

ATLAS98-99 Silicon microstrip detector layout

Draft: 98/3/19, last update: 99/11/10

The drawings of the p-in-n silicon microstrip detectors for the barrel part of the ATLAS SCT system. The attached figures are:

Fig. 1 Overall layout

Fig. 2 Expanded view of a corner and details of pads

Fig. 3 Sizing of the fiducial marks

Fig. 4 Definition of "Stereo fiducial Marks 98". These fiducial marks are different from the corner fiducial mark A with addition of "+" and "-" marks for direction.

Fig. 5 Sizing of the identification pads and the labelling pads

The layout is an evolution of ATLAS97 with six modifications:

(1) The edge contact pads ($80\ \mu\text{m} \times 550\ \mu\text{m}$) has been moved toward the cut edge, $100\ \mu\text{m}$ to the centre of the pads from the cut edge in the ATLAS98, from the $230\ \mu\text{m}$ in the ATLAS97.

(2) Definition of the identification pads and its location has been changed. The identification pads in the ATLAS98 is an single row of 24 pads, 6 groups of 4 pads. The number has been increased to accommodate the total number of detectors in the SCT, about 20,000, and other classifications. The location is 6 mm from the edge of the strip end. The labelling pad, "ATLAS98XXX" where "XXX" is the first 3 letters of vendor, has been moved to associate the identification pads.

(3) The fiducial mark C, 4 dots, in the edge of the strip direction has been moved to $480\ \mu\text{m}$ from the side cut edge from $1400\ \mu\text{m}$ in the ATLAS97.

(4) ± 20 mrad stereo fiducial marks are added as in the "Stereo Fiducial Marks 98" drawing.

(5) DC pad size has been changed from $25\ \mu\text{m} \times 50\ \mu\text{m}$ to $50\ \mu\text{m} \times 60\ \mu\text{m}$ for easier probing.

(6) No passivation in the backplane of the detector.

Updating history

99/11/08 -- Fiducial marks A and B are modified: in the fiducial mark A, four arms are shortened by 10 μm so that there will be more open area around the centre dot; in the fiducial mark B, the line thickness is increased to 30 μm and accordingly the letter F is enlarged and the aperture is 200 μm square.

99/8/16 -- Specifying the size of the labelling pads is re-written using “min” and “max” letters in Fig. 1 and Fig. 5

99/7/23 -- Correction of left-over numbers related to the change of the definition of outer dimension

99/7/7 -- Rearrangement of these introduction pages

99/7/7 -- Outer dimensions being rewritten to show the finished size (after dicing)

99/7/7 -- Incorporate comments and corrections raised in the Final Design Review, May 5, 1999: (1) the strip number 770 to be 769, (2) all dimensions explicitly without calculation, (3) no particular name of manufacturer

99/4/7 -- Incorporate “Stereo Fiducial Marks 98”

