6W,wide input, isolated & regulated single output, SIP package, DC-DC converter

CE Patent Protection RoHS 3 years Warranty

FEATURES

- Wide input voltage range (2:1)
- High efficiency up to 87%
- No-load power consumption as low as 0.12W
- Isolation voltage :1.6K VDC
- Input under-voltage protection, output short circuit, over-current protection
- Operating temperature range: -40℃ to +105℃
- International standard pin-out
- Meets EN62368 standards

VRB_S-6WR3 series are isolated 6W DC-DC products with 2:1 input voltage. The feature efficiency up to 87%, 1600VDC isolation, operating temperature of -40℃ to +105℃, input under-voltage protection, output over-current, short circuit protection, which make them widely applied in medical care, industrial control, electric power, instruments and communication fields.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Efficiency② (%,Min./Typ.) @ Full Load	Max. Capacitive Load (μF)
		Nominal (Range)	Max.①	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
CE	VRB1203S-6WR3	12 (9-18)	20	3.3	1350/0	74/76	1800
	VRB1205S-6WR3			5	1200/0	78/80	1000
	VRB1209S-6WR3			9	667/0	80/82	470
	VRB1212S-6WR3			12	500/0	82/84	470
	VRB1215S-6WR3			15	400/0	82/84	220
	VRB1224S-6WR3			24	250/0	82/84	100
	VRB2403S-6WR3	24 (18-36)	40	3.3	1350/0	76/78	1800
	VRB2405S-6WR3			5	1200/0	80/82	1000
	VRB2409S-6WR3			9	667/0	82/84	470
	VRB2412S-6WR3			12	500/0	84/86	470
	VRB2415S-6WR3			15	400/0	85/87	220
	VRB2424S-6WR3			24	250/0	83/85	100

Notes:
① Absolute maximum rating without damage on the converter, but it isn't recommended;
② Efficiency is measured In nominal input voltage and rated output load.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	12VDC nominai input series, nominai input voltage	3.3V output	--	489/12	502/18	mA
		Others	--	625/12	641/18	
	24VDC nominai input series, nominai input voltage	3.3V output	--	238/5	245/12	
		5V output	--	305/5	313/12	
		Others	--	305/10	313/16	
Reflected Ripple Current			--	50	--	
Surge Voltage (1sec. max.)	12VDC nominai input voltage		-0.7	--	25	VDC
	24VDC nominai input voltage		-0.7	--	50	
Starting Voltage	12VDC nominai input voltage		--	--	9	
	24VDC nominai input voltage		--	--	18	
Input Under-voltage Protection	12VDC nominai input voltage		5.5	6.5	--	VDC
	24VDC nominai input voltage		12	15.5	--	
Input Filter			Capacitance Filter			
Hot Plug			Unavailable			

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Ctrl*	Module switch on	Ctrl suspended or connected to TTL high level (3.5-12VDC)			
	Module switch off	Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off	--	6	10	mA
Note: *The voltage of Ctrl pin is relative to input pin GND.					

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy①	5%-100% load		--	±1	±2	%
Line Regulation	Full load, the input voltage is from low voltage to high voltage		--	±0.5	±1	
Load Regulation②	5%-100% load		--	±0.5	±1.5	
Transient Recovery Time	25% load step change		--	300	500	μs
Transient Response Deviation		3.3V, 5V,output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth, 5%-100% load		--	50	100	mV p-p
Output Over-current Protection	Input voltage range		110	160	230	%Io
Short circuit Protection			Continuous, self-recovery			

Note: ①At 0%-5% load, the Max. output voltage accuracy is ±3%;
②When testing from 0% -100%load working conditions, load regulation index is ±3%;
③0%-5% load ripple&Noise is no more than 150mV. Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.

General Specification

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	1600	--	--	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	--	+105	℃
Storage Humidity	Without condensation	5	--	95	%RH
Storage Temperature		-55	--	+125	℃
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	+300	
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency *	PWM mode	--	500	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Note:* This series of products using reduced frequency technology, the switching frequency is test value of full load,When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Physical Specifications

Casing Material	Black flame-retardant and heat-resistant plastic (UL94 V-0)
Dimension	22.00*9.50*12.00 mm
Weight	4.9g (Typ.)
Cooling method	Free air convection

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EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±4KV	perf. Criteria B
	RS	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	IEC/EN61000-4-5	line to line ±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Product Characteristic Curve

