Discovery kit with STM32U5G9ZJ MCU

Introduction

The STM32U5G9J-DK2 Discovery kit is a complete demonstration and development platform for the STM32U5G9ZJT6Q microcontroller, featuring an Arm® Cortex®-M33 core with Arm® TrustZone®.

Leveraging the innovative ultra-low power-oriented features, 3 Mbytes of embedded SRAM, 4 Mbytes of embedded flash memory, and rich graphics features, the STM32U5G9J-DK2 Discovery kit enables users to prototype applications with state-of-the-art energy efficiency, as well as providing stunning and optimized graphics rendering with the support of a 2.5D Neo-Chrom accelerator, Chrom-ART Accelerator, and Chrom-GRC™ MMU.

The STM32U5G9J-DK2 Discovery kit integrates a full range of hardware features that help the user evaluate all the peripherals, such as a 5" RGB 800x480 pixels TFT colored LCD module with a 24-bit RGB interface and capacitive touch panel, high-speed USB Type-C®, Octo-SPI flash memory device, ARDUINO®, and STLINK-V3EC (USART console).

The STM32U5G9J-DK2 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 STM32CubeU5 MCU Package, which provides an STM32 comprehensive software HAL library as well as various software examples.

Figure 1. STM32U5G9J-DK2 with LCD (top view)

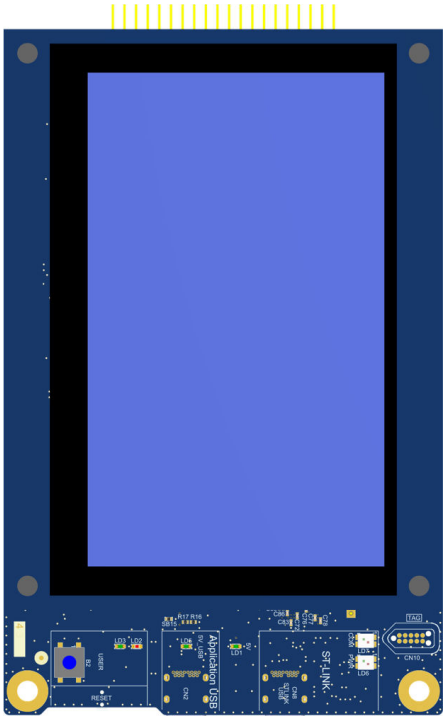


Figure 2. STM32U5G9J-DK2 without LCD (top view)

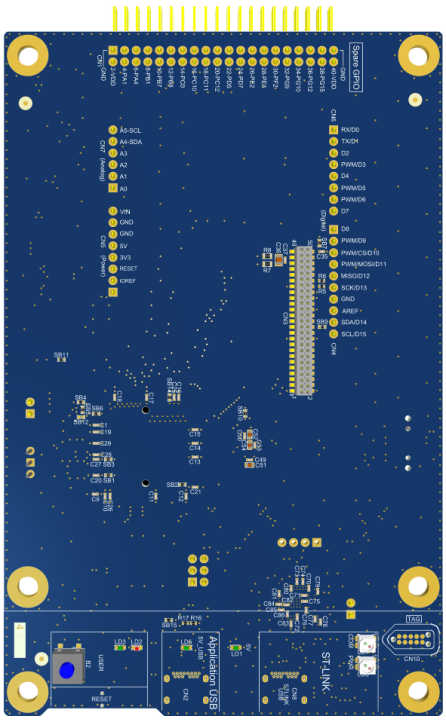
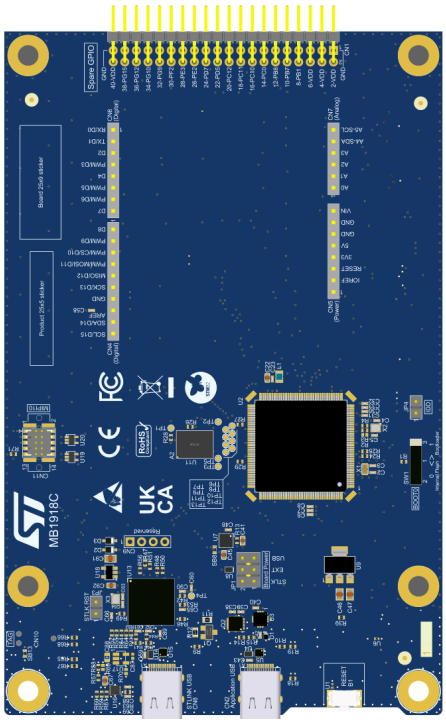


Figure 3. STM32U5G9J-DK2 (bottom view)



Pictures are not contractual.

1 Features

- Ultra-low-power STM32U5G9ZJT6Q microcontroller based on the Arm® Cortex®-M33 core with Arm® TrustZone®, featuring 4 Mbytes of flash memory, 3 Mbytes of SRAM, and SMPS, in an LQFP144 package
- 5" 800 × 480 pixels TFT LCD module with 16.7M color depth, parallel RGB interface, and capacitive touch panel
- USB Type-C® with USB 2.0 high-speed interface, UCPD Sink only
- Low-power system designed for VDD at 3.3 V only
- 1-Gbit Octo-SPI flash memory
- Two user LEDs
- User and reset push-buttons
- Board connectors:
  - ST-LINK USB Type-C®
  - User USB Type-C®
  - Arm® Cortex® MIPI10 connector (SWD/JTAG/trace)
  - Tag-Connect™ 10-pin footprint
  - ARDUINO® Uno V3 expansion
  - Double-row 2.54 mm pitch expansion connector for additional peripherals prototyping
- 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 STM32CubeU5 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 STM32U5G9J-DK2 Discovery kit, refer to Table 1. Additional information is available from the datasheet and reference manual of the target STM32.

Table 1. List of available products

Order code	Board reference	Target STM32
STM32U5G9J-DK2	• MB1918(1) • MB1860(2)	STM32U5G9ZJT6Q

1. *Main board*
2. *LCD daughterboard*

2.1 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32XXYYZ-DKT	Description	Example: STM32U5G9J-DK2
XX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32U5 series
YY	MCU product line in the series	STM32U5F9/5G9 product line
Z	STM32 flash memory size: • J for 4 Mbytes	4 Mbytes
DK	Discovery kit	Discovery kit
T	Sequential number	Second Discovery kit version

3 Development environment

3.1 System requirements

- Multi-OS support: Windows® 10 or 11, 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*.

3.4 EDA resources

All board design resources, including schematics, EDA databases, manufacturing files, and the bill of materials, are available from the STM32U5G9J-DK2 product page at *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
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 like 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 injury.
- 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 a voltage level that is not dangerous, but components might be damaged when shorted.
- Do not put any liquid on the board and avoid operating it close to water or at a high humidity level.
- Do not operate the board if it is dirty or dusty.
- The pins of the board are exposed and must not come into contact with a metal surface, as this can produce a short circuit and damage the board.

5.3 Delivery recommendations

Before the first use, inspect the board for any damage that may have occurred during shipment. Ensure that all socketed components are securely fixed in their sockets and that nothing is loose in the plastic bag.

6 Quick start

Before installing and using the product, accept the evaluation product license agreement from the *www.st.com/epla* webpage.

Follow the sequence below to configure the STM32U5G9J-DK2 Discovery board and launch the demonstration application (refer to Figure 5 for component location):

1. For the correct identification of all the device interfaces from the host PC and before connecting the board, install the STLINK-V3EC USB driver available on the *www.st.com* website.
2. Check that the JP1 jumper (5V power source selection) is set on [1-2] selecting 5V from STLINK-V3EC (STLK) and JP4 (VDD_MCU current measurement) is ON powering the microcontroller. Refer to Table 4.
3. Connect the STM32U5G9J-DK2 Discovery board to a PC with a USB cable (USB Type-A or USB Type-C® to USB Type-C®) through the STLINK-V3EC USB connector (CN8) to power the board.
4. Then, the 5V_PWR green LED (LD1) lights up and the COM LED (LD7) blinks.
5. The LCD module displays a menu with icons, indicating the demonstration application software startup.
6. The demonstration application software and its user manual, as well as other software examples for exploring STM32U5G9J-DK features are available on the STM32CubeU5 webpage.
7. Develop your application using the available examples.

