

## VRB\_D-40W Series 40W, WIDE INPUT, ISOLATED & REGULATED SINGLE OUTPUT DC-DC CONVERTER

RoHS

### FEATURES

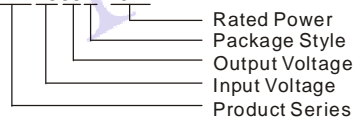
- Efficiency up to 90%
- High power density
- Wide (2:1) Input Range
- 1.5KVDC Input/Output Isolation
- Over Current Protection
- Over Temperature Protection
- Short Circuit Protection
- Over Voltage Protection
- Under Voltage Protection
- Remote Voltage Compensate
- Operating temperature: -40°C to +85°C
- Internal SMD Construction
- Metal Shielding Package 2"×2"×0.42"
- With heatsink
- MTBF>1,000,000 hours
- Industrial level specifications

### APPLICATION

The VRB-D-40W series are particularly suited to data transfer equipments, battery operated equipments, tele-communication equipments, distributing power system, mix analog/digital system, remote control system, industrial robot system and other wide input voltage application fields.

### MODEL SELECTION

VRB4805D-40W



### PRODUCT PROGRAM

Part Number	Input			Output		Capacitor Load Max <sup>(3)</sup> (μF)	Efficiency (% Typ)
	Voltage (VDC)			Voltage (VDC)	Current <sup>(2)</sup> (mA)		
	Nominal	Range	Max. <sup>(1)</sup>				
VRB1203D-40W	12	9-18	20	3.3	8000	21000	84
VRB1205D-40W				5	8000	13600	86
VRB1212D-40W				12	3300	2360	86
VRB1215D-40W				15	2666	1510	88
VRB1224D-40W				24	1670	470	88
VRB2403D-40W	24	18-36	40	3.3	8000	21000	87
VRB2405D-40W				5	8000	13600	89
VRB2412D-40W				12	3300	2360	89
VRB2415D-40W				15	2666	1510	90
VRB2424D-40W				24	1670	470	90
VRB4803D-40W	48	36-75	80	3.3	8000	21000	85
VRB4805D-40W				5	8000	13600	88
VRB4812D-40W				12	3300	2360	90
VRB4815D-40W				15	2666	1510	90
VRB4824D-40W				24	1670	470	89

Note: Add suffix "H" for heatsink mounted, for example VRB4805D-40WH.

### INPUT SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units	
Under Voltage Lockout	Nominal input (12V)	DC-DC Module ON	--	--	9	VDC
		DC-DC Module OFF	7.8	--	--	
	Nominal input (24V)	DC-DC Module ON	--	--	17.8	
		DC-DC Module OFF	16	--	--	
	Nominal input (48V)	DC-DC Module ON	--	--	35.5	
		DC-DC Module OFF	33.0	--	--	
Input filter		PI				
Start-up time	Nominal input and CR load	--	5	--	ms	
Ctrl	Models ON	Open or 3.5V<Vc<12V				
	Models OFF	Short or 0V<Vc<1.2V				
		Input current<1mA				

### MORNSUN Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui development center, Science Ave., Guangzhou Science City, Luogang district, Guangzhou, P.R.China.

Tel: 86-20-28203030

Fax: 86-20-28203068

[Http://www.mornsun-power.com](http://www.mornsun-power.com)

