

Design and Evaluation of Large Area Strip Sensor Prototypes for the ATLAS Inner Tracker Detector

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The ATLAS community is facing the last stages prior to the production of the upgraded silicon strip Inner Tracker (ITk) for the High Luminosity Large Hadron Collider (HL-LHC). An extensive Market Survey was carried out in order to evaluate the capability of different foundries to fabricate large area silicon strip sensors, satisfying ATLAS ITk specifications.

The semiconductor manufacturing company Infineon Technologies AG was one of the two foundries, along with Hamamatsu Photonics K.K., evaluated for the production of the new barrel silicon strip sensors for the ITk. This work presents the complete tests carried out on the sensors designed and fabricated in 6-inch wafers in the framework of the Market Survey.

The full prototype wafer layout was designed using a Python-based automatic layout generation tool, able to rapidly design sensors with different characteristics and dimensions based on a few geometrical and technological input parameters.

A complete characterization of the full sensors and test structures fabricated is presented, including the results of proton and neutron irradiations, and their compliance with the specifications of the ITk strip tracker.

Submission declaration

Original and unpublished

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