DC/DC Converter

SB_XT-1WR2 Series

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

Continuous Short Circuit Protection

c UL us CE CB Patent Protection RoHS

FEATURES

- Continuous short-circuit protection
- Operating ambient temperature range: -40℃ to +105℃
- Compact SMD package
- I/O isolation test voltage 1.5k VDC
- Internal surface mounted design
- No extra components required
- Industry standard pin-out
- IEC62368, UL60950, EN60950 approved

SB_XT-1WR2 series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for

1. *Where the voltage of the input power supply is stable (voltage variation: ±10%Vin);*
2. *Where isolation between input and output is necessary (isolation voltage ≤1500VDC);*
3. *Where the output voltage regulation and the ripple & noise of the output voltage is not strictly required;*
4. *Typical application: digit circuit condition; normal low-frequency artificial circuit condition; relay drive circuit condition, etc.*

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.		
CE	SB0303XT-1WR2	3.3 (2.97-3.63)	3.3	303/30	65/69	220
UL/CE	SB0305XT-1WR2		5	200/20	70/74	
--	SB0309XT-1WR2		9	111/12	76/80	
CE	SB0312XT-1WR2		12	84/9	76/80	
	SB0315XT-1WR2		15	67/7	76/80	
	SB0324XT-1WR2		24	42/4	76/80	
UL/CE	SB0503XT-1WR2	5 (4.5-5.5)	3.3	303/30	68/72	
	SB0505XT-1WR2		5	200/20	76/80	
	SB0506XT-1WR2		6	167/17	76/80	
	SB0509XT-1WR2		9	111/12	76/80	
	SB0512XT-1WR2		12	84/9	76/80	
	SB0515XT-1WR2		15	67/7	76/80	
	SB0524XT-1WR2		24	42/4	76/80	
	SB1203XT-1WR2	12 (10.8-13.2)	3.3	303/30	68/72	
	SB1205XT-1WR2		5	200/20	76/80	
	SB1209XT-1WR2		9	111/12	76/80	
	SB1212XT-1WR2		12	84/9	76/80	
	SB1215XT-1WR2		15	67/7	76/80	
CE	SB1224XT-1WR2		24	42/4	76/80	
	SB1505XT-1WR2	15 (13.5-16.5)	5	200/20	76/80	
--	SB1509XT-1WR2		9	111/12	76/80	
CE	SB1515XT-1WR2		15	67/7	76/80	
--	SB2403XT-1WR2	24 (21.6-26.4)	3.3	303/30	67/71	
UL/CE	SB2405XT-1WR2		5	200/20	76/80	
UL/CE/CB	SB2409XT-1WR2		9	111/12	76/80	
CE	SB2412XT-1WR2		12	84/9	76/80	
UL/CE	SB2415XT-1WR2		15	67/7	76/80	
	SB2424XT-1WR2		24	42/4	76/80	

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Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V input	--	404/25	--/70	mA
	5V input	--	250/20	--/60	
	12V input	--	104/15	--/50	
	15V input	--	82/10	--/35	
	24V input	--	52/7	--/30	
Reflected Ripple Current		--	15	--	mA
Surge Voltage (1sec. max.)	3.3V input	-0.7	--	5	VDC
	5V input	-0.7	--	9	
	12V input	-0.7	--	18	
	15V input	-0.7	--	21	
	24V input	-0.7	--	30	
Input Filter		Capacitance filters			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			See output regulation curve (Fig. 1)			
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	±1.5	--
		Others	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC output	--	18	--	%
		5VDC output	--	12	--	
		6VDC output	--	10	--	
		9VDC output	--	8	--	
		12VDC output	--	7	--	
		15VDC output	--	6	--	
		24VDC output	--	5	--	
Ripple & Noise*	20MHz bandwidth		--	60	150	mVp-p
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Short-circuit Protection**	SB03xxXT-1WR2/SB24xxXT-1WR2/ SB0524XT-1WR2		--	--	1	s
	Others		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;
** Supply voltage must be discontinued at the end of short-circuit duration for SB03xxXT-1WR2 series, SB24xxXT-1WR2 series, and SB0524XT-1WR2 model.

