

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



Patent Protection RoHS



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
- UL60950/EN60950 approved
- Meets EN62368

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(μ F)* Max.	
		Nominal (Range)	Voltage (VDC)	Current(mA) Max./Min.			
--	A0305S-1WR2	3.3 (2.97-3.63)	± 5	$\pm 100/\pm 10$	70/74	100	
	A0312S-1WR2		± 12	$\pm 42/\pm 5$	70/74		
	A0315S-1WR2		± 15	$\pm 34/\pm 4$	72/76		
	B0303LS-1WR2		5	3.3	303/31	68/72	220
	B0305LS-1WR2			5	200/20	74/78	
	A0503S-1WR2			± 3.3	$\pm 152/\pm 15$	67/71	100
A0505S-1WR2	± 5	$\pm 100/\pm 10$		76/80			
A0509S-1WR2	± 9	$\pm 56/\pm 6$		76/80			
A0512S-1WR2	± 12	$\pm 42/\pm 5$		76/80			
A0515S-1WR2	± 15	$\pm 34/\pm 4$	76/80				
A0524S-1WR2	± 24	$\pm 21/\pm 3$	76/80				
--	B0503LS-1WR2	5 (4.5-5.5)	3.3	303/31	70/74	220	
UL/CE	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)	± 9	$\pm 56/\pm 6$	76/80	100	
	A0915S-1WR2		± 15	$\pm 34/\pm 4$	76/80		
	A1203S-1WR2		± 3.3	$\pm 152/\pm 15$	72/76		
UL/CE	A1205S-1WR2	12 (10.8-13.2)	± 5	$\pm 100/\pm 10$	76/80		
	A1209S-1WR2		± 9	$\pm 56/\pm 6$	76/80		
	A1212S-1WR2		± 12	$\pm 42/\pm 5$	76/80		
	A1215S-1WR2		± 15	$\pm 34/\pm 4$	76/80		
	A1224S-1WR2		± 24	$\pm 21/\pm 3$	76/80		
--	B1203LS-1WR2	12	3.3	303/31	72/76	220	
UL/CE	B1205LS-1WR2		5	200/20	76/80		
	B1209LS-1WR2		9	111/11	76/80		

	Model	Output Voltage (V)	Output Current (mA)	Efficiency (%)	Power (W)	Temp. Rise (°C)
UL/CE	B1212LS-1WR2	12 (10.8-13.2)	12	84/9	76/80	220
	B1215LS-1WR2		15	67/7	76/80	
	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	
UL	A1515S-1WR2		±15	±34/±4	76/80	220
CE	B1505LS-1WR2		5	200/20	76/80	
--	B1512LS-1WR2		12	84/9	76/80	
CE	B1515LS-1WR2		15	67/7	76/80	
UL/CE	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
UL/CE	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	--	%
		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 ≥85° 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 ±6kV	perf. Criteria B
		B_LS-1WR2	IEC/EN61000-4-2	Contact ±8kV	perf. Criteria B

