# SERIES: DQD50 | DESCRIPTION: DC-DC CONVERTER

## FEATURES

- up to 50 W isolated output
- single regulated outputs
- over voltage, input under voltage, short circuit, and over current protections
- remote on/off control
- 1,500 Vdc isolation
- -40 ~ 105°C temperature range, with derating
- certified to IEC/EN 62368-1
- PCB, chassis and DIN-rail mount options

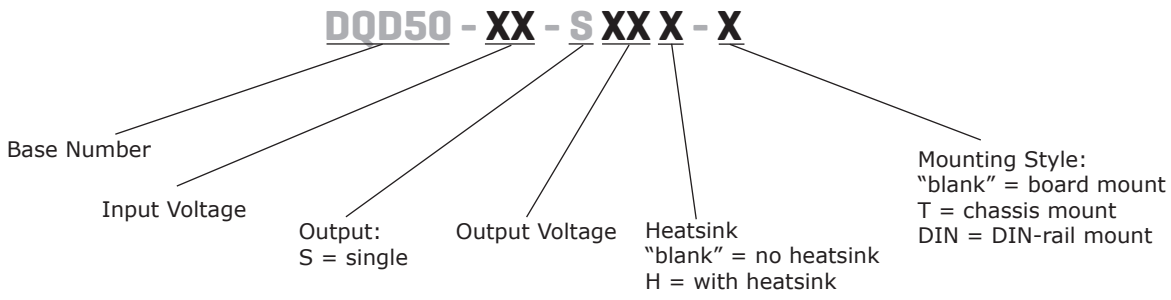
RoHS CE UKCA

## MODEL

| MODEL | input voltage | | output voltage | output current | output power | ripple & noise[1] | efficiency[2] |
|---|---|---|---|---|---|---|---|
| | typ (Vdc) | range (Vdc) | typ (Vdc) | max (A) | max (W) | max (mVp-p) | typ (%) |
| DQD50-24-S5 | 24 | 9~36 | 5 | 10.0 | 50 | 150 | 92 |
| DQD50-24-S12 | 24 | 9~36 | 12 | 4.167 | 50 | 150 | 92 |
| DQD50-24-S15 | 24 | 9~36 | 15 | 3.333 | 50 | 150 | 92 |
| DQD50-24-S24 | 24 | 9~36 | 24 | 2.083 | 50 | 150 | 92 |
| DQD50-48-S5 | 48 | 18~75 | 5 | 10.0 | 50 | 150 | 92 |
| DQD50-48-S12 | 48 | 18~75 | 12 | 4.167 | 50 | 150 | 92 |
| DQD50-48-S15 | 48 | 18~75 | 15 | 3.333 | 50 | 150 | 92 |
| DQD50-48-S24 | 48 | 18~75 | 24 | 2.083 | 50 | 150 | 92 |

Notes:
1. The ripple and noise is measured at 5%~100% load and 20MHz bandwidth. 0% ~5% load ripple & noise is less than or equal to 5%Vo; the ripple & noise test adopts the parallel line test method, see the ripple & noise test instructions for details.
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 |
| input current | 24 Vd input models, at full load<br>48 Vd input models, at full load | | | 6.4<br>3.0 | A<br>A |
| input current (full load/no load) | 24 Vdc input; 5 Vdc output model<br>24 Vdc input; 12, 15 Vdc output models<br>24 Vdc input; 24 Vdc output models<br>48 Vdc input; 5, 12, 15 Vdc output models<br>48 Vdc input; 24 Vdc output models | | 2264/8<br>2264/4<br>2264/3<br>1133/4<br>1133/3 | | mA<br>mA<br>mA<br>mA<br>mA |
| 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 |
| start-up voltage | 24 Vdc input models<br>48 Vdc input models | | 8<br>16 | | Vdc<br>Vdc |
| turn-off voltage threshold | 24 Vdc input models<br>48 Vdc input models | | 7<br>15 | | Vdc<br>Vdc |
| filter | Pi filter | | | | |
| no load power consumption | | | 0.1 | | W |
| remote on/off[4] | module on — CTRL pin suspended or pulled high (3~12 Vdc) | | | | |
| | module off — CTRL pin connected to -Vin or pulled low (0~1.2 Vdc) | | | | |
| input current when off | | | 10 | | mA |

Notes: 4. The voltage of CTRL pin is relative to -Vin pin.

## OUTPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| maximum capacitive load | 5 Vdc output models<br>12 Vdc output models<br>15 Vdc output models<br>24 Vdc output models | | | 10,000<br>3,700<br>2,000<br>1,000 | µF<br>µF<br>µF<br>µF |
| voltage accuracy | | | ±1 | ±3 | % |
| voltage regulation | full voltage range, nominal load | | ±0.2 | ±0.5 | % |
| load regulation | 5% ~ 100% load | | ±0.5 | ±1 | % |
| transient response recovery | 25% rated load step change | | 300 | 500 | µs |
| transient response deviation | 25% rated load step change<br>5 Vdc output models<br>all other models | | <br>±5<br>±3 | <br>±10<br>±5 | <br>%<br>% |
| temperature coefficient | | | | ±0.03 | %/°C |
| start-up time | at rated input voltage and constant resistance load | | 20 | 100 | ms |
| switching frequency | PWM mode | | 300 | | kHz |
| adjustability | via trim | 90 | | 110 | % |

## PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| over current protection | 5 Vdc output model<br>all other models | 110<br>110 | 150<br>150 | 240<br>200 | %<br>% |
| over voltage protection | | 110 | 130 | 160 | % |
| short circuit protection | continuous, auto recovery, hiccup | | | | |
| output overshoot | | | | 10 | % |

## SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| isolation voltage | input to output for 1 minute, 1 mA max<br>input/output to case for 1 minute, 1 mA max | 1,500<br>1,000 | | | Vdc<br>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 ±6 kV, perf. Criteria B | | | | |
| radiated immunity | IEC/EN61000-4-3 10 V/m, perf. Criteria A (see recommended circuit) | | | | |
| EFT/burst | IEC/EN61000-4-4 ±2 kV, perf. Criteria B (see recommended circuit) | | | | |
| surge | IEC/EN61000-4-5 ±2 kV, perf. Criteria B (see recommended circuit) | | | | |
| conducted immunity | IEC/EN61000-4-6 10 Vrms, perf. Criteria A (see recommended circuit) | | | | |
| vibration | 10-150 Hz, 5G, 0.75mm. along X, Y and Z axis | | | | |
| 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 | | 105 | °C |
| storage temperature | | -55 | | 125 | °C |
| operating humidity | non condensing | 5 | | 95 | % |
| max case temperature | | | | 105 | °C |

## SOLDERING

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| pin soldering temperature | 1.5mm from the case for 10 seconds | | | 300 | °C |

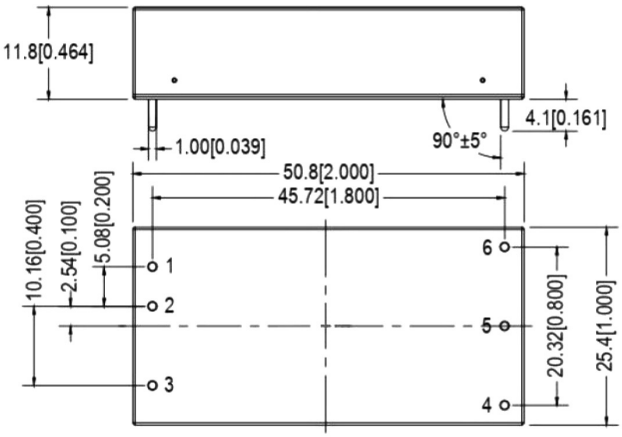
## MECHANICAL

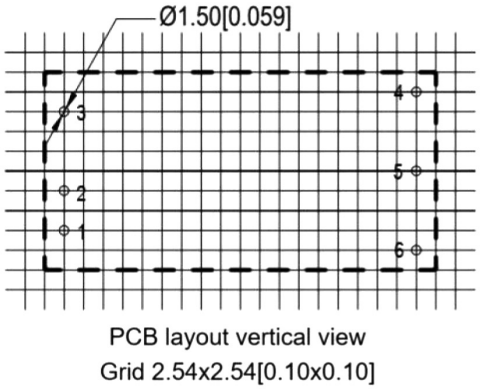
| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| dimensions | board mount: 50.8 x 25.4 x 11.8 [2.000 x 1.000 x 0.464 inches]<br>board mount with heatsink: 50.8 x 25.4 x 21.8 [2.000 x 1.000 x 0.858 inches]<br>chassis mount: 76.0 x 31.5 x 21.3 [2.990 x 1.240 x 0.838 inches]<br>chassis mount with heatsink 76.0 x 31.5 x 31.0 [2.990 x 1.240 x 1.220 inches]<br>DIN-rail mount: 76.0 x 31.5 x 26.0 [2.990 x 1.240 x 1.023 inches]<br>DIN-rail mount with heatsink: 76.0 x 31.5 x 35.5 [2.990 x 1.240 x 1.397 inches] | | | | mm<br>mm<br>mm<br>mm<br>mm<br>mm |
| case material | aluminum | | | | |
| weight | board mount<br>board mount with heatsink<br>chassis mount<br>chassis mount with heatsink<br>DIN-rail mount<br>DIN-rail mount with heatsink | | 36<br>48<br>57<br>69<br>77<br>89 | | g<br>g<br>g<br>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 |
| 1 | +Vin |
| 2 | -Vin |
| 3 | Ctrl |
| 4 | Trim |
| 5 | -Vout |
| 6 | +Vout |

