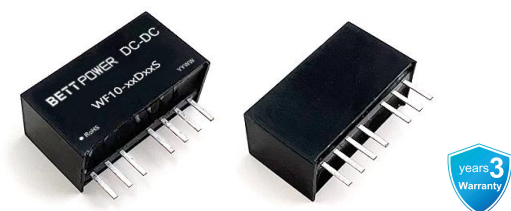


## WF10-xxDxxS Series

DC-DC Converter | 10W | SIP8 | 2:1 Wide Input Voltage, Regulated Output | 3000VDC



### Features

- SIP8 Package
- Operating Temperature Range: -40°C ~ +105°C
- 2:1 Wide Input Voltage Range
- Isolation Voltage: 3000VDC
- Full Load Efficiency: 86% (typ.)
- Input Under-voltage, Output Over-current, Output Short Circuit Protection
- Designed to meet IEC/EN/BS EN/UL 62368

### Product Description



The WF10-xxDxxS series is an industrial-grade DC-DC converter module with 2:1 wide input voltage and regulated output. It features a compact SIP-8 plastic pin package, high efficiency, remote on/off control, and continuous short circuit protection. The small size and excellent cost design make this converter an ideal solution for communication equipment, instrumentation, and industrial electronics applications.

### Selection Guide

| Certification    | Part No.    | Input Voltage (VDC) |      | Output               |                   | Full Load Efficiency (%)<br>Typ. | Capacitive Load (μF)<br>Max.* |
|------------------|-------------|---------------------|------|----------------------|-------------------|----------------------------------|-------------------------------|
|                  |             | Nominal (Range)     | Max. | Output Voltage (VDC) | Max. Current (mA) |                                  |                               |
| EN/UL<br>pending | WF10-12D03S | 12 (9~18)           | 20   | ±3.3                 | ± 1200            | 79                               | 1200                          |
|                  | WF10-12D05S | 12 (9~18)           | 20   | ±5                   | ±1000             | 81                               | 1000                          |
|                  | WF10-12D06S | 12 (9~18)           | 20   | ±6                   | ±833              | 81                               | 820                           |
|                  | WF10-12D09S | 12 (9~18)           | 20   | ±9                   | ±556              | 83                               | 470                           |
|                  | WF10-12D12S | 12 (9~18)           | 20   | ±12                  | ±417              | 84                               | 330                           |
|                  | WF10-12D15S | 12 (9~18)           | 20   | ±15                  | ±333              | 84                               | 220                           |
|                  | WF10-12D24S | 12 (9~18)           | 20   | ±24                  | ±208              | 83                               | 120                           |
|                  | WF10-24D03S | 24 (18~36)          | 40   | ±3.3                 | ±1200             | 80                               | 1200                          |
|                  | WF10-24D05S | 24 (18~36)          | 40   | ±5                   | ± 1000            | 82                               | 1000                          |
|                  | WF10-24D06S | 24 (18~36)          | 40   | ±6                   | ±833              | 82                               | 820                           |
|                  | WF10-24D09S | 24 (18~36)          | 40   | ±9                   | ±556              | 84                               | 470                           |
|                  | WF10-24D12S | 24 (18~36)          | 40   | ±12                  | ±417              | 86                               | 330                           |

# WF10-xxDxxS Series



DC-DC Converter | 10W | SIP8 | 2:1 Wide Input Voltage, Regulated Output | 3000VDC

|  |             |            |    |     |      |    |     |
|--|-------------|------------|----|-----|------|----|-----|
|  | WF10-24D15S | 24 (18~36) | 40 | ±15 | ±333 | 86 | 220 |
|--|-------------|------------|----|-----|------|----|-----|

