

Draft Design for Series Array Housing Circuit Board

Dominic Benford; June 18, 2002.

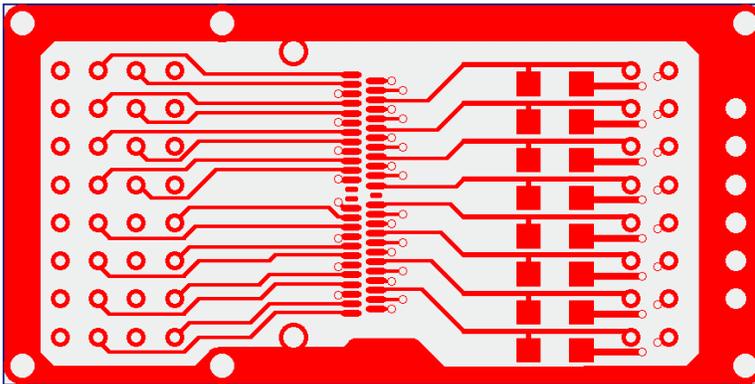
This circuit board is designed to attach to the Series Array Housing (hereafter SA Box), which was detailed in an earlier message. The board will accommodate a set of 48 Samtec pins for connecting into the SA Box, a Nanonics 51-pin horizontal surface mount connector for attaching to room temperature electronics, and a set of 16 wire attachment holes to connect a Tekdata woven cable of CuNi/NbTi twisted pairs that couples to the 2nd Stage Output of the detector array.

The board is designed as a 3-layer board with a 100-mil overall thickness. It is 2" long and 1" wide and requires solder plate and soldermask on both outer surfaces. All pictures below are twice actual size.

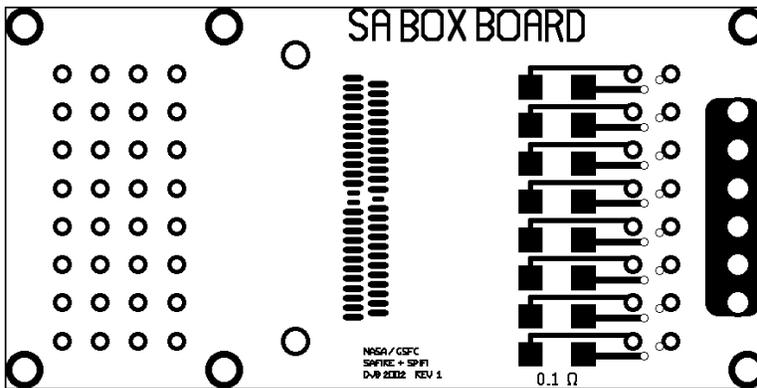
The board has been designed with a few considerations:

- The impedance of the SA Out lines is approximately 50Ω in a microstrip-like configuration.
- The Nanonics connector is positioned for convenient location of a cable without requiring a large circuit board. It will be tied down with 1mm screws in the center of the board.
- The 2nd Stage Shunt Resistor is placed as close as possible to the other components in the 2nd Stage loop, and all lines are superconducting.
- The impedance of the 2nd Stage loop circuit has been made as small as is convenient given the geometric constraints.
- The SA Feedback wiring is designed for low crosstalk, but with higher impedance (as if that mattered).
- There is a metallized bank for soldering a small copper or brass bracket in place to which we will ask Tekdata to epoxy the cables for strain relief.
- The 6 holes around the outside edge shall be tapped 2-56. If the fiberglass is strong enough, these can be used as jackscrews to lift off the board when disassembling. These screw holes can also be used to attach small heat sink straps to the copper End Caps on the SA Box.
- I am assuming that during assembly, a skilled craftsman will carefully mate the pins and then press the board into place. If we decide this isn't accurate or gentle enough, a jig can be machined to enable the board to be jack-screwed into place.
- Yes, there is nothing besides friction holding this in place during operation.
- An alignment jig – not yet designed – will hold the Samtec pin array during soldering operations.

