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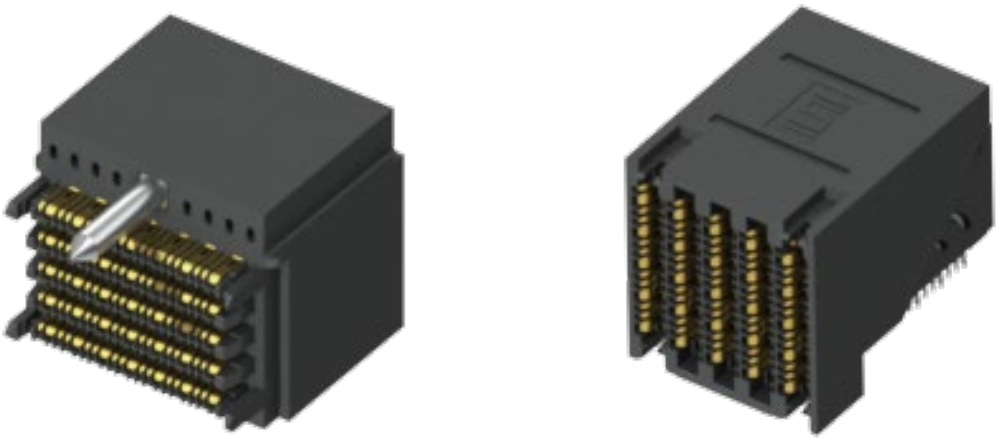
High Speed Characterization Report
ExaMAX® Second Source Verification Report

Samtec
EBDM-6-12-2.0-S-RA-1-G
EBTF-6-12-2.0-S-RA-1

Amphenol ICC
10129181-102LF
10131766-101LF



Description:
Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2.00 mm and 6 Pairs Direct Mate Orthogonal Header mating to Right-Angle Receptacle (EBDM-RA to EBTF-RA)

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Report Revision: 7/22/2021

Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA

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Connector Overview

The EBDM-RA mating to EBTF-RA is ExaMAX® series of 2.00 mm Direct Mate Orthogonal (DMO) Header mating to Right-Angle(RA) Receptacle. EBDM-RA has 6 pairs per column, EBTF-RA have 4 or 6 pairs per column. The data in this report is applicable for 6 pairs.

Since Amphenol ICC has the same products, we tested different mating combinations between Samtec connectors and Amphenol ICC connectors for comparison. For the purposes of data labelling:

- The Samtec EBDM-6-12-2.0-S-RA-1-G will be referred to as “Samtec(DMO)”.
- The Samtec EBTF-6-12-2.0-S-RA-1 will be referred to as “Samtec(RA)”.
- The Amphenol ICC 10129181-102LF will be referred to as “AFCI(DMO)”.
- The Amphenol ICC 10131766-101LF will be referred to as “AFCI(RA)”.

Footprint and the pairs tested on the DUT are shown in the figure below. The pairs shown in the data below were selected to represent behavior of pairs in various wafers, and various positions in a wafer. For any inquiries about the DUT or test plan, please contact sig@samtec.com.

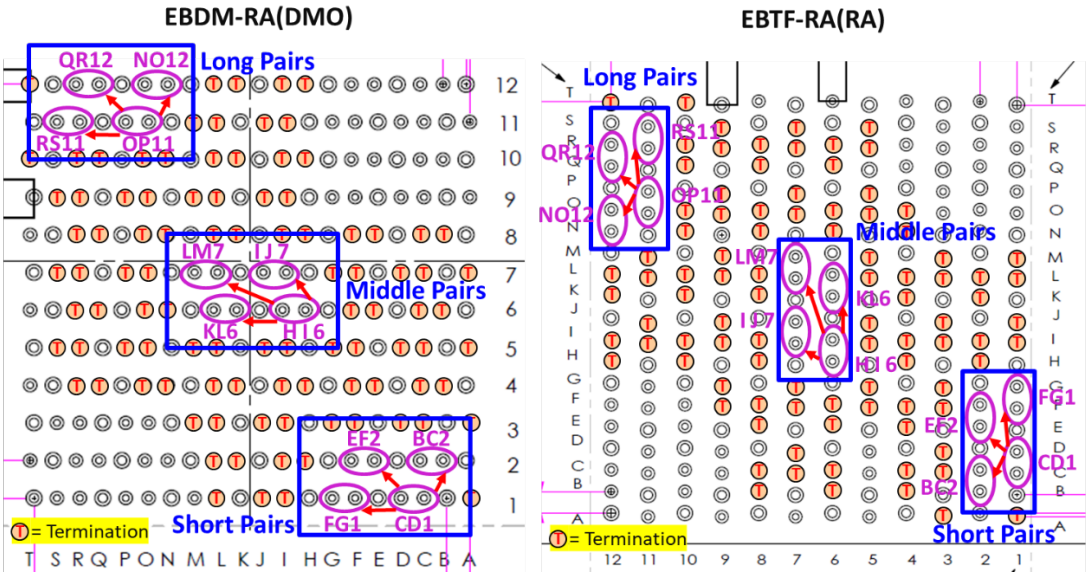

Figure 1: Footprint and Pairs Under Test in 6-Pairs/12-Columns ExaMAX DMO mating to RA

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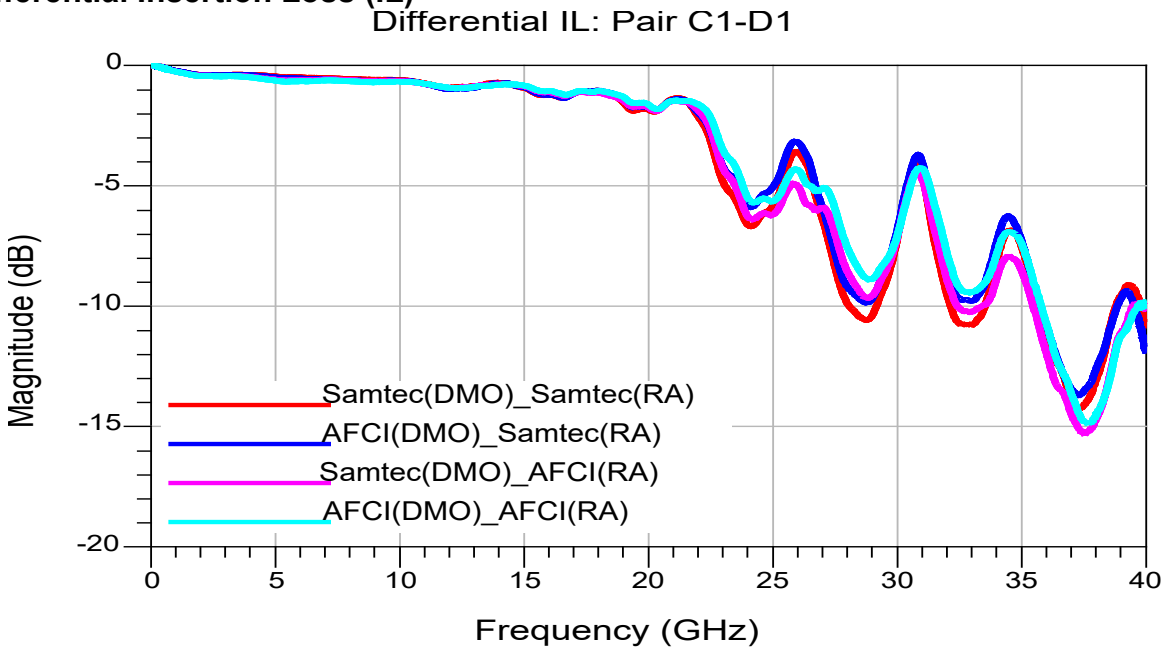
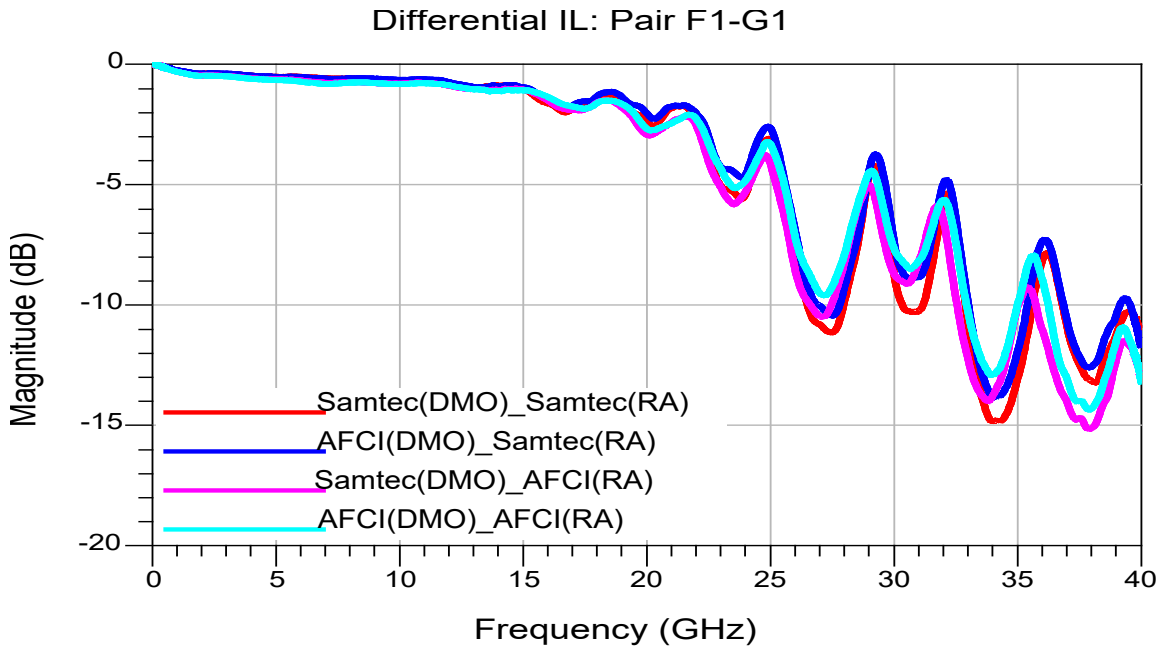
Frequency Domain Responses

Differential Insertion Loss (IL)





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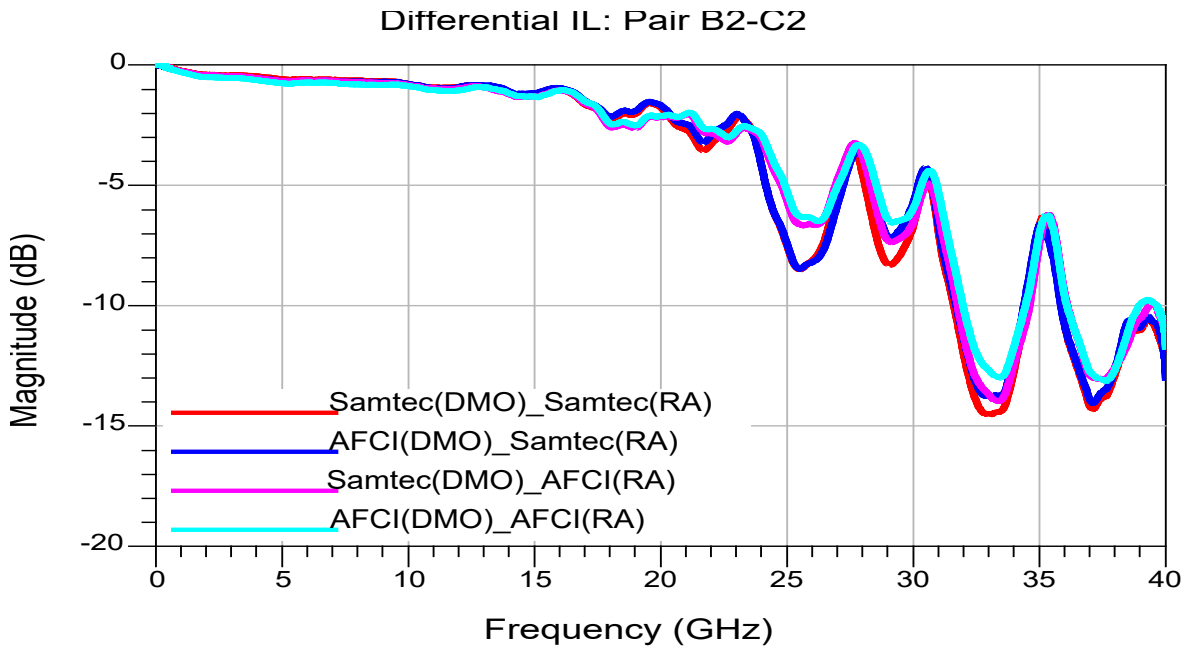

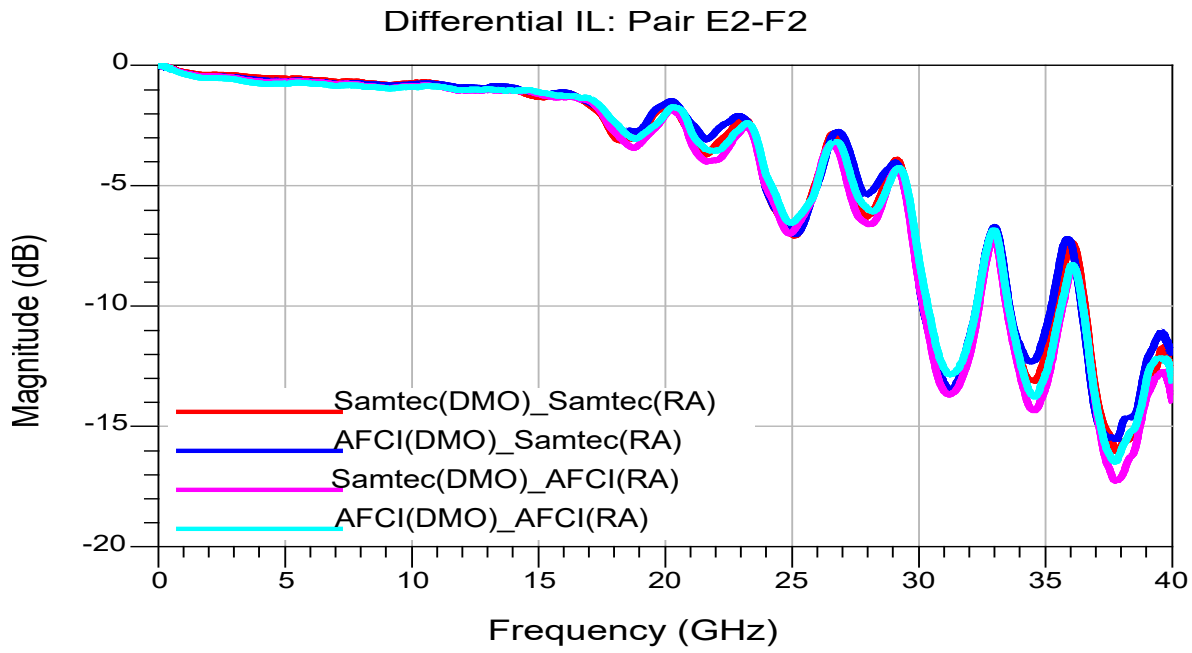

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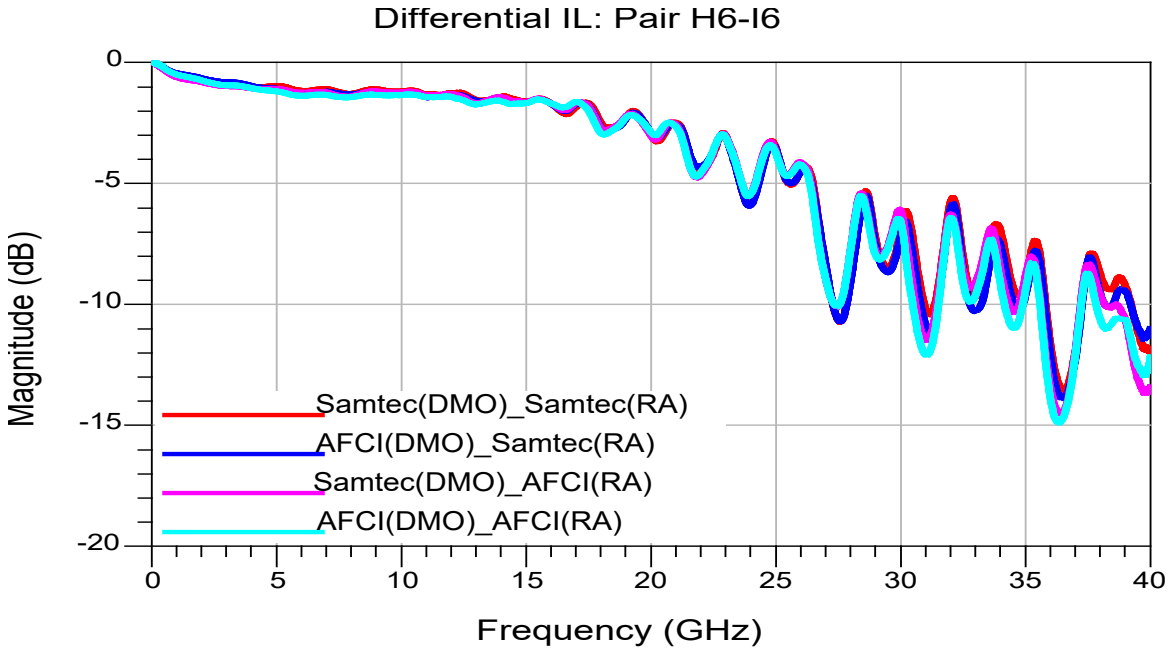

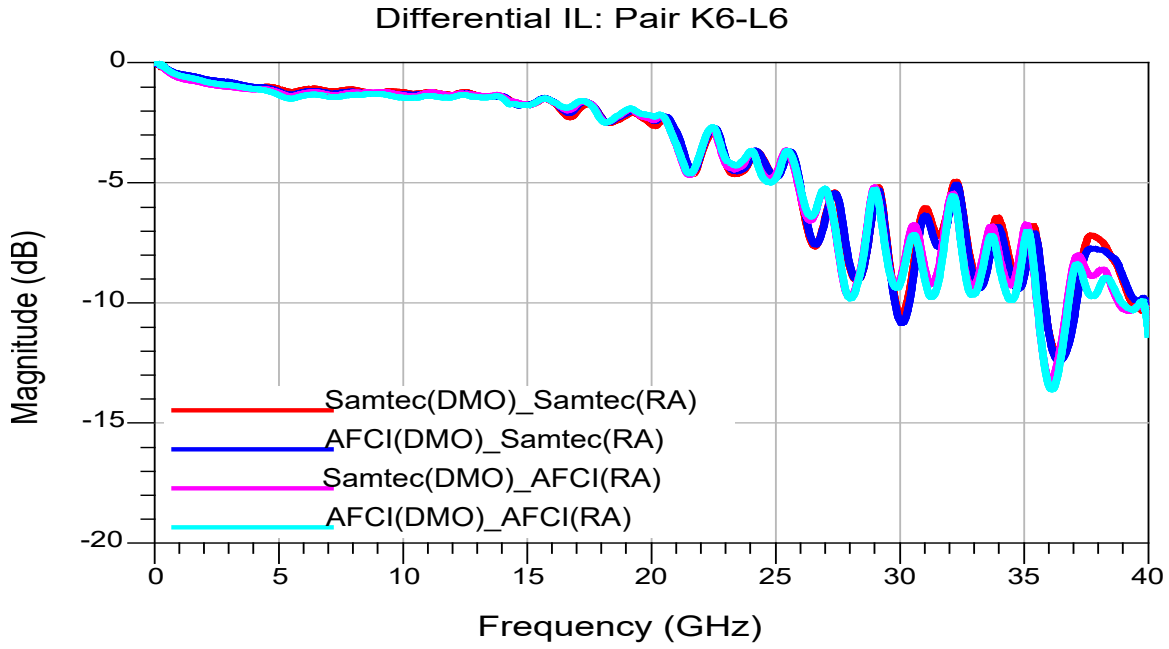

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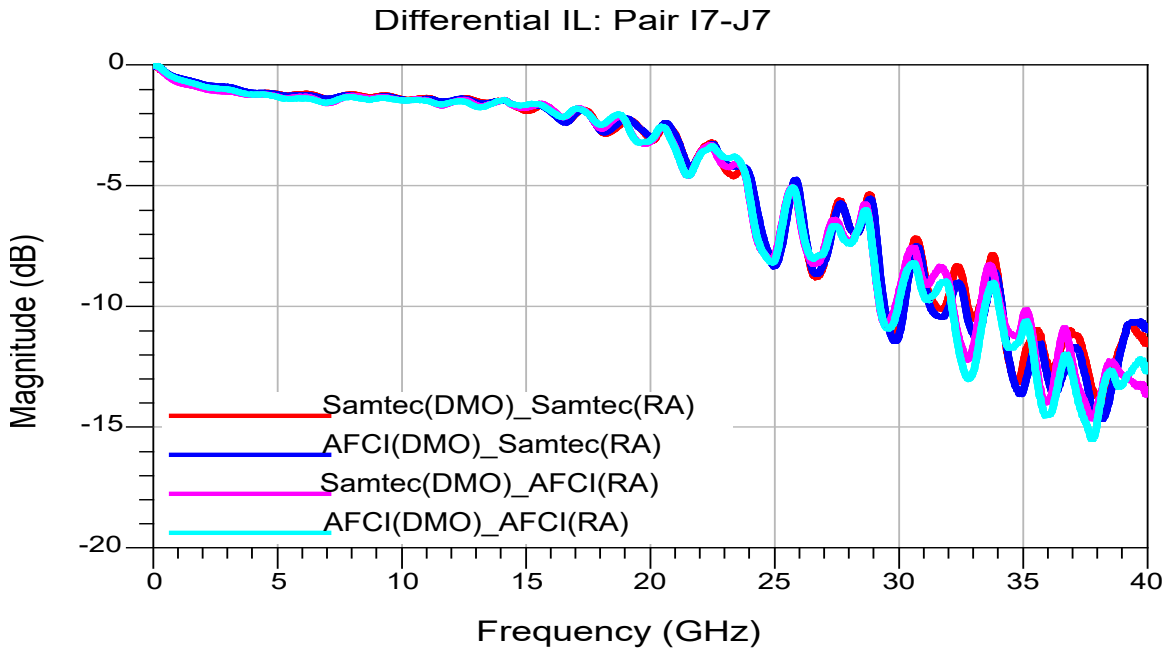

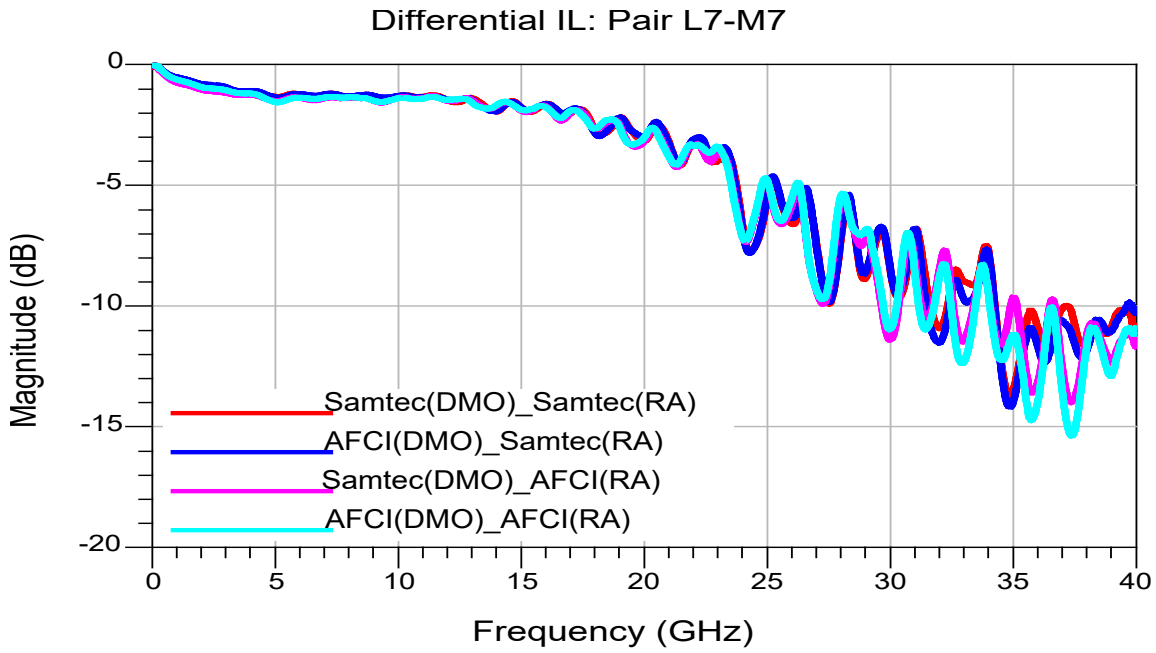

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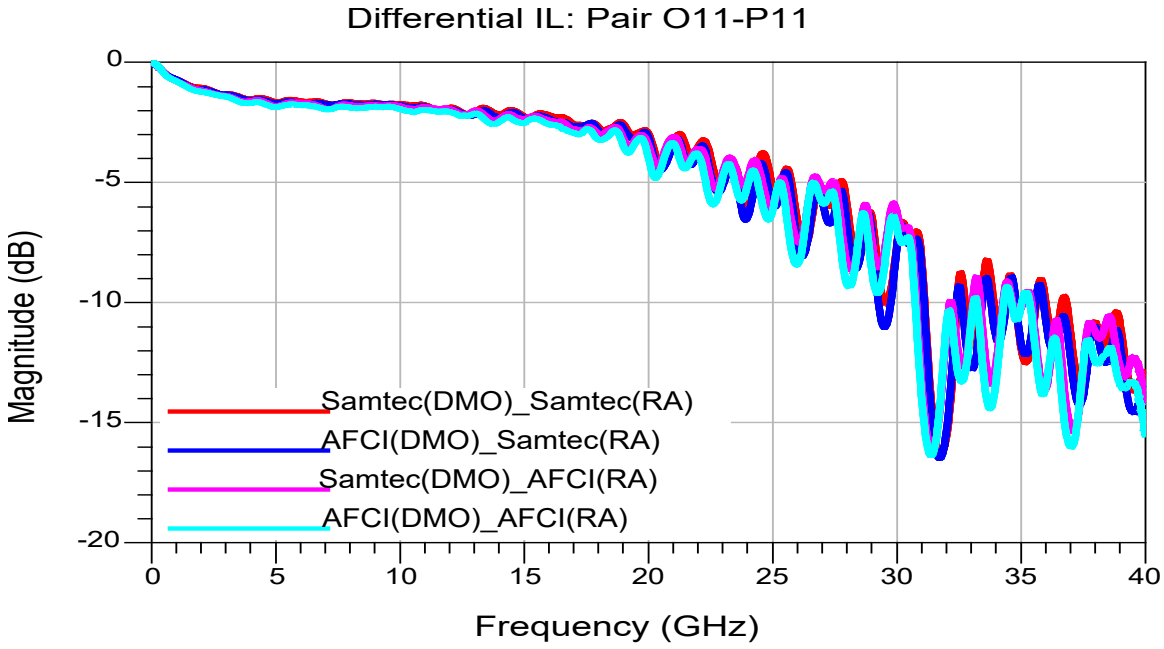

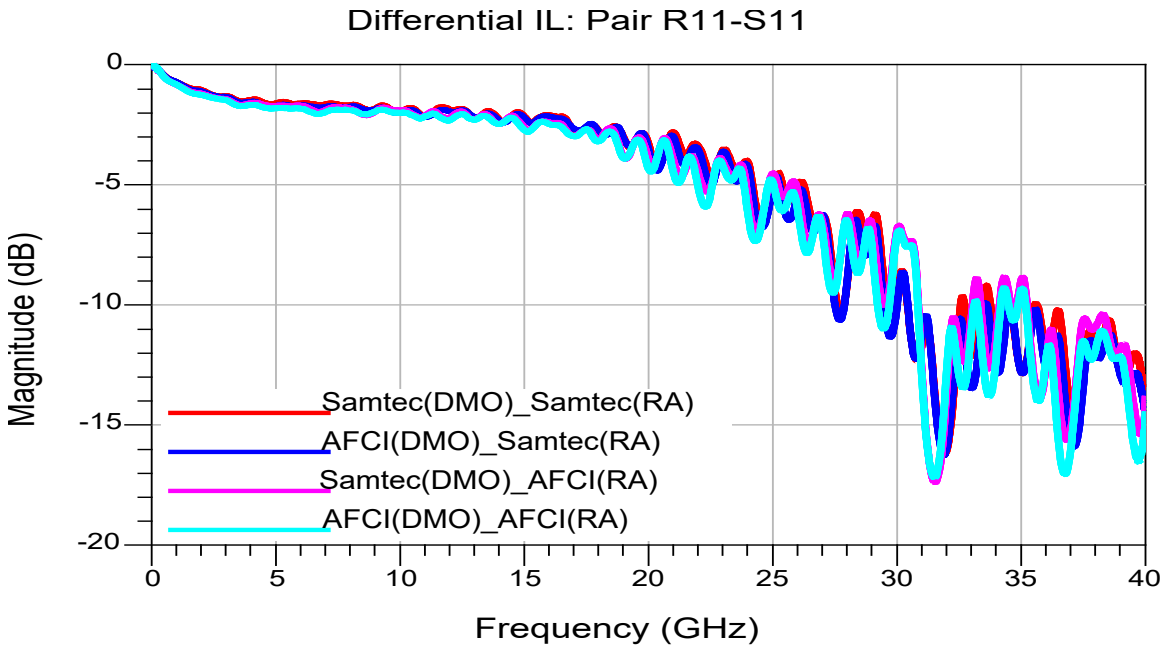

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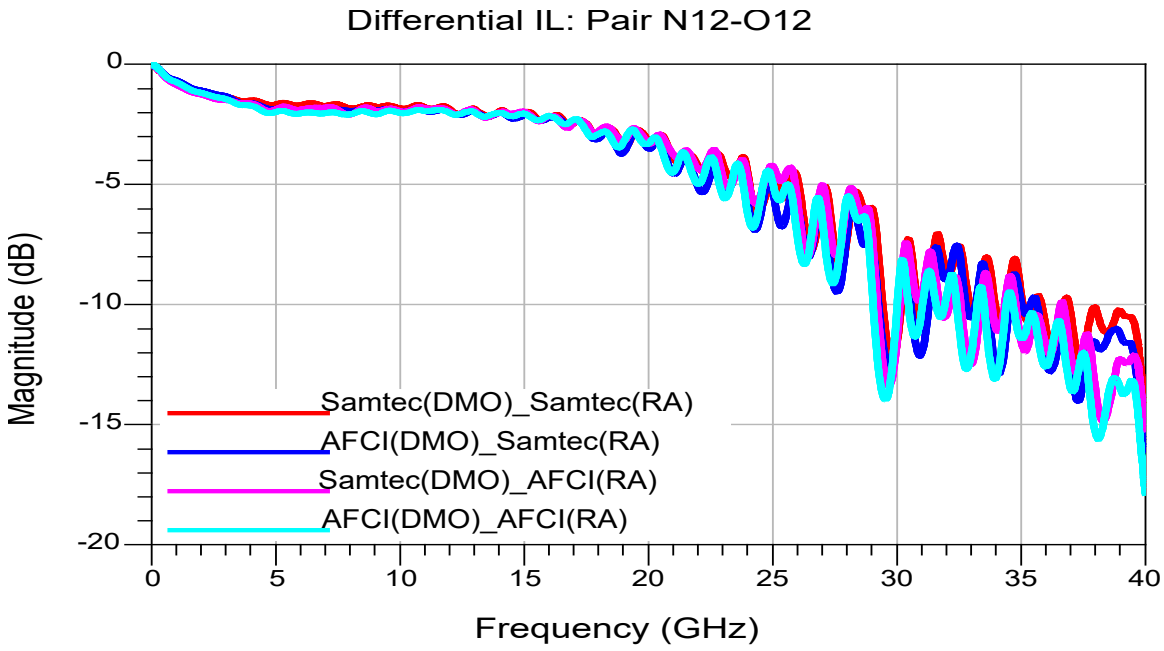

