

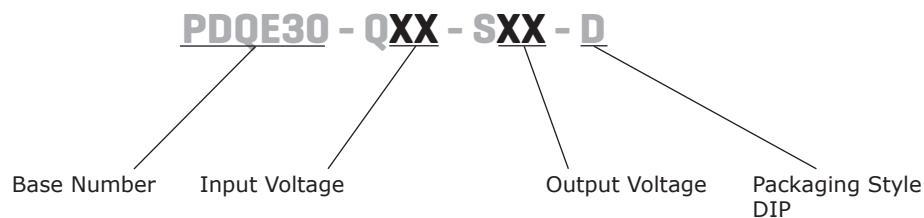
**SERIES: PDQE30-D | DESCRIPTION: DC-DC CONVERTER**
**FEATURES**

- 30W isolated output
- 1500 Vdc isolation
- 1 x 1 inch industry standard package
- ultra-wide 4:1 input voltage range
- EN62368 approved
- wide temperature range: -40°C to +85°C
- high efficiency up to 88%
- input under-voltage protection, output short circuit, over-current, over-voltage protection


**MODEL**

| MODEL            | input voltage |                | output voltage<br>(Vdc) | output current |             | output power<br>max<br>(W) | ripple and noise <sup>1</sup><br>max<br>(mVp-p) | efficiency<br>typ<br>(%) |
|------------------|---------------|----------------|-------------------------|----------------|-------------|----------------------------|-------------------------------------------------|--------------------------|
|                  | typ<br>(Vdc)  | range<br>(Vdc) |                         | min<br>(mA)    | max<br>(mA) |                            |                                                 |                          |
| PDQE30-Q48-S5-D  | 48            | 18~75          | 5                       | 0              | 6000        | 30                         | 120                                             | 88                       |
| PDQE30-Q48-S12-D | 48            | 18~75          | 12                      | 0              | 2500        | 30                         | 120                                             | 88                       |
| PDQE30-Q48-S15-D | 48            | 18~75          | 15                      | 0              | 2000        | 30                         | 120                                             | 88                       |
| PDQE30-Q48-S24-D | 48            | 18~75          | 24                      | 0              | 1250        | 30                         | 150                                             | 88                       |

Note: 1. Ripple & noise testing condition at nominal input voltage and 5%-100% load, 20MHz bandwidth

**PART NUMBER KEY**


## INPUT

| parameter             | conditions/description                    | min  | typ   | max    | units |
|-----------------------|-------------------------------------------|------|-------|--------|-------|
| input voltage         |                                           | 18   | 48    | 75     | Vdc   |
| start-up voltage      | nominal input voltage                     |      |       | 18     | Vdc   |
| surge voltage         | nominal input voltage                     | -0.7 |       | 100    | Vdc   |
| filter                | capacitance filter                        |      |       |        |       |
| current               | nominal input voltage (full load/no load) |      | 710/8 | 735/15 | mA    |
| under-voltage lockout |                                           | 12   | 15.5  |        | Vdc   |
| start-up time         | nominal input voltage                     |      | 10    |        | mS    |
| CTRL <sup>1</sup>     | module on - open or pulled high           | 3.5  |       | 12     | Vdc   |
|                       | module off - pulled low to GND            | 0    |       | 1.2    | Vdc   |
|                       | input current when off                    |      | 2     | 7      | mA    |

Note: 1. CTRL is referenced to GND

## OUTPUT

| parameter               | conditions/description | min | typ  | max   | units |
|-------------------------|------------------------|-----|------|-------|-------|
| line regulation         | min to max Vin         |     | ±0.2 | ±0.5  | %     |
| load regulation         | 5% ~ 100% load         |     | ±0.5 | ±1    | %     |
| set-point accuracy      |                        |     | ±1   | ±3    | %     |
| switching frequency     | PWM mode               |     | 270  |       | kHz   |
| transient response      | 25% load step change   |     | ±3   | ±8    | %     |
|                         | 5V output              |     | ±3   | ±5    | %     |
|                         | others                 |     |      |       | %     |
| temperature coefficient | full load              |     |      | ±0.03 | %/°C  |
| adjustability           | via trim pin           |     | ±10  |       | %     |

## PROTECTIONS

| parameter                | conditions/description    | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| over voltage protection  |                           | 110 |     | 160 | %Vo   |
| over current protection  |                           | 110 |     | 260 | %Io   |
| short circuit protection | continuous, self-recovery |     |     |     |       |

