

Doc: X3T10.1/95a197ro
February 15, 1996
Project: 1146
Ref Doc.: PH2
Reply to: Lisa A. Huff

To: X3T10.1 Membership
From: Lisa A. Huff, Development Engineer - AMP Incorporated
Subject: AMP High Speed Serial Data Connector (HSSDC) Inclusion in X3T10.1/1146 (PH2)

BACKGROUND

The HSSDC is a connector which was specifically designed for high speed data transmission. It is impedance matched for a 150 ohm differential system. As bit rates increase, even slight impedance mismatches will cause multiple reflections that will degrade the signal enough to cause high bit error rates.

PROPOSAL

Include the HSSDC in the PH2 specification (Paragraph 8.5 in PH1) as an alternative to the Shielded Micro D for external connections. The HSSDC will meet the current PH1 impedance specification of $150 \pm 10\Omega$ at rise times as fast as 150 ps. Figure 1 shows the impedance profile for the ITT Cannon Micro D and the AMP HSSDC at several different rise times. This data was taken utilizing the Tektronix 11801B Oscilloscope in TDR mode. It is apparent that the ITT Cannon Micro D failed the impedance requirement at a rise time of 500 ps or less. The AMP HSSDC failed the impedance requirement at 100 ps rise time.

The maximum length of unequalized cable assemblies made with the HSSDC Plugs running at 20 Mbytes/s is 40 meters. The maximum length of unequalized cable assemblies made with the HSSDC Plugs running at 40 Mbytes/s is 40 meters (if the receiver eye pattern amplitude is half that at 20 Mbytes/s). Eye pattern data (Figures 2-11) for unequalized cable assemblies is shown below. The data was taken with the Tektronix 11801B Oscilloscope and the HP 8133A Pulse Generator.

Adding equalization to the cable assemblies could effectively double the maximum length. In order to increase the maximum cable assembly length, new cable designs and equalization circuits are under development.

Figures 12 and 13 show the cable assembly interface.
Figure 14 is the cable assembly.

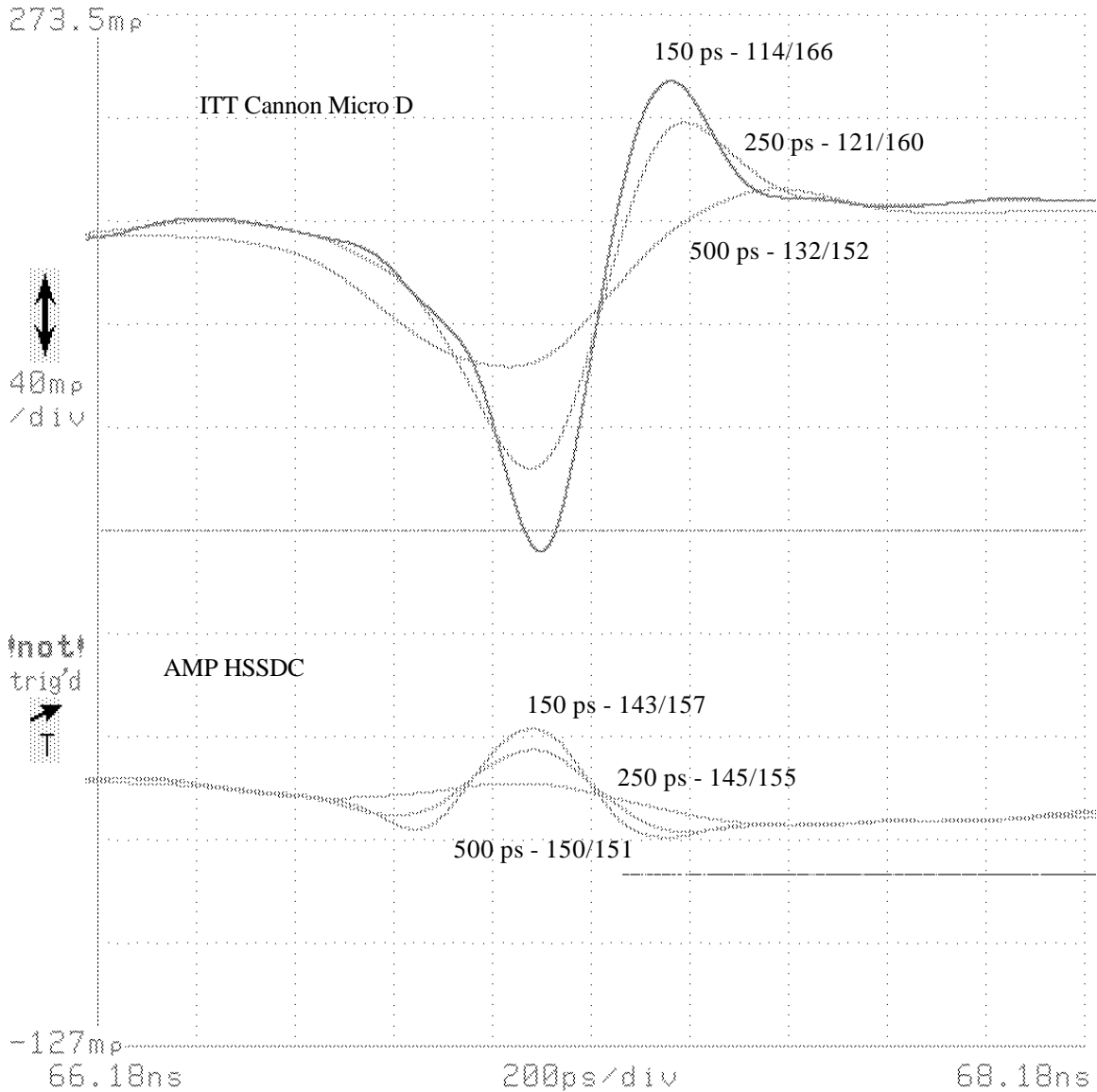
Tek



Cursors

FFTMag

DefTra



GPiB / RS232C	Identify	Color	Hardcopy	Horz Mag
			Bitmap	1x
			HiRes	Horz Pos Gr
Initialize	Instrument Options	Labeling	Page to	Remove/CirPan/Trace 2 Zoom
	11:04:31	On	Enhanced Accuracy	Filter(ST... On
	23-FEB-96	Mode: Man		

