

Mar. 26, 2017

The HV pad, and the HV wire bond, are encased in conformal coating, on both top and bottom of the carrier board.

Bottom

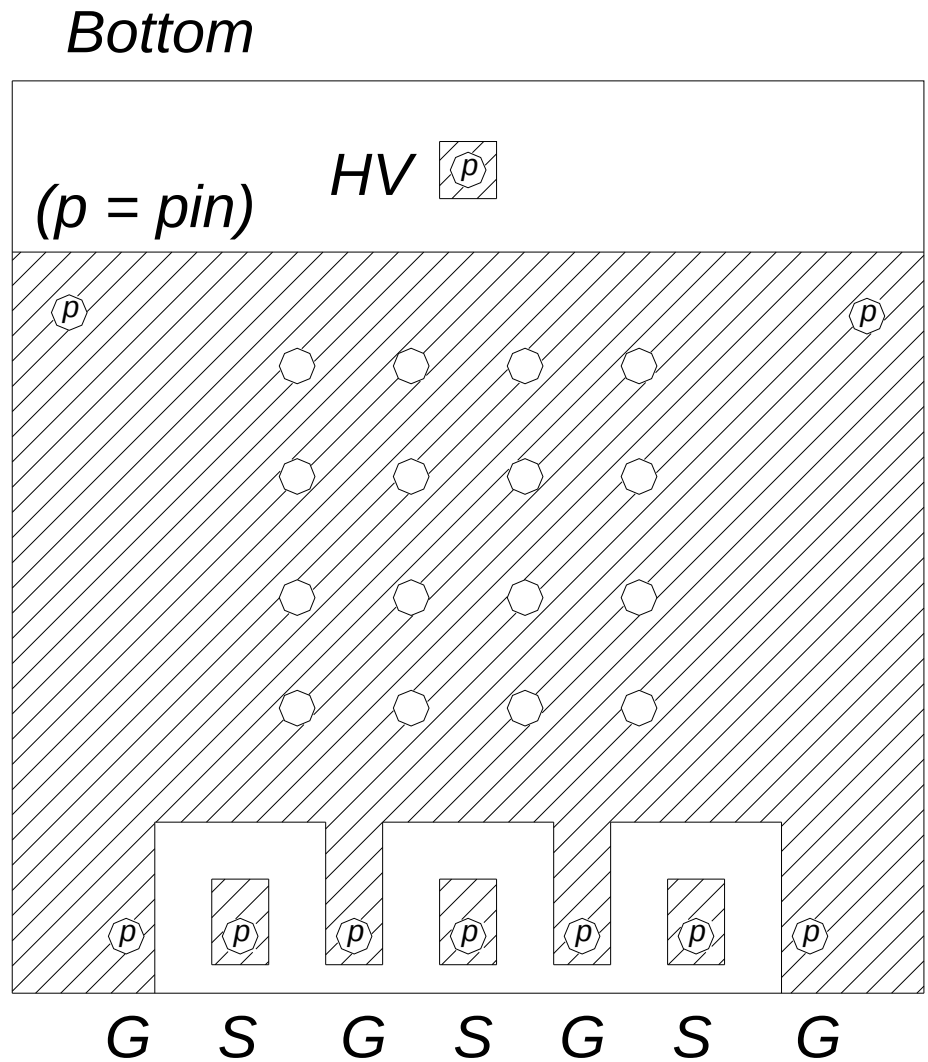
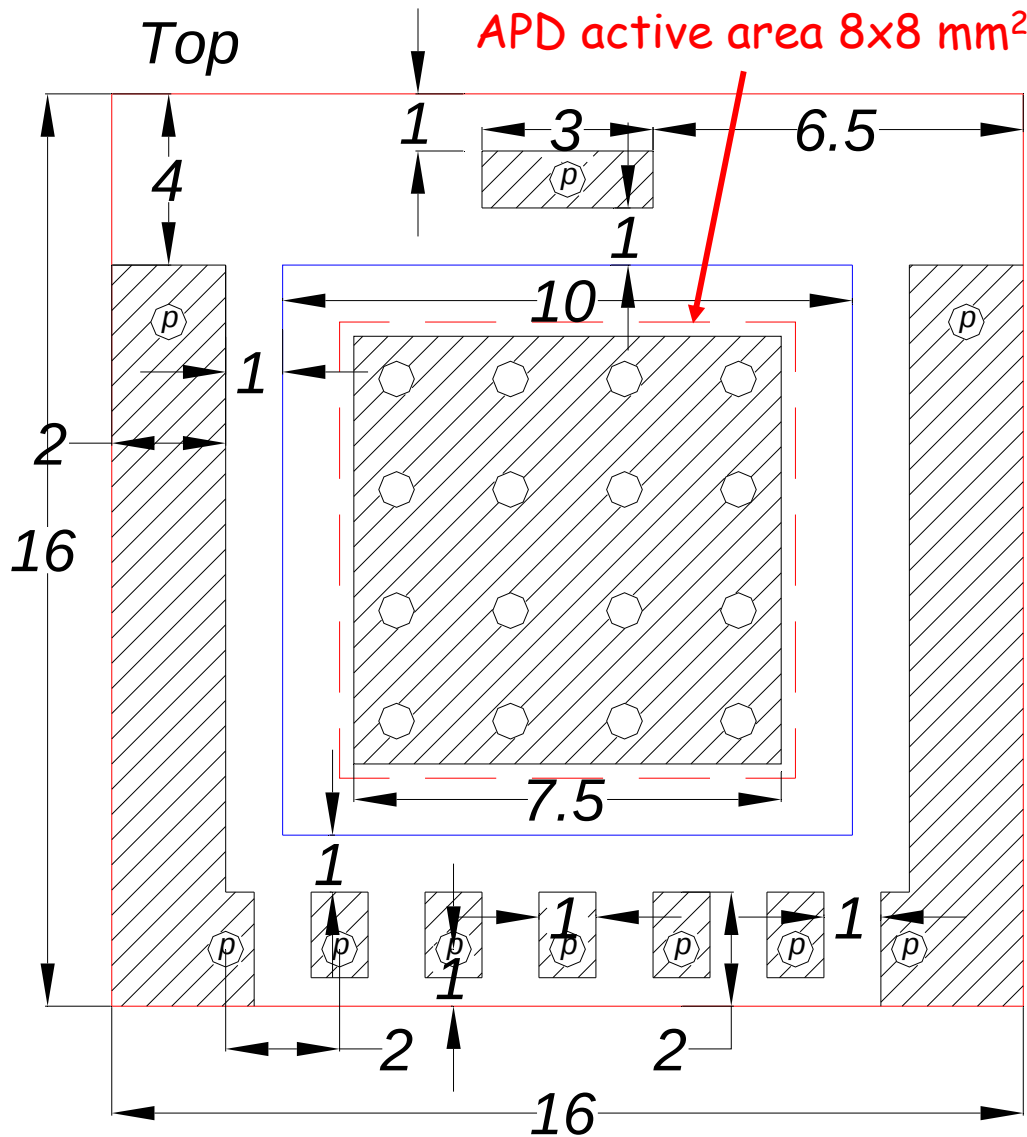
The diagram shows a cross-section of the bottom layer. A central white rectangular region is labeled **HV** and $(p = p_{in})$. This region is surrounded by a hatched area. At the bottom of the hatched area, there are three white rectangular blocks labeled **G** and **S** (alternating). Each **G** block contains a circle with p , and each **S** block contains a circle with p . The hatched area also contains a grid of circles with p .

