



# Cavli CQ20 EVK User Manual

External Release Version 1.0

[www.cavliwireless.com](http://www.cavliwireless.com)

Re-imagining Cellular IoT Solutions

Connect to our website and feel free to contact our technical support team for any assistance.

## Cavli Inc.,

99 South Almaden Blvd., Suite 600, San Jose, California, 95113

**Web:** [www.cavliwireless.com](http://www.cavliwireless.com)

**IoT Connectivity Platform:** [www.cavlihubble.io](http://www.cavlihubble.io)

## Support Center

<https://www.cavliwireless.com/support-center.html>

**e-Mail:** [support@cavliwireless.com](mailto:support@cavliwireless.com)

## For sales enquiries

<https://www.cavliwireless.com/contact-us.html>

**e-Mail:** [sales@cavliwireless.com](mailto:sales@cavliwireless.com)

## More IoT Modules

<https://www.cavliwireless.com/iot-modules/cellular-modules.html>

### **COPYRIGHT**

THE INFORMATION CONTAINED HERE IS PROPRIETARY TECHNICAL INFORMATION OF CAVLI WIRELESS TRANSMITTING, REPRODUCTION, DISSEMINATION AND EDITING OF THIS DOCUMENT AS WELL AS UTILIZATION OF THE CONTENT ARE FORBIDDEN WITHOUT PERMISSION. OFFENDERS WILL BE HELD LIABLE FOR PAYMENT OF DAMAGES. ALL RIGHTS ARE RESERVED IN THE EVENT OF A PATENT GRANT OR REGISTRATION OF A UTILITY MODEL OR DESIGN. EVERY EFFORT HAS BEEN MADE IN PREPARATION OF THIS DOCUMENT TO ENSURE ACCURACY OF THE CONTENTS. BUT ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS DOCUMENT DO NOT CONSTITUTE A WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE DUE TO PRODUCT VERSION UPDATE OR OTHER REASONS. FOR MOST RECENT DOCUMENTS, ALWAYS REFER THE PRODUCT PORTFOLIO SECTION AT [WWW.CAVLIWIRELESS.COM](http://WWW.CAVLIWIRELESS.COM).

*Copyright © Cavli Inc. All rights reserved*



# Table of Contents

- 1 Introduction .....6**
  - 1.1 Overview 6
  - 1.2 References .....6
- 2 Product Overview .....7**
  - 1.1 Key Features .....7
- 3 EVK Layouts .....9**
  - 3.1 EVK Top and Bottom views ..... 9
  - 3.2 Pin Layout..... 11
    - 3.3.1 P1 Pinout..... 12
    - 3.3.2 P2 Pinout..... 14
    - 3.3.3 P3 Pinout..... 14
- 4 EVK Accessories ..... 16**
  - 4.1 List of Accessories..... 16
  - 4.2 Accessories assembly ..... 17
- 5 Component Description ..... 18**
  - 5.1 Interfaces 18
  - 5.2 LED Indicators ..... 13
- 6 Setup Guide..... 14**
  - 6.1 Basic Start-up Steps ..... 14



# List of Figures

Figure 1: CQ20 EVK Top view .....	9
Figure 2 CQ20 EVK Bottom view .....	10
Figure 3: CQ20 EVK Pinout .....	11
Figure 4: Full setup of CQ20 with Cavli accessories .....	17
Figure 5: CQ20 EVK Components .....	18
Figure 6: LED indicators .....	13



## VERSION HISTORY

Version	Edit	Date
1.0	<ul style="list-style-type: none"><li data-bbox="507 450 738 483">• Initial Release</li></ul>	11-11-2024



# 1 Introduction

## 1.1 Overview

This user guide provides a comprehensive introduction to the CQ20 Evaluation Kit (EVK), covering its functionalities and helping users get started with their development projects.

The CQ20 EVK is a comprehensive platform designed to accelerate development and testing of applications based on Cavli CQ20 modules. This user manual will guide you through:

- Debug and/or improve applications based on Cavli CQ20 modules.
- Develop a first-pass proof-of-concept device for new application.

