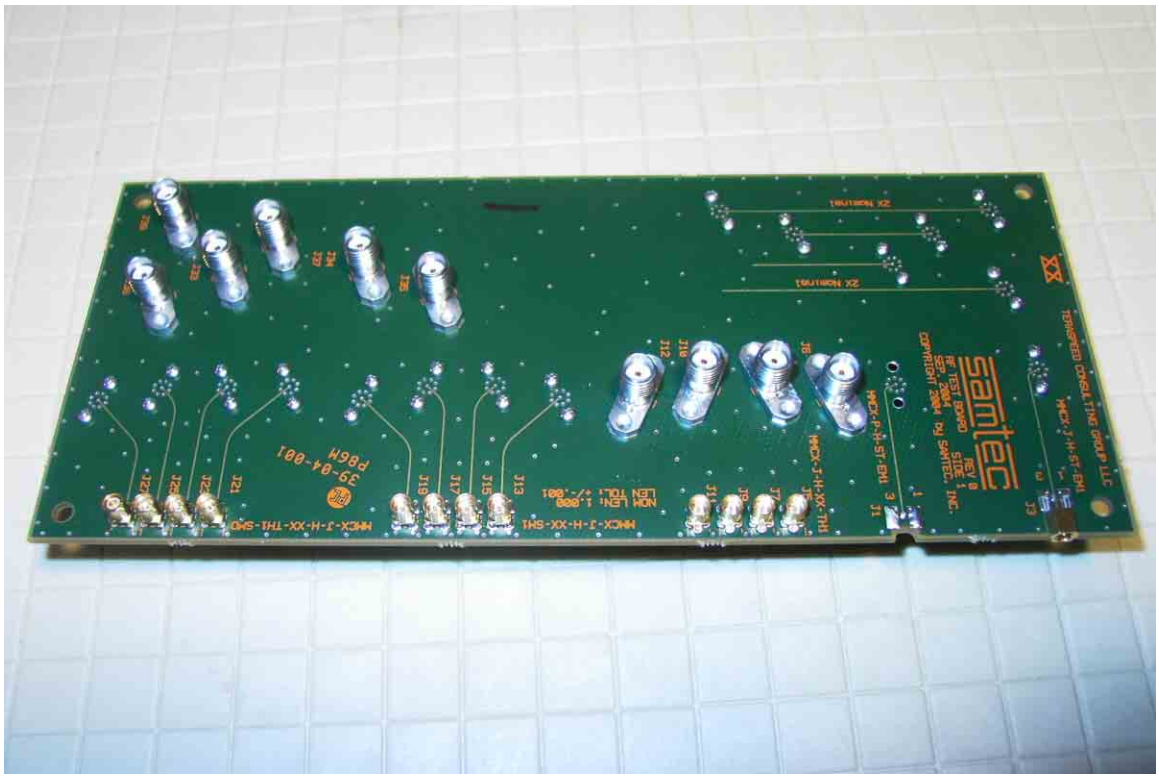
High Speed Competitive Comparison Report

Samtec MMCX-J-P-H-ST-TH1 Mated With MMCX-P-P-H-ST-TH1
Competitor A (Mated Set)
Competitor B (Mated Set)



REVISION DATE: January 6, 2005

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Introduction

This testing was performed to evaluate the electrical performance of the Samtec MMCX-J-P-H-ST-TH1 mated with MMCX-P-P-H-ST-TH1 compared to the equivalents from 2 competitors, herein referred to as Competitor A and Competitor B. Testing was performed in accordance to the High Performance Electrical Interconnect (HPEI) SFF-8416, Level 1 testing standards when applicable.

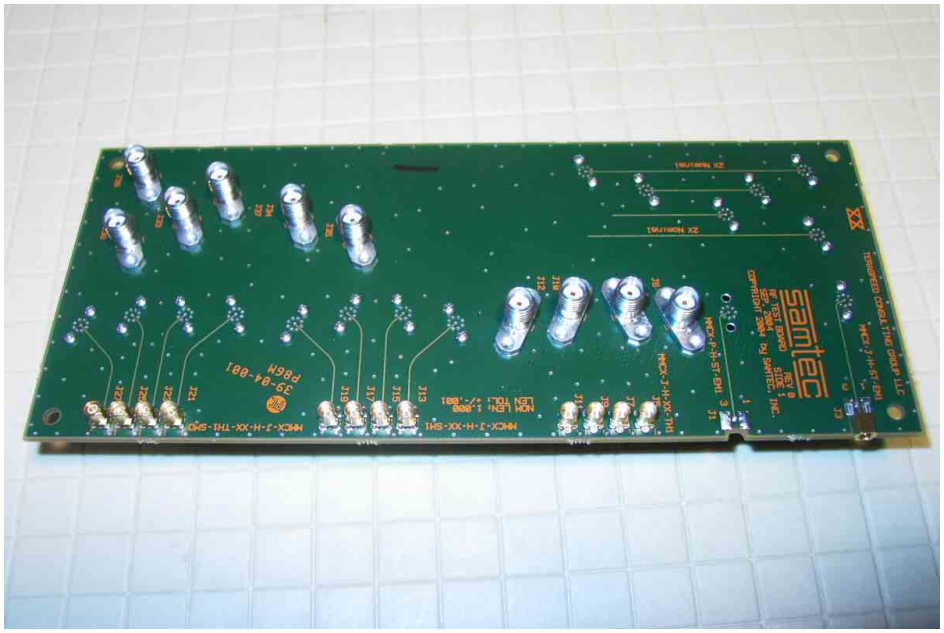

Figure 1 Sample Test Board

Testing was performed to assess Insertion Loss, Return Loss, Impedance, VSWR, and Crosstalk. Testing was performed with TDR and VNA technology, and the results are displayed in Time (Impedance) or Frequency Domain (Insertion Loss, Return Loss, NEXT, FEXT, VSWR) as required. TDA Systems' IConnect Software (V3.0.2) was employed to convert the raw TDR/TDT measurements into the displayed data. Arc RF Systems SPViewII was employed with the frequency domain information. A custom set of test boards supplied by Samtec was used for all measurements. See Figure 1.

Product Description

The samples consisted of three different mated MMCX-style RF connector sets from Samtec, Competitor A, and Competitor B. The mounting scheme was conventional through-hole technology in all cases.