Table 4. Default jumper setting

Jumper	Function	Setting(1)	Comment
JP1	5 V power source selection	**[1-2]**	5 V from STLINK-V3EC (STLK)
JP4	IDD measurement	**ON**	VDD_MCU current measurement

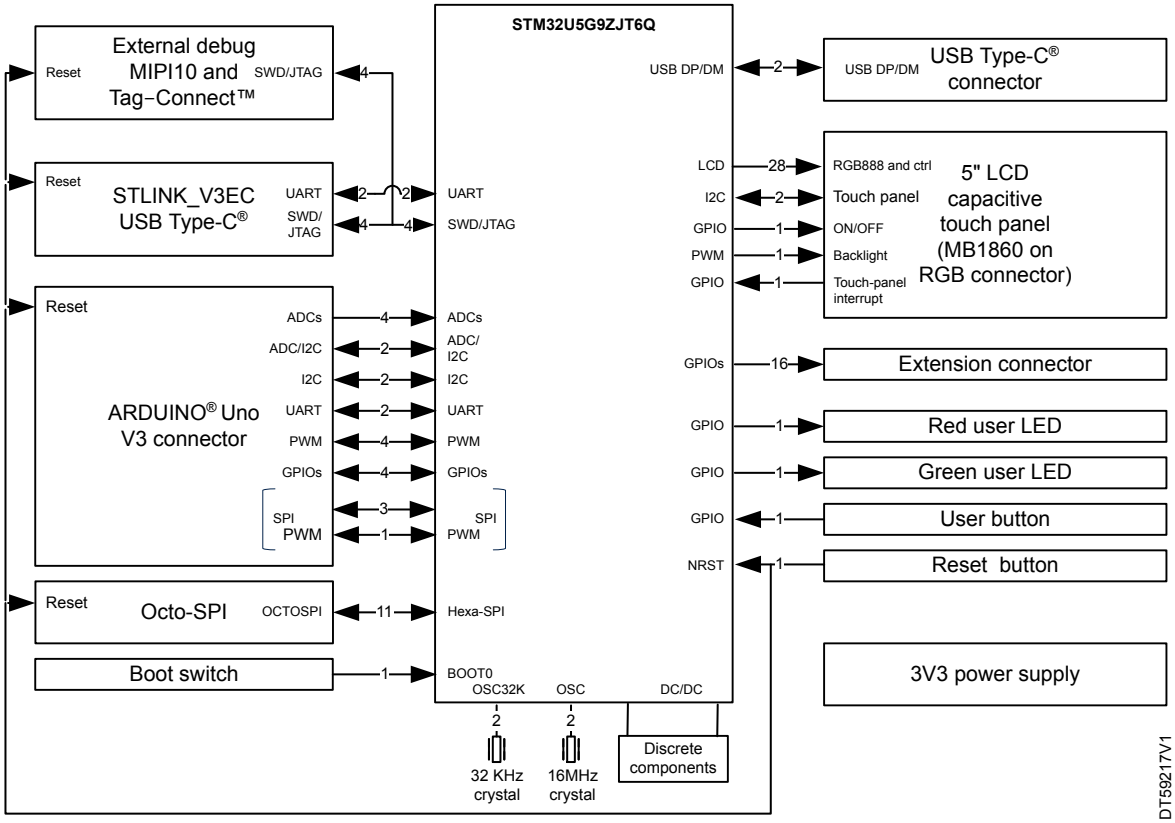
1. *The default setting is in bold.*

7 Hardware layout and configuration

7.1 Hardware block diagram

The STM32U5G9J-DK2 is designed around the STM32U5G9ZJT6Q microcontroller in an LQFP144 package. The hardware block diagram in Figure 4 illustrates the connection between the STM32U5G9ZJT6Q microcontroller and the peripherals. Figure 5 and Figure 6 show the locations of these features on the STM32U5G9J-DK2 Discovery board.

Figure 4. STM32U5G9J-DK2 hardware block diagram



7.2 Main board layout

Figure 5. Main board layout (top view)

