

3W isolated DC-DC converter  
Fixed input voltage, unregulated single output



Patent Protection RoHS

## FEATURES

- Operating ambient temperature range: -40°C ~ +85°C
- Compact SIP package
- I/O isolation test voltage 3k VDC
- High power density
- No extra components required
- Industry standard pin-out

*F\_S-3WR2 series are designed for use in distributed power supply systems and especially suitable in applications such as pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits, where:*

1. Where the voltage of the input power supply is stable (voltage variation:  $\pm 10\%V_{in}$ );
2. Where isolation between input and output is necessary (isolation voltage  $\leq 3000VDC$ );
3. Where the output voltage regulation and the ripple & noise of the output voltage is not strictly required.

## Selection Guide

Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load( $\mu F$ ) Max.
	Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
F0505S-3WR2	5	5	600/60	80/84	220
F0509S-3WR2	(4.5-5.5)	9	333/33	80/84	
F1205S-3WR2	12	5	600/60	77/81	
F1212S-3WR2	(10.8-13.2)	12	250/25	84/88	
F1515S-3WR2	15 (13.5-16.5)	15	200/20	81/85	

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	5VDC input	--	714/40	--/80	mA
	12VDC input	--	308/20	--/40	
	15VDC input	--	230/20	--/40	
Reflected Ripple Current*		--	15	--	
Surge Voltage (1sec. max.)	5VDC input	-0.7	--	9	VDC
	12VDC input	-0.7	--	18	
	15VDC input	-0.7	--	21	
Input Filter		Capacitance filter			
Hot Plug		Unavailable			

Note: \* Please refer to DC-DC Converter Application Note for detailed description of Reflected ripple current testing method.

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy		See output regulation curve (Fig. 1)				
Linear Regulation	Input voltage change: $\pm 1\%$	--	--	$\pm 1.2$	%/%	
Load Regulation	10%-100% load	--	8	--	%	
Ripple & Noise*	20MHz bandwidth	5/9VDC output	--	150	300	mVp-p
		12VDC output	--	150	250	
		15VDC output	--	150	300	
Temperature Coefficient	Full load	--	--	$\pm 0.03$	%/°C	
Short-circuit Protection**		--	--	1	s	

Notes: \* The "parallel cable" method is used for Ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

\*\* At the end of the short circuit duration, the supply voltage must be disconnected from the modules.

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.	3000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	20	--	pF
Operating Temperature	Derating when operating temperature up to 71°C ( see Fig. 2 )	-40	--	85	°C
Storage Temperature		-55	--	125	
Case Temperature Rise	Ta=25°C, nominal input, full load output	--	25	--	
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	100	--	KHz
MTBF	MIL-HDBK-217F@25°C	3500	--	--	K hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	19.65 x 7.05 x 10.16mm
Weight	2.4g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact ±6KV perf. Criteria B

