

en.STSW-STUSB012-v1.1.0 > STSW-STUSB012_v1.1

Name

- STM32F446_MB1303_DRP_2PORTS
- STM32F446_MB1303_DRP_ONLY
- STM32F446_MB1303_DRP_ONLY_noRTOS
- STM32F446_MB1303_DRP_SRCING_DEVICE
- STM32F446_MB1303_DRP_VDM
- STM32F446_MB1303_SNK_ONLY
- STM32F446_MB1303_SNK_ONLY_noRTOS
- STM32F446_MB1303_SNK_VDM
- STM32F446_MB1303_SRC_ONLY
- STM32F446_MB1303_SRC_ONLY_noRTOS
- STM32F446_MB1303_SRC_VDM



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STSW-STUSB012

Firmware package documentation

V2.1



STUSB



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Overview

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

	Project	Typical Application
#1	STM32F446_MB1303_SRC_ONLY(*)	Provider / SOURCE (power management)
#2	STM32F446_MB1303_SRC_VDM	Provider / SOURCE (power management) + extended message support
#3	STM32F446_MB1303_SNK_ONLY(*)	Consumer / SINK (power management)
#4	STM32F446_MB1303_SNK_VDM	Consumer / SINK (power management) + extended message support + UFP support
#5	STM32F446_MB1303_DRP_ONLY (*)	Dual Role Port (power management) + dead battery mode
#6	STM32F446_MB1303_DRP_VDM	Dual Role Port (power management) + dead battery mode + extended message support + UFP support
#7	STM32F446_MB1303_DRP_2ports	2 x Dual Role Port (power management) + dead battery mode + extended message support + UFP support
#8	STM32F446_MB1303_DRP_SRCING_DEVICE	Dual Role Port requesting PR_swap when attached in Sink or DR_swap when attached in Source

- 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: STM32F446 is example below

en.STSW-STUSB012-v1.1.0 > STSW_STUSB012_v1.1 > Projects > STM32446E-Nucleo > Applications > usbpd

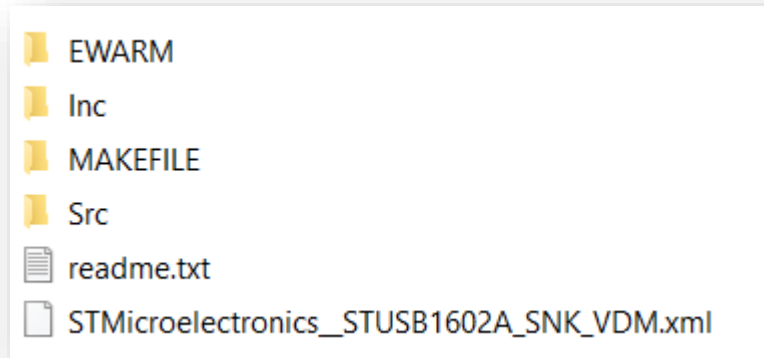
Name	Date modified	Type
STM32F446_MB1303_DRP_2PORTS	13/11/2020 11:22	File folder
STM32F446_MB1303_DRP_ONLY	13/11/2020 11:22	File folder
STM32F446_MB1303_DRP_ONLY_noRTOS	13/11/2020 11:22	File folder
STM32F446_MB1303_DRP_SRCING_DEVICE	13/11/2020 11:22	File folder
STM32F446_MB1303_DRP_VDM	13/11/2020 11:22	File folder
STM32F446_MB1303_SNK_ONLY	13/11/2020 11:22	File folder
STM32F446_MB1303_SNK_ONLY_noRTOS	13/11/2020 11:22	File folder
STM32F446_MB1303_SNK_VDM	13/11/2020 11:22	File folder
STM32F446_MB1303_SRC_ONLY	13/11/2020 11:22	File folder
STM32F446_MB1303_SRC_ONLY_noRTOS	13/11/2020 11:22	File folder
STM32F446_MB1303_SRC_VDM	13/11/2020 11:22	File folder

- Project name is build as: **MCU**name_shieldref_TypeCrole_type



Compiler

- Projects can be compiled in both **IAR 8.x** or with **GCC** using GNU Arm Embedded Toolchain (version used: 9 2020-q2-update with GNUmakemake-4.3):





