Discovery kit with STM32WBA55CG MCU

Introduction

The STM32WBA55G-DK1 Discovery kit is a complete demonstration and development platform for the STM32WBA55CGU7 microcontroller, featuring an Arm® Cortex®-M33 core with Arm® TrustZone® and mainline security extension, 1 Mbyte of flash memory, and 128 Kbytes of SRAM, as well as smart peripheral resources.

The STM32WBA55G-DK1 Discovery kit embeds a powerful and ultra-low-power radio compliant with the Bluetooth® Low Energy SIG resources. This Discovery kit enables a wide diversity of applications by exploiting low-power communication, the Bluetooth® SIG isochronous channel feature related to audio capability for Bluetooth® Low Energy Audio, Matter as Border Router, and Zigbee®.

The support for ARDUINO® Uno V3 and STMod+ connectivity provides expansion capabilities with a large choice of specialized add-on boards.

The STM32WBA55G-DK1 Discovery kit integrates an STLINK-V3EC embedded in-circuit debugger and programmer for the STM32 microcontroller with a USB Virtual COM port bridge and comes with the STM32CubeWBA MCU Package, which provides an STM32 comprehensive software HAL library as well as various software examples.

The STM32WBA55G-DK1 Discovery kit leverages the STM32WBA series key assets to enable prototyping for a variety of wireless, low-energy applications in fitness, metering, industrial, or medical, with state-of-the-art energy efficiency, and higher security.

Figure 1. STM32WBA55G-DK1 top view

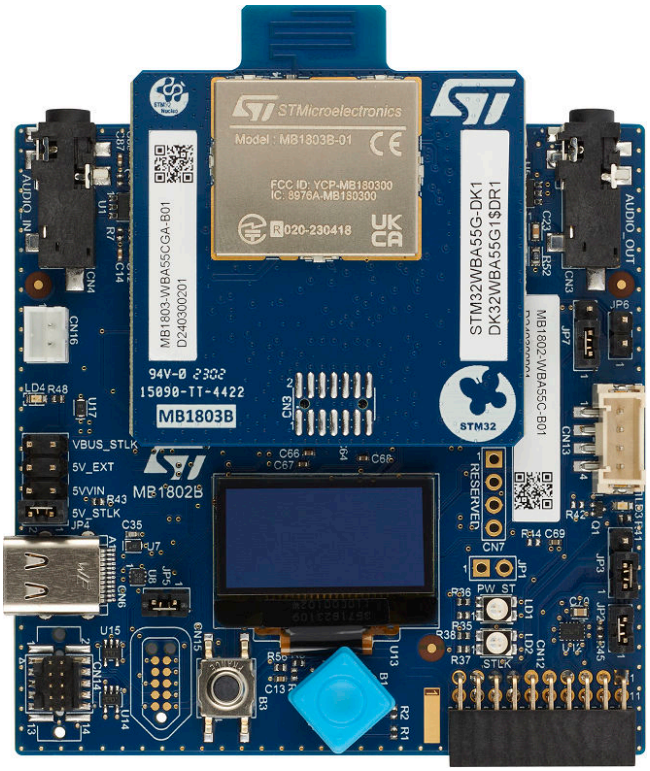
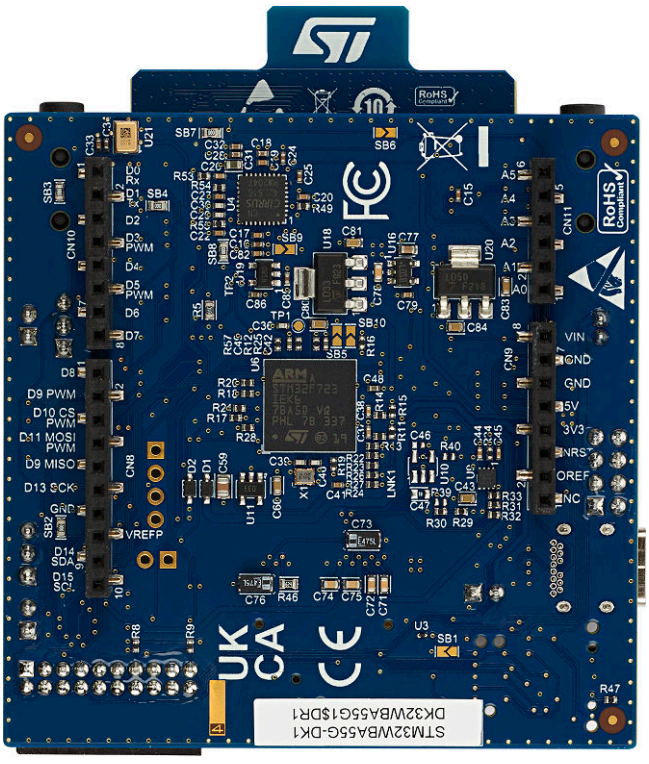


Figure 2. STM32WBA55G-DK1 bottom view



Pictures are not contractual.

1 Features

- Ultra-low-power wireless STM32WBA55CGU7 microcontroller based on the Arm® Cortex®-M33 core, featuring 1 Mbyte of flash memory and 128 Kbytes of SRAM in a UFQFPN48 package
- MCU RF board (MB1803):
  - 2.4 GHz RF transceiver supporting Bluetooth® specification v5.4
  - Bluetooth® Low Energy specification supporting LE Audio
  - Arm® Cortex®-M33 CPU with Arm® TrustZone®, MPU, DSP, and FPU
  - Integrated PCB antenna
- One digital microphone
- OLED display
- One user LED
- User joystick with 4-direction control and selector button
- Reset push-button
- Board connectors:
  - ARDUINO® Uno V3 expansion connector
  - STMod+ expansion connector
  - Grove
  - USB Type-C®
  - Battery
  - Two 3.5 mm stereo jack sockets for input and output with microphone
  - MIPI10
  - Tag-Connect™ 10-pin footprint
- Flexible power-supply options: ST-LINK USB V_{BUS} or external sources
- On-board STLINK-V3EC debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
- Comprehensive free software libraries and examples available with the STM32CubeWBA MCU Package
- Support of a wide choice of Integrated Development Environments (IDEs) including IAR Embedded Workbench®, MDK-ARM, and STM32CubeIDE

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 STM32WBA55G-DK1 Discovery kit, refer to Table 1. Additional information is available from the datasheet and reference manual of the target STM32.

