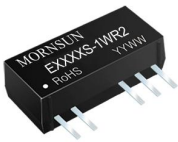
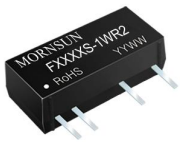
MORNSUN®

E_S-1WR2 & F_S-1WR2 Series

1W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER





Continuous Short Circuit Protection

Patent Protection **RoHS**

PART NUMBER SYSTEM

F0505S-1WR2

- Rated Power
- Package Style
- Output Voltage
- Input Voltage
- Product Series

PRODUCT FEATURES

- Miniature package
- Efficiency up to 81%
- SIP package
- High power density
- Low Temperature drift
- No External Component Required
- 3000VDC Isolation Voltage
- Operating Temperature Range: -40°C ~ +105°C
- Industry Standard Pinout

APPLICATIONS

The E_S-1WR2 & F_S-1WR2 Series are designed for application where isolated output is required from a distributed power system.

These products apply to where:

1) Input voltage variation ≤ ±10%;
2) 3KVDC input and output isolation;
3) Regulated and low ripple noise is not required.

Such as: digital circuits, low frequency analog circuits, and IGBT power device driving circuits.

SELECTION GUIDE

Model Number	Input Voltage(VDC) Nominal (Range)	Output Voltage (VDC)	Output Current (mA) Max.	Output Current (mA) Min.	Input Current (mA)(typ.) @Max. Load	Input Current (mA)(typ.) @No Load	Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(μF)	Efficiency (%, typ.) @Max. Load	Approval
E0505S-1WR2	5 (4.5-5.5)	±5	±100	±10	250	20	10	100	80	
*E0512S-1WR2		±12	±42	±5	250				80	
*E0515S-1WR2		±15	±33	±4	248				81	
*E0524S-1WR2		±24	±21	±2	248				81	
F0505S-1WR2		5	200	20	250			220	80	
*F0512S-1WR2		12	83	9	250				80	
*F0515S-1WR2		15	67	7	248				81	
*F0524S-1WR2		24	42	5	248				81	
*E1205S-1WR2	12 (10.8-13.2)	±5	±100	±10	92	15	5	100	80	
E1212S-1WR2		±12	±42	±5	90				81	
*E1215S-1WR2		±15	±33	±4	90				81	
*F1205S-1WR2		5	200	20	92			220	80	
F1212S-1WR2		12	83	9	92				80	
*F1215S-1WR2		15	67	7	90				81	
*E1505S-1WR2	15 (13.5-16.5)	±5	±100	±10	84	10	5	100	80	
*E1515S-1WR2		±15	±33	±4	84				81	
*F1505S-1WR2		5	200	20	84			220	80	
*F1515S-1WR2		15	67	7	84				81	
E2405S-1WR2	24 (21.6-26.4)	±5	±100	±10	53	7	5	100	80	
*E2412S-1WR2		±12	±42	±5	51				81	
E2415S-1WR2		±15	±33	±4	51				79	
F2405S-1WR2		5	200	20	56			220	79	
*F2412S-1WR2		12	83	9	51				81	
F2415S-1WR2		15	67	7	52				82	

Note:*Designing.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	5VDC Input	-0.7	--	9	VDC
	12VDC Input	-0.7	--	18	

Input Surge Voltage (1sec. max.)	15VDC Input	-0.7	--	21	VDC
	24VDC Input	-0.7	--	30	
Input Filter		C Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Output Power			0.1	--	1	W
Output Voltage Accuracy			See tolerance envelope curve			
Output Voltage Balance	Dual Output, Balanced Loads		--	±0.5	±1	%
Line Voltage Regulation	For Vin change of ±1%		--	--	±1.2	
Load Regulation	10% to 100% load	(5V output)	--	10	15	
		(12V output)	--	8	15	
		(15V output)	--	7	15	
		(24V output)	--	6	15	
Temperature Drift	100% full load		--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	Output Voltage ≤12V	--	30	--	mVp-p
		Others	--	60	--	
Short Circuit Protection*			Continuous, automatic recovery			
Note: *Ripple and noise tested by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.						

