SB_S-1WR2 & SB_D-1WR2 Series

1W, FIXED INPUT, ISOLATED & UNREGULATED SINGLE OUTPUT DC-DC CONVERTER

PRODUCT FEATURES

- Efficiency up to 82%
- Miniature SIP/DIP Package
- 1500VDC Isolation Voltage
- Operating Temperature Range: -40°C ~ +105°C
- Low Temperature rise
- No External Component Required
- PCB Mounting
- Industry Standard Pinout

PART NUMBER SYSTEM

SB0505S-1WR

- Rated Power
- Package Style
- Output Voltage
- Input Voltage
- Product Series

APPLICATIONS

The SB_S-1WR2 & SB_D-1WR2 Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

1) Input voltage variation ≤ ±10%;
2) 1.5KVDC input and output isolation;
3) Regulated and low ripple noise is not required.

Such as: digital circuits, low frequency analog circuits, and IGBT power device driving circuits.

SELECTION GUIDE

Model Number	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA) Max.	Output Current (mA) Min.	Input Current (mA)(typ.) @Max. Load	Input Current (mA)(typ.) @No Load	Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(μF)	Efficiency (%, typ.) @Max. Load	Approval
SB0305S/D-1WR2	3.3 (2.97-3.63)	5	200	20	380	30	15	220	80	
SB0505S/D-1WR2	5 (4.5-5.5)	5	200	20	250	20	10		80	
SB0509S/D-1WR2		9	111	12	250				80	
SB0512S/D-1WR2		12	84	9	248				81	
SB0515S/D-1WR2		15	67	7	248				81	
SB0524S/D-1WR2		24	42	4	248				81	
SB1205S/D-1WR2	12 (10.8-13.2)	5	200	20	104	15	5		80	
SB1209S/D-1WR2		9	111	12	104				80	
SB1212S/D-1WR2		12	83	9	103				81	
SB1215S/D-1WR2		15	67	7	103				80	
SB1515S/D-1WR2	15 (13.5-16.5)	15	67	7	82	10	5		81	
SB2405S/D-1WR2	24 (21.6-26.4)	5	200	20	52	7	5		80	
SB2409S/D-1WR2		9	111	12	52				80	
SB2412S/D-1WR2		12	84	9	50				81	
SB2415S/D-1WR2		15	67	7	50				82	
SB2424S/D-1WR2		24	42	4	50				82	

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	3.3VDC Input Models	-0.7	--	5	VDC
	5VDC Input Models	-0.7	--	9	
	12VDC Input Models	-0.7	--	18	
	15VDC Input Models	-0.7	--	21	
	24VDC Input Models	-0.7	--	30	
Input Filter		Capacitance Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		0.1	--	1	W
Output Voltage Accuracy		See tolerance envelope curve			
Line Voltage Regulation	For Vin change of ±1%	--	--	±1.2	%

Load Regulation	10% to 100% load	(5V output)	--	12	15	
		(9V output)	--	8	15	
		(12V output)	--	7	15	
		(15V output)	--	6	15	
		(24V output)	--	5	15	
Temperature Drift	100% load		--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	Output Voltage ≤12V	--	30	--	mVp-p
		Others	--	60	--	
Short Circuit Protection			Continuous, automatic recovery			
Note: *Ripple and noise tested by “parallel cable” method. See detailed operation instructions at Testing of Power Converter section, application notes.						

COMMON SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA		1500	--	--	VDC
Isolation Resistance	Test at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input/Output,100KHz/0.1V	SB2424S/D-1WR2	--	30	--	pF
		Others	--	20	--	
Switching Frequency	Full load, nominal input		--	100	300	KHz
MTBF	MIL-HDBK-217F@25℃		3500	--	--	K hours
Case Material			Plastic(UL94-V0)			
Weight	SB_S-1WR2 Series		--	1.2	--	g
	SB_D-1WR2 Series		--	1.8	--	

ENVIRONMENTAL SPECIFICATIONS

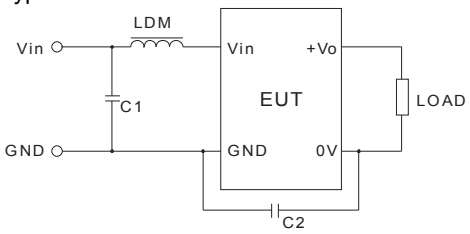
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85℃)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temp. rise at full load		--	25	--	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS B（Typical Recommended Circuit Refer to Figure1）
	RE	CISPR22/EN55022 CLASS B（Typical Recommended Circuit Refer to Figure1）
EMS	ESD	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

