ATLAS98-99 Silicon microstrip detector layout

Draft: 98/3/19, last update: 99/7/23

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 μm x 550 μm) has been moved toward the cut edge, 100 μm to the centre of the pads from the cut edge in the ATLAS98, from the 230 μm 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 μm from the side cut edge from 1400 μm 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 μm x 50 μm to 50 μm x 60 μm for easier probing.

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

Updating history

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)

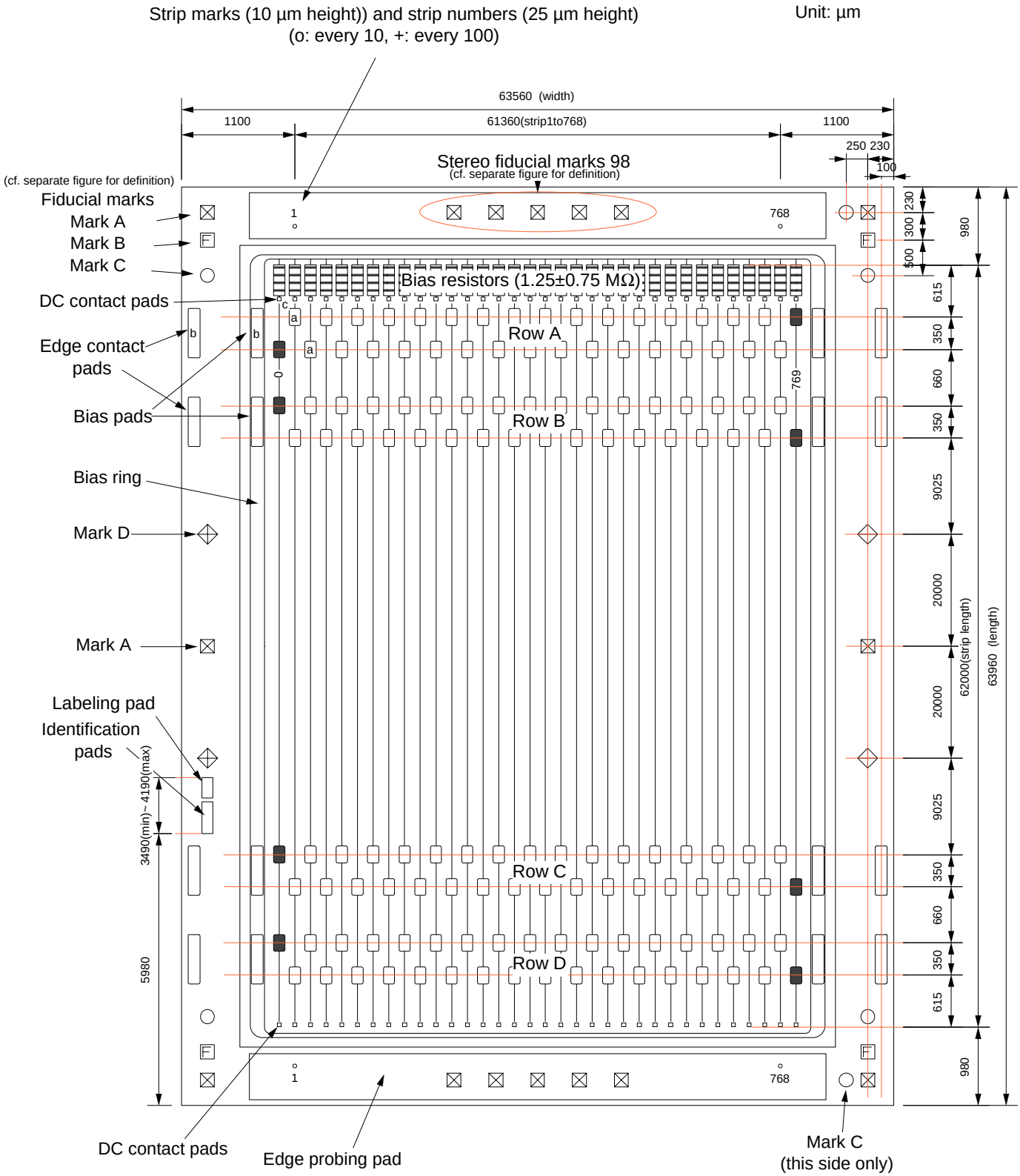
99/7/7 -- Incorporate comments and corrections raised in the Final Design Review, May 5, 1999: (1) the strip number 770 to be 769, (2) all dimensions explicitly without calculation, (3) no particular name of manufacturer

