MORNSUN®

VRA_D-10W & VRB_D-10W Series

10W, 2:1 WIDE INPUT ISOLATED & REGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER

Patent Protection **RoHS**

PRODUCT FEATURES

- Efficiency up to 86%
- Wide input range(2:1)
- Operating temperature: -40°C to +85°C
- 1.5KVDC isolation
- Metal shielding package
- Industry standard pinout
- MTBF>1,000,000 hours
- Good high temperature properties, can meet the industrial products technical requirements

MODEL SELECTION

VRA2405D-10W

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

APPLICATIONS

The VRA_D-10W & VRB_D-10W Series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

1) Where the voltage of the input power supply is wide range (voltage range≤2:1);
2) Where isolation is necessary between input and output(Isolation Voltage ≤ 1500VDC);
3) Where the regulation of the output voltage and the output ripple noise are demanded.

PRODUCT PROGRAM

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			
VRA1205D-10W	12 (9-18)	20	±5	±1000	±100	985	30	50	100	82
VRA1212D-10W			±12	±420	±42	948			47	83
VRA1215D-10W			±15	±330	±33	937			47	84
VRA1224D-10W			±24	±210	±21	950			22	84
VRB1205D-10W			5	2000	200	968			100	80
VRB1212D-10W			12	830	83	939			100	82
VRB1215D-10W			15	667	66	970			100	82
VRB1224D-10W			24	420	42	926			47	83
VRA2405D-10W	24 (18-36)	40	±5	±1000	±100	494	15	150	100	83
VRA2412D-10W			±12	±420	±42	473			47	85
VRA2415D-10W			±15	±330	±33	492			47	84
VRA2424D-10W			±24	±210	±21	496			22	85
VRB2405D-10W			5	2000	200	505			100	83
VRB2409D-10W			9	1111	111	487			100	83
VRB2412D-10W			12	830	83	470			100	85
VRB2415D-10W			15	667	66	451			100	84
VRB2424D-10W			24	420	42	471			47	85
VRA4805D-10W	48 (36-75)	80	±5	±1000	±100	243	5	100	100	83
VRA4812D-10W			±12	±420	±42	229			47	86
VRA4815D-10W			±15	±330	±33	236			47	86
VRA4824D-10W			±24	±210	±21	231			22	86
VRB4805D-10W			5	2000	200	247			100	83
VRB4812D-10W			12	830	83	231			100	86
VRB4815D-10W			15	667	66	237			100	86
VRB4824D-10W			24	420	42	231			47	86

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

INTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1000 ms)	12VDC Input Models	-0.7	--	25	VDC
	24VDC Input Models	-0.7	--	50	
	48VDC Input Models	-0.7	--	100	
Start-up Voltage	12VDC Input Models	--	--	9	
	24VDC Input Models	--	--	18	
	48VDC Input Models	--	--	36	
Under Voltage Shutdown	12VDC Input Models	--	--	9	
	24VDC Input Models	--	--	18	
	48VDC Input Models	--	--	36	
Start-up Time	Nominal input& constant resistance load	--	10	--	ms
Reverse Polarity Input Current*		--	--	2	A
Short Circuit Input Power		--	--	3.5	W
No-load power consumption		--	500	--	mW
Input Filter		L Filter			

Note: *If the product reverse did not seek to limit current, may result in injury or permanent damage, testing is not recommended.

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Output Power		1	--	10	W
Positive voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Negative voltage accuracy		--	±3	±5	
Output Voltage Balance	Dual Output, Balanced Loads	--	±0.5	±1	
Line Regulation	For Vin change of ±1%	--	±0.2	±0.5	
Load Regulation	10% to 100% load	--	±0.5	±1	
Cross Regulation	Dual output	--	--	±5	
Transient Recovery Time	25%~50%~25% rated load or 50%~75%~50% rated load range	--	200	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Drift	100% full load	--	--	±0.03	%/°C
Ripple *	20MHz Bandwidth	--	30	50	mVp-p
Noise *		--	100	300	
Over Current Protection	Full input voltage	120	--	--	%
Short Circuit Protection		Continuous, automatic recovery			

Note: Dual output models unbalanced load: ±5%.
*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Tested for 1 minute and 1mA max	1500	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output,100KHz/0.1V	--	1000	--	pF
Switching Frequency	Full load, nominal input	--	300	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Case Material		Aluminium alloy			
Weight		--	23.5	--	g

