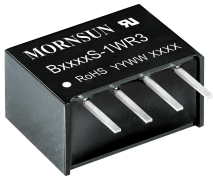
DC/DC Converter

B_S-1WR3 Series

MORNSUN®

1W isolated DC-DC converter

Fixed input voltage, unregulated single output



Continuous Short Circuit Protection

Patent Protection

c UL us Report — UL 62368-1

CE Report — EN 62368-1

UKCA Report — BS EN 62368-1

CB — IEC 62368-1

RoHS

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 85%
- I/O isolation test voltage: 1.5k VDC
- Industry standard pin-out

B_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.		
--	B0303S-1WR3	3.3 (2.97-3.63)	3.3	303/30	75/79	2400
	B0305S-1WR3		5	200/20	78/82	2400
	B0309S-1WR3		9	111/11	81/85	1000
	B0312S-1WR3		12	83/8	78/82	560
	B0315S-1WR3		15	67/7	78/82	560
	B0324S-1WR3		24	42/4	80/84	220
UL/EN/BS EN	B0503S-1WR3	5 (4.5-5.5)	3.3	303/30	70/74	2400
	B0505S-1WR3		5	200/20	78/82	2400
	B0509S-1WR3		9	111/12	79/83	1000
	B0512S-1WR3		12	84/9	79/83	560
	B0515S-1WR3		15	67/7	79/83	560
	B0524S-1WR3		24	42/4	81/85	220
UL/EN/BS EN/IEC	B1203S-1WR3	12 (10.8-13.2)	3.3	303/30	71/75	2400
	B1205S-1WR3		5	200/20	76/80	2400
	B1209S-1WR3		9	111/12	76/80	1000
	B1212S-1WR3		12	83/9	76/80	560
	B1215S-1WR3		15	67/7	77/81	560
	B1224S-1WR3		24	42/5	77/81	220
	B1505S-1WR3	15 (13.5-16.5)	5	200/20	76/80	2400
	B1509S-1WR3		9	111/12	76/80	1000
	B1512S-1WR3		12	83/9	76/80	560
	B1515S-1WR3		15	67/7	77/81	560
--	B1524S-1WR3		24	42/5	77/81	220
UL/EN/BS EN/IEC	B2403S-1WR3	24 (21.6-26.4)	3.3	303/30	69/75	2400
	B2405S-1WR3		5	200/20	73/79	2400
	B2409S-1WR3		9	111/12	74/80	1000
	B2412S-1WR3		12	83/9	75/81	560
	B2415S-1WR3		15	67/7	75/81	560
	B2424S-1WR3		24	42/5	75/81	220

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V input	3.3VDC output	--	384/10	405/--	mA
		Other output	--	370/18	389/--	
	5V input	3.3VDC output	--	271/8	286/--	
		5VDC output	--	244/8	257/--	
		9VDC/12VDC/15VDC output	--	241/12	254/--	
		24VDC output	--	241/18	254/--	
	12V input	3.3VDC output	--	112/8	118/--	
		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.)	3.3VDC input		-0.7	--	5	VDC
	5VDC input		-0.7	--	9	
	12VDC input		-0.7	--	18	
	15VDC input		-0.7	--	21	
	24VDC input		-0.7	--	30	
Input Filter			Capacitance filter			
Hot Plug			Unavailable			

Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	1.5	--
		Other output	--	--	1.2	
Load Regulation	3.3VDC input 10%-100% load	3.3VDC output	--	12	18	%
		Other output	--	8	15	
	5VDC input 10%-100% load	3.3VDC output	--	15	20	
		5VDC output	--	10	15	
		9VDC output	--	8	10	
		12VDC output	--	7	10	
		15VDC output	--	6	10	
		24VDC output	--	5	10	
	12VDC/15VDC/24VVDC input 10%-100% load	3.3VDC output	--	8	20	
		5VDC output	--	5	15	
		9VDC output	--	3	10	
		12VDC output	--	3	10	
		15VDC output	--	3	10	
		24VDC output	--	2	10	

Ripple & Noise*	20MHz bandwidth	Other output	--	30	75	mVp-p
		24VDC output	--	50	100	
Temperature Coefficient	Full load		--	±0.02	--	%/℃
Short-Circuit Protection			Continuous, self-recovery			
Note:* 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
	5V input, input-output electric strength test for 1 second with a leakage current of 1mA max.		3000	--	--	
Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	20	--	pF
Operating Temperature	3.3V input	Derating when operating temperature≥100℃, (see Fig. 2)	-40	--	105	℃
	Other output	Derating when operating temperature≥85℃, (see Fig. 2)				
Storage Temperature			-55	--	125	
Case Temperature Rise	Ta=25℃		--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
Storage Humidity	Non-condensing	5V input	--	--	95	%RH
		Other output	5	--	95	
Vibration	3.3V/12V/15V/24V input		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	3.3V input, full load, nominal input voltage		--	220	--	kHz
	5V input, full load, nominal input voltage		--	270	--	
	12V/15V/24V input, full load, nominal input voltage		--	260	--	
MTBF	MIL-HDBK-217F @ 25℃		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

