

Streamline Series VNA & PC setup procedure and its Troubleshooting tips

Keysight Technologies
30-Mar-2026

Streamline Series VNA A model:

P5000A,P5001A,P5002A,P5003A,P5004A,P5005A,P5006A,P5007A,P5008A
P5020A,P5021A,P5022A,P5023A,P5024A,P5025A,P5026A,P5027A,P5028A
P9370A,P9371A,P9372A,P9373A,P9374A,P9375A

Streamline Series VNA B model:

P5000B,P5001B,P5002B,P5003B,P5004B,P5005B,P5006B,P5007B,P5008B
P5020B,P5021B,P5022B,P5023B,P5024B,P5025B,P5026B,P5027B,P5028B
P9370B,P9371B,P9372B,P9373B,P9374B,P9375B,P9377B,P9382B,P9384B
P5027M, P5028M

Streamline Series VNA and PC setup overview



01

Select Streamline
Series VNA compatible
PC



02

Update PC
configurations



03

Connect Streamline
Series VNA with PC



04

Troubleshooting tips

1. Select PC

When using a PC that was used for another purpose, we recommend to perform system recovery before setting up PC configurations for Streamline Series VNA. System Recovery prevents conflicts between the registries/drivers which were previously configured and the ones that will be configured for the Streamline Series VNA.



1. Select PC

PC Requirements for Streamline Series VNA control

Go to Table 49 of [Streamline series VNA A model Data Sheet](#) or
Table 53 of [Streamline series VNA B model Data Sheet](#) or
Table 26 of Streamline series VNA B P5027M/P5028M^(*1) Data Sheet ^(*2) for External PC System Requirements.

Notes of PC specifications for Streamline Series VNA B model:

1. Connections via USB2.0 cable or USB3.x cable are not supported.
Connection via USB-to-Thunderbolt adapter is not supported.
2. Desktop PCs usually don't have adequate Thunderbolt 3+ support by default. When configuring a Desktop PC on the manufacturer's website, you must select an option to include a PCIe Thunderbolt 3+ card installed in the PC. It is best to use one which comes from the original manufacturer of the whole PC, since a third-party Thunderbolt 3+ PCIe card might not work.
Contact PC maker about valid Thunderbolt 3+ PCIe card, if needed.
See [Thunderbolt PC and Streamline Series VNA B model compatibility list](#) in Appendix.
3. If Thunderbolt 3+ PC cannot work with Streamline Series VNA B model, contact Keysight. For more details, see [Contact Keysight - issue sharing](#) in Appendix.

 KEYSIGHT ^(*1) External PC requirements are identical to VNA B. P502xM leverages VNA B platform.
^(*2) Contact Keysight for data sheet.

2. Update current PC configurations

It is important to use the latest version of OS, BIOS, software and drivers that your Software vendor or PC maker provides.

Most PC makers provide a support assistant tool. We recommend using that tool to install the latest version of the application software and drivers.

2-1 Windows Update

2-2 BIOS

2-3 [Thunderbolt™ control center app and Thunderbolt™ drivers](#)
[\[for Streamline Series VNA B model only\]](#)

2-4 Keysight IO Libraries Suite

2-5 Keysight VNA firmware

2-6 Keysight License Manager 5

2-7 [Windows Registry \[for Streamline Series VNA B model only\]](#)

2-8 Tips on software installation/ uninstallation sequence.

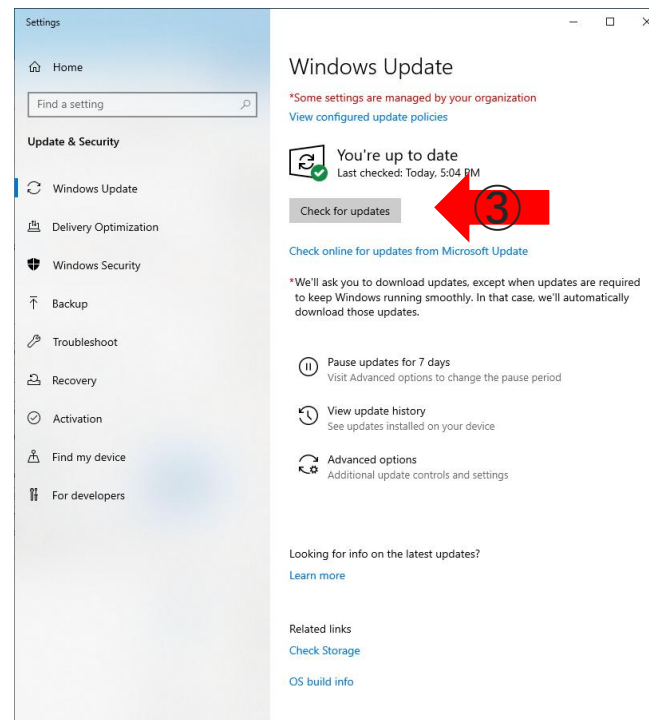
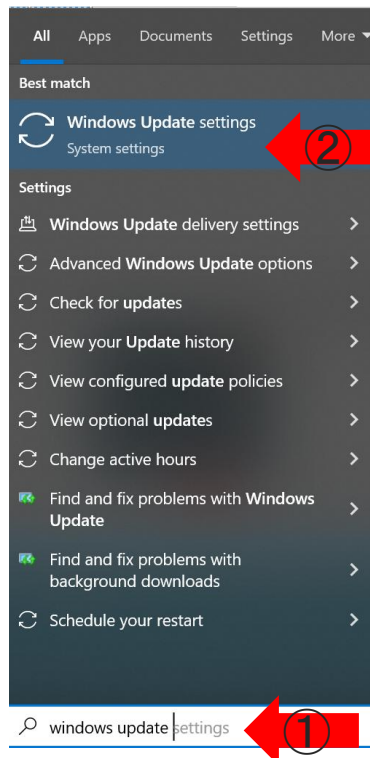


2. Update current PC configurations

2-1. Windows Update

Launch Windows Update and check for updates

- ① Enter Windows Update at Windows Search
- ② Select Windows Update settings
- ③ Select Check for updates
then download and install the updates



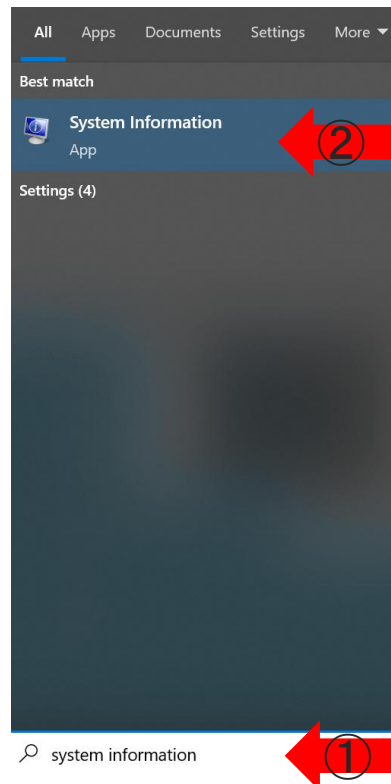
2. Update current PC configurations

2-2. BIOS

Step-1: Launch System Information

- ① Enter System Information at Windows Search
- ② Select System Information

[result] the current BIOS version/Date is shown in System Information.



System Information		
File Edit View Help		
System Summary		
+ Hardware Resources		
+ Components		
+ Software Environment		
Item	Value	
OS Name	Microsoft Windows 10 Enterprise	
Version	10.0.19044 Build 19044	
Other OS Description	Not Available	
OS Manufacturer	Microsoft Corporation	
System Name	[REDACTED]	
System Manufacturer	HP	
System Model	HP ZBook Power 15.6 inch G9 Mobile Workstation PC	
System Type	x64-based PC	
System SKU	6W9L7UC#ABJ	
Processor	12th Gen Intel(R) Core(TM) i7-12800H, 2400 Mhz, 14 Core(s), 20 Logical Processor(s)	
BIOS Version/Date	HP U97 Ver. 01.01.11, 5/24/2022	
SMBIOS Version	3.4	
Embedded Controll...	17.53	
BIOS Mode	UEFI	
BaseBoard Manufact...	HP	
BaseBoard Product	89C0	

2. Update current PC configurations

2-2. BIOS

Step-2: Visit your PC maker's Support page (See [PC makers' driver download page](#) in appendix) and check if installed PC BIOS (UEFI) is latest.

Step-3: If not, download and install the latest version.

2. Update current PC configurations

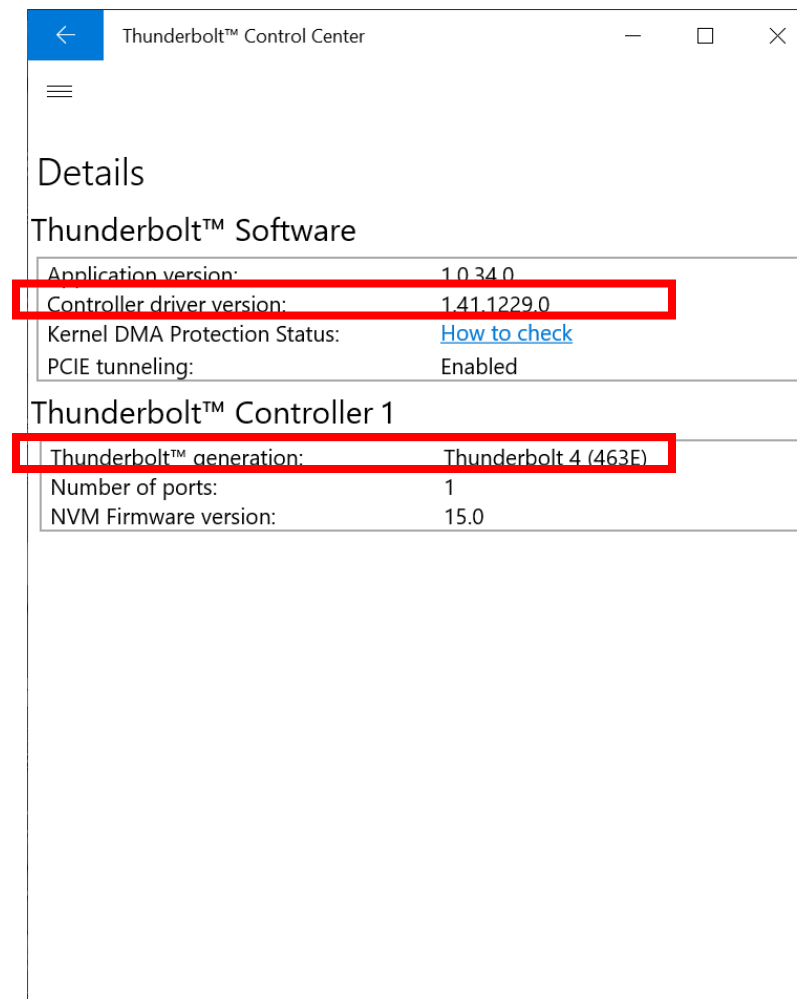
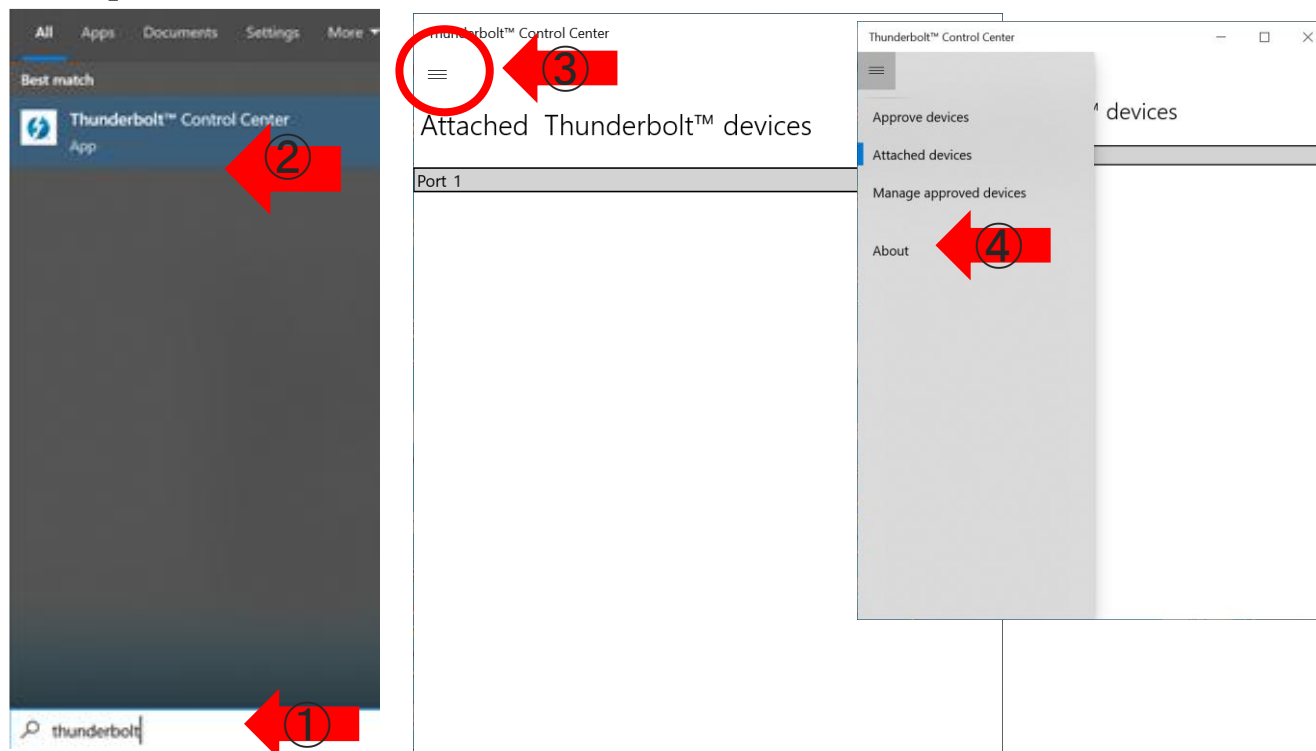
2-3. Thunderbolt generation and driver version [for Streamline Series VNA B model only]

Step-1: Launch Thunderbolt Control Center and check Thunderbolt generation and driver version



- ① Enter Thunderbolt at Windows Search
- ② Select Thunderbolt Control Center
- ③ Select hamburger menu
- ④ Select About

[result] Thunderbolt Generation and driver version are shown.



2. Update current PC configurations

2-3. Thunderbolt Software and Thunderbolt drivers [for Streamline Series VNA B model only]



Step-2: Visit your PC maker's Support page (See [PC makers' driver download page](#) in appendix) and check if current Thunderbolt Software and Thunderbolt drivers are up to date.

Step-3: If not, download and install the latest version.

If Thunderbolt Software is not installed, go to [Troubleshooting tips 2-3-1](#).

Step-4: If PCIe tunneling is Disabled in Detail screen, go to [Troubleshooting tips 2-3-2](#).

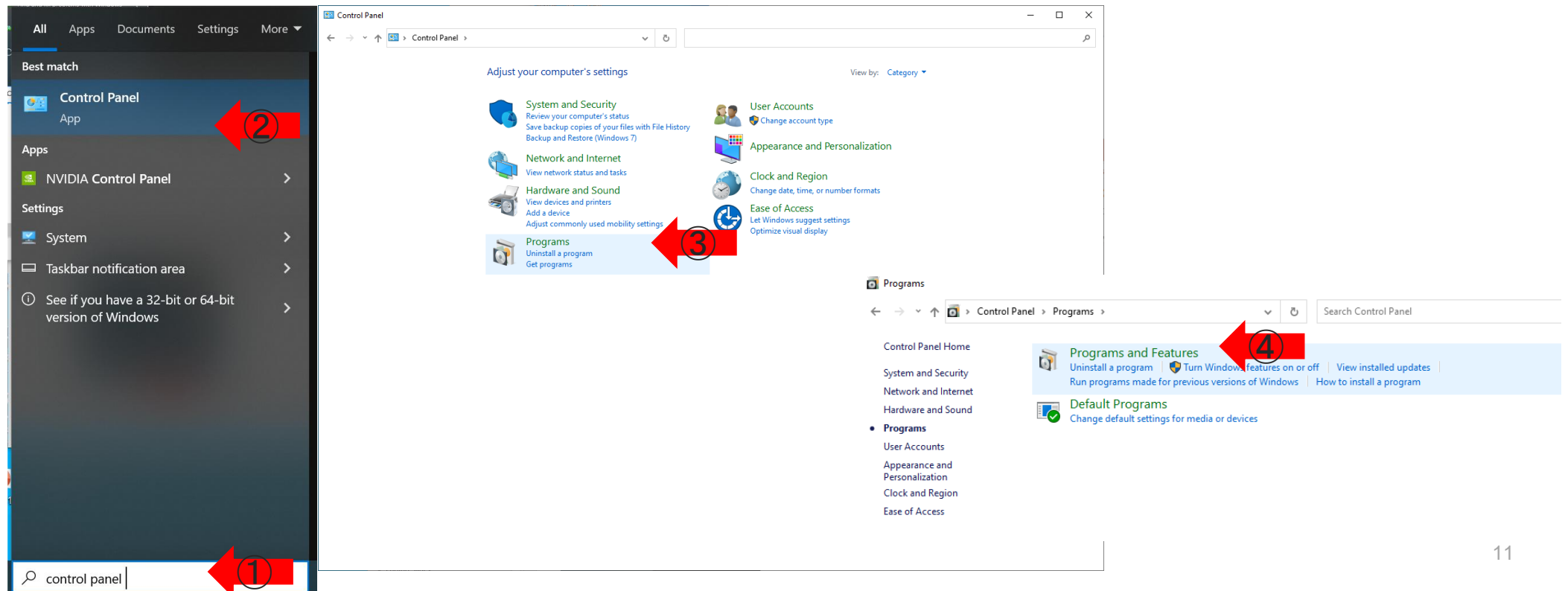
2. Update current PC configurations

2-4. Keysight IO Libraries Suite



Step-1: Launch 'Programs and Features' and check IO Library Suites version

- ① Enter Control Panel at Windows Search
- ② Select Control Panel
- ③ Select Programs
- ④ Select Programs and Features



2. Update current PC configurations

2-4. Keysight IO Libraries Suite



[result] the versions of the programs are shown in Programs and Features

Control Panel Home

Uninstall or change a program

To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.

View installed updates

Turn Windows features on or off

Install a program from the network

Name	Publisher	Installed On	Size	Version
HP Notifications	HP	7/6/2022	18.7 MB	1.1.28.1
ICS	HP Inc.	6/11/2022	182 MB	3.0.16.0
IVI Shared Components 3.0.0	IVI Foundation	8/16/2022	42.7 MB	3.0.2828.0
IVI.NET Shared Components 1.4.1 for .NET 2.0	IVI Foundation	8/16/2022	5.22 MB	1.41.49153
Jabra XPRESS	GN Netcom A/S	7/21/2022	81.2 MB	100.0.5208
Keysight BenchVue Troubleshooting Wizard	Keysight Technologies	8/10/2022	3.02 MB	2020
Keysight CA Certificates	Agilent	7/20/2022	69.0 KB	3.0
Keysight CalPod API	Keysight Technologies, Inc.	8/9/2022	37.1 MB	03.01.006.0004
Keysight Communications Fabric 2.2	Keysight Technologies	7/22/2022	281 KB	2.2.22112.11724
Keysight Device Measurement eXpert Lite	Keysight Technologies, Inc.	7/23/2022	32.8 MB	01.03.003.0003
Keysight Exchange CA Certificates	Agilent	7/21/2022	69.0 KB	1.0
Keysight Exchange CA Certificates	Agilent	7/20/2022	73.0 KB	2.0
Keysight Host Processor Platform	Keysight Technologies	8/9/2022	34.3 MB	5.4.28008.10818
Keysight Ingot OF Utilities	Keysight Technologies, Inc.	7/28/2022	66.2 MB	01.02.002.0034
Keysight IO Libraries Suite 2022 Update 2	Keysight Technologies	8/16/2022	203 MB	18.2.28229.2
Keysight License Manager	Keysight Technologies	7/22/2022	33.2 MB	5.4.1.1509
Keysight License Manager 6	Keysight Technologies	7/22/2022	53.3 MB	6.0.3
Keysight License Service	Keysight Technologies	7/23/2022	19.8 MB	5.3.2.19
Keysight Secure Instrument Communication Expert 2022	Keysight Technologies	8/10/2022	520 MB	1.1.19
Keysight VNA Series Network Analyzer	Keysight Technologies, Inc.	8/17/2022	911 MB	15.75.19.58.0
Keysight VNAUncertainty (X64)	Keysight Technologies, Inc.	7/24/2022	16.7 MB	05.00.018.0000
KtPUsbChassis IVI.NET Driver 1.1.9	Keysight Technologies	8/17/2022	11.6 MB	1.1.9.0
KtPUsbChassis IVI-C Driver 1.1.9	Keysight Technologies	8/17/2022	103 MB	1.1.9.0

2. Update current PC configurations

2-4. Keysight IO Libraries Suite



Step-2: Visit www.keysight.com/find/iosuite and check if the current version is latest or not.

Step-3: If not, uninstall IOLS and perform deep clean.

For more details, go to [Keysight Uninstall IOLS and Deep Clean](#)

Step-4: Download and install the latest version.

Do not use Keysight IO Libraries version: 2024 Update1, Build 21.0.47, release date: 2024-09-03.

- ① Select the download button
- ② Run the downloaded installer with administrator privilege
- ③ After the installation is completed successfully, re-boot the PC
- ④ If the installation is not completed successfully, go to [Troubleshooting tips 2-4](#).

Notes on .NET Framework 3.5/2.0 and known issues:

Keysight IO Libraries Suite 2021 or later does not install .NET Framework.

If .NET Framework is needed, go to [Troubleshooting tips 2-4-4](#).

Notes on Windows 11 PC:

Install IO Libraries Suite 2023 (18.3.29324.3) or newer.

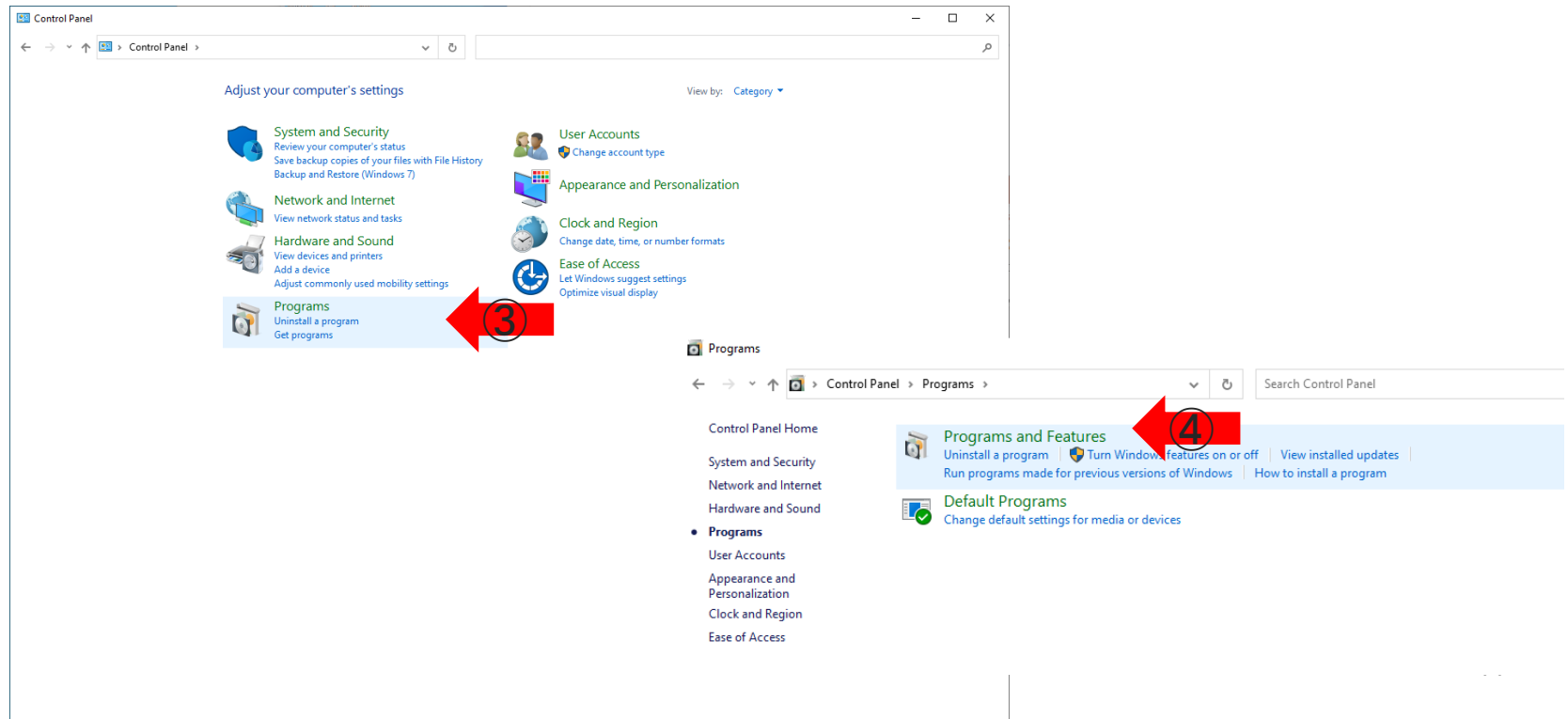
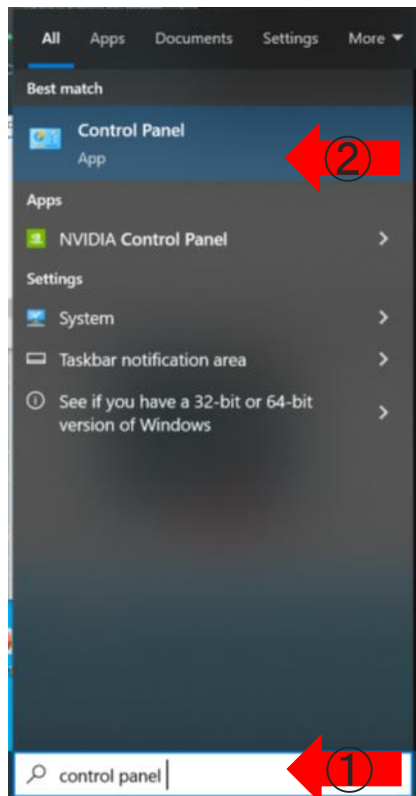
Earlier revisions will **not** be compatible with P50xxB/P93xxB/P502xM firmware on Windows 11.

2. Update current PC configurations

2-5. Keysight VNA firmware

Step-1: Launch 'Programs and Features' and check VNA firmware version

- ① Enter Control Panel at Windows Search
- ② Select Control Panel
- ③ Select Programs
- ④ Select Programs and Features



2. Update current PC configurations

2-5. Keysight VNA firmware



[result] the versions of the programs are shown in Programs and Features

Control Panel Home

Uninstall or change a program

To uninstall a program, select it from the list and then click Uninstall, Change, or Repair.

View installed updates

Turn Windows features on or off

Install a program from the network

Name	Publisher	Installed On	Size	Version
HP Notifications	HP	7/6/2022	18.7 MB	1.1.28.1
ICS	HP Inc.	6/11/2022	182 MB	3.0.16.0
IVI Shared Components 3.0.0	IVI Foundation	8/16/2022	42.7 MB	3.0.2828.0
IVI.NET Shared Components 1.4.1 for .NET 2.0	IVI Foundation	8/16/2022	5.22 MB	1.41.49153
Jabra XPRESS	GN Netcom A/S	7/21/2022	81.2 MB	100.0.5208
Keysight BenchVue Troubleshooting Wizard	Keysight Technologies	8/10/2022	3.02 MB	2020
Keysight CA Certificates	Agilent	7/20/2022	69.0 KB	3.0
Keysight CalPod API	Keysight Technologies, Inc.	8/9/2022	37.1 MB	03.01.006.0004
Keysight Communications Fabric 2.2	Keysight Technologies, Inc.	7/22/2022	281 KB	2.2.22112.11724
Keysight Device Measurement eXpert Lite	Keysight Technologies, Inc.	7/23/2022	32.8 MB	01.03.003.0003
Keysight Exchange CA Certificates	Agilent	7/21/2022	69.0 KB	1.0
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Keysight Host Processor Platform	Keysight Technologies	8/9/2022	34.3 MB	5.4.28008.10818
Keysight Ingot OF Utilities	Keysight Technologies, Inc.	7/28/2022	66.2 MB	01.02.002.0034
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Keysight Secure Instrument Communication Expert 2022	Keysight Technologies	8/10/2022	520 MB	1.1.19
Keysight VNA Series Network Analyzer	Keysight Technologies, Inc.	8/17/2022	911 MB	15.75.19.58.0
Keysight VNAUncertainty (X64)	Keysight Technologies, Inc.	7/24/2022	16.7 MB	05.00.018.0000
KtPUsbChassis IVI.NET Driver 1.1.9	Keysight Technologies	8/17/2022	11.6 MB	1.1.9.0
KtPUsbChassis IVI-C Driver 1.1.9	Keysight Technologies	8/17/2022	103 MB	1.1.9.0

2. Update current PC configurations

2-5. Keysight VNA firmware



Step-2: Visit <https://www.Keysight.com/find/pxiusbvna-firmware> and check if the installed version is **A.19.30.21** or later.

Step-3: If not, download and install **A.19.30.21** or later.

For Windows 11 host PC, download and install **A.17.60.13** or later.

For P5027M & P5028M, download and install **A.19.30.08** or later.

Recommended FW: **A.19.30.21** or later.

- ① Select the download button
- ② Run the downloaded installer with administrator privilege
- ③ After the installation is completed successfully, re-boot the PC
- ④ If the installation did not complete successfully, go to [Troubleshooting tips 2-5](#).

