# SERIES: DQD6 | DESCRIPTION: DC-DC CONVERTER

## FEATURES

- up to 6 W isolated output
- single and dual regulated outputs
- over voltage, input under voltage, short circuit, and over current protections
- remote on/off control
- 1,500 Vdc isolation
- -40 ~ 85°C temperature range, with derating
- certified to IEC/EN 62368-1
- PCB, chassis and DIN-rail mount options

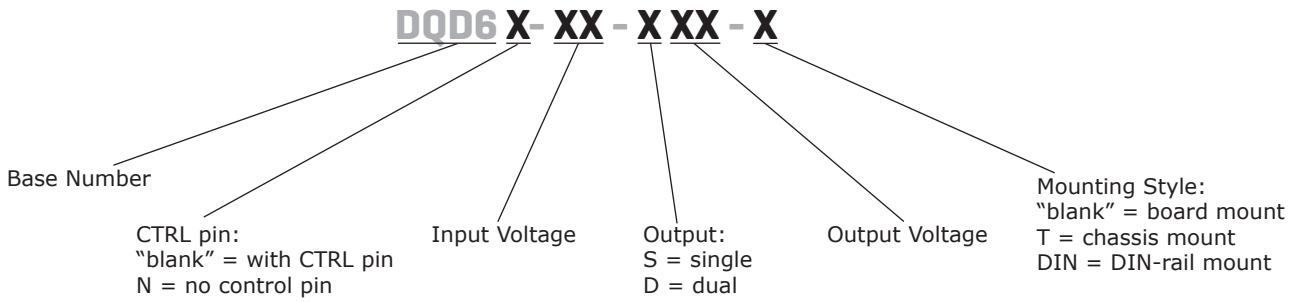
RoHS CE UKCA

## MODEL

| MODEL | input voltage | | output voltage | output current | output power | ripple & noise[1] | efficiency[2] |
|---|---|---|---|---|---|---|---|
| | typ (Vdc) | range (Vdc) | typ (Vdc) | max (mA) | max (W) | max (mVp-p) | typ (%) |
| DQD6-24-S3 | 24 | 9~36 | 3.3 | 1,500 | 4.95 | 100 | 77 |
| DQD6-24-S5 | 24 | 9~36 | 5 | 1,200 | 6 | 100 | 83 |
| DQD6-24-S9 | 24 | 9~36 | 9 | 667 | 6 | 100 | 84 |
| DQD6-24-S12 | 24 | 9~36 | 12 | 500 | 6 | 100 | 85 |
| DQD6-24-S15 | 24 | 9~36 | 15 | 400 | 6 | 100 | 86 |
| DQD6-24-S24 | 24 | 9~36 | 24 | 250 | 6 | 100 | 86 |
| DQD6-24-S40 | 24 | 9~36 | 40 | 150 | 6 | 100 | 86 |
| DQD6-24-D5 | 24 | 9~36 | ±5 | ±600 | 6 | 100 | 82 |
| DQD6-24-D9 | 24 | 9~36 | ±9 | ±333 | 6 | 100 | 84 |
| DQD6-24-D12 | 24 | 9~36 | ±12 | ±250 | 6 | 100 | 85 |
| DQD6-24-D15 | 24 | 9~36 | ±15 | ±200 | 6 | 100 | 86 |
| DQD6-24-D24 | 24 | 9~36 | ±24 | ±125 | 6 | 100 | 86 |
| DQD6-48-S3 | 48 | 18~75 | 3.3 | 1,500 | 4.95 | 100 | 80 |
| DQD6-48-S5 | 48 | 18~75 | 5 | 1,200 | 6 | 100 | 84 |
| DQD6-48-S9 | 48 | 18~75 | 9 | 667 | 6 | 100 | 85 |
| DQD6-48-S12 | 48 | 18~75 | 12 | 500 | 6 | 100 | 87 |
| DQD6-48-S15 | 48 | 18~75 | 15 | 400 | 6 | 100 | 88 |
| DQD6-48-S24 | 48 | 18~75 | 24 | 250 | 6 | 100 | 87 |
| DQD6-48-D5 | 48 | 18~75 | ±5 | ±600 | 6 | 100 | 83 |
| DQD6-48-D9 | 48 | 18~75 | ±9 | ±333 | 6 | 100 | 84 |
| DQD6-48-D12 | 48 | 18~75 | ±12 | ±250 | 6 | 100 | 87 |
| DQD6-48-D15 | 48 | 18~75 | ±15 | ±200 | 6 | 100 | 88 |
| DQD6-48-D24 | 48 | 18~75 | ±24 | ±125 | 6 | 100 | 86 |