Table 1. Ordering information

Order code	Board reference	Target STM32
STM32WBA55G-DK1	• MB1802(1) • MB1803(2)	STM32WBA55CGU7

1. *Mezzanine board*
2. *MCU RF board*

2.1 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32XXXYYZ-DKT	Description	Example: STM32WBA55G-DK1
XXX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32WBA series
YY	MCU product line in the series	STM32WBA54/55 product line
Z	STM32 flash memory size: • G for 1 Mbyte	1 Mbyte
DK	Discovery kit	Discovery kit
T	Sequential number	First Discovery kit version

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 USB Type-C® 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.*

3.3 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 engineers, technicians, or students.

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:

- The connection pins on the board might be sharp. Be careful when handling the board to avoid hurting yourself
- This board contains static-sensitive devices. To avoid damaging it, handle the board in an ESD-proof environment.
- 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 might be damaged when shorted.
- Do not put any liquid on the board. Avoid operating the board close to water or at a high humidity level.
- Do not operate the board if dirty or dusty.

6 Quick start

This section describes how to start development quickly using STM32WBA55G-DK1.

To use the product, the user must accept the evaluation product license agreement from the www.st.com/epla webpage.

Before the first use, make sure that no damage occurred to the board during shipment:

- All components are firmly secured in their sockets.
- No component is loose in the board's carton.

STM32WBA55G-DK1 is an easy-to-use Discovery kit to evaluate and start development with an STM32 microcontroller in a UFQFPN48 package.

6.1 Getting started

Follow the sequence below to configure the STM32WBA55G-DK1 Discovery board and launch the demonstration application (refer to Figure 4 for component locations):

1. Check jumper positions on board: JP4 on 5V_STLK position, JP5 ON, JP7 ON [1-2], and JP6 OFF.
2. Connect the Discovery board with a USB Type-C® cable through the USB connector (CN6).
3. Connect a headset (optionally with microphone and 4-pin jack to enable bidirectional streams) on the 3.5-mm jack connector (CN3).
4. At startup, press the right direction on the joystick two times to start advertising.
5. Using a device compatible with Bluetooth® Low Energy audio unicast client role, like a smartphone supporting the low energy audio feature, connect to the unicast server and link up the available services. Once the unicast client is connected, start a streaming procedure, media playback, or call, to send audio to the unicast server. Ensure that the volume is up.
6. For further information, refer to the ST Bluetooth® Low Energy audio wiki pages.

7 Hardware layout and configuration

The STM32WBA55G-DK1 Discovery kit is designed around the STM32WBA55CGU7 in a UFQFPN48 package. The hardware block diagram in Figure 3 illustrates the connection between the MCU and peripherals, such as embedded ST-LINK, ARDUINO® Uno shields, STMod+ connector, digital microphones, audio codec, and OLED display. Figure 4 and Figure 5 help to locate these features on the Discovery board.

Figure 3. Hardware block diagram

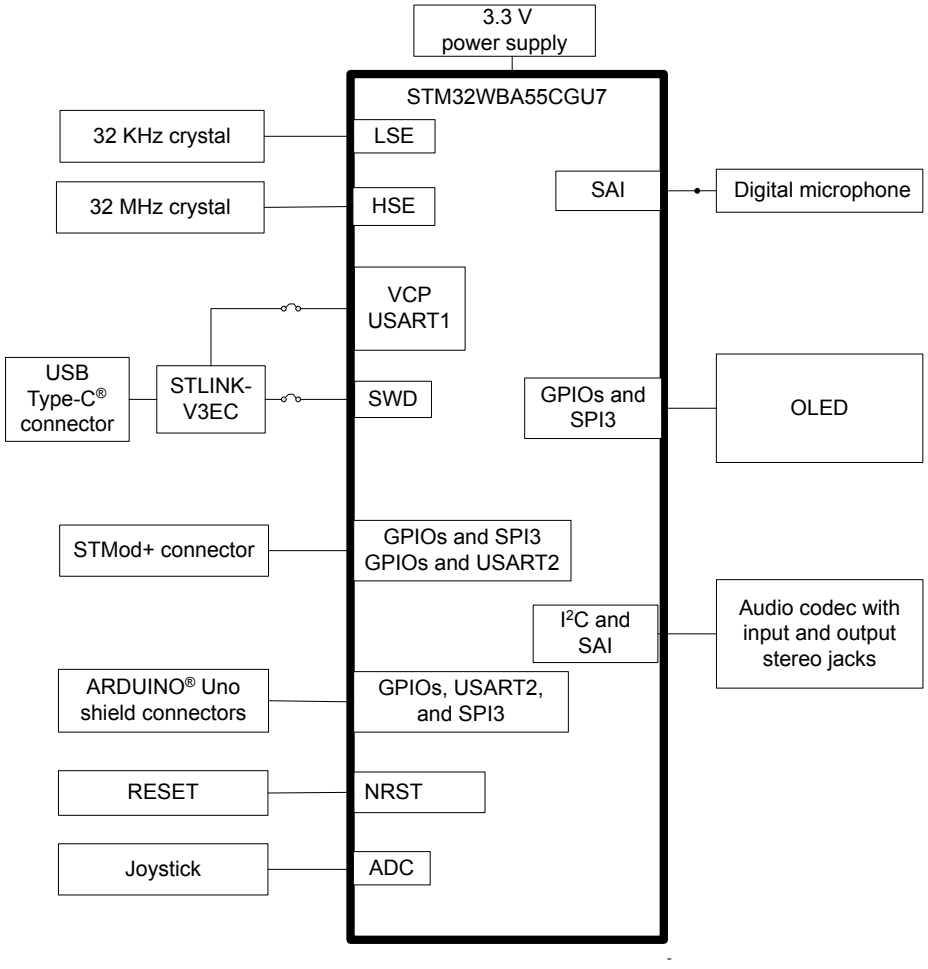


Figure 4. STM32WBA55G-DK1 Discovery kit IoT node board (top view)

