

7 - 25 The Design of Terminal Node for Timing System

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High Intensity heavy-ion Accelerator Facility (HIAF) is a heavy ion scientific research facility with an internationally leading level and a wide range of uses. It adopts accelerator cascade to achieve high power and high current intensity. To achieve coordination between devices, the operation of cascade requires high-precision timing scheduling. High-precision timing is the key to precise control of the all equipment, which determines the accuracy and precision of the operation between the equipment.

Based on the standard time synchronization protocol, this paper develops a terminal node for the HIAF timing system. The synchronization precision is better than 60 ps and the synchronization accuracy is better than 2 ns. At present, the design has been completed, and the test results show that the synchronization precision of the terminal node meets the design requirements, and the reference trigger output jitter is less than 50 ps. Figure 1 is the picture of the terminal node, and Figure 2 is jitter statistics of the pulse per second output and reference trigger output.

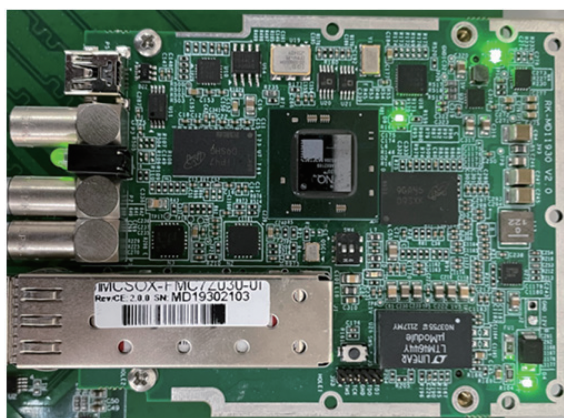


Fig. 1 (color online) Picture of the terminal node board.

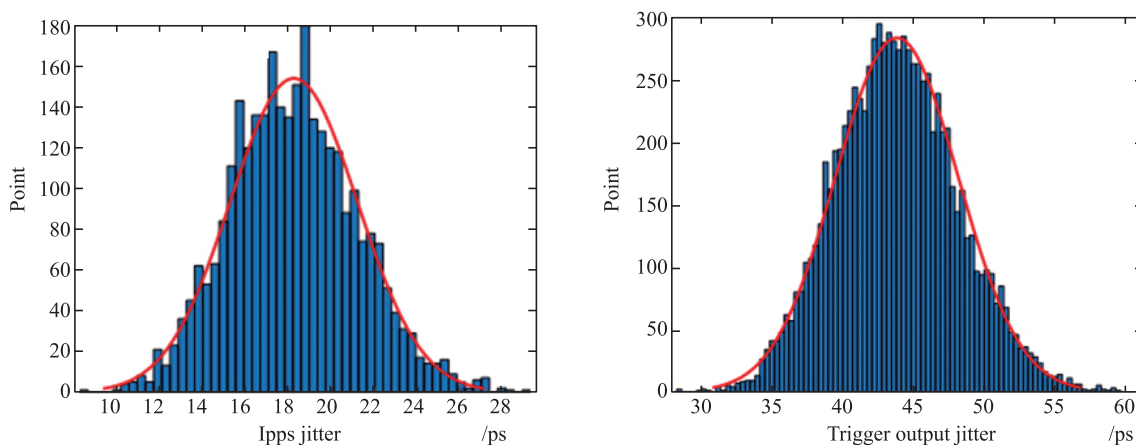


Fig. 2 (color online) jitter statistics of 1 pps(Left) and reference output(Right).

According to the statistical results, the terminal node jitter distribution is similar to the normal distribution. 1pps jitter statistical result is $\mu = 18.264$ ps, $\delta = 2.934$ ps. The reference trigger output jitter statistical result is $\mu = 43.753$ ps, $\delta = 4.347$ ps.