MORNSUN®

VRA_D-20W & VRB_D-20W Series

20W, WIDE INPUT, ISOLATED & REGULATED SINGLE&DUAL OUTPUT DC-DC CONVERTER

RoHS

FEATURES

- Efficiency up to 87%
- Wide (2:1) Input Voltage Range
- 1.5KVDC Input/Output Isolation
- Over Voltage protection
- Over Current protection
- Output Short Circuit Protection
- Operating Temperature: -40°C ~ +85°C
- Internal SMD construction
- Metal Shielding Package
- Industry Standard Pinout
- MTBF>1,000,000 hours
- RoHS Compliance

APPLICATION

The VRA_D-20W & VRB_D-20W series offer 20W of output, with 2:1 wide input voltage range of 9-18, 18-36 and 36-75VDC, and features 1500VDC isolation, over current, over voltage and short circuit protection. All models are particularly suited to tele-communications, industrial, test equipments power etc.

MODEL SELECTION

VRA2405D-20W

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

PRODUCT PROGRAM

Part Number	Input			Output		Efficiency (%, Typ)	Capacitance[2] (max, μF)
	Voltage (VDC)			Voltage (VDC)	Current (mA)		
	Nominal	Range	Max.[1]				
VRA1205D-20W	12	9-18	20	±5	±2000	80	±3400
VRA1212D-20W				±12	±833	82	±680
VRA1215D-20W				±15	±666	82	±450
VRA1224D-20W				±24	±417	87	±400
VRB1203D-20W				3.3	5400	86	7500
VRB1205D-20W				5	4000	79	4000
VRB1212D-20W				12	1666	81	1500
VRB1215D-20W				15	1333	82	500
VRA2405D-20W	24	18-36	40	±5	±2000	81	±3400
VRA2412D-20W				±12	±833	86	±680
VRA2415D-20W				±15	±666	86	±450
VRB2403D-20W				3.3	5400	86	13000
VRB2405D-20W				5	4000	81	6800
VRB2409D-20W				9	2222	85	4700
VRB2412D-20W				12	1666	83	2200
VRB2415D-20W				15	1333	85	755
VRA4805D-20W	48	36-75	80	±5	±2000	81	±3400
VRA4812D-20W				±12	±833	86	±680
VRA4815D-20W				±15	±666	86	±450
VRB4803D-20W				3.3	5400	87	13000
VRB4805D-20W				5	4000	83	6800
VRB4812D-20W				12	1666	84	2200
VRB4815D-20W				15	1333	84	755

COMMON SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Storage humidity		5	--	95	%
Operating temperature		-40	--	85	°C
Storage temperature		-55	--	105	
Maximum Case Temp.	On working temperature	--	--	105	
Isolation voltage	Test for 1 minute and 1 mA max	1500	--	--	VDC
Isolation resistance		500	--	--	MΩ
Isolation capacitance	100kHz / 1V	--	1000	--	pF
Switching frequency	Nominal, full load	--	300	--	kHz
MTBF	MIL-HDBK-217F	1000	--	--	k hours
Case material		Aluminous alloy			
Weight		--	39	--	g

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INPUT SPECIFICATIONS

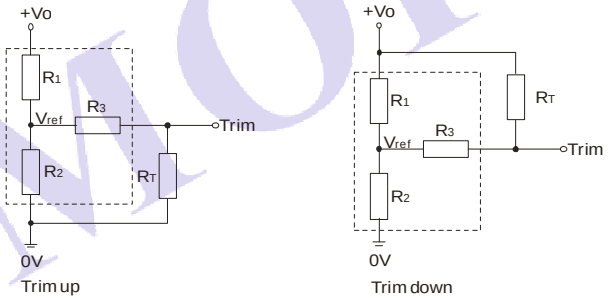
Item	Test conditions	Min.	Typ.	Max.	Units
Start voltage	12V input models	--	8.8	9	VDC
	24V input models	--	17.8	18	
	48V input models	--	35	36	
Input filter		L-C			
Start up time		--	20	--	ms
CTRL[3] (Reference point: GND)	Models on	3.5-40VDC or open circuit			
	Models off	0-1.2VDC			

OUTPUT SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Output power	See product program	2	--	20	W
Positive voltage accuracy	Refer to recommended circuit	--	±1	±3	%
Negative voltage accuracy	Refer to recommended circuit	--	±3	±5	
Load regulation	From 10% to 100% load	--	±0.5	±1	
Line regulation	Input voltage from low to high	--	±0.2	±0.5	
Cross regulation		--	--	±5	
Ripple and noise	20MHz bandwidth	50	75	150	mV
Transient recovery time	25%load change	--	200	500	us
Transient peak deviation		±2	±3	±5	%
Over load protection*	Input voltage range	120	140	--	%
Output Short Circuit		Hiccup, automatics recovery			
Over voltage protection	3.3V output	3.63	--	4.29	VDC
	5V output	5.5	--	6.5	
	12V output	13.2	--	15.6	
	15V output	16.5	--	19.5	
	24 output	26.4	--	31.2	
Temperature drift (Vout)	Refer to recommended circuit	--	±0.02	--	%/°C
Trim		--	±10%Vo	--	VDC

TRIM APPLICATION & TRIM RESISTANCE

Application circuit for TRIM (Part in broken line is the interior of models)



