UMxxxx
User Manual

B-L462E-CELL1 Discovery kit for NB/M1 communication Discovery Board

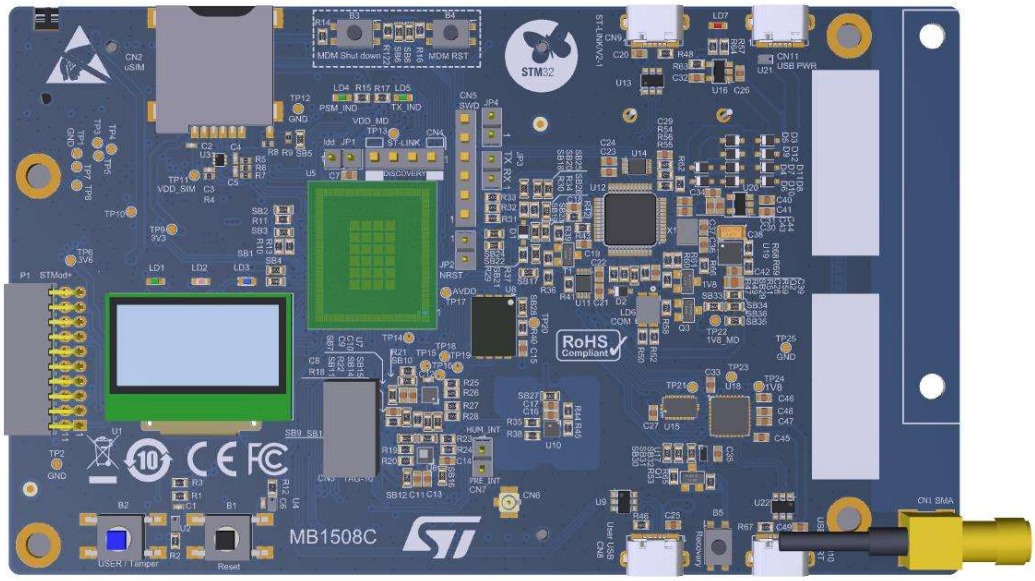
Introduction

The B-L462E-CELL1 Discovery pack (B-L462E-CELL1) is a turnkey development platform for the IoT and cellular technology-based solutions. The pack contains a TYPE-1SE module and a low-power Discovery mother board with antenna connector. The TYPE-1SE module includes a STM32L462REY micro-controller and a TYPE-1SC module which is a worldwide smallest LTE Cat NB1&M1 modem.

STMod+ and extended pins connectivity provides unlimited expansion capabilities with a large choice of specialized add-on boards.

The B-L462E-CELL1 Discovery kit includes an ST-LINK debugger/programmer and comes with the comprehensive STM32Cube software libraries together with packaged software examples to seamlessly connect to cloud servers. In addition, a direct access to the Arm® mbed Enabled™ on-line resources at Http://mbed.org is available.

Figure 1. B-L462E-CELL1 Discovery kit



Contents

1 Features

- TYPE-1SE module including TYPE-1SC and STM32L462REY
- STM32L462REY micro-controller featuring 512 KB of Flash memory and 160 KB of RAM in WLCSP64 package
- TYPE-1SC modem featuring LTE Cat M1/NB1 in LGA pack
- 0.96-inch 128 x 64 OLED screen with SPI interface
- 64Mbytes Quad-SPI(Micron) Flash memory
- ST 16Kbyte IIC EEPROM (M24128-DFMN6TP)
- Ultra-low-power 3D accelerometer and 3D magnetometer (LSM303AGR)
- Capacitive digital sensor for relative humidity and temperature (HTS221)
- 260-1260 hPa absolute digital output barometer (LPS22HH)
- 3 user LEDs connected to timers
- 2 push-buttons (User and reset)
- Board expansion connectors:
  - SMA antenna connector
  - Two 50 Pin and 2.54-mm pin pitch headers
  - SIM card slot
  - 3.5mm CTIA stereo headset jack including analog microphone input
  - Micro-B USB connectors for power, USARTs, USB device and ST-LINK V2-1
  - STMod+
  - TAG10
- Flexible power-supply options: ST-LINK USB, User USB, UART USB, Power USB or 3 x AAA battery
- On-board ST-LINK/V2-1 debugger/programmer with USB re-enumeration capability: mass storage, virtual COM port and debug port
- Comprehensive free software including a variety of examples, as part of the STM32Cube package, as well as a cloud connector software expansion, enabling direct access to cloud servers
- Support of wide choice of Integrated Development Environments (IDEs) including IAR™, Keil®, GCC-based IDEs, Arm® mbed Enabled™
- Arm® mbed Enabled™ (see Http://mbed.org)

2 Product marking

Evaluation tools marked as "ES" or "E" are not yet qualified and therefore they are not ready to be used as reference design or in production. Any consequences deriving from such usage will not be at ST charge. In no event, ST will be liable for any customer usage of these engineering sample tools as reference design or in production.

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

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

3 System requirements

- Windows® OS (7, 8 and 10), Linux® or MacOS™
- USB Type-A to Micro-B cable

4 Development toolchains

- Keil® MDK-Arm(a)
- IAR™ EWARM(a)
- GCC-based IDEs including free SW4STM32 from AC6
- Arm® mbed Enabled™ online

5 Demonstration software

The demonstration software, included in the STM32Cube package, 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 the webpage.

6 Ordering information

To order the B-L462E-CELL1 Discovery kit for IoT node, refer to Table 1.

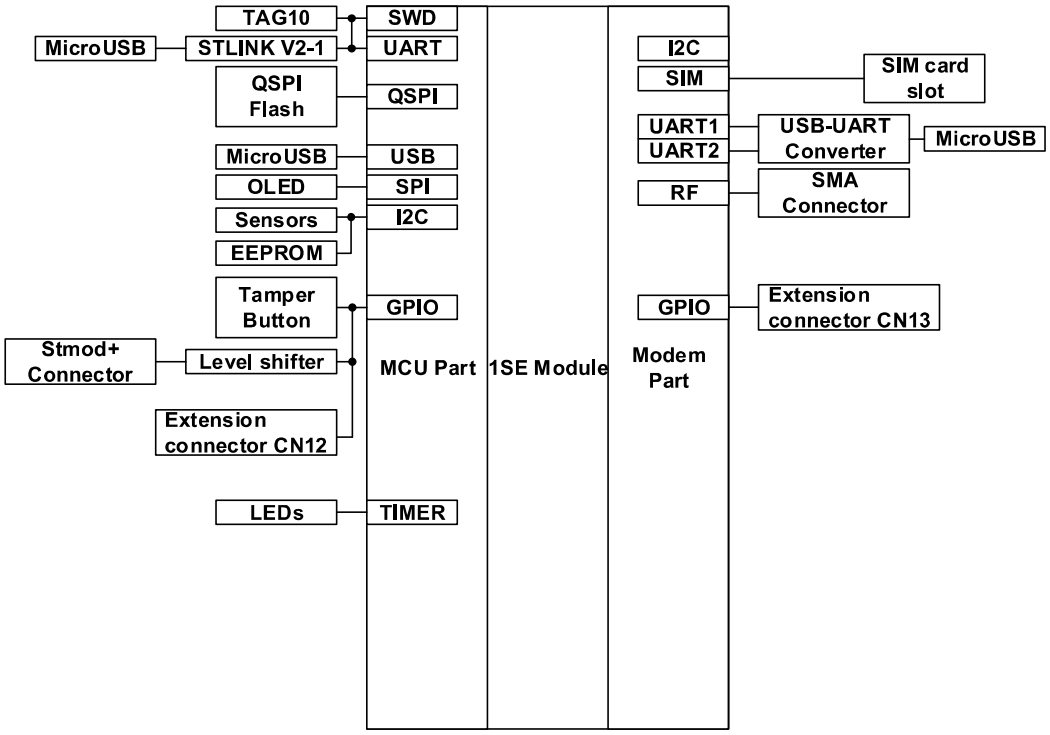
Table 1. Ordering information

Order code	Target STM32
B-L462-CELL1	STM32L462REY

7 Hardware layout and configuration

The B-L462E-CELL1 Discovery kit is designed around the TYPE-1SE module. The hardware block diagram (see Figure 2) illustrates the connection between TYPE-1SE module and peripherals (OLED screen, Sensors, USB FS connector, USARTs, EEPROM, Micro-SIM card and embedded ST-LINK V2-1) and Figure 3 and Figure 4 will help you locate these features on the actual evaluation board.

