MORNSUN®

VRA_YMD-6WR2& VRB_YMD-6WR2 Series

6W,WIDE INPUT ISOLATED& REGULATED DUAL/SINGLE OUTPUT DIP PACKAGING, DC-DC CONVERTER

Patent Protected RoHS

PART NUMBER SYSTEM

VRB1205YMD-6WR2

- Rated Power
- Package
- Output Voltage
- Input Voltage
- Product Series

FEATURES

- 2:1 wide input voltage range
- Efficiency up to 88%
- 1.5KVDC isolation
- Short circuit protection
- Output over voltage protection
- Operating Temperature range: -40°C ~ +85°C
- Industry standard pinout
- Low ripple & noise
- Meet CISPR22/EN55022 CLASS A
- Inverse polarity protection for A2S（chassis mounting）and A4S（DIN-Rail mounting）
- Meet EN60950

APPLICATION

VRA_YMD-6WR2&VRB_YMD-6WR2 series models provide 6 Watt output power, with 2:1 wide range of 9-18VDC,18-36VDC,36-75VDC,output over-voltage and short-circuit protection. And all of them can meet CISPR22/EN55022 CLASS A without external circuit. Typical applications for these converters are industrial, electric power, instrumentation, telecommunication.

SELECTION GUIDE

Model①	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(Typ.)		Reflected Ripple Current (mA,Typ.)	Max. Capacitive Load③ (μF)	Efficiency (%, Typ.)④ @Max. Load	Approval
	Nominal (Range)	Max.②		Max.	Min.	@Max. Load	@No Load				
VRA1205YMD-6WR2	12 (9-18)	20	±5	±600	±30	617	12	20	470	81	CE
VRA1212YMD-6WR2			±12	±250	±12	588			100	85	
VRA1215YMD-6WR2			±15	±200	±10	588			100	85	
VRB1203YMD-6WR2			3.3	1500	75	528			1800	76	
VRB1205YMD-6WR2			5	1200	60	617			1000	81	
VRB1212YMD-6WR2			12	500	25	588			100	85	
VRB1215YMD-6WR2			15	400	20	588			100	85	
VRB1224YMD-6WR2			24	250	12	581			47	86	
VRA2405YMD-6WR2	24 (18-36)	40	±5	±600	±30	301	7		470	83	
VRA2412YMD-6WR2			±12	±250	±12	287			100	87	
VRA2415YMD-6WR2			±15	±200	±10	287			100	87	
VRA2424YMD-6WR2			±24	±125	±6	285			47	87	
VRB2403YMD-6WR2			3.3	1500	75	261			1800	79	
VRB2405YMD-6WR2			5	1200	60	301			1000	83	
VRB2412YMD-6WR2			12	500	25	287			100	87	
VRB2415YMD-6WR2			15	400	20	287			100	87	
VRB2424YMD-6WR2			24	250	12	287			47	87	
VRA4805YMD-6WR2	48 (36-75)	80	±5	±600	±30	151	5		470	83	
VRA4812YMD-6WR2			±12	±250	±12	143			100	87	
VRA4815YMD-6WR2			±15	±200	±10	142			100	88	
VRA4824YMD-6WR2			±24	±125	±6	142			47	88	
VRB4803YMD-6WR2			3.3	1500	75	130	3		1800	79	
VRB4805YMD-6WR2			5	1200	60	151			1000	83	
VRB4812YMD-6WR2			12	500	25	143			100	87	
VRB4815YMD-6WR2			15	400	20	142			100	88	
VRB4824YMD-6WR2			24	250	12	142			47	88	

Note:① series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example VRB2405YMD-6WR2A2S is chassis mounting, VRB2405YMD-6WR2A4S is DIN-Rail mounting.
②Absolute maximum rating without damage on the converter, but it isn't recommended.
③For dual output converter, the given value is the same for each output.
④The efficiency of "A2S" and "A4S" is approx. 4%(12V input) lower, 2%(24V and 48V input) lower for the protection of inverse polarity.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	12VDC input	-0.7	--	25	
	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Start-up Voltage	12VDC input	--	--	9	
	24VDC input	--	--	18	
	48VDC input	--	--	36	
Input Filter		Pi Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±1	±2	%
Output Voltage Balance	Dual output, balanced Loads	--	±0.5	±1.5	
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5	
Load Regulation	5% to 100% load	--	±0.5	±1	
Cross Regulation	Dual output, main output 50% load, secondary output from 10% to 100% load	--	--	±5	
Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature coefficient	100% load	--	--	±0.03	%/°C
Ripple&Noise*	20MHz bandwidth	--	50	75	mVp-p
Output Over Voltage Protection	Input voltage range	110	120	140	%Vo
Output Short Circuit Protection		Continuous, automatic recovery			

Note:* Ripple and noise tested with "parallel cable" method. See detailed operation instructions at *DC-DC Application Notes*.