## 1.2 References

The present document is based on the following document:

**Cavli CQ20 Hardware Manual.**



## 2 Product Overview

### 1.1 Key Features

Characteristics	Description
Operating Voltage	3.6V - 4.5V Typical Voltage 3.8 V
USIM card	✓ Supports 1.8V/2.85V. Supports hot swap function
USB	<ul style="list-style-type: none"> <li>✓ USB2.0 (480Mbps)</li> <li>✓ USB can function as both master and slave</li> <li>✓ OTG Host mode support</li> </ul>
UART	<ul style="list-style-type: none"> <li>✓ AT commands and data transfer</li> <li>✓ The max baud rate is up to 4Mbps. Default is 115200bps.</li> </ul>
Audio	<ul style="list-style-type: none"> <li>✓ For audio, external codec chip</li> <li>✓ Support short frame mode.</li> <li>✓ Support main mode</li> </ul>
SDIO	<ul style="list-style-type: none"> <li>✓ Compliant with SDIO 3.0 protocol</li> <li>✓ Comply with IEEE 802.11 standard</li> </ul>
SDC	<ul style="list-style-type: none"> <li>✓ Compliant with SDIO 3.0 protocol</li> <li>✓ 4-bit SDC</li> <li>✓ Can be interfaced with Wi-Fi Transceiver</li> </ul>
I2C	<ul style="list-style-type: none"> <li>✓ Compliant with I2C bus protocol</li> <li>✓ High speed mode supports 3.3Mbps rate</li> </ul>
SPI	✓ Standard SPI Interface
ADC	✓ 2 ADC lines
Ethernet	✓ SGMII Interface
Network Indicators	✓ STATUS Module status



<b>Antenna Interface</b>	<ul style="list-style-type: none"> <li>✓ MAIN x 1</li> <li>✓ DIV x 1</li> <li>✓ GNSS x 1</li> <li>✓ Characteristic impedance 50 Ω</li> </ul>
<b>Virtual Network Card</b>	<ul style="list-style-type: none"> <li>✓ Supports USB virtual network card</li> </ul>
<b>Switches and Buttons</b>	<ul style="list-style-type: none"> <li>✓ 3 buttons including PWR KEY, RESET, BOOT</li> <li>✓ One kill switch</li> </ul>



# 3 EVK Layouts

This chapter contains all the necessary information on CQ20 EVK Interfaces and Pin-outs.

