SLB-PC104ADAPT-DOC-v2.0

PC-104 Adapter Documentation

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SpaceLab, Universidade Federal de Santa Catarina, Florianópolis - Brazil

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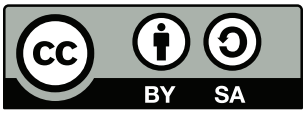

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Nomenclature

BOM	*Bill Of Materials.*
PCB	*Printed Circuit Board.*

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CHAPTER 1

Introduction

The PC-104 Adapter boards are intended to be used in 2 or 3U CubeSat structures as an interconnection of two PC-104 bus segments. This interconnection is made with a set of PicoBlade [1] cables between the top and bottom boards. The set of two boards (top and bottom) of the adapter can be seen in Figure 1.1.

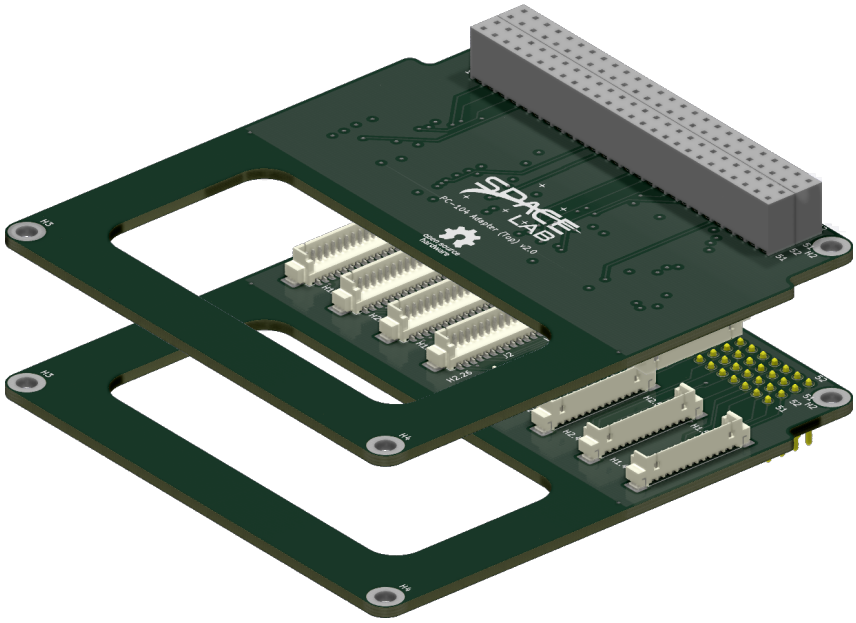

Figure 1.1: PC-104 adapter boards.

This adapter was designed with the objective of be used in the GOLDS-UFSC mission [2], but it is possible to reuse it others mission with similar characteristics (2 or 3U structures divided in segments).

The project is open and licensed under the CERN Open Hardware License, version 2 (CERN OHL-S 2). The source files and this document are available in [3].

CHAPTER 2

Hardware Overview

The hardware project is composed by two boards: top and bottom. Both PCBs were designed using KiCad v5.1.8-5 [4]. Both boards have also the same size, shape and number os layers (4), and are vertically simetrical (same components, but in different sides of the board).

All the pins of the PC-104 connector are routed between the two boards, this way, this adapter can be used in any configuration of the PC-104 pins.

Both boards have also an inner hole to allow vertically passing internal cables of the satellite.

2.1 Top Board

A 3D model of the top board can be seen in Figures 2.1 (top side) and 2.2 (bottom side).

