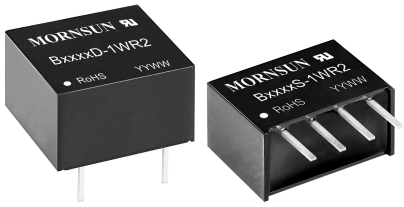
1W isolated DC-DC with Fixed Input Voltage; unregulated Single Output



Continuous Short Circuit Protection

c UL us CE CB Patent Protection RoHS

FEATURES

- Continuous short-circuit protection
- High efficiency up to 80%
- Operating ambient temperature -40℃ to +105℃
- Compact SIP/DIP package
- Industry standard pin-out
- I/O isolation test voltage 1.5k VDC
- IEC60950, UL60950, EN60950 approval

B_S-1WR2 & B-D-1WR2 series is designed for use in distributed power supply systems and especially suitable in applications such as pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits, where:

1. *The voltage of the input power supply is relatively stable with a variation of ±10%Vin or less;*
2. *An input to output isolation voltage of up to 1500VDC is necessary;*
3. *The requirement for a tight output regulation and low ripple & noise is not as strict.*

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-1WR2	3.3 (2.97-3.63)	3.3	303/30	68/72	220
UL/CE/CB	B0305S-1WR2		5	200/20	72/76	
	B0312S-1WR2		12	84/9	76/80	
--	B0303D-1WR2		3.3	303/30	68/72	
	B0305D-1WR2		5	200/20	72/76	
UL/CE/CB	B0503S-1WR2	5 (4.5-5.5)	3.3	303/30	68/72	
	B0505S-1WR2		5	200/20	76/80	
	B0509S-1WR2		9	111/12	76/80	
	B0512S-1WR2		12	84/9	76/80	
	B0515S-1WR2		15	67/7	76/80	
	B0524S-1WR2		24	42/4	76/80	
--	B0503D-1WR2		3.3	303/30	68/72	
UL/CE/CB	B0505D-1WR2		5	200/20	76/80	
	B0509D-1WR2		9	111/12	76/80	
	B0512D-1WR2		12	84/9	76/80	
	B0515D-1WR2		15	67/7	76/80	
	B0524D-1WR2		24	42/4	76/80	
--	B1203S-1WR2	12 (10.8-13.2)	3.3	303/30	68/72	
UL/CE/CB	B1205S-1WR2		5	200/20	76/80	
	B1209S-1WR2		9	111/12	76/80	
	B1212S-1WR2		12	84/9	76/80	
	B1215S-1WR2		15	67/7	76/80	
	B1224S-1WR2		24	42/4	76/80	
--	B1203D-1WR2		3.3	303/30	68/72	
UL/CE/CB	B1205D-1WR2		5	200/20	76/80	
	B1209D-1WR2		9	111/12	76/80	
	B1212D-1WR2		12	84/9	76/80	
	B1215D-1WR2		15	67/7	76/80	
--	B1505S-1WR2	15 (13.5-16.5)	5	200/20	76/80	220
	B1512S-1WR2		12	84/9	76/80	
	B1515S-1WR2		15	67/7	76/80	

--	B1505D-1WR2	15 (13.5-16.5)	5	200/20	76/80	220
	B1509D-1WR2		9	111/12	76/80	
	B1515D-1WR2		15	67/7	76/80	
UL/CE/CB	B2403S-1WR2	24 (21.6-26.4)	3.3	303/30	68/72	
	B2405S-1WR2		5	200/20	76/80	
	B2409S-1WR2		9	111/12	76/80	
	B2412S-1WR2		12	84/9	76/80	
	B2415S-1WR2		15	67/7	76/80	
	B2424S-1WR2		24	42/4	76/80	
--	B2403D-1WR2		3.3	303/30	68/72	
UL/CE/CB	B2405D-1WR2		5	200/20	76/80	
	B2409D-1WR2		9	111/12	76/80	
	B2412D-1WR2		12	84/9	76/80	
	B2415D-1WR2		15	67/7	76/80	
	B2424D-1WR2		24	42/4	76/80	