2. Update current PC configurations

2-6. Keysight License Manager



If Keysight License Manager is not installed on your PC, go to [Keysight License Manager 5 Download | Keysight](#) and

- ① Select the download button
- ② Run the downloaded installer with administrator privilege
- ③ After the installation is completed successfully, re-boot the PC
- ④ If the installation does not complete successfully, go to [Troubleshooting tips 2-6](#)

Note: For floating licenses on a local server, [KLM6](#) or [PLM7](#) is required to install.
For every other type of license, KLM5 is used.

KLM/ PLM is included in VNA firmware installer.

PLM 7 is included in VNA FW A.19.00.09 and newer revisions, superseding KLM 6.

2-7. Shutdown your PC once the installations are all done

2. Update current PC configurations

2-7. Windows Registry [for Streamline Series VNA B model only]

When your Streamline Series VNA B model is 2 modules model, some PCs which shows Code12 error in Device Manager do not recognize one of two VNA modules. If Code12 error is shown, editing Windows Registry is required. For more details, go to [Troubleshooting Tips #3-6-1](#).

VNA B model may show Code31 error in Device Manager. The device is not working properly because Windows cannot load the drivers required for this device. For more details, go to [Troubleshooting Tips #3-6-8](#).

2-8. Shutdown your PC once the installations are all done

2. Update current PC configurations

2-8. Tips on software installation/ uninstallation sequence

If issue persists,

① Remove all programs listed below (except the Thunderbolt software).

In case IOLS libraries fail to be uninstalled, to perform clean uninstallation of IO Libraries, refer to [Troubleshooting Tips #2-4](#).

② Install Keysight IO Libraries Suite first.

③ Reboot the PC.

④ Install VNA firmware.

⑤ Reboot the PC.

Proven latest versions of Key program (as of 30-Mar-2026)

Publisher	Program	Version
Keysight Technologies	Communication Fabric 2.2	2.2.22112.11724
Keysight Technologies	Host Processor Platform	5.5.2.30000
Keysight Technologies	IO Libraries Suite 2025	21.1.174
Keysight Technologies	KtPusbChassis IVI.NET Driver 1.1.11	1.1.11.0
Keysight Technologies	KtPusbChassis IVI-C Driver 1.1.11	1.1.11.0
Keysight Technologies	License Manager (Keysight License Manager 5)	5.7.0.732
Keysight Technologies	License Manager (PathWave License Manager)	7.4.1
Keysight Technologies	License Service	5.7.0.732
Keysight Technologies	VNA Series Network Analyzer firmware	19.30.21.153.0
Intel® Corporation	Thunderbolt™ Software	1.0.37.0
IVI Foundation	IVI Shared Components 3.0.0	3.0.2828.0
IVI Foundation	IVI.NET Shared Components 2.0.0 for .NET 2.0	2.0.2928.0
IVI Foundation	VISA Shared Components 7.2.0 (64-Bit)	7.2
IVI Foundation	VISA.NET Shared Components 7.2.0 (64-Bit)	7.2.0205

3. Connect Streamline Series VNA with PC

- 3-1. Connect the cable between Streamline Series VNA and PC
- 3-2. Plug in the appropriate AC adapter to Streamline Series VNA
- 3-3. Power on Streamline Series VNA, then confirm if the Power LED is green
- 3-4. Power on your PC
- 3-5. Confirm that Device License Changed dialog is shown in the right bottom of PC screen
- 3-6. Confirm that Device manager recognizes Streamline Series VNA
- 3-7. [Confirm that Thunderbolt Control Center recognizes Thunderbolt device \[for Streamline Series VNA B model only\]](#)
- 3-8. Confirm that Keysight connection Expert recognizes Streamline Series VNA
- 3-9. Confirm that Keysight License Manager recognizes all the required licenses
- 3-10. Launch Network Analyzer
- 3-11. Communicate remotely using LAN(TCPIP)



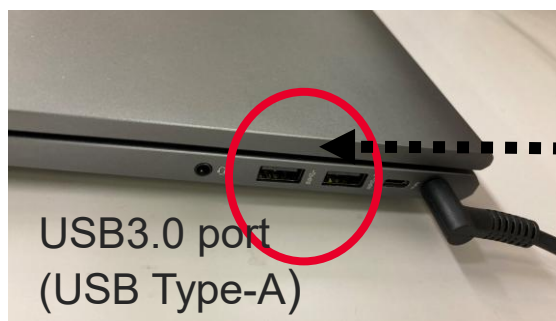
3. Connect Streamline Series VNA with PC

3-1. Connect the cable between Streamline Series VNA and PC

P50xxA/P93xxA rear panel



USB3.0 port x1
(USB Type-C)



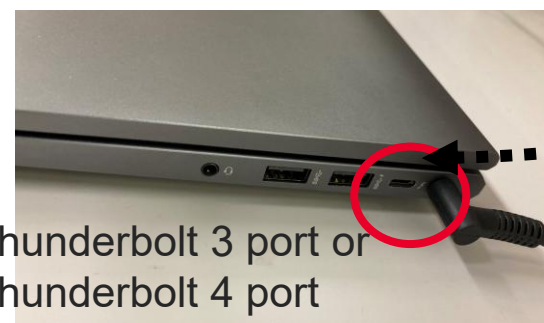
USB3.0 port
(USB Type-A)

USB3.0 cable ¹

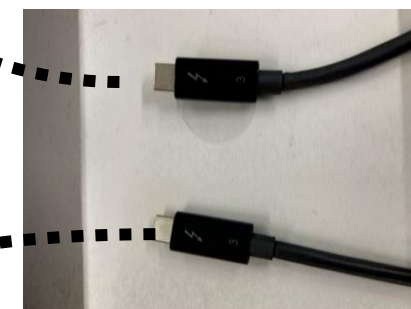
P50xxB/P93xxB rear panel



Thunderbolt 3 port x2
(USB Type-C)



Thunderbolt 3 port or
Thunderbolt 4 port
(USB Type-C)



Thunderbolt 3 cable ^{2,3}

Note:

1. Make sure to connect the USB3.0 cable included in the Streamline Series VNA (KPN: P9375-60010)
2. Make sure to connect the Thunderbolt 3 cable included in the Streamline Series VNA (KPN: P5000-60010).
3. The Thunderbolt 3 cable included in the Streamline Series VNA can be used for connection with a Thunderbolt 4 PC

3. Connect Streamline Series VNA with PC

3-2. Plug in the appropriate AC adapter to Streamline Series VNA



Streamline Series VNA (2-port model)² rear panel



Streamline Series VNA (4- or 6-port model) rear panel



Note:

1. Make sure to connect the AC adapter included in the Streamline Series VNA.
2. 2-port model requires minimum 90W adapter (KPN: 0950-6128). 150W adapter (KPN: 0950-6166) can work, too.

3. Connect Streamline Series VNA with PC

3-3. Power on Streamline Series VNA, then confirm if the Power LED is green

If Power LED is not green, go to [Troubleshooting tips 3-3](#)



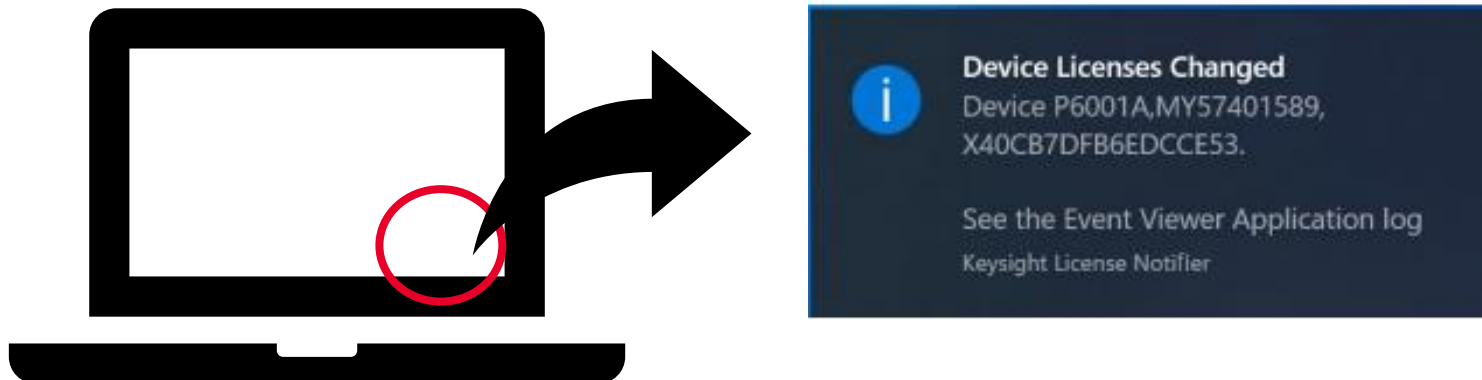
3. Connect Streamline Series VNA with PC

3-4. Power on your PC

Make sure to supply power from AC/DC adapter for the PC.

3-5. Confirm that Device License Changed dialog is shown in the right bottom of PC screen

If Device License Changed dialog is not shown, go to [Troubleshooting tips 3-5](#)



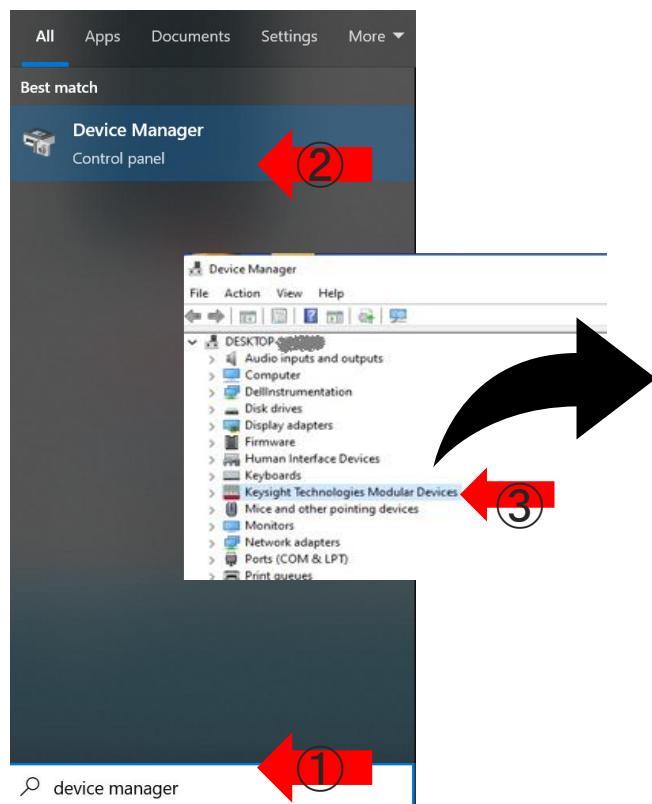
3. Connect Streamline Series VNA with PC

3-6. Confirm that Device manager recognizes Streamline Series VNA

- ① Enter Device Manager at Windows Search
- ② Select Device Manager
- ③ Select Keysight Technologies Modular Devices

[result] one P600X Chassis device and one or two VNA device(s) are shown.

If P600X Chassis or VNA device(s) are not shown correctly, go to [Troubleshooting tips 3-6](#).



	1 module model (See 3-8-A)	2 modules model (See 3-8-B)
A model	Keysight Technologies Modular Devices P600X Chassis P93XX	Keysight Technologies Modular Devices P50xx USB VNA P50xx USB VNA P600X Chassis
B model	Keysight Technologies Modular Devices P50xxB/P93xxB P600X Chassis	Keysight Technologies Modular Devices P50xxB/P93xxB P50xxB/P93xxB P600X Chassis

3. Connect Streamline Series VNA with PC

3-7. Confirm that Thunderbolt Control Center recognizes Thunderbolt device [for Streamline Series VNA model only]

① Enter Thunderbolt Control Center at Windows Search

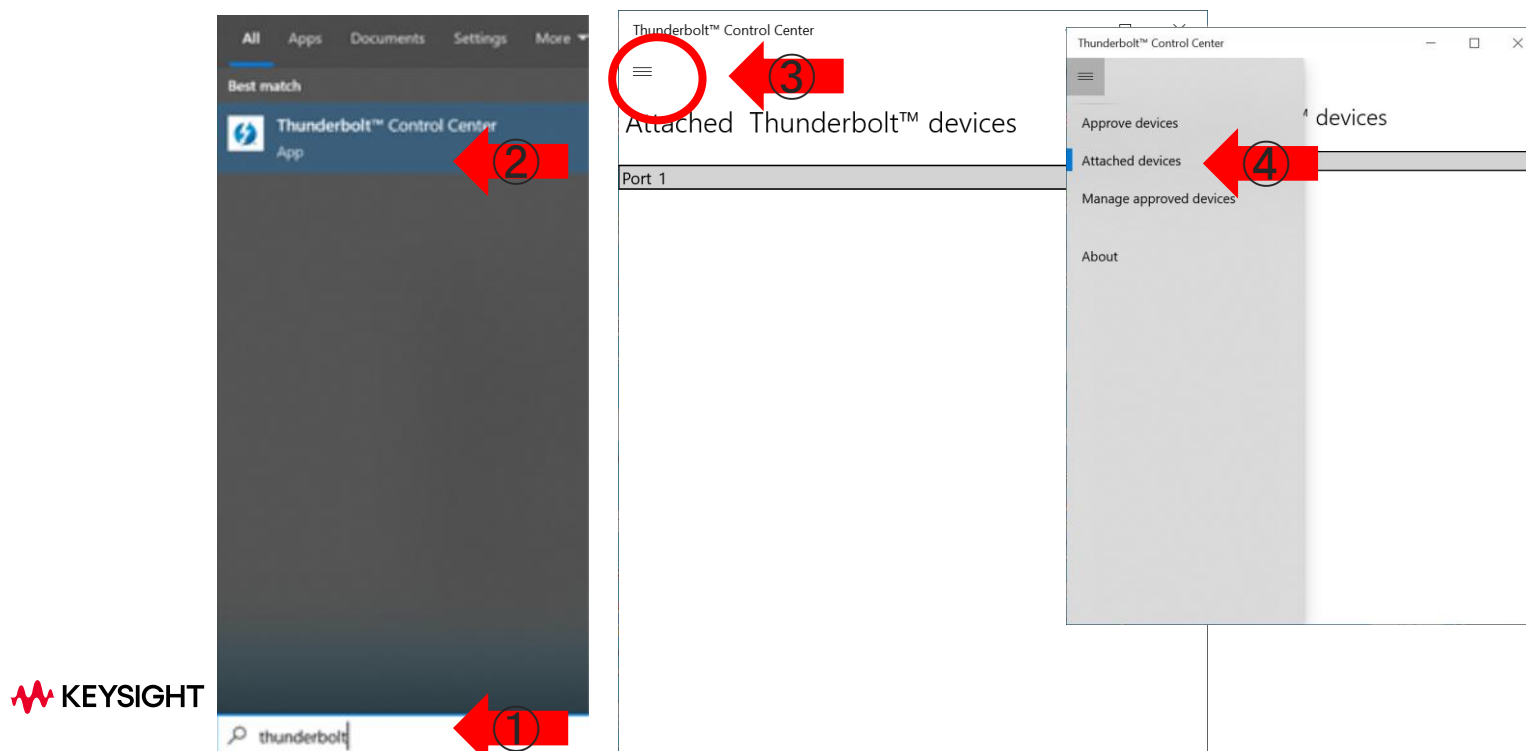
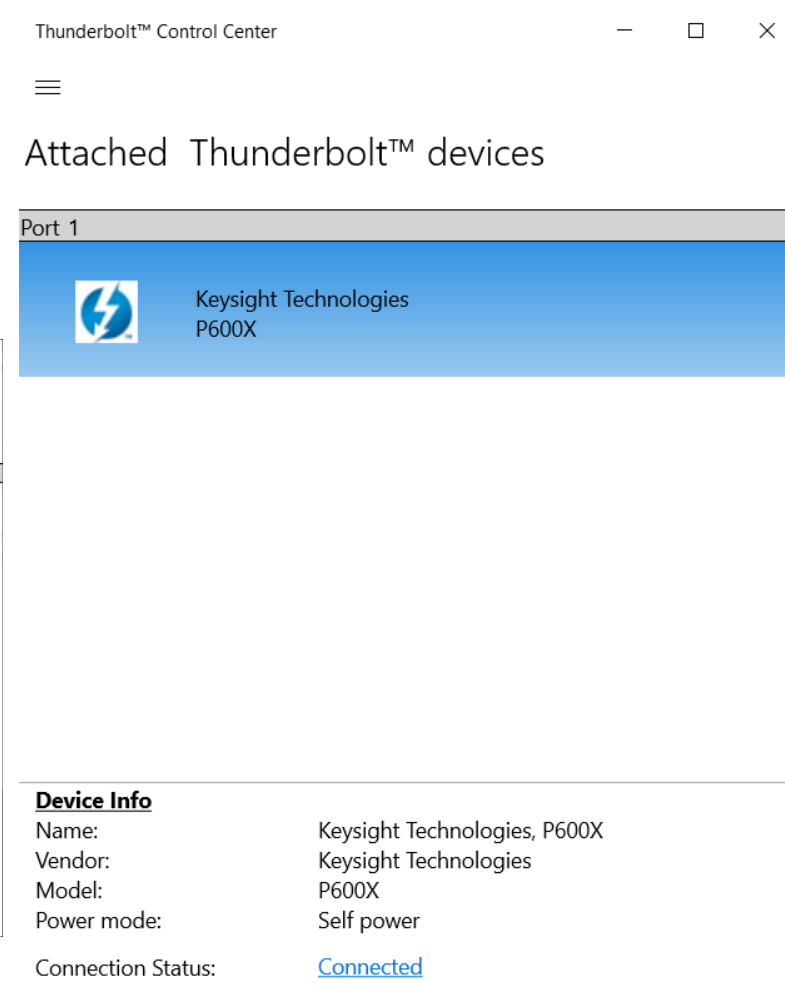
② Select Thunderbolt Control Center

③ Select hamburger menu

④ Select Attached devices

[result] P600X is connected in Attached Thunderbolt devices.

If P600X is not connected, go to [Troubleshooting tips 3-7](#).



3. Connect Streamline Series VNA with PC

3-8. Confirm that Keysight connection Expert recognizes Streamline Series VNA

① Enter Keysight Connection Expert at Windows Search

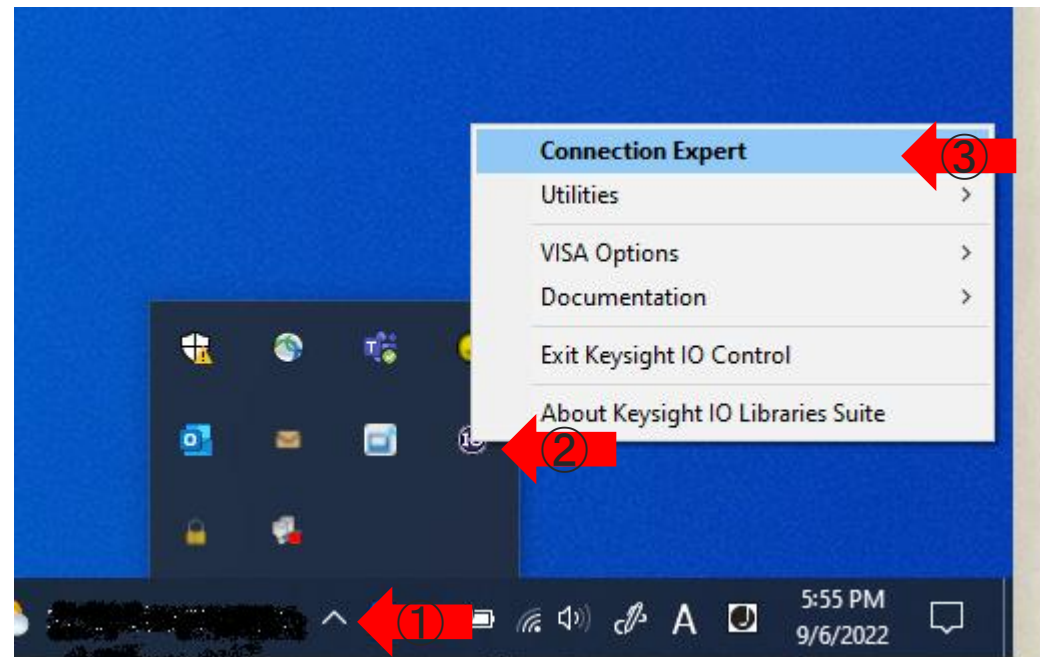
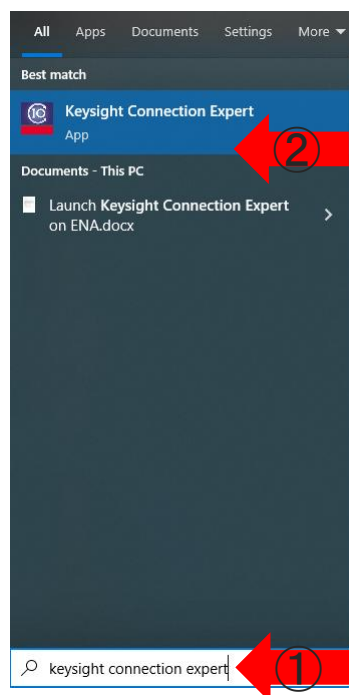
② Select Keysight Connection Expert

or

① Select  Show hidden icons

② Select  Keysight IO Libraries Suite

③ Select Connection Expert



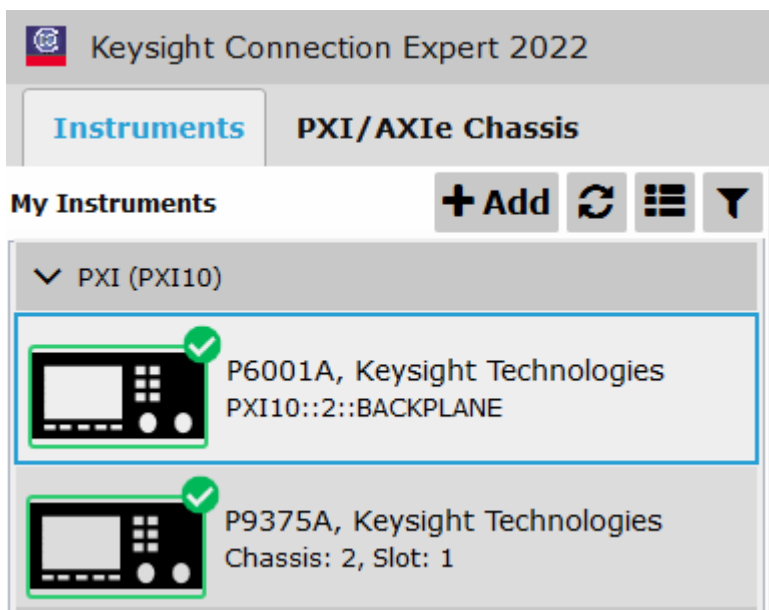
3. Connect Streamline Series VNA with PC

3-8-A. Confirm that Keysight Connection Expert recognizes Streamline Series VNA A-model

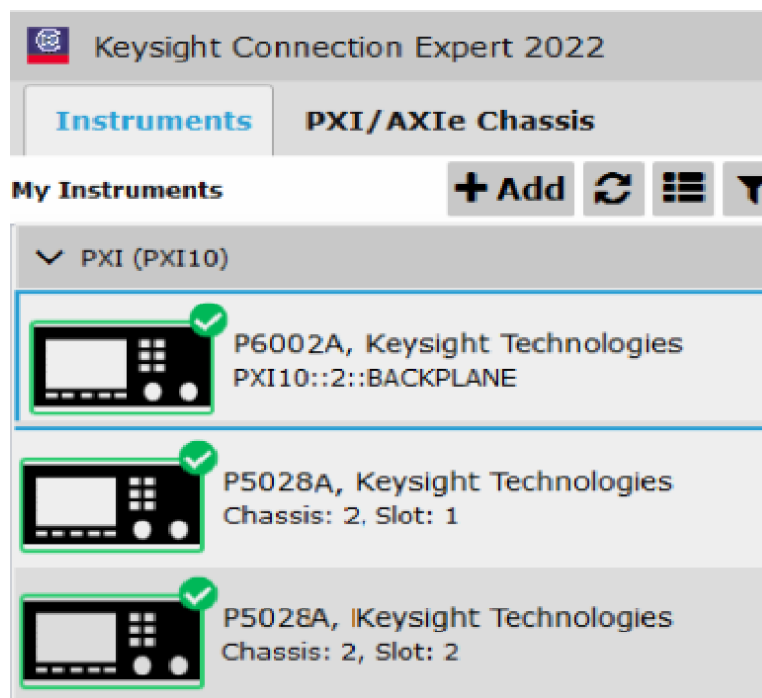
[result] one P6001A/P6002A and one or two VNA device(s) are shown under **PXI (PXI10)**

If they are not shown correctly, go to [Troubleshooting tips 3-8](#).

A model with 1 module



A model with 2 modules



A model with 1 module:

P937xA,
P500xA-200,
P5020A-400/600,
P5021A-400/600,
P5022A-400/600,
P5023A-400/600,
P5024A-400/600

A model with 2 modules:

P5020A-402,
P5021A-402,
P5022A-402,
P5023A-402,
P5024A-402,
P5025A-400/402,
P5026A-400/402,
P5027A-400/402,
P5028A-400/402

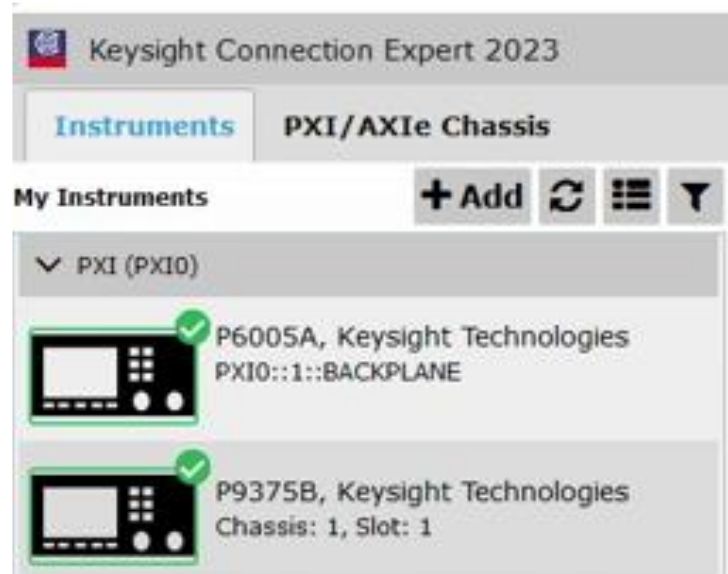
3. Connect Streamline Series VNA with PC

3-8-B. Confirm that Keysight Connection Expert recognizes Streamline Series VNA B model

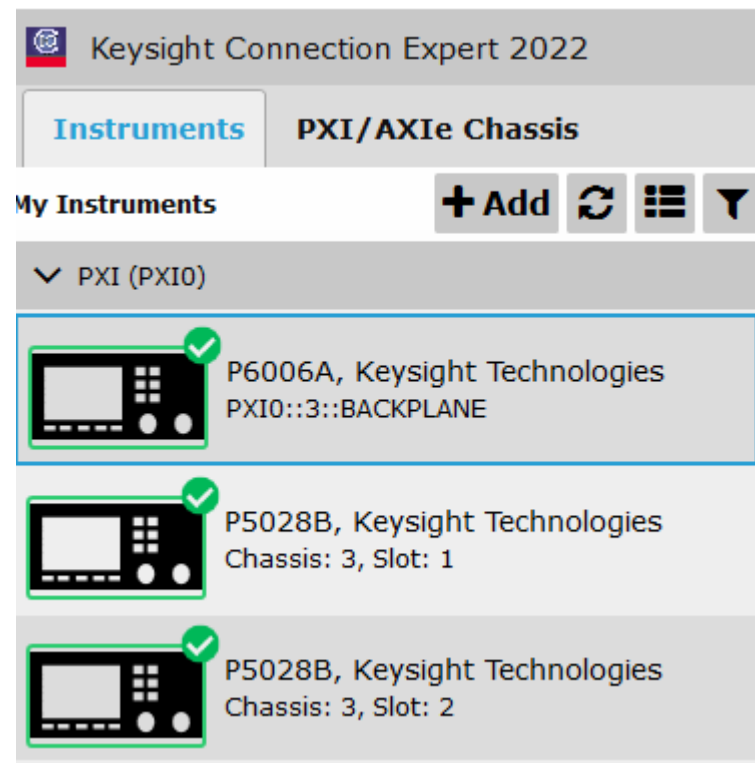
[result] one P6005A/P6006A and one or two VNA device(s) are shown under **PXI (PXI0)**.

If they are not shown correctly, go to [Troubleshooting tips 3-8](#).

B model with 1 module



B model with 2 modules



B model with 1 module:

P937xB-200,
P938xB-400,
P500xB-200,
P5020B-400/600,
P5021B-400/600,
P5022B-400/600,
P5023B-400/600,
P5024B-400/600

B model with 2 modules:

P5020B-402,
P5021B-402,
P5022B-402,
P5023B-402,
P5024B-402,
P5025B-400/402,
P5026B-400/402,
P5027B-400/402,
P5028B-400/402
P5027M-400
P5028M-400

3. Connect Streamline Series VNA with PC

3-9. Confirm that Keysight License Manager recognizes all the required licenses

Step-1: Launch Keysight Software Manager and check your purchased licenses

- ① Go to <http://www.keysight.com/find/softwaremanager>
- ② Enter Order Number and Certificate Number of your Streamline Series VNA
- ③ Select Find Certificate

[result] all the purchased licenses are shown in Keysight Software Manager(KSM)



[Return to Main Menu](#)

Welcome J. Doe

Keysight Software Manager

Add New Certificate

Please Add a Certificate to Associate Your License Entitlements to Your Account.

