

User Manual

Brand Name: CALEX TECH

Model Name: Dongle BLE5

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Declaration the Restriction of this Limited Module Approval:

According to FCC Part 15 Subpart C Section 15.212, the radio elements of the modular transmitter must have their own shielding.

This module is granted as a Limited Modular Approval. When this Bluetooth Module is installed into the end product, a Class II Permissive Change or a New FCC ID submission is required to ensure the full compliance of FCC relevant requirements.

RF exposure statements:

This equipment complies with FCC radiation exposure requirement set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

1 Introduction

The Bluetooth USB Dongle (PCA10059) is the preferred hardware to be used with the nRF Connect for Desktop software package to develop and test your nRF-based wireless solutions. The hardware supports all the short range wireless standards available on the nRF52 family of devices, and the built-in USB device controller provides a high data throughput communication interface.

The Bluetooth USB Dongle can also be used together with the nRF5 SDK for product development based on the nRF52840 SoC.

The Bluetooth USB Dongle is a low-cost, versatile USB development dongle for Bluetooth® Low Energy 802.15.4, and user-proprietary 2.4 GHz applications using the nRF52840 SoC.

Key features:

- Bluetooth Low Energy SoC solution
- Button and LEDs for user interaction
- 15 GPIO available on a castellated edge
- Onboard USB bootloader with buttonless support
- USB support

2 Minimum requirements

Before you start, check that you have the required hardware and software.

Hardware requirements

- PC with a standard type-A USB port

Software requirements

- [nRF Connect for Desktop](#)
- Operating system: macOS, Linux, or Windows 7 or later

Product Specifications

MAIN CHIPSET

- Nordic nRF52840

KEY FEATURES

Bluetooth 5 ready multi-protocol radio

- 2Mbps
- Long range
- Advertising extensions
- Improved coexistence (CSA #2)

32-bit ARM Cortex-M4F @ 64MHz

Up to 111 dB link budget for Bluetooth long range mode

Full-speed 12Mbps USB controller

NFC Tag-A

Software stacks available as downloads

Application development independent of protocol stack

Programmable output power from +8dBm to -20dBm

-96dBm Sensitivity for Bluetooth low energy

On-air compatible with nRF51, nRF24L and nRF24AP Series

Arm CryptoCell CC310 cryptographic security module

High-precision RSSI

Wide supply voltage range + 1.7V to 5.5V

QSPI/SPI/2-wire/I²S/PDM/QDEC

Programmable Peripheral Interface - PPI

High speed SPI interface 32MHz

Quad SPI interface 32MHz

EasyDMA for all digital interfaces

RAM mapped FIFO using EasyDMA

12bit/200K SPS ADC

128 bit AES/ECB/CCM/AAR co-processor

Single-ended antenna output (on-chip balun)

On-chip DC-DC buck converter

Quadrature demodulator

Regulated supply for external components up to 25mA

APPLICATIONS

IoT

- Smart Home products
- Industrial mesh networks
- Smart city infrastructure

Advanced wearables

- Connected watches
- Advanced personal fitness devices
- Wearables with wireless payment
- Connected Health
- Virtual/Augmented Reality applications

Interactive entertainment devices

- Advanced remote controls
- Gaming controller

3 Kit content

The nRF52840 Dongle consists of hardware (PCA10059), access to application firmware examples, documentation, hardware schematics, and layout files.

3.1 Hardware content

The nRF52840 Dongle hardware consists of the board (PCA10059).