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V input	--	404/30	--/70	mA
	5V input	--	277/20	--/60	
	12V input	--	115/15	--/50	
	15V input	--	83/10	--/35	
	24V input	--	57/17	--/30	
Reflected Ripple Current		--	15	--	mA
Surge Voltage (1sec. max.)	3.3 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		Filter capacitor			
Hot Plug		Unavailable			

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	10%-100% load	3.3VDC output	--	18	--	%
		5VDC output	--	12	--	
		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**	B03xxS-1WR2/B03xxD-1WR2/B24xxS-1WR2/ B24xxD-1WR2/B0524S-1WR2/ B0524D-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.
** At the end of the short circuit duration, the supply voltage must be disconnected from following models: B03xxS-1WR2 / B03xxD-1WR2 series, B24xxS-1WR2/ B24xxD-1WR2 series, and B0524S-1WR2/B0524D-1WR2.

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 up to 85℃, (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃, 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	--	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	100	--	kHz
MTBF	MIL-HDBK-217F @ 25℃	3500	--	--	k hours

Mechanical Specifications

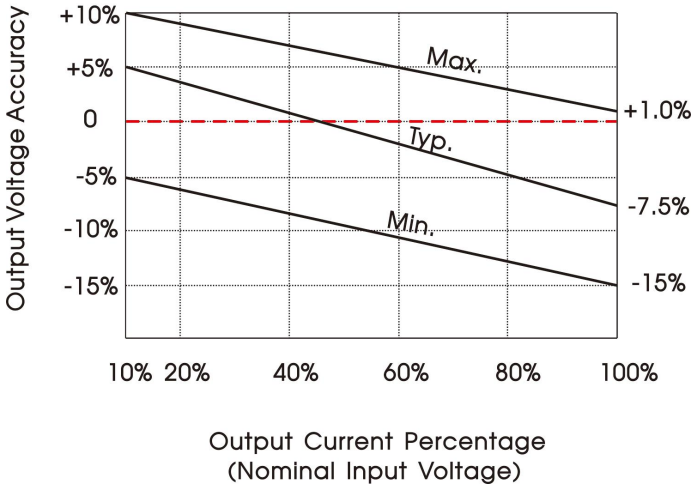
Case Material		Black plastic; flame-retardant and heat-resistant (UL94-V0)
Dimensions	B_S-1WR2 series	11.60 x 6.00 x 10.16 mm
	B_D-1WR2 series	12.70 x 10.16 x 8.20 mm
Weight	B_S-1WR2 series	1.3g (Typ.)
	B_D-1WR2 series	1.8g (Typ.)
Cooling Method		Free air convection

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 Performance Curves

3.3VDC output
Output Regulation Curve



All other output voltages
Output Regulation Curve

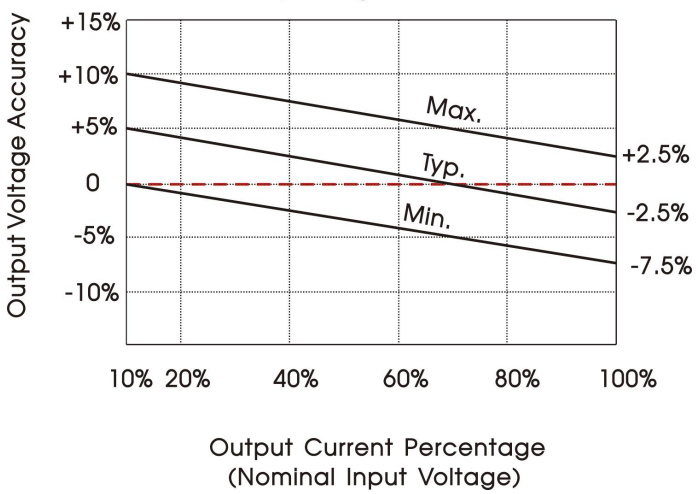


Fig. 1

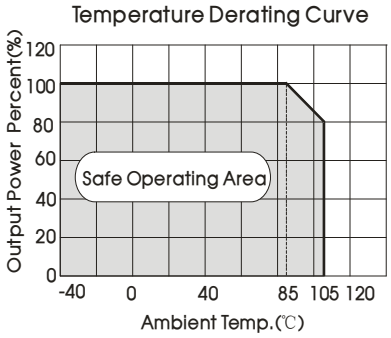
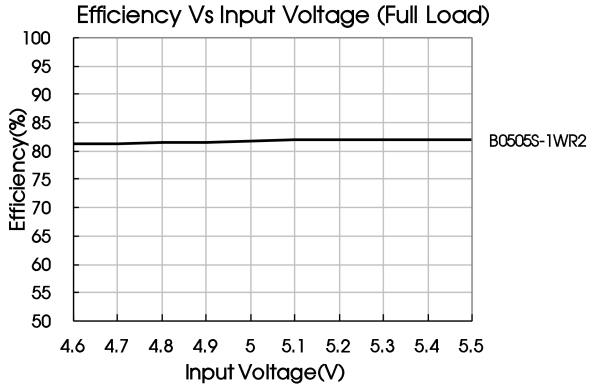
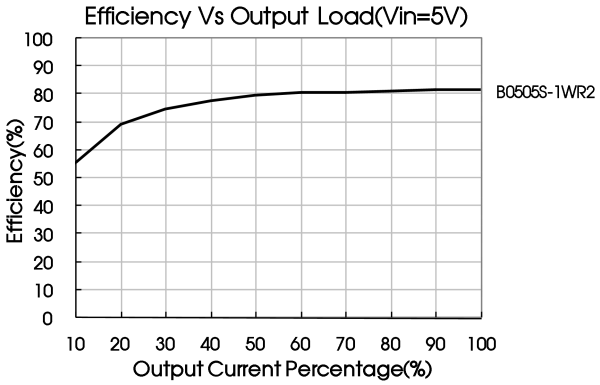
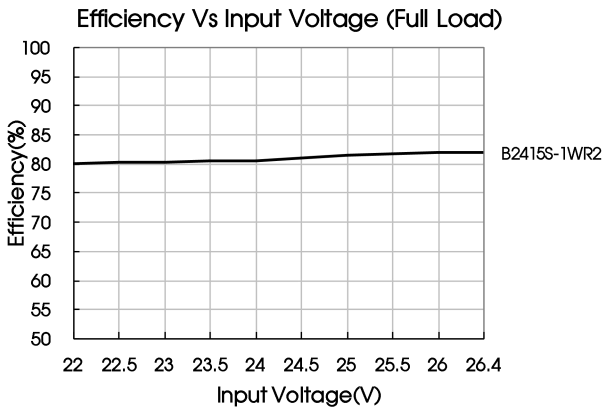
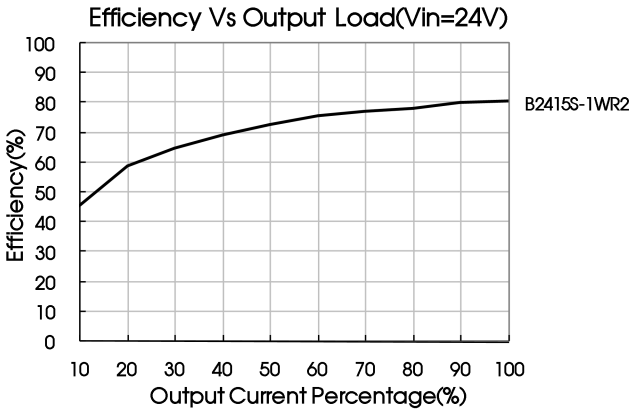


Fig. 2









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.

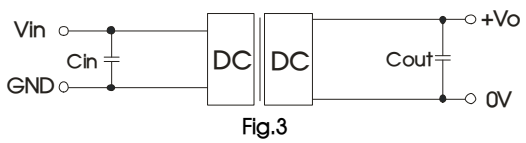


Fig.3

Table 1: Recommended input and output capacitor values

Vin(VDC)	Cin(μF)	Vo (VDC)	Cout(μF)
3.3/5	4.7	3.3/5	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

