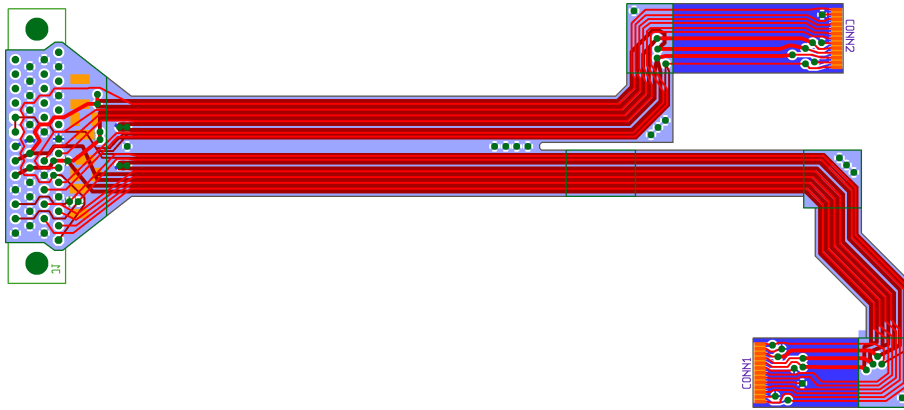


MSL RAD Front-End-Electronics TFlex Rigid-Flex layout

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v00: September 8, 2006



The TFlex rigid-flex board provides the electric connection from the Rad Sensor Head interface connector (MDM 51) to the RADA and RADBC boards in the telescope part of the instrument. The RADA and RADBC board connections are made with Omnetics Dualobe connectors, 25-pin duckbill type.

Apart from the three connectors there will be noise filters for the FET bias supplies to each of the electronics boards.

1 Fabrication

The board shall be made according to IPC class 3 standards.

1.1 Material

The base material is polyimide. The copper thickness is **TBD**, surface finish **TBD**. The outer copper surfaces are to be covered with polyimide films.

1.2 Design Rules

The minimum trace width is 0.25 mm (10 mil), clearance 0.15 mm (6 mil), the clearance on top surfaces to copper carrying -70 V detector bias shall be 0.3 mm (12 mil).

A copper-copper clearance of 0.25 mm (10 mil) is maintained on the layout, except for some power routing on inner layers between the pins MDM 51 connector.

The minimum via hole diameter is 0.3 mm (12 mil), with annular rings of at least 0.25 mm (10 mil) width. The actual via size is 36 mil, with 12 mil hole diameter.

The edge clearance of copper traces and pads is 0.5 mm (20 mil) minimum, except for some redundant traces along the length of the strips.

1.3 Layers

One flexible Capton layer (Flex1) will cover the whole board area, with copper layers on both sides (Inner Gnd, Signals). The Omnetics duckbill connectors will be soldered to this layer. There will be solder pads on both sides, and there are vias in the fully exposed part of this flexible layer.

A second flexible Capton layer covers part of the board area (Flex2), also with copper on both sides (Power, Outer GND). The surface mounted components of the filters and the MDM 51 connector are to be mounted on one side of the Flex2 layer. There are vias in parts that are covered only by the two flexible layers.

The outer copper layers on both flex layers are ground planes.

There shall be five areas covered by a rigid Capton layer facing the Flex1 layer. There shall be copper on the outer surface of this rigid layer.

One of these area covers the MDM 51 connector and the filter components. The solder pads for the MDM 51 connector pins are exposed on this rigid area.

The second rigid area is located in the path to the RADBC board connector (CONN2). This rigid area will be glued to the bottom part of the sensor housing as strain relief for the flex loop to the RADBC board, see Fig. 1. This rigid area has vias.

The third rigid area is located on the path to the RADA board, and will be glued to bottom part of the sensor housing, to support the service loop between the top and bottom half of the housing. There is no copper/vias on the area, see Fig. 2.

The fourth rigid area is located on the path to the RADA board, to be glued to the top part of the sensor housing, completing the service loop. There are via connecting the ground layers (optional).

