

3 W AC-DC Converter PAC3DxxBS3-Series

- Enclosed plastic case
- 85 ... 305 V_{AC}, 100 ... 430 V_{DC} universal input range
- Continuous short circuit protection
- Over voltage protection
- Safety EN 62368-1, class II



Model guide

Type	Output voltage		Output current [mA] max.	Output power [W] max.	Efficiency typ. @ full load [%]	Capacitive load max. [µF]
	[V _{DC}]	tolerance [%] typ.				
PAC3D03BS3	3.3	±3	900	3	72	4000
PAC3D05BS3	5.0	±2	600	3	76	3000
PAC3D09BS3	9.0	±2	333	3	78	1200
PAC3D12BS3	12	±2	250	3	78	1200
PAC3D15BS3	15	±2	200	3	79	680
PAC3D24BS3	24	±2	125	3	79	220

Specifications

Input	
Voltage range	85...305 V _{AC} or 100...430 V _{DC}
Line frequency range	47...63 Hz
Full load input current	80 mA, max. @ 115 V _{AC} 60 mA, max. @ 230 V _{AC}
Inrush current	15 A, typ. @ 115 V _{AC} 25 A, typ. @ 230 V _{AC}
No load power consumption	0.1 W, typ.
Hold up time @ full load	5 ms, typ. @ 115 V _{AC} 50 ms, typ. @ 230 V _{AC}
Recommended fuse	1 A / 300 V~, time delayed type
Hot plug	Unavailable
Isolation	
Isolation voltage, input to output	4000 V _{AC} , test 1 Min., < 5 mA
Leakage current	≤ 0.25 mA @ V _{in} 277 V _{AC} , 50 Hz
Output	
Output voltage tolerance	PAC3D03S: ±3 % All others: ±2 %
Line regulation at full load	± 0.5 %, typ.
Load regulation	± 1 %, typ. @ 0..100 % load
Minimum load	Not required
Temperature coefficient	± 0.02 % / °C
Ripple & noise @ BW 20 MHz	≤ 100 mVp-p (see Figure 1)
Output over voltage protection	
PAC3D03BS3, PAC3D05BS3	≤ 7.5 V _{DC} , TVS diode clamping
PAC3D09BS3	≤ 15 V _{DC} , TVS diode clamping
PAC3D12BS3	≤ 16 V _{DC} , TVS diode clamping
PAC3D15BS3	≤ 20 V _{DC} , TVS diode clamping
PAC3D24BS3	≤ 30 V _{DC} , TVS diode clamping
Protection	
Short circuit	Continuous, hiccup, auto restart
Over current	≥ 200 % of rated current
General	
Safety standard	EN 62368-1
Safety standard to meet	IEC-, UL 62368-1, EN 61558-1, EN 60335-1
Safety class	Class II
Switching frequency	65 kHz, typ.
Reliability MTBF	> 2.8 Mio. h
MIL-HDBK-217F@25°C	

