MORNSUN®

WRA_ZP- 3WR2&WRB_ZP- 3WR2 Series

3W，WIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT, DC-DC CONVERTER

Patent Protection RoHS

FEATURES

- 2:1 wide input voltage range
- DIP Package
- Efficiency up to 86%
- 1.5KVDC isolation
- Short Circuit Protection(automatic recovery)
- Operating Temperature Range: -40°C ~ +85°C
- Meet CISPR22/EN55022 CLASS A

PART NUMBER SYSTEM

WRA0505ZP-3WR2

- Rated Power
- Package Style
- Output Voltage
- Input Voltage
- Product Series

APPLICATION

The WRA_ZP-3WR2 & WRB_ZP-3WR2 Series are specially designed for applications where a wide range input voltage power supplies are unregulated from the input power supply in a distributed power supply system on a circuit board.

These products apply to where:

1) Input voltage range ≤2:1;
2) 1.5KVDC input and output isolation;
3) Output regulated and low ripple noise is required.

SELECTION GUIDE

Model Number	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA,Typ.)	Max. Capacitive Load# (μF)	Efficiency (%, Typ.) @Max. Load
	Nominal (Range)	Max**		Max.	Min.	@Max. Load	@No Load			
WRA0505ZP-3WR2	5 (4.5-9)	11	±5	±300	±15	800	40	20	2200	75
*WRA0512ZP-3WR2			±12	±125	±6	790			1800	76
*WRA0515ZP-3WR2			±15	±100	±5	790			1000	76
WRB0505ZP-3WR2			5	600	30	822			4700	73
*WRB0512ZP-3WR2			12	250	13	790			2700	76
*WRB0515ZP-3WR2			15	200	10	790			2200	76
*WRA1205ZP-3WR2	12 (9-18)	20	±5	±300	±15	313	30	30	2200	80
*WRA1212ZP-3WR2			±12	±125	±6	309			1800	81
*WRA1215ZP-3WR2			±15	±100	±5	305			1000	82
WRB1205ZP-3WR2			5	600	30	313			4700	80
WRB1212ZP-3WR2			12	250	13	309			2700	81
WRB1215ZP-3WR2			15	200	10	305			2200	82
WRB1224ZP-3WR2			24	125	7	302			1800	83
WRA2405ZP-3WR2	24 (18-36)	40	±5	±300	±15	155	15		2200	81
*WRA2412ZP-3WR2			±12	±125	±6	153			1800	82
WRA2415ZP-3WR2			±15	±100	±5	149			1000	84
WRB2405ZP-3WR2			5	600	30	155			4700	81
WRB2412ZP-3WR2			12	250	13	153			2700	82
WRB2415ZP-3WR2			15	200	10	149			2200	84
*WRA4805ZP-3WR2	48 (36-75)	80	±5	±300	±15	77	5		2200	82
*WRA4812ZP-3WR2			±12	±125	±6	75			1800	83
*WRA4815ZP-3WR2			±15	±100	±5	74			1000	84
WRB4805ZP-3WR2			5	600	30	77			4700	82
*WRB4812ZP-3WR2			12	250	13	75			2700	83
WRB4815ZP-3WR2			15	200	10	74			2200	86

Note:1. *Designing. **Input voltage can't exceed this value, or will cause the permanent damage.
2. # For each output.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input 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	3.5	4	4.5	
	12VDC input	4.5	8	9	
	24VDC input	11	16	18	
	48VDC input	24	33	36	
Input Filter		π Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Power		0.15	--	3	W
Output Voltage Accuracy	5% to 100% load	--	±1	±3	%
No load output Voltage Accuracy	Input voltage range	--	±1.5	±5	
Output Voltage Balance	Dual output, balanced loads	--	±0.5	±1	
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	
Load Regulation	5% to 100% load	--	±0.2	±0.5	
Transient Recovery Time	25% load step change	--	0.5	2	ms
Transient Response Deviation		--	±2	±5	%
Temperature Drift	100% load	--	±0.02	±0.03	%/°C
Ripple*	20MHz Bandwidth	--	30	45	mVp-p
Noise*		--	45	60	
Output Power Protection	Input voltage range	120	--	--	%
Output Short Circuit Protection		Continuous, automatic recovery			

Note: 1.Dual output models unbalanced load: ±5%.
2.* Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output,100KHz/1V	--	120	--	pF
Switching Frequency(PFM mode)	100% load, stand Input voltage	--	200	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Case Material		Aluminum Alloy			
Weight		--	14	--	g

