SERIES: PQP1-D | DESCRIPTION: DC-DC CONVERTER

FEATURES
- wide 2:1 input range
- single and Dual output options
- 1500 Vdc isolation
- industry standard pin-out
- ultra compact DIP package
- short circuit protection (continuous)
- wide operating temp: -40°C to +85°C
- supports negative output (dual output model)
- designed to meet EN/BS EN 62368

MODEL

<table>
<thead>
<tr>
<th>MODEL</th>
<th>input voltage</th>
<th>output voltage</th>
<th>output current</th>
<th>output power</th>
<th>ripple and noise</th>
<th>efficiency</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>typ (Vdc)</td>
<td>range (Vdc)</td>
<td>min (mA)</td>
<td>max (mA)</td>
<td>max (W)</td>
<td>typ (%)</td>
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<tr>
<td>PQP1-D12-S3-D</td>
<td>12</td>
<td>9~18</td>
<td>3.3</td>
<td>15</td>
<td>303</td>
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<td>5</td>
<td>10</td>
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<td>5</td>
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<td>±5</td>
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<td>PQP1-D12-D15-D</td>
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<td>±1.7</td>
<td>±33</td>
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<td>18~36</td>
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<td>PQP1-D24-D9-D</td>
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<td>±15</td>
<td>±1.7</td>
<td>±33</td>
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</tbody>
</table>

Notes: 1. Ripple & noise testing condition at nominal input voltage and 5%-100% load, the “tip and barrel” method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

PART NUMBER KEY

PQP1 - DXX - XXX - D

- Base Number
- Input Voltage
- Output Voltage
- Output S = single
- D = dual
- Output Power
- Packaging Style DIP

Additional Resources: Product Page | 3D Model | PCB Footprint
## INPUT

<table>
<thead>
<tr>
<th>parameter</th>
<th>conditions/description</th>
<th>min</th>
<th>typ</th>
<th>max</th>
<th>units</th>
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<tbody>
<tr>
<td>input voltage</td>
<td>12 Vdc input models</td>
<td>9</td>
<td>12</td>
<td>18</td>
<td>Vdc</td>
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<tr>
<td></td>
<td>24 Vdc input models</td>
<td>18</td>
<td>24</td>
<td>36</td>
<td>Vdc</td>
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<tr>
<td>start-up voltage</td>
<td>12 Vdc input models</td>
<td>9</td>
<td></td>
<td></td>
<td>Vdc</td>
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<tr>
<td></td>
<td>24 Vdc input models</td>
<td>18</td>
<td></td>
<td></td>
<td>Vdc</td>
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<tr>
<td>surge voltage</td>
<td>for maximum of 1 second</td>
<td>-0.7</td>
<td></td>
<td>25</td>
<td>Vdc</td>
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<td></td>
<td>12 Vdc input models</td>
<td>-0.7</td>
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<td>50</td>
<td>Vdc</td>
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<tr>
<td>filter</td>
<td>capacitance filter</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>current</td>
<td>full load/no load</td>
<td>111/15</td>
<td>114/30</td>
<td>mA</td>
<td></td>
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<td></td>
<td>12 Vdc input models</td>
<td>55/6</td>
<td>57/10</td>
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## OUTPUT

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<th>units</th>
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<tbody>
<tr>
<td>line regulation</td>
<td>min to max Vin</td>
<td>±0.2</td>
<td>±0.5</td>
<td>±1</td>
<td>%</td>
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<tr>
<td></td>
<td>positive output</td>
<td>±0.5</td>
<td></td>
<td>±1</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>negative output</td>
<td></td>
<td></td>
<td>±2</td>
<td>%</td>
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<tr>
<td>load regulation</td>
<td>5% ~ 100% load</td>
<td>±0.5</td>
<td>±1</td>
<td>±2</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>positive output</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>negative output</td>
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<td></td>
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<tr>
<td>set-point accuracy</td>
<td>5% ~ 100% load</td>
<td>±1</td>
<td>±3</td>
<td>±5</td>
<td>%</td>
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<tr>
<td></td>
<td>positive outputs</td>
<td>±3</td>
<td></td>
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<td></td>
<td>negative outputs</td>
<td>±3</td>
<td></td>
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</tr>
<tr>
<td>switching frequency</td>
<td>full load, nominal input</td>
<td>300</td>
<td></td>
<td></td>
<td>kHz</td>
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<tr>
<td>transient response</td>
<td>25% load step change</td>
<td>±3</td>
<td>±5</td>
<td></td>
<td>%</td>
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<tr>
<td>temperature coefficient</td>
<td>full load</td>
<td>±0.03</td>
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<td></td>
<td>%/°C</td>
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## PROTECTIONS