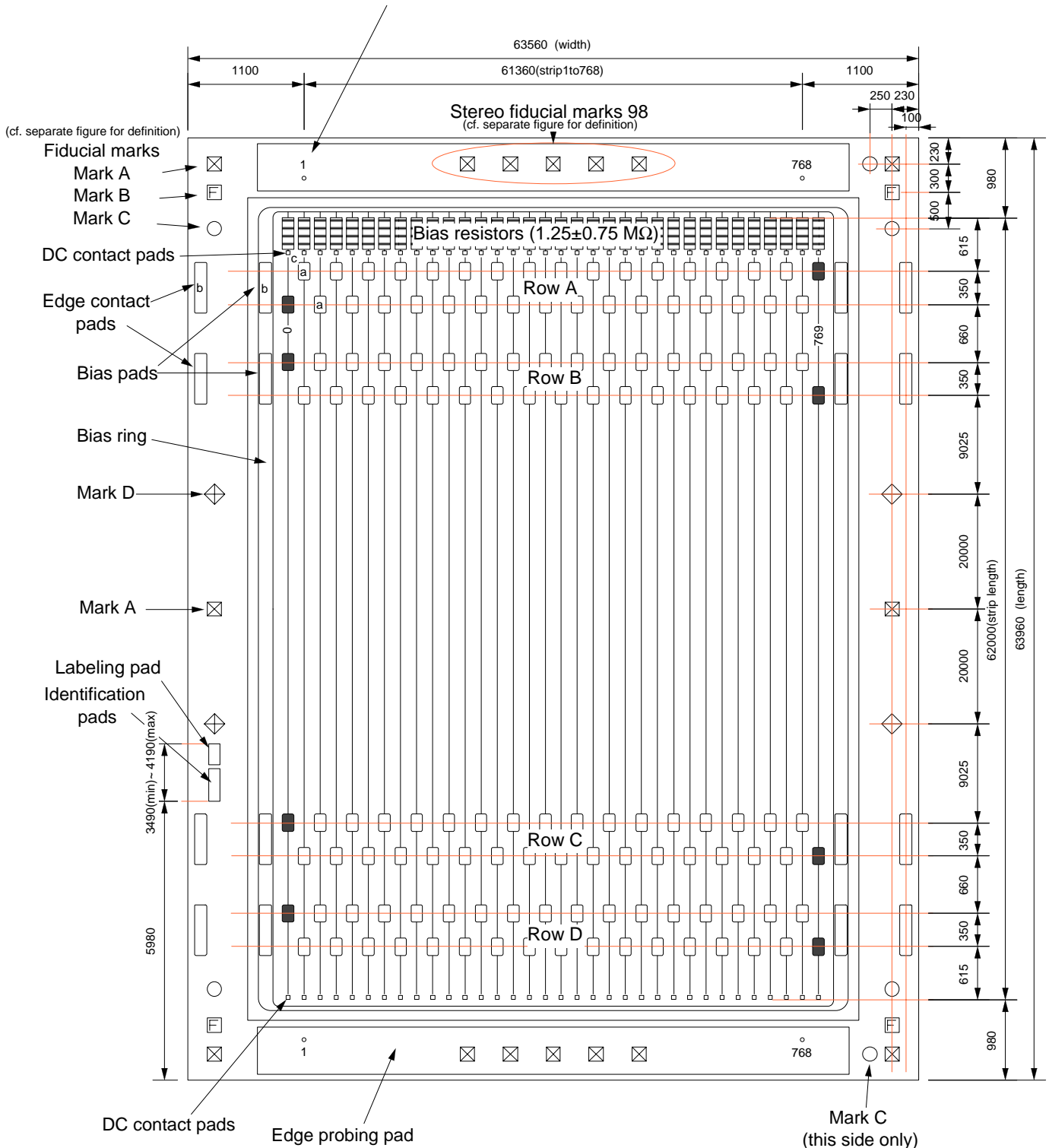
98/6/28 -- Correction of the value of the total length of the “identification pads”; No passivation in the backplane (n-side)

98/4/27 -- Move the location of the mark C and D in the background-free area

Outer dimension: Finish (after dicing)

Strip marks (10 μm height) and strip numbers (25 μm height)
(o: every 10, +: every 100)

