



HPM-5 Performance Testing

Test 234 JF Sawdy 7/3/02

Samples:

Double-ended 2mm cable assemblies: 3, 6 and 8 meters end-to-end, using Meritec's 700219-01 28 awg twinax cable and Meritec's HPM-5 connectors wired GSSGSSG.

Test Equipment and Software:

Tektronix CSA-803 Digital Sampling Oscilloscope with SD-24 TDR /Sampling Heads
Microwave Logic Gigabert-660TX 700MHz Eye Pattern Generator (used to verify 622MHz eye diagram extractions)

Hewlett Packard HP-8753C, 300 KHz to 6 GHz Network Analyzer

Anzac Differential Baluns, 2Mhz to 2GHz

TDA Systems' *IConnect*TM Version 2.0.3 interconnect and lossy cable characterization software

2mm 5+2 AMP male connectors

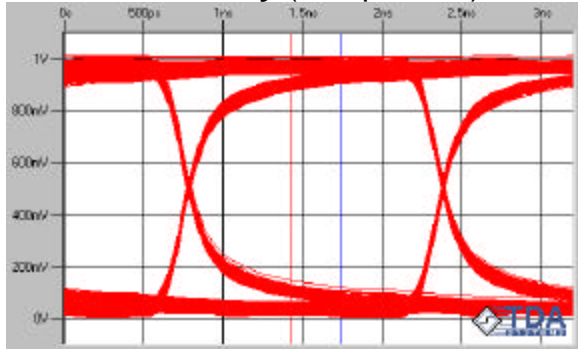
0.085" dia. semirigid 50 ohm coax "probes"

Meritec's Test Board #1159-00102

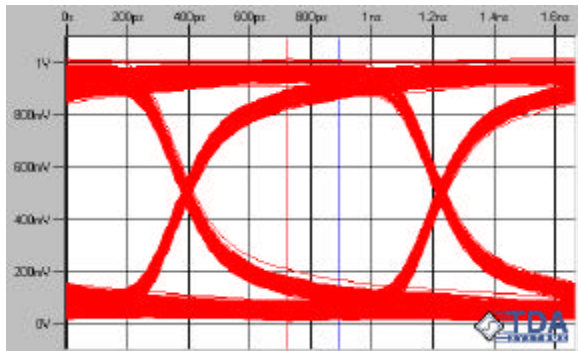
Flexible 50 ohm coax interface cables

Differential Eye Diagrams at 622MHz, 1.2 GHz and 2.4 GHz
extracted from TDR measurements using *IConnect™* software

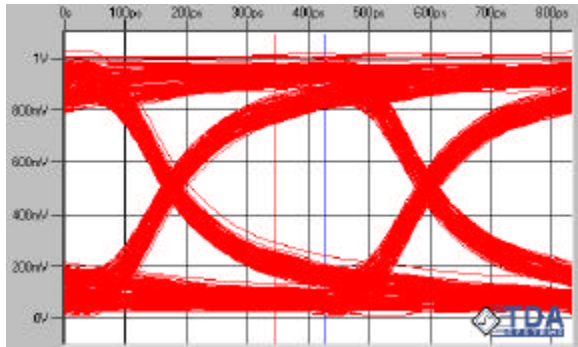
3 Meter Assembly (unequalized)



622MHz



1.2GHz



2.4GHz

Differential Eye Diagrams at 622MHz, 1.2 GHz and 2.4 GHz
extracted from TDR measurements using *IConnect*TM software

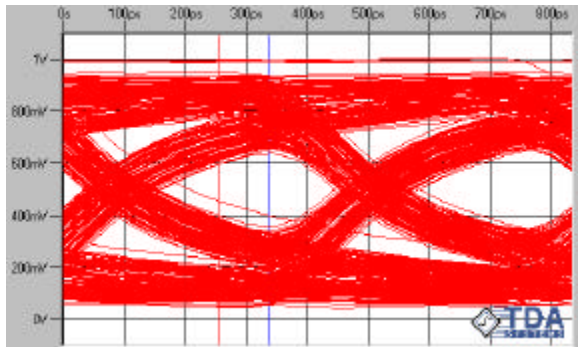
6 Meter Assembly (unequalized)