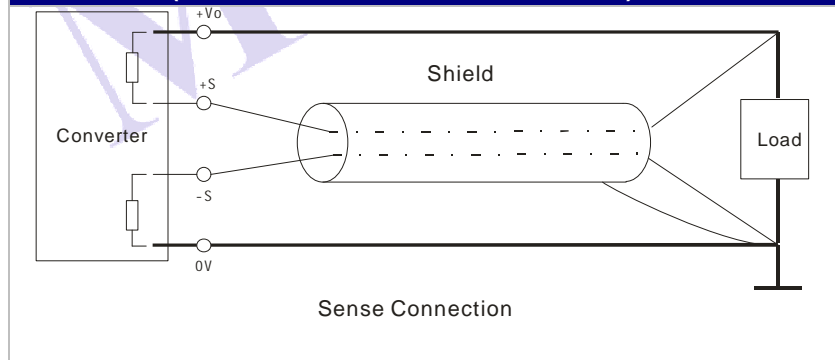
## OUTPUT SPECIFICATIONS

Item	Test Conditions	Min	Typ	Max	Units
Output max Power	Refer to Product Program	4	--	40	W
Output Voltage Accuracy	Refer to recommended circuit	--	$\pm 1$	--	%
Load Regulation	10% to 100% load	--	$\pm 0.5$	--	
Voltage regulation	Input voltage from low to high	--	$\pm 0.2$	--	mV
Ripple	20MHz Bandwidth	--	40	75	
Noise		--	100	150	
Transient recovery time	25% load change	--	200	500	us
Transient peak deviation		--	$\pm 3$	$\pm 5$	%Vo
Over current protection	Input voltage range	120-150%Po			
Over voltage protection	Input voltage range	110-130%Vo			
Over temp. protection	Input voltage range	--	115	--	°C
Short circuit protection	Input voltage range	Hiccup, automatic recovery			
Temperature Drift(Vout)	Refer to recommended circuit	--	$\pm 0.02$	--	%/°C
TRIM		--	$\pm 10\%Vo$	--	VDC
SENSE	Remote Voltage compensation	--	10%Vo	--	

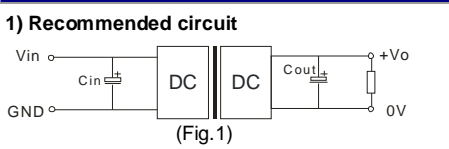
## COMMON SPECIFICATIONS

Item	Test Conditions	Min	Typ	Max	Units
Storage Humidity		5	--	95	%
Operating Temperature		-40	--	+85	°C
Storage Temperature		-55	--	+125	
Maximum Case Temp.	On working temperature	--	--	105	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Isolation voltage	Test for 1 minute and 1 mA max	1500	--	--	VDC
Isolation resistance	Test at 500VDC	1000	--	--	MΩ
Isolation capacitance	100KHz /0.1V	--	2000	--	pF
Switching Frequency	Nominal, full load	--	300	--	KHz
MTBF	MIL-HDBK-217F	1000	--	--	K hours
Weight		--	60	--	g
Cooling		Free Air Convection			
Case material		Nickel-coated copper(Six-sided)			

## SENSE USE ( REMOTE VOLTAGE COMPENSATION)



## RECOMMENDED CIRCUIT



In order to obtain better performance for the DC/DC models. It's recommended that use input and output filters as Fig.1 shown.

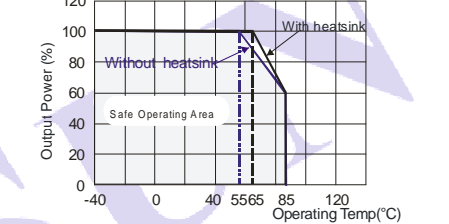
2) Recommended capacitance

Output Voltage	Capacitance Cout (μF)	Cin(μF) (12V, 24V,48V input)
3.3V、5V	220	100
12V、15V	100	
24V	47	

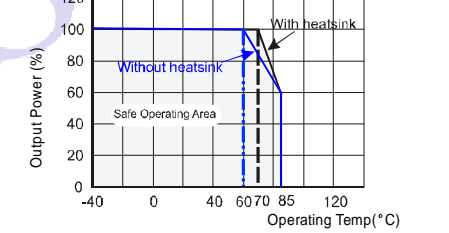
3) No parallel connection or plug and play

## DERATING & EFFICIENCY CURVE

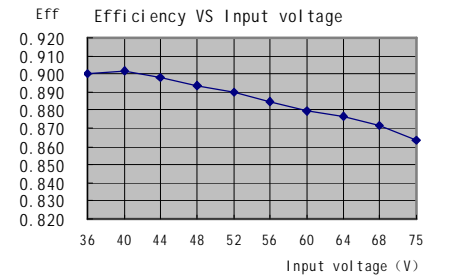
1) Temperature derating curve (Output Voltage ≤ 5V)



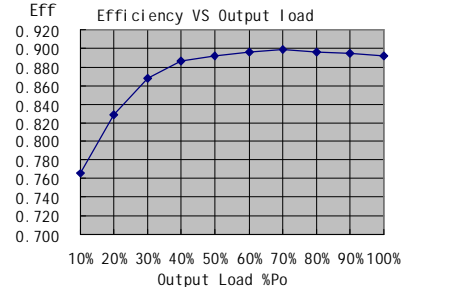
(Output Voltage > 5V)



2) Efficiency VS Input voltage (Rated load) VRB4805D-40W

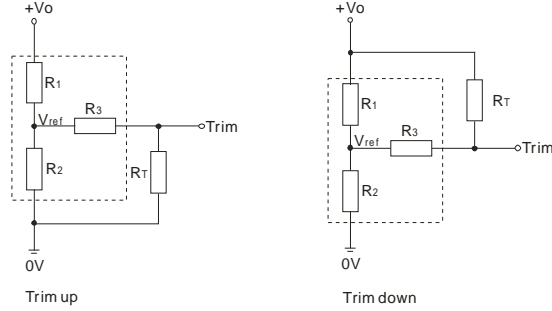


3) Efficiency VS output Load (Nominal input) VRB4805D-40W



## TRIM APPLICATION & TRIM RESISTANCE

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



Formula for resistance of Trim

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

Note: Value for R1, R2, R3, and Vref refer to the following table.

