DC/DC Converter
NN2-XXSXXLNT Series

Typical Feature

- Fixed input voltage, isolated & unregulated, output power 2W
- Efficiency 82% (Typ.)
- SMD package
- Isolation voltage 6000VDC
- Operating temperature from -40℃ to +85℃
- Plastic case, flame class UL94-V0

Test Condition: Unless otherwise specified, all parameter values had been tested at nominal input voltage, pure resistive rated load, and at room temperature 25°C.

Application Filed

This series of converters can be widely used in the fields of instrument, communication, pure digital circuit, general low frequency analog circuit, relay drive circuit, data exchange circuit, etc.

Typical Product List

Certificate	Part No.	Input Voltage Range (VDC)		Output Voltage/Current		Input Current (mA) Typ. @Nominal Voltage		Max Capacitive Load	Ripple & Noise 20MHz Max	Efficiency (%) @full load/Nom. voltage	
		Nom.	Range	Vo (VDC)	Io (mA) Max / Min	Full load	No Load	uF	(mVp-p)	Min	Typ
-	NN2-12S05LNT	12	10.8 - 13.2	5	400/40	200	12	2400	150	80	82
-	NN2-24S05LNT	24	21.6 - 26.4	5	400/40	100	8	1200	150	78	82

Note: The Ripple and Noise is tested by the twisted pair method.

Input Specifications

Item	Operating Condition	Min.	Typ.	Max.	Unit
Input inrush voltage (1Second Max.)	12Vdc Input	-0.7	--	18	Vdc
	24Vdc Input	-0.7	--	30	
Input Filter Type	Capacitor Filter				
Hot Plug	Unavailable				

Output Specifications

Item	Operating Condition	Min.	Typ.	Max.	Unit
Output Power		0.2	--	2	W
Output Voltage Accuracy	Please refer to the output voltage deviation graph (Figure 1)				
Load Regulation	10% ~ 100% load	-	10	15	%
Line Regulation	Input voltage change ±1%	-	-	1.3	--

Temperature Drift Coefficient	Full load	-	-	±0.03	%/℃
Short Circuit Protection	Continuous, Self-recovery				

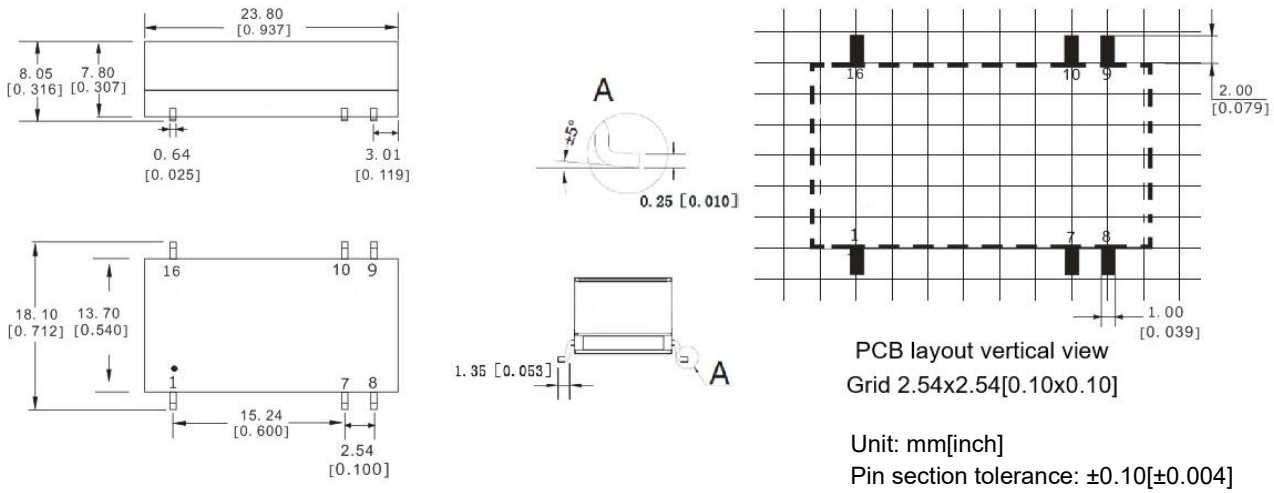
General Specifications

Item	Operating Condition	Min.	Typ.	Max.	Unit
Switching Frequency	Nominal input voltage, full load	--	240	--	KHz
Operating Temperature	Refer to the temperature derating graph (Figure 2)	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Case Temperature Rise	Operating at Ta =25℃	--	30°	--	
Pin Soldering Temperature	1.5mm from the case, 10S	--	--	300	
Reflow Temperature	Peak temperature Tc≤250℃, the maximum time above 217℃ is 60S				
Relative Humidity	No condensing	5	--	95	%RH
Isolation Voltage	Input - Output, test 1min, leakage current <1mA	6000	--	--	VDC
Insulation Resistance	Input - Output, @ 500Vdc	1000	--	--	MΩ
Isolation Capacitor	Input - Output,100KHz/0.1V	--	20	--	pF
MTBF	MIL-HDBK-217F@25℃	3500	--	--	K hours
Case Material	Plastic in Black, flame class UL94-V0				
Product Weight	3.7 g (Typ.)				
Cooling Method	Natural air				
Unit dimensions	L x W x H	23.80 × 13.70 × 7.80 mm		0.937 × 0.540 × 0.307 inch	

