Typical Feature

- 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
- Isolation Voltage: 2250VDC
- Operating Temperature:-40°C~+85°C
- Good EMI performance
- International standard pin-out

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 Typ	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	121	1	700	80	140	87	89
*FD12-110D24B1C3	110	40-160	±24	±250/0	124	1	500	80	140	85	88

Note:

1. "*" indicates a model under development;
2. The suffix "C" indicates a product with Ctrl control function, -T indicates a wiring package, -TS indicates a guide rail package, and the guide rail width is 35mm;
3. The maximum capacitive load refers to the capacitance allowed to be connected when the power supply is fully loaded and started. The positive and negative outputs have the same capacitance. If the capacitance exceeds this capacity, the power supply may not start;
4. In order to reduce no-load power consumption and improve light-load efficiency, the IC works in a jittering state when no-load and light-load. The output cannot be no-loaded. It must carry at least 25% load or an electrolytic capacitor with a high-frequency resistance of more than 470uF, otherwise it will cause the output voltage ripple to increase;

Input Specification

Items	Test Conditions	Min	Typ.	Max	Unit
Standby power consumption	Input voltage range	/	0.15	/	W
Input under voltage protection	110V Nominal Input	34	/	40	VDC
Input surge voltage (1sec.max)	110V Nominal Input	-0.7	/	180	VDC
Start-up Time	/	/	60	/	ms
Hot Plug	/	N/A			
Input filter	/	π filter			
CTRL	Module is turned on	CTRL is left floating or connected to high level（3.5V-12VDC）			
	Module shutdown	CTRL connected to-Vin or low level（0-1.2VDC）			
	Input current at shutdown	5mA (TYP)			

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

Output Specification

Items	Test Conditions		Min	Typ.	Max	Unit
Output Voltage Accuracy	Input voltage range	Vo1	/	±1	±2	%
		Vo2	/	±1.5	±3	%
Cross-regulation rate	Vo1：50% load；Vo2：10~100% load		/	±3	±5	%
Voltage Regulation	Full voltage range, full load		/	±0.2	±0.5	%
Load Regulation	10%~100% load		/	±0.5	±1	%
Ripple & Noise	25%-100%load, 20MHz bandwidth		/	80	140	mVp-p
Dynamic Response	25% of nominal load step, nominal input voltage	/	/	300	500	us
Dynamic Response Deviation		5V output	/	±5	±8	%
		Other output	/	±3	±5	%
Output voltage settling time	Rated input meets output		/	10	/	ms
Output voltage adjustable	Input voltage range		Unavailable			
Output over-voltage Protection			120	160	200	%Vo
Output over-current Protection			110	160	220	%Io
Output start-up overshoot			/	/	10	%Vo
Output Short circuit Protection			Continuous, self-recovery			

Note: 0% - 25% load ripple & noise is less than or equal to 5%Vo; ripple & noise test adopts twisted pair test method, see ripple & noise test instructions for details.

General Specification

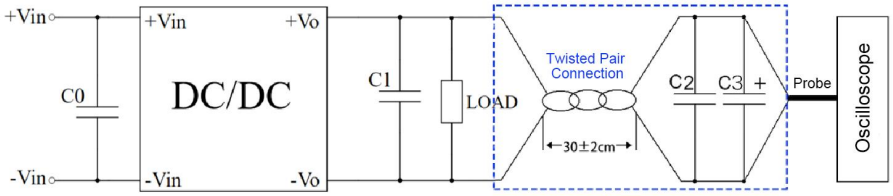
Items	Test Conditions	Min	Typ.	Max	Unit
Switching Frequency	Operating mode（PWM）	/	230	/	KHz
Operating Temperature	Refer to temperature derating curve	-40	/	+85	℃
Storage Temperature	/	-55	/	+125	
Max Case Temperature	Refer to product characteristic curve	/	/	+105	
Pin resistance soldering	The distance between the soldering point	/	/	300	
Relative Humidity	No condensation	5	/	95	%RH
Isolation Voltage	I/P-O/P, test for 1min, leakage current is less than 0.5mA	2250	/	/	VDC
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Cooling method	Natural air cooling				
Shell material	Metal Aluminum				

Weight/ Dimension	Model No.	Weight	L x W x H	
	FD12-110DXXB1C3	20g	50.8X 25.4X11.2 mm	2.00 X 1.00 X 0.440 inch

EMC Characteristics

Total Items		Sub Items	Test Standard	Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B （EMC Recommended Circuit）
		RE	CISPR32/EN55032	CLASS B （EMC Recommended Circuit）
	EMS	RS	IEC/EN61000-4-3	10V/m Perf.Criteria B （EMC Recommended Circuit）
		CS	IEC/EN61000-4-6	3Vr.m.s Perf.Criteria B （EMC Recommended Circuit）
		ESD	IEC/EN61000-4-2	Contact ±4KV Perf.Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf.Criteria B （EMC Recommended Circuit）
		EFT	IEC/EN61000-4-4	±2KV Perf.Criteria B （EMC Recommended Circuit）
		Voltage dips, short Interruptions and voltage variations	IEC/EN61000-4-11	0%~70% Perf.Criteria B

