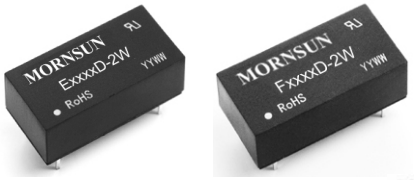
MORNSUN®

E_D-2W & F_D-2W SERIES

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



Patent Protection **RoHS**

FEATURES

- Small Footprint
- Efficiency up to 85%
- DIP Package
- High Power Density
- Low Temperature Rise
- Up to 3KV Isolation
- Operating Temperature Range: -40°C ~ +85°C
- No External Component Required
- Industry Standard Pinout

PART NUMBER SYSTEM

E0505D-2W

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

APPLICATIONS

The E_D-2W & F_D-2W 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
E0505D-2W	5 (4.5-5.5)	±5	±200	±20	477	37	25	100	82	UL CE
~~E0509D-2W~~		~~±9~~	~~±111~~	~~±12~~	~~461~~	~~37~~			~~83~~	~~UL CE~~
E0512D-2W		±12	±84	±9	455	33			84	UL CE
E0515D-2W		±15	±67	±7	464	40			82	UL CE
F0503D-2W		3.3	400	40	492	30	30	220	74	
F0505D-2W		5	400	40	508	32			81	UL CE
F0509D-2W		9	222	23	474	30			83	UL CE
F0512D-2W		12	167	17	469	33			83	UL CE
F0515D-2W		15	133	14	474	36			83	UL CE
F0524D-2W		24	83	9	458	28			84	
E1205D-2W	12 (10.8-13.2)	±5	±200	±20	203	18	25	100	80	
~~E1209D-2W~~		~~±9~~	~~±111~~	~~±12~~	~~195~~	~~21~~			~~83~~	
E1212D-2W		±12	±84	±9	190	19			85	UL CE
E1215D-2W		±15	±67	±7	199	19			82	UL CE
F1205D-2W		5	400	40	203	16	30	220	80	UL CE
F1209D-2W		9	222	23	201	24			82	UL CE
F1212D-2W		12	167	17	195	19			83	UL CE
F1215D-2W		15	133	14	197	18			83	UL CE
E2405D-2W	24 (21.6-26.4)	±5	±200	±20	99	9	30	100	82	UL CE
~~E2409D-2W~~		~~±9~~	~~±111~~	~~±12~~	~~97~~	~~9~~			~~82~~	UL CE
E2412D-2W		±12	±84	±9	93	8			85	UL CE
E2415D-2W		±15	±67	±7	99	11			85	UL CE
F2405D-2W		5	400	40	98	9	30	220	80	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				
F2409D-2W	24 (21.6-26.4)	9	222	23	92	7	30	220	82	UL CE
F2412D-2W		12	167	17	95	9			83	UL CE
F2415D-2W		15	133	14	95	7			84	UL CE
F2424D-2W		24	83	9	96	9			85	

Note: 1.Models listed with strike-through text have been officially discontinued.
2. # For each output.

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	
	24VDC input	-0.7	--	30	
Input Filter		Capacitance Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Output Power			0.2	--	2	W
Output Voltage Accuracy			See tolerance envelope curve			
Output Voltage Balance	Dual Output, Balanced Loads		--	±0.5	±1.0	%
Line Regulation	For Vin change of ±1%	3.3VDC output	--	--	±1.5	
		Other output	--	--	±1.2	
Load Regulation	10% to 100% load	3.3VDC output	--	12	20	
		5VDC output	--	10	15	
		9VDC output	--	8.3	15	
		12VDC output	--	6.8	15	
		15VDC output	--	6.3	15	
		24VDC output	--	6.0	15	
Temperature Drift	100% load		--	--	±0.03	%/°C
Ripple & Noise*	20MHz Bandwidth		--	75	150	mVp-p
Short Circuit Protection**			--	--	1	s

Note: 1.*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.
2.**Supply voltage must be discontinued at the end of short circuit duration.

