UBYTE
2181, Sector 28, HB Colony
Faridabad, Haryana, 121008
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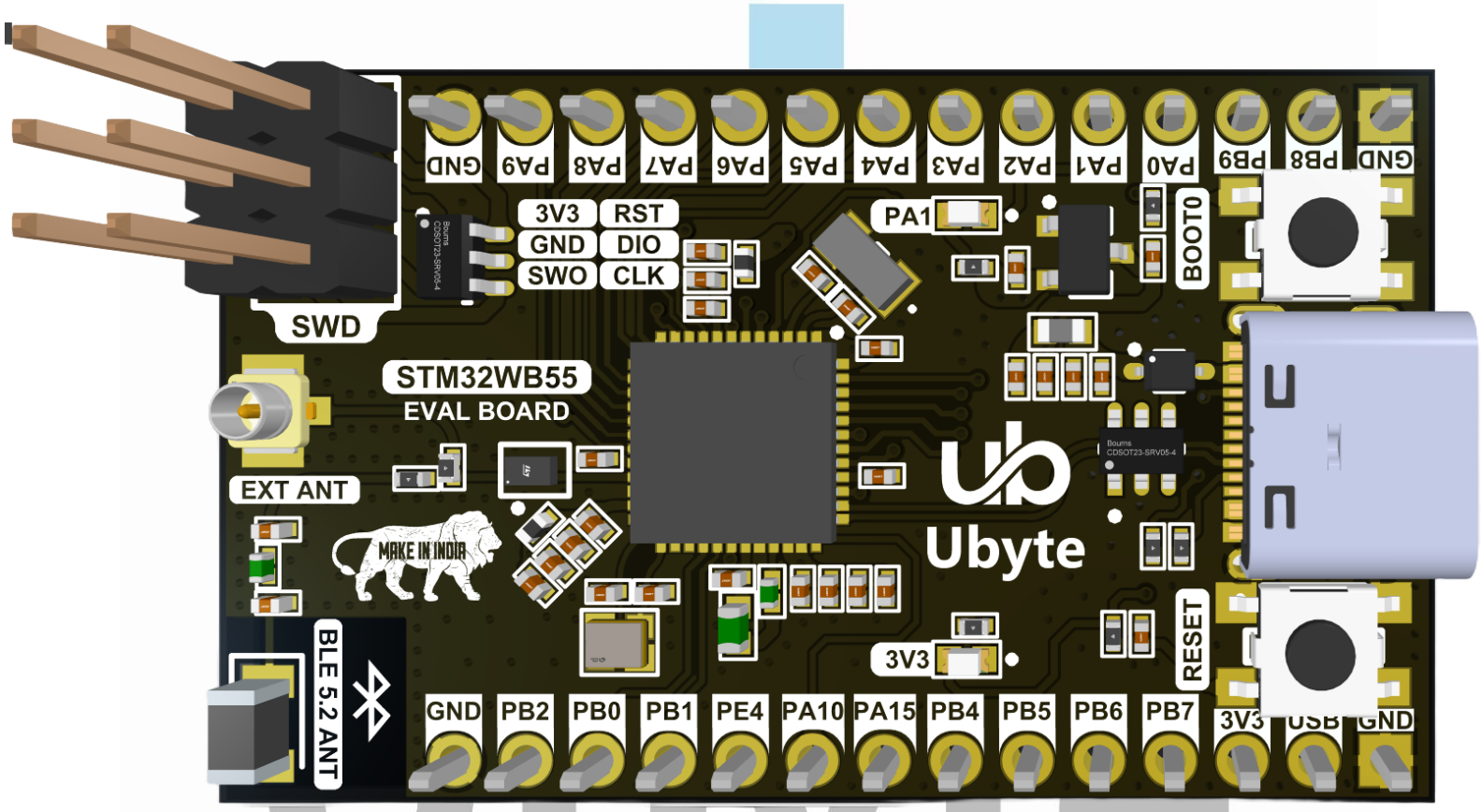
