FC41D TE-B User Guide

Wi-Fi&Bluetooth Module Series

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Safety Information

The following safety precautions must be observed during all phases of operation, such as usage, service or repair of any cellular terminal or mobile incorporating the module. Manufacturers of the cellular terminal should notify users and operating personnel of the following safety information by incorporating these guidelines into all manuals of the product. Otherwise, Quectel assumes no liability for customers' failure to comply with these precautions.

	Full attention must be paid to driving at all times in order to reduce the risk of an accident. Using a mobile while driving (even with a handsfree kit) causes distraction and can lead to an accident. Please comply with laws and regulations restricting the use of wireless devices while driving.
	Switch off the cellular terminal or mobile before boarding an aircraft. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communication systems. If there is an Airplane Mode, it should be enabled prior to boarding an aircraft. Please consult the airline staff for more restrictions on the use of wireless devices on an aircraft.
	Wireless devices may cause interference on sensitive medical equipment, so please be aware of the restrictions on the use of wireless devices when in hospitals, clinics or other healthcare facilities.
	Cellular terminals or mobiles operating over radio signal and cellular network cannot be guaranteed to connect in certain conditions, such as when the mobile bill is unpaid or the (U)SIM card is invalid. When emergency help is needed in such conditions, use emergency call if the device supports it. In order to make or receive a call, the cellular terminal or mobile must be switched on in a service area with adequate cellular signal strength. In an emergency, the device with emergency call function cannot be used as the only contact method considering network connection cannot be guaranteed under all circumstances.
	The cellular terminal or mobile contains a transceiver. When it is ON, it receives and transmits radio frequency signals. RF interference can occur if it is used close to TV sets, radios, computers or other electric equipment.
	In locations with explosive or potentially explosive atmospheres, obey all posted signs and turn off wireless devices such as mobile phones or other cellular terminals. Areas with explosive or potentially explosive atmospheres include fueling areas, below decks on boats, fuel or chemical transfer or storage facilities, and areas where the air contains chemicals or particles such as grain, dust or metal powders.

About the Document

Revision History

Version	Date	Author	Description
-	2021-04-27	Soni RAO	Creation of the document
1.0	2023-03-21	Michael DU	First official release

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1 Introduction

For convenient development of applications with FC41D module in QuecOpen® solution, Quectel supplies the corresponding development board (FC41D-TE-B) for the module testing. This document provides a quick insight into FC41D-TE-B interface specifications, RF characteristics, electrical and mechanical details and explains how to use it.

2 General Overview

FC41D-TE-B is a development board that supports a series of interfaces. It can be used for testing basic functionalities or further development of the module.

