

# FDD12 SERIES

DC - DC CONVERTER

10 ~ 12W SINGLE & DUAL OUTPUT



## FEATURES

- LOW COST
- 4:1 WIDE INPUT RANGE
- I/O ISOLATION
- INPUT  $\pi$  FILTER
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 2 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

|              |           |        |          |          |         |     |     |              |
|--------------|-----------|--------|----------|----------|---------|-----|-----|--------------|
| FDD12 - 03S4 | 10~36 VDC | 0.54 A | 10 WATTS | +3.3 VDC | 3000 mA | 75% | 78% | 4700 $\mu$ F |
| FDD12 - 05S4 | 10~36 VDC | 0.64 A | 12 WATTS | + 5 VDC  | 2400 mA | 77% | 80% | 4700 $\mu$ F |
| FDD12 - 12S4 | 10~36 VDC | 0.63 A | 12 WATTS | + 12 VDC | 1000 mA | 77% | 80% | 1000 $\mu$ F |
| FDD12 - 15S4 | 10~36 VDC | 0.63 A | 12 WATTS | + 15 VDC | 800 mA  | 77% | 80% | 470 $\mu$ F  |
| FDD12 - 03S5 | 18~72 VDC | 0.26 A | 10 WATTS | +3.3 VDC | 3000 mA | 77% | 80% | 4700 $\mu$ F |
| FDD12 - 05S5 | 18~72 VDC | 0.32 A | 12 WATTS | + 5 VDC  | 2400 mA | 77% | 80% | 4700 $\mu$ F |
| FDD12 - 12S5 | 18~72 VDC | 0.32 A | 12 WATTS | + 12 VDC | 1000 mA | 77% | 80% | 1000 $\mu$ F |
| FDD12 - 15S5 | 18~72 VDC | 0.32 A | 12 WATTS | + 15 VDC | 800 mA  | 77% | 80% | 470 $\mu$ F  |

### Dual Output Models

|              |           |        |          |              |               |     |     |                    |
|--------------|-----------|--------|----------|--------------|---------------|-----|-----|--------------------|
| FDD12 - 05D4 | 10~36 VDC | 0.64 A | 12 WATTS | $\pm$ 5 VDC  | $\pm$ 1200 mA | 77% | 80% | $\pm$ 2200 $\mu$ F |
| FDD12 - 12D4 | 10~36 VDC | 0.64 A | 12 WATTS | $\pm$ 12 VDC | $\pm$ 500 mA  | 77% | 80% | $\pm$ 470 $\mu$ F  |
| FDD12 - 15D4 | 10~36 VDC | 0.64 A | 12 WATTS | $\pm$ 15 VDC | $\pm$ 400 mA  | 77% | 80% | $\pm$ 470 $\mu$ F  |
| FDD12 - 05D5 | 18~72 VDC | 0.32 A | 12 WATTS | $\pm$ 5 VDC  | $\pm$ 1200 mA | 77% | 80% | $\pm$ 2200 $\mu$ F |
| FDD12 - 12D5 | 18~72 VDC | 0.32 A | 12 WATTS | $\pm$ 12 VDC | $\pm$ 500 mA  | 77% | 80% | $\pm$ 470 $\mu$ F  |
| FDD12 - 15D5 | 18~72 VDC | 0.32 A | 12 WATTS | $\pm$ 15 VDC | $\pm$ 400 mA  | 77% | 80% | $\pm$ 470 $\mu$ 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              |                       | 200     |        | KHz    |
| Isolation voltage       | Input - Output              | 1500                  |         |        | VDC    |
| Isolation resistance    | Input - Output, @ 500VDC    | 100                   |         |        | MΩ     |
| Isolation capacitance   | 100KHz / 1V                 |                       |         | 1000   | PF     |
| Ambient temperature     | Operating at Vi nom, Io nom | -25                   |         | + 71   | °C     |
| Case temperature        | Operating at Vi nom, Io nom |                       |         | + 100  | °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                    | Belcore issue 6@40°C, GB    |                       | 1040000 |        | Hours  |
| Cooling                 | Free air convection         |                       |         |        |        |

