

# MORNSUN®

## A\_D-2WR2 & B\_D-2WR2 SERIES 2W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



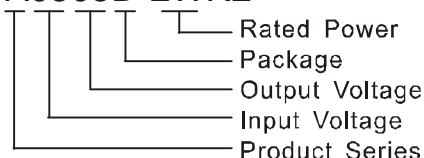
Patent Protected RoHS

### FEATURES

- Miniature DIP package
- Efficiency up to 86%
- High power density
- 1500VDC isolation
- Operating temperature range:  
-40°C ~ +85°C
- No external component required
- Industry standard pinout

### PART NUMBER SYSTEM

A0505D-2WR2



### APPLICATIONS

The A\_D-2WR2 & B\_D-2WR2 Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

- 1) Input voltage rang :±10%Vin;
- 2) 1500VDC 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 ① (μF)	Efficiency (%) @Max. Load	
			Max.	Min.	@Max. Load	@No Load			Min.	Typ.
B0305D-2WR2	3.3 (2.97-3.63)	5	400	40	797	40	15	220	72	76
A0505D-2WR2	5 (4.5-5.5)	±5	±200	±20	500	25	15	100	76	80
A0509D-2WR2		±9	±111	±11	476				80	84
A0512D-2WR2		±12	±83	±8	476				80	84
A0515D-2WR2		±15	±67	±7	476				80	84
A0524D-2WR2		±24	±42	±4	476				80	84
B0503D-2WR2		3.3	400	40	335				75	79
B0505D-2WR2		5	400	40	506				75	79
B0509D-2WR2		9	222	22	476				80	84
B0512D-2WR2		12	167	17	476				80	84
B0515D-2WR2		15	133	13	476				80	84
B0524D-2WR2	24	83	8	476	80	84				
A0905D-2WR2	9 (8.1-9.9)	±5	±200	±20	278	20	15	100	76	80
A0909D-2WR2		±9	±111	±11	271				78	82
A0912D-2WR2		±12	±83	±8	274				77	81
A0915D-2WR2		±15	±67	±7	268				79	83
A0924D-2WR2		±24	±42	±4	268				79	83
B0905D-2WR2		5	400	40	278				76	80
B0909D-2WR2		9	222	22	271				78	82
B0912D-2WR2		12	167	17	274				77	81
B0915D-2WR2		15	133	13	268				79	83
B0924D-2WR2		24	83	8	268				79	83

Model	Input Voltage(VDC)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA, Typ.)	Max. Capacitive Load ① (μF)	Efficiency (%) @ Max. Load	
	Nominal (Range)		Max.	Min.	@Max. Load	@No Load			Min.	Typ.
A1205D-2WR2	12 (10.8-13.2)	±5	±200	±20	208	15	15	100	76	80
A1209D-2WR2		±9	±111	±11	194				82	86
A1212D-2WR2		±12	±83	±8	201				79	83
A1215D-2WR2		±15	±67	±7	196				81	85
A1224D-2WR2		±24	±42	±4	196				81	85
B1205D-2WR2		5	400	40	203			220	78	82
B1209D-2WR2		9	222	22	196				81	85
B1212D-2WR2		12	167	17	203				78	82
B1215D-2WR2		15	133	13	198				80	84
B1224D-2WR2		24	83	8	194				82	86
A1505D-2WR2	15 (13.5-16.5)	±5	±200	±20	167	15	15	100	76	80
A1509D-2WR2		±9	±111	±11	159				80	84
A1512D-2WR2		±12	±83	±8	165				77	81
A1515D-2WR2		±15	±67	±7	157				81	85
A1524D-2WR2		±24	±42	±4	157				81	85
B1505D-2WR2		5	400	40	167			220	76	80
B1509D-2WR2		9	222	22	159				80	84
B1512D-2WR2		12	167	17	165				77	81
B1515D-2WR2		15	133	13	157				81	85
B1524D-2WR2		24	83	8	157				81	85
A2405D-2WR2	24 (21.6-26.4)	±5	±200	±20	104	8	15	100	76	80
A2409D-2WR2		±9	±111	±11	98				81	85
A2412D-2WR2		±12	±83	±8	100				79	83
A2415D-2WR2		±15	±67	±7	99				80	84
A2424D-2WR2		±24	±42	±4	100				79	83
B2405D-2WR2		5	400	40	104			220	76	80
B2409D-2WR2		9	222	22	99				81	84
B2412D-2WR2		12	167	17	100				79	83
B2415D-2WR2		15	133	13	99				80	84
B2424D-2WR2		24	83	8	100				79	83

Note: ① for each output.

## INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec.max.)	3.3VDC input	-0.7	--	5	VDC
	5VDC input	-0.7	--	9	
	9VDC input	-0.7	--	12	
	12VDC input	-0.7	--	18	
	15VDC input	-0.7	--	21	
	24VDC input	-0.7	--	30	
Input Filter		Capacitance Filter			

## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		See tolerance envelope curve			
Line Regulation	For Vin change of ±1%	--	--	±1.2	%

Load Regulation	10% to 100% load	3.3V output	--	15	--	%
		5V output	--	12	--	
		9V output	--	9	--	
		12V output	--	8	--	
		15V output	--	7	--	
		24V output	--	6	--	
Temperature Drift	100% load		--	--	±0.03	%/°C
Ripple & Noise*	20MHz bandwidth	Output Voltage ≤ 12V	--	60	--	mVp-p
		Output Voltage: 15V, 24V	--	75	--	
Short Circuit Protection**	Input Voltage: 9V, 24V and A0512D-2WR2, A0515D-2WR2, A0524D-2WR2		--	--	1	s
	Others	Continuous, automatic recovery				

Note: 1.\*Ripple and noise tested by "parallel cable" method. See detailed operation instructions at DC-DC Application Notes.

2.\*\*For the products of 9V and 24V Input Voltage and A0512D-2WR2, A0515D-2WR2, A0524D-2WR2, supply voltage must be discontinued at the end of short circuit duration.

### 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	100% load, nominal input	--	100	300	KHz
MTBF	MIL-HDBK-217F@25°C	3500	--	--	K hours
Case Material		Plastic (UL94-V0)			
Weight		--	2.4	--	g

### ENVIRONMENTAL SPECIFICATIONS

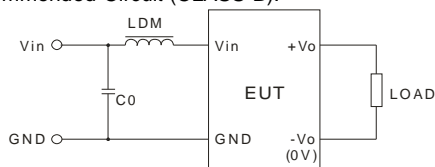
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C, see Figure 2)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise at full load	Ta=25°C	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		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	A_D-2WR2	IEC/EN61000-4-2 Contact ±6KV perf. Criteria B		
		B_D-2WR2	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B		

### EMC RECOMMENDED CIRCUIT

EMI Typical Recommended Circuit (CLASS B):

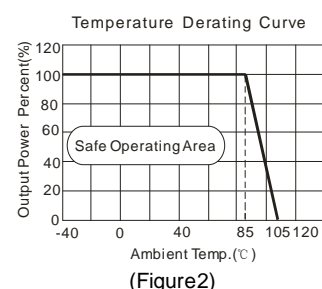
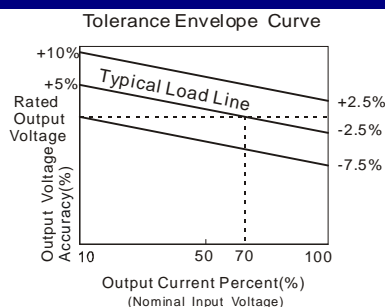


(Figure1)

Recommended external circuit parameters:

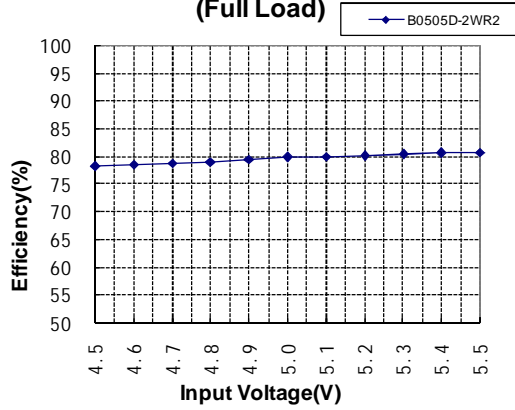
EMI	Vin(V)	3.3/5/9/12/15/24
	C0	4.7μF /50V
	LDM	6.8μH

### PRODUCT TYPICAL CURVE

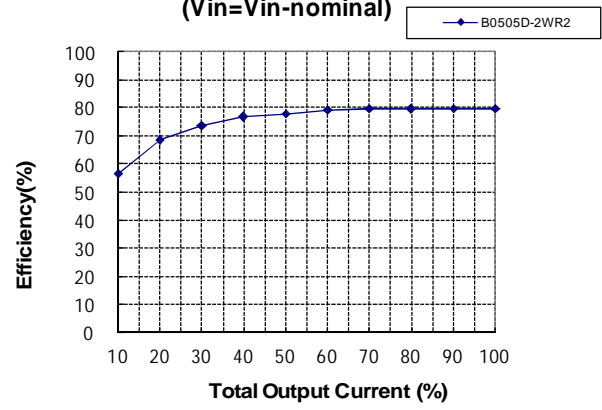


(Figure2)

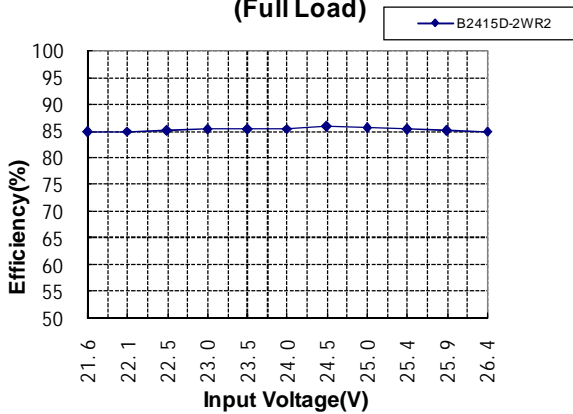
**Efficiency VS Input Voltage curve (Full Load)**



