ARDENT CONCEPTS
An Amphenol Company

APPLICATION NOTE

ICFP De-embedding

Purpose:
The purpose of this document is to explain the de-embedding process of a an ICFP. This will help you get the S-Parameter data for the device alone.

The Procedure:

1. Connect the De-Embed Probe to Port 1 of the PNA and connect a 50Ω load to Port 2 of the PNA. It is important to note that the ICFP with the interface is not connected to the ICFP de-embed probe.

2. In the Port Extension Settings, perform an Open Standard measurement on just Port using the Auto Port Extension function. Both ports should not be checked, just the Port that the Open standard is on. The Open Standard being the ICFP De-Embed Probe.

3. With the Port Extension now applied, connect the ICFP Probe with the Interface to the De-Embed Probe and complete a through connection by removing the Load on Port 2 and connecting the coaxial end of the ICFP with the Interface to Port 2.

4. Obtain the Through Measurement, this is the De-Embedded S2P file using the Port Extension Method.

5. To consider the Reflected Loss of the Port Extension Method, the Through Only De-Embed method is applied by first obtaining a Through Measurement of the ICFP De-Embed Probe and ICFP with Interface. This is the same configuration as step 3, except for the Port Extension being turned off for this measurement.

6. Obtain the Through Measurement. This measurement includes the ICFP De-Embed Probe and the ICFP with the Interface.

7. Using De-Embedding Software, import the S2P file of the ICFP De-Embed Probe and the ICFP with the Interface and import the 2X ICFP De-Embed Probe patch cord S2P file. Under Through Only De-Embedding, select fixture type as asymmetric. This is the De-Embed Probe fixture and set 2X Through Fixture.

8. Note: For the Return Loss parameter using the Through Only De-Embedding it is only useful for up to 50 GHz.

Data:

An image of the Through Only De-Embedding processing setup can be found below in *Figure 1*.

Figure 1

Figure 2 below shows the Return Loss for the De-Embedded ICFP Parameter with Port Extension De-Embedding. For this case, the Through Only De-Embedding method was unable to obtain an accurate Return Loss after 50 GHz and therefore the Port Extension method was applied. The Port Extension method does not remove the Return Loss of the de-embed probe and the response is essentially the same as the De-Embed Probe ICFP and ICFP assembly with the Interface. However, the Return Loss obtained from the Port Extension method is required to obtain a causal Time Domain Reflected Response. Since the De-Embed Probe ICFP and ICFP with the Interface as a blindmate is symmetric, a causal TDR was obtained for S11 and S22.

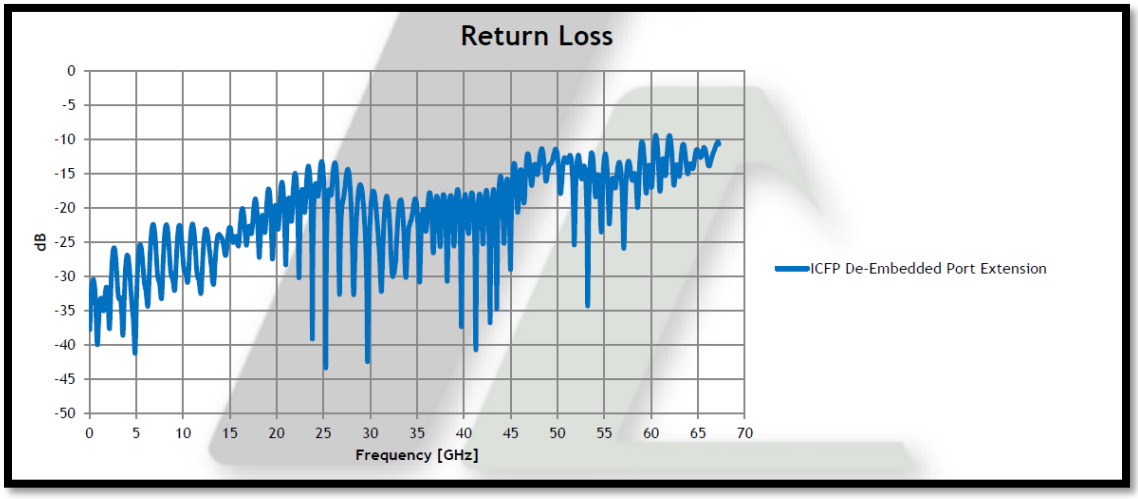


Figure 2

Figure 3 shows the De-Embedded ICFP Insertion Loss Parameter with Through Only De-Embedding. To consider the mismatch loss of reflection of the Insertion

Loss obtained from the Port Extension De-Embedding method, the Through Only De-Embedding method is applied. It is important to note that the Through Only De-Embedding method was unable to obtain the correct Return Loss after 50 GHz.

