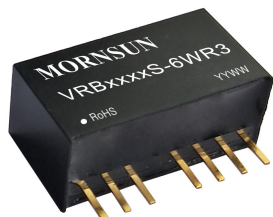


6W isolated DC-DC converter in SIP package  
Wide Input and regulated single output



Patent Protection RoHS



### FEATURES

- Wide 2:1 input voltage range
- High efficiency up to 87%
- No-load power consumption as low as 0.12W
- I/O isolation test voltage 1.6k VDC
- Input under-voltage protection, output short circuit, over-current protection
- Operating ambient temperature range: -40°C to +105°C
- Industry standard pin-out
- Meets EN62368 standards

VRB\_S-6WR3 series of isolated 6W DC-DC products with a 2:1 input voltage range. They feature efficiencies of up to 87%, 1600VDC input to output isolation, operating ambient temperature range of -40°C to +105°C, input under-voltage protection, output over-current, short circuit protection and they are widely used in applications such as medical care, industrial control, electric power, instruments and communication fields.

### Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency <sup>®</sup> Min./Typ.	Max. Capacitive Load (µF)
		Nominal (Range)	Max. <sup>①</sup>	Voltage (VDC)	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 Exceeding the maximum input voltage may cause permanent damage;
- ② Efficiency is measured at nominal input voltage and rated output load.

### Input Specifications

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

Input Filter		Capacitance Filter			
Hot Plug		Unavailable			
Ctrl*	Module on	Ctrl pin open or pulled high (3.5-12VDC)			
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)			
	Input current when off	--	6	10	mA

Note: \*The Ctrl pin voltage is referenced to input GND.

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy <sup>①</sup>	5%-100% load	--	±1	±2	%	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.5	±1		
Load Regulation <sup>②</sup>	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	%/°C	
Ripple & Noise <sup>③</sup>	20MHz bandwidth, 5%-100% load	--	50	100	mV p-p	
Over-current Protection	Input voltage range	110	160	230	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note:  
 ① At 0%-5% load, the Max. output voltage accuracy is ±3%;  
 ② Load regulation for 0%-100% load is ±3%;  
 ③ Ripple & Noise at ≤ 5% load is no more than 150mV. The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.

## General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	1600	--	--	VDC
Insulation Resistance	Input-output insulation at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	1000	--	pF
Operating Temperature	see Fig. 1	-40	--	+105	°C
Storage Humidity	Without condensation	5	--	95	%RH
Storage Temperature		-55	--	+125	°C
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 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°C	1000	--	--	K hours

Note:\*Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

## Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)
Dimensions	22.00 x 9.50 x 12.00 mm
Weight	4.9g (Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
Immunity	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

