

## Joy Diffcon Connector

Test 518

Catalin Muntean, Signal Integrity Engineering

09/14/06 Rev. A

### Purpose

To determine the attenuation and impedance profiles of the Joy Diffcon connector

### Samples Tested

Two 12" and two 20" Joy double-ended Diffcon cable assemblies with Tempflex twinax cable.

### Test Procedure

Four cable assemblies (two 12" and two 20") were tested for attenuation, and the impedance profiles were recorded.

### Test Results

The risetime used for the impedance profile is approximately 50ps (20-80%).

From Figure 1, the cable is very close to 100Ω and the connector/board interface is about 77Ω.

The test boards used for these tests contributed to impedance mismatches and loss due the trace and pad layouts. This can be improved with a new PC board design. Looking at attenuation at 4.5GHz, both assemblies in both lengths have approximately 2dB loss.

### Eye Patterns

The eye patterns on the following pages were simulated using a source of 1000mV pk-pk, without jitter using a PRBS pattern = 2<sup>7</sup>-1 and a rise time of 25% UI (20-80%).

### Test Equipment

Tektronix CSA8200 Digital Sampling Oscilloscope with 80E04 TDR sampling heads

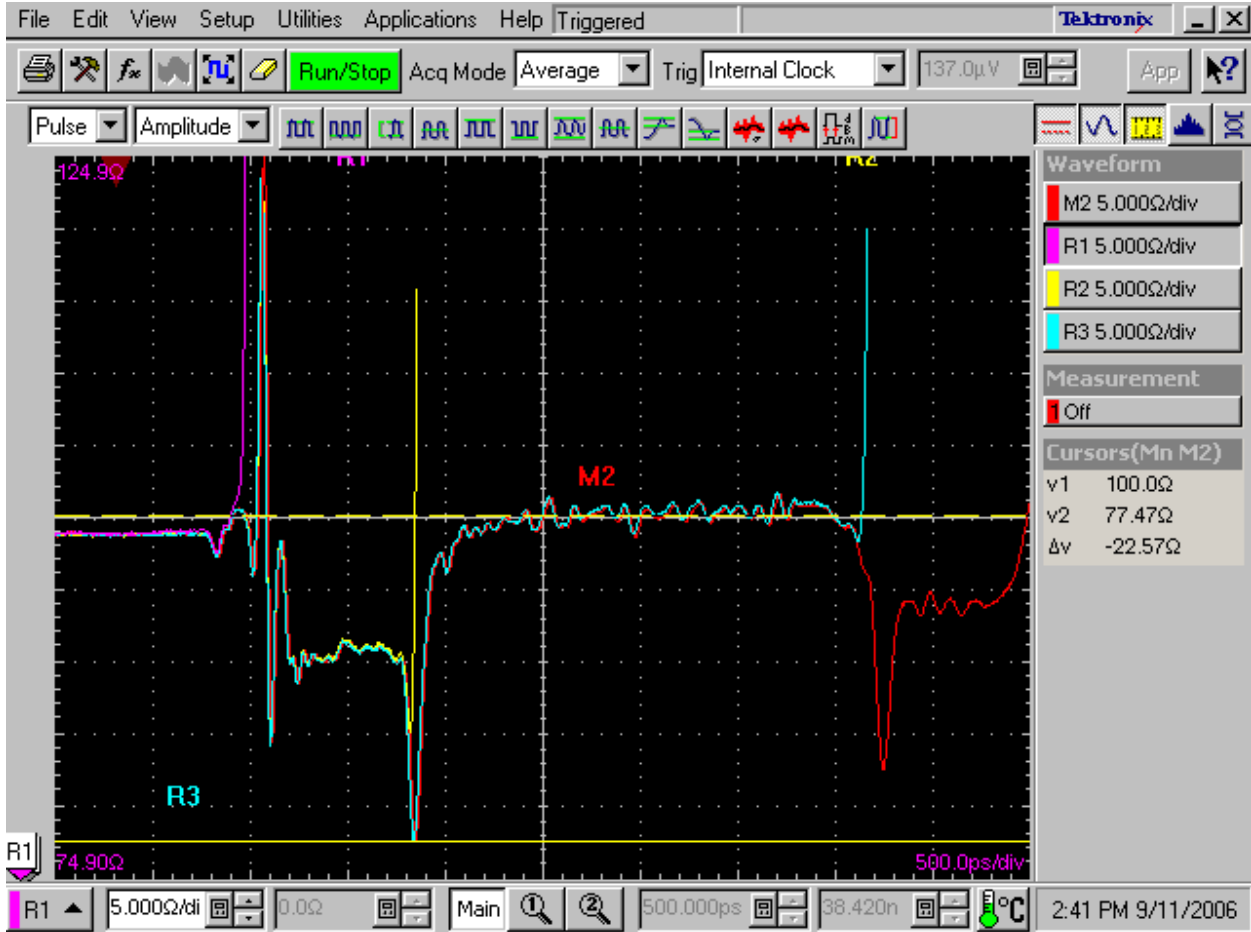
Meritec test boards (P/N: 601124 Rev. A)

