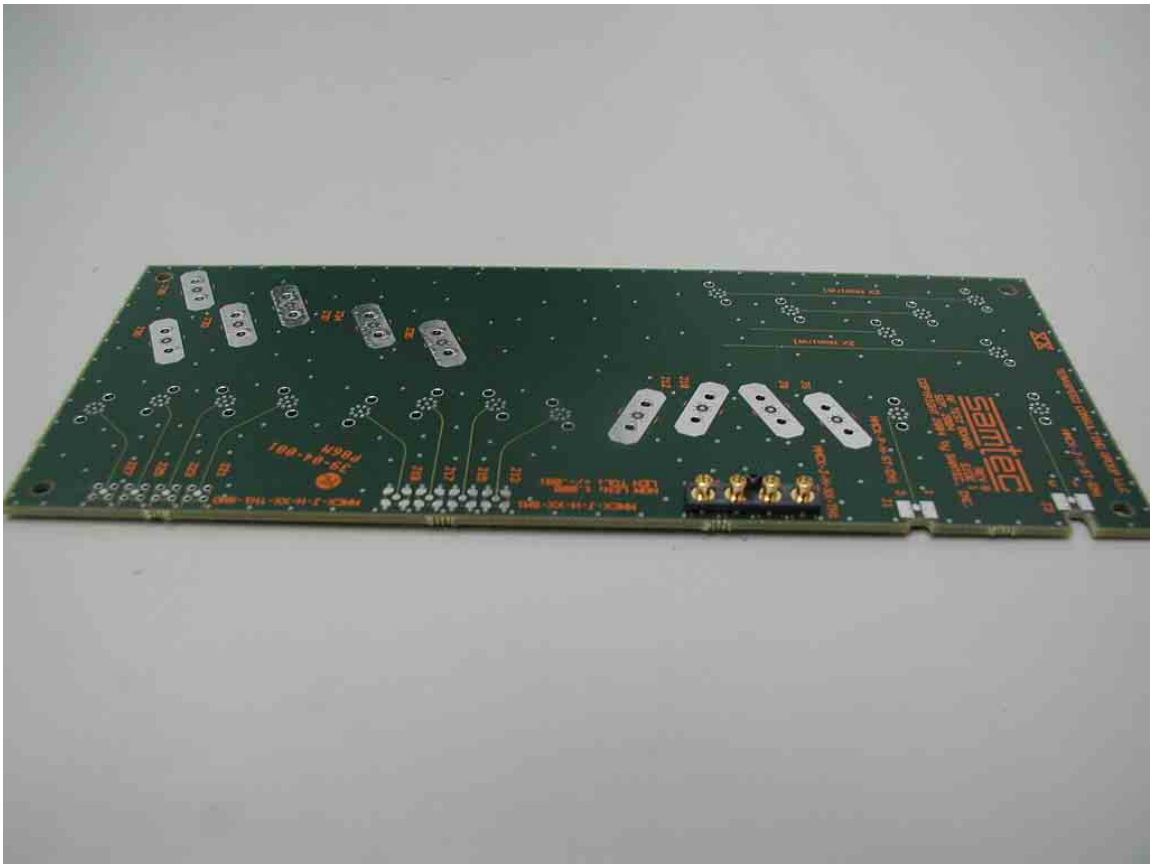
High Speed Characterization Report

GRF1-P-P-04-E-ST-TH1
mated with
GRF1-J-P-04-E-ST-TH1



Description:
RF Connector, PCB Mount, Straight Orientation, Thru-Hole Mount

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Series: GRF1
Description: RF Connector, PCB Mount, Straight Orientation, Thru-Hole Mount

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Introduction

This testing was performed to evaluate the electrical performance of the Samtec GRF1-J-P-04-E-ST-TH1 mated with the GRF1-P-P-04-E-ST-TH1. Testing was performed in accordance to the High Performance Electrical Interconnect (HPEI) SFF-8416, Level 1, testing standards when applicable.

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, and VSWR) as required. TDA Systems' IConnect Software (V3.5) 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 GRF1 Series RF connectors from Samtec. The mounting scheme was conventional through-hole technology.

