

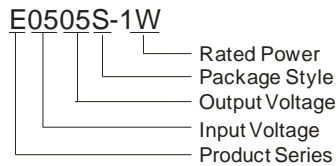
E_S-1W & F_S-1W Series

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



Patent Protection RoHS

MODEL SELECTION



PRODUCT FEATURES

- High Efficiency up to 82%
- SIP Package
- 3000VDC Isolation
- High Density, High Stability
- No Heat sink Required
- Temperature Range: -40°C ~ +85°C
- No External Component Required
- Industry Standard Pinout
- RoHS Compliance

APPLICATIONS

The E_S-1W & F_S-1W series are specially designed for applications where a group of polar power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

These products apply to:

- 1) Where the voltage of the input power supply is fixed (voltage variation $\leq \pm 10\%$);
- 2) Where isolation is necessary between input and output (isolation voltage $\leq 3000\text{VDC}$);
- 3) Where the regulation of the output voltage and the output ripple noise are not demanding.

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

PRODUCT PROGRAM

Model Number	Input Voltage(VDC)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(μF)	Efficiency (% ,typ.) @Max. Load	Approval	
	Nominal (Range)		Max.	Min.	@Max. Load	@No Load					
F0303S-1W	3.3 (3.0-3.6)	3.3	303	31	415	42	17	100	69		
F0305S-1W		5	200	20	390						
E0505S-1W	5 (4.5-5.5)	± 5	± 100	± 10	281	30	19	220	71	UL CE	
E0509S-1W		± 9	± 56	± 6	265				77	UL CE	
E0512S-1W		± 12	± 42	± 5	250				77	UL CE	
E0515S-1W		± 15	± 33	± 4	235				79	UL CE	
F0503S-1W		3.3	303	30	271				30	21	100
F0505S-1W		5	200	20	279	72	UL CE				
F0509S-1W		9	111	12	266	76	UL CE				
F0512S-1W		12	83	9	249	79	UL CE				
F0515S-1W		15	67	7	260	78	UL CE				
F0524S-1W		24	42	5	238	79					
F0909S-1W		9 (8.1-9.9)	9	111	11	145	20	21			
F0915S-1W			15	67	6	140			82		
E1205S-1W	12 (10.8-13.2)	± 5	± 100	± 10	106	19	24	220	73	UL CE	
E1209S-1W		± 9	± 56	± 6	108				77	UL CE	
E1212S-1W		± 12	± 42	± 5	104				80	UL CE	
E1215S-1W		± 15	± 33	± 4	115				80	UL CE	
F1203S-1W		3.3	303	30	112	16	21	100	70		
F1205S-1W		5	200	20	113				70	UL CE	
F1209S-1W		9	111	12	107				75	UL CE	
F1212S-1W		12	83	9	106				78	UL CE	
F1215S-1W	15	67	7	104	79				UL CE		

Model Number	Input Voltage(VDC)	Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(μF)	Efficiency (% , typ.) @Max. Load	Approval
	Nominal (Range)		Max.	Min.	@Max. Load	@No Load				
F1224S-1W	12(10.8-13.2)	24	42	5	97	16	21	100	79	
E1515S-1W	15 (13.5-16.5)	±15	±33	±4	85	14	56	220	75	
F1505S-1W		5	200	20	94	13	22	100	69	
F1509S-1W		9	111	12	87				73	
F1515S-1W		15	67	7	86				75	
E2405S-1W	24 (21.6-26.4)	±5	±100	±10	53	7			42	220
E2409S-1W		±9	±56	±6	52		77	UL CE		
E2412S-1W		±12	±42	±5	51		80	UL CE		
E2415S-1W		±15	±33	±4	51		80	UL CE		
F2403S-1W		3.3	303	31	56	7	47	100	70	
F2405S-1W		5	200	20	56				71	UL CE
F2409S-1W		9	111	12	52				76	UL CE
F2412S-1W		12	83	9	51				78	UL CE
F2415S-1W		15	67	7	52				80	UL CE
F2424S-1W		24	42	5	51				77	

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Input Surge Voltage (1 sec. max.)	3.3VDC Input Models	-0.7	--	5	VDC
	5VDC Input Models	-0.7	--	9	
	9VDC Input Models	-0.7	--	15	
	12VDC Input Models	-0.7	--	18	
	15VDC Input Models	-0.7	--	21	
	24VDC Input Models	-0.7	--	30	
Reverse Polarity Input Current*		--	--	0.4	A
Internal Power Dissipation*		--	--	0.45	W
Input Filter		C Filter			
Note: *If the product reverse did not seek to limit current or work does not limit the maximum power, may result in injury or permanent damage, testing is not recommended.					