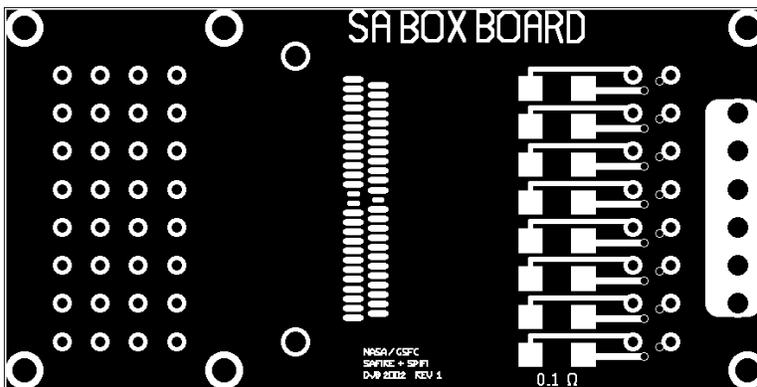
The top layer contains the top pads and wiring:



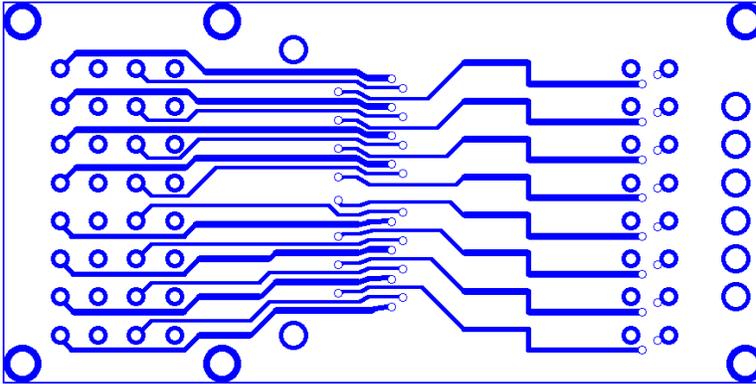
There is a solder plating layer on this:



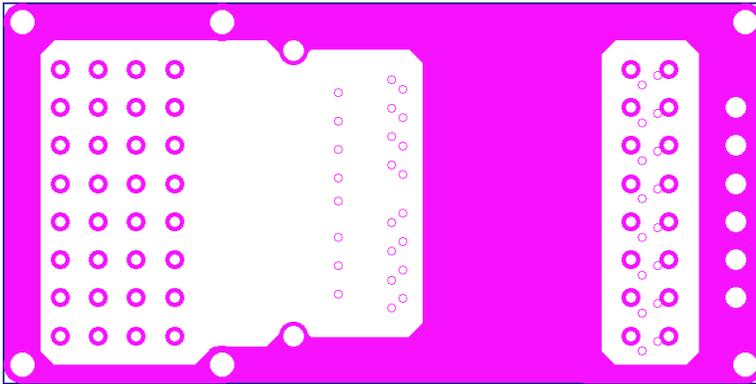
And a soldermask layer:



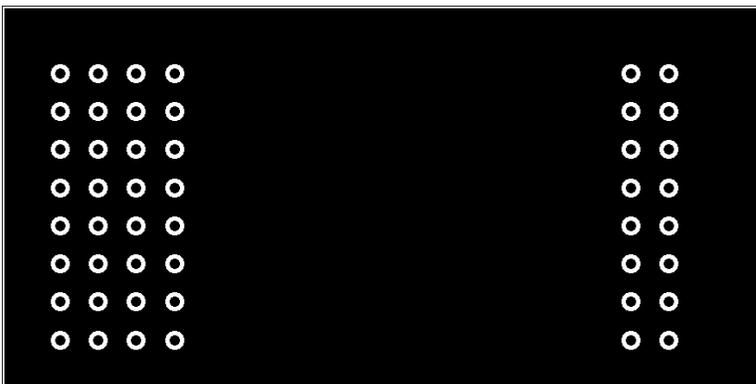
The middle layer is 0.010" below the top layer:



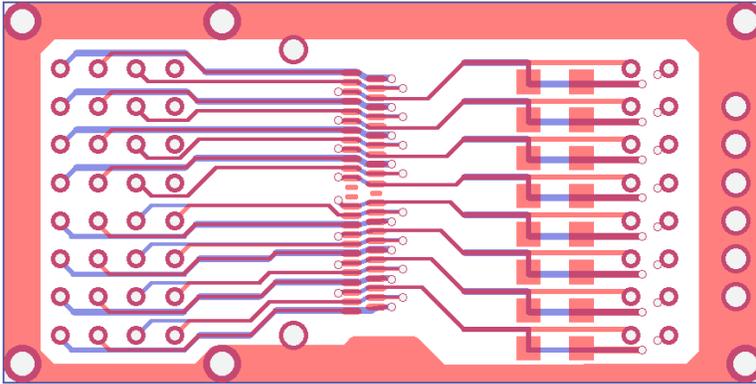
The bottom layer is for cooling only, and could be replicated as a lower internal layer for a 4-layer board:



The bottom layer soldermask is shown below; its solder plate is the inverse.



Altogether, the wiring layers look like this:



When viewed from the top, the board will appear something like this:

