
STM32CubeMonitor-UCPD software tool for USB Type-C® power-delivery port management

Introduction

STM32CubeMonitor-UCPD (STM32CubeMonUCPD) is a software tool to configure and monitor the USB Type-C® power-delivery (UCPD) ports on equipped STM32 boards. The configuring part allows the modification of the USB Type-C® power-delivery port default configuration. Checks of power-delivery contract establishment and activity are possible with the monitoring tool.

1 Features

The main features of the STM32CubeMonitor-UCPD software tool are the following:

- Configures and monitors USB Type-C® power-delivery (UCPD) ports of STMicroelectronics Type-C power delivery boards.
- Sends device policy manager (DPM) messages to the distant USB Type-C® power-delivery port.

This software applies to STM32 Arm®-based microcontrollers.

Note: Arm is a registered trademark of Arm Limited (or its subsidiaries) in the US and/or elsewhere.



2 Getting started

2.1 Computer requirements

Supported operating systems and architectures

- Windows® 10 and 11, 64 bits (x64)
- Linux®: Ubuntu® LTS 20.04 and LTS 22.04
- macOS® 13 (Ventura), macOS® 14 (Sonoma)

Note: Windows is a trademark of the Microsoft group of companies.

Linux® is a registered trademark of Linus Torvalds.

Ubuntu® is a registered trademark of Canonical Ltd.

macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.

Software requirements

For Linux®, the installer requires the Java Runtime Environment.

Note: Oracle and Java are registered trademarks of Oracle and/or its affiliates.

2.2 Hardware requirements

- One free USB2 or USB3 host port
- Mini-B or Micro-B cable depending on the target board to access the STM32 ST-LINK
- STMicroelectronics target board with USB Type-C® and firmware latest version (embedding the tracer or the cubemon_ucpd_emb module) as described in the user manual *STM32 TCPM Application (UM2063)*, downloaded from STMicroelectronics website www.st.com) selecting X-CUBE-USB-PD or built through STM32CubeMX.

2.3 Installing

2.3.1 Installing STM32CubeMonitor-UCPD

The user must have administrator rights on the computer to install the tool.

The steps needed to install the STM32CubeMonitor-UCPD software tool are detailed below (all files can be downloaded from the STMicroelectronics website www.st.com):

1. Download SetupSTM32CubeMonitor-UCPD.zip and unzip it in a temporary location.
2. Perform the setup process associated with the environment (x.y.z represents STM32CubeMonitor-UCPD software version):
 - Windows®: launch SetupSTM32CubeMonitor-UCPD-x.y.z.exe and follow the instructions provided.
 - Linux®: launch SetupSTM32CubeMonitor-UCPD-x.y.z.jar and follow the instructions provided.
 - macOS®: launch SetupSTM32CubeMonitor-UCPD-x.y.z.dmg and, into the installer window, drag and drop the *STM32CubeMonitor-UCPD* icon on the *Applications* icon.

If another version of STM32CubeMonitor-UCPD is already installed, the existing version must be uninstalled before installing the new version. Refer to [Section 2.4](#) for more details.

2.3.2 Installing the USB driver for ST-LINK

Note: This section is only applicable to Windows® operating systems.

Follow the steps detailed below to install the USB driver for ST-LINK (all files can be downloaded from the STMicroelectronics website www.st.com):

1. Download the USB driver for ST-LINK (STSW-LINK009).
2. Go in the directory `C:\Program Files (x86)\STMicroelectronics\Software\Virtual comport driver` and launch `Win8\dpinst_amd64.exe`.
3. Plug the board with the USB cable. Windows® detects it as an STMicroelectronics ST-LINK Virtual COM port named COMxx.
Example: COM10.

2.4 Uninstalling STM32CubeMonitor-UCPD

The steps needed to uninstall STM32CubeMonitor-UCPD are detailed below for the various operating systems:

- **Windows®**
Two possible options are:
 1. Open the Windows® *Control* panel. Select *Programs and Features* to display the list of programs installed on the computer. Right-click on *STM32CubeMonitor-UCPD* from the STMicroelectronics publisher and select the **uninstall** function.
 2. Go to the installation location (for example `C:\Program Files\STMicroelectronics\STM32CubeUCPD`), go to the *Uninstaller* folder, and launch `uninstaller.jar`.
- **Linux®**
Go to the STM32CubeMonitor-UCPD installation location (example `$HOME/STMicroelectronics/STM32CubeMonitor-UCPD`), go to the *Uninstaller* folder, and launch `uninstaller.jar`.
- **macOS®**
Drag and drop the *STM32CubeMonitor-UCPD application* icon onto the *Trash* icon.

2.5 Uninstalling the USB driver for ST-LINK

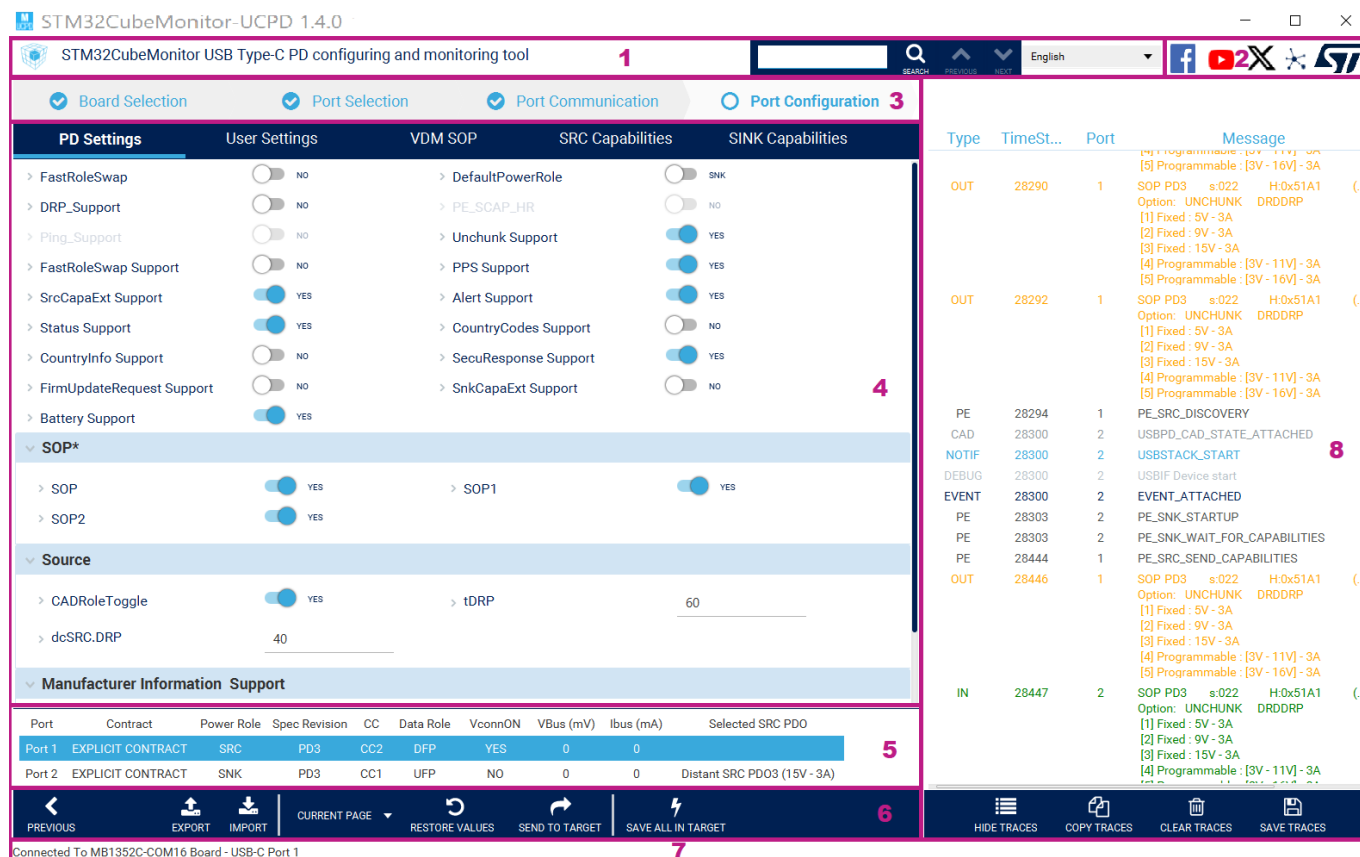
Note: This section is only needed for Windows® operating systems.

Perform the following steps to uninstall the STMicroelectronics USB driver for ST-LINK:

1. Open the Windows® *Control* panel.
2. Select *Programs and Features* to display the list of programs installed on the computer.
3. Right-click on *Windows Driver Package - STMicroelectronics (WinUSB) STLinkWinUSB* from the STMicroelectronics publisher and select the **uninstall** function.

3 Windows structure - main areas

Figure 1. Overview of all panels



The main areas are the following (also shown in Figure 1):

- **Area 1:** Application Title panel
- **Area 2:** Social panel, linked to STMicroelectronics social networks shown in Figure 2
- **Area 3:** Ribbon panel, where the four main states are listed and accessible step after step:
 1. Board selection
 2. Port Selection
 3. Port Configuration
 4. Port Communication
 Chevron-right and chevron-left buttons in the Button panel allow navigation to the previous or next step.
- **Area 4:** Main panel content is state-dependent. Refer to Section 4: How to use STM32CubeMonitor-UCPD.
- **Area 5:** Port Status panel gives a sum up of each board port. Refer to Section 4.4: Port Status information.
- **Area 6:** Button panel lists the actions.
- **Area 7:** The Status bar panel displays the board version and the port selected when relevant.
- **Area 8:** Traces panel. Refer to Section 5: Traces information.

Figure 2. Social network shortcut area



This area contains five shortcuts to social networks and web pages:

- The Facebook™ icon leads to the official STMicroelectronics Facebook page.
- The YouTube™ icon leads to the official STMicroelectronics YouTube page.
- The X icon leads to the official STMicroelectronics X page.
- The Share icon leads to the ST community website.
- The ST icon leads to the official STMicroelectronics website.

