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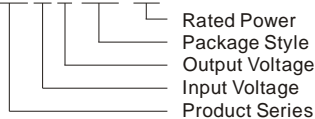
VRA_YMD-6WR2 & VRB_YMD-6WR2 Series 6W, WIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT DIP PACKAGING, DC-DC CONVERTER



Patent Protection RoHS

PART NUMBER SYSTEM

VRB1205YMD-6WR2



FEATURES

- 2:1 wide input voltage range
- Efficiency up to 88%
- 1500VDC 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

APPLICATION

The VRA_YMD-6WR2 & VRB_YMD-6WR2 series offer 6W of output, with wide input voltage of 9-18VDC, 18-36VDC, 36-75VDC and 1500VDC isolation voltage, output over-voltage and short-circuit protection. The products meet CISPR22/EN55022 CLASS A. All models are particularly suited to industrial control, electric power, instrumentation, tele-communications etc.

SELECTION GUIDE

| Model Number | Input Voltage(VDC) | | Output Voltage (VDC) | Output Current (mA) | | Input Current (mA)(Typ.) | | Reflected Ripple Current (mA, Typ.) | Max. Capacitive Load(μF) | Efficiency (% , Typ.) @Max. Load |
|------------------|--------------------|--------|----------------------|---------------------|------|--------------------------|----------|-------------------------------------|--------------------------|----------------------------------|
| | Nominal (Range) | Max ** | | Max. | Min. | @Max. Load | @No load | | | |
| *VRA1205YMD-6WR2 | 12 (9-18) | 20 | ±5 | ±600 | ±30 | 617 | 12 | 20 | 470 | 81 |
| *VRA1212YMD-6WR2 | | | ±12 | ±250 | ±12 | 588 | | | 100 | 85 |
| *VRA1215YMD-6WR2 | | | ±15 | ±200 | ±10 | 588 | | | 100 | 85 |
| VRB1203YMD-6WR2 | | | 3.3 | 1500 | 75 | 528 | | | 1800 | 78 |
| 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 | 9 | 20 | 470 | 83 |
| *VRA2412YMD-6WR2 | | | ±12 | ±250 | ±12 | 287 | | | 100 | 87 |
| VRA2415YMD-6WR2 | | | ±15 | ±200 | ±10 | 287 | | | 100 | 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 | 3 | 20 | 470 | 83 |
| *VRA4812YMD-6WR2 | | | ±12 | ±250 | ±12 | 143 | | | 100 | 87 |
| *VRA4815YMD-6WR2 | | | ±15 | ±200 | ±10 | 142 | | | 100 | 88 |
| VRB4803YMD-6WR2 | | | 3.3 | 1500 | 75 | 130 | | | 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. *designing.

2.** Input voltage can't exceed this value, or will cause the permanent damage.

INPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------------------------|-----------------|----------|------|------|------|
| Input Surge Voltage (1sec. max.) | 12V input | -0.7 | -- | 25 | VDC |
| | 24V input | -0.7 | -- | 50 | |
| | 48V input | -0.7 | -- | 100 | |
| Start-up Voltage | 12V input | -- | -- | 9 | VDC |
| | 24V input | -- | -- | 18 | |
| | 48V input | -- | -- | 36 | |
| No-load Input Power | | -- | 0.15 | 0.3 | W |
| Input Filter | | π Filter | | | |

OUTPUT SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|---|--|--------------------------------|------|-------|--------------------|
| Output Power | | 0.3 | -- | 6 | W |
| Output Voltage Accuracy | | -- | ±1 | ±2 | % |
| Output Voltage Balance | Dual output, Balance load | -- | ±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, Supplement output from 10% to 100% load | -- | -- | ±5 | |
| Transient Recovery Time | 25% load step change | -- | 300 | 500 | |
| Transient Response Deviation | | -- | ±3 | ±5 | % |
| Temperature Drift | 100% load | -- | -- | ±0.03 | %/°C |
| Ripple* | 20MHz Bandwidth | -- | 15 | 25 | mVp-p |
| Noise* | | -- | 50 | 75 | |
| Output Over Voltage Protection | | 110 | -- | 140 | %Vo |
| Output Over Current Protection | Input voltage range | 120 | -- | 180 | %Io _{Max} |
| Output Short Circuit Protection | | Continuous, automatic recovery | | | |
| Note: Dual outpt models unbalanced load:±5%. * Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes. | | | | | |

