6W,wide input, isolated & regulated dual/single output, YMD package, DC-DC converter

c UL us CE CB Patent Protection RoHS

FEATURES

- Wide input voltage range (2:1)
- High efficiency up to 88%
- No-load power consumption as low as 0.12W
- Isolation voltage :1.5K VDC
- Input under-voltage protection, output short circuit, over-current, over–voltage protection
- Operating temperature range: -40℃ to +85℃
- Meet CISPR32/EN55032 CLASS A, without external components
- Reverse voltage protection available with A2S(Chassis mounting) or A4S(35mm DIN-Rail mounting)
- International standard pin-out
- IEC60950, UL60950, EN60950 approval

VRA_YMD-6WR3 & VRB_YMD-6WR3 series are isolated 6W DC-DC products with 2:1 input voltage. The feature efficiency up to 88%, 1500VDC isolation, operating temperature of -40℃ to +85℃, input under-voltage protection, output over-voltage, over-current, short circuit protection and EMI meets CISPR32/EN55032 CLASS A, which make them widely applied in medical care, industrial control, electric power, instruments and communication fields. And extension package A2S and A4S also enable them with reverse voltage protection.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency④ (%,Min./Typ.) @ Full Load	Max. Capacitive Load⑤ (μF)
		Nominal② (Range)	Max. ③	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
UL/CE/ CB	VRA1205YMD-6WR3	12 (9-18)	20	±5	±600/0	79/81	470
	VRA1212YMD-6WR3			±12	±250/0	83/85	100
CE	VRB1205YMD-6WR3			5	1200/0	79/81	1000
	VRB1212YMD-6WR3			12	500/0	83/85	470
UL/CE/ CB	VRA2405YMD-6WR3	24 (18-36)	40	±5	±600/0	81/83	470
	VRA2412YMD-6WR3			±12	±250/0	85/87	100
	VRA2415YMD-6WR3			±15	±200/0	85/87	100
CE	VRB2403YMD-6WR3			3.3	1500/0	75/77	1800
	VRB2405YMD-6WR3			5	1200/0	80/82	1000
--	VRB2409YMD-6WR3			9	667/0	83/85	470
CE	VRB2412YMD-6WR3			12	500/0	83/85	470
	VRB2415YMD-6WR3			15	400/0	84/86	220
	VRB2424YMD-6WR3			24	250/0	83/85	100
--	VRB4803YMD-6WR3	48 (36-75)	80	3.3	1500/0	77/79	1800
	VRB4805YMD-6WR3			5	1200/0	81/83	1000
	VRB4812YMD-6WR3			12	500/0	85/87	470
	VRB4815YMD-6WR3			15	400/0	86/88	220
	VRB4824YMD-6WR3			24	250/0	86/88	100