COMMON SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Tested for 1 minute and leakage current less than 1 mA		3000	--	--	VDC
Isolation Resistance	Test at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input/Output,100KHz/0.1V	E/F2424S-1WR2	--	30	--	pF
		Others	--	20	--	
Switching Frequency	Full load, nominal input		--	100	300	KHz
MTBF	MIL-HDBK-217F@25℃		3500	--	--	K hours
Case Material			Epoxy Resin (UL94-V0)			
Weight			--	2.4	--	g

ENVIRONMENTAL SPECIFICATIONS

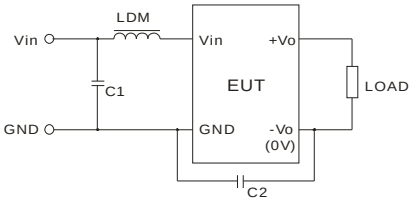
Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85℃)	-40	--	105	°C
Storage Temperature		-55	--	125	
Temp. rise at full load		--	25	--	
Soldering Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE		CISPR22/EN55022 CLASS B（External Circuit Refer to Figure1）
EMS	ESD	E_S-1WR2	IEC/EN61000-4-2 Contact ±6KV perf. Criteria B
		F_S-1WR2	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

EMC RECOMMENDED CIRCUIT

EMI Recommended External Circuit （CLASS B）:



(Figure 1)

E_S-1WR2 Series

Recommended external circuit parameters:

Vin：5V/12V
C1：475K /50V
LDM：6.8μH
Vin：15V/24V
C1：475K /50V
LDM：6.8μH
C2：470pF/2KV

F_S-1WR2 Series

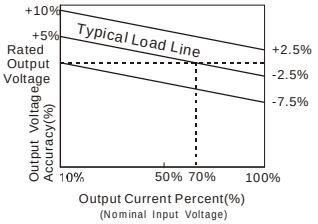
Recommended external circuit parameters:

Vin：5V/12V
C1：475K /50V
LDM：6.8μH
Vin：15V/24V
C1：475K /50V
LDM：6.8μH
C2：470pF/2KV

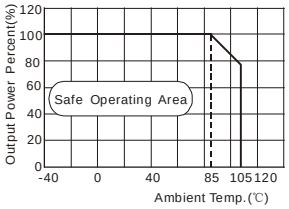
Note: If there is no recommended parameters, the model no require the external component.

PRODUCT TYPICAL CURVE

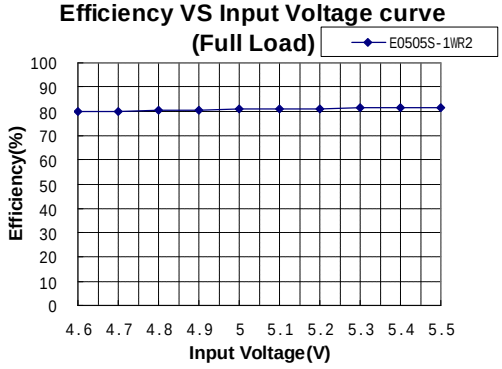
Tolerance Envelope Curve



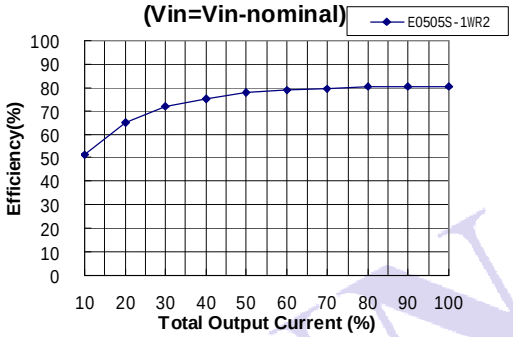
Temperature Derating Curve



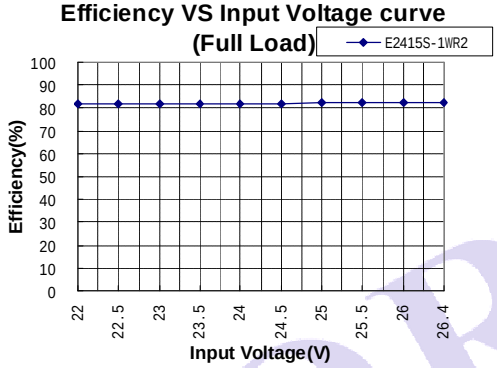
Efficiency VS Input Voltage curve (Full Load)



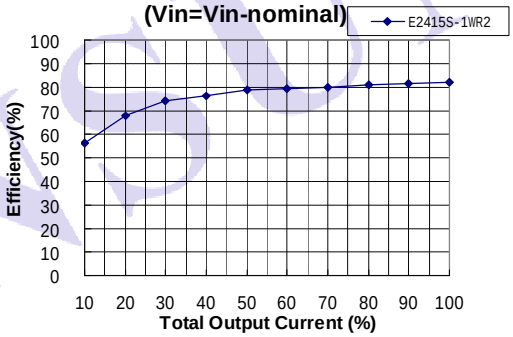
Efficiency VS Output Load curve (Vin=Vin-nominal)