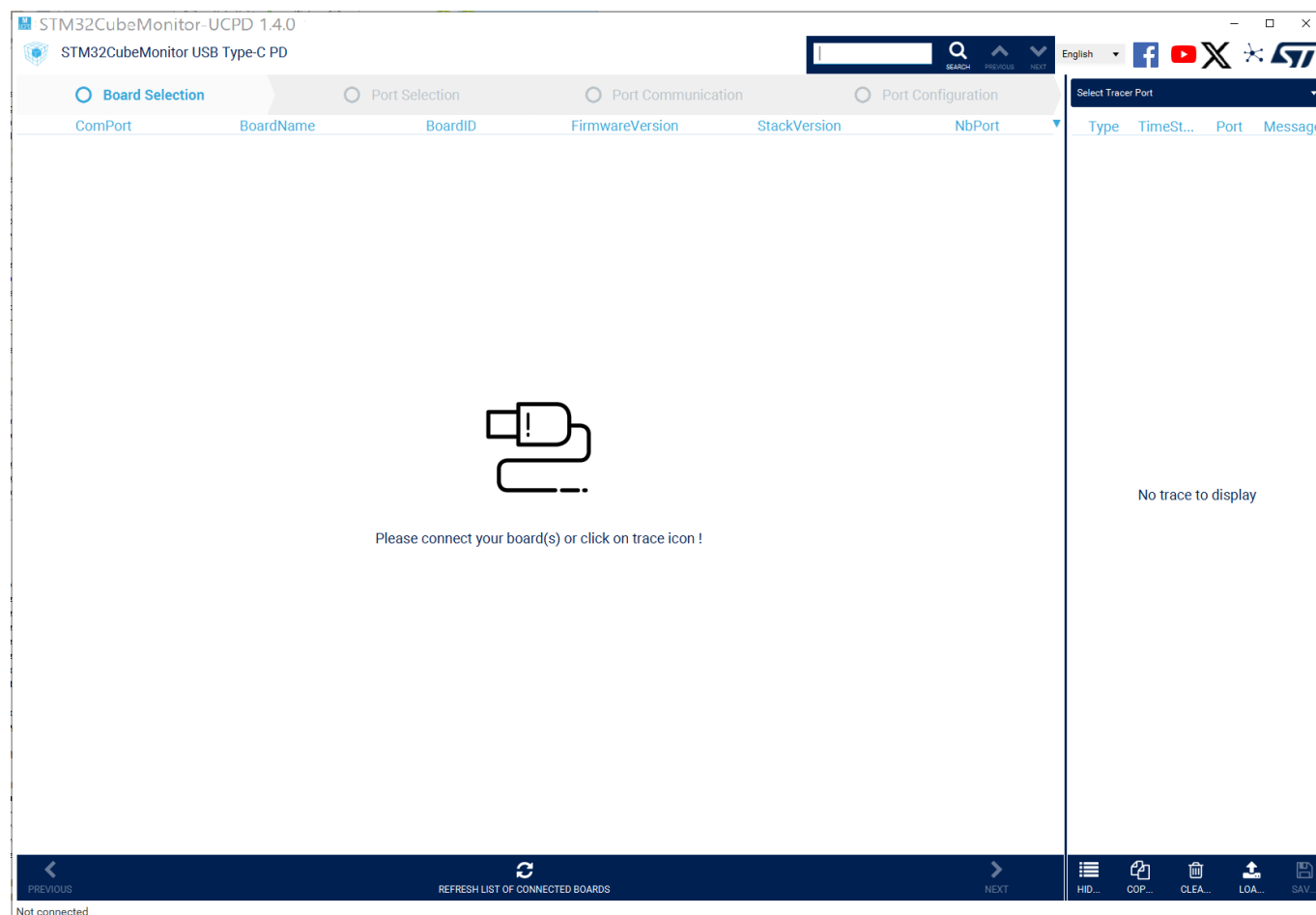
4 How to use STM32CubeMonitor-UCPD

4.1 Board detection and selection

The detection of a board is automatically launched when the application starts.

If there is no board connected via USB to the computer, the application displays an invitation to connect the board as shown in Figure 3.

Figure 3. Invitation to connect the board



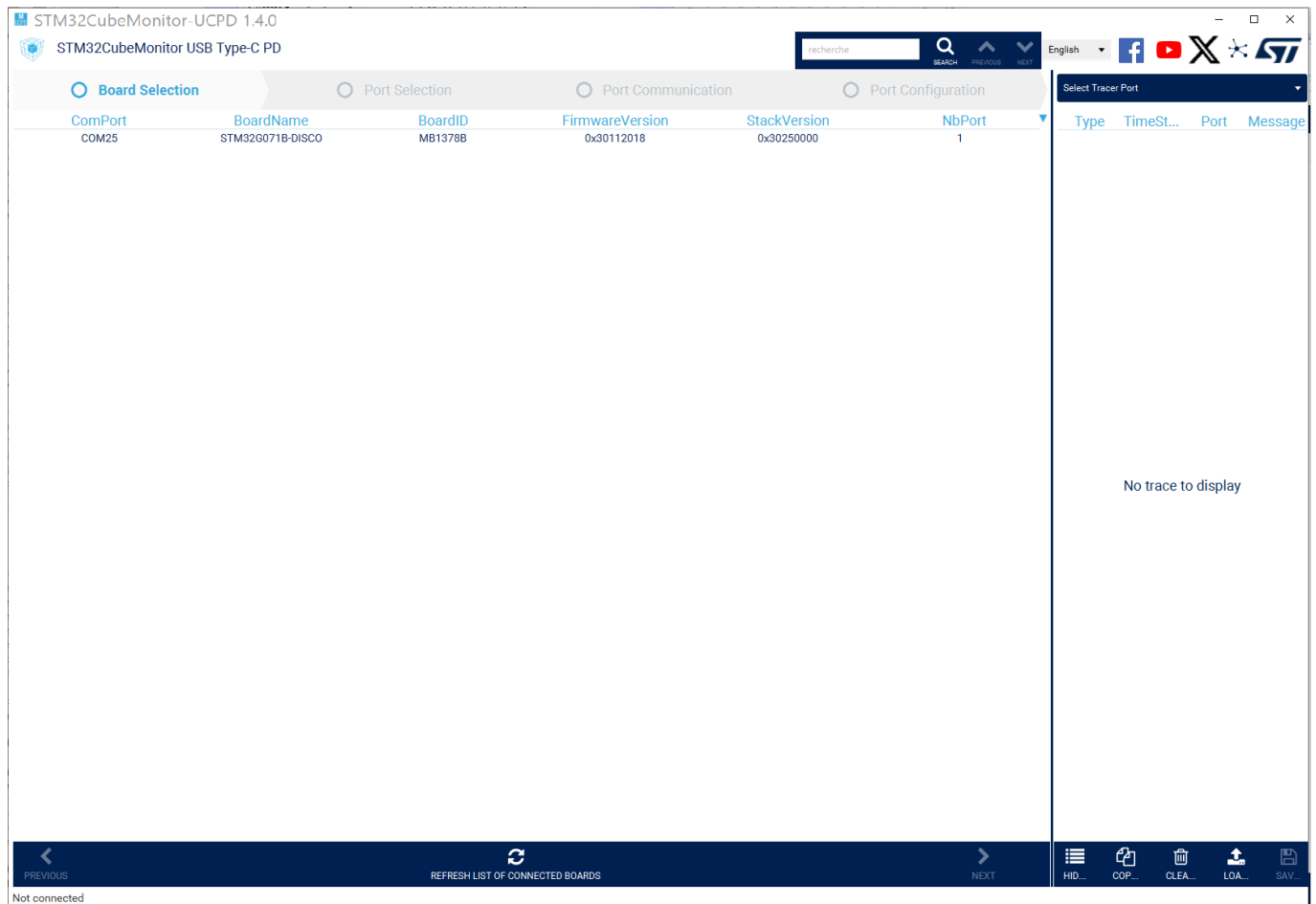
To see a new connected board, click on the button *Refresh list of connected boards*. The application sends a message to all devices, waiting for an appropriate response to distinguish the ST-UCPD GUI-capable boards from the other boards.

An ST-UCPD GUI-capable board is a device that contains a firmware source code to communicate between the STM32CubeMonitor-UCPD application and the device.

Note: *If the GUI responder is not activated in the embedded firmware, but the debug trace is available (UART through VCP of the ST-LINK and the compilation switch `_TRACE` activated), the user might still see the trace in the UCPD monitor by clicking on the Trace button in the bottom-right corner.*

All devices identified as ST-UCPD GUI capable are displayed in the *Board Selection* panel as shown in Figure 4.

Figure 4. Board Selection window



Parameters for each board are the following:

- Communication port assigned to the device (ComPort)
- Hardware board version
- Power delivery type
- Firmware version
- Stack version
- Number of USB Type-C® ports on the board (NbPort)

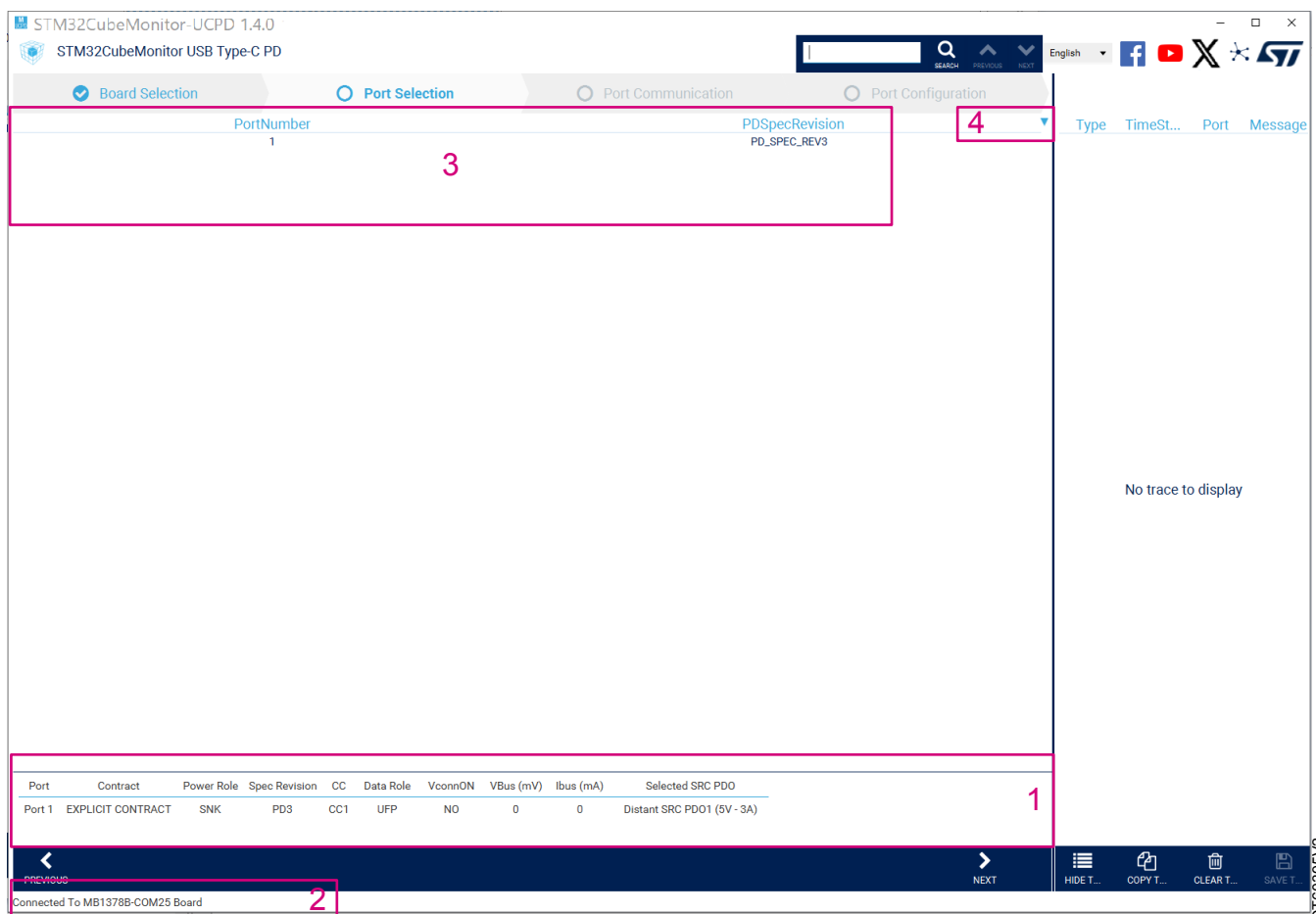
If a board is disconnected, it is removed from the *Board Selection* panel.

To select a board, move the mouse pointer to the corresponding line. The line is grayed out when selected. Then, double-click on the line or click on the chevron-right button. The board is selected and the application window moves to the *Port Selection* window.

4.2 Port selection

When a board is selected, the *Port Selection* window is opened as shown in Figure 5.

