

DC/DC Converter

A_S-2WR2 & B_S-2WR2 series

MORNSUN®

2W Isolated DC-DC with Fixed Input Voltage;
unregulated Single or Dual Output



UL US CE CB Patent Protection RoHS



FEATURES

- High power density
- High efficiency up to 86%
- Operating ambient temperature -40°C to +105°C
- No external components required
- Miniature SIP package
- Industry standard pin-out
- I/O isolation test voltage 1500 VDC
- IEC/UL/EN60950 approval

A_S-2WR2 & B_S-2WR2 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 $\pm 10\%$ Vin or less;
2. An input to output isolation voltage of up to 1500VDC is necessary;
3. The requirement for a tight output 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.		
—	A0503S-2WR2	5 (4.5-5.5)	± 3.3	$\pm 303/\pm 30$	67/71	100
UL/CE/CB	A0505S-2WR2		± 5	$\pm 200/\pm 20$	76/80	
	A0509S-2WR2		± 9	$\pm 111/\pm 11$	80/84	
	A0512S-2WR2		± 12	$\pm 83/\pm 8$	80/84	
	A0515S-2WR2		± 15	$\pm 67/\pm 7$	78/82	
	A0524S-2WR2		± 24	$\pm 42/\pm 4$	80/84	
—	B0503S-2WR2	9 (8.1-9.9)	3.3	400/40	75/79	220
UL/CE/CB	B0505S-2WR2		5	400/40	80/84	
	B0509S-2WR2		9	222/22	75/79	
	B0512S-2WR2		12	167/17	80/84	
	B0515S-2WR2		15	133/13	80/84	
	B0524S-2WR2		24	83/8	80/84	
	B0905S-2WR2		5	400/40	75/79	
—	B0912S-2WR2		12	167/17	79/83	
UL/CE/CB	A1205S-2WR2	12 (10.8-13.2)	± 5	$\pm 200/\pm 20$	76/80	100
	A1209S-2WR2		± 9	$\pm 111/\pm 11$	80/84	
	A1212S-2WR2		± 12	$\pm 83/\pm 8$	80/84	
	A1215S-2WR2		± 15	$\pm 67/\pm 7$	80/84	
	A1224S-2WR2		± 24	$\pm 42/\pm 4$	80/84	
—	B1203S-2WR2		3.3	400/40	75/79	220
UL/CE/CB	B1205S-2WR2		5	400/40	78/82	
	B1209S-2WR2		9	222/22	77/81	
	B1212S-2WR2		12	167/17	80/84	
	B1215S-2WR2		15	133/13	81/85	
	B1224S-2WR2		24	83/8	82/86	
—	A1505S-2WR2	15	± 5	$\pm 200/\pm 20$	76/80	100

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	A1515S-2WR2	(13.5-16.5)	±15	±67/±7	80/84	220
	B1505S-2WR2		5	400/40	76/80	
	B1515S-2WR2		15	133/13	81/85	
	B1524S-2WR2		24	83/8	78/82	
UL/CE/CB	A2403S-2WR2	24 (21.6-26.4)	±3.3	±303/±30	76/80	100
	A2405S-2WR2		±5	±200/±20	76/80	
	A2409S-2WR2		±9	±111/±11	82/86	
	A2412S-2WR2		±12	±83/±8	80/84	
	A2415S-2WR2		±15	±67/±7	80/84	
	A2424S-2WR2		±24	±42/±4	80/84	
—	B2403S-2WR2	24 (21.6-26.4)	3.3	400/40	75/79	220
UL/CE/CB	B2405S-2WR2		5	400/40	76/80	
	B2409S-2WR2		9	222/22	82/86	
	B2412S-2WR2		12	167/17	80/84	
	B2415S-2WR2		15	133/13	82/86	
	B2424S-2WR2		24	83/8	82/86	

