Typical Features

- ◆ Fixed input voltage, isolated & unregulated, output 1W
- ◆ Efficiency up to 86% (Typ.)
- ◆ Mini size SIP package
- ◆ Isolation voltage 1500VDC
- ◆ Continuous short circuit protection, self-recovery
- ◆ Operating temperature from -40℃ to +105℃
- ◆ Plastic Case, flame class UL94-V0

UL62368-1

EN62368-1

IEC62368-1

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. (%)
CE	FN1-3V3S3V3AN	3.3	2.97 - 3.63	3.3	303/30	370	8	2400	74	76
CE	FN1-3V3S05AN			5	200/20	358	8	2400	81	83
CE	FN1-3V3S12AN			12	83/9	340	10	560	83	85
CE	FN1-3V3S15AN			15	67/7	345	20	560	81	83
CE	FN1-3V3S24AN			24	42/5	360	25	220	81	83
CE	FN1-05S3V3AN	5	4.5 - 5.5	3.3	303/30	250	8	2400	78	80
CE、UL	FN1-05S05AN			5	200/20	225	8	2400	83	85
CE	FN1-05S09AN			9	111/12	227	10	1000	83	85
CE	FN1-05S12AN			12	83/9	220	10	560	83	85
CE	FN1-05S15AN			15	67/7	220	15	560	83	85
CE	FN1-05S24AN			24	42/5	266	18	220	82	84
-	FN1-09S09AN	9	8.1 - 9.9	9	111/12	128	10	560	82	84
CE	FN1-12S3V3AN	12	10.8 - 13.2	3.3	303/30	98	10	2400	75	77
UL、CB	FN1-12S05AN			5	200/20	96	10	2400	84	86
-	FN1-12S06AN			6	167/17	96	10	2400	84	86
CE	FN1-12S09AN	12	10.8 - 13.2	9	111/12	92	10	1000	84	86
UL、CE、CB、TSCA	FN1-12S12AN			12	83/9	90	10	560	84	86
CE	FN1-12S15AN			15	67/7	90	10	560	84	86
CE	FN1-12S24AN			24	42/5	92	10	220	83	85

CE	FN1-15S05AN	15	13.5 - 16.5	5	200/20	78	10	2400	83	85
-	FN1-15S09AN			9	111/12	78	10	1000	83	85
CE	FN1-15S12AN			12	83/9	76	10	1000	84	86
CE	FN1-15S15AN			15	67/7	76	10	560	83	85
CE	FN1-15S24AN			24	42/5	75	10	470	83	85
-	FN1-18S18AN	18	16.2 - 19.8	18	56/6	70	10	470	83	85
CE	FN1-24S3V3AN	24	21.6 - 26.4	3.3	303/30	52	8	2400	75	77
CE	FN1-24S05AN			5	200/20	47	8	2400	82	84
CE	FN1-24S09AN			9	111/12	48	8	1000	83	85
CE	FN1-24S12AN			12	83/9	48	8	560	84	86
CE	FN1-24S15AN			15	67/7	48	8	560	83	85
CE	FN1-24S24AN			24	42/5	49	8	220	83	85

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

Items	Test Condition	Min.	Typ.	Max.	Unit
Input inrush voltage (1Sec 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	
	18Vdc Input	-0.7	-	25	
	24Vdc Input	-0.7	-	30	
Input filter	Capacitor Filter				
Hot plug	Unavailable				

Output Specifications

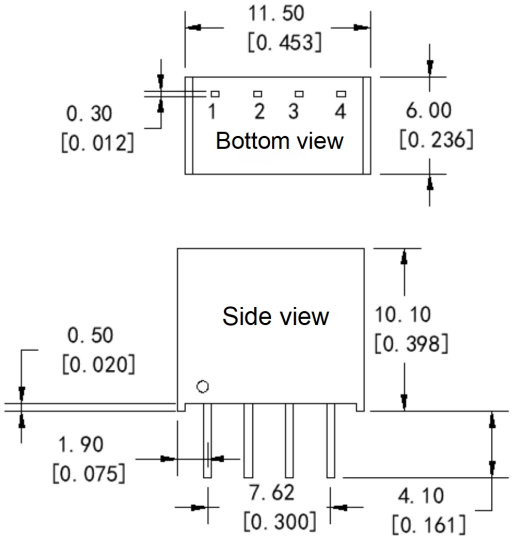
Items	Test Condition		Min.	Typ.	Max.	Unit
Output voltage accuracy	Please refer to the Output Voltage Deviation Graph (Figure 1)					
Load regulation	10%-100% load	3.3Vdc output	-	15	20	%
		Others	-	10	15	
Line voltage regulation	Input voltage change ±1%	3.3Vdc output	-	-	1.5	
		Others	-	-	1.2	
Temperature drift coefficient			-	-	±0.03	%/°C
Ripple & Noise	0%-100% load, 20MHz bandwidth	24Vdc output	-	50	100	mVp-p
		Others		30	75	mVp-p

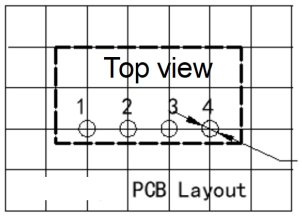
Output power		0.1	-	1	W
Short circuit protection	Continuous, self-recovery				
Note: The Ripple & Noise is tested by the Twisted Pair Method, please refer to the following test instruction.					