Figure 3

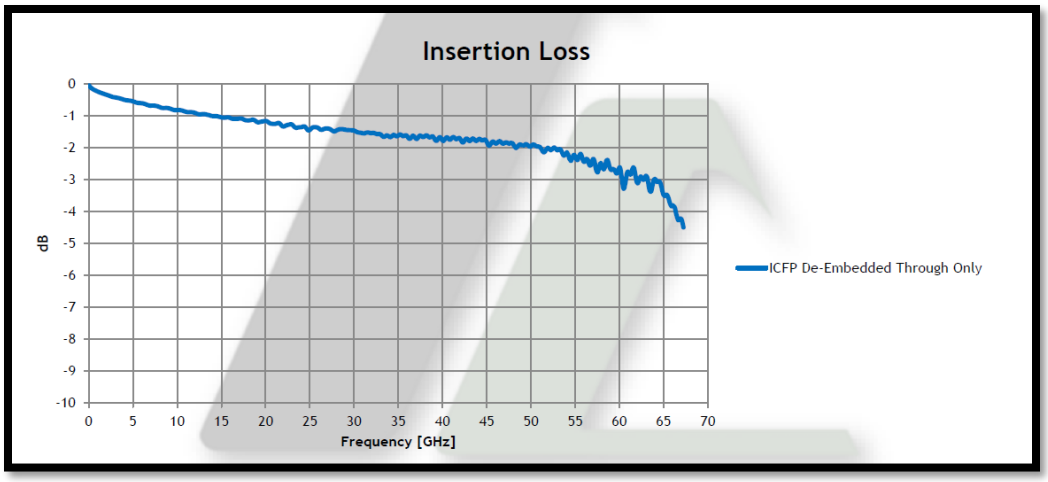
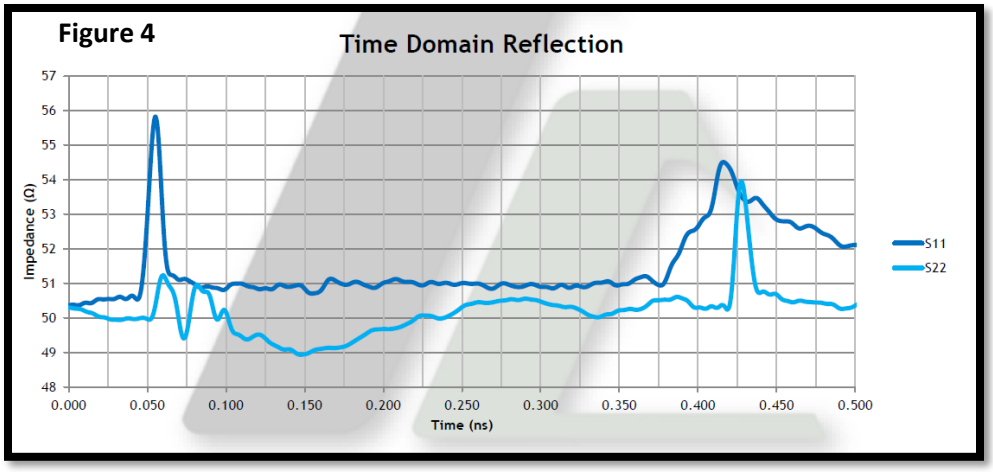


Figure 4 shows the TDR for the De-Embedded ICFP Parameter with Port Extension De-Embedding. With the Port Extension method, the S11 response of the DP device is removed and the path through the interface starts just after zero. The S22 response first starts at the 1.85 mm connector and then ends at the Interface discontinuity. Thus, the S11 and S22 TDR response is causal.

