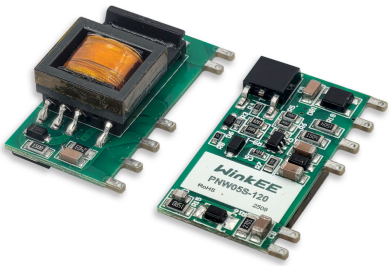
PNW05S Series

5W, Open Frame, AC/DC 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
- Compact SIP package
- Over voltage, over current and short circuit protection
- Meet IEC/EN/UL 62368-1, EN 61558-1, EN 60335-1, CISPR32, EN55032 Class B
- Designed for both civil and industrial applications
- 5 year warranty



RoHS CE

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.	Efficiency [%] Typ.	Capacitive Load [uF] Max.
PNW05S-033	90~528VAC 100~745VDC	3.3	1000	70	2200
PNW05S-050		5	1000	72	1500
PNW05S-090		9	550	73	680
PNW05S-120		12	420	78	470
PNW05S-150		15	330	79	330
PNW05S-240		24	210	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°C, humidity<75%, nominal input voltage and rated output load.

Parameters	Conditions	Min.	Typ.	Max.	Unit
Input voltage range	AC in DC in	90 100	-	528 745	VAC VDC
Nominal input voltage		100	-	480	VAC
Input frequency		47	-	63	Hz
Input current	230VAC 480VAC	-	-	0.2 0.1	A
Inrush current Cold start	230VAC 480VAC	-	17 28	-	A
Leakage current	230VAC, 50Hz	-	-	0.2	mA RMS
Output voltage accuracy I_{OUT}=10%~100% of $I_{OUT, rated}$	V_{OUT}=3.3V Others	-	±3.0 ±2.5	±6.0 ±5.0	%
Line regulation	Full load	-	±1.5	-	%
Load regulation	I_{OUT}=10%~100% of $I_{OUT, rated}$	-	±3.0	-	%
Ripple and noise [2]	20MHz bandwidth	-	100	180	mVp-p
Temperature coefficiency		-	±0.20	-	%/°C
Standby power consumption		-	0.10	0.30	W
Minimum load		10	-	-	% I_{OUT}
Over current protection	Automatic recovery	110	-	-	% I_{OUT}
Short circuit protection		Hiccup mode, automatic recovery			
External fuse		1A, slow blow *required*			

Note [2]: Ripple and noise measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uF & 47uF parallel capacitor.

PNW05S Series

5W, Open Frame, AC/DC Converters

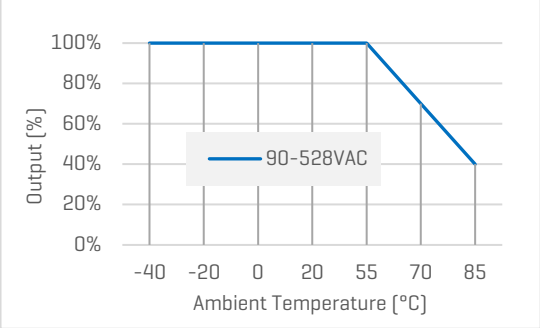
General Specifications

Parameters	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage Tested for 1 minute	I/P to O/P	4000	-	-	VAC
Isolation resistance 500VDC, 25°C, 70%RH	I/P to O/P	100	-	-	M Ohm
Switching frequency		-	55	-	KHz
Operating temperature range	See "Derating Curve"	-40	-	85	°C
Storage temperature		-40	-	105	°C
Storage humidity		10	-	95	%RH
Soldering temperature		-	260	-	°C
Cooling method		Free air convection			
Safety class		Class II			
MTBF	MIL-HDBK-217F	> 500,000 Hours, 25°C			
Safety standards		UL/EN/IEC 62368-1, UKCA, EN 60335-1, EN 61558-1			
EMC standards	CISPR32, EN55032	Class A with External Circuit "Figure 1" [A] Class B with External Circuit "Figure 2" [B]			
ESD	IEC/EN61000-4-2	Contact ±6kV, Air ±8kV, perf. Criteria B			
Radiated	IEC/EN61000-4-3	10V/m, perf. Criteria A			
EFT, Burst	IEC/EN61000-4-4	±2kV, perf. Criteria B [A] ±4kV, perf. Criteria B [B]			
Surge	IEC/EN61000-4-5	Line to Line ±1kV, perf. Criteria B [A] Line to Line ±2kV, perf. Criteria B [B]			
Conducted	IEC/EN61000-4-6	10Vrms, perf. Criteria A			
Size, and Weight		33.5x13x17.2mm, 6.5g			

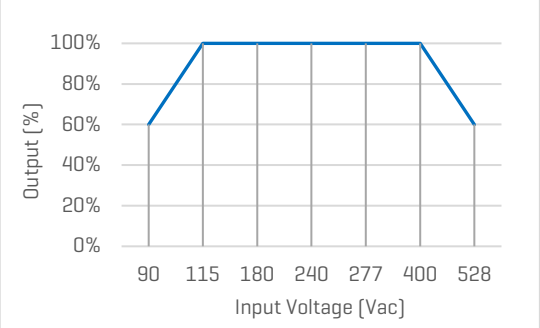
Characteristic Curves

Derating Curves

Output vs Ambient Temperature



Output vs Input Voltage



Recommended External Circuits

Typical External Circuit for EN55032 Class A

This circuit is the basic design reference, components with "" are required for the converter's operating.
FUSE to be 1A, slow blow. R1*, R11* ... R14* refer of that in Table 2.

