

# TDD40 SERIES

DC - DC CONVERTER  
33 ~ 42W SINGLE & DUAL OUTPUT



## FEATURES

- EFFICIENCY UP TO 87%
- 2:1 & 3:1 WIDE INPUT RANGE
- I/O ISOLATION
- INPUT Pi FILTER
- 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.) |
|-----------------------------|---------------|----------------------|----------------|----------------|----------------|-------------|-------------|-----------------------|
| <b>Single Output Models</b> |               |                      |                |                |                |             |             |                       |
| TDD40 - 03S2                | 18~60 VDC     | 1.79 A               | 33 WATTS       | +3.3 VDC       | 10000 mA       | 76%         | 78%         | 3500 $\mu$ F          |
| TDD40 - 05S2                | 18~60 VDC     | 2.01 A               | 40 WATTS       | + 5 VDC        | 8000 mA        | 82%         | 84%         | 3500 $\mu$ F          |
| TDD40 - 12S2                | 18~60 VDC     | 2.04 A               | 42 WATTS       | + 12 VDC       | 3500 mA        | 85%         | 87%         | 330 $\mu$ F           |
| TDD40 - 15S2                | 18~60 VDC     | 2.01 A               | 42 WATTS       | + 15 VDC       | 2800 mA        | 85%         | 87%         | 220 $\mu$ F           |
| TDD40 - 03S3                | 35~75 VDC     | 0.89 A               | 33 WATTS       | +3.3 VDC       | 10000 mA       | 76%         | 78%         | 3500 $\mu$ F          |
| TDD40 - 05S3                | 35~75 VDC     | 0.96 A               | 40 WATTS       | + 5 VDC        | 8000 mA        | 82%         | 84%         | 3500 $\mu$ F          |
| TDD40 - 12S3                | 35~75 VDC     | 1.00 A               | 42 WATTS       | + 12 VDC       | 3500 mA        | 85%         | 87%         | 330 $\mu$ F           |
| TDD40 - 15S3                | 35~75 VDC     | 1.00 A               | 42 WATTS       | + 15 VDC       | 2800 mA        | 85%         | 87%         | 220 $\mu$ F           |
| <b>Dual Output Models</b>   |               |                      |                |                |                |             |             |                       |
| TDD40 - 12D2                | 18~60 VDC     | 1.97 A               | 40 WATTS       | $\pm$ 12 VDC   | $\pm$ 1700 mA  | 84%         | 86%         | $\pm$ 470 $\mu$ F     |
| TDD40 - 15D2                | 18~60 VDC     | 2.05 A               | 42 WATTS       | $\pm$ 15 VDC   | $\pm$ 1400 mA  | 84%         | 86%         | $\pm$ 100 $\mu$ F     |
| TDD40 - 12D3                | 35~75 VDC     | 0.98 A               | 40 WATTS       | $\pm$ 12 VDC   | $\pm$ 1700 mA  | 84%         | 86%         | $\pm$ 470 $\mu$ F     |
| TDD40 - 15D3                | 35~75 VDC     | 0.99 A               | 42 WATTS       | $\pm$ 15 VDC   | $\pm$ 1400 mA  | 84%         | 86%         | $\pm$ 100 $\mu$ 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                       |                       | 300     |        | KHz    |
| Isolation voltage       | Input - Output                       | 1,500                 |         |        | VDC    |
| Isolation resistance    | Input - Output, @ 500VDC             | 100                   |         |        | MΩ     |
| Isolation capacitance   | 100KHz / 1V                          |                       |         | 1,000  | PF     |
| Ambient temperature     | Vi nom, 3.3V & 5V output models      | -25                   |         | + 61   | °C     |
|                         | Io nom 12V, 15V & dual output models | -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               |                                      | L76.2 x W50.8 x H24.4 |         |        | mm     |
| MTBF                    | Belcore issue 6@40°C, GB             |                       | 681,000 |        | Hours  |
| Cooling                 | Free air convection                  |                       |         |        |        |