ENVIRONMENTAL SPECIFICATIONS

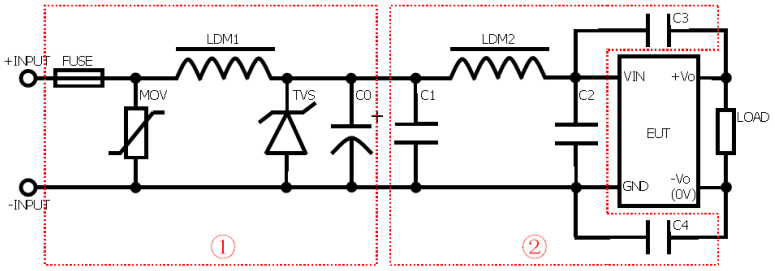
Item	Test Conditions	Min.	Typ.	Max.	Units
Storage Humidity		--	--	95	%
Operating Temperature	Power derating (above 71℃)	-40	--	85	℃
Storage Temperature		-55	--	125	

Temp. rise allowed at full load	Operating Temperature curve range	--	75	--	℃
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASSB（External Circuit Refer to Figure1）
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV perf. Criteria B
	EFT	IEC/EN61000-4-4 ±2KV perf. Criteria B（External Circuit Refer to Figure1）
	Surge	IEC/EN61000-4-5 ±2KV perf. Criteria B（External Circuit Refer to Figure1）

EMC RECOMMENDED CIRCUIT



(Figure1)

VRA_D-10W Recommended external circuit parameters：

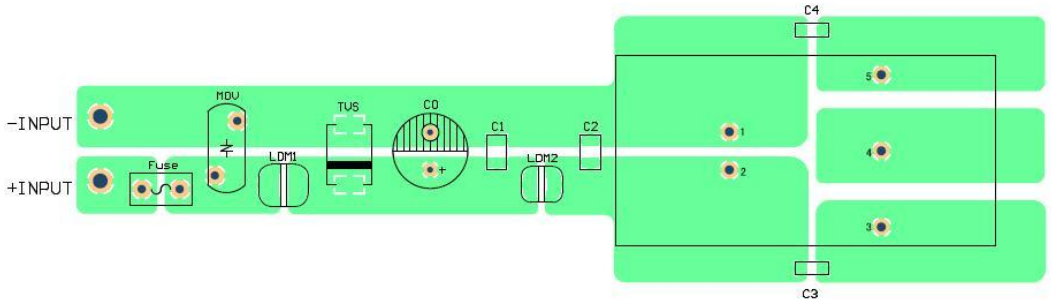
Model		VRA12_D-10W	VRA24_D-10W	VRA48_D-10W
EMS	FUSE	Add based on the actual load		
	MOV	--	10D560K	10D121K
	LDM1	--	82μH CD53	82μH CD53
	TVS	SMCJ28A	SMCJ48A	SMCJ100A
	C0	680μF/25V	120μF/50V	120μF/100V
EMI	C1	1μF/50V 1210	1μF/50V 1210	1μF/100V 1210
	LDM2	12μH CD43	12μH CD43	12μH CD43
	C2	4.7μF/50V 1210	4.7μF/50V 1210	4.7μF/100V 1210
	C3	--	--	100pF/2KV 1206
	C4	--	--	100pF/2KV 1206

VRB_D-10W Recommended external circuit parameters：

Model		VRB12_D-10W	VRB24_D-10W	VRB48_D-10W
EMS	FUSE	Add based on the actual load		
	MOV	--	10D560K	10D121K
	LDM1	--	82μH CD53	82μH CD53
	TVS	SMCJ28A	SMCJ48A	SMCJ100A
	C0	680μF/25V	120μF/50V	120μF/100V
EMI	C1	1μF/50V 1210	1μF/50V 1210	1μF/100V 1210
	LDM2	12μH CD43	12μH CD43	12μH CD43
	C2	4.7μF/50V 1210	4.7μF/50V 1210	4.7μF/100V 1210

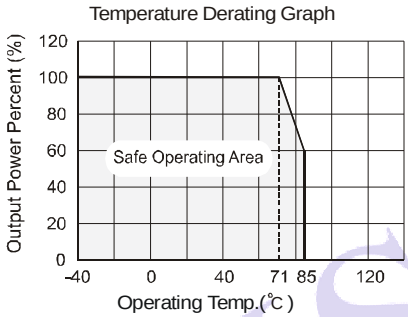
Note: 1. In Figure 1,part①is EMS Recommended external circuit, part②is EMI recommended external circuit. Choose according to requirements.
2. If there is no recommended parameters, the model no require the external component.

