

USB Type-C PD Coupon Test Fixture User Manual



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Product Name	Version	Date	Comments
USB Type-C PD Coupon Test Fixture Series	01	Jan.9,2019	Initial release
USB Type-C PD Coupon Test Fixture Series	02	Nov.4,2019	Update

1. Introduction

This document describes the Dimension and electrical specification for USB Type-C Power Delivery Coupon.

2. Objectives

This specification provides the requirements for test fixture performances and test methods of USB Type-C Power Delivery Coupon.

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 method

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
- Do not apply bending force to test fixture
- Do not twist or screw-in test fixture

4. Dimension Specification

4-1. Drawing

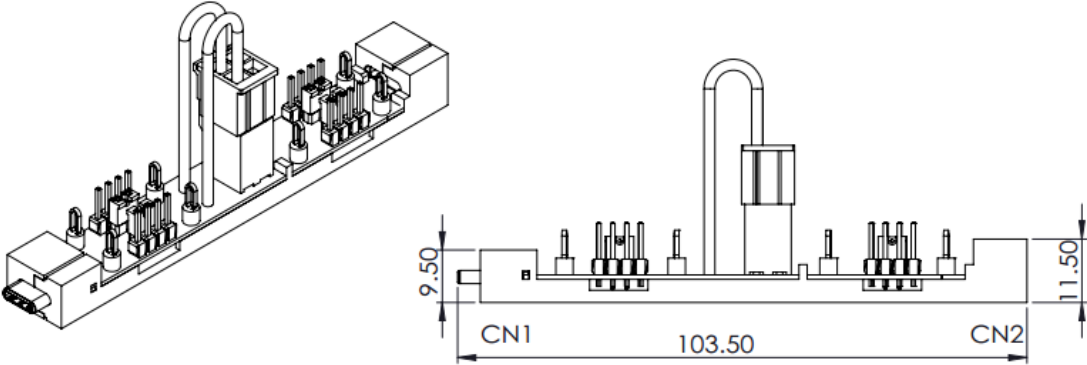


Figure 4-1. USB Type-C PD Coupon No:TF21-215G

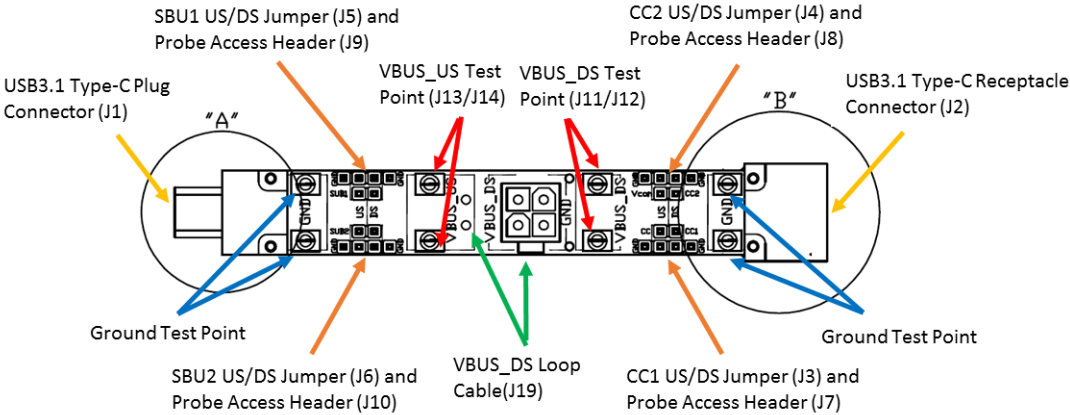


Figure 4-2. USB Type-C PD Coupon Connector and Jumpers

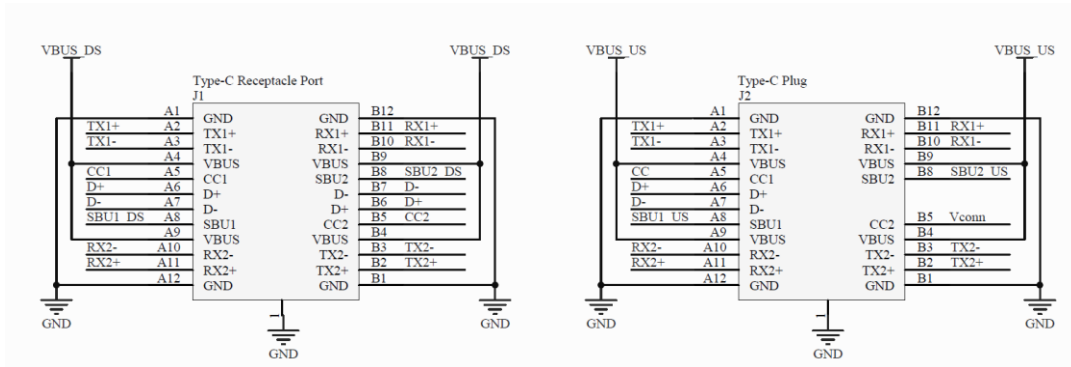


Figure 4-3. USB Type-C PD Coupon Schematic (USB Connector)

