1 W DC-DC Converter P1A-Series

PHI-CON

- 7 Pin SIL
- Low ripple and noise
- Up to 3000 V_{DC} isolation
- -40...85 °C Operating temperature range
- Output voltage not regulated

CE

Model guide, single output

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.
P1A3R33R3SS	3.3	2.97..3.63	30	400	3.3	303	76	220
P1A3R305SS	3.3	2.97..3.63	30	390	5.0	200	78	220
P1A3R37R2SS	3.3	2.97..3.63	30	380	7.2	140	79	220
P1A3R309SS	3.3	2.97..3.63	30	380	9.0	111	80	220
P1A3R312SS	3.3	2.97..3.63	30	390	12.0	84	79	220
P1A3R315SS	3.3	2.97..3.63	30	390	15.0	67	78	220
P1A3R318SS	3.3	2.97..3.63	30	415	18.0	56	73	220
P1A3R324SS	3.3	2.97..3.63	30	415	24.0	42	73	220
P1A053R3SS	5	4.5..5.5	18	255	3.3	303	78	220
P1A0505SS	5	4.5..5.5	18	245	5.0	200	81	220
P1A057R2SS	5	4.5..5.5	18	245	7.2	140	81	220
P1A0509SS	5	4.5..5.5	18	245	9.0	111	82	220
P1A0512SS	5	4.5..5.5	18	250	12.0	84	79	220
P1A0515SS	5	4.5..5.5	18	250	15.0	67	80	220
P1A0518SS	5	4.5..5.5	18	240	18.0	56	83	220
P1A0524SS	5	4.5..5.5	18	245	24.0	42	82	220
P1A123R3SS	12	10.8..13.2	20	110	3.3	303	75	220
P1A1205SS	12	10.8..13.2	20	105	5.0	200	79	220
P1A127R2SS	12	10.8..13.2	20	110	7.2	140	75	220
P1A1209SS	12	10.8..13.2	20	105	9.0	111	80	220
P1A1212SS	12	10.8..13.2	20	105	12.0	84	79	220
P1A1215SS	12	10.8..13.2	20	100	15.0	67	82	220
P1A1218SS	12	10.8..13.2	20	100	18.0	56	81	220
P1A1224SS	12	10.8..13.2	20	110	24.0	42	76	220
P1A153R3SS	15	13.5..16.5	10	83	3.3	303	80	220
P1A1505SS	15	13.5..16.5	10	82	5.0	200	81	220
P1A157R2SS	15	13.5..16.5	10	85	7.2	140	78	220
P1A1509SS	15	13.5..16.5	10	85	9.0	111	78	220
P1A1512SS	15	13.5..16.5	10	83	12.0	84	80	220
P1A1515SS	15	13.5..16.5	10	84	15.0	67	79	220
P1A1518SS	15	13.5..16.5	10	83	18.0	56	80	220
P1A1524SS	15	13.5..16.5	10	80	24.0	42	83	220
P1A243R3SS	24	21.6..26.4	7	56	3.3	303	74	220
P1A2405SS	24	21.6..26.4	7	54	5.0	200	77	220
P1A247R2SS	24	21.6..26.4	7	57	7.2	140	73	220
P1A2409SS	24	21.6..26.4	7	55	9.0	111	76	220
P1A2412SS	24	21.6..26.4	7	53	12.0	84	78	220
P1A2415SS	24	21.6..26.4	7	52	15.0	67	80	220
P1A2418SS	24	21.6..26.4	7	51	18.0	56	82	220
P1A2424SS	24	21.6..26.4	7	52	24.0	42	80	220

