



PHI-CON

30 W AC-DC Power Supply PAC30DxxBS6-Series

- Enclosed plastic case
- 176 ... 528 V_{AC} or 248 ... 746 V_{DC} wide input range
- Isolation voltage 4000 V_{AC}
- Over voltage protected
- Over current & continuously short circuit protected
- Isolation class II
- MTBF > 950 000 h



Model guide

Type	Output voltage [V _{DC}]	Output voltage tolerance [%] typ.	Output current [mA] max.	Output power [W] max.	Efficiency @ full load [%] typ.	Capacitive load [µF] max.
PAC30D03BS6	3.3	±3	6000	19.8	82	15000
PAC30D05BS6	5.0	±2	6000	30	84	15000
PAC30D09BS6	9.0	±2	3340	30	85	8200
PAC30D12BS6	12	±2	2500	30	85	4700
PAC30D15BS6	15	±2	1330	20	85	3300
PAC30D24BS6	24	±2	833	20	86	1500
PAC30D48BS6	48	±2	625	30	88	820

Specifications

Input	
Voltage range	176..528 V _{AC} or 248..746 V _{DC} Power derating see diagram
Line frequency range	47...63 Hz
Full load input current	≤ 0.5 A @ 230 V _{AC} ≤ 0.35 A @ 380 V _{AC}
Inrush current	35 A typ. @ 230 V _{AC} 60 A typ. @ 380 V _{AC}
No load power consumption	≤ 0.3 W @ 230 V _{AC} ≤ 0.5 W @ 380 V _{AC}
Recommended fuse	3.15 A / 500 V _{AC} , time delayed type
Hot plug	Unavailable
Isolation	
Isolation voltage (input to output)	≥ 4000 V _{AC} for 1 minute, ≤ 5 mA
Leakage current	≤ 0.5 mA @ Vin 480 V _{AC} , 50 Hz
Output	
Voltage tolerance	PAC30D03S6 ± 3 %, typ. All others ± 2 %, typ.
Line regulation @ full load	PAC30D03S6 ± 1 %, typ. All others ± 0.5 %, typ.
Load regulation @ 0...100 %	PAC30D03S6 ± 2 %, typ. All others ± 1 %, typ.
Temperature coefficient	± 0.02 % / °C
Ripple & noise @ BW 20 MHz	≤ 150 mVp-p (see Figure 1)
Minimum load	not required
Protection	
Short circuit	Continuous, hiccup, auto recovery
Over current	110 %, of rated current
Output over voltage protection (external TVS D1, see Figure 2)	PAC30D03BS6 < 7.5 V _{DC}
	PAC30D05BS6 < 7.5 V _{DC}
	PAC30D09BS6 < 16 V _{DC}
	PAC30D12BS6 < 16 V _{DC}
	PAC30D15BS6 < 25 V _{DC}
	PAC30D24BS6 < 35 V _{DC}
PAC30D48BS6 < 60 V _{DC}	
General	
Power derating at Ta 55...70 °C	3 % / °C (see derating diagram)
Power derating at Ta 70...85 °C	1.33 % / °C (see derating diagram)
Power derating at Vin 90...110 V _{AC}	2 % / V _{AC} (see derating diagram)
Power derating at Vin 480...528 V _{AC}	0.42%/V _{AC} (see derating diagram)
Switching frequency	65 kHz typ.