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output,1Tested for 1 minute , leakage current less than 1 mA	1500	--	--	VDC
Isolation Resistance	Input-Output,1Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output,100KHz/0.1V	--	1000	--	pF
Switching Frequency	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Safety approvals		EN60950			
Case Material		Aluminum Alloy			
Size	PCB mounting	25.4x25.4x11.7			mm
	A2S chassis mounting	76.0x31.5x21.2			
	A4S DIN-Rail mounting	76.0x31.5x25.8			
Weight	PCB mounting	--	13	--	g
	A2S chassis mounting	--	35	--	
	A4S DIN-Rail mounting	--	55	--	

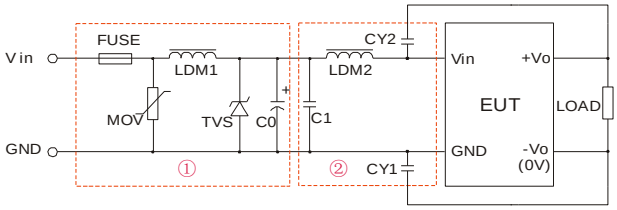
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	5	--	95	%
Operating Temperature	Power derating (above 71℃, see Figure 4)	-40	--	85	°C
Storage Temperature		-55	--	125	
Max. Case Temperature	Operating Temperature curve range	--	--	105	°C
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022	CLASS A（Without External Circuit）/ CLASS B（External Circuit Refer to Figure1-② or Figure 3）	
	RE	CISPR22/EN55022	CLASS A（Without External Circuit）/ CLASS B（External Circuit Refer to Figure1-② or Figure 3）	
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	perf. Criteria B（External Circuit Refer to Figure1-①）
		IEC/EN61000-4-4	±4KV	perf. Criteria B（External Circuit Refer to Figure 3）
	Surge	IEC/EN61000-4-5	±2KV	perf. Criteria B（External Circuit Refer to Figure1-①or Figure 3）
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%-70%	perf. Criteria B

EMC RECOMMENDED CIRCUIT



(Figure1)

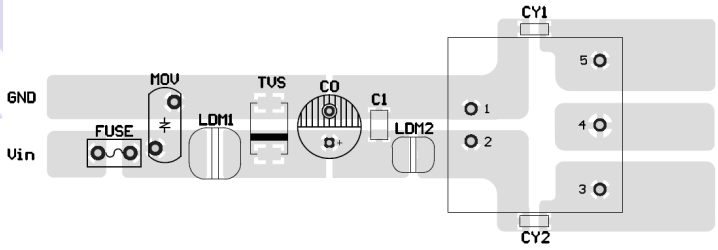
Recommended external circuit parameters:

Model	Vin: 12V	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current		
MOV	--	S14K35	S14K60
LDM1	--	56μH	
TVS	SMCJ28A	SMCJ48A	SMCJ90A
C0	680μF/25V	330μF/50V	330μF/100V
C1	1μF/50V		1μF/100V
LDM2	4.7μH		
CY1	1nF/2KV		
CY2	1nF/2KV		

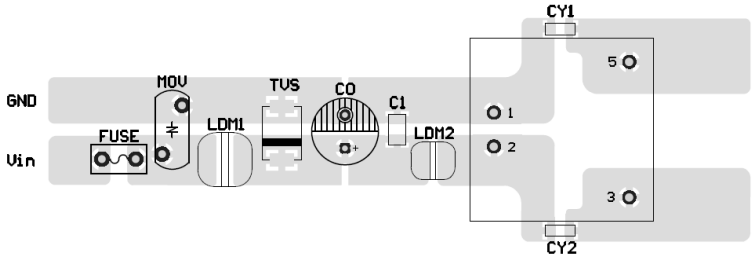
Note: In Figure 1,part①is EMS recommended external circuit, part② is EMI recommended external circuit. Choose according to requirements.