FIGURE 1: Impedance Profile - ITT Cannon Micro D and AMP HSSDC

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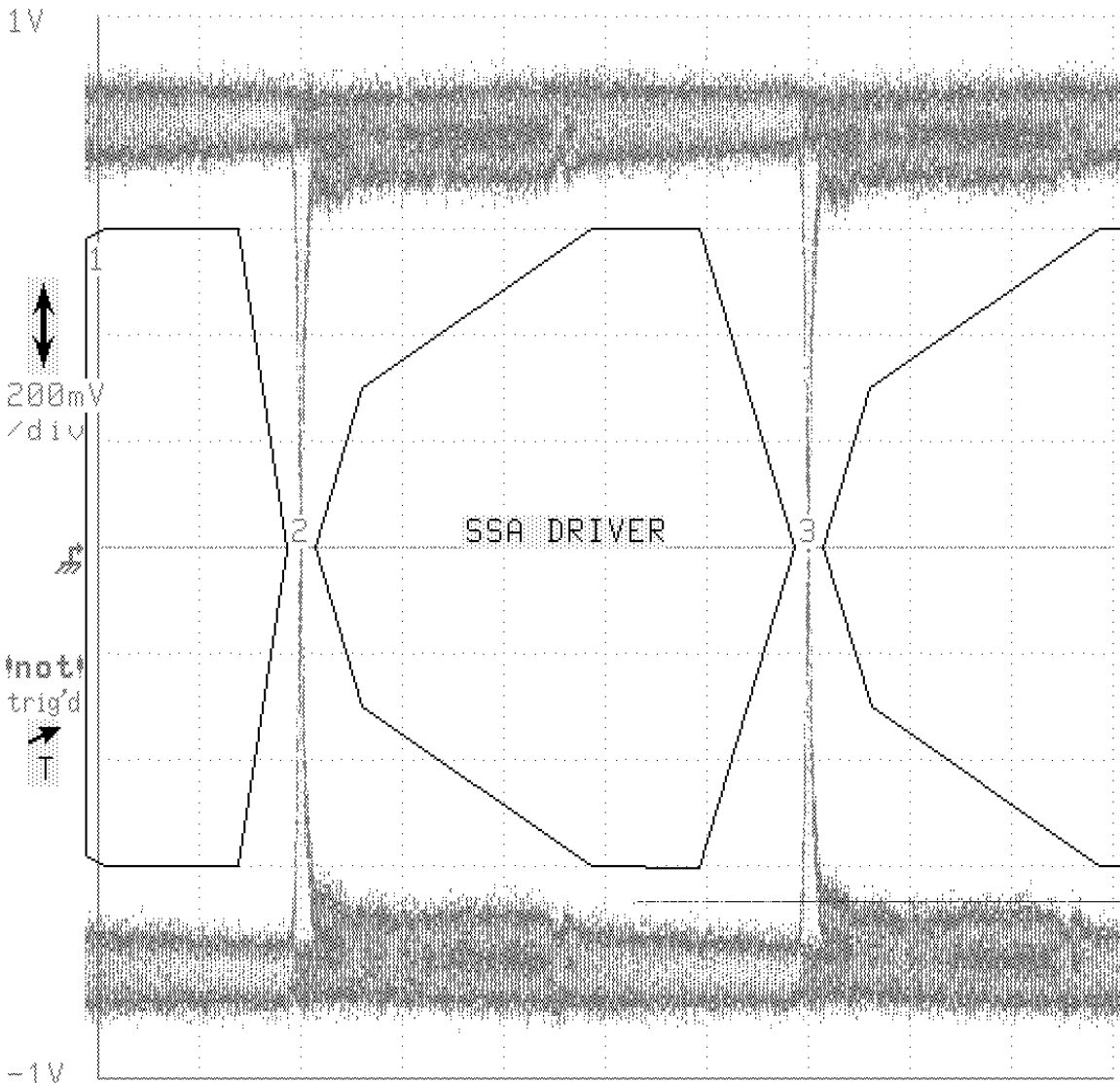
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Window

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DefTra



	51.92ns		1ns/div		61.92ns
Total	20010	Mask3	4588	Mask7	Main Size
Wfms	385	Mask4		Mask8	1ns/div
Mask1	6614	Mask5		Mask9	Main Pos
Mask2	8808	Mask6		Mask10	56.92ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 1	
Color Grad	Count Off		User Mask	M1-M2	
Stopped				Main	

Figure 2: Input Eye Pattern 200 Mbps

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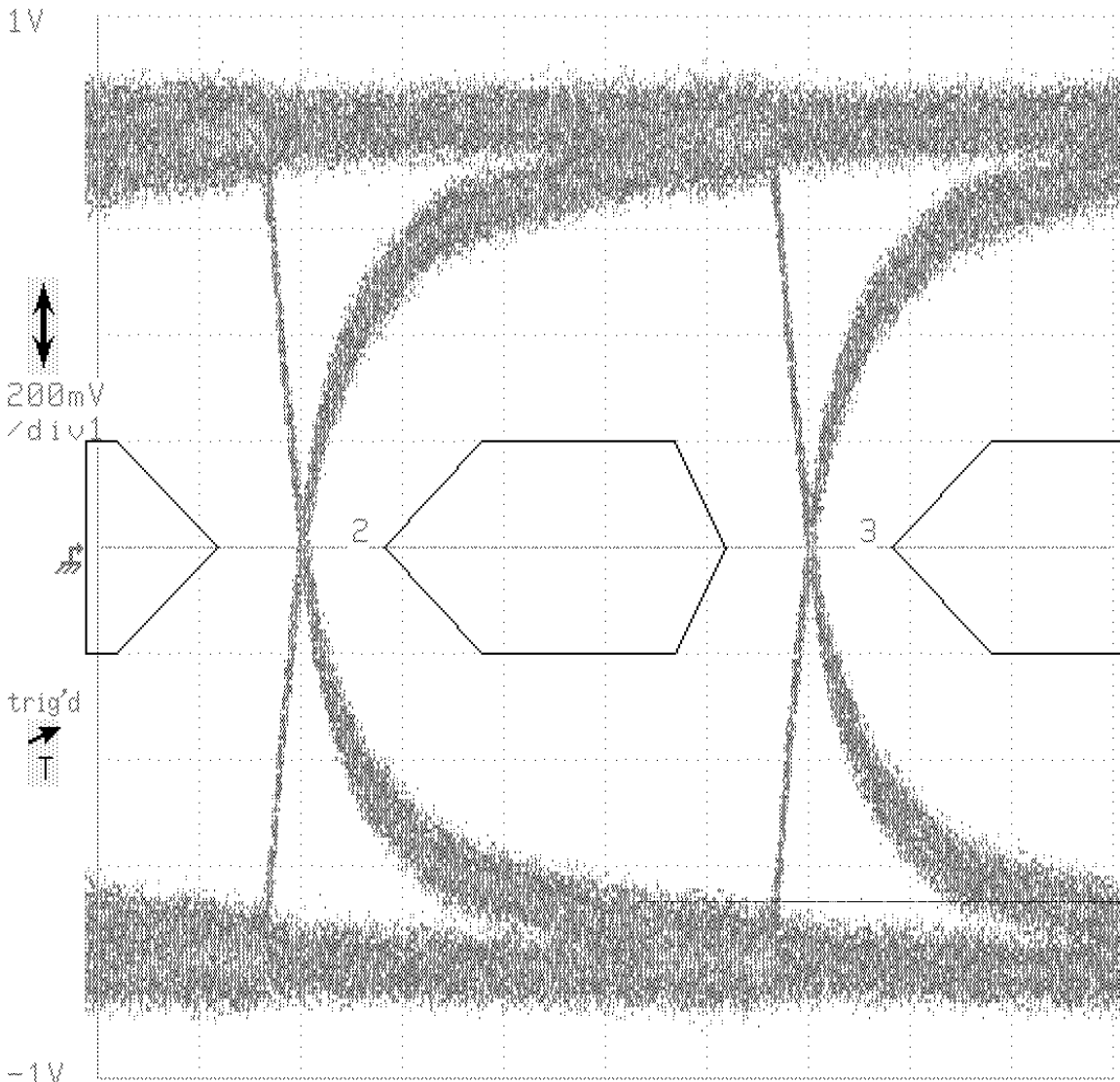
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DefTra



