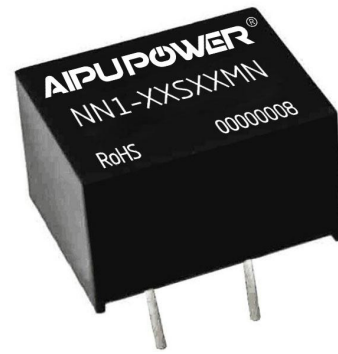


# DC-DC Converter NN1-XXSXXMN Series



## Typical Features

- ◆ Fixed input voltage, Isolated & unregulated output, Output power 1W
- ◆ High Efficiency up to 86%
- ◆ Small compact DIP packing
- ◆ Isolation Voltage 1500VDC
- ◆ Operating Temperature: -40°C ~ +85°C
- ◆ Plastic Case, meet UL94 V-0 standard



**Test Condition:** Unless otherwise specified, data in the datasheet should be tested under the conditions of inputting nominal voltage, pure resistance rated load and Ta=25°C

## Application Field

*It could be widely used for instrument, communication, pure digital circuit, general low frequency analog circuit, relay drive circuit, data exchange circuit, etc.*

## Typical Product List

Part No.	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current(mA) Nominal Voltage		Max. Capacitive Load uF	Ripple & Noise (Max.) mVp-p	Efficiency (%)@output full load, nominal input voltage	
	Nominal	Range	Voltage (VDC)	Current(mA) MAX./Min.	Full load Typ.	No Load Typ.			Min.	Typ.
NN1-05S3V3MN	5	4.5 - 5.5	3.3	300	250	8	2200	150	75	78
NN1-05S05MN			5	200	233	6	2200	150	81	84
NN1-05S09MN			9	110	230	12	2200	150	82	85
NN1-05S12MN			12	83	225	15	2200	150	82	85
NN1-05S15MN			15	67	220	18	2200	150	82	85
NN1-05S24MN			24	42	244	26	2200	150	83	86
NN1-12S3V3MN	12	10.8 - 13.2	3.3	300	98	6	2200	150	79	82
NN1-12S05MN			5	200	96	6	2200	150	82	85
NN1-12S09MN			9	110	90	6	2200	150	82	85
NN1-12S12MN			12	83	90	6	2200	150	83	86
NN1-12S15MN			15	67	94	6	2200	150	82	85
*NN1-12S24MN			24	42	115	15	2200	150	81	84
NN1-15S05MN	15	13.5	5	200	78	6	2200	150	81	84
NN1-15S12MN		-	12	83	82	6	2200	150	82	85
NN1-15S15MN		16.5	15	67	82	8	2200	150	83	86
NN1-24S3V3MN	24	21.6	3.3	300	48	5	2200	150	79	82
NN1-24S05MN		-	5	200	47	5	2200	150	83	86
NN1-24S09MN		26.4	9	110	48	5	2200	150	83	86

# DC-DC Converter

## NN1-XXSXXMN Series



NN1-24S12MN			12	83	48	5	2200	150	83	86
NN1-24S15MN			15	67	51	8	1000	150	79	81
*NN1-24S24MN			24	42	52	10	2200	150	81	84

Note 1.\* are models under developing.

Note 2. In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor at the output side, the resistance recommended equal to 10% nominal power.

### Input Specifications

Item	Test Condition	Min.	Typ.	Max.	Unit
Input Overshoot Voltage (1Second.max.)	5Vdc Input	-0.7	-	9	VDC
	9Vdc Input	-0.7	-	12	
	12Vdc Input	-0.7	-	18	
	15Vdc Input	-0.7	-	21	
	24Vdc Input	-0.7	-	30	
Input Filter	Capacitor Filter				

