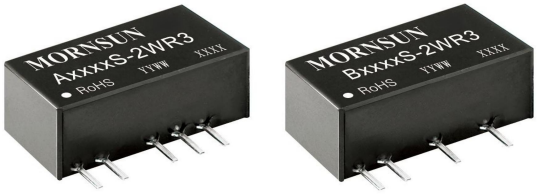
DC/DC Converter

A_S-2WR3 & B_S-2WR3 series

MORNSUN®

2W isolated DC-DC converter

Fixed input voltage, unregulated dual/ single output



3 years Warranty

SHORT CIRCUIT PROTECTION

Continuous Short Circuit Protection

CE Report EN 62368-1 | UKCA Report BS EN 62368-1 | CB IEC 62368-1 | RoHS | Patent Protection

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 86%
- High power density
- I/O isolation test voltage 1.5k VDC
- Industry standard pin-out

A_S-2WR3 & B_S-2WR3 series are specially designed for applications where an (two) isolated voltage is required in a distributed power supply system. They are suitable for:

1. The voltage of the input power supply is relatively stable with a variation of ±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*(μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
EN/BS EN	A0503S-2WR3	5 (4.5-5.5)	±3.3	±303/±30	71/75	1200
EN/BS EN/IEC	A0505S-2WR3		±5	±200/±20	80/84	1200
	A0509S-2WR3		±9	±111/±11	81/85	470
	A0512S-2WR3		±12	±83/±8	81/85	220
	A0515S-2WR3		±15	±67/±7	82/86	220
	A0524S-2WR3		±24	±42/±4	82/86	100
EN/BS EN	B0503S-2WR3		3.3	400/40	74/78	2400
EN/BS EN/IEC	B0505S-2WR3		5	400/40	80/84	2400
EN/BS EN	B0507S-2WR3		7.2	278/28	80/84	1000
EN/BS EN/IEC	B0509S-2WR3		9	222/22	81/85	1000
	B0512S-2WR3		12	167/17	81/85	560
	B0515S-2WR3		15	133/13	82/86	560
	B0524S-2WR3		24	83/8	82/86	220
	A1203S-2WR3	12 (10.8-13.2)	±3.3	±303/±30	71/75	1200
	A1205S-2WR3		±5	±200/±20	76/80	1200
EN/BS EN	A1207S-2WR3		±7.2	±139/±13	76/80	470
	A1209S-2WR3		±9	±111/±11	78/82	470
EN/BS EN/IEC	A1212S-2WR3		±12	±83/±8	79/83	220
	A1215S-2WR3		±15	±67/±7	79/83	220
EN/BS EN	A1224S-2WR3		±24	±42/±4	79/83	100
--	B1203S-2WR3		3.3	400/40	75/79	2400
EN/BS EN/IEC	B1205S-2WR3		5	400/40	78/82	2400
--	B1209S-2WR3		9	222/22	78/82	1000
EN/BS EN/IEC	B1212S-2WR3		12	167/17	80/84	560
	B1215S-2WR3		15	133/13	81/85	560
	B1224S-2WR3		24	83/8	82/86	220

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EN/BS EN	A1515S-2WR3	15 (13.5-16.5)	±15	±67/±7	78/82	220
--	B1505S-2WR3		5	400/40	76/80	2400
	B1515S-2WR3		15	133/13	77/81	560
	B1524S-2WR3		24	83/8	77/81	220
EN/BS EN/IEC	A2405S-2WR3	24 (21.6-26.4)	±5	±200/±20	74/80	1200
EN/BS EN	A2409S-2WR3		±9	±111/±11	75/81	470
EN/BS EN/IEC	A2412S-2WR3		±12	±83/±8	77/83	220
	A2415S-2WR3		±15	±67/±7	77/83	220
EN/BS EN	A2424S-2WR3		±24	±42/±4	77/83	100
--	B2403S-2WR3	24 (21.6-26.4)	3.3	400/40	70/76	2400
EN/BS EN/IEC	B2405S-2WR3		5	400/40	74/80	2400
--	B2409S-2WR3		9	222/22	75/81	1000
EN/BS EN/IEC	B2412S-2WR3		12	167/17	78/84	560
	B2415S-2WR3		15	133/13	80/86	560
	B2424S-2WR3		24	83/8	80/86	220