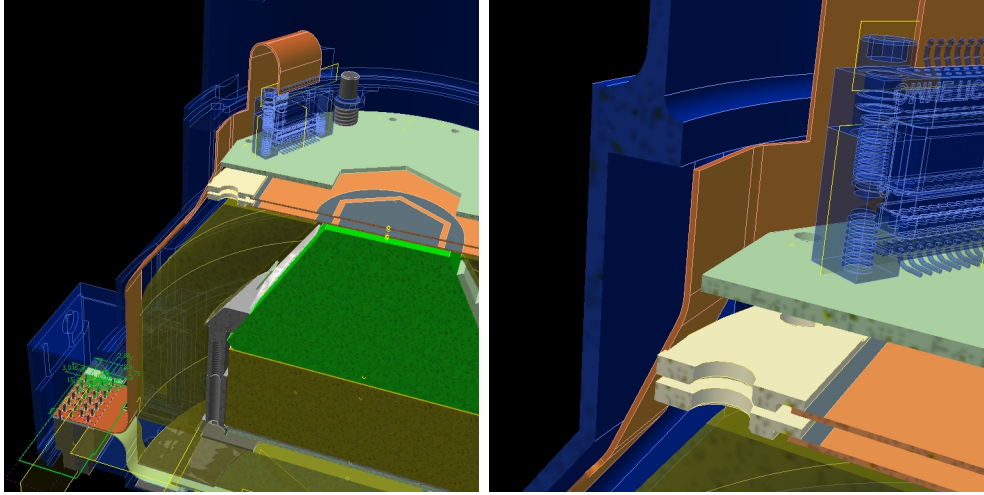


Figure 1: RADC flex routing

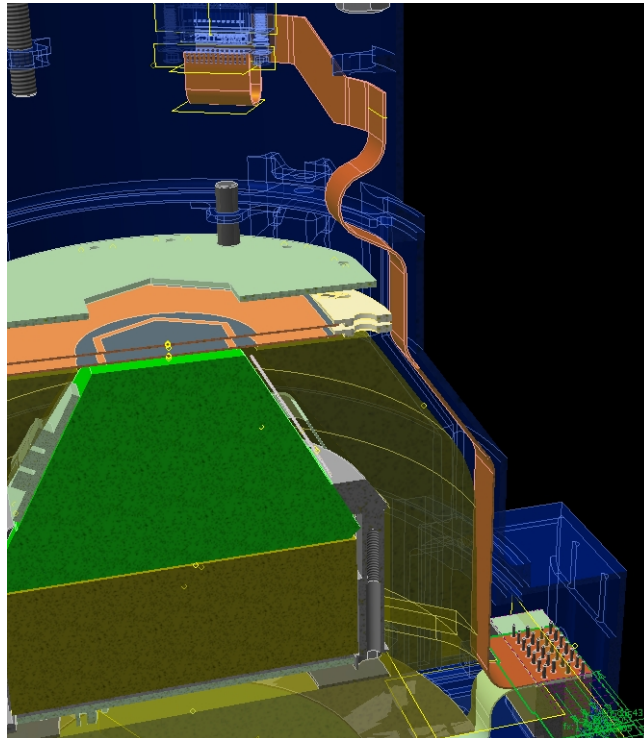


Figure 2: RADA flex routing

The fifth rigid area is located on the path to the RADA board, to be glued to the top part of the sensor housing, providing strain relief for the flex loop to the RADA board. There are vias on this rigid area.

The flex layers shall be **TBD** approximately 0.1 mm thick each. The total thickness of the rigid area shall be **TBD** 0.5 mm.

The following layer table does not include insulation layers or glue.

Layer order			Gerber file
Inner Gnd	copper	35 μm	v00.group0.gbr
Flex 1	Capton	TBD	v04.group6.gbr
Signals	copper	35 μm	v00.group1.gbr
Power	copper	35 μm	v00.group2.gbr
Flex 2	Capton	TBD	v04.group5.gbr
Outer GND	copper	35 μm	v00.group3.gbr
Rigid	Capton	TBD	v04.group4.gbr
	copper	35 μm	v04.group4.gbr

2 Design

Fig. 3 show all the bends and twists that this board needs to do to go into the RAD sensor.