## 3.1 EVK Top and Bottom views

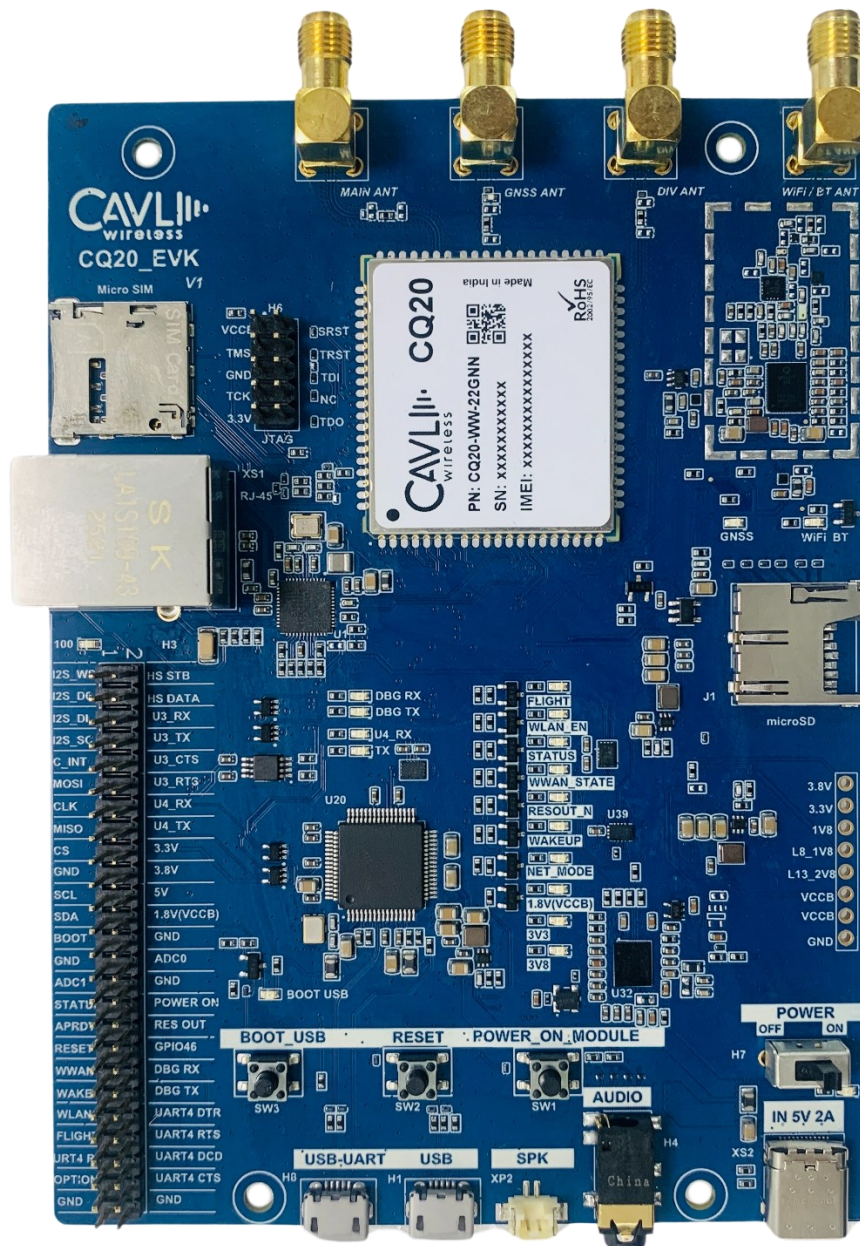
