EMI Filter BST/ (20-50)-461-135

Use Manual

Product Overview

The function of BST/ (20-50) -461-135 EMI filter is to prevent the conduction of common mode and differential mode noise between the primary power supply and the secondary power supply, and to meet the requirements of CE102 for system electromagnetic compatibility. According to the input current of the DC/DC converter used in the system at the low end of the input, and considering the design margin, select the appropriate filter type. The device has an input voltage of 0 V ± 50 V, an output current of 2.7 A, and no internal surge current suppression.

Product features

- Input voltage range: 20 V to 50 V, nominally 28 V and 42 V;
- Output current: 2.7 A;
- Operating temperature (TC): -55 ℃ ~ + 125 ℃;
- Circuit structure: common mode filter circuit, differential mode filter circuit;
- Quality grade: CAST C/SAST;
- Irradiation index: immunity;
- Overall dimensions: UPP5328 metal dual in-line housing with mounting flange, 51.00 mm × 28.94 mm × 8.38 mm maximum.
- Weight: 54 g ± 5 g.

Conditions of use

Absolute maximum:

- Input voltage: 0 V ± 60 V;
- Output current: 3.24 A;
- Shell working temperature: -55 ℃ ~ 125 ℃;
- Storage temperature: -65 ℃ ~ 150 ℃;

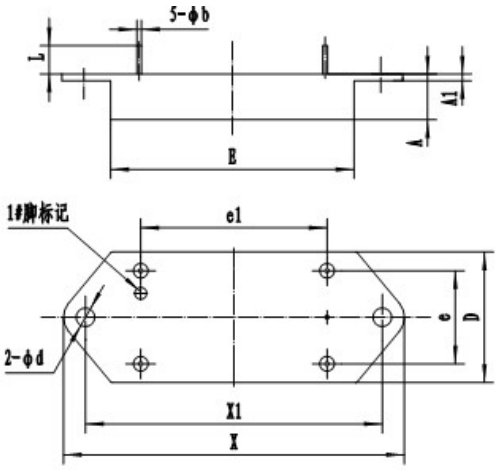
- Welding temperature of lead: 300 ℃ (10 s);

Note: Two or more absolute maximum rating conditions cannot be applied to the device at the same time.

Recommended operating conditions:

- Input voltage: 20 V ± 50 V;
- Output current: 2.7 A;
- Enclosure operating temperature range (TC): -55 ℃ to 125 ℃.

Structure Description



Dimension symbol	Value in mm		
	Minimal	Nominal	Max.
A	-	-	10.16
A1	1.30	-	1.70
ϕb	0.87	-	1.13
ϕd	3.90	-	4.30
D	-	-	28.69
E	-	-	53.58
e	-	20.32	-
e1	-	40.64	-
L	5.35	-	-
X	-	-	73.91
X1	64.57	-	64.97
Note: e and E1 are interchangeability dimensions, which are guaranteed by shell manufacturing and inspection, and are not required to be examined in this specification.			

Figure 1. BST/ (20-50) -461-135 Outline Drawing

NO.	Symbol	Function	Number of outlet	Symbol	Function
1	VI	Input positive	4	GNDO	Outgoing
2	VO	Output positive	5	GNDI	Input Ground
3	CASE	Enclosure			

Figure 2. BST/ (20-50) -461-135 Terminal Arrangement

Functional Block Diagram

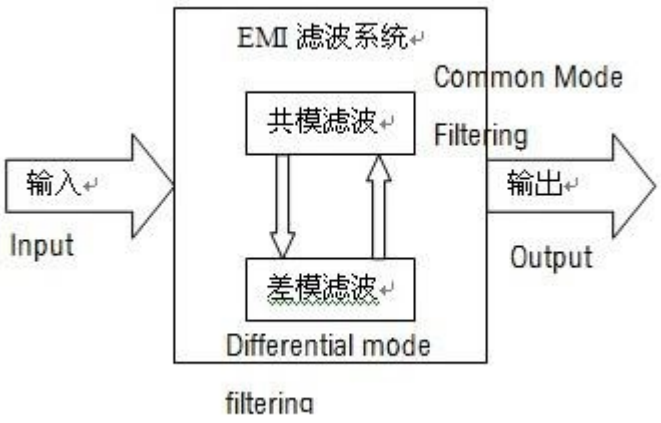


Figure 3. Functional Block Diagram

Electrical Characteristic Index

Table 1. Electrical characteristics (BST/ (20-50) -461-135)