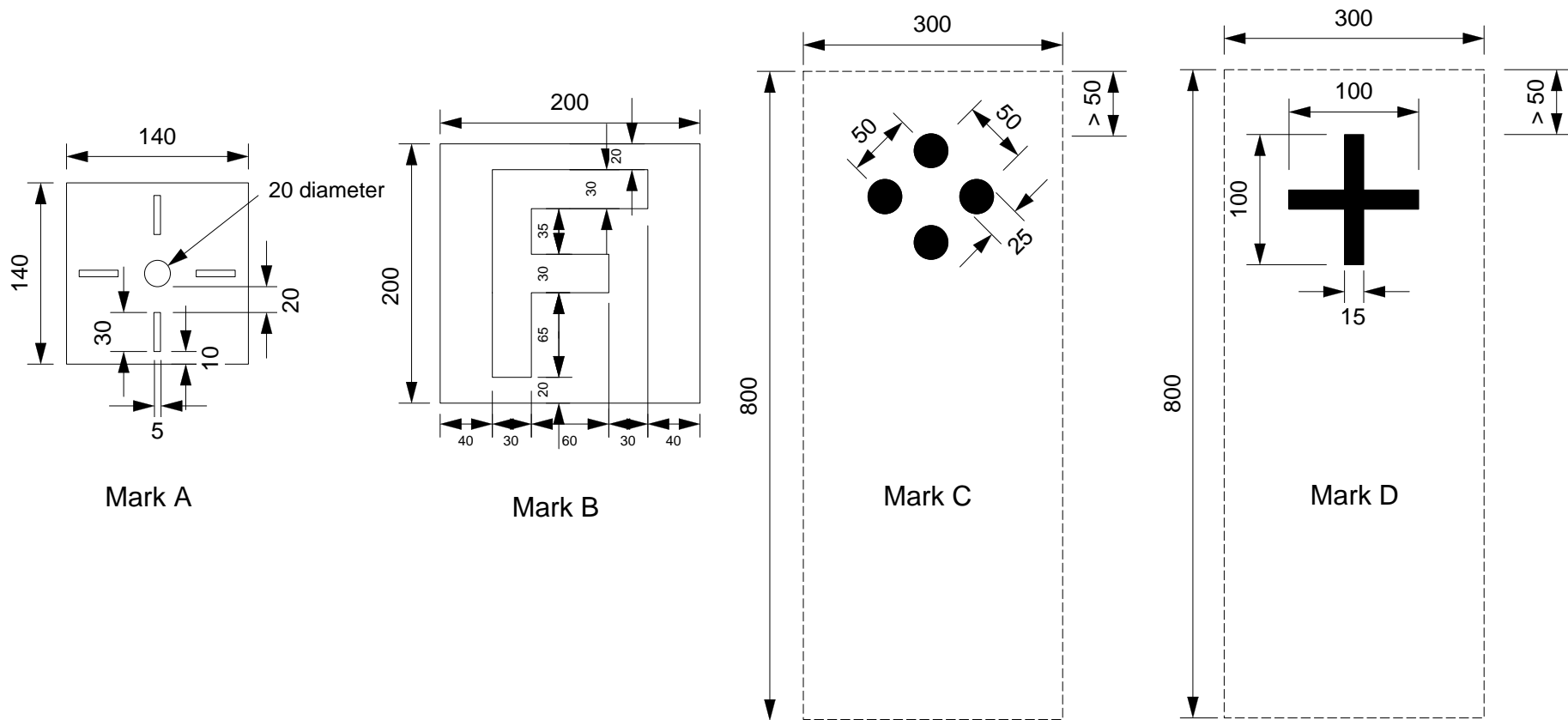
Unit: μm



Notes:

- (1) Pad sizes: a = 56 μm x 200 μm , b = 80 μm x 550 μm , c = 50 μm x 60 μm
- (2) Fiducial marks A & B are "metal-in-opening"
- (3) Fiducial marks C & D are either "hole-in-metal" or "metal-in-opening"
- (4) Bonding pads of strip 0 and 769 are required if the metal is not connected to the bias ring permanently
- (5) Use "Row C" pads for probing
- (6) Dicing tolerance: $\pm 25 \mu\text{m}$ to fiducial marks and $\pm 25 \mu\text{m}$ overall

Fig. 1



Mark A and B are "metal" in the square opening.