2.1. Top and Bottom Views

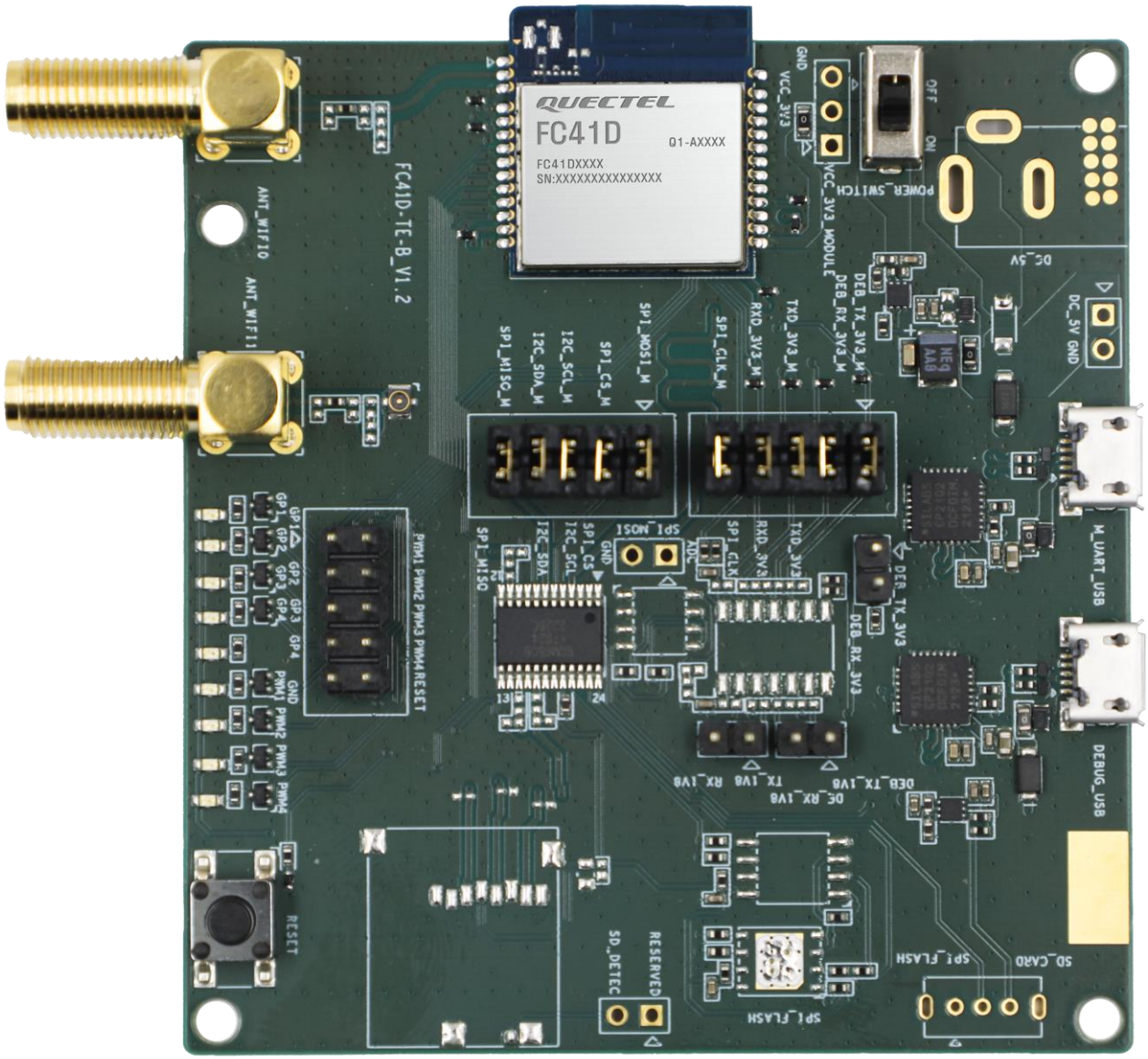

Figure 1: Top View

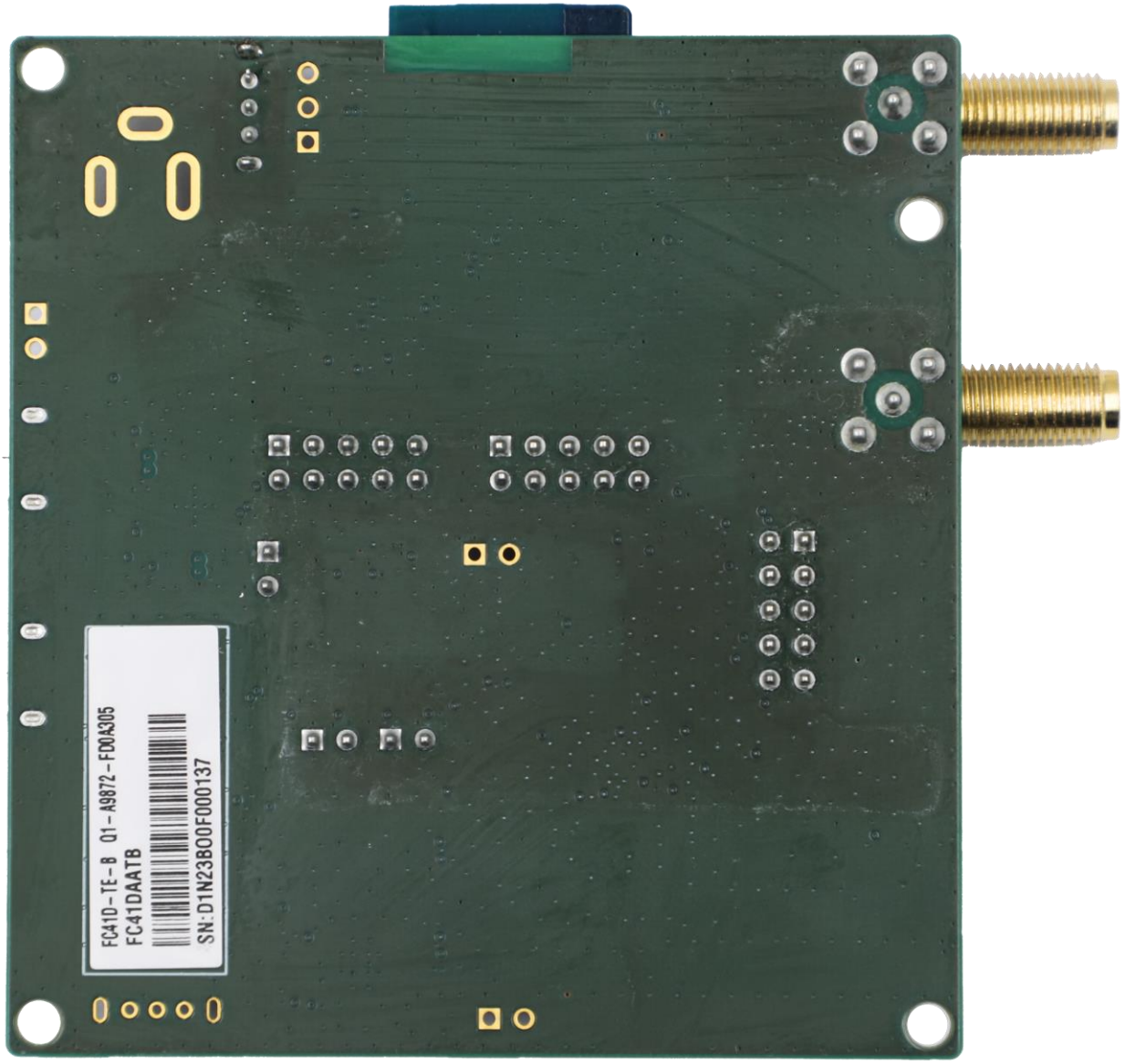

Figure 2: Bottom View

2.2. Component Placement

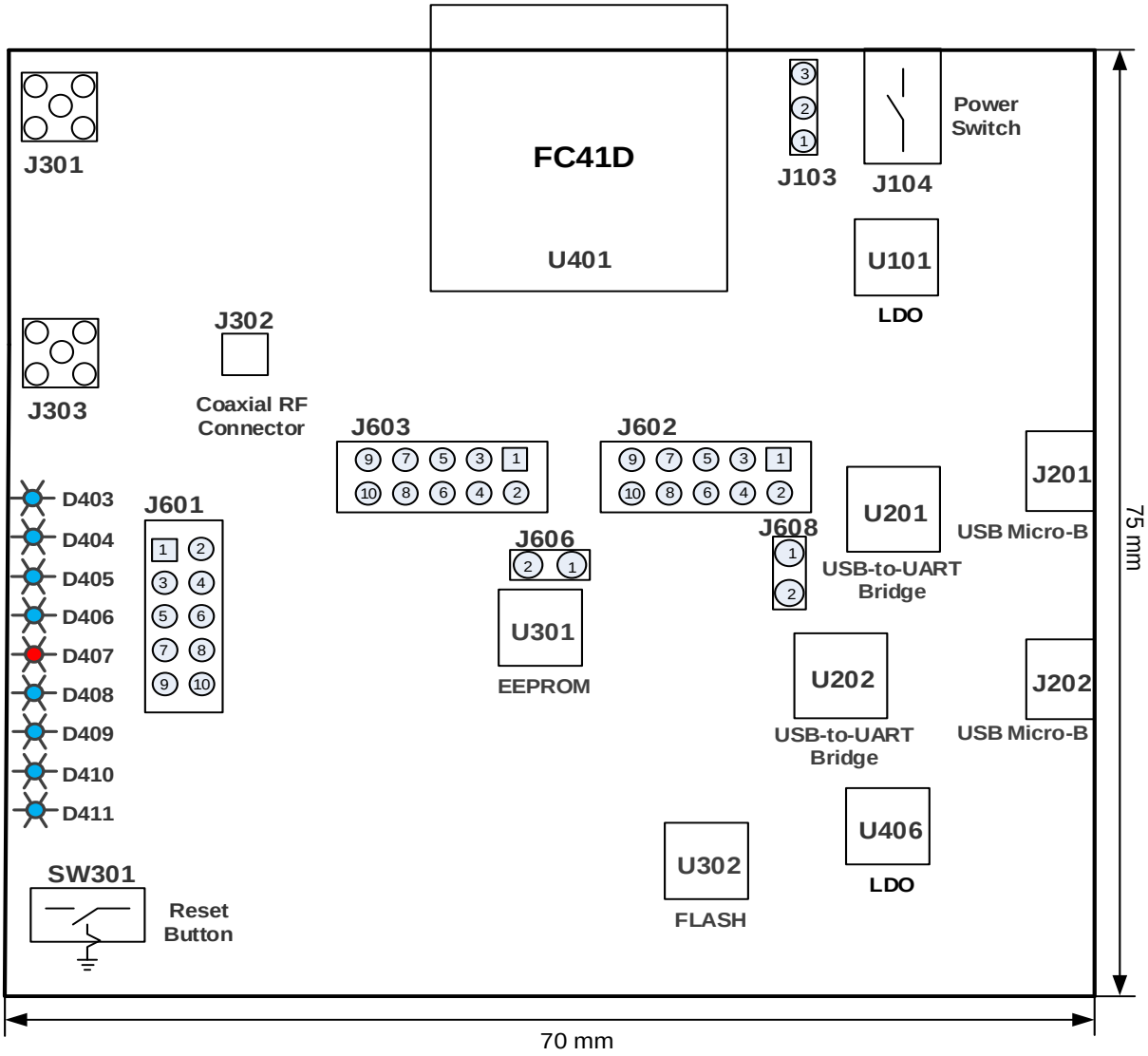

Figure 3: FC41D-TE-B Component Placement

Table 1: Interfaces of FC41D-TE-B

Interface	Reference No.	Description
Power Supply Interfaces	J201, J202	● USB micro-B interfaces ● Typical supply voltage: +5 V
Power Switch	J104	VBAT ON/OFF control
Reset Button	SW301	Used for resetting the module
USB Connectors	J201	Connect to main UART interface of the

		module via USB-to-UART bridge U201
	J202	Connect to debug UART interface of the module via USB-to-UART bridge U202
RF Connectors	J301	SMA connector of the module ANT_WIFI/BT pin
	J302	Coaxial RF connector
	J303	SMA connector of the module's coaxial RF connector
Status LEDs	D403 D404 D405 D406 D407 D408 D409 D410 D411	● D403 is the GPIO1 status indicator ● D404 is the GPIO2 status indicator ● D405 is the GPIO3 status indicator ● D406 is the GPIO4 status indicator ● D407 is the VBAT ON/OFF indicator ● D408 is the PWM1 status indicator ● D409 is the PWM2 status indicator ● D410 is the PWM3 status indicator ● D411 is the PWM4 status indicator
Test Points	J103, J601, J602, J603	Test pins
Analog Signal Input Interface	J606	Used for inputting an external analog signal into ADC pin of the module
Mode Selection	J608	● With jumper, the module enters RF test mode ● Without jumper, the module enters normal mode by default

NOTE

The ANT_WIFI/BT pin antenna and coaxial RF connector are optional for the module. J301 is used for the module's ANT_WIFI/BT pin, and J302 and J303 are used for the module's coaxial RF connector.

