



PHI-CON

# 5 W DC-DC Converter P5A-Series

- Wide 2:1 input range
- 1500 V<sub>DC</sub> isolation
- 3500 V<sub>DC</sub> isolation optional
- MTBF >1.121 Mio. h
- Continuous short circuit protection
- Plastic package optional



Metal package



Plastic package

## Model guide

Type	Input voltage		Input current		Output voltage [V <sub>DC</sub> ] nom.	Output current		Efficiency [%] typ.	Capacitor load (see 2) [mA] max.
	Nominal [V <sub>DC</sub> ]	Range [V <sub>DC</sub> ]	No load [mA] max.	Full load [mA] typ.		[mA] min.	[mA] max.		
<b>Single output</b>									
P5A123R3S	12	9...18	30	490	3.3	0	1300	73	1000
P5A1205S	12	9...18	30	540	5.0	0	1000	77	1000
P5A127R2S	12	9...18	30	535	7.2	0	695	78	680
P5A1209S	12	9...18	30	535	9.0	0	556	78	680
P5A1212S	12	9...18	30	515	12.0	0	417	81	330
P5A1215S	12	9...18	30	520	15.0	0	333	80	220
P5A1218S	12	9...18	30	520	18.0	0	277	80	68
P5A1224S	12	9...18	30	520	24.0	0	209	80	68
P5A243R3S	24	18...36	20	240	3.3	0	1300	75	1000
P5A2405S	24	18...36	20	260	5.0	0	1000	80	1000
P5A247R2S	24	18...36	20	255	7.2	0	695	78	680
P5A2409S	24	18...36	20	255	9.0	0	556	82	680
P5A2412S	24	18...36	20	260	12.0	0	417	80	330
P5A2415S	24	18...36	20	255	15.0	0	333	82	220
P5A2418S	24	18...36	20	255	18.0	0	277	82	68
P5A2424S	24	18...36	20	255	24.0	0	209	82	68
P5A483R3S	48	36...72	12	120	3.3	0	1300	75	1000
P5A4805S	48	36...72	12	130	5.0	0	1000	80	1000
P5A487R2S	48	36...72	12	125	7.2	0	695	82	680
P5A4809S	48	36...72	12	125	9.0	0	556	82	680
P5A4812S	48	36...72	12	130	12.0	0	417	80	330
P5A4815S	48	36...72	12	125	15.0	0	333	83	220
P5A4818S	48	36...72	12	125	18.0	0	277	83	68
P5A4824S	48	36...72	12	125	24.0	0	209	83	68
<b>Dual output</b>									
P5A123R3D	12	9...18	30	565	±3.3	0	±750	73	2 x 680
P5A1205D	12	9...18	30	540	±5.0	0	±500	77	2 x 330
P5A127R2D	12	9...18	30	520	±7.2	0	±347	80	2 x 220
P5A1209D	12	9...18	30	520	±9.0	0	±278	80	2 x 220
P5A1212D	12	9...18	30	520	±12.0	0	±208	80	2 x 100
P5A1215D	12	9...18	30	530	±15.0	0	±167	79	2 x 47
P5A1218D	12	9...18	30	520	±18.0	0	±138	80	2 x 33
P5A1224D	12	9...18	30	520	±24.0	0	±105	80	2 x 33
P5A243R3D	24	18...36	20	275	±3.3	0	±750	75	2 x 680
P5A2405D	24	18...36	20	265	±5.0	0	±500	78	2 x 330
P5A247R2D	24	18...36	20	250	±7.2	0	±347	83	2 x 220
P5A2409D	24	18...36	20	250	±9.0	0	±278	83	2 x 220
P5A2412D	24	18...36	20	260	±12.0	0	±208	80	2 x 100
P5A2415D	24	18...36	20	260	±15.0	0	±167	80	2 x 47
P5A2418D	24	18...36	20	260	±18.0	0	±138	80	2 x 33
P5A2424D	24	18...36	20	260	±24.0	0	±105	80	2 x 33
P5A483R3D	48	36...72	12	140	±3.3	0	±750	73	2 x 680
P5A4805D	48	36...72	12	130	±5.0	0	±500	79	2 x 330
P5A487R2D	48	36...72	12	130	±7.2	0	±347	79	2 x 220
P5A4809D	48	36...72	12	130	±9.0	0	±278	79	2 x 220
P5A4812D	48	36...72	12	130	±12.0	0	±208	80	2 x 100
P5A4815D	48	36...72	12	130	±15.0	0	±167	80	2 x 47
P5A4818D	48	36...72	12	130	±18.0	0	±138	80	2 x 33
P5A4824D	48	36...72	12	130	±24.0	0	±105	80	2 x 33

