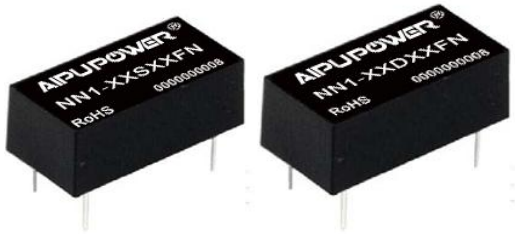
## Typical Features

- ◆ Fixed input voltage, Isolated & unregulated output, Output power 1W
- ◆ High Efficiency up to 86%
- ◆ Small compact DIP packing
- ◆ Isolation Voltage 1500VDC
- ◆ Operating Temperature: -40℃～+105℃
- ◆ Plastic Case, meet UL94 V-0 standard




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

## 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 | Ripple & Noise (Max.) | Efficiency (%)full load, input nominal voltage | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Nominal | Range | Voltage (VDC) | Current(mA) MAX./Min. | Full load Typ. | No Load Typ. | uF | mVp-p | Min. | Typ. |
| NN1-05S3V3FN | 5 | 4.5 - 5.5 | 3.3 | 303/30 | 250 | 8 | 2400 | 100 | 78 | 82 |
| NN1-05S05FN | | | 5 | 200/20 | 225 | 8 | 2400 | 100 | 81 | 85 |
| NN1-05S12FN | | | 12 | 83/9 | 220 | 12 | 560 | 100 | 81 | 85 |
| NN1-05S15FN | | | 15 | 67/7 | 220 | 18 | 560 | 100 | 81 | 85 |
| NN1-12S05FN | 12 | 10.8 - 13.2 | 5 | 200/20 | 96 | 10 | 2400 | 100 | 81 | 85 |
| NN1-12S12FN | | | 12 | 83/9 | 90 | 10 | 560 | 100 | 82 | 86 |
| NN1-12S15FN | | | 15 | 67/7 | 90 | 10 | 560 | 100 | 82 | 86 |
| NN1-24S05FN | 24 | 21.6 - 26.4 | 5 | 200/20 | 47 | 8 | 2400 | 100 | 80 | 84 |
| NN1-24S12FN | | | 12 | 83/9 | 48 | 8 | 560 | 100 | 82 | 86 |
| NN1-24S15FN | | | 15 | 67/7 | 48 | 8 | 560 | 100 | 81 | 85 |
| NN1-05D05FN | 5 | 4.5 - 5.5 | ±5 | ±100/±10 | 236 | 8 | 2400 | 100 | 78 | 82 |
| NN1-05D12FN | | | ±12 | ±42/±5 | 232 | 12 | 2400 | 100 | 79 | 83 |
| NN1-05D15FN | | | ±15 | ±34/±4 | 232 | 20 | 560 | 100 | 79 | 83 |
| NN1-12D05FN | 12 | 10.8 - 13.2 | ±5 | ±100/±10 | 96 | 10 | 2400 | 100 | 78 | 82 |
| NN1-12D12FN | | | ±12 | ±42/±5 | 90 | 10 | 2400 | 100 | 79 | 83 |
| NN1-12D15FN | | | ±15 | ±34/±4 | 90 | 10 | 560 | 100 | 79 | 83 |
| NN1-24D05FN | 24 | 21.6 | ±5 | ±100/±10 | 47 | 8 | 1200 | 100 | 78 | 82 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NN1-24D12FN | | - 26.4 | ±12 | ±42/±5 | 48 | 8 | 220 | 100 | 79 | 83 |
| NN1-24D15FN | | | ±15 | ±34/±4 | 48 | 8 | 220 | 100 | 79 | 83 |

Note: 1.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.
2.the capacitive load of positive and negative output are same.

## Input Specifications

| Item | Working Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input Overshoot Voltage (1Second.max.) | 5Vdc Input | -0.7 | -- | 9 | VDC |
| | 12Vdc Input | -0.7 | -- | 18 | |
| | 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 | -- | -- | 15 | |
| Line Voltage Regulation | Input Voltage Change±1% | -- | -- | ±1.2 | |
| Ripple & Noise① | Nominal input, full load, 20MHZ bandwidth | -- | 75 | 100 | mVp-p |
| Temperature Drift Coefficient | 100% Full Load | -- | -- | ±0.03 | %/°C |
| Output Short Circuit Protection | Continuous short-circuit protection, self-recovery | | | | |

NOTE:①Ripple & Noise tested by twisted-pair method;

