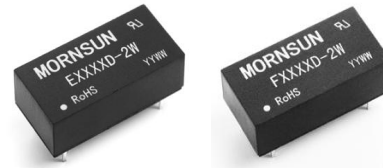


# MORNSUN

## E\_D-2W & F\_D-2W Series

2W, FIXED INPUT, ISOLATED & UNREGULATED  
DUAL/SINGLE OUTPUT DC-DC CONVERTER



Multi-country patent protection **RoHS**

### FEATURES

- High Efficiency up to 85%
- 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-2W & F\_D-2W 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.

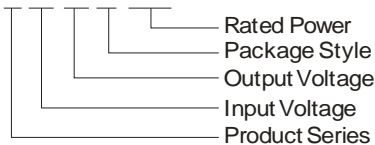
These products apply to:

- 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-2W



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### PRODUCT PROGRAM

Part Number	Input		Output			Efficiency (% Typ.)	Certificate		
	Voltage (VDC)		Voltage (VDC)	Current (mA)					
	Nominal	Range		Max.	Min.				
E0505D-2W	5	4.5-5.5	±5	±200	±20	82	UL CE		
E0509D-2W			±9	±111	±12	83	UL CE		
E0512D-2W			±12	±84	±9	84	UL CE		
E0515D-2W			±15	±67	±7	82	UL CE		
F0503D-2W*			3.3	400	40	74			
F0505D-2W			5	400	40	81	UL CE		
F0509D-2W			9	222	23	83	UL CE		
F0512D-2W			12	167	17	83	UL CE		
F0515D-2W			15	133	14	83	UL CE		
E1205D-2W			12	10.8-13.2	±5	±200	±20	80	UL CE
E1209D-2W	±9	±111			±12	83	UL CE		
E1212D-2W	±12	±84			±9	85	UL CE		
E1215D-2W	±15	±67			±7	82	UL CE		
F1205D-2W	5	400			40	80	UL CE		
F1209D-2W	9	222			23	82	UL CE		
F1212D-2W	12	167			17	83	UL CE		
F1215D-2W	15	133			14	83	UL CE		
E2405D-2W	24	21.6-26.4			±5	±200	±20	82	UL CE
E2409D-2W					±9	±111	±12	82	UL CE
E2412D-2W			±12	±84	±9	85	UL CE		
E2415D-2W			±15	±67	±7	85	UL CE		
F2405D-2W			5	400	40	80	UL CE		
F2409D-2W			9	222	23	82	UL CE		
F2412D-2W			12	167	17	83	UL CE		
F2415D-2W			15	133	14	84	UL CE		

\*Designing.

### 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			2.4		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		0.2		2	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		75	150	mVp-p
Switching frequency	Full load, nominal input		70		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 (E\_D-1W/F\_D-1W Series).

### 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

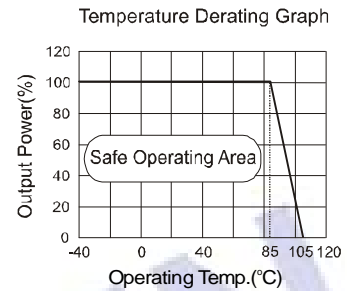
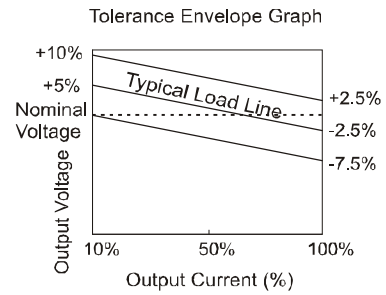
The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

### Overload Protection

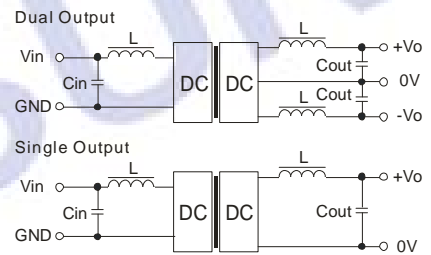
Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

### No parallel connection or plug and play

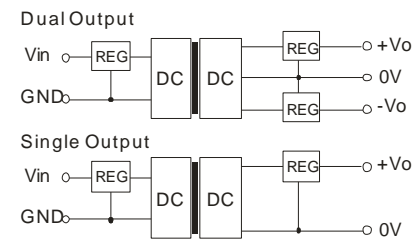
## TYPICAL CHARACTERISTICS



## RECOMMENDED CIRCUIT



(Figure 1)



(Figure 2)

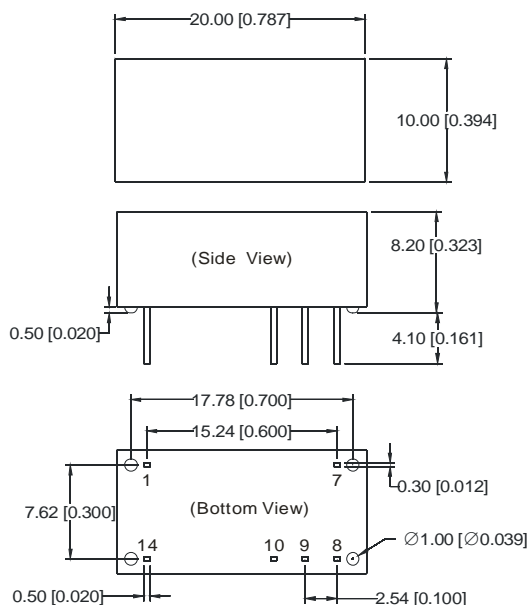
EXTERNAL CAPACITOR TABLE (TABLE 1)

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

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



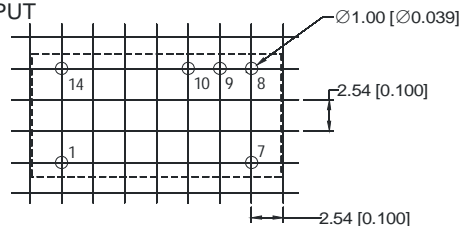
Note:  
 Unit:mm[inch]  
 Pin section tolerances: $\pm 0.10\text{mm}[\pm 0.004\text{inch}]$   
 General tolerances: $\pm 0.25\text{mm}[\pm 0.010\text{inch}]$

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

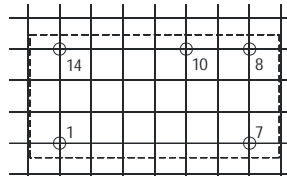
NC: No connection

## RECOMMENDED FOOTPRINT

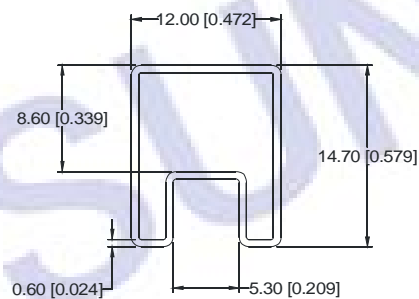
### DUAL OUTPUT



### 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.