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Prototype Performance of Digital LLRF Control System for the SuperKEKB

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SuperKEKB is a new project to upgrade the luminosity to 40 times higher than that of the KEKB accelerator. In order to obtain this high luminosity, the nano-beam scheme will be adopted at the interaction point, accordingly, low-emittance beam will be required. Furthermore, the stored beam current should be approximately twice as high as the KEKB. Therefore, for the high-current and high-quality beam acceleration without instability, accuracy and flexibility in accelerating field control are very significant.
For the SuperKEKB project, a new LLRF control system has been developed to realize high accuracy and flexibility. It is an FPGA-based digital RF feedback control system using 16-bit ADC's, which works on the μTCA platform. In this μTCA-module, the Linux-OS runs then it performs as the EPICS-IOC. This LLRF system is available to both of normal-conducting cavity and super-conducting cavity.
A prototype of the LLRF control system for the SuperKEKB was produced. Its basic performance of the RF control was evaluated by using a simulant cavity. The evaluation results and future issue for the operation will be presented in this report. The amplitude and phase stability in the feedback control is 0.03% and 0.02 degrees, respectively. It is sufficiently stable for the SuperKEKB.

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