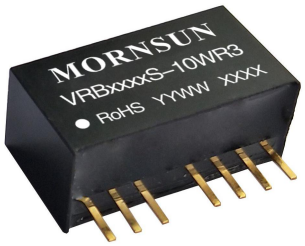
10W isolated DC-DC converter in SIP package
Wide input and regulated single output



3 years Warranty

Patent Protection

CE Report EN62368-1

UKCA Report BS EN62368-1

RoHS

FEATURES

- Wide 2:1 input voltage range
- High efficiency up to 88%
- I/O isolation test voltage 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current protection
- Operating ambient temperature range: -40℃ to +85℃
- Compact SIP package
- Industry standard pin-out

VRB_S-10WR3 series are isolated 10W DC-DC converter products with a wide 2:1 input voltage range. They feature efficiencies of up to 88%, 1500VDC input to output isolation, operating ambient temperature of -40℃ to +85℃, input under-voltage protection, output short-circuit, over-current protection and they are widely used in applications such as medical care, industrial control, electric power, instruments, communications and other industries.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max.①	Voltage(VDC)	Current (mA) Max./Min.		
EN/BS EN	VRB1203S-10WR3	12 (9-18)	20	3.3	2400/0	80/82	2200
	VRB1205S-10WR3			5	2000/0	83/85	2200
	VRB1209S-10WR3			9	1111/0	84/86	680
	VRB1212S-10WR3			12	833/0	84/86	470
	VRB1215S-10WR3			15	667/0	84/86	330
	VRB1224S-10WR3			24	417/0	84/86	220
	VRB2403S-10WR3	24 (18-36)	40	3.3	2400/0	82/84	2200
	VRB2405S-10WR3			5	2000/0	85/87	2200
	VRB2409S-10WR3			9	1111/0	86/88	680
	VRB2412S-10WR3			12	833/0	86/88	470
	VRB2415S-10WR3			15	667/0	86/88	330
	VRB2424S-10WR3			24	417/0	85/87	220

Note:
①Exceeding the maximum input voltage may cause permanent damage;
②Efficiency 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	--	795/35	815/50	mA
		5V output	--	969/35	992/50	
		Others	--	969/9	992/18	
	24VDC nominal input series, nominal input voltage	3.3V output	--	389/25	398/45	
		5V output	--	474/25	485/45	
		Others	--	474/9	485/18	
Reflected Ripple Current			--	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	
	24VDC nominal input voltage		--	--	18	

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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 Accuracy①	5%-100% load		--	±1.5	±2	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.25	±0.5	
Load Regulation②	5%-100% load		--	±0.5	±1	
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		--	75	150	mV p-p
Over-current Protection	Input voltage range		110	160	230	%Io
Short-circuit Protection			Continuous, self-recovery			

Note: ① Under 0%-5% load conditions, the maximum output voltage accuracy is ±3%;
② Load regulation for 0%-100% load is ±3%;
③ Under 0% -5% load conditions, ripple & noise does not exceed 300mV, please refer to Fig.2 for testing method.

General Specification

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output electric strength test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	℃
Storage Humidity	Non-condensing	5	--	95	%RH
Storage Temperature		-55	--	+125	℃
Pin Soldering Resistance Temperature*	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
	Wave soldering,10 seconds	255	260	265	
Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency①	PWM mode	--	500	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours

Note:*The pin resistance temperature is not the actual set temperature of the soldering iron, but the temperature required for a good solder joint. The actual set temperature by the customer needs to be comprehensively set based on the thickness of the PCB, the size of the copper cladding, the power of the soldering iron, and the selection of the soldering iron tip.
①Switching 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 V-0)
Dimension	22.00 x 9.50 x 12.00 mm
Weight	5.5g (Typ.)
Cooling Method	Free air convection (20LFM)

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Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.4-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.4-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV (see Fig.4-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.4-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