Order Number *

Certificate Number *

Find Certificate



Order Number *

Certificate Number *

Find Certificate

Order Details

Product	Description	Term	Start Date	End Date	Qty Purchased	Qty Remaining
P5024B	Vector network analyzer, 9 kHz to 20 GHz, Thunderbolt 3 interfaces	PERPETUAL			1	0
P5024B-402	4-port, 9 kHz to 20 GHz with second source	PERPETUAL			1	0
S97214B	High Performance Enabler Software for P5024B				1	0
S97214B-1FP	R-A5K-001-A High Performance Enabler Software for P5024B, node-locked perpetual license	PERPETUAL			1	0
S97214B+R-A6C-001-L	R-A6C-001-L High Performance Enabler Software for P5024B, KeysightCare software support subscription, node-locked 12 months	SUBSCRIPTION	April 7, 2022	May 26, 2023	1	
S97234B	Vector network analyzer activation software for P5024B				1	0
S97234B-1FP	R-A5K-001-A Vector network analyzer activation software for P5024B, node-locked perpetual license	PERPETUAL			1	0
S97234B+R-A6C-001-L	R-A6C-001-L Vector network analyzer activation software for P5024B, KeysightCare software support subscription, node-locked - 12 months	SUBSCRIPTION	April 7, 2022	May 26, 2023	1	

Cancel Changes

Add Certificate



3. Connect Streamline Series VNA with PC

3-9. Confirm that Keysight License Manager recognizes all the required licenses

Step-2: Launch Keysight License Manager and check loaded licenses for Streamline Series VNA

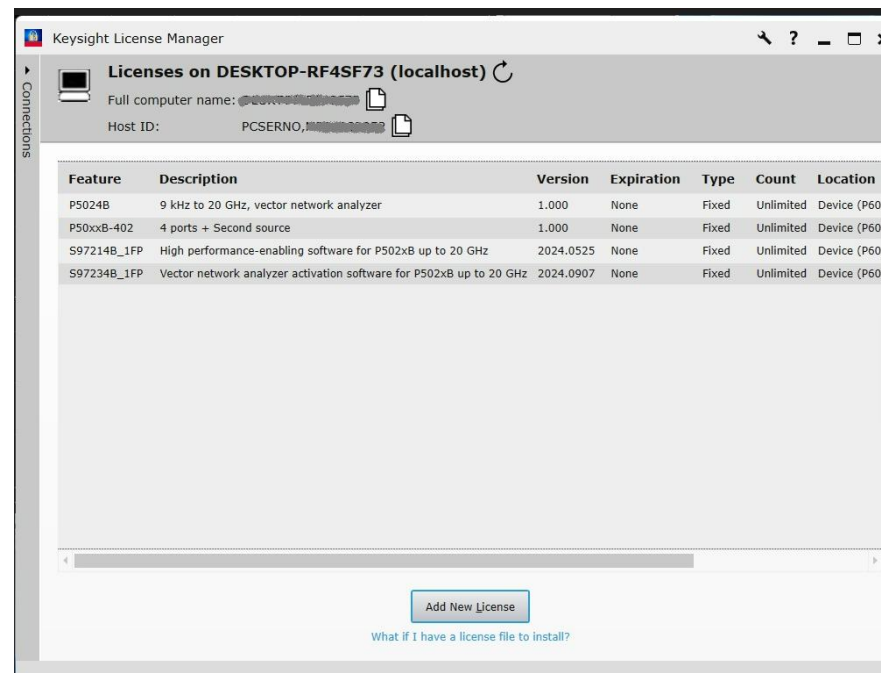
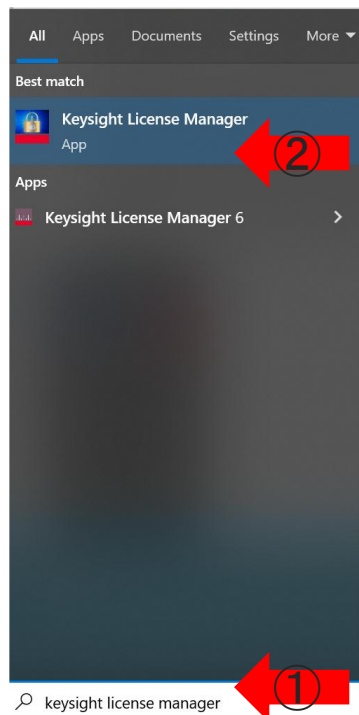
① Enter Keysight License Manager at Windows Search

② Select Keysight License Manager

[result] all the loaded licenses to Streamline Series VNA are shown in Keysight License Manager (KLM)

Step-3: Compare purchased licenses in KSM with loaded licenses for Streamline Series VNA in KLM

Step-4: If required licenses are not shown, go to [Troubleshooting tips 3-9](#).



3. Connect Streamline Series VNA with PC

3-10. Launch Network Analyzer

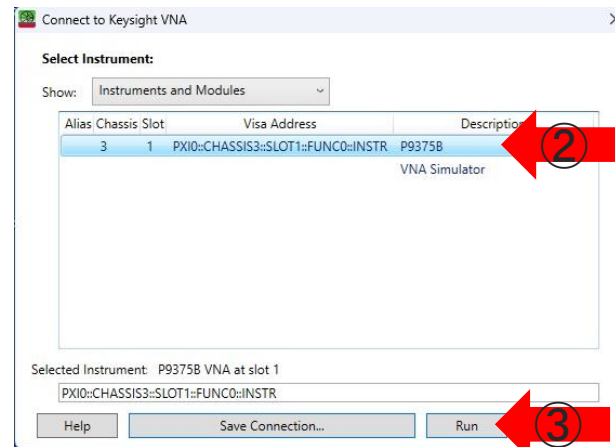
- ① Click the Network Analyzer icon on the PC desktop to execute the VNA application
- ② Select Streamline Series VNA model(s)
If VNA model(s) not shown, go to [Troubleshooting tips 3-6-1](#) and [Troubleshooting tips 3-3-1-3](#)
- ③ Select Run and then confirm if the Instrument Status LED is green
If not, go to [Troubleshooting tips 3-3-2](#)

Note:

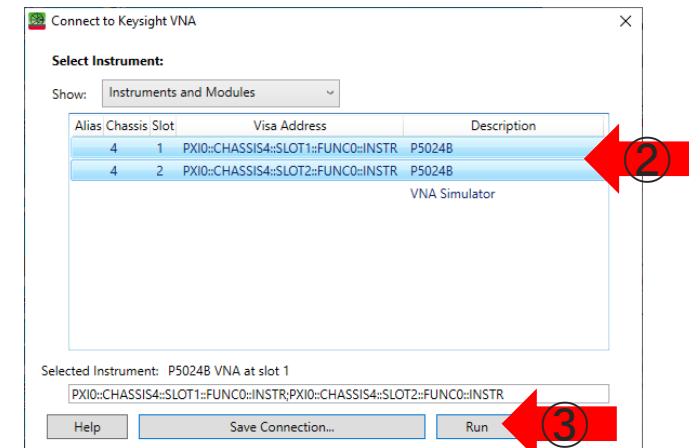
If FPGA image in FW is different from FPGA image in VNA, the FW will require updating the VNA's FPGA. It takes some time to complete the FPGA update. Until the completion, do not turn off the PC or VNA and do not pull off the cable between PC and VNA.



1 module model



2 modules model



3. Connect Streamline Series VNA with PC

3-10. Launch Network Analyzer

[result] measurement screen is shown.

If VNA firmware halts or shows error message before showing the measurement screen, go to [Troubleshooting tips 3-10](#).



3. Connect Streamline Series VNA with PC

3-11. Communicate remotely using LAN (TCPIP)

Refer to [Keysight Streamline Series VNA – LAN \(TCPIP\) communication setup](#)

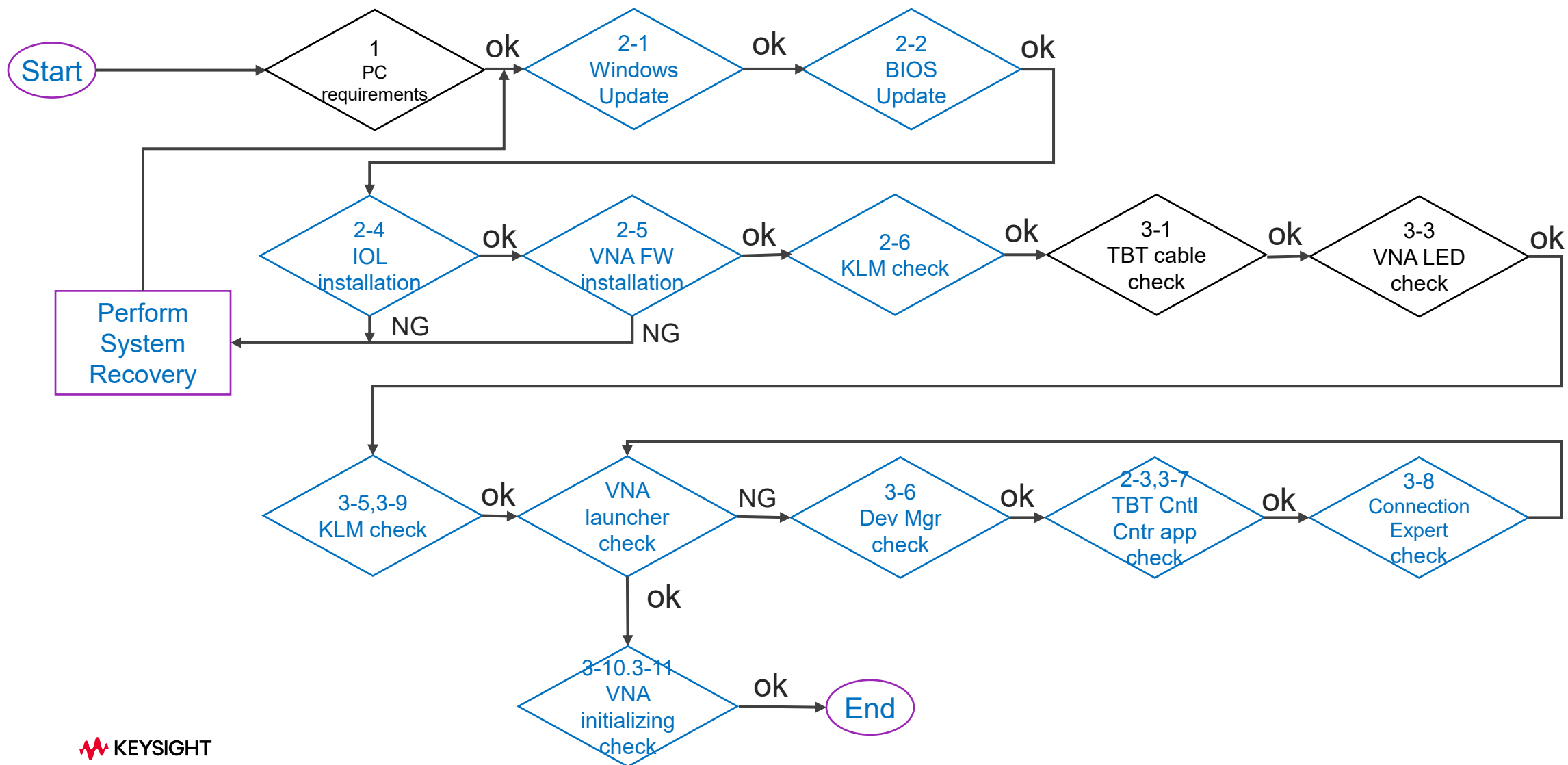
If remote communication does not work well, go to [Troubleshooting tips 3-11](#).

4. Troubleshooting tips



4. Troubleshooting tips

Troubleshooting Flow



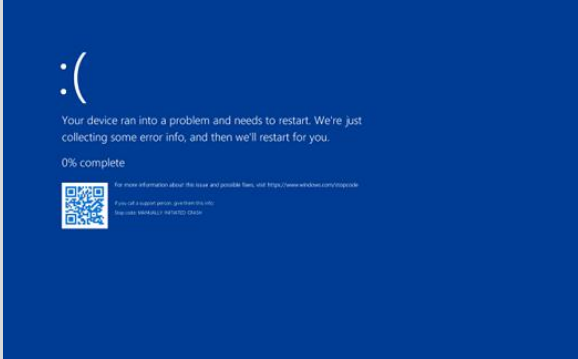
4. Troubleshooting tips 1

1. PC requirements

Symptom	Possible root cause	Solution
#1-1 PCIe Thunderbolt card does not communicate with VNA properly on Desktop PC	Poor signal quality of PCIe Thunderbolt card or Thunderbolt cable	Go to Troubleshooting tips #3-10-4 .
#1-2 Cannot install Keysight IO Libraries Suite and/or VNA firmware.	There are conflicts between the registries/drivers which were previously configured and the ones that will be configured for the Streamline Series VNA.	Step-1: ① Download IO Libraries Suite direct download again ② Open the exe file with Administrator mode ③ Select Repair > Next > Finish If the symptom still occurs, Step-2: ① Download Command Expert direct download ② Open the exe file with Administrator mode ③ Select Next > Repair > Next > Install > Finish If the symptom still occurs, Step-3: ① Download BenchVue Platform direct download ② Open the exe file with Administrator mode ③ Select Install > Repair > Install > Install > Next > Finish If the symptom still occurs, Step-4: Perform system recovery of your PC before setting up PC configurations for Streamline Series VNA.

4. Troubleshooting tips 1

1. PC requirements

Symptom	Possible root cause	Solution
#1-3 BSOD (Blue Screen Of Death) is shown 		Go to Windows 11 BSODs Automatic Repair and advanced troubleshooting options - Microsoft Community Refer to Bug Check Code Reference - Windows drivers Microsoft Learn for more details.

4. Troubleshooting tips 2-1, 2-2

2-1. Windows Update

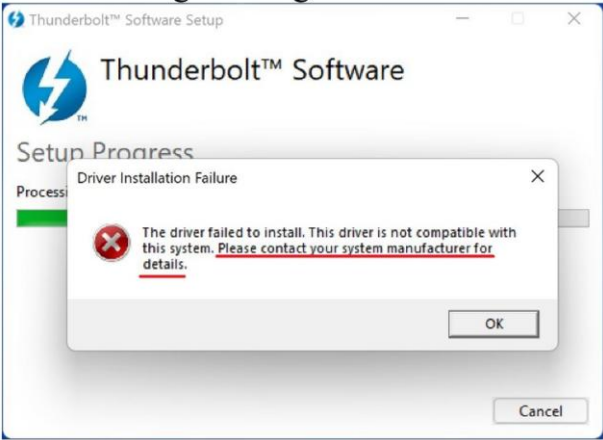
Install the latest Windows update settings, then you can reduce the possibility that the behavior is caused by a bug in Windows OS.

2-2. BIOS Update

Install the latest BIOS drivers, then you can reduce the possibility that the behavior is caused by a bug in the BIOS.

4. Troubleshooting tips 2-3

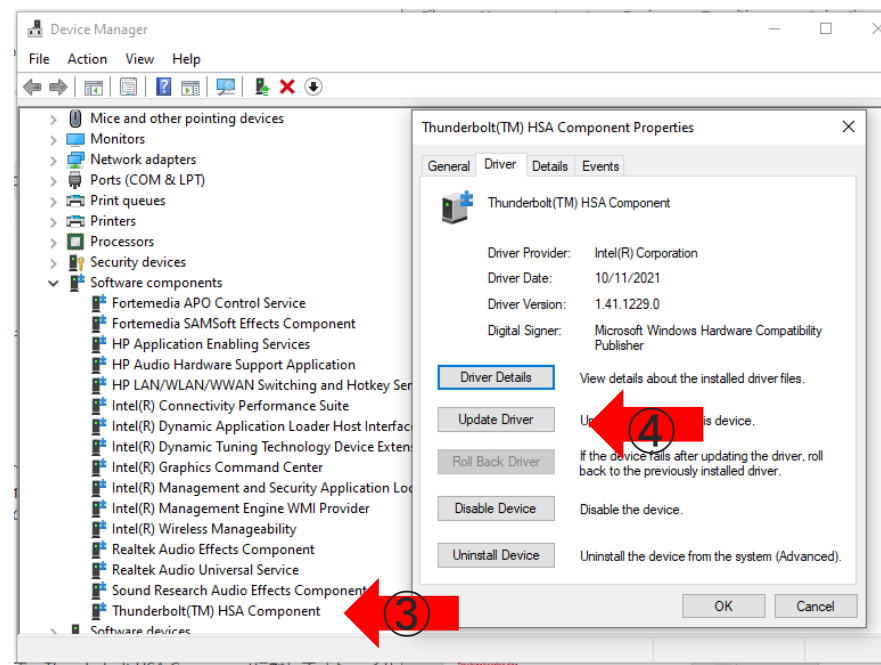
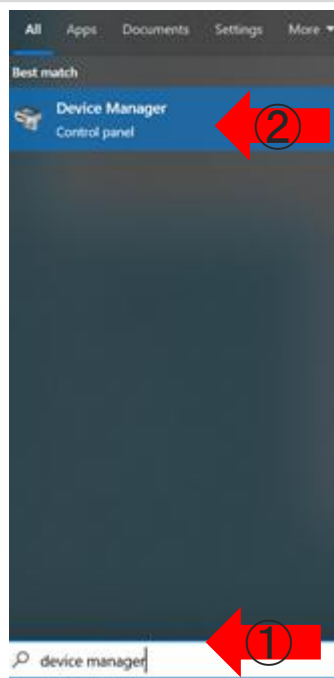
2-3. Thunderbolt Control Center related issues

Symptom	Possible root cause	Solution
#2-3-1 Driver Installation Failure is shown on Intel Gen12 CPU with Windows 11 	For Intel Gen12 CPU, Windows 11 OS already contains the necessary driver for Thunderbolt device to work properly.	No action is needed. Refer to Troubleshooting Tips #3-7-3.

4. Troubleshooting tips 2-3

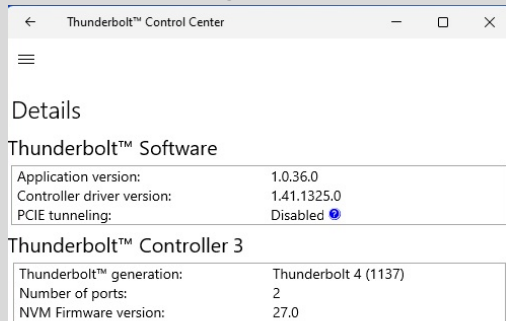
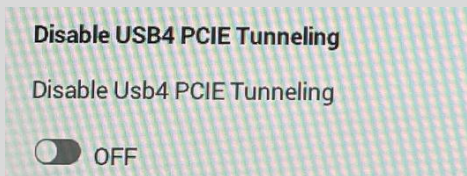
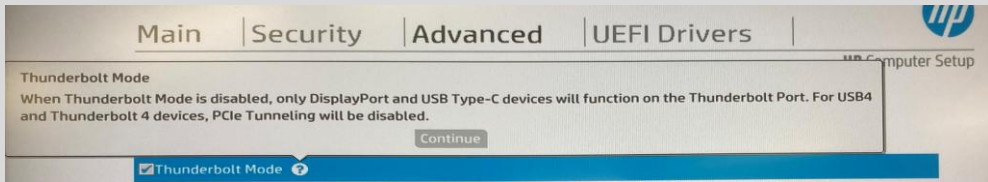
2-3. Thunderbolt Control Center related issues

Symptom	Possible root cause	Solution
#2-3-1 (for CPU Gen11 or below with Win11 OS & any CPU Gen with Win10 OS) Thunderbolt Control Center is not shown from the Windows Start menu.	Cannot download Thunderbolt Software (Thunderbolt Control Center app) via Microsoft Store	Step-1: Update Thunderbolt driver ① Enter Device Manager at Windows Search ② Select Device Manager ③ Navigate to Software Components > Thunderbolt™ HSA Component ④ In the Driver tab, choose Update Driver ⑤ If Thunderbolt Control Center app still cannot be installed, ask Intel to support Step-2: If the symptom still occurs, go to Error 0x803FB005 While Installing Thunderbolt Control Center App



4. Troubleshooting tips 2-3

2-3. Thunderbolt Control Center related issues

Symptom	Possible root cause	Solution												
#2-3-2 PCIe tunneling is Disabled  Thunderbolt™ Control Center Details Thunderbolt™ Software <table><tr><td>Application version:</td><td>1.0.36.0</td></tr><tr><td>Controller driver version:</td><td>1.41.1325.0</td></tr><tr><td>PCIe tunneling:</td><td>Disabled ⓘ</td></tr></table> Thunderbolt™ Controller 3 <table><tr><td>Thunderbolt™ generation:</td><td>Thunderbolt 4 (1137)</td></tr><tr><td>Number of ports:</td><td>2</td></tr><tr><td>NVM Firmware version:</td><td>27.0</td></tr></table> When PCIe tunneling is disabled, some Thunderbolt™ devices, including external GPUs and storage drives, may not work properly. PCIe tunneling settings may be changed in BIOS.	Application version:	1.0.36.0	Controller driver version:	1.41.1325.0	PCIe tunneling:	Disabled ⓘ	Thunderbolt™ generation:	Thunderbolt 4 (1137)	Number of ports:	2	NVM Firmware version:	27.0	PCIe tunneling setting in BIOS might be incorrect.	Step-1: If you are setting up with desktop-PC, confirm the PCIe Thunderbolt card is installed to the appropriate slot which supports PCIe tunneling. Step-2: If the symptom still occurs, go to PC BIOS setting menu and enable PCIe tunneling. [samples of BIOS setting] <u>Dell Desktop PC BIOS (UEFI)</u> BIOS Setup > Integrated devices > Disable USB4 PCIe Tunneling > Off  <u>HP Laptop PC BIOS (UEFI)</u> HP Computer Setup > Advanced > Thunderbolt Options > Enable Thunderbolt Mode 
Application version:	1.0.36.0													
Controller driver version:	1.41.1325.0													
PCIe tunneling:	Disabled ⓘ													
Thunderbolt™ generation:	Thunderbolt 4 (1137)													
Number of ports:	2													
NVM Firmware version:	27.0													

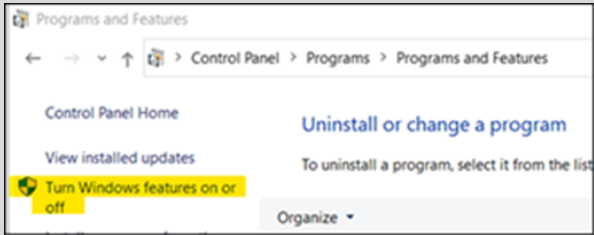
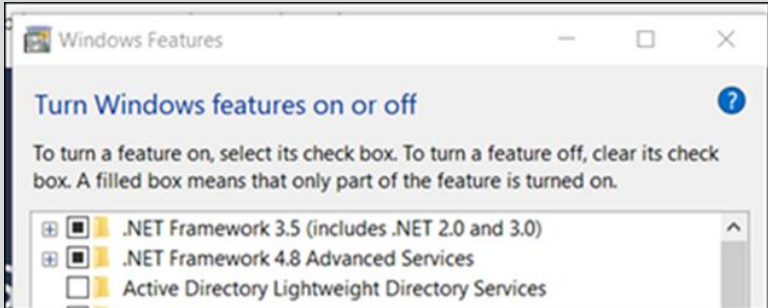
4. Troubleshooting tips 2-4

2-4. Keysight IO Libraries Suite installation is not completed successfully

Symptom	Possible root cause	Solution
#2-4-1 IVI drivers and/or VISA drivers are not installed (See Proven latest versions in Appendix)	Old drivers are left on the system.	① Go to Shared Components (ivifoundation.org) ② Download IVI Shared Components Cleanup Utility ③ Download VISA and VISA.NET Shared Components VISA Cleanup Utility ④ Execute Cleanup Utility and VISA Cleanup Utility with administrator privilege ⑤ Re-boot the PC ⑥ Install the latest Keysight IO Libraries Suite with administrator privilege ⑦ If the symptom still occurs, go to Troubleshooting tips #1-2.

4. Troubleshooting tips 2-4

2-4. Keysight IO Libraries Suite installation is not completed successfully

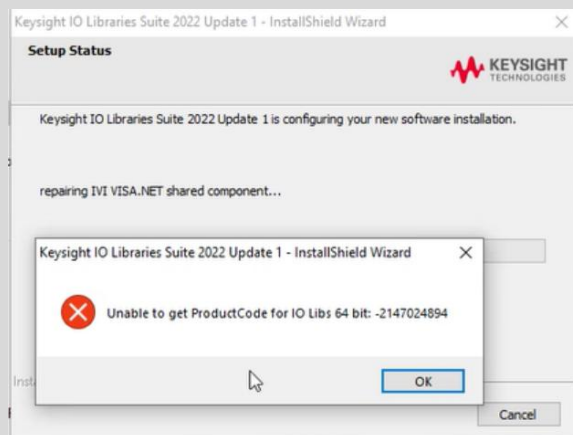
Symptom	Possible root cause	Solution
#2-4-2 .NET Framework 3.5 is not enabled		① Enter Control Panel at Windows Search ② Navigate to Programs > Programs and Features > Turn Windows Features on or off ③ Enable the .NET Framework 3.5 ④ Re-boot the PC For more details, go to https://docs.microsoft.com/en-us/dotnet/framework/install/dotnet-35-windows  

4. Troubleshooting tips 2-4

2-4. Keysight IO Libraries Suite installation is not completed successfully

Symptom

#2-4-3
Unable to get ProductCode for IO
Libs 64 bit error is shown



Possible root cause

Some files or registries were not removed correctly.

Solution

Uninstall IOLS and perform deep clean.

For more details, go to [Keysight Uninstall IOLS and Deep Clean](#)

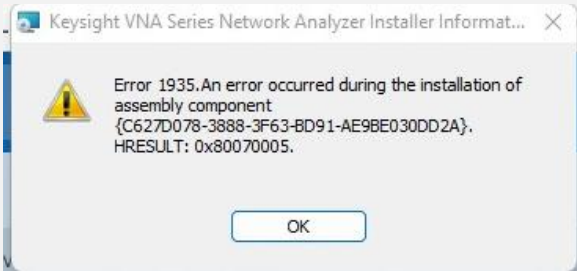
4. Troubleshooting tips 2-4

2-4. Keysight IO Libraries Suite installation is not completed successfully

Symptom	Possible root cause	Solution
#2-4-4 .NET Framework 3.5 is not installed. Ivi.Visa.Interop.dll is missing in the 32-bit VISA COM applications	Keysight IO Libraries Suite 2021 or later does not install .NET Framework. If users want to use VISA.NET drivers which are provided by the IVI Organization rather than Keysight Technologies, Inc., then they must install .NET Framework 3.5/2.0.	The workarounds to resolve the issue is as follows: - Install .NET Framework 3.5 - You can install .NET Framework 3.5 using the IO Libraries Suite installer with the net35 directive. For example: <i>IOLibSuite_version.exe /s /z"typical;net35"</i> - Uninstall VISA shared component - Repair IO Library Suite to install VISA shared component Another way to fix the issue is as follows: - Open Visual Studio developer command window with elevated privilege - Change to C:\Program Files (x86)\IVI Foundation\VISA\VisaCom\Primary Interop Assemblies - Run "IviPiaRegistration.bat"

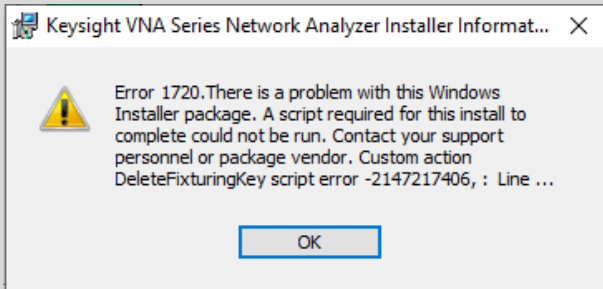
4. Troubleshooting tips 2-5

2-5. Keysight VNA firmware installation is not completed successfully

Symptom	Possible root cause	Solution
#2-5-1 KtPUsbChassis IVI drivers are not installed	Known issue on VNA firmware A.15.75.19 when no previous VNA firmware was installed.	Install A.15.75.22 or newer
#2-5-2 Error 1935 is shown while installing VNA firmware. 	During the VNA firmware installation, required permissions are missing, or .Net Framework setting is not correct.	① Re-boot the PC and install the latest VNA firmware again. Make sure the VNA firmware is installed with “Run as administrator” capability. ② If the symptom still occurs, disable any anti-virus, anti-spyware or firewalls while installing VNA firmware. ③ If the symptom still occurs, go to Troubleshooting tips #2-4-2. For more details, go to Download Microsoft .NET Framework Repair Tool from Official Microsoft Download Center ④ If the symptom still occurs, go to Troubleshooting tips #1-2.

4. Troubleshooting tips 2-5

2-5. Keysight VNA firmware installation is not completed successfully

Symptom	Possible root cause	Solution
#2-5-3 Error 1720 is shown while installing VNA firmware 	There is a problem with Windows Installer Package.	Go to Error 1720: There is a problem with this Windows Installer package. A - Microsoft Community If the symptom still occurs, go to Troubleshooting tips #1-2.

4. Troubleshooting tips 2-6

2-6. Keysight License Manager installation is not completed successfully

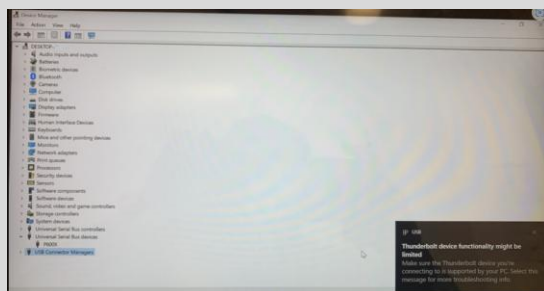
Symptom	Possible root cause	Solution
#2-6-1 Keysight License Service is installed but not running on the host PC	Agilent License Service/ Keysight License Service Stopped.	Change Agilent License Service/ Keysight License Service status from Stop to Running For more details, go to FAQ in Keysight.com .
#2-6-2 License Service not installed	Old VNA firmware installer didn't handle Keysight License service well	The 89600 VSA firmware installer enables user to manually install the required Keysight Licensing Service. For more details, go to FAQ in Keysight.com .
#2-6-3 VNA firmware shows "Error Initializing licensing provider. File Keysight.Ccl.Licensing.App.dll does not appear to be signed with a valid digital signature"	Missing "DigiCert Assured ID Root CA"	① Download "DigiCert Assured ID Root CA Serial Number: 0CE7E0E517D846FE8FE560FC1BF03039" from DigiCert Root Certificates - Download & Test DigiCert.com ② Enter Manage User Certificates at Windows Search ③ Select Manage User Certificates ④ Install the certificate under Certificates – Current User\Trusted Root Certification Authorities\Certificates\

4. Troubleshooting tips 3-1

3-1. USB-C cable is connected wrongly

Symptom

#3-1
Thunderbolt device functionality might be limited is shown in Device Manager



Thunderbolt device functionality might be limited
Make sure the Thunderbolt device you're connecting to is supported by your PC. Select this message for more troubleshooting info.

