

Keysight N7015A/16A Type-C Test Kit

User Guide

Notices

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Warranty

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Keysight N7015A/16A Type-C Test Kit

User Guide

Introduction

The Keysight N7015A type-C high speed test fixture provides best-in-class performance up to 30 GHz of bandwidth, enabling engineers to verify and debug *USB 3.1 Gen 2* designs, and designs using other high-speed signal standards that support the type-C connector.

The N7015A/16A Type-C Test Kit:

- has a durable design that can withstand an active test environment.
- has form factor to fit two type-C high speed test fixtures side-by-side and/or top-and-bottom.
- helps you to obtain the most accurate measurements with the best signal integrity by enabling bandwidth up to 30 GHz with low noise levels.
- helps in reducing the test time with a configurable system.

You can order this test kit with the following product options:

Table 1 Product Option Numbers with Descriptions

Product Model Numbers	Description
N7015A	Type-C High Speed Test Fixture (see page 8) Included as a standard component of the test kit along with the Wrench.
N7015A - 016 (Optional)	Type-C Low Speed Signal Access and Control Fixture (see page 10) This fixture can be ordered with the test kit as the N7015A-016 option or separately as a standalone product (model number N7016A).
N7015A -017 (Optional)	USB Type-C Receptacle Adapter (see page 18) This adapter can be ordered with the test kit as the N7015A-017 option or separately as a standalone product (model number N7017A).

Figure 1 shows the contents of a N7015A Type-C Test Kit with the N7015A-016 product option.

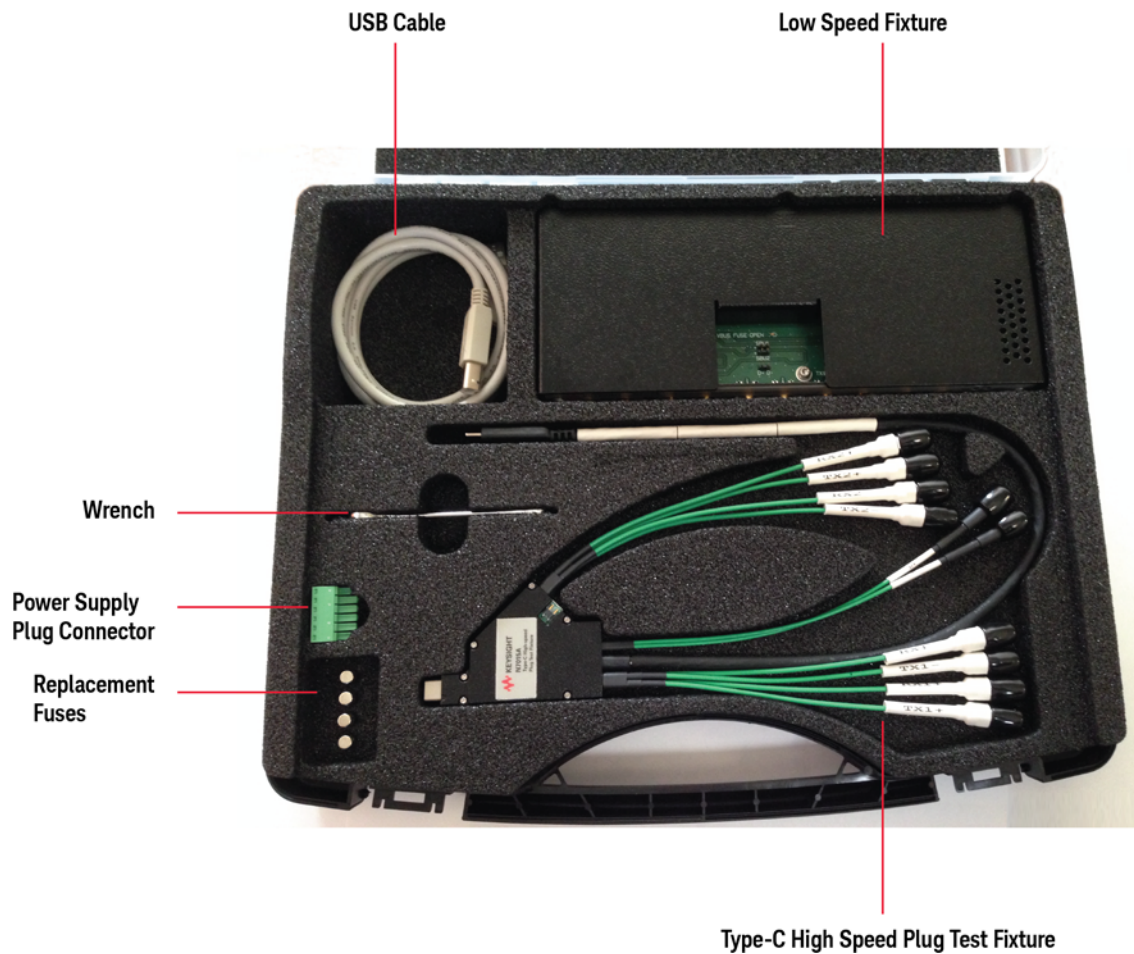


Figure 1 N7015A Type-C Test Kit with N7015A-016 Product Option

Table 2 Contents of the N7015A/16A Type-C Test Kit with N7015A-016 and N7015A-017 Product Options

Item	Part Number	Quantity
N7015A Type-C High Speed Plug Test Fixture		
Type-C High Speed Plug Test Fixture	N7015A	1
Wrench	8710-2803	1
N7015A - 016 (optional) Type-C Low Speed Signal Access and Control Fixture		
Low Speed Fixture	N7016A	1
Power Supply Plug Connector	0360-2693	1
USB Cable	8121-1242	1
Replacement Fuses	2110-0623	4
N7015A - 017 (optional) Type-C Receptacle Adapter		
Receptacle Adapter	N7017A	1

N7015A Type-C High Speed Plug Test Fixture

The N7015A type-C high speed fixture comes with a plug type-C connector mated to the receptacle on the USB host/device and breaks the signal into four differential lanes of high speed TX, RX protocol signals and USB 2.0 D+/D- signals to a scope input and also passes low speed power and control signal via the captive C cable to the N7016A low speed fixture.

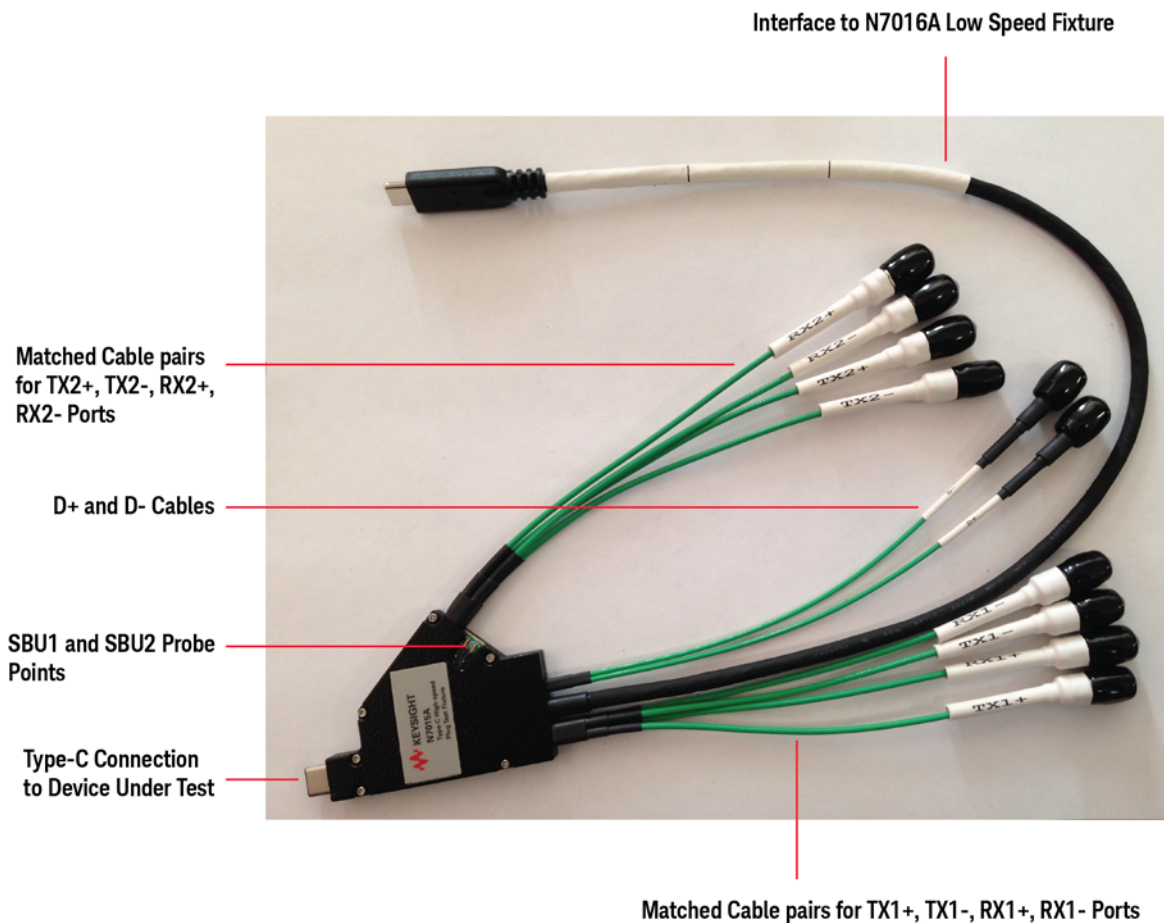


Figure 2 N7015A Type-C High Speed Plug Test Fixture

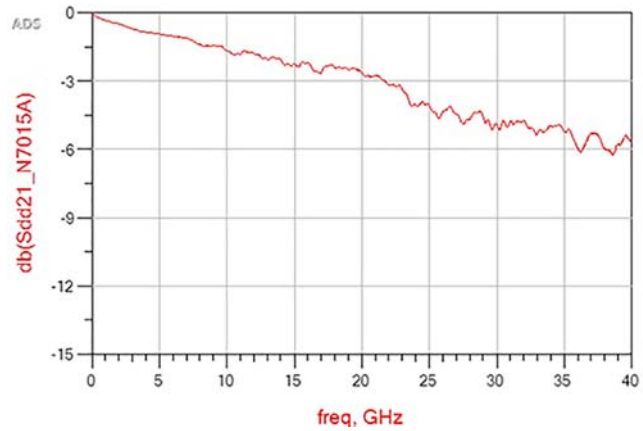


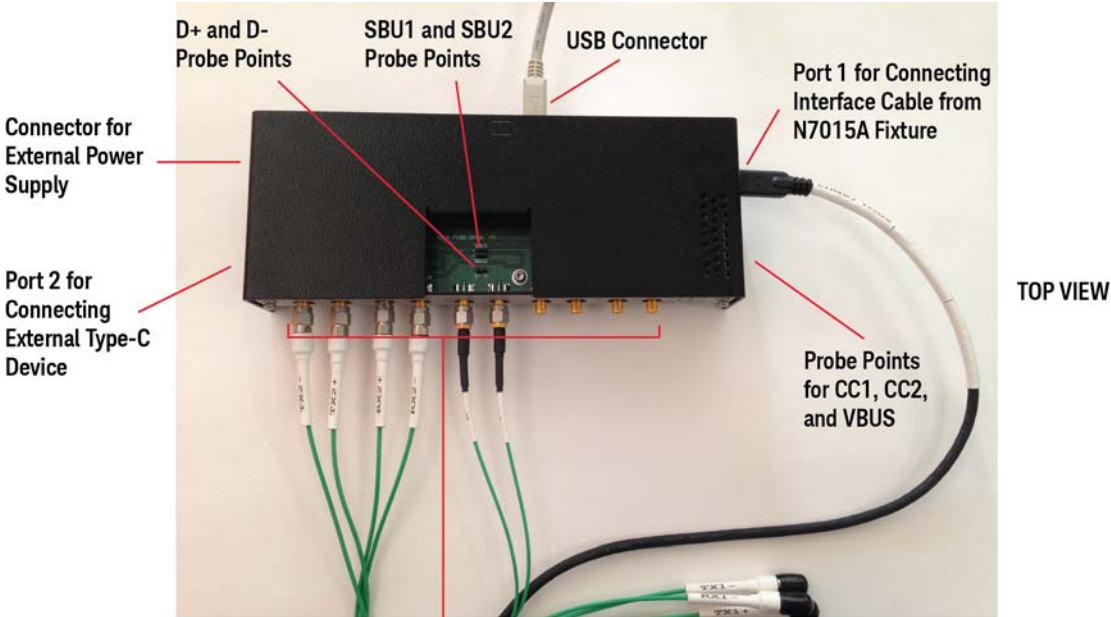
Figure 3 N7015A Fixture Insertion Loss Plot

For the insertion loss plot of the N7015A test fixture when used with the N7017A receptacle adapter, refer to the topic ["Insertion Loss Plot for N7015A with N7017A"](#) on page 20.

N7016A Low Speed Fixture

You can use the N7016A low speed fixture to do the following:

- Turn on a type-C device under test using the N7016A low speed fixture termination control options. These options are the Rp, Rd and Ra resistances (See [“Significance and Values of Rp, Rd, and Ra Termination Resistors in the USB Type-C Connector:”](#) on page 15 for more details).
- Probe the CC lines for power delivery protocol and power delivery physical layer testing.
- Probe the SBU1/SBU2 lines for AUX channel testing.
- Probe the VBUS and D+/D- signals.
- Load the VCONN according to both the Display Port and USB specifications. VCONN is the CC line which is not used for link communication and can be controlled using the N7016A low speed fixture control software.
- Simulate a flip of the CC lines without removing the type-C cable.
- Enable the use of an external power supply to support two quadrant operation. An optional Keysight power supply can supply and load VBUS and report the value of the current.
- Pass the VBUS and N7015A high speed lanes to Port 2 to be used by a power delivery controller or other link partner.