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

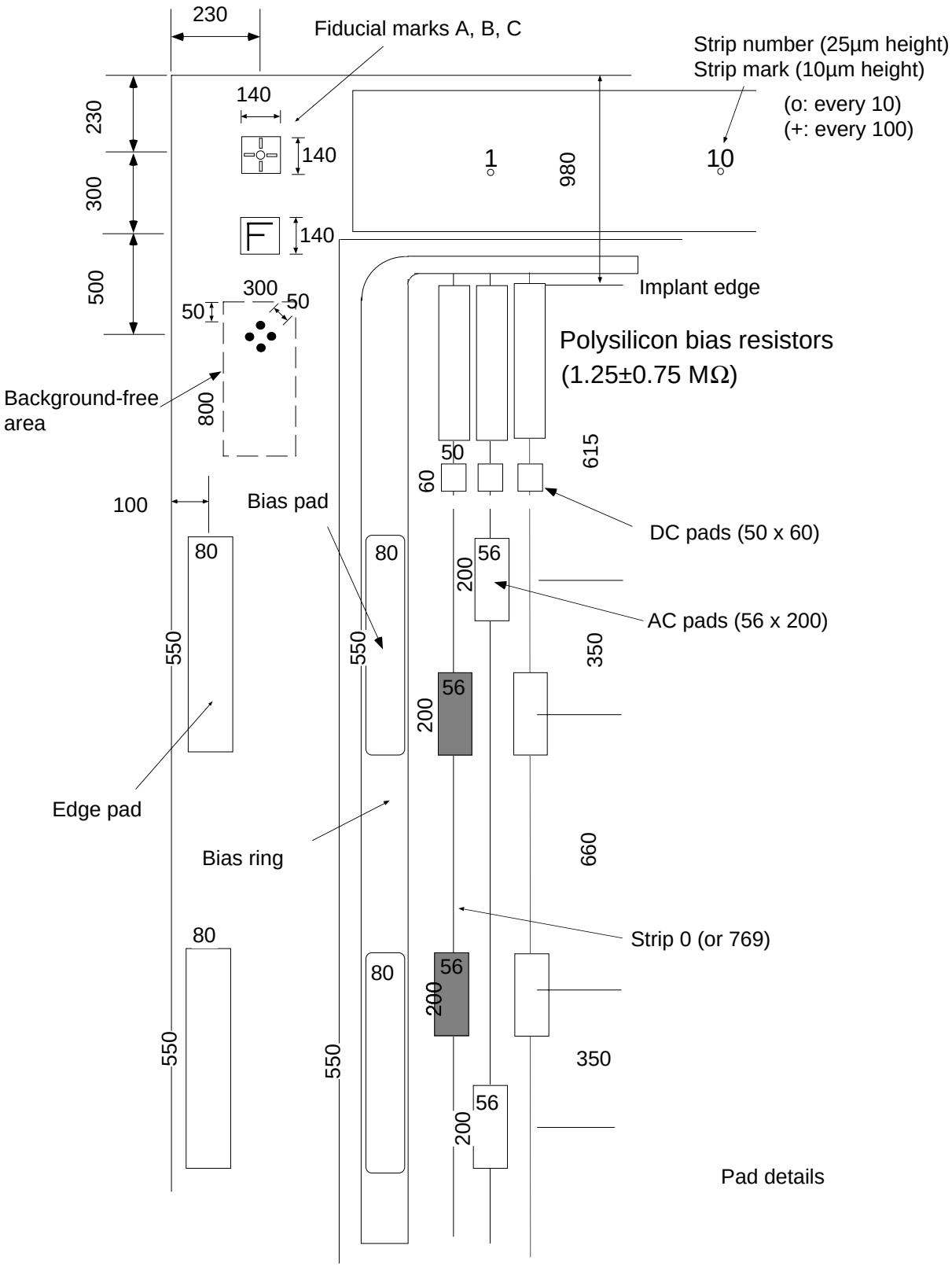
Outer dimension: Finish (afer dicing)



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: ±25 µm to fiducial marks and ±25 µm overall

Fig. 1

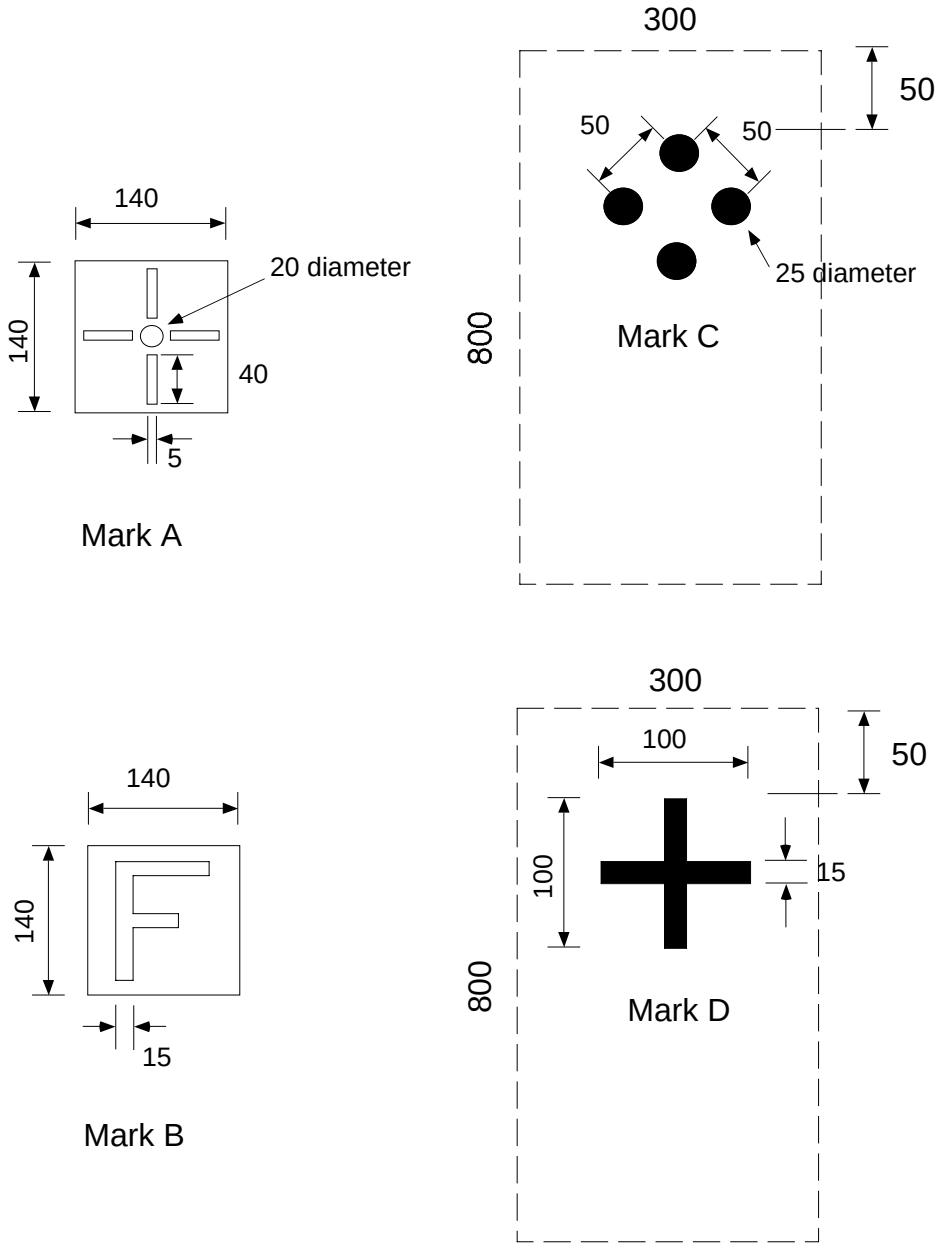


Notes:

(1) Bonding pads of strip 0 and 769 are required if the metal is not connected to the Bias ring permanently.

(2) The detector edge is "Finish (after dicing)".

