

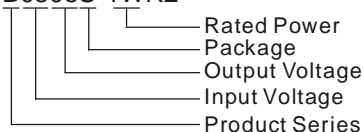
## B\_S-1WR2 & B\_D-1WR2 Series 1W, FIXED INPUT, ISOLATED & UNREGULATED SINGLE OUTPUT DC-DC CONVERTER



Patent Protected RoHS

### PART NUMBER SYSTEM

B0505S-1WR2



### PRODUCT FEATURES

- Efficiency up to 82%
- Miniature SIP/DIP Package
- 1500VDC Isolation
- Operating Temperature Range: -40°C ~ +105°C
- 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 range  $\pm 10\%$  Vin;
- 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 relay drive circuit.

### SELECTION GUIDE

Model	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA, Typ.)	Max. Capacitive Load(μF)	Efficiency (%. Typ.) @Max. Load
			Max.	Min.	@Max. Load	@No Load			
B0303S/D-1WR2	3.3 (2.97-3.63)	3.3	303	30	405	25	15	220	75
B0305S/D-1WR2		5	200	20	380				80
B0503S/D-1WR2	5 (4.5-5.5)	3.3	303	30	263	20			76
B0505S/D-1WR2		5	200	20	250				80
B0509S/D-1WR2		9	111	12	250				80
B0512S/D-1WR2		12	84	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				111
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		67	7	103	80			
B1515S/D-1WR2	15 (13.5-16.5)	15	67	7	82	10			81
B2403S/D-1WR2	24 (21.6-26.4)	3.3	303	30	55	7			76
B2405S/D-1WR2		5	200	20	52				80
B2409S/D-1WR2		9	111	12	52				80
B2412S/D-1WR2		12	84	9	50				81
B2415S/D-1WR2		15	67	7	50				82
B2424S/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		Capacitor			

## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	See tolerance envelope curve					
Line Voltage Regulation	For Vin change of ±1%	3.3V output	--	--	±1.5	%
		Others	--	--	±1.2	
Load Regulation	10% to 100% load	3.3V output	--	18	--	
		5V output	--	12	--	
		9V output	--	8	--	
		12V output	--	7	--	
		15V output	--	6	--	
		24V output	--	5	--	
Temperature drift coefficient	100% load	--	--	±0.03	%/°C	
Ripple & Noise*	20MHz Bandwidth	Output Voltage ≤12V	--	30	--	
		Others	--	60	--	
Short Circuit Protection	Continuous, automatic recovery					

Note:\* Ripple and noise tested with "parallel cable" method. See detailed operation instructions at *DC-DC Application Notes*.

## COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output, Tested for 1 minute and leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Input-Output, Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	--	20	--	pF
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

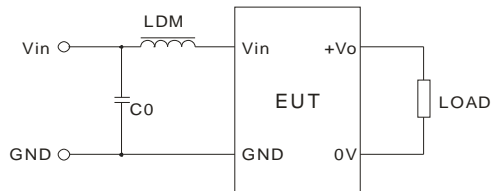
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C see Figure 2)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temperature rise	Ta=25°C, 100% Load	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling	Free air convection				

## EMC SPECIFICATIONS

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

## EMC RECOMMENDED CIRCUIT

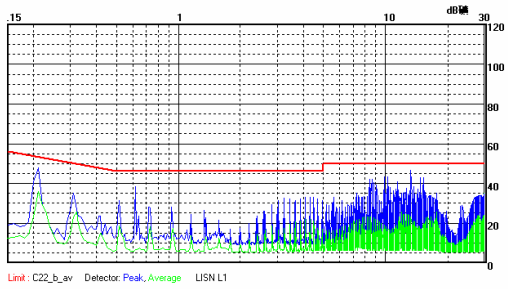
EMI Typical Recommended Circuit (CLASS B) :



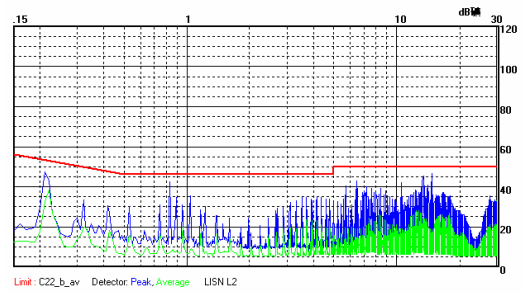
Recommended typical circuit parameters:

	Vin(V)	3.3/5/12/15/24
EMI	C0	4.7μF /50V
	LDM	6.8μH

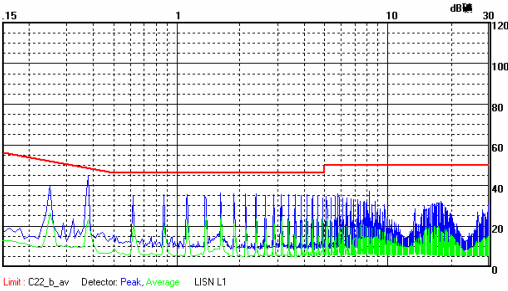
# EMI TEST WAVEFORM (RECOMMENDED CIRCUIT FIGURE 1)



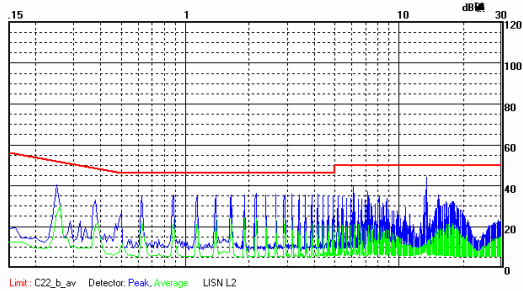
B0505S-1WR2 CE(Class B, Positive line)



B0505S-1WR2 CE(Class B, Negative line)

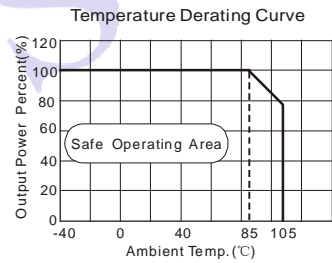
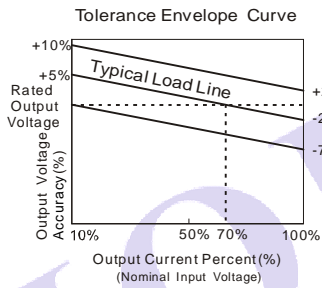


B0512D-1WR2 CE(Class B, Positive line)

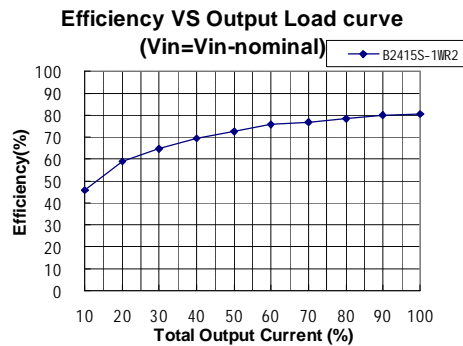
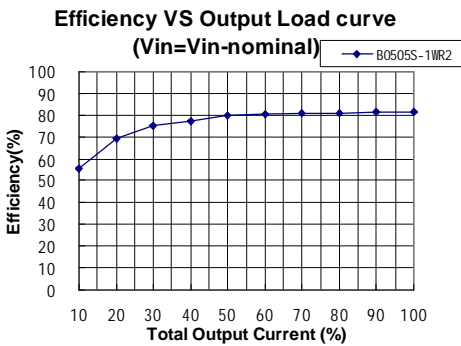
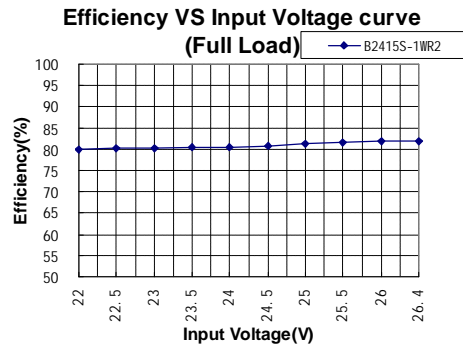
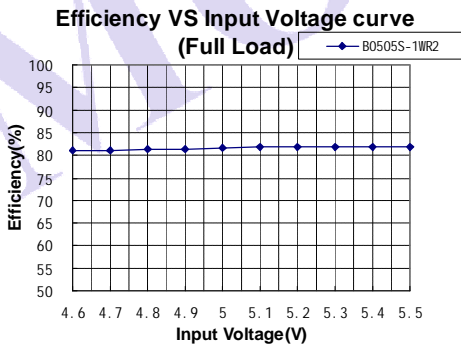


