

1W isolated DC-DC converter  
Fixed input voltage, unregulated single or dual output



CE Report Patent Protection RoHS  
EN 62368-1

### FEATURES

- High power density
- High efficiency of up to 80%
- Operating ambient temperature range: -40°C to +105°C
- Ultra compact SIP package
- Industry standard pin-out
- I/O isolation test voltage 1.5k VDC
- Meets EN62368/UL60950

A\_S-1WR2 & B\_LS-1WR2 series is designed for use in distributed power supply systems and especially suitable in applications such as pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits, where:

1. The voltage of the input power supply is relatively stable with a variation of  $\pm 10\%V_{in}$  or less;
2. An input to output isolation voltage of up to 1500VDC is necessary;
3. The requirement for a tight line and load regulation is not as strict.

### Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load( $\mu$ F)* Max.
		Nominal (Range)	Voltage (VDC)	Current(mA) Max./Min.		
--	A0305S-1WR2	3.3 (2.97-3.63)	$\pm 5$	$\pm 100/\pm 10$	70/74	100
	A0312S-1WR2		$\pm 12$	$\pm 42/\pm 5$	70/74	
	A0315S-1WR2		$\pm 15$	$\pm 34/\pm 4$	72/76	
	B0303LS-1WR2		3.3	303/31	68/72	220
	B0305LS-1WR2		5	200/20	74/78	
	A0503S-1WR2		$\pm 3.3$	$\pm 152/\pm 15$	67/71	100
EN	A0505S-1WR2	$\pm 5$	$\pm 100/\pm 10$	76/80		
	A0509S-1WR2	$\pm 9$	$\pm 56/\pm 6$	76/80		
	A0512S-1WR2	$\pm 12$	$\pm 42/\pm 5$	76/80		
	A0515S-1WR2	$\pm 15$	$\pm 34/\pm 4$	76/80		
	A0524S-1WR2	$\pm 24$	$\pm 21/\pm 3$	76/80		
--	B0503LS-1WR2	5 (4.5-5.5)	3.3	303/31	70/74	220
EN	B0505LS-1WR2	5	200/20	76/80		
	B0509LS-1WR2	9	111/11	76/80		
	B0512LS-1WR2	12	84/9	76/80		
	B0515LS-1WR2	15	67/7	76/80		
	B0524LS-1WR2	24	42/5	76/80		
--	A0909S-1WR2	9 (8.1-9.9)	$\pm 9$	$\pm 56/\pm 6$	76/80	100
	A0915S-1WR2		$\pm 15$	$\pm 34/\pm 4$	76/80	
	A1203S-1WR2		$\pm 3.3$	$\pm 152/\pm 15$	72/76	
EN	A1205S-1WR2	12 (10.8-13.2)	$\pm 5$	$\pm 100/\pm 10$	76/80	
	A1209S-1WR2		$\pm 9$	$\pm 56/\pm 6$	76/80	
	A1212S-1WR2		$\pm 12$	$\pm 42/\pm 5$	76/80	
	A1215S-1WR2		$\pm 15$	$\pm 34/\pm 4$	76/80	
	A1224S-1WR2		$\pm 24$	$\pm 21/\pm 3$	76/80	
--	B1203LS-1WR2	3.3	303/31	72/76	220	
EN	B1205LS-1WR2	5	200/20	76/80		
	B1209LS-1WR2	9	111/11	76/80		
	B1212LS-1WR2	12	84/9	76/80		

EN	B1215LS-1WR2	12 (10.8-13.2)	15	67/7	76/80	220
	B1224LS-1WR2		24	42/5	76/80	
--	A1505S-1WR2	15 (13.5-16.5)	±5	±100/±10	76/80	100
--	A1512S-1WR2		±12	±42/±5	76/80	
--	A1515S-1WR2		±15	±34/±4	76/80	
EN	B1505LS-1WR2		5	200/20	76/80	220
--	B1512LS-1WR2	12	84/9	76/80		
EN	B1515LS-1WR2	15	67/7	76/80		
EN	A2405S-1WR2	24 (21.6-26.4)	±5	±100/±10	76/80	100
	A2409S-1WR2		±9	±56/±6	76/80	
	A2412S-1WR2		±12	±42/±5	76/80	
	A2415S-1WR2		±15	±34/±4	76/80	
	A2424S-1WR2		±24	±21/±3	76/80	
--	B2403LS-1WR2		3.3	303/31	70/74	220
EN	B2405LS-1WR2	5	200/20	76/80		
	B2409LS-1WR2	9	111/11	76/80		
	B2412LS-1WR2	12	84/9	76/80		
	B2415LS-1WR2	15	67/7	76/80		
	B2424LS-1WR2	24	42/5	76/80		

