



PHI-CON

# 0.25 W DC-DC Converter P0C-Series

- 4 Pin SIL
- Low ripple and noise
- 1000 V<sub>DC</sub> isolation
- Optional 3000 V<sub>DC</sub> isolation



## Model guide

Type	Input voltage		Input current		Output voltage [V <sub>DC</sub> ]	Output current [mA] max.	Efficiency [%] typ.	Capacitive load [μF] max.
	Nominal [V <sub>DC</sub> ]	Range [V <sub>DC</sub> ]	no load [mA] typ.	full load [mA] typ.				
P0C3R33R3SL	3.3	2.97 ... 3.63	30	120	3.3	75.7	63	100
P0C3R305SL	3.3	2.97 ... 3.63	25	115	5.0	50.0	66	100
P0C3R37R2SL	3.3	2.97 ... 3.63	25	118	7.2	34.7	64	100
P0C3R309SL	3.3	2.97 ... 3.63	25	118	9.0	27.7	64	100
P0C3R312SL	3.3	2.97 ... 3.63	32	113	12.0	20.8	67	100
P0C3R315SL	3.3	2.97 ... 3.63	25	118	15.0	16.6	64	100
P0C3R318SL	3.3	2.97 ... 3.63	25	115	18.0	13.8	66	100
P0C3R324SL	3.3	2.97 ... 3.63	20	115	24.0	10.4	66	100
P0C053R3SL	5.0	4.5 ... 5.5	20	78	3.3	75.7	64	100
P0C0505SL	5.0	4.5 ... 5.5	17	70	5.0	50.0	71	100
P0C057R2SL	5.0	4.5 ... 5.5	18	74	7.2	34.7	68	100
P0C0509SL	5.0	4.5 ... 5.5	15	68	9.0	27.7	73	100
P0C0512SL	5.0	4.5 ... 5.5	14	66	12.0	20.8	76	100
P0C0515SL	5.0	4.5 ... 5.5	20	70	15.0	16.6	71	100
P0C0518SL	5.0	4.5 ... 5.5	17	69	18.0	13.8	72	100
P0C0524SL	5.0	4.5 ... 5.5	18	65	24.0	10.4	77	100
P0C123R3SL	12.0	10.8 ... 13.2	10	32	3.3	75.7	65	100
P0C1205SL	12.0	10.8 ... 13.2	12	31	5.0	50.0	67	100
P0C127R2SL	12.0	10.8 ... 13.2	10	31	7.2	34.7	67	100
P0C1209SL	12.0	10.8 ... 13.2	12	33	9.0	27.7	64	100
P0C1212SL	12.0	10.8 ... 13.2	15	33	12.0	20.8	63	100
P0C1215SL	12.0	10.8 ... 13.2	13	31	15.0	16.6	67	100
P0C1218SL	12.0	10.8 ... 13.2	13	32	18.0	13.8	65	100
P0C1224SL	12.0	10.8 ... 13.2	18	38	24.0	10.4	55	100
P0C153R3SL	15.0	13.5 ... 16.5	12	26	3.3	75.7	63	100
P0C1505SL	15.0	13.5 ... 16.5	8	27	5.0	50.0	62	100
P0C157R2SL	15.0	13.5 ... 16.5	12	28	7.2	34.7	60	100
P0C1509SL	15.0	13.5 ... 16.5	12	28	9.0	27.7	60	100
P0C1512SL	15.0	13.5 ... 16.5	12	27	12.0	20.8	62	100
P0C1515SL	15.0	13.5 ... 16.5	10	27	15.0	16.6	61	100
P0C1518SL	15.0	13.5 ... 16.5	12	29	18.0	13.8	57	100
P0C1524SL	15.0	13.5 ... 16.5	12	29	24.0	10.4	57	100
P0C243R3SL	24.0	21.6 ... 26.4	8	17	3.3	75.7	60	100
P0C2405SL	24.0	21.6 ... 26.4	7	17	5.0	50.0	61	100
P0C247R2SL	24.0	21.6 ... 26.4	8	18	7.2	34.7	57	100
P0C2409SL	24.0	21.6 ... 26.4	8	17	9.0	27.7	62	100
P0C2412SL	24.0	21.6 ... 26.4	10	19	12.0	20.8	56	100
P0C2415SL	24.0	21.6 ... 26.4	7	19	15.0	16.6	55	100
P0C2418SL	24.0	21.6 ... 26.4	10	18	18.0	13.8	57	100
P0C2424SL	24.0	21.6 ... 26.4	10	18	24.0	10.4	59	100

Product ordering information								
Series	Input voltage		Output voltage		Output		Isolation voltage	
PHI-CON 0.25 W	3R3	3.3 V	3R3	3.3 V	SL	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				
Example:	P0C1205SLH		Pout: 0.25 W, Vin: 12 V, Vout: 5 V single, Isolation 3 kV					

