3 W AC-DC Power-Supply PAC3BxxSB(B)

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- 85 … 264 V_{AC} universal input range
- Continuously short circuit and over current protected
- Isolation class II
- MTBF > 300000 h
- Very small outlines

Model guide

Type	Output voltage		Output current	Ripple & noise up to 20 MHz	Efficiency typ.@ full load, Vin 230 V_{AC}	Capacitive load
	[V_{DC}]	Accuracy [%] max.	[mA] max.	[mVp-p] max.	[%]	[µF]
PAC3B03SB	3.3	±8	500	150	63	470
PAC3B05SB	5.0	±5	500	150	68	470
PAC3B09SB	9.0	±5	333	150	75	150
PAC3B12SB	12	±5	250	150	77	100
PAC3B15SB	15	±5	200	150	78	100
PAC3B24SB	24	±5	125	150	80	100

Specifications

Input	
Voltage range	85..264 V_{AC} or 70..400 V_{DC} Power derating see diagram
Frequency	47…440 Hz
Full load input current	120 mA max @ 115 V_{AC} 60 mA max @ 230 V_{AC}
Inrush current	13 A @ 115 V_{AC} 23 A @ 230 V_{AC}
No load power consumption	0.5 W, max.
Recommended fuse	1 A, 250 V_{AC}, time delay type
Hold up time	20 ms @ 115 V_{AC} 80 ms @ 230 V_{AC}
Isolation	
Isolation voltage (input to output)	3000 V_{AC} for 1 minute
Isolation resistance	100 MΩ
Output	
Ripple & noise BW 20 MHz	50…70 mV, typ.
Minimum load	5 %
Line regulation	±1.5 %, typ.
Load regulation @ 5 to 100% load change	±2.5 %, typ.
Temperature coefficient	0.15 % / °C

Protection	
Short circuit	Continuous, auto recovery
Over current protection	> 110 % of full load
Over temperature	No
General	
Reliability MTBF@25°C	> 300000 h (MIL-HDBK-217)
Switching frequency	~ 60 kHz
Environmental	
Operating temperature (ambient)	-40 °C to +85 °C (with derating, see diagram)
Power derating	see diagram
Storage temperature	-40 °C to +105 °C
Case temperature	90 °C, max.
Humidity	85 %, max.
Cooling	Free air convection
Safety standard	IEC60950, EN60950, UL60950
Physical	
Dimensions	35 x 18 x 11 mm
Weight	7 g
Case material	UL94V-0
Mounting	On PCB
Soldering temperature, Time	Wave 265 °C max., 10 s max. Manual 370 °C max., 5 s max.

EMC	EMI	Conducted emission	EN55022 (CISPR22), class A (External circuit refer to fig. 2)
			EN55022 (CISPR22), class B (External circuit refer to fig. 3)
		Radiation emission	EN55022 (CISPR22), class A (External circuit refer to fig. 2)
			EN55022 (CISPR22), class B (External circuit refer to fig. 3)
	EMS	ESD Electrostatic discharge	IEC, EN61000-4-2 contact ± 4 kV perf. criteria B
		RS field susceptibility	IEC, EN61000-4-3, 10 V/m perf. criteria A (External circuit refer to fig. 3)
		EFT Fast transients on mains line	IEC, EN61000-4-4, ± 2 kV, perf. criteria B (External circuit refer to fig. 2)
			IEC, EN61000-4-4, ± 4 kV, perf. criteria B (External circuit refer to fig. 3)
		Surge	IEC, EN61000-4-5, ± 1 kV perf. criteria B (External circuit refer to fig. 3)
			IEC, EN61000-4-5, ± 2 kV perf. criteria B (External circuit refer to fig. 3)
		CS	IEC, EN61000-4-6, 10 V rms perf. criteria A (External circuit refer to fig. 3)
		PFM	IEC, EN61000-4-8, 10 A/m perf. criteria A
		Voltage dips, short and interruptions immunity	IEC, EN61000-4-11, 0…70 % perf. criteria B

1. External electrolytic capacitor are required to models. More details refer to typical applications.
2. Ripple and noise were measured refer to “ripple and noise measure figure”.
3. All specifications were measured at Ta 25 °C, humidity <75 %, nominal input voltage (115 V_{AC} or 230 V_{AC}) and rated output load unless otherwise specified.
4. Module required dispensing fixed after assembled.