Notes:
① Part No. with suffix of "A2S" means chassis mounting and suffix of "A4S" means DIN-Rail mounting (e.g. VRB2405YMD-6WR3A2S means chassis mounting; VRB2405YMD-6WR3A4S means DIN-Rail mounting);
② A2S (wiring) and A4S (rail) Model due to input reverse polarity protection function, input voltage range the minimum value and starting voltage is higher than 1VDC DIP package;
③ Absolute maximum rating without damage on the converter, but it isn't recommended;
④ Efficiency is measured in nominal input voltage and rated output load;A2S (wiring) and A4S (rail) Model due to input reverse polarity protection, minimum efficiency greater than Min.-2 is qualified;
⑤ The capacitive loads of positive and negative outputs are identical.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC nominal input series, nominal input voltage		--	603/10	633/22	mA
	24VDC nominal input series, nominal input voltage	3.3V output	--	268/5	275/15	
		Others	--	296/5	313/15	
	48VDC nominal input series, nominal input voltage	3.3V output	--	130/4	134/8	
		Others	--	150/4	155/8	
Reflected Ripple Current			--	20	--	
Surge Voltage (1sec. max.)	12VDC nominal input series		-0.7	--	25	VDC
	24VDC nominal input series		-0.7	--	50	
	48VDC nominal input series		-0.7	--	100	
Starting Voltage	12VDC nominal input series		--	--	9	
	24VDC nominal input series		--	--	18	
	48VDC nominal input series		--	--	36	
Input Under-voltage Protection	12VDC nominal input series		5.5	6.5	--	
	24VDC nominal input series		12	15.5	--	
	48VDC nominal input series		26	30	--	
Input Filter			Pi filter			
Hot Plug			Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	5%-100% load		--	±1	±3	%
	0%-5% load	±5V output	--	±2	±5	
		others	--	±1	±3	
Line Regulation	Full load, the input voltage is from low voltage to high voltage	Positive output	--	±0.2	±0.5	
		Negative output	--	±0.5	±1	
Load Regulation①	5%-100% load	Positive output	--	±0.5	±1	
		Negative output	--	±0.5	±1.5	
Cross Regulation	Dual output, main circuit with 50% load, auxiliary circuit with 10%-100% load		--	--	±5	
Transient Recovery Time	25% load step change		--	300	500	μs
Transient Response Deviation		3.3V, 5V, ±5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth, 5%-100% load		--	60	85	mV p-p
Output Over-voltage Protection	Input voltage range		110	--	160	%Vo
Output Over-current Protection			110	140	190	%Io
Short circuit Protection			Continuous, self-recovery			

Note: ①When testing from 0% -100%load working conditions, load regulation index is ±5%;
②0%-5% load ripple&Noise is no more than 5%Vo.Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.

General Specification

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, insulation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	see Fig. 1	-40	--	+85	℃
Storage Humidity	Without condensation	5	--	95	%RH

Storage Temperature		-55	--	+125	℃
Lead Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	+300	
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Note:* This series of products using reduced frequency technology, the switching frequency is test value of full load,When the load is reduced to below 50%, the switching frequency decreases with decreasing load.					

Physical Specifications

Casing Material		Aluminum alloy
Dimension	Horizontal package	25.40*25.40*11.70 mm
	A2S chassis mounting	76.00*31.50*21.20 mm
	A4S DIN-rail mounting	76.00*31.50*25.80 mm
Weight	Horizontal package/A2S wiring package/A4S rail package	14g /36g /56g(Typ.)
Cooling method		Free air convection

EMC Specifications

EMI	CE	12VDC, 24VDC nominal input series	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.3-② for recommended circuit)	
		48VDC nominal input series	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	12VDC,24VDC nominal input series	CISPR32/EN55032	CLASS A (without external components)/ CLASS B (see Fig.3-② for recommended circuit)	
		48VDC nominal input series	CISPR32/EN55032	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	line to line ±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

