BM-Lite Development Kit

Getting Started Guide

FINGERPRINTS

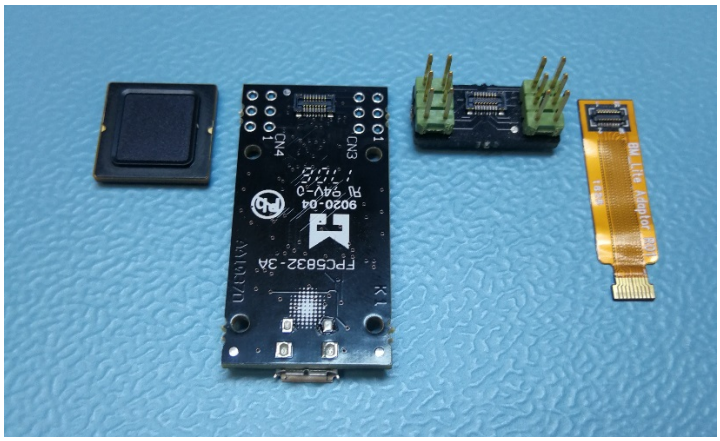
Contents

1 Introduction

Welcome to the BM-Lite Getting Started Guide for the FPC BM-Lite Development Kit. This document will take you through the necessary steps for setting up your FPC BM-Lite Development kit to interface with your PC.

Included in your FPC BM-Lite Development Kit should be the following hardware:

- 1 BM-Lite module (Part number: 100018754)
- 1 FPC5832 FTDI USB Adapter (Part number: 100015089)
- 1 FPC5924 adapter board (Part number: 100015050)
- 1 BM-Lite adapter flex cable (Part number: 100020709)



You should also have the following documentation and software:

- BM-Lite Product Specification and Integration Guideline (Doc. number: 100020596)
- Reference source code for host implementation (Doc. number: 100020845)
- Reference Python scripts for host interface (Doc. number: 100020846)

This guide takes you through the steps to setup your FPC BM-Lite Development Kit on Linux and Windows. The development kit should be fairly OS agnostic but the operating systems that have been verified and are recommended are:

- Ubuntu 16.04
- Windows 7
- Windows 10

2 Development Kit Hardware

2.1 BM-Lite Module

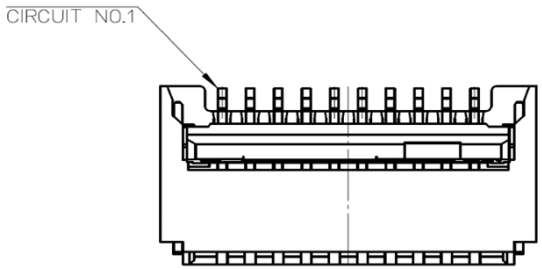
BM-Lite module (Part number: 100018754)

The BM-Lite module has a standard 10 pin 0.5 mm pitch Flat Flex Connector as main interface. The pin-out is described in the table below.

Pin number	Signal Name	Function	Description	Min. Voltage [V]	Max. Voltage [V]	Max. frequency [MHz]
1	GND	Supply	GND pin	0	0	DC
2	SPICLK	Digital in	Serial clock used for SPI	GND	3.6	20
3	MISO	Digital out	The SPI Serial tri-state output which is enabled with CS_N low	GND	3.6	SPICLK
4	MOSI	Digital in	The SPI Serial data Input	GND	3.6	SPICLK
5	CS_N	Digital in	Chip Select active when low	GND	3.6	~0
6	IRQ	Digital out	Interrupt request output (SPI only)	GND	3.6	~0
7	RST_N	Digital in	Reset module. Active low*.	GND	3.6	~0
8	UART_RX	Digital in	UART receive data pin	GND	3.6	921600** (Baud)
9	UART_TX	Digital out	UART transmit data pin	GND	3.6	921600** (Baud)
10	VDDIO	Supply	Core supply voltage. Typical 3.3V	3.0	3.6	DC

BM-Lite interface

** Keep low at least 20µs to reset whole module*
***Default baud rate is 115200*

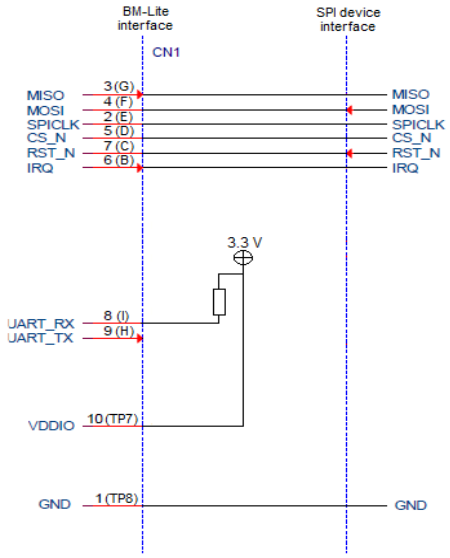


BM-Lite FFC connector. Pin 1 is to the left.

BM-Lite supports both UART and SPI interfaces. Both interfaces are enabled at power-on, but only one of them can be used at the same time. BM-Lite will auto detect which interface is being used by detecting data traffic. It is therefore important that the input signals for the unused interface are pulled into a fixed state to avoid interference.

2.1.1 SPI Interface

When using the SPI interface, the *UART RX* signal should be held at a fixed state to avoid unintentional interference on the UART interface.

