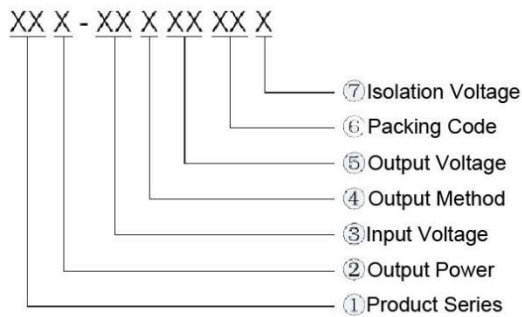


**Typical Feature**

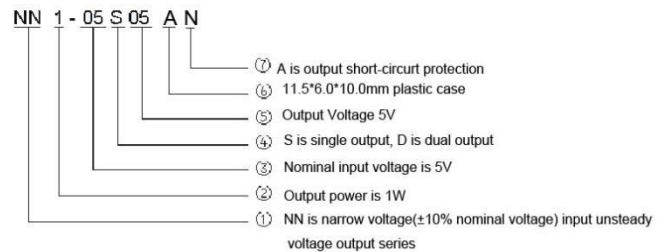
- ◆ Fixed Input Voltage, isolated & unregulated output, Output power
- ◆ High efficiency up to 80%
- ◆ Small compact SIP packing
- ◆ No external component required
- ◆ Isolation Voltage 1000VDC
- ◆ Operating Temperature: -40°C ~ +85°C
- ◆ Plastic Case, meet UL94 V-0 standard



**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.

**Product Named Method:**


Example:


**Input Specifications**

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

**Output Specifications**

Item	Operating Condition	Min.	Typ.	Max.	Unit
Output Power		0.1	--	1	W
Output Voltage Accuracy	Nominal input, full load	--	±2	±5	%
Load Regulation	10% ~100% 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 & Noise ①	Nominal input, full load, 20MHZ bandwidth	Other output	--	75	mVp-p
		24Vdc output	--	100	
Temperature Drift Coefficient	100% load	--	--	±0.03	%/°C
Output Short Circuit Protection		no			

Note: ① Ripple & Noise tested by twisted-pair method.

**General Specifications**

Switching Frequency	Typical	100KHz (Typ.)
Operating Temperature	Refer to Temperature Derating Curve	-40°C ~ +85°C
Storage Temperature		-55°C ~ +125°C
Case temperature rise when working	Within Temperature Derating Curve	25°C(Typ.)
Storage Humidity	No condensing	5%~95%
Case Material		Black flame-retardant heat-resistant Plastic(UL94V-0)
Product Weight		1.5g (Typ.)
Isolation Voltage	Test 1 minute, leakage current < 0.5mA	1000Vdc
Isolation Capacitor	Input/ Output,100KHz/0.1V	20 (Typ.)
MTBF	MIL-HDBK-217F@25°C	35X10 <sup>5</sup> Hrs

### Typical Product List

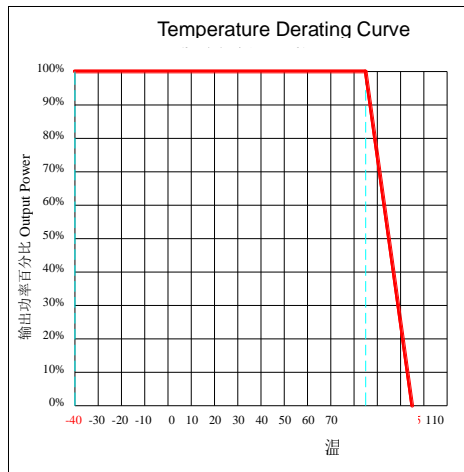
Model	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current (mA) Nominal Voltage		Max. Capacitive Load	Ripple & Noise (Max.)	Efficiency (%)
	Nominal	Range	Voltage (V)	Current (mA)	Full load Typ.	No Load Typ.	uF	mVp-p	Typ.
<b>Single Output:</b>									
NN1-3V3S3V3A	3.3	3.0 - 3.6	3.3	300	421	50	220	100	72
NN1-3V3S05A			5	200	410		220		74
NN1-3V3S09A			9	110	410		100		74
NN1-3V3S12A			12	83	410		100		74
NN1-3V3S15A			15	67	410		100		74
NN1-3V3S24A			24	42	421		47		120
NN1-05S3V3A	5	4.5 - 5.5	3.3	300	263	40	220	100	76
NN1-05S05A			5	200	253		220		79
NN1-05S09A			9	110	250		100		80
NN1-05S12A			12	83	256		100		78
NN1-05S15A			15	67	256		100		78
NN1-05S24A			24	42	256		47		120
NN1-09S3V3A	9	8.1 - 9.9	3.3	300	146	25	220	100	76
NN1-09S05A			5	200	141		220		79
NN1-09S09A			9	110	139		100		80
NN1-09S12A			12	83	139		100		80
NN1-09S15A			15	67	139		100		80
NN1-09S24A			24	42	139		47		120
NN1-12S3V3A	12	10.8 - 13.2	3.3	300	110	18	220	100	76
NN1-12S05A			5	200	105		220		79
NN1-12S09A			9	110	104		100		80
NN1-12S12A			12	83	104		100		80
NN1-12S15A			15	67	104		100		80
NN1-12S24A			24	42	104		47		120
NN1-15S3V3A	15	13.5	3.3	300	88	15	220	100	76
NN1-15S05A		-	5	200	84		220		79