## Part number ordering information

P	Output power	Series	Input voltage		Output voltage		Output		Isolation voltage		Package material	
			12 V	24 V	3R3	05	S	D	H	1.5 kV	3.5 kV	blanc
PHI-CON	5 W	A	12	24	3R3	05	S	single	blanc	1.5 kV	blanc	metal
			12	24	05	05	D	dual ±	H	3.5 kV	P	plastic
				48	7R2	7.2 V						
					09	9 V						
					12	12 V						
					15	15 V						
					18	18 V						
					24	24 V						



PHI-CON

# 5 W DC-DC Converter P5A-Series

Old part number system. **Do not use the old part number system for new design in!**

P	Output power	Series	Input voltage	Output voltage	Output	Output power	Isolation voltage	Package material
PHI-CON	5 W	A	24	05	S	5 W	H	P
			12	3R3	S		blanc	blanc
			24	05	D		1.5 kV	metal
			24	5 V			3.5 kV	plastic
			48	7R2				
				09				
				12				
				15				
				18				
				24				

## Specifications

Input	
Filter	Pi Network
Reflected input ripple current	35 mA <sub>p-p</sub> (see Figure 1)
Isolation:	
In / Out rated voltage (60 s)	1500 V <sub>DC</sub> , Standard 3500 V <sub>DC</sub> , Suffix "H"
Input or output to <b>metall</b> case	1000 V <sub>DC</sub>
Resistance	10 <sup>9</sup> Ω
Capacitance	500 pF, typ.
Output	
Voltage accuracy	± 1 %
Ripple and noise (at 20 MHz BW)	60 mV <sub>p-p</sub> , max. (see Figure 2)
Short circuit protection	Continuous, hiccup automatic restart
Line regulation	± 0.5 %, max.
Load voltage regulation	± 1.5 % @ P5Axx3R3x ± 0.5 % all others
Temperature coefficient	± 0.02 % / °C
General	
Switching frequency	270 kHz, typ.
Safety standards	IEC, EN, UL, cUL 60950-1 IEC, EN, UL, cUL 62368-1
Reliability calc. MTBF @ Ta 25 °C (MIL-HDBK-217F)	1.12 Mio. h

EMC specifications		
RE	EN 55032	Class A (Only metal case version)
CE	EN 55032	EN 55032 Class A (see Figure 3)
ESD	EN 61000-4-2	perf. criteria A
RS	EN 61000-4-3	perf. criteria A
EFT	EN 61000-4-4	perf. criteria A (see Figure 3)
Surge	EN 61000-4-5	perf. criteria A (see Figure 3)
CS	EN 61000-4-6	perf. criteria A
PFMF	EN 61000-4-8	perf. criteria A
Environmental		
Operating ambient temperature	-40 ... 85 °C	
Storage temperature	-40 ... 125 °C	
Case temperature	100 °C, max.	
Derating	None required	
Humidity	95 % max., non condensing	
Cooling	Free air convection 30 ... 65 LFM	
Physical		
Weight	17 g metal case, standard 13.5 g plastic case, Suffix "P"	
Potting material	Epoxy (UL94V-0 rated)	
Case material	Metal: Aluminum or Black Plastic (UL94V-0 rated)	
Absolute maximum ratings		
P5A12xxx	Vin: ≤ 24 V <sub>DC</sub> , duration ≤ 100 ms	
P5A24xxx	Vin: ≤ 40 V <sub>DC</sub> , duration ≤ 100 ms	
P5A48xxx	Vin: ≤ 80 V <sub>DC</sub> , duration ≤ 100 ms	
Lead soldering Temperature	≤ 260 °C peak, duration ≤ 10 s, distance from package ≥ 1.5 mm	

Note:

1. All parameter typical at Ta 25 °C, nominal input voltage and full load unless otherwise specified
2. Capacitor load is specified at nominal input voltage and constant resistive load.
3. Parallel operation of DC/DC-Converter outputs is not recommended.
4. The P5A-series is not usable for IGBT and MOSFET driver applications.

