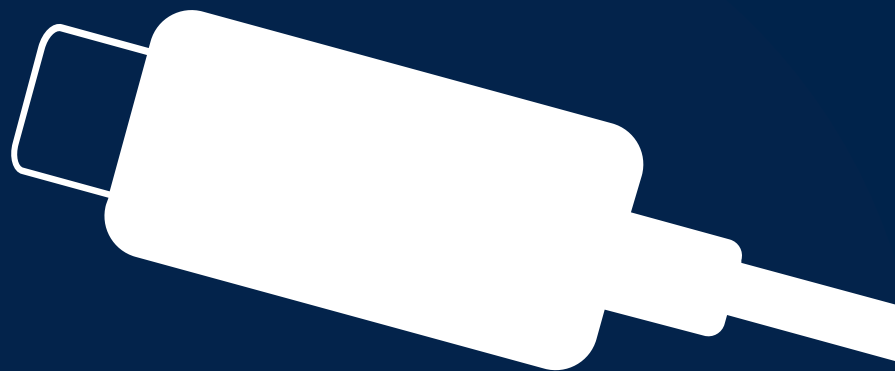




life.augmented



STUSB

STSW-STUSB010 Quick Start

STUSB1602 software library
for P-NUCLEO-USB002



Introduction

This document provides an overview of the STUSB1602 software package enabling the functionalities of the P-NUCLEO-USB002 development board.

SOFTWARE	
STSW-STUSB010	STUSB1602 software library for P-NUCLEO-USB002
IAR 8.x	C code compiler
GCC	GNU Arm Embedded Toolchain
STM32CubeIDE	Integrated Development Environment for STM32
HARDWARE	
P-NUCLEO-USB002	USB-C and Power Delivery Nucleo Pack with NUCLEO-F072RB



SW library set-up (1/3)

- 1 Download the STUSB1602 software package by searching [STSW-STUSB010](#) from www.st.com home page:

The screenshot shows the ST website search interface. At the top, the ST logo and 'life.augmented' tagline are visible. A search bar contains 'STSW-STUSB010' and a 'Search' button. Below the search bar, navigation links for 'Products', 'Applications', 'Tools & Software', and 'About ST' are present, along with a 'Sample & Buy' link. The search results section shows 'Search result >' and a search bar with 'STSW-STUSB010'. Below this, there are links for 'My bookmarks' and 'Search History'. A horizontal menu shows 'Products', 'Tools & Software (1)', 'Resources (2)', 'Videos', 'Solutions', 'Applications', 'X-Reference', and 'All site'. On the left, there are filters for 'REFINE BY TYPE' (Embedded Software (1)) and 'REFINE BY VENDOR' (ST (1)). The main content area displays '1 tools & software: STSW-STUSB010' and a table with the following data:

Part Number	Status	Type	Category	Description
STSW-STUSB010	ACTIVE	Embedded Software	Evaluation Tool Software	STUSB1602 software library for P-NUCLEO-USB002



SW library set-up (2/3)

2 Then click on “Get Software” from either the bottom or top of the page

Get Software				
Part Number	Software Version	Marketing Status	Supplier	Download
STSW-STUSB010	1.3.0	Active	ST	Get Software

3 Download will start after accepting the License Agreement, and filling contact information.

License Agreement

ACCEPT

IMPORTANT-READ CAREFULLY:

This Limited License Agreement ("LLA") is made between you (either an individual person or a single legal entity, who will be referred to in this LLA as "You" or "Licensee") and STMicroelectronics International NV, a company incorporated under the laws of the Netherlands acting for the purpose of this LLA through its Swiss branch 39, Chemin du Champ des Filles, 1228 Plan-les-Ouates, Geneva, Switzerland (hereinafter "ST") for the software licensed materials that accompany this LLA, including any associated media, printed materials and electronic documentation (the "Licensed Materials"). The Licensed Materials include any software updates and supplements, that ST may provide You or make available to You after the date You obtain the Licensed Materials to the extent that such items are not accompanied by a separate license agreement or other terms of use.

