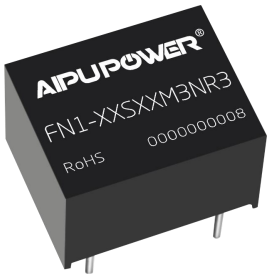
Typical Features

- ◆ Fixed input voltage, isolated & unregulated, output 1W
- ◆ Efficiency up to 86% (Typ.)
- ◆ Mini size DIP package
- ◆ Isolation voltage 3000VDC
- ◆ Continuous short circuit protection, self-recovery
- ◆ Operating temperature from -40℃ to +105℃
- ◆ Plastic case, flame class UL94-V0



Application Field

This series of products 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		Output Voltage/Current (Vo/Io)		Input Current (mA) Typ. @nominal volt.		Max. Capacitive Load	Efficiency @full load, nominal Volt.	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io(mA) Max/Min	Full Load	No Load	(uF)	Min (%)	Typ. (%)
-	FN1-3V3S3V3M3NR3	3.3	2.97 - 3.63	3.3	303/30	370	8	2400	74	78
-	FN1-3V3S05M3NR3			5	200/20	358	8	2400	79	82
-	FN1-05S3V3M3NR3	5	4.5 - 5.5	3.3	303/30	128	8	2400	75	78
-	FN1-05S05M3NR3			5	200/20	230	8	2400	82	85
-	FN1-05S07M3NR3			7.2	139/14	226	12	1000	82	85
-	FN1-05S09M3NR3			9	110/11	226	12	1000	83	86
-	FN1-05S12M3NR3			12	83/8	224	12	560	83	86
-	FN1-05S15M3NR3			15	67/7	222	18	560	83	86
-	FN1-05S24M3NR3			24	42/4	235	25	220	80	83
-	FN1-12S05M3NR3	12	10.8 - 13.2	5	200/20	98	12	470	81	85
-	FN1-12S09M3NR3			9	110/11	98	12	470	81	85
-	FN1-12S12M3NR3			12	83/8	96	12	470	82	86
-	FN1-12S15M3NR3			15	67/7	96	12	470	82	86
-	FN1-15S05M3NR3	15	13.5 - 16.5	5	200/20	78	6	470	81	84
-	FN1-15S12M3NR3			12	83/8	82	6	470	82	85
-	FN1-15S15M3NR3			15	67/7	82	8	470	83	86
-	FN1-24S05M3NR3	24	21.6 - 26.4	5	200/20	50	10	470	81	85
-	FN1-24S09M3NR3			9	110/11	48	10	470	82	86
-	FN1-24S12M3NR3			12	83/8	48	10	470	82	86
-	FN1-24S15M3NR3			15	67/7	50	10	470	81	85
-	FN1-24S24M3NR3			24	42/4	50	10	220	82	86

Note 1: The maximum capacitive load is the capacitance allowed to be used when the power supply starts up at full load. The converter may not start if the capacitor exceeds this value.
Note 2: The efficiency is tested at the nominal input voltage and the rated load.
Note 3: Please contact Aipu sales for other output voltages requirements of this series but not listed in this table.

Input Specifications

Item	Test Condition	Min.	Typ.	Max.	Unit
Input inrush voltage (1Sec max.)	3.3Vdc Input	-0.7	-	7	VDC
	5Vdc Input	-0.7	-	9	
	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	Test Condition		Min.	Typ.	Max.	Unit
Output power			0.1	-	1	W
Output voltage accuracy	Please refer to the Output Voltage Deviation Graph (Figure 1)					
Load regulation	10%-100% load	3.3Vdc output	-	15	20	%
		Others	-	10	15	
Line voltage regulation	Input voltage change ±1%	3.3Vdc output	-	-	1.5	%
		Others	-	-	1.2	
Temperature drift coefficient			-	-	±0.03	%/°C
Ripple & Noise	10%-100% load, 20MHz bandwidth		-	75	150	mVp-p
Short circuit protection	Continuous, self-recovery					
Note: The Ripple & Noise is tested by the Twisted Pair Method, please refer to the following test instruction.						

