FGE573Q&FGE576Q
Hardware Design

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 terminal or mobile incorporating the module. Manufacturers of the 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 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.
	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 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 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 phone or other 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
-	2023-11-01	Soni RAO/Amy HAN/ Qingzong MA/ Zhongjun YU	Creation of the document
1.0.0	2023-11-01	Soni RAO/Amy HAN/ Qingzong MA/ Zhongjun YU	Preliminary

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1 Introduction

This document defines the FGE573Q&FGE576Q features, performances, and air interfaces and hardware interfaces connected to your applications. The document provides a quick insight into interface specifications, RF performance, electrical and mechanical details, as well as other related information of the module.

Hereby, Quectel Wireless Solutions Co., Ltd. declares that the radio equipment type FGE576Q is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address: http://www.quectel.com/support/technical.htm

Disposal of old electrical appliances

The European directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE), requires that old household electrical appliances must not be disposed of in the normal unsorted municipal waste stream. Old appliances must be collected separately in order to optimize the recovery and recycling of the materials they contain, and reduce the impact on human health and the environment.

The crossed out "wheeled bin" symbol on the product reminds you of your obligation, that when you dispose of the appliance, it must be separately collected.

Consumers should contact their local authority or retailer for information concerning the correct disposal of their old appliance.

AT	BE	BG	HR	CY	CZ	DK
EE	FI	FR	DE	EL	HU	IE
IT	LV	LT	LU	MT	NL	PL
PT	RO	SK	SI	ES	SE	UK(NI)

This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. The device is restricted to indoor use only when operating in the 5150 to 5350 MHz and 5945 to 7125 MHz frequency range.

2 Product Overview

The modules are high-performance IEEE 802.11a/b/g/n/ac/ax/be Wi-Fi 7 and Bluetooth 5.3 module with low power consumption. It provides a PCIe Gen 3 interface for Wi-Fi application and a UART/USB and a PCM interface for Bluetooth application.

The module integrates the following features:

- 2 × 2 Multi-User Multiple-Input Multiple-Output (MU-MIMO)
- Multi-link Operation (MLO)
- 2.4 GHz/5 GHz/6 GHz Tri-band Wi-Fi
    - 2.4 GHz: 20/40 MHz bandwidth
    - 5 GHz: 20/40/80/160 MHz bandwidth
    - 6 GHz: 20/40/80/160 MHz bandwidth
- Maximum data transmission rate:
    - FGE573Q: 600 Mbps (2.4 GHz), 2.9 Gbps (5 GHz/6 GHz)
    - FGE576Q: 3.6 Gbps (2 × 2 + 2 × 2 802.1be DBS)

It is an SMD module with compact packaging. Related information is listed in the table below:

Table 1: Basic Information

FGE573Q&FGE576Q	
Packaging type	LGA
Pin counts	168
Dimensions	(16.0 ±0.2) mm × (20.0 ±0.2) mm × (1.8 ±0.2) mm
Weight	TBD

2.1. Key Features

Table 2: Key Features

Basic Information	
Protocols and Standard	● Wi-Fi protocols: IEEE 802.11a/b/g/n/ac/ax/be ● Bluetooth protocol: Bluetooth 5.3 ● All hardware components are fully compliant with EU RoHS directive
Power Supplies	**VBAT Power Supply:** ● 3.0–3.6 V ● Typ.: 3.3 V **VDD_IO Power Supply:** ● 1.71–1.89 V ● Typ.: 1.8 V
Temperature Ranges	● Operating temperature [1]: -20 °C to +70 °C ● Storage temperature: -40 °C to +85 °C
EVB Kit	FGE57xQ-M.2, RK3568-WF EVB [2]
RF Coaxial Connector	
Wi-Fi/Bluetooth Antenna Interfaces	● ANT_WIFI0 ● ANT_WIFI1 ● 50 Ω characteristic impedance
Application Interface	
Wi-Fi Application Interface	PCIe 3.0
Bluetooth Application Interfaces	● UART or USB ● PCM

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[1] To meet the normal operating temperature range requirements, it is necessary to ensure effective thermal dissipation, e.g., by adding passive or active heatsinks, heat pipes, vapor chambers, etc. Thermal dissipation is necessary for the module in soft-AP mode. Within this range, the module's indicators comply with IEEE and Bluetooth specification requirements.

[2] For more details about the EVB, see *document [1]*.