HY-LINE®

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

1 W DC-DC Converter P1A-Series

PHI-CON

Model guide, dual output

Type	Input voltage		Input current		Output voltage [V_{DC}]	Output current [mA] max.	Efficiency [%] typ.	Capacitive load (note 2) [µF] max
	Nominal [V_{DC}]	Range [V_{DC}]	no load [mA] typ.	full load [mA] typ.				
P1A3R33R3S	3.3	2.97..3.63	30	460	±3.3	±152	66	2 x 100
P1A3R305S	3.3	2.97..3.63	30	430	±5.0	±100	70	2 x 100
P1A3R37R2S	3.3	2.97..3.63	30	420	±7.2	±70	72	2 x 100
P1A3R309S	3.3	2.97..3.63	26	400	±9.0	±56	75	2 x 100
P1A3R312S	3.3	2.97..3.63	30	395	±12.0	±42	77	2 x 100
P1A3R315S	3.3	2.97..3.63	25	390	±15.0	±34	78	2 x 100
P1A3R318S	3.3	2.97..3.63	25	400	±18.0	±28	75	2 x 100
P1A3R324S	3.3	2.97..3.63	25	400	±24.0	±21	75	2 x 100
P1A053R3S	5	4.5..5.5	20	300	±3.3	±152	67	2 x 100
P1A0505S	5	4.5..5.5	20	270	±5.0	±100	74	2 x 100
P1A057R2S	5	4.5..5.5	15	255	±7.2	±70	79	2 x 100
P1A0509S	5	4.5..5.5	15	245	±9.0	±56	81	2 x 100
P1A0512S	5	4.5..5.5	15	250	±12.0	±42	80	2 x 100
P1A0515S	5	4.5..5.5	20	245	±15.0	±34	82	2 x 100
P1A0518S	5	4.5..5.5	20	245	±18.0	±28	81	2 x 100
P1A0524S	5	4.5..5.5	22	245	±24.0	±21	81	2 x 100
P1A123R3S	12	10.8..13.2	13	123	±3.3	±152	68	2 x 100
P1A1205S	12	10.8..13.2	10	123	±5.0	±100	74	2 x 100
P1A127R2S	12	10.8..13.2	10	110	±7.2	±70	76	2 x 100
P1A1209S	12	10.8..13.2	13	110	±9.0	±56	78	2 x 100
P1A1212S	12	10.8..13.2	10	100	±12.0	±42	82	2 x 100
P1A1215S	12	10.8..13.2	10	100	±15.0	±34	82	2 x 100
P1A1218S	12	10.8..13.2	15	100	±18.0	±28	82	2 x 100
P1A1224S	12	10.8..13.2	20	110	±24.0	±21	75	2 x 100
P1A153R3S	15	13.5..16.5	20	90	±3.3	±152	75	2 x 100
P1A1505S	15	13.5..16.5	20	90	±5.0	±100	75	2 x 100
P1A157R2S	15	13.5..16.5	18	90	±7.2	±70	75	2 x 100
P1A1509S	15	13.5..16.5	18	85	±9.0	±56	77	2 x 100
P1A1512S	15	13.5..16.5	20	85	±12.0	±42	77	2 x 100
P1A1515S	15	13.5..16.5	20	85	±15.0	±34	77	2 x 100
P1A1518S	15	13.5..16.5	15	90	±18.0	±28	75	2 x 100
P1A1524S	15	13.5..16.5	15	89	±24.0	±21	75	2 x 100
P1A243R3S	24	21.6..26.4	7	62	±3.3	±152	67	2 x 100
P1A2405S	24	21.6..26.4	7	56	±5.0	±100	74	2 x 100
P1A247R2S	24	21.6..26.4	7	55	±7.2	±70	78	2 x 100
P1A2409S	24	21.6..26.4	7	55	±9.0	±56	78	2 x 100
P1A2412S	24	21.6..26.4	7	53	±12.0	±42	80	2 x 100
P1A2415S	24	21.6..26.4	7	53	±15.0	±34	80	2 x 100
P1A2418S	24	21.6..26.4	7	51	±18.0	±28	81	2 x 100
P1A2424S	24	21.6..26.4	7	51	±24.0	±21	82	2 x 100

Ordering information									
Output power	Series	Input voltage		Output voltage		Outputs		Primary / secondary isolation	
1 Watt		3R3	3.3 V	3R3	3.3 V	SS	single	blanc	1 kV_{DC}
		05	5 V	05	5 V	S	dual	H	3 kV_{DC}
		12	12 V	7R2	7.2 V			H6	6 kV_{DC}
		15	15 V	09	9 V				
		24	24 V	12	12 V				
				15	15 V				
				18	18 V				
				24	24 V				
Example:	P1A0505SH	Pout:1 W, Vin 5 V, Vout 5 V, Single output, Isolation 3 kV							