#### INPUT SPECIFICATIONS

| Characteristics          | Conditions                | min. | typ. | max. | unit |
|--------------------------|---------------------------|------|------|------|------|
| Input voltage range      | Ta min ... Ta max, Io nom | 18   | 24   | 60   | VDC  |
|                          |                           | 35   | 48   | 75   | VDC  |
| No load input current    | Vi nom, Io = 0            | 24V  |      | 20   | mA   |
|                          |                           | 48V  |      | 15   | mA   |
| Input voltage w/o damage | Io nom                    | 24V  |      | 65   | VDC  |
|                          |                           | 48V  |      | 80   | VDC  |
| Startup voltage          | Io nom                    | 24V  | 16   |      | VDC  |
|                          |                           | 48V  | 30   |      | 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)              | 6  |      |             | %    |
| 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 6% - 100% FL                 |  |      | ± 5         | %    |
| Startup time                  | Vi nom, Io nom                                |  |      | 30          | ms   |
| Transient recovery time       | Vi nom, 1 ~ 0.5 Io nom                        |  |      | 500         | μs   |
| Ripple & noise                | Vi nom, Io nom, 3.3V & 5V                     |  |      | 150         | mV   |
|                               | BW = 20MHz 12V, 15V & dual                    |  |      | Vout x ± 1% | mV   |
| Voltage trim range *          | Vi nom 3.3V                                   |  | ± 5  |             | %    |
|                               | 5V, 12V, 15V & dual                           |  | ± 10 |             | %    |
| Efficiency                    | Vi nom, Io nom, Po / Pi                       | Up to 87%, See model list and efficiency curve |      |             |      |

\* NOTE : Pls refer to Fig 1 & Table 1 for connection resistance recommended.

#### CONTROL AND PROTECTION

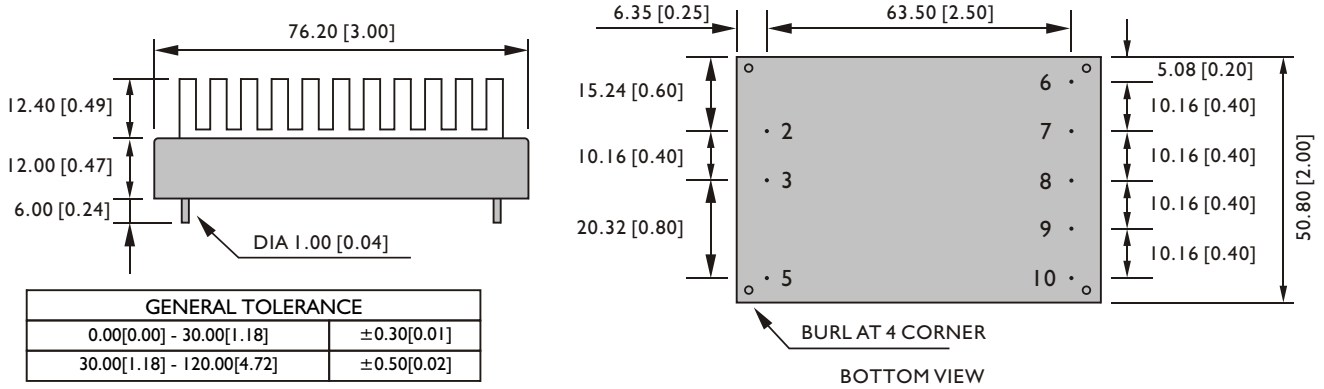
|                            |   |
|----------------------------|---|
| Remote ON / OFF            | ON: opened or 8 ~ 10VDC applied, reference to input GND<br>OFF: -0.3 ~ 2VDC applied, reference to input GND |
| Input reversed             | Shunt diode built in, external fuse recommended 3A  |
| Output short circuit       | Current limited (Auto-recovery)   |
| Rated over load protection | 110%min....140%max  |

### PHYSICAL CHARACTERISTICS

|                  |   |
|------------------|---|
| Case size        | 76.2 x 50.8 x 24.4 mm ( 3 x 2 x 0.96 inches ) |
| Case material    | Plastic base / Metal case                     |
| Weight           | 175 g   |
| Potting material | Epoxy   |

### MECHANISM & PIN CONFIGURATION

mm [inch]



