

# PNR03S Series

3W, Open Frame, SIP Package AC/DC Power Converters

## Features

- ▶ Rated power: 3W
- ▶ Universal input: 85~305VAC 47~63Hz
- ▶ Regulated single output
- ▶ Isolation voltage 4000VAC
- ▶ Typical efficiency 68 ... 81%
- ▶ Energy saving, standby power only 0.1W
- ▶ Operating temperature range: -40~+85°C
- ▶ RoHS compliance
- ▶ Compact SIP package
- ▶ Designed for high reliability and long lifetime
- ▶ Certified to IEC/EN 62368, CISPR32, EN55032
- ▶ Suitable for both civil and industrial applications
- ▶ 3 year warranty



## Overview

PNR03S series are compact size AC/DC power converters, featuring universal input voltage range 90~305VAC, low standby power consumption, high efficiency. They are certified to IEC/EN 62368-1, and EMC performance meets CISPR32, EN55032, 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.
PNR03S-033	85~305VAC 70~430VDC	3.3	600	150	68	820
PNR03S-050		5	600	150	73	680
PNR03S-090		9	333	150	77	470
PNR03S-120		12	250	150	77	470
PNR03S-150		15	200	150	78	330
PNR03S-240		24	125	150	81	200

\* 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	85	-	305	VAC	
	DC in	70	-	430	VDC	
Input frequency		47	-	63	Hz	
Nominal input voltage		100	-	277	VAC	
Input current	115VAC	-	-	0.12	A	
	230VAC	-	-	0.07	A	
Inrush current	115VAC	-	13	-	A	
	230VAC	-	23	-	A	
Cold start						

### Electrical Specifications [continued]

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>Output voltage accuracy</b> $I_{OUT}=10\%\sim 100\%$ of $I_{OUT, rated}$		-	$\pm 5$	-	%	
<b>Line regulation</b> Full load	$V_{OUT}=3.3\text{V}$ Others	-	$\pm 2.5$ $\pm 1.5$	-	%	
<b>Load regulation</b> $I_{OUT}=10\%\sim 100\%$ of $I_{OUT, rated}$		-	$\pm 3$	-	%	
<b>Ripple and noise</b> 20MHz bandwidth, peak to peak		-	80	150	mV	
<b>Standby power consumption</b>	230VAC	-	0.10	0.15	W	
<b>Temperature coefficient</b>		-	$\pm 0.15$	-	%/ $^{\circ}\text{C}$	
<b>Minimum load</b>		10	-	-	%	
<b>Output over current protection</b>	Automatic recovery	110	-	-	% $I_{OUT}$	
<b>Output short circuit protection</b>	Automatic recovery	Continuous, hiccup mode				
<b>Recommended external fuse</b>		1A, slow blow				

\* 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.

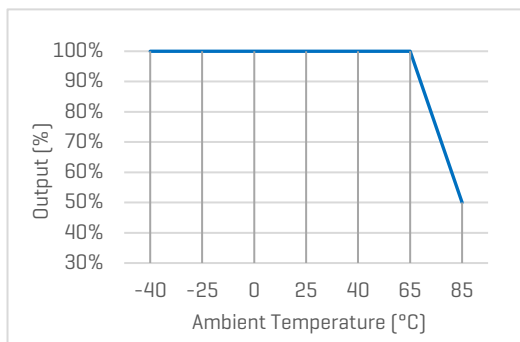
### General Specifications

Parameters	Condition	Min.	Typ.	Max.	Unit	Note
<b>Isolation voltage</b> 1 minute, leakage current 5mA max	Input to Output	4000	-	-	VAC	
<b>Operating temperature range</b>	See "Derating Curve"	-40	-	85	$^{\circ}\text{C}$	
<b>Storage temperature</b>		-40	-	105	$^{\circ}\text{C}$	
<b>Storage humidity</b>		-	-	95	%RH	
<b>Soldering temperature</b>	Wave Manual	-	260 360	-	$^{\circ}\text{C}$	
<b>Cooling method</b>		Free air convection				
<b>Safety class</b>		Class II, no FG				
<b>MTBF</b>	MIL-HDBK-217F	>1,000,000 Hours, $25^{\circ}\text{C}$				
<b>Design based on standards</b>		UL/EN/IEC 62368-1, EN/IEC 60335-1, EN/IEC 61558-1				
<b>Safety certifications</b>		EN/IEC 62368-1				
<b>EMC</b>		CISPR32, EN55032 Class B with external circuit				
<b>Size, and Weight</b>		26.4x11.0x14.8mm, 5.9g				

