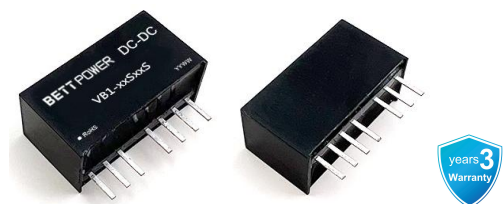


VB1-xxSxxS Series

DC-DC Converter | 1W | 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: 1600VDC
- Full Load Efficiency: 83% (typ.)
- Input Under-voltage, Output Over-current, Output Short Circuit Protection
- Designed to meet IEC/EN/BS EN/UL 62368

Product Description



The VB1-xxSxxS series is an industrial-grade DC-DC converter module with 4:1 wide input voltage range and regulated output. It features a compact SIP-8 plastic pin package, high efficiency, and meets -40°C to +85°C operating temperature, with remote on/off and continuous short circuit protection. The small 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	VB1-12S03S	12 (4.5~18)	20	3.3	303	74	2400
	VB1-12S05S	12 (4.5~18)	20	5	200	75	2200
	VB1-12S06S	12 (4.5~18)	20	6	167	75	1800
	VB1-12S09S	12 (4.5~18)	20	9	111	78	1200
	VB1-12S12S	12 (4.5~18)	20	12	83	78	1000
	VB1-12S15S	12 (4.5~18)	20	15	67	78	680
	VB1-12S18S	12 (4.5~18)	20	18	56	75	560
	VB1-12S24S	12 (4.5~18)	20	24	42	75	470
	VB1-12S28S	12 (4.5~18)	20	28	36	75	330
	VB1-24S03S	24 (9~36)	40	3.3	303	73	2400
	VB1-24S05S	24 (9~36)	40	5	200	75	2200
	VB1-24S06S	24 (9~36)	40	6	167	75	1800

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	VB1-24S09S	24 (9~36)	40	9	111	76	1200
	VB1-24S12S	24 (9~36)	40	12	83	76	1000
	VB1-24S15S	24 (9~36)	40	15	67	76	680
	VB1-24S18S	24 (9~36)	40	18	56	72	560
	VB1-24S24S	24 (9~36)	40	24	42	70	470
	VB1-24S28S	24 (9~36)	40	28	36	70	330
	VB1-48S03S	48 (18~75)	80	3.3	303	71	2400
	VB1-48S05S	48 (18~75)	80	5	200	72	2200
	VB1-48S06S	48 (18~75)	80	6	167	72	1800
	VB1-48S09S	48 (18~75)	80	9	111	74	1200
	VB1-48S12S	48 (18~75)	80	12	83	74	1000
	VB1-48S15S	48 (18~75)	80	15	67	74	680
	VB1-48S18S	48 (18~75)	80	18	56	74	560
	VB1-48S24S	48 (18~75)	80	24	42	74	470
	VB1-48S28S	48 (18~75)	80	28	36	74	330

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.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (Full Load/No-load)	12VDC Input	3.3/5/6V Output	--	113/10	116/20	mA
		9/12/15V Output	--	107/15	120/25	mA
		18/24/28V Output	--	111/25	114/35	mA
	24VDC input	3.3/18V Output	--	58/6	60/12	mA
		24/28V Output	--	60/12	61/20	mA
		Others	--	56/8	57/15	mA
	48VDC input	3.3/5/6V output	--	29/4	30/8	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	--	± 1.0	±3.0	%
Line Regulation	Full load, input voltage from low limit to high limit	--	±0.2	±0.5	%
Load Regulation	0% - 100% load	--	± 0.5	±1.0	ms
	0% - 5% load	--	± 1.0	±2.0	ms
Ripple & Noise	20MHz bandwidth, 5%-100% load	--	0.5	2	mVp-p
Transient Recovery Time	25% load step change, nominal input voltage	--	±3	±5	%
Transient Response Deviation		--	±0.02	±0.03	%
Temperature Coefficient	Full load	--	80	150	%/°C