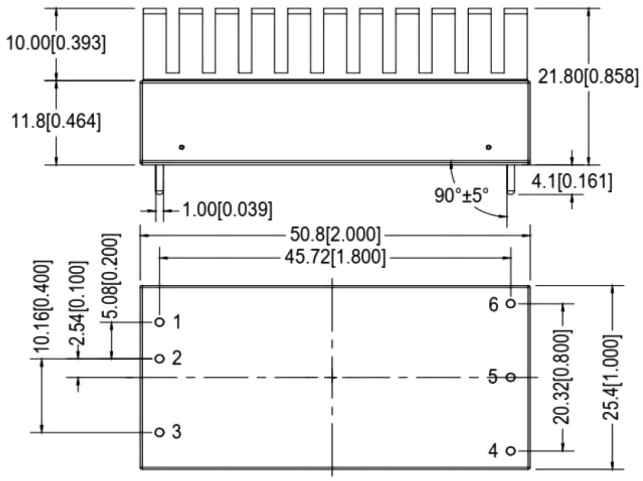


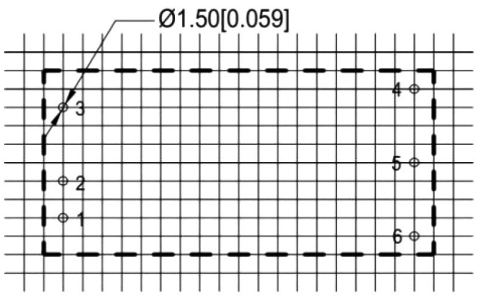




PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

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

| PIN CONNECTIONS | |
|---|---|
| PIN | Single |
| 1 | +Vin |
| 2 | -Vin |
| 3 | Ctrl |
| 4 | Trim |
| 5 | -Vout |
| 6 | +Vout |



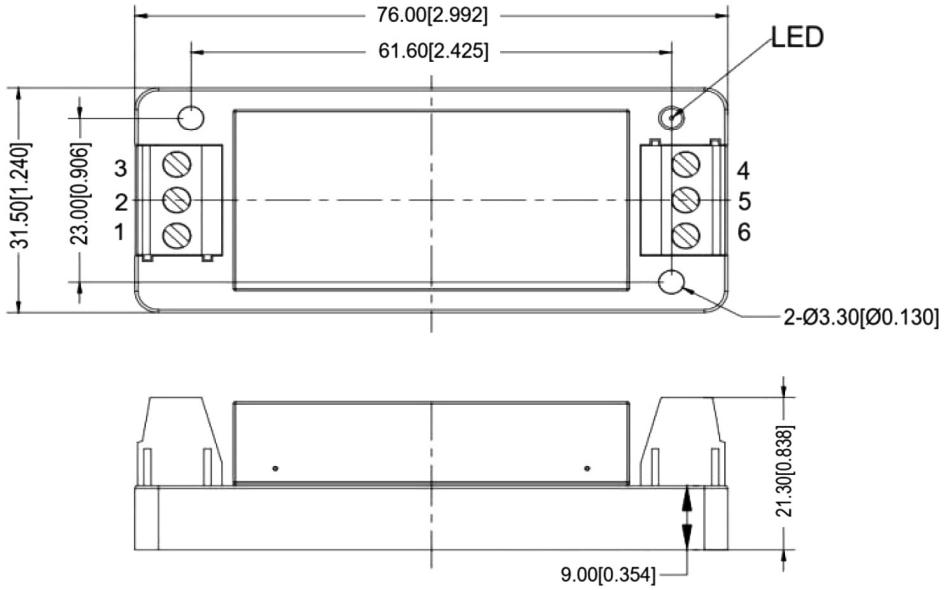




PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

## MECHANICAL DRAWING (CONTINUED)

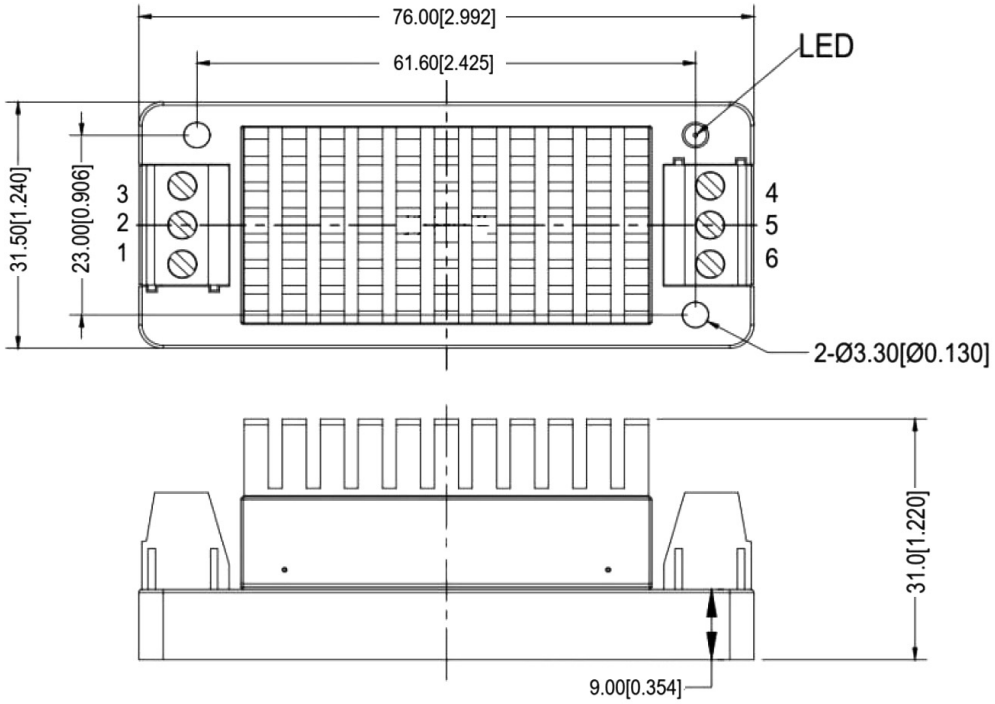
**Chassis Mount**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±1.00 [±0.039]
wire range: 24~12 AWG
tightening torque: max 0.4 N·m

| PIN CONNECTIONS | |
|---|---|
| PIN | Single |
| 1 | +Vin |
| 2 | -Vin |
| 3 | Ctrl |
| 4 | Trim |
| 5 | -Vout |
| 6 | +Vout |