* 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)	5V input	--	506/35	--/60	mA
	9V input	--	268/25	--/50	
	12V input	--	208/20	--/50	
	15V input	--	167/15	--/35	
	24V input	--	104/10	--/30	
Reflected Ripple Current		--	15	--	mA
Surge Voltage (1sec. max.)	5V input	-0.7	--	9	VDC
	9V input	-0.7	--	12	
	12V input	-0.7	--	18	
	15V input	-0.7	--	21	
	24V input	-0.7	--	30	
Input Filter		Filter capacitor			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			See Typical Performance Curves (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		--	75	200	mVp-p
Temperature Coefficient	Full load		--	--	±0.03	%/°C

Short-Circuit Protection**	A24xxS-2WR2/B24xxS-2WR2 A12xxS-2WR2/B12xxS-2WR2 A15xxS-2WR2/B15xxS-2WR2 A0524S-2WR2/B0524S-2WR2	--	--	1	s
	Others	Continuous, self-recovery			

Note: * 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:
 A24xxS-2WR2/B24xxS-2WR2/A12xxS-2WR2/B12xxS-2WR2/A15xxS-2WR2/B15xxS-2WR2 series, and A0524S-2WR2/B0524S-2WR2.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	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 when operating temperature up to 85℃, (see Fig. 2)	-40	--	105	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃, nominal input, full load output	--	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	Full load, nominal input voltage	--	100	--	kHz
MTBF	MIL-HDBK-217F @ 25℃	3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	19.65 x 7.05 x 10.16mm
Weight	2.4g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emission	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-2WR2	IEC/EN61000-4-2 Contact ±6kV performance Criteria B
		B_S-2WR2	IEC/EN61000-4-2 Contact ±8kV performance Criteria B

Typical Performance Curves

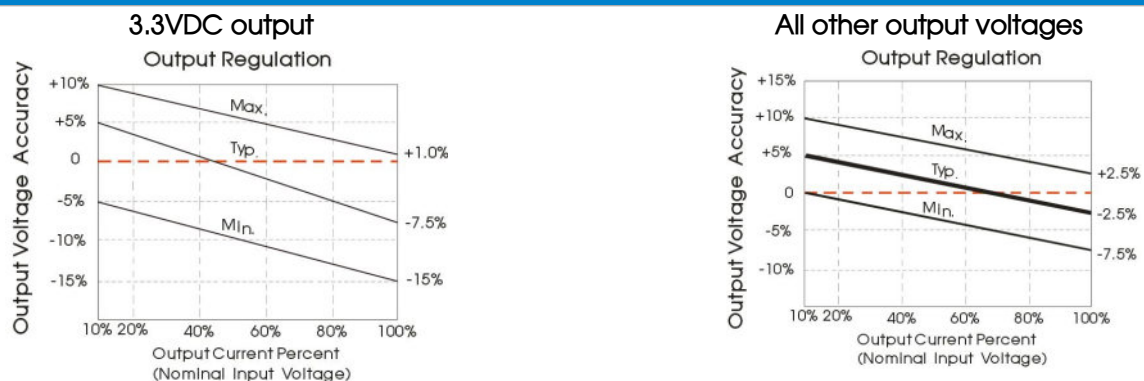


Fig. 1

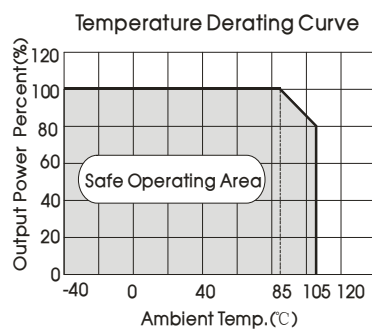
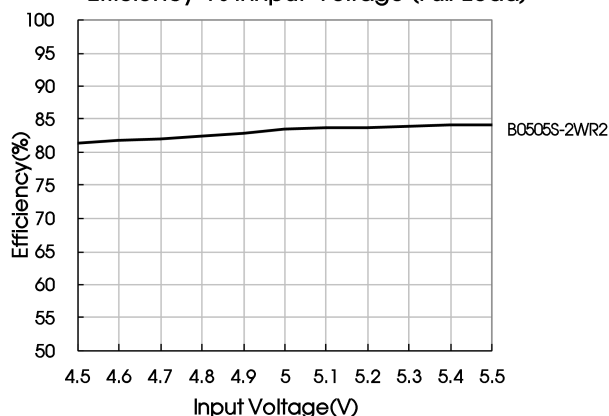
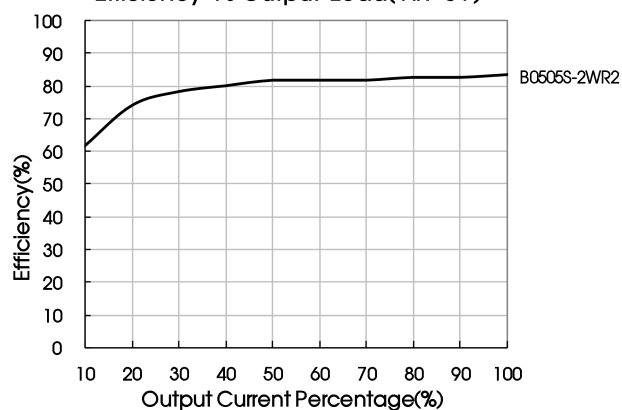