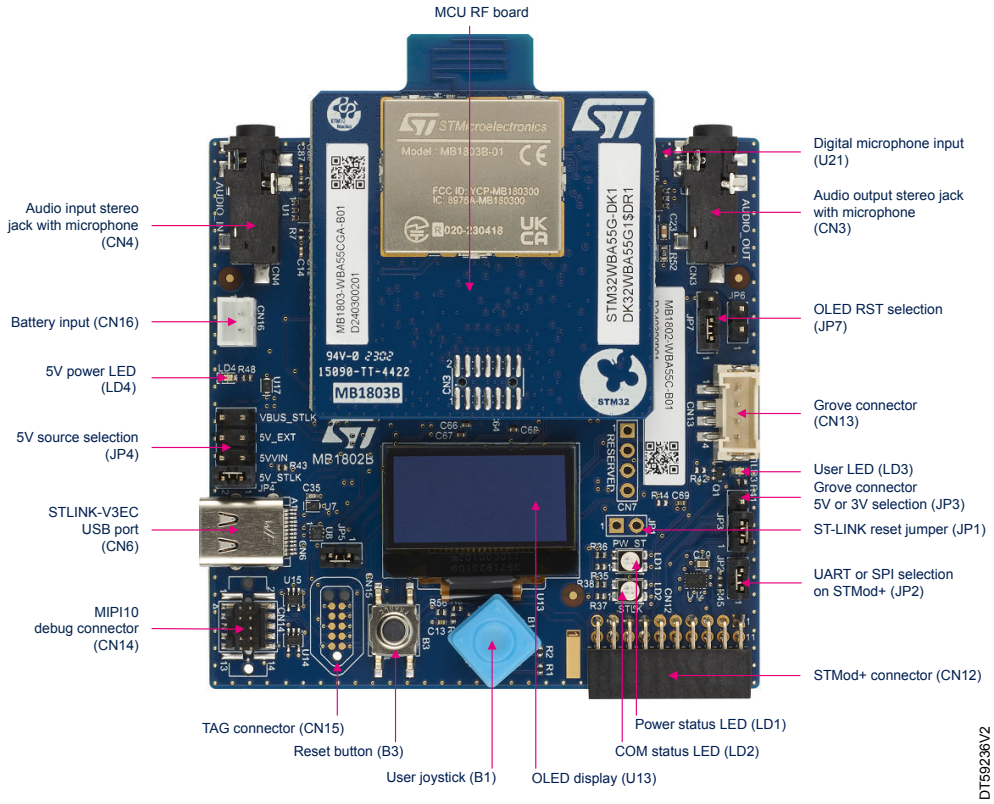


Figure 5. STM32WBA55G-DK1 Discovery kit IoT node (bottom view)

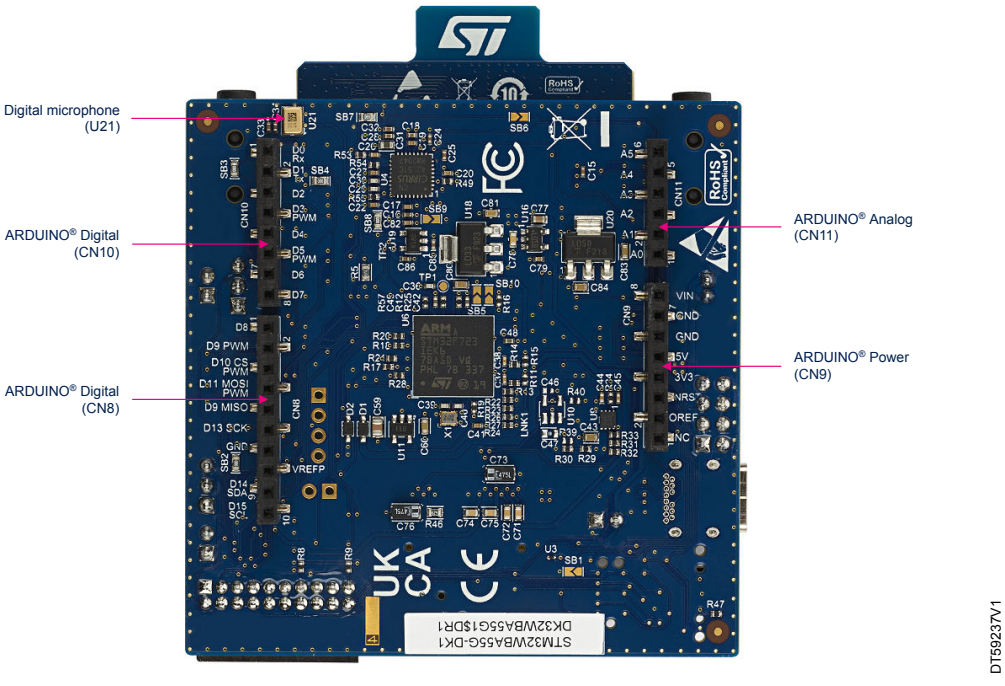
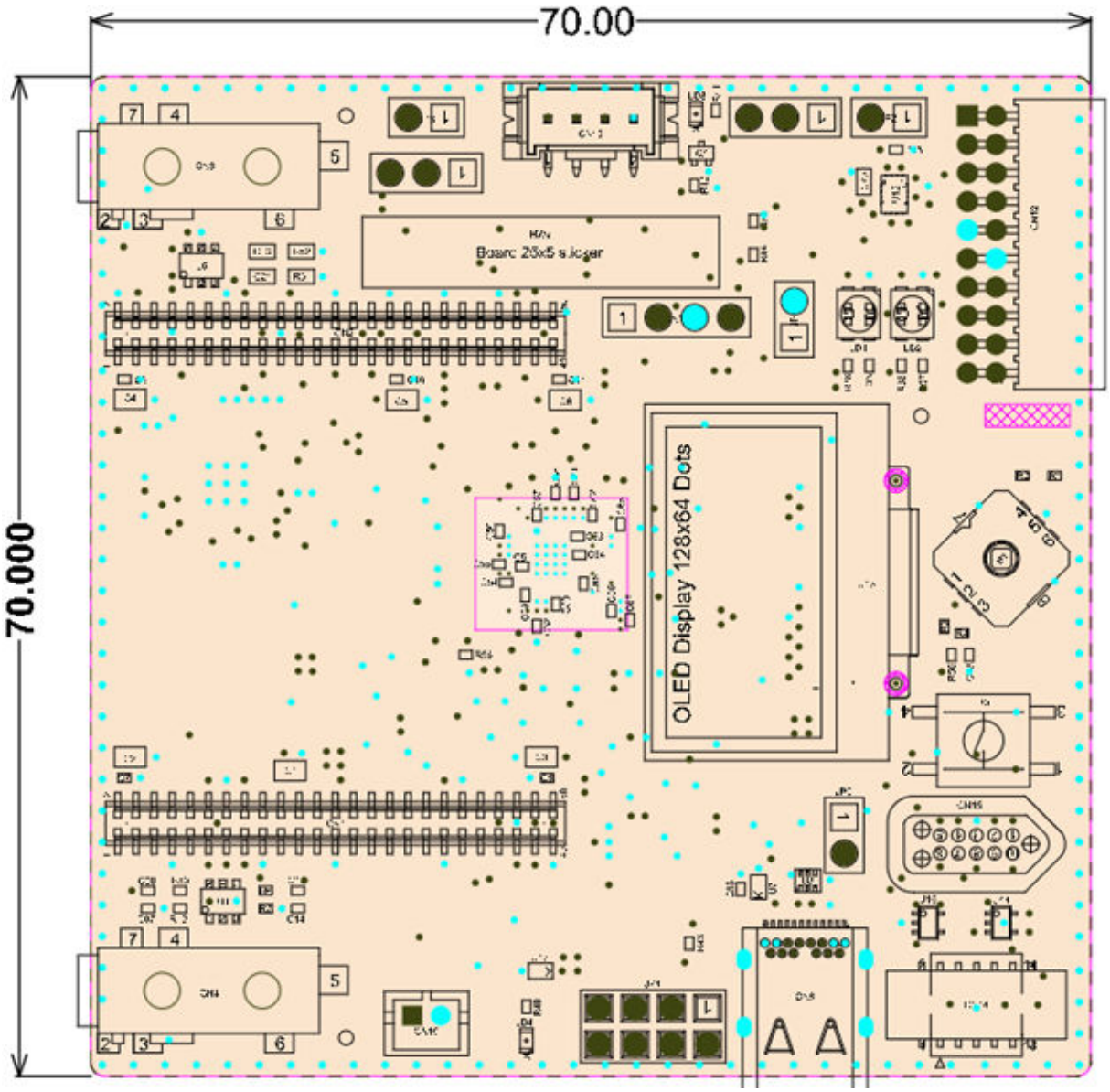