General Specifications

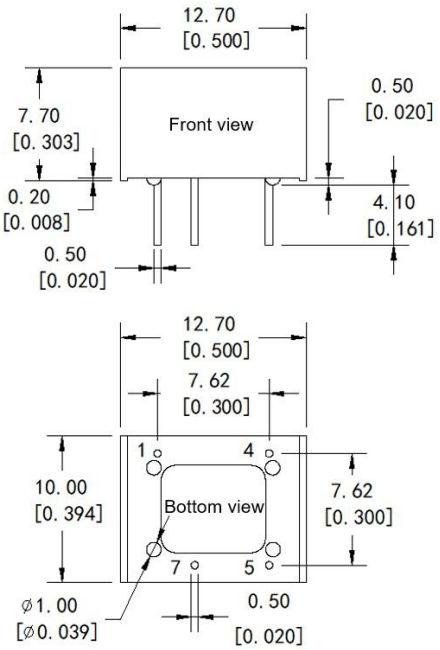
Item	Test Condition		Min.	Typ.	Max.	Unit
Switching frequency	Nominal input voltage, full load		-	260	-	KHz
Operating temperature	Refer to the Temperature Derating Graph (Figure 2)		-40	-	+105	℃
Storage temperature			-55	-	+125	℃
Case temperature rise	Within the operation derating range		-	25°	-	℃
Pin soldering temperature	1.5mm from the case, soldering time 10S		-	-	300	℃
Relative humidity	No condensing		5	-	95	%RH
Isolation voltage	I/P-O/P	Test 1 minute, leakage current <1mA	3000	-	-	VDC
Insulation resistance	I/P-O/P	@ 500VDC	1000	-	-	MΩ
Isolation capacitance	I/P-O/P	100KHz/0.1V	-	20	-	pF
Vibration			10-150Hz, 5G, 30 Min. along X, Y and Z			

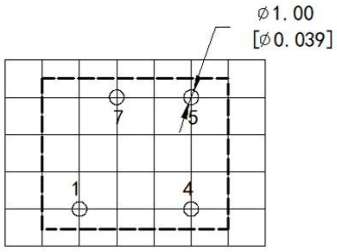
MTBF	MIL-HDBK-217F@25℃	3500	-	-	K hours
Case material	Plastic in Black, flame class UL94-V0				
Unit weight	2.1g (Typ.)				
Cooling method	Natural air				
Packing	Tube size (220x12x15mm)	16PCS/Tube			
	Carton size (242x110x155mm)	2304PCS/Carton (Total 144 Tubes)			
Unit dimensions	L x W x H	12.70× 10.00 × 7.70 mm	0.500 × 0.394 × 0.303 inch		

EMC Performance

Item		Test Standard	Performance/Class
EMI	CE	CISPR32/EN55032	CLASS B (with the Recommended EMC circuit)
	RE	CISPR32/EN55032	CLASS B (with the Recommended EMC circuit)
EMS	ESD	IEC/EN61000-4-2	Air ±8kV, Contact ±6kV perf. Criteria B

Mechanical Dimensions





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

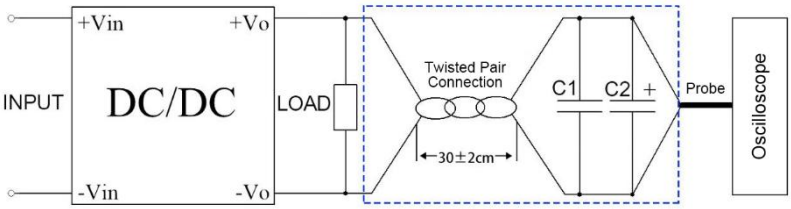
Unit: mm[inch]
Pin diameter tolerance: ±0.10[±0.004]
General tolerance: ±0.50[±0.020]

Pin-out Function Description

Pin No.	1	4	5	7			
Single (S)	GND	+Vin	+Vo	-Vo			

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

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



1. The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C1(0.1uF polypropylene capacitor) and C2(10uF high frequency low impedance electrolytic capacitor) are connected in parallel with the probes and one side of the twisted pair.
2. Refer to the test diagram, 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 other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load. The test can start after the input power on.
3. It is recommended to use a ≥10% load or a high frequency low impedance electrolytic capacitor (≥100uF) load at the output to avoid the output ripple increasing.