Interconnect for High Speed Signals from N7015A Fixture

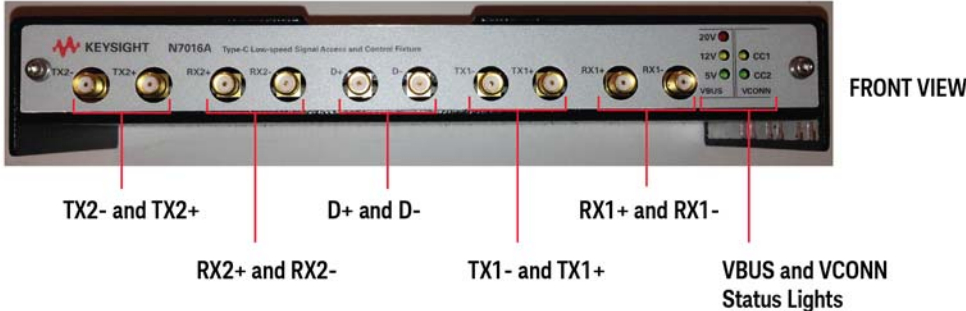
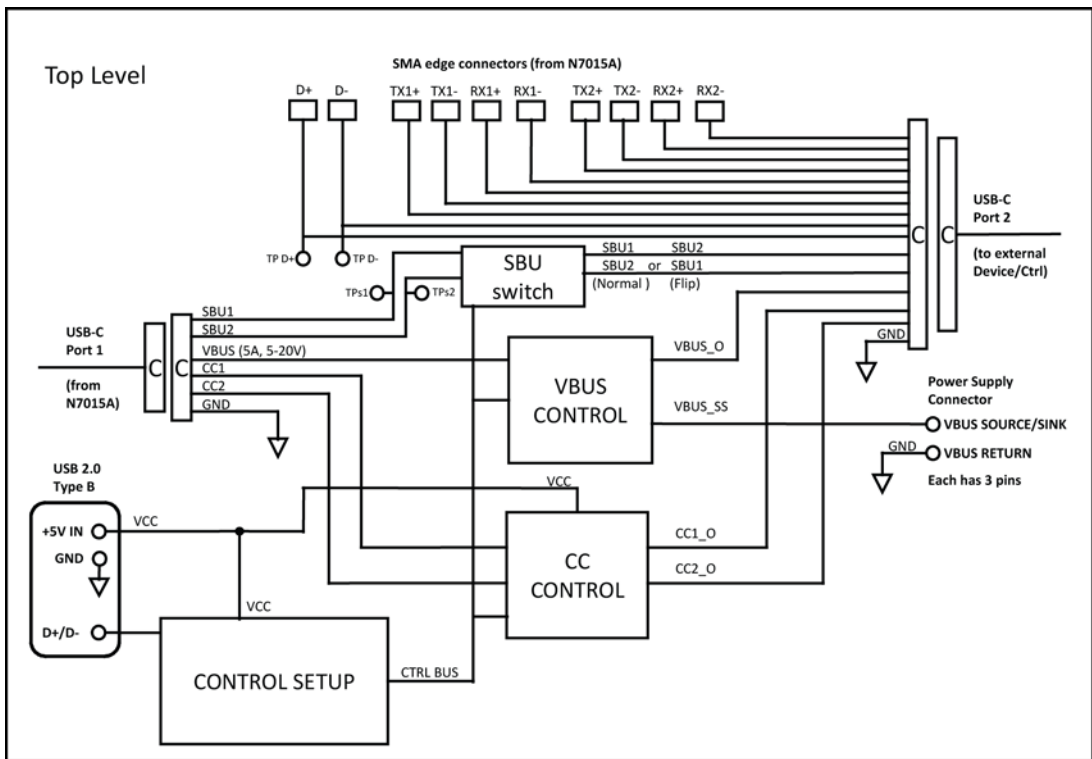


Figure 4 N7016A Low Speed Fixture

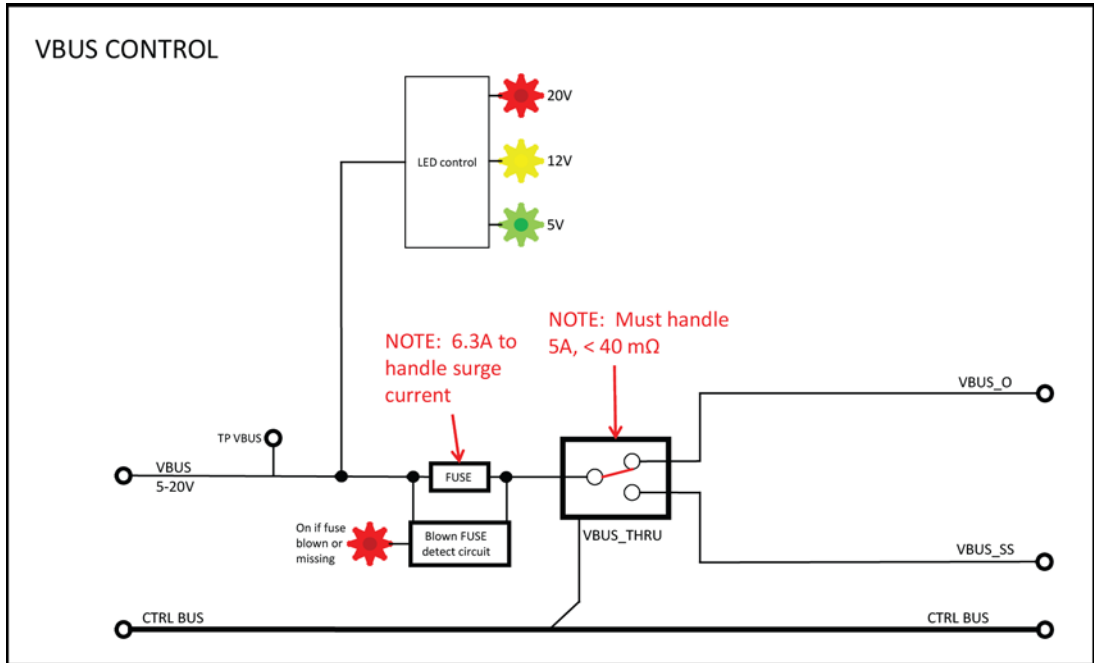
NOTE

The N7016A low speed fixture requires the installation of a software driver to operate. See [“Installing the N7016A Type-C Low Speed Signal Access and Control Fixture Software”](#) on page 33. You can install this fixture software driver on an external personal computer or on the Infiniium Oscilloscope for convenience.

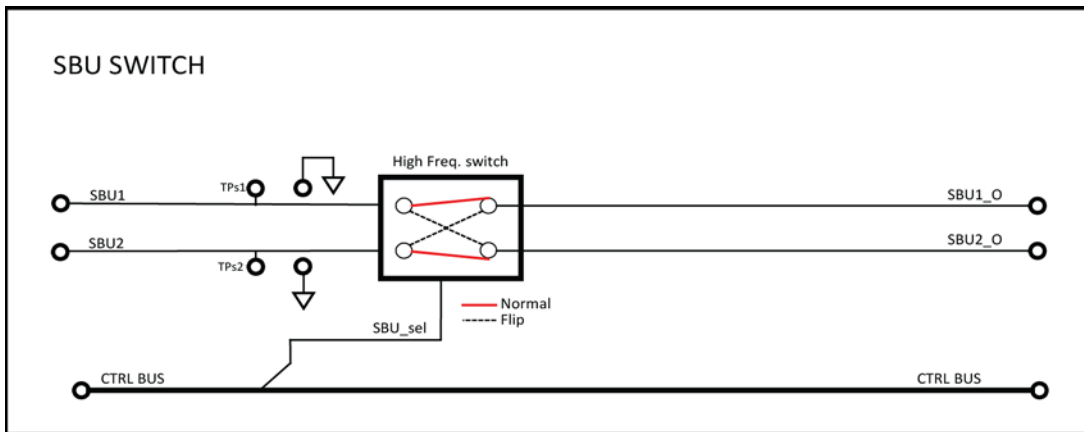
Connection Block Diagram



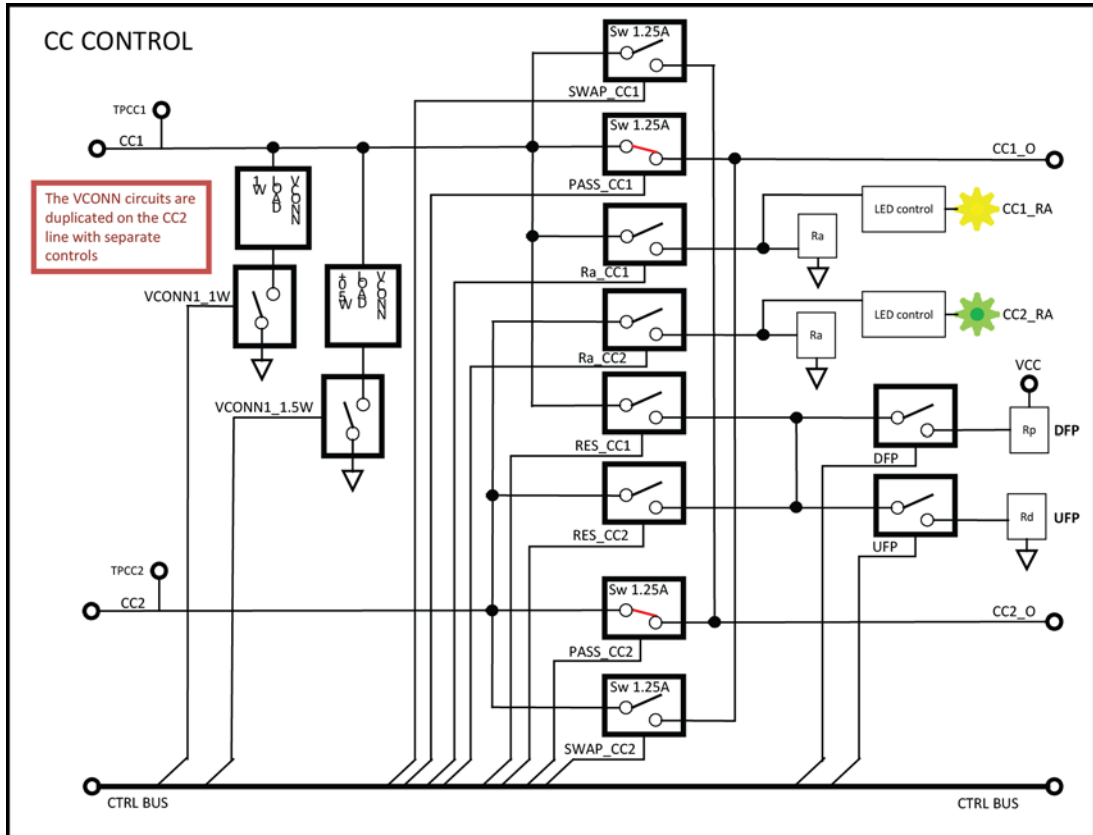
VBUS Control Block Diagram



SBU Switch Block Diagram

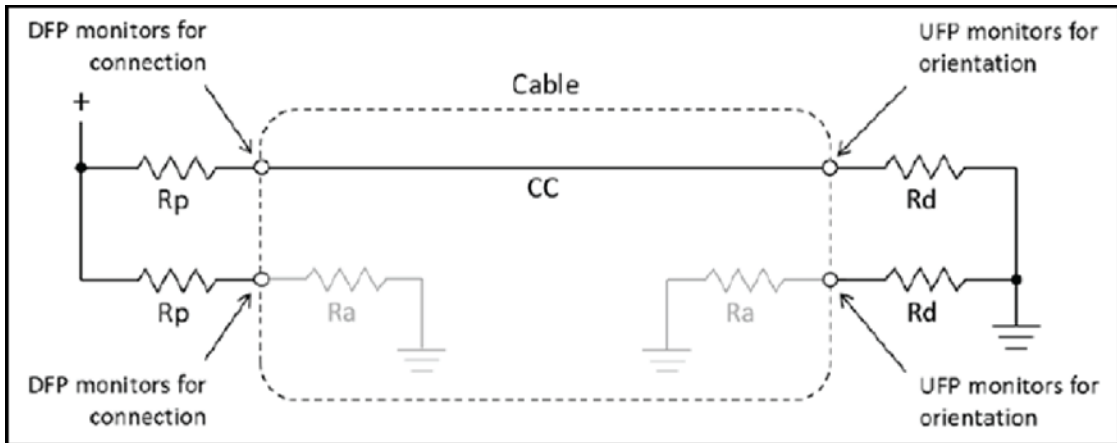


CC Control Block Diagram



Significance and Values of Rp, Rd, and Ra Termination Resistors in the USB Type-C Connector:

A downstream facing port (DFP), such as a host computer, exposes pull-up terminations, Rp, on its CC pins (CC1 and CC2). An upstream facing port (UFP), such as a peripheral, exposes pull-down terminations, Rd, on its CC pins. The purpose of Rp and Rd terminations on CC pins is to identify the DFP to UFP connection and the CC pin that will be used for communication. To do this, the DFP monitors both CC pins for a voltage lower than its unterminated voltage.



The N7016A low speed fixture has a fixed R_d value of $5.1\text{ k}\Omega$ for the UFP connection and a fixed R_d value of $56\text{ k}\Omega$ for the DFP connection. For simulating the VCONN connection, the R_a value is fixed at $1\text{ k}\Omega$.

