

Voyager M310e™ Protocol Analyzer/Exerciser Quick Start

Before Starting

Use this document for quick installation and setup. If you experience problems or need more information, see the **USB Protocol Suite User Manual** at the Teledyne LeCroy web site <https://teledynelecroy.com/sw/usb/>

1 Introduction

The Teledyne LeCroy Voyager M310e™ Protocol Analyzer/Exerciser is a multifunction verification system for USB development and testing. It supports USB 3.2 Gen 1 (5 Gbps) and Gen 2 (10 Gbps), as well as USB 2.0, Power Delivery (PD) 2.0 and 3.1 (with EPR) and USB Type-C™ event data over the "C" connector cables. Power Delivery capture is available for SOP, SOP' and SOP" traffic. PD packets can be captured and displayed in an Eye Diagram for use in USB-IF PD Compliance, which is fully supported on M310e. The M310e is built to support the latest PD exerciser capability, with the ability to sink or source up to 240 Watts. The M310e can sink or source voltages from 5 to 48 VDC (with an attached programmable power supply or electronic load) and currents from 0 to 5 Amps. It can also verify and display the configuration channel (CC) data coming from connected ports and cables. The Voyager M310e is designed to record USB traffic and graphically present the logical transactions and events. It can also be configured to generate USB Gen 1 (5 Gbps) and Gen 2 (10 Gbps), as well as USB 2.0 traffic. The Voyager M310e is connected to

a laptop or desktop host machine via its SuperSpeed USB or Gigabit Ethernet port. Please see the Readme file on the installation site <https://teledynelecroy.com/sw/usb/> for the latest information on the host machine requirements and supported operating systems. The system can monitor traffic between USB 2.0 links using standard high-speed compliant cables.

If configured for USB 3.2 testing, the system supports monitoring between Enhanced SuperSpeed links using USB 3.2 cables.

Note: You must install the software before connecting the Analyzer to the host machine for the first time.



The Voyager M310e models available are

	Voyager M310e USB 2.0 / Type-C Compliance Bundle	Voyager M310e USB 2.0 / PD Compliance Bundle	Voyager M310e USB 3.2 / PD (5 Gbps) Analyzer	Voyager M310e USB 3.2 / PD (5 Gbps) Analyzer/Exerciser	Voyager M310e USB 3.2 / PD (10 Gbps) Analyzer	Voyager M310e USB 3.2 / PD (10 Gbps) Analyzer/Exerciser
Model Number	USB-TZC2-V09-X	USB-TZA2-V09-X	USB-T0A3-V09-X	USB-TZA3-V09-X	USB-T0P3-V09-X	USB-TZP3-V09-X
USB 2.0 / USB 1.1 Recording	STD	STD	STD	STD	STD	STD
USB 3.0 (5 Gbps) SuperSpeed Recording	UP	UP	STD	STD	STD	STD
USB 3.2 (10 Gbps) SuperSpeed Recording	UP	UP	UP	UP	STD	STD
Standard Recording Memory	8GB	8GB	8GB	8GB	16GB	16GB
USB 3.0 & Gbe Connection to host	STD	STD	STD	STD	STD	STD
Hardware Triggering	STD	STD	STD	STD	STD	STD
USB 2.0 Host/Device Exerciser	STD	STD	UP	STD	UP	STD
USB 3.2 Host/Device Exerciser	UP	UP	UP	STD	UP	STD
Power Delivery Analyzer	STD	STD	STD	STD	STD	STD
Power Delivery Exerciser	STD	STD	UP	STD	UP	STD
Power Delivery (2.0 & 3.0) Compliance Option	\$	STD	\$	\$	\$	\$
Type-C Functional Verification Option	STD	\$	\$	\$	\$	\$
Link Layer & Hub Compliance Option	\$	\$	\$	\$	\$	\$
Power Tracker Option	STD	STD	\$	\$	\$	\$

STD: Standard Equipment

UP: Add by upgrading

\$: additional cost option

2 Components

The Voyager M310e basic components are:

- Voyager M310e Protocol Analyzer/Exerciser System
- 160 Watt AC Power Adapter and Cord
- USB cables
 - 3.1: C-C unmarked (x2), C-C eMarked, C-C Vconn-through, C-B, C-uB, C-A, C-A Receptacle, C to A (.3m), C to A (1m)
 - 2.0: C-B, C-uB
- Quick Start Guide

- Please see the *USB Protocol Suite User Manual* at the Teledyne LeCroy web site <https://teledynelecroy.com/sw/usb/> for component specifications.