622MHz

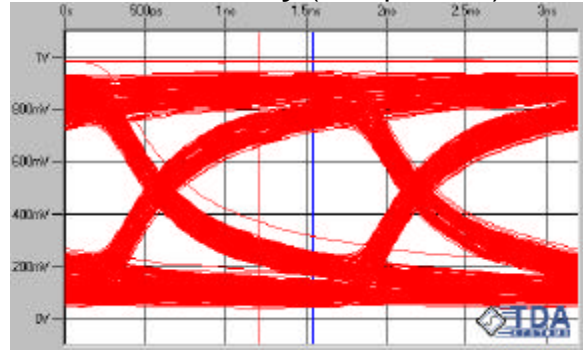


1.2GHz

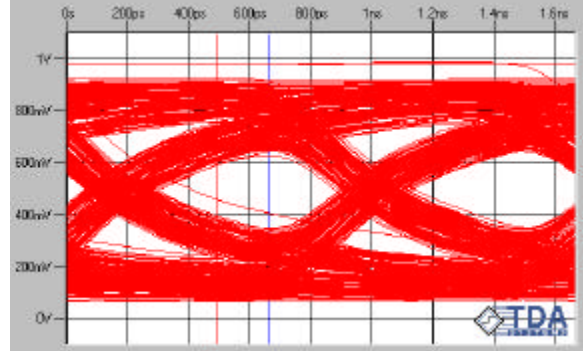


2.4GHz

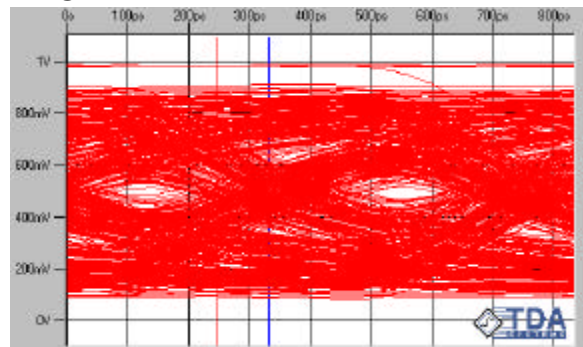
10 Meter Assembly (unequalized)



622MHz



1.2GHz



2.4GHz

Attenuation through cable (S21)

Measured from 500MHz to 3GHz

Smoothing set at 20% (500Mhz)

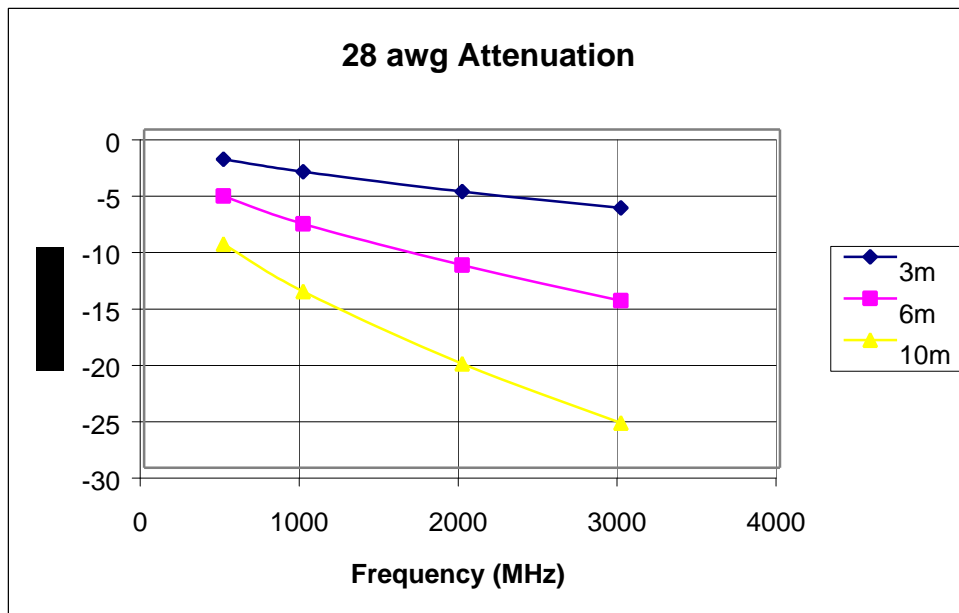
Used differential baluns rated to maximum frequency of 2 GHz (results indicate baluns are valid to 3GHz)

Fixture and connectors were de-embedded; results reflect cable attenuation

Summary of results:

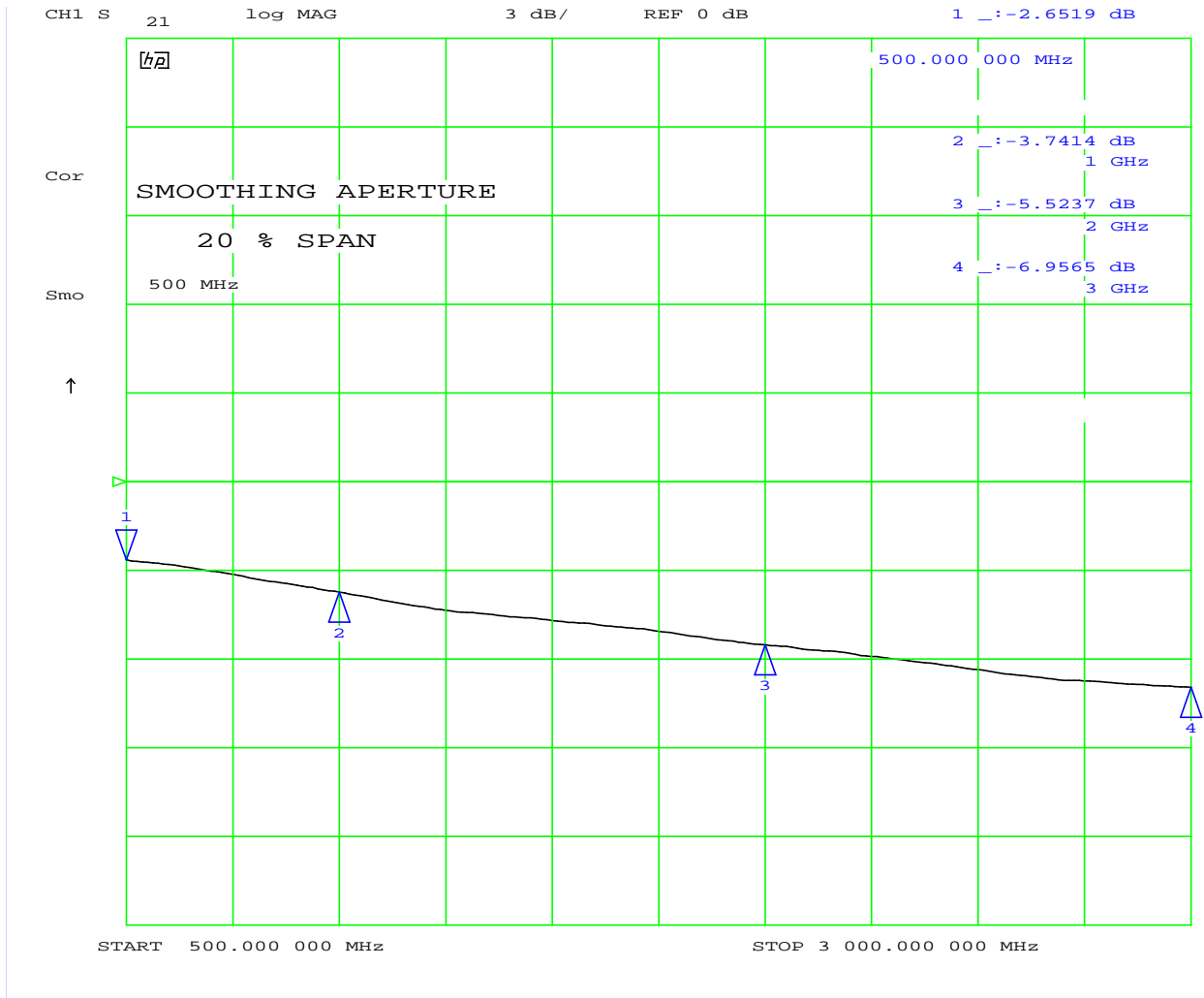
Attenuation (decibels)

Frequency	3 meters	6 meters	10 meters
500 MHz	-2.65	-5.89	-10.17
1GHz	-3.74	-8.36	-14.36
2GHz	-5.52	-12.04	-20.77
3Ghz	-6.96	-15.18	-26.02



Attenuation through cable (S21) (continued)

