



# DFEC15W SERIES

DIN RAIL DC-DC CONVERTER

4:1 ULTRA WIDE INPUT RANGE  
UP TO 15 Watts



## FEATURES

- NO MINIMUM LOAD REQUIRED
- 1600VDC INPUT TO OUTPUT ISOLATION
- SCREW TERMINALS FOR INPUT AND OUTPUT CONNECTIONS
- RELIABLE SNAP-ON FOR DIN RAIL TS-35/7.5 OR TS-35/15
- CASE PROTECTION MEET IP20(IEC60529)
- INTERNAL OUTPUT DC-OK INDICATOR
- MEET EN55022 CLASS B
- SAFETY MEETS UL60950-1, EN60950-1, & IEC60950-1
- CE MARKED
- COMPLIANT TO RoHS II & REACH

## APPLICATIONS

- COMMUNICATION SYSTEM
- INDUSTRY CONTROL SYSTEM
- FACTORY AUTOMATIC EQUIPMENT
- SEMICONDUCTOR EQUIPMENT

|                   |                |     |     |     |     |               |              |                             |
|-------------------|----------------|-----|-----|-----|-----|---------------|--------------|-----------------------------|
| 1600VDC ISOLATION | REMOTE CONTROL | UVP | OCP | SCP | OVP | FUSE INCLUDED | INRUSH LIMIT | REVERSE POLARITY PROTECTION |
|-------------------|----------------|-----|-----|-----|-----|---------------|--------------|-----------------------------|

## TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25°C otherwise noted

| Model Number   | Input Range | Output Voltage | Output Current @Full Load | Input Current @ No Load | Efficiency | Maximum Capacitor Load (1) |
|----------------|-------------|----------------|---------------------------|-------------------------|------------|----------------------------|
|                | VDC         | VDC            | mA                        | mA                      | %          | μF                         |
| DFEC15-24S3P3W | 9.5 ~ 36    | 3.3            | 4500                      | 52mA                    | 84         | 14700                      |
| DFEC15-24S05W  | 9.5 ~ 36    | 5              | 3000                      | 67mA                    | 85         | 7200                       |
| DFEC15-24S5P1W | 9.5 ~ 36    | 5.1            | 3000                      | 67mA                    | 85         | 7200                       |
| DFEC15-24S12W  | 9.5 ~ 36    | 12             | 1250                      | 26mA                    | 85         | 1250                       |
| DFEC15-24S15W  | 9.5 ~ 36    | 15             | 1000                      | 26mA                    | 85         | 800                        |
| DFEC15-24D05W  | 9.5 ~ 36    | ±5             | ±1500                     | 57mA                    | 85         | ±3600                      |
| DFEC15-24D12W  | 9.5 ~ 36    | ±12            | ±625                      | 35mA                    | 86         | ±625                       |
| DFEC15-24D15W  | 9.5 ~ 36    | ±15            | ±500                      | 35mA                    | 86         | ±400                       |
| DFEC15-48S3P3W | 18 ~ 75     | 3.3            | 4500                      | 37mA                    | 84         | 14700                      |
| DFEC15-48S05W  | 18 ~ 75     | 5              | 3000                      | 38mA                    | 86         | 7200                       |
| DFEC15-48S5P1W | 18 ~ 75     | 5.1            | 3000                      | 38mA                    | 86         | 7200                       |
| DFEC15-48S12W  | 18 ~ 75     | 12             | 1250                      | 18mA                    | 85         | 1250                       |
| DFEC15-48S15W  | 18 ~ 75     | 15             | 1000                      | 18mA                    | 85         | 800                        |
| DFEC15-48D05W  | 18 ~ 75     | ±5             | ±1500                     | 37mA                    | 86         | ±3600                      |
| DFEC15-48D12W  | 18 ~ 75     | ±12            | ±625                      | 20mA                    | 86         | ±625                       |
| DFEC15-48D15W  | 18 ~ 75     | ±15            | ±500                      | 20mA                    | 86         | ±400                       |

## PART NUMBER STRUCTURE

|                 |                         |                 |  |             |  |
|-----------------|-------------------------|-----------------|--|-------------|--|
| <b>DFEC15</b> - | <b>48</b>               | <b>S</b>        | <b>05</b>  | <b>W</b> -  | <b>P</b>                               |
| Series Name     | Input Voltage (VDC)     | Output Quantity | Output Voltage (VDC)                             | Input Range | Remote Control Option                  |
|                 | 24: 9.5~36<br>48: 18~75 | S: Single       | 3P3: 3.3<br>05: 5<br>5P1 5.1<br>12: 12<br>15: 15 | 4:1         | P: Positive logic<br>N: Negative logic |
|                 |                         | D: Dual         | 05: ±5<br>12: ±12<br>15: ±15                     |             |  |