Possible root cause

USB-C cable is connected between Streamline B model and PC

Solution

Replace USB-C cable with the Thunderbolt 3 cable included in the Streamline Series VNA

4. Troubleshooting tips 3-3

3-3-1. Power LED does not turn green

Power LED



Symptom	Possible root cause	Solution
#3-3-1-1 Not glowing amber when power adapter is connected to VNA	Power adapter or power line in the VNA is broken.	Return it to Keysight for repair
#3-3-1-2 Blinking red	Power adapter does not supply enough power	① Check if proper power adapter is used (See 3-2). If KPN 0950-6128 is used to Streamline Series VNA 4-/6- port model, replace it with KPN 0950-6166. ② Retry powering on the VNA. If the symptom still occurs, return it to Keysight for repair.
#3-3-1-3 Glowing red	PC does not recognize the VNA	① Check the power on sequence. 1.Connect the cable between PC and the VNA (See 3-1) 2. Power on the VNA (See 3-2, 3-3) 3. Power on the PC (3-4) ② If the symptom still occurs, return it to Keysight for repair.

4. Troubleshooting tips 3-3

3-3-1. Power LED does not turn green



Symptom	Possible root cause	Solution
#3-3-1-4 Once glowing green for a few seconds, then shutdown automatically Impacted model: 2-port VNA only	VNA firmware version A.15.60.05 or newer has a function to shutdown automatically when in-rush voltage drop event is detected. [This is intended behavior]	① Check if VNA firmware version A.15.55.14 or newer. If VNA firmware version is A.15.60.05 or newer, the firmware has a function to shutdown automatically when in-rush voltage drop event is detected. ② Retry powering on the VNA. If the symptom still occurs, return it to Keysight for repair.
#3-3-1-5 Glowing blue	Chassis FPGA update failed.	Return it to Keysight for repair

[Power LED status]
Refer to https://helpfiles.keysight.com/csg/pxivna/Front_Panel/P937xA_Front_Panel.htm

4. Troubleshooting tips 3-3

3-3-1. Power LED does not turn green

Power LED



Symptom	Possible root cause	Solution
#3-3-1-6 VNA chassis power button LED turned from Green to Red when USB/Thunderbolt cable is connected.	VNA firmware is equipped with current surge detection function to shutdown automatically when surge is detected. [This is intended behavior]. Abrupt surge (transient) during power on stage lead to the false alarm and the chassis is automatically switched off.	① Update VNA firmware to version A.16.70.00 or newer. VNA chassis IVI-C and IVI.NET driver version 1.1.10 and above resolve the false alarm. ② Retry powering on the VNA. If the symptom still occurs, return it to Keysight for repair.
[Power LED status] Refer to https://helpfiles.keysight.com/csg/pxivna/Front_Panel/P937xA_Front_Panel.htm		

4. Troubleshooting tips 3-3

3-3-2. Instrument Status LED does not turn Green



Instrument Status LED

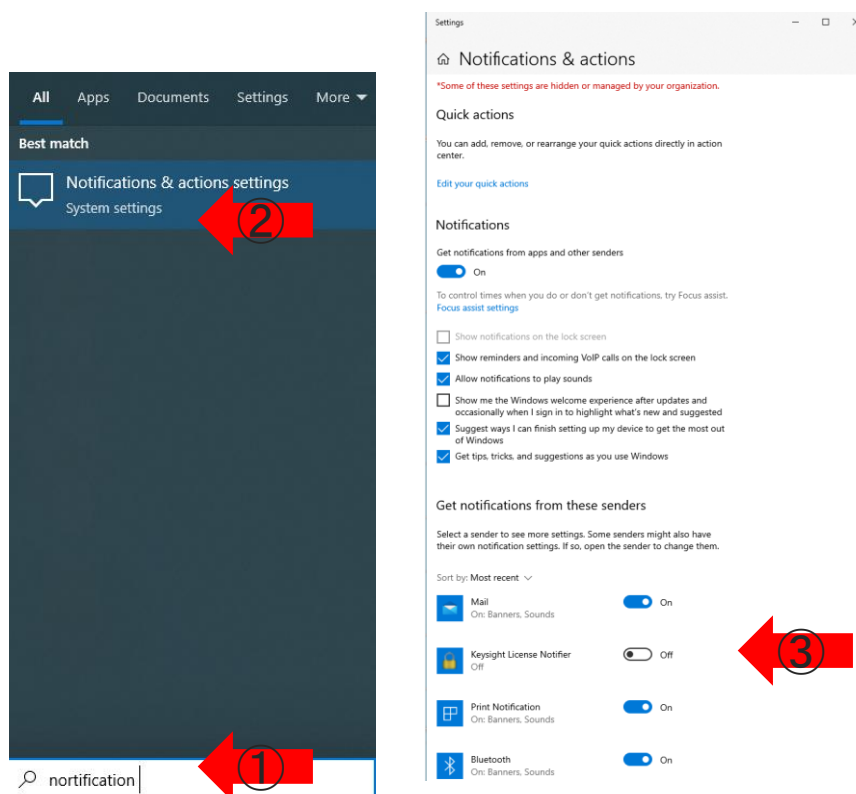
Symptom	Possible root cause	Solution
#3-3-2-1 Glowing amber	Power is ON, but firmware is not running.	① Check if VNA firmware is working correctly. ② If not, go to Troubleshooting tips2-5 ③ Check if the cable between Streamline Series VNA and PC is connected correctly ④ If not, replace the cable ⑤ If the symptom still occurs, return it to Keysight for repair.
#3-3-2-2 Glowing red	PC battery is not maintained in a fully charged condition. Or A hardware error has occurred, or the VNA firmware is not installed or corrupted in the PC.	① Make sure AC/DC adapter for the PC is connected. ② Check if VNA firmware is installed correctly. ③ If not, go to Troubleshooting tips 2-5 ④ If the symptom still occurs, check if Keysight IO Libraries Suites is installed correctly. ⑤ If not, go to Troubleshooting tips 2-4 ⑥ If the symptom still occurs, return it to Keysight for repair.

[Instrument Status LED status]
Refer to https://helpfiles.keysight.com/csg/pxivna/Front_Panel/P937xA_Front_Panel.htm

4. Troubleshooting tips 3-5

3-5. Device Licenses Changed dialog is not shown

Symptom	Possible root cause	Solution
#3-5-1 Device Licenses Changed dialog is not shown	#1 Notifications for Keysight License Notifier turns off	① Enter Notification at Windows Search ② Select Notifications & actions settings ③ Turn on Keysight License Notifier



4. Troubleshooting tips 3-5

3-5. Device Licenses Changed dialog is not shown

Symptom	Possible root cause	Solution
#3-5-1 Device Licenses Changed dialog is not shown	#2. Agilent License Service/ Keysight License Service is not running	① Enter Services at Windows Search ② Select Services ③ If Status of Agilent License Service/ Keysight License Service is blank, open Agilent License Service/ Keysight License Service Properties ④ Select Start ⑤ Select OK

The image displays three screenshots illustrating the steps to start the Keysight License Service:

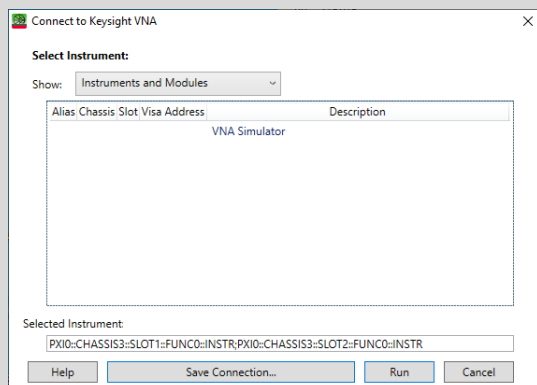
- Step 1:** Windows Search results for "services".
- Step 2:** Windows Services console showing the list of services. The "Keysight License Service" is highlighted.
- Step 3:** The "Keysight License Service Properties" dialog box, showing the "General" tab. The "Service status" is "Stopped". The "Start" button is highlighted.
- Step 4:** The "Keysight License Service Properties" dialog box, showing the "Start" button highlighted.
- Step 5:** The "Keysight License Service Properties" dialog box, showing the "OK" button highlighted.

4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Symptom

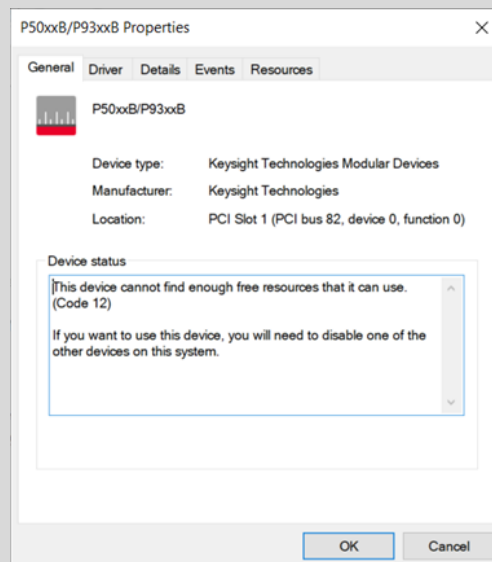
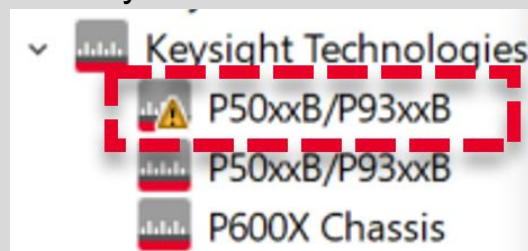
#3-6-1



For B model with 2 modules, one of two VNA modules is not correctly recognized in some PCs as shown with Code 12 error in Device Manager.

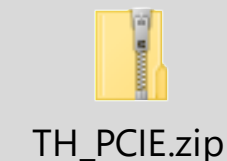
Possible root cause

PC cannot allocate enough free Kernel memory resource for PCIe



Solution

To solve this issue, registry edit is required with TH_PCIE.zip



Note:

1. The following steps are to be performed at end user's own risk.
2. This solution of Code12 error is for Streamline B model with 2 modules only. This solution cannot be applied to Code 12 error of A model and of B model with 1 module.

4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

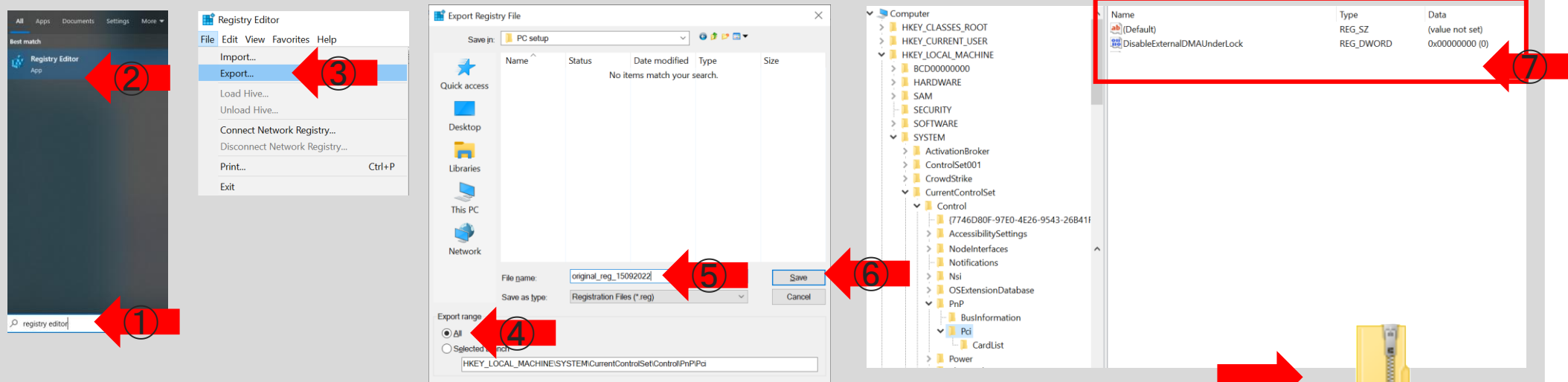
Solution (cont.)

#3-6-1

Step-1: Backup the current registry and check the current registry values

Launch Registry Editor:

- ① Enter registry editor at Windows Search
- ② Select Registry Editor
- ③ Navigate to File> Export
- ④ Select All for Export Range
- ⑤ Enter file name (example original_reg_ddmmyyyy.reg)
- ⑥ Select Save
- ⑦ Check the current value before registry patch at \HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\PnP\Pci



Step-2: Download and unzip the TH_PCIE.reg registry patch to the PC the VNA is connected to.

TH_PCIE.zip

4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Solution (cont.)

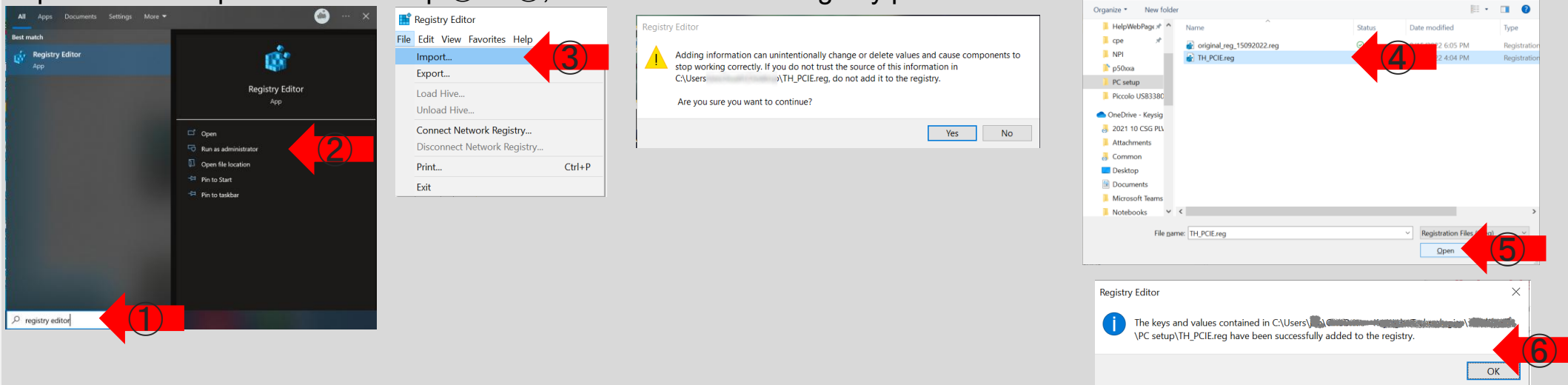
#3-6-1

Step-3: Edit registry

Launch Registry Editor with administrator privilege:

- ① Enter registry editor at Windows Search
- ② Execute Registry Editor with administrator privilege
- ③ Navigate to File> Import
- ④ Select TH_PCIE.reg
- ⑤ Select Open
- ⑥ Select OK

Tips: Alternative procedure for step ① to ⑥, double click on the registry patch to add.



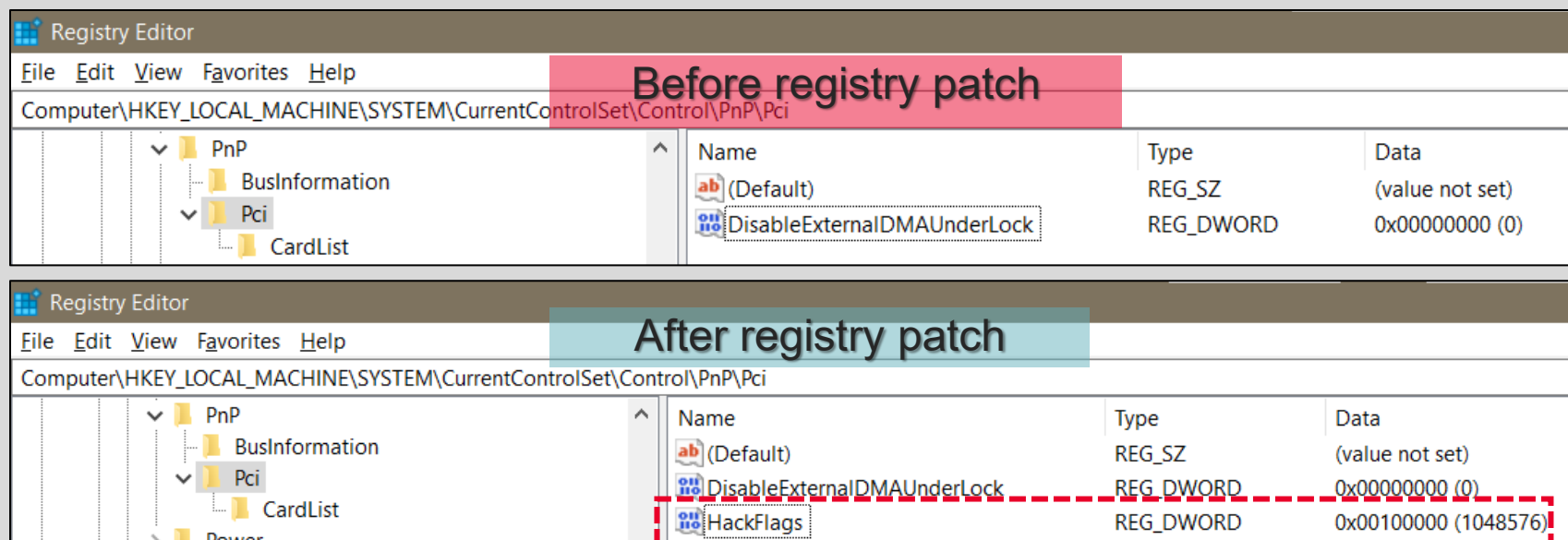
4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Solution (cont.)

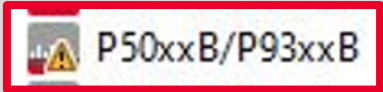
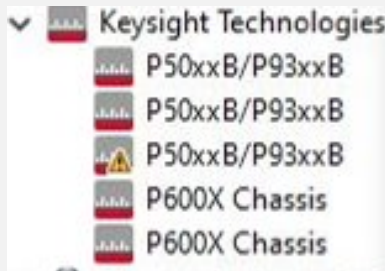
#3-6-1

Step-4: Ensure the HackFlags value is successfully edited to \HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\PnP\Pci



4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Symptom	Possible root cause	Solution
#3-6-2 For A model with 1 module and B model with 1 module, Code 12 error is shown in Device Manager 	PC cannot allocate enough free Kernel memory resource for PCIe	Use another PC in Thunderbolt PC and Streamline Series VNA B model compatibility list
#3-6-3 For 2 VNA operation with star topology or with daisy topology, Code 12 error is shown in Device Manager 	PC cannot allocate enough free Kernel memory resource for PCIe	Go to Troubleshooting Tips #3-6-1

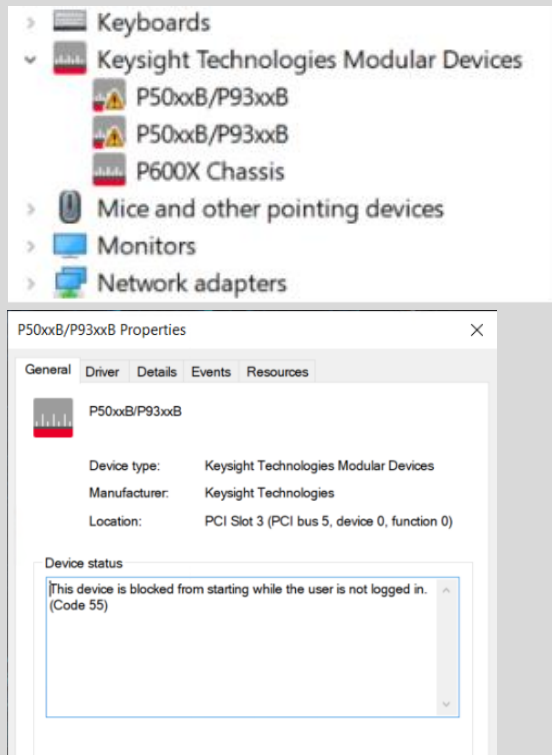
4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Symptom

#3-6-4

For B model, Code 55 error is shown in Device Manager



Possible root cause

B model is blocked from enumeration, due to a Group policy / MDM policy to protect from DMA attack.

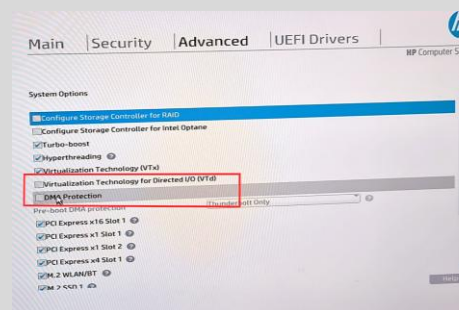
Solution

① This issue can be resolved with Microsoft service pack update [KB5014699](#) for Windows 10 versions 20H2 and newer. Install Windows 10 versions 20H2 or newer.

② If you need to stay on older versions of Windows 10 prior to 20H2, the workaround is to disable the Kernel DMA Protection in the BIOS setting. To disable Bitlocker and Windows Kernel DMA Protection, it depends on different manufacturer BIOS.

You may also set Intel Virtualization Technology for I/O (VT-d) to Disabled in the BIOS, if Kernel DMA Protection cannot be disabled.

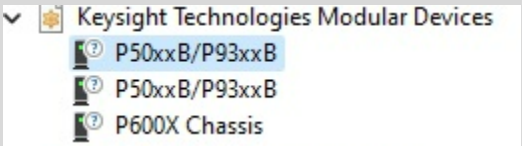
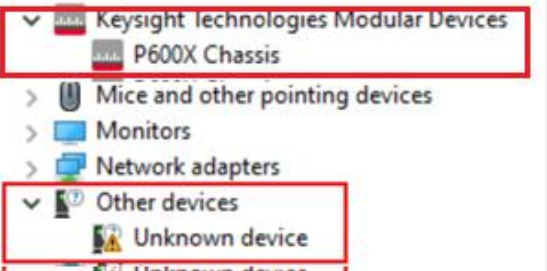
Below is a sample of HP PC BIOS setting.



③ If the symptom still occurs, contact end user's IT department to change the Group Policy / MDM policy to protect from DMA attack.

4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Symptom	Possible root cause	Solution
#3-6-5 Keysight VNA icon is not shown 		This is not an issue. No action is required.
#3-6-6 No VNA device(s) is/are shown under Keysight Technologies Modular Devices, but VNA device(s) is/are shown under Other devices 	Windows does not recognize VNA device(s) correctly, since P50xx drivers are not installed correctly. [Known Issue on A15.75.19 for Streamline Series VNA (P50xxA/B, P93xxA/B)]: The unit will not be detected if you install the firmware from scratch. The driver for Chassis is not installed at this version.	Go to Troubleshooting Tips #2-5-1

4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Symptom

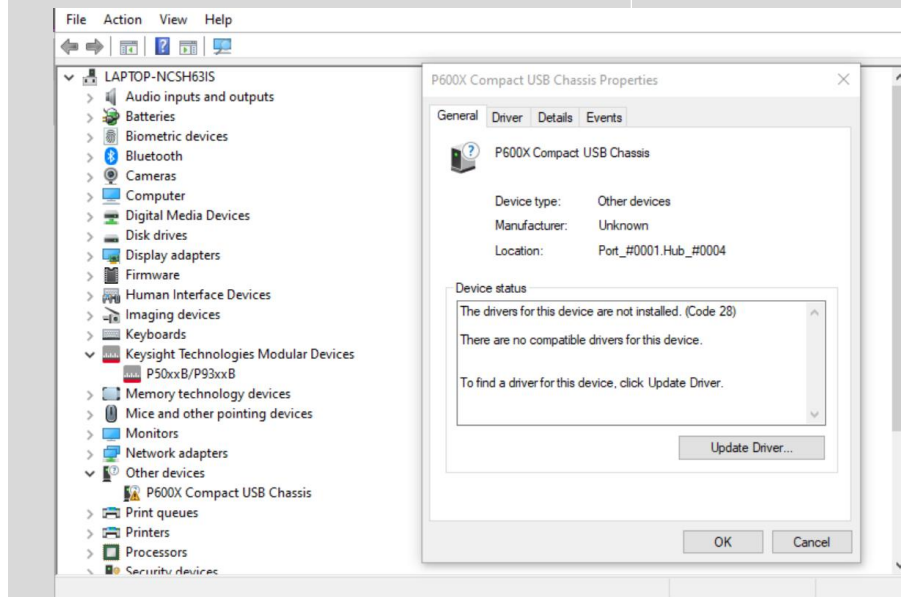
#3-6-7
P600X Chassis is not shown under Keysight Technologies Modular Devices, but P600X Chassis is shown under Other devices. Code 28 error is shown in Device Manger.

Possible root cause

#1. Chassis drivers are missing or broken
#2. Thunderbolt Control Center does not recognize P600X Chassis

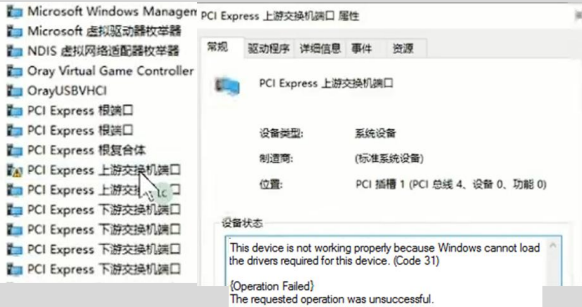
Solution

#1. Go to [Troubleshooting tips 2-5](#)
#2. Go to [Troubleshooting tips 3-7](#)



4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Symptom	Possible root cause	Solution
#3-6-8  For B models, Thunderbolt control center detects and recognizes the instrument correctly. In Device Manager, the B model is not correctly recognized. Under “System Devices” > PCI Express Upstream/ Downstream Port shows Code31 error.	Operating System runs out of PCI bus numbers. Typically, the computer BIOS configures a limited bus-number range for PCI Express bridge device. When an expansion chassis that contains a PCI Express complex switch together with a deep device hierarchy is added to the computer, the OS runs out of available bus numbers. Therefore, the system cannot start devices in the expansion chassis. Fail to attach PCI Express expansion chassis - Windows Client Microsoft Learn	To solve this issue, perform the following: This requires two-stage solutions: First, remove Code31 error. Secondly, remove Code12 error. (Code12 may appear after Code31 is resolved) Note: 1. The listed steps are to be performed at end user’s own risk.

4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

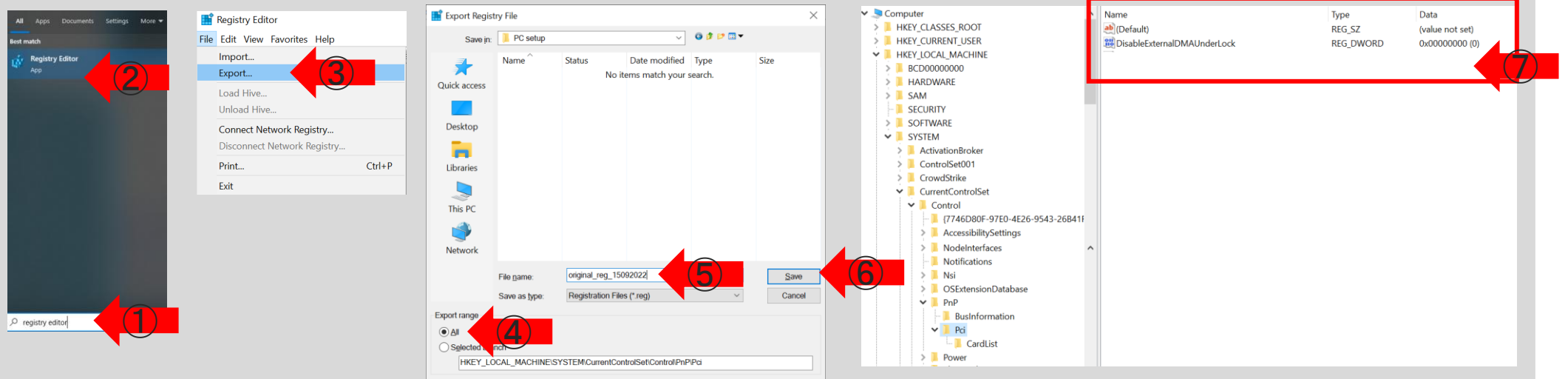
Solution (cont.)

