Zero Delay Buffers and Your Timing Budget

When a system requires multiple synchronized copies of a timing signal, the designer will use a PLL-based device commonly called a Zero Delay Buffer (ZDB). The PLL on board allows a ZDB to provide outputs which rise and fall concurrently with the timing signal provided to it as a reference. There are five characteristic specifications of a ZDB that directly impact a systems timing budget

- **Propagation Delay**
  - — The variation between the rise times at the feedback and reference inputs to the ZDB.
- **Tracking Skew**
  - — When a timing signal has a Spread Spectrum feature on it, the low-pass filter in the ZDB will likely filter off some portion of the low-frequency spread signal. The resulting skew between the input and the outputs is called tracking skew.
- **Phase Error Jitter**
  - — The propagation delay is non-constant. The variation is called phase error jitter.
- **Output Jitter**
  - — The period variation of the signals that are buffered out.
- **Output-to-Output Skew**
  - — The amount of time between the rising edge of the earliest output to the rising edge of the latest output.

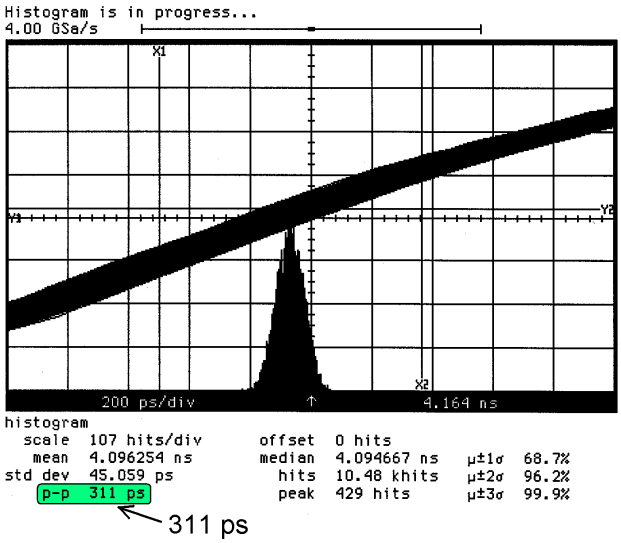
Many of these elements are inter- and/or co-dependant, and are sometimes hard to measure separately. Since the base concern is the sum total impact on your system timing budget, measuring them separately is not vital.

Specifically for the 2510-type ZDBs which are being used in PC133 registered SDRAM DIMM modules, Cypress has done comparative analysis between our W132-10B and Hitachi's F2510B. We chose Hitachi because we have found them to come closest to meeting our performance standard and they seem to have secured some mind share with customers.

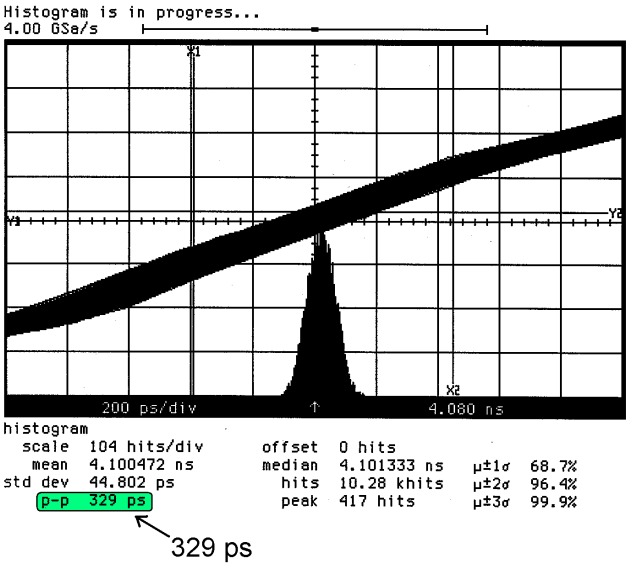
On the next page you will find the most dramatic evidence of this fact. The plots reflect a combination of tracking skew and phase error jitter. You will note that the results show Cypress W132-10B to perform better not only in the overall variability, but also in the distribution of the variations. Note that our distribution throughout the range is a Gaussian and predictable whereas the bimodal distribution present on the Hitachi ZDB is unpredictable in nature.

Our comparison on the other elements which impact timing budget do not show any significant variance, and as such, in total we conclude that our product is not only sufficient to be used as an alternate source to the Hitachi device, but is overall a more dependable device with less of an impact on a systems timing budget.

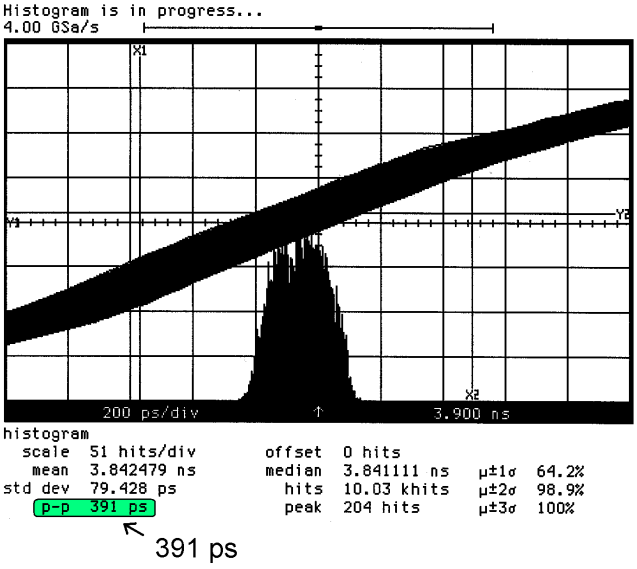
Cypress at 100 MHz



Cypress at 133 MHz



Hitachi at 100 MHz



Hitachi at 133 MHz