Figure 5. Port Selection window



The following details are provided in this window:

1. *Port Status* information panel. Refer to [Section 4.4.2: Port Status information-Selected port](#)).
2. The board selected in the previous steps is reported here (*PowerDeliveryType* and *ComPort* board parameters are described in [Section 4.1: Board detection and selection](#)).
3. List of USB Type-C® PD available on the selected board (two in this example), with the *PortNumber* written on the board and the PD specification revision supported by the *PDSpecRevision* port.
4. Click on it to select the static parameters to display. Refer to the USB PD standards for further definition of these parameters on the USB website.

Port selection can be performed in zone 1 or 3.

4.3 Port Selection action

Figure 6 shows the port parameters. On the *Port Status* panel, the port selected is highlighted in light blue. Refer to the next section for more details. The selected port number is added in the *Status* bar close to the selected board identification.

Figure 6. Port selected: *Port Status* panel, *Button*, and *Status* bars

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SRC	PD3	CC1	DFP	YES	0	0	SRC PDO1 (5V - 3A)
Port 2	NO								

PREVIOUS
NEXT TRACES

Connected To MB1352B-COM13 Board - USB-C Port 1

4.4 Port Status information

The *Port Status* panel is displayed as soon as a board is selected. This panel is available in the *Port Selection*, *Port Communication*, and *Port Configuration* windows. Refer to Figure 7.

Figure 7. *Port Selection* ribbon



This *Port Status* panel lists all the USB Type-C® with power delivery ports available on the board. Refer to Figure 8.

Figure 8. *Port Status* panel

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SRC	PD3	CC1	DFP	YES	0	0	SRC PDO1 (5V - 3A)
Port 2	NO								

For each port, the following characteristics are displayed:

- **Contract:** If this field is not NO, it means that the port established a contract with a distant port and the relevant characteristics of this contract are displayed in the next columns.
- **Power Role:**
 - If this field is SNK, the *Selected SRC PDO* is the PDO selected for the distant port.
 - If this field is SRC, the *Selected SRC PDO* is the PDO selected for the current port.
- **Spec Revision and CC, Data Role, VconnON:** characteristics defined in the norm (<http://www.usb.org/developers/powerdelivery>)
- **VBus and IBus:** filled as soon as measurements are done. Refer to Section 4.5.2)
- **Selected SRC PDO:** selected PDO
 - If the current port is connected as a source, the *Selected SRC PDO* is its PDO selected which is displayed.
 - If the current port is connected as a sink, the *Selected SRC PDO* is the selected SRC PDO of the distant port on which the port is connected.

When the user double-clicks on a port in the *Port Status* panel, the selected port changes, and information in *Port communication* or port configuration is updated.

4.4.1 Port Status information update

When one of the parameters is updated, its value blinks for several seconds to draw attention. Updates can come from a hard-cable disconnection or a message sent that involves the contract cancellation or modification. Refer to Figure 9.

Figure 9. The *Parameter* blinks when the update is done

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SRC	PD3	CC1	DFP	YES	0	0	SRC PDO1 (5V - 3A)
Port 2	NO								

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SNK	PD3	CC1	DFP	YES	0	0	Distant SRC PDO1 (5V - 3A)
Port 2	NO								

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SNK	PD3	CC1	DFP	YES	0	0	Distant SRC PDO1 (5V - 3A)
Port 2	NO								

4.4.2 Port Status information-Selected port

As soon as the *Port Communication* or *Port Configuration* window is selected, the *Port Status* panel highlights the selected port in blue, as shown in Figure 10.

Figure 10. Selected port highlighted

Port	Power Contract ?	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	NO								
Port 2	NO								

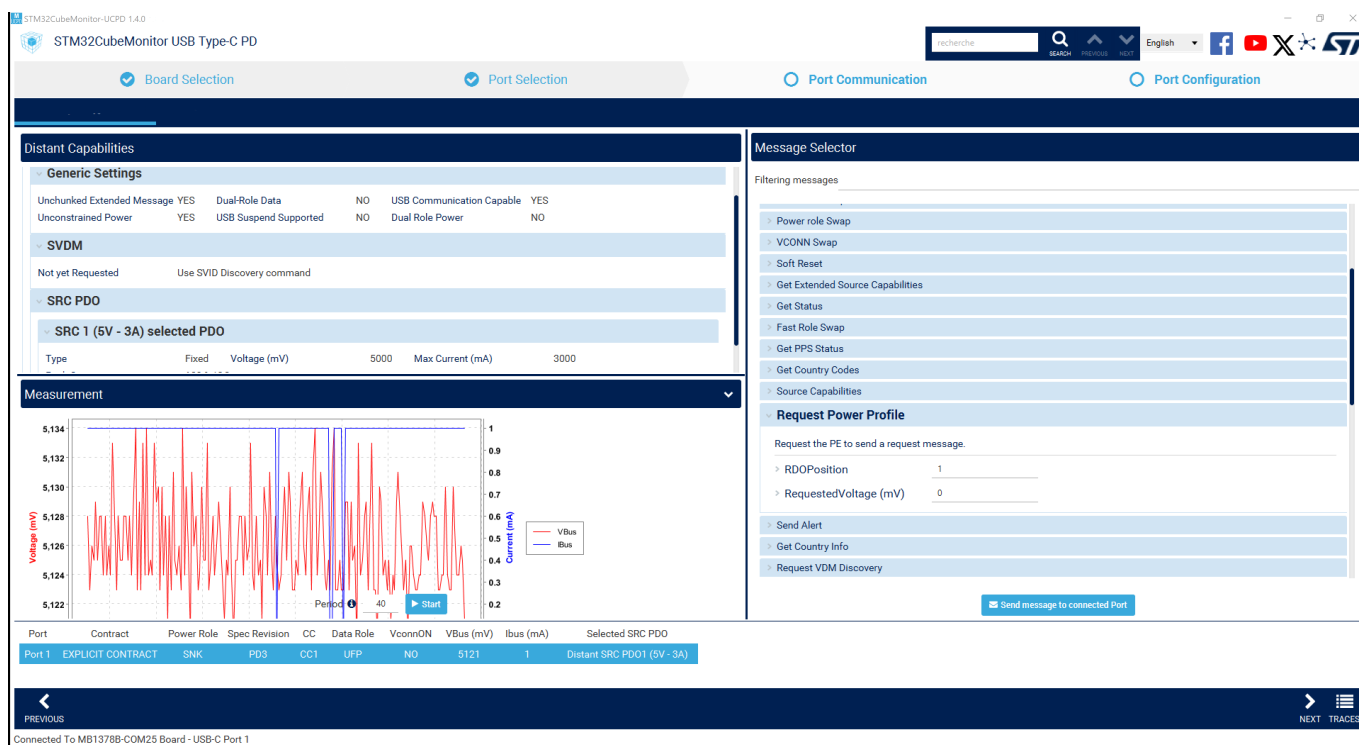
4.5 Port Communication

Click on the *Port Communication* tab to see specific content, which can be useful only if the selected port is plugged into another device port.

The two following tabs are displayed:

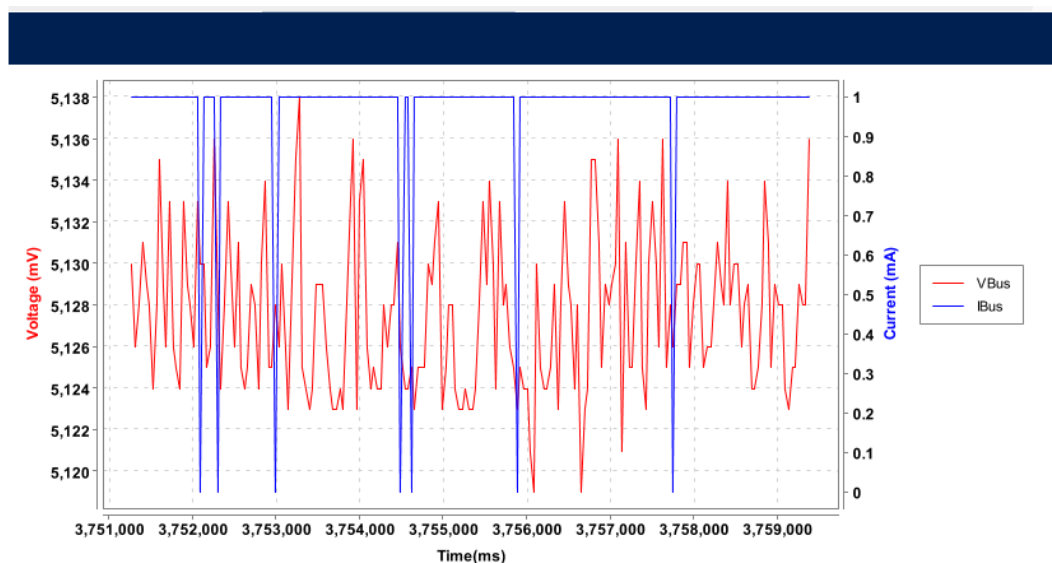
- The *General* tab, including three panels shown in Figure 11:
 - *DISTANT CAPABILITIES*: Capabilities of the distant device port
 - *MEASUREMENT*: Start or stop measures for this connection
 - *MESSAGE SELECTOR*: Messages sent to the distant device port

Figure 11. General tab overview



- The *Measurement* tab displays a full-screen view of the measurement graph. Refer to Figure 12).

Figure 12. Measurement tab overview



4.5.1 Distant Capabilities panel

The *Distant Capabilities* panel contains information coming from the distant port regarding its capabilities (settings, PDO, and VDM), depending on the selected *Power Role*, in a read-only mode.

The PDO used for the current contract is mentioned as the *selected PDO*.

If the port is connected as a sink, the panel displays the source capabilities of the distant port as shown in Figure 13.

Figure 13. SRC capabilities of the distant port

Distant Capabilities			
Distant Port			
Generic Settings			
Unchunked Extended Message	YES	Dual-Role Data	YES
USB Communication Capable	NO	Unconstrained Power	NO
USB Suspend Supported	NO	Dual Role Power	YES
SVDm			
SRC PDO			
SRC (5V - 3A) selected PDO			
SRC (9V - 3A)			
SRC (15V - 3A)			

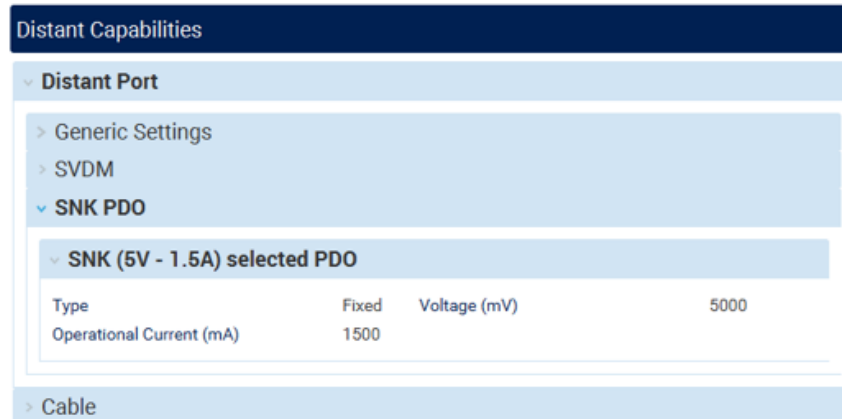
If the port is connected as a source, the panel displays the sink capabilities of the distant port. If an electronic cable is in use, and the information related to it is displayed. Refer to Figure 14.

