

FDD05 SERIES

DC - DC CONVERTER
5 ~ 6W SINGLE & DUAL OUTPUT



FEATURES

- 4:1 & 3:1 & 2:1 WIDE INPUT RANGE
- I/O ISOLATION
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 3 YEARS WARRANTY

MODEL LIST

| MODEL NO. | INPUT VOLTAGE | INPUT CURRENT (typ.) | OUTPUT WATTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | EFF. (min.) | EFF. (typ.) | CAPACITOR LOAD (max.) |
|-----------------------------|---------------|----------------------|----------------|----------------|----------------|-------------|-------------|-----------------------|
| Single Output Models | | | | | | | | |
| FDD05 - 05S | 20~60 VDC | 135 mA | 5 WATTS | + 5 VDC | 1000 mA | 72% | 74% | 2200 μ F |
| FDD05 - 12S | 20~60 VDC | 160 mA | 6 WATTS | + 12 VDC | 500 mA | 72% | 74% | 1500 μ F |
| FDD05 - 15S | 20~60 VDC | 155 mA | 6 WATTS | + 15 VDC | 400 mA | 72% | 74% | 270 μ F |
| FDD05 - 05S1 | 9~18 VDC | 550 mA | 5 WATTS | + 5 VDC | 1000 mA | 72% | 74% | 2200 μ F |
| FDD05 - 12S1 | 9~18 VDC | 635 mA | 6 WATTS | + 12 VDC | 500 mA | 72% | 74% | 1500 μ F |
| FDD05 - 15S1 | 9~18 VDC | 625 mA | 6 WATTS | + 15 VDC | 400 mA | 72% | 74% | 270 μ F |
| FDD05 - 05S2 | 18~36 VDC | 275 mA | 5 WATTS | + 5 VDC | 1000 mA | 72% | 74% | 2200 μ F |
| FDD05 - 12S2 | 18~36 VDC | 315 mA | 6 WATTS | + 12 VDC | 500 mA | 72% | 74% | 1500 μ F |
| FDD05 - 15S2 | 18~36 VDC | 305 mA | 6 WATTS | + 15 VDC | 400 mA | 72% | 74% | 270 μ F |
| FDD05 - 05S3 | 36~72 VDC | 135 mA | 5 WATTS | + 5 VDC | 1000 mA | 72% | 74% | 2200 μ F |
| FDD05 - 12S3 | 36~72 VDC | 160 mA | 6 WATTS | + 12 VDC | 500 mA | 72% | 74% | 1500 μ F |
| FDD05 - 15S3 | 36~72 VDC | 155 mA | 6 WATTS | + 15 VDC | 400 mA | 72% | 74% | 270 μ F |
| FDD05 - 05S4 | 9~36 VDC | 275 mA | 5 WATTS | + 5 VDC | 1000 mA | 72% | 74% | 2200 μ F |
| FDD05 - 12S4 | 9~36 VDC | 315 mA | 6 WATTS | + 12 VDC | 500 mA | 72% | 74% | 1500 μ F |
| FDD05 - 15S4 | 9~36 VDC | 310 mA | 6 WATTS | + 15 VDC | 400 mA | 72% | 74% | 270 μ F |
| FDD05 - 05S5 | 18~72 VDC | 135 mA | 5 WATTS | + 5 VDC | 1000 mA | 72% | 74% | 2200 μ F |
| FDD05 - 12S5 | 18~72 VDC | 160 mA | 6 WATTS | + 12 VDC | 500 mA | 72% | 74% | 1500 μ F |
| FDD05 - 15S5 | 18~72 VDC | 155 mA | 6 WATTS | + 15 VDC | 400 mA | 72% | 74% | 270 μ F |
| Dual Output Models | | | | | | | | |
| FDD05 - 05D | 20~60 VDC | 140 mA | 5 WATTS | \pm 5 VDC | \pm 500 mA | 73% | 75% | \pm 680 μ F |
| FDD05 - 12D | 20~60 VDC | 160 mA | 6 WATTS | \pm 12 VDC | \pm 250 mA | 75% | 77% | \pm 150 μ F |
| FDD05 - 15D | 20~60 VDC | 155 mA | 6 WATTS | \pm 15 VDC | \pm 200 mA | 75% | 77% | \pm 68 μ F |
| FDD05 - 05D1 | 9~18 VDC | 570 mA | 5 WATTS | \pm 5 VDC | \pm 500 mA | 73% | 75% | \pm 680 μ F |
| FDD05 - 12D1 | 9~18 VDC | 645 mA | 6 WATTS | \pm 12 VDC | \pm 250 mA | 75% | 77% | \pm 150 μ F |
| FDD05 - 15D1 | 9~18 VDC | 630 mA | 6 WATTS | \pm 15 VDC | \pm 200 mA | 75% | 77% | \pm 68 μ F |
| FDD05 - 05D2 | 18~36 VDC | 280 mA | 5 WATTS | \pm 5 VDC | \pm 500 mA | 73% | 75% | \pm 680 μ F |
| FDD05 - 12D2 | 18~36 VDC | 315 mA | 6 WATTS | \pm 12 VDC | \pm 250 mA | 75% | 77% | \pm 150 μ F |
| FDD05 - 15D2 | 18~36 VDC | 310 mA | 6 WATTS | \pm 15 VDC | \pm 200 mA | 75% | 77% | \pm 68 μ F |
| FDD05 - 05D3 | 36~72 VDC | 140 mA | 5 WATTS | \pm 5 VDC | \pm 500 mA | 73% | 75% | \pm 680 μ F |
| FDD05 - 12D3 | 36~72 VDC | 160 mA | 6 WATTS | \pm 12 VDC | \pm 250 mA | 75% | 77% | \pm 150 μ F |

