



PHI-CON

1 W DC-DC Converter P1R-Series

- DIL 14 pin package
- Low ripple and noise
- 1000 V_{DC}, optional 3000 V_{DC} isolation
- -40...85 °C Operating temperature range
- Regulated output voltage



Model guide

Type	Input voltage		Input current		Output voltage [V _{DC}]	Output current [mA] max.	Efficiency typ. [%] typ.	Capacitive load (note 2) [μF] max.
	Nominal [V _{DC}]	Range [V _{DC}]	no load [mA] typ.	full load [mA] typ.				
P1R3R33R3S	3.3	2.97...3.63	30	500	3.3	303	61	220
P1R3R305S	3.3	2.97...3.63	30	475	5.0	200	64	220
P1R3R37R2S	3.3	2.97...3.63	40	480	7.2	140	63	220
P1R3R309S	3.3	2.97...3.63	40	480	9.0	111	63	220
P1R3R312S	3.3	2.97...3.63	40	480	12.0	84	63	220
P1R3R315S	3.3	2.97...3.63	45	465	15.0	67	65	220
P1R053R3S	5	4.5...5.5	25	335	3.3	303	60	220
P1R0505S	5	4.5...5.5	25	310	5.0	200	67	220
P1R057R2S	5	4.5...5.5	25	300	7.2	140	67	220
P1R0509S	5	4.5...5.5	30	305	9.0	111	66	220
P1R0512S	5	4.5...5.5	35	285	12.0	84	70	220
P1R0515S	5	4.5...5.5	25	295	15.0	67	68	220
P1R123R3S	12	10.8...13.2	15	145	3.3	303	57	220
P1R1205S	12	10.8...13.2	10	125	5.0	200	67	220
P1R127R2S	12	10.8...13.2	15	125	7.2	140	67	220
P1R1209S	12	10.8...13.2	15	125	9.0	111	67	220
P1R1212S	12	10.8...13.2	15	125	12.0	84	70	220
P1R1215S	12	10.8...13.2	20	125	15.0	67	66	220
P1R243R3S	24	21.6...26.4	5	75	3.3	303	61	220
P1R2405S	24	21.6...26.4	5	60	5.0	200	67	220
P1R247R2S	24	21.6...26.4	5	60	7.2	140	67	220
P1R2409S	24	21.6...26.4	5	60	9.0	111	70	220
P1R2412S	24	21.6...26.4	5	60	12.0	84	73	220
P1R2415S	24	21.6...26.4	5	60	15.0	67	73	220

Specifications

Input	
Voltage range	± 10 %
Reflected ripple current	20 mA _{p-p} (see Figure 1)
Filter	Capacitors
I/O-Isolation	
Isolation voltage	Standard: 1 kV _{DC} Suffix: 3 kV _{DC}
Resistance	≥ 10 ⁹ Ω
Capacitance	60 pF, typ.
Output	
Voltage tolerance	± ± 2 %
Ripple and noise (at 20 MHz BW)	≤ 50 mV _{p-p} (see Figure 2)
Short circuit	No protection
Line voltage deviation	± 0.5 %
Voltage stability at load change 0...100 %	P1Rxx3R3x: ≤ ± 1 % All others: ≤ ± 0.5 %
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 design to meet standard	IEC 60950-1
Switching frequency	50 kHz, typ.
Reliability calculated MTBF (MIL-HDBK-217 F at Ta 25°C)	≥ 3.5 Mio. h
Environmental	
Operating ambient temperature	-40 ... 85 °C
Storage temperature	-40 ... 125 °C
Case temperature	≤ 100 °C
Humidity	95 % max., non condensing
Cooling	Free air convection, 35...60 LFM
Physical	
Weight	2.7 g
Dimensions	10.2 x 20.3 x 6.9 mm
Case material	Black plastic (UL94V-0 rated)
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum ratings	
Input voltage	P1R3R3xxS: ≤ 5 V _{DC} , 100 ms
Input voltage	P1R05xxS: ≤ 7 V _{DC} , 100 ms
Input voltage	P1R12xxS: ≤ 15 V _{DC} , 100 ms
Input voltage	P1R24xxS: ≤ 28 V _{DC} , 100 ms
Pin soldering temperature	≤ 260 °C duration ≤ 10 s, ≥ 1.5 mm distance from body

Part number ordering information

P1	R	05	3R3	S	H
Output power	Series	Input voltage	Output voltage	Output	Isolation
P1	1W	R	3R3 3.3 V	S	Blank 1 kV _{DC}
			05 5 V	Single	H 3 kV _{DC}
			12 12 V		
			24 24 V		
			09 9 V		
			12 12 V		
			24 24 V		

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Notes:

1. Specifications at 25 °C, nominal input voltage and full load unless otherwise specified.
2. Capacitive loading tested by minimal V_{in} and constant resistive load.
3. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
4. Operation under no load conditions will not damage the device, however they may not meet all listed specifications.
5. All converters are to be used about an external fuse. See figure 3.
6. Not usable for high voltage MOSFET and IGBT driver application.

