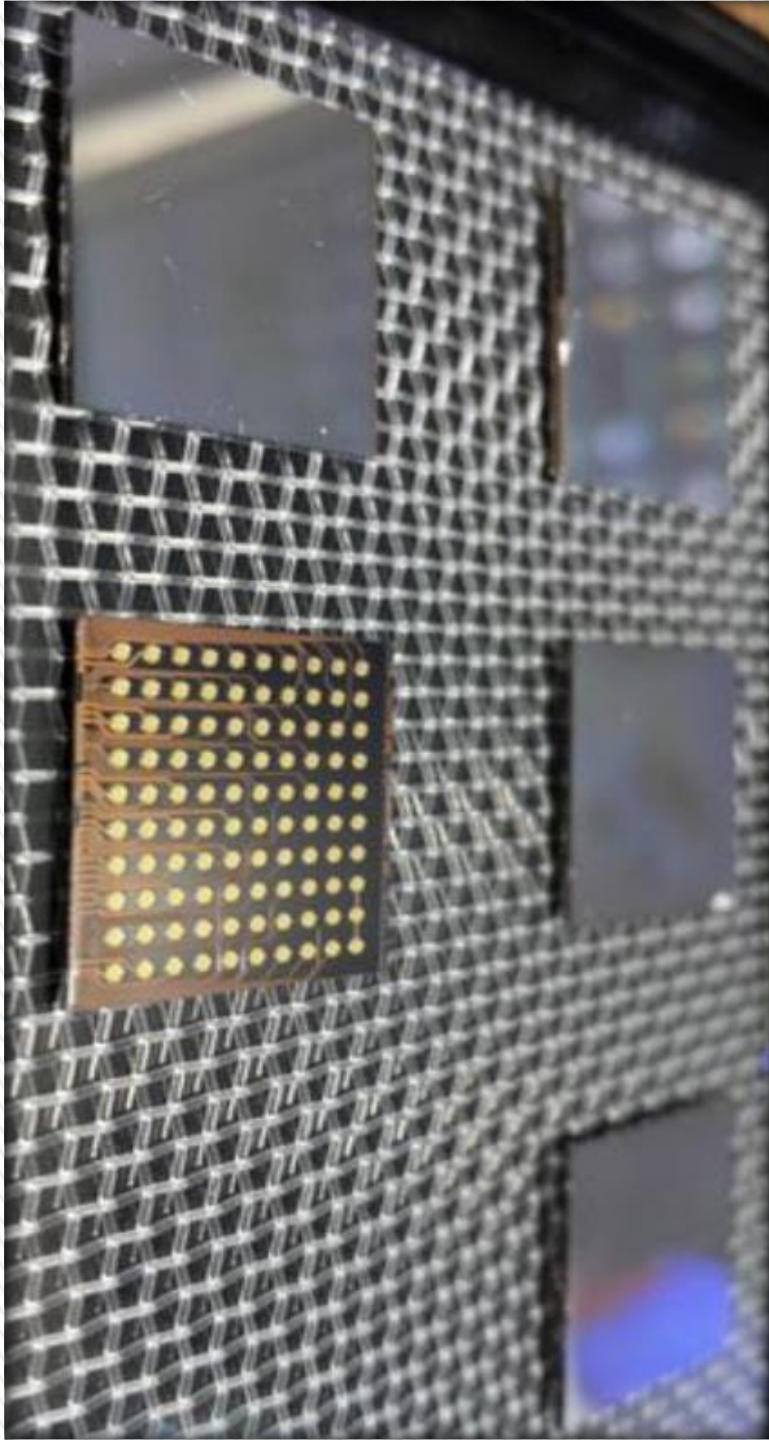Pierpaolo Valerio
11/06/2014
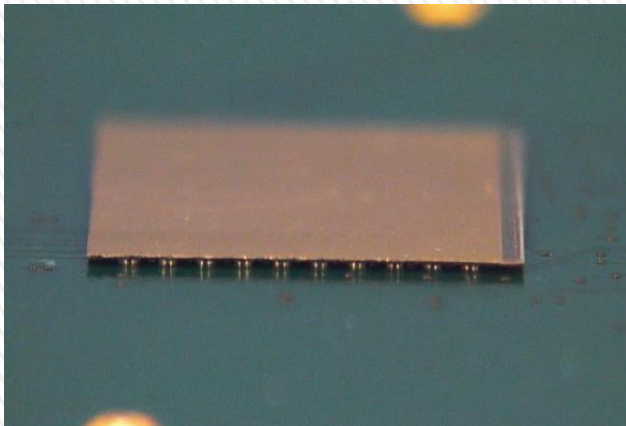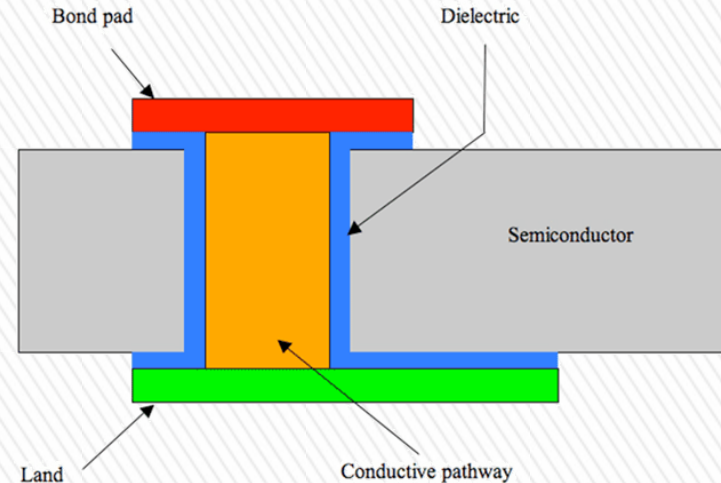
Update on the TSV project

