RIBBON CABLE ASSEMBLY COMPARISION SUMMARY

Purpose: The purpose of this report is to document the difference in crosstalk performance between standard IDC ribbon cable and twisted pair IDC cable when employing differential signaling. Two different cable assemblies were tested using the Agilent E8364B PNA Series Network Analyzer in conjunction with Agilent's N4421B S-Parameter Test Set; all data presented in this summary report was generated by Agilent PLTS version 3.120.

The two cable assemblies tested were:
1. Samtec's FFTP Series: IDC Twisted Pair Ribbon Cable Assembly
2. Samtec's FFSD Series: IDC Ribbon Cable Assembly

All cable assemblies were approximately 12 inch samples.

Test Setup: All cable assemblies were mated to test boards which contained Final Inch®-type board launches. These boards were then attached to a 4-port VNA as in Figure 1. The test equipment was calibrated from 10MHz to 7.1GHz with an intermediate bandwidth of 1000Hz so that when translated to the time domain, the test pulse would have an equivalent rise time of 100ps. As part of the post-processing effort, the data was truncated at 1.42GHz in the frequency domain to allow for data with an equivalent rise-time of 500ps in the time domain. All frequency domain data is presented from 10MHz to 4GHz.

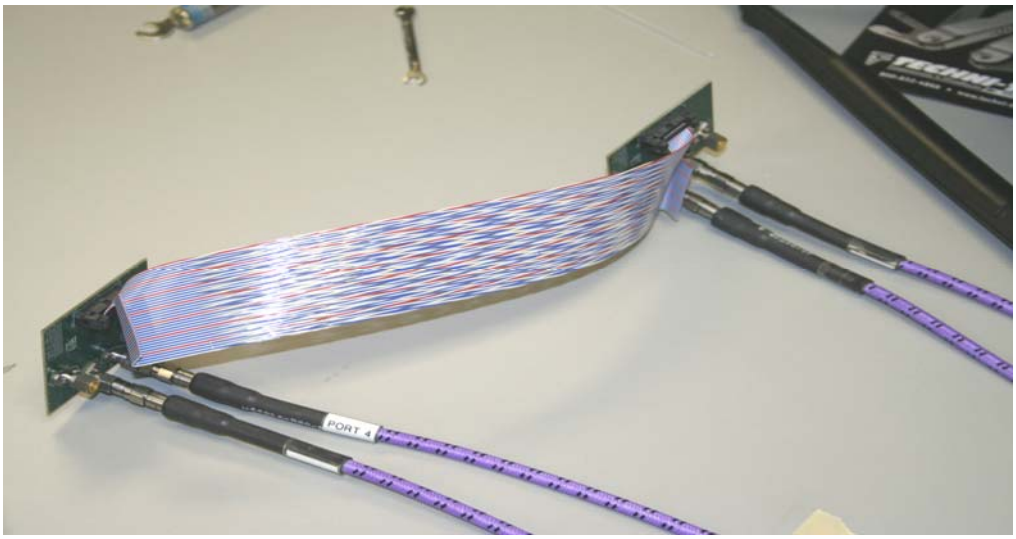

Figure 1: 4-port VNA attached to FFTP test boards with SMAs

Test Setup: Of the 20 total pins in the standard IDC FFSD Series test boards, only 14 pins were routed to test points (in yellow below in Figure 2).

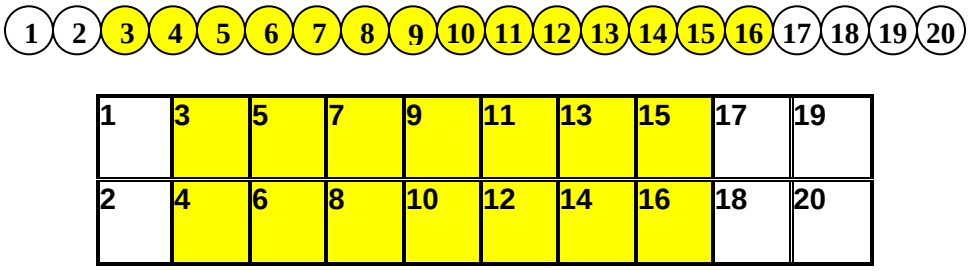

Figure 2: FFSD Series connector-to-cable layout

In an All Signal layout, pins 9 and10 were the Aggressor Pair while pins 11and 12 were the Victim Pair (in red and blue below in Figure 3).

