MICRODC
Industry Power Family

# 2E-XD&2F-XD Series

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

## FEATURES

- High Efficiency up to 85%
- High Density, High Stability
- 3000VDC Isolation
- DIP14 Package
- Internal SMD construction
- No Heat sink Required
- Temperature Range: -40°C ~ +85°C
- No External Component Required
- Industry Standard Pinout
- RoHS Compliance
- 5V,12V and 24V input
- 3.3V,5V,9V,12V and 15V output

## MODEL SELECTION

2E①05②05③X④ D⑤

①Product Series ②Input Voltage
③Output Voltage ④Fixed Input
⑤DIP14 Package

## APPLICATIONS

The 2E-XD&2F-XD 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 ≤ ±10%);
2) Where isolation is necessary between input and output (isolation voltage ≤3000VDC);
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. | | |
| 2E0505XD | 5 | 4.5-5.5 | ±5 | ±200 | ±20 | 82 | UL C2E |
| 2E0509XD | | | ±9 | ±111 | ±12 | 83 | UL C2E |
| 2E0512XD | | | ±12 | ±84 | ±9 | 84 | UL C2E |
| 2E0515XD | | | ±15 | ±67 | ±7 | 82 | UL CE |
| 2F0503XD | | | 3.3 | 400 | 40 | 74 | -- |
| 2F0505XD | | | 5 | 400 | 40 | 81 | UL CE |
| 2F0509XD | | | 9 | 222 | 23 | 83 | UL CE |
| 2F0512XD | | | 12 | 167 | 17 | 83 | UL CE |
| 2F0515XD | | | 15 | 133 | 14 | 83 | UL CE |
| 2E1205XD | 12 | 10.8-13.2 | ±5 | ±200 | ±20 | 80 | UL CE |
| 2E1209XD | | | ±9 | ±111 | ±12 | 83 | UL CE |
| 2E1212XD | | | ±12 | ±84 | ±9 | 85 | UL CE |
| 2E1215XD | | | ±15 | ±67 | ±7 | 82 | UL CE |
| 2F1205XD | | | 5 | 400 | 40 | 80 | UL CE |
| 2F1209XD | | | 9 | 222 | 23 | 82 | UL CE |
| 2F1212XD | | | 12 | 167 | 17 | 83 | UL CE |
| 2F1215XD | | | 15 | 133 | 14 | 83 | UL CE |
| 2E2405XD | 24 | 21.6-26.4 | ±5 | ±200 | ±20 | 82 | UL CE |
| 2E2409XD | | | ±9 | ±111 | ±12 | 82 | UL CE |
| 2E2412XD | | | ±12 | ±84 | ±9 | 85 | UL CE |
| 2E2415XD | | | ±15 | ±67 | ±7 | 85 | UL CE |
| 2F2405XD | | | 5 | 400 | 40 | 80 | UL CE |
| 2F2409XD | | | 9 | 222 | 23 | 82 | UL CE |
| 2F2412XD | | | 12 | 167 | 17 | 83 | UL CE |
| 2F2415XD | | | 15 | 133 | 14 | 84 | UL CE |

## ABSOLUTE MAXIMUM RATINGS

| Item | Test conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Storage humidity range | | | | 95 | % |
| Operating Temp. Range | | -40 | | 85 | °C |
| Storage Temp. Range | | -55 | | 125 | °C |
| Temp. rise at full load | | | 15 | 25 | °C |
| Lead temperature | 1.5mm from case for 10 seconds | | | 300 | °C |
| Cooling | | Free air convection | | | |
| Case material | | Plastic (UL94-V0) | | | |
| Short circuit protection[1] | | | | 1 | S |
| MTBF | | 3500 | | | K hours |
| Weight | | | 2.4 | | g |

1.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 |

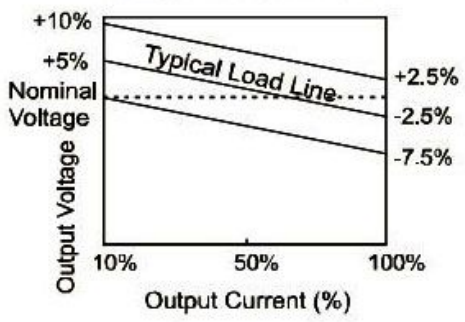
## OUTPUT SPECIFICATIONS

| 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 | 20 | % |
| | | (5V output) | | 10 | 15 | % |
| | | (9V output) | | 8.3 | 10 | % |
| | | (12V output) | | 6.8 | 10 | % |
| | | (15V output) | | 6.3 | 10 | % |
| Output voltage accuracy | | | See tolerance envelope graph | | | |
| Temperature drift | 100% full load | | | | ±0.03 | %/℃ |
| Ripple& Noise* | 20MHz Bandwidth | | | 75 | 150 | mVp-p |
| Switching frequency | Full load, nominal input | | | 70 | | KHz |

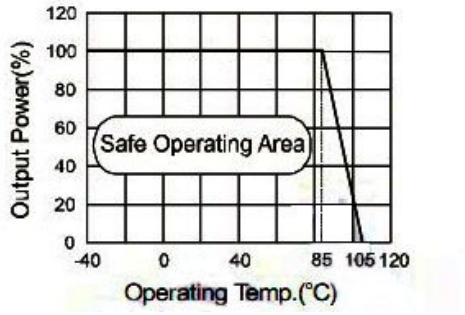
*Test ripple and noise by "parallel cable" method.
See detailed operation instructions at Testing of Power Converter section, application notes.
Note: Dual output models unbalanced load: ±5%.

