30W, wide input isolated & regulated single output DC/DC converter

Patent Protection RoHS

FEATURES

- Wide range of input voltage (2:1)
- Efficiency up to 88%
- Isolation voltage :1500VDC
- Output over-voltage, over-current and short circuit protection
- Operating temperature range: -40℃ to +85℃
- International standard pin-out

VRB_LD-30W series products are of 30W output power, with 2:1 wide input voltage of 18-36VDC, 36-75VDC and features 1500VDC isolation, over current and short-circuit protection, as well as six-sided metal shielding. All models are particularly suited to tele-communications, industrial, test equipments power.

Selection Guide

Part No.①	Input Voltage (VDC)		Output		Efficiency③ (%,Typ.) @ Full Load	Max. Capacitive Load (μF)
	Nominal (Range)	Max.②	Output Voltage (VDC)	Output Current (mA)(Max./Min.)		
VRB2403LD-30W	24 (18-36)	40	3.3	6000/600	86	6800
VRB2405LD-30W			5	6000/600	86	6800
VRB2412LD-30W			12	2500/250	88	680
VRB2415LD-30W			15	2000/200	88	680
VRB4803LD-30W	48 (36-75)	80	3.3	6000/600	84	6800
VRB4805LD-30W			5	6000/600	86	6800
VRB4812LD-30W			12	2500/250	88	680
VRB4815LD-30W			15	2000/200	88	680
VRB4824LD-30W			24	1250/125	88	470

Note:
① Series with suffix "H" are heat sink mounting, such as VRB2405LD-30WH;
② Absolute maximum rating without damage on the converter, but it isn't recommended;
③ Efficiency is measured In nominal input voltage and rated output load;A2S (wiring) and A4S (rail) Model due to input reverse polarity protection, minimum efficiency greater than Min.-2 is qualified.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	3.3/5V output	--	1454/120	--	mA
		Other voltage output	--	1421/20	--	
	28VDC input	3.3/5V output	--	727/80	--	
		Other voltage output	--	711/20	--	
Reflected Ripple Current	24VDC input		--	40	--	
	28VDC input		--	30	--	
Input impulse Voltage (1sec. max.)	24VDC input		-0.7	--	50	VDC
	28VDC input		-0.7	--	100	
Starting Time	Nominal input& constant resistance load		--	10	--	ms
Input Filter			Pi filter			
Ctrl*	Module switch on		Ctrl suspended or connected to TTL high level (3-40VDC)			
	Module switch off		Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off		--	--	1	mA
under-voltage turn-off	24VDC input	Models ON	--	--	17.8	VDC
		Models OFF	16	--	--	
	48VDC input	Models ON	--	--	35.8	
		Models OFF	32	--	--	

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Positive 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		--	50	120	mV p-p
Output Over-voltage Protection	Input voltage range	3.3VDC output	--	3.9	--	VDC
		5VDC output	--	6.2	--	
		12VDC output	--	15	--	
		15VDC output	--	18	--	
		24VDC output	--	28	--	
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	--	2000	--	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	
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency	PWM mode	--	300	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

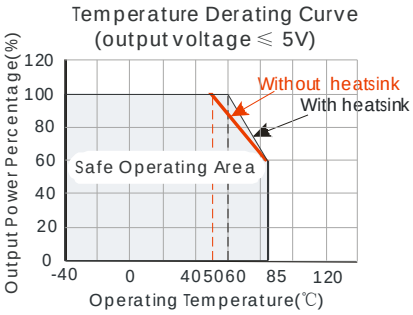
Physical Specifications

Casing Material	Aluminum alloy	
Package Dimensions	Horizontal package(without heat sink)	50.80*25.40*11.80 mm
	Horizontal package(with heat sink)	50.80*25.40*16.30 mm
Weight	Horizontal package(without heat sink)/ Horizontal package(with heat sink)	28g/36g(Typ.)
Cooling Method	Free air convection	

EMC Specifications

EMI	Conducted disturbance	CISPR22/EN55022	CLASS B (see Fig.3-② for recommended circuit)	
	Radiated emission	CISPR22/EN55022	CLASS B (see Fig.3-② for recommended circuit)	
EMS	Electrostatic discharge	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
	Radiation immunity	IEC/EN61000-4-3	10V/m	perf. Criteria A
	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
	Conducted disturbance immunity	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29	0-70%	perf. Criteria B