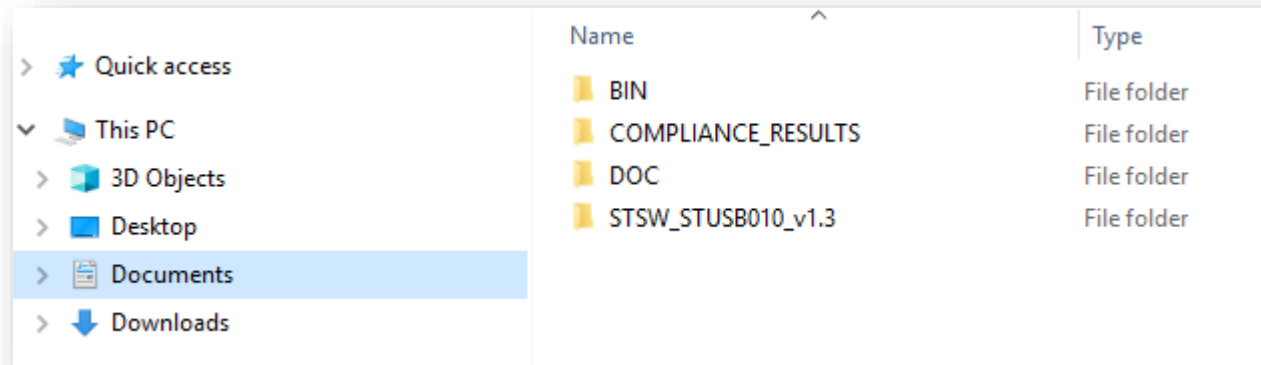


SW library set-up (3/3)

4 Save the file **en.STSW-STUSB010_v1.3.0.zip** on your laptop



and unzip:



5 The package contains a DOC directory, ready-to-use binary files, associated projects and compliance reports



Hardware settings

The software library has been optimized to quickly compile on the P-NUCLEO-USB002 development board. The board is composed of a customized NUCLEO-F072RB and a STUSB1602 expansion board.

It is composed of 2 Dual Role Ports (DRP) USB PD capable receptacles.

It is mandatory to align board settings with the selected application requirements. Please refer to below 2 user manuals from P-NUCLEO-USB002 web page.

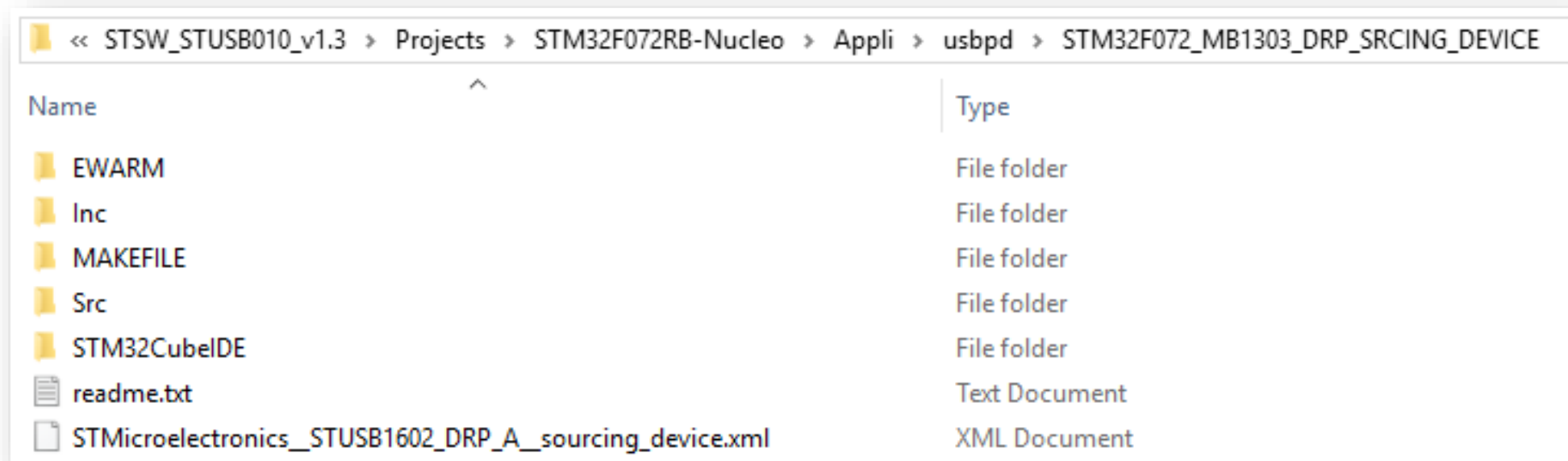
Title ↕	Type ↕	Product Associations	Version ↕	Size ↕	Icon
UM2205: Getting started with the STM32 Nucleo pack for USB Type-C™ and Power Delivery with the Nucleo-F072RB board and the STUSB1602	User Manual	P-NUCLEO-USB002	1	1.6 MB	↓ PDF
UM2191: STM32 Nucleo pack for USB Type-C™ and Power Delivery with the Nucleo-F072RB board and the STUSB1602	User Manual	P-NUCLEO-USB002	2	3.7 MB	↓ PDF



Compiler

Projects can be compiled with either:

- IAR 8.x,
- GCC using GNU Arm Embedded Toolchain (version used: 9 2020-q2-update with GNU make-4.3),
- STM32CubeIDE (download [here](#)).