3 Kit Accessories & Assembly

3.1. Kit Accessories

Table 2: Accessories List

Items	Description	Quantity (pcs)
Cables	USB micro-B cable	2
	Coaxial cable	1
Antennas	Wi-Fi&Bluetooth antenna	2
Instruction Sheet	A sheet of paper giving instructions for TE-B connection, details of TE-B accessories, etc.	1

3.2. Kit Assembly

The connection between the TE-B and its components is shown in the figure below. Refer to the instruction sheet in the accessories list for more details.

Figure 4: TE-B Kit Assembly

4 Interface Applications

This chapter outlines the information and applications of some hardware interfaces of FC41D-TE-B.

4.1. Power Supply Interfaces

FC41D-TE-B can be powered by USB Micro-B connectors (J201, J202).

The simplified power supply schematic of FC41D-TE-B is provided in the following figure.

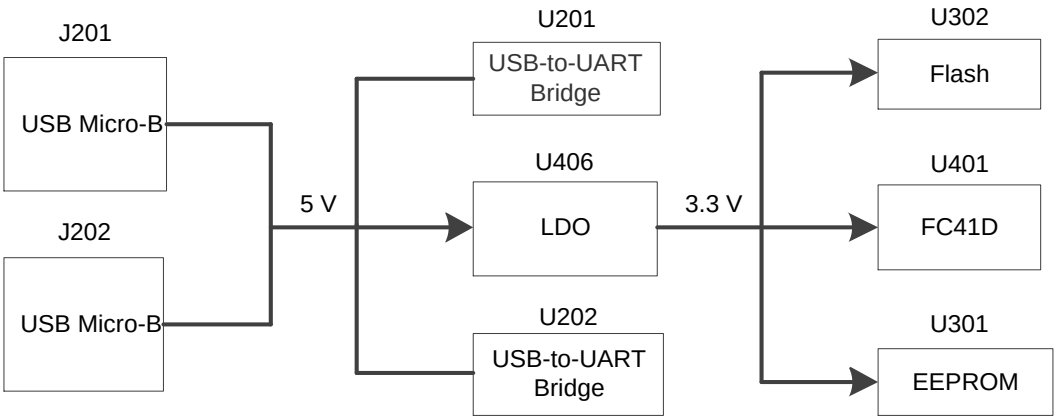

Figure 5: Power Supply for FC41D-TE-B

4.2. Power Switch and Reset Button

FC41D-TE-B includes one power switch (J104) and one reset button (SW301) as shown in the following figure.

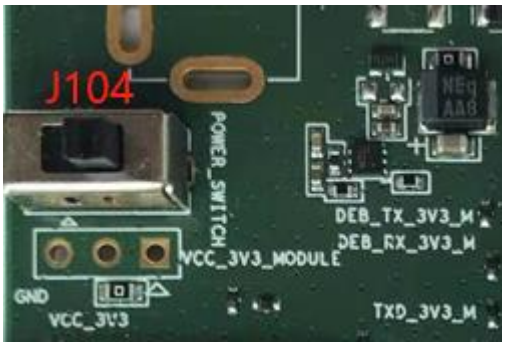

Figure 6: Power Switch

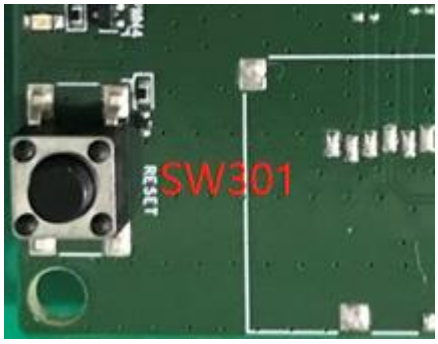

Figure 7: Reset Button

Table 3: Description of Power Switch and Reset Button

Reference No.	Description
J104	VBAT ON/OFF control
SW301	Used for resetting the module

4.3. USB Connectors

FC41D-TE-B features two USB connectors, J201 and J202, which are connected to the main UART and debug UART interfaces of the module via U201 and U202 respectively.

J201 supports 115200 bps baud rate by default. It is intended for data transmission between the module and the host application. It can be used for firmware downloading and AT command communication.

J202 supports 921600 bps baud rate by default. It can be used for outputting partial logs.

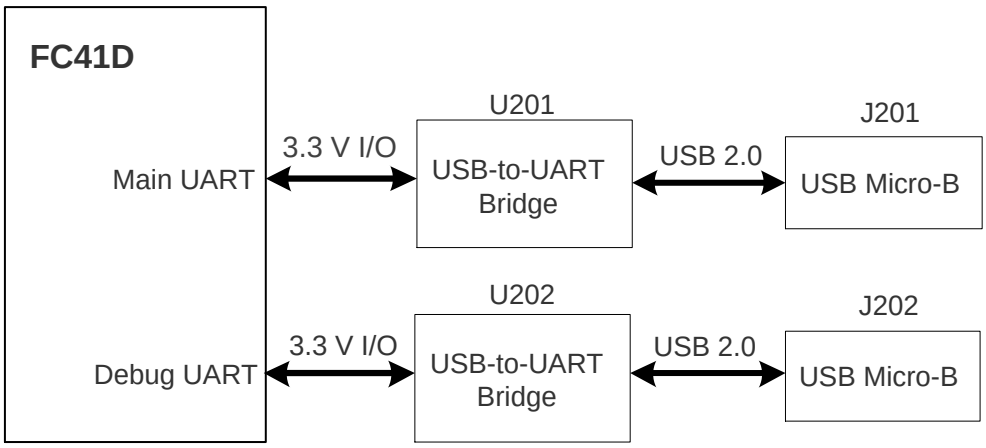

Figure 8: USB-to-UART Connection

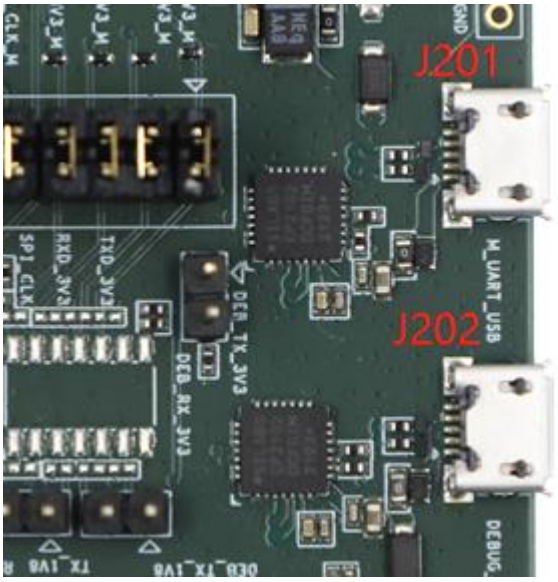

Figure 9: USB Connectors

4.4. Mode Selection

FC41D-TE-B offers a two-pin header J608 for selecting the operating mode. the module enters RF test mode with the jumper. Otherwise, it enters normal mode.