NN1-15S09A	24	16.5	9	110	84	10	100	120	79
NN1-15S12A			12	83	83				80
NN1-15S15A			15	67	83				80
NN1-15S24A			24	42	84				79
NN1-24S3V3A	24	21.6	3.3	300	56	10	220	100	75
NN1-24S05A			5	200	54				77
NN1-24S09A			9	110	53				78
NN1-24S12A			12	83	54				77
NN1-24S15A			15	67	53				78
NN1-24S24A			24	42	53				78

Note:

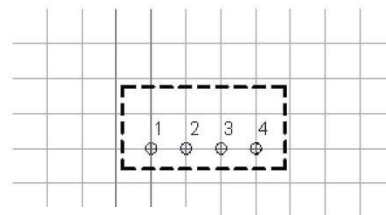
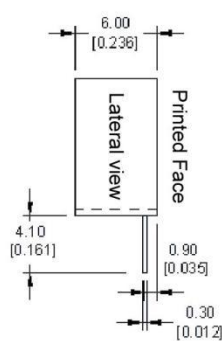
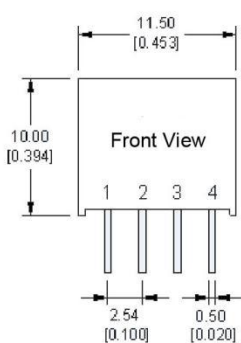
1. "\*" is model under developing.
2. In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor at the output side, the resistance recommended equal to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

### Temperature Derating Curve



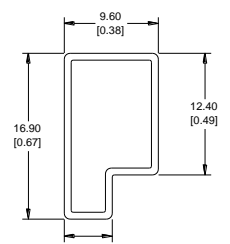
Temperature: °C

### Packing Dimension, Pin Function, Recommended PCB layout



Printed board vertical view

Lattice spacing: 2.54mm(0.1 inch)



Unit:mm[inch]  
General tolerance: x.x±0.5mm[x.x±0.020inch]  
0.x±0.2mm[0.x±0.008inch]

Pin Function

Recommend Print Board drawing

Packing Dimension

Pin Function	Single	1	2	3	4
	(S)	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.

### Packing Dimension

Packing Code	L x W x H	
A	11.50× 6.00 × 10.00mm	0.453 × 0.236 × 0.394inch

## Design and Application Circuit Recommended

### 1. Output Load Request

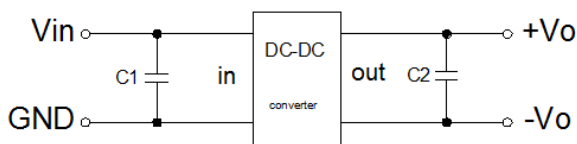
a. In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor at the output side, the resistance equal to 10% nominal load.

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 side, 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)

Photo 1



Recommended capacitive load value (Table 1)

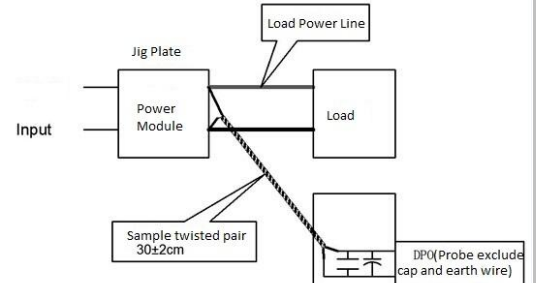
Vin (Vdc)	C1 (μF)	Vout (Vdc)	C2 (μF)
3.3/5	4.7	3.3/5	10
12	2.2	9	4.7
15	1	12	2.2
24	1	15	1
--	--	24	0.47

### 3. Ripple & Noise Test: (Twisted Pair Method 20MHz bandwidth)

Test Method:

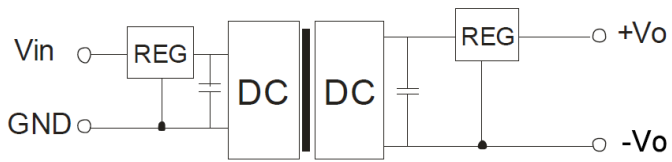
a. 12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1μF polypropylene capacitor and 47μF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

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.



Note:

- 1.This product cannot be used in parallel, and do not support hot-plugging;
2. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
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.