6 W DC-DC Converter P6A-Series

PHI-CON

- Wide 2:1 input range
- 1500 V_{DC} isolation
- 3500 V_{DC} 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	Output current		Efficiency	Capacitor load (see Figure 2)
	Nominal [V_{DC}]	Range [V_{DC}]	No load [mA] max.	Full load [mA] typ.	[V_{DC}] nom.	[mA] min.	[mA] max.	[%] typ.	[mA] max.
Single output									
P6A123R3S	12	9...18	30	527	3.3	0	1400	73	1000
P6A1205S	12	9...18	30	649	5.0	0	1200	77	1000
P6A127R2S	12	9...18	30	641	7.2	0	833	78	680
P6A1209S	12	9...18	30	641	9.0	0	666	78	680
P6A1212S	12	9...18	30	617	12.0	0	500	81	330
P6A1215S	12	9...18	30	625	15.0	0	400	80	220
P6A1218S	12	9...18	30	625	18.0	0	333	80	68
P6A1224S	12	9...18	30	625	24.0	0	250	80	68
P6A243R3S	24	18...36	20	256	3.3	0	1400	75	1000
P6A2405S	24	18...36	20	313	5.0	0	1200	80	1000
P6A247R2S	24	18...36	20	304	7.2	0	833	82	680
P6A2409S	24	18...36	20	304	9.0	0	666	82	680
P6A2412S	24	18...36	20	313	12.0	0	500	80	330
P6A2415S	24	18...36	20	204	15.0	0	400	82	220
P6A2418S	24	18...36	20	305	18.0	0	333	82	68
P6A2424S	24	18...36	20	305	24.0	0	250	82	68
P6A483R3S	48	36...72	12	128	3.3	0	1400	75	1000
P6A4805S	48	36...72	12	156	5.0	0	1200	80	1000
P6A487R2S	48	36...72	12	152	7.2	0	833	82	680
P6A4809S	48	36...72	12	152	9.0	0	666	82	680
P6A4812S	48	36...72	12	156	12.0	0	500	80	330
P6A4815S	48	36...72	12	151	15.0	0	400	83	220
P6A4818S	48	36...72	12	151	18.0	0	333	83	68
P6A4824S	48	36...72	12	151	24.0	0	250	83	68
Dual output									
P6A123R3D	12	9...18	30	527	±3.3	0	±909	73	2 x 680
P6A1205D	12	9...18	30	649	±5.0	0	±600	77	2 x 330
P6A127R2D	12	9...18	30	625	±7.2	0	±416	80	2 x 220
P6A1209D	12	9...18	30	625	±9.0	0	±333	80	2 x 220
P6A1212D	12	9...18	30	625	±12.0	0	±250	80	2 x 100
P6A1215D	12	9...18	30	632	±15.0	0	±200	79	2 x 47
P6A1218D	12	9...18	30	625	±18.0	0	±166	80	2 x 33
P6A1224D	12	9...18	30	625	±24.0	0	±125	80	2 x 33
P6A243R3D	24	18...36	20	333	±3.3	0	±909	75	2 x 680
P6A2405D	24	18...36	20	321	±5.0	0	±600	78	2 x 330
P6A247R2D	24	18...36	20	301	±7.2	0	±416	83	2 x 220
P6A2409D	24	18...36	20	301	±9.0	0	±333	83	2 x 220
P6A2412D	24	18...36	20	312	±12.0	0	±250	80	2 x 100
P6A2415D	24	18...36	20	312	±15.0	0	±200	80	2 x 47
P6A2418D	24	18...36	20	312	±18.0	0	±166	80	2 x 33
P6A2424D	24	18...36	20	312	±24.0	0	±125	80	2 x 33
P6A483R3D	48	36...72	12	171	±3.3	0	±909	73	2 x 680
P6A4805D	48	36...72	12	158	±5.0	0	±600	79	2 x 330
P6A487R2D	48	36...72	12	158	±7.2	0	±416	79	2 x 220
P6A4809D	48	36...72	12	158	±9.0	0	±333	79	2 x 220
P6A4812D	48	36...72	12	156	±12.0	0	±250	80	2 x 100
P6A4815D	48	36...72	12	156	±15.0	0	±200	80	2 x 47
P6A4818D	48	36...72	12	156	±18.0	0	±166	80	2 x 33
P6A4824D	48	36...72	12	156	±24.0	0	±125	80	2 x 33

