

DC/DC Converter

VRA_ZP-6WR2 & VRB_ZP-6WR2 Series

MORNSUN®

6W, wide input voltage, isolated & regulated output
DC/DC converter



CE Patent Protection RoHS

FEATURES

- Wide range of input voltage (2:1)
- Efficiency up to 89%
- Isolation voltage: 1.5K VDC
- Output over-voltage protection, short-circuit protection
- Operating temperature range: -40℃ to +85℃
- Low ripple & noise
- Meet CISPR22/EN55022 CLASS A
- International standard pin-out
- Meet EN60950

VRA_ZP-6WR2 & VRB_ZP-6WR2 series are isolated 6W DC-DC products with 2:1 input voltage. They feature efficiency up to 89%, 1500VDC isolation, operating temperature of -40℃ ~+85℃, output over-voltage protection, short-circuit protection and EMI meets CISPR22/EN55022 CLASS A, which make them widely applied in industrial control, electricity, instruments, communication fields.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency ② (%Min./Typ.) @ Full Load	Max. Capacitive Load ③ (μF)
		Nominal (Range)	Max. ②	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
--	VRA1205ZP-6WR2	12 (9-18)	20	±5	±600/±30	79/81	470
	VRA1212ZP-6WR2			±12	±250/±12	83/85	100
	VRA1215ZP-6WR2			±15	±200/±10	83/85	100
CE	VRB1203ZP-6WR2			3.3	1500/75	74/76	1800
	VRB1205ZP-6WR2			5	1200/60	79/81	1000
	VRB1212ZP-6WR2			12	500/25	83/85	100
	VRB1215ZP-6WR2			15	400/20	83/85	100
	VRB1224ZP-6WR2			24	250/12	85/87	47
--	VRA2405ZP-6WR2	24 (18-36)	40	±5	±600/±30	81/83	470
	VRA2409ZP-6WR2			±9	±333/±16	84/86	100
CE	VRA2412ZP-6WR2			±12	±250/±12	85/87	100
	VRA2415ZP-6WR2			±15	±200/±10	85/87	100
--	VRA2418ZP-6WR2			±18	±166/±8	84/86	150
	VRA2424ZP-6WR2			±24	±125/±6	86/88	47
CE	VRB2403ZP-6WR2			3.3	1500/75	77/79	1800
	VRB2405ZP-6WR2			5	1200/60	81/83	1000
	VRB2409ZP-6WR2			9	667/33	83/85	470
	VRB2412ZP-6WR2			12	500/25	85/87	100
	VRB2415ZP-6WR2			15	400/20	87/89	100
	VRB2424ZP-6WR2			24	250/13	86/88	47
--	VRA4805ZP-6WR2	48 (36-75)	80	±5	±600/±30	81/83	470
	VRA4812ZP-6WR2			±12	±250/±12	85/87	100
	VRA4815ZP-6WR2			±15	±200/±10	86/88	100
CE	VRB4803ZP-6WR2			3.3	1500/75	77/79	1800
	VRB4805ZP-6WR2			5	1200/60	81/83	1000
	VRB4812ZP-6WR2			12	500/25	86/88	100
	VRB4815ZP-6WR2			15	400/20	86/88	100

Notes:

① Exceeding the maximum input voltage may cause permanent damage;

② For the dual output modules, the capacitive loads of positive and negative outputs are the same.

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Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC input	--	617/12	633/18	mA
	24VDC input	--	301/9	309/13	
	48VDC input	--	150/3	155/7	
Reflected Ripple Current	12VDC input	--	20	--	
	24VDC input	--	20	--	
	48VDC input	--	20	--	
Input impulse Voltage (1sec. max.)	12VDC input	-0.7	--	25	VDC
	24VDC input	-0.7	--	50	
	48VDC input	-0.7	--	100	
Starting Voltage	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
Output Voltage Accuracy	5%-100% load		--	±1	±2	%
Balance of Output Voltage	Dual output, balanced load		--	±0.5	±1.5	
Line Regulation	Full load, the input voltage is from low to high		--	±0.2	±0.5	
Load Regulation	5%-100% load		--	±0.5	±1	
Cross Regulation	Dual output, primary output with 50% loading, secondary output with 10%-100% loading		--	--	±5	
Transient Recovery Time	25% load step change		--	300	500	μs
Transient Response Deviation			--	±3	±5	%
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise*	20MHz bandwidth	3.3V/5V output	--	30	80	mV p-p
		others	--	50	100	
Over-voltage Protection	Input voltage range		110	--	140	%Vo
Short circuit Protection			Continuous, self-recovery			
Note: *Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.						