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)	5VDC input	3.3VDC output	--	534/8	564/--	mA
		5VDC/7.2VDC output	--	477/8	500/--	
		9VDC/12VDC output	--	471/8	494/--	
		15VDC/24VDC output	--	466/8	488/--	
	12VDC input	3.3VDC output	--	223/8	235/--	
		5VDC/7.2VDC output	--	208/8	219/--	
		9VDC output	--	203/8	214/--	
		12VDC/15VDC/24VDC output	--	201/8	211/--	
	15VDC input	5VDC output	--	167/8	176/--	
		15VDC output	--	163/8	171/--	
		24VDC output	--	165/8	174/--	
	24VDC input	3.3VDC output	--	110/8	120/--	
		5VDC output	--	104/8	112/--	
		9VDC output	--	103/8	111/--	
		12VDC/15VDC/24VDC output	--	101/8	108/--	
Reflected Ripple Current*			--	15	--	
Surge Voltage (1sec. max.)	5VDC input		-0.7	--	9	VDC
	12VDC input		-0.7	--	18	
	15VDC input		-0.7	--	21	
	24VDC input		-0.7	--	30	
Input Filter			Capacitance filter			
Hot Plug			Unavailable			

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

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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	--
			Others	--	--	±1.2	
Load Regulation	10%-100% load	5VDC input	3.3VDC output	--	10	20	%
			5VDC/7.2VDC output	--	8	15	
			9VDC/12VDC/15VDC output	--	7	10	
			24VDC output	--	5	10	
		12/15/24 VDC input	3.3VDC output	--	15	20	
			5VDC output	--	7	15	
			7.2VDC output	--	6	15	
			9VDC output	--	5	15	
			12VDC output	--	5	10	
			15VDC output	--	4	10	
			24VDC output	--	3	10	
Ripple & Noise*	20MHz bandwidth		5VDC input	--	75	200	mVp-p
			12/15/24VDC input	--	75	180	
Temperature Coefficient	Full load			--	±0.02	--	%/℃
Short-circuit Protection				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.

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≥85℃, (see Fig. 2)		-40	--	105	℃
Storage Temperature			-55	--	125	
Case Temperature Rise	Ta=25℃	5VDC input	--	25	--	
		12/15/24VDC input	--	15	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	
Storage Humidity	Non-condensing		5	--	95	%RH
Vibration			10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	Full load, nominal input voltage	5VDC input	--	220	--	kHz
		12/15/24VDC input	--	260	--	
MTBF	MIL-HDBK-217F @ 25℃		3500	--	--	k hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	19.65 x 7.05 x 10.16mm
Weight	2.4g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B
	RE	CISPR32/EN55032	CLASS B
Immunity	ESD	IEC/EN61000-4-2	Air ±8kV, Contact ±6kV perf. Criteria B

Note: Refer to Fig. 4 for recommended circuit test

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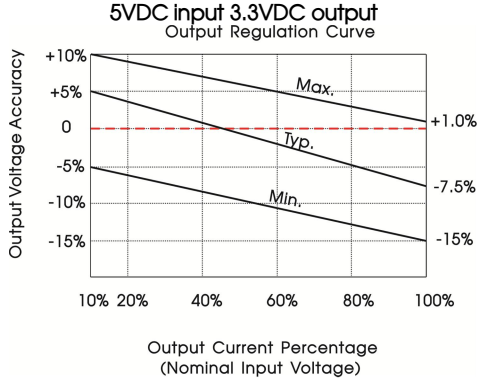
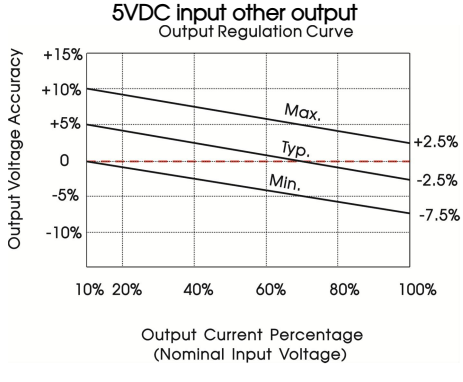
Typical Characteristic Curves

