

BST/ (20-50) -461-40 EMI Filter

Use Manual

Product Overview

The function of BST/ (20-50) -461-40 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 system electromagnetic compatibility CE102. According to the input current of the DC/DC converter used in the system at the input low end, and considering the design margin, the appropriate filter type is selected. The input voltage is 0 V ~ 50 V, and the output current is 0.8 A. No internal inrush current suppression.

Product features

- Input voltage range: 20V ~ 50V, nominal value: 28V and 42V;
- Output current: 0.8 A;
- Operating temperature (T_C): -55 °C ~ + 125 °C;
- Circuit structure: common mode filter circuit, differential mode filter circuit;
- Quality grade: CAST C/SAST;
- Irradiation index: immunity;
- Dimensions: UPP2520 metal dual in-line housing with mounting flange, maximum size of 25.14 mm × 20.66 mm × 6.86 mm.
- Weight: 14 g ± 3 g.

Conditions of use

Absolute maximum:

- Input voltage: 0 V ~ 60 V;
- Output current: 0.96 A;
- Shell working temperature: -55 °C ~ 125 °C;

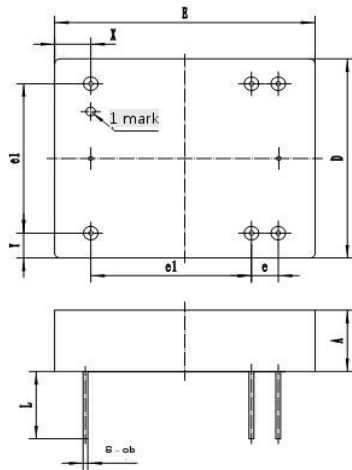
- Storage temperature: -65 °C ~ 150 °C;
- Soldering temperature of lead: 300 °C (10 s);

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

Recommended working conditions:

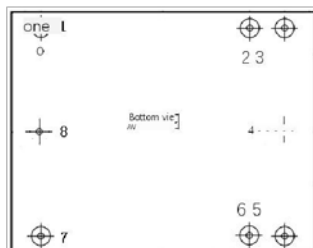
- Input voltage: 20 V ~ 50 V;
- Output current: 0.8 A;
- Enclosure operating temperature range (T_C): -55 °C ~ 125 °C.

Structure description



Dimension symbol	Value in mm		
	Minimal	Nominal	Max
A	-	-	6.86
φb	0.35	-	0.55
D	-	-	20.66
E	-	-	25.14
e	-	2.54	-
e1	-	15.24	-
L	5.90	-	-
X	3.13	-	3.73
Y	2.16	-	2.76
Note: e and E1 are interchangeable dimensions, which are guaranteed by shell manufacturing and inspection, and there is no assessment requirement in this specification.			

Figure 1. BST/ (20-50) -461-40 Outline



Pin-out serial number	Symbol	Function	Pin-out serial number	Symbol	Function
1	V_I	Enter the positive terminal	5	GND_O	Output ground
2	V_O	Output positive terminal	6	GND_O	Output ground
3	V_O	Output positive terminal	7	GND_I	Input ground
4	CASE	Enclosure	8	CASE	Enclosure

Fig.2. BST/ (20-50) -461-40 Lead-out Arrangement

Functional block diagram

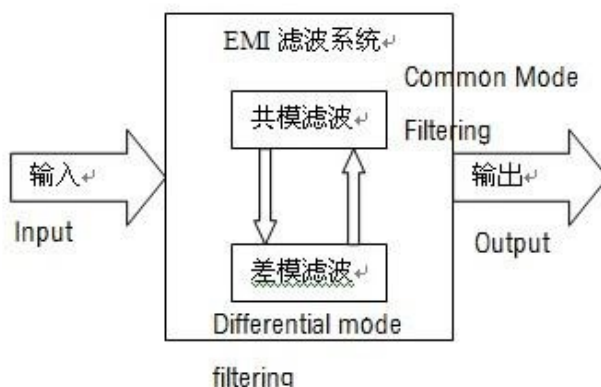


Figure 3. Functional Block Diagram

Electrical characteristic index

Table 1. Electrical characteristics (BST/ (20-50) -461-40)

NO.	Characteristic	Symbol	Conditions (-55 °C ≤ T _C ≤ 125 °C, unless otherwise specified V _I = 28V ± 0.5V versus V _I = 42V ± 0.5V)	Group A Grouping	Limit value		Measured value	Unit
					Minimal	Max		
1	Input voltage range ^a	V _I	Continuous	1,2,3	0	50	0-50	V
2	Output Current ^a	I _O	V _I = 20V ~ 50V, full load	1,2,3	-	0.8	0.8	A
3	Output voltage sag	V _{OD}	V _I = 20V, 28V, 42V, 50V, full load	1	-	1.2	0.35	V
4	Noise suppression	N _O	Test frequency 1 kHz	4,5,6	-1	1	0.6	dB
			Test frequency: 500kHz	4,5,6	50	-	60	
			Test frequency: 1MHz	4,5,6	50	-	70	
			Test frequency: 5MHz	4,5,6	45	-	65	
5	DC resistance	R _{DC}	I _O = 0.8A	1	-	1.5	0.4	Ω
6	Power consumption	P _I	I _O = 0.8A	1	-	0.96	0.26	W
7	Insulation resistance	R _{ISO}	DC voltage of 500 V is applied between the input and output terminals and the enclosure (except terminals 4 and 8)	1	100	-	100	MΩ
8	Capacitance	C _O	Between any lead-out terminal (except terminal 4 and 8) and housing	1	-	25000	23200	pF

Note: a_i is verified when testing the output voltage drop, and is not tested separately.

