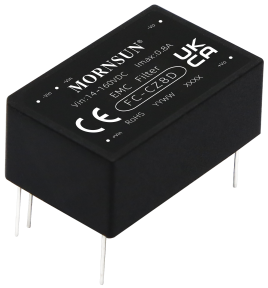
EMC Filter



FEATURES

- Ultra-Wide input voltage range: 14 - 160VDC
- Insertion Loss DM&CM>30dB@10MHz
- Operating ambient temperature range -40℃ to +105℃
- Meet IEC/EN61000-4 series standards and CISPR32/EN55032
- Meet railway industry EN50155, EN52121-3-2 standards
- Safety according to EN62368
- Input anti-reverse connection protection function

The filter module are extremely useful in noise-sensitive analog circuit applications. The filter 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 filter maximum voltage rating.

Selection Guide

Model	Operating Voltage(VDC)		Operating Current(A)		Certification
	Typ.(Range)	Max*	Typ.	Max	
FC-CZ8D	110(14-160)	180	--	0.8	CE/UKCA
FC-CX2D	110(14-160)	180	--	2.5	--

Note: * The input voltage must not exceed this value, otherwise permanent and unrecoverable damage may be caused;

General Specifications

Item	Test Conditions		Min.	Typ.	Max.	Unit
Operating Temperature			-40	--	+105	℃
Storage Temperature			-55	--	+125	
Storage Humidity	No condensation		5	--	95	%RH
Case Temperature	FC-CZ8D	Ta=85℃, 110VDC @ 0.8A	--	100	--	℃
	FC-CX2D	Ta=85℃, 110VDC @ 2.5A	--	110	--	
Withstand voltage	+Vin~PE , -Vin~PE, electric strength test for 1 minute with a leakage current of 5mA max	FC-CZ8D	--	--	--	VAC
		FC-CX2D	1500	--	--	
MTBF	MIL-HDBK-217F@25℃		1000	--	--	K hours
Impact and vibration test			IEC/EN 61373 Class B			
The altitude	Atmospheric pressure 80-110kpa		≦5000m			
Insertion Loss(CM/DM)	150KHz~1MHz		20	25	-	dB
	1MHz~10MHz		25	30	-	dB
	10MHz~30MHz		20	25	-	dB

Mechanical Specifications

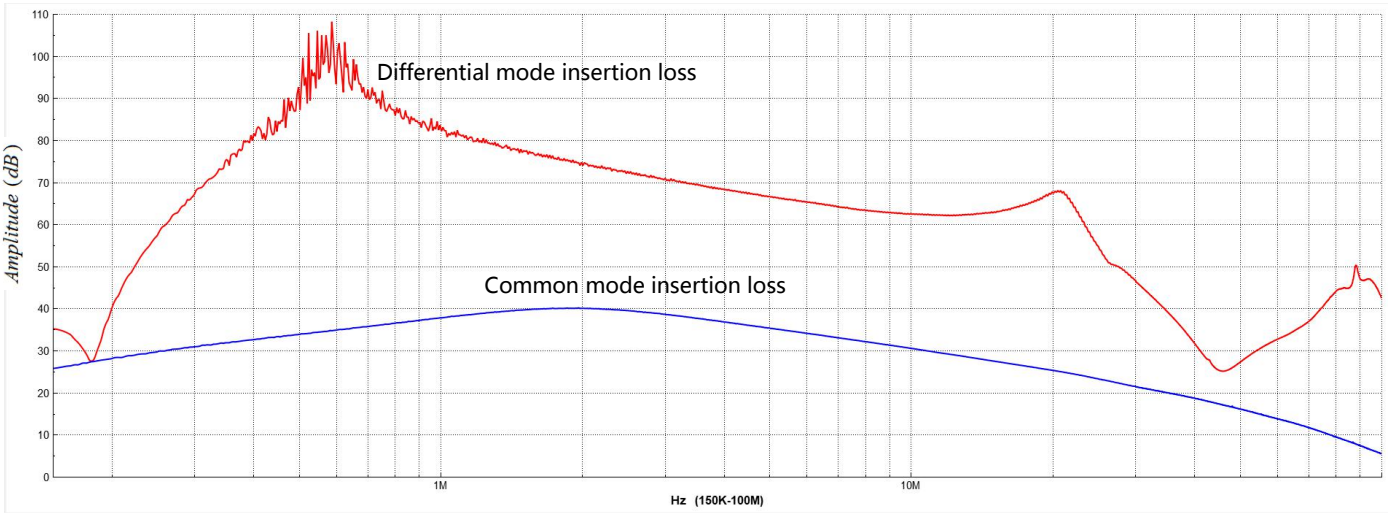
Case Material	Black plastic, flame-retardant and heat-resistant (UL94 V-0)	
Dimensions	FC-CZ8D	31.60 x 20.30 x 12.50 mm
	FC-CX2D	50.80 x 20.40 x 15.16 mm