COMMON SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|--|----------------|------|------|---------|
| Isolation Voltage | Tested for 1 minute and leakage current less than 1 mA | 1500 | -- | -- | VDC |
| Isolation Resistance | Test at 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input/Output, 100KHz/0.1V | -- | 1000 | -- | pF |
| Switching Frequency | | -- | 300 | -- | KHz |
| MTBF | MIL-HDBK-217F @25°C | 1000 | -- | -- | K hours |
| Case Material | | Aluminum Alloy | | | |
| Weight | | -- | 14 | -- | g |

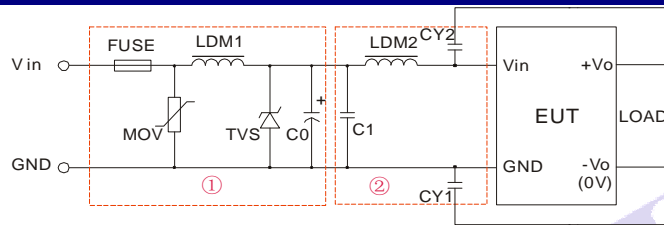
ENVIRONMENTAL SPECIFICATIONS

| Item | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------------|-----------------------------------|--|------|------|------|
| Storage Humidity | Non condensing | 5 | -- | 95 | % |
| Operating Temperature | Power derating (above 71°C) | -40 | -- | 85 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| The Max. Case Temperature | Operating Temperature curve range | -- | -- | 105 | |
| Lead Temperature | 1.5mm from case for 10 seconds | -- | -- | 300 | |
| Cooling | | Free air convection | | | |
| Shake | | 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 Figure 1-② or Figure 3) | |
| | RE | CISPR22/EN55022 | CLASS A(Without External Circuit)/ CLASS B (External Circuit Refer to Figure 1-② 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 Figure 1-①) |
| | | 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 Figure 1-① or Figure 3) |
| | Voltage dips, short and interruptions immunity | IEC/EN61000-4-29 | 0%-70% | perf. Criteria B |

EMC RECOMMENDED CIRCUIT

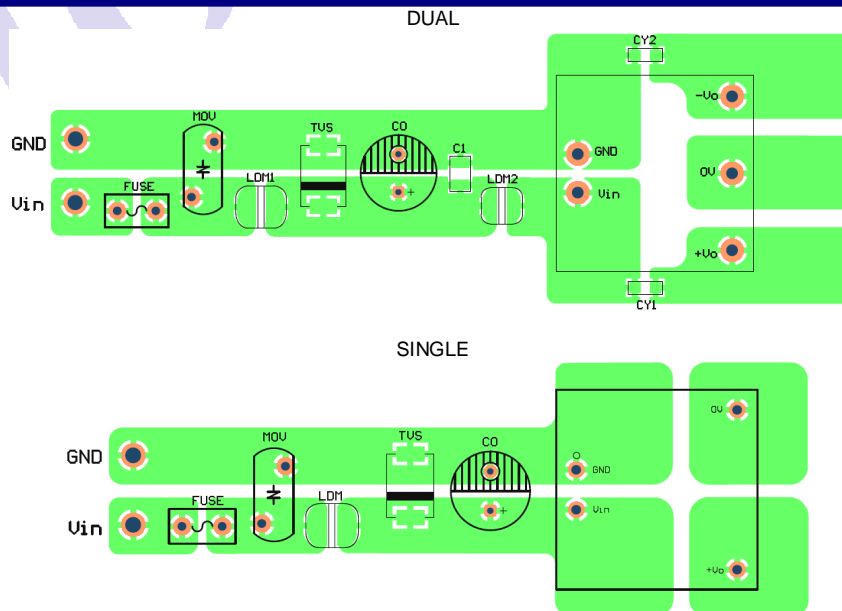


(Figure1)