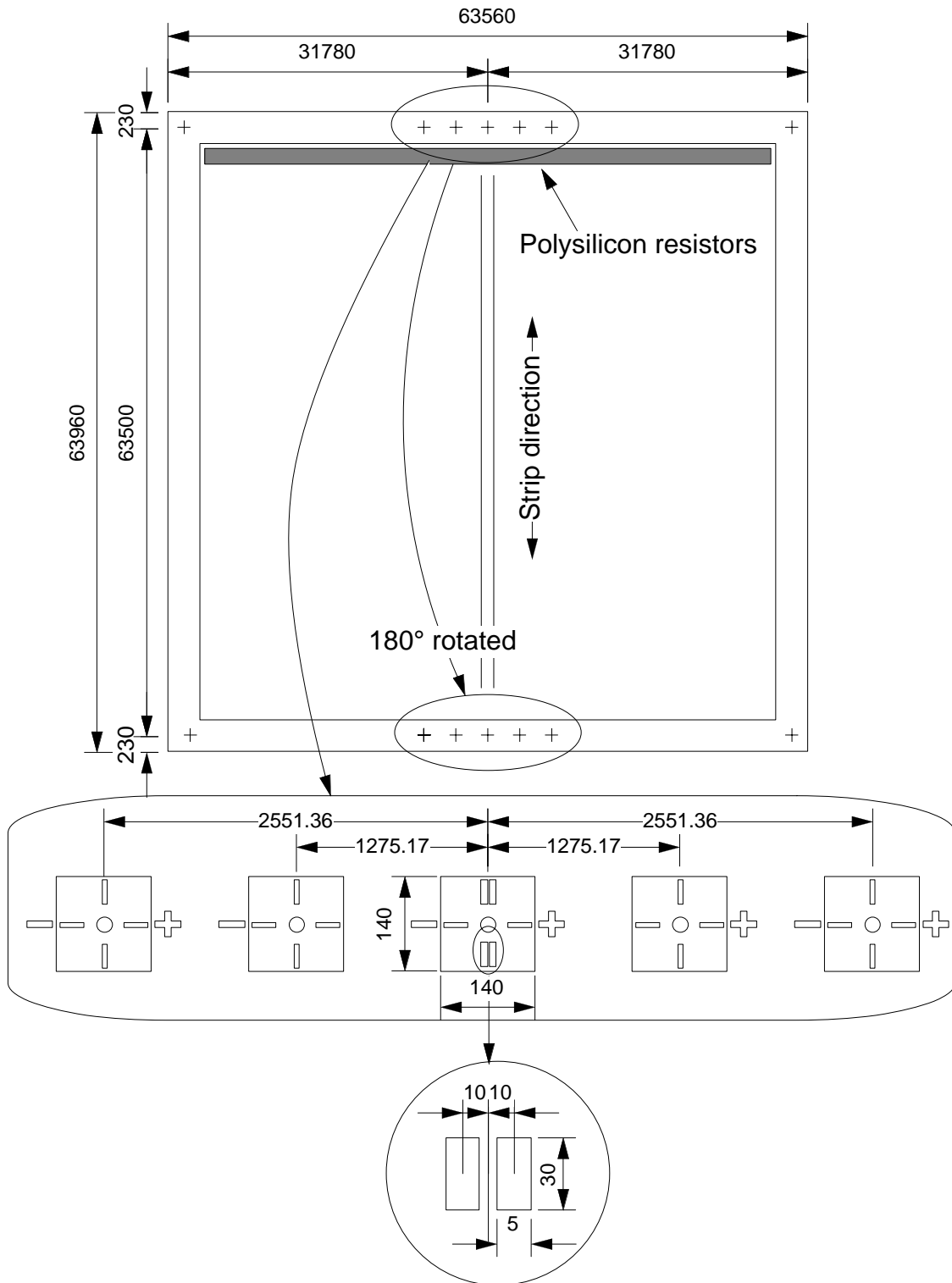
Mark B is vendor's option (if no trouble, please add this).

Mark C and D are EITHER "opening" in the metal OR "metal" in the opening where the "background-free" area must be as wide as 300 μm x 800 μm (approximately) and the C and D mark is placed asymmetrically in the "background-free" area with the wider open area being towards the centre of the detector.

