GT-19-159

Signal Integrity Characterization Report

For Glenair High-Speed Micro-D

Series GHSM

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Revision History

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Introduction

This testing was performed in order to evaluate the high-frequency electrical performance of the High-Speed Micro-D contacts. All measurements were taken with a Tektronix DSA8300 Digital Serial Analyzer & an Agilent E5071C network analyzer with option TDR; both connected to an SMA-launch PCB test fixture which is specifically designed for this testing. This report outlines frequency domain performance such as Insertion Loss (IL), Return Loss (RL), Near-End Crosstalk (NEXT), Far-End Crosstalk (FEXT), as well as time-domain performance including Impedance.

Product Overview

Glenair High-Speed Micro-D connectors offer outstanding signal integrity results, mating performance, durability and minimal contact resistance.

Test Samples and Test Fixtures

1) Two (2) board mount right angle Micro-D connectors (PN GHSM2L-9SBRHPT-.110) installed on PCB test fixtures (PN 691-CB120 REV 5)
2) SMA PCB 2x CAL test fixture (P/N: 691-CB120 REV 5)

Note* Test fixtures are shown in Figure 1.

Four (4) test cable assemblies were constructed in lengths of 9.84” (.25 m), 19.68” (.5 m), 39.37” (1 m), 118.11” (3 m) that as described below:

Cable PN:

963-121-28, 100-Ohm impedance matched twinax twisted pair

Cable Assembly PN (a sample picture of the cable assembly is shown in Figure 2)

1) GHSM2L-9PP-A8K1-10 (9.84” ≈ 0.25 m)
2) GHSM2L-9PP-A8K1-20 (19.68” ≈ 0.50 m)
3) GHSM2L-9PP-A8K1-40 (39.37” ≈ 1.00 m)
4) GHSM2L-9PP-A8K1-118 (118.11” ≈ 3.00 m)

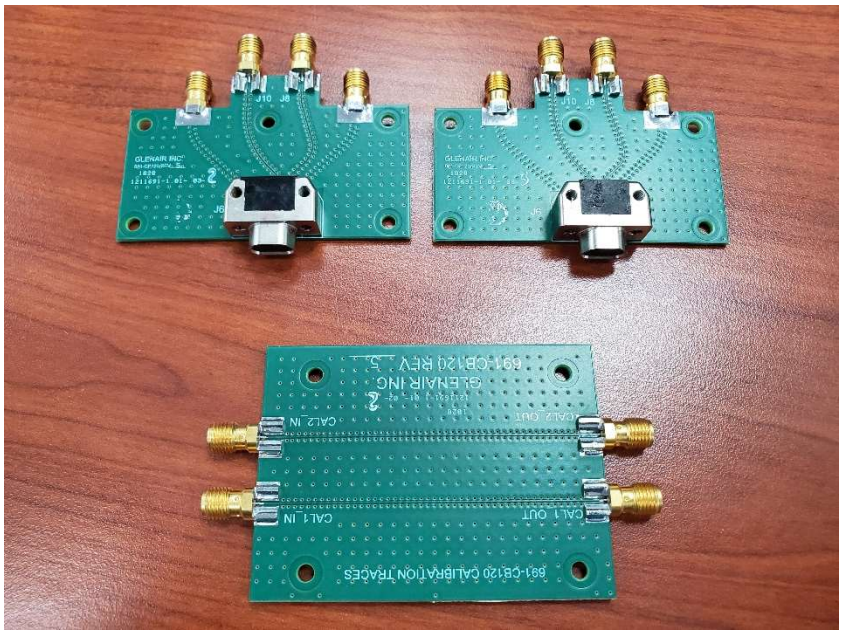


Figure 1: High-Speed Micro-D test fixtures and 2X CAL PCB

Figure 2: Sample photo of the High-Speed Micro-D cable assembly

Test Equipment:

- Keysight ENA E5071C 4-port Vector Network Analyzer with option TDR
- Keysight ECAL Module N4433A
- Tektronix 8300 TDR Scope with 80E08 Test Modules

Test Setup and Calibration

The ENA was set up to characterize the differential s-parameters and impedance of the mated High-Speed Micro-D connector cable assemblies. The setup inputs for the ENA are specified as below:

Frequency Sweep:	300 KHz – 20 GHz
IF Bandwidth:	500 Hz
Resolution:	2001 Points
Power Level:	-5.0dBm

A full 4-port calibration was performed using the ECAL module as illustrated in Figure 3 before commencing test of the mated cable assemblies.

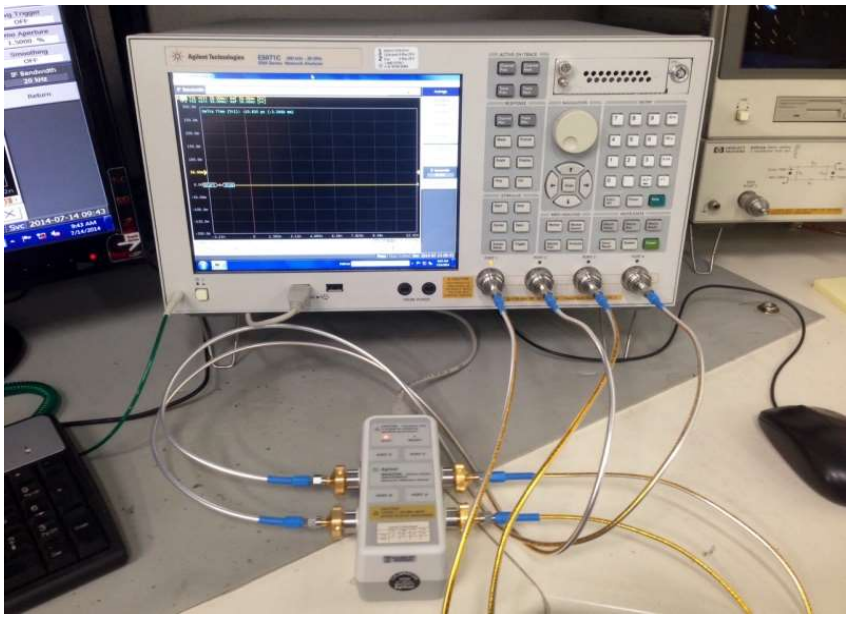


Figure 1: ENA Test Setup and Calibration

Test Procedure

1. PCB Test Fixture

The PCB test fixture for the High-Speed Micro-D qualification test for SI compliance is shown in Figure 1. The test fixture was first characterized for the impedance performance using the TDR scope to ensure a good impedance match.

The ENA and TDR scope would be used to collect the respective frequency domain and time domain test parameters for the bulk cable and mated connectors:

- Impedance @ 50ps signal rise time using the TDR scope
- Insertion Loss
- Return Loss
- Near-end crosstalk or NEXT
- Far-end crosstalk or FEXT

For the Insertion Loss, the PCB test fixture artifact that is not part of the mated connectors would be de-embedded from the results using the 2x CAL PCB test fixture.

The High-Speed Micro-D cable assembly under test is considered from the first mated pin/socket to the last mated pin/socket as shown in Figures 2 and 4.
For the SI performance test, Four (4) cable assembly configurations and lengths would be evaluated.

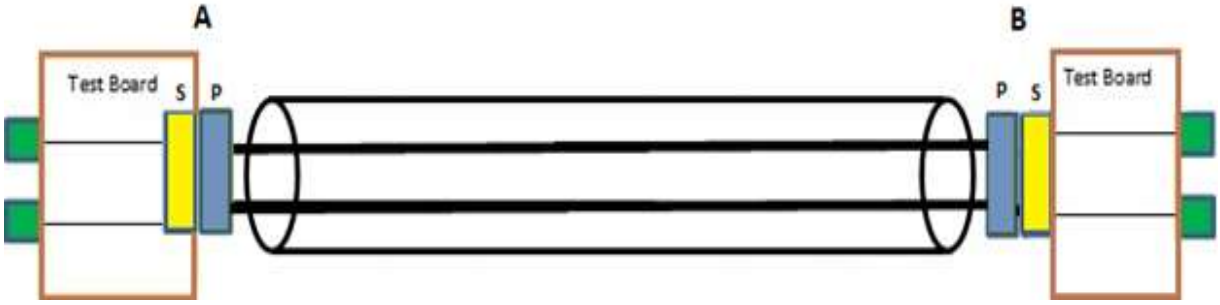


Figure 4: Test Configuration for each 0.25m, 0.5m, 1.0m and 3.0m length cable assembly test

The test data would be saved in a touchstone (.s4p) format for the s-parameters and in a .csv format for the impedance data. All parts of the PCB test fixture artifact that are not part of the cable assemblies would be de-embedded from the results using the Ataitec software and the s-parameter data of the PCB test fixture.