49.57ns		1ns/div		59.57ns	
Total	0	Mask3	0	Mask7	Main Size
Wfms	53	Mask4		Mask8	1ns/div
Mask1	0	Mask5		Mask9	Main Pos
Mask2	0	Mask6		Mask10	54.57ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 3: 200Mbps, 10m, 28AWG Shielded Quad

Tek



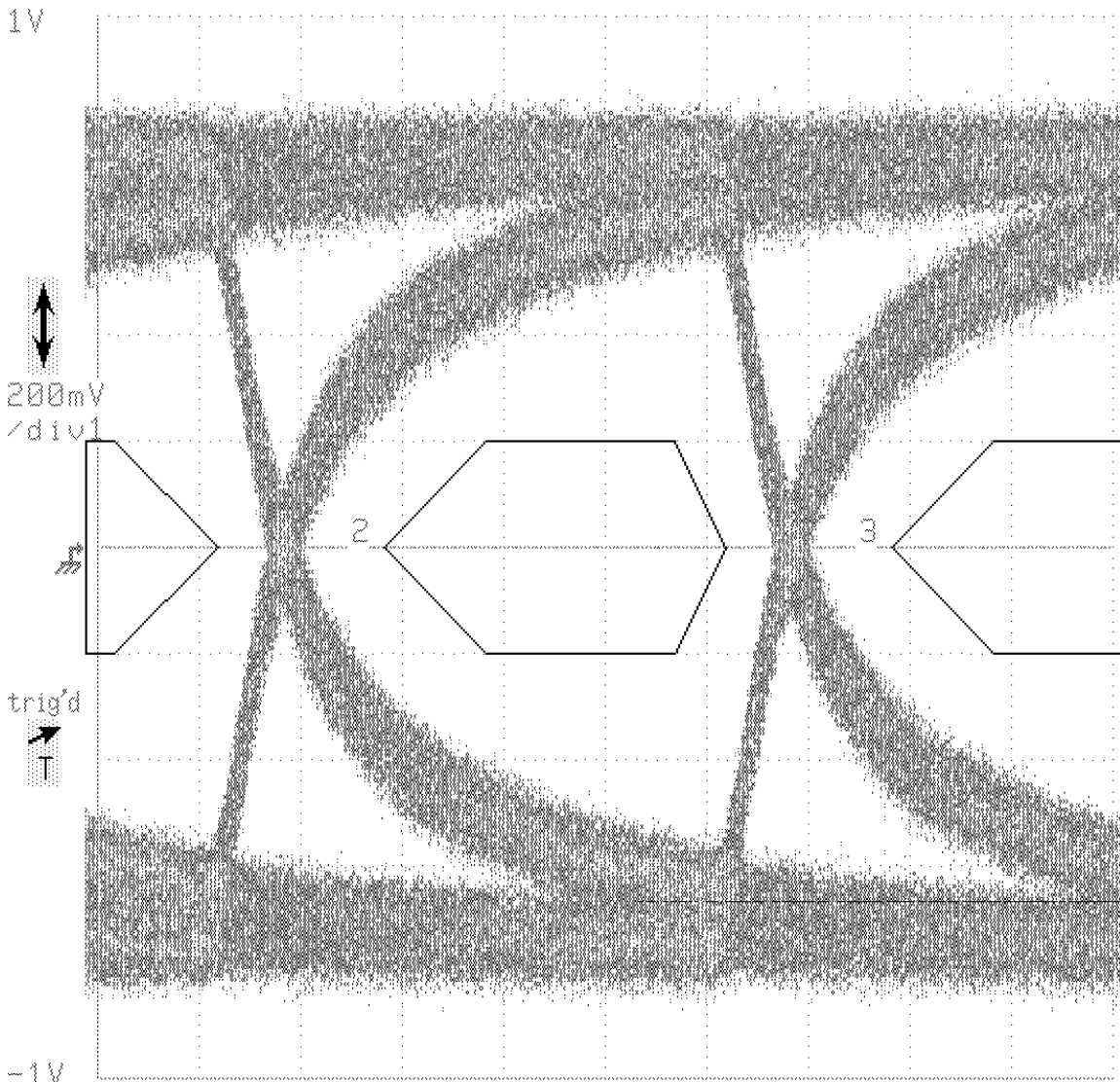
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Window

FFTMag

Def Tra



51.62ns		1ns/div		61.62ns	
Total	0	Mask3	0	Mask7	Main Size
Wfms	75	Mask4		Mask8	1ns/div
Mask1	0	Mask5		Mask9	Main Pos
Mask2	0	Mask6		Mask10	56.62ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 4: 200 Mbps, 20m, 28 AWG Shielded Quad