Joy "dog-houses" (Joy P/N: 690418)

Joy 12" Diffcon cable assemblies (Joy P/N: 9-903693)

Joy 20" Diffcon cable assemblies (Joy P/N: 9-903583)

atSpeed's *Oculus*<sup>™</sup> for S-parameter extraction from TDR measurements



**Figure 1)** Differential impedance of 12" double-ended cable assembly and test board. First open (purple) is the end of the test leads. Second open (yellow) is the end of the test board. Third open (blue) is the far-end of the cable assembly and the fourth open (red) is the end of the other test board (at the SMAs).

Note: The negative dip (22.6Ω drop from the nominal 100Ω) in the blue and red traces is due to the PCB connector contact pads. This can be improved with a better PCB design.

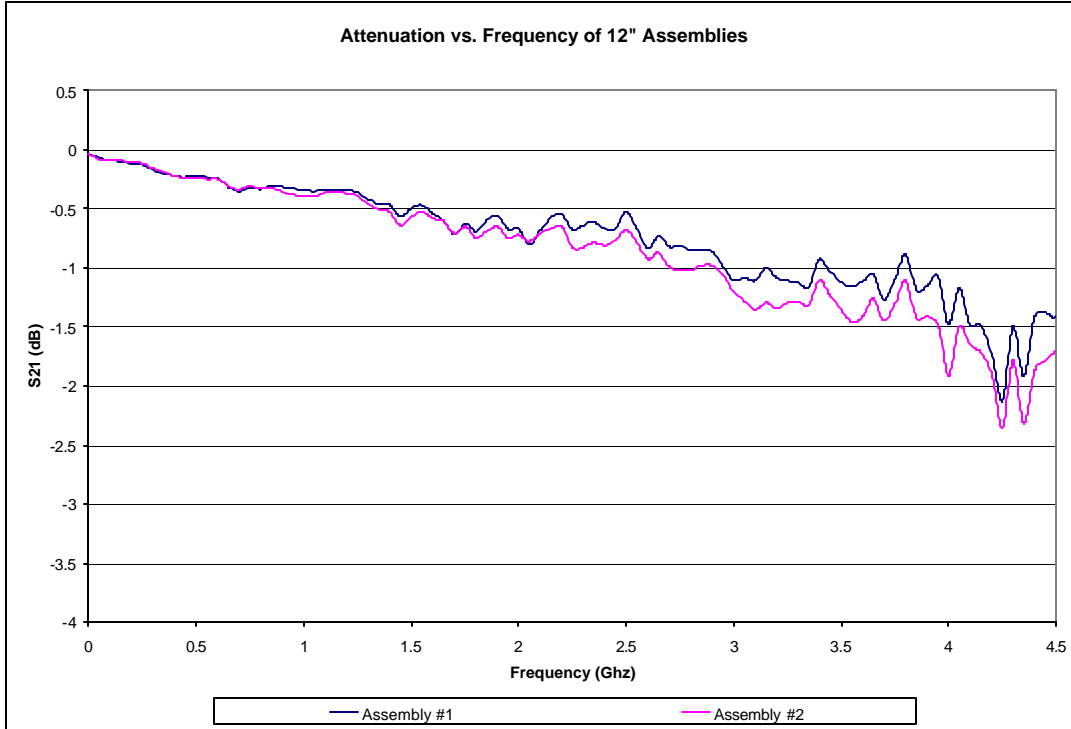


Figure 2) Attenuation of 12" assemblies