#3-6-8

Step-1: Backup the current registry and check the current registry values

Launch Registry Editor:

- ① Enter registry editor at Windows Search
- ② Select Registry Editor
- ③ Navigate to File> Export
- ④ Select All for Export Range
- ⑤ Enter file name (example original_reg_ddmmyyyy.reg)
- ⑥ Select Save
- ⑦ Check the current value before registry patch at \HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\PnP\Pci



4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

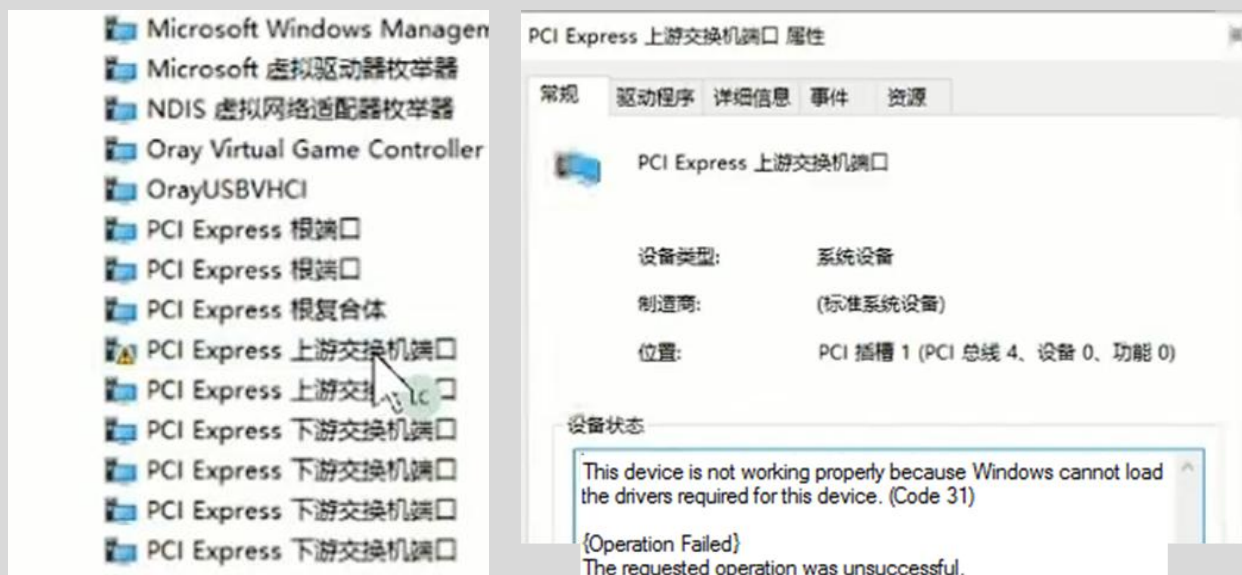
Solution (cont.)

#3-6-8

Group1: Intel PCI Express Root Port. (Description starts with Intel)

Group2: PCI Express Downstream/ Upstream Switch Port.

Step-2: In Device Manager, under “System Devices”, identify the PCI Express item (Group2) with Code31 ! warning status. Disable it.



4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Solution (cont.)

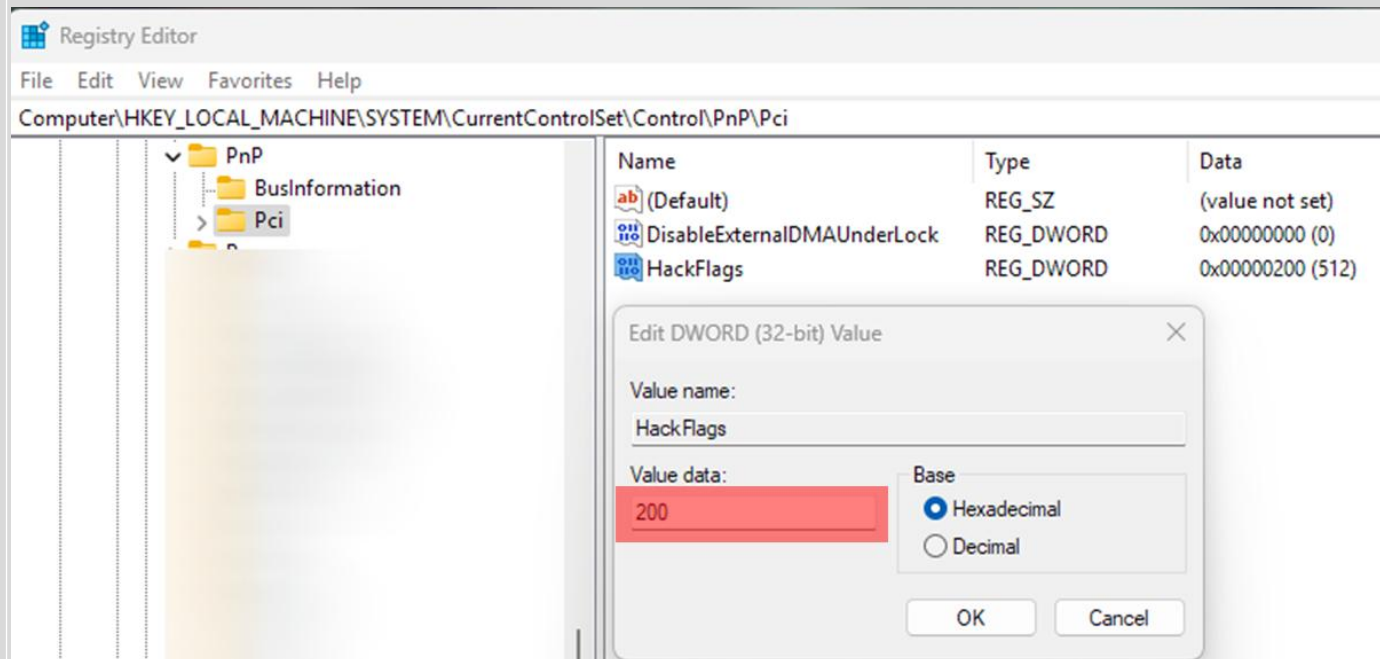
#3-6-8

Group1: Intel PCI Express Root Port. (Description starts with Intel)

Group2: PCI Express Downstream/ Upstream Switch Port.

Step-3: Apply registry hack flags of 200 (Hex). Restart PC.

[Fail to attach PCI Express expansion chassis - Windows Client | Microsoft Learn](#)



4. Troubleshooting tips 3-6

3-6. one P600X Chassis device and one or two VNA device(s) are not shown correctly

Solution (cont.)

#3-6-8

Group1: Intel PCI Express Root Port. (Description starts with Intel)

Group2: PCI Express Downstream/ Upstream Switch Port.

Step-4: Disable some of the Intel® PCI Express Root Port (Group1).

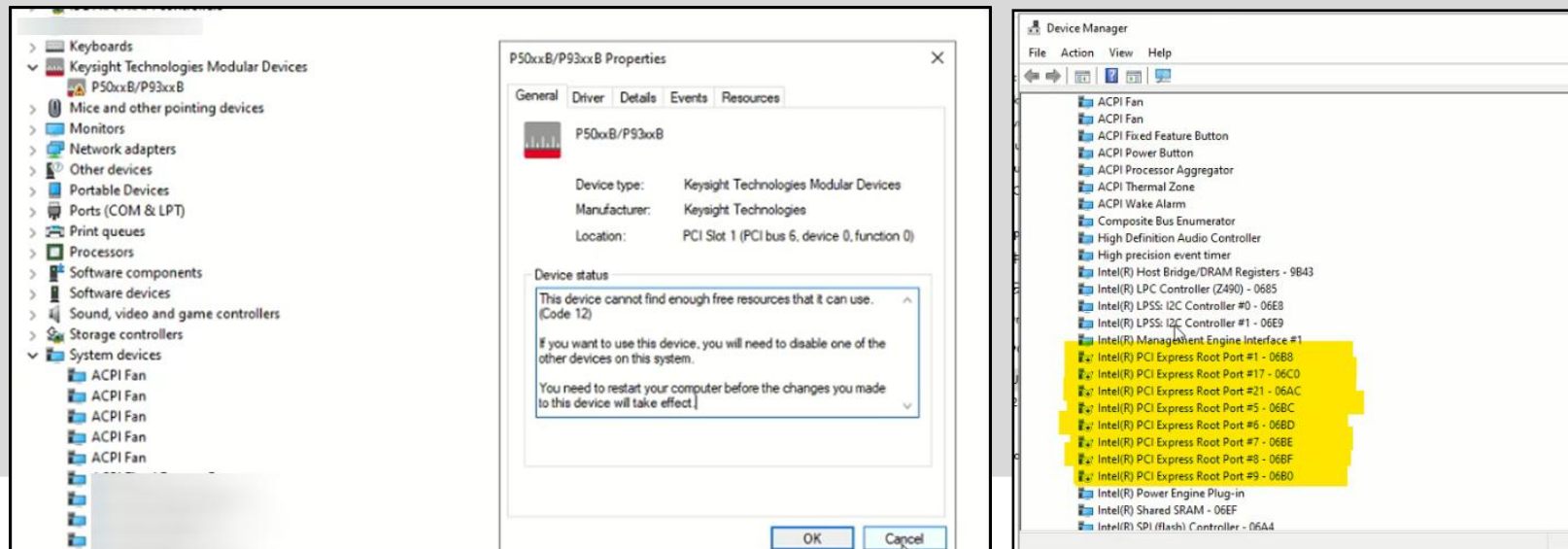
Step-5: Re-enable the PCI Express Upstream Switch Port (Group2) until P50xxB appears in Device Manager.

Note: At this stage, if B model remains undetected, repeat step-4 for every single Intel PCI Express Root Port (Group1) followed with step-5.

If the B model appears in Keysight Technologies Modular Devices group with Code 12 error, proceed with Step-6. Otherwise, proceed with step-7.

Step-6: Disable even more Intel PCI Express Root Port (Group1) until the B model appears correctly without Code 12.

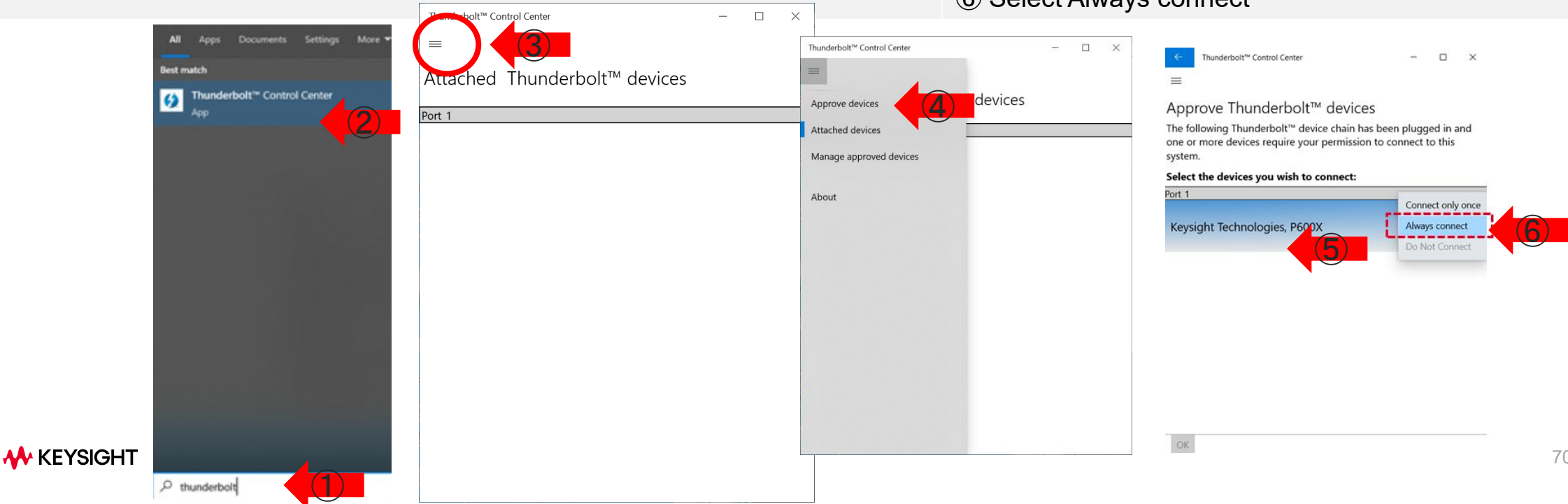
Step-7: Once it is correctly recognised, re-enable the devices previously disabled in Device Manager (Group1 & Group2)



4. Troubleshooting tips 3-7

3-7. one P600X is not connected in Attached Thunderbolt™ device [for Streamline Series VNA B model only]

Symptom	Possible root cause	Solution
#3-7-1 P600X is not shown	Chassis drivers are missing or broken	Go to Troubleshooting tips 2-5
#3-7-2 P600X is shown, but is not connected	Old version of Thunderbolt Control Center app requests user to approve to connect P600X as Thunderbolt device	① Enter Thunderbolt at Windows Search ② Select Thunderbolt Control Center ③ Select hamburger menu ④ Select Approve devices ⑤ Select Keysight Technologies, P600X ⑥ Select Always connect



4. Troubleshooting tips 3-7

3-7. one P600X is not connected in Attached Thunderbolt™ device [for Streamline Series VNA B model only]

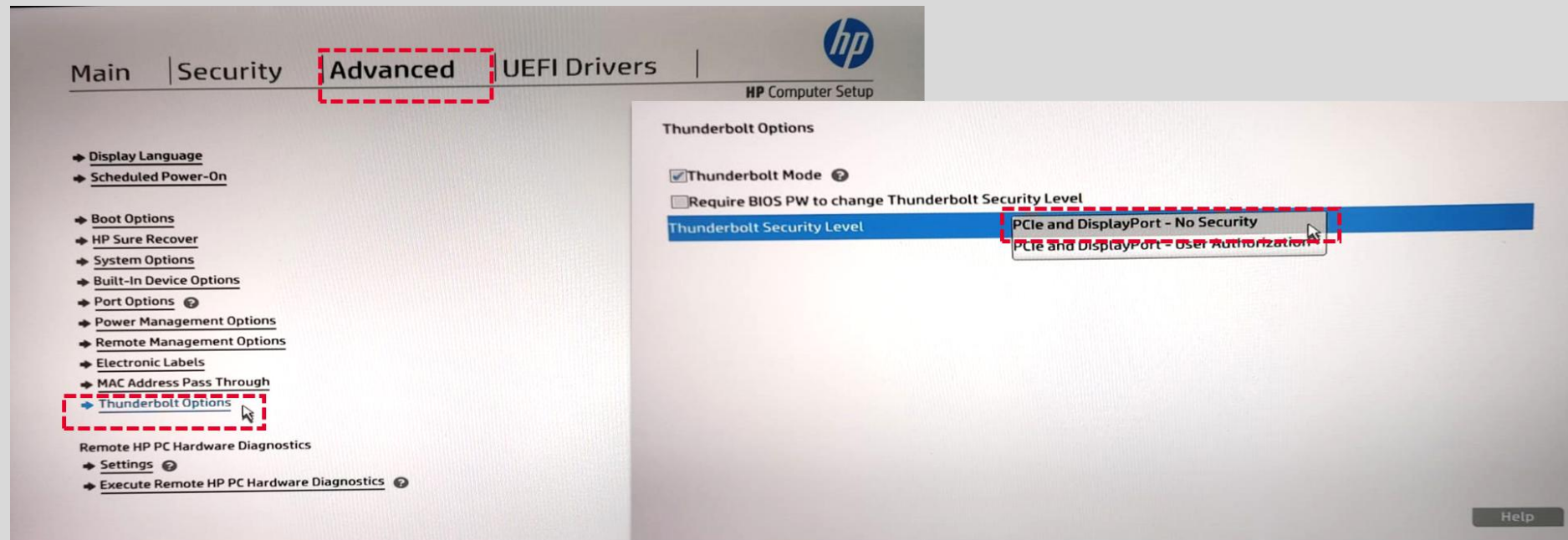
Solution (Cont.)

#3-7-2

To pre-approve Thunderbolt device connection for every device

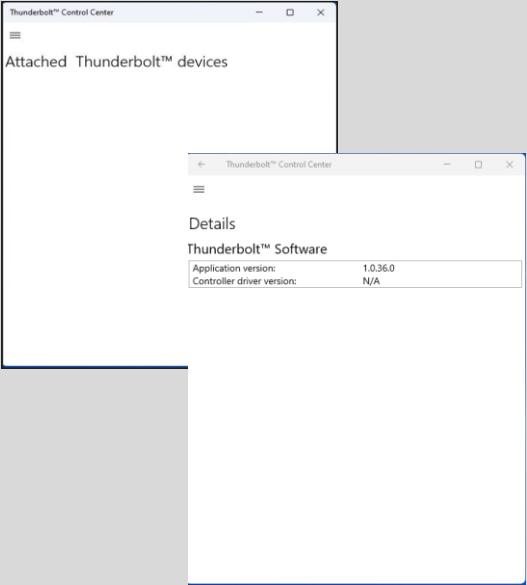
- ① Re-boot into BIOS (UEFI) settings
- ② Select “PCIe and Display Port – No Security” in Thunderbolt Options
- ③ Save changes and restart the PC

Below are the HP BIOS settings samples.



4. Troubleshooting tips 3-7

3-7. one P600X is not connected in Attached Thunderbolt™ device [for Streamline Series VNA B model only]

Symptom	Possible root cause	Solution
#3-7-3 P600X is not shown in Thunderbolt Control Center application on PC of Windows 11 OS . 	P50xxB/P93xxB is connected to PC of Gen12 or later CPU with Windows 11 OS through USB4 connection manager.	This is not an issue on PC of Gen12 or later CPU with Windows 11 OS, when Keysight Connection Expert shows the required devices. No action is required. Introduction to the USB4 connection manager in Windows Microsoft Learn

4. Troubleshooting tips 3-8

3-8. One chassis and one or two VNA device(s) are not shown in Keysight Connection Expert

Symptom	Possible root cause	Solution
#3-8-1 P6001A, P6002A, P6005A or P6006A is not shown	Chassis drivers are missing or broken	Go to Troubleshooting tips 2-5
#3-8-2 P50xxA, P93xxA, P50xxB, P93xxB is not shown	#1. Instrument drivers are missing or broken. #2. IVI drivers are missing or broken or #3. PC cannot allocate enough free Kernel memory resource for PCIe	#1. Go to Troubleshooting tips 2-5 #2. Go to Troubleshooting tips 2-4 #3. Go to Troubleshooting tips #3-6-1 for Streamline Series VNA B model with 2 modules

4. Troubleshooting tips 3-8

3-8. One chassis and one or two VNA device(s) are not shown in Keysight Connection Expert

Symptom

Possible root cause

Solution

#3-8-3

P6001A or P6002A is shown under PXI (PXI0)

Launch Keysight Connection Expert

- ① Click PXI/AXIe Chassis
- ② Select P6001A or P6002A
- ③ Click Delete Chassis
- ④ Close Keysight Connection Expert and re-boot the PC

#3-8-4

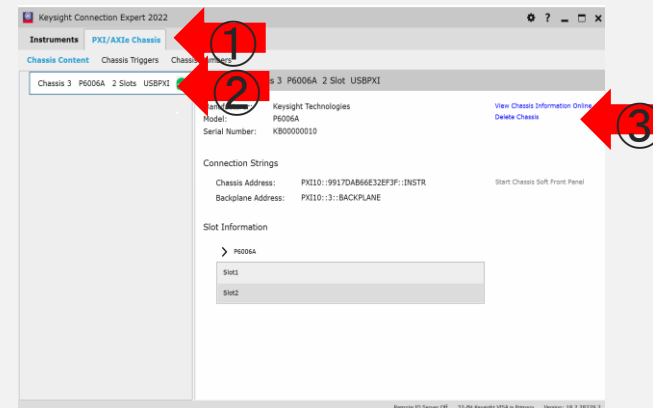
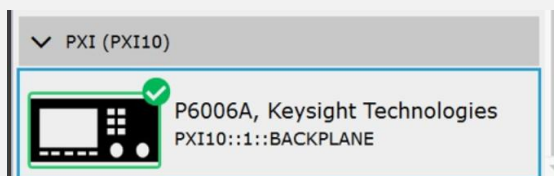
P6005A or P6006A is shown under PXI (PXI10)

Device Manager cannot recognize PXI Chassis

Launch Keysight Connection Expert

- ① Click PXI/AXIe Chassis
- ② Select P6005A or P6006A
- ③ Click Delete Chassis

- ④ Close Keysight Connection Expert and re-boot the PC



4. Troubleshooting tips 3-8

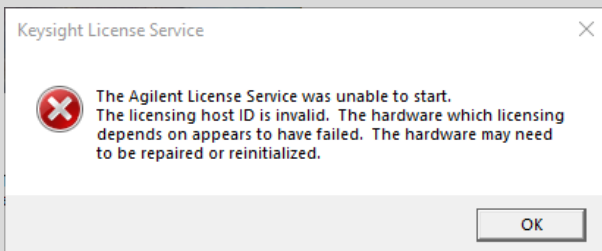
3-8. One chassis and one or two VNA device(s) are not shown in Keysight Connection Expert

Symptom	Possible root cause	Solution
#3-8-5 P50xxA, P93xxA is shown under PXI (PXI0)		
#3-8-6 P50xxB, P93xxB is shown under PXI (PXI10)		

4. Troubleshooting tips 3-9

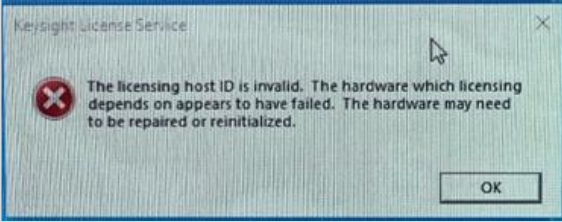
3-9. required license is not shown in Keysight License Manager

Symptom	Possible root cause	Solution
#3-9-1 No license is shown	Agilent License Service/ Keysight License Service stopped	Go to Troubleshooting tips #3-5
#3-9-2 A certain license is missing		① Go to http://www.keysight.com/find/softwaremanager ② Enter Order Number and Certificate Number of your Streamline Series VNA ③ Select Find Certificate ④ Get the license ⑤ Install the license
#3-9-3 “The Agilent License Service was unable to start. The licensing host ID is invalid” error message is shown		Go to Troubleshooting tips #1-2 Step-3



4. Troubleshooting tips 3-9

3-9. required license is not shown in Keysight License Manager

Symptom	Possible root cause	Solution
#3-9-4 The licensing host ID is invalid. 		Go to Troubleshooting tips #1-2 Step-3

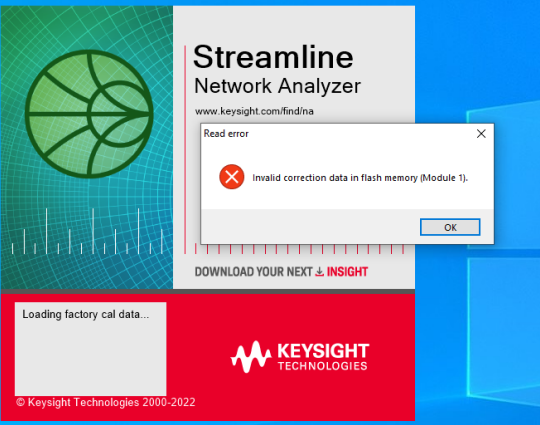
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-1 Fail to read FPGA of Pxxxxx (chassis x, slot x) is shown while Initializing hardware. 	VNA firmware was not able to read FPGA on Analog Module	Go to Troubleshooting Tips #3-10-4

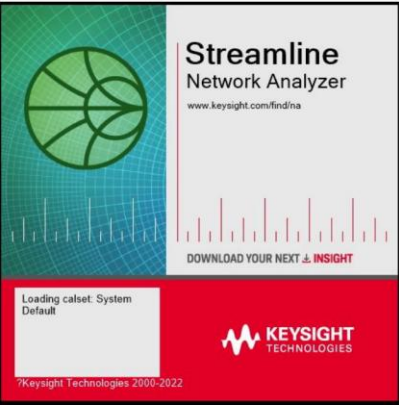
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-2 Invalid correction data in Flash memory (Module1) is shown while loading factory cal data. 	Factory calibration data is corrupted.	Return it to Keysight for calibration

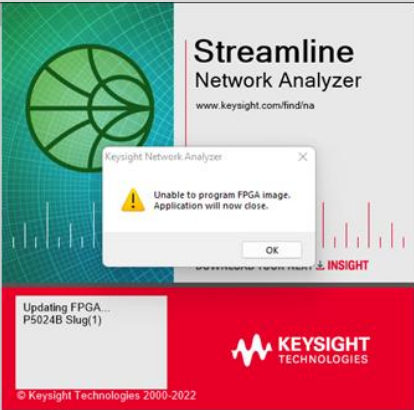
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-3 VNA firmware halts at “Loading Calset” 	Combination issue between VNA firmware and HPP5.3	Install VNA firmware A.15.75.22 or newer

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-4 “Unable to program FPGA image. Application will now close” message is shown, while updating VNA FPGA. 	When FPGA image in VNA is different from the one in VNA firmware, VNA firmware attempts to load the FPGA image to VNA chassis. During this process, a time out error may occur. The root cause of this issue is due to declined Thunderbolt signal quality on PCIe Thunderbolt card for Desktop PC or Thunderbolt cable.	Step-1: ① Install VNA firmware A.19.30.21 or newer ② Launch Network Analyzer (See 3-10)

4. Troubleshooting tips 3-10

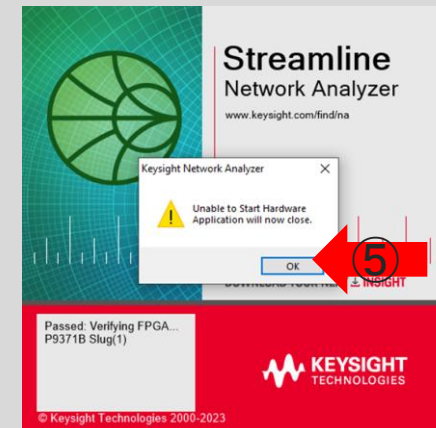
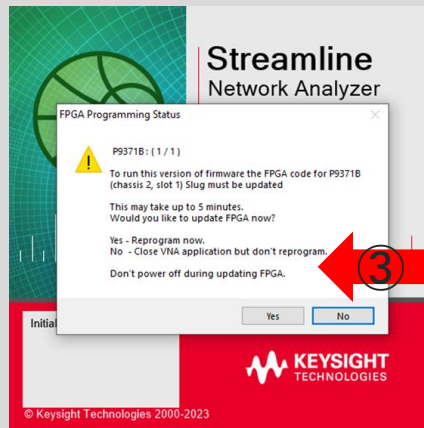
3-10. VNA firmware halts or shows error message

Solution (Cont.)

#3-10-4

Step-1:

- ③ FPGA Programming Status pops up, then click Yes
- ④ FPGA Programming Status pops up and click OK, then launch Network Analyzer (See [3-10](#)).
- ⑤ The following message pops up, then click OK



- ⑥ Launch Network Analyzer (See [3-10](#)), again

4. Troubleshooting tips 3-10

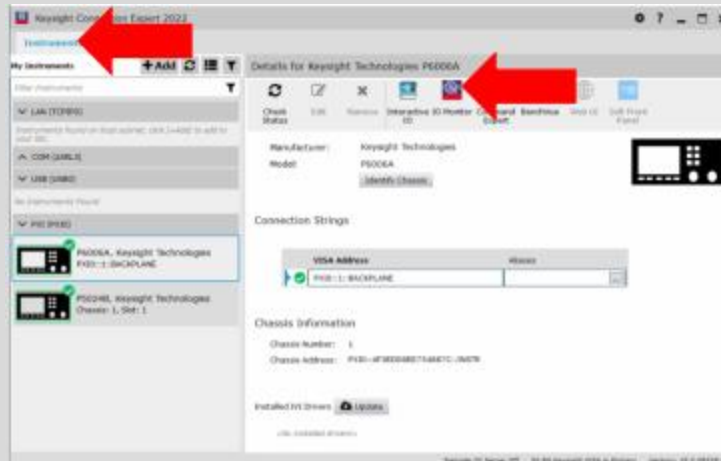
3-10. VNA firmware halts or shows error message

Solution (Cont.)

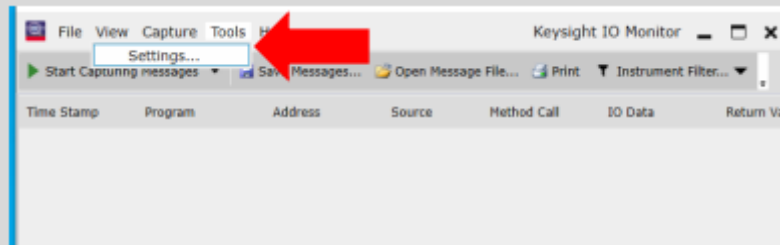
#3-10-4

Step-2: If the symptom still occurs, follow the steps from ① to ⑩ as IO monitor workaround

- ① Open Keysight Connection Expert as administrator
- ② Click Instrument and click IO Monitor



- ③ Select Tools and Settings...



4. Troubleshooting tips 3-10

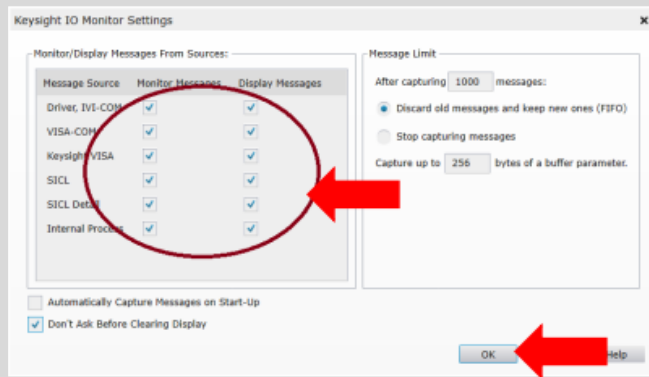
3-10. VNA firmware halts or shows error message

Solution (Cont.)