Typical Characteristic Curves

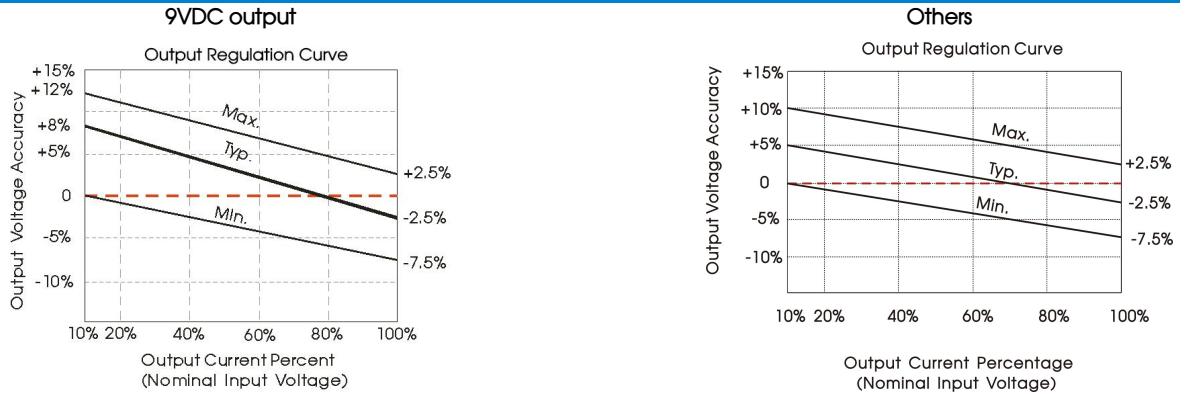


Fig. 1

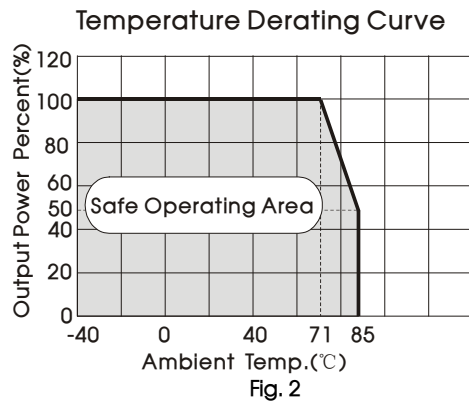
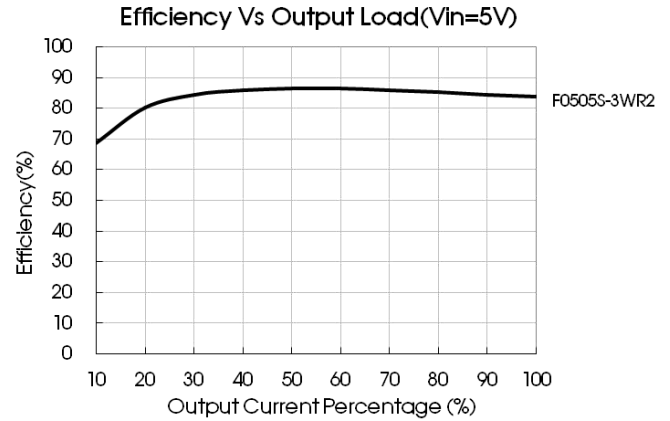
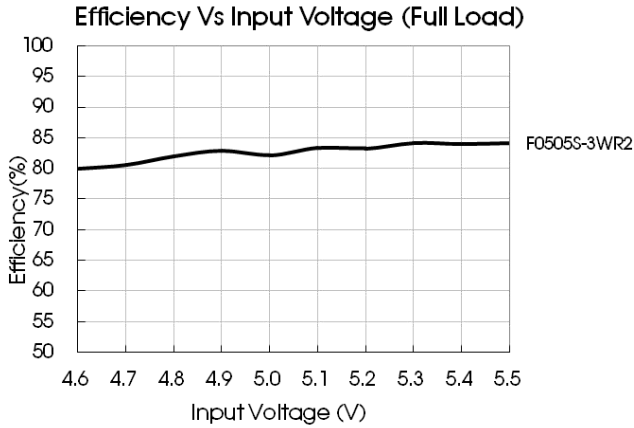