EMC		
CE	EN 55032, CISPR 32	Class B (see Figure 2, 3 & 4)
	EN 55014-1	
RE	EN 55032, CISPR 32	Class B (see Figure 2, 3 & 4)
	EN 55014-1	
ESD	EN -, IEC 61000-4-2	Contact ± 6 kV, Air ±8 kV, perf. Crit. B
	EN 55014-2	perf. Crit. B
RS	EN -, IEC 61000-4-3	10 V/m perf. Crit. A
	EN 55014-2	perf. Crit. A
EFT	EN -, IEC 61000-4-4	± 2kV, perf. Crit. B (see Figure 2) ± 4kV, perf. Crit. B (see Figure 3) ± 4kV, perf. Crit. A (see Figure 4)
	EN 55014-2	perf. Crit. B
Surge	EN -, IEC 61000-4-5	Line to line ± 1 kV perf. Crit. B (see Fig. 2) Line to line ± 2 kV, perf. Crit. B (see Fig. 3) Line to line ± 2 kV, Line to ground ± 4 kV, perf. Crit. B (see Fig. 4)
	EN 55014-2	perf. Crit. B
CS	EN -, IEC 61000-4-6	10 Vrms perf. Crit. A
	EN 55014-2	perf. Crit. A
Voltage dips, short interruptions and voltage variations	EN -, IEC 61000-4-11	0 %, 70 % perf. Crit. B
	EN 55014-2	perf. Crit. B
Environmental		
Operating ambient temperature	-40 ... 85 °C with derating	
Storage temperature	-40 ... 105 °C	
Altitude	≤ 5000 m	
Power derating	70 °C...85 °C	≥ 2.33 % per °C, (see diagram)
	PAC3D03BS3 85 V _{AC} ...100 V _{AC}	≥ 1.33 % per V _{AC}
Power derating	70 °C...85 °C	≥ 1.33 % per °C, (see diagram)
	All others 85 V _{AC} ...100 V _{AC}	≥ 1.33 % per V _{AC}
Storage humidity	95 %, non condensing	
Cooling	Free air convection, ≥ 35 LFM	
Physical		
	Dimensions [mm]	Weight [g]
PAC3DxxBS3	25.4 x 25.4 x 17.6	18
PAC3DxxBS3A2	31.5 x 76 x 26.4	38
PAC3DxxBS3A4	31.5 x 76 x 31	58
Case material	Black plastic, UL94V-0 rated	
Wave soldering temperature	≤ 260 °C duration ≤ 10 s, ≥ 1.5 mm distance from case	
Manual soldering temperature	≤ 360 °C duration ≤ 5 s, ≥ 1.5 mm distance from case	

Part number information

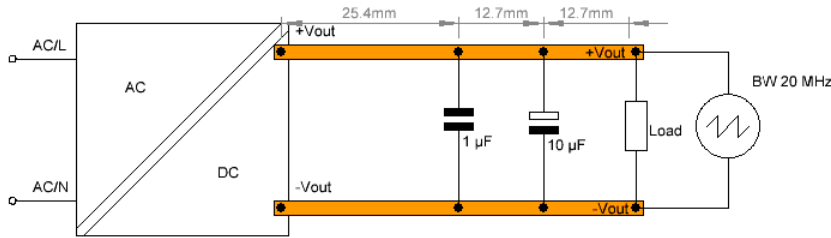
PHI-CON	AC/DC-Converter	Output Power	Series	Output voltage	Rev.	Output	Extended V _{in} range	Mountable on
P	AC	3 3 W	D	03 3.3 V	B	S single	3 85...305 V~	blanc PCB
				05 5 V				A2 Chassis
				09 9 V				A4 DIN Rail
				12 12 V				
				15 15 V				
				24 24 V				
Example:	PAC3D12BS3	PHI-CON AC/DC Converter, Pout: 3 W, Vout: 12 V, Vin range: 85...305 V~, single Out, PCB mountable						

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Note:

1. Unless otherwise specified are all values specified at Ta 25 °C, humidity < 75 % and rated output load current.
2. The outputs of the AC/DC converters are not suitable for parallel operation.