HY-LINE®

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

1 W DC-DC Converter P1A-Series

PHI-CON

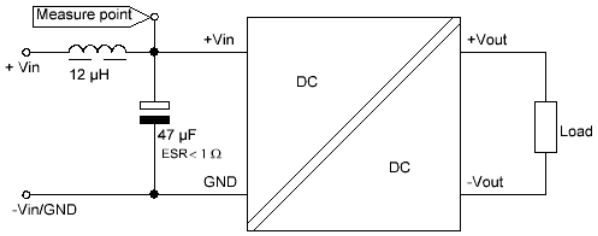
Specifications

Input			
Voltage range		± 10%	
Filter		Capacitors	
Reflected ripple current		20 mAp-p	(see Figure 1)
I/O-Isolation:			
DC-Isolation voltage input / output		1 kV_{DC}, 3 kV_{DC}, 6kV_{DC}	
Resistance		≥ 10^9 Ω	
Capacitance		60 pF, typ.	
Output			
Voltage tolance		≤ ± 3 %	
Ripple and noise (at 20 MHz BW)		≤ 75 mVp-p	(see Figure 2)
Short circuit protection		No	
Output voltage deviation @ 1% Vin change		± 1.2 %, typ.	
Voltage stability at load change 20...100 %		± 20 % @ only P1Axx3R3x ± 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 61000-4-2	Perf. crit. A	
RS	EN 61000-4-3	Perf. crit. A	
EFT	EN 61000-4-4	Perf. crit. A	(see Figure 3)
Surge	EN 61000-4-5	Perf. crit. A	(see Figure 3)
CS	EN 61000-4-6	Perf. crit. A	
PFMF	EN 61000-4-8	Perf. crit. A	

General	
Safety standards	EN-, IEC-, UL-, cUL 60950-1 EN-, IEC-, UL-, cUL 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
Humidity	Up to 95 %, non condensing
Cooling	Free air convection, ≥ 35 LFM
Physical	
Dimensions	6 x 19.5 x 10 mm
Weight	2.3 g
Case material	Non conductive black plastic (UL94V-0 rated)
Potting material	Epoxy (UL94V-0 rated)
Absolute maximum input voltage	
P1A3R3xxxxx-Series	Vin: 6 V_{DC}, duration ≤ 100 ms
P1A05xxxxx-Series	Vin: 7 V_{DC}, duration ≤ 100 ms
P1A12xxxxx-Series	Vin: 15 V_{DC}, duration ≤ 100 ms
P1A15xxxxx-Series	Vin: 18 V_{DC}, duration ≤ 100 ms
P1A24xxxxx-Series	Vin: 28 V_{DC}, duration ≤ 100 ms
Pin soldering temperature	≤ 260 °C duration ≤ 10 s ≥ 1.5 mm distance from body

1. Output ripple and noise measured with 20 MHz bandwidth. See Figure 2.
2. Capacitive load is tested by minimal Vin and constant resistive load.
3. Measured input reflected ripple current with a simulated source inductance of 12 µH and a source capacitor 47 µF. See Figure 1.
4. Input filter circuit is required if the module to meet conducted emissions class B, surge & transients EN 61000-4-4 and EN 61000-4-5. All converters are to use about an external fuse. See Figure 3.
5. Exceeding the absolute maximum ratings of the unit could cause damage. It is not allowed for continuous operating.
6. Operation under no load conditions will not damage these devices, however they may not meet all listed specifications.
7. Not usable for high voltage IGBT- and MOSFET- driver applications.
8. All values are specified at 25 °C, nominal input voltage and full load unless otherwise specified.

Figure 1 Measure circuit for input ripple current



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

Figure 2 Measure circuit for output ripple and noise voltage

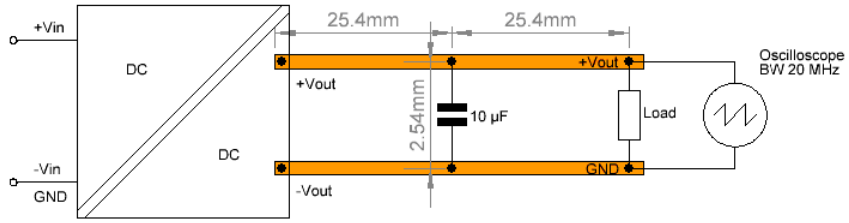
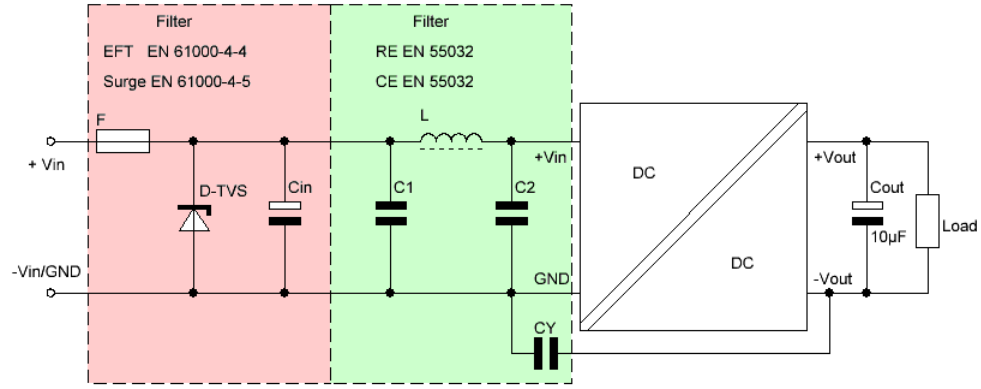


