

EMC Filter



FEATURES

- Meet IEC/EN61000-4 series standards and CISPR32/EN55032
- Meet railway industry EN50155 standards
- Efficiency up to 98%

Patent Protection RoHS



The filter module are extremely useful in noise-sensitive analog circuit applications. FC-FX3D connected on the input side of DC/DC converters can ensure system compliance with EMC requirements according to EN50155 standards. MORNSUN's DC/DC railway converter module can be used with the filters as long as the DC-DC converters input voltage does not exceed FC-FX3D maximum voltage rating.

Selection Guide

Model	Input Voltage Range (VDC)	Rated Current (A)
FC-FX3D	110 (14-160)	3.5

Input Specifications

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage	Operating temperature range	14	110	160	VDC
No Load Input Current	25°C	--	2	4	mA

Output Specifications

Item	Test Conditions	Min.	Typ.	Max.	Unit
Efficiency	25°C, 110VDC, 100%Io	96	98	--	%
Operating Current		--	3.5	--	A

General Specifications

Item	Test Conditions	Min.	Typ.	Max.	Unit
Operating Temperature		-40	--	105	°C
Storage Temperature		-55	--	125	
Storage Humidity		5	--	95	%RH
Case Temperature Rise	25°C, 110VDC @100W	--	25	--	°C
Withstand voltage	+Vin~ $\frac{1}{2}$ , -Vin~ $\frac{1}{2}$ , electric strength test for 1 minute with a leakage current of 5mA max	1500	--	--	VAC
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimensions	53.80 x 28.80 x 19.00 mm
Weight	40g(Typ.)

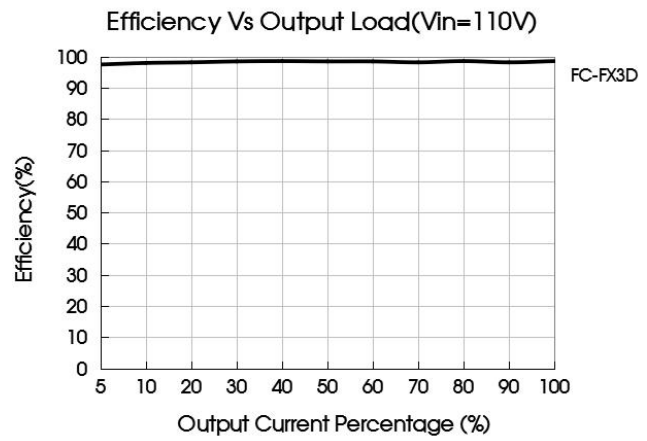
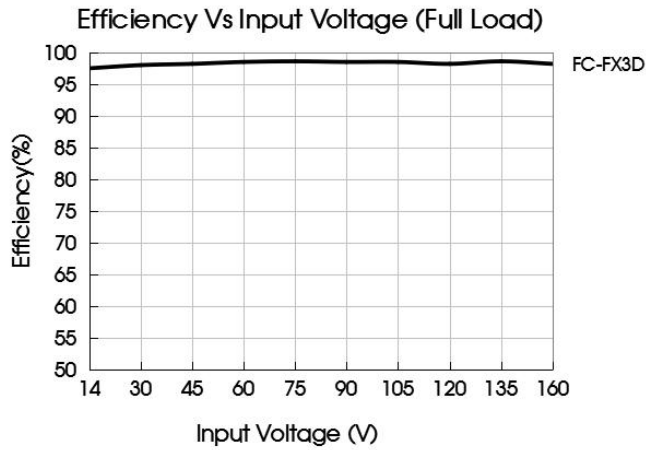
Electromagnetic Compatibility (EMC) (EN50155: EN50121-3-2)

