UM2617

User manual

Discovery kit with STM32L562QE MCU

Introduction

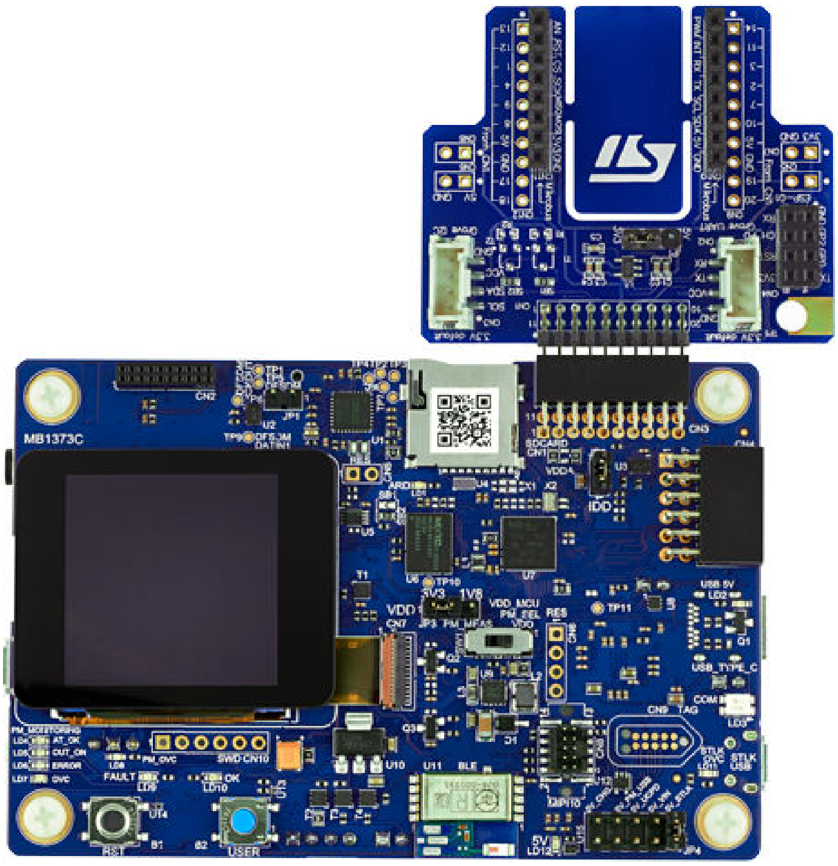
The STM32L562E-DK Discovery kit is designed as a complete demonstration and development platform for the STMicroelectronics Arm® Cortex®-M33 core-based STM32L562QEI6Q microcontroller with TrustZone®. It features 256 Kbytes of internal SRAM and 512 Kbytes of internal flash memory, one flexible memory controller (FMC) interface, one Octo-SPI memory interface, one TFT-LCD controller, one RTC, up to 16 timers, one USB Type-C® device FS port with UCPD controller, two SAI ports, four I²C buses, six USART ports, three SPIs, one CAN-FD port, one SDMMC interface, 2x 12-bit ADC, 2x 12-bit DAC, two low-power comparators, four digital filters for sigma-delta modulation, touch-sensing capability, an embedded step-down converter, and JTAG and ETM debugging support.

STM32L562E-DK, shown in Figure 1, associated with the fanout expansion board, is used as a reference design for user application development, although it is not considered as the final application.

The full range of hardware features on the board helps the user to evaluate all the peripherals (USB, USART, digital microphones, ADC and DAC, TFT LCD, Octo-SPI flash memory device, microSD™ card, audio codec, joystick, user button, Bluetooth® Low Energy, accelerometer and gyroscope) and to develop applications. Extension headers allow easy connection of a daughterboard or wrapping board for a specific application.

An STLINK-V3E is integrated on the board, as an embedded in-circuit debugger and programmer for the STM32 MCU and the USB Virtual COM port bridge.

Figure 1. STM32L562E-DK Discovery kit (top view)



Picture is not contractual.

1 Features

- STM32L562QEI6Q microcontroller featuring 512 Kbytes of flash memory and 256 Kbytes of SRAM in a BGA132 package
- 1.54" 240 × 240 pixel-262K color TFT-LCD module with a parallel interface and touch-control panel
- USB Type-C® Sink device FS
- On-board energy meter: 300 nA to 150 mA measurement range with a dedicated USB interface
- SAI audio codec
- MEMS digital microphones
- 512-Mbit Octo-SPI flash memory
- Bluetooth® Low Energy V4.1 module
- iNEMO 3D accelerometer and 3D gyroscope
- Two user LEDs
- User and reset push-buttons
- Board connectors:
  - USB Type-C®
  - microSD™ card
  - Stereo headset jack including analog microphone input
  - JTAG debugger
  - DPM dynamic-power measurement interface for external device
  - STMod+ expansion connector with fanout expansion board for Wi-Fi®, Grove, and mikroBUS™ compatible connectors
  - Pmod™ expansion connector
  - Audio MEMS daughterboard expansion connector
  - ARDUINO® Uno V3 expansion connector
- Flexible power-supply options: ST-LINK USB V_{BUS}, USB connector, or external sources
- On-board STLINK-V3E debugger/programmer with USB re-enumeration capability: mass storage, Virtual COM port, and debug port
- Comprehensive free software libraries and examples available with the STM32CubeL5 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 STM32L562E-DK 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 references	Target STM32
STM32L562E-DK	• MB1373(1) • MB1280(2)	STM32L562QEI6Q

1. Main board.

2. Fanout board.

2.1 Codification

The meaning of the codification is explained in Table 2.

Table 2. Codification explanation

STM32XXYYZ-DK	Description	Example: STM32L562E-DK
XX	MCU series in STM32 32-bit Arm Cortex MCUs	STM32L5 series
YY	MCU product line in the series	STM32L562
Z	STM32 flash memory size: • E for 512 Kbytes	512 Kbytes
DK	Discovery kit	Discovery kit

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.*

3.3 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 Delivery recommendations

Before the first use, check the board for any damage that might have occurred during shipment, and check that all socketed components are firmly fixed in their sockets and that none is loose in the plastic bag.

6 Hardware layout and configuration

The STM32L562E-DK Discovery kit is designed around the STM32L562QEI6Q target microcontroller. Figure 2 illustrates STM32L562QEI6Q connections with peripheral components. Figure 3 shows the location of the main components on the top side of the Discovery board. Figure 4 shows the location of the main components on the bottom side of the Discovery board.

Figure 2. Hardware block diagram

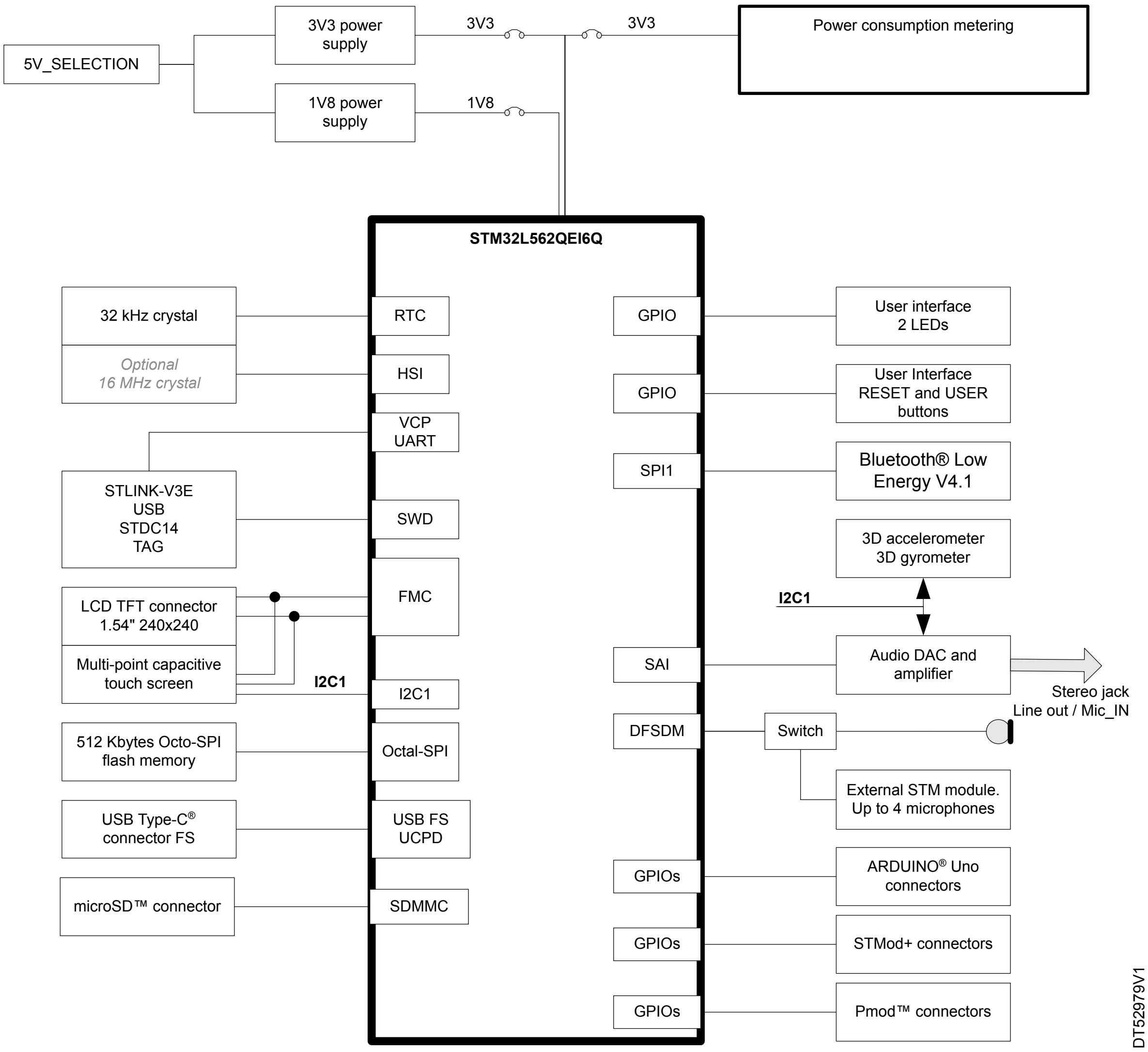


Figure 3. STM32L562E-DK PCB layout (top view)

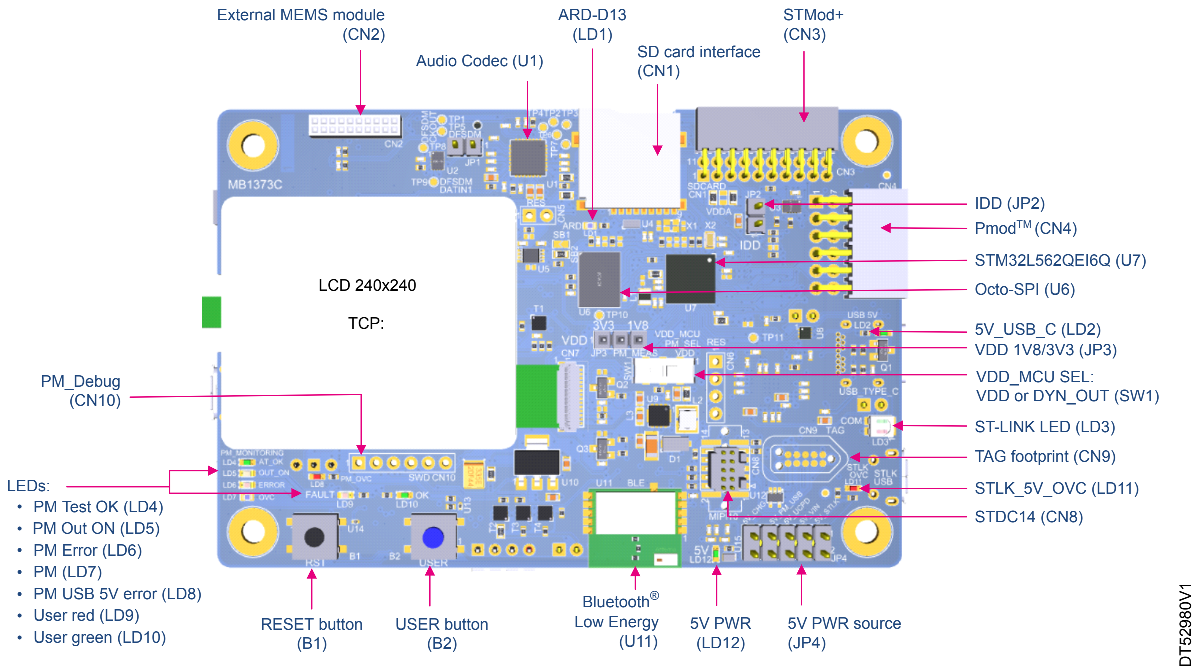
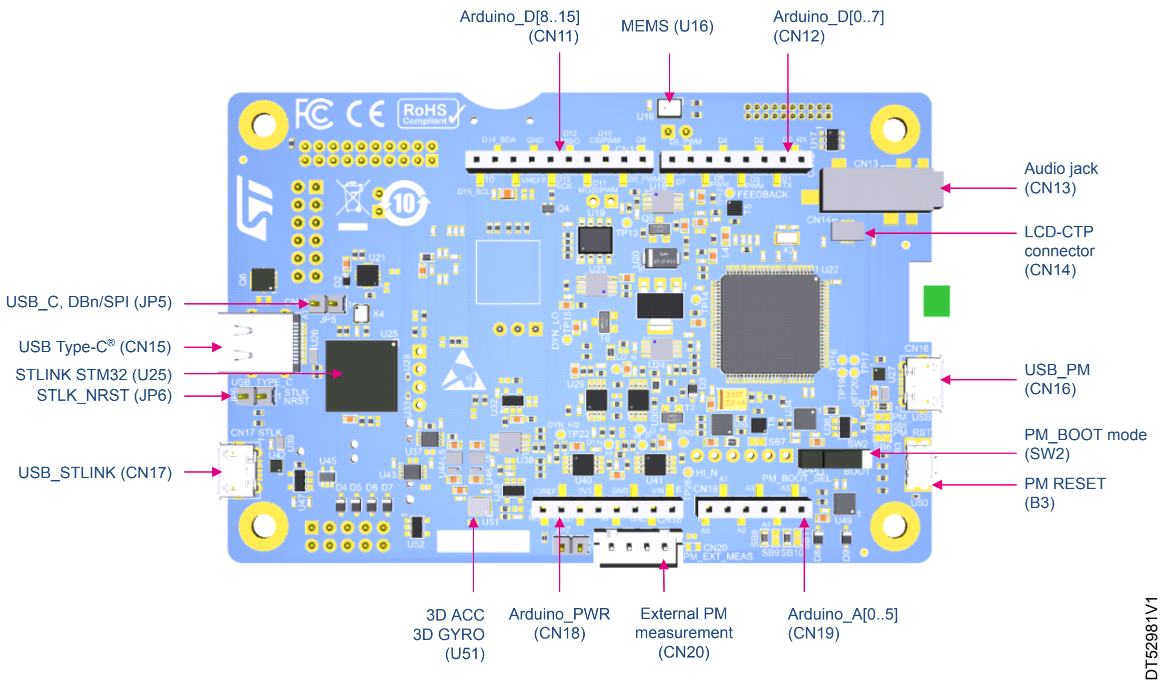


Figure 4. STM32L562E-DK PCB layout (bottom view)



6.1 Embedded STLINK-V3E

6.1.1 Description

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

- Using the embedded STLINK-V3E
- Using an external debug tool connected to the STDC14/MIPI10 connector (CN8)

The STLINK-V3E facility for debugging and flashing is integrated into the STM32L562E-DK Discovery kit.

The STLINK-V3E makes the STM32L562E-DK Discovery kitArm® Mbed Enabled™.

The embedded STLINK-V3E supports only SWD and VCP for STM32 devices.

Features supported in STLINK-V3E:

- 5 V power supplied by the USB connector (CN17)
- USB 2.0 high-speed-compatible interface
- JTAG and Serial Wire Debug (SWD) specific features:
  - 3 to 3.6 V application voltage on the JTAG/SWD interface and 5 V tolerant inputs
  - JTAG
  - SWD and Serial Wire Viewer (SWV) communication
- STDC14 (MIPI10) compatible connector (CN8)
- COM status LED (LD3) which blinks during communication with the PC
- OC fault red LED (LD11) alerting on USB overcurrent request
- 5 V/500 mA output power supply capability (U47) with current limitation and LED (LD11)
- 5 V power green LED (LD12)

Table 4 describes the USB Micro-B connector (CN17) pinout.