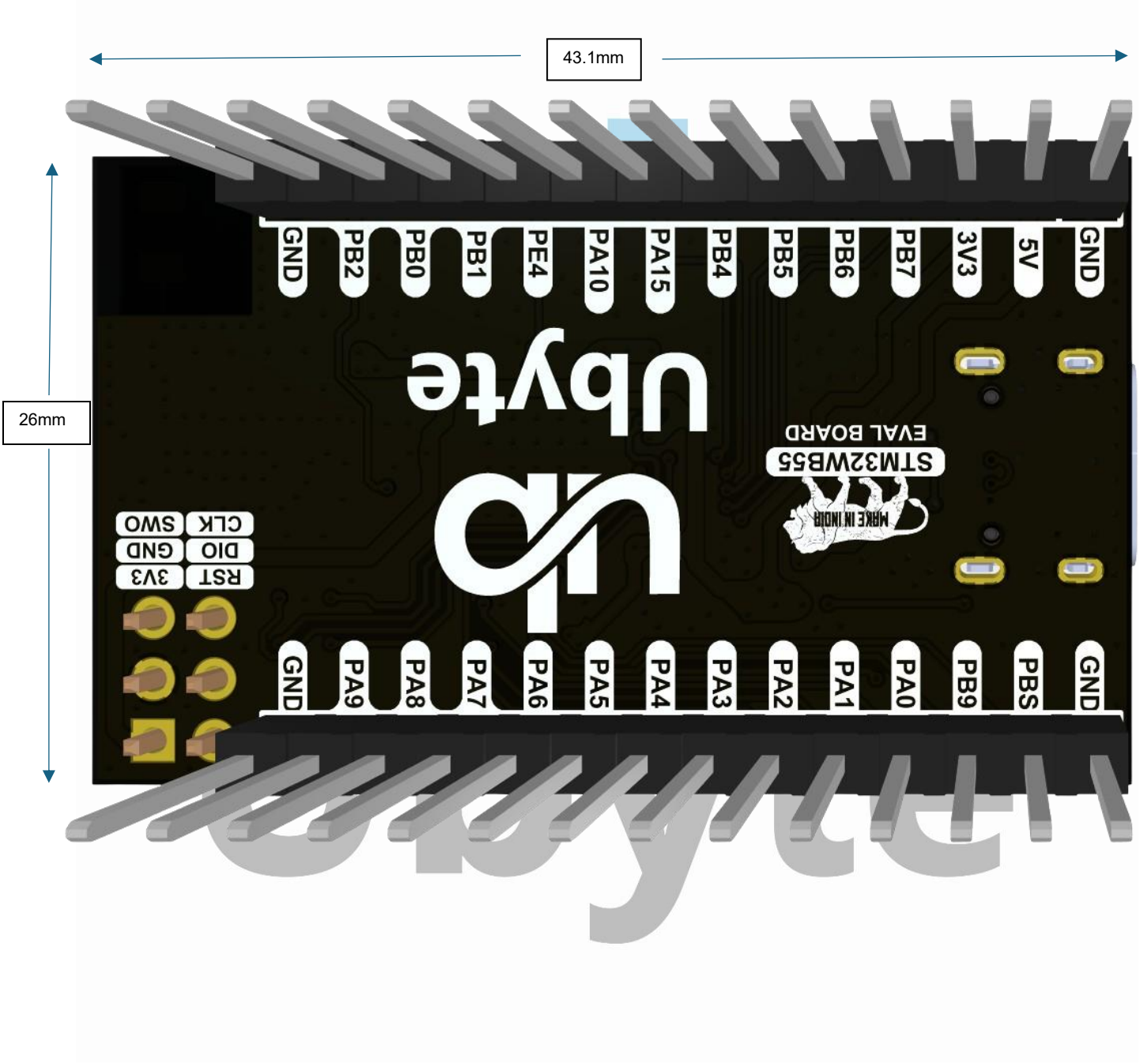
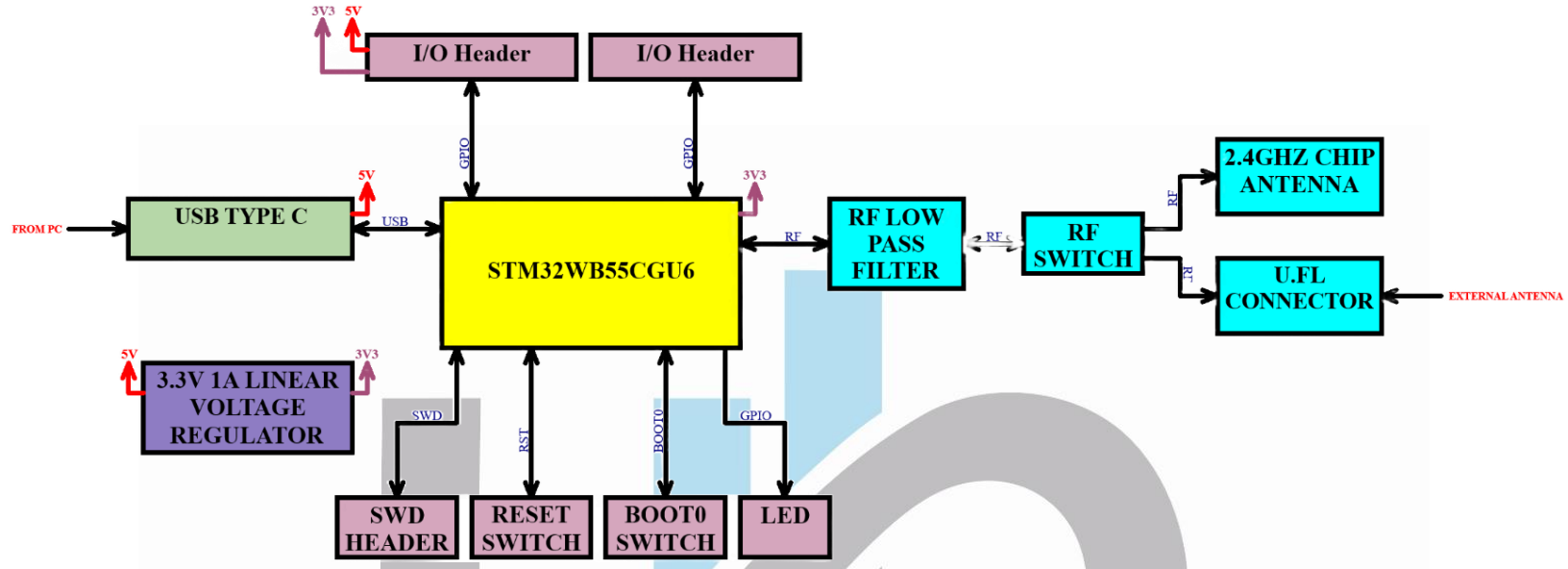
STM32WB55CGU6 Evaluation Board HARDWARE DOCUMENTATION




