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Brochure

Therma (2024)

RC-filter and thermalization block

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Therma

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Therma

RC-filter and thermalization block

Aivon Therma is a RC-filter and thermalization block for 24 dc lines in robust aluminum enclosure. Copper (oxygen-free, C101) and gold-plated copper enclosures upon request. Therma filters are used to filter and thermalize dc wires at 4K or 10mK stages of the cryostat. These dc wires are typically twisted pair cables that end in microD25 connector and are provided by the cryostat manufacturer. At the room temperature end, the wiring ends in circular Fischer connector which can be connected to Aivon breakout boxes for easy handling of signals.

In Therma-uD25 models, the connection in the block is via 1.27mm female and male D-microminiature 25-contact Cinch connectors. Enclosure can be easily opened if one wants to replace components or apply epoxy for e.g. rf suppression. One can also replace the brass screws with longer ones in order to attach the filter to external mount. The printed circuit board inside the filter has four layers of which the two inner layers form a perfect ground plane for better grounding and thermalization. This ground plane makes contact to enclosure in sides of the board.

We have two standard models Therma-uD25-PW and Therma-uD25-G2F that use the same enclosure. They differ by the equivalent circuit of the filter.

Therma - uD25 – PW (Aivon Product Nr: 100302)

Therma-uD25-PW is a two-stage RC-filter and thermalization block for 12-pairs, where paired lines are filtered pairwise. The pairs are formed by pins 1-14, 2-15 etc of the connector. This matches the notation used by cryostat manufacturers. Connection in the block is via 1.27mm D-microminiature 25-contact Cinch/Glenair connectors, from male to female (or vice-versa due to the symmetry). Figure 3 illustrates the equivalent circuit consisting of SMD resistors and capacitors. Customer can choose suitable resistors and capacitors to meet the required filter cutoff and other requirements.

The body size without connectors is 56 mm x 36 mm x 10 mm.

Figure 1: Equivalent circuit for one pair. Component size code 0805. Values could be e.g. R1 = R3 = 1 kΩ, R2 = 10 kΩ, C1 = C2 =1 nF.

Figure 2: Therma-uD25-PW (model 100301) opened.

Therma - uD25 - G2F (Aivon Product Nr: 100402)

Therma-uD25-G2F is a two-stage RC-filter and thermalization block for 24 individual lines that are grounded capacitively to ground plane/filter body. The block is equipped with microminiature Cinch/Glenair connectors. Figure 1 illustrates the equivalent circuit consisting of SMD resistors and capacitors. All resistors and capacitors have size code of 0805. The maximum capacitance value can be as high as 47 nF (NP0/C0G capacitor) or 220 nF (acrylic capacitor). Customer can choose suitable resistors and capacitors to meet the required filter cutoff and other requirements. Customer can freely select different values to different lines if needed.

The body size without connectors is 56 mm x 36 mm x 10 mm.

Figure 3: Equivalent circuit for one pair and layout of the top side of the internal pcb. Values could be e.g. R1 = R2 = 1 kΩ, C1 = C2 = 1 nF.

Figure 3: Therma enclosure. In the middle there are six D3.2mm thru holes for mounting. The distance between the adjacent holes is 10mm. Both models PW and G2F use this enclosure.

Pinout of Therma filters

Therma filters use microminiature D-connectors such as Cinch M83513 series. One end on Therma filter has male and the other end has female connector.

As there are 25-pins in the connectors but the pcb has only 24 lines, one pin (#13) is left unconnected. The Figure 5 below shows the correspondence between twisted-pair dc lines (circular Fischer 24-pin connector at room temperature) and micro-D25 connector pin numbers. We send the component values and types with the customer for approval and information transparency.

Project number	xxxx							
Customer	NN							
Model	Therma-uD25_PW_2023_0805 filter							
Quantity	1							
Each line has two RC (R1+C1, R2+C2) filters to ground.								
Fischer line	Connector line	pair	R1	C1	R2	C2	R3	pcb side
1 (green dot)	1	1+	1k	1nF	10k		1k	top
2	14	1-	1k		10k	1nF	1k	bottom
3	2	2+	1k	1nF	10k		1k	top
4	15	2-	1k		10k	1nF	1k	bottom
5	3		1k	1nF	10k		1k	top
6	16		1k		10k	1nF	1k	bottom
7	4		1k	1nF	10k		1k	top
8	17		1k		10k	1nF	1k	bottom
9	5		1k	1nF	10k		1k	top
10	18		1k		10k	1nF	1k	bottom
11	6		1k	1nF	10k		1k	top
12	19		1k		10k	1nF	1k	bottom
13	7		1k	1nF	10k		1k	top
14	20		1k		10k	1nF	1k	bottom
15	8		1k	1nF	10k		1k	top
16	21		1k		10k	1nF	1k	bottom
17	9		1k	1nF	10k		1k	top
18	22		1k		10k	1nF	1k	bottom
19	10		1k	1nF	10k		1k	top
20	23		1k		10k	1nF	1k	bottom
21	11		1k	1nF	10k		1k	top
22	24		1k		10k	1nF	1k	bottom
23	12	12+	1k	1nF	10k		1k	top
24	25	12-	1k		10k	1nF	1k	bottom
Components	pcs	MPN						
1k	96	RN73C2A1K0BTD						
10k	48	RN73C2A10KBTD						
1nF	48	CC0805FRNPO0BN102						

Figure 4: Table of Therma-uD25-PW pinout and example components

Product summary

Product code	Product name	Description
100302	Therma-uD25-PW	Low pass RC filter with pairwise action
100402	Therma-uD25-G2F	Low pass RC filter with respect to ground

Mounting of Therma filters

We can design and manufacture mounting brackets for easy thermal anchoring of the filter. Please ask for more information.

Specifications

Data for the components is following:

- All size 0805 resistors
  - TE Holsworthy RN73 series, values 4R7 – 511k
  - Specs at room temperature:
    - ± 10ppm/°C
    - ± 0.1%
    - 100mW (0805)
- All size 0805 capacitors
  - C0G / NP0, 50V or better (except 0805, 47 nF)
  - C0G / NP0, 25V (0805, 47 nF)
  - Acrylic, 16V (0805, 220nF)
  - Specs at room temperature:
    - 5% (or better upon request)

Enclosure

Material	Raw aluminum, copper C101 or Au-plated copper C101
Male connector plug	Cinch M83513/01-DN
Female connector socket	Cinch M83513/02-DN

Document revision history

Date	Version	Description	Author
23.9.2024	0.1	Initial draft	JSP
3.9.2025	0.2	Added models 100302 and 100402	JSP