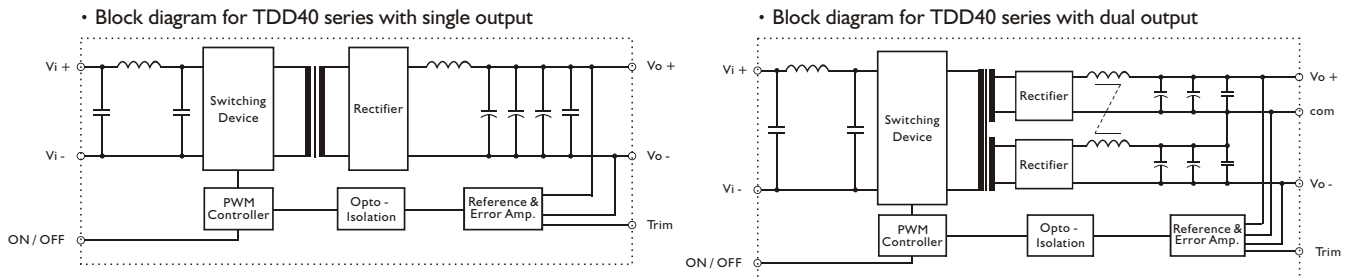
| GENERAL TOLERANCE          |             |
|----------------------------|-------------|
| 0.00[0.00] - 30.00[1.18]   | ±0.30[0.01] |
| 30.00[1.18] - 120.00[4.72] | ±0.50[0.02] |

### PIN ASSIGNMENT

#### GENERAL

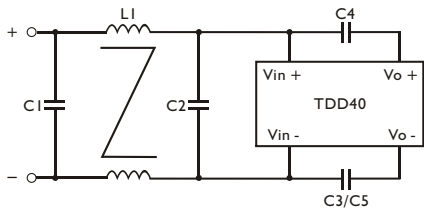
| PIN NO. | 2    | 3    | 5        | 6     | 7     | 8    | 9    | 10   |
|---------|------|------|----------|-------|-------|------|------|------|
| SINGLE  | Vi - | Vi + | ON / OFF | N. C. | N. C. | Vo - | Vo + | Trim |
| DUAL    | Vi - | Vi + | ON / OFF | Vo -  | N. C. | com  | Vo + | Trim |

### CIRCUIT SCHEMATIC



### RECOMMENDED CIRCUIT

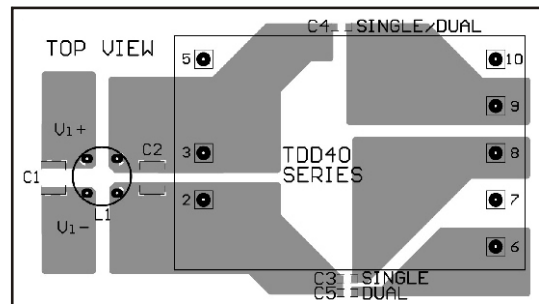
- Recommended filter for EN 55032 Class B compliance.



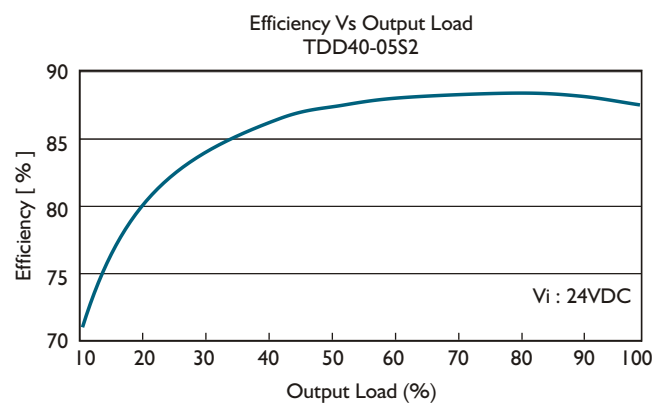
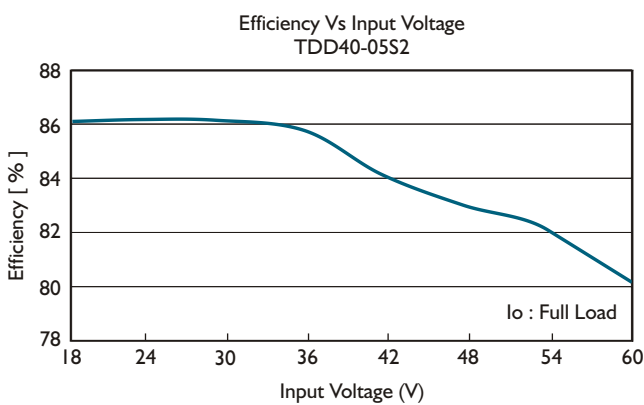
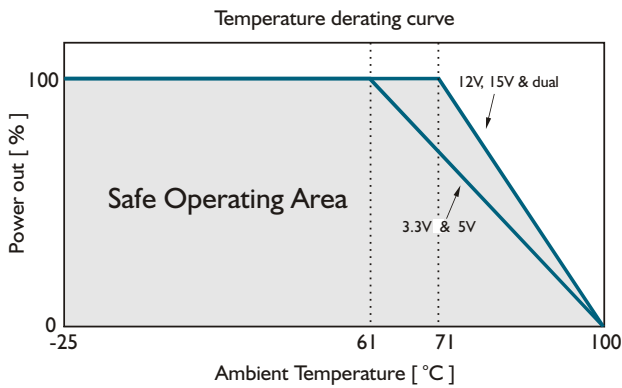
- The components used in the above figure, together with the manufacturer part numbers for these components, are as follows.

