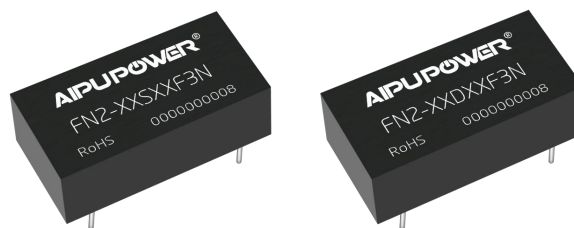


Typical Features

- ◆ Fixed input voltage, isolated & unregulated, output 2W
- ◆ 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.
-	FN2-05S3V3F3N	5	4.5 - 5.5	3.3	400/40	328	10	2400	77	80
-	FN2-05S05F3N			5	400/40	456	8	2400	80	83
-	FN2-05S09F3N			9	222/22	450	8	1000	81	84
-	FN2-05S12F3N			12	167/17	445	10	560	82	85
-	FN2-05S15F3N			15	133/13	440	16	560	82	85
-	FN2-05S24F3N			24	83/8	435	18	220	82	85
-	FN2-05D05F3N			±5	±200/±20	456	10	1200	77	80
-	FN2-05D09F3N			±9	±111/±11	450	8	470	80	83
-	FN2-05D12F3N			±12	±83/±8	445	8	220	81	84
-	FN2-05D15F3N			±15	±67/±7	440	16	220	82	85
-	FN2-05D24F3N			±24	±42/±4	435	18	100	82	85
-	FN2-12S3V3F3N	12	10.8 - 13.2	3.3	400/40	130	8	2400	77	80
-	FN2-12S05F3N			5	400/40	192	8	2400	80	83
-	FN2-12S09F3N			9	222/22	190	8	1000	80	83
-	FN2-12S12F3N			12	167/17	188	8	560	83	86
-	FN2-12S15F3N			15	133/13	185	8	560	83	86
-	FN2-12S24F3N			24	83/8	180	10	220	82	85
-	FN2-12D05F3N			±5	±200/±20	192	8	1200	80	83
-	FN2-12D09F3N			±9	±111/±11	190	8	470	80	83
-	FN2-12D12F3N			±12	±83/±8	187	8	200	83	86
-	FN2-12D12V5F3N			±12.5	±80/±8	185	8	200	83	86

-	FN2-12D15F3N			±15	±67/±7	182	8	220	83	86
-	FN2-12D24F3N			±24	±42/±4	180	10	100	80	83
-	FN2-15S05F3N	15	13.5 - 16.5	5	400/40	155	8	2400	80	83
-	FN2-15S12F3N			12	167/17	150	8	560	80	83
-	FN2-15S15F3N			15	133/13	150	8	560	83	86
-	FN2-15S24F3N			24	83/8	145	8	220	83	86
-	FN2-15D05F3N			±5	±200/±20	155	8	1200	80	83
-	FN2-15D12F3N			±12	±83/±8	150	8	220	80	83
-	FN2-15D15F3N			±15	±67/±7	150	8	220	83	86
-	FN2-15D24F3N			±24	±42/±4	145	8	100	83	86
-	FN2-24S3V3F3N	24	21.6 - 26.4	3.3	400/40	68	8	2400	77	80
-	FN2-24S05F3N			5	400/40	96	8	2400	80	83
-	FN2-24S09F3N			9	222/22	94	8	1000	81	84
-	FN2-24S12F3N			12	167/17	92	8	560	83	86
-	FN2-24S15F3N			15	133/13	90	8	560	83	86
-	FN2-24S24F3N			24	83/8	90	8	220	82	85
-	FN2-24D3V3F3N			±3.3	±303/±30	100	8	1200	79	82
-	FN2-24D05F3N			±5	±200/±20	96	8	1200	80	83
-	FN2-24D09F3N			±9	±111/±11	94	8	470	81	84
-	FN2-24D12F3N			±12	±83/±8	92	8	220	83	86
-	FN2-24D15F3N			±15	±67/±7	90	8	220	83	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	Operating Condition	Min.	Typ.	Max.	Unit
Input inrush voltage (1Sec max.)	5Vdc Input	-0.7	--	9	VDC
	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	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	3.3V output	--	15	%
		Others	--	10	