43.1mm
26mm
GND PB2 PB0 PB1 PE4 PA10 PA15 PB4 PB5 PB6 PB7 3V3 5V GND
GND PA9 PA8 PA7 PA6 PA5 PA4 PA3 PA2 PA1 PA0 PB9 PB8 GND
RST 3V3
DIO GND
CLK SWO
STM32WB55
EVAL BOARD
MADE IN INDIA
ubyte



STM32WB55CGU6 Evaluation Board Hardware Block Diagram

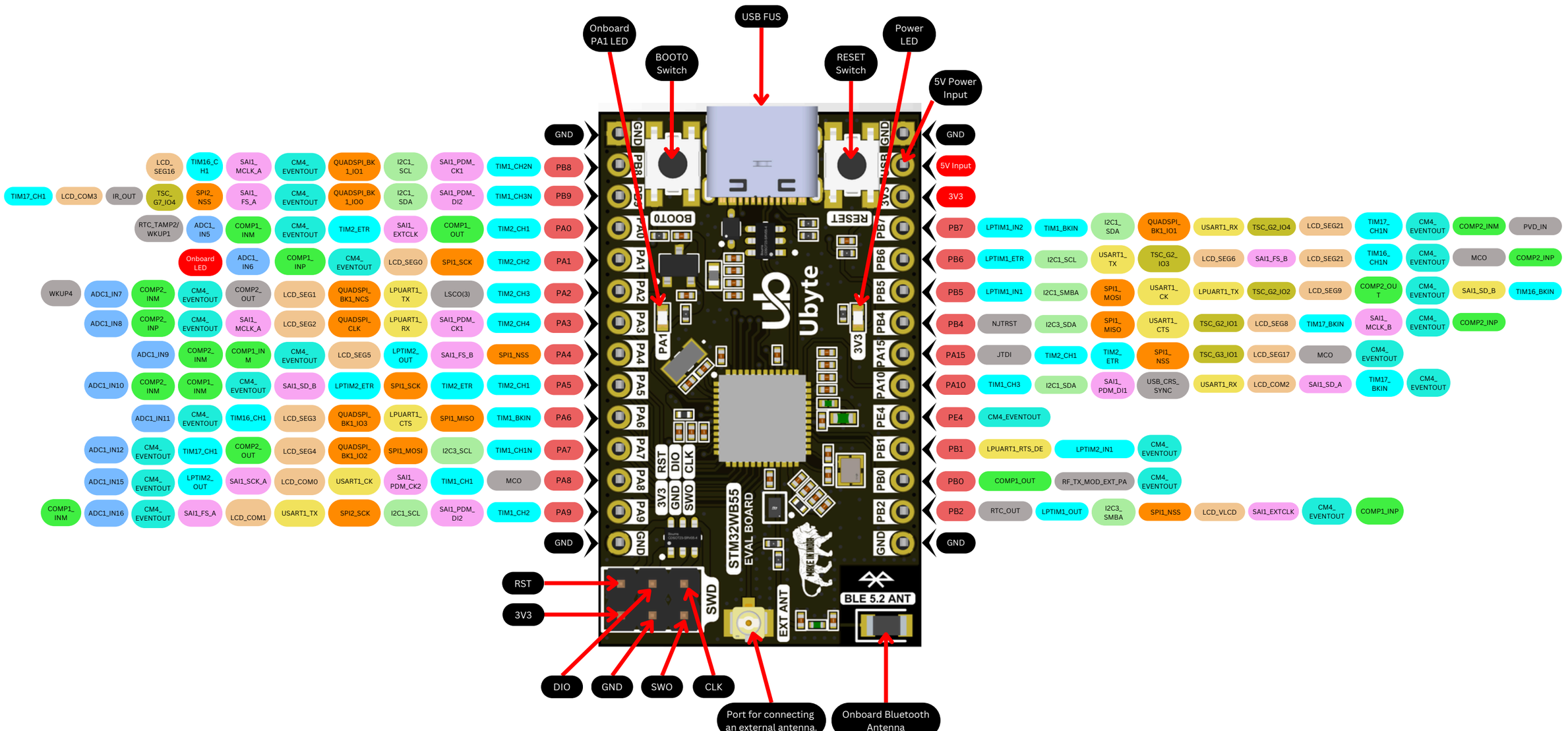
1. Introduction

This document provides a detailed hardware description of the STM32WB55CGU6-based evaluation board. The design integrates power management, a USB interface, RF connectivity, and GPIO access, making it suitable for IoT and embedded system applications.

2. Features

- STM32WB55CGU6 microcontroller (ARM Cortex-M4 & Cortex-M0+ dual-core)
- 3.3V power supply with XC6206P332MR-G (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 LEDs for status indication
- External GPIO access via headers
- 32 MHz and 32.768 kHz crystal oscillators

4. Pinout


Onboard PA1 LED
BOOT0 Switch
USB FUS
RESET Switch
Power LED
5V Power Input
GND
5V Input
3V3
PB8
PB9
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
PA8
PA9
PB7
PB6
PB5
PB4
PA15
PA10
PE4
PB1
PB0
PB2
LCD_SEG16 TIM16_CH1 SAI1_MCLK_A CM4_EVENTOUT QUADSPI_BK1_IO1 I2C1_SCL SAI1_PDM_CK1 TIM1_CH2N
TIM17_CH1 LCD_COM3 IR_OUT TSC_G7_IO4 SPI2_NSS SAI1_FS_A CM4_EVENTOUT QUADSPI_BK1_IO0 I2C1_SDA SAI1_PDM_DI2 TIM1_CH3N
RTC_TAMP2/WKUP1 ADC1_IN5 COMP1_INM CM4_EVENTOUT TIM2_ETR SAI1_EXTCLK COMP1_OUT TIM2_CH1
Onboard LED ADC1_IN6 COMP1_INP CM4_EVENTOUT LCD_SEG0 SPI1_SCK TIM2_CH2
WKUP4 ADC1_IN7 COMP2_INM CM4_EVENTOUT COMP2_OUT LCD_SEG1 QUADSPI_BK1_NCS LPUART1_TX LSCO(3) TIM2_CH3
ADC1_IN8 COMP2_INP CM4_EVENTOUT SAI1_MCLK_A LCD_SEG2 QUADSPI_CLK LPUART1_RX SAI1_PDM_CK1 TIM2_CH4