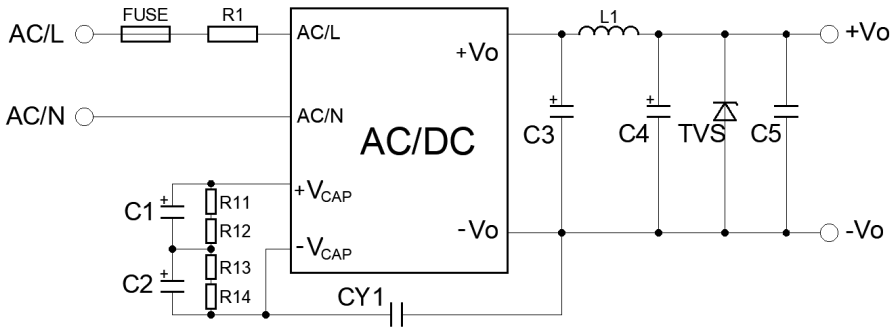


Figure 1. Typical external circuit

Recommended Component [Table 1]

V_{OUT} [V]	C1*, C2*	C3*	C4*	C5	CY1*	L1*	TVS
3.3, 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

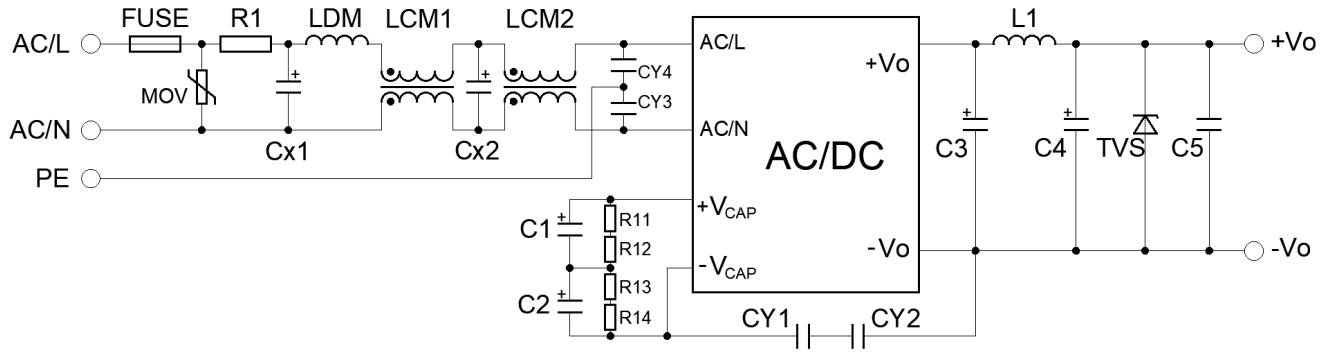


Figure 2. Circuit for EMC enhancement

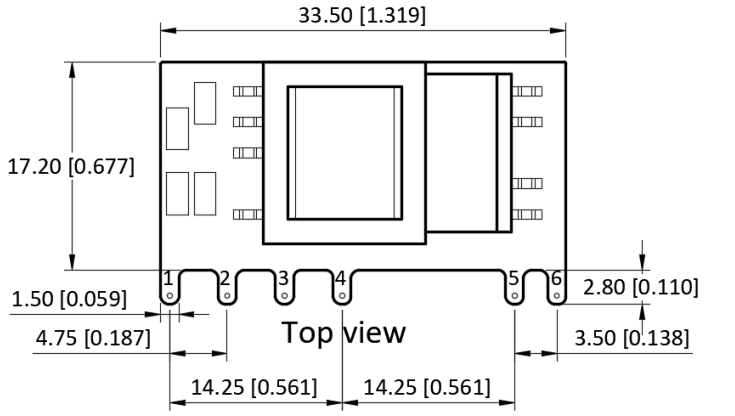
Recommended Component [Table 2]

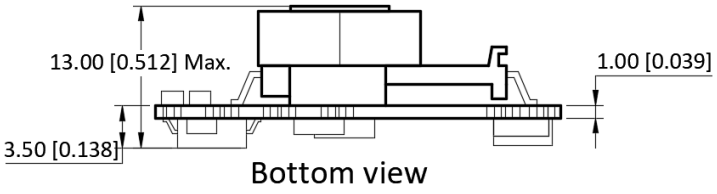
Item	FUSE*	R1*	MOV	LDM	LCM1	LCM2
Spec	2A, 500VAC	12 Ohm, 3W	14D911K	2.2mH, 0.24A	200uH, 0.8A	12.6mH 0.5A
Item	Cx1, Cx2	CY1, CY2	CY3, CY4	C1*, C2*	R11* ... R14*	
Spec	0.1uF, 480VAC	2.2nF, 400VAC	1nF, 400VAC	47uF, 400VAC	1M Ohm, 1206	

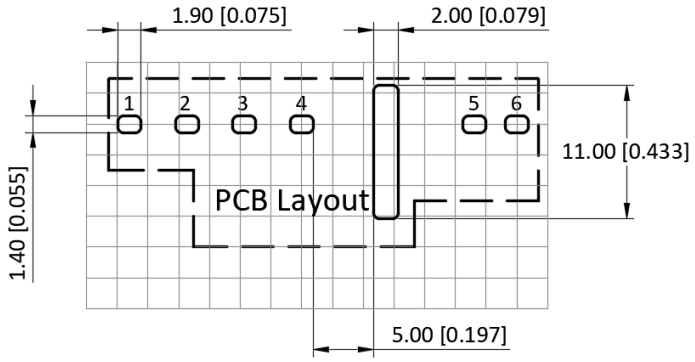
Components above with "" are required for the converter's operating. "R1" is wire-wound resistor.
*Refer to Table 1 for the output circuit configuration.

Mechanical Specifications

Default Package







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: ±0.15 [±0.006]
* Pin distance: ±0.50 [±0.020]
* Footprint grid 2.54 x 2.54 mm