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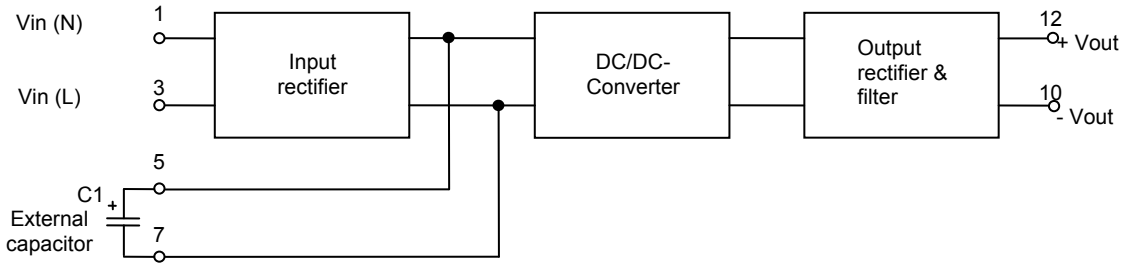
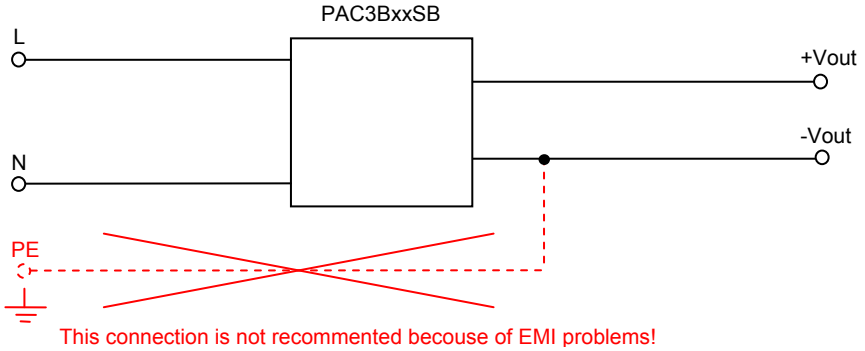
Functional diagram



Application note inadmissible connection



Ripple and noise measure configuration

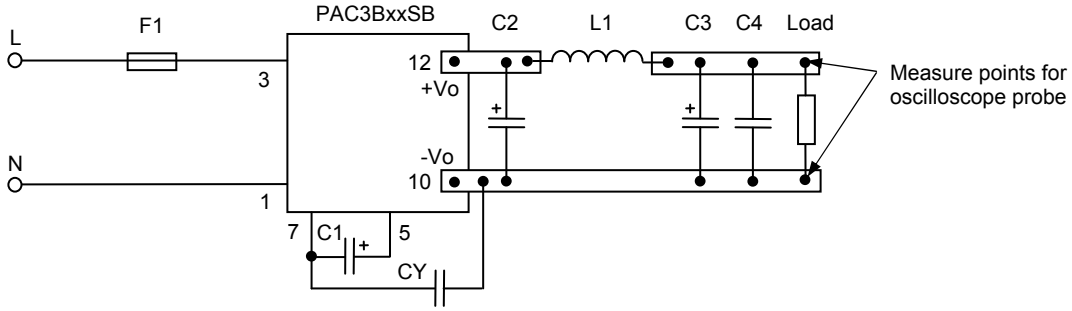
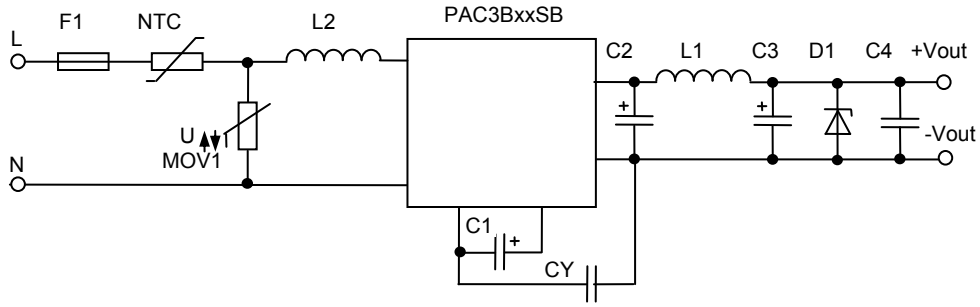


