Typical Features

- Wide input voltage range (4:1)，Output Power 12W
- Transfer Efficiency up to 89%
- Stand-by Power Consumption as low as 0.15W
- Output super-fast start up
- Continuous Short Circuit protection, Self-recovery
- Input under voltage, output over voltage, short circuit, over current protection
- Switching Frequency 230KHz
- Isolation Voltage: 2250VDC
- Operating Temperature:-40°C~+85°C
- Good EMI performance
- International standard pin-out

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℃.

Application Field

FD12-110DXXB1C3 The newly developed DIP standard 2X1 package by Aipu, 12W output power, ultra-wide voltage 4:1 input range, ultra-low standby power consumption, isolated and regulated positive and negative dual output, DC-DC module power supply, can be widely used in railways , industrial control, instrumentation, communication, electricity, Internet of Things and other fields.

Typical Product List

Part no.	Input voltage range (VDC)		Output Voltage/Current （Vo/Io）		Input current (mA) (Nominal Voltage)		Max. Capacitive Load	Ripple & Noise		Efficiency (%)@full load	
	Nominal	Range	Voltage (VDC)	Current （mA） MAX/Min	Full Load typ	Empty Load typ	uF	mVp-p Ty	mVp-p Max	Min	Typ
*FD12-110D3V3B1C3	110	40-160	±3.3	±1200/0	86	1	3000	80	140	81	84
*FD12-110D05B1C3	110	40-160	±5	±1200/0	127	1	3000	80	140	83	86
*FD12-110D09B1C3	110	40-160	±9	±667/0	125	1	2000	80	140	84	87
FD12-110D12B1C3	110	40-160	±12	±500/0	124	1	1500	80	140	85	88
*FD12-110D15B1C3	110	40-160	±15	±400/0	123	1	1000	80	140	86	89
*FD12-110D24B1C3	110	40-160	±24	±250/0	124	1	500	80	140	85	88

1. The suffix with "C" means that the product has Ctrl control function, -T is the wiring type package, -TS is the guide rail type package, and the width of the guide rail is 35mm;
2. The maximum capacitive load refers to the capacitance capacity that the output is allowed to connect when the power supply is fully loaded and started. The positive and negative output channels have the same load capacity. If this capacity is exceeded, the power supply may not be able to start;
3. In order to reduce the no-load power consumption and improve the light-load efficiency, the IC works in a frequency jittering state at no-load and light-load, and the output cannot be no-load, at least an electrolytic capacitor with a 15% load or a high-frequency resistance above 470uF is required, otherwise It will cause the output voltage ripple to increase;

Input Specification

Stand-by Consumption	0.15 W(TYP)	
Input Filter	π filter	
Input undervoltage	34VDC Input	
CTRL*	Module turn-on	CTRL suspended or connect to TTL high level （3.5-12VDC）
	Module turn-off	CTRL connect to GND or low level (0-1.2VDC)
	Input current when switched off	5mA (TYP)

Note: *The voltage of CTRL pin is relative to -Vin pin.

Output Specification

Output Voltage Accuracy	Full voltage full load	Vo	±2.0%
Auxiliary output voltage	Full voltage full load	Vo	±3.0%
cross adjustment rate	Main circuit 50% load, auxiliary circuit 10~100% load		±5.0%
Voltage regulation	Nominal load, full voltage range	Vo	±0.5%
load regulation	10% ~ 100% rated load	Vo	±1.0%
Ripple & Noise	Nominal load, nominal voltage, twisted pair test method, 20MHz bandwidth;	≤15% Load	5%Vo mVp-p typ
		≥15% Load	80mVp-p typ，140mVp-p max
Output Over-voltage	120%~200%Vo		
Output overload protection	110%~220%Io		
Output short circuit protection	sustainable, self-healing		
Dynamic Response	25% nominal load step △Vo/△t	3.3V、5V output	±3% typ , ±8% max /500us
		other output	±3% typ , ±5% max /500us
Output voltage regulation	No adjustment end		
start delay time	Typical value	60ms	
Output voltage settling time	Rated input meets output	10mS	
Output startup overshoot voltage		≤10%Vo	

Note: For individual models, when the high voltage input and load is less than or equal to 15%, the ripple may be greater than or equal to 140mv.