MODEL LIST

| MODEL NO. | INPUT VOLTAGE | INPUT CURRENT (typ.) | OUTPUT WATTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | EFF. (min.) | EFF. (typ.) | CAPACITOR LOAD (max.) |
|-----------|---------------|----------------------|----------------|----------------|----------------|-------------|-------------|-----------------------|
|-----------|---------------|----------------------|----------------|----------------|----------------|-------------|-------------|-----------------------|

Dual Output Models

| | | | | | | | | |
|--------------|-----------|--------|---------|----------|----------|-----|-----|---------------|
| FDD05 - 15D3 | 36~72 VDC | 155 mA | 6 WATTS | ± 15 VDC | ± 200 mA | 75% | 77% | ± 68 μ F |
| FDD05 - 05D4 | 9~36 VDC | 280 mA | 5 WATTS | ± 5 VDC | ± 500 mA | 73% | 75% | ± 680 μ F |
| FDD05 - 12D4 | 9~36 VDC | 315 mA | 6 WATTS | ± 12 VDC | ± 250 mA | 75% | 77% | ± 150 μ F |
| FDD05 - 15D4 | 9~36 VDC | 310 mA | 6 WATTS | ± 15 VDC | ± 200 mA | 75% | 77% | ± 68 μ F |
| FDD05 - 05D5 | 18~72 VDC | 140 mA | 5 WATTS | ± 5 VDC | ± 500 mA | 73% | 75% | ± 680 μ F |
| FDD05 - 12D5 | 18~72 VDC | 160 mA | 6 WATTS | ± 12 VDC | ± 250 mA | 75% | 77% | ± 150 μ F |
| FDD05 - 15D5 | 18~72 VDC | 155 mA | 6 WATTS | ± 15 VDC | ± 200 mA | 75% | 77% | ± 68 μ F |

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

GENERAL

| Characteristics | Conditions | min. | typ. | max. | unit |
|-------------------------|-----------------------------|-----------------------|-----------|--------|------------|
| Switching frequency | Vi nom, Io nom | 80 | | | KHz |
| Isolation voltage | Input - Output | 1,500 | | | VDC |
| Isolation resistance | Input - Output, @ 500VDC | 100 | | | M Ω |
| Isolation capacitance | 100KHz / 1V | | | 330 | PF |
| Ambient temperature | Operating at Vi nom, Io nom | -25 | | + 71 | °C |
| Case temperature | Operating at Vi nom, Io nom | | | + 90 | °C |
| Derating | Vi nom | See derating curve | | | |
| Storage temperature | Non operational | -40 | | + 100 | °C |
| Relative humidity | Vi nom, Io nom | 20 | | 95 | % RH |
| Temperature coefficient | Vi nom, Io min | | | ± 0.02 | % / °C |
| Dimension | | L50.8 x W50.8 x H12.0 | | | mm |
| MTBF | Bellcore issue 6@40°C, GB | | 1,120,000 | | Hours |
| Cooling | Free air convection | | | | |

INPUT SPECIFICATIONS

| Characteristics | Conditions | min. | typ. | max. | unit | |
|--------------------------|---------------------------|-------|------|------|------|-----|
| Input voltage range | Ta min ... Ta max, Io nom | 2 : 1 | 9 | 12 | 18 | VDC |
| | | | 18 | 24 | 36 | VDC |
| | | | 36 | 48 | 72 | VDC |
| | | 3 : 1 | 20 | 48 | 60 | VDC |
| | | 4 : 1 | 9 | 24 | 36 | VDC |
| | | | 18 | 48 | 72 | VDC |
| No load input current | Vi nom, Io = 0 | 12V | | 40 | mA | |
| | | 24V | | 25 | mA | |
| | | 48V | | 15 | mA | |
| Input voltage w/o damage | Io nom | 12V | | 20 | VDC | |
| | | 24V | | 40 | VDC | |
| | | 48V | | 75 | VDC | |
| Startup voltage | Io nom | 12V | 8.5 | | VDC | |
| | | 24V | 8.5 | | VDC | |
| | | 48V | 16 | | VDC | |
| Input filter | Pi type | | | | | |

