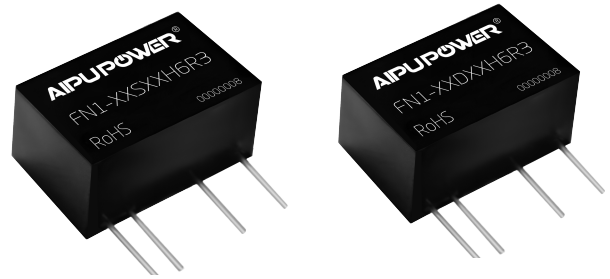


### Typical Features

- ◆ Fixed input voltage, isolated & unregulated, output power 1W
- ◆ Efficiency up to 85% (Typ.)
- ◆ Mini SIP packaging
- ◆ Isolation Voltage 5000VAC/6000VDC
- ◆ Operating Temperature from -40°C to +105°C
- ◆ Plastic case, flame class UL94 V-0



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

### 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 (VDC)		Output Voltage/ Current (Vo/Io)		Input Current (mA) Typ. Nominal Volt.		Max. Capacitive Load (uF)	Ripple & Noise① (20MHz) (mVp-p) Max/Typ.	Efficiency (%) @full load/nom. voltage	
		Nom.	Range	Vo (VDC)	Io(mA) Max/Min	Full load	No Load			Min	Typ.
ETL	FN1-05S05H6R3	5	4.5 - 5.5	5	200/20	240	20	2200	120/100	78	81
-	FN1-05S12H6R3			12	84/9	230	20	470	120/100	80	83
-	FN1-05S15H6R3			15	67/7	230	20	470	120/100	80	83
-	FN1-05D05H6R3			±5	±100/±10	240	15	1000	120/100	78	81
-	FN1-05D07H6R3			±7.2	±70/±7	225	15	470	120/100	79	83
-	FN1-05D12H6R3			±12	±42/±5	230	15	220	120/100	79	83
-	FN1-05D15H6R3			±15	±34/±4	230	15	220	120/100	79	83
-	FN1-12S05H6R3	12	10.8 - 13.2	5	200	100	10	1000	120/80	80	84
-	FN1-12S09H6R3			9	111	100	10	680	120/80	80	84
-	FN1-12S12H6R3			12	83	100	10	680	120/80	81	85
-	FN1-12S15H6R3			15	67	100	10	470	120/80	81	85
-	FN1-12D05H6R3			±5	±100	100	10	1000	120/80	80	84
-	FN1-12D09H6R3			±9	±56	100	10	470	120/80	80	84
-	FN1-12D12H6R3			±12	±42	100	10	220	120/80	81	85
-	FN1-12D15H6R3			±15	±33	100	10	220	120/80	81	85
-	FN1-24S05H6R3	24	21.6 - 26.4	5	200	52	10	1000	120/80	80	83
-	FN1-24S09H6R3			9	111	50	10	680	120/80	80	83
-	FN1-24S12H6R3			12	83	55	10	470	120/80	81	84

-	FN1-24S15H6R3			15	67	56	10	470	120/80	81	84
-	FN1-24D05H6R3			±5	±100	55	10	470	120/80	80	83
-	FN1-24D09H6R3			±9	±56	55	10	470	120/80	80	83
-	FN1-24D12H6R3			±12	±42	55	10	220	120/80	81	84
-	FN1-24D15H6R3			±15	±33	55	10	220	120/80	81	84

Note ①, The ripple and noise are tested by the twisted pair method.

**Input Specifications**

Item	Operating conditions	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	
	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	Please refer to the output voltage deviation curve (Figure 1)				
Load Regulation	10% - 100% load	--	10	15	%
Line Voltage Regulation	Input Voltage Change ±1%	--	--	1.2	--
Temperature Drift Coefficient	100% Load	--	--	±0.03	%/°C
Short Circuit Protection	Continuous, self-recovery				