Part Number	Mounting Configuration
GRF1-J-P-04-E-ST-TH1	Through Hole
GRF1-P-P-04-E-ST-TH1	Through Hole

Table 1: GRF1 Sample Descriptions

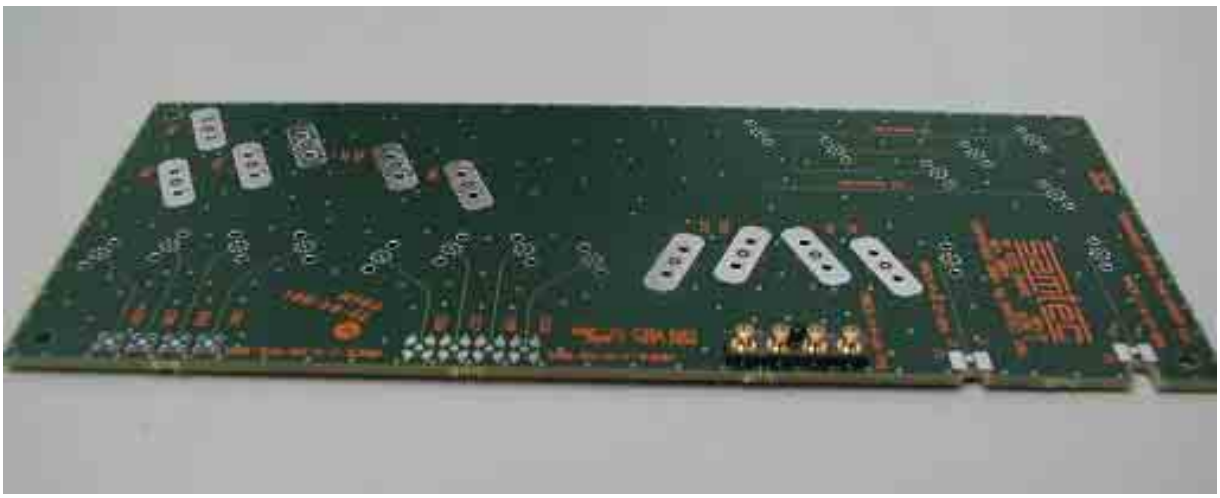

Figure 1: HFEM2-SE Sample tested

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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 GRF1 Series connector region only.

Connector	**Minimum Impedance**	**Maximum Impedance**
GRF1-x-P-04-E-ST-TH1	36 Ohms	57.3 Ohms

Table 2: Impedance Measurements (tr = 30ps)

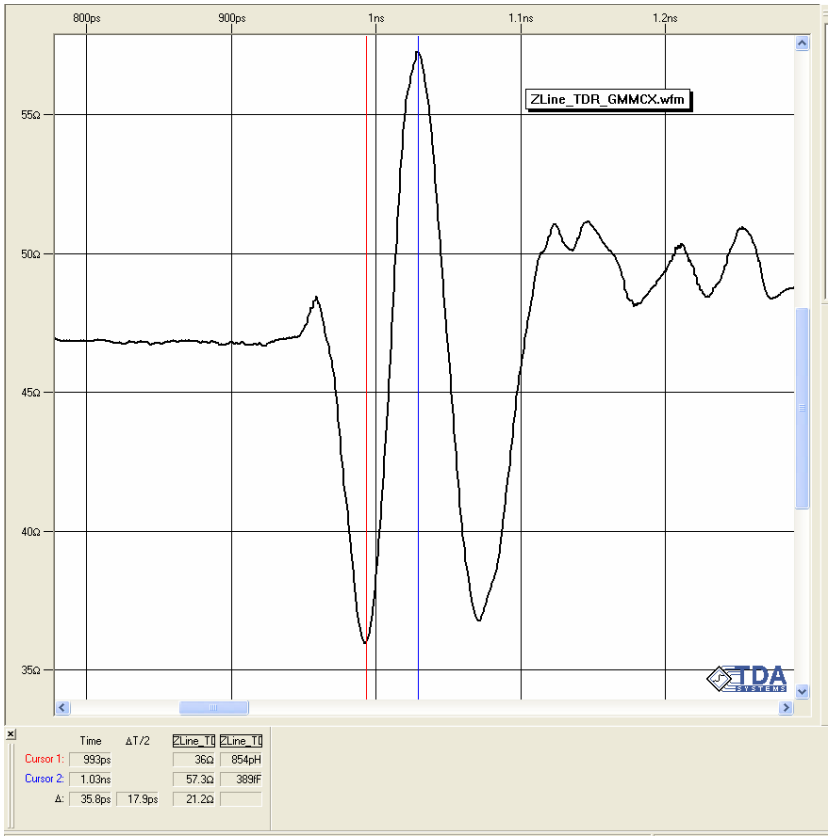

Figure 2: Impedance Profile GRF1-J-P-04-E-ST-TH1.