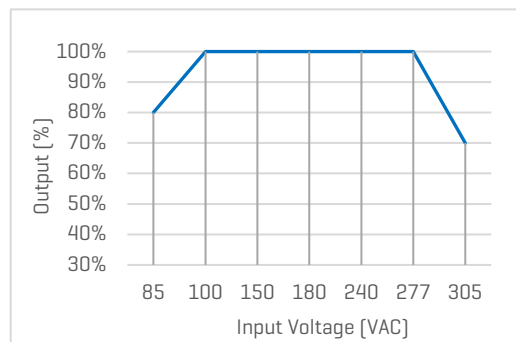
### Characteristic Curves

#### Derating Curves

##### Output vs Ambient Temperature



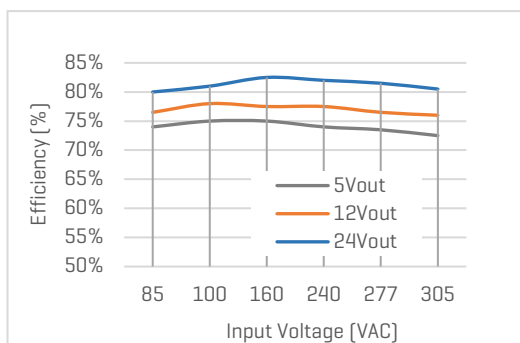
##### Output vs Input Voltage



#### Efficiency Curves

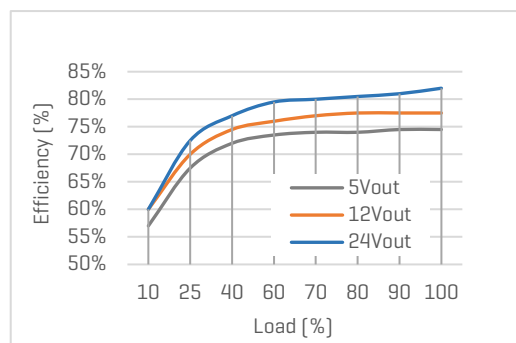
##### Efficiency vs Input Voltage

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.

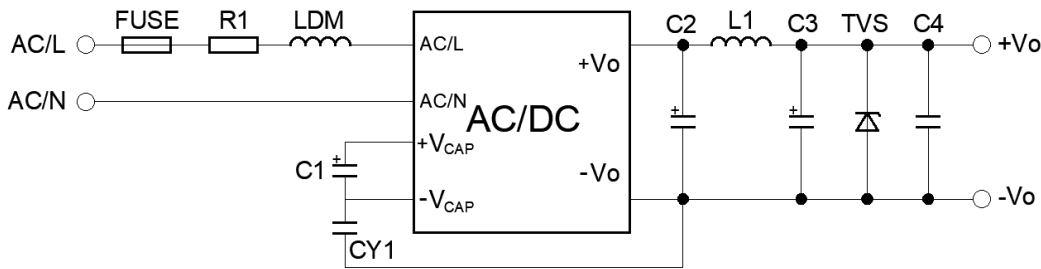


Figure 1. Typical external circuit

#### Recommended Component Spec [Table 1]

V <sub>OUT</sub> [V]	C1*	C2*	C3*	C4	CY1*	L1*	TVS
3.3, 5	10uF, 450V	470uF, 16V	150uF, 35V	0.1uF, 50V	1nF, 400VAC	2.2uH, 3A	SMBJ7.0A
9, 12	10uF, 450V	270uF, 25V	150uF, 35V	0.1uF, 50V	1nF, 400VAC	2.2uH, 3A	SMBJ12A
15, 24	10uF, 450V	470uF, 35V	100uF, 35V	0.1uF, 50V	1nF, 400VAC	3.3uH, 3A	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.