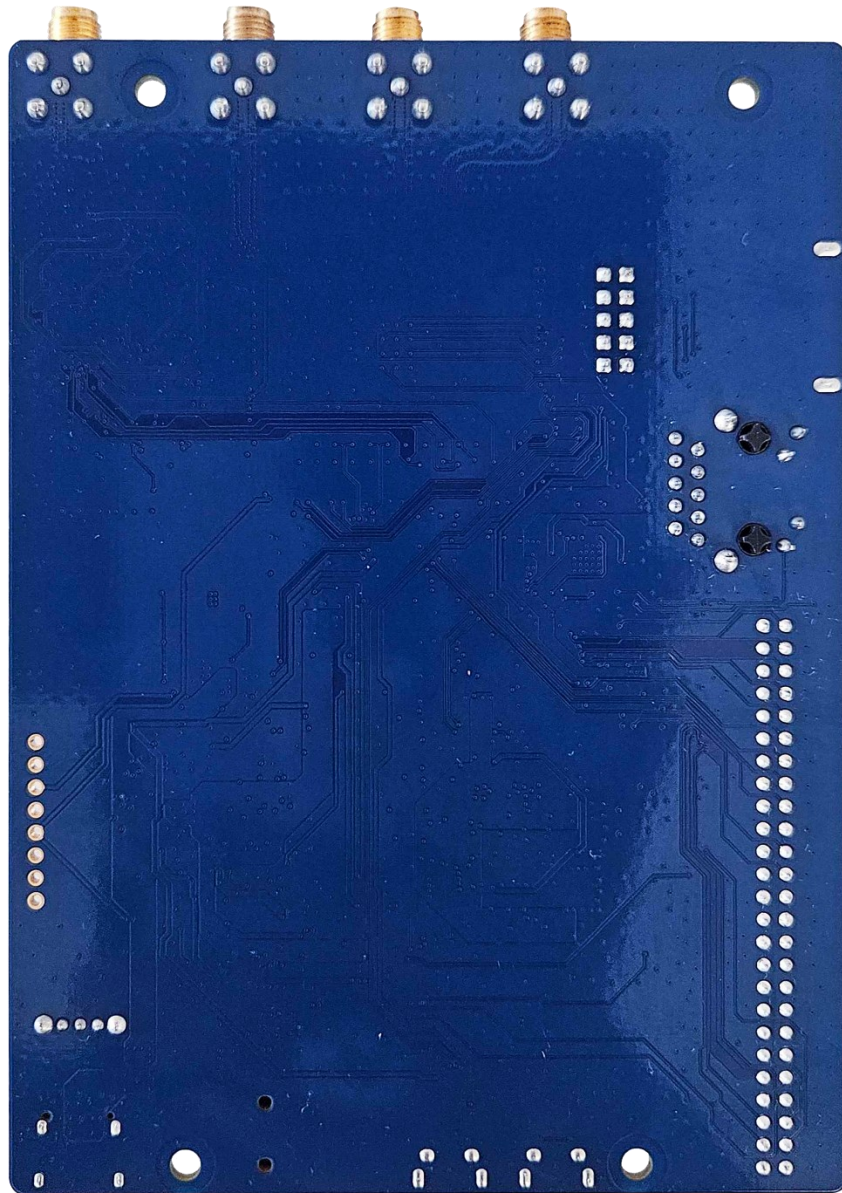