## INPUT SPECIFICATIONS

| Parameter                      | Conditions  | Min.           | Typ.      | Max.   | Unit  |
|--------------------------------|---|----------------|-----------|--|-------|
| Operating input voltage range  | 24Vin(nom)  | 9.5            | 24        | 36   | VDC   |
|                                | 48Vin(nom)  | 18             | 48        | 75   |       |
| Input fuse (slow blow)         | 24Vin(nom)  |                | 6         |  | A     |
|                                | 48Vin(nom)  |                | 4         |  |       |
| In-rush current                |   |                | 15        |  | A     |
| Input reflected ripple current | Nominal input and Full load                           |                | 10        |  | mAp-p |
| Start up voltage               | 24Vin(nom)  |                |           | 9.5  | VDC   |
|                                | 48Vin(nom)  |                |           | 18   |       |
| Shutdown voltage               | 24Vin(nom)  |                | 7.5       |  | VDC   |
|                                | 48Vin(nom)  |                | 15        |  |       |
| Start up time                  | Nominal input and Constant resistive load<br>Power up |                | 100       |  | ms    |
| Input surge voltage            | 100ms, max.   | 24Vin(nom)     |           | 50   | VDC   |
|                                |   | 48Vin(nom)     |           | 100  |       |
| Remote ON/OFF (Option)         | Referred to -Vin pin                                  | Positive logic | DC-DC ON  | Open or 3 ~ 12VDC<br>Short or 0 ~ 1.2VDC<br>Short or 0 ~ 1.2VDC<br>Open or 3 ~ 12VDC |       |
|                                |   |                | DC-DC OFF |  |       |
|                                |   | Negative logic | DC-DC ON  |  |       |
|                                |   |                | DC-DC OFF |  |       |
|                                | Input current of Ctrl pin                             | -0.5           |           | 0.5  | mA    |
|                                | Remote off input current                              |                | 2.5       |  | mA    |

## OUTPUT SPECIFICATIONS

| Parameter                        | Conditions                         | Min.           | Typ.                    | Max.  | Unit                           |       |
|----------------------------------|------------------------------------|----------------|-------------------------|-------|--------------------------------|-------|
| Voltage accuracy                 | 3.3Vout                            | -2.0           |                         | +2.0  | %                              |       |
|                                  | Others                             | -1.2           |                         | +1.2  |                                |       |
| Line regulation                  | Low Line to High Line at Full Load | Single         | -0.2                    | +0.2  | %                              |       |
|                                  |                                    | Dual           | -0.5                    | +0.5  |                                |       |
| Load regulation                  | No Load to Full Load               | 3.3Vout        | -2.0                    | +2.0  | %                              |       |
|                                  |                                    | Others         | -1.5                    | +1.5  |                                |       |
| Cross regulation                 | Asymmetrical load 25%/100% FL      |                |                         |       | Dual                           |       |
| Ripple and noise                 | Measured by 20MHz bandwidth        | Single         | 3.3Vout, 5Vout, 5.1Vout |       | 50                             | mVp-p |
|                                  |                                    |                | 12Vout, 15Vout          |       | 75                             |       |
|                                  |                                    |                | Dual                    | All   |                                |       |
| Temperature coefficient          |                                    | -0.02          |                         | +0.02 | %/°C                           |       |
| Transient response recovery time | 25% load step change               |                | 250                     |       | µs                             |       |
| Over voltage protection          | Zener diode clamp                  | 3.3Vout        |                         | 3.9   | VDC                            |       |
|                                  |                                    | 5Vout, 5.1Vout |                         | 6.2   |                                |       |
|                                  |                                    | 12Vout         |                         | 15    |                                |       |
|                                  |                                    | 15Vout         |                         | 18    |                                |       |
| Output indicator                 |                                    |                |                         |       | Green LED                      |       |
| Over load protection             | % of Iout rated; Hiccup mode       |                | 150                     |       | %                              |       |
| Short circuit protection         |                                    |                |                         |       | Continuous, automatic recovery |       |

## GENERAL SPECIFICATIONS

| Parameter             | Conditions   | Min. | Typ. | Max.            | Unit                                 |
|-----------------------|--|------|------|-----------------|--------------------------------------|
| Isolation voltage     | 1 minute<br>Input to Output<br>Input (Output) to Chassis | 1600 |      |                 | VDC                                  |
|                       |  | 1600 |      |                 |                                      |
| Isolation resistance  | 500VDC   | 1    |      |                 | GΩ                                   |
| Isolation capacitance |  |      |      | 4000            | pF                                   |
| Switching frequency   |  | 360  | 400  | 440             | kHz                                  |
| Safety meets          |  |      |      |                 | UL60950-1<br>EN60950-1<br>IEC60950-1 |
| Chassis material      |  |      |      |                 | Aluminum                             |
| Weight                |  |      |      | 147.5g (5.19oz) |                                      |
| MTBF                  | MIL-HDBK-217F, Full load                                 |      |      |                 | 1.681 x 10 <sup>6</sup> hrs          |