## Selection Guide

| Certification    | Part No.    | Input Voltage (VDC) |      | Output               |                   | Full Load Efficiency (%)<br>Typ. | Capacitive Load (μF)<br>Max.* |
|------------------|-------------|---------------------|------|----------------------|-------------------|----------------------------------|-------------------------------|
|                  |             | Nominal (Range)     | Max. | Output Voltage (VDC) | Max. Current (mA) |                                  |                               |
| EN/UL<br>pending | WF10-24D24S | 24 (18~36)          | 40   | ±24                  | ±208              | 86                               | 120                           |
|                  | WF10-48D03S | 48 (36~75)          | 80   | ±3.3                 | ±1200             | 79                               | 1200                          |
|                  | WF10-48D05S | 48 (36~75)          | 80   | ±5                   | ±1000             | 81                               | 1000                          |
|                  | WF10-48D06S | 48 (36~75)          | 80   | ±6                   | ±833              | 81                               | 820                           |
|                  | WF10-48D09S | 48 (36~75)          | 80   | ±9                   | ±556              | 82                               | 470                           |
|                  | WF10-48D12S | 48 (36~75)          | 80   | ±12                  | ±417              | 83                               | 330                           |
|                  | WF10-48D15S | 48 (36~75)          | 80   | ±15                  | ±333              | 83                               | 220                           |
|                  | WF10-48D24S | 48 (36~75)          | 80   | ±24                  | ±208              | 83                               | 120                           |

Note:

1. The input voltage should not exceed the maximum value, otherwise it may cause permanent and irreparable damage;
2. The above efficiency values are measured at nominal input voltage and rated output load.
3. \*The capacitive load for both positive and negative outputs is the same.

## Input Specifications

| Item                                 | Operating Conditions       |             | Min.                                        | Typ.    | Max.    | Unit |
|--------------------------------------|----------------------------|-------------|---------------------------------------------|---------|---------|------|
| Input Current<br>(Full Load/No-load) | 12VDC Input                | 3.3V Output | --                                          | 835/10  | 857/20  | mA   |
|                                      |                            | 5/6V Output | --                                          | 1029/15 | 1055/30 | mA   |
|                                      |                            | Others      | --                                          | 1004/20 | 1029/50 | mA   |
|                                      | 24VDC Input                | 3.3V Output | --                                          | 413/5   | 423/10  | mA   |
|                                      |                            | 5/6V Output | --                                          | 508/10  | 521/20  |      |
|                                      |                            | Others      | --                                          | 496/20  | 508/40  | mA   |
|                                      | 48VDC Input                | 3.3V Output | --                                          | 209/5   | 214/10  | mA   |
|                                      |                            | 5/6V Output | --                                          | 257/10  | 264/20  | mA   |
|                                      |                            | Others      | --                                          | 254/15  | 260/30  | mA   |
| Reflected Ripple Current             | Input Nominal Input Series |             | --                                          | 50      | --      | mA   |
| Surge Voltage<br>(1sec.max.)         | 12VDC Input                |             | -0.7                                        | --      | 25      | VDC  |
|                                      | 24VDC Input                |             | -0.7                                        | --      | 50      | VDC  |
|                                      | 48VDC Input                |             | -0.7                                        | --      | 100     | VDC  |
| Start-up Voltage                     | 12VDC Input                |             | --                                          | --      | 9       | VDC  |
|                                      | 24VDC Input                |             | --                                          | --      | 18      | VDC  |
|                                      | 48VDC Input                |             | --                                          | --      | 36      | VDC  |
| Input Under-voltage<br>Protection    | 12VDC Input                |             | 5.5                                         | 6.5     | --      | VDC  |
|                                      | 24VDC Input                |             | 5.5                                         | 6.5     | --      | VDC  |
|                                      | 48VDC Input                |             | 13                                          | 16      | --      | VDC  |
| Ctrl                                 | Module On                  |             | Ctrl pin open or pulled high (TTL2.7-12VDC) |         |         |      |
|                                      | Module shutdown            |             | Ctrl pin pulled low to GND (0-1.2VDC)       |         |         |      |
| Input Filter Type                    |                            |             | Capacitance Filtering                       |         |         |      |
| Hot Plug                             |                            |             | Unavailable                                 |         |         |      |

