

Update on Large Sensor Studies

**Mechanical Properties,
Electrical Properties
of
Non-irradiated Large Barrel Sensors,
inner cut (slim dice), and outer cut (normal dice)**

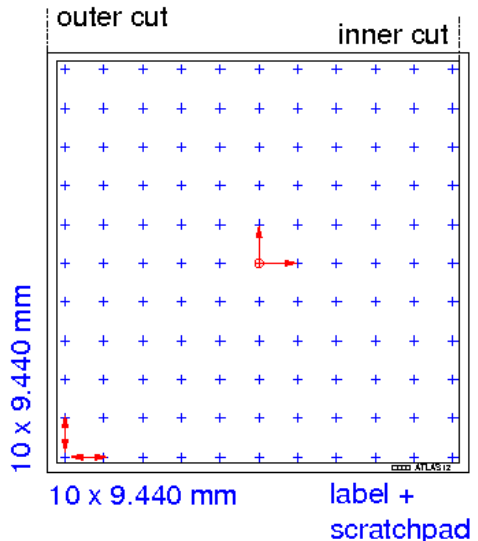
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ATLAS12A Sensors

- another shipment of 20 sensors
- type: ATLAS12A
- batch: VPX12518
- Wafer list: see table on right
- SCT ID: 25220901100xxx
where xxx is wafer ID
- narrow common P-stop w/ $4E+12$ concentration
- All slim dicing (“Inner Cut”)

VPX12518
653
655
656
657
659
660
661
663
664
665
668
669
675
679
687
689
690
691
694
695

Metrology measurements summary



Sensor bow determined from z-height points measured by non-contact (optical) measurement microscope. Sensor is freely suspended on a glass plate.

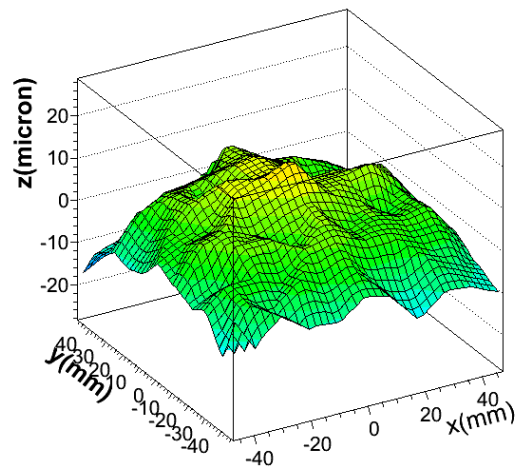
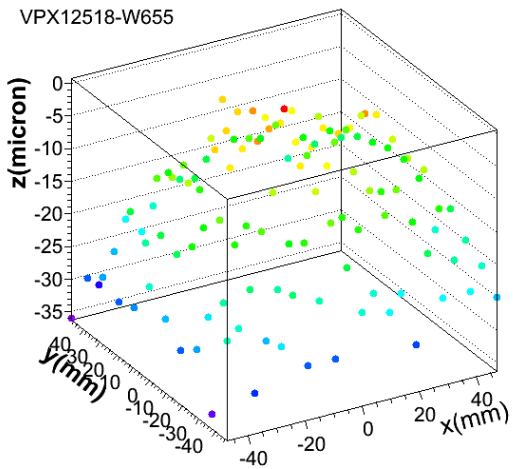
The coordinate system used is pictured on the left: the z-height at the origin (sensor centre) is defined as 0

Sensor net bow is obtained by subtracting a fitted flat plane from the measurement data points

The table on the right lists the greatest z height difference for the sensor

The plot below, on wafer 655, is typical for the batch

VPX12518	max z diff
653	56
655	34
656	30
657	45
659	54
660	38
661	29
663	32
664	49
665	34
668	31
669	45
675	28
679	27
687	40
689	36
690	38
691	41
694	50
695	40