EMC Performance

EMI	CE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (with the Recommended EMC Circuit)
	RE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (with the Recommended EMC Circuit)
EMS	ESD	EN60601-1-2 (IEC/EN61000-4-2 Contact ±6KV perf.Criteria B)

Mechanical Dimensions



PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

Unit: mm[inch]
Pin section tolerance: ±0.10[±0.004]
General tolerance: ±0.50[±0.020]

Pin-out Function Description

Pin No.	1	7	8	9	10	16
Single output (S)	GND	NC	NC	+Vout	-Vout	+Vin

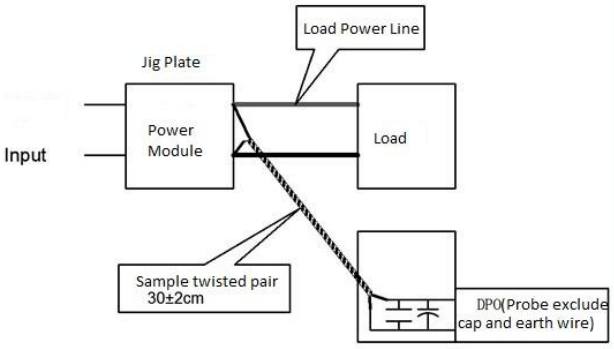
Note 1: Pin 7&8 (NC) should not be connected to any external circuit.

Note 2: Please take the pin definition on the product label marking as the right one if it is different than the description on the data sheet.

Ripple & Noise Test Instruction (Twisted Pair Method, 20MHz Bandwidth)

1) The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which bandwidth should be set to 20MHz, 0.1uF polypropylene capacitor and 10uF high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes (100M bandwidth). The oscilloscope should be set at the Sample Mode.

2) The test diagram is shown on the right. The converter output connects to the electronic load by the jig with cables which size should be defined according to the output current value. The twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the location is as close as possible to the output pins or terminals. The test can be start after input power on.