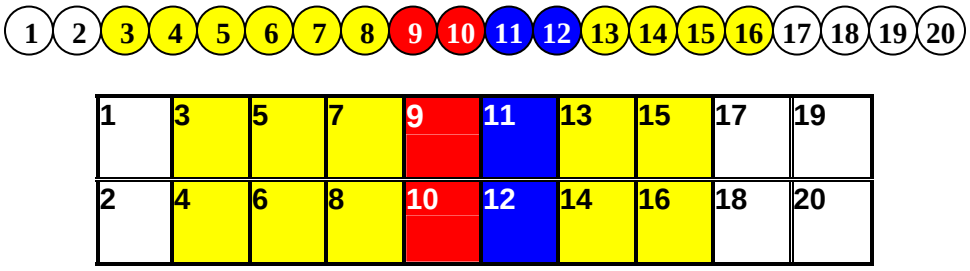

Figure 3: FFSD Series All Signal cableto-connector layout

In a Differential Pairs with Grounds layout, pins 9 and 10 were the Aggressor Pair while pins 13 and 14 were the Victim Pair (in red and blue below in Figure 4.)

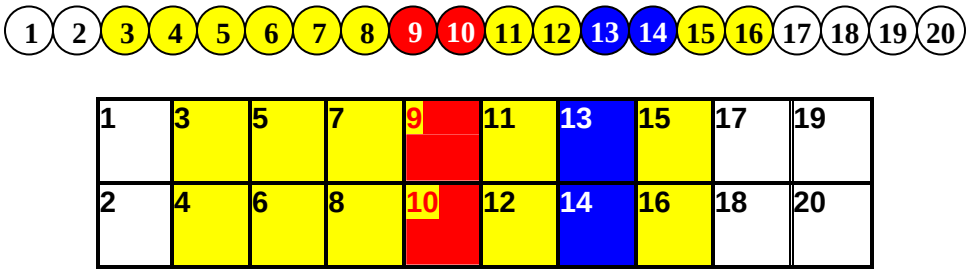

Figure 4: FFSD Series Differential Pairs with Grounds cable-to-connector layout

Frequency Domain Data

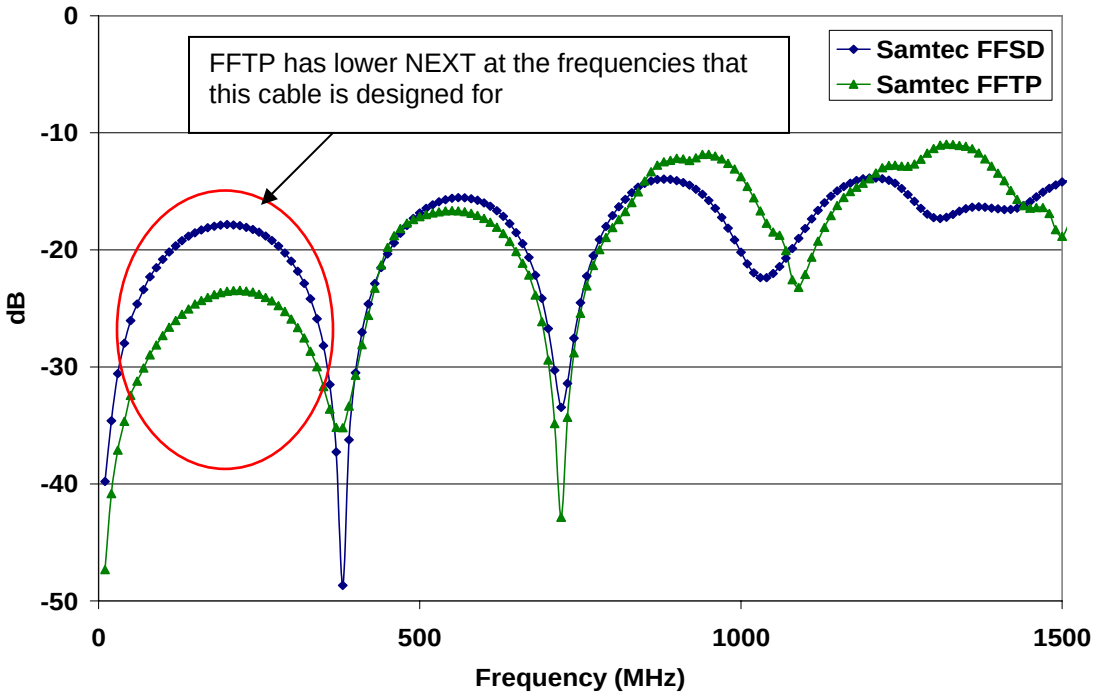

Figure 5: NearEnd Cross Talk (NEXT), all signal

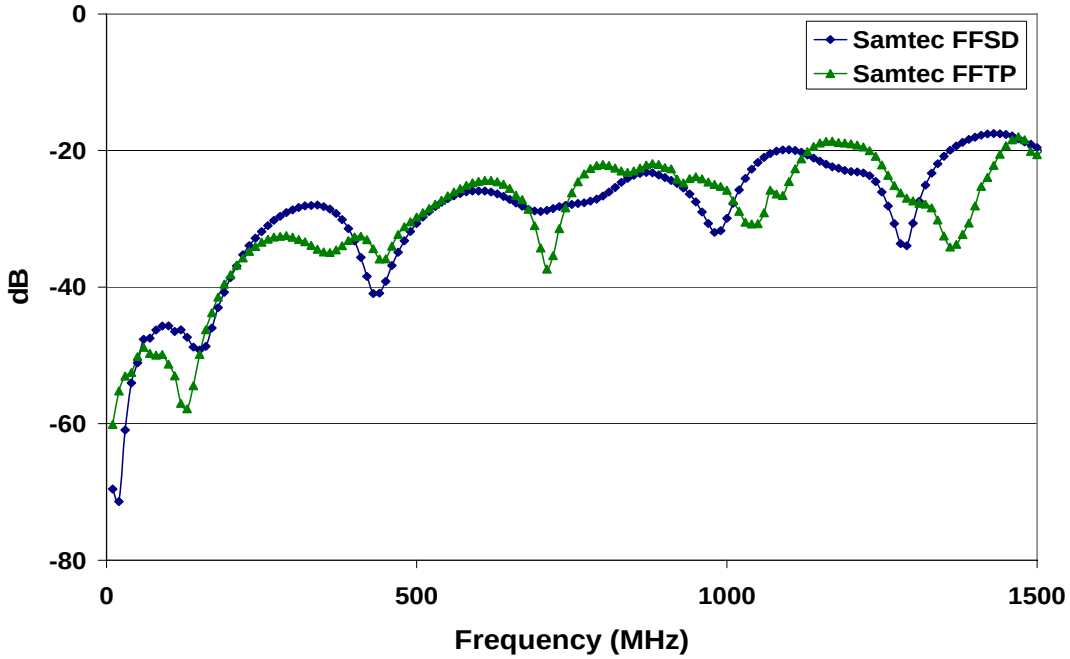