Figure 2. Hardware block diagram



7.1 B-L462E-CELL1 Discovery kit for IoT node layout

Figure 3. B-L462E-CELL1 Discovery kit (top view)

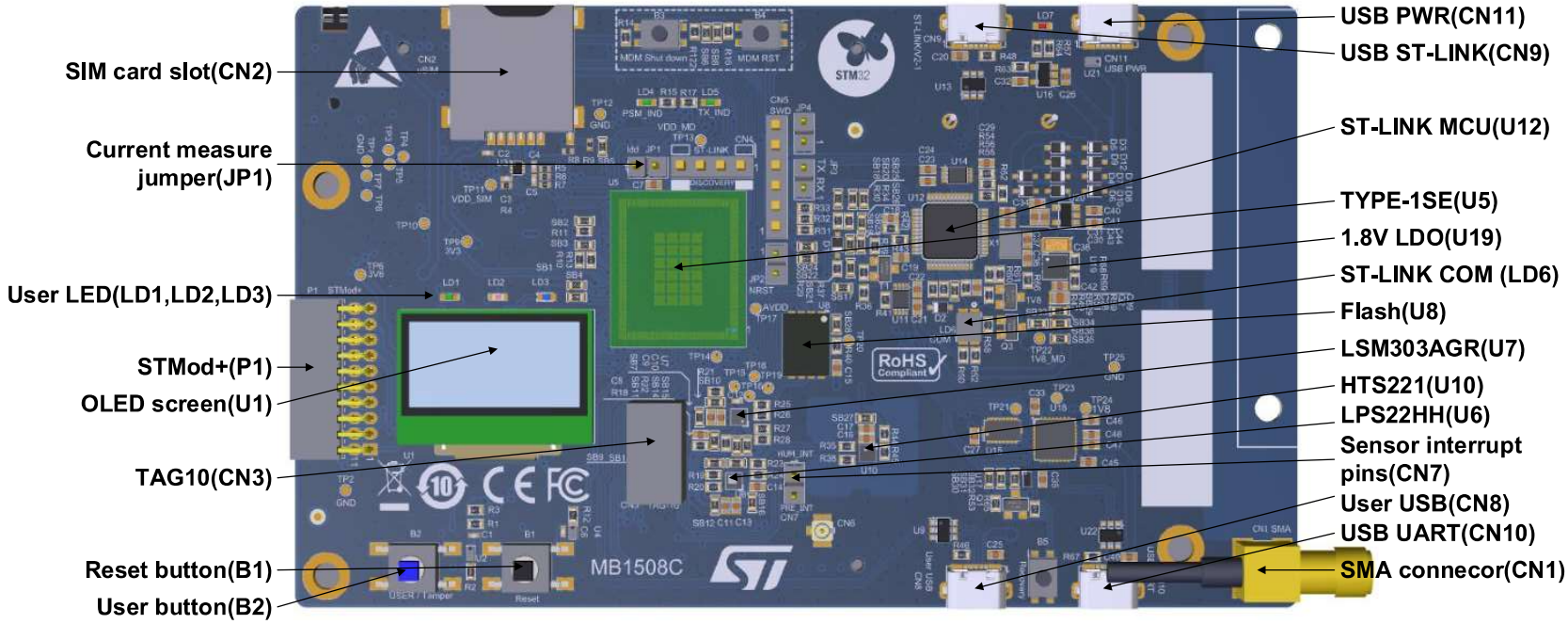
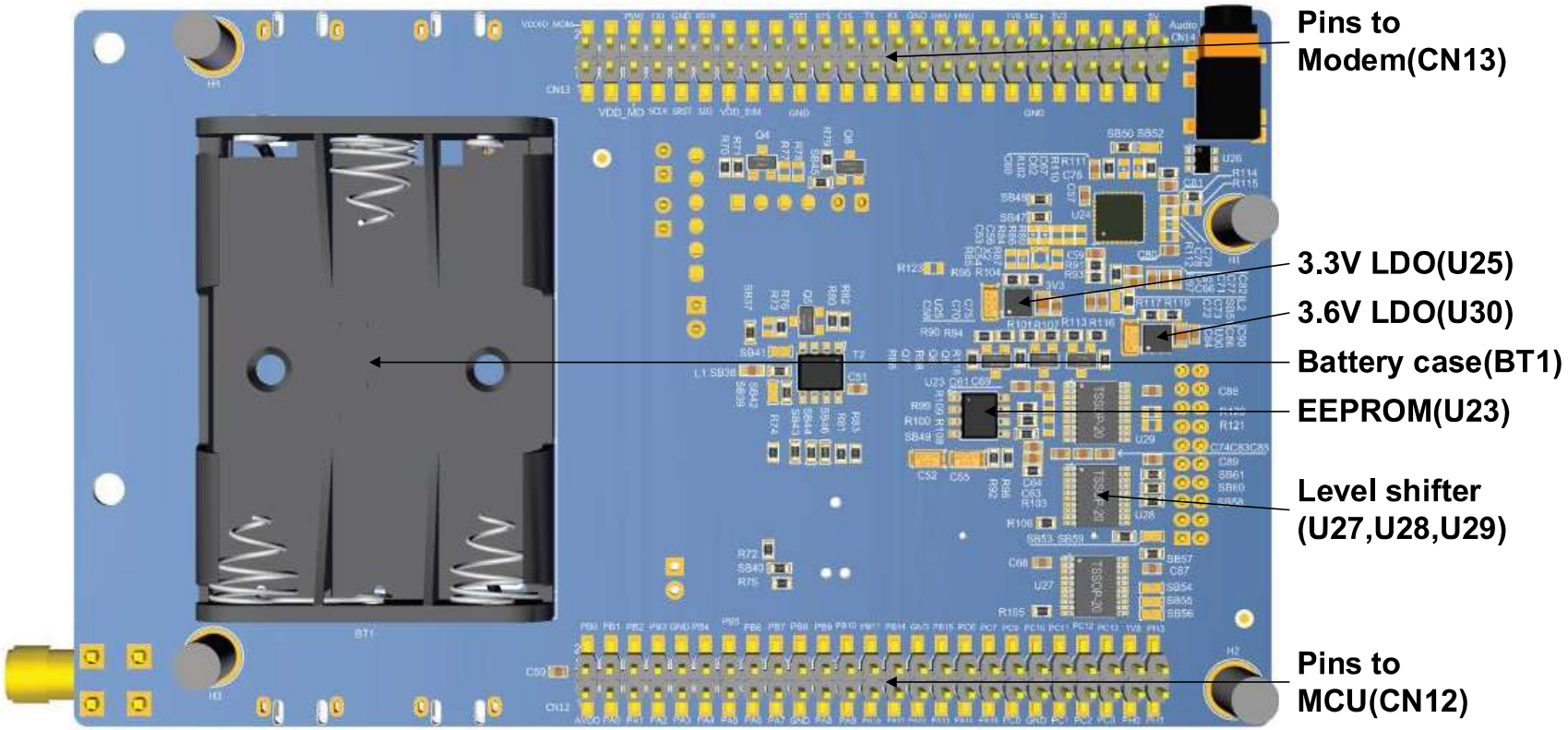
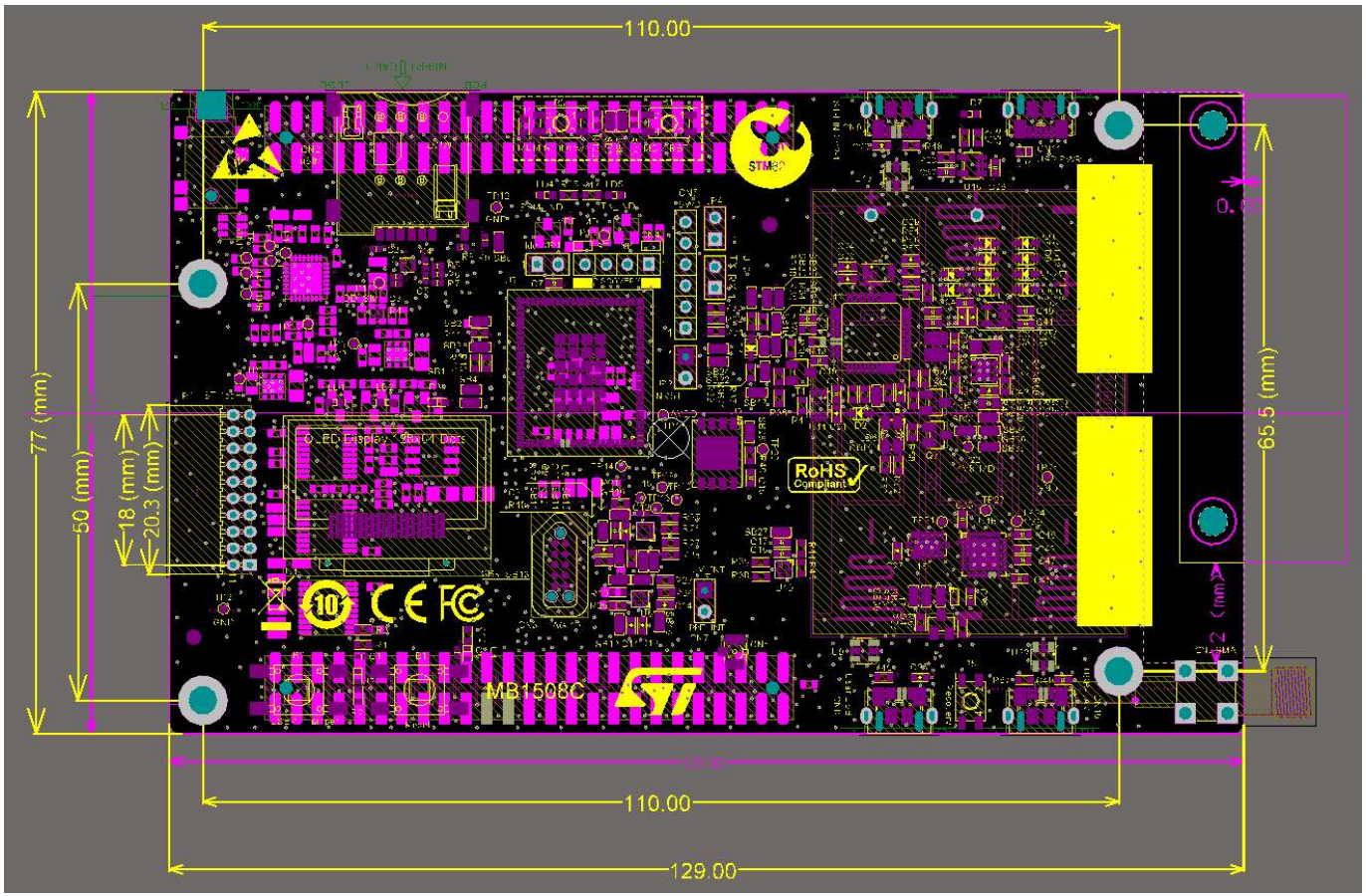


