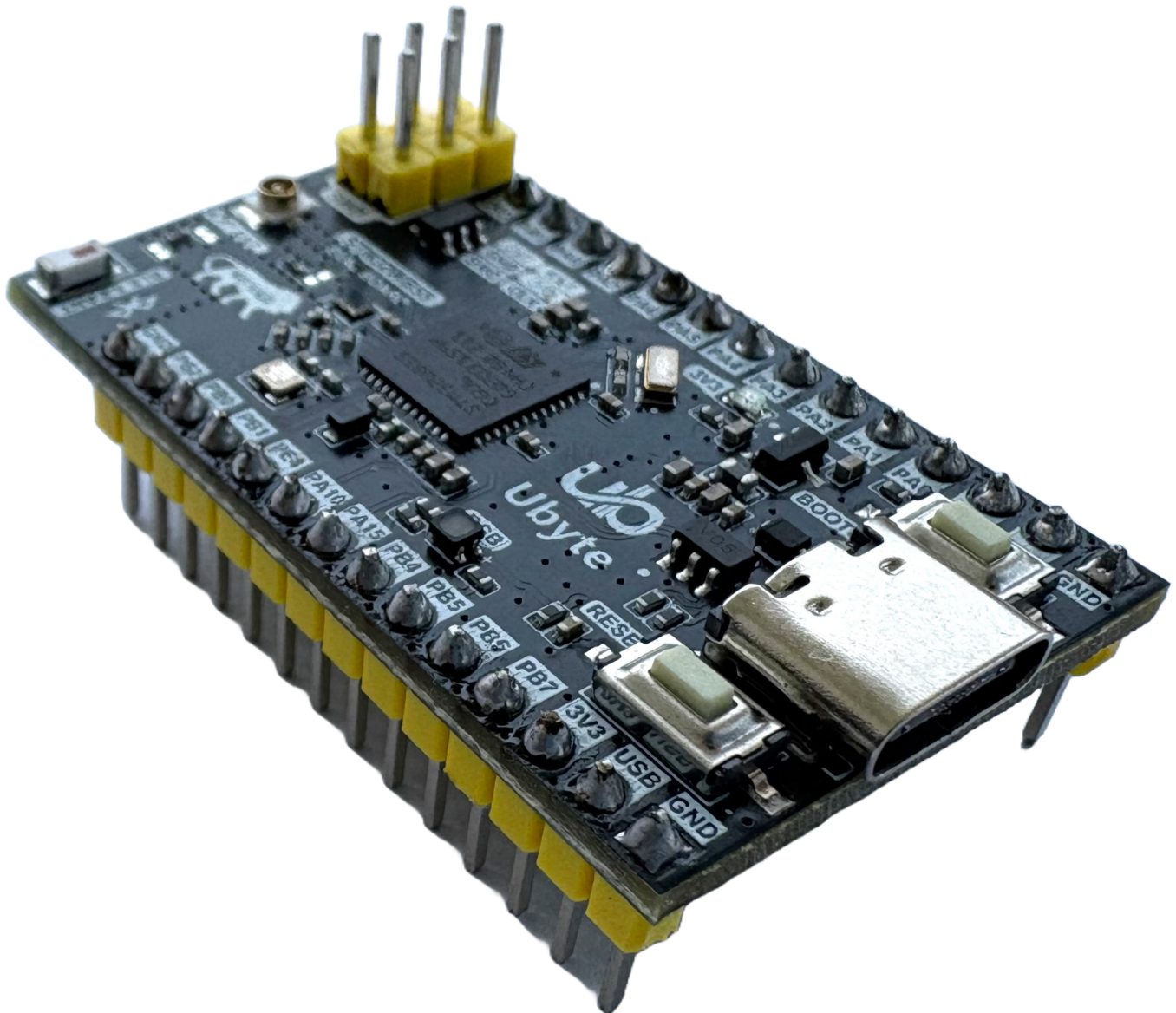


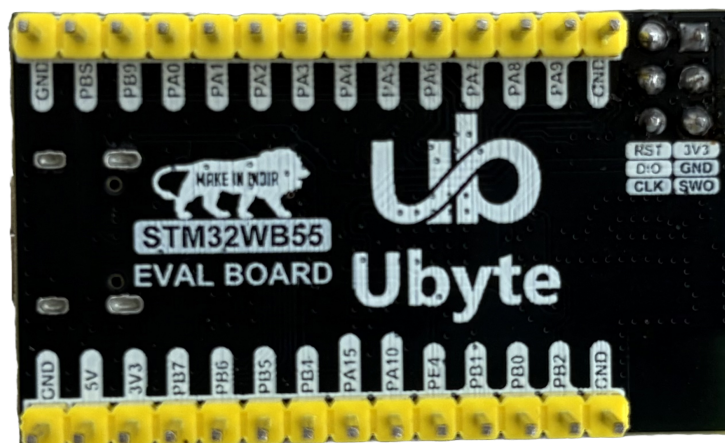
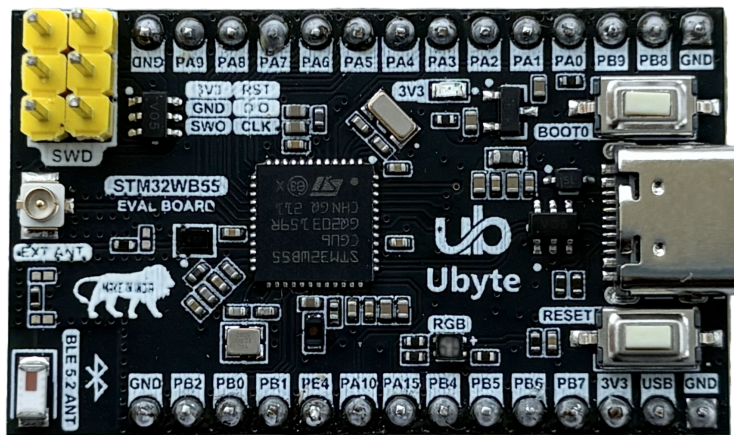
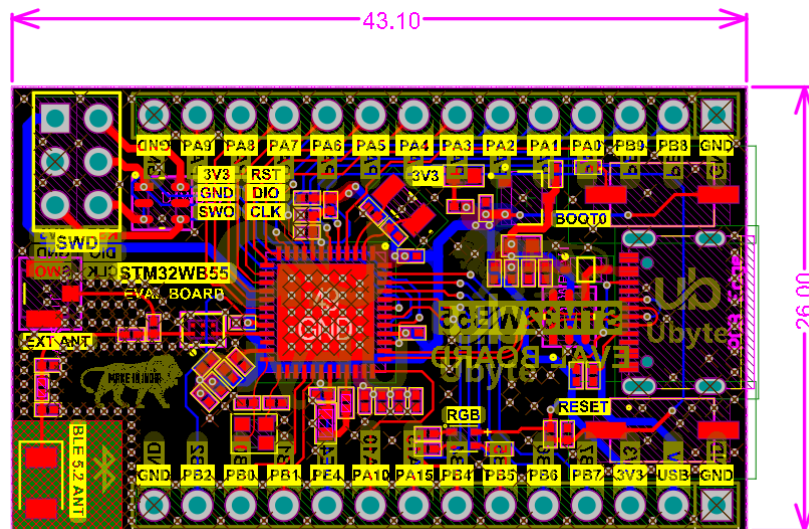
STM32WB55CGU6 Evaluation Board HARDWARE DOCUMENTATION