Test Results

The following data represents typical signal integrity performance of mated High-Speed Micro-D cable assemblies:

The Impedance of a mated High-Speed Micro-D cable assembly is shown in Figure 5. All cable assemblies have similar impedance results despite the cable length differences:

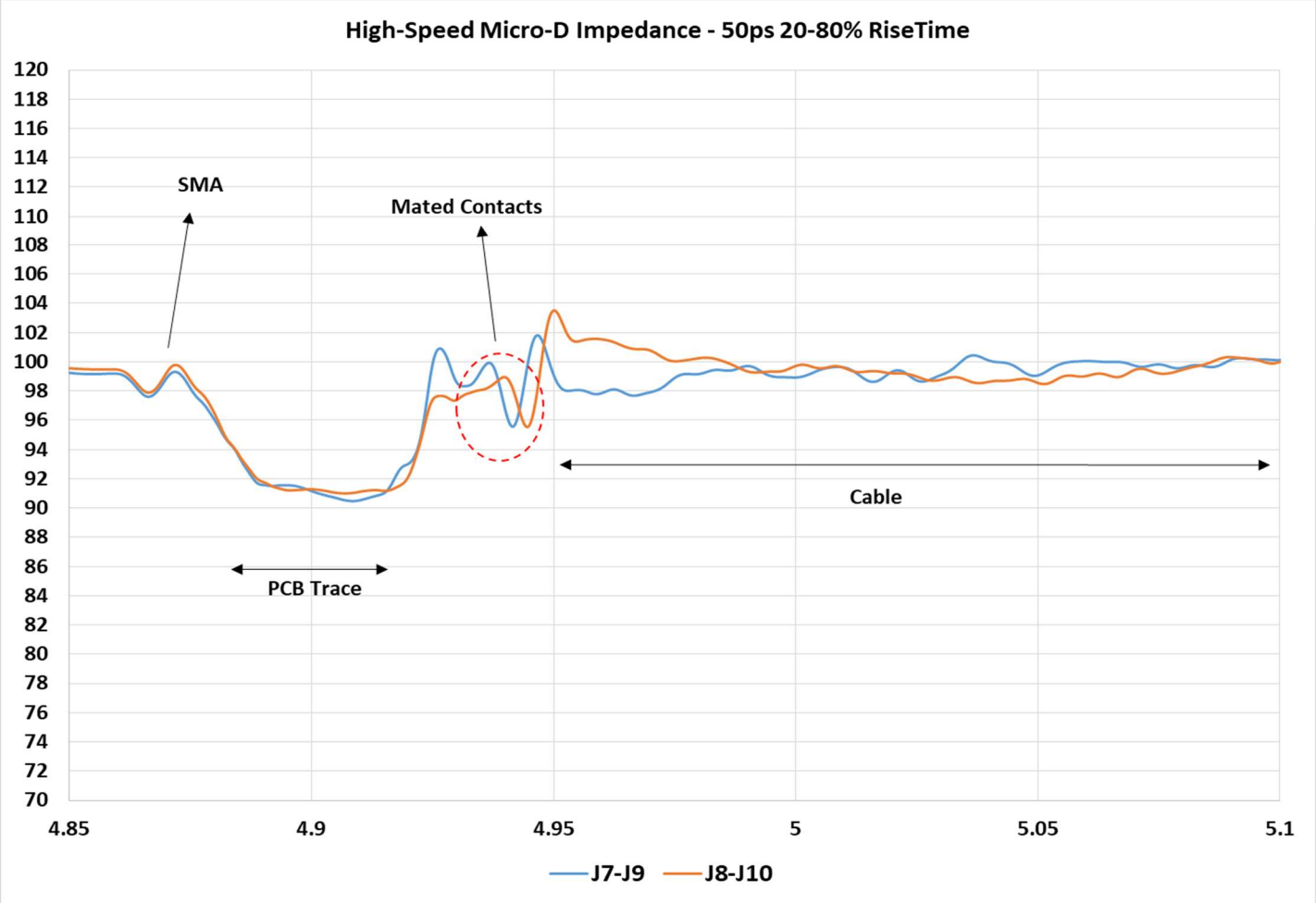


Figure 5: Impedance of the 1m cable assembly (all cable assemblies have similar impedance results)

1) 0.25m Cable Assembly:

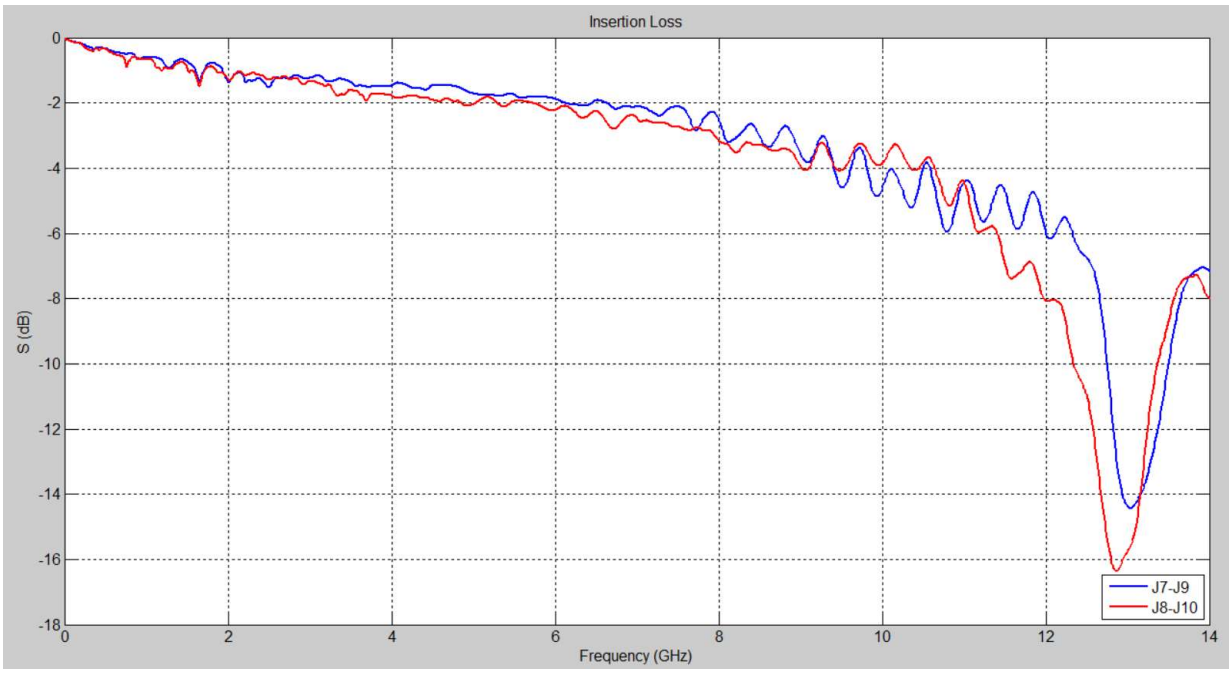


Figure 6: Insertion Loss - Pair 1 and Pair 2

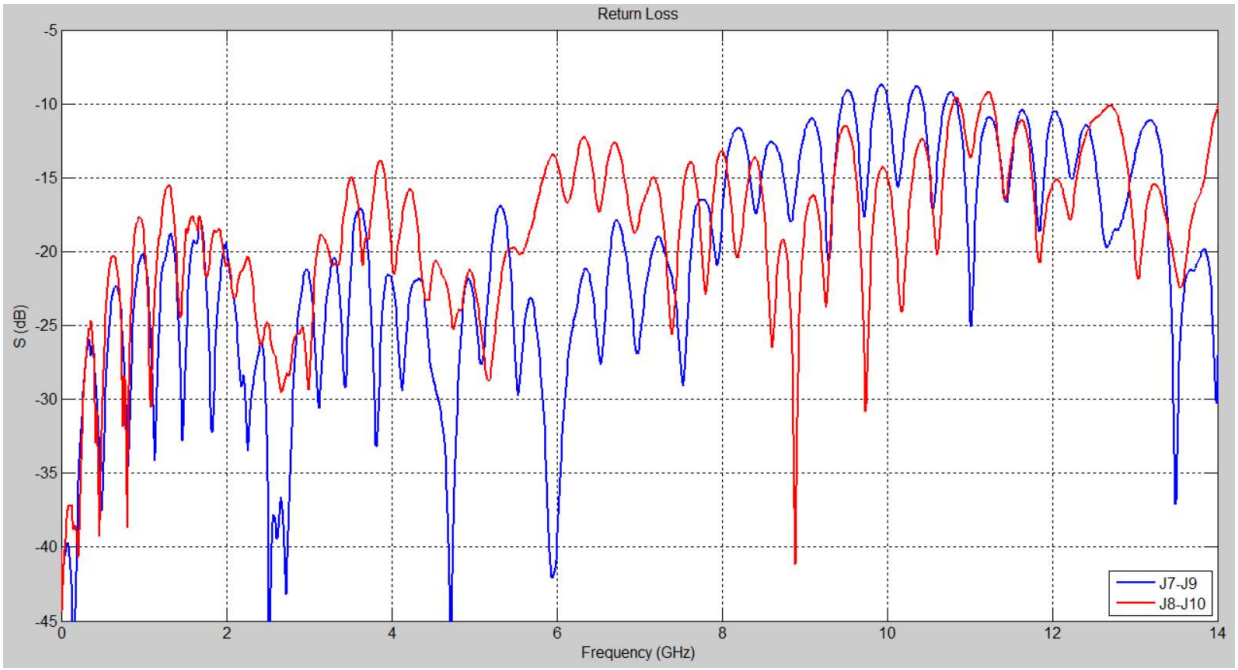


Figure 7: Return Loss - Pair 1 and Pair 2

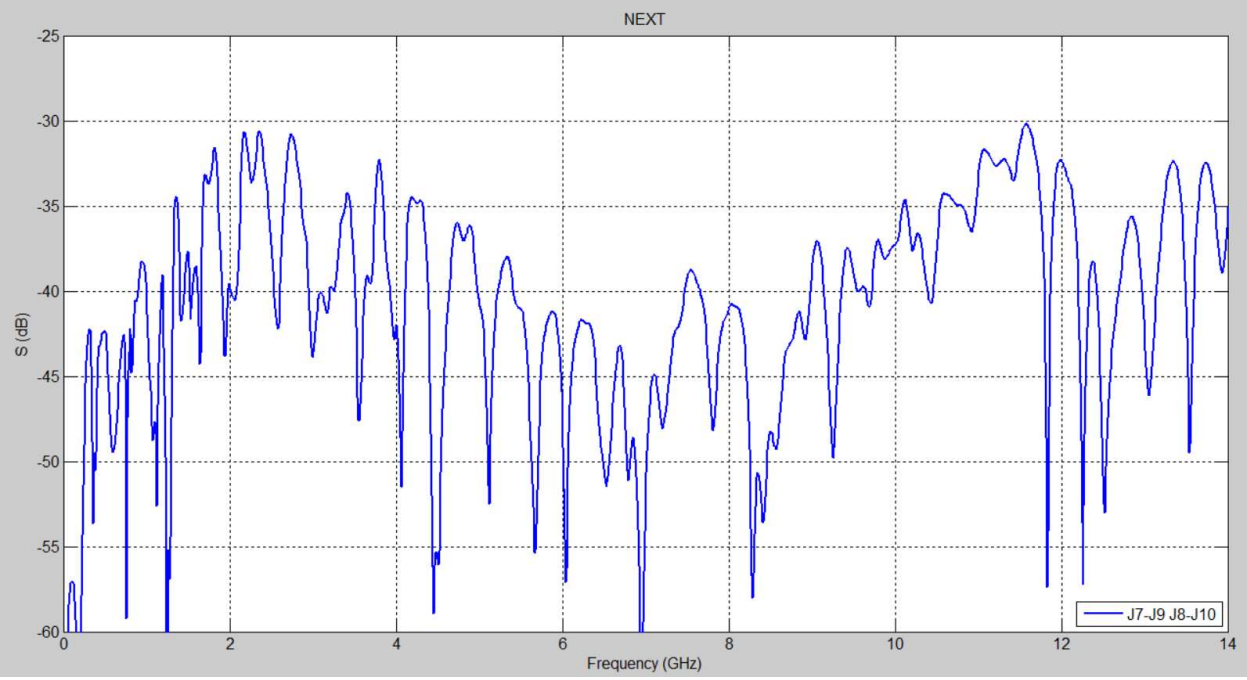


Figure 8: Near-End Crosstalk (NEXT)