Table 4. USB Micro-B connector (CN17) pinout

Pin	Pin name	Signal name	STLINK-V3E STM32 pin	Function
1	VBUS	5V_USB_CHGR	-	VBUS power
2	DM	USB_DEV_HS_CN_N	PB14	DM
3	DP	USB_DEV_HS_CN_P	PB15	DP
4	ID	-	GND	ID
5	GND	GND	GND	GND

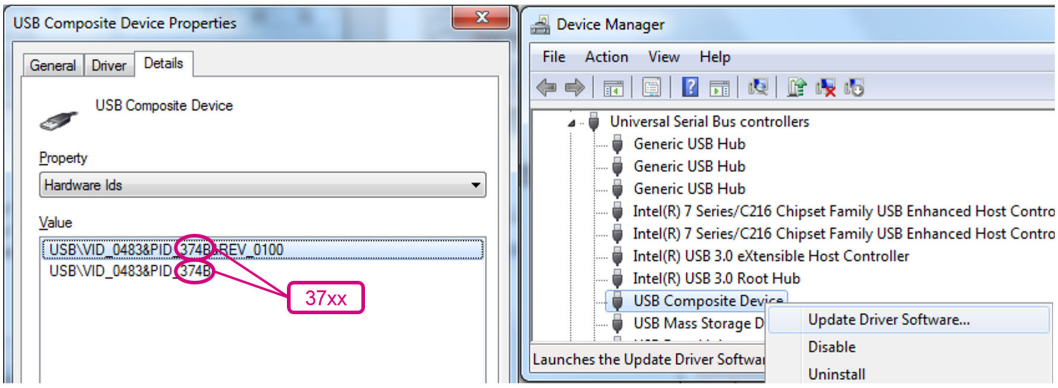
6.1.2 Drivers

Before connecting the STM32L562E-DK board to a Windows PC via USB, the user must install a driver for STLINK-V3E (not required since Windows® 10). It is available on the *www.st.com* website.

In case the STM32L562E-DK board is connected to the PC before the driver is installed, some STM32L562E-DK 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 5.

Note: Prefer using the USB Composite Device handle for a full recovery.

Figure 5. **USB composite device**



Note: *37xx:*
- *374E for STLINK-V3E without bridge functions*
- *374F for STLINK-V3E with bridge functions*

6.1.3 STLINK-V3E firmware upgrade

The STLINK-V3E embeds a firmware upgrade mechanism for in-place upgrades through the USB port. The firmware might evolve during the lifetime of the STLINK-V3E product (for example new functionalities, bug fixes, support for new microcontroller families). Visit the *www.st.com* website before starting to use the STM32L562E-DK Discovery kit and periodically, to stay up-to-date with the latest firmware version.

6.1.4 Using an external debug tool to program and debug the onboard STM32

Two basic ways to support an external debug tool:

1. Keep the embedded STLINK-V3E running. Power on the STLINK-V3E at first until the COM LED lights RED. Then connect the external debug tool through the STDC14/MIPI10 debug connector (CN8).
2. Set the embedded STLINK-V3E in a high-impedance state. When setting the jumper JP6 (STLK_RST) ON, the embedded STLINK-V3E is in the RESET state and all GPIOs are in high impedance. Then the user can connect the external debug tool to the debug connector (CN8).

Figure 6. **Connecting an external debug tool to program the on-board STM32L5**

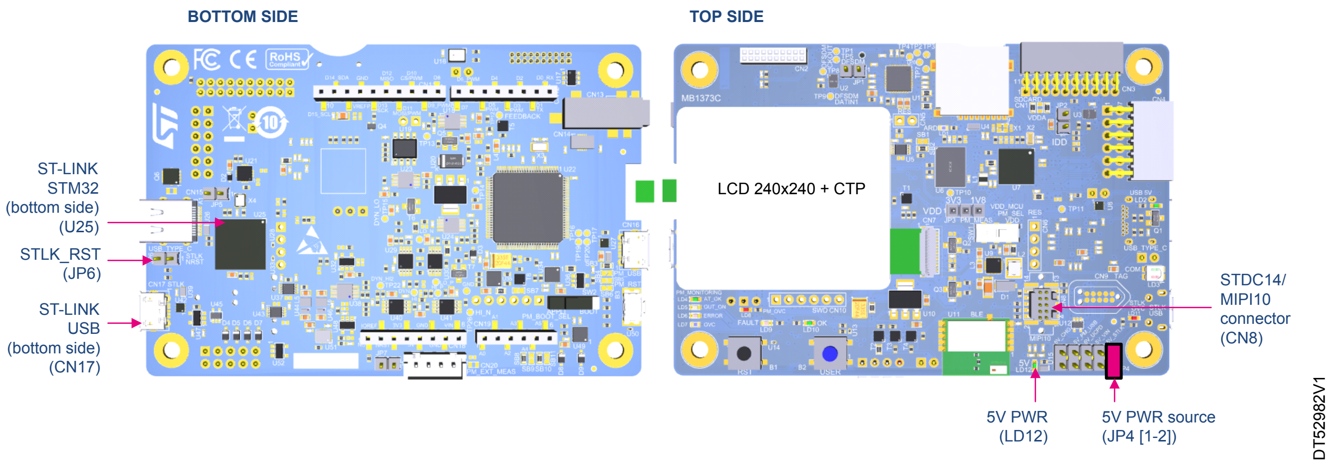


Figure 7 shows the STDC14 connector (CN8) pinout.

Figure 7. STDC14 connector (CN8) pinout

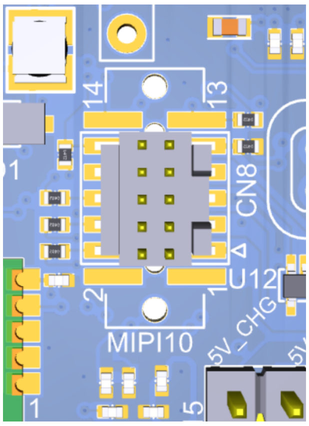


Table 5 describes the STDC14/MIPI10 debug connector (CN8) pinout.

Table 5. STDC14 connector pinout

STM32 pin	Board function	Pin	Pin	Board function	STM32 pin
-	-	1	2	-	-
VDD	Power	3	4	T.SWDIO: Target SWDIO using SWD protocol or target JTMS (T.JTMS) using JTAG protocol	PA13
GND	Power	5	6	T.SWCLK: Target SWCLK using SWD protocol or target JCLK (T.JCLK) using JTAG protocol	PA14
GND	Power	7	8	T.SWO: Target SWO using SWD protocol or target JTDO (T_JTMS) using JTAG protocol	PB3
-	KEY	9	10	T.JTDI[(1)]: Not used by SWD protocol, target JTDI (T.JTDI) using JTAG protocol, only for external tools	PA15[(1)]
-	GNDDetect: Pull-down	11	12	NRST: Target NRST using SWD protocol or target JTMS (T.JTMS) using JTAG protocol	NRST
PA10	T.VCP_RX: Target RX used for VCP (can be a UART supported bootloader)	13	14	T.VCP_TX: Target TX used for VCP (can be a UART supported bootloader)	PA9

1. *PA15 is used by default for the UCPD_CC1 feature. To use PA15 for JTDI, add the R42 resistor. In this case, the UCPD_CC1 feature cannot be used.*

6.2 TAG footprint

The TAG footprint (CN9) can also output a debug interface compatible with the TAG probe TC2050-IDC-NL. Figure 8 shows the TAG connector pinout.

Figure 8. TAG connector (CN9) pinout

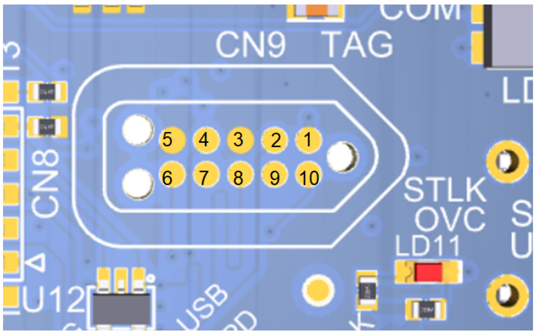


Table 6 describes the TAG connector (CN9) pinout.

Table 6. TAG connector (CN9) pinout

STM32 pin	Board function	Pin	Pin	Board function	STM32 pin
VDD	Power	1	10	NRST: Target NRST using SWD protocol or target JTMS (T.JTMS) using JTAG protocol	NRST
PA13	T.SWDIO: Target SWDIO using SWD protocol or target JTMS (T.JTMS) using JTAG protocol	2	9	NC	-
GND	Power	3	8	T.JTDI[(1)]: Not used by SWD protocol, target JTDI (T.JTDI) using JTAG protocol, only for external tools	PA15[(1)]
PA14	T.SWCLK: Target SWCLK using SWD protocol or target JCLK (T.JCLK) using JTAG protocol	4	7	NC	-
GND	Power	5	6	T.SWO: Target SWO using SWD protocol or target JTDO (T_JTMS) using JTAG protocol	PB3

1. *PA15 is used by default for the UCPD_CC1 feature. To use PA15 for JTDI, add the R42 resistor. In this case, the UCPD_CC1 feature cannot be used.*

6.3 Power supply

6.3.1 5 V power supply general view

The STM32L562E-DK Discovery kit can be powered from a 5 V DC power source.

One of the following 5 V DC power inputs can be used, upon an appropriate board configuration:

- 5V_STLK provided by a host PC connected to CN17 through a Micro-B USB cable (default configuration)
- 5V_VIN provided by an external 7 to 12 V power supply connected to ARDUINO® CN18 pin 8
- 5V_UCPD provided by a host PC connected to CN15 through a USB Type-C® cable.
- 5V_PM provided by a host PC connected to CN16 through a Micro-B USB cable. This one is used for the energy meter function.
- 5V_CHG provided by a 5 V USB charger connected to CN17 through a Micro-B USB cable
- 5V_DC provided by an external 5V_DC source on ARDUINO® CN18 pin 5, or directly after the JP4 connector for 5 V selection

When 5V_VIN, 5V_CHG, 5V_DC, or 3V3 is used to power the STM32L562E-DK board, this power source must comply with the standard EN-60950-1: 2006+A11/2009 and must be safety extra low voltage (SELV) with limited power capability.

The green LED (LD12) turns on when the voltage on the power line marked as 5 V is present. All supply lines required for the operation of the components on STM32L562E-DK are derived from that 5 V line.

When the power supply is external 3V3 or 5V_CHG on CN17, the STLINK-V3E cannot be used.

Table 7 describes the 5 V power supply capabilities.

Table 7. Power supply capabilities

Input power name	Connector pins	Input voltage range	Max. current	Limitation
5V_STLK	CN17 pin 1 JP4 [1-2]	4.75 to 5.25 V	500 mA	The maximum current depends on the USB enumeration: • 100 mA without enumeration • 500 mA with correct enumeration
5V_VIN	CN18 pin 8 JP4 [3-4]	7 to 12 V	-	From 7 V to 12 V only, and input current capability is linked to input voltage: • 800 mA input current when VIN=7 V • 450 mA input current when 7 V < VIN < 9 V • 250 mA input current when 9 V < VIN < 12 V
5V_UCPB	CN15 JP4 [5-6]	4.75 to 5.25 V	1 A	The maximum current depends on the USB host used to power the board.
5V_PM	CN16 pin 1 JP4 [7-8]	4.75 to 5.25 V	500 mA	The maximum current depends on the USB enumeration: • 100 mA without enumeration. • 500 mA with correct enumeration
5V_CHG	CN17 pin 1 JP4 [9-10]	4.75 to 5.25 V	-	The maximum current depends on the USB charger used to power the board.
5V_DC	CN18 pin 5 JP4 pin 2/4/6/8/10 JUMPER OFF	4.75 to 5.25 V	-	The maximum current depends on the 5V_DC used to power the board.

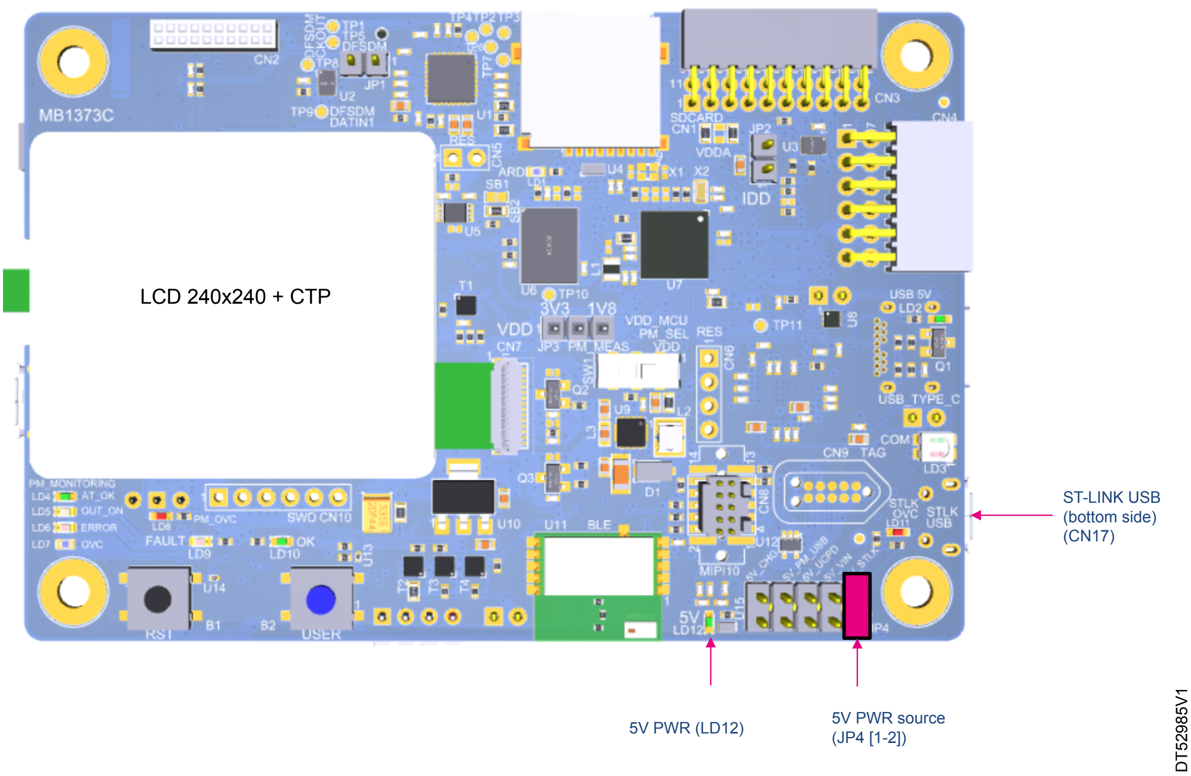
6.3.2 Power supply input from an STLINK-V3E USB connector (default setting): 5 V/500 mA

5V_STLK is a DC power with limitation from an STLINK-V3E USB connector (CN17), the USB Micro-B connector of STLINK-V3E. In this case, the JP4 jumper must be on pin [1-2] to select the 5V_STLK power source on the JP4 silkscreen. This is the default setting. If the USB enumeration succeeds, the 5V_STLK power is enabled, by asserting the PWR_ENn signal (from the STLINK-V3E MCU). This pin is connected to a power switch, which powers the board. This power switch also features a 500 mA current limitation to protect the PC in case of an onboard short circuit.

The STLINK-V3E USB connector (CN17) can power the Discovery board with its shield, but only an STLINK-V3E circuit has the power before USB enumeration because the host PC only provides 100 mA to the board at that time. During the USB enumeration, the Discovery board asks for a 500 mA current to the host PC. If the host can provide the required power, the enumeration finishes by a *SetConfiguration* command. Then the power switch and the green LED (LD12) turned ON. Thus, the Discovery board with its shield can consume 500 mA current, but no more. If the host is not able to provide the requested current, the enumeration fails. Therefore, the power switch remains OFF and the MCU part including the expansion board is not powered. As a consequence, the green LED (LD12) remains turned OFF. In this case, it is mandatory to use another power supply.

The 5V_STLK power source configuration for jumper JP4 [1-2] is described in Figure 9.

Figure 9. **JP4 [1-2]: 5V_STLK PWR SOURCE**



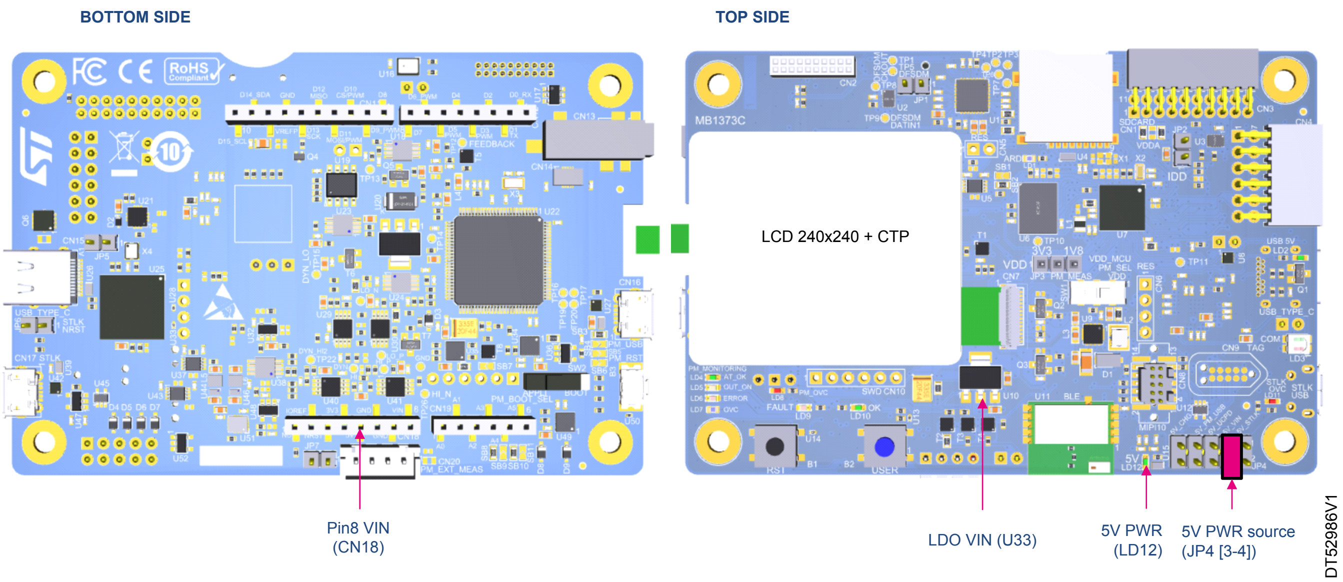
6.3.3 5V_VIN power source: 7 to 12 V, 800 mA maximum

5V_VIN is the DC power coming from the ARDUINO® connector (CN18). In this case, the JP4 jumper must be on pin [3-4] to select the 5V_VIN power source on the JP4 silkscreen.

