



PHI-CON

0.5 W DC-DC Converter P0A-Series

- 4 Pin SIL
- Low ripple and noise
- 1000 V_{DC} isolation
- 3000 V_{DC} isolation optional
- Unregulated



Model guide

| Type | Input voltage | | Input current | | Output voltage [V _{DC}] | Output current [mA] max. | Efficiency [%] typ. | Capacitive load [μF] max. |
|------------|----------------------------|--------------------------|-------------------|---------------------|-----------------------------------|--------------------------|---------------------|---------------------------|
| | Nominal [V _{DC}] | range [V _{DC}] | no load [mA] typ. | full load [mA] typ. | | | | |
| P0A3R33R3S | 3.3 | 2.97 ... 3.63 | 20 | 205 | 3.3 | 152 | 76 | 100 |
| P0A3R305S | 3.3 | 2.97 ... 3.63 | 25 | 215 | 5.0 | 100 | 70 | 100 |
| P0A3R37R2S | 3.3 | 2.97 ... 3.63 | 25 | 215 | 7.2 | 70 | 70 | 100 |
| P0A3R309S | 3.3 | 2.97 ... 3.63 | 25 | 215 | 9.0 | 56 | 70 | 100 |
| P0A3R312S | 3.3 | 2.97 ... 3.63 | 25 | 200 | 12.0 | 42 | 72 | 100 |
| P0A3R315S | 3.3 | 2.97 ... 3.63 | 25 | 210 | 15.0 | 33 | 73 | 100 |
| P0A3R318S | 3.3 | 2.97 ... 3.63 | 25 | 210 | 18.0 | 28 | 73 | 100 |
| P0A3R324S | 3.3 | 2.97 ... 3.63 | 25 | 210 | 24.0 | 21 | 73 | 100 |
| P0A053R3S | 5 | 4.5 ... 5.5 | 20 | 130 | 3.3 | 152 | 76 | 100 |
| P0A0505S | 5 | 4.5 ... 5.5 | 15 | 120 | 5.0 | 100 | 83 | 100 |
| P0A057R2S | 5 | 4.5 ... 5.5 | 15 | 135 | 7.2 | 70 | 75 | 100 |
| P0A0509S | 5 | 4.5 ... 5.5 | 15 | 130 | 9.0 | 56 | 78 | 100 |
| P0A0512S | 5 | 4.5 ... 5.5 | 18 | 125 | 12.0 | 42 | 79 | 100 |
| P0A0515S | 5 | 4.5 ... 5.5 | 20 | 130 | 15.0 | 33 | 77 | 100 |
| P0A0518S | 5 | 4.5 ... 5.5 | 20 | 125 | 18.0 | 28 | 79 | 100 |
| P0A0524S | 5 | 4.5 ... 5.5 | 25 | 135 | 24.0 | 21 | 75 | 100 |
| P0A123R3S | 12 | 10.8 ... 13.2 | 15 | 58 | 3.3 | 152 | 72 | 100 |
| P0A1205S | 12 | 10.8 ... 13.2 | 10 | 54 | 5.0 | 100 | 78 | 100 |
| P0A127R2S | 12 | 10.8 ... 13.2 | 15 | 57 | 7.2 | 70 | 73 | 100 |
| P0A1209S | 12 | 10.8 ... 13.2 | 15 | 57 | 9.0 | 56 | 73 | 100 |
| P0A1212S | 12 | 10.8 ... 13.2 | 20 | 58 | 12.0 | 42 | 72 | 100 |
| P0A1215S | 12 | 10.8 ... 13.2 | 20 | 61 | 15.0 | 33 | 69 | 100 |
| P0A1218S | 12 | 10.8 ... 13.2 | 15 | 61 | 18.0 | 28 | 68 | 100 |
| P0A1224S | 12 | 10.8 ... 13.2 | 15 | 59 | 24.0 | 21 | 71 | 100 |
| P0A153R3S | 15 | 13.5 ... 16.5 | 10 | 44 | 3.3 | 152 | 75 | 100 |
| P0A1505S | 15 | 13.5 ... 16.5 | 8 | 43 | 5.0 | 100 | 78 | 100 |
| P0A157R2S | 15 | 13.5 ... 16.5 | 12 | 44 | 7.2 | 70 | 75 | 100 |
| P0A1509S | 15 | 13.5 ... 16.5 | 12 | 44 | 9.0 | 56 | 75 | 100 |
| P0A1512S | 15 | 13.5 ... 16.5 | 10 | 44 | 12.0 | 42 | 77 | 100 |
| P0A1515S | 15 | 13.5 ... 16.5 | 15 | 48 | 15.0 | 33 | 70 | 100 |
| P0A1518S | 15 | 13.5 ... 16.5 | 12 | 51 | 18.0 | 28 | 66 | 100 |
| P0A1524S | 15 | 13.5 ... 16.5 | 10 | 51 | 24.0 | 21 | 66 | 100 |
| P0A243R3S | 24 | 21.6 ... 26.4 | 8 | 31 | 3.3 | 152 | 69 | 100 |
| P0A2405S | 24 | 21.6 ... 26.4 | 8 | 29 | 5.0 | 100 | 73 | 100 |
| P0A247R2S | 24 | 21.6 ... 26.4 | 10 | 30 | 7.2 | 70 | 70 | 100 |
| P0A2409S | 24 | 21.6 ... 26.4 | 10 | 30 | 9.0 | 56 | 71 | 100 |
| P0A2412S | 24 | 21.6 ... 26.4 | 8 | 30 | 12.0 | 42 | 71 | 100 |
| P0A2415S | 24 | 21.6 ... 26.4 | 10 | 29 | 15.0 | 33 | 73 | 100 |
| P0A2418S | 24 | 21.6 ... 26.4 | 10 | 29 | 18.0 | 28 | 73 | 100 |
| P0A2424S | 24 | 21.6 ... 26.4 | 10 | 29 | 24.0 | 21 | 72 | 100 |