Safety standard	EN 62368-1
Safety	Class II
Reliability MTBF	≥ 950 000 h
MIL-HDBK-217 @ 25° C	
Hold up time @ full load	45 ms @ 230 V _{AC} , typ. 120 ms @ 380 V _{AC} , typ.
EMC specification	
CE	EN 55032, CISPR32 Class B
RE	EN 55032, CISPR32 Class B
ESD	EN-, IEC 61000-4-2 Contact ± 6 kV, Perf. Criteria A Air ± 8 kV, Perf. Criteria A
	RS EN-, IEC 61000-4-3 10 V / m, Perf. Criteria A
EFT	EN-, IEC 61000-4-4 ± 2 kV, Perf. Criteria A (see Figure 2)
	± 4 kV, Perf. Criteria A (see Figure 3, 4 or 5)
Surge	EN-, IEC 61000-4-5 Line to line ± 2 kV, Perf. Criteria A (see Figure 2)
	Line to line ± 4 kV, Perf. Criteria A (see Figure 3 or 4)
	Line to line ± 2 kV, Perf. Criteria A Line to PE ± 4 kV, Perf. Criteria A (see Figure 5)
CS	EN-, IEC 61000-4-6 10 Vrms, Perf. Criteria A
Voltage dips, short interruptions and voltage variations immunity	
EN-, IEC 61000-4-11	0 %...70 %, Perf. Criteria B
Environmental	
Operating ambient temperature range	-40 ...85 °C, see derating diagram
Storage temperature range	-40 ...85 °C
Storage humidity	95 %, max., non condensing
Cooling	Free air convection, ≥ 35 LFM
Physical	
PAC30D BS6	Dimensions 70 x 48 x 30 mm Weight 152 g
PAC30D S6A2	96.1 x 54 x 38.5 mm 210 g
PAC30D S6A4	96.1 x 54 x 43 mm 250 g
Case material	Black plastic, UL94 V-0 rated
Wave soldering temperature	≤ 265 °C, peak duration ≤ 10 s, ≥ 1.5 mm distance from case
Manual soldering temperature	≤ 370 °C, peak duration ≤ 5 s, ≥ 1.5 mm distance from case

Notes:

1. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta 25 °C, humidity <75 % with nominal input voltage and rated output load.

Part number structure													
Brand	Type			Output power		Series	Output voltage		Rev	Outputs		Vin Range	
P	PHI-CON	AC	AC/DC-Converter	30	30 W	D	03	3.3 V	B	S	single	6	200...528 V-
							05	5 V					
							09	9 V					
							12	12 V					
							15	15 V					
							24	24 V					
							48	48 V					
Example:	PAC30D24BS6	PHI-CON AC/DC-Converter, Pout 30 W, E-Series, Vout 24 V, Single Output, Vin 200...528 V _{AC}											





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Figure 1 Output ripple & noise measure method

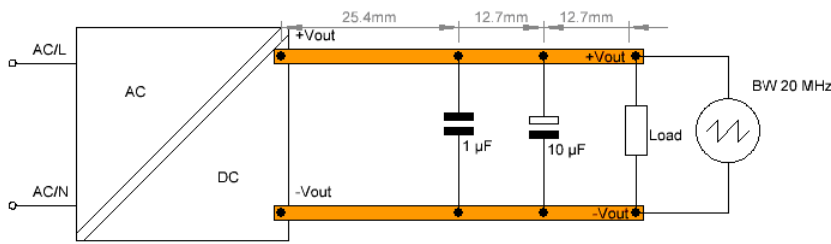


Figure 2 Typical application circuit

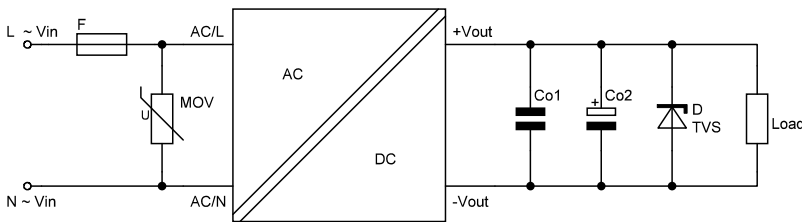


Table for typical circuit (Figure 2)

Type	Fuse time delayed	MOV	Co1	Co2	TVS1
PAC30D03BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	330 µF	SMBJ7.0A
PAC30D05BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	330 µF	SMBJ7.0A
PAC30D09BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	220 µF	SMBJ12A
PAC30D12BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	220 µF	SMBJ20A
PAC30D15BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	220 µF	SMBJ20A
PAC30D24BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	220 µF	SMBJ30A
PAC30D48BS6	3.15 AT / 500 V~	S14K550	1 µF, MLCC	10 µF	SMBJ64A

Figure 3 Recommended circuit for applications which require 4 kV differential mode inrush standard (half wave rectification)