## TYPICAL CHARACTERISTICS

Tolerance Envelope Graph




Temperature Derating Graph




## 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_XD-1W/F_XD-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).

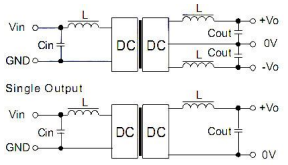
**Overload Protection**

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.**

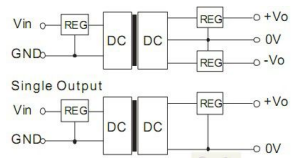
## RECOMMENDED CIRCUIT

Dual Output




(Figure 1)

Dual Output




(Figure 2)

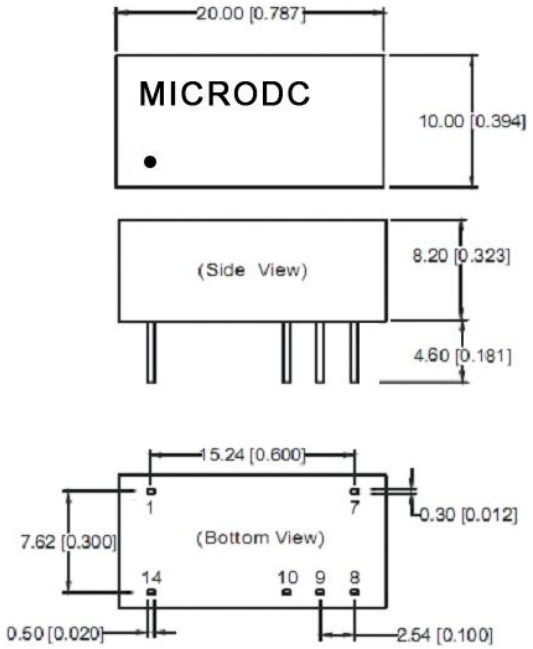
EXTERNAL CAPACITOR TABLE (TABLE 1)

| 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 2



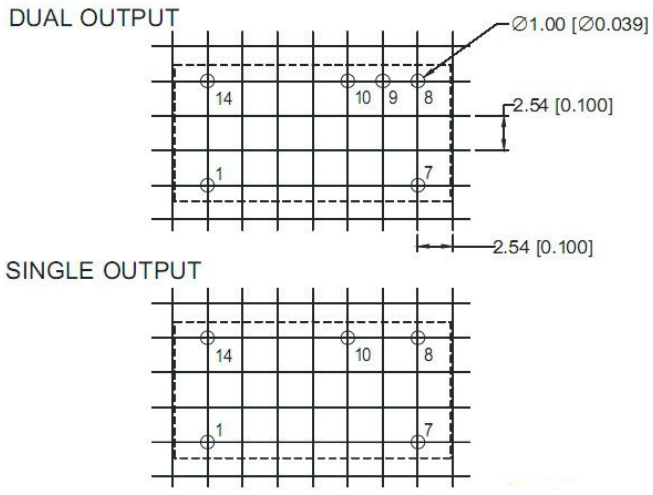

Note:
Unit:mm[inch]
Pin section tolerances: 0.10mm[ 0.004inch]
General tolerances: 0.25mm[ 0.010inch]

**FOOTPRINT DETAILS**

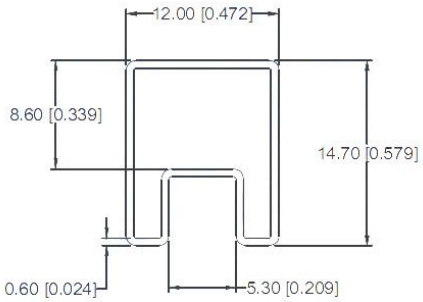
| SERIES | F-XD | E-XD |
|---|---|---|
| Pin | Single | Dual |
| 1 | GND | GND |
| 7 | NC | NC |
| 8 | +Vo | +Vo |
| 9 | No Pin | 0V |
| 10 | 0V | -Vo |
| 14 | Vin | Vin |

NC: No connection

## RECOMMENDED FOOTPRINT




## 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

The length of the tube can be set according to the customer.

Note:
1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed.
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.

MICRODC Industry Power Family

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**RoHS COMPLIANT INFORMATION**
This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds.
The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

**REACH COMPLIANT INFORMATION**

This series has proven that this product does not contain harmful chemicals, it also has harmful chemical substances through the registration, inspection and approval.