SPECIFICATION

All Specifications Typical At Nominal Line, Full Load, 25°C Unless Otherwise Noticed

OUTPUT SPECIFICATIONS

| Characteristics | Conditions | min. | typ. | max. | unit |
|-------------------------------|--|--|------|------|------|
| Output voltage accuracy | Vi nom, Io nom | | | ± 2 | % |
| Minimum load | Vi nom, single output models | 0 | | | % |
| | Vi nom, dual output models (each output) | 20 | | | % |
| Line regulation | Io nom, Vi min ...Vi max | | | ± 1 | % |
| Load regulation | Vi nom, Io 0 ...Io nom, single output models | | | ± 2 | % |
| | Vi nom, Io min ...Io nom, dual output models | | | ± 5 | % |
| Cross regulation (Dual model) | Aymmetrical load 20% - 100% FL | | | ± 10 | % |
| Startup time | Vi nom, Io nom | | | 30 | ms |
| Transient recovery time | Vi nom, I ~0.5 Io nom | | | 3 | ms |
| Ripple & noise | Vi nom, Io nom, BW = 20MHz | | | 150 | mV |
| Efficiency | Vi nom, Io nom, Po / Pi | Up to 77%, See model list and efficiency curve | | | |

CONTROL AND PROTECTION

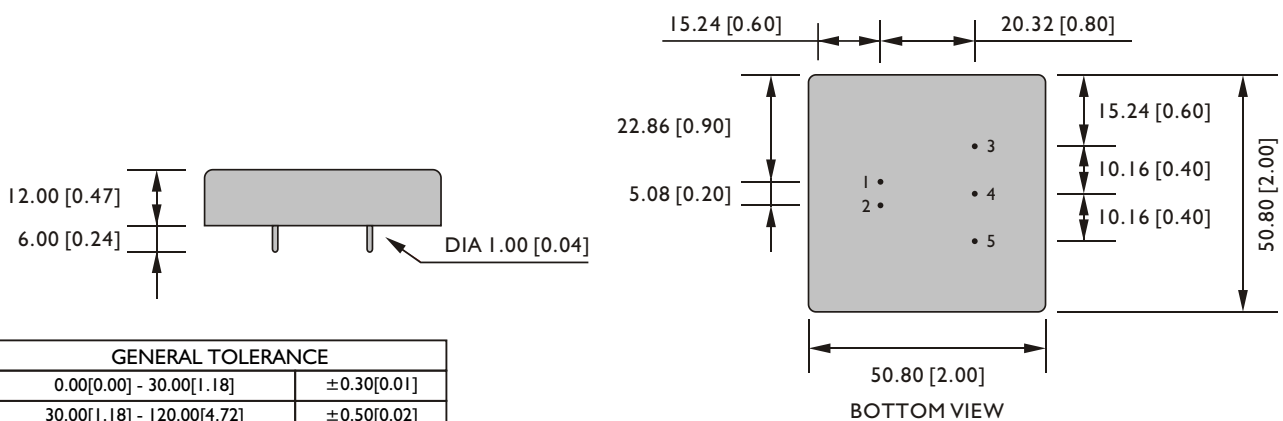
| | |
|----------------------|--|
| Input reversed | External shunt diode, external fuse recommended (12Vin : 1.5A, 24Vin : 1.5A, 48Vin : 1A) |
| Output short circuit | Current limited (Auto-recovery) |

PHYSICAL CHARACTERISTICS

| | |
|------------------|---|
| Case size | 50.8 x 50.8 x 12.0 mm (2 x 2 x 0.47 inches) |
| Case material | Plastic |
| Weight | 45 g |
| Potting material | Epoxy |

MECHANISM & PIN CONFIGURATION

mm [inch]



