

N7019A USB Type-C® Active Link Fixture



The Keysight Technologies, Inc. N7019A Type-C Active Link fixture provides a fast and easy access to test, debug and decode your Type-C active link. Used in conjunction with the Keysight Protocol and Decode SW, you can now access, debug, and decode Vbus, USB-PD, USB 2.0, USB 3.2, and USB4 SB, USB4 10G, and USB4 20G, on an active link.

Features

- Provides access to all Type-C signals during an active link
- Signals include Vbus, USB 2.0, USB-PD, SBU1/2, and TX/RX up to maximum USB4 rate of 20 Gbps
- Works in conjunction with Keysight Protocol Trigger Decode solutions for USB-PD, USB 2.0, USB 3.2, and USB4

Type-C Active Link Signal Access

For a USB4 active link to function correctly, many different signals need to be transmitted and received on a live link – Vbus, USB-PD, SBUTX/RX, TX/RX.

With the N7019A, you can access and view all Type-C signals and determine where in the link start-up an error occurred. Coupled with the Keysight suite of Protocol Trigger and Decode solutions, you can time-correlate protocol errors with signal integrity issues in the time domain.

Depending on the Type-C signal being accessed, there are different ways to connect to the N7019A (Figure 1).

- **Vbus:** N7023A Power Rail probe browser.
- **USB 2.0:** N2871A probe or E2678B probe heads.
- **USB4 10G/20G:** N2823A phase-matched cables.
- **SBU:** N2871A probe or E2678B probe heads.

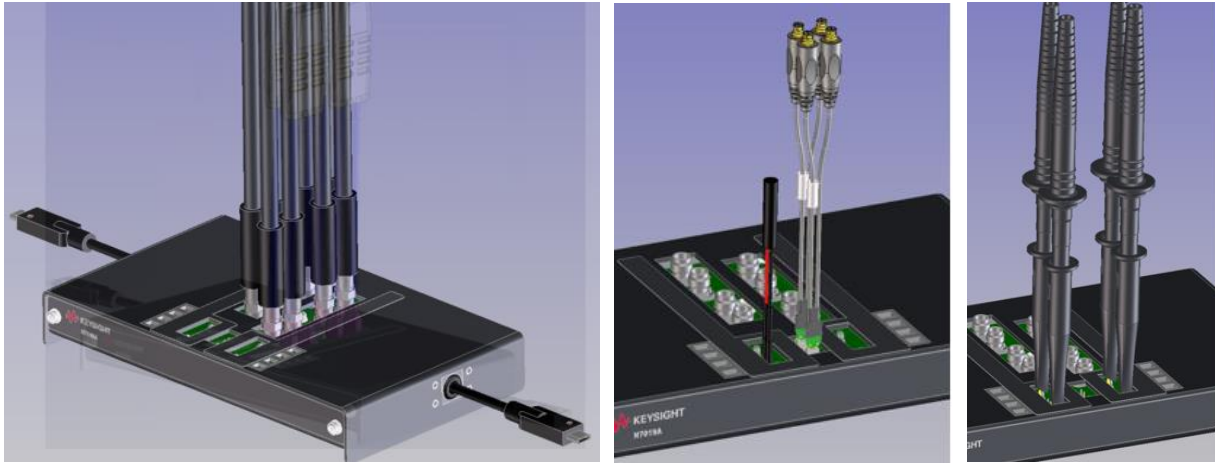


Figure 1: Connecting to the N7019A

Type-C Active Link Decode and Debug

During a USB4 link-up, optimization of both the TX and RX equalization are critical to achieving a low BER link.

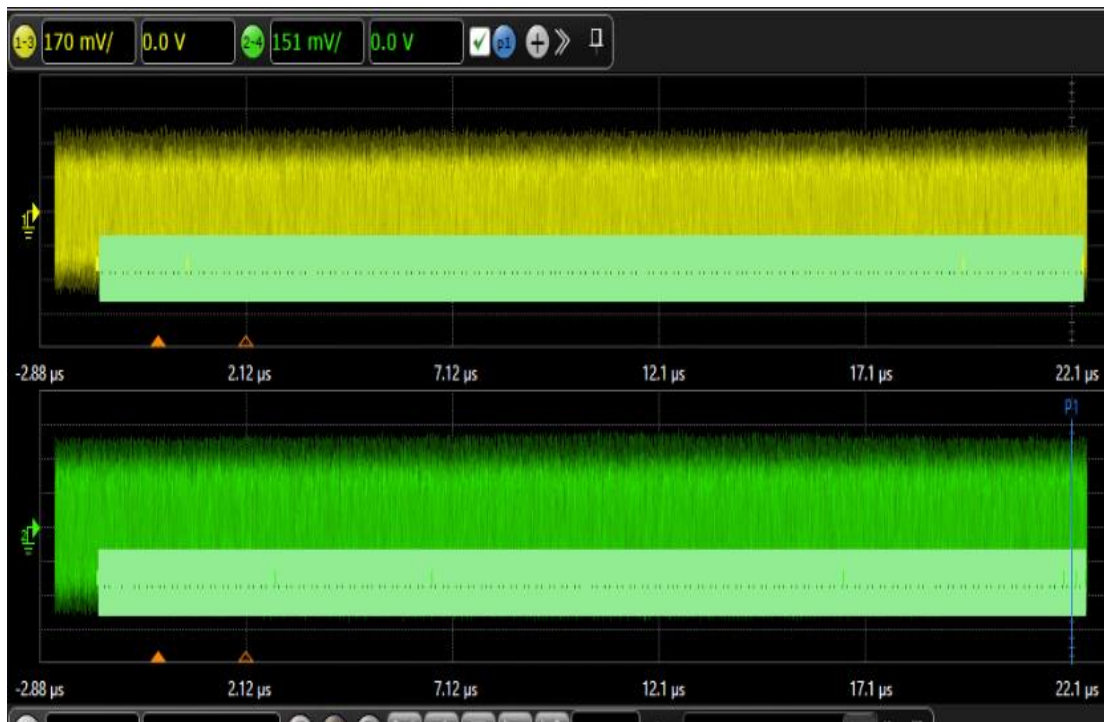
Figure 2 shows the low-speed negotiation occurring on the SBU lines.