## SAFETY AND COMPLIANCE

| parameter             | conditions/description                                                         | min  | typ  | max | units  |
|-----------------------|--------------------------------------------------------------------------------|------|------|-----|--------|
| isolation voltage     | input-output electric strength test for 1 minute                               | 1500 |      |     | Vdc    |
| isolation resistance  | input-output insulation at 500 Vdc                                             | 1000 |      |     | MΩ     |
| isolation capacitance | input-output capacitance at 100 KHz / 0.1 V                                    |      | 2000 |     | pF     |
| safety approvals      | EN62368 approved                                                               |      |      |     |        |
| EMC                   | CISPR32/EN55032 Class B (see recommended circuit)                              |      |      |     |        |
| ESD                   | IEC/EN61000-4-2, Contact ±6K, perf. Criteria B                                 |      |      |     |        |
| radiated immunity     | IEC/EN61000-4-3, 10 v/m, perf. Criteria B                                      |      |      |     |        |
| EFT/burst             | IEC/EN61000-4-4, ±2KV, perf. Criteria B (see recommended circuit)              |      |      |     |        |
| surge                 | IEC/EN61000-4-5, line to line ±2KV, perf. Criteria B (see recommended circuit) |      |      |     |        |
| conducted immunity    | IEC/EN61000-4-6 3 Vrms, perf. Criteria B                                       |      |      |     |        |
| RoHS                  | yes                                                                            |      |      |     |        |
| MTBF                  | MIL-HDBK-217F @ 25°C                                                           | 1000 |      |     | kHours |

## ENVIRONMENTAL

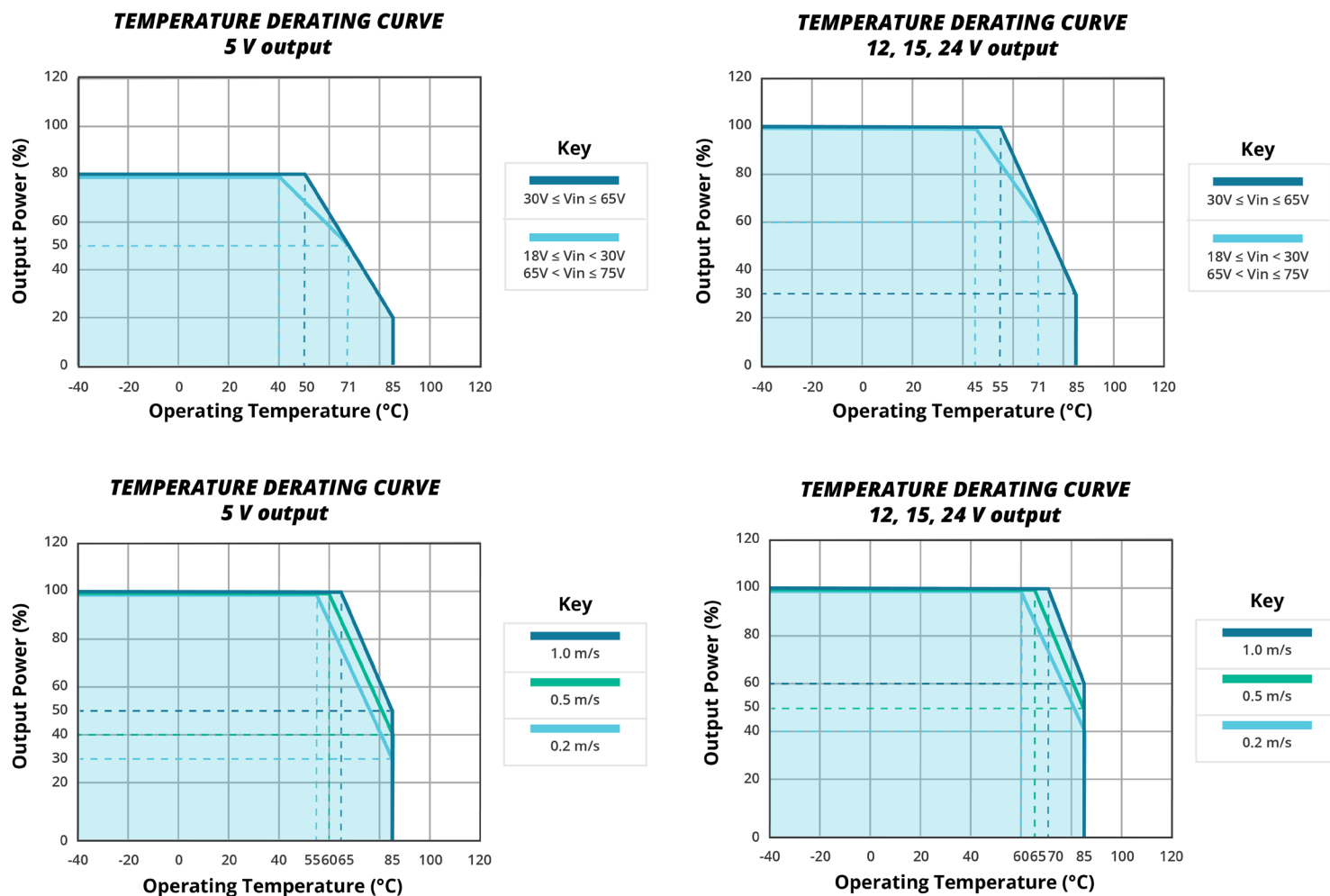
| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature |                        | -40 |     | 85  | °C    |
| storage temperature   |                        | -55 |     | 125 | °C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