Part number ordering information

	Output power	Series	Input voltage		Output voltage		Output		Isolation voltage		Package material	
P	6	A	24		05		S		H		P	
PHI-CON	6W	A	12	12 V	3R3	3.3 V	S	single	blanc	1.5 kV	blanc	metal
			24	24 V	05	5 V	D	dual ±	H	3.5 kV	P	plastic
			48	48 V	7R2	7.2 V						
					09	9 V						
					12	12 V						
					15	15 V						
					18	18 V						
					24	24 V						

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Specifications

Input	
Filter	Pi Network
Reflected input ripple current	35 mAp-p (see Figure 1)
Isolation:	
In / Out rated voltage (60 s)	1500 V_{DC}, Standard 3500 V_{DC}, Suffix “H”
Input or output to **metall** case	1000 V_{DC}
Resistance	≥ 10^9 Ω
Capacitance	500 pF, typ.
Output	
Voltage tolerance	≤ ± 1 %
Ripple and noise (at 20 MHz BW)	≤ 60 mVp-p (see Figure 2)
Short circuit protection	Continuous, hiccup automatic restart
Line regulation	± 0.5 %, max.
Load voltage regulation	± 1.5 % @ P6Axx3R3x ± 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
Derating		None required
Humidity		≤ 95 %, non condensing
Cooling		Free air convection 30 ... 65 LFM
Physical		
Weight		13 g, typ metal case, standard 13.5 g plasic case, Suffix “P”
Potting material		Epoxy (UL94V-0 rated)
Case material		Metal: Aluminum or Black Plastic (UL94V-0 rated)
Absolute maximum ratings		
P6A12xxx		Vin: ≤ 24 V_{DC}, duration ≤ 100 ms
P6A24xxx		Vin: ≤ 40 V_{DC}, duration ≤ 100 ms
P6A48xxx		Vin: ≤ 80 V_{DC}, 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 P6A-series is not usable for IGBT and MOSFET driver applications.