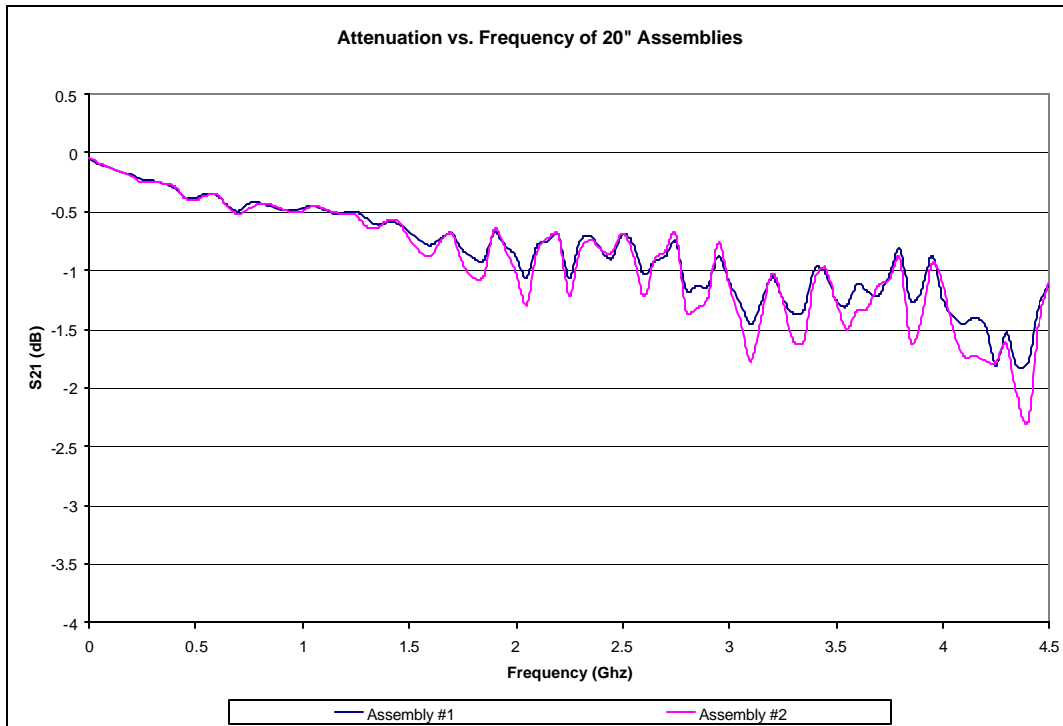


Figure 3) Attenuation of 20" assemblies

Property of Meritec - © Meritec 2006

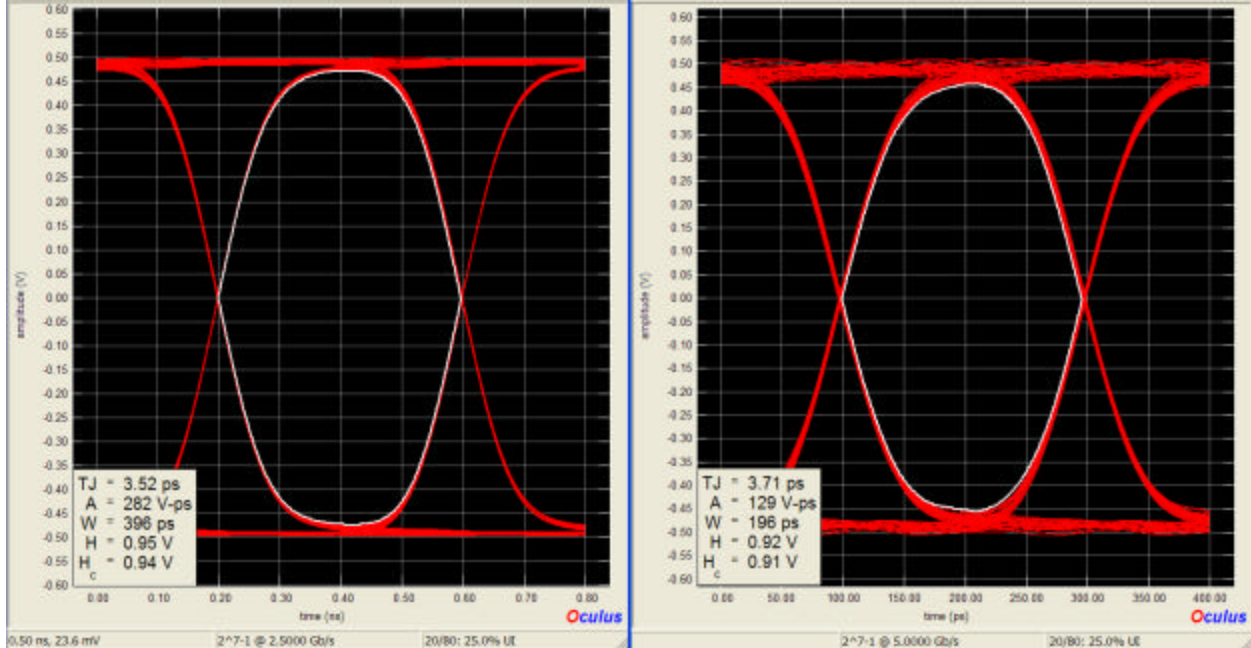


Figure 4) Eye diagrams for 12" cable assemblies

2.5Gbps: Total Jitter = 3.52ps, Eye Height = 940mV

5.0Gbps: Total Jitter = 3.71ps, Eye Height = 910mV

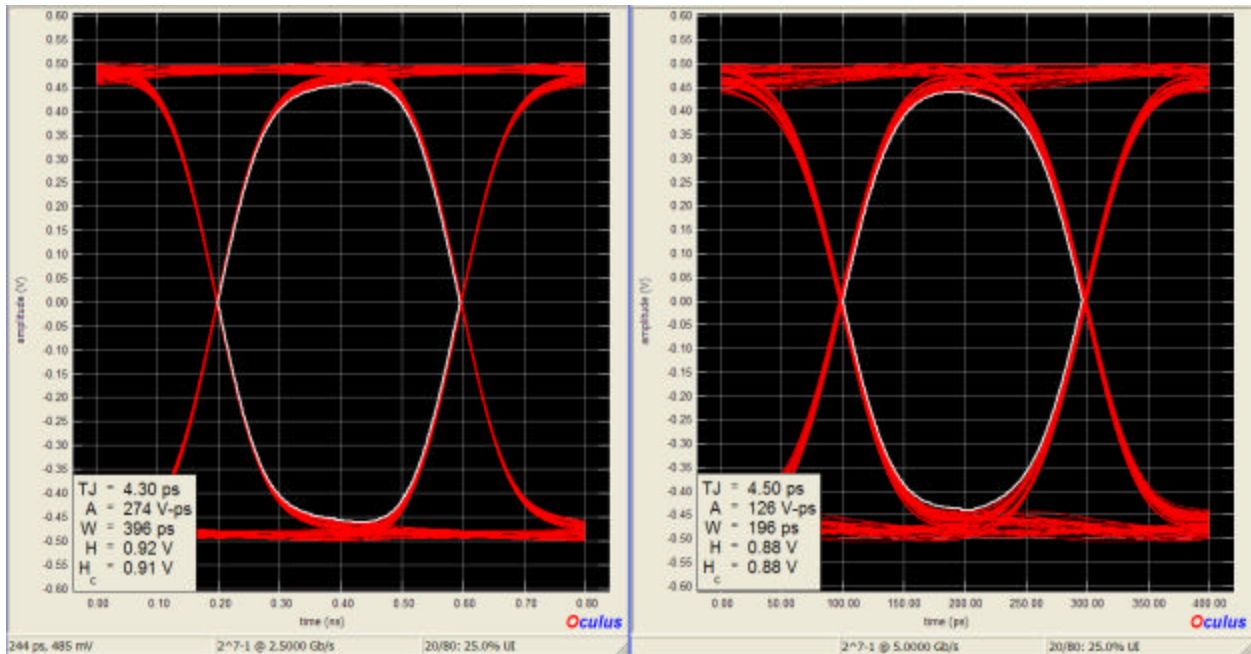
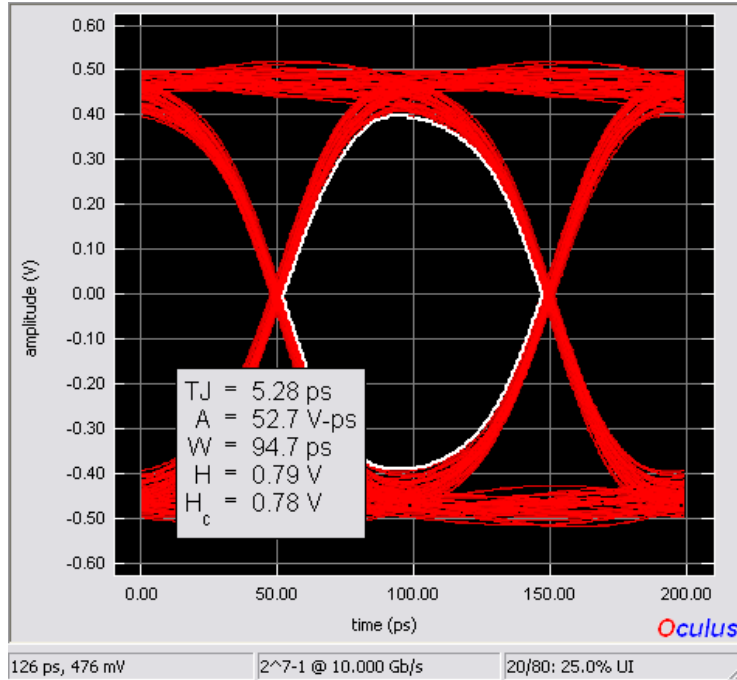