| Parameters | VRA12_YMD-6WR2 VRB12_YMD-6WR2 | VRA24_YMD-6WR2 VRB24_YMD-6WR2 | VRA48_YMD-6WR2 VRB48_YMD-6WR2 |
|------------|---|----------------------------------|----------------------------------|
| FUSE | Choose according to practical input current | | |
| MOV | -- | 10D560K | 10D101K |
| LDM1 | -- | 56μH | |
| TVS | SMCJ28A | SMCJ48A | SMCJ90A |
| C0 | 680μF/25V | 120μF/50V | 120μF/100V |
| C1 | 225K/50V | | 225K/100V |
| LDM2 | 4.7μH | | |
| CY1 | 102K/2000V | | |
| CY2 | 102K/2000V | | |

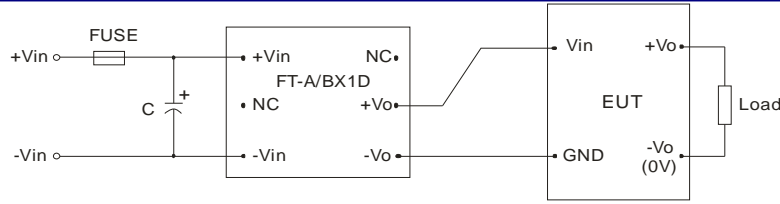
Note: 1. In Figure 1, part ① is EMS Recommended external circuit, part ② is EMI recommended external circuit. Choose according to requirements.
2. If there is no recommended parameters, the model no require the external component.

EMC RECOMMENDED CIRCUIT PCB LAYOUT



(Figure2)

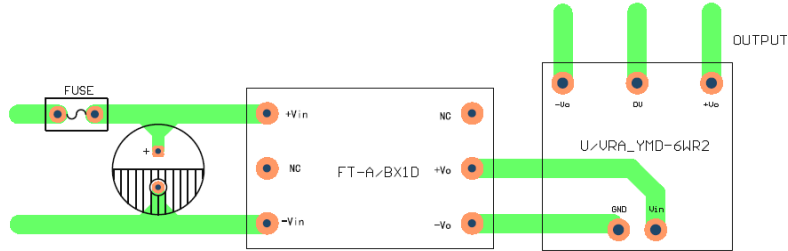
EMC MODULE RECOMMENDED CIRCUIT



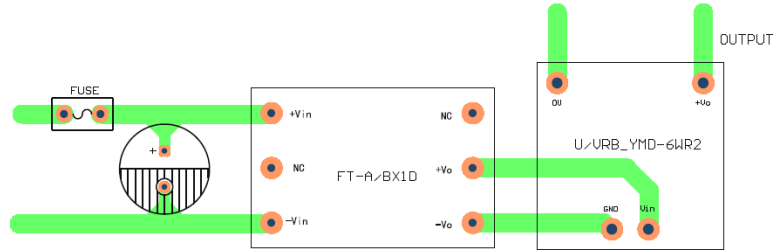
Nominal Voltage <math><48V, C \ge 330\mu F/50V</math>
 Nominal Voltage = $48V, C \ge 330\mu F/100V$
 (Figure 3)