Note: \* The specified maximum capacitive load for positive and negative output is identical.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V input	--	426/30	-/70	mA
	5V input	--	281/25	-/60	
	9V input	--	142/20	-/60	
	12V input	--	106/15	-/50	
	15V input	--	84/10	-/35	
	24V input	--	54/7	-/30	
Surge Voltage (1sec. max.)	3.3V input	-0.7	--	5	VDC
	5V input	-0.7	--	9	
	9V input	-0.7	--	12	
	12V input	-0.7	--	18	
	15V input	-0.7	--	21	
	24V input	-0.7	--	30	
Reflected Ripple Current*		--	15	--	mA
Input Filter		Capacitance filter			
Hot Plug		Unavailable			

Note: \* Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy		See output regulation curve (Fig. 1)				
Linear Regulation	Input voltage change: ±1%	3.3VDC output	--	--	±1.5	--
		Other output	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC output	--	18	--	%
		5VDC output	--	12	--	
		9VDC output	--	9	--	
		12VDC output	--	8	--	
		15VDC output	--	7	--	

Load Regulation	10%-100% load	24VDC output	--	6	--	%
Ripple & Noise*	20MHz bandwidth		--	60	150	mVp-p
Temperature Coefficient	100% load		--	--	±0.03	%/°C
Short-circuit Protection**	B03xxLS-1WR2/A24xxS-1WR2 /B24xxLS-1WR2 A0524S-1WR2/B0524LS-1WR2/A0315S-1WR2		--	--	1	s
	others		Continuous, self-recovery			

Notes: \* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

\*\* At the end of the short circuit duration, the supply voltage must be disconnected from following models: B03xxLS-1WR2/A24xxS-1WR2 /B24xxLS-1WR2 series, and A0524S-1WR2/ B0524LS-1WR2/A0315S-1WR2.

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating if the temperature $\geq 85^\circ\text{C}$ , (see Fig. 2)	-40	--	105	°C
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25°C	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	100% load, nominal input voltage	--	100	--	kHz
MTBF	MIL-HDBK-217F @ 25°C	3500	--	--	k hours

### Mechanical Specifications

Case Material	Black epoxy resin; flame-retardant heat- resistant (UL94 V-0)
Dimensions	19.50 x 6.00 x 9.30 mm
Weight	2.4g (Typ.)
Cooling Method	Free air convection

### Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032	CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	A_S-1WR2	IEC/EN61000-4-2 Contact $\pm 6\text{kV}$ perf. Criteria B
		B_LS-1WR2	IEC/EN61000-4-2 Contact $\pm 8\text{kV}$ perf. Criteria B