Figure 1: CQ20 EVK Top view



*Figure 2 CQ20 EVK Bottom view*



### 3.2 Pin Layout

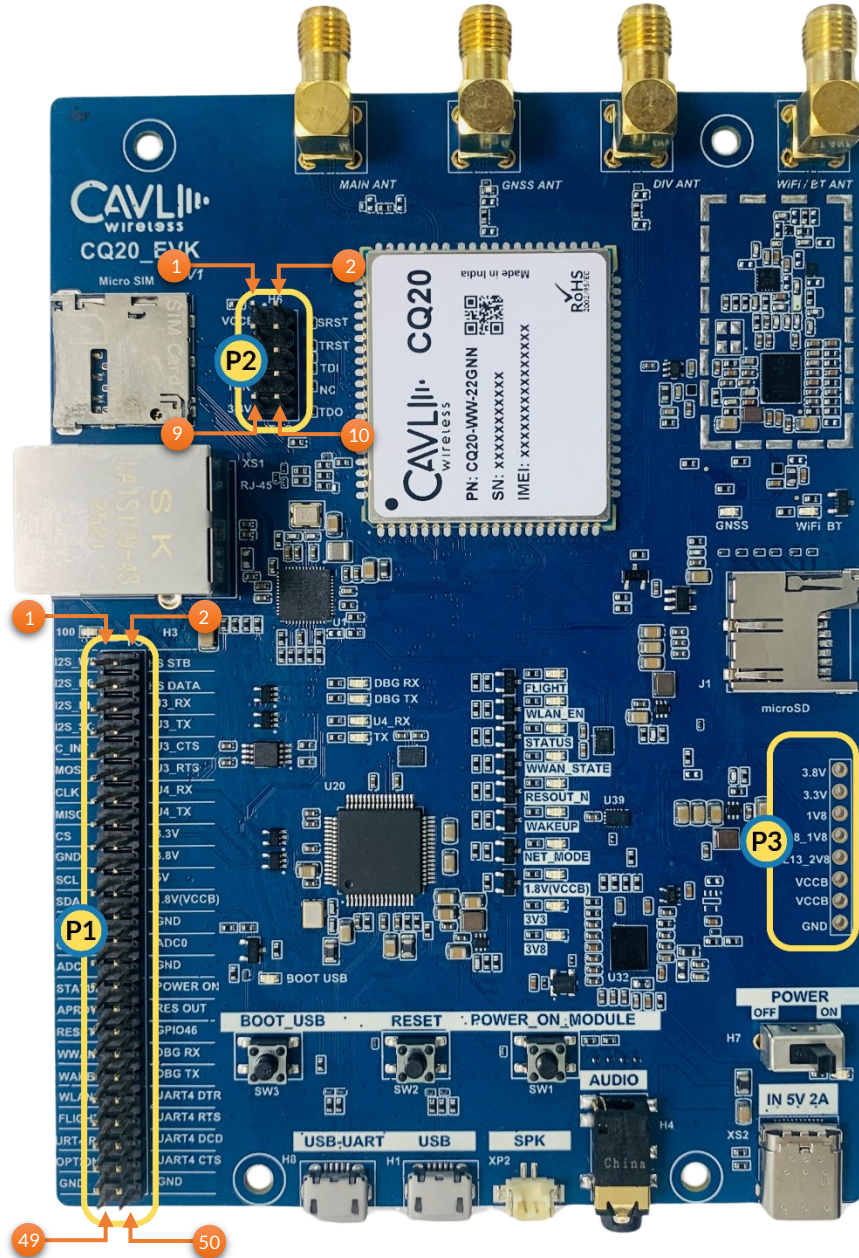


Figure 3: CQ20 EVK Pinout

## 3.3.1 P1 Pinout

Table 1 P1 Expansion Header Pin definition

Pin No.	Pin name	Pad Type	Comment
1	I2S_WS	-	-
2	HSIC_STB	B	-
3	I2S_DO	-	-
4	HSIC_DATA	B	-
5	I2S_DI	-	-
6	UART3_RX	B	-
7	I2S_SCK	-	-
8	UART3_TX	B	-
9	CODEC_INT	B	-
10	UART3_CTS	DI	-
11	SPI_MOSI	DO	-
12	UART3_RTS	DO	-
13	SPI_CLK	DO	-
14	UART4_RX_3V	DI	-
15	SPI_MISO	DI	-
16	UART4_TX_3V	DO	-
17	SPI_CS_N	DO-Z	-
18	3.3V	P	-
19	GND	-	-
20	3.8V	P	-
21	I2C_SCL_3V3	B	-
22	VIN_5V	P	-
23	I2C_SDA_3V3	B	-



24	VCCB	P	
25	BOOT_USB_N	DI	
26	GND	-	
27	GND	-	
28	ADC0	AI	
29	ADC1	AI	
30	GND	-	
31	STATUS	PO	
32	POWER_ON	DI	
33	AP_READY	DO	
34	RESOUT_N	DO	
35	RESET_IN	DI	
36	GPIO_46	DI	
37	WWAN_STATE	DO	
38	DBG_UART_RX_3V	DI	
39	WAKEUP	DO	
40	DBG_UART_TX_3V	DO	
41	WLAN_EN	DI	
42	UART4_DTR	DO	
43	FLIGHT	DO	
44	UART4_RTS	DO	
45	UART4_RI	DI	
46	UART4_DCD	DO	
47	OPTION1	DI	



48	UART4_CTS	DI	
49	GND	-	
50	GND	-	

## 3.2.2 P2 Pinout

Table 2 P2 Expansion Header Pin definition

Pin No.	Pin name	Pad Type	Comment
1	VCCB	P	-
2	JTAG_SRST_N	DI	-
3	JTAG_TMS	B	-
4	JTAG_TRST_N	DI	-
5	GND	-	-
6	JTAG_TDI	DI	-
7	JTAG_TCK	DI	-
8	NC	-	-
9	3V3	P	-
10	JTAG_TDO	DO	-

## 3.2.3 P3 Pinout

Table 3 P3 Expansion Header Pin definition

Pin No.	Pin name	Pad Type	Comment
1	3V8	PI	-
2	3V3	PO	-
3	1V8	PO	-
4	VREG_L8_1P8	PO	-
5	VREG_L13_2P85	PO	-



6	VCCB	PO	-
7	VCCB	PO	-
8	GND	-	-

Table 4 Pad type definition

Pin Type	V_min	V_typ	V_max
L18	1.70 V	1.80 V	1.90 V
LVB	1.504 V	1.8 V	3.3 V
L33	2.80 V	3.3 V	3.48 V
LFL	4.2 V	-	5.5 V



# 4 EVK Accessories

## 4.1 List of Accessories

Listed below are all of the accessories included with the EVK board.