3 Description



The Analyzer has the following indicators and connectors in the front:

Power LED (Green if plugged in and powered on)

Status LED (Blue if system successfully initializes)
(Red if hardware failure)
(Green while initializing)

Analyzer Connector 1 / Left

Connect DUT 1 to this connector

Analyzer Connector 2 / Right

Connect DUT 2 to this connector.

(Use at most 1 Electronically Marked cable between the 2 DUT's)

Exerciser

Use this connector for Exerciser, Trainer, and Compliance scenarios.

Connector LEDs

(Red: You need to flip the plug)

(Green: Plug is oriented correctly)

LEDs

Gen - Generator Status (Green if enabled)

Rec - Recording (Green if recording enabled)

Trig - Triggered (Yellow if triggered)

2.0 - USB 2.0 (Yellow for Low and Full Speed)
(Green for Hi Speed)

5G Gen 1 SuperSpeed (Green if link is up)
(Yellow if only LFPS traffic)

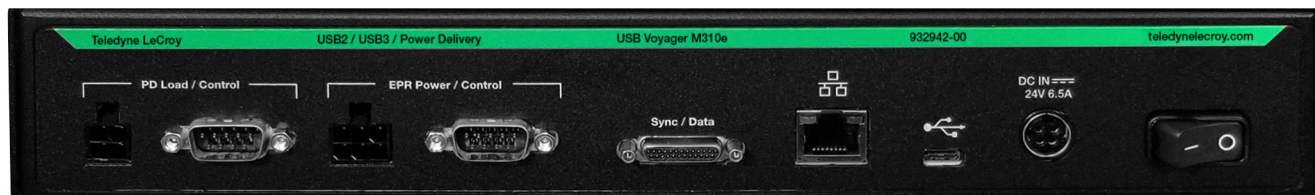
10G Gen 2 SuperSpeedPlus (Green if link is up)
(Yellow if LFPS traffic)

Trigger

In - SMA external trigger input.

Out - SMA external trigger output.

Warning: Do not open the Voyager M310e enclosure. No operator serviceable parts are inside. Refer servicing to Teledyne LeCroy customer care.



The Analyzer has the following connectors in the rear:

PD Load / Control - Connectors for power and RS-232 communication with a compatible programmable electronic load

EPR Power / Control - Connectors for power and RS-232 communication with a compatible programmable power supply

Sync / Data - Used for Daisy Chaining and Cross Sync with Cable (P/N AC061XXA-X), as well as 8-bit Data Capture and external Trig In/Out (P/N AC050XXA-X) (Cables sold separately)

ETHERNET - Gigabit Ethernet for connection to host machine

USB - USB 3.2 SuperSpeed Standard C Connector to host machine

DC IN - 24 V, 6.67 A power supply connector.

Power Switch (0/1)

4 Installing the Software

Note: You must install the software before connecting the Analyzer to the host machine for the first time. This installation procedure is for Windows 10

To install the software, follow the steps below:

[Refer to the System Requirements in the readme file for information about the exact Windows operating systems supported.](#)

1. Download the latest software from the website <https://teledynelcroy.com/sw/usb/>.
2. Follow the on-screen instructions to complete the installation.

5 Setting Up the Analyzer

To set up the Analyzer:

1. Connect the provided Power Adapter to the rear of the Analyzer and to a 100-volt to 240-volt, 50-Hz to 60-Hz, 200-W power outlet.

2. Connect the USB port on the rear of the Voyager M310e to a USB port on the host machine using a USB 3 Type-C to Type-A or Type-C to Type-C cable.
3. Turn on the power switch.
At power on, the Voyager M310e initializes itself and performs self-diagnostics for approximately 50 seconds before it is ready.

