

DC-DC Converter

FN1-XXXXXAN Series

Typical Features

- ◆ Fixed input voltage, Isolated & unregulated output, Output power 1W
- ◆ High Efficiency up to 86%
- ◆ Small compact SIP packing
- ◆ Isolation Voltage 1500VDC
- ◆ Operating Temperature: -40°C ~ +105°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

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 uF	Ripple & Noise (Max.) mVp-p	Efficiency (%)@output full load, nominal input voltage	
	Nominal	Range	Voltage (VDC)	Current(mA) MAX./Min.	Full load Typ.	No Load Typ.			Min.	Typ.
FN1-3V3S3V3AN	3.3	2.97 - 3.63	3.3	303/30	307	8	2400	100	74	76
FN1-3V3S05AN			5	200/20	358	8	2400	100	81	83
FN1-3V3S12AN			12	84/9	340	10	560	100	83	85
FN1-3V3S15AN			15	67/7	345	20	560	100	81	83
FN1-3V3S24AN			24	42/4	360	20	220	100	81	83
FN1-05S3V3AN	5	4.5 - 5.5	3.3	303/30	250	8	2400	100	78	80
FN1-05S05AN			5	200/20	225	8	2400	100	83	85
FN1-05S09AN			9	111/12	227	10	1000	100	83	85
FN1-05S12AN			12	84/9	220	10	560	100	83	85
FN1-05S15AN			15	67/7	220	18	560	100	83	85
FN1-05S24AN			24	42/4	266	18	220	100	82	84
FN1-12S3V3AN	12	10.8 - 13.2	3.3	303/30	98	10	2400	100	80	82
FN1-12S05AN			5	200/20	96	10	2400	100	84	86
FN1-12S09AN			9	111/12	92	10	1000	100	84	86
FN1-12S12AN			12	84/9	90	10	560	100	84	86
FN1-12S15AN			15	67/7	90	10	560	100	84	86

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FN1-12S24AN			24	42/4	92	10	220	100	83	85
FN1-15S05AN	15	13.5 - 16.5	5	200/20	78	10	2400	100	83	85
FN1-15S12AN			12	84/9	76	10	1000	100	84	86
FN1-15S15AN			15	67/7	76	10	560	100	83	85
FN1-15S24AN			24	42	75	10	470	100	83	85
FN1-24S3V3AN			24	21.6 - 26.4	3.3	303/30	48	8	2400	100
FN1-24S05AN	5	200/20			47	8	2400	100	82	84
FN1-24S09AN	9	111/12			48	8	1000	100	83	85
FN1-24S12AN	12	84/9			48	8	560	100	84	86
FN1-24S15AN	15	67/7			48	8	560	100	83	85
FN1-24S24AN	24	42/4			49	8	220	100	83	85

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.

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				

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	3.3Vdc output	--	--	20	
		Other output	--	--	15	
Line Voltage Regulation	Input Voltage Change±1%	3.3Vdc output	--	--	±1.5	
		Other output	--	--	±1.2	
Ripple & Noise①	Nominal input, full load, 20MHZ bandwidth		--	75	100	
Temperature Drift Coefficient	100% Full Load		--	--	±0.03	%/°C

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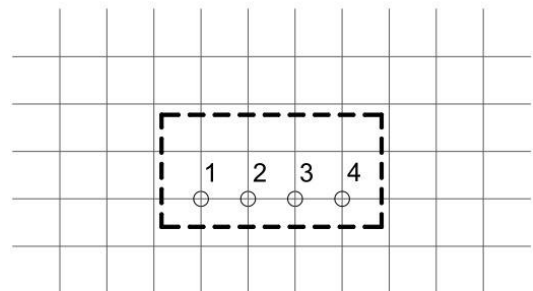
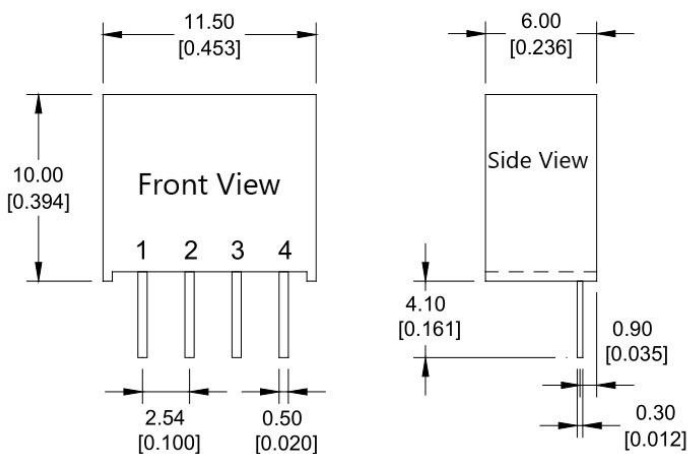
Pin resistance soldering temperature	The distance between the soldering point and the shell is 1.5mm, 10 seconds	--	--	300	%/°C
Output Short Circuit Protection	Continuous, self-recovery				

NOTE:① Ripple & Noise Tested by twisted-pair method.