Figure 4 GNSS antenna



Figure 5 USB Micro-B cable



Figure 6 USB Type-C Cable



Figure 7 Antennas

Items	Description	Quantity (nos)
Cables	• USB Type-C	1
	• USB Micro B	2
Antennas	• Main Antenna	1
	• Diversity Antenna	1
	• Wi-Fi/ Bluetooth Antenna	1
	• GNSS Antenna	1



## 4.2 Accessories assembly

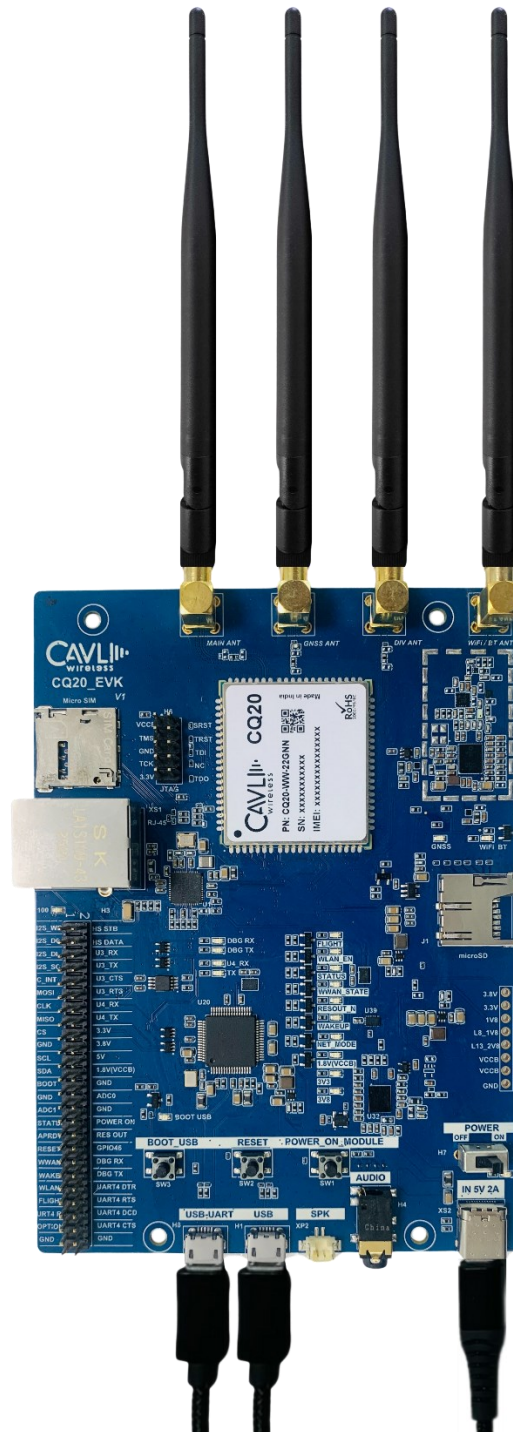


Figure 4: Full setup of CQ20 with Cavli accessories

# 5 Component Description

## 5.1 Interfaces

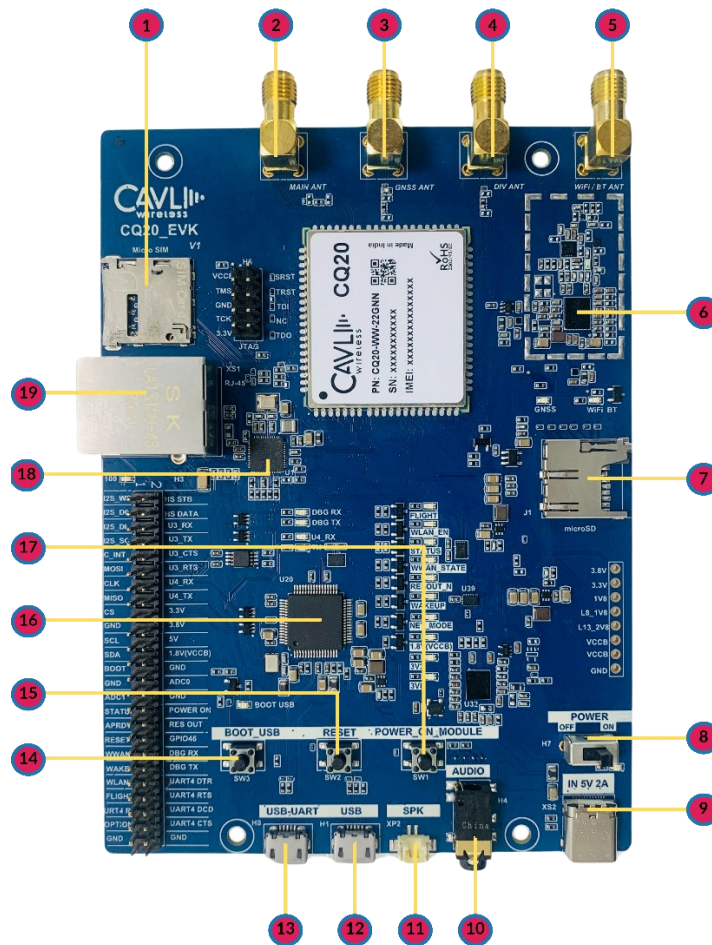


Figure 5: CQ20 EVK Components

- |                            |                              |                       |
|----------------------------|------------------------------|-----------------------|
| 1. SIM Slot                | 8. Input Power Switch        | 15. Reset Button      |
| 2. LTE Main Antenna        | 9. Power Input Port (Type C) | 16. FTDI Chip         |
| 3. GNSS Antenna            | 10. Audio Jack               | 17. Power - ON Button |
| 4. Diversity Antenna       | 11. Speaker                  | 18. Ethernet Chip     |
| 5. Wi-Fi-Bluetooth Antenna | 12. Port - USB Interface     | 19. Port - Ethernet   |
| 6. Wi-Fi/ BT Chip          | 13. Port - USB UART          |                       |
| 7. SD card Socket          | 14. BOOT Button              |                       |

Pin No	Pin name	Description
1	SIM Slot	You can insert your external SIM card to the micro-SIM card push-push socket.