All sensors are flat within 40µm

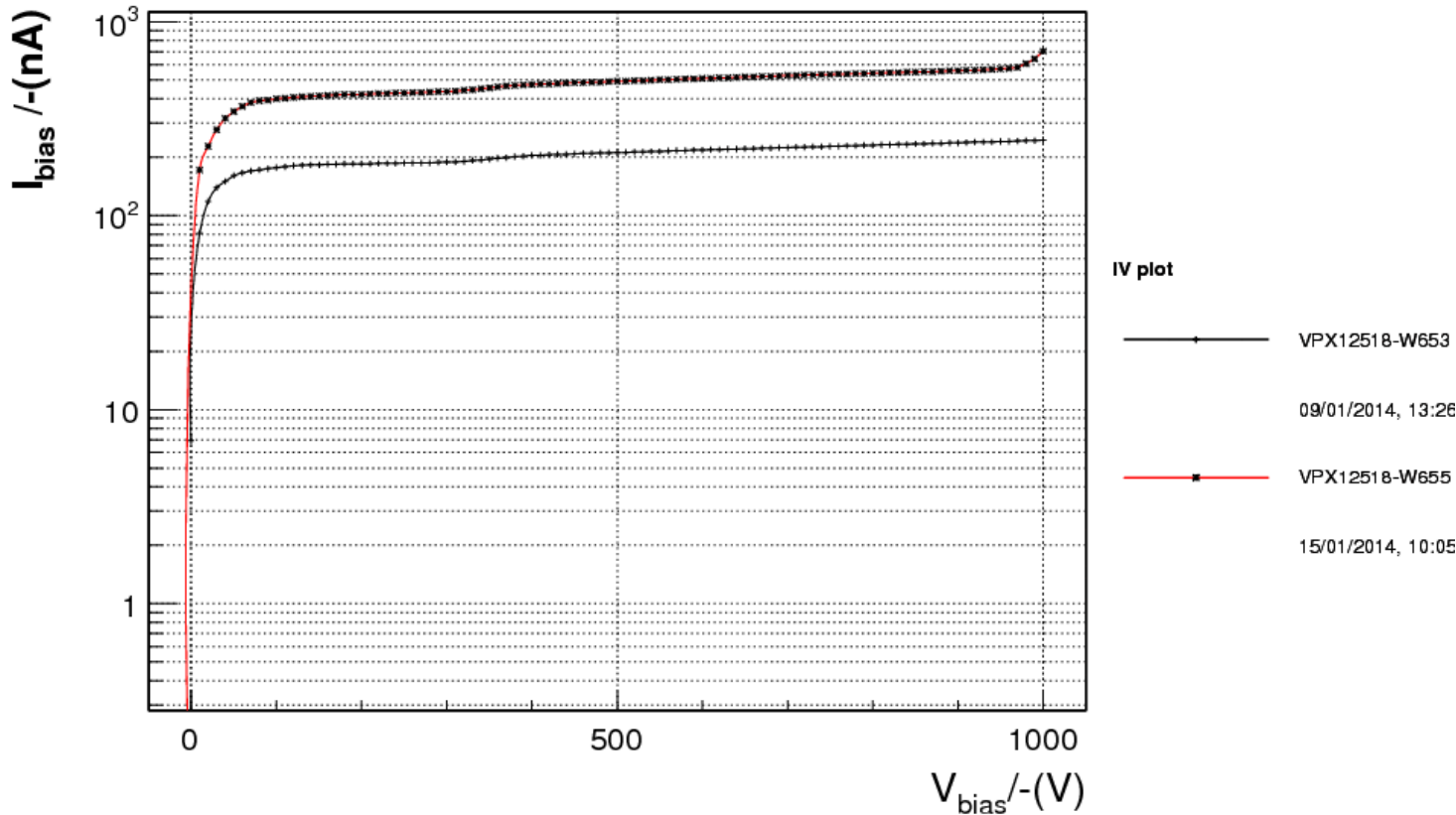
NB: VPX12318 batch was flat within 80µm, specification is 200µm

All sensors have convex shape

(centre higher than edges)

I-V Measurement summary

During measurement, the sensor is sitting in a light-tight box, flushed with N₂. Due to time constraints, only 2 sensors were measured so far.



W655 initially suffered from early breakdown (at ~800V), this was cured by conditioning, and running the IV once at 10V/1s increments, as is done by HPK, instead of our internally agreed 10V/10s steps.

Both sensors are well within specification

Depletion Measurements summary

Depletion voltage measurement taken directly after IV curve

Sensor is kept in light tight box with N₂ flush.

W653, W655 full depletion reached at 354, 376 V respectively.

Capacitance at 500V bias is 3.147, 3.158 nF, respectively. Measuring the area within the bias ring, and assuming $\epsilon_r(\text{Si})=11.86$, the resulting active depth yields 305 μm