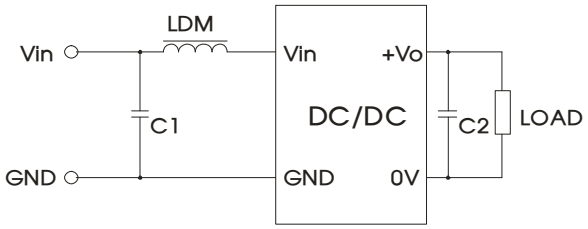


Fig. 4

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

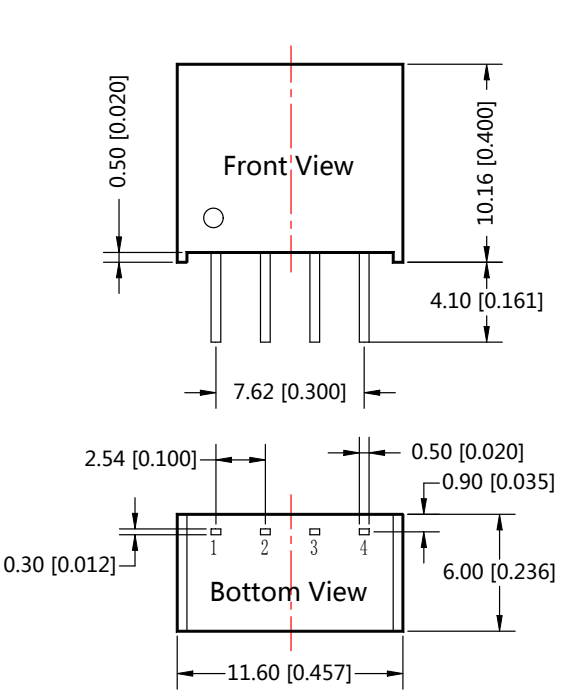
3. Minimum Output Load Requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

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

www.mornsun-power.com

Dimensions and Recommended Layout (B_S-1WR2)

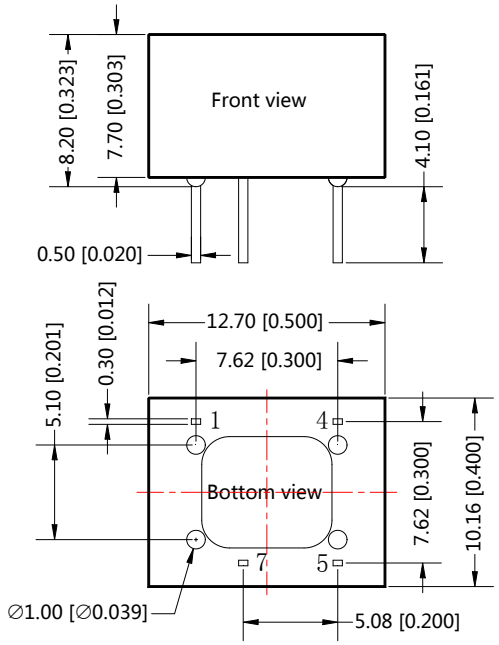


Note : Grid 2.54*2.54mm

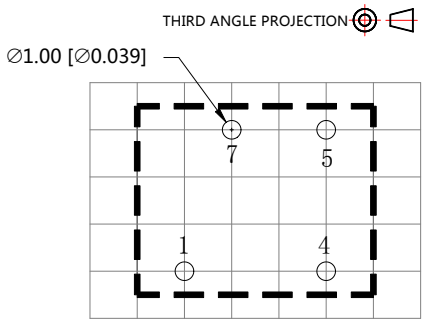
Pin-Out	
Pin	Function
1	GND
2	Vin
3	0V
4	+Vo

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

Dimensions and Recommended Layout (B_D-1WR2)



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
4	Vin
5	+Vo
7	0V

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200003(B_S-1WR2), 58200011(B_D-1WR2);
2. In order to guarantee product performance and datasheet compliance, the product must be operated within specifications and load range requirement;
3. The specified maximum capacitive load is tested under full load condition and over the input voltage range;
4. All parameters in this datasheet were measured under following conditions: Ta=25℃, relative humidity<75%RH, nominal input voltage and rated output load (unless otherwise specified);
5. All index testing methods in this datasheet are based on our corporate Company standards;
6. For special requirements and customization service, please contact your nearest MORNUSN sales representative or one of our technicians;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be handled according to ISO14001 and related environmental laws and regulations by qualified personnel only.

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