U320 Cable Cross Talk Analysis

T10/00-013r0

Umesh Chandra

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Cables and lengths measured

- ## Amphenol (Twist and Flat)

  - Amp TnF222 = TPE, 4.25" twist, 1.75" flat, 30 AWG, solid, 222 feet

  - AmpTnF_b = TPE, 22.25" twist, 1.75" flat, 30 AWG, solid, 84 feet

  - AmpTnF_c = PVC, 3.75" twist, 2.25" flat, 30 AWG, solid, 61.5 feet

  - AmpTnF_d = PVC, 5.75" twist, 4.1" flat, 30 AWG, solid, 86 feet

  - **AmpTnF_e = TPE, 8.1" twist, 1.75" flat, 30 AWG, solid, 207 feet**

  - AmpTnF_F = TPE, 3.5" twist, 1.75" flat, 30 AWG, solid, 199.1 feet

  - AmpTnF_G = PVC, 8.1" twist, 1.75" flat, 30 AWG, Stranded (7), 124.8 feet

  - AmpTnF_H = PVC, 3.75" twist, 1.75" flat, 30 AWG, stranded (7), 147 feet

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# Cables spec lengths (in meters)

- ## Amphenol (Twist and Flat)

  - Amp TnF222 =3/0.2   =15
  - AmpTnF_b =3/0.1   =30
  - AmpTnF_c =3/0.22   =14
  - AmpTnF_d =3/0.5   =6
  - **AmpTnF_e =3/0.25   =12**
  - AmpTnF_F =3/0.25   =12
  - AmpTnF_G =3/0.25   =12
  - AmpTnF_H =3/0.35   =8

Amphenol T&F_E,12M - Test Set Up

- Cable Cut to 12 Meter Length To Give -3dB Attenuation at 80MHz

- Attenuation Data on Various cables (T10/00-385r0) was used (previous page)

- Measurements without cross talk were made with the twisted pairs on adjacent sides of DB13 cut at both ends, close to the connector