|            | C1                      | C2                      | C3/C4/C5         | L1                        |
|------------|-------------------------|-------------------------|------------------|---------------------------|
| TDD40-XXSX | 3.3 $\mu$ F / 100V MLCC | 3.3 $\mu$ F / 100V MLCC | InF / 2KV MLCC   | 1.5mH Command Chock       |
| TDD40-XXD2 | 6.8 $\mu$ F / 100V MLCC | 6.8 $\mu$ F / 100V MLCC | InF / 2KV MLCC   | 500 $\mu$ H Command Chock |
| TDD40-XXD3 | 6.8 $\mu$ F / 100V MLCC | 6.8 $\mu$ F / 100V MLCC | 2.2nF / 2KV MLCC | 500 $\mu$ H Command Chock |

- Recommended EN 55032 Class B filter circuit layout.

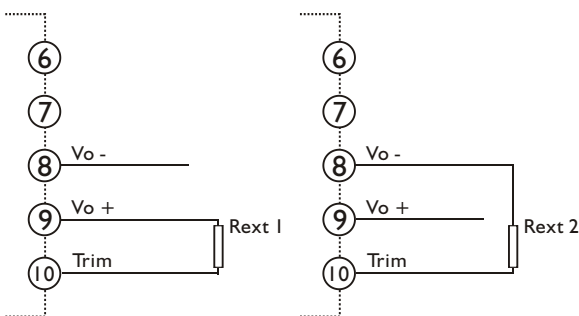


### DERATING AND EFFICIENCY CURVE

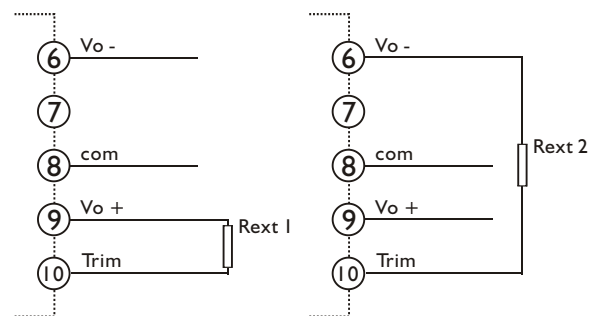


**Fig. 1 Trim connection**

( For Single output )



( For Dual output )



**Table I Typical resistor values for various output voltage adjustment settings**

| Type       | Rext 1       |             | Rext 2       |             |
|------------|--------------|-------------|--------------|-------------|
|            | Vo nom -2.5% | Vo nom -5%  | Vo nom +2.5% | Vo nom +5%  |
| TDD40-03SX | 1KΩ          | 0Ω          | 10KΩ         | 3.9KΩ       |
| Type       | Vo nom -5%   | Vo nom -10% | Vo nom +5%   | Vo nom +10% |
| TDD40-05SX | 1KΩ          | 0Ω          | 1KΩ          | 0Ω          |
| TDD40-12SX | 62KΩ         | 20KΩ        | 8.2KΩ        | 1KΩ         |
| TDD40-15SX | 180KΩ        | 62KΩ        | 20KΩ         | 0Ω          |
| TDD40-12DX | 100KΩ        | 51KΩ        | 10KΩ         | 1KΩ         |
| TDD40-15DX | 180KΩ        | 68KΩ        | 10KΩ         | 0Ω          |