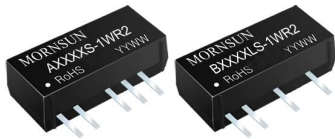


# MORNSUN®

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



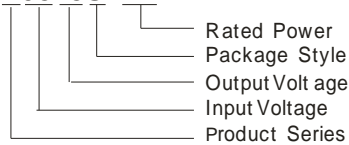
Patent Protection RoHS



Continuous Short  
Circuit Protection

### PART NUMBER SYSTEM

A0515S-1WR2



### PRODUCT FEATURES

- Miniature package
- Efficiency up to 81%
- SIP package
- High power density
- Low Temperature drift
- No External Component Required
- 1500VDC Isolation Voltage
- Operating Temperature Range: -40°C ~ +105°C
- Industry Standard Pinout
- Continuous Short Circuit Protection (Automatic Recovery)

### 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 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.

### 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							
A0505S-1WR2	5 (4.5-5.5)	$\pm 5$	$\pm 100$	$\pm 10$	250	20	10	100	80				
A0512S-1WR2		$\pm 12$	$\pm 42$	$\pm 5$	250				80				
A0515S-1WR2		$\pm 15$	$\pm 33$	$\pm 4$	248				81				
A0524S-1WR2		$\pm 24$	$\pm 21$	$\pm 2$	248				81				
B0505LS-1WR2		5	200	20	250			220	80				
B0512LS-1WR2		12	83	9	250				80				
B0515LS-1WR2		15	67	7	248				81				
B0524LS-1WR2		24	42	5	248				81				
A1205S-1WR2	12 (10.8-13.2)	$\pm 5$	$\pm 100$	$\pm 10$	92	15	5	100	80				
A1212S-1WR2		$\pm 12$	$\pm 42$	$\pm 5$	90				81				
A1215S-1WR2		$\pm 15$	$\pm 33$	$\pm 4$	90				81				
B1205LS-1WR2		5	200	20	92				220	80			
B1212LS-1WR2		12	83	9	92			80					
B1215LS-1WR2		15	67	7	90			81					
A1505S-1WR2		15 (13.5-16.5)	$\pm 5$	$\pm 100$	$\pm 10$			84		10	5	100	80
A1515S-1WR2			$\pm 15$	$\pm 33$	$\pm 4$			84	81				
B1505LS-1WR2	5		200	20	84	220	80						
B1515LS-1WR2	15		67	7	84		81						
A2405S-1WR2	24 (21.6-26.4)	$\pm 5$	$\pm 100$	$\pm 10$	53	7	5	100	80				
A2412S-1WR2		$\pm 12$	$\pm 42$	$\pm 5$	51				81				
A2415S-1WR2		$\pm 15$	$\pm 33$	$\pm 4$	51				79				
B2405LS-1WR2		5	200	20	56				220	79			
B2412LS-1WR2		12	83	9	51			81					
B2415LS-1WR2		15	67	7	52			82					

### INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	5VDC Input	-0.7	--	9	VDC
	12VDC Input	-0.7	--	18	

Input Surge Voltage (1sec. max.)	15VDC Input	-0.7	--	21	VDC
	24VDC Input	-0.7	--	30	
Input Filter	Capacitance Filter				

## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Output Power		0.1	--	1	W	
Output Voltage Accuracy		See tolerance envelope curve				
Output Voltage Balance	Dual Output, Balanced Loads	--	±0.5	±1	%	
Line Voltage Regulation	For Vin change of ±1%	--	--	±1.2		
Load Regulation	10% to 100% load	(5V output)	--	10		15
		(12V output)	--	8		15
		(15V output)	--	7		15
		(24V output)	--	6	15	
Temperature Drift	100% full load	--	--	±0.03	%/°C	
Ripple & Noise*	20MHz Bandwidth	Output Voltage ≤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	A2415S-1WR2/B2415LS-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		Epoxy Resin (UL94-V0)				
Weight		--	2.4	--	g	

## ENVIRONMENTAL SPECIFICATIONS

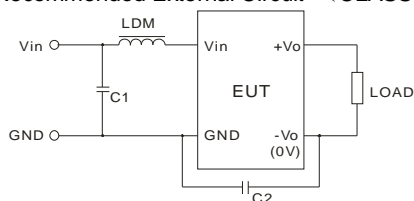
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85°C)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temp. rise at full load		--	25	--	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

## EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS B (External Circuit Refer to Figure1)			
EMS	ESD	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 Recommended External Circuit (CLASS B):



(Figure 1)

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

A\_S-1WR2 Series

Recommended external circuit parameters:

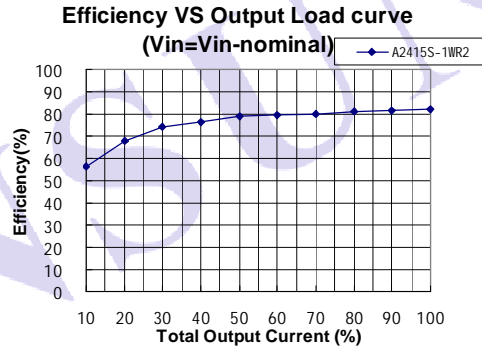
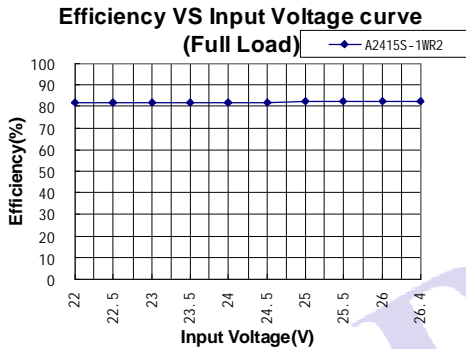
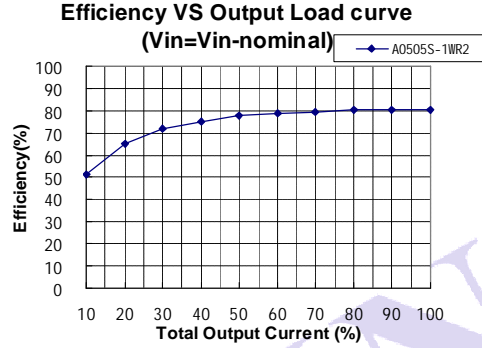
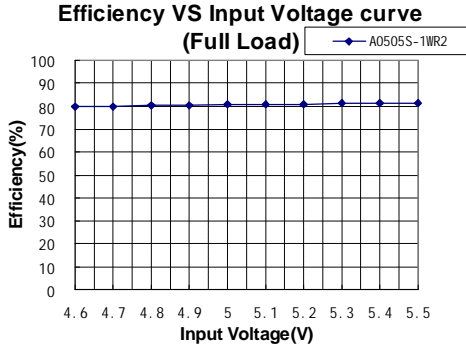
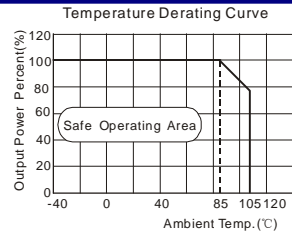
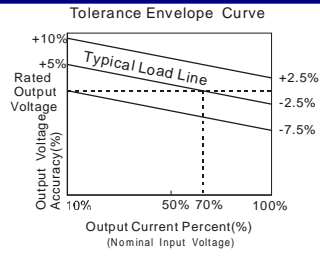
Vin: 5V/12V  
 C1: 4.7uF /50V  
 LDM: 6.8μH  
 Vin: 15V/24V  
 C1: 4.7uF /50V  
 LDM: 6.8μH  
 C2: 470pF/2KV

B\_LS-1WR2 Series

Recommended external circuit parameters:

Vin: 5V/12V  
 C1: 4.7uF /50V  
 LDM: 6.8μH  
 Vin: 15V/24V  
 C1: 4.7uF /50V  
 LDM: 6.8μH  
 C2: 470pF/2KV

# PRODUCT TYPICAL CURVE



# OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

### MECHANICAL DIMENSIONS

(Front View)

(Bottom View)

(Side View)

FOOTPRINT DETAILS		
PIN	A_S-1WR2	B_LS-1WR2
1	Vin	Vin
2	GND	GND
4	-Vo	0V
5	0V	No Pin
6	+Vo	+Vo

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

### RECOMMENDED FOOTPRINT

Note: grid 2.54\*2.54mm.

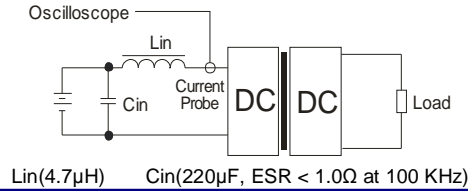
### TUBE OUTLINE DIMENSIONS

Note:  
Unit: mm[inch]  
General tolerances: ±0.50mm[±0.020inch]  
L=53.0mm[2.0866inch] Devices per tube quantity: 25pcs  
L=22.0mm[0.8661inch] Devices per tube quantity: 10pcs  
Short tube inner package dimensions: 255\*170\*80mm  
Short tube outer package dimensions (with six inner package box): 375\*280\*270mm  
Long tube inner package dimensions: 580\*200\*100mm  
Long tube outer package dimensions (with two inner package box): 600\*215\*220mm  
Long tube outer package dimensions (with three inner package box): 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 .

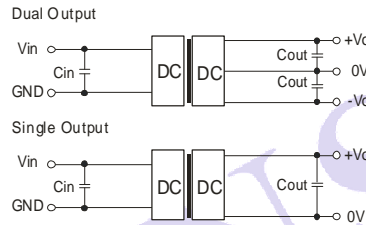
### 2) Overload Protection

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 sees (Table 1).



(Figure 2)

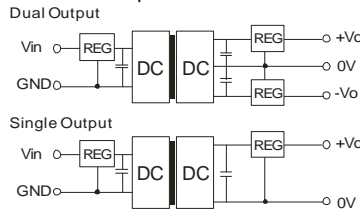
EXTERNAL CAPACITOR TABLE (Table 1)

$V_{in}$ (VDC)	$C_{in}$ ( $\mu F$ )	Single $V_o$ (VDC)	$C_{out}$ ( $\mu F$ )	Dual $V_o$ (VDC)	$C_{out}$ ( $\mu F$ )
5	4.7	5	10	$\pm 5$	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	--	--	--	--

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.



(Figure 3)

### 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  $T_a=25^\circ C$ , 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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