

FRD6-00

DC-DC Converter Input Filter

Not Recommended for New Design

Bel Power Solutions FRD6-00 Input Filter helps control EMC immunity and emission in board-level DC-DC converter applications, minimizing the conducted and radiated emissions generated by switch mode DC-DC converters.

The FRD6-00 allows board designs utilizing DC-DC converters to meet stringent EMC requirements according to railway industry standards.



Key Features & Benefits

- Ultra-Wide input voltage range: 14 -160 VDC
- Maximum operating current 0.8 A
- Operating ambient temperature range -40 °C to +105 °C
- Small footprint
- Meet IEC/EN 61000-4 series standards and CISPR16 / EN 55032
- Meet railway industry EN 50155 / EN 50121-3-2 and AREMA standards
- In compliance with the latest revision of the safety standard IEC 62368-1

Applications

- Railway related equipment

1. MODEL SELECTION

PART NUMBER	INPUT VOLTAGE RANGE [VDC]	RATED CURRENT [A]
FRD6-00	14 – 160	0.8

2. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage Range		14	110	160	VDC
Transient Maximum Voltage	1 s	–	–	200	VDC

3. OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITIONS	MIN	TYP.	MAX.	UNIT
Operating Current		–	–	0.8	A

4. GENERAL SPECIFICATIONS

PARAMETER	DESCRIPTION / CONDITIONS	MIN	TYP.	MAX.	UNIT
Operating Temperature		-40	–	105	°C
Storage Temperature		-55	–	125	°C
Storage Humidity		5	–	95	%RH
MTBF	MIL-HDBK-217F @ 25 °C	1000	–	–	kh

5. MECHANICAL SPECIFICATIONS

PARAMETER	DESCRIPTION
Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Dimension	31.60 x 20.30 x 12.50 mm
Weight	10 g (Typ.)

6. ELECTROMAGNETIC COMPATIBILITY (EN50121-3-2)

PARAMETER	DESCRIPTION		CLASS / CRITERIA
Emission ¹	CE	EN 55016-2-1 150 kHz – 500 kHz; 79 dBuV (see Fig. 1 for recommended circuit) 500 kHz – 30 MHz; 73 dBuV (see Fig. 1 for recommended circuit)	
	RE	CISPR16-2-3 30 MHz – 230 MHz; 40 dBuV/m at 10 m (see Fig. 1 for recommended circuit) 230 MHz – 6 GHz; 47 dBuV/m at 10 m (see Fig. 1 for recommended circuit)	
Immunity	ESD	EN 61000-4-2 Contact ± 6 kV/Air ± 8 kV	perf. Criteria A
	RS	EN 61000-4-3 80 – 800 MHz; 20 V/m 800 – 1000 MHz; 20 V/m 1400 – 2000 MHz; 10 V/m 2000 – 2700 MHz; 5 V/m 5100 – 6000 MHz; 3 V/m	perf. Criteria A
	EFT	EN 61000-4-4 ± 2 kV; 5/50 ns; 5 kHz (see Fig. 1 for recommended circuit)	perf. Criteria A
	Surge	EN 61000-4-5 Line to line ± 1 kV (42 Ω , 0.5 μ F) (see Fig. 1 for recommended circuit) Line to line ± 1 kV (2 Ω , 18 μ F) (see Fig. 1 for recommended circuit)	perf. Criteria A
	CS	EN 61000-4-6 0.15 MHz – 80 MHz 10 V r.m.s	perf. Criteria A

¹ Corresponds or exceeds EN 50121-3-2

7. ELECTROMAGNETIC COMPATIBILITY (AREMA)

PARAMETER	DESCRIPTION		CLASS / CRITERIA
Emissions	CE	CISPR16-2-1 150 kHz – 500 kHz; 79 dBuV (see Fig. 1 for recommended circuit) CISPR16-1-2 500 kHz – 30 MHz; 73 dBuV (see Fig. 1 for recommended circuit)	CLASS A
	RE	CISPR16-2-3 30 MHz – 230 MHz; 40 dBuV/m at 10 m (see Fig. 1 for recommended circuit) 230 MHz – 1 GHz; 47 dBuV/m at 10 m (see Fig. 1 for recommended circuit)	CLASS A
Immunity	ESD	IEC 61000-4-2 Contact ± 6 kV/Air ± 8 kV	perf. Criteria A
	RS	IEC 61000-4-3 80 – 1000 MHz; 10 V/m 160 – 165 MHz; 20 V/m 450 – 470 MHz; 20 V/m 800 – 960 MHz; 20 V/m 1400 – 2000 MHz; 20 V/m 2100 – 2500 MHz; 5 V/m	perf. Criteria A
	EFT	IEC 61000-4-4 ± 2 kV 5/50 ns; 5 kHz (see Fig. 1 for recommended circuit)	perf. Criteria A
	Surge	IEC 61000-4-5 Line to line ± 2 kV (2 Ω , 18 μ F) (see Fig. 1 for recommended circuit)	perf. Criteria A
	CS	IEC 61000-4-6 0.15 MHz-80 MHz; 10 V r.m.s	perf. Criteria A
	MS	IEC 61000-4-8 60 Hz; 100 A/m (see Fig. 1 for recommended circuit) IEC 61000-4-8 60 Hz; 300 A/m (see Fig. 1 for recommended circuit)	perf. Criteria A