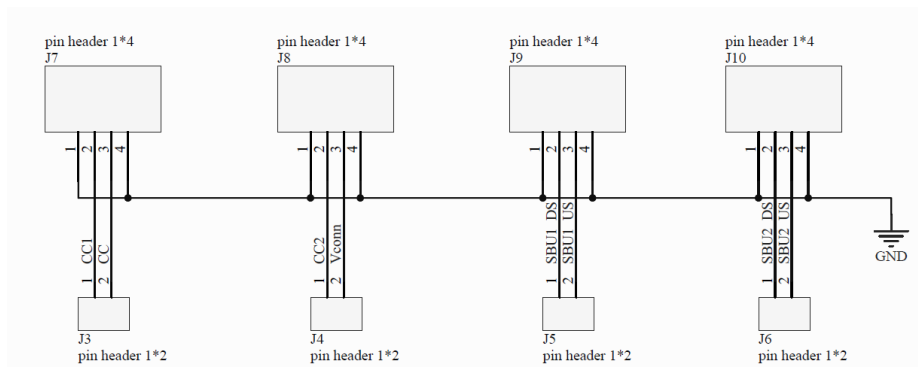


Figure 4-4. USB Type-C PD Coupon Schematic (CC/CC1/CC2/Vconn/SBU1/SBU2)

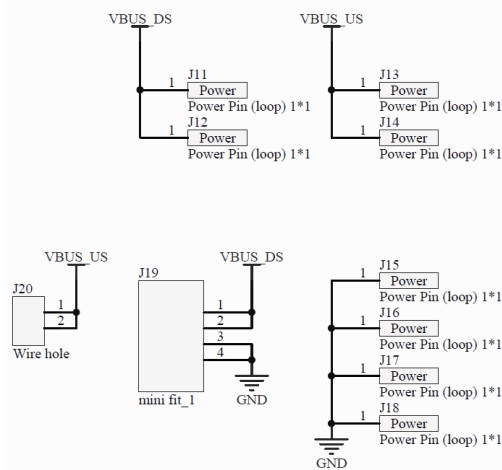


Figure 4-5. USB Type-C PD Coupon Schematic (VBUS/GND)

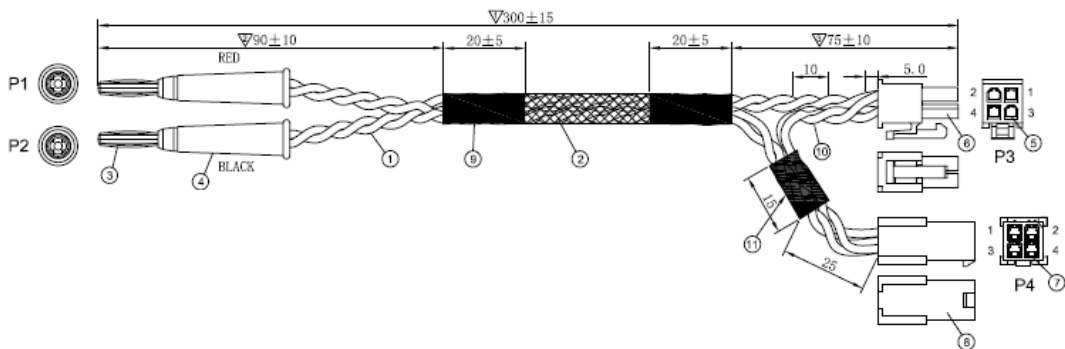


Figure 4-6. USB Type-C PD Cable No:TF21-220G

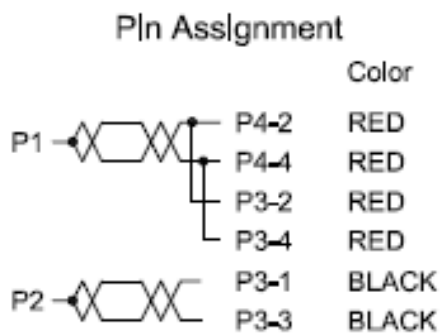


Figure 4-7. USB Type-C PD Cable Wiring Diagram

TF21-215G

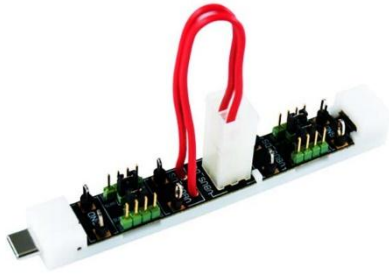


Figure 4-8. USB Type-C PD Coupon
Test Fixture

TF21-220G



Figure 4-9. USB Type-C PD Cable Test
Fixture

5. Electrical Specification

Test Item		Requirements		Description
01	Differential Impedance (SS- Pair PCB Test Line)	TF21-215G	85± 9 Ohm	Rise Time : 40ps (20%~80%)
02	Differential Impedance (D+ /D- PCB Test Line)	TF21-215G	85± 9 Ohm	Rise Time : 200ps (10%~90%)
03	Open , Short , Miss Test	TF21-215G		Open , Short , Miss Test
04	Cable Wire Resistance	TF21-220G		DC Resistance
05	Cable Voltage Drop	TF21-220G		5V / 20A

