

PNW05S Series

5W, Open Frame, SIP Package AC/DC Power Converters



Features

- Rated power: 5W Max
- Universal input: 90~528VAC 47~63Hz
- Regulated single output
- Isolation voltage 4000VAC
- Typical efficiency 70 ... 79%
- Energy saving, standby power only 0.1W
- Operating temperature range: -40~+85°C
- RoHS compliance
- SIP installation
- Over current, and short circuit protection
- Meet IEC/EN/UL 62368-1, EN 61558-1, EN 60335-1, CISPR32, EN55032 Class B with external circuits
- 3 year warranty



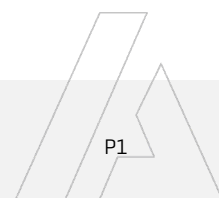
Overview

PNW05S series are compact size and open frame AC/DC power converters, designed for energy meters, and high reliability industrial applications. They feature ultra-wide input voltage range 90~528VAC, low stand by power consumption, high efficiency, and class II reinforced insulation. They are designed to meet IEC/EN/UL62368-1, EN60335-1, EN61558-1, UKCA and EMC performance meets CISPR32, EN55032 Class B with external components, ideally suitable for industrial, and critical commercial applications.

Model Numbers

Model Number	Input Voltage [VAC]	Output Voltage [VDC]	Output Current [mA] Max.	Ripple & Noise [mVp-p] Max.	Efficiency [%] Typ.	Capacitive Load [uF] Max.
PNW05S-033	90~528VAC 100~745VDC	3.3	1000	180	70	2200
PNW05S-050		5	1000	180	72	1500
PNW05S-090		9	550	180	73	680
PNW05S-120		12	420	180	79	470
PNW05S-150		15	330	180	79	330
PNW05S-240		24	210	180	79	100

* Only typical models are listed, other models may be available, upon request.



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Electrical Specifications

Unless otherwise indicated, specifications are measured at $T_A=25^{\circ}\text{C}$, humidity<75%, nominal input voltage and rated output load.

Parameters	Condition	Min.	Typ.	Max.	Unit	Note
Input voltage range	AC in	90	-	528	VAC	
	DC in	100	-	745	VDC	
Nominal input voltage		100	-	480	VAC	
Input frequency		47	-	63	Hz	
Input current	230VAC	-	0.10	-	A	
	480VAC	-	0.07	-	A	
Inrush current Cold start	230VAC	-	17	-	A	
	480VAC	-	28	-	A	
Leakage current	230VAC, 50Hz	-	0.2	-	mA RMS	
Output voltage accuracy	$V_{OUT}=3.3\text{V}$	-	± 3.0	± 6.0	%	
	Others	-	± 2.5	± 5.0	%	
Line regulation Full load		-	± 1.5	-	%	
Load regulation $I_{OUT}=10\%\sim 100\%$ of $I_{OUT, rated}$		-	± 3.0	-	%	
Ripple and noise 20MHz bandwidth, peak to peak		-	100	180	mV	
Standby power consumption	230VAC	-	0.1	0.3	W	
Temperature coefficient		-	± 0.2	-	%/ $^{\circ}\text{C}$	
Hold up Time	230VAC	-	35	-	mS	
	380VAC	-	100	-	mS	
Minimum load		10	-	-	%	
Over current protection	Automatic recovery	110	-	-	% I_{OUT}	
Short circuit protection	Automatic recovery	Continuous, hiccup mode				
Recommended external fuse		1A, slow blow, *required*				

* Ripple and noise measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 1uF ceramic capacitor and a 10uF electrolytic capacitor in parallel.

General Specifications

Parameters	Condition	Min.	Typ.	Max.	Unit	Note
Isolation voltage 1 minute, leakage current 5mA max	Input to Output	4000	-	-	VAC	
Insulation resistance 500VDC	Input to Output	100			M Ohm	
Operating temperature range	See "Derating Curve"	-40	-	85	$^{\circ}\text{C}$	

