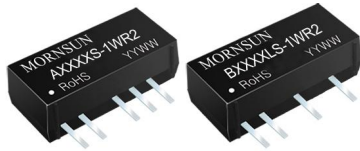


# MORNSUN®

## A\_S-1WR2 & B\_LS-1WR2 Series 1W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



Patent Protected RoHS



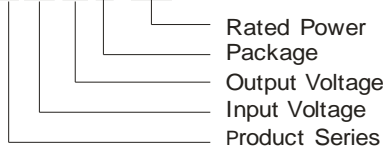
Continuous Short  
Circuit Protection

### FEATURES

- Miniature SIP package
- Efficiency up to 81%
- High power density
- 1500VDC isolation
- Operating temperature range:  
-40°C ~ +105°C
- No external component required
- Industry standard pinout
- Continuous short circuit protection  
(automatic recovery)

### PART NUMBER SYSTEM

A0515S-1WR2



### APPLICATIONS

The A\_S-1WR2 & B\_LS-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:  $\pm 10\%V_{in}$ ;
- 2) 1500VDC input and output isolation;

3) Regulated and low ripple noise is not required,

Such as: digital circuit, low frequency analog circuit, and relay drive circuit.

### SELECTION GUIDE

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 (% Typ.) @Max. Load
	Nominal (Range)			Max.	Min.	@Max. Load	@No Load			
B0303LS-1WR2	3.3 (2.97-3.63)	3.3	303	30	415	25		220	73	
B0305LS-1WR2		5	200	20	388				78	
A0503S-1WR2	5 (4.5-5.5)	±3.3	±152	±15	274	20	15	100	73	
A0505S-1WR2		±5	±100	±10	250				80	
A0512S-1WR2		±12	±42	±5	250				80	
A0515S-1WR2		±15	±33	±4	248				81	
A0524S-1WR2		±24	±21	±2	248				81	
B0503LS-1WR2		3.3	303	30	267				75	
B0505LS-1WR2		5	200	20	250					80
B0512LS-1WR2		12	83	9	250					80
B0515LS-1WR2		15	67	7	248					81
B0524LS-1WR2		24	42	5	248					81
A1203S-1WR2	12 (10.8-13.2)	±3.3	±152	±15	114	15		100	73	
A1205S-1WR2		±5	±100	±10	92				80	
A1212S-1WR2		±12	±42	±5	90				81	
A1215S-1WR2		±15	±33	±4	90				81	
B1203LS-1WR2		3.3	303	30	111				75	
B1205LS-1WR2		5	200	20	92					80
B1212LS-1WR2		12	83	9	92					80
B1215LS-1WR2		15	67	7	90					81
B1215LS-1WR2		15	67	7	90					81
A1505S-1WR2		15 (13.5-16.5)	±5	±100	±10				84	10
A1515S-1WR2	±15		±33	±4	84	81				
B1505LS-1WR2	5		200	20	84	80				
B1515LS-1WR2	15		67	7	84		81			

A2403S-1WR2	24 (21.6-26.4)	±3.3	±152	±15	60	7	15	100	73
A2405S-1WR2		±5	±100	±10	53				80
A2412S-1WR2		±12	±42	±5	51				81
A2415S-1WR2		±15	±33	±4	51				80
A2424S-1WR2		±24	±21	±2	51				80
B2403LS-1WR2		3.3	303	30	60			220	75
B2405LS-1WR2		5	200	20	56				79
B2412LS-1WR2		12	83	9	51				81
B2415LS-1WR2		15	67	7	52				81
B2424LS-1WR2		24	42	4	52				81

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	
	12VDC Input	-0.7	--	18	
	15VDC Input	-0.7	--	21	
	24VDC Input	-0.7	--	30	
Input Filter				Capacitor	

## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		See tolerance envelope curve				
Line 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	--	
		12V output	--	8	--	
		15V output	--	7	--	
		24V output	--	6	--	
Temperature coefficient	100% load	--	--	±0.03	%/°C	
Ripple & Noise*	20MHz Bandwidth	Output Voltage ≤12V	--	30	--	mVp-p
		15V,24V Output Voltage	--	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		Epoxy Resin (UL94-V0)			
Weight		--	2.4	--	g

## ENVIRONMENTAL SPECIFICATIONS

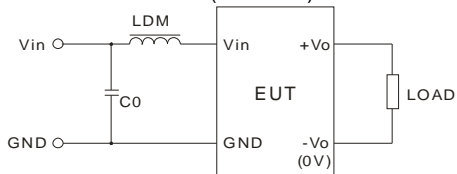
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C, see Figure 2)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temp. rise at full load	Ta=25°C	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		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_S-1WR2 IEC/EN61000-4-2 Contact ±6KV perf. Criteria B
		B_LS-1WR2 IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