3 RF Performances

3.1. Wi-Fi Performances

Table 3: Wi-Fi Performances

Operating Frequency
● **2.4 GHz:** 2.400–2.4835 GHz
● **5 GHz:** 5.150–5.850 GHz
● **6 GHz:** 5.945–7.125 GHz

Modulation
DBPSK, DQPSK, CCK, BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM

Operating Mode
● AP
● STA
● P2P

Encryption Mode
● WPA
● WPA2
● WPA3

Transmission Data Rate
● 802.11b: 1 Mbps, 2 Mbps, 5.5 Mbps, 11 Mbps
● 802.11a/g: 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps
● 802.11n: HT20 (MCS 0–7), HT40 (MCS 0–7)
● 802.11ac: VHT20 (MCS 0–8), VHT40 (MCS 0–9), VHT80 (MCS 0–9), VHT160 (MCS 0–9)
● 802.11ax: HE20 (MCS 0–11), HE40 (MCS 0–11), HE80 (MCS 0–11), HE160 (MCS 0–11)
● 802.11 be: EHT20 (MCS 0–13), EHT40 (MCS 0–13), EHT80 (MCS 0–13), EHT160 (MCS 0–13)

Condition (VBAT = 3.3 V, VDD_IO = 1.8 V; Temp. 25 °C)	EVM	Typ.; Unit: dBm; Tolerance: ±2 dB	
		Transmitting	Receiving

			Power	Sensitivity
2.4 GHz	802.11b @ 1 Mbps	≤ 35 %	19	-99
	802.11b @ 11 Mbps		19	-91.5
	802.11g @ 6 Mbps	≤ -5 dB	19	-96
	802.11g @ 54 Mbps	≤ -25 dB	17	-78
	802.11n, HT20 @ MCS 0	≤ -5 dB	19	-96.5
	802.11n, HT20 @ MCS 7	≤ -27 dB	17	-78
	802.11n, HT40 @ MCS 0	≤ -5 dB	19	-94
	802.11n, HT40 @ MCS 7	≤ -27 dB	17	-75
	802.11ax, HE20 @ MCS 0	≤ -5 dB	19	-96.5
	802.11ax, HE20 @ MCS 11	≤ -35 dB	17	-65.5
	802.11ax, HE40 @ MCS 0	≤ -5 dB	19	-94
	802.11ax, HE40 @ MCS 11	≤ -35 dB	16	-63
	802.11be, EHT20 @ MCS 0	≤ -5 dB	19	-96.5
	802.11be, EHT20 @ MCS 13	≤ -38 dB	15.5	-59.5
	802.11be, EHT40 @ MCS 0	≤ -5 dB	19	-94
	802.11be, EHT40 @ MCS 13	≤ -38 dB	15	-57
5 GHz	802.11a @ 6 Mbps	≤ -5 dB	18.5	-95
	802.11a @ 54 Mbps	≤ -25 dB	16	-77
	802.11n, HT20 @ MCS 0	≤ -5 dB	18.5	-95
	802.11n, HT20 @ MCS 7	≤ -27 dB	15.5	-77
	802.11n, HT40 @ MCS 0	≤ -5 dB	18.5	-92
	802.11n, HT40 @ MCS 7	≤ -27 dB	15.5	-74
	802.11ac, VHT20 MCS 0	≤ -5 dB	18.5	-95
	802.11ac, VHT20 MCS 8	≤ -30 dB	15	-74
	802.11ac, VHT40 @ MCS 0	≤ -5 dB	18.5	-92

802.11ac, VHT40 @ MCS 9	≤ -32 dB	14	-69
802.11ac, VHT80 @ MCS 0	≤ -5 dB	18.5	-89
802.11ac, VHT80 @ MCS 9	≤ -32 dB	14	-65.5
802.11ac, VHT160 @ MCS 0	≤ -5 dB	18.5	-86.5
802.11ac, VHT160 @ MCS 9	≤ -32 dB	14	-63
802.11ax, HE20 @ MCS 0	≤ -5 dB	18.5	-95
802.11ax, HE20 @ MCS 11	≤ -35 dB	14.5	-64.5
802.11ax, HE40 @ MCS 0	≤ -5 dB	18.5	-92.5
802.11ax, HE40 @ MCS 11	≤ -35 dB	13.5	-62
802.11ax, HE80 @ MCS 0	≤ -5 dB	18.5	-89
802.11ax, HE80 @ MCS 11	≤ -35 dB	13	-59
802.11ax, HE160 @ MCS 0	≤ -5 dB	18.5	-86.5
802.11ax, HE160 @ MCS 11	≤ -35 dB	12.5	-56
802.11be, EHT20 @ MCS 0	≤ -5 dB	18.5	-95
802.11be, EHT20 @ MCS 13	≤ -38 dB	13.5	-58.5
802.11be, EHT40 @ MCS 0	≤ -5 dB	18.5	-92.5
802.11be, EHT40 @ MCS 13	≤ -38 dB	13	-56
802.11be, EHT80 @ MCS 0	≤ -5 dB	18.5	-89
802.11be, EHT80 @ MCS 13	≤ -38 dB	12.5	-53
802.11be, EHT160 @ MCS 0	≤ -5 dB	18.5	-86.5
802.11be, EHT160 @ MCS 13	≤ -38 dB	11	-50
6 GHz	802.11a @ 6 Mbps	≤ -5 dB	17.5	-94
	802.11a @ 54 Mbps	≤ -25 dB	15	-76
	802.11ax, HE20 @ MCS 0	≤ -5 dB	17.5	-94
	802.11ax, HE20 @ MCS 11	≤ -35 dB	13.5	-63.5
	802.11ax, HE40 @ MCS 0	≤ -5 dB	17.5	-91.5