Product Characteristics Graphs

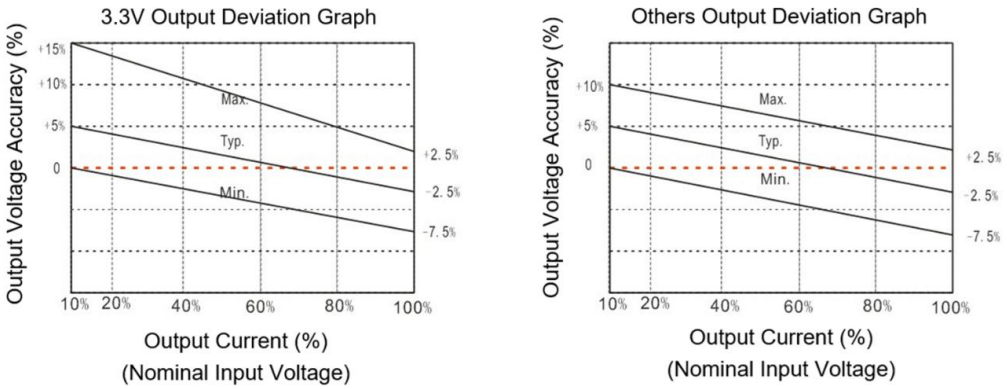


Figure 1

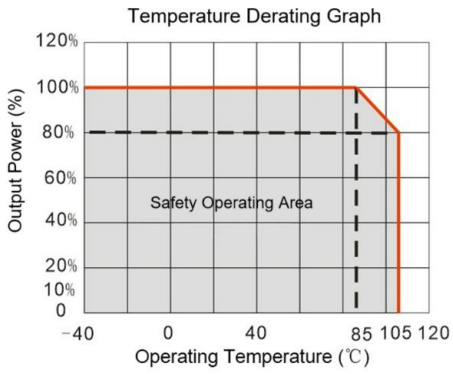


Figure 2

Recommended Circuits for Application

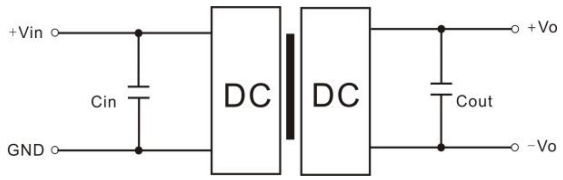
1. Requirement for Output load

a. To ensure the converter operating efficiently and reliably, its minimum load should not be less than 10% of the rated load. It is recommended to connect a resistor in parallel to the output when the real load is less than 10% (the sum of the power consumed should be bigger than or equal to 10% of the rated power).

b. The maximum capacitive load is tested at the full load. The converter may not start or be damaged at the capacitive over-load.

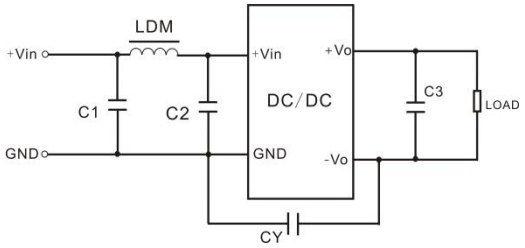
2. Typical application circuit

To ensure effectively decrease the input and output ripple and noise, a capacitor filtering net can be used at the input and output, the application circuit diagram is shown below. Suitable filtering 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 Values (Table 1)			
Vin (Vdc)	Cin	Vout (Vdc)	Cout
3.3	4.7uF/16V	3.3	10uF/16V
5	4.7uF/16V	5 & 7.2	10uF/16V
12	2.2uF/25V	9 & 12	2.2uF/25V
15	2.2uF/25V	15	1uF/25V
24	1uF/50V	24	0.47uF/50V

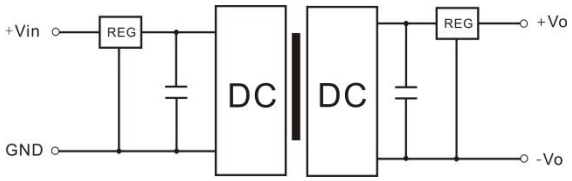
3. Recommended EMC circuit diagram



Input Voltage		3.3/5Vdc	12/15/24Vdc
EMI	C1/C2	4.7uF/16V	4.7uF/50V
	CY	270pF/3KVdc	270pF/3KVdc
	C3	Refer to Cout value in Table 1	
	LDM	6.8uH	6.8uH

4. Output voltage regulation and overvoltage protection

The simple solution to achieve the output regulated voltage, over voltage and over current protections is to use a linear regulator with overheat protection at input or output, and a capacitor filtering net 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 series of products cannot be used in parallel, and do not support hot-plug.

2.The product should be used according to the specifications, otherwise it could be permanently damaged.

3. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.

4. The product performance cannot be guaranteed if it works under over-load condition.

5. Unless otherwise specified, all values or indicators on this datasheet are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).

6. All values or indicators on this datasheet have been tested based on Aipupower test specifications.

7.The specifications are specially for the parts listed on this datasheet, any other non-standard model performances could be out of the specifications. Please contact our technician for specific requirements.

8. Aipupower can provide customization service.

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