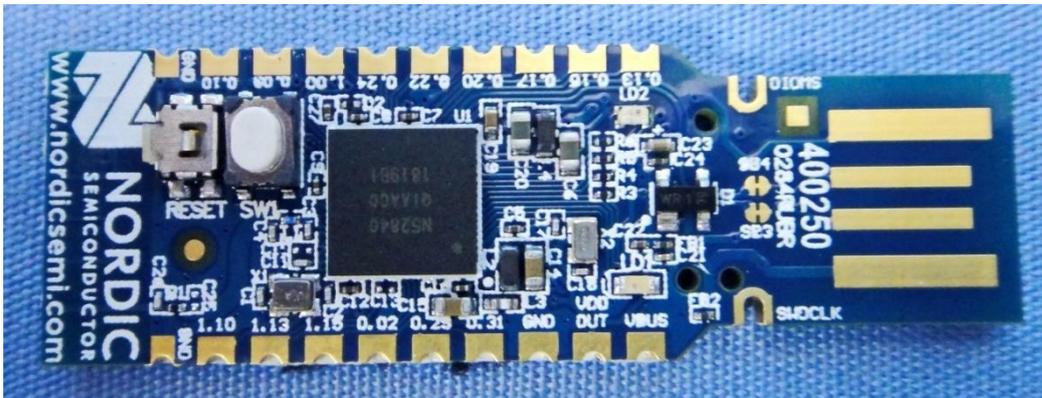


Figure 1: nRF52840 Dongle hardware (PCA10059) front

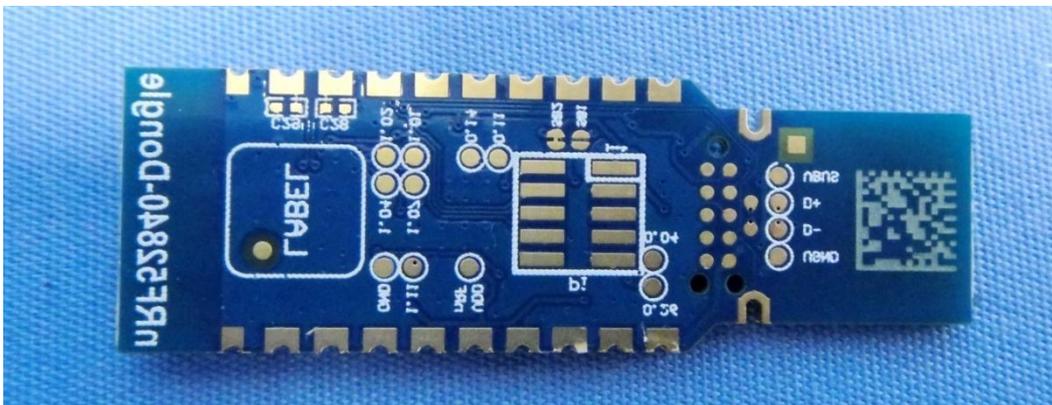


Figure 2: nRF52840 Dongle hardware (PCA10059) back

The sticker on the back side of the nRF52840 Dongle contains the following information:

- Board number (PCA10059)
- Hardware revision
- Production year and week (YYYY.WK)
- MAC address/serial number

3.2 Downloadable content

The nRF52840 Dongle downloadable content consists of a software tool, application firmware examples, and hardware files.

Software

- nRF Connect for Desktop

Firmware package

In the nRF5 SDK, you can find precompiled application firmware examples.

Hardware files

Schematics, layout, bill of materials, and Gerber files for nRF52840 Dongle (PCA10059) are included in a zip file:

- nRF52840 Dongle Hardware Files

3.3 Related documentation

In addition to the information in this document, you may need to consult other documents.

Nordic documentation

- nRF52840 Product Specification
- nRF52840 Errata
- nRF52840 Compatibility Matrix
- nRF52840 Development Kit User Guide
- nRF Connect
- nRF5 SDK

4 Getting started

Complete a few steps to set up the hardware and install the required software.

Before you start, check [Minimum requirements](#) on page 4.

Connect the Dongle to a computer and get started with nRF Connect for Desktop.

1. Download and install [nRF Connect for Desktop](#).

This includes the driver for the nRF52840 USB Device Firmware Upgrade (DFU) feature.

For documentation on the tool, see [nRF Connect](#).

2. Insert the nRF52840 Dongle in a USB port on your computer.

The status light (LD2) starts pulsing red, indicating that the Dongle is powered up and is in bootloader mode. After a few seconds, the computer will recognize the Dongle as a USB composite device. The driver needed for the nRF52840 USB DFU feature is also installed.

3. Optional: Download the [nRF5 SDK](#).

nRF5 SDK contains application examples for the Dongle. For documentation, see [nRF5 SDK v15.2.0](#).

4. Optional: Download [SEGGER Embedded Studio \(SES\)](#).

SES is needed for building application examples for the Dongle. It can be used free of charge with nRF devices.

5. Optional: Install [nrfutil](#).

nrfutil can be used for programming the Dongle from the command line.

6. Open an nRF Connect for Desktop app and select the serial number of the nRF52840 Dongle as the target.

Applications that support the nRF52840 Dongle will display the serial numbers of any connected Dongles in the device drop-down list.