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NEXT / FEXT

The near end and far end crosstalk was measured in the time domain, converted to a percentage and reported below in Table 3. The incident pulse amplitude from the TDR is 250 mV.

Connector	NEXT		FEXT	
GRF1-x-P-04-E-ST-TH1	0.2 mV	0.08%	2.4 mV	0.96%

Table 3: Crosstalk Summary

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Frequency Domain Data

Insertion Loss

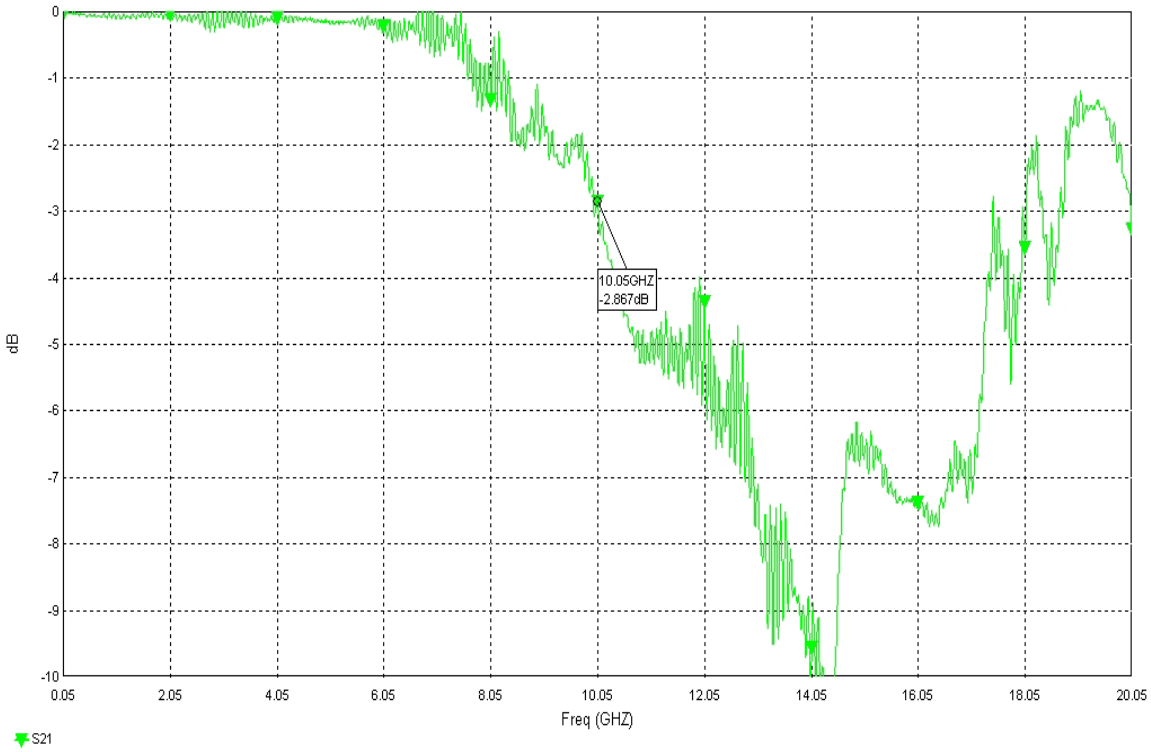

Figure 3: Insertion Loss (De-embedded), GRF1-J-P-04-E-ST-TH1 + GRF1-P-P-04-E-St-TH1

