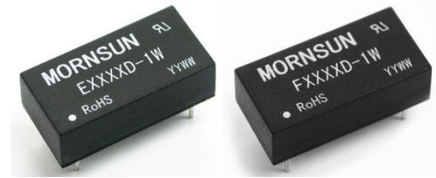


# MORNSUN

## E\_D-1W & F\_D-1W Series 1W, FIXED INPUT, ISOLATED & UNREGULATED DUAL/SINGLE OUTPUT DC-DC CONVERTER



### FEATURES

- High Efficiency up to 80%
- High Density, High Stability
- 3000VDC Isolation
- DIP Package
- Internal SMD construction
- No Heat sink Required
- Temperature Range: -40°C ~ +85°C
- No External Component Required
- Industry Standard Pinout
- RoHS Compliance

### APPLICATIONS

The E\_D-1W & F\_D-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.

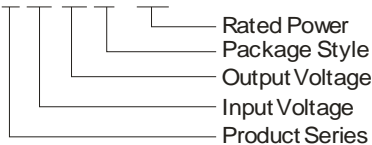
These products apply to:

- 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.

### MODEL SELECTION

E0505D-1W



### MORNSUN America

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### PRODUCT PROGRAM

Part Number	Input		Output			Efficiency (% Typ.)	Certificate		
	Voltage (VDC)		Voltage (VDC)	Current (mA)					
	Nominal	Range		Max.	Min.				
F0305D-1W	3.3	3.0-3.6	5	200	20	74			
E0505D-1W	5	4.5-5.5	$\pm 5$	$\pm 100$	$\pm 10$	71	UL CE		
E0509D-1W			$\pm 9$	$\pm 56$	$\pm 6$	77	UL CE		
E0512D-1W			$\pm 12$	$\pm 42$	$\pm 5$	77	UL CE		
E0515D-1W			$\pm 15$	$\pm 33$	$\pm 4$	79	UL CE		
F0503D-1W			3.3	303	30	73			
F0505D-1W			5	200	20	72	UL CE		
F0509D-1W			9	111	12	76	UL CE		
F0512D-1W			12	83	9	79	UL CE		
F0515D-1W			15	67	7	78	UL CE		
E1205D-1W			12	10.8-13.2	$\pm 5$	$\pm 100$	$\pm 10$	73	UL CE
E1209D-1W	$\pm 9$	$\pm 56$			$\pm 6$	77	UL CE		
E1212D-1W	$\pm 12$	$\pm 42$			$\pm 5$	80	UL CE		
E1215D-1W	$\pm 15$	$\pm 33$			$\pm 4$	80	UL CE		
F1205D-1W	5	200			20	70	UL CE		
F1209D-1W	9	111			12	75	UL CE		
F1212D-1W	12	83			9	78	UL CE		
F1215D-1W	15	67			7	79	UL CE		
F1505D-1W	15	13.5-16.5			5	200	20	69	
E2405D-1W	24	21.6-26.4			$\pm 5$	$\pm 100$	$\pm 10$	73	UL CE
E2409D-1W			$\pm 9$	$\pm 56$	$\pm 6$	77	UL CE		
E2412D-1W			$\pm 12$	$\pm 42$	$\pm 5$	80	UL CE		
E2415D-1W			$\pm 15$	$\pm 33$	$\pm 4$	80	UL CE		
F2405D-1W			5	200	20	71	UL CE		
F2409D-1W			9	111	12	76	UL CE		
F2412D-1W			12	83	9	78	UL CE		
F2415D-1W			15	67	7	80	UL CE		

### COMMON SPECIFICATIONS

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

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

## ISOLATION SPECIFICATIONS

Item	Test conditions	Min.	Typ.	Max.	Units
Isolation voltage	Tested for 1 minute and 1 mA max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ

## OUTPUT SPECIFICATIONS

Item	Test conditions	Min	Typ	Max	Units
Output power		0.1		1	W
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	%
		(5V output)		10	
		(9V output)		8.3	
		(12V output)		6.8	
		(15V output)		6.3	
Output voltage accuracy		See tolerance envelope graph			
Temperature drift	100% full load			±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth(EXXXD-1W)		50	75	mVp-p
	20MHz Bandwidth(FXXD-1W)		75	100	
Switching frequency	Full load, nominal input		100		KHz

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

Note: Dual output models unbalanced load: ±5%.