If the app supports the Dongle but the correct firmware is missing, you will be asked to confirm that you want to have the Dongle programmed. Click **OK**.

If the Dongle contains the correct firmware, the app will start immediately.

For further information on programming the nRF52840 Dongle, see [Nordic Developer Zone](#).

6 Hardware description

The nRF52840 Dongle can be used as a development platform for the nRF52840 SoC. It features userconfigurable LEDs and a button as well as multiple GPIOs available along the board edges. In addition toradio communication, the nRF5240 SoC can communicate with a computer through USB.

6.1 Hardware drawings

The nRF52840 Dongle hardware drawings show both sides of the PCA10059 board.

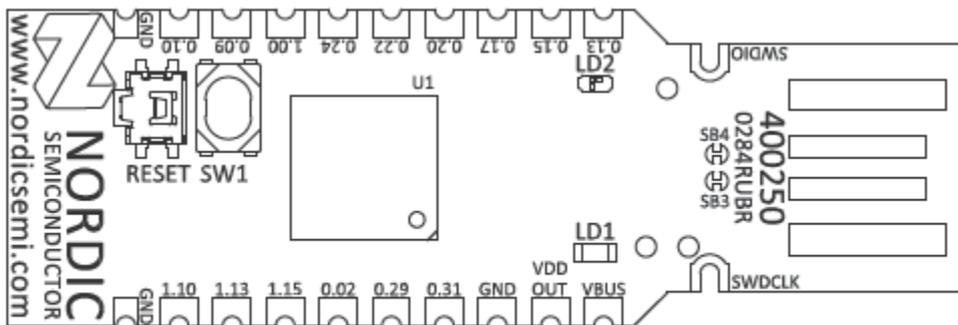


Figure 3: nRF52840 Dongle (PCA10059) front view

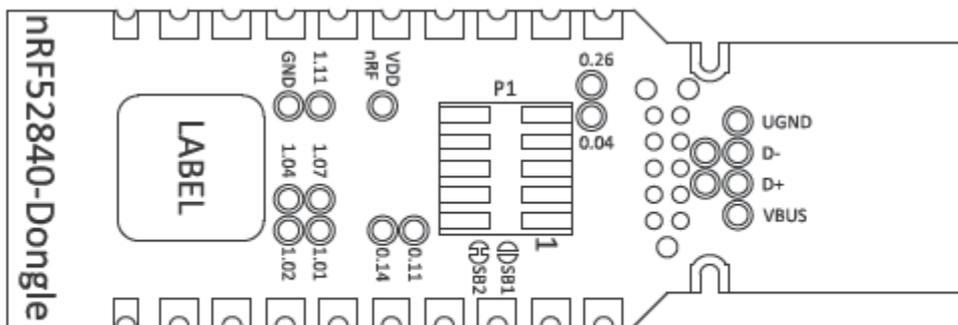
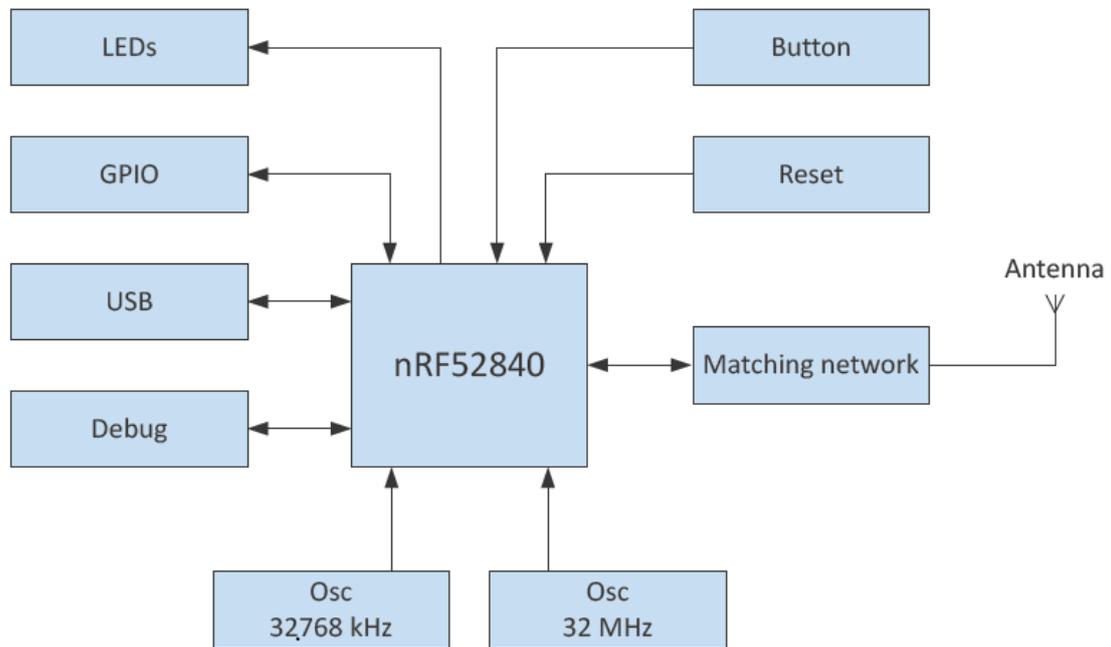