| Product ordering information | | | | | | | | |
|------------------------------|---------------|-------|----------------|-------|--------|--------|-------------------|------|
| Series | Input voltage | | Output voltage | | Output | | Isolation voltage | |
| P0A | 12 | | 05 | | S | | H | |
| PHI-CON 0.5 W | 3R3 | 3.3 V | 3R3 | 3.3 V | S | Single | blank | 1 kV |
| | 05 | 5 V | 05 | 5 V | | | H | 3 kV |
| | 12 | 12 V | 7R2 | 7.2 V | | | | |
| | 15 | 15 V | 09 | 9 V | | | | |
| | 24 | 24 V | 12 | 12 V | | | | |
| | | | 15 | 15 V | | | | |
| | | | 18 | 18 V | | | | |
| | | | 24 | 24 V | | | | |

0.5 W DC-DC Converter P0A-Series

| Input | |
|---|--|
| Voltage range | ± 10% |
| Filter | Capacitors |
| Reflected ripple current | 20 mA _{p-p} (see figure 1) |
| I/O-Isolation: | |
| DC-Isolation voltage for 60 s | Standard, suffix blanc: 1 kV Suffix "H": 3 kV |
| Resistance | ≥ 10 ⁹ Ω |
| Capacitance | 60 pF, typ. |
| Output | |
| Voltage accuracy | ≤ ± 3 % |
| Ripple and noise @ 20 MHz BW | ≤ 100 mV _{p-p} , (see figure 2) |
| Short circuit protection | No |
| Line voltage deviation @ 1% Vin change | ≤ ± 1.2 % |
| Voltage stability at load change 20...100 % | ± 20 % @ only P0Axx3R3x types ± 10 % all others |
| Temperature drift | ± 0.02 %/°C |
| EMC | |
| RE | EN 55032 Class B (see Figure 3) |
| CE | EN 55032 Class B (see Figure 3) |
| ESD | EN-, IEC 61000-4-2 Perf. criteria A |
| RS | EN-, IEC 61000-4-3 Perf. criteria A |
| EFT | EN-, IEC 61000-4-4 Perf. criteria A (see Figure 3) |
| Surge | EN-, IEC 61000-4-5 Perf. criteria A (see Figure 3) |
| CS | EN-, IEC 61000-4-6 Perf. criteria A |
| PFMF | EN-, IEC 61000-4-8 Perf. criteria A |

| General | |
|---|--|
| Safety standard, designed to meet | EN-, IEC-, UL 60950-1 EN-, IEC-, UL 62368-1 |
| Switching frequency | ~ 80 kHz |
| Reliability calculated MTBF (MIL-HDBK-217 F) | ≥ 1.12 Mio. h |
| Environmental | |
| Operating ambient temperature | -40 ... 85 °C |
| Case temperature | ≤ 100 °C |
| Storage temperature | -40 ... 125 °C |
| Derating | None required |
| Humidity | Up to 95 %, non condensing |
| Cooling | Free air convection, 35...60 LFM |
| Physical | |
| Mechanical dimensions | 6 x 10.15 x 10.68 mm |
| Weight | 1.5 g |
| Case material | Non conductive black plastic (UL94V-0 rated) |
| Potting material | Epoxy (UL94V-0 rated) |
| Capacitive load at 100 % resistive load and minimal input voltage | ≤ 100 µF |
| Absolute maximum ratings | |
| P0A3R3xxS-Series | 6 V _{dc} , ≤ 100 ms |
| P0A05xxS-Series | 7 V _{dc} , ≤ 100 ms |
| P0A12xxS-Series | 15 V _{dc} , ≤ 100 ms |
| P0A15xxS-Series | 18 V _{dc} , ≤ 100 ms |
| P0A24xxS-Series | 28 V _{dc} , ≤ 100 ms |
| Pin soldering temperature | ≤ 260 °C duration ≤ 10 s, ≥ 1.5 mm distance from body |