Figure 4



Shown in *Figure 5* below is the Insertion Loss for ICFP and Fixture measurements. Traces comparing the Through Blindmate ICFP measurement and the patch cord response used to obtain the Port Extension and Through Only De-Embedded responses. Note that the De-Embedded Insertion Loss response of the Port Extension is corrected after applying the Through Only De-Embed Method.

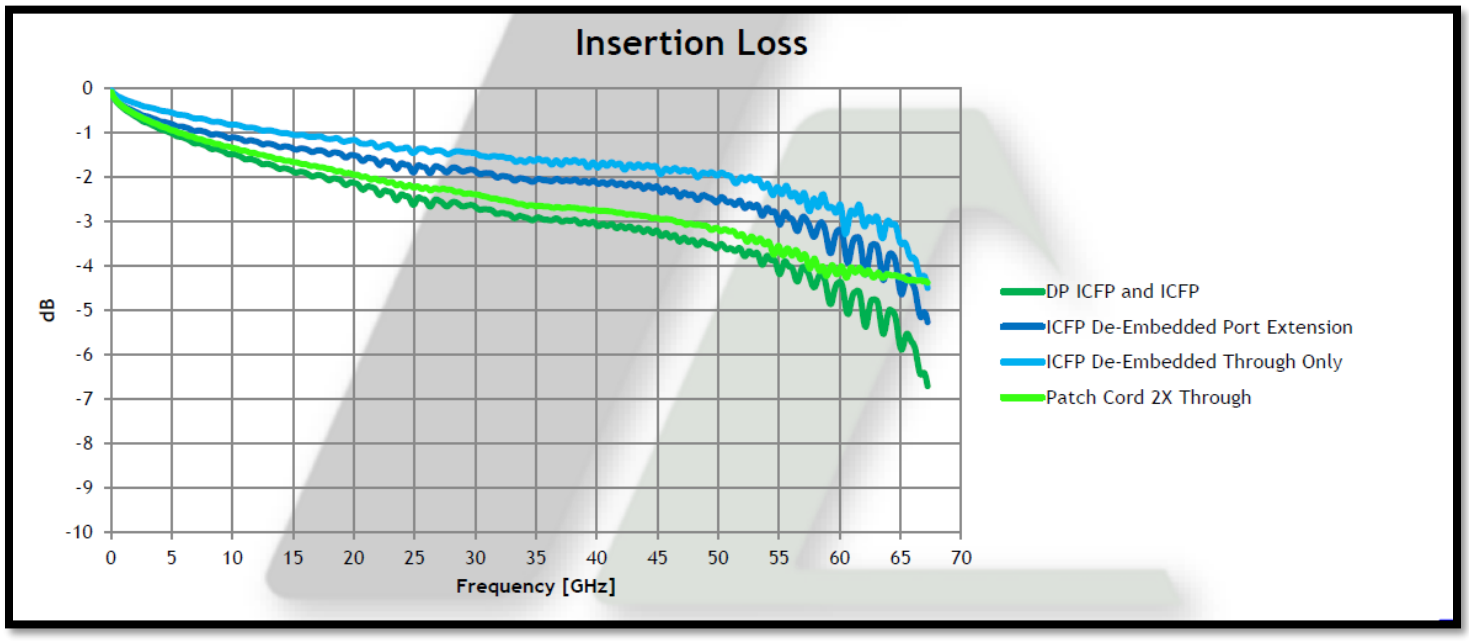

Insertion Loss
dB
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Frequency [GHz]
DP ICFP and ICFP
ICFP De-Embedded Port Extension
ICFP De-Embedded Through Only
Patch Cord 2X Through

Figure 5

Who is Amphenol Ardent Concepts?

Amphenol Ardent Concepts is a leading designer and manufacturer of high performance multicoax and coaxial assemblies, connectors, and sockets used in the development of next generation semiconductors and electronics systems. Our core technology is the smallest, fastest, most electrically efficient compression mount connector technology worldwide. As data rate requirements increase and devices and systems shrink, Ardent's products deliver superior signal integrity in a dense footprint that can be reusable across programs to maximize cost savings.