Weight	FC-CZ8D	10.0g(Typ.)
	FC-CX2D	29.0g(Typ.)
Cooling Way	Natural air cooling	

Insertion Loss Specifications

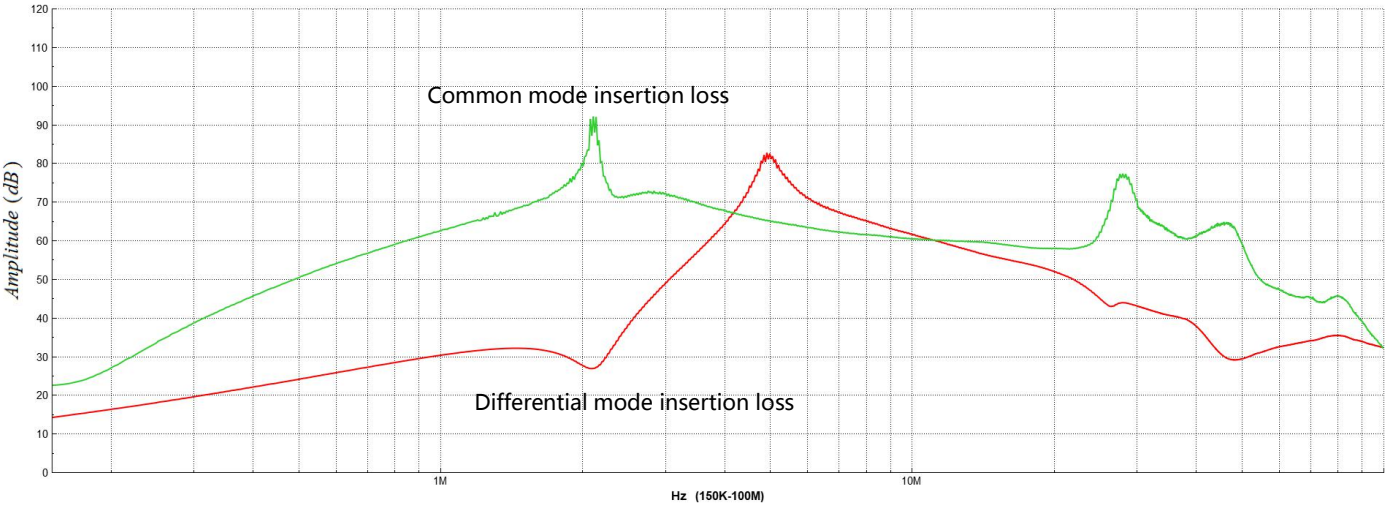
FC-CZ8D:

Insertion Loss Curve



FC-CX2D:

Insertion Loss Curve



Electromagnetic Compatibility(EMC)

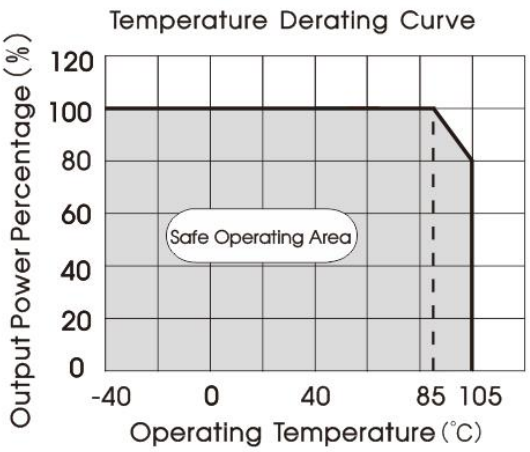
EMI	CE	EN55032	FC-CZ8D	Class B	(see Fig.1)
			FC-CX2D	Class A	(see Fig.2, Fig.3)
	RE	EN55032	FC-CZ8D	Class B(30MHz-1GHz, 1GMHz-6GHz)	(see Fig.1)
			FC-CX2D	Class A(30MHz-1GHz, 1GMHz-6GHz)	(see Fig.2, Fig.3)
EMS	ESD	EN50121-3-2	Contact ±6kV , Air ±8kV		perf. Criteria A
	RS	EN50121-3-2	80 – 800MHz 20V/m 800 – 1000MHz 20V/m 1400 – 2000MHz 10V/m 2000 – 2700MHz 5V/m		perf. Criteria A