Over current Protection	Input Voltage Range	110	--	--	%Io
Short Circuit Protection	Input Voltage Range	Continuous short circuit, 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 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	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

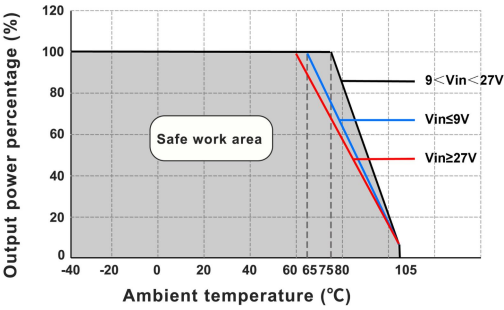
Case Material	Black flame-retardant and heat-resistant plastic (UL94V-0)
Mechanical Dimensions	22.00 * 12.00 * 9.50 mm
Weight	4.8g (typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

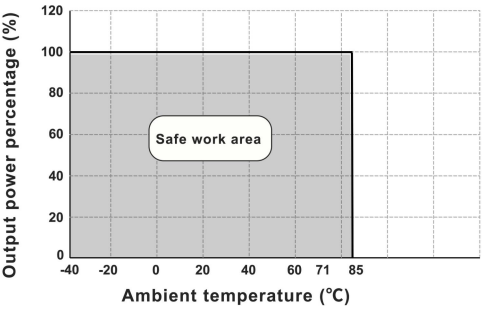
EMI	CE	CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2-②)			
	RE	CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2-②)			
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV			perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m			perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (Recommended circuit see Figure 2-①)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

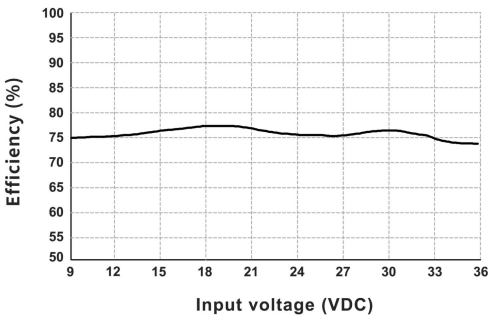
Temperature Derating Curve (12V/24V Input)



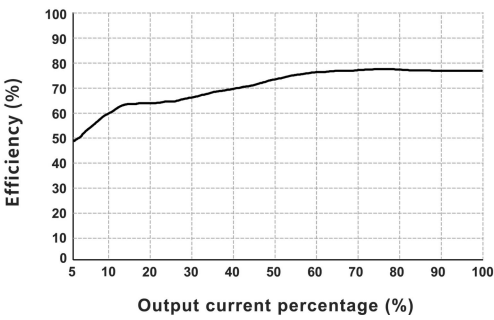
Temperature Derating Curve (48V Input)



Efficiency VS Input Voltage (Full Load, VB1-24S05S)

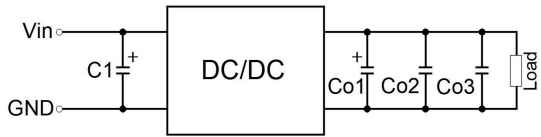


Efficiency VS Output Load (Vin=24V, VB1-24S05S)



Design Reference - Application circuit

Application circuit



(Figure 1)

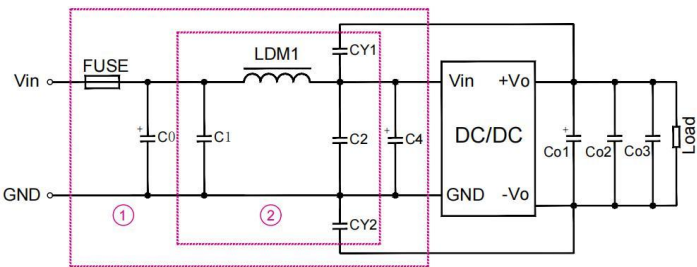
Recommended Capacitive Load Value Table

Vout	C1	Co1	Co2	Co3
3.3/5/6VDC	100μF/100V	100μF/16V	10μF/50V	0.1μF/16V
9/12/15VDC	100μF/100V	100μF/25V	10μF/50V	0.1μF/25V
18/24/28VDC	100μF/100V	100μF/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, the external input and output capacitors C1, Co1, Co2, Co3 can be increased or capacitors with lower 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)