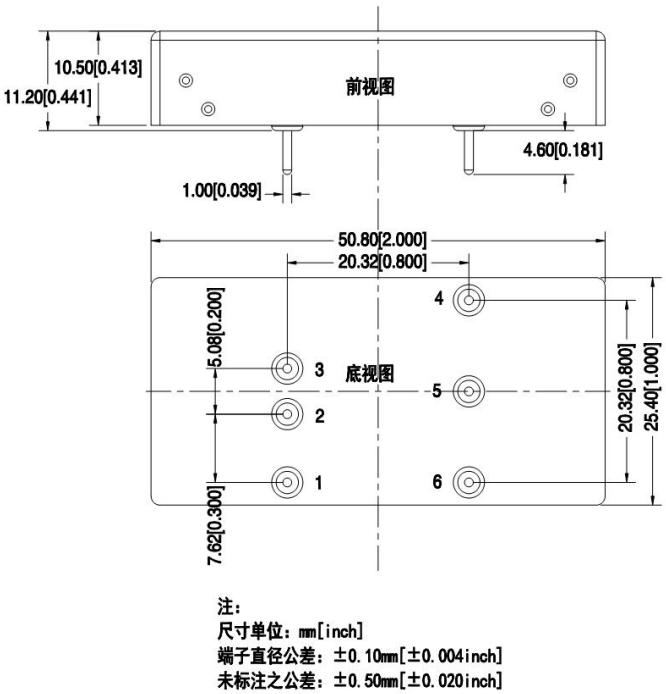
General Specification

Switching Frequency	Typical	230KHz
Operating Temperature	Refer to Temperature Derating	-40℃ ~ +85℃
Storage Temperature		-55℃ ~ +125℃
Max Case Temperature	Within Operating Curve	+105℃
Relative Humidity	No condensing	5%~95%
Case Material		Aluminum Metal Case
Cooling Method		Free air convection
Isolation Voltage	Input to Output	2250Vdc ≤ 0.5mA / 1min
Meantime Between Failure	MIL-HDBK-217F@25℃	$2X10^5$Hrs
Product Weight	Average	20g

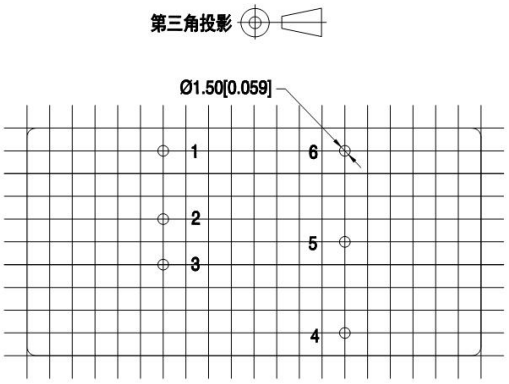
EMC Characteristics

Total Items		Sub Items	Test Standard	Class
EMC	EMI	CE	CISPR22/EN55032	CLASS B （The recommended circuit is shown in Fig.②）
		RE	CISPR22/EN55032	CLASS B （The recommended circuit is shown in Fig.②）
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria B （The recommended circuit is shown in Fig.2）
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria B（The recommended circuit is shown in Fig.2）
		ESD	IEC/EN61000-4-2	Contact ±4KV Perf.Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf.Criteria B （The recommended circuit is shown in Fig.1）
		EFT	IEC/EN61000-4-4	±2KV Perf.Criteria B （The recommended circuit is shown in Fig.1）
		Voltage dips, short interruptions and voltage variations	IEC/EN61000-4-11	0%~70% Perf.Criteria B

B1 Packing Dimension



注：
尺寸单位：mm[inch]
端子直径公差：±0.10mm[±0.004inch]
未标注之公差：±0.50mm[±0.020inch]



