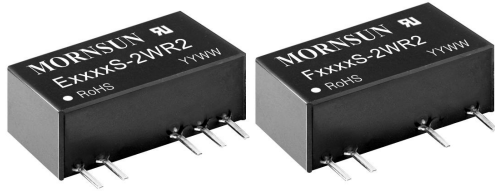


2W isolated DC-DC converter  
Fixed input voltage, unregulated single & dual output



UL US CE CB Patent Protected RoHS



FEATURES

- Operating ambient temperature range: -40°C ~ +105°C
- High efficiency up to 86%
- High power density
- Miniature SIP package
- I/O isolation test voltage 3K VDC
- No extra components required
- Industry standard pin-out
- IEC60950, UL60950, EN60950 approved

E\_S-2WR2 & F\_S-2WR2 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. The voltage of the input power supply is relatively stable with a variation of  $\pm 10\%V$  in or less;
2. A high input to output isolation voltage of  $\leq 3000VDC$  is necessary;
3. The requirement for a tight output regulation and low ripple & noise is not as strict.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load*( $\mu F$ ) Max.	
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.				
UL/CE/CB	E0503S-2WR2	5 (4.5-5.5)	$\pm 3.3$	$\pm 303/\pm 30$	68/72	100		
	E0505S-2WR2		$\pm 5$	$\pm 200/\pm 20$	76/80			
	E0509S-2WR2		$\pm 9$	$\pm 111/\pm 11$	80/84			
	E0512S-2WR2		$\pm 12$	$\pm 83/\pm 8$	79/83			
	E0515S-2WR2		$\pm 15$	$\pm 67/\pm 7$	78/82			
	E0524S-2WR2		$\pm 24$	$\pm 42/\pm 4$	80/84			
UL/CE/CB	F0503S-2WR2		12 (10.8-13.2)	3.3	400/40	75/79	220	
	F0505S-2WR2			5	400/40	78/82		
	F0509S-2WR2			9	222/22	78/82		
	F0512S-2WR2			12	167/17	78/82		
	F0515S-2WR2			15	133/13	79/83		
	F0524S-2WR2			24	83/8	80/84		
UL/CE/CB	E1203S-2WR2	15 (13.5-16.5)		$\pm 3.3$	$\pm 303/\pm 30$	71/75	100	
	E1205S-2WR2			$\pm 5$	$\pm 200/\pm 20$	76/80		
	E1209S-2WR2			$\pm 9$	$\pm 111/\pm 11$	78/82		
	E1212S-2WR2			$\pm 12$	$\pm 83/\pm 8$	80/84		
	E1215S-2WR2			$\pm 15$	$\pm 67/\pm 7$	80/84		
	F1205S-2WR2			5	400/40	78/82		220
	F1209S-2WR2		9	222/22	77/81			
	F1212S-2WR2		12	167/17	80/84			
	F1215S-2WR2		15	133/13	81/85			
	F1224S-2WR2		24	83/8	82/86			
	UL/CE/CB		E2405S-2WR2	24 (21.6-26.4)	$\pm 5$	$\pm 200/\pm 20$	76/80	
			E2409S-2WR2		$\pm 9$	$\pm 111/\pm 11$	80/84	
E2412S-2WR2		$\pm 12$	$\pm 83/\pm 8$		80/84			
E2415S-2WR2		$\pm 15$	$\pm 67/\pm 7$		80/84			

UL/CE/CB	F2405S-2WR2	24 (21.6-26.4)	5	400/40	76/80	220
	F2409S-2WR2		9	222/22	82/86	
	F2412S-2WR2		12	167/17	80/84	
	F2415S-2WR2		15	133/13	82/86	
--	F2418S-2WR2		18	111/11	82/86	
UL/CE/CB	F2424S-2WR2		24	83/8	82/86	

Note: \* The specified maximum capacitive load for positive and negative output is identical.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	5V input	--	506/35	--/60	mA
	12V input	--	208/20	--/50	
	15V input	--	159/15	--/35	
	24V input	--	104/10	--/30	
Reflected Ripple Current		--	15	--	
Surge Voltage (1sec. max.)	5V input	-0.7	--	9	VDC
	12V input	-0.7	--	18	
	15V input	-0.7	--	21	
	24V input	-0.7	--	30	
Input Filter		Capacitance filter			
Hot Plug		Unavailable			