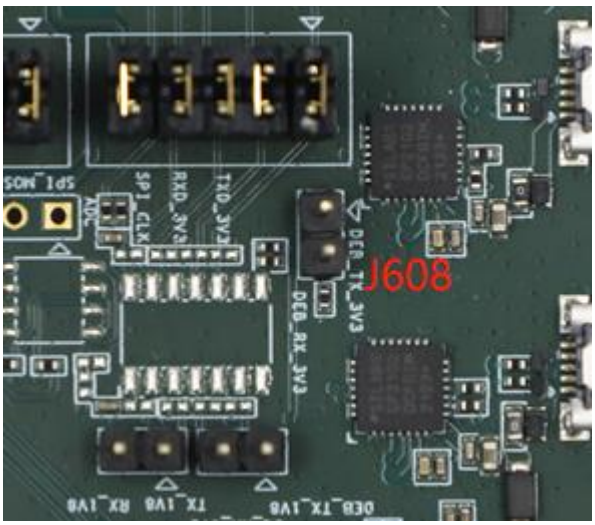

Figure 10: Mode Selection Header

4.5. RF Connectors

FC41D-TE-B features two SMA connectors (J301, J303). The ANT_WIFI/BT pin antenna and coaxial RF connector are optional for the module. You can connect coaxial RF connector of the module to J302 through coaxial cable, then the module RF signal can be tested via an external antenna or instrument on J303. Also, you can connect ANT_WIFI/BT pin to J301.

Block diagram of RF connectors is illustrated in the figure below.

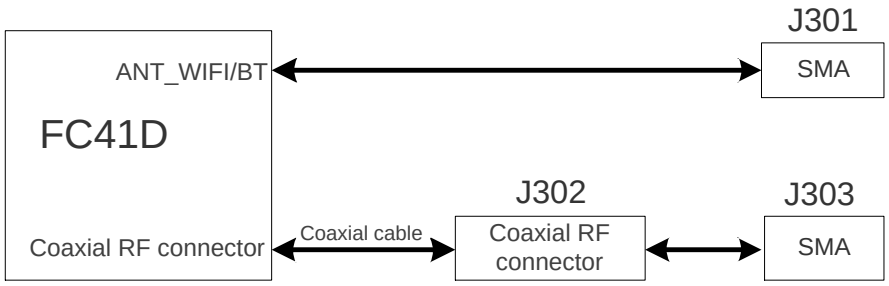

Figure 11: RF Block Diagram

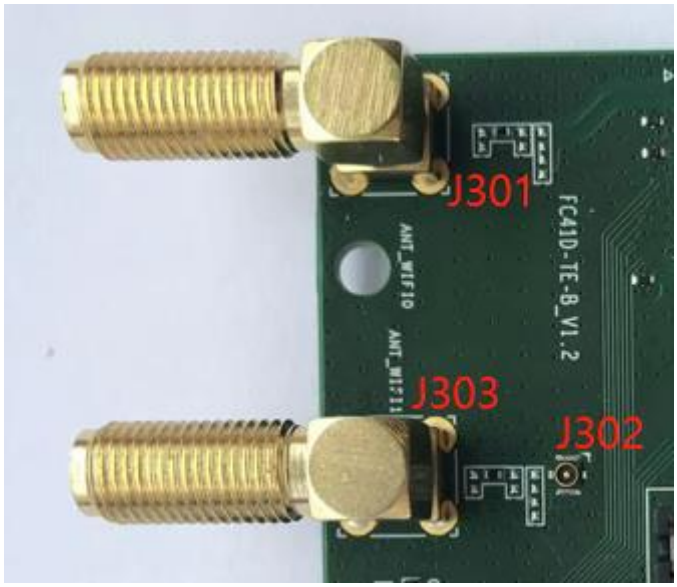

Figure 12: RF Connectors

4.6. Test Points

FC41D-TE-B features a series of test points, which can help you to obtain the corresponding waveform of some signals.

J103, J601, J602 and J603 test points are illustrated in the following figures.

Figure 13: J103 Test Point

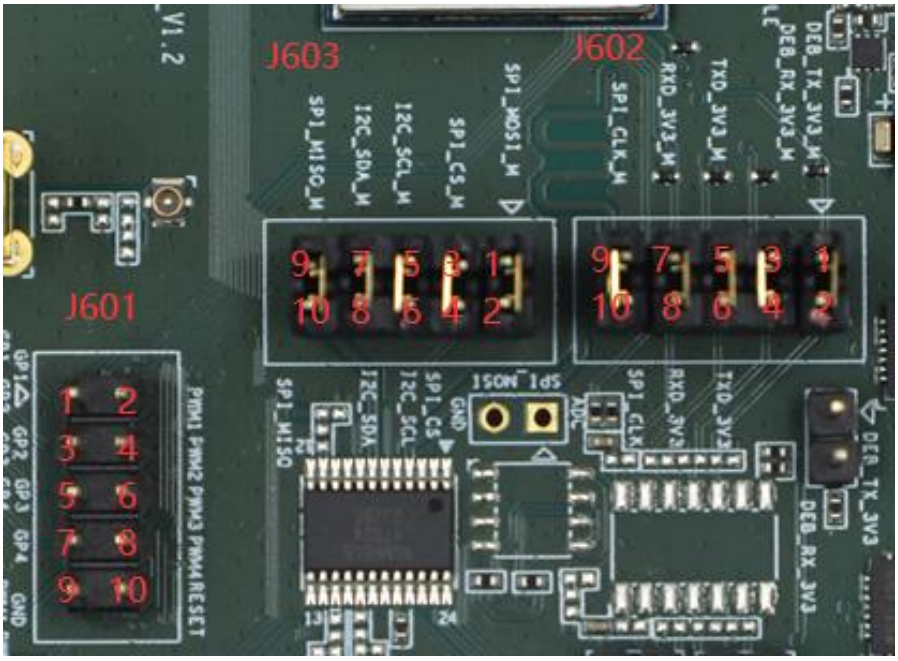

Figure 14: J601, J602 and J603 Test Points

Table 4: Pin Definition of J103, J601, J602, J603

J103		
Pin No.	**Pin Name**	**Description**
1	VCC_3V3_MODULE	VBAT power supply of the module
2	VCC_3V3	3.3 V power supply
3	GND	Ground
J601		
Pin No.	**Pin Name**	**Description**
1	GPIO1	Connected directly to GPIO1 of the module
2	PWM1	Connected directly to PWM1 of the module
3	GPIO2	Connected directly to GPIO2 of the module
4	PWM2	Connected directly to PWM2 of the module
5	GPIO3	Connected directly to GPIO3 of the module
6	PWM3	Connected directly to PWM3 of the module