Note:

1. Specifications at 25 °C, nominal input voltage and full load unless otherwise specified.
2. Capacitive load is specified by minimal Vin and constant resistive load.
3. Not usable for high voltage IGBT- and MOSFET- driver applications.
4. Operation under no load conditions will not damage the converter, however they may not meet all listed specifications.

Figure 1 Measure circuit for input ripple current

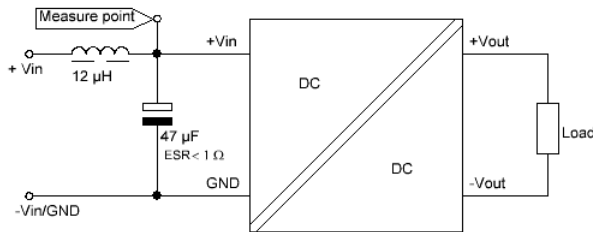
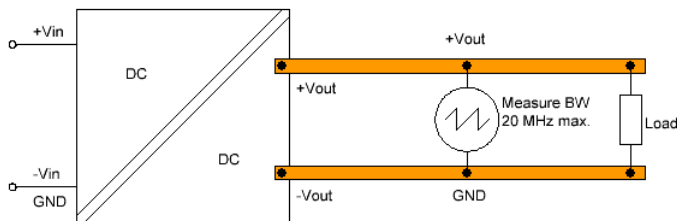
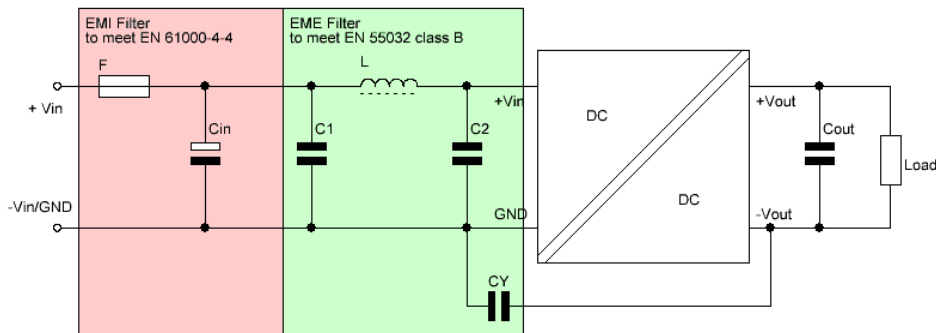


Figure 2 Measure circuit for output ripple & noise (Oscilloscope BW 20 MHz)



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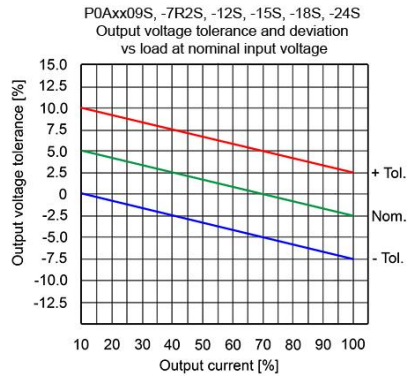
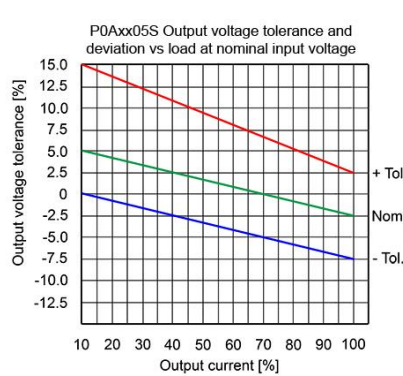
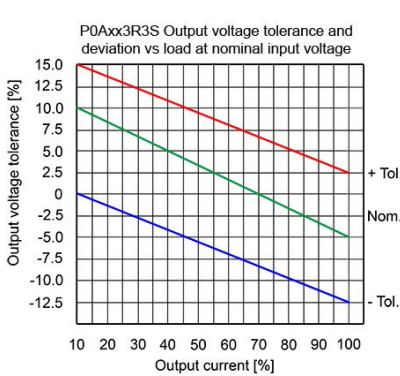
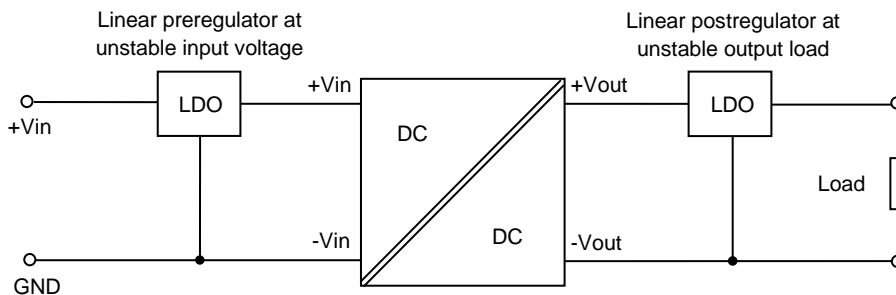
Figure 3 Application circuit to meet EN 61000-4-4-, EN 61000-4-5 performance criteria A and EN 55032 class B