**Chassis Mount with Heatsink**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±1.00 [±0.039]
wire range: 24~12 AWG
tightening torque: max 0.4 N·m]

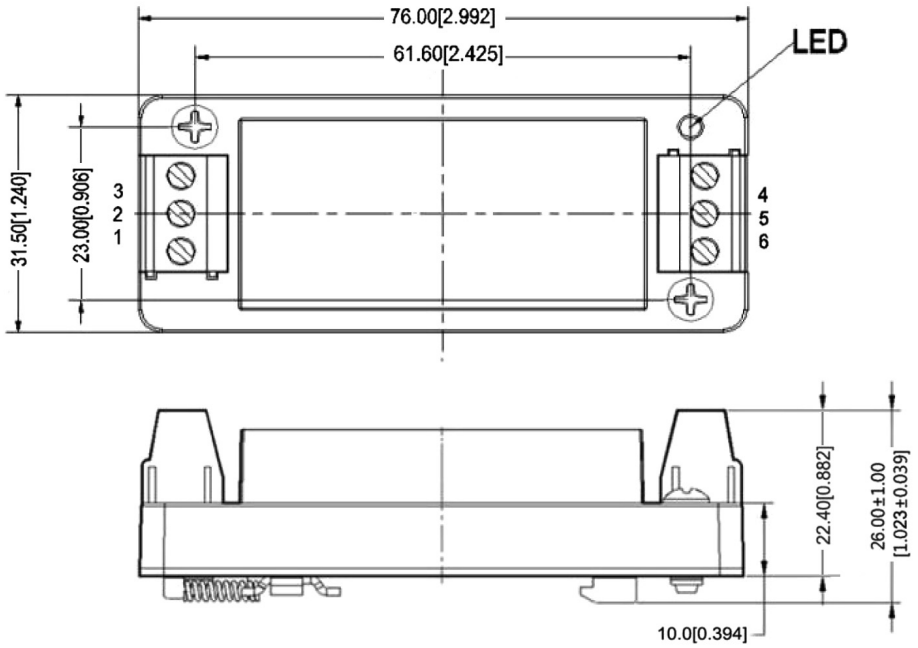
| PIN CONNECTIONS | |
|---|---|
| PIN | Single |
| 1 | +Vin |
| 2 | -Vin |
| 3 | Ctrl |
| 4 | Trim |
| 5 | -Vout |
| 6 | +Vout |



## MECHANICAL DRAWING (CONTINUED)

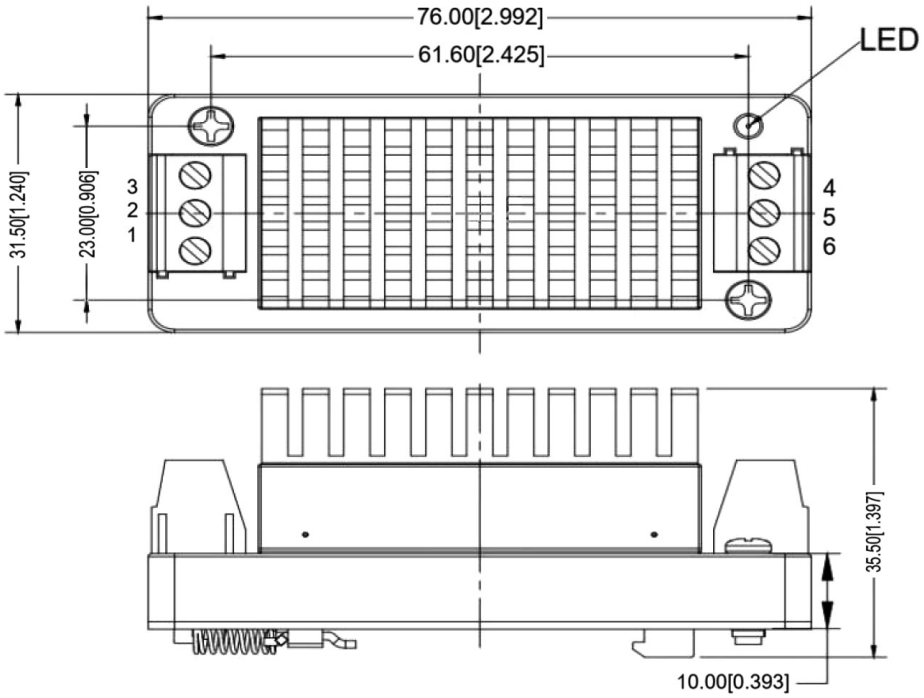
**DIN-rail Mount**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±1.00 [±0.039]
wire range: 24~12 AWG
tightening torque: max 0.4 N·m

| PIN CONNECTIONS | |
|---|---|
| PIN | Single |
| 1 | +Vin |
| 2 | -Vin |
| 3 | Ctrl |
| 4 | Trim |
| 5 | -Vout |
| 6 | +Vout |