			5100 – 6000MHz 3V/m		
	EFT	EN50121-3-2	±2kV , 5/50ns , 5kHz (see Fig.1 or Fig.2, Fig.3)		perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) line to ground ±2kV (42Ω, 0.5μF) (see Fig.1 or Fig.2, Fig.3)		perf. Criteria A
		EN61000-4-5	FC-CZ8D	line to line ±2kV (2Ω, 18μF) line to ground ±4kV (12Ω, 9μF) (see Fig.1)	
			FC-CX2D	line to line ±1kV (2Ω, 18μF) line to ground ±2kV (12Ω, 9μF) (see Fig.2, Fig.3)	
	CS	EN50121-3-2	0.15MHz-80MHz 10V r.m.s		perf. Criteria A
Note: The above performance indexes are the test results of Filter matching Ultra-wide series railway power supply. FC-CZ8D matches UWTH1D_P-6WR3 series, FC-CX2D matches UWTH1D-LD-10W/20W/30WR3 series.					

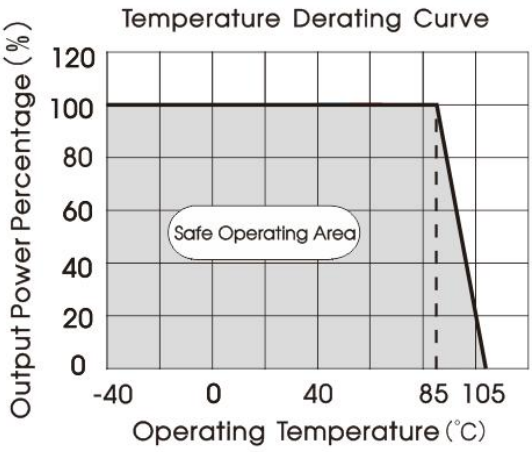
Electromagnetic Compatibility(EMC) (AREMA)

EMI	CE	150kHz-500kHz 79dBuV QP, 66dBuV AV 500kHz-30MHz 73dBuV QP, 60dBuV AV	(see Fig.1 or Fig.2, Fig.3)
	RE	30MHz-230MHz 50dBuV/m QP at 3m 230MHz-1GHz 57dBuV/m QP at 3m	(see Fig.1 or Fig.2, Fig.3)
EMS	ESD	Contact ±6kV , Air ±8kV	perf. Criteria A
	RS	80 – 1000MHz 10V/m 160 – 165MHz 20V/m 450 – 470MHz 20V/m 800 – 960MHz 20V/m 1400 – 2000MHz 20V/m 2100 – 2500MHz 5V/m	perf. Criteria A
	EFT	±2kV , 5/50ns , 5kHz (see Fig.1 or Fig.2, Fig.3)	perf. Criteria A
	Surge	line to line ±2kV (2Ω, 18μF) line to ground ±2kV (2Ω, 18μF) (see Fig.1 or Fig.2, Fig.3)	perf. Criteria A
	CS	0.15MHz-80MHz 10V r.m.s (see Fig.1 or Fig.2, Fig.3)	perf. Criteria A
	Power Frequency Magnetic Field	60Hz 100A/m(rms) (see Fig.1 or Fig.2, Fig.3)	perf. Criteria A
	Pulse Magnetic Field	60Hz 300A/m(rms) (see Fig.1 or Fig.2, Fig.3)	
Note: The above performance indexes are the test results of Filter matching Ultra-wide series railway power supply. FC-CZ8D matches UWTH1D_P-6WR3 series, FC-CX2D matches UWTH1D-LD-10W/20W/30WR3 series.			