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General Specifications

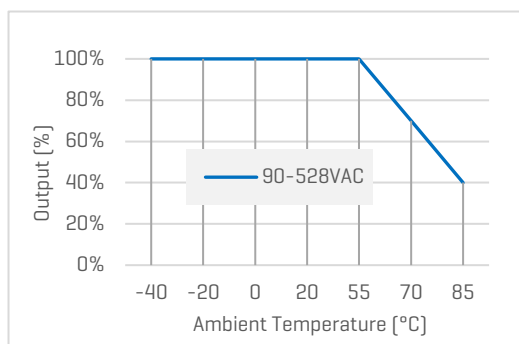
Parameters	Condition	Min.	Typ.	Max.	Unit	Note
Storage temperature		-40	-	105	°C	
Storage humidity		-	-	95	%RH	
Soldering temperature	Wave Manual	-	260 360	-	°C	
Cooling method ⁷		Free air convection				
Safety class		Class II, no FG				
MTBF	MIL-HDBK-217F	>500,000 Hours, 25°C				
Design based on standards		IEC/EN/UL 62368, EN 60335, EN 61558, UKCA				
Safety certifications		IEC/EN 62368-1				
EMC	CE ESD RS EFT EFT Surge Surge CS	CISPR32, EN55032 Class B ^{**} IEC/EN61000-4-2, Contact ±6kV, Air ±8kV, Criteria B IEC/EN61000-4-3, 10V/m, Criteria A IEC/EN61000-4-4, ±2kV, Criteria B IEC/EN61000-4-4, ±4kV, Criteria B ^{**} IEC/EN61000-4-5, Line to Line ±1kV, Criteria B IEC/EN61000-4-5, Line to Line ±2kV, Criteria B ^{**} IEC/EN61000-4-6, 10Vrms, Criteria A				
Size, and Weight		33.5x17.2x13.0mm, 6.5g				

^{**}With "External Circuit" for EMC enhancement as shown in Figure 2

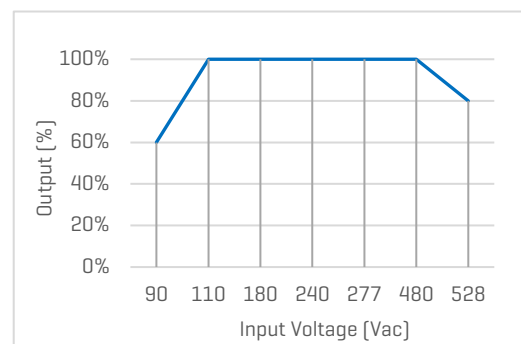
Characteristic Curves

Derating Curves

Output vs Ambient Temperature



Output vs Input Voltage



Recommended External Circuits

Typical External Circuit

This circuit is the basic design reference, components with "" are required for the converter's operating.

FUSE to be 1A, slow blow and is also required for safety. R1* ... R4* to be 1M Ohm 1206 SMD resistors, and it is also required.

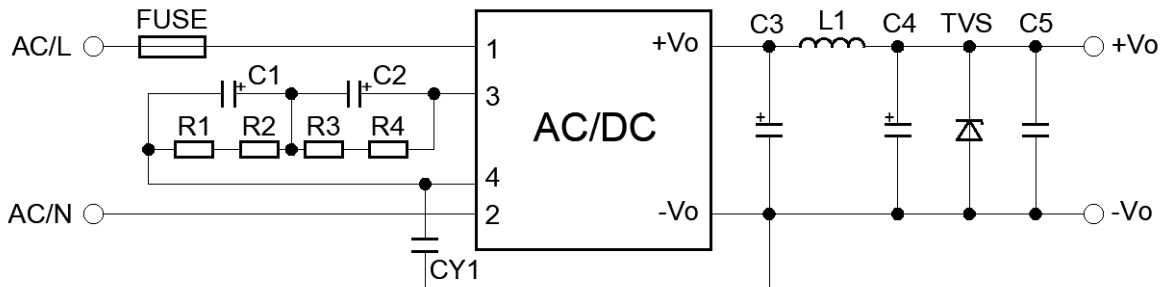


Figure 1. Typical External Circuit

Recommended Component [Table 1]

V _{OUT} [V]	C1*, C2*	C3*	C4*	C5	CY1*	L1*	TVS
5	47uF, 400V	470uF, 16V	150uF, 25V	0.1uF, 25V	1nF, 400VAC	2.2uH, 6A	SMBJ7.0A
9, 12	47uF, 400V	470uF, 16V	100uF, 25V	0.1uF, 25V	1nF, 400VAC	2.2uH, 6A	SMBJ12A
15, 24	47uF, 400V	220uF, 35V	47uF, 35V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6A	SMBJ20A