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 = 2PORTS

- This project manages 2 STUSB1602 with single MCU

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	✓	✓	✓	_SRC_CAPA_EXT	Enable source extended capability messages
X	X	✓	✓	✓	_ADC_MONITORING	Enable MCU ADC usage for voltage reporting.
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	☀	☀	☀	_MANU_INFO	Disabled by default. Used to send/reply to manufacturer info messages
X	X	✓	✓	✓	_ALERT	Allow to send Alert messages
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	☀	☀	☀	_BATTERY	Disabled by default. Used to send/reply to battery messages
X	X	✓	✓	✓	USBPD_DATA	To setup and initialize USB IP in peripheral. Disabled by default on 'SRC' project
X	X	☀	✓	✓	_CLASS_HID	To configure descriptor class in HID
X	X	✓	☀	☀	_CLASS_BB	To configure descriptor class in Billboard
X	X	☀	☀	✓	SOURCING_DEVICE	Application requests PR_swap when attached in Sink or DR_swap when attached in Source
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 (see here)
☀	☀	☀	☀	☀	_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

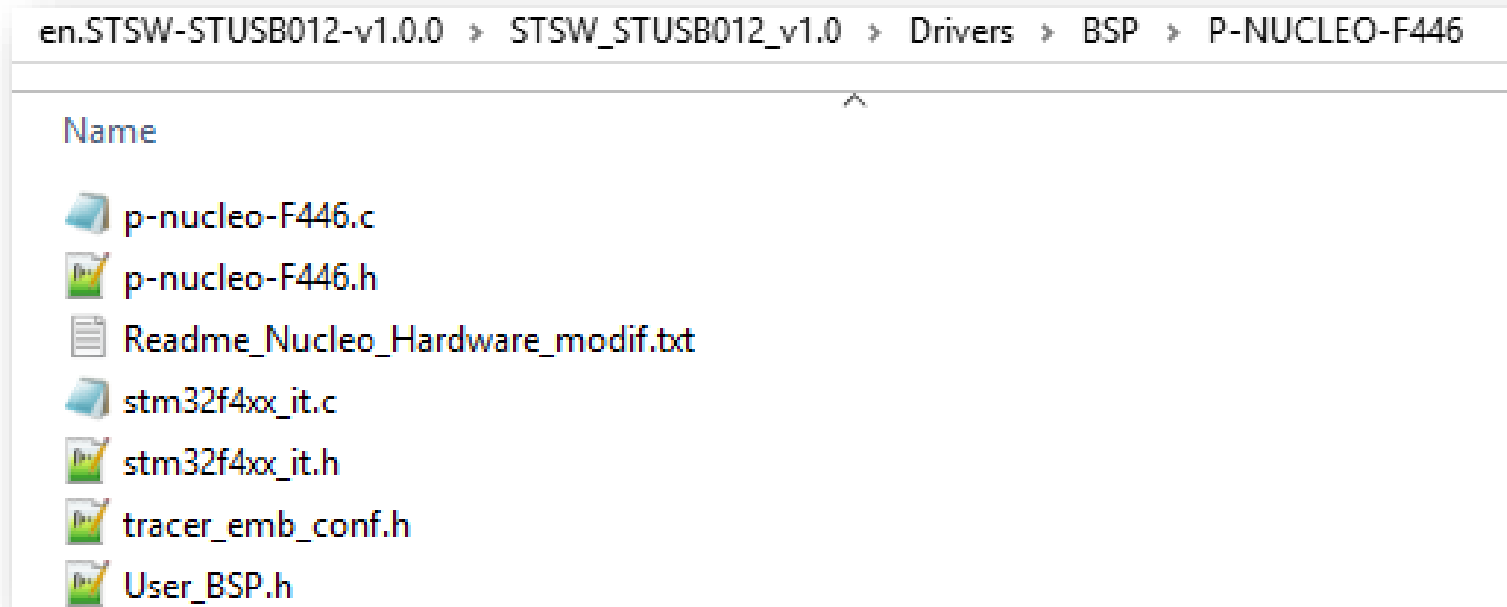


Supported by default (and can be disabled) in current project



Shield-MCU setup

- MCU and board related settings are part of **BSP folder**. MCU name is found in folder name: see stm32F446 example below