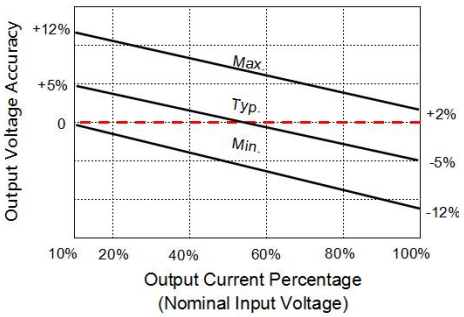
5VDC input 3.3VDC output



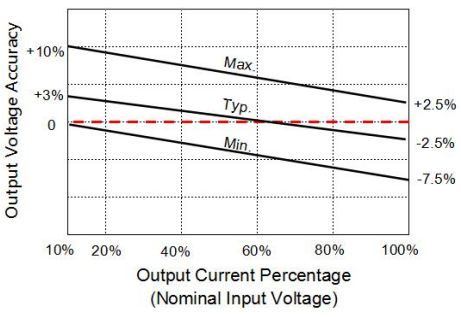
5VDC input other output



12/15/24VDC input 3.3VDC output



12/15/24VDC input 5/7.2VDC output



12/15/24VDC input other output

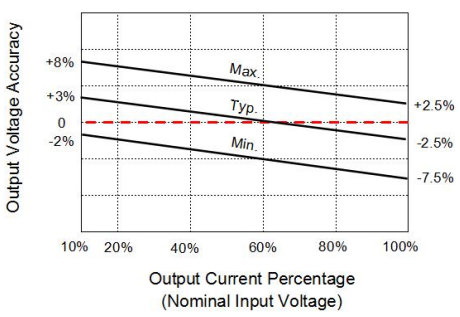


Fig. 1

Temperature Derating Curve

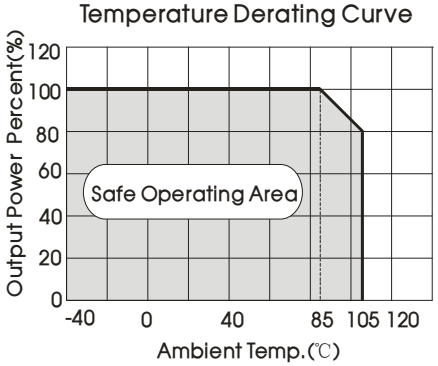
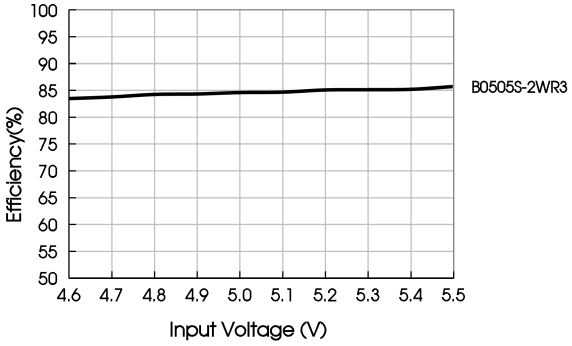
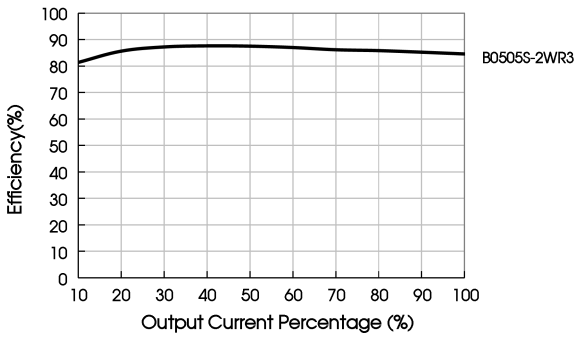


Fig. 2

Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load(Vin=5V)



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.