7	GPIO4	Connected directly to GPIO4 of the module
8	PWM4	Connected directly to PWM4 of the module
9	GND	Ground
10	RESET	Connected directly to CEN of the module
J602		
Pin No.	**Pin Name**	**Description**
1	DEB_TX_3V3_M	Connected directly to DBG_TXD of the module
2	DEB_TX_3V3	Connected directly to UART_RXD of U202
3	DEB_RX_3V3_M	Connected directly to DBG_RXD of the module
4	DEB_RX_3V3	Connected directly to UART_TXD of U202
5	TXD_3V3_M	Connected directly to MAIN_TXD of the module
6	TXD_3V3	Connected directly to UART_RXD of U201
7	RXD_3V3_M	Connected directly to MAIN_RXD of the module
8	RXD_3V3	Connected directly to UART_TXD of U201
9	SPI_CLK_M	Connected directly to SPI_CLK of the module
10	SPI_CLK	Connected directly to SPI_CLK of U302 via a multiplexer
J603		
Pin No.	**Pin Name**	**Description**
1	SPI_MOSI_M	Connected directly to SPI_MOSI of the module
2	SPI_MOSI	Connected to SPI_MOSI of U302 via a multiplexer
3	SPI_CS_M	Connected directly to SPI_CS of the module
4	SPI_CS	Connected to SPI_CS of U302 via a multiplexer
5	I2C_SCL_M	Connected directly to I2C_SCL of the module
6	I2C_SCL	Connected directly to I2C_SCL of U301
7	I2C_SDA_M	Connected directly to I2C_SDA of the module

8	I2C_SDA	Connected directly to I2C_SDA of U301
9	SPI_MISO_M	Connected directly to SPI_MISO of the module
10	SPI_MISO	Connected to SPI_MISO of U302 via a multiplexer

NOTE

See ***document [1]*** for details of the module pin name and definition in the above table.

4.7. Analog Signal Input Interface

FC41D-TE-B provides an analog signal input interface, which is connected to the ADC pin of the module. The position of the input interface is presented in the following figure.

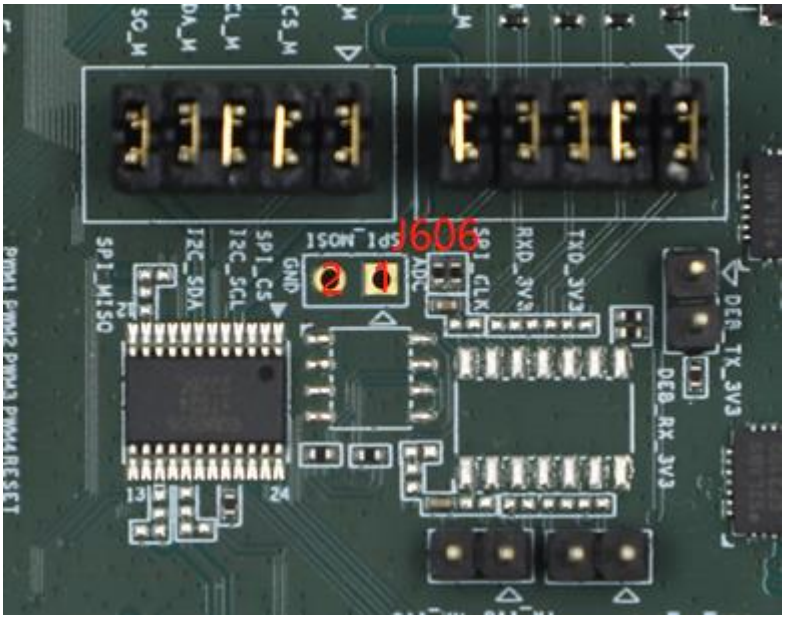

Figure 15: Analog Signal Input Interface

Table 5: Pin Definition of J606

J606		
Pin No.	**Pin Name**	**Description**
1	ADC	Analog signal input pin
2	GND	Ground

4.8. Status LEDs

FC41D-TE-B comprises 9 status LEDs. The positions of these LED indicators are presented in the following figure.

Figure 16: Status LEDs

Table 6: Description of Status LEDs

Reference No.	Description
D403	Indicates the status of GPIO1. Light on: high level Light off: low level
D404	Indicates the status of GPIO2. Light on: high level Light off: low level

D405	Indicates the status of GPIO3. Light on: high level Light off: low level
D406	Indicates the status of GPIO4. Light on: high level Light off: low level
D407	VBAT ON/OFF indicator. It indicates power supply readiness. Light on: VBAT on Light off: VBAT off
D408	Indicates the status of PWM1. Light on: high level Light off: low level
D409	Indicates the status of PWM2. Light on: high level Light off: low level
D410	Indicates the status of PWM3. Light on: high level Light off: low level
D411	Indicates the status of PWM4. Light on: high level Light off: low level

5 Operating Procedures

This chapter outlines how to use the FC41D-TE-B for testing and evaluating the module.

5.1. Power Up

1. Connect the USB connectors of FC41D-TE-B to PC with the USB micro-B cable.
2. Switch J104 (Power Switch) to ON state, then D407 (VBAT ON/OFF indicator) will light up.

5.2. Communication via USB Connectors

1. Turn on the module according to the procedure mentioned in ***Chapter 5.1***.
2. The USB serial port number can be viewed through the PC Device Manager, as shown below.

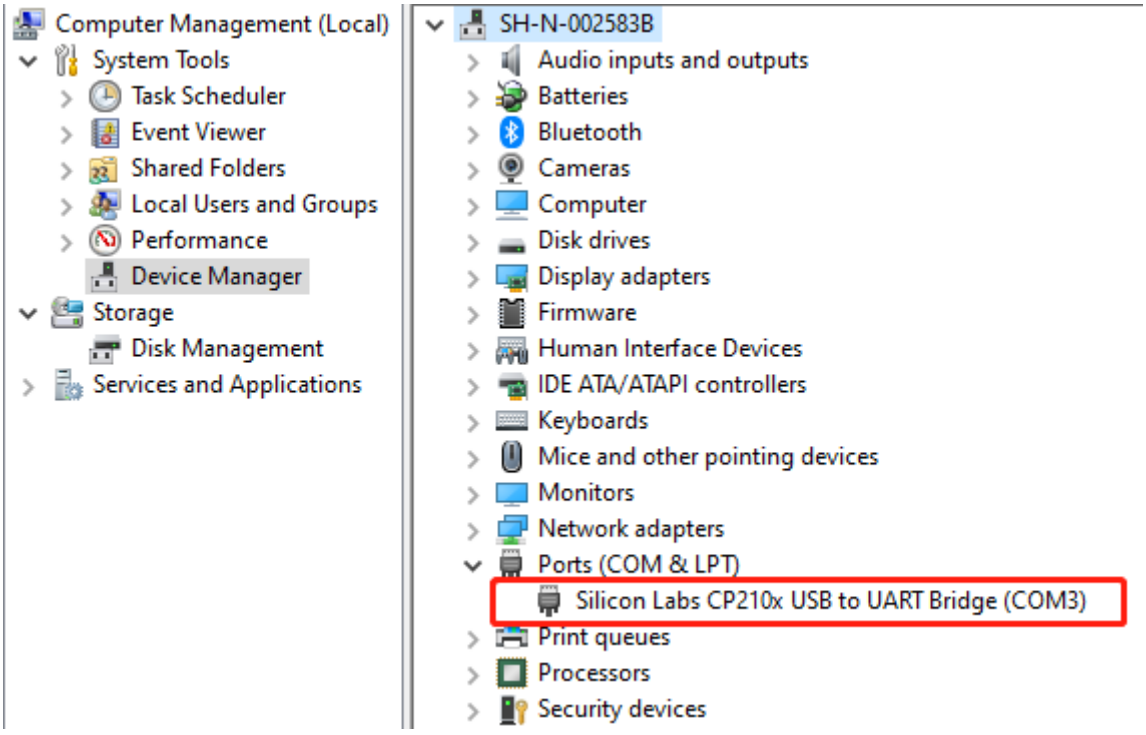

Figure 17: USB Serial Port

3. Use the QCOM tool provided by Quectel to establish communication between the module and the PC via debug UART. The following figure shows the field for setting the COM port on QCOM. Select the "**COM port**" (USB serial port) and set the correct "**Baudrate**". For more details about QCOM tool usage and configuration, see ***document [2]***.