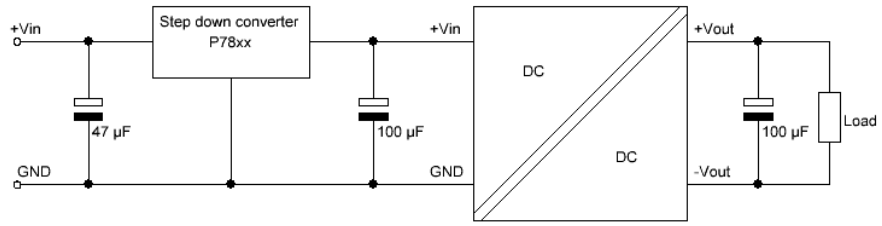
Figure 3 Application circuit to meet EN 61000-4-4 and EN 61000-4-5 performance criteria A and EN 55032 class B



BOM to Figure 3											
Type	Fuse (time delayed type) [mA]	D-TVS	Cin		L	C1		C2		C3	
			[µF]	[V]	[µH]	[µF]	technology	[µF]	technology	[pF]	[kV]
P1A3R3xxx	800	SMAJ5A	2200	100	18	2.2	MLCC	-		-	
P1A05xxx	500	SMAJ6.5A	2200	100	18	2.2	MLCC	-		-	
P1A12xxx	300	SMAJ14A	2200	100	18	2.2	MLCC	-		-	
P1A15xxx	300	SMAJ18A	2200	100	18	2.2	MLCC	-		-	
P1A24xxx	300	SMAJ26A	2200	100	18	2.2	MLCC	2.2	MLCC	470	≥ 2

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.

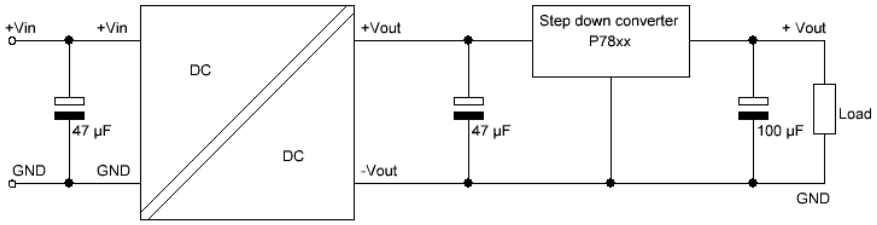
Application example with low drop out linear voltage regulator for input stabilisation