Figure 2 EMC application circuit for standard requirement



For standard EMC requirement, please refer to figure 2, recommended parameters are shown in this table.											
Type	F1	MOV1	NTC	L1	L2	CY	C1	C2	C3	C4	D1
PAC3B03SB	1 A, 250 V_{AC}, time delay	Type S14K320	Type 13D-5	2.2 µH	5 mH	1 nF 400 V_{AC}	10 µF 400 V	330 µF	120 µF	0.1 µF 50 V ceramic	SMBJ7.0A
PAC3B05SB									68 µF 35 V		SMBJ12A
PAC3B09SB											
PAC3B12SB								150 µF			SMBJ20A
PAC3B15SB											
PAC3B24SB								100 µF			SMBJ30A

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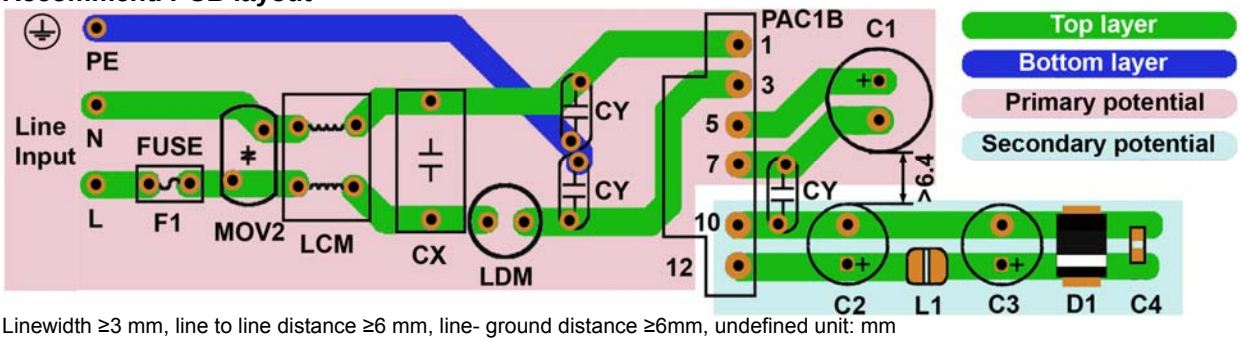
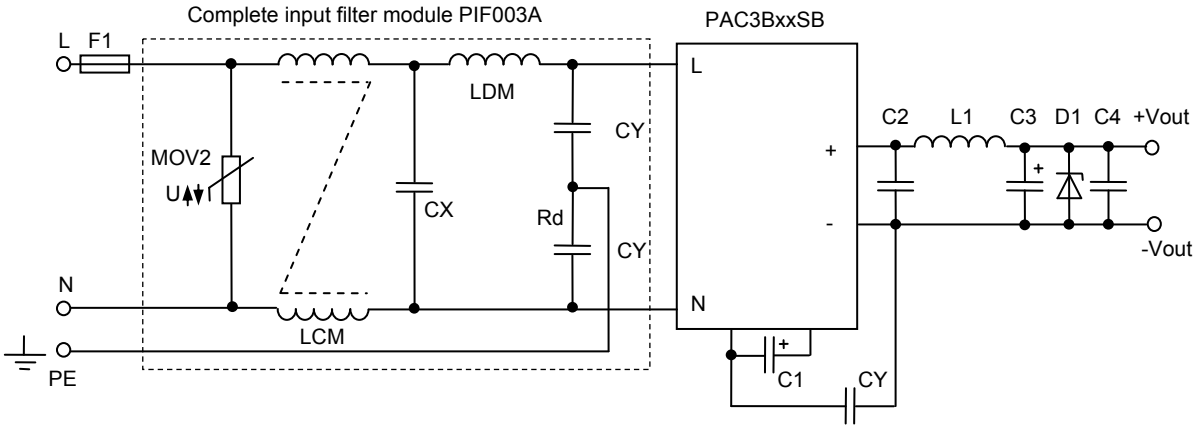
Recommend PCB layout