Line voltage regulation	Input voltage change ±1%	3.3V output	--	--	1.5	%
		Others	--	--	1.2	
Temperature drift coefficient			--	--	±0.03	%/°C
Ripple & Noise	0%-100% load, 20MHz bandwidth	Others	--	80	150	mVp-p
		24V output	--	100	150	
Short circuit protection	Continuous, self-recovery					
Note: The Ripple & Noise is tested by the Twisted Pair Method, please refer to the following test instruction.						

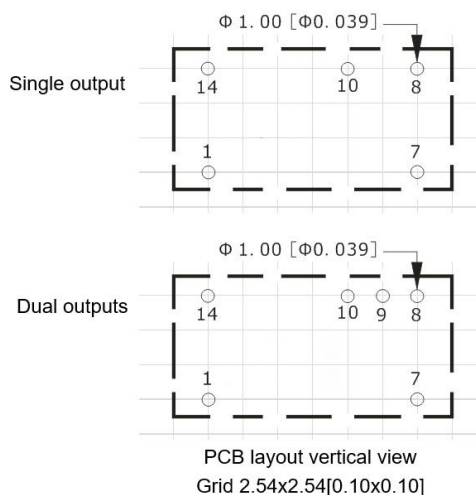
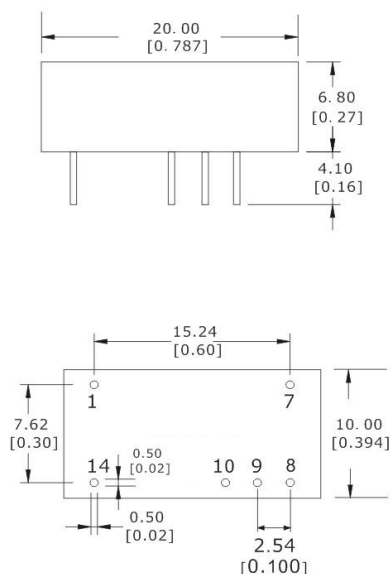
General Specifications

Item	Operating 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	$^{\circ}\text{C}$
Storage temperature		-55	--	+125	$^{\circ}\text{C}$
Case temperature rise	Within the operating derating range	--	30 $^{\circ}$	--	$^{\circ}\text{C}$
Pin soldering temperature	1.5mm from the case, soldering time 10S	--	--	300	$^{\circ}\text{C}$
Relative humidity	No condensing	5	--	95	%RH
Isolation voltage	I/P-O/P, test 1 minute, leakage current $< 1\text{mA}$	3000	--	--	VDC
Insulation resistance	I/P-O/P, @ 500VDC	1000	--	--	M Ω
Isolation capacitance	I/P-O/P, 100KHz/0.1V	--	20	--	pF
MTBF	MIL-HDBK-217F@25 $^{\circ}\text{C}$	3500	--	--	K hours
Vibration	10-150Hz, 5G, 30 Min. along X, Y and Z				
Case material	Plastic in Black, flame class UL94-V0				
Unit weight	2.5g (Typ.)				
Cooling method	Natural air				
Packing	Tube size (525x18x10mm)	25PCS/Tube			
	Carton size (542x110x155mm)	2000PCS/Carton (Total 80 Tubes)			
Unit dimensions	L x W x H	20.00 \times 10.00 \times 6.80 mm		0.787 \times 0.394 \times 0.270 inch	

EMC Performance

Item		Standards	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	Contact $\pm 6\text{kV}$ perf. Criteria B

Mechanical Dimensions



Unit: mm[inch]