Figure 1 Measure circuit input reflected ripple current

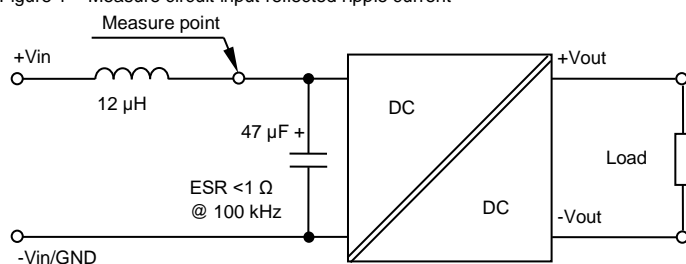
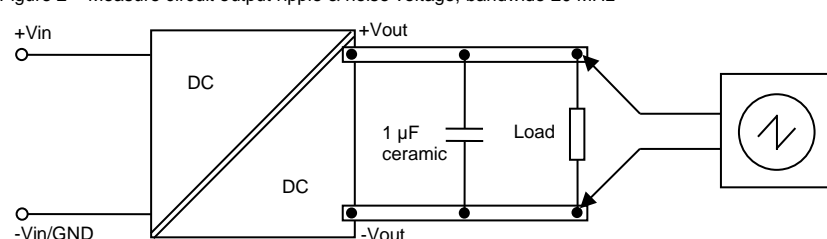
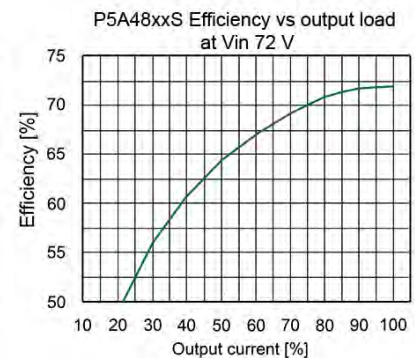
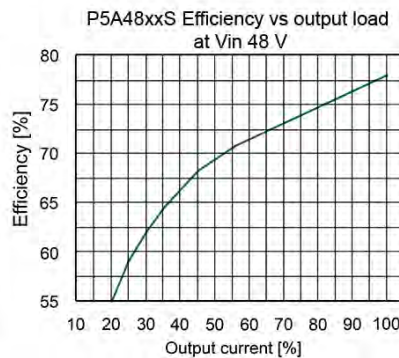
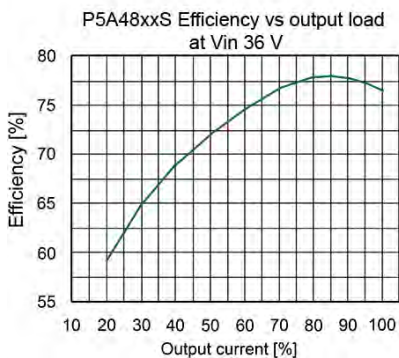