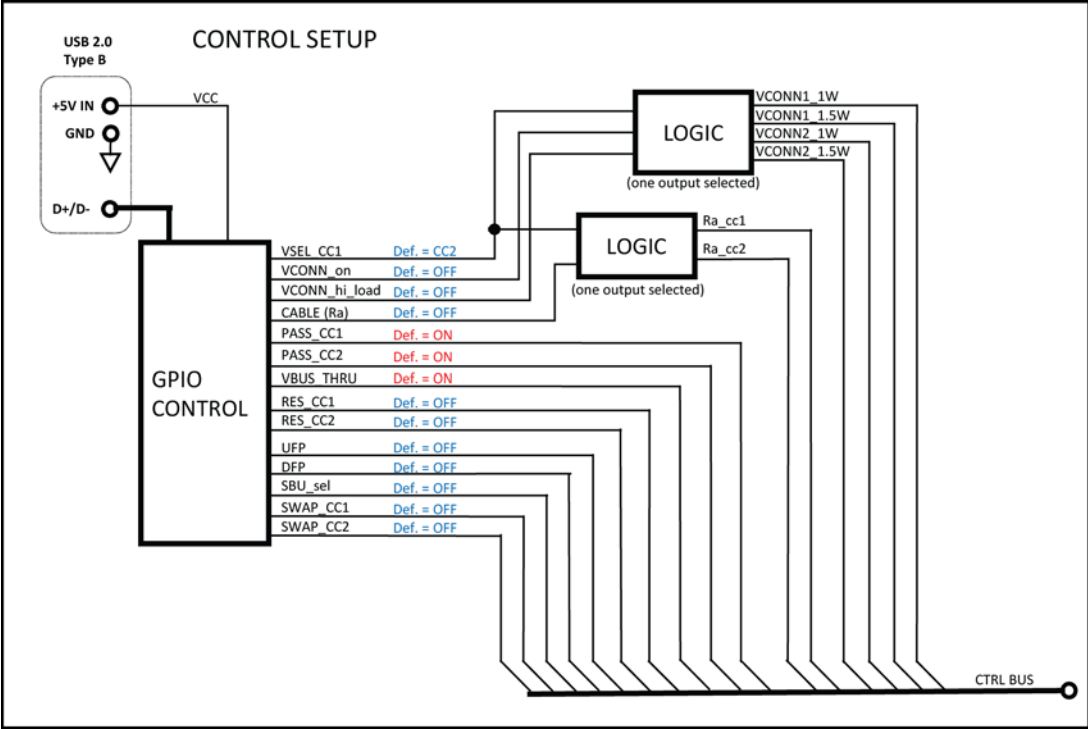
The following table provides the values used for the DFP's R_p based on the current sourcing capability of the type-C port and the voltage that is connected to the R_p .

DFP Advertisement	Resistor Pull-up to 4.75 V - 5.5 V	Resistor Pull-up to 3.3 V \pm 5%
Default USB power	$56\text{ k}\Omega \pm 20\%$	$36\text{ k}\Omega \pm 20\%$
1.5A at 5 V	$22\text{ k}\Omega \pm 5\%$	$12\text{ k}\Omega \pm 5\%$
3.0A at 5 V	$10\text{ k}\Omega \pm 5\%$	$4.7\text{ k}\Omega \pm 5\%$

The type-C cable needs to expose a pull-down termination, R_a , on its VCONN pin to signal to the DFP that it needs power. The DFP must be able to differentiate between the presence of R_d and R_a to know whether there is a UFP attached and where to apply VCONN. The DFP is not required to source VCONN unless R_a is detected.

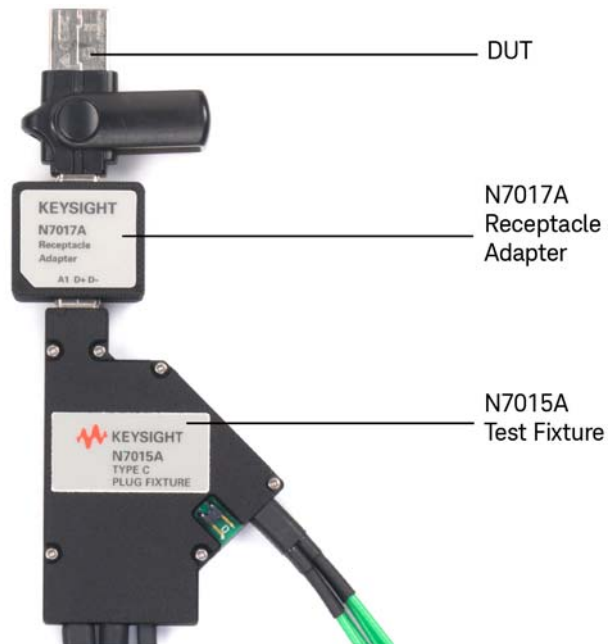
	Minimum Impedance	Maximum Impedance
R_a	$800\ \Omega$	$1.2\text{ k}\Omega$

Control Setup Block Diagram



N7017A USB Type-C Receptacle Adapter

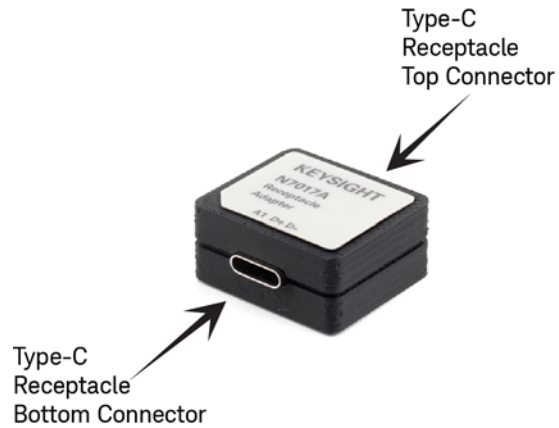
The N7015A test fixture comes with a plug Type-C connector that allows it to connect only to a USB host/device with a receptacle connector. With the usage of the N7017A receptacle adapter, the N7015A test fixture can act as a receptacle fixture that allows it connect to a USB device with a plug connector such as a thumb drive.



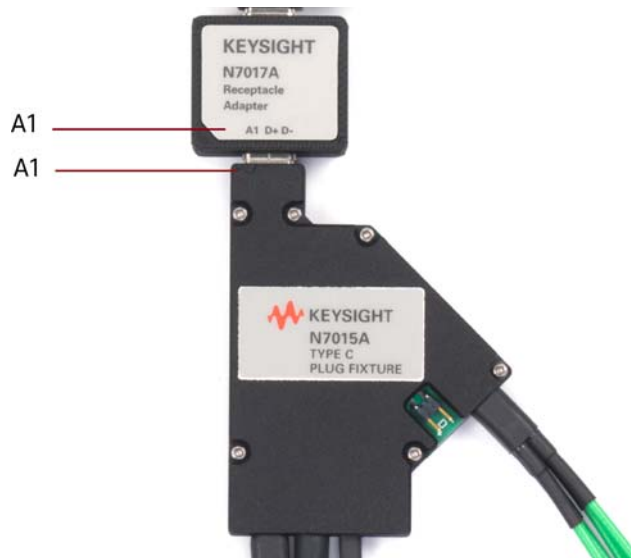
The N7017A receptacle adapter is required in the following situations:

- Testing tethered devices such as thumb drives
- Enabling Rx signal validation and calibration when testing receptacle devices

The N7017A receptacle adapter provides two receptacle connectors. You can use any of these two connectors to connect to the N7015A test fixture's plug and the other to connect to a USB device's plug.



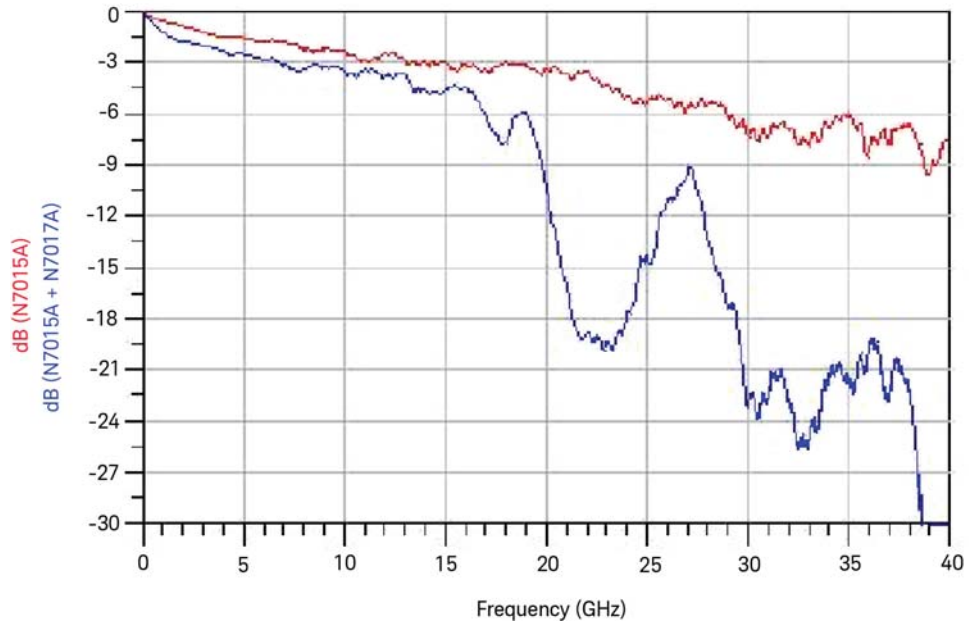
While making these connections, ensure that the A1 pin marking displayed on the receptacle adapter is aligned to the A1 pin on the N7015A test fixture as shown in the figure below.



To learn more about the pinout of the N7017A's receptacle connectors, refer to the topic "[N7017A Receptacle Adapter Pinout](#)" on page 52.

To know about the signal path when using the N7017A receptacle adapter with the N7015A test fixture, refer to the topic "[Signal Routing when using the N7017A Receptacle Adapter](#)" on page 53. This topic illustrates how these signals are routed from the DUT to the N7017A receptacle adapter and then to the N7015A test fixture.

Insertion Loss Plot for N7015A with N7017A



Recommended Accessories

You can order the following accessories with the N7015A/16A type-C Test Kit or separately later as individual products.

N2787A 3D Probe Positioner

The N2787A 3D Probe Positioner can be quickly positioned in a wide variety of configurations to support the N7015A type-C high speed plug test fixture and the device under test. This support is intended to mitigate accidentally disconnecting the device under test.



InfiniiMax 1130A Series Probe

This InfiniiMax probe is used for probing USB 2.0 D+/D- or SBU1/SBU2 signals.

E2678B Socketed Head for InfiniiMax Probe

This socketed head for InfiniiMax probe is used for probing USB 2.0 D+/D- or SBU1/SBU2 signals.

Passive Probe

For probing CC1, CC2 and VBUS, use either Keysight N2871A 200MHz or 10074C 150MHz passive probe.

N2823A or N5448B Coaxial Phase Matched Cable Pair

For extending the cable length of the N7015A type-C high speed test fixture and add convenience and flexibility to the probing setup, use the N2823A 39 inches (1 m) long coaxial phase matched cable pair. This coaxial cable has 2.92 mm male connectors on both ends.



Figure 5 N2823A Coaxial Cable Pair

NOTE

In situations where a shorter extension of a cable's length is needed, you can use the N5448B (25 cm long) coaxial phase matched cable pair.



Figure 6 N5448B Coaxial Cable Pair

The figure below shows the N5448B cables attached to the 2.92 mm high speed signal connectors of the N7015A test fixture and channels 1 and 3 of the Infiniium oscilloscope.

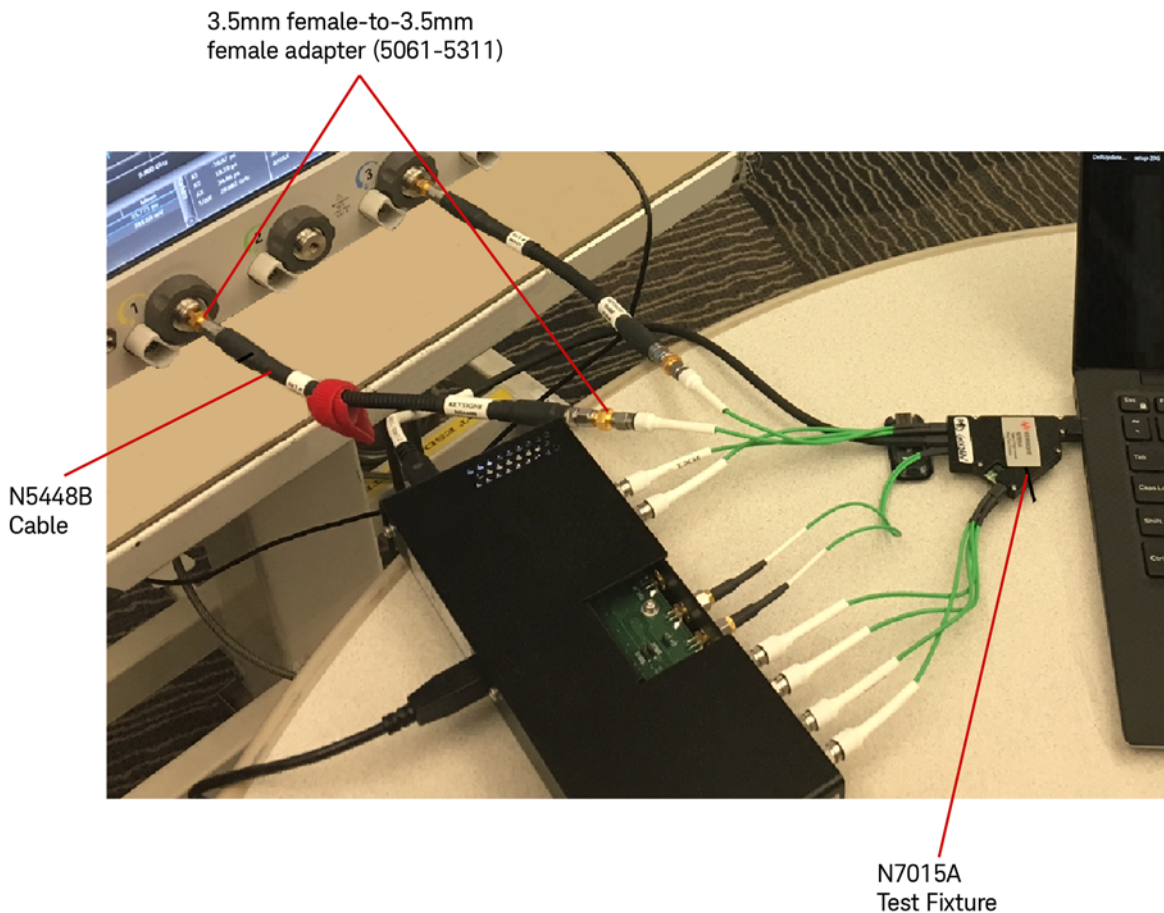


Figure 7 N5448B Cable Pair Attached to N7015A and Infiniium Oscilloscope

The N2823A (or the shorter N5448B) cables provide excellent signal integrity to support high speed digital signals. These are, therefore, optimum for use with the matched cables for differential high speed lines of the N7015A Type-C High Speed Test Fixture's connectivity with the Infiniium Oscilloscope channels.

