

# DP 1.4 Test Fixture

## User Manual



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Product Name	Version	Date	Comments
DP 1.4 Test Fixture Series	01	Apr.30,2019	Initial release

## 1. Introduction

This document describes the Dimension and electrical specification for DP test fixture.

## 2. Objectives

This specification provides the requirements for test fixture performances and test methods of DP test fixture.

## 3. Method of operation & Cleaning

### 3-1. Handling

Before each use of the test fixture, ensure that all connectors are clean.

### 3-2. Visual Inspection

Be sure to inspect all test fixture carefully before making a connection. Inspect all test fixture for metal particles, scratches, deformed threads, dents, or bent, broken, or misaligned center conductors. Do not use damaged test fixture.

### Cleaning

If necessary, clean the connectors using low-pressure (less than 60 PSI) compressed air or nitrogen with an effective oil-vapor filter and condensation trap. Clean the cable threads, if necessary, using a lint-free swab or cleaning cloth moistened with isopropyl alcohol. Always completely dry a connector before use. Do not use abrasives to clean the connectors. Re- inspect connectors, making sure no particles or residue remains.

### **3-3. Precautions**

Before making any connections, review the “Handling Precautions” section.

Follow these guidelines when making connections:

- Align test fixture carefully
- Make preliminary connection lightly
- To tighten, turn connector nut only
- Do not apply bending force to test fixture
- Do not over-tighten preliminary connections
- Do not twist or screw-in test fixture
- Use an appropriately sized torque wrench (depends on SMA gender), and do not tighten past the “break” point of the torque wrench (normally set to 5 in-lbs.)

### **3-4. Calibration Through De-Embedding**

The DP Test Adapters are fully passive components. Therefore, calibration compensating for the losses must occur within the test instrumentation that drives the Creating S2P files. These files will soon be available to de-embed the electrical length and losses within the test fixture up to the DP connector interface pads.

TFU-36R4R

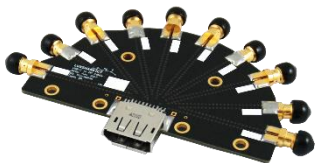


Figure 3-1. DP 1.4 Receptacle Test  
Fixture

TFU-37R4R

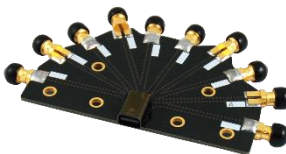


Figure 3-2. mDP 1.4 Receptacle Test  
Fixture

TFU-36C4R



Figure 3-3. DP 1.4 Calibration Board

TFD-23R1T

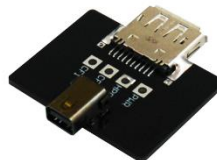


Figure 3-4. DP DC Signals Test Board

## 4. Testing Equipment

Item	Product Model	Name	Manufacturer
01	1220S	Auto Inserting Pulling Force (Tension, Compression) Tester	.Se-tester
02	E5071C-TDR	300KHz~20GHz ENA Network Analyzer	Keysight
03	N4433A	200KHz~20GHz Electronic Calibration Module	Keysight

## 5. Test Conditions

(Reference DisplayPort 1.4 specification)

Test Fixture	Part No.	S/N
DP 1.4 Receptacle Test Fixture	TFU-36R4R	001
mDP 1.4 Receptacle Test Fixture	TFU-37R4R	001
DP 1.4 Calibration Board	TFU-36RCR	001

Test Item:	Condition	Requirement
Differential Insertion Loss	10MHz~15GHz	N/A
Differential Return Loss	10MHz~15GHz	N/A
Differential to Common mode Conversion	10MHz~15GHz	N/A
Differential Near-End Crosstalk	10MHz~15GHz	N/A
Differential Far-End Crosstalk	10MHz~15GHz	N/A
Intra-Pair Skew (DP)	50ps (20%~80%)	<5ps
Traces Impedance	130ps (20% - 80%)	50 Ω ± 5%
Differential Impedance (DP)	130ps (20% - 80%)	100 Ω ± 10%
Differential Impedance (mDP)	130ps (20% - 80%)	100Ω ± 15%

## 6. Testing Result

### 6-1. DP 1.4 Test Fixture

#### 6-1-1. Differential Intra-Pair Skew

Test Pair \ DUT	Result (ps)	Remark
AUX	0.467	Refer to Fig. 6-1
ML0	0.007	Refer to Fig.6-2
ML1	0.340	Refer to Fig. 6-3
ML2	0.258	Refer to Fig. 6-4
ML3	2.854	Refer to Fig. 6-5

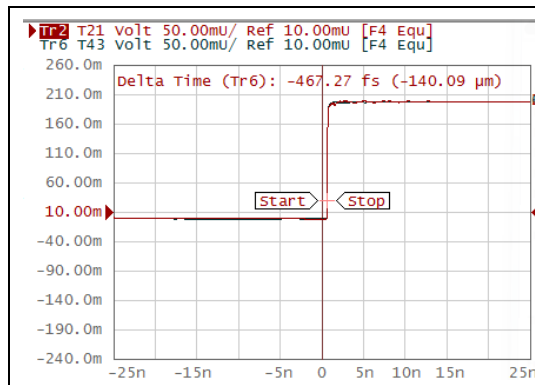


Figure 6-1. AUX Pair

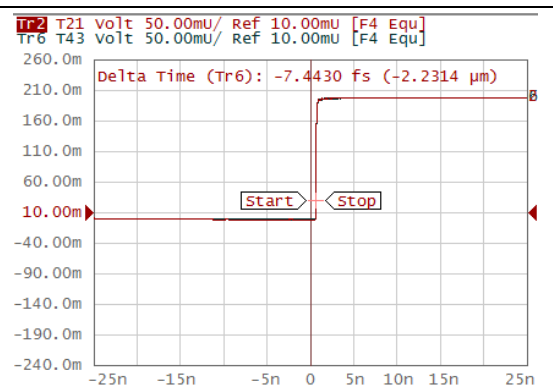


Figure 6-2. ML0 Pair

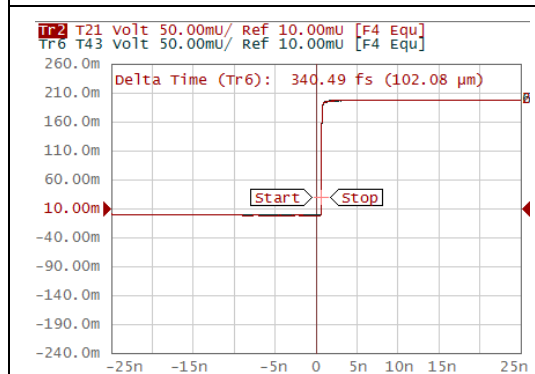


Figure 6-3. ML1 Pair

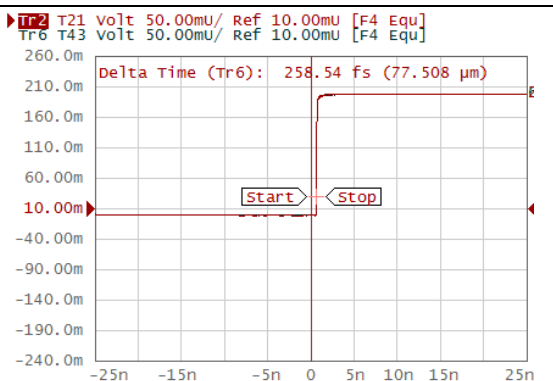
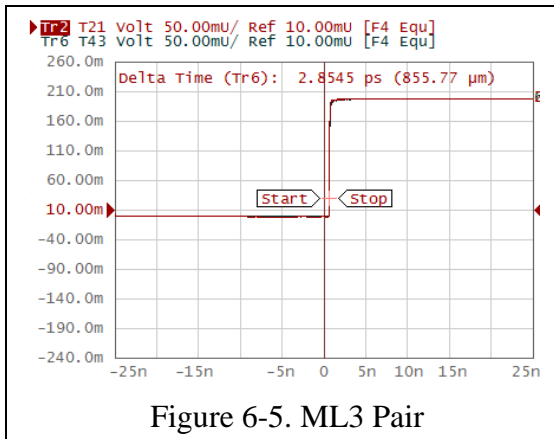
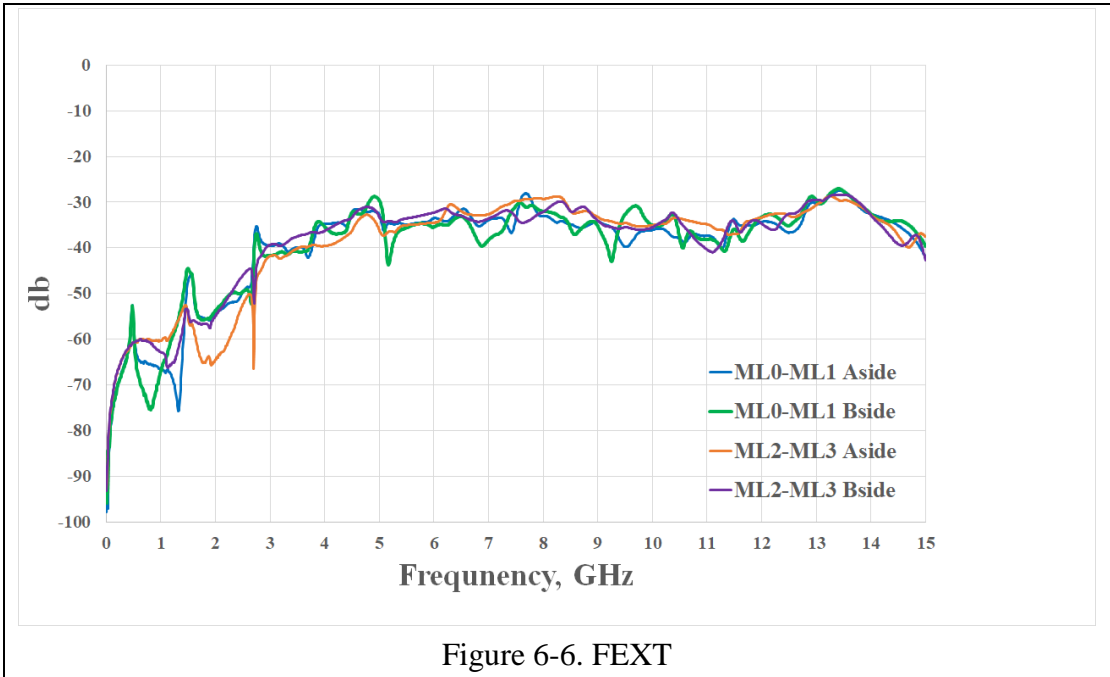