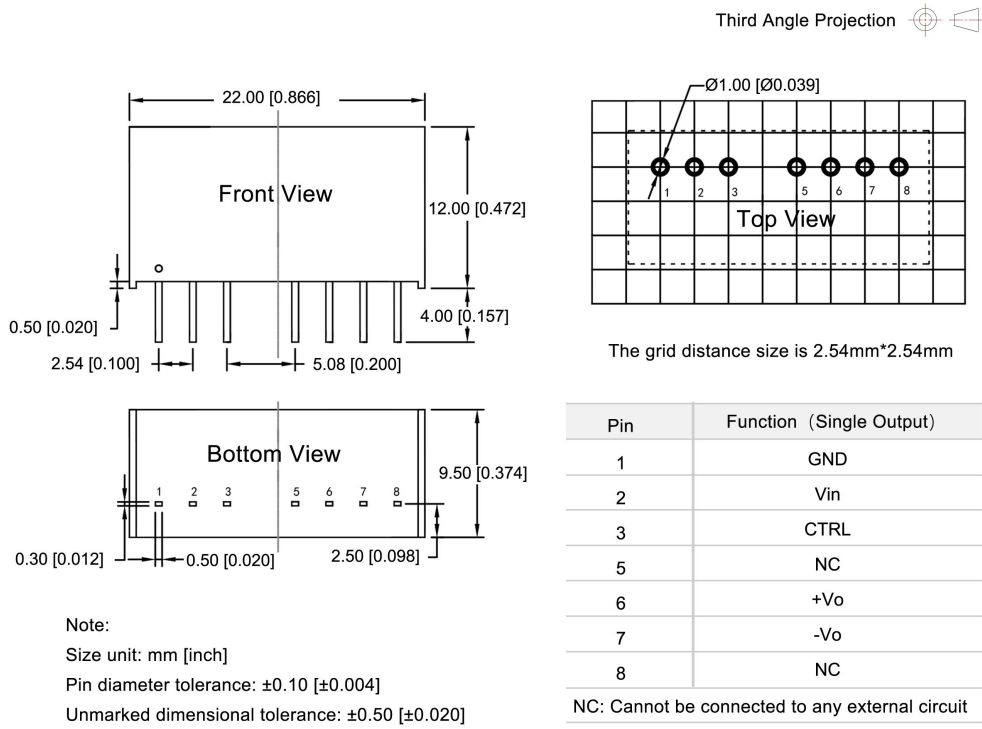
Recommended Parameter Table

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	Refer to capacitor parameters in Figure 1		
CY1, CY2	2.2nF/2kVDC		

Part ① is used for EMC testing;
Part ② is used for EMI filtering, selectable based on requirements.

Dimensions and Recommended Layout

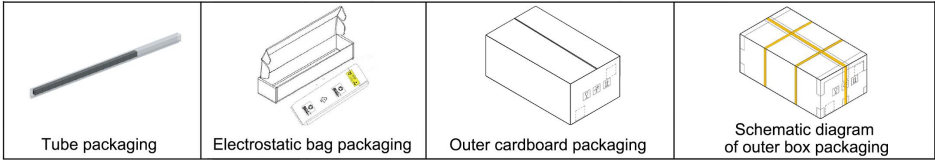
VB1-xxSxxS Dimensions and Recommended Layout



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-xxSxxS	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 $T_a=25^{\circ}\text{C}$, 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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