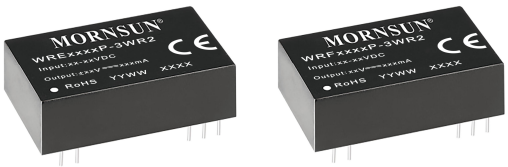
DC/DC Converter

WRE_P- 3WR2 & WRF_P- 3WR2 Series

MORNSUN®

3W isolated DC-DC converter in DIP packege
Wide input and regulated dual/single output



Patent Protection

CE Report RoHS

EN62368-1

FEATURES

- Wide input voltage range (2:1)
- High efficiency up to 86%
- I/O isolation test voltage 3k VDC
- Output short-circuit protection(self-recovery)
- Operating ambient temperature range: -40℃ to +85℃
- Meet EN62368 standards

The WRE_P-3WR2 & WRF_P-3WR2 series are isolated 3W DC-DC products with 2:1 input voltage and conventional voltage output. The product has a relatively compact DIP package, and features high efficiency, operating temperature of -40℃ to +85℃, remote control, and continuous short-circuit protection. The smaller size and fine cost-effective design make the converter an ideal solution in communication, instruments, and industrial electronics applications.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load② (μF)Max.
		Nominal (Range)	Max.①	Voltage (VDC)	Current (mA) Max./Min.		
EN	WRE0505P-3WR2	5 (4.5-9)	11	±5	±300/±15	74/76	2200
	WRE0512P-3WR2			±12	±125/±6	76/78	1800
	WRE0515P-3WR2			±15	±100/±5	76/78	1000
	WRF0505P-3WR2			5	600/30	72/74	4700
	WRF0512P-3WR2			12	250/12	75/77	2700
	WRF0515P-3WR2			15	200/10	75/77	2200
	WRE1205P-3WR2	12 (9-18)	20	±5	±300/±15	79/81	2200
	WRE1209P-3WR2			±9	±166/±8	82/84	2000
--	WRE1212P-3WR2			±12	±125/±6	82/84	1800
	WRE1215P-3WR2			±15	±100/±5	83/85	1000
--	WRF1205P-3WR2			5	600/30	79/81	4700
	WRF1212P-3WR2			12	250/12	81/83	2700
EN	WRF1215P-3WR2			15	200/10	80/82	2200
	WRF1224P-3WR2			24	125/6	81/83	1800
EN	WRE2405P-3WR2	24 (18-36)	40	±5	±300/±15	80/82	2200
	WRE2412P-3WR2			±12	±125/±6	82/84	1800
	WRE2415P-3WR2			±15	±100/±5	82/84	1000
	WRF2403P-3WR2			3.3	909/46	76/78	4700
EN	WRF2405P-3WR2			5	600/30	79/81	4700
EN	WRF2412P-3WR2			12	250/12	84/86	2700
--	WRF2415P-3WR2			15	200/10	84/86	2200
EN	WRF2424P-3WR2			24	125/6	83/85	1800
	WRE4815P-3WR2	48 (36-75)	80	±15	±100/±5	83/85	1000

Note: ①Exceeding the maximum input voltage may cause permanent damage;
②For dual output converter, the given value is the same for each output.

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Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	5VDC input	--	811/40	834/--	mA
	12VDC input	--	309/30	347/35	
	24VDC input	--	154/15	165/20	
	48VDC input	--	77/5	85/10	
Reflected Ripple Current	5VDC input	--	20	--	
	12VDC input	--	30	--	
	24VDC input	--	30	--	
	48VDC input	--	30	--	
Surge Voltage (1sec. max.)	5VDC input	-0.7	--	12	VDC
	12VDC input	-0.7	--	25	
	24VDC input	-0.7	--	50	
	48VDC input	-0.7	--	100	
Start-up Voltage	5VDC input	--	--	4.5	
	12VDC input	--	--	9	
	24VDC input	--	--	18	
	48VDC input	--	--	36	
Input Filter		Pi filter			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	5%-100% load		--	±1	±3	%
No load Output Voltage Accuracy	Input voltage range		--	±1.5	±5	
Balance Of Output Voltage	Dual output, balanced load		--	±0.5	±1	
Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
Load Regulation	5%-100% load		--	±0.2	±0.5	
Transient Recovery Time	25% load step change		--	0.5	2	ms
Transient Response Deviation			--	±2	±5	%
Temperature Coefficient	Full load		--	±0.02	±0.03	%/°C
Ripple&Noise*	20MHz bandwidth, nominal input voltage	24VDC output	--	100	150	mV p-p
		Others	--	50	80	
Short-circuit Protection	Input voltage range		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.	3000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	30	50	pF
Operating Temperature	Derating when operating temperature up to 85°C (see Fig. 1)	-40	--	85	℃
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25℃	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	5	--	95	%RH