Figure 6-4. ML2 Pair

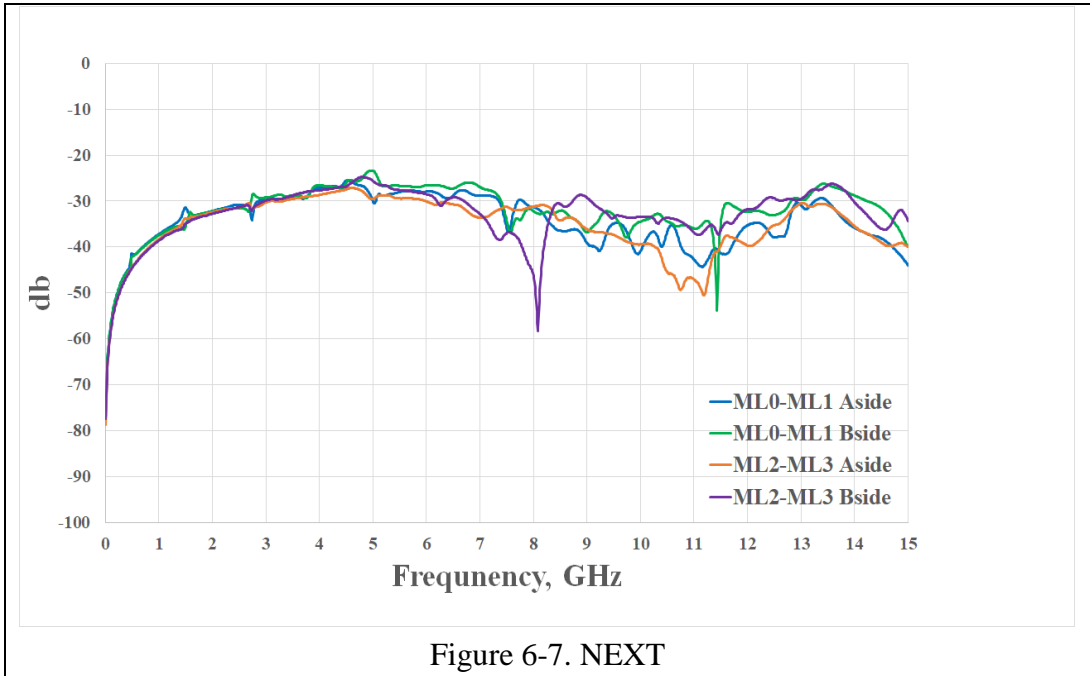




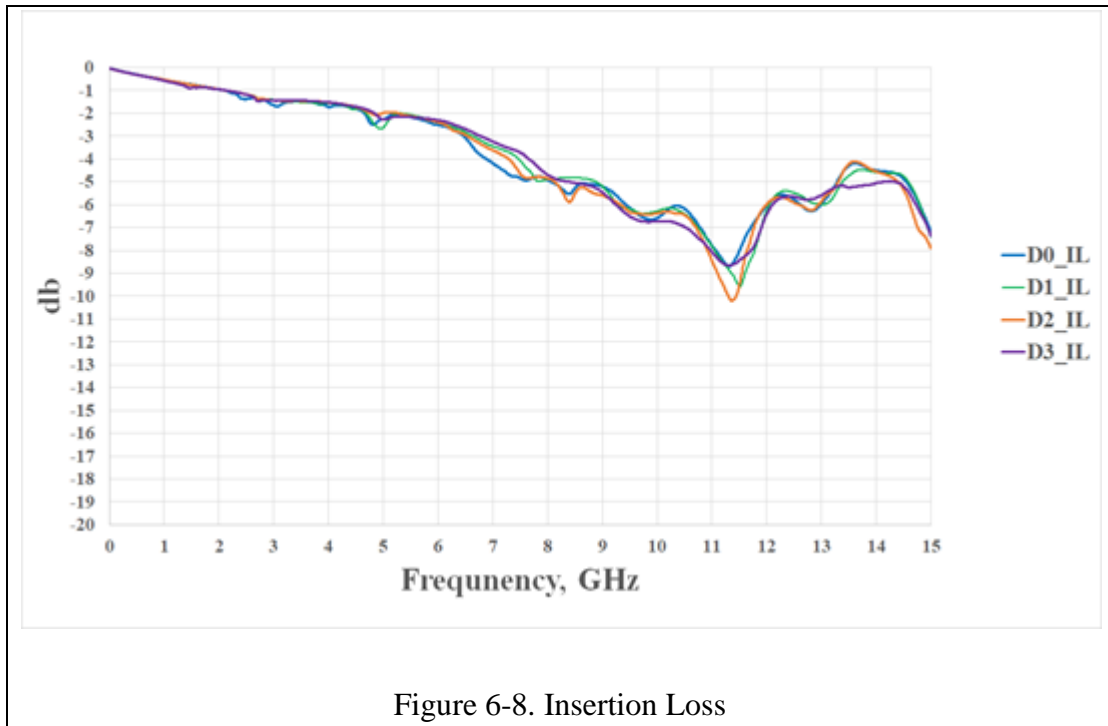
**6-1-2. Far-End Crosstalk**



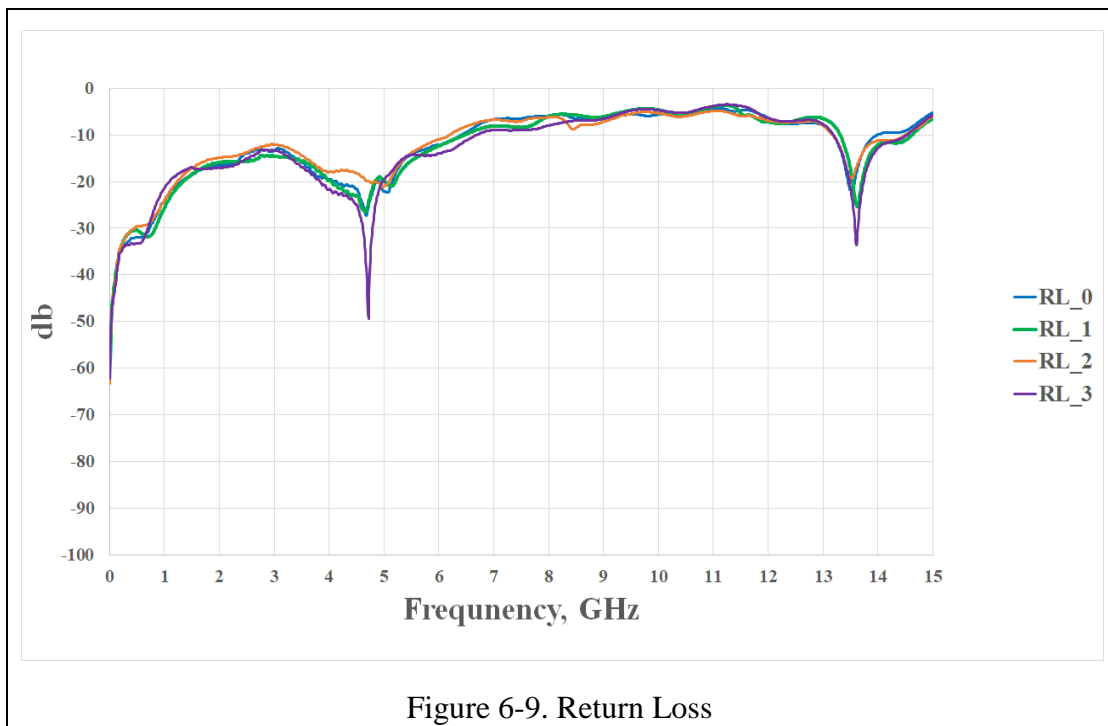
**6-1-3. Near-End Crosstalk**



### 6-1-4. Insertion Loss

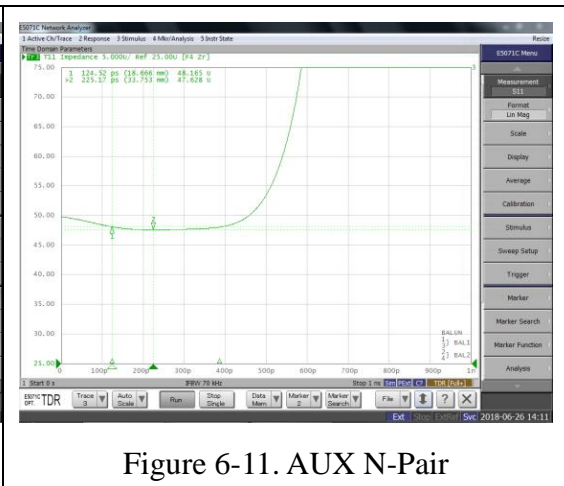
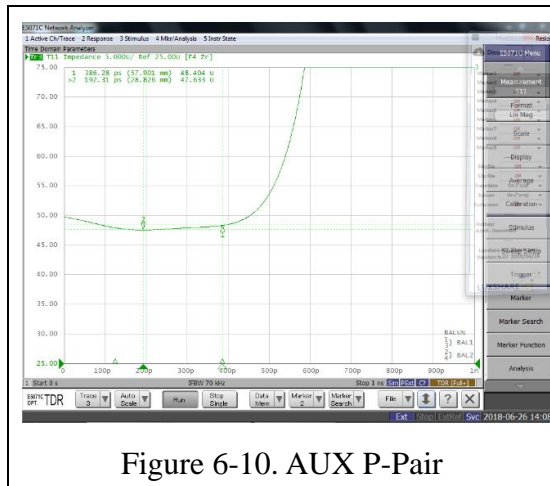


### 6-1-5. Return Loss



## 6-1-6. Traces Impedance

Test Item		Impedance ( $\Omega$ )			
Test Pin		DUT			
		DP 1.4 Receptacle Test Fixture			
Pair	Pin	Max	Min	$\Delta$	Remark
AUX	P-Pair	48.40	47.63	0.77	Refer to Fig. 6-10
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-11
L0	P-Pair	49.07	48.30	0.77	Refer to Fig. 6-12
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-13
L1	P-Pair	48.74	48.17	0.57	Refer to Fig. 6-14
	N-Pair	49.10	48.37	0.73	Refer to Fig. 6-15
L2	P-Pair	49.31	48.37	0.94	Refer to Fig. 6-16
	N-Pair	49.43	48.46	0.97	Refer to Fig. 6-17
L3	P-Pair	48.74	48.08	0.66	Refer to Fig. 6-18
	N-Pair	48.47	47.98	0.49	Refer to Fig. 6-19