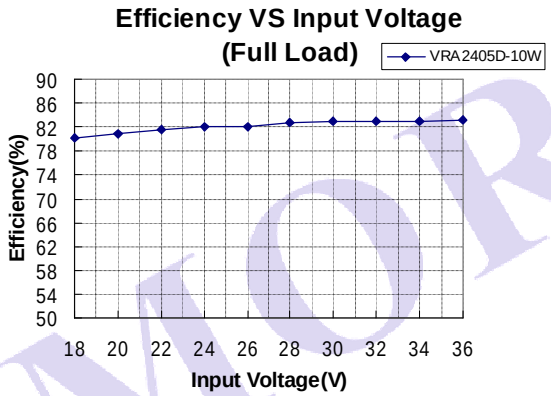
EMC RECOMMENDED CIRCUIT PCB LAYOUT

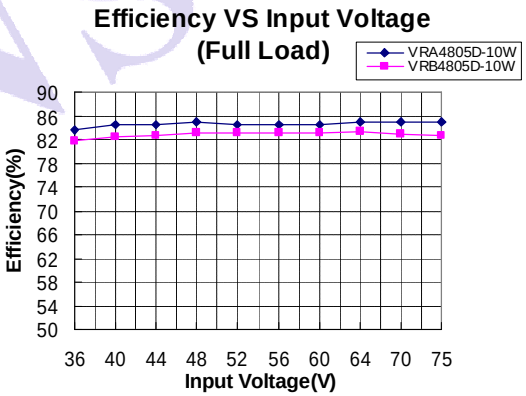


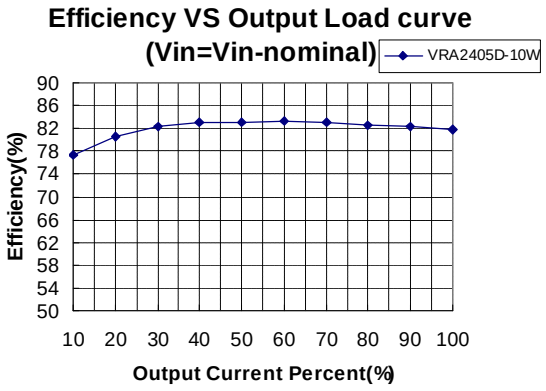
(Figure 2)

