POWER MATE TECHNOLOGY CO.,LTD.

# FDC15-SERIES

## FEATURES

- 15 WATTS OUTPUT POWER
- OUTPUT CURRENT UP TO 3A
- STANDARD 2.0 X 1.6 X 0.4 INCH PACKAGE
- HIGH EFFICIENCY UP TO 82%
- 4:1 WIDE INPUT VOLTAGE RANGE
- SIX-SIDED CONTINUOUS SHIELD
- FIXED SWITCHING FREQUENCY
- CE MARK MEETS 2006/95/EC,93/68/EEC AND 2004/108/EC
- UL60950-1, EN60950-1 AND IEC60950-1 LICENSED
- ISO9001 CERTIFIED MANUFACTURING FACILITIES
- COMPLIANT TO RoHS EU DIRECTIVE 2002/95/EC

## APPLICATIONS

Wireless Network
Telecom/Datacom
Industry Control System
Measurement Equipment
Semiconductor Equipment

## DESCRIPTION

The FDC15 series offer 15 watts of output power from a 2 x 1.6 x 0.4 inch package. The FDC15 series have 4:1 wide input voltage of 9-36 and 18-75VDC. The FDC15 features 1600VDC of isolation, short-circuit and over-voltage protection.

## TECHNICAL SPECIFICATION

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

| OUTPUT SPECIFICATIONS | | | |
|---|---|---|---|
| Output power | | | 15 Watts, max. |
| Voltage accuracy | Full load and nominal Vin | | ± 1% |
| Minimum load (Note 6) | | | See Table |
| Voltage adjustability | | | ± 10% |
| Line regulation | LL to HL at Full Load | | ± 0.2% |
| Load regulation | Min. load to Full load | Single<br>Dual | ± 0.5%<br>± 1% |
| Cross regulation (Dual) | Asymmetrical load 25% / 100% FL | | ± 5% |
| Ripple and noise | 20MHz bandwidth | | See table |
| Temperature coefficient | | | ±0.02% / ºC, max. |
| Transient response recovery time | 25% load step change | | 250µS |
| Over voltage protection Zener diode clamp | 5V output<br>12V output<br>15V output | | 6.2VDC<br>15VDC<br>18VDC |
| Over load protection | % of FL at nominal input | | 150%, max. |
| Short circuit protection | | | Hiccup, automatics recovery |

| GENERAL SPECIFICATIONS | | |
|---|---|---|
| Efficiency | | See table |
| Isolation voltage | | 1600VDC, min. |
| Isolation resistance | | $10^9$ ohms, min. |
| Isolation capacitance | | 300pF, max. |
| Switching frequency | | 270KHz, typ. |
| Approvals and standard | | IEC60950-1, UL60950-1, EN60950-1 |
| Case material | | Nickel-coated copper |
| Base material | | Non-conductive black plastic |
| Potting material | | Epoxy (UL94-V0) |
| Dimensions | | 2.00 X 1.60 X 0.40 Inch<br>(50.8 X 40.6 X 10.2 mm) |
| Weight | | 48g (1.69oz) |
| MTBF (Note 1) | BELLCORE TR-NWT-000332<br>MIL-HDBK-217F | $2.041 \times 10^6$ hrs<br>$9.140 \times 10^5$ hrs |

| INPUT SPECIFICATIONS | | | |
|---|---|---|---|
| Input voltage range | 24V nominal input<br>48V nominal input | | 9 – 36VDC<br>18 – 75VDC |
| Input filter | | | Pi type |
| Input surge voltage 100mS max | 24V input<br>48V input | | 50VDC<br>100VDC |
| Input reflected ripple current | Nominal Vin and full load | | 20mAp-p |
| Start up time | Nominal Vin and constant resistive load | Power up | 20mS, typ. |
| Remote ON/OFF (Note 7) (Positive logic) | DC-DC ON<br>DC-DC OFF | | Open or 3.5V < Vr < 12V<br>Short or 0V < Vr < 1.2V |
| Input current of remote control pin | Nominal Vin | | -0.5mA~+0.5mA |
| Remote off state input current | Nominal Vin | | 20mA |

| ENVIRONMENTAL SPECIFICATIONS | | |
|---|---|---|
| Operating ambient temperature | | -40ºC ~ +85ºC (with derating) |
| Maximum case temperature | | 100ºC |
| Storage temperature range | | -55ºC ~ +105ºC |
| Thermal impedance (Note 8) | Nature convection<br>Nature convection with heat-sink | 10ºC/Watt<br>8.24ºC/Watt |
| Thermal shock | | MIL-STD-810F |
| Vibration | | MIL-STD-810F |
| Relative humidity | | 5% to 95% RH |