Typical Characteristic Curves

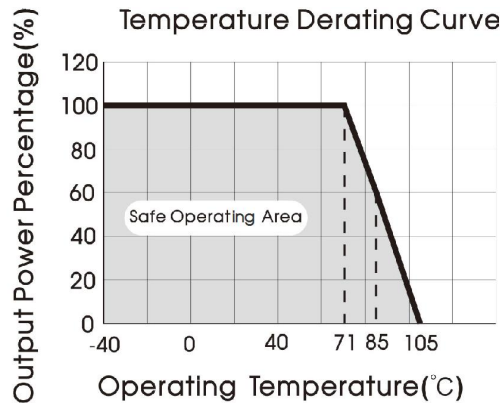
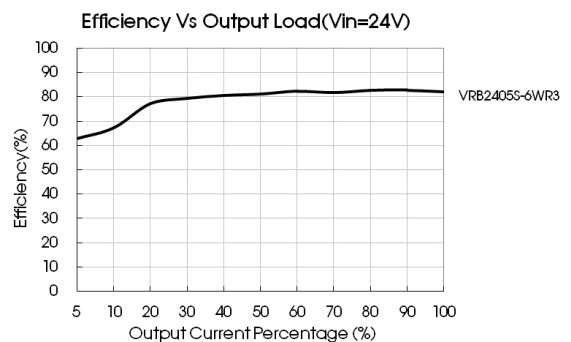
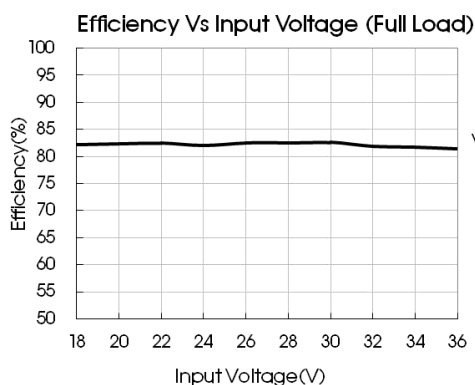
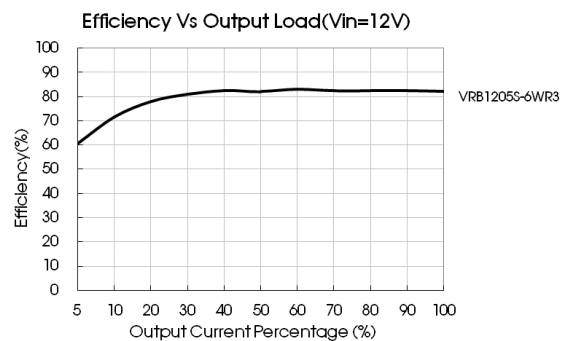
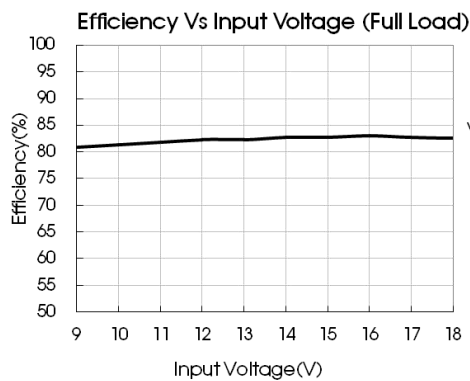


Fig. 1



Design Reference

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values  $C_{in}$  and  $C_{out}$  and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.



Fig. 2

Cin(uF)	Cout(uF)
100	22

## 2. EMC compliance circuit

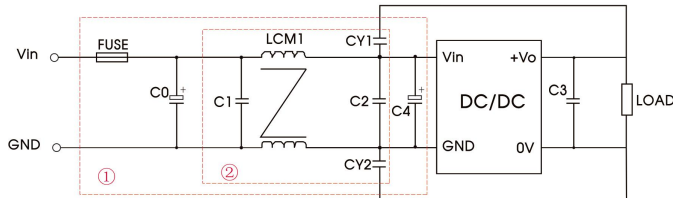


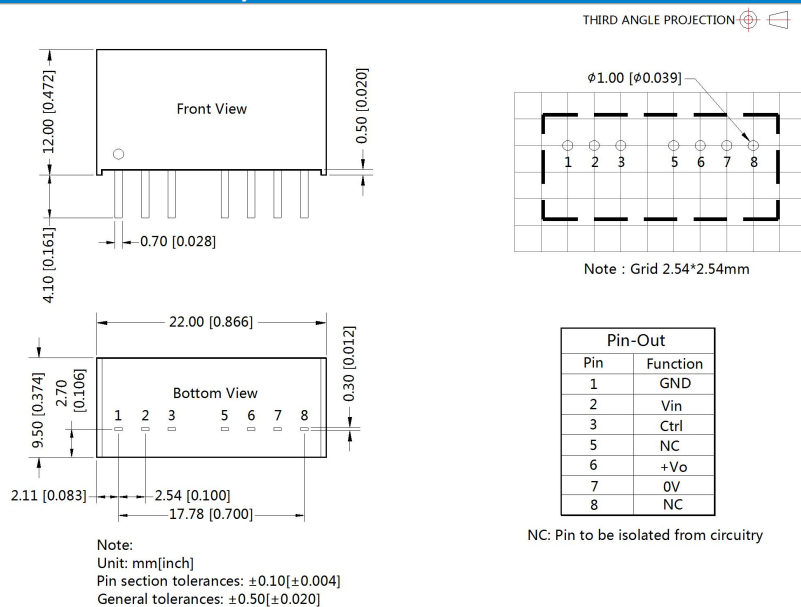
Fig. 3

Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting 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	

## Dimensions and Recommended Layout



### Note:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging number: 58210004;
- The maximum capacitive load offered were tested at input voltage range and full load;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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