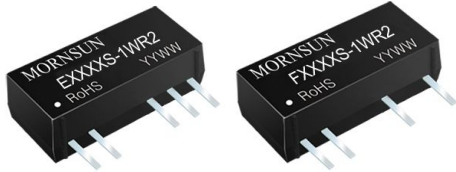


1W, Fixed input voltage, isolated & unregulated dual/single output

### FEATURES

- Miniature SIP package, International standard pin-out
- Conversion efficiency high up to 81%
- Isolation voltage: 3K VDC
- Operating temperature range: -40°C to +105°C
- EN60950,UL60950 Approval



Continuous Short Circuit Protection

**UL** **us** **CE** Patent Protection **RoHS**

*E\_S-1WR2 & F\_S-1WR2 series is specially designed for applications where an isolated voltage is required in a distributed power supply system. It is suitable for:*

1. Where the voltage of the input power supply is stable (voltage variation:  $\pm 10\%V_{in}$ );
2. Where isolation is necessary between input and output (isolation voltage  $\leq 3000VDC$ );
3. Where do not has high requirement of line regulation, load regulation and low ripple noise;
4. Such as: pure digital circuits, low frequency analog circuits and relay-driven circuits.etc.

### Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Efficiency (%Min./Typ.) @ Full Load	Max. Capacitive Load* ( $\mu F$ )
		Nominal (Range)	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
--	E0312S-1WR2	3.3 (2.97-3.63)	$\pm 12$	$\pm 42/\pm 5$	72/76	100
	F0303S-1WR2		3.3	303/30	69/73	
	F0305S-1WR2		5	200/20	74/78	220
	F0324S-1WR2		24	42/5	74/78	
UL/CE	E0505S-1WR2	5 (4.5-5.5)	$\pm 5$	$\pm 100/\pm 10$	76/80	100
	E0509S-1WR2		$\pm 9$	$\pm 56/\pm 6$	76/80	
	E0512S-1WR2		$\pm 12$	$\pm 42/\pm 5$	76/80	
	E0515S-1WR2		$\pm 15$	$\pm 33/\pm 4$	77/81	
	E0524S-1WR2		$\pm 24$	$\pm 21/\pm 2$	77/81	
--	F0503S-1WR2	5 (4.5-5.5)	3.3	303/30	69/73	220
	F0505S-1WR2		5	200/20	76/80	
	F0509S-1WR2		9	111/12	76/80	
	F0512S-1WR2		12	83/9	76/80	
	F0515S-1WR2		15	67/7	77/81	
	F0524S-1WR2		24	42/5	77/81	
--	E0909S-1WR2	9 (8.1-9.9)	$\pm 9$	$\pm 56/\pm 6$	76/80	100
	F0909S-1WR2		9	111/12	76/80	220
UL/CE	E1205S-1WR2	12 (10.8-13.2)	$\pm 5$	$\pm 100/\pm 10$	76/80	100
	E1212S-1WR2		$\pm 12$	$\pm 42/\pm 5$	77/81	
	E1215S-1WR2		$\pm 15$	$\pm 33/\pm 4$	77/81	
	E1224S-1WR2		$\pm 24$	$\pm 21/\pm 2$	76/80	
--	F1203S-1WR2	12 (10.8-13.2)	3.3	303/30	71/75	220
	F1205S-1WR2		5	200/20	76/80	
	F1209S-1WR2		9	111/12	76/80	
	F1212S-1WR2		12	83/9	76/80	
	F1215S-1WR2		15	67/7	77/81	
	F1224S-1WR2		24	42/5	77/81	
--	E1505S-1WR2	15 (13.5-16.5)	$\pm 5$	$\pm 100/\pm 10$	76/80	100
	E1515S-1WR2		$\pm 15$	$\pm 33/\pm 4$	77/81	
CE	F1505S-1WR2	15 (13.5-16.5)	5	200/20	76/80	220

Model	Series	Output Voltage (V)	Output Current (A)	Efficiency (%)	Power (W)
--	F1509S-1WR2	9	111/12	76/80	
	F1512S-1WR2	12	83/9	76/80	
CE	F1515S-1WR2	15	67/7	77/81	
UL/CE	E2405S-1WR2	±5	±100/±10	76/80	100
	E2409S-1WR2	±9	±56/±6	76/80	
	E2412S-1WR2	±12	±42/±5	77/81	
	E2415S-1WR2	±15	±33/±4	75/79	
	E2424S-1WR2	±24	±21/±2	76/80	
--	F2403S-1WR2	3.3	303/30	71/75	220
UL/CE	F2405S-1WR2	5	200/20	75/79	
	F2409S-1WR2	9	111/12	76/80	
	F2412S-1WR2	12	83/9	77/81	
	F2415S-1WR2	15	67/7	77/81	
	F2424S-1WR2	24	42/5	77/81	