Figure 4. B-L462E-CELL1 Discovery kit (bottom view)



7.2 B-L462E-CELL1 Discovery kit mechanical drawing

Figure 5. B-L462E-CELL1 Discovery kit mechanical drawing



7.3 Embedded ST-LINK/V2-1

The ST-LINK/V2-1 programming and debugging tool is integrated on the B-L462E-CELL1 Discovery kit. Compared to the ST-LINK/V2 the changes are listed below.

The new features supported on the ST-LINK/V2-1 are:

- USB software re-enumeration
- Virtual COM port interface on USB
- Mass storage interface on USB
- USB power management request for more than 100 mA power on USB

The following features are no more supported on the ST-LINK/V2-1:

- SWIM interface
- Application voltage lower than 3 V

For all general information concerning debugging and programming features common between V2 and V2-1 versions, refer to ST-LINK/V2 in-circuit debugger/programmer for STM8 and STM32 User manual (UM1075) at the www.st.com website.

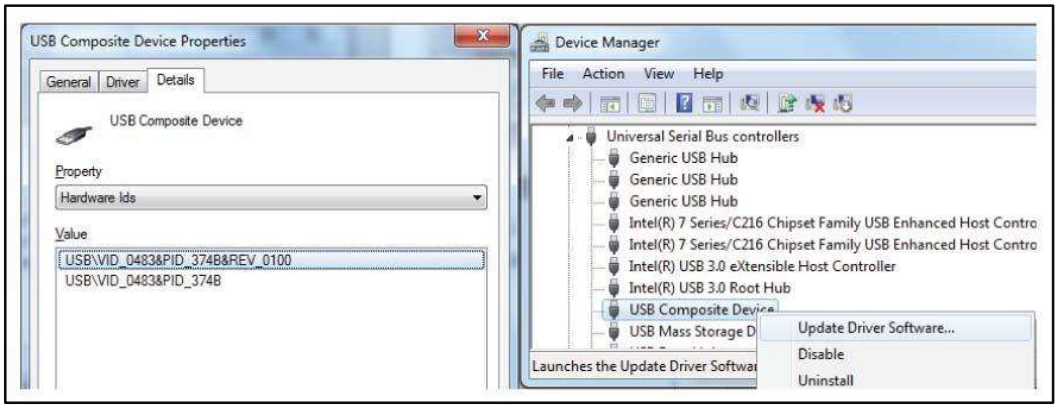
7.3.1 Drivers

Before connecting discovery kit to a Windows® PC (7, 8 or 10) via USB, a driver for the ST-LINK/V2-1 must be installed. It is available at the www.st.com website.

In case the B-L462E-CELL1 Discovery kit is connected to the PC before the driver is installed, some B-L462E-CELL1 Discovery kit interfaces may be declared as “unknown” in the PC device manager. In this case the user must install the driver files, and update the driver of the connected device from the device manager (see Figure 6).

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

Figure 6. USB Composite Device



7.3.2 ST-LINK/V2-1 firmware upgrade

The ST-LINK/V2-1 embeds a firmware upgrade mechanism for in-situ upgrade through the USB port. As the firmware may evolve during the lifetime of the ST-LINK/V2-1 product (for example new functionalities, bug fixes, support for new microcontroller families), it is recommended to visit the www.st.com website, before starting to use the B-L462E-CELL1

Discovery kit for IoT node and periodically, to stay up-to-date with the latest firmware version.

