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Wide range low cost digital RF phase shifter

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Shifting RF phases is a common task in particular at particle accelerators. Which RF frequencies need to be shifted is highly facility dependent, which demands a wide range phase shifter. The phase shifter presented in this contribution consists of a custom board, that includes a high-performance quadrature modulator, voltage regulators and an 16-bit digital-to-analogue converter that offers an I2C interface. The quadrature modulator is specified to work in the frequency range between 50 MHz and a 6 GHz. The board is combined with commercial off-the-shelf products to provide a software interface and a RF tight compact housing. We present amplitude and phase noise measurements and amplitude stability measurements.
At the ELBE Center for High-Power Radiation Sources we use the phase shifter to shift the phase of the superconducting RF gun laser with respect to the accelerator cavity RF field. This allows to implement a feedback loop that stabilizes the THz output power of the THz undulator source at ELBE. In order to achieve this, the beam position is monitored in an energy dispersive beam line section and the gun laser phase is used to keep it constant.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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