Emissions	CE	EN50121-3-2	150kHz-500kHz 500kHz-30MHz	99dBuV (see Fig. 1 for recommended circuit) 93dBuV (see Fig. 1 for recommended circuit)	
	RE	EN55011	30MHz-230MHz 230MHz-1GHz 1GHz-6GHz	40dBuV/m at 10m (see Fig. 1 for recommended circuit) 47dBuV/m at 10m (see Fig. 1 for recommended circuit) 47dBuV/m at 10m (see Fig. 1 for recommended circuit)	
Immunity	ESD	EN61000-4-2	Contact ±6KV, Air ±8KV		perf. Criteria A
	RS	EN61000-4-3	80 – 800MHz 800 – 1000MHz 1400 – 2000MHz 2000 – 2700MHz 5100 – 6000MHz	20V/m 20V/m 10V/m 5V/m 3V/m	perf. Criteria A
	EFT	EN61000-4-4	±2kV 5/50ns	5kHz (see Fig. 1 for recommended circuit)	perf. Criteria A
	Surge	EN61000-4-5	line to line ±1KV (42Ω, 0.5μF) line to ground ±2kV (42Ω, 0.5μF) (see Fig. 1 for recommended circuit) line to line ±1KV (2Ω, 18μF) line to ground ±2kV (12Ω, 9μF) (see Fig. 1 for recommended circuit) line to line ±2KV (2Ω, 18μF) line to ground ±2kV (12Ω, 9μF) (see Fig. 1 for recommended circuit)		perf. Criteria A
	CS	EN61000-4-6	0.15MHz-80MHz	10V r.m.s	perf. Criteria A

Electromagnetic Compatibility (EMC) (AREMA)

Emissions	CE	CISPR16-2-1	150kHz-500kHz	79dBuV	CLASS A (see Fig. 1 for recommended circuit) CLASS B (see Fig. 2 for recommended circuit)		
		CISPR16-1-2	500kHz-30MHz	73dBuV	CLASS A (see Fig. 1 for recommended circuit) CLASS B (see Fig. 2 for recommended circuit)		
RE	RE	CISPR16-2-3	30MHz-230MHz 230MHz-1GHz	40dBuV/m at 10m 47dBuV/m at 10m	CLASS A (see Fig. 1 for recommended circuit) CLASS B (see Fig. 2 for recommended circuit) CLASS A (see Fig. 1 for recommended circuit) CLASS B (see Fig. 2 for recommended circuit)		
		ESD	IEC61000-4-2	Contact ±6KV, Air ±8KV		perf. Criteria A	
Immunity	RS	IEC61000-4-3	80 – 1000MHz 160 – 165MHz 450 – 470MHz 800 – 960MHz 1400 – 2000MHz 2100 – 2500MHz	10V/m 20V/m 20V/m 20V/m 20V/m 5V/m	perf. Criteria A		
			EFT	IEC61000-4-4	±2kV 5/50ns	5kHz (see Fig. 1 for recommended circuit)	perf. Criteria A
			Surge	IEC61000-4-5	line to line ±1KV (42Ω, 0.5μF) line to ground ±2kV (42Ω, 0.5μF) (see Fig. 1 for recommended circuit) line to line ±1KV (2Ω, 18μF) line to ground ±2kV (12Ω, 9μF) (see Fig. 1 for recommended circuit) line to line ±2KV (2Ω, 18μF) line to ground ±2kV (12Ω, 9μF) (see Fig. 1 for recommended circuit)		perf. Criteria A
			CS	IEC61000-4-6	0.15MHz-80MHz	10V r.m.s	perf. Criteria A
			MS	IEC61000-4-8	60Hz 60Hz	100A/m (see Fig. 1 for recommended circuit) 300A/m (see Fig. 1 for recommended circuit)	perf. Criteria A