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General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Isolation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	Derating when operating temperature up to ≥71°C (see Fig. 1)	-40	--	85	°C
Storage Temperature		-55	--	125	
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300	
Storage Humidity	Non-condensing	5	--	95	%RH
Switching Frequency	PFM Mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Physical Specifications

Casing Material	Aluminum alloy
Dimension	32.00*20.00*10.80 mm
Weight	13g(Typ.)
Cooling Method	Free convection

EMC Specifications

EMI	CE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2 Contact $\pm 4\text{KV}$	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 $\pm 2\text{KV}$ (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 $\pm 2\text{KV}$ (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3 V _{r.m.s}	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0-70%	perf. Criteria B

Product Characteristic Curve

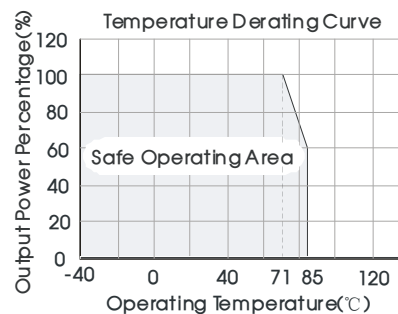
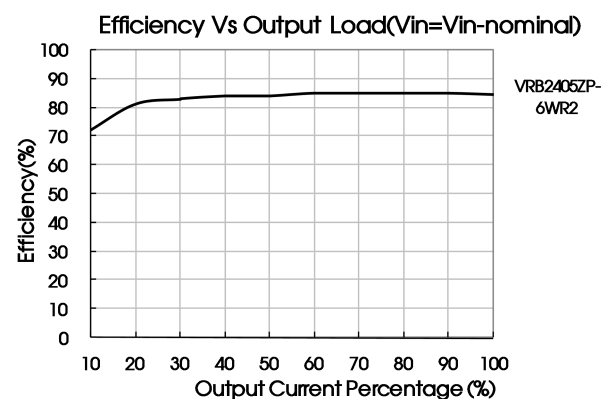
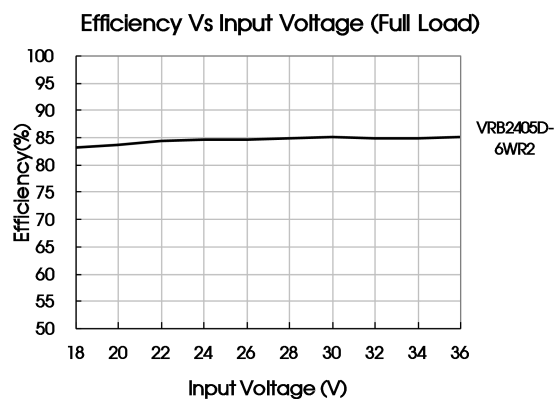


Fig. 1



Design Reference

1.Recommended circuit

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.

If a further decrease of the input and output ripple is required, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance, and ensure the capacitance should be lower than the max. capacitive load of the product.



Vout(VDC)	Cin	Cout
12	100μF	10μF
24/48	10μF ~ 47μF	

2.EMC solution-recommended circuit

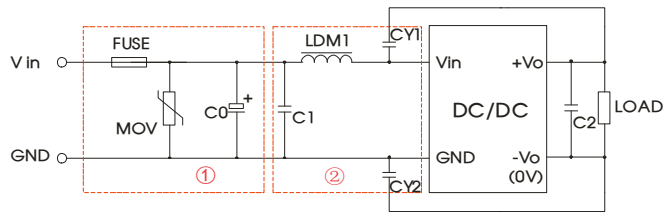


Fig. 3

Note: Part ① in the Fig. 3 is for EMS test, part ② is for EMI filtering; parts ① and ② can be added based on actual requirement.