**General Specifications**

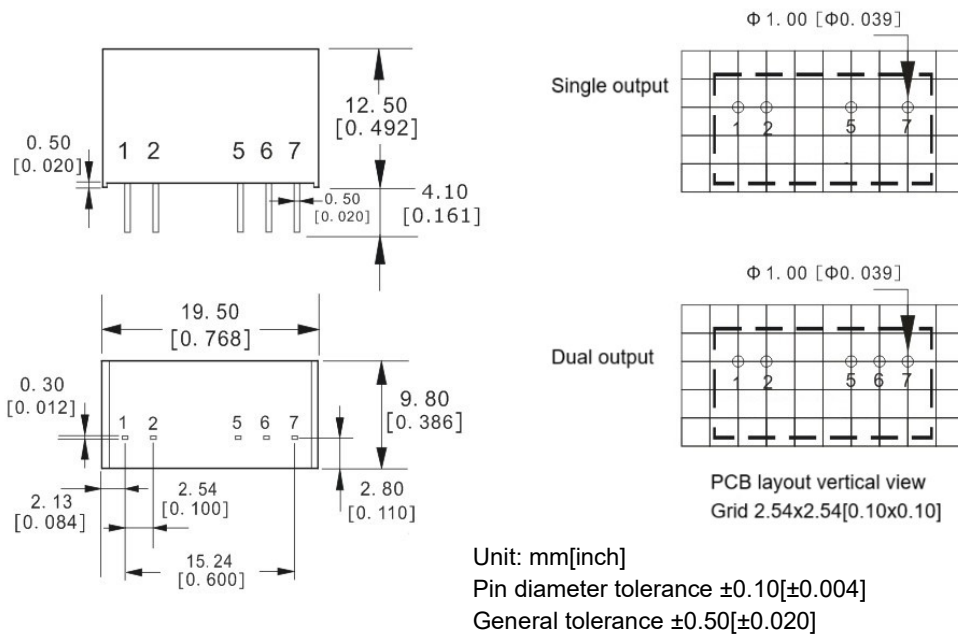
Item	Operating conditions	Min.	Typ.	Max.	Unit	
Switching Frequency	Nominal input voltage, full load	--	260	--	KHz	
Operating Temperature	Please refer to the temperature derating curve (Figure 2)	-40	--	+105	°C	
Storage Temperature		-55	--	+125		
Case temperature rise		Operating at Ta =25°C	--	30°		--
Pin Soldering Temperature		1.5mm from the case, 10S	--	--		300
Relative humidity	No condensation	5	--	95	%RH	
Isolation Voltage	Input-Output, test 1min, leakage current <1mA	6000	--	--	VDC	
		5000	--	--	VAC	

Insulation Resistance	Input-Output, @ 500VDC	1000	--	--	M Ω
Isolation Capacitor	Input/Output, 100KHz/0.1V	--	6	--	pF
Vibration	10-150Hz, 5G, 30 Min. along X, Y and Z				
MTBF	MIL-HDBK-217F@25°C	19360	--	--	K hours
Transformer Clearance distance		5	--	--	mm
Transformer Creepage distance		5	--	--	
PCB CL & CR distances		5.5	--	--	
Case Material	Plastic in Black, flame class UL94 V-0				
Unit Weight	3.7 g (Typ.)				
Cooling Method	Natural air				
Packing	Tube size (525*18*10mm)	25PCS/Tube			
	Carton size (542*110*155mm)	2000PCS/Carton (Total 80 Tubes)			
Unit dimensions	L x W x H	19.50 × 9.80 × 12.50 mm	0.768 × 0.386 × 0.492 inch		

**EMC Performance**

EMI	CE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (with Recommended EMC circuit)
	RE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (with Recommended EMC circuit)
EMS	ESD	EN60601-1-2 (IEC/EN61000-4-2 Contact ±6KV perf.Criteria B)

**Mechanical Dimensions**



**Pin Function definition**

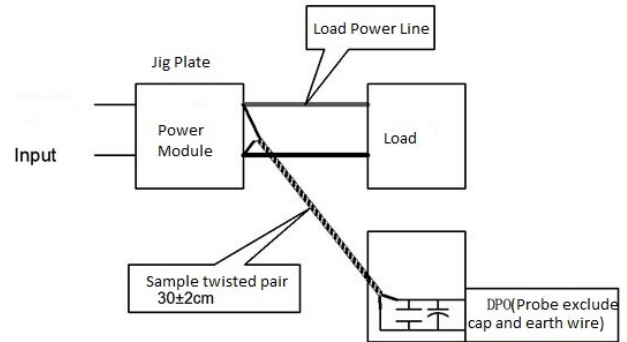
Pin No.	1	2	3, 4	5	6	7
Single(S)	+Vin	GND	No Pin	-Vout	No Pin	+Vout
Dual (D)	+Vin	GND	No Pin	-Vout	COM	+Vout

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 Instructions (Twisted Pair Method, 20MHz Bandwidth)**

1) The Ripple & noise test needs 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 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 Curves**