Manufacturer	Part Number - Jack	Part Number - Plug	Mounting Config.
Samtec	MMCX-J-P-H-ST-TH1	MMCX-P-P-H-ST-TH1	Through Hole
Competitor A			Through Hole
Competitor B			Through Hole

Table 1: Sample Part Descriptions

Results Summary

Time Domain Data

Impedance

Impedance measurements were performed using an input risetime of 30ps as launched into the test boards. The minimum and maximum impedances are for the mated MMCX-style connector region only.

Manufacturer	Minimum Impedance	Maximum Impedance
Samtec	35 Ohms	51 Ohms
Competitor A	35 Ohms	57 Ohms
Competitor B	36 Ohms	55 Ohms

Table 2: Impedance Measurements

NEXT and FEXT

Near End and Far End Crosstalk was measured in the time domain. In all cases, the percent time domain crosstalk was less than 1 %.

Manufacturer	NEXT		FEXT	
Samtec	0.5 mV	0.20%	0.9 mV	0.36%
Competitor A	0.2 mV	0.10%	1.0 mV	0.4%
Competitor B	0.3 mV	0.12%	1.4 mV	0.56%

Table 3: Crosstalk Measurements

Impedance Profiles

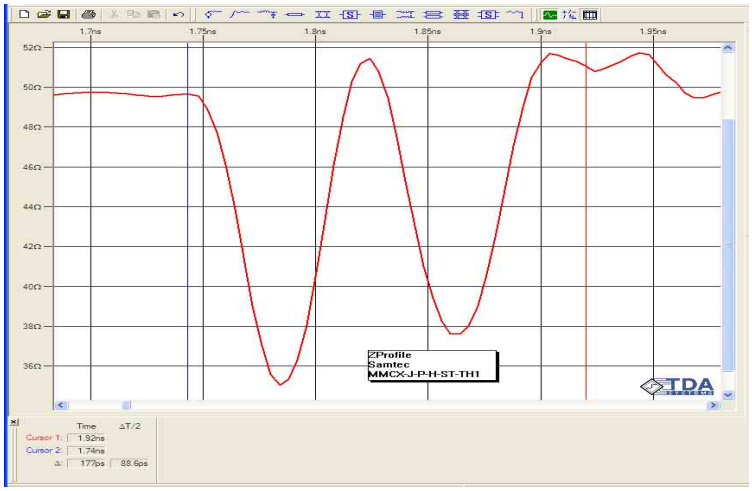

Figure 2: Impedance Profile - SAMTEC

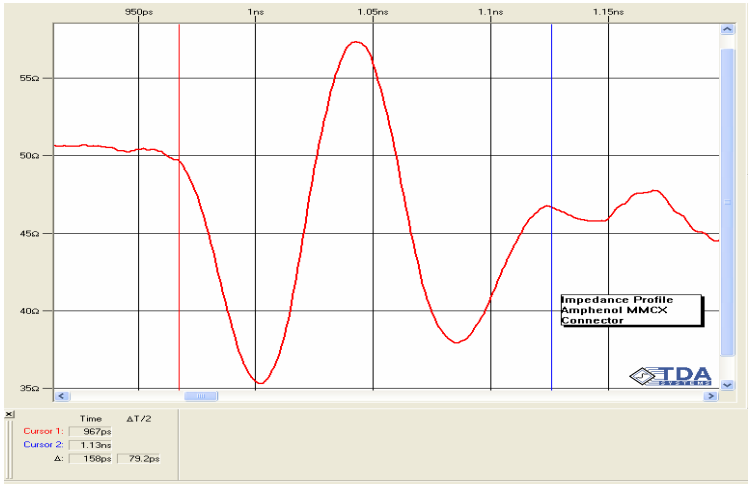

Figure 3: Impedance Profile - COMPETITOR A

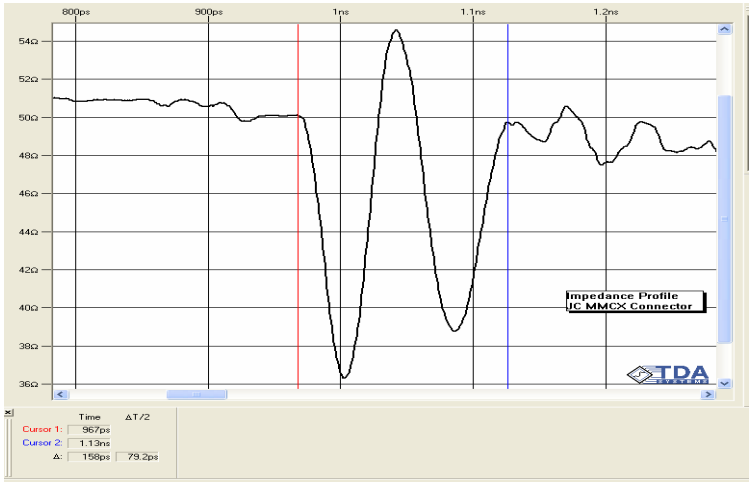