Notes:
1. The ripple & noise ≤5%Vo at 0% ~ 5% load, it is tested by the twisted pair method. Please refer to the Ripple & noise test instructions below.
2. The efficiency is tested at full load.
3. Unless otherwise specified, all values or indicators in this manual are tested at Ta=25°C, humidity<75%RH, rated input voltage and rated load (pure resistance load).

## PART NUMBER KEY




## INPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| input voltage range | 24 Vdc input models<br>48 Vdc input models | 9<br>18 | 24<br>48 | 36<br>75 | Vdc<br>Vdc |
| surge voltage | 1 second max<br>24 Vdc input models<br>48 Vdc input models | <br>-0.7<br>-0.7 | | <br>50<br>100 | <br>Vdc<br>Vdc |
| turn-on voltage threshold | at full load<br>24 Vdc input models<br>48 Vdc input models | | | <br>9<br>18 | <br>Vdc<br>Vdc |
| turn-off voltage threshold | at full load<br>24 Vdc input models<br>48 Vdc input models | <br>5.5<br>12 | <br>6.5<br>15 | | <br>Vdc<br>Vdc |
| filter | Pi filter | | | | |
| reflected ripple current | at rated input voltage | | 20 | | mA |
| remote on/off | module on: CTRL pin opened or pulled high (3~12 Vdc) with respect to -Vin | | | | |
| | module off: CTRL pin pulled low (0~1.2 Vdc) with respect to -Vin | | | | |

## OUTPUT

| parameter | conditions/description | | min | typ | max | units |
|---|---|---|---|---|---|---|
| maximum capacitive load | 3.3, 5 Vdc output models<br>±5, 9 Vdc output models<br>12, 15, 24 Vdc output models<br>40 Vdc output models<br>±9, ±12, ±15 Vdc output models<br>±24 Vdc output models | | | | 2200<br>1000<br>680<br>470<br>330<br>220 | µF<br>µF<br>µF<br>µF<br>µF<br>µF |
| voltage accuracy | 5% ~ 100% load | | | ±1 | ±3 | % |
| | 0% ~ 5% load | single output<br>dual output | | ±1<br>±2 | ±3<br>±5 | %<br>% |
| voltage balance | dual output | | | ±0.5 | ±1.5 | % |
| voltage regulation | full voltage range, full load | positive output<br>negative output | | ±0.2<br>±0.5 | ±0.5<br>±1 | %<br>% |
| load regulation | 5% ~ 100% load | positive output<br>negative output | | ±0.5<br>±0.5 | ±1<br>±1.5 | %<br>% |
| transient response deviation | 25% rated load step change | | | ±3 | ±5 | % |
| transient response recovery | 25% rated load step change | | | 300 | 500 | µs |
| start-up time | at rated input voltage and constant resistance load | | | 10 | | ms |
| temperature coefficient | | | | | ±0.03 | %/°C |
| switching frequency | PWM mode | | | 300 | | kHz |

## PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| over current protection | | 110 | 150 | 260 | % |
| over voltage protection | | 110 | 160 | 230 | % |
| short circuit protection | continuous, auto recovery | | | | |
| output overshoot | | | | 10 | % |

## SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| isolation voltage | input to output for 1 minute, 1 mA max | 1,500 | | | Vdc |
| isolation capacitance | input to output, (100 kHz, 0.1V) | | 1,000 | | pF |
| safety approvals | certified to 62368-1: IEC, EN | | | | |
| conducted emissions | CISPR32/EN55032 Class B (see recommended circuit) | | | | |
| radiated emissions | CISPR32/EN55032 Class B (see recommended circuit) | | | | |
| ESD | IEC/EN61000-4-2 Contact ±4 kV, Air ±8 kV, Perf. Criteria B | | | | |
| radiated immunity | IEC/EN61000-4-3 10 V/m, Perf. Criteria A | | | | |
| conducted immunity | IEC/EN61000-4-6 3 Vrms, Perf. Criteria A | | | | |
| MTBF | as per MIL-HDBK-217F at 25 °C | 1,000,000 | | | hours |
| RoHS | yes | | | | |

## ENVIRONMENTAL

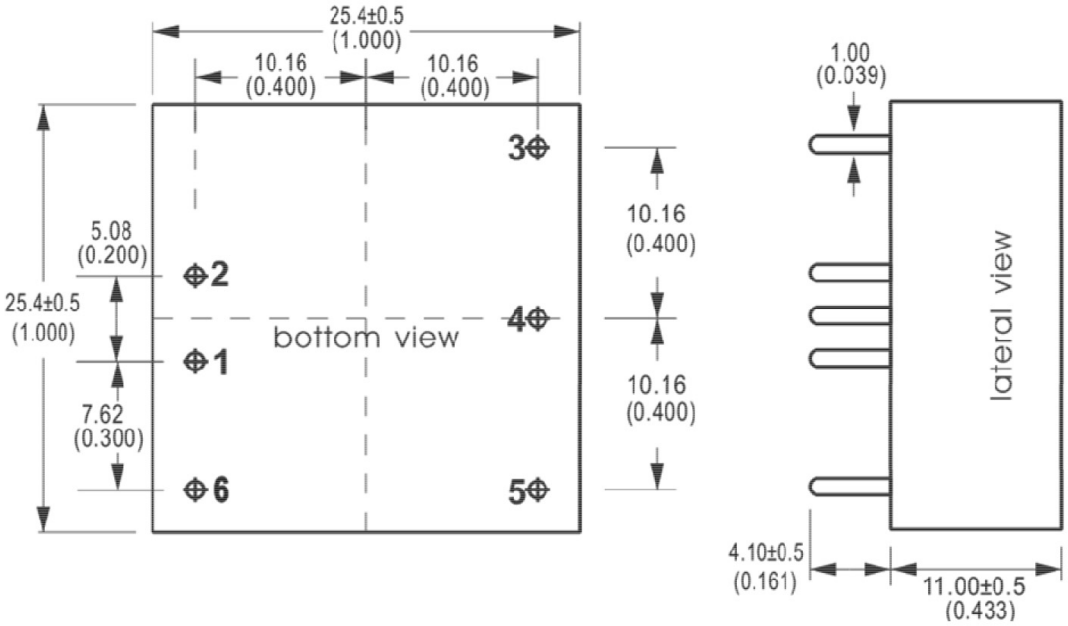
| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating temperature | see derating curve | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| operating humidity | non condensing | 5 | | 95 | % |

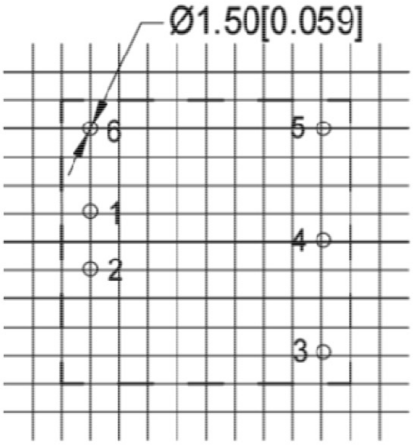
## MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| dimensions | board mount: 25.4 x 25.4 x 11.0 [1.000 x 1.000 x 0.433 inches]<br>chassis mount: 76.0 x 31.5 x 21.3 [2.990 x 1.240 x 0.838 inches]<br>DIN-rail mount: 76.0 x 31.5 x 26.0 [2.990 x 1.240 x 1.023 inches] | | | | mm<br>mm<br>mm |
| case material | aluminum | | | | |
| weight | board mount<br>chassis mount<br>DIN-rail mount | | 15<br>36<br>56 | | g<br>g<br>g |
| cooling | natural convection | | | | |