Figure 1 Measure circuit for input ripple current

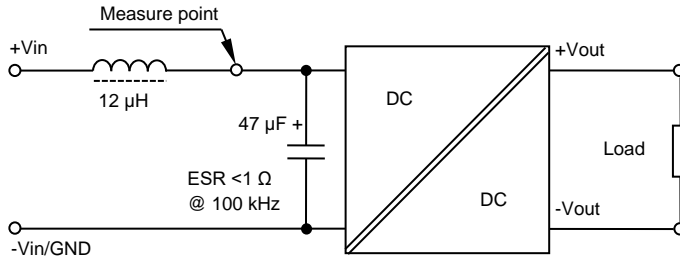


Figure 2 Measure circuit for output ripple & noise (measured with 20 MHz bandwidth)

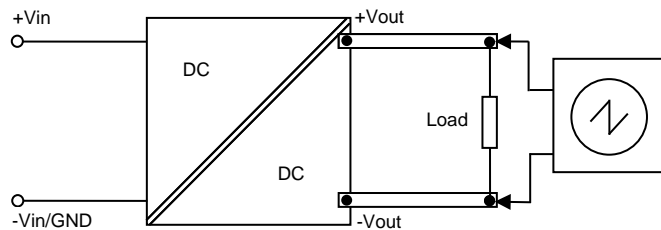
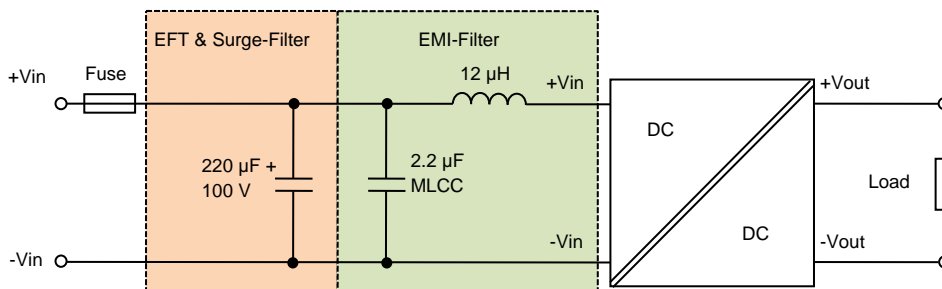