NO.	Characteristic	Symbol	Condition (Unless otherwise specified, -55 ℃ ≤ TC ≤ 125 ℃ VI = 28V ± 0.5V and VI = 42V ± 0.5V)	Group A Grouping	Limit Value		Measured Value	Unit
					Minimal	Max.		
1	Input Voltage Range a	VI	Continuity	1,2,3	0	50	0-50	V
2	Output current a	IO	VI = 20Vx50V, full load	1,2,3	-	2.7	2.7	A
3	Output Voltage Dip	VOD	VI = 20V, 28V, 42V, 50V at full load	1	-	0.54	0.36	V
4	Noise	NO	Test frequency 1 kHz	4,5,6	-1	1	0.6	dB
	Suppression		Test frequency 500 kHz	4,5,6	55	-	70	
			Test frequency: 1MHz	4,5,6	60	-	70	
			Test frequency: 5MHz	4,5,6	60	-	73	
5	DC resistance	RDC	IO=2.7A	1	-	0.2	0.13	Ω
6	Power consumption	PI	IO=2.7A	1	-	1.458	1.0	W
7	Insulation Resistance	RISO	500 V DC voltage is applied between the input and output terminals and the enclosure (except terminal 3)	1	100	-	100	MΩ
8	Capacitance	CO	Between any outgoing terminal (except terminal 3) and the enclosure	1	-	48000	28000	pF
Note: a is verified when the test output voltage drops, and is not tested separately.								

Typical application circuit

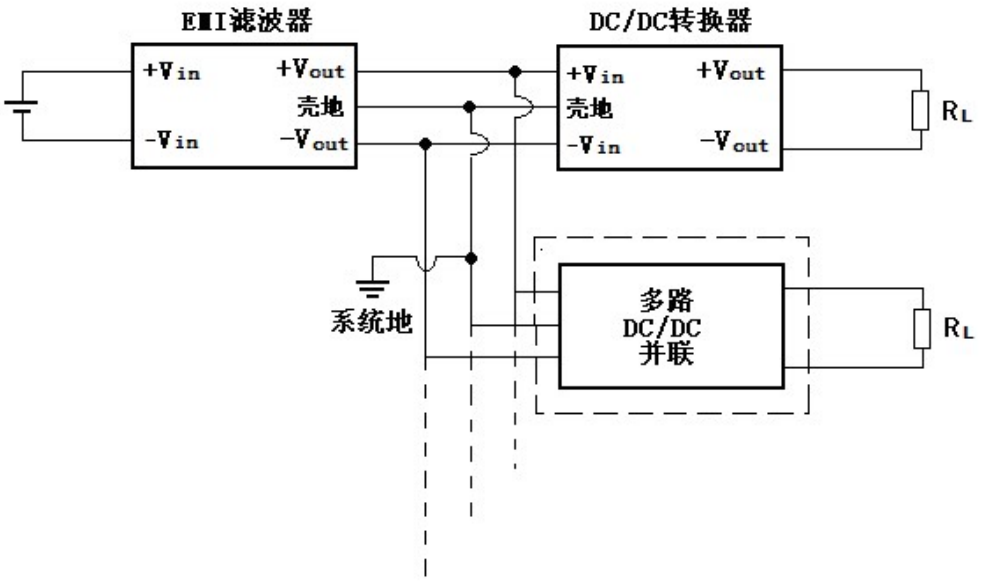


Figure 4. Typical Application Circuit

Description of typical application

Treatment of Shell Ground

The housing of the device must be in good contact with the system ground or the device will not have the conduction suppression it was designed for.

Overcurrent and short circuit precautions

The device has no short-circuit protection function. When the output positive terminal and the output negative terminal are short-circuited or the device is overcurrent, the device has no protection mode, which is easy to cause thermal burnout of the device. Check whether the output terminal is short-circuited before powering on. If yes, the power can be turned on only after the fault is removed.

Overvoltage/undervoltage protection

The device has no input overvoltage and output overvoltage protection, so attention shall be paid during use.

Reliability recommendations

- Pay attention to the working voltage, working current and leakage current when
- selecting the filter;
- Thermal performance data: Test at Tc = 60 ℃ (the temperature of the temperature control platform is 60 ℃), input 28 V, output full load, the maximum temperature rise of the internal magnetic core is 8 ℃, the power consumption of the device is 1 W, and the internal thermal resistance is 8 ℃/W.
- The device is packaged with salt-fog resistant metal (10 # steel), and the device can be coated with "three-proof" paint to enhance the adaptability of the system to harsh environments;

Installation Precautions

- Before installation, check whether the appearance of the module is deformed, the surface is rusted, and the insulator is broken.
- The outer pins of the module are mainly used for electrical connection and are not allowed to be used as mechanical supports for the module.