Medipix TSV project

Objectives :

» Fabrication of a read-out chip with Through-Silicon Vias (TSV)
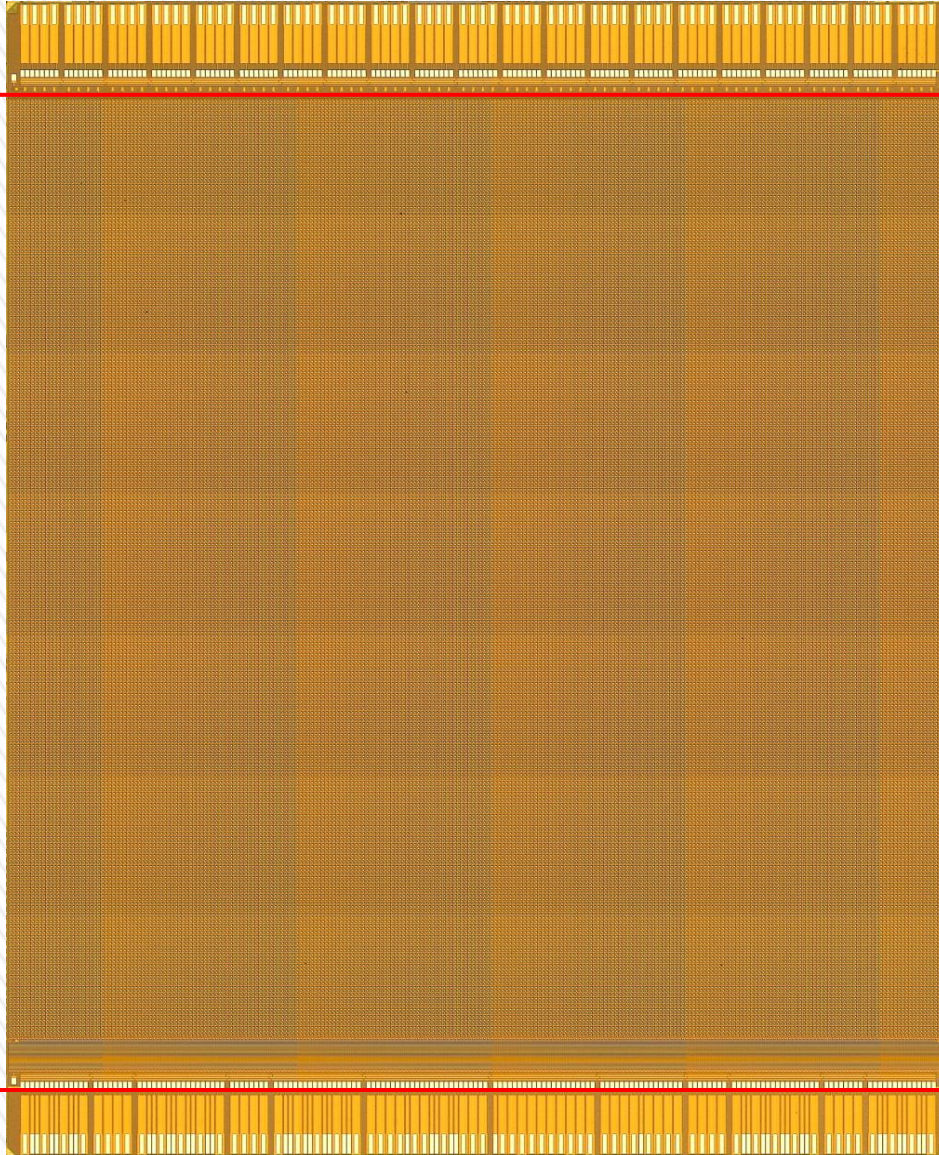» Assembly of a particle detector on top of it
» Proof of concept