## MECHANICAL DRAWING

**Board Mount**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±0.50 [±0.020]



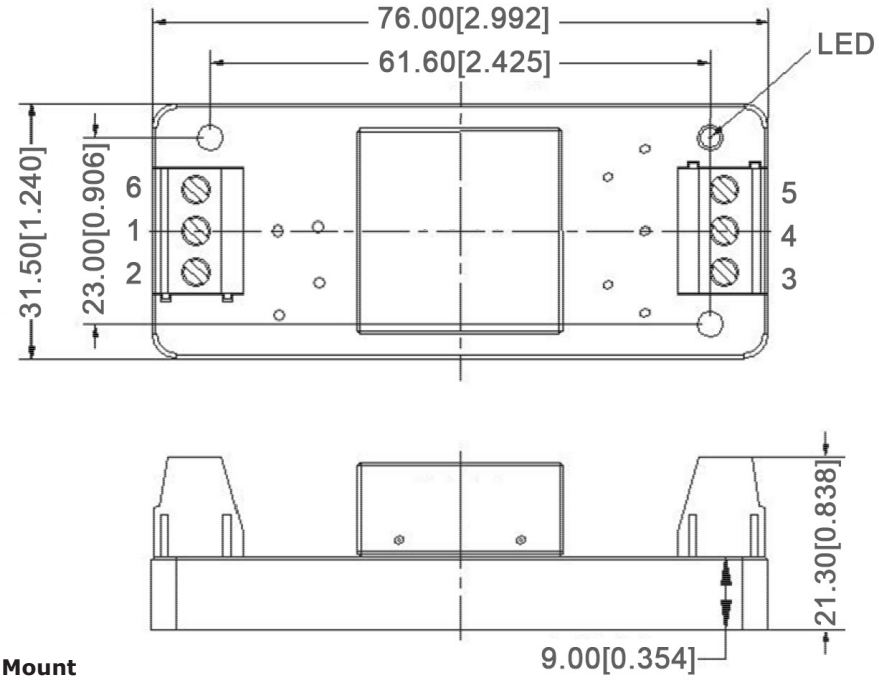




| PIN CONNECTIONS | | | | |
|---|---|---|---|---|
| PIN | Single | | Dual | |
| 1 | -Vin | | -Vin | |
| 2 | +Vin | | +Vin | |
| 3 | +Vout | | +Vout | |
| 4 | NC | | COM | |
| 5 | GND | | -Vout | |
| 6 | Ctrl | No pin | Ctrl | No pin |

Note: NC = no connection

## MECHANICAL DRAWING (CONTINUED)

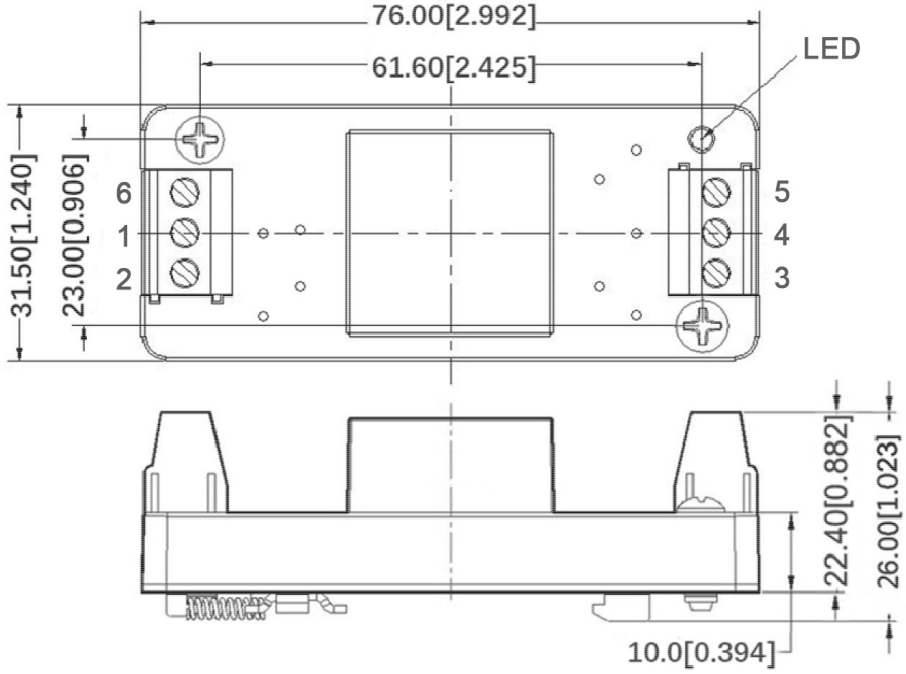
**Chassis Mount**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±0.50 [±0.02]
wire range: 24~12 AWG
tightening torque: max 0.4 N·m




