Typical Features

- Wide input voltage range (4:1), output power 12W
- Efficiency up to 89% (Typ.)
- Standby power consumption 0.15W (Typ.)
- Continuous short circuit protection, self-recovery
- Input under voltage protection, output over voltage & over current protections
- Isolation voltage 2250VDC
- Operating temperature from -40°C to +85°C
- Good EMC performance
- Standard pin-out alignment

Application Field

FD12-110DXXB1C3 series ---- DIP mounting standard 2″X1″ package DC-DC modular converters with wide input voltage range 4:1, low standby power consumption， isolated & regulated dual output power 12W. This series of products can be widely used in the fields of Industrial control, Instrument, Communication, Electricity power and IoT, etc. Additional circuit diagram for EMC is recommended for the application with high EMC requirement.

Typical Product List

Certificate	Part No.	Input Voltage Range		Output Voltage/Current （Vo/Io）		Input Current @Nominal volt. (mA) Typ.		Max Capacitive load	Efficiency @Full load, nominal volt.	
		Nominal (VDC)	Range (VDC)	Vo (VDC)	Io (mA)	Full load	No load	(uF)	Min (%)	Typ (%)
-	*FD12-110D3V3B1C3	110	40 - 160	±3.3	1200	86	1	3000	81	84
-	FD12-110D05B1C3			±5	1200	127	1	3000	83	86
-	*FD12-110D09B1C3			±9	667	125	1	2000	84	87
-	FD12-110D12B1C3			±12	500	124	1	1500	85	88
-	FD12-110D15B1C3			±15	400	121	1	700	87	89
-	*FD12-110D24B1C3			±24	250	124	1	500	85	88

Note 1: The * marked parts have been developed in process.

Note 2: The part number letter C indicates the part with ON/OFF Control.

Note 3: The maximum capacitive load is the capacitance allowed to be used when the power supply starts at full load. The converter may not start if the dual output capacitors exceed this value.

Note 4: The chip could operate at jitter frequency situation with no load or light load to decrease the no-load power consumption, so no load is not available. ≥25% load or a high frequency low impedance E-cap(≥470uF) load is recommended, to avoid the output ripple increasing.

Note 5: Please contact Aipu sales for other output voltages requirements of this series but not listed in this table.

Input Specifications

Items	Test Conditions	Min	Typ.	Max	Unit
Standby power consumption	Full input voltage range	/	0.15	/	W
Input current Max	Full input voltage range	/	/	0.4	A
Start-up voltage	110V nominal input series	/	/	40	VDC
Under voltage protection	110V nominal input series	34	/	40	VDC
Input inrush voltage (1sec.max)	110V nominal input series	-0.7	/	180	VDC
Input filter	/	Pi type filter			
Hot-plug	/	NA			
ON/OFF control (*Ctrl)	Turn ON the converter	No connection or connected to high level (3.5V-12VDC)			
	Turn OFF the converter	Connected to -Vin or the low voltage level (0-1.2VDC)			
	Input current for switching OFF	/	5	/	mA

*Note: The Ctrl voltage is relative to the input -Vin.

Output Specifications

Items	Test Conditions		Min	Typ.	Max	Unit
Output voltage accuracy	0%-100% load	+Vo	/	±1	±2	%
		-Vo	/	±1.5	±3	%
Cross regulation	+Vo: 50% load / -Vo: 10~100% load		/	±3	±5	%
Line regulation	Full input 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 time	25% rated load step, full input voltage range		/	300	500	uS
Dynamic response deviation	25% rated load step, nominal input voltage	5V output	/	±5	±8	%
		Others	/	±3	±5	%
Temperature drift coefficient			/	/	±0.03	%/°C
Turn on delay time	Nominal input voltage		/	60	/	mS
Output voltage start-up	Rated input voltage		/	10	/	mS
Output overshoot	Full input voltage range		/	/	10	%Vo
Over voltage protection			120	160	230	%Vo
Over current protection			110	160	220	%Io
Short Circuit Protection			Continuous, self-recovery			

Note: Ripple & Noise ≤5%Vo at 0% - 25% load, it is tested by the Parallel-line method (refer to the following test instruction).

General Specifications

Items	Test Conditions	Min	Typ.	Max	Unit
Switching frequency	Operating Mode (PWM)	/	230	/	KHz
Operating temperature	Refer to the Temperature Derating Graph	-40	/	+85	℃
Storage temperature		-55	/	+125	℃
Case temperature	Within the operating derating range	/	/	+105	℃