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Switching Frequency(PFM mode)	100% load, nominal input voltage	--	200	--	kHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	k hours

Mechanical Specifications

Case Material	Black flame-retardant and heat-resistant plastic Plastic(UL94-V0)
Dimensions	31.60 x 20.30 x 10.20 mm
Weight	14g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

EMI	CE	CISPR22/EN55022	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR22/EN55022	CLASS B (see Fig.3-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±4kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±2kV (see Fig.3-①for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0-70%	perf. Criteria B

Typical Characteristic Curves

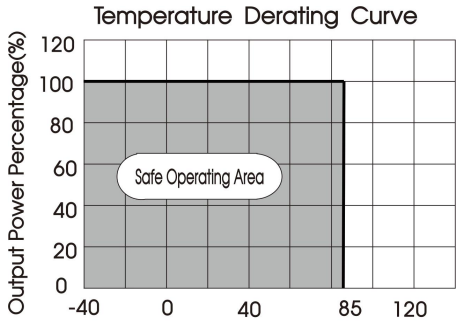
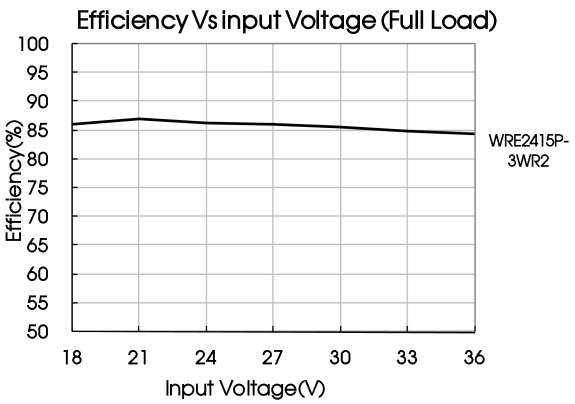
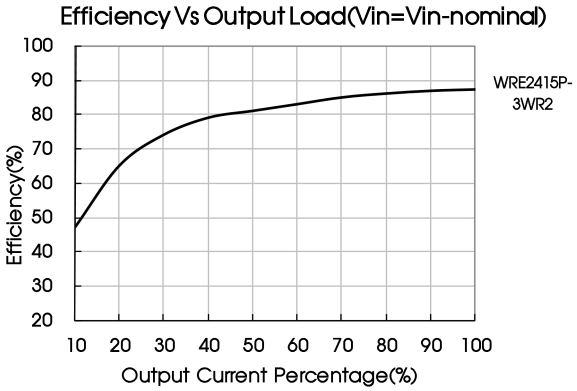


Fig. 1





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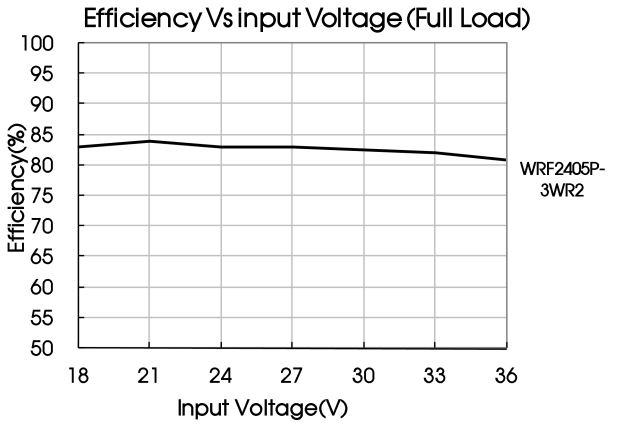

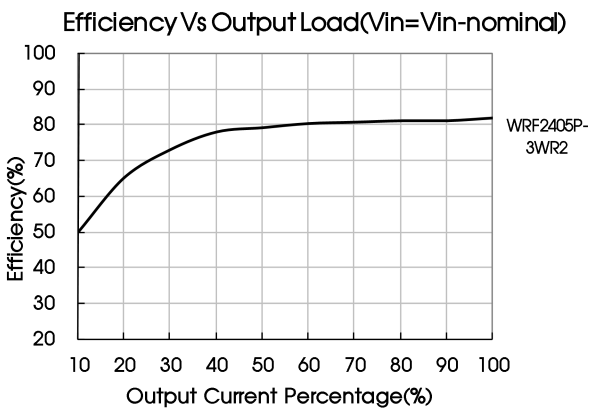

Design Reference

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.
Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

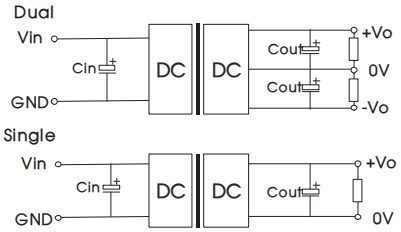

Fig. 2

Vin(VDC)	Cin	Cout
5V&12	100μF/25V	Vo(3/5/±5/±9):10μF/16V Vo(12/±12/15/±15V):10μF/25V
24V&48	10μF~47μF/100V	Vo(24):10μF/50V