## Output Specifications

| Item                    | Operating Conditions                                  |                 | Min. | Typ. | Max. | Unit  |
|-------------------------|-------------------------------------------------------|-----------------|------|------|------|-------|
| Output Voltage Accuracy | 0%~100% load                                          | Vo1             | --   | ±1.0 | ±3.0 | %     |
|                         |                                                       | Vo2             | --   | ±3.0 | ±5.0 | %     |
| Line Regulation         | Full load, input voltage from low limit to high limit | Vo1             | --   | ±0.5 | ±1.0 | %     |
|                         |                                                       | Vo2             | --   | ±1.0 | ±3.0 | %     |
| Load Regulation         | 5% to 100% load                                       |                 | --   | ±1.0 | ±2.0 | %     |
|                         | 0% to 100% load                                       |                 | --   | ±2.0 | ±4.0 | %     |
| Ripple & Noise          | 20MHz bandwidth, 5%-100% load                         |                 | --   | 100  | 150  | mVp-p |
| Transient Recovery Time | 25% load step change, nominal input voltage           |                 | --   | 300  | 500  | μs    |
| Transient Response      | 25% load step change, nominal input voltage           | 3.3/5/6V output | --   | ±5   | ±8   | %     |

| Deviation                |                     | Others | --                                      | ±3  | ±5    | %    |
|--------------------------|---------------------|--------|-----------------------------------------|-----|-------|------|
| Temperature Coefficient  | Full Load           |        | --                                      | --  | ±0.03 | %/°C |
| Over current Protection  | Input Voltage Range |        | 110                                     | 160 | --    | %    |
| Short Circuit Protection | Input Voltage Range |        | Continuous short circuit, self-recovery |     |       |      |

Note: Ripple & noise are measured at 20MHz of bandwidth with a 10uF electrolytic capacitor and a 1uF ceramic capacitor connected inparallel at the output.

## General Specifications

| Item                  | Operating Conditions                                            |                | Min.                                   | Typ. | Max. | Unit |
|-----------------------|-----------------------------------------------------------------|----------------|----------------------------------------|------|------|------|
| Isolation Voltage     | Input-Output, Test Time 1 minute, leakage current less than 1mA |                | 3000                                   | --   | --   | VDC  |
| Insulation Resistance | Input-Output, Insulation Voltage 500VDC                         |                | 1000                                   | --   | --   | MΩ   |
| Isolation Capacitance | Input-Output, 100KHz/0.1V                                       |                | --                                     | 1000 | --   | pF   |
| Operating Temperature | See: Temperature Derating Curve                                 | 12/24VDC Input | -40                                    | --   | +85  | °C   |
|                       |                                                                 | 48VDC Input    | -40                                    | --   | +105 | °C   |
| Storage Temperature   |                                                                 |                | -55                                    | --   | +125 | °C   |
| Storage Humidity      | No condensation                                                 |                | 5                                      | --   | 95   | %RH  |
| Soldering Profile     | Wave soldering                                                  |                | 260±5°C; Time: 5-10s                   |      |      |      |
|                       | Manual soldering                                                |                | 360±10°C; Time: 3-5s                   |      |      |      |
| Switching Frequency   | Full load, nominal input voltage                                |                | --                                     | 300  | --   | kHz  |
| Vibration             |                                                                 |                | 10-150Hz, 5g, 0.75mm, along X, Y and Z |      |      |      |
| MTBF                  | MIL-HDBK-217F@25°C                                              |                | >1000Kh                                |      |      |      |

