

1W isolated DC-DC converter
Fixed input voltage, unregulated single output



us **CE** **CB** Patent Protection **RoHS**

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 81%
- I/O isolation test voltage: 1.5k VDC
- Industry standard pin-out
- IEC62368, UL62368, EN62368 approved

SB_S-1WR3 series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.	
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.			
UL/CE/CB	SB1203S-1WR3	12 (10.8-13.2)	3.3	303/30	71/75	2400	
	SB1205S-1WR3		5	200/20	76/80	2400	
	SB1209S-1WR3		9	111/12	76/80	1000	
	SB1212S-1WR3		12	83/9	76/80	560	
	SB1215S-1WR3		15	67/7	77/81	560	
	SB1224S-1WR3		24	42/5	77/81	220	
	--	SB1505S-1WR3	15 (13.5-16.5)	5	200/20	76/80	2400
		SB1509S-1WR3		9	111/12	76/80	1000
		SB1512S-1WR3		12	83/9	76/80	560
		SB1515S-1WR3		15	67/7	77/81	560
--	SB1524S-1WR3		24	42/5	77/81	220	
UL/CE/CB	SB2403S-1WR3	24 (21.6-26.4)	3.3	303/30	69/75	2400	
	SB2405S-1WR3		5	200/20	73/79	2400	
	SB2409S-1WR3		9	111/12	74/80	1000	
	SB2412S-1WR3		12	83/9	75/81	560	
	SB2415S-1WR3		15	67/7	75/81	560	
	SB2424S-1WR3		24	42/5	75/81	220	

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12V input	3.3VDC output	--	112/8	118/--	mA
		5VDC/9VDC/12VDC output	--	105/8	110/--	
		15VDC/24VDC output	--	103/8	109/--	
	15V input	5VDC/9VDC/12VDC output	--	84/8	88/--	
		15VDC/24VDC output	--	83/8	87/--	
	24V input	3.3VDC output	--	56/8	61/--	
		5VDC output	--	53/8	58/--	
		9VDC output	--	53/8	57/--	
		12VDC/15VDC/24VDC output	--	52/8	56/--	
Reflected Ripple Current			--	15	--	
Surge Voltage(1sec. max.)	12VDC input		-0.7	--	18	VDC
	15VDC input		-0.7	--	21	
	24VDC input		-0.7	--	30	

DC/DC Converter

SB_S-1WR3 Series

Input Filter		Capacitance filter
Hot Plug		Unavailable

Note: * Reflected ripple current testing method please see DC-DC Converter Application Notes for specific operation.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: $\pm 1\%$	3.3VDC output	--	--	1.5	--
		5VDC/9VDC/12VDC/15VDC/24VDC output	--	--	1.2	
Load Regulation	10%-100% load	3.3VDC output	--	8	20	%
		5VDC output	--	5	15	
		9VDC output	--	3	10	
		12VDC output	--	3	10	
		15VDC output	--	3	10	
Ripple & Noise*	20MHz bandwidth	3.3VDC/5VDC/9VDC/12VDC/15VDC output	--	30	75	mVp-p
		24VDC output	--	50	100	
Temperature Coefficient	Full load		--	± 0.02	--	%/ $^{\circ}\text{C}$
Short-Circuit Protection			Continuous, self-recovery			

Notes: * The "parallel cable" method is used for ripple and noise test, please refer to *DC-DC Converter Application Notes* for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output electric strength test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	M Ω
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature $\geq 85^{\circ}\text{C}$, (see Fig. 2)	-40	--	105	$^{\circ}\text{C}$
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25 $^{\circ}\text{C}$, nominal input, full load output	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	5	--	95	%RH
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	Full load, nominal input voltage	--	260	--	kHz
MTBF	MIL-HDBK-217F @ 25 $^{\circ}\text{C}$	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	11.60 x 6.00 x 10.16 mm
Weight	1.3g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air $\pm 8\text{kV}$, Contact $\pm 6\text{kV}$ perf. Criteria B

Note: Refer to Fig.4 for recommended circuit test.

