

High-Frequency Phase Detection

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Abstract

Phase detection plays an integral role in radio frequency (RF) systems found in particle accelerators. Since accelerating a beam requires a specific phase in the period, phase detection is necessary to determine if an accelerating cavity is at resonance with the applied RF signal. Superconducting technology has led to smaller accelerating cavities which operate at higher frequencies making phase detection a bit more complex. A phase detector was designed using a double-balanced mixer with the RF input signals passing through an ultra-fast comparator before the mixer. Analog Devices' ADCMP572 ultra-fast comparator was selected for testing of a high-frequency phase detector due to its very short propagation delay (150 picoseconds) [1].