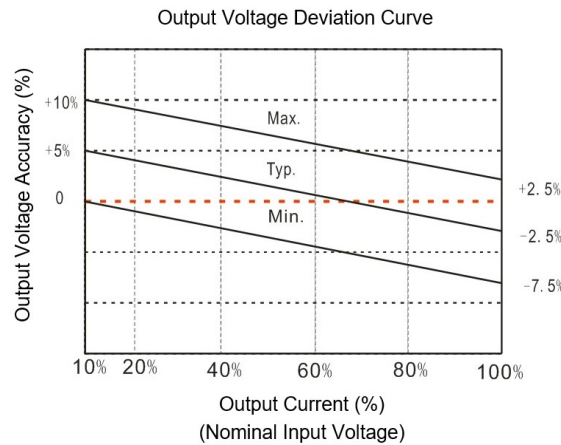


Figure 1

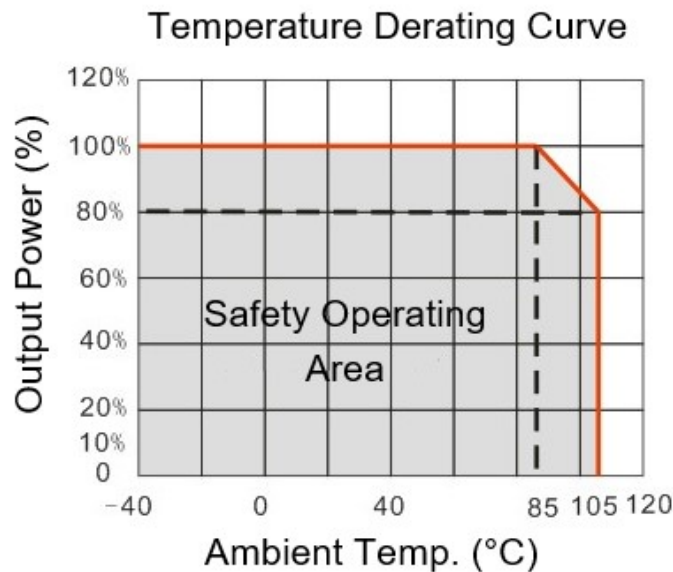


Figure 2

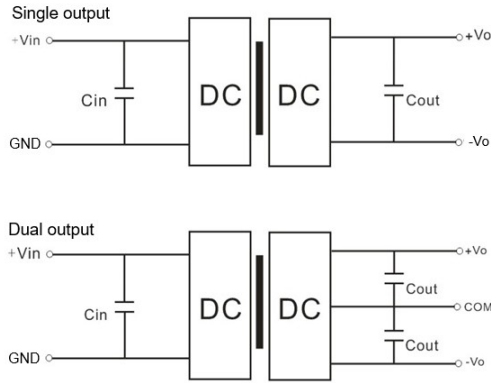
**Recommended Circuits for Application**

**1. Requirement for Output load**

The maximum capacitive load was tested at the rated full load. The converter may not start or be damaged if the output capacitors exceed this value.

**2. Typical application circuit**

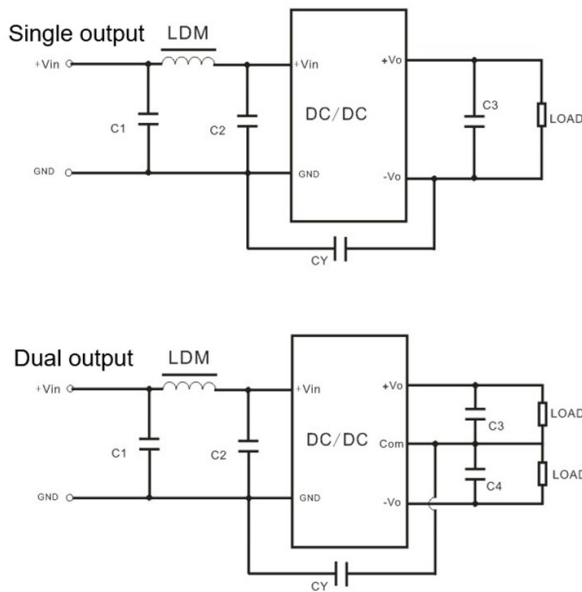
To ensure effectively decrease the input and output ripple and noise, a capacitor filter can be connected at the input and output, the application circuit is shown in the figure below. The suitable filter capacitors should be chosen as the recommended capacitive load values in Table 1. The converter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

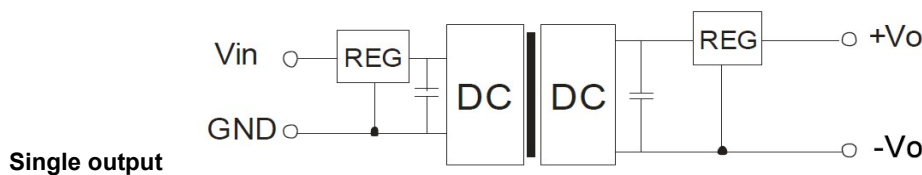


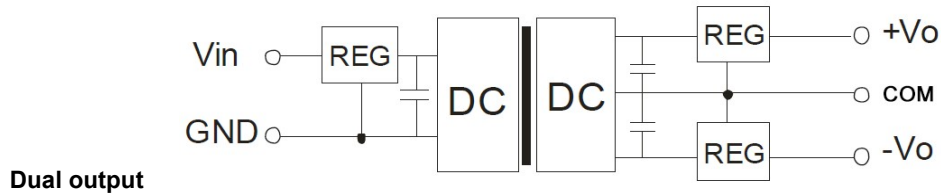
Input voltage		5VDC	12/15/24VDC
EMI	C1/C2	4.7 μF/16V	4.7 μF/50V
	CY	270 pF	270 pF
	C3	Refer to Cout in Table 1	
	LDM	6.8 μH	6.8 μH

Input voltage		5VDC	12/15/24VDC
EMI	C1/C2	4.7 μF/16V	4.7 μF/50V
	CY	270 pF	270 pF
	C3/C4	Refer to Cout in Table 1	
	LDM	6.8 μH	6.8 μH

**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 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 converters should not be used in parallel, and they do not support hot-plugging.
2. The product performance in this datasheet cannot be guaranteed if it works at a lower load than the minimum load condition.
3. All values or indicators in this datasheet had been tested based on Aipupower test specifications.

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