Figure 14. Sink capabilities of the distant port

Distant Capabilities			
Distant Port			
Generic Settings			
Unchunked Extended Message	NO	Dual-Role Data	YES
USB Communication Capable	NO	Unconstrained Power	NO
Higher Capability	NO	Dual Role Power	NO
SVDm			
SNK PDO			
SNK (5V - 1.5A) selected PDO			
Cable			
USB_SS_Support	USB3P1_GEN1N2		
VBUS_CurrentHandCap	VBUS_5A	CableMaxVoltage	VBUS_MAX_50V
CableTermType	BOTH_PASSIVE_VCONN		
CableLatency	10NS	CableToType	TYPE_C
VDO_Version	0	CableFWVersion	0x00
CableHWVersion	0x00		

Each capability is summarized but the detailed view is available by clicking on the chevron-right as shown in Figure 15.

Figure 15. Distant PDO details



4.5.2 Measurement panel

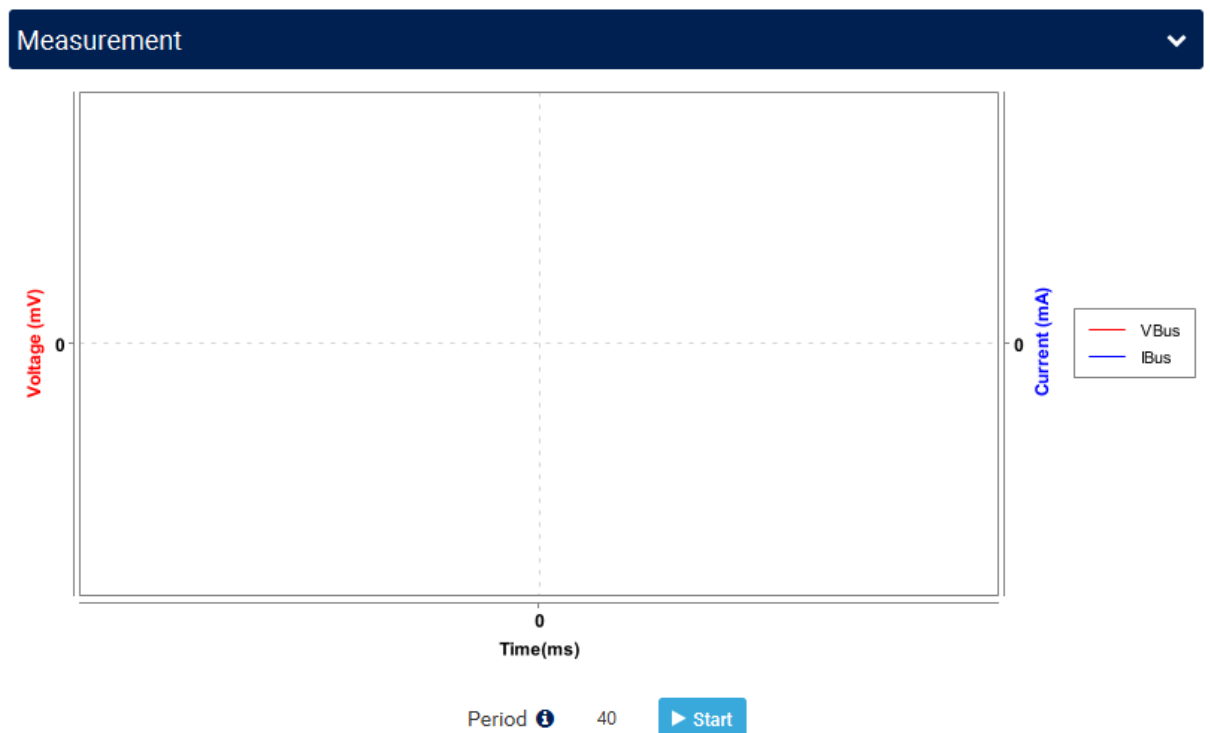
This panel shows a graphical view of the measures, containing the two following controls:

- *Start/Stop* button to activate or deactivate the measures
- *Period* to set the period in ms (between 40 and 5000 ms with 40 ms step)

When the measurement period is set to 0, it means that the measurement is not yet launched or is stopped. The measures are only available when the port is connected. When measures are started but the port is not connected, there is no measurement done.

As shown in Figure 16, two different measures are done: the voltage (V_{BUS}) in mV and the current (I_{BUS}) in mA. Current values for I_{BUS} and V_{BUS} are also visible in the *Port Status* panel. Refer to Section 4.4: *Port Status* information.

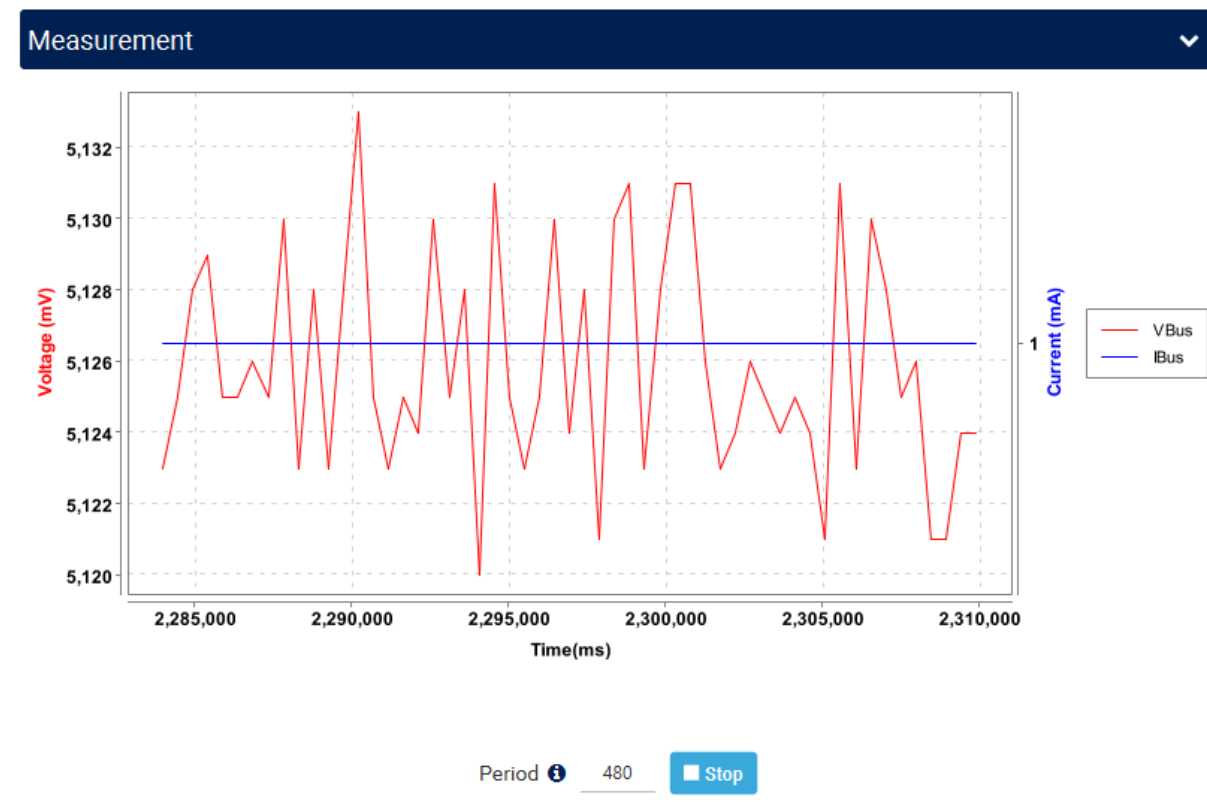
Figure 16. Measurement panel



The steps to follow are detailed below:

1. Select a given period (for example 480 ms).
2. Activate the measurement by clicking on the *Start* button.

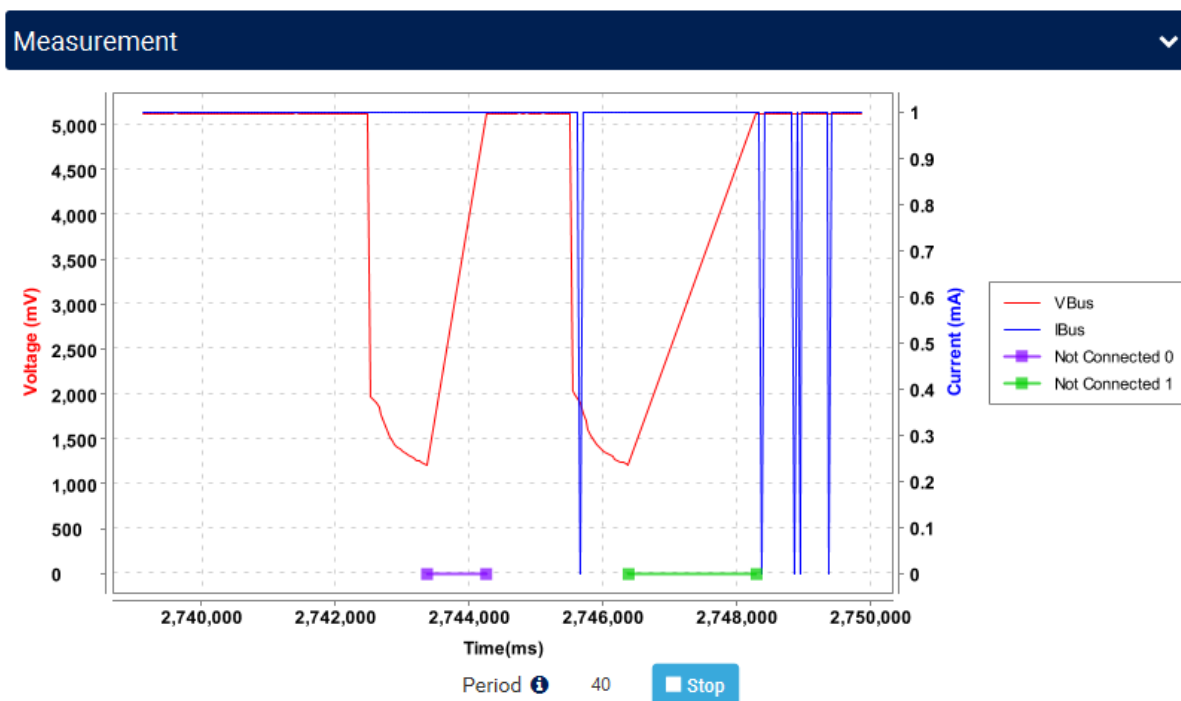
Figure 17. Measurement panel registering



3. Deactivate the measurement by clicking on the *Stop* button.

When the cable connecting the remote device is unplugged, a *Not Connected* line appears in the graph. In the example below, two disconnections occur and are visible with the green and purple lines.

