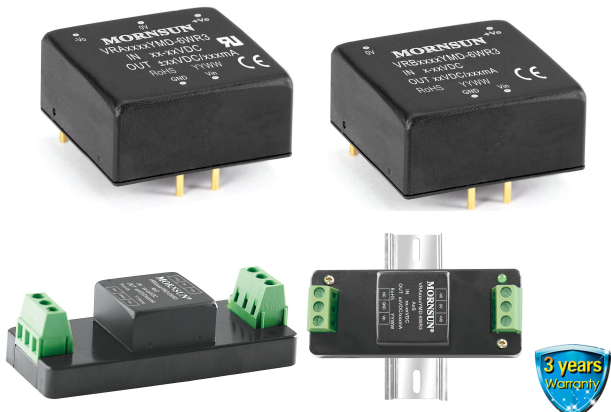


DC/DC Converter

VRA_YMD-6WR3 & VRB_YMD-6WR3 Series

6W isolated DC-DC converter in YMD package
Wide input voltage and regulated dual/single output



UL **us** **CE** **CB** Patent Protection **RoHS**



FEATURES

- Wide 2:1 input voltage range
- High efficiency up to 88%
- No-load power consumption as low as 0.12W
- I/O test isolation voltage : 1.5k VDC
- Input under-voltage protection, output short circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40°C ~ +85°C
- Meet CISPR32/EN55032 CLASS A, without extra components
- Input reverse polarity protection available with chassis(A2S) or Din-Rail mounting (A4S) version
- Industry standard pin-out
- IEC60950, UL60950, EN60950 approved

VRA_YMD-6WR3 & VRB_YMD-6WR3 series of isolated 6W DC-DC converter with 2:1 input voltage with efficiencies of up to 88%, 1500VDC input to output isolation and the converter safely operate ambient temperature of -40°C to +85°C, input under-voltage protection, output over-voltage, over-current, short circuit protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components, optional packages are offered for chassis or DIN-rail mounting (A2S, A4S), adding additional input reverse polarity protection, which make them widely applied in medical care, industrial control, electric power, instruments and communication fields.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency ^④ (%) Min./Typ.	Max. Capacitive Load ^⑤ (μF)
		Nominal ^② (Range)	Max. ③	Voltage (VDC)	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
--	VRA1215YMD-6WR3			±15	±200/0	81/83	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
	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 Use "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting;
- ② The A2S and A4S Model's start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;
- ③ Exceeding the maximum input voltage may cause permanent damage;
- ④ Efficiency is measured at nominal input voltage and rated output load; efficiencies for A2S and A4S Model's is decreased by 2% due to the input reverse polarity protection circuit;
- ⑤ The specified maximum capacitive load value for positive and negative output is 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	3.3VDC output	--	268/5		275/15
		Others	--	296/5		313/15
	48VDC nominal input series, nominal input voltage	3.3VDC 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		
Start-up Voltage	12VDC nominal input series	--	--	9	VDC	
	24VDC nominal input series	--	--	18		
	48VDC nominal input series	--	--	36		
Input Under-voltage Protection	12VDC nominal input series	5.5	6.5	--	VDC	
	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	
Voltage Accuracy	5%-100% load	--	±1	±3	%	
	0%-5% load	±5VDC output	--	±2		±5
		others	--	±1		±3
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	%
		Vo2	--	±0.5	±1	
Load Regulation ^①	5%-100% load	Vo1	--	±0.5	±1	%
		Vo2	--	±0.5	±1.5	
Cross Regulation	Vo1 load at 50%, Vo2 load at range of 10%-100%	--	--	±5		
Transient Recovery Time		--	300	500	μs	
Transient Response Deviation	25% load step change	3.3VDC, 5VDC, ±5VDC output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple & Noise ^②	20MHz bandwidth, 5%-100% load	--	60	85	mV p-p	
Over-voltage Protection		110	--	160	%Vo	
Over-current Protection	Input voltage range	110	140	190	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note: ①Load regulation for 0%-100% load is ±5%;

②Ripple & Noise at ≤ 5% load is 5%Vo Max. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specification

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	°C
Storage Humidity	Non-condensing	5	--	95	%RH
Storage Temperature		-55	--	+125	°C

Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	°C
Vibration		10-55Hz, 2G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Note:*Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

Case Material	Aluminum alloy				
Dimensions	Horizontal package	25.40 x 25.40 x 11.70 mm			
	A2S chassis mounting	76.00 x 31.50 x 21.20 mm			
	A4S DIN-rail mounting	76.00 x 31.50 x 25.80 mm			
Weight	Horizontal package/A2S wiring package/A4S DIN-rail package			12.5g /36.0g /56.0g(Typ.)	
Cooling method	Free air convection				

Electromagnetic Compatibility (EMC)

Emissions	CE	12VDC, 24VDC nominal input series	CISPR32/EN55032	CLASS A (without extra 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 extra 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)	
Immunity	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.3-① 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

Typical Characteristic Curve

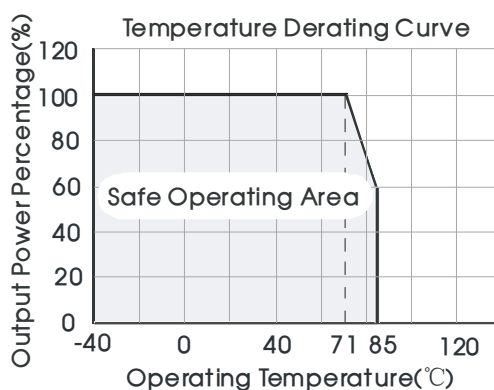
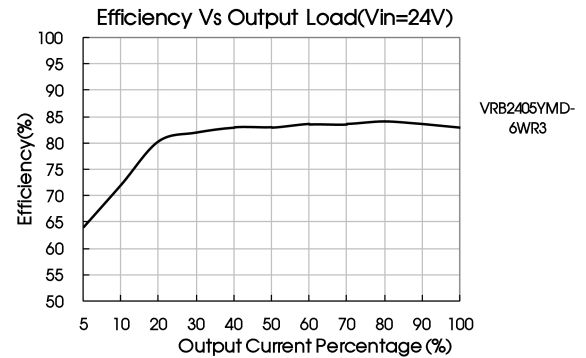
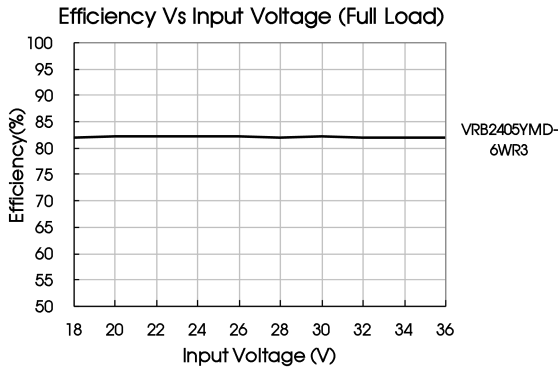
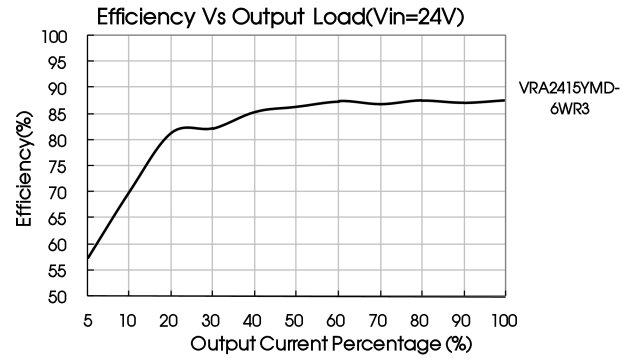
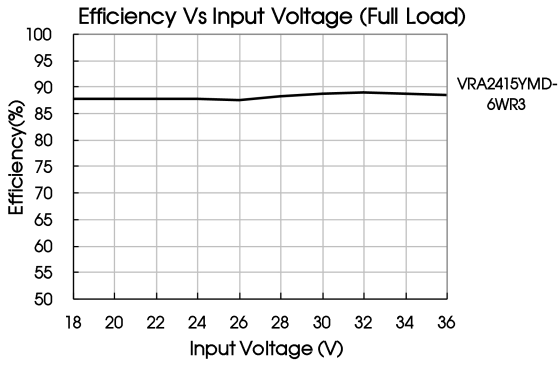


Fig. 1



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 C_{in} and C_{out} 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.