Figure 4: nRF52840 Dongle (PCA10059) back view

6.2 Block diagram

The block diagram illustrates the nRF52840 Dongle functional architecture.



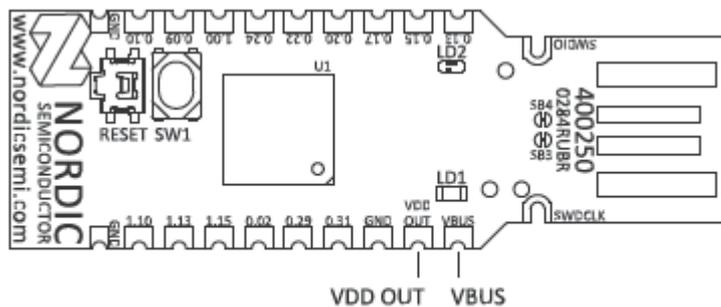
6.3 Power supply

The nRF52840 Dongle can be powered from different sources.

6.3.1 Internal regulator

The default power supply of the nRF52840 Dongle is the USB interface. The USB interface supplies power to the on-chip high voltage regulator of the nRF52840 SoC.

The output of the regulator supplies the SoC and the LEDs. The USB power connection (**VBUS**) is also available along the board edge. Next to **VBUS**, there is a connection point for **VDD OUT**, which is the output of the nRF52840 SoC high voltage regulator. For maximum power draw from this pad, see [nRF52840 Product Specification](#), and take into account the power draw of the onboard nRF52840 and the LEDs.



6.3.2 External regulated source

The nRF52840 Dongle can also be configured to be supplied from an external regulated 1.8–3.6 V source through the **VDD OUT** connection point. To enable this, **SB2** must be cut and **SB1** must be soldered.

CAUTION: Do not have both SB1 and SB2 connected at the same time as this will damage the nRF52840 SoC.

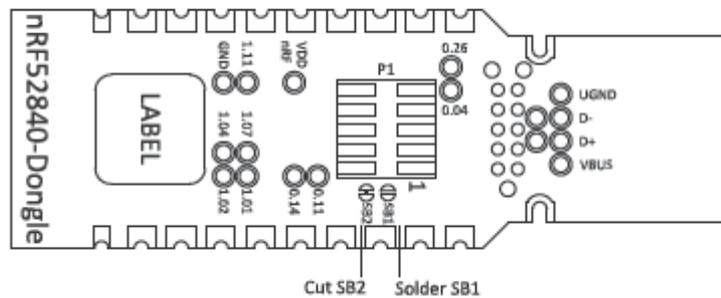


Figure 7: Configuring 1.8-3.6 V external source

6.4 Buttons and LEDs

The nRF52840 Dongle is equipped with a green LED (**LD1**), a multicolor RGB LED (**LD2**), a userconfigurable button (**SW1**), and a reset button (**SW2**).

The LEDs and buttons are connected to dedicate I/Os on the nRF52840 SoC.