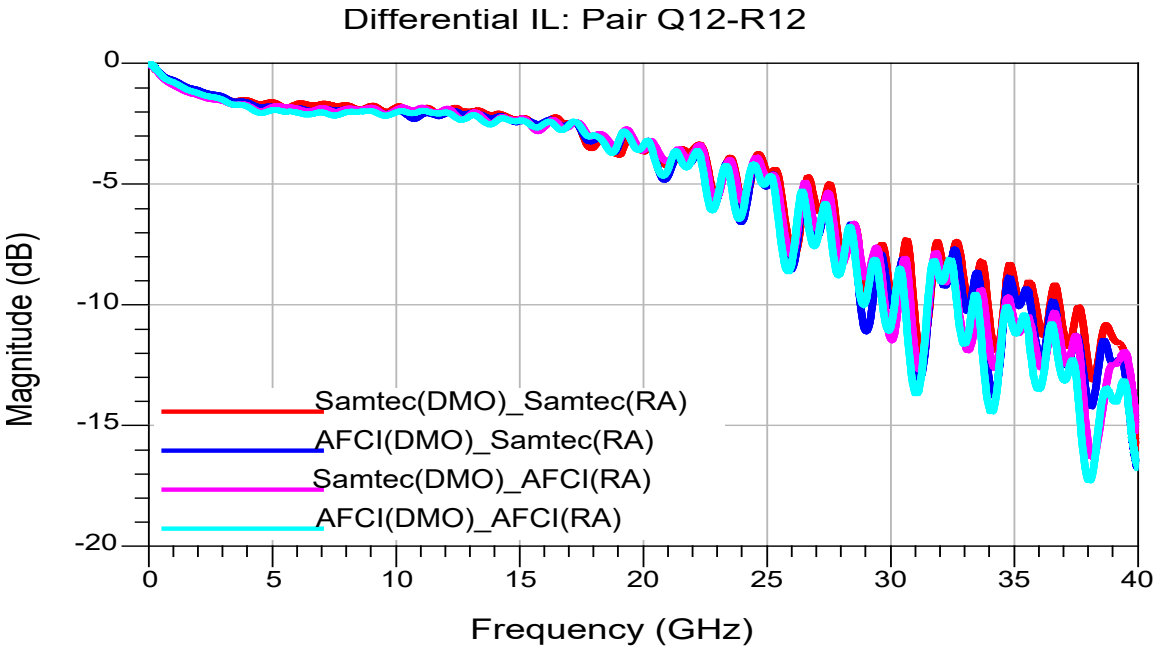

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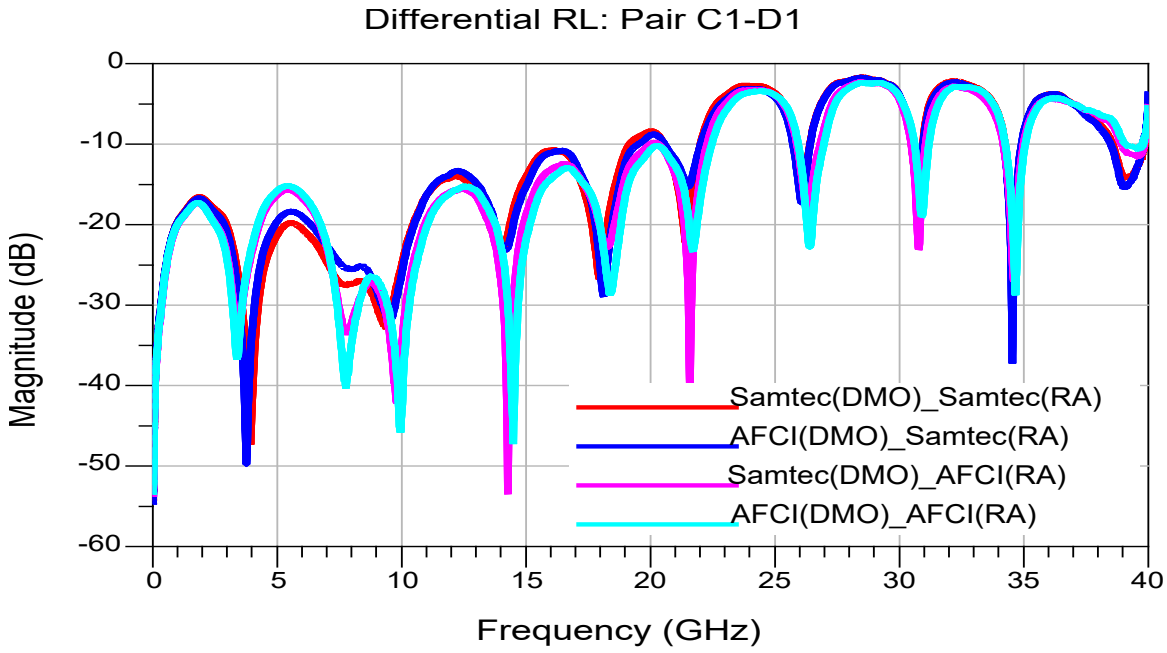
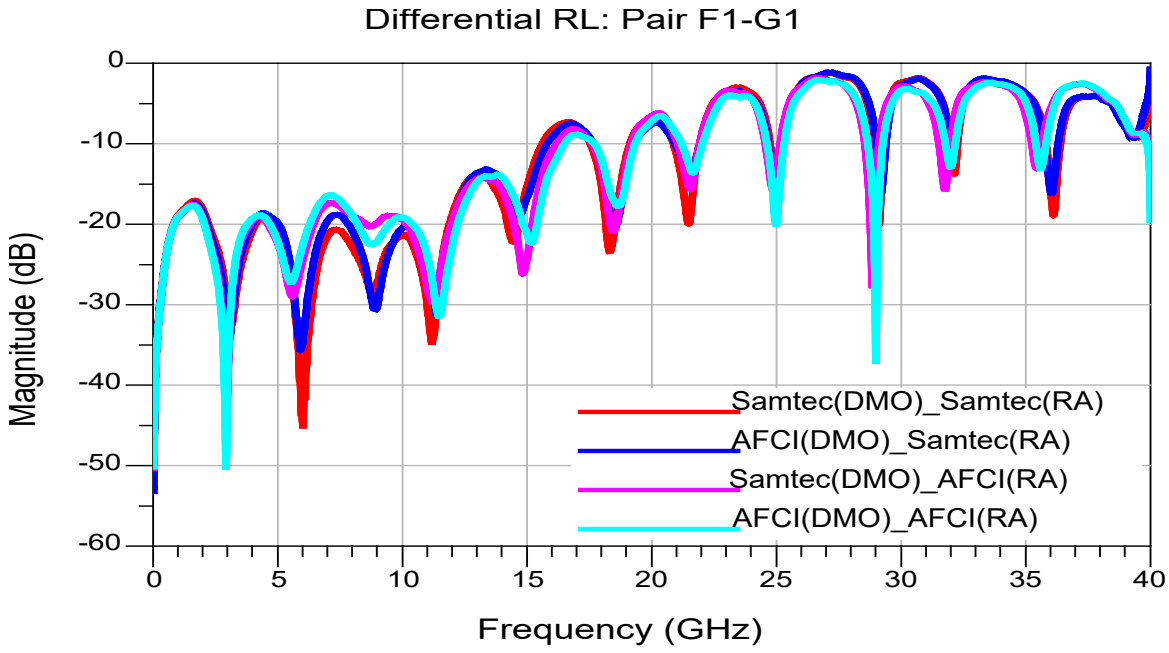
Differential Return Loss (RL)





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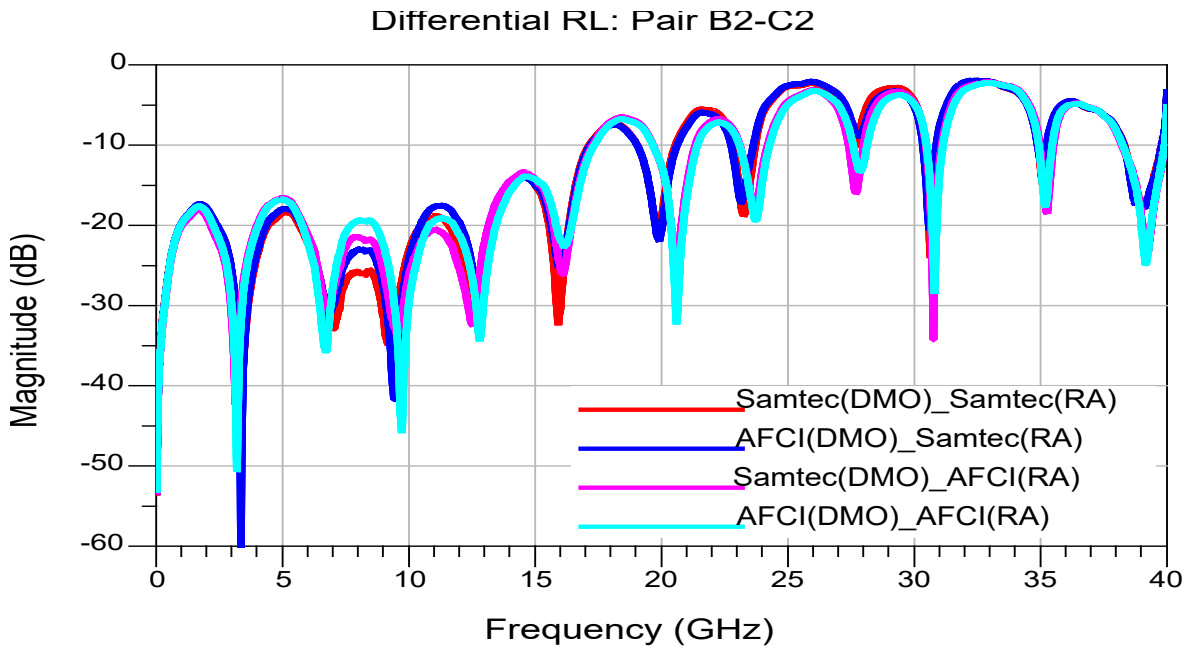

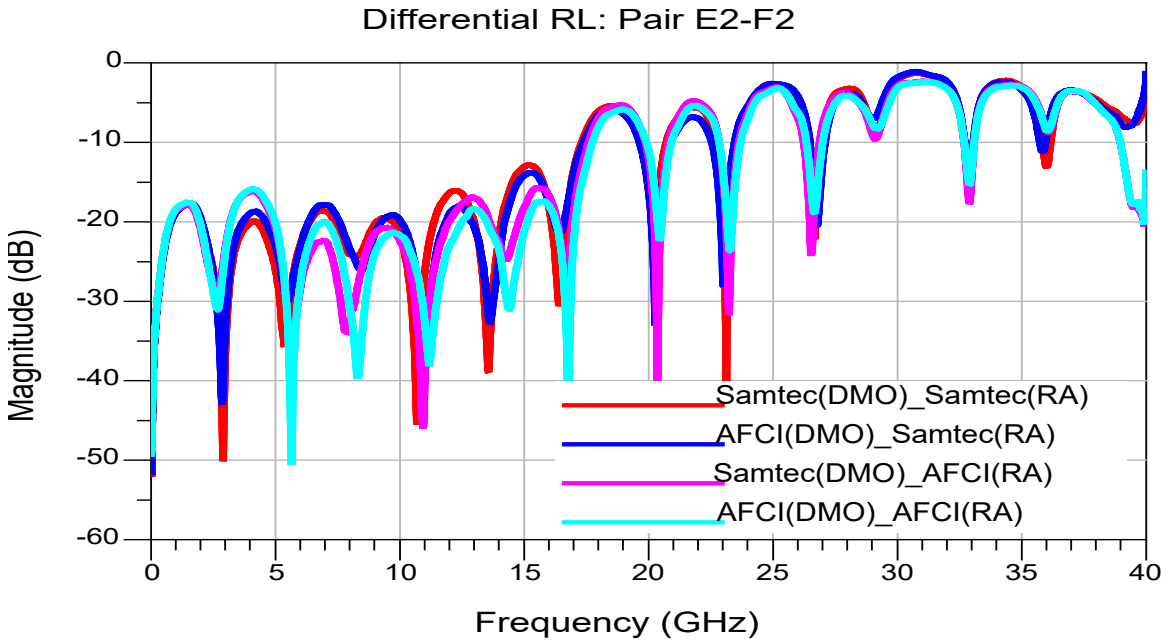

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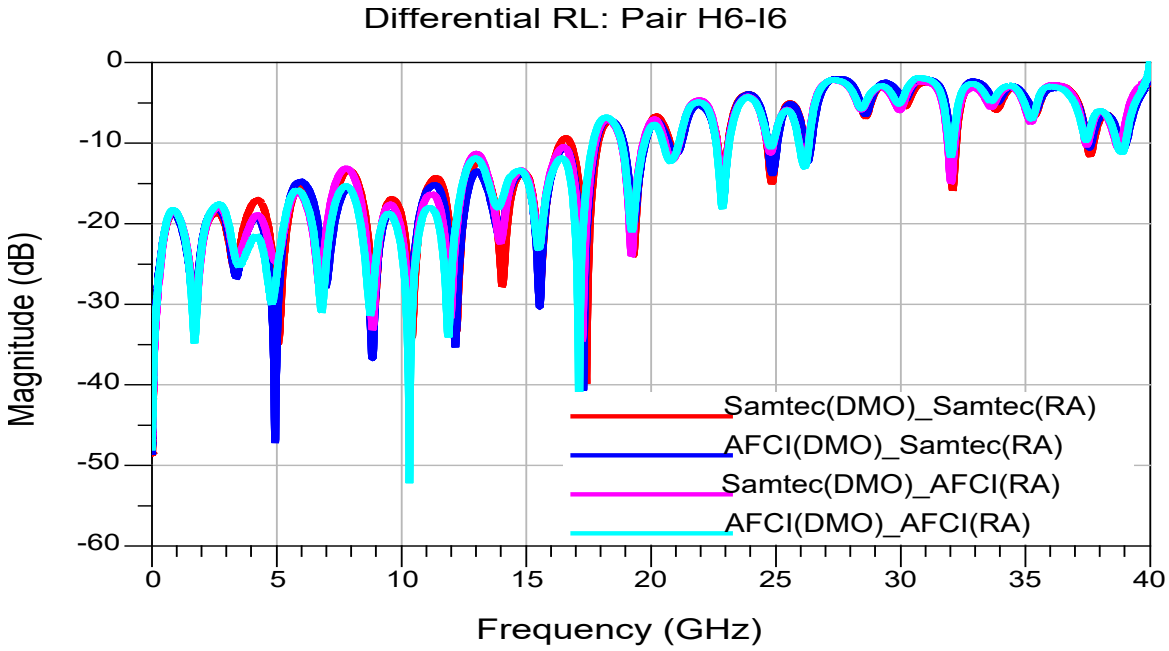

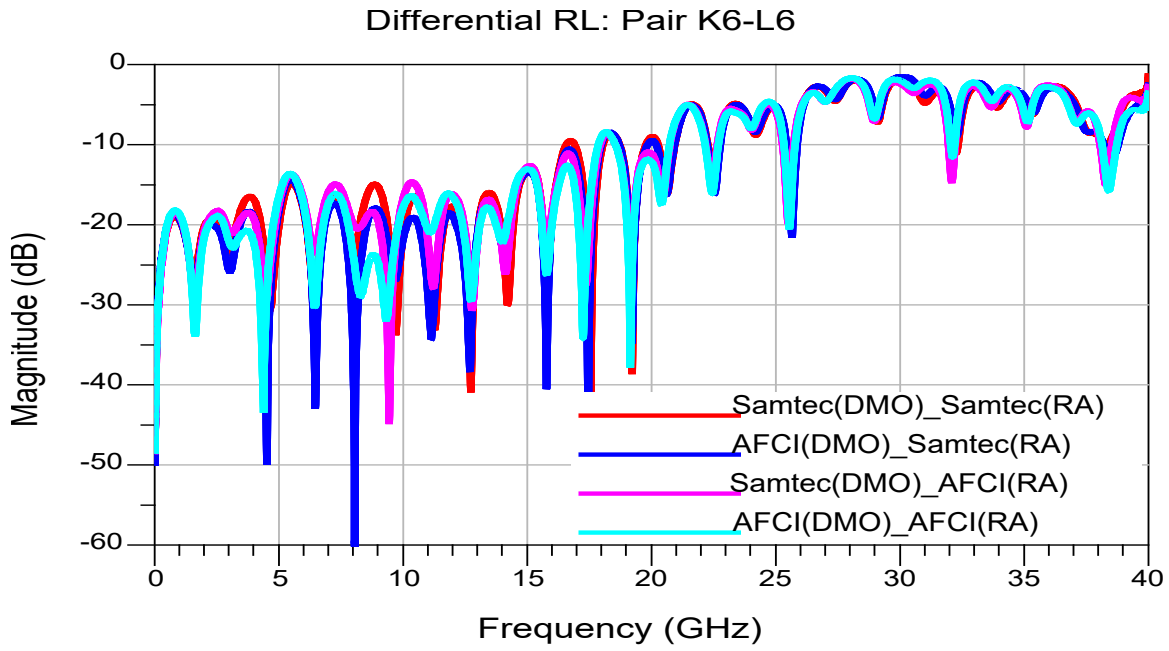

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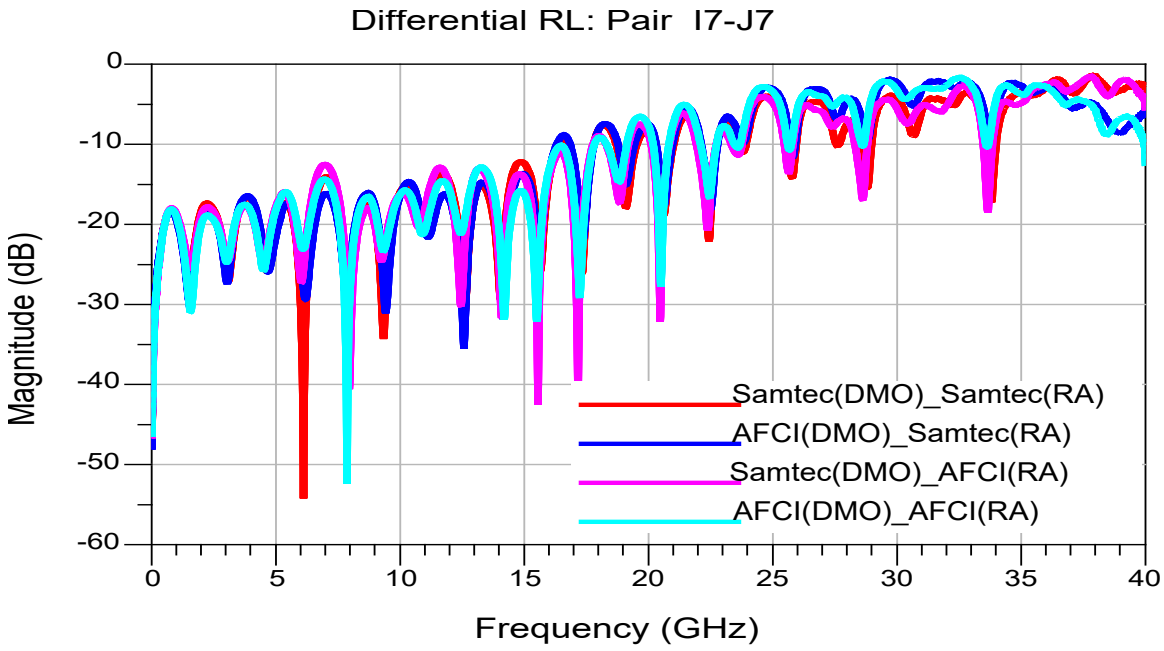

