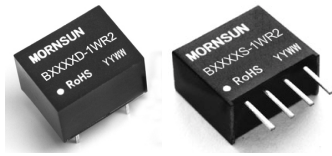


# MORNSUN®

## B\_S-1WR2 & B\_D-1WR2 Series 1W, FIXED INPUT, ISOLATED & UNREGULATED SINGLE OUTPUT DC-DC CONVERTER



Patent Protection RoHS



Continuous Short Circuit Protection

### PRODUCT FEATURES

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

### APPLICATIONS

The B\_S-1WR2 & B\_D-1WR2 Series are designed for application where isolated output is required from a distributed power system.

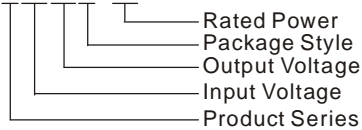
These products apply to where:

- 1) Input voltage variation  $\leq \pm 10\%$ ;
- 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.

### PART NUMBER SYSTEM

B0505S-1WR2



### SELECTION GUIDE

Model Number	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load( $\mu$ F)	Efficiency (%, typ.) @Max. Load	Approval
			Max.	Min.	@Max. Load	@No Load				
*B0303S/D-1WR2	3.3 (2.97-3.63)	3.3	303	30	380	30	15	220	80	
*B0305S/D-1WR2		5	200	20	380				80	
*B0503S/D-1WR2	5 (4.5-5.5)	3.3	303	30	250	20	10	220	80	
B0505S/D-1WR2		5	200	20	250				80	
*B0507S/D-1WR2		7.2	138	14	250				80	
*B0509S/D-1WR2		9	111	12	250				80	
*B0512S/D-1WR2		12	83	9	248				81	
*B0515S/D-1WR2		15	67	7	248				81	
*B0524S/D-1WR2		24	42	4	248				81	
*B1203S/D-1WR2		12 (10.8-13.2)	3.3	303	30				104	15
*B1205S/D-1WR2	5		200	20	104	80				
*B1209S/D-1WR2	9		111	12	104	80				
*B1212S/D-1WR2	12		83	9	103	81				
*B1215S/D-1WR2	15 (13.5-16.5)	15	67	7	104	10	5	220	80	
*B1505S/D-1WR2		5	200	20	83				80	
*B1515S/D-1WR2		15	67	6	82				81	
*B2403S/D-1WR2	24 (21.6-26.4)	3.3	303	30	52	7	5	220	80	
B2405S/D-1WR2		5	200	20	52				80	
*B2409S/D-1WR2		9	111	12	52				80	
*B2412S/D-1WR2		12	83	9	50				81	
*B2415S/D-1WR2		15	67	7	50				82	
*B2424S/D-1WR2		24	42	4	50				82	

Note:\*Designing.

### 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		C 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 $\pm 1\%$ (3.3V output)	--	--	$\pm 1.5$	%	
	For Vin change of $\pm 1\%$ (Others)	--	--	$\pm 1.2$		
Load Regulation	10% to 100% load	(3.3V output)	--	15		20
		(5V/7.2V output)	--	10		15
		(9V output)	--	10		15
		(12V output)	--	8		15
		(15V output)	--	7	15	
(24V output)	--	6	15			
Temperature Drift	100% full load	--	--	$\pm 0.03$	%/°C	
Ripple & Noise*	20MHz Bandwidth	Output Voltage $\leq 12V$	--	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	B2424S/D-1WR2	--	30	--	pF
		Others	--	20	--	
Switching Frequency	Full load, nominal input	--	100	300	KHz	
MTBF	MIL-HDBK-217F @25°C	3500	--	--	K hours	
Case Material		Plastic(UL94-V0)				
Weight	B_S-1WR2 Series	--	1.2	--	g	
	B_D-1WR2 Series	--	1.8	--		

## ENVIRONMENTAL SPECIFICATIONS

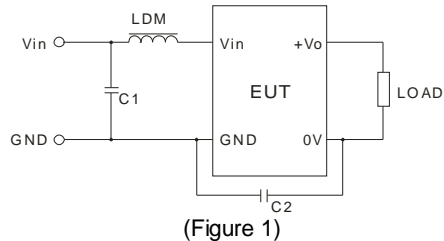
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temp. rise at full load		--	25	--	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

## EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS B (External Circuit Refer to Figure1)
EMS	ESD	IEC/EN61000-4-2 Contact $\pm 8KV$ perf. Criteria B

## EMC RECOMMENDED CIRCUIT

EMI Recommended External Circuit (CLASS B):



### B\_S-1WR2 Series

Recommended external circuit parameters:

Vin: 3.3V/5V/12V  
 C1: 475K /50V  
 LDM: 6.8μH  
 Vin: 15V/24V  
 C1: 475K /50V  
 LDM: 6.8μH  
 C2: 470pF/2KV

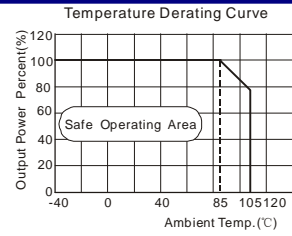
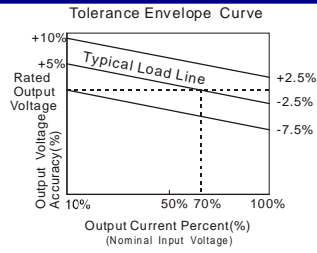
### B\_D-1WR2 Series

Recommended external circuit parameters:

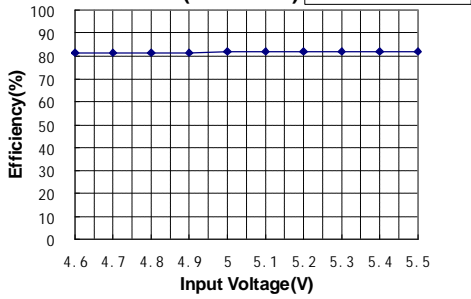
Vin: 3.3V/5V/12V  
 C1: 475K /50V  
 LDM: 6.8μH  
 Vin: 15V/24V  
 C1: 475K /50V  
 LDM: 6.8μH  
 C2: 470pF/2KV

Note: If there is no recommended parameters, the model no require the external component.

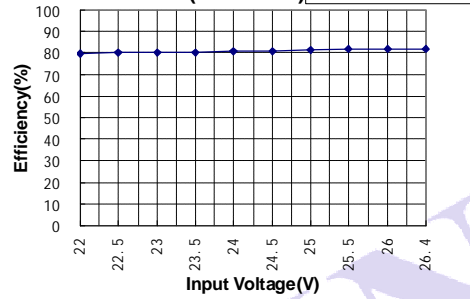
# PRODUCT TYPICAL CURVE



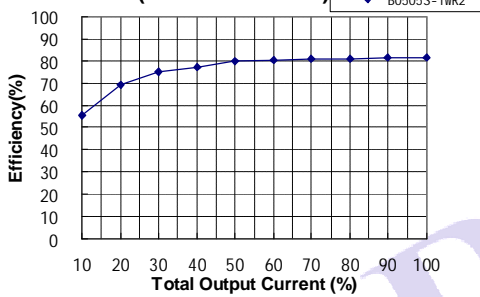
**Efficiency VS Input Voltage curve (Full Load)**



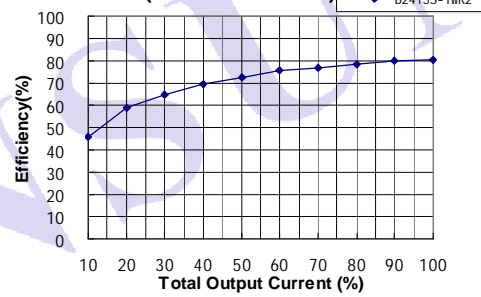
**Efficiency VS Input Voltage curve (Full Load)**



**Efficiency VS Output Load curve (Vin=Vin-nominal)**



**Efficiency VS Output Load curve (Vin=Vin-nominal)**



# OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

**MECHANICAL DIMENSIONS**

**B\_S-1WR2 Series**

(Main View)

(Bottom View)

**B\_D-1WR2 Series**

(Main View)

(Bottom View)

Pin	B_S-1WR2
1	GND
2	Vin
3	0V
4	+Vo

Pin	B_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**

**B\_S-1WR2 Series**

**B\_D-1WR2 Series**

Note: grid 2.54\*2.54mm.

**TUBE OUTLINE DIMENSIONS**

**B\_S-1WR2 Series**

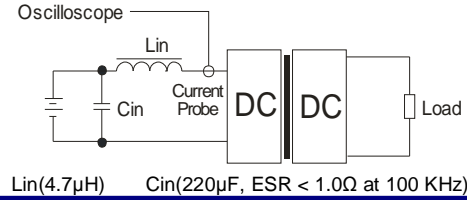
**B\_D-1WR2 Series**

Note:  
 Unit: mm[inch]  
 General tolerances: ± 0.50mm [± 0.020inch]  
 L=530mm [20.866inch] Devices per tube: 43pcs (B\_S-1WR2) 40pcs (B\_D-1WR2)  
 L=220mm [8.661inch] Devices per tube: 17pcs (B\_S-1WR2) 16pcs (B\_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  $L_{in}$  and Capacitor  $C_{in}$  to simulate source impedance.



## 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 the load, or use our company's products with a lower rated output power.

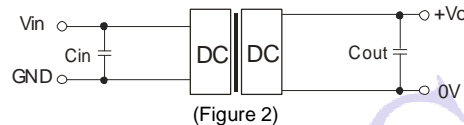
### 2) Overload Protection

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).



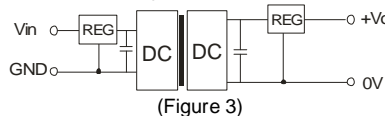
(Figure 2)  
EXTERNAL CAPACITOR TABLE (Table 1)

Vin (VDC)	Cin (μF)	Vo (VDC)	Cout (μF)
3.3/5	4.7	3.3/5	10
12	2.2	7.2/9	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.



### 5) Cannot use in parallel and hot swap

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  $T_a=25^{\circ}\text{C}$ , 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.

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