Project status

» Demonstrate feasibility of TSV processing on Medipix3.1 – completed
» Demonstrate mastery of yield using Medipix3RX wafers – on-going
» Demonstrate feasibility of TSV-last processing on Timepix3 wafers sensor – on-going

Medipix3 ready for TSVs

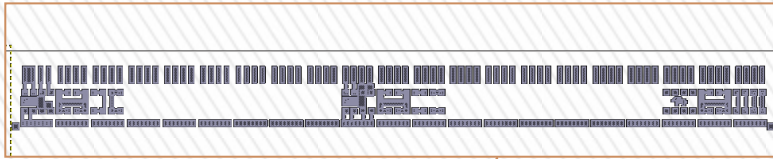All IO logic and pads contained within one strip of 800mm width

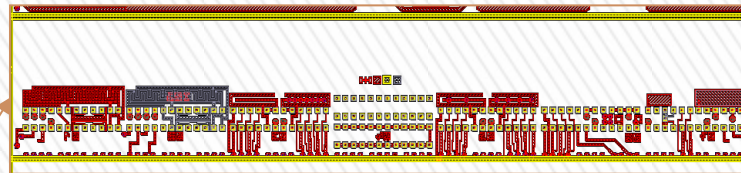All IO´s have TSV landing pads in place
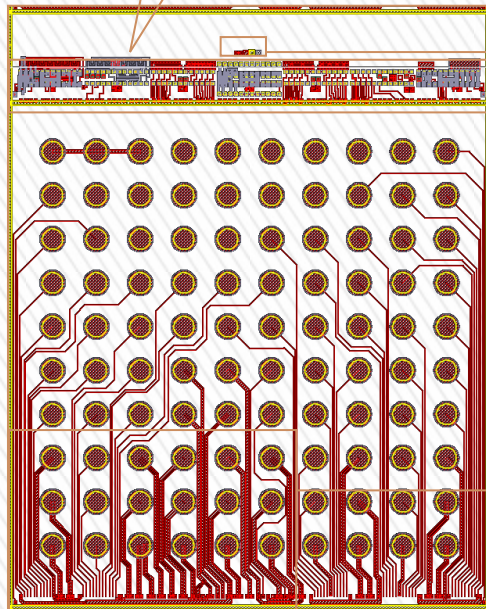
Permits 4-side butting