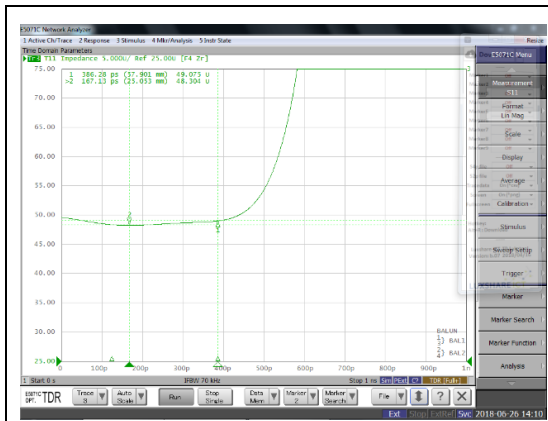


Figure 6-12. ML0 P-Pair

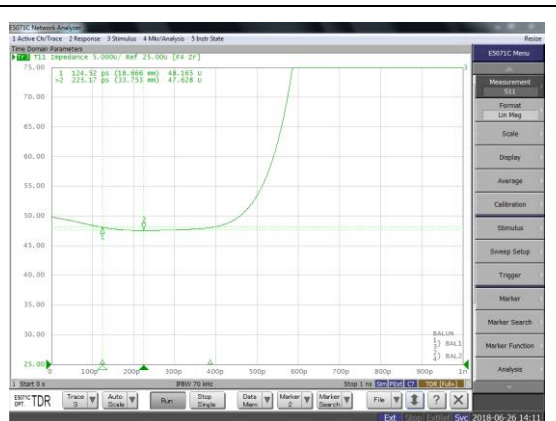


Figure 6-13. ML0 N-Pair

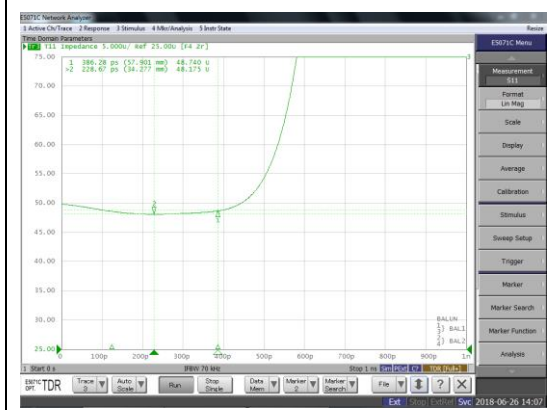


Figure 6-14. ML1 P-Pair

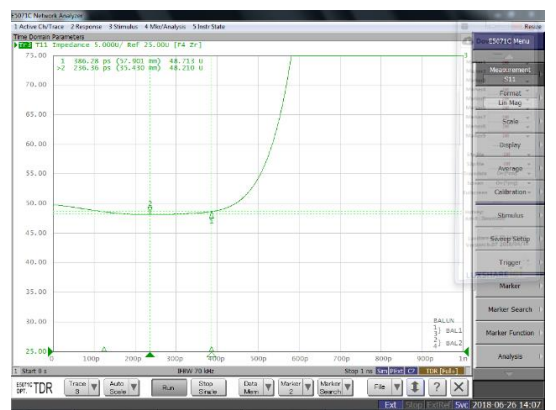


Figure 6-15. ML1 N-Pair

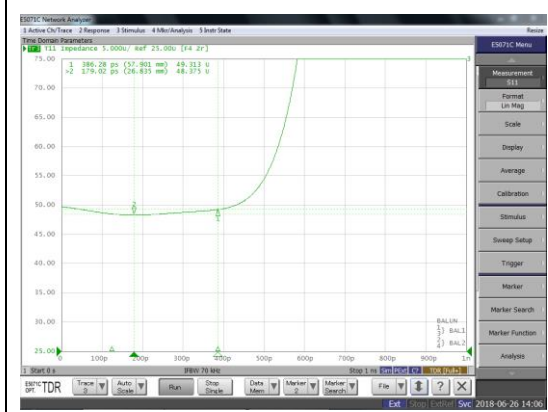


Figure 6-16. ML2 P-Pair

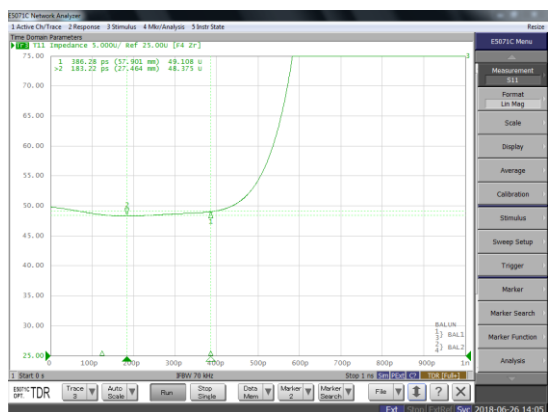


Figure 6-17. ML2 N-Pair

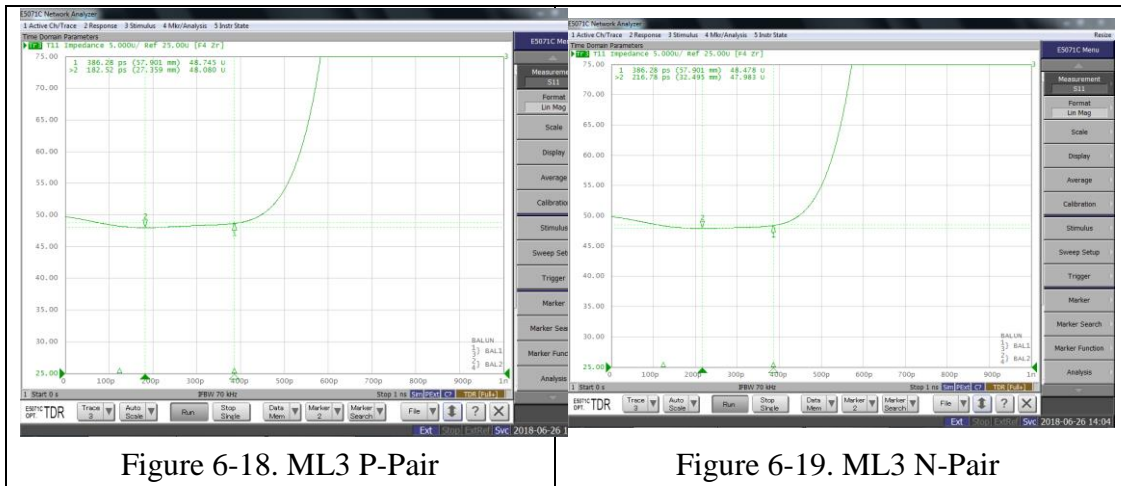


Figure 6-18. ML3 P-Pair

Figure 6-19. ML3 N-Pair

### 6-1-7. Differential Impedance of Mated Connectors

Test Item	Impedance ( $\Omega$ )				
DUT	DP 1.4 Test Fixture				
Test Pin	Pair	Max	Min	$\Delta$	Remark
	AUX	102.55	94.23	8.32	Refer to Fig. 6-20
	L0	104.95	95.01	9.94	Refer to Fig. 6-21
	L1	104.05	94.17	9.88	Refer to Fig. 6-22
	L2	104.77	95.05	9.72	Refer to Fig. 6-23
	L3	106.98	96.60	10.38	Refer to Fig. 6-24

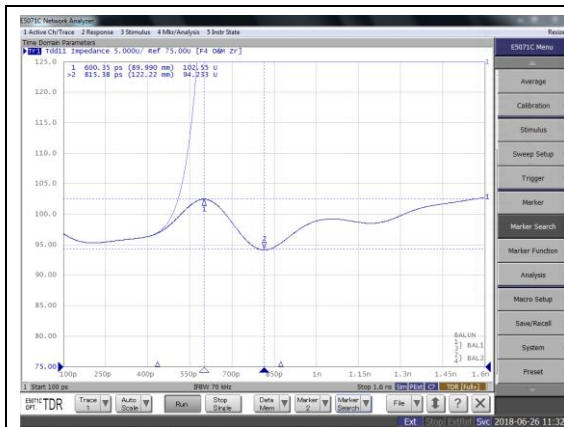


Figure 6-20. AUX Pair

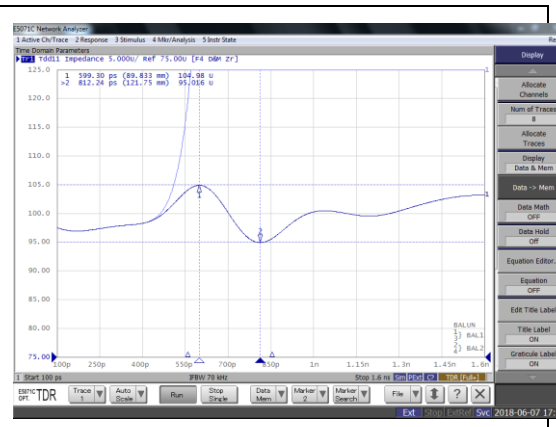


Figure 6-21. ML0 Pair

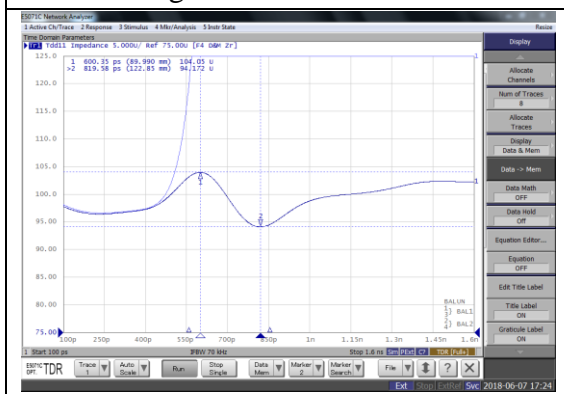


Figure 6-22. ML1 Pair

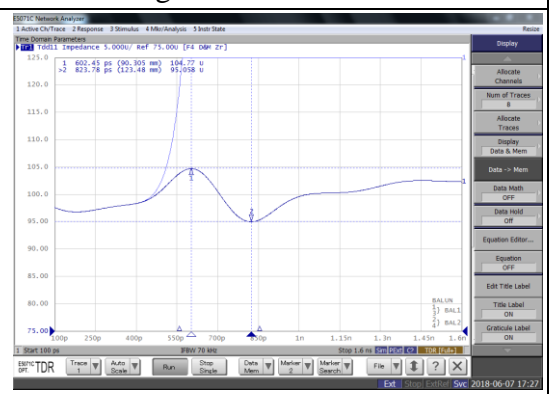


Figure 6-23. ML2 Pair

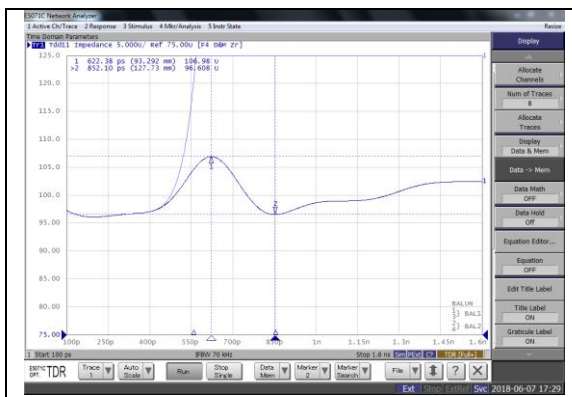
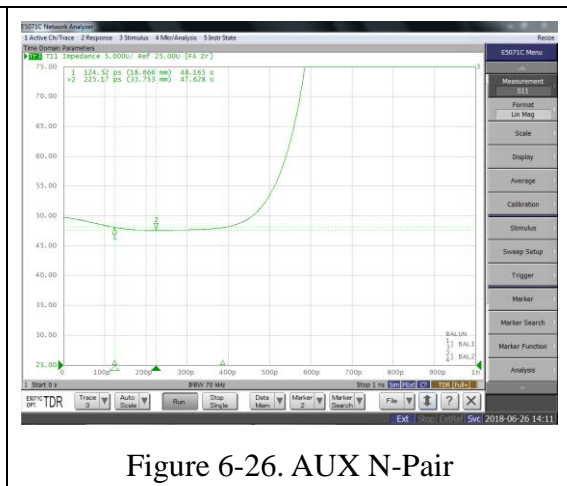
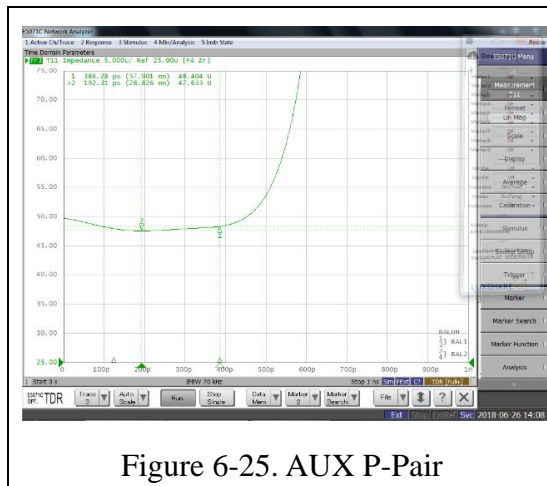