5-1. Testing Equipment

Item	Product Model	Name	Manufacturer
01	E5071C-TDR	300KHz~20GHz ENA Network Analyzer	Agilent
02	N4433A	200KHz~20GHz Electronic Calibration Module	Agilent
03	CT-8687	4-WIRE UNIVERSAL CABLE/HARNESS TESTER	MICROTEST
04	34420A	Micro-Ohm Meter	HP
05	6330A	High Speed DC Electronic Load	Chroma

5-2. Test Conditions/Setup Pictures

5-2-1. Differential Impedance (SS-Pair PCB Test Line)

1. Rise Time : 40ps (20%~80%)

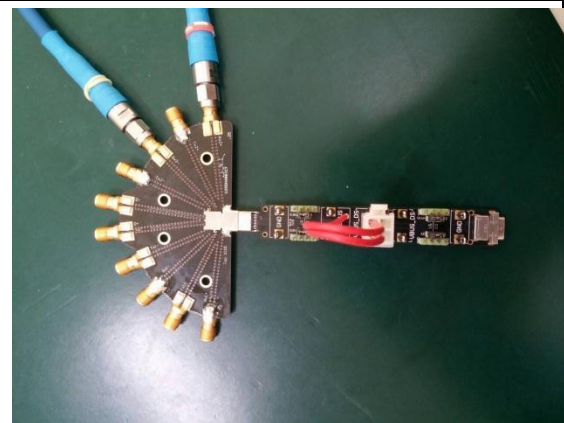


Figure 5-1. Impedance test setup

5-2-2. Differential Impedance (D+/D- PCB Test Line)

1. Rise Time : 200ps (10%~90%)

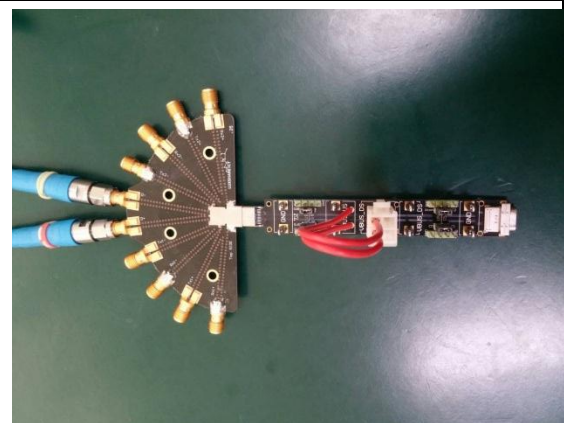


Figure 5-2. Impedance test setup

5-2-3. Open , Short , Miss Test

1. Open , Short , Miss Test



Figure 5-3. Open , Short , Miss Test

5-2-4. Cable Wire Resistance

1. Wire Resistance Test

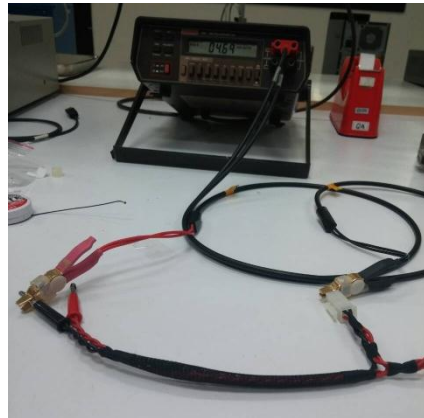


Figure 5-4. Wire Resistance Test

5-2-5. Cable Voltage Drop

1. 5V / 20A Load

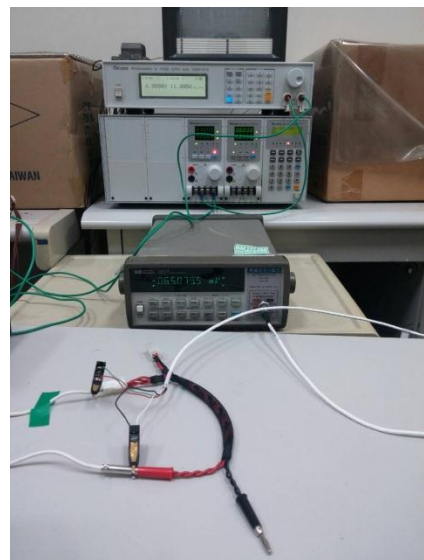


Figure 5-5. Cable Voltage Drop

5-2-6. Low Level Contact Resistance and Voltage Drop

- 1.VBUS: 5V / 3A Load
- 2.Vconn: 5V/0.3A Load
- 3.GND: 5V / 3A Load
- 4.CC: 5V / 0.3A Load



Figure 5-6. Low Level Contact Resistance and Voltage Drop

6. Testing Result

6-1. USB Type-C PD Coupon Test Fixture

6-1-1. Differential Impedance (SS-Pair PCB Test Line)				
Pair Num	Maximum	Minimum	Unit	Figure
SS-TX1	84.90	81.75	Ω	11
SS-RX1	84.02	80.01		
SS-TX2	83.69	78.98		
SS-RX2	85.52	81.71		