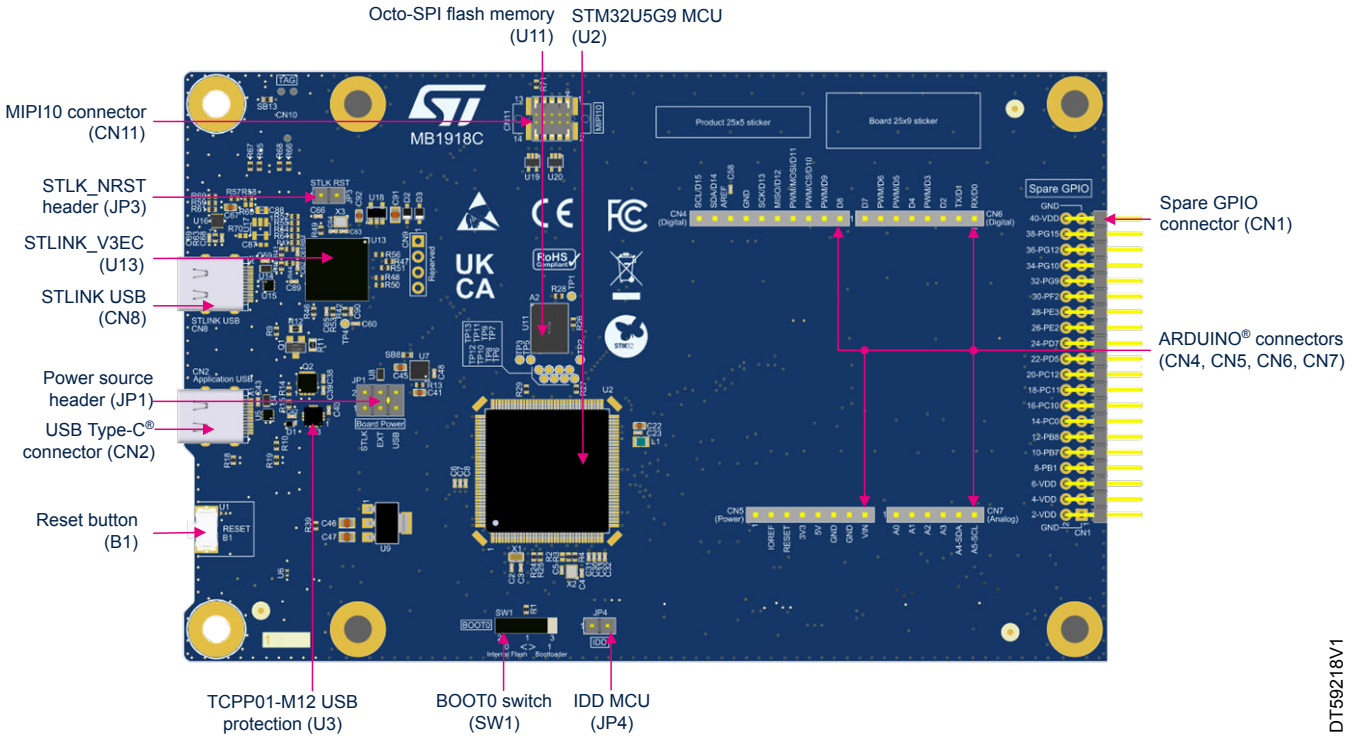
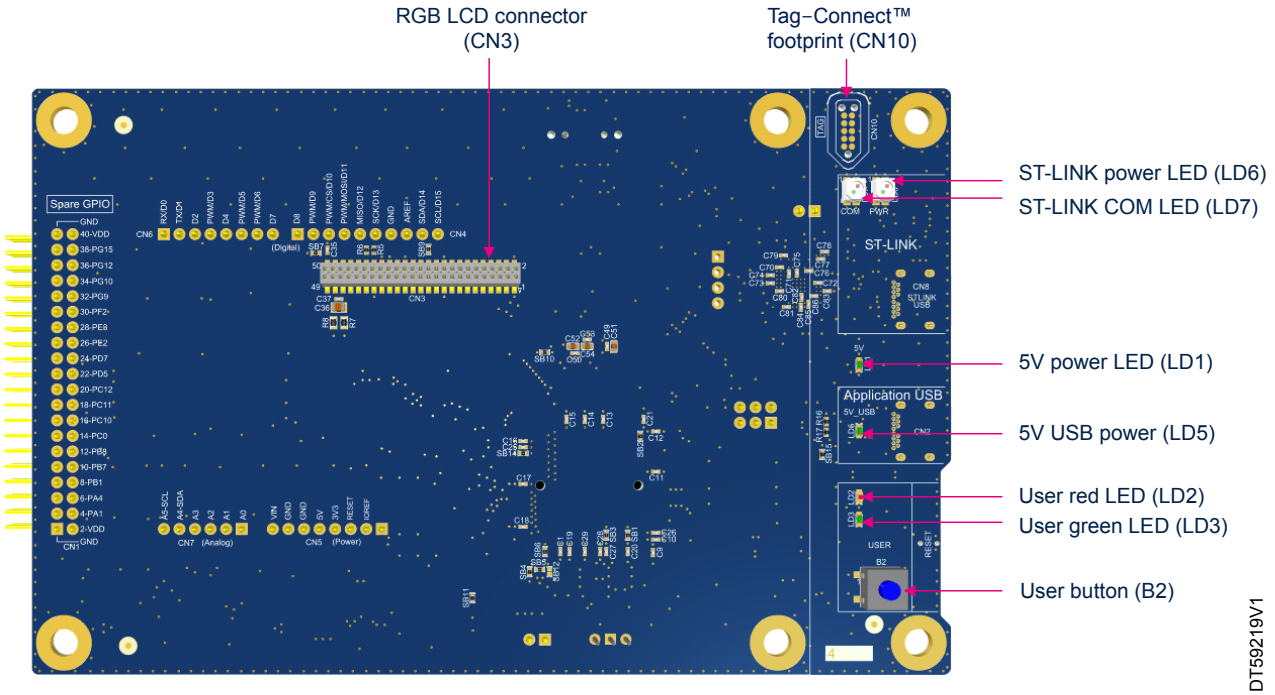
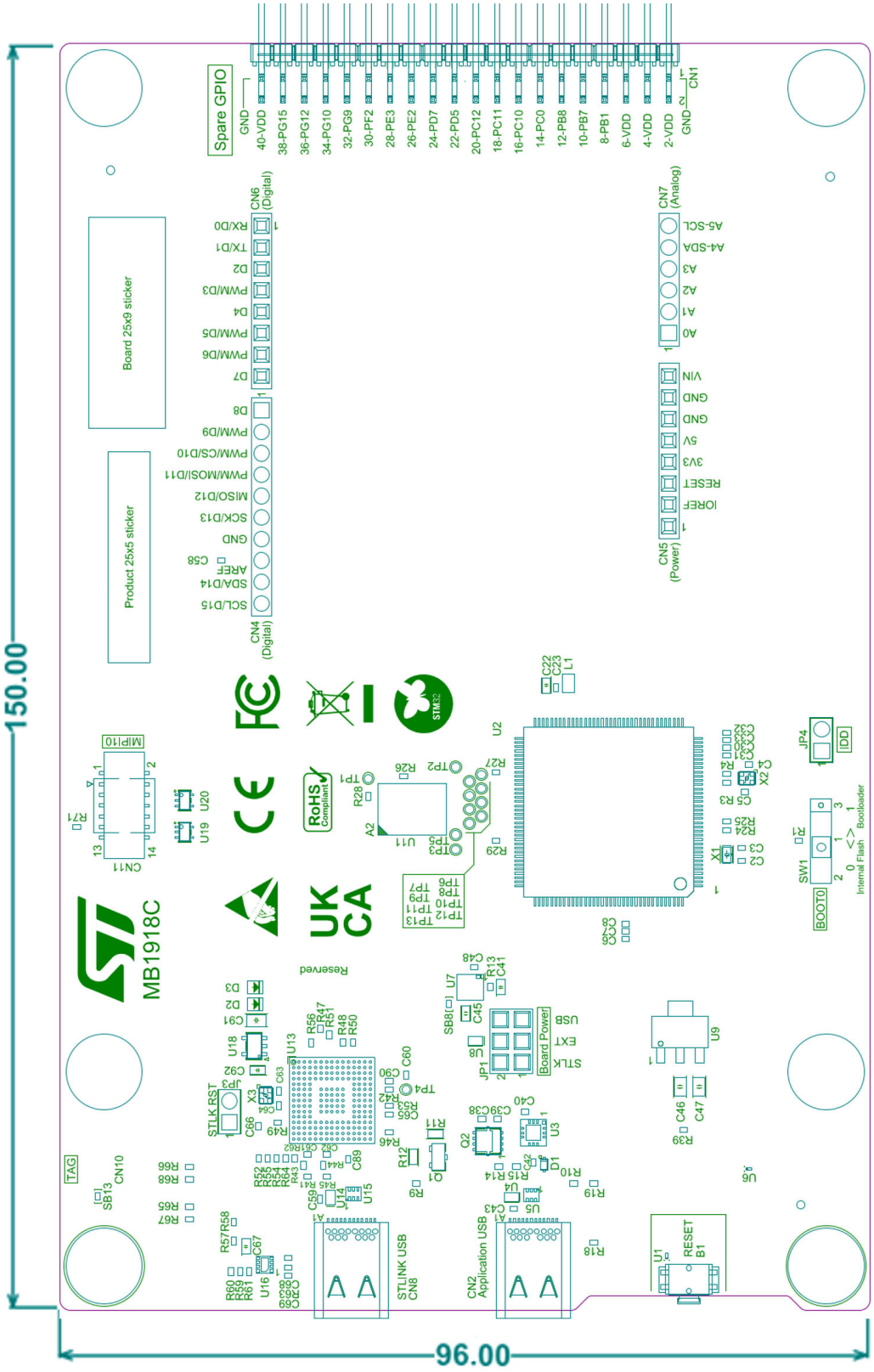


Figure 6. Main board layout (bottom view)



7.3 Mechanical drawing

Figure 7. **Main board mechanical drawing (in millimeters)**



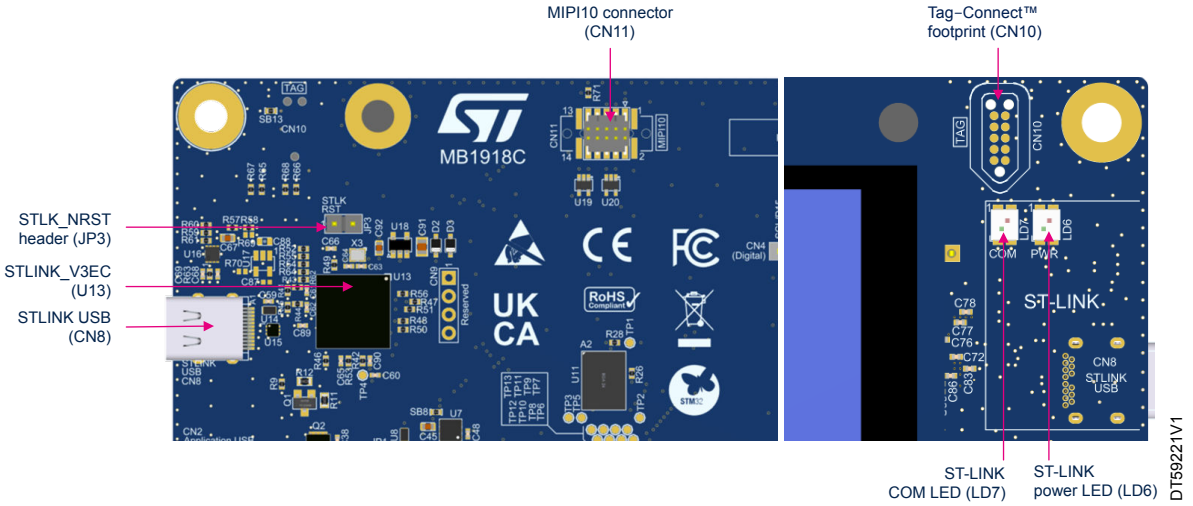
7.4 Embedded STLINK-V3EC

The chapter below gives some information about the implementation of the STLINK-V3EC on this board.

For detailed information about the STLINK-V3EC capabilities such as LED management, drivers, and firmware, refer to the technical note *Overview of ST-LINK derivatives* (TN1235).

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

Figure 8. STM32U5G9J-DK2 ST-LINK



7.4.1 Description

There are two different ways to program and debug the onboard STM32 MCU:

- Using the embedded STLINK-V3EC
- Using an external debug tool connected to the MIPI10 connector (CN11) or the Tag-Connect™ footprint (CN10) with a TC2050-IDC-NL cable

Features supported in STLINK-V3EC:

- 5 V/500 mA power supplied by the USB Type-C® connector (CN1)
- USB 2.0 USB high-speed-compatible interface
- JTAG and Serial Wire Debug (SWD) with Serial Wire Viewer (SWV)
- Virtual COM port (VCP)
- COM status LED (LD7), which blinks during communication with the PC
- Power status LED (LD6), which gives information about STLINK-V3EC target power
- USB-C® overvoltage protection (U16) with current limitation

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

7.4.2 Drivers

Since Windows® 10, driver installation is not mandatory.

Anyway, it is highly recommended as 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).

7.4.3 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 STM32U5G9J-DK2 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).