EMC RECOMMENDED CIRCUIT

EMI Typical Recommended Circuit（CLASS B）:



(Figure 1)

SB_S-1WR2 Series
Recommended typical circuit parameters:
Vin：3.3V/5V
C1：4.7μF/50V
LDM：6.8μH

Vin：12V /15V/24V
C1：4.7μF /50V
LDM：6.8μH
C2：470pF/2KV

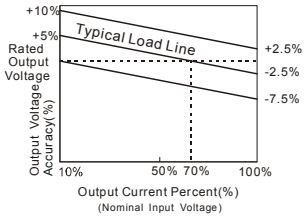
SB_D-1WR2 Series
Recommended typical circuit parameters:
Vin：3.3V/5V
C1：4.7μF /50V
LDM：6.8μH

Vin：12V /15V/24V
C1：4.7μF /50V
LDM：6.8μH
C2：470pF/2KV

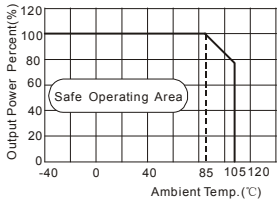
Note:
1.If there is no recommended parameters, the model no require the external component.
2.Typical recommended circuit can meet the vast majority of the EMT specifications, but there are individual models do not meet the specifications.

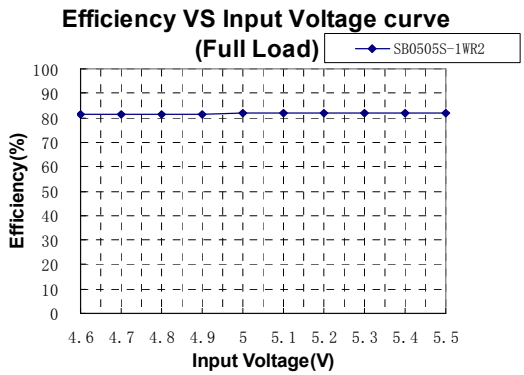
PRODUCT TYPICAL CURVE

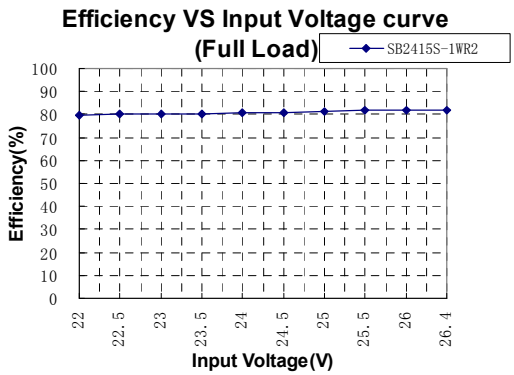
Tolerance Envelope Curve

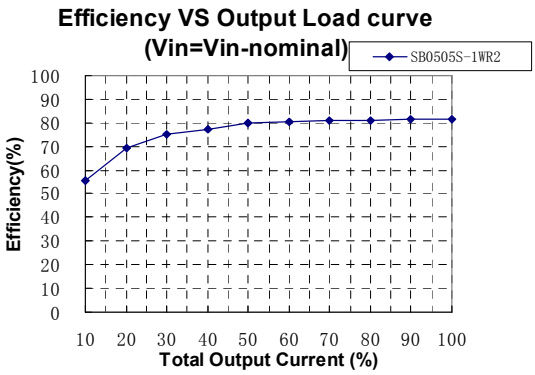


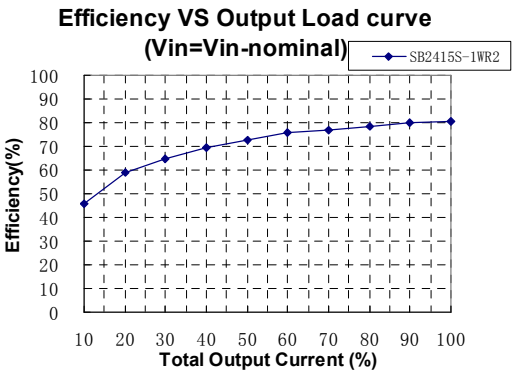
Temperature Derating Curve







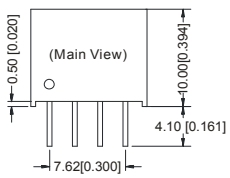


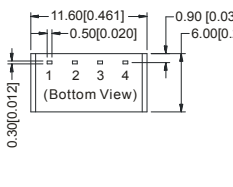


OUTLINE DIMENSIONS、RECOMMENDED FOOTPRINT & PACKAGING

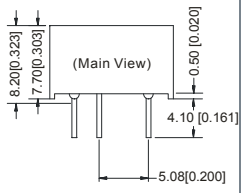
MECHANICAL DIMENSIONS

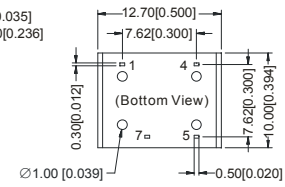
SB_S-1WR2 Series





SB_D-1WR2 Series





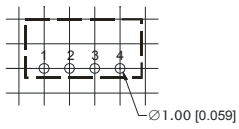
FOOTPRINT DETAILS	
Pin	SB_S-1WR2
1	GND
2	Vin
3	0V
4	+Vo

FOOTPRINT DETAILS	
Pin	SB_D-1WR2
1	GND
4	Vin
5	+Vo
7	0V

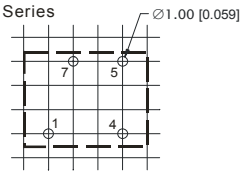
Note:
Unit:mm[inch]
Pin section tolerances:± 0.10mm[± 0.004inch]
General tolerances:± 0.25mm[± 0.010inch]

RECOMMENDED FOOTPRINT

SB_S-1WR2 Series



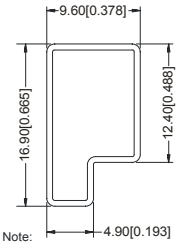
SB_D-1WR2 Series



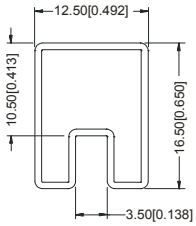
Note: grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS

SB_S-1WR2 Series



SB_D-1WR2 Series

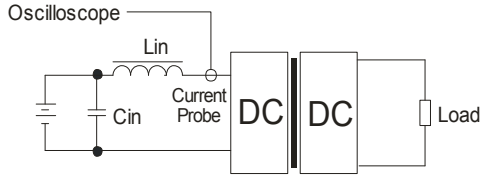


Note:
Unit :mm[inch]
General tolerances: ± 0.50mm[± 0.020inch]
L=530mm[20.866inch] Devices per tube: 43pcs(SB_S-1WR2) 40pcs(SB_D-1WR2)
L=220mm[8.661inch] Devices per tube: 17pcs(SB_S-1WR2) 16pcs(SB_D-1WR2)
