

ATLAS98 Silicon microstrip detector layout

Draft: 98/3/19, updates: 98/6/28¹, 98/9/29²

The following pages are a new set of pad layout for the p-in-n silicon microstrip detectors for the barrel part of the ATLAS SCT system. The layout is an evolution of ATLAS97 with five modifications:

(1) The edge contact pads (80 μm x 550 μm) has been moved toward the cutting edge, 120 μm to the centre of the pads from the cutting line in the ATLAS98, from the 250 μm in the ATLAS97.

(2) Definition of the scratch pads and its location has been changed. The scratch 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. Associated with the new location, the labelling pad, "ATLAS98XXX" where "XXX" is the first 3 letters of the vendor, e.g., HAM for Hamamatsu photonics, has been moved to associate the scratch pads.

(3) The fiducial mark C, 4 dots, in the edge of the strip direction has been moved to 500 μm from the side edge from 1420 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.

Attached are 7 pages of the drawings:

(1) Overall layout,

(2) Expanded view of a corner,

(3) Expanded view of a corner with a guard ring contact pad design

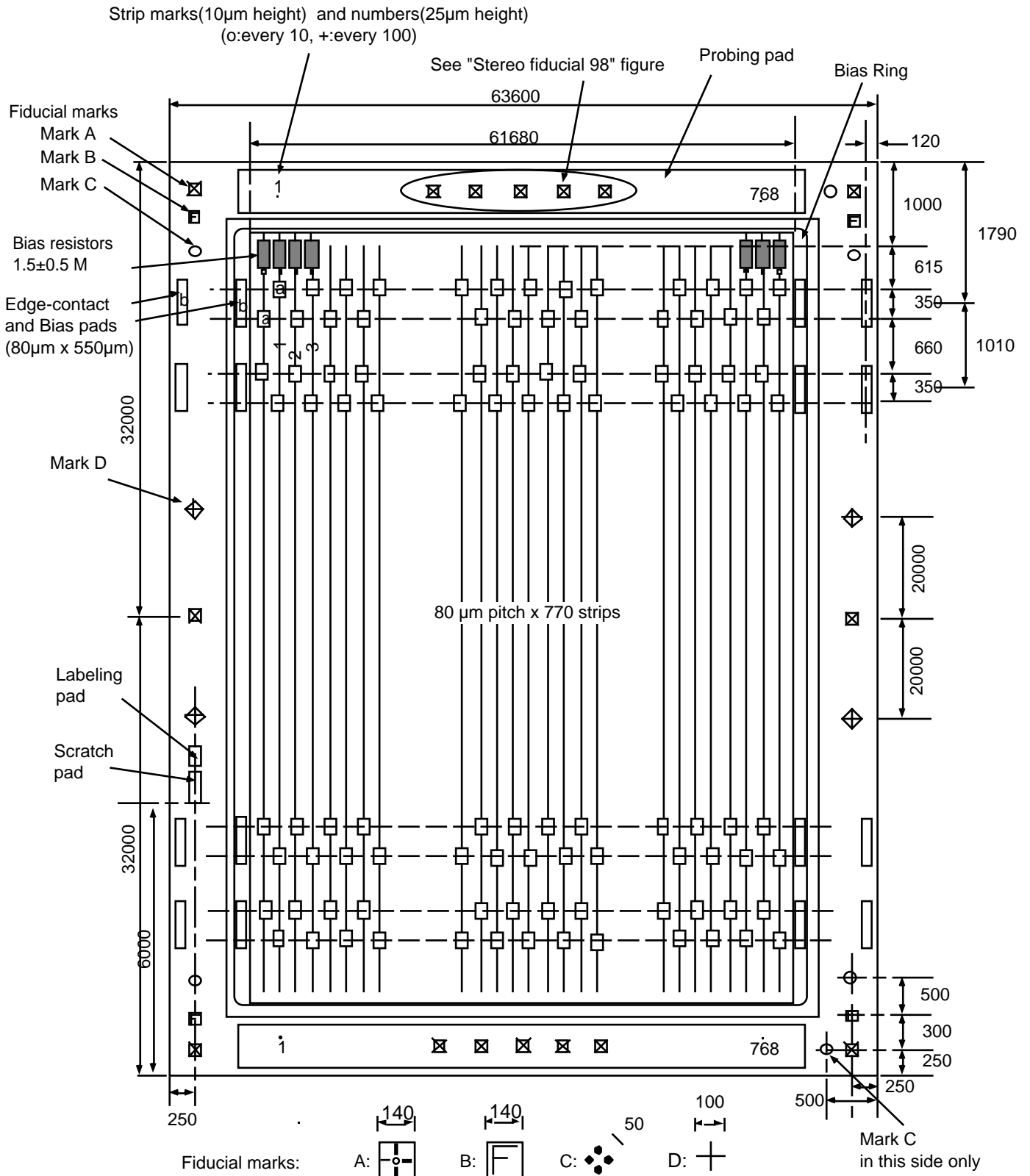
(4) Sizing of the fiducial marks,

(5) Definition of "Stereo fiducial Marks 98", (These fiducial marks are slightly different from the corner fiducial mark, A),

(6) Sizing of the scratch pads and the labelling pads, and

(7) Passivation opening in the n-side: (A) No passivation, (B) Full passivation. For the 98 prototyping, the design (A) is the baseline, and 10% of detectors will be fabricated with the design (B).

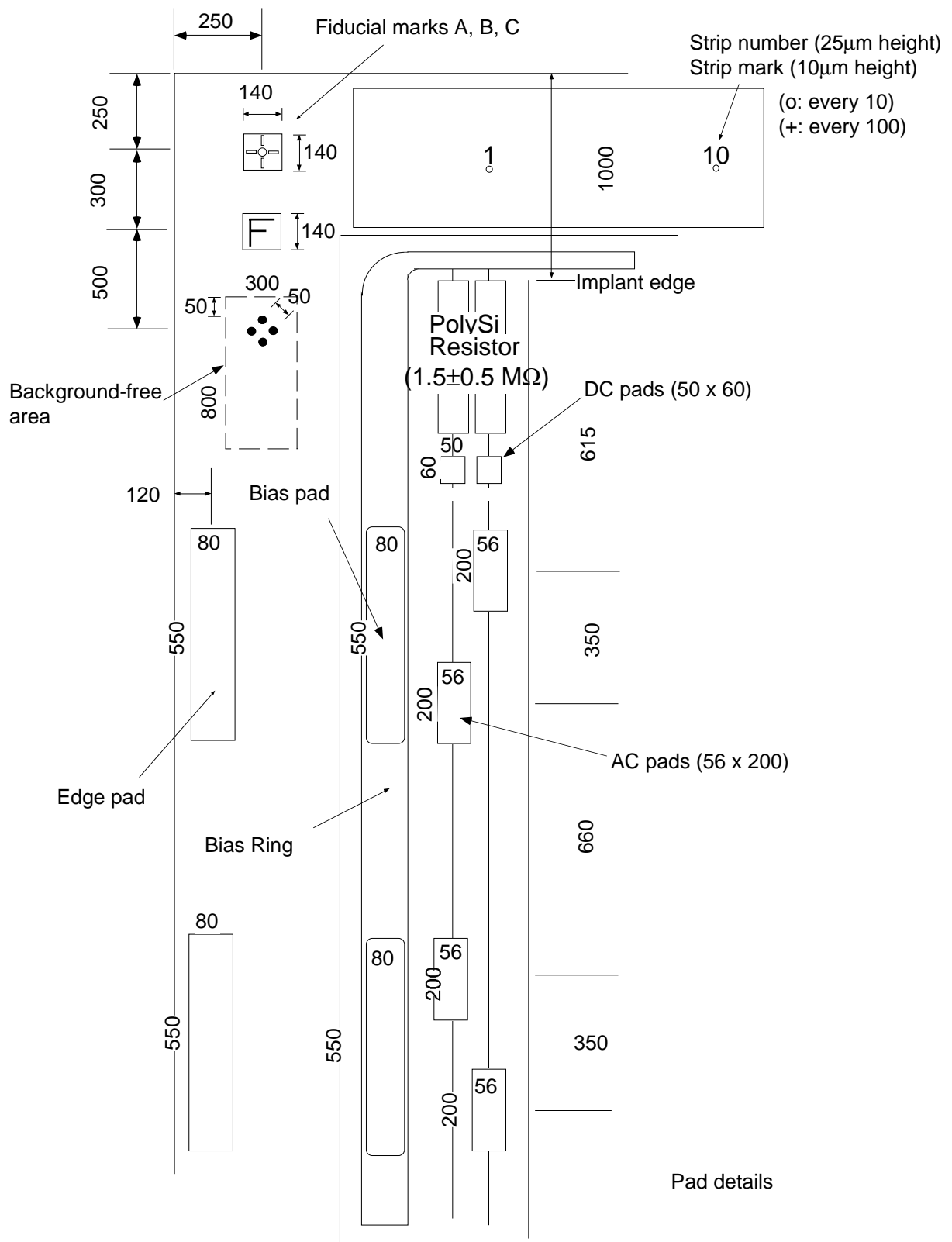
1. Incorporation of "Stereo Fiducial Marks 98", 98/6/28; Correction of the value of the total length of the "scratch pads", 98/4/27; Location of the mark C and D in the background-free area, 98/4/13; Appending the page of the passivation openings in the n-side, 98/4/13
2. Correct the passivation opening in the n-side.