A dedicated LDO (U10) is used to generate the 5V_VIN from the 7 to 12 V VIN input.

The 5V_VIN power source configuration for jumper JP4 [3-4] is described in Figure 10.

Figure 10. JP4 [3-4]: 5V_VIN PWR SOURCE

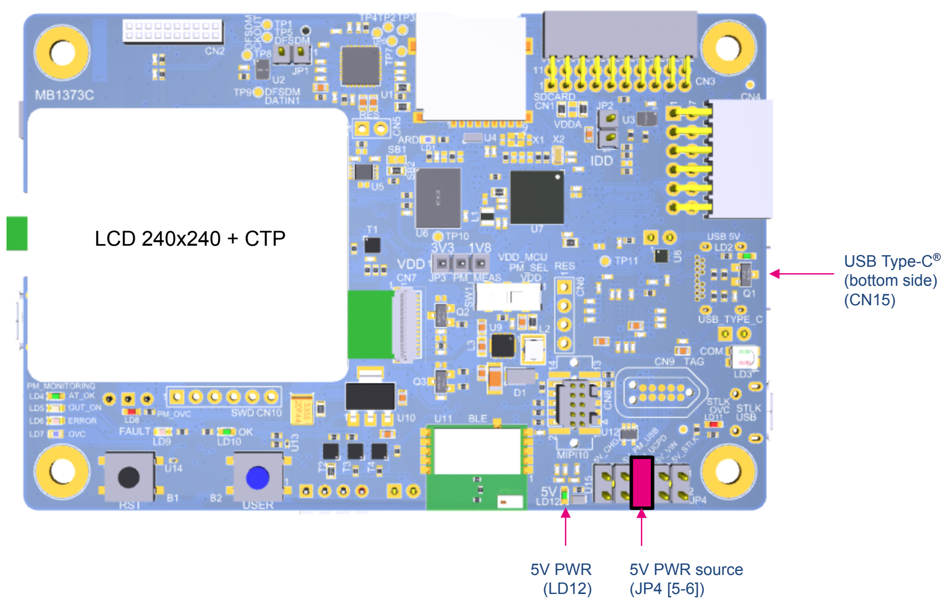


6.3.4 5V_UCPD power source: 5 V, 1 A maximum

5V_UCPD is the DC power supply connected to the user USB Type-C® connector (CN15) for power delivery. To select the 5V_UCPD power source on the JP4 silkscreen, the JP4 jumper must be on pins [5-6].

The 5V_UCPD power source configuration for jumper JP4 [5-6] is described in Figure 11.

Figure 11. JP4 [5-6]: 5V_USB_TYPE_C PWR SOURCE (CN15)



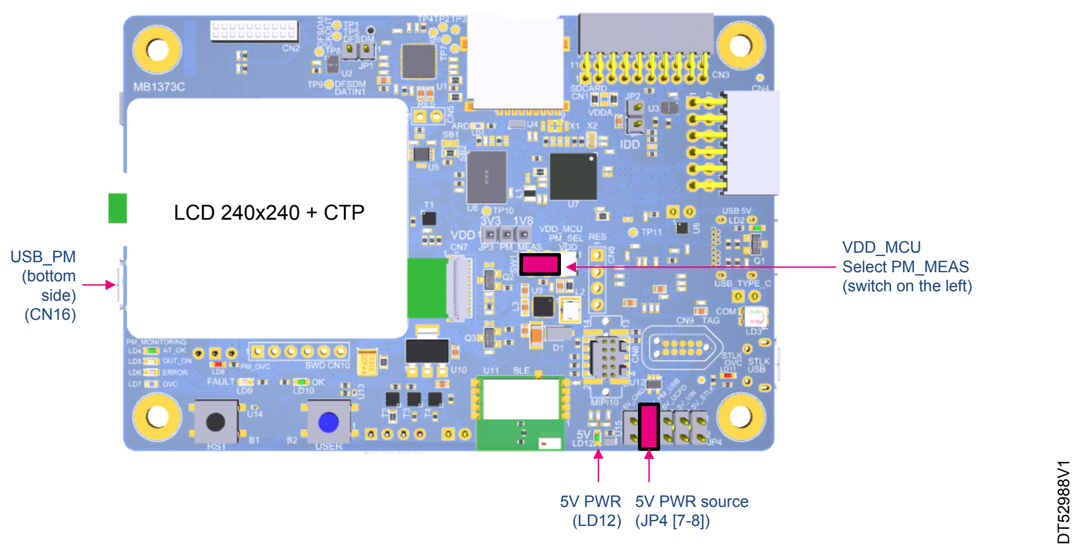
6.3.5 5V_PM power source: 5 V, 500 mA

5V_PM is the DC power coming from the energy metering part on the USB connector (CN16). In this case, the JP4 jumper must be on pin [7-8] to select the 5V_PM power source on the JP4 silkscreen.

When the 5V_PM is selected, the SW1 switch must be set in the PM_MEAS position to provide and measure VDD.

The 5V_PM power source configuration for jumper JP4 [7-8] is described in Figure 12.

Figure 12. JP4 [7-8]: 5V_PM PWR SOURCE (CN16)

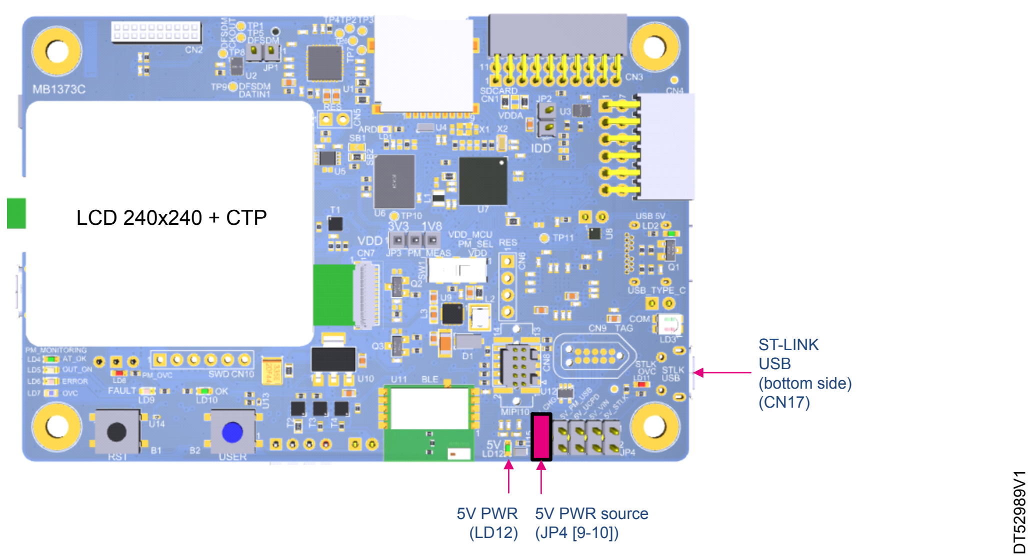


6.3.6 5V_CHG power source: 5 V

5V_CHG is the DC power charger connected to USB STLINK-V3E (CN17). To select the 5V_CHG power source on the JP4 silkscreen, the JP4 jumper must be on pins [9-10]. In this case, if the STM32L562E-DK board is powered by an external USB charger, then the debug on the STLINK-V3E USB connector is not available.

The 5V_CHG power source configuration for jumper JP4 [9-10] is described in Figure 13.

Figure 13. JP4 [9-10]: 5V_CHG PWR SOURCE (CN17)



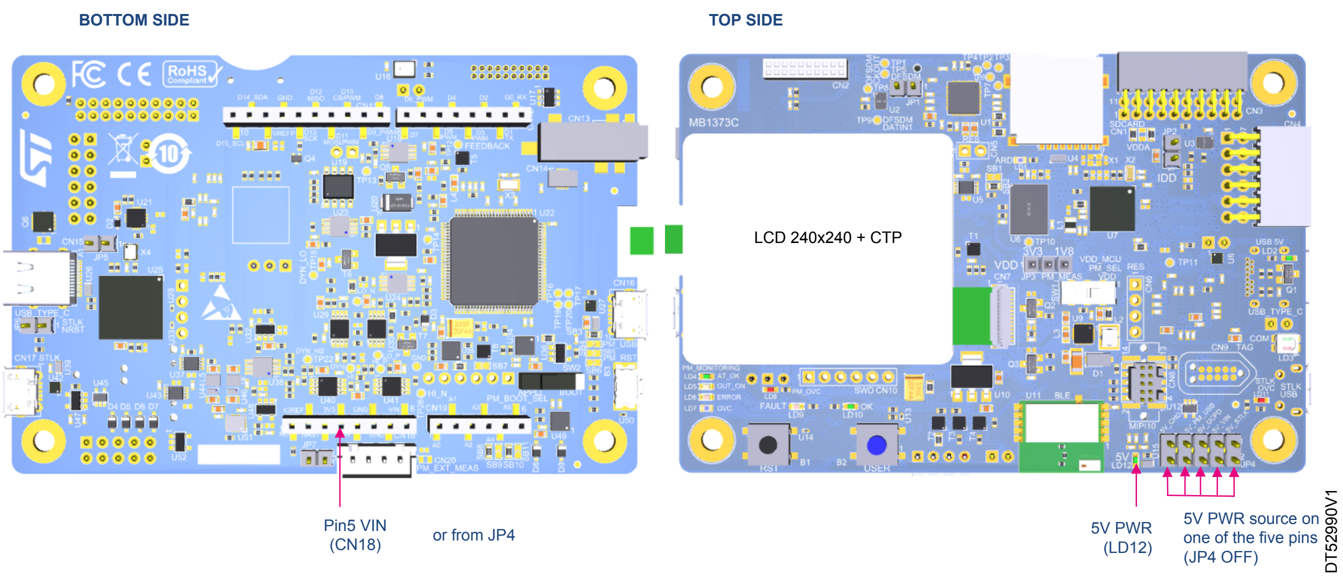
Note: With this JP4 configuration: 5V_CHG, the USB_PWR protection is bypassed. Never use this configuration with a computer connected instead of the charger. As the USB_PWR protection is bypassed, if the board consumption is higher than 500 mA, this can damage the computer. If a 500 mA current is enough, it is recommended to prefer the 5V_STLK source instead of the 5V_CHG source.

6.3.7 5V_DC power source

5V_DC is the DC power coming from external (5 V DC power from ARDUINO® CN5 pin5 or JP4 pin 2, 4, 6, 8, or 10 jumper connectors. In this case, the JP4 jumper must be OFF.

The 5V_DC power source configuration for jumper JP4 [-] is described in Figure 14.

Figure 14. JP4 [-]: 5V_DC PWR SOURCE



6.3.8 Programing/debugging when the power supply is not from STLINK-V3E (5V_STLK)

5V_VIN, 5V_PM, 5V_DC, or 5V_UCPD can be used as an external power supply, in case the current consumption of the STM32L562E-DK Discovery kit, with expansion boards, exceeds the allowed current on USB. In such a condition, it is still possible to use the USB for communication for programming or debugging only.

In this case, it is mandatory to power the board first using 5V_VIN, 5V_PM, 5V_DC or 5V_UCPD then connect a USB cable to the PC. Proceeding this way, the enumeration succeeds thanks to the external power source.

The following power sequence procedure must be respected:

1. Connect the JP4 jumper according to the external 5 V power source selected.
2. Connect the external power source according to JP4.
3. Power ON the external power supply.
4. Check that the 5 V green LED (LD12) is turned ON.
5. Connect the PC to the USB connector (CN17).

If this sequence is not respected, the board might be powered by V_{BUS} first from STLINK-V3E, and the following risks might be encountered:

- If the board needs more than 500 mA, the PC might be damaged or limit the current. As a consequence, the board is not powered correctly.
- A 500 mA current is requested at the enumeration step. If the PC does not provide such a current, there is a risk that the request is rejected and enumeration fails. Consequently, the board is not powered and LD12 remains OFF.

6.3.9 External power supply output

5 V: When the STM32L562E-DK board is powered by 5V_STLK, 5V_VIN, 5V_PM, 5V_UCPD, or 5V_CHG, the 5 V on ARDUINO® CN18 pin 5 can be used as an output power supply for an expansion board plugged into CN18. In this case, the maximum current of the power source specified in Table 7 must be respected.

3V3: ARDUINO® CN18 pin 4 can also be used as a power supply output. The current is limited by the maximum 300 mA current capability of the DC-DC converter (U46), concerning the STM32L562E-DK board and its shield consumption.

6.3.10 Internal power supply

For general information concerning design recommendations for STM32L562QEI6Q with INTERNAL SMPS and design guide for ultra-low-power applications with performance, refer to the application note *Getting started with STM32L5 Series hardware development* (AN5211), available on the *www.st.com* website.

3V3

Regardless of the 5V power source, a U46 DC-DC converter is used to deliver a fixed 3.3 V power supply, with a current capability of 300 mA. This power source of 3.3 V is shared between the STM32L562E-DK and its expansion board.

1V8

Regardless of the 5V power source, a U44 DC-DC converter is used to deliver a fixed 1.8 V voltage, with a current capability of 300 mA. This power source of 3.3 V is shared between the STM32L562E-DK and its expansion board.

When VDD_MCU is connected to 1V8, the MCU switches to LDO mode instead of SMPS mode.

Warning: *The power sequence is not respected when using 1V8 VDD. Refer to the application note Getting started with STM32L5 Series hardware development (AN5211), and STM32L5xx product datasheets for power sequencing, available on the www.st.com website.*

DYN_OUT

The STM32L562E-DK Discovery kit offers the possibility to make dynamic current consumption measurements with a range of 300 nA to 150 mA. An integrated energy meter performs this function. Refer to Section 6.19 MCU energy meter tools.

VDD_MCU selection

VDD_MCU used to supply the STM32 can be powered by the U46 DC-DC converter (3V3) by setting JP3 [1-2], or by the U44 DC-DC converter (1V8) by setting JP3 [2-3]. For both configurations, the SW1 must be in the VDD position.

Energy meter tools can also power VDD_MCU. To use the energy meter tools, follow the configuration below:

- Set the SW1 switch to the position PM_MEAS.
- Power the board through the 5V_PM with the USB connector (CN16).
- JP4 jumper must be on pin [7-8] to select the 5V_PM power source on the JP4 silkscreen.

With this configuration, it is recommended to set JP3 to the correct position, 3V3 or 1V8, to respect the I/O level compatibility between MCU and onboard I/Os.

The VDD_MCU power selection schematic is described in Figure 15.

Figure 15. VDD_MCU power selection schematics

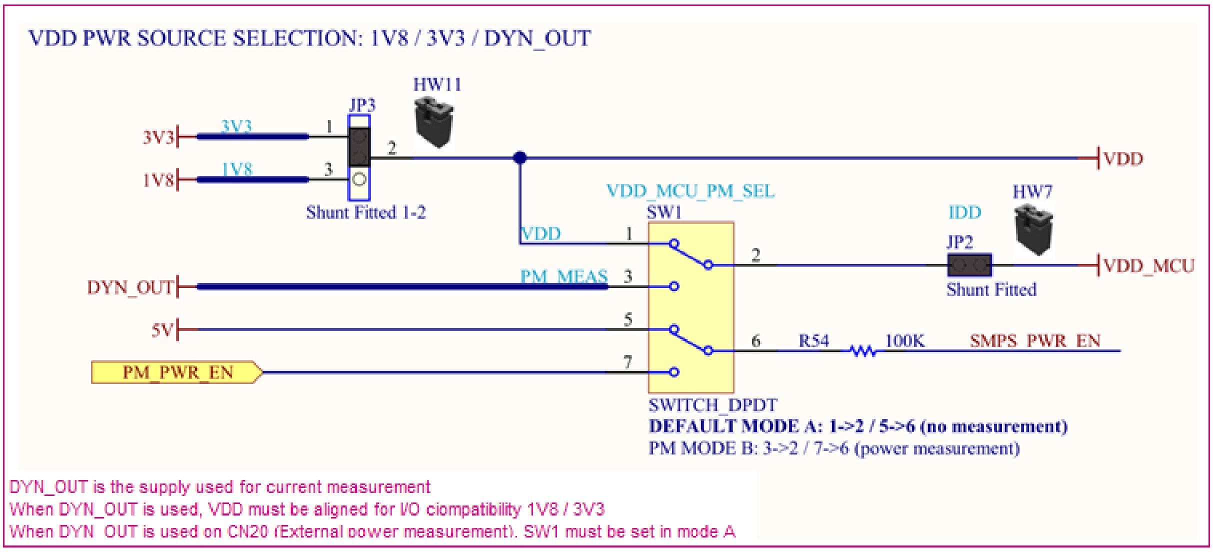


Figure 15 details the VDD_MCU power selection.