| PIN CONNECTIONS | | | | |
|---|---|---|---|---|
| PIN | Single | | Dual | |
| 1 | -Vin | | -Vin | |
| 2 | +Vin | | +Vin | |
| 3 | +Vout | | +Vout | |
| 4 | NC | | COM | |
| 5 | GND | | -Vout | |
| 6 | Ctrl | No pin | Ctrl | No pin |

Note: NC = no connection

**DIN-rail Mount**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±0.50 [±0.02]
wire range: 24~12 AWG
tightening torque: max 0.4 N·m

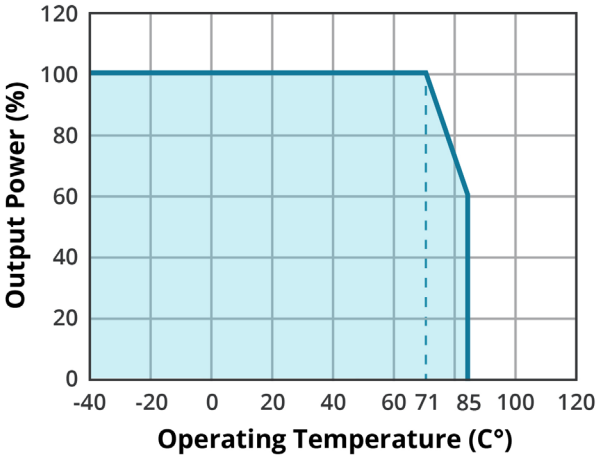



| PIN CONNECTIONS | | | | |
|---|---|---|---|---|
| PIN | Single | | Dual | |
| 1 | -Vin | | -Vin | |
| 2 | +Vin | | +Vin | |
| 3 | +Vout | | +Vout | |
| 4 | NC | | COM | |
| 5 | GND | | -Vout | |
| 6 | Ctrl | No pin | Ctrl | No pin |