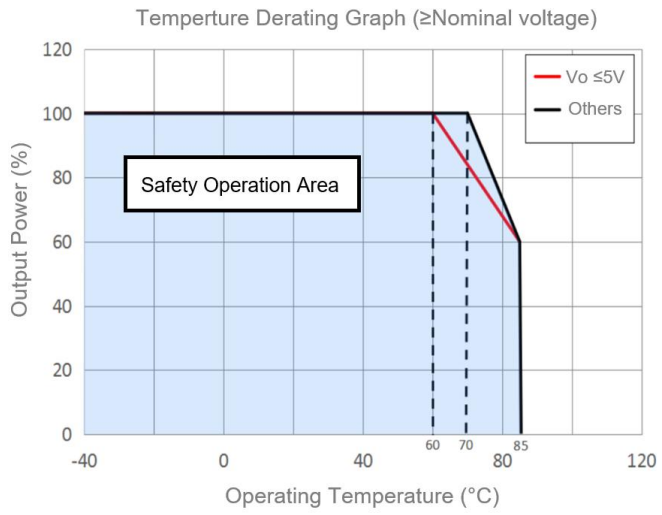
Pin soldering temperature	1.5mm from the case, soldering time 10S	/	/	300	℃
Relative humidity	No condensing	5	/	95	%RH
Isolation voltage	I/P – O/P, test 1min, leakage current <1mA	2250	/	/	VDC
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Cooling method	Nature air				
Vibration	10-150Hz, 5G, 0.75mm, along X, Y and Z				
Case material	Aluminum				

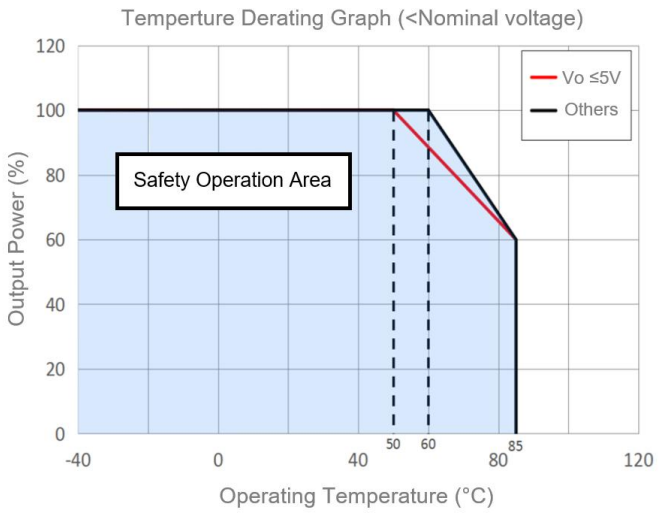
Weight/Dimensions	Part No.	Weight (Typ)	Dimensions L x W x H	
	FD12-110DXXB1C3	20g	50.8 X 25.4 X 11.2 mm	2.000 X 1.000 X 0.441 inch

EMC Performance

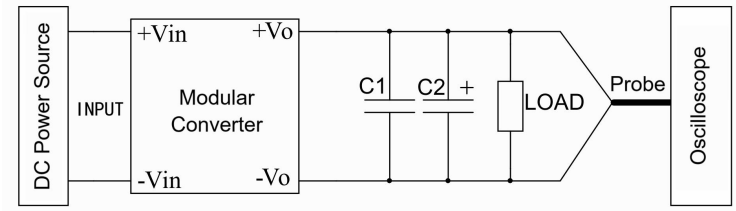
Item			Test Standard	Performance/Class
EMC	EMI	CE	CISPR32/EN55032	CLASS B (with the Recommended EMC Circuit)
		RE	CISPR32/EN55032	CLASS B (with the Recommended EMC Circuit)
	EMS	RS	IEC/EN61000-4-3	10V/m Perf. Criteria B (with the Recommended EMC Circuit)
		CS	IEC/EN61000-4-6	3V r.m.s Perf. Criteria B (with the Recommended EMC Circuit)
		ESD	IEC/EN61000-4-2	Contact ±4KV Perf. Criteria B
		Surge	IEC/EN61000-4-5	±2KV Perf. Criteria B (with the Recommended EMC Circuit)
		EFT	IEC/EN61000-4-4	±2KV Perf. Criteria B (with the Recommended EMC Circuit)

Temperature Derating Graphs





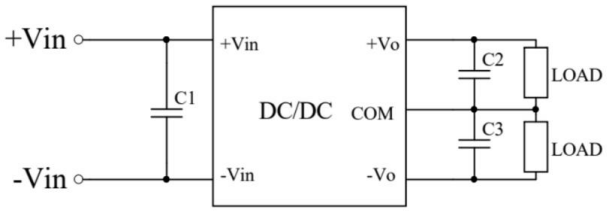
Ripple & Noise Test Instruction (Parallel-line Method, 20MHz Bandwidth)



1. The Ripple & Noise test needs the cables in parallel, an oscilloscope that should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. One polypropylene capacitor C1(0.1uF) and one high frequency low impedance electrolytic capacitor C2(10uF) are connected in parallel with the probe.
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 test can start at the converter output terminals after the input power on.
3. It is recommended to use a ≥25% load or a high frequency low impedance electrolytic capacitor (≥470uF) load at the output to avoid the output ripple increasing.

