1 W DC-DC Converter P1U-Series

PHI-CON

- 7 Pin SIL package
- Low ripple and noise
- 1000 V_{DC} isolation
- optional 3000 V_{DC} isolation
- -40...85 °C Operating temperature range
- Output voltage regulated

Model guide

Type	Input voltage		Input current		Output voltage	Output current	Efficiency typ.	Capacitive load (note 2)
	Nominal [V_{DC}]	Range [V_{DC}]	no load [mA] typ.	full load [mA] typ.	[V_{DC}]	[mA] max.	[%] typ.	[µF] max.
P1U3R33R3S	3.3	2.97..3.63	30	500	3.3	303	61	220
P1U3R305S	3.3	2.97..3.63	30	475	5.0	200	64	220
P1U3R37R2S	3.3	2.97..3.63	40	480	7.2	140	63	220
P1U3R309S	3.3	2.97..3.63	40	480	9.0	111	63	220
P1U3R312S	3.3	2.97..3.63	40	480	12.0	84	63	220
P1U3R315S	3.3	2.97..3.63	45	465	15.0	67	65	220
P1U053R3S	5	4.5..5.5	25	335	3.3	303	60	220
P1U0505S	5	4.5..5.5	25	295	5.0	200	68	220
P1U057R2S	5	4.5..5.5	25	300	7.2	140	67	220
P1U0509S	5	4.5..5.5	30	280	9.0	111	71	220
P1U0512S	5	4.5..5.5	35	285	12.0	84	70	220
P1U0515S	5	4.5..5.5	25	282	15.0	67	71	220
P1U123R3S	12	10.8..13.2	15	155	3.3	303	60	220
P1U1205S	12	10.8..13.2	10	130	5.0	200	65	220
P1U127R2S	12	10.8..13.2	15	125	7.2	140	67	220
P1U1209S	12	10.8..13.2	15	125	9.0	111	67	220
P1U1212S	12	10.8..13.2	15	115	12.0	84	71	220
P1U1215S	12	10.8..13.2	20	120	15.0	67	69	220
P1U243R3S	24	21.6..26.4	5	70	3.3	303	64	220
P1U2405S	24	21.6..26.4	5	60	5.0	200	68	220
P1U247R2S	24	21.6..26.4	5	60	7.2	140	67	220
P1U2409S	24	21.6..26.4	5	60	9.0	111	72	220
P1U2412S	24	21.6..26.4	5	60	12.0	84	70	220
P1U2415S	24	21.6..26.4	5	60	15.0	67	71	220

Specifications

Input			
Voltage range		± 10 %	
Reflected ripple current		20 mAp-p (see figure 1)	
Filter		Capacitors	
I/O-Isolation			
DC-Isolation voltage		1 kV, Suffix “H”: 3 kV	
Resistance		10^9 Ω, max.	
Capacitance		60 pF, typ.	
Output			
Voltage accuracy		± 2 %, max.	
Ripple and noise (at 20 MHz BW)		50 mVp-p, max. (see figure 2)	
Short circuit		No protection	
Line voltage deviation		± 0.5 %	
Voltage stability at load change 0...100 %		± 0.5 % ± 1 % @ P1Uxx3R3x only	
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. crit. A	
RS	EN-, IEC 61000-4-3	Perf. crit. A	
EFT	EN-, IEC 61000-4-4	Perf. crit. A	(see Figure 2)
Surge	EN-, IEC 61000-4-5	Perf. crit. A	(see Figure 2)
CS	EN-, IEC 61000-4-6	Perf. crit. A	
PFMF	EN-, IEC 61000-4-8	Perf. crit. A	

