DC-DC Converter
NN1-XXSXXANR3 Series

Typical Features

- ◆ Fixed input voltage, Isolated & unregulated output, Output power 1W
- ◆ High Efficiency up to 86%
- ◆ Small compact SIP packing
- ◆ Isolation Voltage 1500VDCs
- ◆ 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 inputting 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

Certificate	Part No.	Input Voltage Range (VDC)		Output Voltage/Current (Vo/Io)		Input Current(mA) Nominal Voltage		Max. Capacitive Load	Ripple & Noise (Max.)	Efficiency (%)@output full load, nominal input voltage	
		Nominal	Range	Voltage (VDC)	Current (mA) MAX./Min.	Full load Typ.	No Load Typ.	uF	mVp-p	Min.	Typ.
-	NN1-3V3S3V3ANR3	3.3	2.97 - 3.63	3.3	303/30	370	8	2400	75/40	74	76
-	NN1-3V3S05ANR3			5	200/20	358	8	2400	75/40	81	83
-	NN1-3V3S12ANR3			12	83/9	340	10	560	75/40	83	85
-	NN1-3V3S15ANR3			15	67/7	345	20	560	75/40	81	83
-	NN1-3V3S24ANR3			24	42/5	360	30	220	100/80	81	83
-	NN1-05S3V3ANR3	5	4.5 - 5.5	3.3	303/30	250	8	2400	75/40	78	80
UL/CE	NN1-05S05ANR3			5	200/20	225	8	2400	75/40	83	85
-	NN1-05S09ANR3			9	111/12	227	10	1000	75/40	83	85
-	NN1-05S12ANR3			12	83/9	220	10	560	75/40	83	85
-	NN1-05S15ANR3			15	67/7	220	18	560	75/40	83	85
-	NN1-05S24ANR3			24	42/5	266	18	220	100/80	82	84
-	NN1-09S09ANR3	9	8.1 - 9.9	9	111/12	128	10	560	75/40	82	84

-	NN1-12S3V3ANR3	12	10.8 - 13.2	3.3	303/30	98	10	2400	75/40	80	82
-	NN1-12S05ANR3			5	200/20	96	10	2400	75/40	84	86
-	NN1-12S09ANR3			9	111/12	92	10	1000	75/40	84	86
-	NN1-12S12ANR3			12	83/9	90	10	560	75/40	84	86
-	NN1-12S15ANR3			15	67/7	90	10	560	75/40	84	86
-	NN1-12S24ANR3			24	42/5	92	10	220	100/80	83	85
-	NN1-15S05ANR3	15	13.5 - 16.5	5	200/20	78	10	2400	75/40	83	85
-	NN1-15S12ANR3			12	83/9	76	10	1000	75/40	84	86
-	NN1-15S15ANR3			15	67/7	76	10	560	75/40	83	85
-	NN1-24S3V3ANR3	24	21.6 - 26.4	3.3	303/30	48	8	2400	75/40	80	82
-	NN1-24S05ANR3			5	200/20	47	8	2400	75/40	82	84
-	NN1-24S09ANR3			9	111/12	48	8	1000	75/40	83	85
-	NN1-24S12ANR3			12	83/9	48	8	560	75/40	84	86
-	NN1-24S15ANR3			15	67/7	48	8	560	75/40	83	85
-	NN1-24S24ANR3			24	42/5	49	8	220	100/80	83	85

Note: ① The ripple & noise test method adopts the twisted pair method.

Input Specifications

Item	Test Condition	Min.	Typ.	Max.	Unit
Input Overshoot 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	
	15Vdc Input	-0.7	--	21	
	24Vdc Input	-0.7	--	30	
Input Filter	Capacitor Filter				
Hot Plug	Unavailable				

Output Specifications

ITEM	Working Conditions		Min.	Typ.	Max.	Unit
Output Power			0.1	--	1	W
Output Voltage Accuracy			See the error envelope 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				