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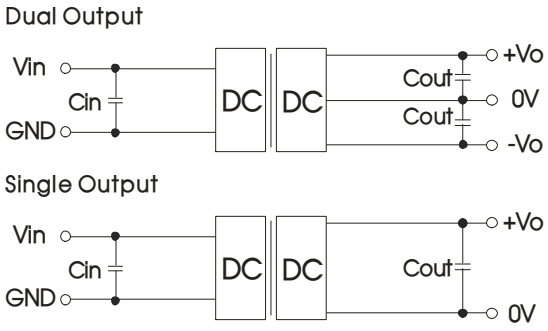


Fig. 3

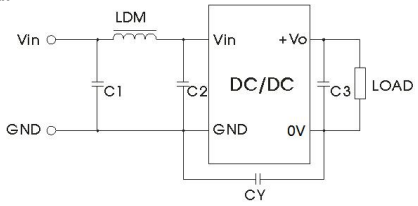
Table 1: Recommended input and output capacitor values

Vin	Cin	Single Vout	Cout	Dual Vout	Cout*
5VDC	10μF/16V	3.3VDC	10μF/16V	±3.3VDC	4.7μF/16V
12VDC	2.2μF/25V	5VDC	10μF/16V	±5VDC	4.7μF/16V
15VDC	2.2μF/25V	7.2VDC	10μF/16V	±7.2VDC	2.2μF/25V
24VDC	1μF/50V	9VDC	2.2μF/25V	±9VDC	2.2μF/25V
--	--	12VDC	2.2μF/25V	±12VDC	1μF/25V
--	--	15VDC	1μF/25V	±15VDC	1μF/25V
--	--	24VDC	1μF/50V	±24VDC	0.47μF/50V

Note: *The capacitor value of the positive and the negative output is identical.

2. EMC compliance circuit

Single Output



Dual Output

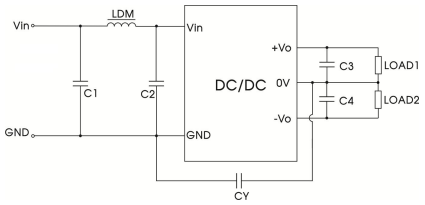


Fig. 4

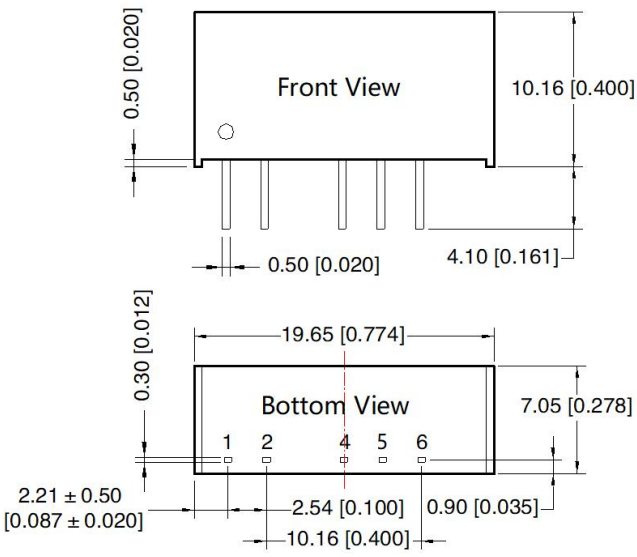
Input voltage		5 VDC	12/15/24 VDC
Emissions	C1/C2	4.7μF /16V	4.7μF /50V
	CY	270pF/2kV	
	C3	Refer to Cout in Fig. 3	
	LDM	6.8μH	

Input voltage		5 VDC	12/15/24 VDC
Emissions	C1/C2	4.7μF /16V	4.7μF /50V
	CY	270pF/2kV	
	C3/C4	Refer to Cout in Fig. 3	
	LDM	6.8μH	

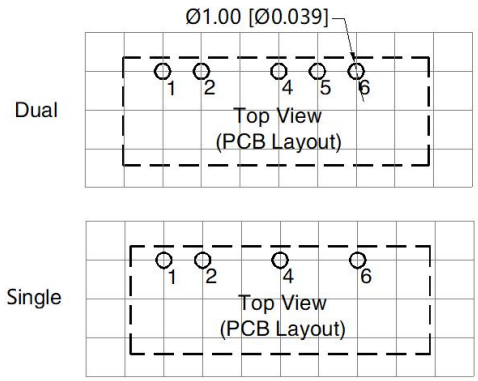
3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



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



Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
4	0V	–Vo
5	No Pin	0V
6	+Vo	+Vo

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Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200001;
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 Ta=25℃, 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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