

Cable Skew Tests

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Premise:

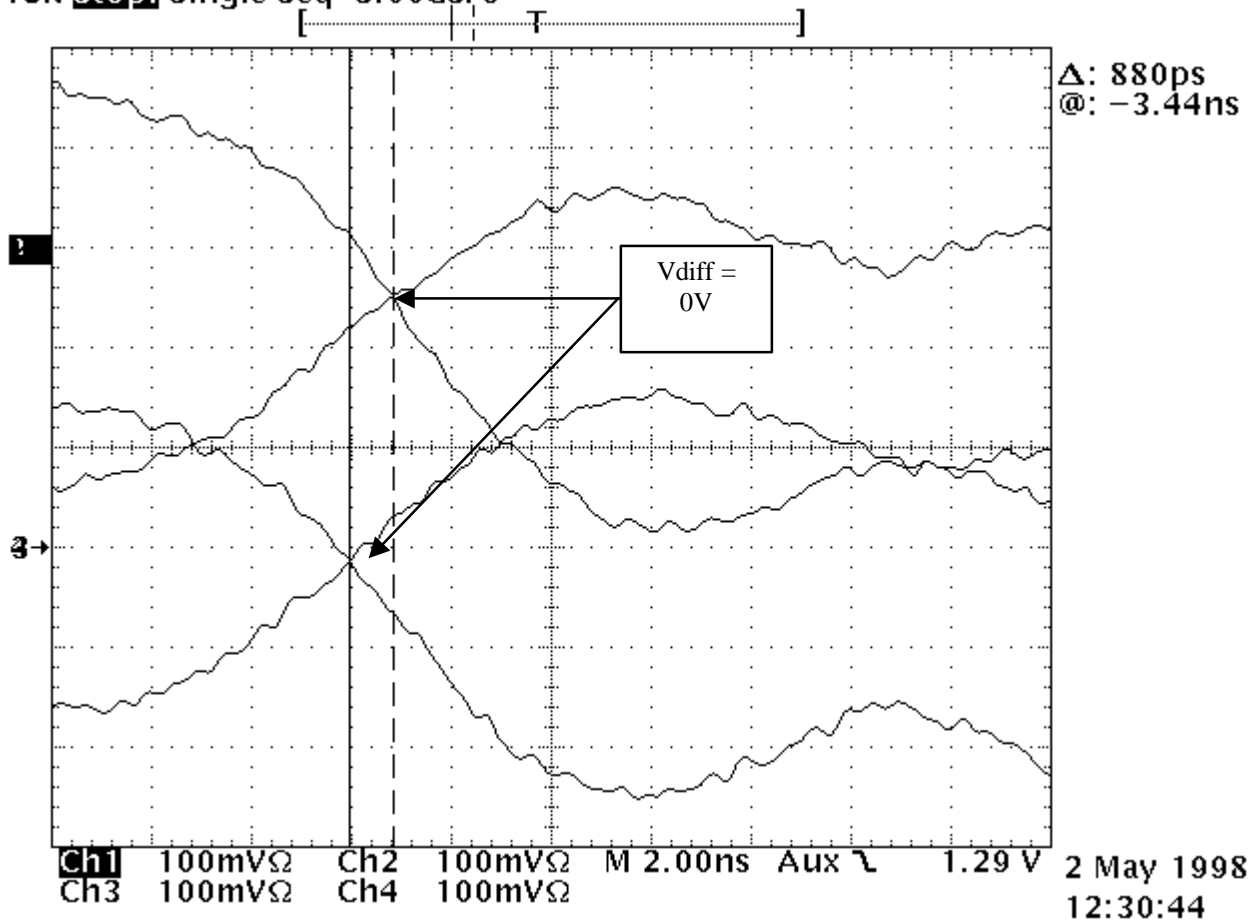
Ultra3/Fast80 is assumed to use a dual-edge clocking scheme to double the transfer rate of the data. Because Ultra3/Fast80 data would be changing between each edge of the REQ/ACK pulses, it is important to analyze the setup and hold requirements to determine whether there is enough margin for the new technique to succeed. Observation of current Fast40 cable skew can supply some information to help analyze future margin requirements. The data below are cable skew measurements between two data channels on a bus having worst-case loading and cable length. The data shown represents the worst channel pairing for the maximum possible skew in this system.

Setup:

- LVD, Fast40 data transfers, 'FF 00' pattern.
- 12 meter cable; PVC dielectric, 28AWG solid conductor, flat, non-twisted.
- Active termination at both ends of the bus.
- 16 total devices on the cable: host at one end, 15 devices at the other end in a cluster with a spacing of 0.3 meters apart (cable capacitance: 45 pF/m).
- 14 devices in the cluster were dummy loads having the maximum LVD capacitance specified in SPI-2.
- The driving device was placed at the last position on the cable before the active terminator. This assumes the longest cable length seen and therefore the worst skew.
- Measurements were made with a Tektronix TDS684B scope using FET probes with < 2pF of capacitance. The probes were used in a single-ended fashion to reduce any time error induced by the math functions of the scope.
- All waveforms were recorded with the scope probes attached to the receiving end of the cable.