Figure 5) Eye diagrams for 20" cable assemblies

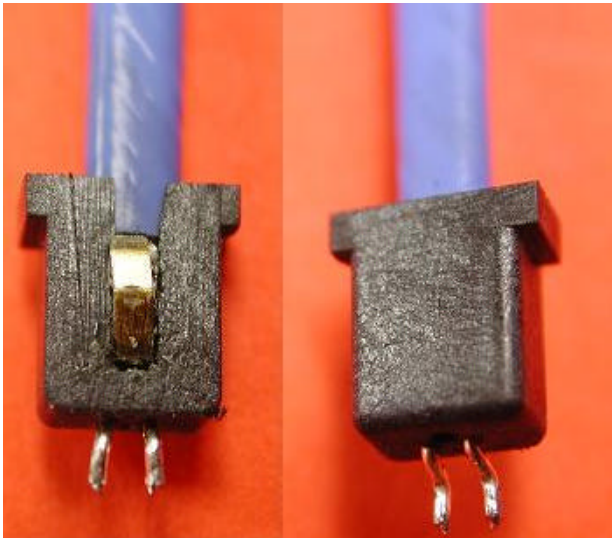


**Figure 6)** Eye diagram of 20" cable assembly at 10Gbps

2.5Gbps: Total Jitter = 4.30ps, Eye Height = 910mV

5.0Gbps: Total Jitter = 4.50ps, Eye Height = 880mV

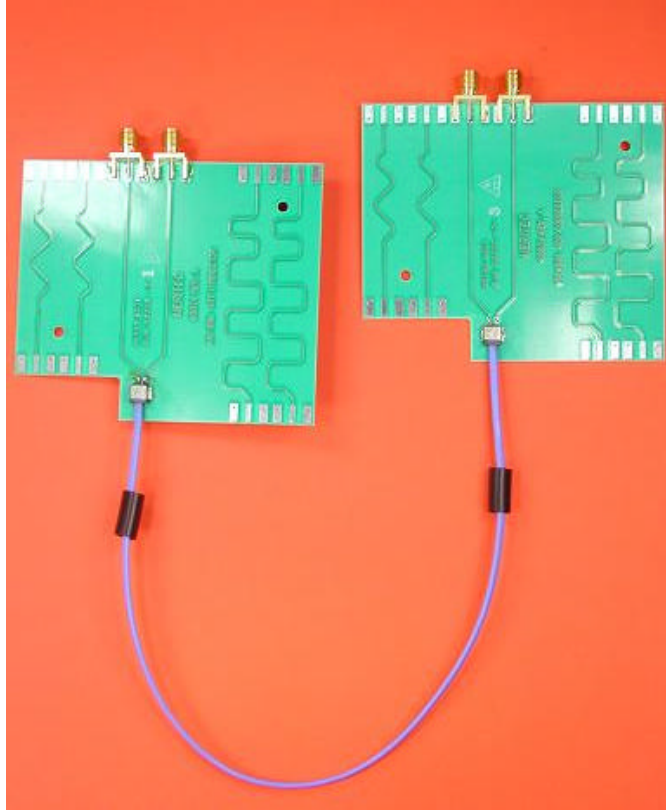
10Gbps: Total Jitter: 5.28ps, Eye Height = 780mV



**Figure 7)** Bottom and top close-up of Diffcon connector



**Figure 8)** Close-up of Diffcon connected to board along with the "dog-house"



**Figure 9)** 12" Diffcon test assembly with boards

Property of Meritec - © Meritec 2006