Figure 4: Impedance Profile – COMPETITOR B

Frequency Domain Data
Insertion Loss

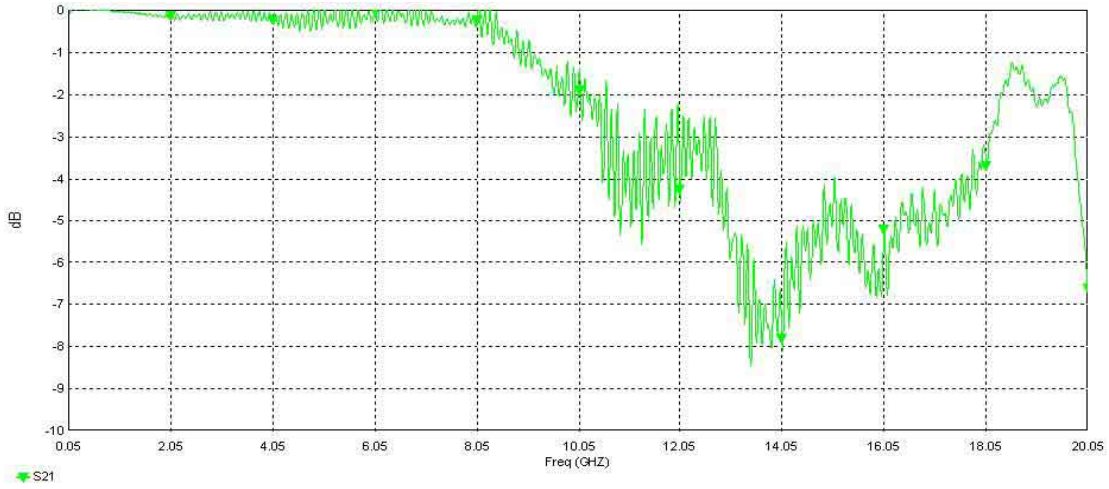

Figure 5: Insertion Loss - SAMTEC

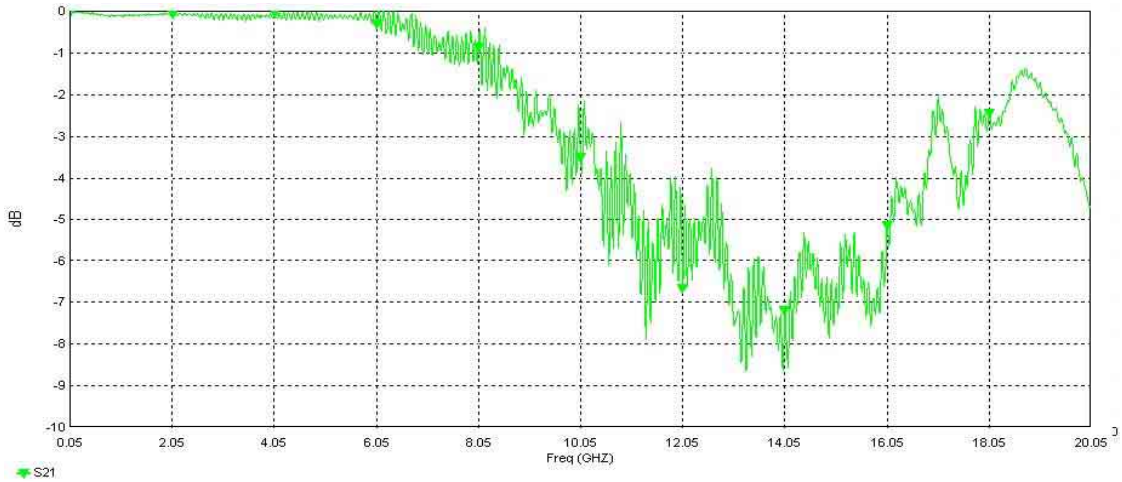

Figure 6: Insertion Loss - COMPETITOR A

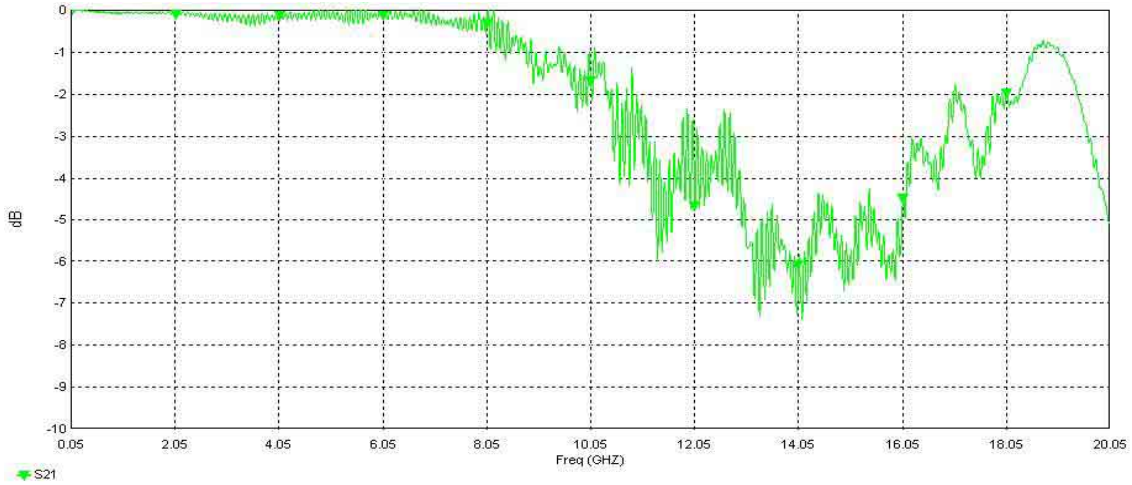

Figure 7: Insertion Loss – COMPETITOR B

Return Loss

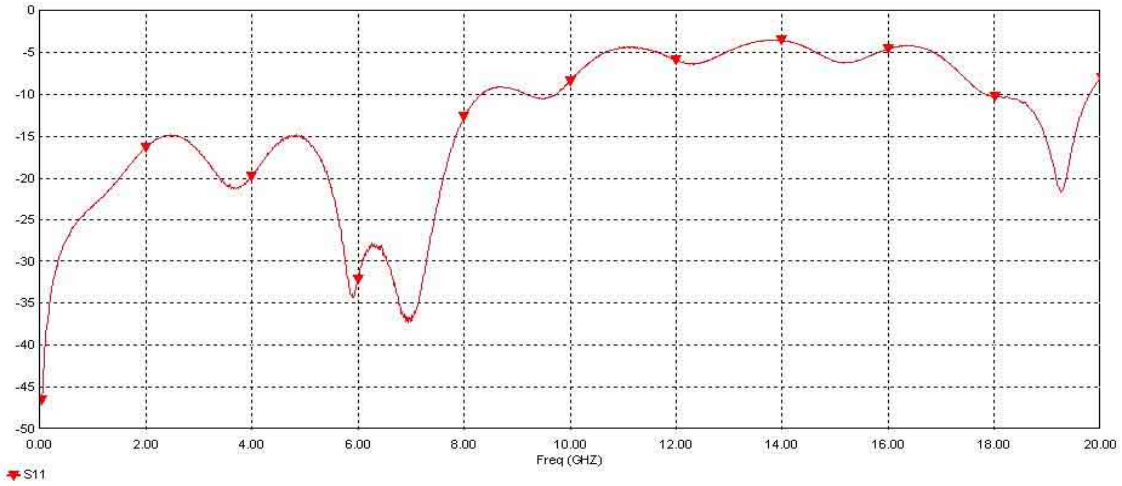

Figure 8: Return Loss - SAMTEC

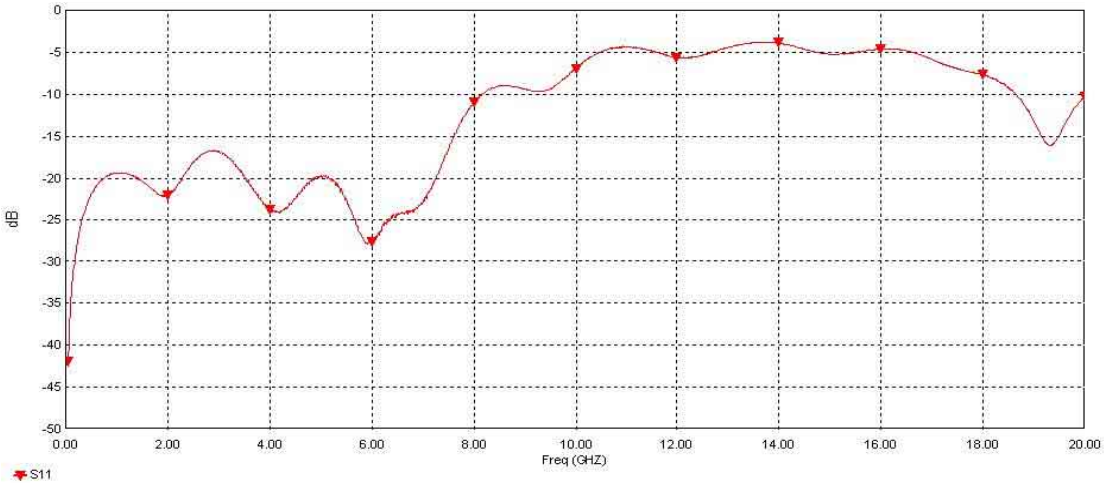

Figure 9: Return Loss - COMPETITOR A

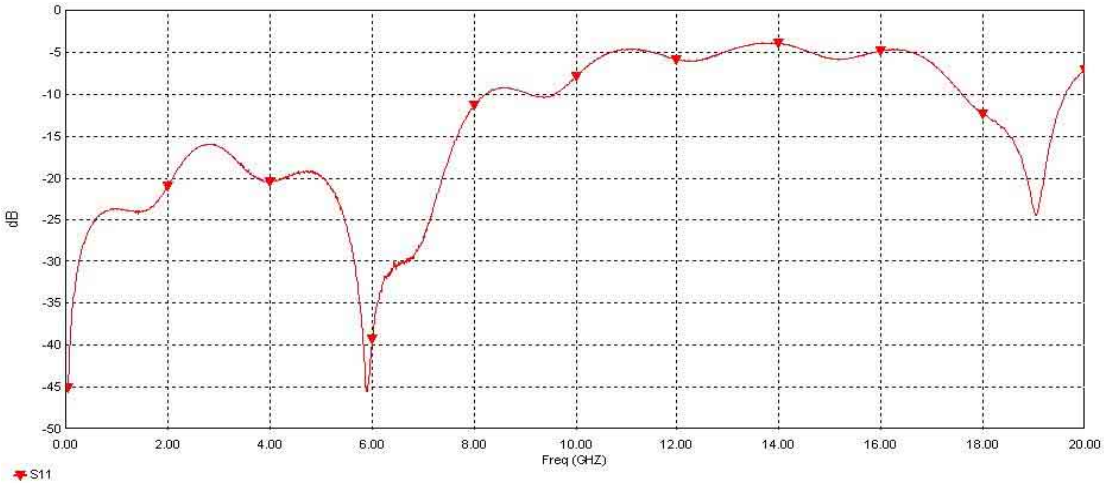

Figure 10: Return Loss – COMPETITOR B