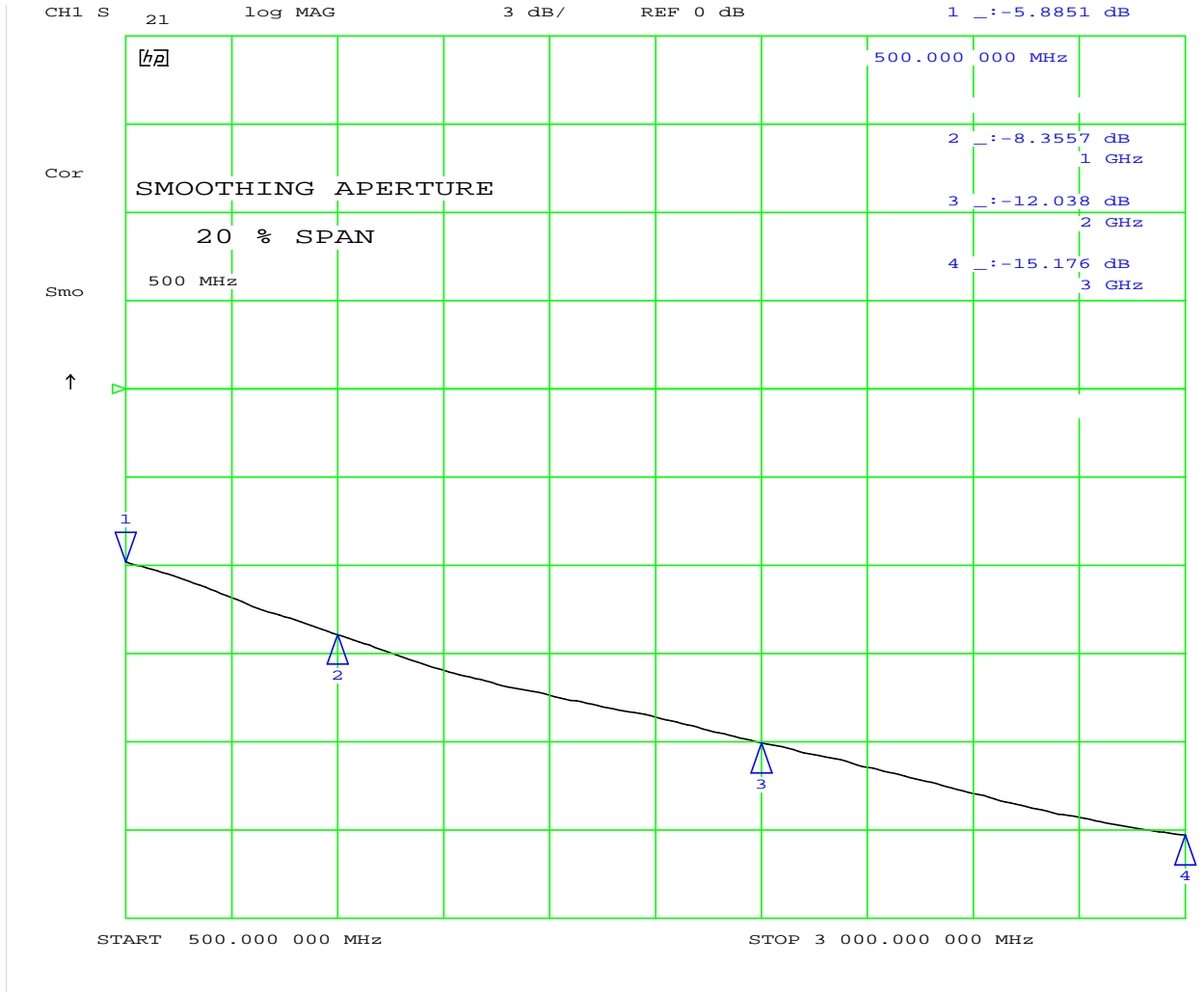
Network Analyzer Traces



Measured on 3 meter cable

Attenuation through cable (S21) (continued)