- Measurements with cross talk were made with the adjacent twisted pairs reconnected to the connector
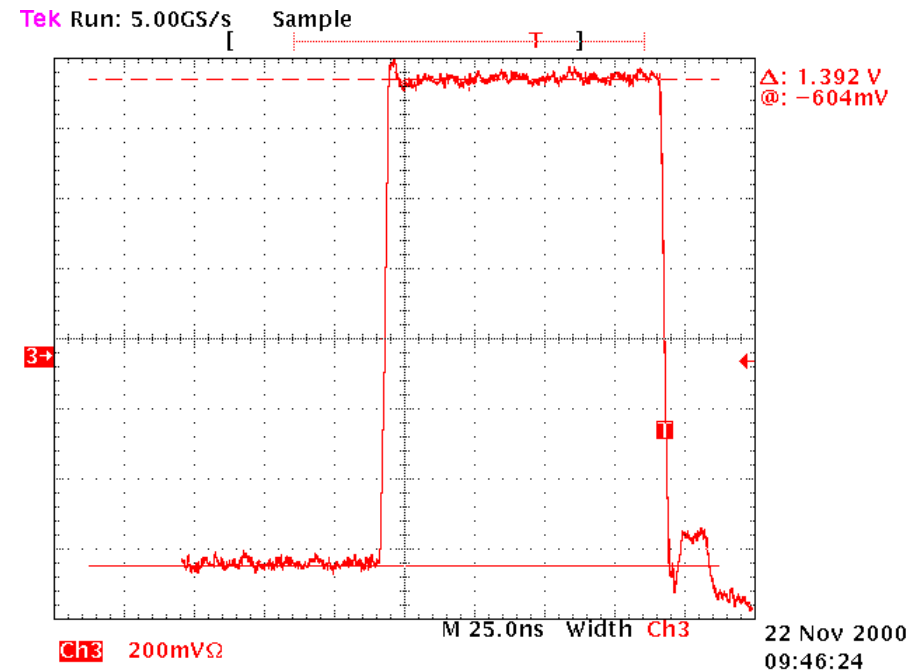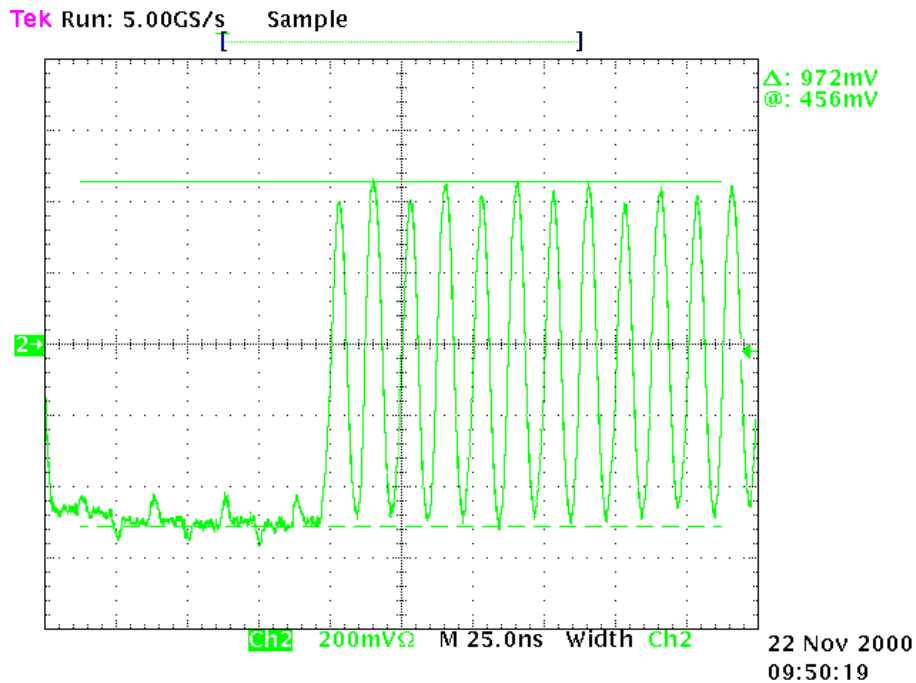
Test Setup