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/1V	F2424D-2W	--	100	--	pF
		Others	--	50	--	
Switching Frequency	Full load, nominal input		--	70	--	KHz
MTBF	MIL-HDBK-217F@25℃		3500	--	--	K hours
Case Material			Plastic(UL94-V0)			
Weight			--	2.4	--	g

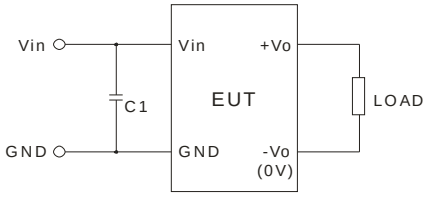
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	--	--	95	%
Operating Temperature	Power derating (above 85℃)	-40	--	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	IEC/EN61000-4-2 Contact ±8KV perf. Criteria B

EMC RECOMMENDED CIRCUIT

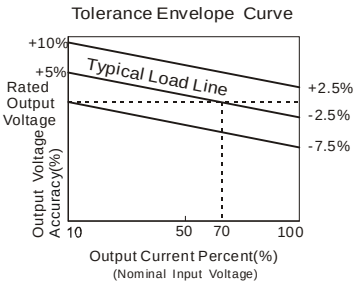
EMI Recommended External Circuit：

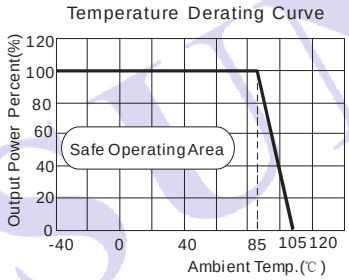


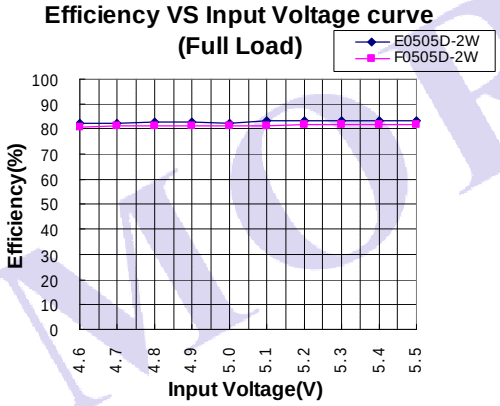
(Figure 1)

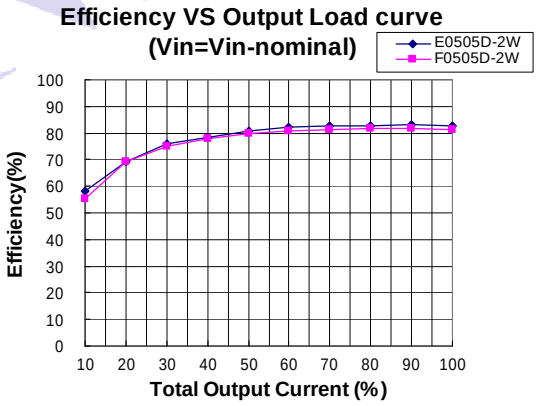
E_D-2W series product bare can be tested by the CLASS A.
F_D-2W series recommended external circuit parameters:
①Vin：12V
C1：2.2μF/50V
②Vin：24V
C1：4.7μF/50V
Remarks：Product bare input of 5V can be tested by the CLASS A.