Besides this usage, you can also use the N2823A (or the shorter N5448B) cables in other scenarios such as extending the length of matched cables that connect the high speed signals from the N7015A high-speed test fixture to the N7016A Low Speed fixture.

NOTE

To adapt the 2.92mm male connector of the N2823A (or N5448B) cable and the N7015A test fixture, use the Keysight 3.5mm female-to-3.5mm female adapter (part number 5061-5311).



This adapter is also recommended to connect the 2.92mm male connector of these cables to the input of Infiniium V Series, Z Series or 90000X oscilloscope.

CAUTION

The maximum bend radius for the N2823A and N5448B coaxial cable pair is 30 mm. Bending these cables at too tight a radius or twisting the cables can cause damage, reduce performance, and impact the precision of these cables.

Also, ensure that the plastic caps that are provided with these cables are installed when the cables are not in use.

For details on the N2823A and N5448B cables, refer to its guide available in the Document Library tab of this product's page on www.keysight.com.

Setting up the N7015A/16A Type-C Test Kit

Perform the following procedure to set up the N7015A/16A Type-C Test Kit hardware.

- 1 Install the N7016A USB Type-C Low Speed Signal Access and Control Fixture software on your personal computer or on the Infiniium Oscilloscope. See "[Installing the N7016A USB Type-C Low Speed Signal Access and Control Fixture Software](#)" on page 33.
- 2 Connect the N7016A low speed fixture to an external personal computer or a USB-A port of the Infiniium Oscilloscope using the supplied USB cable.

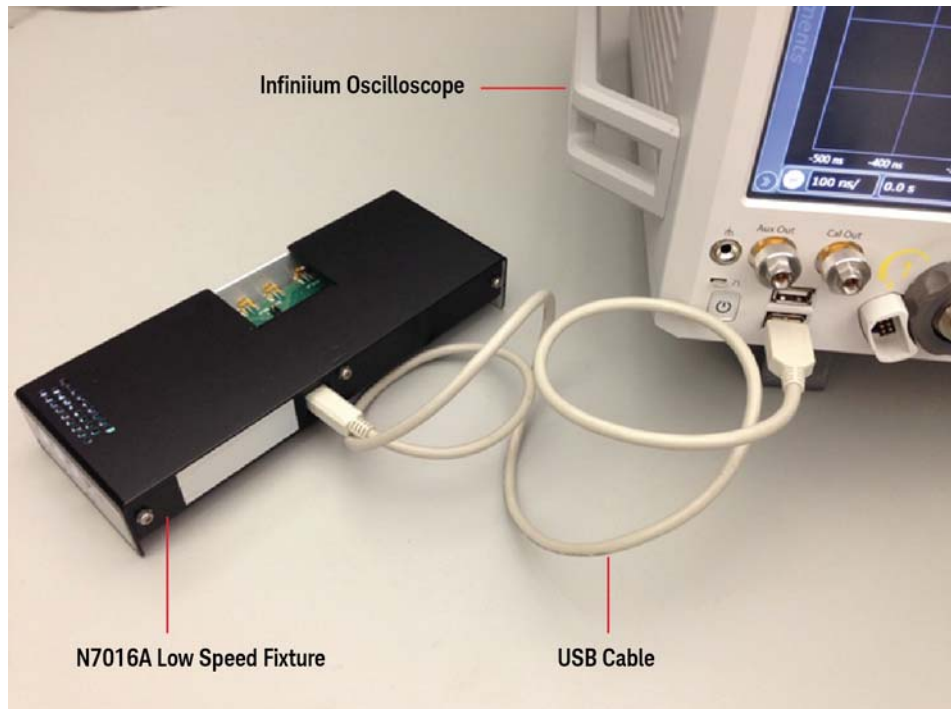


Figure 8 USB Cable Connecting the N7016A Low Speed Fixture to the Oscilloscope

- 3 Power on the N7016A low speed fixture using the supplied USB cable.

When connected to a personal computer or an Infiniium Oscilloscope, the supplied USB cable provides power to this low speed fixture. [Figure 8](#) on page 25 shows the USB cable connecting the N7016A low speed fixture to the Infiniium Oscilloscope.

Using an External Power Supply

In order to comply with the USB type-C specification, the N7016A low speed fixture supports the Keysight N6701A Low-Profile Modular Power System Mainframe and Module which acts as an external power supply. The external power supply port is also a power sink port.

A power supply plug connector is included in the N7015A/16A Type-C Test Kit for convenience.

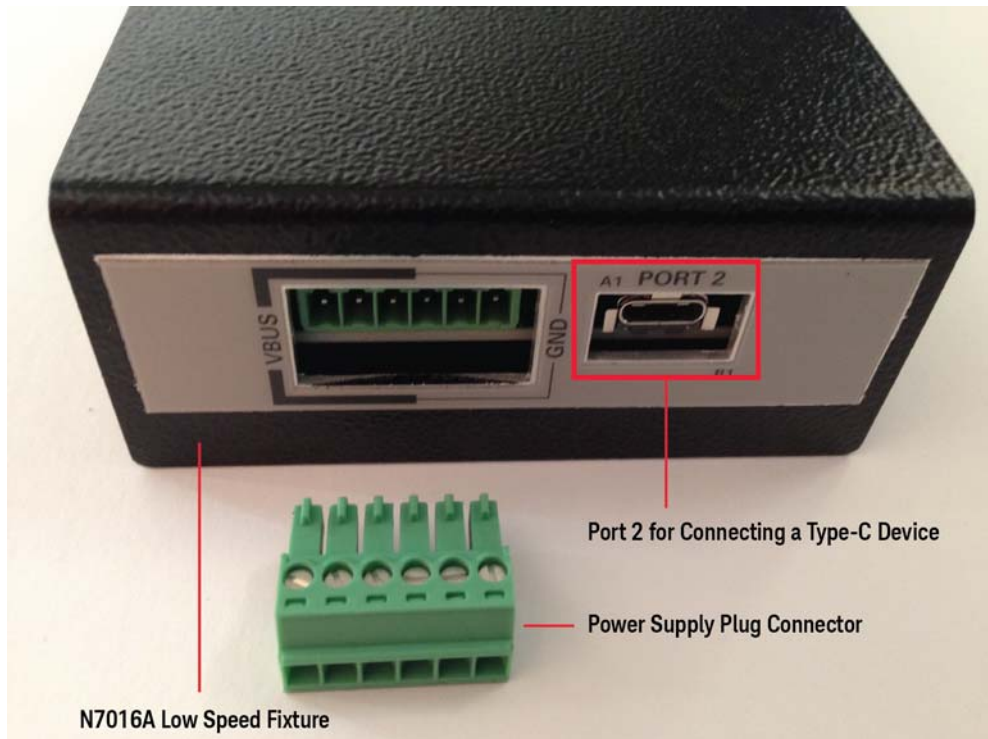


Figure 9 Port 2 of Low Speed Fixture

NOTE

Port 2 of the N7016A low speed fixture can be used to connect a type-C device such as a power delivery controller, a monitor, or a USB-C power supply which acts as an external power supply to this low speed fixture.

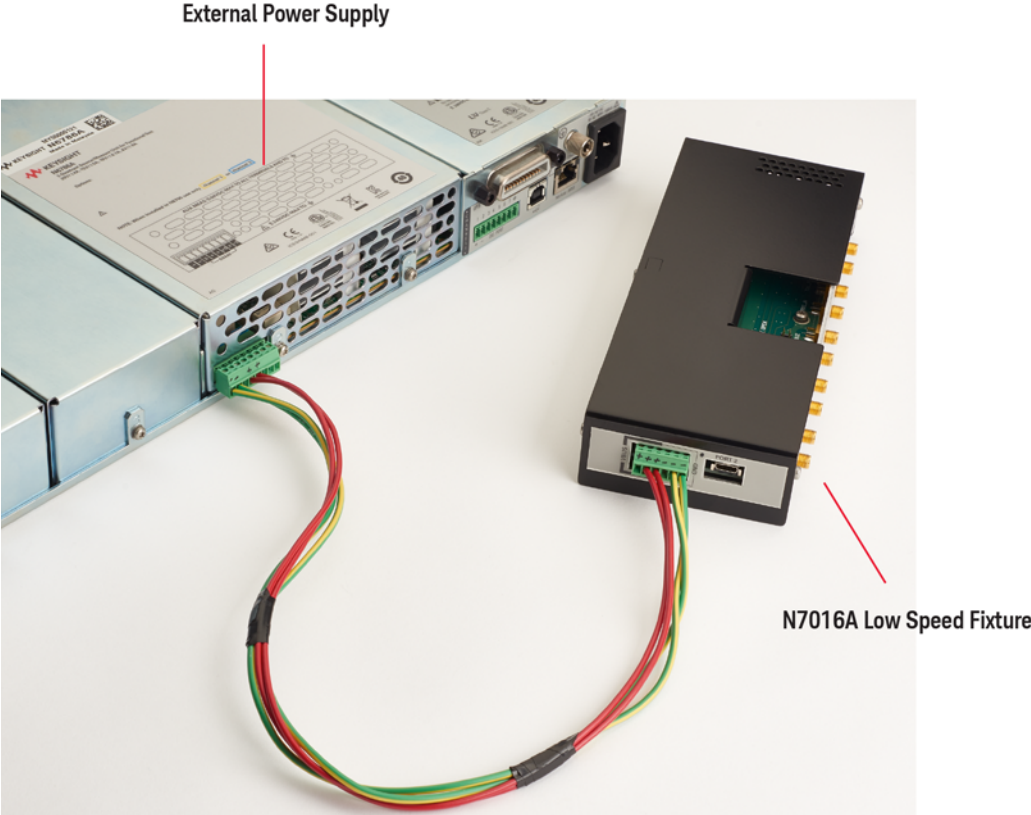


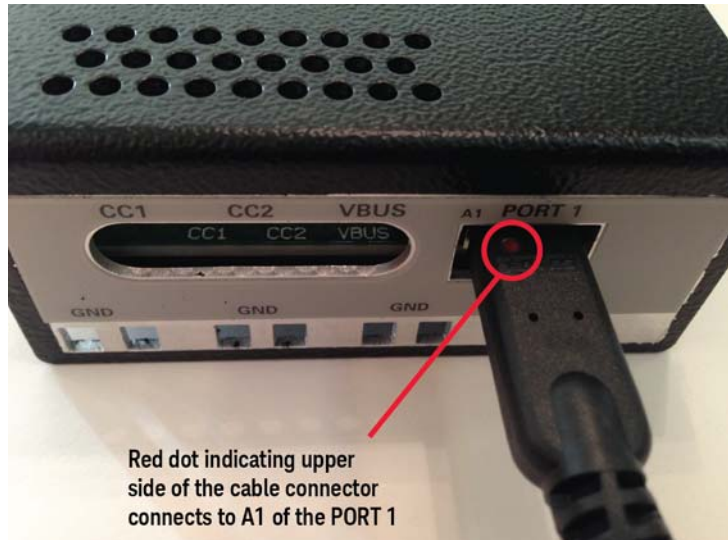
Figure 10 External Power Supply for Low Speed Fixture

- 4 Connect the type-C connector of the N7015A high speed plug test fixture to the port 1 of the N7016A low speed fixture.

NOTE

As the cable connector of the N7015A type-C high speed plug test fixture is reversible, the top side of this connector is provided with a red dot to indicate proper insertion of the cable to the port 1 of the N7016A low speed fixture. Inserting this cable with the red dot upwards allows the N7016A USB Type-C Low Speed Signal Access and Control Fixture software to match the lines from the DUT.