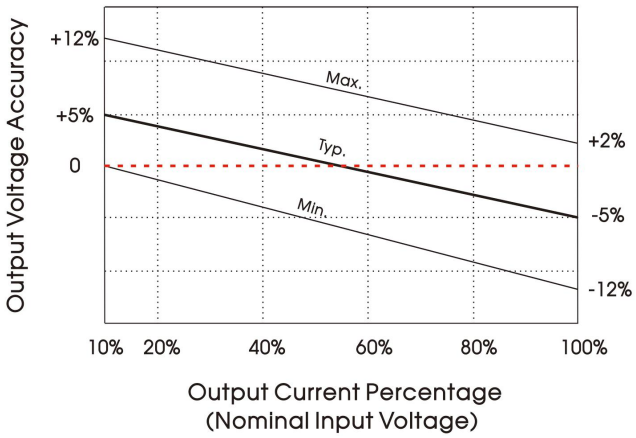
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B
Note: Refer to Fig.4 for recommended circuit test.		

Typical Characteristic Curves

3.3VDC output

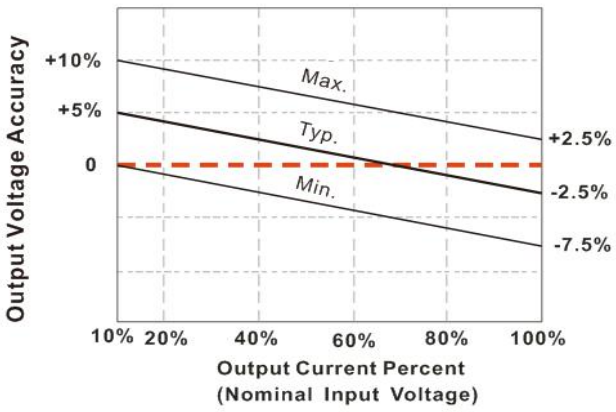
Output Regulation Curve



3.3/5VDC input

Other output

Output Regulation Curve



12VDC/15VDC/24VDC input

Other output

Output Regulation Curve

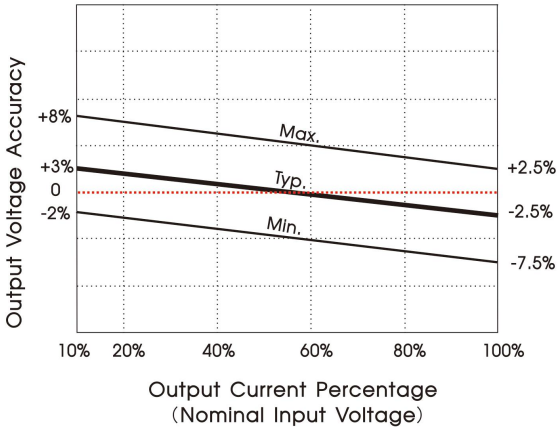
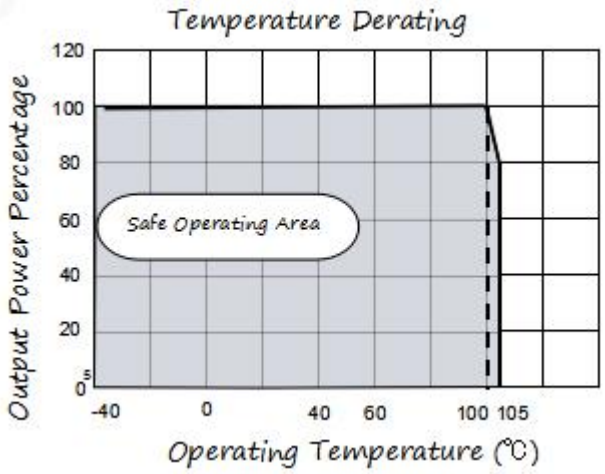