R<sub>T</sub>: Resistance of Trim

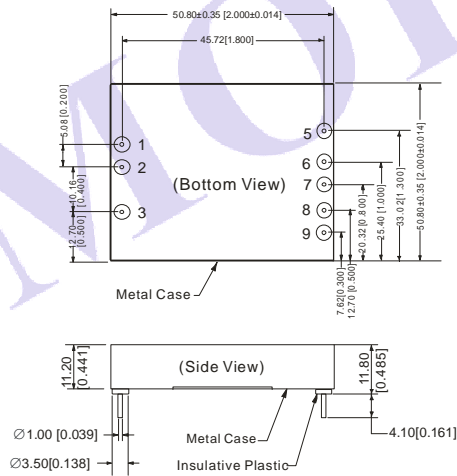
a: User-defined parameter, no actual meanings.

V<sub>o'</sub>: The trim up/down voltage

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

## OUTLINE DIMENSIONS & FOOTPRINT DETAILS

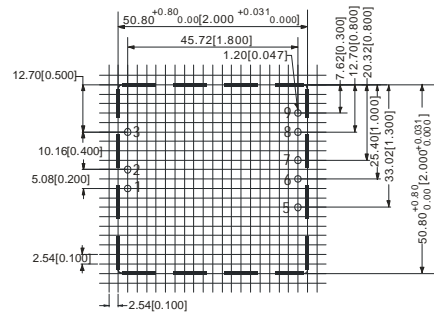
### MECHANICAL DIMENSIONS



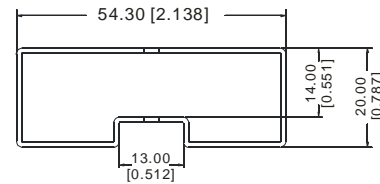
FOOTPRINT DETAILS	
Pin	Function
1	Vin
2	GND
3	Ctrl
5	-Sense
6	+Sense
7	+Vo
8	0V
9	Trim

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

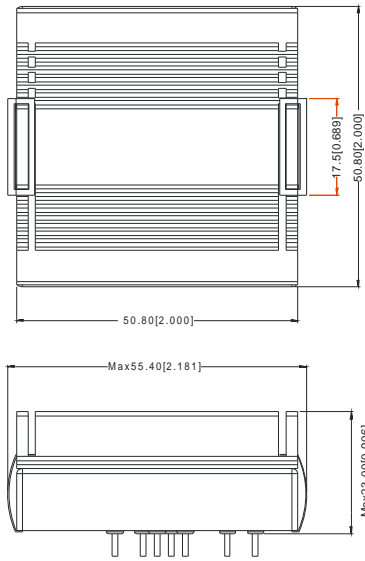
### RECOMMENDED FOOTPRINT



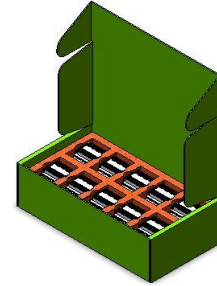
### TUBE OUTLINE DIMENSIONS (WITHOUT HEATSINK)



Unit :mm[inch]  
General tolerances: ±0.50mm[±0.020inch]  
L=230mm[9.055inch] Pcs/Tube:3



Note:  
 Unit: mm[inch]  
 tolerances:  $\pm 0.50\text{mm}[\pm 0.020\text{inch}]$   
 1. If use heatsinks, make sure there is enough space for a specific size in the above graph;  
 2. Products will be supplied with heatsinks already mounted, separate heatsinks are not available.



Inside package box:  
 L\*W\*H=355\*192\*93mm    Package quantity: 20pcs  
 Outside package box:  
 L\*W\*H=405\*380\*305mm    Package quantity: 120pcs

## NOTE

1. Input voltage can't exceed this value, or will cause the permanent damage.
2. Minimum operating current is 10% of rated current, if less than 10% rated current, output ripple may increase rapidly, the amplitude  $\leq 1\text{V}$ .
3. Capacitor MAX load tested at nominal input voltage, full load and constant resistive load.
4. The CTRL control pin voltage is referenced to GND.
5. Only typical model listed. Non-standard models will be different from the above, please contact us for more details.
6. All specifications are measured at  $T_A=25^\circ\text{C}$ , humidity $<75\%$ , nominal input voltage and rated output load unless otherwise specified.
7. In this datasheet, all the test methods of indications are based on corporate standards.