

Introduction

MB2130 is wireless and ultra-low-power board embedding a powerful and ultra-low-power radio compliant with the Bluetooth® Low Energy SIG specification v5.4.

figure 1 MB2130A global view



1. Features

- Ultra-low-power wireless [STM32WBA65RI](#) microcontroller based on the Arm® Cortex®-M33 core, featuring 2 Mbyte of flash memory and 330 Kbytes of SRAM in a UFQFPN68 package
- MCU RF board (MB2130):
 - 2.4 GHz RF transceiver supporting Bluetooth® specification v5.4
 - IEEE 802.15.4-2015 PHY and MAC, supporting Thread, Chip and Zigbee®
 - Arm® Cortex® M33 CPU with Arm® TrustZone®, MPU, DSP, and FPU – Integrated PCB antenna

Note: [Arm](#) and [TrustZone](#) are registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere.



2. Ordering information

To order the [MB2130A](#) board, refer to [Table 1](#). Additional information is available from the datasheet and reference manual of the target microcontroller.

Table 1. List of available products

Order code	Board reference	Target STM32
MB2130A-02	• MB2130	STM32WBA65RI

Codification

The meaning of the codification is explained in [Table 2](#).

Table 2. Codification explanation

NUCLEO-WBXXYYRZ	Description	Example: NUCLEO-WBA65RI
XX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32WBA series
YY	MCU product line in the series	STM32WBA65 product line
R	STM32 package pin count: • R for 68 pins	68 pins
Z	STM32 flash memory size: • I for 2 Mbyte	2 Mbyte

3. Development environment

3.1 System requirements

- Multi-OS support: Windows® 10, Linux® 64-bit, or macOS®
- USB Type-A or USB Type-C® to Micro-B cable

Note:

macOS® is a trademark of Apple Inc., registered in the U.S. and other countries and regions.

Linux® is a registered trademark of Linus Torvalds.

Windows is a trademark of the Microsoft group of companies.

3.2 Development toolchains

- IAR Systems® - IAR Embedded Workbench®⁽¹⁾
- Keil® - MDK-ARM⁽¹⁾
- STMicroelectronics - STM32CubeIDE

1. On Windows® only.

3.2 Demonstration software

The demonstration software, included in the STM32Cube MCU Package corresponding to the on-board microcontroller, is preloaded in the STM32 flash memory for easy demonstration of the device peripherals in standalone mode. The latest versions of the demonstration source code and associated documentation can be downloaded from www.st.com.

4. Conventions

Table 3 provides the conventions used for the ON and OFF settings in the present document.

Table 3. ON/OFF convention

Convention	Definition
Jumper JPx ON	Jumper fitted
Jumper JPx OFF	Jumper not fitted
Jumper JPx [1-2]	Jumper fitted between Pin 1 and Pin 2
Solder bridge SBx ON	SBx connections closed by 0 Ω resistor
Solder bridge SBx OFF	SBx connections left open
Resistor Rx ON	Resistor soldered
Resistor Rx OFF	Resistor not soldered
Capacitor Cx ON	Capacitor soldered
Capacitor Cx OFF	Capacitor not soldered

5. Safety recommendations

5.1 Targeted audience

This product targets users with at least basic electronics or embedded software development knowledge like engineer, technician, or student.

This board is not a toy and is not suited for use by children.

5.2 Handling the board

This product contains a bare printed circuit board and as with all products of this type, the user must be careful about the following points:

- 5.2.1 The connection pins on the board might be sharp. Be careful when handling the board to avoid hurting yourself
- 5.2.2 This board contains static-sensitive devices. To avoid damaging it, please handle the board in an ESD-proof environment.
- 5.2.3 While powered, do not touch the electric connections on the board with your fingers or anything conductive. The board operates at voltage levels that are not dangerous, but components could be damaged when shorted.
- 5.2.4 Do not put any liquid on the board and avoid operating the board close to water or at a high humidity level.
- 5.2.5 Do not operate the board if dirty or dusty.

6. Hardware layout and configuration

MB2130A is designed around the STM32WBA65RI. The design includes a mezzanine board and an MCU RF board. The hardware block diagram in Figure 2 illustrates the connection between STM32WBA65RI and peripherals (ARDUINO® Uno V3 connectors, ST morpho connector, and embedded ST-LINK).

Figure 3 and Figure 5 help users locate these features on the MB2130A board. The mechanical dimensions of the MB2130A product are shown in Figure 6.

Figure 2 Hardware block diagram

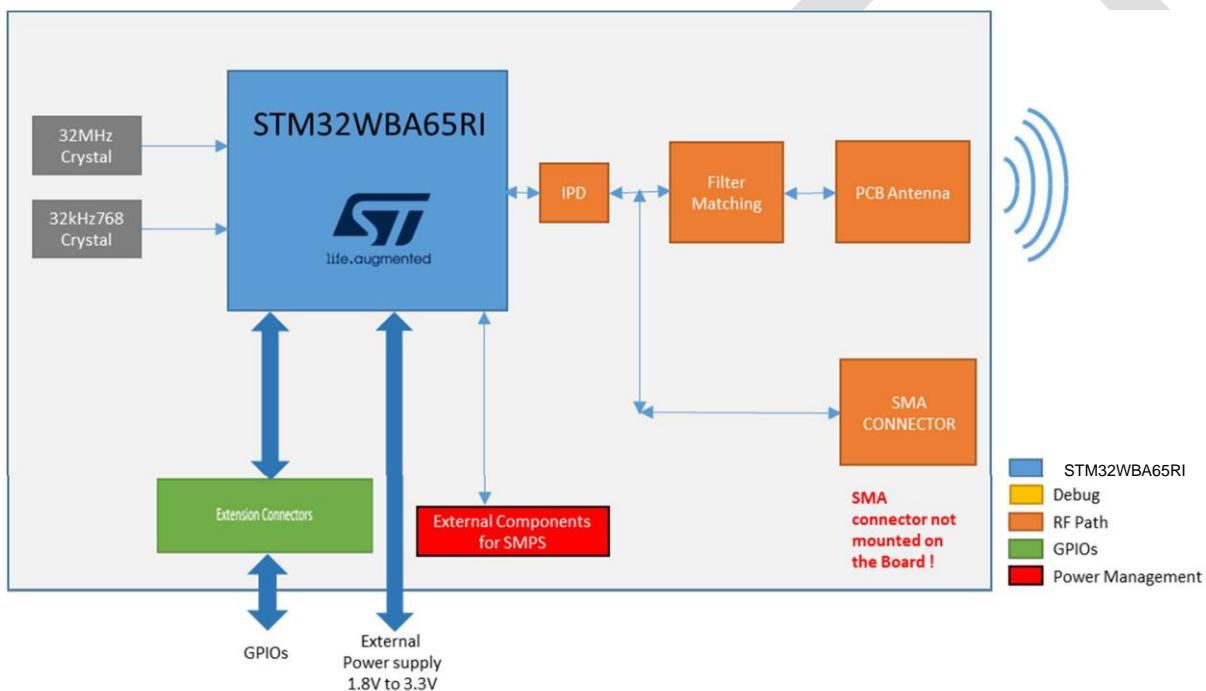
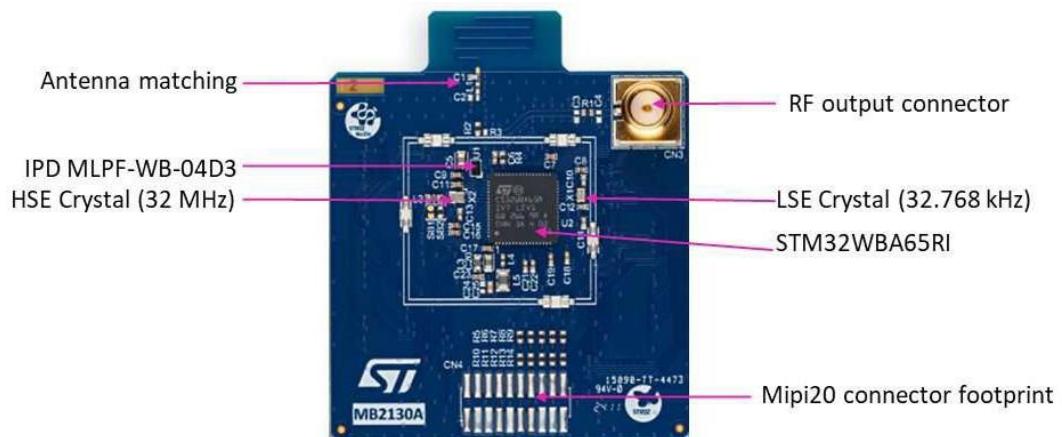
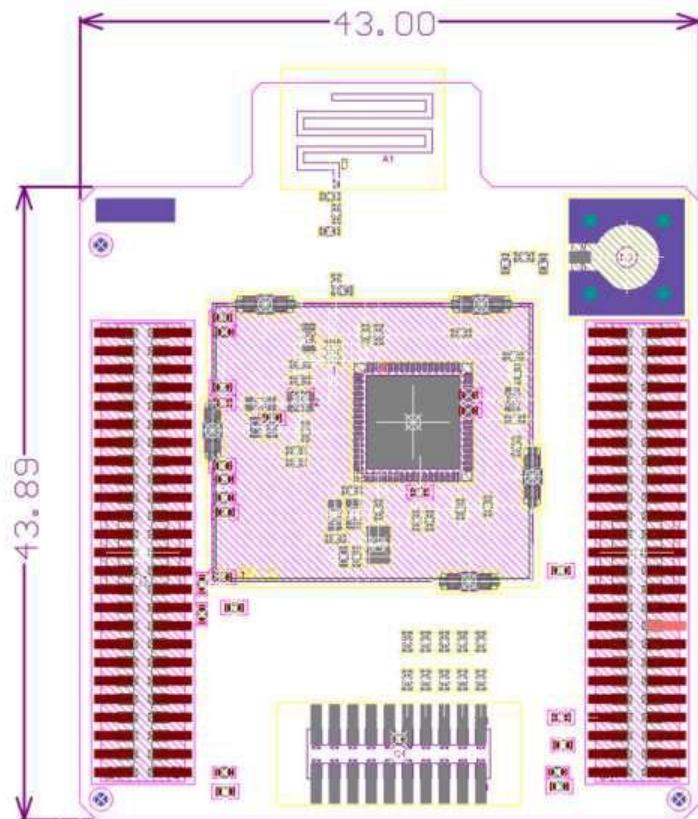