Product Characteristic Curve

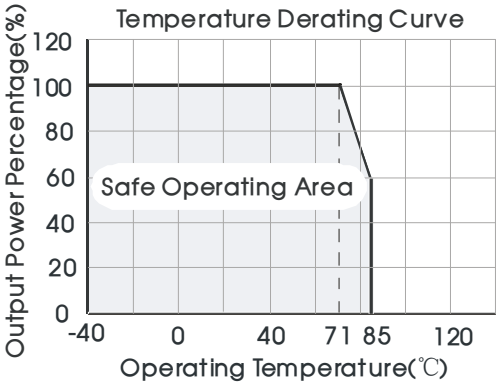
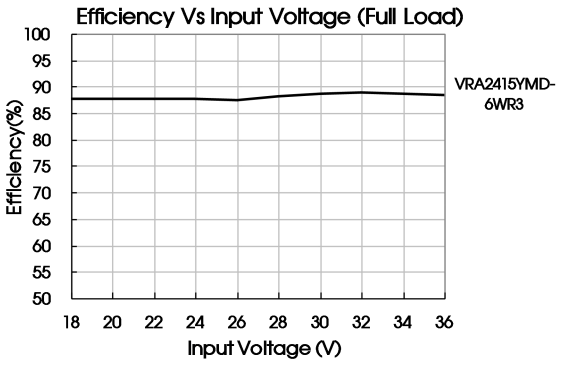
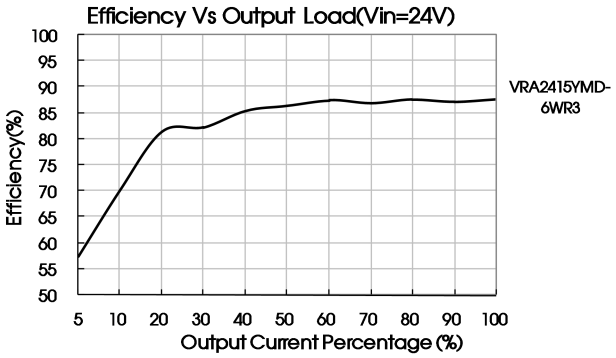
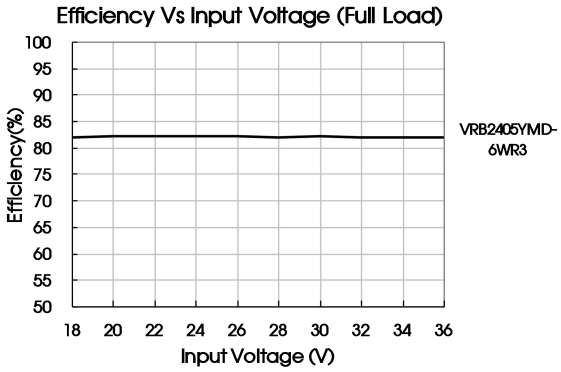
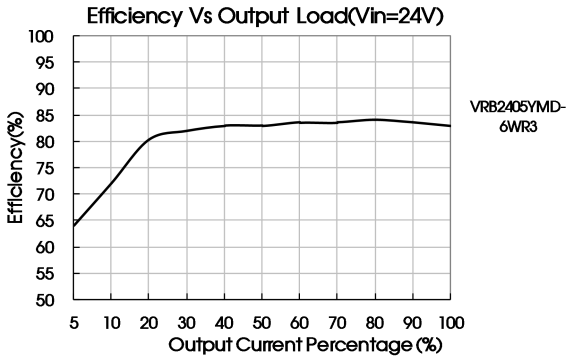


Fig. 1









Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

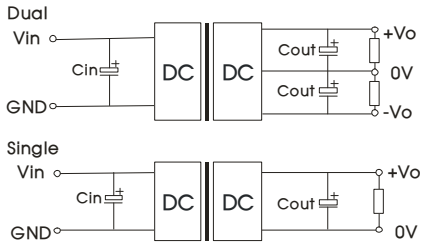


Fig. 2

Vin(VDC)	Cin(uF)	Cout(uF)
12	100	10
24	10 - 47	
48	100	

2. EMC solution-recommended circuit

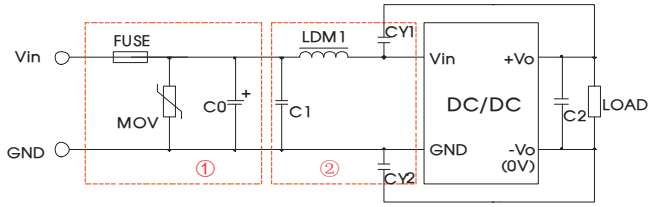


Fig. 3

Notes: Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.

Parameter description

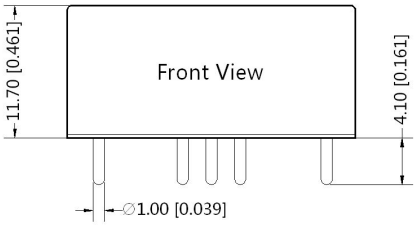
Model	Vin:12V	Vin:24V	Vin:48V
FUSE	Choose according to actual input current		
MOV	S14K20	S20K30	14D101K
C0	1000μF/35V	1000μF/50V	330uF/100V
C1	1μF/50V		4.7uF/100V
C2	Refer to the Cout in Fig.2		
LDM1	4.7μH		
CY1/CY2	1nF/2KV		