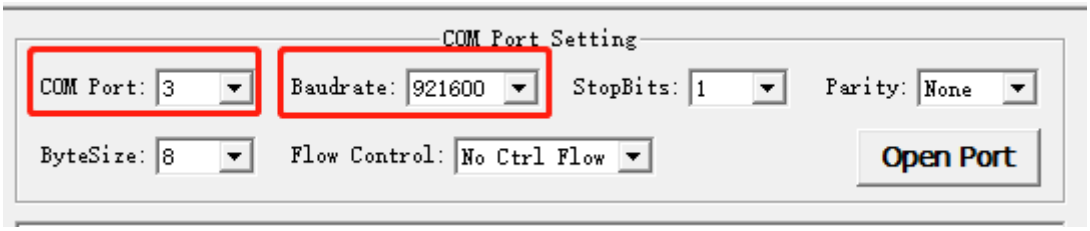

Figure 18: Debug UART Setting Field on QCOM

5.3. Firmware Upgrade

You can use the QFlash tool provided by Quectel establish communication between the module and the PC via main UART. The module upgrades firmware via main UART with specific steps as below:

1. Open the firmware upgrade tool QFlash tool on your PC, and power up the module as explained in ***Chapter 5.1***.
2. Select the main UART port from "**COM Port**" dropdown list, and select "**921600**" baud rate from "**Baudrate**" dropdown list.
3. Choose the firmware package from "**Load FW Files**".

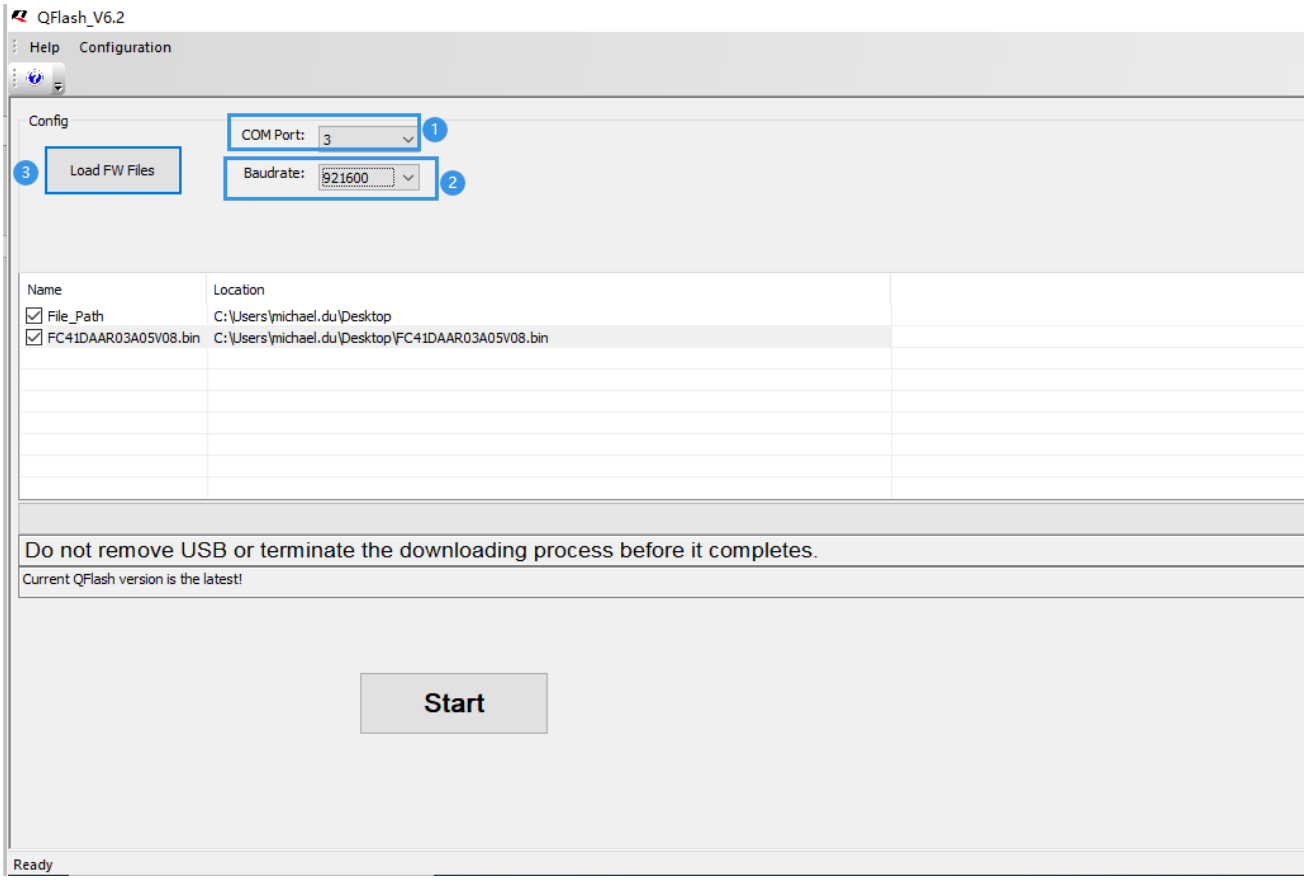

Figure 19: Configurations for Firmware Upgrade

4. Click "**Start**", and then the message "**Wait Port (3) is normal …**" appears in the tool window. Press SW301 (reset button) on FC41D-TE-B to upgrade firmware when the message "**Erasing Flash …**" appears in the tool window.