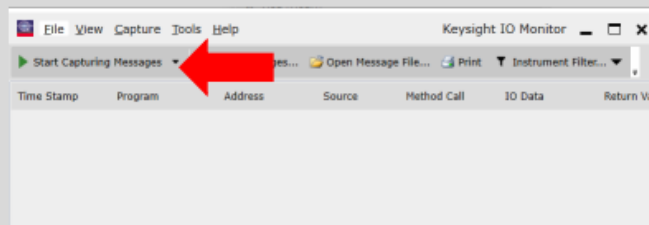
#3-10-4

Step-2:

- ④ Check every single IO log capture source and click OK



- ⑤ Click Start Capturing Message in IO Monitor



- ⑥ Launch Network Analyzer (See [3-10](#))
Note that the message are captured in Keysight IO Monitor

4. Troubleshooting tips 3-10

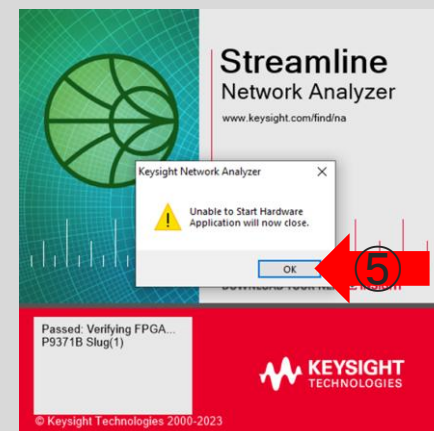
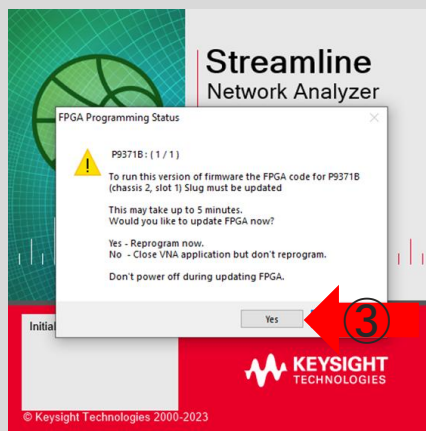
3-10. VNA firmware halts or shows error message

Solution (Cont.)

#3-10-4

Step-2:

- ⑦ FPGA Programming Status pops up, then click Yes
- ⑧ FPGA Programming Status pops up and click OK, then launch Network Analyzer (See [3-10](#)).
- ⑨ The following message pops up, then click OK



- ⑩ Launch Network Analyzer (See [3-10](#)), again

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Solution (Cont.)

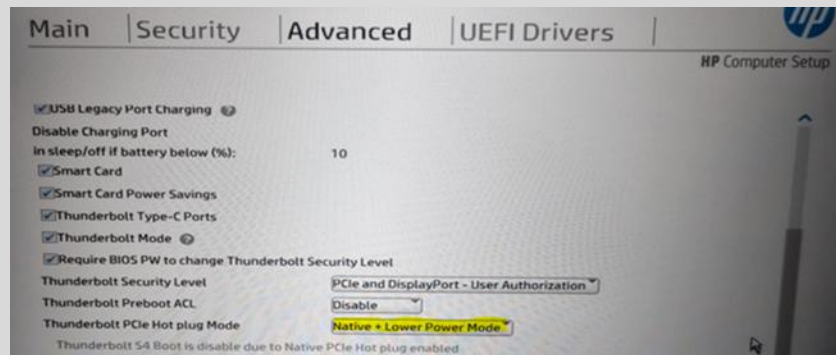
#3-10-4

Step-3: If the symptom still occurs, go to [Troubleshooting tips #3-3-2](#) to check status LED

Step-4: If the symptom still occurs, check if the Thunderbolt PCIe Hot plug Mode in BIOS (UEFI) setting is Legacy Mode.

- ① Re-boot into BIOS (UEFI) settings.
- ② If Thunderbolt PCIe Hot plug mode is “Legacy Mode”, change it to “Native + Low Power Mode”.

Below is the HP BIOS settings sample.



Step-5: If the above BIOS setting does not exit and the symptom still occurs, try the followings.

- Use [known-good cable](#)
- Use another known-good laptop PC
- Use PCIe Thunderbolt card for desktop PC which the desktop PC maker recommends

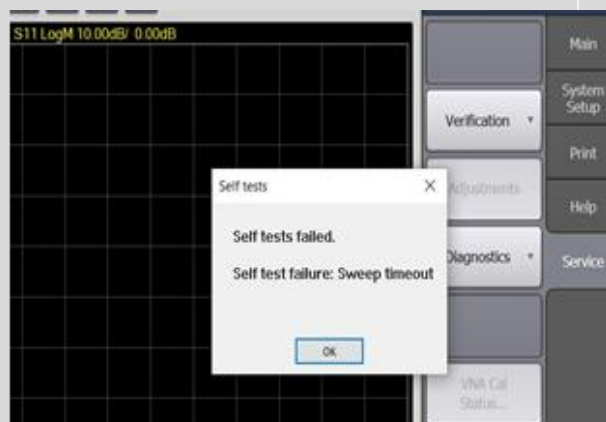
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom

#3-10-5

“Self test failure: Sweep timeout” error message is shown



Possible root cause

Interconnect cables for LO or control cable is not connected properly or broken.

Solution

- ① Check if the control cable (Black) is connected properly. If the connection is missing or loosened, connect it and tighten it with the nuts as shown in the image below.
- ② If the symptom still occurs, replace the control cable.

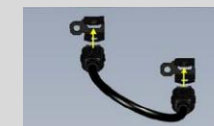


1 VNA operation
of Streamline Series VNA A
model with 2 modules or
of Streamline Series VNA B
model with 2 modules

2 VNA operation



nuts



[2 VNA multiport connection]

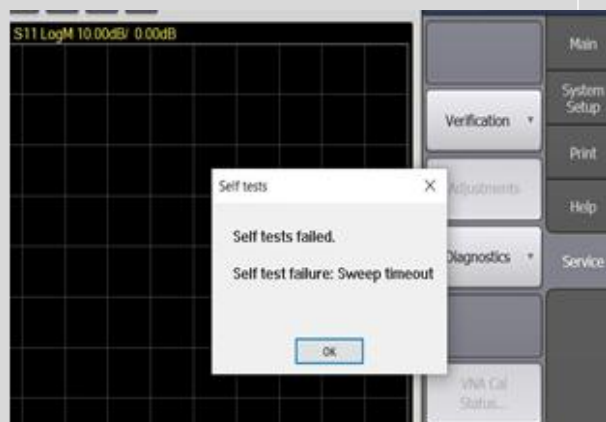
Refer to https://helpfiles.keysight.com/csg/pxivna/S0_Start/Multiport_and_Multisite_Configuration.htm#P937xA_Multiport_VNA

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom

#3-10-5
“Self test failure: Sweep timeout”
error message is shown



Possible root cause

Incorrectly configured chassis number for primary and secondary chassis in Connection Expert/ IOLS.

Solution

① Check if the control cable is connected in the correct direction. To configure a unit into a primary chassis, it needs to be assigned with a lower chassis# in IOLS than secondary chassis.

Primary chassis will always output Ctrl-M and LO-out signal into secondary chassis Ctrl-S and LO-in.

[2 VNA multiport connection]

Refer to

https://helpfiles.keysight.com/csg/pxivna/S0_Start/Multiport_and_Multisite_Configuration.htm#P937xA_Multiport_VNA

Note: In the multiport configuration using 2 modules, it is critical that the correct chassis number be assigned to the “primary” chassis. The primary chassis must have the lowest chassis number.

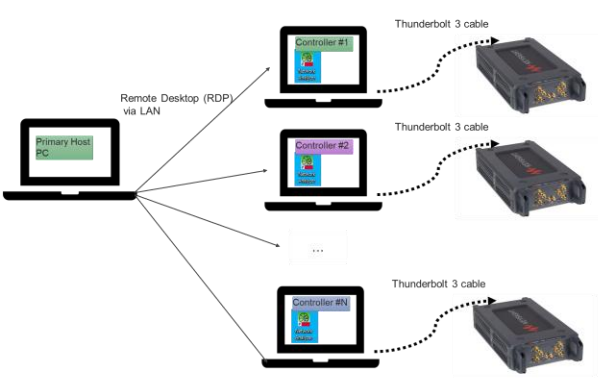
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-6 [Streamline Series VNA B model only] Hot plug-in/out¹ of VNA is not working correctly on non-English (Traditional Chinese and Simplified Chinese) OS. PC re-boot is required to recognize the VNA after hot plug-in. Note: 1. Hot plug-in/out is a function that PC can recognize Thunderbolt device while connecting or disconnecting Thunderbolt cable without re-booting the PC.	KtPUsbChassis IVI.NET driver 1.1.8 and KtPUsbChassis IVI-C driver 1.1.8 cannot handle non-English code properly.	Install VNA firmware A.15.75.22 or newer

4. Troubleshooting tips 3-10

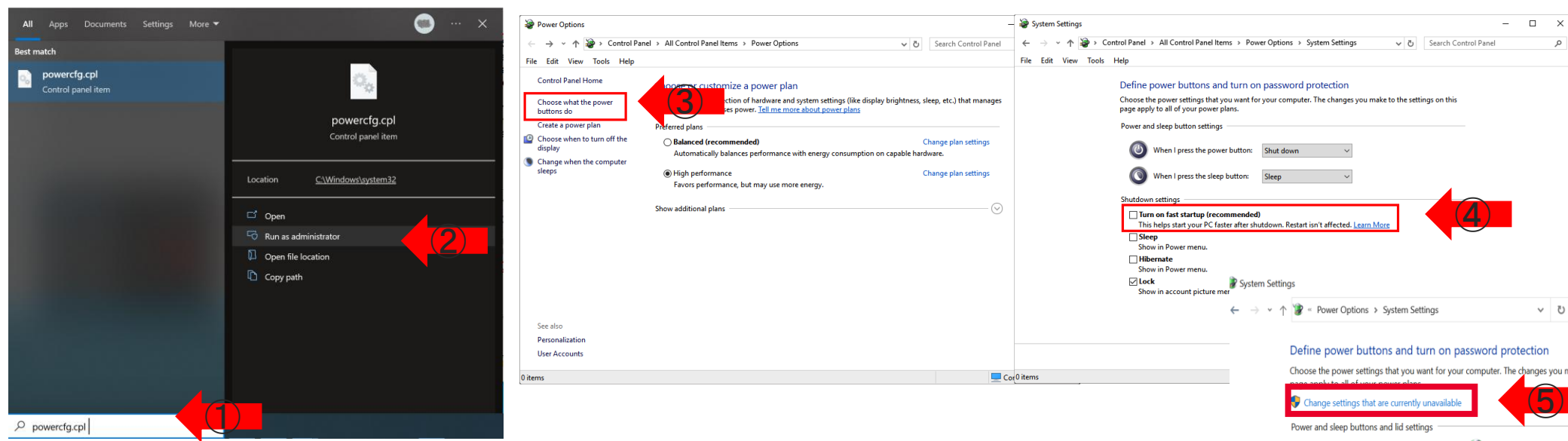
3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-7 [Streamline Series VNA B model only] When user tries to access Streamline B model remotely via Remote Desktop (remote logon after controller PC reboot), Streamline B model cannot be recognized until user manually logon the controller PC with physical keyboard. 	Windows Kernel DMA Protection blocks an external access to Thunderbolt device. <i>When Kernel DMA Protection is enabled: Peripherals with DMA Remapping-compatible device drivers are automatically enumerated and started. Peripherals with DMA Remapping-incompatible drivers are blocked from starting if the peripheral was plugged in before an authorized user logs in, or while the screen is locked. Once the system is unlocked, the peripheral driver is started by the OS, and the peripheral continues to function normally until the system is rebooted, or the peripheral is unplugged. The peripheral will continue to function normally if the user locks the screen or signs out of the system.</i> Kernel DMA Protection Microsoft Learn	Solution 1: Disable Kernel DMA Protection. For more information on how this works and how to prevent it, refer to the following document from Microsoft and configure it appropriately https://docs.microsoft.com/en-us/windows/security/information-protection/kernel-dma-protection-for-thunderbolt Solution 2: Enable auto-logon to Windows. If user intends to enable the Kernel DMA Protection function, configure the controller PC to enable auto-logon upon reboot. For more information on how this works, refer to the following document from Microsoft and configure it appropriately. https://learn.microsoft.com/en-us/sysinternals/downloads/autologon

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-8 [Streamline Series VNA B model only] When PC is resumed, Streamline B model cannot be recognized.	Fast Startup disconnects Thunderbolt device.	Disable Fast Startup. ① Enter powercfg.cpl at Windows Search ② Execute powercfg.cpl with administrator privilege ③ Select “Choose what the power buttons do” from the menu on left. ④ Uncheck the box of “Turn on fast startup”. ⑤ If these options are greyed out, then select “Change settings that are currently unavailable” and go to ④ again

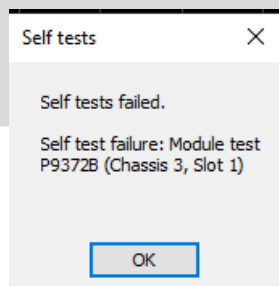


4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom

#3-10-9
VNA shuts down intermittently, after running for an extended period of time. Sometimes error like “Self test failure: Module test Pxxxx (Chassis x, Slot x) is shown



Possible root cause

One of possible cause is overheating.

[Streamline Series VNA A model only]

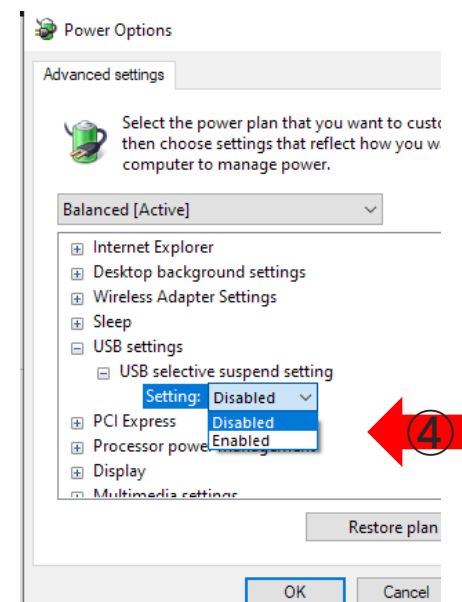
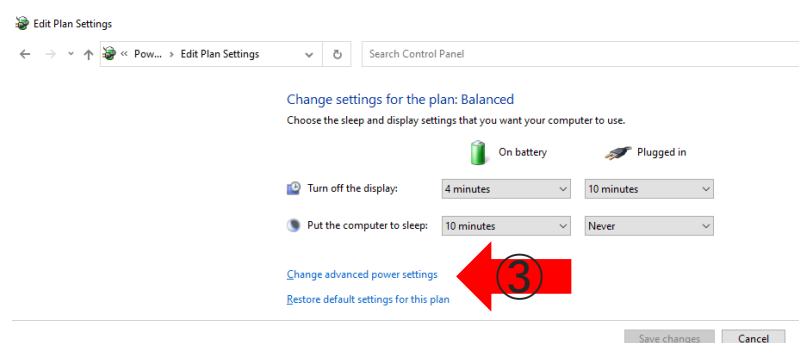
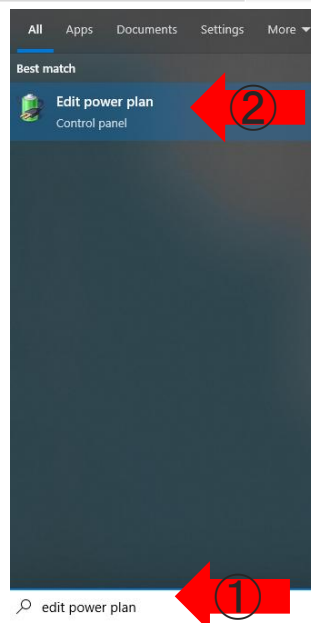
Another possible cause is Windows power settings interfering with VNA operation

Solution

Remove dust and air blockage from around the VNA, increase airflow however possible

Disable automatic USB shutoff in Windows

- ① Enter Edit power plan at Windows Search
- ② Select Edit power plan
- ③ Select Change advanced power settings
- ④ Navigate to USB settings > USB selective suspend setting and turn this Disabled:



4. Troubleshooting tips 3-10

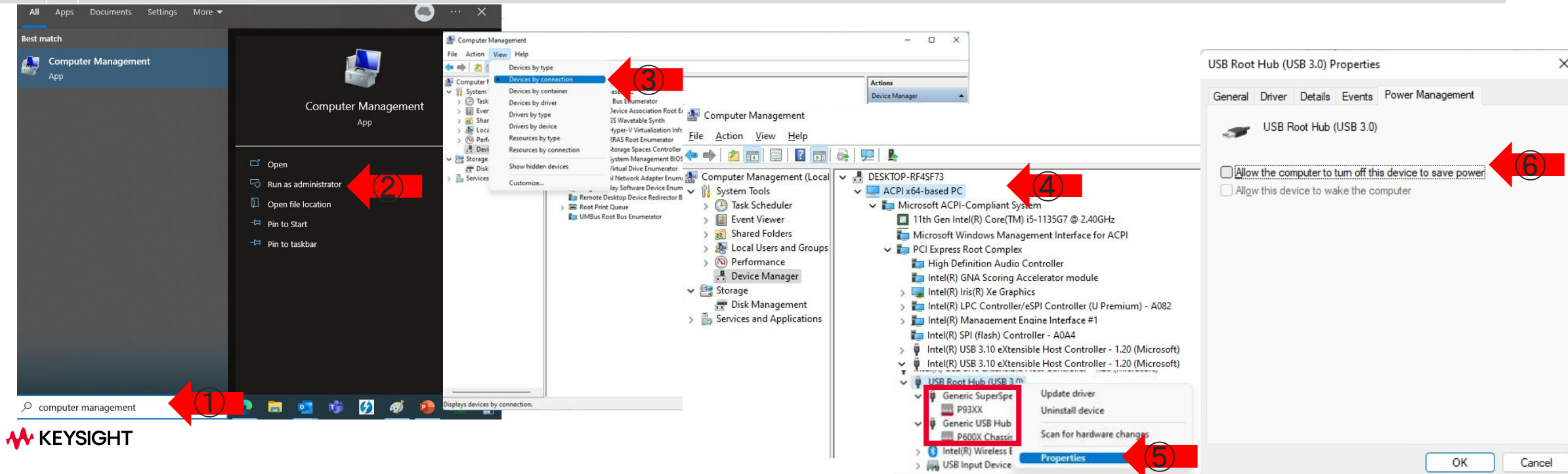
3-10. VNA firmware halts or shows error message

Solution (cont.)

#3-10-9

Disable automatic USB shutoff in Windows.

- ① Enter Computer Management at Windows Search
- ② Execute Computer Management with administrator privilege
- ③ Navigate to Device Manager > View > Devices by connection
- ④ Navigate to ACPI x64-based PC > Microsoft ACPI-Compliant System > PCI Express Root Complex > Intel® USB 3.10 eXtensible Host Controller – 1.20 (Microsoft) > the Keysight devices labelled "P50xx USB VNA" and "P600X Chassis"
- ⑤ Select the USB Root hub one level above these items and open Properties
- ⑥ Uncheck "Allow the computer to turn off this device to save power" in the Power Management tab



4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Solution (cont.)

#3-10-9	If the symptom still occurs, return it to Keysight for repair.
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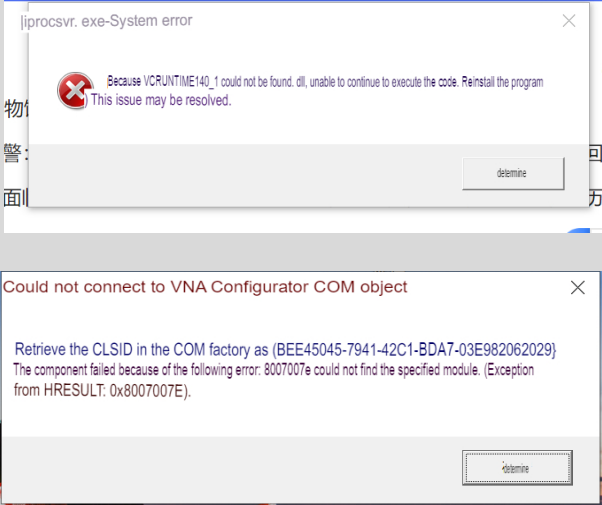
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-10 DSP Execution Error is shown 	When DSP cannot receive the whole measurement data within the specified time, this error message is shown. There are some root causes found. #1. Command list size is bigger than FPGA processing capability #2. Contact failure due to • PCIe connector lubricant • control cable connector contamination • control cable physical stress. • solder residual on backplane board • flux residual on backplane board	Step1: Check if control cable is connected properly. Go to Troubleshooting tips #3-10-5. Step2: If the symptom still occurs, try Workaround for #1. Workaround for #1 If user measures multiple sweeps per channel, VNA firmware sends one command list per channel. Keysight workaround proposal is to send one command per sweep. Ask Keysight for more details. Step3: If the symptom occurs continuously, return it to Keysight for repair.

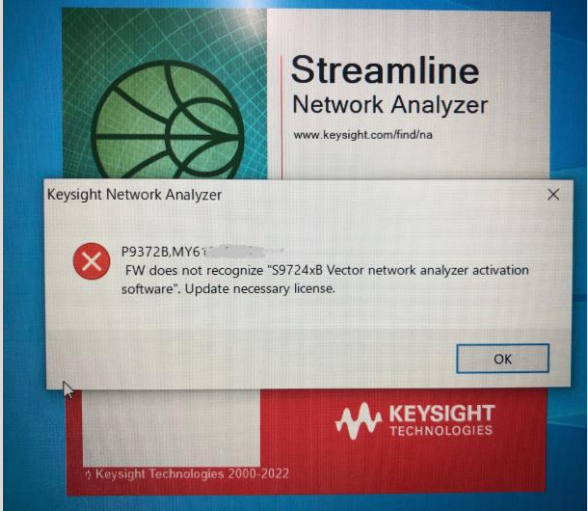
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-11 DLL & COM error is shown. 	Microsoft Visual C++ 2015-2019 versions are missing or corrupted.	Download and install x64 for Visual C++ 2015/2017/2019 from Latest supported Visual C++ Redistributable downloads Microsoft Learn Refer to VCRUNTIME140_1.dll Missing: where to get? - Microsoft Community

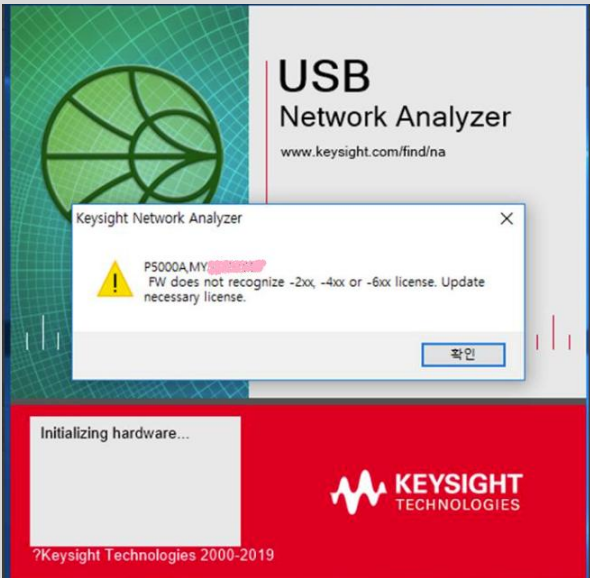
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-12 FW does not recognize “S97824xB Vector network analyzer activation software” Update necessary license pop-up is shown. 	FW bug to check the required license	Install VNA firmware A.15.60.05 or newer

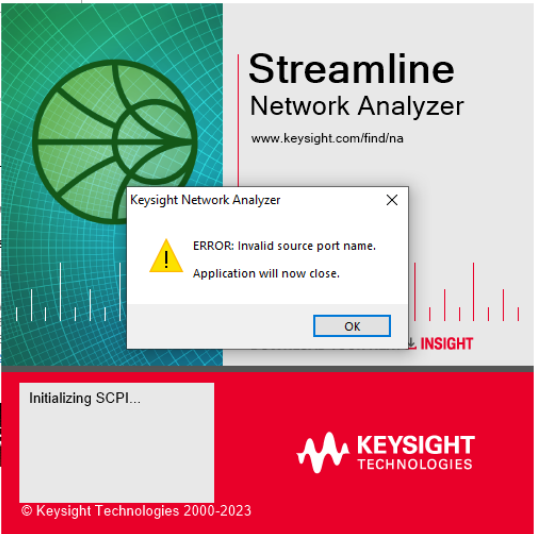
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-13 FW does not recognize -2xx,-4xx or -6xx license. Update necessary license pop-up is shown. 	KLM license is expired	Check the license in Keysight License Manager Update necessary license, if the license is expired.

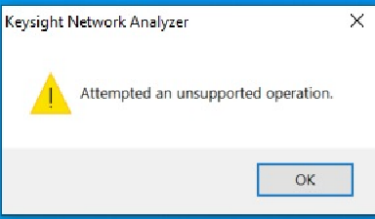
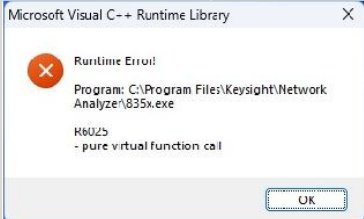
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-14 Invalid source port name error is shown. 	VNA firmware detects a different number of physical source ports than the installed option	① Uninstall VNA firmware and delete the below folders. C:\ProgramData\Keysight\Network Analyzer C:\Program Files\Keysight\Network Analyzer C:\Users\Public\Public Documents\Network Analyzer ② Install the latest VNA firmware again

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

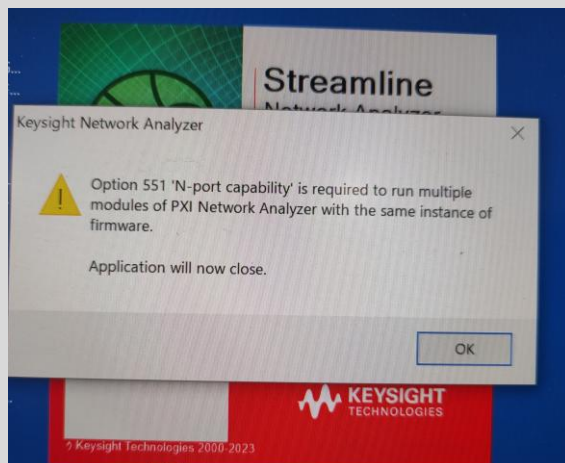
Symptom	Possible root cause	Solution
#3-10-15 The trigger operation failed. Application will now close error is shown.   	Interconnect cables for LO or control cable is not connected properly or broken.	Go to Troubleshooting tips #3-10-5

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom

#3-10-16
Option 551 'N-port capability' is required error is shown.



Possible root cause

S97551B-1FP license is not loaded to Keysight License Manager.

Solution

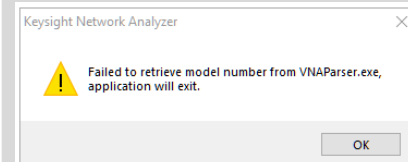
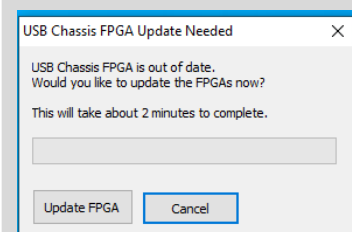
Go to [Troubleshooting tips #3-9-2](#)

4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom

#3-10-17
During USB Chassis FPGA Update, “Failed to retrieve model number from VNAParser.exe, application will exit.” error and “VNA Parser has encountered a problem” error are shown.

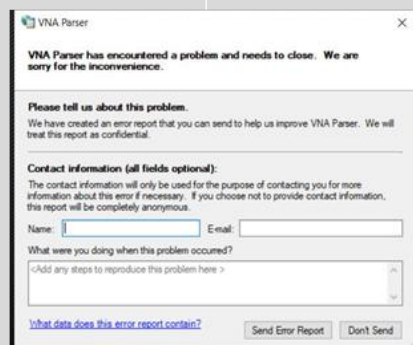


Possible root cause

SCPII parser is crashed during VNA FW installation.

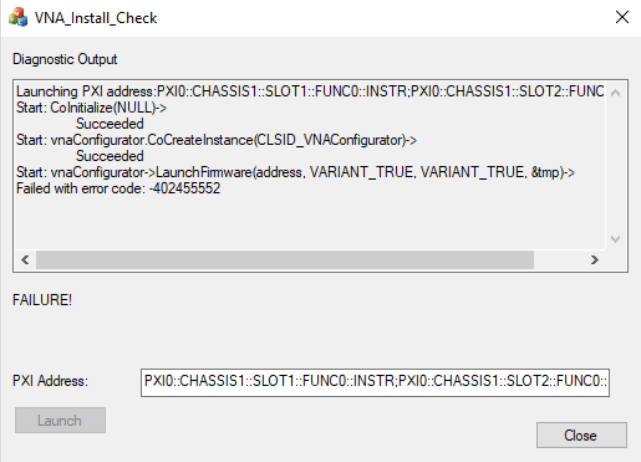
Solution

Go to [Troubleshooting Tips#3-10-4](#) Step-2.



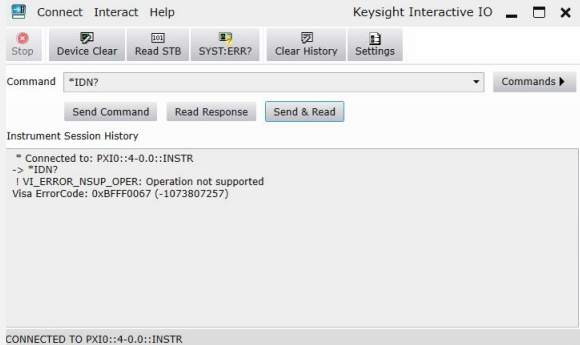
4. Troubleshooting tips 3-10

3-10. VNA firmware halts or shows error message

Symptom	Possible root cause	Solution
#3-10-18 Other VNA firmware installation issue		Further investigation is required to solve the VNA firmware installation issue. ① Download the diagnostic tool (VNA_Install_Check.exe) from https://files.keysight.com/dl/ljMqqBP1rm ② Launch the diagnostic tool ③ If you see Failure!, copy the Diagnostic Output and send it to Keysight. 