Tek



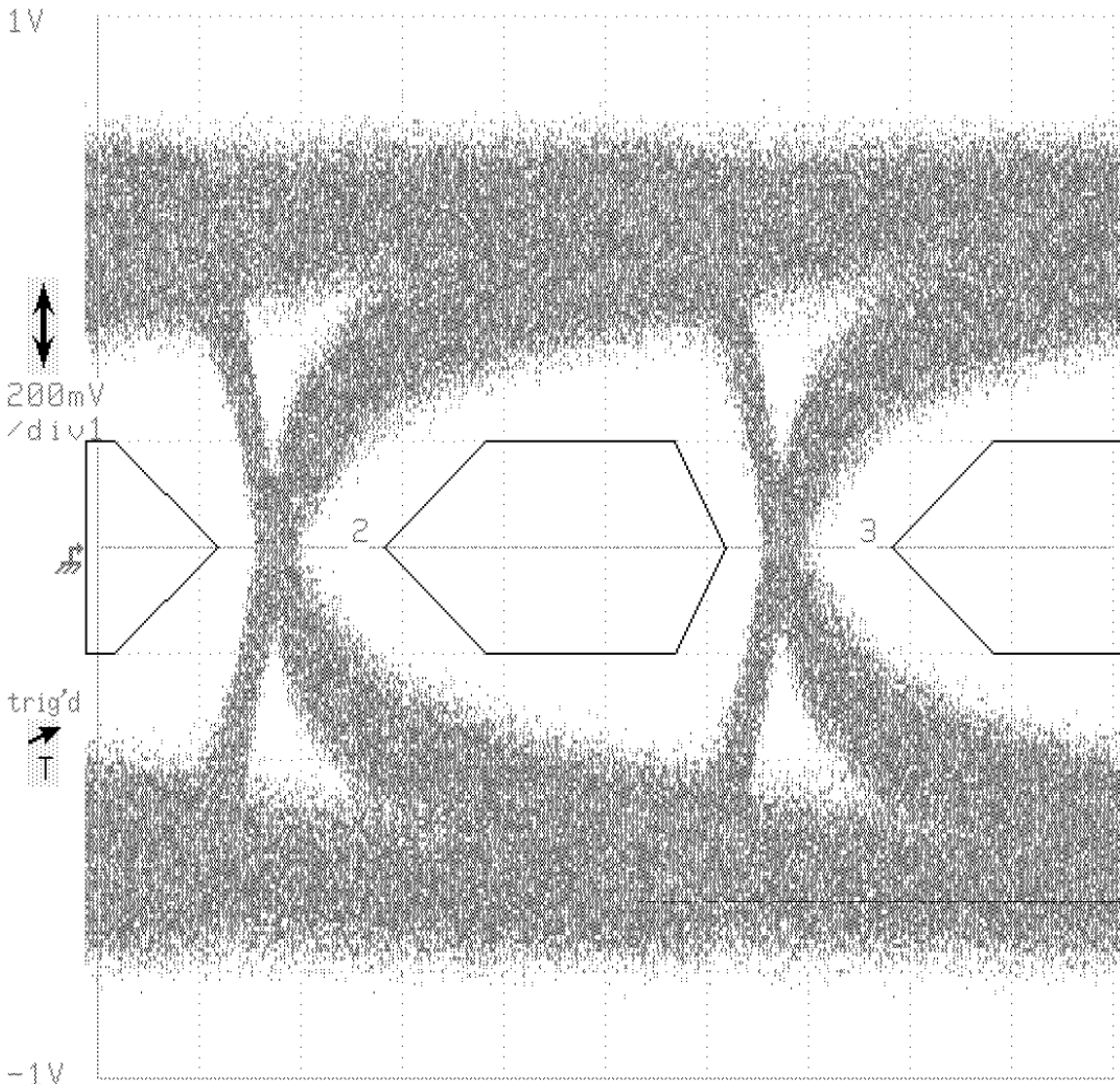
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Window

FFTMag

Def Tra



50.62ns		1ns/div		60.62ns	
Total	3084	Mask3	1011	Mask7	Main Size
Wfms	171	Mask4		Mask8	1ns/div
Mask1	577	Mask5		Mask9	Main Pos
Mask2	1496	Mask6		Mask10	55.62ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 5: 200 Mbps, 30m, 24 AWG Shielded Quad

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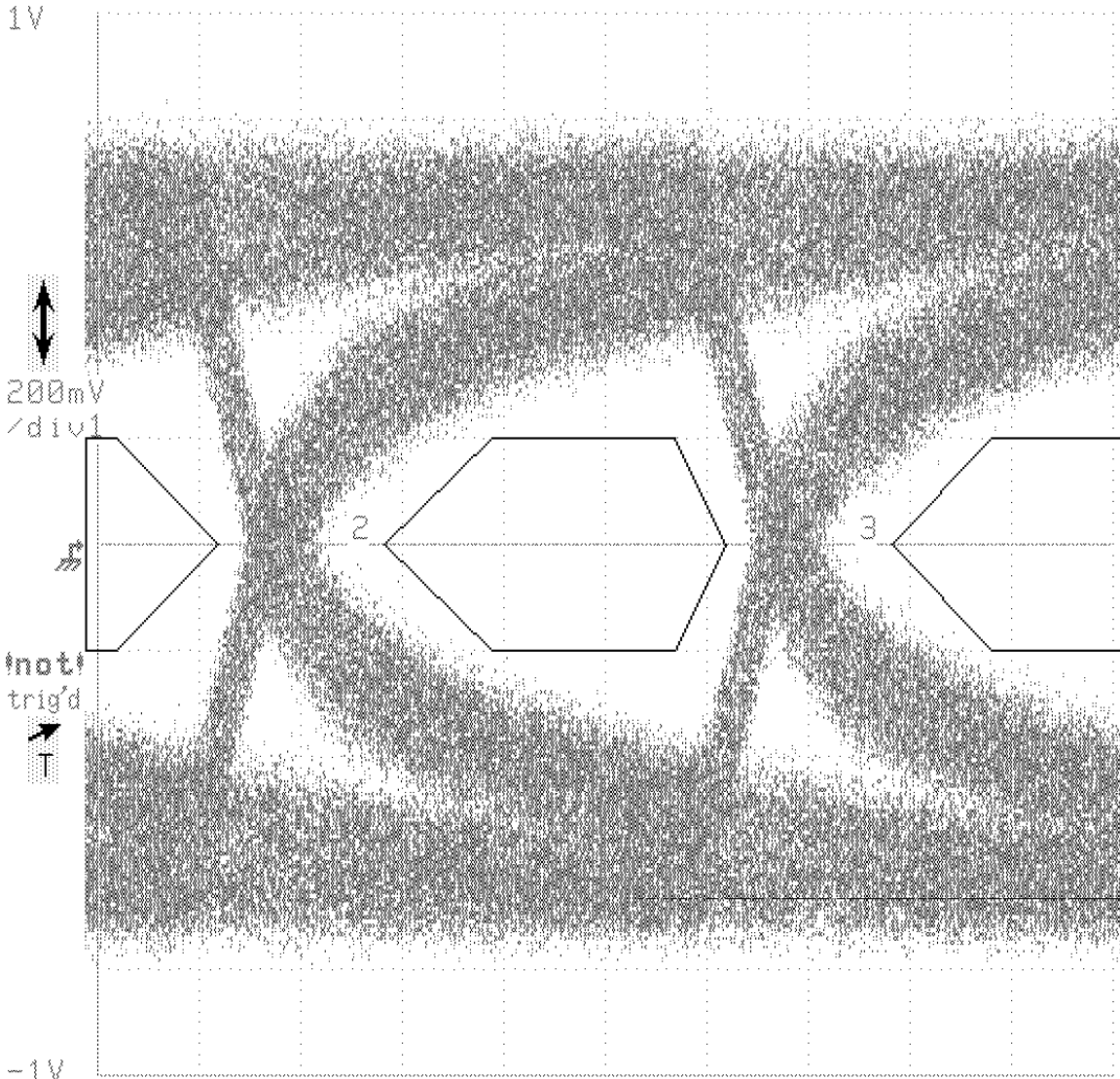
C