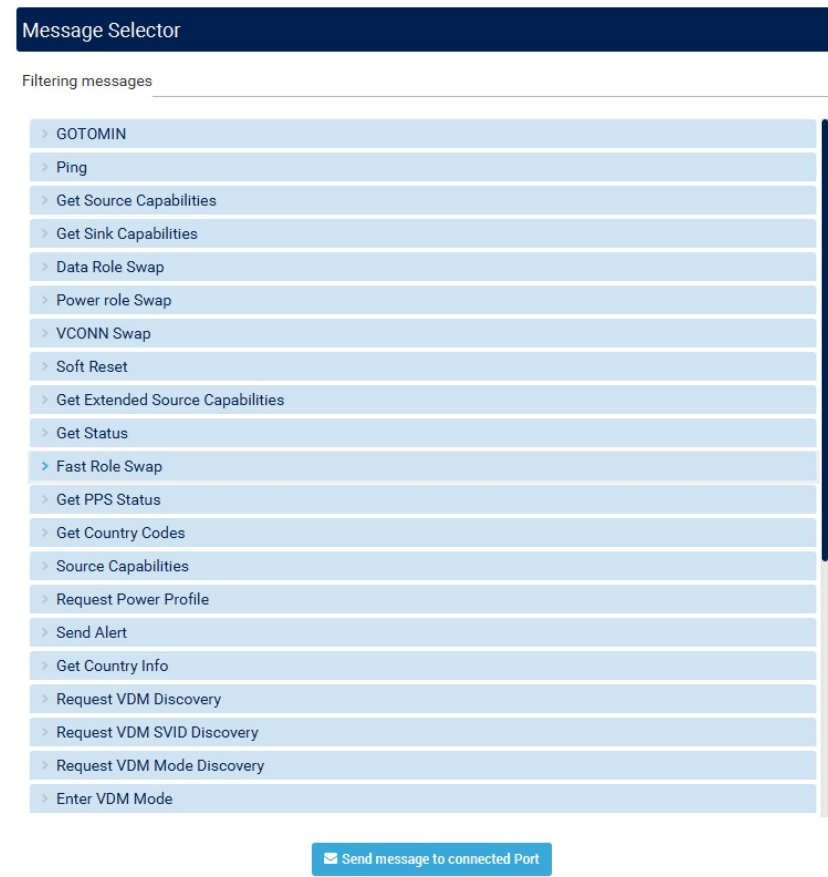
Figure 18. Measurement panel disconnection



4.5.3 Message Selector panel

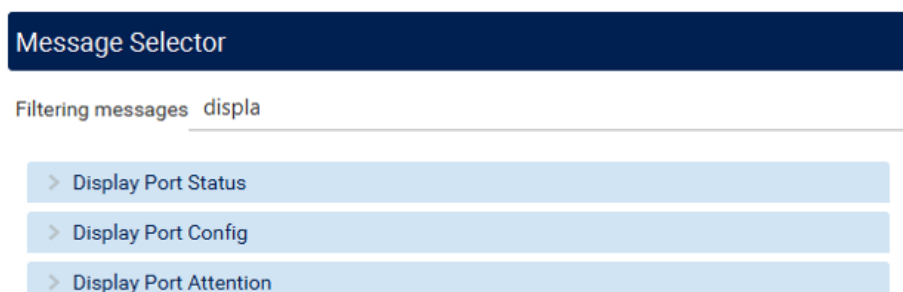
When a distant port is connected, it is possible to send messages to this distant port. The list of messages is available in the *Message Selector* panel as shown in [Figure 19](#).

Figure 19. Message Selector panel



To reduce the number of messages visible, this list can be filtered with the *Filtering messages* field. Refer to the example in [Figure 20](#).

Figure 20. Messages filtering



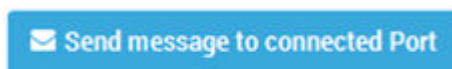
Select the message to send by clicking on it. When a message is selected, additional parameters to fill in are displayed if any. Refer to Figure 21.

Figure 21. Message parameters setting

The screenshot shows a web interface titled 'Message Selector'. Below the title is a search bar with the text 'Filtering messages: displa'. A list of message categories is shown: 'Display Port Status', 'Display Port Config' (which is expanded), and 'Display Port Attention'. Under 'Display Port Config', there is a sub-header 'Request the PE to send a Display Port Config'. Below this, there are four parameters to be configured: 'SOPTtype' with a dropdown menu showing 'SOP', 'SelectConfiguration' with a dropdown menu showing 'conf1', 'Signaling' with a text input field showing '0x00', and 'UFP_U_Pin' with a text input field showing '0x00'.

Send the selected message by clicking on the *Send message to connected Port* button or double-clicking on the message itself. If the message is correctly sent, the *Send message to connected Port* button becomes green for a few seconds.

Figure 22. Send message button



Note: A message is considered correctly sent when the firmware considers it, but the attached action can fail. The analysis must be done with the available monitoring panels (such as Measurement, Distant Port Capabilities, Port Status, and Traces).

If the message is not correctly sent, a specific pop-up with a warning or error message appears as shown in Figure 23.

Figure 23. Message-warning information

The screenshot shows the STM32CubeMonitor-UCPD software interface. The top navigation bar includes tabs for Board Selection, Port Selection, Port Communication, and Port Configuration. The main content area is divided into two panels: Distant Capabilities and Message Selector. The Distant Capabilities panel shows settings for the Distant Port, including Generic Settings and SRC PDO. The Message Selector panel shows a list of messages to filter, with GOTOMIN selected. A pink warning banner at the bottom states "Message Rejected for this Port Configuration". Below the banner is a table showing the current port configuration.

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SNK	PD3	CC1	UFP	NO	5161	1	Distant SRC PDO1 (5V - 3A)

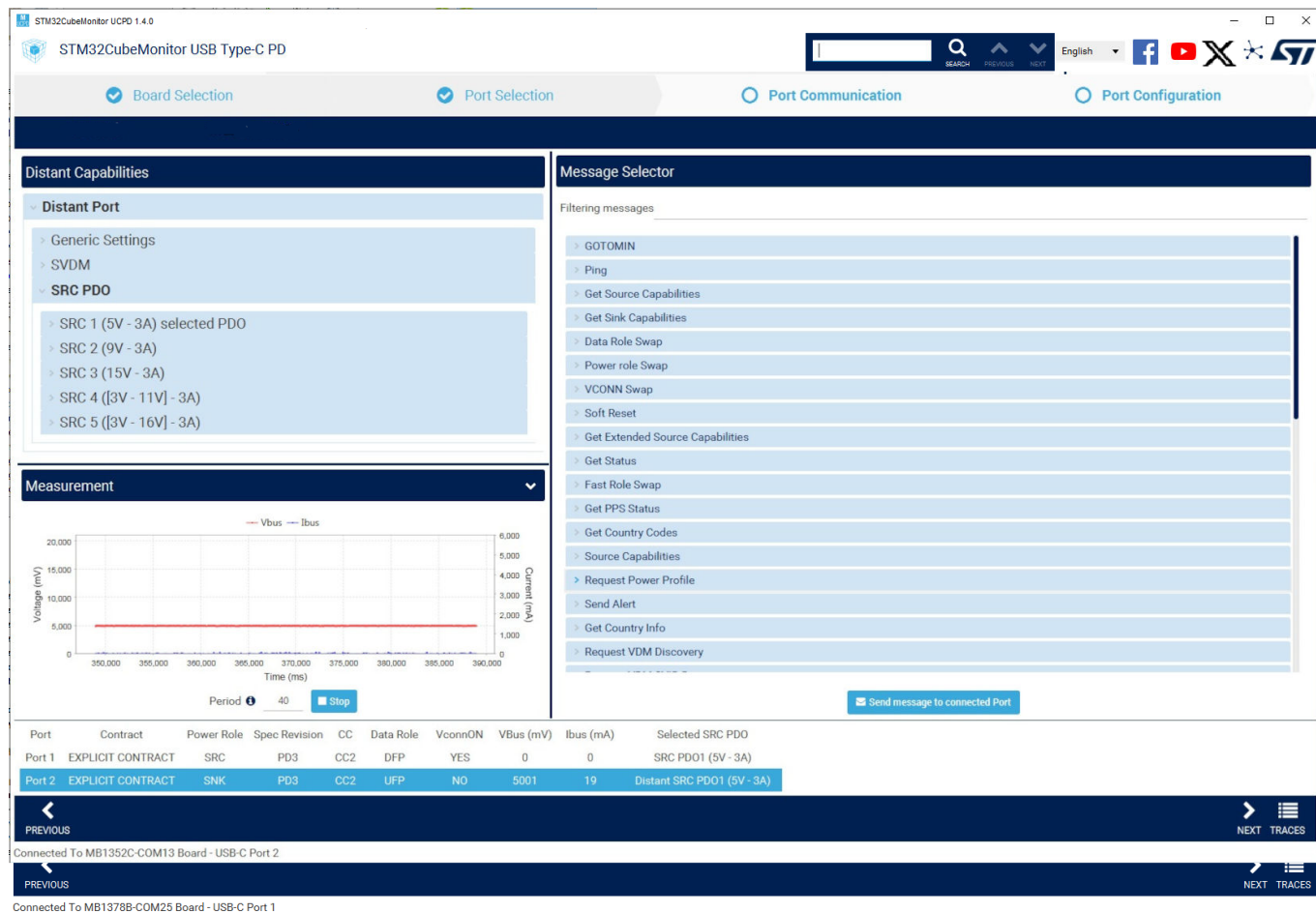
4.5.4 Typical use case with the *General* tab

This typical use case shows actions performed with the *Message Selector* panel and the analysis done with the *Measurement*, *Distant Port Capabilities*, *Port Status*, and *Traces* monitoring panels.

This use case is the selection of a new capability for the current contract.

The initial status is *port connected with the selected PDO SRC1*, visible in the *Distant Port Capabilities* panel. The voltage measured in the *Measurement* panel is around 5000 mV.

Figure 24. Overview communication panel



In the *Message Selector* panel, select *Request Power* profile, and fill in the *RDOPosition* and *RequestedVoltage* additional parameters as shown in [Figure 25](#).