Product Typical Curve



Design Reference

1. Typical application

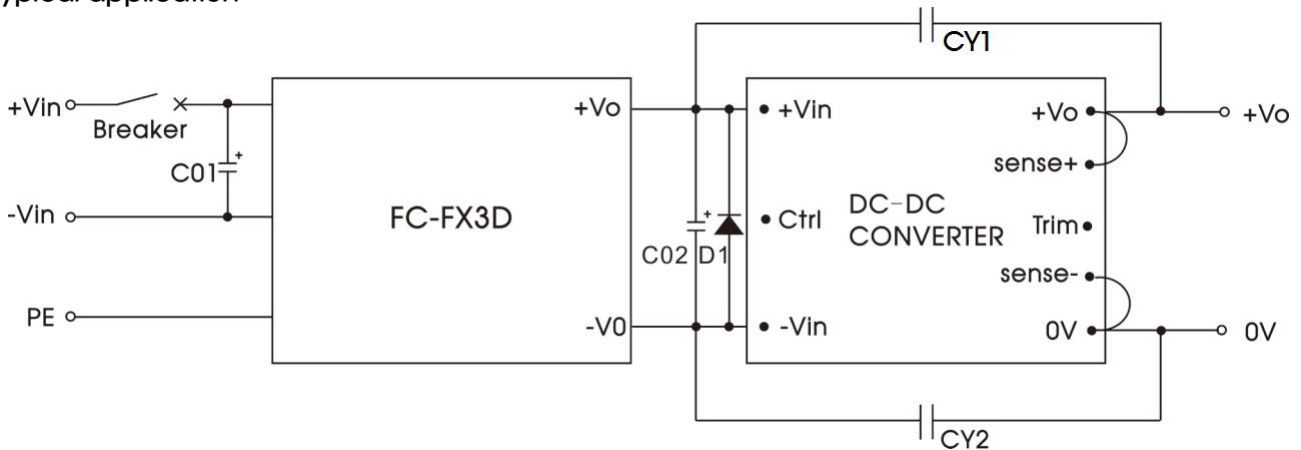


Fig.1

CLASS A	Model	Parameters
	C01, C02	100uF/250V electrolytic capacitor
	D1	20A/250V schottky Diode
	CY1, CY2	1000pF/400VAC safety capacitor
	Breaker	The Breaker value varies with different power modules and must be selected in accordance with the specified input current of the corresponding power converter, but not exceeding the filter specifications.

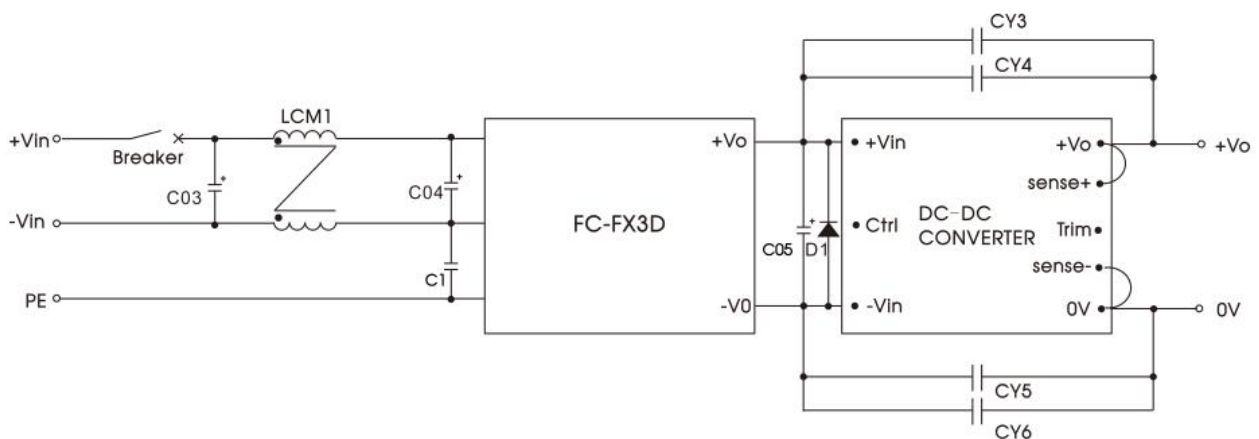
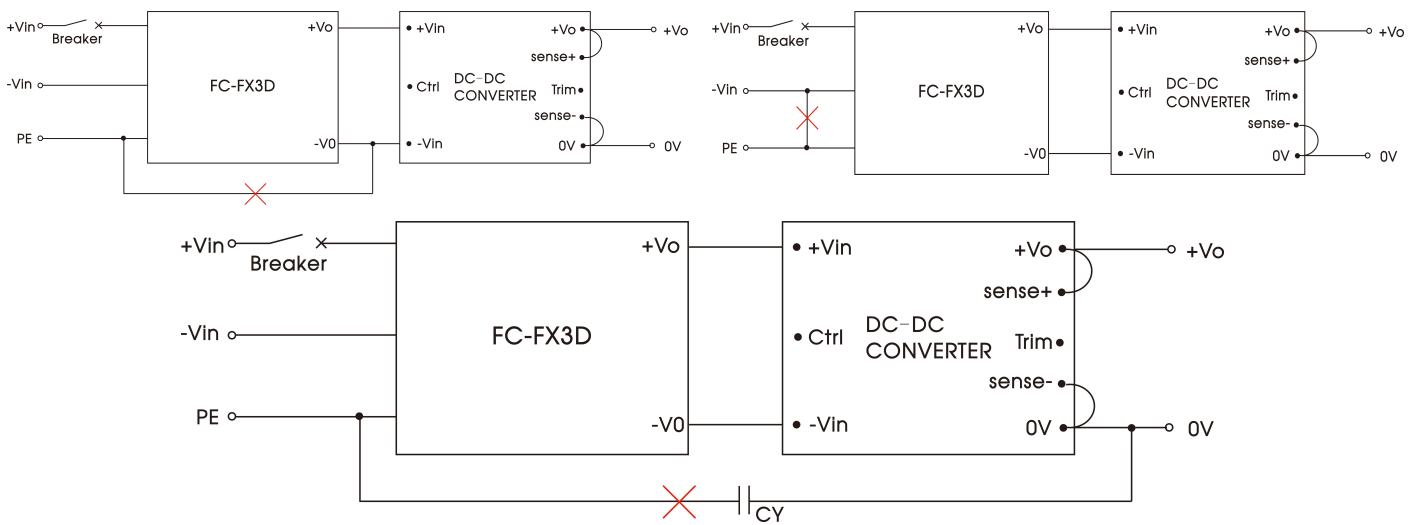