Note: NC = no connection

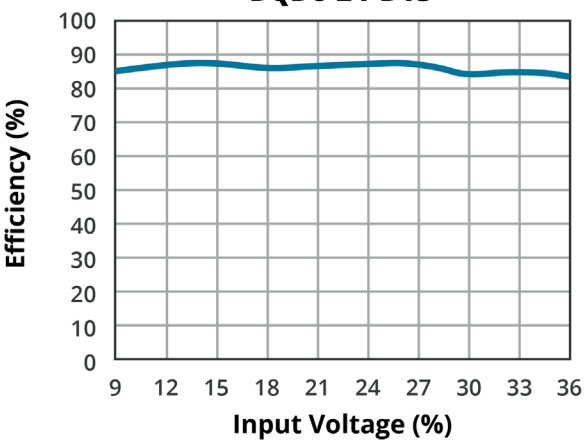
## DERATING CURVES

***TEMPERATURE DERATING CURVE***

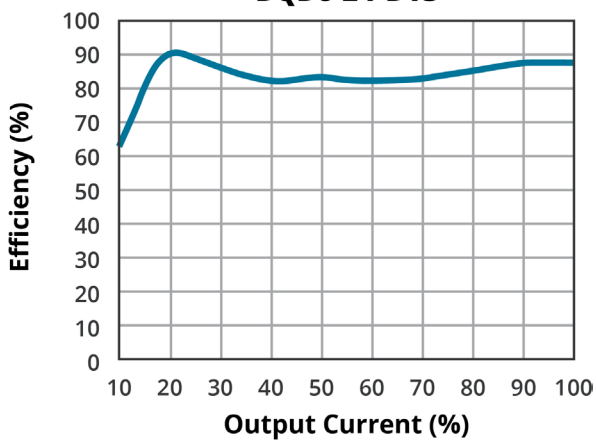



## EFFICIENCY CURVES

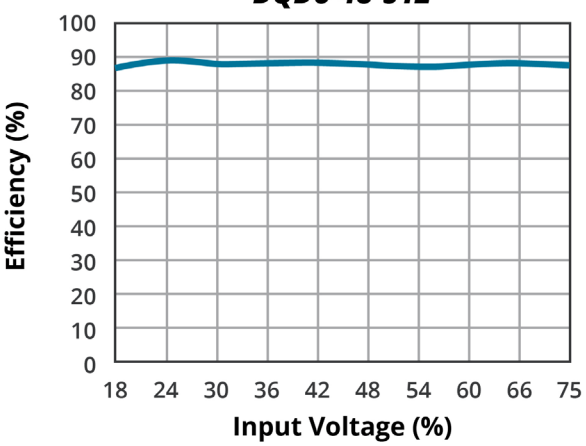
***EFFICIENCY VS INPUT VOLTAGE***
***DQD6-24-D15***