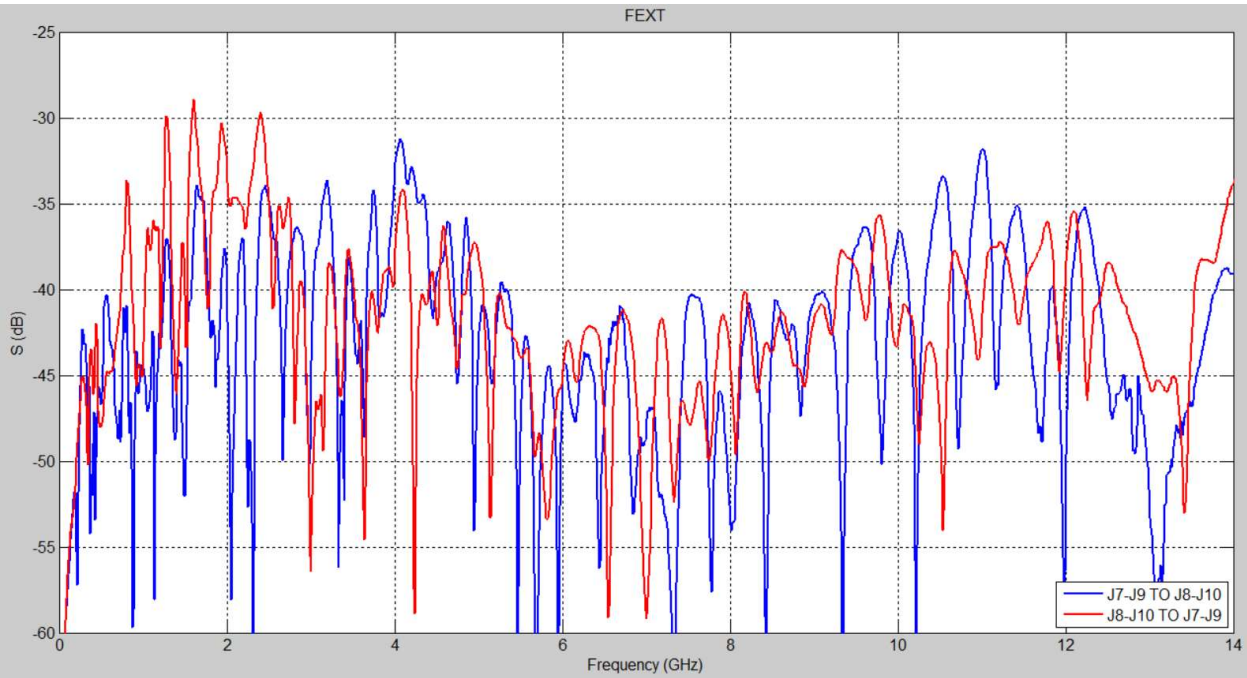


Figure 9: Far-End Crosstalk (FEXT) – Pair 1 and Pair 2

2) 0.5m Cable Assembly:

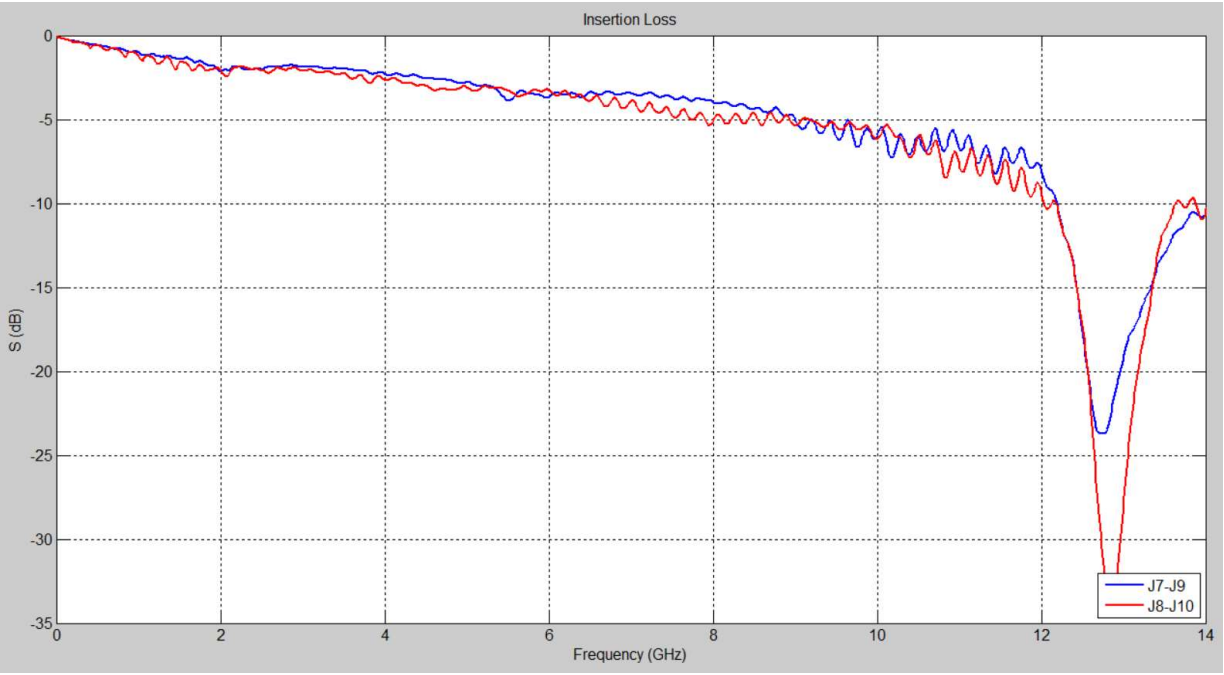


Figure 10: Insertion Loss - Pair 1 and Pair 2

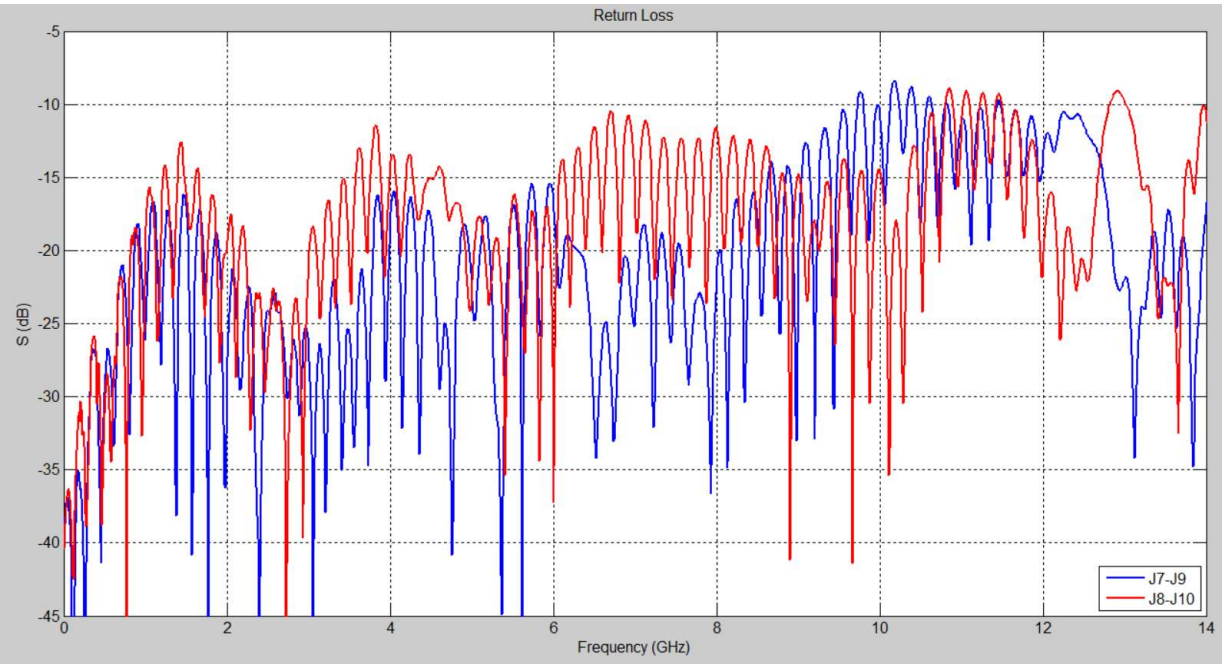


Figure 11: Return Loss - Pair 1 and Pair 2

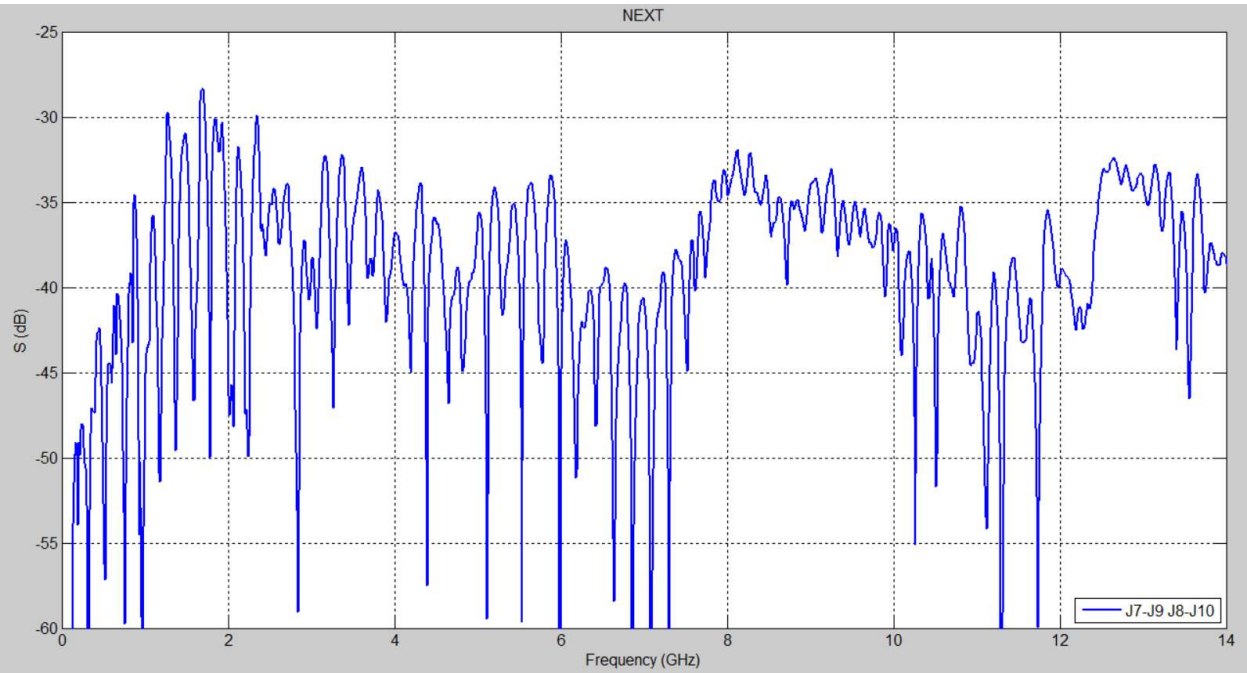


Figure 12: Near-End Crosstalk (NEXT)

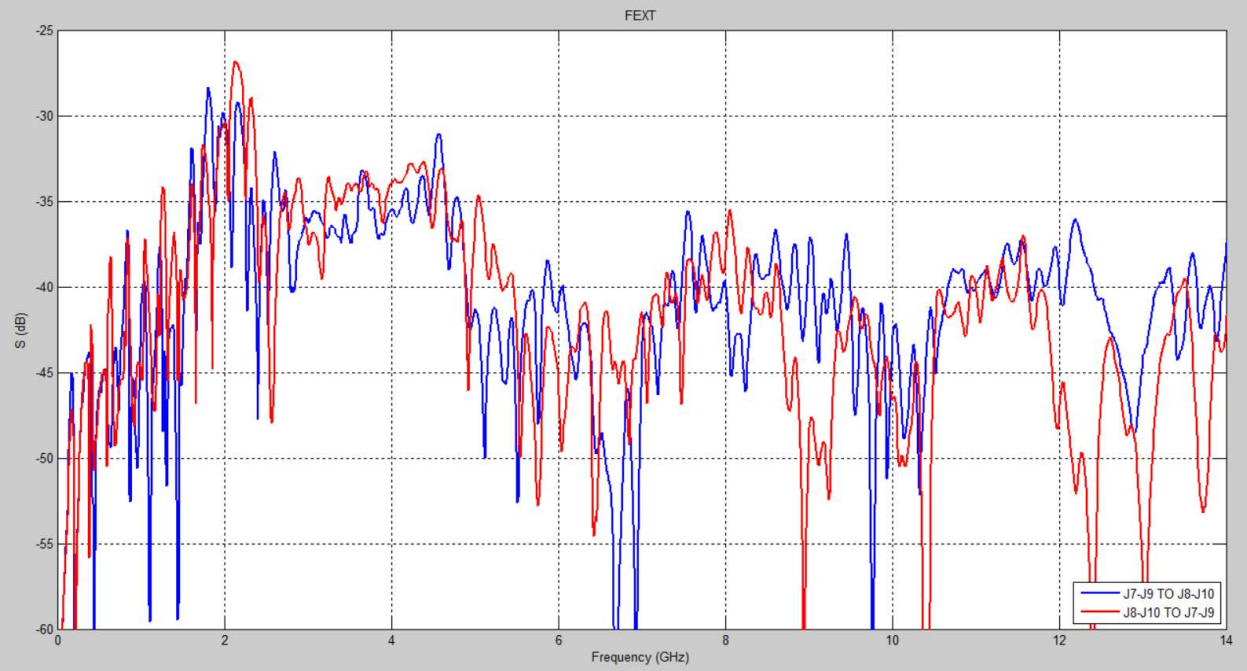


Figure 13: Far-End Crosstalk (FEXT) – Pair 1 and Pair 2

3) 1.0m Cable Assembly:

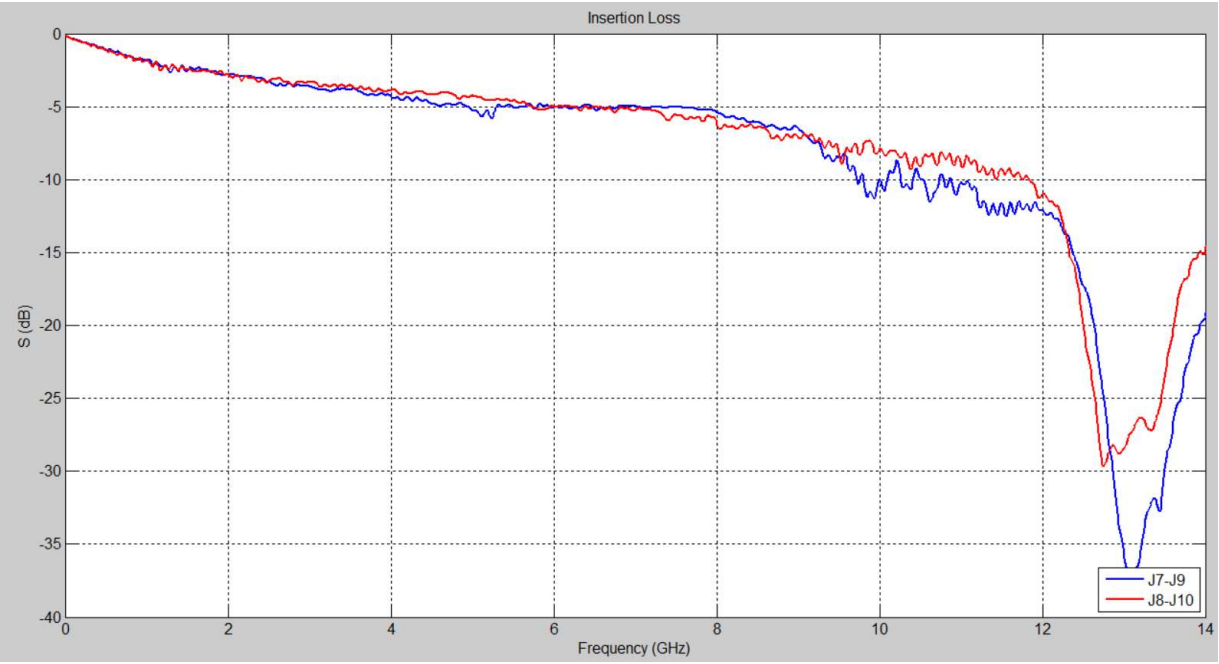


Figure 14: Insertion Loss - Pair 1 and Pair 2

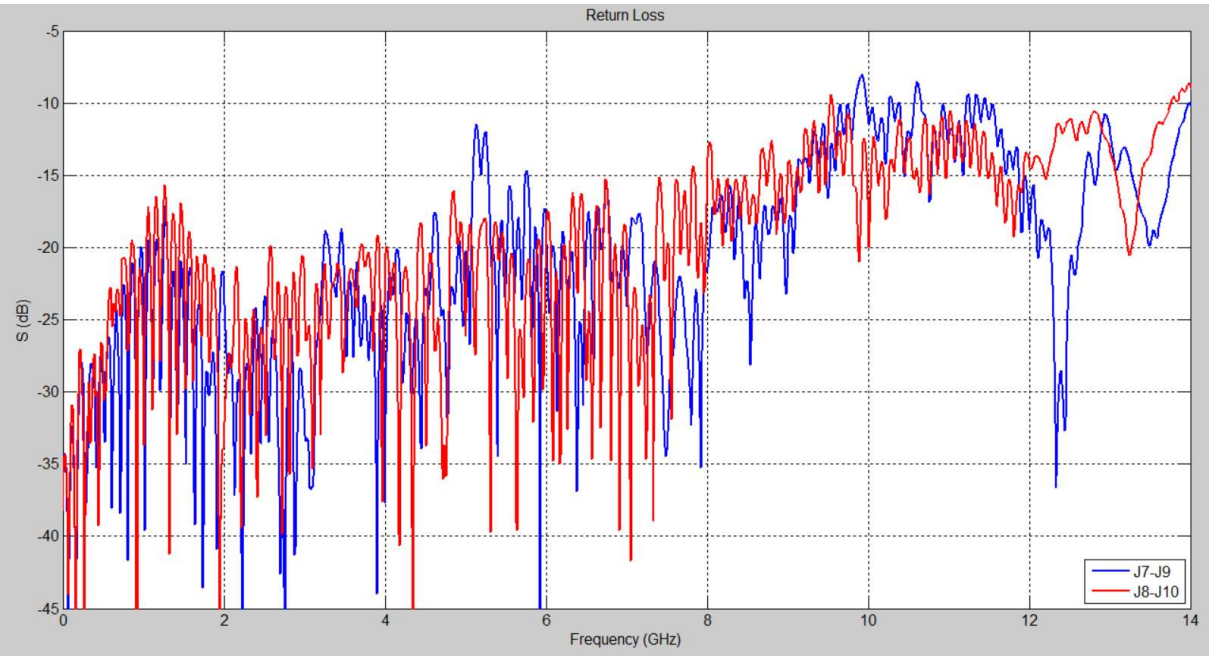


Figure 15: Return Loss - Pair 1 and Pair 2

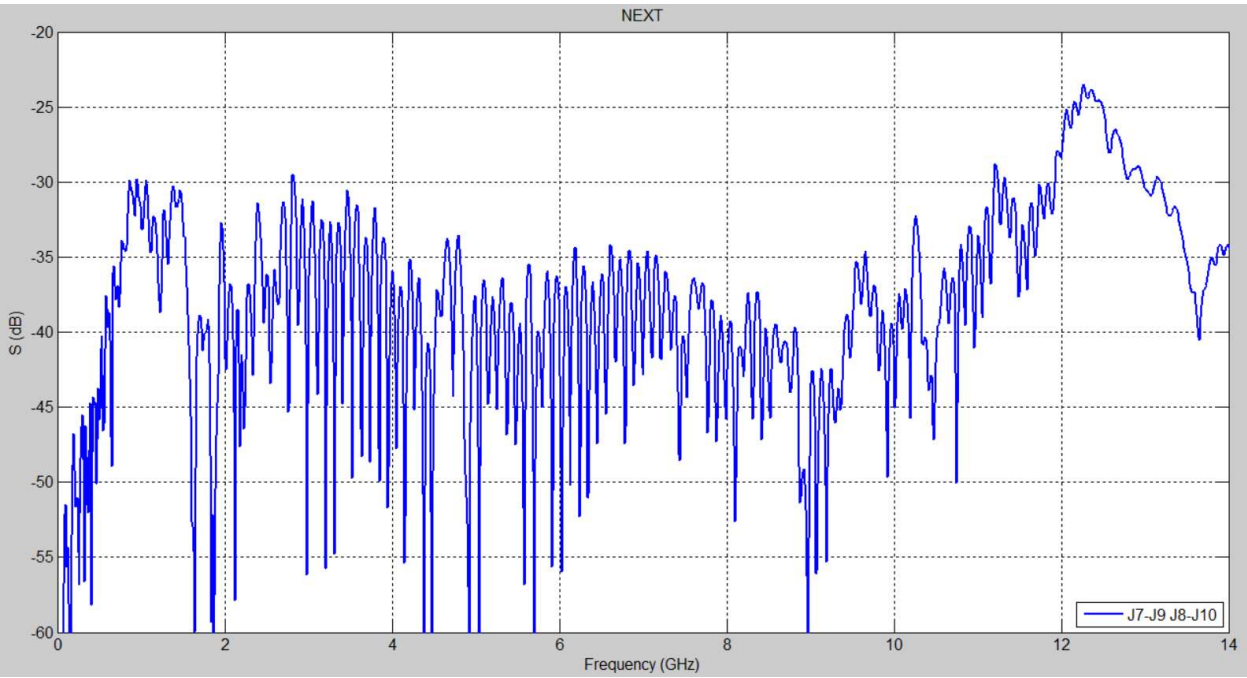


Figure 16: Near-End Crosstalk (NEXT)

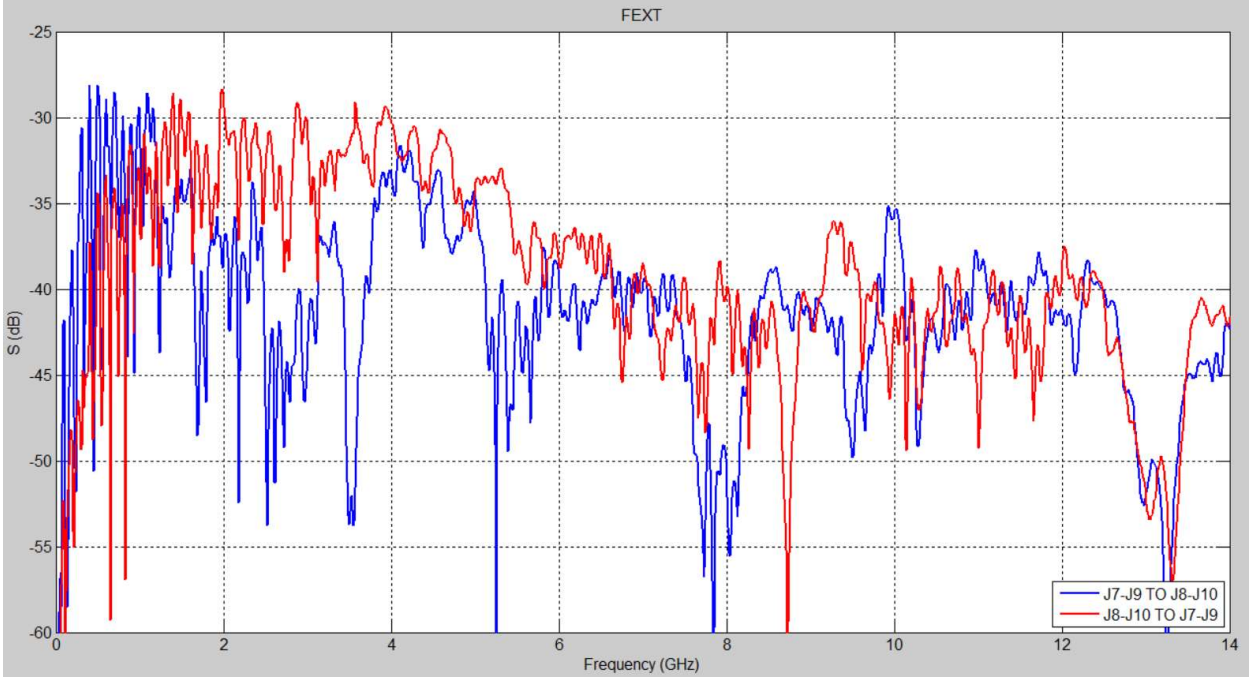


Figure 17: Far-End Crosstalk (FEXT) – Pair 1 and Pair 2

4) 3.0m Cable Assembly:

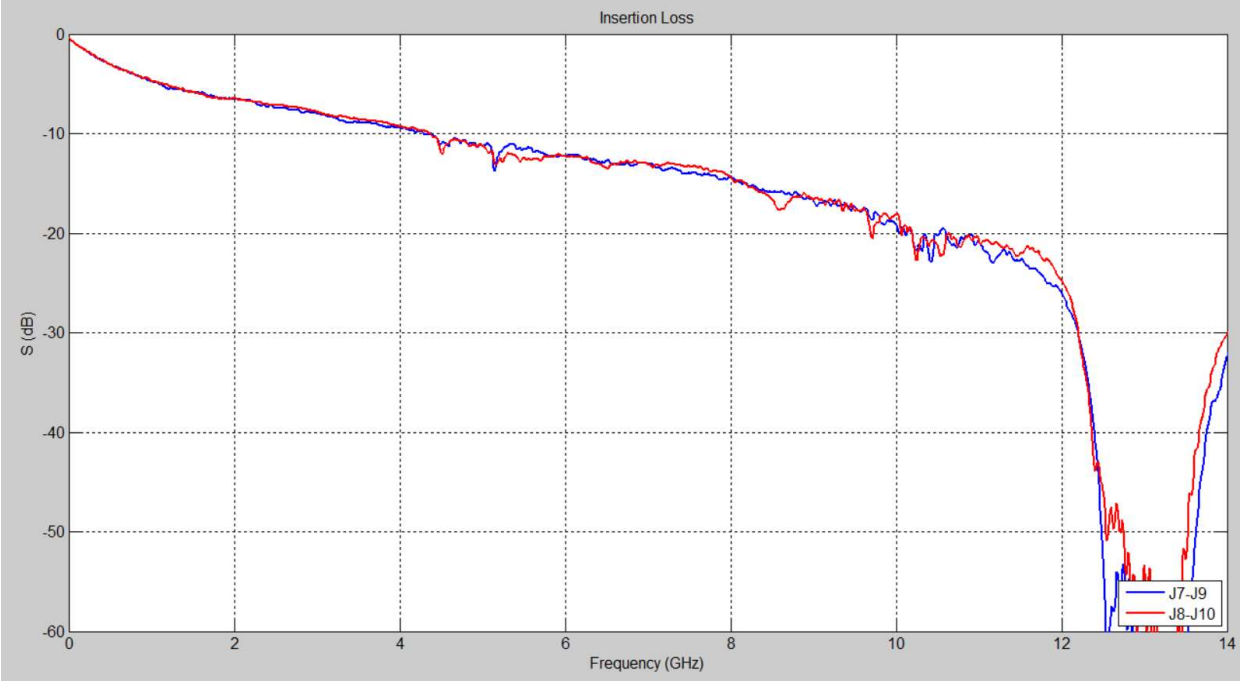


Figure 18: Insertion Loss - Pair 1 and Pair 2

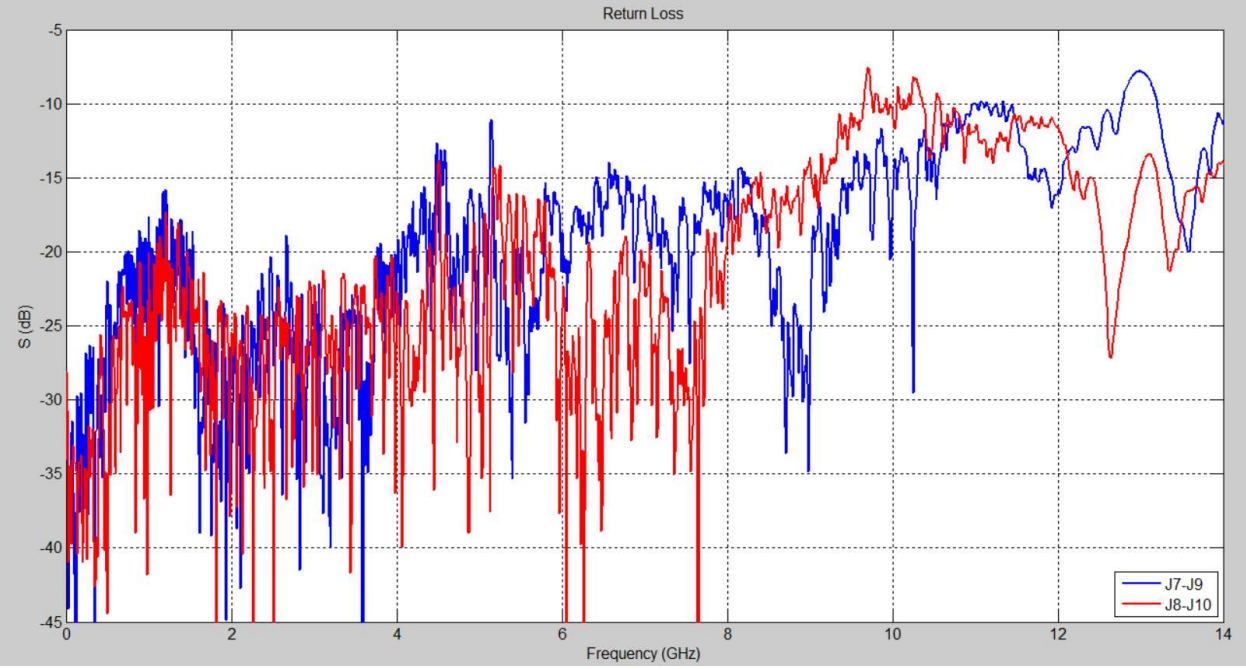


Figure 19: Return Loss - Pair 1 and Pair 2

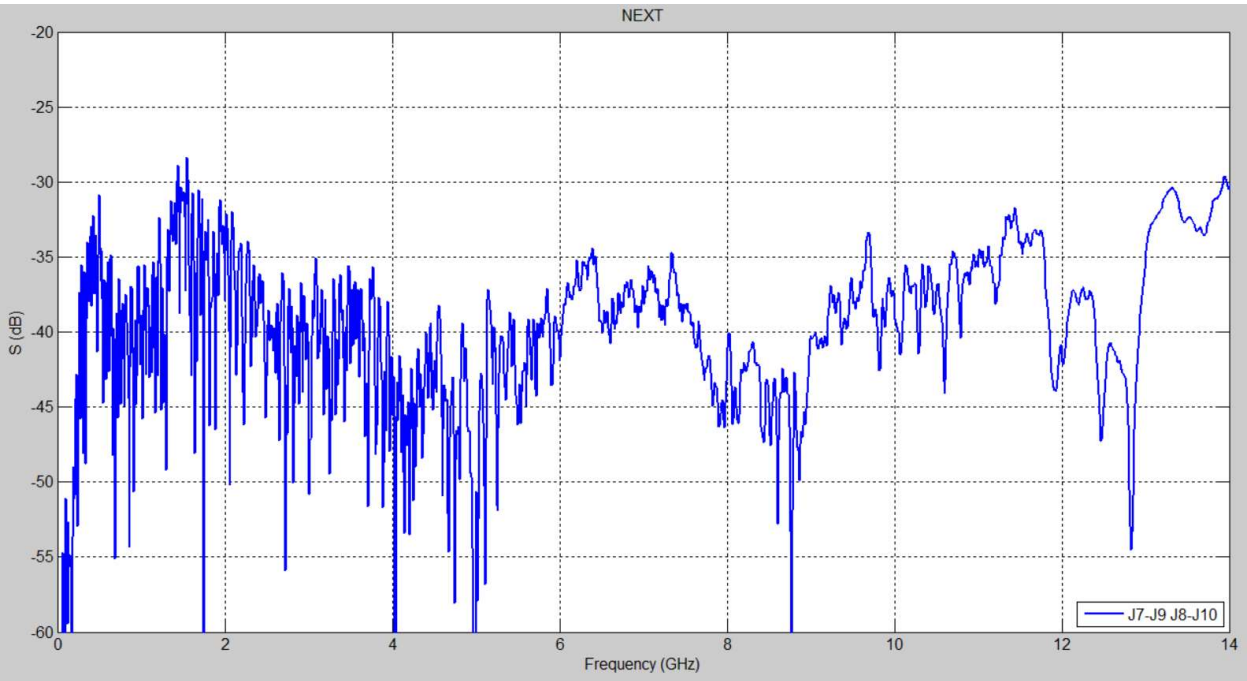


Figure 20: Near-End Crosstalk (NEXT)

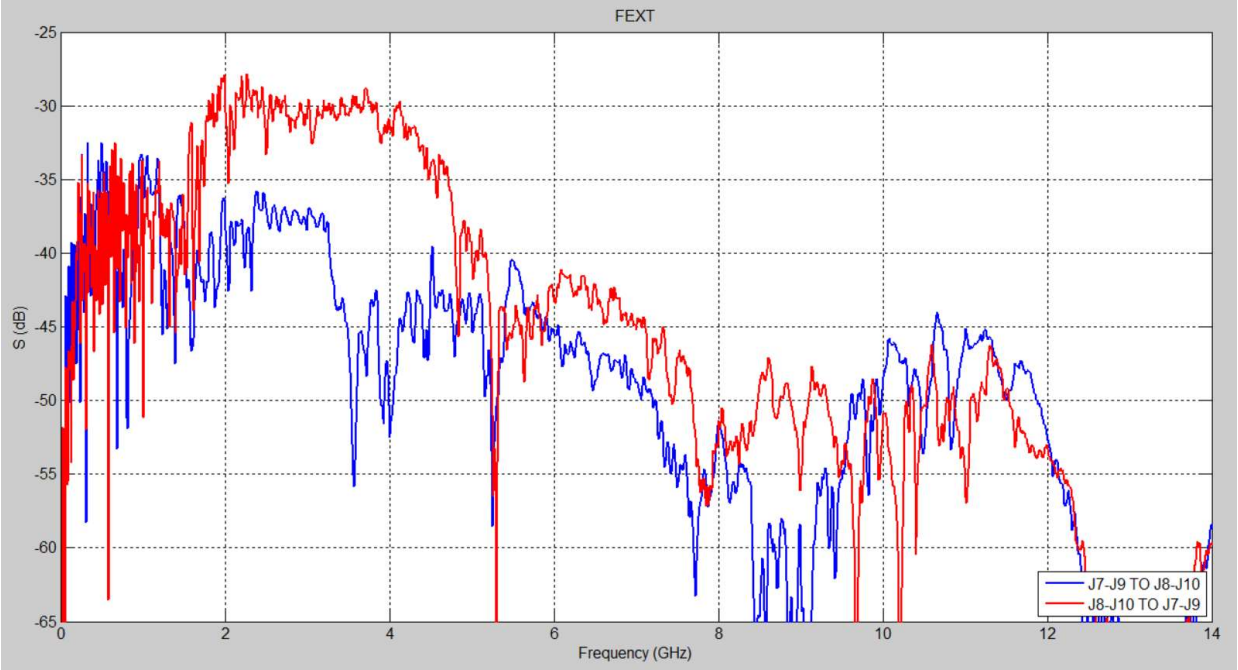


Figure 21: Far-End Crosstalk (FEXT) – Pair 1 and Pair 2

Appendix A:

Calibration board (2x CAL):