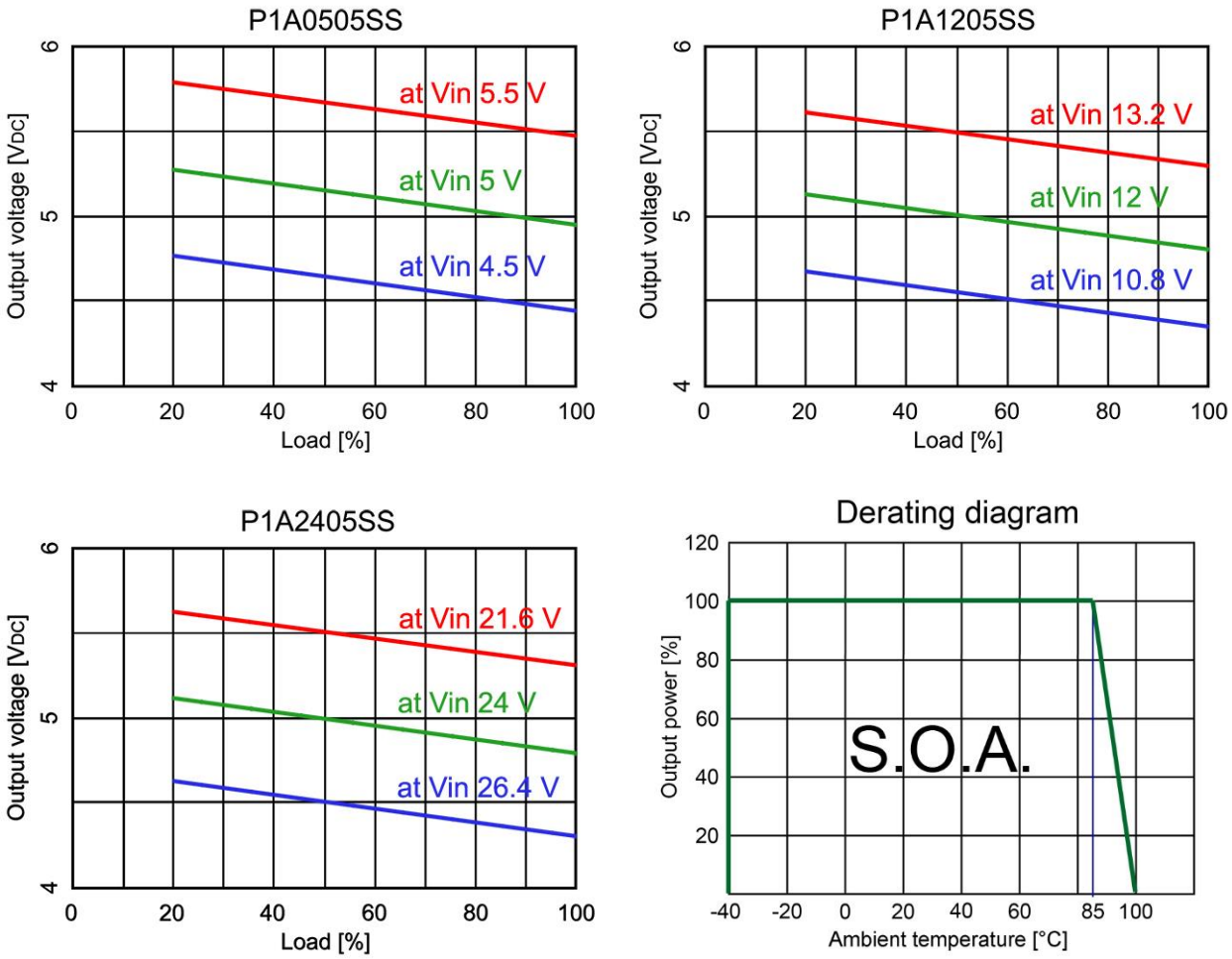
HY-LINE Power Components Vertriebs GmbH
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

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

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



Output voltage at load change



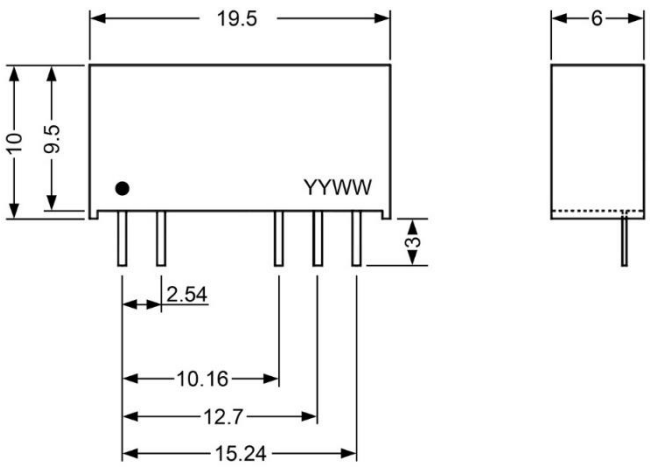
HY-LINE Power Components Vertriebs GmbH
Inselkammerstraße 10
D-82008 Unterhaching
Tel.: 089 614 503-10
E-Mail: power@hy-line.de

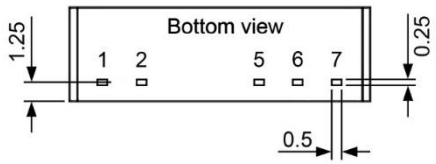
HY-LINE AG
Hochstrasse 355
CH-8200 Schaffhausen
Tel.: 052 647 42 00
E-Mail: info@hy-line.ch

1 W DC-DC Converter P1A-Series

PHI-CON

Mechanical 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				
	1 kV_{DC} Isolation		3 kV_{DC} & 6 kV_{DC} Isolation	
	Single	Dual	Single	Dual
1	+V Input	+V Input	+V Input	+V Input
2	-V Input	-V Input	-V Input	-V Input
3	No pin	No pin	No pin	No pin
4	-V Output	-V Output	No pin	No pin
5	No pin	Common	-V Output	-V Output
6	+V Output	+V Output	No pin	Common
7	No pin	No pin	+V Output	+V Output

Rev: 20210903 f

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