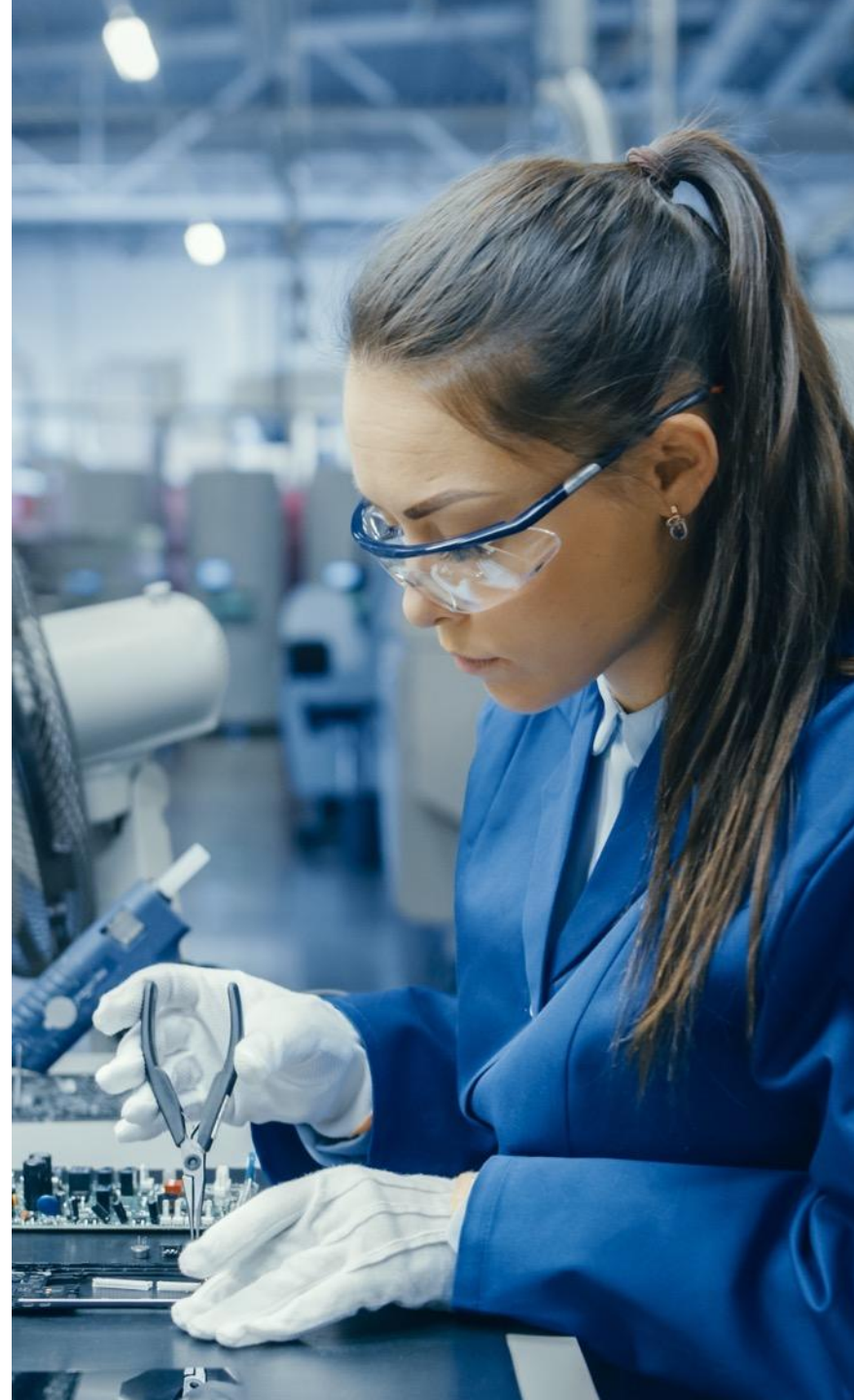
4. Troubleshooting tips 3-11

3-11. Remote communication does not work well

Symptom	Possible root cause	Solution
#3-11-1 Device Licenses Changed dialog is not shown.	Agilent License Service is not working	Go to Troubleshooting tips #3-5-1
#3-11-2 *IDN? shows ! VI_ERROR_NSUP_OPER: Operation not supported Visa ErrorCode: 0xBFFF0067 (- 1073807257) 	Remote Interface is not set up correctly	Go to 3-11. Communicate remotely using LAN (TCPIP)

Appendix

- Thunderbolt PC and Streamline Series VNA B model compatibility list
- PC makers' driver download page
- Proven latest versions
- VNA firmware revision history
- Contact Keysight – Issue sharing



Thunderbolt 3 PC and Streamline Series VNA B model compatibility list

PCs with Thunderbolt 3 interface in the list are verified to work with P50xxB/P93xxB VNAs

PC Maker	PC model name	CPU Gen - Code name	CPU	OS	Microsoft Windows	BIOS	Thunderbolt Controller (chipset) Gen	# of Thunderbolt3 connectors	Single VNA operation (1module model) ¹	Single VNA operation (2modules model) ²	Two VNA operation (star topology ³)	Two VNA operation (daisy topology ⁴)	Verified by
Laptop/Mobile workstation													
Dell	Latitude 7410	10 th Gen - Comet Lake	Intel Core i7-10810U	Windows 10 Business (x64)		1.19.0, 11/7/2022	15EB	2	Pass	Pass	Pass	Pass	end user
Dell	Precision 5530	8 th Gen - Coffee Lake	Intel Core i7-8850H	Windows 11 Professional (x64)		1.31.0, 3/13/2023	15D9	1	Pass	Pass	N/A	Pass	Keysight
Dell	Precision 5540	9 th Gen - Coffee Lake	Intel Xeon E-2276M	Windows 10 Professional (x64)		1.23.0, 7/18/2023	unknown	1	Pass	Pass	N/A	Pass	end user
Dell	Precision 5550	10 th Gen - Comet Lake	Intel Core i7-10750H	Windows 10 Professional (x64)		1.6.1, 1/14/2021	15EB	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 7550	10 th Gen - Comet Lake	Intel Core i7-10850H	Windows 10 Professional (x64)		1.22.0, 3/21/2023	15EB	2	Pass	Pass	Pass	Pass	Keysight
Dell	XPS 15 9560	7 th Gen - Kaby Lake	Intel Core i7-7700HQ	Windows 10 Professional (x64)		1.22.1, 3/24/2021	unknown	1	Pass	not tested	N/A	not tested	end user
HP	EliteBook 830 G6	8 th Gen – Whiskey Lake	Intel Core i5-8365U	Windows 10 Professional (x64)		R70 Ver 01.12.20	15EB	1	Pass	not tested	N/A	not tested	end user
HP	EliteBook 830 G7	10 th Gen - Comet Lake	Intel Core i5-10210U	Windows 10 Professional (x64)		unknown	15EB	2	Fail	not tested	not tested	not tested	end user
HP	EliteBook 840 G5	8 th Gen - Coffee Lake	Intel Core i5-8350U	Windows 10 Enterprise (x64)		unknown	15E8	1	Pass	not tested	not tested	not tested	end user
HP	EliteBook 840 G6	8 th Gen – Whiskey Lake	Intel Core i5-8365U	Windows 10 Professional (x64)		R70 Ver.01.20.00, 5/10/2022	15E8	1	Pass	Pass	N/A	Fail	end user
HP	EliteBook 840 G7	10 th Gen - Comet Lake	Intel Core i5-10310U	Windows 10 Professional (x64)		S70 Ver.01.09.00, 5/10/2022	15EB	1	Pass	Pass ⁵	N/A	Pass	Keysight
HP	ZBook 15 G4	7 th Gen - Kaby Lake	Intel Core i7-7028HQ	Windows 10 Professional (x64)		P70 Ver.01.41, 4/29/2022	15EB ⁶	2	Pass	not tested	not tested	not tested	end user
HP	ZBook 15 G5	8 th Gen - Coffee Lake	Intel Core i7-8850H	Windows 10 Professional (x64)		Q70 Ver 01.19.00, 1/27/2022	15EB	2	Pass	Pass	Pass	not tested	end user
HP	ZBook 15 G6	9 th Gen - Coffee Lake	Intel Core i9-9880H	Windows 10 Professional (x64)		R92 Ver 01.23.00, 11/29/2022	15EB	2	Pass	Pass	Pass	Pass	Keysight
HP	Zbook Power G7	10 th Gen - Comet Lake	Intel Core i7-10850H	Windows 10 Enterprise (x64)		T75 Ver 01.12.00, 3/1/2023	15EB	1	Pass	Pass	N/A	Pass	Keysight
HP	ZBook Studio G7	10 th Gen - Comet Lake	Intel Core i7-10750H	Windows 10 Professional (x64)		S91 Ver.01.90.00, 5/10/2022	15EB	2	Pass	Pass	Pass	Pass	Keysight
HP	ZBook Firefly 14 G7	10 th Gen - Comet Lake	Intel Core i7-10810U	Windows 10 Professional (x64)		S70 Ver.01.03.02, 4/11/2020	15EB	2	Pass	Pass	Pass	Pass	Keysight
HP	ZBook Firefly 14 G7	10 th Gen - Comet Lake	Intel Core i7-10810U	Windows 10 Professional (x64)		S70 Ver.01.12.00, 4/1/2023	15EB	2	Fail	not tested	not tested	not tested	Keysight
Lenovo	ThinkPad P1 Gen2	9 th Gen - Coffee Lake	Intel Core i7-9850H	Windows 10 Professional (x64)		unknown	15EB	2	Pass	not tested	not tested	not tested	end user
Lenovo	ThinkPad P52	8 th Gen - Coffee Lake	Intel Core i7-8750H	Windows 10 Professional (x64)		N2CET67W (1.50), 12/15/2022	15EB	2	Pass	Pass	Pass	Pass	Keysight
Lenovo	ThinkPad P53	9 th Gen - Coffee Lake	Intel Core i7-9850H	Windows 10 Professional (x64)		N2NUJ21W (1.36), 3/30/2022	15EB	2	Pass	Pass	Pass	Pass	Keysight
Lenovo	ThinkPad X1 Carbon Gen 8	10 th Gen - Comet Lake	Intel Core i7-10510U	Windows 10 Home (x64)		N2WUJ22W (1.26), 4/27/2022	15D2	2	Pass	not tested	not tested	not tested	end user
LG	gram 14Z90N-VR51J	10 th Gen - Ice Lake	Intel Core i5-1035G7	Windows 10 Home (x64)		C2ZE0210 X64, 02/02/2022	8A17	1	Pass	Pass ⁵	N/A	not tested	end user
LG	gram 15ZB95N	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Enterprise (x64)		unknown	15EB	1	Pass	Pass ⁵	N/A	not tested	end user
Panasonic	CF-LV8RD7VS	8 th Gen – Whiskey Lake	Intel Core i5-8365U	Windows 10 Professional (x64)		unknown	15D9	1	Pass	not tested	N/A	not tested	end user
Panasonic	CF-SV9	10 th Gen - Ice Lake	Intel Core i5-10210U	Windows 10 Professional (x64)		005142, 11/20/2023	unknown	1	Pass	not tested	N/A	not tested	end user
Toshiba	Dynabook UZ63/L	8 th Gen – Whiskey Lake	Intel Core i7-8565U	Windows 10 Home (x64)		v4.10, 12/16/2021	unknown	2	Pass	Pass	not tested	not tested	end user

- Note:
1. 1 module model: P93xxB, P500xB, P5020B-400/600, P5021B-400/600, P5022B-400/600, P5023B-400/600, P5024B-400/600

2. 2 modules model: P5020B-402, P5021B-402, P5022B-402, P5023B-402, P5024B-402, P5025B, P5026B, P5027B, P5028B

3. Two VNA operation with star topology requires two Thunderbolt ports on a single PC. This topology is not available with a PC with a single Thunderbolt port.

4. Two VNA operation with daisy topology requires only one Thunderbolt port on a single PC. This topology is available with a PC with a single Thunderbolt port.

5. If PC cannot detect 2 modules model with Code12 error in Device Manager, a registry change is required.

6. Thunderbolt Controller chipset driver was copied from Zbook 15 G5.



Thunderbolt 3 PC and Streamline Series VNA B model compatibility list

PCs with Thunderbolt 3 interface in the list are verified to work with P50xxB/P93xxB VNAs

PC Maker	PC model name	CPU Gen - Code name	CPU	OS	Microsoft Windows	BIOS	Thunderbolt Controller (chipset) Gen	# of Thunderbolt3 connectors	Single VNA operation (1module model) ¹	Single VNA operation (2modules model) ²	Two VNA operation (star topology ³)	Two VNA operation (daisy topology ⁴)	Verified by
Desktop	When configuring the PC on the manufacturer's website, you must select an option to include a PCIe Thunderbolt 3 card installed in the PC.												
Dell	Optiplex 7070 Tower	9 th Gen - Coffee Lake	Intel Core i7-9700	Windows 10 Professional (x64)		1.0.3, 5/30/2019	15D2	2	Pass	Pass	Fail	Fail	Keysight
Dell	Optiplex 7090 Tower	10 th Gen - Comet Lake	Intel Core i9-10900K	Windows 11 Professional (x64)		1.15.0, 12/6/2021	15D2 ^{7.#}	1	Pass	Pass	N/A	Pass	Keysight
Dell	Precision 3660 Tower	12 th Gen - Alder Lake	Intel Core i7-12700	Windows 11 Professional (x64) for Workstations		2.2.0, 2/14/2023	15D2 ^{7.#}	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 5820 Tower	6 th Gen - Skylake	Intel Xeon W-2135	Windows 10 Professional (x64) for Workstations		2.0.2, 2/27/2020	15D2 ^{8.#}	2	Pass	Pass	Fail	Fail	Keysight
HP	Z4 G4	6 th Gen - Skylake	Intel Xeon W-2123	Windows 10 Enterprise (x64)		P61 Ver.02.91, 3/22/2023	15D2 ⁹	2	Pass ¹⁰	Pass ^{5,10}	Pass ¹⁰	Pass ^{5,10}	Keysight
HP	Z6 G4	6 th Gen - Skylake	Intel Xeon Silver 4114	Windows 10 Professional (x64) for Workstations		P60 Ver.02.91, 3/22/2023	15D2 ⁹	2	Pass ¹⁰	Pass ^{5,10}	Pass ¹⁰	Pass ^{5,10}	Keysight
Mini-PC													
Asus	PN62	10 th Gen - Comet Lake	Intel Core i7-10710U	Windows 11 Professional (x64)		1006, 9/15/2022	15BF	1	Pass	Pass ⁵	N/A	Pass ⁵	Keysight
PXle embedded PC controller													
Keysight	M9038A	9 th Gen - Coffee Lake	Intel Core i7-9850HE	Windows 10 Enterprise (x64)		KS08.0, 7/25/2022	15EB	2	Pass	Pass	Pass	Pass	Keysight
Mother Board													
Asus	Prime H670-Plus D4	12 th Gen - Alder Lake	Intel H670	unknown		2212, 1/12/2023	15EB ¹³	2	Pass	not tested	not tested	not tested	end user

Note:				
1. 1 module model: P93xxB, P500xB, P5020B-400/600, P5021B-400/600, P5022B-400/600, P5023B-400/600, P5024B-400/600				
2. 2 modules model: P5020B-402, P5021B-402, P5022B-402, P5023B-402, P5024B-402, P5025B, P5026B, P5027B, P5028B				
3. Two VNA operation with star topology requires two Thunderbolt ports on a single PC. This topology is not available with a PC with a single Thunderbolt port.				
4. Two VNA operation with daisy topology requires only one Thunderbolt port on a single PC. This topology is available with a PC with a single Thunderbolt port.				
5. If PC cannot detect 2 modules model with Code12 error in Device Manager, a registry change is required.				
7. tested with Thunderbolt 3 extended PCIe card, FH5T4				
8. tested with Thunderbolt 3 extended PCIe card, R9MN8				
9. tested with Thunderbolt 3 extended PCIe card, 3UU05AA				
10. 3UU05AA is unstable to communicate with P50xxB/P93xxB.				
Known issues: (1) Only Port-A of Controller PC can communicate with P50xxB/P93xxB, due to PCIe resource limitations.				
(2) 2m/40Gbps Thunderbolt 3 active cable cannot communicate with P50xxB/P93xxB both on Port-A and on Port-B.				
13. tested with Thunderbolt 3 extended PCIe card, ThunderboltEX 3-TR (ASUS)				
*. FPGA update pass with IO monitor workaround (#3-10-4 Step-2)				
#. BSOD occurs when launching VNA firmware				

Thunderbolt 4 PC and Streamline Series VNA B model compatibility list

PCs with Thunderbolt 4 interface in the list are verified to work with P50xxB/P93xxB VNAs

PC Maker	PC model name	CPU Gen - Code name	CPU	OS Windows	Microsoft BIOS	Thunderbolt Controller (chipset) Gen	# of Thunderbolt4 connectors	Single VNA operation (1module model) ¹	Single VNA operation (2modules model) ²	Two VNA operation (star topology ³)	Two VNA operation (daisy topology ⁴)	Verified by
Laptop/Mobile workstation												
Acer	Swift SF314-511	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Home (x64)	v1.06, 7/19/2021	9A1B	1	Pass	not tested	N/A	not tested	end user
Asus	TUF Gaming F15	12 th Gen - Alder Lake-P	Intel Core i7-12700H	Windows 11 Home (x64)	Version 311, 8/30/2022	N/A (USB4)	1	Pass	Pass ⁵	not tested	not tested	end user
Asus	Zenbook UX425EA	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Home (x64)	Version 309, 12/25/2021	9A1B/9A1D	2	Pass	not tested	not tested	not tested	end user
Dell	Inspiron 16 Plus 7620	12 th Gen - Alder Lake-P	Intel Core i7-12700H	Windows 11 Professional (x64)	1.4.0, 7/14/2022	N/A (USB4)	1	Pass	not tested	not tested	not tested	end user
Dell	Latitude 5320	11 th Gen - Tiger Lake	Intel Core i7-1185G7	Windows 11 Professional (x64)	1.26.2, 3/2/2023	9A1B	2	Pass	Pass	Pass	Pass	Keysight
Dell	Latitude 5440	13 th Gen - Raptor Lake	Intel Core i7-1370P	Windows 11 Professional (x64)	1.10.0, 8/11/2023	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Latitude 5520	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 10 Professional (x64)	1.18.1, 5/9/2022	9A1B	2	Pass	Pass	not tested	not tested	end user
Dell	Latitude 5530	12 th Gen - Alder Lake-P	Intel Core i7-1265U	Windows 10 Professional (x64)	1.12.0, 3/17/2023	463E	2	Pass	Pass	Pass	Pass	Keysight
Dell	Latitude 5531	12 th Gen - Alder Lake-P	Intel Core i7-12800H	Windows 10 Professional (x64)	1.13.0, 10/3/2023	463E	2	Pass	Pass	Pass	Pass	Keysight
Dell	Latitude 5531	12 th Gen - Alder Lake-P	Intel Core i7-12800H	Windows 11 Professional (x64)	1.13.0, 10/3/2023	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Latitude 5550	Series 1 - Meteor Lake	Intel Core Ultra 7 165U	Windows 11 Professional (x64)	1.8.0, 10/9/2024	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Latitude 7420	11 th Gen - Tiger Lake	Intel Core i7-1185G7	Windows 10 Business (x64)	1.20.0, 10/17/2022	9A1B	2	Pass	Pass	Pass	Pass	end user
Dell	Latitude 7520	11 th Gen - Tiger Lake	Intel Core i7-1185G7	Windows 11 Professional (x64)	1.4.4, 3/9/2021	9A1B	2	Pass	not tested	not tested	not tested	end user
Dell	Latitude 7530	12 th Gen - Alder Lake-P	Intel Core i7-1265U	Windows 10 Professional (x64)	1.13.0, 3/13/2023	463E	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 3560	11 th Gen - Tiger Lake	Intel Core i7-1185G7	Windows 10 Professional (x64)	1.11.1, 8/13/2021	9A1B	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 3560	11 th Gen - Tiger Lake	Intel Core i7-1185G7	Windows 10 Professional (x64)	1.27.0, 3/17/2023	9A1B	2	Fail	not tested	not tested	not tested	Keysight
Dell	Precision 3561	11 th Gen - Tiger Lake	Intel Core i7-11850H	Windows 10 Enterprise (x64)	1.11.1, 4/14/2022	9A1F	2	Pass	Pass	not tested	not tested	end user
Dell	Precision 3571	12 th Gen - Alder Lake-P	Intel Core i7-12700H	Windows 11 Professional (x64)	1.17.1, 9/18/2023	N/A (USB4)	2	Pass	Pass ⁵	Pass	Pass ⁵	end user
Dell	Precision 3581	13 th Gen - Raptor Lake	Intel Core i9-13900	Windows 11 Professional (x64)	1.4.1, 5/31/2023	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 3591	Series 1 - Meteor Lake	Intel Core Ultra 7 165H	Windows 11 Enterprise (x64)	1.14.1, 4/10/2025	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 5560	11 th Gen - Tiger Lake	Intel Core i7-11850H	Windows 10 Enterprise (x64)	1.12.0, 7/14/2022	9A21	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
Dell	Precision 5570	12 th Gen - Alder Lake-P	Intel Core i9-12900	Windows 10 Professional (x64)	1.12.0, 3/15/2023	463E	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 7670	12 th Gen - Alder Lake-P	Intel Core i7-12850HX	Windows 10 Professional (x64)	1.3.1, 7/14/2022	1137*	2	Pass	Pass	Pass	Pass	end user
Dell	Precision 7670	12 th Gen - Alder Lake-P	Intel Core i9-12950HX	Windows 10 Professional (x64)	1.8.0, 11/17/2022	1137*	2	Pass	not tested	not tested	not tested	end user
Dell	XPS 15 9530	13 th Gen - Raptor Lake	Intel Core i7-13700H	Windows 11 Professional (x64)	1.13.0, 4/11/2024	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	XPS 16 9640	Series 1 - Meteor Lake	Intel Core Ultra 9 185H	Windows 11 Professional (x64)	1.10.0, 11/11/2024	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	XPS 17 9720	13 th Gen - Raptor Lake	Intel Core i7-13700H	Windows 11 Professional (x64)	1.20.0, 11/10/2023	N/A (USB4)	4	Pass	not tested	not tested	not tested	end user
Dell	Vostro 7620	12 th Gen - Alder Lake-P	Intel Core i7-12700H	Windows 11 Professional (x64)	1.4.0, 7/14/2022	N/A (USB4)	1	Pass	not tested	not tested	not tested	end user
Note:												
1. 1 module model: P93xxB, P500xB, P5020B-400/600, P5021B-400/600, P5022B-400/600, P5023B-400/600, P5024B-400/600												
2. 2 modules model: P5020B-402, P5021B-402, P5022B-402, P5023B-402, P5024B-402, P5025B, P5026B, P5027B, P5028B												
3. Two VNA operation with star topology requires two Thunderbolt ports on a single PC. This topology is not available with a PC with a single Thunderbolt port.												
4. Two VNA operation with daisy topology requires only one Thunderbolt port on a single PC. This topology is available with a PC with a single Thunderbolt port.												
5. If PC cannot detect 2 modules model with Code12 error in Device Manager, a registry change is required.												
*. FPGA update pass with VNA FW A.17.05.10												
 KEYSIGHT											108	

Thunderbolt 4 PC and Streamline Series VNA B model compatibility list

PCs with Thunderbolt 4 interface in the list are verified to work with P50xxB/P93xxB VNAs

PC Maker	PC model name	CPU Gen - Code name	CPU	OS Windows	Microsoft BIOS	Thunderbolt Controller (chipset) Gen	# of Thunderbolt4 connectors	Single VNA operation (1module model) ¹	Single VNA operation (2modules model) ²	Two VNA operation (star topology ³)	Two VNA operation (daisy topology ⁴)	Verified by
Laptop/Mobile workstation												
HP	Elite x2 G2 Tablet	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 11 Professional (x64)	T91 Ver.01.04.00, 5/18/2021	9A1B	2	Pass	Pass ⁵	not tested	not tested	end user
HP	EliteBook 830 G8	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Enterprise (x64)	T76 Ver.01.04.02, 6/25/2021	9A1B	2	Pass	not tested	not tested	not tested	end user
HP	EliteBook 840 Aero G8	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 10 Professional (x64)	T76 Ver.01.09.01, 5/24/2022	9A1B	2	Pass	not tested	not tested	not tested	end user
HP	EliteBook 840 G8	11 th Gen - Tiger Lake	Intel Core i5-1145G7	Windows 10 Enterprise (x64)	T76 Ver. 01.06.02, 8/12/2021	9A1B	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
HP	EliteBook 840 14" G9	12 th Gen - Alder Lake-P	Intel Core i5-1245U	Windows 10 Enterprise (x64)	U70 Ver.01.05.00, 12/30/2022	463E/466D	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
HP	EliteBook 840 G10	13 th Gen - Raptor Lake	Intel Core i7-1365U	Windows 11 Professional (x64)	V70 Ver.01.01.08, 5/30/2023	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
HP	EliteBook 850 G8	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 10 Professional (x64)	T76 Ver.01.12.10, 2/15/2023	9A1B	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
HP	OMEN 17-ck0906ng	11 th Gen - Tiger Lake	Intel Core i7-11800H	Windows 11 Home (x64)	unknown	unknown	1	Pass	not tested	N/A	not tested	end user
HP	ProBook 650 G8	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Professional (x64)	T72 Ver.01.09.01, 5/13/2022	9A1B	1	Pass	not tested	N/A	not tested	end user
HP	Spectre x360 Convertible 15-eb	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 11 Professional (x64)	AMI F08, 7/26/2021	9A1B	2	Pass	Pass ⁵	not tested	not tested	end user
HP	ZBook Firefly 14 G9	12 th Gen - Alder Lake-P	Intel Core i7-1260P	Windows 10 Professional (x64)	U71 Ver.01.05.00, 4/1/2023	463E/466D	2	Pass	Pass	Pass	Pass	Keysight
HP	ZBook Firefly 14 G9	12 th Gen - Alder Lake-P	Intel Core i7-1260P	Windows 11 Professional (x64)	U71 Ver.01.05.00, 4/1/2023	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
HP	ZBook Power 15.6 G8	11 th Gen - Tiger Lake	Intel Core i7-11850H	Windows 10 Professional (x64)	T81 Ver.01.12.00, 4/1/2023	9A1F	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
HP	ZBook Power 15.6 G9	12 th Gen - Alder Lake-P	Intel Core i7-12800H	Windows 10 Enterprise (x64)	U97 Ver.01.01.11, 5/24/2022	463E	1	Pass	Pass ⁵	N/A	Pass ⁵	Keysight
HP	Zbook Power 16 G11	Series 1 - Meteor Lake	Intel Core Ultra 7 165H	Windows 11 Enterprise (x64)	W97 Ver.01.07.00, 8/22/2025	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Lenovo	ThinkBook 14 Gen2 ITL	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Home (x64)	F8CN47WW (V2.10), 4/8/2022	9A1B	1	Pass	Pass ⁵	N/A	not tested	end user
Lenovo	ThinkBook 14s Yoga ITL	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 11 Professional (x64)	FNCN38WW, 4/25/2022	9A1B	1	Pass	not tested	N/A	not tested	end user
Lenovo	ThinkBook 15 Gen2 ITL	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 11 Professional (x64)	F8CN47WW (V2.10), 4/8/2022	9A1B	1	Pass	Pass ⁵	N/A	not tested	end user
Lenovo	ThinkBook 16 G7	AMD Zen 3+ Rembrant Refre	AMD Ryzen 7 7735HS	Windows 11 Enterprise (x64)	P6CN24WW, 1/4/2025	N/A (USB4)	1	Pass	Pass	N/A	Pass	Keysight
Lenovo	ThinkPad L15 Gen2	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Enterprise (x64)	R1JET55W (V1.55), 2/28/2022	9A1B	1	Pass	Pass ⁵	N/A	not tested	end user
Lenovo	ThinkPad P15s Gen2	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 10 Professional (x64)	N34ET55W(1.55), 2/14/2023	9A1B/9A1D	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
Microsoft	Surface Pro 9	12 th Gen - Alder Lake-P	Intel Core i7-1265U	Windows 11 Professional (x64)	Nov 2023 Update, 7/17/2023	N/A (USB4)	2	Pass	not tested	not tested	not tested	end user
MSI	Prestige 15 A11SB-469CA	11 th Gen - Tiger Lake	Intel Core i7-1185G7	Windows 10 Home (x64)	AMI E16S6IMS.119, 7/1/2022	9A1B	2	Pass	not tested	not tested	not tested	end user

Note:	
1. 1 module model: P93xxB, P500xB, P5020B-400/600, P5021B-400/600, P5022B-400/600, P5023B-400/600, P5024B-400/600	
2. 2 modules model: P5020B-402, P5021B-402, P5022B-402, P5023B-402, P5024B-402, P5025B, P5026B, P5027B, P5028B	
3. Two VNA operation with star topology requires two Thunderbolt ports on a single PC. This topology is not available with a PC with a single Thunderbolt port.	
4. Two VNA operation with daisy topology requires only one Thunderbolt port on a single PC. This topology is available with a PC with a single Thunderbolt port.	
5. If PC cannot detect 2 modules model with Code12 error in Device Manager, a registry change is required.	