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<th>max</th>
<th>units</th>
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</thead>
<tbody>
<tr>
<td>short circuit protection</td>
<td>continuous, self-recovery</td>
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SAFETY AND COMPLIANCE

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<th>units</th>
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<tbody>
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<td>isolation voltage</td>
<td>input-output electric strength test for 1 minute</td>
<td>1500</td>
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<td></td>
<td>Vdc</td>
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<td>isolation resistance</td>
<td>input-output insulation at 500 Vdc</td>
<td>1000</td>
<td></td>
<td></td>
<td>MΩ</td>
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<td>isolation capacitance</td>
<td>input-output capacitance at 100 KHz / 0.1 V</td>
<td></td>
<td>100</td>
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<td>pF</td>
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<td>safety approvals</td>
<td>designed to meet 62368: EN/BS EN</td>
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<tr>
<td>EMC</td>
<td>CISPR32/EN55032 Class B (see recommended circuit)</td>
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<tr>
<td>ESD</td>
<td>IEC/EN61000-4-2, Contact ±6K, perf. Criteria B</td>
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<tr>
<td>radiated immunity</td>
<td>IEC/EN61000-4-3, 10 v/m, perf. Criteria A</td>
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<td>EFT/burst</td>
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<td>surge</td>
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<td>conducted immunity</td>
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<td>RoHS</td>
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<tr>
<td>MTBF</td>
<td>MIL-HDBK-217F @ 25°C</td>
<td>1000</td>
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<td>kHours</td>
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ENVIRONMENTAL

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<th>max</th>
<th>units</th>
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<tbody>
<tr>
<td>operating temperature</td>
<td></td>
<td>-40</td>
<td>85</td>
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<td>°C</td>
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<tr>
<td>storage temperature</td>
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<td>-55</td>
<td>125</td>
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<td>°C</td>
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<tr>
<td>humidity</td>
<td>non-condensing</td>
<td>5</td>
<td>95</td>
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SOLDERABILITY

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<th>typ</th>
<th>max</th>
<th>units</th>
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</thead>
<tbody>
<tr>
<td>hand soldering</td>
<td>1.5 mm from case for 10 seconds</td>
<td></td>
<td>300</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>reflow soldering</td>
<td>60 s max above 217°C</td>
<td></td>
<td>217</td>
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<td>°C</td>
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DERATING CURVE
MECHANICAL

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<th>units</th>
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<tbody>
<tr>
<td>dimensions</td>
<td>14 x 14 x 9</td>
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<td></td>
<td></td>
<td>mm</td>
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<tr>
<td>case material</td>
<td>Black plastic; flame-retardant and heat-resistant</td>
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<tr>
<td>weight</td>
<td></td>
<td>2.2</td>
<td></td>
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MECHANICAL DRAWING

units: mm [inches]
tolerance: ± 0.50 [±0.020]

PIN CONNECTIONS

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<th>Single</th>
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<tr>
<td>1</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>Vin</td>
<td>Vin</td>
</tr>
<tr>
<td>5</td>
<td>+Vo</td>
<td>+Vo</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td>0V</td>
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<td>7</td>
<td>0V</td>
<td>-Vo</td>
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RECOMMENDED CIRCUITS

Parameter Description

<table>
<thead>
<tr>
<th>Parameter Description</th>
<th>Vin (Vdc)</th>
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<th>24</th>
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<tbody>
<tr>
<td>Cin</td>
<td>47uF/25V</td>
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<table>
<thead>
<tr>
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<th>Vo (Vdc)</th>
<th>3.3, 5</th>
<th>12, 15, 24</th>
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<tbody>
<tr>
<td>Cout</td>
<td>100uF/6.3V</td>
<td>27uF/35V</td>
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EMC COMPLIANCE CIRCUITS

Parameter Description

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Vin: 12 Vdc</th>
<th>Vin: 24 Vdc</th>
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<tbody>
<tr>
<td>FUSE</td>
<td>slow blow, choose according to actual input current</td>
<td></td>
</tr>
<tr>
<td>C0</td>
<td>1000µF/25V</td>
<td>680µF/50V</td>
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<tr>
<td>C1</td>
<td>4.7µF/50V</td>
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</tr>
<tr>
<td>LDM1</td>
<td>15µH</td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>4.7µF/50V</td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>330µF/50V</td>
<td></td>
</tr>
<tr>
<td>CY1</td>
<td>1nF/2KV</td>
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</tr>
<tr>
<td>C4</td>
<td>Refer to the Cout Fig.2</td>
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### REVISION HISTORY

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<th>description</th>
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<td>initial release</td>
<td>03/28/2020</td>
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<td>10/30/2020</td>
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The revision history provided is for informational purposes only and is believed to be accurate.