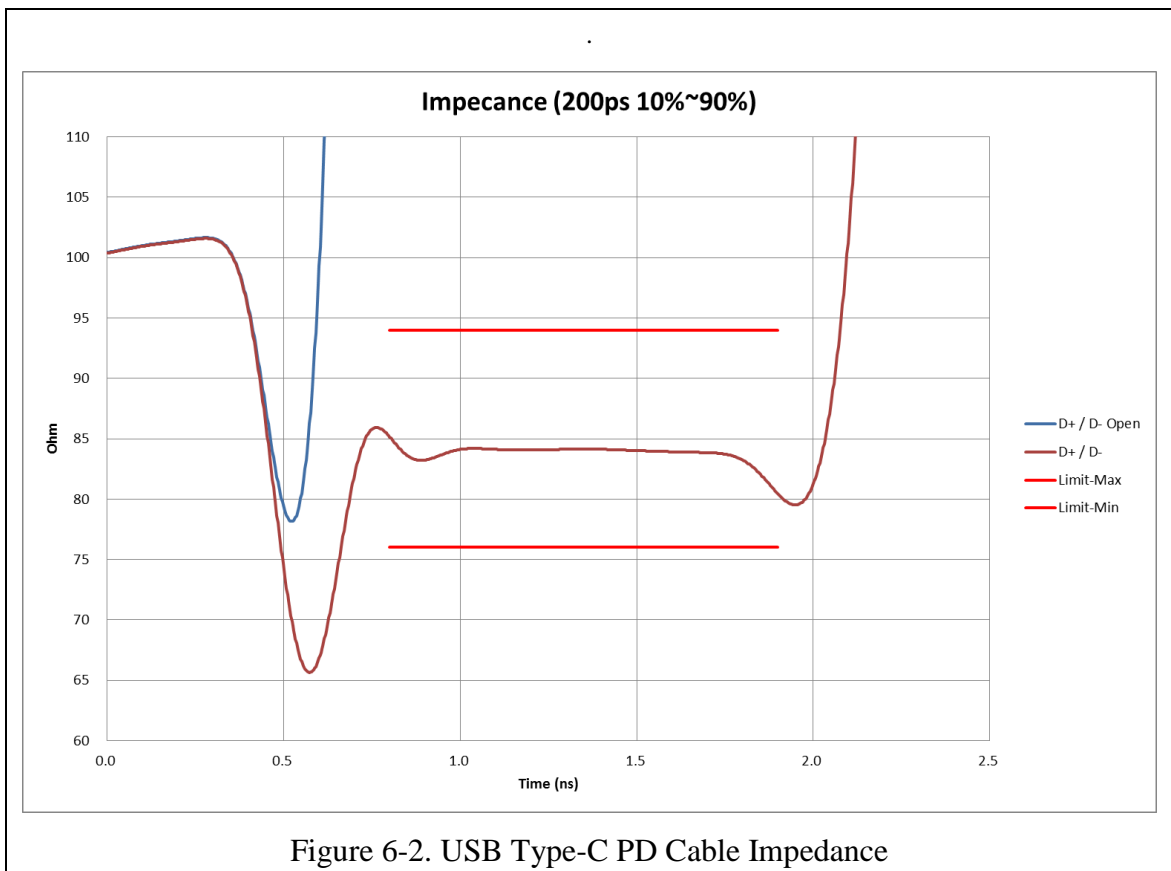
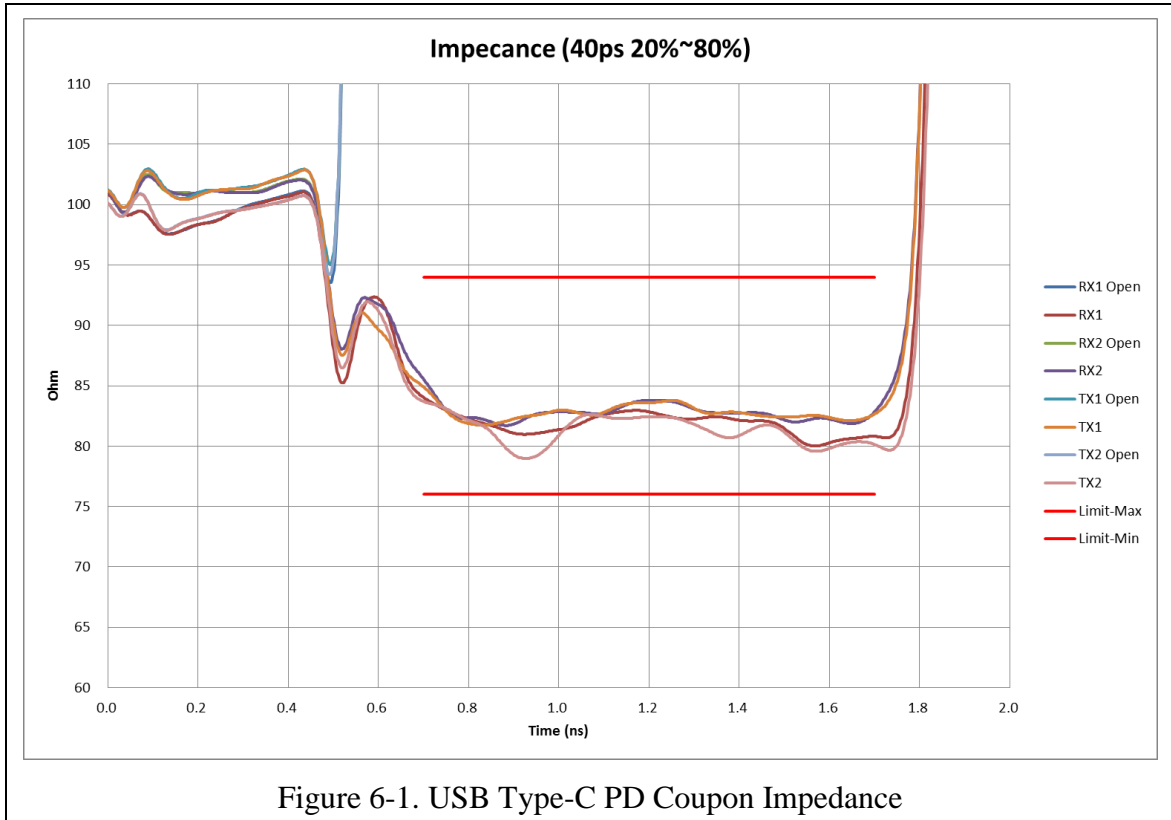
6-1-2. Differential Impedance (D+ / D- PCB Test Line)				
Pair Num	Maximum	Minimum	Unit	Figure
D	85.15	80.56	Ω	12