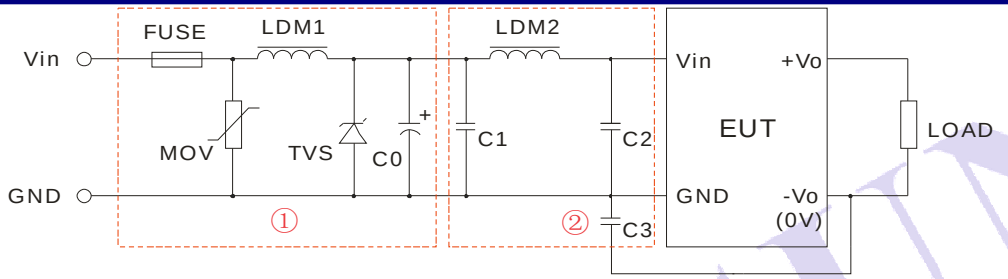
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above85℃)	-40	--	85	°C
Storage Temperature		-55	--	125	
Temp. rise at full load	Ta=25°C	--	25	--	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS A(Without External Circuit)/ CLASS B（External Circuit Refer to Figure1-② or Figure 3）	
	RE	CISPR22/EN55022	CLASS A(Without External Circuit)/ CLASS B（External Circuit Refer to Figure1-② or Figure 3）	
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV/ Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV	perf. Criteria B（External Circuit Refer to Figure1-①）
		IEC/EN61000-4-4	±4KV	perf. Criteria B（External Circuit Refer to Figure 3）
	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B（External Circuit Refer to Figure1-②or Figure 3）
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips、short and interruptions immunity	IEC/EN61000-4-29	0%-70%	perf. Criteria B

EMC RECOMMENDED CIRCUIT



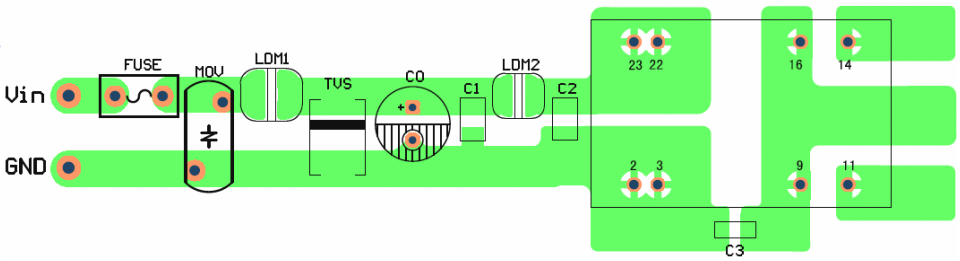
(Figure1)

参数说明	Vin:5V	Vin:12V	Vin:24V	Vin:48V
FUSE	Choose according to practical input current			
MOV	--	--	10D560K	10D101K
LDM1	--	--	56μH	
TVS	SMCJ13A	SMCJ28A	SMCJ48A	SMCJ90A
C0	680μF/16V	680μF/25V	120μF/50V	120μF/100V
C1	4.7μF /50V			4.7μF /100V
LDM2	12μH			
C2	4.7μF /50V			4.7μF /100V
C3	1μF			

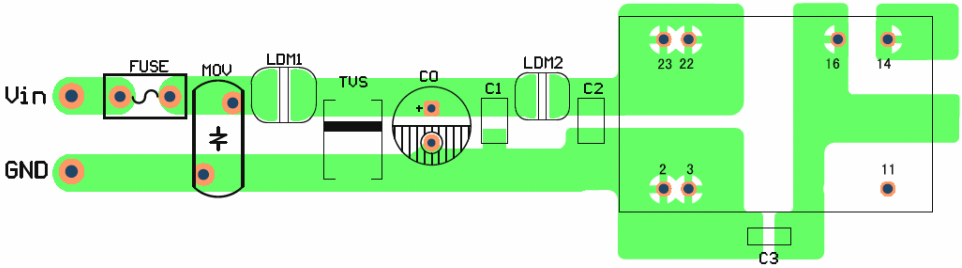
Note: 1.In Figure 1,part① is EMS Recommended external circuit, part② is EMI recommended external circuit. Choose according to requirements.
2. If there is no recommended parameters, the model no require the external component.

EMC RECOMMENDED CIRCUIT PCB LAYOUT

DUAL

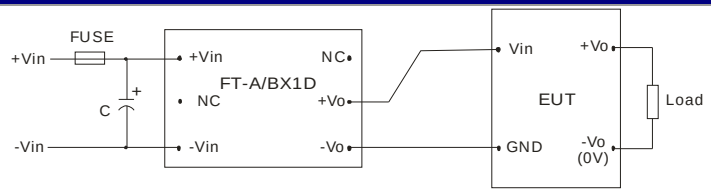


SINGLE



(Figure 2)
Note: The space between input and output GND (C3) must≥2mm.