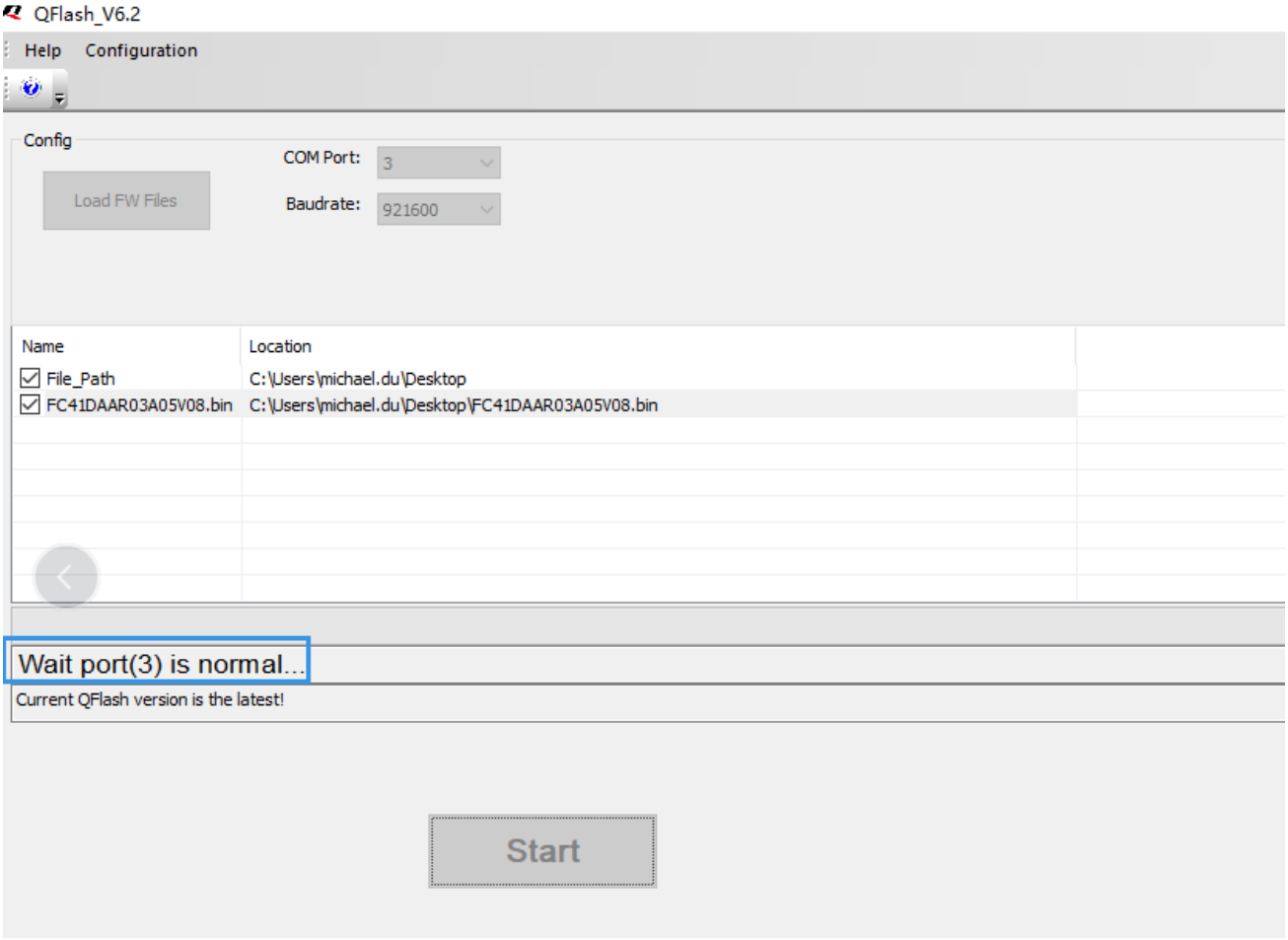

Figure 20: Start to Upgrade Firmware-1

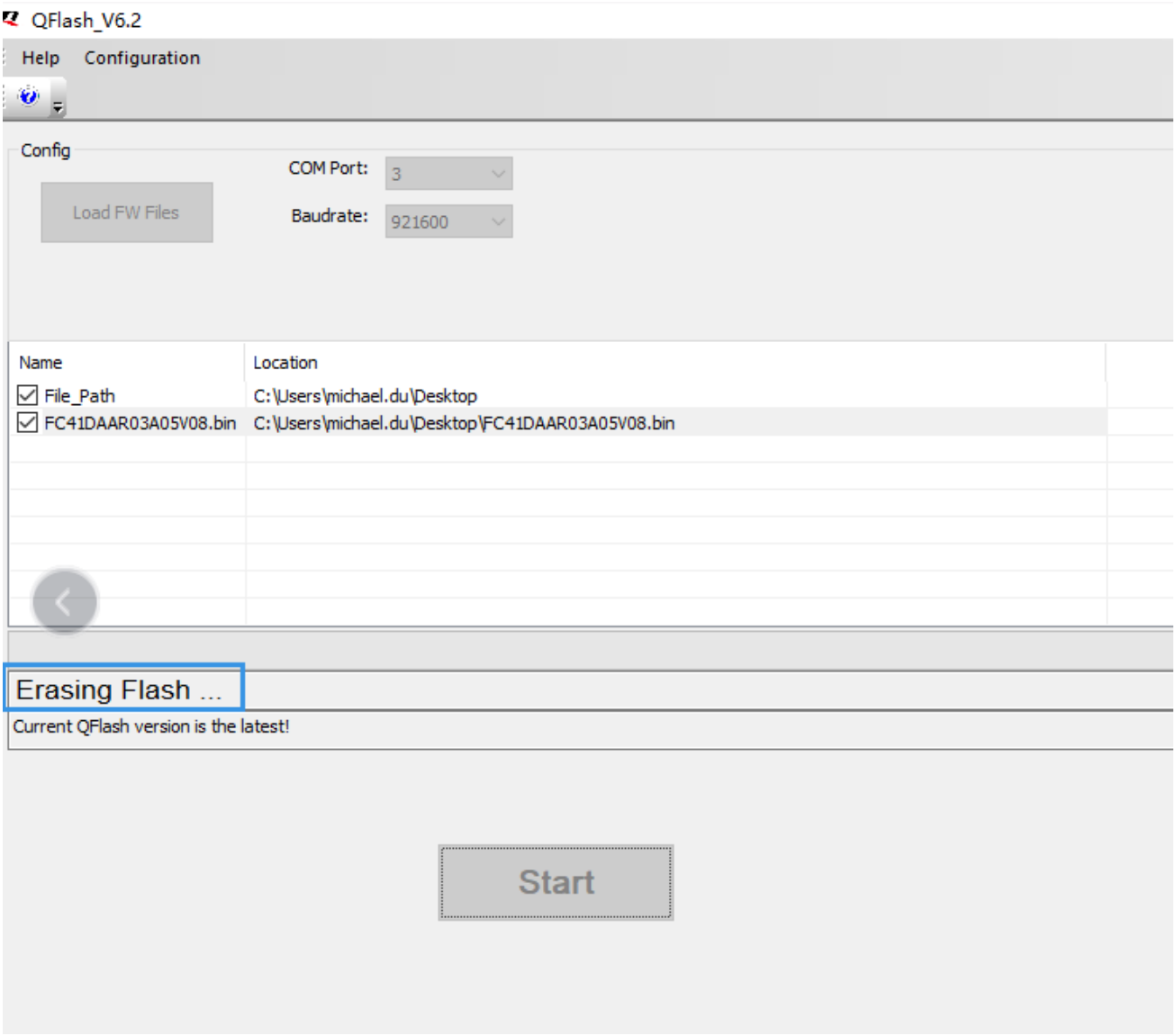

Figure 21: Start to Upgrade Firmware-2

5. Firmware is upgrading presenting in percentage form, and "**PASS**" is displayed in the tool window when the upgrade is completed.