6-1-3. Open , Short , Miss Test			
Pair Num	Open	Short	Miss
VBUS	PASS	PASS	PASS
GND	PASS	PASS	PASS
Tx1+	PASS	PASS	PASS
TX1-	PASS	PASS	PASS
RX1+	PASS	PASS	PASS
RX1-	PASS	PASS	PASS
D+	PASS	PASS	PASS
D-	PASS	PASS	PASS
TX2+	PASS	PASS	PASS
TX2-	PASS	PASS	PASS
RX2+	PASS	PASS	PASS
RX2-	PASS	PASS	PASS
SUB1	PASS	PASS	PASS
SUB2	PASS	PASS	PASS
CC1 / CC	PASS	PASS	PASS
CC2 / VCONN	PASS	PASS	PASS

6-1-4. Cable Wire Resistance				
Pair Num			Resistance	Unit
VBUS	P1	P3	5.08	mΩ
VBUS	P1	P4	6.16	
GND	P2	P3	4.69	

6-1-5. Cable Voltage Drop				
Pair Num			Resistance	Unit
VBUS	P1	P3	0.108	V
VBUS	P1	P4	0.131	
GND	P2	P3	0.095	

6-1-6. Low Level Contact Resistance and Voltage Drop				
Pair Num	LLCR	Unit	Voltage Drop	Unit
VBUS	29	mΩ	86.87	mV
Vconn	102		31.37	
GND	16.57		48.87	
CC	113.43		35.31	



USB Type-C PD Coupon Test Fixture User Manual



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Product Name	Version	Date	Comments
USB Type-C PD Coupon Test Fixture Series	01	Jan.9,2019	Initial release
USB Type-C PD Coupon Test Fixture Series	02	Nov.4,2019	Update

1. 簡介

本文介紹 USB Type-C Power Delivery Coupon 的機械規格與電氣規格。

2. 目的

本規範提供了 USB Type-C Power Delivery Coupon 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

如需清潔，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和冷凝器。如有需要清潔內部，使用沾有異丙醇的清潔布清潔測試治具。清潔後請確認連接器是否為乾燥狀態。請勿使用研磨劑清潔連接器。使用前確保連接器內無殘留物。

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
- 不要對測試治具施加彎曲力
- 測試治具端請勿旋轉或扭動