### Output Specifications

ITEM	Working Conditions	Min.	Typ.	Max.	Unit	
Output Power		0.1	--	1	W	
Output Voltage Accuracy	Nominal input, Full load	--	±2	±5	%	
Load Regulation	10% ~ 100% nominal load	3.3Vdc output	--	--		20
		Other output	--	--		15
Line Voltage Regulation	Input Voltage Change±1%	3.3Vdc output	--	--		±1.5
		Other output	--	--		±1.2
Ripple & Noise①	Nominal input, full load,20MHZ bandwidth	--	80	150	mVp-p	
Temperature Drift Coefficient	100% Full Load	--	--	±0.03	%/°C	
Output Short Circuit Protection	Continuous, self-recovery					

NOTE:① Ripple & Noise Tested by twisted-pair method, for details please check Design and Application Circuit.

### General Specifications

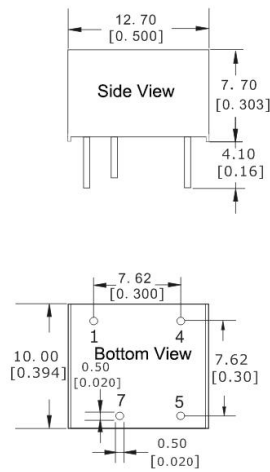
ITEM	Working Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	100% Load, 5Vdc Input	--	260	--	KHZ
	100% Load, 12Vdc/24Vdc Input	--	450	--	
Operating Temperature	Refer to Temperature Derating Curve	-40°C ~ +85°C			
Storage Temperature		-55°C ~ +125°C			
Shell temperature rise during work	Within Temperature Derating Curve	25°C(Typ.)			

# DC-DC Converter NN1-XXSXXMN Series



Relative Humidity	No condensing	5%~95%
Case Material		Black flame-retardant heat-resistant Plastic(UL94 V-0)
Pin withstand soldering temp		300°C MAX
Isolation Voltage	Test 1 minute, leakage current < 0.5mA	1500Vdc
Isolation Capacitor	Input/Output, 100KHz/0.1V	20 pF (Typ.)
MTBF	MIL-HDBK-217F@25°C	35X10 <sup>5</sup> Hrs
Product Weight		1.4g (Typ.)

## Packing Dimension



Note: Grid 2.54x2.54mm  
unit:mm[inch]  
pin tolerance:±0.10[±0.004]  
general tolerance:±0.50[±0.020]

Packing Code	L x W x H	
MN	12.70X10.00X8.20mm	0.500X0.394X0.323inch

## Pin Function

Single(S)	1	4	5	7
	GND	+Vin	+Vo	-Vo

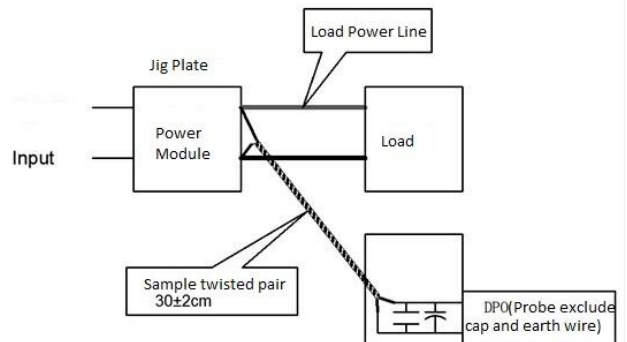
Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

