

## Description

The dual-output DFC15 Series of dc-dc converters are designed to provide a wide range of PCB power solutions where positive and negative outputs are required. The converter features fully isolated and filtered input and outputs for low noise. Trim and remote On/Off features give flexibility to designs. The ultra-wide input range, from 20 to 72 volts, allows use in most industrial and communication applications.

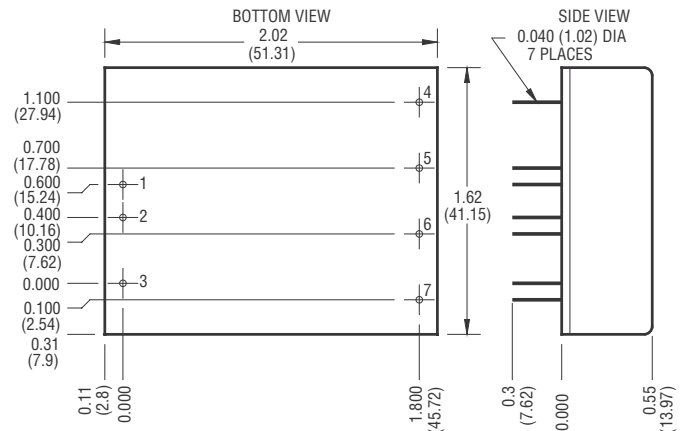
| Model Selection |                 |     |            |           |
|-----------------|-----------------|-----|------------|-----------|
| Model           | Input Range VDC |     | Output VDC | Output mA |
|                 | Min             | Max |            |           |
| DFC15U48D12     | 20              | 72  | ±12        | 625       |
| DFC15U48D15     | 20              | 72  | ±15        | 500       |

Model numbers highlighted in yellow or shaded are not recommended for new designs.

| General Specifications (1)                           |            |            |  |                   |
|--|------------|------------|--|-------------------|
| All Models   |            |            |  | Units             |
| <b>ON/OFF Function (2)</b>                           |            |            |  |                   |
| ON Logic Level or Leave Pin Floating                 | MIN        | 8.0        |  | VDC               |
| Off Logic Level                                      | MAX        | 2.0        |  | VDC               |
| Input Resistance                                     | TYP        | 100        |  | Kohms             |
| Converter Idle Current ON/OFF Pin Low                | TYP        | 2          |  | mA                |
| <b>Isolation (3)</b>                                 |            |            |  |                   |
| Breakdown Voltage 10 $\mu$ A Leakage Input to Output | MIN        | 1544       |  | VDC               |
| Input to Output Capacitance                          | TYP        | 450        |  | pF                |
| <b>Output Trim Function</b>                          |            |            |  |                   |
| Input Resistance                                     | TYP        | 40         |  | Kohms             |
| Programming Range                                    | MIN        | +5, -34    |  | %                 |
| <b>Environmental</b>                                 |            |            |  |                   |
| Case Functional Range, Tc No Derating                | MIN<br>MAX | -40<br>100 |  | $^{\circ}$ C      |
| Storage Range  | MIN<br>MAX | -55<br>105 |  | $^{\circ}$ C      |
| Thermal Impedance (4)                                | TYP        | 10         |  | $^{\circ}$ C/Watt |
| Thermal Shutdown Case Temperature                    | TYP        | 105        |  | $^{\circ}$ C      |
| <b>General</b>                                       |            |            |  |                   |
| MTBF (Calculated)                                    | TYP        | 800,000    |  | HRS               |
| Unit Weight  | TYP        | 2.3/65     |  | oz/gm             |
| Chassis Mounting Kit                                 |            | CM2B2      |  |                   |

## Features

- RoHS lead solder exemption compliant
- Remote on/off and trim
- Overcurrent and overtemperature protected
- Water-washable case
- Efficiencies to 82%
- 1544 V isolation
- Ultra-wide range input (>3:1)



Mechanical tolerances unless otherwise noted:  
 X.XX dimensions:  $\pm 0.010$  inches  
 X.XXX dimensions:  $\pm 0.005$  inches

| Pin | Function |
|-----|----------|
| 1   | +INPUT   |
| 2   | -INPUT   |
| 3   | ON/OFF   |
| 4   | +OUTPUT  |
| 5   | COMMON   |
| 6   | -OUTPUT  |
| 7   | TRIM     |