Figure 6: NEXT, differential pairs with grounds

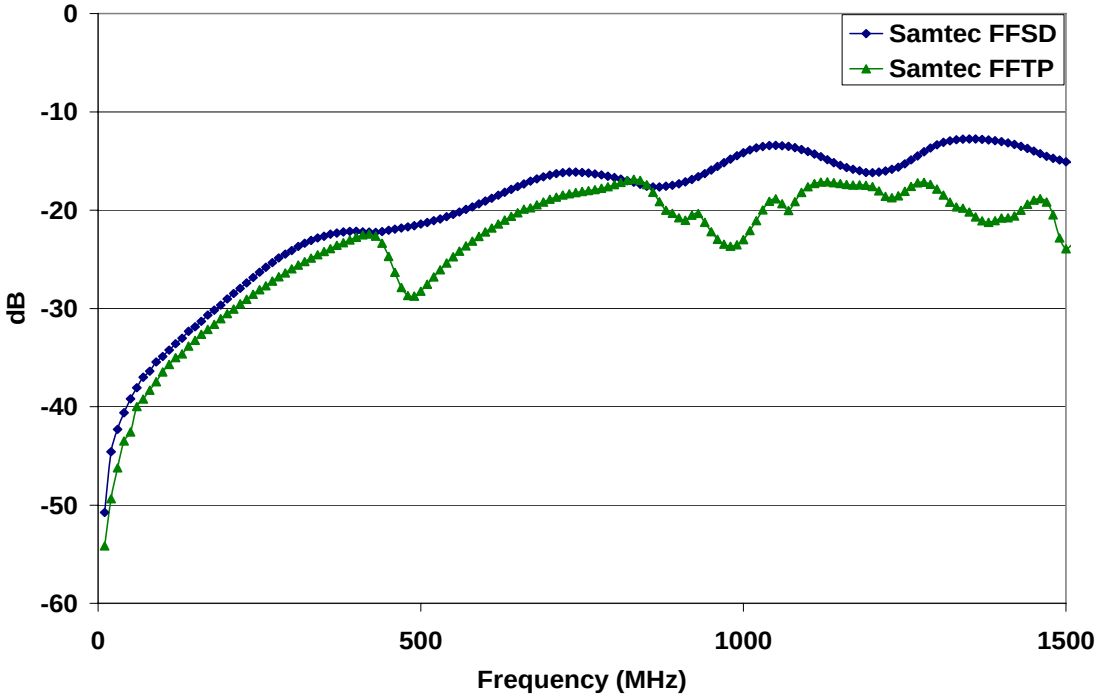

Figure 7: FarEnd Cross Talk (FEXT), all signal

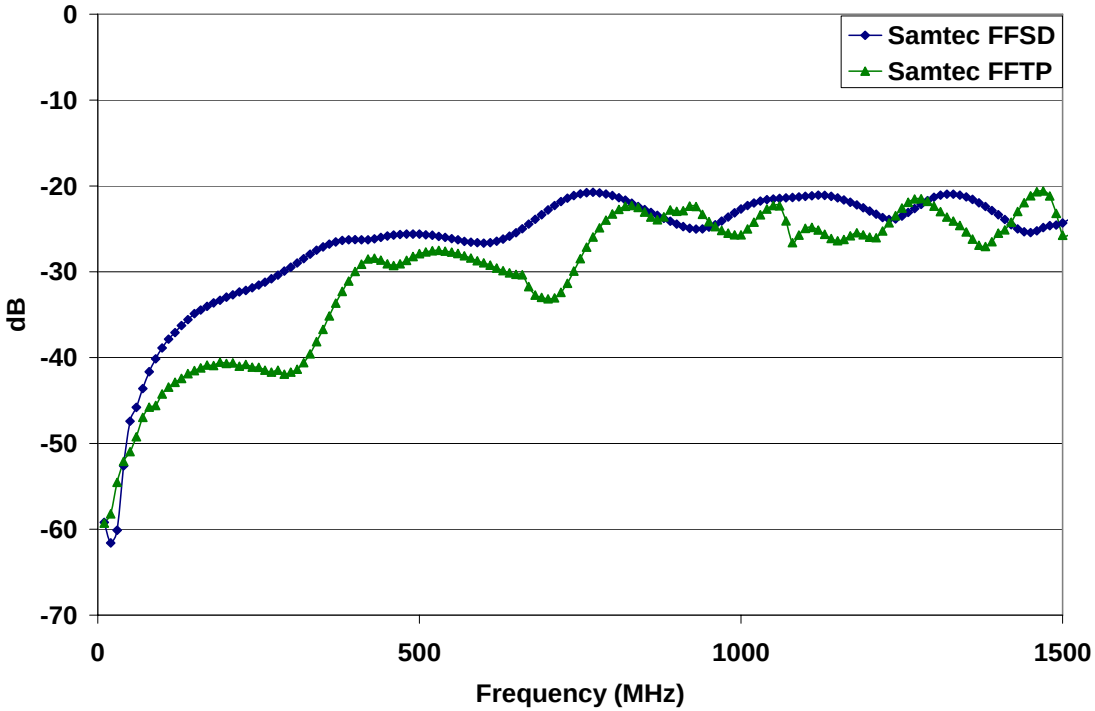

Figure 8: FEXT, differential pairs with grounds

Time Domain Data

Product	% Cross-Talk Based On 400mV Signal Pulse			
	NEXT (%)		FEXT (%)	
	All	(1:1)	All	(1:1)
Samtec FFTP Series	10.1	6	8.6	3.5
Samtec FFSD Series	10.1	6.2	11.0	7.2

Table 1: 100ps rise time data

Product	% Cross-Talk Based On 400mV Signal Pulse			
	NEXT (%)		FEXT (%)	
	All	(1:1)	All	(1:1)
Samtec FFTP Series	4.4	1.8	4.1	1.7
Samtec FFSD Series	6.0	1.8	5.7	2.7

Table 2: 500ps rise time data

Results: As evidenced in Figure 5, Samtec's FFTP Series with twisted pair IDC cable has approximately -6dB better NEXT performance (up to 250 MHz) in an all signal, differential environment and -2dB better FEXT performance (up to 500MHz) when compared to Samtec's standard FFSD Series with ribbonized IDC cable. Even with the introduction of grounds between pairs, Samtec's FFTP Series twisted pair IDC cable assembly has lower NEXT and FEXT than the FFSD Series standard IDC cable assembly.