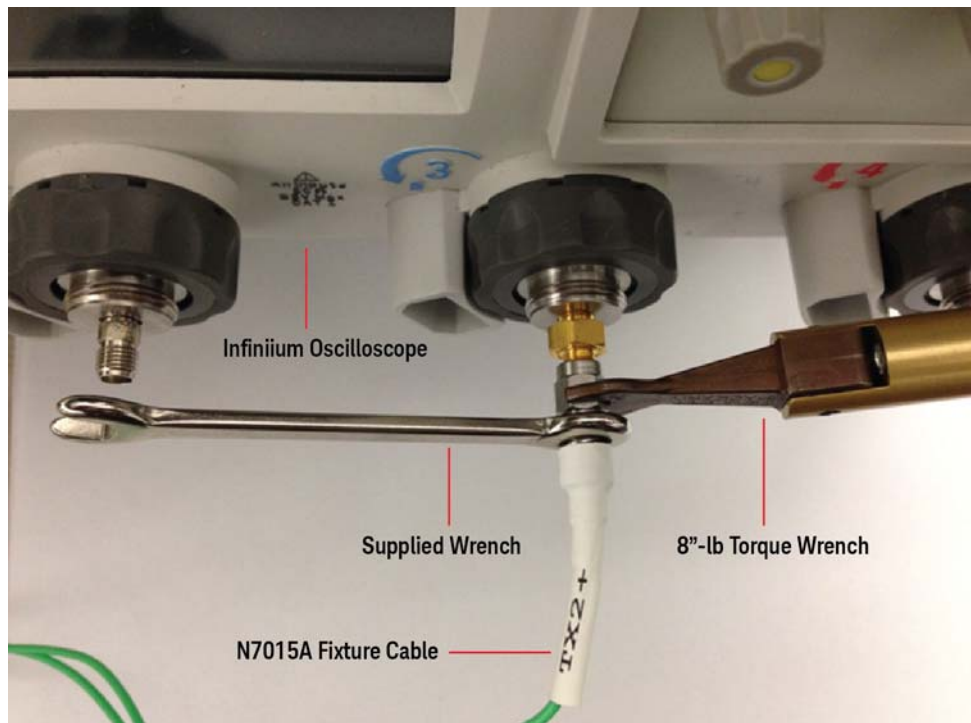
If the N7015A type-C high speed plug test fixture is reversed (Keysight label facing down), the cable connector should also be reversed (red dot facing down).



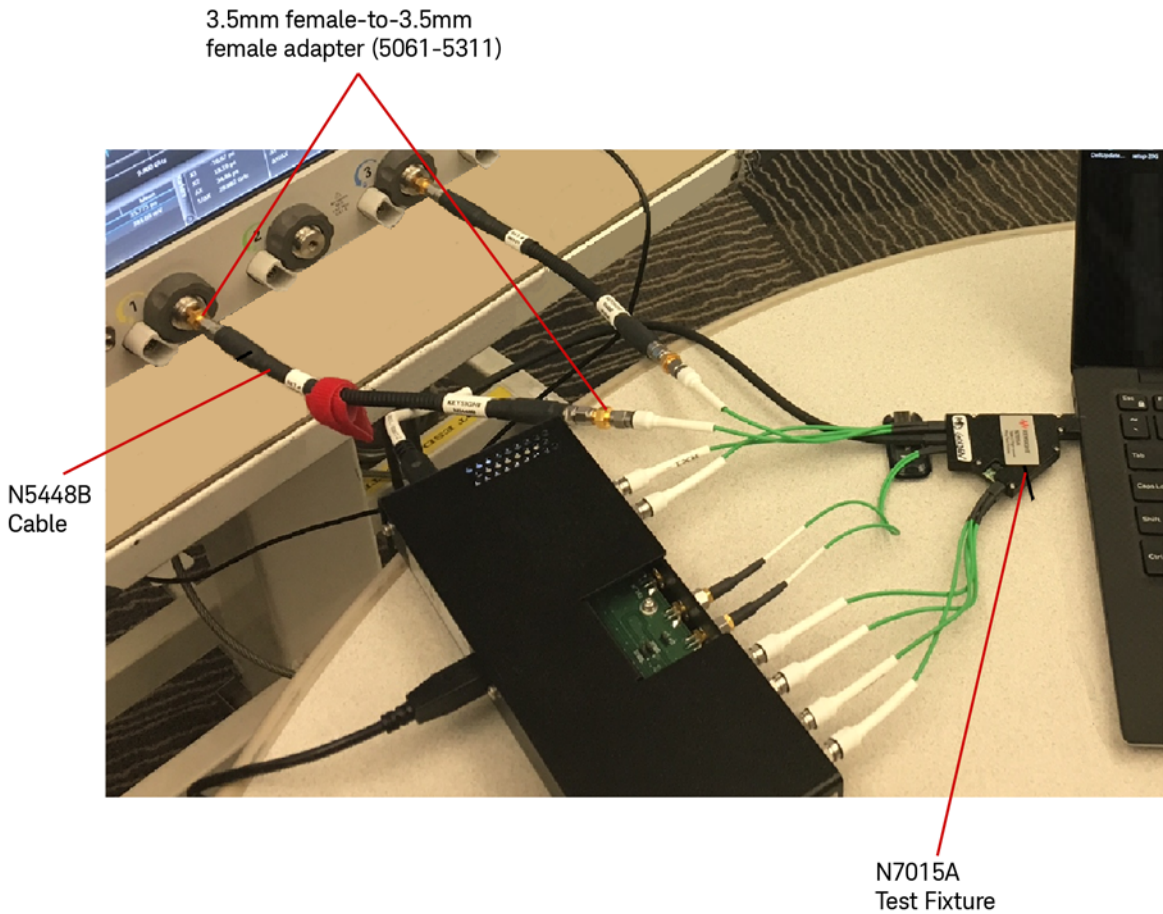
- 5 Connect the 2.92 mm connectors of the N7015A fixture to channel 1 and 3 of the Infiniium oscilloscope. To ensure proper connection and to minimize wear on the cables, use the supplied wrench and a standard 8"-lb torque wrench to connect the N7015A fixture cables.

WARNING

In order to maintain the precision of the N7015A type-C high speed plug test fixture, it is recommended to minimize the twisting of the N7015A fixture cables while connecting them to the Infiniium Oscilloscope or the N7016A low speed fixture.



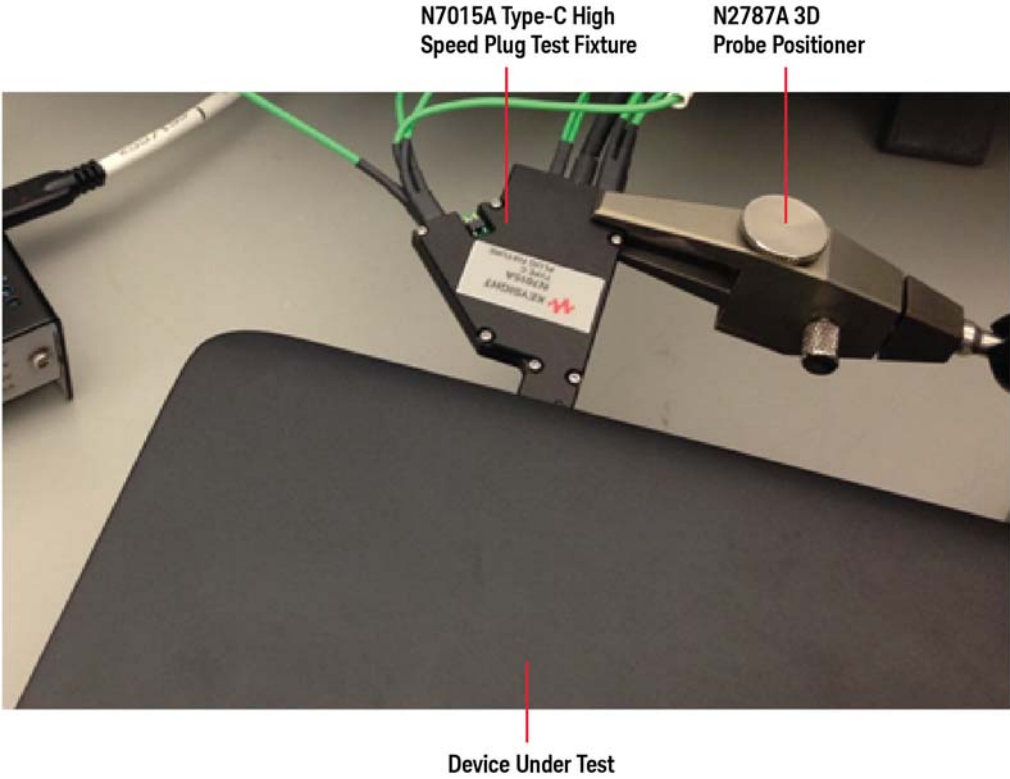
Alternatively, you can use the N2823A (or the shorter N5448B) coaxial phased matched cable pair to connect the 2.92 mm connectors of the N7015A test fixture to channel 1 and 3 of the Infiniium oscilloscope. The extra length gained by using this cable provides flexibility and improved usability to the N7015A type-C high speed plug test fixture.



- 6 Connect the N7015A type-C high speed plug test fixture to the Device Under Test.

CAUTION

It is strongly recommended to place the N2787A 3D Probe Positioner between the N7015A type-C high speed plug test fixture and the DUT to ensure a consistent connection to the DUT and to mitigate accidentally disconnecting the DUT during testing.

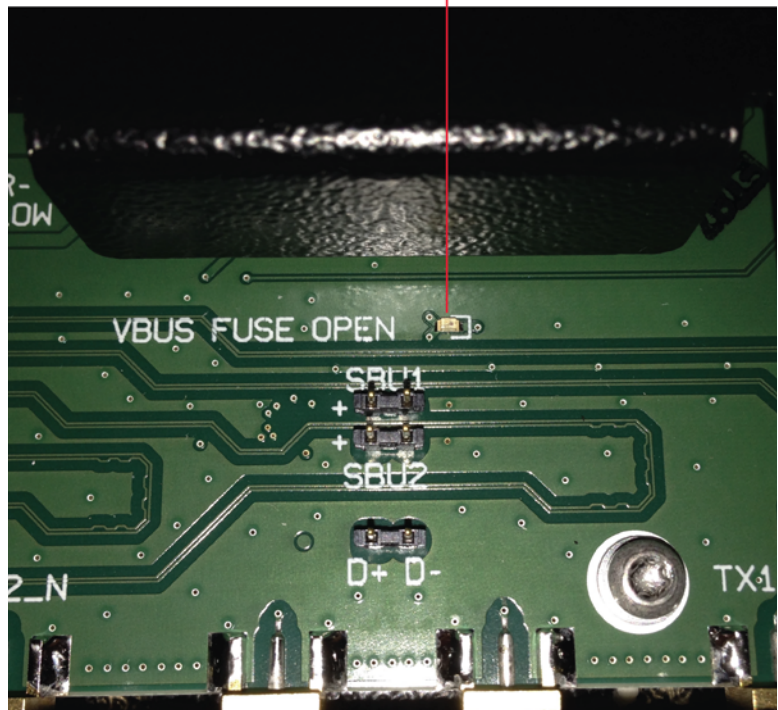


NOTE

A 6.3A slow blow fuse is provided on the top side of the N7016A low speed fixture to protect the device from a faulty connection when using an external power supply.

- This fuse blows if the output power supply plug connector is accidentally shorted between the VBUS and GND ports while the device under test is attached.
- If the fuse blows or is missing, an LED on the top side of the N7016A low speed fixture (labeled VBUS FUSE OPEN) glows red when the device under test is attached to the N7015A type-C high speed plug test fixture and the VBUS voltage is present on port A.

LED glows red when Fuse blows



See ["Replacing the N7016A Low Speed Fixture Fuse"](#) on page 56 to replace this fuse.

Installing the N7016A Type-C Low Speed Signal Access and Control Fixture Software

Before you Start

Make sure that the Microsoft .NET 4.5.2 software is installed on your Infiniium Oscilloscope or personal computer before installing the N7016A USB Type-C Low Speed Signal Access and Control Fixture software.

If not already installed, download and install the Microsoft .NET 4.5.2 software for free from

<https://www.microsoft.com/en-us/download/details.aspx?id=42642>. This software requires a few minutes to install on your Infiniium Oscilloscope or personal computer.

Installing the N7016A USB Type-C Low Speed Signal Access and Control Fixture Software

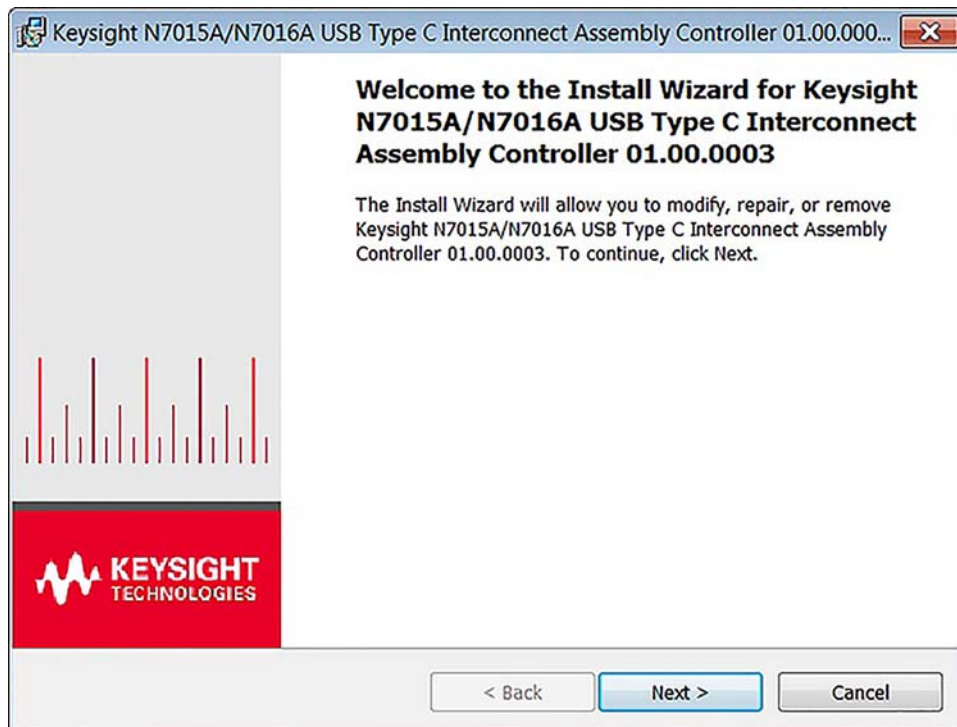
NOTE

In case you have not received the installation package of the N7016A USB Type-C Low Speed Signal Access and Control Fixture software driver, contact your Keysight representative.