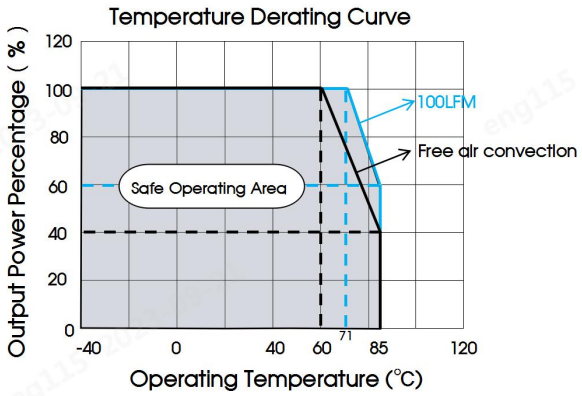
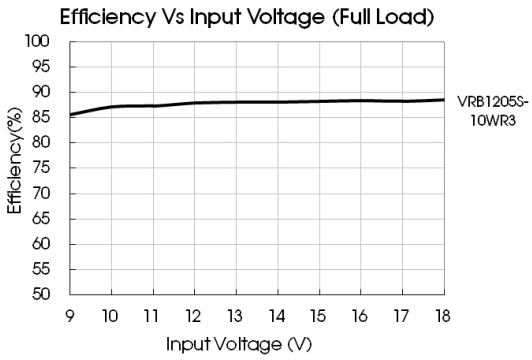
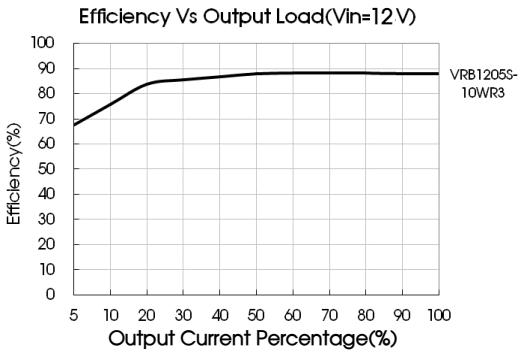
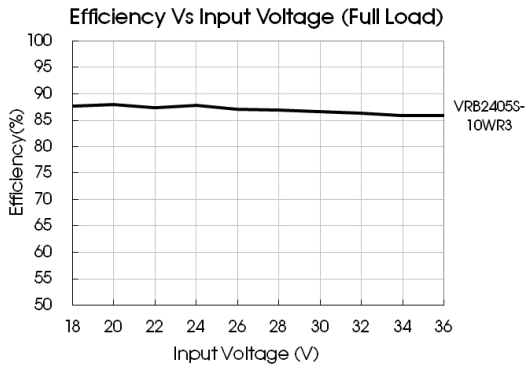
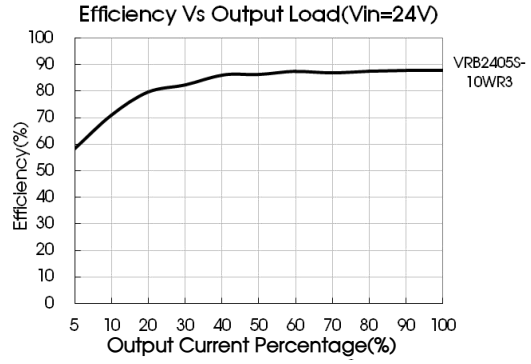


Fig. 1









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Design Reference

1. Ripple & Noise

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Please keep the wire of probe to copper as short as possible.

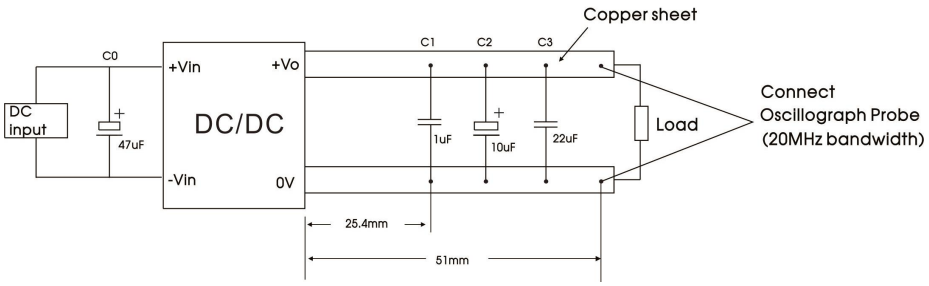

Fig. 2

2. Typical application

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout 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. 3