Linewidth ≥3 mm, line to line distance ≥6 mm, line- ground distance ≥6mm, undefined unit: mm

Figure 3, EMC application circuit for applications with higher EMC requirement



For higher EMC requirement, please refer to figure 3, recommended parameters are shown in this table.								
Type	F1	Filter module	CY	C1	C2	C3	C4	D1
PAC3B03SB	1 A, 250 V_{AC}, time delay	PIF003A	1 nF, 400 V_{AC}	10 µF, 400 V	330 µF	120 µF, 25 V	0.1 µF 50 V ceramic	SMBJ7.0A
PAC3B05SB						68 µF, 35 V		
PAC3B09SB								SMBJ12A
PAC3B12SB					150 µF			SMBJ20A
PAC3B15SB								
PAC3B24SB					100 µF			SMBJ30A

Note:

C1 and C3 are electrolytic capacitors and they are required. C2, C3 and L1 form a pi-type filter circuit for AC- and DC- input voltage. C2 and C3 are output filter capacitors, they are recommended to be high frequency and low impedance electrolytic capacitors. Capacitance and rated ripple current of capacitors refer to the data sheets provided by the manufactures. Voltage derating of capacitors should be 80 % or above.
At AC input voltage use C1 as filter capacitor. The recommended value of C1 should be 10 µF / 400 V.
At DC input voltage use C1 as EMC filter capacitor. The recommended value of C1 should be 10 µF / 400 V.
When the input voltage is above 370 V_{DC} is the recommended value of C1 10 µF / 450 V.
C4 is a ceramic capacitor, which is used to filter high frequency noise. Current of L1 and L2 refer to the datas heets provided by the manufactures, current derating should be 80% or above.
TVS is a recommended component to protect following circuits, if the converter fails.
External input NTC is recommended to use 13D-5.
External input MOV1 is recommended to use S14K320.

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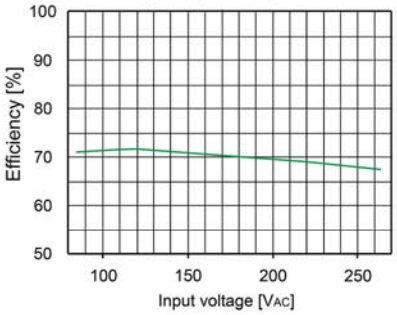
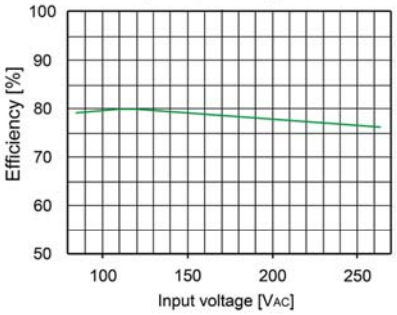
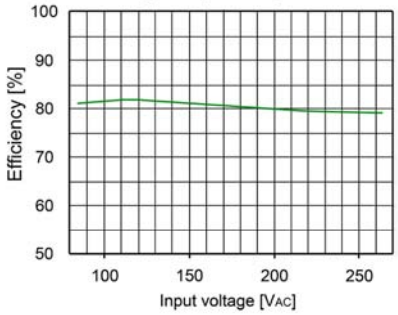
PAC3B05SB
Efficiency vs input voltage at full load



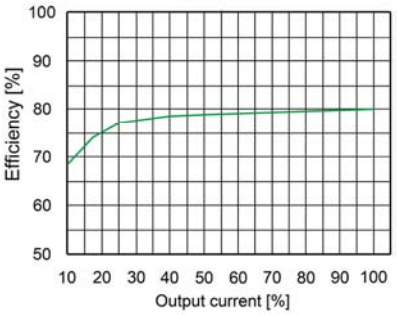
PAC3B12SB
Efficiency vs input voltage at full load