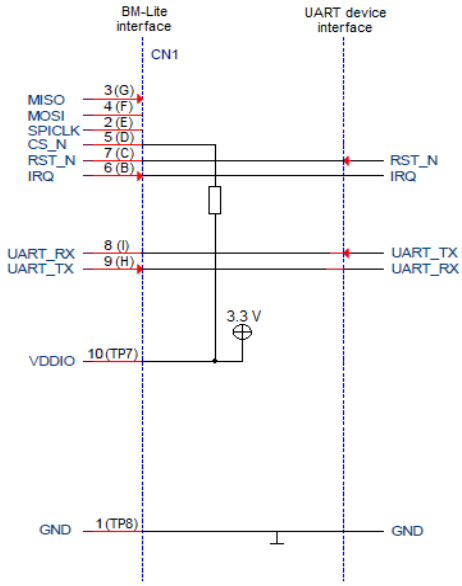


Example schematic of BM-Lite interface using SPI

The SPI communication and commands are described in the BM-Lite Product description.

2.1.2 UART Interface

When using the UART interface, the *SPI CS* signal should be held pulled up to avoid unintentional interference on the SPI interface.



Schematic of BM-Lite interface using UART

2.2 BM-Lite Adapter Flex Cable

BM-Lite adapter flex cable (Part number: 100020709)

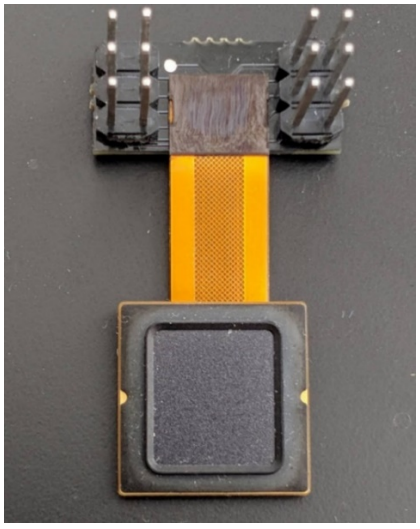
The BM-Lite Adapter Flex Cable supports the SPI interface only. It does not have the UART TX signal connected. The UART RX is connected to Ground.

To use UART a regular flex cable and can be used. This is not included in the BM-Lite package.

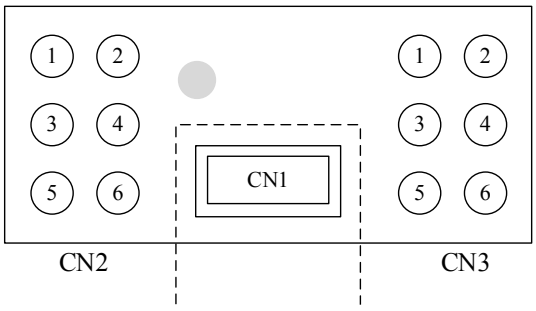
2.3 FPC5924 Adapter Board

FPC5924 adapter board (Part number: 100015050)

The FPC5924 Adapter Board is a breakout board for the BM-Lite Adapter Flex Cable.



Showing how the BM-Lite Flex Cable should be mounted on the FPC5924 board.

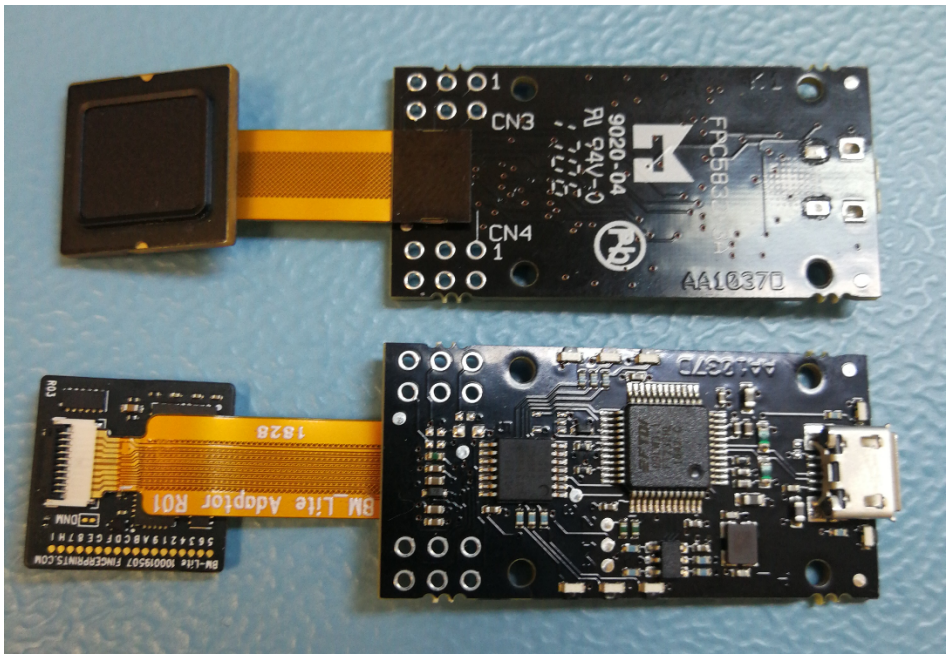


Pinout of the FPC5924 breakout board.

Pin	BM Lite pin	Function	Comment
CN2: 1	5	CS_N	
CN2: 2	3	MISO	
CN2: 3	7	RST	
CN2: 4	4	MOSI	
CN2: 5	6	IRQ	
CN2: 6	2	SPI_CLK	
CN3: 1	-		Not connected
CN3: 2	-		Not connected
CN3: 3	-	VDD	
CN3: 4	-		Not connected
CN3: 5	-		Not connected
CN3: 6	1, 8	GND	

2.4 FPC5832 FTDI USB Adapter

FPC5832 FTDI USB Adapter (Part number: 100015089)



The FPC5832 is an USB-SPI adapter using an FTDI FT232H converter. The CN3 connector is pin-compatible with CN2 on FPC5924, and CN4 is pin-compatible with CN3 on FPC5924.