2. EMC compliance circuit

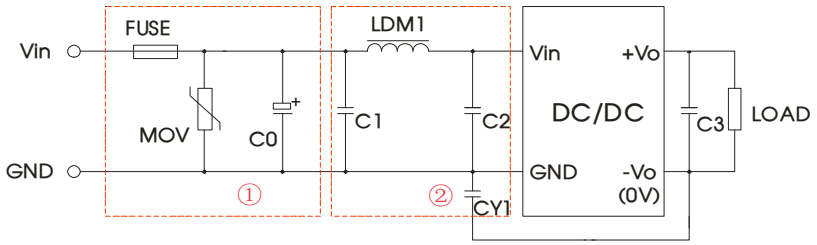

Fig. 3

Parameter description:

Model	Vin:5VDC	Vin:12VDC	Vin:24VDC	Vin:48VDC
FUSE	Choose according to actual input current			
MOV	--	S14K20	S20K30	S14K60
C0	1000μF/16V	1000μF/25V	330μF/50V	330μF/100V
C1	4.7μF/50V			4.7μF/100V
LDM1	12μH			
C2	4.7μF/50V			4.7μF /100V
C3	Refer to the Cout in Fig.2			
CY1	1nF/3kV			

Note: ①For EMC tsets we use Part ① in the Fig. 3 for immunity and part ② for emissions, Selecting based on needs.
②If there is no recommended parameters, the model no require the external component.

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3. Input current

When the electricity is provided by the unstable power supply, please make sure that the range of the output voltage fluctuation and the ripple voltage of the power supply do not exceed the indicators of the modules. Input current of power supply should afford the flash startup current of this kind of DC/DC module(see Fig. 4).

Generally: Vin=5V Iave =1297mA
Vin=12V Iave=649mA
Vin=24V Iave=307mA
Vin=48V Iave =158mA

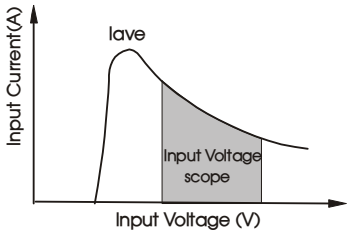


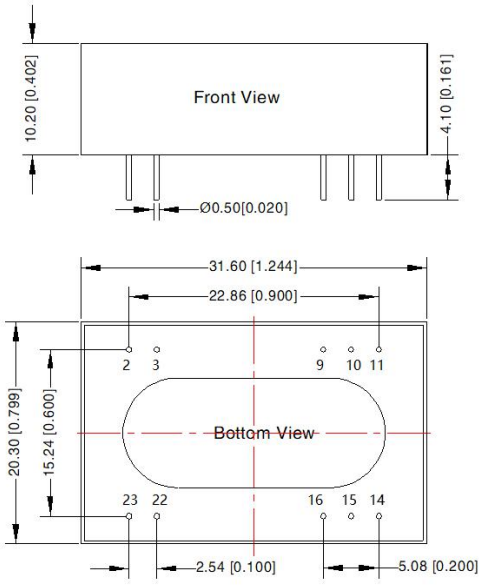
Fig. 4

4. Output load requirements

To ensure that the module can work efficiently and reliably, its output min. load shall be no lower than 5% of the rated load when using, or the output ripple may increase rapidly. Ensure that the product working load must be higher than 5% of the rated load.

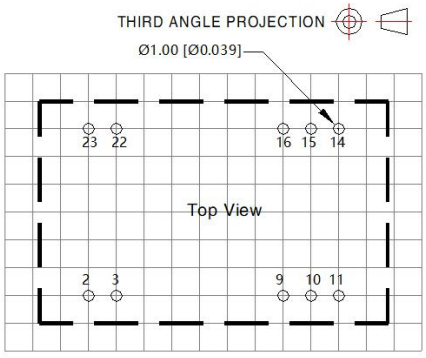
5. For more information please find DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin diameter tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.50[± 0.020]

Dual Output
/Single Output



Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
2,3	GND	GND
9	NC	0V
10,15	NC	NC
11	NC	-Vo
14	+Vo	+Vo
16	0V	0V
22,23	Vin	Vin

NC: No Connection

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Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com.Packaging bag number: 58210008;
2. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
3. The recommended unbalance degree of the dual output module load is ≤±5%; if the degree exceeds ±5%, than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
4. The maximum capacitive load offered were tested at nominal input voltage and full load;
5. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
6. All index testing methods in this datasheet are based on our company corporate standards;
7. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
8. We can provide product customization service, please contact our technicians directly for specific information;
9. Specifications-are subject to change without prior notice.

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