4. 尺寸規格

4-1. 工程圖

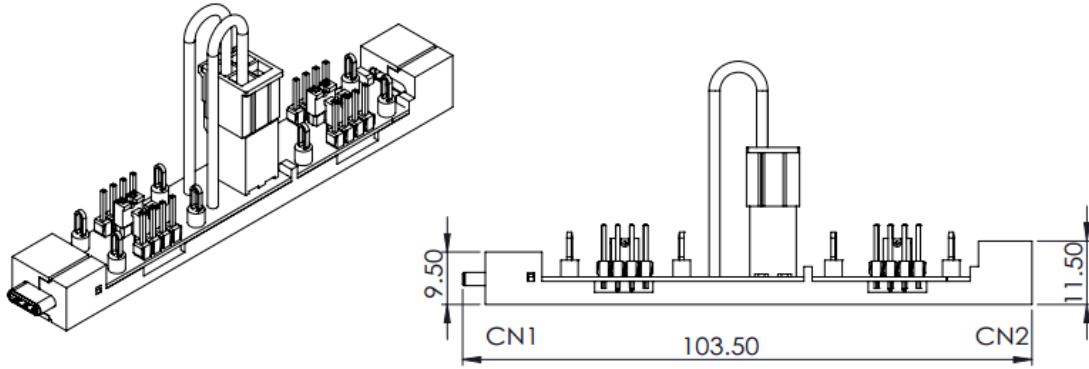


Figure 4-1. USB Type-C PD Coupon No:TF21-215G

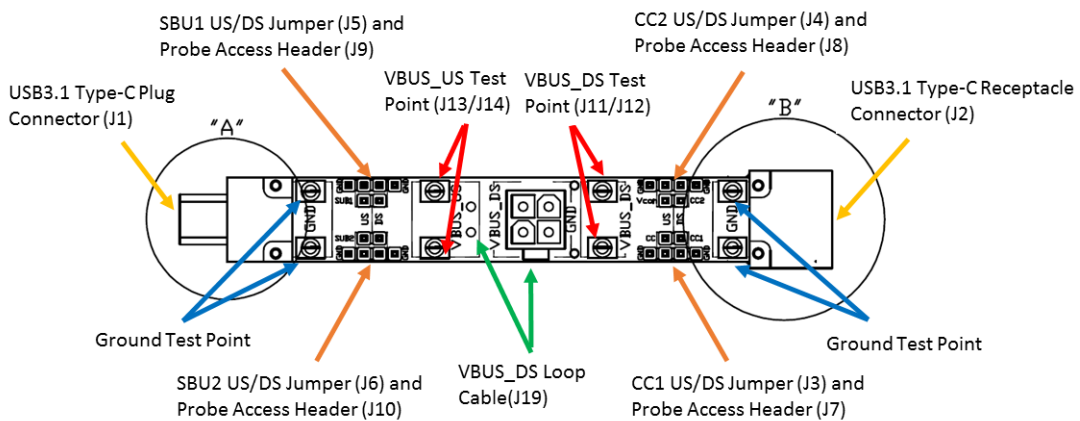


Figure 4-2. USB Type-C PD Coupon Connector and Jumpers

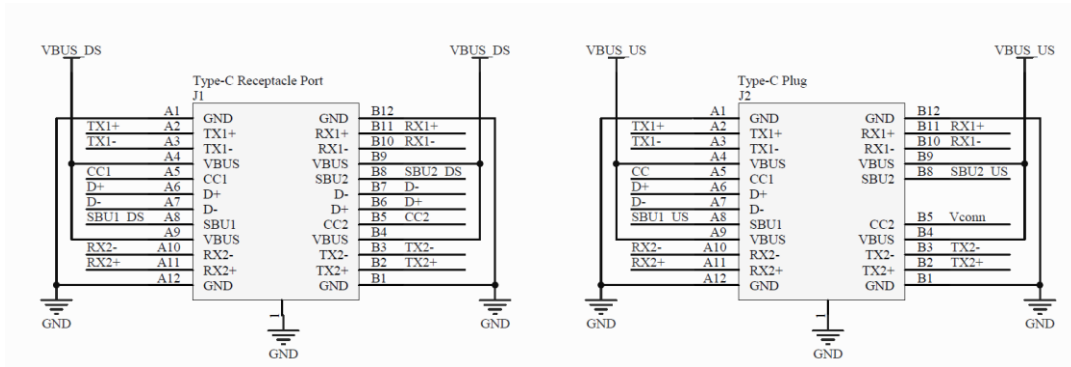


Figure 4-3. USB Type-C PD Coupon Schematic (USB Connector)

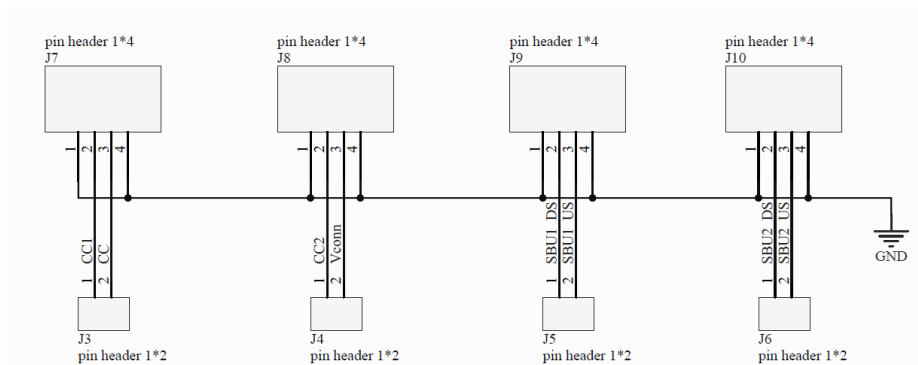


Figure 4-4. USB Type-C PD Coupon Schematic (CC/CC1/CC2/Vconn/SBU1/SBU2)

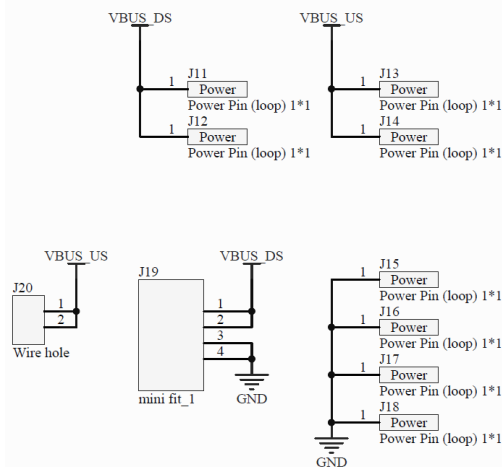


Figure 4-5. USB Type-C PD Coupon Schematic (VBUS/GND)

