DC-DC Converter
NN1-XXSXXM3N Series

Typical Features

- ◆ Fixed input voltage, Isolated & unregulated, Output power 1W
- ◆ Efficiency up to 86%
- ◆ Mini DIP Package
- ◆ Isolation Voltage 3000VDC
- ◆ Operating Temperature: -40℃～+105℃
- ◆ Plastic Case, Flame class UL94 V-0

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

Application Field

This series products can be widely used in the 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 (Vo/Io)		Input Current (mA) Typ. @Rated Volt.		Max. Capacitive Load	Ripple & Noise (20MHz) Max/Typ	Efficiency (%) @Full load/Rated input volt.	
		Rated	Range	Voltage (VDC)	Current(mA) Max./Min.	Full Load	No Load	uF	mVp-p	Min.	Typ.
-	NN1-3V3S05M3N	3.3	2.97 - 3.63	5	200/20	358	8	2400	100/50	79	82
-	NN1-05S3V3M3N	5	4.5 - 5.5	3.3	303/30	128	8	2400	100/50	75	78
CE	NN1-05S05M3N			5	200/20	230	8	2400	100/50	82	85
-	NN1-05S07M3N			7.2	139/14	226	12	1000	100/50	82	85
-	NN1-05S09M3N			9	110/11	226	12	1000	100/50	83	86
-	NN1-05S12M3N			12	83/8	224	12	560	100/50	83	86
-	NN1-05S15M3N			15	67/7	222	18	560	100/50	83	86
-	NN1-05S24M3N			24	42/4	235	25	220	100/50	80	83

Note: The ripple & noise are tested by the twisted pair method.

Input Specifications

Item	Test Condition	Min.	Typ.	Max.	Unit
Input Inrush Voltage (1Second.max.)	3.3Vdc Input	-0.7	--	7	VDC
	5Vdc Input	-0.7	--	9	
	9Vdc Input	-0.7	--	12	
	12Vdc Input	-0.7	--	18	VDC
	15Vdc Input	-0.7	--	21	
	24Vdc Input	-0.7	--	30	

Input Filter	Capacitor Filter
Hot Plug	Unavailable

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Power			0.1	--	1	W
Output Voltage Accuracy			Refer to the Deviation Curve (Figure 1)			
Load Regulation	10% ~ 100% load	3.3Vdc output	--	15	20	%
		Other output	--	10	15	
Line Voltage Regulation	Input Voltage Change ±1%	3.3Vdc output	--	--	1.5	--
		Other output	--	--	1.2	
Temperature Drift Coefficient	100% Full Load		--	--	±0.03	%/°C
Output Short Circuit Protection	Continuous, self-recovery					

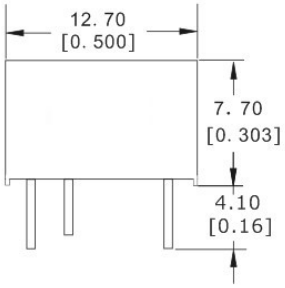
General Specifications

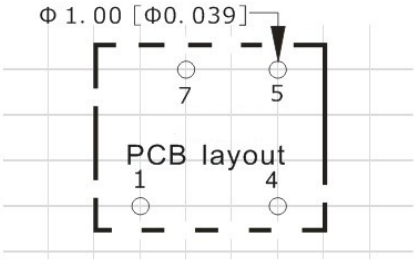
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Rated input voltage full load	--	330	--	KHz
Operating Temperature	Refer to temperature derating curve (Figure 2)	-40	--	+105	℃
Storage Temperature		-55	--	+125	
Case temperature rise	Operating at Tα=25℃	--	30	--	
Pin soldering temperature	1.5mm from the case, 10 seconds	--	--	300	
Relative Humidity	No condensation	5	--	95	%RH
Isolation Voltage	Input-output, test 1 minute, leakage current less than 1mA	3000	--	--	VDC
Insulation resistance	Input-output, @ 500VDC	1000	--	--	MΩ
Isolation Capacitor	Input/output, 100KHz/0.1V	--	20	--	pF
Vibration		10-150Hz, 5G, 30 Min. along X, Y and Z			
MBTF	MIL-HDBK-217F@25℃	3500	--	--	K hours
Case Material	Plastic in Black, flame class UL94-V0				
Weight	2.1g (Typ.)				
Cooling Method	Natural air				
Packing	Single tube（220*12*15mm）			18PCS	
	Carton size（242*110*155mm）			2304PCS（Total 144 tubes）	
Unit package dimensions	L x W x H	12.70× 10.00 × 7.7 mm		0.500 × 0.394 × 0.303 inch	