Figure 1 Output ripple & noise measure method BW 20 MHz



Typical application circuit

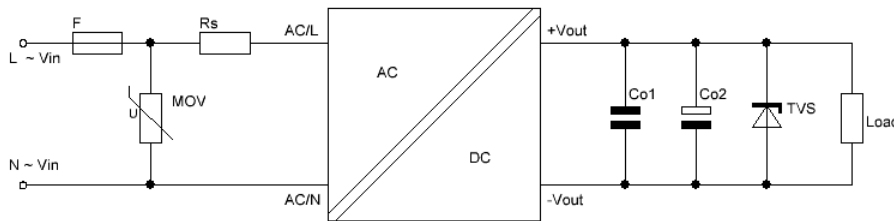


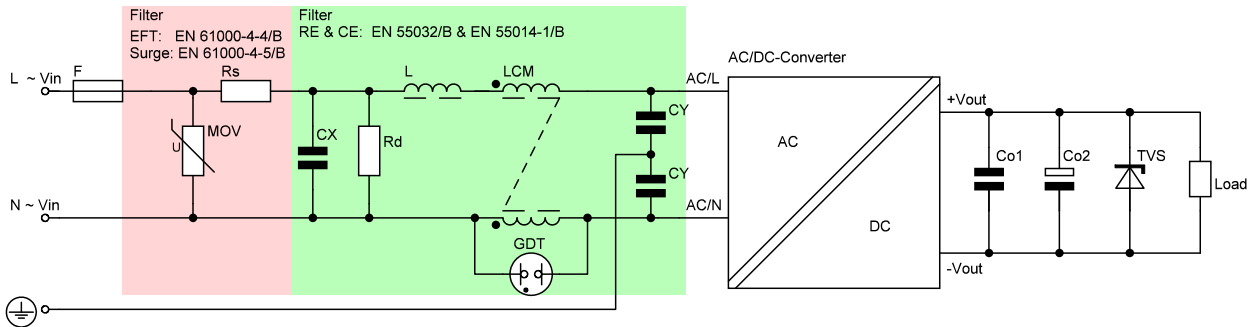
Figure 2

Type	F (Time delayed type)	MOV	Rs (wire wound type)	Co1	Co2	TVS
PAC3D03BS3	1 AT / ≥300 V~	S10K350	12 Ω, 3 W	1 µF, MLCC	150 µF, ≥ 10 V	SMBJ7.0A
PAC3D05BS3	1 AT / ≥300 V~	S10K350	12 Ω, 3 W	1 µF, MLCC	150 µF, ≥ 10 V	SMBJ7.0A
PAC3D09BS3	1 AT / ≥300 V~	S10K350	12 Ω, 3 W	1 µF, MLCC	120 µF, ≥ 25 V	SMBJ12A
PAC3D12BS3	1 AT / ≥300 V~	S10K350	12 Ω, 3 W	1 µF, MLCC	120 µF, ≥ 25 V	SMBJ20A
PAC3D15BS3	1 AT / ≥300 V~	S10K350	12 Ω, 3 W	1 µF, MLCC	120 µF, ≥ 25 V	SMBJ20A
PAC3D24BS3	1 AT / ≥300 V~	S10K350	12 Ω, 3 W	1 µF, MLCC	68 µF, ≥ 35 V	SMBJ30A

Figure 3

Type	F (Time delayed type)	MOV	Rs (wire wound type)	Co1	Co2	TVS
PAC3D03BS3	2 AT / ≥300 V~	S14K350	33 Ω, 3 W	1 µF, MLCC	150 µF, ≥ 14 V	SMBJ7.0A
PAC3D05BS3	2 AT / ≥300 V~	S14K350	33 Ω, 3 W	1 µF, MLCC	150 µF, ≥ 14 V	SMBJ7.0A
PAC3D09BS3	2 AT / ≥300 V~	S14K350	33 Ω, 3 W	1 µF, MLCC	120 µF, ≥ 25 V	SMBJ12A
PAC3D12BS3	2 AT / ≥300 V~	S14K350	33 Ω, 3 W	1 µF, MLCC	120 µF, ≥ 25 V	SMBJ20A
PAC3D15BS3	2 AT / ≥300 V~	S14K350	33 Ω, 3 W	1 µF, MLCC	120 µF, ≥ 25 V	SMBJ20A
PAC3D24BS3	2 AT / ≥300 V~	S14K350	33 Ω, 3 W	1 µF, MLCC	68 µF, ≥ 35 V	SMBJ30A

Figure 4 Application circuit for higher EMC performance



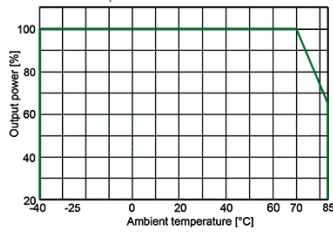
F1 (Time delayed type)	MOV1	Rs	CX	Rd	L	LCM	GDT	CY	Rs	Co1	Co2	TVS
2 AT, ≥300 V~	S14K350	33 Ω, 3 W	330 nF, 400 V _{AC}	2.2 MΩ (Operating voltage > 500 V)	1.2 µH, 0.3 A	20 mH	300 V, 1 kA	1 nF, 400 V _{AC}	33 Ω, 3 W	See Table 1		