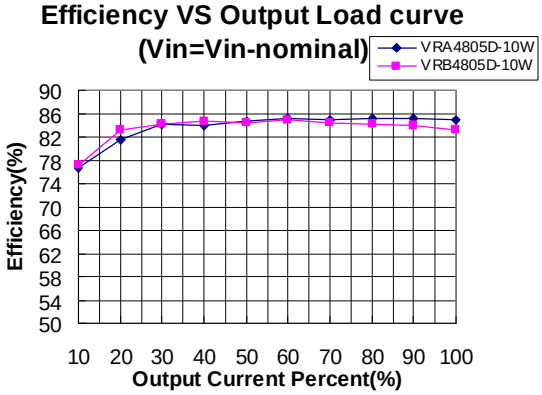
PRODUCT TYPICAL CURVE





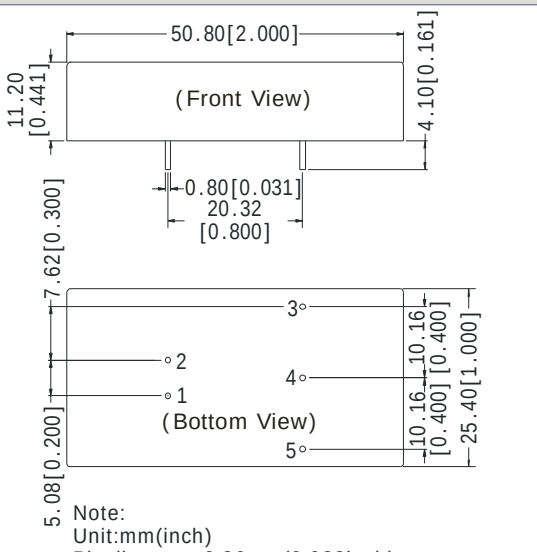






OUTLINE DIMENSIONS、RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

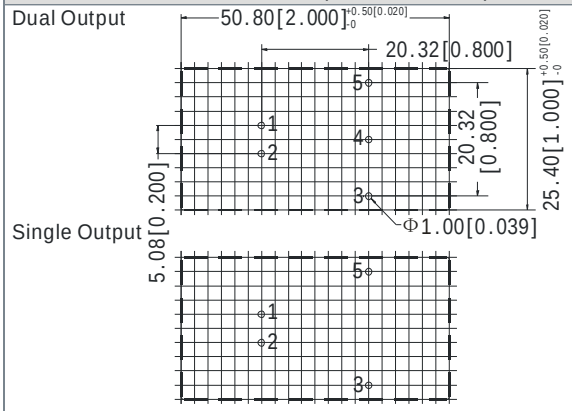


Note:
Unit:mm(inch)
Pin diameter:0.80mm(0.032inch)
Pin diameter tolerances:±0.10mm(±0.004inch)
General tolerances:±0.50mm(±0.020inch)

FOOTPRINT DETAILS

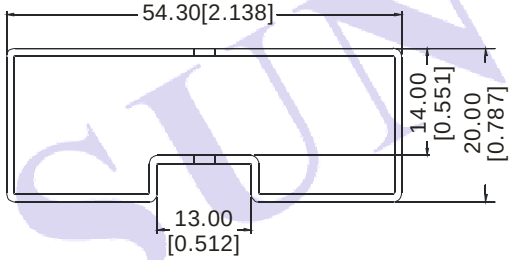
Pin	Single	Dual
1	GND	GND
2	Vin	Vin
3	+Vo	+Vo
4	No Pin	0V
5	0V	-Vo

RECOMMENDED FOOTPRINT(BOTTOM VIEW)



Note：Grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS(NO HEAT SINK)

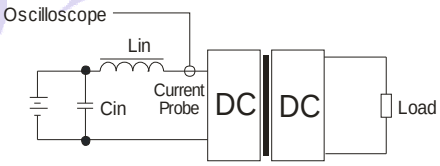


Note:
Unit: mm[inch]
General toletrances: ±0.50mm[±0.020inch]
L=220mm[8.661inch] pcs /tube: 7pcs
Inner packaging dimensions：255*170*80mm
Outer packaging dimensions(with six inner packaging boxes):375*280*270mm

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

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



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

DESIGN & APPLY CONSIDERATIONS

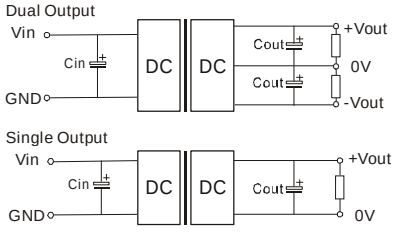
1) Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load ***could not be less than 10% of the full load.*** If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power.

2) Recommended circuit

All the VRA_D-10W&VRB_D-10W Series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under load. Never be tested under no load (see Figure 3).

If you want to further decrease the output ripple, you can increase capacitance properly or choose capacitors with low ESR. However, the capacitance can't exceed the maximum capacitor load in the list (Table 1).



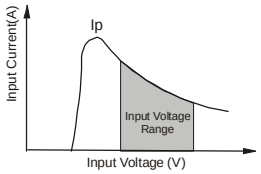
(Figure 3)

EXTERNAL CAPACITOR TABLE (TABLE 1)

Output Voltage \ Capacitance		Cout(μF)	Cin(μF) (24&48V input)
Single	5V	220	100
	12V,15V	100	
	24V	47	
Dual	±5V	100	
	±12V,±15V	47	
	±24V	22	

3) **Input Current**

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the startup current of this kind of DC/DC module. (Figure 4).



(Figure 4)

4) **External Capacitor**

To ensure this module operate efficiently and reliably, It's recommend to connect external capacitor in the application field.(see table 1)

5) No parallel connection or plug and play

Note:

1. The load shouldn't be less than 10%, otherwise ripple will increase dramatically. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. Max. Capacitive Load tested at nominal input voltage, full load and constant resistive load.
3. All specifications measured at Ta=25°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 corporate standards.
5. Only typical models listed, other models may be different, please contact our technical person for more details.
6. Our company offer custom products.
7. Specifications subject to change without notice.

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