ADC1_IN9 COMP2_INM COMP1_INM CM4_EVENTOUT LCD_SEG5 LPTIM2_OUT SAI1_FS_B SPI1_NSS
ADC1_IN10 COMP2_INP COMP1_INM CM4_EVENTOUT SAI1_SD_B LPTIM2_ETR SPI1_SCK TIM2_ETR TIM2_CH1
ADC1_IN11 CM4_EVENTOUT TIM16_CH1 LCD_SEG3 QUADSPI_BK1_IO3 LPUART1_CTS SPI1_MISO TIM1_BKIN
ADC1_IN12 CM4_EVENTOUT TIM17_CH1 COMP2_OUT LCD_SEG4 QUADSPI_BK1_IO2 SPI1_MOSI I2C3_SCL TIM1_CH1N
ADC1_IN15 CM4_EVENTOUT LPTIM2_OUT SAI1_SCK_A LCD_COM0 USART1_CK SAI1_PDM_CK2 TIM1_CH1 MCO
COMP1_INM ADC1_IN16 CM4_EVENTOUT SAI1_FS_A LCD_COM1 USART1_TX SPI2_SCK I2C1_SCL SAI1_PDM_DI2 TIM1_CH2
PB7 LPTIM1_IN2 TIM1_BKIN I2C1_SDA QUADSPI_BK1_IO1 USART1_RX TSC_G2_IO4 LCD_SEG21 TIM17_CH1N CM4_EVENTOUT COMP2_INM PVD_IN
PB6 LPTIM1_ETR I2C1_SCL USART1_TX TSC_G2_IO3 LCD_SEG6 SAI1_FS_B LCD_SEG21 TIM16_CH1N CM4_EVENTOUT MCO COMP2_INP
PB5 LPTIM1_IN1 I2C1_SMBA SPI1_MOSI USART1_CK LPUART1_TX TSC_G2_IO2 LCD_SEG9 COMP2_OUT CM4_EVENTOUT SAI1_SD_B TIM16_BKIN
PB4 NJTRST I2C3_SDA SPI1_MISO USART1_CTS TSC_G2_IO1 LCD_SEG8 TIM17_BKIN SAI1_MCLK_B CM4_EVENTOUT COMP2_INP
PA15 JTDI TIM2_CH1 TIM2_ETR SPI1_NSS TSC_G3_IO1 LCD_SEG17 MCO CM4_EVENTOUT
PA10 TIM1_CH3 I2C1_SDA SAI1_PDM_DI1 USB_CRS_SYNC USART1_RX LCD_COM2 SAI1_SD_A TIM17_BKIN CM4_EVENTOUT
PE4 CM4_EVENTOUT
PB1 LPUART1_RTS_DE LPTIM2_IN1 CM4_EVENTOUT
PB0 COMP1_OUT RF_TX_MOD_EXT_PA CM4_EVENTOUT
PB2 RTC_OUT LPTIM1_OUT I2C3_SMBA SPI1_NSS LCD_VLCD SAI1_EXTCLK CM4_EVENTOUT COMP1_INP
RST
3V3
DIO
GND
SWO
CLK
SWD
STM32WB55 EVAL BOARD
BLE 5.2 ANT
EXT ANT
Port for connecting an external antenna.
Onboard Bluetooth Antenna
COMP
I2C
TIM
SAI
SPI
TSC
UART
LCD
Others
ADC
Onboard LED/Power
CM4_EVENTOUT