EMC RECOMMENDED CIRCUIT PCB LAYOUT

DUAL



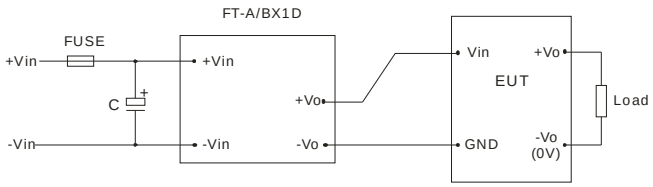
SINGLE



Note: The pad space between input and output (CY1/CY2) must≥2mm.

(Figure 2)

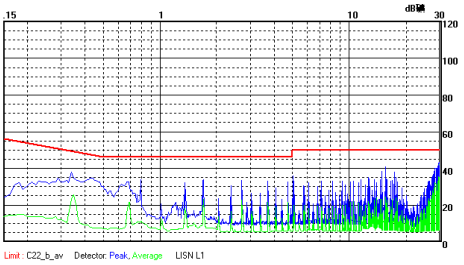
EMC MODULE APPLICATION CIRCUIT



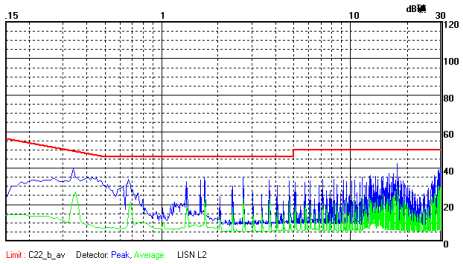
FT-A/BX1D is MORNSUN's EFT suppresser

For nominal voltage <48V,C≥330μF/50V
For nominal voltage =48V,C≥330μF/100V
(Figure 3)

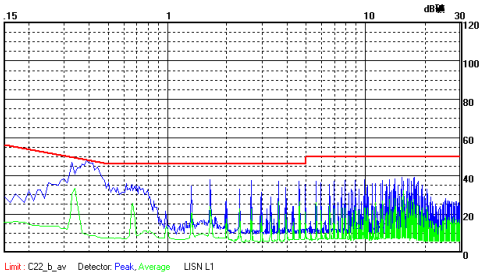
EMI TEST WAVEFORM (RECOMMENDED CIRCUIT FIGURE 1-②)



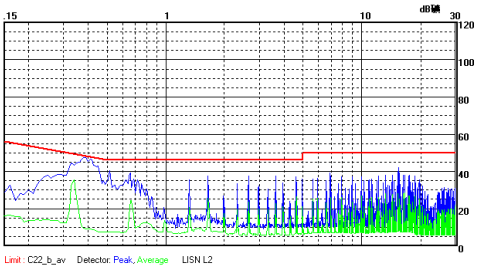
VRA2415YMD-6WR2 CE（Class B, Positive line）