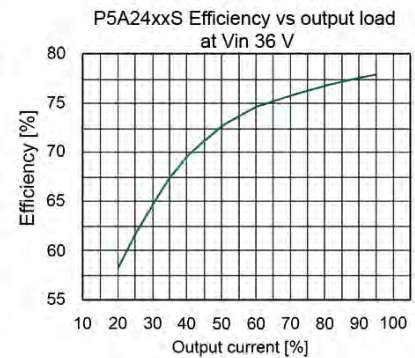
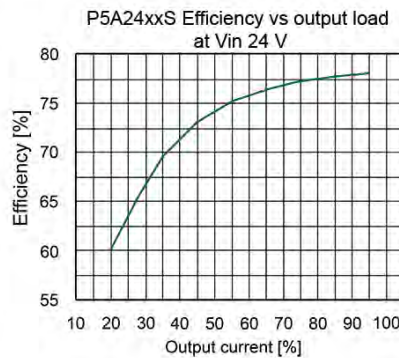
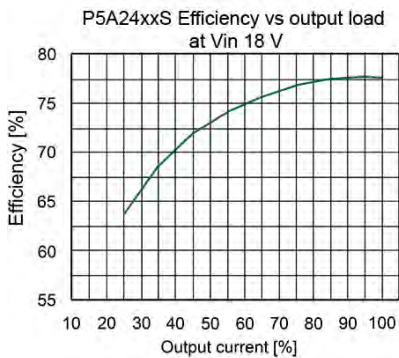
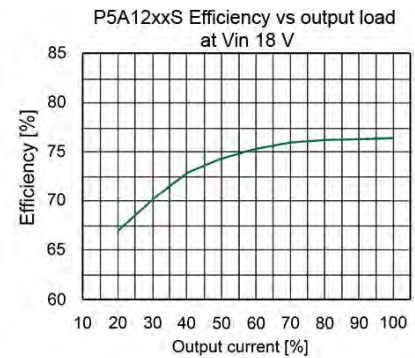
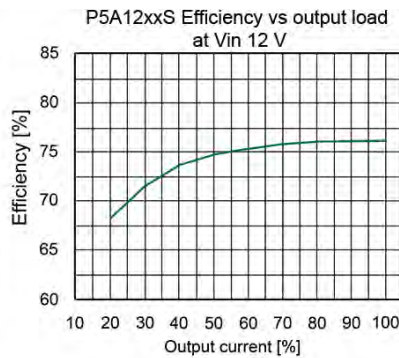
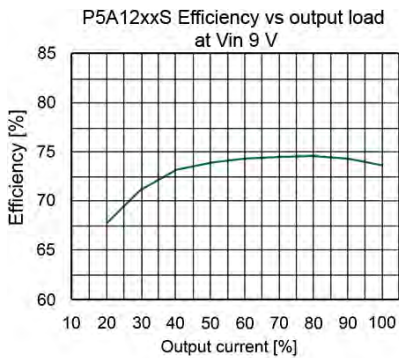
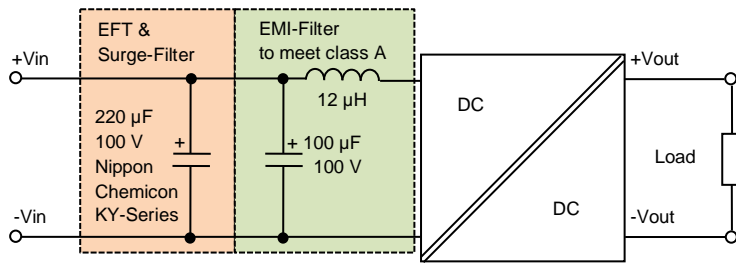


