

## Application on Metastable Measurement with Wide Range High Resolution VDL Circuit

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**Abstract :** This paper proposed a high resolution Vernier Delay Line (VDL) measurement circuit with coarse and fine detection mechanism, which improved the trade-off problem between high resolution and less delay cells in traditional VDL circuits. And the measuring time of proposed measurement circuit is also under the high resolution requests. At first, the testing range of input signal which proposed high resolution delay line is detected by coarse detection VDL. Moreover, the delayed input signal is transmitted to fine detection VDL for measuring value with better accuracy. This paper is implemented at 0.18 $\mu$ m process, operating frequency is 100 MHz, and the resolution achieved 2.0 ps with only 16-stage delay cells. The test range is 170ps wide, and 17% stages saved compare with traditional single delay line circuit.

**Keywords :** vernier delay line, D-type flip-flop, DFF, metastable phenomenon

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