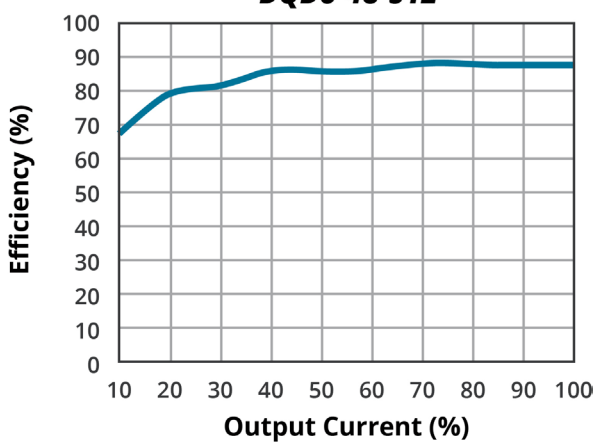

***EFFICIENCY VS OUTPUT CURRENT***
***DQD6-24-D15***




***EFFICIENCY VS INPUT VOLTAGE***
***DQD6-48-S12***




***EFFICIENCY VS OUTPUT CURRENT***
***DQD6-48-S12***

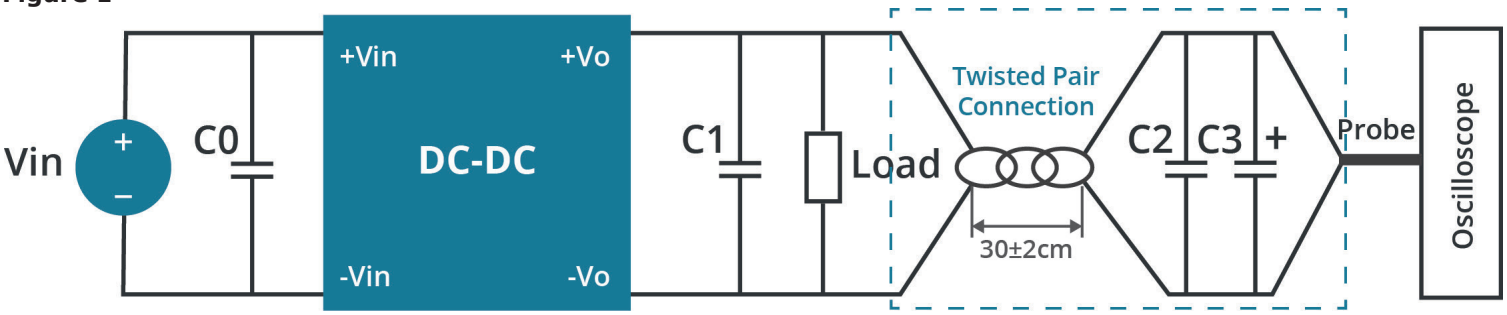


## RIPPLE AND NOISE TEST INSTRUCTION

**1.** The ripple noise test requires the following setup:
- 12 twisted pair cables.
- An oscilloscope configured to Sample Mode with a bandwidth of 20 MHz.
- A 100 MHz bandwidth probe with the capacitor and ground removed.
- Capacitors C2 (0.1 µF), a polypropylene capacitor, and C3 (10 µF), a high-frequency, low-resistance electrolytic capacitor, connected in parallel to the probes and one side of the twisted pair.
- C0 and C1 refer to the application circuit as per the recommended specifications.

**2.** The power supply output is connected to the load using cables. The opposite end of the twisted pair (30 cm ± 2 cm in length) should be connected in parallel with the load. Ensure that the polarity of the output and the oscilloscope probe is correct and not reversed. The test can start once the power is switched on.

