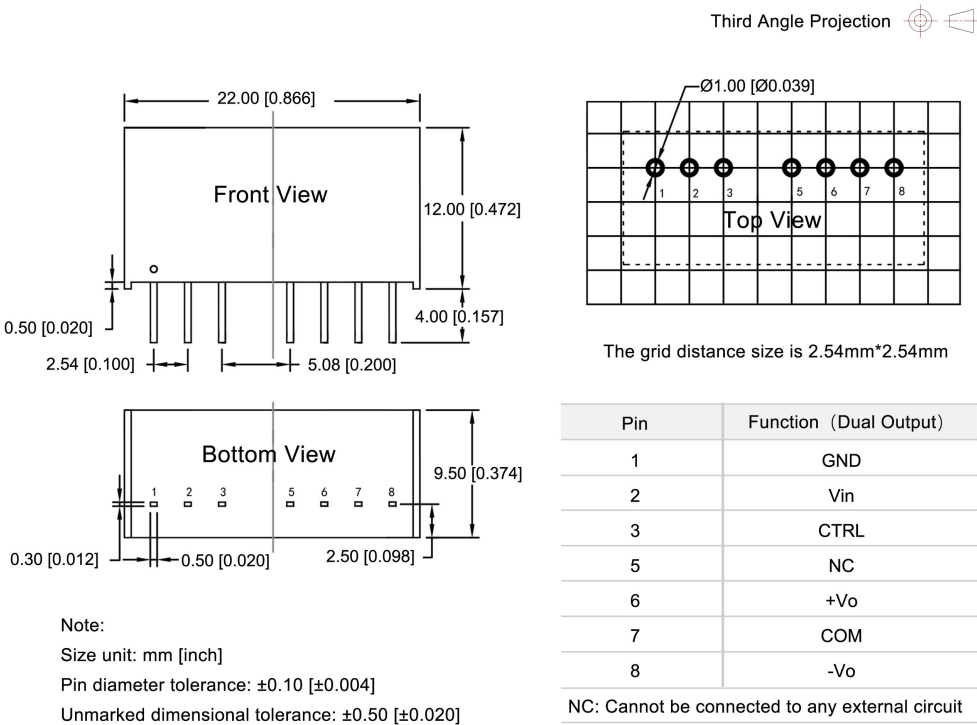
Input Voltage	Vin:12VDC	Vin:24VDC	Vin:48VDC
FUSE	Select according to the actual input current		
C0, C4	680μF/25V	330μF/50V	330μF/100V
C1, C2	10μF/50V		10μF/100V
LDM1	12μH		
Co1/Co2/Co3/ Co4/Co5/Co6	Refer to capacitor parameters in Figure 1		
CY1, CY2	2.2nF/3kV		

Part ① is used for EMC testing;

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

Dimensions and Recommended Layout

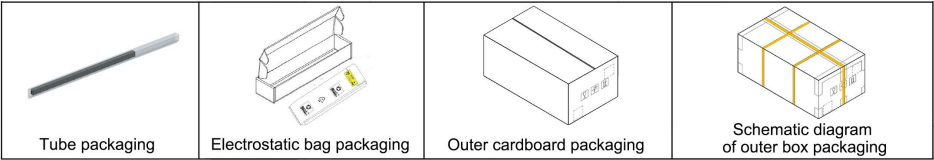
VB1-xxDxxS Dimensions and Recommended Layout



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)
VB1-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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