

Cable Test Requirements

- Impedance (Differential & SE)
 - TDR vs Frequency domain
 - TDR measurement
 - 1) Sample window
 - 2) Sample length
 - 3) Rise time

- Attenuation
 - Testing frequency range
 - 6 dB down requirement

Cable Test Requirements

- Capacitance (Mutual & SE)
 - Frequency domain sweep vs test on interesting point
- Time Delay
 - TDT vs Signal generator/Scope

The purpose of this presentation is to address some concerns in the cable test requirements proposed at working group on Dec.2, 1998.

TDR vs Frequency domain on Impedance Measurement

- TDR is more appropriate test method for impedance(Z) measurement on SCSI cables
 - at HF, Z is almost independent from frequency for the insulation compound used on SCSI cables
 - at LF, Z varies as frequency varies and Z @LF can not be controlled separately from Z @HF
 - in frequency domain, Z measurement is very sensitive to the test cable length. To accurately measure Z , an optimal test length and its measureable frequency range need to be carefully calculated. For a desired wide frequency range, several cable length needed to be tested and this is not practical at production level. See attached test data.

TDR vs Frequency domain on Impedance Measurement

- for a desired wide frequency range, several cable length needed to be tested and this is not practical at production level.
- There is a limit on test frequency where the test cable length is too short comparing to the test fixture that accurate Z can be measured.

Impedance TDR Measurement

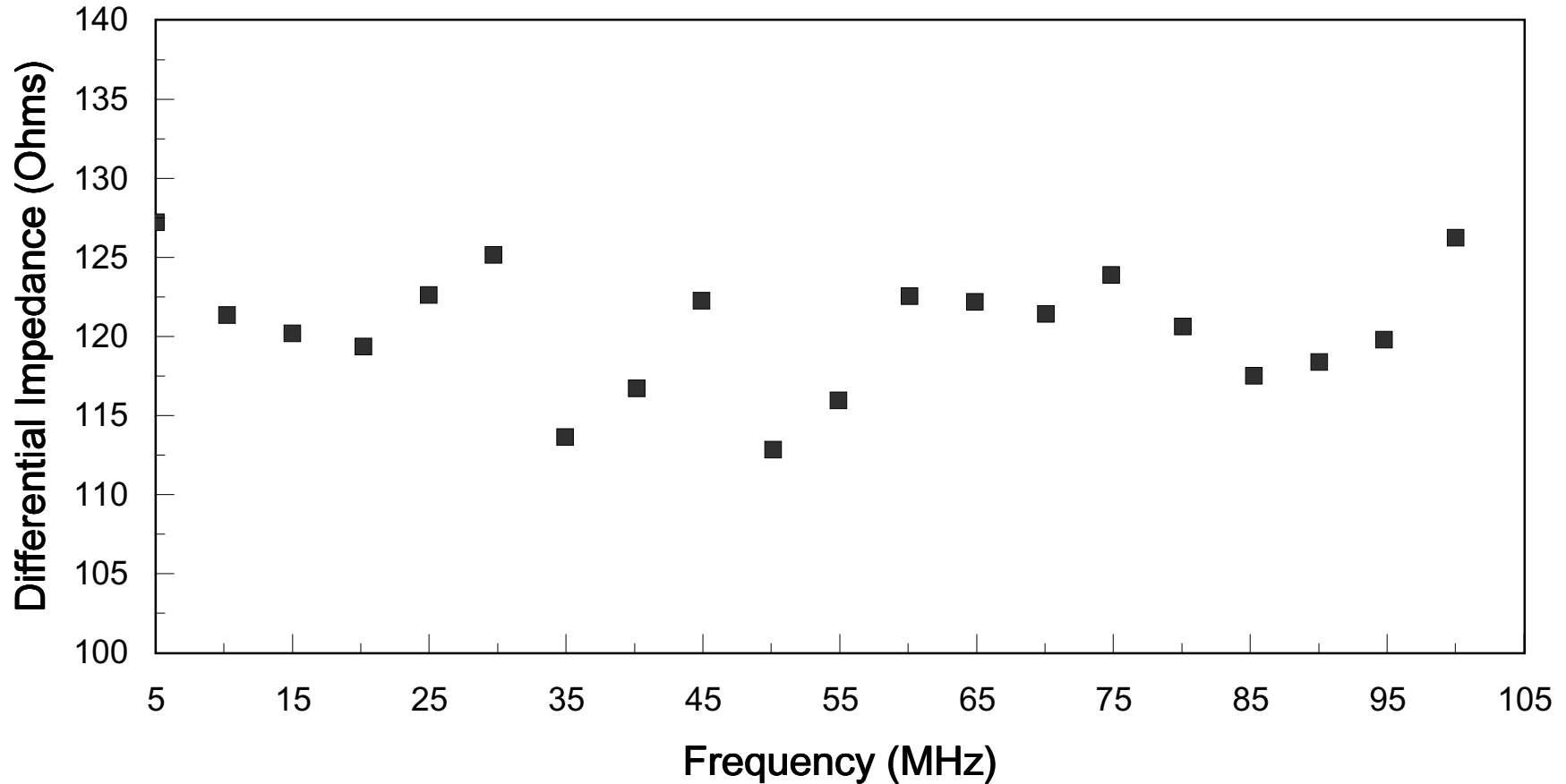
- We concern the following issues on impedance TDR measurements
 - Time Window need to be specified
 - Because @TDR, impedance is indepedant from the cable length so that the minimum testable cable length should be allowed, for example 10 ft. See attached figure for the comparision of impedance measurement on a 6 m and a 10 ft cable.
 - Rise time: we concerned 3 ns rise time is too slow for SCSI cable impedance measurement.