### Typical Performance Curves

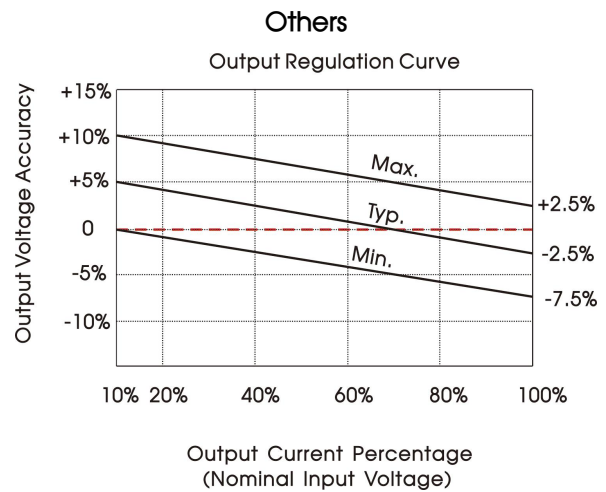
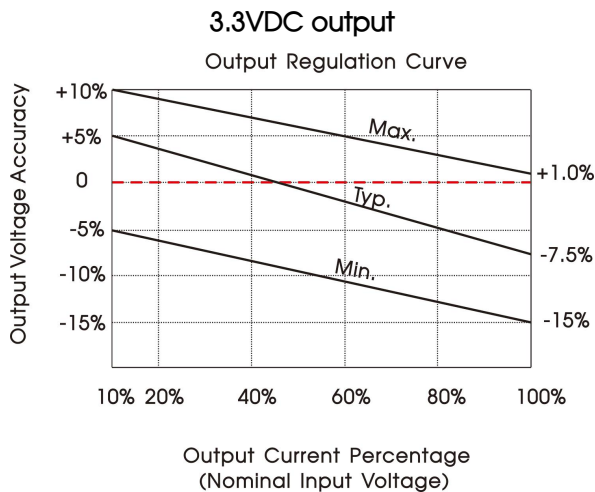


Fig. 1

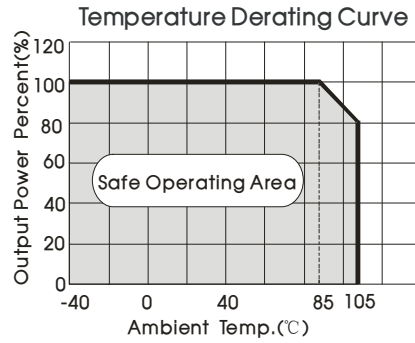
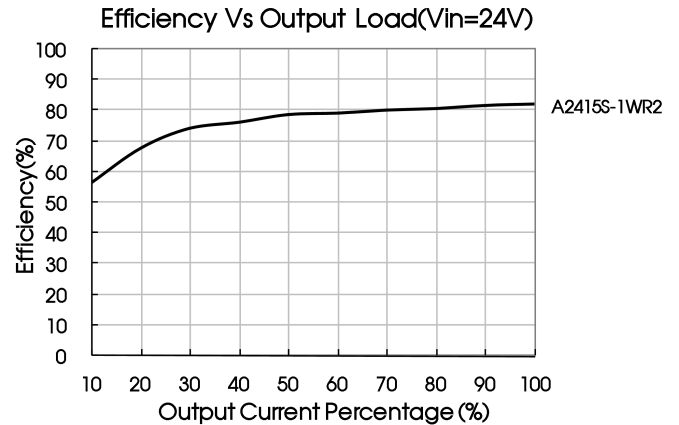
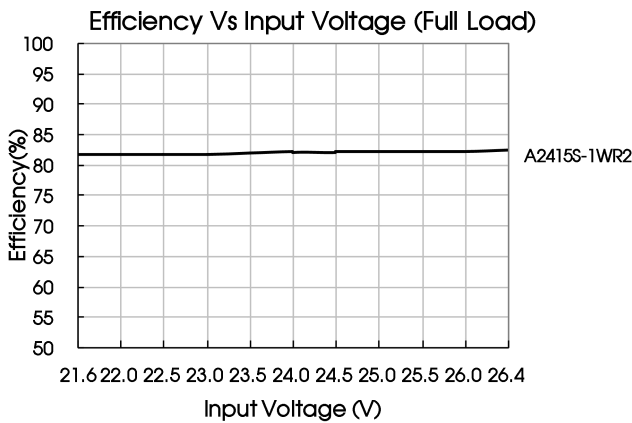
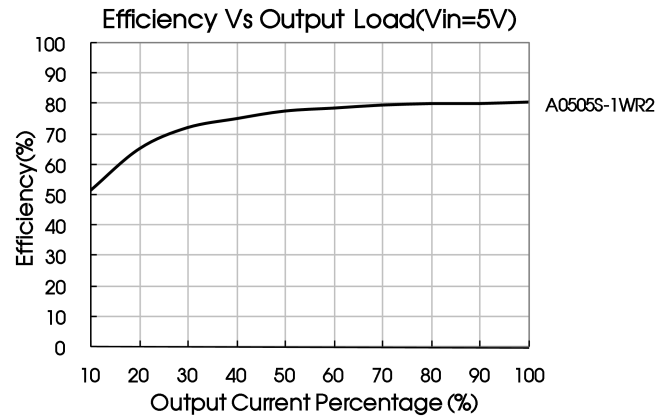
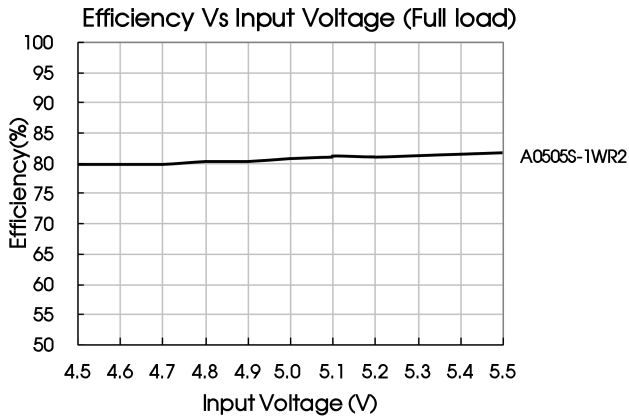