| EMC CHARACTERISTICS | | | |
|---|---|---|---|
| EMI | EN55022 | | Class A |
| ESD | EN61000-4-2 | Air ± 8KV<br>Contact ± 6KV | Perf. Criteria B |
| Radiated immunity | EN61000-4-3 | 10 V/m | Perf. Criteria A |
| Fast transient (Note 9) | EN61000-4-4 | ± 2KV | Perf. Criteria B |
| Surge (Note 9) | EN61000-4-5 | ± 1KV | Perf. Criteria B |
| Conducted immunity | EN61000-4-6 | 10 Vr.m.s | Perf. Criteria A |

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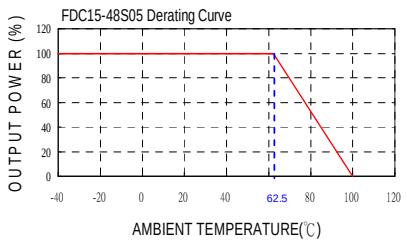
# 15 WATTS DC-DC CONVERTER

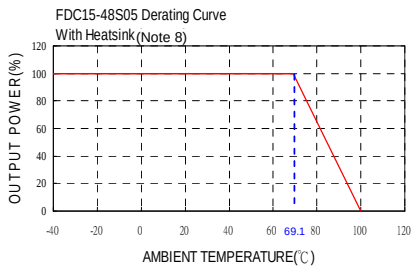


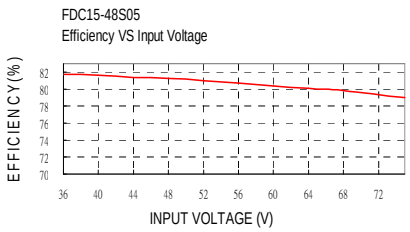
| Model Number | Input Range | Output Voltage | Output Current | | Output (4) Ripple & Noise | Input Current | | Eff (4) (%) | Capacitor Load max(5) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Min. load | Full load | | No load (3) | Full load (2) | | |
| FDC15-24S05 | 9 – 36 VDC | 5 VDC | 210mA | 3000mA | 75mVp-p | 20mA | 822mA | 80 | 6800μF |
| FDC15-24S12 | 9 – 36 VDC | 12 VDC | 100mA | 1250mA | 75mVp-p | 10mA | 801mA | 82 | 890μF |
| FDC15-24S15 | 9 – 36 VDC | 15 VDC | 80mA | 1000mA | 75mVp-p | 20mA | 801mA | 82 | 570μF |
| FDC15-24D05 | 9 – 36 VDC | ± 5 VDC | ± 105mA | ± 1500mA | 75mVp-p | 20mA | 822mA | 80 | ± 1700μF |
| FDC15-24D12 | 9 – 36 VDC | ± 12 VDC | ± 50mA | ± 625mA | 75mVp-p | 20mA | 801mA | 82 | ± 300μF |
| FDC15-24D15 | 9 – 36 VDC | ± 15 VDC | ± 40mA | ± 500mA | 75mVp-p | 20mA | 801mA | 82 | ± 200μF |
| FDC15-48S05 | 18 – 75 VDC | 5 VDC | 210mA | 3000mA | 75mVp-p | 15mA | 411mA | 80 | 6800μF |
| FDC15-48S12 | 18 – 75 VDC | 12 VDC | 100mA | 1250mA | 75mVp-p | 15mA | 401mA | 82 | 890μF |
| FDC15-48S15 | 18 – 75 VDC | 15 VDC | 80mA | 1000mA | 75mVp-p | 10mA | 401mA | 82 | 570μF |
| FDC15-48D05 | 18 – 75 VDC | ± 5 VDC | ± 105mA | ± 1500mA | 75mVp-p | 10mA | 411mA | 80 | ± 1700μF |
| FDC15-48D12 | 18 – 75 VDC | ± 12 VDC | ±50mA | ± 625mA | 75mVp-p | 20mA | 401mA | 82 | ± 300μF |
| FDC15-48D15 | 18 – 75 VDC | ± 15 VDC | ± 40mA | ± 500mA | 75mVp-p | 15mA | 401mA | 82 | ± 200 μF |