B0512D-1WR2 CE(Class B, Negative line)

# PRODUCT TYPICAL CURVE

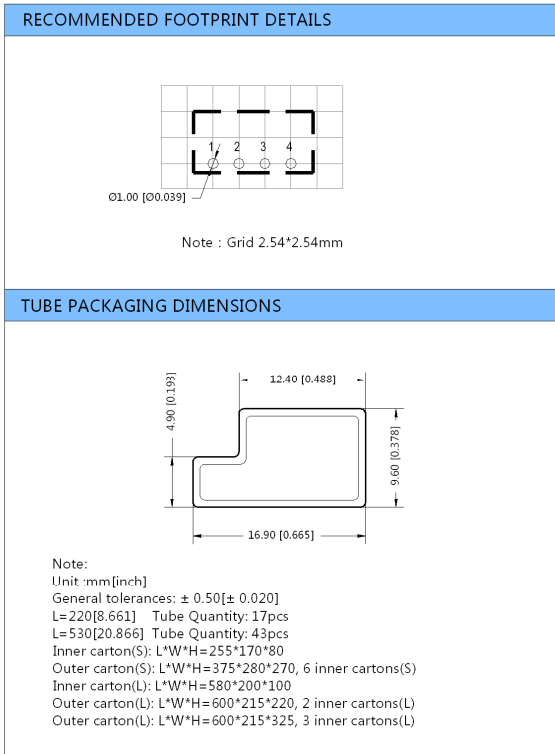
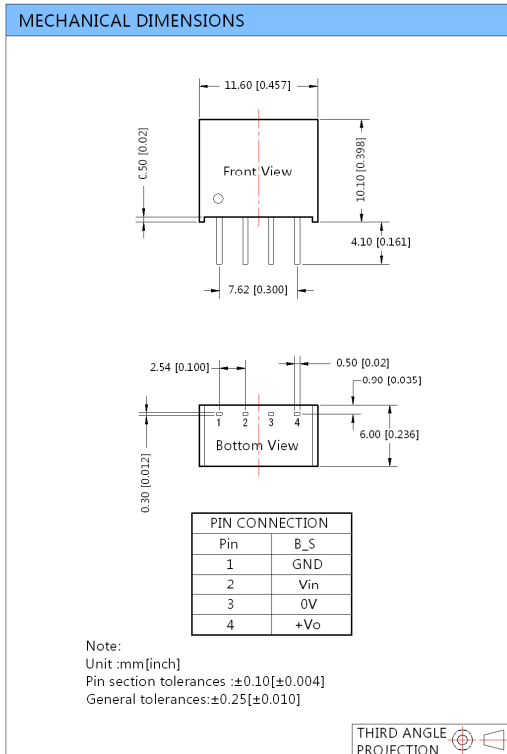


(Figure 2)