Figure 25. Message selection

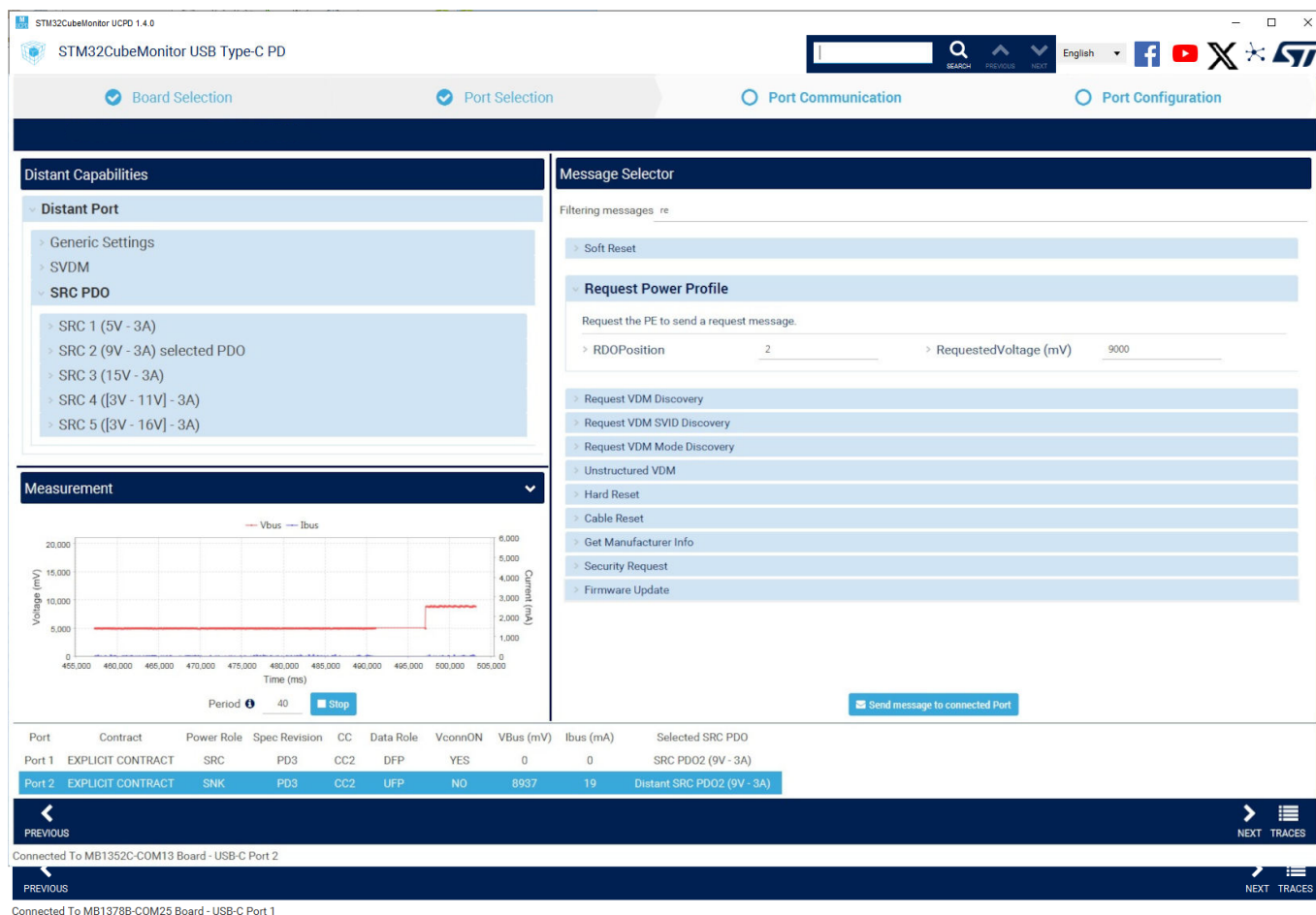
The screenshot displays the STM32CubeMonitor USB Type-C PD software interface. The top navigation bar includes 'Board Selection', 'Port Selection', 'Port Communication', and 'Port Configuration'. The 'Port Communication' tab is active, showing the 'Message Selector' panel. In this panel, the 'Request Power Profile' is selected, and the 'RDOPosition' is set to 2 and 'RequestedVoltage (mV)' is set to 9000. The 'Distant Capabilities' panel on the left shows the 'SRC PDO' section with five options: SRC 1 (5V - 3A) selected PDO, SRC 2 (9V - 3A), SRC 3 (15V - 3A), SRC 4 ([3V - 11V] - 3A), and SRC 5 ([3V - 16V] - 3A). The 'Measurement' panel at the bottom left shows a graph of Voltage (mV) and Current (mA) over Time (ms). The bottom status bar indicates the device is connected to MB1352C-COM13 Board - USB-C Port 2.

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SRC	PD3	CC2	DFP	YES	0	0	SRC PDO1 (5V - 3A)
Port 2	EXPLICIT CONTRACT	SNK	PD3	CC2	UFP	NO	5032	9	Distant SRC PDO1 (5V - 3A)

As soon as the message is sent, the modifications listed below are visible. Refer to Figure 26:

- The *Selected PDO* in the *Distant Port Capabilities* panel is now SRC2.
- The measured voltage is around 9000 mV in the *Measurement* panel.

Figure 26. New power contract



4.6 Port configuration

4.6.1 Overall presentation

The *Port Configuration* window, shown in Figure 27, is used to configure the selected port.

Figure 27. Port configuration window

STM32CubeMonitor-UCPD 1.4.0

STM32CubeMonitor USB Type-C PD

Board Selection Port Selection Port Communication Port Configuration

PD Settings

- FastRoleSwap: NO
- DRP_Support: NO
- Ping_Support: NO
- AlertSupport: YES
- BatteryCapaSupport: YES
- SecuResponseSupport: YES

VDM SOP

- SOP*: YES
- SOP: YES

SRC Capabilities

- DataRoleSwap: YES
- PE_SCAP_HR: NO
- PPS_Support: YES
- StatusSupport: YES
- CountryCodesSupport: NO

SINK Capabilities

- DefaultPowerRole: SNK
- VConnSwap: NO
- SrcCapaExtSupport: NO
- BatteryStatusSupport: YES
- CountryInfoSupport: NO

Source

- CADRoleToggle: NO
- DRP: NO
- dcSRC.DRP: NO

Manufacturer Information Support

- ManulInfoSupport: YES
- ManulInfoPort_String: STMicroelectronics
- ManulInfoPort_VID: 0x0483
- ManulInfoPort_PID: 0x0002

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	NO								
Port 2	NO								

PREVIOUS EXPORT IMPORT ALL PAGES RESTORE VALUES SEND TO TARGET SAVE ALL IN TARGET TRACES

Connected To MB1352C-COM13 Board - USB-C Port 2

PREVIOUS NEXT TRACES

Connected To MB1378B-COM25 Board - USB-C Port 1

The *PD Settings* and *VDM SOP* tabs display the configuration parameters of the selected port.

The *SRC capabilities* panel displays the source PDO configured on this port.

The *SINK capabilities* panel displays the sink PDO configured on this port.

4.6.2 Button bar details

The *Button* bar (refer to Figure 28) provides the following actions:

- The *EXPORT* button is used to save the current configuration in a text file.
- The *IMPORT* button is used to upload a saved configuration.
- The *SEND TO TARGET* button saves the parameter modified from the user interface on the board. In this case, the saving is done only in RAM. It means that, after resetting or board disconnection, the updates are lost.
- The *SAVE ALL IN TARGET* button saves the parameter modified from the user interface on the board as the *SEND TO TARGET* button, but this action saves also these updates in the flash memory. It means that, after resetting or board disconnection, the updates are kept.
- The *RESTORE VALUES* button restores the values displayed in the user interface as they are on the board.

Figure 28. Button bar



Because the *Port Configuration* window contains four tabs on which parameter updates can be performed, the actions *SAVE IN TARGET*, *SEND TO TARGET*, or *RESTORE VALUES* can be applied to the four tabs (*ALL TABS*) at the same time, or only for the tab (*CURRENT TAB*) displayed in the user interface.

4.6.3 Modify the configuration-Update parameter presentation

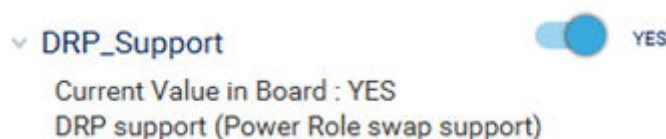
The default view is shown in Figure 29.

Figure 29. Default parameter view



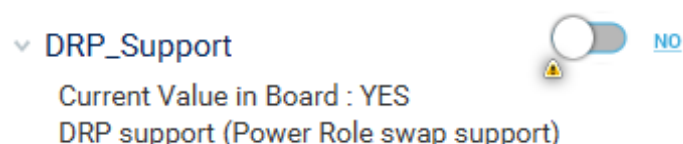
Each parameter has its self-content help. Click on the chevron-right as shown in Figure 30.

Figure 30. Extended parameter view



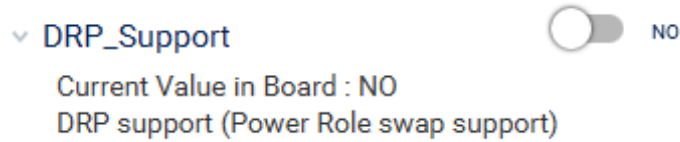
In addition to the signification of the parameter, this area also displays the currently registered value on the board. If the value is changed in the GUI interface, an attention mark is displayed close to the new value, and the onboard value is still visible. Refer to Figure 31.

Figure 31. Parameter modified



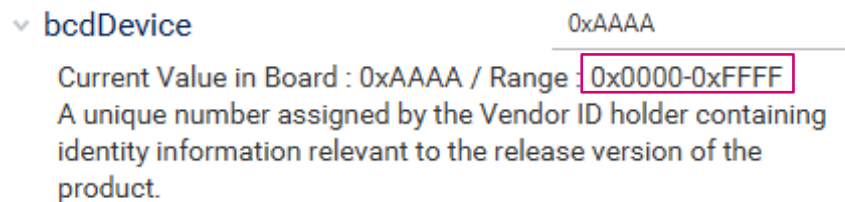
To save the parameter in the board, use the *Send to target* or *Save all in target* button. Refer to Figure 32.

Figure 32. Parameter saved



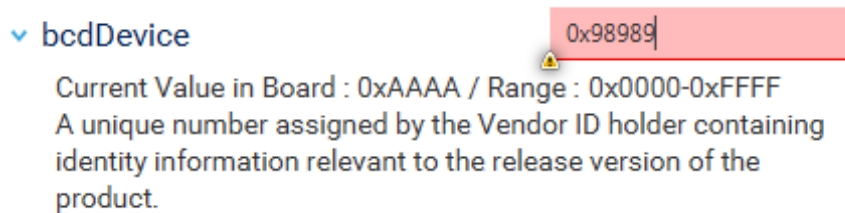
When a value is required, then the range allowed is mentioned in the help. Refer to Figure 33.

Figure 33. Range



The user interface controls the value set with the range. If the value is out of range, then it is highlighted in red.

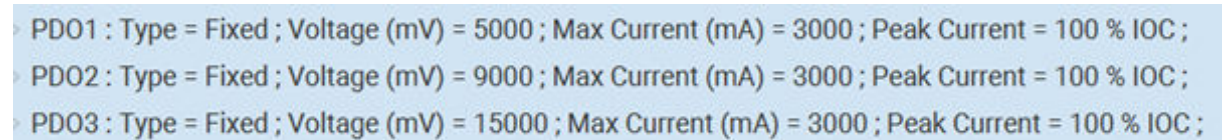
Figure 34. Value out of range



4.6.4 SRC/SNK capabilities tabs-PDO management

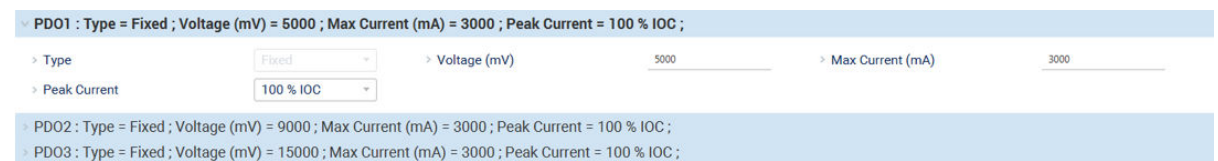
Source PDO and sink PDO have some generic read-only parameters, which are visible on the top of the panel. On each panel, a sum-up of each PDO is displayed as shown in Figure 35.

Figure 35. Parameters of the PDOs



Click on the chevron right of the PDO to see all its parameters. Refer to Figure 36.

Figure 36. Detailed parameters of a PDO



Click on the chevron right of the PDO parameter to get the help, range, and value on the board. Refer to Figure 37.

Figure 37. PDO parameter: Help, range, and value on the board

PDO1 : Type = Fixed ; Voltage (mV) = 5000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 > Type: Fixed > Voltage (mV): 5000 > Max Current (mA): 3000
 Current Value in Board : 5000 / Range : 0-20000
 Voltage in 50mV units
 > Peak Current: 100 % IOC
 PDO2 : Type = Fixed ; Voltage (mV) = 9000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 PDO3 : Type = Fixed ; Voltage (mV) = 15000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

4.6.5

Add a PDO

The first step to adding a PDO is to define its type in one of the two following ways:

- From a picklist as shown in Figure 38

Figure 38. Add a new fixed PDO

ADD PDO
 Add a new PDO
 Type: Fixed
 Voltage: 0-20000mV in 50mV units
 Max Current: 0-5000mA in 10mA units
 Peak Current:
 Finish Cancel

- With a value to choose from a predefined range.

When the new PDO is created, it appears as a *new PDO* up to the sending to the target. Refer to Figure 39.