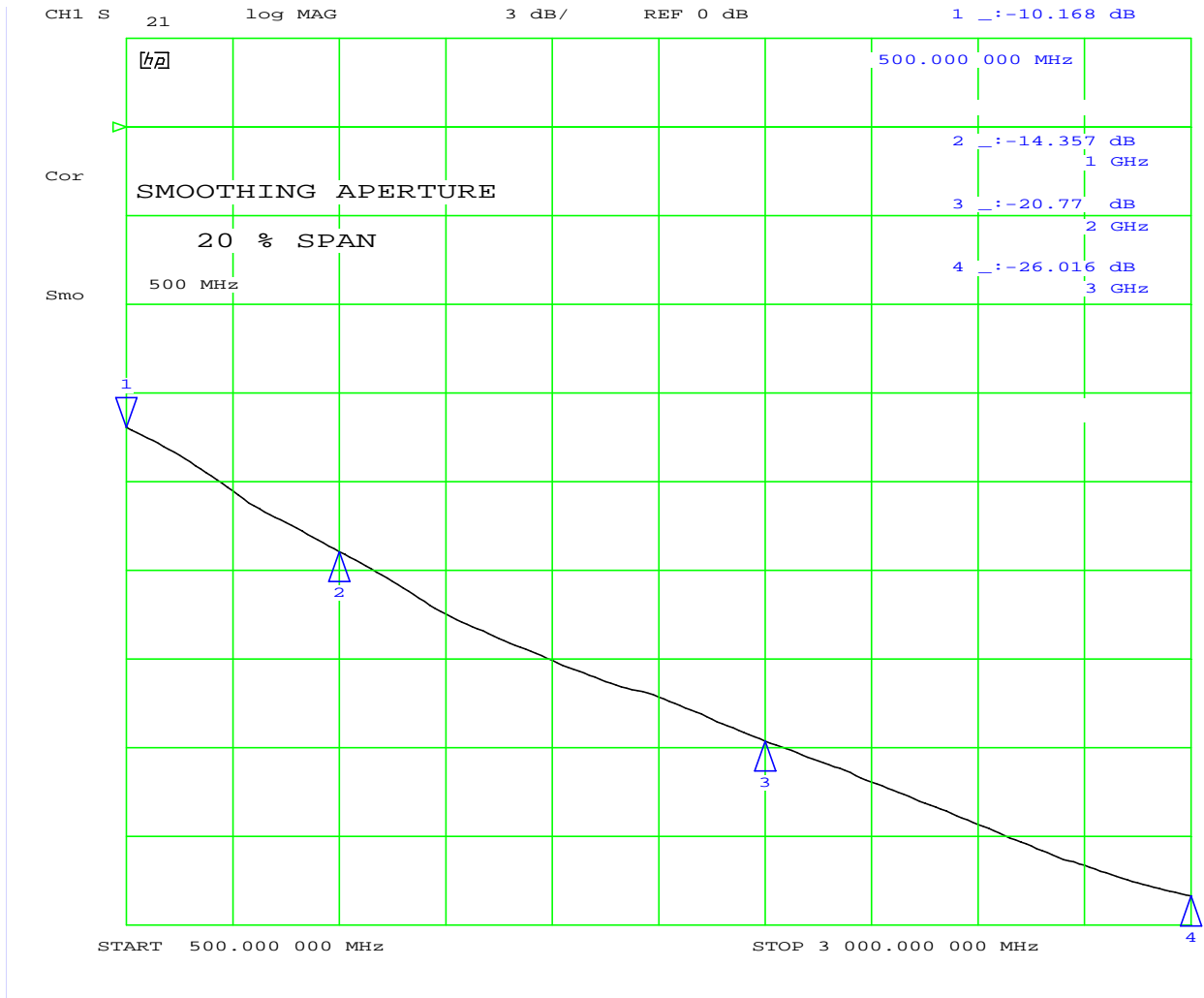
Network Analyzer Traces



Measured on 6 meter cable

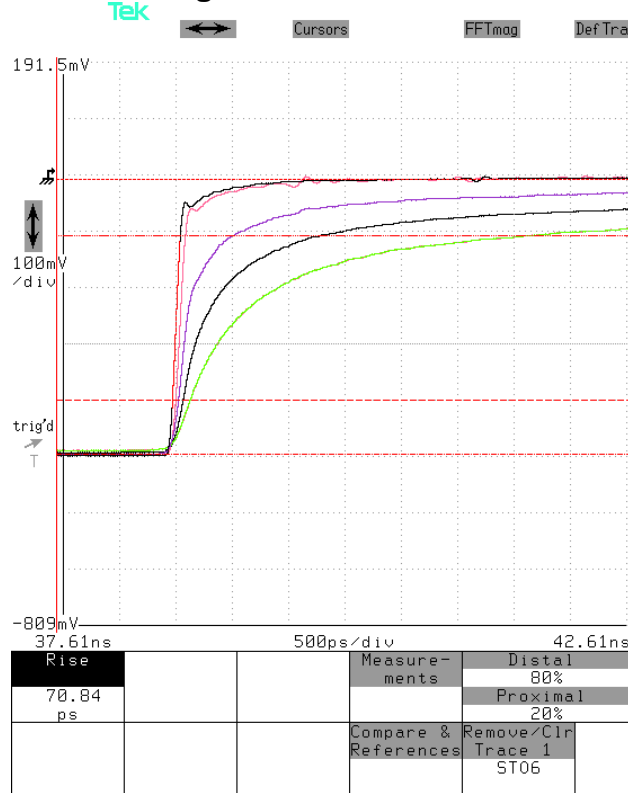
Attenuation through cable (S21) (continued)