You can also download this software from

<http://www.keysight.com/main/software.jsp?ckey=2674876&lc=eng&c=US&nid=-33524.1140138&id=2674876>.

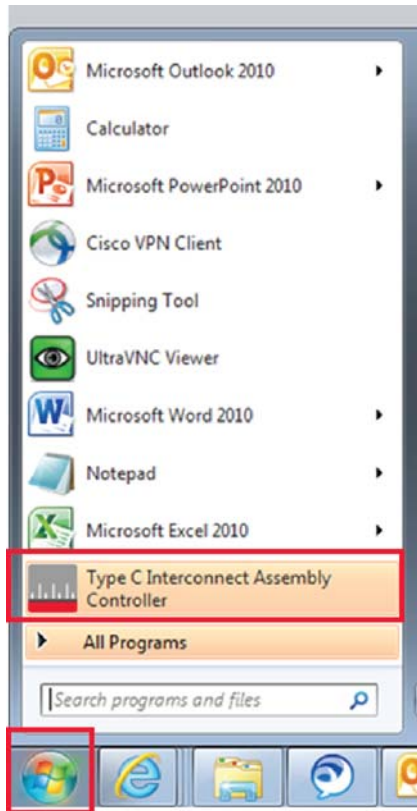
- 1 Install the N7016A USB Type-C Low Speed Signal Access and Control Fixture software by following the on-screen prompts.



- 2 To complete the installation of this software driver on your Infiniium Oscilloscope or personal computer, restart the system.

Launching the N7016A USB Type-C Low Speed Signal Access and Control Fixture Software

- You can launch this N7016A driver software by navigating to **Start > All Programs > Keysight Infiniium Applications > USB C-Connector > Type-C Interconnect Assembly Controller** on your desktop.
- To launch this software for the first time after installation, you can navigate to **Start> Type-C Interconnect Assembly Controller** on your desktop.



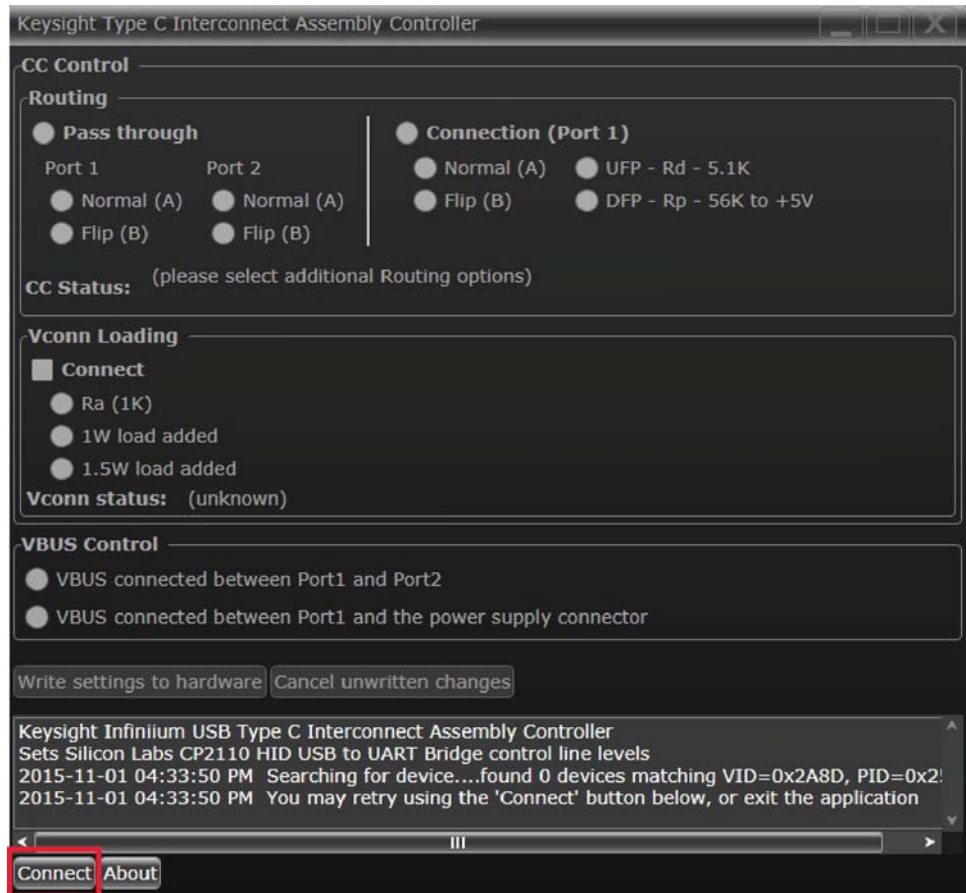
Using the N7016A USB Type-C Low Speed Signal Access and Control Fixture Software

The N7016A USB Type-C Low Speed Signal Access and Control Fixture software is used to configure the hardware settings of the low speed fixture. To use this software, perform the following procedure.

- 1 In the Keysight Type C Interconnect Assembly Controller dialog box, click **Connect** to connect the N7016A low speed fixture to your Infiniium Oscilloscope or personal computer.

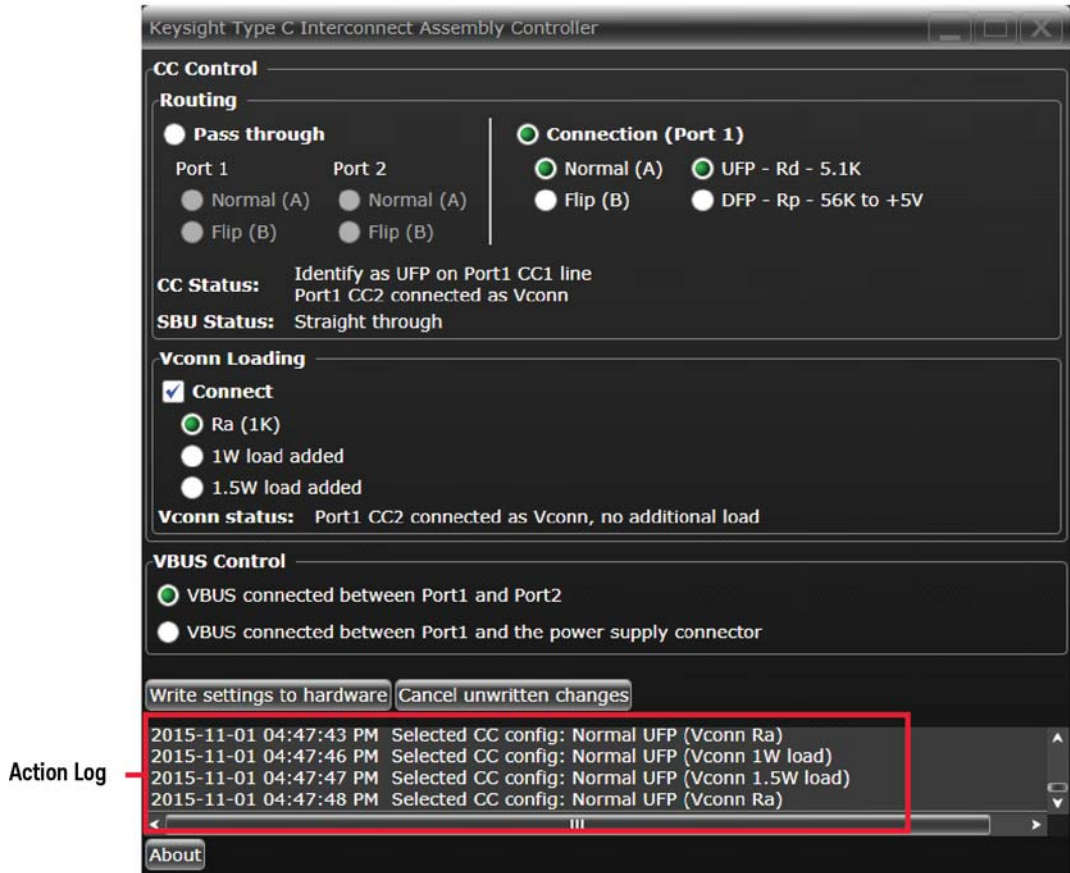
NOTE

If you have already connected the N7016A low speed fixture hardware to your Infiniium Oscilloscope or personal computer, this driver software automatically connects the low speed fixture to the oscilloscope / computer at the driver software launch.

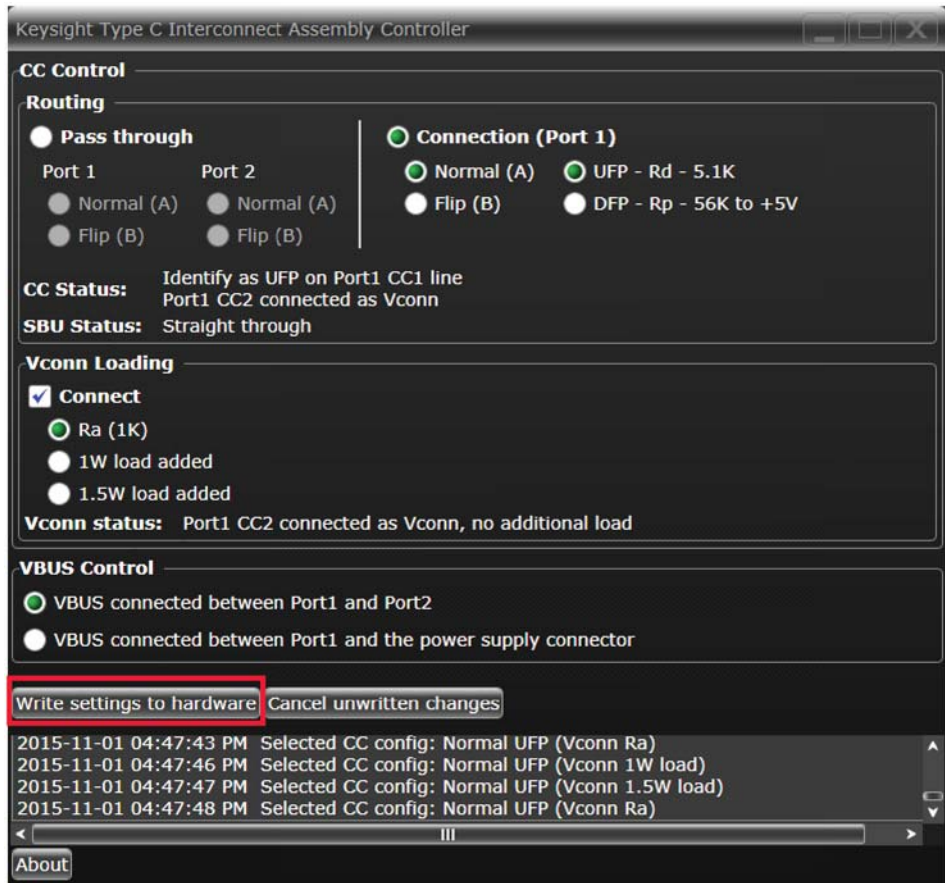


Click to Connect the N7016A Low Speed Fixture to the Infiniium Oscilloscope

- 2 Select the appropriate hardware configuration option in the Keysight Type C Interconnect Assembly Controller dialog box to configure the N7016A low speed fixture settings. As you configure these hardware settings, the subsequent actions are logged and displayed in the bottom section of the software driver dialog box.



- 3 Click **Write settings to hardware** to allow the configured hardware settings to take effect.



Probing Signals

You can probe the following signals using the N7015A/16A Type-C Test Kit.

- CC1, CC2, and VBUS Signals
- SBU1 and SBU2 (Secondary Bus) Signals
- USB 2.0 D+ and D- Signals

Probing the CC1, CC2, and VBUS Signals

You can probe the CC1, CC2, and VBUS signals from the N7016A low speed fixture using passive probes such as Keysight N2871A-3A or 10073D/74D general-purpose high impedance passive probe with 10:1 attenuation ratio.

To probe these signals, connect the passive probe to the CC1, CC2 and/or VBUS ports of the N7016A low speed fixture as shown in [Figure 11](#) on page 41.

NOTE

The GND slots below the probe connection opening in the N7016A low speed fixture can be used to clip the probe grounds to the N7016A low speed fixture.