Fig. 1

3.3VDC input



5VDC/12VDC/15VDC/24VDC input

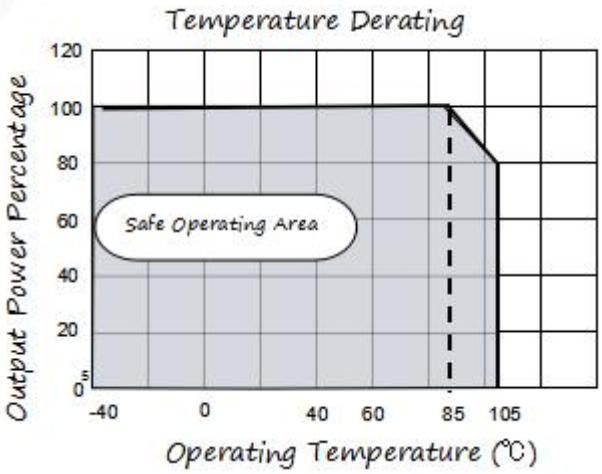
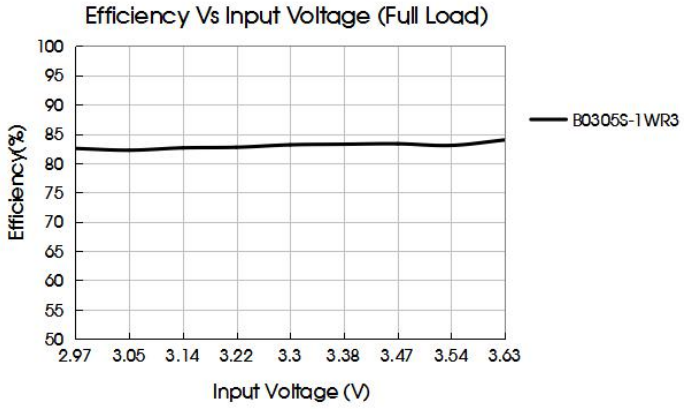
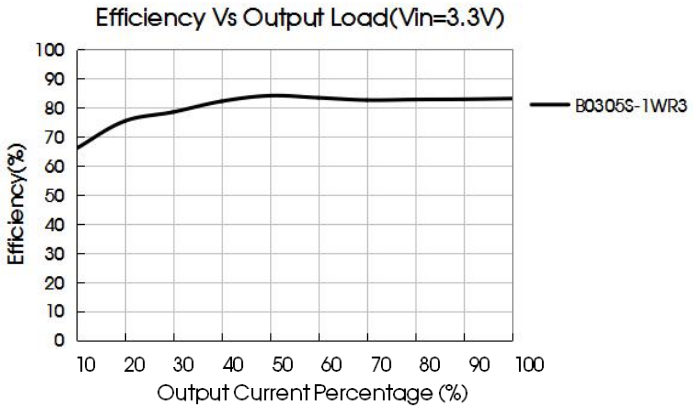
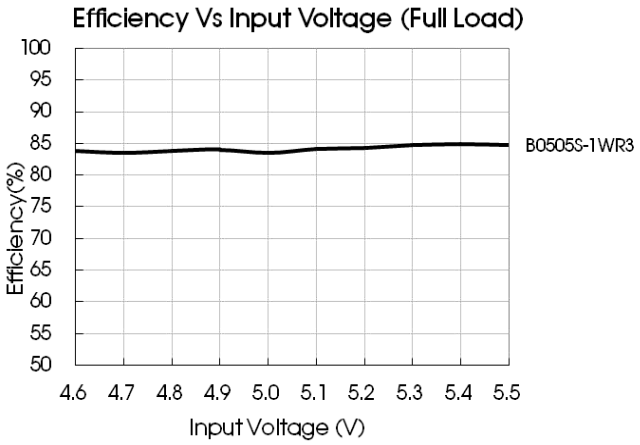
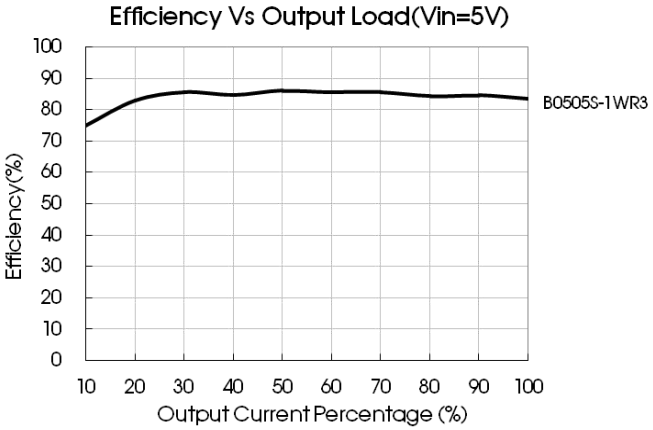