Near End Crosstalk

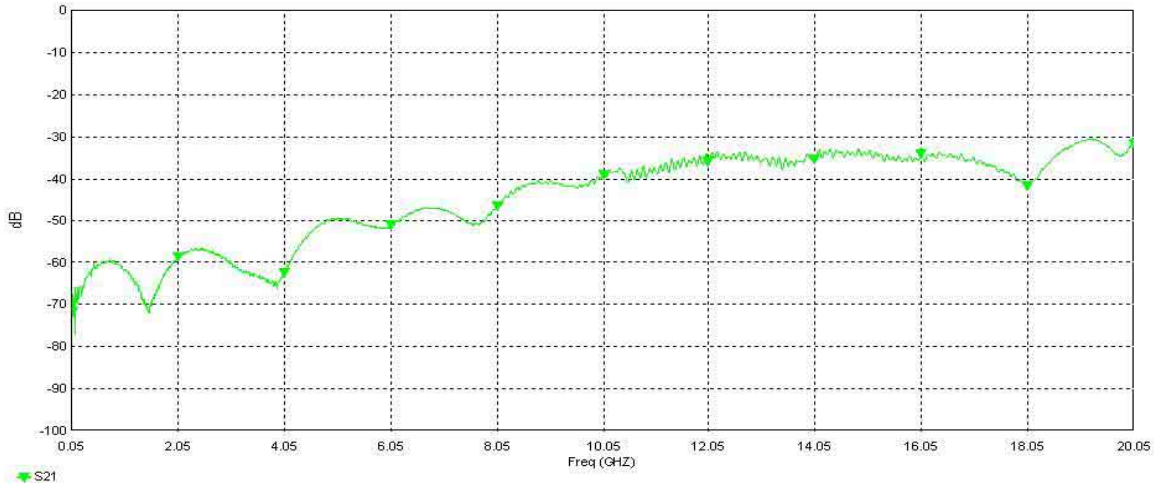

Figure 11: NEXT - SAMTEC

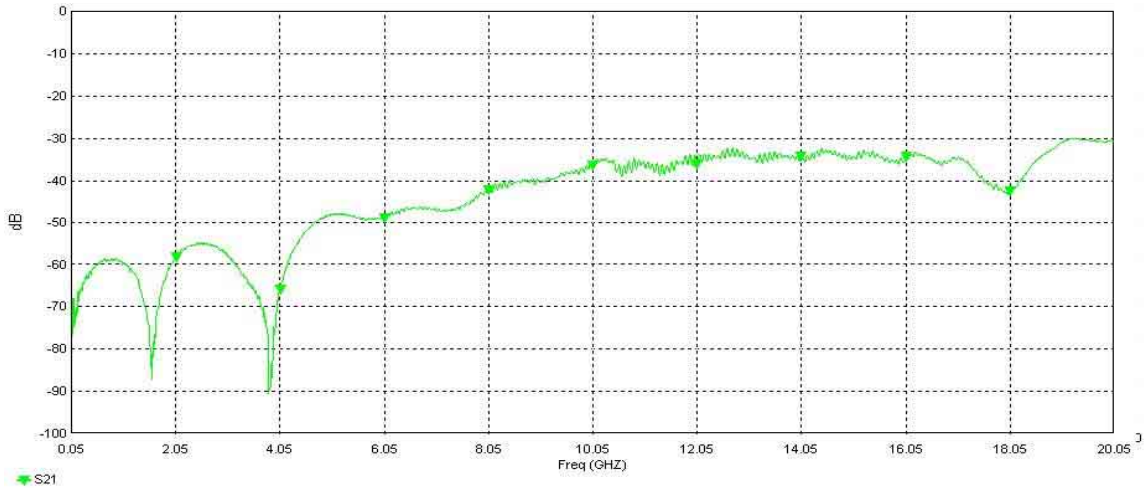

Figure 12: NEXT - COMPETITOR A

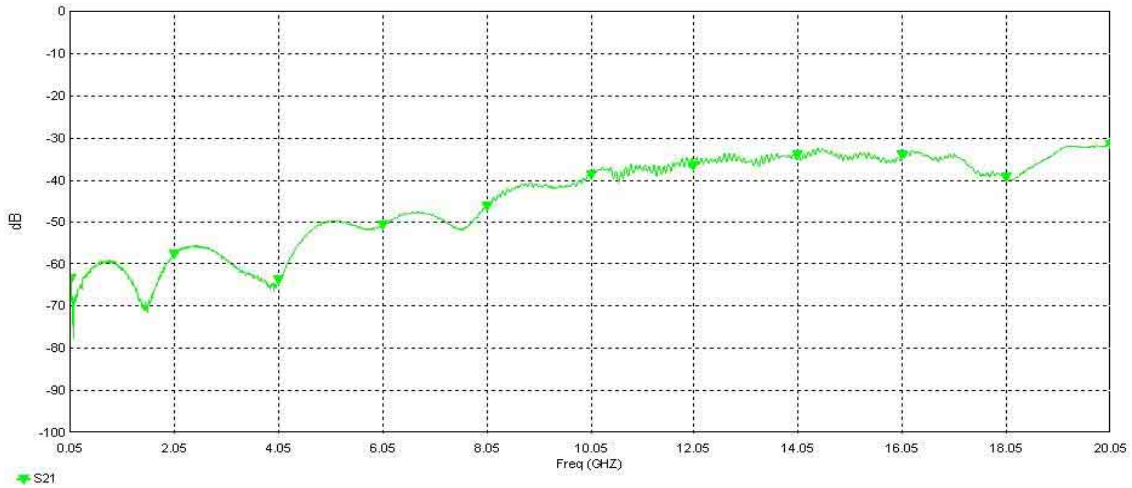

Figure 13: NEXT – COMPETITOR B

Far End Crosstalk

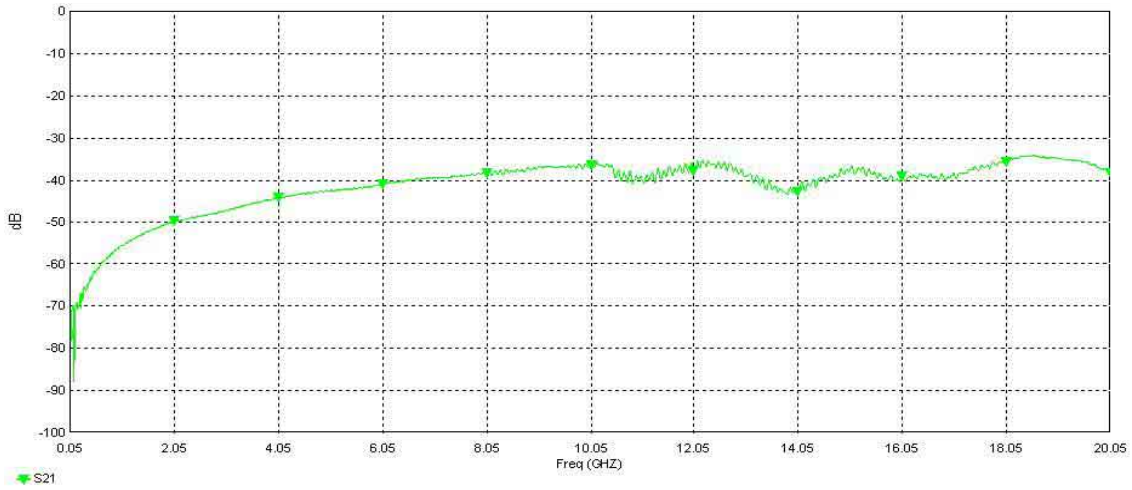

Figure 14: FEXT - SAMTEC

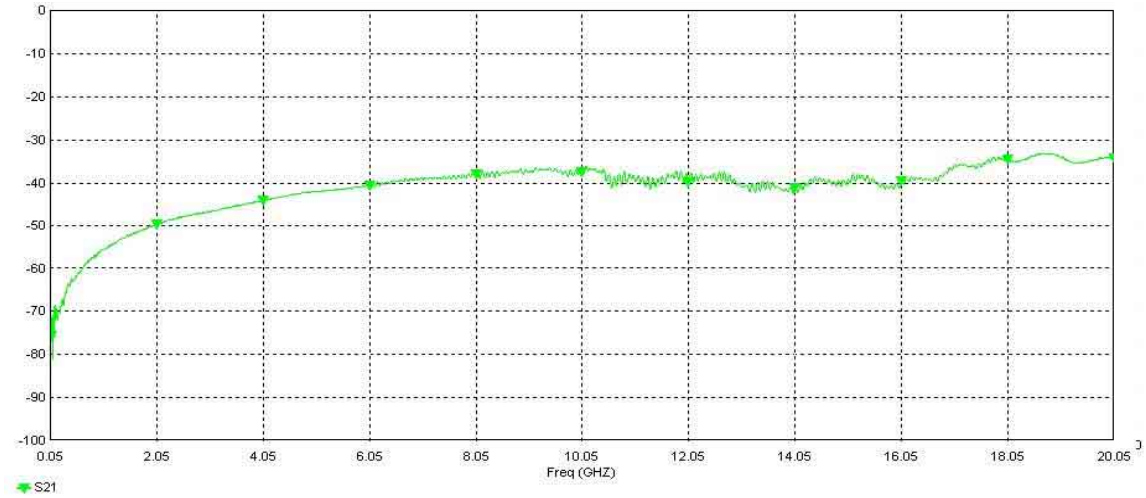

Figure 15: FEXT - COMPETITOR A

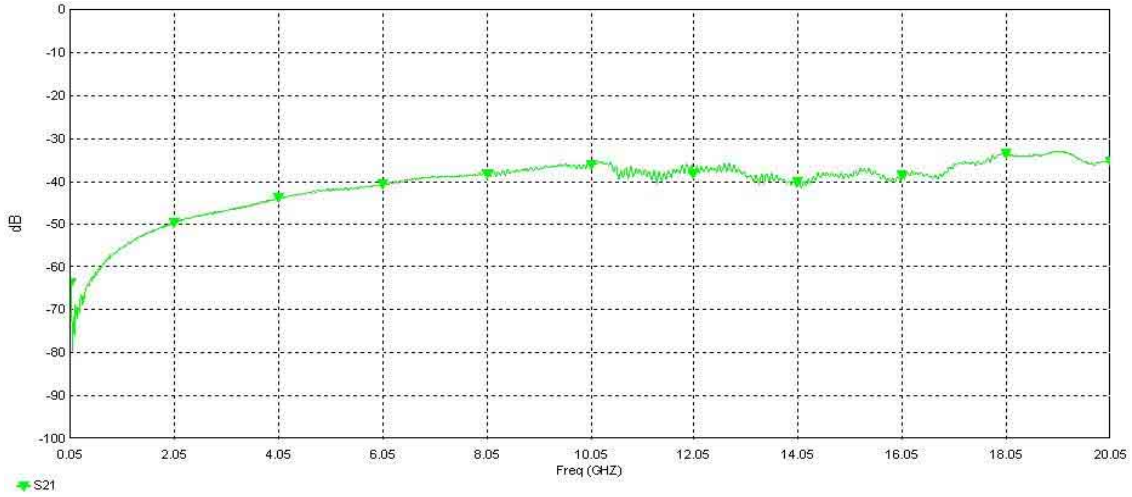

Figure 16: FEXT – COMPETITOR B

VSWR

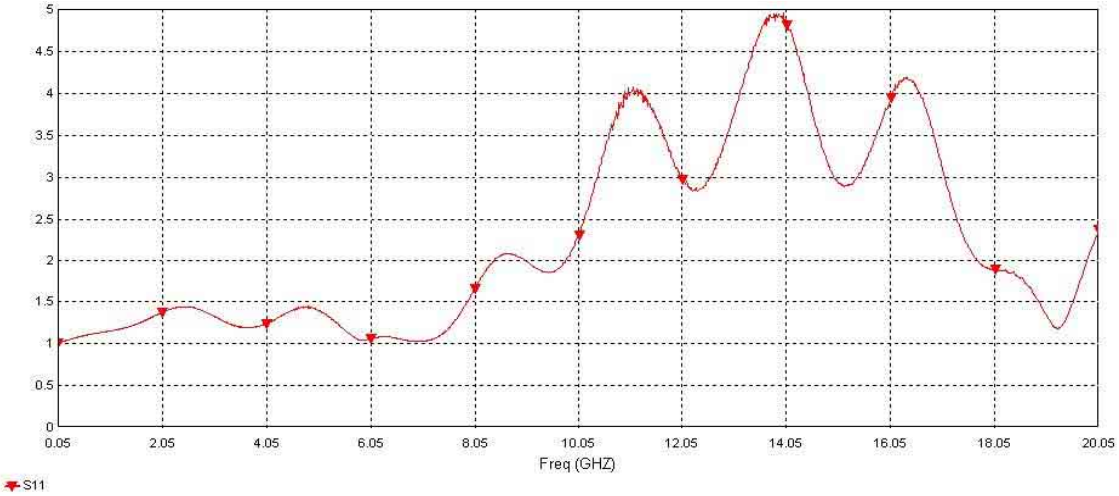

Figure 17: VSWR - SAMTEC

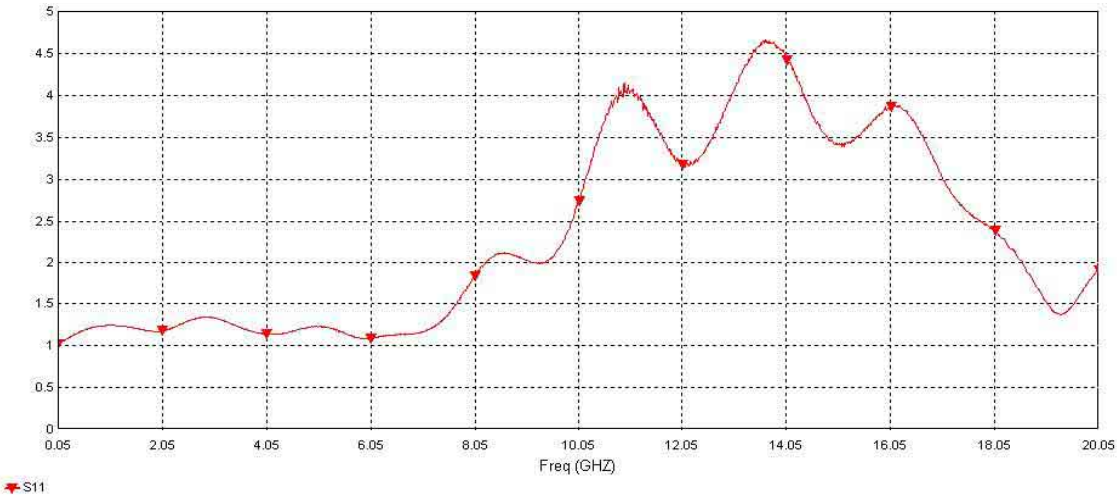