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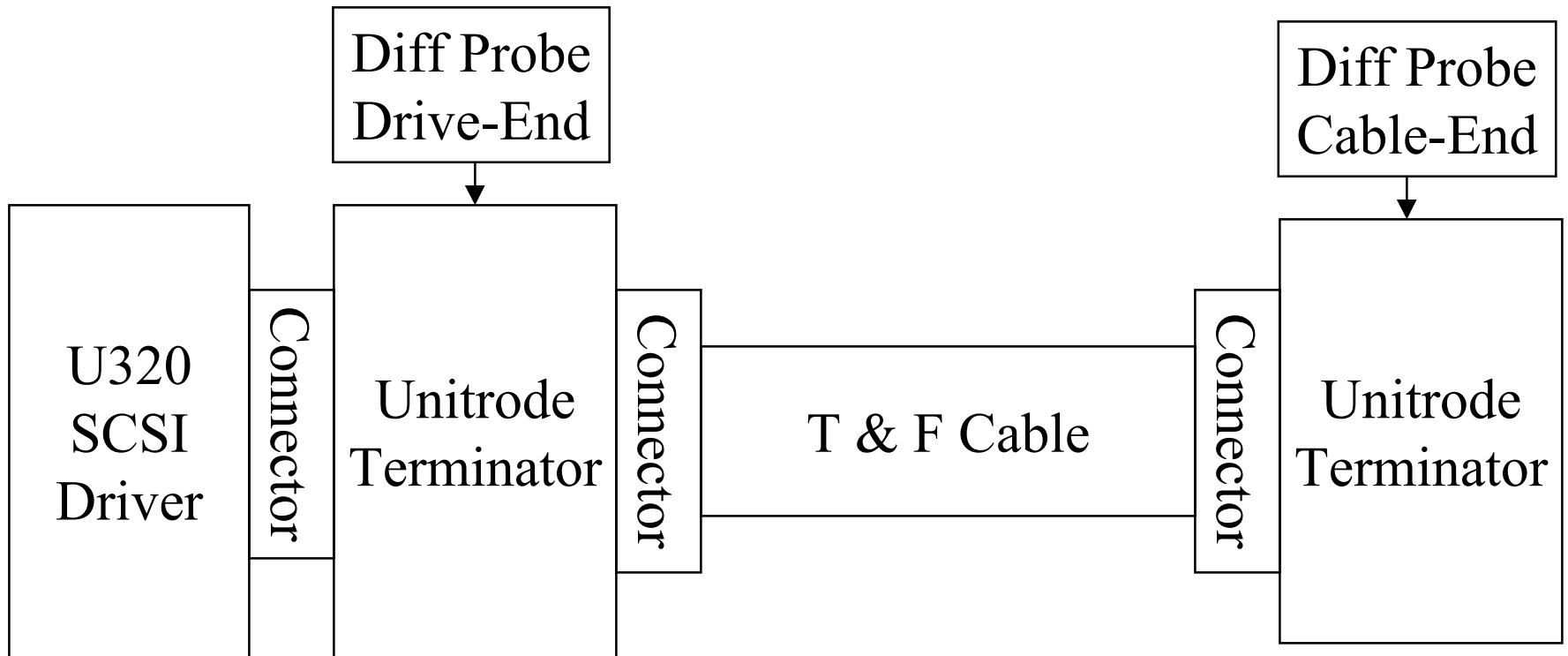
Amphenol T&F_E,12M - Attenuation,No Cross Talk

