

SERIES: PQC10-0 | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

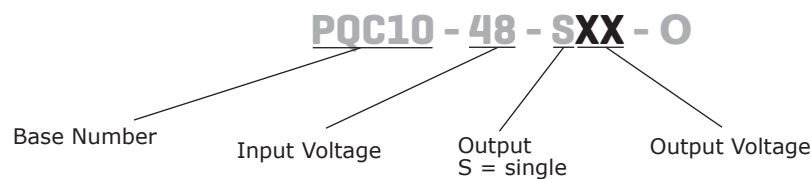
- 10 W isolated output
- 2:1 input range (36~60 Vdc)
- single regulated outputs
- industry standard 1/16th brick
- over-current, input under-voltage, over-voltage and output short-circuit protection



| MODEL | input voltage | | output voltage (Vdc) | output current | | output power max (W) | ripple and noise ¹ max (mVp-p) | efficiency ² typ (%) |
|----------------|---------------|----------------|-------------------------|----------------|-------------|----------------------------|---|---------------------------------------|
| | typ (Vdc) | range (Vdc) | | min (mA) | max (mA) | | | |
| PQC10-48-S5-O | 48 | 36~75 | 5 | 0 | 2,000 | 10 | 120 | 83 |
| PQC10-48-S12-O | 48 | 36~75 | 12 | 0 | 833 | 10 | 120 | 87 |
| PQC10-48-S15-O | 48 | 36~75 | 15 | 0 | 667 | 10 | 120 | 88 |
| PQC10-48-S24-O | 48 | 36~75 | 24 | 0 | 417 | 10 | 120 | 88 |

Notes: 1. Ripple and noise are measured at 20 MHz BW, 5%~100% load by "parallel cable" method with 1 μF ceramic and 10 μF electrolytic capacitors on the output.
2. Efficiency is measured at nominal input voltage and rated output load.

PART NUMBER KEY



INPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|---|------|-------|-------|-------|
| operating input voltage ³ | | 36 | 48 | 75 | Vdc |
| current (full load/no load) | at nominal input voltage | | 252/4 | 258/8 | mA |
| reflected ripple current | at nominal input voltage | | 50 | | mA |
| start-up voltage | | | | 36 | Vdc |
| under-voltage protection | | 26 | 29 | | Vdc |
| start-up time | at nominal input voltage & constant resistance load | | | 100 | ms |
| surge voltage | for maximum of 1 second | -0.7 | | 100 | Vdc |
| CTRL ⁴ | module on (CTRL pin open or pulled high (TTL 3.5~12Vdc) | | | | |
| | module off (CTRL pin pulled low to GND (0~1.2Vdc) | | | | |
| | input current when off | | 6 | 10 | mA |
| filter | C filter | | | | |

Notes: 3. Input must be supplied by ES1 source to conform to CE regulations.
4. The CTRL pin voltage is referenced to input GND.

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|----------------------------------|---|-----|------|-------|-------|
| maximum capacitive load | 5 Vdc output | | | 2,200 | μF |
| | 12 Vdc output | | | 470 | μF |
| | 15 Vdc output | | | 330 | μF |
| | 24 Vdc output | | | 100 | μF |
| line regulation | full load, input voltage from low to high | | ±0.2 | ±0.5 | % |
| load regulation | 5% to 100% load | | ±0.5 | ±1 | % |
| voltage accuracy | 5% to 100% load | | ±1 | ±3 | % |
| switching frequency ⁴ | PWM mode | | 300 | | kHz |
| transient recovery time | 25% load step change | | 300 | 500 | μs |
| transient response deviation | 25% load step change | | ±5 | ±8 | % |
| | 5 Vdc output voltage | | ±3 | ±5 | % |
| | all other output models | | | | |
| temperature coefficient | full load | | | ±0.03 | %/°C |

Notes: 4. Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| over voltage protection | | 110 | | 160 | % |
| over current protection | | 110 | 140 | 190 | % |
| short circuit protection | auto recovery, continuous | | | | |

SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|-----------------------|---|-------|-------|-----|-------|
| isolation voltage | input to output for 1 minute at 1 mA max. | 1,500 | | | Vdc |
| isolation resistance | input to output at 500 Vdc | 1,000 | | | MΩ |
| isolation capacitance | input to output at 100kHz/0.1V | | 1,000 | | pF |
| vibration | 10-150Hz, 5G, 0.75mm. along X, Y and Z | | | | |
| safety approvals | certified to 62368: EN, BS EN | | | | |
| conducted emissions | CISPR32/EN55032 CLASS B (see Fig.2 for recommended circuit) | | | | |
| radiated emissions | CISPR32/EN55032 CLASS B (see Fig.2 for recommended circuit) | | | | |
| ESD | IEC/EN61000-4-2 Contact ±4kV, perf. Criteria B | | | | |
| radiated immunity | IEC/EN61000-4-3 10V/m, perf. Criteria A | | | | |

SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|--------------------|---|-----------|-----|-----|-------|
| EFT/burst | IEC/EN61000-4-4 ±2kV (see Fig.2-1 for recommended circuit), perf Criteria B | | | | |
| surge | IEC/EN61000-4-5 line to line ±2kV (see Fig.2-1 for recommended circuit), perf. Criteria B | | | | |
| conducted immunity | IEC/EN61000-4-6 3Vrms, perf. Criteria A | | | | |
| MTBF | as per MIL-HDBK-217F @ 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 |
| storage humidity | non-condensing | 5 | | 95 | % |

MECHANICAL

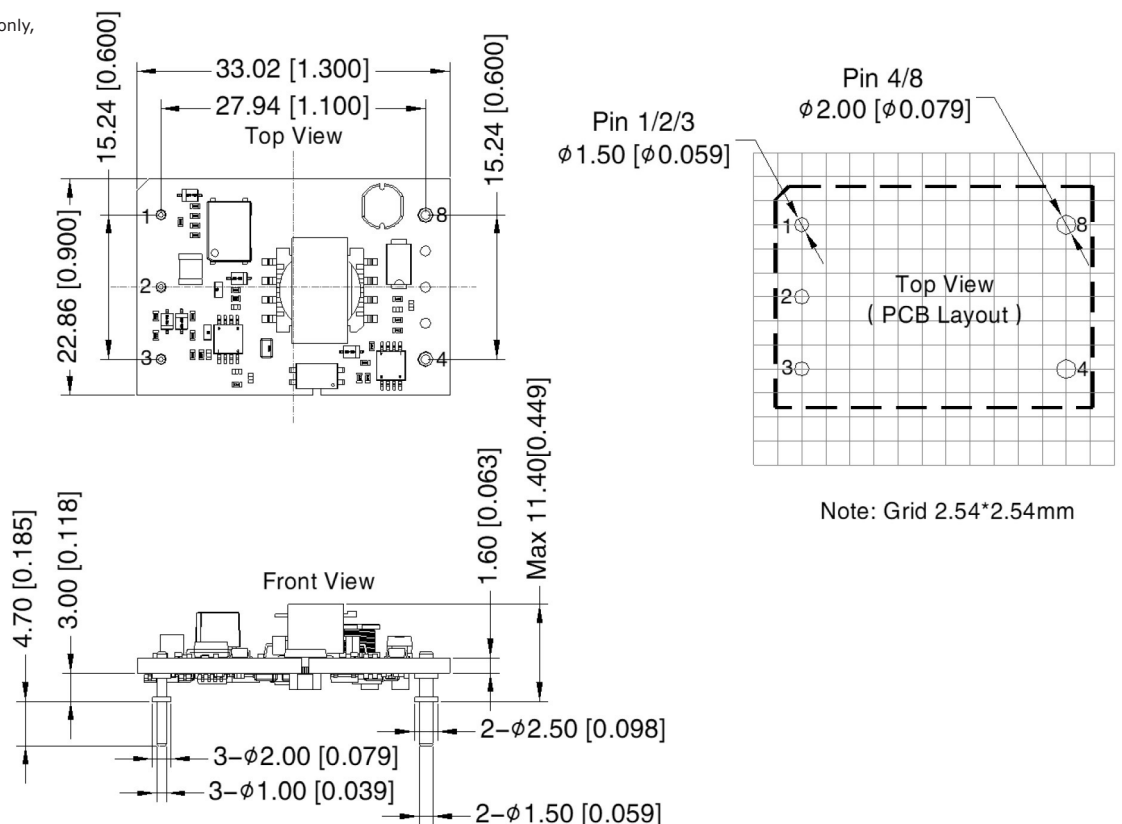
| parameter | conditions/description | min | typ | max | units |
|----------------|--|-----|-----|-----|-------|
| dimensions | 33.02 x 22.86 x 11.40 (1.300 x 0.900 x 0.449 inch) | | | | mm |
| weight | | | 5.8 | | g |
| cooling method | natural convection | | | | |

