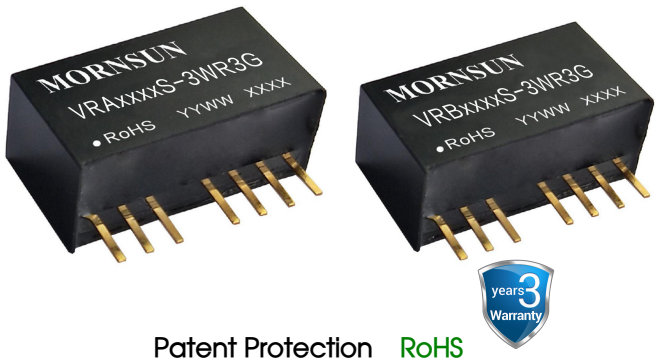
DC/DC Converter

VRA_S-3WR3G & VRB_S-3WR3G Series

MORNSUN®

3W isolated DC/DC converter
Wide input and regulated dual/single output



years 3 Warranty

Patent Protection RoHS

FEATURES

- Ultra compact SIP package
- Wide 2:1 input voltage range
- No-load power consumption as low as 0.24W
- 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℃
- Industry standard pin-out

VRA_S-3WR3G & VRB_S-3WR3G series of isolated 3W DC-DC converter products with a wide 2:1 input voltage range, input to output isolation is tested with 1500VDC and the converter safety operate ambient temperature of -40℃ to +85℃, input under-voltage protection, output short-circuit, over-current protection. They are ideally and widely used in applications such as medical, industrial control, electric power, instruments and communications.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load② (μF)Max.
		Nominal (Range)	Max.①	Voltage (VDC)	Current(mA) Max./Min.		
--	VRA2415S-3WR3G	24 (18-36)	40	±15	±100/0	79/81	100
	VRB2403S-3WR3G			3.3	758/0	76/78	2200
	VRB2405S-3WR3G			5	600/0	78/80	2200
	VRB2412S-3WR3G			12	250/0	80/82	560
	VRB2415S-3WR3G			15	200/0	80/82	470
	VRB2424S-3WR3G			24	125/0	79/81	100
	VRB2428S-3WR3G			28	107/0	79/81	68

Note: ①Exceeding the maximum input voltage may cause permanent damage;
②For the dual output modules, the capacitive loads of positive and negative outputs are the same.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	3.3V output	--	134/10	138/16	mA
		Others output	--	156/10	160/16	
Reflected Ripple Current			--	50	--	
Surge Voltage (1sec. max.)			-0.7	--	50	VDC
Start-up Voltage			--	--	18	
Input under-voltage protection			11	13	--	
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, input voltage range	Vo1	--	±1	±2	%
		Vo2	--	±1	±3	

Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.5	±1	%
		Vo2	--	±1	±1.5	
Load Regulation②	5%-100% load	Vo1	--	±0.5	±1.5	
		Vo2	--	±1.2	±2	
Cross Regulation	Dual output, Vo1 load at 50%, Vo2 load at range of 25%-100%		--	--	±5	
Transient Recovery Time	25% load step change, nominal input voltage		--	450	500	μs
Transient Response Deviation	25% load step change, nominal input voltage	3.3V, 5V output	--	±5	±8	%
		Others output	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth, 5%-100% load		--	80	120	mVp-p
Over-current Protection	Input voltage range		110	170	250	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:
①Under 0-5% load condition, the maximum accuracy of the main output voltage is ±3%, and the maximum accuracy of the secondary output voltage is ±5%;
②Under 0-100% load condition, the load regulation of the Vo1 is ±3%, and that of the Vo2 is ±4%;
③Under 0% -5% load conditions, ripple & noise does not exceed 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.	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 Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
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	--	330	--	kHz
MTBF	MIL-HDBK-217F@25℃	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	4.6g(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

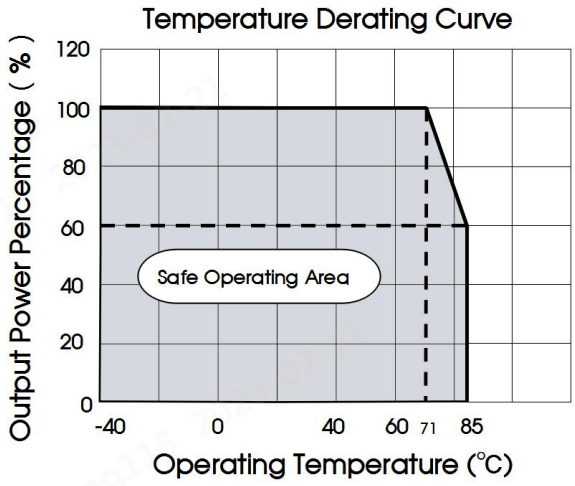


Fig. 1

Design Reference

1. Typical application

All 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 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.