EMC Performance

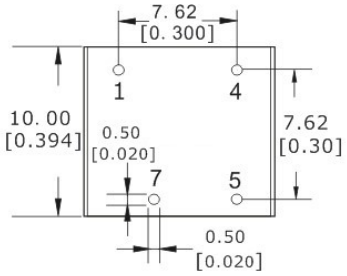
EMI	CE	CISPR32/EN55032 CLASS B（with Recommended EMC Circuit）
	RE	CISPR32/EN55032 CLASS B（with Recommended EMC Circuit）
EMC	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf.Criteria B

Mechanical Dimensions





Recommended PCB layout
Grid: 2.54x2.54[0.10x0.10]



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

Pin Function

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

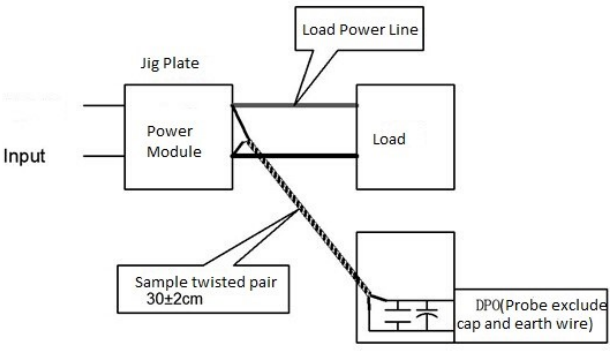
Note: Please take the pin definition on the product label as the right one if there is any difference between the data sheet and the one printed on the product label.

Ripple& Noise Test Instruction (Twisted Pair Method, 20MHZ bandwidth)

Test Method

1) Ripple noise test need 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 output ripple noise 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 started after input power on.