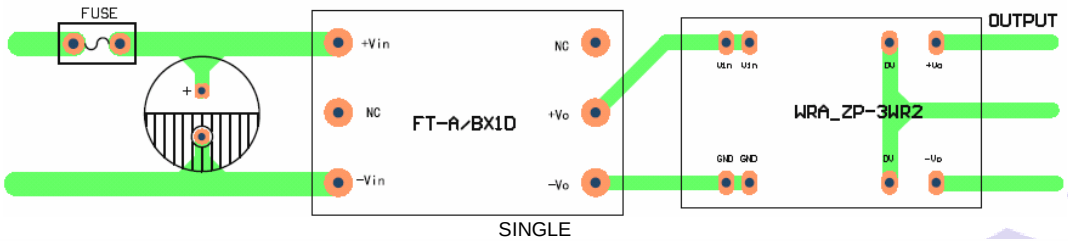
EMC MODULE RECOMMENDED CIRCUIT



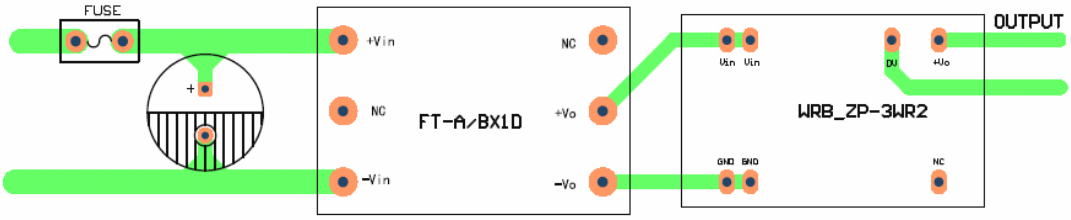
Nominal Voltage=5V/12V/24V, C≥330uF/50V
Nominal Voltage=48V, C≥330uF/100V
(Figure 3)

EMC MODULE RECOMMENDED CIRCUIT PCB LAYOUT

DUAL

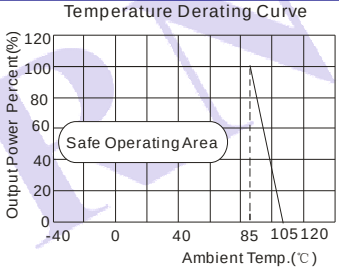


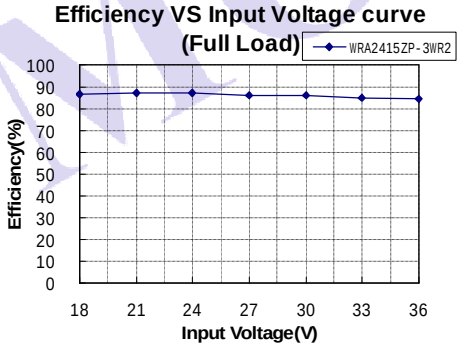
SINGLE

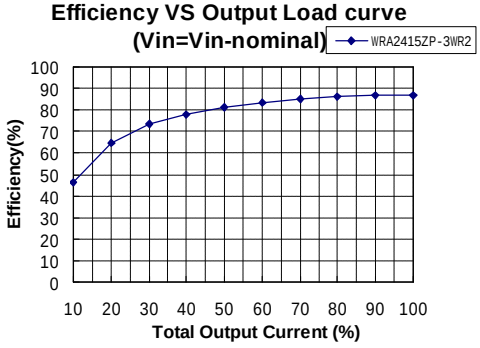


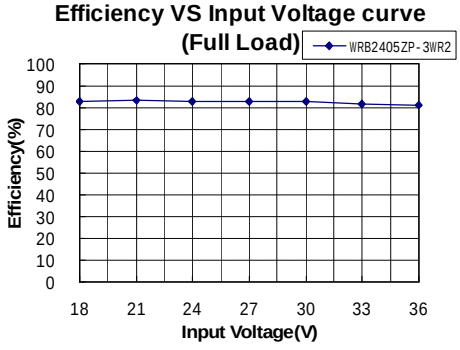
(Figure 4)