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Return Loss

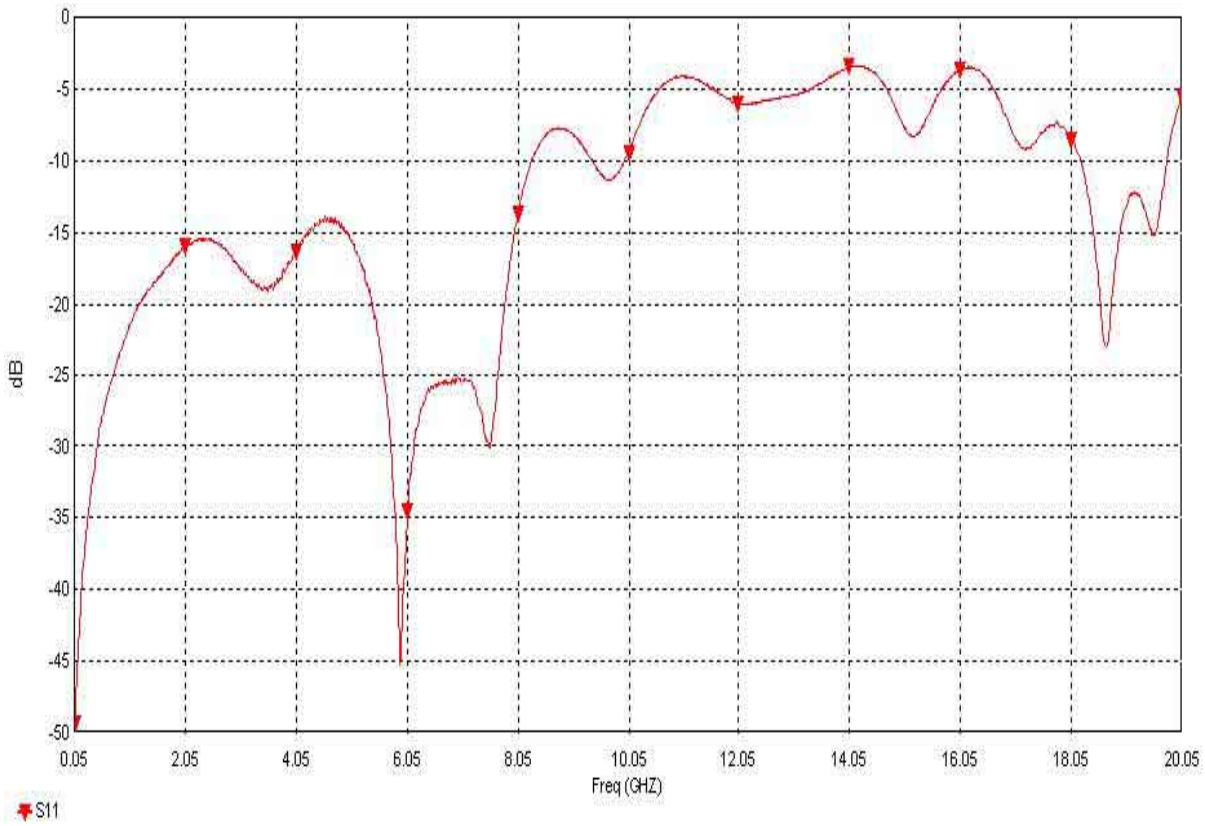

Figure 4: Return Loss, GRF1-J-P-04-E-ST-TH1 + GRF1-P-P-04-E-St-TH1

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Near End Crosstalk

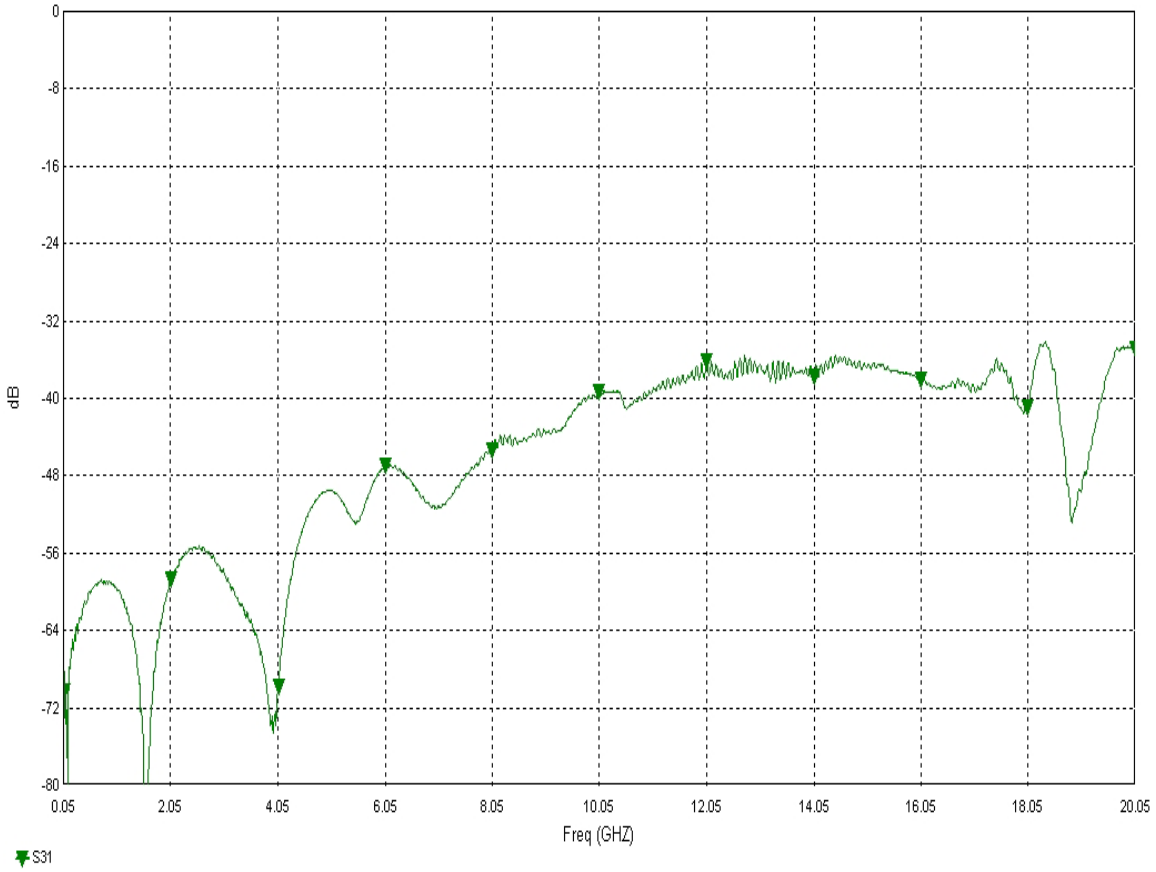