General Specifications

Switching Frequency	Typical	260KHz (Typ.)
Operating Temperature	Refer to Temperature Derating Curve	-40°C ~ +105°C
Storage Temperature		-55°C ~ +125°C
Shell temperature rise during work	Within Temperature Derating Curve	25°C(Typ.)
Relative Humidity	No condensing	5%~95%
Case Material		Black flame-retardant heat-resistant Plastic(UL94 V-0)
Pin withstand welding temp	Distance to case 1.5mm, 10s	300°C 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°C	35X10 ⁵ Hrs
Product Weight		1.4g(Typ.)
Package	Tube(525*18*10mm)	43PCS
	Inner Box(542*110*155mm)	3440PCS(Total 80Tubes)

Packing Dimension



Printed board vertical view

Lattice spacing:2.54mm(0.1 inch)

General tolerance: ±0.5mm

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

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Pin Function

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

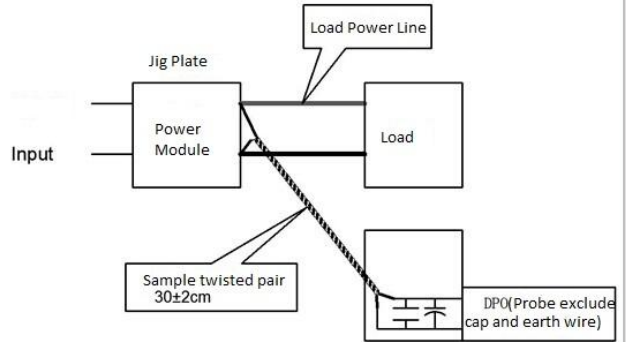
Note: if the definition of pin is not in accordance with the model selection manual, please refer to the label on actual item.

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

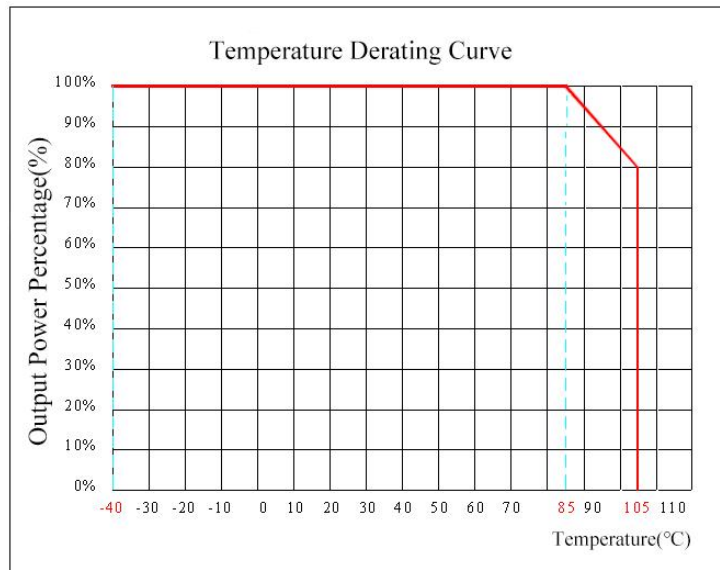
Test Method:

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



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.

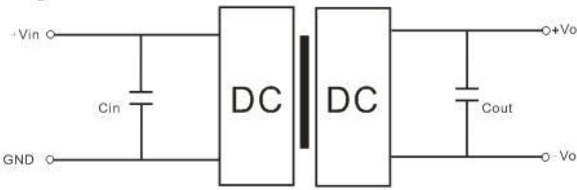
2. Recommended circuit

a. 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.

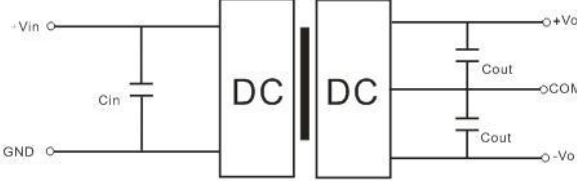
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b. To ensure the modules running safely and reliably, the recommended capacitive load values as shown in Table 1. (But for the actual output power of application circuit is less than 0.5W, suggest not to connect external capacitor)

Single



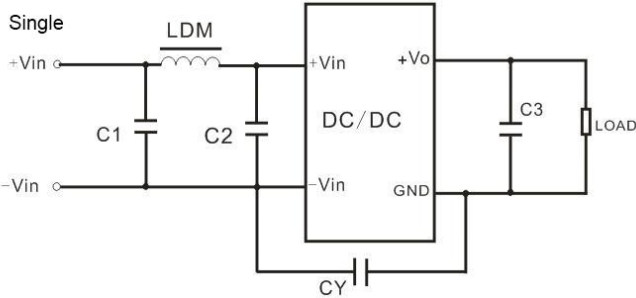
Dual



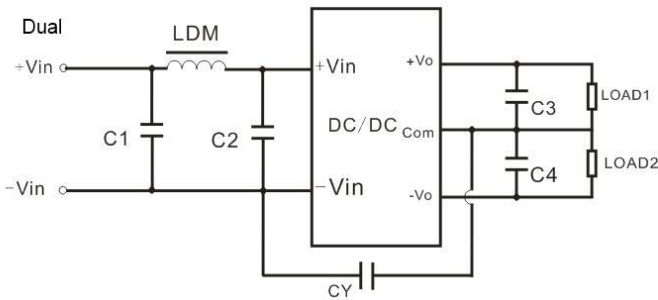
Recommended capacitive load value (Table 1)

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

3. EMC Recommended Circuit



Input Voltage		3.3/5/9VDC	12/15/24VDC
EMI	C1/C2	4.7 μF/16V	4.7 μF/50V
	CY	270pF/2kV	270pF/2kV
	C3	Refer to the parameters of Cout in Table 1	
	LDM	6.8 μH	6.8 μH



Input Voltage		3.3/5/9VDC	12/15/24VDC
EMI	C1/C2	4.7 μF/16V	4.7 μF/50V
	CY	270pF/2kVdc	270pF/2kVdc
	C3/C4	Refer to the parameters of Cout in Table 1	
	LDM	6.8 μH	6.8 μH

4 Output Voltage Regulation and Over-voltage 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 our NW series products can be selected.