2.1 Tools

The design is done with GNU EDA tools. (<http://www.geda.seul.org/>)
The layout tool is PCB version 20060822. GAF version is 20060824.

2.2 Schematics

Fig. 4 shows the schematics drawing of the TFlex board.

2.3 Layout

Fig. 5 shows the layout of the Flex 1 outline and copper layers. Fig. 6 is the same for the Flex 2 layer. Fig. 7 shows the rigid areas. Each layer is shown at scale 1:1 and 2:1.

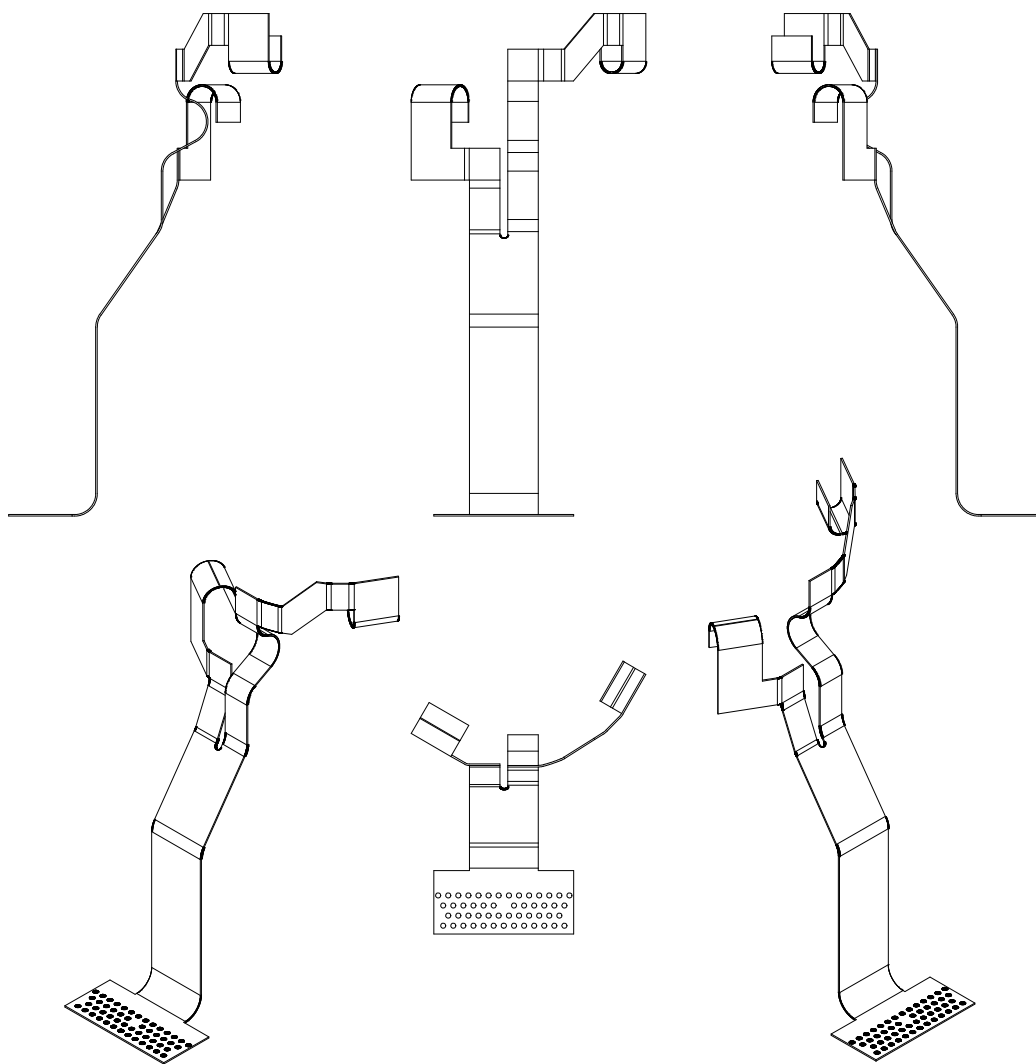


Figure 3: TFlex CAD views