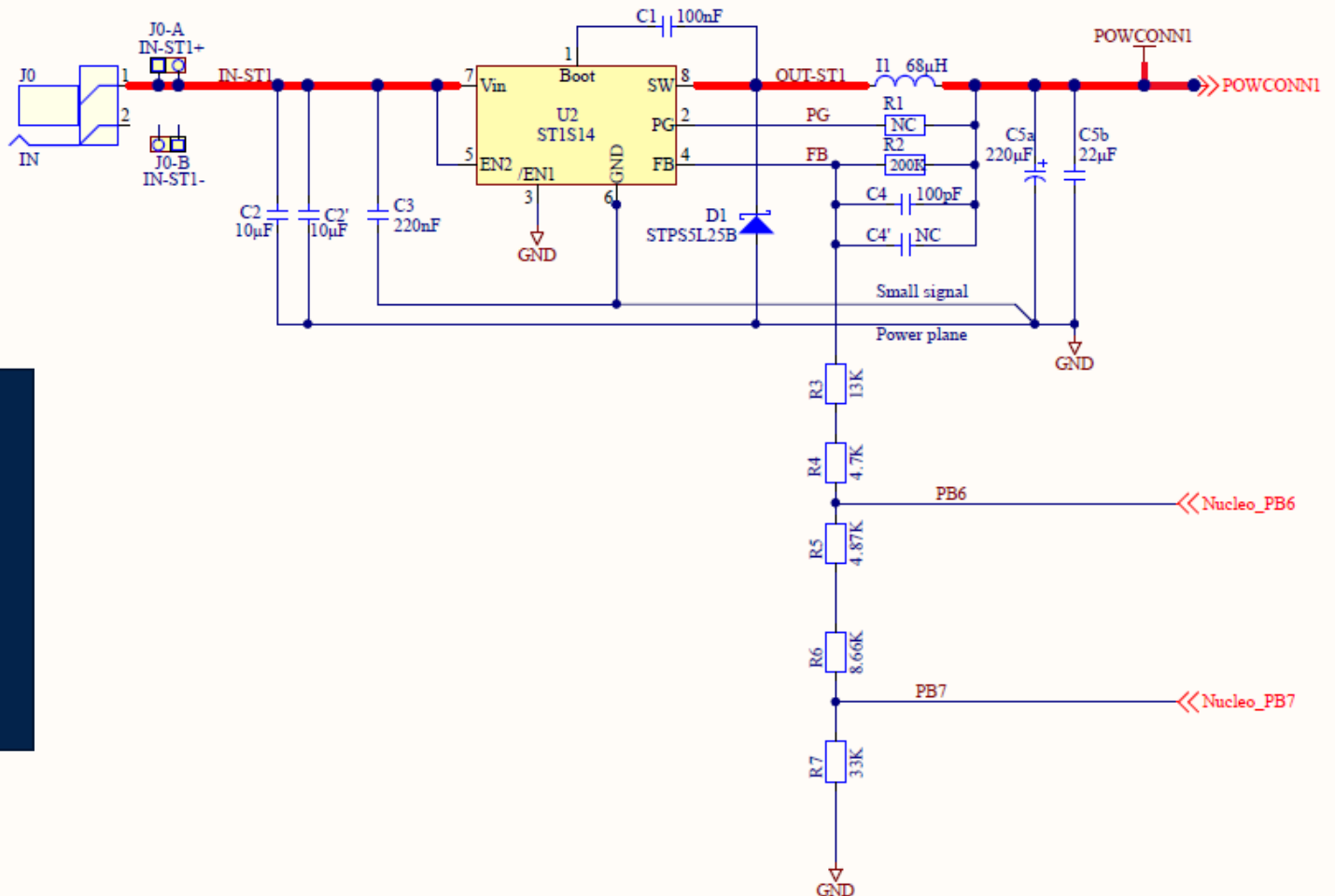


- In BSP file, **Readme_Nucleo_Hardware_modif.txt** file gives instructions on modifications to be done on Nucleo board used in order to use MB1303 shield



_GPIO_FOR_SRC

Hardware implementation proposal using _GPIO_FOR_SRC switch.