Product Performance Curve

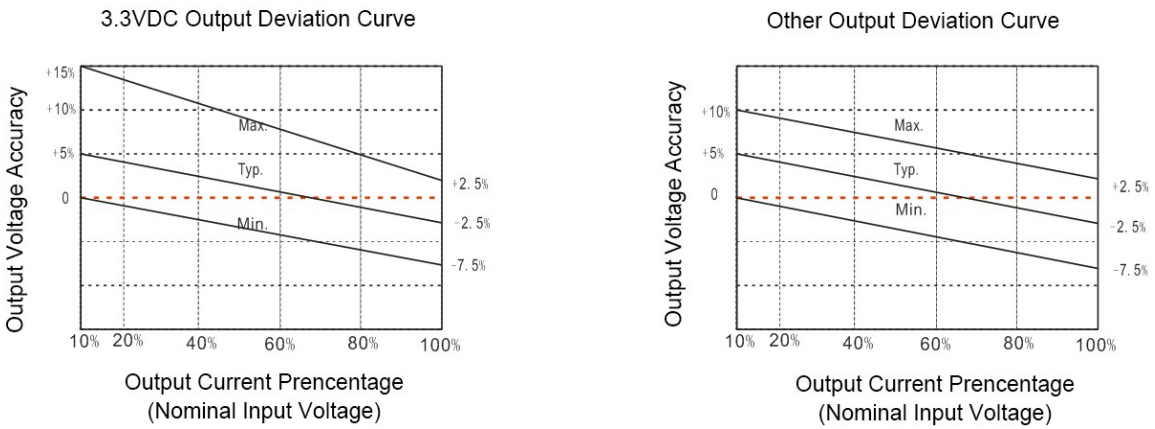


Figure 1

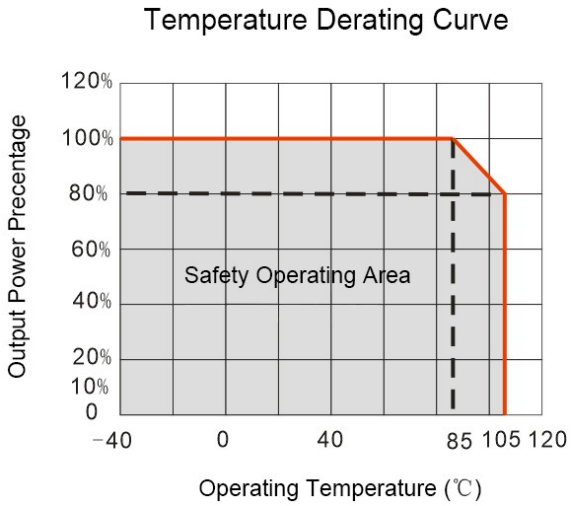


Figure 2

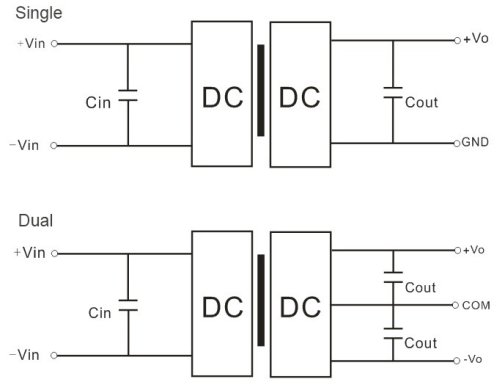
Recommendation for Application

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 capacitor exceeds this value.

2. Recommended circuit

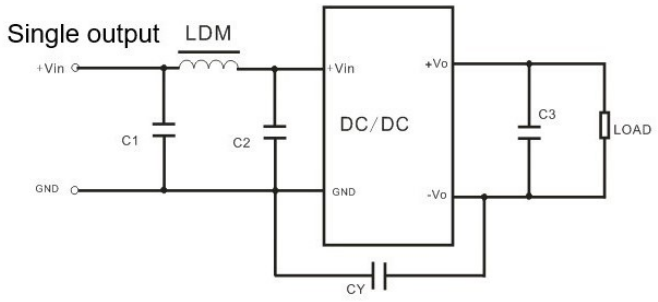
To ensure effectively decrease the input and output ripple and noise, a capacitor filter can be connected at the input and output, the application circuit is shown in the figure below. The suitable filter capacitors should be chosen as the recommended capacitive load values in Table 1. The converter 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

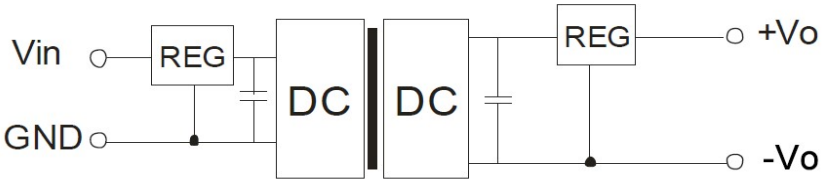


Input voltage		5VDC	12/15/24VDC
EMI	C1/C2	4.7μF/16V	4.7μF/50V
	CY	270pF/2KV	270pF/2KV
	C3	Refer to Cout in Table 1	
	LDM	6.8μH	6.8μH

4. Output regulated voltage and over voltage protection circuit

The simple solution to achieve the output regulated voltage, 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.

Single



Note:

1.This converter should not be used in parallel, and it does not support hot-plugging.

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.

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