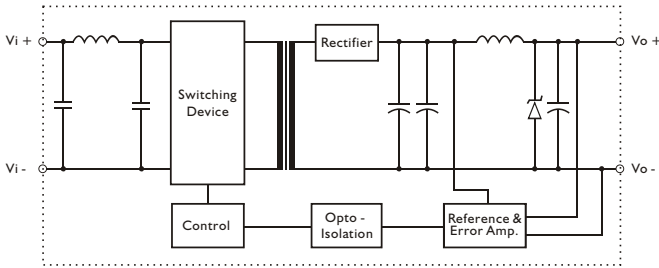
PIN ASSIGNMENT

GENERAL

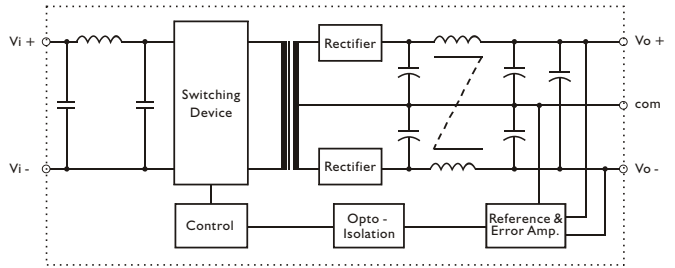
| PIN NO. | 1 | 2 | 3 | 4 | 5 |
|---------|-----|-----|-----|--------|-----|
| SINGLE | Vi+ | Vi- | Vo+ | NO PIN | Vo- |
| DUAL | Vi+ | Vi- | Vo+ | com | Vo- |

CIRCUIT SCHEMATIC

• Block diagram for FDD05 series with single output

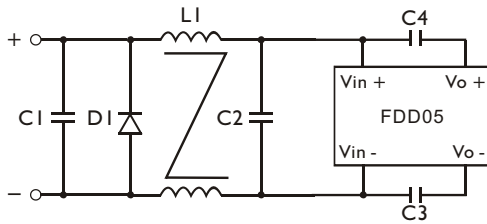


• Block diagram for FDD05 series with dual output



RECOMMENDED CIRCUIT

• Recommended filter for EN55022 Class B compliance

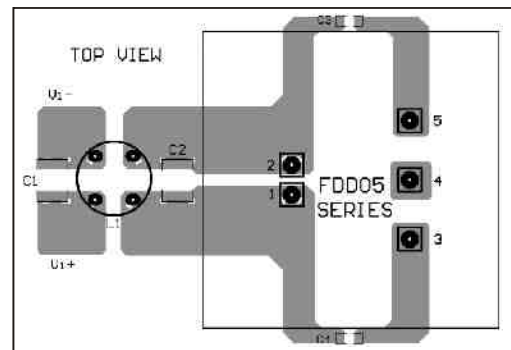


NOTE: D1-Reverse Diode (2A/100V)

• The components used in the above figure, together with the manufacturer part numbers for these components, are as follows.

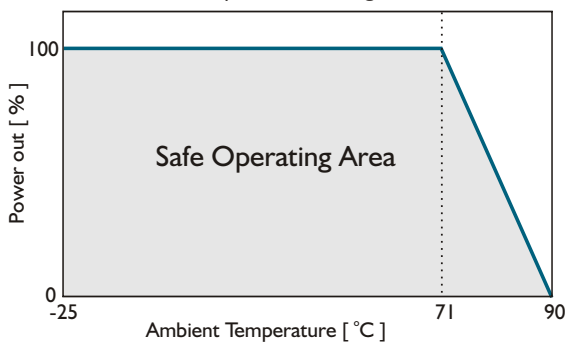
| | C1 | C2 | C3 | C4 | L1 |
|--------------------------------|----------------------------|----------------------------|-----------------|-----------------|--------------------------|
| FDD05-XXS1/S2/S4 XXD1/D2/D4 | 6.8 μ F / 50V MLCC | 3.3 μ F / 50V MLCC | 1nF/2KV MLCC | 1nF/2KV MLCC | 0.5mH Common Choke |
| FDD05-XXS3/S5 XXD/D3/D5 | 4.7 μ F / 100V MLCC | 4.7 μ F / 100V MLCC | 1nF/2KV MLCC | 1nF/2KV MLCC | 3mH Common Choke |

• Recommended EN 55022 Class B filter circuit layout.

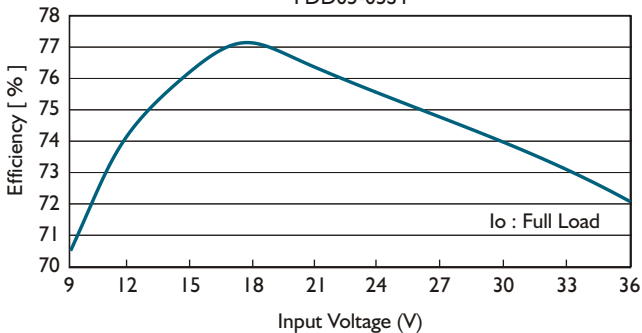


DERATING AND EFFICIENCY CURVE

Temperature derating curve



Efficiency Vs Input Voltage
FDD05-05S4



Efficiency Vs Output Load
FDD05-05S4