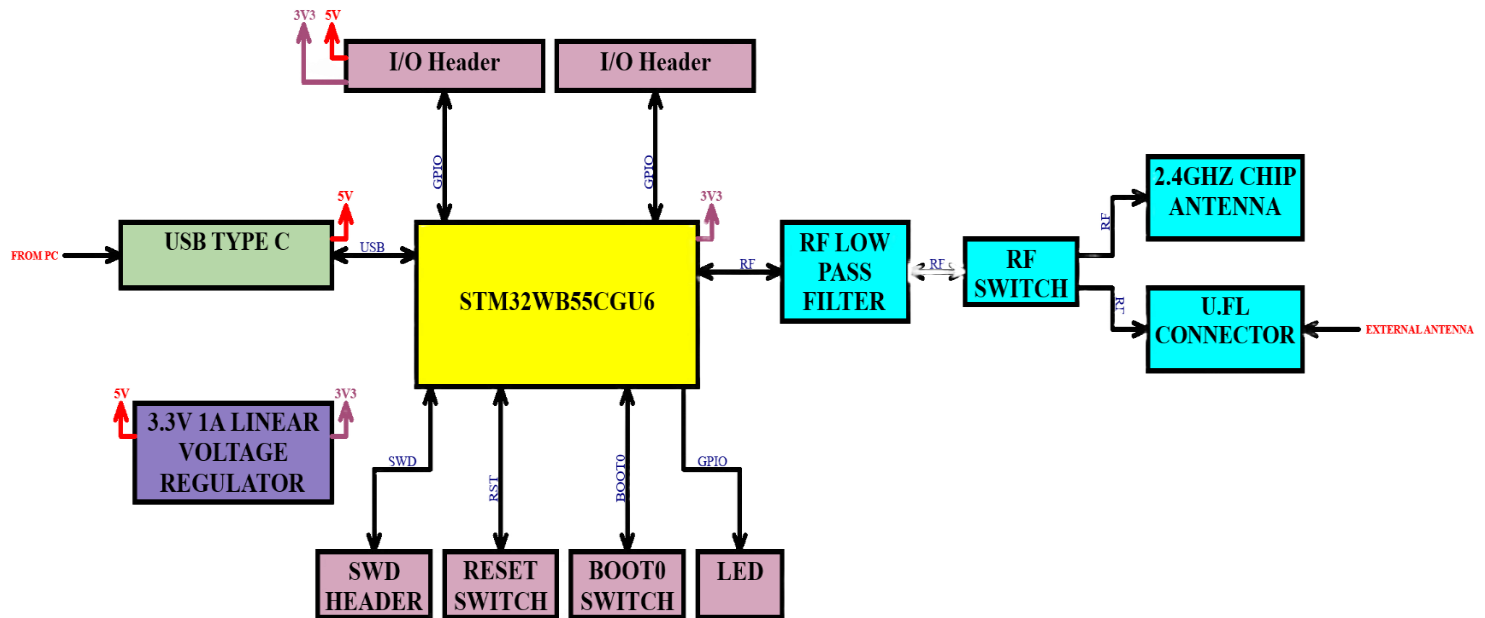
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1. STM32WB55CGU6 Evaluation Board V1.1 PCB Dimensions



2. Hardware Block Diagram



3. Features

- STM32WB55CGU6 microcontroller (ARM Cortex-M4 & Cortex-M0+ dual-core)
- 3.3V power supply with 3.3V 200mA LDO regulation
- USB Type-C connectivity (16-pin)
- Bluetooth 5.0 RF section with onboard and external antenna options
- SWD interface for debugging and programming
- Onboard user configurable RGB LEDs
- External GPIO access via headers
- 32 MHz and 32.768 kHz crystal oscillators for precise timing