Figure 3 MB2130A PCB top view



DRAFT

Figure 4 MB2130A mechanical dimensions (in millimetres)

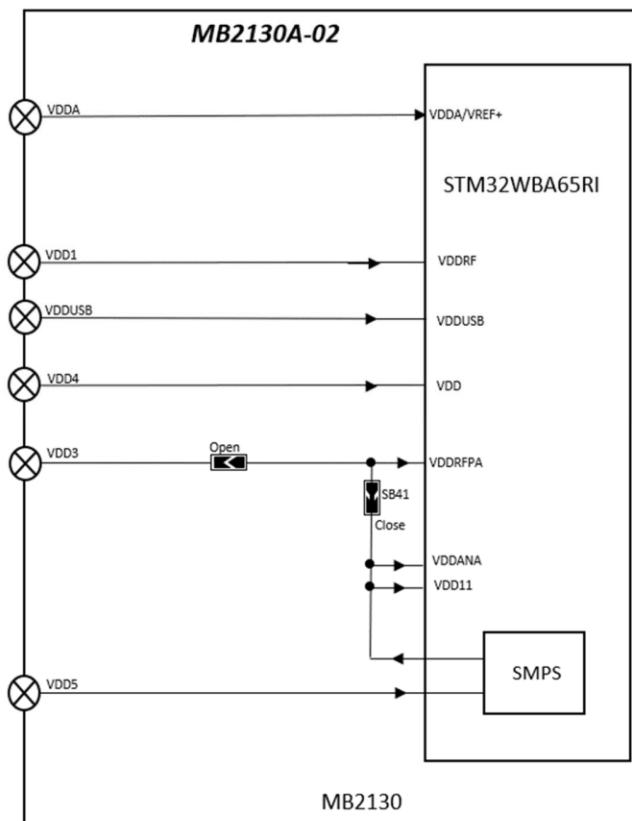


6.1 Power supply

6.1.1 General description

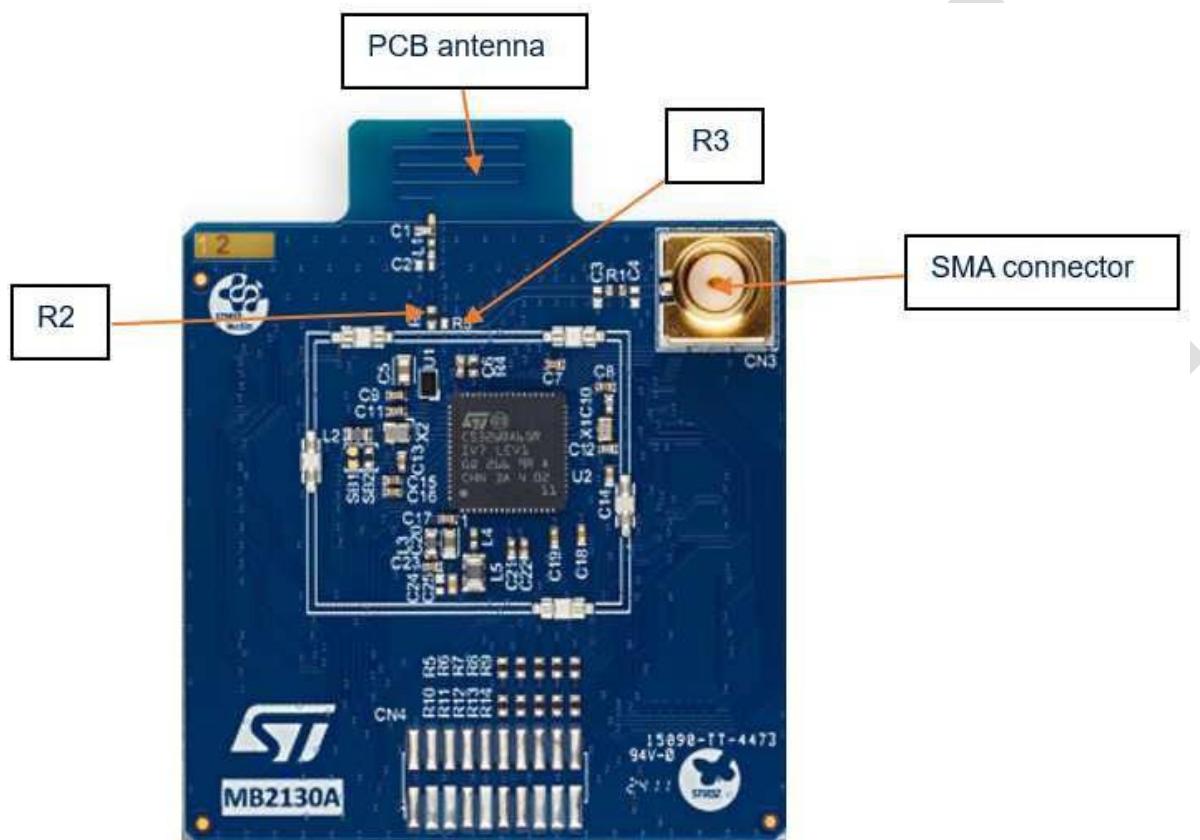
By default, the STM32WBA65RI embedded on this Nucleo board is supplied by 3V3 but the board proposes a lot of possibilities to supply the module. In fact, at first, the 3V3 can come