Typical application circuit

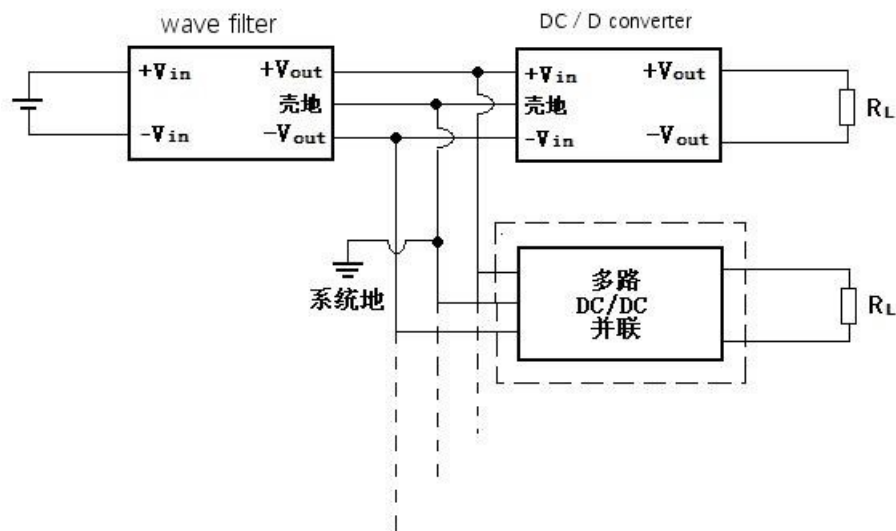


Figure 4. Typical Application Circuit

Typical application description

Treatment of crustal land

The housing of the device must be in good contact with the system ground, otherwise the conduction suppression of the device will not be as good as designed.

Precautions for overcurrent and short circuit

The device has no short-circuit protection function. When the output positive terminal and 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. Before power-on, check whether the output terminal is short-circuited. If yes, power on after troubleshooting.

Overvoltage/undervoltage considerations

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

Reliability recommendations

- Attention should be paid to the working voltage, working current and leakage current in the selection of the filter;
- Thermal performance data: the test is carried out at $T_c = 60\text{ }^{\circ}\text{C}$ (the temperature of the temperature control station is $60\text{ }^{\circ}\text{C}$), the input is 28 V, the output is fully loaded, the maximum temperature rise of the internal magnetic core is $2\text{ }^{\circ}\text{C}$, the power
- consumption of the device is 0.26 W, and the internal thermal resistance is $7.7\text{ }^{\circ}\text{C/W}$.
- The device is packaged with anti-salt spray metal (10 # steel) shell, and the device can

be coated with "three-proof" paint to enhance the adaptability of the system to harsh environment;

Installation Precautions

- Before installation, check that the appearance of the module shall be free of deformation, the surface shall be free of rust, and the insulator shall not be broken.
- The outer pin of the module is mainly used for electrical connection and is not allowed to be used as the mechanical support of the module.
- When the module shall be fixed by mechanical reinforcement, the module must be fixed first, and then the lead pin and PCB shall be welded. The operation sequence shall not be reversed.
- The PCB board in contact with the bottom surface of the module shall be free of raised through holes or solder joints, and the heat sink 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 be able to play a normal role, or even play a negative role. Only by properly installing the filter can good results be achieved:

- It is better to install the filter at the exit 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 shall be well lapped with the interference source shell outside 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 filter characteristics. The filter is usually fixed by using a clapboard chassis, and if the isolation method cannot be implemented, a shielding lead wire is used; Reduce common impedance coupling; ③ 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. If the low frequency characteristic is expected to be good, it is generally at the expense of the volume;
- 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.

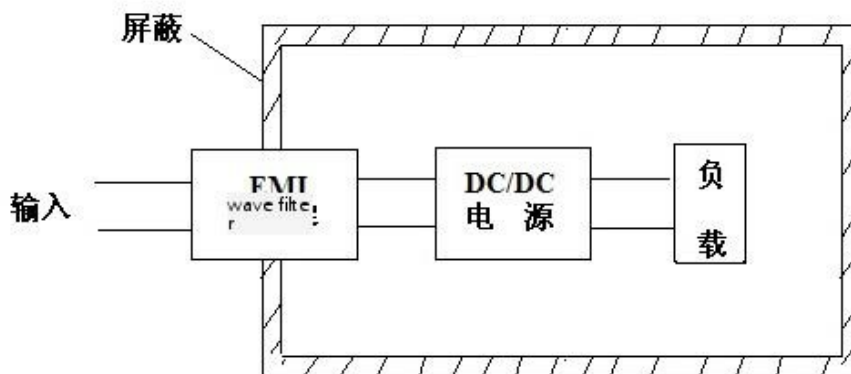


Figure 5. Installation method of ideal EMI power supply filter

Characteristic curve



Figure 6. BST/ (20-50) -461-40 Insertion Loss

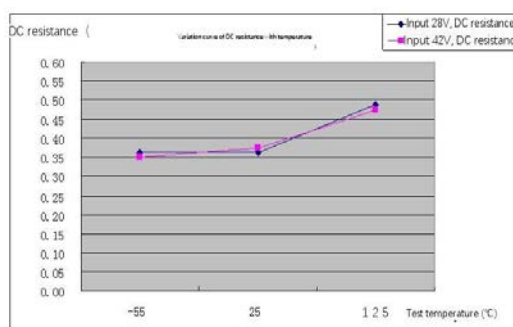


Fig.7. DC Resistance-Temperature Curve

Limiting characteristics

- Electrical stress limit characteristics: maximum input voltage 80 V, minimum input voltage 0 V, insulation resistance up to 800 V.

- Temperature limit characteristics: the highest working temperature can reach 150 °C, the lowest working temperature can reach -65 °C, 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 condition D and random vibration test under condition F in GJB548B-2005.