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy		See output regulation curve (Fig. 1)				
Linear Regulation	Input voltage change: $\pm 1\%$	3.3VDC output	--	--	$\pm 1.5$	--
		Other output	--	--	$\pm 1.2$	
Load Regulation	10%-100% load	3.3VDC output	--	18	--	%
		5VDC output	--	12	--	
		9VDC output	--	9	--	
		12VDC output	--	8	--	
		15VDC/18VDC output	--	7	--	
		24VDC output	--	6	--	
Ripple & Noise*	20MHz bandwidth	--	75	200	mVp-p	
Temperature Coefficient	Full load	--	--	$\pm 0.03$	%/°C	
Short Circuit Protection**	E24xxS-2WR2/F24xxS-2WR2 E12xxS-2WR2/F12xxS-2WR2 E15xxS-2WR2/F15xxS-2WR2 E0524S-2WR2/F0524S-2WR2	--	--	1	s	
	Others	Continuous, self-recovery				

Note: \* 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 following models: E24xxS-2WR2/F24xxS-2WR2/  
E12xxS-2WR2/F12xxS-2WR2/ E15xxS-2WR2/F15xxS-2WR2 series, and E0524S-2WR2/F0524S-2WR2.

### 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	24VDC input	--	50	--	pF
		Other models	--	20	--	
Operating Temperature	Derating when operating temperature up to 85°C (see Fig. 2)	-40	--	105	°C	

Storage Temperature		-55	--	125	°C
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 10.16 mm
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	E_S-2WR2	IEC/EN61000-4-2 Contact ±6kV performance Criteria B
		F_S-2WR2	IEC/EN61000-4-2 Contact ±8kV performance Criteria B

**Typical Performance Curves**

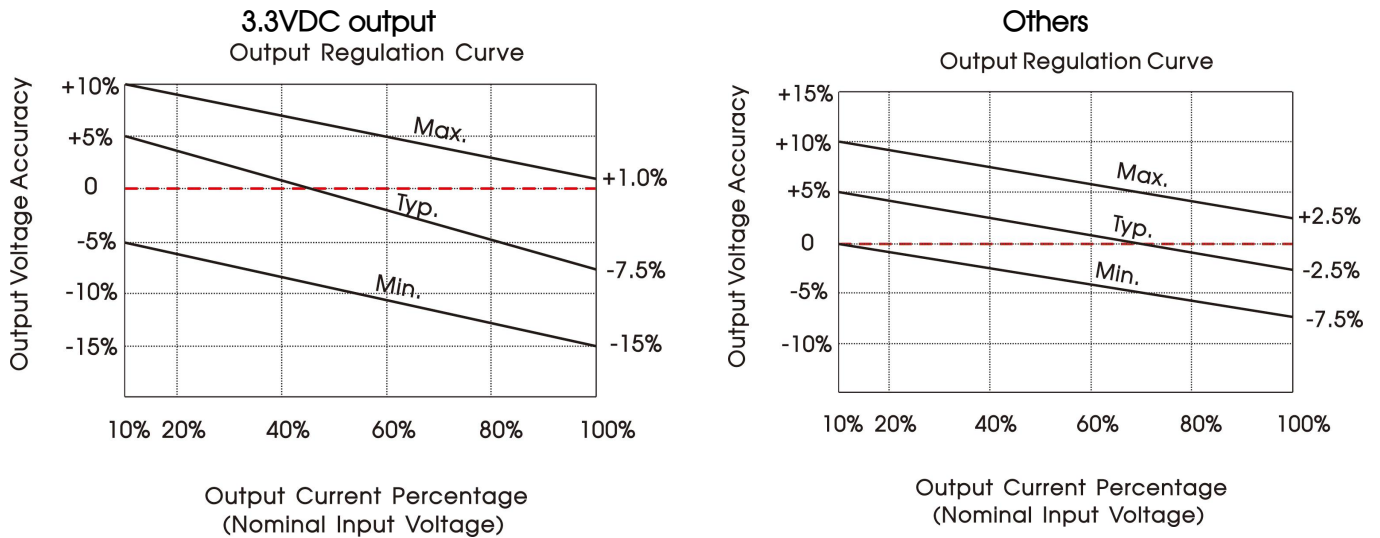


Fig. 1

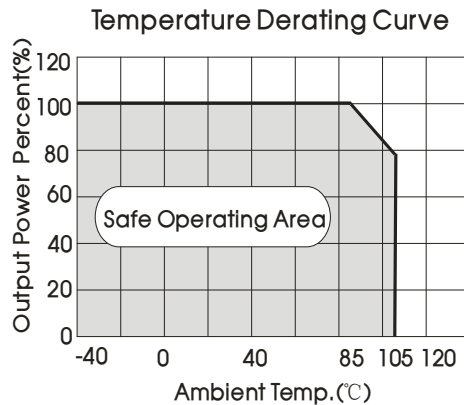
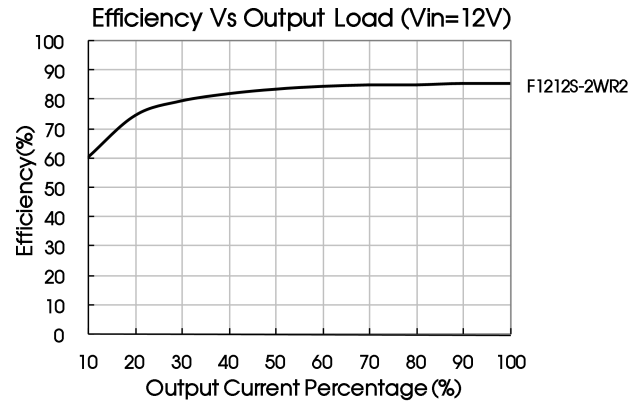
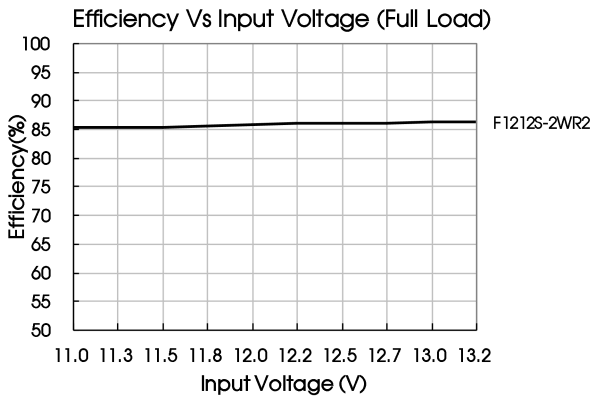
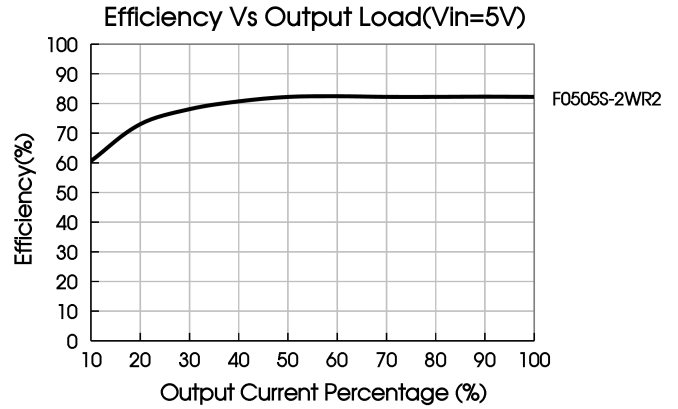
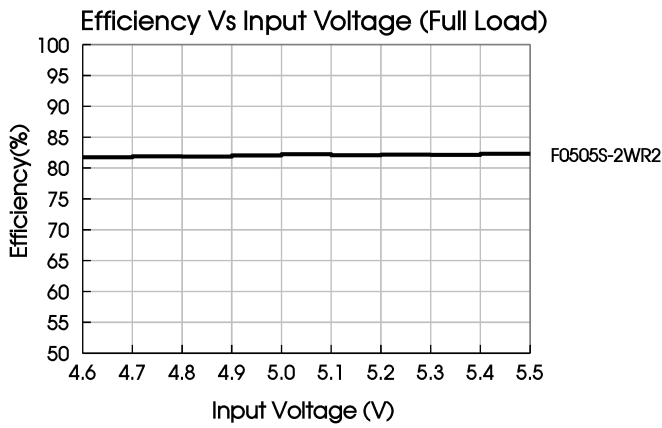


Fig. 2



## 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.

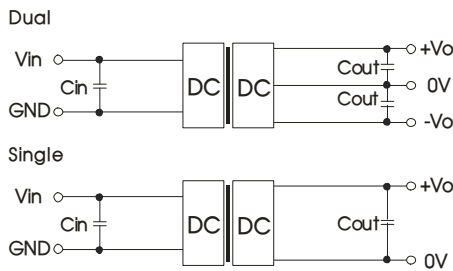


Fig. 3

Table 1: Recommended input and output capacitor values

Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout* (μF)
5	4.7	3.3/5	10	±3.3/±5	4.7
12/15	2.2	9/12	2.2	±9/±12	1
24	1	15/18/24	1	±15/±24	0.47

Note: The capacitor value of the positive and the negative output are identical.