Overview

The software library includes 8 different software frameworks (+ 3 without RTOS) already optimized to address most common application scenario:

	Project	Typical Application
#1	STM32F072_MB1303_SRC_ONLY(*)	Provider / SOURCE (power management)
#2	STM32F072_MB1303_SRC_VDM	Provider / SOURCE (power management) + extended message support
#3	STM32F072_MB1303_SNK_ONLY(*)	Consumer / SINK (power management)
#4	STM32F072_MB1303_SNK_VDM	Consumer / SINK (power management) + extended message support + UFP support
#5	STM32F072_MB1303_DRP_ONLY (*)	Dual Role Port (power management) + dead battery mode
#6	STM32F072_MB1303_DRP_VDM	Dual Role Port (power management) + dead battery mode + extended message support + UFP support
#7	STM32F072_MB1303_DRP_SRCING_DEVICE	Dual Role Port requesting PR_swap when attached in Sink or DR_swap when attached in Source
#8	STM32F072_MB1303_DRP_2PORTS	2 x Dual Role Port (power management) + dead battery mode

NB:

- by default, all projects are packaged with RTOS support
- project annotated with a (*) are available with and without RTOS support



Folder view

- Projects folder provides different application examples in which each project name is prefix with MCU name: STM32F072 is example below

<< STSW_STUSB010_v1.3 > Projects > STM32F072RB-Nucleo > Appli > usbpd

Name	Type
STM32F072_MB1303_SRC_VDM	File folder
STM32F072_MB1303_SRC_ONLY_noRTOS	File folder
STM32F072_MB1303_SRC_ONLY	File folder
STM32F072_MB1303_SNK_VDM	File folder
STM32F072_MB1303_SNK_ONLY_noRTOS	File folder
STM32F072_MB1303_SNK_ONLY	File folder
STM32F072_MB1303_DRP_VDM	File folder
STM32F072_MB1303_DRP_SRCING_DEVICE	File folder
STM32F072_MB1303_DRP_ONLY_noRTOS	File folder
STM32F072_MB1303_DRP_ONLY	File folder
STM32F072_MB1303_DRP_2PORTS	File folder

- Project name is build as:
MCUname_shieldref_TypeCrole_type



Project Type

Type = ONLY

- Those projects are simple ones. Only mandatory features are present, with RTOS

Type = ONLY_noRTOS

- Those projects are simple ones. Only mandatory features are present, without RTOS

Type = VDM

- Those projects are complex ones. Lot of optional features are present and could be disabled/enabled by compilation switch

Type = SRCING_DEVICE

- This project is DRP sourcing device: application always try to achieve power role as source and data role as UFP



Compilation switches (1/2)

ONLY	ONLY_noRTOS	VDM	2PORTS	SRCING_DEVICE	Switch name	Comment
✓	✓	✓	✓	✓	_TRACE	Trace enabled for debug using UART
✓	✓	✓	✓	✓	_ERROR_RECOVERY	Enable error_recovery in lib stack. Mandatory for DRP compliance
✓	✓	✓	✓	✓	_VCONN_SUPPORT	Enabled in SRC and DRP project for cable messaging
X	X	✓	X	✓	_SRC_CAPA_EXT	Enable source extended capability messages
X	X	✓	X	✓	_ADC_MONITORING	Enable MCU ADC usage for voltage reporting.
X	X	✓	X	✓	_VDM	Enable VDM messages possibility and needed for cable messages
☀	☀	☀	☀	☀	SPI_ONE_LINE	Disabled by default. Allow to merge MOSI and MISO pins
X	X	☀	X	☀	_MANU_INFO	Disabled by default. Used to send/reply to manufacturer info messages
X	X	✓	X	✓	_ALERT	Allow to send Alert messages
X	X	✓	X	✓	_STATUS	Allow to send Status messages



Compilation switches (2/2)

ONLY	ONLY_no RTOS	VDM	2PORTS	SRCING_DEVICE	Switch name	Comment
X	X		X		_BATTERY	Disabled by default. Used to send/reply to battery messages
X	X		X		USBPD_DATA	To setup and initialize USB IP in peripheral. Disabled by default on 'SRC' project
X	X		X		_CLASS_HID	To configure descriptor class in HID
X	X		X		_CLASS_BB	To configure descriptor class in Billboard
X	X		X		SOURCING_DEVICE	Application requests PR_swap when attached in Sink or DR_swap when attached in Source
X	X		X		UNCHUNKED_SUPPORT	Allow support of unchunked messages
	X				USBPD_LED_SERVER	To enable LED server for VBUS/CC/role toggling
					_GPIO_FOR_SRC	To drive 2 other voltages on top of 5V, in Source or DRP, using OpenDrain GPIOs
					_VVAR_FLASH	Allows to output DAC on ADD0 pin. DAC output value is always 1/10 of VBUS value



Not supported and can't be enabled in current project



Not supported by default but can be enabled in current project



Supported by default (and can be disabled) in current project





#1 - MB1303_SRC_ONLY

This is the typical framework for SOURCE only applications, implementing USB PD power negotiation.

