

Analysis of the results from Quality Control tests performed on ATLAS18 Strip Sensors during on-going production

The ATLAS experiment will replace its existing Inner Detector with the new all-silicon Inner Tracker (ITk) to cope with the operating conditions of the forthcoming high-luminosity phase of the LHC (HL-LHC). The outer regions of the ITk will be instrumented with ~18000 ATLAS18 strip sensors fabricated by Hamamatsu Photonics K.K. (HPK). With the launch of full-scale sensor production in 2021, the ITk strip sensor community has undertaken quality control (QC) testing of these sensors to ensure compliance with mechanical and electrical specifications agreed with HPK. The testing is conducted at seven QC sites on each of the monthly deliveries of ~500 sensors.

This contribution will give an overview of the QC procedures and analysis; the tests most likely to determine pass/fail for a sensor are IV, long-term leakage current stability, full strip test and visual inspection. The contribution will then present trends in the results and properties following completion of ~60% of production testing. It will also mention challenges overcome through collaborative efforts with HPK during the early phases of production. With less than 5% of sensors rejected by QC testing, the overall production quality has been very good.

Submission declaration

Original and unpublished

Author: Dr MIYAGAWA, Paul (University of London (GB))

Co-authors: BEVAN, Adrian (Queen Mary University of London); FOURNIER, Andrew (Simon Fraser University (CA)); DOWLING, Andrew Jay; DESHMUKH, Aware (UC-Santa Cruz); HOMMELS, Bart (University of Cambridge (GB)); STELZER, Bernd (SFU/TRIUMF); JESSIMAN, Callan (Carleton University (CA)); SOLAZ CONTELL, Carles (IFIC / CSIC-UV); LACASTA LLACER, Carlos (IFIC/CSIC-UV); KLEIN, Christoph Thomas (Carleton University (CA)); WESTBROOK, Connor (SCIPP); DUVNJAK, Damir (Carleton University (CA)); SLAVIKOVA, Eliska Alice (Czech Academy of Sciences (CZ)); HILL, Ewan Chin (University of Toronto (CA)); Mr STAATS, Ezekiel (Carleton University (CA)); KARIYAPPERUMA, Gayani Kosala (University of Cambridge (GB)); MARTINEZ-MCKINNEY, George (SCIPP); Dr BECK, Graham (University of London (GB)); DAWSON, Ian (University of London (GB)); OSIEJA, Jack (Simon Fraser University (CA)); KOZAKOVA, Jana (Czech Academy of Sciences (CZ)); FERNANDEZ-TEJERO, Javier (Simon Fraser University / TRIUMF (CA)); KROLL, Jiri (Czech Academy of Sciences (CZ)); KVASNICKA, Jiri (Czech Academy of Sciences (CZ)); KELLER, John Stakely (Carleton University (CA)); BERNABEU VERDU, Jose (IFIC (CSIC-UV)); SATO, Kazuyuki (University of Tsukuba (JP)); AFFOLDER, Kirsten (University of California,Santa Cruz (US)); NAKAMURA, Koji (High Energy Accelerator Research Organization (JP)); POLEY, Luise (Simon Fraser University (CA)); KUTOVA, Magdalena (Czech Academy of Sciences (CZ)); MIKESTIKOVA, Marcela (Czech Academy of Sciences (CZ)); ULLAN, Miguel (CNM-Barcelona (ES)); KANG, Nathan Jihoon (University of California,Santa Cruz (US)); GONZALEZ, Noe (SCIPP); TUMA, Pavel (Czech Academy of Sciences (CZ)); FEDERICOVA, Pavla (Czech Academy of Sciences (CZ)); FRYMAN PADDOCK, Quinn; JIRÁSEK, Radek; BEAUPRE, Scott (Simon Fraser University); MANSON, Sebastian (TRIUMF (CA)); ZENZ, Seth (Queen Mary University of London); HIROSE, Shigeki (University of Tsukuba (JP)); O'TOOLE, Stephanie (Simon Fraser University (CA)); ISHII, Tatsuya (Japan/Univ. of Tsukuba); KOFFAS, Thomas (Carleton University (CA)); AFFOLDER, Tony (University of California,Santa Cruz (US)); SOLDEVILA SERRANO, Urmila (IFIC (CSIC-UV)); LATONOVA, Vera (Czech Academy of Sciences (CZ)); FADEYEV, Vitaliy (University of California,Santa Cruz (US)); UNNO, Yoshinobu (High Energy Accelerator Research Organization (JP)); HARA, kazuhiko; CHEN, zongde (Queen Mary University of London)

Presenter: Dr MIYAGAWA, Paul (University of London (GB))

Track Classification: Strip sensors