5. Introduction

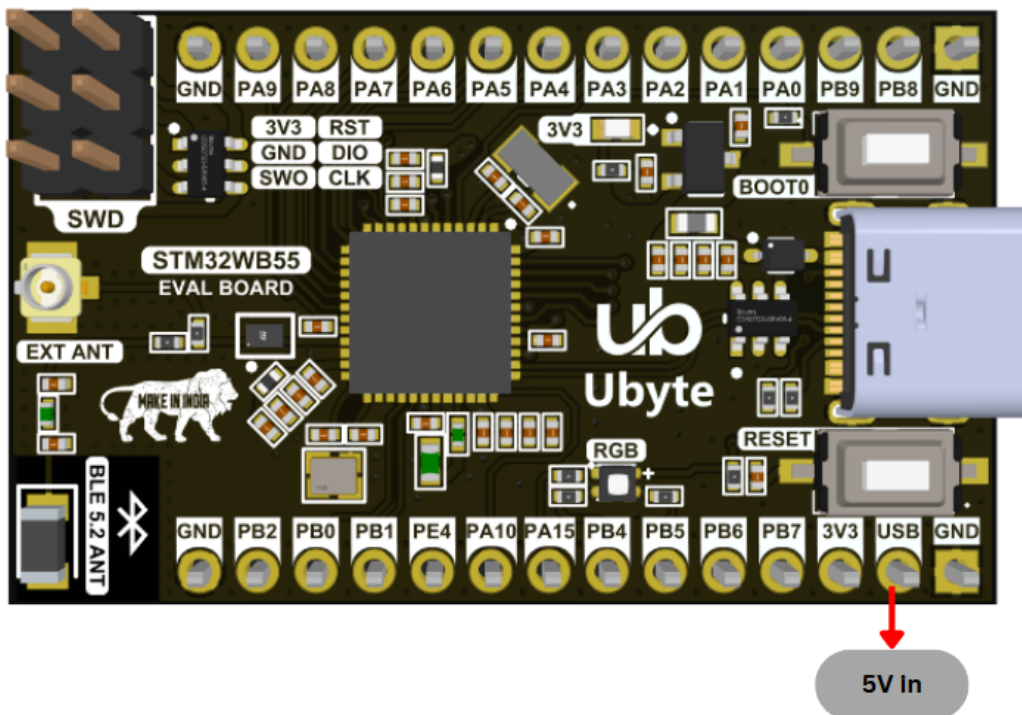
The STM32WB55 Evaluation Board is a feature-rich development platform designed for wireless embedded applications and IoT integration. Powered by the STM32WB55CGU6 dual-core wireless microcontroller from STMicroelectronics, the board supports Bluetooth Low Energy (BLE) 5.4, IEEE 802.15.4, and Thread/Zigbee protocols, making it suitable for a wide range of wireless control and sensor network applications. USB connectivity is provided via a USB Type C interface for programming, and power supply, while the onboard U.FL antenna connector ensures robust RF signal transmission. For rapid development, the STM32WB55 Evaluation Board offers access to key GPIOs, multiple communication interfaces (UART, SPI, I2C), and expansion headers. An onboard RGB LED is included for application-level feedback. This board is equipped with reverse polarity protection and ESD protection components to enhance reliability during prototyping and deployment. It also includes a SWD interface for seamless debugging with standard development tools. Housed in a compact and robust form factor, the STM32WB55 Evaluation Board is ideal for developers building and testing wireless applications in industrial automation, smart home, wearable devices, and healthcare domains.

6. Hardware Description

6.1 Powering the Board

The board offers two power input options for flexibility in various applications:

- **USB Type-C Connector:** The primary method of powering the board, providing regulated 5V input.
- **5V Input via 14-Pin Header:** An alternative power source that allows external 5V input directly through the expansion header pin **5V Input**



6.2 Power Supply

The board operates on a **3.3V** main power supply, regulated by an onboard 3.3V Low Dropout (LDO) regulator with a **maximum output current of 200 mA**. This regulated supply powers the core components of the board, including the STM32WB55 microcontroller and associated peripherals.

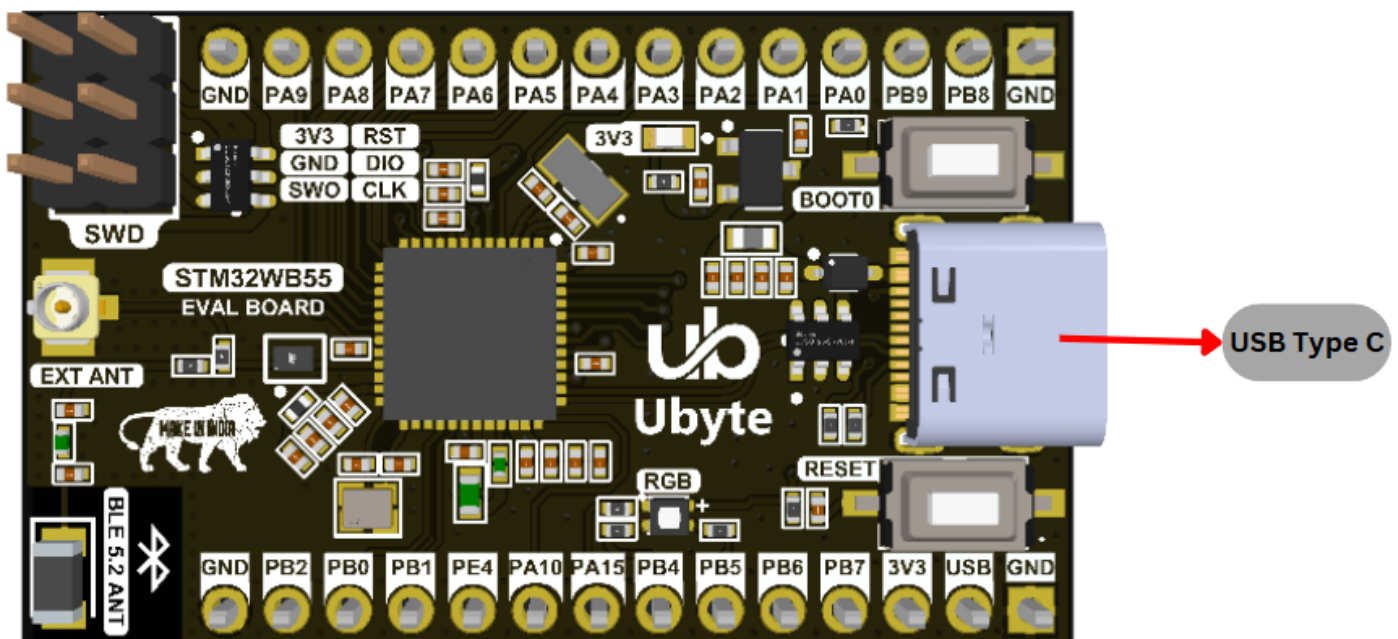
6.3 Microcontroller Unit (MCU)