80MHz Amplitude at Cable End - 972 mv pk-pk

LOW Freq Amplitude at Driver End

Tek Run: 5.00GS/s   Sample

Δ: 972mV
@: 456mV

Ch2   200mVΩ   M 25.0ns   Width Ch2

22 Nov 2000
09:50:19

Tek Run: 5.00GS/s   Sample

Δ: 1.392 V
@: −604mV

Ch3   200mVΩ   M 25.0ns   Width Ch3

22 Nov 2000
09:46:24

Attenuation = 20 log(972/1392) = -3.1195dB

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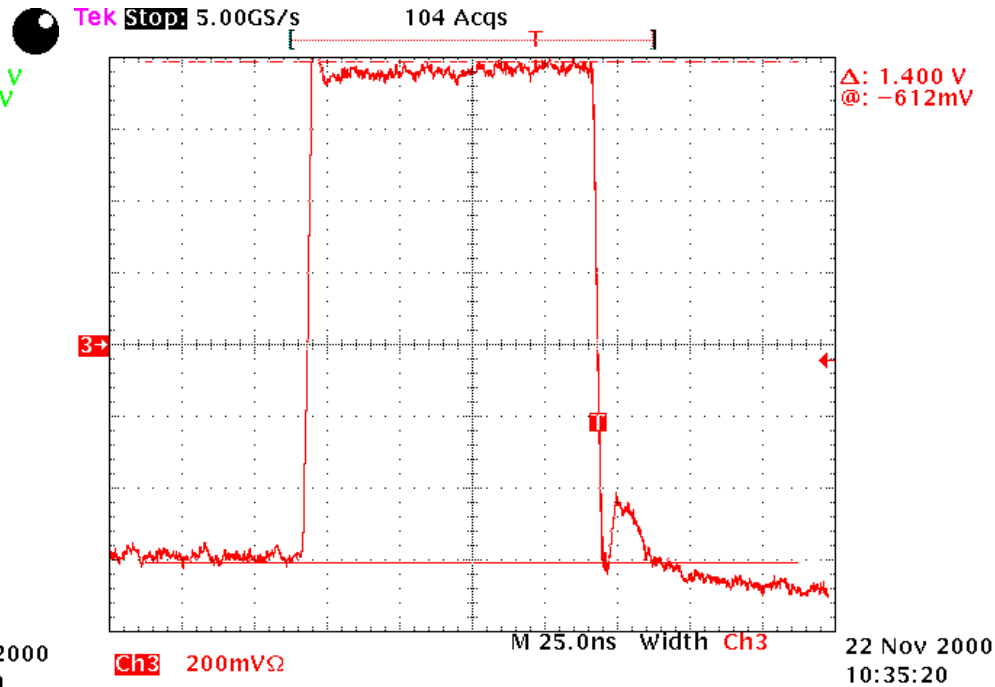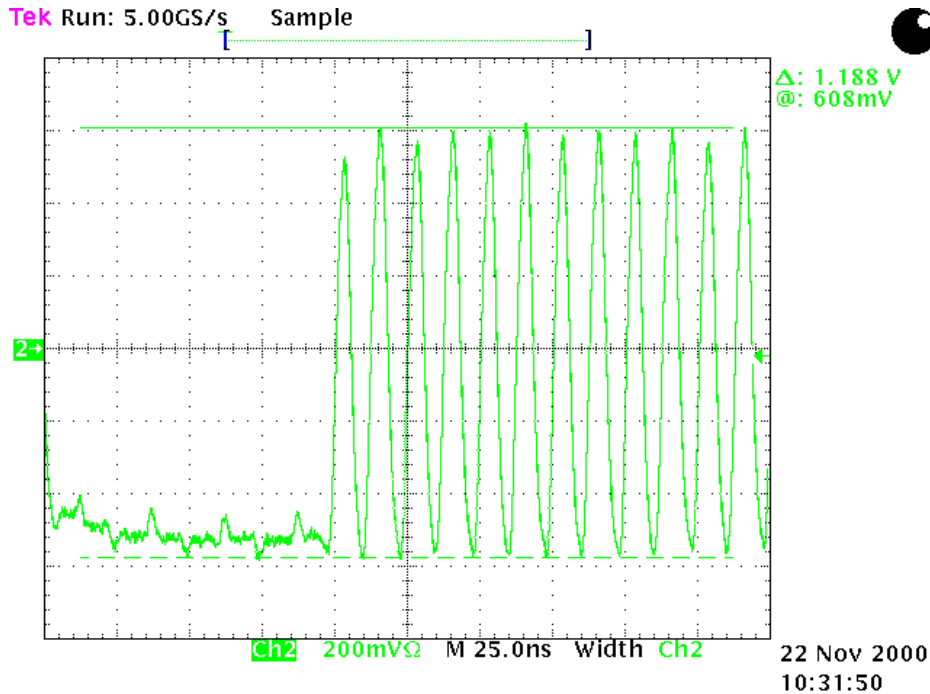*Information the way you want it™*