Note: \*The capacitive loads of positive and negative outputs are identical.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3 VDC input	--	415/25	--/70	mA
	5 VDC input	--	274/20	--/60	
	9 VDC input	--	139/20	--/55	
	12 VDC input	--	114/15	--/50	
	15 VDC input	--	84/10	--/35	
	24 VDC input	--	58/7	--/30	
Surge Voltage (1sec. max.)	3.3 VDC input	-0.7	--	5	VDC
	5 VDC input	-0.7	--	9	
	9 VDC input	-0.7	--	12	
	12 VDC input	-0.7	--	18	
	15 VDC input	-0.7	--	21	
	24 VDC input	-0.7	--	30	
Input Filter		Capacitor filter			
Hot Plug		Unavailable			

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy		See tolerance envelope curve(Fig. 1)				
Line Regulation	Input voltage change: ±1%	3.3 VDC output	--	--	±1.5	--
		Other output	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC output	--	18	--	%
		5VDC output	--	12	--	
		9VDC output	--	9	--	
		12VDC output	--	8	--	
		15VDC output	--	7	--	
		24VDC output	--	6	--	
Ripple & Noise*	20MHz bandwidth	The output voltage is 12VDC and under	--	30	--	mVp-p
		15VDC and 24VDC output voltage	--	60	--	
Temperature Drift Coefficient	100% load	--	--	±0.03	%/°C	
Short Circuit Protection	E0524S-1WR2/F0524S-1WR2/ E24xxS-1WR2/ F24xxS-1WR2	--	--	1	s	
	Others	Continuous, self-recovery				

Note: \* Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.

\*\*Supply voltage must be discontinued at the end of short circuit duration for E0524S-1WR2/F0524S-1WR2/E24xxS-1WR2/F24xxS-1WR2 models.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	3000	--	--	VDC
Isolation Resistance	Input-output, isolation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	20	--	pF
Operating Temperature	Derating if the temperature $\geq 85^{\circ}\text{C}$ (see Fig. 2)	-40	--	105	$^{\circ}\text{C}$
Storage Temperature		-55	--	125	
Casing Temperature Rise	$T_{\alpha}=25^{\circ}\text{C}$	--	25	--	$^{\circ}\text{C}$
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	300	
Storage Humidity	Non-condensing	--	--	95	%
Switching Frequency	100% load, nominal input voltage	--	100	--	KHz
MTBF	MIL-HDFK-217F@25 $^{\circ}\text{C}$	3500	--	--	K hours

Physical Specifications

Casing Material	Black flame-retardant heat-proof epoxy resin (UL94-V0)
Package Dimensions	19.50*6.00*9.30 mm
Weight	2.40g(Typ.)
Cooling Method	Free air convection

EMC Specifications

EMI	Conducted disturbance	CISPR22/EN55022 CLASS B (see Fig. 4 for recommended circuit)		
	Radiated emission	CISPR22/EN55022 CLASS B (see Fig. 4 for recommended circuit)		
EMS	Electrostatic discharge	E_S-1WR2	IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ perf. Criteria B
		F_S-1WR2	IEC/EN61000-4-2	Contact $\pm 8\text{KV}$ perf. Criteria B