- **Part Number:** STM32WB55CGU6
- **Package:** UFQFPN-48
- **Core:** ARM Cortex-M4 & Cortex-M0+
- **Flash Memory:** 1MB
- **SRAM:** 256KB
- **Operating Voltage:** 1.71V to 3.6V

6.4 USB Type-C Interface

The board features a **16-pin USB Type-C** connector that serves dual functions: providing power input and enabling data communication. This interface supports USB connectivity for programming while simultaneously powering the board.

Input Voltage: 5V



6.5 SWD Interface, Reset, and Boot

The board features an SWD programming and debugging interface using a **2x3-pin header**.

- **SWD Header**
- **Reset (NRST) and Boot (BOOT0) buttons** for system control

6.6 Clock Circuitry

- **Main Clock:** 32 MHz crystal oscillator
- **Low-Frequency Clock:** 32.768 kHz crystal for RTC operation

6.7 Onboard LED Indicator

- **RGB LED (0603 package):** Connected to **PA15, PB4, PB5**
- **Red LED (0603 package):** Power indication

6.8 GPIO and Expansion Headers

The board provides external GPIO access via two **14-pin headers**.

- **Header Details:** Direct Insert, Round Needle, Pitch=2.54mm
- Supports connections for **USB signals, SWD, and RF control lines**

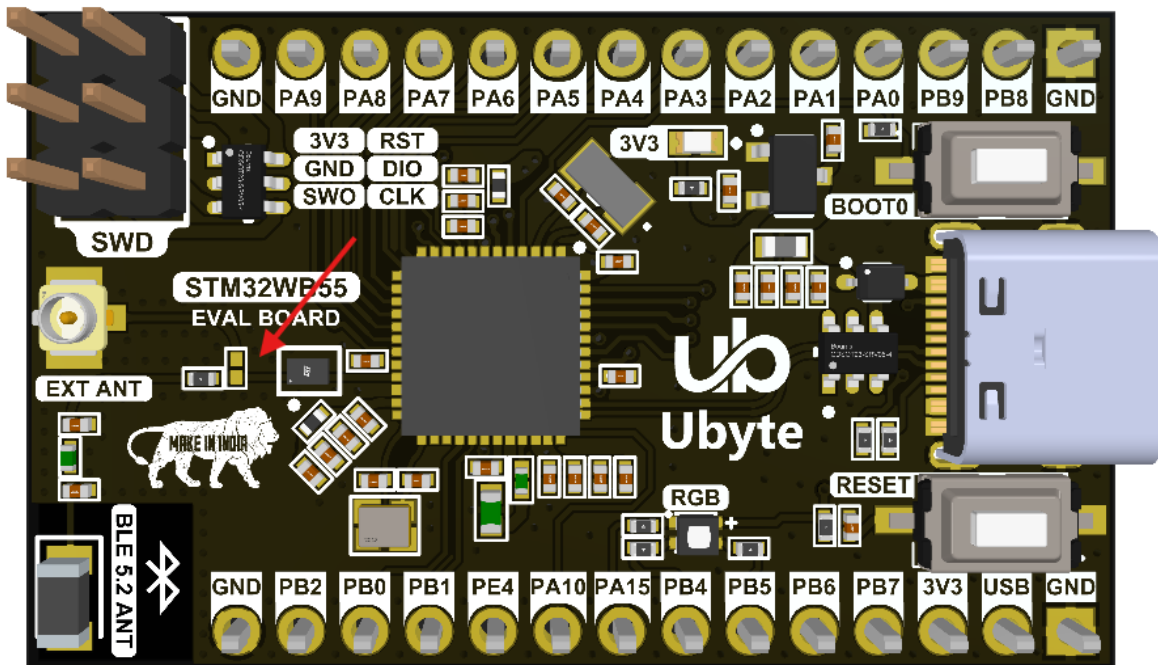
7. Bluetooth 5.4 RF Section

The RF section of the board is engineered to support flexible antenna configuration while maintaining proper 50 Ω impedance matching for optimal RF performance. It features a well-tuned matching network, an onboard chip antenna for compact applications, and an option for external antenna connection via a 1.25 mm SMD coaxial connector.