Figure 6-24. ML3 Pair

## 6-2. mDP 1.4 Test Fixture

### 6-2-1. Traces Impedance

Test Item		Impedance ( $\Omega$ )			
DUT		mDP 1.4 Receptacle Test Fixture			
		Max	Min	$\Delta$	Remark
Test Pin	Pair				
	Pin				
AUX	P-Pair	48.40	47.63	0.77	Refer to Fig. 6-25
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-26
L0	P-Pair	49.07	48.30	0.77	Refer to Fig. 6-27
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-28
L1	P-Pair	48.74	48.17	0.57	Refer to Fig. 6-29
	N-Pair	49.10	48.37	0.73	Refer to Fig. 6-30
L2	P-Pair	49.31	48.37	0.94	Refer to Fig. 6-31
	N-Pair	49.43	48.46	0.97	Refer to Fig. 6-32
L3	P-Pair	48.74	48.08	0.66	Refer to Fig. 6-33
	N-Pair	48.47	47.98	0.49	Refer to Fig. 6-34





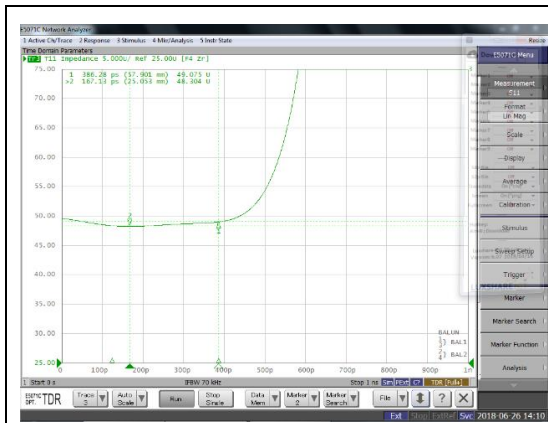


Figure 6-27. ML0 P-Pair

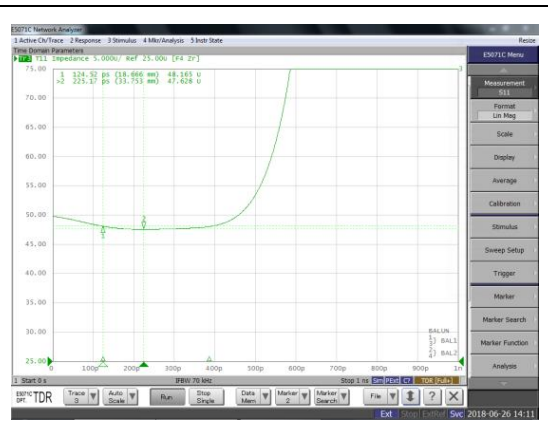


Figure 6-28. ML0 N-Pair

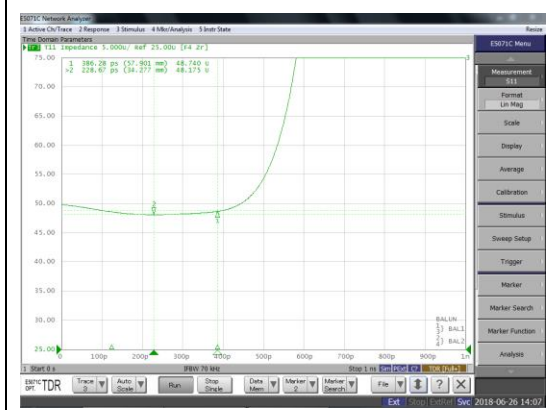


Figure 6-29. ML1 P-Pair

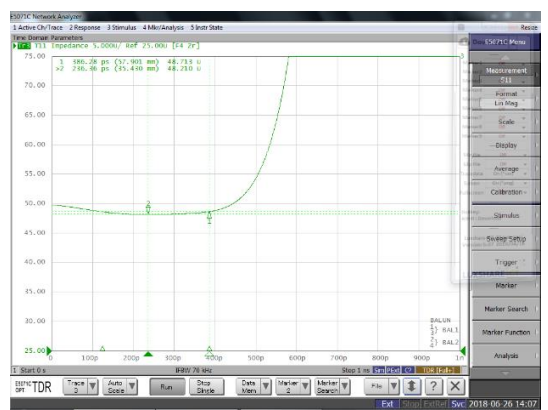


Figure 6-30. ML1 N-Pair

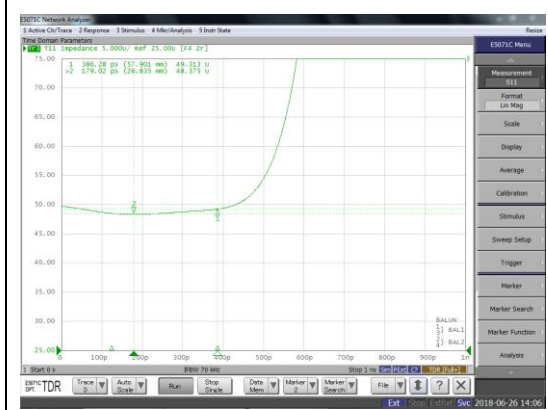


Figure 6-31. ML2 P-Pair

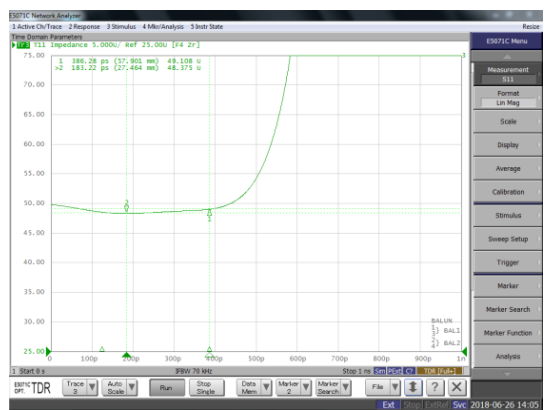


Figure 6-32. ML2 N-Pair

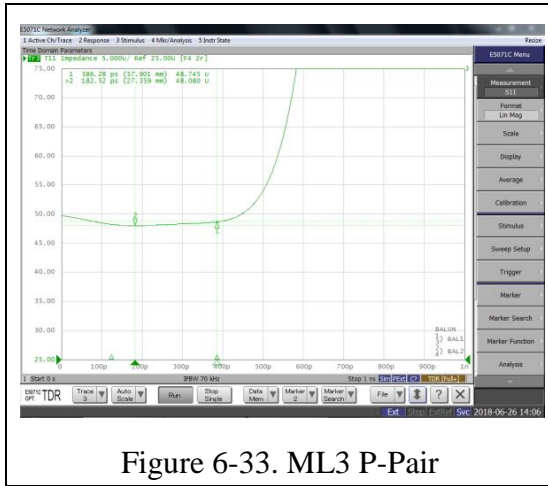


Figure 6-33. ML3 P-Pair

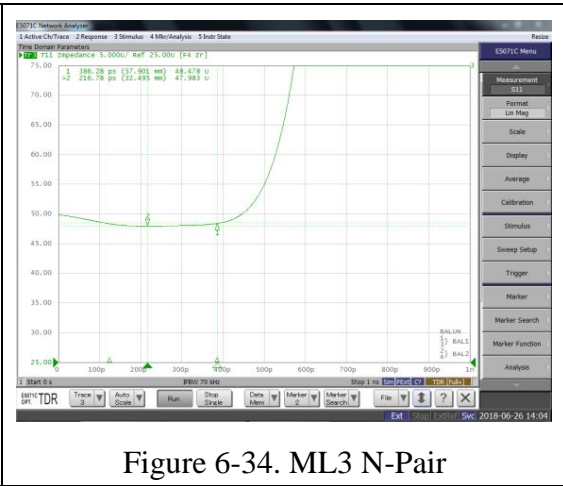


Figure 6-34. ML3 N-Pair

## 6-3. DP 1.4 Calibration Board

### 6-3-1. Traces Impedance

Test Item		Impedance ( $\Omega$ )				
DUT		DP 1.4 Calibration Board				
Test Pin	Pair	Pin	Max	Min	$\Delta$	Remark
1X	1	1	48.00	47.55	0.45	Refer to Fig. 6-35
	2	2	47.98	47.68	0.30	Refer to Fig. 6-36

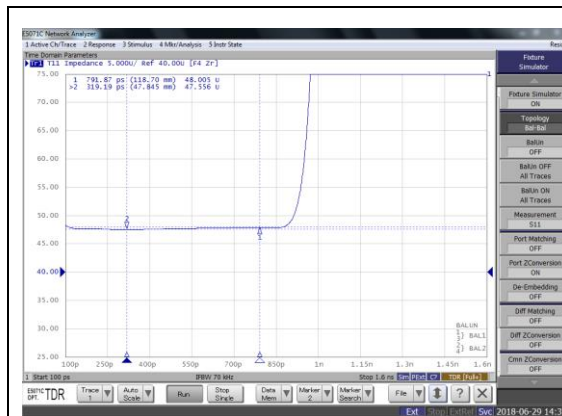


Figure 6-35. 1X\_1 Pair

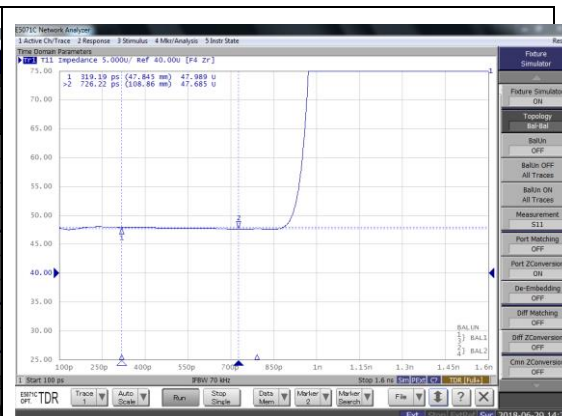
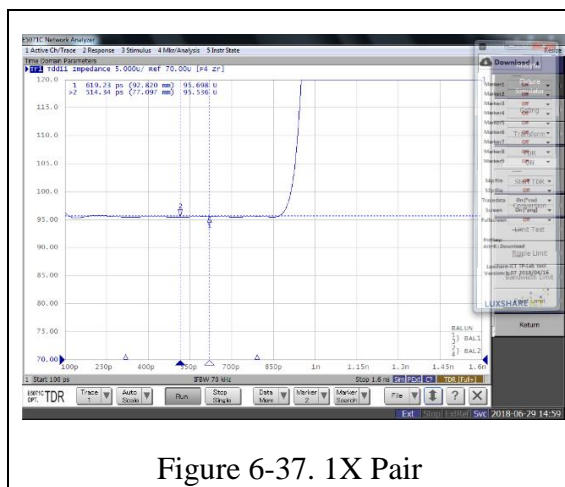


Figure 6-36. 1X\_2 Pair

### 6-3-2. Differential Impedance

Test Item	Impedance ( $\Omega$ )			
Test Pin	DUT			
	DP 1.4 Calibration Board			
Pair	Max	Min	$\Delta$	Remark
1X	98.46	97.52	0.94	Refer to Fig. 6-37



