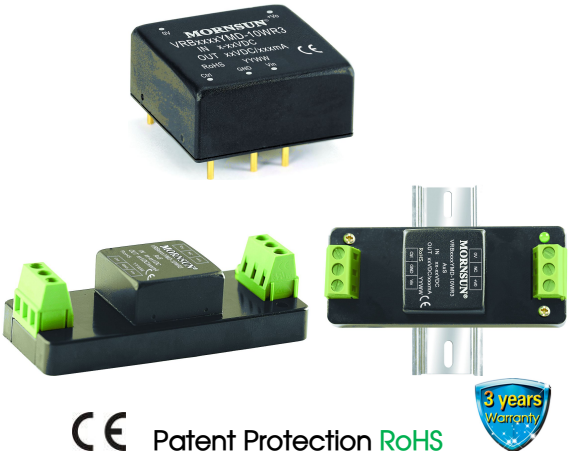
10W,wide input isolated & regulated single output, DIP packaging, DC-DC converter



CE 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
- EN60950 approval

VRB_YMD-10WR3 series are isolated 10W DC-DC products with 2:1 input voltage. They 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 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		Efficiency ④ (%,Min./Typ.) @ Full Load	Max. Capacitive Load(μF)
		Nominal ② (Range)	Max. ③	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
--	VRB1205YMD-10WR3	12 (9-18)	20	5	2000/0	81/83	2200
CE	VRB2405YMD-10WR3	24 (18-36)	40	5	2000/0	81/83	2200
	VRB2412YMD-10WR3			12	833/0	85/87	470
	VRB2415YMD-10WR3			15	667/0	86/88	330
	VRB2424YMD-10WR3			24	416/0	86/88	100
--	VRB4803YMD-10WR3	48 (36-75)	80	3.3	2400/0	77/79	2200
	VRB4805YMD-10WR3			5	2000/0	81/83	2200
	VRB4812YMD-10WR3			12	833/0	85/87	470
	VRB4815YMD-10WR3			15	667/0	85/87	330
	VRB4824YMD-10WR3			24	416/0	86/88	100

Notes:
①Part No. with suffix of "A2S" means chassis mounting and suffix of "A4S" means DIN-Rail mounting (e.g. VRB2405YMD-10WR3A2S means chassis mounting; VRB2405YMD-10WR3A4S means DIN-Rail mounting);
②A2S (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;
③Absolute maximum rating without damage on the converter, but it isn't recommended;
④Efficiency 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.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC nominal input series, nominal input voltage		--	1004/5	1029/12	mA
	24VDC nominal input series, nominal input voltage		--	502/5	515/12	
	48VDC nominal input series, nominal input voltage	3.3V output	--	208/4	215/8	
		Others	--	251/4	258/8	
Reflected Ripple Current	12VDC nominal input series		--	50	--	
	24VDC nominal input series		--	40	--	
	48VDC nominal input series		--	30	--	

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	--	VDC
	24VDC nominal input series	12	15.5	--	
	48VDC nominal input series	26	30	--	
Starting Time	Nominal input voltage & constant resistance load	--	10	--	ms
Input Filter		Pi filter			
Hot Plug		Unavailable			
Ctrl*	Module switch on	Ctrl suspended or connected to TTL high level (3.5-12VDC)			
	Module switch off	Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off	--	6	10	mA

Note: *The voltage of Ctrl pin is relative to input pin GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100% load		--	±1	±3	%
Line Regulation	Full load, the input voltage is from low voltage to high voltage		--	±0.2	±0.5	
Load Regulation①	5%-100% load	12VDC/48VDC nominal input series	--	±0.5	±1	
	0%-100% load	24VDC nominal input series	--	±0.5	±1	
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs
Transient Response Deviation		VRB4803YMD-10WR3 VRB4805YMD-10WR3	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise②	20MHz bandwidth, 5%-100% load		--	40	100	mV p-p
Over-voltage Protection	Input voltage range, nominal input voltage		110	--	160	%Vo
Over-current Protection			110	140	190	%Io
Short circuit Protection			Continuous, self-recovery			

Note: ①When testing from 0% to100%load working conditions，load regulation index of 12VDC/48VDC nominal input series 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 Specifications

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 Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
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	--	350	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Note:*This series of products with reduced frequency technology,The switching frequency of the full test, when the load is light, the switching frequency decline.