Figure 39. New PDO created (not saved yet)

PDO1 : Type = Fixed ; Voltage (mV) = 5000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 PDO2 : Type = Fixed ; Voltage (mV) = 9000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 PDO3 : Type = Fixed ; Voltage (mV) = 15000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 new PDO : Type = Fixed ; Voltage = 1000 ; Max Current = 1000 ; Peak Current = 100 % IOC ;

After saving, the new PDO is integrated into the numbered list as shown in Figure 40.

Figure 40. New PDO saved

PDO1 : Type = Fixed ; Voltage (mV) = 5000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 PDO2 : Type = Fixed ; Voltage (mV) = 1000 ; Max Current (mA) = 1000 ; Peak Current = 100 % IOC ;
 PDO3 : Type = Fixed ; Voltage (mV) = 9000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;
 PDO4 : Type = Fixed ; Voltage (mV) = 15000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

4.6.6 Delete a PDO

View details of the PDO to delete and click on the *Delete* button as shown in Figure 41.

Figure 41. Select the PDO to delete

> PDO1 : Type = Fixed ; Voltage (mV) = 5000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

> **PDO2 : Type = Fixed ; Voltage (mV) = 1000 ; Max Current (mA) = 1000 ; Peak Current = 100 % IOC ;**

> Type > Voltage (mV)

> Max Current (mA) > Peak Current

Delete

> PDO3 : Type = Fixed ; Voltage (mV) = 9000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

> PDO4 : Type = Fixed ; Voltage (mV) = 15000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

The deleted PDO appears in red up to the sending to the target. Refer to Figure 42).

Figure 42. PDO to delete selected

> PDO1 : Type = Fixed ; Voltage (mV) = 5000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

> **Deleted PDO2 : Type = Fixed ; Voltage (mV) = 1000 ; Max Current (mA) = 1000 ; Peak Current = 100 % IOC ;**

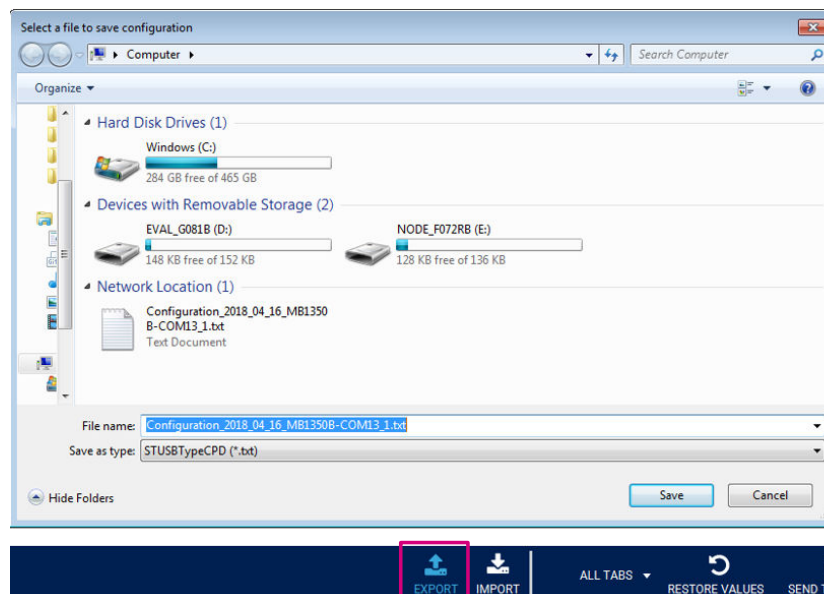
> PDO3 : Type = Fixed ; Voltage (mV) = 9000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

> PDO4 : Type = Fixed ; Voltage (mV) = 15000 ; Max Current (mA) = 3000 ; Peak Current = 100 % IOC ;

4.6.7 Configuration saving

The tool proposes to save the selected port configuration for further needs. The *EXPORT* button allows this saving in a text file with a predefined name and location, which can be updated. Refer to Figure 43.

Figure 43. Export the configuration of a port



The *IMPORT* button allows the saved configuration to be loaded only in the user interface.

The differences between the current configuration and the configuration loaded are highlighted in the user interface as shown in Figure 44.

Figure 44. Modified parameter after importing a configuration file

STM32CubeMonitor-UCPD 1.4.0

STM32CubeMonitor USB Type-C PD

Board Selection Port Selection Port Communication Port Configuration

PD Settings User Settings VDM SOP SINK Capabilities

VDM_Support YES
Data_Capable_as_USB_Host NO
Modal_Operation_Supported NO

Responds_To_Discov YES
Data_Capable_as_USB_Device NO
bcdDevice 0xAAAB

Attempts_Discov YES
Product_Type Undefined

Port	Contract	Power Role	Spec Revision	CC	Data Role	VconnON	VBus (mV)	Ibus (mA)	Selected SRC PDO
Port 1	EXPLICIT CONTRACT	SNK	PD3	CC1	UFP	NO	5166	1	Distant SRC PDO1 (5V - 3A)

PREVIOUS EXPORT IMPORT CURRENT PAGE RESTORE VALUES SEND TO TARGET SAVE ALL IN TARGET TRACES

Connected To MB1378B-COM25 Board - USB-C Port 1

To set effectively the configuration imported in the board, use the *SEND TO TARGET* or *SAVE ALL IN TARGET* button.

5 Traces information

The tool displays debug information on a dedicated *Debug* panel.

There are five types of debugging information listed below:

- Type-C event (EVENT)
- Power-delivery notification traces (NOTIF)
- Traces of messages sent to the distant device (OUT)
- Traces of messages received from the distant device (IN)
- Debug traces (DEBUG)

5.1 Message contents

Message-type contents are described in the user manual *STM32 TCPM Application (UM2063)*.

5.2 Traces panel

The *Traces* panel, shown in [Figure 45](#), includes the following four columns:

1. Type of the message (*EVENT*, *NOTIF*, *OUT*, *IN*, or *DEBUG*)
2. Timestamp of the message. The timestamp is the current hardware value in milliseconds since the boot of the hardware platform.
3. USB Type-C® port number of the message
4. Content of the message

Figure 45. Traces panel

Type	TimeSt...	Port	Message
			[4] Programmable : [3V - 11V] - 3A [5] Programmable : [3V - 16V] - 3A
PE	28294	1	PE_SRC_DISCOVERY
CAD	28300	2	USBDPD_CAD_STATE_ATTACHED
NOTIF	28300	2	USBSTACK_START
DEBUG	28300	2	USBIF Device start
EVENT	28300	2	EVENT_ATTACHED
PE	28303	2	PE_SNK_STARTUP
PE	28303	2	PE_SNK_WAIT_FOR_CAPABILITIES
PE	28444	1	PE_SRC_SEND_CAPABILITIES
OUT	28446	1	SOP PD3 s:022 H:0x51A1 (id:0, DR:DFP, PR:SRC) SRC_CAPABILITIES DATA:...
			Option: UNCHUNK DRDDRP [1] Fixed : 5V - 3A [2] Fixed : 9V - 3A [3] Fixed : 15V - 3A [4] Programmable : [3V - 11V] - 3A [5] Programmable : [3V - 16V] - 3A
IN	28447	2	SOP PD3 s:022 H:0x51A1 (id:0, DR:DFP, PR:SRC) SRC_CAPABILITIES DATA:...
			Option: UNCHUNK DRDDRP [1] Fixed : 5V - 3A [2] Fixed : 9V - 3A [3] Fixed : 15V - 3A [4] Programmable : [3V - 11V] - 3A [5] Programmable : [3V - 16V] - 3A
OUT	28447	2	SOPs:002 H:0x0001 (id:0, DR:UFP, PR:SNK) GOODCRC
IN	28447	1	SOPs:002 H:0x0001 (id:0, DR:UFP, PR:SNK) GOODCRC
NOTIF	28447	1	SRCCAP_SENT
PE	28448	2	PE_SNK_EVALUATE_CAPABILITY
PE	28448	1	PE_SRC_WAIT_REQUEST
PE	28450	2	PE_SNK_SEND_REQUEST
OUT	28450	2	SOP PD3 REQUEST s:006 H:0x1082 (id:0, DR:UFP, PR:SNK) DATA: 96588231
			ObjectPosition:3 GiveBack:0 CapabilityMismatch:0 USBCommunicationCapable:0 MultiUSBSupported:1

HIDE TRACES
 COPY TRACES
 CLEAR TRACES
 SAVE TRACES

5.3 Traces panel functionality

This panel offers functionalities to select, copy, clear, or save traces. It can also be done using the mouse, keyboard controls (Ctrl-V), or *Copy Traces*, *Clear Traces*, and *Save Traces* buttons. Selections can be copied (Ctrl-V) to the usual text editors.

The panel can be also hidden if needed by clicking on *Hide Traces*.

5.4 Read saved traces file

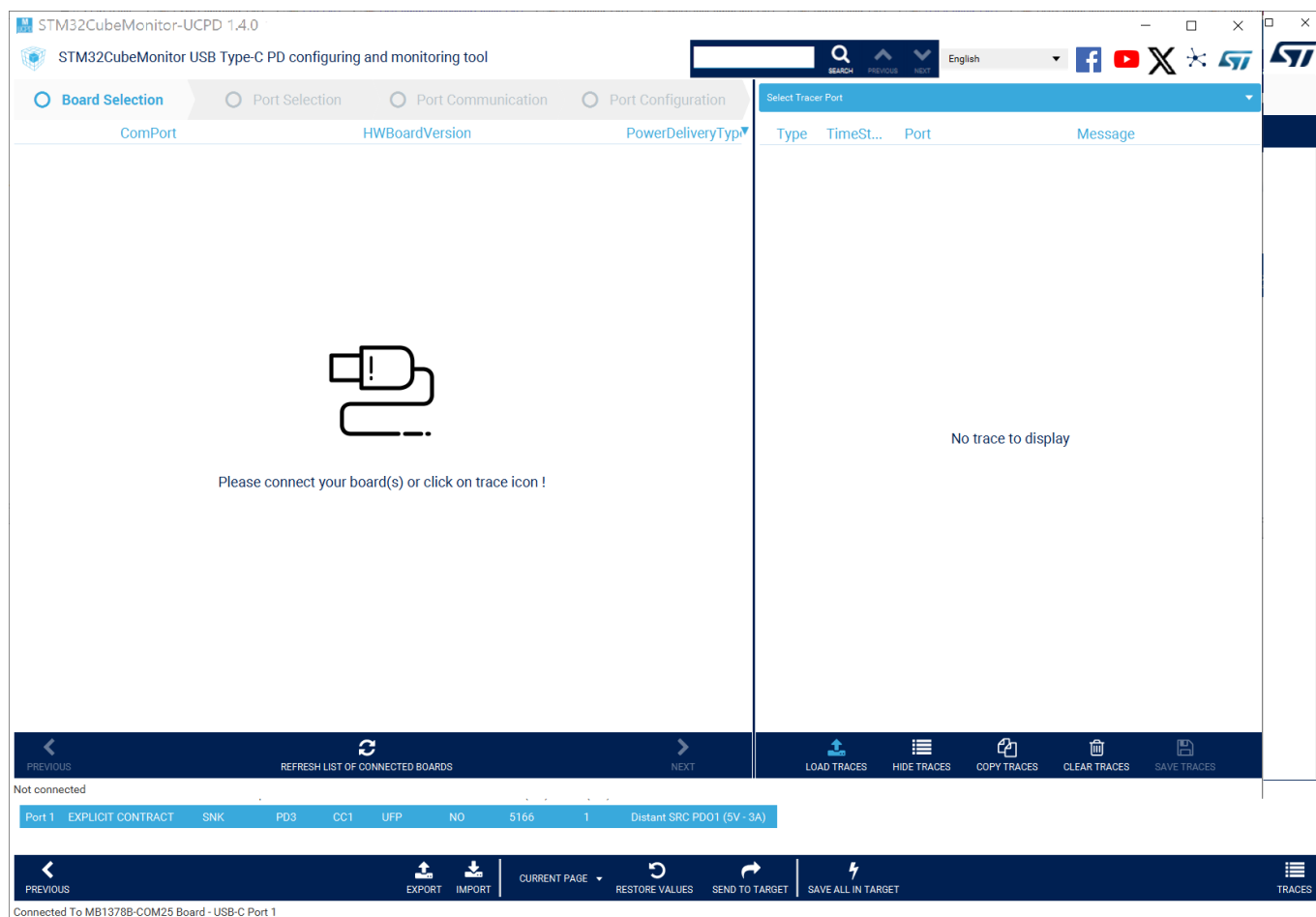
As soon as the user saves a trace in a directory, the tool uses this directory for all file operations, such as opening or saving a trace.

