PNW10S Series

10W, Open Frame, SIP Package AC/DC Power Converters

Features

- Rated power: 10W
- Universal input: 85~528VAC, 47~63Hz
- Regulated single output
- Isolation voltage 4000VAC
- Typical efficiency 70 ... 83%
- Energy saving, standby power only 0.10W typ.
- Operating temperature range: -40~+85°C
- RoHS compliance
- Compact SIP installation
- Over current and short circuit protection
- Meet IEC/EN/UL 62368, EN 61558-1, EN 60335-1, CISPR32, EN55032 Class B with external circuits
- 3 year warranty

Overview

PNW10S 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 85~528VAC, 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.
PNW10S-033	85~528VAC 100~745VDC	3.3	2,000	180	70	1,500
PNW10S-050		5	2,000	180	77	1,500
PNW10S-090		9	1,100	180	80	1,000
PNW10S-120		12	830	180	82	680
PNW10S-150		15	670	180	82	470
PNW10S-240		24	420	180	83	330

* 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	Condition	Min.	Typ.	Max.	Unit	Note
Input voltage range	AC in DC in	85 100	-	528 745	VAC VDC	
Input certified voltage range	AC in	100	-	480	VAC	
Input frequency		47	-	63	Hz	

Electrical Specifications

Unless otherwise indicated, specifications are measured at T_A=25°C, humidity<75%, nominal input voltage and rated output load.

Parameters	Condition	Min.	Typ.	Max.	Unit	Note
Input current	85VAC 115VAC 230VAC 380VAC	-	0.23 0.18 0.12 0.09	-	A	
Inrush current Cold start	85VAC 115VAC 230VAC 380VAC	-	11.6 13.5 28.6 42.6	-	A	
Leakage current	480VAC/50HZ	-	0.5	-	mA RMS	
Output voltage accuracy I_{OUT}=10%~100% of $I_{OUT, rated}$	V_{OUT}=3.3V Others	-	±6 ±5	-	%	
Line regulation Full load	V_{OUT}=3.3V Others	-	±2.0 ±1.5	-	%	
Load regulation I_{OUT}=10%~100% of $I_{OUT, rated}$		-	±3.0	-	%	
Ripple and noise	20MHz bandwidth	-	100	180	mVp-p	
Standby power consumption	V_{IN}<115VAC Others	- -	0.20 0.10	0.30 0.15	W	
Temperature coefficiency		-	±0.2	-	%/°C	
Minimum load		10	-	-	%	
Over current protection	Automatic recovery	110	-	-	% I_{OUT}	
Short circuit protection	Automatic recovery	Continuous, hiccup mode				
Recommended external fuse		2A, 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 frequency		-	50	-	KHz	
Operating temperature range	See "Derating Curve"	-40	-	85	°C	
Storage temperature		-40	-	105	°C	

General Specifications

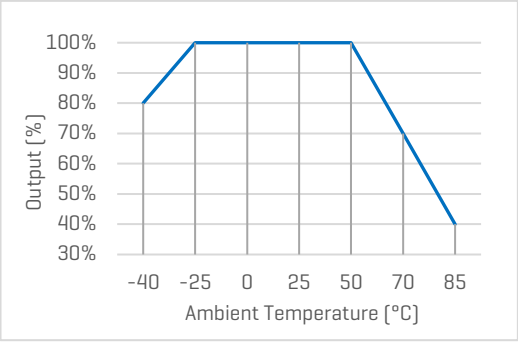
Parameters	Condition	Min.	Typ.	Max.	Unit	Note
Storage humidity		-	-	95	%RH	
Soldering temperature	Wave Manual	-	260 360	-	°C	
Cooling method7		Free air convection				
Safety class		Class II, no FG				
MTBF	MIL-HDBK-217F	>500,000 Hours, 25°C				
Design based on standards		IEC/EN/UL 62368, EN 60335, EN 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 ±2kV, Criteria B IEC/EN61000-4-5, Line to Line ±4kV, Criteria B** IEC/EN61000-4-6, 10Vrms, Criteria A				
Size, and Weight		38.0x20.0x15.2mm, 11g				

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

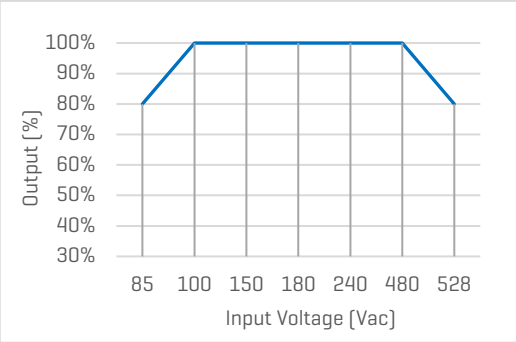
Characteristic Curves

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. R1*, R11* ... R14* refer of that in Table 2.