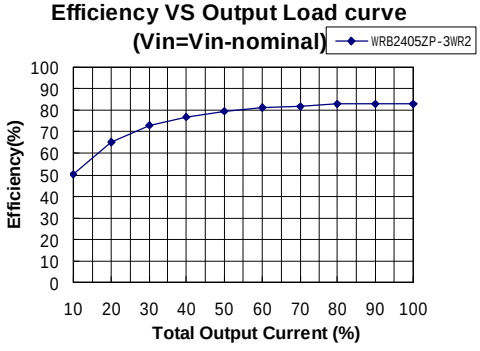
PRODUCT TYPICAL CURVE





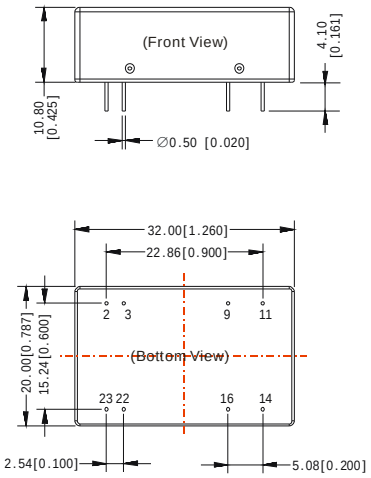






OUTLINE DIMENSIONS，RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

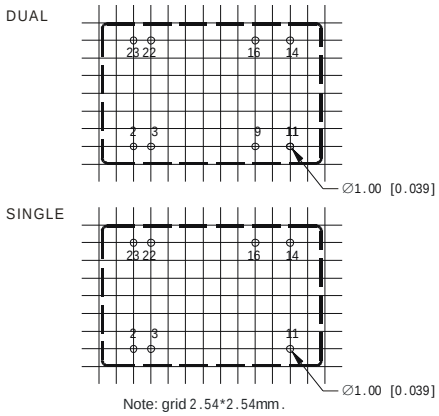


FOOTPRINT DETAILS		
Pin	Single	Dual
2,3	GND	GND
9	No Pin	0V
11	NC	-Vo
14	+Vo	+Vo
16	0V	0V
22,23	Vin	Vin

NC: No connection

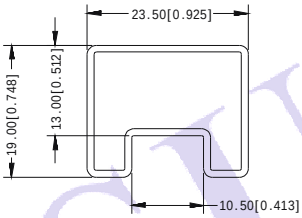
Note:
Unit:mm[inch]
Pin diameter tolerances: ± 0.10mm[± 0.004inch]
General tolerances: ± 0.25mm[± 0.010inch]

RECOMMENDED FOOTPRINT



Note: grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS

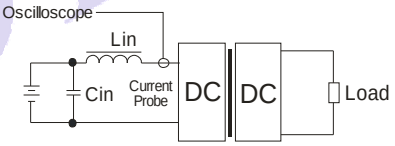


Note:
Unit :mm[inch]
General tolerances: ± 0.50mm[± 0.020inch]
L=530mm[20.866inch] Devices per tube quantity: 15pcs
L=220mm[8.661inch] Devices per tube quantity: 6pcs
Short tube inner package dimensions: L*W*H= 255*170*80mm
Short tube outer package dimensions(with six inner package boxes):
L*W*H= 375*280*270mm
Long tube inner package dimensions: L*W*H= 580*200*100mm
Long tube outer package dimensions(with two inner package boxes):
L*W*H= 600*215*220mm
Long tube outer package dimensions(with three inner package boxes):
L*W*H= 600*215*325mm

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.



Lin(4.7μH) Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN CONSIDERATIONS

1) Requirement on output load

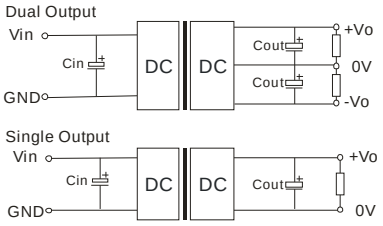
To ensure this module can operate efficiently and reliably, During operation, the minimum output load could not be less than 5% of the full load. otherwise ripple maybe increase dramatically. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, suppose to use the resistance of 5% rated power, or use our company's products with a lower rated output power.

2) Recommended circuit

All the WRA_ZP-3WR2 & WRB_ZP-3WR2 Series have been tested according to the following recommended testing circuit before leaving factory (see Figure 5).

If you want to further decrease the input/output ripple, you can increase a capacitance properly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor must less than the Max. Capacitive Load.

General: Cin: 5V&12V 100μF
24V&48V 10μF~47μF
Cout: 10μF/100mA

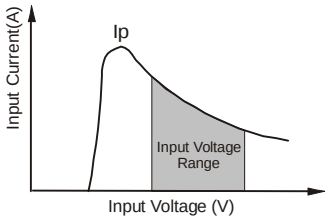


(Figure 5)

3) Input current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the flash startup current of this kind of DC/DC module (Figure 6).

General: Vin:5V Ip =1400mA
Vin:12V Ip =620mA
Vin:24V Ip =300mA
Vin:48V Ip =150mA



(Figure 6)

4) Cannot use in parallel and hot swap

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. All characteristics are for listed model, non-standard models may perform differently, please contact our technical person for more detail.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

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