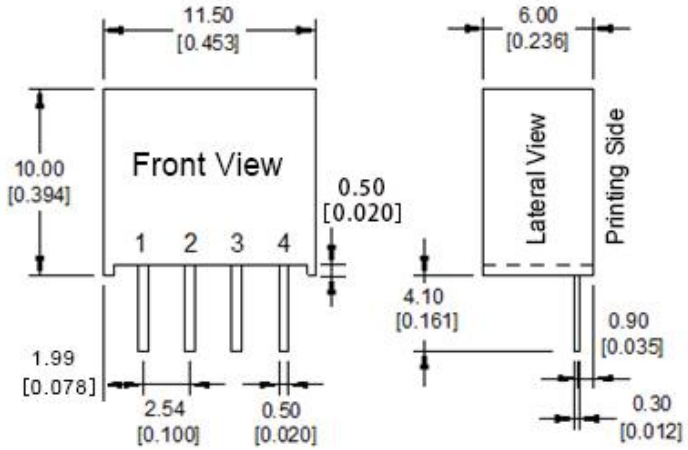
General Specifications

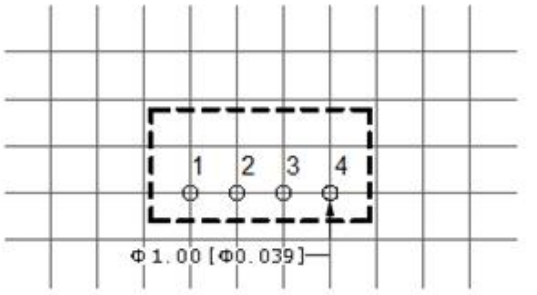
ITEM	Working Conditions	Min.	Typ.	Max.	Unit
Switching Frequency	Nominal input voltage, full load	--	260	--	KHz
Operating Temperature	Refer to temperature derating curve (Figure 2)	-40	--	105	℃
Storage Temperature		-55	--	+125	
Shell temperature rise during work	Ta=25℃	--	30	--	
Pin resistance soldering temperature	Distance to case 1.5mm, 10s	--	--	300	
Relative Humidity	No condensing	5	--	95	%RH
Isolation Voltage	I/P-O/P, test 1min, leakage current ＜ 1mA	1500	--	--	VDC
Insulation Resistance	I/P-O/P, insulation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitor	Input/Output, 100KHz/0.1V	--	20	--	pF
Vibration		10-150Hz, 5G, 30 Min. along X, Y and Z			
MTBF	MIL-HDBK-217F@25℃	3500	--	--	K hours
Case Material	Black flame-retardant heat-resistant Plastic (UL94 V-0)				
Product Weight	1.4g (Typ.)				
Cooling Method	Natural air cooling				
Package	Tube(525*18*10mm)	43PCS			
	Inner Box(542*110*155mm)	3440PCS(Total 80Tubes)			
Dimension	L x W x H	11.50 × 6.00 × 10.00mm		0.453 × 0.236 × 0.394inch	

EMC Characteristic

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

Packing Dimension





Unit:
Grid spacing 2.54*2.54mm
Unit: mm [inch]
Terminal section tolerance: ±0.10 [±0.004]
Unmarked tolerance: ±0.50 [±0.020]

Pin Function

Single(S)	1	2	3	4
	GND	+Vin	-Vo	+Vo

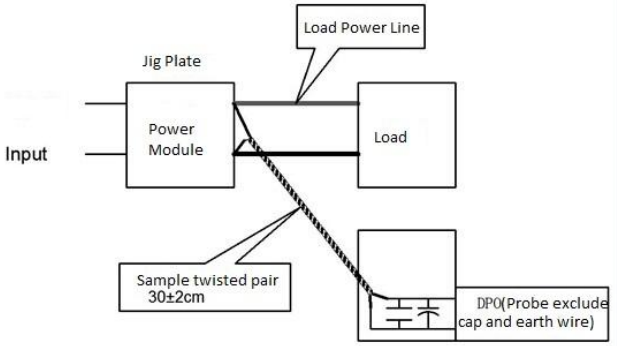
Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

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

Test Method:

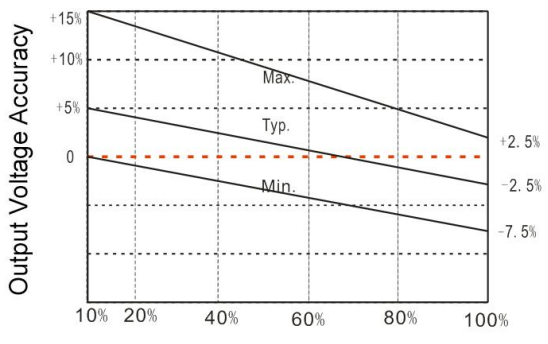
a.12# twisted pair to connect, Oscilloscope bandwidth set as 20MHz, 100M bandwidth probe, terminated with 0.1uF polypropylene capacitor and 10uF high frequency low resistance electrolytic capacitor in parallel, oscilloscope set as Sample pattern.

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.



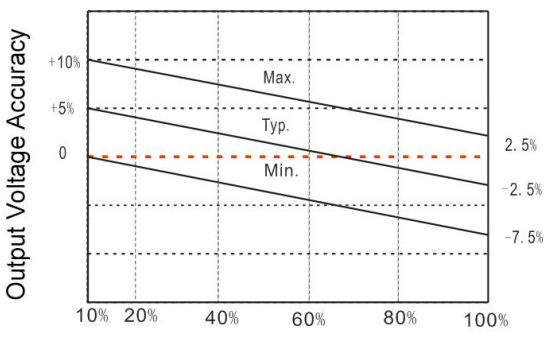
Product Characteristic Curve

3.3VDC Output
Error Envelope Curve



Output Current Precentage
(Nominal Input Voltage)