Figure 5: NEXT, GRF1-J-P-04-E-ST-TH1 + GRF1-P-P-04-E-St-TH1

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Far End Crosstalk

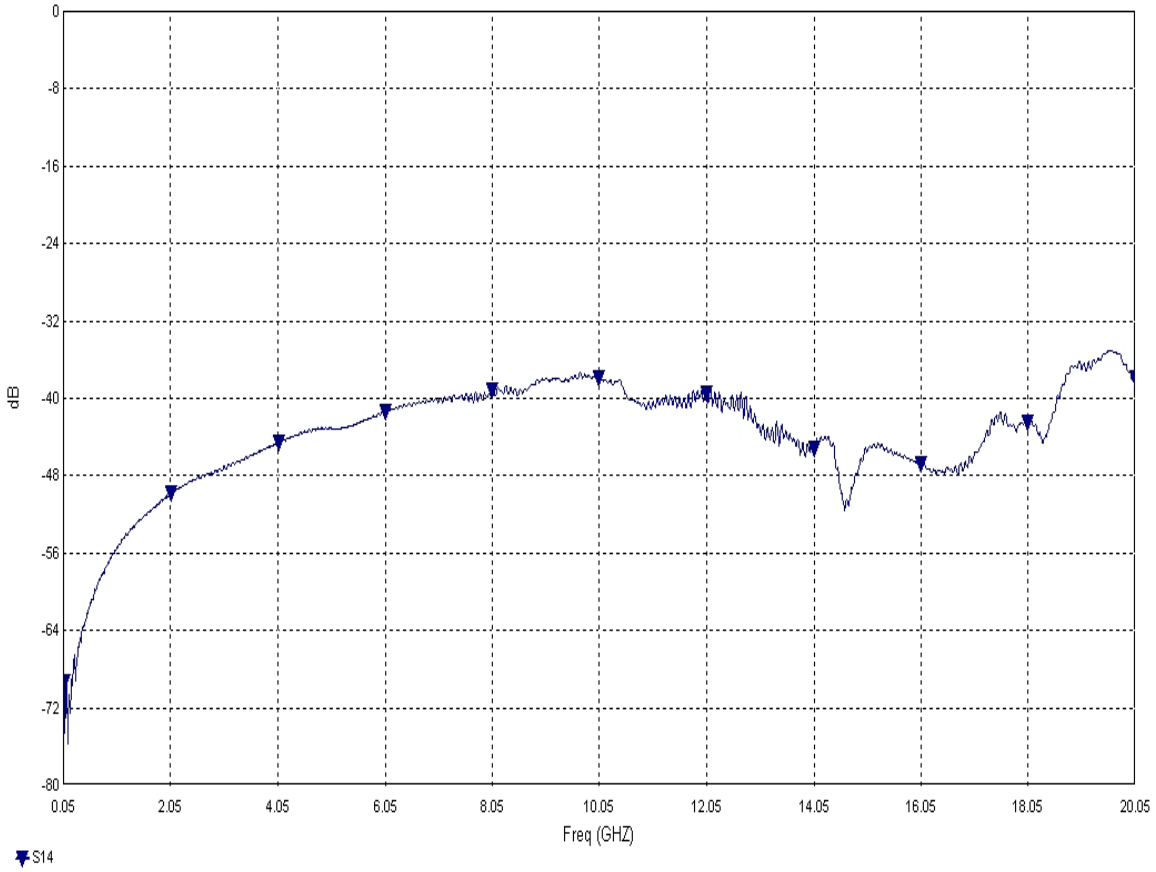

Figure 6: FEXT, GRF1-J-P-04-E-ST-TH1 + GRF1-P-P-04-E-St-TH1

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VSWR

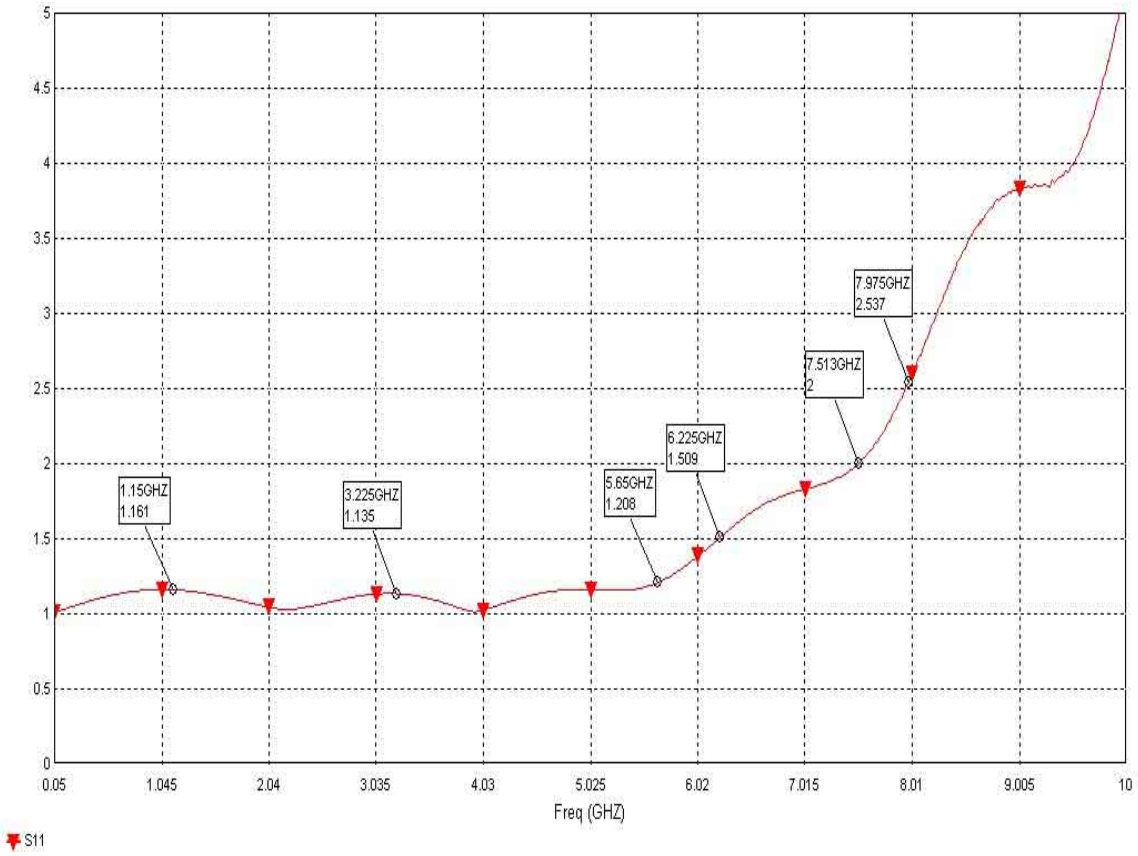

Figure 7: VSWR, GRF1-J-P-04-E-ST-TH1 + GRF1-P-P-04-E-St-TH1

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Test Procedures

Fixturing:

All measurements were performed using the 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 8 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.