## EMC RECOMMENDED CIRCUIT

EMI Typical Recommended Circuit(CLASS B):

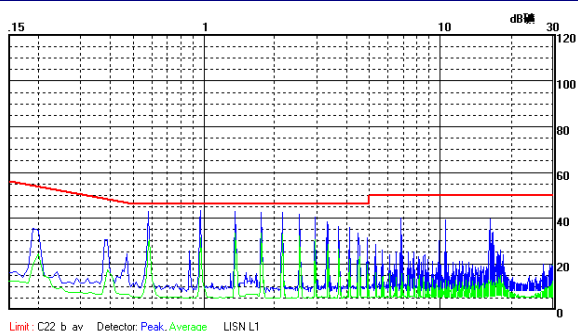


(Figure 1)

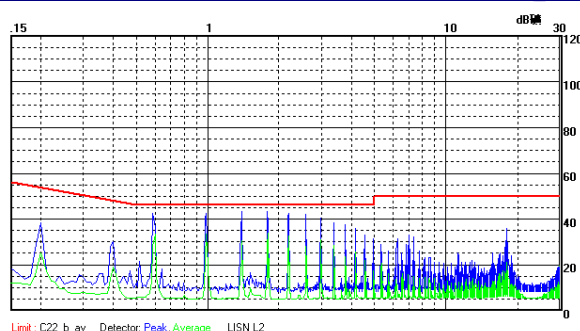
Recommended external circuit parameters:

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

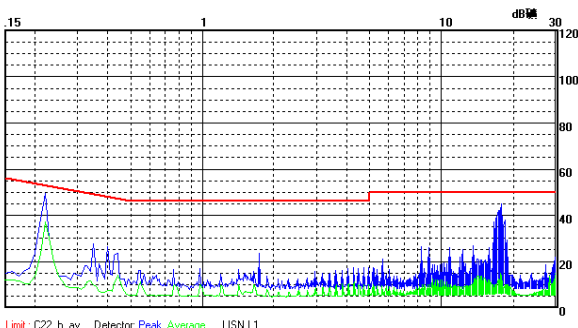
## EMI TEST WAVEFORM (RECOMMENDED CIRCUIT FIGURE 1)



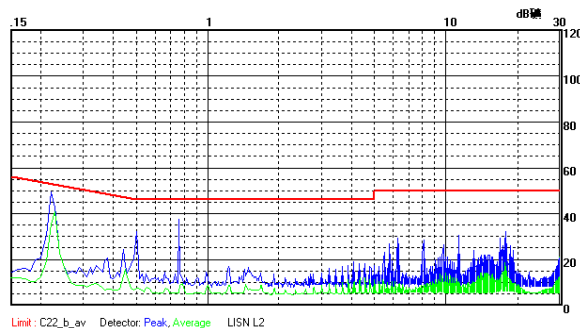
A2415S-1WR2 CE(Class B, Positive line)



A2415S-1WR2 CE(Class B, Negative line)

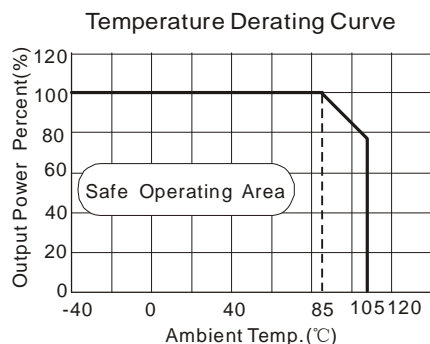
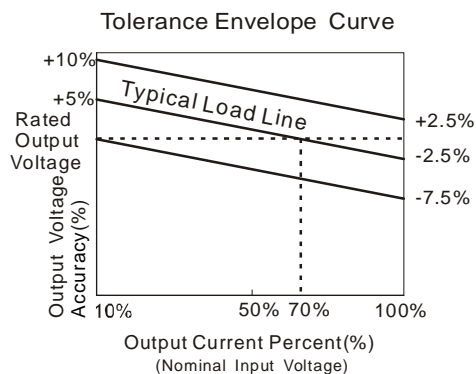


B0505LS-1WR2 CE(Class B, Positive line)



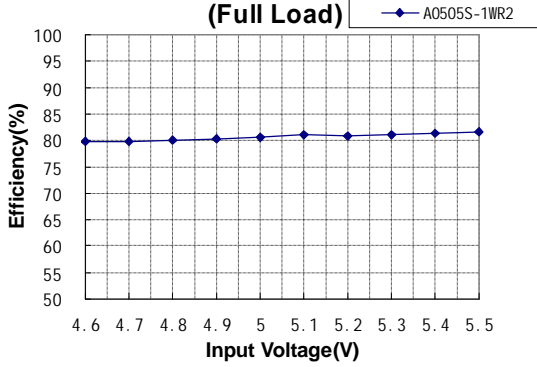
B0505LS-1WR2 CE(Class B, Negative line)