#### INPUT SPECIFICATIONS

| Characteristics          | Conditions                | min.       | typ. | max. | unit |
|--------------------------|---------------------------|------------|------|------|------|
| Input voltage range      | Ta min ... Ta max, Io nom | 10         | 24   | 36   | VDC  |
|                          |                           | 18         | 48   | 72   | VDC  |
| No load input current    | Vi nom, Io = 0            | 24V models |      | 20   | mA   |
|                          |                           | 48V models |      | 15   | mA   |
| Input voltage w/o damage | Io nom                    | 24V models |      | 40   | VDC  |
|                          |                           | 48V models |      | 75   | VDC  |
| Startup voltage          | Io nom                    | 24V models | 9    |      | VDC  |
|                          |                           | 48V models | 15   |      | VDC  |
| Input filter             | Pi type                   |            |      |      |      |

#### OUTPUT SPECIFICATIONS

| Characteristics               | Conditions                                    | min.                                           | typ. | max.        | unit |
|-------------------------------|-----------------------------------------------|------------------------------------------------|------|-------------|------|
| Output voltage accuracy       | Vi nom, Io nom                                |                                                |      | ± 2         | %    |
| Minimum load                  | Vi nom                                        | single output models                           | 0    |             | %    |
|                               |                                               | 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                |                                                |      | ± 5         | %    |
| Startup time                  | Vi nom, Io nom                                |                                                |      | 30          | ms   |
| Transient recovery time       | Vi nom, I ~ 0.5 Io nom                        |                                                |      | 500         | μs   |
| Ripple & noise                | Vi nom, Io nom, BW = 20MHz                    | 3.3V model                                     |      | 100         | mV   |
|                               |                                               | 5V, 12V, 15V & dual                            |      | Vout x ± 1% | mV   |
| Efficiency                    | Vi nom, Io nom, Po / Pi                       | Up to 80%, See model list and efficiency curve |      |             |      |

#### CONTROL AND PROTECTION

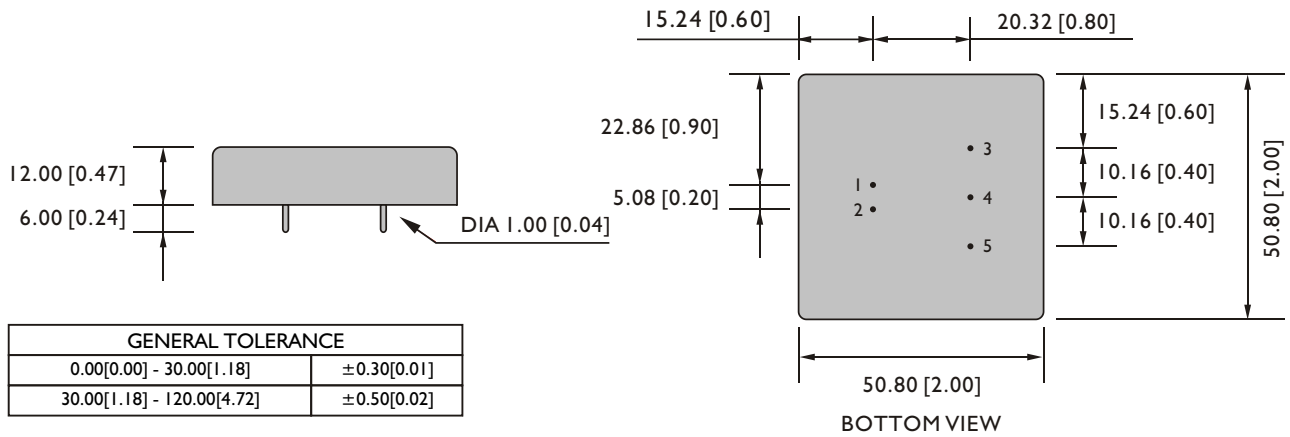
|                            |                                                                             |
|----------------------------|-----------------------------------------------------------------------------|
| Input reversed             | Shunt diode built in, external fuse recommended ( 24Vin : 1.5A, 48Vin : 1A) |
| Output short circuit       | Current limited (Auto-recovery)                                             |
| Rated over load protection | 110%min....140%max                                                          |

### PHYSICAL CHARACTERISTICS

|                  |                                             |
|------------------|---------------------------------------------|
| Case size        | 50.8 × 50.8 × 12.0 mm (2 × 2 × 0.47 inches) |
| Case material    | Plastic base / Metal case                   |
| Weight           | 70 g                                        |
| Patting material | Epoxy                                       |