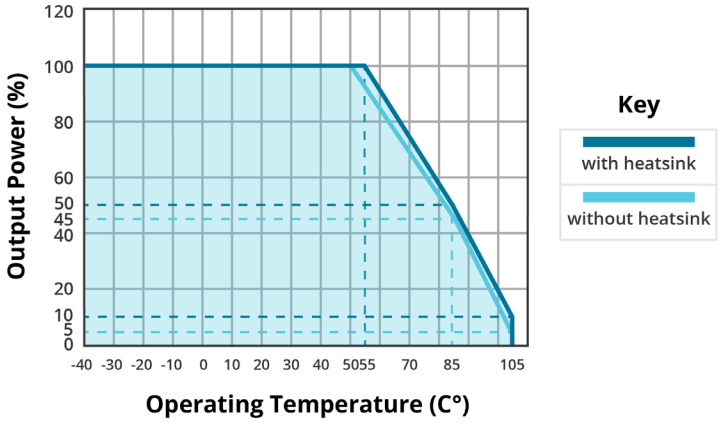

**DIN-rail Mount with Heatsink**
units: mm [inch]
pin diameter tolerance: ±0.10 [±0.004]
general tolerance: ±1.00 [±0.039]
wire range: 24~12 AWG
tightening torque: max 0.4 N·m

| PIN CONNECTIONS | |
|---|---|
| PIN | Single |
| 1 | +Vin |
| 2 | -Vin |
| 3 | Ctrl |
| 4 | Trim |
| 5 | -Vout |
| 6 | +Vout |

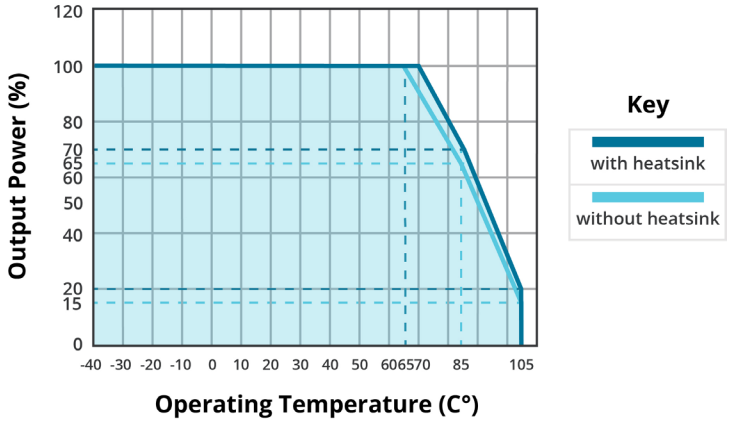


## DERATING CURVES

***TEMPERATURE DERATING CURVE***
***5 Vdc output model***

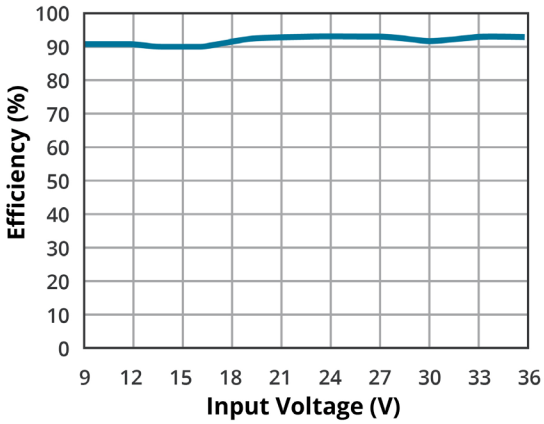



***TEMPERATURE DERATING CURVE***
***all other output models***

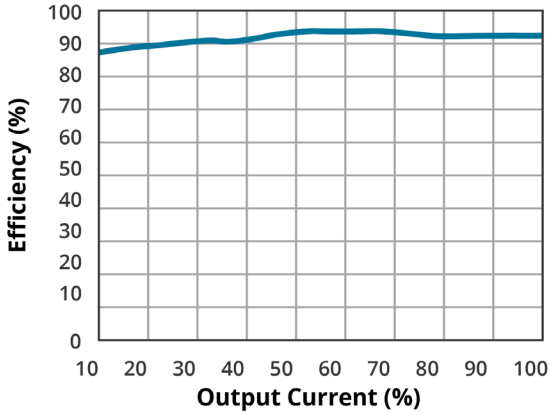



## EFFICIENCY CURVES

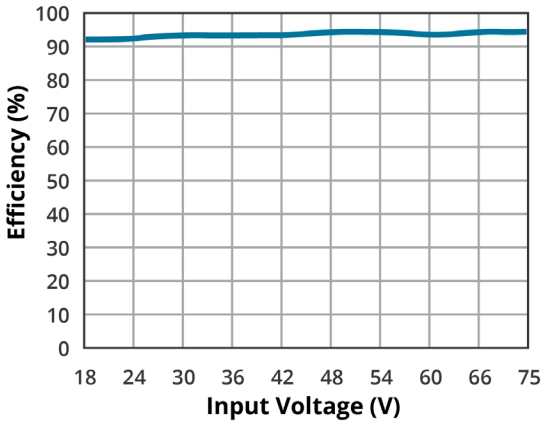
***EFFICIENCY VS INPUT VOLTAGE***
***(full load)***