Figure 18: VSWR - COMPETITOR A

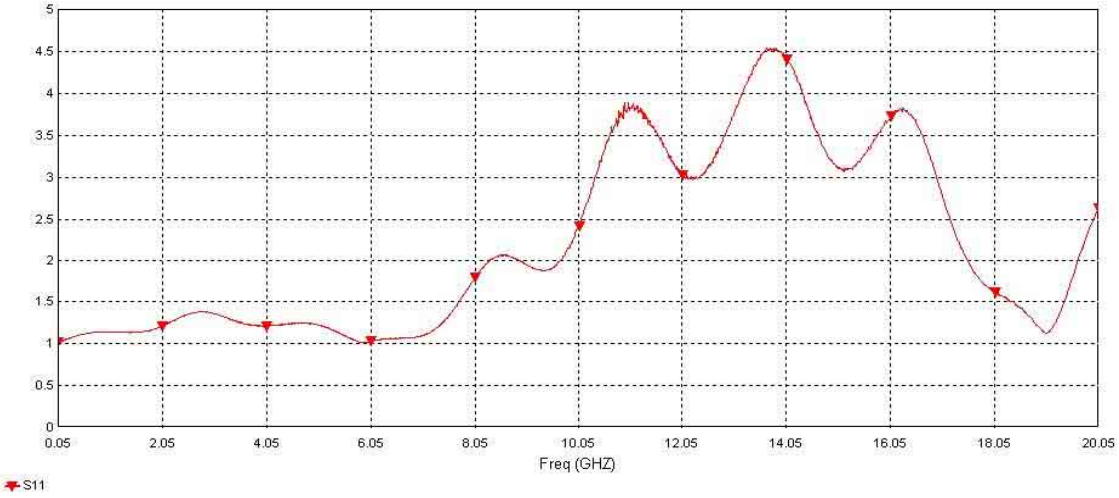

Figure 19: VSWR - COMPETITOR B

Test Procedures

Fixturing

All measurements were performed using the MMCX RF Test Board, Rev. 0. The Test Board includes test traces and two printed circuit test boards. For measurements that required reference measurements, reference traces were utilized as shown in Figure 20 below. The reference board was used to compensate for the losses due to the coaxial test cables, SMA launch, and the trace routing of the test PCB during the measurement process.