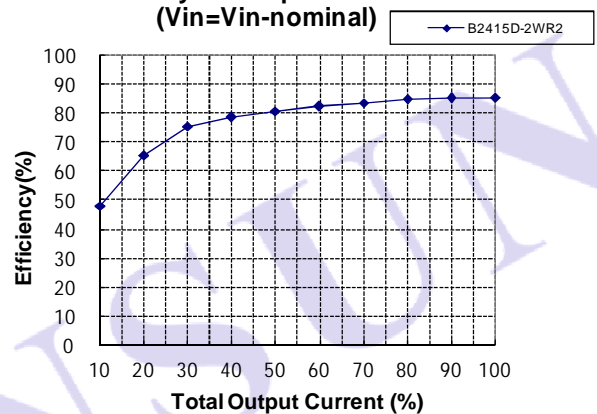
**Efficiency VS Output Load curve (Vin=Vin-nominal)**



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

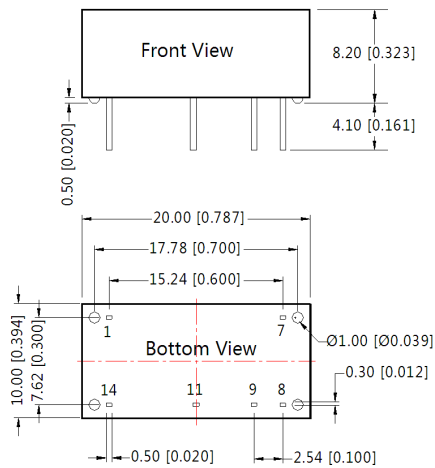


**Efficiency VS Output Load curve (Vin=Vin-nominal)**



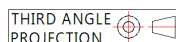
**DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING**

**MECHANICAL DIMENSIONS**

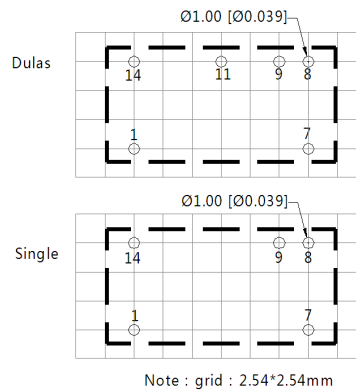


PIN CONNECTION		
Pin	Single	Dulas
1	GND	GND
7	NC	NC
8	0V	0V
9	+Vo	+Vo
11	No Pin	-Vo
14	Vin	Vin

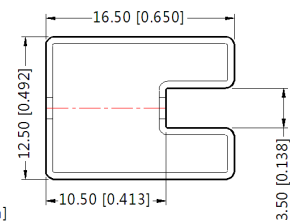
Note:  
 NC: No connection  
 Unit :mm[inch]  
 Pin section tolerances :±0.10[±0.004]  
 General tolerances:±0.25[±0.010]



**RECOMMENDED FOOTPRINT DETAILS**



**TUBE PACKAGING DIMENSIONS**

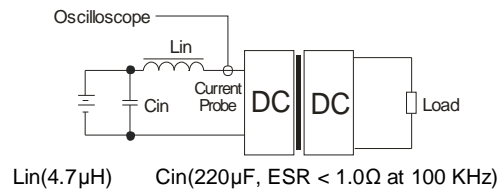


Note :  
 Unit:mm[inch]  
 General tolerances : ±0.50[±0.020]  
 L=530[20.866] Tube Quantity:25pcs  
 L=220[8.661] Tube Quantity:10pcs  
 Inner carton(S): L\*W\*H=255\*170\*80  
 Outer carton(S): L\*W\*H=375\*280\*270, 6 inner cartons(S)  
 Inner carton(L): L\*W\*H=580\*200\*100  
 Outer carton(L): L\*W\*H=600\*215\*220, 2 inner cartons(L)  
 Outer carton(L): L\*W\*H=600\*215\*325, 3 inner cartons(L)

## 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 is not less than 10% of the full load. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power.

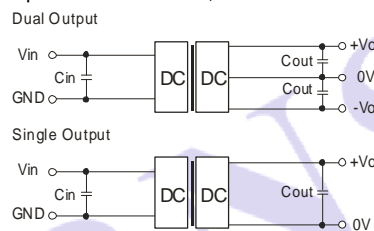
### 2) Overload Protection

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 3).

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 sees (Table 1).



(Figure 3)

EXTERNAL CAPACITOR TABLE (Table 1)

Vin (VDC)	Cin ( $\mu$ F)	Single Vout (VDC)	Cout ( $\mu$ F)	Dual Vout (VDC)	Cout# ( $\mu$ F)
3.3	4.7	3.3	10	$\pm 5$	4.7
5	4.7	5	10	$\pm 9$	2.2
9	2.2	9	4.7	$\pm 12$	1
12	2.2	12	2.2	$\pm 15$	0.47
15/24	1	15/24	1	$\pm 24$	0.47

Note: # for each output. 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)