## Mechanical Specifications

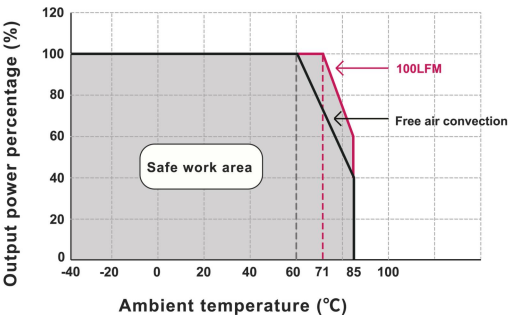
|                       |                                                            |
|-----------------------|------------------------------------------------------------|
| Case Material         | Black flame-retardant and heat-resistant plastic (UL94V-0) |
| Mechanical Dimensions | 22.00 * 9.50 * 12.00mm                                     |
| Weight                | 4.9g (typ.)                                                |
| Cooling Method        | Free air convection                                        |

## Electromagnetic Compatibility (EMC)

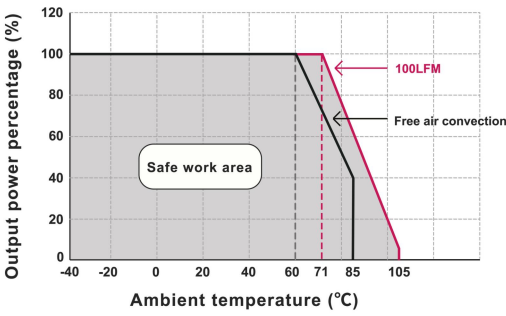
|     |       |                                                                          |  |  |  |                  |
|-----|-------|--------------------------------------------------------------------------|--|--|--|------------------|
| EMI | CE    | CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2/3-②)           |  |  |  |                  |
|     | RE    | CISPR32/EN55032 CLASS B (Recommended circuit see Figure 2/3-②)           |  |  |  |                  |
| EMS | ESD   | IEC/EN61000-4-2 Contact ±6KV                                             |  |  |  | perf. Criteria B |
|     | RS    | IEC/EN61000-4-3 10V/m                                                    |  |  |  | perf. Criteria A |
|     | EFT   | IEC/EN61000-4-4 ±2KV (Recommended circuit see Figure 2/3-①)              |  |  |  | perf. Criteria B |
|     | Surge | IEC/EN61000-4-5 line to line ±2KV (Recommended circuit see Figure 2/3-①) |  |  |  | perf. Criteria B |
|     | CS    | IEC/EN61000-4-6 3Vr.m.s                                                  |  |  |  | perf. Criteria A |

Product Characteristic Curve

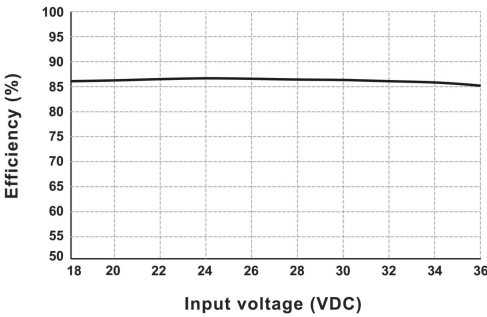
Temperature Derating Curve (12/24V nominal input)



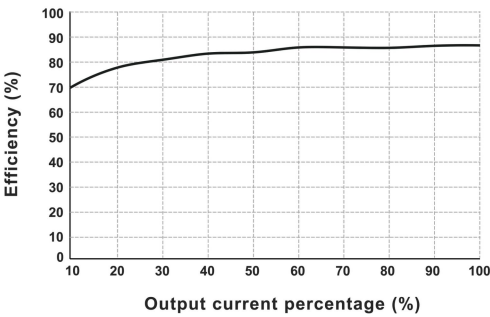
Temperature Derating Curve (48V nominal input)



Efficiency VS Input Voltage (Full load, WF10-24D05S)

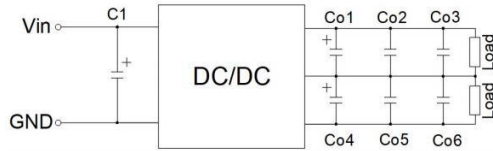


Efficiency VS Output Load (Vin=24V, WF10-24D05S)