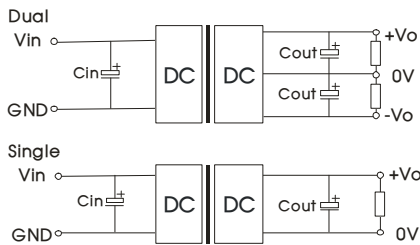


Fig. 2

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

2. EMC compliance circuit

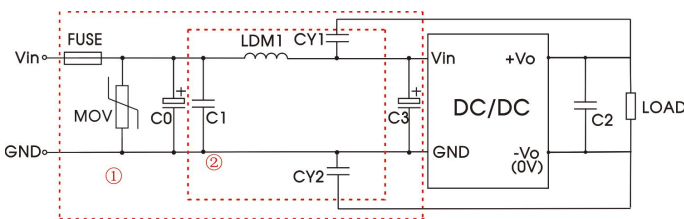


Fig. 3

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test.

Parameter description

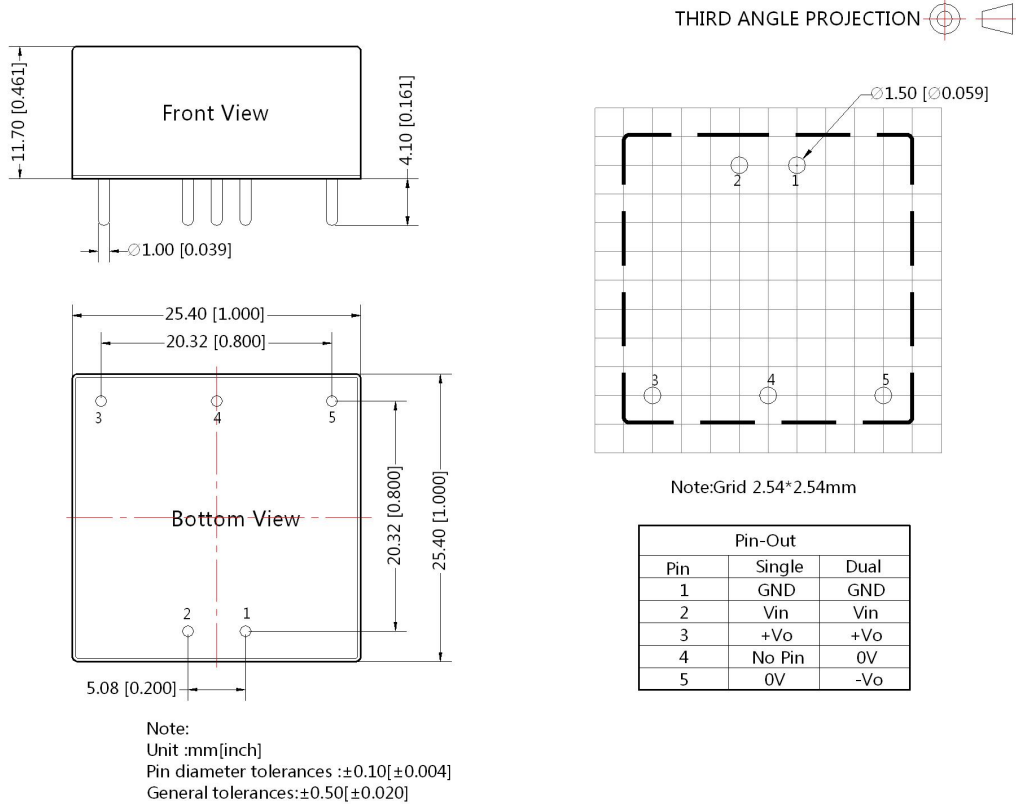
Model	Vin:12V	Vin:24V	Vin:48V
FUSE	Choose according to actual input current		
MOV	S14K20	S20K30	14D101K
C0	1000µF/35V	1000µF/50V	330µF/100V
C1	1µF/50V		4.7µF/100V
C2	Refer to the Cout in Fig.2		
C3	330µF/35V	330µF/50V	330µF/100V
LDM1	4.7µH		
CY1/CY2	1nF/2KV		