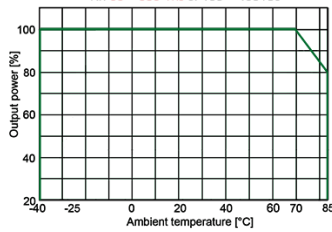
PHI-CON

3 W AC-DC Converter PAC3DxxBS3-Series

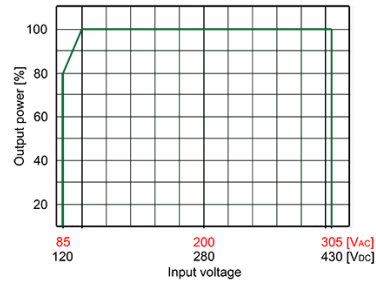
PAC3D03BS3 power derating vs ambient temperature at Vin (85 ~ 305 V_{AC} or 100 ~ 430V_{DC})



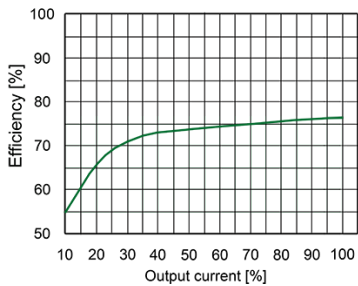
All others power derating vs ambient temperature at Vin 85 ~ 305 V_{AC} or 100 ~ 430V_{DC}



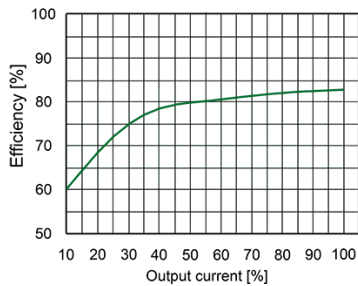
Derating vs input Voltage



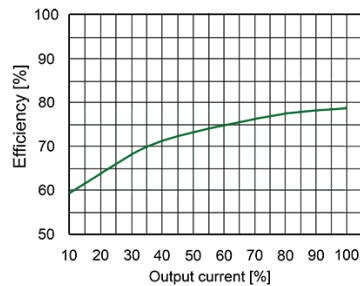
PAC3D05BS3 Efficiency vs output load at Vin 230 V_{AC}



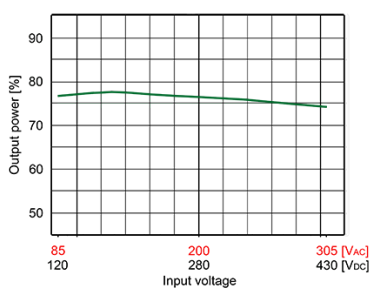
PAC3D12BS3 Efficiency vs output load at Vin 230 V_{AC}



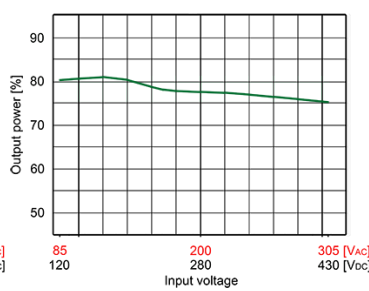
PAC3D24BS3 Efficiency vs output load at Vin 230 V_{AC}



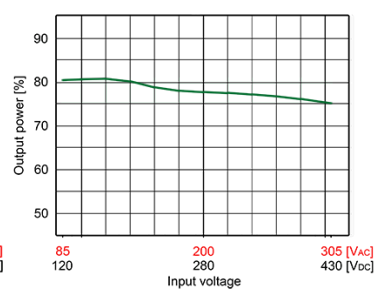
PAC3D05BS3 Efficiency vs input voltage at Ta 25°C



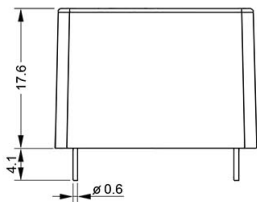
PAC3D12BS3 Efficiency vs input voltage at Ta 25°C