Figure 5: Flex 1 layout

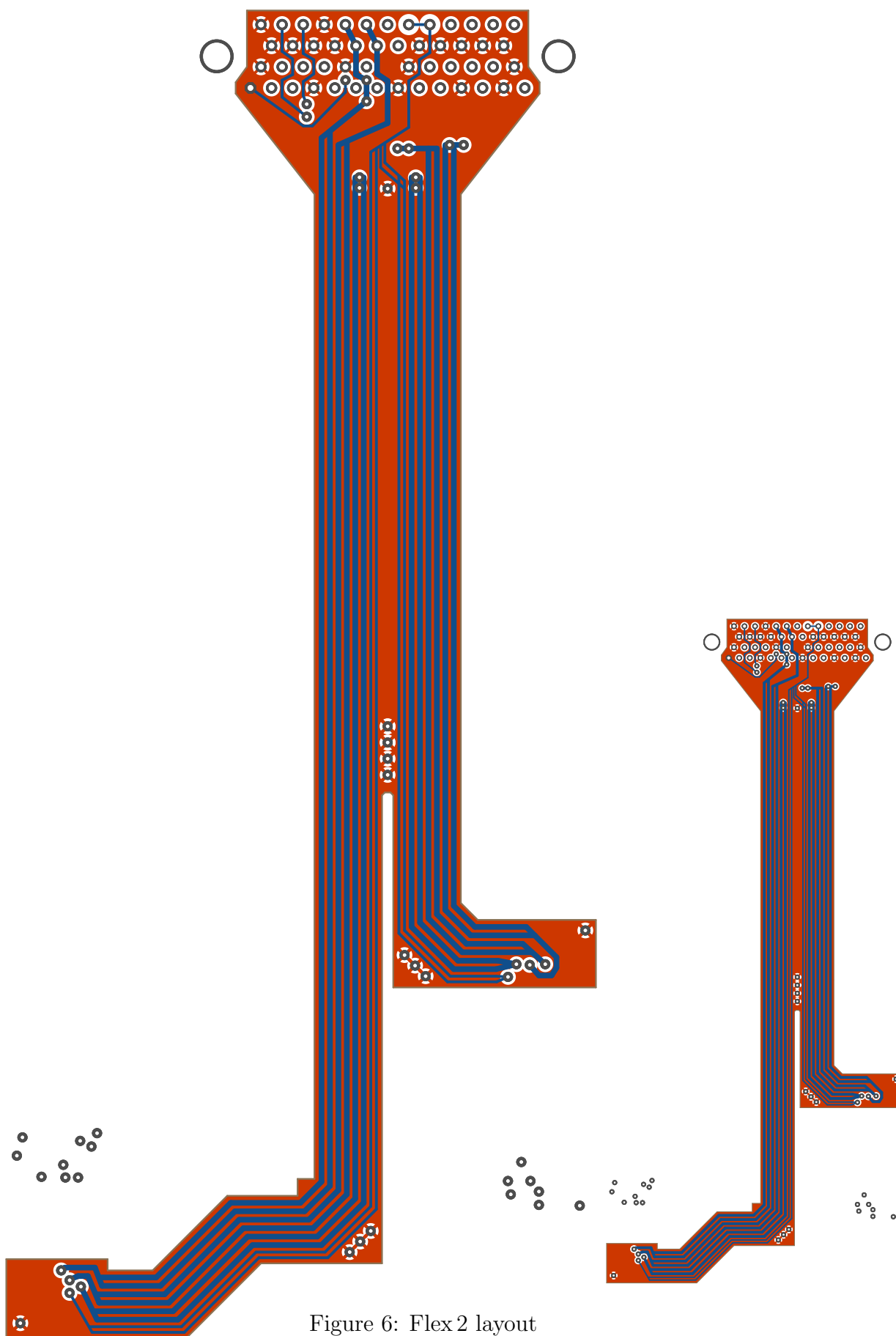


Figure 6: Flex 2 layout

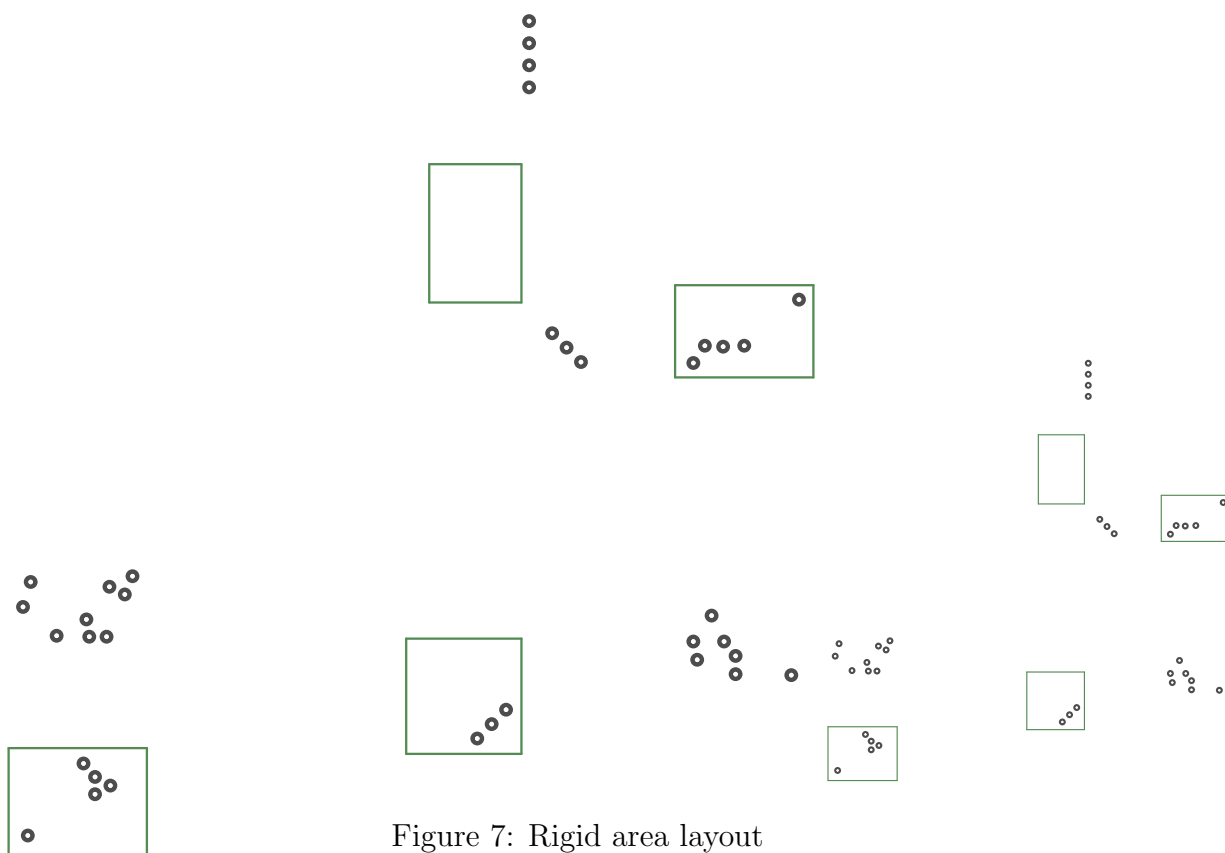
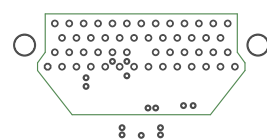
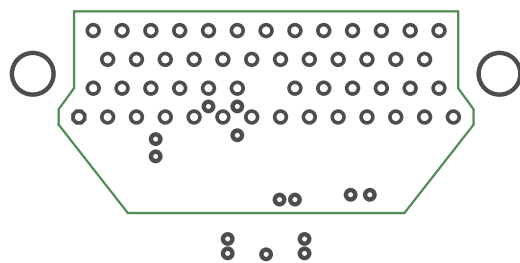


Figure 7: Rigid area layout