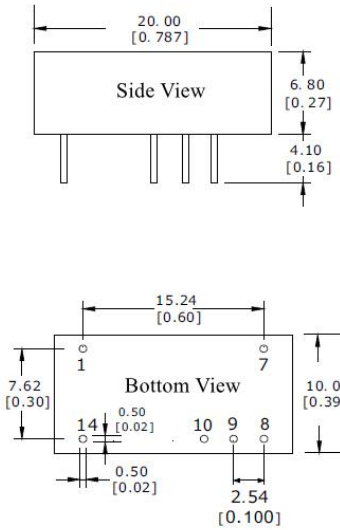
## General Specifications

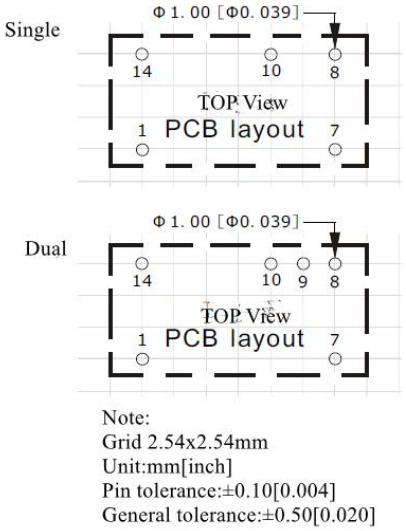
| | | |
|---|---|---|
| Switching Frequency | Nominal Input, Full load | 260KHz (Typ.) |
| Operating Temperature | Refer to Temperature Derating Curve | -40℃ ~ +85℃ |
| Storage Temperature | | -55℃ ~ +125℃ |
| Shell temperature rise during work | Within Temperature Derating Curve | 25℃(Typ.) |
| Relative Humidity | No condensing | 5%~95% |
| Case Material | | Black flame-retardant heat-resistant Plastic(UL94 V-0) |
| Pin withstand solder temperature | Distance to case 1.5mm, 10Seconds | 300℃ 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℃ | 35X10$^5$Hrs |
| Product Weight | | 2.5g (Typ.) |

| | | |
|---|---|---|
| Packing | Tube(525*18*10mm) | 25PCS |
| | Box(542*110*155mm) | 2000PCS(Total 80tubes) |

## Packing Dimension




Note:
Grid 2.54x2.54mm
Unit:mm[inch]
Pin tolerance:±0.10[0.004]
General tolerance:±0.50[0.020]

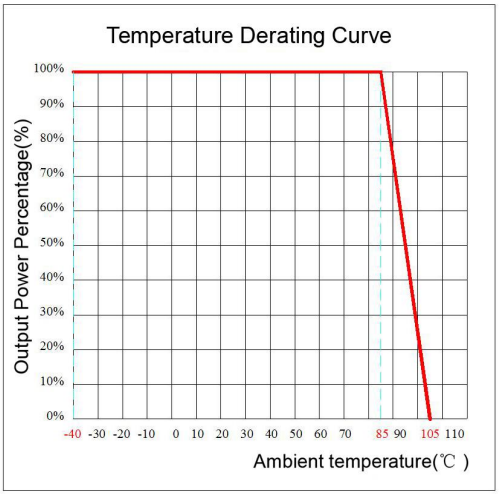
| Packing Code | L x W x H | |
|---|---|---|
| F | 20.00× 10.00 × 6.80mm | 0.787 × 0.394 × 0.270inch |

## Pin Function

| Pin Function | 1 | 7 | 8 | 9 | 10 | 14 |
|---|---|---|---|---|---|---|
| Single(S) | GND | NC | -Vo | +Vo | NP | +Vin |
| Dual(D) | GND | NC | COM | +Vo | -Vo | +Vin |

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

## Temperature Curve




## Design and Application Circuit Recommended

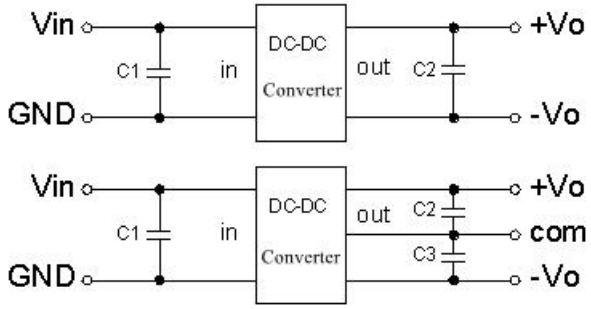
## 1. Output load requirements

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

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.



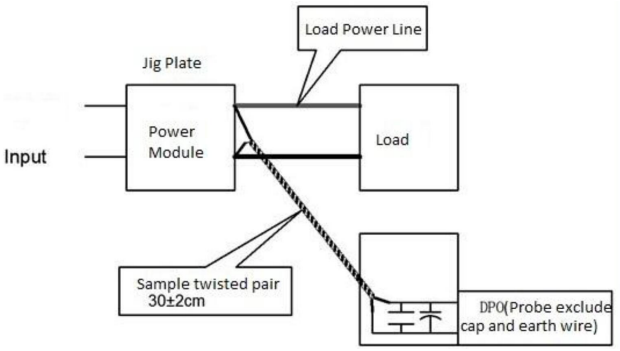

Recommended capacitive load value(Table 1)

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

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.

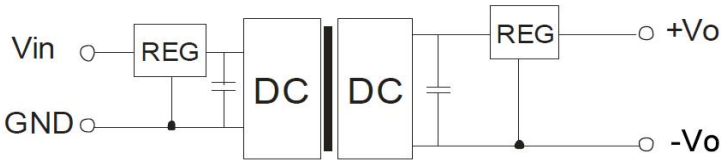
b.Input terminal connect to power supply, output terminal connect to electronic load through jig plate, Use 30cm±2 cm sampling line, Power line selected from corresponding diameter wire with insulation according to the flow of output current.




## 4. 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.

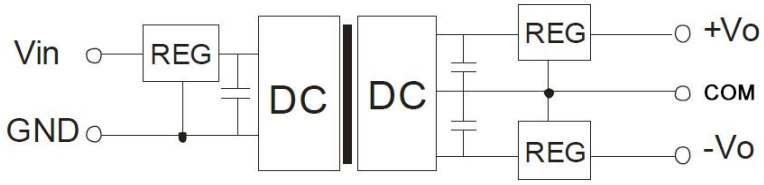
Single Output





Dual Output




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.

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