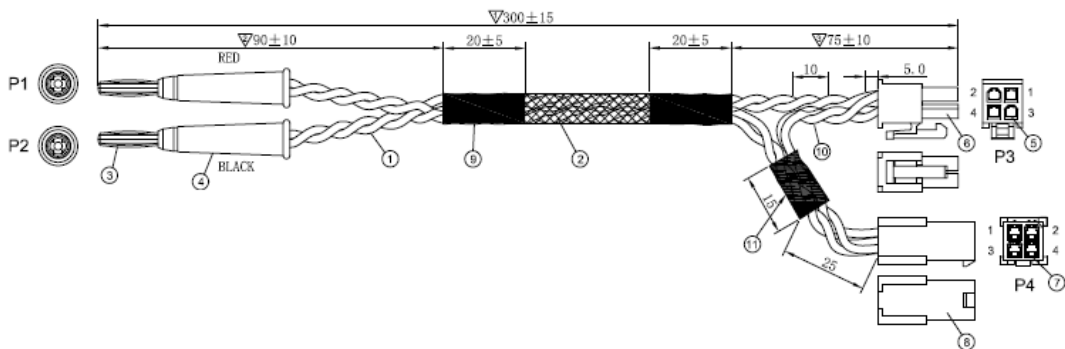


Figure 4-6. USB Type-C PD Cable No:TF21-220G

Pin Assignment

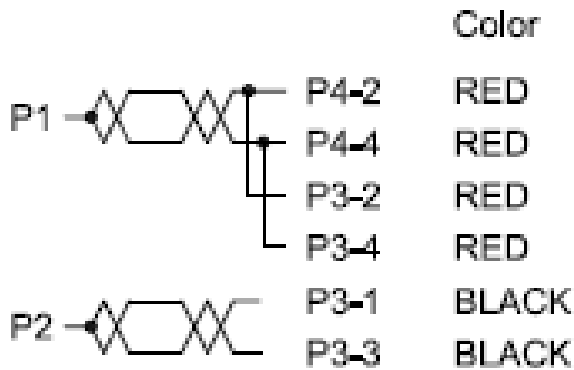


Figure 4-7. USB Type-C PD Cable Wiring Diagram

TF21-215G

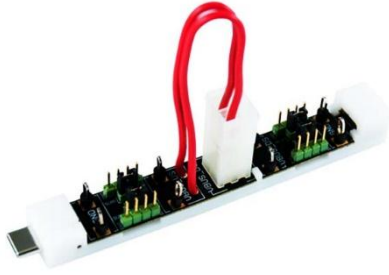


Figure 4-8. USB Type-C PD Coupon
Test Fixture

TF21-220G



Figure 4-9. USB Type-C PD Cable Test
Fixture

5. 電氣規格

Test Item		Requirements		Description
01	Differential Impedance (SS- Pair PCB Test Line)	TF21-215G	85± 9 Ohm	Rise Time : 40ps (20%~80%)
02	Differential Impedance (D+ /D- PCB Test Line)	TF21-215G	85± 9 Ohm	Rise Time : 200ps (10%~90%)
03	Open , Short , Miss Test	TF21-215G		Open , Short , Miss Test
04	Cable Wire Resistance	TF21-220G		DC Resistance
05	Cable Voltage Drop	TF21-220G		5V / 20A

5-1. 測試設備

Item	Product Model	Name	Manufacturer
01	E5071C-TDR	300KHz~20GHz ENA Network Analyzer	Agilent
02	N4433A	200KHz~20GHz Electronic Calibration Module	Agilent
03	CT-8687	4-WIRE UNIVERSAL CABLE/HARNESS TESTER	MICROTEST
04	34420A	Micro-Ohm Meter	HP
05	6330A	High Speed DC Electronic Load	Chroma

5-2. 測試條件/設置狀態圖

5-2-1. Differential Impedance (SS-Pair PCB Test Line)

1. Rise Time : 40ps (20%~80%)

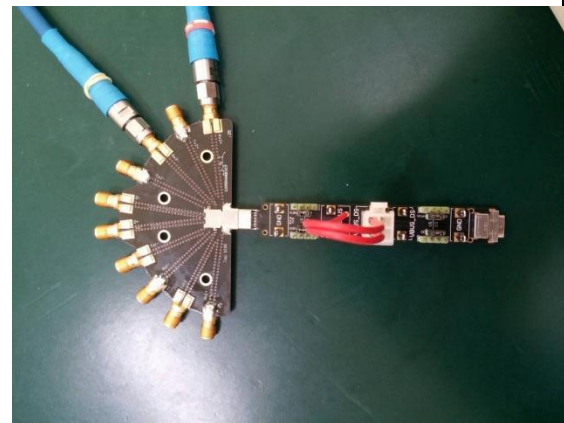


Figure 5-1. Impedance test setup

5-2-2. Differential Impedance (D+/D- PCB Test Line)