## Design Reference - Application Circuit

Application circuit



(Figure 1)

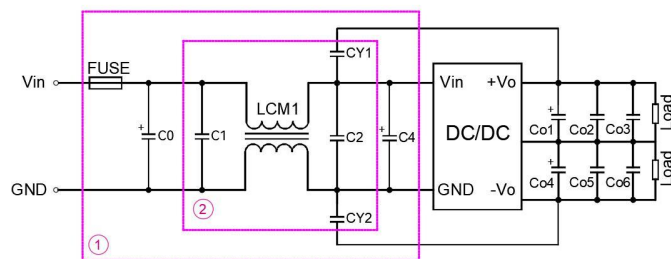
Recommended Capacitive Load Value Table

| Vout       | C1               | Co1/Co4         | Co2/Co5        | Co3/Co6         |
|------------|------------------|-----------------|----------------|-----------------|
| 3.3/5/6VDC | 100 $\mu$ F/100V | 100 $\mu$ F/16V | 10 $\mu$ F/50V | 0.1 $\mu$ F/16V |
| 9/12/15VDC | 100 $\mu$ F/100V | 100 $\mu$ F/25V | 10 $\mu$ F/50V | 0.1 $\mu$ F/25V |
| 24VDC      | 100 $\mu$ F/100V | 100 $\mu$ F/50V | 10 $\mu$ F/50V | 0.1 $\mu$ F/50V |

All DC/DC converters in this series are tested before shipment using the test circuit recommended in (Figure 1). To further reduce input and output ripple, the external input and output capacitors C1, Co1, Co2, Co3, Co4, Co5, Co6 can be increased or capacitors with lower series equivalent impedance can be selected. For each output, under safe and reliable operating conditions, the maximum capacitance of the filter capacitor must not exceed the maximum capacitive load of the product.

## Design Reference - EMC Solutions - Recommended Circuits

EMC Recommended Circuit Design and Application

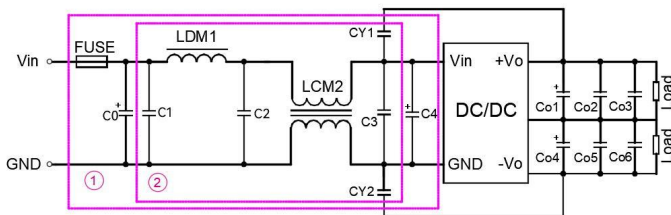


(Figure 2)

Recommended Parameter Table

| Model       | Vin: 12VDC                                    | Vin: 24VDC      |
|-------------|-----------------------------------------------|-----------------|
| FUSE        | Select according to the actual input current  |                 |
| C0/C4       | 330 $\mu$ F/25V                               | 330 $\mu$ F/50V |
| C1/C2       | 10 $\mu$ F/50V                                |                 |
| LCM1        | 470 $\mu$ H                                   |                 |
| Co1/Co2/Co3 | Refer to the capacitor parameters in Figure 1 |                 |
| CY1/CY2     | 1nF/2kVDC                                     |                 |

Note: Part ① in Figure 2 is used for EMC testing; Part ② is used for EMI filtering and can be selected based on requirements.



(Figure 3)