Fig. 2



## Design Reference

### 1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

Dual



Single



Fig.3

Table 1: Recommended input and output capacitor values

Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout (μF)
3.3/5	4.7	3.3/5	10	±3.3/±5	4.7
9/12	2.2	9/12	2.2	±9/±12	1
15	2.2	15/24	1	±15/±24	0.47
24	1	--	--	--	--

2. EMC (CLASS B) compliance circuit

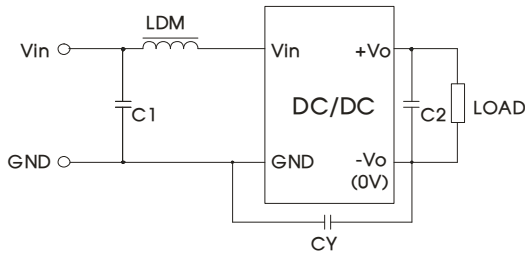


Fig. 4

Input voltage (VDC)		3.3/5/9/12	15/24
EMI	C1	4.7μF /50V	
	C2	Refer to Cout in Fig.3	
	CY	--	1nF/2kV
	LDM	6.8μH	

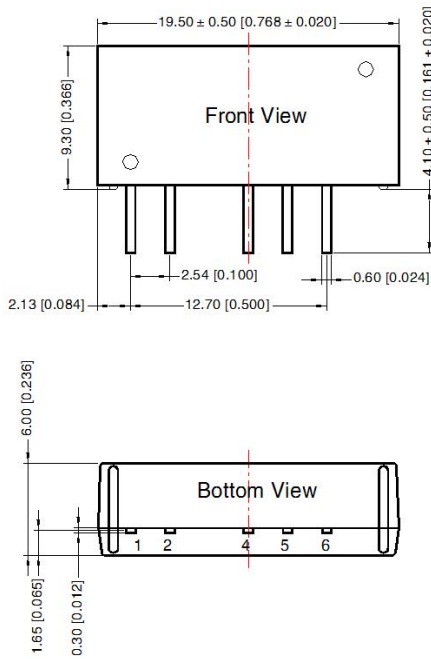
Note: For 15V/24V input models use a Y-capacitor CY of 1nF/2kV.

3. Minimum Output Load Requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

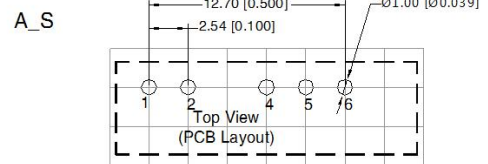
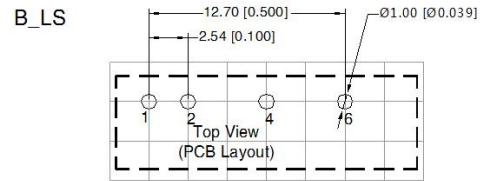
4. For additional information, please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



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

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

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

Note:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200029;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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