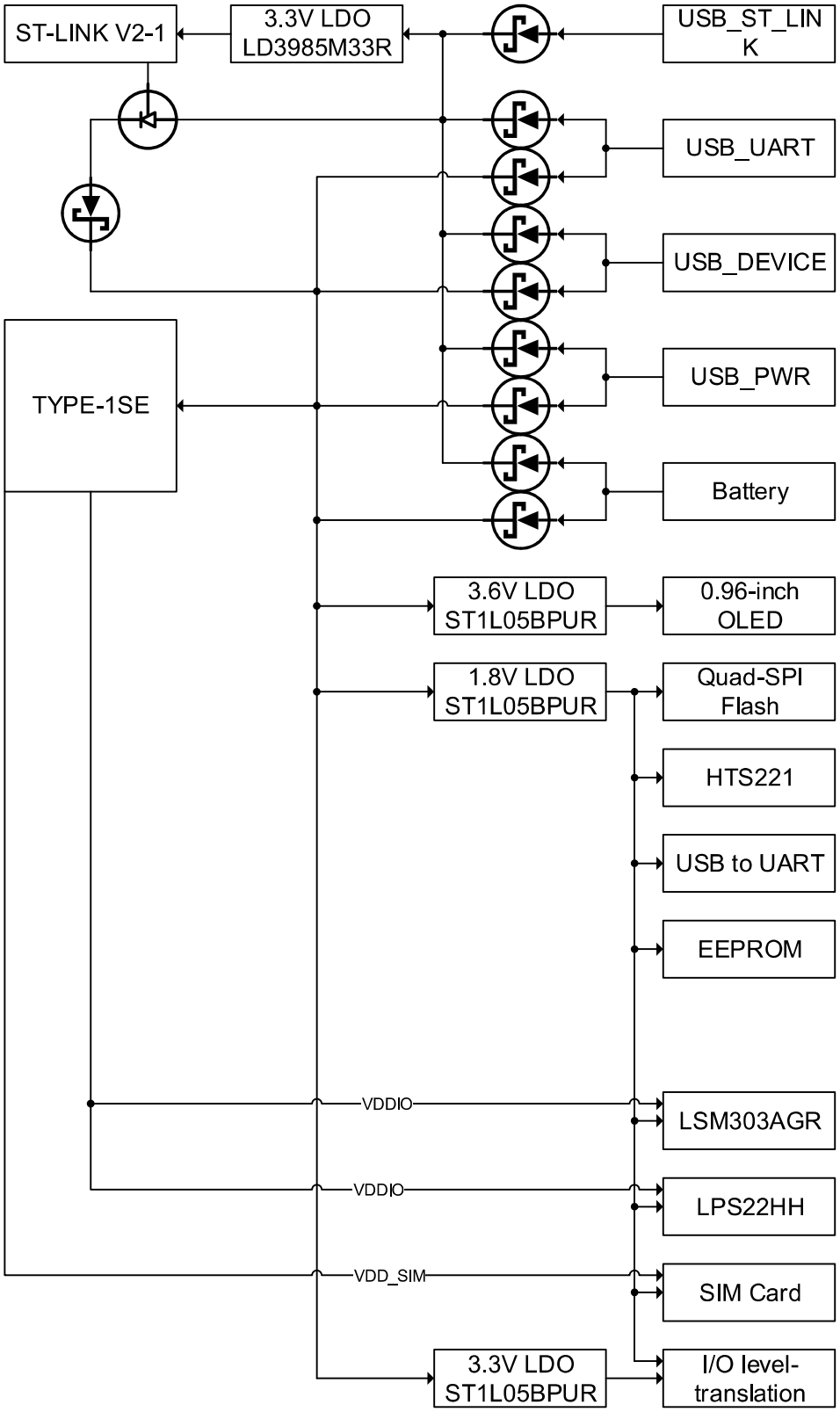
7.4 Power supply

The B-L462E-CELL1 Discovery kit is designed to be powered by 5V DC power supply. It is possible to use any of the following five sources for the power supply: UartUsbVbus, Vbus, 5V_USB_CHG, 5V_USB_PWR, EXT_BAT. Power sources are selected automatically by diodes.

All extern power sources are connected to the JP1, so we can use the JP1 to measure current which is consumed by the module.

- UartUsbVbus is provided by the UART USB connector (CN10).
- Vbus is provided by the User USB connector (CN8).
- 5V_USB_CHG is provided by the ST-LINK/V2-1 USB connector (CN9). This power source can be controlled by the on-board ST-Link V2-1.
- 5V_USB_PWR is provided by the power USB connector (CN11).
- EXT_BAT is connected to a battery case which contains 3 AAA battery. As it can provide only 4.5V power source, this power source is not designed for the long-time and huge-current applications. Low-power applications can consider to use this as the main power source and other applications may use this as the back-up power source.

Figure 7 Power tree



7.5 Clock sources

One clock source is described below:

- X1 which is the 8MHz clock source for ST-LINK MCU.

The other one clock source is the 32.768KHz clock source in the module which is used to be the RTC clock source for STM32L462REY.

7.6 Reset sources

The reset signal of the B-L462E-CELL1 Discovery kit is active low and the reset sources includes:

- A reset button B1
- An embedded ST-LINK/V2-1
- TAG10 connector reset pad

7.7 USB DEVICE FS

The B-L462E-CELL1 Discovery kit supports USB Device function via a USB Micro-B connector (CN8)

7.8 Quad-SPI NOR Flash memory

512-Mbit Quad-SPI NOR Flash memory (MT25QU512ABB1EW9-0SIT from Micron) is connected to the Quad-SPI interface of the STM32L462REY in the TYPE-1SE module.

7.9 Virtual COM port

The serial interface USART1 is directly available as a virtual COM port of the PC connected to the ST-LINK/V2-1 USB connector CN7. The virtual COM port settings are configured as: 115200 b/s, 8 bits data, no parity, 1 stop bit, no flow control.

7.10 ST sensors

Several STMicroelectronics sensors are available on the B-L462E-CELL1 Discovery kit for IoT node board, they are listed below:

- ultra-low-power 3D accelerometer and 3D magnetometer (LSM303AGR)
- 260-1260 hPa absolute digital output barometer (LPS22HH)
- Capacitive digital sensor for relative humidity and temperature (HTS221)

7.10.1 Ultra-low-power 3D accelerometer and 3D magnetometer (LSM303AGR)

The LSM303AGR is an ultra-low-power high-performance system-in-package featuring a 3D digital linear acceleration sensor and a 3D digital magnetic sensor.

The LSM303AGR has linear acceleration full scales of ±2g/±4g/±8g/16g and a magnetic field dynamic range of ±50 gauss.

The LSM303AGR includes an I2C serial bus interface that supports standard, fast mode, fast mode plus, and high-speed (100 kHz, 400 kHz, 1 MHz, and 3.4 MHz) and an SPI serial standard interface. On the B-L462E-CELL1 Discovery kit for IoT node the I2C1 bus from the STM32L462REY is used.

The system can be configured to generate an interrupt signal for free-fall, motion detection and magnetic field detection.

The magnetic and accelerometer blocks can be enabled or put into power-down mode separately.

The LSM303AGR is available in a plastic land grid array package (LGA) and is guaranteed to operate over an extended temperature range from -40 °C to +85 °C.

- 3 magnetic field channels and 3 acceleration channels
- ±50 gauss magnetic dynamic range
- ±2/±4/±8/16 g selectable acceleration full scales
- 16-bit data output
- SPI / I2C serial interfaces
- Analog supply voltage 1.71 V to 3.6 V
- Power-down mode / low-power mode
- Programmable interrupt generators for freefall, motion detection and magnetic field detection
- Embedded self-test
- Embedded temperature sensor
- Embedded FIFO
- ECOPACK®, RoHS and “Green” compliant

7.10.2 260-1260 hPa absolute digital output barometer (LPS22HH)

The absolute pressure-sensing device LPS22HH is an ultra-compact piezoresistive sensor which functions as a digital output barometer.

The device comprises a sensing element and an IC interface which communicates from the sensing element to the application through I2C or SPI. On the B-L462E-CELL1 Discovery kit for IoT node the I2C1 bus from the STM32L462REY is used.

The sensing element, which detects absolute pressure, consists of a suspended membrane manufactured using a dedicated process developed by ST.