DC/DC Converter

SB_S-1WR3 Series

Typical Performance Curves

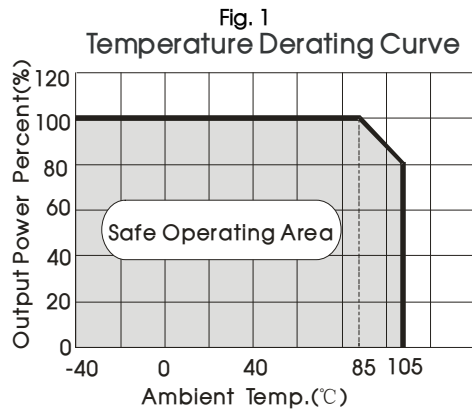
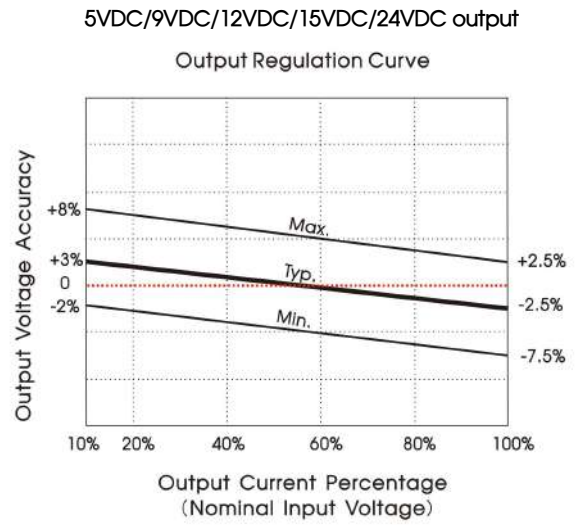
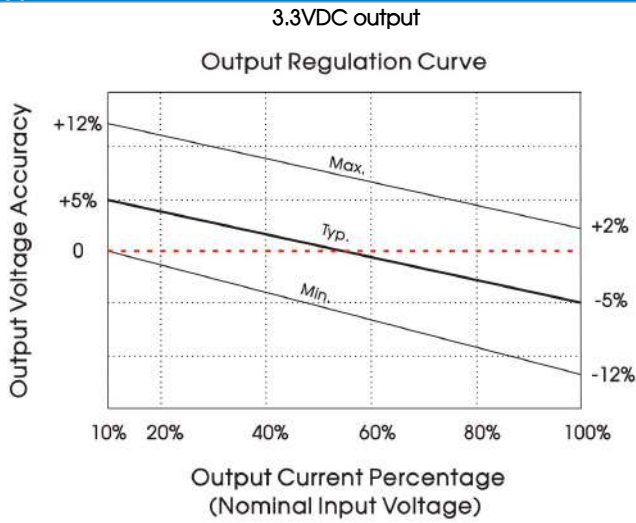
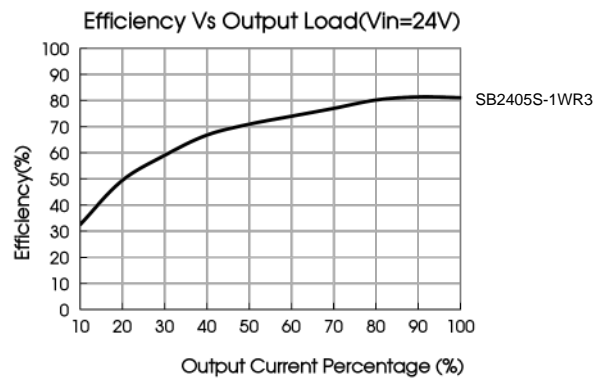
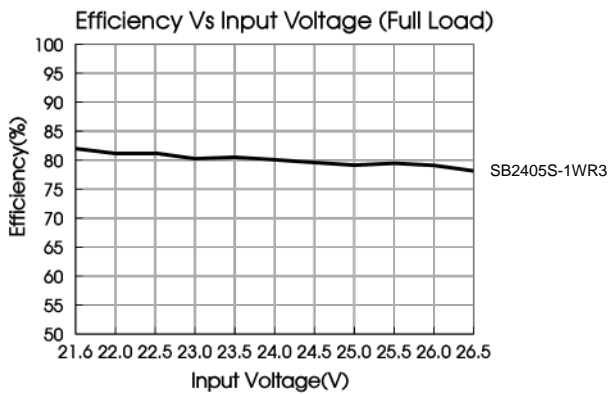
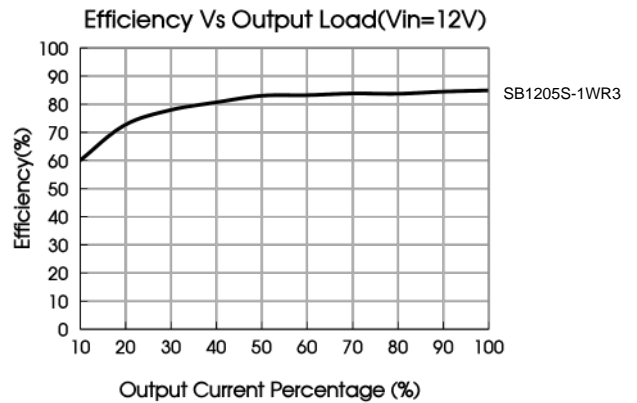
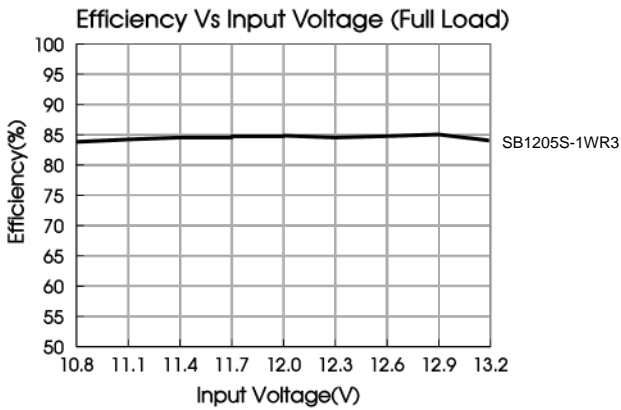