VRA2415YMD-6WR2 CE（Class B, Negative line）

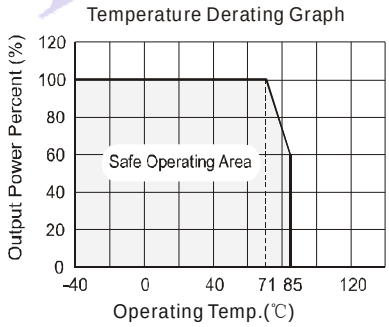


VRB2405YMD-6WR2 CE（Class B, Positive line）

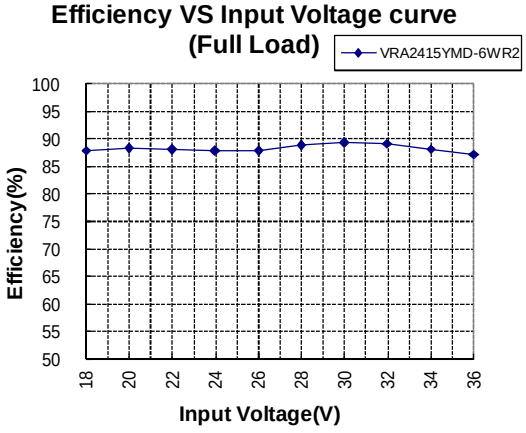


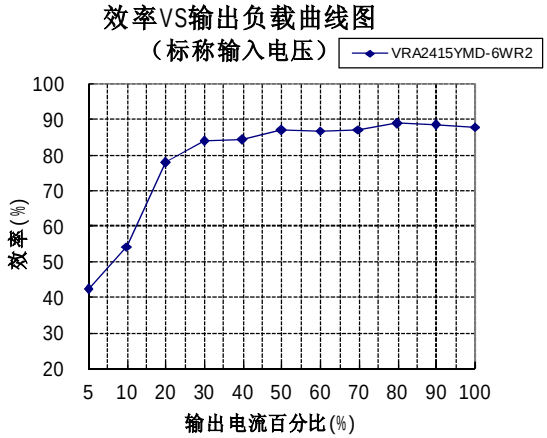
VRB2405YMD-6WR2 CE（Class B, Negative line）

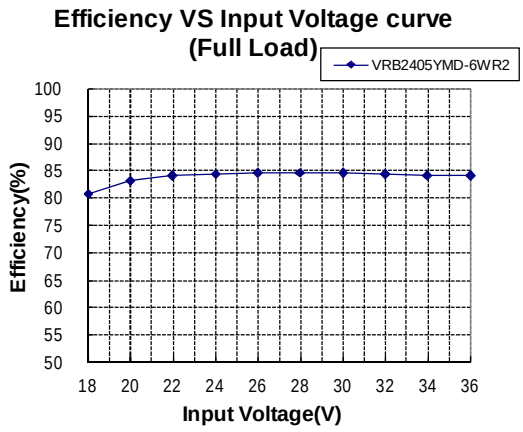
PRODUCT TYPICAL PERFORMANCE CURVE

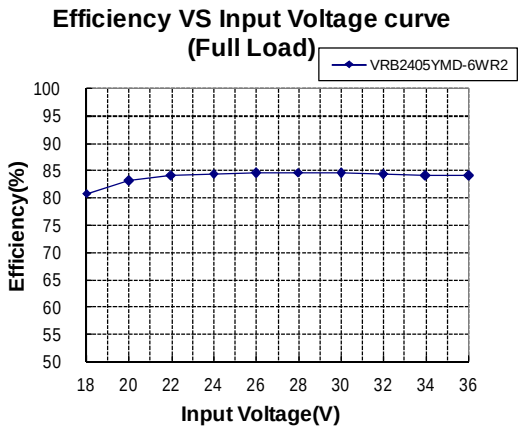


(Figure 4)