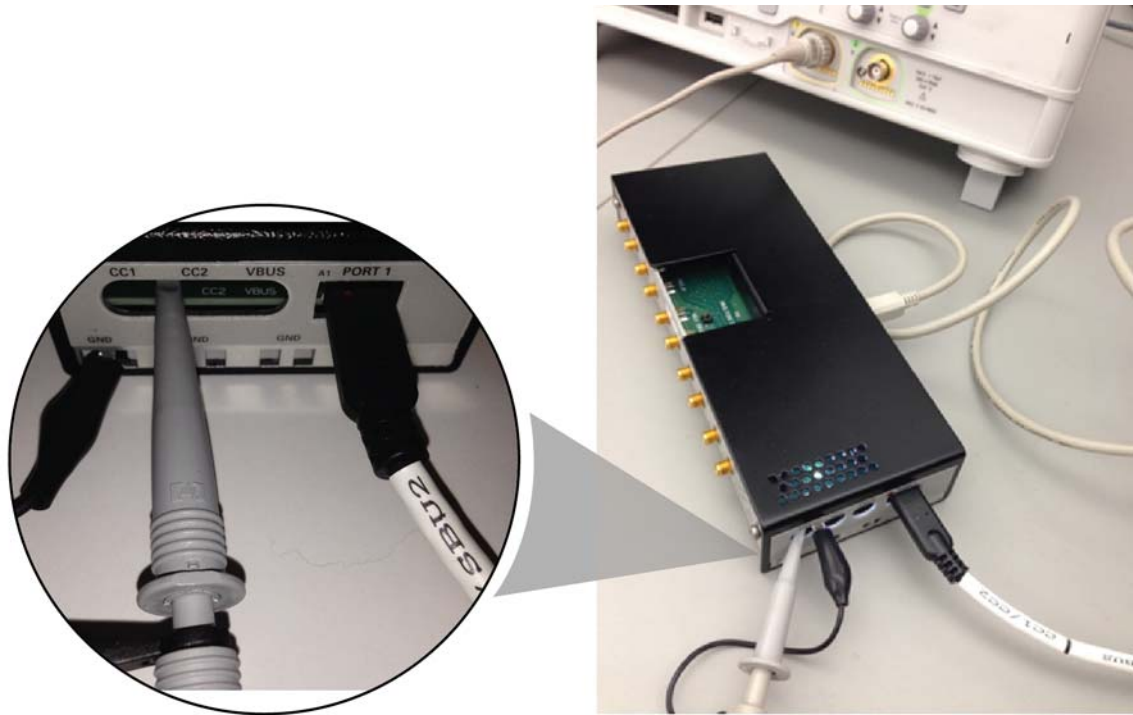


Figure 11 Probing the CC1, CC2, and VBUS Signals

Probing the SBU1 and SBU2 (Secondary Bus) Signals

You can probe the USB Type-C SBU1 and SBU2 signals either at the N7015A type-C high speed plug test fixture or at the N7016A low speed fixture.

Probing the SBU1 and SBU2 Signals at the N7015A High Speed Fixture

You can probe the SBU1 and SBU2 signals at the N7015A type-C high speed plug test fixture using the E2678B InfiniiMax differential socket probe head and an InfiniiMax probe.

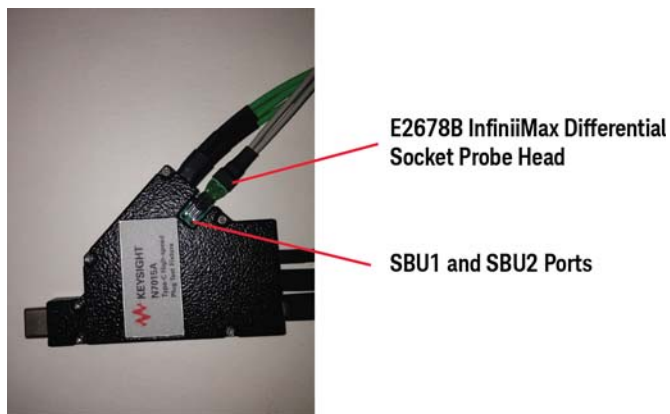


Figure 12 Probe connected to the N7015A Type-C High Speed Plug Test Fixture

Probing the SBU1 and SBU2 Signals at the N7016A Low Speed Fixture

You can probe these SBU1 and SBU2 signals at the N7016A low speed fixture in the following two ways:

- Differentially
- Single-ended

Probing the SBU1 and SBU2 Signals Differentially

For probing the SBU1 and SBU2 signals differentially, connect the E2678B InfiniiMax differential socket probe head and an InfiniiMax probe across both the SBU1 and SBU2 pins on the top left side of the N7016A low speed fixture at the probe pins labeled with the “+” indicators.

Probe Head Connected Differentially

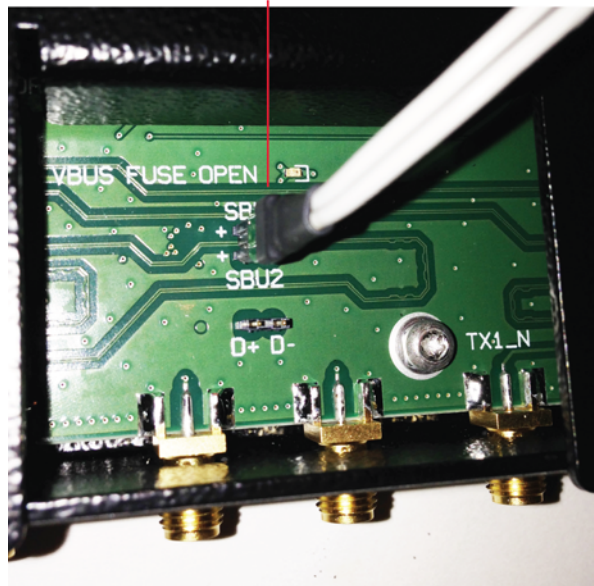


Figure 13 Top View of the N7016A Low Speed Fixture Showing the Probe Head Connected to the SBU1 and SBU2 Pins Differentially

NOTE

The N7016A low speed fixture must be connected to the N7015A type-C high speed plug test fixture via Port 1 in order for the SBU1/SBU2 signals to be present at the probe points.

Probing the SBU1 and SBU2 Signals Single-ended

For probing the SBU1 or SBU2 signals single-ended, connect the E2678B InfiniiMax differential socket probe head and an InfiniiMax probe across either the SBU1 or SBU2 pins of the N7016A low speed fixture at the probe pins labeled SBU1 or SBU2.

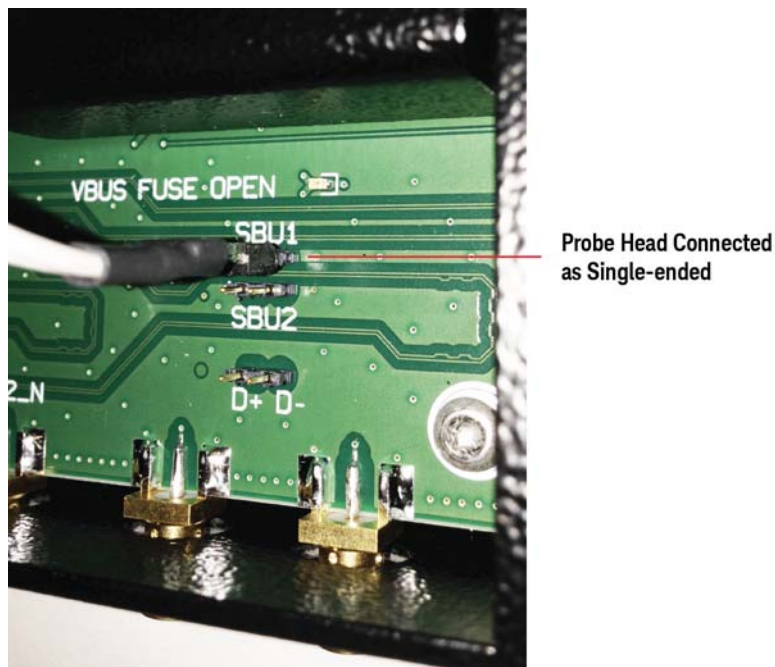


Figure 14 Top View of the N7016A Low Speed Fixture Showing the Probe Head Connected to the SBU1 Pin (Single-ended)

NOTE

The N7016A low speed fixture must be connected to the N7015A type-C high speed plug test fixture via Port 1 in order for the SBU1/SBU2 signals to be present at the probe points.

Probing the D+ and D- Signals at the N7016A Low Speed Fixture

For probing the D+ and D- signals differentially at the N7016A low speed fixture, connect the E2678B InfiniiMax differential socket probe head and an InfiniiMax probe across both the D+ and D- pins on the top side of the N7016A low speed fixture.

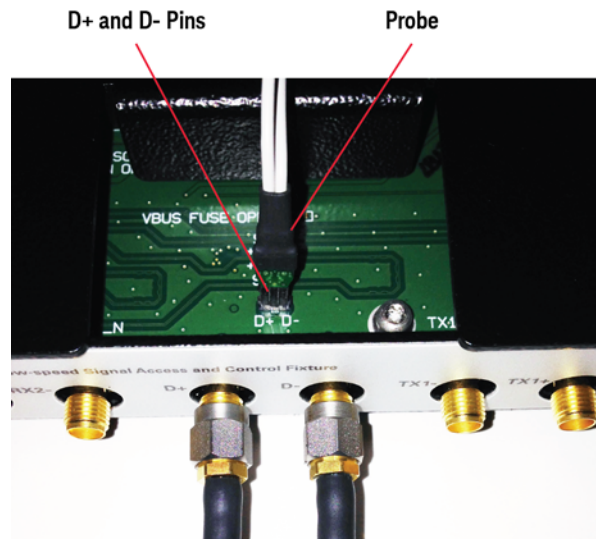


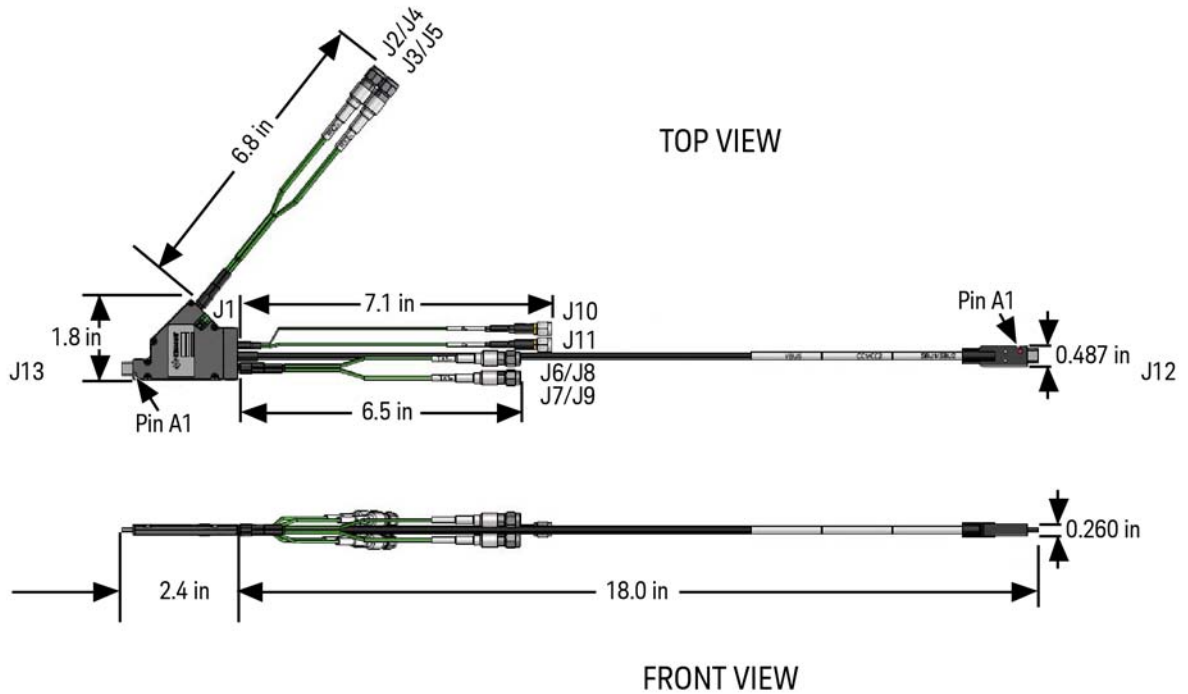
Figure 15 Top View of N7016A Low Speed Fixture showing D+ and D- Pins

NOTE

The N7016A low speed fixture must be connected to the N7015A type-C high speed plug test fixture via both the Port 1 cable and the D+/D- SMA cables in order for the D+/D- signals to be present at the N7016A low speed fixture.

Schematic Diagrams and Pinouts

N7015A Type-C High Speed Plug Test Fixture Dimensions



N7015A Type-C High Speed Plug Test Fixture Pinout

The tables that follow provide the pinouts for the connectors of the N7015A type-C high speed plug test fixture.