Figure 6. **STM32WBA55G-DK1 Discovery board mechanical drawing (top view, in millimeters)**



7.1 Embedded STLINK-V3EC

There are two different ways to program and debug the on-board STM32WBA55 MCU:

- The STLINK-V3EC programming and debugging tool is integrated into the STM32WBA55G-DK1 Discovery kit.
- The embedded STLINK-V3EC supports only SWD and VCP for STM32WBA55 devices. For information about debugging and programming features refer to the technical note *Overview of ST-LINK derivatives* (TN1235), which describes in detail all the STLINK-V3EC features.

For information about the debugging and programming with STLINK-V3EC, refer to the user manual *STLINK-V3SET debugger/programmer for STM8 and STM32* (UM2448).

Features supported on ST-LINK/V3EC:

- 5 V/500 mA power supplied by USB connector (CN6)
- USB 2.0 high-speed-compatible interface
- JTAG/SWD (Serial Wire Debug) with SWV (Serial Wire Viewer)
- 3 to 3.6 V application voltage on the JTAG/SWD interface and 5 V tolerant inputs
- MIPI10 compatible connector (CN14)
- Status COM LED (LD2) which blinks during communication with the PC (red by default)
- Fault LED (LD1) alerting on USB overcurrent (green, orange, or red)
- USB-C® overvoltage protection (U9) with current limitation

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

7.1.1 Drivers

The driver installation is not mandatory since Windows® 10 but if done, it allocates an ST-specific name to the ST-LINK COM port in the system device manager.

For detailed information on the ST-LINK USB drivers, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).

7.1.2 STLINK-V3EC firmware upgrade

The STLINK-V3EC embeds a firmware upgrade 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). Make sure to have the latest ST-LINK firmware version before using the STM32WBA55G-DK1 board. The latest version of this firmware is available from the *www.st.com* website.

For detailed information on the ST-LINK firmware upgrade, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).

7.1.3 Using an external debug tool to program and debug the on-board STM32

Set the embedded STLINK-V3EC in a high-impedance state: When the jumper JP1 (STLK_RST) is ON, the embedded STLINK-V3EC is put in Reset state and all GPIOs in high impedance, then you can connect the external debug tool on the debug connector (CN14).

Table 4. MIPI10 debug connector (CN14) pinout

MIPI10 pin	CN14	Function
-	NC	Reserved
-	NC	Reserved
1	T_VCC	Target VCC
2	T_SWDIO	Target SWDIO using SWD protocol or target JTMS (T_JTMS) using JTAG protocol
3	GND	Ground
4	T_SWCLK	Target SWCLK using SWD protocol or target JCLK (T_JCLK) using JTAG protocol
5	GND	Ground
6	T_SWO	Target SWO using SWD protocol or target JTDO (T_JTMS) using JTAG protocol
7	T_JRCLK	Not used by SWD protocol, target JRCLK (T_JRCLK) using JTAG protocol, only for specific use
8	T_JTDI	Not used by SWD protocol, target JTDI (T_JTDI) using JTAG protocol, only for external tools
9	GNDdetect	Ground detection for plug indicator, used on SWD and JTAG neither
10	T_NRST	Target NRST using SWD protocol or target JTMS (T_JTMS) using JTAG protocol
-	T_VCP_RX	Target Rx used for VCP (must be UART dedicated to the bootloader
-	T_VCP_TX	Target Tx used for VCP (must be UART dedicated to the bootloader

The TAG connector is implemented on the STM32WBA55G-DK1 Discovery kit IoT node board. The TAG connector is a 10-pin footprint that supports SWD and JTAG modes.

Figure 7. TAG connector

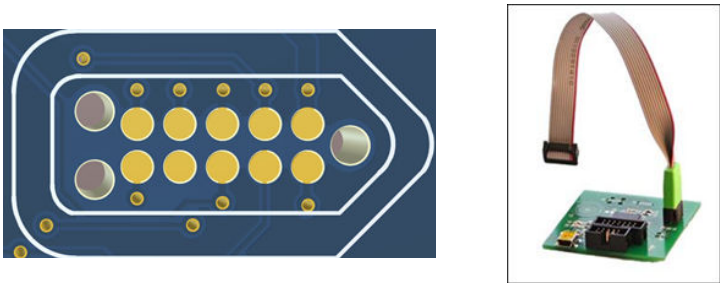


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Table 5. TAG footprint (CN15) pinout for TC2050-IDC-NL cable

CN15 pin	Signal	Function
1	3V3	Target power(2)
2	MCU.SWDIO	Target SWDIO using SWD protocol or target JTMS (T_JTMS) using JTAG protocol
3	GND	Ground
4	MCU.SWCLK	Target SWCLK using SWD protocol or target JTCK (T_JTCK) using JTAG protocol
5	GND	Ground It must be disconnected (SB1) if the debugger probe provides a power supply on this pin.
6	MCU.SWO	Target SWO using SWD protocol or target JTDO (T_JTDO) using JTAG protocol(3)
7	NC	NC(1)
8	MCU.JTDI	Not used by SWD protocol, target JTDI (T_JTDI) using JTAG protocol
9	JNTRST	JTAG reset
10	NRST	Target NRST using SWD protocol or target JTMS (T_JTMS) using JTAG protocol

1. *Not connected on this board*
2. *Output for this board*
3. *SWO is optional and required only for Serial Wire Viewer (SWV) trace.*

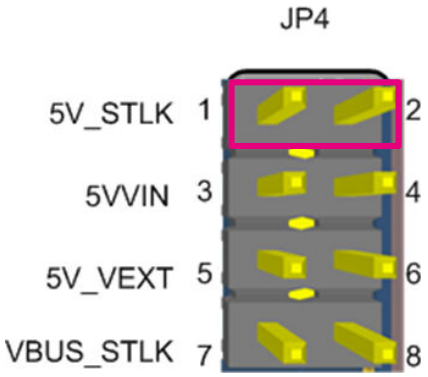
7.2 Power supply

The STM32WBA55G-DK1 Discovery kit IoT node board is designed to be powered by a 5 V DC power supply. It is possible to configure the Discovery board using a jumper on JP4 to use any of the following four sources for the power supply (5V_USB_STLK, 5V_VIN, 5V_EXT, and 5V_USB_CHGR). The user must only connect one source at a time.