3 Setup on Linux – Ubuntu 16.04

3.1 Install Python3

- Many Linux distributions come with Python3 pre-installed. To make sure your Python3 is up to date, open a terminal window and type the following commands:

  “sudo apt-get update”

  “sudo apt-get upgrade”

- When the process is complete, check the version of Python3 by typing the following command: “python3 -V”

Expected output will be “Python 3.5.2” or something similar. Recommended version is 3.4 or higher so that the Python package manager, pip, comes pre-installed.

- If Python3 is not pre-installed on your system, install it by opening a terminal window and typing the command: “sudo apt-get install python3”

3.2 Install the required packages

The required packages for using the bep_ref.py script together with the BM-Lite on Linux are:

- pexpect
- pyserial
- numpy
- pillow
- pyftdi
- spidev

- Install these by using the pip install command in a terminal window:

  “python3 -m pip install <package name>”

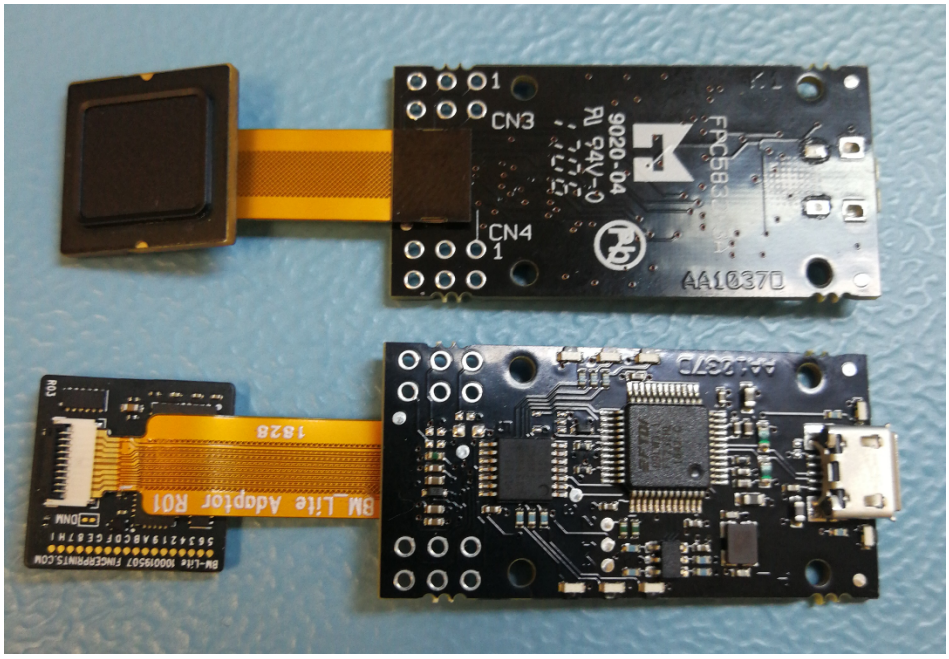
  For example: “python3 -m pip install pexpect”

The package manager will fetch and install the package for you. Repeat the install command for all of the above packages.

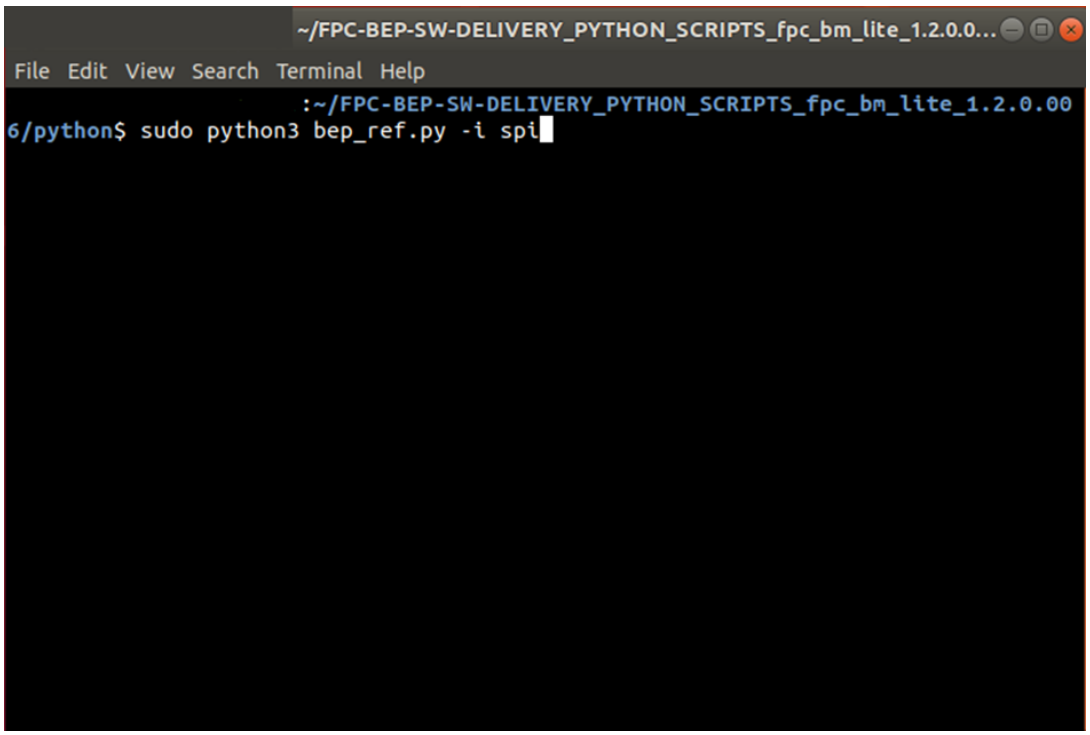
3.3 Run reference Python Script to test the BM-Lite

With the BM-Lite release comes a .zip file named “FPC-BEP-SW-DELIVERY_PYTHON_SCRIPTS_fpc_bm_lite_1.2.0.006.zip”. This zip file contains the Python scripts necessary to test the functionalities of the BM-Lite module.