Figure 5 STM32WBA65RI power tree



6.2 output power configuration

- By default, the Board power output is configured on the PCB antenna in radiated mode R2 connected and R3 disconnected
- To configure the board in conducted on the SMA connector output, disconnect R2 and connect R3



6.3 DEBUG

in order to debug on MB2130 you need to assembly the CN4 connector as Below, you can use the FTSH-110-01-L-DV reference from samtech or equivalent, this is an ETM 20 pin connector , To perform High speed ETM traces, please removed Resistors R5, R6, R7, R8, R9



DRAFT

6.4 Clock sources

6.4.1 HSE clock references

The accuracy of the high-speed clock (HSE) of the MCU RF board is committed to a 32 MHz crystal oscillator.

The HSE oscillator is trimmed during board manufacturing.

6.4.2 LSE clock references

The accuracy of the low-speed clock (LSE) of the MCU RF board is committed to a 32.768 kHz crystal oscillator.

DRAFT

6.5 Reset sources

The reset signal of NUCLEO-WBA65RI is active LOW. The internal PU forces the RST signal to a high level.

The sources of reset are:

- Reset push-button (B4)
- Embedded STLINK-V3EC
- ARDUINO® connector (CN5 pin 3), reset from the ARDUINO® board
- ST morpho connector (CN3 pin 14)

6.6 Embedded STLINK-V3EC

The STLINK-V3EC programming and debugging tool is integrated into NUCLEO-WBA65RI.

The features supported on the STLINK-V3EC are:

- USB 2.0 high-speed interface
- Probe firmware update through USB
- JTAG communication support up to 21 MHz
- SWD and SWV communication support up to 24 MHz
- 3.0 to 3.6 V application voltage support and 5 V tolerant inputs
- Virtual COM port (VCP) up to 16 Mbps
- Optional drag-and-drop flash memory programming binary files
- Multipath bridge USB to SPI/UART/I²C/CAN/GPIOS

For all general information concerning debugging and programming features common between V3 and V2-1 versions, refer to the user manual *ST-LINK in-circuit debugger/programmer for STM8 and STM32 microcontrollers* (UM0627) at www.st.com.

6.7 Drivers

STLINK-V3EC requires a dedicated USB driver, which, for Windows 7® and Windows 8® is available from www.st.com. For Windows 10®, it is not necessary to install the driver. ST-LINK is automatically identified.

In case the NUCLEO-WBA65RI board is connected to the PC before the driver is installed, some board interfaces might be declared as *Unknown* in the PC device manager. In this case, the user must install the dedicated driver files and update the driver of the connected device from the device manager, as shown in Figure 10. **USB composite device**.

Note:

It is preferable to use the USB Composite Device to handle a full recovery.

Figure 6 USB composite device



6.8 STLINK-V3EC firmware upgrade

The STLINK-V3EC embeds a firmware upgrade (stsw-link007) mechanism through the USB port. The firmware might evolve during the lifetime of the STLINK-V3EC product (for example to add new functionalities, fix bugs, and support new microcontroller families). Keep the STLINK-V3EC firmware up to date before starting to use the NUCLEOWBA65RI board. The latest version of this firmware is available from the www.st.com website. For detailed information on the ST-LINK USB drivers, refer to the technical note Overview of ST-LINK derivatives (TN1235).

6.8.1 STLINK-V3EC USB connector (CN15)

The main function of this connector is the access to STLINK-V3EC embedded on the NUCLEO-WBA65RI for the debugging as explained above. It allows supplying the board (refer to [Section 7.1 Power supply](#)). The connector is a standard USB Type-C® connector.

Table 5. ST-LINK USB Type-C® connector (CN15)

Pin	Pin name	Signal name	Function
A4, A9, B4, B9	VBUS	VBUS_STLK	VBUS power
A7, B7	DM	STLK_USB_N	DM
A6, B6	DP	STLK_USB_P	DP
A5	CC1	-	Configuration Channel-
B5	CC2	-	Configuration Channel-
A1, A12, B1, B12	GND	GND	GND

6.8.2 Virtual COM port USART1 (VCP1)

STLINK-V3EC offers a USB Virtual COM port bridge. This feature allows access to the USART1 of NUCLEOWBA65RI by the USB_STLINK connector. By default, this USART1 interface of NUCLEO-WBA65RI is connected to the VCP1 of the STLINK-V3EC MCU (STM32F723IE).

The access is possible on the CN3 connector of the Mezzanine Board (MB1801), both signals (TX and RX) are available, and two solder bridges allow disconnecting the UART coming from the SoC. By default, VCP1 is connected to USART1 of STM32WBA65.

Table 6. VCP1 interface pinout description

STM32WBA65RI	CN3	STM32F723
USART1 RX (PA8/pin 5)	Pin 35 (GPIO23)	STLINK_TX: PG14/pin A7
USART1 TX (PB12/pin 4)	Pin 37 (GPIO24)	STLINK_RX: PG9/pin C10

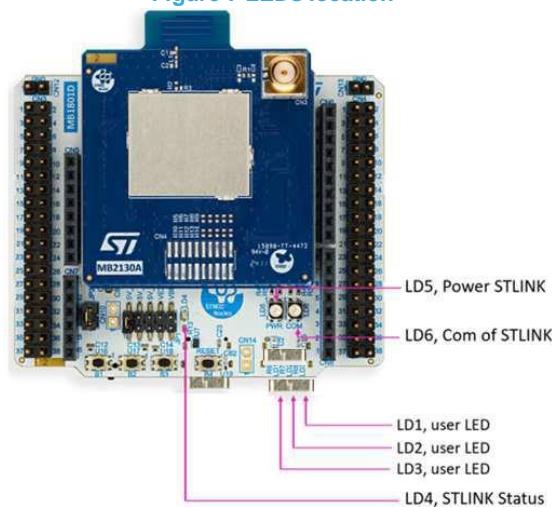
6.9 Level shifter

NUCLEO-WBA65RI has a system for supplying STM32WBA65RI with a different voltage than the ST-LINK. The ST-LINK is always supplied by 3V3 sources. By default, the STM32WBA65RI is supplied by the same voltage value as ST-LINK, but it is possible to supply the SoC with another value. It accepts voltage between 1.8 and 3.3 V trust to a specific component (level shifter). This level shifter assures the voltage conversion between STLINK and the SoC. It drives SWD and UARTs signals connected to the VCP1 or the ST-LINK.

6.10 LEDs

Four LEDs on the top side of the Nucleo board help the user during the application development.

Figure 7 LEDs location



- LD1: This blue LED is available for user application.
- LD2: This green LED is available for user application.
- LD3: This red LED is available for user application.
- LD4: This LED turns green when a 5V source is available (to select the 5V source, refer to [Section 7.1.3, 5V power supply](#)).
- LD5: This LED gives information about STLINK-V3EC target power.
- LD6: This LED blinks during communication with the PC.

For detailed information about the STLINK-V3EC LEDs, refer to the technical note Overview of ST-LINK derivatives (TN1235).