5V_STLK

5V_STLK is a 5 V DC power with limitation from the STLINK-V3EC USB Type-C® connector (CN6). In that case, a jumper must be set on [1-2] to select the 5V_USB_STLK power source on the JP4 silkscreen (refer to Figure 8 below). This is the default setting. If the USB enumeration succeeds (as explained below), the 5V_STLK power is enabled, by asserting the T_PWR_EN signal (from STLINK-V3EC MCU). This pin is connected to a power controller TPS259535DSG, which powers the board. This power controller also features a current limitation to protect the PC, in case of a short circuit on board or if the USB port is unable to provide the necessary current.

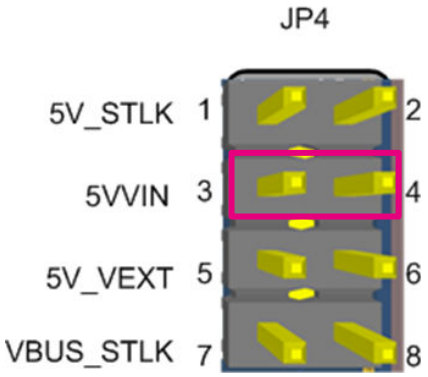
Figure 8. 5V_USB_STLK selection: JP4 [1-2]



5V_VIN

5V_VIN is the 7 to 12 V DC power from the ARDUINO® connector (CN9 pin 8) named VIN on the ARDUINO® connector silkscreen (the extension connectors for ARDUINO® Uno shields or daughterboards). In this case, a jumper must be set on [3-4] to select the 5V_VIN power source on the JP4 silkscreen (refer to Figure 9 below). In this case, the DC power can come from the power supply through the ARDUINO® battery shield (compatible with Adafruit® PowerBoost 500 shield).

Figure 9. 5V_VIN selection from CN17 (VIN): JP4 [3-4]



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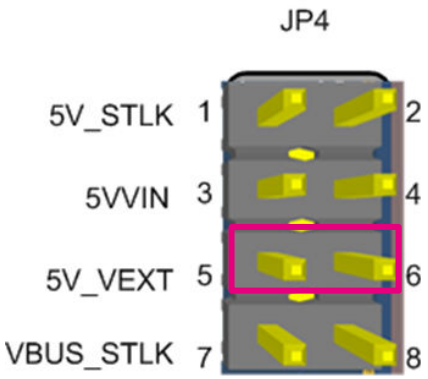
5V_EXT

5V_EXT is the 5 V DC power provided by an external source like a battery or regulator from the CN16 connector. In this case, a jumper must be set on [5-6] to select the 5V_EXT on the JP4 silkscreen (refer to Figure 10).

The product must be powered by a voltage source or auxiliary equipment that complies with EN 62368-1:2014+A11:2017

Figure 10. 5V_EXT selection: JP4 [5-6]



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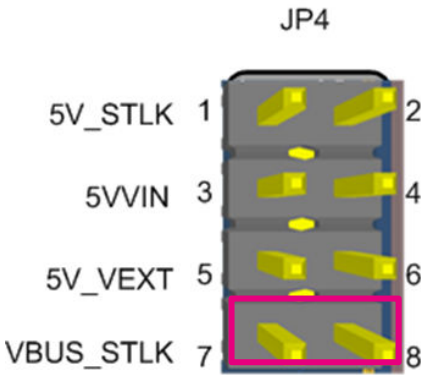
VBUS_STLK

5V_USB_CHGR is the DC power charger connected to the USB STLINK (CN6). Then, a jumper must be on [7-8] to select the 5V_USB_CHARGER power source on the JP4 silkscreen. In this case, if the STM32WBA55G-DK1 Discovery board is powered by an external USB charger then the debug is not available. If a PC is connected instead of the charger, then the limitation is no more effective and that might damage the PC.

Figure 11. 5V_USB_CHGR selection: JP4 [7-8]