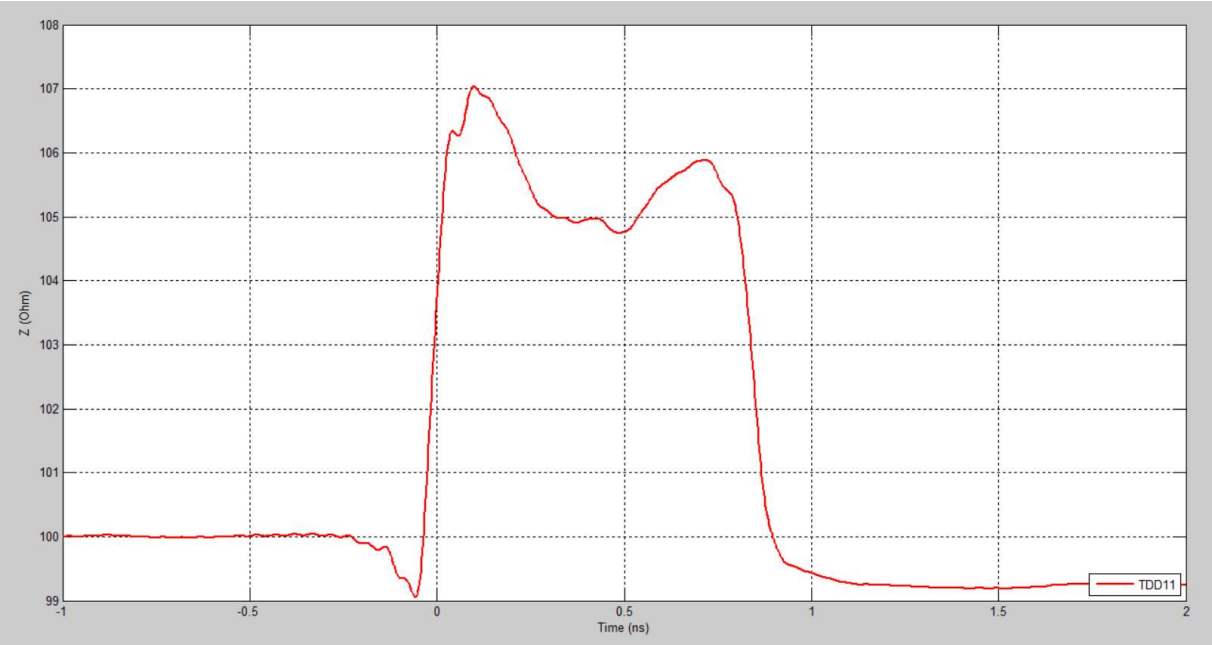


Figure 22: 2X-CAL Impedance 50ps 20-80% RiseTime

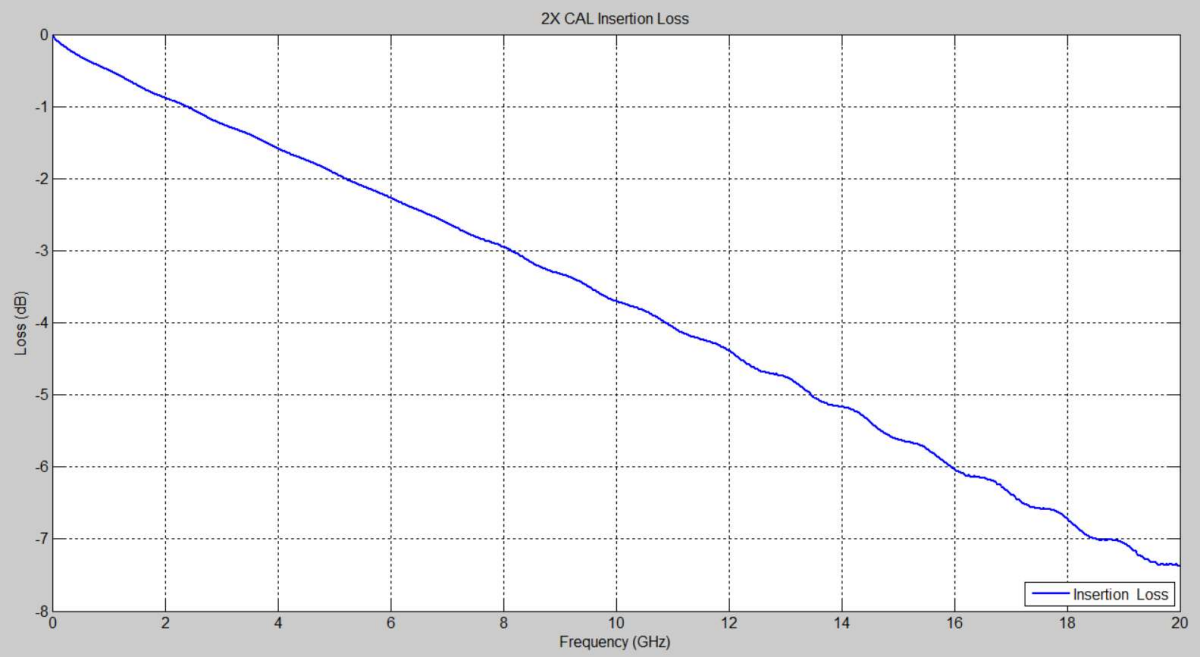


Figure 23: 2X-CAL Insertion Loss

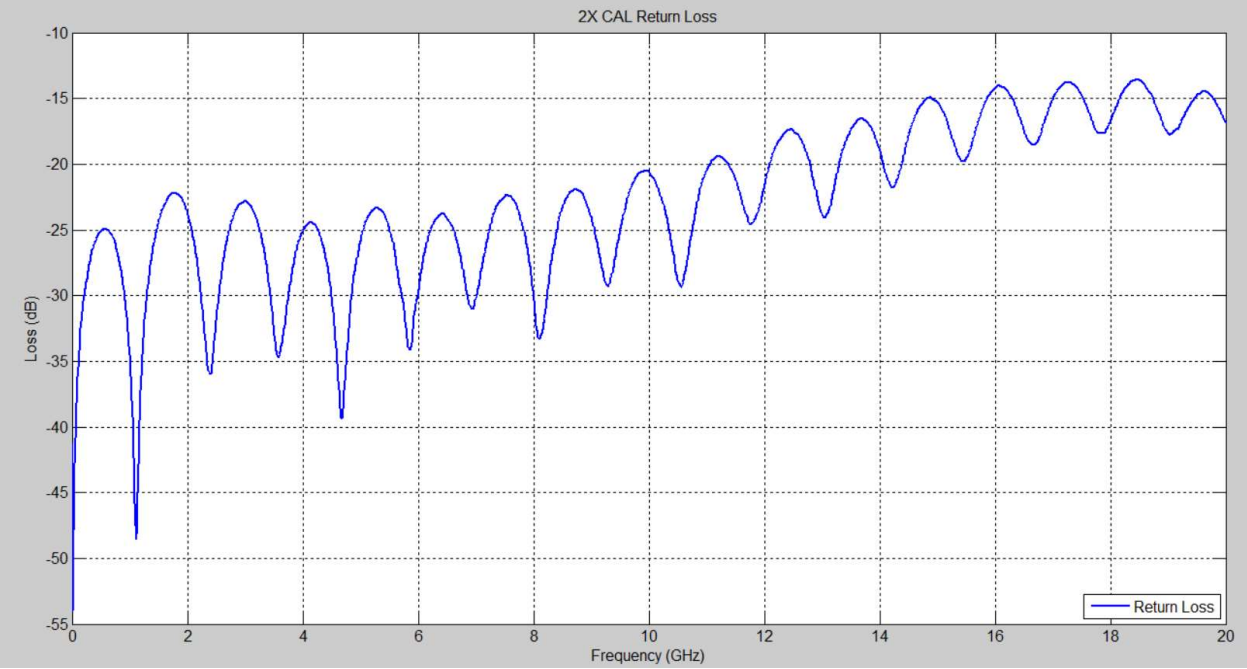
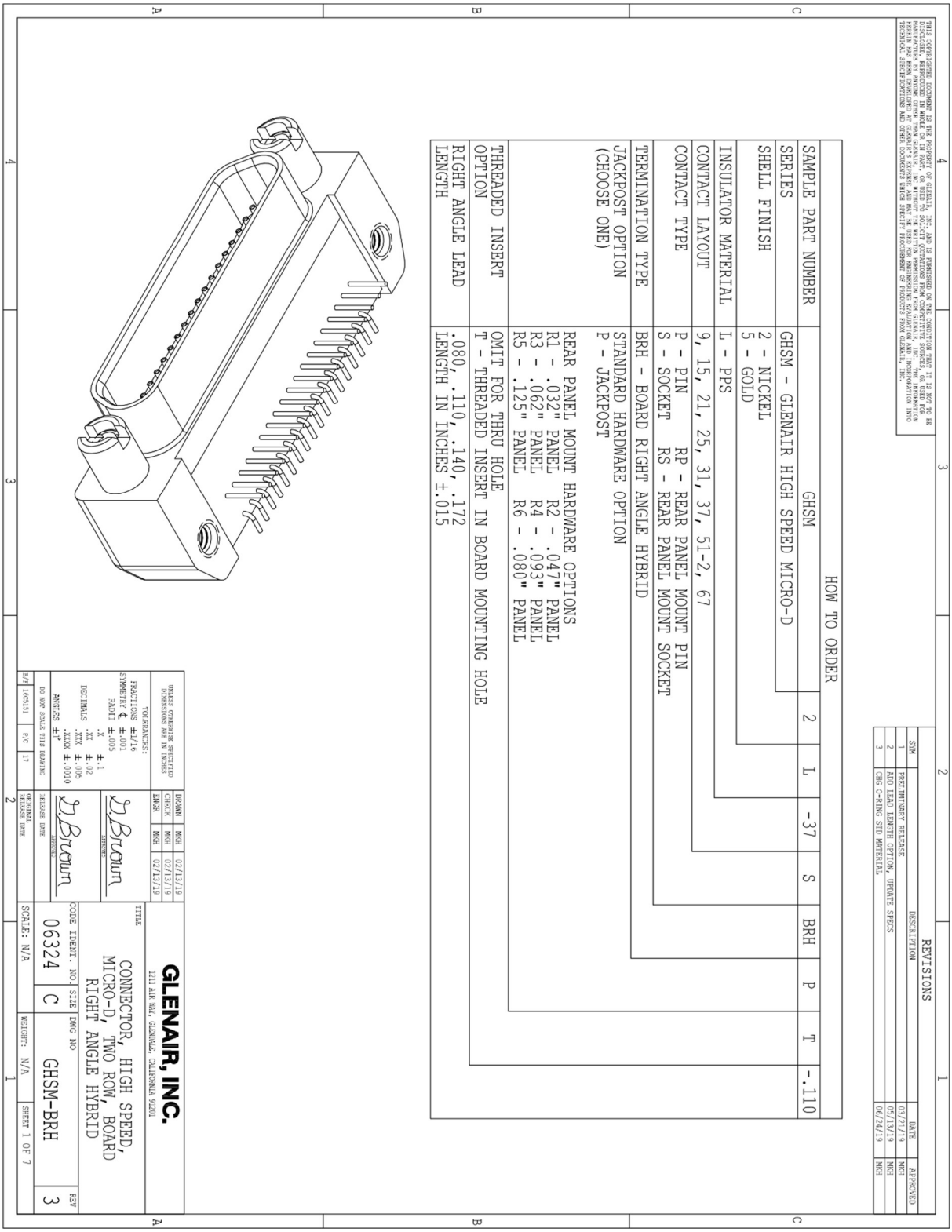
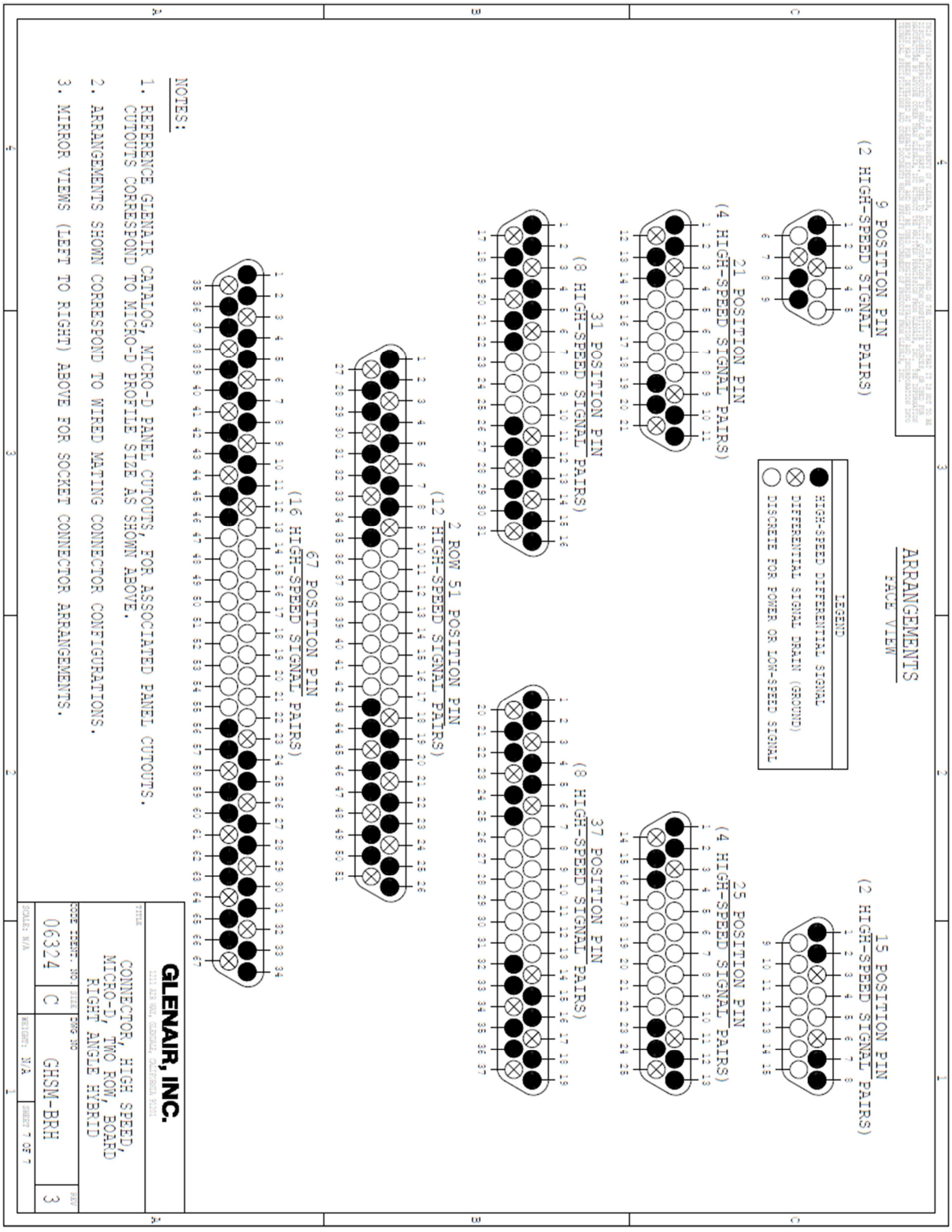


