30W,Wide input isolated & regulated DC/DC converter

Patent Protection RoHS

FEATURES

- Wide range of input voltage (2:1)
- Efficiency up to 89%
- Isolation voltage :1500VDC
- Output over-voltage, over-current and short circuit protection
- Operating temperature range: -40℃ to +85℃
- Metal Shielding Package
- Internal SMD Construction
- Industrial level specifications

VRB_D-30W series products are of 30W output power, extremely wide range of voltage input of 9-18VDC, 18-36VDC, 36-75VDC, isolation voltage of 1500VDC, output over-current protection and output short circuit protection; these products are widely used in fields such as industrial control, electric power, instruments and communication.

Selection Guide

Part No.①	Input Voltage (VDC)		Output		Efficiency (%,Typ.) @ Full Load	Max. Capacitive Load(μF)
	Nominal (Range)	Max.②	Output Voltage (VDC)	Output Current (mA)(Max./Min.)		
VRB1203D-30W	12 (9-18)	20	3.3	6000/600	85	19500
VRB1205D-30W			5	6000/600	86	10200
VRB1212D-30W			12	2500/250	86	3240
VRB1215D-30W			15	2000/200	86	1100
VRB1224D-30W			24	1250/125	87	900
VRB2403D-30W	24 (18-36)	40	3.3	6000/600	87	19500
VRB2405D-30W			5	6000/600	88	10200
VRB2409D-30W			9	3333/333	88	6800
VRB2412D-30W			12	2500/250	89	3300
VRB2415D-30W			15	2000/200	89	1100
VRB2424D-30W			24	1250/125	89	900
VRB4803D-30W	48 (36-75)	80	3.3	6000/600	87	19500
VRB4805D-30W			5	6000/600	89	10200
VRB4812D-30W			12	2500/250	87	3300
VRB4815D-30W			15	2000/200	88	1100
VRB4824D-30W			24	1250/125	87	900

Note:
① Series with suffix "H" are heat sink mounting, such as VRB2405D-30WH;
② Absolute maximum rating without damage on the converter, but it isn't recommended.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC input	3.3VDC、5VDC output	--	2907/68	--	mA
		Others	--	2907/13	--	
	24VDC input	3.3VDC、5VDC output	--	1420/35	--	
		Others	--	1420/9	--	
	28VDC input	3.3VDC、5VDC output	--	702/26	--	
		Others	--	702/9	--	
Reflected Ripple Current	12VDC input		--	100	--	
	24VDC input		--	50	--	
	28VDC input		--	25	--	

Input impulse Voltage (1sec. max.)	12VDC input	-0.7	--	25	VDC
	24VDC input	-0.7	--	50	
	28VDC input	-0.7	--	100	
Starting Voltage	12VDC input	--	--	9	
	24VDC input	--	--	18	
	28VDC input	--	--	36	
Starting Time	Nominal input& constant resistance load	--	10	--	ms
Input Filter		Pi filter			
Ctrl*	Module switch on	3.5 -12VDC or open circuit			
	Module switch off	0-1.2VDC			
	Input current when switched off	--	10	--	mA

Note: * the voltage of Ctrl pin is relative to input pin GND.

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Power			3	--	30	W
Output Voltage Accuracy			--	±1	±3	%
Line Regulation	Full load, the input voltage is from low voltage to high voltage		--	±0.2	±0.5	
Load Regulation	10%-100% load		--	±0.5	±1	
Transient Recovery Time	25% load step change		--	300	500	μs
Transient Response Deviation			--	±3	±5	%
Temperature Drift Coefficient	Full load		--	±0.02	--	%/℃
Ripple & Noise*	20MHz bandwidth		--	75	150	mV p-p
Output Voltage Regulation (Trim)	light Load		--	±10%Vo	--	VDC
Output Over-voltage Protection	Input voltage range	3.3VDC output	--	3.9	--	
		5VDC output	--	6.2	--	
		9VDC output	--	10.8	--	
		12VDC output	--	15	--	
		15VDC output	--	18	--	
		24VDC output	--	30	--	
Output Over-current Protection	Input voltage range		120	130	150	%
Output Short circuit Protection			Hiccup, continuous, self-recovery			