Cursors

Window

FFTMag

Def Tra



48.82ns		1ns/div		58.82ns	
Total	3084	Mask3	1011	Mask7	Main Size
Wfms	29	Mask4		Mask8	1ns/div
Mask1	577	Mask5		Mask9	Main Pos
Mask2	1496	Mask6		Mask10	53.82ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Stopped				Main	

Figure 6: 200Mbps, 40m, 24 AWG Shielded Quad

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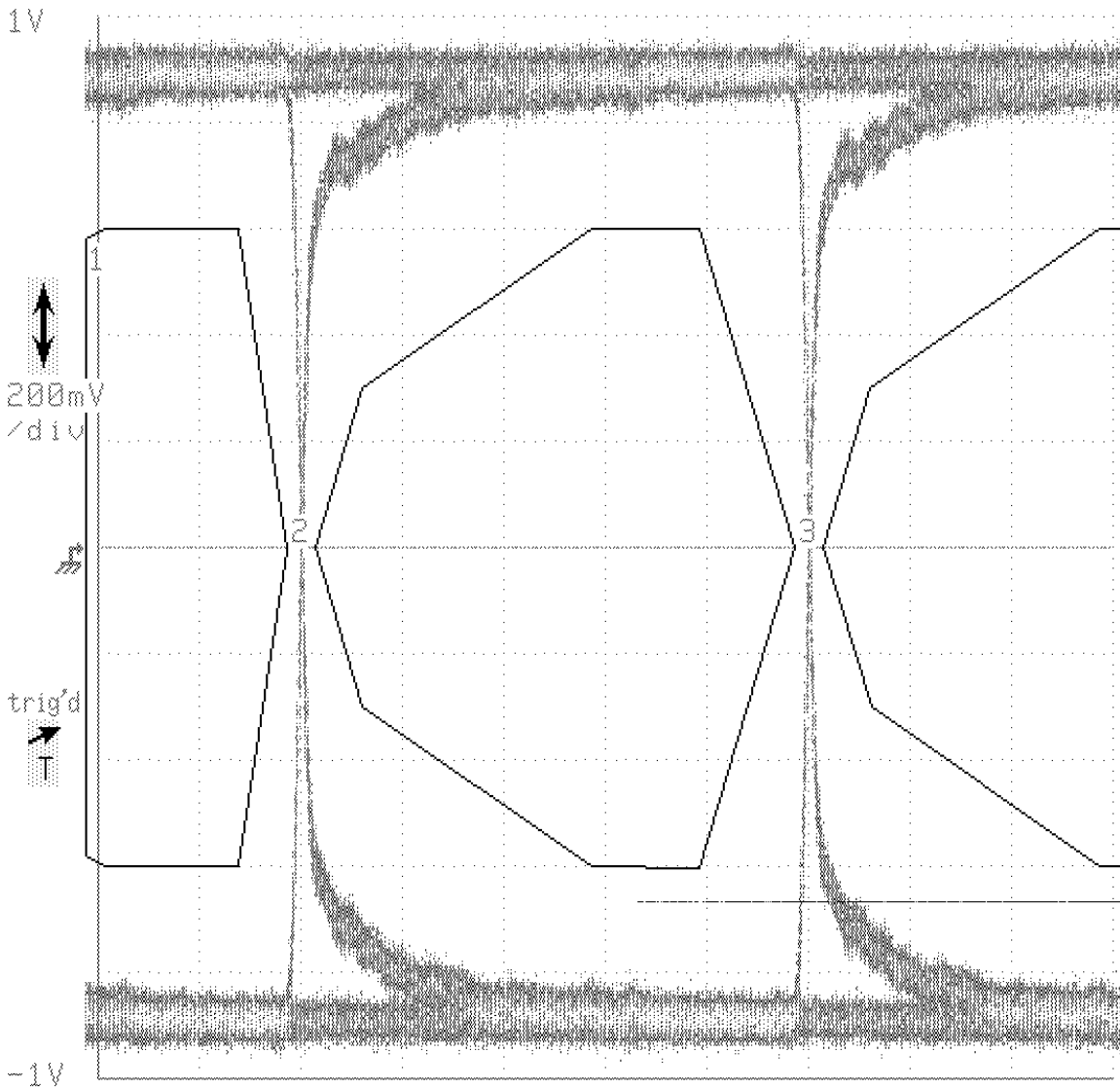
C

Cursors

Window

FFTMag

DefTra



51.97ns		500ps/div		56.97ns	
Total	5783	Mask3	1769	Mask7	Main Size
Wfms	255	Mask4		Mask8	500ps/div
Mask1	1188	Mask5		Mask9	Main Pos
Mask2	2826	Mask6		Mask10	54.47ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 1	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 7: 400 Mbps Input Eye Pattern