Cin		Vout(VDC)	Cout
Vin: 12VDC	Vin: 24VDC		
47μF/50V	47μF/100V	3.3/5/9	22μF/16V
		12/15	22μF/25V
		24	22μF/50V

3. EMC solution-recommended circuit

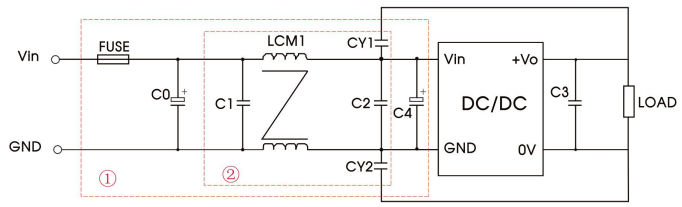

Fig. 4

Note: We use Part ① in Fig. 3 for Immunity test and part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	Vin: 12VDC	Vin: 24VDC
FUSE	Choose according to actual input current	
C0/C4	330μF/35V	330μF/50V
C1/C2	10μF/50V	
C3	Refer to the Cout in Fig2	
LCM1	470μH, recommended to use MORNSUN's FL2D-13-471R3	
CY1/CY2	1nF/2000VDC	

4. The products do not support parallel connection of their output

5. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

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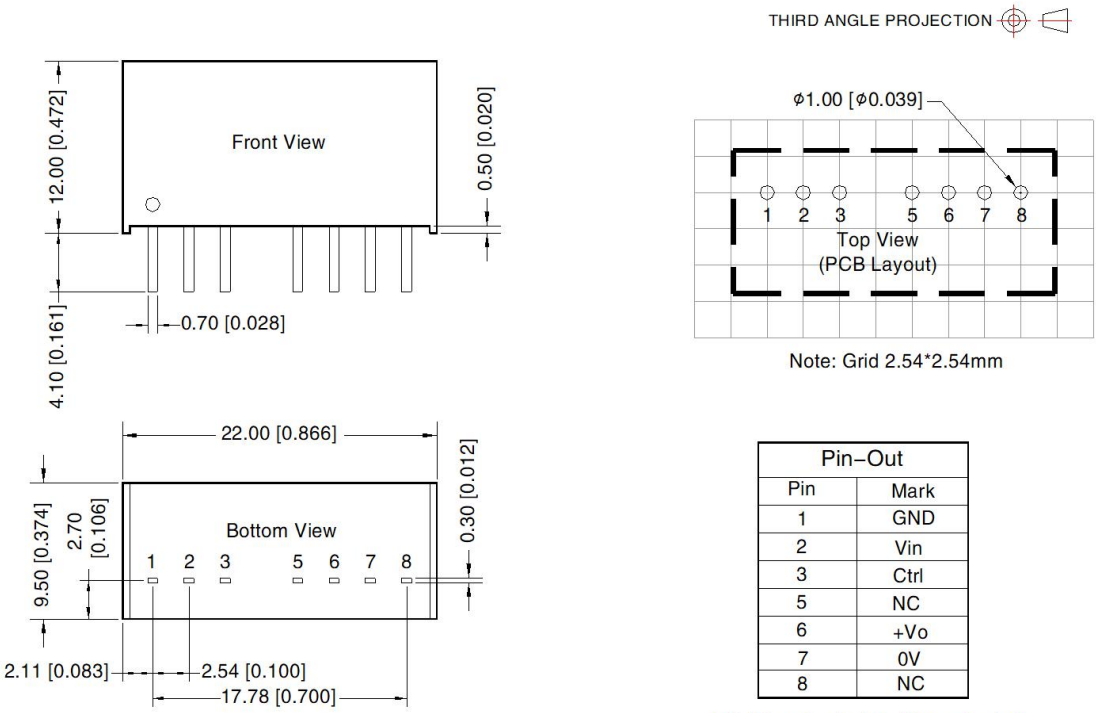
Dimensions and Recommended Layout



Note: Grid 2.54*2.54mm

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

NC: Pin to be isolated from circuitry

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

Note:
1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging 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 our company 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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