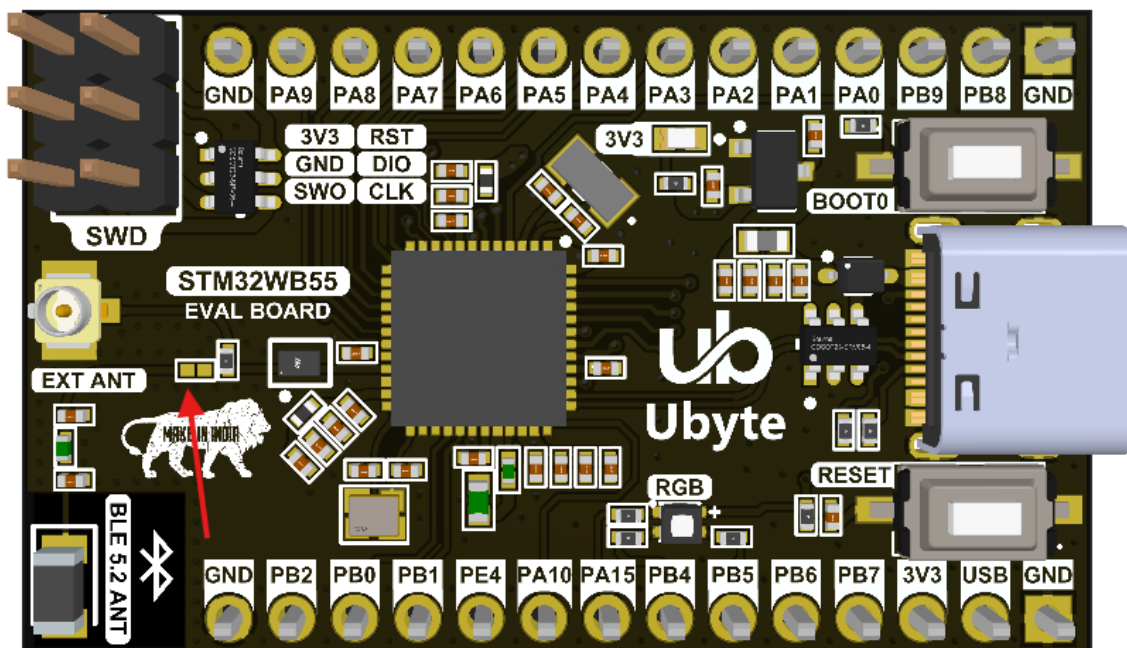
Antenna Selection Mechanism

The board allows users to switch between the onboard **chip antenna** and an external antenna via the **U.FL 1.25mm SMD coaxial connector**. This selection is made using a **0 Ω jumper resistor** in the RF signal path:

- **Onboard Chip Antenna (Default Configuration):**
 - A **0 Ω resistor** is placed to connect the RF signal directly to the **chip antenna (ANT1)**.
 - The **U.FL connector** remains disconnected.



- External Antenna (U.FL Connector Activated):
 - The **0Ω resistor** is removed.
 - We **short the marked terminal** to direct signals towards the U.FL connector and enable using an external antenna.
 - This disconnects the onboard chip antenna and directs the RF signal to the **U.FL 1.25mm SMD coaxial connector** for an external antenna connection.



8. Required Software & Tools

Software/Driver	Purpose	Download Link
STM32CubeIDE	Development environment (code, compile, debug)	Download
STM32CubeProgrammer	Flashing firmware via USB DFU or ST-Link	Download
ST-Link/V2 Driver	Debugging and flashing with ST-Link	Download
BLE Drivers	Bluetooth	Download

8.1 Install STM32CubeIDE

STM32CubeIDE is an integrated development environment used to write, compile, and debug code for STM32 microcontrollers.

Steps to Download and Install

1. Go to the [STM32CubeIDE download page](#).
2. Click on "Get Software" and log in or create an ST account.
3. Select the appropriate version for your operating system (Windows, Linux, macOS).
4. Download the installer and run it.
5. Follow the installation steps and choose the default installation path.
6. Launch STM32CubeIDE after installation and allow it to download required packages.

8.2 Install STM32CubeProgrammer

STM32CubeProgrammer is used for flashing firmware onto the STM32WB55 via USB DFU or ST-Link.

Steps to Download and Install

1. Go to the [STM32CubeProgrammer download page](#).
2. Click "Get Software," log in, and download the version for your OS.
3. Run the installer and follow the on-screen instructions.
4. During installation, ensure the option "Add to system PATH" is selected for command-line usage.

8.3 Install ST-Link/V2 Driver (For Debugging via ST-Link)

If you are using an ST-Link debugger to flash firmware, you need the ST-Link driver.

Steps to Download and Install

1. Download the **ST-Link/V2 driver** from [ST-Link/V2 Driver Download Page](#).
2. Click "Get Software," log in, and download the installer.
3. Extract the downloaded file and run the installer.
4. Follow the installation steps and restart your PC if required.

8.4 Installing BLE Drivers on STM32WB55 Eval Board

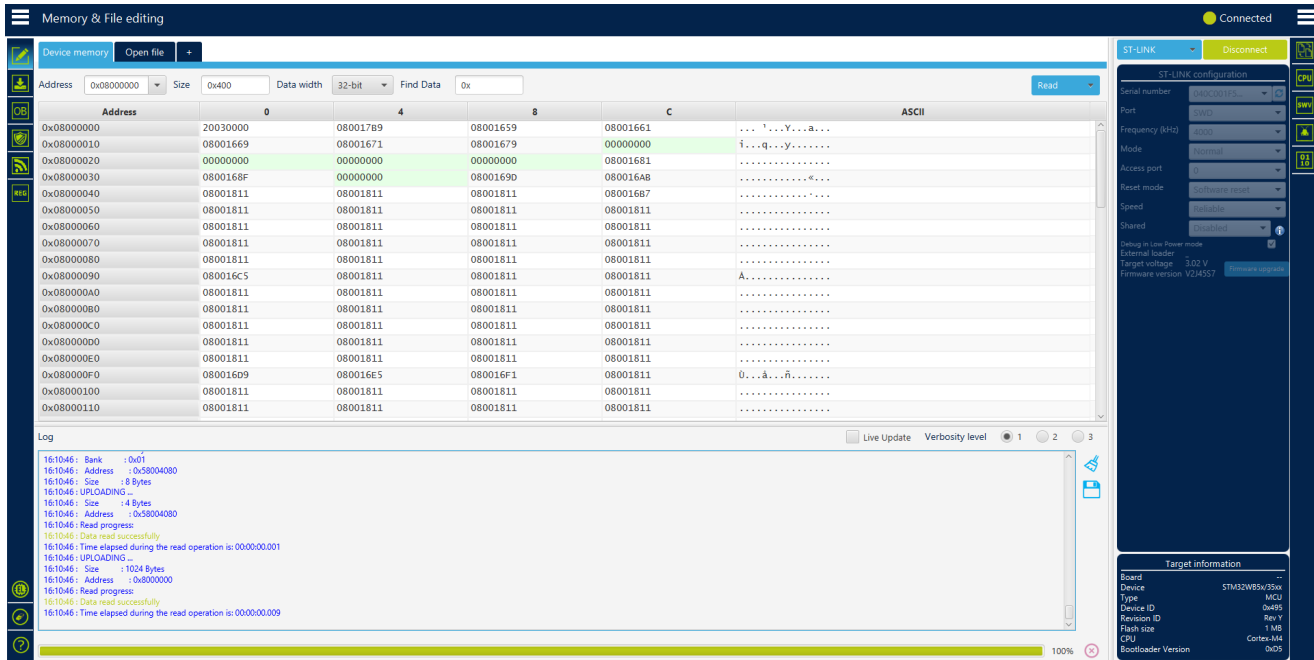
Follow these steps to install BLE drivers on the STM32WB55 Eval Board using STM32CubeProgrammer.