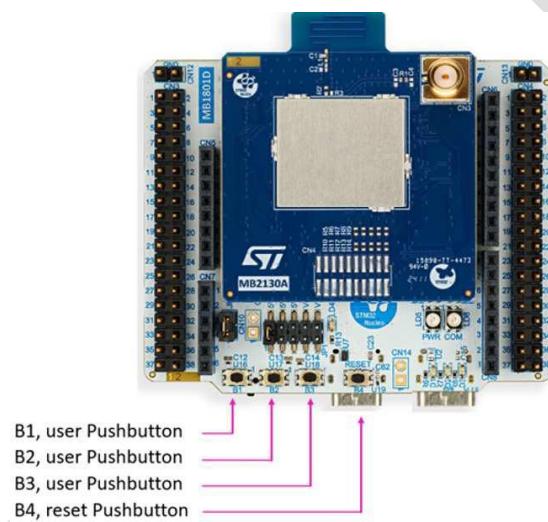
6.11 Push-buttons

6.11.1 Description

NUCLEO-WBA65RI provides two types of buttons:

- USER1 push-button (B1)
- USER2 push-button (B2)
- USER3 push-button (B3)
- Reset push-button (B4), used to reset the Nucleo board.

Figure 8 Push buttons location



6.11.2 Reset push-button

B4 is dedicated to the hardware reset of the NUCLEO board.

6.11.3 User push-buttons

There are three push-buttons available for the user application. They are connected to PA0, PE4, and PA6. It is possible to use with GPIO reading or to wake up the device (only B1).

Note that PA0 is also connected to ARDUINO® and ST morpho connectors as GPIO, depending on the use case that can generate conflict with B1. In this case, it is possible to remove the connection of B1 (SB11 OFF).

Table 7. I/O configuration for the physical user interface

Name	I/O	Wake-Up available
USER1 pushbutton (B1).	PC13	WKUP1
USER2 pushbutton (B2)	PB6	WKUP3
USER3 pushbutton (B3)	PB7	WKUP5

6.12 RF I/O stage

Due to FCC/ISED constraints, the antenna cannot be removable. So, the board is proposed by default with a PCB antenna. This antenna is described on AN5129 available on the ST web site. Between the STM32WBA65 and the antenna, there an integrated passive device (MLPF-WB-04D3). This IPD reduced drastically the harmonics and matches the output to 50ohm, this enable to pass easily the certifications requirements (FCC, ISED, RED, MIC,...). At the IPD output, there is two passive components for antenna matching.

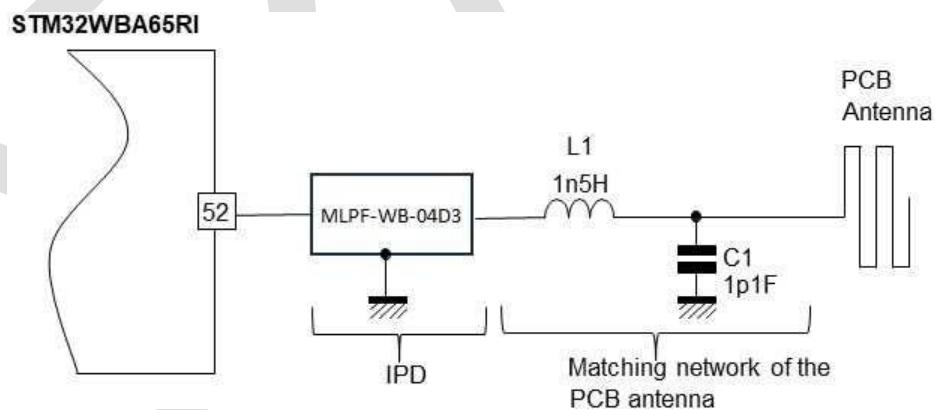
The table 8 shows the level of harmonic expected worst case at the output of the STM32WBA65 without filter. That allows to determinate the attenuation of the filter vs. frequency.

Table 8. harmonic level on the STM32WBA65 (TX mode)

Harmonic indice	Harmonic Level
H2	-28 dBm
H3	-45 dBm
H4	-54 dBm
H5	-78 dBm
H6	-66 dBm

The antenna matching network is built with 2 components L1 and C1. That guaranteed a comfortable margin in all cases. The study takes in count, the drift of the components (accuracy and temperature), the drift due to the PCB, and the variation of the STM32WBA65. Of course, depending on the components manufacturer and the specification of the PCB, these components values can change after mandatory optimisation.