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

To support an external debug tool, set the jumper (JP3) to isolate the output I/O from STLINK-V3EC. Then connect the external debug tool through the STDC14/MIPI10 debug connector (CN11) or through the Tag-Connect™ footprint (CN10) with a TC2050-IDC-NL cable.

Table 5. MIPI10 debug connector (CN11) pinout

MIPI10 pin	STDC14 pin	CN11	Function
-	1	NC(4)	Reserved(1)
-	2	NC	Reserved(1)
1	3	VDD	Target VDD (indication to the probe)(2)
2	4	JTMS_SWDIO	Target SWDIO using SWD protocol or target JTMS (T_JTMS) using JTAG protocol
3	5	GND	Ground
4	6	JTCK_SWCLK	Target SWCLK using SWD protocol or target JTCK (T_JTCK) using JTAG protocol
5	7	GND	Ground
6	8	JTDO_SWO	Target SWO using SWD protocol or target JTDO (T_JTDO) using JTAG protocol (SB44 ON)(3)
7	9	JTCK_SWCLK	Target SWCLK using SWD protocol or target JTCK (T_JTCK) using JTAG protocol
8	10	JTDI	Not used by SWD protocol, target JTDI (T_JTDI) using JTAG protocol
9	11	GND_Det	GND detection for plug indicator(5)
10	12	NRST	Target NRST using SWD protocol or target JTMS (T_JTMS) using JTAG protocol
-	13	VCP_RX	Target RX used for VCP (bootloader compatible)(6)
-	14	VCP_TX	Target TX used for VCP (bootloader compatible)(2)

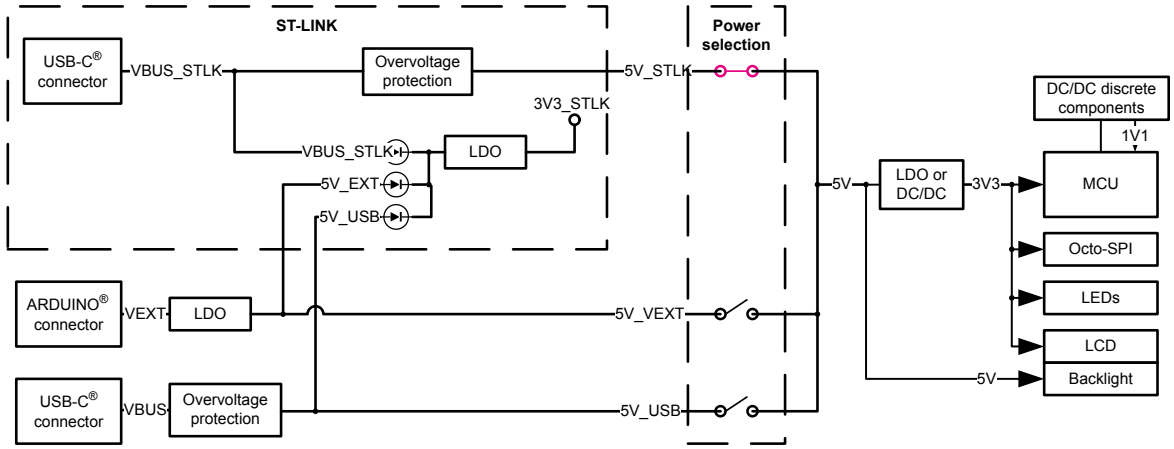
Table 6. Tag-Connect™ footprint (CN10) pinout for TC2050-IDC-NL cable

CN10 pin	Signal	Function
1	VDD	Target VDD (indication to the probe)(2)
2	JTMS_SWDIO	Target SWDIO using SWD protocol or target JTMS (T_JTMS) using JTAG protocol
3	GND	Ground
4	JTCK_SWCLK	Target SWCLK using SWD protocol or target JTCK (T_JTCK) using JTAG protocol
5	GND	Ground It must be disconnected (SB13) if the debugger probe provides a power supply on this pin
6	JTDO_SWO	Target SWO using SWD protocol or target JTDO (T_JTDO) using JTAG protocol (SB44 ON)(3)
7	NC	NC
8	JTDI	Not used by SWD protocol, target JTDI (T_JTDI) using JTAG protocol
9	JNRST	JNRST using JTAG protocol
10	NRST	Target reset

1. *Not connected on this board*
2. *Output for this board*
3. *SWO is optional and required only for Serial Wire Viewer (SWV) trace.*
4. *NC means not required for the SWD connection, or not connected on this board*
5. *Tied to GND. The external debugger might use it.*
6. *Input for this board*

7.5 Power supply

Figure 9. **STM32U5G9J-DK2 power diagram**



7.5.1 Power source selection

The Discovery board product is designed to be powered by a 5 V DC power supply. It is possible to configure the power source selection with the JP1 header (Figure 10) to use any of the three sources described in Table 7.

Figure 10. **5 V power source selection**

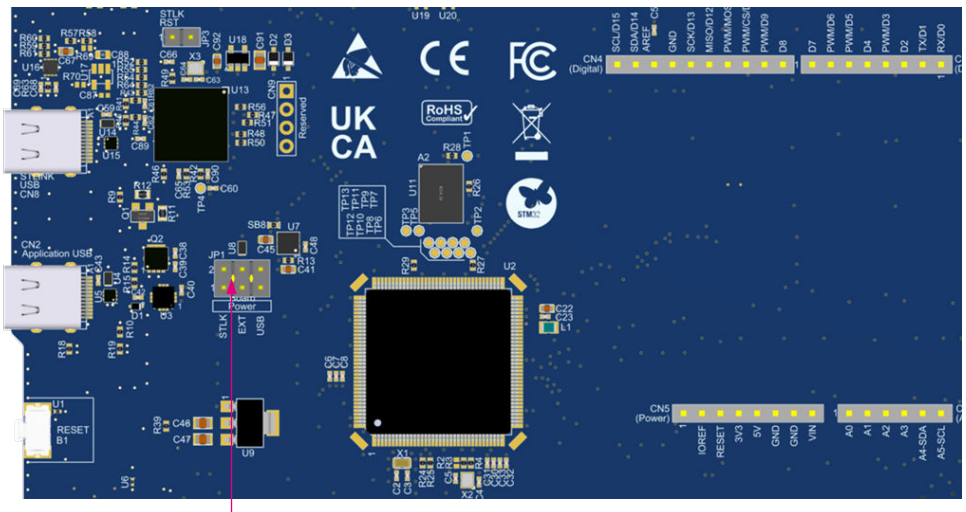


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Table 7. Power source selection header (JP1)

JP1	Source	Function
[1-2]	**STLK**	**5 V is supplied from the ST-LINK USB connector (CN8)**(1)
[3-4]	EXT	5 V is supplied from the ARDUINO® connector (CN5).
[5-6]	USB	5 V is supplied from the user USB connector (CN2).

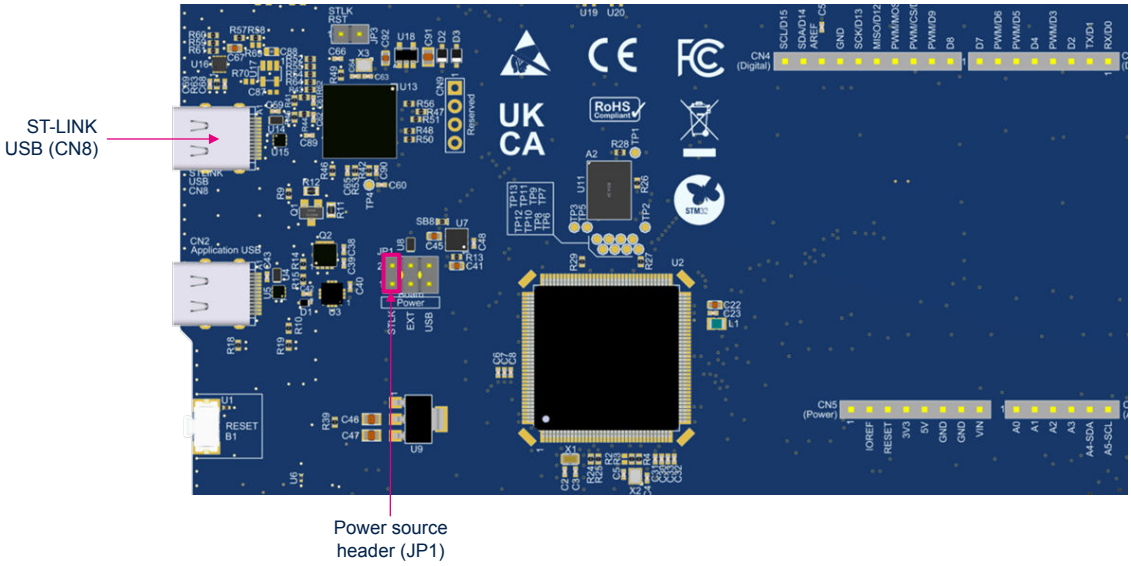
1. *The default setting is in bold.*

A power supply unit or auxiliary equipment complying with the EN 62368-1:2014+A11:2017 standard (or the one replacing it) and safety extralow voltage (SELV/ES1) with limited power capability (LPS/PS2) must power this equipment.