General	
Safety design to meet standard	EN-, IEC 60950-1
Switching frequency	~ 50 kHz
Reliability calculated MTBF (MIL-HDBK-217 F at 25 °C)	>3.5 Mio. h
Environmental	
Operating ambient temperature	-40 … 85 °C
Case temperature	100 °C, max.
Storage temperature	-40 … 125 °C
Humidity	95 % max., non condensing
Cooling	Free air convection, ≥ 30 LFM
Physical	
Weight	2.8 g
Case material	Black plastic (UL94V-0 rated)
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum ratings	
Input voltage P1U3R3xxS	5 VDC, 100 ms, max.
Input voltage P1U05xxS	7 VDC, 100 ms, max.
Input voltage P1U12xxS	15 VDC, 100 ms, max.
Input voltage P1U24xxS	28 VDC, 100 ms, max.
Pin soldering temperature	≤ 260 °C, duration ≤ 10 s, ≥ 1.5 mm distance from body

Ordering information									
Output power	Series	Input voltage		Output voltage		Outputs		Primary / secondary isolation	
P1	U	05		05		S		H	
1 Watt		3R3	3.3 V	3R3	3.3 V	S	single	blanc	1 kV_{DC}
		05	5 V	05	5 V	D	dual	H	3 kV_{DC}
		12	12 V	7R2	7.2 V				
		24	24 V	09	9 V				
				12	12 V				
				15	15 V				

HY-LINE Power Components Vertriebs GmbH
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

HY-LINE AG
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: info@hy-line.ch

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Note

1. Specifications at 25 °C, nominal input voltage and full load unless otherwise specified.
2. Capacitive loading tested by minimal Vin and constant resistive load.
3. Operation under no load conditions will not damage these devices, however they may not meet all listed specifications.
4. All converters are to be used about an external fuse. See figure 3.
5. Not usable for MOSFET- and IGBT-driver applications.

Figure 1 Measure circuit for input ripple current

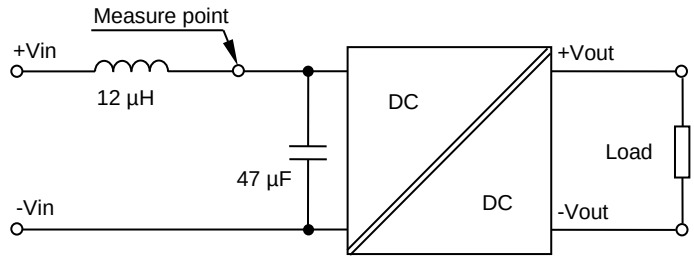
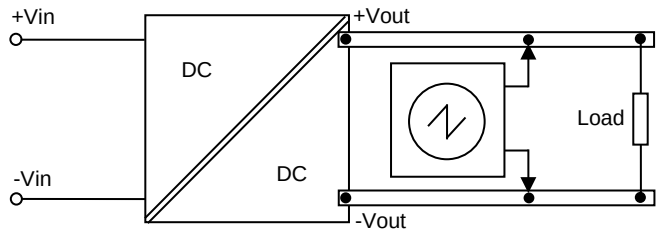
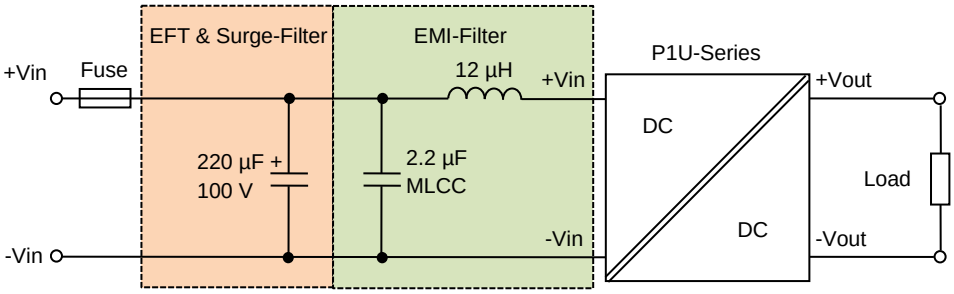


Figure 2 Measure circuit for output ripple & noise



Ripple and Noise measured with 20 MHz bandwidth.