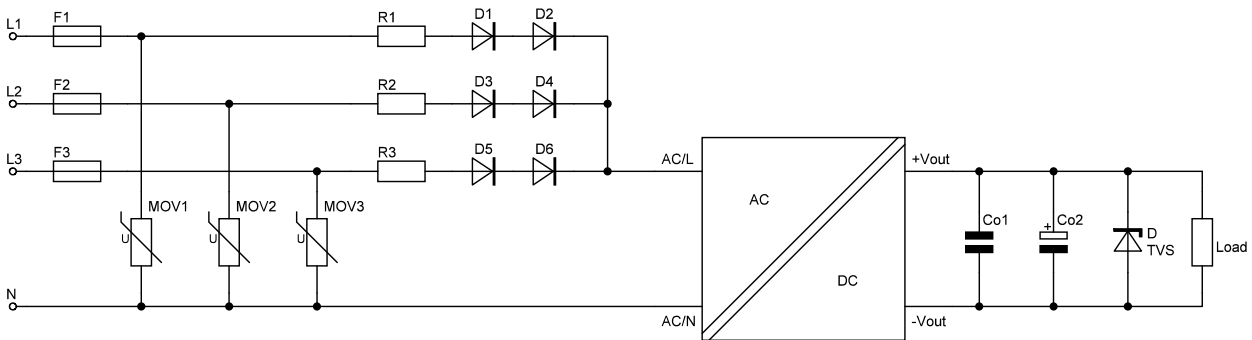
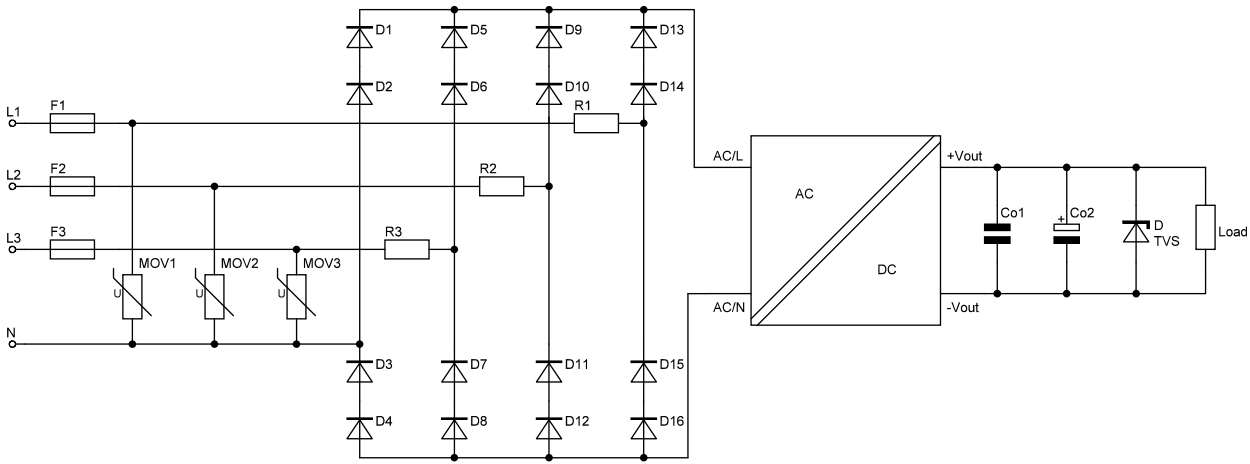


Table for Figure 3

Type	Fuse F1 - F3	MOV1 - MOV3	R1 - R3	D1 - D6	Co1	Co2	TVS
PAC30D3R3S6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	330 µF	SMBJ7.0A
PAC30D05BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	330 µF	SMBJ7.0A
PAC30D09BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	220 µF	SMBJ12A
PAC30D12BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	220 µF	SMBJ20A
PAC30D15BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	220 µF	SMBJ20A
PAC30D24BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	220 µF	SMBJ30A
PAC30D48BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 µF, MLCC	10 µF	SMBJ64A
					E.g.: RL207-G		

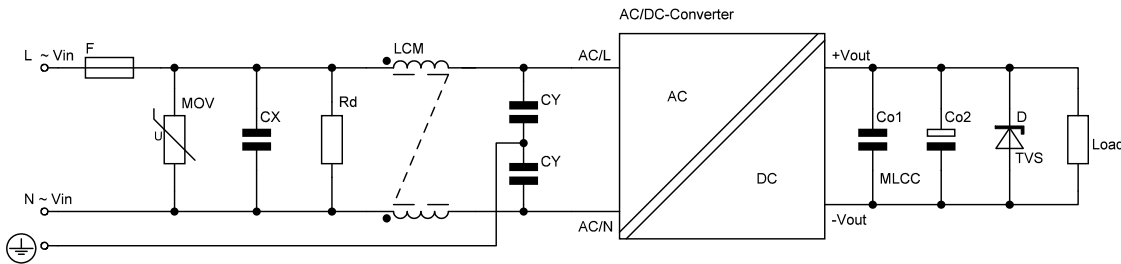
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Figure 4 Recommended circuit for applications which require 4 kV differential mode inrush standard (full wave rectification)