## PRODUCT TYPICAL CURVE

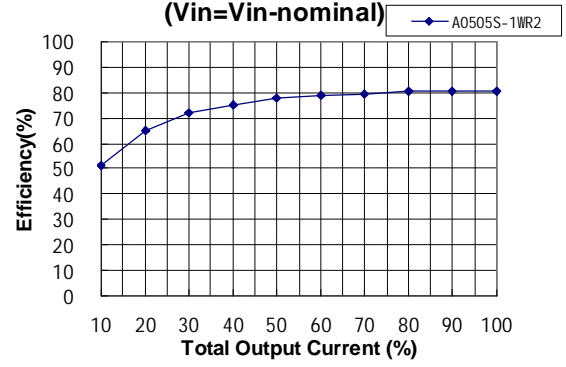


(Figure 2)

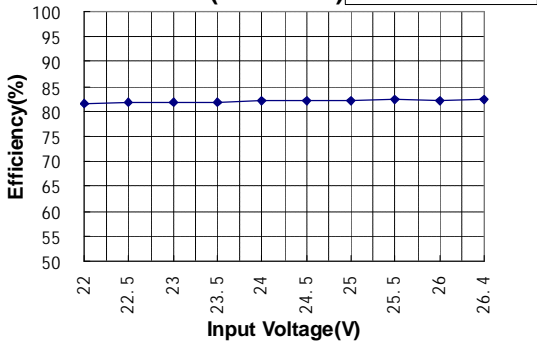
**Efficiency VS Input Voltage curve (Full Load)**



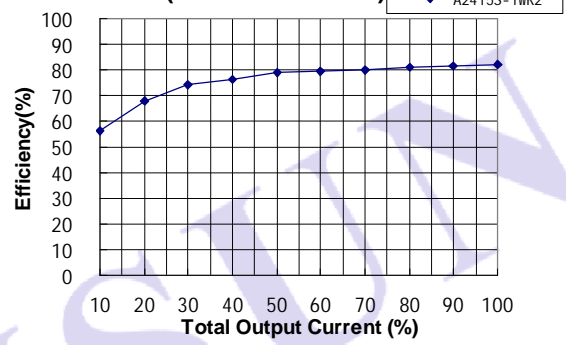
**Efficiency VS Output Load curve (Vin=Vin-nominal)**



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



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



**DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING**

**MECHANICAL DIMENSIONS**

THIRD ANGLE PROJECTION

Note:  
Unit: mm[inch]  
Pin section tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.25[\pm 0.010]$

PIN CONNECTION		
Pin	B_LS	A_S
1	Vin	Vin
2	GND	GND
4	0V	-Vo
5	No Pin	0V
6	+Vo	+Vo

**RECOMMENDED FOOTPRINT DETAILS**

B\_LS

A\_S

Note : Grid 2.54\*2.54mm

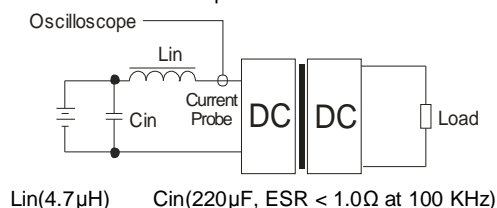
**TUBE PACKAGING DIMENSIONS**

Note:  
Unit:mm[inch]  
General tolerances: $\pm 0.50\text{mm}[\pm 0.020\text{inch}]$   
L=530[20.866] Quantity:25pcs  
L=220[8.661] Quantity:10pcs  
Inner carton(S):L\*W\*H=255\*170\*80  
Outer carton(S):L\*W\*H=375\*280\*270  
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 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 .

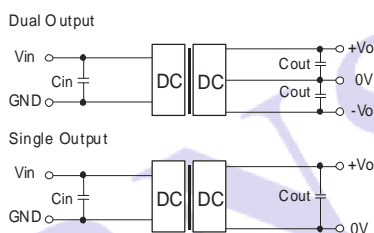
### 2) Overload Protection

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 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)

$V_{in}$ (VDC)	$C_{in}$ ( $\mu F$ )	Single $V_o$ (VDC)	$C_{out}$ ( $\mu F$ )	Dual $V_o$ (VDC)	$C_{out}$ ( $\mu F$ )
3.3/5	4.7	3.3/5	10	$\pm 3.3/\pm 5$	4.7
12	2.2	12	2.2	$\pm 12$	1
15	2.2	15/24	1	$\pm 15/\pm 24$	0.47
24	1	--	--	--	--

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  $T_a=25^\circ C$ , 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)