### MECHANISM & PIN CONFIGURATION

mm [inch]

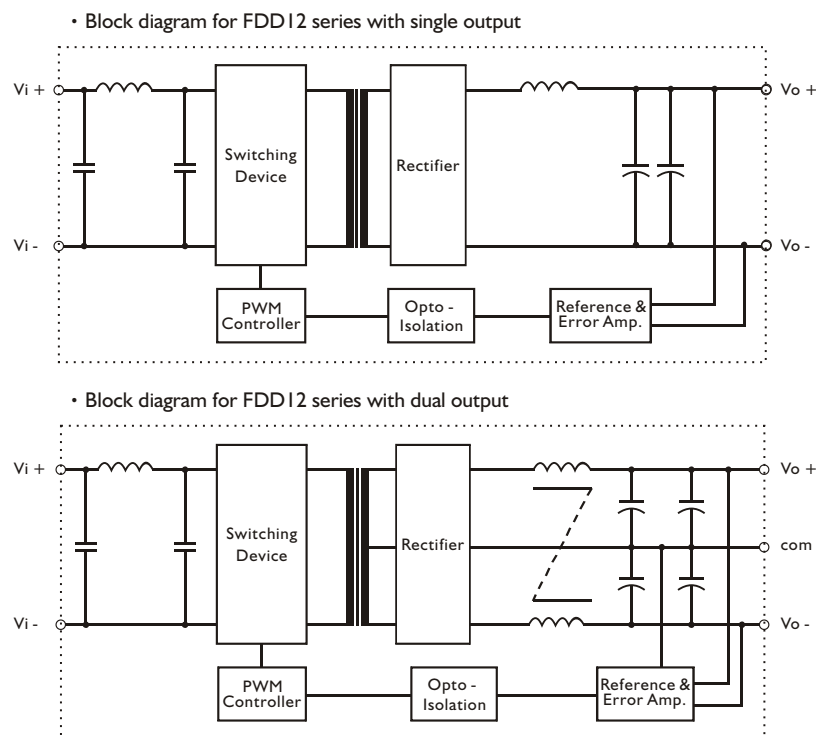


### PIN ASSIGNMENT

#### GENERAL

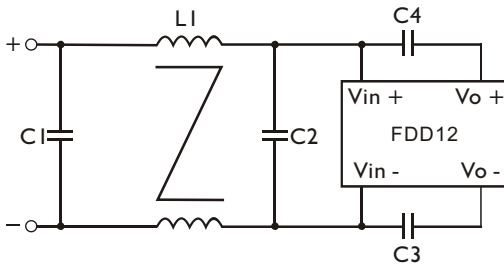
| PIN NO. | 1    | 2    | 3    | 4      | 5    |
|---------|------|------|------|--------|------|
| SINGLE  | Vi + | Vi - | Vo + | NO PIN | Vo - |
| DUAL    | Vi + | Vi - | Vo + | com    | Vo - |

### CIRCUIT SCHEMATIC



### RECOMMENDED CIRCUIT

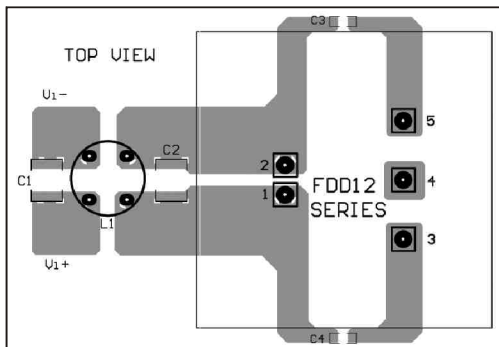
- Recommended filter for EN55022 Class B compliance