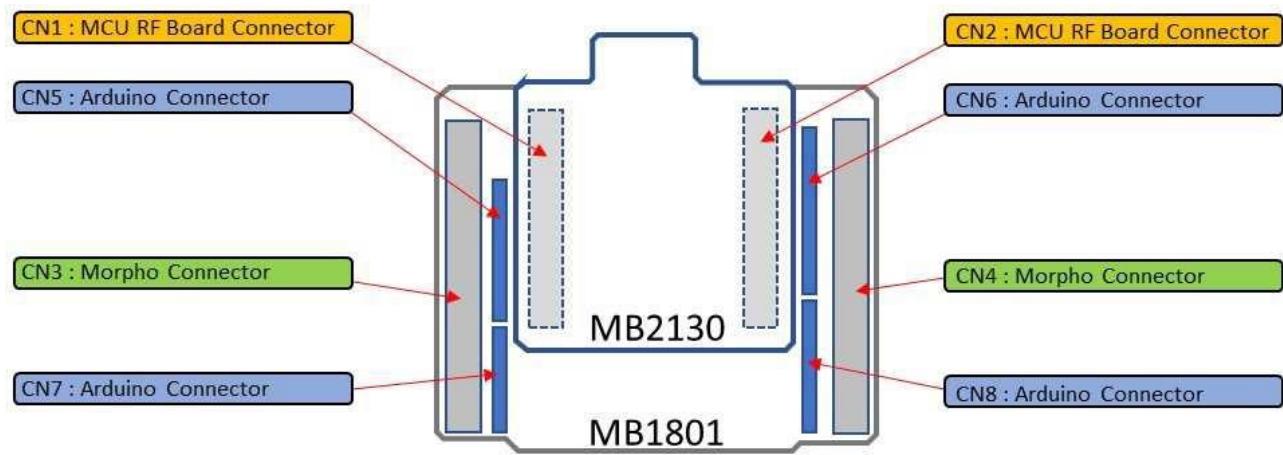
Figure 9 RF I/O stage



6.13

Connectors naming

Figure 10 Connectors location and naming

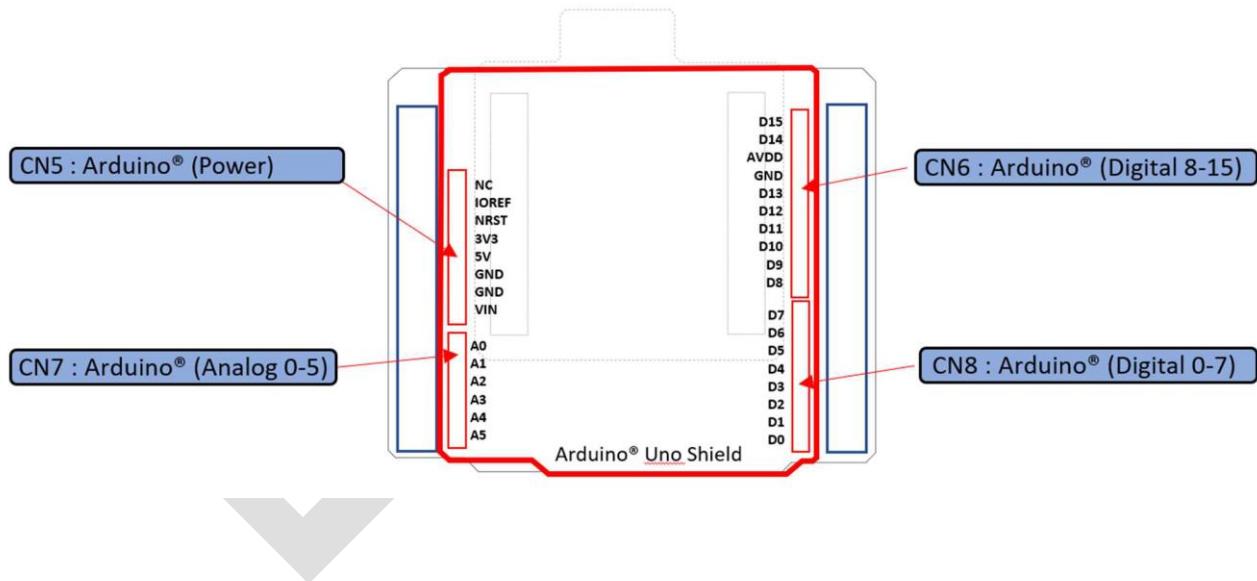


6.14 ARDUINO® interface and pinout

6.14.1 Description

On the bottom side of the board, there is an ARDUINO® Uno V3 extension socket. It is built around four standard connectors (CN5, CN6, CN7, and CN8). Most shields designed for ARDUINO® can fit with the Discovery kits to offer flexibility in small form factor applications.

Figure 11 ARDUINO® Uno connectors and ARDUINO® shield location



6.14.2 Operating voltage

The ARDUINO® Uno V3 connectors support 5 V, 3.3 V, and VDD for I/O compatibility.

Caution: Do not supply 3.3 V or 5 V from the ARDUINO® shield. Supplying 3.3 V or 5 V from the ARDUINO® shield might damage the Nucleo board.

Furthermore, if it is necessary to supply the Nucleo board by the ARDUINO® connector, a dedicated pin is available. VIN allows supplying the board directly. To use this feature, refer to [Section 7.1.2 7 to 12 V power supply](#).

6.14.3 ARDUINO® pinout

Figure 20 and 20 shows the position of the ARDUINO® shield when it is plugged into NUCLEO-WBA65RI. The pinout shown in Figure 22 corresponds to standard ARDUINO® naming. To see the correspondence with the STM32, refer to Table 9.

Figure 12 ARDUINO® connectors pinout

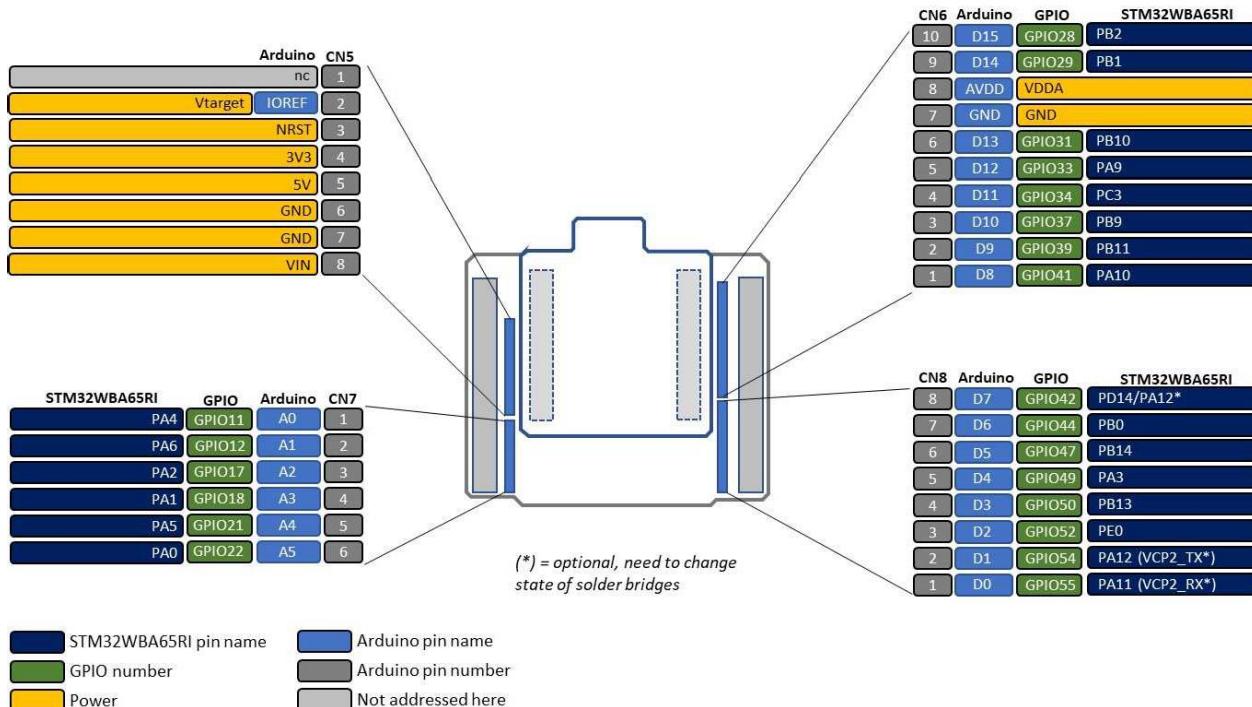


Table 9. Pinout of the ARDUINO® connectors

Connector	Pin number	Signal name	STM32 port	Comment
CN5	1	NC	-	NC (reserved for tests)
	2	3V3 (IOREF)	-	IOREF
	3	NRST	NRST	NRST
	4	3V3	-	3V3
	5	5V	-	5V
	6	GND	-	GND
	7	GND	-	GND
	8	VIN	-	External supply input (+12Vmax)
CN7	1	A0	PA4	ADC4_IN5
	2	A1	PA6	ADC4_IN3
	3	A2	PA2	ADC4_IN7
	4	A3	PA1	ADC4_IN8
	5	A4	PA5	ADC4_IN4
	6	A5	PA0	ADC4_IN9
CN8	1	ARD_D0	PA11	USART2_RX ⁽¹⁾
	2	ARD_D1	PA12	USART2_TX ⁽¹⁾
	3	ARD_D2	PE0	GPIO/TIM16_CH1
	4	ARD_D3	PB13	GPIO/TIM3_CH4
	5	ARD_D4	PA3	GPIO/TIM16_CH1N
	6	ARD_D5	PB14	GPIO/TIM3_CH3
	7	ARD_D6	PB0	GPIO/TIM1_CH3N
	8	ARD_D7	PD14/PA12 ⁽¹⁾	GPIO/TIM4_CH3/TIM1_CH2
CN6	1	ARD_D8	PA10	GPIO/TIM3_CH1 ⁽¹⁾
	2	ARD_D9	PB11	GPIO/TIM1_CH1
	3	ARD_D10	PB9	SPI2_NSS
	4	ARD_D11	PC3	SPI2_MOSI
	5	ARD_D12	PA9	SPI2_MISO
	6	ARD_D13	PB10	SPI2_SCK/16_BKIN
	7	GND	-	GND
	8	AVDD	-	VDDA
	9	ARD_D14	PB1	I2C1_SDA/I2C3_SDA
	10	ARD_D15	PB2	I2C1_SCL/I2C3_SCL

1. Optional need to change the state of solder bridges.

6.15 ST Morpho interface and pinout

6.15.1 Description

The ST morpho connectors (CN3 and CN4) are male pin headers accessible on both sides of the board. All signals and power pins of the MCU are available on the ST morpho connectors. An oscilloscope, logical analyzer, or voltmeter can also probe these connectors.