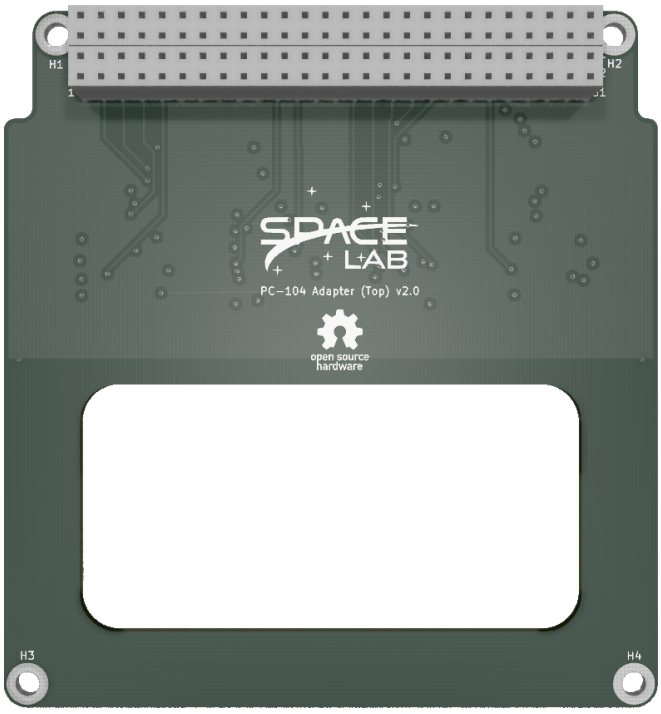

Figure 2.1: Top view of the top board (real size).

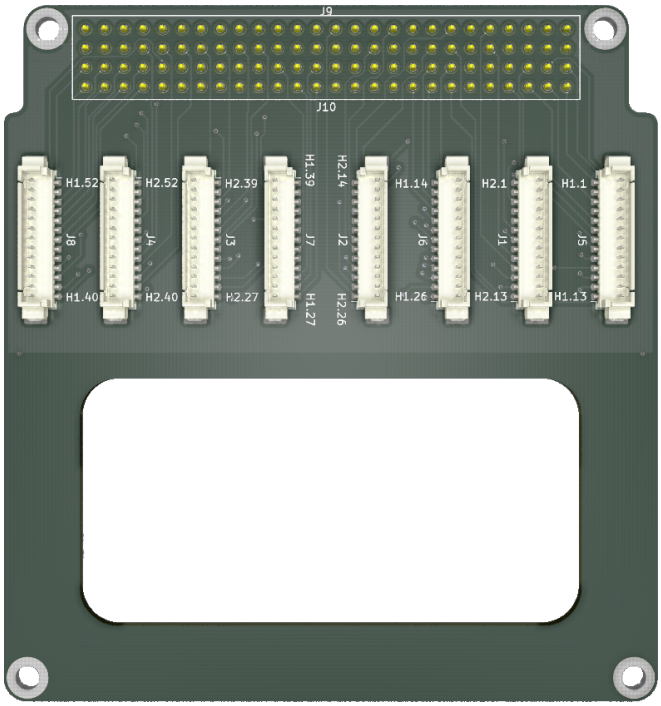

Figure 2.2: Bottom view of the top board (real size).

2.2 Bottom Board

A 3D model of the bottom board can be seen in Figures 2.3 (top side) and 2.4 (bottom side).

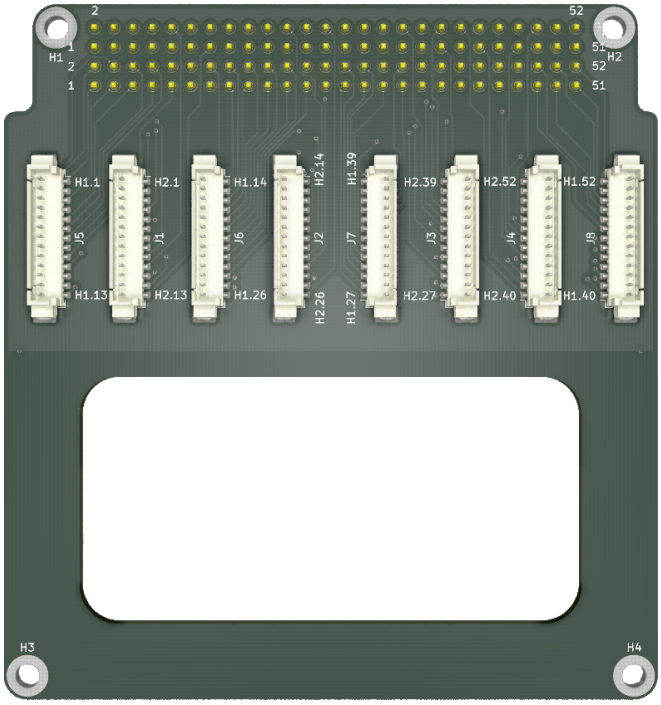

Figure 2.3: Top view of the bottom board (real size).