MECHANICAL DRAWING

units: mm[inch]
 tolerance: ±0.50[±0.020]
 pin section tolerance: ±0.10[±0.004]
 pin 1,2,3: Ø1.0mm
 pin 4,8: Ø1.5mm

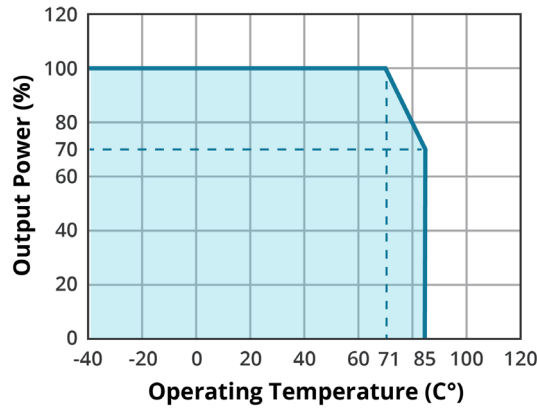
Note: The layout of the device is for reference only, please refer to the actual product.

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | Vin |
| 2 | CTRL |
| 3 | GND |
| 4 | 0V |
| 8 | +Vo |



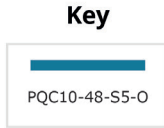
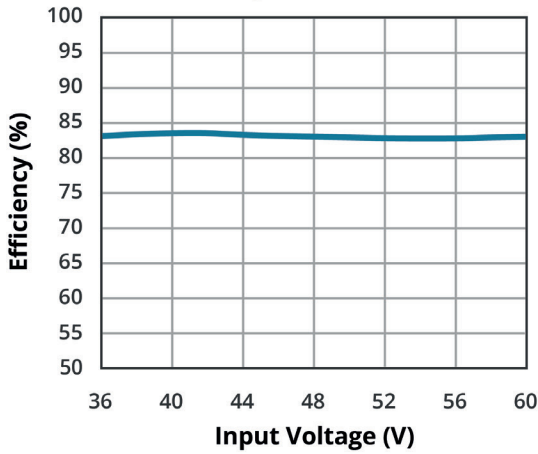
DERATING CURVE

TEMPERATURE DERATING CURVE

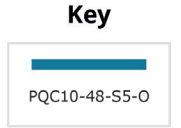
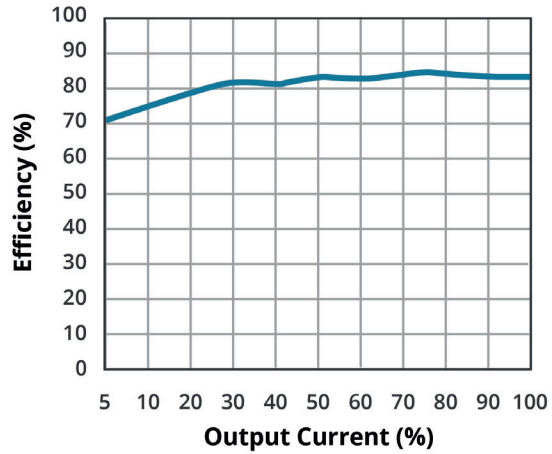


EFFICIENCY CURVES

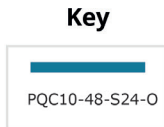
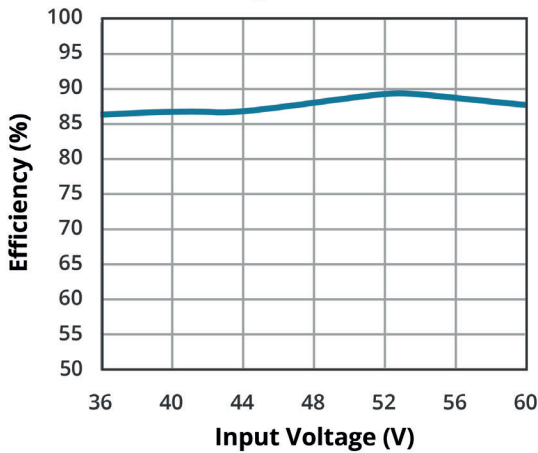
EFFICIENCY VS INPUT VOLTAGE (full load)