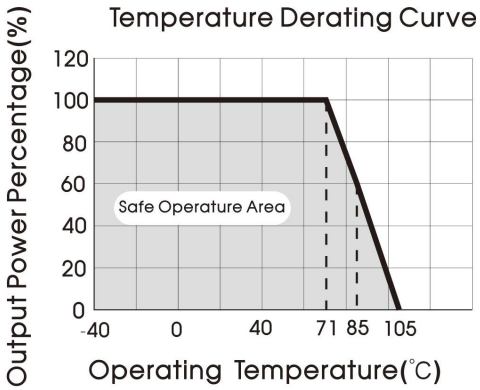
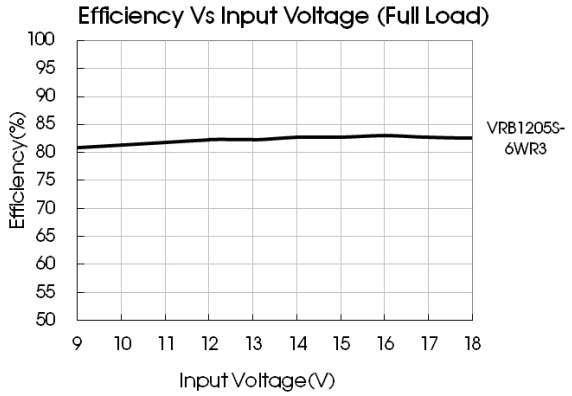
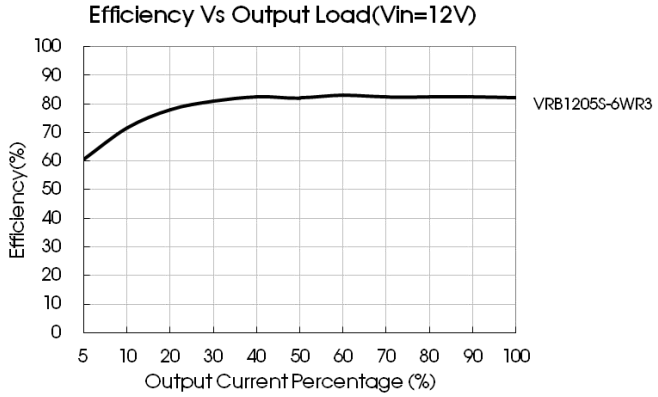
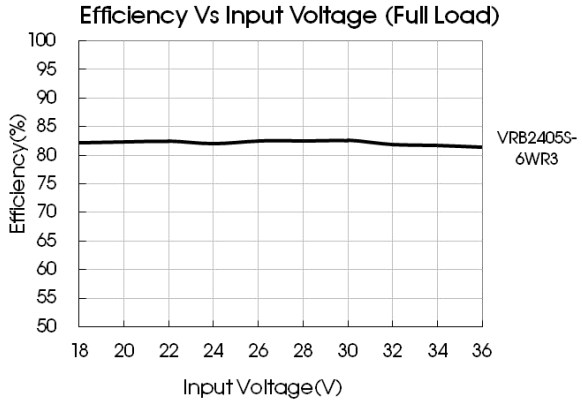
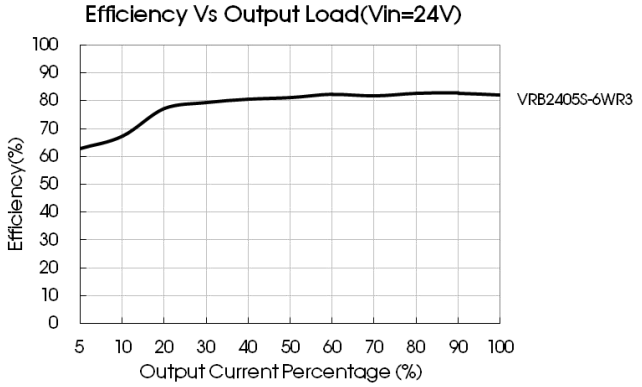


Fig. 1









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.

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Fig. 2

Cin(uF)	Cout(uF)
100	22

2. EMC solution-recommended circuit

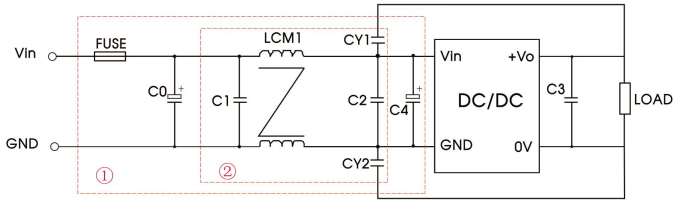


Fig. 3

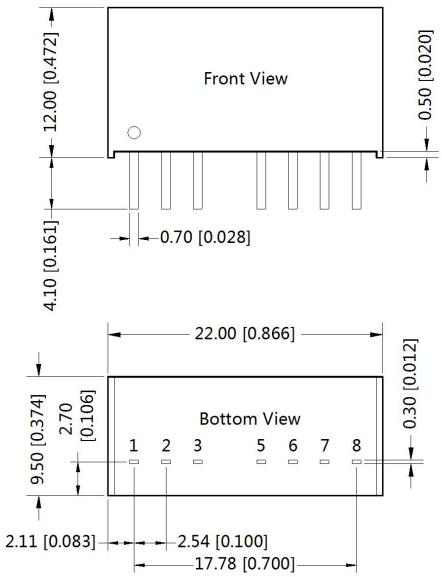
Notes: Part ① in the Fig. 3 is used for EMC test and part ② for EMI filtering; selected based on needs.

Fig. 3 Parameter description

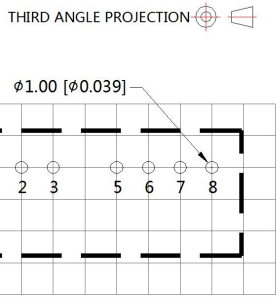
Model	Vin:12V	Vin:24V
FUSE	Choose according to actual input current	
C0, C4	330μF/35V	330μF/50V
C1, C2	10μF/50V	
C3	22μF/50V	
LCM1	1.4-1.7mH（TN150P-RH12.7*12.7*7.9）	
CY1, CY2	1nF/400VAC	

3. For more information please find DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



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



Note : Grid 2.54*2.54mm

Pin-Out	
Pin	Function
1	GND
2	Vin
3	Ctrl
5	NC
6	+Vo
7	0V
8	NC

NC: Pin to be isolated from circuitry

Note:
1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Packing bag number: 58210004;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on Company's corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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