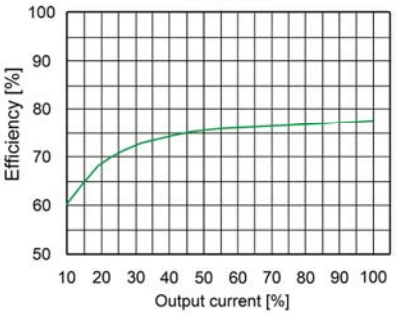
PAC3B24SB
Efficiency vs input voltage at full load



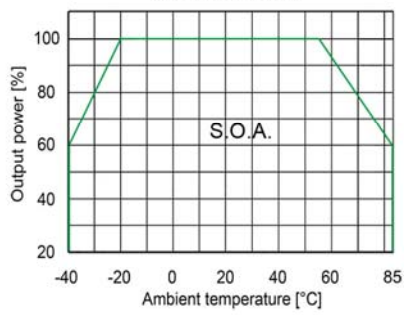
PAC3B12SB Efficiency vs output load
at 115 VAC



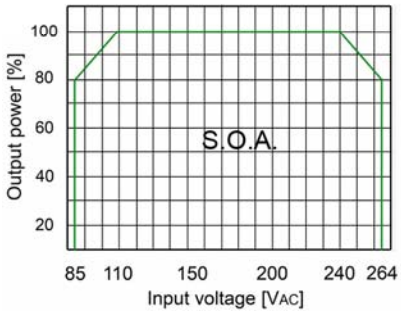
PAC3B12SB Efficiency vs output load
at 230 VAC



Power derating vs ambient temperature at
Vin 115 ~ 240 VAC



Input voltage vs power derating



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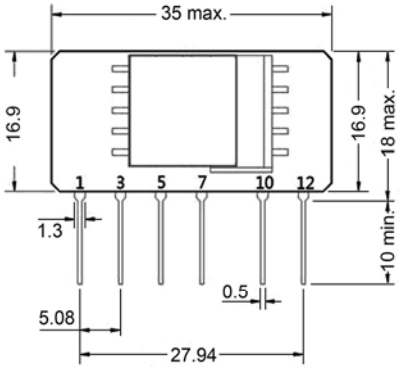
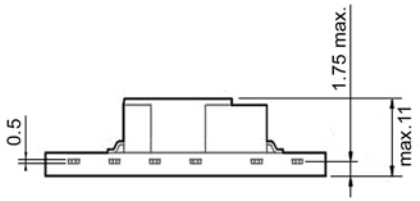
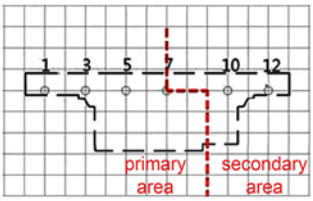
Dimensions PAC3BxxSB





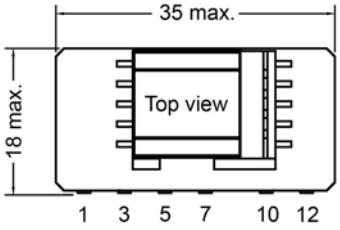


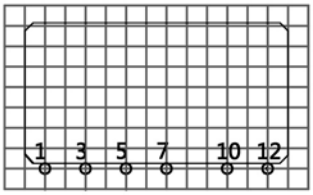
Grit: 2.54 mm
Hole diameter: 1 mm

Unit: mm
Pin section tolerance: ± 0.1 mm
Genral tolerance: ± 0.5 mm

Pin connections	
1	AC In (N) or -Vin
3	AC In (L) or +Vin
5	+ Capacitor (C1)
7	- Capacitor (C1)
10	- DC Out
12	+ DC Out

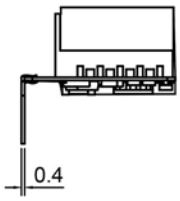
Dimensions PAC3BxxSBB

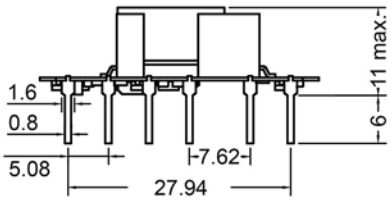




Grit: 2.54 mm
Hole diameter: 1.3 mm

Unit: mm
Pin section tolerance: ± 0.1 mm
Genral tolerance: ± 0.5 mm





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