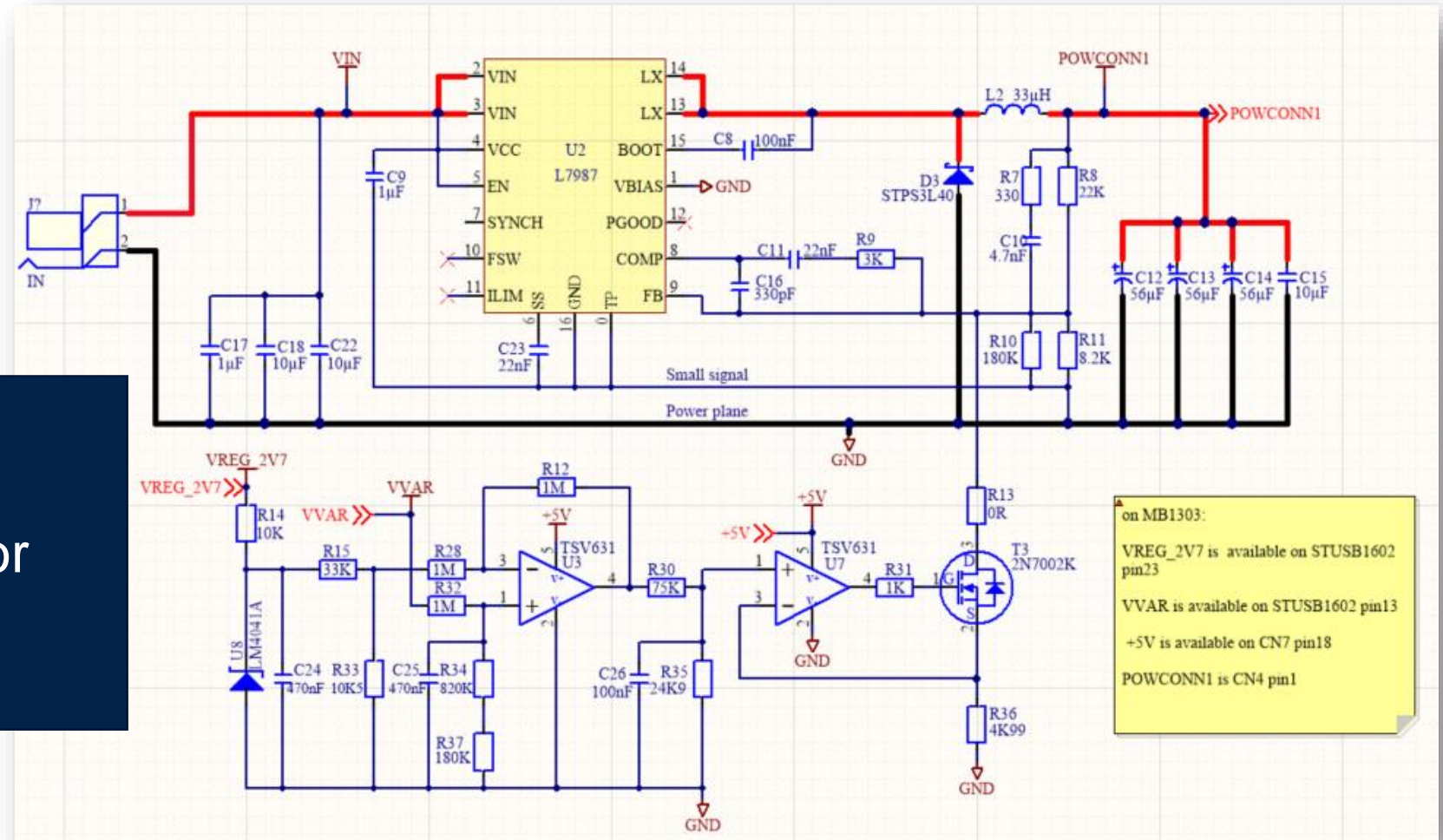
It proposes total 3 PDOs:
5V-9V-15V
toggling PB6 and PB7
defined as OpenDrain GPIOs
using Nucleo stm32F446ZE



_VVAR_FLASH

Hardware implementation proposal using _VVAR_FLASH switch.

Enabling this switch will allow to output 1/10th of PDO voltage selected for VBUS on VVAR-ADD0 STUSB1602 pin





#1 - MB1303_SRC_ONLY overview

- 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

NB:

Optional 9V and 12V profiles are available using _GPIO_FOR_SRC switch and appropriate hardware (see [here](#))



#2 - MB1303_SRC_VDM overview

- 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

NB:

Optional 9V and 12V profiles are available using _GPIO_FOR_SRC switch and appropriate hardware (see [here](#))



#3 - MB1303_SNK_ONLY overview

- This is the typical framework for SINK only applications, implementing USB PD power negotiation.
- The code provided includes 2 PDOs (max power has priority),
- Defaults profiles are:
 - PDO1: 5V - 1.5A
 - PDO2: 9V - 1.5A



#4 - MB1303_SNK_VDM overview

- 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 as a Display Port and enumerate as Billboard otherwise.
- The code provided includes 2 PDOs, and is able to answer:
 - Manufacturer info
 - Discover identity
 - Unchunked extended messages
- Defaults profiles are:
 - PDO1: 5V - 1.5A
 - PDO2: 9V - 1.5A



#5 - MB1303_DRP_ONLY overview

- 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

NB:

Optional 9V and 12V SOURCE profiles are available using _GPIO_FOR_SRC switch and appropriate hardware (see [here](#))



#6 - MB1303_DRP_VDM overview

- 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

NB:

Optional 9V and 12V SOURCE profiles are available using _GPIO_FOR_SRC switch and appropriate hardware (see [here](#))



#7 - MB1303_DRP_2ports overview

- This is the typical framework for dual port applications with Dual Role Port capability supporting extended messages and UFP.
- It can be used typically for dual DRP applications, sourcing devices or sinking host
- 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 HID device for port #0, and USB PD power negotiation for both SOURCE (including EMCA support) and SINK, and supports optional PD3 features.
- 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 (see [here](#))



#8 - MB1303_DRP_SRCING_DEVICE overview

- 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 (see [here](#))