Amphenol T&F_E,12M - Eye Diag,No Cross Talk
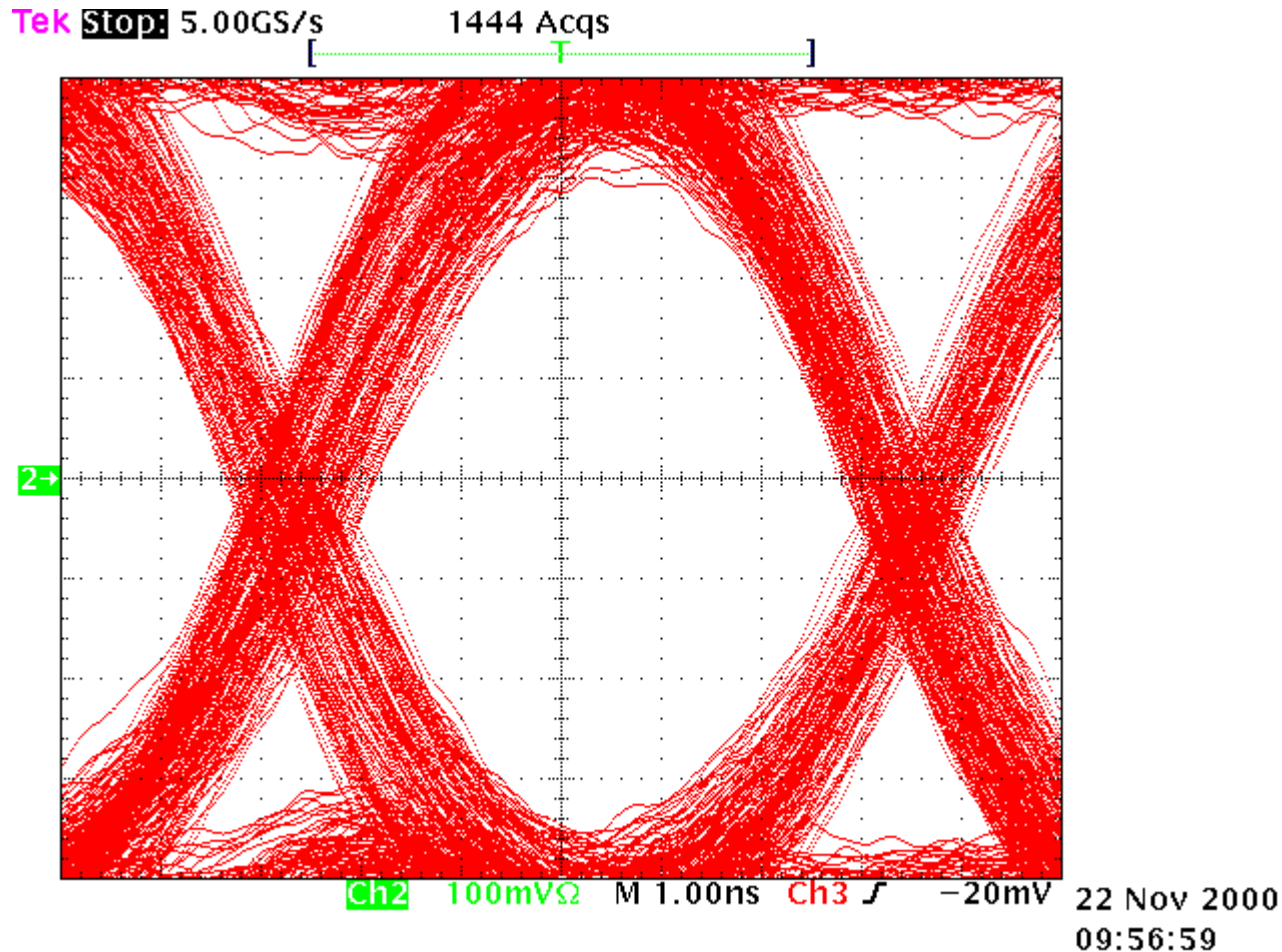
Amphenol T&F_E,12M - Atten, with Cross Talk
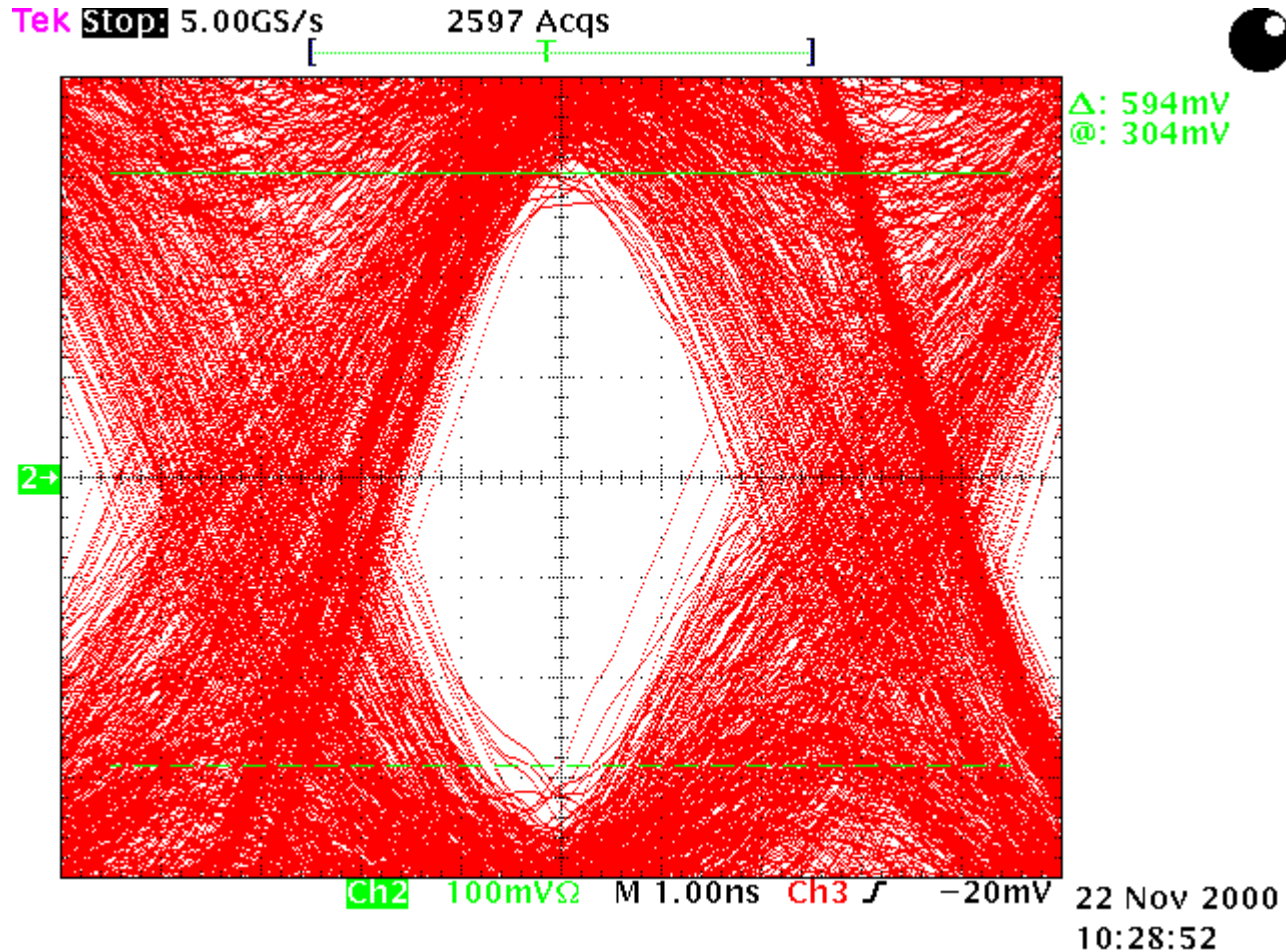
80 MHz Amplitude at Cable End - 1.188 v pk-pk

Low Frequency Amplitude at Drive End - 1.4 v pk-pk

Attenuation = 20 log(1.188/1.4) = -1.42dB

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Amphenol T&F_E,12M - Eye Diag, With Cross Talk

Summary

•Cables with short sections of twist and flat have significant cross-talk, causing jitter and closing of the eye.

• When the training pattern is used on all DB bits, the 80MHz amplitude is increased due to cross talk, causing the attenuation to appear to be reduced.

•Further experiments will be done to try and establish a relationship between twist and flat lengths/ratios and cross talk.

•With cross talk removed, the measurements done on the selected cable verify the cable attenuation data presented in October, by Seagate.

•The experiment will be repeated on other cables to validate these results.

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