

Voyager M480x™ Protocol Analyzer/Exerciser Quick Start

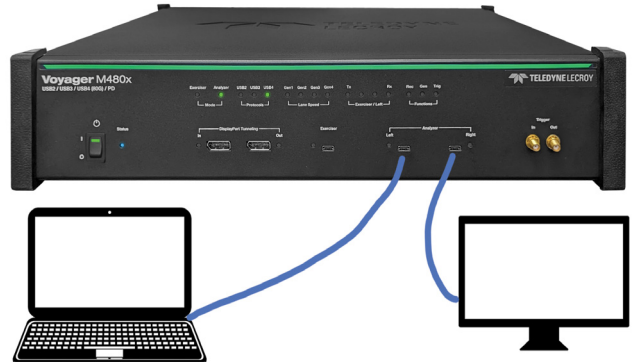
Before Starting

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 website <https://teledynelecroy.com/sw/usb/>

1 Introduction

Teledyne LeCroy's Voyager M480x is the first protocol analyzer for testing next-generation USB4 80Gb/s systems. The new platform leverages Teledyne LeCroy's cutting-edge probe technology to support Gen-4 (PAM-3) signaling as well as USB4 Gen-3, Gen-2, Thunderbolt™ in addition to legacy USB 3.2 speeds. Based on the Voyager platform, the M480x captures symmetric link operation and tunneled DisplayPort 2.1 with complete decoding of USB4 protocol.

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



2 Components

The Voyager M480x includes these basic components:

- Voyager M480x Protocol Analyzer/Exerciser System
- AC Power Cord

- Various USB cables (See the Cable Tech Brief for a full list)
- Quick Start Guide

Consult the *USB Protocol Suite User Manual* at the Teledyne LeCroy website <https://teledynelecroy.com/sw/usb/> for component specifications.

3 Description



The Analyzer has these indicators and connectors in the front:

Power Switch (0/1)

Power status of the analyzer

Status

System status of the M480x

DisplayPort Tunneling

DisplayPort IN/OUT adapters (future enhancement)

Exerciser

For Exerciser and Compliance scenarios

Analyzer – Left

Connect DUT 1 to this connector

Analyzer – Right

Connect DUT 2 to this connector
(Use at most one eMarked cable between the two DUTs)

Connector LEDs

Indicates whether the cable is inserted in the correct

orientation

Mode

Whether Exerciser or Analyzer mode is enabled

Protocols

The statuses of traffic using various USB protocols

Lane Speed

The USB3 or USB4 data rate when there is an active link

Exerciser / Left

The lane configuration of the Exerciser or DUT connected to Analyzer Left port

Functions

The status of Record, Generation, and Trigger actions

Trigger In / Out

SMA Connectors for attaching external measurement equipment

See the *USB Protocol Suite User Manual* at the Teledyne LeCroy website <https://teledynelecroy.com/sw/usb/> for component specifications.

3 Description (Continued)

Warning: Do not open the Voyager M480x enclosure. No operator serviceable parts are inside. Contact Teledyne LeCroy technical support with any concerns.



The Analyzer has the following connectors in the rear:

Sync / Data

Used for daisy chaining and CrossSync as well as 8-bit data capture and external Trig In/Out
(Cable kit sold separately - P/N AC061XXA-X)

Ethernet

Gigabit Ethernet for connection to host machine

USB

USB 3.2 SuperSpeed Type-C connector to host machine

AC IN

100-240V AC Power Cord

4 Installing the Software

You must install the software before connecting the Analyzer to the host machine for the first time. This installation procedure is for Windows 11.

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

To install the software, follow the steps below:

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

Note: If you get an error message during installation of the drivers, consult your system administrator.

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 M480x to a

USB port on the host machine using a USB3 Type-C to Type-A or Type-C to Type-C cable.

3. Turn on the power switch.

At power on, the Voyager M480x initializes itself and performs self-diagnostics for approximately 30 seconds before it is ready. This is indicated by the Blue color of the Status LED.

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.

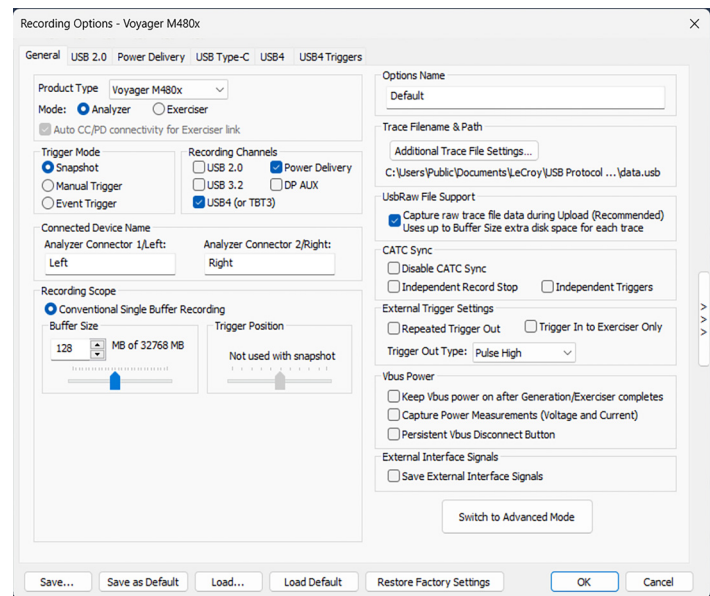
7 First USB Recording

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).
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 128 MB buffer size. For the first recording, you can leave these settings unchanged.
4. Click **OK** to activate the recording options you selected.
5. Click  **Record** on the Tool Bar.
6. The system starts to record the USB traffic immediately. After 128 MB of traffic are recorded, the Analyzer uploads the data and displays the packets in the trace window.
7. Connect a USB Host Under Test with its cable to Connector 2 (on the right).
8. 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.
- Display formats can be named and saved for later use.