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	15g/35g/55g (Typ.)
Cooling method	Free air convection	

EMC Specifications

EMI	CE	12VDC nominal input series	CISPR32/EN55032	CLASS A (Bare component)/ CLASS B (see Fig.4-② for recommended circuit)	
		24VDC nominal input series	CISPR32/EN55032	CLASS A (Bare component)/ 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 nominal input series	CISPR32/EN55032	CLASS A(Bare component)/CLASS B(see Fig.4-② for recommended circuit)	
		24VDC nominal input series	CISPR32/EN55032	CLASS A(Bare component)/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	Others	IEC/EN61000-4-4	±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B
		12VDC nominal input series	IEC/EN61000-4-4	±2KV (see Fig.4-① for recommended circuit)	perf. Criteria B
	Surge	Others	IEC/EN61000-4-5	line to line ±2KV (see Fig.3-①for recommended circuit)	perf. Criteria B
		12VDC nominal input series	IEC/EN61000-4-5	line to line ±2KV (see Fig.4-①for 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

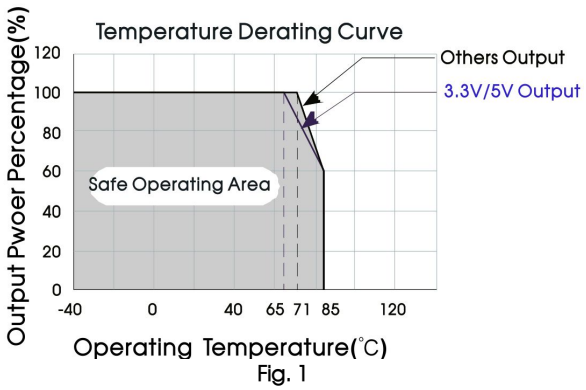
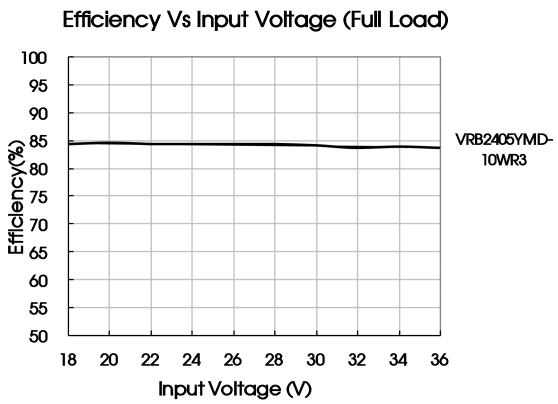
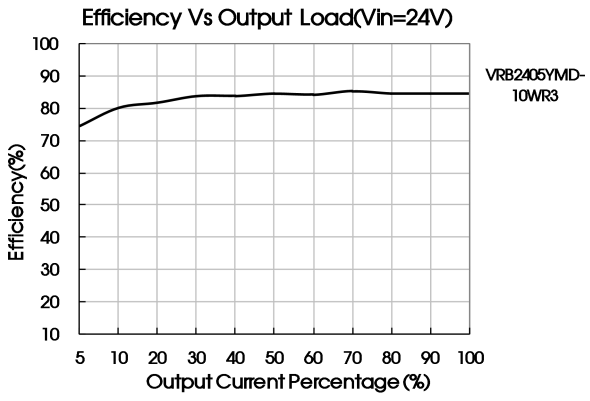


Fig. 1





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	24V/48V
Cin1	100μF
Cout	10μF

2. EMC solution-recommended circuit

24VDC/48VDC nominal input series

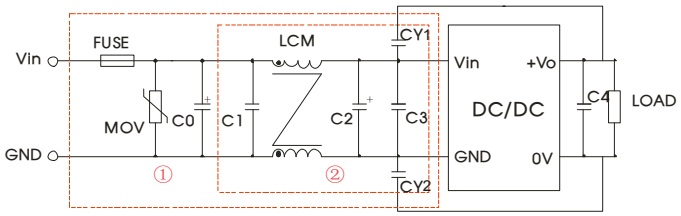


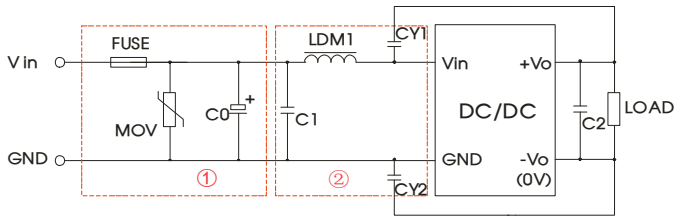
Fig. 3

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:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S20K30	14D101K
C0	680μF/50V	680uF/100V
C1	1μF/50V	1uF/100V
C2	330μF/50V	330μF/100V
C3	4.7μF/50V	4.7uF/100V
C4	Refer to the Cout in Fig.2	
LCM	4.7mH, recommended to use MORNSUN's FL2D-30-472	
CY1/CY2	1nF/2KV	