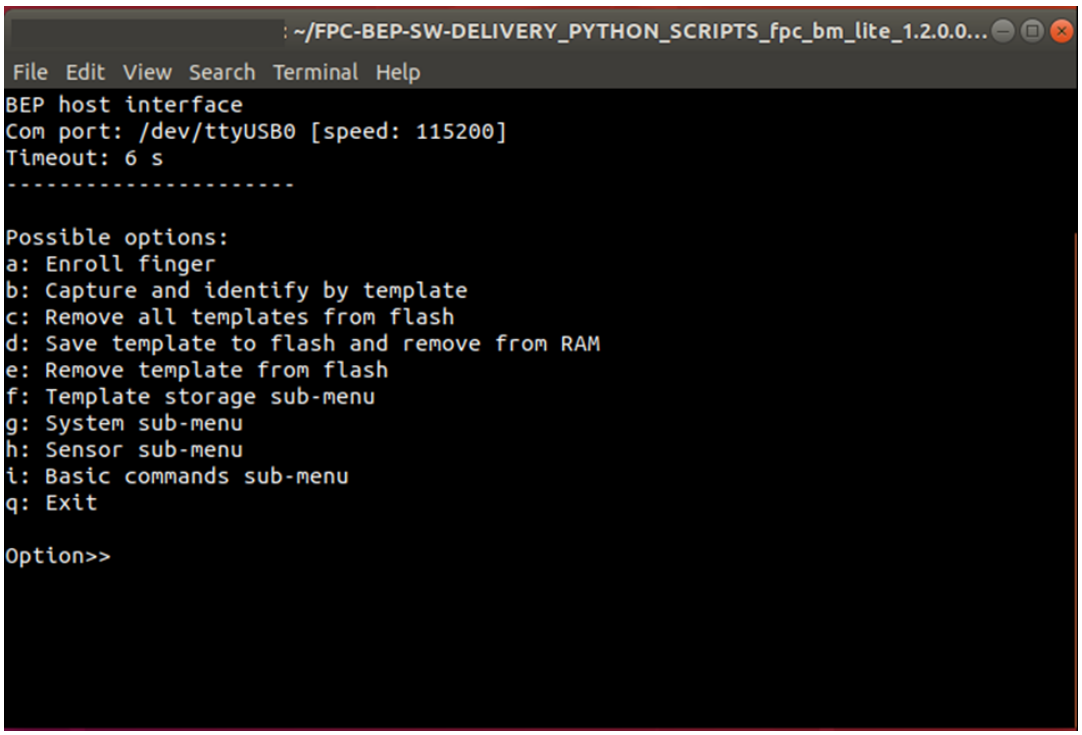
- Connect your BM-Lite module to the FPC5832 board as shown below.



- Unzip the “python” folder from the .zip file into the directory of your choice.
- Open a terminal window and navigate into the “python” folder you just unzipped.
- Run the Python script called “bep_ref.py” using the following command and argument: “sudo python3 ./bep_ref.py -i spi”



The script will now search through your COM ports and connect to the correct one. When the BEP host interface script starts, note that it states which COM port and baud rate it's using. These and other properties can be changed when running the script using the appropriate arguments as listed in the BM-Lite integration document.



You are now ready to try out the BM-Lite module. For examples on how to use the BEP host interface script, see the final section of this document.