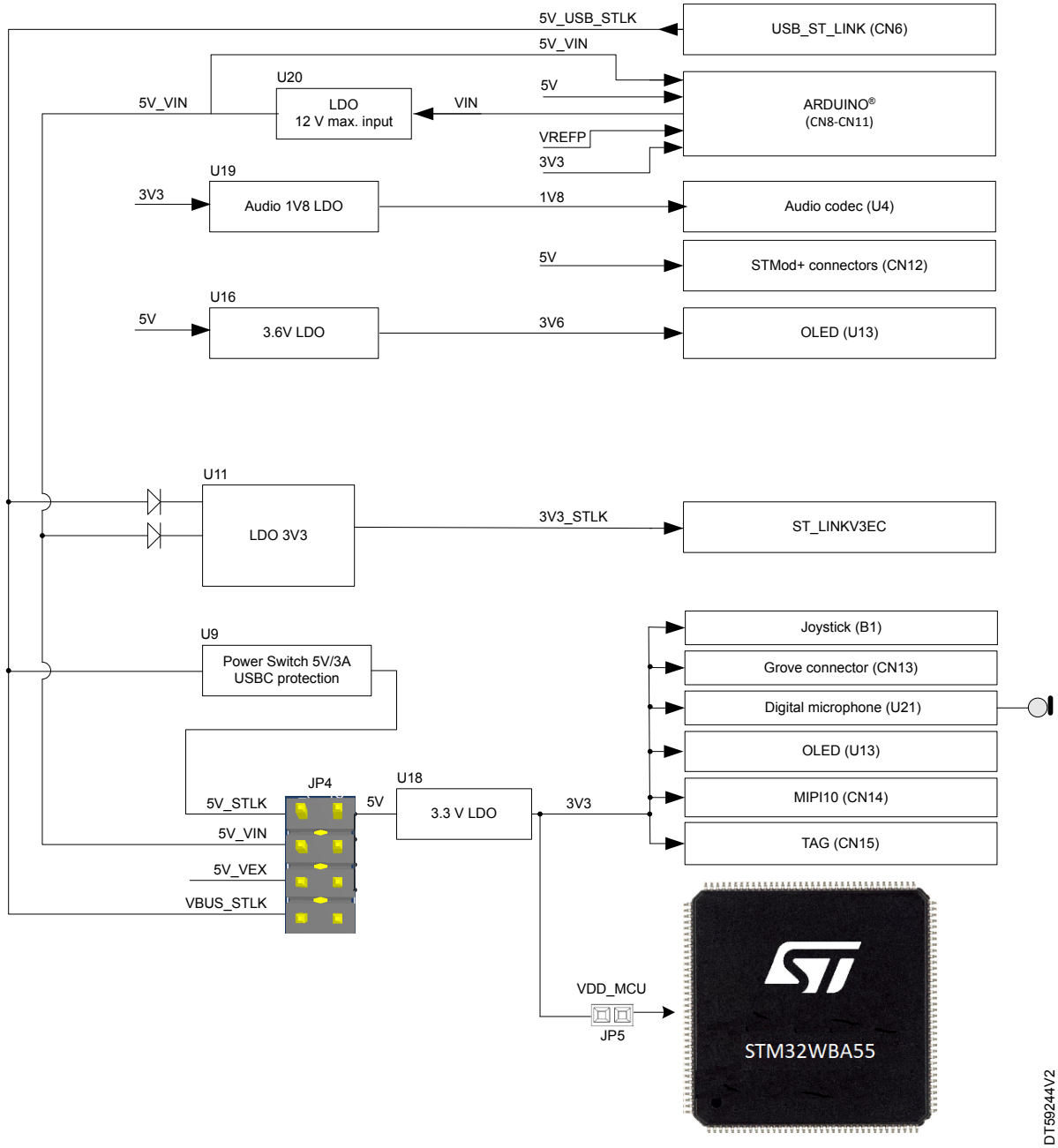


Note: If the board is powered by a USB charger, there is no USB enumeration, so the red LED (LD2) remains OFF permanently.

Caution: Do not connect a PC to the ST-LINK connector (CN6). The PC might be damaged. The green LED (LD1) is lit when 5V powers correctly the STM32WBA55G-DK1 Discovery board.

The power tree is the following one:

Figure 12. Power tree



7.3 Clock sources

7.3.1 HSE clock reference

A 32 MHz crystal oscillator is used as the high-speed clock (HSE) of the MCU. The HSE oscillator is trimmed during board manufacturing.

7.3.2 LSE clock reference

A 32.768 kHz crystal oscillator is used as the low-speed clock (LSE) of the MCU.

7.4 Reset sources

The reset signal of the STM32WBA55G-DK1 Discovery kit is active at a low level and the reset sources can come from:

- The reset push-button (B3),
- The CN9 pin3 of the ARDUINO® connector,
- The embedded STLINK-V3EC debugger,
- Or the MIPI10 and TAG interfaces.

7.5 Virtual COM port

The serial interface USART1 is directly available as a Virtual COM port of the PC, connected to the STLINK-V3EC USB connector (CN6).

7.6 Audio codec

There is a low-power stereo audio codec (U4) with a headphone amplifier, provided with STM32WBA55G-DK1. Input and output stereo jacks are also provided.

The MCU is connected to the audio codec using an I^2C interface for the control path (I2C3) and the SAI1 interface for the data path.

7.7 Onboard MEMS audio sensor omnidirectional digital microphone

A miniature high-performance low-power silicon digital microphone with a single-bit PDM output is available on this Discovery board and connected to the SAI interface.

7.8 Display

On the STM32WBA55G-DK1 Discovery board, an OLED display with a panel matrix of 128x64, 2000/1 contrast is provided on SPI3. Make sure that jumper JP7 is in the position [1-2] to select the OLED reset.

7.9 Buttons and LEDs

Joystick

A joystick is provided on the Discovery board with the position detected with an ADC.

Here are the positions with the associated ADC level to be detected:

Table 6. Document revision history

Position	Ratio	ADC4 channel 8
Select	0.00	0.00 V
Left	0.20	0.67 V
Down	0.40	1.32 V
Up	0.61	2.01 V
Right	0.80	2.65 V

The black button (B3) located on the top side is the reset of the STM32WBA55CGU7 microcontroller. Refer to Figure 4.

Table 7 gives the assignment of control ports to the LED indicators.

Table 7. Button and LED control port

Reference	Color	Name	Comment
B1	Blue	Joystick	User button with five positions
B3	Black	Reset	MCU reset
LD1	Tricolor (red, green, and orange)	PW_ST	Power status (refer to Section 7.1 for more detail)
LD2	Tricolor (red, green, and orange)	STLK	ST-LINK LED (refer to Section 7.1)
LD3	Blue	User LED	Driven by GPIO
LD4	Green	5V LED	5V available

7.10 ARDUINO® Uno V3 connector

CN8, CN9, CN10, and CN11 are female connectors (SMD component devices) compatible with the ARDUINO® standard. Most shields designed for ARDUINO® can fit the STM32WBA55G-DK1 Discovery board.

The ARDUINO® connectors on the Discovery board support the ARDUINO® Uno V3.

The I/Os of this STM32WBA55CGU7 microcontroller are 5 V tolerant, so no issue with ARDUINO® Uno compatibility.

Figure 13. ARDUINO® connector location (front view)