Typical Performance Curves

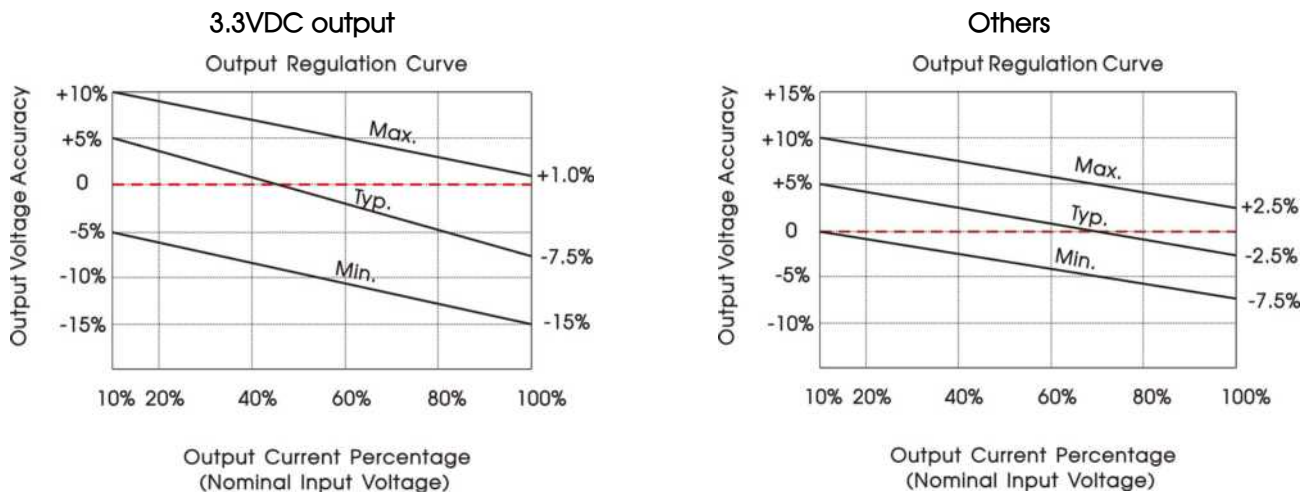


Fig. 1

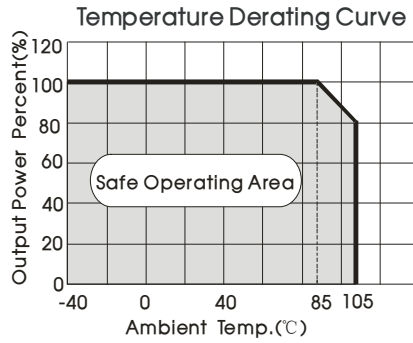
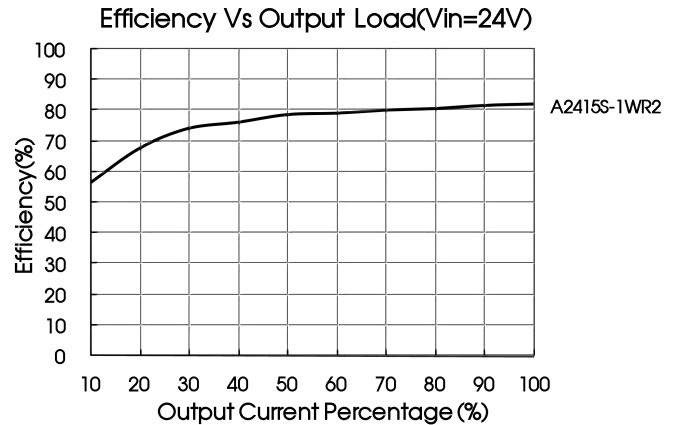
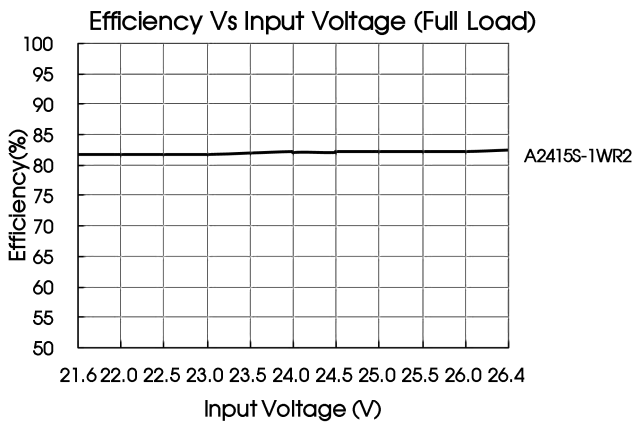
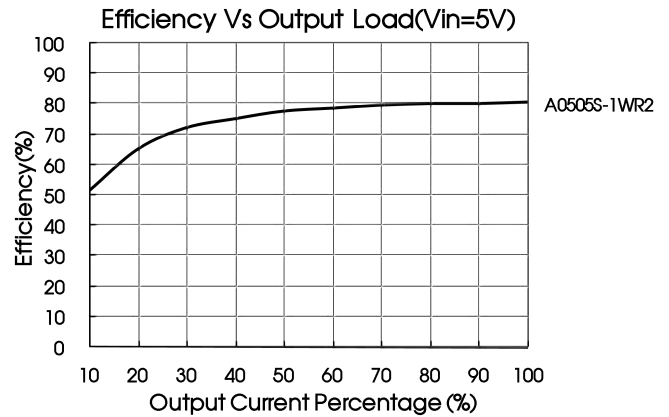
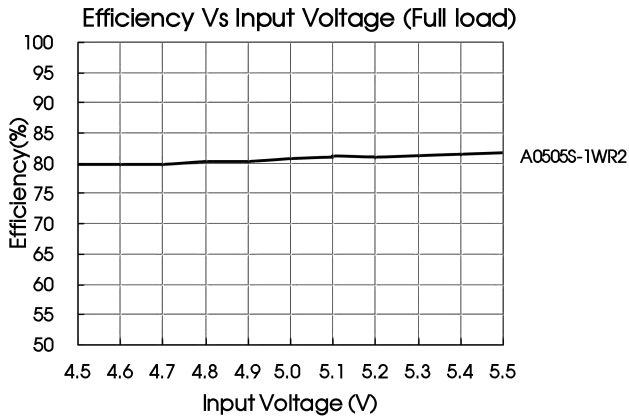