Figure 1 Measure circuit input reflected ripple current

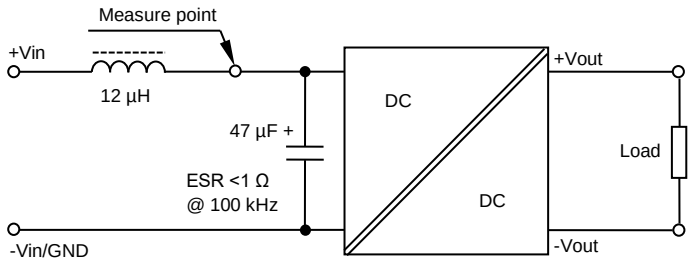

Figure 2 Measure circuit output ripple & noise voltage, bandwide 20 MHz

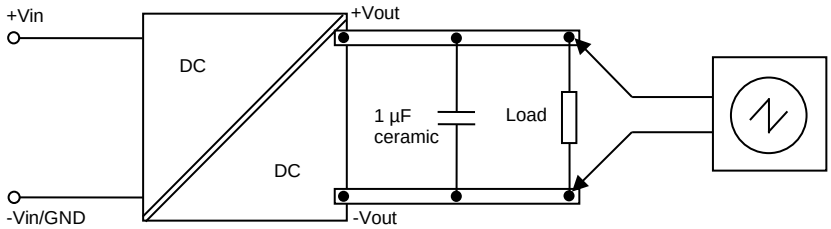

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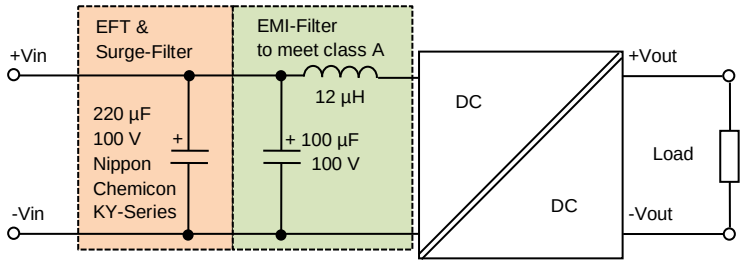
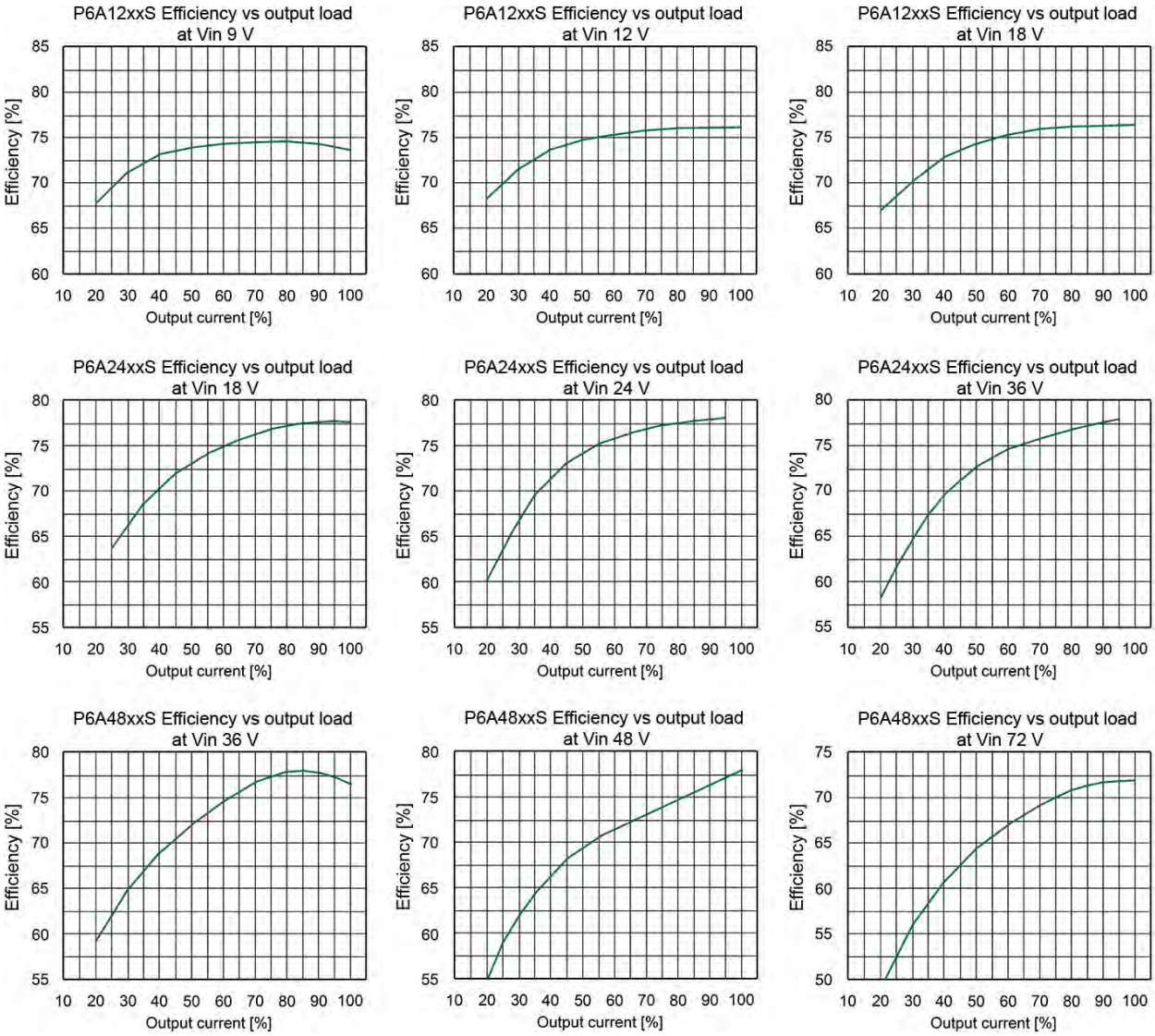
Figure 3 Application circuit to meet EN 61000-4-4 class A, surge EN 61000-4-5 Class A and EMI conducted emission EN 55032 class A