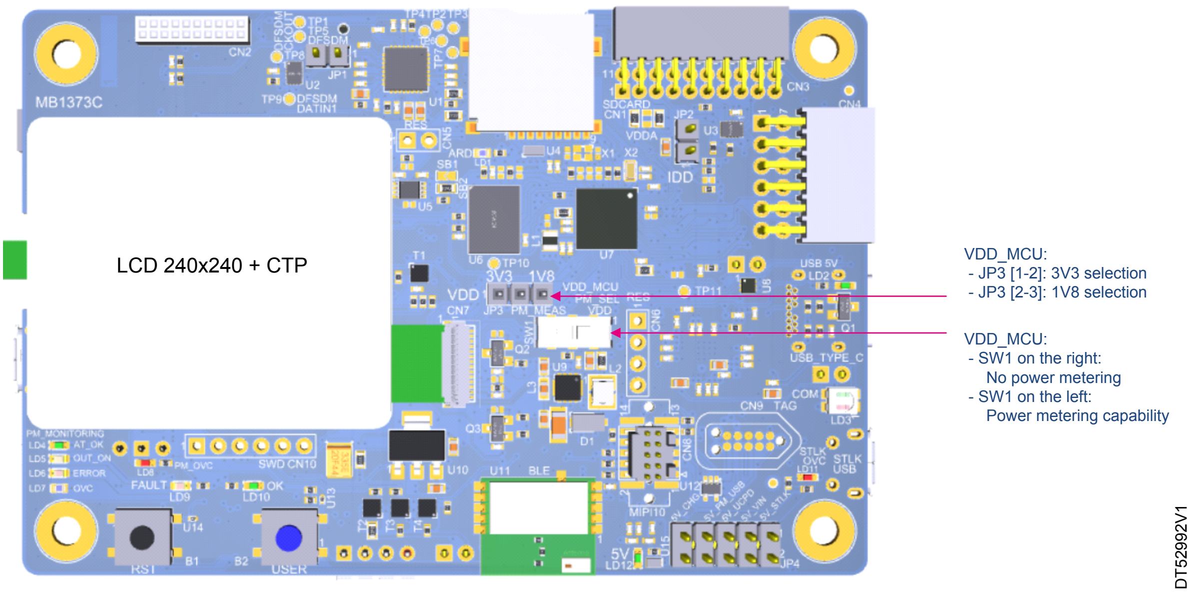
Table 8. VDD_MCU power selection

JP6	SW1	Definition(1)	Comment
JP3 [1-2]	**SW1 [1-2] [5-6]**	**DCDC U46 3V3**	**U46 is used to provide 3V3 VDD_MCU.**
	SW1 [2-3] [6-7]	NA	U46 is used to provide 3V3 only for the onboard device, not the MCU.
JP3 [2-3]	SW1 [1-2] [5-6]	U44 DC-DC 1V8	U44 is used to provide 1V8 VDD_MCU.
	SW1 [2-3] [6-7]	NA	U44 is used to provide 3V3 only for the onboard device, not the MCU.
JP3 [x-x]	SW1 [2-3] [6-7]	Current measurement selection	The energy metering part is used to supply VDD_MCU and to measure current consumption.

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

Figure 16 describes the VDD_MCU power selection on the STM32L562E-DK board.

Figure 16. VDD_MCU power selection



6.4 RSS/bootloader

The bootloader is located in the system memory, programmed by ST during production. It is used to reprogram the flash memory by using USART, I^{2}C, SPI, CAN FD, or USB FS in device mode through the DFU (device firmware upgrade). The bootloader is available on all devices. For more details, refer to the application note *STM32 microcontroller system memory boot mode* (AN2606), available on the *www.st.com* website.

The root secure services (RSS) are embedded in a flash memory area named the secure information block, programmed during ST production. For example, it enables secure firmware installation (SFI) thanks to the RSS extension firmware (RSSe SFI). This feature allows customers to protect the confidentiality of the firmware to be provisioned into the STM32 when production is subcontracted to an untrusted third-party. The root secure services are available on all devices, after enabling the TrustZone® through the TZEN option bit.

The bootloader version can be identified by reading the bootloader ID at the address `0x0BF97FFE`.

6.4.1 Limitation

The STM32L5 part soldered on STM32L562E-DK on the product version DK32L562E$AT1 (sticker available on the top side of the board) embeds the bootloader V9.0 affected by the limitations to be worked around, as described hereunder. The bootloader ID of the bootloader V9.0 is `0x90`.

The following limitations exist in the bootloader V9.0:

Issue observed:

Option byte programming in RDP level 0.5: The user cannot program nonsecure option bytes in RDP level 0.5 through the bootloader.

Proposed workaround:

The user can program option bytes thanks to STM32CubeProgrammer GUI or command-line interfaces through JTAG. To know how to program option bytes through STM32CubeProgrammer, refer to the user manual *STM32CubeProgrammer software description* (UM2237), available on the *www.st.com* website.

Issue observed:

Impossible to set the TZEN option bit: The user cannot set the TZEN option bit through the bootloader interfaces.

Proposed workaround:

Instead of the bootloader interface, the user can use JTAG to set the TZEN option bit.

Issue observed:

Go command on USB-DFU interface: The user cannot use the *Go command through bootloader* on the USB-DFU interface.

Proposed workaround:

Instead of the USB-DFU interface, the user can use JTAG or any other communication port supported by the bootloader to run the *Go command*, like USART, I^2C, SPI, or CAN FD.

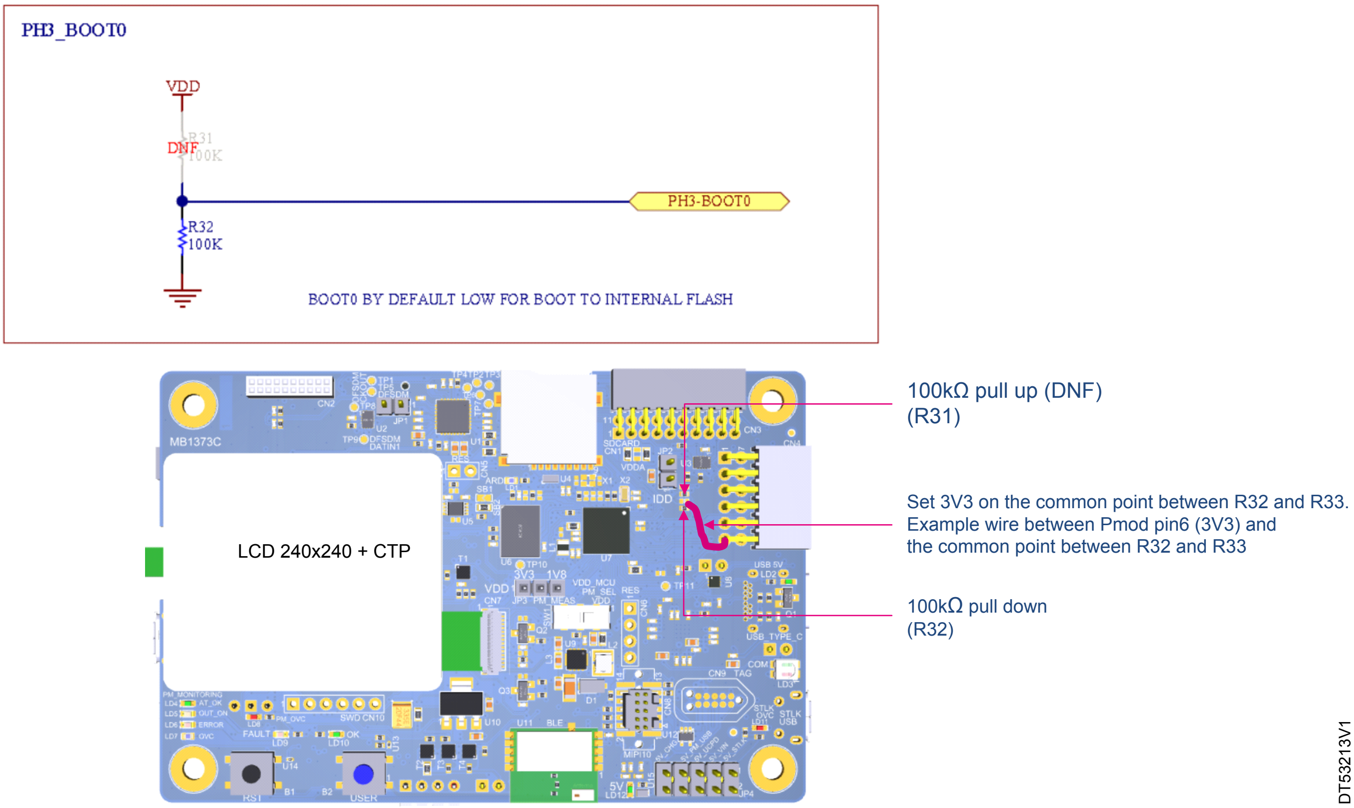
Caution: Only SFI through JTAG is fully supported on bootloader V9.0. SFI through bootloader interfaces is partially supported because the bootloader cannot manage some option bytes and they must be set through JTAG.

6.4.2 Boot from RSS

On STM32L562E-DK, the PH3-BOOT0 is fixed to a low level allowing the boot from the memory address defined by the SECBOOTADD0 option byte. To change the boot from RSS, it is needed to set the PH3-BOOT0 to the high level by removing R32 and soldering R31, or just by applying 3V3 on the PH3-BOOT0 signal between R32 and R31. In this second case, it is not necessary to remove R32 or to add R31.

Figure 17 explains how to connect 3V3 to BOOT0.

Figure 17. BOOT0 modification to set the high-level logic



6.5 Clock source

6.5.1 LSE clock reference

The LSE clock reference on the STM32L562QEI6Q microcontroller is done by an external crystal X2.

- 32.768 kHz crystal

6.5.2 HSE clock reference

The HSE clock references on the STM32L562QEI6Q microcontroller can come from:

- Internal RC for MSI clock reference (default configuration)
- STLK_MCO from STLINK-V3E: 8 MHz optional clock not connected by default
- 16 MHz crystal X1, for HSE clock generator. This one is optional and not mounted by default.

Table 9 describes the I/O configuration for the optional HSE.

Table 9. I/O configuration for the optional HSE

I/O	Resistor	Setting	Configuration
PH0	R28	**OFF**	**The PH0 OSC_IN terminal is not connected to STLK_MCO** **MSI is used** **PH0 is used as the LCD_PWR-ON GPIO (R29 connected)**
		ON	PH0 OSC_IN is connected to STLK_MCO 8 MHz. MSI is not used. PH0 is not used as a GPIO.
	R27	**OFF**	**The PH0 OSC_IN terminal is not connected to the HSE crystal.** **MSI is used.** **PH0 is used as the LCD_PWR-ON GPIO (R29 connected).**
		ON	PH0 OSC_IN is connected to the 16 MHz HSE crystal. MSI is not used. PH0 is not used as a GPIO.
PH1	R26	**OFF**	**The PH1 OSC_OUT terminal is not connected to the HSE crystal.** **MSI is used.** **PH1 is used as the MEMS LED GPIO (R25 connected).**
		ON	PH1 OSC_OUT is connected to the 16 MHz HSE crystal. MSI is not used. PH1 is not used as a GPIO.

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

6.6 Reset source

The reset signal of the STM32L562E-DK Discovery kit is active at a low level. Internal PU forces the RST signal to a high level.

Sources of reset are:

- Black RESET button (B1)
- Embedded STLINK-V3E
- JTAG/SWD STDC14 connector (CN8) and TAG connector (CN9) (reset from debug tools)
- ARDUINO® CN18 pin 3 (reset from daughterboard)
- PD12 from the energy meter part included in the STM32L562E-DK Discovery kit

6.7 Audio

6.7.1 Description

An audio codec (U1) is connected to the SAI interface of STM32L562QEI6Q, which supports the TDM feature of the SAI port. The TDM feature offers STM32L562QEI6Q the capability to stream stereo audio channels.

There is one low-power digital microphone on board the STM32L562E-DK. The Discovery kit offers the possibility to connect a MEMS expansion module.

6.7.2 Operating voltage

VDD supplies the microphone, which is compatible with the VDD_MCU voltage range from 1.8 to 3.3 V. The audio codec has two supplies:

- VL connected to VDD compatible with VDD_MCU voltage selection 1V8 or 3V3 according to the audio codec datasheet
- 1V8_CODEC source provided by U44

6.7.3 Audio codec interface

The audio codec interface is the MCU SAI1 and an I^{2}C interface.

Table 10 describes the I/O configuration for the audio codec interface.

Table 10. I/O configuration for the audio interface

I/O	Configuration
PG1	PG1 is used as audio RESET (active low).
PE2	PE2 is used as SAI.MCLK_A.
PE3	PE3 is used as SAI.SD_B.
PE4	PE4 is used as SAI.FS_A.
PE5	PE5 is used as SAI.SCK_A.
PE6	PE6 is used as SAI.SD_A.
PB6	PB6 is used as I2C1_SCL shared between ARDUINO®, CTP, STMod+, 3D accelerometer, and 3D gyrometer.
PB7	PB7 is used as I2C1_SDA shared between ARDUINO®, CTP, STMod+, 3D accelerometer, and 3D gyrometer.

6.7.4 Headphones outputs

The STM32L562E-DK Discovery kit can drive stereo headphones. The STM32L562QEI6Q sends up the stereo audio channels, via its SAI1 TDM port, to the codec device. The codec device converts the digital audio stream to stereo analog signals. It then boosts them for direct drive of headphones connecting to a 3.5 mm stereo jack (CN13) receptacle on the board.

An I^{2}C bus sets the audio codec. The address is a 7-bit address, with an additional bit to read or write (high to read, low to write). The AD0 pin connected to GND gives the least significant bit of the address. The address of the audio codec is `0b1001010x`. The hexadecimal code is `0x94` to write, and `0x95` to read.

6.7.5 Audio jack connector

Figure 18 shows the audio jack connector (CN13).

Figure 18. Audio jack connector (CN13)

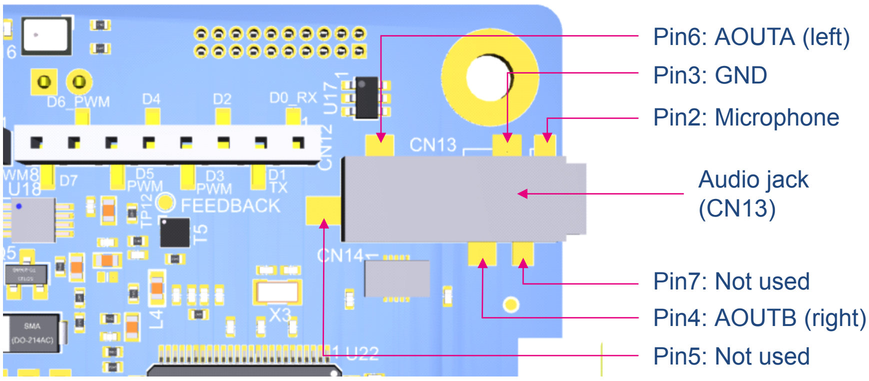


Table 11 describes the audio jack connector (CN13) pinout.

Table 11. Audio jack connector (CN13) pinout

Pin	Signal name	Codec pin	Function
2	MIC_IN	MICIN1	Microphone IN
3	GND	GND	GND
4	AOUTB	AOUTB	OUT_SPEAKER_LEFT
5	-	NA	-
6	AOUTA	AOUTA	OUT_SPEAKER_RIGHT
7	-	NA	NA

6.7.6 Digital microphone interface

A low-power digital microphone (U16) is available on STM32L562E-DK.

The interface used for this microphone is the DFSDM1 with DFSDM1_CKOUT and DFSDM1_DATIN1. The microphone is supplied with a programmable clock directly generated by STM32L562QEI6Q.

The STM32L562QEI6Q DFSDM interface is shared and exclusive between the embedded microphone (U13), the MEMS expansion module on connector CN2 and with the STMod+ connector (CN3).

A quad SPDT switch (U2) driven by a jumper (JP1) routs the DFSDM interface to the selected application.

Table 12 describes the I/O configuration for the audio DFSDM interface.

Table 12. I/O configuration for the U13 AUDIO MEMS

I/O	Configuration
PG7	PG7 used as DFSDM_CKOUT
PB12	PB12 used as DFSDM_DATIN1

Table 13 describes the I/O configuration for the audio DFSDM interface.

Table 13. Audio jack connector (CN13) pinout

Function	STM32 pin	Signal name	Pin	Pin	Signal name	STM32 pin	Function
GND	-	GND	1	2	3V3	-	3V3
-	-	-	3	4	DFSDM_CKOUT_EXT	PG7	DFSDM CLK
DFSDM DATA3	PC7	DFSDM_DATIN3	5	6	DFSDM_DATIN1_EXT	PB12	DFSDM DATA1
-	-	-	7	8	-	-	-
-	-	-	9	10	DETECTn	-	Module detection
-	-	-	1	12	MEMS_LED	PH1	Module LED
-	-	-	13	14	-	-	-
-	-	-	15	16	-	-	-
-	-	-	17	18	-	-	-
3V3	-	3V3	19	20	GND	-	GND

Table 14 describes the I/O configuration for the audio DFSDM interface.