Network Analyzer Traces



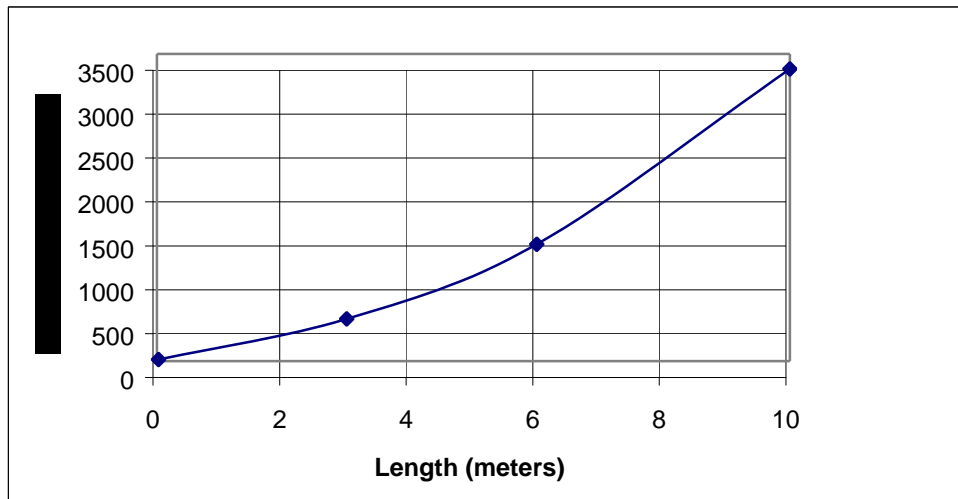
Measured on 10 meter cable

Risetime Degradation

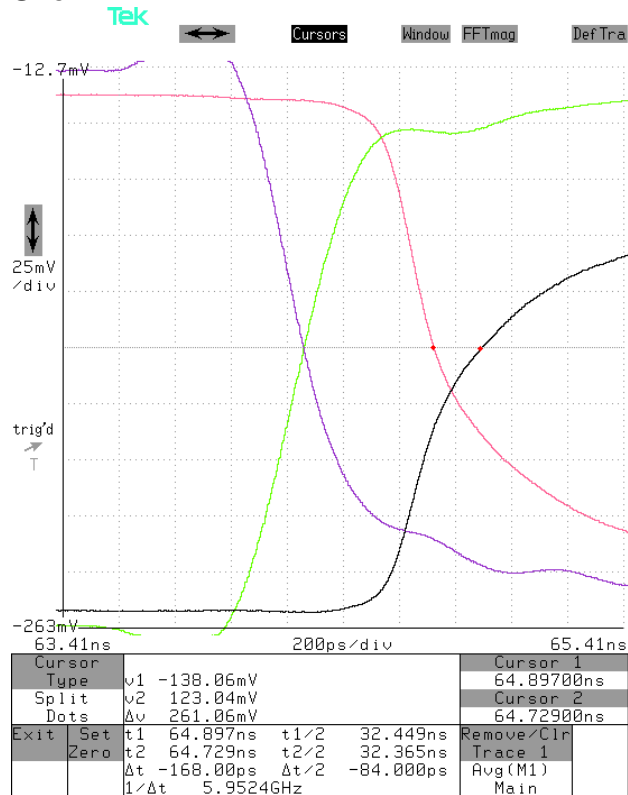


Risetime measured at 20-80%
 Fixture – 71 psec (black trace)
 5 inch assy – 88 psec (red trace)
 3 meter assy – 550 psec (purple)
 6 meter assy – 1400 psec (black)
 10 meter assy – 3400 psec (green)

Risetime degradation = Measured risetime minus fixture risetime
 5 inch assy – 17 psec
 3 meter assy – 480 psec
 6 meter assy – 1330 psec
 10 meter assy – 3330 psec



Skew



Traces show skew as measured on 3 meter assembly

Near end - purple and green

Far end - red and black

3 meter assembly – 84 psec

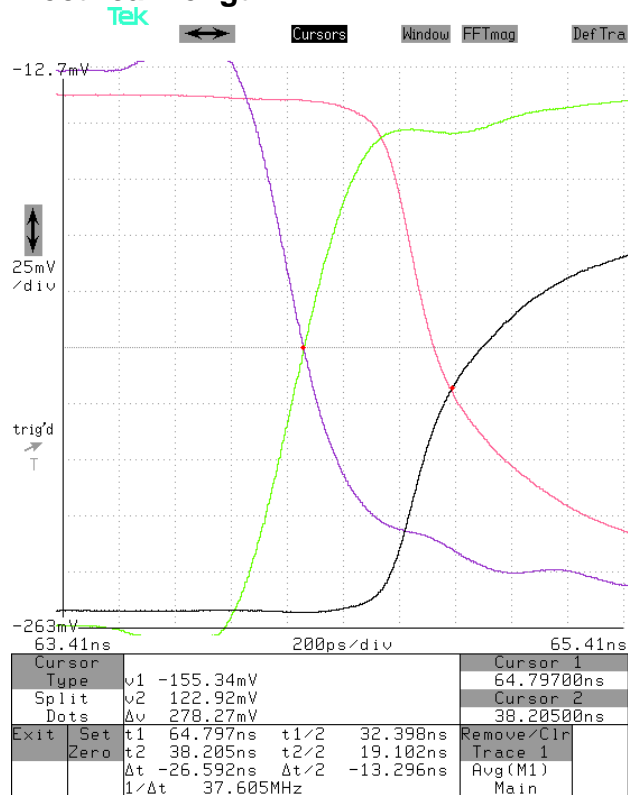
6 meter assembly – 110 psec

10 meter assembly – 220 psec

Average –

21.8 psec/meter (6.7 psec/foot)

Electrical Length



Traces show electrical length as measured on 3 meter assembly

Near end - purple and green

Far end - red and black

3 meter assembly – 13.296 nsec

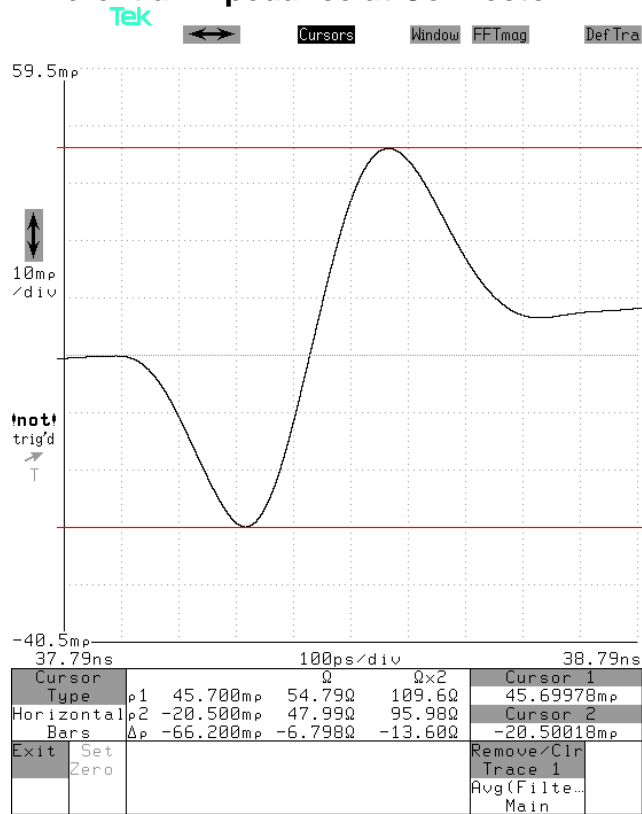
6 meter assembly – 26.518 nsec

10 meter assembly – 44.320 nsec

Average –

4.43 nsec/meter (1.36 nsec/foot)