Other Output
Error Envelope Curve



Output Current Precentage
(Nominal Input Voltage)

Figure 1

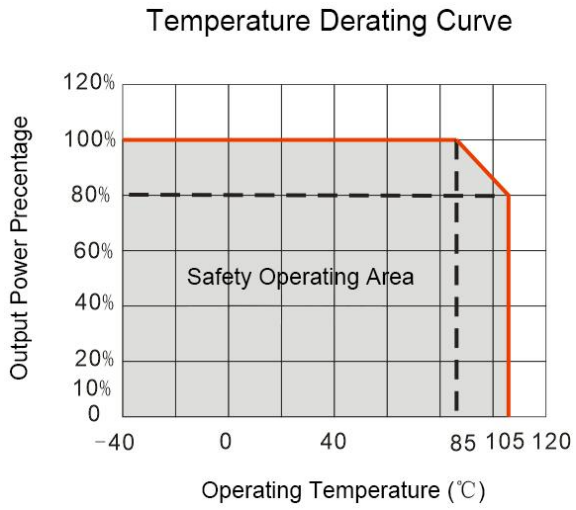


Figure 2

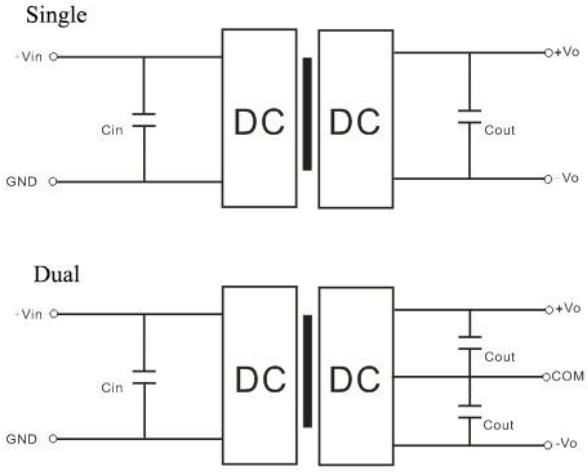
Design and Application Circuit Recommended

① Output load requirements

The maximum capacitive load of the product is obtained from the nominal full load test. It should not exceed the maximum capacitive load of the output when used, otherwise it is likely to cause startup difficulties and damage the product.

② Recommended circuit

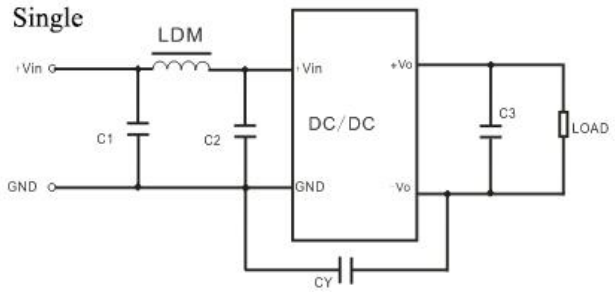
To ensure effective reduction of input and output ripple and noise, a capacitor filter network can be connected to the input and output ends. The application circuit is shown in the figure below; however, a suitable filter capacitor should be selected. If the capacitance is too large, it may affect the startup of the product. To ensure that each output works under safe and reliable conditions, the recommended capacitive load value is detailed in Table 1 below.



Recommended capacitive load value(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

③EMC typical recommended circuit



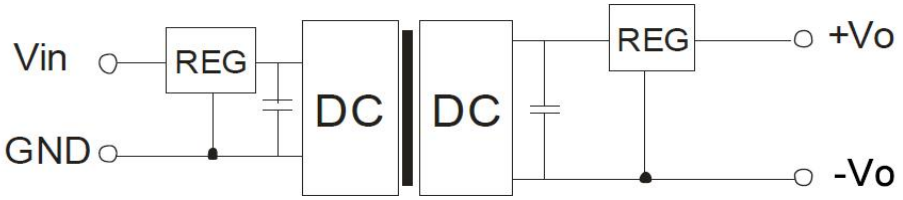
EMC Recommended Circuit

Input Voltage		5VDC	12/15/24VDC
EMI	C1/C2	4.7μF/16V	4.7μF/50V
	CY	270pF/2kV	270pF/2kV
	C3	Refer to Cout spec at Tabel 1	
	LDM	6.8μH	6.8μH

④ Output voltage regulation and overvoltage protection circuit

The simplest device for output voltage regulation, overvoltage and overcurrent protection is to connect a linear voltage regulator with overheat protection in series at its input or output end and connect a capacitor filter network (see the figure below). The recommended value of the filter capacitor is detailed in (Table 1). The linear voltage regulator should be reasonably selected according to the voltage and current required for actual work; or choose our NW series products.

Single



Note:

1. This product cannot be used in parallel and does not support hot swapping;
2. If the product works below the minimum required load, it cannot be guaranteed that the product performance meets all the performance indicators in this manual;
3. All indicator test methods in this article are based on the company's corporate standards;

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