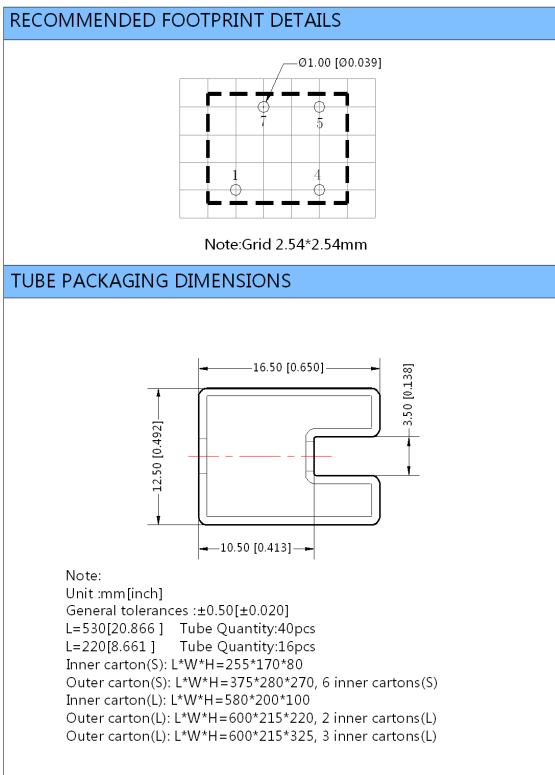
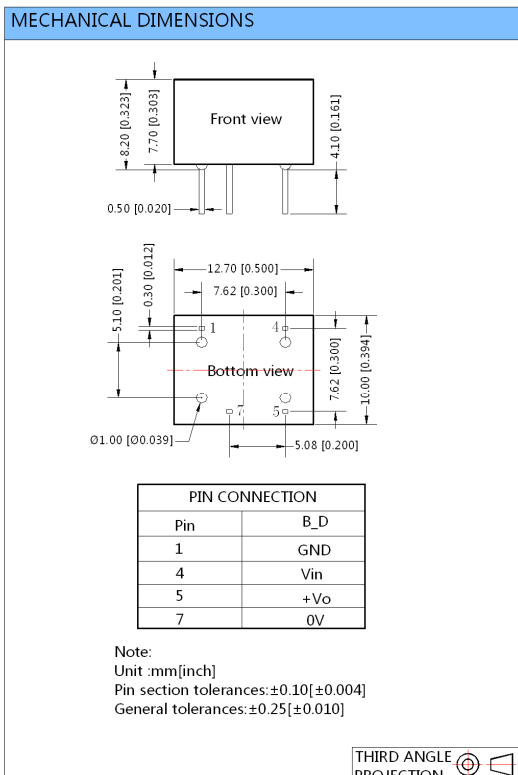


# DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

## B\_S-1WR2



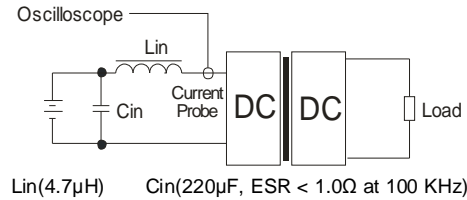
## B\_D-1WR2



## 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 for output load

To ensure this module can operate efficiently and reliably, 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 to the output in parallel to increase the load.

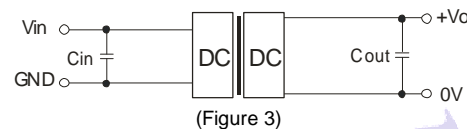
### 2) Overload Protection

Under normal operating conditions, the output circuit of these products have not overload protection. The simplest method is to add a breaker circuit in the circuit.

### 3) Recommended circuit

If you want to further decrease the input/output ripple, an capacitor filtering network may be connected to the input and output ends of the DC/DC converter, refer to Figure 3.

It should also be noted that the capacitance of the capacitor must be proper. If the capacitance is too large, a startup problem might arise. For ensuring every channel of output can provide a safe and reliable operation, the recommended capacitance of the capacitor refer to Table 1.



(Figure 3)

EXTERNAL CAPACITOR TABLE (Table 1)

V <sub>in</sub> (VDC)	C <sub>in</sub> (μF)	V <sub>o</sub> (VDC)	C <sub>out</sub> (μF)
3.3/5	4.7	3.3/5	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) The input and the output of the product are recommended to be connected to ceramic capacitor or electrolytic capacitor. Using tantalum capacitor may cause risk of failure**

**5) It is not recommended to increase the output power capability by connecting two or more converters in parallel. The product is not hot-swappable**

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specifications.
2. Max. Capacitive Load is tested at nominal input voltage and full load.
3. Unless otherwise noted, All specifications are measured at  $T_a=25^{\circ}\text{C}$ , humidity<75%, nominal input voltage and rated output load.
4. In this datasheet, all test methods are based on our corporate standards.
5. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more detail.
6. Please contact our technical support for any specific requirement.
7. Specifications of this product are subject to changes without prior notice.

### **MORNSUN Science & Technology Co.,Ltd.**

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou, P.R.China.

Tel: 86-20-38601850

Fax:86-20-38601272

E-mail: [info@mornsun.cn](mailto:info@mornsun.cn)

[Http://www.mornsun-power.com](http://www.mornsun-power.com)