Figure 3 Application circuit for EFT and EMI protection



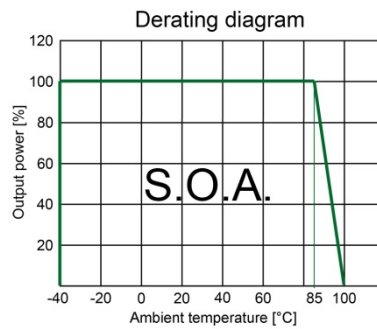
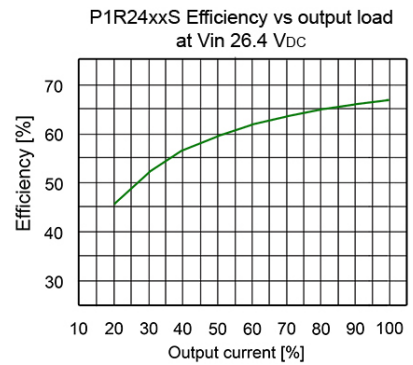
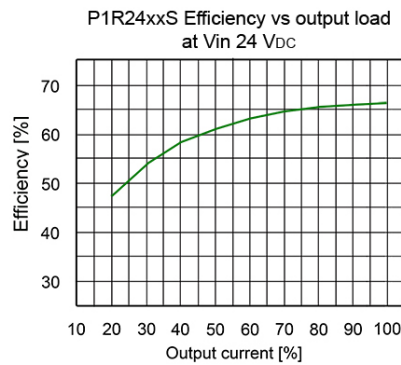
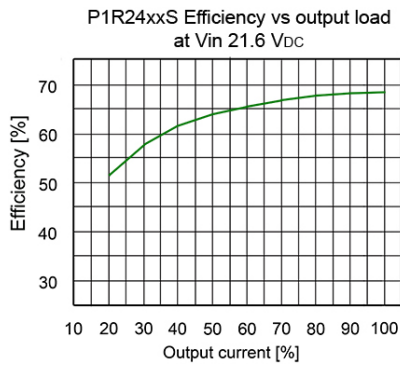
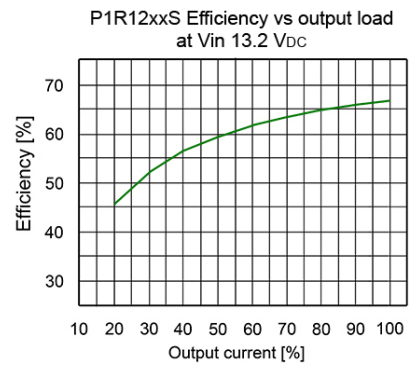
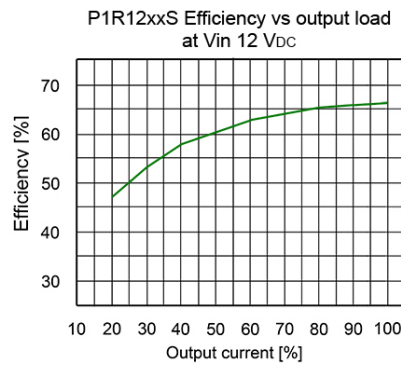
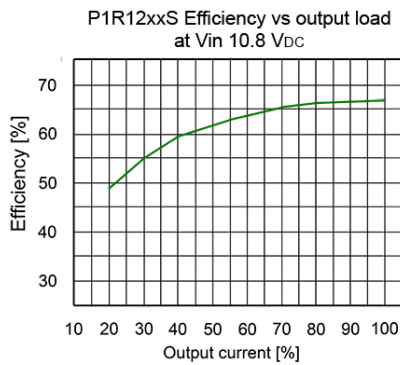
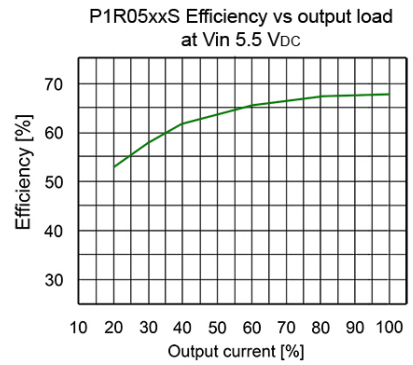
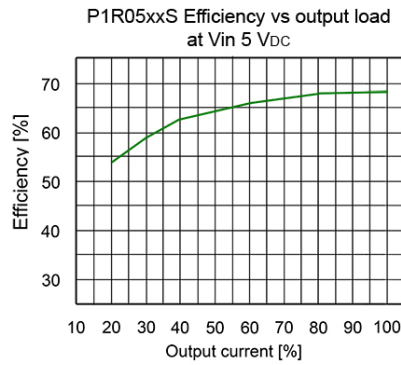
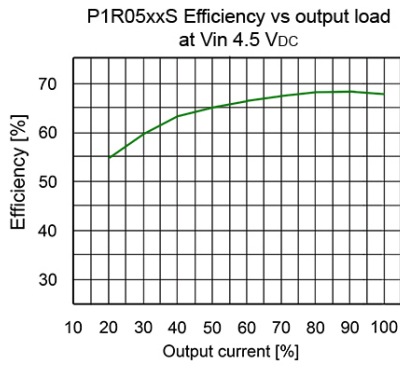
BOM to Fig.3	
Type	Fuse (time delay type)
P1R3R3xxx	800 mA
P1R05xxx	500 mA
P1R12xxx	300 mA
P1R24xxx	300 mA

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.



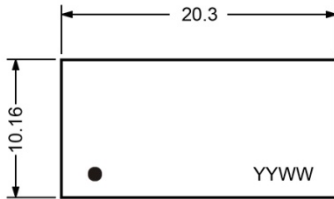
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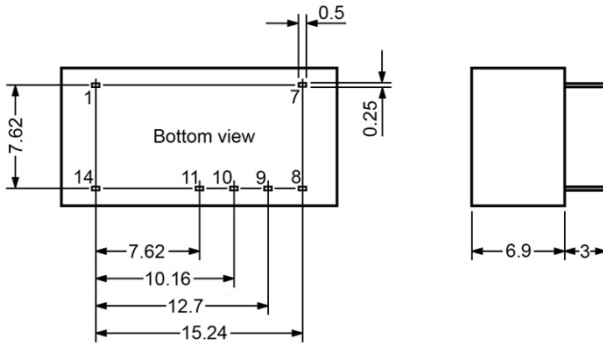


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Mechanical dimensions



- All units are in millimeters
1. Pin cross section tolerance ± 0.05
 2. Pin length tolerance ± 0.35
 3. Pitch tolerance ± 0.35
 4. Case tolerance ± 0.5



Pin assignment		
Pin	1 kV _{DC} Isolation	3 kV _{DC} Isolation
1	-V Input	-V Input
7	Not connected	Not connected
8	No pin	+V Output
9	+V Output	No pin
10	No pin	-V Output
11	-V Output	No pin
14	+V Input	+V Input

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