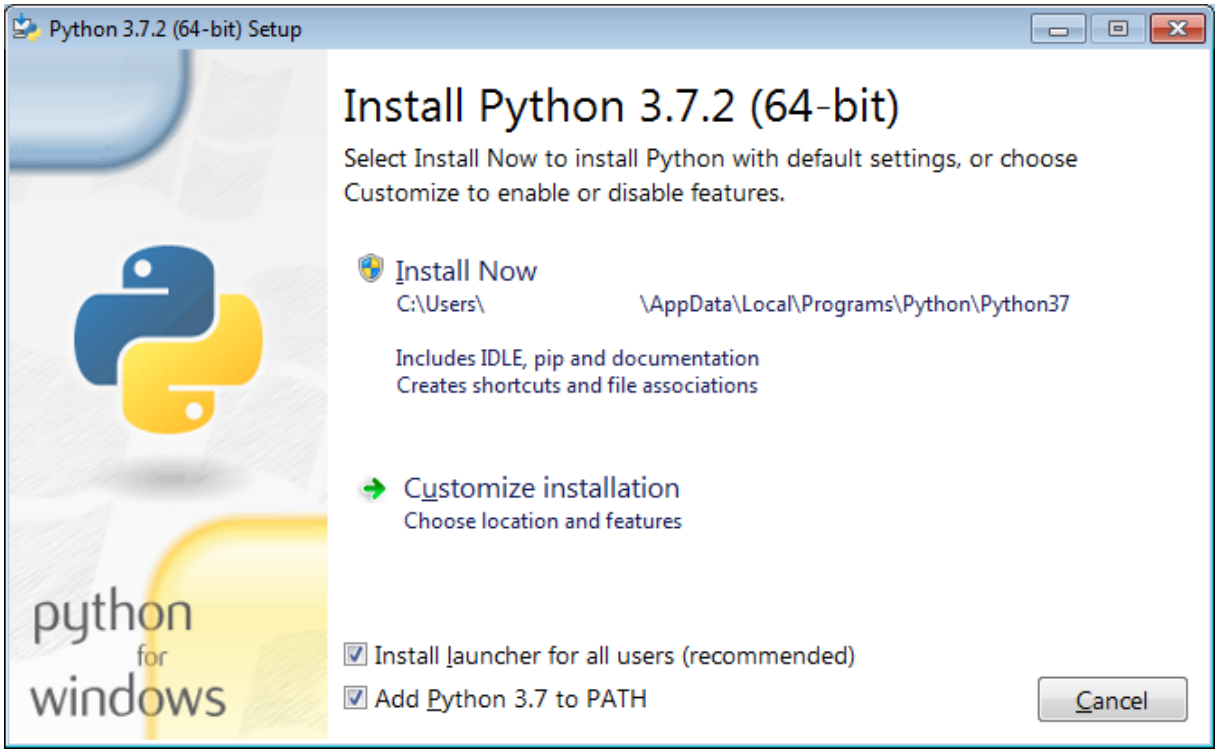
4 Setup on Windows 7/10

4.1 Install Python3

You can find the latest release of Python3 on Python's website:
https://www.python.org/downloads/

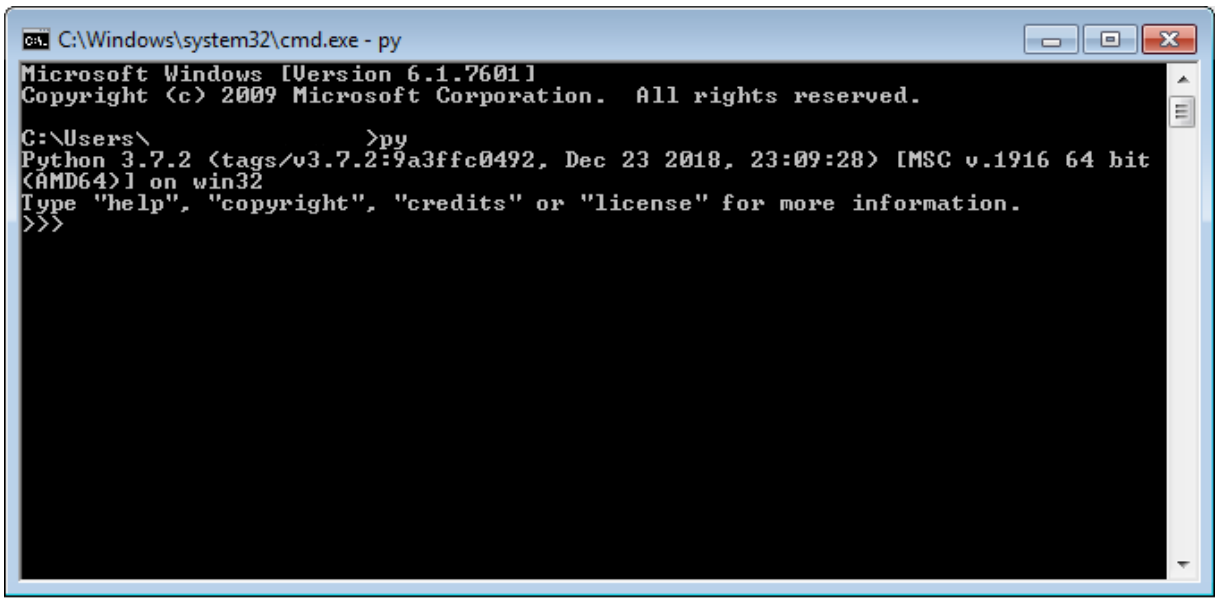
Recommended version is 3.4 or later.

- Click download on the release version you want and then, under "Files", choose the appropriate installer for your system (e.g "Windows x86-64 executable installer" for a 64 bit Windows system.)
- Run the installer executable and make sure to tick the boxes for "Install launcher for all users" and "Add Python to PATH". Then press "Install now"



This will install Python3 and all the standard libraries as well Python's package manager, pip, which you will use to install all the required libraries that are not included by default.

- To make sure that the installation was successful, open a command prompt and type "py" to start Python. If everything works as it should, it will look something like this:



4.2 Install the required packages

The required packages for using the bep_ref.py script together with the BM-Lite on Windows are:

- pexpect
- pyserial
- numpy
- pillow
- pyftdi

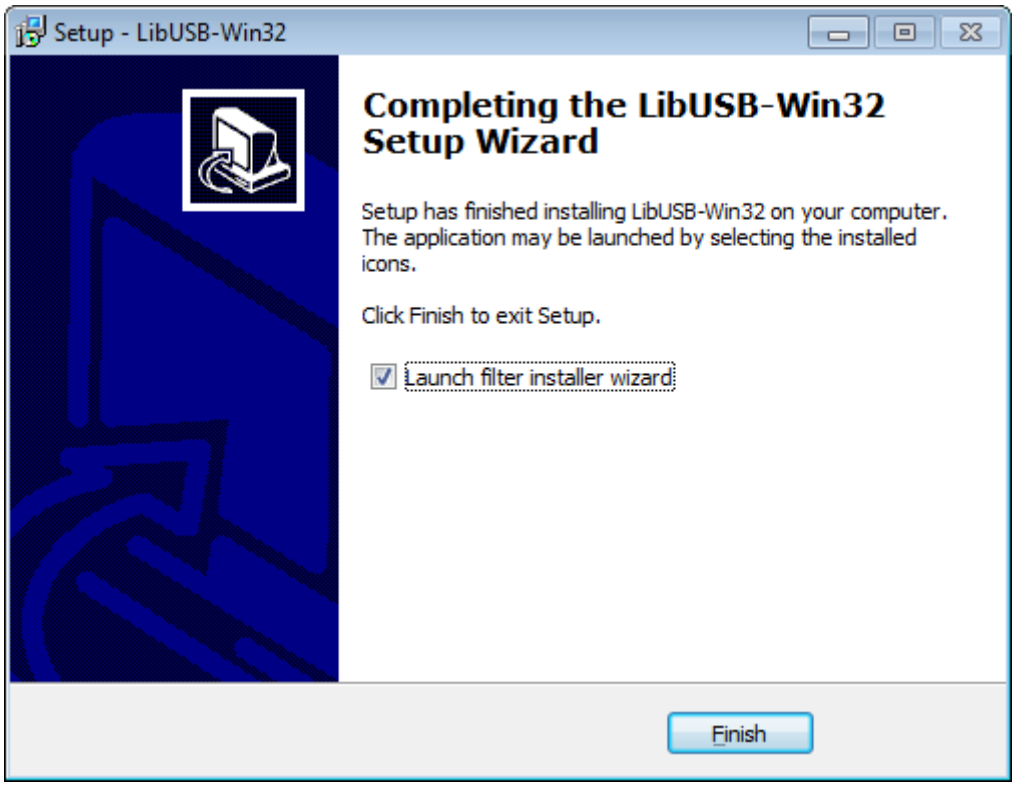
- Install these by using the pip install command in a command prompt:
  “pip install <package name>”
  For example: “pip install pexpect”

The package manager will fetch and install the package for you. Repeat the install command for all of the above packages.

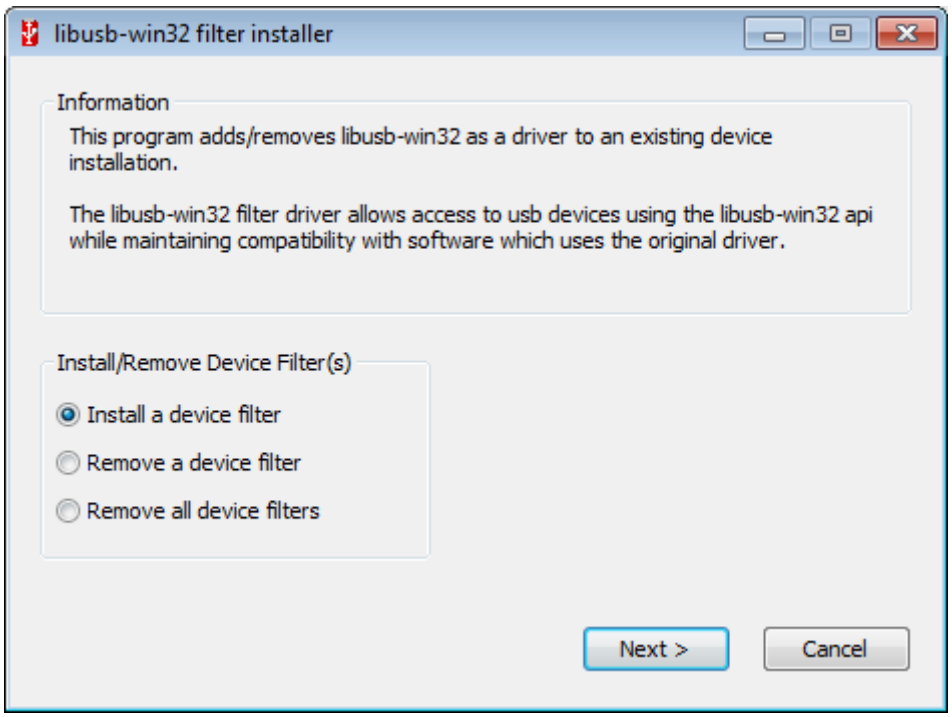
4.3 Installing an SPI filter for the FTDI board.

In addition to the packages above, a filter driver for SPI is needed for using the FPC5832 board with Windows.

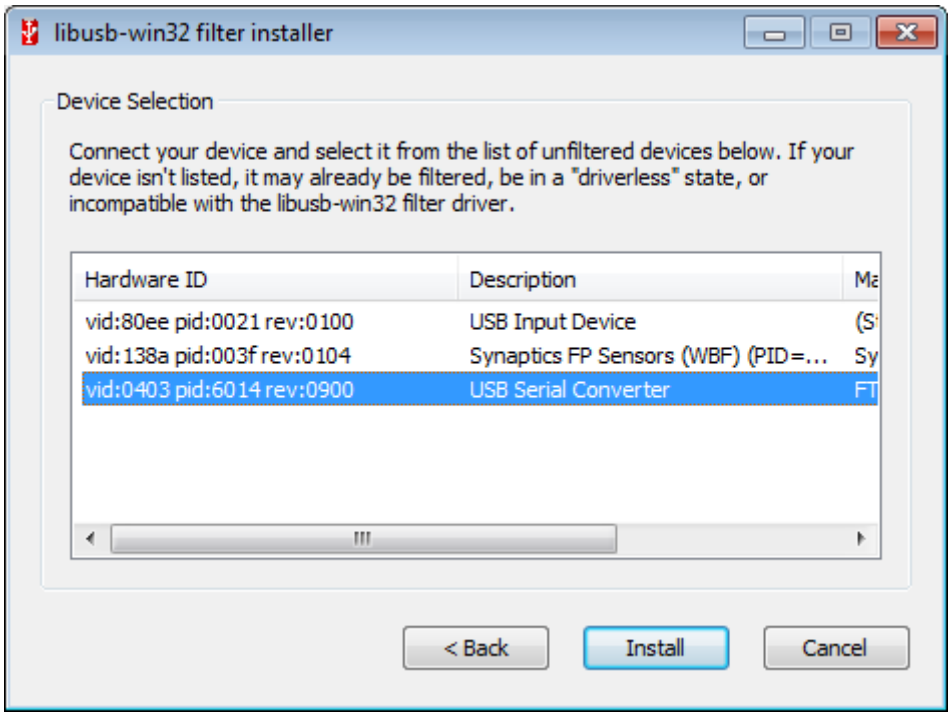
- Connect your FPC5832 board to your computer using a USB cable. Drivers will automatically start installing. When the drivers have finished installing, you're ready to install the SPI filter.
- Download "libusb-win32-bin-1.2.6.0" from: https://sourceforge.net/projects/libusb-win32/files/libusb-win32-releases/1.2.6.0/
- Run "install-filter-win.exe" and follow the installation wizard until the installation is complete. Then choose "Launch filter installer wizard" before clicking finish.