The LPS22HH is available in a full-mold, holed LGA package (HLGA). It is guaranteed to operate over a temperature range extending from -40 °C to +85 °C. The package is holed to allow external pressure to reach the sensing element.

- 260 to 1260 hPa absolute pressure range
- Current consumption down to 4 µA
- Absolute pressure accuracy: 0.5 hPa
- Low pressure sensor noise: 0.65 Pa
- High-performance TCO: 0.65 Pa/°C
- Embedded temperature compensation
- 24-bit pressure data output
- ODR from 1 Hz to 200 Hz
- SPI, I²C or MIPI I3CSM interfaces
- Embedded FIFO
- Interrupt functions: Data-Ready, FIFO flags, pressure thresholds
- Supply voltage: 1.7 to 3.6 V
- High shock survivability: 22,000 g
- Small and thin package

- ECOPACK® lead-free compliant

7.10.3 Capacitive digital sensor for relative humidity and temperature (HTS221)

The HTS221 is an ultra-compact sensor for relative humidity and temperature. It includes a sensing element and a mixed signal ASIC to provide the measurement information through digital serial interfaces. On the B-L462E-CELL1 Discovery kit for IoT node the I2C1 bus from the STM32L462REY is used.

The sensing element consists of a polymer dielectric planar capacitor structure capable of detecting relative humidity variations and it is manufactured using a dedicated ST process.

The HTS221 is available in a small top-holed cap land grid array (HLGA-6L (2 x 2 x 0.9 mm)) package guaranteed to operate over a temperature range from -40 ℃ to +120 ℃.

The main features of the HTS221 are:

- 0 to 100% relative humidity range,
- Low-power consumption: 2 µA @ 1 Hz ODR
- Selectable ODR from 1 Hz to 12.5 Hz
- High rH sensitivity: 0.004% rH/LSB
- Humidity accuracy: ±3.5% rH, 20 to +80% rH
- Temperature accuracy: ±0.5 ℃,15 to +40 ℃
- Embedded 16-bit ADC
- 16-bit humidity and temperature output data
- SPI and I2C interfaces. On the STM32L4 Discovery kit for IoT node, the I2C2 bus from STM32L475VG is used.
- Factory calibrated • Tiny 2 x 2 x 0.9 mm package
- ECOPACK® compliant

7.11 EEPROM (M24128-DFMN6TP)

128-Kbit serial I℃ bus EEPROM(M24128-DFMN6TP) is connected to the I2C1 interface of the STM32L462REY.It's features are:

- Compatible with all I2C bus modes: – 1 MHz – 400 kHz – 100 kHz
- Memory array: – 128 Kbit (16 Kbyte) of EEPROM – Page size: 64 byte – Additional Write lockable page (M24128-D order codes)
- Single supply voltage and high speed: – 1 MHz clock from 1.7 V to 5.5 V
- Write: – Byte Write within 5 mS – Page Write within 5 mS
- Operating temperature range: – from -40 ℃ up to +85 ℃
- Random and sequential Read modes
- Write protect of the whole memory array
- Enhanced ESD/Latch-Up protection
- More than 4 million Write cycles
- More than 200-years data retention

7.12 OLED screen

9OL9935701000 is a 0.96-inch OLED screen with the SSD1315Z driver IC. On the B-L462E-CELL1 Discovery kit for IoT node the SPI3 bus from the STM32L462REY is used to connect this OLED screen. It has features which are:

- Small molecular organic light emitting diode
- Color: White

- Panel matrix: 128x64
- Driver IC: SSD1315Z
- Excellent quick response time
- Extremely thin thickness for best mechanism design: 1.42mm
- High contrast: 2000:1
- Wide viewing angle: 160 °
- 3/4 wire Serial Peripheral Interface
- Wide range of operating temperature: -40 to 70 ℃
- Anti-glare polarizer

7.14 Buttons and LEDs

The black button B1 located on top side is the reset of the microcontroller STM32L462REY.

The blue button B2 located top side is available to be used as a digital input or as alternate wake-up function.

When the button is depressed the logic state is “0”, otherwise the logic state is “1”.

Three LEDs (LD1, LD2 and LD3) located on the top side are available for the user. To light a LED a high logic state “1” should be written in the corresponding GPIO. As the GPIOs can be connected to timers in chip, users are allowed to use the PWM function to control the brightness of LEDs.

Table 2 Button and LED control port

Reference	Color	Name	Comment
B1	Black	Reset	-
B2	Blue	Wake-up	Alternate function Wake-up
LD1	Green	User LED1	PC6
LD2	Red	User LED2	PB15
LD3	Blue	User LED3	PB14
LD4	Green	LED4	PSM_IND
LD5	Green	LED5	TX_IND
reference	Bicolor (red and green)	ST-LINK COM	green when communication
LD7	Red	Fault Power	Current upper than 750 mA

7.15 I2C addresses of modules used on MB1508

The Table 3 displays the IIC address (read and write) for the modules that are connected to the I2C1 bus.

Table 3 I2C address for each component

Modules	Description	SAR[6:0] +R/W	I2C write address	I2C read address
HTS221	Capacitive digital sensor for relative humidity and temperature	1011111X	0xBE	0xBF
LPS22HH	MEMS nano pressure sensor	1011101x(SDA[0]=1])	0xBA	0xBB
LSM303AGR	3D accelerometer and 3D magnetometer	0011001x(Linear acceleration)	0x32(Linear acceleration)	0x33(Linear acceleration)
		0011110x(Magnetic field)	0x3C(Magnetic field)	0x3D(Magnetic field)
M24128-DFMN6TP	128-Kbit serial I²C bus EEPROM	1010000x(Memory array)	0xA0(Memory array)	0xA1(Memory array)
		1011000x(Identification page)	0xB0(Identification page)	0xB1(Identification page)

8 Connectors

Sixteen connectors are implemented on the B-L462E-CELL1 Discovery kit for IoT node:

- CN1: SMA connector for ant
- CN2: SIM card slot
- CN3: Tag connector
- CN4: ST-LINK select jumper
- CN5: ST-LINK debug connector
- CN6: reserved U.FL connector
- CN7: INT pins of sensors
- CN8: USB connector for DEVICE
- CN9: USB connector for ST_LINK
- CN10: USB connector for UART
- CN11: USB connector for power
- CN12: 25*2 pins connector for MCU
- CN13: 25*2 pins connector for Modem
- CN14: 3.5mm stereo headphone connector
- P1: Socket 10X2 STMod+

In addition, one jumper JP1 is used for IDD measurements.

8.1 SMA connector for antenna

CN1 is a female SMA connector compatible with male SMA rod antenna.

On the TYPE-1SE module, U.FL connector is the only way to connect extern antenna. The TYPE-1SE module can use the SMA rod antenna through the CN1 cable which convert the SMA port to U.FL port. Users can connect rod antenna on the SMA connector as it has better

performance.

8.2 SIM card slot

CN2 is a micro-SIM card slot.

SIM card slot only support Micro-SIM card and it supports card detect function which can detect the existence of the SIM card. When the SIM-card exists, the CD signal pin will be floating. Otherwise, the signal pin will be pulled down. As R8 is soldered, floating state is replaced by pull-up state.

Table 4 SIM card slot

Connector	Pin number	Pin name	Signal name	Function
CN2	1	CD	SIM_DETECT	Card exist detect
	2	GND	-	Power
	3	GND	-	Power
	4	GND	-	Power
	5	GND	-	Power
	C1	VCC	VDD_SIM	Power
	C2	RST	SIM_RST	SIM RST
	C3	CLK	SIM_CLK	SIM clock
	C5	GND	-	Power
	C6	VPP	VDD_SIM	Power
	C7	I/O	SIM_DATA	SIM data

8.3 Tag connector

CN3 is a tag connector which provides direct debug port for the MCU.

The TAG connector is implemented on the B-L462E-CELL1 Discovery kit for IoT node. The TAG connector is a 10-pin footprint supporting SWD mode, which is shared with the same signals as for the ST-LINK.