**Figure 1**




## RIPPLE AND NOISE TEST CIRCUIT

**Figure 2**

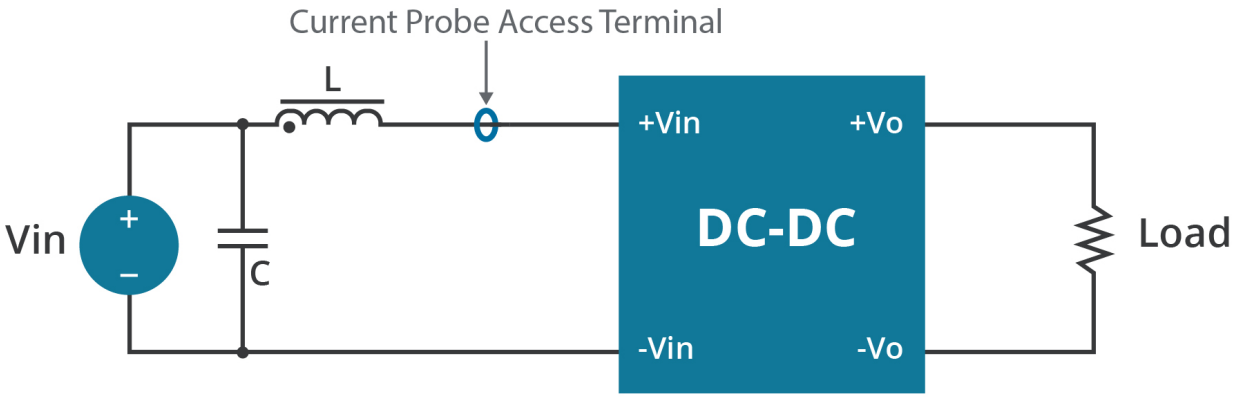



**Table 1**

| COMPONENT | PARAMETER |
|---|---|
| C | 100 µF/ 100 V |
| L | 4.7 µH |

## APPLICATION NOTES

**Figure 3**
**Single output**

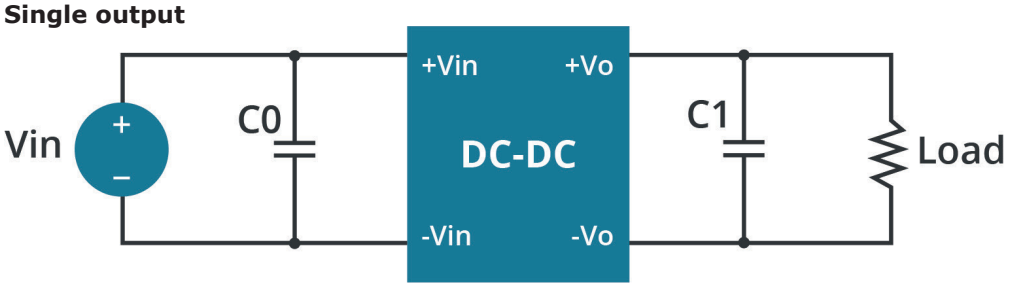



**Table 2**

| COMPONENT | PARAMETER |
|---|---|
| C0 | 100 µF/ 100 V |
| C1 | 10 µF/ 50 V |

**Figure 4**
**Dual output**

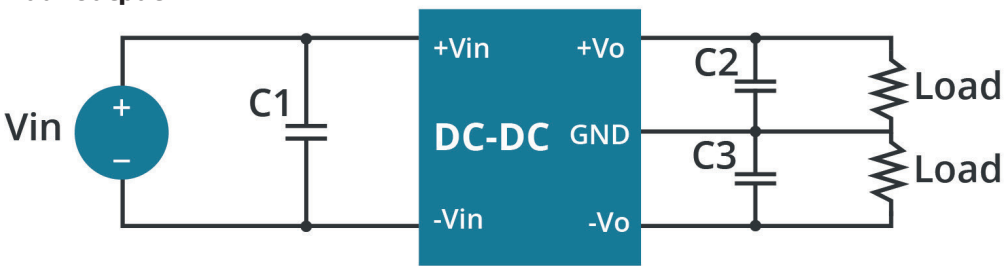



**Table 3**

| COMPONENT | PARAMETER |
|---|---|
| C1 | 100 µF/ 100 V |
| C2, C3 | 10 µF/ 50 V |

## EMC RECOMMENDED CIRCUIT

**Figure 5**

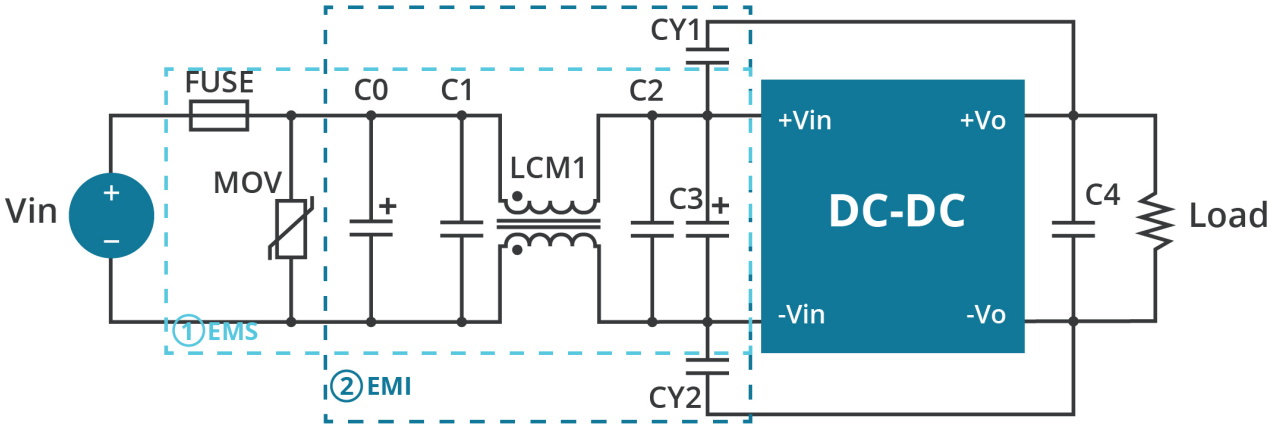



**Table 4**

| COMPONENT | 24 Vdc | 48 Vdc |
|---|---|---|
| Fuse | TBD by customer | |
| MOV | 10D470K | 10D101K |
| C0, C3 | 330 µF/50 V | 100 µF/100 V |
| C1, C2, C4 | 10 µF/50 V | 10 µF/100 V |
| LCM1 | 10 mH | |
| CY1, CY2 | 1 nF/3 kV | |

Note: 1. Section 1 of the circuit diagram corresponds to EMS, while Section 2 handles EMI filtering. Both sections can be modified to suit specific requirements or situations.

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 05/29/2025 |
| 1.01 | no control pin option added | 07/21/2025 |
| 1.02 | remote on/off description added to input section | 09/02/2025 |

The revision history provided is for informational purposes only and is believed to be accurate.

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