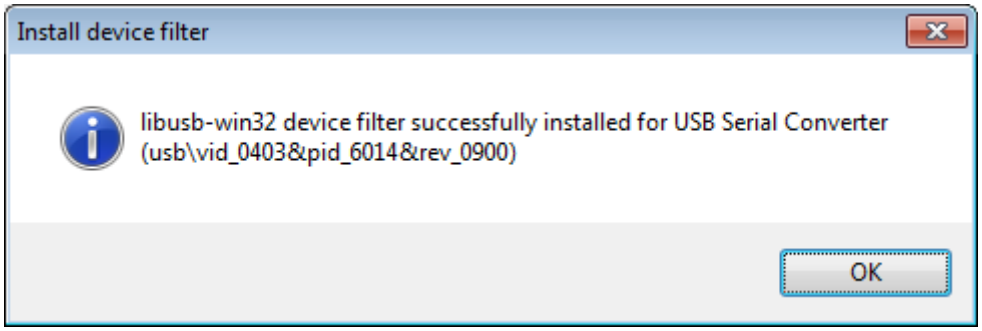
- This will open the "libusb-win32 installer" in a new window. Choose "Install a device filter" and press "Next".



- In the list of devices, the FPC5832 board is the one with the description “USB Serial Converter” and the manufacturer “FTDI”. Select that device and press “Install”.



- When the filter installation is done, you will receive a confirmation on the successful installation:



- Close the filter installer. Your FPC5832 board is now ready to be used.

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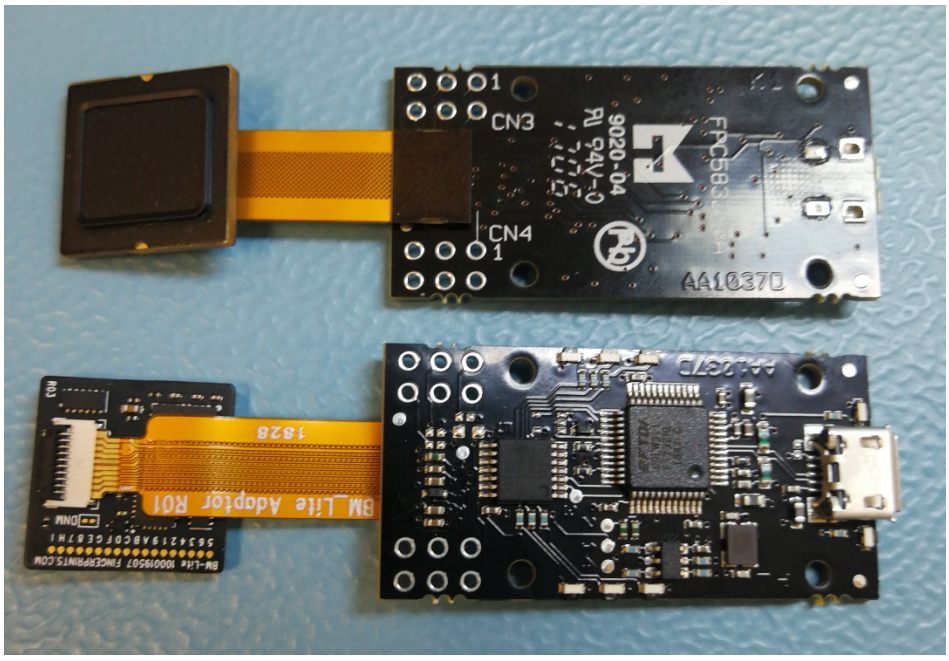