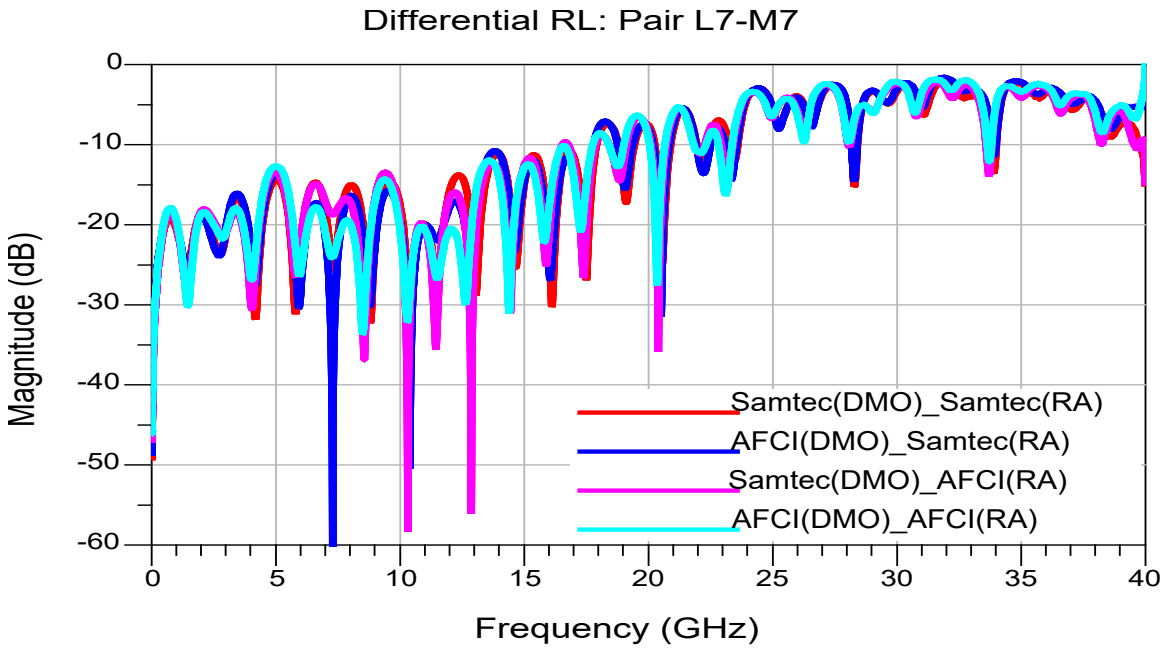

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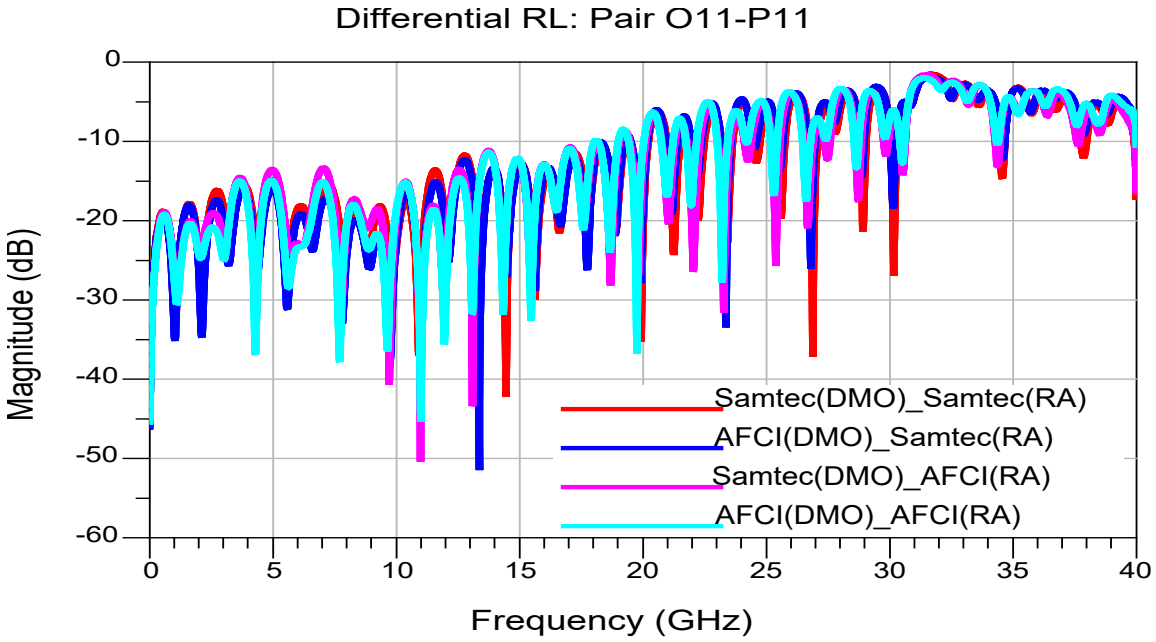

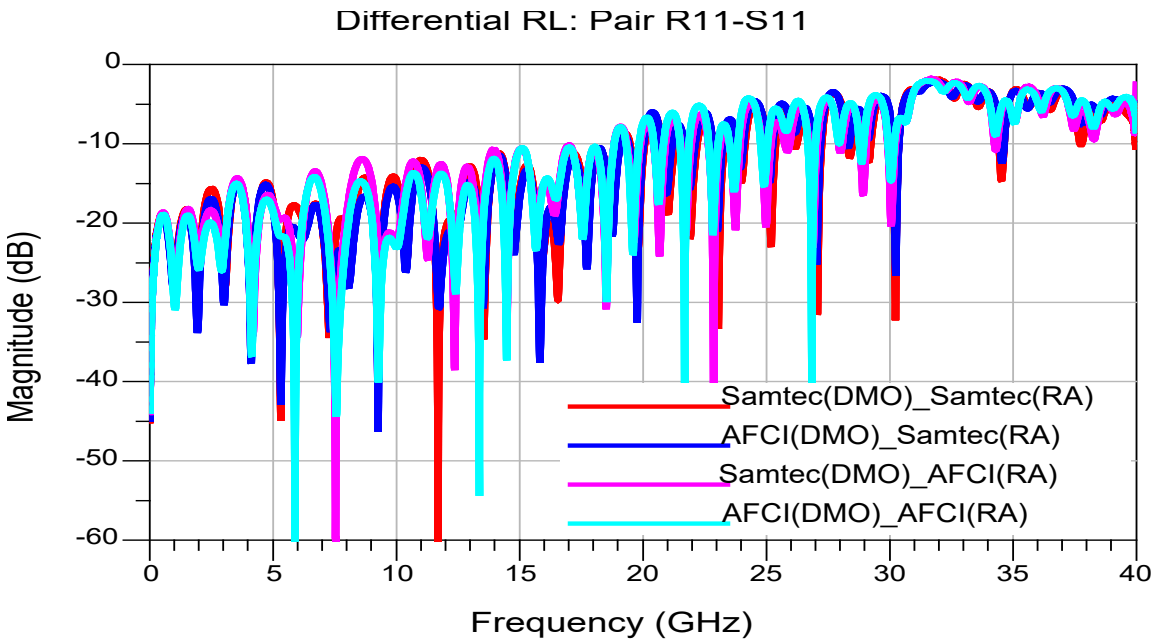

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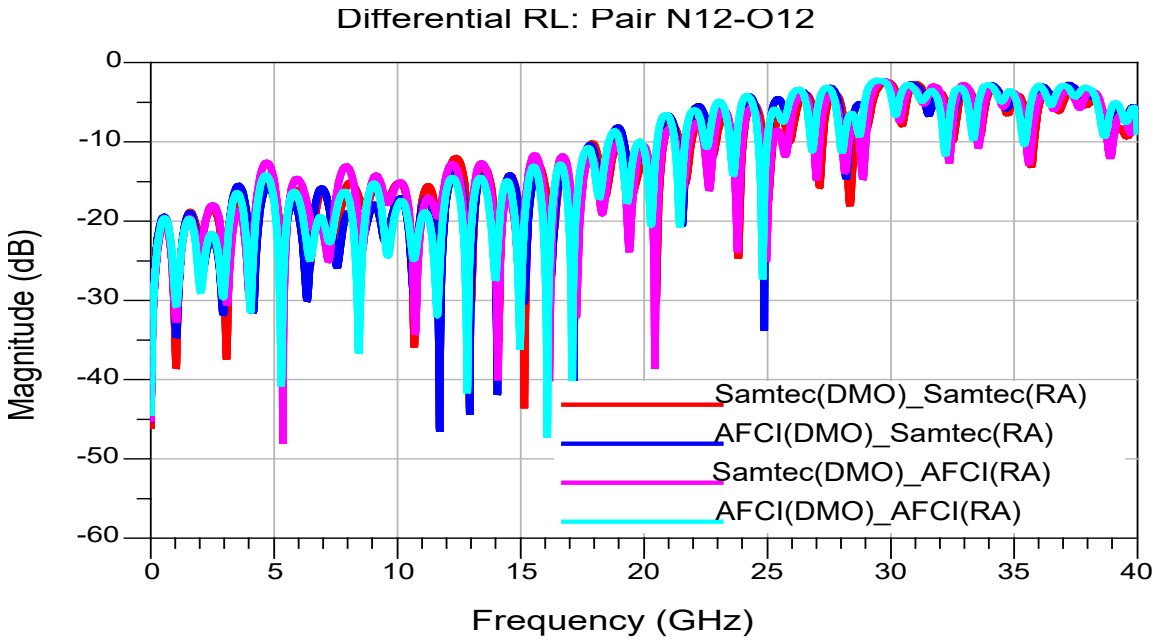

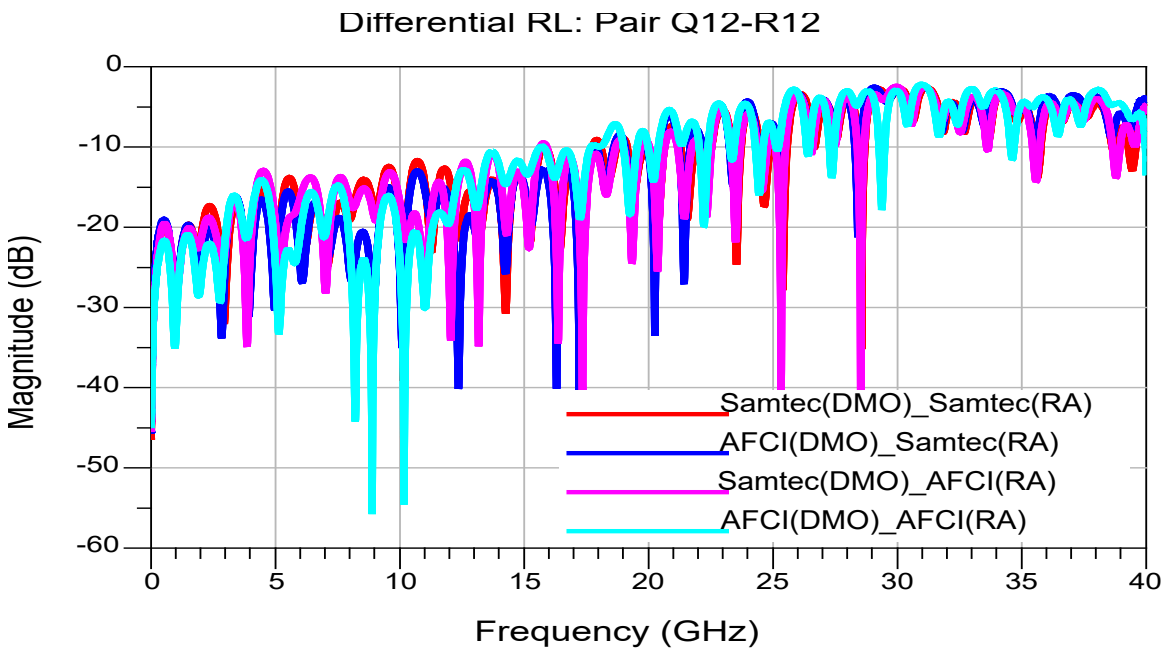

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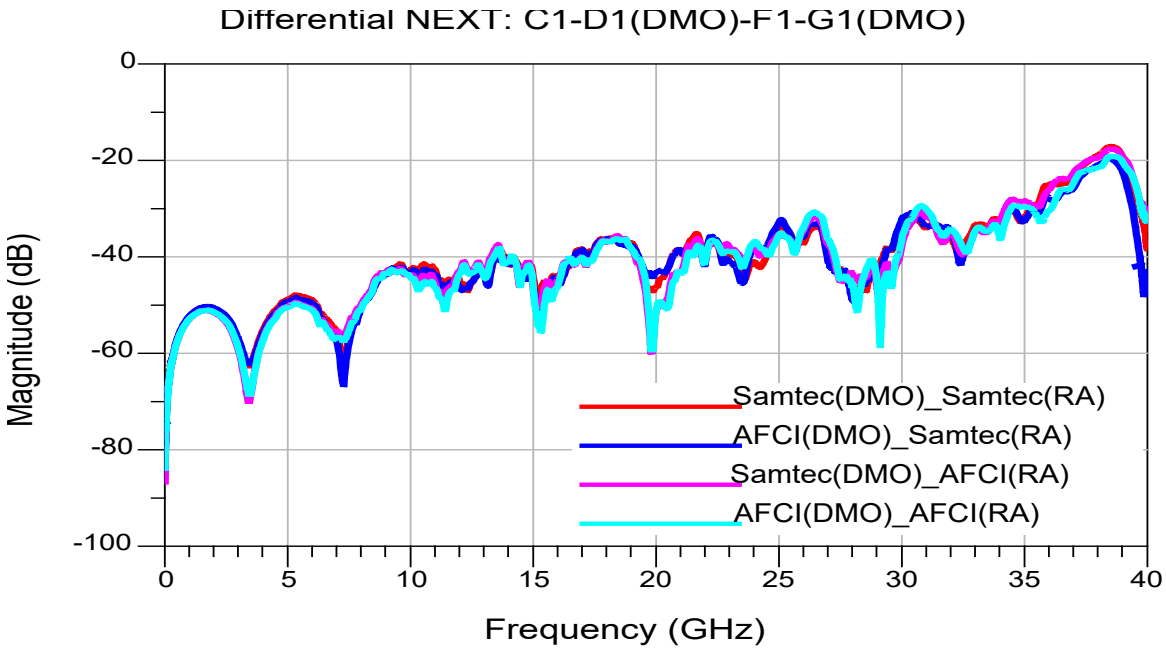
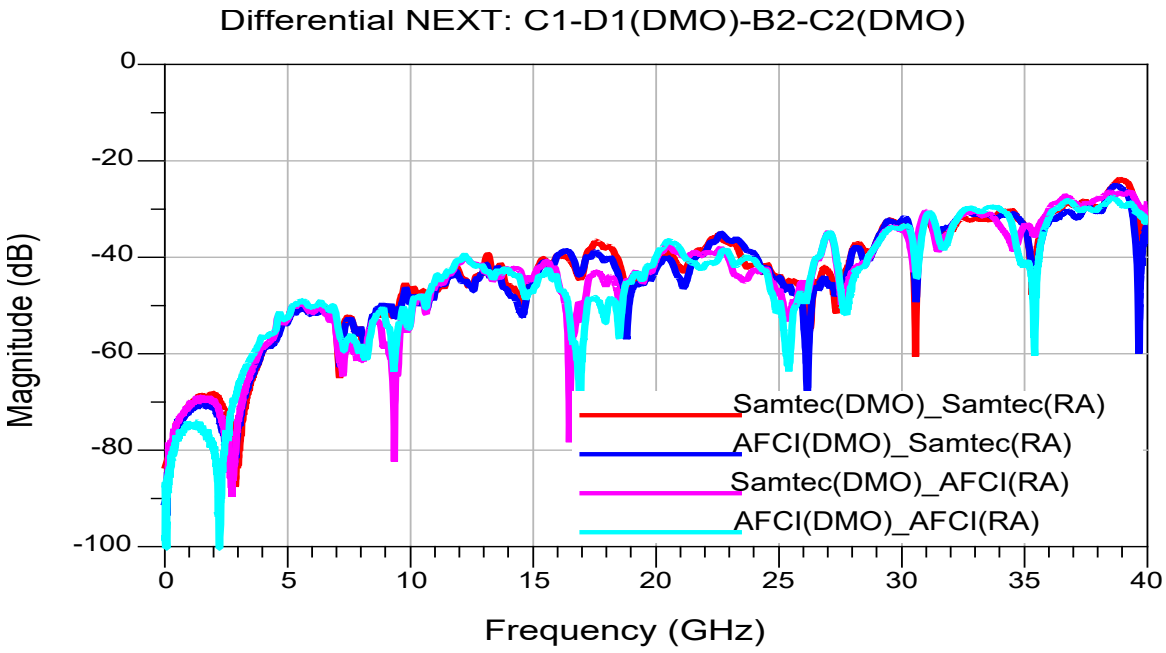
Differential Near End Crosstalk (NEXT) from Direct Mate Orthogonal(DMO) Header