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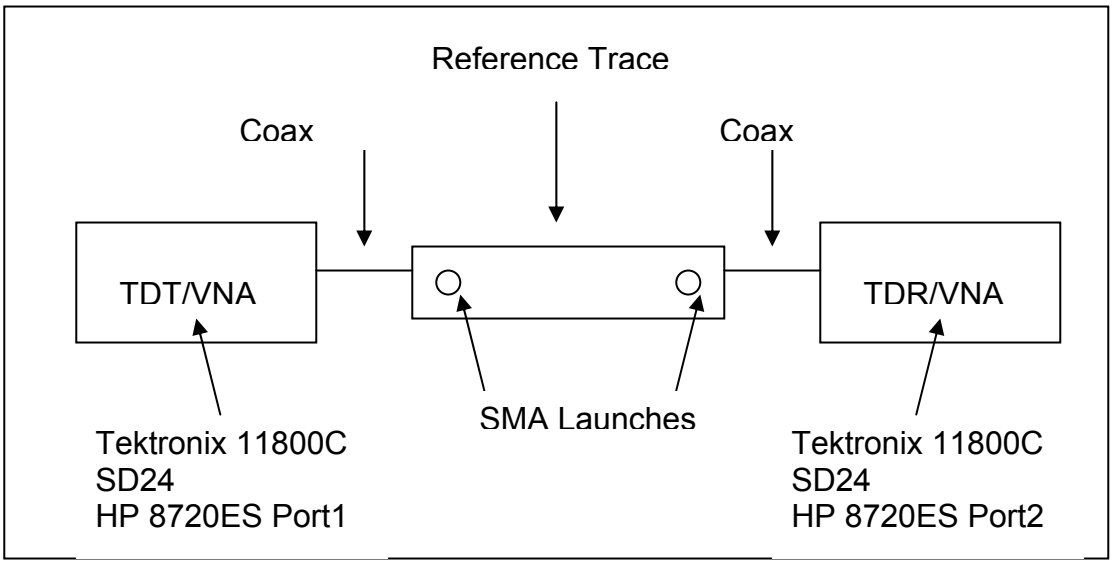

Figure 8: Test setup for Insertion Loss Reference acquisition

Measurements were then performed using the test boards as shown in Figure 9.

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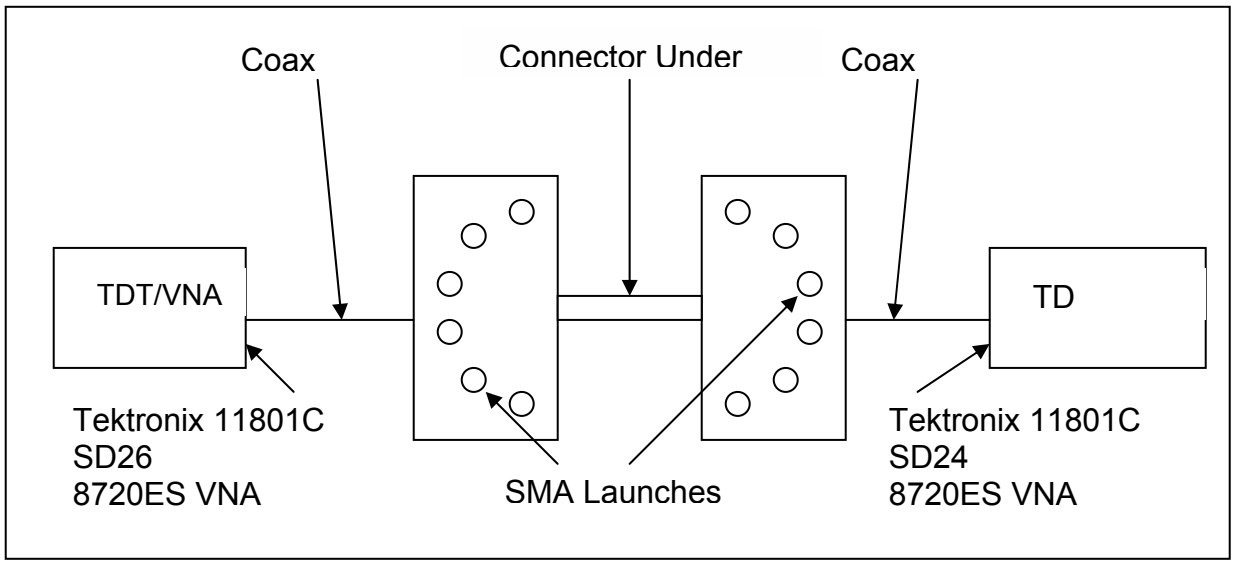

Figure 9: Characterization Test Setup

Time Domain Testing

Impedance:

The Tektronix 11801C 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 EndCrosstalk (FEXT) measurements were made using the Tektronix 11801C 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 10).

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 11). All adjacent lines were terminated, at both ends, with 50Ω SMA loads.

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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 10).

The reference trace was then replaced with the Test PCBs and the sample (see Figure 10). A thru measurement was taken and then post processed by using Arc RF System's SPViewII. The result is the Insertion Loss of the GRF1 Series 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 GRF1 Series 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 GRF1 Series connectors 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 GRF1 Series connectors in the Frequency Domain. All adjacent lines were terminated, at both ends, with 50Ω SMA loads.

