

# PNW05S Series

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

## Features

- ▶ Rated power: 5W
- ▶ Universal input: 90~528VAC 47~63Hz
- ▶ Regulated single output
- ▶ Isolation voltage 4000VAC
- ▶ Typical efficiency 70 ... 78%
- ▶ Energy saving, standby power only 0.1W
- ▶ Operating temperature range: -40~+85°C
- ▶ RoHS compliance
- ▶ SIP and SMD installation
- ▶ Over current, and short circuit protection
- ▶ Meet IEC/EN/UL 62368, CISPR32, EN55032 Class B
- ▶ 3 year warranty



## 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.

## 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	$V_{OUT}=3.3\text{V}$	-	$\pm 3.0$	$\pm 6.0$	%	
	Others	-	$\pm 2.5$	$\pm 5.0$	%	

### 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
<b>Line regulation</b> Full load		-	±1.5	-	%	
<b>Load regulation</b> $I_{OUT}=10\%\sim 100\%$ of $I_{OUT, rated}$		-	±3.0	-	%	
<b>Ripple and noise</b> 20MHz bandwidth, peak to peak		-	100	180	mV	
<b>Standby power consumption</b>	230VAC	-	0.1	0.3	W	
<b>Temperature coefficient</b>		-	±0.2	-	%/°C	
<b>Hold up Time</b>	230VAC 380VAC	-	35 100	-	mS	
<b>Minimum load</b>		10	-	-	%	
<b>Over current protection</b>	Automatic recovery	110	-	-	% $I_{OUT}$	
<b>Short circuit protection</b>	Automatic recovery	Continuous, hiccup mode				
<b>Recommended external fuse</b>		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.

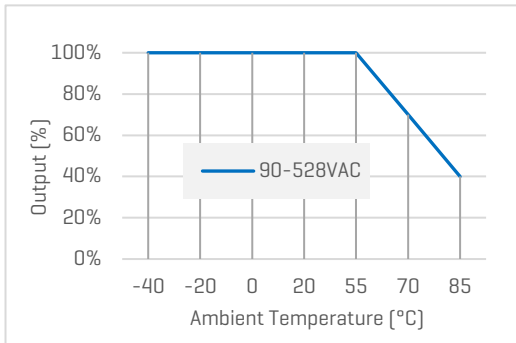
### General Specifications

Parameters	Condition	Min.	Typ.	Max.	Unit	Note
<b>Isolation voltage</b> 1 minute, leakage current 5mA max	Input to Output	4000	-	-	VAC	
<b>Insulation resistance</b> 500VDC	Input to Output	100			M Ohm	
<b>Operating temperature range</b>	See "Derating Curve"	-40	-	85	°C	
<b>Storage temperature</b>		-40	-	105	°C	
<b>Storage humidity</b>		-	-	95	%RH	
<b>Soldering temperature</b>	Wave Manual	-	260 360	-	°C	
<b>Cooling method</b>		Free air convection				
<b>Safety class</b>		Class II, no FG				
<b>MTBF</b>	MIL-HDBK-217F	>500,000 Hours, 25°C				
<b>Design based on standards</b>		IEC/EN/UL 62368, EN 60335, EN 61558, UKCA				
<b>Safety certifications</b>		IEC/EN 62368-1				
<b>EMC</b>		CISPR32, EN55032 Class B with external circuit				
<b>Size, and Weight</b>		33.5x17.2x13.0mm, 6.5g				