Fig. 2



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

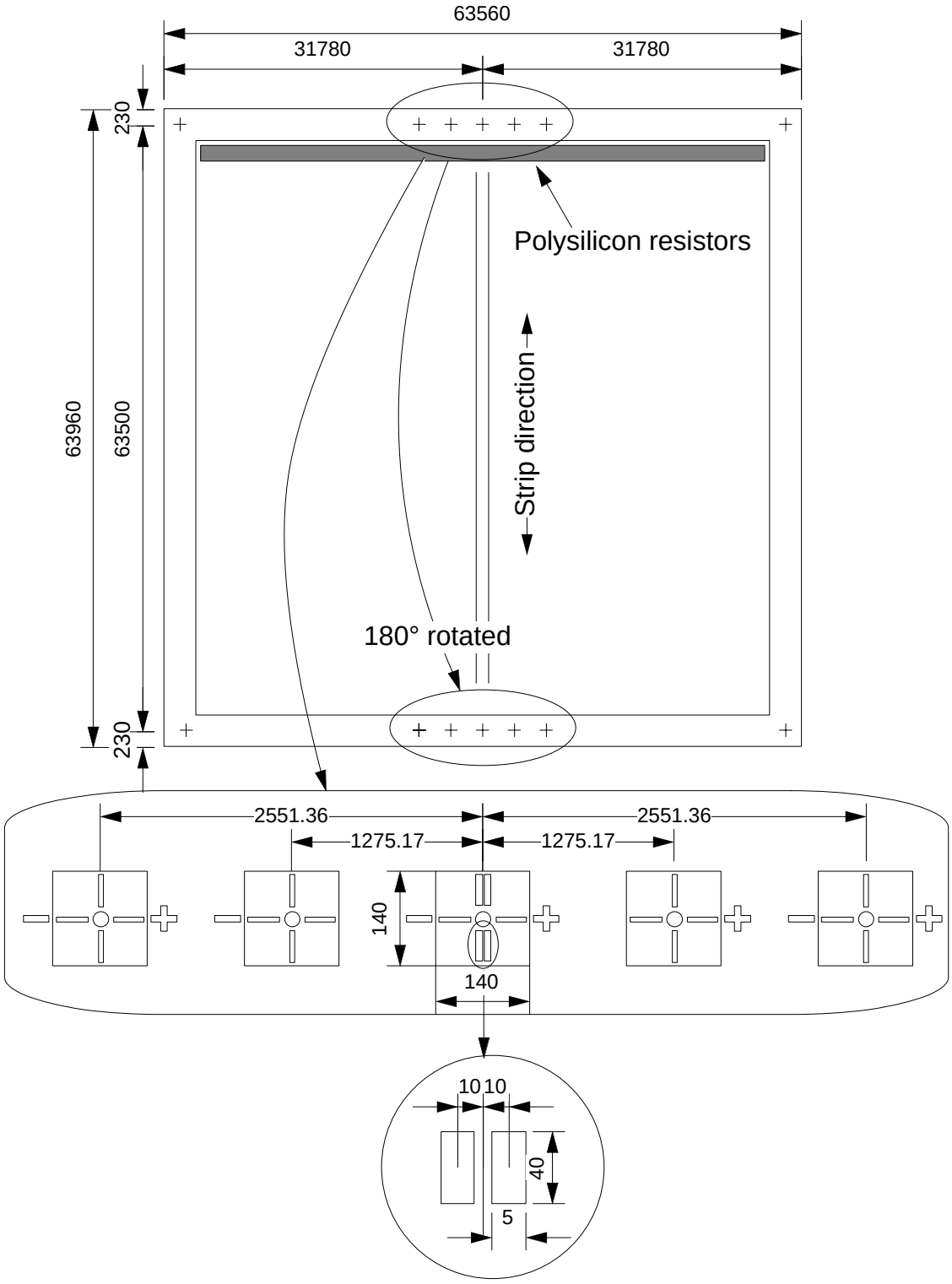
Mark C and D are EITHER "opening" in the metal OR "metal" in the opening where the "background-free" area must be as wide as 300 μm x 800 μm (approximately) and the C and D mark is placed asymmetrically in the "background-free" area with the wider open area being towards the centre of the detector.