## SOLDERABILITY

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

## DERATING CURVES

Figure 1



Note:

## MECHANICAL

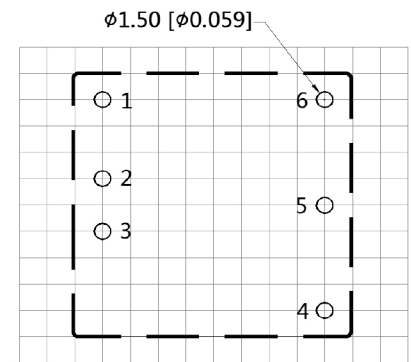
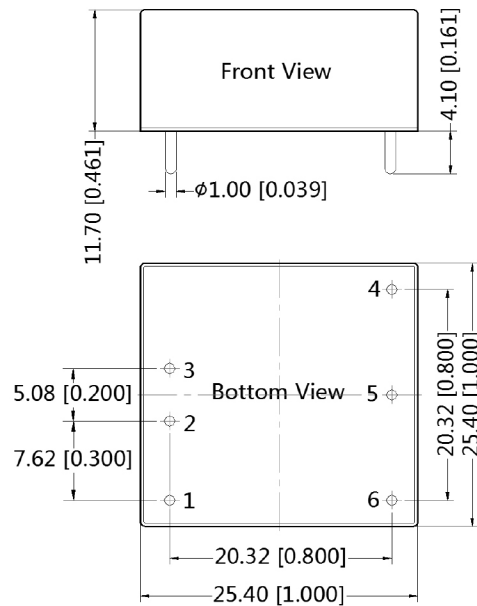
| parameter     | conditions/description   | min | typ  | max | units |
|---------------|--------------------------|-----|------|-----|-------|
| dimensions    | 25.40 × 25.40 × 11.70 mm |     |      |     | inch  |
| case material | aluminum alloy           |     |      |     |       |
| weight        |                          |     | 18.4 |     | g     |

## MECHANICAL DRAWING

units: inches [mm]

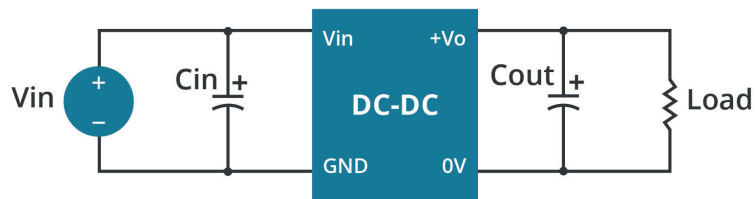
tolerance: ± 0.50 [±0.020]

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | FUNCTION |
| 1               | Ctrl     |
| 2               | GND      |
| 3               | Vin      |
| 4               | Vo       |
| 5               | Trim     |
| 6               | 0V       |



## TYPICAL APPLICATION CIRCUIT

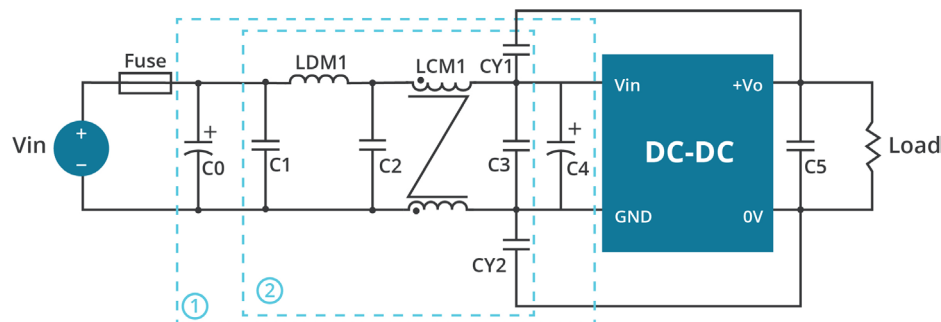
Figure 2



| Vout (Vdc) | Cin (μF) | Cout (μF) |
|------------|----------|-----------|
| 5/12/15    | 100      | 100       |
| 24         |          | 47        |