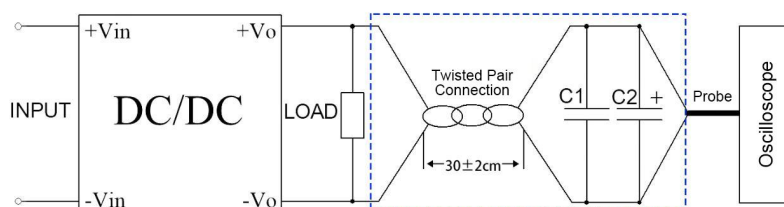
Pin diameter tolerance: $\pm 0.10[\pm 0.004]$ General tolerance: $\pm 0.50[\pm 0.020]$

Pin-out Function Description

Pin No.	1	7	8	9	10	14
Single (S)	GND	No Connection	+Vo	No Pin	-Vo	+Vin
Dual (D)	GND	No Connection	+Vo	COM	-Vo	+Vin

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-resistance 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 \pm 2 cm) should be connected in parallel with the load. The test can start after the input power on.
3. It is recommended to connect a $\geq 10\%$ load or a high-frequency low resistance electrolytic capacitor ($\geq 100\mu\text{F}$) load to the output to avoid the output ripple increasing.

Product Characteristics Graphs

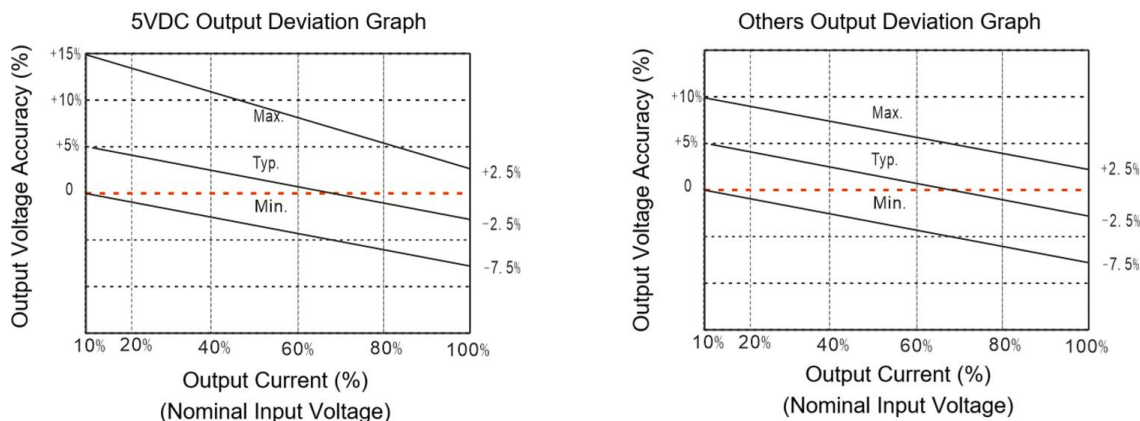


Figure 1

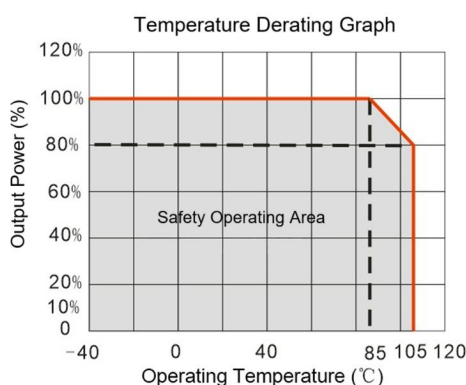


Figure 2

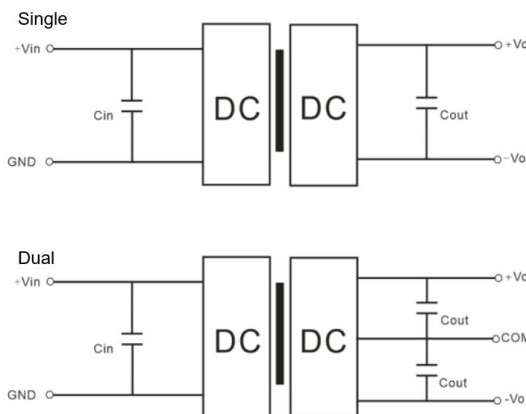
Recommended Circuits for Application

1. Requirement for the 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 circuits

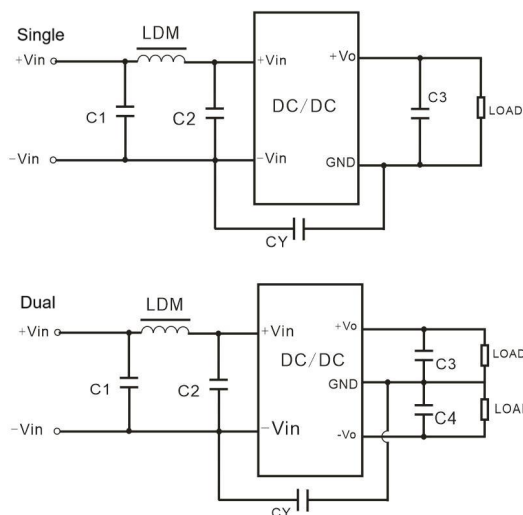
To ensure effectively decrease the input and output ripple and noise, a capacitor filter can be connected at the input and output, the application circuit is shown in the figure below. The suitable filter capacitors should be chosen as the recommended capacitive load values in Table 1. The converter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



