DC/DC Converter
FD12-110DXXB1C3 Series

Typical Feature

- Wide input voltage range (4:1), Output Power 12W
- Efficiency up to 89% (Typ.)
- Stand-by Power Consumption 0.15W (Typ.)
- Output fast start-up
- Continuous Short Circuit protection, self-recovery
- Input under voltage, output over voltage, short circuit, over current protections
- Isolation Voltage 2250VDC
- Operating Temperature from -40°C to +85°C
- Good EMI performance
- International standard pin-out

Application Field

FD12-110DXXB1C3 Series ----- *DIP mounting standard 2"X1" size packaging DC-DC modular converters with wide input voltage range (4:1), low standby power consumption, isolated and regulated dual outputs power 12W. This series of products can be widely used in the fields of industrial control, instrumentation, communication, electricity power and Internet of Things, etc. The additional circuit for EMC is recommended in this data sheet for the application with high EMC requirement.*

Typical Product List

Certificate	Part No.	Input voltage range (VDC)		Output Voltage/Current (Vo/Io)		Input current (mA)@ Nominal Volt.		Capacitive Load	Ripple & Noise (mVp-p)		Efficiency (%) @full load	
		Nom.	Range	Vo (VDC)	Io(mA) Max/Min	Full Load	No Load	(uF) Max	Typ	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 - * marked part has been developed in process.

Note 2 - The maximum capacitive load is the capacitance allowed to be used when the power supply operates at full load. The converter may not start if the capacitor exceeds this value.

Note 3 - The chip could operate at jitter frequency situation at no load or light load to decrease no-load power consumption, so no load is not available. ⩾25% load or a high-frequency resistance E-cap(⩾470uF) load is recommended to avoid the output ripple increasing.

Input Specifications

Items	Test Conditions	Min	Typ.	Max	Unit
Standby power consumption	Full input voltage range	/	0.15	/	W
Input under voltage protection	/	34	/	40	VDC
Input Inrush voltage (1sec.max)	/	-0.7	/	180	VDC
Start-up Time	/	/	60	/	mS
Hot Plug	/	N/A			
Input filter	/	π filter			
CTRL*	Turn-on the converter	No connection or connect to high level (3.5V-12VDC)			
	Shut off the converter	Connect to -Vin or low level（0-1.2VDC）			
	Current value to shut off the converter	5mA (TYP)			
Note - The voltage of CTRL is relative to -Vin.					

Output Specifications

Items	Test Conditions		Min	Typ.	Max	Unit
Output Voltage Accuracy	Full input voltage range	Vo1	/	±1	±2	%
		Vo2	/	±1.5	±3	%
Cross Regulation	Vo1：50% load / Vo2：10~100% load		/	±3	±5	%
Voltage 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	25% of rated load step, Nominal input voltage	/	/	300	500	uS
Dynamic Response Deviation		5V output	/	±5	±8	%
		Others output	/	±3	±5	%
Turn-on Delay	Nominal input voltage		/	10	/	mS
Output over-voltage Protection	Full input voltage range		120	160	230	%Vo
Output over-current Protection			110	160	220	%Io
Output start-up overshoot			/	/	10	%Vo
Output Short circuit Protection			Continuous, self-recovery			
Note – The Ripple & noise ≤5%Vo @ 0%-25% load, it is tested by the twisted pair test method, please refer to the Ripple & noise test instructions in this data sheet.						

General Specifications

Items	Test Conditions	Min	Typ.	Max	Unit
Switching Frequency	Operating mode（PWM）	/	230	/	KHz
Operating Temperature	Refer to the temperature derating curve	-40	/	+85	℃
Storage Temperature	/	-55	/	+125	

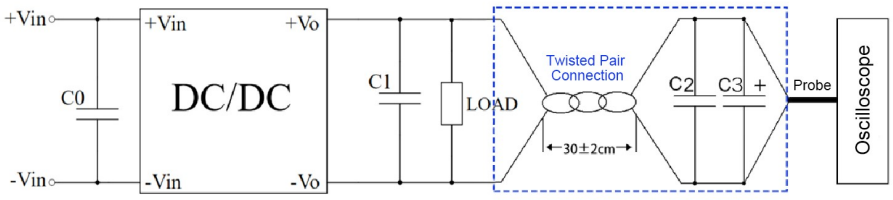
Case Temperature	Within the temperature derating curve	/	/	+105	℃
Pin soldering temperature	1.5mm from the case, <10 seconds	/	/	300	
Relative Humidity	No condensation	5	/	95	%RH
Isolation Voltage	I/P-O/P, test for 1min, leakage current ≤0.5mA	2250	/	/	VDC
MTBF	MIL-HDBK-217F@25℃	1000	/	/	K hours
Cooling method	Nature air				
Case material	Aluminum				