8. DESIGN REFERENCE

TYPICAL APPLICATION

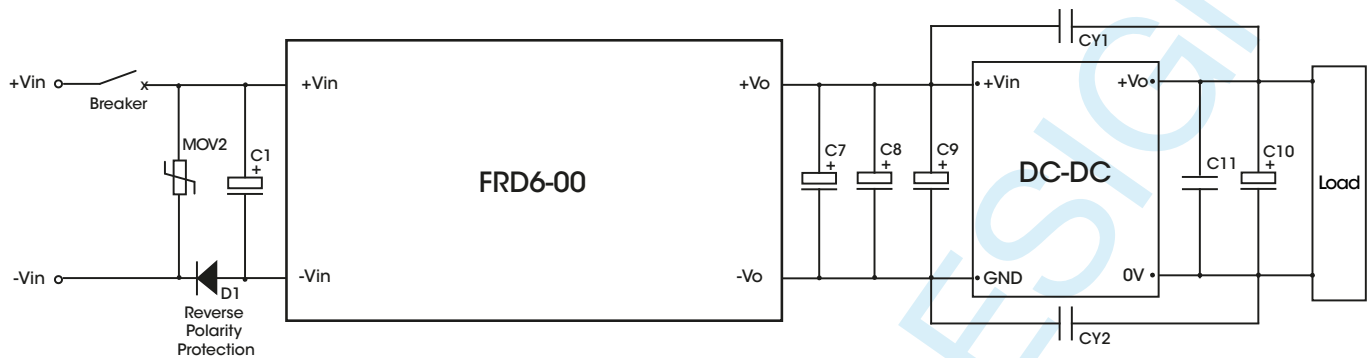


Figure 1. Recommended EMC Filtering

COMPONENTS	VALUE	RECOMMENDED COMPONENT
C1	330 μ F	ELECTROLYTIC; Al, WET; RADIAL; 330 μ F; 20%; 250 V; $\varnothing$ 18 x 30 mm; PITCH 7.5 mm; -40 to +105°C
C7, C8, C9	100 μ F	ELECTROLYTIC; Al, WET; RADIAL; 100 μ F; 20%; 250 V; $\varnothing$ 16 x 20 mm; PITCH 7.5 mm; -40 to +105°C
CY1, CY2	2.2 nF	CERAMIC; X1/Y1; 2.2 nF; 10%; 400 V; PITCH 10 mm; -40 to +125°C
D1	2 A	SCHOTTKY; DUAL; 600 V; 2 A; Vf 1.1 V; DO-15; -50 to +150°C; COMMON CATHODE
MOV2	220 V / 58 J	VDR; 220 V; 4 kA; 58 J; THT; PITCH 7.5 mm; -40 to +85°C
Fuse or Breaker ²	2 A	Type C

¹ Type of fuse / circuit breaker to be selected according to the application requirements. The current rating shall be above the maximum working input current and below rated working current of reverse polarity diode.

9. MECHANICAL SPECIFICATIONS

THIRD ANGLE PROJECTION

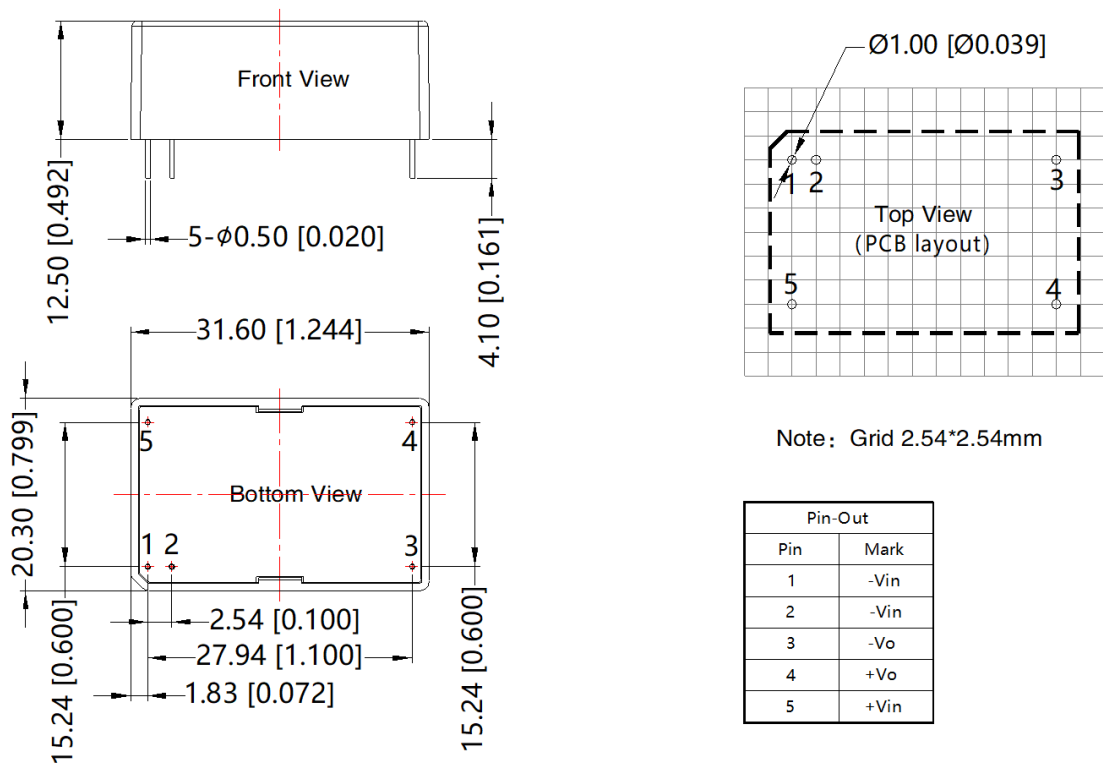


Figure 3. Mechanical drawing

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.

TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.



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