Product Characteristics Graphs

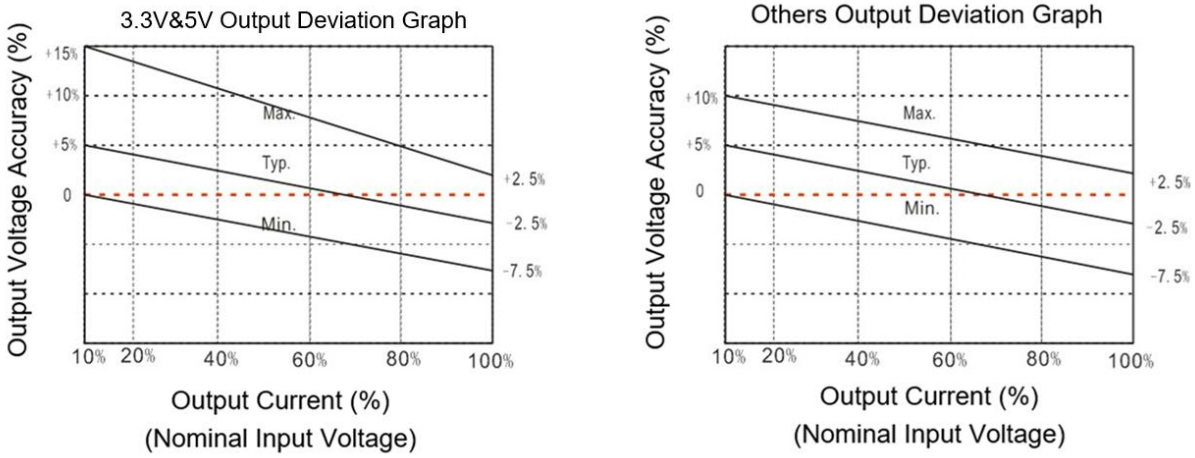


Figure 1

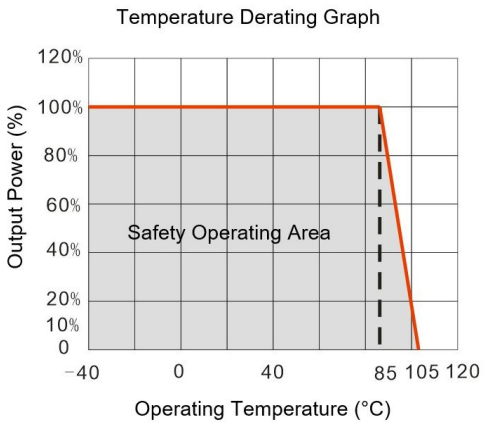


Figure 2

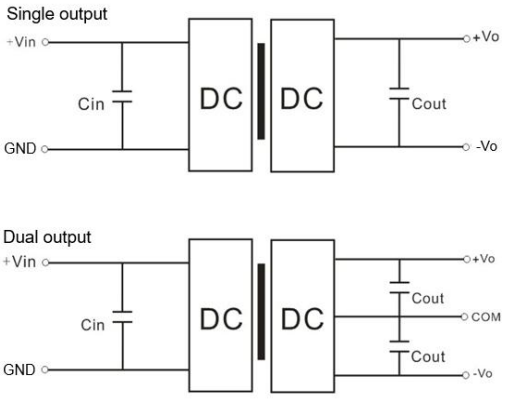
Recommended Circuits for Application

① Output load requirements

The maximum capacitive load of the product was tested at the Rated full load. The converter may not start or be damaged if the output capacitor exceeds this value.

② Recommended circuit for application

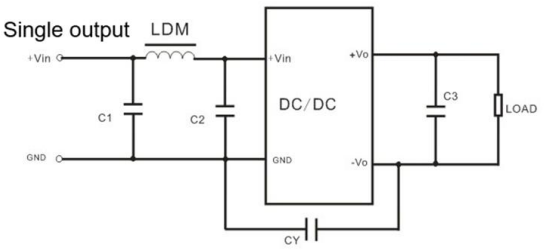
To effectively decrease the input and output ripple and noise, a capacitor filter should be connected at the input and output, the application circuit diagrams are shown below. The suitable filter capacitors should be chosen as the recommended capacitive load values in Table 1. The converter could not start if the capacitance is too big.



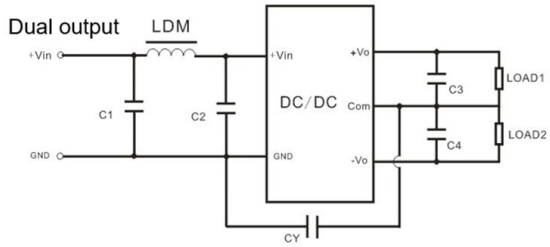
Recommended Capacitive Load Value Table (Table 1)

Vin (Vdc)	Cin	Single Vout (Vdc)	Cout (μF)	Dual Vout (Vdc)	Cout (μF)
5	10μF/16V	3.3	10μF/16V	±3.3	4.7μF/16V
12	2.2μF/25V	5	10μF/16V	±5	4.7μF/16V
15	2.2μF/25V	9	2.2μF/25V	±9	2.2μF/25V
24	1μF/50V	12	2.2μF/25V	±12	1μF/25V
--	--	15	1μF/25V	±15	1μF/16V
--	--	24	1μF/50V	±24	0.47μF/50V

③ Recommended EMC circuit diagrams



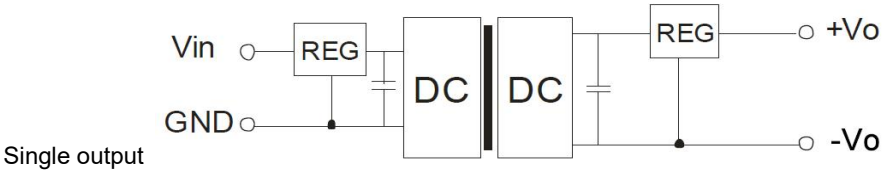
Input voltage		5VDC	12/15/24VDC
EMI	C1/C2	4.7μF/16V	4.7μF/50V
	CY	270 pF	270 pF
	C3	Refer to Cout in Table 1	
	LDM	6.8μH	6.8μH



Input voltage		5VDC	12/15/24VDC
EMI	C1/C2	4.7μF/16V	4.7μF/50V
	CY	270 pF	270 pF
	C3/C4	Refer to Cout in Table 1	
	LDM	6.8μH	6.8μH

④ Output voltage regulation and over voltage protection

The simple solution to achieve the output voltage regulated, over voltage and over current protections is to connect a linear regulator with overheat protection at input or output, and a capacitor filter connected in parallel as below circuit. Filter capacitive value recommended see table 1, Linear regulator should be chosen according to the actual voltage & current for operating. Or Aipu NW series products are recommended instead.



Application Notice

1.This product cannot be used in parallel connected, and it does not support hot-plug.

2.The product performance in this manual cannot be guaranteed if it works at a lower load than the minimum load condition.

3. All values or indicators in this manual had been tested based on Aipupower test specifications.

Guangzhou Aipu Electron Technology Co., Ltd

Address: Building 4, HEDY Park, No.63, Punan Road, Huangpu Dist, Guangzhou, China.

Tel: 86-20-84206763 Fax: 86-20-84206762 HOTLINE: 400-889-8821

E-mail: sales@aipu-elec.com Website: https://www.aipupower.com