Figure 3 Application circuit for EFT and EMI protection



BOM to Fig.3	
Type	Fuse (time delay type) [mA]
P1U3R3xxx	800
P1U05xxx	500
P1U12xxx	300
P1U24xxx	300

The EMI filter components are to meet the contucted 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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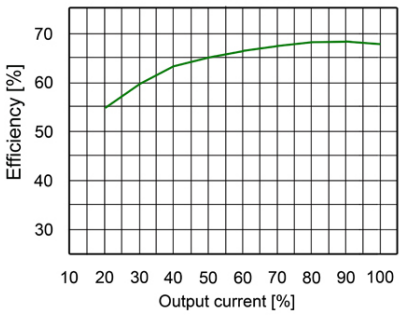
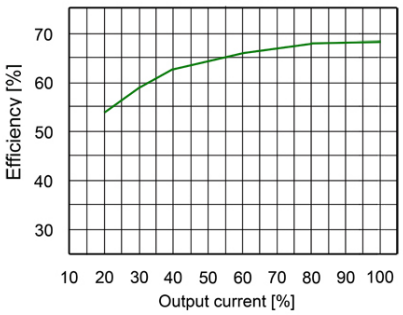
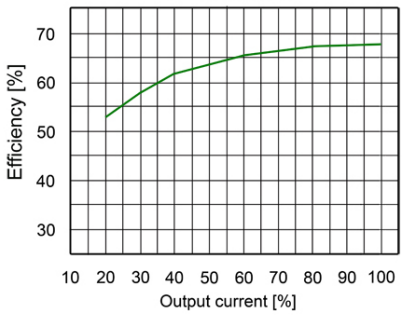
P1U05xxS Efficiency vs output load at Vin 4.5 VDC



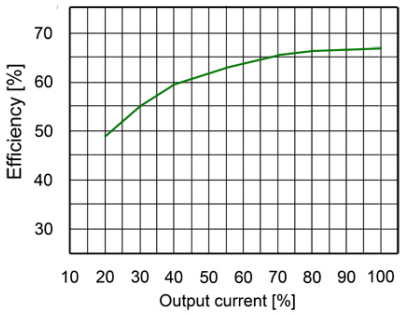
P1U05xxS Efficiency vs output load at Vin 5 VDC



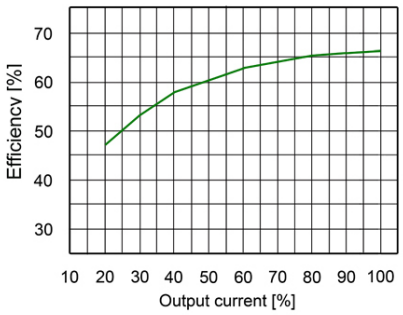
P1U05xxS Efficiency vs output load at Vin 5.5 VDC



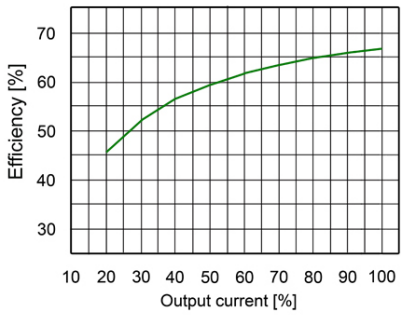
P1U12xxS Efficiency vs output load at Vin 10.8 VDC



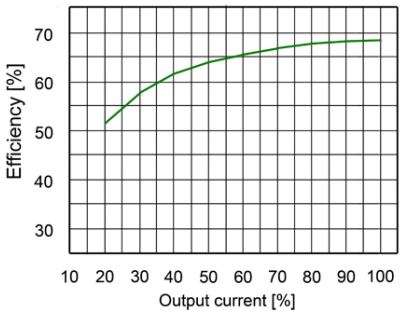
P1U12xxS Efficiency vs output load at Vin 12 VDC