# 0.25 W DC-DC Converter P0C-Series

## Specifications

Input	
Voltage range	± 10%
Filter	Capacitors
Reflected ripple current	20 mA <sub>p-p</sub> (see Figure 1)
I/O-Isolation:	
DC-Isolation voltage for 60 s	Standard, suffix blanc: 1 kV Suffix "H": 3 kV
Resistance	≥ 10 <sup>9</sup> Ω
Capacitance	60 pF, typ.
Output	
Voltage accuracy	± ± 3 %
Ripple and noise at BW 20 MHz (see Figure 2)	≤ 100 mV <sub>p-p</sub>
Short circuit protection	No
Output voltage deviation @ 1% V <sub>in</sub> change	± 1.2 %
Voltage stability at load change 20...100 %	± 20 % @ only P0Cxx3R3SL ± 10 % @ all others
Temperature drift	± 0.02 % / °C
EMC	
RE	EN 55032 Class B
CE	EN 55032 Class B (see Figure 3)
ESD	EN-, IEC 61000-4-2 Perf. crit. A
RS	EN-, IEC 61000-4-3 Perf. crit. A
EFT	EN-, IEC 61000-4-4 Perf. crit. A (see Figure 3)
Surge	EN-, IEC 61000-4-5 Perf. crit. A (see Figure 3)
CS	EN-, IEC 61000-4-6 Perf. crit. A
PFMF	EN-, IEC 61000-4-8 Perf. crit. A

General	
Safety standards, 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 temperature (ambient)	-40 ... 85 °C
Case temperature	≤ 100 °C
Storage temperature	-40 ... 125 °C
Derating	None required
Storage humidity	Up to 95 %, non condensing
Cooling	Free air convection, 35...60 LFM
Physical	
Mechanical dimensions	6 x 11.68 x 10.15 mm
Weight	1.5 g
Case material	Non conductive black plastic (UL94V-0 rated)
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum input voltage	
P0C3R3xxSL-Series	5 V <sub>DC</sub> , ≤ 100 ms
P0C05xxSL-Series	7 V <sub>DC</sub> , ≤ 100 ms
P0C12xxSL-Series	15 V <sub>DC</sub> , ≤ 100 ms
P0C15xxSL-Series	18 V <sub>DC</sub> , ≤ 100 ms
P0C24xxSL-Series	28 V <sub>DC</sub> , ≤ 100 ms
Pin soldering temperature	≤ 260 °C duration ≤ 10 s, ≥ 1.5 mm distance from body

### Note:

- Specifications at 25 °C, nominal input voltage and full load unless otherwise specified.
- Capacitive load is specified by minimal V<sub>in</sub> and constant resistive load.
- Not usable for high voltage IGBT- and MOSFET- driver applications.
- 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

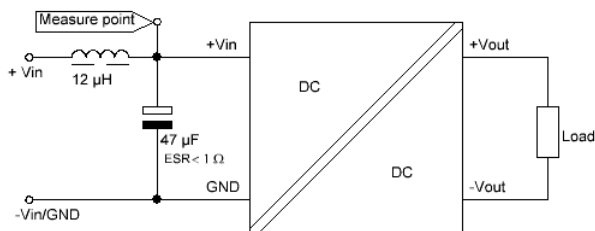
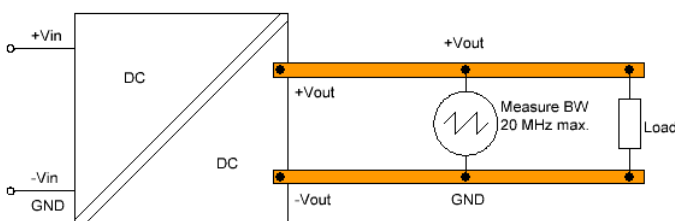
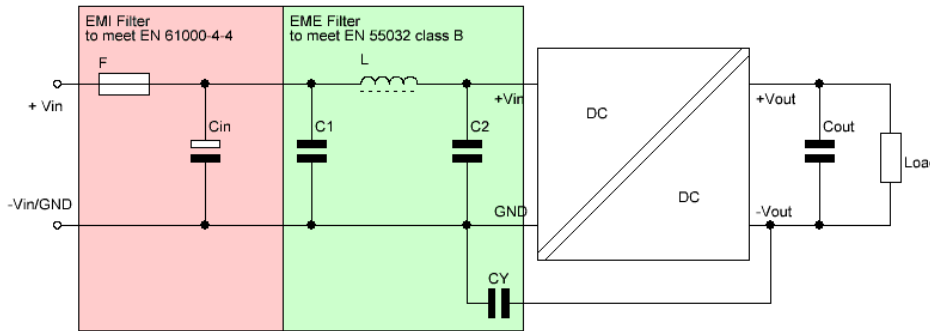


Figure 2 Measure circuit for output ripple and noise voltage (Bandwidth 20 MHz)



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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