Pin Details

Connector	Name
J1	SBU1
	SBU2

Top Coax/Bottom Coax	
Connector	Name
J2	RX2+
J3	RX2-
J4	TX2+
J5	TX2-

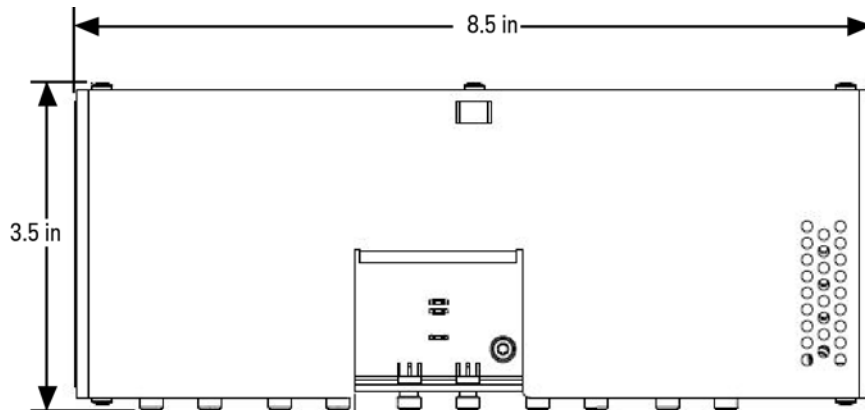
Top Coax/Bottom Coax	
Connector	Name
J6	TX1-
J7	TX1+
J8	RX1-
J9	RX1+

Connector	Name
J10	D-
J11	D+

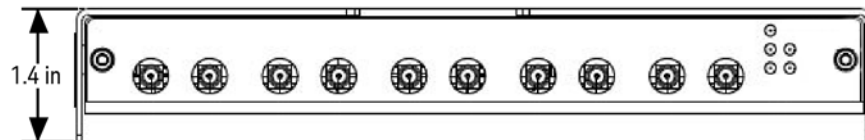
J12 (Looking into the Connector)			
Pin No.	Name	Name	Pin No.
A1	GND	GND	B12
A2	NC	NC	B11
A3	NC	NC	B10
A4	VBUS	VBUS	B9
A5	CC1	SBU2	B8
A6	NC	NC	B7
A7	NC	NC	B6
A8	SBU1	CC2	B5
A9	VBUS	VBUS	B4
A10	NC	NC	B3
A11	NC	NC	B2
A12	GND	GND	B1

J13 (Looking into the Connector)			
Pin No.	Name	Name	Pin No.
B1	GND	GND	A12
B2	TX2+	RX2+	A11
B3	TX2-	RX2-	A10
B4	VBUS	VBUS	A9
B5	CC2	SBU1	A8
B6		D-	A7
B7		D+	A6
B8	SBU2	CC1	A5
B9	VBUS	VBUS	A4
B10	RX1-	TX1-	A3
B11	RX1+	TX1+	A2
B12	GND	GND	A1

N7016A Low Speed Fixture Dimensions



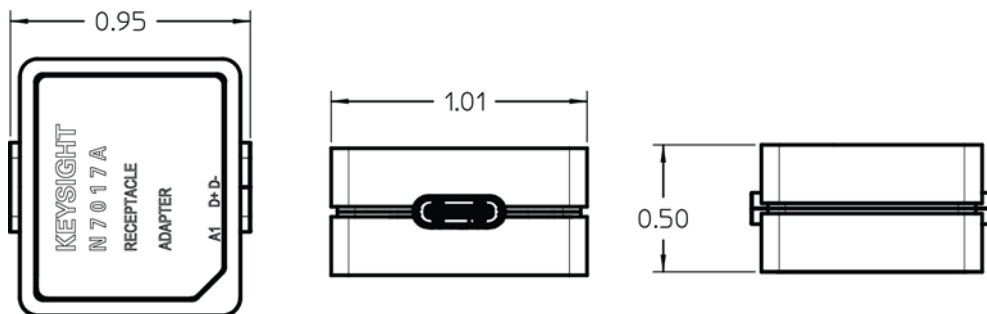
TOP VIEW



FRONT VIEW

N7017A Receptacle Adapter Dimensions

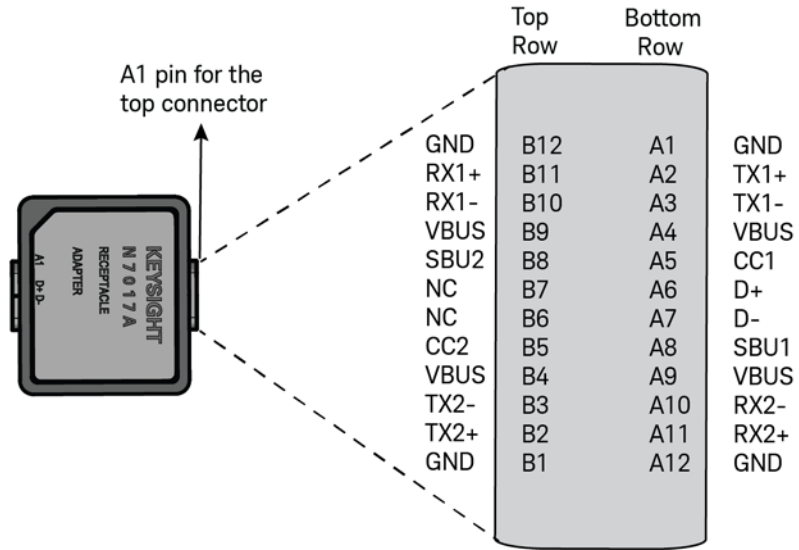
All dimensions are in Inches.



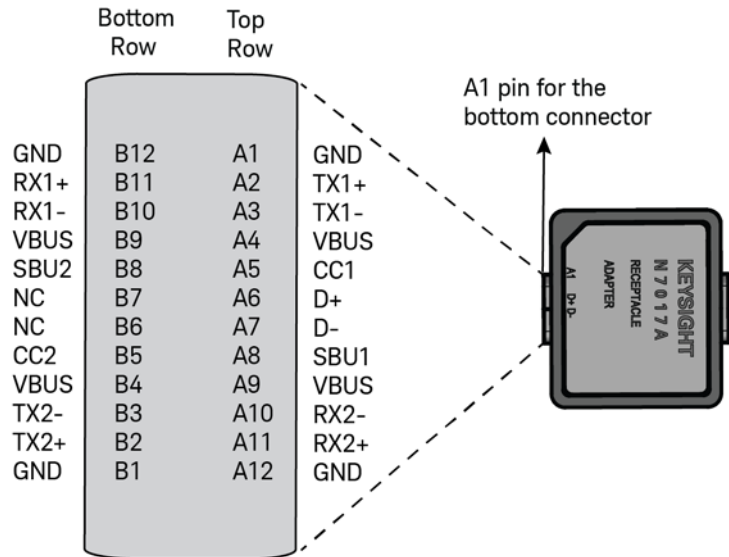
N7017A Receptacle Adapter Pinout

The following figures illustrate the pinouts for the receptacle connectors on the top and bottom of the N7017A receptacle adapter.

Pinout for the Top Connector of N7017A
(Looking into the connector with the Keysight label on top)



Pinout for the Bottom Connector of N7017A
(Looking into the bottom connector with the Keysight label on top)

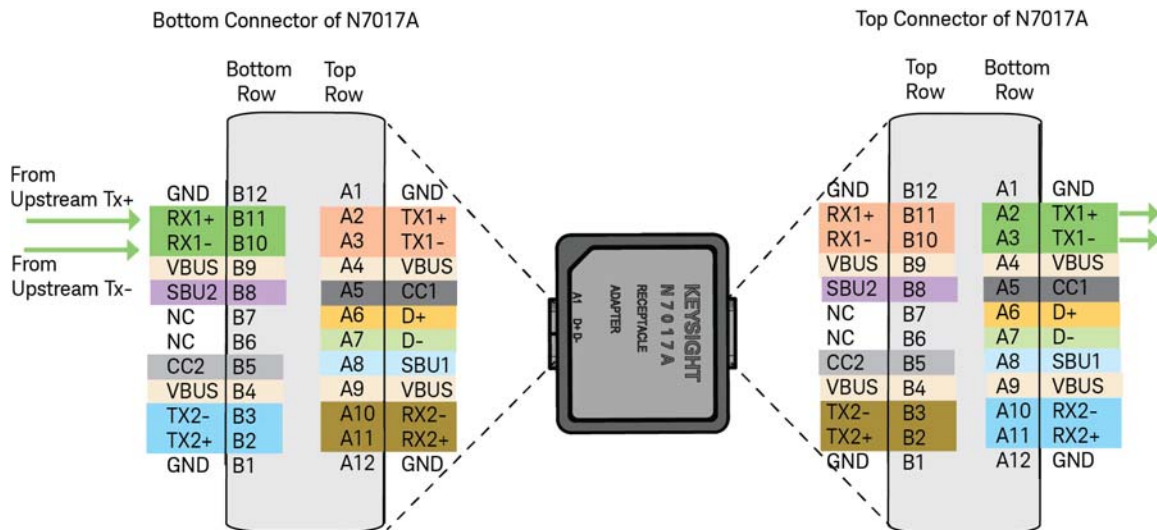


Signal Routing when using the N7017A Receptacle Adapter

The following illustration shows how a signal is routed from a DUT to the N7015A test fixture when using the N7017A receptacle adapter to connect the DUT and N7015A test fixture.

Color codes are used in the illustration below to indicate the signal path.

For instance, the N7017A adapter receives the Tx+ and Tx- signals from the host as Rx1+ and Rx1- on its bottom connector's B11 and B10 pins. These Rx1+ and Rx1- signals are routed as Tx1+ and Tx1- signals to the N7015A test fixture. The green color has been used to indicate these signals' path.



Characteristics

Item	Weight
N7015A Type-C High Speed Plug Test Fixture	110 grams
N7016A Low Speed Fixture	320 grams
N7017A USB Type-C Receptacle Adapter	5 grams

Environmental Characteristics

Attributes	Characteristics
Temperature	Operating: 0 °C to +55 °C
	Non-operating: -40 °C to +70 °C
Humidity	Operating: Up to 95% RH at or below +40 °C; up to 80% RH up to +65 °C
	Non-operating: Up to 90% RH up to 65 °C
Altitude	Operating: Up to 4600 m (15000 ft)
	Non-operating: 4600 m
Safety	IEC 61010-1:2010 / EN 61010-1:2010 (3rd Edition)

Replacing the N7016A Low Speed Fixture Fuse

When using an external power supply for supplying power to the N7016A low speed fixture, the 6.3A slow blow fuse protects the device under test from a VBUS to GND short at the external power supply connector.

In case this fuse blows, you can replace this fuse with a fuse (P/N: 2110-0623) provided in the N7015A/16A Type-C Test Kit.

To replace this fuse, perform the following procedure.

- 1 Remove the power source and connecting cables from the N7016A low speed fixture.

WARNING

Do not remove power from the N7016A low speed fixture before disconnecting the connected devices from Port 1 and Port 2 of this fixture.

- 2 Remove the three screws on the back side and the two screws on the front side of the N7016A low speed fixture cover using a Torx size 10 driver.

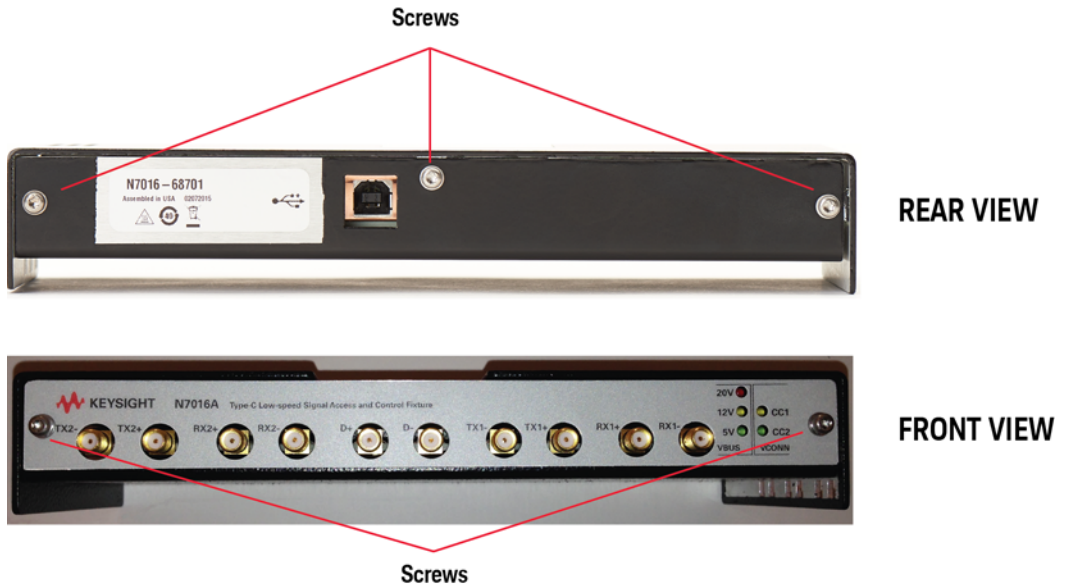


Figure 16 Cover Screws

- 3 Pull the cover off the N7016A low speed fixture.

- 4 Pull the fuse out carefully and replace this fuse with one of the fuses provided in the N7016A/16A Type-C Test Kit.

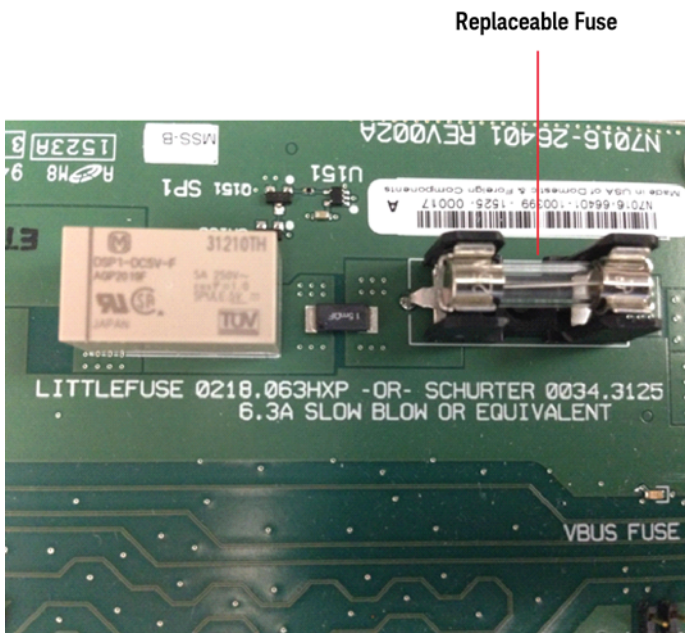


Figure 17 Fuse Location

- 5 After replacing the fuse, carefully fit the cover back on the N7016A low speed fixture and tighten the three screws on the back side and the two screws on the front side of the N7016A fixture cover (See [Figure 16](#) on page 57).

Downloading the S-parameter File

The N7015A high speed test fixture has four high speed differential paths from its 2.92 mm connectors to its type C plug. To correct for the signal loss of the N7015A test fixture, the N7017A receptacle adapter, and the N2823A coaxial phase-matched cable pair in the de-embedding software such as InfiniiSim, download the S-parameter files from the below-mentioned product pages. On these product pages, click the **Technical Support** link and then click the **Drivers, Firmware, & Software** tab.

Product	S-parameter file location
N7015A	www.keysight.com/find/N7015A
N7017A	www.keysight.com/find/N7017A
N2823A	www.keysight.com/find/N2823A

Downloading the S-parameter File

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