2	LTE Main antenna	CQ20 EVK comes with an SMA Antenna connector for interfacing an external LTE Antenna.
3	GNSS Antenna	CQ20 EVK comes with an SMA Antenna connector along with active antenna of voltage 3.3V for interfacing external GNSS Antenna.
4	Diversity Antenna	CQ20 EVK comes with an SMA Antenna connector for interfacing Diversity Antenna.
5	Wi-Fi – Bluetooth Antenna	CQ20 EVK comes with an SMA Antenna connector for interfacing Wi-Fi or Bluetooth antenna.
6	Wi-Fi/ BT Chip	IC Chip for Wi-Fi and BT Functionalities
7	SD card socket	This interface is used to access the files from SD card.
8	Input Power Switch	It is used to enable the input power source.
9	Power input port (Type C)	It is recommended to use a 5V adapter for the input power supply. The user can also use PC USB port to power the modules.
10	Audio Jack	For connecting Earphone via AUX.
11	Speaker	To connect external speakers.
12	Port – USB Interface	USB 2.0 can be accessed through this port.
13	Port – USB UART	Can be used for Serial Communication.
14	BOOT Button	This button is used to enter into FDL or EDL
15	Reset Button	This button is used to reset the Module.
16	FTDI Chip	This is used for USB to UART Conversion and vice versa.
17	Power ON Button	This button is used to power on the module. It is an interrupt going to the module to power on the module.
18	Ethernet Chip	This chip is used for the Ethernet Functionalities.
19	Port – Ethernet	It is called RJ-45, which is used to connect ethernet cable