The user must save the first traces manually in a specific directory and relaunch the tool. After that, the tool uses this directory for all file operations, such as opening or saving a trace. Each time the user connects to the board, a new .cpd file is created by default on the directory.

When installing a new version of the tool, the user must repeat the process of saving the first trace manually in a specific directory. Relaunch the tool saves by default the traces in the same directory.

When the tool is not connected to any board, the *Traces* panel proposes a *Load Traces* button to read a .cpd file formerly saved in the application folder.

Figure 46. Load Traces button



5.5 Search in Trace

Figure 47. Look for a text in the trace



By entering a text in the text area, the user locates all entries of this text into the entire trace.

Figure 48. Find messages in the trace

STM32CubeMonitor-UCPD 1.4.0

STM32CubeMonitor USB Type-C PD

NOTIF

Select Trace Port

Type	TimeSt...	Port	Message
CAD	780	1	USBD_CAD_STATE_ATTACHED_WAIT
CAD	899	1	USBD_CAD_STATE_ATTACHED
NOTIF	899	1	USBSTACK_START
DEBUG	899	1	ADVICE: USBD_DPM_Notification:104
EVENT	899	1	EVENT_ATTACHED
DEBUG	899	1	VBUS ON
DEBUG	899	1	-- BSP_USBD_PWR_VBUSOn --
DEBUG	902	1	-- GDFP/GDC setting : SRC --
PE	902	1	PE_SRC_STARTUP
NOTIF	902	1	POWER_STATE_CHANGE
DEBUG	902	1	ADVICE: USBD_DPM_Notification:90
PE	902	1	PE_SRC_SEND_CAPABILITIES
OUT	903	1	SOP PD3 s:006 H:0x11A1 (id:0, DR:DFP, PR:SRC) SRC_CAPABILITIES DATA: 2C910100 Option: [1] Fixed: SV-3A
OUT	905	1	SOP PD3 s:006 H:0x11A1 (id:0, DR:DFP, PR:SRC) SRC_CAPABILITIES DATA: 2C910100 Option: [1] Fixed: SV-3A
OUT	906	1	SOP PD3 s:006 H:0x11A1 (id:0, DR:DFP, PR:SRC) SRC_CAPABILITIES DATA: 2C910100 Option: [1] Fixed: SV-3A
IN	907	1	SOP s:002 H:0x0001 (id:0, DR:UFP, PR:SNK) GOODCRC
NOTIF	907	1	SRCCAP_SENT
DEBUG	907	1	ADVICE: USBD_DPM_Notification:15
PE	907	1	PE_SRC_WAIT_REQUEST
IN	907	1	SOP PD3 REQUEST s:006 H:0x1082 (id:0, DR:UFP, PR:SNK) DATA: 0A280011 ObjectPosition:1 GiveBack:0 CapabilityMismatch:0 USBCCommunicationCapable:0 NoUSBSuspend:1 UnchinkedExtendedMessagesSupported:0 MaximumOperatingCurrent:100mA OperatingCurrent:100mA
OUT	907	1	SOP s:002 H:0x0161 (id:0, DR:DFP, PR:SRC) GOODCRC
PE	908	1	PE_SRC_NEGOTIATE_CAPABILITY
DEBUG	908	1	ADVICE: update USBD_DPM_EvaluateRequest
OUT	908	1	SOP PD3 ACCEPT s:002 H:0x03A3 (id:1, DR:DFP, PR:SRC)
IN	909	1	SOP s:002 H:0x0201 (id:1, DR:UFP, PR:SNK) GOODCRC
PE	909	1	PE_SRC_TRANSITION_SUPPLY
NOTIF	938	1	POWER_STATE_CHANGE
DEBUG	999	1	ADVICE: USBD_DPM_Notification:104

Not connected

DISCONNECT TRACES COPY TRACES CLEAR TRACES SAVE TRACES

In the example shown in Figure 48, the user is searching entries of NOTIF messages in the trace. After entering NOTIF in the text area and clicking the Search button, NOTIF messages are highlighted all along the trace. Clicking on the previous or next button, the user navigates to each occurrence of the entry.

6 Troubleshooting

6.1 Board not detected

If the board is not detected after clicking on the *Refresh list of connected boards*: Unplug the board, plug it again and have a new click on the *Refresh* button.

Note: If the GUI responder is not activated in the embedded firmware but the debug trace is available (UART through VCP of the ST-LINK and the compilation switch `_TRACE` activated), the user might still see the trace in the UCPD monitor by clicking on the *Trace* button in the bottom-right corner.

7 Support material

7.1 Hardware

STM32 Nucleo pack for USB Type-C® and any board embedding power delivery <https://www.st.com/en/applications/connectivity/usb-type-c-and-power-delivery.html>.

7.2 Software

X-CUBE-USB-PD is STM32 USB power-delivery firmware with the tracer and the cubemon_ucpd_emb modules on their latest version (as described in the user manual *STM32 TPM application* (UM2063), available from www.st.com, or built through STM32CubeMX) or any new power delivery firmware from STM32G0, G4, L5 MCU Package.

For more information, refer to the USB power-delivery overview wiki page https://wiki.st.com/stm32mcu/wiki/USB_Power_Delivery_overview.

Revision history

Table 1. Document revision history

Date	Revision	Changes
15-Nov-2018	1	Initial release.
1-Sep-2020	2	Updated: <ul style="list-style-type: none"> Section 2.1 Computer requirements Section 2.3.2 Installing the USB driver for ST-LINK
18-Nov-2021	3	Updated: <ul style="list-style-type: none"> Figure 1, Figure 44, Figure 45, and Section 5.3 Traces panel functionality with the Save Traces feature and button
26-May-2023	4	Updated <ul style="list-style-type: none"> Section 5.4: Read saved traces file Figure 1, Figure 3 to Figure 5, Figure 11, Figure 22 to Figure 26, and Figure 43 Added: <ul style="list-style-type: none"> Section 5.5: Search in Trace Figure 46 and Figure 47
14-Nov-2024	5	Updated: <ul style="list-style-type: none"> Section 2.1: Computer requirements Global screenshot update with refreshed social network shortcut area Added: <ul style="list-style-type: none"> Figure 18. Measurement panel disconnection

Contents

1	Features	2
2	Getting started	3
2.1	Computer requirements	3
2.2	Hardware requirements	3
2.3	Installing	3
2.3.1	Installing STM32CubeMonitor-UCPD	3
2.3.2	Installing the USB driver for ST-LINK	4
2.4	Uninstalling STM32CubeMonitor-UCPD	4
2.5	Uninstalling the USB driver for ST-LINK	4
3	Windows structure - main areas	5
4	How to use STM32CubeMonitor-UCPD	7
4.1	Board detection and selection	7
4.2	Port selection	9
4.3	<i>Port Selection</i> action	10
4.4	<i>Port Status</i> information	10
4.4.1	<i>Port Status</i> information update	11
4.4.2	<i>Port Status</i> information-Selected port	11
4.5	<i>Port Communication</i>	11
4.5.1	<i>Distant Capabilities</i> panel	13
4.5.2	<i>Measurement</i> panel	14
4.5.3	<i>Message Selector</i> panel	17
4.5.4	Typical use case with the <i>General</i> tab	19
4.6	Port configuration	23
4.6.1	Overall presentation	23
4.6.2	Button bar details	24
4.6.3	Modify the configuration-Update parameter presentation	24
4.6.4	<i>SRC/SNK capabilities</i> tabs-PDO management	25
4.6.5	Add a PDO	26
4.6.6	Delete a PDO	27
4.6.7	Configuration saving	27
5	Traces information	29
5.1	Message contents	29
5.2	<i>Traces</i> panel	29
5.3	<i>Traces</i> panel functionality	30
5.4	Read saved traces file	30

5.5	Search in <i>Trace</i>	31
6	Troubleshooting	32
6.1	Board not detected	32
7	Support material	33
7.1	Hardware	33
7.2	Software	33
	Revision history	34



List of tables

Table 1.	Document revision history	34
----------	-------------------------------------	----

List of figures

Figure 1.	Overview of all panels	5
Figure 2.	Social network shortcut area	6
Figure 3.	Invitation to connect the board	7
Figure 4.	<i>Board Selection</i> window.	8
Figure 5.	<i>Port Selection</i> window	9
Figure 6.	Port selected: <i>Port Status</i> panel, <i>Button</i> , and <i>Status</i> bars	10
Figure 7.	<i>Port Selection</i> ribbon	10
Figure 8.	<i>Port Status</i> panel	10
Figure 9.	The <i>Parameter</i> blinks when the update is done.	11
Figure 10.	Selected port highlighted	11
Figure 11.	<i>General</i> tab overview	12
Figure 12.	<i>Measurement</i> tab overview	12
Figure 13.	SRC capabilities of the distant port	13
Figure 14.	Sink capabilities of the distant port	13
Figure 15.	Distant PDO details.	14
Figure 16.	<i>Measurement</i> panel	14
Figure 17.	<i>Measurement</i> panel registering.	15
Figure 18.	<i>Measurement</i> panel disconnection	16
Figure 19.	<i>Message Selector</i> panel	17
Figure 20.	Messages filtering.	17
Figure 21.	Message parameters setting	18
Figure 22.	Send message button	18
Figure 23.	Message-warning information.	19
Figure 24.	Overview communication panel	20
Figure 25.	Message selection	21
Figure 26.	New power contract	22
Figure 27.	Port configuration window	23
Figure 28.	<i>Button</i> bar	24
Figure 29.	Default parameter view	24
Figure 30.	Extended parameter view	24
Figure 31.	Parameter modified.	24
Figure 32.	Parameter saved	25
Figure 33.	Range	25
Figure 34.	Value out of range.	25
Figure 35.	Parameters of the PDOs	25
Figure 36.	Detailed parameters of a PDO	25
Figure 37.	PDO parameter: Help, range, and value on the board	26
Figure 38.	Add a new fixed PDO	26
Figure 39.	New PDO created (not saved yet).	26
Figure 40.	New PDO saved	26
Figure 41.	Select the PDO to delete	27
Figure 42.	PDO to delete selected	27
Figure 43.	Export the configuration of a port	27
Figure 44.	Modified parameter after importing a configuration file	28
Figure 45.	<i>Traces</i> panel	29
Figure 46.	<i>Load Traces</i> button	30
Figure 47.	Look for a text in the trace	31
Figure 48.	Find messages in the trace	31

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