1. Data-to-Data Skew, Worst-Case Pairing, Worst-Case Cable/Loading, receiving end of cable

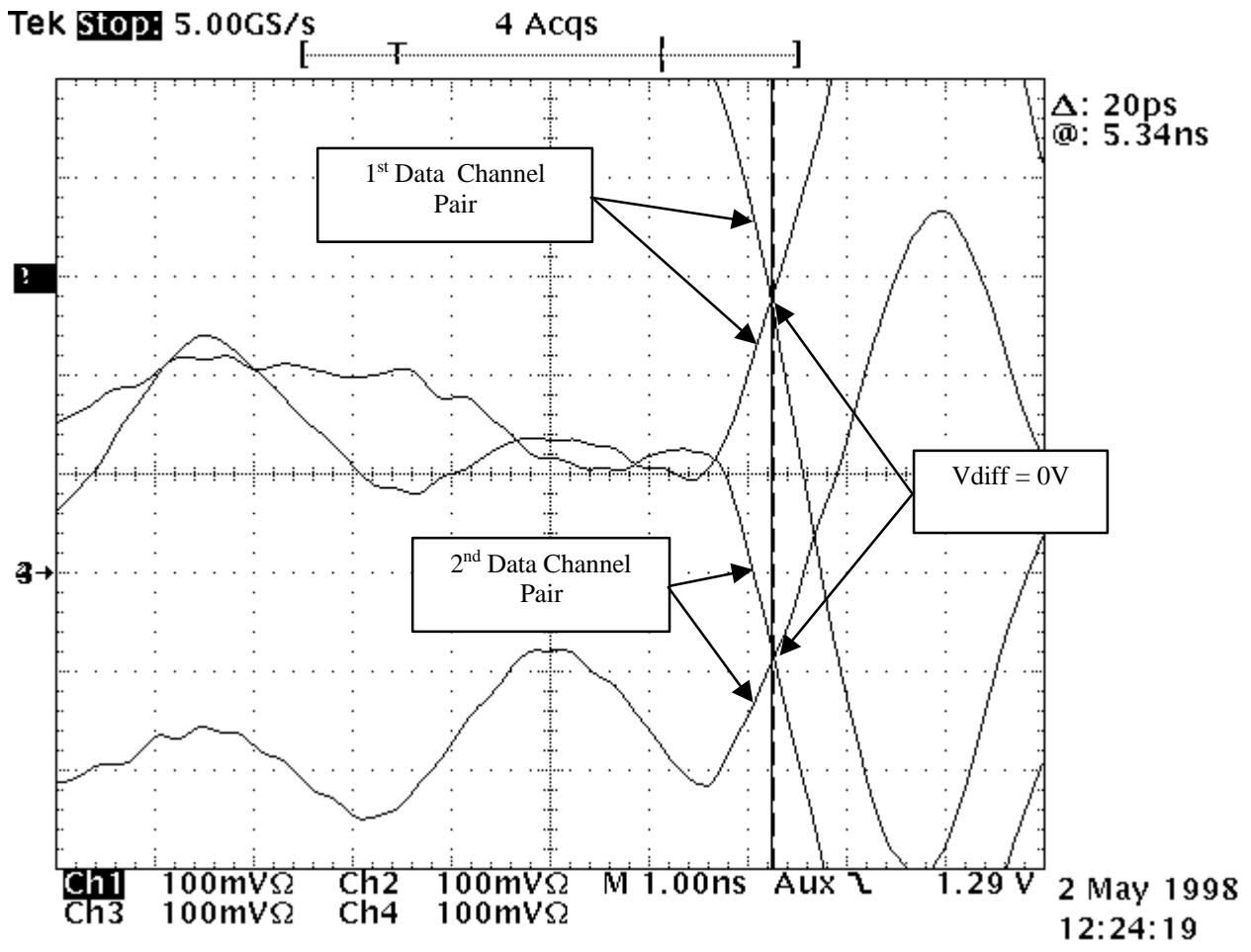
Tek **Stop** Single Seq 5.00GS/s



Data In phase, 'FF 00' pattern

Skew = 0.88 nsec

2. Data-to-Data Skew, Worst-Case Pairing, Worst-Case Cable/Loading, at the driving device



Data In phase, 'FF 00' pattern

Skew = 20 psec (measurement limit of the scope)

Conclusions:

The signal skew at the driver end resulted in practically zero. Therefore, the worst-case skew over the total length of the worst-case loaded, 12 meter cable was 0.88 nsec. This cable was not a twisted pair cable, so it can be assumed that the skew could be even worse than the measurements shown here.

Because Ultra3 cable requirements are presently the same as Ultra2, the skew measured above represents a possible cable skew budget for the Ultra3 bus. This should be taken into consideration when planning the setup and hold requirements in the Ultra3 specification.