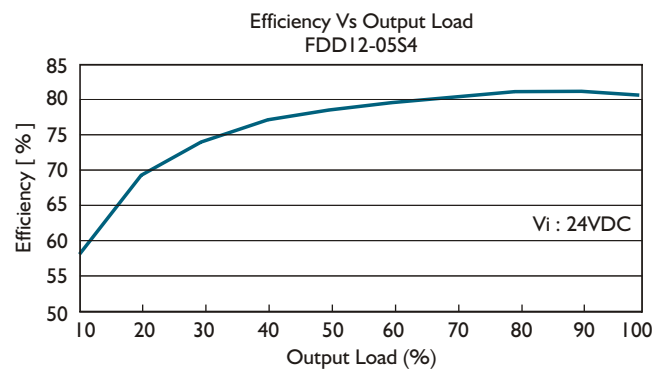
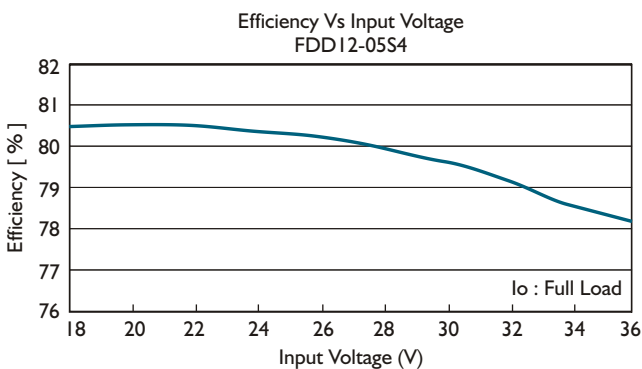
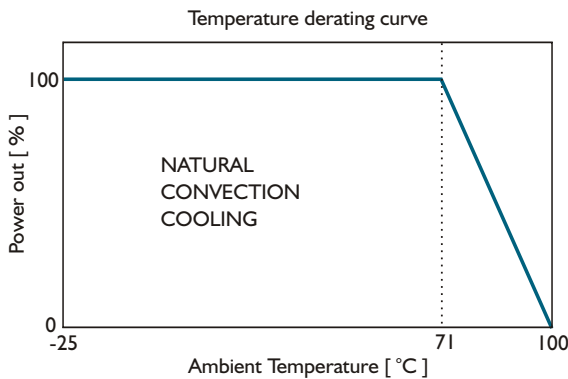
- The components used in the above figure, together with the manufacturer part numbers for these components, are as follows.

|            | C1                      | C2                      | C3             | C4             | L1                 |
|------------|-------------------------|-------------------------|----------------|----------------|--------------------|
| FDD12-XXX4 | 4.7 $\mu$ F / 50V MLCC  | 4.7 $\mu$ F / 50V MLCC  | 1nF / 2KV MLCC | 1nF / 2KV MLCC | 0.5mH Common Choke |
| FDD12-XXX5 | 6.8 $\mu$ F / 100V MLCC | 6.8 $\mu$ F / 100V MLCC | 1nF / 2KV MLCC | 1nF / 2KV MLCC | 0.5mH Common Choke |

- Recommended EN 55022 Class B filter circuit layout.



### DERATING AND EFFICIENCY CURVE



# FDD12 SERIES

DC - DC CONVERTER  
12W TRIPLE OUTPUT



## FEATURES

- LOW COST
- 4:1 WIDE INPUT RANGE
- I/O ISOLATION
- LC INPUT FILTER
- SHORT CIRCUIT PROTECTION
- HIGH PERFORMANCE
- 2 YEARS WARRANTY

## MODEL LIST

| MODEL NO.            | INPUT VOLTAGE | INPUT CURRENT (typ.) | OUTPUT WATTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | EFF. (min.) | EFF. (typ.) | CAPACITOR LOAD (max.)        |
|----------------------|---------------|----------------------|----------------|----------------|----------------|-------------|-------------|------------------------------|
| Triple Output Models |               |                      |                |                |                |             |             |                              |
| FDD12 - 0512T4       | 10~36 VDC     | 0.62 A               | 12 WATTS       | +5 / ±12 VDC   | 1.5A / ± 0.2 A | 80%         | 82%         | 3500 $\mu$ F / ±1000 $\mu$ F |
| FDD12 - 0515T4       | 10~36 VDC     | 0.64 A               | 12 WATTS       | +5 / ±15 VDC   | 1.5A / ± 0.16A | 80%         | 82%         | 3500 $\mu$ F / ±1000 $\mu$ F |
| FDD12 - 0512T5       | 18~72 VDC     | 0.31 A               | 12 WATTS       | +5 / ±12 VDC   | 1.5A / ± 0.2 A | 80%         | 82%         | 3500 $\mu$ F / ±1000 $\mu$ F |
| FDD12 - 0515T5       | 18~72 VDC     | 0.31 A               | 12 WATTS       | +5 / ±15 VDC   | 1.5A / ± 0.16A | 80%         | 82%         | 3500 $\mu$ F / ±1000 $\mu$ 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              |                       | 200    |        | KHz    |
| Isolation voltage       | Input - Output              | 1500                  |        |        | VDC    |
| Isolation resistance    | Input - Output, @ 500VDC    | 100                   |        |        | MΩ     |
| Isolation capacitance   | 100KHz / 1V                 |                       |        | 1000   | PF     |
| Ambient temperature     | Operating at Vi nom, Io nom | -25                   |        | + 71   | °C     |
| Case temperature        | Operating at Vi nom, Io nom |                       |        | + 100  | °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                    | Belcore issue 6@40°C, GB    |                       | 960000 |        | Hours  |
| Cooling                 | Free air convection         |                       |        |        |        |