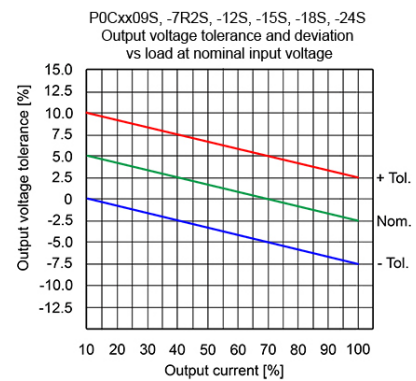
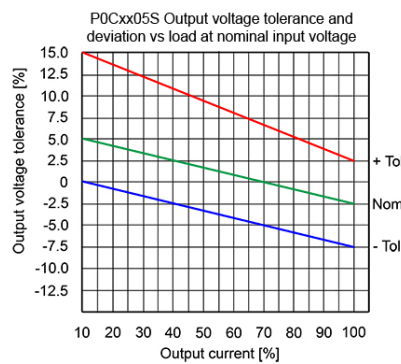
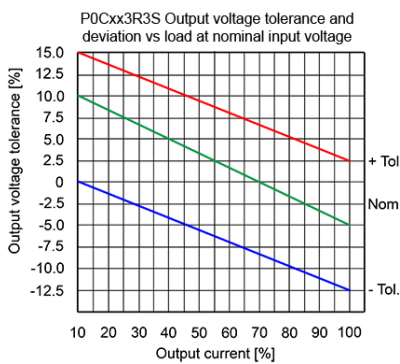
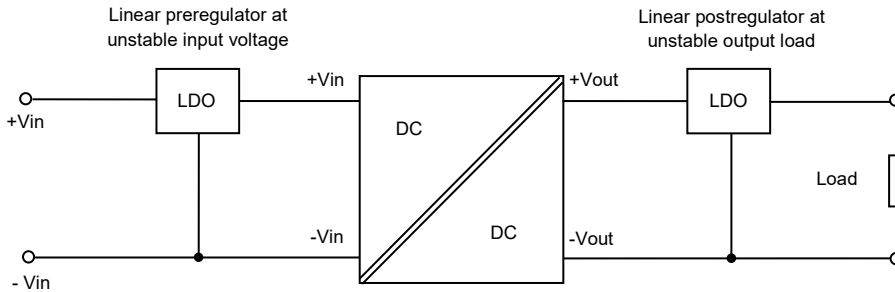


BOM to Figure 3

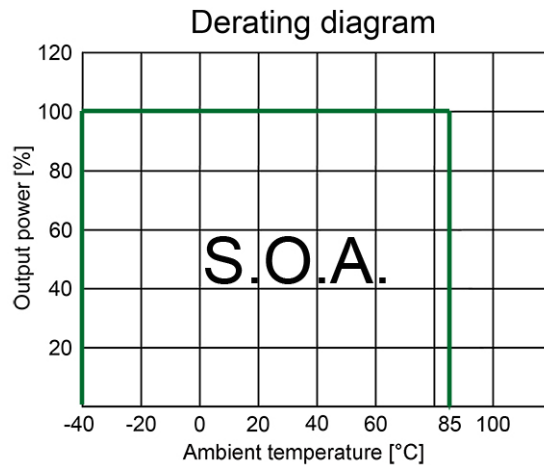
Type	Fuse time delayed type [mA]	Cin	C1	L	C2	CY
P0C3R3xxx	500	470 $\mu$ F, 100V	2.2 $\mu$ F ceramic chip	18 $\mu$ H	-	-
P0C05xxx	500	470 $\mu$ F, 100V	2.2 $\mu$ F ceramic chip	18 $\mu$ H	-	-
P0C12xxx	300	470 $\mu$ F, 100V	2.2 $\mu$ F ceramic chip	18 $\mu$ H	-	-
P0C15xxx	300	470 $\mu$ F, 100V	2.2 $\mu$ F ceramic chip	18 $\mu$ H	-	-
P0C24xxx	300	470 $\mu$ F, 100V	2.2 $\mu$ F ceramic chip	18 $\mu$ H	2.2 $\mu$ 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.

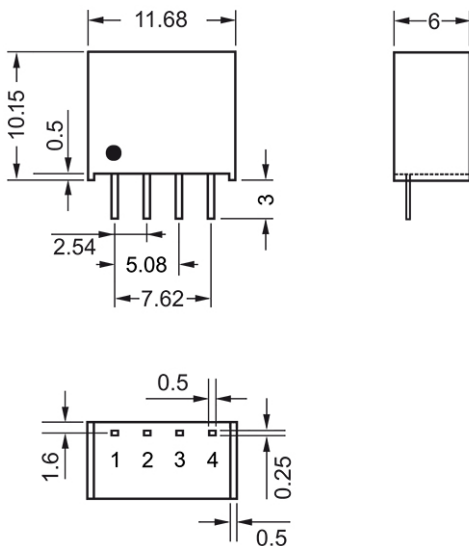
## Application example with low drop out linear voltage regulator for input or output stabilisation



# 0.25 W DC-DC Converter P0C-Series



## Mechanical package dimensions



All dimensions in mm

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

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

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