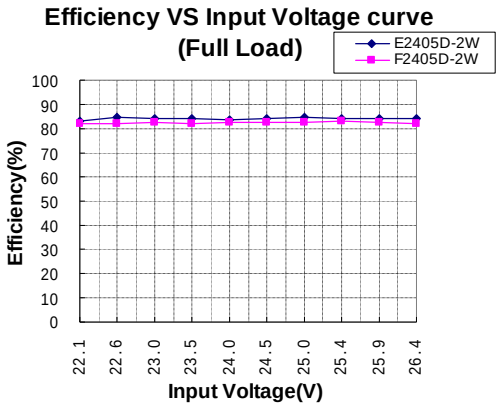
PRODUCT TYPICAL CURVE

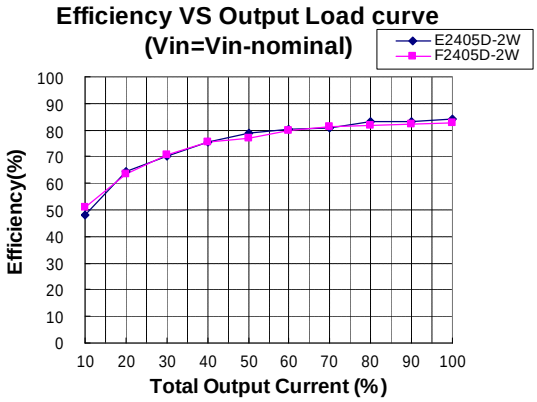






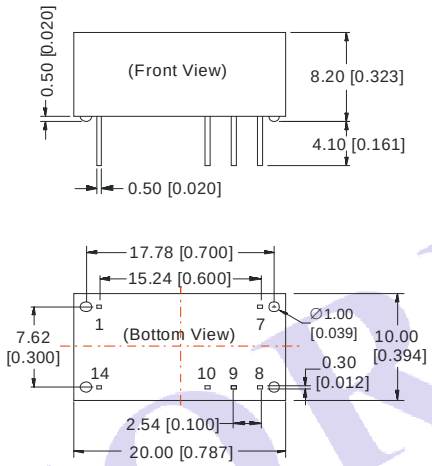






OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

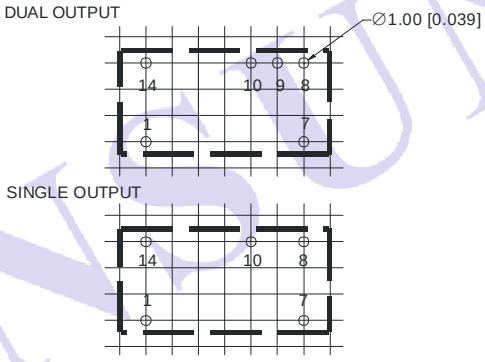


FOOTPRINT DETAILS		
Pin	Single	Dual
1	GND	GND
7	NC	NC
8	+Vo	+Vo
9	No Pin	0V
10	0V	-Vo
14	Vin	Vin

NC: No connection

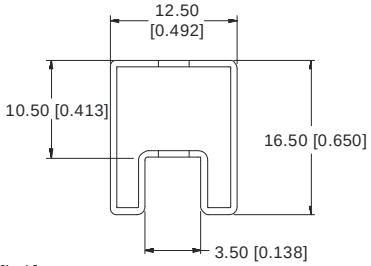
Note:
Unit:mm[inch]
Pin section tolerances: ±0.10mm[±0.004inch]
General tolerances: ±0.25mm[± 0.010inch]

RECOMMENDED FOOTPRINT



Note: grid 2.54*2.54mm.

TUBE OUTLINE DIMENSIONS

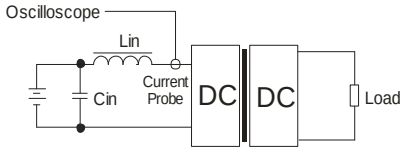


Note:
Unit :mm[inch]
General tolerances: ±0.50mm[±0.020inch]
L=530mm[20.866inch] Tube Quantity: 25pcs
L=220mm[8.661inch] Tube Quantity: 10pcs
Short tube inner package dimensions: L*W*H= 255*170*80mm
Short tube outer package dimensions(with six inner package boxes): L*W*H= 375*280*270mm
Long tube inner package dimensions: L*W*H= 580*200*100mm
Long tube outer package dimensions(with two inner package boxes): L*W*H= 600*215*220mm
Long tube outer package dimensions(with three inner package boxes): L*W*H= 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 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_D -1W/F_D-1W Series).

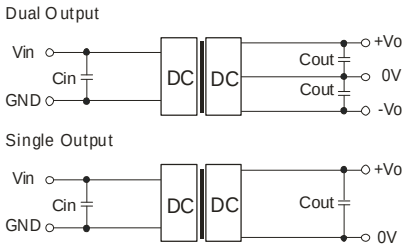
2) Overload Protection

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

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)

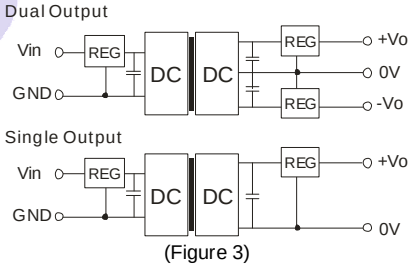
EXTERNAL CAPACITOR TABLE (TABLE 1)

Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout# (μF)
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
-	-	15/24	1	±15	0.47

Note: # For each output. 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) 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 date in the datasheet are measured according to nominal input voltage, rated output load, TA=25℃, humidity<75%, unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on our corporate standards.
5. The performance in the datasheet is just fit for the part number in the selection guide, and may be different from the customer-designed product, you can get more details from MORNSUN FAE.
6. Contact us for your specific requirement.
7. Specifications subject to change without prior notice.

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