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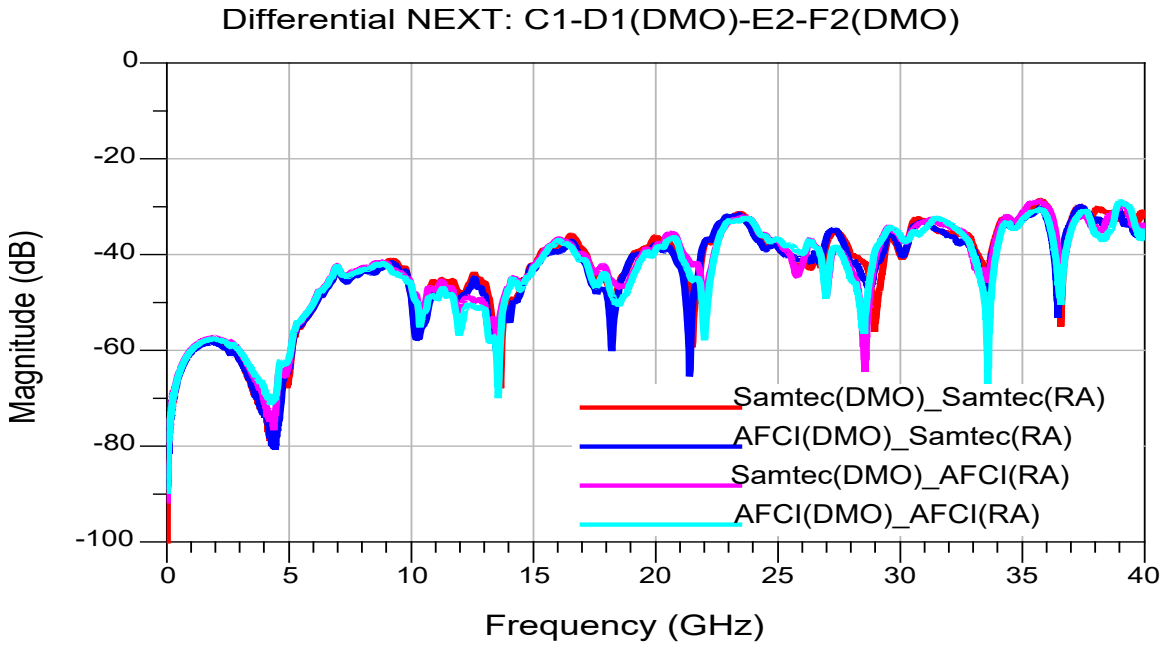

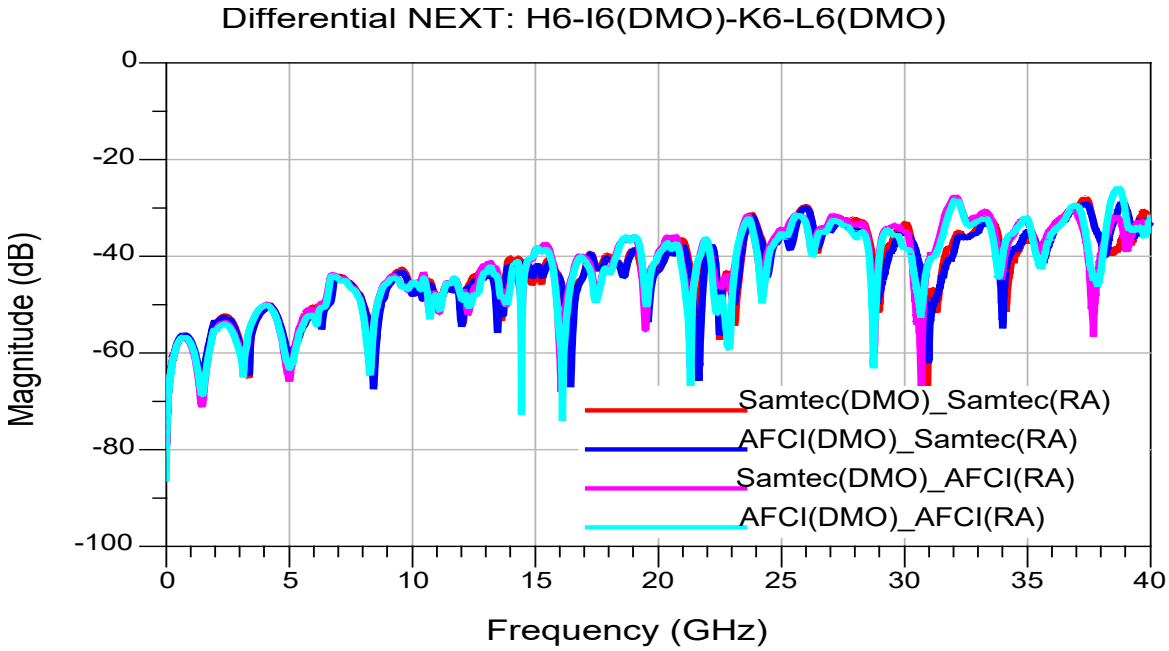

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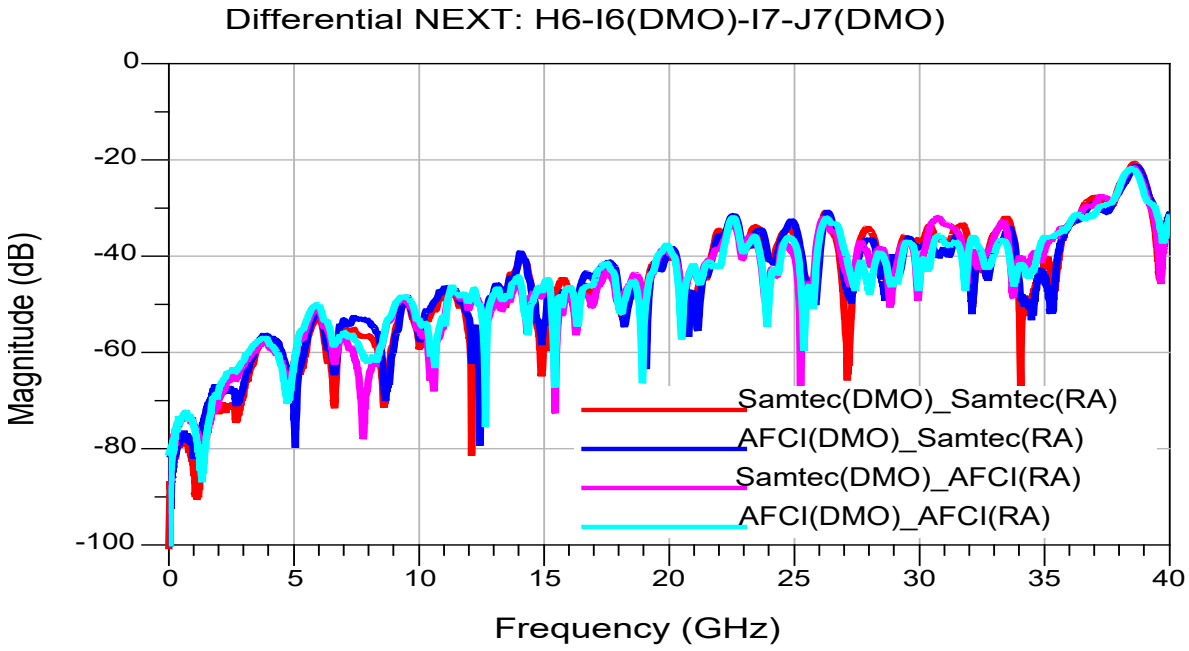

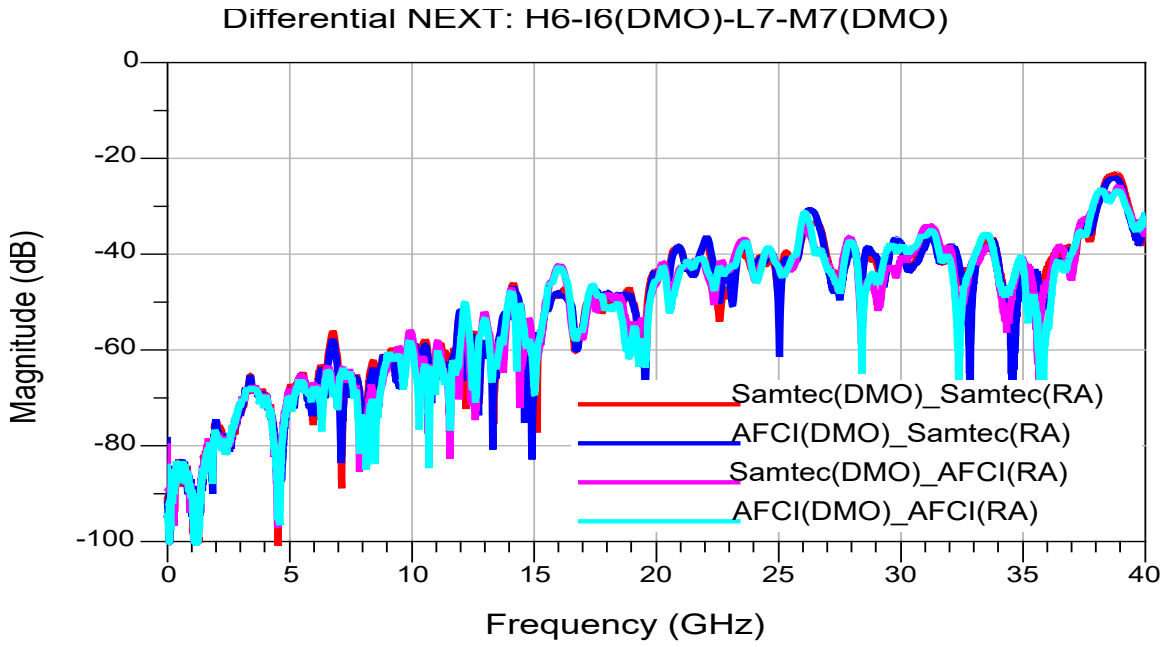

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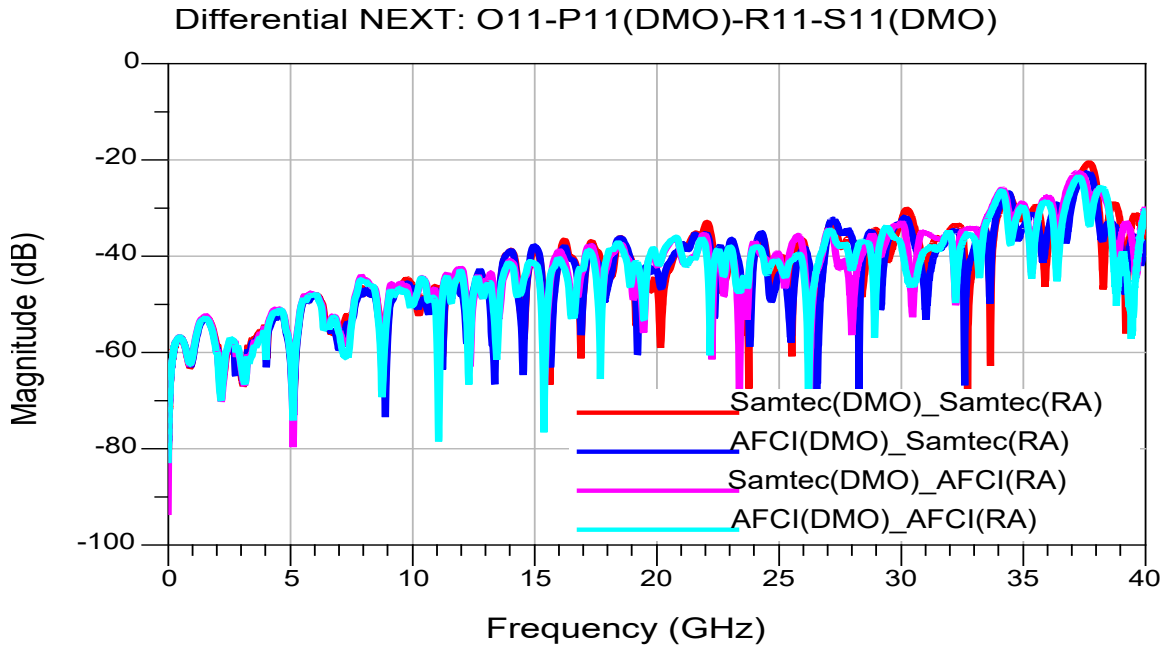

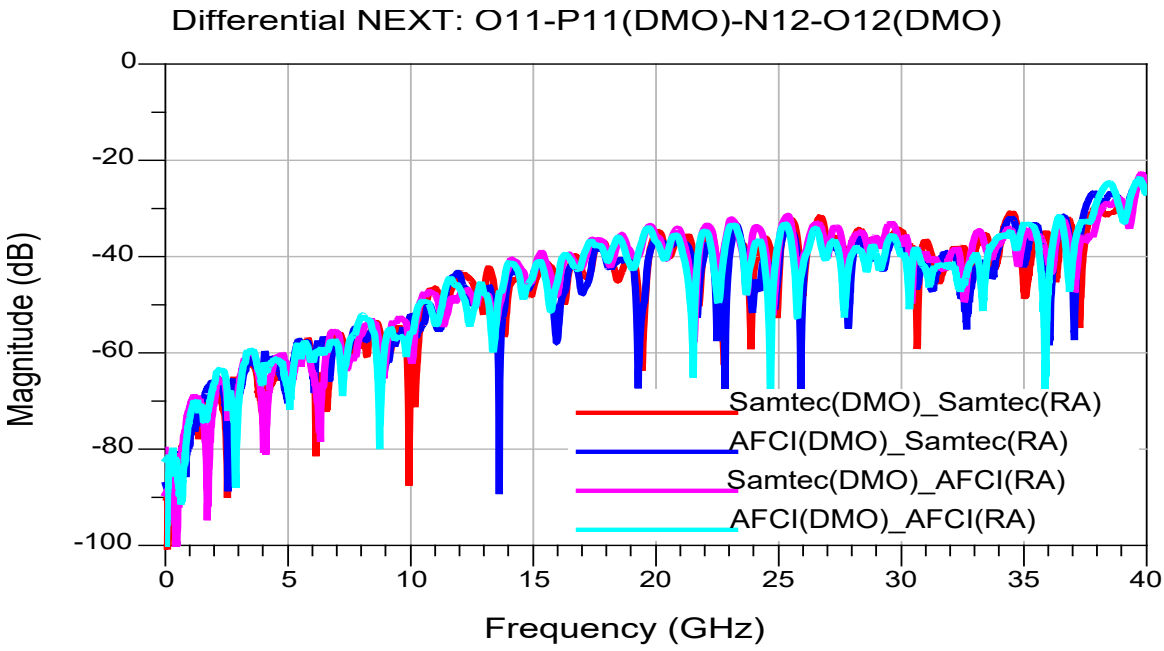

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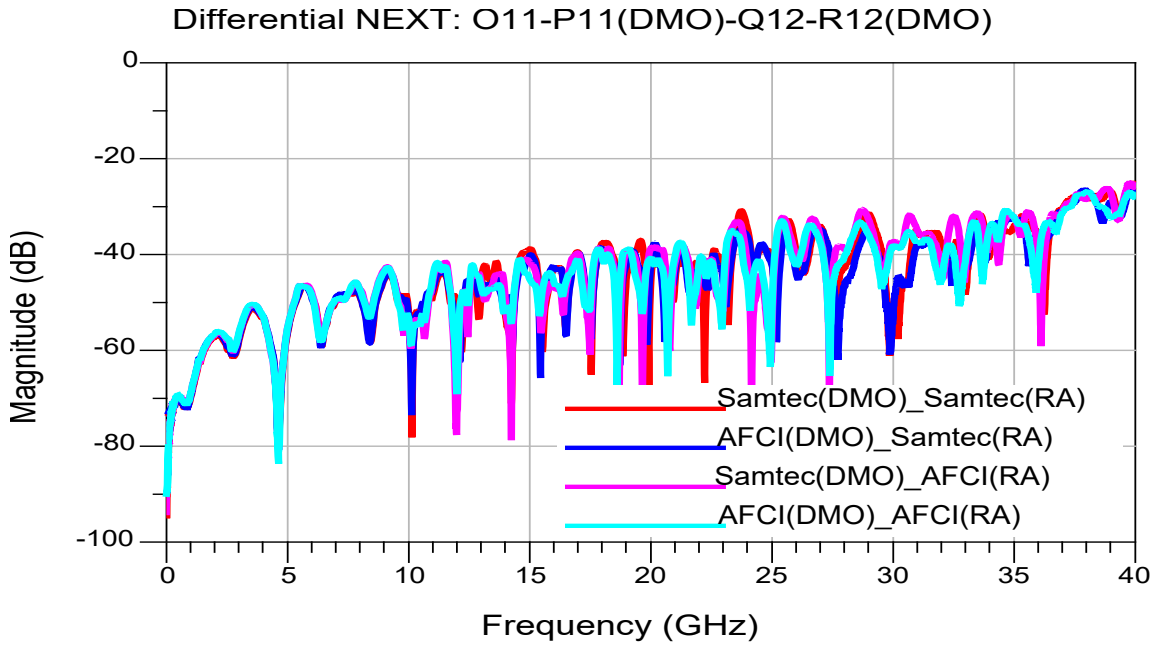