Product Typical Curve



FC-CZ8D



FC-CX2D

Design Reference

1. Typical application: FC-CZ8D

Note: Matching the UWTH1D_P-6WR3 series railway power supply.

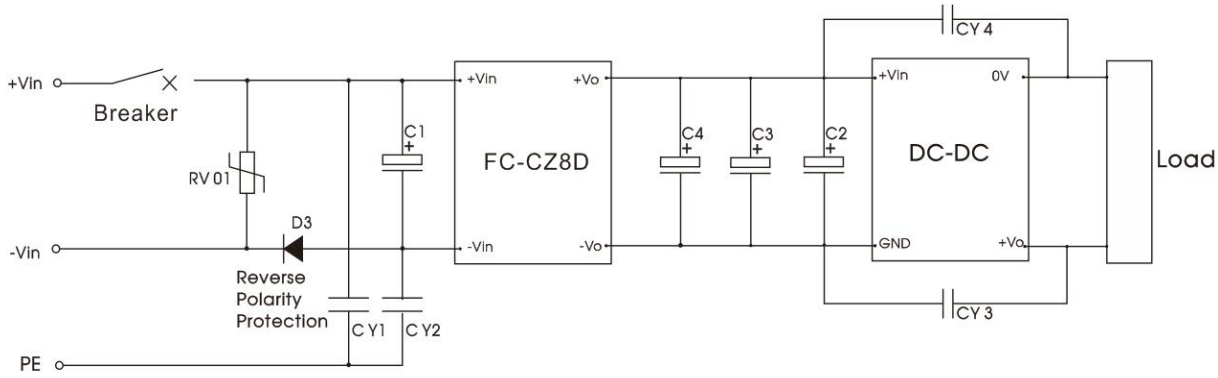


Fig.1

Components	Value	Recommended Component
DC-DC	Converter module	All power modules that meet the input voltage and operating current range can be used
RV01	10D221K	Varistor
D3	600V/2A	Diode
C1	330uF	Voltage≥200V
C2,C3,C4	100μF	Voltage≥200V
CY1,CY2	1000pF/400VAC	Y1 safety capacitor
CY3,CY4	2200pF/400VAC	Y1 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.	
Note: For higher requirements of output CE, our common mode filter FL2D-50-102 can be added to the output port.		

2. Typical application: FC-CX2D

①Matching the UWTH1D-LD-10W/20W/30WR3 series railway power supply.

②EMC recommended circuit and parameters for connecting the shell to PE ;

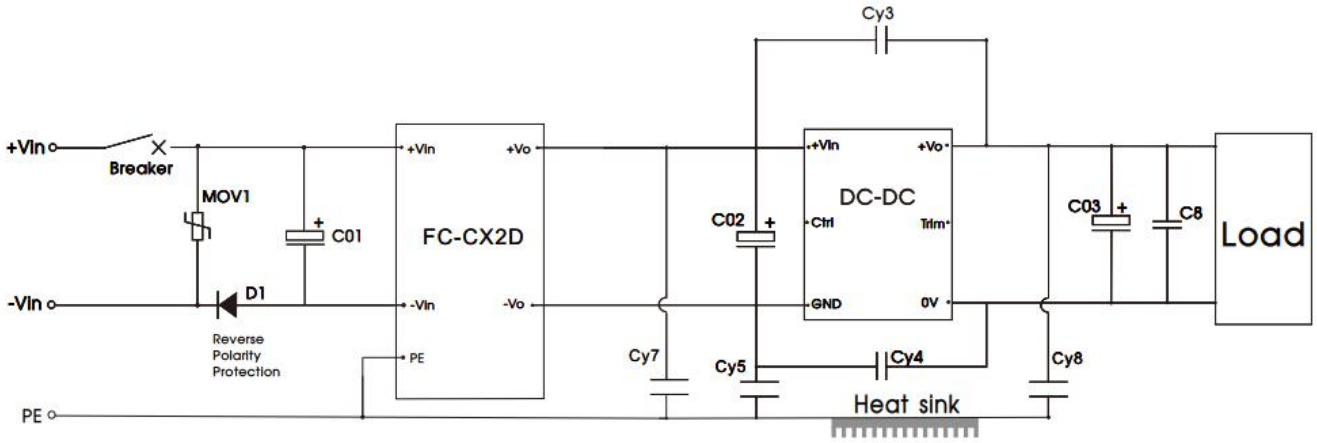


Fig.2

③EMC recommended circuit and parameters when the shell is not connected to PE:

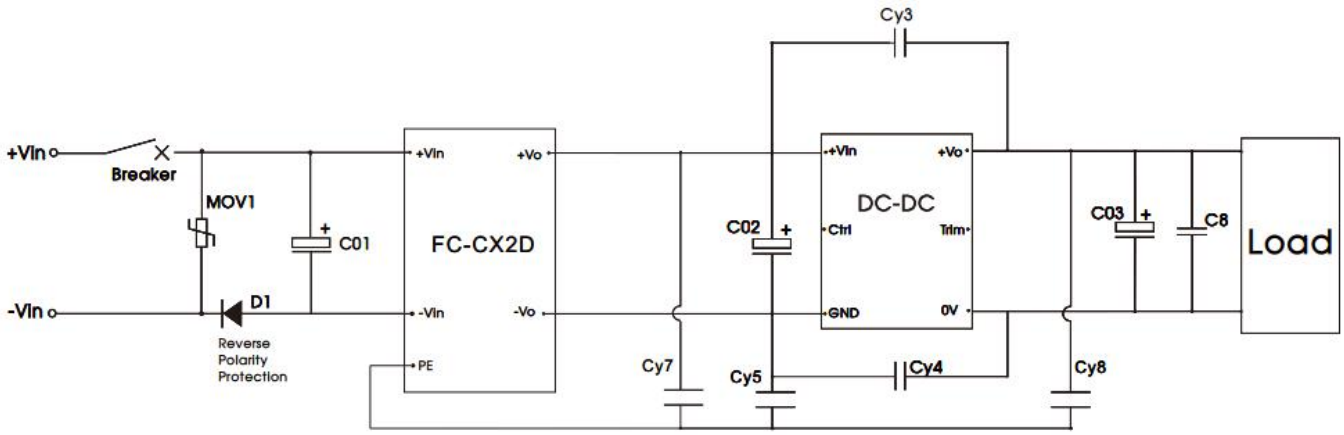
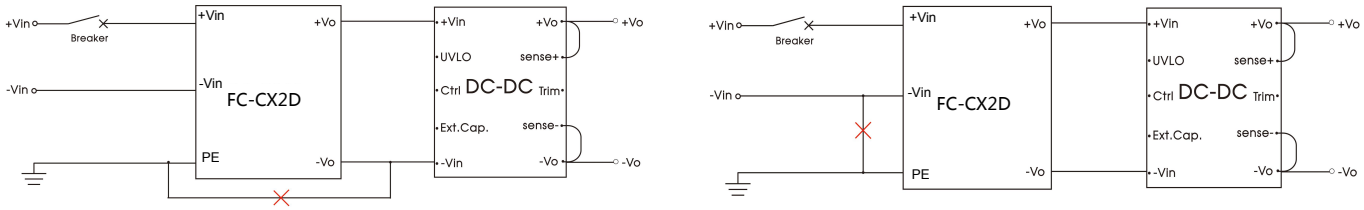


Fig.3

Components	Value	Recommended Component
DC-DC	converter module	All power modules that meet the input voltage and operating current range can be used
MOV1	10D221K	Varistor
D1	600V/16A	Diode
Cy3,Cy5	2200pF/400VAC	Y1 safety capacitor
Cy4	4700pF/400VAC	Y1 safety capacitor
Cy7, Cy8	1100pF/400VAC	Y1 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.	
Note: A ferrite core on the power lines and load lines can ensures a better EMI test margin.		

Surge standard	Components	Value	Recommended Component
line to line ±1kV (42Ω, 0.5μF) line to ground ±2kV(42Ω, 0.5μF)	C01	220μF	Voltage≥200V
line to line ±1kV (2Ω, 18μF) line to ground ±2kV(12Ω, 9μF)	C02	220uF	Voltage≥200V
line to line ±2kV (2Ω, 18μF)	C01	330μF	Voltage≥200V
line to ground ±2kV(2Ω, 18μF)	C02	220uF	Voltage≥200V
Note : Reducing C01\C02 has an impact on the EMI margin , please select a reference value based on the actual situation.			