Step 1: Download and Install STM32CubeProgrammer

1. Download **STM32CubeProgrammer** from the official STMicroelectronics website.
2. Install it on your PC following the setup instructions.

Step 2: Connect STM32WB55 to STM32CubeProgrammer

1. Use an **ST-LINK** debugger to connect your **STM32WB55 Eval Board** to the PC.
2. Open **STM32CubeProgrammer** and ensure the board is detected.



Step 3: Upgrade the Firmware Upgrade Services (FUS)

1. Navigate to **Firmware Upgrade Services (FUS)** in STM32CubeProgrammer.

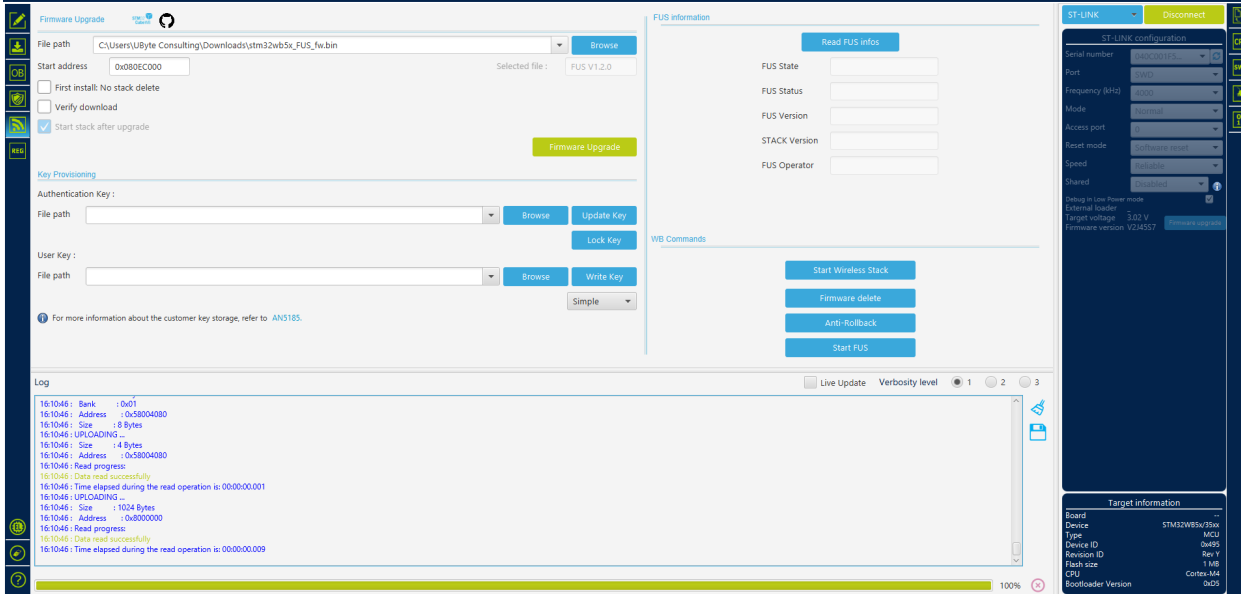
Download the **FUS firmware file**:

[STM32CubeWB/Projects/STM32WB_Copro_Wireless_Binaries/STM32WB5x/stm32wb5x_FUS_fw.bin at master · STMicroelectronics/STM32CubeWB · GitHub](#)

2. Select the downloaded **FUS firmware file** (stm32wb5x_FUS_fw.bin) as the firmware upgrade source.
3. Click on **"Firmware Upgrade"**.

Step 4: Start and Read FUS

1. Click on **"Start FUS"** in STM32CubeProgrammer.
2. Click on **"Read FUS"** to verify the upgrade.



Firmware Upgrade

File path: C:\Users\Ubyte Consulting\Downloads\stm32wb5x_fw_bin
 Start address: 0x080EC000
 Selected file: FUS V1.2.0

☐ First install: No stack delete
☐ Verify download
☒ Start stack after upgrade

Key Provisioning

Authentication Key:
 File path:
 Update Key:
 Lock Key:
 User Key:
 File path:
 Write Key:
 Simple

FUS information

Read FUS info:
 FUS State:
 FUS Status:
 FUS Version:
 STACK Version:
 FUS Operator:
 Start Wireless Stack
 Firmware delete
 Anti-Rollback
 Start FUS

ST-LINK **Disconnect**

ST-LINK configuration:
 Serial number: 00000000
 Port: COM1
 Frequency (kHz): 1000
 Mode: Normal
 Access port: 0
 Reset mode: Software reset
 Speed: 1000000
 Shared: Disabled