Fig. 2



DC/DC Converter

SB_S-1WR3 Series

Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

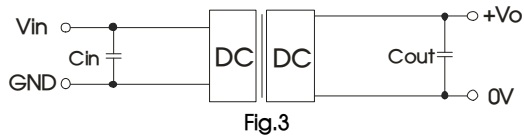
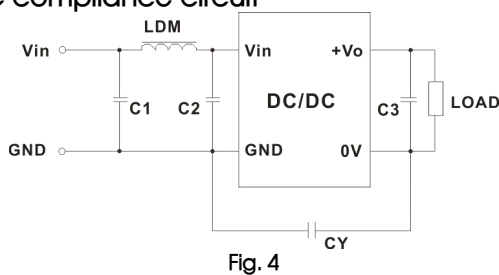


Table 1: Recommended input and output capacitor values

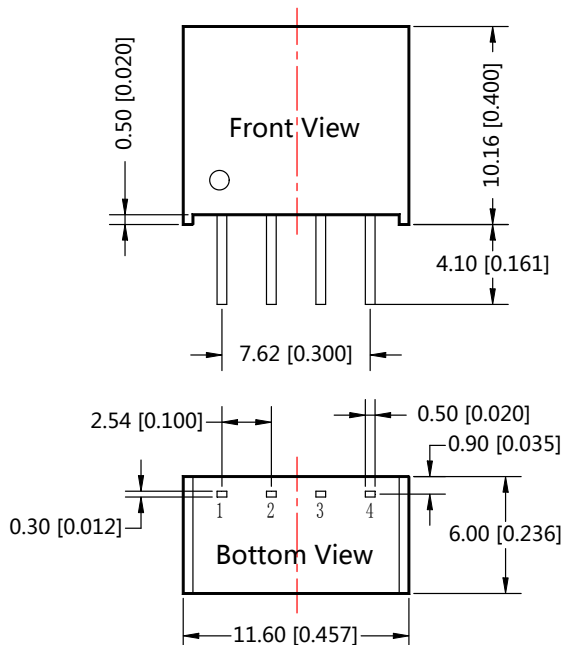
Vin	Cin	Vo	Cout
12VDC	2.2μF/25V	3.3VDC	10μF/16V
15VDC	2.2μF/25V	5VDC	10μF/16V
24VDC	1μF/50V	9VDC	2.2μF/16V
--	--	12VDC	2.2μF/25V
--	--	15VDC	1μF/25V
--	--	24VDC	1μF/50V

2. EMC compliance circuit



Emissions	Component	Value
	C1	4.7μF /50V
	C2	4.7μF /50V
	C3	Refer to the Cout in Fig.3
	LDM	6.8μH
	CY	270pF/2kV

Dimensions and Recommended Layout



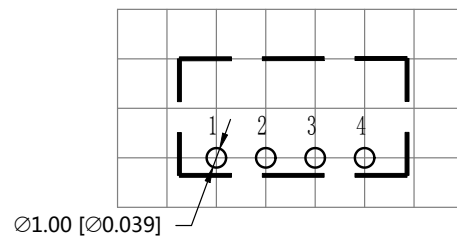
Note:

Unit :mm[inch]

Pin section tolerances : ±0.10[±0.004]

General tolerances: ±0.25[±0.010]

THIRD ANGLE PROJECTION



Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	GND
2	Vin
3	0V
4	+Vo

DC/DC Converter

SB_S-1WR3 Series

Notes:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
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 $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our 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.