Formula for resistance of Trim

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \qquad a = \frac{Vref}{Vo' - Vref} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \qquad a = \frac{Vo' - Vref}{Vref} \cdot R_2$$

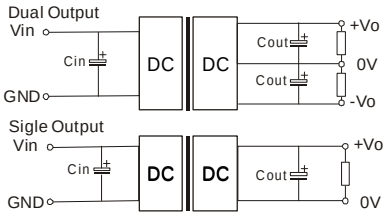
Note: Value for R1, R2, R3, and Vref refer to the following table.
R_T: Resistance of Trim
a: User-defined parameter, no actual meanings
Vo': The trim up/down voltage

Vo / Resistance	3.3(VDC)	5(VDC)	9(VDC)	12(VDC)	15(VDC)	24(VDC)
R1(KΩ)	4.801	2.883	7.5	10.971	14.497	24.872
R2(KΩ)	2.863	2.864	2.864	2.864	2.864	2.863
R3(KΩ)	15	10	15	17.8	17.8	20
Vref(V)	1.24	2.5	2.5	2.5	2.5	2.5

RECOMMENDED CIRCUIT

1) **Recommended circuit**

All the VRA_D-20W & VRB_D-20W 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 1).



(Figure 1)

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.

2) Recommended capacitance

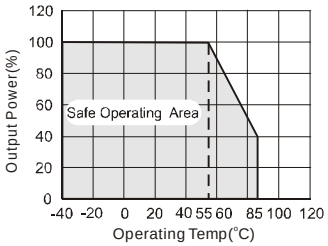
For better performance and more reliable, output capacitance refer to the below table.

Output voltage \ Capacitance		Cout	Cin(12V,24V 48V output)
Single output	3.3V,5V	470μF	100μF
	9V,12V,15V	220μF	
Dual output	±5V	±220μF	
	±12V,±15V	±100μF	
	±24	±47μF	

3) No parallel connection or plug and play

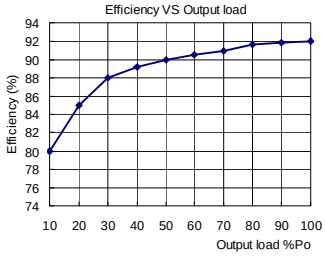
DERATING & EFFICIENCY CURVE

1) Temperature derating curve



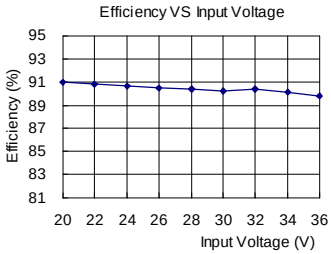
2) Curve of Efficiency VS output load

VRA2412D-20W



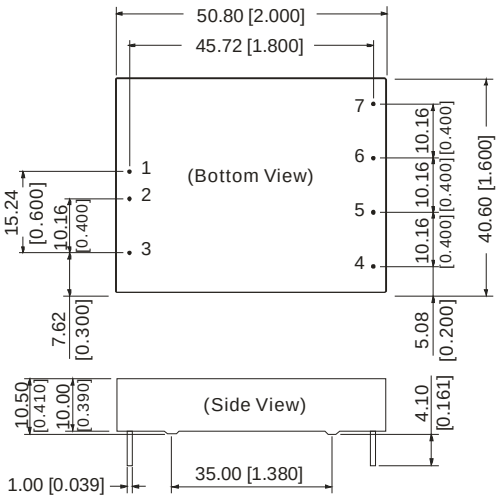
3) Curve of Efficiency VS input Voltage

VRA2412D-20W



OUTLINE DIMENSIONS & FOOTPRINT DETAILS

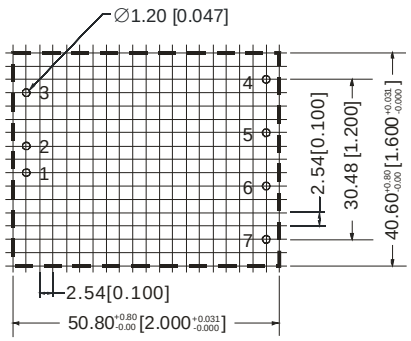
MECHANICAL DIMENSIONS



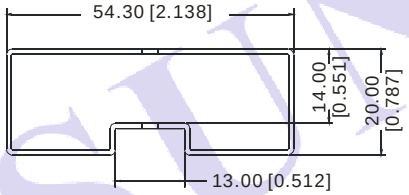
FOOTPRINT DETAILS		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
3	Ctrl	Ctrl
4	Trim	Trim
5	0V	-Vo
6	+Vo	0V
7	No Pin	+Vo

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

RECOMMENDED FOOTPRINT(TOP VIEW)



TUBE OUTLINE DIMENSIONS



Note:
Unit :mm[inch]
General tolerances: ±0.50mm[±0.020inch]
L=230mm[9.055inch] pcs/tube: 4

NOTES

Note:

1. Input voltage can't exceed this value, or will cause the permanent damage.
2. Capacitor MAX load tested at nominal input voltage and constant resistive load.
3. The CTRL control pin voltage is referenced to GND.
4. Only typical model listed. Non-standard models will be different from the above, please contact us for more details.
5. All specifications are measured at TA=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
6. In this datasheet, all the test methods of indications are based on corporate standards.