Table 14. I/O configuration for the audio DFSDM interface

JP1 jumper	MEMS module on CN2	STMod+ shield on CN3	Configuration(1)
OFF	**NOT CONNECTED**	**NOT CONNECTED**	**The U2 switch connects the DFSDM interface directly to the U16 onboard MEMS (signal DETECTn low).**
OFF	CONNECTED	NOT CONNECTED	The U2 switch disconnects the DFSDM of the U16 onboard MEMS, and connects the DFSDM to the CN2 connector (signal DETECTn switched high by the module on CN2 pin10).
ON	NOT CONNECTED	CONNECTED	The U2 switch disconnects the DFSDM of the U16 onboard MEMS, and connects the DFSDM to the CN2 connector (signal DETECTn switched high by the jumper JP1).

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

6.7.7 I/O restriction to other features

Caution: Due to the sharing of some I/Os of STM32L562QEI6Q by multiple peripherals, and because STM32L562QEI6Q only supports one DFSDM interface, the following limitations apply in using the audio DFSDM features:

The onboard MEMS (U16), the MEMS module on CN2, and the STMod+ DFSDM interface cannot be operated simultaneously.

6.8 USB Type-C® FS port

6.8.1 Description

The STM32L562E-DK Discovery kit supports USB full-speed (FS) communication. The USB connector (CN15) is a USB Type-C® connector.

The STM32L562E-DK Discovery kit supports USB Type-C® sink mode only.

A green LED (LD2) lights up when V_{BUS} is powered by a USB host when the STM32L562E-DK Discovery kit works as a USB device.

6.8.2 Operating voltage

The STM32L562E-DK Discovery kit supports USB voltage, from 4.75 to 5.25 V.

MCU VDD_USB only supports the 3.3 V voltage.

6.8.3 USB FS device

When a *USB Host* connection to the USB Type-C® connector (CN15) of STM32L562E-DK is detected, the STM32L562E-DK Discovery kit starts behaving as a *USB Device*. Depending on the powering capability of the *USB Host*, the board can take power from the V_{BUS} terminal of CN15. In the board schematic diagrams, the corresponding power voltage line is called 5V_UCPD.

Section 6.3 Power supply provides information on how to use the powering option.

Table 15 describes the hardware configuration for the USB interface.

Table 15. I/O configuration for the USB interface

I/O	Configuration
PA11	PA11 used as USB_FS_N diff pair interface
PA12	PA12 used as USB_FS_P diff pair interface

6.8.4 UCPD

USB Type-C® introduces the USB power-delivery feature. The STM32L562E-DK Discovery kit supports the dead battery and the SINK mode.

In addition to the DP/DM I/Os directly connected to the USB Type-C® connector, five I/Os are also used for UCPD configuration: Configuration Channel (CCx), VBUS-SENSE, UCPD dead battery (DBn), and UCPD_FAULT (FLT) feature.

To protect STM32L562E-DK from USB overvoltage, a USB Type-C® PPS-compliant port protection is used, IC compliant with IEC6100-4-2 level 4.

- Configuration Channel I/O: UCPD_CCx: These signals are connected to the associated CCx line of the USB Type-C® connector through the STMicroelectronics USB port protection. These lines are used for the configuration channel lines (CCx) to select the USB Type-C® current mode. STM32L562E-DK only supports SINK current mode.
- Dead battery I/O: UCPD_DBn: This signal is connected to the associated DBn line of the port protection. The STMicroelectronics USB port protection internally manages the dead battery resistors.
- V_{BUS} fault detection: UCPD_FLT: This signal is provided by the STMicroelectronics Type-C port protection. It is used as a fault reporting to the MCU after a bad V_{BUS} level detection. By design, R45 is set to 2.7 kΩ and the STM32L562E-DK V_{BUS} protection is set to 6 V maximum.

Table 16 describes the I/O configuration for the UCPD feature.

Table 16. I/O configuration for the UCPD feature

I/O	Hardware	Setting[1]	Configuration
PA15	R42	**OFF**	**PA15 is used as USB_C.CC1.**
		ON	PA15 is shared between USB_C.CC1 and JTAG JTDI.
PB15	-	-	PB15 is used as USB_C.CC2 (no other multiplexing).
PA4	R33	OFF	PA4 is not used as VBUS_SENSE.
		ON	**PA4 is shared between VBUS_SENSE and ARD_ADC.A2.**
PB5	JP5	**ON**	**PB5 is shared between USB-C.DB1 (dead battery mode supported), ARD.D11, and STMod+.**
PB14	-	-	**PB14 is used as USB-C.FLT (overvoltage fault reporting to MCU).**

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

6.8.5 USB Type-C® connector

Figure 19 shows the pinout of the USB Type-C® (CN15) connector.

Figure 19. USB Type-C® connector (CN15) pinout

A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
GND	TX1+	TX1-	VBUS	CC1	D+	D-	SBU1	VBUS	RX2-	RX2+	GND
GND	RX1+	RX1-	VBUS	SBU2	D-	D+	CC2	VBUS	TX2-	TX2+	GND
B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1

Table 17 describes the pinout of the CN15 USB Type-C® connector.

Table 17. USB Type-C® (CN15) connector pinout

STM32 pin	Signal name	Pin	Pin	Signal name	STM32 pin
-	GND	A1	B12	GND	-
-	TX1+	A2	B11	RX1+	-
-	TX1-	A3	B10	RX1-	-
-	VBUSc	A4	B9	VBUSc	-
PA15	CC1	A5	B8	SBU2	-
PA12	D+	A6	B7	D-	PA11
PA11	D-	A7	B6	D+	PA12
-	SBU1	A8	B5	CC2	PB15
-	VBUSc	A9	B4	VBUSc	-
-	RX2-	A10	B3	TX2-	-
-	RX2+	A11	B2	TX2+	-
-	GND	A12	B1	GND	-

6.8.6 I/O restriction to other features

Caution: Due to the sharing of some I/Os of STM32L562QEI6Q by multiple peripherals, the following limitations apply in using the USB features:

The USB UCPD cannot be operated simultaneously with full JTAG (JTDI).

- If PA15 is used as USB_CC1 (USB peripheral), JTDI cannot be used for JTAG peripheral.

The USB UCPD imposes some restrictions on the ARDUINO® and the STMod+.

- If PB5 is used as USB_DBn (USB peripheral) and JP5 is OFF, ARDUINO® D11 (SPI_MOSI or timer) and STMod+ SPI3_MOSIP cannot be used.

6.9 microSD™ card

6.9.1 Description

The slot for the microSD™ card (CN1) is routed to the STM32L562QEI6Q SDIO port. This interface is compliant with SD memory card specification version 4.1: SDR104 SDMMC_CK speed limited to the maximum allowed I/O speed. UHS-II mode is not supported.

6.9.2 Operating voltage

The SD card interface is only compatible with the 3.3 V voltage range, from 2.7 to 3.6 V.

The SD card interface does not support the MCU low voltage 1.8 V range.

6.9.3 SD card interface

The SD card interface is used in four data lines D [0:3], one CLK, one CDM, and a card detection signal.

Table 18 describes the hardware configuration for the SDIO interface.

Table 18. I/O configuration for the SDIO interface

I/O	Configuration
PF2	PF2 is connected to SDCARD DETECT.
PC8	PC8 is connected to SDCARD SDIO_D0. PC8 is shared with STMod+ pin 14 (timer function).
PC9	PC9 is connected to SDCARD SDIO_D1. PC9 is shared with Pmod™ pin 8/STMod+ pin 12 (RST function).
PC10	PC10 is connected to SDCARD SDIO_D2. PC10 is shared with Pmod™ pin 2/STMod+ pin 2 (UART_TX function).
PC11	PC11 is connected to SDCARD SDIO_D3. PC11 is shared with Pmod™ pin 3/STMod+ pin 3 (UART_RX function).
PC12	PC12 is connected to SDCARD SDIO_CLK.
PD2	PD2 is connected to SDCARD SDIO_CMD. PD2 is shared with Pmod™ pin 4/STMod+ pin 3 (UART_RTS function).

Figure 20 shows the SD card (CN1) connector.

Figure 20. SD card connector (CN1)

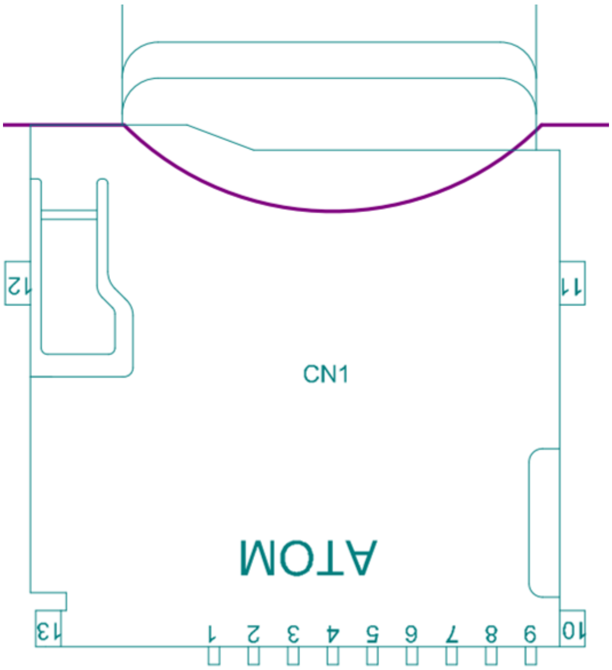


Table 19 describes the SD card connector (CN1) pinout.

Table 19. SD card connector (CN1) pinout

Pin	Pin names	Signal name	STM32 pin	Function
1	DAT2	SDIO.D2	PC10	SDIO.D2
2	DAT3_CD	SDIO.D3	PC11	SDIO.D3
3	CMD	SDIO.CMD	PD2	SDIO.CMD
4	VDD	VDD	-	VDD_SDCARD
5	CLK	SDIO.CLK	PC12	SDIO.CLK
6	VSS	GND	-	GND
7	DAT0	SDIO.D0	PC8	SDIO.D0
8	DAT1	SDIO.D1	PC9	SDIO.D1
9	CARD_DETECT	SDIO.DETECT	PF2	SDCARD_DETECT active low
10/11/12/13	GND	GND	-	GND pin

6.9.4 I/O restriction to other features

Caution: Due to the sharing of some I/Os of STM32L562QEI6Q by multiple peripherals, the following limitations apply in using the SDIO features:

The microSD™ card cannot be operated simultaneously with Pmod™.

The microSD™ card cannot be operated simultaneously with STMod+.

6.10 User LEDs

6.10.1 Description

Two general-purpose color LEDs (LD9 and LD10) are available as light indicators. Each LED is in the light-emitting state when a low level is applied to the corresponding ports.

The red and the green user LEDs (LD9 and LD10) are directly connected to STM32L562QEI6Q.

6.10.2 Operating voltage

As the I/O low-level drives LEDs, they are compatible with VDD_MCU 3.3 V and 1.8 V.

Caution: With this configuration, consumption is not optimized because of the I/Os at 1.8 V and LEDs VDD at 3.3 V. A small leakage current can appear.

6.10.3 LED interface

Table 20 describes the I/O configuration for the LED interface.

Table 20. Hardware configuration for the LED interface

I/O	Configuration
PG12	PG12 is connected to the green LED (LD10) and active low.
PD3	PD3 is connected to the red LED (LD9) and active low.

6.11 Physical input devices: buttons

6.11.1 Description

The STM32L562E-DK Discovery kit provides two push buttons for physical human control.

- The USER button (B2),
- The RST reset button (B1).

6.11.2 Operating voltage

Input devices for physical human control are connected to VDD or are referenced to GND. So, input devices are compatible with VDD_MCU voltage range from 1.8 to 3.3 V.

6.11.3 Physical input I/O interface

Table 21 describes the I/O configuration for the physical user interface.

Table 21. I/O configuration for the physical user interface

I/O	Configuration
NRST	RST reset button (active low)
PC13	USER button (active high, connected as MCU WKUP2 function) (shared with PM_WAKE-UP)

6.12 Octo-SPI memory devices

6.12.1 Description

A 512-Mbit Octo-SPI flash memory device is fitted on STM32L562E-DK, in the U6 position. It is used when evaluating the STM32L562QEI6Q Octo-SPI interface.

The flash memory can operate in both single (STR) and double (DTR) transfer-rate modes.

6.12.2 Operating voltage

The voltage of the Octo-SPI flash memory device is in the range of 2.7 to 3.6 V.

The Octo-SPI memory does not support the low voltage MCU 1.8 V.

6.12.3 Octo-SPI I/O interface

Table 22 describes the hardware configuration for the Octo-SPI interface.

Table 22. I/O configuration for the Octo-SPI interface

I/O	Configuration
PA2	PA2 is connected to Octo-SPI flash memory as NCS.
PA3	PA3 is connected to Octo-SPI flash memory as CLK.
PA6	PA6 is connected to Octo-SPI flash memory as IO3.
PA7	PA7 is connected to Octo-SPI flash memory as IO2.
PB0	PB0 is connected to Octo-SPI flash memory as IO1.
PB1	PB1 is connected to Octo-SPI flash memory as IO0.
PB2	PB2 is connected to Octo-SPI flash memory as DQS.
PC0	PC0 is connected to Octo-SPI flash memory as IO7.
PC1	PC1 is connected to Octo-SPI flash memory as IO4.
PC2	PC2 is connected to Octo-SPI flash memory as IO5.
PC3	PC3 is connected to Octo-SPI flash memory as IO6.
NRST	NRST is connected to Octo-SPI flash memory as RESET.

6.13 Bluetooth® Low Energy

6.13.1 Description

The STM32L562E-DK Discovery kit supports a Bluetooth® Low Energy module V4.1. A module supports this function. An SPI interface drives this module.

The Bluetooth® antenna is integrated into the module.

6.13.2 Operating voltage

The module supports a voltage range from 1.8 to 3.3 V.

6.13.3 Bluetooth® Low Energy I/O interface

Table 23 describes the I/O configuration for the Bluetooth® Low Energy interface.

Table 23. I/O configuration for the Bluetooth® Low Energy I/O interface

I/O	Configuration
PG8	PG8 is connected to BLE_RSTN.
PG6	PG6 is connected to BLE_INT.
PG5	PG5 is connected to SPI1.BLE_CS.
PG4	PG4 is connected to SPI1.MOSI.
PG3	PG3 is connected to SPI1.MISO.
PG2	PB0 is connected to SPI1.SCK.

6.14 3D accelerometer and 3D gyroscope

6.14.1 Description

The STM32L562E-DK Discovery kit supports a 3D accelerometer and a 3D gyroscope. A module supports these functions. An I^2C interface drives this module.

6.14.2 Operating voltage

The module supports a voltage range from 1.8 to 3.3 V.

6.14.3 3D accelerator and 3D gyrometer interface

An I^2C sets the 3D ACC/GYRO. The address is a 7-bit address with an additional R/W bit (high for reading, low for writing). The SD0/SA0 pin connected to GND gives the least significant bit address. The 3D ACC/GYRO address is `0b1101010x`: `0xD4` to write, and `0xD5` to read.

Table 24 describes the I/O configuration for the 3D ACC/GYRO interface.

Table 24. I/O configuration for the 3D ACC/GYRO interface

I/O	Configuration
PF3	PF3 is connected to GYRO_ACC_INT.
PB6	PB6 used as I2C1_SCL shared between ARDUINO®, audio, STMod+, and CTP.
PB7	PB7 used as I2C1_SDA shared between ARDUINO®, audio, STMod+, and CTP.

6.15 TFT LCD

6.15.1 Description

The 29-pin FCP connector (CN7) is used to connect a TFT LCD module supporting the FMC interface. It is associated with the 10-pin connector (CN14) used for the touch panel.

The LCD module is composed of a TFT LCD module with an LCD driver. The LCD supports a resolution of 240 (RGB) x 240 dots in 262 K colors, 1.54”, and a sensitive touch panel driven by a self-capacitive controller.

6.15.2 Operating voltage

The LCD module supports several power supplies: The core power supply is connected to 3V3, and the I/O power supply is connected to VDD and compatible with 1V8 and 3V3 voltage.

The touch panel supports several power supplies: The core power supply is connected to 3V3, and the I/O power supply is connected to VDD and compatible with 1V8 and 3V3 voltage.

An external IC (U9) connected directly to 5 V drives the backlight of the LCD.

6.15.3 LCD interface

Table 25 describes the I/O configuration for the LCD and CTP interface.

Table 25. I/O configuration for the LCD and CTP interface

I/O	Configuration
PD7	PD7 is used as LCD.FMC_NE1_CS.
PD5	PD5 is used as LCD.FMC_NWE.
PD4	PD4 is used as LCD.FMC_NOE.
PF0	PF0 is used as LCD.FMC_A0_RS.
PD14	PD14 is used as LCD.FMC_D0.
PD15	PD15 is used as LCD.FMC_D1.
PD0	PD0 is used as LCD.FMC_D2.
PD1	PD1 is used as LCD.FMC_D3.
PE7	PE7 is used as LCD.FMC_D4.
PE8	PE8 is used as LCD.FMC_D5.
PE9	PE9 is used as LCD.FMC_D6.
PE10	PE10 is used as LCD.FMC_D7.
PE11	PE11 is used as LCD.FMC_D8.
PE12	PE12 is used as LCD.FMC_D9.
PE13	PE13 is used as LCD.FMC_D10.
PE14	PE14 is used as LCD.FMC_D11.
PE15	PE15 is used as LCD.FMC_D12.
PD8	PD8 is used as LCD.FMC_D13.
PD9	PD9 is used as LCD.FMC_D14.
PD10	PD10 is used as LCD.FMC_D15.
PE1	PE1 is used as LCD_BL_CTRL.
PF1	PF1 is used as LCD.CTP_INT for the touch panel.
PA8	PA8 is used as LCD.TE.
PF14	PF14 is used as LCD.RST.
PF15	PF15 is used as CTP.RST.
PH0	PH0 is used to switch OFF the LCD power supplies.
PB6	PB6 is used as I2C1_SCL shared between ARDUINO®, audio, STMod+, 3D ACC, and 3D GYRO.
PB7	PB7 is used as I2C1_SDA shared between ARDUINO®, audio, STMod+, 3D ACC, and 3D GYRO.