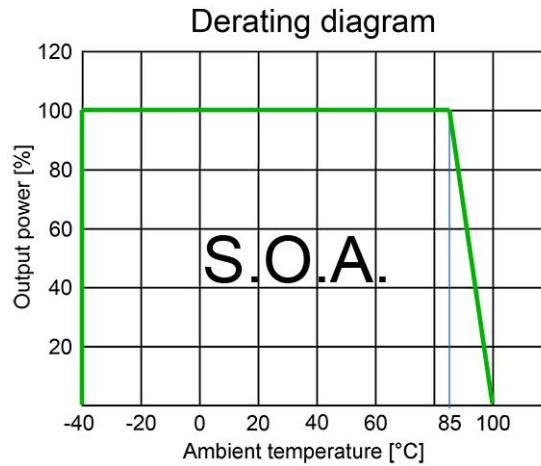
| BOM to Figure 3 | | | | | | |
|-----------------|-----------------------------|-------------------|--------------------------|------------|--------------------------|---------------------------|
| Type | Fuse time delayed type [mA] | Cin | C1 | L | C2 | CY |
| P0A3R3xxx | 800 | 470 μ F, 100V | 2.2 μ F ceramic chip | 18 μ H | - | - |
| P0A05xxx | 500 | 470 μ F, 100V | 2.2 μ F ceramic chip | 18 μ H | - | - |
| P0A12xxx | 300 | 470 μ F, 100V | 2.2 μ F ceramic chip | 18 μ H | - | - |
| P0A15xxx | 300 | 470 μ F, 100V | 2.2 μ F ceramic chip | 18 μ H | - | - |
| P0A24xxx | 300 | 470 μ F, 100V | 2.2 μ F ceramic chip | 18 μ H | 2.2 μ F ceramic chip | 470 pF, 2 kV ceramic chip |

The EMI filter components are to meet the conducted emissions requirement of the converter. These components should be as near as possible mounted to the converter. All leads should be as short as possible to minimize the radiation.

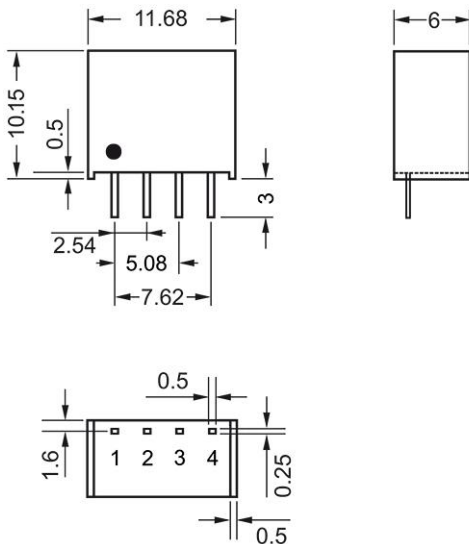
Application example with low drop out linear voltage regulator for input or output stabilisation



0.5 W DC-DC Converter P0A-Series



Mechanical package dimensions



All dimensions in mm

1. Pin cross section tolerance ± 0.02 mm
2. Pin length tolerance ± 0.35 mm
3. Pin pitch tolerance ± 0.35 mm
4. Case tolerance ± 0.5 mm

| Pin assignment | |
|----------------|-----------|
| 1 | -V Input |
| 2 | +V Input |
| 3 | -V Output |
| 4 | +V Output |

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