Figure 2 Measure circuit output ripple & noise voltage, bandwidth 20 MHz

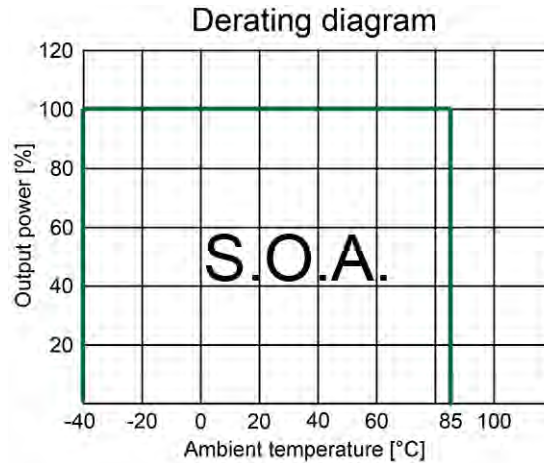


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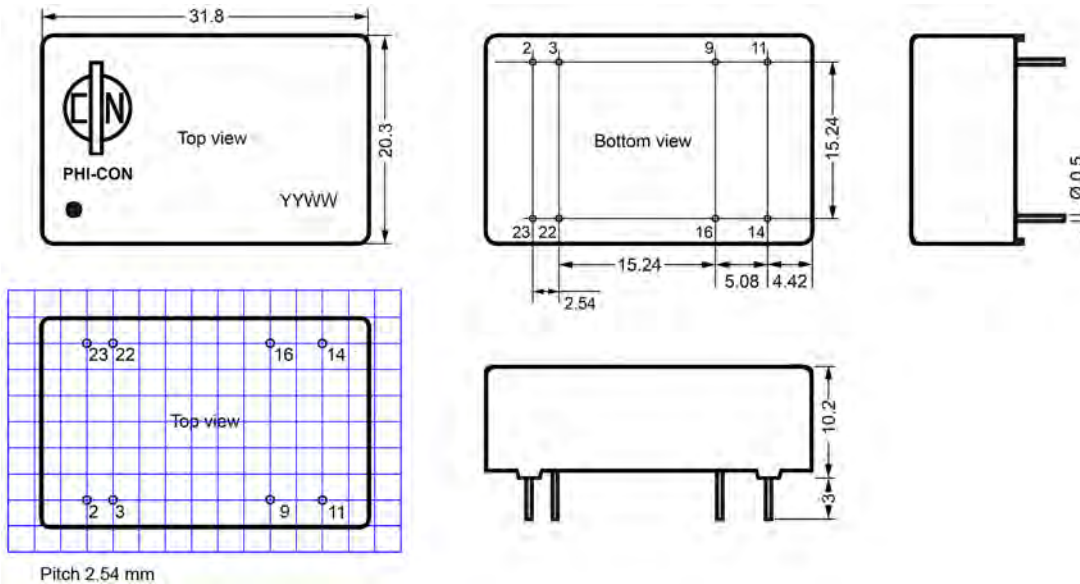
Figure 3 Application circuit to meet EN 61000-4-4 class A, surge EN 61000-4-5 Class A and EMI conducted emission EN 55032 class A



# 5 W DC-DC Converter P5A-Series



Mechanical dimensions metal case version



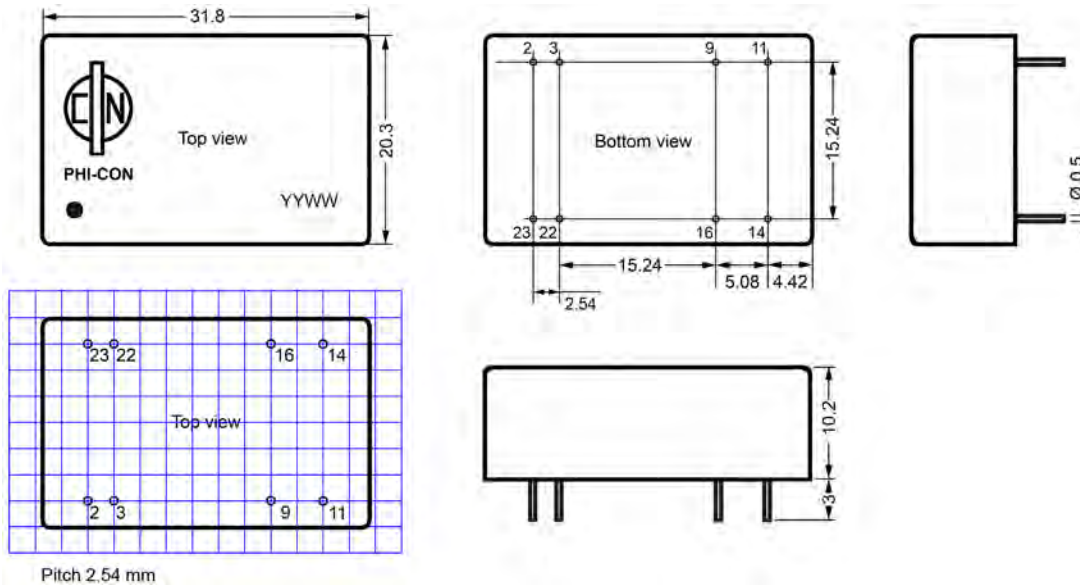
Pin assignment		
Pin	1.5 kV & 3.5 kV isolation version	
	Single output	Dual output
2	-V Input	-V Input
3	-V Input	-V Input
9	No Pin	Common
11	Not Connected.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

All units in mm

1. Pin tolerance  $\pm 0.05$  mm
2. Pitch tolerance  $\pm 0.35$  mm
3. Pin length tolerance  $\pm 0.35$  mm
4. Case tolerance  $\pm 0.5$  mm

# 5 W DC-DC Converter P5A-Series

Mechanical dimensions plastic case version



Pin assignment		
Pin	1.5 kV & 3.5 kV isolation version	
	Single output	Dual output
2	-V Input	-V Input
3	-V Input	-V Input
9	No Pin	Common
11	Not Connected.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

All units in mm

1. Pin tolerance  $\pm 0.05$  mm
2. Pitch tolerance  $\pm 0.35$  mm
3. Pin length tolerance  $\pm 0.35$  mm
4. Case tolerance  $\pm 0.5$  mm

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