Figure 21 shows the LCD connector (CN7) pinout.

Figure 21. LCD connector (CN7) pinout

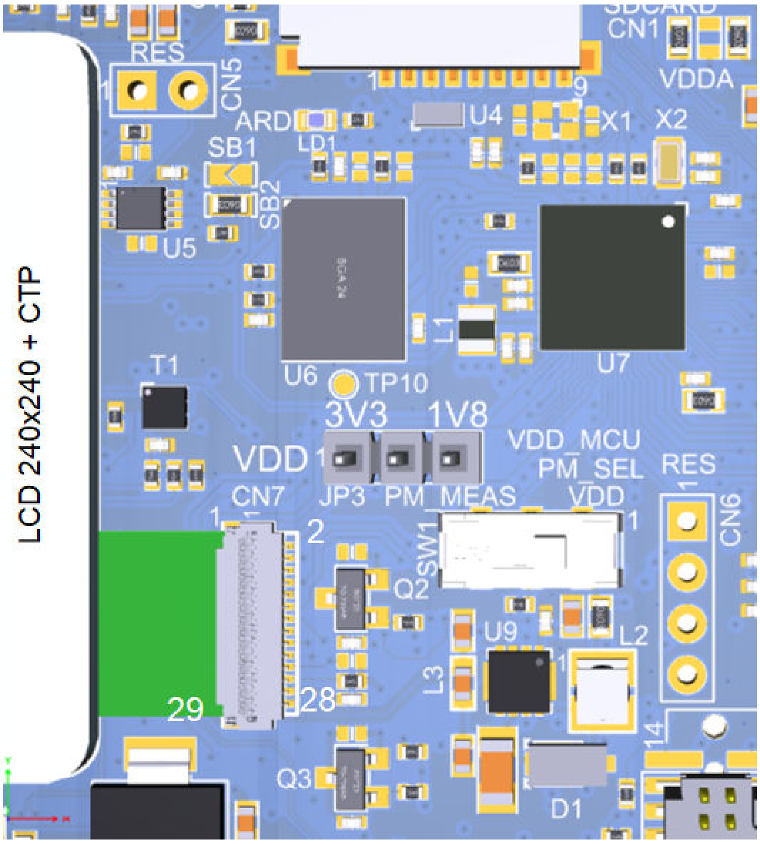


Table 26 describes the LCD interface and connector (CN7) pinout.

Table 26. LCD connector (CN7) pinout

Function	STM32 pin	Signal name	Pin name	Pin	Pin	Pin name	Signal name	STM32 pin	Function
GND	-	GND	GND	1	2	FMARK	LCD.TE	PA8	LCD.TE
D15	PD10	LCD.FMC_D15	DB15	3	4	DB14	LCD.FMC_D14	PD9	D14
D13	PD8	LCD.FMC_D13	DB13	5	6	DB12	LCD.FMC_D12	PE15	D12
D11	PE14	LCD.FMC_D11	DB11	7	8	DB10	LCD.FMC_D10	PE13	D10
D9	PE12	LCD.FMC_D9	DB9	9	10	DB8	LCD.FMC_D8	PE11	D8
D7	PE10	LCD.FMC_D7	DB7	11	12	DB6	LCD.FMC_D6	PE9	D6
D5	PE8	LCD.FMC_D5	DB5	13	14	DB4	LCD.FMC_D4	PE7	D4
D3	PD1	LCD.FMC_D3	DB3	15	16	DB2	LCD.FMC_D2	PD0	D2
D1	PD15	LCD.FMC_D1	DB1	17	18	DB0	LCD.FMC_D0	PD14	D0
NOE	PD4	LCD.FMC_NOE	RDn	19	20	WRn	LCD.FMC_NWE	PD5	NWE
RS	PF0	LCD.FMC_A0_RS	RS	21	22	CS	LCD.FMC_CS	PD7	CS
LCD_RST	PF14	LCD.RST	RESET	23	24	IM	IM	-	IM
IOVCC	-	VDD_LCD	IOVCC	25	26	VCI	3V3_LCD	-	VCI
GND	-	GND	GND	27	28	LEDA	LEDA	-	LEDA
LEDK	-	LEDK	LEDK	29	-	-	-	-	-

Figure 22 shows the touch-panel connector (CN14) pinout.

Figure 22. LCD touch-panel connector (CN14) pinout

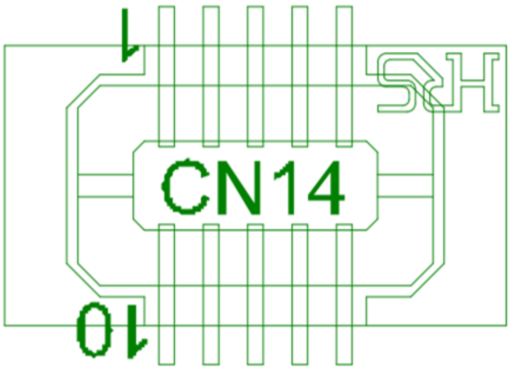


Table 27 describes the touch-panel interface and connector (CN14) pinout.

Table 27. Touch-panel connector (CN14) pinout

Function	STM32 pin	Signal name	Pin name	Pin	Pin	Pin name	Signal name	STM32 pin	Function
GND	-	GND	GND	1	10	GND	GND	-	GND
CTP_INT	PF1	LCD.CTP_INT	INT	2	9	VDD	VDD_LCD	-	VDD
GND	-	GND	GND	3	8	IOVCC	VDD_LCD	-	IOVCC
I2C1_SDA	PB7	I2C1_SDA	SDA	4	7	RESET	LCD.CTP_RST	PF15	LCD.RST
I2C1_SCL	PB6	I2C1_SCL	SCL	5	6	GND	GND	-	GND

6.16 Pmod™ connector

6.16.1 Description

The Pmod™ standard connector (CN4) is in the STM32L562E-DK board to support flexibility in small form factor applications. The Pmod™ connector implements the Pmod™ type 2A and 4A on the STM32L562E-DK board.

6.16.2 Operating voltage

The Pmod™ module is directly supplied by 3.3 V. VDD and VDD_MCU must be set to 3.3 V to be I/O compatible with the Pmod™ module.

6.16.3 Pmod™ interface

A quad SPDT switch driven by two I/Os is used to connect three different interfaces: SPI, UART, and mikroBUS™ interfaces to the Pmod™ connector.

Table 28 describes the I/O configuration to select the SPI, the UART, or the mikroBUS™ interface on the Pmod™ connector.

Table 28. I/O configuration for the Pmod™ interface

I/O PF12 STMod+ SEL_34	I/O PF11 STMod+ SEL_12	Configuration(1)
0	0	SPI interface PB13/PB5/PB4/PG9 used for SPI mode
0	**1**	**mikroBUS™ interface PC10/PC11 for UART mode and PB13/PG9 for SPI mode**
1	0	Not used
1	1	UART interface PB13/PC10/PC11/PD2 used for UART mode

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

Figure 23 shows the Pmod™ connector pinout.

Figure 23. Pmod™ connector (CN4) pinout

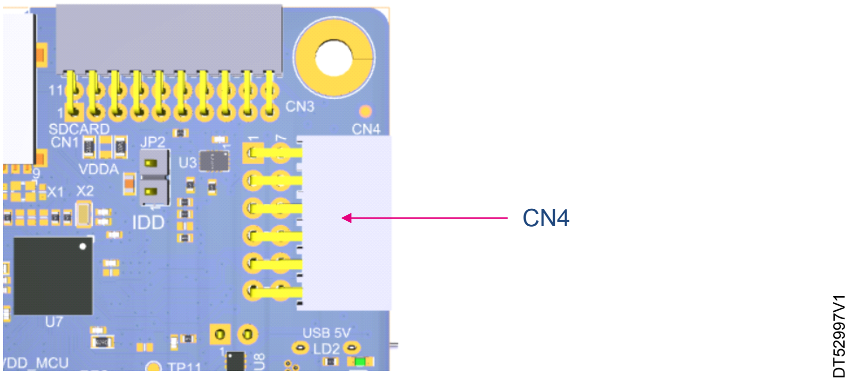


Table 29 describes the Pmod™ interface and connector pinout.

Table 29. Pmod™ connector (CN4) pinout

Function	STM32 pin	Signal name	Pin name	Pin	Pin	Pin name	Signal name	STM32 pin	Function
SPI3 USART3	PB13 PB13	SPI_NSS UART_CTS	1	1	7	7	PMOD_INT	PF5	INT5
SPI3 USART3	PB5 PC10	SPI_MOSI UART_TX	2	2	8	8	PMOD_RST	PC9	Reset
SPI3 USART3	PB4 PC11	SPI_MISO UART_RX	3	3	9	9	NC	NC	NC
SPI3 USART3	PG9 PD2	SPI_SCK UART_RTS	4	4	10	10	NC	NC	NC
GND	-	GND	5	5	11	11	GND	-	GND
Power	-	VDD	6	6	12	12	VDD	-	Power

6.16.4 I/O restriction to other features

Caution: Due to the sharing of some I/Os of STM32L562QEI6Q by multiple peripherals, the following limitations apply in using the Pmod™ features:

- The Pmod™ cannot be operated simultaneously with the UCPD function.
- The Pmod™ cannot be operated simultaneously with the STMod+ function.
- The Pmod™ cannot be operated simultaneously with the SD card function.

6.17 STMod+ connector

6.17.1 Description

The STMod+ standard connector (CN3) is on the STM32L562E-DK board to support flexibility in small form factor applications. The STMod+ expansion connector supports the MB1280 fanout expansion board for Wi-Fi®, Grove, and mikroBUS™ compatible connectors.

6.17.2 Operating voltage

The STMod+ module is directly supplied by 5 V. STM32L562E-DK I/O level can be set according to STMod+ module 3.3 V. The fanout board also embeds a 3.3 V regulator and I^2C level shifters. For more detailed information, refer to the STMicroelectronics fanout board and relevant datasheets of associated modules.

6.17.3 STMod+ interface

A quad SPDT switch driven by two I/Os is used to connect three different interfaces: SPI, UART, and mikroBUS™ interface to the STMod+ connector.

Table 30 describes the I/O configuration to select the SPI, UART, or mikroBUS™ interface to the STMod+ connector.

For more detailed information about the MB1280 fanout expansion board, refer to the user manual *STMod+ fan-out expansion board for STM32 Discovery kits and Evaluation boards* (UM2695), available on the www.st.com website.

Table 30. **I/O configuration for the STMod+ interface**

IO PF12 STMod+ SEL_34	IO PF11 STMod+ SEL_12	Configuration(1)
0	0	SPI interface PB13/PB5/PB4/PG9 used for SPI mode
0	**1**	**mikroBUS™ interface PC10/PC11 for UART mode and PB13/PG9 for SPI mode**
1	0	Not used
1	1	UART interface PB13/PC10/PC11/PD2 used for UART mode

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

Figure 24 shows the STMod+ connector pinout.

Figure 24. **STMod+ connector (CN3) pinout**

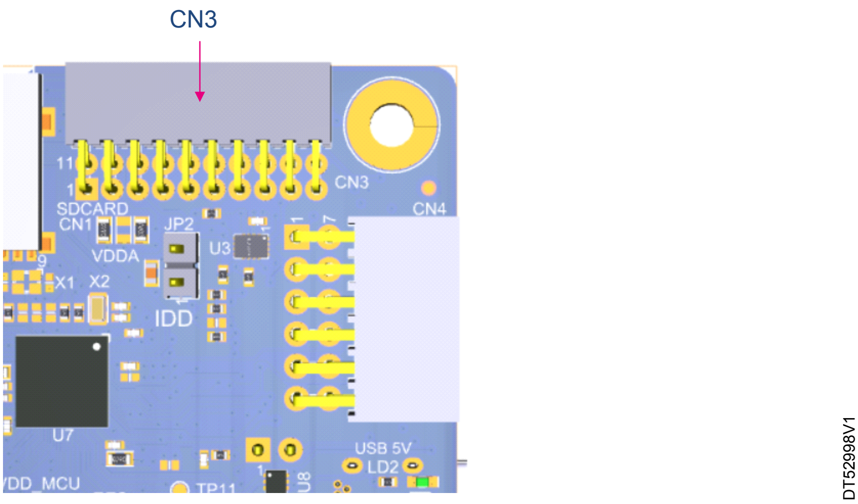


Table 31 describes the STMod+ interface and connector (CN3) pinout.

Table 31. STMod+ interface and connector (CN3) pinout

MCU function	STM32 pin	Function	Pin	Pin	Function	STM32 pin	MCU function
SPI3 USART3	PB13 PB13	SPI_NSS UART_CTS	1	11	PMOD_INT	PF5	INT5
SPI3 USART3	PB5 [1] PC10	SPI_MOSIp UART_TX	2	12	PMOD_RST	PC9	Reset
SPI3 USART3	PB4 PC11	SPI_MISOp UART_RX	3	13	STMod+ ADC	PA0	ADC1_IN5
SPI3 USART3	PG9 PD2	SPI_SCK UART_RTS	4	14	STMod+ _TIM	PC8	TIM8_CH3
GND	-	GND	5	15	5 V	-	Power
Power	-	5 V	6	16	GND	-	GND
I2C1	PB6	I2C1_SCL	7	17	DFSDM1_DATIN1	PB12	DFSDM
SPI3	PD6	SPI3_MOSIs	8	18	DFSDM1_CKOUT	PG7	DFSDM
SPI3	PG10	SPI3_MISOs	9	19	DFSDM1_DATIN3	PC7	DFSDM
I2C1	PB7	I2C1_SDA	10	20	DFSDM1_CKOUT	PG7	DFSDM

1. *To use PB5 as SPI_MOSI, it is recommended to remove JP5 to disconnect the USB_DBn function.*

6.17.4 I/O restriction to other features

Caution: Due to the sharing of some I/Os of STM32L562QEI6Q by multiple peripherals, the following limitations apply in using the STMod+ features:

- The STMod+ cannot be operated simultaneously with the UCPD function.
- The STMod+ cannot be operated simultaneously with the Pmod™ function.
- The STMod+ cannot be operated simultaneously with the SDCARD function.
- The STMod+ cannot be operated simultaneously with the ARDUINO® function.
- The STMod+ cannot be operated simultaneously with onboard MEMS and module MEMS (CN2).

6.18 ARDUINO® connectors

6.18.1 Description

The ARDUINO® Uno V3 connector (CN11, CN12, CN18, and CN19) is available on the STM32L562E-DK board. Most shields designed for ARDUINO® can fit with the STM32L562E-DK Discovery kit to offer flexibility in small form factor applications.

6.18.2 Operating voltage

The ARDUINO® Uno V3 connector supports 5 V, 3.3 V, and VDD for I/O compatibility. VIN, voltage range from 7 to 12 V is also available to supply the STM32L562E-DK Discovery kit from an ARDUINO® shield. Section 6.3 Power supply provides information on how to use the powering option.

6.18.3 ARDUINO® interface

Figure 25 shows the ARDUINO® connector pinouts.