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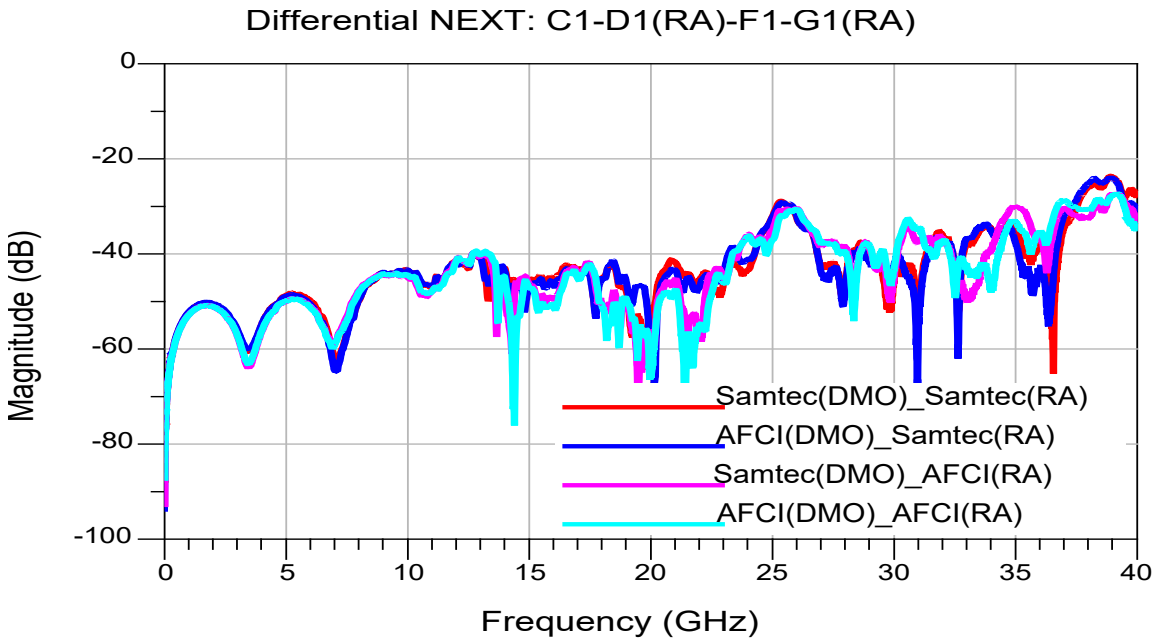
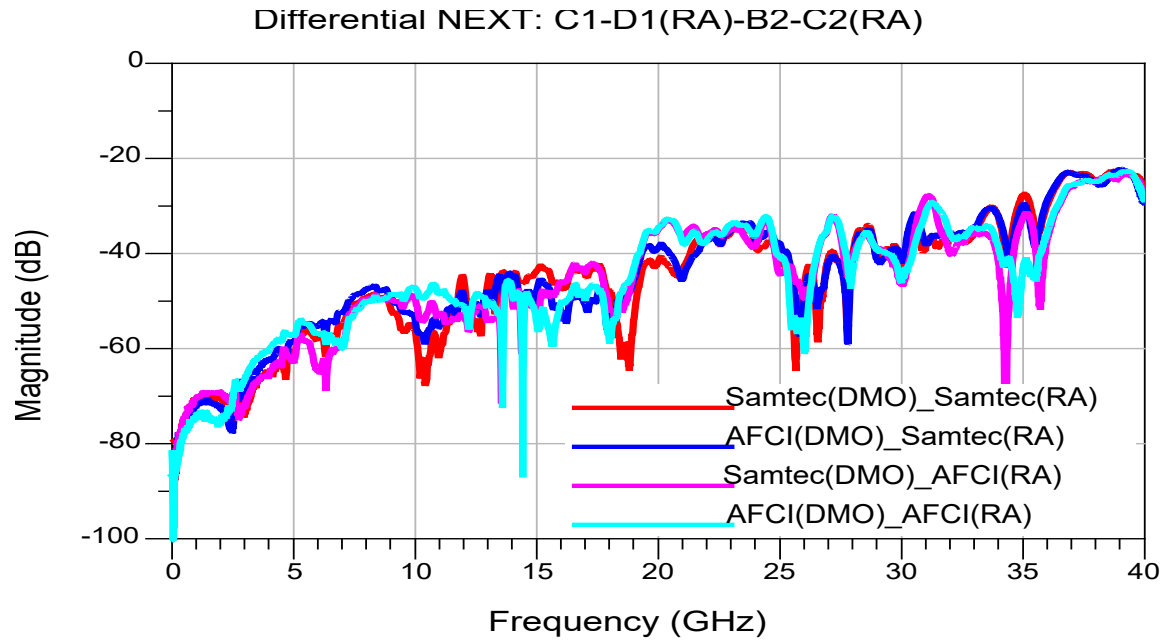
Differential Near End Crosstalk (NEXT) from Right Angle(RA) Receptacle





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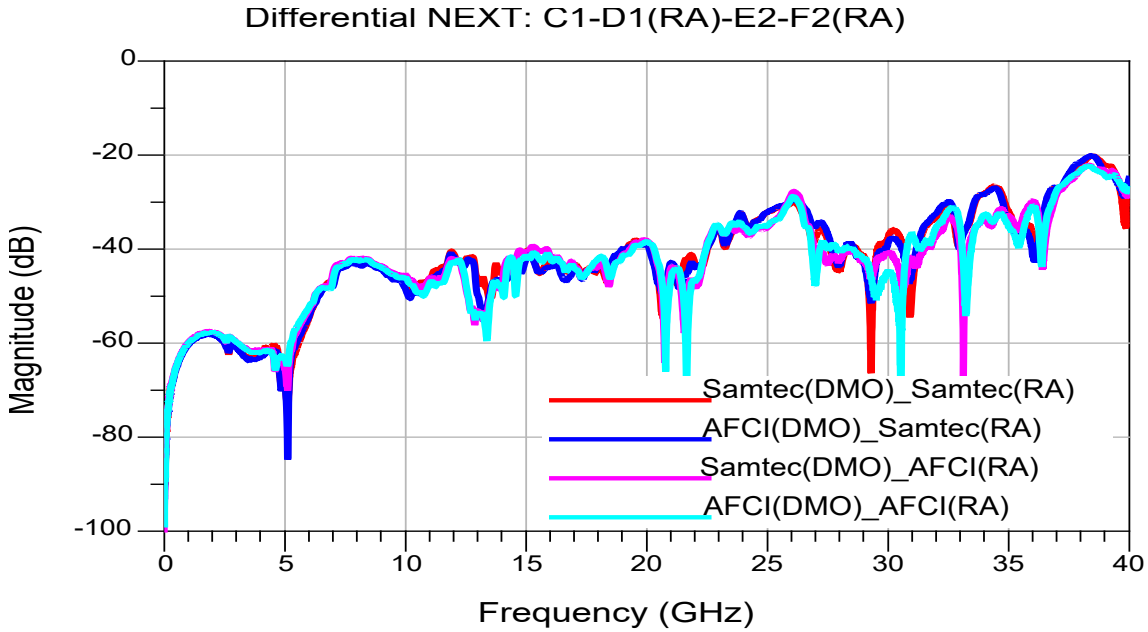

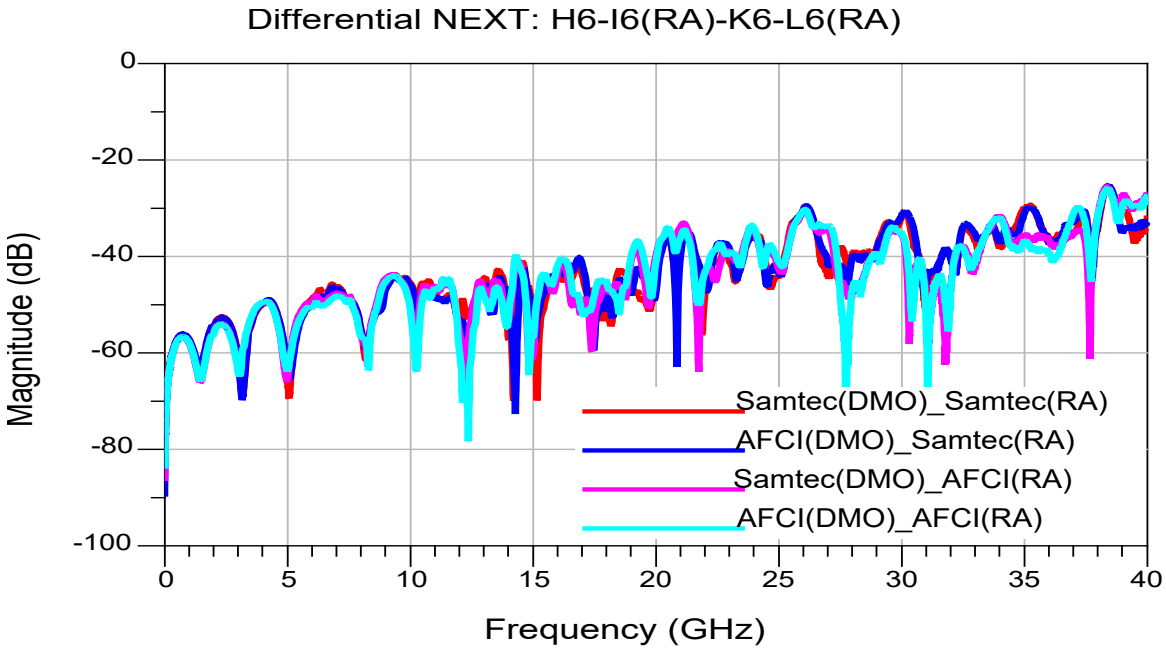

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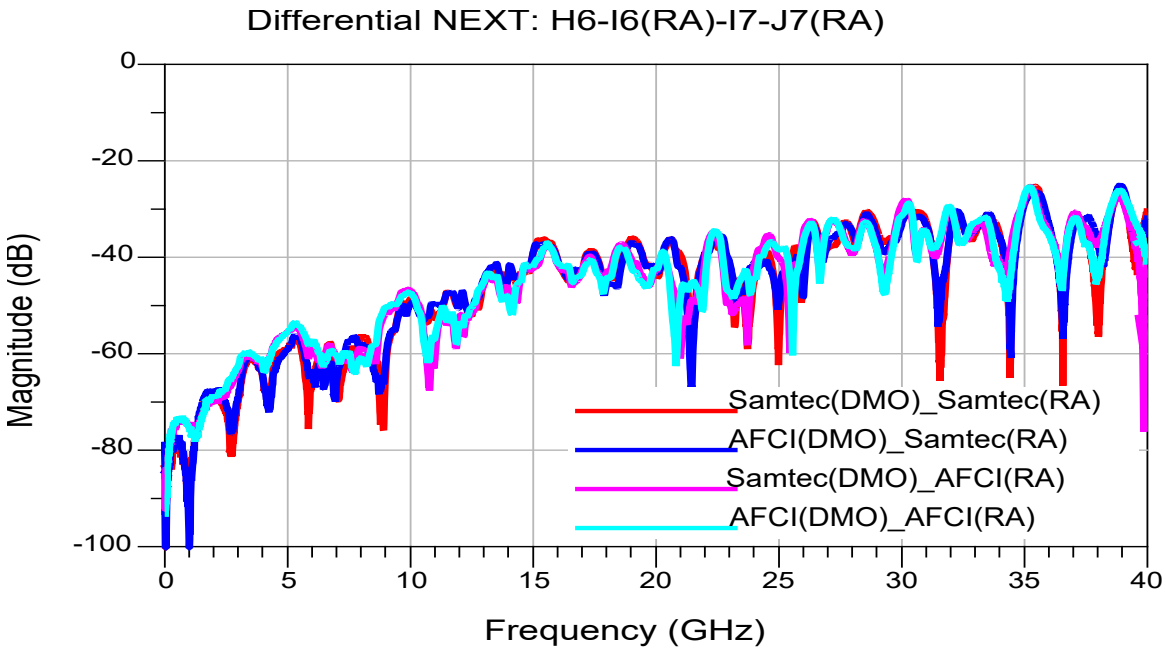

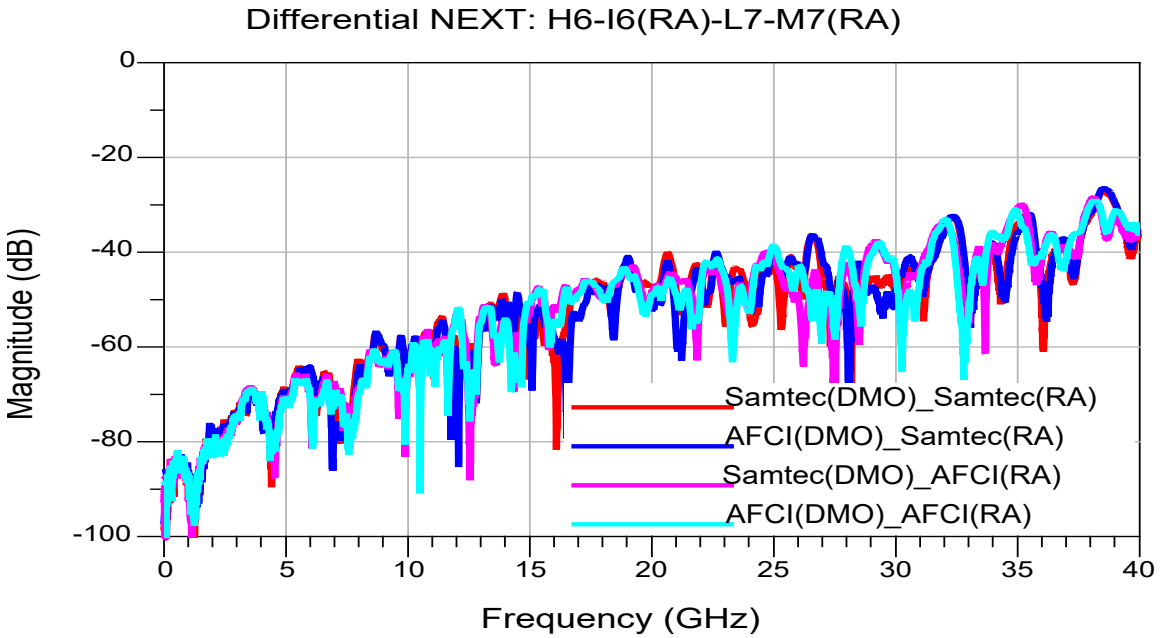

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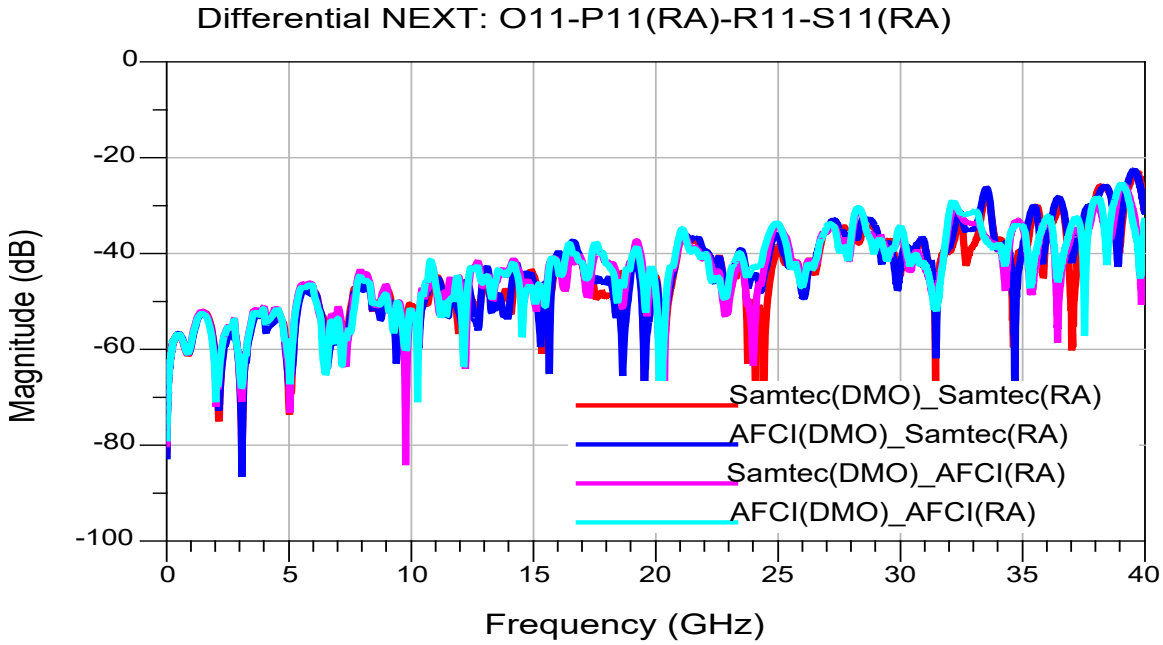