94% sensitive area

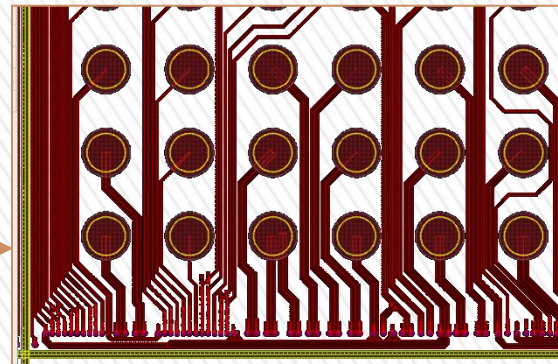# Redistribution Layer Design

Front side Electrical tests area

Back side Electrical tests area

Metrology boxes

Active chip
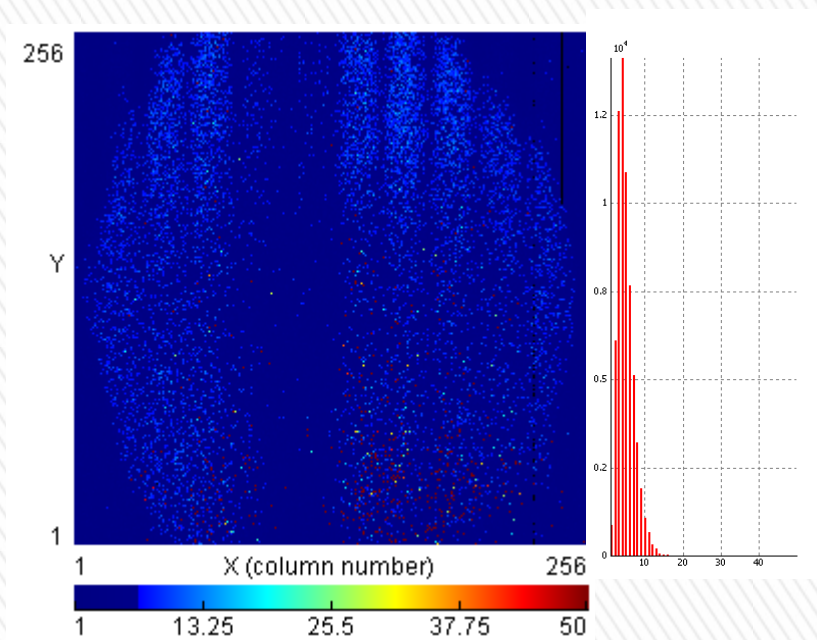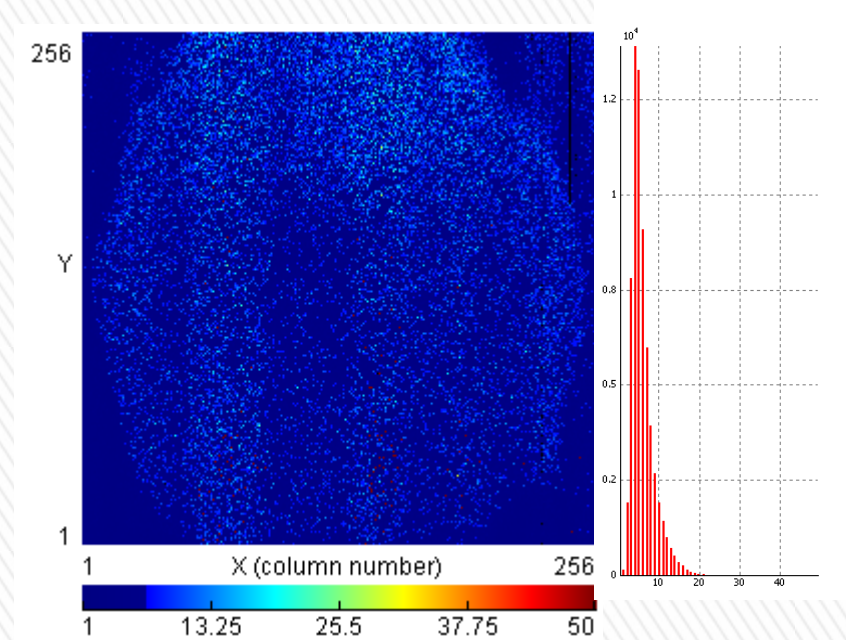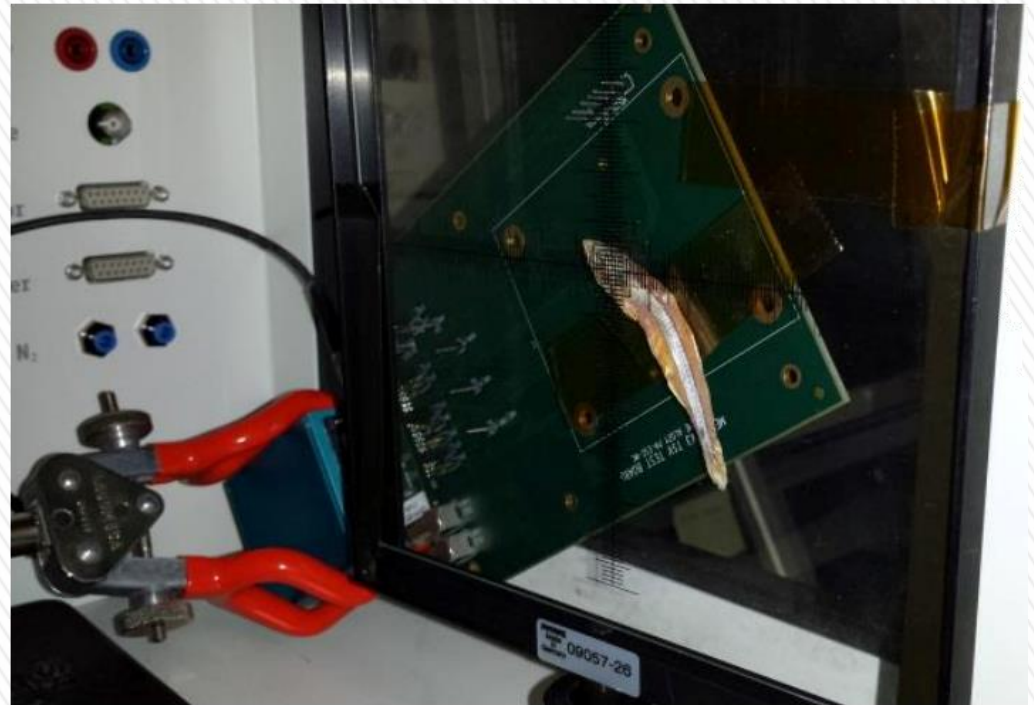
RDL details

Noise Performances

Before TSV

After TSV

We could notice only a slight difference

Imaging Test Setup

» X-Ray chamber 35kV, 1mA

» Hybrid Pixel Detector was positioned in front of the X-Ray beam

» A biological sample (fish) placed before the detector

Imaging Test Setup

» The sensor bias current was high when applied through TSV (tens of µA in full depletion voltage region)

» Without sensor bias wire bonding via the TSV it was clearly better (few µA)

» The quality of the assemblies is good. Unfortunately assemblies have not been tested before mounting so we cannot yet quantify the impact of chip-on-board integration

Latest Developments

» Imaging capabilities with a TSV-processed Medipix3 chip has been demonstrated

» A lot of 6 Medipix3RX wafers has been processed (the delivery is expected in one week), to demonstrate a reasonable yeld

» Design of a redistribution layer for Timepix3, aimed at producing ultra-thin Si assemblies is ongoing

Thanks for your attention