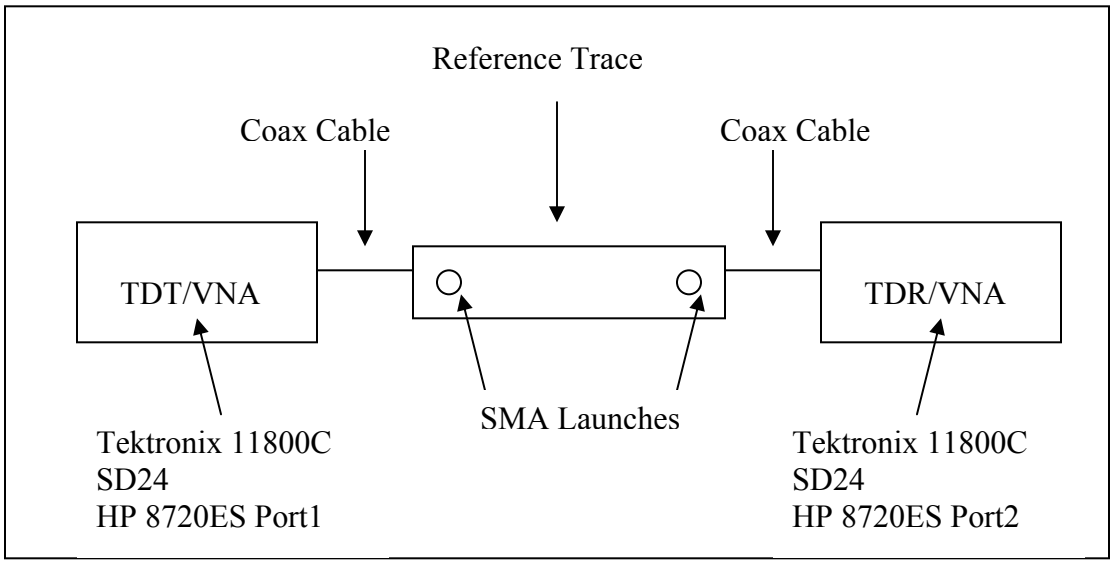

Figure 20: Test setup for Reference acquisition

Measurements were then performed using the test PCBs as shown in Figure 21.

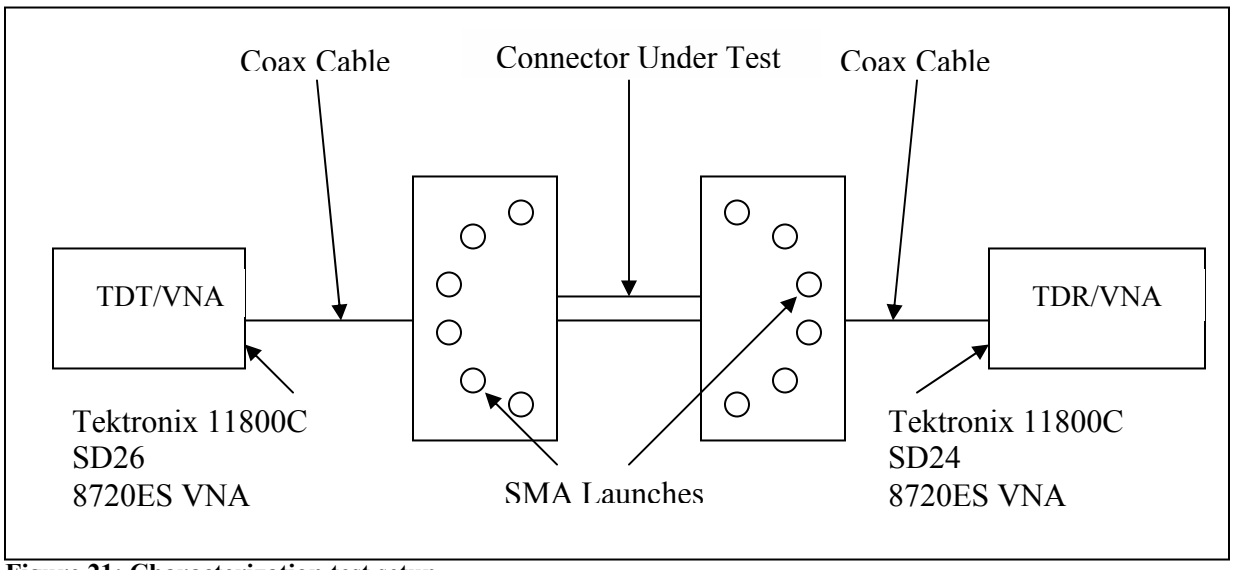

Figure 21: Characterization test setup

Time Domain Testing

Impedance

The Tektronix 11800C oscilloscope was set up in TDR (Time Domain Reflectometry) mode using 128 averages and a 5000-point record length. The horizontal scale was set to 2ns/div to allow the near end connector and a portion of the cable to be displayed. No filtering function was set.