| INPUT SPECIFICATIONS     |                          |            |      |      |      |
|--------------------------|--------------------------|------------|------|------|------|
| Characteristics          | Conditions               | min.       | typ. | max. | unit |
| Input voltage range      | Ta min ...Ta max, Io nom | 10         | 24   | 36   | VDC  |
|                          |                          | 18         | 48   | 72   | VDC  |
| No load input current    | Vi nom, Io = 0           | 24V models |      | 25   | mA   |
|                          |                          | 48V models |      | 15   | mA   |
| Input voltage w/o damage | Io nom                   | 24V models |      | 40   | VDC  |
|                          |                          | 48V models |      | 75   | VDC  |
| Startup voltage          | Io nom                   | 24V models | 9.4  |      | VDC  |
|                          |                          | 48V models | 15   |      | VDC  |
| Input filter             | Pi type                  |            |      |      |      |

| OUTPUT SPECIFICATIONS   |                                |                                                |      |             |      |
|-------------------------|--------------------------------|------------------------------------------------|------|-------------|------|
| Characteristics         | Conditions                     | min.                                           | typ. | max.        | unit |
| Output voltage accuracy | Vi nom, Io nom                 | + 5V                                           |      | ± 2         | %    |
|                         |                                | ± 12V or ± 15V                                 |      | ± 6         | %    |
| Minimum load            | Vi nom                         | + 5V                                           | 10   |             | %    |
|                         |                                | ± 12V or ± 15V                                 | 20   |             | %    |
| Line regulation         | Io nom, Vi min ...Vi max       |                                                |      | ± 2         | %    |
| Load regulation         | Vi nom, Io min...Io nom        | + 5V                                           |      | ± 2         | %    |
|                         |                                | ± 12V or ± 15V                                 |      | ± 6         | %    |
| Cross regulation        | Aymmetrical load 20% - 100% FL |                                                |      | ± 6         | %    |
| Startup time            | Vi nom, Io nom                 |                                                |      | 30          | ms   |
| Transient recovery time | Vi nom, I ~ 0.5 Io nom         |                                                |      | 500         | μs   |
| Ripple & noise          | Vi nom, Io nom, BW = 20MHz     |                                                |      | Vout x ± 1% | mV   |
| Efficiency              | Vi nom, Io nom, Po / Pi        | Up to 82%, See model list and efficiency curve |      |             |      |