EMC MODULE RECOMMENDED CIRCUIT PCB LAYOUT

DUAL

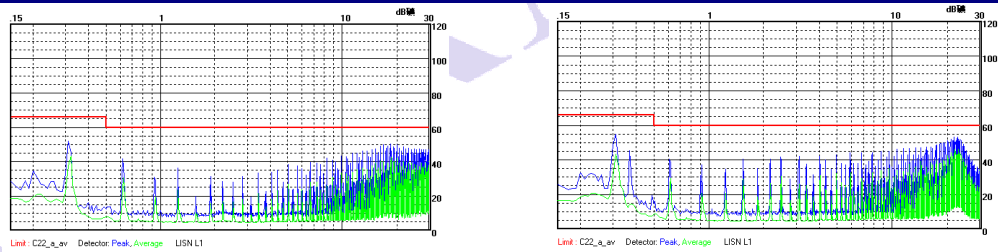


SINGLE



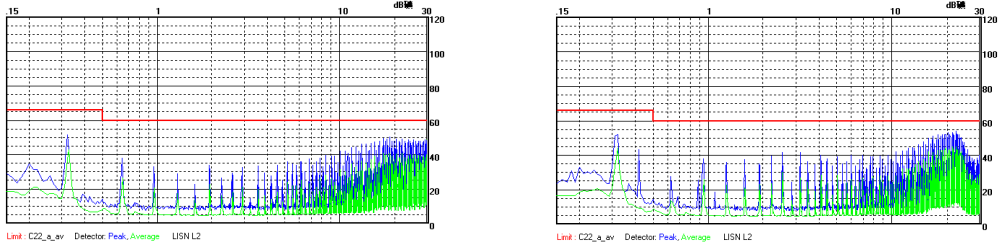
(Figure 4)

EMI TEST WAVEFORM (NOMINAL AND FULL LOAD)



VRA2415YMD-6WR2 Without External Circuit Power+ (Class A)

VRB2405YMD-6WR2 Without External Circuit Power+ (Class A)

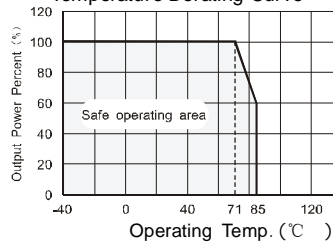


VRA2415YMD-6WR2 Without External Circuit Power- (Class A)

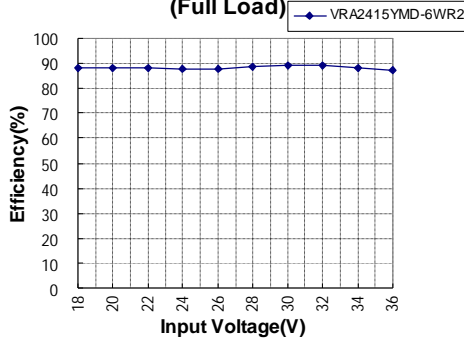
VRB2405YMD-6WR2 Without External Circuit Power- (Class A)

PRODUCT TYPICAL CURVE

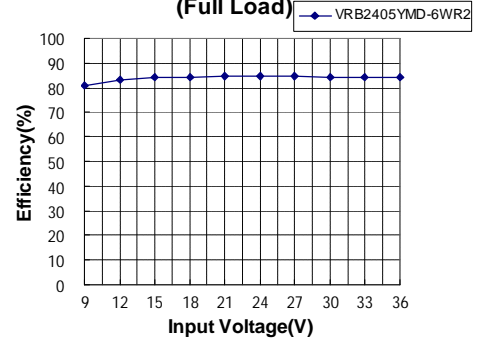
Temperature Derating Curve



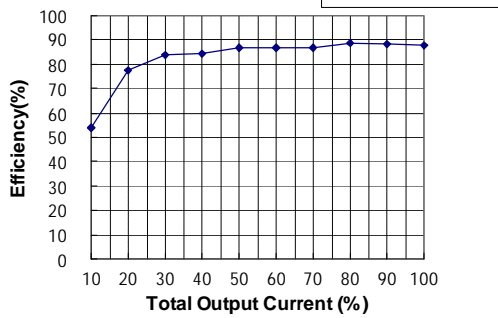
Efficiency VS Input Voltage curve (Full Load)