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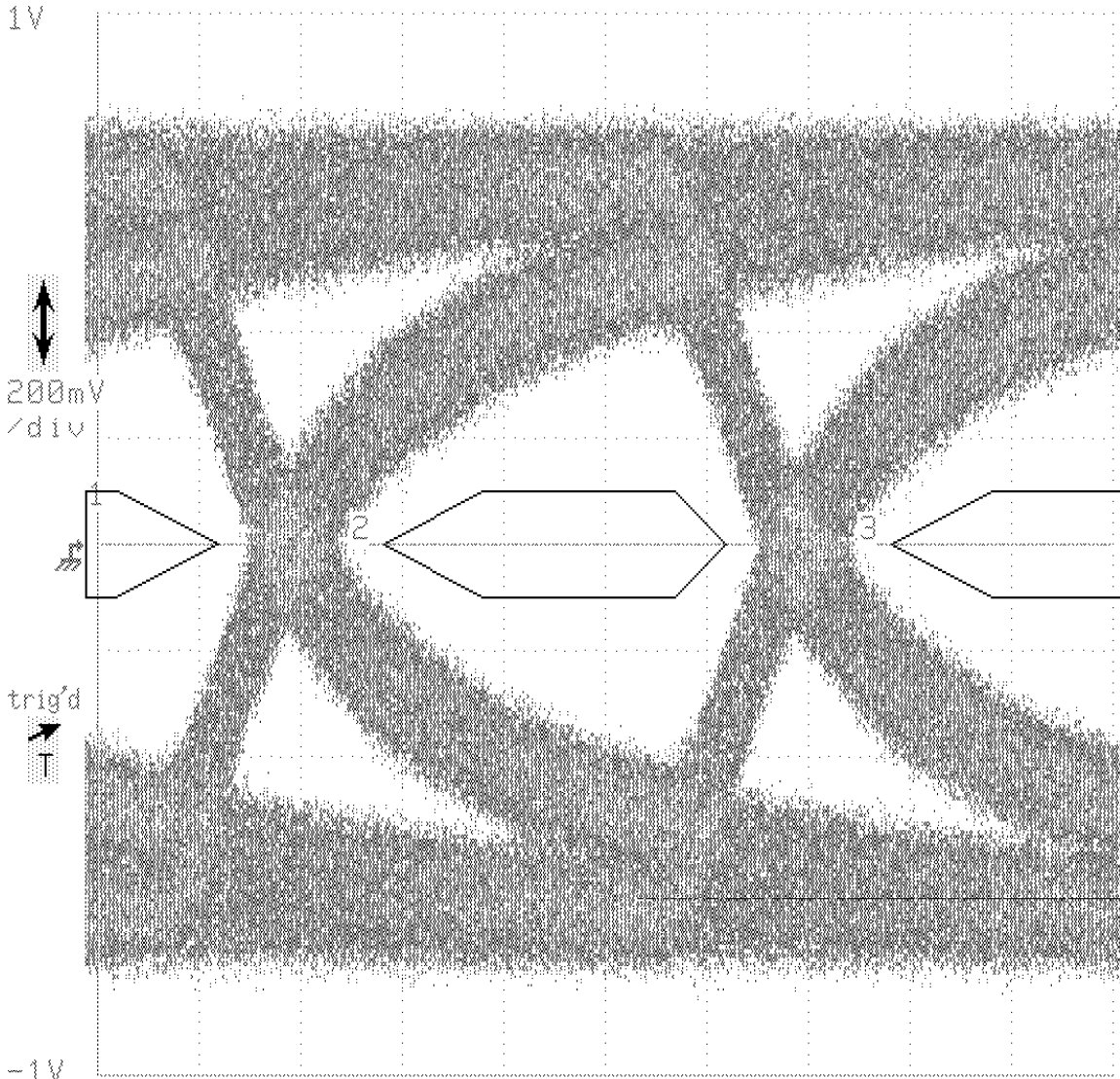
C

Cursors

Window

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Def Tra



53.62ns		500ps/div		58.62ns	
Total	0	Mask3	0	Mask7	Main Size
Wfms	31	Mask4		Mask8	500ps/div
Mask1	0	Mask5		Mask9	Main Pos
Mask2	0	Mask6		Mask10	56.12ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 9: 400 Mbps, 20m, 28 AWG Shielded Quad

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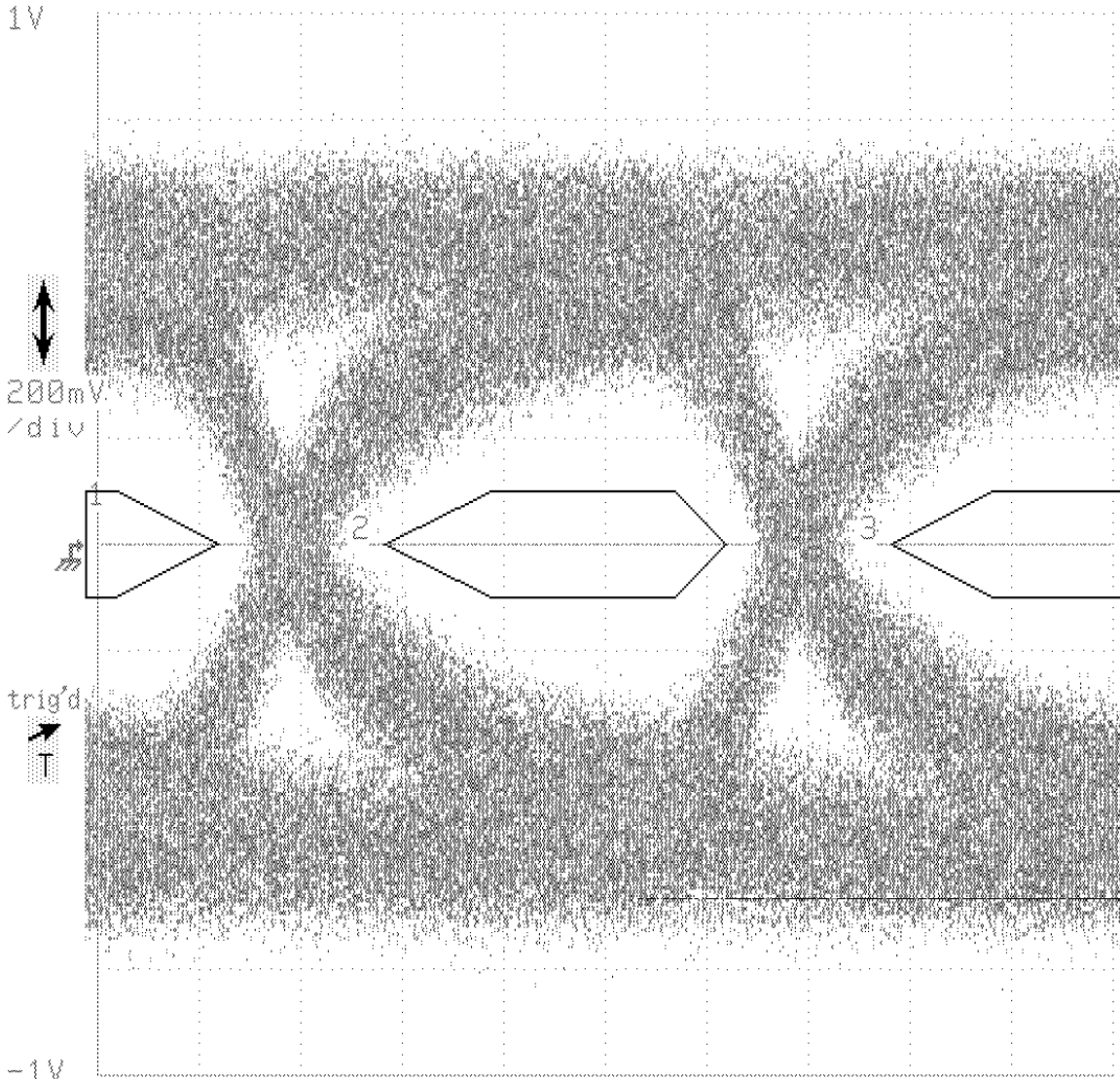
C

Cursors

Window

FFTmag

DefTra



52.57ns		500ps/div		57.57ns	
Total	3084	Mask3	1011	Mask7	Main Size
Wfms	17	Mask4		Mask8	500ps/div
Mask1	577	Mask5		Mask9	Main Pos
Mask2	1496	Mask6		Mask10	55.07ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 10: 400 Mbps, 30m, 24 AWG Shielded Quad