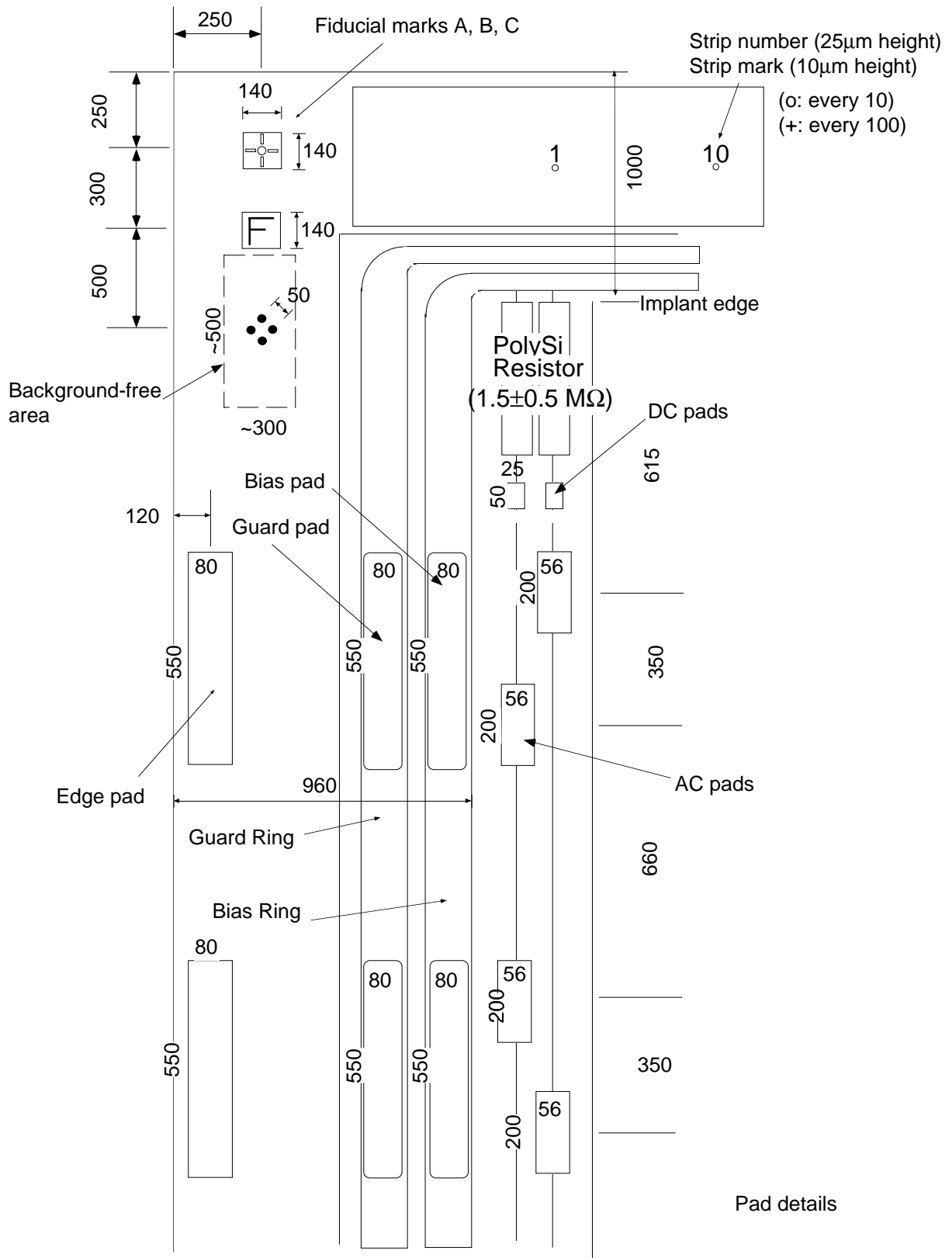


Notes:

(Not to Scale) [Unit: μ m]

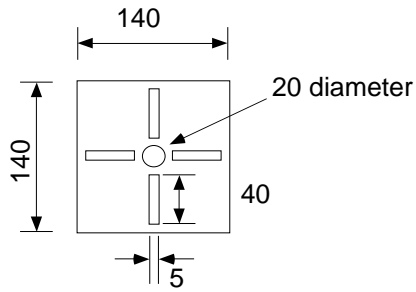
- (1) Pads: a = 56 μ m x 200 μ m, b = 80 μ m x 550 μ m
- (2) Fiducial mark C along the edge of strip direction is put in the right side only
- (3) Fiducial marks A & B are "metal-in-opening or frame"
- (4) Fiducial marks C & D are either "hole-in-metal" or "metal-in-(wide)opening"
- (5) Labeling pad: "ATLAS98xxx", 3 characters xxx for the vendor name
- (6) Scratch pad: 1 x 24 pads for Detector numbering
- (7) Outer dimension: "cutting line of scribe to cutting line of scribe"



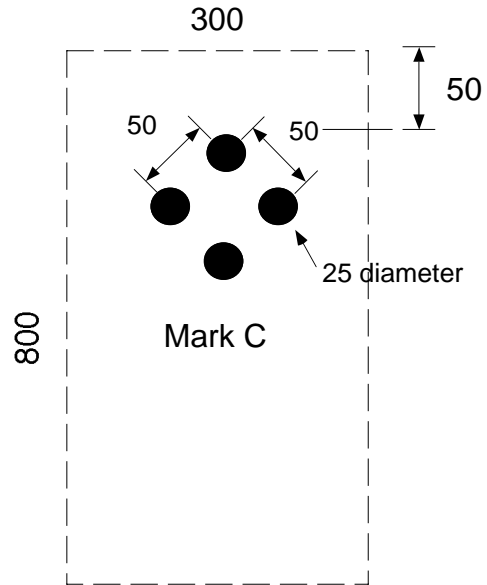


ATLAS98 Silicon Strip Detector

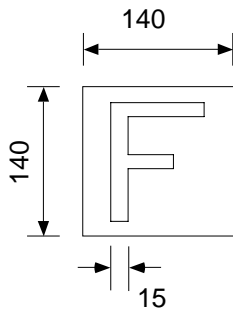
(Implementation of "Guard pads" in Hamamatsu detectors)