Figure 25. ARDUINO® connector pinouts

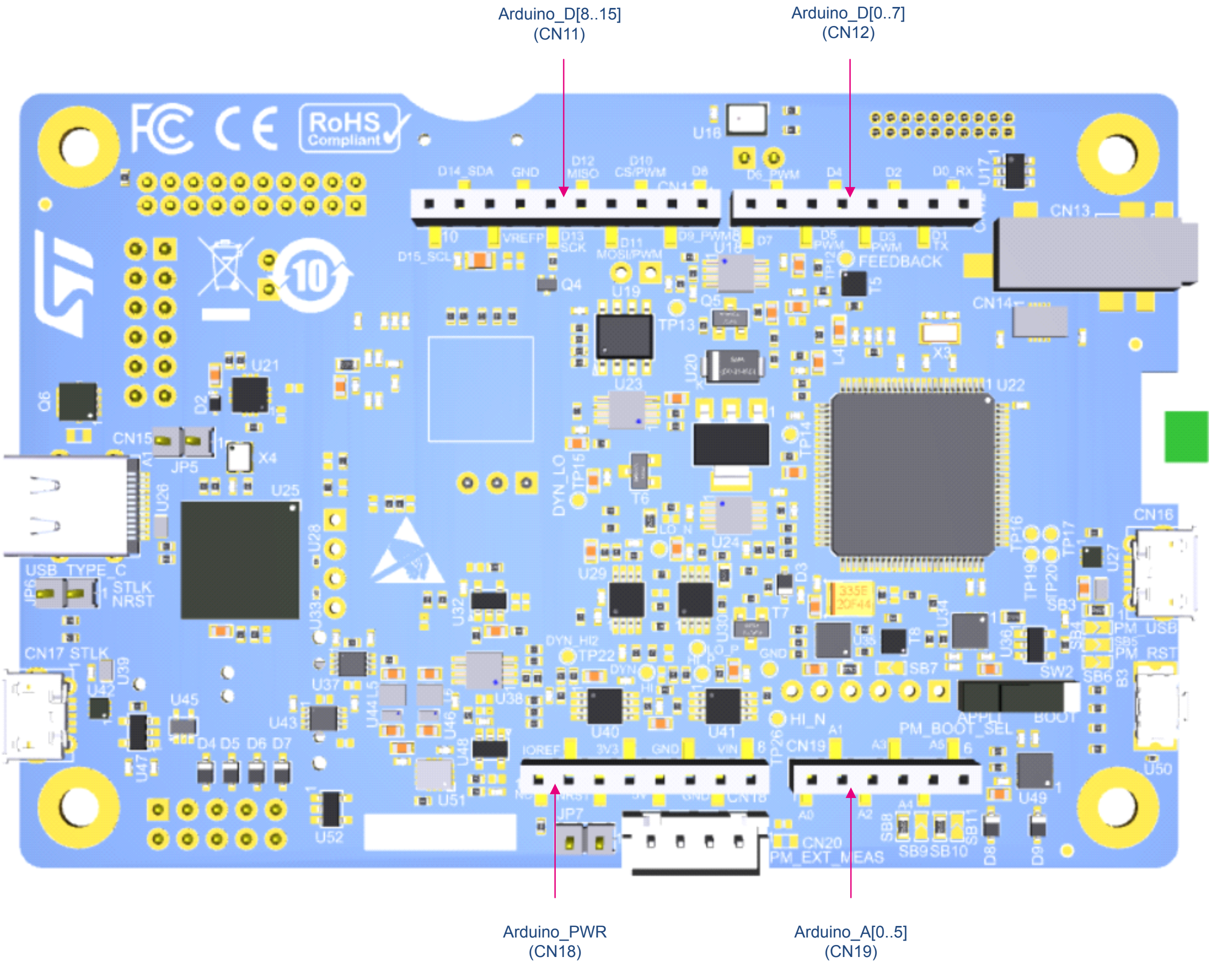


Table 32 describes the I/O configuration for the ARDUINO® interface.

Table 32. I/O configuration for the ARDUINO® interface

I/O	Hardware	Configuration(1)
PA0	-	PA0 is used as ARD.A0: ADC1_IN5. shared with STMod+.
PA1	-	PA1 is used as ARD.A1: ADC1_IN6.
PA4	R33 OFF	PA4 is used as ARD.A2: ADC1_IN9 only.
	R33 ON	**PA4 is used as ARD.A2: ADC1_IN9. Shared with USB_C.VBUS_SENSE**
PA5	-	PA5 is used as ARD.A3: ADC1_IN10.
PC4	-	PC4 is used as ARD.A4: ADC1_IN13.
PC5	-	PC5 is used as ARD.A5: ADC1_IN14.
PB10	R125 OFF	PB10 is not used as ARD.D0: PB10 can be used for VCP UART.
	R125 ON	**PB10 is used as ARD.D0: LPUART1_RX.**
PA10	**R124 OFF**	**PA10 is not used as ARD.D0: PA10 is used for VCP UART.**
	R124 ON	PA10 can be used as ARD.D0: USART1_RX
PB11	R133 OFF	PB11 is not used as ARD.D1: LPUART1_TX. PB11 can be used for VCP UART.
	R133 ON	**PB11 is used as ARD.D1: LPUART1_TX.**
PA9	**R131 OFF**	**PA9 is not used as ARD.D1: USART1_TX. PA9 is used for VCP UART.**
	R131 ON	PA9 can be used as ARD.D1: USART1_TX.
PD11	-	PD11 is used as ARD.D2: I/O.
PD12	-	PD12 is used as ARD.D3: TIM4_CH1.
PF4	-	PF4 is used as ARD.D4: INT.
PD13	-	PD13 is used as ARD.D5: TIM4_CH2.
PB8	-	PB8 is used as ARD.D6: TIM4_CH3.
PC6	-	PC6 is used as ARD.D7: I/O.
PG0	-	PG0 is used as ARD.D8: I/O.
PB9	-	PB9 is used as ARD.D9: TIM4_CH4.
PE0	-	PE0 is used as ARD.D10: SPI_CSn and TIM16_CH1.
PB5	-	PB5 is used as ARD.D11: SPI3_MOSI and TIM3_CH2 shared with UCPD, Pmod™v, and STMod+.
PB4	-	PB4 is used as ARD.D12: SPI3_MISO shared with Pmod™ and STMod+.
PG9	-	PG9 is used as ARD.D13: SPI3_SCK shared with Pmod™ and STMod+.
PB7	-	PB7 is used as ARD.D14: I2C1_SDA shared between STMod+, audio, LCD, 3D accelerometer, and 3D gyrometer.
PB6	-	PB6 is used as ARD.D15: I2C1_SCL shared between STMod+, audio, LCD, 3D accelerator, and 3D gyrometer.

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

Table 33 describes the ARDUINO connector pinout.

Table 33. ARDUINO® connector pinout

Connector	Pin names	Function	STM32 pin	MCU function
CN18	1	NC	-	NC (reserved for the test)
	2	VDD	-	IOREF (VDD 1V8 or 3V3)
	3	NRST	NRST	NRST
	4	3V3	-	3V3
	5	5 V	-	5 V
	6	GND	-	GND
	7	GND	-	GND
	8	VIN	-	VIN 7V-12V
CN19	1	ARD_ADC.A0	PA0	ADC1_IN5
	2	ARD_ADC.A1	PA1	ADC1_IN6
	3	ARD_ADC.A2	PA4	ADC1_IN9
	4	ARD_ADC.A3	PA5	ADC1_IN10
	5	ARD_ADC.A4	PC4	ADC1_IN13
	6	ARD_ADC.A5	PC5	ADC1_IN14
CN12	1	ARD_D0	**PB10**/PA10	**LPUART1_RX**/USART1_RX
	2	ARD_D1	**PB11**/PA9	**LPUART1_TX**/USART1_TX
	3	ARD_D2	PD11	I/O
	4	ARD_D3	PD12	TIM4_CH1
	5	ARD_D4	PF4	INT4
	6	ARD_D5	PD13	TIM4_CH2
	7	ARD_D6	PB8	TIM4_CH3
	8	ARD_D7	PC6	I/O
CN11	1	ARD_D8	PG0	I/O
	2	ARD_D9	PB9	TIM4_CH4
	3	ARD_D10	PE0	SPI_CSn and TIM16_CH1
	4	ARD_D11	PB5	SPI3_MOSI and TIM3_CH2
	5	ARD_D12	PB4	SPI3_MISO
	6	ARD_D13	PG9	SPI3_SCK/ARD LED(1)
	7	GND	-	GND
	8	VREFP	-	VREFP (AVDD)
	9	ARD_D14	PB7	I2C1_SDA
	10	ARD_D15	PB6	I2C1_SCL

1. *A blue LED is connected to ARD-D13. This LED can be disconnected by removing the resistor R87 to help increase SPI frequency communication.*

6.19 MCU energy meter tools

6.19.1 Description

The STM32L562E-DK Discovery kit embeds energy meter tools.

This function is performed with the support of the MCU (U22). The energy meter tools included in the STM32L562E-DK are a part of the standalone board X-NUCLEO-LPM01A, also called PowerShield.

The X-NUCLEO-LPM01A expansion board is a programmable power supply source, from 1.8 to 3.3 V, with advanced power consumption measurement capability.

6.19.2 Operating voltage

The power metering part is independent and has its power supplies, 3V3_PM, and 3V3_MCU_PM for the STM32L562QEI6Q.

6.19.3 IDD measurement

The STM32L562E-DK Discovery kit has a circuit to measure the STM32L562QEI6Q current consumption (IDD) within a range of 300 nA to 150 mA.

To measure MCU current lower than 300 nA, a JP2 jumper can be configured to use an external ammeter.

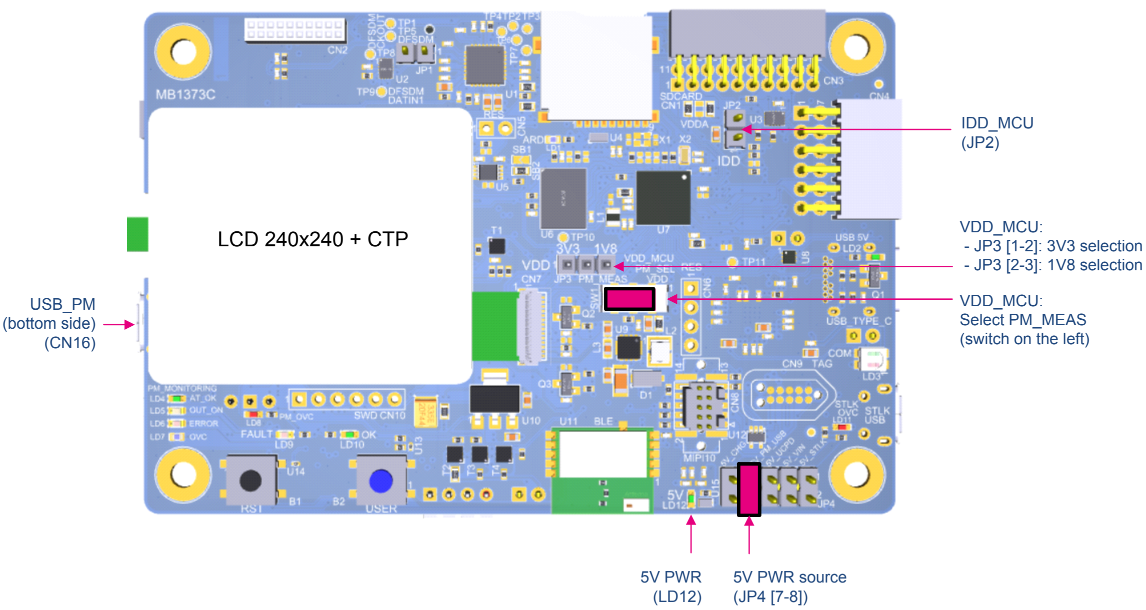
The recommendations for the power metering measurement are the following:

- Supply the STM32L562E-DK Discovery kit with USB_PM through the USB connector (CN16).
- Set JP4 jumper [7-8] to select 5V_PM power.
- Keep JP3 to the correct voltage, to be aligned with the energy metering setting: 1.8 or 3.3 V for the device I/O compatibility. By default, the energy meter tools start at 3.3 V.
- Keep the jumper on the JP2 header. To measure a current below 300 nA, remove it and add an external ammeter connected to JP2.
- Set the SW1 switch to the PM_MEAS position to measure the current consumption.

Section 6.3 Power supply provides information on how to use the powering option.

Figure 26 shows the energy metering hardware configuration.

Figure 26. Energy metering hardware configuration



DT53200V1

6.19.4 Energy meter firmware update

The energy meter firmware can be upgraded with the following procedure:

1. Get the PowerShield firmware binary file on *www.st.com*: firmware binary file has the extension *.dfu* standing for device firmware upgrade (DFU).
2. Download and install the USB-DFU driver and utility: software reference: STSW-STM320803.
3. Set the board in bootloader mode: Set switch SW2 to BOOT mode.
4. Download the *.dfu* file with USB-DFU utility software. Connect the energy meter part with CN16 via a USB cable, and launch USB-DFU utility software. Only two buttons to use:
   – *Choose*: Load the *.dfu* file
   – *Upgrade*: Upgrade into flash memory
5. Set the board in application mode (SW2 on the left to APPLI). Reset the board by pressing the RESET button or unplug and plug the USB cable.

Figure 27. **Energy metering firmware update hardware**

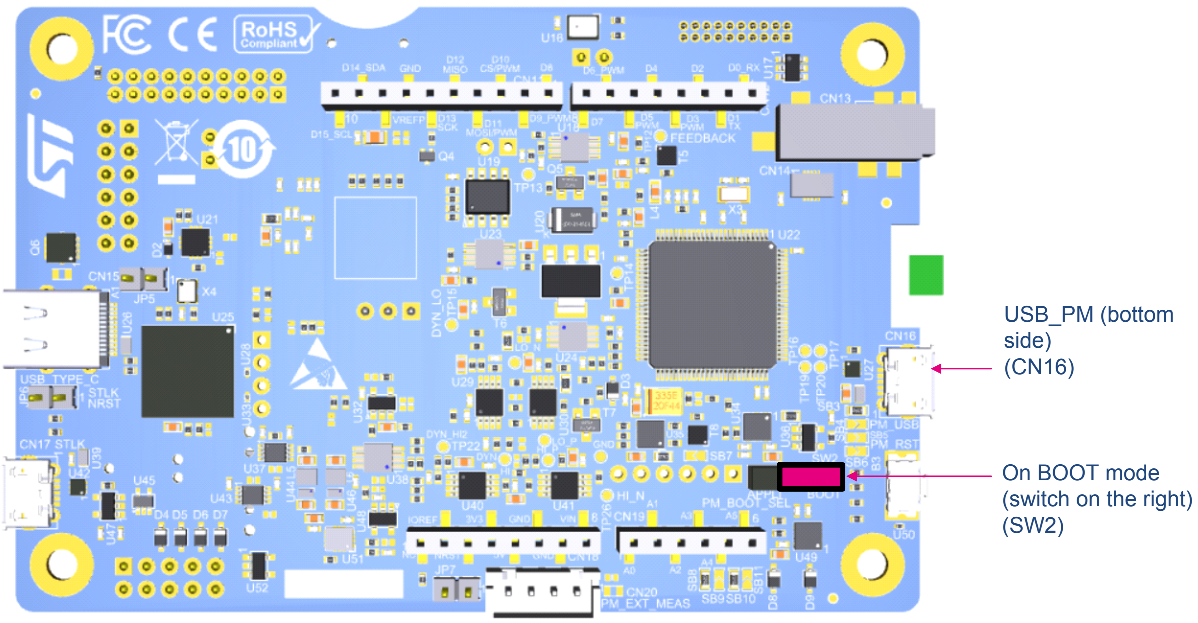
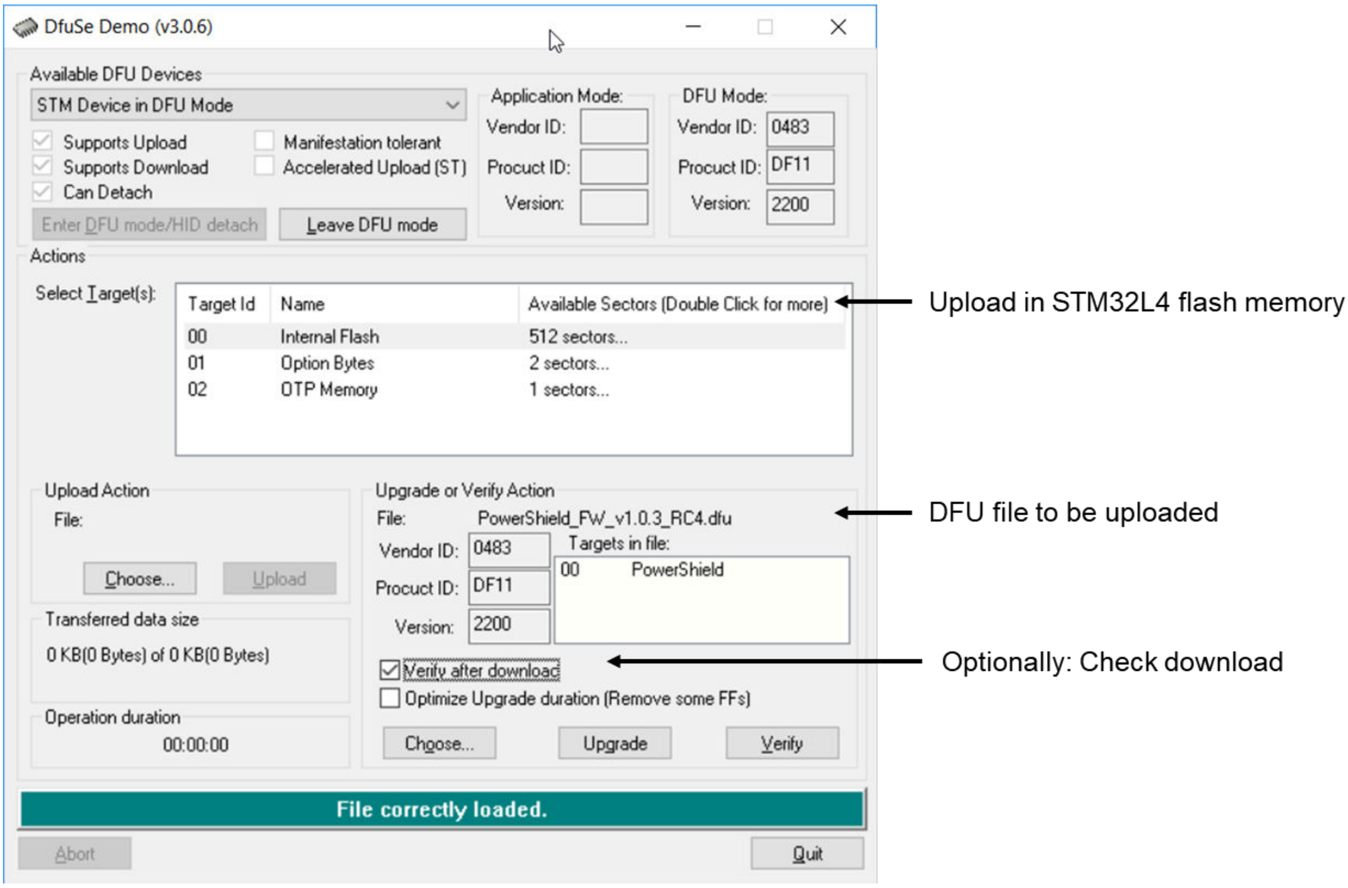


Figure 28. Energy metering firmware upgrade software



For more information about energy meter measurement firmware updates, refer to the user manual *Getting started with PowerShield firmware* (UM2269), available on the *www.st.com* website.