The TC2050-IDC-NL cable is used to link ST-LINK and TAG connector on the B-L462E-CELL1 Discovery kit for IoT node, so that the STM32L4 in the module can be easily programmed and debugged without any extra accessory.

Figure 8. TAG connector

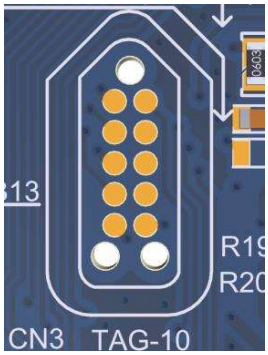


Figure 9. TC2050-IDC-NL cable

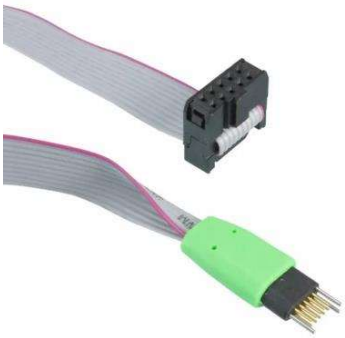


Table 5 TAG connector

Connector	Pin number	Pin name	Signal name	STM32L4 pin	Function
CN3	1	1.8V	1V8	-	Power
	2	TMS/SWDIO	TMS/SWDIO	PA13	Serial Wire Data Input/output
	3	GND	-	-	Ground
	4	TCK/SWCLK	TCK/SWCLK	PA14	Serial Wire Clock
	5	GND	-	-	Ground
	6	SWO	SWO	PB3	Serial Wire Output
	7	NC	-	-	-
	8	NC	-	-	-
	9	NC	-	-	-
	10	RESET#	RESET#	NRST	RESET

8.4 ST-LINK select jumper

The ST-LINK select connector is a 4pin, 2.54-mm pitch male connector. It is used to decide which target the ST-LINK is connected to.

Table 6 ST-LINK select jumper

Connector	Pin number	Pin name	Signal name	STM32L4 pin	Function
CN4	1	T_JTCK	T_JTCK	-	When Pin 1, 2 and Pin 3, 4 are connected, discovery board is selected.
	2	TCK/SWCLK	TCK/SWCLK	PA14	
	3	T_JTMS	T_JTMS	-	
	4	TMS/SWDIO	TMS/SWDIO	PA13	

8.5 ST-LINK debug connector

The ST-LINK debug connector is a 6-pin, 2.54-mm pitch male connector. It provides access to the embedded SWJ-DP interface of the STM32F103CBT6 MCU. This SWJ-DP interface is a combined JTAG and serial wire debug port that enables either a serial wire debug or a JTAG probe, to be connected to the target.

Table 7 ST-LINK debug connector

Connector	Pin number	Pin name	Signal name	STM32L4 pin	Function
CN5	1	GND	GND	-	Power
	2	T_JTCK	TCK/SWCLK	PA14	Serial Wire Clock
	3	GND	GND	-	Power
	4	T_JTMS	TMS/SWDIO	PA13	Serial Wire Data Input/Output
	5	T_NRST	T_NRST	NRST	RESET
	6	T_SWO	T_SWO	PB3	Serial Wire Output

8.6 reserved U.FL connector

This U.FL connector(CN6) is used to connect the CN1 connector when the CN1 connector is not connected to the module.

8.7 INT pins of sensors

Table 8 INT pins of sensors

Connector	Pin number	Pin name	Signal name	Function
CN7	1	DRDY	INT_HUM	HTS221's INT
	2	INT/DRDY	INT_PRE	LPS22HH's INT

8.8 USB connector for User Device

The USB connector is used to connect the USB device port in the STM32L462REY microcontroller.

Figure 10 USB connector for User Device

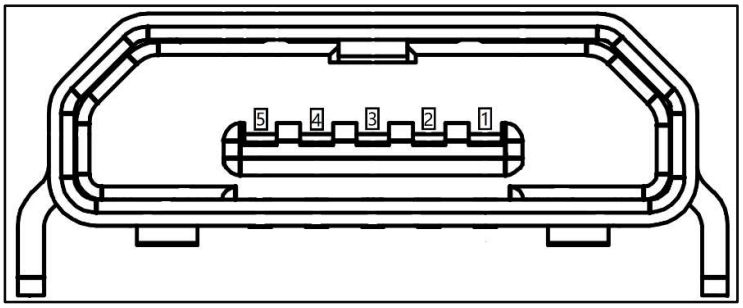


Table 9 USB connector for User Device

Connector	Pin number	Pin name	Signal name	STM32L4 pin	Function
CN8	1	VBUS	VBUS	-	Power
	2	DM	USB_DM	PA11	USB Device -
	3	DP	USB_DP	PA12	USB Device +
	4	ID	-	-	-
	5	GND	GND	-	Power

8.9 USB connector for ST-LINK

The USB connector is used to connect the embedded ST-LINK/V2-1 to the PC to program and debug the STM32L462REY microcontroller.

Figure 11 USB connector for ST-LINK

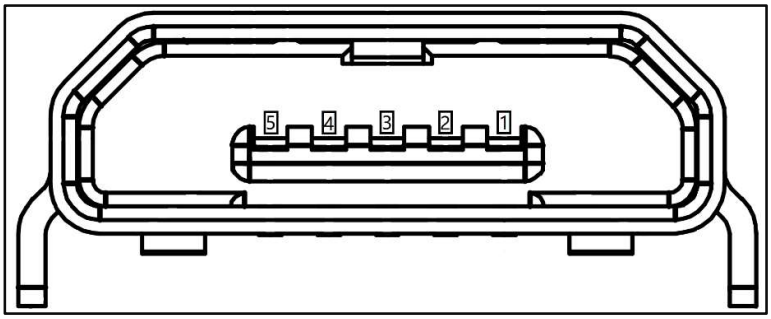


Table 10 USB connector for ST-LINK

Connector	Pin number	Pin name	Signal name	STM32L4 pin	Function
CN9	1	VBUS	5V_USB_CHG	-	Power
	2	DM	STL_USB_D_N	PA11	USB ST-LINK -
	3	DP	STL_USB_D_P	PA12	USB ST-LINK +
	4	ID	-	-	-
	5	GND	GND	-	Power

8.10 USB connector for UART

The USB connector is used to connect the UARTs of the modem which is used to debug and update the modem in the TYPE-1SE.

Figure 12 USB connector for UART

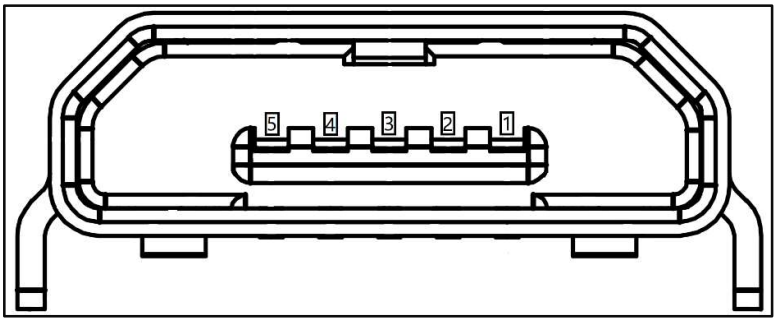


Table 11 USB connector for UART

Connector	Pin number	Pin name	Signal name	Function
CN10	1	VBUS	UartUsbVbus	Power
	2	DM	USBDM	USB UART -
	3	DP	USBDP	USB UART +

	4	ID	-	-
	5	GND	GND	Power

8.11 USB connector for power

The USB connector is only used to power the whole system and it has no communication functions.