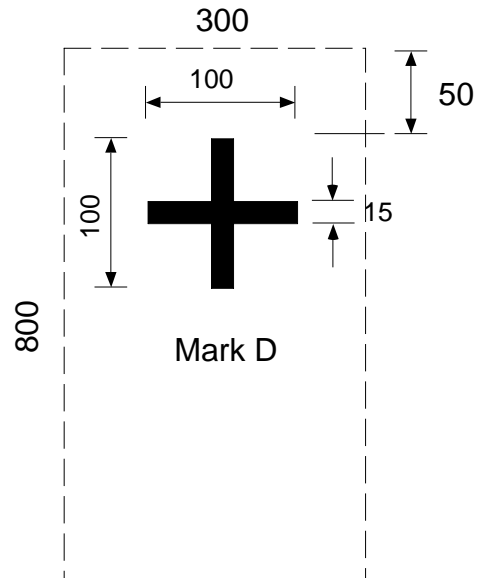
Mark A



Mark C



Mark B

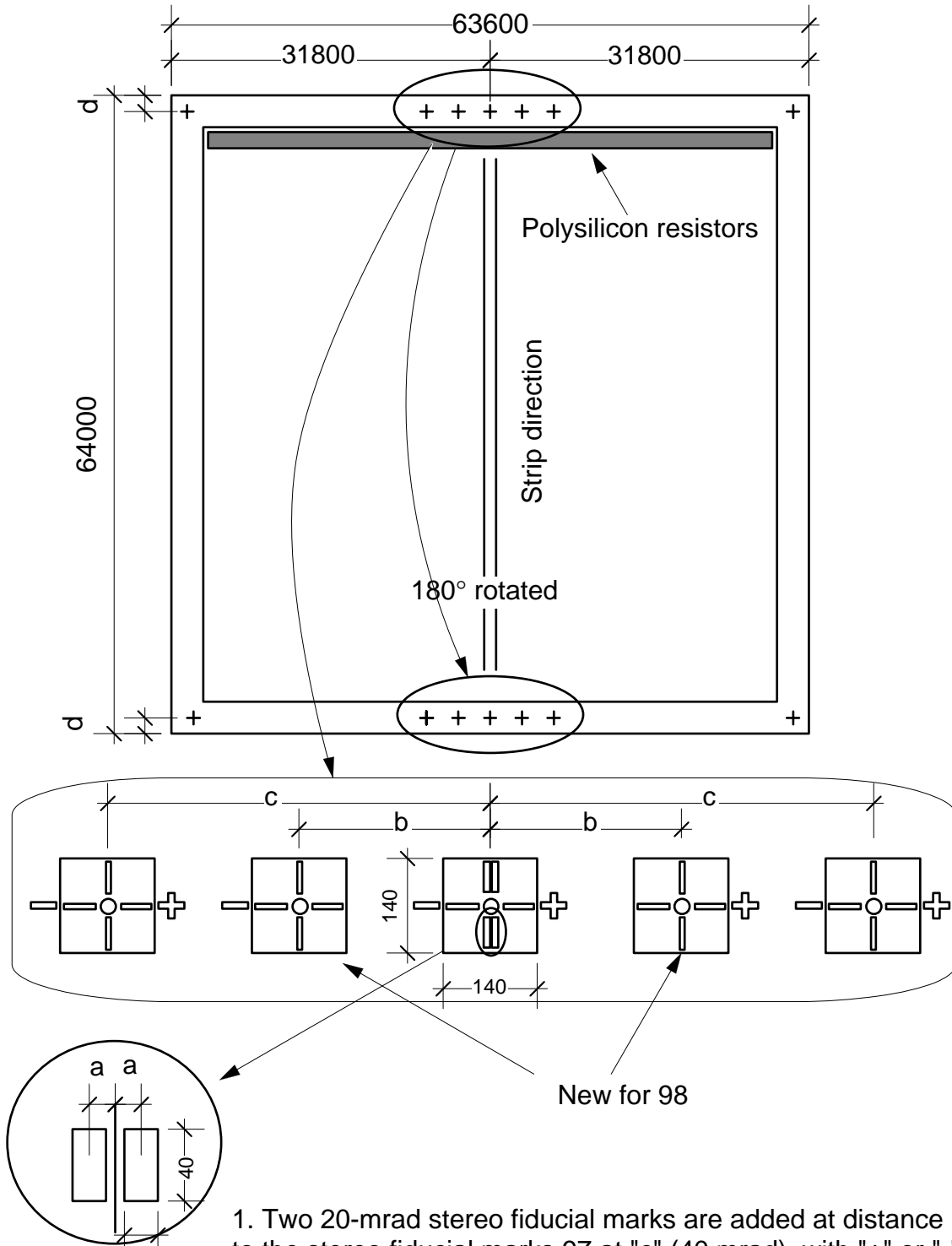


Mark D

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 $300 \mu\text{m} \times 800 \mu\text{m}$ (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).



1. Two 20-mrad stereo fiducial marks are added at distance "b", to the stereo fiducial marks 97 at "c" (40 mrad), with "+" or "-" signs attached right-hand or left-hand only.