12VDC nominal input series

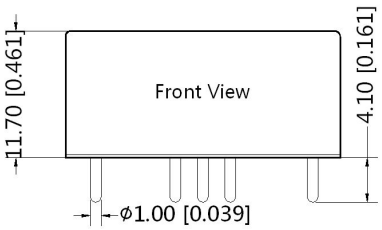


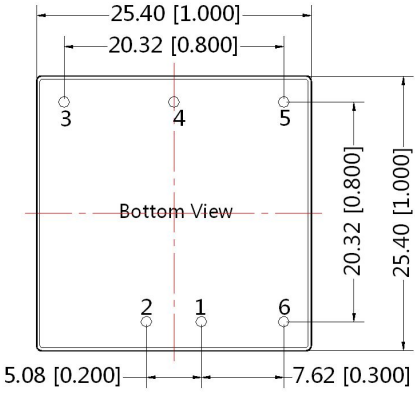
Parameter description:

Model	Vin:12V
FUSE	Choose according to actual input current
MOV	20D470K
C0	330μF/50V
C1	1μF/50V
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

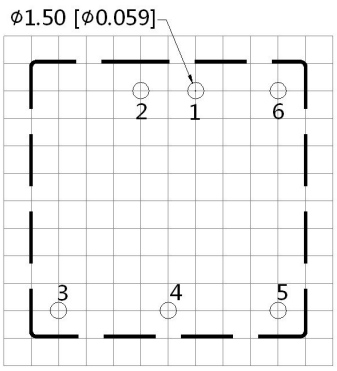
4. For more information please find DC-DC converter application notes on www.mornsun-power.com





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

THIRD ANGLE PROJECTION

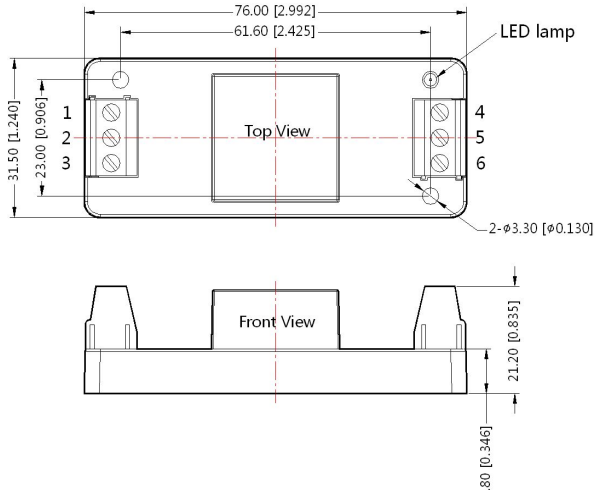


Note:Grid 2.54*2.54mm

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

VRB_YMD-10WR3A2S Dimensions

THIRD ANGLE PROJECTION

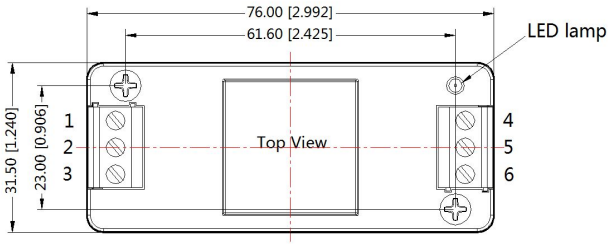


Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	0V	NC	+Vo

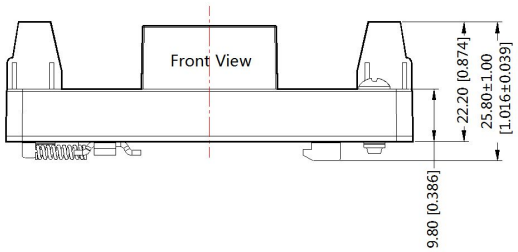
Note:
Unit:mm[inch]
Wire range:24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances:±0.50[±0.020]

VRB_YMD-10WR3A4S Dimensions

THIRD ANGLE PROJECTION



Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	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: ±0.50[±0.020]

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 maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on Company's corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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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