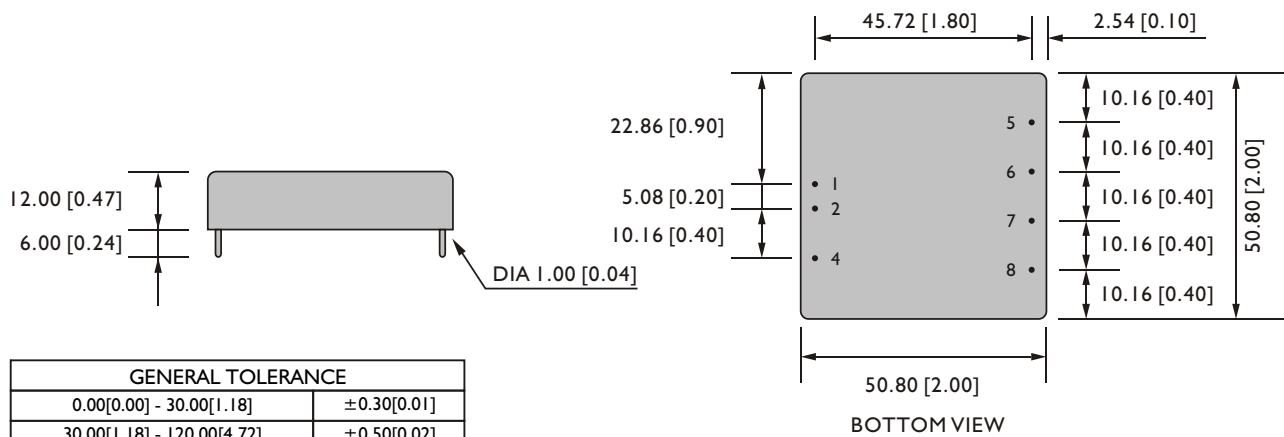
| CONTROL AND PROTECTION     |                                                                                                               |
|----------------------------|---------------------------------------------------------------------------------------------------------------|
| Remote ON / OFF            | ON : opened or 8 ~ 10VDC applied, reference to input GND<br>OFF : -0.3 ~ 2VDC applied, reference to input GND |
| Input reversed             | Shunt diode built in, external fuse recommended (24Vin : 1.5A, 48Vin : 1A)                                    |
| Output short circuit       | Current limited (Auto-recovery)                                                                               |
| Rated over load protection | 110%min....140%max                                                                                            |

### PHYSICAL CHARACTERISTICS

|                  |                                             |
|------------------|---------------------------------------------|
| Case size        | 50.8 x 50.8 x 12.0 mm (2 x 2 x 0.47 inches) |
| Case material    | Plastic base / Metal case                   |
| Weight           | 70 g                                        |
| Patting material | Epoxy                                       |

### MECHANISM & PIN CONFIGURATION

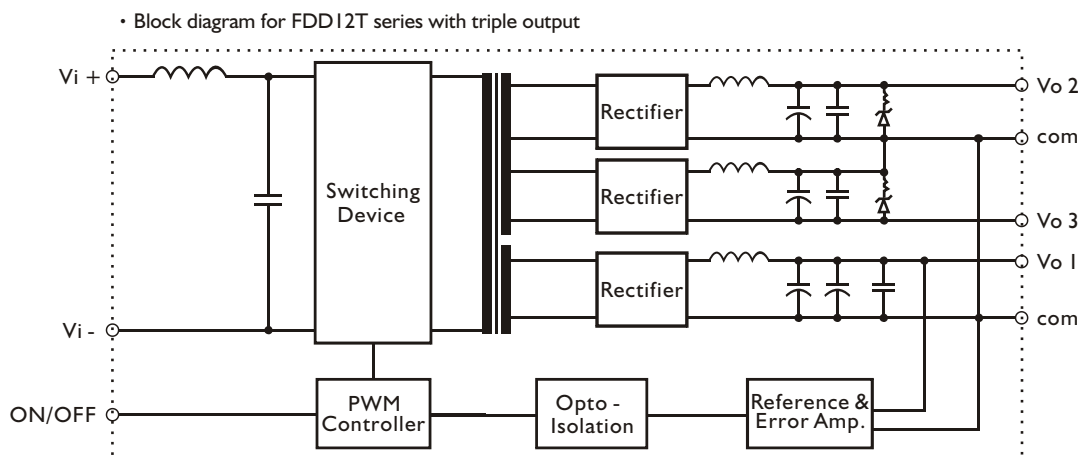
mm [inch]



### PIN ASSIGNMENT

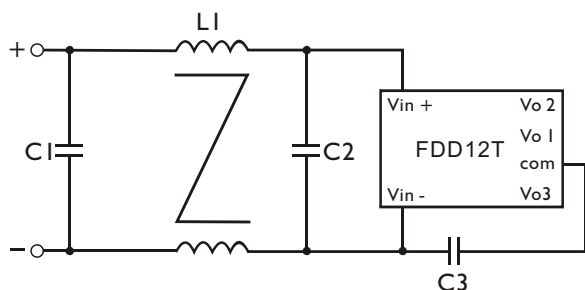
| GENERAL |     |      |          |                |               |     |                |
|---------|-----|------|----------|----------------|---------------|-----|----------------|
| PIN NO. | 1   | 2    | 4        | 5              | 6             | 7   | 8              |
| TRIPLE  | Vi+ | Vi - | ON / OFF | Vo2<br>(+ OUT) | Vo1<br>(+ 5V) | com | Vo3<br>(- OUT) |