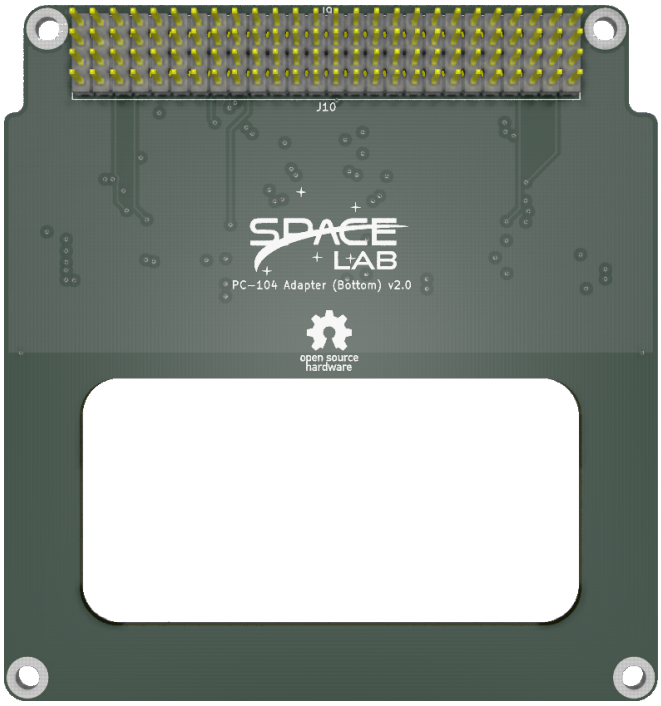

Figure 2.4: Bottom view of the bottom board (real size).

2.3 Pinout

The pinout of the connectors are available in this section. The pin numbering reference of the PC-104 and the PicoBlade connectors can be seen in Figures 2.5 and 2.6.

The connection between the PicoBlade connectors and the PC-104 bus is available below.

2.3.1 Top Board

2.3.2 Bottom Board

2.4 Bill of Materials

The Bill of Materials (BOM) of the top and bottom boards, and the interconnection cables are available in Tables 2.3, 2.4 and 2.5, respectively.

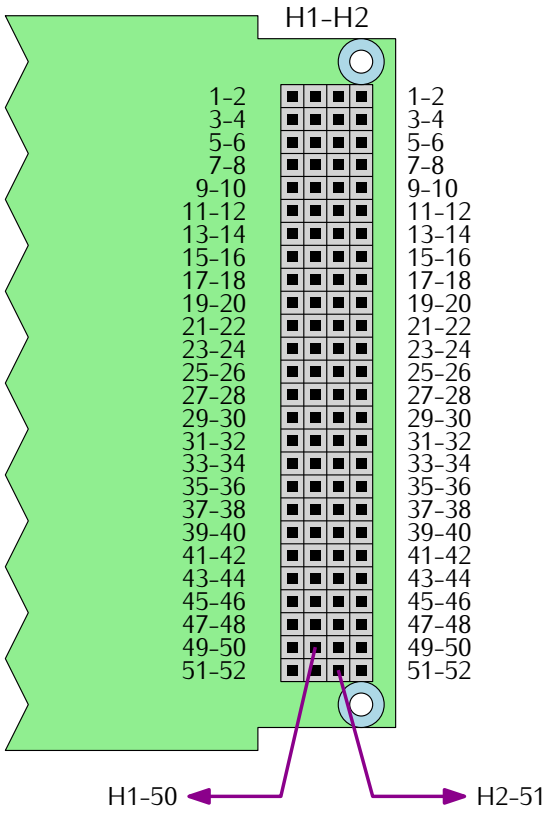

Figure 2.5: PC-104 pinout reference.