6.15.2 Morpho pinout

Figure 13 Pinout of ST morpho connectors

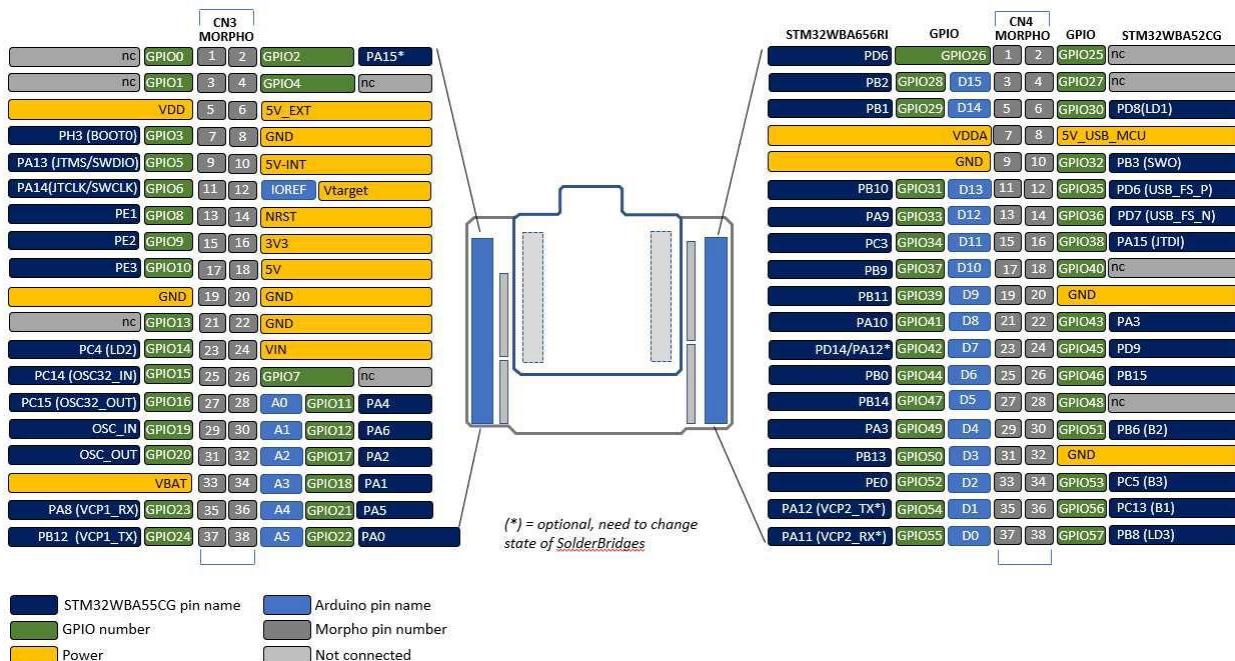


Table 10. Pinout of the ST morpho connectors

CN3				CN4			
Pin number	STM32WBA65RI pin name	Pin number	STM32WBA65RI pin name	Pin number	STM32WBA65RI pin name	Pin number	STM32WBA65RI pin name
1	NC	2	PA15 ⁽¹⁾	1	PD6	2	NC
3	NC	4	NC	3	PB2	4	NC
5	VDD	6	5V_EXT	5	PB1	6	PD8
7	BOOT0	8	GND	7	VDDA	8	5V_USB MCU ⁽²⁾
9	PA13	10	NC	9	GND	10	PB3/SWO
11	PA14	12	IOREF	11	PB10	12	PD6(USB_FS_P)
13	NC	14	NRST	13	PA9	14	PD7(USB_FS_N)
15	NC	16	3V3	15	PC3	16	PA15 (JTDI)
17	NC	18	5V	17	PB9	18	NC
19	GND	20	GND	19	PB11	20	GND
21	NC	22	GND	21	PA10	22	PA3
23	PC4	24	VIN	23	PD14/PA12 ⁽¹⁾	24	PD9
25	PC14	26	NC	25	PB0	26	PB15
27	PC15	28	PA4	27	PB14	28	NC
29	OSC_IN	30	PA6	29	PA3	30	PB6
31	OSC_OUT	32	PA2	31	PB13	32	GND
33	VBAT	34	PA1	33	PE0	34	PC5
35	PA8	36	PA5	35	PA12(VCP2_TX) ⁽¹⁾	36	PC13
37	PB12	38	PA0	37	PA11(VCP2_RX) ⁽¹⁾	38	PB8

1. *Optional, need to change the state of solder bridges.*
2. *Not available on NUCLEO-WBA65RI (Mezzanine Board variant: "MB1801-NoUSB")*

6.16 MCU RF board interface and pinout

6.16.1 Description

The ST-MCU RF board connectors (CN1 and CN2) are accessible on the top side of the board. They are used to plug the MCU RF board into the mezzanine board.