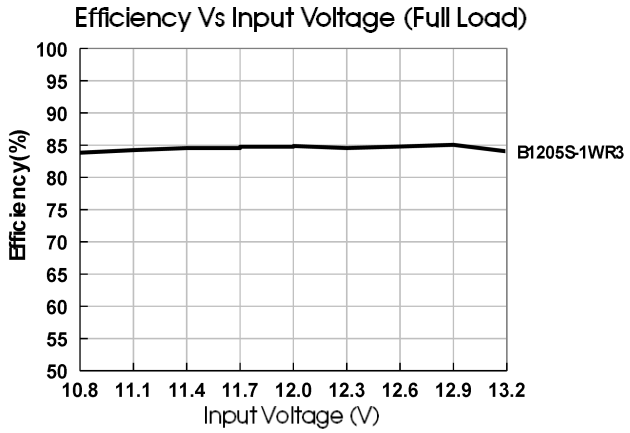
Fig. 2

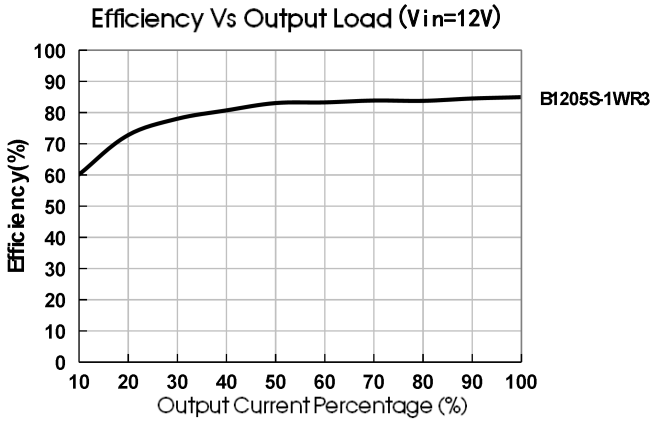












Design Reference

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.

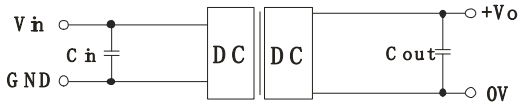


Fig.3

Table 1: Recommended input and output capacitor values

Vin	Cin	Vo	Cout
3.3VDC	10μF/25V	3.3VDC	10μF/16V
5VDC	4.7μF/16V	5VDC	10μF/16V
12VDC	2.2μF/25V	9VDC	2.2μF/16V
15VDC	2.2μF/25V	12VDC	2.2μF/25V
24VDC	1μF/50V	15VDC	1μF/25V
--	--	24VDC	1μF/50V

2. EMC compliance circuit

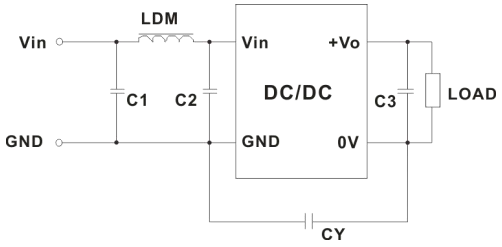


Fig. 4

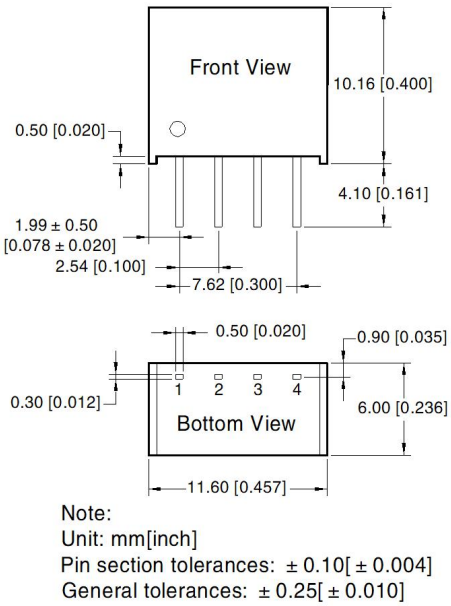
Table 2: Recommended EMC filter values

Input voltage		3.3DVC		5DVC		12/15/24DVC
Output voltage		3.3/5VDC	9/12/15/24VDC	3.3/5/9VDC	12/15/24VDC	--
Emissions	C1/C2	4.7μF /16V	4.7μF/16V	4.7μF/25V	4.7μF/25V	4.7μF/50V
	CY	--	270pF /4kVDC VISHAY HGZ102MBP	100pF/4kV	1000pF/4kV	270pF/2kV
	C3	Refer to the Cout in table 1				
	LDM	6.8μH				

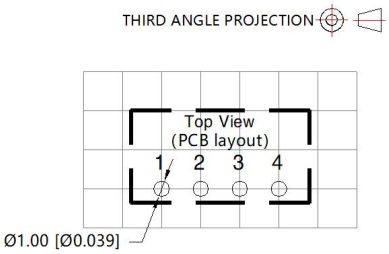
3. For additional information please refer to DC-DC converter application notes on

www.mornsun-power.com

Dimensions and Recommended Layout



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



Note: Grid 2.54*2.54mm

Pin	Mark
1	GND
2	Vin
3	0V
4	+Vo

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200003;
2. 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;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on our company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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