7.5.2 Supplying the board with the STLINK-V3EC USB connector (CN8)

Green LED (LD1) lighting confirms the presence of the 5 V power supply.

Figure 11. STLK (CN8) selection for 5 V power



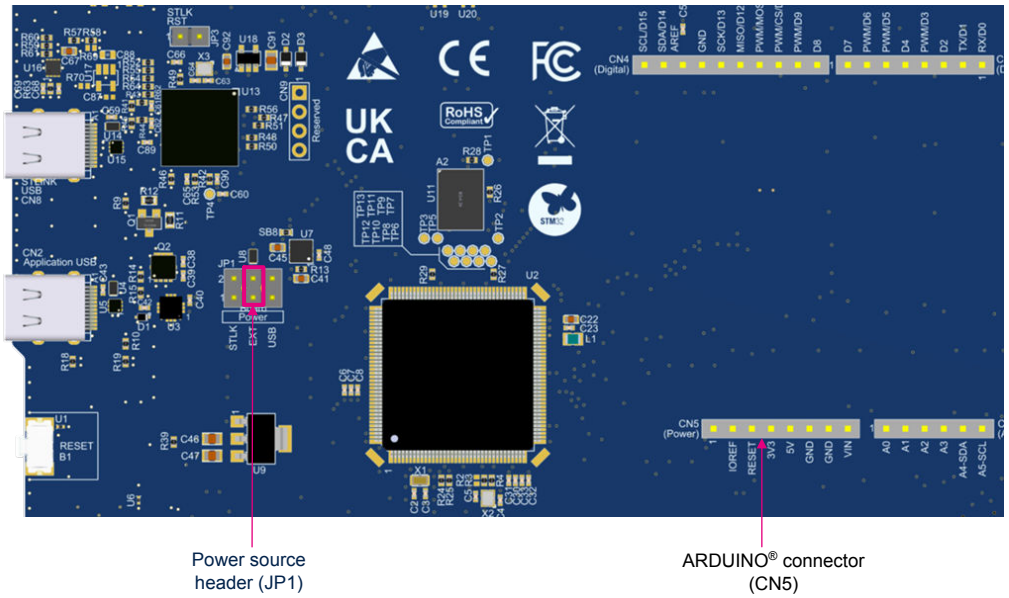
7.5.3 Supplying the board with an external power supply from the ARDUINO® connector (CN5)

In this mode, the board is powered (7 to 12 V DC) through the VIN pin of the ARDUINO® compatible connector (CN5).

Embedded LDO generates the 5 V power supply.

The green LED (LD1) lighting confirms the presence of the 5 V power supply.

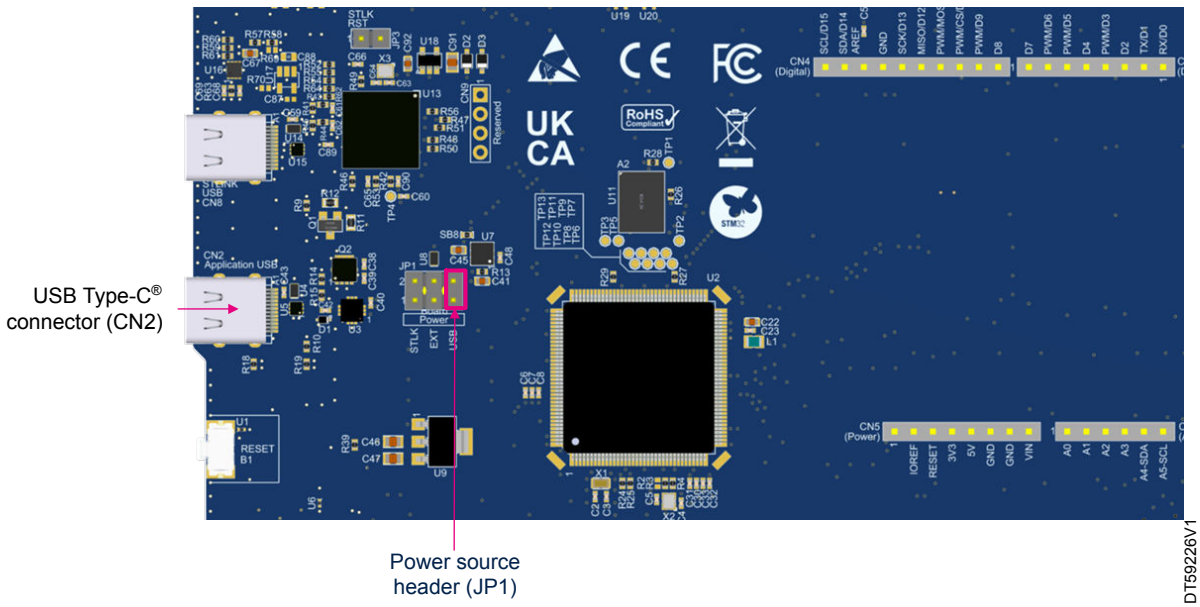
Figure 12. ARDUINO® (CN5) selection for 5 V power



7.5.4 Supplying the board with the application USB connector (CN2)

The green LED (LD1) lighting confirms the presence of a 5 V power supply.

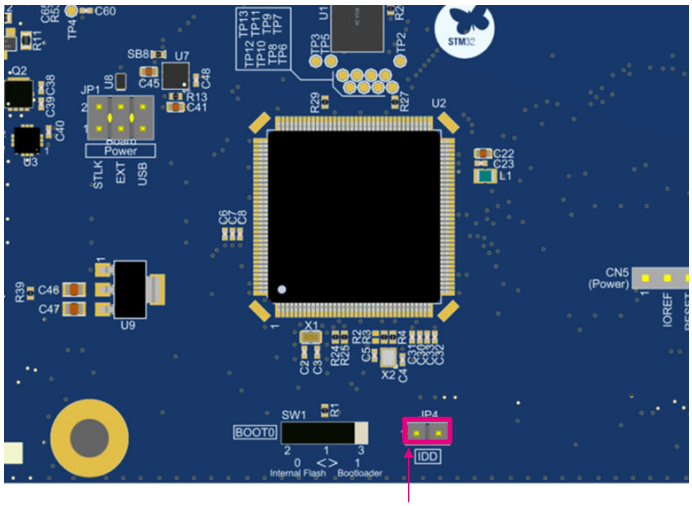
Figure 13. Application USB (CN2) selection for 5 V power



7.5.5 Measurement of microcontroller current consumption

The power consumption measurement of the STM32U5G9ZJT6Q MCU is possible by replacing the JP4 jumper labeled IDD with an ammeter.

Figure 14. Current consumption measurement jumper (JP4)



7.6 Clocks

7.6.1 Low-speed external (LSE) clock

The LSE oscillator clock reference on the STM32U5G9ZJT6Q MCU is provided by the external 32.768 kHz crystal X1.

7.6.2 High-speed external (HSE) clock

The HSE oscillator clock reference on the STM32U5G9ZJT6Q MCU is provided by the external 16 MHz crystal X2.

7.7 Reset

The reset (NRST) signal of the STM32U5G9ZJT6Q MCU is active at a low level. Internal MCU pull-up resistor forces the reset (NRST) signal to a high level.

Reset sources are:

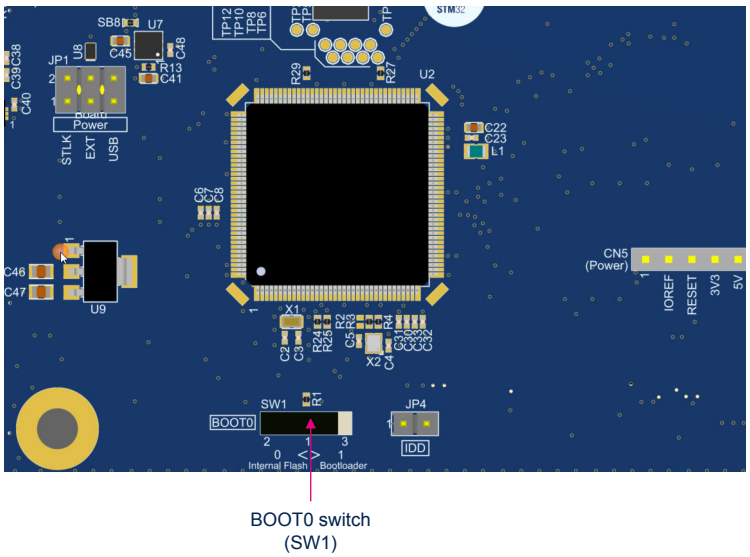
- The reset button B1 (side button),
- The embedded STLINK-V3EC,
- External debug interfaces (CN10 and CN11),
- And the ARDUINO® connector (CN5): pin 3 reset from the ARDUINO® board.