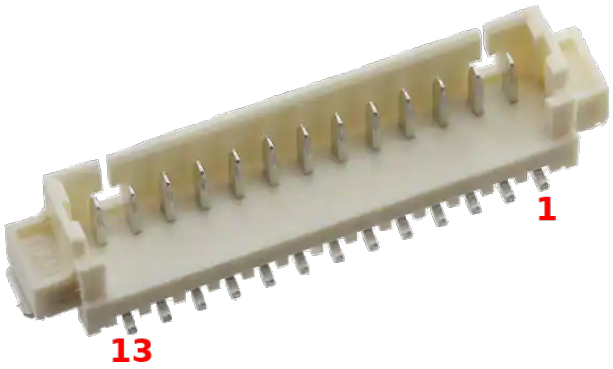

Figure 2.6: Pin numbering of the PicoBlade connector.

	PC-104 Pin							
PicoBlade Pin	**J1**	**J2**	**J3**	**J4**	**J5**	**J6**	**J7**	**J8**
1	H2-13	H2-26	H2-39	H2-52	H1-13	H1-26	H1-39	H1-52
2	H2-12	H2-25	H2-38	H2-51	H1-12	H1-25	H1-38	H1-51
3	H2-11	H2-24	H2-37	H2-50	H1-11	H1-24	H1-37	H1-50
4	H2-10	H2-23	H2-36	H2-49	H1-10	H1-23	H1-36	H1-49
5	H2-9	H2-22	H2-35	H2-48	H1-9	H1-22	H1-35	H1-48
6	H2-8	H2-21	H2-34	H2-47	H1-8	H1-21	H1-34	H1-47
7	H2-7	H2-20	H2-33	H2-46	H1-7	H1-20	H1-33	H1-46
8	H2-6	H2-19	H2-32	H2-45	H1-6	H1-19	H1-32	H1-45
9	H2-5	H2-18	H2-31	H2-44	H1-5	H1-18	H1-31	H1-44
10	H2-4	H2-17	H2-30	H2-43	H1-4	H1-17	H1-30	H1-43
11	H2-3	H2-16	H2-29	H2-42	H1-3	H1-16	H1-29	H1-42
12	H2-2	H2-15	H2-28	H2-41	H1-2	H1-15	H1-28	H1-41
13	H2-1	H2-14	H2-27	H2-40	H1-1	H1-14	H1-27	H1-40

Table 2.1: Pinout of the PicoBlade connectors of the Top Board.

	PC-104 Pin							
PicoBlade Pin	**J1**	**J2**	**J3**	**J4**	**J5**	**J6**	**J7**	**J8**
1	H2-1	H2-14	H2-27	H2-40	H1-1	H1-14	H1-27	H1-40
2	H2-2	H2-15	H2-28	H2-41	H1-2	H1-15	H1-28	H1-41
3	H2-3	H2-16	H2-29	H2-42	H1-3	H1-16	H1-29	H1-42
4	H2-4	H2-17	H2-30	H2-43	H1-4	H1-17	H1-30	H1-43
5	H2-5	H2-18	H2-31	H2-44	H1-5	H1-18	H1-31	H1-44
6	H2-6	H2-19	H2-32	H2-45	H1-6	H1-19	H1-32	H1-45
7	H2-7	H2-20	H2-33	H2-46	H1-7	H1-20	H1-33	H1-46
8	H2-8	H2-21	H2-34	H2-47	H1-8	H1-21	H1-34	H1-47
9	H2-9	H2-22	H2-35	H2-48	H1-9	H1-22	H1-35	H1-48
10	H2-10	H2-23	H2-36	H2-49	H1-10	H1-23	H1-36	H1-49
11	H2-11	H2-24	H2-37	H2-50	H1-11	H1-24	H1-37	H1-50
12	H2-12	H2-25	H2-38	H2-51	H1-12	H1-25	H1-38	H1-51
13	H2-13	H2-26	H2-39	H2-52	H1-13	H1-26	H1-39	H1-52

Table 2.2: Pinout of the PicoBlade connectors of the Bottom Board.

Item	**Designator**	**Partnumber**	**Quantity**
1	J9, J10	SSW-126-01-G-D	2
2	J1, J2, J3, J4, J5, J6, J7, J8	53398-1371	8

Table 2.3: Bill of Materials (BOM) of the top board.

Item	Designator	Partnumber	Quantity
1	J9, J10	TSW-126-07-G-D	2
2	J1, J2, J3, J4, J5, J6, J7, J8	53398-1371	8

Table 2.4: Bill of Materials (BOM) of the bottom board.