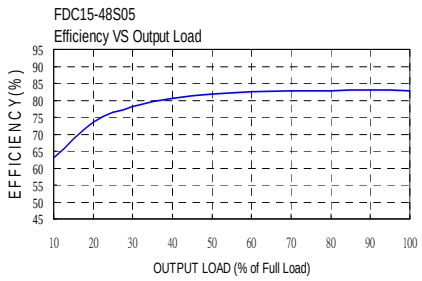
Note

1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40ºC.
   MIL-HDBK-217F Notice2 @Ta=25 ºC, Full load(Ground, Benign, controlled environment).
2. Maximum value at nominal input voltage and full load.
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load.
5. Test by minimum Vin and constant resistive load.
6. The output requires a minimum loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.
7. The ON/OFF control pin voltage is reference to -Vin.
8. Heat-sink is optional and P/N: 7G-0011C-F.
9. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Power Mate suggest: Nippon chemi-con KY series, 220μF /100V, ESR 48mΩ.



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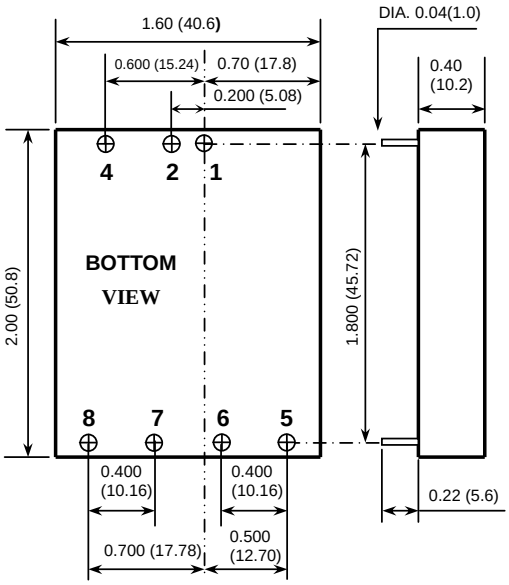
# 15 WATTS DC-DC CONVERTER



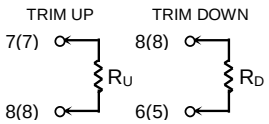


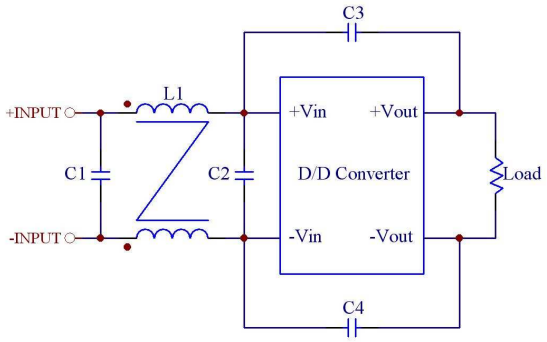

1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
2. Pin pitch tolerance ±0.01(0.25)
3. Pin dimension tolerance ±0.004 (0.1)

| PIN CONNECTION | | |
|---|---|---|
| PIN | SINGLE | DUAL |
| 1 | + INPUT | + INPUT |
| 2 | - INPUT | - INPUT |
| 4 | CTRL | CTRL |
| 5 | NO PIN | + OUTPUT |
| 6 | + OUTPUT | COMMON |
| 7 | - OUTPUT | - OUTPUT |
| 8 | TRIM | TRIM |

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using the method shown below.
( ) for dual output trim

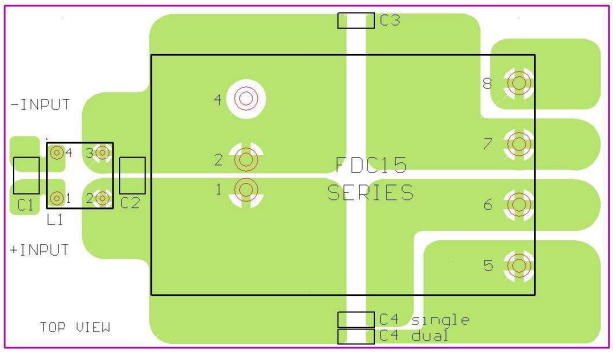



**Recommended Filter for EN55022 Class B Compliance**

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

| | C1 | C2 | C3 | C4 | L1 |
|---|---|---|---|---|---|
| FDC15-24xxx | 6.8μF/50V 1812 MLCC | N/A | 1000pF/2KV MLCC | 1000pF/2KV MLCC | 450μH Common Choke PMT-048 |
| FDC15-48xxx | 2.2μF/100V 1812 MLCC | 2.2μF/100V 1812 MLCC | 1000pF/2KV MLCC | 1000pF/2KV MLCC | 450μH Common Choke PMT-048 |




**Recommended EN55022 Class B Filter Circuit Layout**

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