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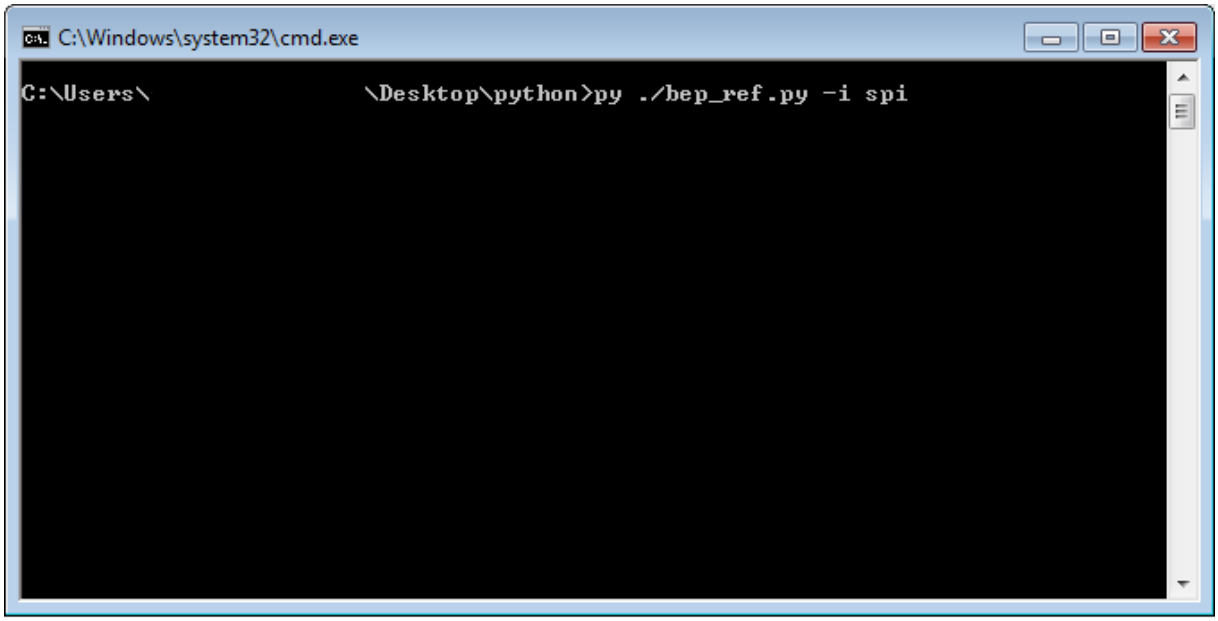

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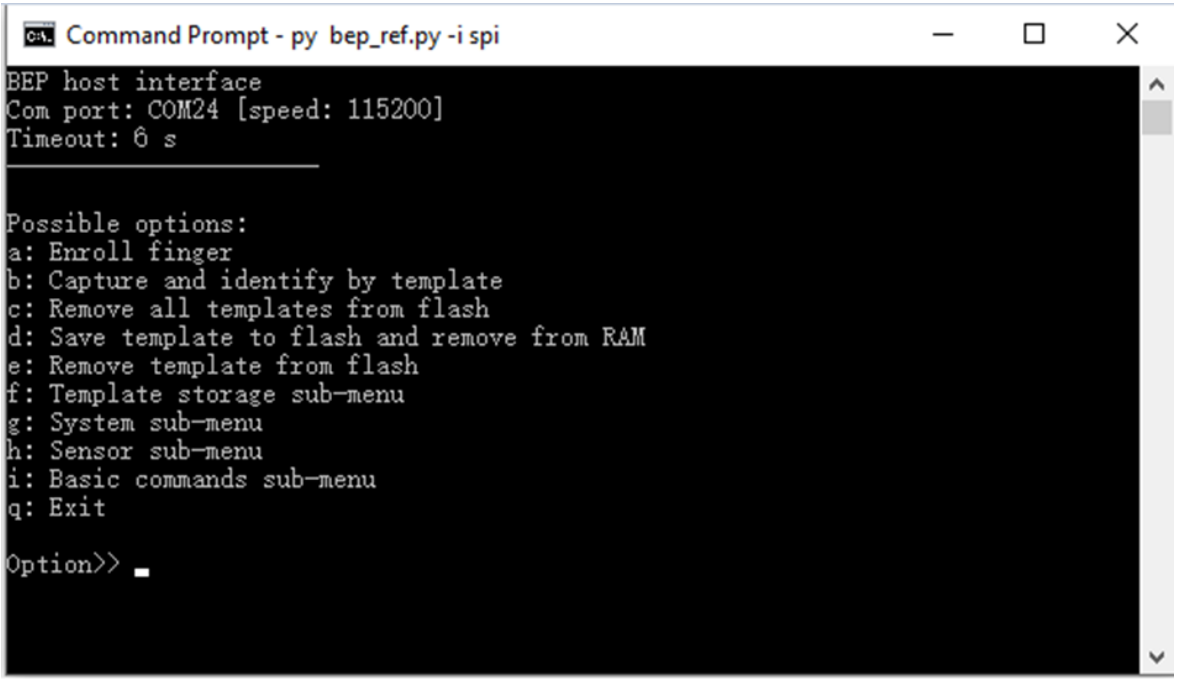

You are now ready to try out the BM-Lite module. For examples on how to use the BEP host interface script, see the next section of this document.

5 How to use the Python script ‘bep_ref.py’

5.1 Arguments for running bep_ref.py

Arguments	Description
-i, --interface	Host interface for communication with BM-Lite. Default is 'uart'. Other alternatives: 'spi' for the FPC5832 FTDI-card, 'rpispi' for the Raspberry Pi SPI
-p, --port	Input port name (COMX, /dev/ttyACMX, /dev/ttyUSBX)
-s, --speed	Input communication speed
-t, --timeout	Timeout for 'UART receive' in seconds (>=2)
--id	Partial or full Jlink device id
--debug	Print debug information
--log	Collect KPI data and target logs. Port number must be entered "--log=[PORT]"
--gui	Start application with graphical user interface

5.2 SPI Startup example

(Replace the comport name with the one you are using)

Linux: sudo python3 ./bep_ref.py -i spi -p /dev/ttyUSB0

Win: py ./bep_ref.py -i spi -p COM5

5.3 UART Startup example

(Replace the comport name with the one you are using)

Linux: sudo python3 ./bep_ref.py -i uart -p /dev/ttyUSB0 -s 115200

Win: py ./bep_ref.py -i uart -p COM5 -s 115200

(Note that all UART communication must be at baud rate 115200, from SW version 1.2. For older SW versions the default baud rate is 921600.)

5.4 Example procedures

After starting the bep_ref.py application, "Possible options" will be presented for controlling the BM-Lite. Please follow the below procedures in numerical order.