# DP 1.4 Test Fixture

## User Manual



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Product Name	Version	Date	Comments
DP 1.4 Test Fixture Series	01	Apr.30,2019	Initial release

## 1. 簡介

本文介紹 DP test fixture 的機械規格與電氣規格。

## 2. 目的

本規範提供了 DP test fixture 的特性規格與測試結果。

## 3. 操作方式&清潔

### 3-1. 處理

在每次使用測試治具之前，確保所有連接器都乾淨。

### 3-2. 目測檢查

在連接之前，一定要仔細檢查所有的測試治具。檢查所有測試治具是否有金屬顆粒，划痕，變形螺紋，凹痕或彎曲，斷裂或中心導體未對齊。不要使用損壞的測試治具。

### 清潔方法

如有必要，請使用低壓（小於 60 PSI）的壓縮空氣或氮氣與有效的油氣過濾器及冷凝器。如果必須，使用不含棉籤的棉籤或蘸有異丙醇的清潔布清潔測試治具。使用前請始終完全乾燥連接器。請勿使用研磨劑清潔連接器。重新檢查連接器，確保沒有顆粒或殘留物。

### 3-3. 注意事項

在進行任何連接之前，請查看“操作注意事項”部分。連接時請遵循以下準則：

- 仔細對齊測試治具
- 輕微進行初步連接
- 要鎖緊，只能轉動連接器螺母
- 不要對測試夾具施加彎曲力
- 請勿過度鎖緊初步連接
- 請勿扭曲或旋入測試治具
- 使用適當尺寸的扭矩扳手（取決於 SMA 的規格），並且不要擰過扭矩扳手的“斷開”點（通常設置為 5 英寸磅）。

### 3-4. 校正

DP 測試治具是完全無源組件。因此，校準在驅動的測試儀器中必須補償損失。創建 S2P 文件。這些文件將很快用於將測試夾具內的電氣長度和損耗去除到 DP 連接器接口焊盤。



TFU-36R4R

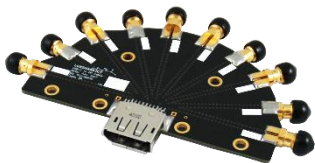


Figure 3-1. DP 1.4 Receptacle Test  
Fixture

TFU-37R4R

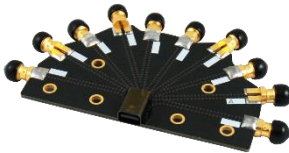


Figure 3-2. mDP 1.4 Receptacle Test  
Fixture

TFU-36C4R



Figure 3-3. DP 1.4 Calibration Board

TFD-23R1T

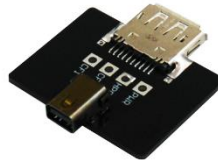


Figure 3-4. DP DC Signals Test Board

## 4. Testing Equipment

Item	Product Model	Name	Manufacturer
01	1220S	Auto Inserting Pulling Force (Tension, Compression) Tester	.Se-tester
02	E5071C-TDR	300KHz~20GHz ENA Network Analyzer	Keysight
03	N4433A	200KHz~20GHz Electronic Calibration Module	Keysight

## 5. Test Conditions

(Reference DisplayPort 1.4 specification)

Test Fixture	Part No.	S/N
DP 1.4 Receptacle Test Fixture	TFU-36R4R	001
mDP 1.4 Receptacle Test Fixture	TFU-37R4R	001
DP 1.4 Calibration Board	TFU-36RCR	001

Test Item:	Condition	Requirement
Differential Insertion Loss	10MHz~15GHz	N/A
Differential Return Loss	10MHz~15GHz	N/A
Differential to Common mode Conversion	10MHz~15GHz	N/A
Differential Near-End Crosstalk	10MHz~15GHz	N/A
Differential Far-End Crosstalk	10MHz~15GHz	N/A
Intra-Pair Skew (DP)	50ps (20%~80%)	<5ps
Traces Impedance	130ps (20% - 80%)	50 Ω ± 5%
Differential Impedance (DP)	130ps (20% - 80%)	100 Ω ± 10%
Differential Impedance (mDP)	130ps (20% - 80%)	100Ω ± 15%

## 6. Testing Result

### 6-1. DP 1.4 Test Fixture

#### 6-1-1. Differential Intra-Pair Skew

DUT \ Test Pair	Result (ps)	Remark
AUX	0.467	Refer to Fig. 6-1
ML0	0.007	Refer to Fig.6-2
ML1	0.340	Refer to Fig. 6-3
ML2	0.258	Refer to Fig. 6-4
ML3	2.854	Refer to Fig. 6-5

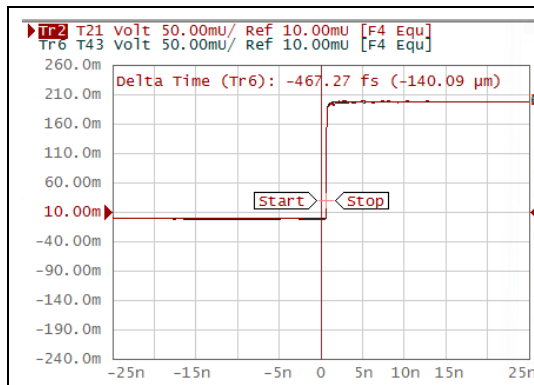


Figure 6-1. AUX Pair

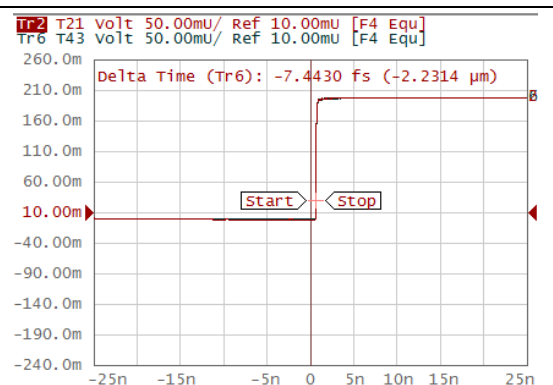


Figure 6-2. ML0 Pair

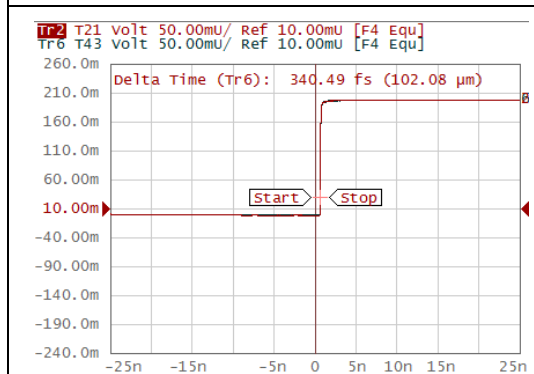


Figure 6-3. ML1 Pair

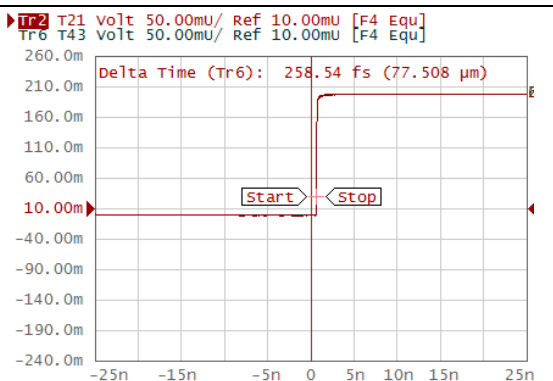
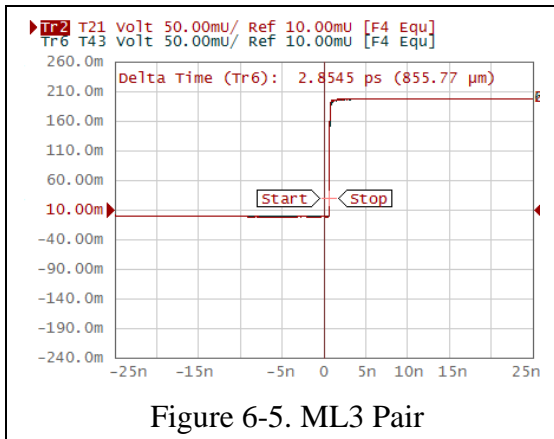
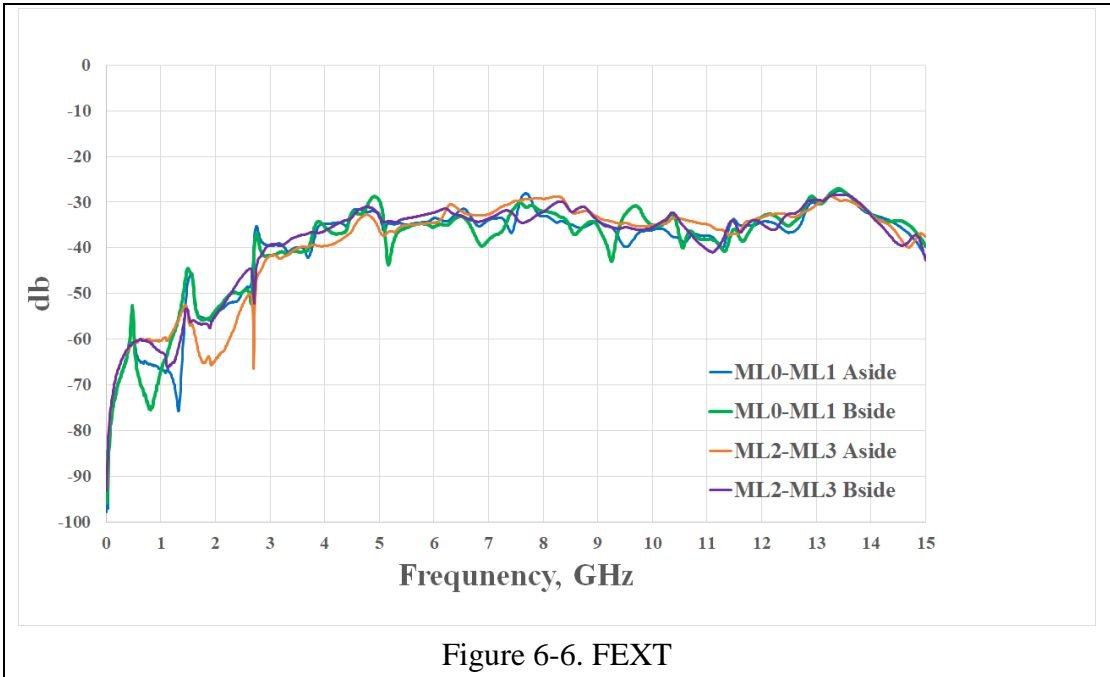