## Notes

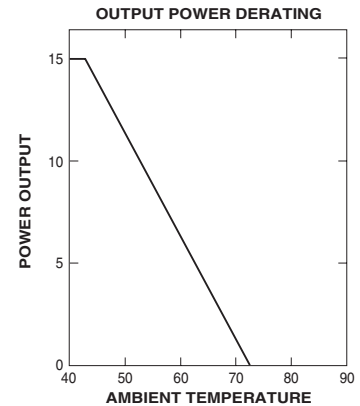
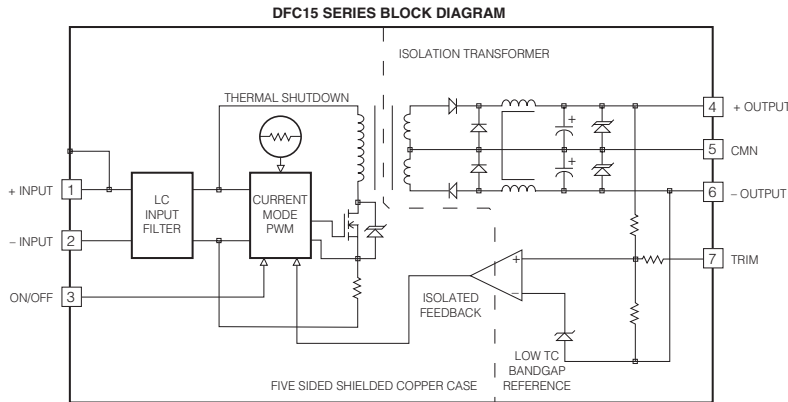
- (1) All parameters measured at Tc = 25  $^{\circ}$ C, nominal input voltage and full rated load unless otherwise noted.
- (2) The logic ON/OFF pin is Open Collector TTL, CMOS, and relay compatible. The input to this pin is referenced to Pin 2, -Input and is protected to +100 VDC.
- (3) Case is tied to Pin 1, + Input.
- (4) The case thermal impedance is specified as the case temperature rise over ambient per package watt dissipated.

| Input Parameters (1)            |           |             |     |             |                  |
|---------------------------------|-----------|-------------|-----|-------------|------------------|
| Model                           |           | DFC15U48D12 |     | DFC15U48D15 | Units            |
| Voltage Range                   | MIN       | 20.0        |     |             | VDC              |
|                                 | TYP       | 48.0        |     |             |                  |
|                                 | MAX       | 72.0        |     |             |                  |
| Reflected Ripple (2) (3)        |           | TYP         | 660 |             | mA <sub>pp</sub> |
| Input Current                   | Full Load | TYP         | 384 | 381         | mA               |
|                                 | No Load   | TYP         | 5   | 5           |                  |
| Efficiency                      |           | TYP         | 81  | 82          | %                |
| Switching Frequency             |           | TYP         | 120 |             | kHz              |
| Maximum Input Overvoltage 100ms |           | MAX         | 85  |             | VDC              |
| Turn-on Time, 1% Output Error   |           | TYP         | 20  |             | ms               |

| Output Parameters (1)  |                   |  |  |                            |                                      |
|--|-------------------|--|--|----------------------------|--------------------------------------|
| Model  |                   | DFC15U48D12  |  | DFC15U48D15                | Units                                |
| Output Voltage   |                   | ±12  |  | ±15                        | VDC                                  |
| Rated Load Range   | MIN<br>MAX        | 0<br>625   |  | 0<br>500                   | mA                                   |
| Voltage Range  | MIN<br>TYP<br>MAX | 11.900<br>12.000<br>12.100   |  | 14.900<br>15.000<br>15.100 |                                      |
| Load Regulation (4)<br>0% -100% Full Load  | TYP<br>MAX        | 0.15<br>0.4  |  |                            | %                                    |
| Cross Regulation (5)<br>25%-100% Load  | TYP               | 3.0  |  |                            | %                                    |
| Line Regulation<br>Vin = Min-Max VDC   | TYP<br>MAX        | 0.04<br>0.2  |  |                            | %                                    |
| Short Term Stability (6)   | TYP               | < 0.02   |  |                            | %/24Hrs                              |
| Long Term Stability  | TYP               | < 0.2  |  |                            | %/kHrs                               |
| Input Ripple Rejection (7)   | TYP               | >60  |  |                            | dB                                   |
| Noise, 0-20MHz bw (2)<br>with 0.1µF External Capacitor<br>with no External Capacitor | TYP<br>TYP        | 30<br>70   |  |                            | mV <sub>PP</sub><br>mV <sub>PP</sub> |
| Temperature Coefficient  | TYP<br>MAX        | 50<br>150  |  |                            | ppm/°C                               |
| Overvoltage Clamp  | TYP               | 18   |  |                            | VDC                                  |
| Short Circuit Protection to<br>Common for all Outputs                                |                   | Continuous protection with current limiting and thermal<br>overload techniques |  |                            |                                      |

## Notes

- (1) All Parameters measured at Tc=25 °C, nominal input voltage and full rated load unless otherwise noted.
- (2) Noise measurement bandwidth is 0-20 MHz.
- (3) An input capacitor must be used for proper operation of the converter. See the DFC15 Series Application Notes on sizing the input capacitor.
- (4) Load regulation for the outputs is specified as the voltage change when both outputs are changed from maximum to minimum at the same time.
- (5) Cross regulation is defined as the change in one output when the other output is changed from full load to 25% of full load. The converter can be run at no load on either or both outputs with no damage.
- (6) Short term stability is specified after a 60-minute warmup at full load, constant line and recording the drift over a 24-hour period.
- (7) The input ripple rejection is specified for DC to 120 Hz ripple with a modulation amplitude of 1% of Vin.