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units	
Output Power		0.1	--	1	W	
Output Voltage Accuracy		See tolerance envelope graph				
Output Voltage Balance	Dual Output, Balanced Loads	--	±0.5	±1	%	
Line Regulation	For Vin change of ±1%	(3.3V output)	--	±1.5		
		(Others output)	--	±1.2		
Load Regulation	10% to 100% load	(3.3V output)	--	12		20
		(5V output)	--	10		15
		(9V output)	--	8.3		15
		(12V output)	--	6.8		15
		(15V output)	--	6.3		15
		(24V output)	--	6		15
Temperature Drift	100% full load	--	--	±0.03		%/°C
Ripple & Noise*	20MHz Bandwidth	(ExxxxS-1W)	--	50	75	mVp-p
		(Exx15S-1W)	--	100	150	
		(FxxxxS-1W)	--	75	100	
		(Fxx24S-1W)	--	100	150	
Short Circuit Protection**		--	--	1	s	

*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

**Supply voltage must be discontinued at the end of short circuit duration.

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Tested for 1 minute and 1mA max	3000	--	--	VDC
Isolation Resistance	Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input/Output, 100KHz/1V	F2424S-1W	--	100	pF
		Other Models	--	30	
Switching Frequency	Full load, nominal input	--	100	--	KHz
MTBF	MIL-HDBK-217F @25°C	3500	--	--	K hours
Case Material		Plastic(UL94-V0)			
Weight		--	2.1	--	g

ENVIRONMENTAL SPECIFICATIONS

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

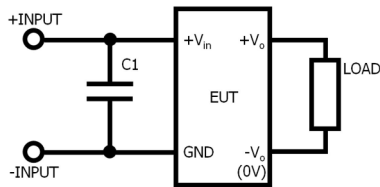
EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS A (External Circuit Refer to Figure1)			
EMS	ESD	ExxxS-1W Series	IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
		FxxxS-1W Series	IEC/EN61000-4-2	Contact ±8KV	perf. Criteria B

EMC RECOMMENDED CIRCUIT

EMI Recommended External Circuit

(CLASS A):



(Figure 1)

E_S-1W Series

Recommended external circuit parameters:

Vin: 24V

C1: 2.2μF/50V 1210

Remarks: Product bare input of 5V, 12V, 15V can be tested by the CLASS A.

F_S-1W Series

Recommended external circuit parameters:

Vin: 3.3V/9V

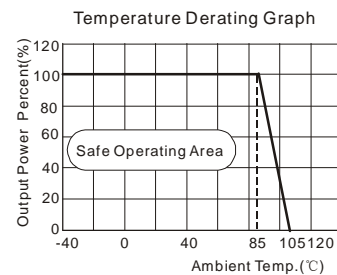
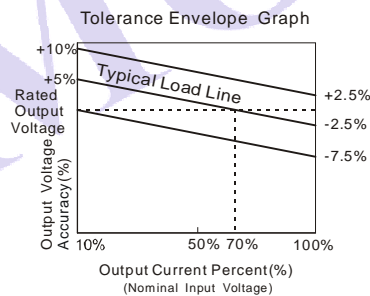
C1: 2.2μF/50V 1210

Vin: 5V/12V/24V

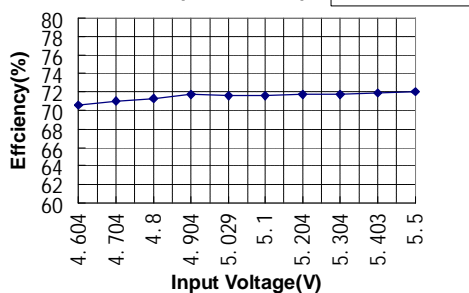
C1: 1μF/50V 1210

Remarks: Product bare input of 3.3V, 5V, 12V, 15V can be tested by the CLASS A, increase the capacitor margin increase.

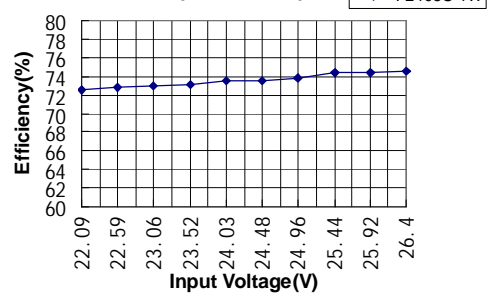
PRODUCT TYPICAL CURVE



Efficiency VS Input Voltage curve (Full Load)



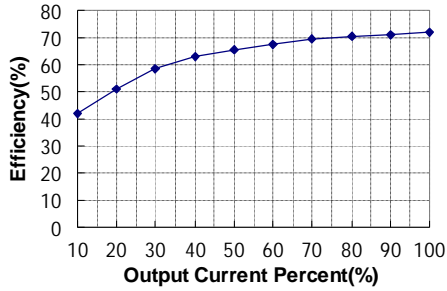
Efficiency VS Input Voltage curve (Full Load)



Efficiency VS Output Load curve

(Vin=Vin-nominal)