1. Rise Time : 200ps (10%~90%)

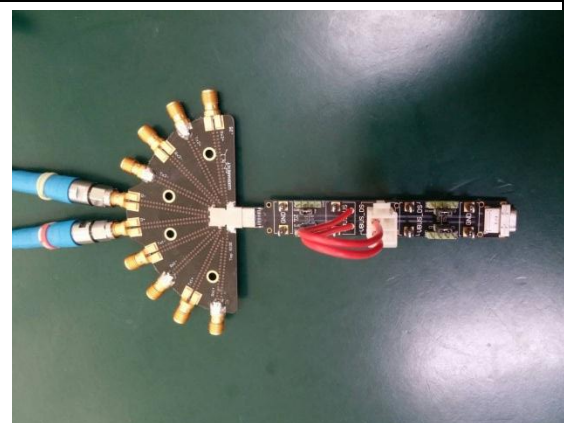


Figure 5-2. Impedance test setup

5-2-3. Open , Short , Miss Test

1. Open , Short , Miss Test



Figure 5-3. Open , Short , Miss Test

5-2-4. Cable Wire Resistance

1. Wire Resistance Test

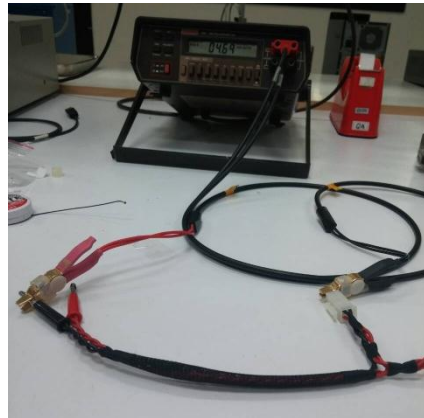


Figure 5-4. Wire Resistance Test

5-2-5. Cable Voltage Drop

1. 5V / 20A Load

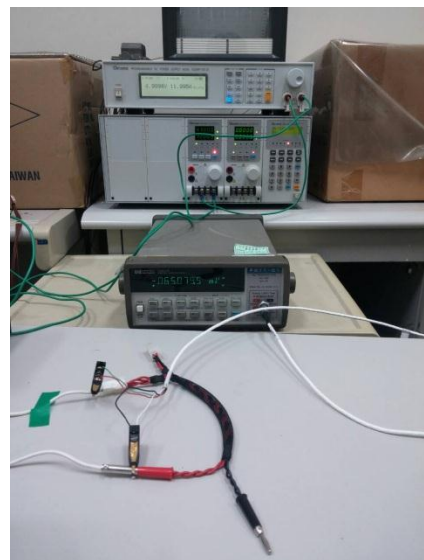


Figure 5-5. Cable Voltage Drop

5-2-6. Low Level Contact Resistance and Voltage Drop

- 1.VBUS: 5V / 3A Load
- 2.Vconn: 5V/0.3A Load
- 3.GND: 5V / 3A Load
- 4.CC: 5V / 0.3A Load



Figure 5-6. Low Level Contact Resistance and Voltage Drop

6. 測試結果

6-1. USB Type-C PD Coupon Test Fixture

6-1-1. Differential Impedance (SS-Pair PCB Test Line)				
Pair Num	Maximum	Minimum	Unit	Figure
SS-TX1	84.90	81.75	Ω	11
SS-RX1	84.02	80.01		
SS-TX2	83.69	78.98		
SS-RX2	85.52	81.71		

6-1-2. Differential Impedance (D+ / D- PCB Test Line)				
Pair Num	Maximum	Minimum	Unit	Figure
D	85.15	80.56	Ω	12

6-1-3. Open , Short , Miss Test			
Pair Num	Open	Short	Miss
VBUS	PASS	PASS	PASS
GND	PASS	PASS	PASS
Tx1+	PASS	PASS	PASS
TX1-	PASS	PASS	PASS
RX1+	PASS	PASS	PASS
RX1-	PASS	PASS	PASS
D+	PASS	PASS	PASS
D-	PASS	PASS	PASS
TX2+	PASS	PASS	PASS
TX2-	PASS	PASS	PASS
RX2+	PASS	PASS	PASS
RX2-	PASS	PASS	PASS
SUB1	PASS	PASS	PASS
SUB2	PASS	PASS	PASS
CC1 / CC	PASS	PASS	PASS
CC2 / VCONN	PASS	PASS	PASS

6-1-4. Cable Wire Resistance				
Pair Num			Resistance	Unit
VBUS	P1	P3	5.08	mΩ
VBUS	P1	P4	6.16	
GND	P2	P3	4.69	

6-1-5. Cable Voltage Drop				
Pair Num			Resistance	Unit
VBUS	P1	P3	0.108	V
VBUS	P1	P4	0.131	
GND	P2	P3	0.095	

6-1-6. Low Level Contact Resistance and Voltage Drop				
Pair Num	LLCR	Unit	Voltage Drop	Unit
VBUS	29	mΩ	86.87	mV
Vconn	102		31.37	
GND	16.57		48.87	
CC	113.43		35.31	