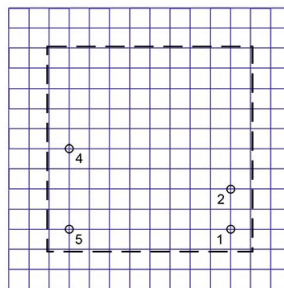
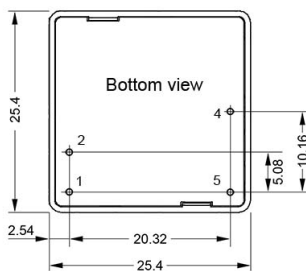
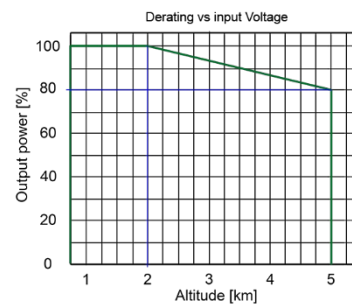
PAC3D24BS3 Efficiency vs input voltage at Ta 25°C



Mechanical dimensions PCB mountable version



Note
Unit: mm
Pin diameter tolerance: ± 0.1 mm
General tolerance: ± 0.5 mm

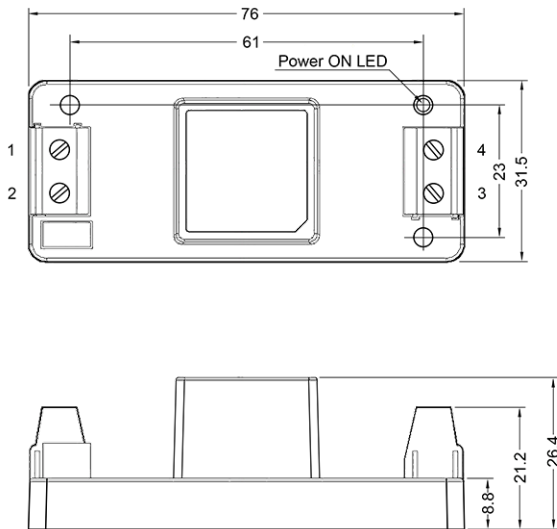


Grid: 2.54 mm
Recommended hole diameter: 1.1 mm

Pin assignment	
1	AC In (N)
2	AC In (L)
3	No Pin
4	- DC Out
5	+ DC Out

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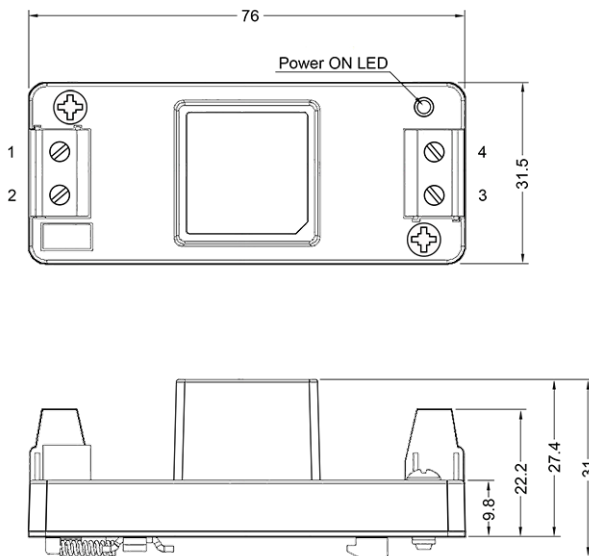
Mechanical dimensions chassis mountable version



Terminal assignment	
1	AC In (N)
2	AC In (L)
3	- Vout
4	+ Vout

Note
 Unit: mm
 General tolerances: ± 1 mm
 Wire range: 12...24 AWG
 Tightening torque: < 0.4 Nm

Mechanical dimensions DIN-rail mountable version



Terminal assignment	
1	AC In (N)
2	AC In (L)
3	- Vout
4	+ Vout

Note
 Unit: mm
 General tolerances: ± 1 mm
 Wire range: 12...24 AWG
 Tightening torque: < 0.4 Nm
 Mountable on DIN Rail TS35
 DIN Rail must be connected with protection earth

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