7.8 Boot modes

The SW1 switch selects the Boot mode thanks to the PH3/BOOT0 pin of the MCU and SWBOOT0 option byte:

- Position 0 [2-1]: BOOT0 is pulled down to the ground. The code is executed from the internal flash memory (default configuration as shown in Figure 15)
- Position 1 [1-3]: BOOT0 is pulled up to VDD. The bootloader is executed.

Figure 15. Boot mode selection switch (SW1)



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8 Board functions

This section explains all the functions, peripherals, and interfaces of the board. Refer to Features, Hardware layout and configuration, Figure 5, and Figure 6 STM32U5G9J-DK top and bottom layout views.

8.1 USB

The STM32U5G9J-DK2 board provides a USB Type-C® connector (CN2) that can support a custom USB application (Sink mode only).

VBUS (5 V) and CC lines have overvoltage protection

The green LED (LD5) lights up when powered by a USB Host.

Figure 16. USB Type-C® connector pinout (CN4)

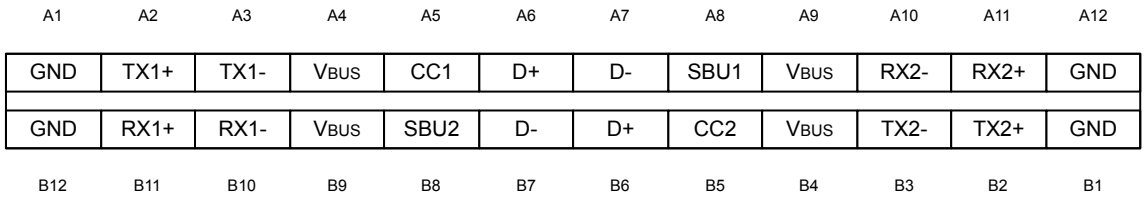


Table 8. USB Type-C® connector (CN2)

STM32 pin	Signal name	Pin name	Pin	Pin	Pin name	Signal name	STM32 pin
-	GND	GND	A1	B12	GND	GND	-
-	-	TX1+	A2	B11	RX1+	-	-
-	-	TX1-	A3	B10	RX1-	-	-
-	VBUS	VBUS	A4	B9	VBUS	VBUS	-
-	UCPD_CC1_C	CC1	A5	B8	SBU2	-	-
PA12	USBC_CN_HS_P	D+	A6	B7	D-	USBC_CN_HS_N	PA11
PA11	USBC_CN_HS_N	D-	A7	B6	D+	USBC_CN_HS_P	PA12
-	-	SBU1	A8	B5	CC2	UCPD_CC2_C	-
-	VBUS	VBUS	A9	B4	VBUS	VBUS	-
-	-	RX2-	A10	B3	TX2-	-	-
-	-	RX2+	A11	B2	TX2+	-	-
-	GND	GND	A12	B1	GND	GND	-

8.2 Octo-SPI flash memory

The Octo-SPI flash memory has the following characteristics:

- 1 Gbit
- 3V3
- 133 MHz maximum frequency
- DTR

It is connected to the Hexadeca-SPI (HSPI) interface of the STM32U5G9ZJT6Q MCU.

Table 9. OCTOSPI connection

STM32 pin	STM32 I/O	STM32 signal	Octo-SPI signal	Octo-SPI pin
28	NRST	NRST	RESET#	A4
81	PH9	HSPI1_NCS	CS#	C2
97	PI3	HSPI1_CLK	SCLK	B2
96	PI2	HSPI1_DQS0	DQS	C3
84	PH10	HSPI1_IO0	SI/SIO0	D3
85	PH11	HSPI1_IO1	SO/SIO1	D2
86	PH12	HSPI1_IO2	SIO2	C4
87	PH13	HSPI1_IO3	SIO3	D4
90	PH14	HSPI1_IO4	SIO4	D5
91	PH15	HSPI1_IO5	SIO5	E3
92	PI0	HSPI1_IO6	SIO6	E2
93	PI1	HSPI1_IO7	SIO7	E1
-	-	-	ECS#	A5

The embedded footprint is also compatible with many references in BGA24 packages. Check the compatibility of the memory datasheet versus the schematic.

8.3 Virtual COM port

A Virtual COM port is available on the STLINK-V3EC USB connector (CN8).

The communication between the target and ST-LINK MCUs is enabled on the USART1 (PA9/PA10).

8.4 Buttons and LEDs

Two buttons are available on STM32U5G9J-DK2.

- Side reset button:
  - B1 is connected to the global reset signal (NRST of STM32U5G9ZJT6Q MCU).
- Blue user button:
  - B2 is connected to PC13-WKUP2.
  - When the button is pressed, the logic state is HIGH, otherwise, the logic state is LOW.

Six LEDs are available on STM32U5G9J-DK2.

- STLINK-V3EC LEDs:
  - LD6 provides information about the STLINK-V3EC power status.
  - LD7 provides information about the STLINK-V3EC communication status.
  - For more detailed information about these two LEDs, refer to the STLINK-V3EC technical note (TN1235).
- User LEDs:
  - LD2 is a red LED connected to PD2.
  - LD3 is a green LED connected to PD4.
- 5 V PWR LED:
  - LD1 is a green LED indicating 5 V power.
- USB LED:
  - LD5 is a green LED indicating a USB Host connection.

8.5 Display

The STM32U5G9J-DK2 Discovery kit embeds a 5-inch 800x480 TFT LCD MB1860 board, which is connected to the RGB interface of the STM32U5G9ZJT6Q MCU through a 50-pin connector (CN3).

The MB1860 board uses the RK050HR18-CTG TFT LCD from Rocktech including a backlight and a capacitive touch panel.

The touchscreen controller is connected to the STM32U5G9ZJT6Q MCU via the I2C2 bus, at the `0x5D` address).

Table 10. Display connections

Connector		MCU			Connector		MCU		
Pin	Signal	Function	I/O	Pin	Pin	Signal	Function	I/O	Pin
1	GND	GND			2	GND	GND		
3	R0	LCD R0	PC6	98	4	G0	LCD G0	PC8	100
5	R1	LCD R1	PC7	99	6	G1	LCD G1	PC9	101
7	R2	LCD R2	PE15	61	8	G2	LCD G2	PE9	53
9	R3	LCD R3	PD8	73	10	G3	LCD G3	PE10	56
11	R4	LCD R4	PD9	74	12	G4	LCD G4	PE11	57
13	R5	LCD R5	PD10	75	14	G5	LCD G5	PE12	58
15	R6	LCD R6	PD11	76	16	G6	LCD G6	PE13	59
17	R7	LCD R7	PD12	77	18	G7	LCD G7	PE14	60
19	GND	GND			20	GND	GND		
21	B0	LCD B0	PB9	140	22	DE	LCD DE	PD6	123
23	B1	LCD B1	PB2	48	24	DISP ON/OFF	GPIO output	PE4	3
25	B2	LCD B2	PD14	79	26	HSYNC	LCD HSYNC	PE0	141
27	B3	LCD B3	PD15	80	28	VSYNC	LCD VSYNC	PD13	78
29	B4	LCD B4	PD0	116	30	GND	GND		
31	B5	LCD B5	PD1	117	32	PCLK	LCD CLK	PD3	119
33	B6	LCD B6	PE7	51	34	GND	GND		
35	B7	LCD B7	PE8	52	36	TP WAKE	System NRST	NRST	28
37	GND	GND			38	TPSDA	I2C2 SDA	PF0	10
39	TP INT	GPIO interrupt	PE5	4	40	TPSCL	I2C2 SCL	PF1	11
41	NC	GND			42	NC	-		
43	BL CTRL	GPIO PWM	PE6	5	44	NC	-		
45	BL 5V	5V			46	NC	-		
47	BL GND	GND			48	NC	-		
49	BL GND	GND			50	VDD	3V3		
49	BL GND	GND			50	VDD	3V3		

8.6 ARDUINO® interface

CN4, CN5, CN6, and CN7 are female connectors compatible with ARDUINO® Uno V3 standard. Most shields designed for ARDUINO® Uno V3 fit the STM32U5G9J-DK2 board.

