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 80%
- No-load power consumption as low as 0.14W
- I/O isolation test voltage 1.6k VDC
- Input under-voltage protection, output short-circuit, over-current protection
- Operating ambient temperature range: -40℃ to +105℃
- Industry standard pin-out

VRB1206S-6WR3 of isolated 6W DC-DC converter products with a 2:1 input voltage range. They feature efficiencies of up to 80%, 1600VDC input to output isolation, operating ambient temperature range of -40℃ to +105℃, 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 and communication fields.

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.		
--	VRB1206S-6WR3	12 (9-18)	20	6	1000/0	78/80	1000

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)	Nominal input voltage	--	625/12	641/18	mA
Reflected Ripple Current		--	50	--	
Surge Voltage (1sec. max.)	12VDC nominal input voltage	-0.7	--	25	VDC
Start-up Voltage	12VDC nominal input voltage	--	--	9	
Input Under-voltage Protection	12VDC nominal input voltage	5.5	6.5	--	
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
Output Voltage Accuracy①	5%-100% load	--	±1.5	±2	%
Linear Regulation	Input voltage variation from low to high at full load	--	±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		--	±5	±8	%
Temperature Coefficient	Full load	--	--	±0.03	%/℃
Ripple & Noise③	20MHz bandwidth, 5%-100% load	--	50	100	mVp-p
Over-current Protection	Input voltage range	110	160	230	%Io
Short-circuit Protection		Continuous, self-recovery			

Note: ①Under 0%-5% load conditions, the maximum output voltage accuracy is ±3%;
②Load regulation for 0%-100% load is ±3%;
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.

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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 resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	see Fig. 1	-40	--	+105	℃
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 Frequency *	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.
*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

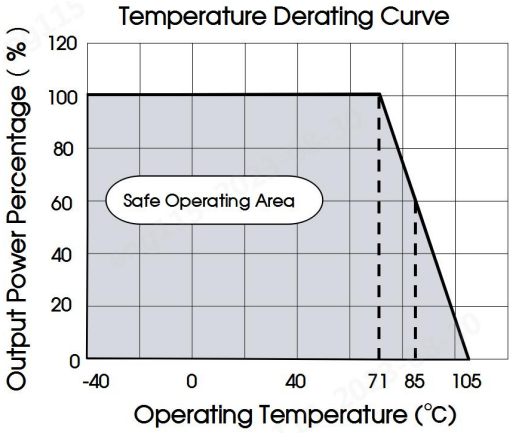

Fig. 1

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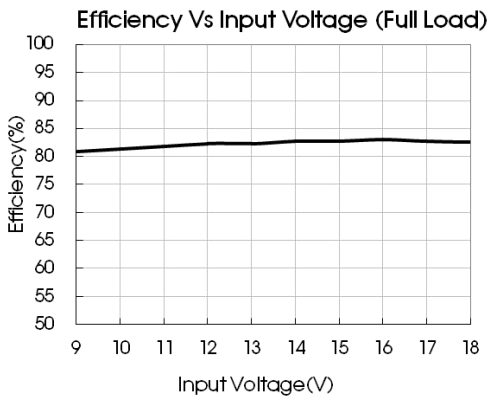

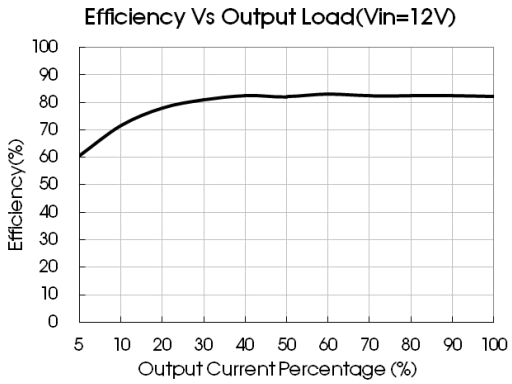

Design Reference

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 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

Cin	Cout
100μF/50V	22μF/50V

2. EMC compliance circuit

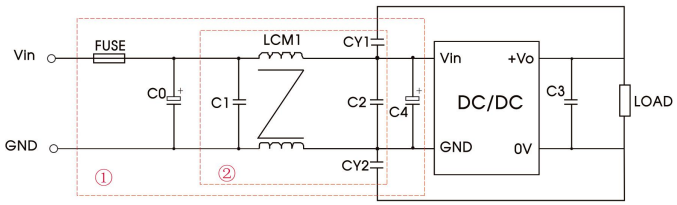

Fig. 3

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

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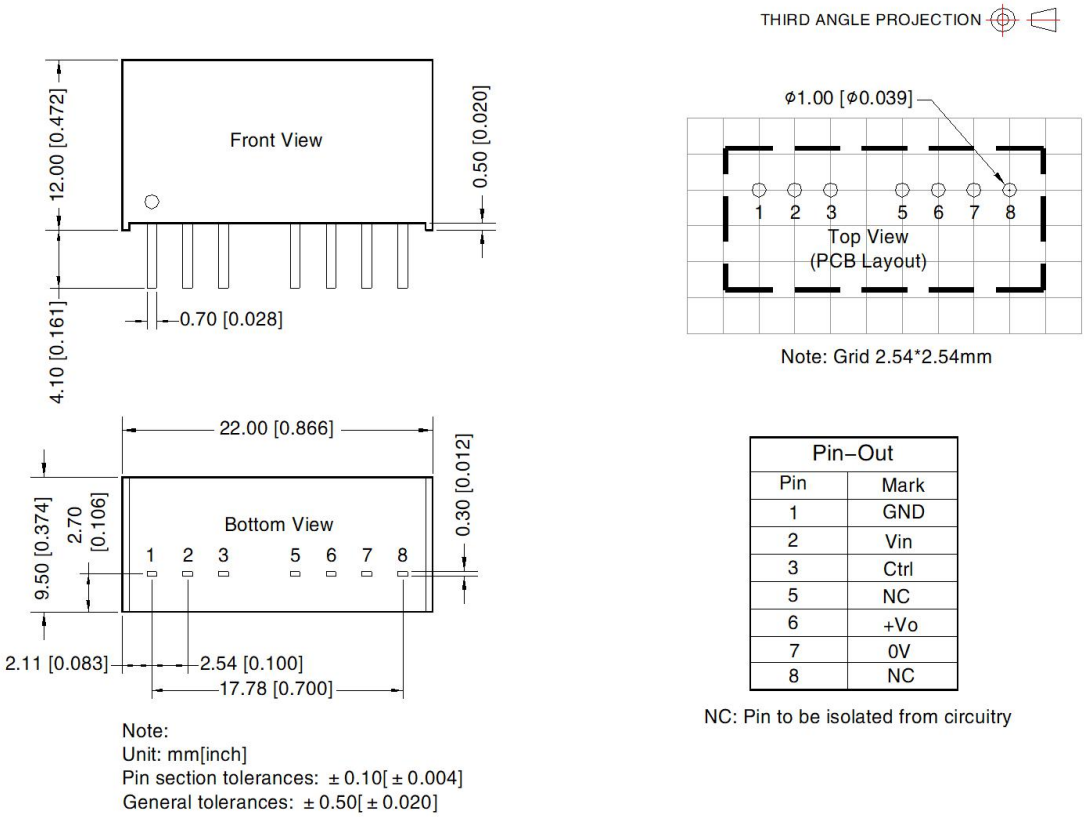
Dimensions and Recommended Layout



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 number: 58210004;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. 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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