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	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature≥100℃ (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃, nominal input, full load output	--	25	--	
Storage Humidity	Non-condensing	--	--	95	%RH
Reflow Soldering Temperature		Peak temp.≤245℃, maximum duration time≤60s over 217℃. For actual application, please refer to IPC/JEDEC J-STD-020D.1.			
Switching Frequency	Full load, nominal input voltage	--	100	--	KHz
MTBF	MIL-HDBK-217F@25℃	3500	--	--	K hours

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Mechanical Specifications

Case Material	Black epoxy resin; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	12.70 x 11.20 x 7.25 mm
Weight	1.6g(Typ.)
Cooling Method	Free air convection

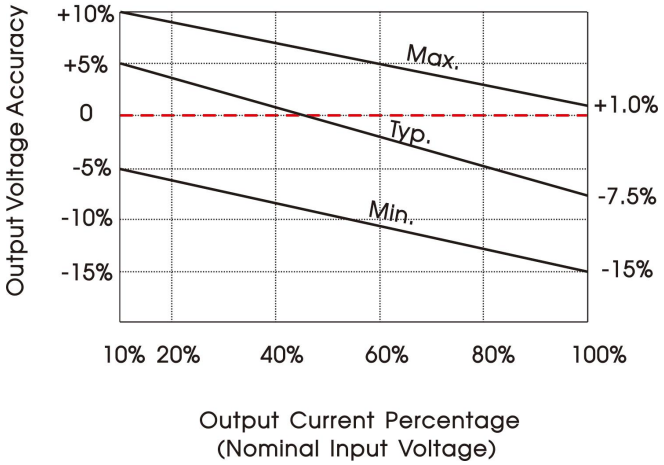
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

Typical Characteristic Curves

3.3VDC output

Output Regulation Curve



Other output

Output Regulation Curve

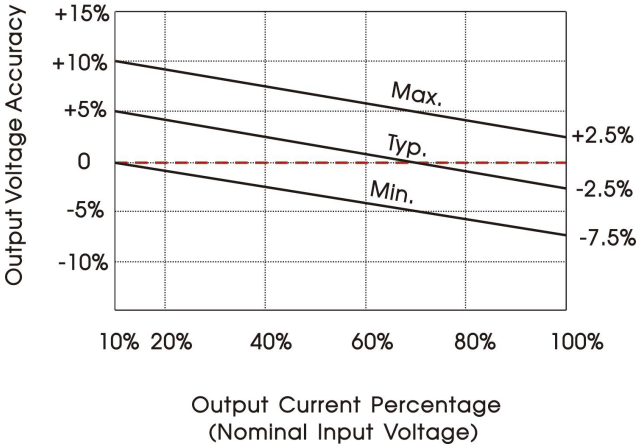


Fig. 1

Temperature Derating Curve

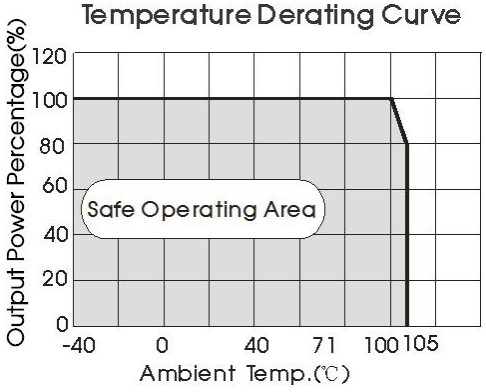
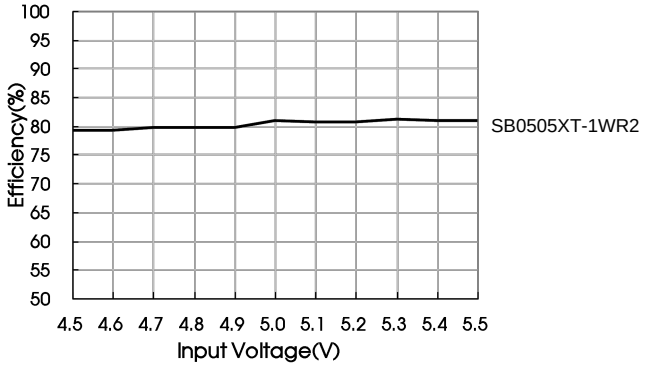
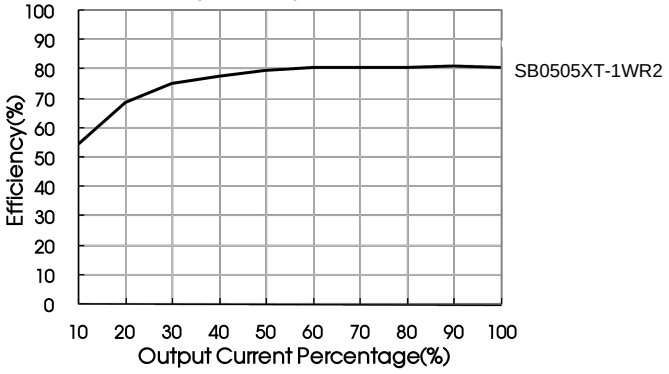