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



Test conditions:

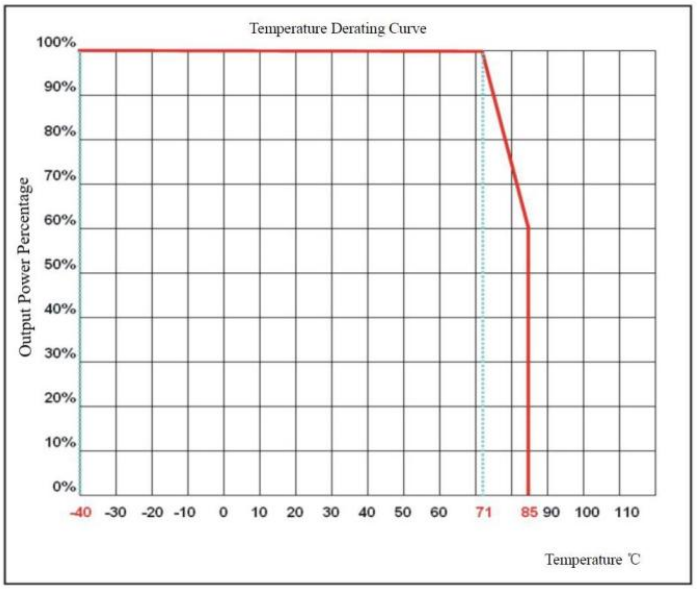
1. Ripple noise is connected using 12# twisted pair cable, oscilloscope sampling uses sampling mode, oscilloscope bandwidth is set to 20MHz, 100M bandwidth probe is used, probe cap and ground clip are removed; and C2 (0.1uF) polypropylene capacitor and C3 (10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel at the probe end of the twisted pair cable, and the capacitance values of C0 and C1 refer to the design application circuit data;

2. Ripple noise test: The module input end (INPUT) is connected to the input power supply, and the power supply output is connected to the electronic load (LOAD) through the power line. The test is sampled from the power supply output port with a 30±2 cm twisted pair cable alone, and connected to the oscilloscope probe according to polarity.

3. It is recommended to output a minimum load of 25% or connect an electrolytic capacitor with a high-frequency resistance of more than 470uF, otherwise the output voltage ripple will increase;

4. It is recommended that the load imbalance of dual-channel output products is less than ±5%.

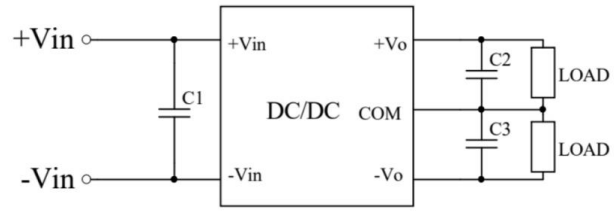
Product Characteristic Curve



Design reference applications

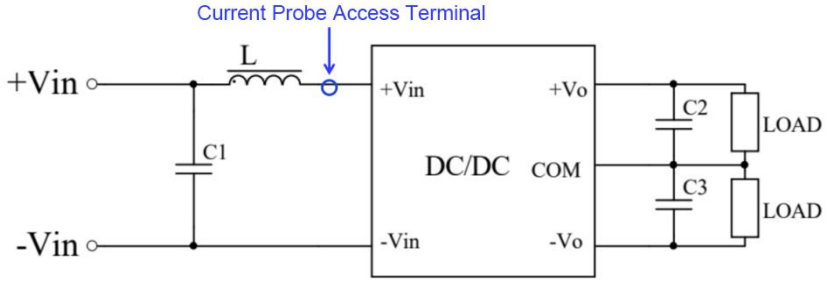
Recommended circuit

1. This series of module power supplies are tested according to this peripheral circuit before leaving the factory. Increasing the capacity of C0 or C1 can reduce the output ripple, but the output capacity must be less than the maximum capacitive load;



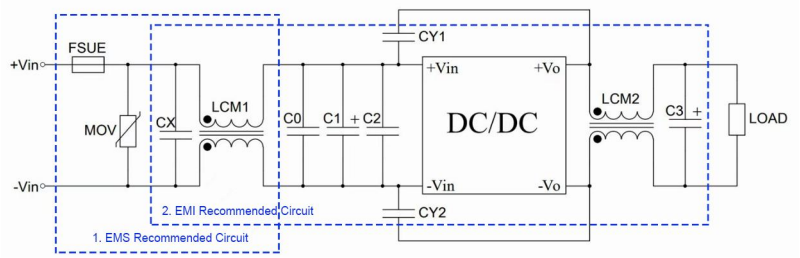
Component	Parameter
C1	47-100uF/200V
C2、C3	470uF/50V