## Ripple & Noise Test: (Twisted Pair Method 20MHZ bandwidth)

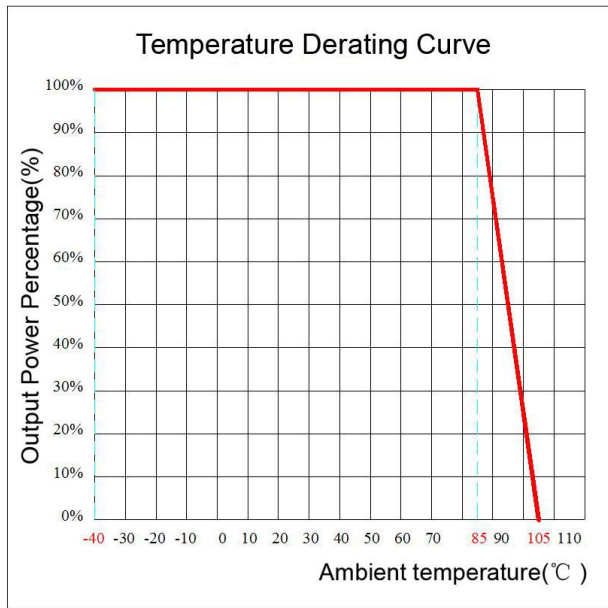
Test Method:

a. 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHZ, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

b. Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.



## Product Characteristic Curve



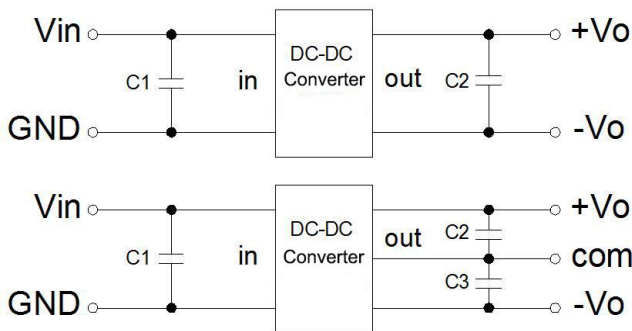
**Design and Application Circuit Recommended**

1. Output load requirements

- a. In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor at the output side, the resistance equal to 10% nominal load.
- b. The maximum capacitive load is tested under nominal input full load, and cannot exceed the maximum capacitive load of output terminal under operation, otherwise it will cause it difficult to start up and damage the product.

2. Recommended circuit

a. In order to ensure the input/output ripple and noise decreased, capacitor filter net could be connected to input and output terminal, application circuit as below photo 1; choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensure the modules running safely and reliably, the recommended capacitive load values as shown in Table 1. (But for the actual output power of application circuit is less than 0.5W, suggest not to connect external capacitor)

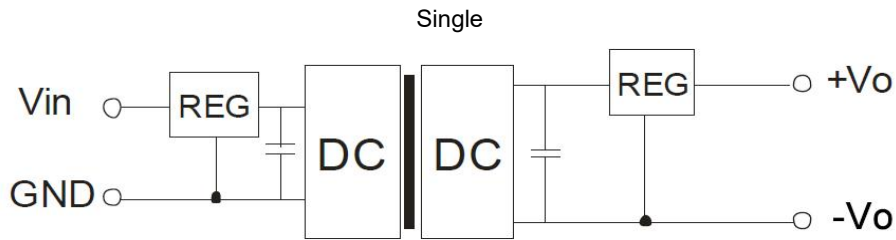


Recommended capacitive load value(Table 1)

Vin (Vdc)	C1 (μF)	Vout (Vdc)	C2 (μF)	Vout (Vdc)	C2,C3 (μF)
3.3/5	4.7	3.3/5	10	±3.3/±5	4.7
12	2.2	9	4.7	±9	2.2
15	1	12	2.2	±12	1
24	1	15	1	±15	0.47
--	--	24	0.47	±24	0.22

3. Output regulated voltage and over voltage protection circuit

The simplest device to protect output regulated voltage, over voltage and over current is to cascade a linear regulator with overheat protection at input or output terminal, and connect a capacitor filter net(see below picture), filter capacitive value recommended see table 1, Linear regulator is chosen according to the actual voltage, current needed in working, or choose our NW series products.



Note:

- 1.This product cannot be used in parallel, and do not support hot-plugging;
- 2.If the product works below the minimum required load, it cannot guarantee that the product performance meets all performance indicators in this manual;
3. All index testing methods in this datasheet are based on our Company's corporate standards
4. The product specification may be changed at any time without prior notice.