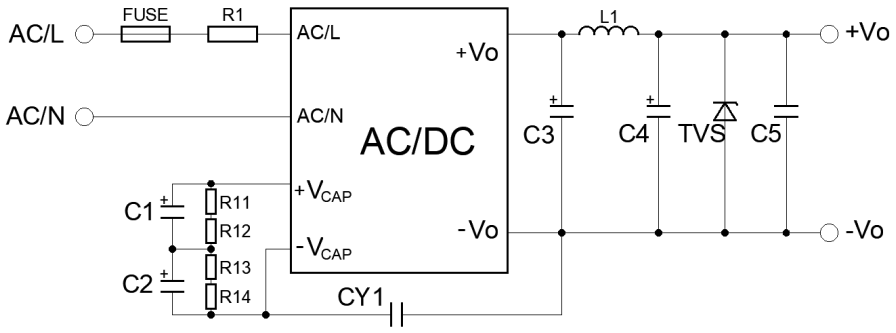


Figure 1. Typical external circuit

Recommended Component [Table 1]

V_{OUT} [V]	C1*, C2*	C3*	C4*	C5	CY1*	L1*	TVS
3.3	47uF, 400V	1500uF, 6.3V	680uF, 25V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6.5A	SMBJ7.0A
5	47uF, 400V	820uF, 16V	680uF, 25V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6.5A	SMBJ7.0A
9	47uF, 400V	470uF, 25V	330uF, 25V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6.5A	SMBJ12A
12	47uF, 400V	470uF, 25V	330uF, 25V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6.5A	SMBJ20A
15	33uF, 400V	470uF, 25V	330uF, 35V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6.5A	SMBJ20A
24	33uF, 400V	470uF, 35V	100uF, 35V	0.1uF, 50V	1nF, 400VAC	2.2uH, 6.5A	SMBJ30A

Circuit for EMC Enhancement

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

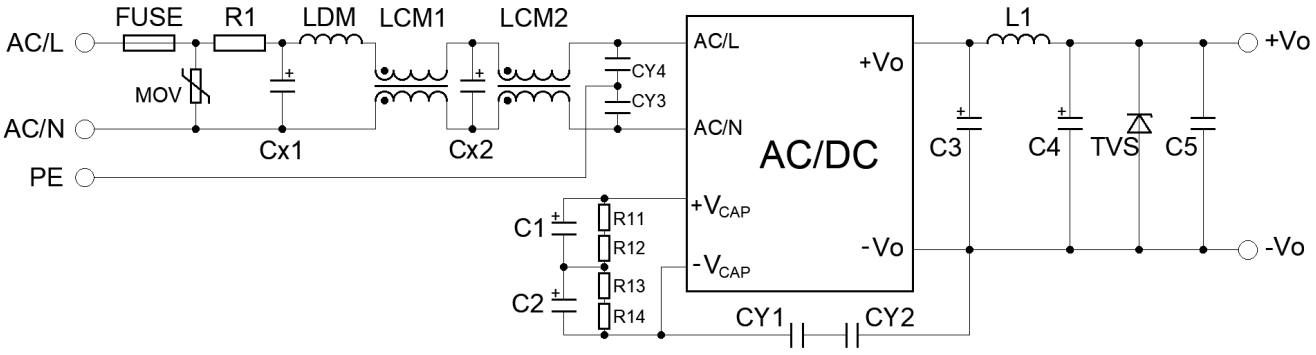


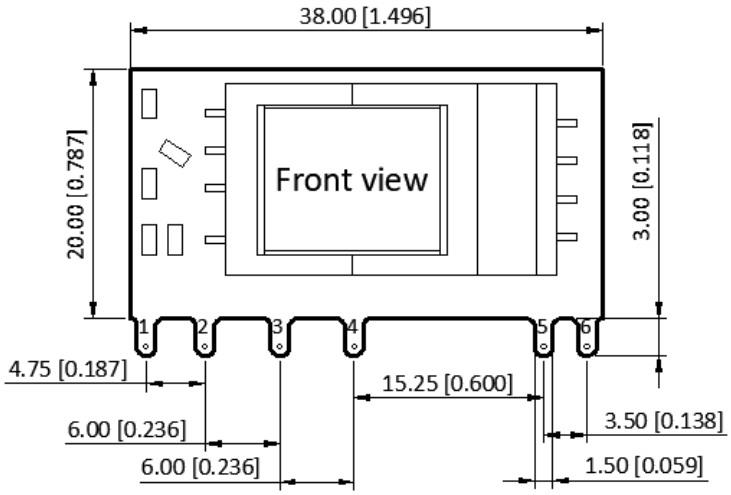
Figure 2. External circuit design for EMC enhancement

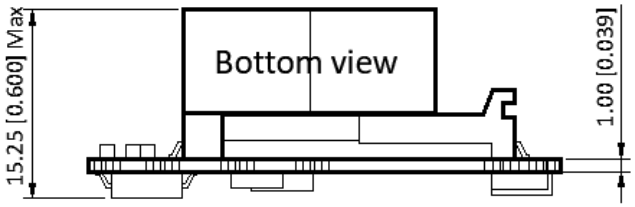
Recommended Component [Table 2]

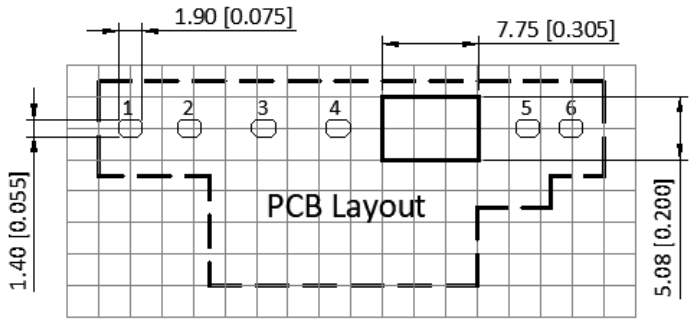
Item	FUSE*	R1*	MOV	LDM	LCM1	LCM2
Spec	2A, 500VAC	6.8 Ohm, 3W	14D911K	2.2mH, 0.35A	200uH, 0.8A	12.6mH 0.5A
Item	Cx1, Cx2	C1*, C2*	R11* ... R14*	CY1 ... CY4		
Spec	0.1uF, 480VAC	47uF, 400VAC	1M Ohm, 1206	1nF, 400VAC		

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

Mechanical Specifications







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