Fig. 2

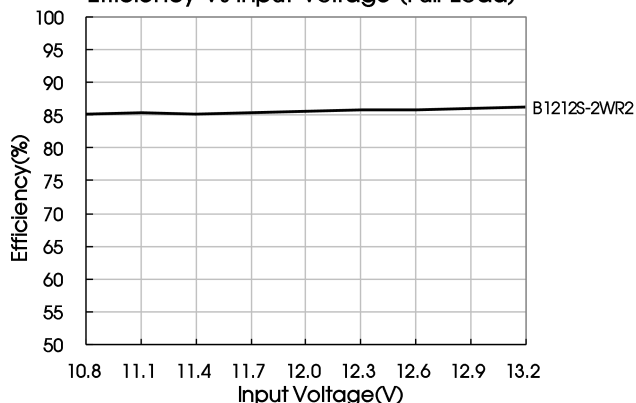
Efficiency Vs Input Voltage (Full Load)



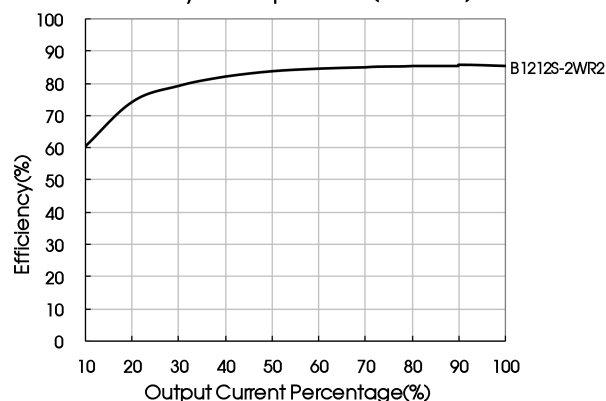
Efficiency Vs Output Load (Vin=5V)



Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=12V)



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 Output



Single Output

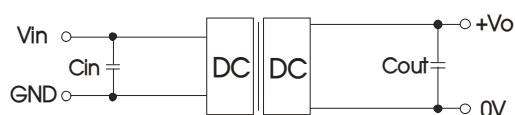


Fig.3

Table 1: Recommended input and output capacitor values

Vin (VDC)	Cin (μF)	Single Vo (VDC)	Cout (μF)	Dual Vo (VDC)	Cout (μF)
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

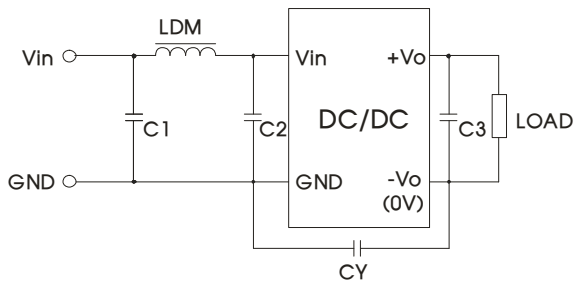


Fig. 4

Input voltage (VDC)		5/9/12/15	24
EMI	C1/C2	4.7 μ F /50V	
	CY	--	1nF/2kV
	C3	Refer to Cout in Fig.3	
	LDM	6.8 μ H	