Item	Designator	Partnumber	Quantity
1	-	51021-1300	8
2	-	15134-1401	16

Table 2.5: Bill of Materials (BOM) of the connection cables.

CHAPTER 3

Assembly Instructions

This chapter presents the assembly instructions of the two boards and the interconnection cables between the top and bottom boards.

This project does not have sensible components (electrostatic or temperature), and no major care should be taken during the solder process. A recommended temperature of the soldering iron can be 350 °C or lower.

3.1 Top Board

The instructions to assembly the top board are presented below:

1. Solder the PicoBlade connectors (J1, J2, J3, J4, J5, J6, J7 and J8), beginning with the external connectors and moving to the center of the board, as can be seen in Figure 3.1.

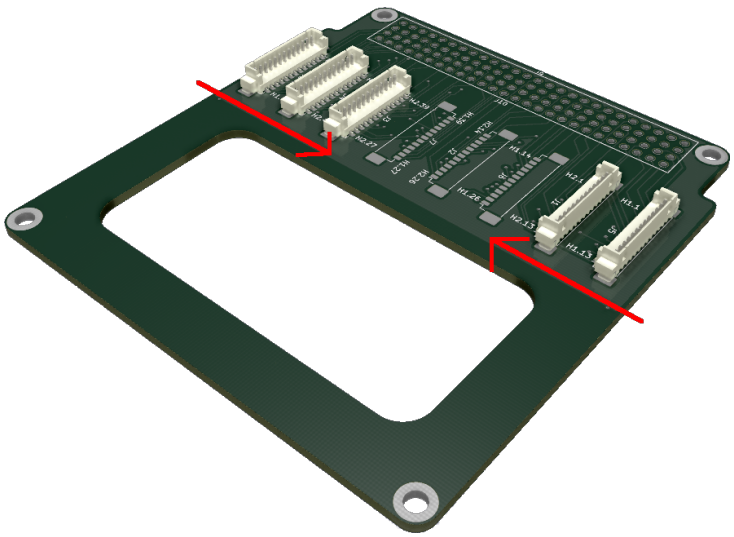

Figure 3.1: Solder sequence of the PicoBlade connectors.

2. Solder the PC-104 connectors (J9 and J10), taking care to keep the alignment of all the pins with the surface of the board, as can be seen in Figure 3.2.

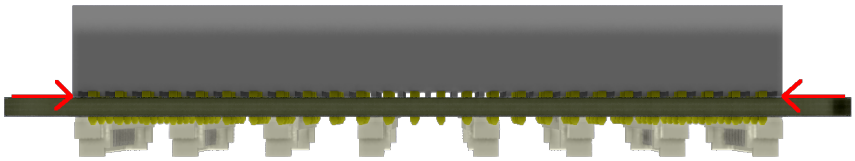

Figure 3.2: Alignment of the PC-104 connectors.

3.2 Bottom Board

The same instructions apply to the bottom board:

1. Solder the PicoBlade connectors (J1, J2, J3, J4, J5, J6, J7 and J8), beginning with the external connectors and moving to the center of the board, as can be seen in Figure 3.1.

2. Solder the PC-104 connectors (J9 and J10), taking care to keep the alignment of all the pins with the surface of the board, as can be seen in Figure 3.2.

3.3 Cables

For now, there is no assembled cables with 13 wires available to buy. So, a custom set of cables is required to connect the top and bottom boards.

The instructions to assembly these custom cables are presented below:

1. TBD.

Bibliography

[1] Molex, LLC. *PicoBlade Connector System*, 2020. Available at <https://www.molex.com/molex/products/family/picoblade>.

[2] Space Technology Research Laboratory (SpaceLab). *GOLDS-UFSC Documentation*, 2020. Available at <https://github.com/spacelab-ufsc/golds-ufsc-doc>.

[3] Space Technology Research Laboratory (SpaceLab). *PC-104 Adapter*, 2020. Available at <https://github.com/spacelab-ufsc/pc104-adapter>.

[4] KiCad Developers Team. *KiCad EDA*, 2020. Available at <https://kicad-pcb.org/>.