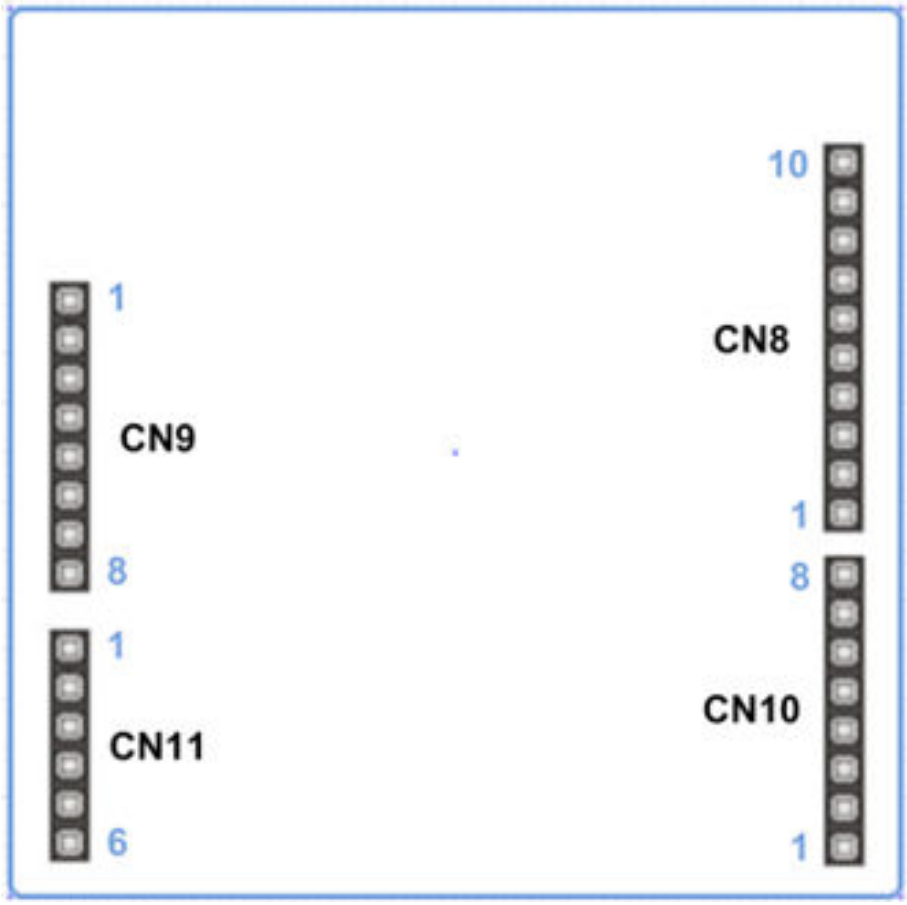


Table 8. **ARDUINO® connector pinout**

Left connectors				
Connector	**Pin number**	**Pin name**	**MCU pin**	**Function**
CN9 power	1	NC	-	-
	2	IOREF	-	3V3 reference
	3	NRST	NRST	System reset
	4	3V3	-	3V3
	5	5 V	-	5 V
	6	GND	-	Ground
	7	GND	-	Ground
	8	VIN	-	Power input
CN11 analog	1	A0	PA2	ADC
	2	A1	PA1	ADC
	3	A2	PA5	ADC
	4	A3	PB9	ADC
	5	A4	PA7	ADC/I2C3_SDA
	6	A5	PA6	ADC/I2C3_SCL

Right connectors				
Function	**MCU pin**	**Pin name**	**Pin number**	**Connector**
I2C3 SCL	PA6	SCL/D15	10	CN8 digital
I2C3 SDA	PA7	SDA/D14	9	
Reference voltage	-	AVDD	8	
Ground	-	GND	7	
SPI3_SCK/ LED3	PA0	SCK/D13	6	
SPI3_MISO	PB9	MISO/D12	5	
SPI3_MOSI/ TIM1_CH1	PB8	PWM/MOSI/D11	4	
SPI3_NSS/ TIM2_CH1	PA5	PWM/CS/D10	3	
TIM3_CH2	PA9	PWM/D9	2	
GPIO drives LD3 by setting SB2 ON	PB15	D8	1	
GPIO	PA12	D7	8	CN10 digital
TIM3_CH1	PA10	PWM/D6	7	
TIM1_CH2	PA15	PWM/D5	6	
GPIO	PC13	D4	5	
TIM1_CH1	PB3	PWM/D3	4	
GPIO	PB1	D2	3	
UART2_TX	PB0	TX/D1	2	
UART2_RX	PA11	RX/D0	1	

7.11 STMod+ connector (CN12)

On the STM32WBA55G-DK1 Discovery board, one STMod+ connector is provided to support flexibility in small form factor applications. The STMod+ connector extends the SPI interface and the spare I/Os for different peripheral expansions like cellular modems.

The pin assignments are based on the existing STMod+ standard.

The jumper JP2 is used to select UART or SPI. If JP2 is ON, UART is selected. If JP2 is OFF, then SPI is selected.

Table 9. STMod+ connector (CN12) pinout

Pin number	Pin names	Alternate pin names	STM32WBA pin	Function
1	STMOD+.1_UART2_CTS	STMOD+.1_SPI3_NSS	PB15/PA5	UART/SPI
2	STMOD+.1_UART2_TX	STMOD+.1_SPI3_MOSI	PB0/PB8	UART/SPI
3	STMOD+.1_UART2_RX	STMOD+.1_SPI3_MISO	PA11/PB9	UART/SPI
4	STMOD+.1_UART2_RTS	STMOD+.1_SPI3_SCK	PB1/PA0	UART/SPI
5	GND	-		Ground
6	5V	-		Power supply
7	I2C3_SCL	-	PA6	I^2C
8	-	-	-	-
9	-	-	-	-
10	I2C3_SDA	-	PA7	I^2C
11	STMOD+.1_INT	-	PC13	Interrupt
12	STMOD+.1_RST	-	PA9	Reset
13	STMOD+.1_ADC	-	PA2	ADC (ADC4_IN7)
14	STMOD+.1_TIM	-	PA1	TIM (TIM1_CH1N, TIM3_CH2)
15	5V	-	-	Power supply
16	GND	-	-	Ground
17	STMOD+.1_17	-	PA10	GPIO
18	STMOD+.1_18	-	PA12	GPIO
19	STMOD+.1_19	-	PA15	GPIO
20	STMOD+.1_20	-	PB3	GPIO

7.11.1 STMod+ switch (U12)

A switch is used on the STMod+ connector to choose SPI or UART on the STMod+ alternate pins
The JP2 jumper drives the switch. The default configuration is set on SPI (JP2 OFF).
To select UART, the jumper JP2 must be assembled.

Table 10. STMod+ switch (U12) configuration

	JP2	
	JP2 OFF(1)	JP2 ON
SPI	**ON**	OFF
UART	**OFF**	ON

1. *The default configuration is shown in bold.*

7.12 Jumper overview

Table 11. Jumper reference table

Reference	Default position	Comment
JP1	OFF	STLINK-V3EC reset, active low
JP2	OFF	Jumper for STMod+ alternate pin selection. Refer to Section 7.11.1.
JP3	[1-2]	Supply selection (5 or 3 V) on Grove connector (CN13)
JP4	5V_STLK	Board power source selection. Refer to Section 7.2.
JP5	ON	Jumper for MCU current measurement. The MCU current measurement can be performed on JP5. By default, JP5 is ON. For the current measurement configuration, an ammeter must replace the JP5 jumper.
JP6	OFF	MCU Boot mode selection BOOT0 by default low to boot on internal flash
JP7	[1-2]	GPIO PA12 is exclusive between the OLED reset pin and the ARDUINO®/STMod+ pin. The JP7 jumper helps with selection. Set the JP7 jumper to [1-2] to select OLED reset and to position [2-3] to select ARDUINO® or STMod+ pin.