Tek



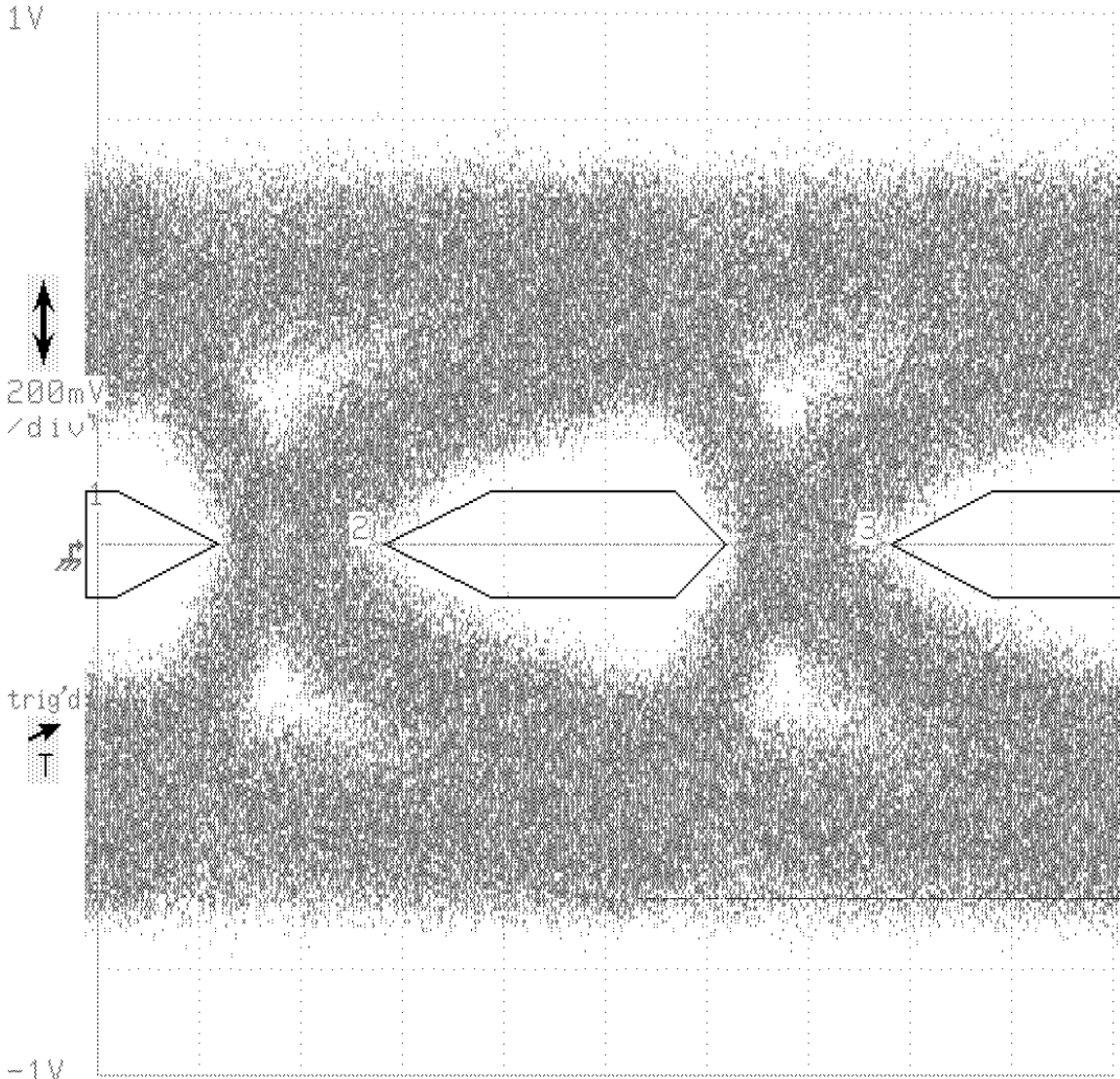
C

Cursors

Window

FFTmag

Def Tra



Total	3084	Mask3	1011	Mask7	Main Size
Wfms	12	Mask4		Mask8	500ps/div
Mask1	577	Mask5		Mask9	Main Pos
Mask2	1496	Mask6		Mask10	55.72ns
Persist/	Mask	Color Grad	Standard	Remove/Clr	
Histograms	Testing	Scale	Masks	Trace 2	
Color Grad	Count Off		User Mask	M1-M2	
Continuous				Main	