Figure 24: 2X-CAL Return Loss

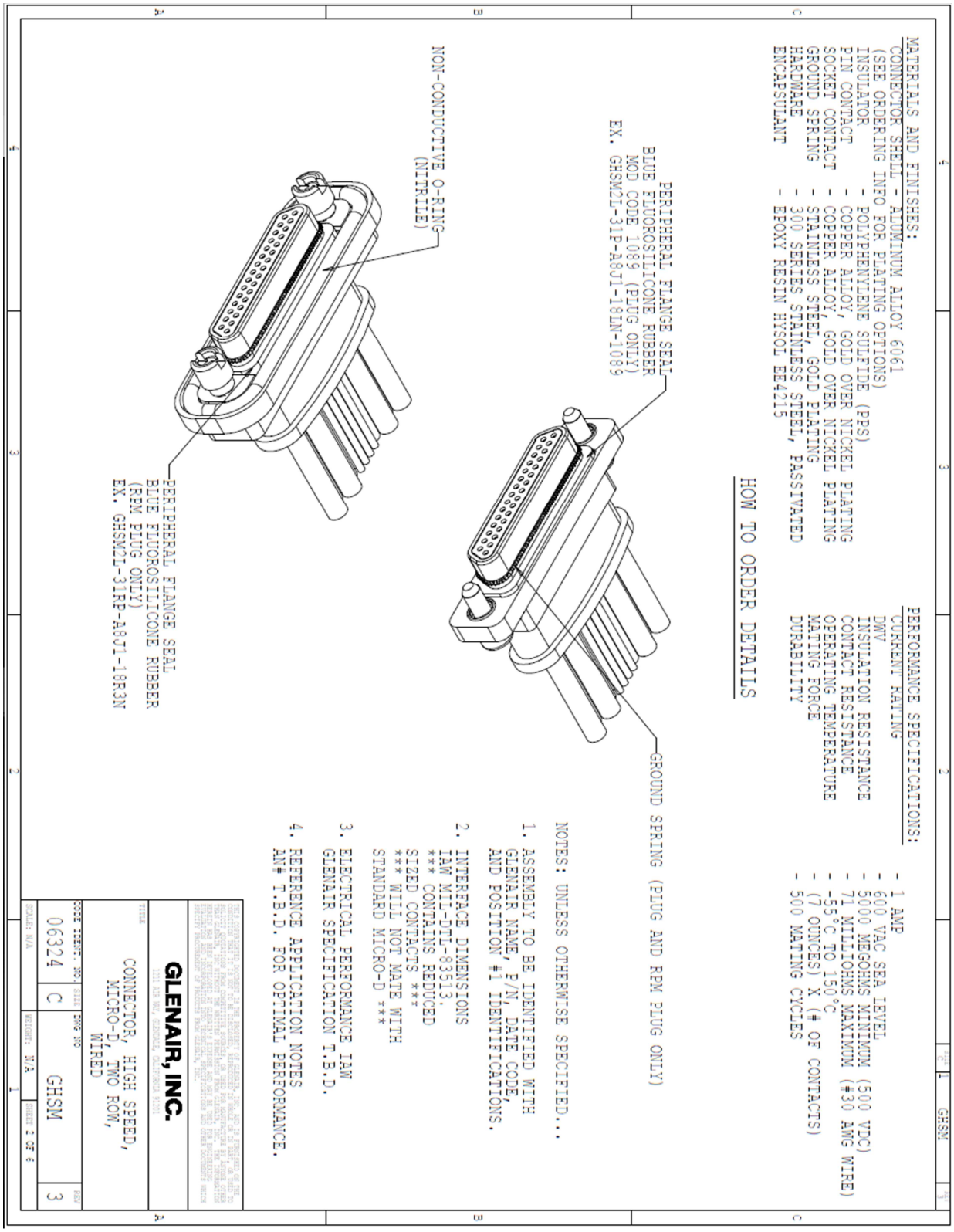
1) High-Speed Micro-D, Two Row, Board Right Angle Hybrid Connector



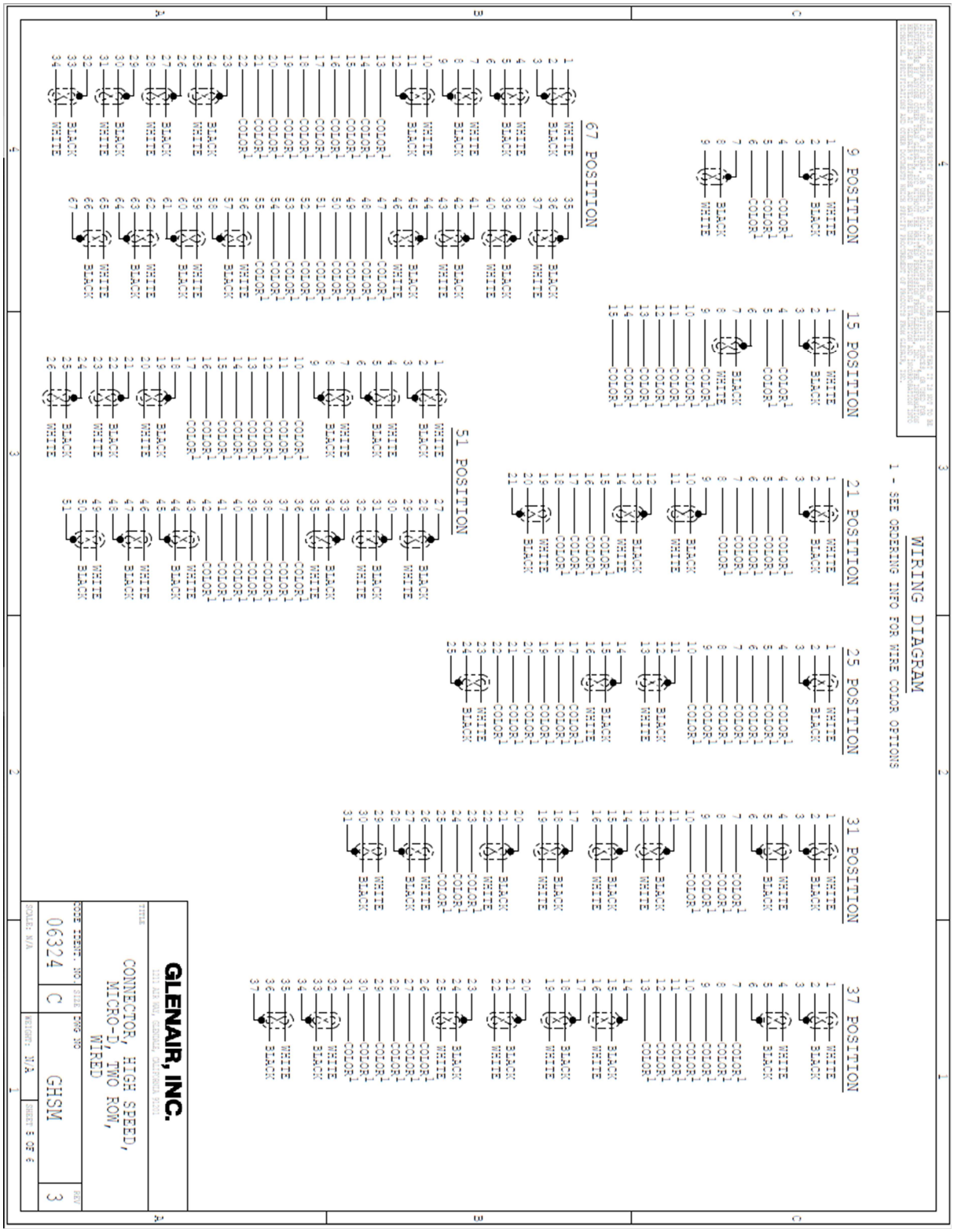
2) High-Speed Micro-D Connector, Selection and Pinout



3) High-Speed Micro-D Wired Connector



4) High-Speed Micro-D Connector, wire diagram



5) 100-Ohm Impedance matched Twinax Twisted Pair Cable