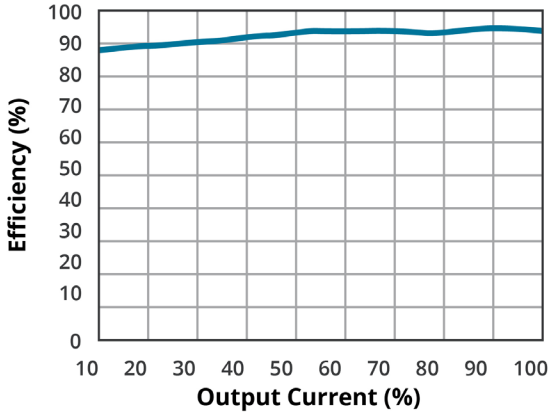

***EFFICIENCY VS OUTPUT CURRENT***
***(Vin = 24 V)***




***EFFICIENCY VS INPUT VOLTAGE***
***(full load)***



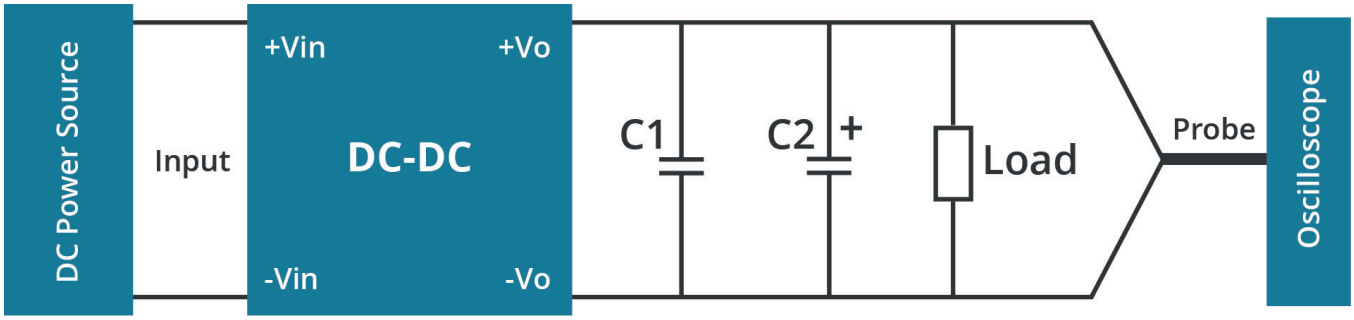

***EFFICIENCY VS OUTPUT CURRENT***
***(Vin = 48 V)***



## RIPPLE AND NOISE TEST INSTRUCTION

1. The Ripple & Noise test needs the cables in parallel, an oscilloscope that should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. One polypropylene capacitor C1 (0.1μF) and one high-frequency low-resistance electrolytic capacitor C2(10uF) are connected in parallel with the probe.
2. Refer to the test diagram, the converter output connects to the electronic load by the jig with cables which size should be definedaccording to the output current value. The test can start at the converter output terminals after the input power on.
3. It is recommended to connect a ≥5% load or a high-frequency low resistance electrolytic capacitor (≥470μF) load to the output toavoid the output ripple increasing.

**Figure 1**




## APPLICATION NOTES

**Figure 2**
**5 Vdc output model**

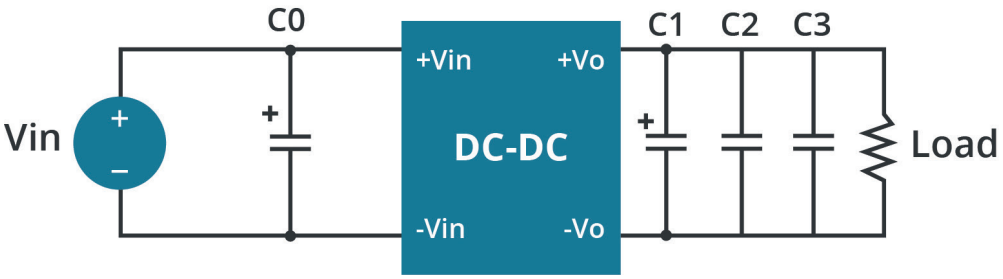



**Table 1**

| 5 Vdc output model | |
|---|---|
| COMPONENT | PARAMETER |
| C0 | 100 μF / 100 V |
| C1 | 330 μF / 50 V |
| C2 | 1 μF / 16 V |
| C3 | 10 μF / 16 V |

**Figure 3**
**all other output models**

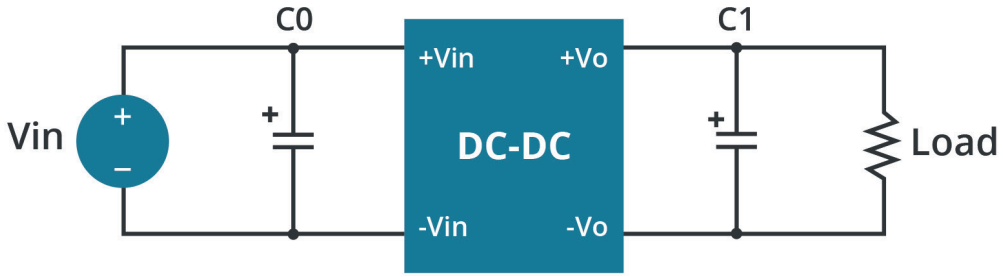



**Table 2**

| 12 & 15 Vdc output models | |
|---|---|
| COMPONENT | PARAMETER |
| C0 | 100 μF / 100 V |
| C1 | 100 μF / 25 V |

| 24 Vdc output model | |
|---|---|
| COMPONENT | PARAMETER |
| C0 | 100 μF / 100 V |
| C1 | 47 μF / 50 V |