Note: * Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, insulation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	see Fig. 1	-40	--	85	℃
Storage Temperature		-55	--	125	
Storage Humidity	Non-condensing	5	--	95	%RH
Max. Operating Temperature for casing	Within the operating temperature curve	--	--	105	℃
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300	
Switching Frequency	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Physical Specifications

Casing Material	Aluminum alloy	
Package Dimensions	Horizontal package(without heat sink)	50.80*40.60*11.80mm
	Horizontal package(with heat sink)	50.80*40.60*16.30mm
Weight	Horizontal package(without heat sink)/ Horizontal package(with heat sink)	50.00g/70.00g(Typ.)
Cooling Method	Free air convection	

EMC Specifications

EMI	Conducted disturbance	CISPR22/EN55022	CLASS A (see Fig.3-② for recommended circuit)	
EMS	Electrostatic discharge	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
	EFT	IEC/EN61000-4-4	±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge immunity	IEC/EN61000-4-5	±2KV (see Fig.3-①for recommended circuit)	perf. Criteria B

Product Characteristic Curve

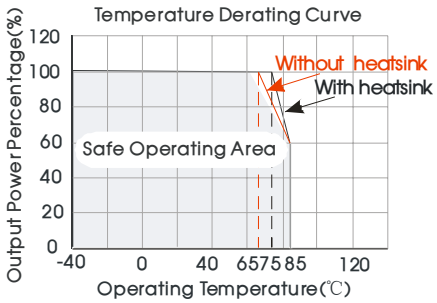
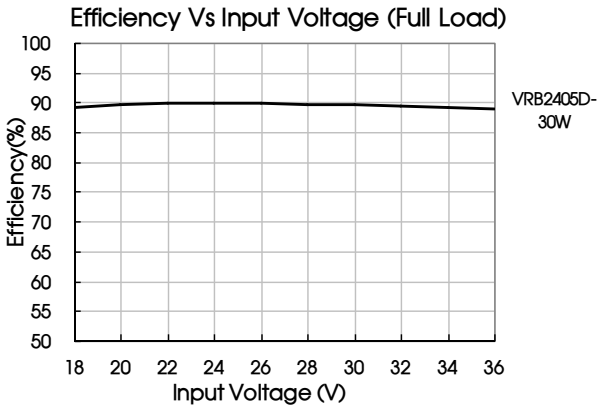
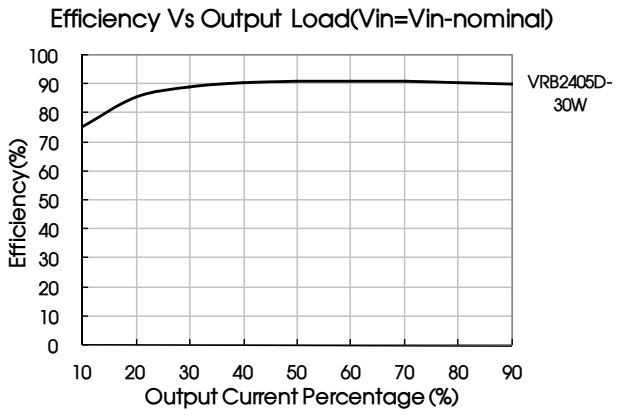
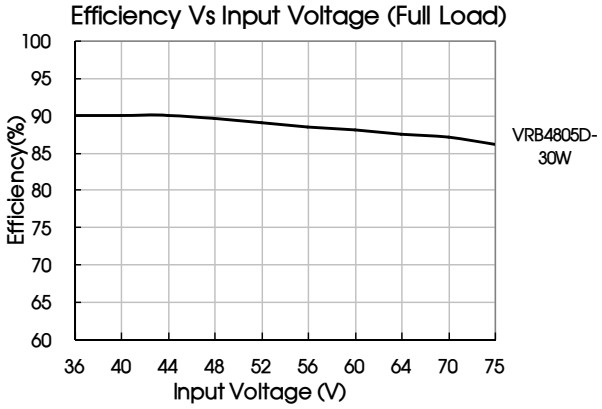
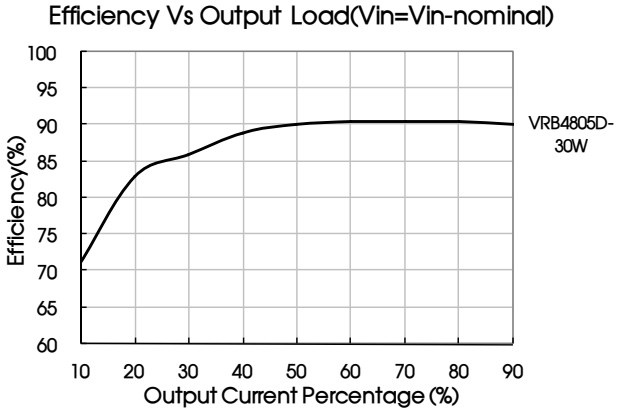