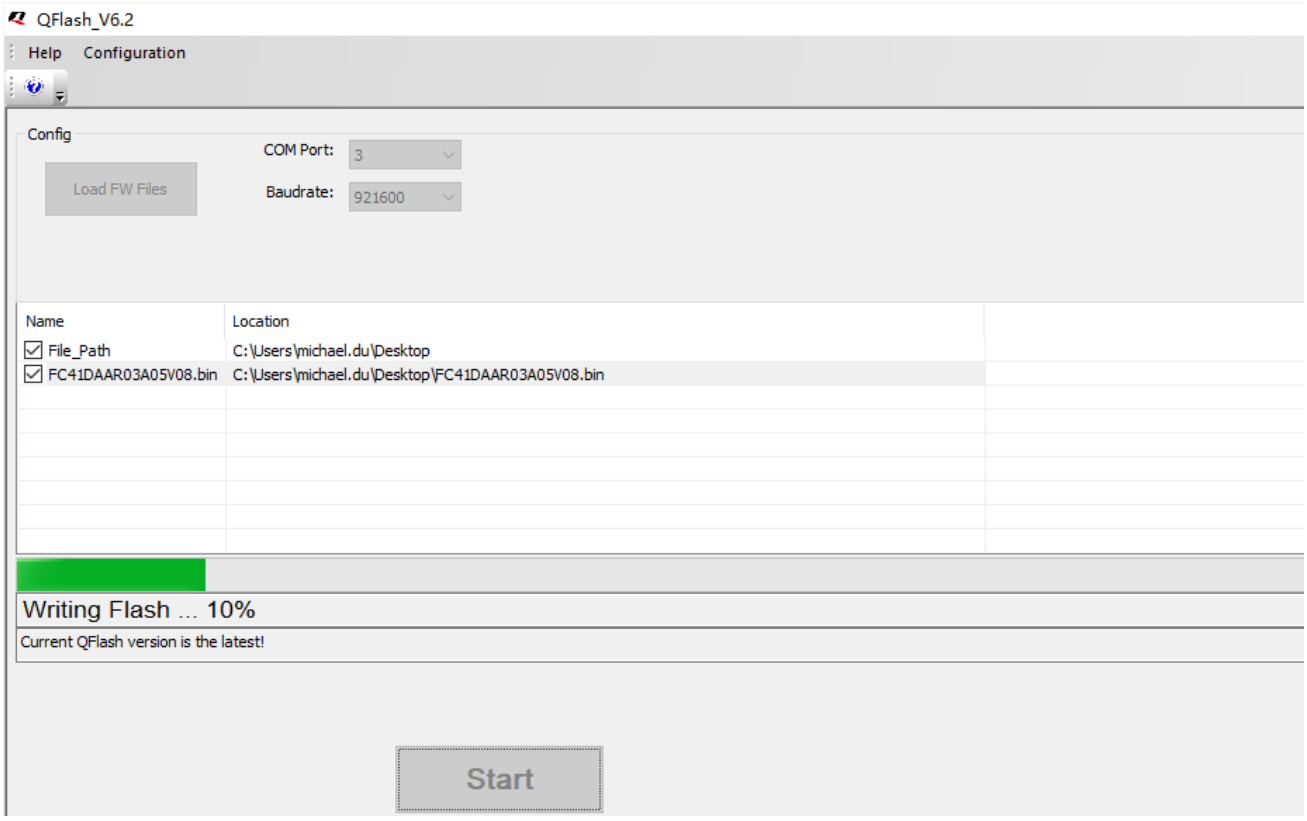

Figure 22: Firmware Upgrading

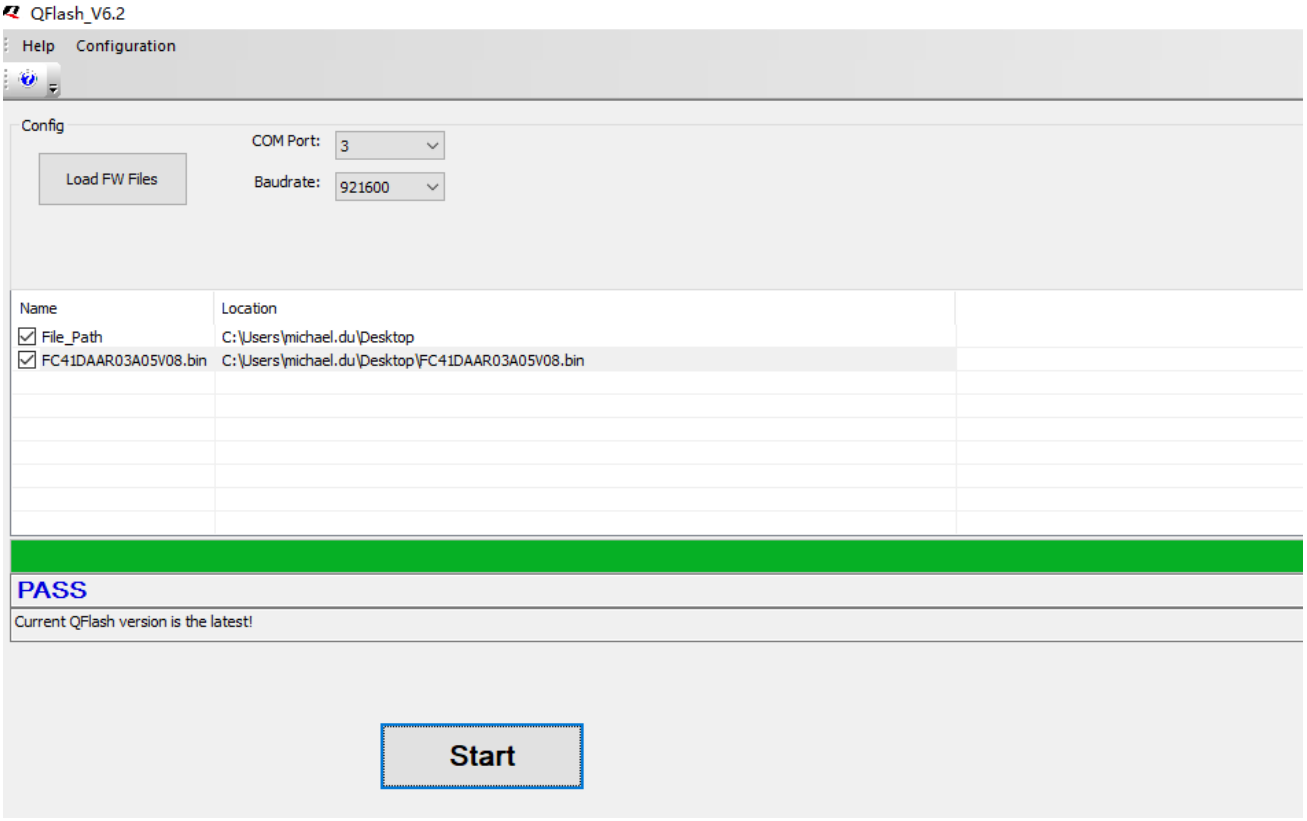

Figure 23: Complete the Firmware Upgrade

NOTE

Contact Quectel Technical Support for the QFlash tool and the QFlash version should be later than 5.4. For more details about QFlash tool usage and configuration, see ***document [3]***.

5.4. Reset

Press SW301 (reset button) for more than 100 ms and then release it to reset the module.

6 Appendix References

Table 7: Related Documents

Document Name
[1] Quectel_FC41D_QuecOpen_Hardware_Design
[2] Quectel_QCOM_User_Guide
[3] Quectel_QFlash_User_Guide

Table 8: Terms and Abbreviations

Abbreviation	Description
ADC	Analog-to-Digital Converter
COM	Communication
EVB	Evaluation Board
EEPROM	Electrically-Erasable Programmable Read-Only Memory
GND	Ground
GPIO	General Purpose Input/Output
LED	Light Emitting Diode
NC	Not Connected
PC	Personal Computer
RF	Radio Frequency
SMA	Sub Miniature version A
UART	Universal Asynchronous Receiver & Transmitter
USB	Universal Serial Bus