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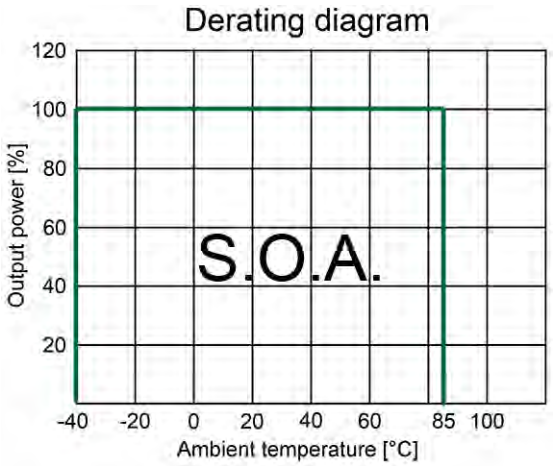
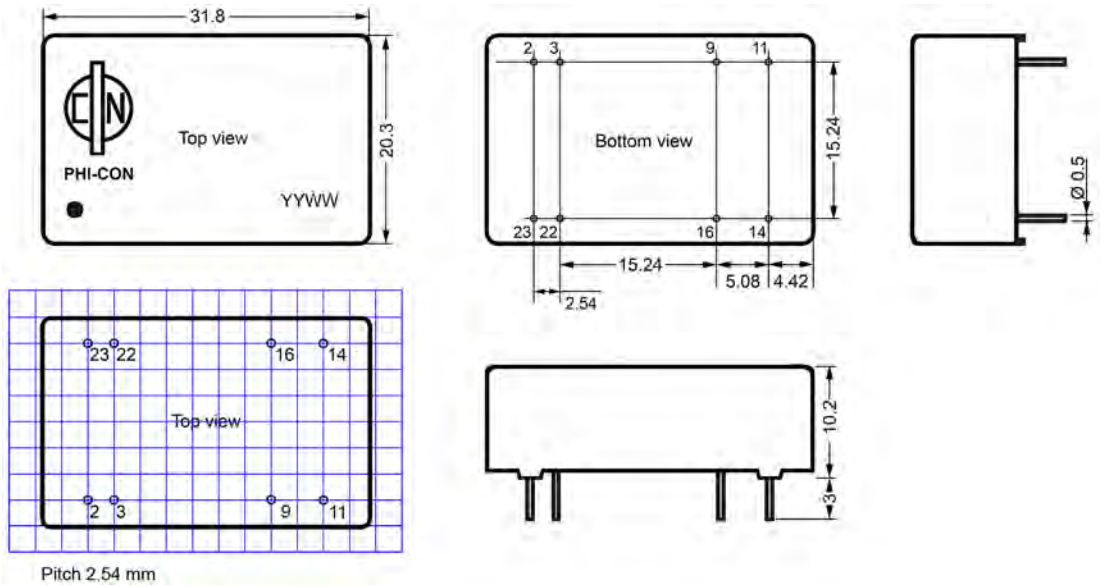


Mechanical dimensions metal case version



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 ± 0.05 mm
2. Pitch tolerance ± 0.35 mm
3. Pin length tolerance ± 0.35 mm
4. Case tolerance ± 0.5 mm

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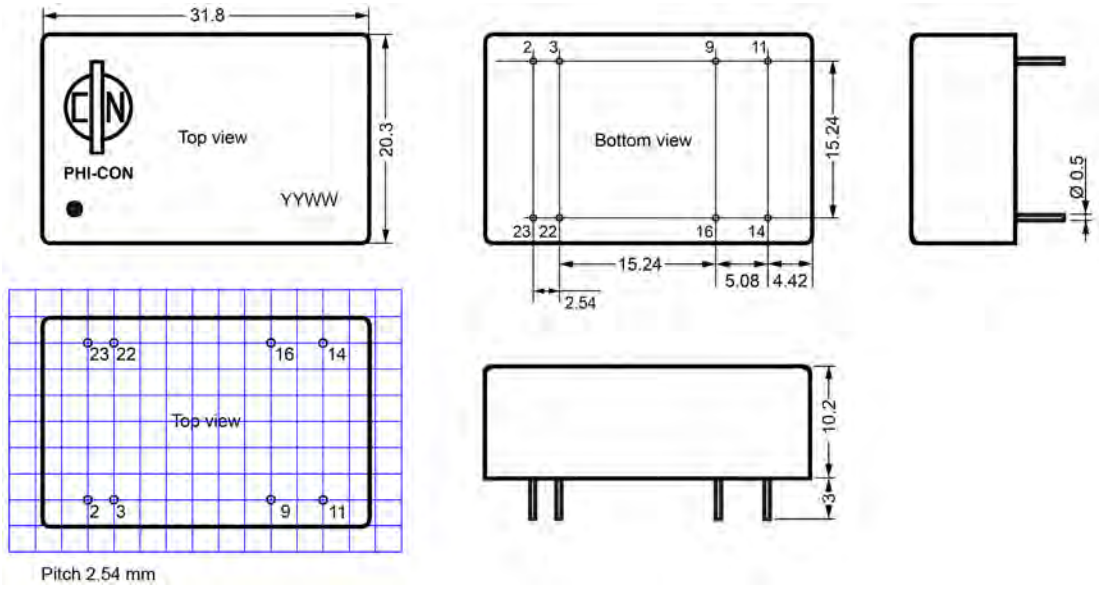
Mechanical dimensions plastic case version



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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 ± 0.05 mm
2. Pitch tolerance ± 0.35 mm
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4. Case tolerance ± 0.5 mm

Rev: 20240808 g

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