General Specifications

Items	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 operating 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	1500	-	-	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	1.4g (Typ.)				
Cooling method	Natural air				
Packing	Tube size (525x18x10mm)	43PCS			
	Carton size (542x110x155mm)	3440PCS (Total 80 Tubes)			
Unit dimensions	L x W x H	11.50× 6.00 × 10.10mm		0.453 × 0.236 × 0.398inch	

Mechanical Dimensions





PCB layout vertical view
Grid 2.54×2.54 [0.10×0.10]

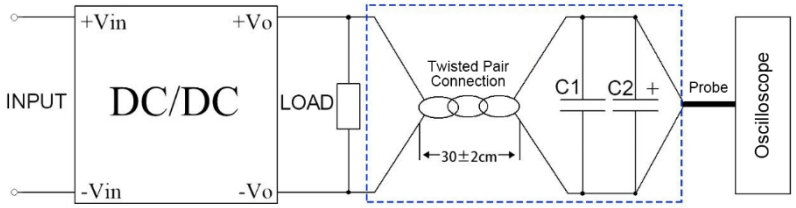
Unit:mm[inch]
Pin section tolerance: ±0.10 [±0.004]
General tolerance:±0.50 [±0.020]

Pin-out Function Description

Pin No.	1	2	3	4
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-resistance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair.
2. The power supply output connects to the load by the cables. The other side of the twisted pair (length 30cm±2 cm) should be connected in parallel with the load, the polarity of the output and the oscilloscope probe should not be reversed. The test can be start after input power on.
3. It is recommended to connect a ⩾10% load or a high-frequency low resistance E-cap(⩾100uF) load at output to avoid the output ripple increasing.

Product Characteristics Graphs

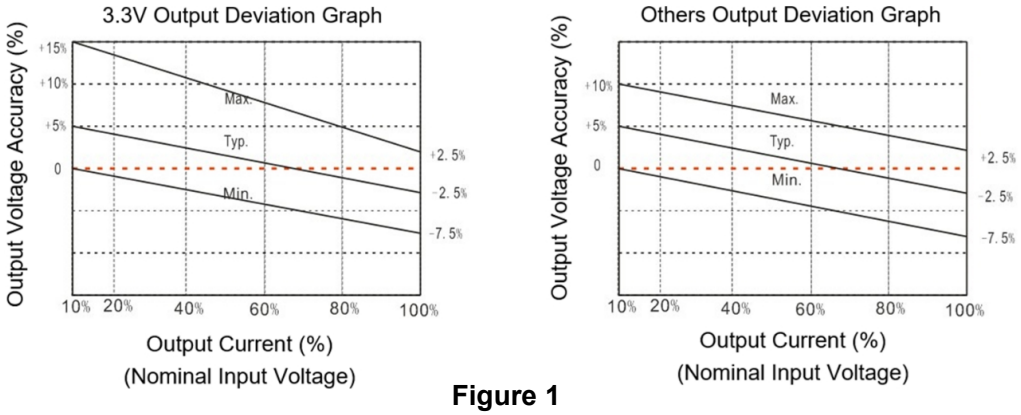


Figure 1

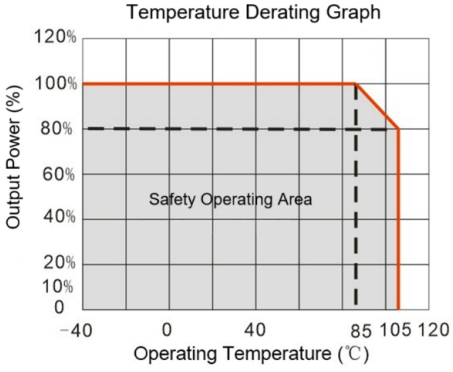


Figure 2

EMC Performance

Items		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

Recommended Circuits for Application

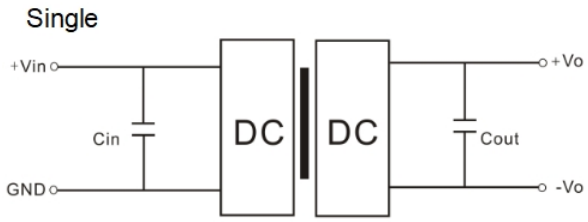
1. Requirement for Output load

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.

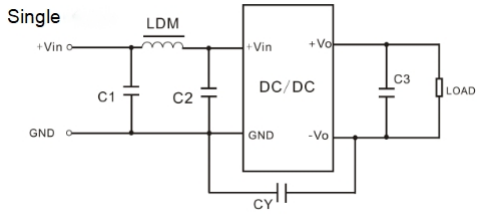
2. Typical application circuits

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	Vout(Vdc)	Cout
3.3	10uF/16V	3.3	10uF/16V
5	10uF/16V	5	10uF/16V
9	4.7uF/16V	9	2.2uF/25V
12	2.2uF/25V	12	2.2uF/25V
15	2.2uF/25V	15	2.2uF/25V
18	2.2uF25V	18	2.2uF/25V
24	1uF/50V	24	1uF/50V

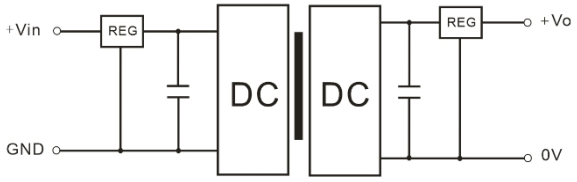
3. Recommended EMC circuit diagram



Input Voltage (Single)		3.3/5Vdc	12/15/18/24Vdc
EMI	C1/C2	4.7uF/16V	4.7uF/50V
	CY	270pF/2KVdc	270pF/2KVdc
	C3	Refer to Cout value in Table 1	
	LDM	6.8uH	6.8uH

4. Output voltage regulation and over voltage 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 FW 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 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.

Guangzhou Aipu Electron Technology Co., Ltd

Address: Building 4, HEDY Park, No.63, Punan Road, Huangpu Dist, Guangzhou, China.

Tel: 86-20-84206763 Fax: 86-20-84206762 HOTLINE: 400-889-8821

E-mail: sales@aipu-elec.com Website: https://www.aipupower.com