

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°C to +85°C
- 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°C ~+85°C, 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
	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
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.

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	--	mA
	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	VDC
	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	%/°C	
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.

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 ±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.3-① for 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

Product Characteristic Curve

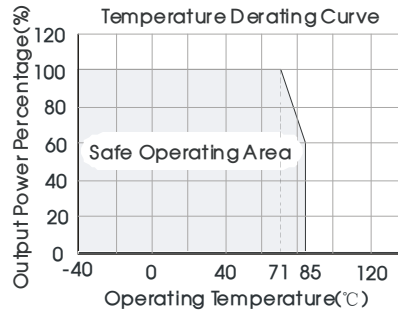
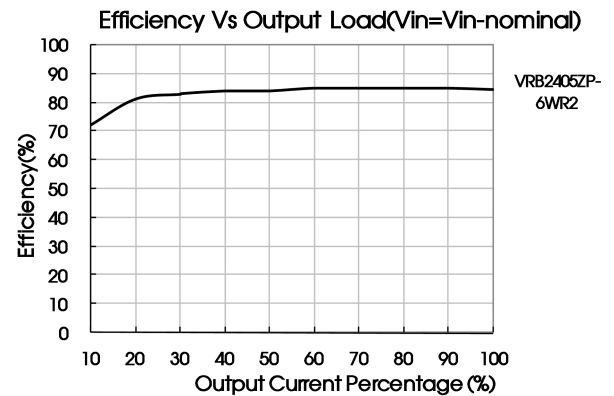
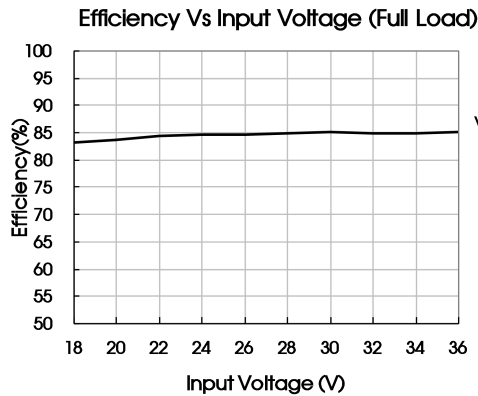


Fig. 1



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.



Fig. 2

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

2.EMC solution-recommended circuit

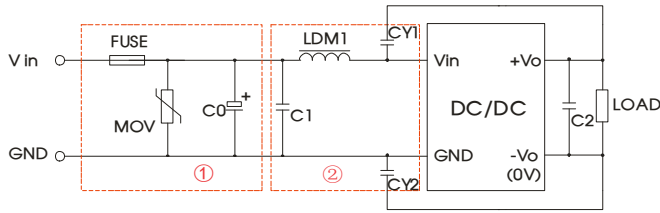


Fig. 3

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

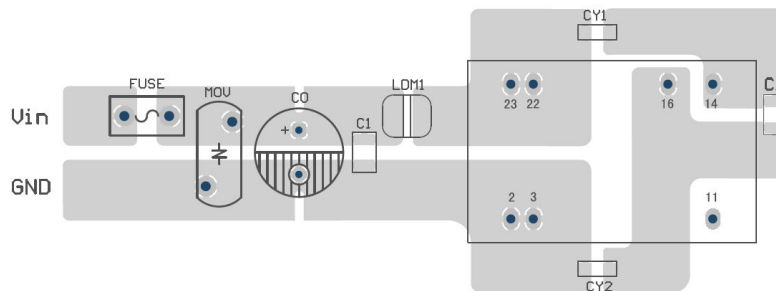


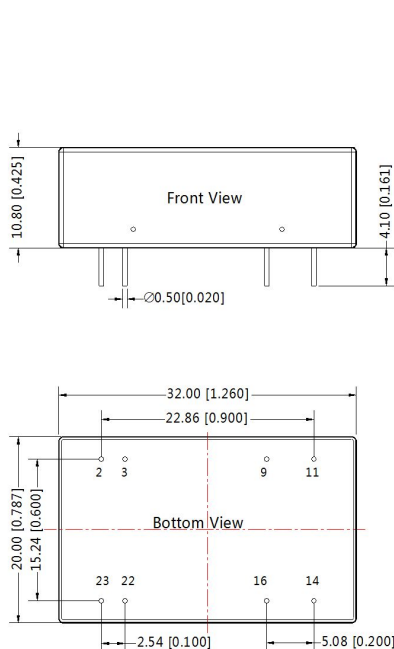
Fig. 4

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

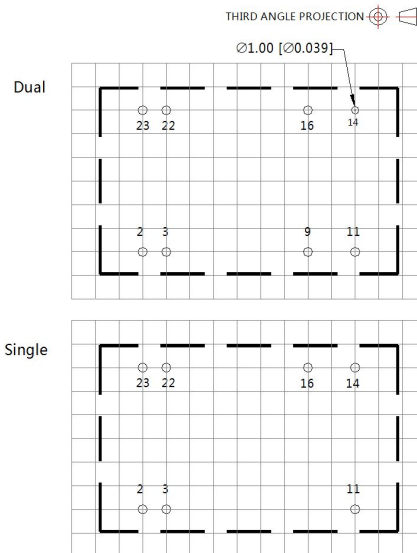
3. It is not allowed to connect modules output in parallel to enlarge the power

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.

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