Product Characteristic Curve



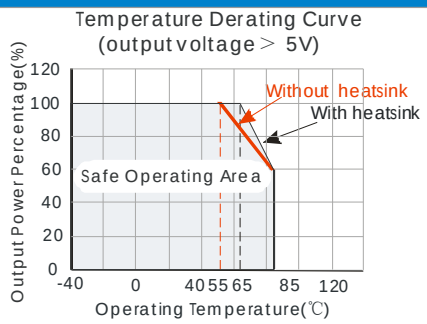
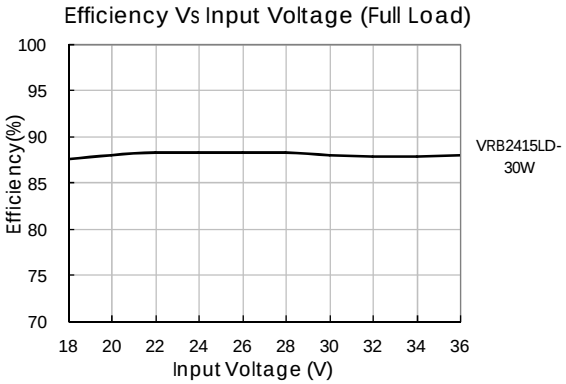
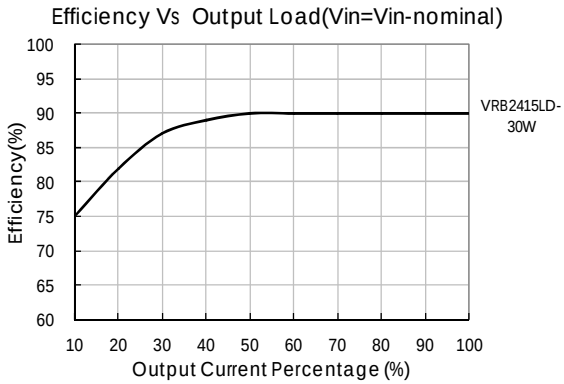


Fig. 1





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.

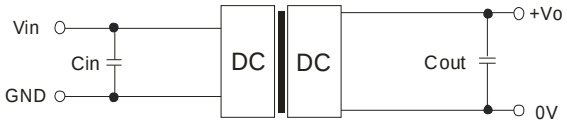


Fig. 2

Vout(VDC)	Cin(μF)	Cout(μF)
5	100	220
9/12/15		100
24		47

2. EMC solution-recommended circuit

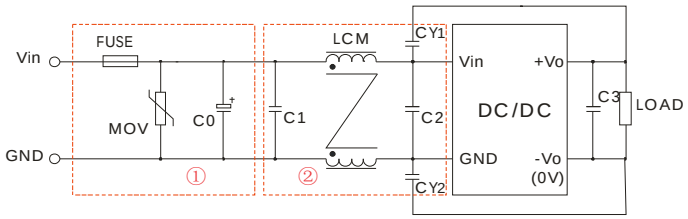


Fig. 3

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:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S14K35	S14K60
C0	330μF/50V	330μF/100V
C1, C2	4.7μF/50V	4.7μF/100V
C3	Refer to the Cout in Fig.2	
LCM	1mH(FL2D-30-102)	
CY1, CY2	1nF/2KV	

EMC solution-recommended circuit PCB layout

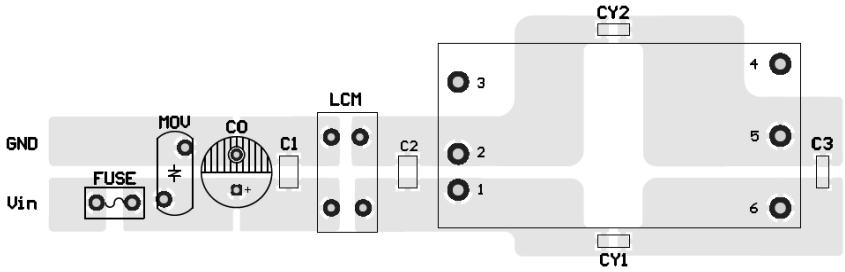
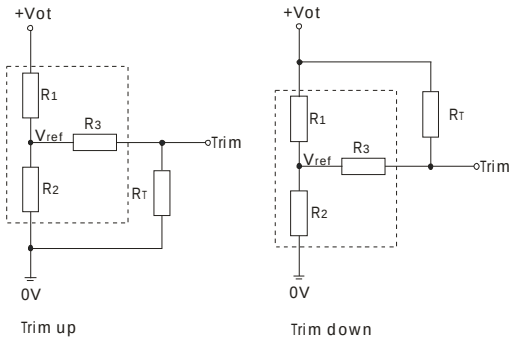