- When the module should be fixed by mechanical reinforcement, the module must be fixed first, and then the soldering between the pins and the PCB must be carried out, and the operation sequence cannot be reversed.
- There shall be no raised through hole or solder joint on the PCB board contacting with the bottom of the module, and the heat dissipation device shall be flat to avoid affecting the contact.
- Pay attention to electrostatic protection during installation. 、

The installation principle of the filter is to effectively isolate the main power supply from the DC/DC power supply. If the EMI filter is installed incorrectly, the performance of the filter will not work properly, or even have a negative effect. Only when the filter is installed properly can good results be achieved:

- It is better to install the filter at the outlet of the interference source (power supply), and then shield the interference source and the filter. If the inner cavity space of the interference source is limited, the filter shell and the interference source shell shall be well lapped near the outside of the power line outlet of the interference source;
- The input and output lines of the filter must be separated to prevent the coupling between the input line and the output line and reduce the characteristics of the filter. A clapboard-type chassis is usually used to fix the filter, and if an isolation method cannot be implemented, shielded leads are used to reduce common impedance coupling;
- The connection of the filter is preferably twisted-pair, which can eliminate part of the high-frequency interference;
- The low frequency characteristic of the filter is related to the volume, and if the low frequency characteristic is desired to be good, the volume is generally sacrificed;
- The grounding wire of the filter shall be as short as possible to minimize the electromagnetic coupling between the input end and the output end of the filter without damaging the suppression effect of the shielding structure of the system equipment on the electromagnetic interference noise.

An ideal EMI power filter installation is shown in Figure 14.

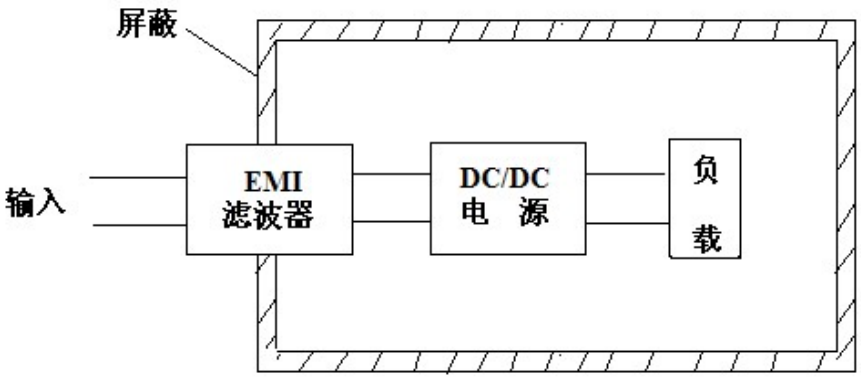


Figure 5. Installation method of ideal EMI power filter

Characteristic curve

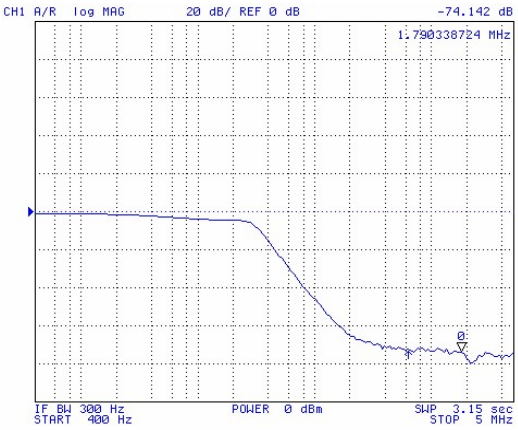


Figure 6. BST/ (20-50) -461-135 Insertion Loss

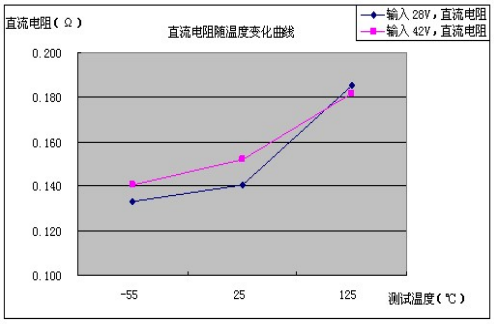


Fig.7. DC Resistance-Temperature Curve

Limiting characteristic

- Electrical stress limit characteristics: maximum input voltage 80 V, minimum input voltage 0 V, insulation resistance up to 800 V.
- Temperature limit characteristics: the maximum working temperature can reach 150 ℃, the minimum working temperature can reach -65 ℃, and it can pass 100 times of temperature cycle and 100 times of temperature shock test in GJB548B-2005 method.
- Mechanical limit characteristics: it can pass the mechanical shock test under the condition C and the random vibration test under the condition F in GJB548B-2005.