Fig. 3

Outer dimension: Finish (after dicing)

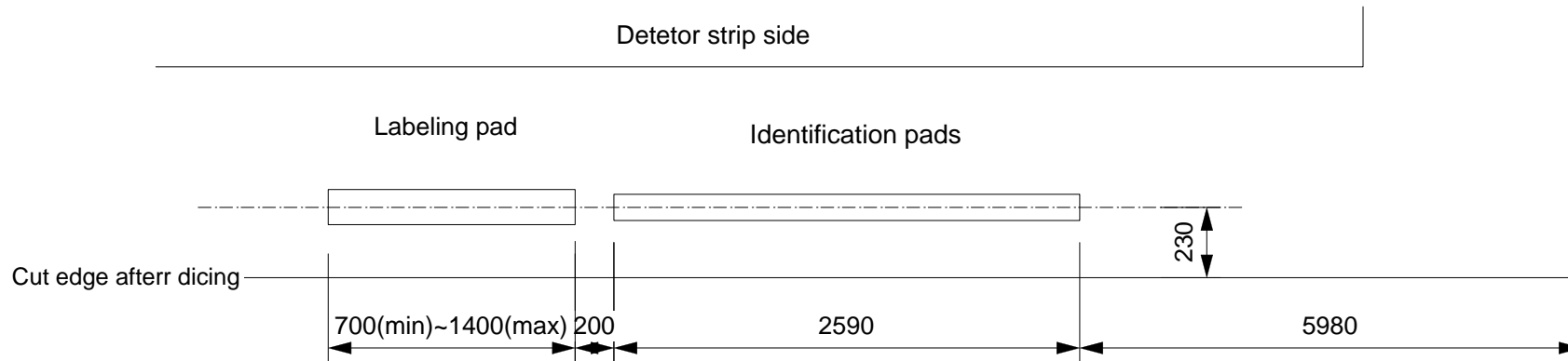
Unit: μm



Notes:

- (1) Each mark is a copy of the fiducial mark A, with a modification to the centre mark
- (2) Distances are measured from the centre of 40 μm dicing blade, and finished edges are recessed by 20 μm
- (3) The 20-mrad stereo fiducial marks are those with "+" OR "-" signs attached right-hand side or left-hand side only. The 40-mrad stereo fiducial marks are those with "+" AND "-" signs.

Fig. 4



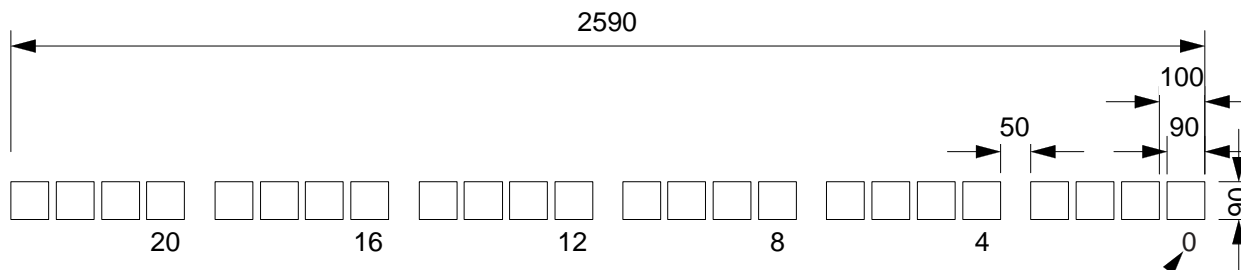
Labeling pad:

ATLAS98XXX

80(min)~200(max)

Notes:
 "XXX" is a 3 letter manufacturer's name
 Labelling and Identification pads are metal in opening

Identification pads:



Unit: μm

Numbers (50 μm height, 20 μm space to pad)

Fig. 5