Tiling

The active area of an APD is 8x8 mm².

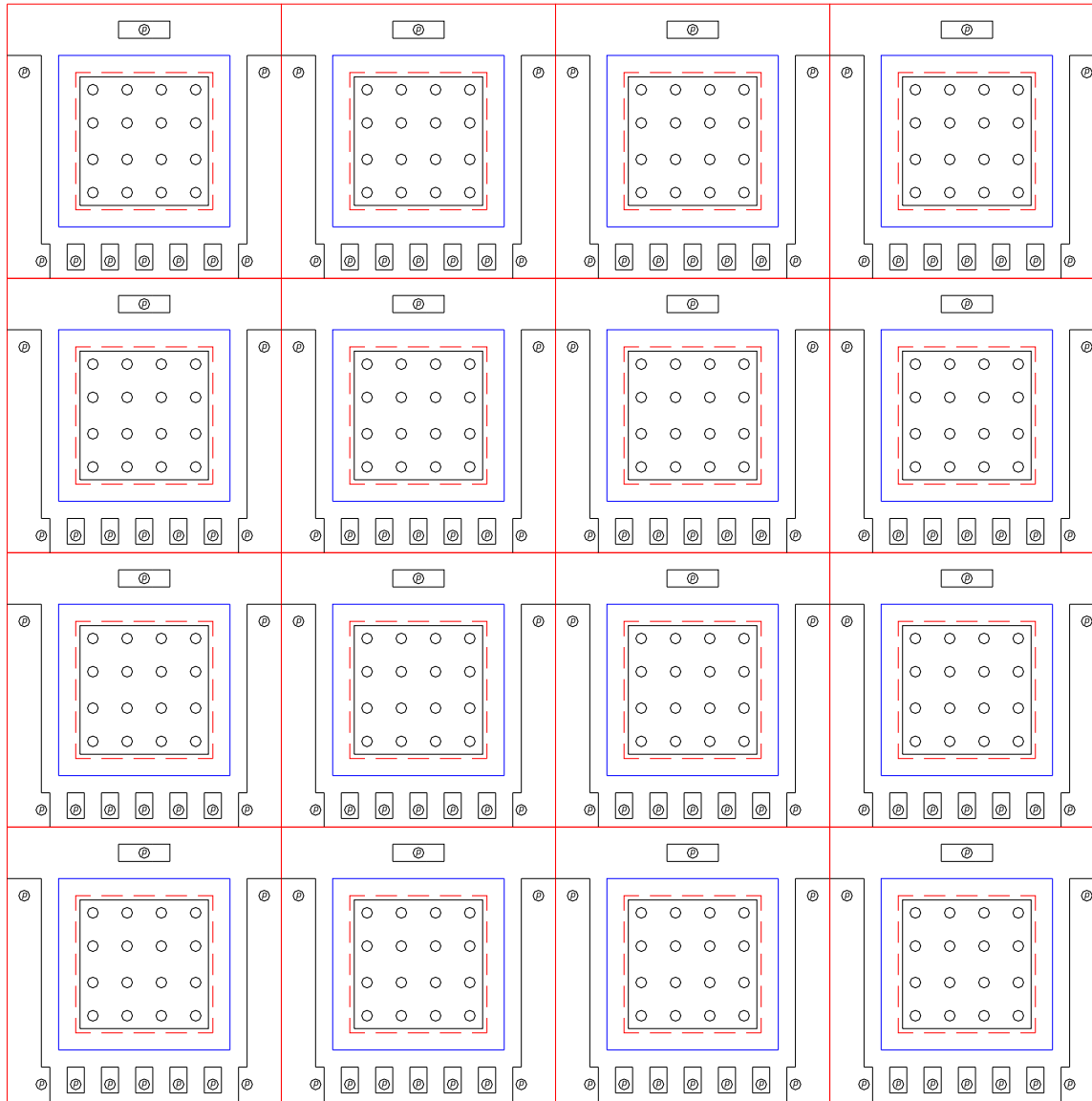
So, to make a square tiling of such APDs, they could be on a carrier board that is $16 \times 16 \text{ mm}^2$, with 25% active area per layer of tiling, and 4 tiling layers for 100% active area.