Parameter description

Model	Vin:12V	Vin:24V	Vin:48V
FUSE	Choose according to actual input current		
MOV	S14K20	S14K35	S14K60
C0	680μF/25V	330μF/50V	330μF/100V
C1	1μF/50V		1μF/100V
C2	Refer to the Cout in Fig.2		
LDM1	4.7μH		
CY1	1nF/2KV		
CY2	1nF/2KV		

EMC solution-recommended circuit PCB layout

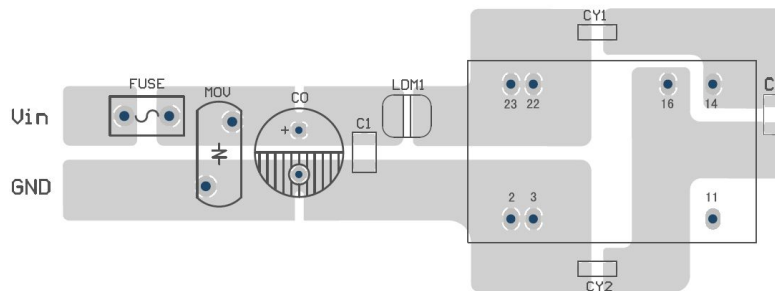


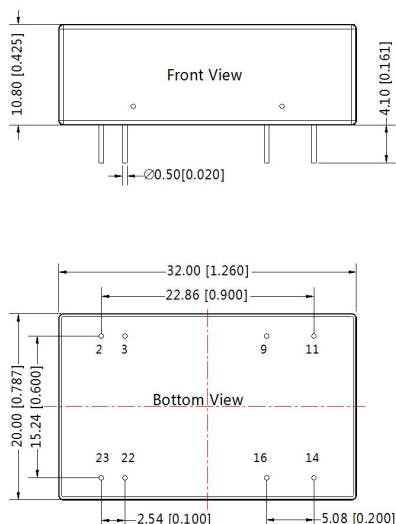
Fig. 4

Note: the min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be $\geq 2\text{mm}$.

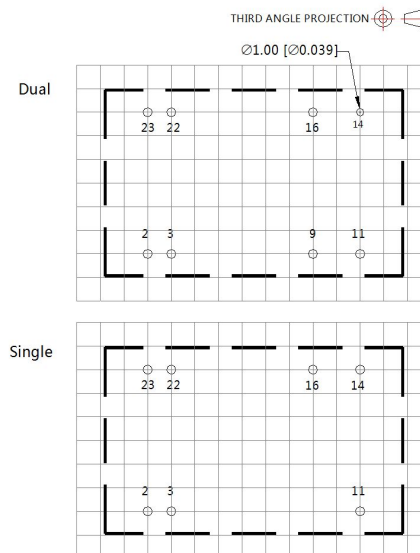
3.It is not allowed to connect modules output in parallel to enlarge the power

4.For more information about Mornsun EMC Filter products, please visit www.mornsun-power.com to download the Selection Guide of EMC Filter

Dimensions and Recommended Layout



Note:
Unit :mm[inch]
Pin diameter tolerances : $\pm 0.10[\pm 0.004]$
General tolerances: $\pm 0.50[\pm 0.020]$



Note:Grid 2.54*2.54mm

Pin	Pin-Out	
	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

Notes:

1. Packing information please refer to 'Product Packing Information' which can be downloaded from www.mornsun-power.com. Packing 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 $\leq \pm 5\%$; if the degree exceeds $\pm 5\%$, 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 $T_a=25^\circ\text{C}$, humidity $<75\%$ with nominal input voltage and rated output load;
6. All index testing methods in this datasheet are based on our Company's 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;
9. Specifications are subject to change without prior notice.

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: 86-20-38601850-8801 Fax: 86-20-38601272 E-mail: info@mornsun.cn