Important: *STM32 microcontroller I/Os are 3.3 V compatible instead of 5 V for ARDUINO® Uno.*

As explained in Section 7.5.3, the STM32U5G9J-DK2 board can be powered from the ARDUINO® connector (CN5 VIN pin 8) with a power supply in the 7 to 12 V voltage range.

Figure 17. STM32U5G9J-DK2 ARDUINO® connectors

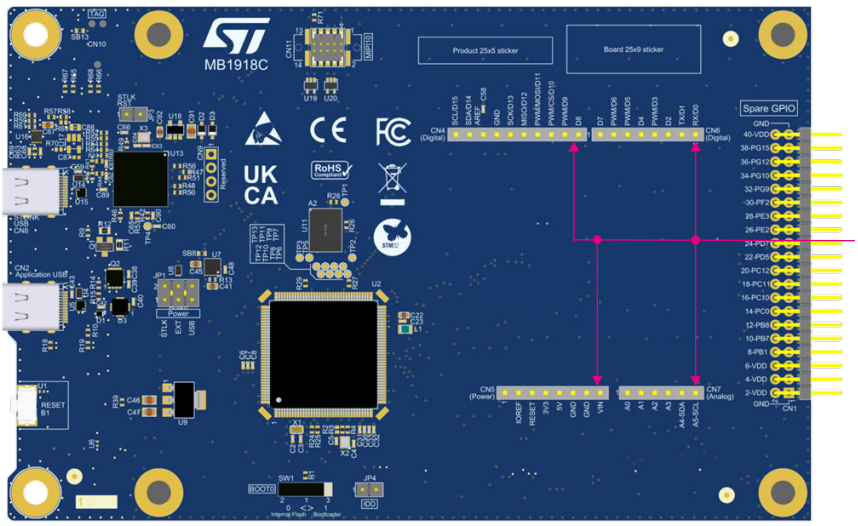


Table 11. **ARDUINO® Uno V3 compatible connectors**

Left connectors					Right connectors				
Connector	Pin number	Pin name	MCU pin	Function	Function	MCU pin	Pin name	Pin number	Connector
					I2C1_SCL	PG14	D15	10	CN4 Digital
					I2C1_SDA	PG13	D14	9	
					AVDD	-	AVDD	8	
					Ground	-	GND	7	
CN5 Power	1	-	-	Reserved	SPI1_SCK	PA5	D13	6	
	2	IOREF	-	3V3 ref	SPI1_MISO	PA6	D12	5	
	3	RESET	NRST	Reset	SPI1_MOSI/ TIM3_CH2	PB5	D11	4	
	4	3V3	-	3.3 V output	SPI1_NSS/ TIM3_CH3, SPI5_NSS	PB0	D10	3	
	5	5V	-	5 V input/output	TIM4_CH1	PB6	D9	2	
	6	GND	-	Ground	-	PB15	D8	1	
	7	GND	-	Ground					
	8	VIN	-	Power input (7-12 V)	PB14	PB14	D7	8	CN6 Digital
					TIM5_CH1	PA0	PWM-D6	7	
CN7 Analog	1	A0	PC2	ADC2_IN3	TIM2_CH3	PB10	PWM-D5	6	
	2	A1	PC3	ADC2_IN4	PB13	PB13	D4	5	
	3	A2	PG0	ADC4_IN7	TIM1_CH1	PA8	PWM-D3	4	
	4	A3	PG1	ADC4_IN8	PB11	PB11	D2	3	
	5	A4	PC1	ADC1_IN2 or I2C3_SDA	UART2_TX	PA2	TX-D1	2	
	6	A5	PA7	ADC1_IN12 or I2C3_SCL	UART2_RX	PA3	RX-D0	1	

8.7 GPIO extension connector

Spare GPIOs of the STM32U5G9ZJT6Q MCU (in DK application) are connected on a general purpose 2.54 mm pitch SAMTEC TSW-120-07-G-D extension connector (CN1).

Figure 18. General extension connector (CN1)

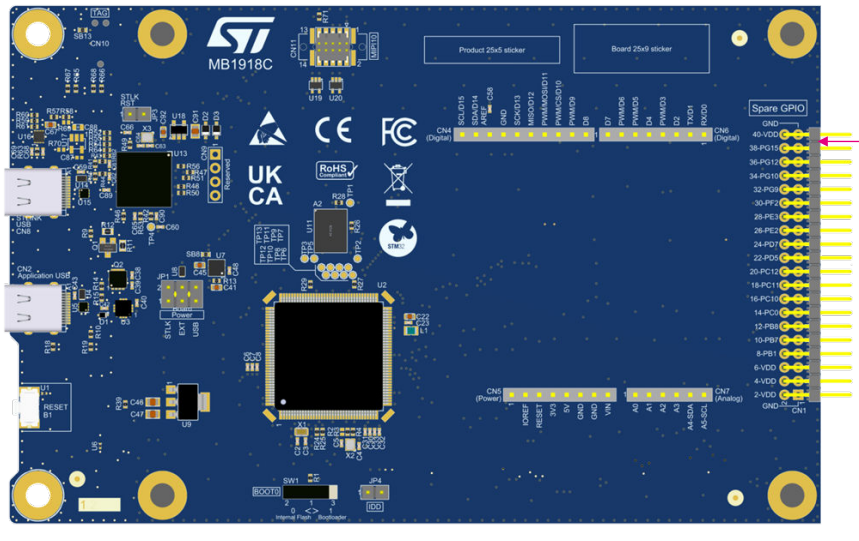


Table 12. General extension connector (CN1) pinout

Pin number	Signal		Signal	Pin number
1	GND		VDD	2
3				4
5				6
7			PB1	8
9			PB7	10
11			PB8	12
13			PC0	14
15			PC10	16
17			PC11	18
19			PC12	20
21			PD5	22
23			PD7	24
25			PE2	26
27			PE3	28
29			PF2	30
31			PG9	32
33			PG10	34
35			PG12	36
37			PG15	38
39			VDD	40

9 STM32U5G9ZJT6Q MCU I/O assignment

Table 13. STM32U5G9ZJT6Q I/O assignment

STM32U5G9ZJT6Q signal	Signal assignment	Secondary function	Usage
PA0	TIM5_CH1	ARDUINO®	PWM-D6
PA1	GPIO interrupt	USB	USB Detect
PA2	USART2_TX	ARDUINO®	TX-D1
PA3	USART2_RX	ARDUINO®	RX-D0
PA4	GPIO interrupt	USB	USB Fault
PA5	SPI1_SCK	ARDUINO®	SCK-D13
PA6	SPI1_MISO	ARDUINO®	MISO-D12
PA7	ADC1_IN12/I2C3_SCL	ARDUINO®	A5-SCL
PA8	TIM1_CH1	ARDUINO®	PWM-D3
PA9	USART1_TX	Virtual COM port	TX
PA10	USART1_RX	Virtual COM port	RX
PA11	OTG_HS_DM	USB	D-
PA12	OTG_HS_DP	USB	D+
-			
PB0	SPI1_NSS/TIM3_CH3	ARDUINO®	PWM-CS-D10
PB1	GPIO	Spare GPIOs	-
PB2	LCD_B1	Display	Blue 1
PB5	SPI1_MOSI/TIM3_CH2	ARDUINO®	PWM-MOSI-D11
PB6	TIM4_CH1	ARDUINO®	PWM-D9
PB7	GPIO	Spare GPIOs	-
PB8	GPIO	Spare GPIOs	-
PB9	LCD_B0	Display	Blue 0
PB10	TIM2_CH3	ARDUINO®	PWM-D5
PB11	GPIO	ARDUINO®	D2
PB13	GPIO	ARDUINO®	D4
PB14	GPIO	ARDUINO®	D7
PB15	GPIO	ARDUINO®	D8
-			
PC0	GPIO	Spare GPIOs	-
PC1	ADC1_IN2/I2C3_SDA	ARDUINO®	A4-SDA
PC2	ADC2_IN3	ARDUINO®	A0
PC3	ADC2_IN4	ARDUINO®	A1
PC6	LCD_R0	Display	Red 0
PC7	LCD_R1	Display	Red 1
PC8	LCD_G0	Display	Green 0
PC9	LCD_G1	Display	Green 1