8 Limitations on MB1802

8.1 ARDUINO® and STMod+

- The ARDUINO® connector is exclusive with the STMod+ connector.
- ARDUINO® ADC_A2 exclusive with ARDUINO® SPI3_NSS on PA5
- ARDUINO® ADC_A3 exclusive with ARDUINO® SPI3_MOSI on PB8
- ARDUINO® ADC_A4 and ADC_A5 exclusive with I2C3 on PA6 and PA7

8.2 Digital microphone and ARDUINO®/STMod+

The digital microphone is exclusive with ARDUINO® pin D9 on PA9 and D6 on PA10 and STMod+ reset pin and pin 17.

8.3 ARDUINO® and OLED

ARDUINO® ADC_A3 is exclusive to OLED D/C on PB9.

8.4 ARDUINO® and joystick

The joystick is exclusive to ARDUINO® ADC_A1 on PA1.

9 MB1802 B01 I/O assignment updates

Table 12. **STM32WBA55G-DK1 I/O assignment**

UFQFPN48 pinout	Pin name	Main function pinout assignment	Alternate function pinout assignment
1	VSSSMPS	-	-
2	VDDSMPS	-	-
3	VLXSMPS	-	-
4	PB12	MCU.VCP_TX	-
5	PA8	MCU.VCP_RX	-
6	PA7	ARD _ADC.A4	I2C3_SDA
7	PA6	ARD_ADC.A5	I2C3_SCL
8	VDDA	-	-
9	PA5	ARD_ADC.A2	SPI3_NSS
10	PA2	ARD_ADC.A0	-
11	VDD	-	-
12	PA1	ARD_ADC.A1	-
13	PA0	ARD.D13	SPI3_SCK
14	PB9	ARD.D12	SPI3_MISO
15	PB8	ARD.D11_TIM	SPI3_MOSI
16	PC15	32 KHz out	-
17	PC14	32 KHz in	-
18	PC13	STMOD+.1_INT	ARD.D4_INT
19	PB7	Audio.SD_B	-
20	PB6	Audio.SCK_B	-
21	PB5	Audio.FS_B	-
22	VDD	-	-
23	PB4	Audio.MCLK_B	-
24	PB3	STMOD+.1_20	ARD.D3_TIM
25	PA15	ARD.D5_TIM	STMOD+.1_19
26	PA14	MCU.SWCLK	-
27	PA13	MCU.SWDIO	-
28	PA12	ARD.D7_IO	OLED_RST
29	PA11	ARD.D0_RX	-
30	PB2	AUDIO_NRST	-
31	PB1	ARD.D2	STMOD+_UART2_RTS
32	PB0	ARD.D1_TX	STMOD+_UART2_RX
33	PB15	ARD.D8_IO	STMOD+_UART2_CTS
34	PH3	Boot0	OLED.CS
35	VDD	-	-
36	NRST	-	-
37	RF	RF output	-
38	VDDHPA	-	-

UFQFPN48 pinout	Pin name	Main function pinout assignment	Alternate function pinout assignment
39	VDDANA	-	-
40	VDDRF	-	-
41	OSC_OUT	32 MHz out	-
42	OSC_IN	32 MHz in	-
43	VDDRFPA	-	-
44	VDD	-	-
45	VDD11	-	-
46	PA10	ARD.D6_TIM	Audio.1_D1
47	PA9	ARD.D9_TIM	Audio.1_CK1
48	PB14	Audio.SD_A	-
49	VSS	Exposed pad	-

10 STM32WBA55G-DK1 product information

10.1 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
  syywwxxxxx

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.

10.2 STM32WBA55G-DK1 product history

Table 13. Product history

Order code	Product identification	Product details	Product change description	Product limitations
STM32WBA55G-DK1	DK32WBA55G1$DR1	MCU: • STM32WBA55CGU7 silicon revision "B"	Initial revision	No limitation
		MCU errata sheet: • *STM32WBA5x device errata* (ES0592)		
		Boards: • MB1802-WBA55C-B01 (mezzanine board) • MB1803-WBA55CGA-B01 (MCU RF board)		

10.3 Board revision history

Table 14. Board revision history

Board reference	Board variant and revision	Board change description	Board limitations
MB1802 (mezzanine board)	WBA55C-B01	Initial revision	No limitation
MB1803 (MCU RF board)	WBA55CGA-B01	Initial revision	No limitation

11 Federal Communications Commission (FCC) and ISED Canada Compliance Statements

11.1 FCC Compliance Statement

Identification of products: STM32WBA55G-DK1

Contains FCC ID: YCP-MB180300

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 a 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 cables.

To satisfy FCC RF exposure requirements, a separation distance of 20 cm 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 collocated or operating in conjunction with any other antenna or transmitter.

Responsible party (in the USA)

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USA
Telephone: +1 781-472-9634

11.2 ISED Compliance Statement

Identification of products: STM32WBA55G-DK1
Contains FCC ID: YCP-MB180300

Identification du produit : STM32WBA55G-DK1
Contient sous-ensemble certifié IC : 8976A-MB180300

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.

ISED Canada ICES-003 Compliance Label: CAN ICES-3 (B) / NMB-3 (B).

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.

Étiquette de conformité à la NMB-003 d'ISDE Canada : CAN ICES-3 (B) / NMB-3 (B).

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 20 cm 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 20 cm avec les personnes et ne doit pas être installé à proximité ou être utilisé en conjonction avec une autre antenne ou un autre émetteur.

12 RED Compliance Statement

Simplified EU declaration of conformity

Hereby, STMicroelectronics declares that the radio equipment type "STM32WBA55G-DK1" is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address: *www.st.com*.

Déclaration de conformité UE simplifiée

STMicroelectronics déclare que l'équipement radioélectrique du type "STM32WBA55G-DK1" est conforme à la directive 2014/53/UE.

Le texte complet de la déclaration de conformité UE est disponible à l'adresse internet suivante: *www.st.com*.

13 UKCA Compliance Statement

SIMPLIFIED UK DECLARATION OF CONFORMITY

Hereby, the manufacturer STMicroelectronics, declares that the radio equipment type “STM32WBA55G-DK1” 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*.

Revision history

Table 15. **Document revision history**

Date	Revision	Changes
22-Mar-2024	1	Initial release.
20-Jun-2024	2	Updated Features, Figure 3, Figure 4, Figure 12. Power tree, Section 7.12: Jumper overview with Table 1, and microcontroller package name.

Contents

List of tables

List of figures