### CIRCUIT SCHEMATIC



### RECOMMENDED CIRCUIT

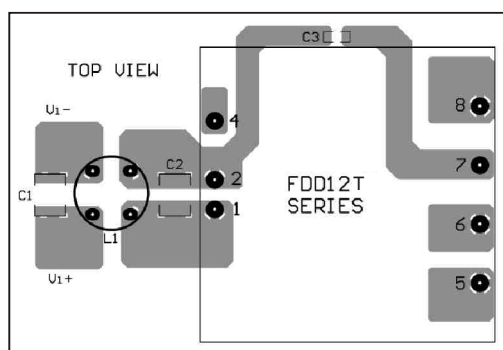
- Recommended filter for EN55022 Class B compliance



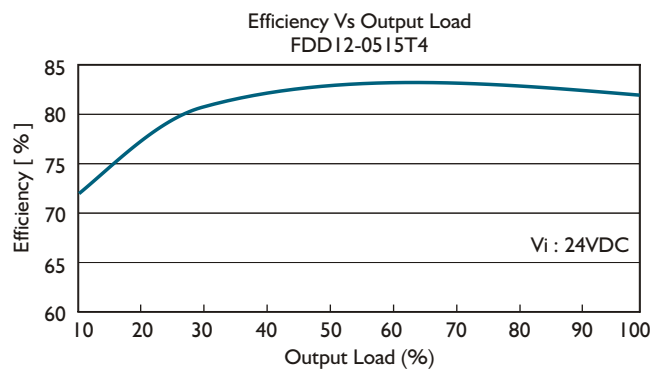
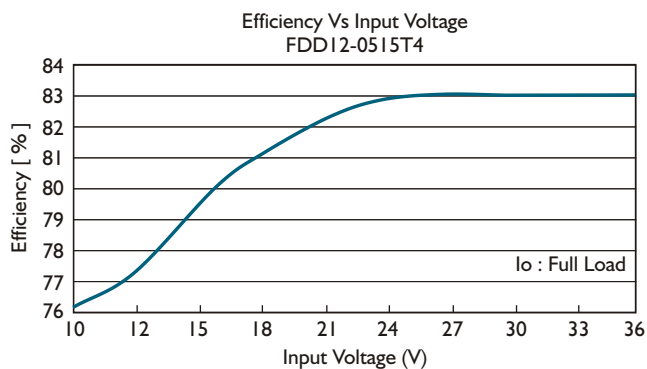
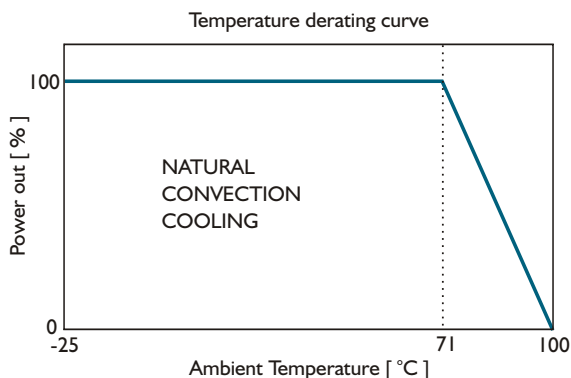
- The components used in the above figure, together with the manufacturer part numbers for these components, are as follows.

|              | C1                      | C2                      | C3             | L1                 |
|--------------|-------------------------|-------------------------|----------------|--------------------|
| FDD12-XXXXT4 | 3.3 $\mu$ F / 50V MLCC  | 3.3 $\mu$ F / 50V MLCC  | 1nF / 2KV MLCC | 0.5mH Common Choke |
| FDD12-XXXXT5 | 3.3 $\mu$ F / 100V MLCC | 3.3 $\mu$ F / 100V MLCC | 1nF / 2KV MLCC | 0.5mH Common Choke |

- Recommended EN 55022 Class B filter circuit layout.



### DERATING AND EFFICIENCY CURVE





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.