NEXT and FEXT

Near end crosstalk (NEXT) and far end crosstalk (FEXT) measurements were made using the Tektronix 11800C with SD24 and SD26 Sampling Heads. A thru reference of the coaxial test cables, SMAs, and reference board was performed to compensate for the test setup losses and the routing layer differences in the PCBs (see Figure 20).

To acquire Crosstalk, a signal line was driven using the TDR. NEXT was measured on an adjacent line at the near end. FEXT was measured on an adjacent line at the far end (see Figure 21). All adjacent lines were terminated, at both ends, with 50Ω SMA loads.

Frequency Domain Testing

Insertion Loss

Insertion Loss measurements were made using the Hewlett Packard 8720ES. Testing was performed over a 50 MHz to 20GHz range. Test setup losses were compensated for by acquiring a thru measurement of the coaxial test cables, SMAs, and the reference board (see Figure 20).

The reference trace was then replaced with the Test PCBs and the sample (see Figure 20). A thru measurement was taken and then post processed by using Arc RF System's SPViewII. The result is the insertion loss of the MMCX Connectors.

Return Loss and VSWR

Return Loss measurements were made using the Hewlett Packard 8720ES VNA. Testing was performed over a 50 MHz to 20GHz range.

A matched reflection waveform of the connector assembly was acquired and then post processed by using Arc RF System's SPViewII. The result is the return loss and VSWR of the total test board and MMCX connectors. VSWR is plotted to 10 GHz.

Near and Far End Crosstalk

NEXT and FEXT were measured in the frequency domain using the Hewlett Packard 8720ES VNA.

To acquire the NEXT, a line was driven using the VNA. NEXT was measured on an adjacent line (see Figure 22). NEXT was then post processed by using Arc RF System's SPViewII. The result is the NEXT of the MMCX connector in the frequency domain.

FEXT was measured on an adjacent line at the far end (see Figure 23). FEXT was then post processed by using Arc RF System's SPViewII. The result is the FEXT of the MMCX connectors in the frequency domain. All adjacent lines were terminated, at both ends, with 50Ω SMA loads.

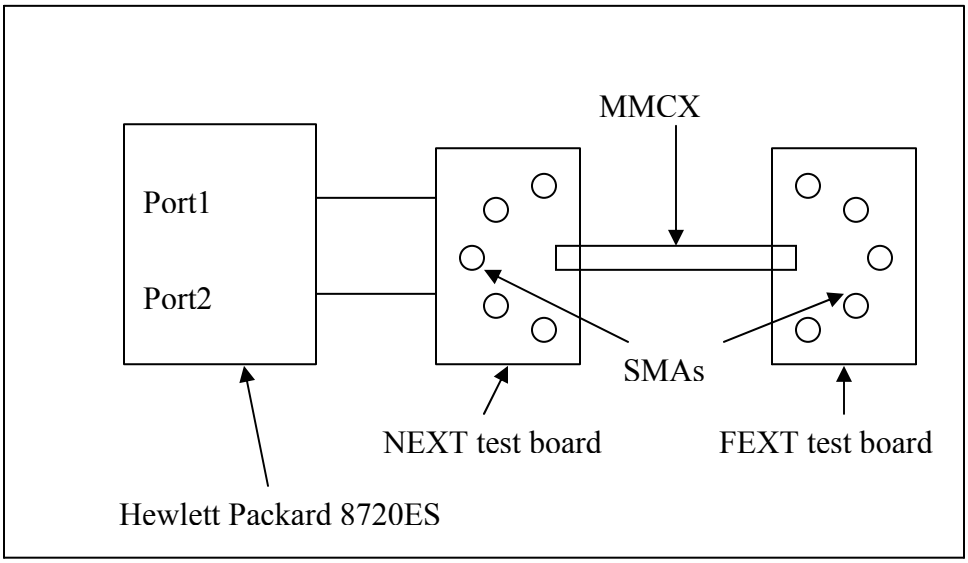

Figure 22: NEXT Measurement Setup

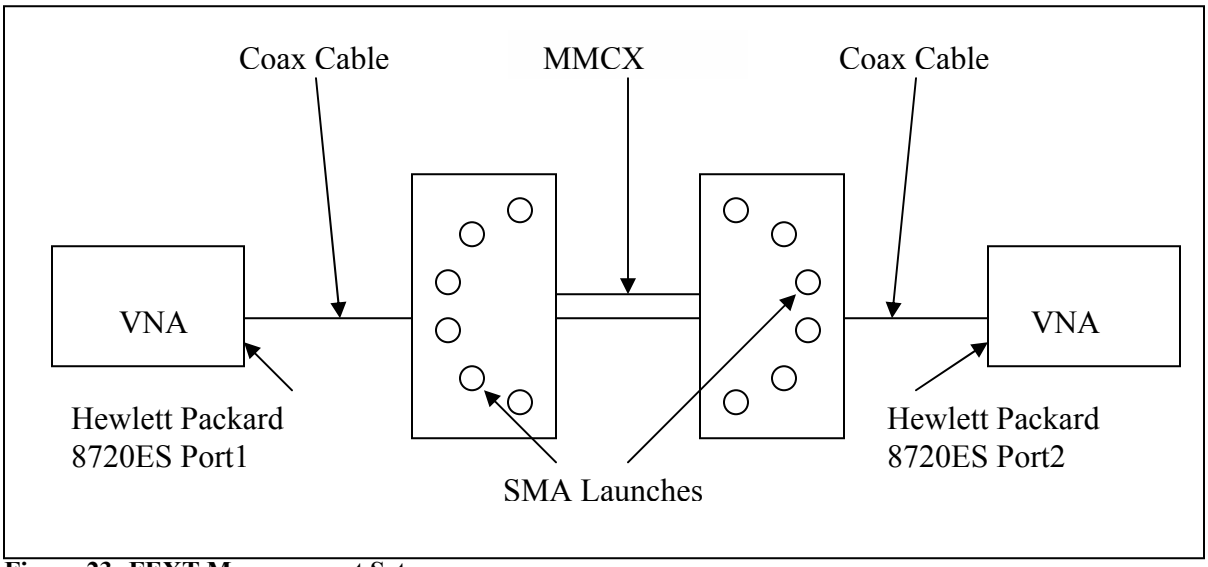

Figure 23: FEXT Measurement Setup

Equipment

Time Domain Testing

Tektronix 11800C Oscilloscope
Tektronix SD26 Sampling Head
Tektronix SD24 TDR/Sampling Head

Frequency Domain Testing

Hewlett Packard 8720ES VNA