STM32U5G9ZJT6Q signal	Signal assignment	Secondary function	Usage
PC10	-	Spare GPIOs	-
PC11	-	Spare GPIOs	-
PC12	-	Spare GPIOs	-
PC13	WKUP2	User interface	User button
-			
PD0	LCD_B4	Display	Blue 4
PD1	LCD_B5	Display	Blue 5
PD2	-	User interface	Red LED
PD3	LCD_CLK	Display	Pixel clock
PD4	-	User interface	Green LED
PD5	-	Spare GPIOs	-
PD6	LCD_DE	Display	Data enable
PD7	-	Spare GPIOs	-
PD8	LCD_R3	Display	Red 3
PD9	LCD_R4	Display	Red 4
PD10	LCD_R5	Display	Red 5
PD11	LCD_R6	Display	Red 6
PD12	LCD_R7	Display	Red 7
PD13	LCD_VSYNC	Display	Vertical sync
PD14	LCD_B2	Display	Blue 2
PD15	LCD_B3	Display	Blue 3
-			
PE0	LCD_HSYNC	Display	Horizontal sync
PE2	-	Spare GPIOs	-
PE3	-	Spare GPIOs	-
PE4	-	Display	LCD ON
PE5	-	Display	Touch panel IRQ
PE6	-	Display	Backlight control
PE7	LCD_B6	Display	Blue 6
PE8	LCD_B7	Display	Blue 7
PE9	LCD_G2	Display	Green 2
PE10	LCD_G3	Display	Green 3
PE11	LCD_G4	Display	Green 4
PE12	LCD_G5	Display	Green 5
PE13	LCD_G6	Display	Green 6
PE14	LCD_G7	Display	Green 7
PE15	LCD_R2	Display	Red 2
-			
PF0	I2C2_SDA	Display	Touch panel SDA
PF1	I2C2_SCL	Display	Touch panel SCL
PF2	-	Spare GPIOs	-

STM32U5G9ZJT6Q signal	Signal assignment	Secondary function	Usage
-			
PG0	ADC4_IN7	ARDUINO®	A2
PG1	ADC4_IN8	ARDUINO®	A3
PG9	-	Spare GPIOs	-
PG10	-	Spare GPIOs	-
PG12	-	Spare GPIOs	-
PG13	I2C1_SDA	ARDUINO®	SDA-D14
PG14	I2C1_SCL	ARDUINO®	SCL-D15
PG15	-	Spare GPIOs	-
-			
PH9	PH9-HSPI1_NCS	Flash memory	Chip select
PH10	HSPI1_SIO0	Flash memory	Data 0
PH11	HSPI1_SIO1	Flash memory	Data 1
PH12	HSPI1_SIO2	Flash memory	Data 2
PH13	HSPI1_SIO3	Flash memory	Data 3
PH14	HSPI1_SIO4	Flash memory	Data 4
PH15	HSPI1_SIO5	Flash memory	Data 5
-			
PI0	HSPI1_SIO6	Flash memory	Data 6
PI1	HSPI1_SIO7	Flash memory	Data 7
PI2	HSPI1_DQS0	Flash memory	Data strobe signal
PI3	HSPI1_CLK	Flash memory	Clock

10 STM32U5G9J-DK2 product information

10.1 Product marking

The product and each board composing the product are identified with one or several stickers. The stickers, located on the top or bottom side of each PCB, provide product information:

- Main board featuring the target device: product order code, product identification, serial number, and board reference with revision.

  Single-sticker example:

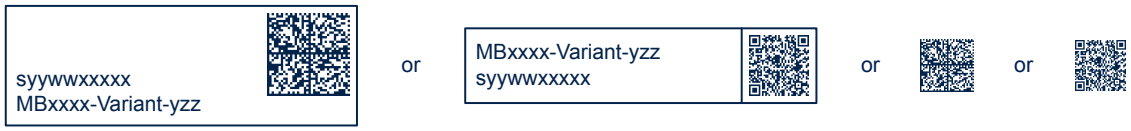
  

  Dual-sticker example:

- Other boards if any: board reference with revision and serial number.

  Examples:

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

On all board stickers, the line formatted as *"MBxxxx-Variant-yzz"* shows the board reference *"MBxxxx"*, the mounting variant *"Variant"* when several exist (optional), the PCB revision *"y"*, and the assembly revision *"zz"*, for example B01. The other line shows the board serial number used for traceability.

Products and parts labeled as *"ES"* or *"E"* are not yet qualified or feature devices that are not yet qualified. STMicroelectronics disclaims any responsibility for consequences arising from their use. Under no circumstances will STMicroelectronics be liable for the customer's use of these engineering samples. Before deciding to use these engineering samples for qualification activities, contact STMicroelectronics' quality department.

"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 ordering part number of the evaluation tool 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 STM32U5G9J-DK product history

Table 14. Product history

Order code	Product identification	Product details	Product change description	Product limitations
STM32U5G9J-DK2	DK32U5G9J2$AR1	MCU: • STM32U5G9ZJT6Q silicon revision "Z"	Initial revision	No limitation
		MCU errata sheet: • *STM32U5Fxxx and STM32U5Gxxx device errata* (ES0595)		
		Boards: • MB1918-U5G9ZJQ-C01 (main board) • MB1860-RK050HR18C-A02 (LCD daughterboard)		

10.3 Board revision history

Table 15. Board revision history

Board reference	Board variant and revision	Board change description	Board limitations
MB1918 (main board)	U5G9ZJQ-C01	Initial revision	No limitation
MB1860 (LCD daughterboard)	RK050HR18C-A02	Initial revision	No limitation

11 Compliance statements and conformity declarations

11.1 Federal Communications Commission (FCC) compliance statement

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 instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct 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.

Responsible Party - U.S. Contact Information:

Francesco Doddo
STMicroelectronics, Inc.
200 Summit Drive | Suite 405 | Burlington, MA 01803
USA
Telephone: +1 781-472-9634

11.2 Innovation, Science and Economic Development Canada (ISED) compliance statement

This product complies with the ICES-003 standard class B of the ISED regulation.

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

Note: Use only shielded cables.

Ce produit est conforme à la norme NMB-003 classe B de la ISDE.

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

Note: Utiliser uniquement des câbles blindés.

11.3 UKCA conformity

Simplified UK declaration of conformity

Hereby, the manufacturer STMicroelectronics, declares that the equipment type STM32U5G9J-DK2 is in compliance with the UK Electromagnetic Compatibility Regulations 2016 (UK SI 2016 No. 1091) and with the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (UK SI 2012 No. 3032).

Note: Use only shielded cables.

11.4 CE conformity

11.4.1 Simplified EU declaration of conformity

Hereby, STMicroelectronics declares that the equipment type STM32U5G9J-DK2 is in compliance with directives 2011/53/EU and 2015/863/EU (RoHS), and 2014/30/EU (EMC).

Note:
- *RoHS: Restriction of hazardous substances*
- *EMC: Electromagnetic compatibility*

Note: Use only shielded cables.

11.4.2 Déclaration de conformité UE simplifiée

STMicroelectronics déclare que l'équipement électrique du type STM32U5G9J-DK2 est conforme aux directives 2011/53/UE et 2015/863/UE (LdSD), et à la directive 2014/30/UE (CEM).

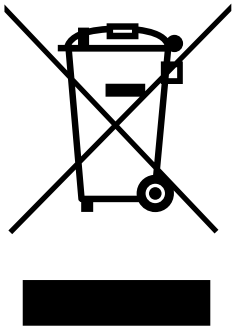
Note:
- *LdSD : directive sur la limitation de l'utilisation des substances dangereuses*
- *CEM : compatibilité électromagnétique*

Note: Utiliser uniquement des câbles blindés.

12 Product disposal

Disposal of this product: WEEE (Waste Electrical and Electronic Equipment)

(Applicable in Europe)



This symbol on the product, accessories, or accompanying documents indicates that the product and its electronic accessories must not be disposed of with household waste at the end of their working life.

To prevent possible harm to the environment and human health from uncontrolled waste disposal, separate these items from other types of waste and recycle them responsibly at a designated collection point to promote the sustainable reuse of material resources.

Household users:

Contact the retailer that you purchased the product from or your local authority for details of your nearest designated collection point.

Business users:

Contact your dealer or supplier for further information.

Revision history

Table 16. **Document revision history**

Date	Revision	Changes
12-Jan-2024	1	Initial release.
12-Nov-2025	2	Updated: • Section 3.1: System requirements • Section 7.5.1: Power source selection • Section 10.1: Product marking • Section 11: Compliance statements and conformity declarations Added: • Section 3.4: EDA resources • Section 5: Safety recommendations • Section 12: Product disposal

Contents

List of tables

List of figures

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