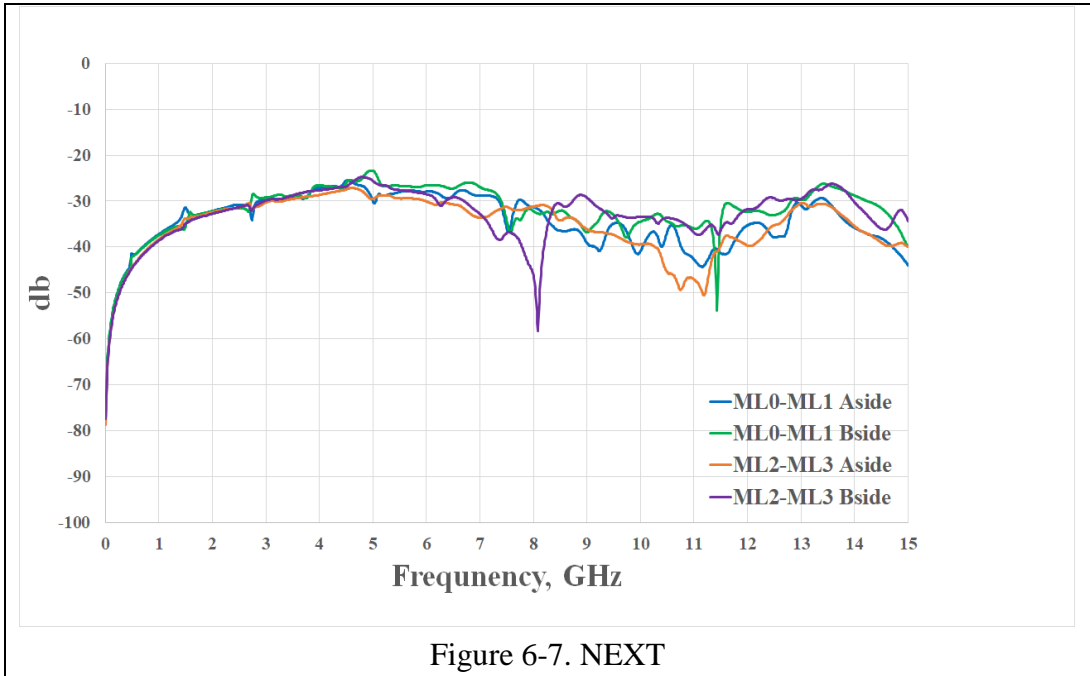
Figure 6-4. ML2 Pair



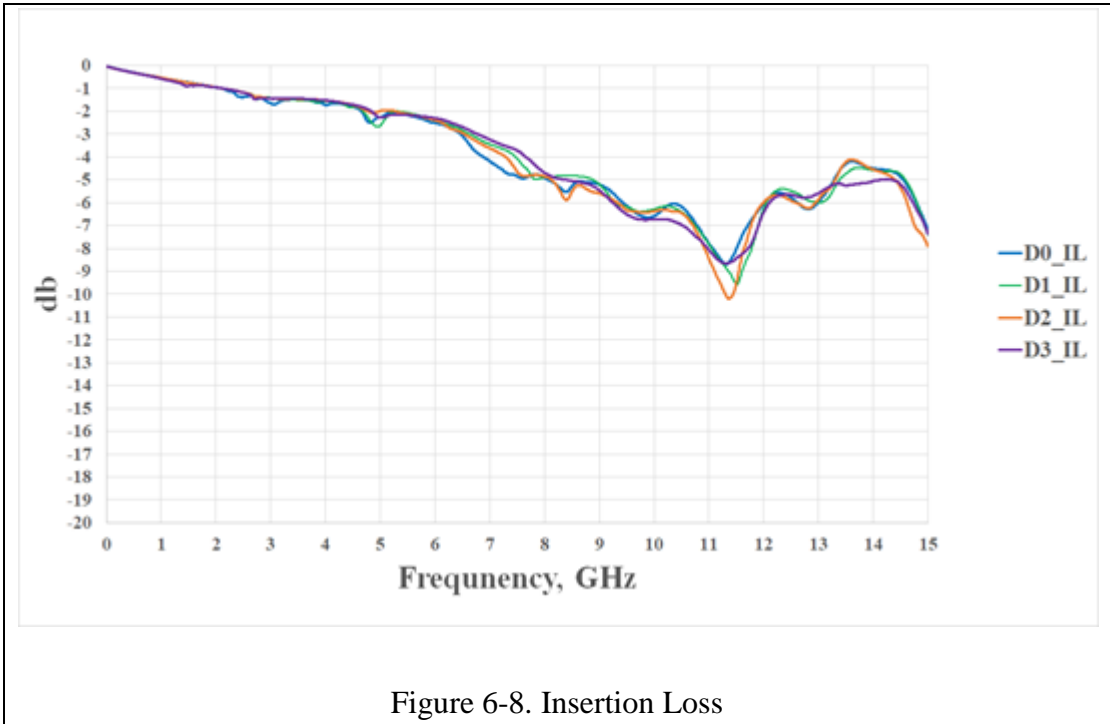
**6-1-2. Far-End Crosstalk**



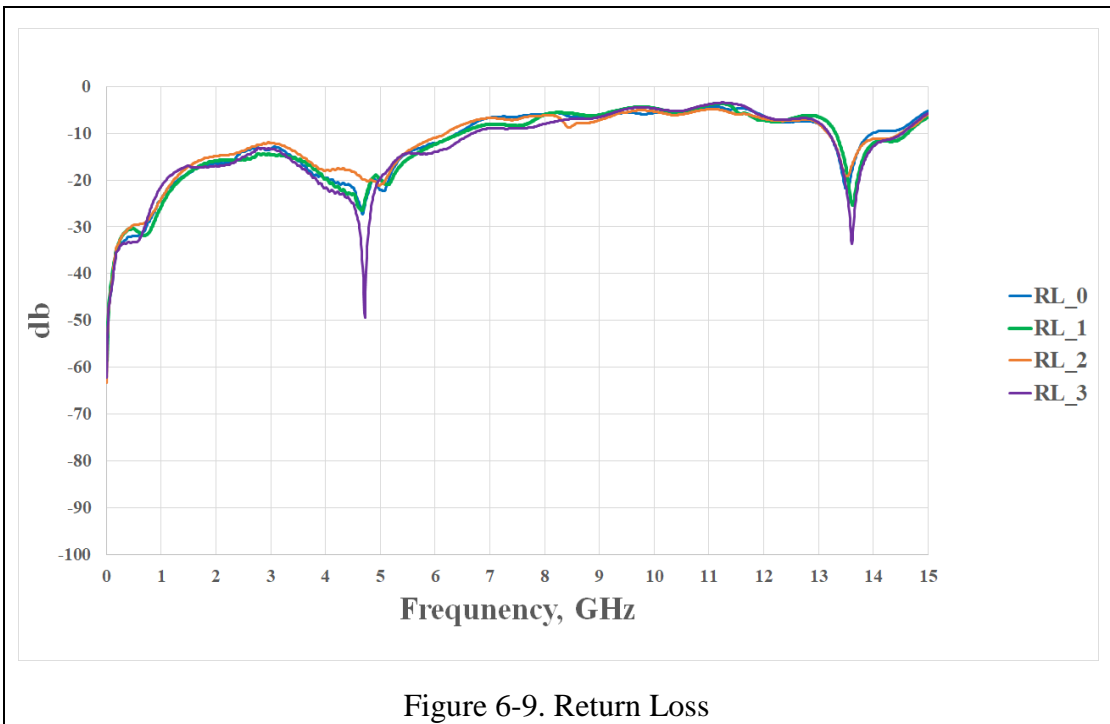
**6-1-3. Near-End Crosstalk**



6-1-4. Insertion Loss

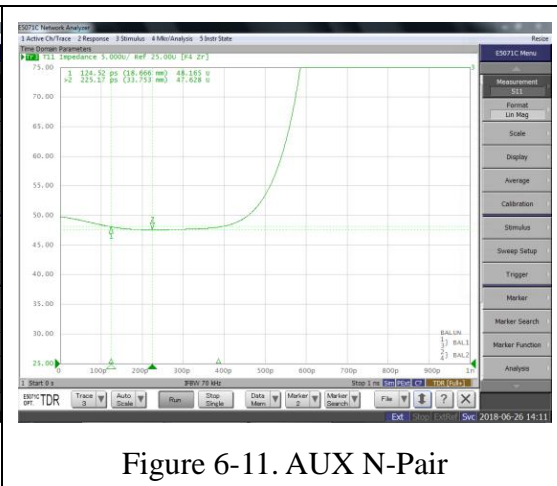
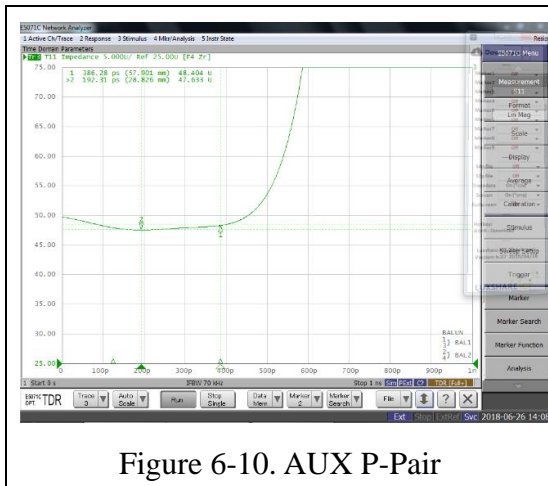


6-1-5. Return Loss



### 6-1-6. Traces Impedance

Test Item		Impedance ( $\Omega$ )			
Test Pin		DUT			
		DP 1.4 Receptacle Test Fixture			
Pair	Pin	Max	Min	$\Delta$	Remark
AUX	P-Pair	48.40	47.63	0.77	Refer to Fig. 6-10
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-11
L0	P-Pair	49.07	48.30	0.77	Refer to Fig. 6-12
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-13
L1	P-Pair	48.74	48.17	0.57	Refer to Fig. 6-14
	N-Pair	49.10	48.37	0.73	Refer to Fig. 6-15
L2	P-Pair	49.31	48.37	0.94	Refer to Fig. 6-16
	N-Pair	49.43	48.46	0.97	Refer to Fig. 6-17
L3	P-Pair	48.74	48.08	0.66	Refer to Fig. 6-18
	N-Pair	48.47	47.98	0.49	Refer to Fig. 6-19