Differential Impedance at Connector



Differential impedance through header (including via) and connector – left to right (risetime filtered to 200 psec)

Minimum – 96 ohms

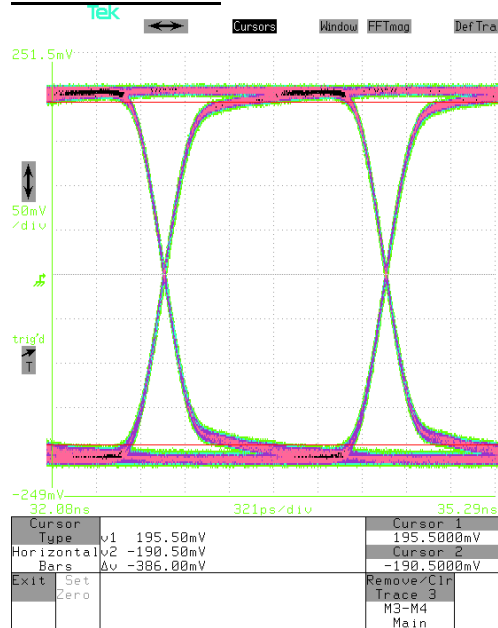
Maximum – 109.6 ohms

Appendix A

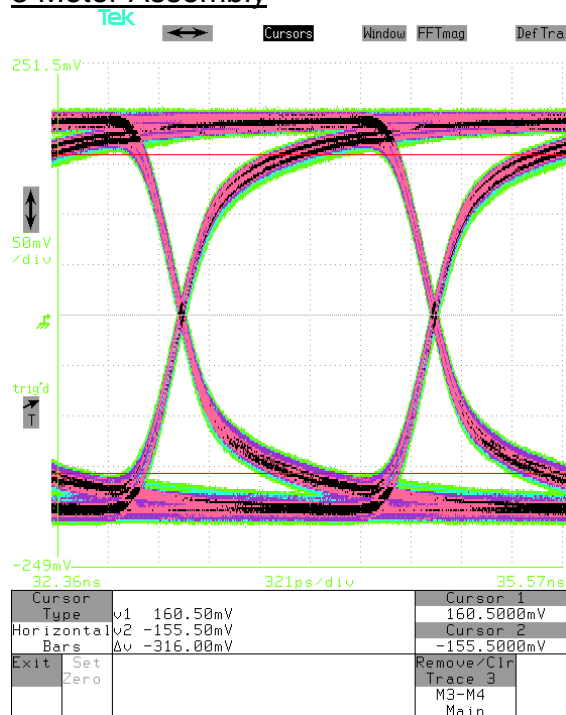
Compare TDA Extracted Eyes to Actual Eye Measurements at 622MHz

(Measured results include effects of test pc board shown below, whereas extracted results do not include test PC board)