Weight/Dimension	Part No.	Weight (Typ.)	Dimensions L x W x H	
	FD12-110DXXB1C3	20g	50.8X25.4X11.2 mm	2.00X1.00X0.441 inch

EMC Performance

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

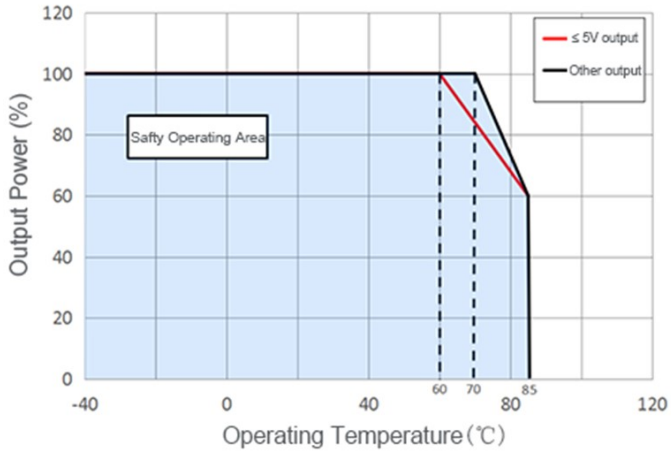
Ripple & Noise Test Instructions (Twisted Pair Method, 20MHz Bandwidth)



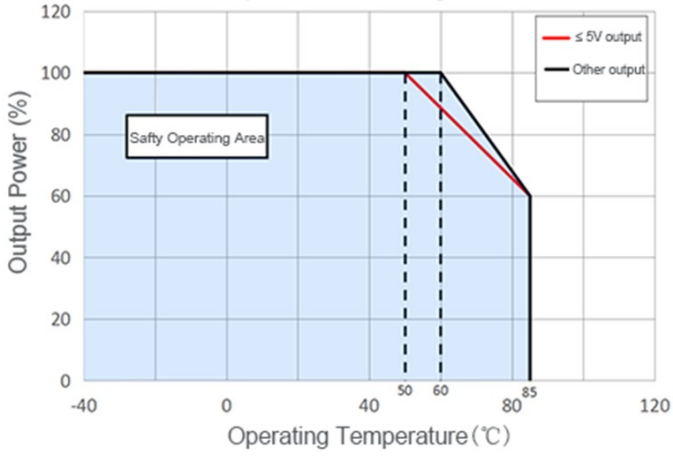
1. The Ripple & noise test needs 12# twisted pair cables, an oscilloscope which should be set at the Sample Mode, bandwidth 20MHz. 100M bandwidth probe with cap and ground removed. C2(0.1uF) polypropylene capacitor and C3(10uF) high-frequency low-resistance electrolytic capacitor are connected in parallel with the probes and one side of the twisted pair. C0 & C1 refer to the application circuit recommended.
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 started after input power on.
3. It is recommended to connect a ≥25% load or a high-frequency resistance E-cap(≥470uF) load at output to avoid the output ripple increasing.
4. It is recommended that the load imbalance of Dual outputs should be less than ±5% deviation.

Product Performance Curves

≥ Nominal Input Voltage
Temperature Derating Curve

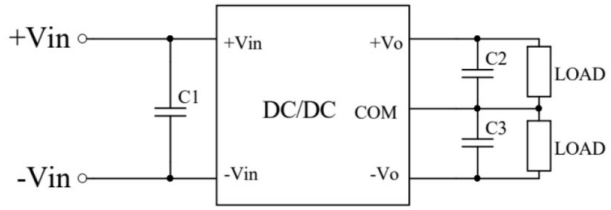


< Nominal Input Voltage
Temperature Derating Curve



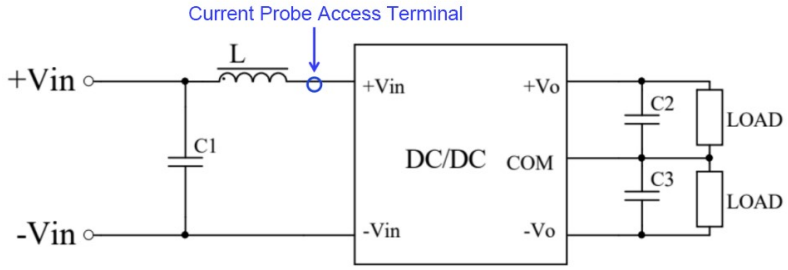
Recommended Circuits for Application

1. This series of converters will be tested according to this circuit below before shipping. Increasing the capacitances of C1 or C2 & C3 can decrease the output ripple, the output capacitances should be less than the max capacitive load.