4. Hardware Description

4.1 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**

4.2 Power Supply

The board operates on a **3.3V** main power supply, regulated by the **XC6206P332MR-G (3.3V 200mA LDO)**.

4.3 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

4.4 USB Type-C Interface

The **USB Type-C 16-pin connector (2MD-073)** is used for both power input and data transfer.

- **Input Voltage:** 5V

4.5 Bluetooth 5.0 RF Section

The RF section of the board is designed to provide flexible antenna selection while ensuring proper impedance matching for optimal signal performance. It includes a **matching network**, an onboard chip antenna (**2450AT18B100E**), and an external antenna option through an **IPEX 1.25mm 6GHz 50Ω SMD coaxial connector**.

Antenna Selection Mechanism

The board allows users to switch between the onboard **2450AT18B100E chip antenna** and an external antenna via the **U.FL/IPEX connector (J1)**. This selection is made using a **0Ω jumper resistor (R6)** in the RF signal path:

- **Onboard Chip Antenna (Default Configuration)**:
  - The **0Ω resistor (R6)** is placed to connect the RF signal directly to the **chip antenna (ANT1)**.
  - The **U.FL connector (J1)** remains disconnected.
- **External Antenna (U.FL Connector Activated)**:
  - The **0Ω resistor (R6)** is removed (DNP - Do Not Populate).
  - This disconnects the onboard chip antenna and directs the RF signal to the **U.FL connector (J1)** for an external antenna connection.

4.6 SWD Interface, Reset, and Boot

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

- **SWD Header:** Gold-plated, **3A Direct Insert**, **2.54mm pitch, 2x3 Pins**
- **Reset (NRST) and Boot (BOOT0) buttons** for system control

4.7 Clock Circuitry

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

4.8 Onboard LED Indicator

- **Yellow LED (0603 package):** Connected to **PA1**
- **Red LED (0603 package):** Power indication

4.9 GPIO and Expansion Headers

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

- **Header Details:** Gold-plated, **3A, Direct Insert**, **Round Needle, Pitch=2.54mm**
- Supports connections for **USB signals, SWD, and RF control lines**