The code provided includes 1 PDO including EMCA support : when used with 3A only cables, maximum current advertised by the SOURCE is bounded to 3A for those PDO which normally support more than 3A.

Default profiles is:

- PDO1: 5V - 3A



#2 - MB1303_SRC_VDM

This is the typical framework for SOURCE only applications, implementing USB PD power negotiation and supporting optional extended messages.

The code provided includes 1 PDO (including EMCA support), and is able to answer to the following messages:

- Manufacturer info
- Discover identity
- Unchunked extended messages

Defaults profiles is:

- PDO1: 5V - 3A



#3 - MB1303_SNK_ONLY

This is the typical framework for SINK only applications, implementing USB PD power negotiation.

The code provided includes 2 PDOs (maximum power has priority),

Defaults profiles are:

- PDO1: 5V - 1.5A
- PDO2: 9V - 1.5A



#4 - MB1303_SNK_VDM

This is the typical framework for SINK only applications, implementing USB PD power negotiation and supporting optional extended messages. Project is defined as an Alternate Mode Adapter: it is able to enter alternate mode as a Display Port and enumerate as Billboard otherwise.

The code provided includes 2 PDOs, and is able to answer to the following messages:

- Manufacturer info
- Discover identity
- Unchunked extended messages

Defaults profiles are:

- PDO1: 5V - 1.5A
- PDO2: 9V - 1.5A



#5 - MB1303_DRP_ONLY

This is the typical framework for Dual Role Port applications, such as Power bank applications.

By default, the port connects as a SINK when application is not supplied (dead Battery mode), and supports both power and data role swap (PR_SWAP and DR_SWAP) and EMCA.

Defaults profiles are:

- Source:
 - PDO1: 5V - 3A
- Sink:
 - PDO1: 5V - 1.5A
 - PDO2: 9V - 1.5A



#6 - MB1303_DRP_VDM

This is the typical framework for Dual Role Port supporting alternate mode in UFP.

By default, the port connects as a SINK when application is not supplied (dead Battery mode), and supports both power and data role swaps (PR_SWAP and DR_SWAP). It implements USB PD power negotiation for both SOURCE (including EMCA support) and SINK, and supports optional PD3 features like:

- Manufacturer info, Discover identity, Unchunked extended messages
- Alternate mode:
 - Enters DP mode
 - Enumerate as Billboard if needed

Defaults profiles are:

- Source:
 - PDO1: 5V - 3A
- Sink:
 - PDO1: 5V - 1.5A
 - PDO2: 9V - 1.5A



#7 - MB1303_DRP_SRCING_DEVICE

- This is the typical framework for single port application with Dual Role Port capability supporting extended messages and UFP.
- It can be used typically for applications acting as a power SOURCE and as a PERIPHERAL for USB data.
- At the connection, the port connects either as a SINK or as a SOURCE (depending on counterpart device role). When contract is established as a SINK (so by default UFP), it requests a POWER_SWAP to become a SOURCE/UFP (HID). At the opposite, when contract is established as a SOURCE (so by default DFP), it requests a DATA_SWAP to become a SOURCE/UFP (HID)
- Defaults profiles are:
 - Source:
 - PDO1: 5V – 3A
 - Sink:
 - PDO1: 5V 1.5A
 - PDO2: 9V 1.5A

NB:

Optional 9V and 12V SOURCE profiles are available using _GPIO_FOR_SRC switch and appropriate hardware



#8 - MB1303_DRP_2ports

- This is the typical framework for dual port applications with Dual Role Port capability.
- It can be used typically for dual DRP applications.
- By default, each port connects as a SINK when application is not supplied (dead Battery mode), and supports both power and data role swaps (PR_SWAP and DR_SWAP). It implements USB PD power negotiation for both SOURCE (including EMCA support) and SINK.
- Defaults profiles are:
 - Source:
 - PDO1: 5V – 3A
 - Sink:
 - PDO1: 5V 1.5A
 - PDO2: 9V 1.5A

NB:

Optional 9V and 12V SOURCE profiles are available using _GPIO_FOR_SRC switch and appropriate hardware

Thank you