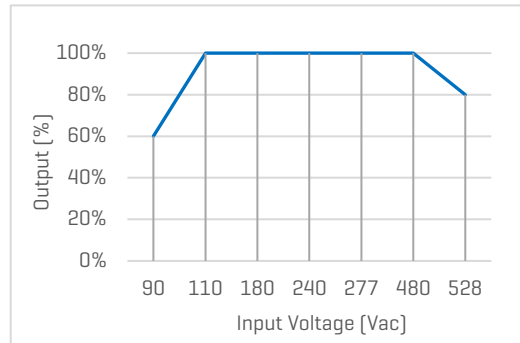
## Characteristic Curves

### Derating Curves

Output vs Ambient Temperature



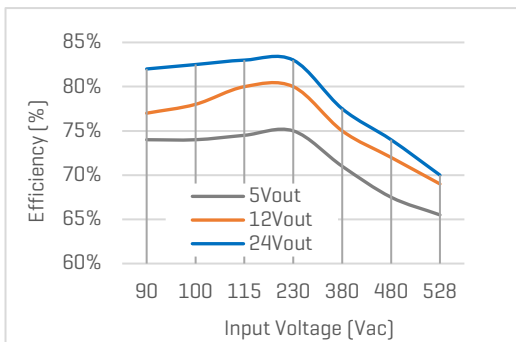
Output vs Input Voltage



### Efficiency Curves

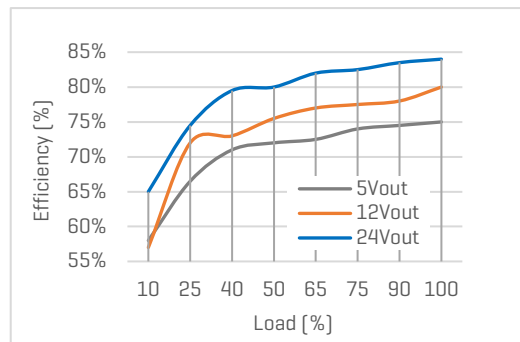
Efficiency vs Input Voltage

Full load



Efficiency vs Load

$V_{IN}=230VAC$



### 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.

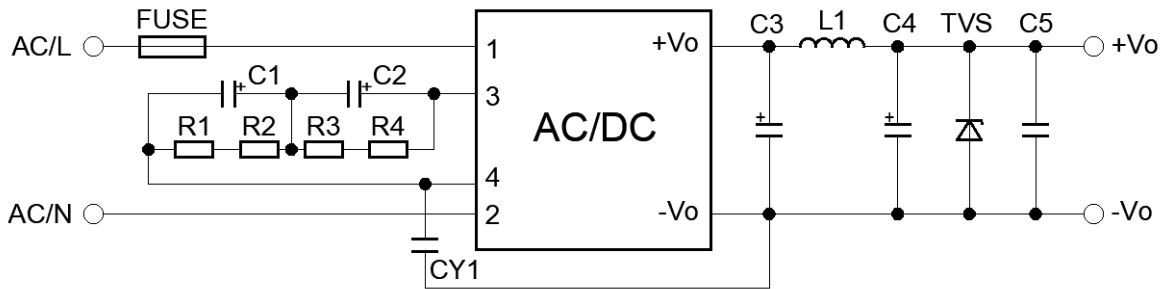


Figure 1. Typical external circuit

#### Recommended Component [Table 1]

V <sub>OUT</sub> [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

#### Circuit for EMC Enhancement

\*This application circuit is recommended for EMC enhancement. It is not mandatory if this is not critical in the application.

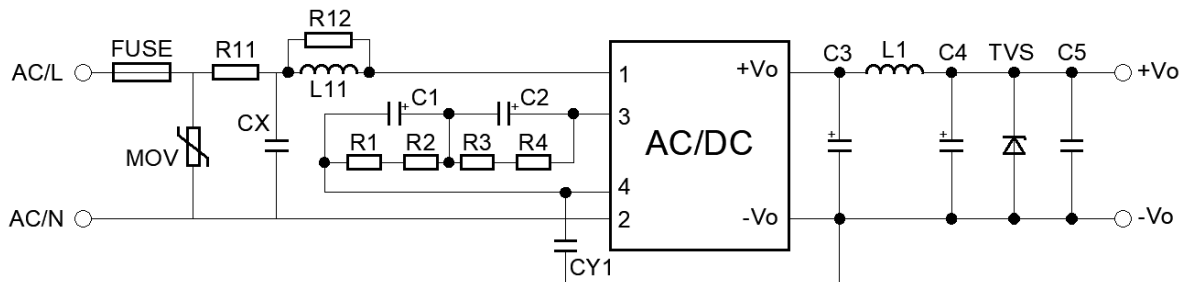


Figure 2. External circuit design for EMC enhancement

#### Recommended Component [Table 2]

Item	FUSE*	MOV	CX	R11*	R12*	L11
Spec	1A, 500V	14D911	0.1uF, 480VAC	12 Ohm, 3W	2...20K, 1/4W	1.2...4.7mH

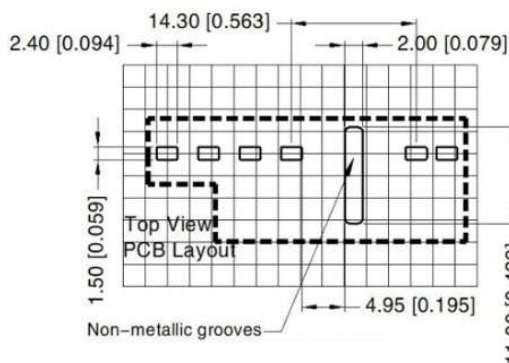
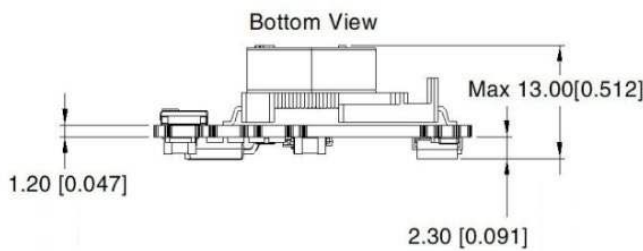
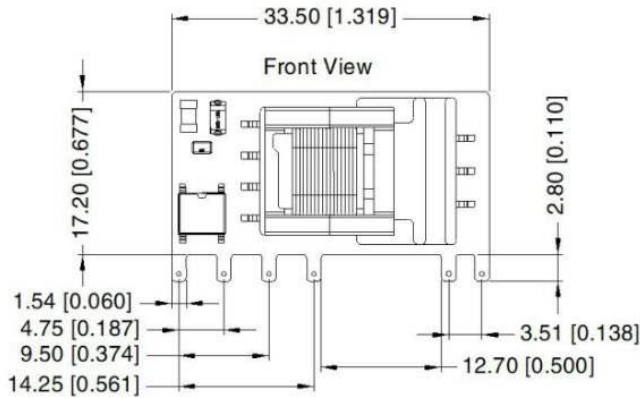
\*Components above with "\*" are required for the converter's operating. "R11" is wire-wound resistor.

\*Refer to Table 1 for the basic components.

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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 <sub>OUT</sub>
6	+V <sub>OUT</sub>

\* Unless otherwise specified unit: mm [inch]

\* General tolerance:  $\pm 1.00$  [ $\pm 0.040$ ]

\* Pin thickness:  $\pm 0.10$  [ $\pm 0.004$ ]

\* Footprint grid 2.54 x 2.54 mm

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