Short tube inner packaging dimensions: L*W*H=255*170*80mm;
Short tube outer packaging dimensions(with six inner packaging boxes):
L*W*H=375*280*270mm;
Long tube inner packaging dimensions: L*W*H=580*200*100mm;
Long tube outer packaging dimensions(with two inner packaging boxes):
L*W*H=600*215*220mm;
Long tube outer packaging dimensions(with three inner packaging boxes):
L*W*H=600*215*325mm.

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.



Lin(4.7μH) Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN CONSIDERATIONS

1) Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load ***could not be less than 10% of the full load.*** If the actual output power is very small, please connect a resistor at the output end in parallel to increase the10% load

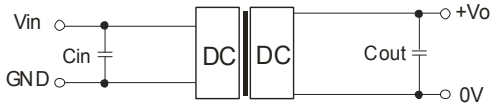
2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to add a circuit breaker to the circuit.

3) Recommended circuit

If you want to further decrease the input/output ripple, a capacitor filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 2).

It should also be noted that the capacitance of filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor refer to (Table 1).



(Figure 2)

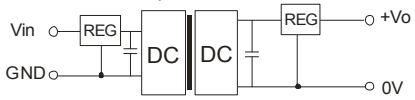
EXTERNAL CAPACITOR TABLE (Table 1)

Vin (VDC)	Cin (μF)	Vo (VDC)	Cout (μF)
3.3/5	4.7	5	10
12	2.2	9	4.7
15	1	12	2.2
24	1	15	1
--	--	24	0.47

It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

4) Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear regulator and an capacitor filtering network with overheat protection that is connected to the input or output end in series (Figure 3), the recommended capacitance of its filter capacitor sees (Table 1), linear regulator based on the actual voltage and current required.



(Figure 3)

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. All characteristics are for listed model only, non-standard models may perform differently, please contact our technical person for more detail.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.