

## E\_S-1W & F\_S-1W Series

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



Multi-country patent protection

RoHS

#### FEATURES

- High Efficiency up to 80%
- 3000VDC Isolation
- SIP Package
- Internal SMD construction
- No Heat sink Required
- Temperature Range: -40°C to +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.

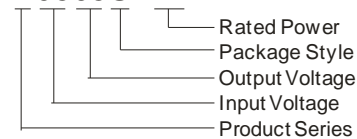
#### PRODUCT PROGRAM

Part Number	Input		Output			Efficiency (% Typ)	Certificate		
	Voltage (VDC)		Voltage (VDC)	Current (mA)					
	Nominal	Range		Max	Min				
F0305S-1W	3.3	3.0-3.6	5	200	20	74			
E0505S-1W	5	4.5-5.5	$\pm 5$	$\pm 100$	$\pm 10$	71	UL		
E0509S-1W			$\pm 9$	$\pm 56$	$\pm 6$	77	UL		
E0512S-1W			$\pm 12$	$\pm 42$	$\pm 5$	77	UL		
E0515S-1W			$\pm 15$	$\pm 33$	$\pm 4$	79	UL		
F0503S-1W			3.3	303	30	73			
F0505S-1W			5	200	20	72	UL		
F0509S-1W			9	111	12	76	UL		
F0512S-1W			12	83	9	79	UL		
F0515S-1W			15	67	7	78	UL		
E1205S-1W			12	10.8-13.2	$\pm 5$	$\pm 100$	$\pm 10$	73	UL
E1209S-1W	$\pm 9$	$\pm 56$			$\pm 6$	77	UL		
E1212S-1W	$\pm 12$	$\pm 42$			$\pm 5$	80	UL		
E1215S-1W	$\pm 15$	$\pm 33$			$\pm 4$	80	UL		
F1205S-1W	5	200			20	70	UL		
F1209S-1W	9	111			12	75	UL		
F1212S-1W	12	83			9	78	UL		
F1215S-1W	15	67			7	79	UL		
F1505S-1W	15	13.5-16.5			5	200	20	69	
E2405S-1W	24	21.6-26.4			$\pm 5$	$\pm 100$	$\pm 10$	73	UL
E2409S-1W			$\pm 9$	$\pm 56$	$\pm 6$	77	UL		
E2412S-1W			$\pm 12$	$\pm 42$	$\pm 5$	80	UL		
E2415S-1W			$\pm 15$	$\pm 33$	$\pm 4$	80	UL		
F2405S-1W			5	200	20	71	UL		
F2409S-1W			9	111	12	76	UL		
F2412S-1W			12	83	9	78	UL		
F2415S-1W			15	67	7	80	UL		

Note: The E\_S-W25/F\_S-W25 series also are available in our company.

#### MODEL SELECTION

##### E0505S-1W



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#### COMMON SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Operating Temp. Range		-40		85	°C
Storage Temp. Range		-55		125	
Storage humidity range				95	%
Cooling		Free air convection			
Temp. rise at full load			15	25	°C
Lead temperature	1.5mm from case for 10 seconds			300	
Isolation voltage	Tested for 1 minute and 1 mA max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Short circuit protection*				1	s
Case material		Plastic (UL94-V0)			
MTBF		3500			K hours
Weight			2.1		g

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

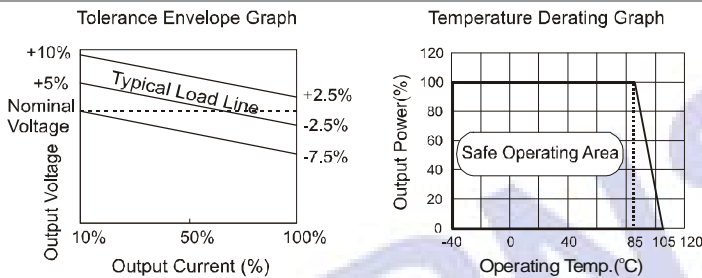
## OUTPUT SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Output power		0.1		1	W
Line regulation	For Vin change of ±1%	(3.3 input)		±1.5	%
		(others input)		±1.2	
Load regulation	10% to 100% load	(3.3 output)	12	20	%
		(5V output)	10	15	
		(9V output)	8.3	15	
		(12V output)	6.8	15	
		(15V output)	6.3	15	
Output voltage accuracy		See tolerance envelope graph			
Temperature drift	100% full load			0.03	%/°C
Ripple & Noise*	20MHz Bandwidth	(EXXXS-1W)	50	75	mVp-p
		(EXX24S-1W)	100	150	
		(FXXXS-1W)	75	100	
		(FXX24S-1W)	100	150	
Switching frequency	Full load, nominal input		100		KHz

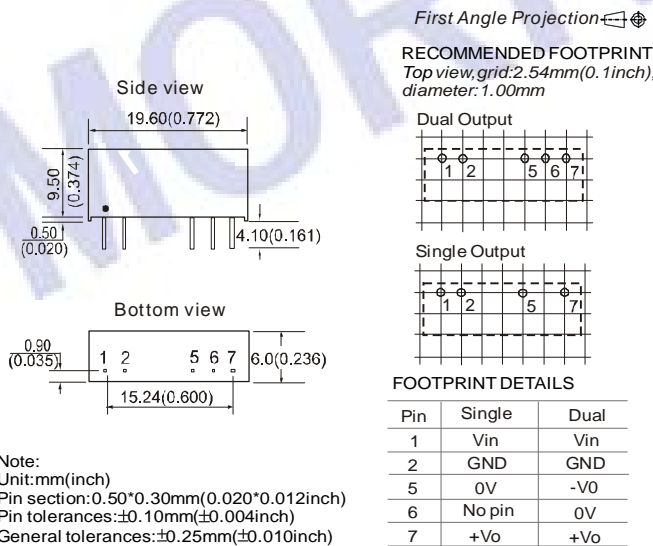
Note:

- All specifications measured at  $T_A=25^{\circ}\text{C}$ , humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- Dual output models unbalanced load: ±5%.

## TYPICAL CHARACTERISTICS



## OUTLINE DIMENSIONS & PIN CONNECTIONS



## APPLICATION NOTE

### Requirement on output load

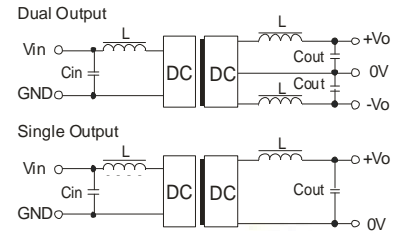
To ensure this module can operate efficiently and reliably, During operation, the minimum output load is **not less than 10%** of the full load, and that **this product should never be operated under no load!** If the actual output power is very small, please connect a resistor with proper resistance 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).

### 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.

### Recommended circuit

If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 1).



(Figure 1)

It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference. However, the capacitance of the output 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).

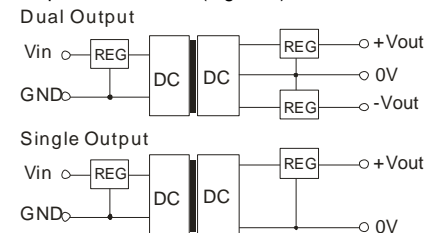
EXTERNAL CAPACITOR TABLE (TABLE 1)

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

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

### Output Voltage Regulation and Over-voltage Protection Circuit

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).



(Figure2)

**No parallel connection or plug and play.**