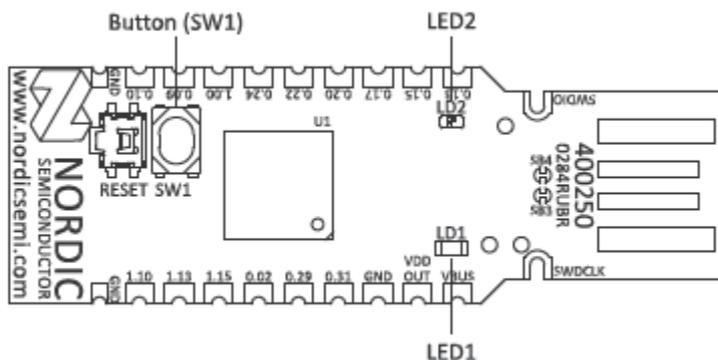


Figure 8: nRF52840 Dongle buttons and LEDs

Part	Description	GPIO
SW1	Button	P1.06
SW2	Reset	P0.18 ¹
LD1	Green	P0.06
LD2	Red	P0.08
LD2	Green	P1.09
LD2	Blue	P0.12

The buttons are active low, which means that the input will be connected to ground when the button is activated. The **SW1** button has no external pull-up resistor, but the reset button (**SW2**) has a 10 k pull-up resistor. To use **SW1**, **P1.06** must be configured as an input with an internal pull-up resistor.

The LEDs are active low, which means that writing a logical zero '0' to the output pin will illuminate the LED.

6.5 32.768 kHz crystal

The nRF52840 Dongle is equipped with a 32.768 kHz crystal (**X2**) for high accuracy and low average power consumption.

6.6 USB

The nRF52840 Dongle features a USB-A-type connector printed on the circuit board.

Additional test points for the USB data lines are available on the bottom side of the circuit board if the nRF52840 Dongle is used as a module on a motherboard with a USB connector. To

disconnect data lines from the onboard USB connector, cut solder bridges **SB3** and **SB4**.

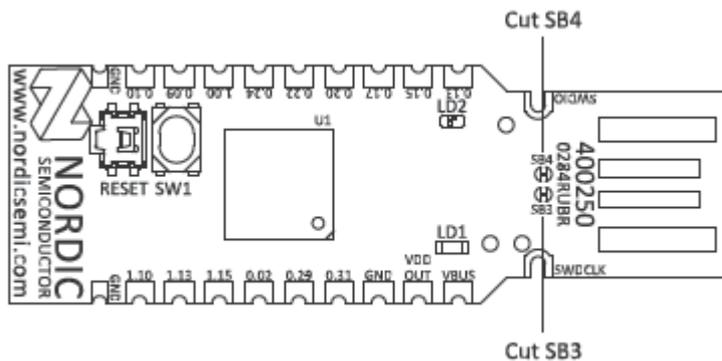


Figure 9: Disconnecting USB data lines

6.7 SWD interface

On the back side of the nRF52840 Dongle, there are connection points for the SWD interface.

The dongle is equipped with a footprint for two different connectors. On footprint **P1**, a

standard 2x5-pinpin header with a 1.27 mm pitch can be soldered. On footprint **J2**, it is possible

to connect a TC2050 cable from Tag-Connect.

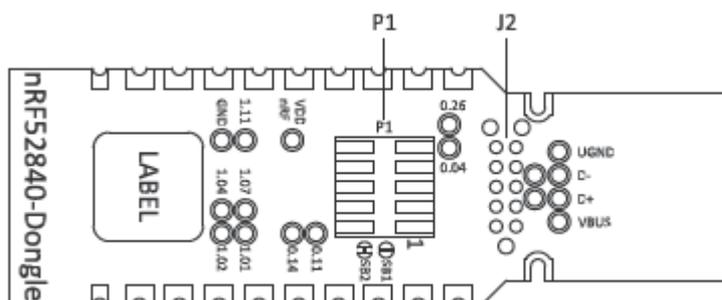


Figure 10: SWD interface connectors

For instance, a Nordic development kit can be used as a programmer for the Dongle.

6.8 External connections

The nRF52840 Dongle has 15 GPIOs in addition to the ground, power, and SWD connections along the castellated edges.

The castellated edge holes have a pitch of 0.1 inches (2.54 mm) and a row spacing of 0.6 inches (15.24mm)², making it suitable for stripboard connection. Test points for additional nine GPIOs are available on the back side of the circuit board, leaving a total of 24 GPIOs accessible.

Note: There is no reverse voltage protection on the power connections.

6.9 Host information

Product Name : LED Driver Box

Brand name: CALEX TECH

Model Name: DongleBLE5



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