- Packets are numbered (sequentially, as recorded), time-stamped, and highlighted to show the transmitted speed.
- Data fields can be collapsed to occupy minimal space in the display.

The display software can operate independently of the hardware and 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

α	12 Packets	Right	D	G3	L0	FEC	TS2	LBT2	Lane Num	LBT	TSID	SCR	Duration	Time	Time Stamp
	205823-205856	"Right"						x2	Symmetric Link	Lane 0	Symmetric Link	TS2	0x0F2	6.200 ns	0.000 ns
α	12 Packets	Right	D	G3	L1	FEC	TS2	LBT2	Lane Num	LBT	TSID	SCR	Duration	Time	Time Stamp
	205824-205857	"Right"						x2	Symmetric Link	Lane 1	Symmetric Link	TS2	0x0F2	6.200 ns	2.000 ns
J	Packet	Left	H	J	G3	L1	TS2	LBT2	Lane Num	LBT	TSID	SCR	Duration	Time	Time Stamp
	205826	"Left"						x2	Symmetric Link	Lane 1	Symmetric Link	TS2	0x0F2	3.100 ns	70.000 ns
J	Packet	Left	H	J	G3	L0	FEC	DESKEW	Content	SCR	Duration	Time	Time Stamp		
	205858	"Left"						x2	0x3796383CB79638	0x0F2	3.100 ns	0.000 ns	3.187.493.212		
J	Packet	Left	H	J	G3	L1	FEC	DESKEW	Content	SCR	Duration	Time	Time Stamp		
	205859	"Left"						x2	0x3796383CB79638	0x0F2	3.100 ns	2.000 ns	3.187.493.212		
α	5 Packets	Right	D	G3	L0	FEC	TS2	LBT2	Lane Num	LBT	TSID	SCR	Duration	Time	Time Stamp
	205860-205868	"Right"						x2	Symmetric Link	Lane 0	Symmetric Link	TS2	0x0F2	6.200 ns	0.000 ns
α	4 Packets	Right	D	G3	L1	FEC	TS2	LBT2	Lane Num	LBT	TSID	SCR	Duration	Time	Time Stamp
	205861-205867	"Right"						x2	Symmetric Link	Lane 1	Symmetric Link	TS2	0x0F2	6.200 ns	106.000 ns
)Right L1, Lane Bonding ==> CL0 @ 03.187.493.320)															
α	Packet	Right	D	G3	L0	FEC	DESKEW	Content	SCR	Duration	Time	Time Stamp			
	205869	"Right"						x2	0x3796383CB79638	0x0F2	3.100 ns	0.000 ns	3.187.493.320		
α	Packet	Right	D	G3	L1	FEC	DESKEW	Content	SCR	Duration	Time	Time Stamp			
	205870	"Right"						x2	0x3796383CB79638	0x0F2	3.100 ns	63.680 us	3.187.493.320		
J	Packet	Left	H	J	G3	LB	FEC	Link Management	CreditGrant	Len	HopID	SupplD	PDF	RecordCnt	Record
	205871	"Left"						x2	8	1	0	0x1	2	Record	Record
J	Packet	Right	D	G3	LB	FEC	Link Management	CreditGrant	Len	HopID	SupplD	PDF	RecordCnt	Record	Record
	205872	"Right"													

After Trigger

Time-stamp appended to each packet

Specifies speed packet transmitted

Indicates a marked comment is sent

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 USB4/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 clear the "Auto CC/PD connectivity for exerciser link" checkbox in the recording options.

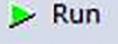
☐ Auto CC/PD connectivity for Exerciser link

Start Recording

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

Start Generation

Select the **USB/PD Exerciser** icon  from the toolbar and open a generation script file for USB4 generation or PD generation scenarios.

Click the **Run** button  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 124 6 . 885 248 000	Left "Adapter"	SRC	SOP	PD Msg	Msg Type Source Cap	DR UFP	PR SRC	Msg ID 1	Fixed	Max Cur 0.50 A	Voltage 5.00 V	Variable	Max Cur 1.50 A	Min Volt 13.85 V	Max Volt 15.50 V
PD	Packet 125 6 . 886 116 000	Right "Laptop"		SNK	PD Msg	Msg Type GoodCRC	DR DFP	PR SNK	Msg ID 1	Duration 496.617 us	Idle 61.738 ms					
PD	Packet 126 6 . 948 351 000	Right "Laptop"		SNK	PD Msg	Msg Type Request	DR DFP	PR SNK	Msg ID 7	RDO	Max Opr Cur/Pow 1.50A / 37.50W	Opr Cur/Pow 1.50A / 37.50W	Cap Mismatch 0	Obj Pos 2		
PD	Packet 127 6 . 949 083 000	Left "Adapter"	SRC	SOP	PD Msg	Msg Type GoodCRC	DR UFP	PR SRC	Msg ID 7	Duration 494.978 us	Idle 361.022 us					
PD	Packet 128 6 . 949 939 000	Left "Adapter"	SRC	SOP	PD Msg	Msg Type Accept	DR UFP	PR SRC	Msg ID 2	Duration 496.617 us	Idle 2.093 ms					

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/protocolanalyzer/usb

E-mail: psgsupport@teledyne.com

Support: teledynelecroy.com/support/contact

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