Silicon strip sensor layout for the CBM Silicon Tracking System

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The CBM Silicon Tracking System will be equipped with double-sided Silicon micros-strip sensors, where the strips on the p-side are inclined by 7.5° with respect to the n-side strips as well as the sensor edge. The final and homogeneous layouts for the 3 different sensor lengths, namely 22mm, 42mm and 62mm, has been elaborated. Longer sensors may be realized as a daisy-chain of two 62mm sensors. The sensors will be produced by two vendors to avoid the stop of module production in case of problems with any one single vendor.

The stereo angle of 7,5° effects a correlation between the x and y coordinate of a bond pad on a strip. The x distance between to strips on the sensor is 58 μm, equivalent to the pitch of the straight n-side strips. Therefore the second row of bond pads must have a y distance of at least once the multiple of 58 μm/tan(7,5°). On the sensor a pad pattern with x distance of 58 μm and y distance of $\sim$ 440,554 μm is possible, but the minimum producible pitch for the long analog microcables is in x direction 116 μm. In order to contact all strips, a double layered cable needs to be employed und thus a doubly staggered bond pattern is needed.

This leads to a checker-board-pattern where every second pattern-point is alternatingly reserved for a bond pad. The pitch of the bond pads is in x 116 μm and in y $\sim$ 881.108 μm (the center of the pads in the second row is shifted in x direction by 58 μm relative to the center of the first row of pads). Figure 1 shows an exemple of the such pattern.

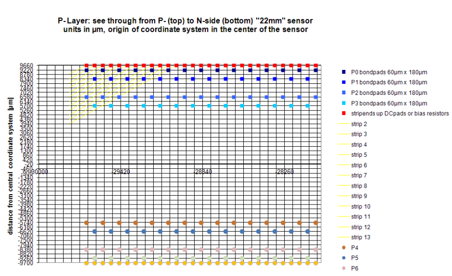

Figure 1: Schematic view on the bond pad and DC pad pattern.

As there are different lengths of sensors and as the pad rows should be located on the same x-position on the top edge as on the bottom edge it proved most adequate to allocate the origin of the coordinate system in the center of the sensor. Further, the distance from the coordinate center to the innermost pad row was fixed to be a multiple of the y-pitch of two staggered pad rows, namely 881.108 μm. Consequently the distance from the outermost pad row to the edge of the sensor is a variable of the sensor length, as the pre-chosen lengths are none multiples of this pitch.

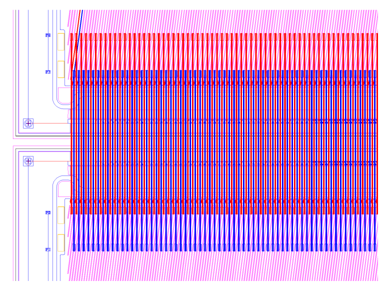

Figure 2: Schematic view of a sensor to sensor daisy chain. The red and blue lines are the leads of the short 58 μm-pitch cable that serves to daisy chain two sensors.

These definitions together with the respective symmetry allow daisy-chaining of sensors of the same as well as different lengths to each other. Figure 2 shows two daisy-chained sensors with a microcable of a constant lead length.

Consequently, also one FEB-design may serve all sensor configurations as well as either sensor side. In Fig. 3 a scheme of a microcable connection between the foreseen CBM STSxyter chip and the STS sensor is shown.

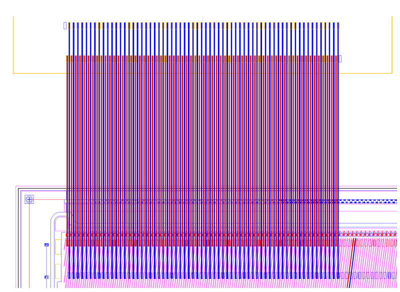

Figure 3: Schematic view of a sensor to chip connection. The red and blue lines are the leads of the microcable on two different layers with a pitch of 116 μm.

All participating vendors will employ this layout of the bond pads even though they may vary the sensor design according to their proprietary design and production preferences.

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