Product Characteristic Curve

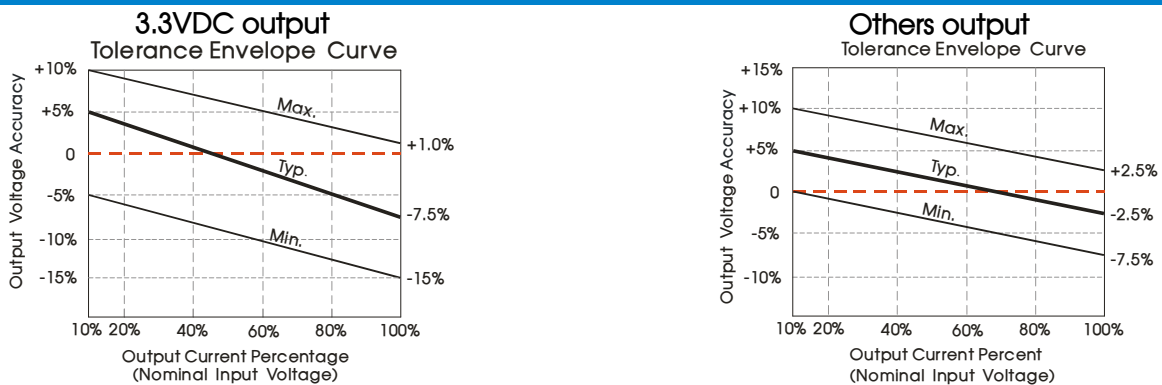


Fig. 1

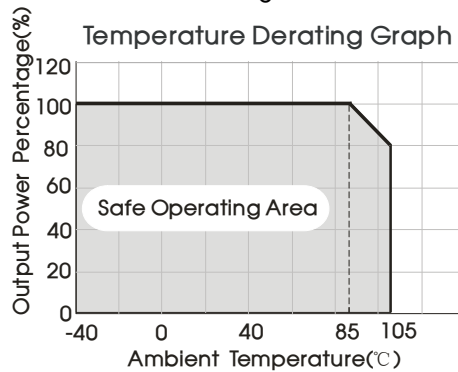
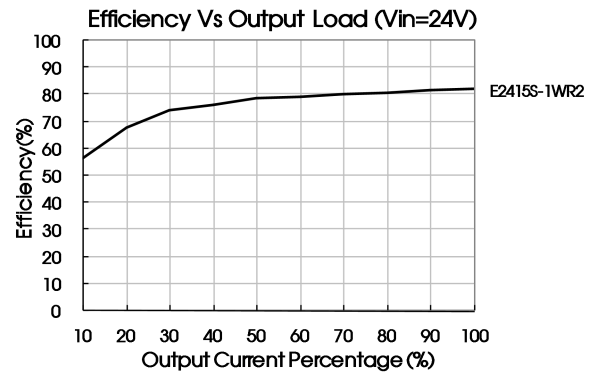
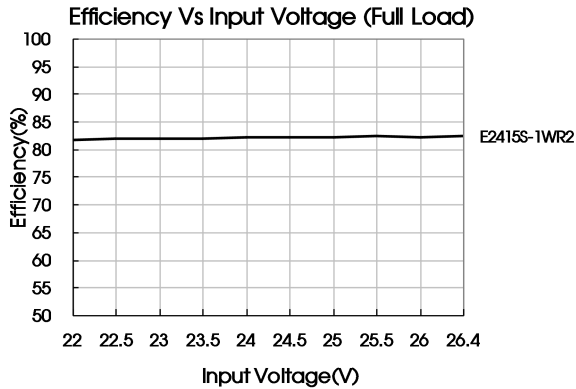
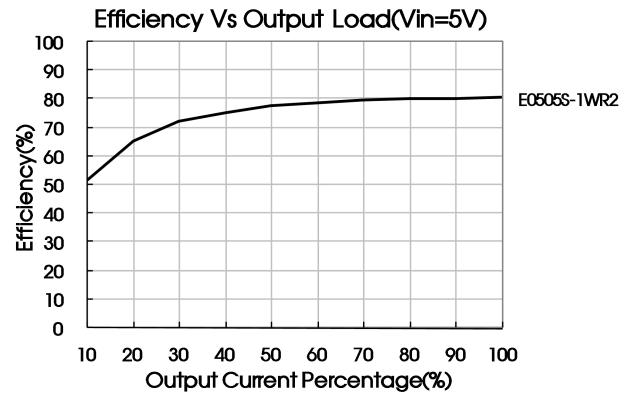
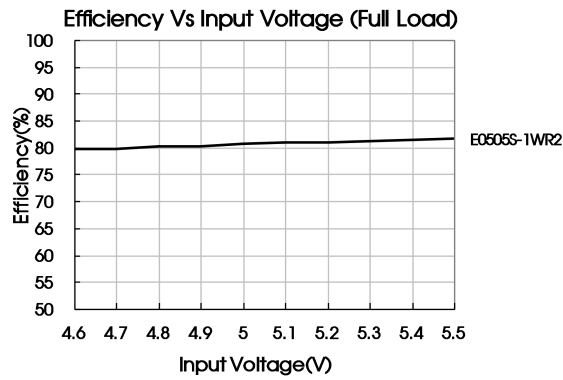


Fig. 2



## Design Reference

### 1. Typical application

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.3. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensure the modules running well, the recommended capacitive load values as shown in Table 1.

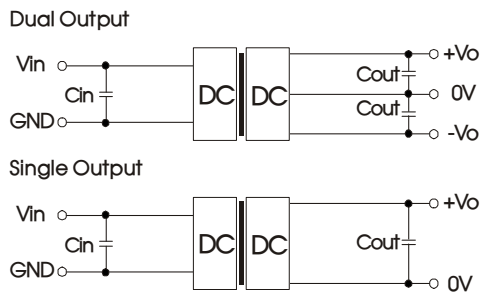


Fig.3

Recommended capacitive load value table (Table 1)

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

### 2. EMC typical recommended circuit (CLASS B)

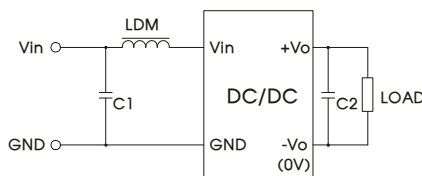


Fig. 4

Input voltage(VDC)	3.3/5/9/12/15/24
C1	4.7μF /50V
C2	Refer to the Cout in Fig.3
LDM	6.8μH

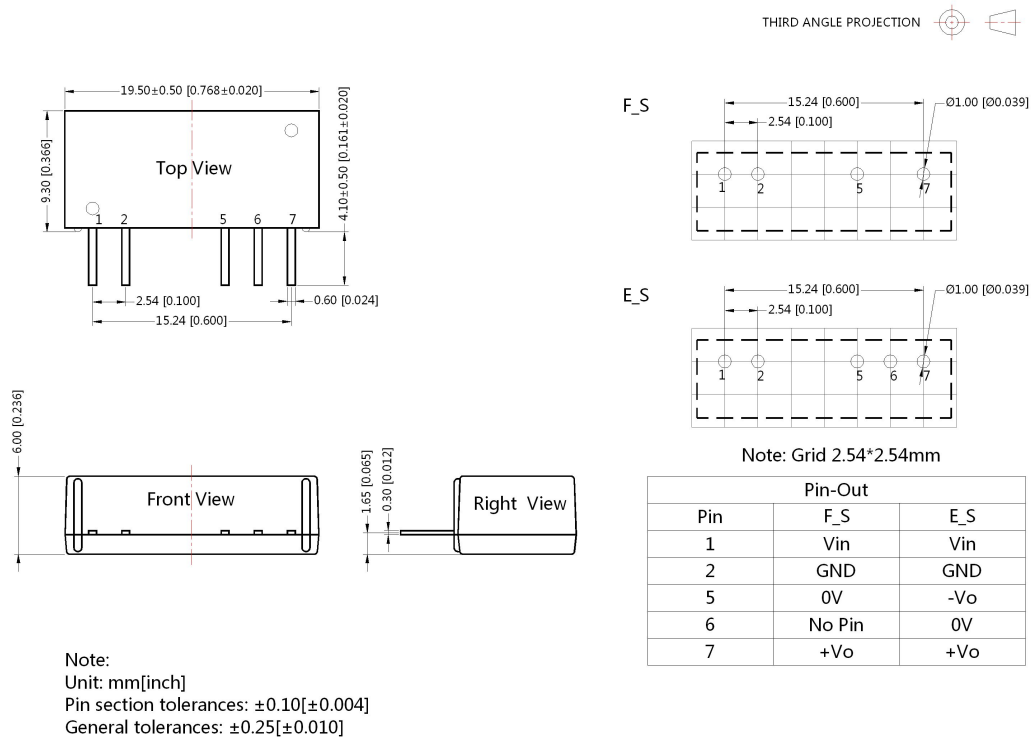
Note: It is not needed to add the component in the peripheral circuit when parameter with the symbol of "--"

### 3. Output load requirements

In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

4. For more information please find the application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Notes:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58200029;
2. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
3. The max. capacitive load should be tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, data in this data sheet should be tested under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75% when inputting nominal voltage and outputting rated load;
5. All index testing methods in this datasheet are based on our Company's corporate standards;
6. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
7. We can provide product customization service;
8. Specifications of this product are subject to changes without prior notice.

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