2. Input reflected ripple current test peripheral circuit:



Component	Parameter
C1	220uF/200V
L	4.7uH/15A
C2、C3	470uF/50V

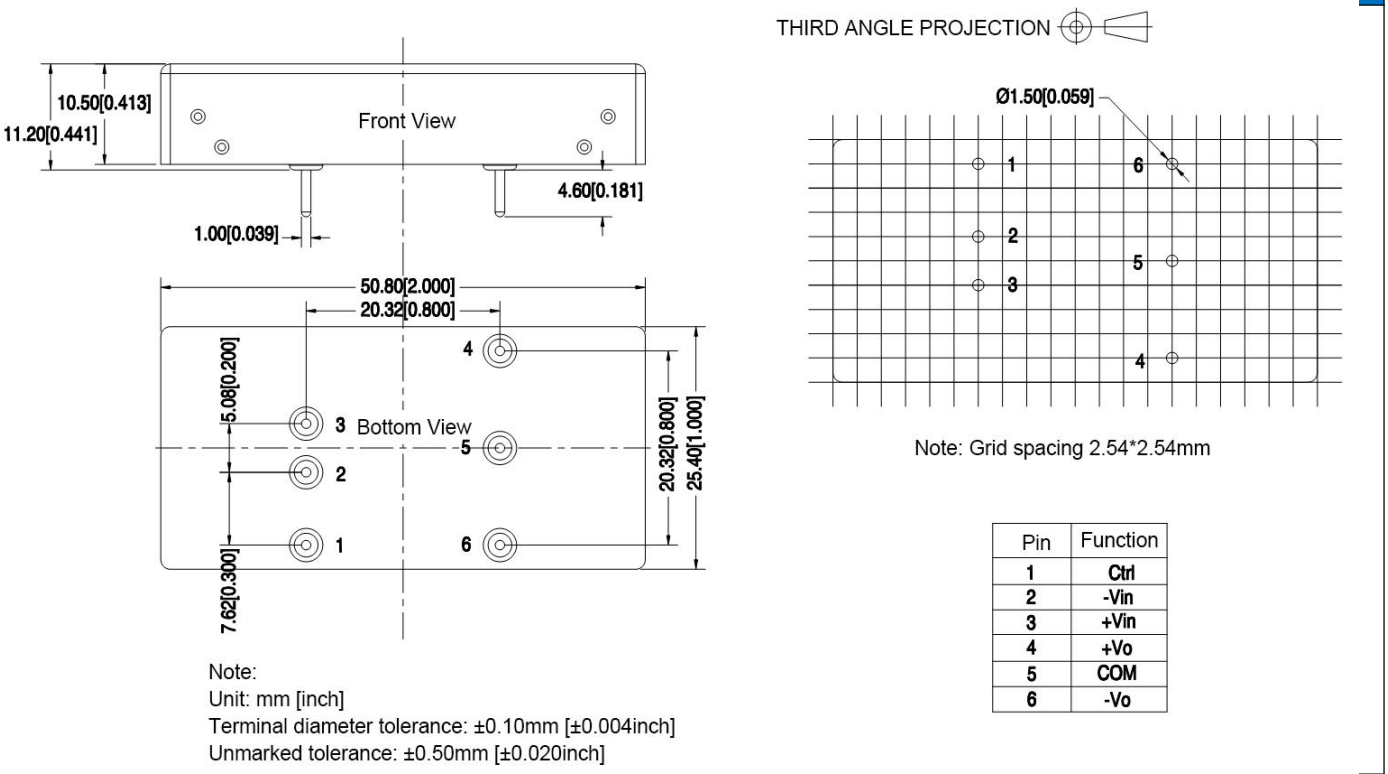
3. Recommended EMC peripheral circuits:



Component	110V nominal input
FUSE	Choose according to customer needs
CX	0.47 uF
MOV	14D201K
C0、C2	1uF/250V
LCM1	15mH
C1	100uF/200V
C3	47uF/50V
CY1,CY2	2.2nF/2KV

Note: Part 1 in the figure is for EMS testing, and part 2 in the figure is for EMI filtering, which can be adjusted according to the situation.

B1 Package Dimension



Note: Grid spacing 2.54*2.54mm

Pin	Function
1	Ctrl
2	-Vin
3	+Vin
4	+Vo
5	COM
6	-Vo

Note:
Unit: mm [inch]
Terminal diameter tolerance: ±0.10mm [±0.004inch]
Unmarked tolerance: ±0.50mm [±0.020inch]

Pin	1	2	3	4	5	6
FD12-110DXXB1C3	Ctrl	-Vin	+Vin	+Vo	COM	-Vo

Note:

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.

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