EMC Enhancement for EN55032 Class B

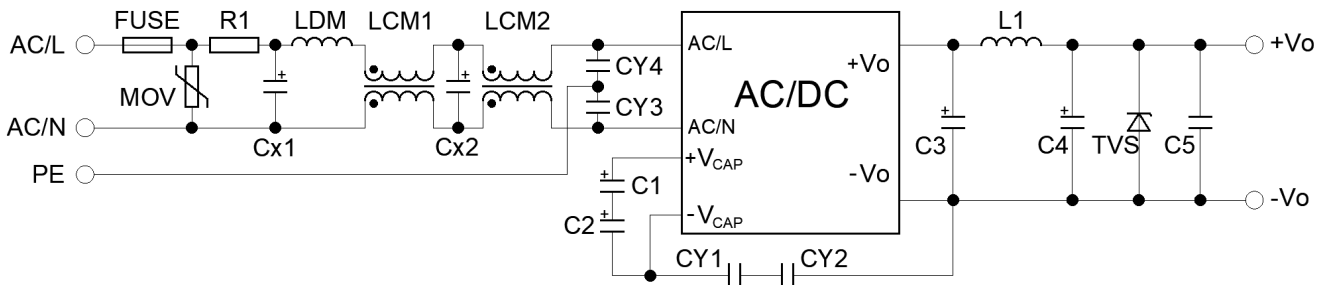


Figure 2. Circuit for EMC enhancement

Recommended Component [Table 2]

Item	FUSE*	R1*	MOV	LDM	LCM1	LCM2
Spec	2A, 500VAC	12 Ohm, 3W	14D561	2.2mH, 0.24A	200uH, 0.8A	12.6mH 0.5A
Item	Cx1, Cx2	CY1, CY2	CY3, CY4	C1, C2		
Spec	0.1uF, 480VAC	2.2nF, 400VAC	1nF, 400VAC	47uF, 400VAC		

Components above with "" are required for the converter's operating. "R1" is wire-wound resistor.

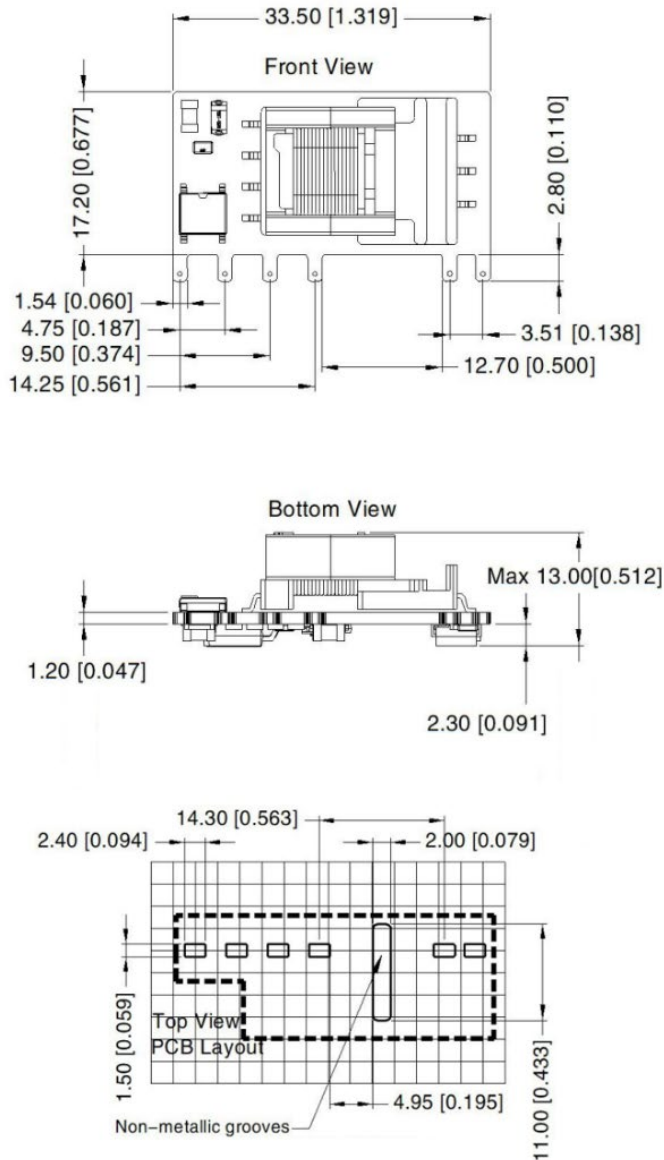
*Refer to Table 1 for the output circuit configuration.

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Mechanical Specifications



Recommended Footprint

Pin Definition

Pin #	Single Out
1	AC [L]
2	AC [N]
3	+V [CAP]
4	-V [CAP]
5	-V _{OUT}
6	+V _{OUT}

* Unless otherwise specified unit: mm [inch]

* General tolerance: ± 1.00 [± 0.040]

* Pin thickness: ± 0.10 [± 0.004]

* Footprint grid 2.54 x 2.54 mm