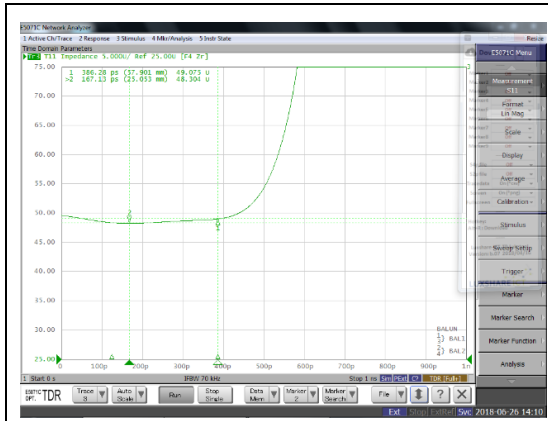


Figure 6-12. ML0 P-Pair

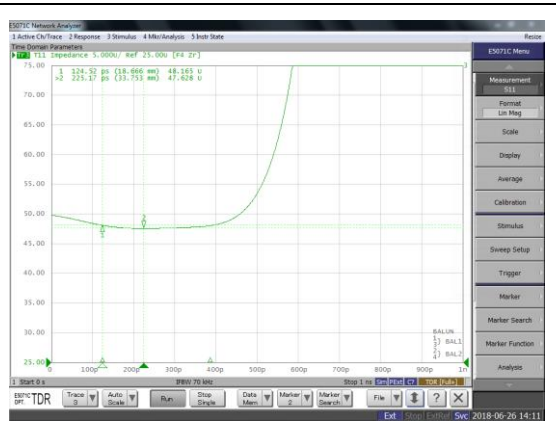


Figure 6-13. ML0 N-Pair

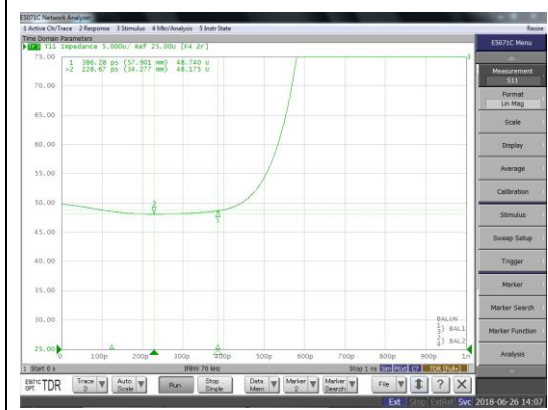


Figure 6-14. ML1 P-Pair

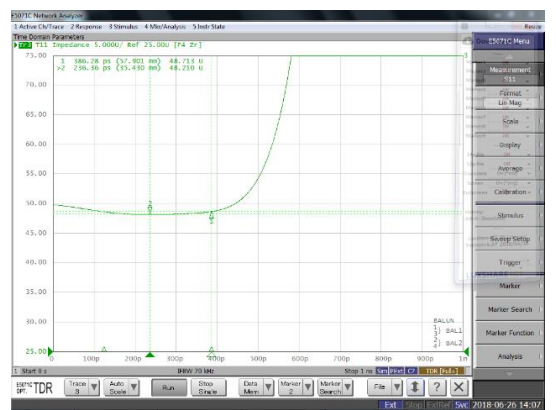


Figure 6-15. ML1 N-Pair

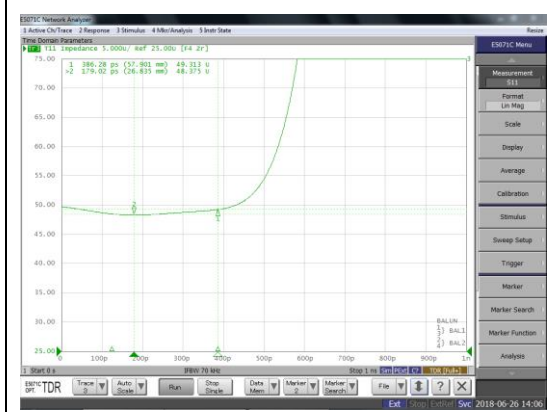


Figure 6-16. ML2 P-Pair

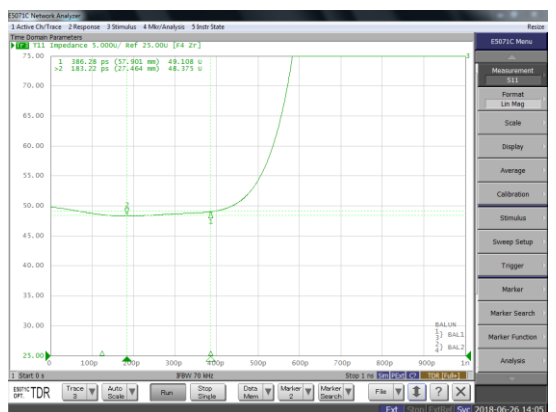
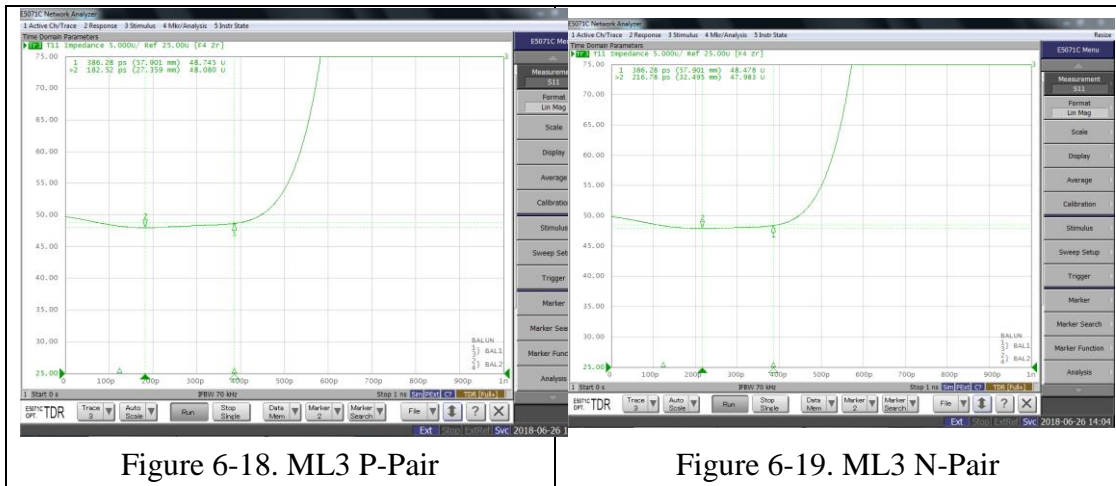


Figure 6-17. ML2 N-Pair





### 6-1-7. Differential Impedance of Mated Connectors

Test Item	Impedance ( $\Omega$ )				
DUT	DP 1.4 Test Fixture				
Test Pin	Pair	Max	Min	$\Delta$	Remark
	AUX	102.55	94.23	8.32	Refer to Fig. 6-20
	L0	104.95	95.01	9.94	Refer to Fig. 6-21
	L1	104.05	94.17	9.88	Refer to Fig. 6-22
	L2	104.77	95.05	9.72	Refer to Fig. 6-23
	L3	106.98	96.60	10.38	Refer to Fig. 6-24

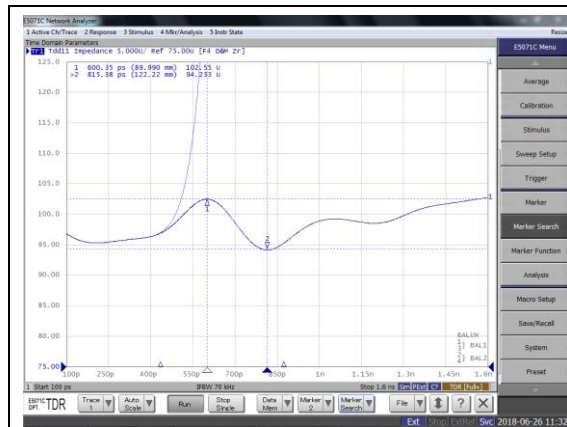


Figure 6-20. AUX Pair

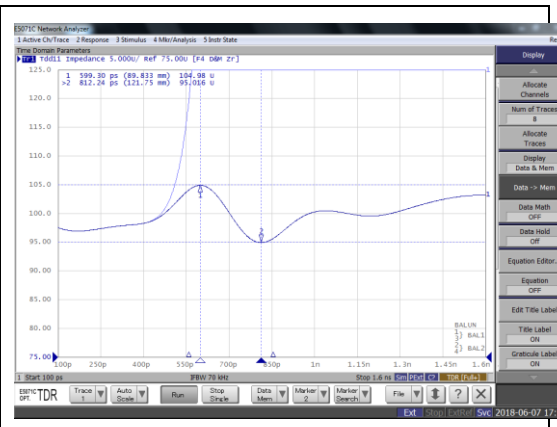


Figure 6-21. ML0 Pair

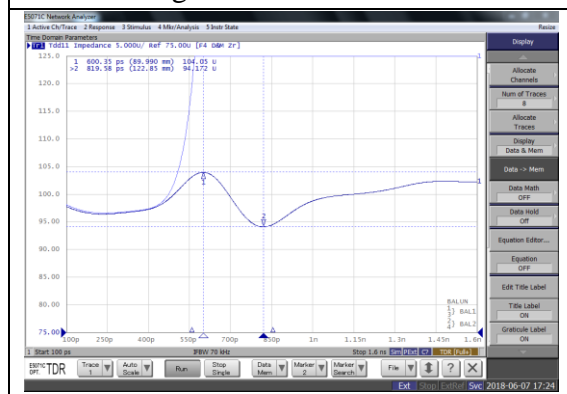


Figure 6-22. ML1 Pair

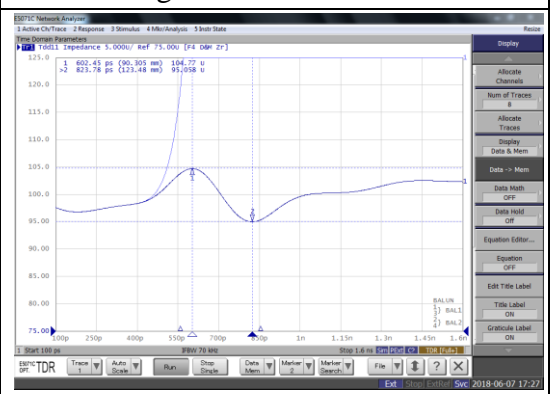


Figure 6-23. ML2 Pair

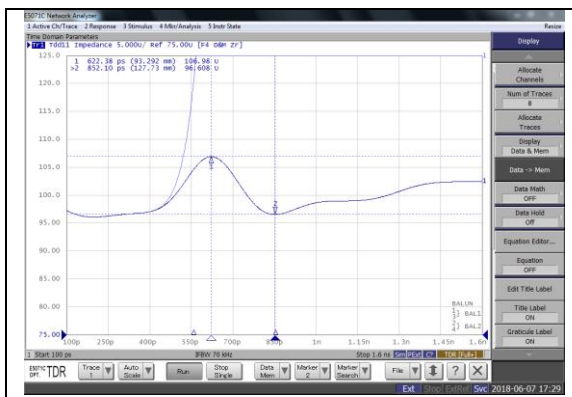


Figure 6-24. ML3 Pair

## 6-2. mDP 1.4 Test Fixture

### 6-2-1. Traces Impedance

Test Item		Impedance ( $\Omega$ )			
Test Pin		mDP 1.4 Receptacle Test Fixture			
		Pair	Pin	Max	Min
AUX	P-Pair	48.40	47.63	0.77	Refer to Fig. 6-25
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-26
L0	P-Pair	49.07	48.30	0.77	Refer to Fig. 6-27
	N-Pair	48.16	47.62	0.54	Refer to Fig. 6-28
L1	P-Pair	48.74	48.17	0.57	Refer to Fig. 6-29
	N-Pair	49.10	48.37	0.73	Refer to Fig. 6-30
L2	P-Pair	49.31	48.37	0.94	Refer to Fig. 6-31
	N-Pair	49.43	48.46	0.97	Refer to Fig. 6-32
L3	P-Pair	48.74	48.08	0.66	Refer to Fig. 6-33
	N-Pair	48.47	47.98	0.49	Refer to Fig. 6-34