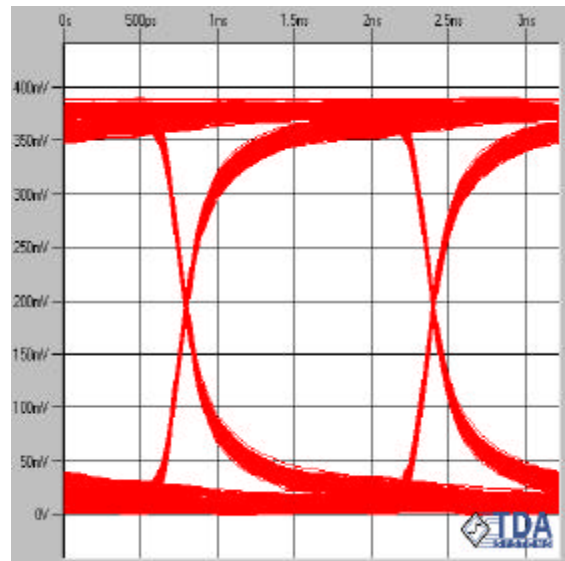
Test PC Board



3 Meter Assembly



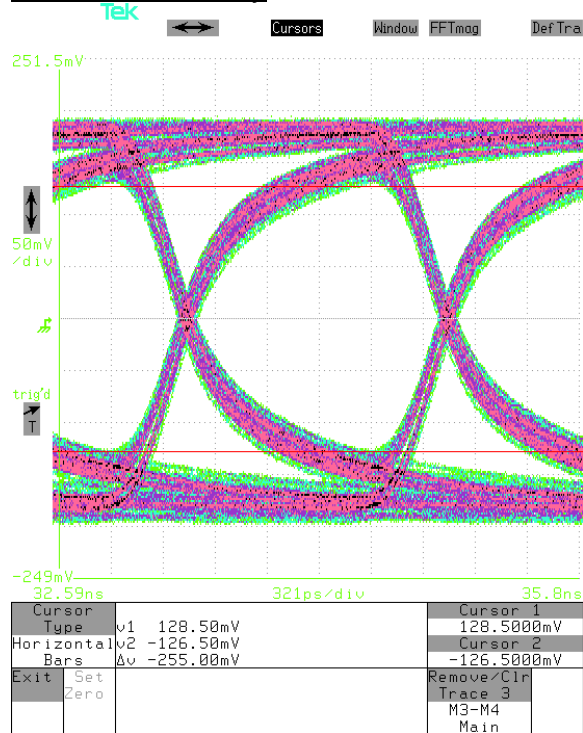
Measured



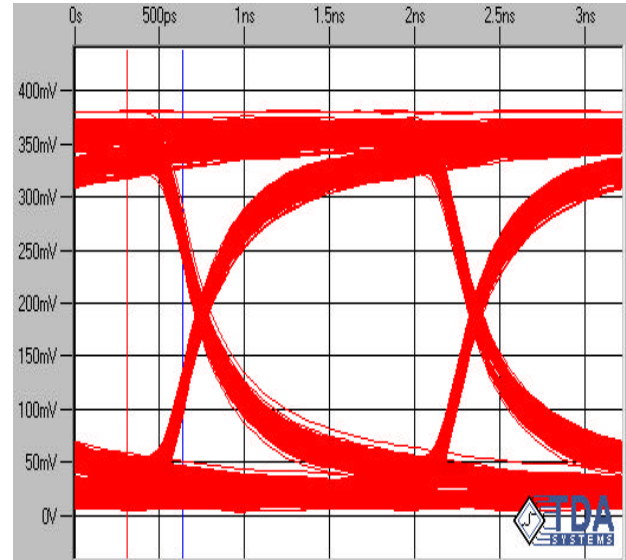
Extracted

Appendix A (continued)

6 Meter Assembly

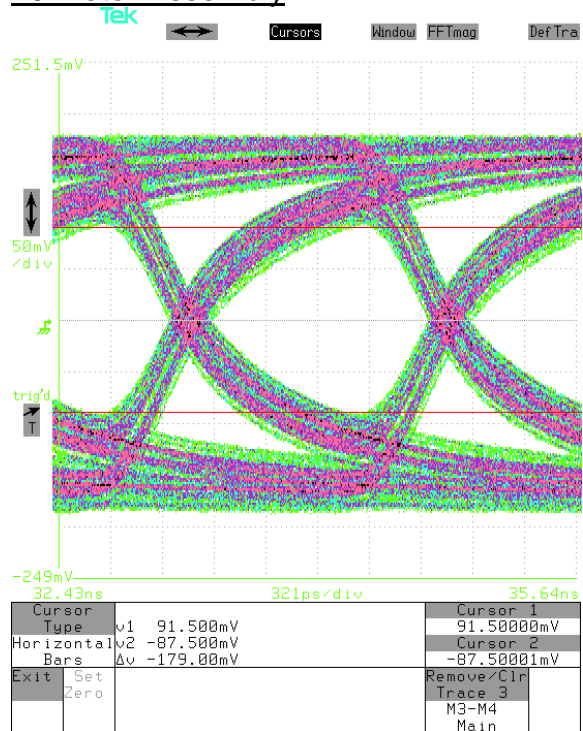


Measured

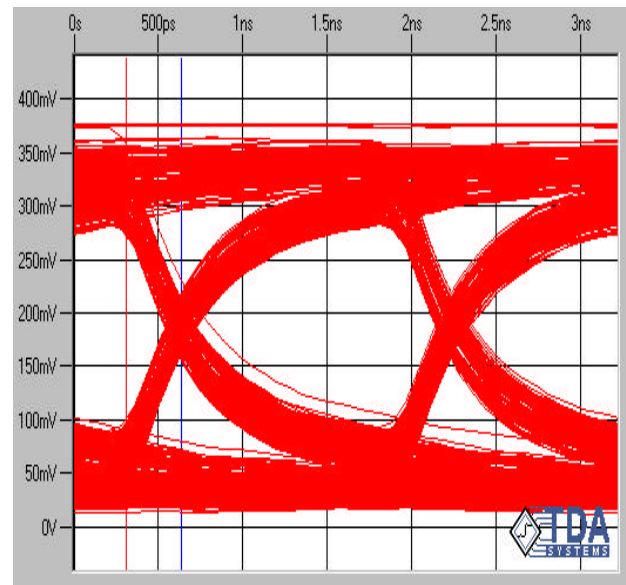


Extracted

10 Meter Assembly



Measured



Extracted