802.11ax, HE40 @ MCS 11	≤ -35 dB	12.5	-61
802.11ax, HE80 @ MCS 0	≤ -5 dB	17.5	-88
802.11ax, HE80 @ MCS 11	≤ -35 dB	12	-58
802.11ax, HE160 @ MCS 0	≤ -5 dB	17.5	-85.5
802.11ax, HE160 @ MCS 11	≤ -35 dB	11.5	-55
802.11be, EHT20 @ MCS 0	≤ -5 dB	17.5	-94
802.11be, EHT20 @ MCS 13	≤ -38 dB	12.5	-57.5
802.11be, EHT40 @ MCS 0	≤ -5 dB	17.5	-91.5
802.11be, EHT40 @ MCS 13	≤ -38 dB	12	-55
802.11be, EHT80 @ MCS 0	≤ -5 dB	17.5	-88
802.11be, EHT80 @ MCS 13	≤ -38 dB	11.5	-52
802.11be, EHT160 @ MCS 0	≤ -5 dB	17.5	-85.5
802.11be, EHT160 @ MCS 13	≤ -38 dB	10	-49

NOTE

The built-in BPF of the module is optional. And the above is the transmitting power and receiving sensitivity data of the module without built-in BPF. Due to the impact of BPF, these data are reduced by 1 dB when the module is equipped with BPF.

3.2. Bluetooth Performances

Table 4: Bluetooth Performances

Operating Frequency		
2.402–2.480 GHz		
Modulation		
GFSK, π/4-DQPSK, 8-DPSK		
Operating Mode		
● Classic Bluetooth (BR + EDR) ● Bluetooth Low Energy (BLE), supporting 2 Mbps and BLE Long Range		

Condition (VBAT = 3.3 V，VDD_IO = 1.8 V; Temp. 25 °C)	Typ.; Unit: dBm; Tolerance: ±2 dB	
	Transmitting Power	**Receiving Sensitivity**
BR	16	-96
EDR (π/4-DQPSK)	11.5	-95
EDR (8-DPSK)	11.5	-88
BLE (1 Mbps)	7	-100
BLE (2 Mbps)	7	-95

NOTE

The built-in BPF of the module is optional. And the above is the transmitting power and receiving sensitivity data of the module without built-in BPF. Due to the impact of BPF, these data are reduced by 1 dB when the module is equipped with BPF.