Efficiency VS Input Voltage curve (Full Load)

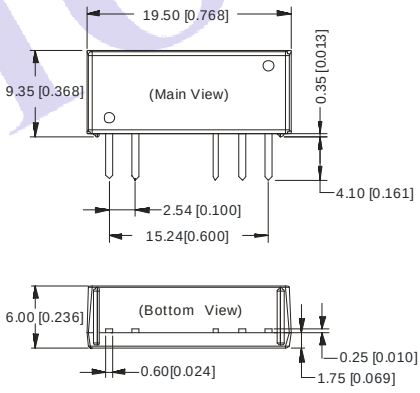


Efficiency VS Output Load curve (Vin=Vin-nominal)



OUTLINE DIMENSIONS、RECOMMENDED FOOTPRINT & PACKAGING

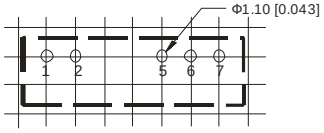
MECHANICAL DIMENSIONS



FOOTPRINT DETAILS		
PIN	E_S-1WR2	F_S-1WR2
1	Vin	Vin
2	GND	GND
5	-Vo	0V
6	0V	No Pin
7	+Vo	+Vo

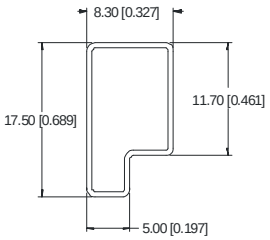
Note:
Unit：mm[inch]
Pinsection tolerances：±0.10mm[±0.004inch]
General tolerances: ±0.25mm[±0.010inch]

RECOMMENDED FOOTPRINT



Note: grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS

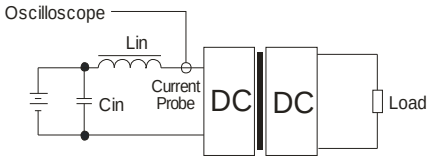


Note:
Unit：mm[inch]
General tolerances: ± 0.50mm[± 0.020inch]
L=530mm[20.866inch] Devices per tube quantity: 25pcs
L=220mm[8.661inch] Devices per tube quantity: 10pcs
Short tube inner package dimensions: 255*170*80mm
Short tube outer package dimensions
(with six inner package box): 375*280*270mm
Long tube inner package dimensions: 580*200*100mm
Long tube outer package dimensions
(with two inner package box): 600*215*220mm
Long tube outer package dimensions
(with three inner package box):600*215*325mm

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor Lin and Capacitor Cin to simulate source impedance.



Lin(4.7μH) Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN CONSIDERATIONS

1) Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load ***could not be less than 10% of the full load.*** If the actual output power is very small, please connect a resistor at the output end in parallel to increase the load, or use our company's products with a lower rated output power .

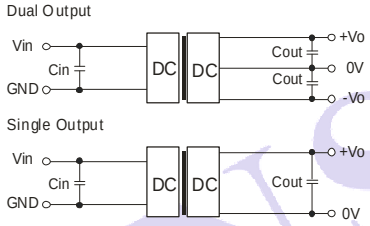
2) Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to add a circuit breaker to the circuit.

3) Recommended circuit

If you want to further decrease the input/output ripple, a capacitor filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 2).

It should also be noted that the capacitance of filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor sees (Table 1).



(Figure 2)

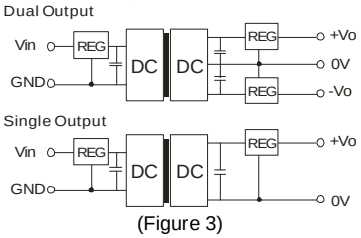
EXTERNAL CAPACITOR TABLE (Table 1)

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

It's not recommended to connect any external capacitor in the application field with less than 0.5 watt output.

4) Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear regulator and an capacitor filtering network with overheat protection that is connected to the input or output end in series (Figure 3), the recommended capacitance of its filter capacitor sees (Table 1), linear regulator based on the actual voltage and current required.



(Figure 3)

5) Cannot use in parallel and hot swap

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. Max. Capacitive Load tested at input voltage range and full load.
3. All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. All characteristics are for listed model only, non-standard models may perform differently, please contact our technical person for more detail.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

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