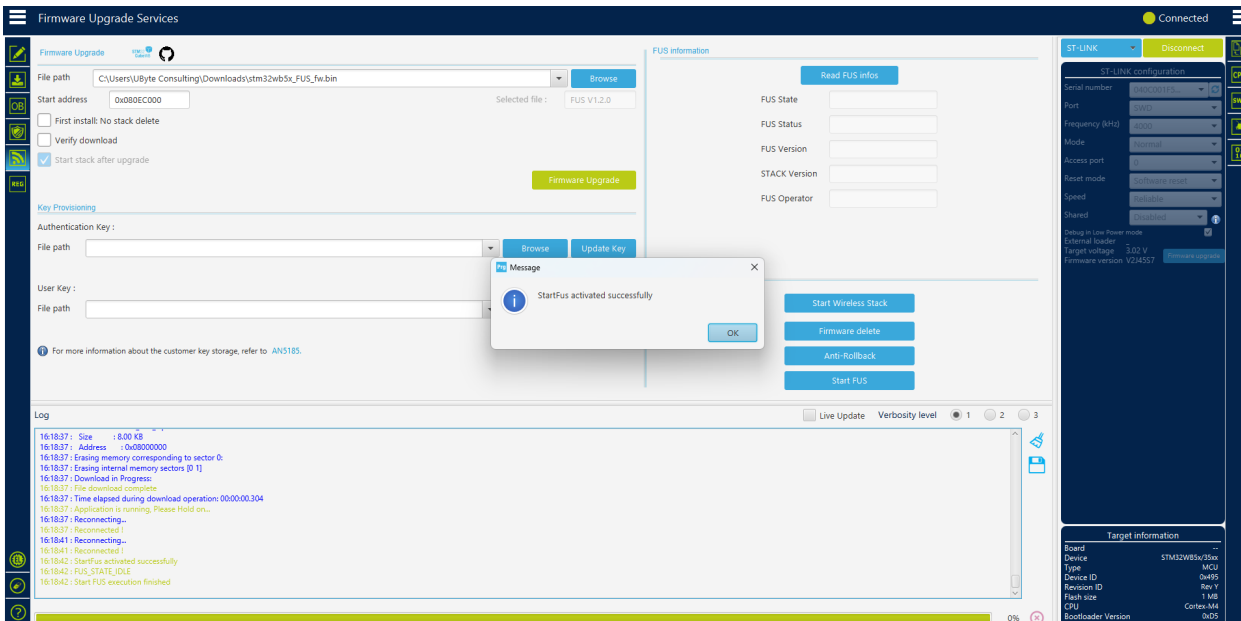
Setup in Low Power mode:
 External loader: 3.02 V
 Target voltage: 3.02 V
 Firmware version: V2.4557

Target information

Board: STM32WB55CGU6
 Device: STM32WB55CGU6
 Type: MCU
 Device ID: 0x495
 Revision ID: Rev Y
 Flash size: 1 MB
 CPU: Cortex-M4
 Bootloader Version: 0x25

Log

16:10:46: Bank : 0x01
 16:10:46: Address : 0x58004080
 16:10:46: Size : 8 Bytes
 16:10:46: UPLOADING :
 16:10:46: Size : 4 Bytes
 16:10:46: Address : 0x58004080
 16:10:46: Read progress:
 16:10:46: Data read successfully
 16:10:46: Time elapsed during the read operation is 00:00:00.001
 16:10:46: UPLOADING :
 16:10:46: Size : 1024 Bytes
 16:10:46: Address : 0x8000000
 16:10:46: Read progress:
 16:10:46: Data read successfully
 16:10:46: Time elapsed during the read operation is 00:00:00.009



Firmware Upgrade Services

File path: C:\Users\Ubyte Consulting\Downloads\stm32wb5x_fw_bin
 Start address: 0x080EC000
 Selected file: FUS V1.2.0

☐ First install: No stack delete
☐ Verify download
☒ Start stack after upgrade

Key Provisioning

Authentication Key:
 File path:
 Update Key:
 Lock Key:
 User Key:
 File path:
 Write Key:
 Simple

FUS information

Read FUS info:
 FUS State:
 FUS Status:
 FUS Version:
 STACK Version:
 FUS Operator:
 Start Wireless Stack
 Firmware delete
 Anti-Rollback
 Start FUS

ST-LINK **Disconnect**

ST-LINK configuration:
 Serial number: 00000000
 Port: COM1
 Frequency (kHz): 1000
 Mode: Normal
 Access port: 0
 Reset mode: Software reset
 Speed: 1000000
 Shared: Disabled

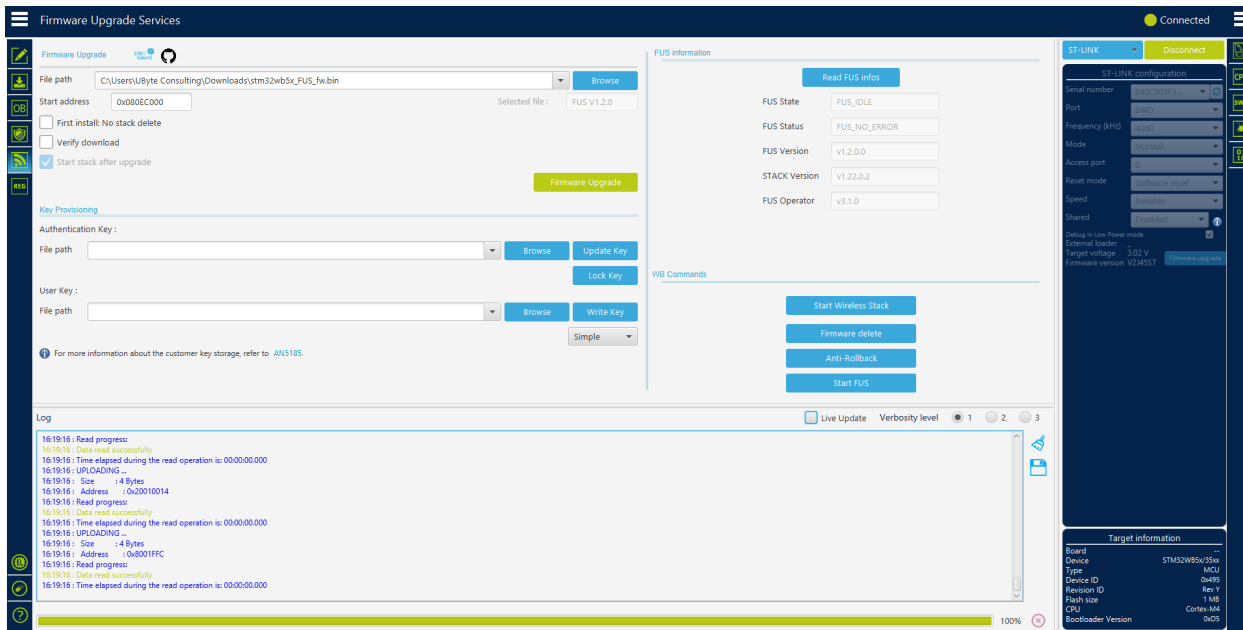
Setup in Low Power mode:
 External loader: 3.02 V
 Target voltage: 3.02 V
 Firmware version: V2.4557

