# IB51822 - User Manual

Armstart – Makers helping makers

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## Introduction

IB51822 is an mbed enabled Bluetooth 4.0/4.1 Low Energy ARM Cortex M0 Development board based on nRF51822 chip from NordicSemi. IB51822 runs in SUPER LOW POWER, which means you can power it with a coin battery for a very long time! You can use IB51822 to prototype your IoT projects like smart watch, step-counter, sleep tracker, smart home switches, Amazon dash-button, Beacon, and all kind of sensor projects like heart-rate sensor, brain wave sensor, muscle sensor, etc. There're so many ideas that can be achieved with IB51822.

It's designed with flexibility, easy to use with all pin-outs accessible for any requirements of project prototyping.

IB51822 can be used to with a variety of smart phone, here's a list of devices that are known having the BLE supported:

**Apple smart devices:**

iPhone 4S, iPhone 5, iPhone 5C, iPhone 5S, iPhone 6, iPhone 6C and iPhone 6S.

iPAD, iPAD2, iPAD mini.

**Android phones:**

Google Nexus 4, 5, 6, 7; Samsung Note 3 / GT-I9300 / GT-I9500; Huawei Ascend P7; HTC One running Android OS v4.4.2+; HTC One M7 running Android OS v4.4.2+; Moto X/G running Android OS v4.4.2+; Samsung Galaxy S5; Sony Xperia E1 running Android OS v4.3; Sony Xperia Z1 running Android OS v4.4.4+;

# IB51822 Pinmap

IB51822 schematic is provided and can be downloaded from the following link:

https://s3.amazonaws.com/armstart/BLE/IB51822/IB51822_SCH-latest.pdf
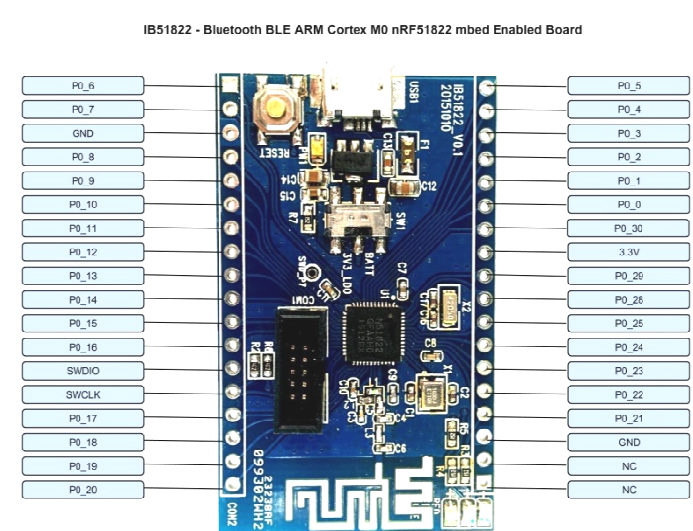


| Features: | Peripherals: |
|---|---|
| • 32-bit ARM Cortex M0 CPU core<br>• 256kB flash + 16kB RAM, nRF51822 QFAA<br>• BLE 4.0/4.1 support,<br>• Support BLE standard and custom GATT Profiles.<br>• Supports both BLE Central and Peripheral Roles. | • 3 x 16/24-bit timers with counter mode<br>• 16 channel CPU independent Programmable Peripheral Interconnect (PPI)<br>• Encryption -128-bit AES ECB/CCM/AAR co-processor<br>• Random Number Generator<br>• RTC<br>• Integrated on chip temperature sensor<br>• Flexible GPIO pin configuration<br>• 31 GPIO<br>• Up to 4 PWM |

# Getting Started - Programming Guide

The following guide works for **Windows**, **Linux** and **Mac OS** users.

Note: If you are a programming expert and want to have full control of codes, then you could use Nordic's official SDK. But here, for quick demonstration or quick prototyping, we'll be using mbed Online IDE.

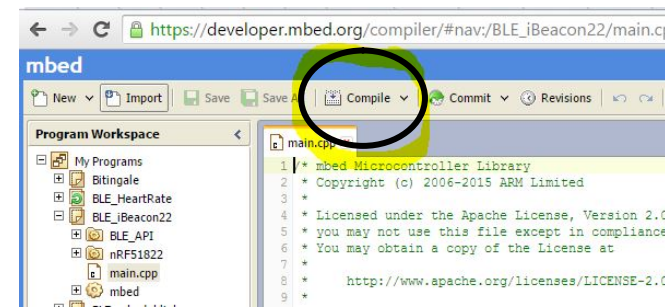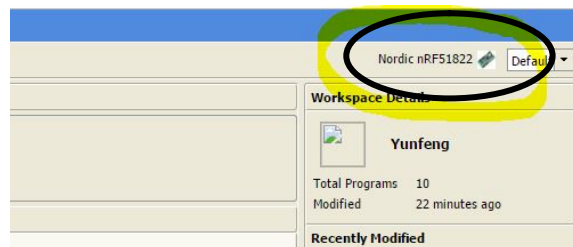To find official documents, examples please visit Nordic Infocenter:
http://infocenter.nordicsemi.com/index.jsp

**STEP1:** Open mbed Online IDE: https://developer.mbed.org/

**STEP2:** Choose "mbed Compiler":
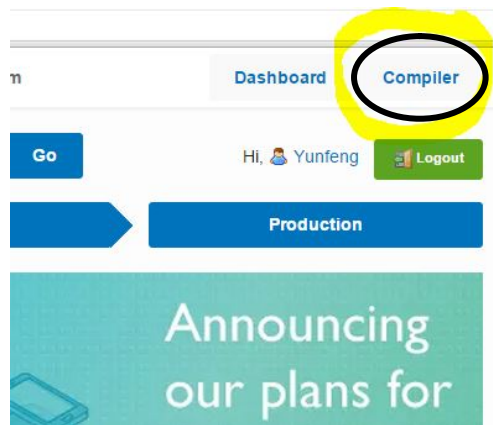


**STEP 3:** Import a BLE beacon example project and compile it:

Before importing example project, click the top right button to choose the Nordic nRF51822 platform.





**STEP4:** Flash Application firmware using OpenOCD + IBDAP (CMSIS-DAP Debug Probe)

First of all, install the OpenOCD v0.9+ on your computer. OpenOCD v0.9+ is available for Windows, Linux and Mac OS. Prebuilt binaries are ready for download at sourceforge:
http://sourceforge.net/projects/gnuarmeclipse/files/OpenOCD/

After installation, open a Terminal to navigate to the openocd(.exe) executable location(If openocd executable's folder is not added the PATH environment), run the openocd server as follows:

*$ openocd.exe –f interface/cmsis-dap.cfg -f target/nrf51.cfg*

Open new Terminal and run the following command to flash the firmware:

*$ telnet localhost 4444*
*> reset halt*
*> flash write_image erase /file/path/to/downloaded/mbed/hex/file.hex 0x0*

nRF51822 has a memory protection mechanism where some of the codes can be protected from erasing and re-programming. If you ever encountered any firmware update problem, this usually happens if you ever used J-Link as a programmer and it by default protects code region 0, you can always disable that protection first and then do a firmware update:

*$ telnet localhost 4444*
*> reset halt*
*> flash info 0*
*> nrf51 mass_erase*
*> flash info 0*
*> flash write_image erase /file/path/to/downloaded/mbed/hex/file.hex 0x0*