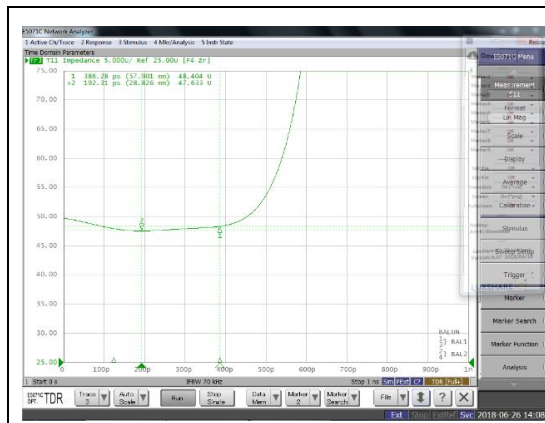


Figure 6-25. AUX P-Pair

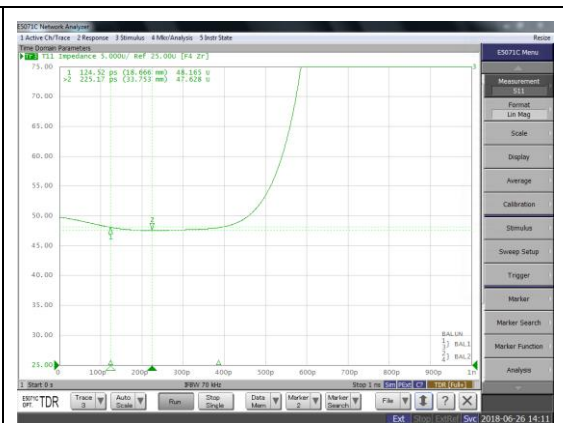


Figure 6-26. AUX N-Pair

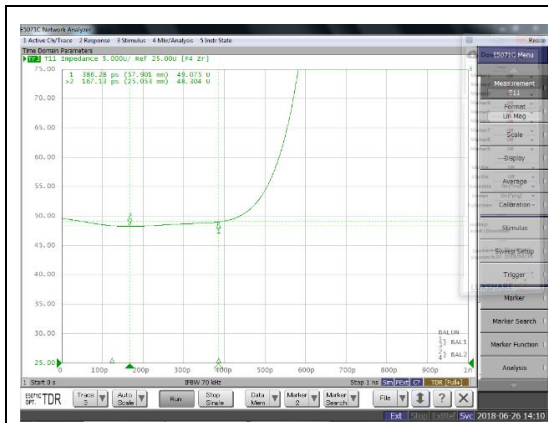


Figure 6-27. ML0 P-Pair

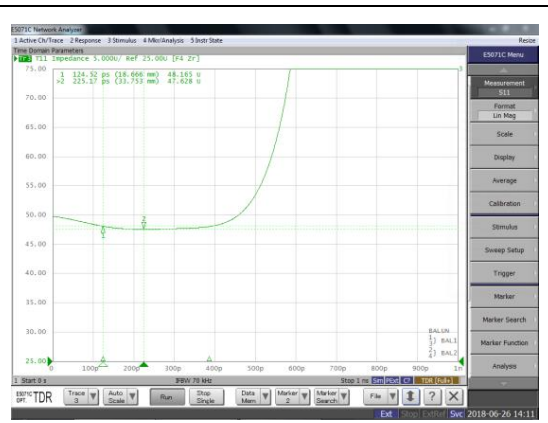


Figure 6-28. ML0 N-Pair

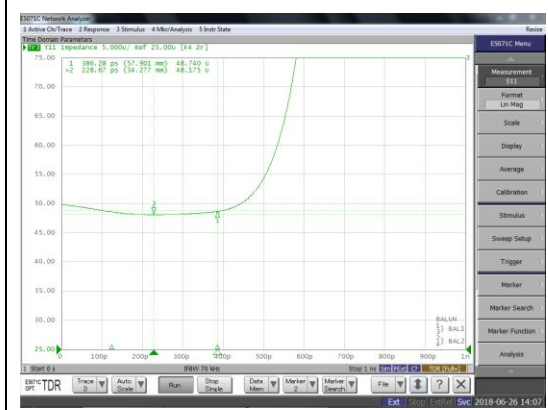


Figure 6-29. ML1 P-Pair

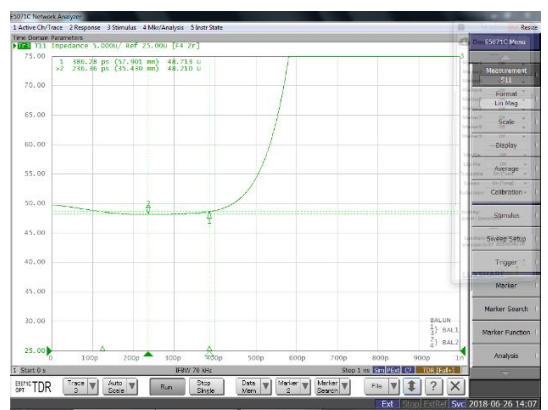


Figure 6-30. ML1 N-Pair

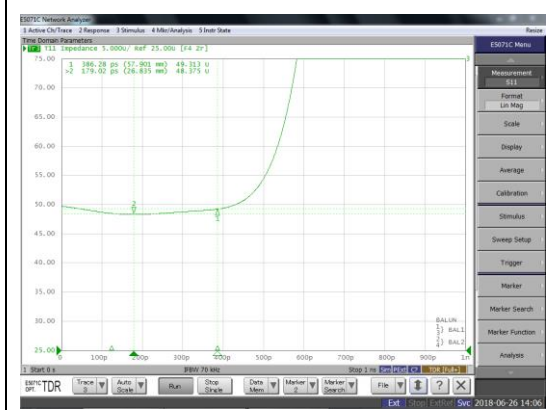


Figure 6-31. ML2 P-Pair

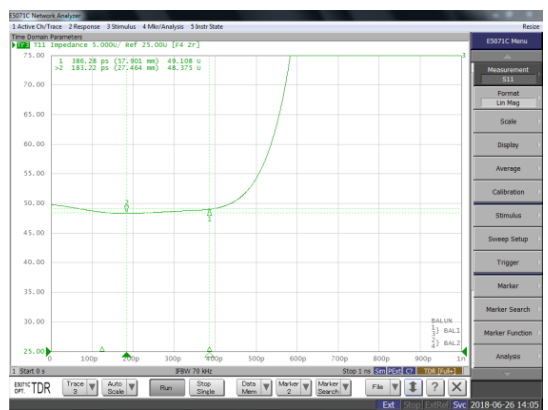


Figure 6-32. ML2 N-Pair

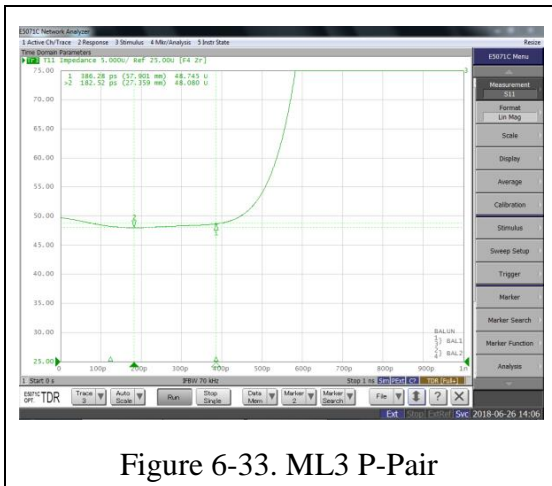


Figure 6-33. ML3 P-Pair

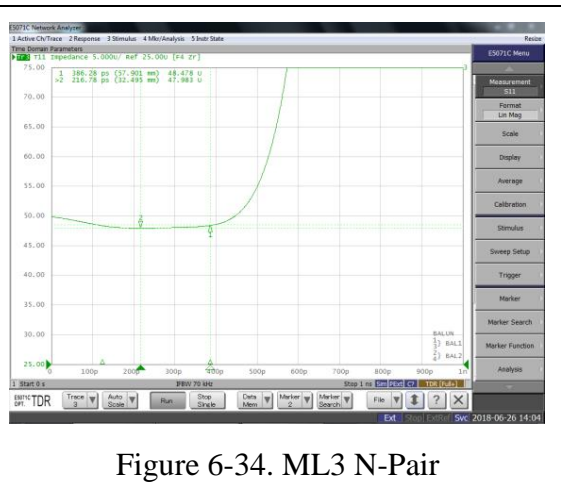


Figure 6-34. ML3 N-Pair

## 6-3. DP 1.4 Calibration Board

### 6-3-1. Traces Impedance

Test Item		Impedance ( $\Omega$ )			
DUT		DP 1.4 Calibration Board			
Pair	Pin	Max	Min	$\Delta$	Remark
1X	1	48.00	47.55	0.45	Refer to Fig. 6-35
	2	47.98	47.68	0.30	Refer to Fig. 6-36

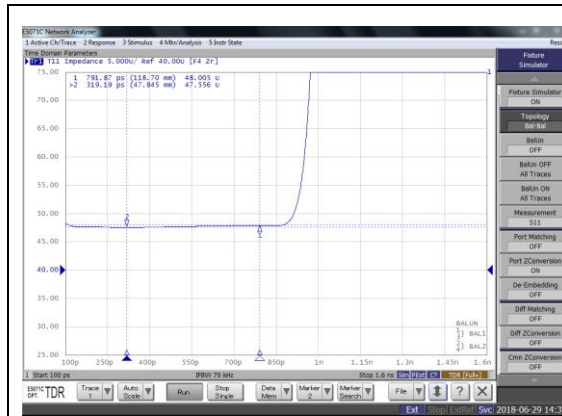


Figure 6-35. 1X\_1 Pair

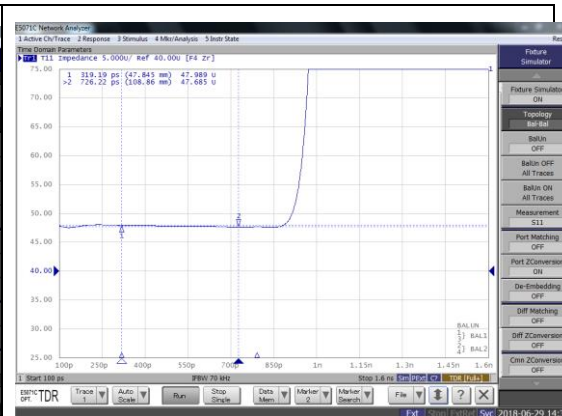


Figure 6-36. 1X\_2 Pair

### 6-3-2. Differential Impedance

Test Item	Impedance ( $\Omega$ )			
Test Pin	DUT			
	DP 1.4 Calibration Board			
Pair	Max	Min	$\Delta$	Remark
1X	98.46	97.52	0.94	Refer to Fig. 6-37

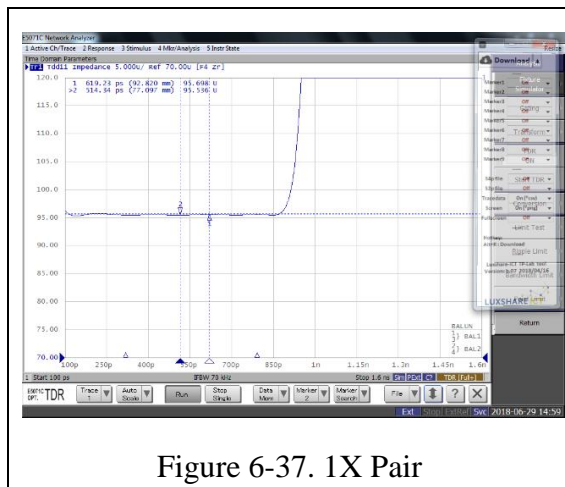


Figure 6-37. 1X Pair