Target information

Board: STM32WB55CGU6
 Device: STM32WB55CGU6
 Type: MCU
 Device ID: 0x495
 Revision ID: Rev Y
 Flash size: 1 MB
 CPU: Cortex-M4
 Bootloader Version: 0x25

Log

16:18:37: Size : 8.00 KB
 16:18:37: Address : 0x08000000
 16:18:37: Erasing memory corresponding to sector 0
 16:18:37: Erasing internal memory sectors [0 1]
 16:18:37: Download in Progress:
 16:18:37: The download complete
 16:18:37: Time elapsed during download operation: 00:00:00.304
 16:18:37: Application is running. Please Hold on...
 16:18:37: Reconnecting...
 16:18:37: Reconnected!
 16:18:41: Reconnecting...
 16:18:41: Reconnected!
 16:18:42: StartFus activated successfully
 16:18:42: FUS_STATE_IDLE
 16:18:42: Start FUS execution finished

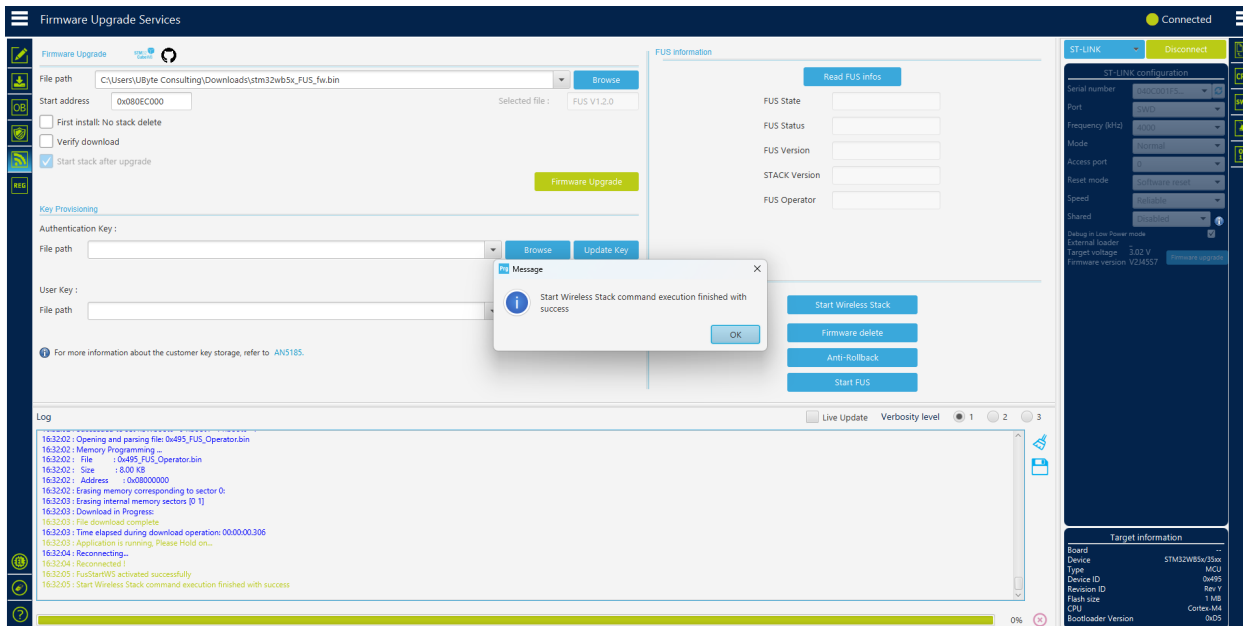


Step 5: Install the BLE Stack

1. Download the **BLE Stack firmware file**:
[STM32CubeWB/Projects/STM32WB_Copro_Wireless_Binaries/STM32WB5x/stm32wb5x_BLE_Stack_full_fw.bin](#) at master · STMicroelectronics/STM32CubeWB · GitHub BLE stack full
2. Select the **BLE Stack firmware file** (stm32wb5x_BLE_Stack_full_fw.bin) as the firmware upgrade source.
3. Click on "**Firmware Upgrade**".

Step 6: Start Wireless Stack

1. After upgrading the BLE Stack firmware, click on "**Start Wireless Stack**".
2. The BLE driver installation is now complete.



4. Verify Installation

Check if the STM32WB55 is Detected

- Open **Device Manager (Windows)** and check for:
 - **ST-Link:** "STMicroelectronics STLink" under **Universal Serial Bus Controllers** (if using ST-Link).

Check Connection in STM32CubeProgrammer

1. Open **STM32CubeProgrammer**.
2. Select the connection interface:
 - **ST-Link** (if using an ST-Link debugger).
3. Click "Connect" to verify the board is recognized.
4. If any tool does not detect the board, check the USB connection, drivers, and boot mode settings.