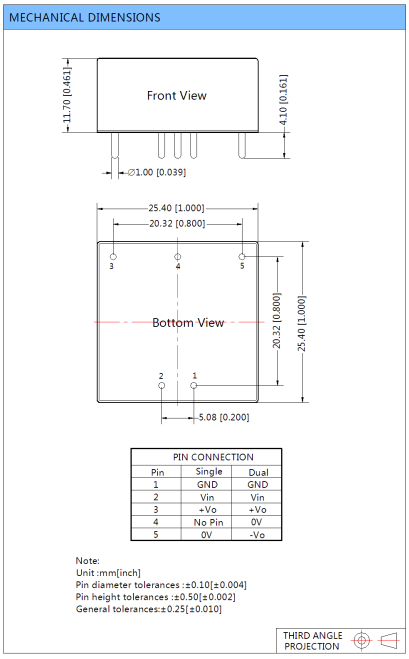


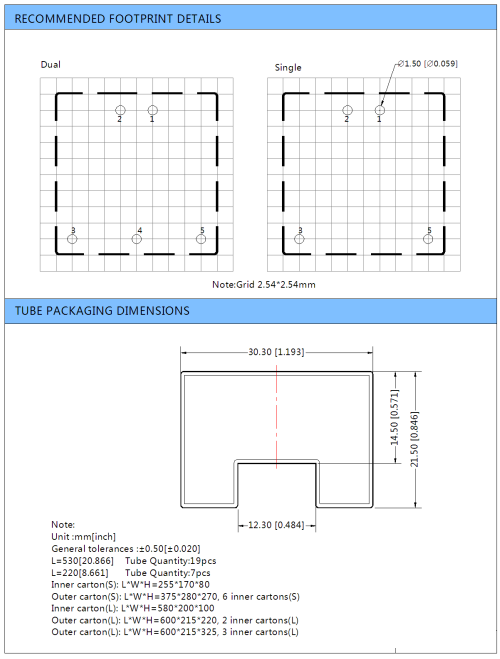






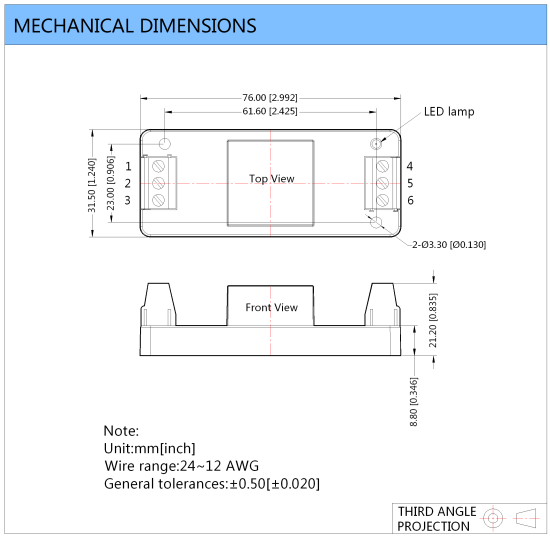
VRA_YMD-6WR2& VRB_YMD-6WR2 PCB MOUNTING OUTLINE DIMENSIONS,RECOMMENDED FOOTPRINT





VRA_YMD-6WR2A2S& VRB_YMD-6WR2A2S CHASSIS MOUNTING OUTLINE DIMENSIONS

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

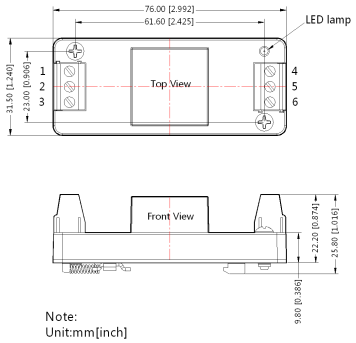


VRA_YMD-6WR2A4S& VRB_YMD-6WR2A4S DIN-RAIL MOUNTING OUTLINE DIMENSIONS

DIN-rail modules are fitting to TS35 rails

Footprint Details						
Pin	1	2	3	4	5	6
Dual	NC	GND	V in	-Vo	0V	+Vo
Single	NC	GND	V in	0V	NC	+Vo

MECHANICAL DIMENSIONS



PACKAGE DIAGRAM

Special Package Series（A2S/A4S）

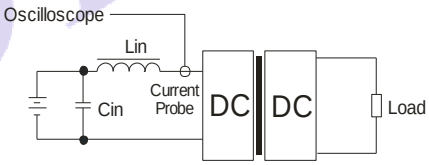
PACKAGE DIAGRAM

Note:
Unit:mm[inch]
Inner carton dimensions L*W*H=365*350*105
Packaging quantity : 48 PCS
Outer carton dimensions: L*W*H=390*360*245
Packaging quantity : 96 PCS

TEST CONFIGVRATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate the source impedance.



Lin(4.7μH)　　Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN CONSIDERATIONS

1) Recommended circuit

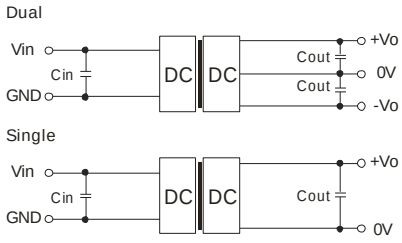
All the VRA_YMD-6WR2 & VRB_YMD-6WR2 Series have been tested according to the following recommended test circuit before leaving the factory (see Figure 5).

If you want to further decrease the input/output ripple, you can increase a capacitance-values properly or choose capacitors with low ESR, bu the total capacitance of the filter capacitor must not exceed the Max. Capacitive Load.

Cin:　100μF（Vin nom=12V）

Cin: 10μF~47μF（Vin nom=24V&48V）

Cout: 10μF



(Figure 5)

2) It is not recommended to increase the output power capability by connecting two or more converters in parallel.The product is no hot-swappable.

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increased dramatically, If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. Recommended Dual output models unbalanced load is ≤±5%, If the product operates >±5%, it may not be guaranteed to meet all specifications listed. Please contact our technical support for more details.
3. Max. Capacitive Load is tested at input voltage range and full load.
4. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
5. In this datasheet, all test methods are based on our corporate standards.
6. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
7. Please contact our technical support for any specific requirement.
8. Specifications of this product are subject to changes without prior notice.

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