6 Starting the Application

To start the application, launch the Teledyne LeCroy USB Protocol Suite program from the Start Menu:

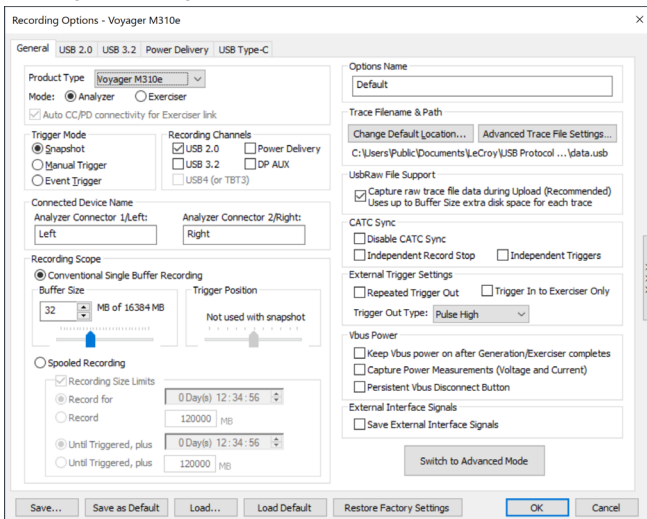
Start > All Programs > LeCroy > USB Protocol Suite > USB Protocol Suite to open the main window.

You can use the software with or without the system connected to the host machine. Without the Analyzer, the program functions as a trace viewer to view, analyze, and print trace files. The first time you open the USB Protocol Suite application, confirm proper installation by selecting **About** from the Help menu to view the Software Version, Firmware Version, BusEngine™ Version, and Unit Serial Number.

7 First USB Recording

After installing and launching the software, you can test the system by performing the following steps:

1. Connect a USB Device Under Test with its cable to Connector 1 (on the left), and a USB Host Under Test with its cable to Connector 2 (on the right).
2. Select **Recording Options** under **Setup** on the Menu Bar.
3. Select the **General** tab to display the following dialog box showing factory default settings such as Snapshot and 32 MB buffer size. For the first recording, you can leave these settings unchanged.



4. Click **OK** to activate the recording options you selected.
5. Turn on the USB devices that are to be tested and cause them to generate USB traffic.

6. Click **Record** on the Tool Bar.

The system starts to record the USB traffic immediately. After 16 MB of traffic are recorded, the Analyzer uploads the data and displays the packets in the trace window.

7. To terminate recording before the snapshot automatically

completes, click  on the Tool Bar.

When the recording session is finished, the traffic is uploaded from the Analyzer to the hard drive on your host machine as a file named **data.usb** or the name you assigned as the default filename. While the file is being uploaded, you should see a brown progress bar at the bottom of the screen. When the bar disappears, it indicates that the data has been uploaded to disk.

8. To save a current recording for future reference, select **Save As** under **File** on the Menu Bar
OR



Click  on the Tool Bar to display the standard **Save As** screen.

Give the recording a unique name and save it to the appropriate directory.

Trace View Features

After a moment, the recording terminates and the results display.

- The packet view display makes extensive use of color and graphics to fully document the captured traffic.
- Packets are shown on separate rows, with their individual fields both labeled and color coded.
- Packets are numbered (sequentially, as recorded), time-stamped (with a resolution of 1 ns on 3.1 10Gbps signaling), and highlighted to show the transmitted speed (low-speed, full-speed, high-speed, or superspeed).
- Display formats can be named and saved for later use.
- Data fields can be collapsed to occupy minimal space in the display.

The display software can operate independently of the hardware and so can function as a stand-alone Trace Viewer that may be freely distributed

Each row numerates, labels, and color-codes a USB packet

Before Trigger

Packet	Dir	F	S	Sync	SOF	Frame #	CRC5	EOP	Idle	Time Stamp	
2734	-->	S		00000001	0xA5	721	0xD0	250 ns	996.883 µs	00010.2143 3631	
2735	-->	S		00000001	0xA5	722	0x0F	233 ns	996.900 µs	00010.2151 3619	
2736	-->	S		00000001	0xA5	723	0x10	233 ns	350 ns	00010.2159 3607	
2737	-->	S		00000001	0xB4	0	0	0x08	233 ns	183 ns	00010.2159 3802
2738	-->	S		00000001	DATA0	8	bytes	0xBB29	233 ns	493 ns	00010.2159 3987
2739	-->	S		00000001	ACK	EOP			983.200 µs	00010.2159 4510	
2743	-->	S		00000001	0xA5	724	0x0E	250 ns	333 ns	00010.2167 3596	
2744	-->	S		00000001	IN	ADDR	END0	CRC5	EOP	Idle	Time Stamp