## 5.2 LED Indicators

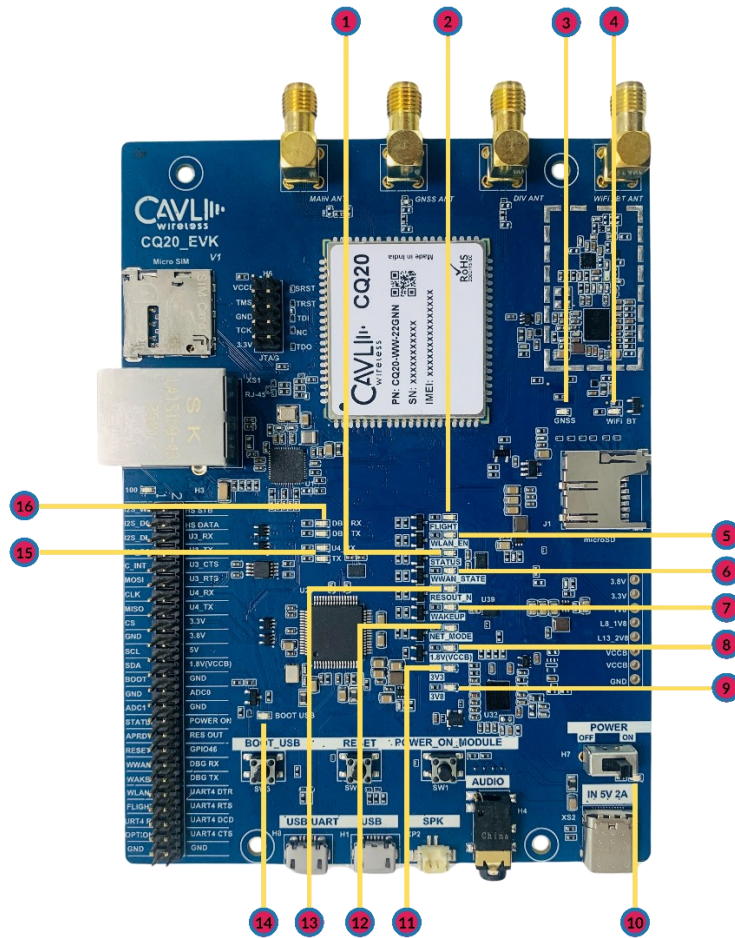


Figure 6: LED indicators

Led Indicators of CQ20 EVK are:

- |                             |                                    |
|-----------------------------|------------------------------------|
| 1. Module Status indicator  | 12. 3.8V power indicator           |
| 2. FLIGHT MODE indicator    | 13. Input power indicator          |
| 3. GNSS indicator           | 14. 3.3V power indicator           |
| 4. Wi-Fi/ BT indicator      | 15. Net mode indicator             |
| 5. WLAN enable indicator    | 13. Reset Confirmation indicator   |
| 6. WWAN State indicator     | 14. USB-Boot indicator             |
| 7. Module Wake Up indicator | 15. FTDI Channel-1 Tx/Rx indicator |
| 8. 1.8V power indicator     | 16. FTDI Channel-2 Tx/Rx indicator |



# 6 Setup Guide

## 6.1 Basic Start-up Steps

Given below are the various steps involved in powering on the CQ20 Module.

1. Place the EVK on an insulated platform.
2. Connect the Antennas to the corresponding connectors.
3. Power the EVK by connecting to the INPUT\_5V Type-C port (using a Type-C). Please note this is only a power input port and does not have data channels.
4. The Input power indicator and 3.3V power indicator will be glowing when the Type-C is connected.
5. Connect the Micro USB (USB-UART) to access the AT port.
6. Press the Input Power Switch to enable the power supply.
7. After toggling the Input Power Switch, 1 LED glows up. (3.8V power indicator)
8. Press (500 ms) the PWR\_KEY to power on the module.

### NOTE

- After toggling PWR\_KEY, both FTDI channel LEDs turns OFF automatically if no data transmission is happening.