Figure 13 USB connector for power

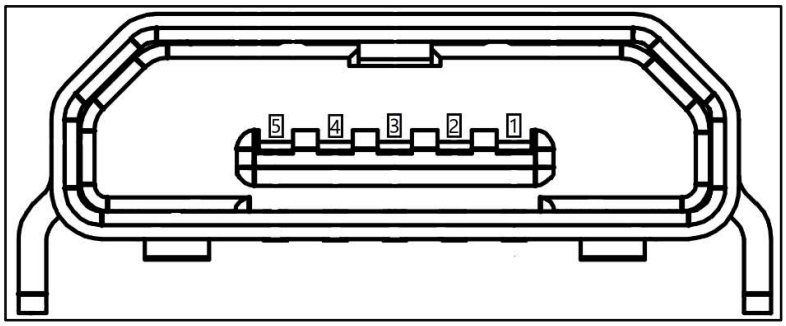


Table 12 USB connector for power

Connector	Pin number	Pin name	Signal name	Function
CN11	1	VBUS	5V_USB_PWR	Power
	2	DM	-	-
	3	DP	-	-
	4	ID	-	-
	5	GND	GND	Power

8.12 Extension pin header for MCU

This connector is a 50-pin, 2.54-mm pitch male connector. It is used to connect the MCU's pins in module.

Table 13 Extension pin header for MCU

Connector	Pin number	Signal name	Function
CN12	1	AVDD	Power
	2	PB0	QUADSPI_IO1
	3	PA0	USART2_CTS
	4	PB1	QUADSPI_IO0
	5	PA1	USART2_RTS
	6	PB2_R	CS_DISP
	7	PA2	USART2_TX
	8	PB3	SWO
	9	PA3	USART2_RX
	10	GND	Power
	11	PA4	SPI_NSS
	12	PB4	SPI1_MISO
	13	PA5	SPI1_SCK
	14	PB5	SPI1_MOSI
	15	PA6	QUADSPI_IO3
	16	PB6	SF_EN
	17	PA7	QUADSPI_IO2
	18	PB7_R	NC_PWR_EN
	19	GND	Power
	20	PB8	IIC_SCL
	21	PA8	RCC_MCO
	22	PB9	IIC_SDA
	23	PA9	USART1_TX
	24	PB10	QUADSPI_CLK
	25	PA10	USART1_RX
	26	PB11	QUADSPI_nCS
	27	PA11	USB_DM
	28	PB14	LED3
	29	PA12	USB_DP
	30	GND	Power
	31	PA13	SWDIO
	32	PB15	LED2
	33	PA14	SWCLK
	34	PC6	LED1
	35	PA15	SPI1_NSS
	36	PC7	NC_RST_IND
	37	PC0	ADC1_IN1
	38	PC9	TIM3_CH4
	39	GND	Power
	40	PC10	SPI3_SCK

	41	PC1	ADC1_IN2
	42	PC11	D/C_DISP
	43	PC2	INT_ACC
	44	PC12	SPI3_MOSI
	45	PC3	INT_MAG
	46	PC13	User/Tamper Button
	47	PH0	Extern Clock In
	48	1V8	Power
	49	PH1	RST_DISP
	50	PH3	BOOT0

8.13 Extension pin header for Modem

This connector is a 50-pin, 2.54-mm pitch male connector. It is used to connect the modem's pins in module.

Table 14 Extension pin header for Modem

Connector	Pin number	Signal name	Function
CN13	1	FFU_I2C0_SCL	
	2	VDDIO_MDM	Power
	3	FFU_I2C0_SDA	
	4	PMU_VBACKUP	
	5	VDD_MD	Power
	6	FFU_PSM_IND	
	7	NC_SIM_CLK	SIM card signal clock
	8	FFU_TX_IND	
	9	NC_SIM_RST	SIM card reset
	10	GND	Power
	11	NC_SIM_IO	SIM card data input/output
	12	NC_RST	Modem reset
	13	VDD_SIM	Power
	14	FFU_GNSS_CODES_IND	
	15	NC_SIM_DETECT	SIM card detect
	16	FFU_GNSS_EXT_LNA	
	17	FFU_CLKOUT	
	18	FFU_GNSS_SFN_IND	
	19	GND	Power
	20	NC_RST_IND	
	21	FFU_PCM_IN	
	22	NC_UART0_RTS	Modem UART0 RTS
	23	FFU_PCM_OUT	
	24	NC_UART0_CTS	Modem UART0 CTS
	25	FFU_PCM_FS	
	26	NC_UART0_TX	Modem UART0 TX

	27	FFU_PCM_CLK	
	28	NC_UART0_RX	Modem UART0 RX
	29	RFT_UART1_TX	Modem UART1 TX
	30	GND	Power
	31	RFT_UART1_RX	Modem UART1 RX
	32	NC_DWU	
	33	RFT_UART1_CTS	Modem UART1 CTS
	34	NC_HWU	
	35	RFT_UART1_RTS	Modem UART1 RTS
	36	NC_PWR_BUTTON	
	37	RFT_UART2_TX	Modem UART2 TX
	38	eSIM_SWP	
	39	GND	Power
	40	1V8_MD	Power
	41	RFT_UART2_RX	Modem UART2 RX
	42	3V3	Power
	43	RFT_UART2_CTS	Modem UART2 CTS
	44	FFU_RFFE_VDDIO	
	45	RFT_UART2_RTS	Modem UART2 RTS
	46	FFU_RFFE_SCLK	
	47	PMU_AT_IN	
	48	FFU_RFFE_SDATA	
	49	PMU_AT_OUT	
	50	5V	Power

8.14 3.5mm stereo headphone connector

This headphone connector supports the CTIA standard which means the sequence of signals is Left, Right, GND and Mic.

8.15 Socket 10X2 STMod+

On the B-L462E-CELL1 Discovery kit for IoT node, the STMod+ connector provides flexibility in small form factor application.

The related STM32L462REY I/Os for STMod+ are listed in Table 15. The STMod+ connector is 20 pins with 2.00 mm pitch and right-angle female connector.

Table 15 Socket 10X2 STMod+

Connector	Pin number	Signal name	SB		STM32L4 Pin	Function
CN12	1	PA0_C	-	-	PA0	UART_CTS/SPI_CS
	2	-	SB56	SB60	-	-
		PC12_C	Close	Open	PC12	SPI_MOSIp
		PA2_C	Open	Close	PA2	UART_TX
	3	-	SB55	SB58	-	-
		PC11_C	Close	Open	PC11	SPI_MISOp
		PA3_C	Open	Close	PA3	UART_RX
	4	-	SB54	SB61	-	-
		PC10_C	Close	Open	PC10	SPI_SCK
		PA1_C	Open	Close	PA1	UART_RTS
	5	GND	-	-	-	Power
	6	5V	-	-	-	Power
	7	PB8_C	-	-	PB8	I2C_SCL
	8	PB5_C	-	-	PB5	SPI_MOSIs
	9	PB4_C	-	-	PB4	SPI_MISOs
	10	PB9_C	-	-	PB9	I2C_SDA
	11	PC1_C	-	-	PC1	INT
	12	PH0_C	-	-	PH0	RESET
	13	PC0_C	-	-	PC0	ADC1_IN1
	14	PC9_C	-	-	PC9	TIM3_CH4
	15	5V	-	-	-	Power
	16	GND	-	-	-	Power
	17	PA8_C	-	-	PA8	I/O
	18	PA5_C	-	-	PA5	I/O
	19	PA15_C	-	-	PA15	I/O
	20	PB14_C	-	-	PB14	I/O

8.16 Jumper JP1 for IDD measurements

The STM32 current measurement can be done on JP1. By default, a jumper is placed on JP1.

For current measurement configuration, the jumper on JP1 should be removed and an amp-meters should be placed on JP1.