Fig.2

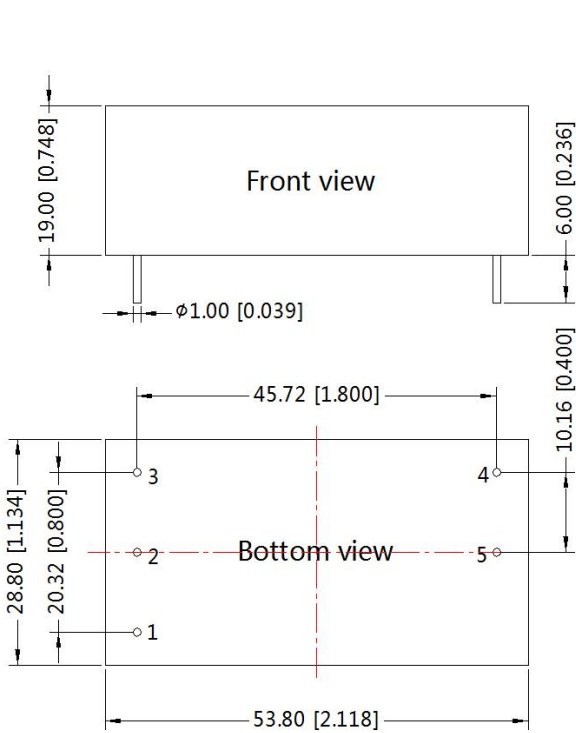
CLASS B	Model	Parameters
	C1	102K/3000V ceramic capacitor
	C03, C04	100uF/250V electrolytic capacitor
	C05	27uF/250V electrolytic capacitor
	D1	20A/250V schottky Diode
	CY3, CY4, CY5, CY6	1000pF/400VAC safety capacitor
	LCM1	1.45mH, recommend to use MORNSUN's FL2D-30-222-DT common mode inductance
	Breaker	The Breaker value varies with different power modules and must be selected in accordance with the specified input current of the corresponding power converter, but not exceeding the filter specifications.



Note: Connections marked with X interfere with this filter modules performance and should therefore not be used.

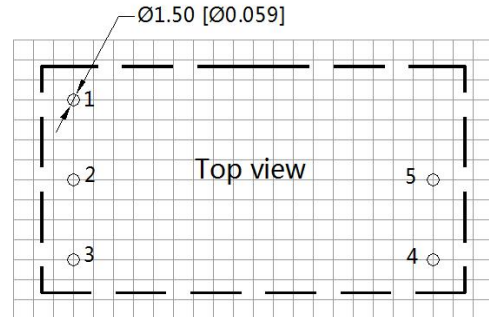
2. For additional information please refer to application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Note:  
Unit: mm[inch]  
Pin diameter tolerances:  $\pm 0.10[\pm 0.004]$   
General tolerances:  $\pm 0.50[\pm 0.020]$

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

Pin-Out	
Pin	Mark
1	
2	+Vin
3	-Vin
4	-Vo
5	+Vo

- Note:
1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58220005;
  2. Unless otherwise specified, data in this datasheet should be tested under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75%RH with nominal input voltage and rated load;
  3. All index testing methods in this datasheet are based on our company corporate standards;
  4. We can provide product customization service, please contact our technicians directly for specific information;
  5. Products are related to laws and regulations: see "Features" and "EMC";
  6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China  
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: [info@mornsun.cn](mailto:info@mornsun.cn) [www.mornsun-power.com](http://www.mornsun-power.com)