注：栅格距离2.54*2.54mm

引脚方式	
引脚	功能
1	Ctrl
2	-Vin
3	+Vin
4	+Vo
5	COM
6	-Vo

Package code	L x W x H
B1	50.8X 25.4X11.2 mm

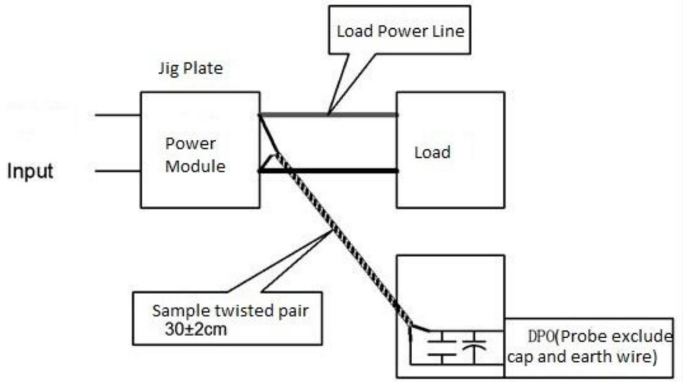
Note: If the definition of each pin of the power module is inconsistent with the selection manual, the label on the physical label shall prevail.

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

Testing method:

1. Ripple noise is connected by 12# twisted pair, and the oscilloscope
The bandwidth is set to 20MHz, 100M bandwidth probe, and
A 0.1uF polypropylene capacitor and a 10uF high frequency are connect
Low-resistance electrolytic capacitors, oscilloscope sampling uses Sampl
model.

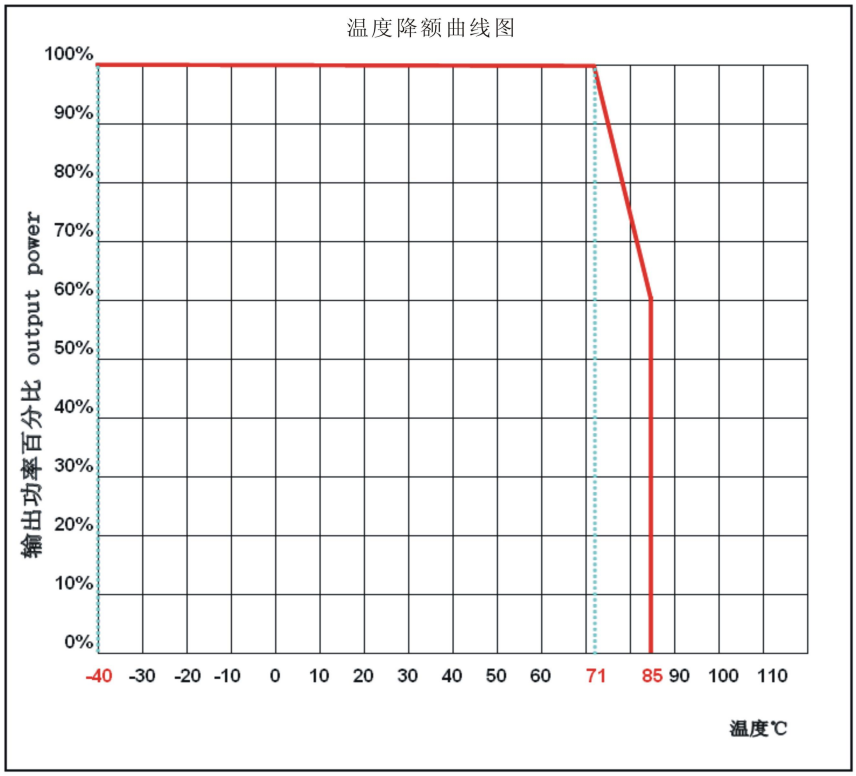
2. Schematic diagram of output ripple noise test:
Connect the power input terminal to the input power supply, and the pc
The jig board is connected to the electronic load, and the test uses 30cm
The sampling line is directly sampled from the power output port. powe
The size of the outgoing current selects the wire with the insulation shea



Application Reference:

1. It is recommended to output a minimum load of 15% or an electrolytic capacitor with a high frequency resistance above 470uF, otherwise the output voltage ripple will increase;
2. It is recommended that the load imbalance of dual output products is less than ±5%;
3. The maximum capacitive load is obtained from the pure resistance full load condition test;
4. Our company can provide the overall solution of power supply, or product customization; due to limited space, if you have any other questions, please contact the relevant personnel of our company