Fig. 1









Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

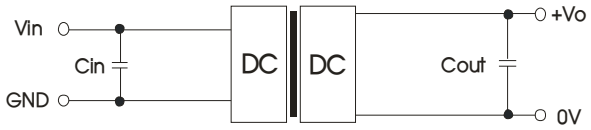


Fig. 2

Vout(VDC)	Cin(μF)	Cout(μF)
3.3/5	100	220
12/15		100
24		47

2. EMC solution-recommended circuit

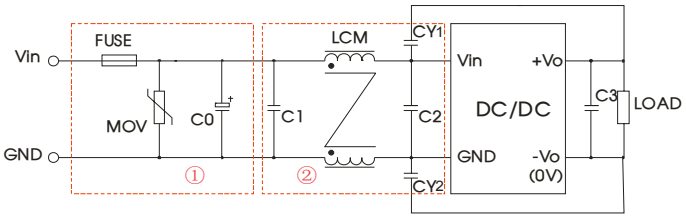


Fig. 3

Notes: Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.

Parameter description

Model	Vin:12V	Vin:24V	Vin:48V
FUSE	Choose according to actual input current		
MOV	S14K20	S14K35	S14K60
C0	680μF/25V	330μF/50V	330μF/100V
C1、C2	4.7μF/50V	4.7μF/50V	2.2μF/100V
C3	Refer to the Cout in Fig.2		
LCM	1mH		
CY1、CY2	1nF/2KV		

EMC solution-recommended circuit PCB layout

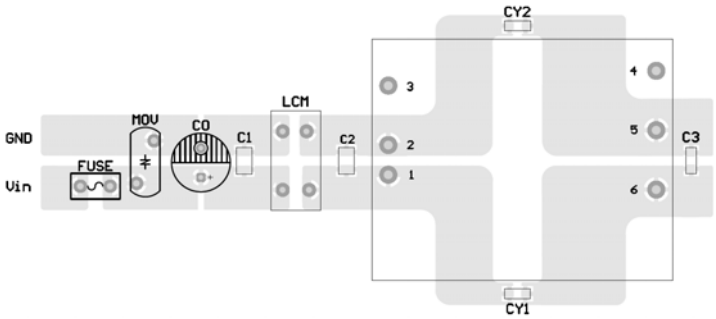
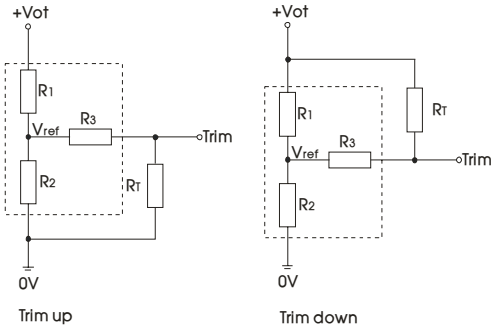


Fig. 4

Note: the min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be ≥ 2mm.

3. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

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

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

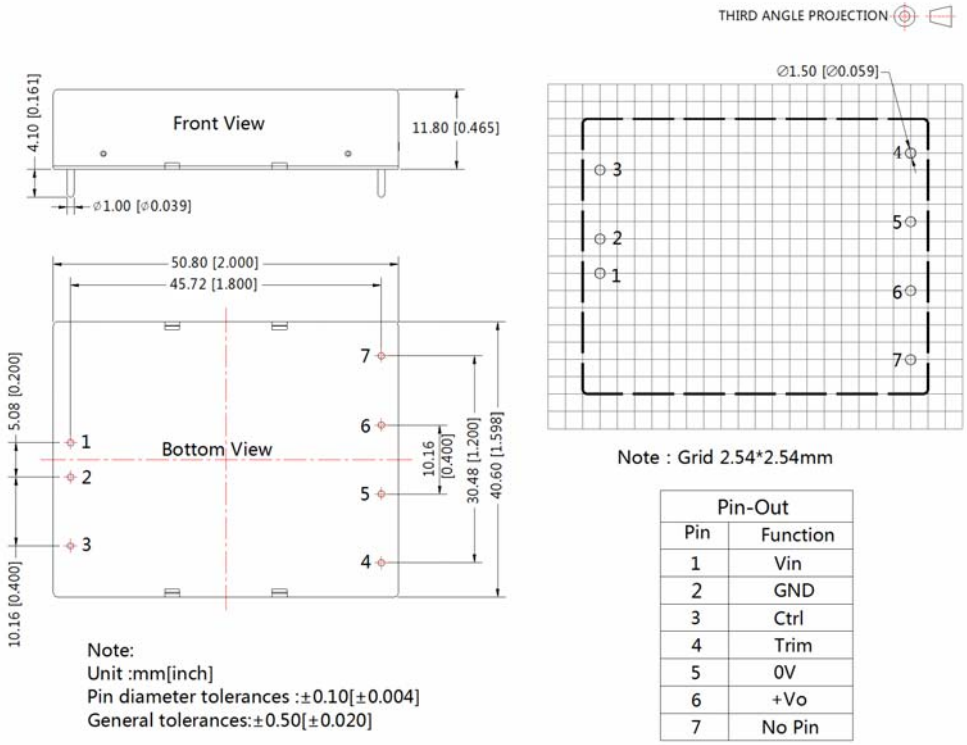
R_T is Trim resistance
a is a self-defined parameter, with no real meaning.

Vout	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3V	4.80	2.86	15	1.24
5V	2.88	2.86	10	2.5
9V	7.5	2.86	15	2.5
12V	10.97	2.86	17.8	2.5
15V	14.50	2.86	17.8	2.5
24V	24.87	2.86	20	2.5

4. The product does not support output in parallel with power per liter or hot-plug use

5. For more information please find the application notes on www.mornsun-power.com

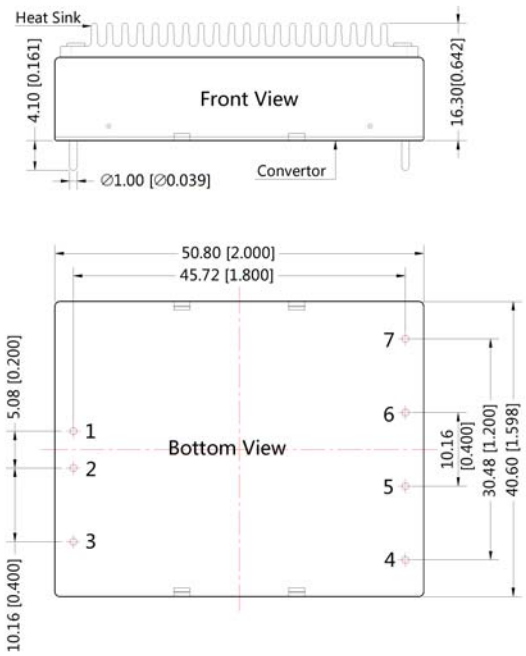
Dimensions and Recommended Layout (Horizontal package without heat sink)



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

Pin-Out	
Pin	Function
1	Vin
2	GND
3	Ctrl
4	Trim
5	0V
6	+Vo
7	No Pin

Dimensions (Horizontal package with heat sink)



Pin-Out	
Pin	Function
1	Vin
2	GND
3	Ctrl
4	Trim
5	0V
6	+Vo
7	No Pin

Note:
Unit :mm[inch]
General tolerances:±0.50[±0.020]
If use heat sinks, make sure there is enough space for a specific size in the above graph.

Notes:

1. Packing Information please refer to 'Product Packing Information'. The Packing bag number of Horizontal package :58200024(without heat sink), 58200050(with heat sink);
2. Recommended used in more than 5% load, if the load is lower than 5%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;
3. The max. capacitive load should be tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25℃, humidity<75% when inputting nominal voltage and outputting rated load;
5. All index testing methods in this datasheet are based on our Company's corporate standards;
6. The performance indexes of the product models listed in this datasheet are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
7. We can provide product customization service;
8. Specifications of this product are subject to changes without prior notice.

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