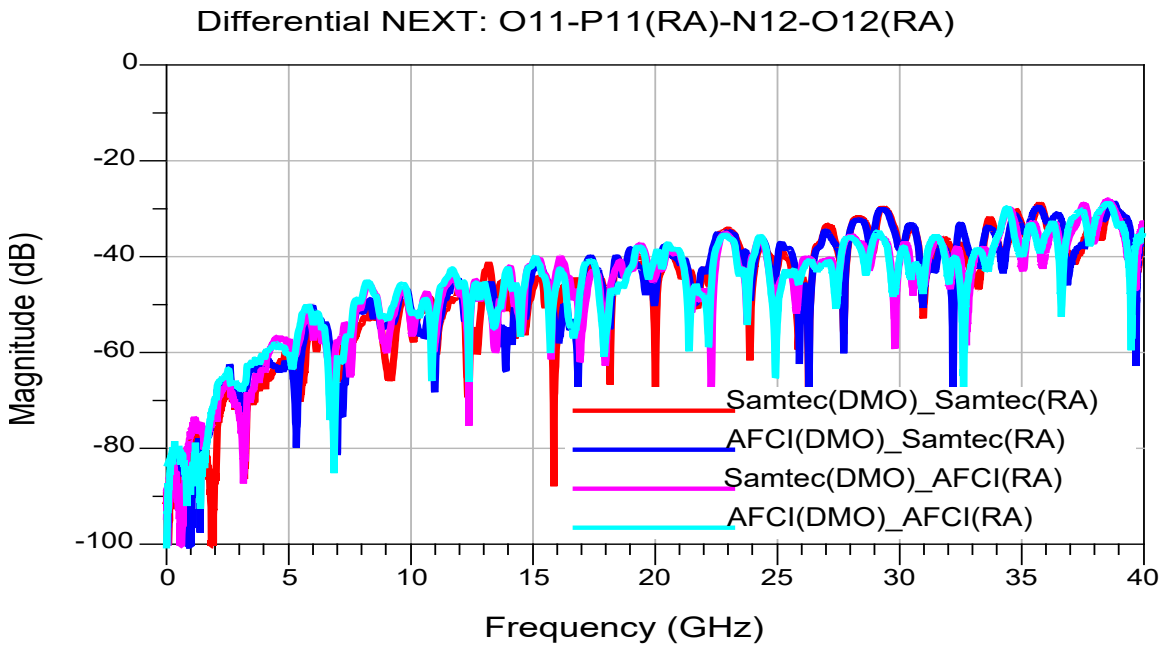

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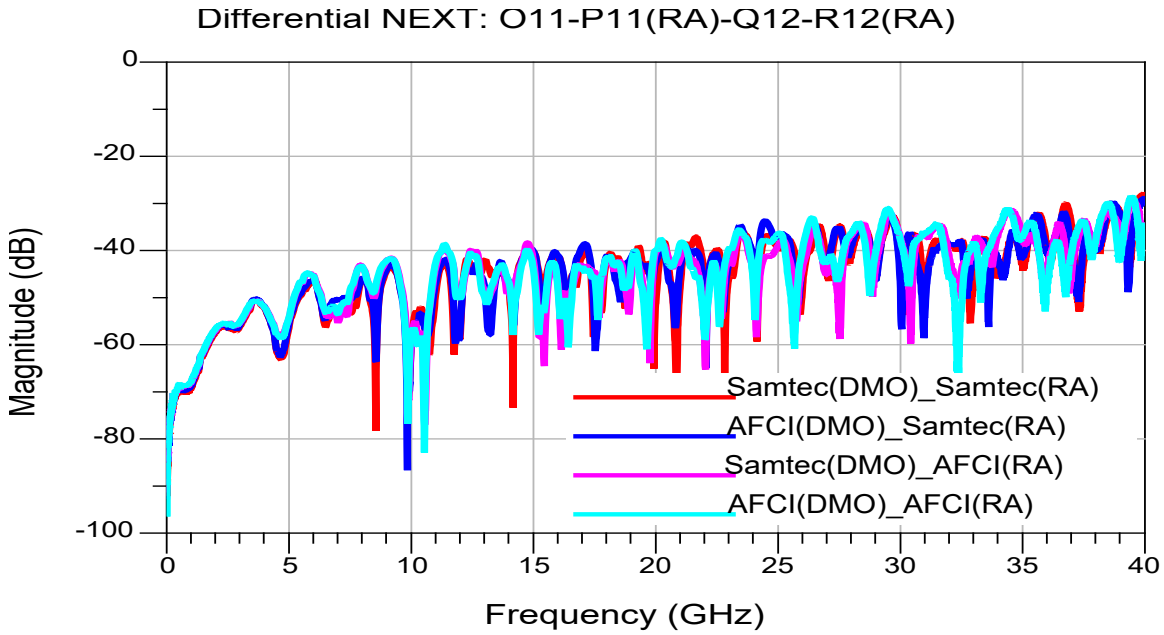

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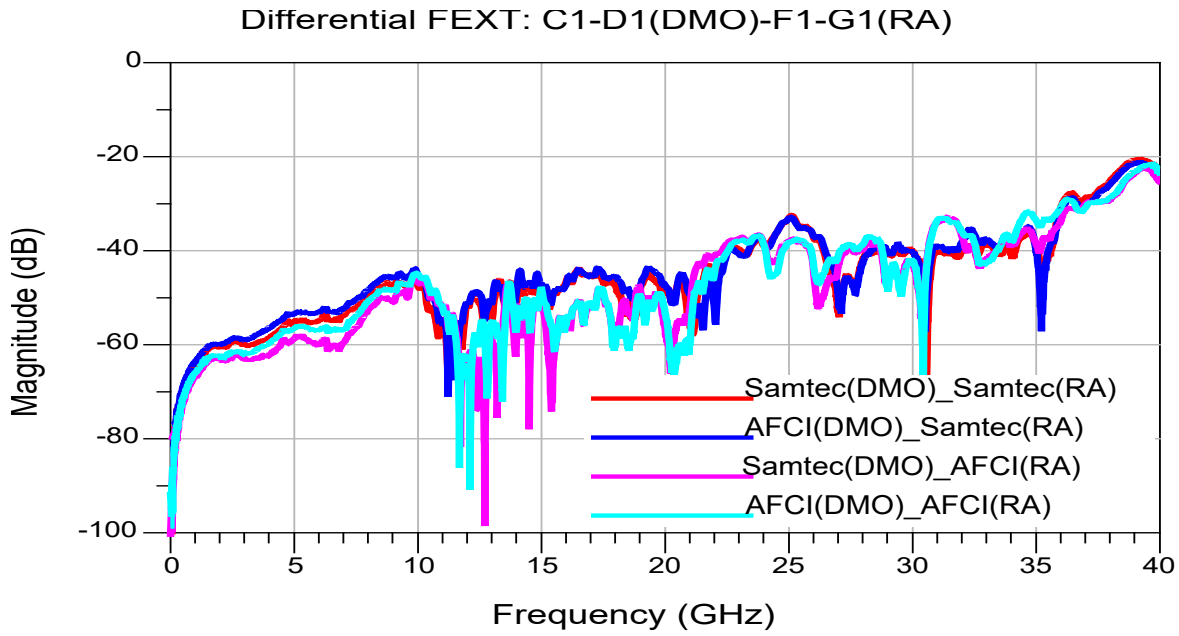
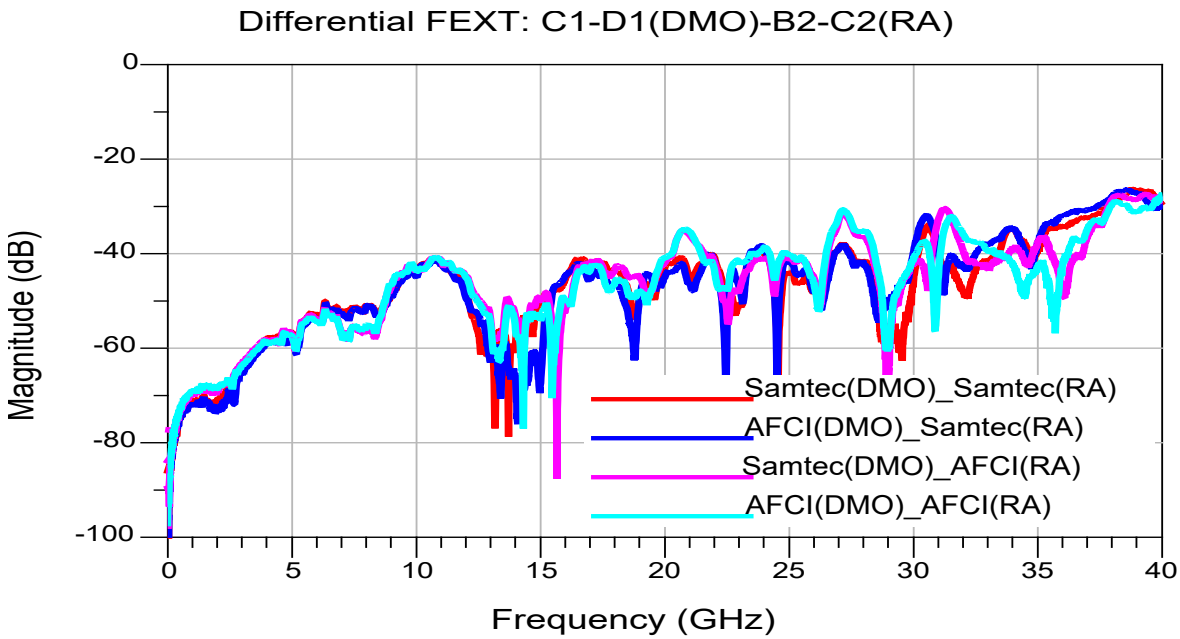
Differential Far End Crosstalk (FEXT)





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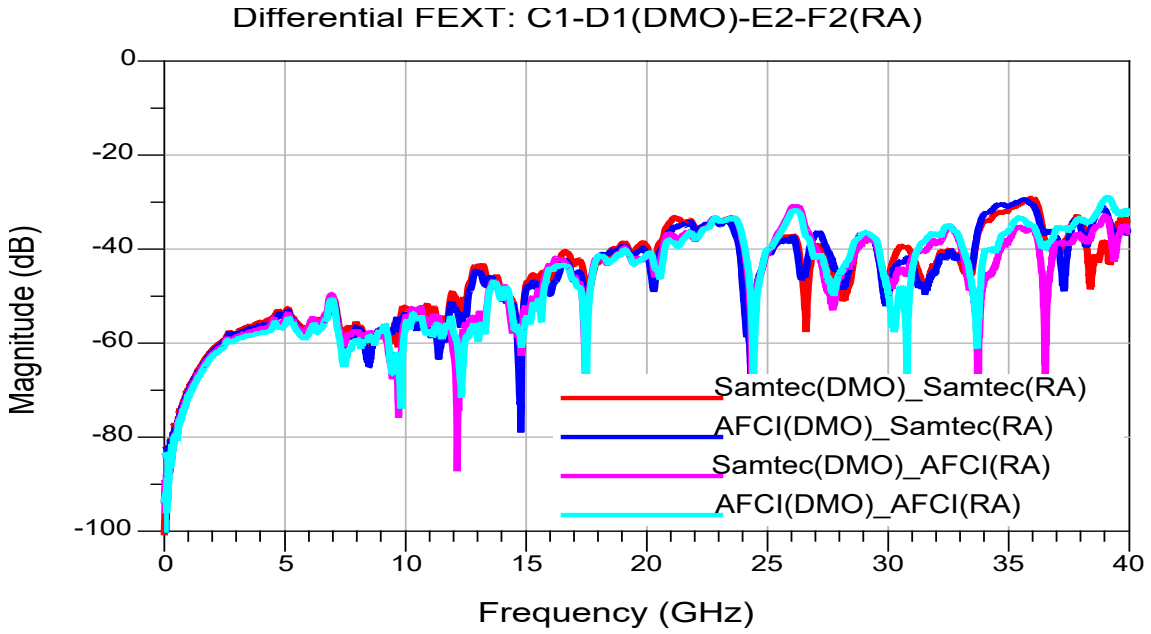
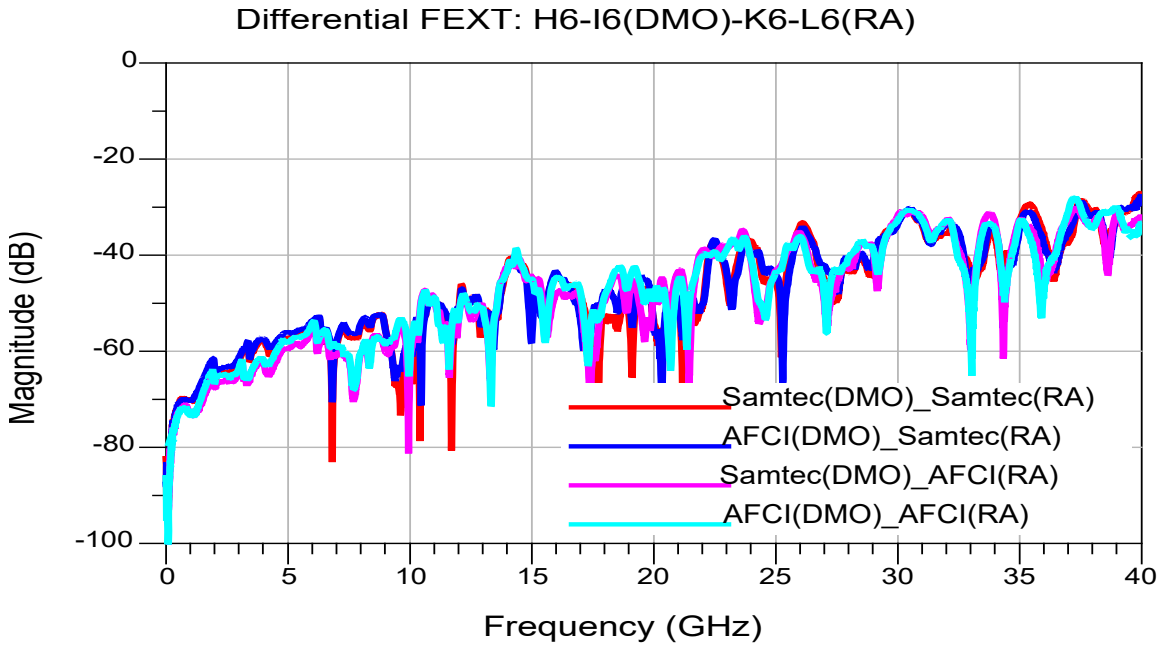
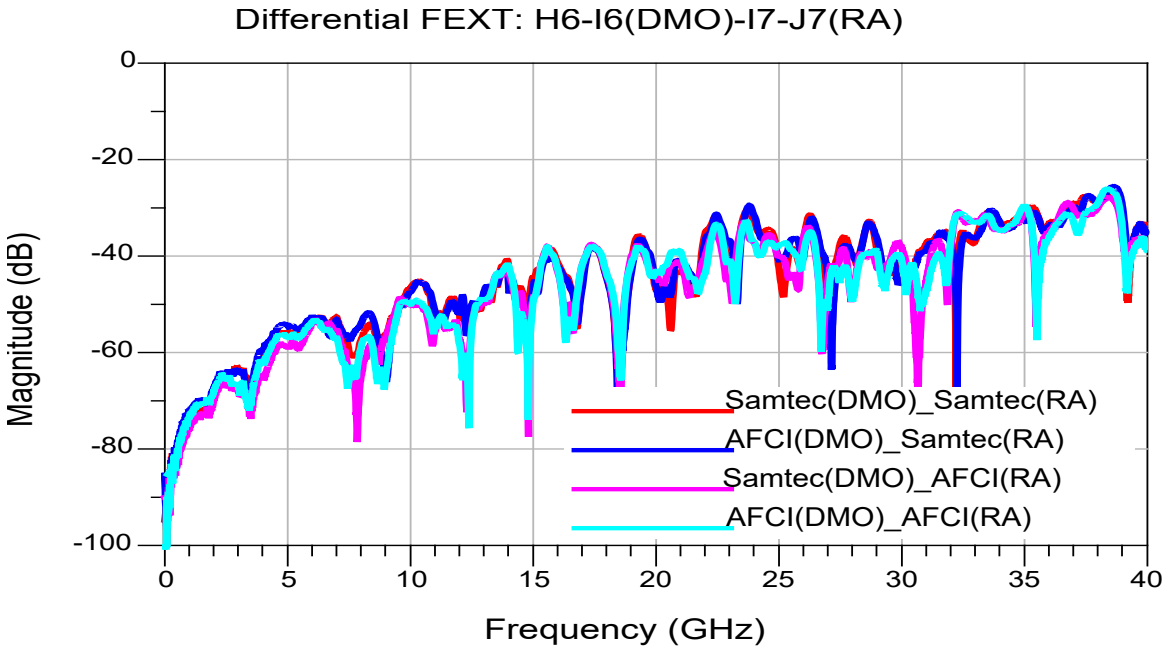
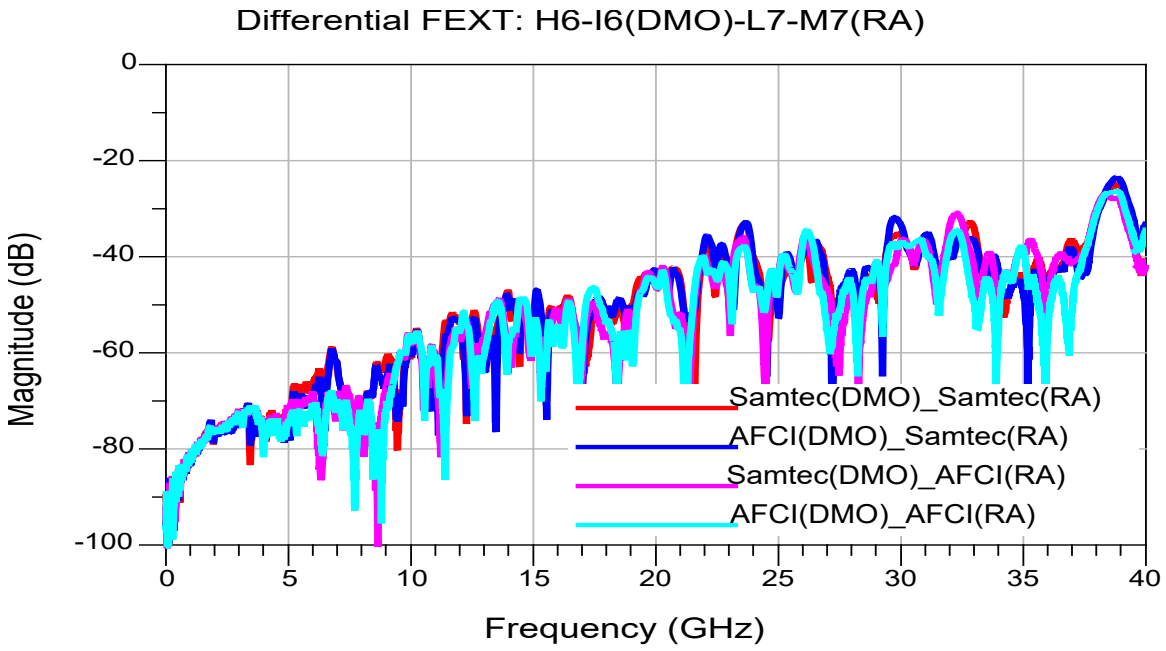