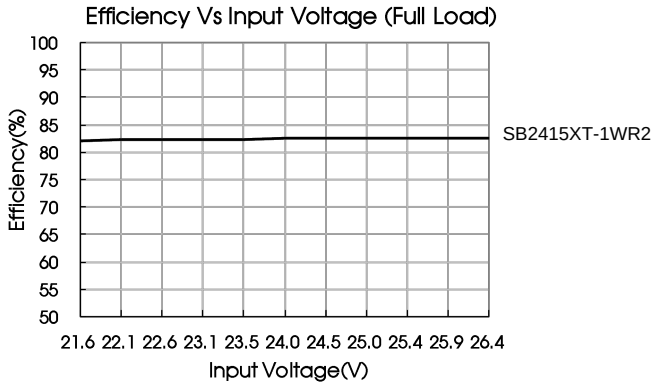
Fig. 2

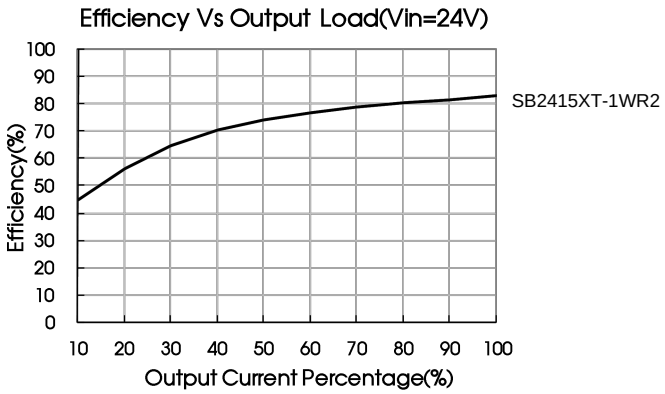
Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load(Vin=5V)







Design Reference

1. Typical application circuit

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.

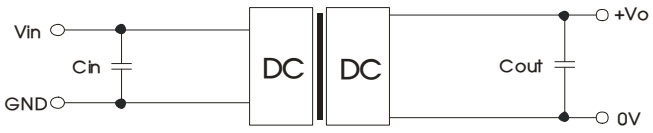


Fig.3

Table 1: Recommended capacitive load value table

Vin(VDC)	Cin(μF)	Vo (VDC)	Cout(μF)
3.3	4.7	3.3	10
5	4.7	5/6	10
12	2.2	9	4.7
15	2.2	12	2.2
24	1	15	1
--	--	24	0.47

2. EMC (CLASS B) compliance circuit

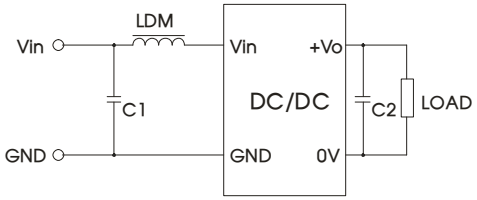


Fig. 4

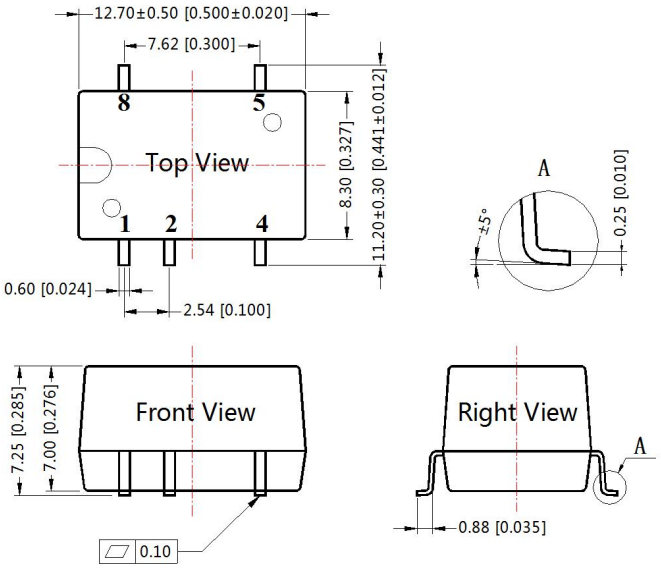
Input voltage (VDC)		3.3/5/12/15/24
Emissions	C1	4.7μF /50V
	C2	Refer to the Cout in Fig.3
	LDM	6.8μH

3. Minimum output load requirement

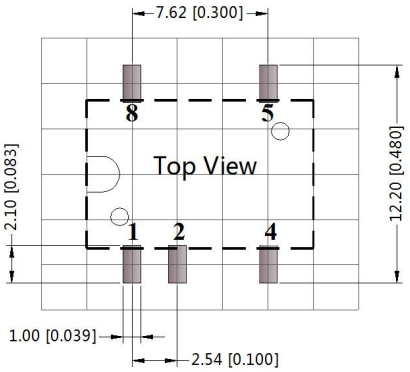
In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



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



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	GND
2	Vin
4	0V
5	+Vo
8	NC

NC: Pin to be isolated from circuitry

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 Ta=25℃, 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.