Recommended Capacitive Load Values (Table 1)

Vin (Vdc)	Cin	Single Vout (Vdc)	Cout	Dual Vout (Vdc)	Cout
5	10uF/16V	3.3	10uF/16V	±3.3	4.7uF/16V
12	2.2uF/25V	5	10uF/16V	±5	4.7uF/16V
15	2.2uF/25V	9	2.2uF/25V	±9	2.2uF/25V
24	1uF/50V	12	2.2uF/25V	±12	1uF/50V
-	-	15	2.2uF/25V	±15	1uF/50V
-	-	24	1uF/50V	±24	470nF/50V

3. Recommended EMC circuit diagrams

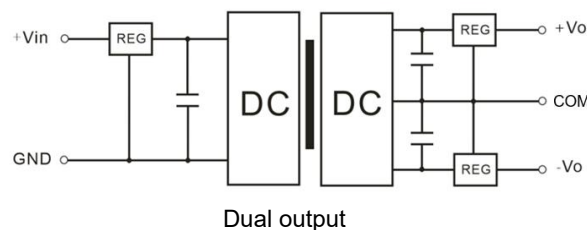
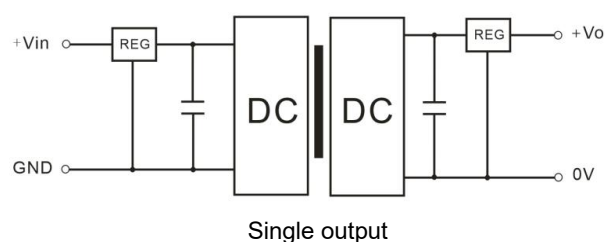


Input Volt. (single)		5Vdc	12/15/24Vdc
EMI	C1/C2	4.7uF/16V	4.7uF/50V
	CY	270pF/3kV	270pF/3kV
	C3	Refer to Cout value in Table 1	
	LDM	6.8uH	6.8uH

Input Volt. (dual)		5Vdc	12/15/24Vdc
EMI	C1/C2	4.7uF/16V	4.7uF/50V
	CY	270pF/3kV	270pF/3kV
	C3/C4	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 connect a linear regulator with overheat protection at input or output, and a capacitor filter connected in parallel as below circuits diagrams. 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 connected in parallel to increase the output power, 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 the over-load condition.
5. Unless otherwise specified, all values or indicators on this datasheet are tested at $T_a=25^{\circ}\text{C}$, 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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