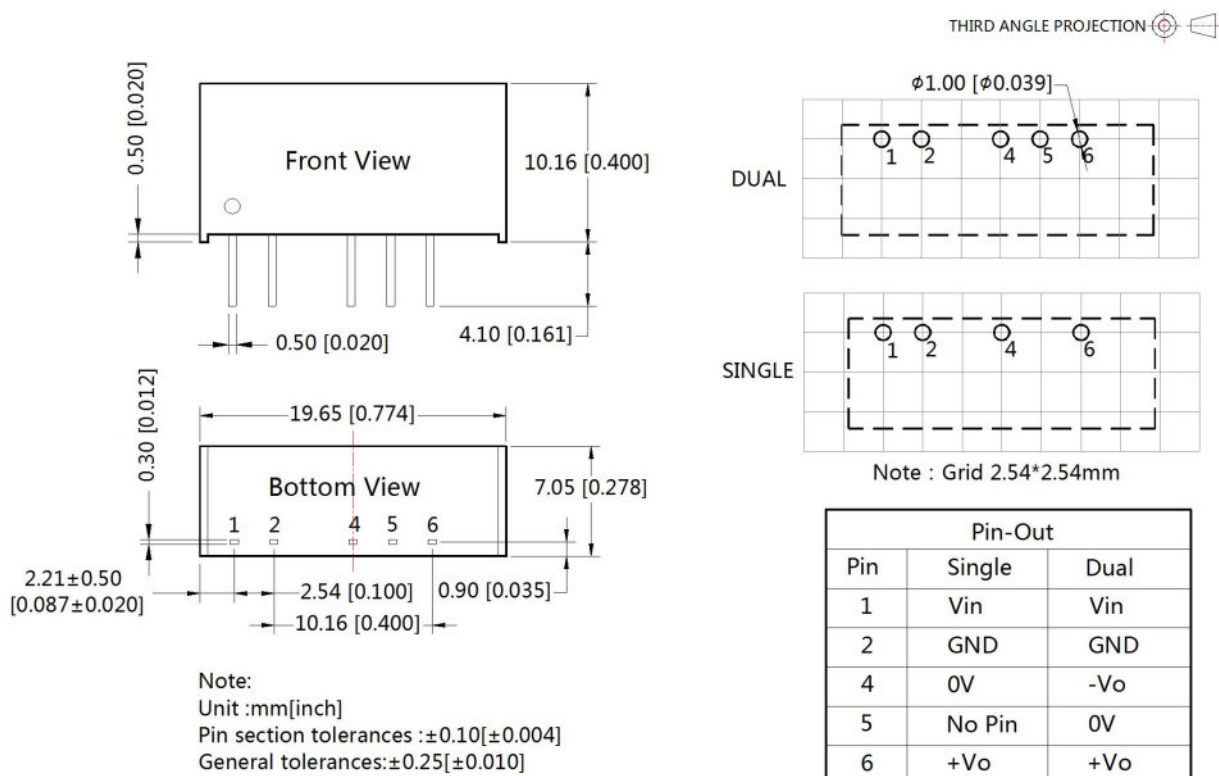
Note: 1. For 24V input models use a Y-capacitor CY of 1nF/2kV.
2. It is not needed to add the component in the peripheral circuit when parameter with the symbol of "--".

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



Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200001;
2. In order to guarantee product performance and datasheet compliance, the product must be operated within specifications and load range requirement;
3. The specified maximum capacitive load is tested under full load condition and over the input voltage range;
4. All parameters in this datasheet were measured under following conditions: $T_a=25^{\circ}\text{C}$, relative humidity<75%RH, nominal input voltage and rated output load (unless otherwise specified);
5. All index testing methods in this datasheet are based on our corporate Company standards;
6. For special requirements and customization service, please contact your nearest MORNUSN sales representative or one of our technicians;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be handled according to ISO14001 and related environmental laws and regulations by qualified personnel only.

MORNSUN Guangzhou 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: sales@mornsun.cn www.mornsun-power.com