6.16.2 MCU RF board pinout

Figure 14 Pinout of the MCU RF board connectors

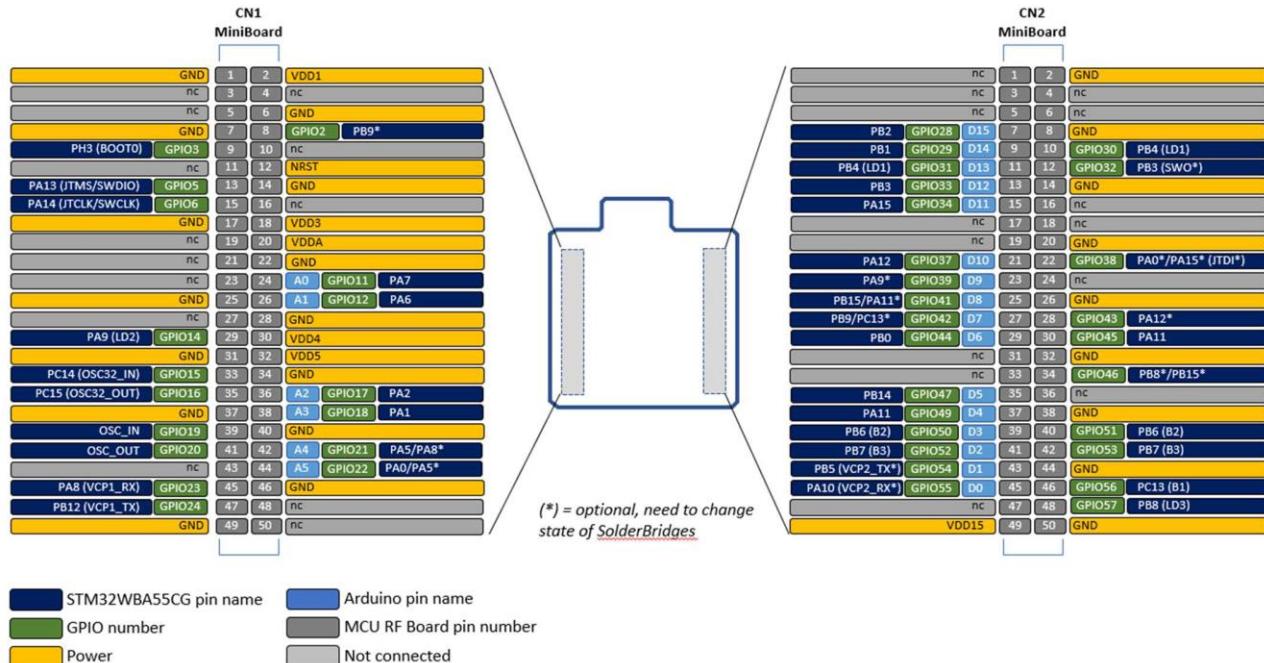


Table 11. Pinout of the MCU RF board connectors

CN1				CN2			
Pin number	STM32WBA65RI pin name	Pin number	STM32WBA65RI pin name	Pin number	STM32WBA65RI pin name	Pin number	STM32WBA65RI pin name
1	GND	2	VDD1	1	NC	2	GND
3	NC	4	NC	3	NC	4	NC
5	NC	6	GND	5	NC	6	NC
7	GND	8	PB9 ⁽¹⁾	7	PB2	8	GND
9	BOOT0	10	NC	9	PB1	10	PB4
11	NC	12	NRST	11	PB4	12	PB3/SWO ⁽¹⁾
13	PA13	14	GND	13	PB3	14	GND
15	PA14	16	NC	15	PA15	16	NC
17	GND	18	VDD3	17	NC	18	NC
19	NC	20	VDDA	19	NC	20	GND
21	NC	22	GND	21	PA12	22	PA0 ⁽¹⁾ /PA15 ⁽¹⁾ /JTDI ⁽¹⁾
23	NC	24	PA7	23	PA9 ⁽¹⁾	24	NC
25	GND	26	PA6	25	PB15/PA11 ⁽¹⁾	26	GND
27	NC	28	GND	27	PB9/PC13 ⁽¹⁾	28	PA12 ⁽¹⁾
29	PA9	30	VDD4	29	PB0	30	PA11
31	GND	32	VDD5	31	NC	32	GND
33	PC14	34	GND	33	NC	34	PB8 ⁽¹⁾ /PB15 ⁽¹⁾
35	PC15	36	PA2	35	PB14	36	NC
37	GND	38	PA1	37	PA11	38	GND
39	OSC_IN	40	GND	39	PB6	40	PB6
41	OSC_OUT	42	PA5/PA8 ⁽¹⁾	41	PB7	42	PB7
43	NC	44	PA0/PA5 ⁽¹⁾	43	PB5	44	GND
45	PA8	46	GND	45	PA10	46	PC13
47	PB12	48	NC	47	NC	48	PB8
49	GND	50	NC	49	VDD15	50	GND

1. Optional, need to change the state of solder bridges.

6.17 ETM 20 connector pinout

6.17.1 Description

On the MCU RF Board, there is a footprint for direct debug. This is an ETM 20 connector. By default, the ETM connector (CN4) is not assembly. On the MB2130 ETM trace is available. In order to perform ETM trace, it is necessary to sold CN4 connector(FTSH-110-01-L-DV from Samtec can be used.).

For high speed trace, the resistors R5, R6, R7, R8 and R9 needs to be removed.

6.17.2 ETM 20 pinout

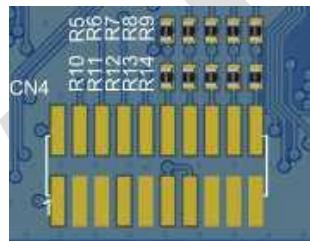


Table 12. Pinout of the ETM 20 (CN4 of the MCU RF board)

ETM20 #	Pin description	Type
1	VDD	Power supply
2	ETM.SWDIO	SWD Data
3	GND	Ground
4	ETM.SWCLK	SWD Clock
5	GND	Ground
6	ETM.SWO	SWO
7	NC	Not connected
8	ETM.JTDI	JTDI
9	GND	Ground
10	NRST	RESET signal active low
11	NC	Not connected
12	ETM.CLK	ETM Clock
13	NC	Not connected
14	ETM.D0	ETM Data0
15	GND	Ground
16	ETM.D1	ETM Data1
17	GND	Ground
18	ETM.D2	ETM Data3
19	GND	Ground
20	ETM.D3	ETM Data3

7. MB3120A product information

7.1 Product marking

The stickers located on the top or bottom side of all PCBs provide product information:

- First sticker: product order code and product identification, generally placed on the main board featuring the target device. Example:

Product order code
Product identification

- Second sticker: board reference with revision and serial number, available on each PCB. Example:

MBxxxx-Variant-yzz sywxxxxxx	
---------------------------------	---

On the first sticker, the first line provides the product order code, and the second line the product identification.

On the second sticker, the first line has the following format: "*MBxxxx-Variant-yzz*", where "*MBxxxx*" is the board reference, "*Variant*" (optional) identifies the mounting variant when several exist, "*y*" is the PCB revision, and "*zz*" is the assembly revision, for example B01. The second line shows the board serial number used for traceability.

Parts marked as "*ES*" or "*E*" are not yet qualified and therefore not approved for use in production. ST is not responsible for any consequences resulting from such use. In no event will ST be liable for the customer using any of these engineering samples in production. ST's Quality department must be contacted prior to any decision to use these engineering samples to run a qualification activity.

"*ES*" or "*E*" marking examples of location:

- On the targeted STM32 that is soldered on the board (for an illustration of STM32 marking, refer to the STM32 datasheet *Package information* paragraph at the www.st.com website).
- Next to the evaluation tool ordering part number that is stuck, or silk-screen printed on the board.

Some boards feature a specific STM32 device version, which allows the operation of any bundled commercial stack/library available. This STM32 device shows a "*U*" marking option at the end of the standard part number and is not available for sales.

To use the same commercial stack in their applications, the developers might need to purchase a part number specific to this stack/library. The price of those part numbers includes the stack/library royalties.

8. NUCLEO-WBA65RI product history

Table 13. Product history

Order code	Product identification	Product details	Product change description	Product limitations
NUCLEO-WBA65RI	EDK32WBA65RI\$DR4	MCU: STM32WBA65RIU6 silicon revision "Z" Boards: <ul style="list-style-type: none">• MB1801-USB-D01 (Mezzanine board)• MB2130-WBA65RI-A02 (MCU RF board)	Initial revision	No limitation

8.1 Boards revision history

Table 14. Board revision history

Board reference	Board variant and revision	Board change description	Board limitations
MB1801 (Mezzanine board)	MB1801-USB-D01	Initial revision	No limitation
MB2130 (MCU RF board)	MB2130-WBA65RI-A02	Initial revision	No limitation

9. Federal Communications Commission (FCC) and ISED Canada

9.1 FCC Compliance Statement

Identification of products: MB2130A

FCC ID: YCP-MB213000

Part 15.19

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.

Part 15.21

Any changes or modifications to this equipment not expressly approved by STMicroelectronics may cause harmful interference and void the user's authority to operate this equipment.

Part 15.105

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 instruction, 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 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 circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note: Use only shielded cable

To satisfy FCC RF Exposure requirements, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Responsible party (in the USA)

Francesco DODDO

AME AMS Sensors to Cloud Applications | Director

STMicroelectronics Inc

200 Summit Drive| Suite 405| Burlington| MA 01803

USA

Phone Number: +1 781 472 963

Modular integration

- Applicable FCC rules: This module has been approved under FCC part 15C 15.247 in the frequency range 2402-2480MHz. This modular transmitter is only FCC authorized for this specific rule part.
- Specific operational use conditions:
 - The module is not intended to OEM installation.
- Limited module procedures are not applicable to this application.
- Trace antenna: Not applicable (PCB antenna fitted on module)
- List of antenna type approved: Not applicable (PCB antenna fitted on module)
- End Product Labeling: The final end product must be labeled in a visible area with the following:
“Contains Transmitter Module FCC ID: YCP-MB213000”
- End Product User's Manual: The user manual for end users must include the following information in a prominent location:
To satisfy FCC RF Exposure requirements, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Additional testing requirements:
 - If testing of the host product with this transmitter installed and operating is necessary (to verify that the host product meets all the applicable FCC rules), a test mode for this specific module is available.
 - The host product shall be compliant to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. (For example, Part 15 Subpart B)

9.2 ISED Compliance Statement

Identification of products: MB2130A

IC: 8976A-MB213000

Compliance Statement

Notice: This device complies with ISED Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Déclaration de conformité

Avis: Le présent appareil est conforme aux CNR d'ISDE Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF exposure statement

This device complies with ISED radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme aux niveaux limites d'exigences d'exposition RF aux personnes définies par ISDE. L'appareil doit être installé afin d'offrir une distance de séparation d'au moins 20cm avec les personnes et ne doit pas être installé à proximité ou être utilisé en conjonction avec une autre antenne ou un autre émetteur.