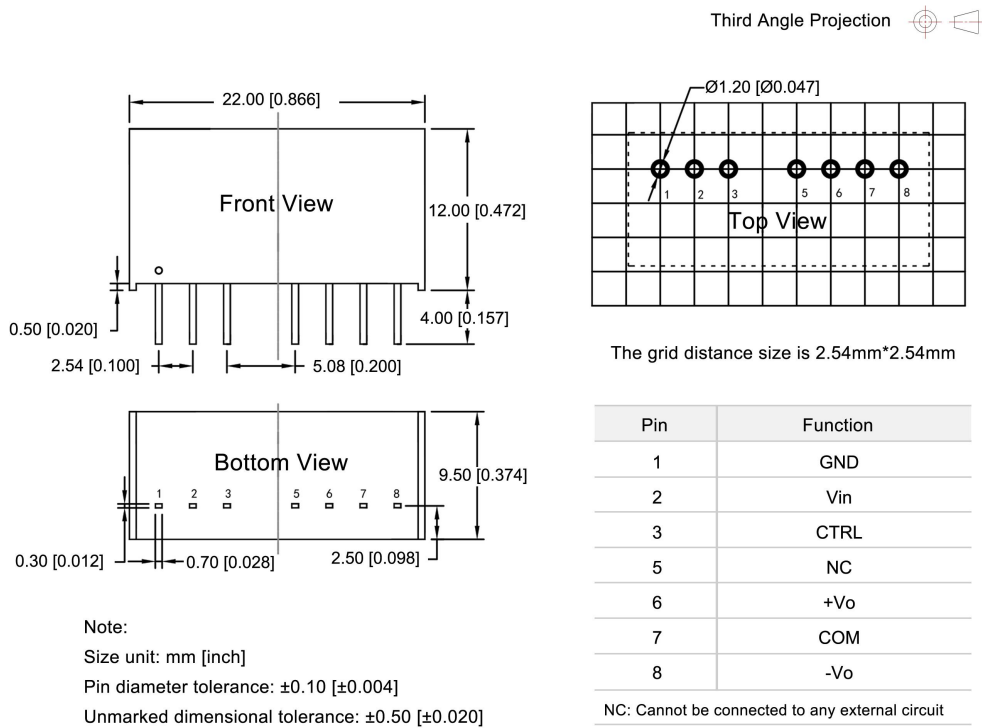
EMC Recommended Data Table

| Part No.    | Vin: 48VDC                                    |
|-------------|-----------------------------------------------|
| FUSE        | Select according to the actual input current  |
| C0/C4       | 560 $\mu$ F/100V                              |
| C1/C2       | 10 $\mu$ F/100V                               |
| C3          | 27 $\mu$ F/100V                               |
| LDM1        | 4.7 $\mu$ H                                   |
| LCM2        | 1mH                                           |
| Co1/Co2/Co3 | Refer to the capacitor parameters in Figure 1 |
| CY1/CY2     | 1nF/2kVDC                                     |

Note: Part ① in Figure 3 is used for EMC testing; Part ② is used for EMI filtering, which can be selected based on requirements.

Dimensions and Recommended Layout

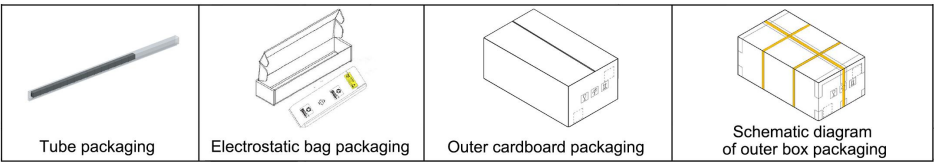
WF10-xxDxxS Dimensions and Recommended Layout



Packaging Information

| Model series<br>(Tube packaging) | Quantity per tube<br>(pcs/ tube) | Quantity of electrostatic bag<br>(pcs/ bag) | Quantity of inner box<br>(pcs/ box) | Full box Quantity (pcs) |
|----------------------------------|----------------------------------|---------------------------------------------|-------------------------------------|-------------------------|
| WF10-xxDxxS                      | 23                               | 230                                         | 920                                 | 3680                    |

The schematic diagram of tube packaging is shown below:



## Product precautions

1. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage;
2. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product;
3. The maximum capacitive load is tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, all indicators in this manual are measured at Ta=25 °C, humidity<75% RH, nominal input voltage, and output rated load;
5. All indicator testing methods in this manual are based on our company's corporate standards;
6. Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel;
7. Product specifications are subject to change without prior notice.

## Manufacturer contact information

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