Type	Fuse F1 ... F3	MOV1 ... MOV3	R1 ... R3	D1 ... D16	Co1	Co2	TVS
PAC30D3R3BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	330 μF	SMBJ7.0A
PAC30D05BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	330 μF	SMBJ7.0A
PAC30D09BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	220 μF	SMBJ12A
PAC30D12BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	220 μF	SMBJ20A
PAC30D15BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	220 μF	SMBJ20A
PAC30D24BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	220 μF	SMBJ30A
PAC30D48BS6	3.15 A time delayed	S20K550	12 Ω, 5 W	2 A, 2000 V, I _{FSM} >50A	1 μF, MLCC	10 μF	SMBJ64A
				E.g.: RL207-G			

Figure 5 Recommended circuit for Safety Class I applications

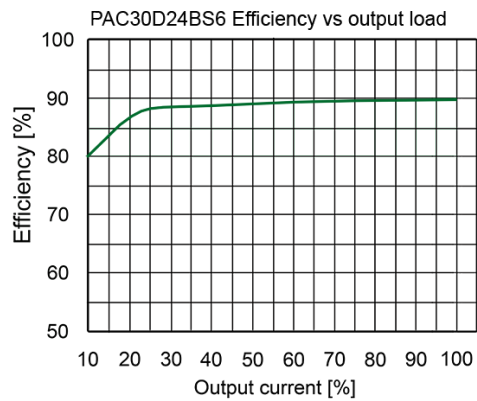
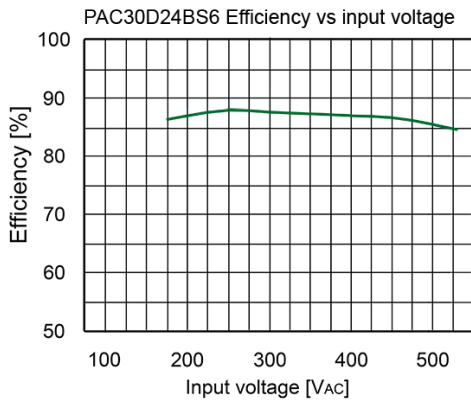
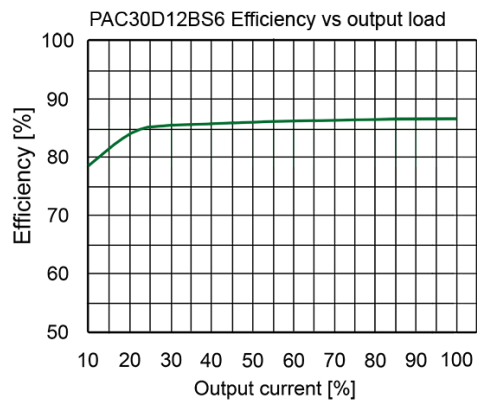
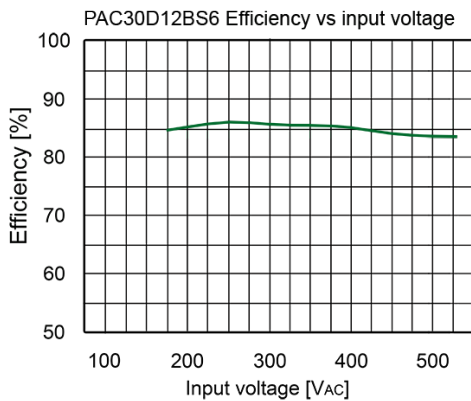
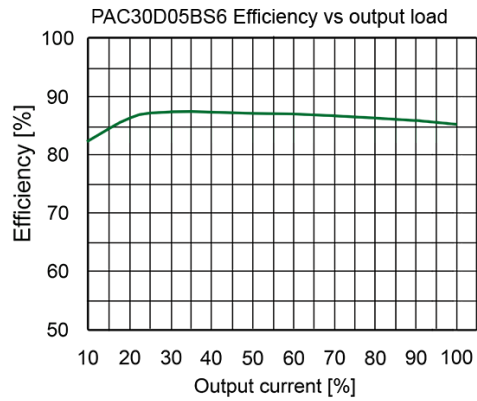
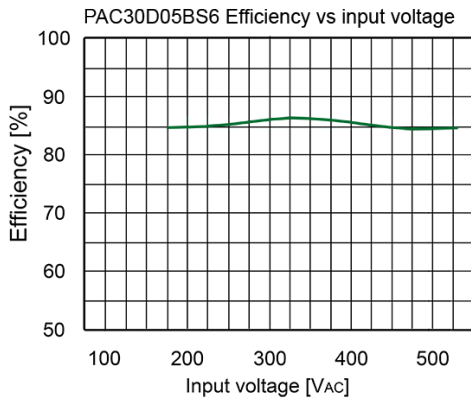