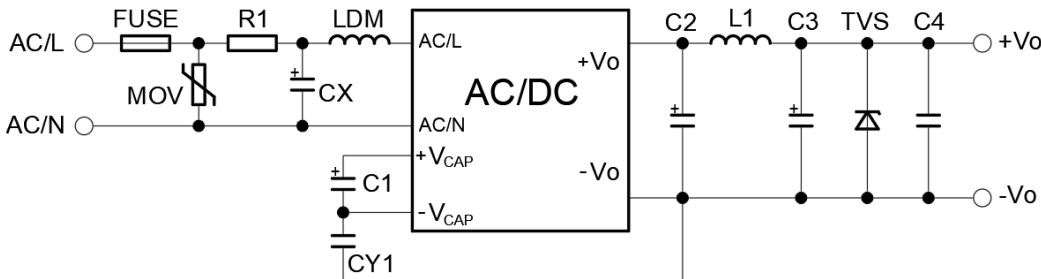


Figure 2. External circuit design for EMC enhancement

#### Recommended Component Spec [Table 2]

Item	FUSE*	MOV	CX	R1*	LDM
Spec	2A, 300V	S14K350	0.1uF, 310VAC	12 Ohm, 3W	2.2mH, 0.2A

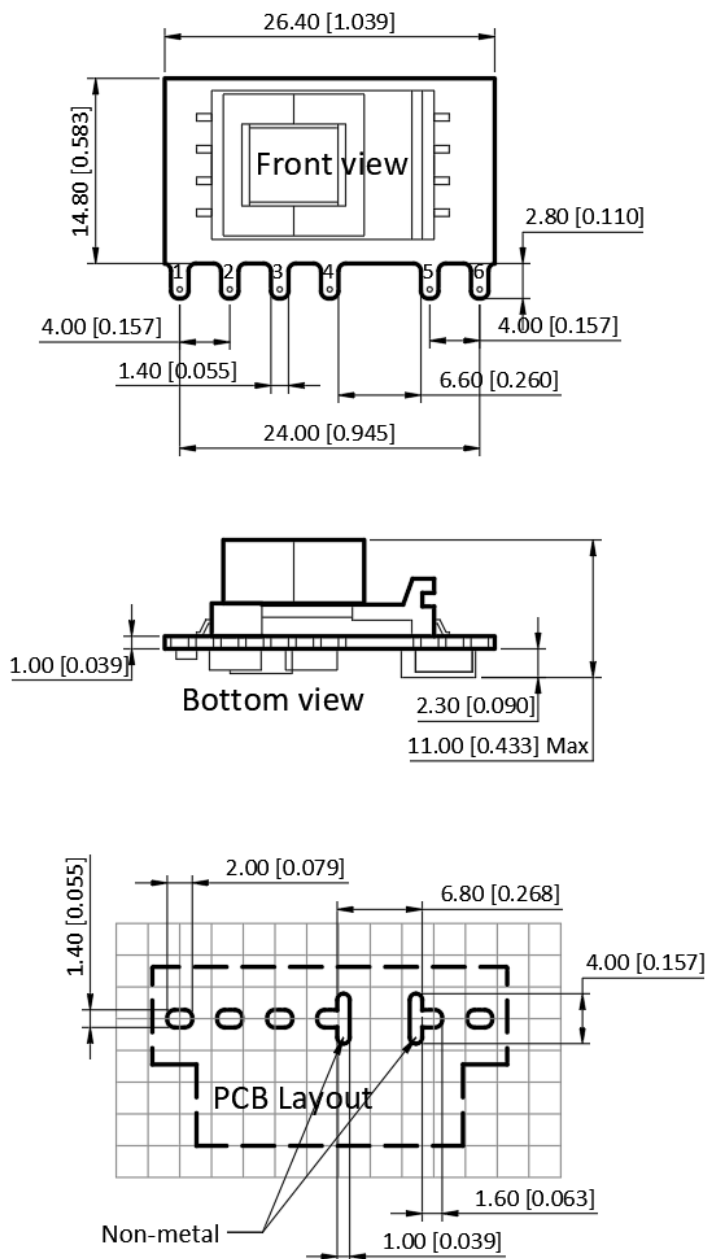
\*Components above with "\*" are required for the converter's operating. "R1" is wire-wound resistor.

\*Refer to Table 1 for components at the output.

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## Mechanical Specifications



### 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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