Modular integration

- Applicable ISED-CANADA rules: This module has been approved under RSS-247 in the frequency range 2402-2480MHz. This modular transmitter is only FCC authorized for this specific rule part.
- Specific operational use conditions:
 - The module is not intended to OEM installation.
- Limited module procedures are not applicable to this application.
- Trace antenna: Not applicable (PCB antenna fitted on module)
- List of antenna type approved: Not applicable (PCB antenna fitted on module)
- End Product Labeling: The final end product must be labeled in a visible area with the following:
"Contains Transmitter Module IC: 8976A-MB213000"
- End Product User's Manual: The user manual for end users must include the following information in a prominent location:
To satisfy ISED-Canada RF Exposure requirements, a separation distance of 20cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at a closer distance than this is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Additional testing requirements:
 - If testing of the host product with this transmitter installed and operating is necessary (to verify that the host product meets all the applicable ISED rules), a test mode for this specific module is available.
 - The host product shall be compliant to any other ISED rules that apply to the host not covered by the modular transmitter grant of certification. (For example, ICES-003)

Intégration du module

- Règles ISDE-CANADA applicables : Ce module a été approuvé suivant la norme RSS-247 dans la gamme de fréquences 2402-2480 MHz. Cet émetteur modulaire est uniquement autorisé par ISDE pour cette partie de règle spécifique.
- Conditions opérationnelles spécifiques d'utilisation :
 - Le module n'est pas destiné à l'installation OEM.
- Les procédures de module limité ne sont pas applicables à cette application.
- La conception de la piste d'antenne : Non applicable (antenne intégré sur le PCB)
- Liste des types d'antennes approuvés : Non applicable (antenne intégré sur le PCB)
- Étiquetage du produit final : Le produit final doit être étiqueté dans une zone visible avec les éléments suivants :
 - « Contient IC : 8976A-MB213000 »
- Manuel de l'utilisateur du produit final : le manuel de l'utilisateur destiné aux utilisateurs finaux doit inclure les informations suivantes dans un endroit bien en vue :

Pour satisfaire aux exigences d'ISDE-Canada en matière d'exposition aux RF, une distance de séparation de 20 cm ou plus doit être maintenue entre l'antenne de cet appareil et les personnes pendant le fonctionnement. Pour garantir la conformité, il n'est pas recommandé d'opérer à une distance plus courte que celle-ci. Cet émetteur ne doit pas être colocalisé ou fonctionner en conjonction avec une autre antenne ou émetteur.
- Exigences de tests supplémentaires :
 - Si un test du produit hôte avec cet émetteur installé et opérationnel est nécessaire (pour vérifier que le produit hôte répond à toutes les règles applicables d'ISDE-Canada), un mode de test pour ce module spécifique est disponible.
 - Le produit hôte est doit respecter de toutes les autres règles ISDE applicables à l'hôte non couvertes par l'octroi de certification de l'émetteur modulaire. (Par exemple, ICES-003)

10. RED Compliance Statement

Déclaration de conformité CE simplifiée

STMicroelectronics déclare que l'équipement radioélectrique du type " MB2130A " est conforme à la directive 2014/53/UE.

Simplified UE compliance statement

Hereby, STMicroelectronics declares that the radio equipment type "MB2130A" is in compliance with Directive 2014/53/EU.

11. UKCA Compliance Statement

SIMPLIFIED UK DECLARATION OF CONFORMITY

Hereby, the manufacturer STMicroelectronics, declares that the radio equipment type "MB2130A" is in compliance with The UK Radio Equipment Regulations 2017 (UK S.I. 2017 No. 1206). The full text of the UK declaration of conformity is available at the following internet address: www.st.com

DRAFT

12. Revision history

Table 15. Document revision history

Date	Revision	Changes
13-Dec-2024	1	Initial release.

DRAFT

Contents

1. Features	2
2. Ordering information	3
3. Development environment	4
3.1 System requirements	4
3.2 Development toolchains	4
4. Conventions	5
5. Safety recommendations	6
5.1 Targeted audience	6
5.2 Handling the board.....	6
6. Hardware layout and configuration	7
6.1 Power supply.....	10
6.1.1 General description	10
6.2 output power configuration.....	11
6.3 Clock sources.....	13
7.2.1 HSE clock references	13
7.2.2 LSE clock references.....	13
6.4 Reset sources	14
6.5 Embedded STLINK-V3EC	14
7.4.1 Drivers	14
7.4.2 STLINK-V3EC firmware upgrade.....	15
7.4.3 STLINK-V3EC USB connector (CN15).....	15
7.4.4 Virtual COM port USART1 (VCP1)	16
7.4.6 Level shifter.....	16
6.6 LEDs	17
6.7 Push-buttons.....	18
7.6.1 Description	18
7.6.2 Reset push-button.....	18
7.6.3 User push-buttons.....	18
6.8 RF I/O stage	19
6.9 Connectors naming.....	20

6.10	ARDUINO® interface and pinout.....	20
7.9.1	Description.....	20
7.9.2	Operating voltage.....	21
7.9.3	ARDUINO® pinout.....	21
6.11	ST Morpho interface and pinout	23
7.10.1	Description.....	23
7.10.2	Morpho.....	23
6.12	MCU RF board interface and pinout.....	25
7.11.1	Description.....	25
7.11.2	MCU RF board pinout.....	25
6.13	ETM 20 connector pinout.....	27
7.12.1	Description.....	27
7.12.2	ETM 20 pinout.....	27
7.	NUCLEO-WBA65RI product information	29
7.1	Product marking.....	29
8.	NUCLEO-WBA65RI product history.....	30
8.1	Boards revision history	30
9.	Federal Communications Commission (FCC) and ISED Canada.....	31
9.1	FCC Compliance Statement.....	31
9.2	ISED Compliance Statement.....	32
10.	RED Compliance Statement	33
11.	UKCA Compliance Statement	33
12.	Revision history	34
List of tables.....		37
List of figures		37

List of tables

List of figures

figure 1 NUCLEO-WBA65RI global view	1
Figure 2 Hardware block diagram.....	7
Figure 3 NUCLEO-WBA65RI PCB top view.....	8
Figure 7 NUCLEO-WBA65RI (MB2130A) mechanical dimensions (in millimetres)	9
Figure 8 STM32WBA65RI power tree.....	10
Figure 16 USB composite device.....	14
Figure 17 LEDs location	17
Figure 18 Push buttons location	18
Figure 19 RF I/O stage.....	19
Figure 20 Connectors location and naming	20
Figure 21 ARDUINO® Uno connectors and ARDUINO® shield location.....	20
Figure 22 ARDUINO® connectors pinout	21
Figure 23 Pinout of ST morpho connectors	23
Figure 24 Pinout of the MCU RF board connectors	25

IMPORTANT NOTICE – READ CAREFULLY

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgment.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, refer to www.st.com/trademarks. All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2023 STMicroelectronics – All rights reserved

DRAFT