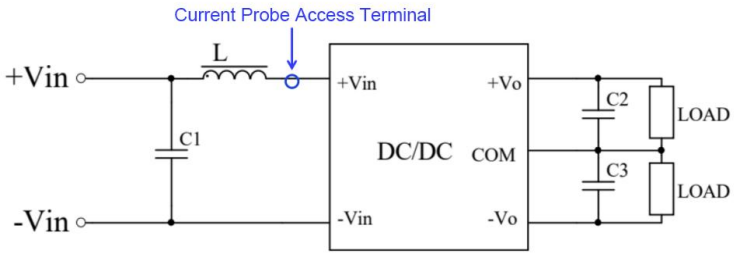
Recommended Circuits for Application

1, All this series of converters will be tested according to this circuit diagram below before shipping. To increase the capacitances of C2 & C3 can decrease the output ripple, but the output capacitance must be less than the Max capacitance load defined.



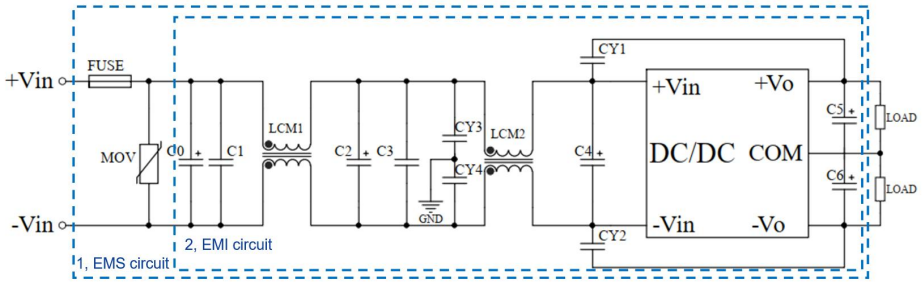
Components	Parameters
C1	47-100uF/200V
C2, C3	470uF/50V

2, Input reflected ripple current test circuit diagram



Components	Parameters
C1	220uF/200V
L	4.7uH/15A
C2, C3	470uF/50V

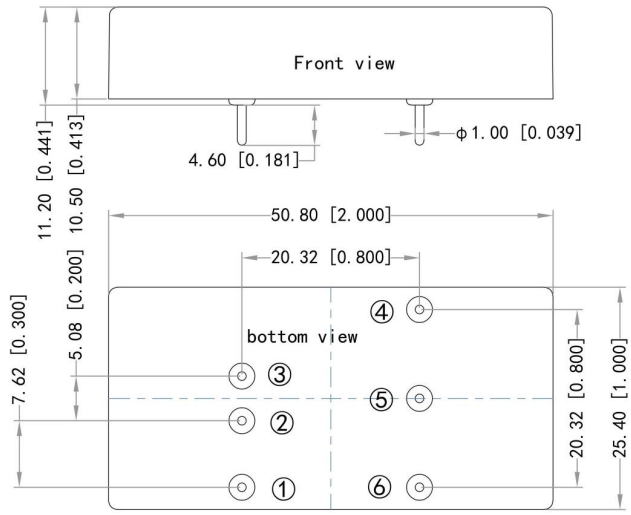
3, Recommended EMC circuit diagram

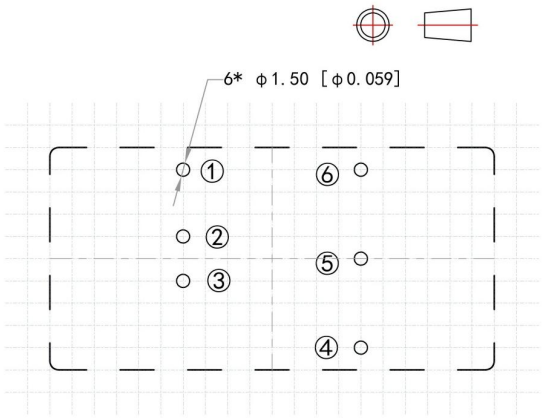


Note: Part 1 circuit is for EMS, part 2 for EMI filtering, both can be adjusted according to the actual situation.

Components	Nominal 110V series
FUSE	TBD by customer
MOV	14D201K
C0, C2, C4	330uF/200V
C1, C3	100nF/250V
LCM1, LCM2	4.7mH
C5, C6	470uF/50V
CY1, CY2	Y1/102M/400VAC
CY3, CY4	Y1/222M/400VAC

Mechanical Dimensions





PCB layout vertical view
Grid 2.54x2.54[0.10x0.10]

Unit: mm(inch)
Pin diameter tolerance: ±0.10(±0.004)
General tolerance: ±0.50(±0.020)

Pin-out Function Description

Pin No.	1	2	3	4	5	6
FD12-110DXXB1C3	Ctrl	-Vin	+Vin	+Vo	COM	-Vo

Application Notice

1.The product should be used according to the specifications, otherwise it could be permanently damaged.

2. The product performance cannot be guaranteed if it works at a lower load than the minimum load defined.

3. The product performance cannot be guaranteed if it works under over-load condition.

4. 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).

5. All values or indicators on this datasheet have been tested based on Aipupower test specifications.

6.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.

7. Aipupower can provide customization service.

8. The product should operate under the condition of nature air, please contact us if it could be used at a closed space.

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