Fig. 2



## Design Reference

### 1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

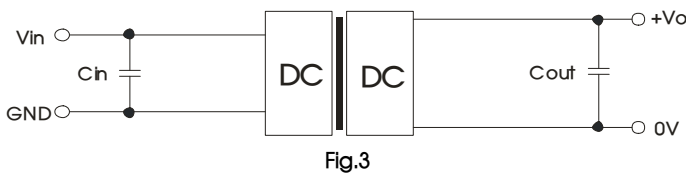


Table 1: Recommended input and output capacitor values

Vin(VDC)	Cin(μF)	Vo (VDC)	Cout(μF)
5	4.7	5	10
12/15	2.2	9	4.7
--	--	12/15	2.2

### 2. EMC (CLASS B) compliance circuit

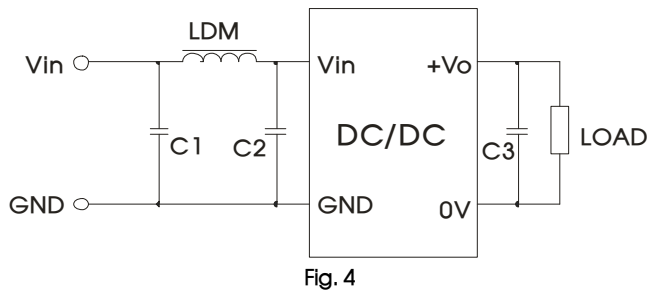


Table 2: Recommended EMC filter values

Input voltage (VDC)	5/12	15
	C1/ C2	4.7μF /50V
C3	Refer to the Cout in Fig.3	
LDM	6.8μH	12μH

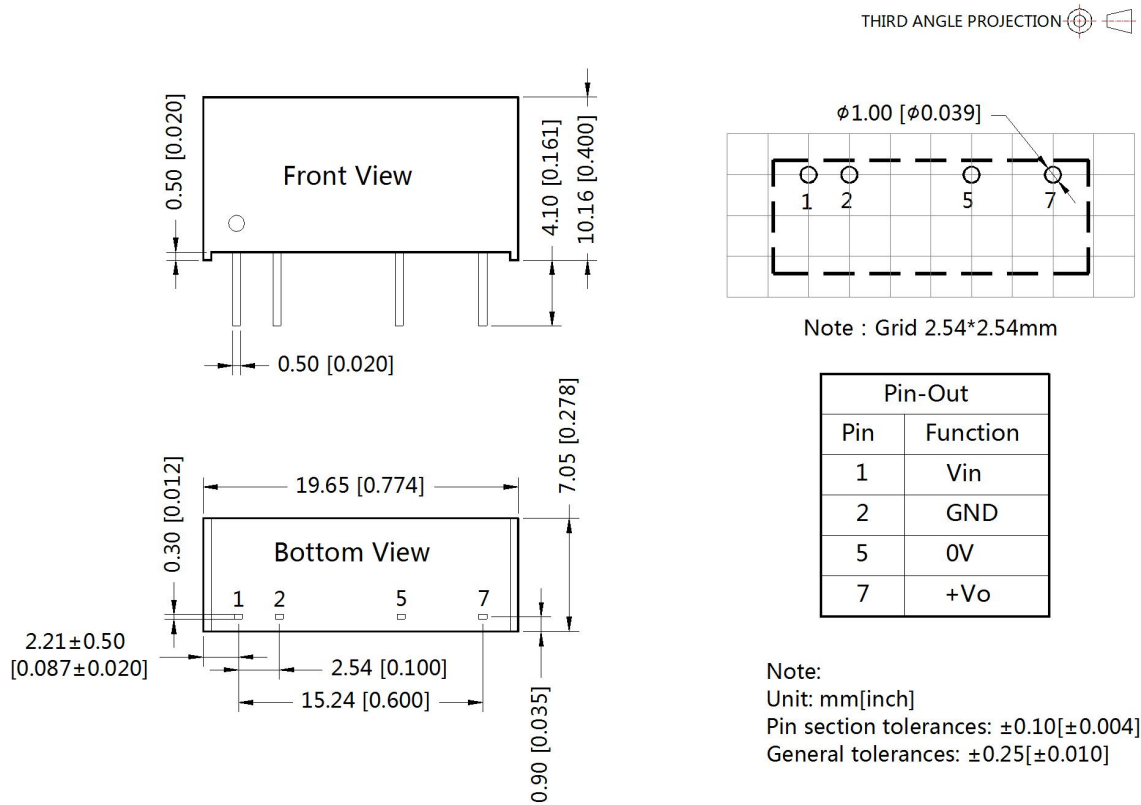
### 3. Minimum Output load requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

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

[www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Notes:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200001;
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  $T_a=25^{\circ}\text{C}$ , humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our 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.

MORNSUN Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Luogang District, Guangzhou, P. R. China  
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: info@mornsun.cn www.mornsun-power.com