## EMC RECOMMENDED CIRCUIT

**Figure 4**
**5 Vdc output model**

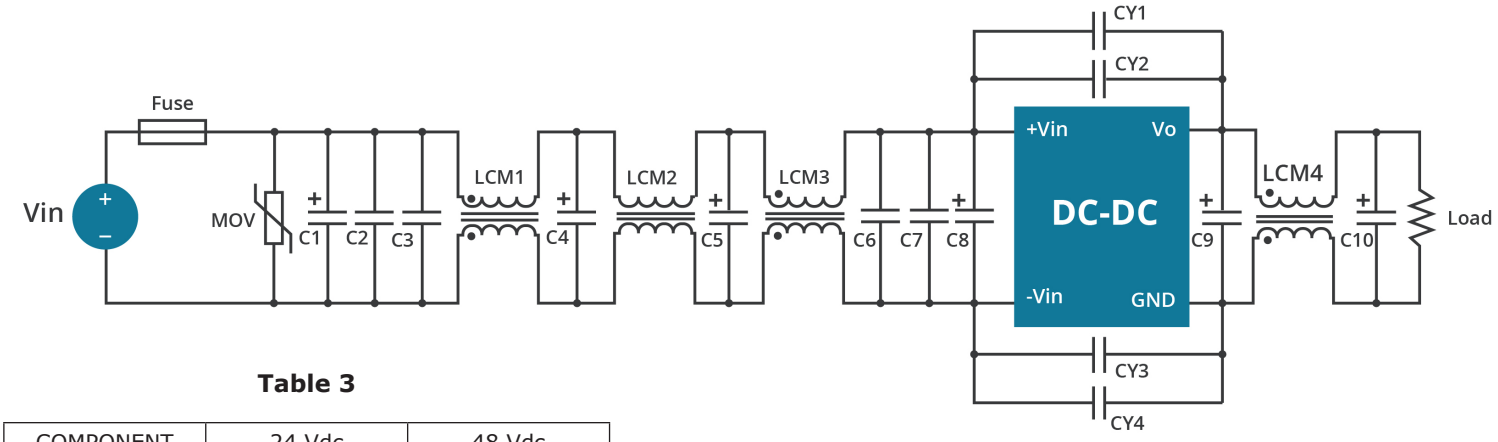



**Table 3**

| COMPONENT | 24 Vdc | 48 Vdc |
|---|---|---|
| Fuse | TBD by customer | |
| MOV1 | 14D470K | 14D101K |
| LCM1 | 2.2 mH | |
| LCM2 | 1.0 mH | |
| LCM3, LCM4 | 270 µH | |
| C1, C4, C5, C8 | 330 µF/100 V | |
| C2, C3 | 4.7 µF/100 V | |
| C6, C7 | 10 µF/100 V | |
| C9, C10 | 100 µF/100 V | |
| CY1, CY3 | 2.2 nF/2 kV | |
| CY2, CY4 | 10 nF/2 kV | |

**Figure 5**
**12 & 15 Vdc output model**

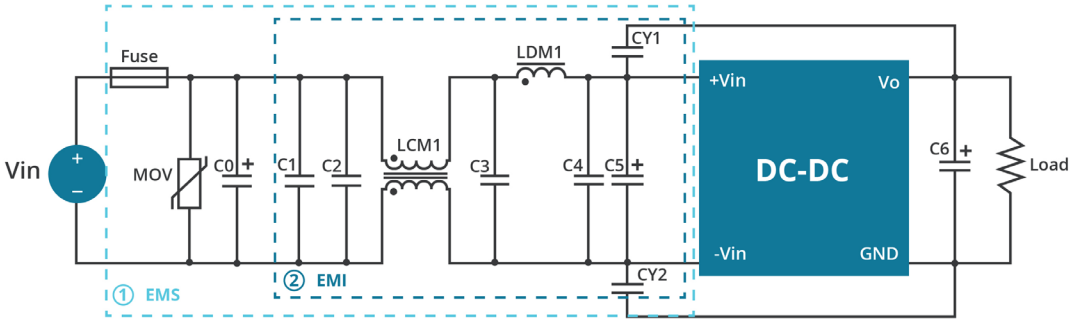



**Table 4**

| COMPONENT | PARAMETER |
|---|---|
| Fuse | TBD by customer |
| MOV | 14D470K |
| LDM1 | 2.2 µH |
| LCM1 | 2.2 mH |
| LCM2 | / |
| C0 | 680 µH/100 V |
| C1, C2 | 4.7 µF/100 V |
| C3 | 10 µF/100 V |
| C4 | 10 µF/100 V |
| C5 | 330 µF/100 V |
| C6 | 100 µF/50 kV |
| CY1, CY2 | 2.2 nF/2 kV |