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

Fig. 3

Outer dimension: Finish (after dicing)

Unit: µm



Notes:

(1) Distances are measured from the scribe lines of cutting.
The finished edges are recessed by 20 µm due to dicing

(2) 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

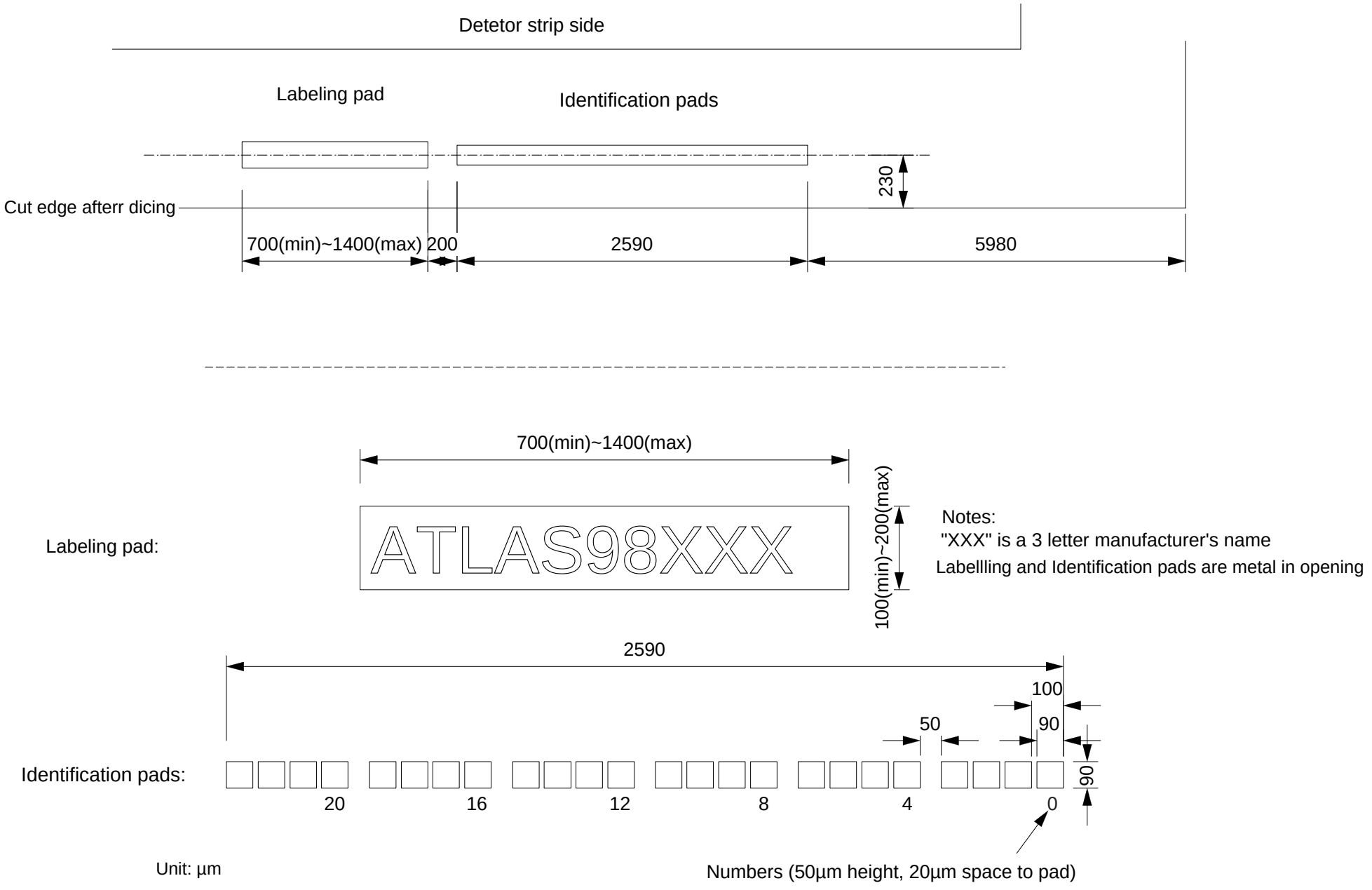

Detetor strip side
Labeling pad
Identification pads
230
Cut edge afterr dicing
700(min)~1400(max)
200
2590
5980
700(min)~1400(max)
Labeling pad:
ATLAS98XXX
100(min)~200(max)
Notes:
"XXX" is a 3 letter manufacturer's name
Labellling and Identification pads are metal in opening
2590
100
50
90
90
Identification pads:
20
16
12
8
4
0
Unit: µm
Numbers (50µm height, 20µm space to pad)

Fig. 5