## EMC COMPLIANCE CIRCUITS

Figure 3

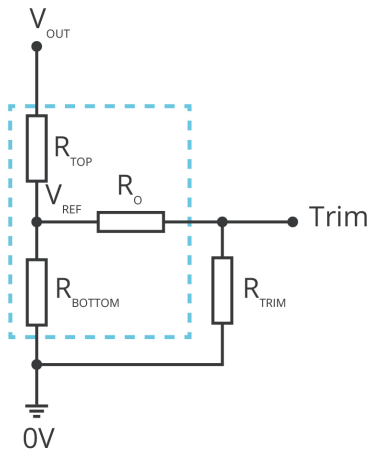


Note: We use Part ① in Fig. 3 for Immunity tests and Part ② for Emissions test. Selecting based on needs.

|          |                                          |
|----------|------------------------------------------|
| Model    | Vin: 48 V                                |
| FUSE     | Choose according to actual input current |
| C0, C4   | 470μF/100V                               |
| C1       | 10μF/100V                                |
| LDM1     | 22uH/3A                                  |
| C2       | 22uF/100V                                |
| LCM1     | 1.4mH/3A                                 |
| C3       | 22uF/100V                                |
| C5       | Refer to the Cout Fig.2                  |
| CY1, CY2 | 1nF/2KV                                  |

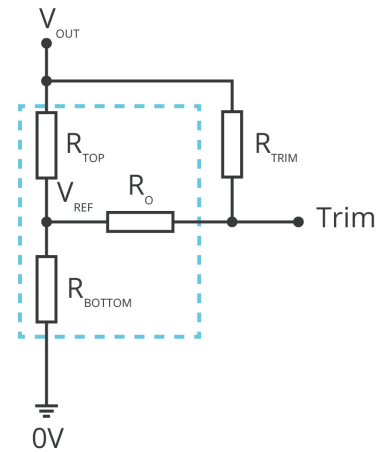
## TRIM FUNCTION FOR OUTPUT VOLTAGE ADJUSTMENT

Trim up



Trim resistor connection (dashed line shows internal resistor network).

Trim down



$$R_{\text{TRIM}} = \frac{a \cdot R_{\text{BOTTOM}}}{R_{\text{BOTTOM}} - a} - R_{\text{O}} \quad a = \frac{V_{\text{REF}}}{V_{\text{OUT}} - V_{\text{REF}}} \cdot R_{\text{TOP}}$$

Formula for Trim up

$$R_{\text{TRIM}} = \frac{a \cdot R_{\text{TOP}}}{R_{\text{TOP}} - a} - R_{\text{O}} \quad a = \frac{V_{\text{OUT}} - V_{\text{REF}}}{V_{\text{REF}}} \cdot R_{\text{BOTTOM}}$$

Formula for Trim down

| $V_{\text{NOM}}$ | $R_{\text{TOP}}$ | $R_{\text{BOTTOM}}$ | $R_{\text{O}}$ | $V_{\text{REF}}$ |
|------------------|------------------|---------------------|----------------|------------------|
| (Vdc)            | (kΩ)             | (kΩ)                | (kΩ)           | (V)              |
| 5                | 8.832            | 2.87                | 10             | 1.24             |
| 12               | 11.00            | 2.87                | 8.2            | 2.5              |
| 15               | 14.40            | 2.87                | 10             | 2.5              |
| 24               | 24.87            | 2.87                | 7.5            | 2.5              |

Note: Value for  $R_{\text{TOP}}$ ,  $R_{\text{BOTTOM}}$ ,  $R_{\text{O}}$ , and  $V_{\text{REF}}$  refer to Table 4 (fixed internal values).

$R_{\text{TRIM}}$ : Trim resistance

$a$ : User-defined parameter, no actual meanings

$V_{\text{NOM}}$ : Nominal output voltage

$V_{\text{OUT}}$ : Target output voltage

## REVISION HISTORY

| rev. | description                                | date       |
|------|--------------------------------------------|------------|
| 1.0  | initial release                            | 03/28/2020 |
| 1.01 | derating curve and circuit figures updated | 08/24/2021 |
| 1.02 | adjustability limits added                 | 03/14/2022 |
| 1.03 | output voltage trimming updated            | 05/23/2023 |

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



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