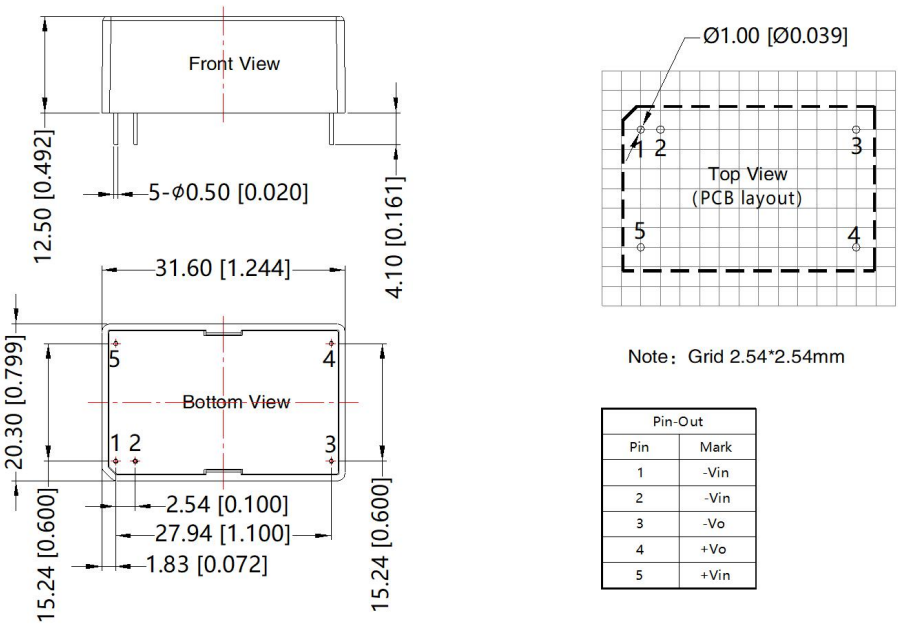


Note: Connections marked with X interfere with this filter modules performance and should therefore not be used.

3. For additional information please refer to application notes on www.mornsun-power.com

Dimensions and Recommended Layout

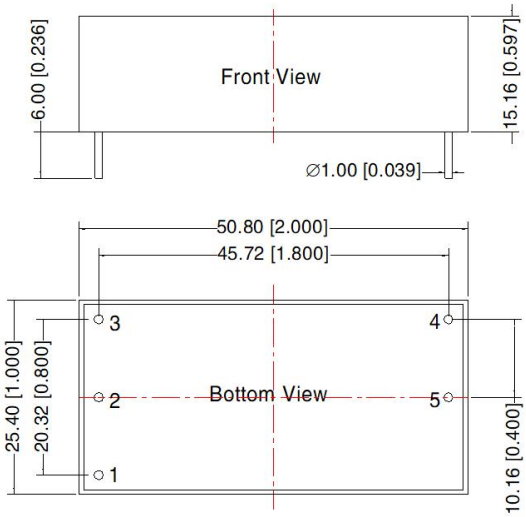
FC-CZ8D：

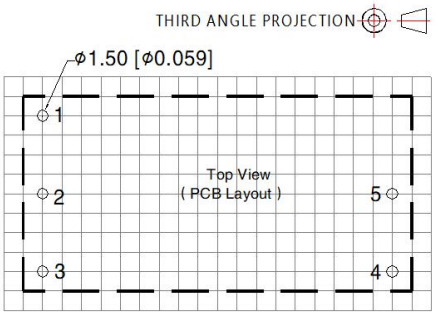


Pin-Out	
Pin	Mark
1	-Vin
2	-Vin
3	-Vo
4	+Vo
5	+Vin

Note:
Unit: mm[inch]
Pin dia tolerances: ±0.10[±0.004]
General tolerances: ±0.50[±0.020]

FC-CX2D：





Note: Grid 2.54*2.54mm

Pin–Out					
Pin	1	2	3	4	5
Function	⏚	–Vin	+Vin	+Vo	–Vo

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

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58000150,58220003;
2. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25℃, 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 www.mornsun-power.com