4 Application Interfaces

4.1. Pin Assignment
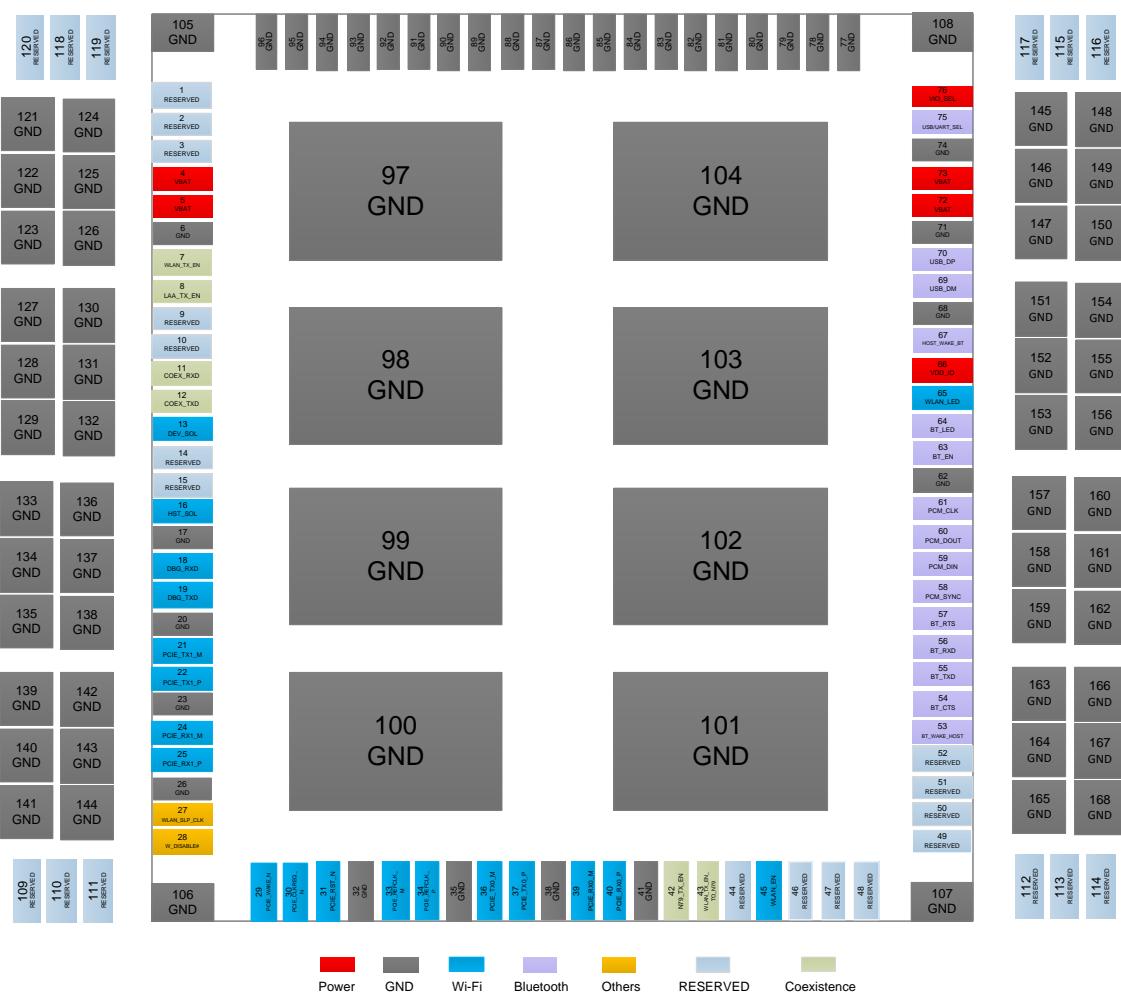
Figure 1: Pin Assignment (Top View)

> **NOTE**
>
> 1. Keep all RESERVED and unused pins unconnected.
> 2. All GND pins should be connected to ground.

4.2. Pin Description

Table 5: Parameter Definition

Parameter	Description
AI	Analog Input
AIO	Analog Input/Output
AO	Analog Output
DI	Digital Input
DIO	Digital Input/Output
DO	Digital Output
PI	Power Input

DC characteristics include power domain and rated current.

Table 6: Pin Description

Power Supply					
Pin Name	**Pin No.**	**I/O**	**Description**	**DC Characteristics**	**Comment**
VBAT	4, 5, 72, 73	PI	Provide 3.3 V for the module's main part	Vmin = 3.0 V Vnom = 3.3 V Vmax = 3.6 V	It must be provided with sufficient current up to 3 A.
VDD_IO	66	PI	Power supply for the module's I/O pins	Vmin = 1.71 V Vnom = 1.8 V Vmax = 1.89 V	It must be provided with sufficient current up to 0.05 A.
VDD_SEL	76	DI	VDD_IO power supply selection		Pulled down to GND: internal 1.8 V supply (VDD_IO unconnected); Kept open: VDD_IO 1.8 V supply.
GND	6, 17, 20, 23, 26, 32, 35, 38, 41, 62, 68, 71, 74, 77–108, 121–168				

Wi-Fi Application Interfaces

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
WLAN_EN	45	DI	WLAN function enable control	VDD_IO	Active high.
PCIE_REFCLK_M	33	AI	PCIe reference clock (-)		Require differential impedance of 90 Ω. PCIe Gen 3 compliant.
PCIE_REFCLK_P	34	AI	PCIe reference clock (+)		
PCIE_TX0_M	36	AO	PCIe transmit (-)		
PCIE_TX0_P	37	AO	PCIe transmit (+)		
PCIE_TX1_M	21	AO	PCIe transmit (-)		
PCIE_TX1_P	22	AO	PCIe transmit (+)		
PCIE_RX1_M	24	AI	PCIe receive (-)		
PCIE_RX1_P	25	AI	PCIe receive (+)		
PCIE_RX0_M	39	AI	PCIe receive (-)		
PCIE_RX0_P	40	AI	PCIe receive (+)		
PCIE_CLKREQ_N	30	DO	PCIe clock request		Active low. Pull each of them up to 1.8 V with an external 100 kΩ resistor respectively.
PCIE_WAKE_N	29	DO	PCIe wakes up		
PCIE_RST_N	31	DI	PCIe reset		Active low.
DEV_SOL	13	DO	Device sign of life	VDD_IO	If unused, keep them open.
HST_SOL	16	DI	Host sign of life		
WLAN_LED	65	DO	WLAN status indicator		
DBG_RXD	18	DI	Debug UART receive		Test points must be reserved.
DBG_TXD	19	DO	Debug UART transmit		