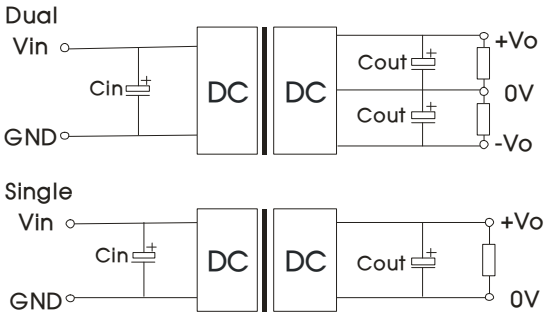


Fig.2

Vout	Cin	Cout
3.3V/5V	100μF/50V	22μF/15V
12V/15V/±15V		22μF/25V
24V/28V		22μF/50V

2. EMC compliance circuit

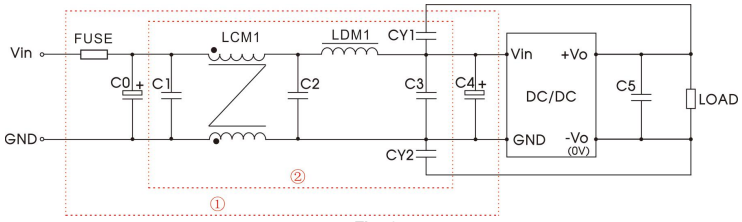


Fig.3

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

Parameter description:

Model	Vin: 24VDC
FUSE	Choose according to actual input current
C0/C4	330μF/50V
C1/C2/C3	10μF/50V
C5	Refer to the Cout in Fig.2
LDM1	12μH
LCM1	2.2mH (Recommend use Mornsun P/N, FL2D-30-222)
CY1/CY2	2.2nF/3kV

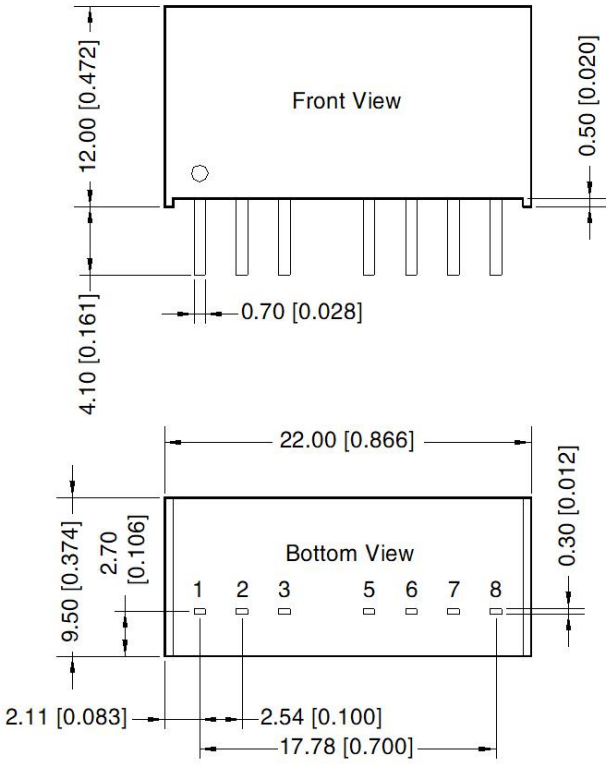
3. The products do not support parallel connection of their output

4. For additional information please refer to DC-DC converter application notes on

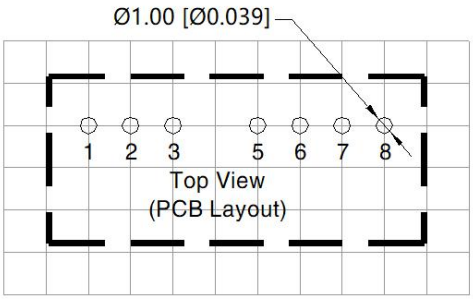
www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



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	Single	Dual
1	GND	GND
2	Vin	Vin
3	Ctrl	Ctrl
5	NC	NC
6	+Vo	+Vo
7	0V	0V
8	NC	–Vo

NC: Pin to be isolated from circuitry

Notes:
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 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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