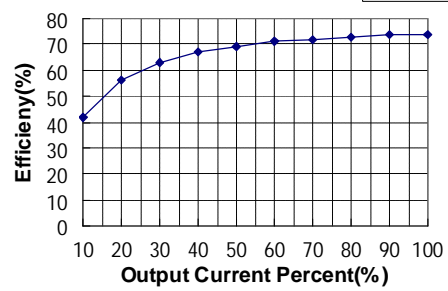
—●— E0505S-1W



Efficiency VS Output Load curve

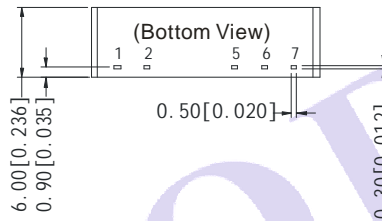
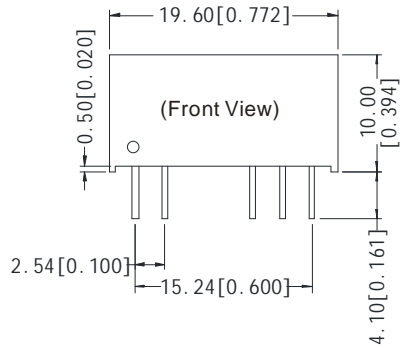
(Vin=Vin-nominal)

—●— F2405S-1W



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS



FOOTPRINT DETAILS

Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	-Vo
6	No Pin	0V
7	+Vo	+Vo

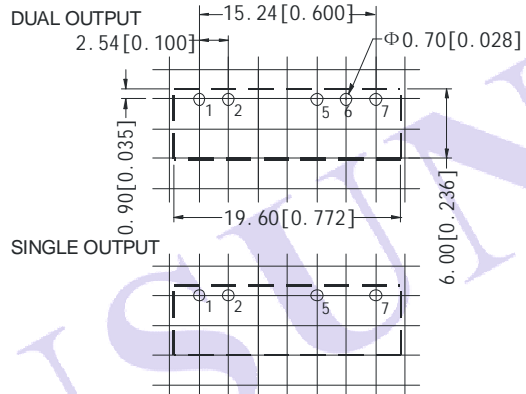
Note:

Unit:mm[inch]

Pin section tolerances: ± 0.10mm [±0.004inch]

General tolerances: ± 0.50mm [±0.020inch]

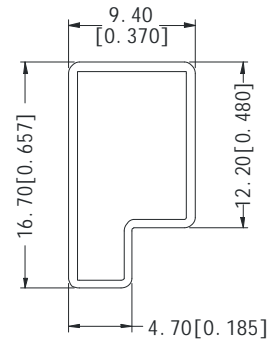
RECOMMENDED FOOTPRINT



Note:

Grid: 2.54*2.54 mm.

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 packaging dimensions: L*W*H=255*170*80mm;

Short tube outer packaging dimensions(with six inner packaging boxes):

L*W*H=375*280*270mm;

Long tube inner packaging dimensions: L*W*H=580*200*100mm;

Long tube outer packaging dimensions(with two inner packaging boxes):

L*W*H=600*215*220mm;

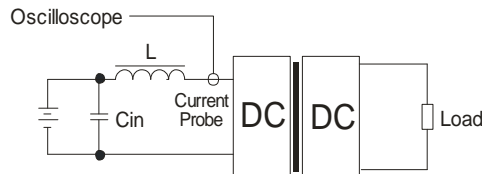
Long tube outer packaging dimensions(with three inner packaging boxes):

L*W*H=600*215*325mm.

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

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



Lin(4.7μH)

Cin(220μF, ESR < 1.0Ω at 100 KHz)

DESIGN & APPLY 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 with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power (E_S-W25&F_S-W25).

2) Overload protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

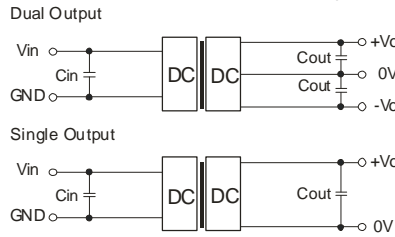
Input Fuse Selection Guide

3.3VDC Input Models	500mA slow-Blow Type	12VDC Input Models	200mA slow-Blow Type
5VDC Input Models	500mA slow-Blow Type	15VDC Input Models	100mA slow-Blow Type
9VDC Input Models	200mA slow-Blow Type	24VDC Input Models	100mA slow-Blow Type

3) Recommended circuit

If you want to further decrease the input/output ripple, an 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)

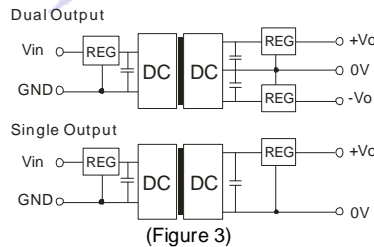
EXTERNAL CAPACITOR TABLE (TABLE 1)

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

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 to reasonable selection.



(Figure 3)

5) No parallel connection or plug and play

Note:

- 1.Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
- 2.All specifications measured at Ta=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- 3.In this datasheet, all the test methods of indications are based on corporate standards.
- 4.Only typical models listed, other models may be different, please contact our technical person for more details.
- 5.Our company offer custom products.
- 6.Specifications subject to change without notice.

MORNSUN 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: 86-20-28203030

Fax:86-20-38601272

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