Attached supporting test data

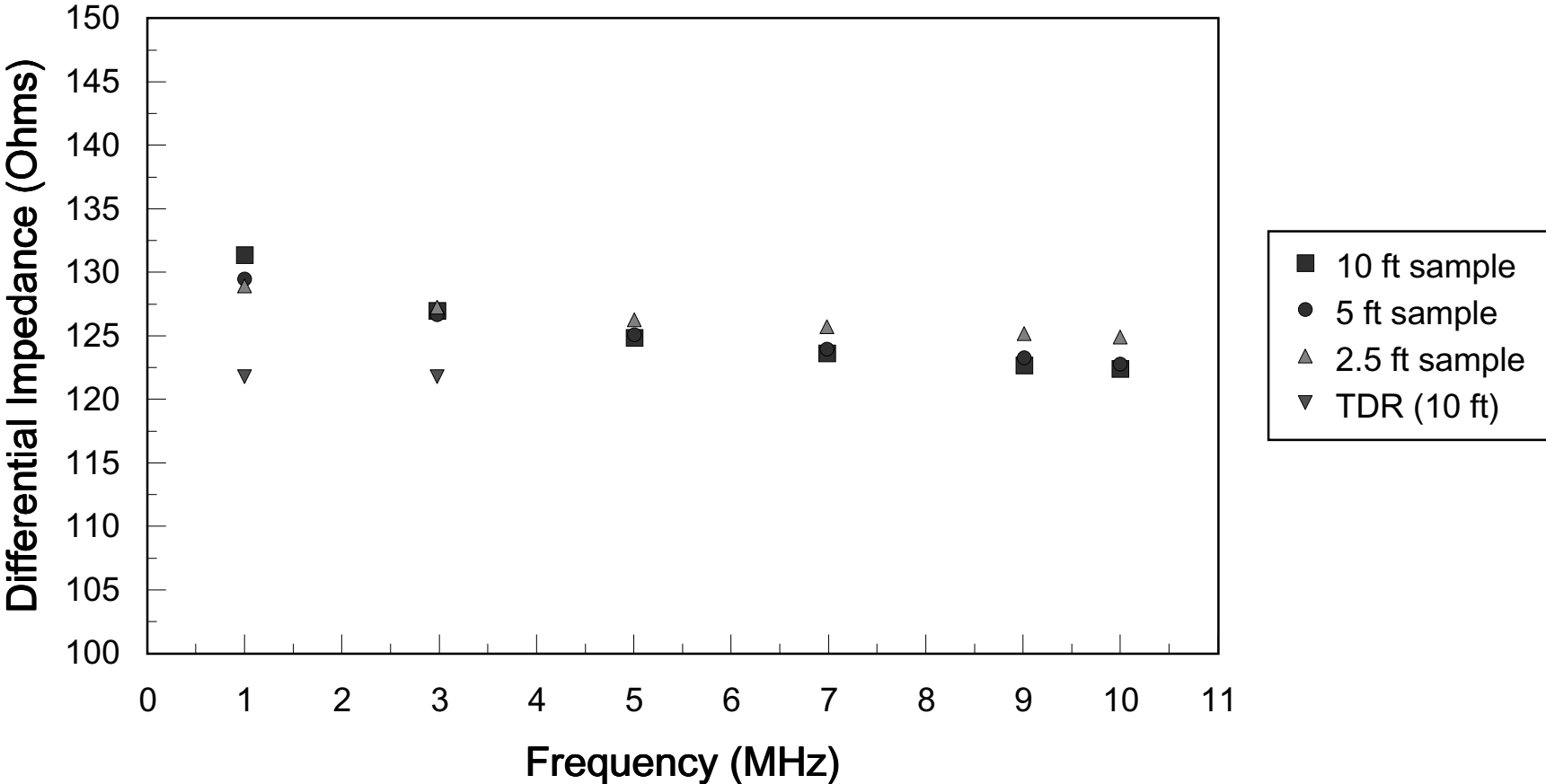
- See the test cable construction on the next page
 - Impedance measurement @TDR on one pair (10 ft sample)
 - Impedance measurement @frequency domain (25 m sample)
 - Short sample frequency domain impedance measurement
 - same 10 ft sample measured from 1 to 10 MHz
 - 5 ft sample measured from 2 to 20 MHz
 - 2.5 sample measured from 4 to 40 MHz

Cable being tested
30 awg 7 stranded,
foam polyolefin insulated,
34 pairs,
overall shielded,
Differential Impedance=124 +/- 10 ohms

Impedance measurement in frequency domain with long sample (25 m)



Imp. at Time domain vs Frequency domain



Attenuation test requirements

- We have two concerns:
 - 6 dB insertion loss: Based on our test data, on one given cable length, it is not practical to set this requirement. We propose to remove this requirement.
 - Required test frequency range: It will be very difficult to measure the attenuation at very high frequency due to fixture limit. We propose 1 MHz to 600 MHz and would like to see some actual test data from other manufacturers and to discuss the more practical test range.

Capacitance Measurement

- We have two concerns:
 - Measuring frequency range: Due to the similar concerns as impedance measurement, it is not practical to measure the capacitance in a wide range of the frequency. We propose to set the measurement @ 1 MHz or 1 kHz
 - Capacitance can not be measured at very high frequency due to the proper cable length. See attached test data for support.



Time Delay Measurement

- We would like to test and compare the result of time delay on TDT (Madison's standard method) vs generator/scope method (proposed method).