**ENVIRONMENTAL SPECIFICATIONS**

| Parameter                     | Conditions       | Min. | Typ. | Max. | Unit         |
|-------------------------------|------------------|------|------|------|--------------|
| Operating ambient temperature | Without derating | -40  |      | +85  | °C           |
|                               | With derating    | +85  |      | +95  |              |
| Storage temperature range     |                  | -40  |      | +105 | °C           |
| Thermal shock                 |                  |      |      |      | MIL-STD-810F |
| Vibration                     |                  |      |      |      | MIL-STD-810F |
| Relative humidity             |                  |      |      |      | 5% to 95% RH |

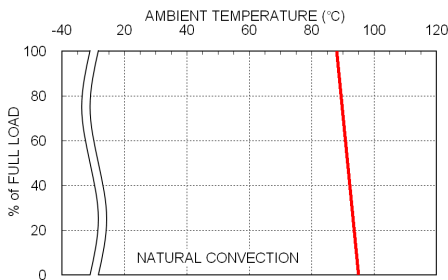
**EMC SPECIFICATIONS**

| Parameter                      | Conditions                                      | Level            |
|--------------------------------|---|------------------|
| EMI                            | EN55022   | Class B          |
| ESD                            | EN61000-4-2 Air ± 8kV and Contact ± 6kV         | Perf. Criteria A |
| Radiated immunity              | EN61000-4-3 10V/m                               | Perf. Criteria A |
| Fast transient                 | EN61000-4-4 ± 2kV                               | Perf. Criteria A |
| Surge                          | EN61000-4-5 ± 0.5kV                             | Perf. Criteria A |
| Conducted immunity             | EN61000-4-6 10Vr.m.s                            | Perf. Criteria A |
| Power frequency magnetic field | EN61000-4-8 100A/m continuous; 1000A/m 1 second | Perf. Criteria A |

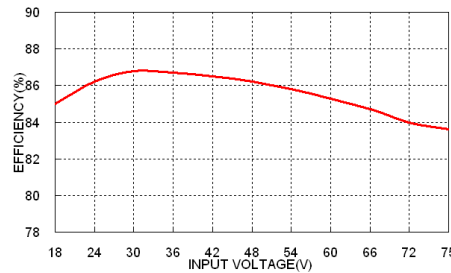
**Note:**

1. Test by minimum input and constant resistive load.

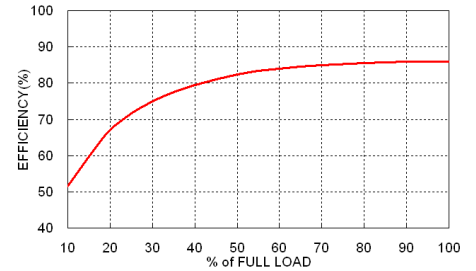
**CHARACTERISTIC CURVE**



DFEC15-48S05W Derating Curve

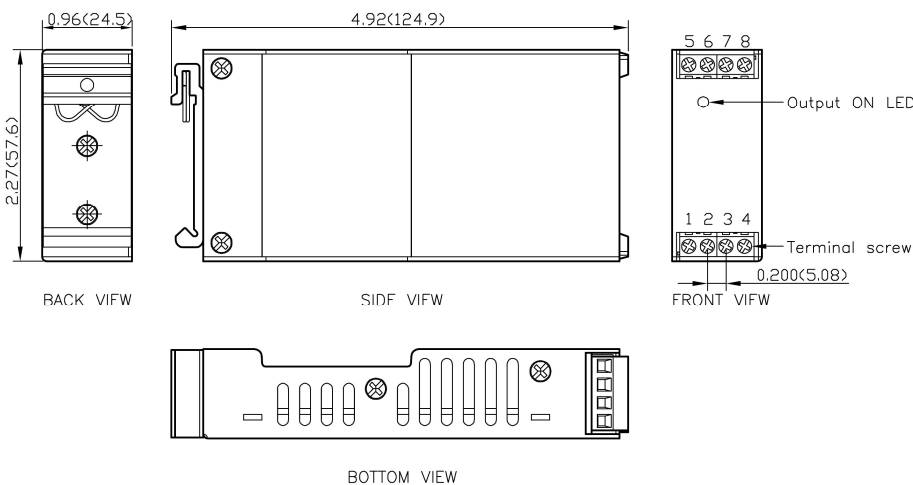


DFEC15-48S05W Efficiency vs. Input Voltage



DFEC15-48S05W Efficiency vs. Output Load

**MECHANICAL DRAWING**



**PIN CONNECTION**

| PIN | SINGLE         | DUAL           |
|-----|----------------|----------------|
| 1   | Ctrl(Optional) | Ctrl(Optional) |
| 2   | -Vin           | -Vin           |
| 3   | -Vin           | -Vin           |
| 4   | +Vin           | +Vin           |
| 5   | NC             | NC             |
| 6   | -Vout          | -Vout          |
| 7   | +Vout          | Common         |
| 8   | NC             | +Vout          |

- \* NC : No Connection
- \* Screw terminals – wire range from 14 to 18 AWG

1. All dimensions in Inch (mm)
2. Tolerance : X.XX±0.02 (X.X±0.5)
4. Tolerance : X.XXX±0.01 (X.XX±0.25)
3. Terminal screw locked torque : MAX 2.5kgf – cm (0.25N – m)