Type	F Time delayed type	MOV	CX 500 V~ Type	Rd Operating voltage 1000 V	LCM	CY 1000 V~ Type	Co1	Co2	TVS
PAC30D3R3BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	330 μF	SMBJ7.0A
PAC30D05BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	330 μF	SMBJ7.0A
PAC30D09BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	220 μF	SMBJ12A
PAC30D12BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	220 μF	SMBJ20A
PAC30D15BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	220 μF	SMBJ20A
PAC30D24BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	220 μF	SMBJ30A
PAC30D48BS6	3.15 A	S14K550	0.1 μF	2.2 MΩ	10 mH	1 nF	1 μF, MLCC	10 μF	SMBJ64A

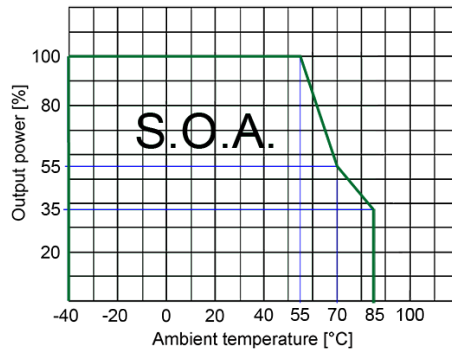


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Power derating vs ambient temperature at Vin 176..528VAc, 248...746 Vdc

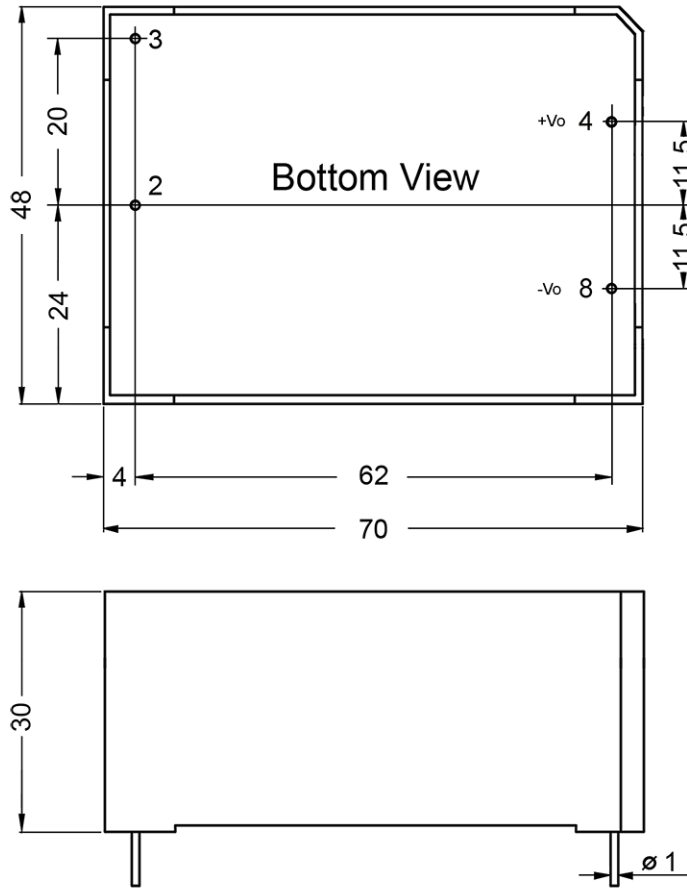


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Mechanical dimensions PCB module



Pin assignment	
2	AC in, N
3	AC in, L
4	+ V out
8	- V out

Note:
 Unit: mm
 Pin diameter tolerance: ± 0.1 mm
 General tolerances: ± 0.5 mm
 Recommended hole diameter 1.5 mm

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