After Trigger

Time-stamp appended to each packet

Filtered Traffic is displayed as a gray line

Specifies speed packet transmitted

Indicates a marked comment is set

8 Recording Traffic Generation with Analyzer

Recording Options

After installation, the system defaults to Snapshot recording. To change the default settings, refer to the "Recording Options" chapter of the *USB Protocol Suite User Manual*.

Traffic Generation

Systems configured with the Voyager exerciser option can generate USB 3.2/PD traffic and record the real response from the DUT. Traffic Generation can also transmit known bad packets, providing an opportunity for engineers to observe how a device handles specific adverse conditions. To use Traffic Generation, refer to the "Traffic Generation" chapter of the USB Protocol Suite User Manual.

To start traffic generation, select exerciser mode in recording option mode option: Mode: ☐ Analyzer ☒ **Exerciser**

For creating custom PD traffic, you need to uncheck "Auto CC/PD connectivity for exerciser link" in the recording options.

☐ Auto CC/PD connectivity for Exerciser link

Start Recording

Click the **Start Recording** button  **Record** on the Toolbar or select the **Record > Start** command.

Start Generation

For USB 3.2 exerciser, Select **Host Emulation** or **Device Emulation** in the Recording/Generating section of the Misc. USB 3.2 tab of the Recording Options dialog to enable ReadyLink™ emulation mode which initiates the USB 3.2 exerciser to continually attempt to bring up a USB

3.2 link. Click **Record**  on the toolbar and connect the appropriate DUT. After 16 MB of traffic has been recorded, the trace automatically uploads from the analyzer to the host machine, and the software displays the captured packets.

Optionally, you can select the **USB/PD Exerciser** icon  from the toolbar and open a generation script file for USB 3.2 generation or PD generation scenarios.

Click the **Run** button  **Run** on the Toolbar or select the **Generation > Run Scenario** command.

Stop Recording

You may also choose to stop the recording by pressing the **Stop** button  on the Tool bar or selecting the **Record > Stop** command. The trace automatically uploads from the analyzer to the host machine.

Interrupting the Upload Process: During upload, you can interrupt the upload process by pressing the **Stop** button to display the Abort or Continue Uploading dialog box with the following options: Stop upload but keep the data that has been uploaded already, Stop upload and discard (Flush) any data that has been uploaded, Continue upload, or Re-upload part (Partial) of the recorded buffer.

Save the Trace

After upload finishes, the software saves the recorded traffic data in the **LeCroy\USB Protocol Suite** directory in a file named **data.usb**. You can change the default directory and file name by clicking the **Change Default Location** button in the Trace Filename & Path section of the General tab.

Power Delivery Trace

A typical power delivery trace is shown below:

PD	Packet	SRC	SOP	PD Msg	Msg Type	Rsvd 1	Spec Rev	PR	Msg ID	Obj Cnt	Rsvd 2	Fixed	Max Cur	Voltage	Dual Role
	212				Source Cap	0x0	Rev. 1	SRC	0	4	0x0		1.50 A	5.00 V	0
				Fixed	Max Cur	Voltage	Dual Role	Fixed	Max Cur	Voltage	Dual Role	Fixed	Max Cur	Voltage	Dual Role
					3.00 A	5.00 V	0		3.00 A	12.00 V	0		3.00 A	18.00 V	0
															CRC32
															0xCB6672D8

Teledyne LeCroy Customer Support

Online Download

Periodically check the Teledyne LeCroy Protocol Solutions Group web site for software updates and other support related to this product. Software updates are available to users with a current Maintenance Agreement.

Web: teledynelecroy.com/tm/software/PSG

E-mail: psgsupport@teledyne.com

Support: teledynelecroy.com/support/contact

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