Figure 11: 400 Mbps, 40m, 24 AWG Shielded Quad

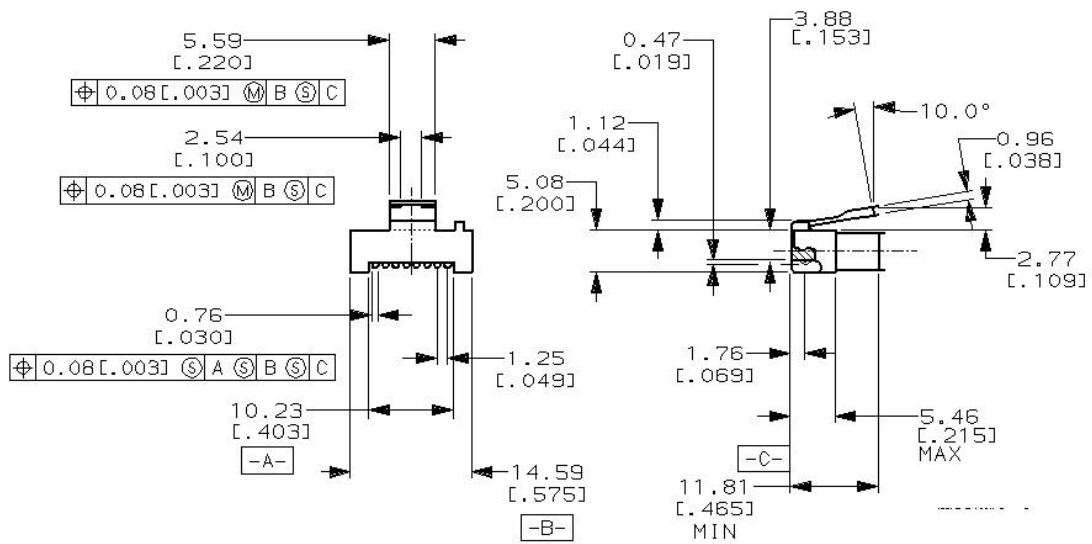


Figure 12: Interface HSSDC Cable Assembly

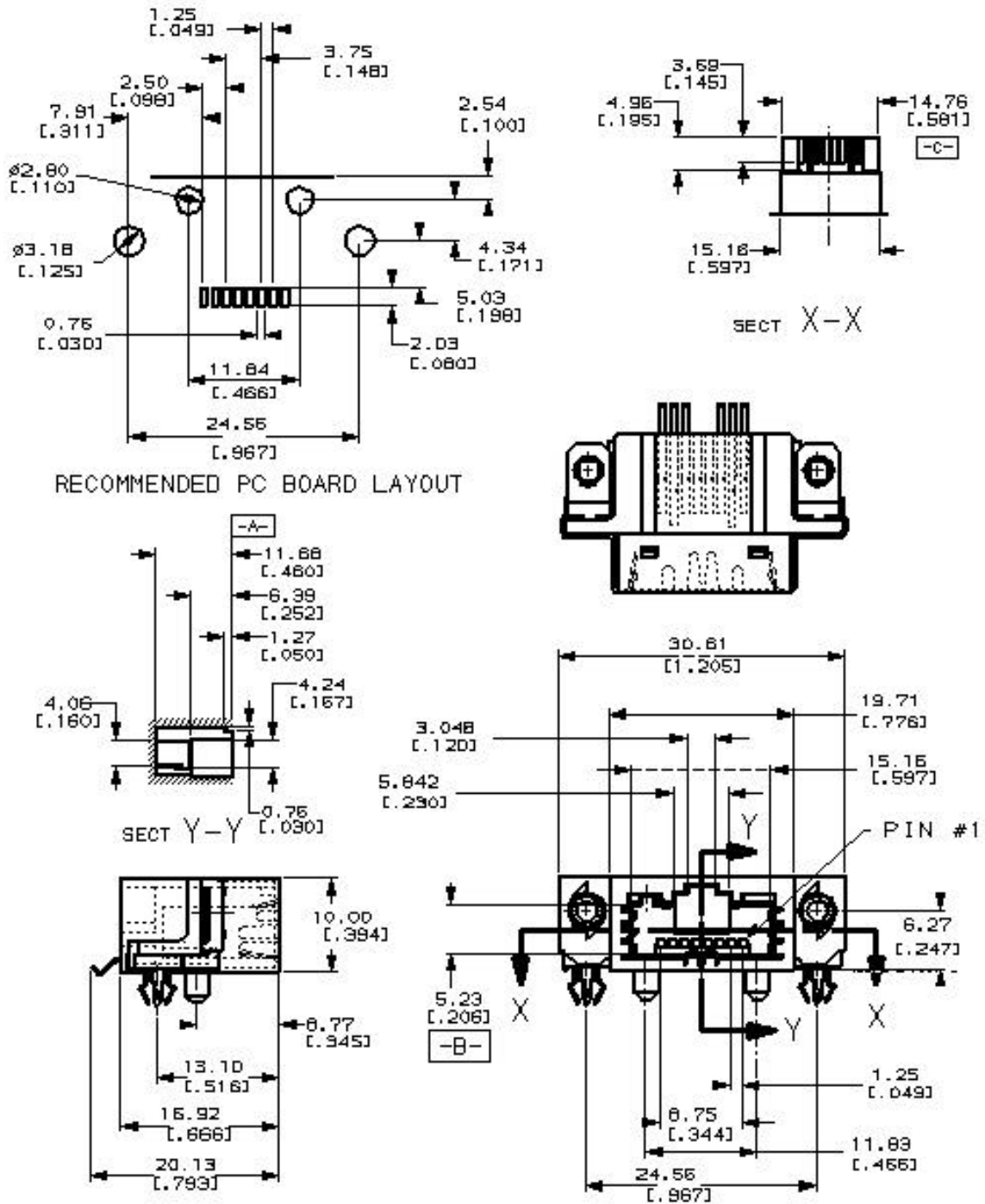
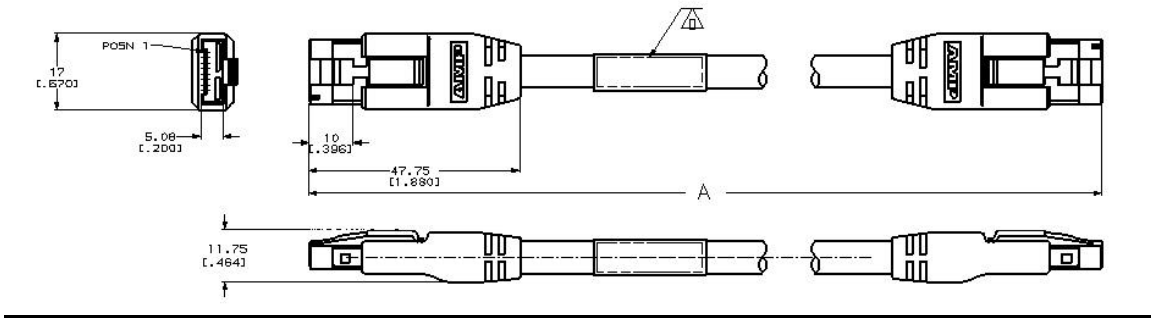


Figure 13: Interface HSSDC PCB Connector



WIRING SCHEMATIC

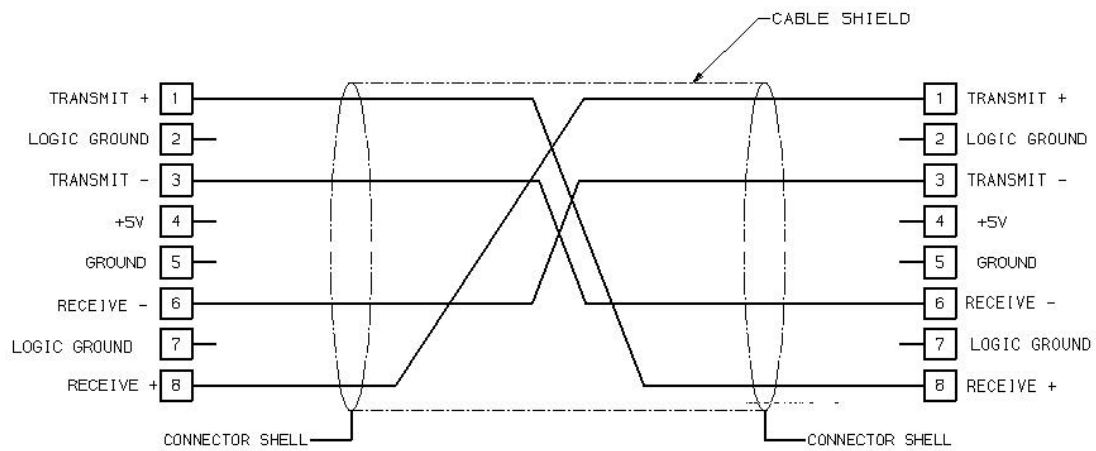


Figure 14: HSSDC Cable Assembly