Fig. 2



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

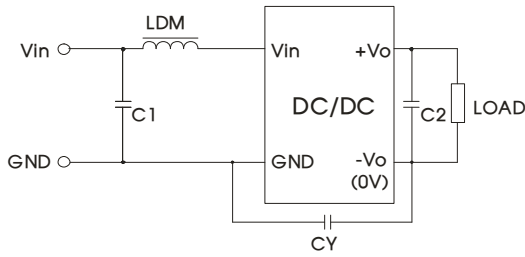


Fig. 4

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	

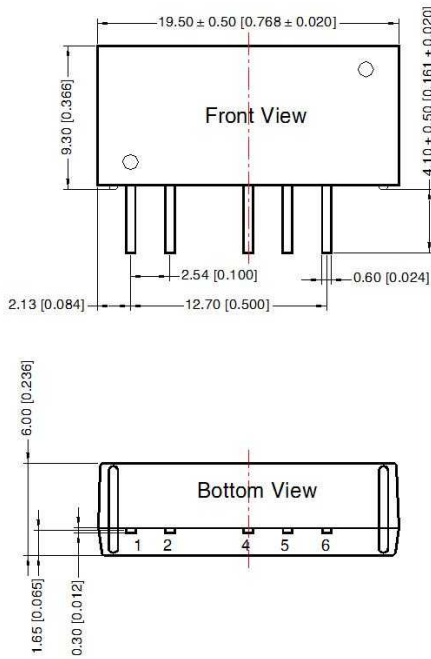
Note: For 15V/24V input models use a Y-capacitor CY of 1nF/2kV.

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.

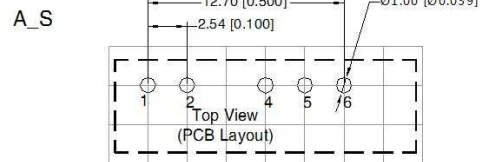
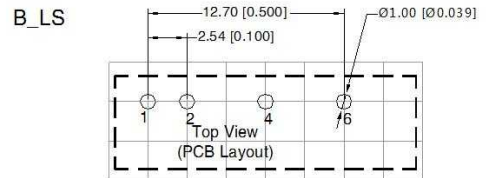
4. For additional information, please refer to DC-DC converter application notes on www.mornsun-power.com

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. 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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