The carrier board:

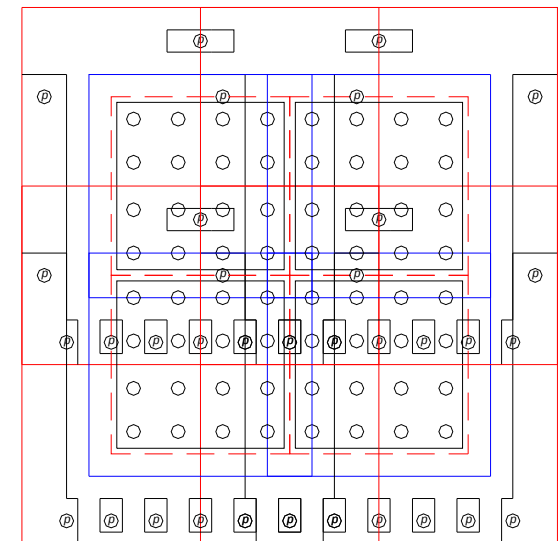


Tiling, II

A single tiling layer, with a 4x4 array of APDs; active area is 25%.



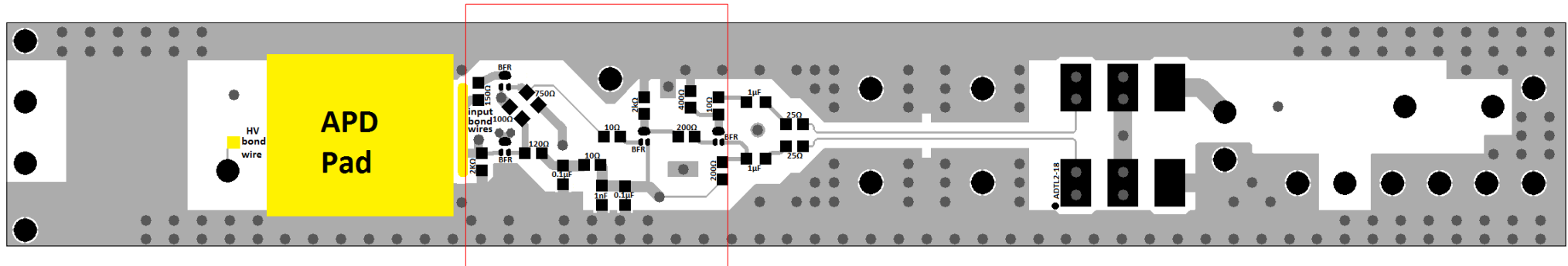
One APD on each of 4 tiling layers, showing how 100% coverage is thereby obtained



The Penn preamps would be laid in a similar array, with external HV, DC and signal connections along, say the left edge. A multilayer board would facilitate this.

Preamplifier

The present Penn preamp is shown below, together with an indication of the 16x16 mm² footprint of the proposed carrier board.



16x16 mm² footprint of proposed carrier board

The surface-mount components of the preamp should be rearranged to fit within this footprint on bottom side of the preamp board, with the HV connection (and the sockets for the pins of the carrier board) on the top side.

The low-voltage power conditioning, and the signal and HV connectors, will be outside the footprint of the preamp itself, as on the present board. This items should be on the top side of the new preamp to facilitate stacking of the preamp + APD units into a relatively compact 4-layer detector.

The new preamp will include diode protection, and a test-pulse input.