7 STM32L562E-DK jumper summary

Figure 29 and Figure 30 summarize the default setting of the STM32L562E-DK jumpers and switches.

Figure 29. Default jumper and switch setting of the STM32L562E-DK (top view)

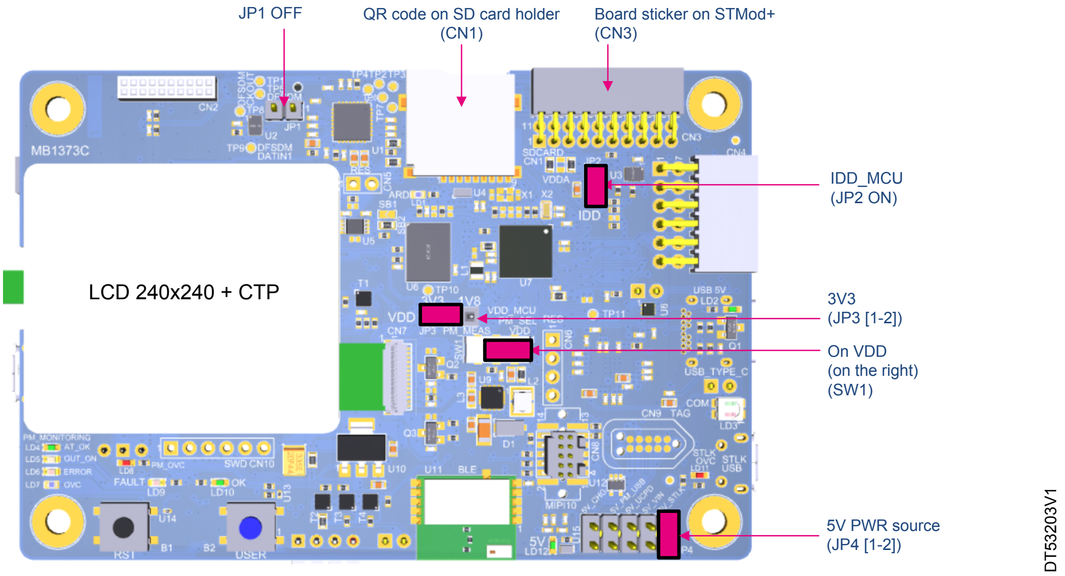
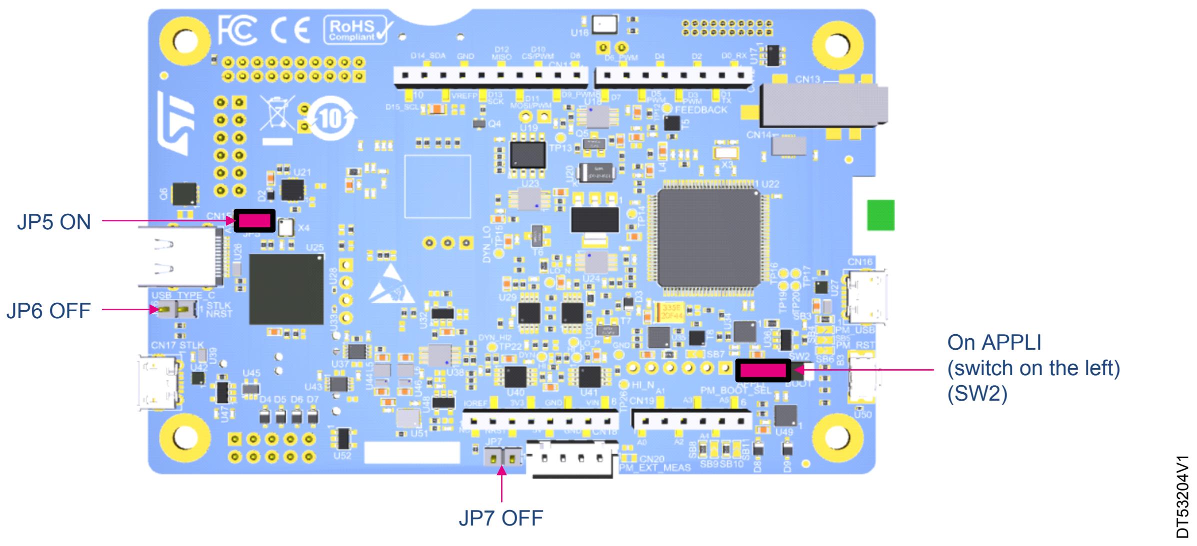


Figure 30. Default jumper and switch setting of the STM32L562E-DK (bottom view)



8 STM32L562E-DK I/O assignment

Table 34. STM32L562E-DK I/O assignment

BGA pinout	Pin name	Main function pinout assignment	Optional function pinout assignment
A1	PE5	SAI.SCK_A	-
A2	PE3	SAI.SD_B	-
A3	PE1	LCD.BL_CTRL	-
A4	PB9	ARD.D9_TIM	-
A5	PB6	I2C1_SCL	-
A6	PG12	LED_GREEN	-
A7	PD6	-	STMod+ 8_SPI_MOSIs
A8	PD5	LCD.FMC_NWE	-
A9	PD2	SDIO.CMD	STMod+ 4_UART_RTS
A10	PC11	SDIO.D3	STMod+ 3_UART_RX
A11	PA15	USB_C.CC1	T.JTDI
A12	VDDUSB	POWER/VDD_USB	-
B1	VBAT	POWER/VBAT	-
B2	PE4	SAI.FS_A	-
B3	PE2	SAI.MCLK_A	-
B4	V15	POWER/V15SMPS	-
B5	PH3	PH3_BOOT0	-
B6	PB4	ARD.D12_SPI_MISO	STMod+ 3_SPI_MISOp
B7	PG9	ARD.D13_SPI_SCK	STMod+ 4_SPI_SCK
B8	PD4	LCD.FMC_NOE	-
B9	PD1	LCD.FMC_D3	-
B10	PC12	SDIO.CLK	-
B11	PC10	SDIO.D2	STMod+ 2_UART_TX
B12	PA12	USB_C.FS_P	-
C1	PC14	PC14-OSC32_IN	-
C2	PE6	SAI.SD_A	-
C3	PC13	USER BUTTON (WKUP2)	PM_WAKE-UP
C4	PE0	ARD.D10_TIM_SPI_CSN	-
C5	PB8	ARD.D6_TIM	-
C6	PB3	T.SWO	-
C7	PG10	-	STMod+ 9_SPI_MISOs
C8	PD3	LED_RED	-
C9	PD0	LCD.FMC_D2	-
C10	PA13	T.SWDIO	-
C11	PA14	T.SWCLK	-
C12	PA11	USB_C.FS_N	-
D1	PC15	OSC32_OUT	-

BGA pinout	Pin name	Main function pinout assignment	Optional function pinout assignment
D2	PF0	LCD.FMC_A0_RS	-
D3	PF3	GYRO_ACC_INT	-
D4	VDD	POWER/VDD_MCU	-
D5	PB7	I2C1_SDA	-
D6	PB5	USB_C.DBn ARD.D11_TIM_SPI_MOSI	STMod+ 2_SPI_MOSIp
D7	PD7	LCD.FMC_NE1_CS	-
D8	VDDIO	POWER/VDDIO2	-
D9	VDD	POWER/VDD_MCU	-
D10	PA9	T.VCP_TX	ARD.D1_TX
D11	PA10	T.VCP_RX	ARD.D0_RX
D12	PA8	LCD.TE	-
E1	PF2	SDIO.DETECT	-
E2	PF1	LCD.CTP_INT	-
E3	PF4	ARD.D4_INT	-
E4	VSS	POWER/GND	-
E9	VSS	POWER/GND	-
E10	PC7	DFSMD_DATIN3	-
E11	PC9	SDIO.D1	STMod+ 12_RST
E12	PC8	SDIO.D0	STMod+ 14_TIM
F1	PH0	LCD_PWR_ON	OSC_IN
F2	PF5	-	STMod+ 11_INT
F3	PC2	OCTOSPI.IO5	-
F4	PC3	OCTOSPI.IO6	-
F6	VSS	POWER/GND	-
F7	VDD	POWER/VDD_MCU	-
F9	PG6	BLE_INT	-
F10	PG7	DFSMD_CKOUT	-
F11	PC6	ARD.D7_IO	-
F12	PG8	BLE_RSTN	-
G1	PH1	MEMS_LED	OSC_OUT
G2	NRST	NRST	-
G3	PC1	OCTOSPI.IO4	-
G4	PA1	ARD.ADC_A1	-
G6	VDD	POWER/VDD_MCU	-
G7	VSS	POWER/GND	-
G9	PG4	SPI1.MOSI	-
G10	PG2	SPI1.SCK	-
G11	PG3	SPI1.MISO	-
G12	PG5	SPI1.BLE_CS	-
H1	VSSA	POWER/GND	-

BGA pinout	Pin name	Main function pinout assignment	Optional function pinout assignment
H2	PC0	OCTOSPI.IO7	-
H3	OPAM1_VINM	-	-
H4	VSS	POWER/GND	-
H9	VSS	POWER/GND	-
H10	PD14	LCD.FMC_D0	-
H11	PD13	ARD.D5_TIM	-
H12	PD15	LCD.FMC_D1	-
J1	VREFP	POWER/VREFP	-
J2	PA0	ARD_ADC.A0	STMod+ 13_ADC
J3	PC5	ARD_ADC.A5	-
J4	VDD	POWER/VDD_MCU	-
J5	PF14	LCD.RST	-
J6	PE8	LCD.FMC_D5	-
J7	PE10	LCD.FMC_D7	-
J8	PE12	LCD.FMC_D9	-
J9	VDD	POWER/VDD_MCU	-
J10	PD9	LCD.FMC_D14	-
J11	PD11	ARD.D2_IO	-
J12	PD12	ARD.D3_TIM	-
K1	VDDA	POWER/VDDA	-
K2	PA2	OCTOSPI.NCS	-
K3	PA7	OCTOSPI.IO2	-
K4	PB2	OCTOSPI.DQS	-
K5	PF11	-	STMod+ SEL_12
K6	PG1	AUDIO_RESETN	-
K7	PE7	LCD.FMC_D4	-
K8	PE14	LCD.FMC_D11	-
K9	PB10	ARD.D0_RX	T.VCP_RX
K10	PB13	-	STMod+ 1_UART_CTS/STMod+ 1_SPI_CSN
K11	PB14	USB_C.FLT	-
K12	PB15	USB_C.CC2	-
L1	PA3	OCTOSPI.CLK	-
L2	PA6	OCTOSPI.IO3	-
L3	PA4	ARD_ADC.A2	USB_C.VBUS_VSENSE
L4	PB1	OCTOSPI.IO0	-
L5	PF12	-	STMod+ SEL_34
L6	PF15	LCD.CTP_RST	-
L7	PE11	LCD.FMC_D8	-
L8	PE15	LCD.FMC_D12	-
L9	PB11	ARC.D1_TX	T.VCP_TX

BGA pinout	Pin name	Main function pinout assignment	Optional function pinout assignment
L10	VSS_SMPS	POWER/GND	-
L11	PB12	DFSDM_DATIN1	-
L12	PD8	LCD.FMC_D13	-
M1	PA5	ARD_ADC.A3	-
M2	OPAM2_VINM	-	-
M3	PC4	ARD_ADC.A4	-
M4	PB0	OCTOSPI.IO1	-
M5	PF13	-	-
M6	PG0	ARD.D8_IO	-
M7	PE9	LCD.FMC_D6	-
M8	PE13	LCD.FMC_D10	-
M9	VDD_SMPS	POWER/VDDSMPS	-
M10	VLX	POWER/VLX	-
M11	V15	POWER/V15SMPS	-
M12	PD10	LCD.FMC_D15	-

9 STM32L562E-DK product information

9.1 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.

9.2 STM32L562E-DK product history

Table 35. **Product history**

Order code	Product identification	Product details	Product change description	Product limitations
STM32L562E-DK	DK32L562E$AT1	MCU: • STM32L562QEI6Q silicon revision "B" MCU errata sheet: • *STM32L552xx/562xx device errata* (ES0448) Boards: • MB1373-L562QEQ-C01 (main board) • MB1280-B01 (fanout board)	Initial revision	No limitation
	DK32L562E$AT2	MCU: • STM32L562QEI6Q silicon revision "B" MCU errata sheet: • *STM32L552xx/562xx device errata* (ES0448) Boards: • MB1373-L562QEQ-C01 (main board) • MB1280-B01 (fanout board)	Updated MCU with RSS corrected	No limitation
	DK32L562E$AT3	MCU: • STM32L562QEI6Q silicon revision "Z" MCU errata sheet: • *STM32L552xx/562xx device errata* (ES0448) Boards: • MB1373-L562QEQ-C01 (main board) • MB1280-B01 (fanout board)	Updated MCU with SMPS corrected	No limitation
	DK32L562E$AT4	MCU: • STM32L562QEI6Q silicon revision "Z" MCU errata sheet: • *STM32L552xx/562xx device errata* (ES0448) Boards: • MB1373-L562QEQ-C01 (main board) • MB1280-3V3-C01 (fanout board)	• Packaging: plastic blister replaced by a carton box • Fanout board revision changed	No limitation

Order code	Product identification	Product details	Product change description	Product limitations
STM32L562E-DK	DK32L562E$AT5	MCU: • STM32L562QEI6Q silicon revision "Z"	Main board revision changed	No demonstration software is provided from this revision.
		MCU errata sheet: • *STM32L552xx/562xx device errata* (ES0448)		
		Boards: • MB1373-L562QEQ-C02 (main board) • MB1280-3V3-C01 (fanout board)		

9.3 Board revision history

Table 36. **Board revision history**

Board reference	Board variant and revision	Board change description	Board limitations
MB1373 (main board)	L562QEQ-C01	Initial revision	No limitation
	L562QEQ-C02	Several part references updated due to obsolescence (such as the HW13 LCD SHENZEN_FRIDA_LCD-FRD154B2902-D-CTQ replaced with new LCD SHENZEN_FRIDA_LCD-FRD154H29003-A-CTQ with impact on firmware, refer to the bill of materials for details).	No limitation
MB1280 (fanout board)	DEFAULT-B01	Initial revision	No limitation
	3V3-C01	Updated: • Several part references due to obsolescence (such as transistors or others, refer to the bill of materials for details) • T1 and T2 wiring • Silkscreens, logos, and PCB mechanical size	No limitation

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

10.1 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 A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note: Use only shielded cables.

Responsible party (in the USA)

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10.2 ISED-Canada User Manual Notice for Licence-Exempt Radio Apparatus

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique 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;
2. L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

10.3 FCC and ISED-Canada RF Exposure statements

To satisfy FCC and ISED-Canada RF Exposure requirements for mobile devices, 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 closer than this distance is not recommended. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Pour satisfaire aux exigences FCC et IC concernant l'exposition aux champs RF pour les appareils mobile, une distance de séparation de 20 cm ou plus doit être maintenu entre l'antenne de ce dispositif et les personnes pendant le fonctionnement. Pour assurer la conformité, il est déconseillé d'utiliser cet équipement à une distance inférieure. Cet émetteur ne doit pas être co-situé ou fonctionner conjointement avec une autre antenne ou un autre émetteur.

10.4 CE conformity

10.4.1 Warning

EN 55032 / CISPR32 Class A product

Warning: this device is compliant with Class A of EN55032 / CISPR32. In a residential environment, this equipment may cause radio interference.

Simplified CE declaration of conformity:

ST Microelectronics hereby declares that the device STM32L562E-DK conforms with the essential requirements of Directive 2014/53/EU. The declaration of conformity can be found at *www.st.com*.

Revision history

Table 37. **Document revision history**

Date	Revision	Changes
29-Nov-2019	1	Initial release.
28-Jan-2020	2	Added *Section 7 Limitations* Updated *Section 6.4 RSS/bootloader*
17-Mar-2020	3	Added DK32L562E$AT2 to impacted parts in *SMPS limitation*
30-Jun-2020	4	Updated *Limitation* regarding limited support to SFI through the bootloader towards JTAG
8-Feb-2021	5	Added *Section 7 STM32L562E-DK Discovery kit information* with moved *Section 7.1 Product marking* from *Section 2 Ordering information* Updated *Section Appendix C Federal Communications Commission (FCC) and Innovation, Science and Economic Development Canada (ISED) Compliance Statements*
2-Jun-2021	6	Updated *Figure 17. BOOT0 modification to set the high-level logic*
26-Oct-2023	7	Cleaned most of the figures Updated STM32L562E-DK product information with Product marking, Table 35, and Table 36

Contents

List of tables

List of figures