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

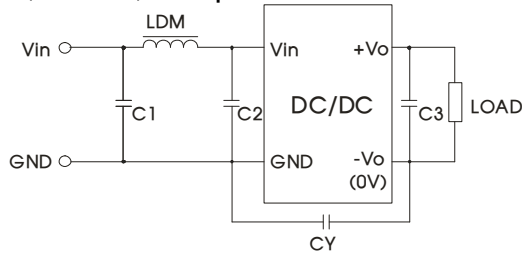


Fig. 4

Input voltage (VDC)		5/12/15	24
EMI	C1/C2	4.7μF/50V	
	CY	--	1nF/3KV
	C3	Refer to the Cout in Fig.3	
	LDM	6.8μH	

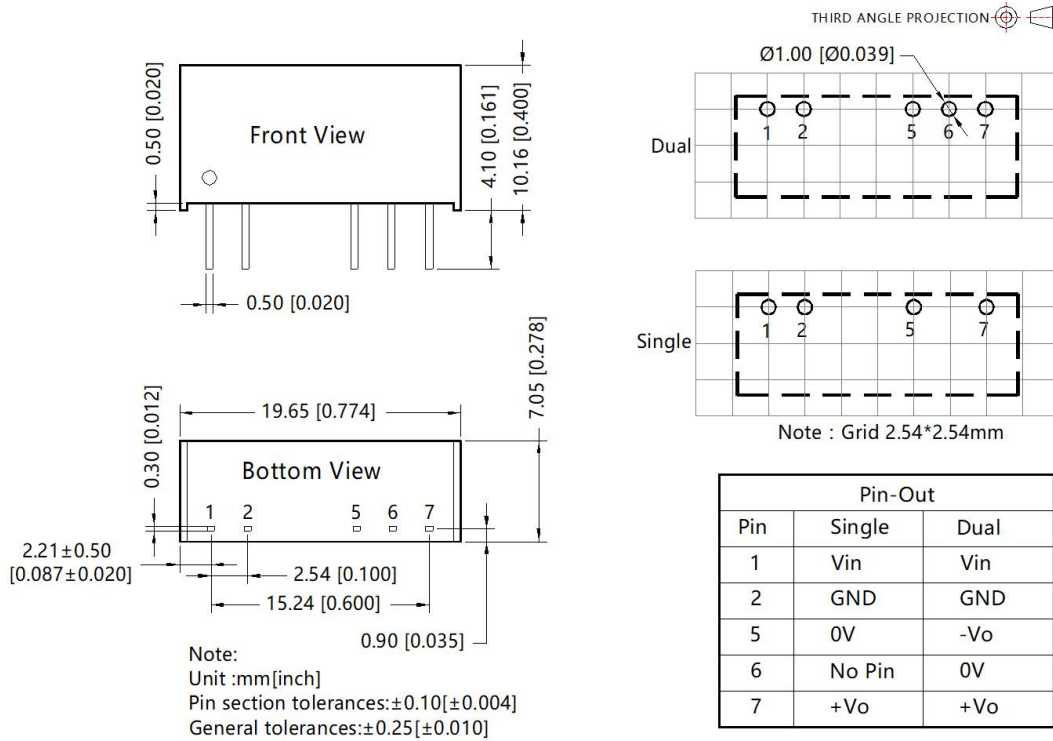
Note: For 24V input models, use a Y-capacitor CY of 1nF/3kV.

### 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 the 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. In order to guarantee product performance and datasheet compliance, the product must be operated within specifications and load range requirement;
3. The specified maximum capacitive load is tested under full load condition and over the input voltage range;
4. All parameters in this datasheet were measured under following conditions: Ta=25 °C , relative humidity<75%RH, nominal input voltage and rated output load (unless otherwise specified);
5. All index testing methods in this datasheet are based on our company corporate standards;
6. For special requirements and customization service, please contact your nearest MORNSUN sales representative or one of our technicians;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be handled according to ISO14001 and related environmental laws and regulations by qualified personnel only .

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