3. The products do not support parallel connection of their output

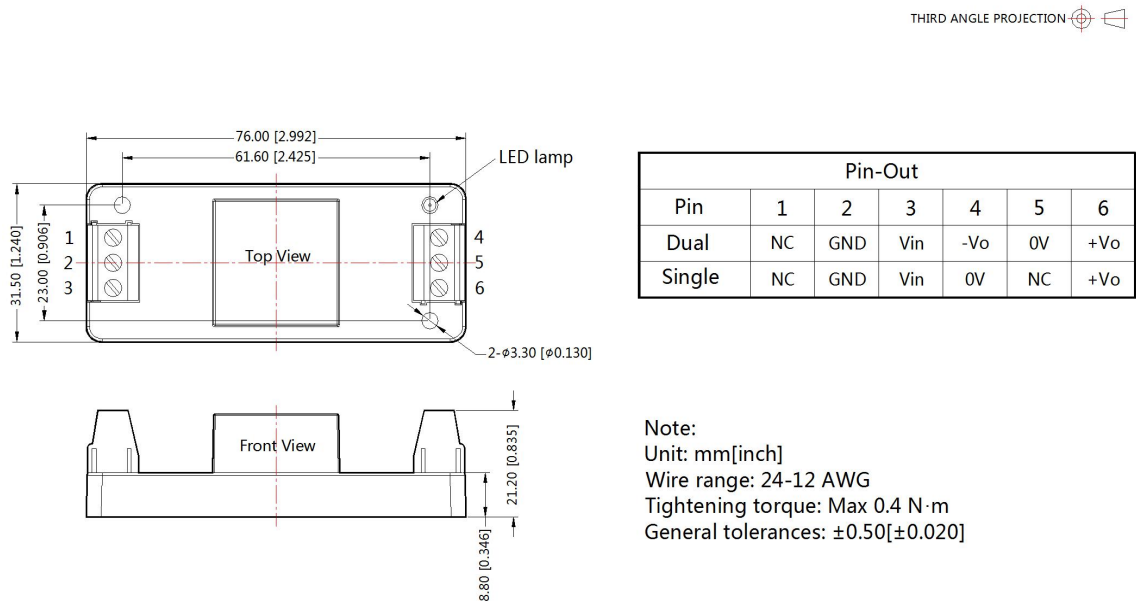
4. For additional information please refer to DC-DC converter application notes on

www.mornsun-power.com

Dimensions and Recommended Layout

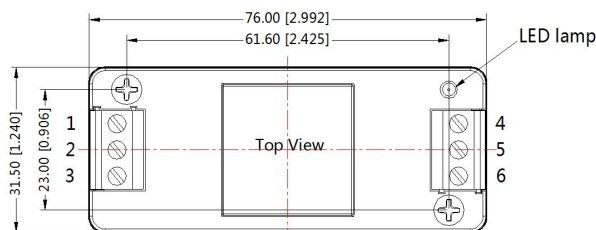


VRA_YMD-6WR3A2S & VRB_YMD-6WR3A2S Dimensions

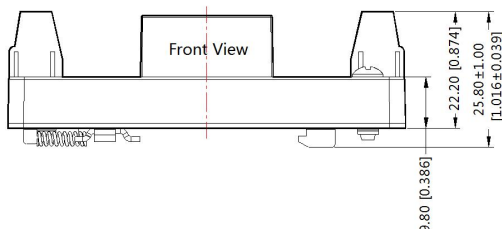


VRA_YMD-6WR3A4S & VRB_YMD-6WR3A4S Dimensions

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:
- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210003(DIP), 58220022(A2S/A4S package);
 - The recommended unbalance degree of the dual output module load is $\leq \pm 5\%$; if the degree exceeds $\pm 5\%$, then the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
 - The maximum capacitive load offered were tested at input voltage range and full load;
 - Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity $<75\%$ RH with nominal input voltage and rated output load;
 - All index testing methods in this datasheet are based on company corporate standards;
 - We can provide product customization service, please contact our technicians directly for specific information;
 - Products are related to laws and regulations: see "Features" and "EMC";
 - 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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