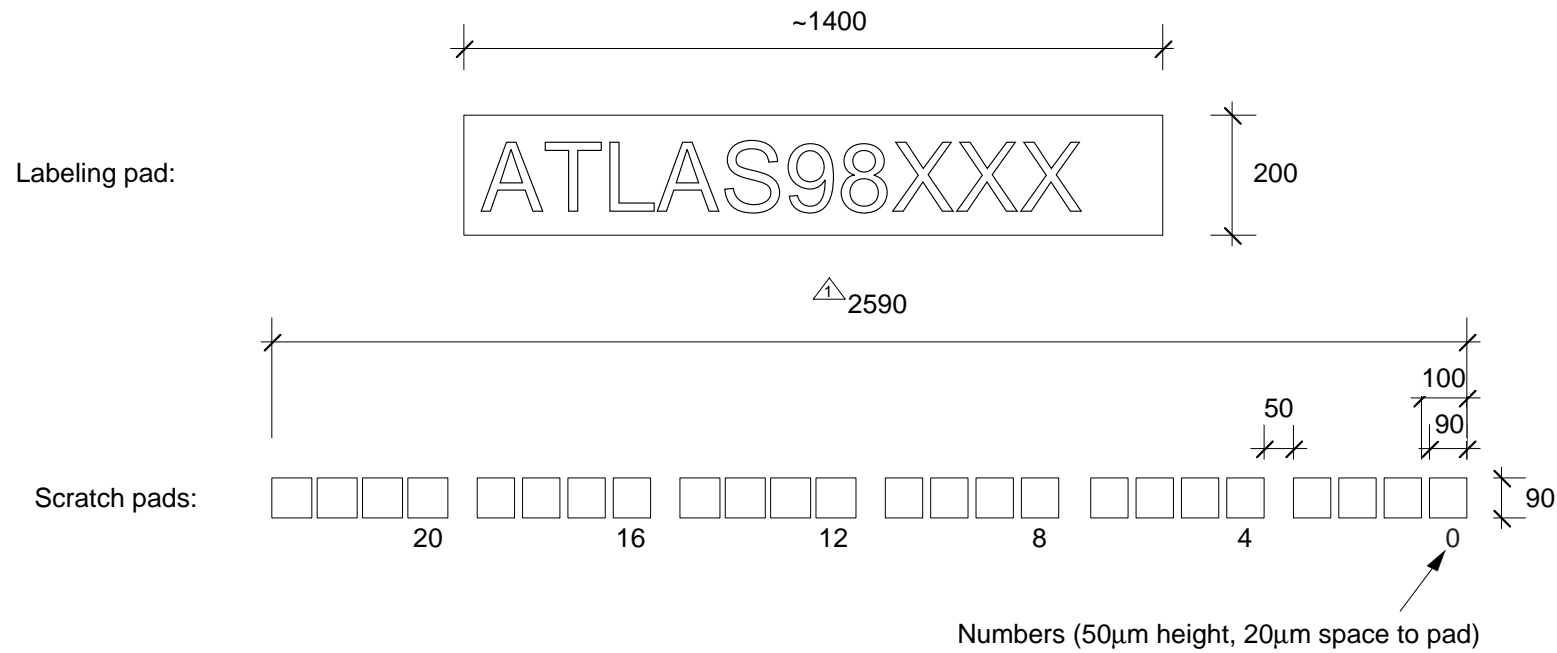
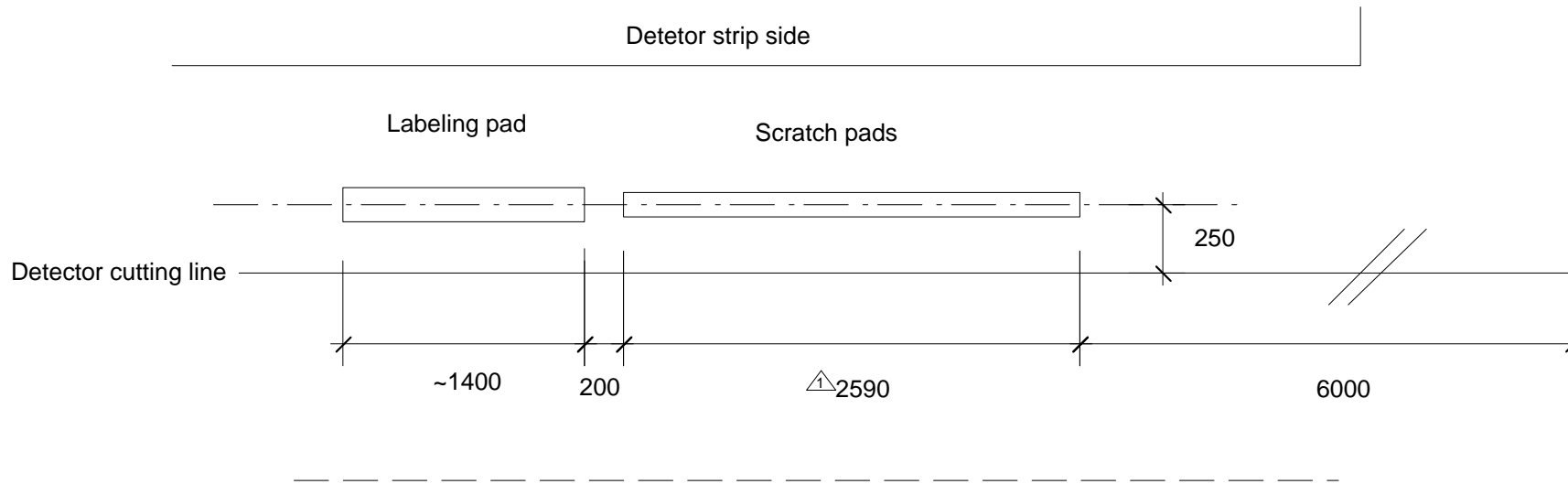
2. Distance "a" is $a = d \times \tan(40\text{mrad})$