## 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.

### 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).

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).

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

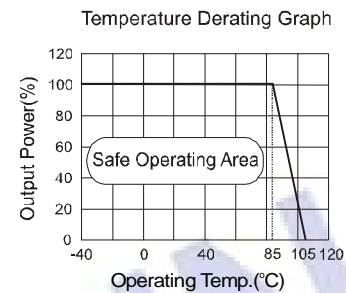
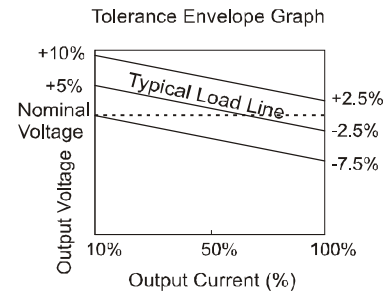
The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

### Overload Protection

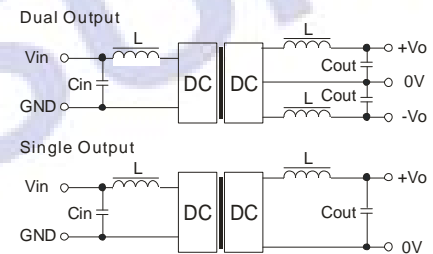
Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

### No parallel connection or plug and play

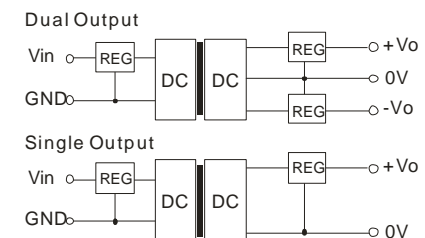
## TYPICAL CHARACTERISTICS



## RECOMMENDED CIRCUIT



(Figure 1)



(Figure 2)

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.

# OUTLINE DIMENSIONS & PIN CONNECTIONS

### MECHANICAL DIMENSIONS

Top View: 20.00 [0.787] mm width, 10.00 [0.394] mm height.

(Side View): 7.00 [0.276] mm height, 4.10 [0.161] mm base width, 0.50 [0.020] mm lead height.

(Bottom View): 17.78 [0.700] mm width, 15.24 [0.600] mm width, 7.62 [0.300] mm height, 0.30 [0.012] mm lead height, 0.50 [0.020] mm lead width, 2.54 [0.100] mm pin spacing,  $\varnothing 1.00 [\varnothing 0.039]$  mm pin diameter.

Note:  
 Unit:mm[inch]  
 Pin section tolerances: $\pm 0.10\text{mm}[\pm 0.004\text{inch}]$   
 General tolerances: $\pm 0.25\text{mm}[\pm 0.010\text{inch}]$

FOOTPRINT DETAILS		
Pin	Single	Dual
1	GND	GND
7	NC	NC
8	+Vo	+Vo
9	No Pin	0V
10	0V	-Vo
14	Vin	Vin

NC: No connection

### RECOMMENDED FOOTPRINT

DUAL OUTPUT

SINGLE OUTPUT

### TUBE OUTLINE DIMENSIONS

Note:  
 Unit :mm[inch]  
 General tolerances:  $\pm 0.50\text{mm}[\pm 0.020\text{inch}]$   
 L=530mm[20.866inch] Tube Quantity: 25pcs  
 L=220mm[8.661inch] Tube Quantity: 10pcs

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
2. All specifications measured at  $T_a=25^\circ\text{C}$ , 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.