Product Characteristic Curve



Design reference applications

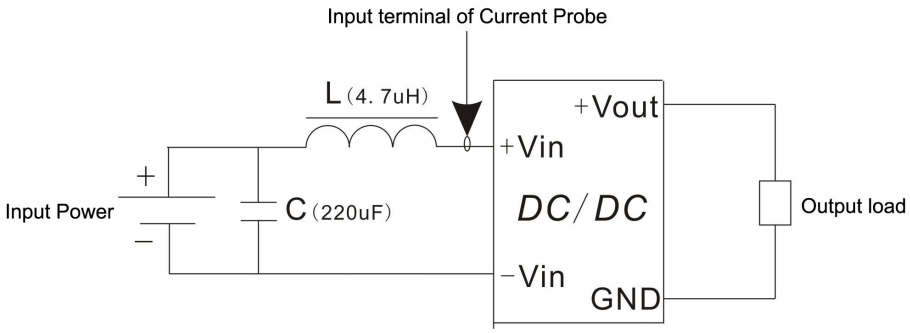
Test recommended circuit:

1. DC/DC test circuit:

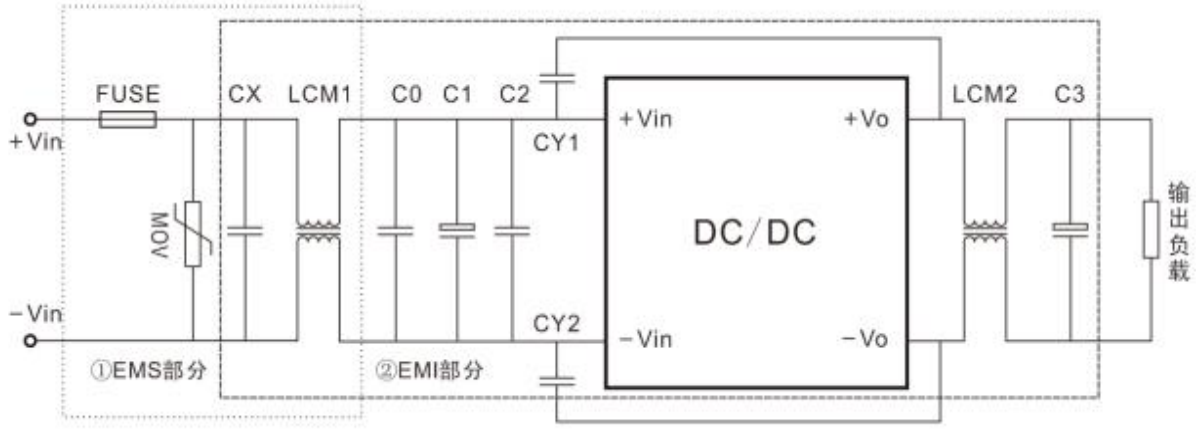
Normal recommended capacitors：Cin：47-100uF； Cout：470uF.

2. Input reflecting ripple current test circuit:

Capacitor C choose low ESR ones, withstand voltage value should be bigger than max input voltage;



3. EMC external recommended circuit



Recommended Spec:

Device code	110V input product
FUSE	Access the corresponding fuse according to customer needs
MOV	14D201K
CX	0.47 uF
LCM1	10mH
C0	1uF/250V
C1	100uF/200V
C2	1uF/250V
LCM2	30uH
C3	47uF/50V
CY1,CY2	2.2nF/2000V

Note 1:

1. The product should be used within the specification range, otherwise it will cause permanent damage to the product;

2. If the product works below the minimum required load, the product performance cannot be guaranteed to meet all the performance indicators in this manual;

3. If the product works beyond the product load range, it cannot be guaranteed that the product performance meets all the performance indicators in this manual;

4. Unless otherwise specified, the above data are all measured at Ta=25℃, humidity <75%, input nominal voltage and output rated load (pure resistive load);

5. All the above index test methods are based on the company's standards;

6. The above are the performance indicators of the product models listed in this manual. Some indicators of non-standard models will exceed the above requirements. For details, please contact our technical staff directly;

7. Our company can provide product customization;

8. Product specifications are subject to change without prior notice. Please pay attention to the latest manual published on our official website.