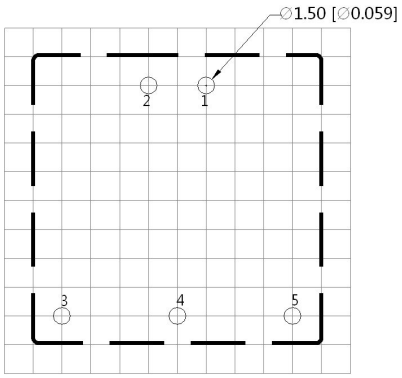
3. It is not allowed to connect modules output in parallel to enlarge the power

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

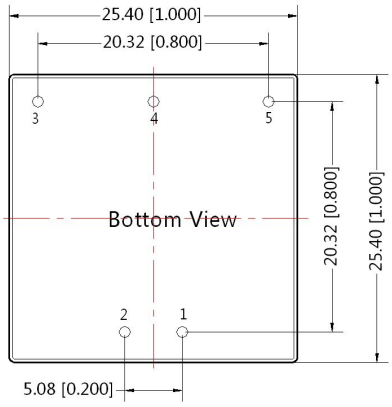
Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





Note:Grid 2.54*2.54mm

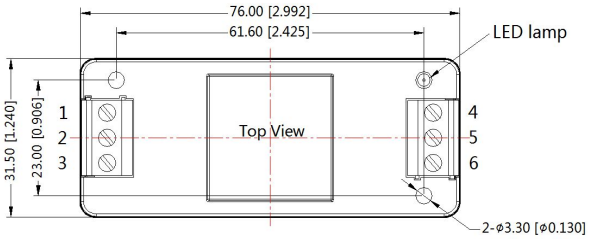


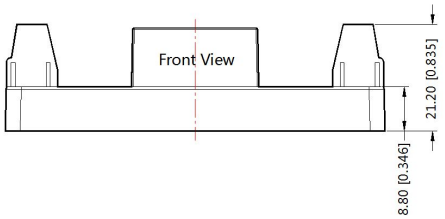
Pin-Out		
Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	No Pin	0V
5	0V	-Vo

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

VRA_YMD-6WR3A2S & VRB_YMD-6WR3A2S Dimensions

THIRD ANGLE PROJECTION



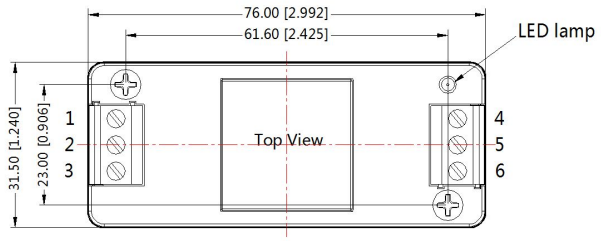


Pin-Out						
Pin	1	2	3	4	5	6
Dual	NC	GND	Vin	-Vo	0V	+Vo
Single	NC	GND	Vin	0V	NC	+Vo

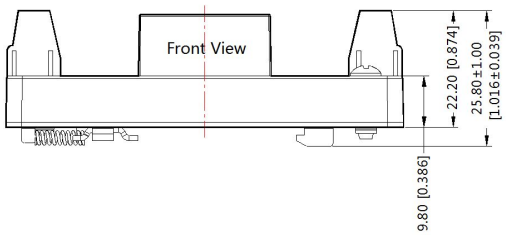
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±0.50[±0.020]

VRA_YMD-6WR3A4S & VRB_YMD-6WR3A4S Dimensions

THIRD ANGLE PROJECTION



Pin-Out						
Pin	1	2	3	4	5	6
Dual	NC	GND	Vin	-Vo	0V	+Vo
Single	NC	GND	Vin	0V	NC	+Vo



Note:
Unit: mm[inch]
Mounting rail: TS35
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±1.00[±0.039]

Note:
1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Packing bag number: 58210003(DIP), 58220022(A2S/A4S package);
2. 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;
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 Company's 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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