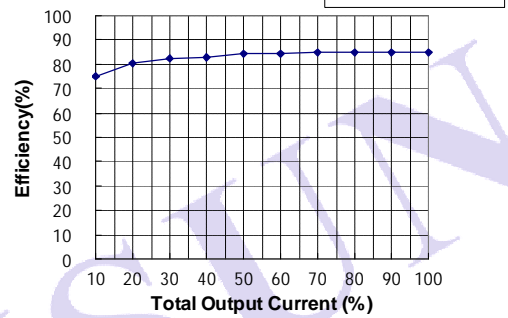
Efficiency VS Input Voltage curve (Full Load)



Efficiency VS Output Load curve (Vin=Vin-nominal)



Efficiency VS Output Load curve (Vin=Vin-nominal)



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

(Front View) Dimensions: 11.70 [0.461], 4.10 [0.161], 1.00 [0.039]

(Bottom View) Dimensions: 25.40 [1.000], 20.32 [0.800], 20.32 [0.800], 25.40 [1.000], 5.08 [0.200]

Note:
 Unit: mm[inch]
 Pin diameter tolerances: ±0.10mm [±0.004inch]
 Pin height tolerances: ±0.50mm [±0.020inch]
 General tolerances: ±0.25mm [±0.010inch]

| FOOTPRINT DETAILS | | |
|-------------------|--------|------|
| Pin | SINGLE | DUAL |
| 1 | GND | GND |
| 2 | Vin | Vin |
| 3 | +Vo | +Vo |
| 4 | No Pin | 0V |
| 5 | 0V | -Vo |

RECOMMENDED FOOTPRINT

DUAL OUTPUT:

SINGLE OUTPUT:

Note: grid 2.54*2.54mm

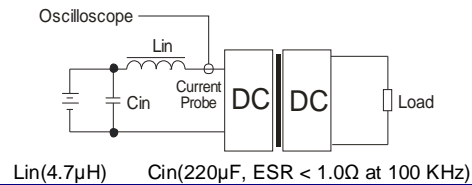
TUBE OUTLINE DIMENSIONS

Note:
 Unit: mm[inch]
 General tolerances: ±0.50mm [±0.020inch]
 L=530mm [20.866inch] Devices per tube quantity: 19pcs
 L=220mm [8.661inch] Devices per tube quantity: 7pcs
 Short tube inner packaging dimensions:
 L*W*H=255*170*80 mm
 Short tube outer packaging dimensions (with six inner packaging boxes):
 L*W*H=375*280*270 mm
 Long tube inner packaging dimensions: L*W*H=580*200*100 mm
 Long tube outer packaging dimensions (with two inner packaging boxes):
 L*W*H=600*215*220 mm
 Long tube outer packaging dimensions (with three inner packaging boxes):
 L*W*H=600*215*325 mm

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

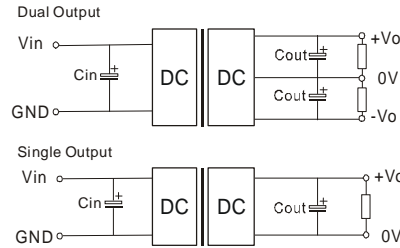
Input reflected-ripple current is measured with an inductor L_{in} and Capacitor C_{in} to simulate source impedance.



DESIGN CONSIDERATIONS

1) Recommended circuit

All the VRA_YMD-6WR2 & VRB_YMD-6WR2 Series have been tested according to the following recommended testing circuit before leaving factory (see Figure 5). If you want to further decrease the output ripple, you can increase a capacitance properly or choose capacitors with low ESR, but the greatest capacitance of its filter capacitor must less than the Max. Capacitive Load.



2) Cannot use in parallel and hot swap

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increase dramatically. Operation under minimum load will not damage the converter, however, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All specifications measured at $T_a=25^\circ\text{C}$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. All characteristics are for listed model, non-standard models may perform differently, please contact our technical person for more detail.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

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