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## Prototype design of a digital low-level RF system for S-band deflectors

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S-band deflectors are generally operated on pulsed mode for beam diagnosis. We plan to deploy 5 S-band (2997 MHz) deflectors to accurately measure the longitudinal time distribution of ultra-short electron beam pulses in Shenzhen Superconducting Soft X-ray Free Electron Laser (S3FEL). A microwave system of one deflector consists of a low-level RF system (LLRF), a solid-state amplifier, waveguide couplers, and a klystron, operated in pulse mode with a maximum repetition frequency of 50 Hz. Its microwave amplitude and phase stability must be better than 0.06%/0.08° (RMS). This article will introduce the prototype design of the hardware, firmware, and software of the digital LLRF system. We use homemade Local Oscillators (LOs) and commercial cards based on the MicroTCA standard in hardware design. The firmware design will use a Non-IQ demodulation and a pulse feedforward algorithm to suppress noise from high voltage of klystron. The software design is based on the EPICS control system architecture, achieving slow control and interface display functions. This report will also show some preliminary test results.

### Footnotes

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Asia

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