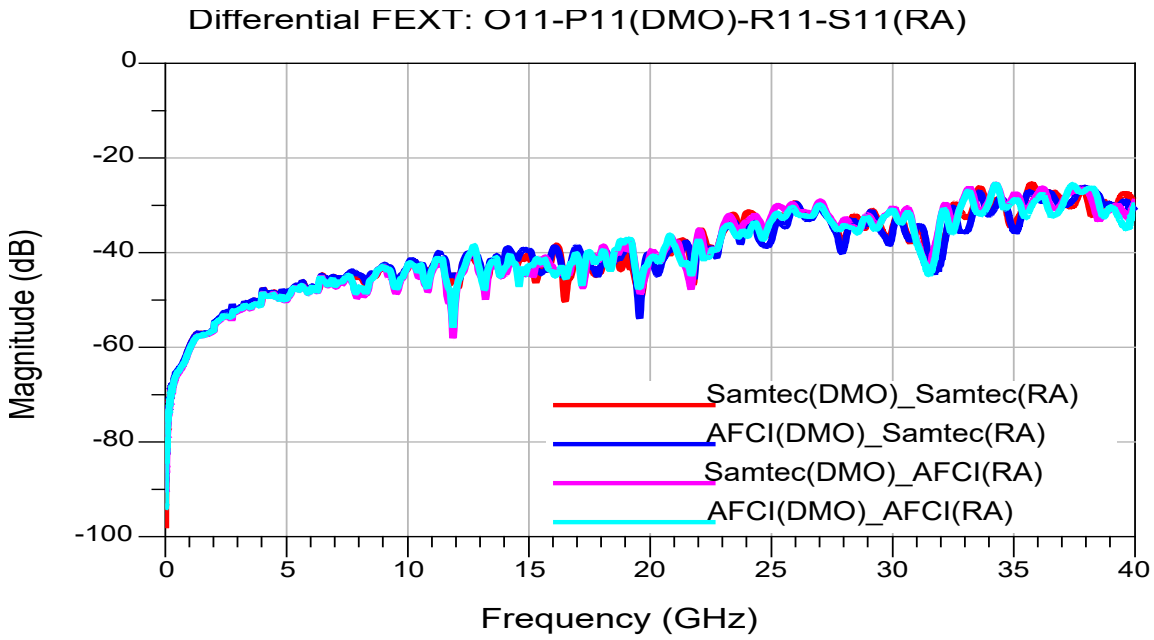


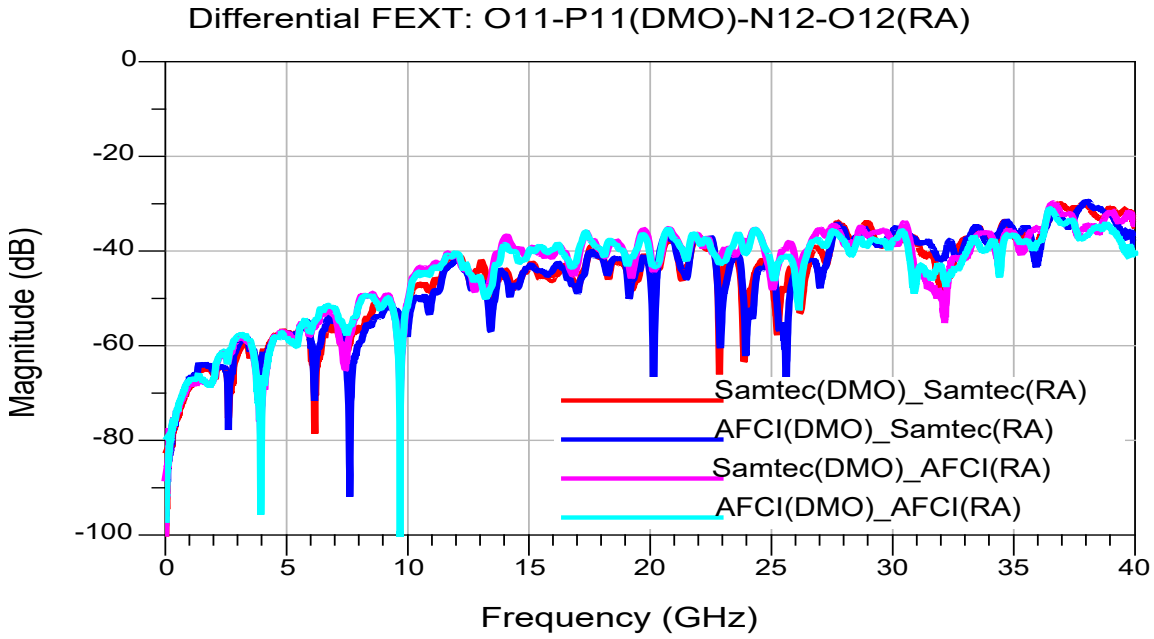
Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA



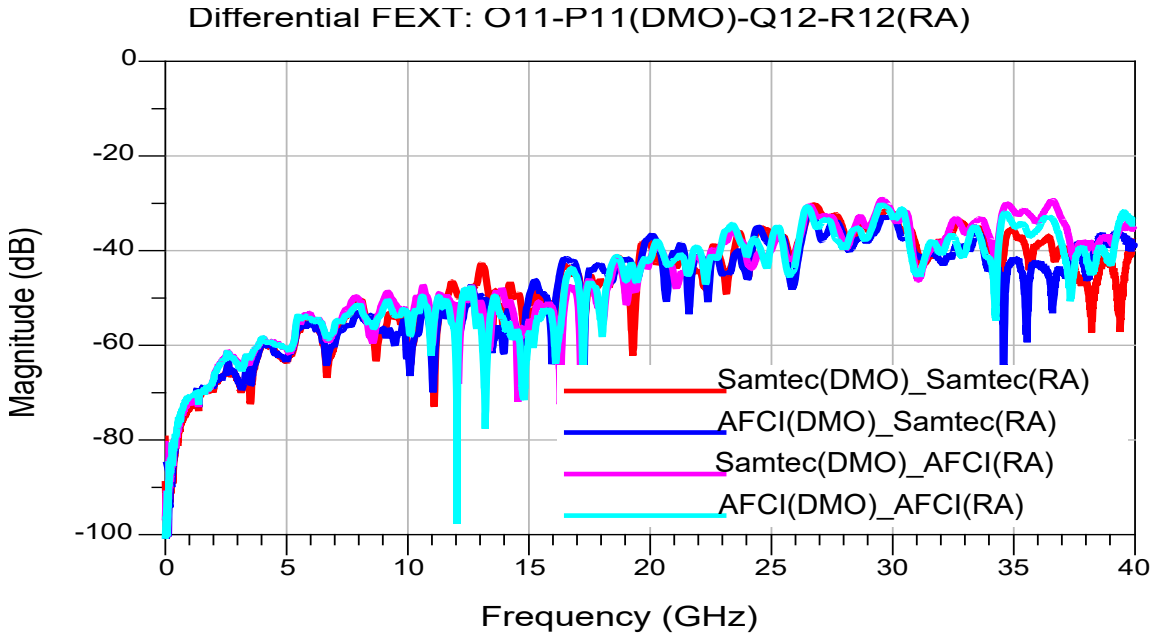


Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA





Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA



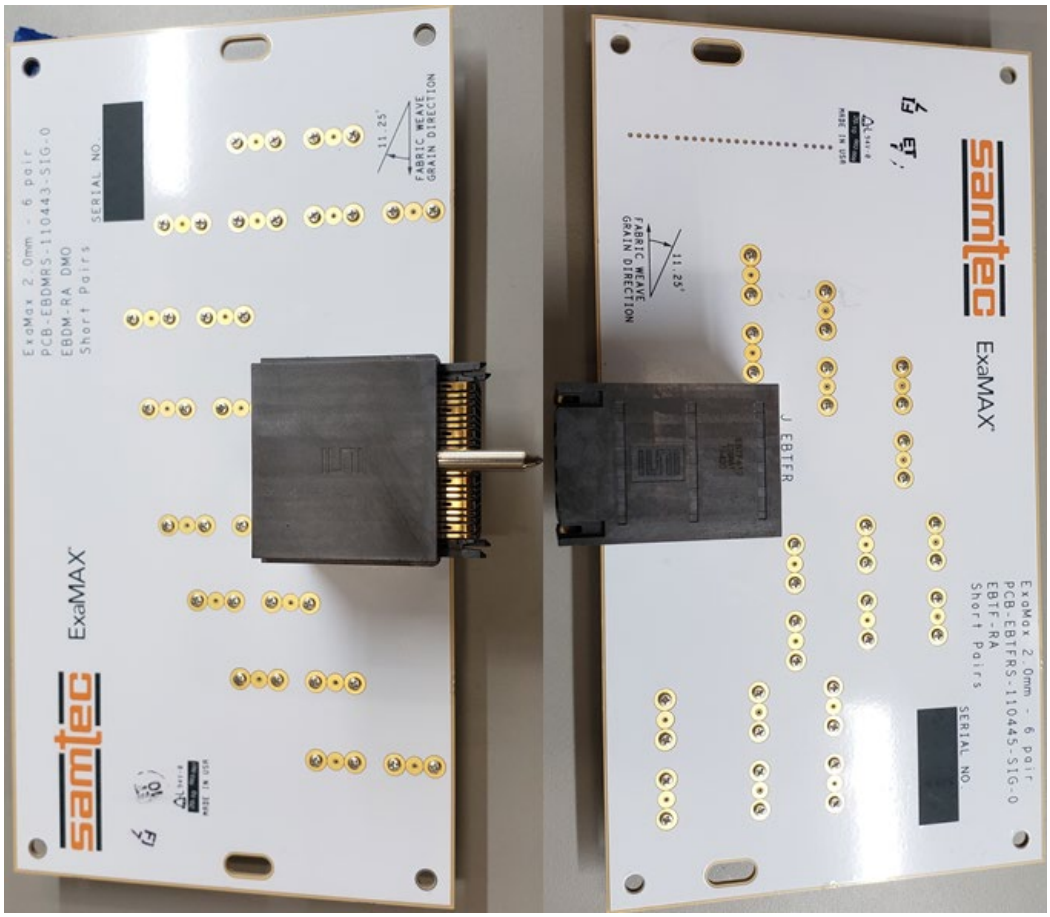
Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA

Appendix A – Product and Test System Descriptions

Product Description

Product test samples are EBDM-RA/EBTF-RA Series connectors. The part number is EBDM-6-12-2.0-S-RA-1-G and EBTF-6-12-2.0-S-RA-1. A photo of the test samples mounted to SI test boards is shown below. The boards were populated with 2.4 mm connectors to reliable out to 50 GHz.

PCB-EBDMRS-110443-SIG-0 and PCB-EBTFRS-110445-SIG-0



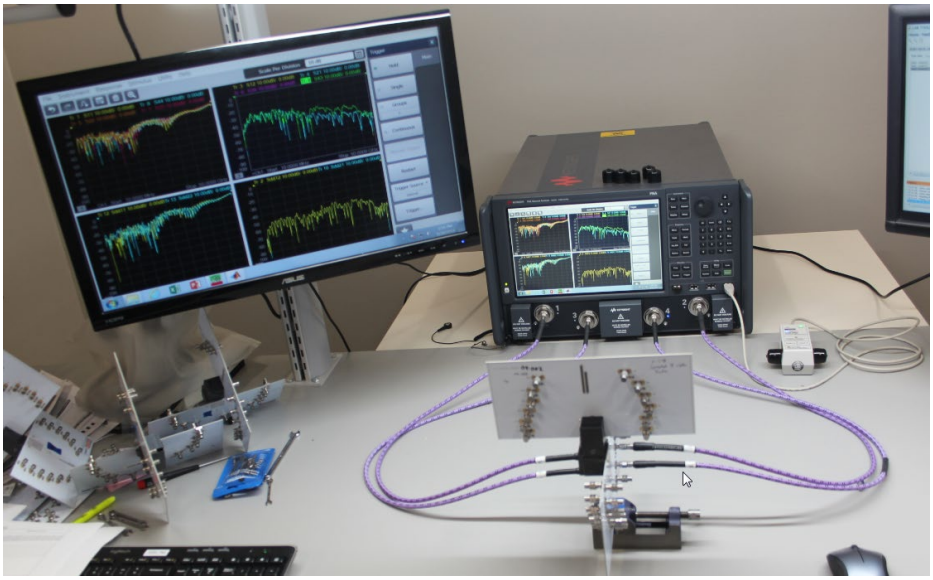
Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA

Appendix B – Test and Measurement Setup

For frequency domain measurements, the test instrument is the Keysight N5225B PNA-L network analyzer. Frequency domain data are obtained directly from the instrument and figures are generated by Keysight ADS. The network analyzer is configured as follows:

Start Frequency – 10 MHz
Stop Frequency – 40 GHz
Number of points – 4000
IFBW – 1KHz

N5225B Measurement Setup



Test Instruments

QTY	Description
1	Keysight N5225B PNA-L Network Analyzer (10 MHz to 67 GHz)
1	Keysight N4694-60003 ECAL Module (10 MHz to 67 GHz)

Test Cables & Adapters

QTY	Description
16	1 m Junkosha 2.4mm male to female cables

Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA

Appendix C - Frequency Domain Measurements

Frequency (S-Parameter) Domain Procedures

The quality of any data taken with a network analyzer is directly related to the quality of the calibration standards and the use of proper test procedures. For this reason, extreme care is taken in the design of the through calibration standards, the SI test boards, and the selection of the PCB vendor.

A coaxial SOLT calibration is performed using a N4694-60003 ECAL module. Then DUT measurements are performed under SOLT calibration. The measurements include the effect of test fixture. The measurements of the 2X THRU line standards are required to remove the test fixture effect.

The boards PCB-EBDMRS-110443-SIG-0, PCB-EBDMRM-110443-SIG-0, PCB-EBDMRL-110443-SIG-0 and PCB-EBTFRS-110445-SIG-0, PCB-EBTFRM-110445-SIG-0, PCB-EBTFRL-110445-SIG-0 were used. The bandwidth of all calibration traces is higher than 40 GHz.

Series: EBDM-RA / EBTF-RA
Description: Performance Comparison of Samtec and Amphenol ICC ExaMAX® 2 mm 6 Pairs High Speed Backplane Connector, DMO mating to RA

Appendix D – Glossary of Terms

ADS – Advanced Design Systems
DUT – Device under test
FEXT – Far-End Crosstalk
NEXT – Near-End Crosstalk
PCB – Printed Circuit Board
SE – Single-Ended
SI – Signal Integrity
SOLT – used to define Short, Open, Load & Thru Calibration Standards