

Single Pass Stripline Beam Position Monitor Design, Fabrication and Commissioning

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To monitor the position of the electron beam during transport from the Booster Synchrotron to the Storage Ring at the Australian Synchrotron, a stripline Beam Position Monitor (BPM) has been designed, fabricated and installed in-house. The design was based on an existing stripline in the Booster and modified for the transfer line with a particular emphasis on ensuring the line impedance is properly matched to the detector system. The initial bench tests of a prototype stripline showed that the fabrication of the four individual striplines in the BPM was made precisely, each with a measured standing wave ratio (SWR) of 1.8 at 500 MHz. Further optimization for impedance matching will be done for new stripline BPMs.

The linearity and gain factor was measured with the detector system. The detector system that digitizes the signals is an Instrumentation Technologies Brilliance Single Pass [1]. The results show an error of 1 mm at an offset (from the electrical centre) of 10 mm when a linear gain factor is assumed and an RMS noise of ~150 μm that decreases to < 10 μm with increasing signal intensity. The results were well under our requirements for the transport line.

The commissioning results of the stripline will also be presented showing a very strong signal for an electron beam with an estimated integrated charge of ~50 nC with a position stability of 28 μm (horizontal) and 75 μm (vertical). The increase in the RMS stability is believed to be caused by the elements in the transport line perturbing the beam position.

- [1] A. Kosicek, M. Znidarcic and S. Bassanese, *Particle Accelerator Conference Proceedings*, p 3579 (2009).