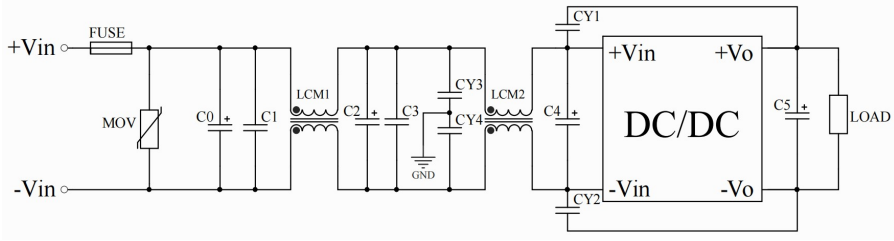
Component	Parameter
C1	47-100uF/200V
C2, C3	470uF/50V

2. Input reflected ripple current test circuit



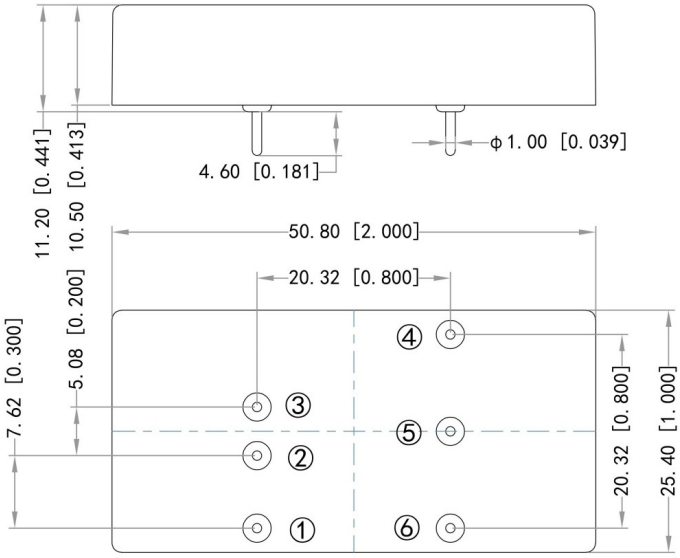
Component	Parameter
C1	220uF/200V
L	4.7uH/15A
C2, C3	470uF/50V

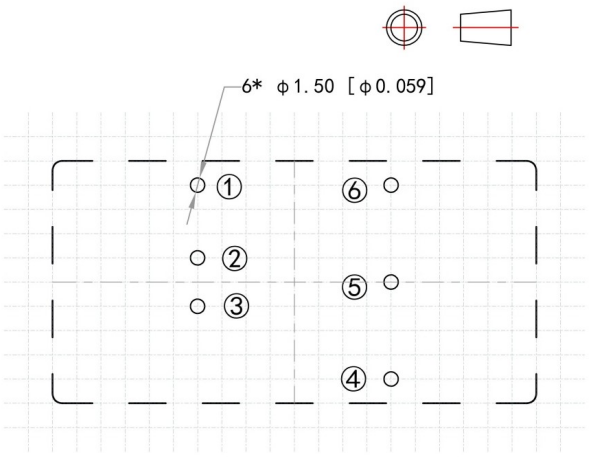
3. Recommended EMC circuit



Component	Parameter
FUSE	TBD by customer
MOV	14D201K
C0, C2, C4	330uF/200V
C1, C3	0.22uF/250V
LCM1, LCM2	15mH
C5	330uF/50V
CY1, CY2, CY3, CY4	Y1/222M/400VAC

Mechanical Dimensions





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

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

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

Application Notice

1.The products should be used according to the specifications in this datasheet, otherwise it could be permanently damaged.

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

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

4. Unless otherwise specified, all values or indicators in this datasheet are tested at Ta=25℃, humidity<75%RH, nominal input voltage and rated load (pure resistance load).

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

6.The specifications are specially for the parts listed in 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.

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