In parallel, Figure 3 shows the high-speed training occurring on the TX 20 Gbps lines.

In addition to the decode view, you can also view and debug the time-correlated analog signal waveform that is the source of both the low-speed and 20 Gbps decode.

Index	Time	Channel 1: USB4 Low-Speed Packet	Channel 2: USB4 Low-Speed Packet	STX	LEN	Rx Locked (L0)	Rx Locked (L1)	Rx Active (L0)	Rx Active (L1)	TxFFE
39	-100.6144997 ms		LT_Resume (Primary Lane)							
40	-100.5843358 ms	LT_Resume (Primary Lane)								
41	-100.5668894 ms		LT_Resume (Subordinate Lane)							
42	-100.5335635 ms	LT_Resume (Subordinate Lane)								
43	-99.1310338 ms	Read TxFFE AT Cmd		05	04					
44	-98.9461488 ms		Read TxFFE AT Resp (LEN=4)	04	04	Not Done	Not Done	Inactive	Inactive	0
45	-97.4858902 ms	Read TxFFE AT Cmd		05	08					
46	-97.3357352 ms	Read TxFFE AT Resp (LEN=4)		04	04	Not Done	Not Done	Inactive	Inactive	C
47	-95.4991334 ms	Read TxFFE AT Cmd		05	04					
48	-95.2590091 ms		Read TxFFE AT Resp (LEN=4)	04	04	Not Done	Not Done	Inactive	Inactive	C
49	-93.3892525 ms	Read TxFFE AT Cmd		05	08					
50	-93.0144321 ms	Read TxFFE AT Resp (LEN=4)		04	04	Not Done	Not Done	Inactive	Inactive	C
51	-91.8432558 ms	Read TxFFE AT Cmd		05	04					
52	-91.5353447 ms		Read TxFFE AT Resp (LEN=4)	04	04	Done	Done	Active	Active	C
53	-88.8735913 ms	Read TxFFE AT Cmd		05	08					
54	-88.7168348 ms	Read TxFFE AT Resp (LEN=4)		04	04	Not Done	Not Done	Active	Active	C
55	-87.8778290 ms	Read TxFFE AT Cmd		05	04					
56	-87.4323224 ms		Read TxFFE AT Resp (LEN=4)	04	04	Done	Done	Active	Active	C
57	-85.1665372 ms	Read TxFFE AT Cmd		05	08					
58	-84.7513305 ms	Read TxFFE AT Resp (LEN=4)		04	04	Not Done	Not Done	Active	Active	C
59	-83.9122362 ms	Read TxFFE AT Cmd		05	04					
60	-83.7086367 ms		Read TxFFE AT Resp (LEN=4)	04	04	Done	Done	Active	Active	C
61	-80.6507515 ms	Read TxFFE AT Cmd		05	08					
62	-80.4572309 ms	Read TxFFE AT Resp (LEN=4)		04	04	Not Done	Not Done	Active	Active	C

Figure 2: USB4 Low Speed SBU decode



Protocol 1 Listing : USB 4.0 Gen 2-3

Packets

Index	Time	FEC	Channel 1 - 3: USB4 Packet	Channel 2 - 4: USB4 Packet	HEC	Length	HopID	SuppID	PDF	Sec
445	21.35259949 μs			SLOS1 (Gen2,3)						
446	21.38353262 μs		SLOS1 (Gen2,3)							
447	21.45512529 μs			SLOS1 (Gen2,3)						
448	21.48605864 μs		SLOS1 (Gen2,3)							
449	21.55765071 μs			SLOS1 (Gen2,3)						
450	21.58858205 μs		SLOS1 (Gen2,3)							
451	21.66016715 μs			SLOS1 (Gen2,3)						
452	21.69109542 μs		SLOS1 (Gen2,3)							
453	21.76267413 μs			SLOS1 (Gen2,3)						
454	21.79360084 μs		SLOS1 (Gen2,3)							
455	21.86517784 μs			SLOS1 (Gen2,3)						
456	21.89610486 μs		SLOS1 (Gen2,3)							
457	21.96768444 μs			SLOS1 (Gen2,3)						
458	21.99861163 μs		SLOS1 (Gen2,3)							
459	22.07018461 μs			SLOS1 (Gen2,3)						
460	22.10110788 μs		SLOS1 (Gen2,3)							
461	22.17267862 μs			SLOS1 (Gen2,3)						
462	22.20360309 μs		SLOS1 (Gen2,3)							
463	22.27517561 μs			SLOS1 (Gen2,3)						
464	22.30609856 μs		SLOS1 (Gen2,3)							

Figure 3: USB4 High Speed TX decode with time-correlated analog signal

Recommended Oscilloscope

The N7019A Active Link Fixture is compatible with the Infiniium series oscilloscope.

Data rate	Minimum bandwidth	Minimum channels	Description
20 Gb/s	25 GHz	4	Z- series, UXR oscilloscopes

Ordering Information

Model number	Description	Note
N7019A	Type-C Active Link Fixture	Required

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