Fig. 4

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:

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

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

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

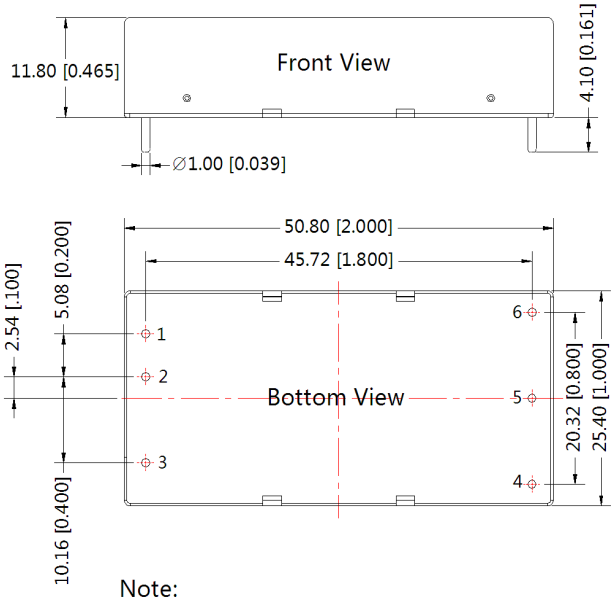
Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.80	2.86	15	1.24
5	2.88	2.86	10	2.5
12	10.97	2.86	17.8	2.5
15	14.50	2.86	17.8	2.5
24	24.87	2.86	20	2.5

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

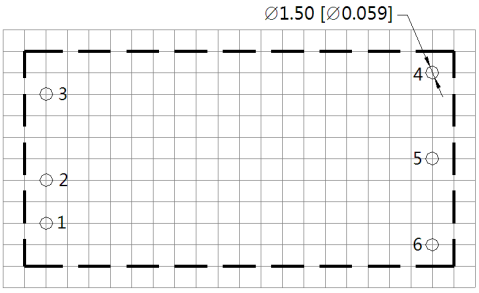
5. For more information please find the application notes on www.mornsun-power.com

Horizontal Package Dimensions and Recommended Layout (without heat sink)

THIRD ANGLE PROJECTION



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

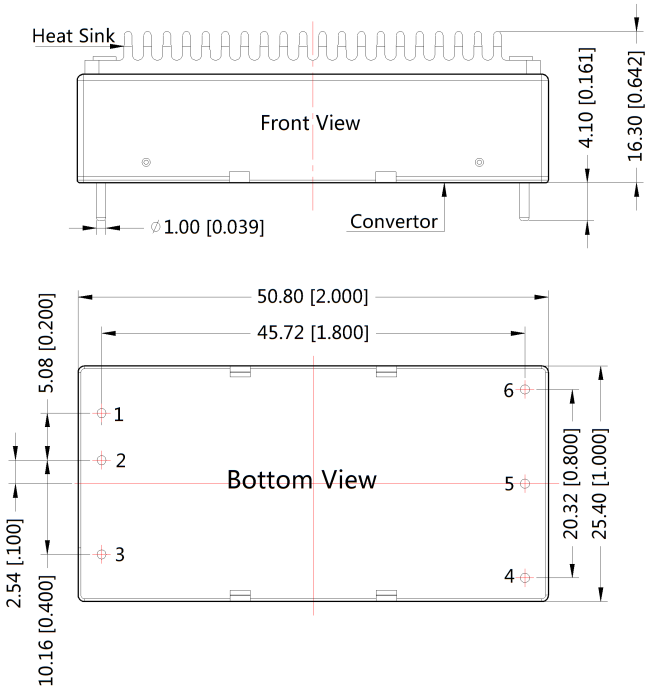


Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	Vin
2	GND
3	Ctrl
4	Trim
5	0V
6	+Vo

Horizontal Package Dimensions (with heat sink)

THIRD ANGLE PROJECTION



Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
3	Ctrl	Ctrl
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

Note:
Unit :mm[inch]
General tolerances:±0.50[±0.020]
If use heatsinks,make sure there is enough space for a special size in ther above graph

Notes:

1. Packing Information please refer to 'Product Packing Information'. The Packing bag number of Horizontal package :58200035(without heatsink), 58200051(with heatsink);
2. Recommended used in more than 10% load, if the load is lower than 10%, 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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