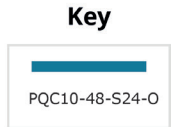
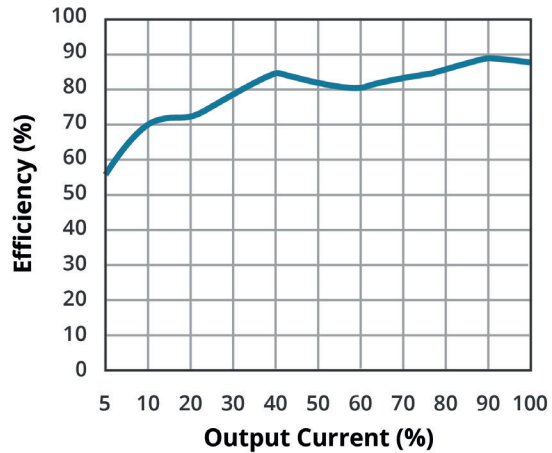
EFFICIENCY VS OUTPUT LOAD (Vin = 48V)



EFFICIENCY VS INPUT VOLTAGE (full load)



EFFICIENCY VS OUTPUT LOAD (Vin = 48V)



APPLICATION NOTES

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 1. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product. The products do not support parallel connection of their output.

Figure 1

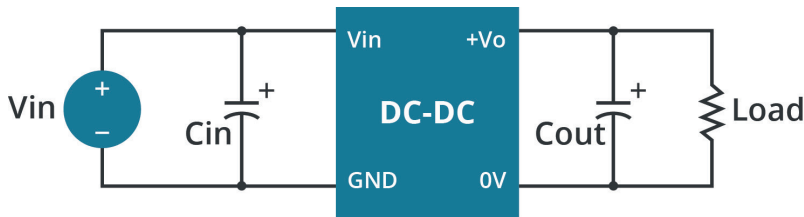
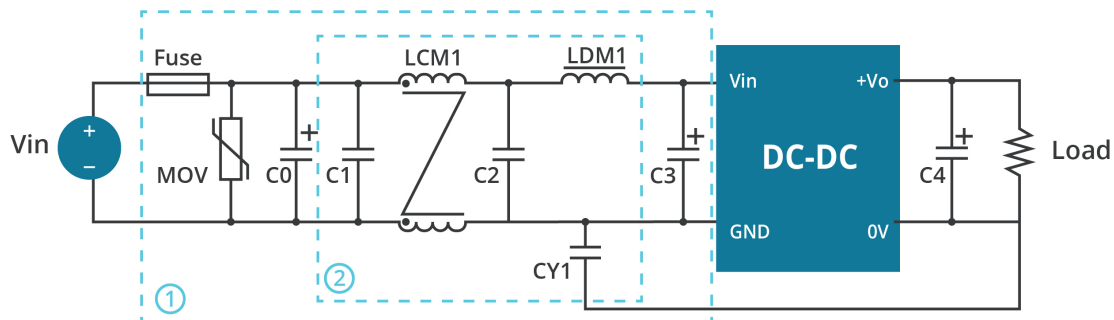


Table 1

| Vin (Vdc) | Vout (Vdc) | Cin (μ F/V) | Cout (μ F) |
|-----------|------------|------------------|-----------------|
| 48 | 5 | 100 μ F/100V | 10 μ F/16V |
| | 12/15 | | 10 μ F/25V |
| | 24 | | 10 μ F/50V |

EMC RECOMMENDED CIRCUIT

Figure 2



Notes: For EMC tests we use Part 1 in Fig. 2 for immunity and part 2 for emissions test. Selecting based on needs.

Table 2

| Recommended external circuit components | |
|---|----------------------------------|
| FUSE | T/1A/300Vac |
| MOV | S14K60 |
| C0 | 680 μ F/100V |
| C1/C2 | 4.7 μ F/100V |
| C3 | 330 μ F/100V |
| C4 | refer to the C_{out} in Fig. 1 |
| LCM1 | 4.7mH |
| LDM1 | 10 μ H |
| CY1 | 1nF/2kV |

Note: 1. Maximum capacitive load is tested at input voltage range and full load.
2. All specifications are measured at $T_a=25^\circ\text{C}$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.

SAFETY SPECIFICATIONS

The input is considered as safety extra low voltage (ES1/SELV) if one of the following conditions is met.

1. The input source provides double or reinforced insulation from the AC mains according to IEC/EN/UL 62368-1.
2. The input source provides basic or supplementary insulation from the AC mains and product's output is reliably connected to protective earth according to IEC/EN/UL 62368-1.
3. The input source is reliably connected to protective earth and provides basic or supplementary insulation according to IEC/EN/UL 62368-1 and the maximum input source voltage is 60 Vdc.

REVISION HISTORY

| rev. | description | date |
|------|----------------------------|------------|
| 1.0 | initial release | 01/18/2023 |
| 1.01 | safety specification added | 04/26/2023 |

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



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