3. Distance "b" is $b = (64000 - d) \times \tan(20\text{mrad})$

4. Distance "c" is $c = (64000 - d) \times \tan(40\text{mrad})$

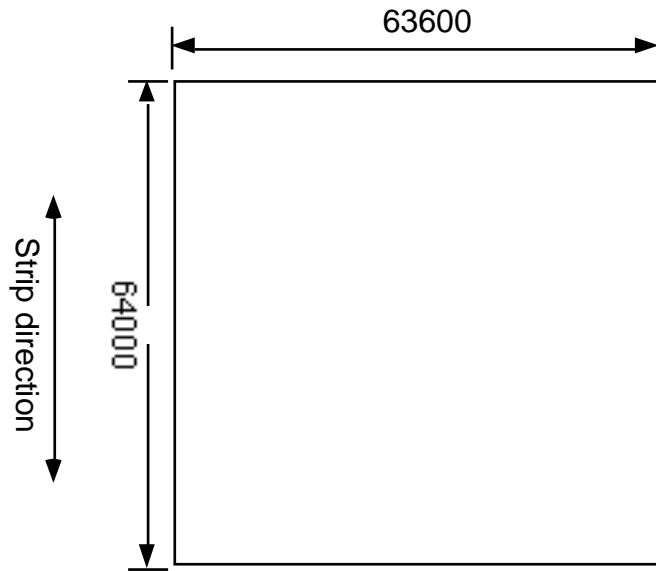
5. With $d = 250 \mu\text{m}$, $a = 10 \mu\text{m}$, $b = 1275.17 \mu\text{m}$, $c = 2551.36 \mu\text{m}$

Stereo Fiducial Marks 98	
98/6/28	Y. Unno

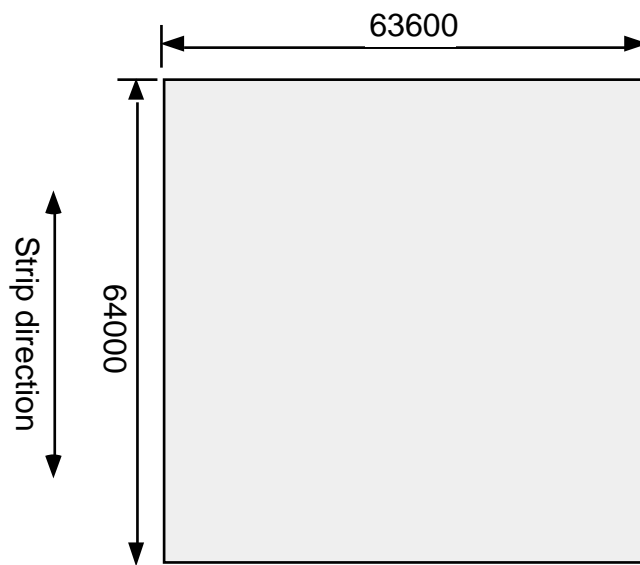


△98/4/27

Y. Unno 98/3/19



(A) No passivation



(B) Full passivation

	[Unit: μm]
ATLAS98	29/9/98
Passivation in the n-side	