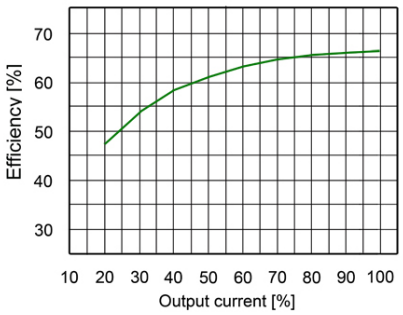
P1U12xxS Efficiency vs output load at Vin 13.2 VDC



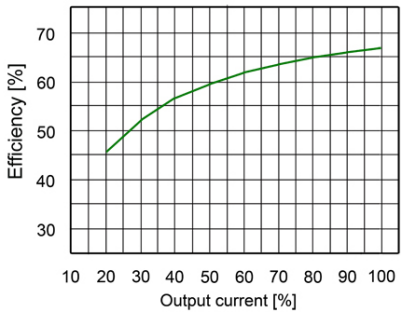
P1U24xxS Efficiency vs output load at Vin 21.6 VDC



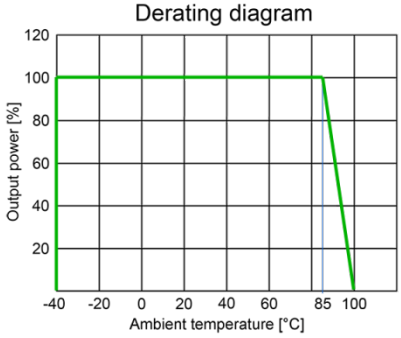
P1U24xxS Efficiency vs output load at Vin 24 VDC



P1U24xxS Efficiency vs output load at Vin 26.4 VDC



Derating diagram



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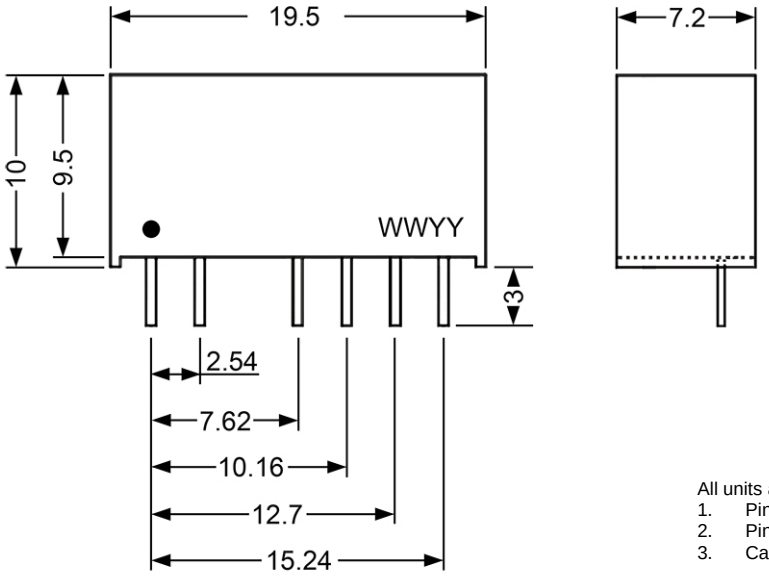
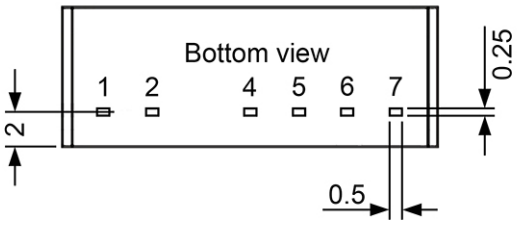
Dimensions



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



Pin assignment		
Pin	P1UxxxxS	P1UxxxxSH
1	+V Input	+V Input
2	-V Input	-V Input
4	-V Output	No pin
5	No pin	-V Output
6	+V Output	No pin
7	No pin	+V Output

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