### DFC15 Series Application Notes:

#### External Capacitance Requirements

An external capacitance is required for operation of the DFC15 Series. For maximum performance, it is recommended that the DFC15 Series use a capacitor of sufficient ripple current capacity connected across the input pins. To meet the reflected ripple requirements of the converter, an input impedance of less than 0.05 Ohms from DC to 200 kHz is required. External output capacitance is not required for operation, however it is recommended that 1  $\mu$ F to 10  $\mu$ F of tantalum and 0.001 to 0.1  $\mu$ F ceramic capacitance be selected for reduced system noise. Additional output capacitance may be added for increased filtering, but should not exceed 400  $\mu$ F.

#### Remote ON/OFF Operation

The remote ON/OFF pin may be left floating if this function is not used. It is recommended to drive this pin with an open collector arrangement or a relay contact. When the ON/OFF pin is pulled low with respect to the -INPUT, the converter is placed in a low power drain state. Do not drive this input from a logic gate directly; there is a 100KV internal pull-up resistor to a 9 volt source.

#### Output TRIM

The TRIM pin may be used to adjust the output +5% to -34% from the nominal setting. This function allows adjustment for voltage drops in the system wiring. As well 5.2 volt Figure 1 shows the proper connections to use this function. A trimpot value of 10KV or a fixed resistor may be used. If the TRIM function is not required the pin may be left floating.

Typical Performance: ( $T_c=25^\circ\text{C}$ ,  $V_{in}=\text{Nom VDC}$ , Rated Load)

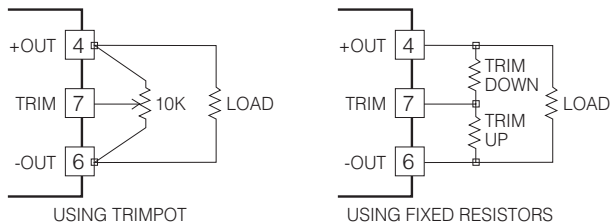
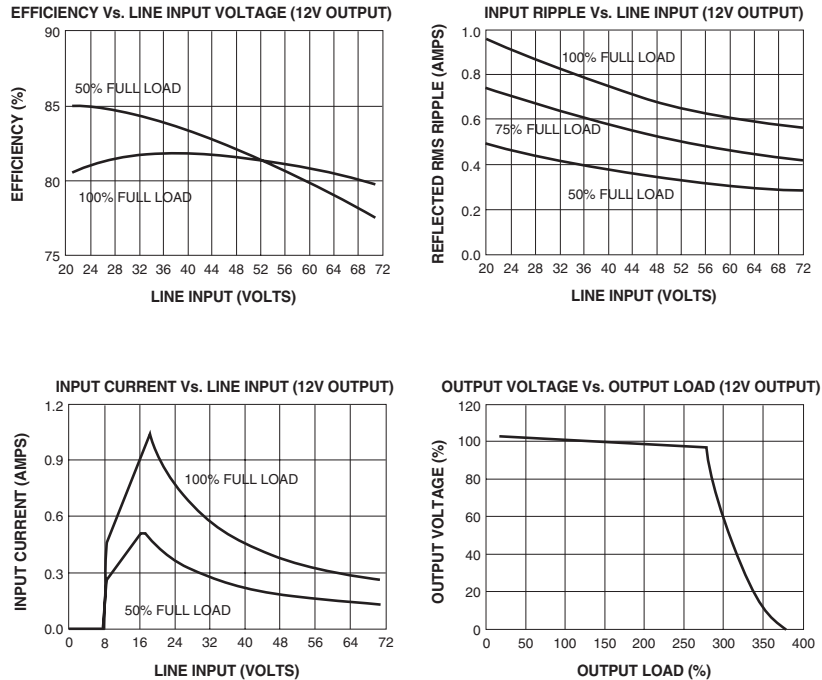
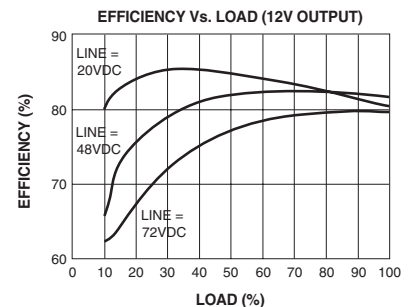


Figure 1.



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