Thunderbolt 4 PC and Streamline Series VNA B model compatibility list

PCs with Thunderbolt 4 interface in the list are verified to work with P50xxB/P93xxB VNAs

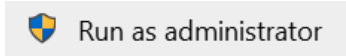
PC Maker	PC model name	CPU Gen - Code name	CPU	OS Windows	Microsoft BIOS	Thunderbolt Controller (chipset) Gen	# of Thunderbolt4 connectors	Single VNA operation (1module model) ¹	Single VNA operation (2modules model) ²	Two VNA operation (star topology) ³	Two VNA operation (daisy topology) ⁴	Verified by
Desktop	When configuring the PC on the manufacturer's website, you must select an option to include a PCIe Thunderbolt 4 card installed in the PC.											
Corsair	ONE i300	10 th Gen - Ice Lake	Intel Core i9-10900K	Windows 11 Professional (x64)	7D29v12, 2/22/2022	1137*	2	Pass	not tested	not tested	not tested	end user
Dell	Optiplex 7000 Tower	12 th Gen - Alder Lake-S	Intel Core i7-12700	Windows 11 Professional (x64)	1.9.0, 1/10/2023	N/A (USB4)	2	Pass	not tested	not tested	not tested	end user
Dell	Optiplex 7020 Tower	14 th Gen - Raptor Lake Refresh	Intel Core i7-14700	Windows 11 Professional (x64)	1.11.1, 8/11/2024	1137 ^{15, ^}	2	Pass	Pass	Pass	Pass	Keysight
Dell	Optiplex 7090 Tower	10 th Gen - Ice Lake	Intel Core i9-10900K	Windows 11 Professional (x64)	1.19.0, 7/3/2023	1137 ^{15,*}	2	Pass	Pass	Pass	Pass	Keysight
Dell	Poweredge R7610	Ivy Bridge EP	Intel Xeon E5-2697 v2	Windows 10 Professional (x64)	A07, 8/20/2014	1137 ^{15,*}	2	Pass	Pass	Pass	Pass	end user
Dell	Precision 3650 Tower	11 th Gen - Rocket Lake	Intel Core i7-11700	Windows 11 Professional (x64)	1.24.0, 7/12/2023	1137 ^{15,*}	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 3660 Tower	12 th Gen - Alder Lake-S	Intel Core i7-12700	Windows 11 Professional (x64) for WS	2.2.0, 2/14/2023	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Precision 3680 Tower	14 th Gen - Raptor Lake Refresh	Intel Core i9-14900	Windows 11 Professional (x64)	1.9.0, 9/20/2024	1137 ^{15, ^}	2	Pass	Pass	Pass	Pass	Keysight
Dell	Pro Max Tower T2	Series 2 - Arrow Lake	Intel Core Ultra 9 285K	Windows 11 Enterprise (x64)	1.6.1, 6/23/2025	N/A (USB4)	1	Pass	Pass	N/A	Pass	Keysight
HP	Envy TE02	12 th Gen - Alder Lake-S	Intel Core i9-12900K	Windows 11 Home (x64)	F.16 Rev.A, 9/14/2023	N/A (USB4)	1	Pass	Pass	N/A	not tested	end user
HP	Z1 G8 Tower	11 th Gen - Rocket Lake	Intel Core i9-11900	Windows 11 Professional (x64)	T01 Ver. 02.11.00, 12/21/2022	1134 ^{11,*}	1	Pass	Pass	N/A	Pass	Keysight
HP	Z2 G8 SFF	11 th Gen - Rocket Lake	Intel Core i5-11500	Windows 11 Professional (x64)	T50 Ver. 01.06.01, 2/10/2023	1134 ^{12,*}	1	Pass	Pass	N/A	Pass	Keysight
HP	Z2 G8 Tower	11 th Gen - Rocket Lake	Intel Xeon W-1370	Windows 11 Professional (x64) for WS	T50 Ver. 01.06.00, 2/10/2023	1134 ^{11,*}	1	Pass	Pass	N/A	Pass	Keysight
HP	Z4 G5 Tower	Sapphire Rapids	Intel Xeon W3-2423	Windows 10 Enterprise (x64)	HP U61 Ver. 01.02.17, 1/10/2025	1137 ^{16, ^}	2	Pass	Pass	Pass	Pass	Keysight
HP	Z8 G5 Fury Tower	Sapphire Rapids	Intel Xeon W5-3423	Windows 11 Professional (x64) for WS	HP U61 Ver. 01.02.17, 1/10/2025	1137 ^{16, ^}	2	Pass	Pass	Pass	Pass	Keysight
Mini-PC												
Asus	NUC 14 Pro AI	Series 2 - Lunar Lake	Intel Core Ultra 9 288V	Windows 11 Enterprise (x64)	0006.2024.1210.1520, 10/12/2024	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Asus	NUC 15 Pro	Series 2 - Arrow Lake	Intel Core Ultra 5 225H	Windows 11 Enterprise (x64)	CRARL579.0028.2025.1029.1430, 11/10/2025	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Dell	Optiplex 7090 Ultra UFF	11 th Gen - Tiger Lake	Intel Core i5-1145G7	Windows 10 Professional (x64)	1.4.1, 7/19/2021	9A1D	1	Pass	Pass	N/A	Pass	Keysight
GIGABYTE	GB-BSi7-1165G7	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 10 Professional (x64)	F9, 2/14/2022	9A1B	1	Pass	Pass	N/A	Pass	end user
Intel	NUC11TNHi5	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 11 Enterprise (x64)	0064, 2/17/2022	9A1B/9A1D	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
Intel	NUC11TNKi5	11 th Gen - Tiger Lake	Intel Core i5-1135G7	Windows 10 Professional (x64)	0057, 7/7/2021	9A1B/9A1D	2	Pass	not tested	Pass	not tested	end user
Intel	NUC11PAHi7	11 th Gen - Tiger Lake	Intel Core i7-1165G7	Windows 11 Professional (x64)	0050, 12/28/2022	9A1B/9A1D	2	Pass	Pass ⁵	Pass	Pass ⁵	Keysight
Intel	NUC 13 Pro	13 th Gen - Raptor Lake	Intel Core i7-1360P	Windows 11 Professional (x64)	ANRPL357.0027.2023.0607.1754, 7/10/2024	N/A (USB4)	2	Pass	Pass	Pass	Pass	Keysight
Minisforum	UM760 Slim	AMD Zen 4 Phoenix	AMD Ryzen 5 -7640HS	Windows 11 Professional (x64)	AMI, LLC. 1.08, 11/5/2024	N/A (USB4)	1	Pass	Pass	N/A	Pass	Keysight
Note:												
1. 1 module model: P93xxB, P500xB, P5020B-400/600, P5021B-400/600, P5022B-400/600, P5023B-400/600, P5024B-400/600												
2. 2 modules model: P5020B-402, P5021B-402, P5022B-402, P5023B-402, P5024B-402, P5025B, P5026B, P5027B, P5028B												
3. Two VNA operation with star topology requires two Thunderbolt ports on a single PC. This topology is not available with a PC with a single Thunderbolt port.												
4. Two VNA operation with daisy topology requires only one Thunderbolt port on a single PC. This topology is available with a PC with a single Thunderbolt port.												
5. If PC cannot detect 2 modules model with Code12 error in Device Manager, a registry change is required.												
11. tested with Thunderbolt 4 extended PCIe card, 2A0B0AV												
12. tested with Thunderbolt 4 extended PCIe card, 3E4N1AV												
14. tested with Thunderbolt 4 extended PCIe card, ThunderboltEX 4 (ASUS)												
15. tested with Dell Thunderbolt 4 extended PCIe card, 7R4VG												
16. tested with HP Thunderbolt 4 extended PCIe card, 340L1AA												
*. FPGA update pass with VNA FW A.17.05.10												
^ .FPGA update pass with VNA FW A.19.30.21												

PC makers' driver download page

PC Maker	Driver Update page	Assistant tool
HP	Official HP® Drivers and Software Download HP® Customer Support	HP Support Assistant
Dell	Drivers & Downloads Dell US	SupportAssist
Intel	Intel® Driver & Support Assistant	Intel DSA
Lenovo	Official Lenovo Laptop, Accessories & PC Support - Lenovo Support US	Lenovo Vantage Lenovo US
Asus	Download Center Official Support ASUS USA	MyAsus Application
Acer	Download Acer Support Drivers and Manuals	

Note:

1. Administrator privileges are required to install the application software and drivers
2. The above links are subject to change.



Proven latest versions of Key program (as of 30-Mar-2026)

Publisher	Program	Version
Keysight Technologies	Communication Fabric 2.2	2.2.22112.11724
Keysight Technologies	Host Processor Platform	5.5.2.30000
Keysight Technologies	IO Libraries Suite 2025	21.1.174
Keysight Technologies	KtPUsbChassis IVI.NET Driver 1.1.11	1.1.11.0
Keysight Technologies	KtPUsbChassis IVI-C Driver 1.1.11	1.1.11.0
Keysight Technologies	License Manager (Keysight License Manager 5)	5.7.0.732
Keysight Technologies	License Manager (PathWave License Manager)	7.4.1
Keysight Technologies	License Service	5.7.0.732
Keysight Technologies	VNA Series Network Analyzer firmware	19.30.21.153.0
Intel® Corporation	Thunderbolt™ Software	1.0.37.0
IVI Foundation	IVI Shared Components 3.0.0	3.0.2828.0
IVI Foundation	IVI.NET Shared Components 2.0.0 for .NET 2.0	2.0.2928.0
IVI Foundation	VISA Shared Components 7.2.0 (64-Bit)	7.2
IVI Foundation	VISA.NET Shared Components 7.2.0 (64-Bit)	7.2.0205

VNA firmware revision history

Release date	FW revision	FPGA1	FPGA2	Comment
12/9/2021	A.15.40.13	00.16 datecode: 2111155d	00.14 datecode: 2111155d	Support P50xxB/P93xxB
1/7/2022	A.15.55.08	00.16 datecode: 2111155d	00.14 datecode: 2111155d	
2/3/2022	A.15.55.14	00.16 datecode: 2111155d	00.14 datecode: 2111155d	
2/17/2022	A.15.60.05	00.16 datecode: 2111155d	00.14 datecode: 2111155d	Feature added: Auto shutdown when in-rush voltage drop event is detected (#3-3-1-4) Resolved: activation lic check issue (#3-10-12)
3/11/2022	A.15.60.08	00.16 datecode: 2111155d	00.14 datecode: 2111155d	
4/26/2022	A.15.65.19	00.16 datecode: 2111155d	00.14 datecode:22041387	
7/27/2022	A.15.75.19	00.16 datecode: 2111155d	00.14 datecode:22041387	
9/6/2023	A.15.75.22	00.16 datecode: 2111155d	00.14 datecode:22041387	Resolved: missing chassis driver (#2-5-1), halt at Loading Calset (#3-10-3), hot plug-in/out issue (#3-10-6)
10/5/2022	A.15.75.26	00.16 datecode: 2111155d	00.14 datecode:22041387	
11/22/2022	A.16.20.02	00.16 datecode: 2111155d	00.14 datecode:22041387	
2/3/2023	A.16.20.04	00.16 datecode: 2111155d	00.14 datecode:22041387	
2/17/2023	A.16.70.00	00.16 datecode: 2111155d	00.14 datecode:22081948	
4/5/2023	A.16.70.01	00.16 datecode: 2111155d	00.14 datecode:22081948	
5/25/2023	A.16.70.06	00.16 datecode: 2111155d	00.14 datecode:22081948	
6/7/2023	A.16.70.08	00.16 datecode: 2111155d	00.14 datecode:22081948	
6/21/2023	A.17.05.10	00.16 datecode: 2111155d	00.14 datecode:22081948	Resolved: Unable to program FPGA image (#3-10-4)
8/9/2023	A.17.20.08	00.16 datecode: 2111155d	00.14 datecode:22081948	
8/17/2023	A.17.20.09	00.16 datecode: 2111155d	00.14 datecode:22081948	
9/3/2023	A.17.25.03	00.16 datecode: 2111155d	00.14 datecode:22081948	
9/15/2023	A.17.25.05	00.16 datecode: 2111155d	00.14 datecode:22081948	Support Windows 11 OS (#3-7-3)
11/6/2023	A.17.35.05	00.16 datecode: 2111155d	00.14 datecode:22081948	
12/4/2023	A.17.35.10	00.16 datecode: 2111155d	00.14 datecode:22081948	
	This VNA firmware version is not available to download in Keysight.com			

For more details, go to [PXIe/USB VNA Firmware Revision History | Keysight](#)

Contact Keysight – Issue sharing

This document provides lots of troubleshooting tips and will continue to improve based on your feedback.

Since Windows security is getting stricter, newer OS/BIOS might block Streamline Series VNA. In the case that a customer's PC cannot use Streamline Series VNA B model, or the troubleshooting document does not cover the symptoms of the issue, please contact Keysight.

Please include this information in the case:

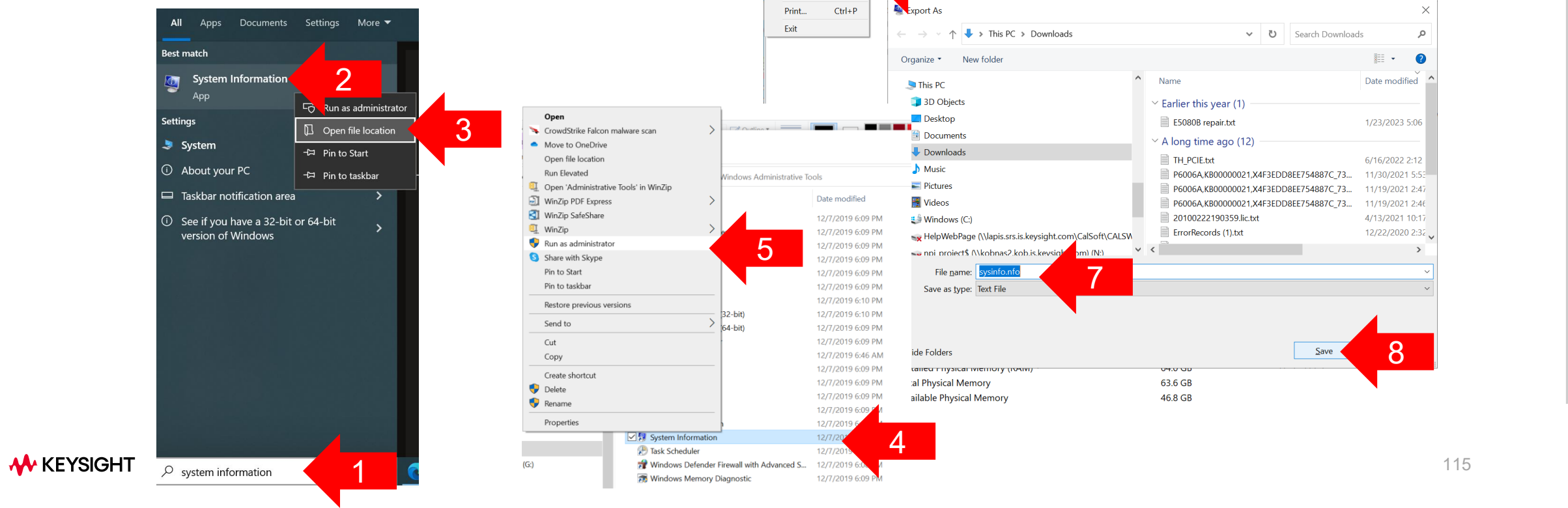
- Photo/video of the symptom
- System Information w/ administrative mode
- Device Manager information
- Thunderbolt Control Center information
- Connection Expert information
- Programs and Features information (software version information)

Contact Keysight - Issue sharing

System Information /w administrative mode

1. Enter System Information at Windows Search
2. Right click System Information
3. Click Open file location
4. Right click System Information
5. Click Run as administrator or
Click Run Elevated (for Keysight internal user)

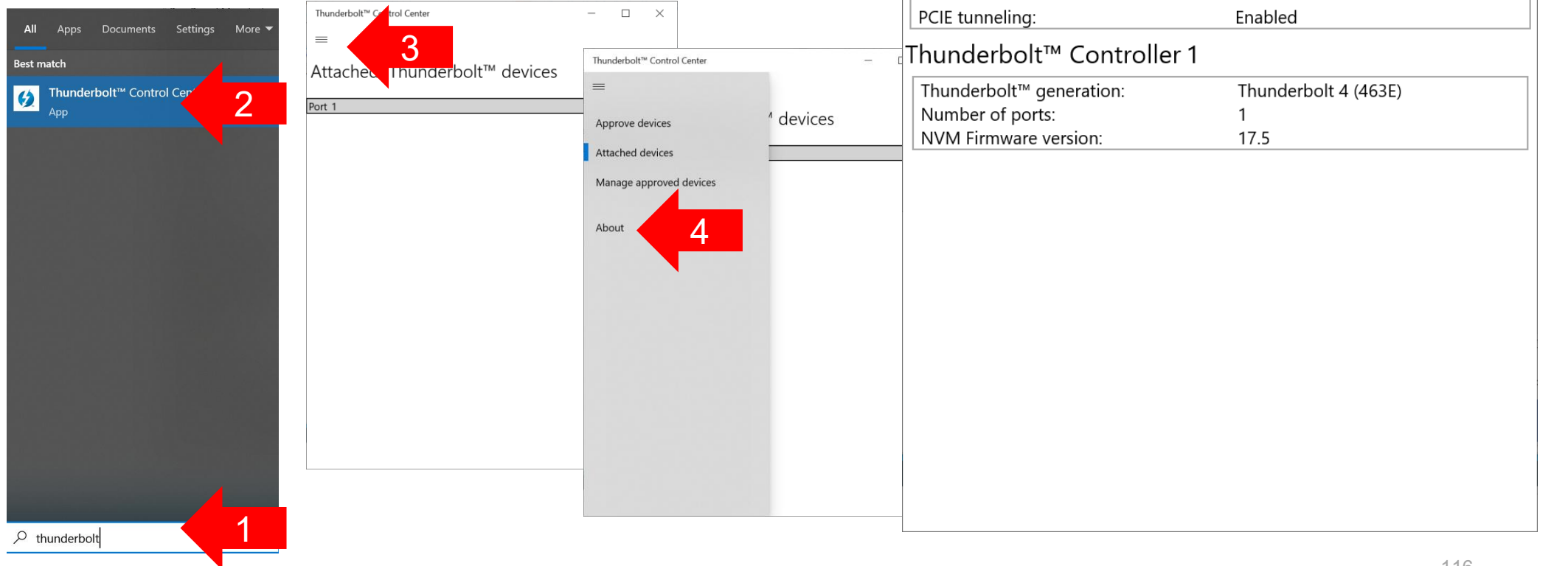
6. Click File > Export
7. Enter sysinfo.txt at File name
8. Click Save



Contact Keysight – Issue sharing

Thunderbolt Control Center information

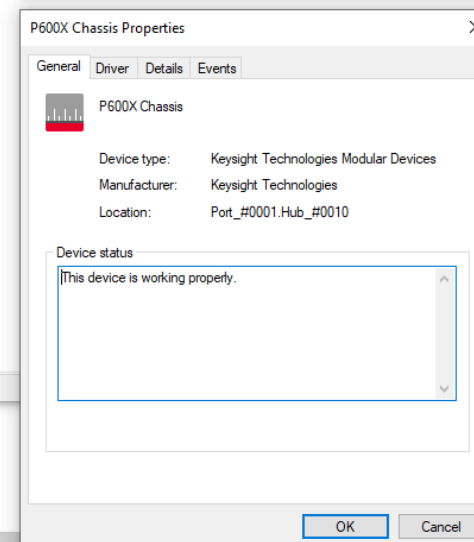
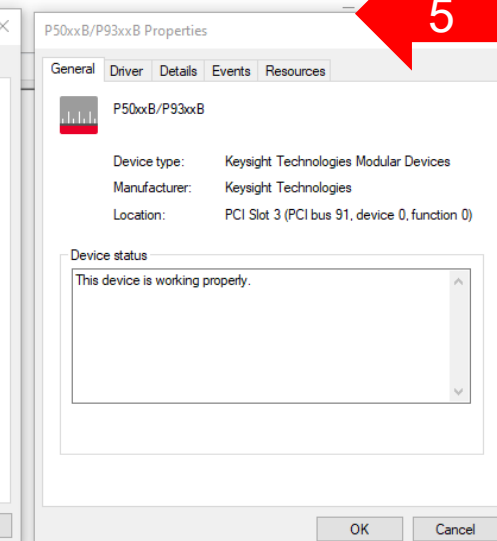
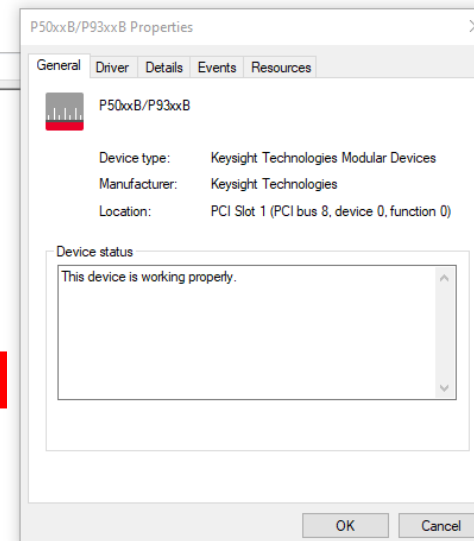
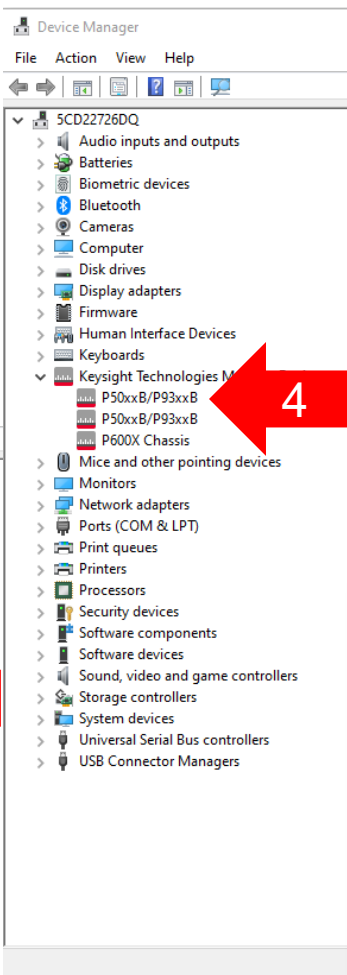
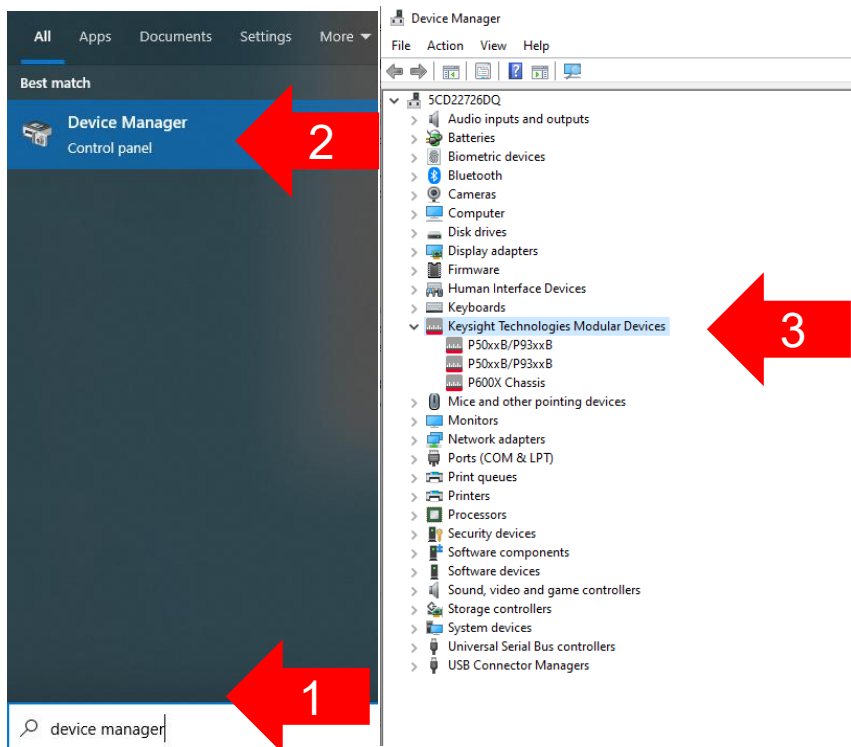
1. Enter Thunderbolt at Windows Search
2. Click Thunderbolt™ Control Center
3. Click hamburger menu
4. Click About
5. Take screenshot of Details



Contact Keysight – Issue sharing

Device Manager information

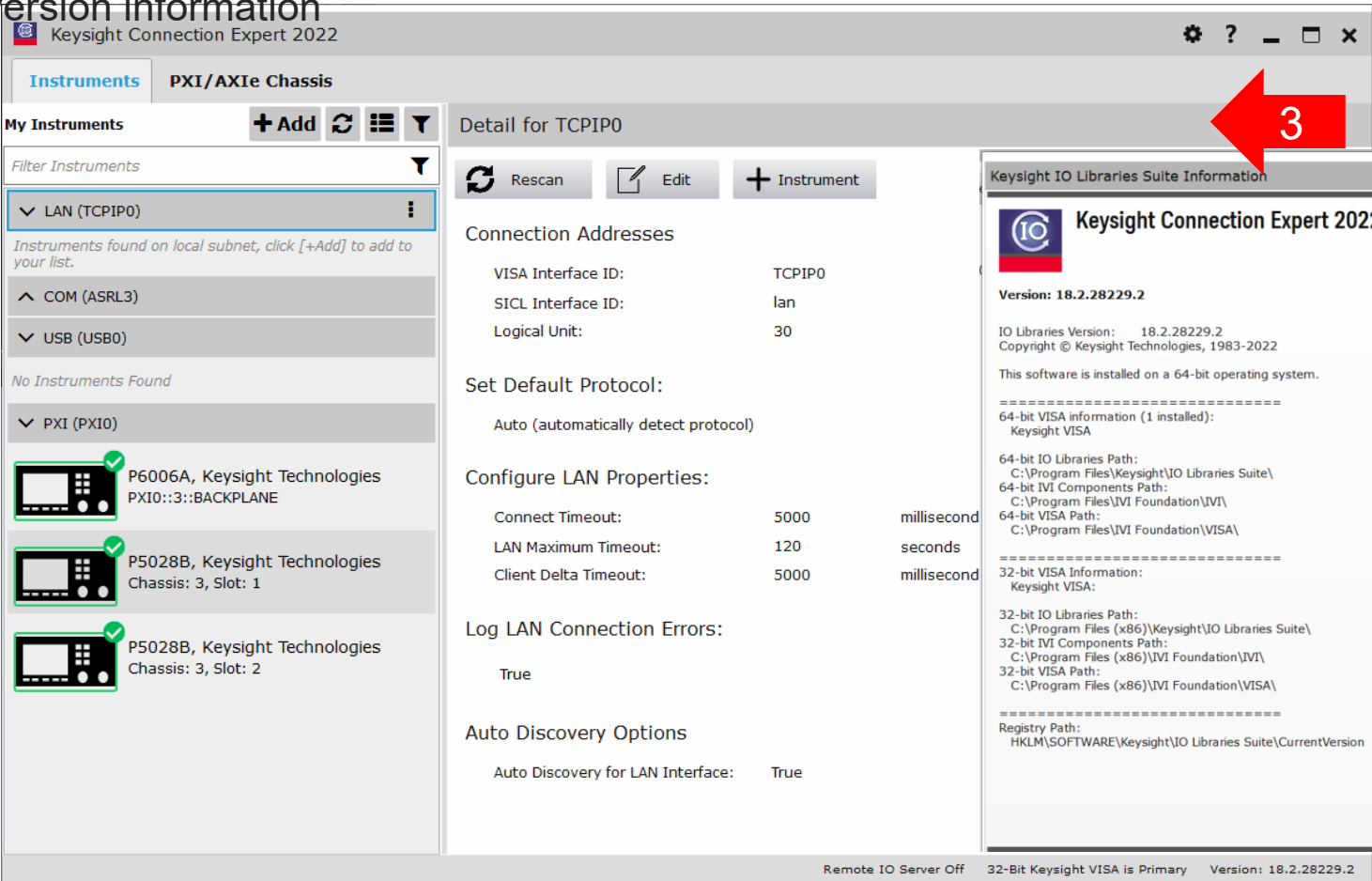
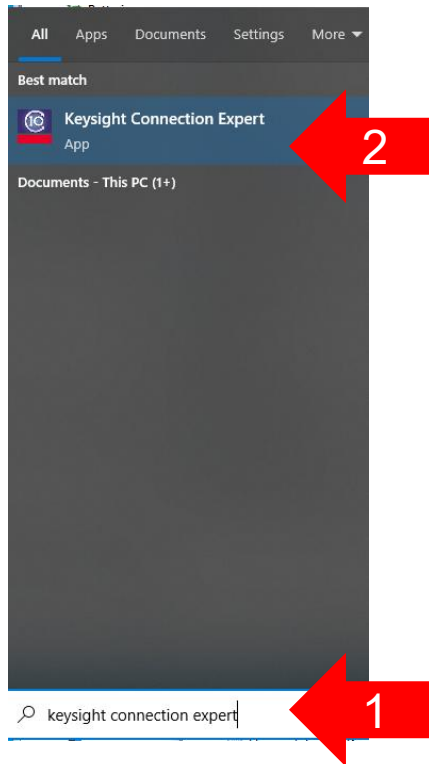
1. Enter Device Manager at Windows Search
2. Click Device Manager
3. Click Keysight Technologies Modular Devices
4. Click P50xxB/P93xxB
Click P50xxB/P93xxB
Click P600X Chassis
5. Take Screenshots of Properties of P50xxB/P93xxB and P600X Chassis.



Contact Keysight – Issue sharing

Connection Expert information

1. Enter Keysight Connection Expert at Windows Search
2. Click Keysight Connection Expert
3. Take screenshot of Instruments and version information



Windows Search results for "Keysight Connection Expert" showing the app as the best match.

Keysight Connection Expert 2022 application window. The "Instruments" tab is selected, showing a list of instruments under "PXI/AXIe Chassis". The "LAN (TCPIP0)" instrument is highlighted. The "Detail for TCPIP0" panel on the right shows connection addresses and configuration options.

Keysight IO Libraries Suite Information dialog box. It displays the version "18.2.28229.2" and provides paths for 64-bit and 32-bit VISA and IO Libraries.

Contact Keysight – Issue sharing

Program and Features information

1. Enter Control Panel at Windows Search
2. Click Control Panel
3. Click Programs
4. Click Programs and Features
5. Take screenshot of programs and its version