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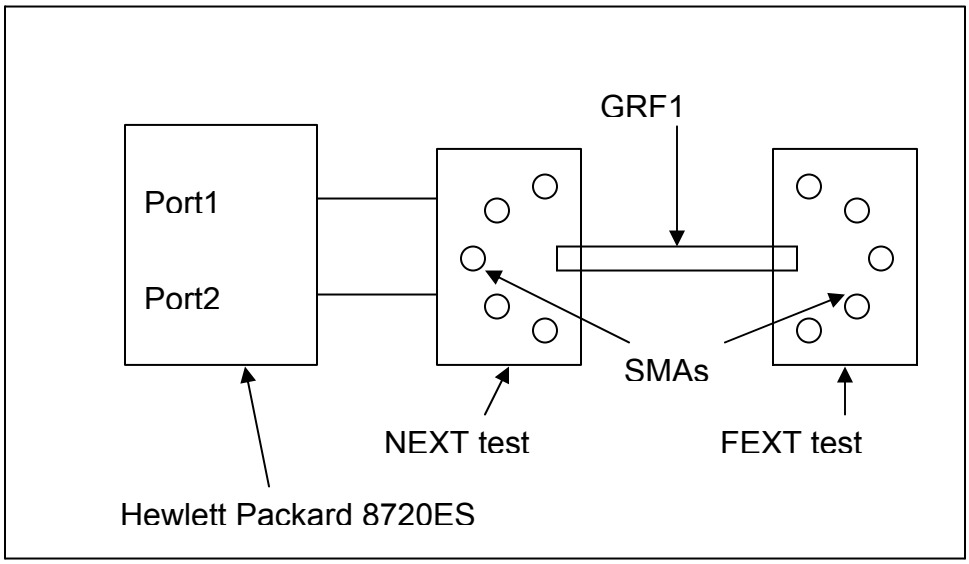

Figure 10: NEXT Measurement Setup

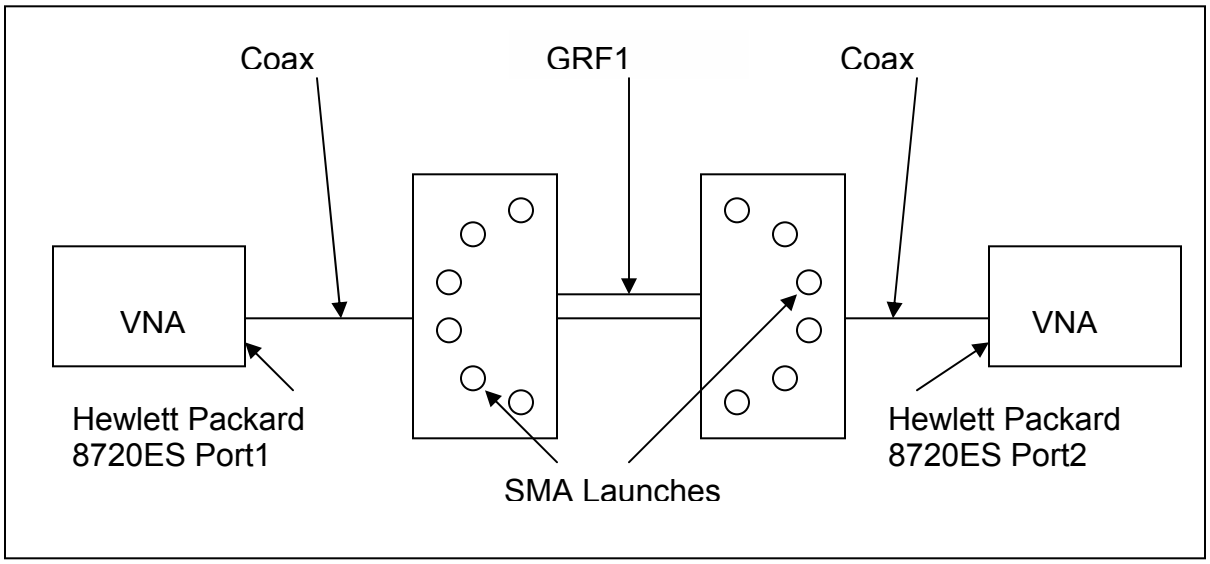

Figure 11: FEXT Measurement Setup

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Equipment

Time Domain Testing

Tektronix 11801C Oscilloscope
Tektronix SD26 Sampling Head
Tektronix SD24 TDR/Sampling Head

Frequency Domain Testing

Hewlett Packard 8720ES VNA

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