## EMC RECOMMENDED CIRCUIT (CONTINUED)

**Figure 6**
**24 Vdc output model**

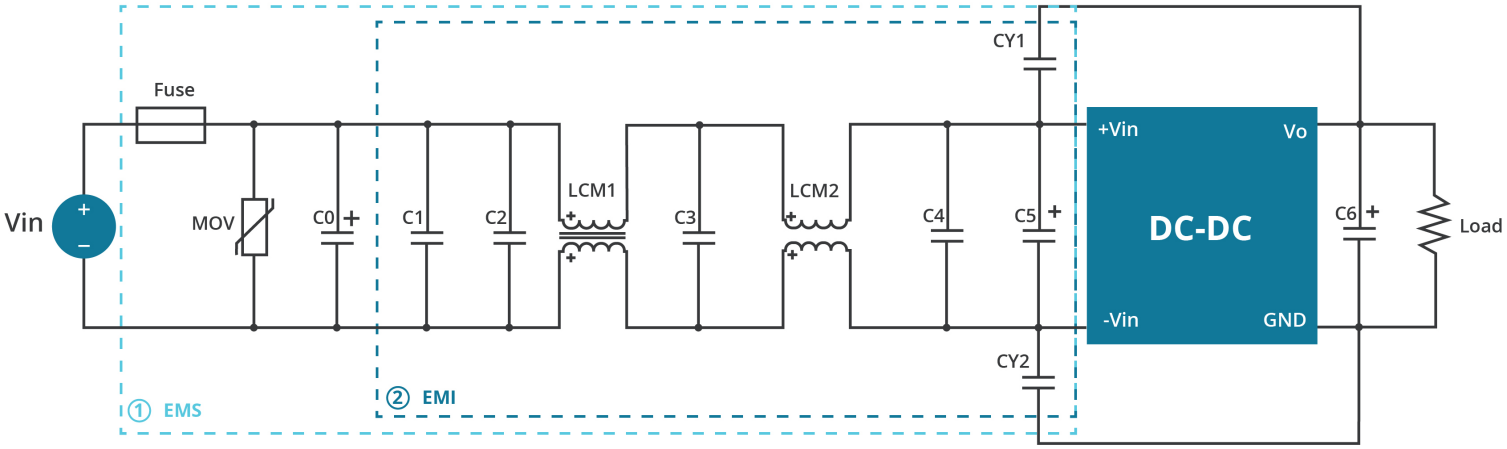



**Table 5**

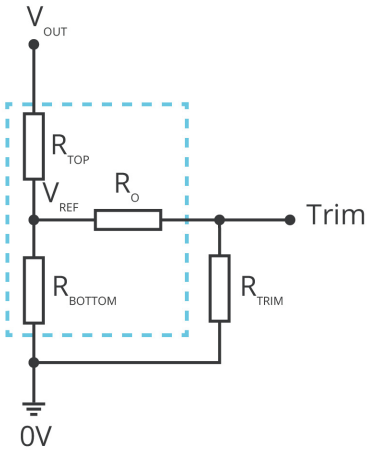
| COMPONENT | PARAMETER |
|---|---|
| Fuse | TBD by customer |
| MOV | 14D470K |
| LDM1 | / |
| LCM1 | 10 mH |
| LCM2 | 10 mH |
| C0 | 680 µH/100 V |
| C1, C2 | 4.7 µF/100 V |
| C3 | 10 µF/100 V |
| C4 | 47 µF/100 V |
| C5 | 330 µF/100 V |
| C6 | 100 µF/50 kV |
| CY1, CY2 | 2.2 nF/2 kV |

Note: Part 1 in the circuit is for EMS test, part 2 for EMI filtering, both can be adjusted according to the actual situation.

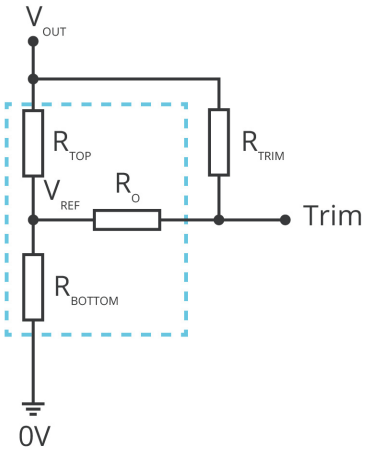
## TRIM RESISTOR AND CALCULATION (SINGLE OUTPUT MODELS ONLY)

**Figure 7**

*Trim up*




*Trim down*




$$R_{TRIM} = \frac{a \cdot R_{BOTTOM}}{R_{BOTTOM} - a} - R_O \qquad a = \frac{V_{REF}}{V_{OUT} - V_{REF}} \cdot R_{TOP}$$

*Formula for Trim up*

$$R_{TRIM} = \frac{a \cdot R_{TOP}}{R_{TOP} - a} - R_O \qquad a = \frac{V_{OUT} - V_{REF}}{V_{REF}} \cdot R_{BOTTOM}$$

*Formula for Trim down*

**Table 6**

| $V_{NOM}$ | $R_{TOP}$ | $R_{BOTTOM}$ | $R_O$ | $V_{REF}$ |
|---|---|---|---|---|
| (Vdc) | (kΩ) | (kΩ) | (kΩ) | (V) |
| 5 | 24 | 24.0 | 68 | 2.5 |
| 12 | 75 | 19.73 | 30 | 2.5 |
| 15 | 24 | 4.78 | 30 | 2.5 |
| 24 | 68 | 7.89 | 30 | 2.5 |

Note: Value for $R_{TOP}$, $R_{BOTTOM}$, $R_O$, and $V_{REF}$ refer to Table 6 (fixed internal values).
$R_{TRIM}$: Trim resistance
a: User-defined parameter, no actual meanings
$V_{NOM}$: Nominal output voltage
$V_{OUT}$: Target output voltage

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 01/28/2026 |

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

CUI INC
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