Appendix A B-L462E-CELL1 Discovery kit I/O assignment

Table 16 B-L462E-CELL1 Discovery kit I/O assignment

Pin No.	Pin Name	Feature / Comment	Signal or Label
1	PA1	PA1/USART2_RTS	USART2_RTS
2	PA3	PA3/USART2_RX	USART2_RX
3	PA2	PA2/USART2_TX	USART2_TX
4	PA0	PA0/USART2_CTS	USART2_CTS
5	VDDA	ADC power	AVDD
6	VSSA	ADC GND	GND
7	NRST	Reset STM32	NRST
8	FFU_RFFE_SCLK	RFFE MIPI SCLK	FFU_RFFE_SCLK
9	FFU_RFFE_SDATA	RFFE MIPI SDADA	FFU_RFFE_SDATA
10	PC7	PC7/GPIO_EXTI7	GPIO_EXIT7
11	NC_RST_IND	Modem reset indicator	NC_RST_IND
12	NC_UART0_RTS	Reserved for internal usage	NC_UART0_RTS
13	NC_UART0_CTS	Reserved for internal usage	NC_UART0_CTS
14	NC_UART0_TX	Reserved for internal usage	NC_UART0_TX
15	NC_UART0_RX	Reserved for internal usage	NC_UART0_RX
16	RFT_UART2_CTS	Recovery UART_CTS	UART2_CTS
17	RFT_UART2_TX	Recovery UART_TX	UART2_TX
18	RFT_UART2_RTS	Recovery UART_RTS	UART2_RTS
19	RFT_UART2_RX	Recovery UART_RX	UART2_RX
20	FFU_TX_IND	NC	FFU_TX_IND
21	FFU_GNSS_COEX_IND	NC	FFU_GNSS_COEX_IND
22	FFU_GNSS_EXT_LNA	NC	FFU_GNSS_EXT_LNA
23	RFT_UART1_RTS	Log UART_RTS	UART1_RTS
24	RFT_UART1_TX	Log UART_TX	UART1_TX
25	RFT_UART1_RX	Log UART_RX	UART1_RX
26	RFT_UART1_CTS	Log UART_CTS	UART1_CTS
27	NC_DWU	Reserved for internal usage (DTR)	NC_DWU
28	GND	GND	GND
29	NC_HWU	Reserved for internal usage (RI)	NC_HWU
30	FFU_VREF	IO reference voltage	VDDIO_MDM
31	FFU_PCM_OUT	PCM Data Out	PCM_OUT
32	FFU_PCM_FS	PCM Frame Sync	PCM_FS

33	FFU_PCM_IN	PCM Data In	PCM_IN
34	FFU_PCM_CLK	PCM Clock	PCM_CLK
35	PMU_AT_OUT	Anti-tamper	PMU_AT_OUT
36	PMU_VBACKUP	Modem backup battery @2.2-4.35V	PMU_VBACKUP
37	PMU_AT_IN	Anti-tamper	PMU_AT_IN
38	FFU_CLKOUT	Clock for codec	CLKOUT
39	NC_RST	PMU_SHUTDOWN	NC_RST
40	FFU_GNSS_SFN_IND	NC	FFU_GNSS_SFN_IND
41	NC_PWR_BUTTON	PMU_POWER_BUTTON	NC_PWR_BUTTON
42	GND	GND	GND
43	VDD	Module power	VDD_MD
44	VDD	Module power	VDD_MD
45	VDD	Module power	VDD_MD
46	GND	GND	GND
47	FFU_PSM_IND	Power save mode indicator	FFU_PSM_IND
48	PB7	Reserved for internal usage (PB7)	PB7_R
49	NC_SIM_CLK	SIM clock	SIM_CLK
50	NC_VSIM	SIM power supply	VDD_SIM
51	GND	GND	GND
52	NC_SIM_DETECT	SIM detect	SIM_DETECT
53	NC_SIM_RST	SIM reset	SIM_RST
54	PH1	PH1/RCC_OSC_OUT	RST_DISP
55	PH0	PH0/RCC_OSC_IN	PH0_OSC_IN
56	FFU_RFFE_VDDIO	RFFE MIPI VIO (PMU_VO_RF@1.9V)	FFU_RFFE_VDDIO
57	NC_SIM_IO	SIM data	SIM_DATA
58	PC0	PC0/ADC1_IN1	ADC1_IN1
59	PC1	PC1/ADC1_IN2	ADC1_IN3
60	PC2	PC2/ADC1_IN3	INT_ACC
61	PC3	PC3/ADC1_IN4	INT_MAG
62	PC13	PC13/RTC_TAMP1	RTC_TAMP1
63	PH3	PH3/BOOT0	BOOT0
64	PB6	PB6/SF_EN	SF_EN
65	PA8	PA8/RCC_MCO	RCC_MCO
66	FFU_I2C0_SCL	I2C for codec	I2C0_SCL
67	FFU_I2C0_SDA	I2C for codec	I2C0_SDA
68	VDD_1V8	Reserved for codec supply/MCU VBAT/MCU VDDA	1V8_MD
69	PB9	PB9/I2C1_SDA	I2C1_SDA
70	PB8	PB8/I2C1_SCL	I2C1_SCL

71	VBAT	Backup supply	1V8_MD
72	PA5	PA5/SPI1_SCK	SPI1_SCK
73	PB5	PB5/SPI1_MOSI	SPI1_MOSI
74	PB4	PB4/SPI1_MISO/NJTRST	SPI1_MISO
75	PA15	PA15/SPI1_NSS/JTDI	SPI1_NSS
76	PB3	PB3/TIM2_CH2/JTDO/TRACESWO	SWO
77	PC11	PC11/SPI3_MISO	D/C_DISP
78	PC12	PC12/SPI3_MOSI	SPI3_MOSI
79	GND	GND	GND
80	PC10	PC10/SPI3_SCK	SPI3_SCK
81	eSIM_SWP	SWP for NFC to ST33	eSIM_SWP
82	PA4	PA4/SPI3_NSS	SPI3_NSS
83	PB2	Reserved for internal usage (PB2/ST33_VCC_CTRL)	CS_DISP
84	VDDUSB	3.3V supply for modem USB	3V3
85	PA14	PA14/JTCK/SWCLK	TCK/SWCLK
86	PA13	PA13/JTMS/SWDIO	TMS/SWDIO
87	PA12	PA12/USB_DP	USB_DP
88	PA11	PA11/USB_DM	USB_DM
89	PA10	PA10/USART1_RX	STLK_RX
90	PA9	PA9/USART1_TX	STLK_TX
91	PB15	PB15/TIM15_CH2	LED2
92	PB14	PB14/TIM15_CH1	LED3
93	PC9	PC9/TIM3_CH4	TIM3_CH4
94	PC6	PC6/TIM3_CH1	LED1
95	PB1	PB1/QUADSPI_BK1_IO0	QSPI_IO0
96	PB10	PB10/QUADSPI_CLK	QSPI_CLK
97	PB11	PB11/QUADSPI_BK1_NCS	QSPI_NCS
98	SF_nCS	Internal serial flash chip select	SF_nCS
99	PB0	PB0/QUADSPI_BK1_IO1	QSPI_IO1
100	PA6	PA6/QUADSPI_BK1_IO3	QSPI_IO3
101	PA7	PA7/QUADSPI_BK1_IO2	QSPI_IO2
102	GND	GND	GND
103	GND	GND	GND
104	GND	GND	GND
105	GND	GND	GND

106	GND	GND	GND
107	GND	GND	GND
108	GND	GND	GND
109	GND	GND	GND
110	GND	GND	GND
111	GND	GND	GND
112	GND	GND	GND
113	GND	GND	GND
114	GND	GND	GND
115	GND	GND	GND
116	GND	GND	GND
117	GND	GND	GND
118	GND	GND	GND
119	GND	GND	GND
120	GND	GND	GND
121	GND	GND	GND
122	GND	GND	GND
123	GND	GND	GND
124	GND	GND	GND
125	GND	GND	GND
126	GND	GND	GND