Bluetooth Application Interfaces

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
BT_EN	63	DI	Bluetooth function enable control		Active high. If unused, pull it down.
PCM_DOUT	60	DO	PCM data output		
PCM_DIN	59	DI	PCM data input		
PCM_SYNC	58	DIO	PCM data frame sync		
PCM_CLK	61	DIO	PCM clock		
BT_TXD	55	DO	Bluetooth UART transmit		
BT_RXD	56	DI	Bluetooth UART receive	VDD_IO	If unused, keep them open.
BT_RTS	57	DO	Request to send signal from the module		
BT_CTS	54	DI	Clear to send signal to the module		
HOST_WAKE_BT	67	DI	Host wakes up Bluetooth		
BT_WAKE_HOST	53	DO	Bluetooth wakes up host		
BT_LED	64	DI	Bluetooth status indicator		
USB_DM	69	AIO	USB 1.1 data (-)		● Reserve test points。 ● If unused, keep them open.
USB_DP	70	AIO	USB 1.1 data (+)		
USB/UART_SEL	75	DI	USB/UART interface function selection		Pulled down to GND: USB interface function; ● Kept open: UART function.
Coexistence Interfaces					
Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
COEX_TXD	12	DO	2.4 GHz LTE & Wi-Fi/Bluetooth coexistence transmit	VDD_IO	If unused, keep them open.

COEX_RXD	11	DI	2.4 GHz LTE & Wi-Fi/Bluetooth coexistence receive		
LAA_TX_EN	8	DI	If it is at high level, the module places the 5 GHz LNA receiver in a protected state		
WLAN_TX_EN	7	DO	The module outputs to SDR		
N79_TX_EN	42	DI	SDR input into the module		
WLAN_TX_EN_TO_N79	43	DO	The module outputs to SDR		

Other Interfaces

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
WLAN_SLP_CLK	27	DI	WLAN sleep clock	VDD_IO	32.768 kHz sleep clock input.
W_DISABLE#	28	DI	WLAN CPU control		It is an interrupt pin to WLAN CPU. When WLAN detected interrupt, it turns off WLAN MAC/PHY/RF for power save application. If unused, keep it open.

RESERVED Pins

Pin Name	Pin No.			Comment
RESERVED	1–3, 9, 10, 14, 15, 44, 46–52, 109–120			Keep them open.

4.3. Power Supply

The module is powered by VBAT, and it is recommended to use a power supply chip with sufficient current up to 3 A. For better power supply performance, it is recommended to parallel a 47 µF decoupling capacitor and 100 nF, 33 pF and 10 pF filter capacitors near the module's VBAT pins. At the same time, it is suggested to add a TVS near the VBAT pins to improve the surge voltage bearing capacity of the module. In principle, the longer the power supply trace is, the wider it should be.

VBAT reference circuit is shown below:
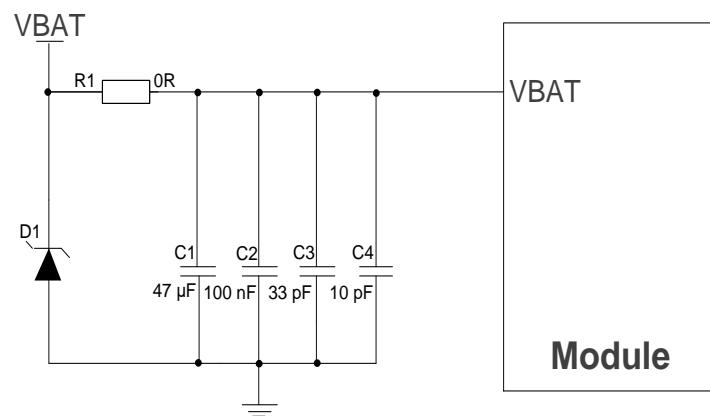
Figure 2: Reference Circuit of Power Supply

The power-up and power-down timing of the module is shown in the figure below.
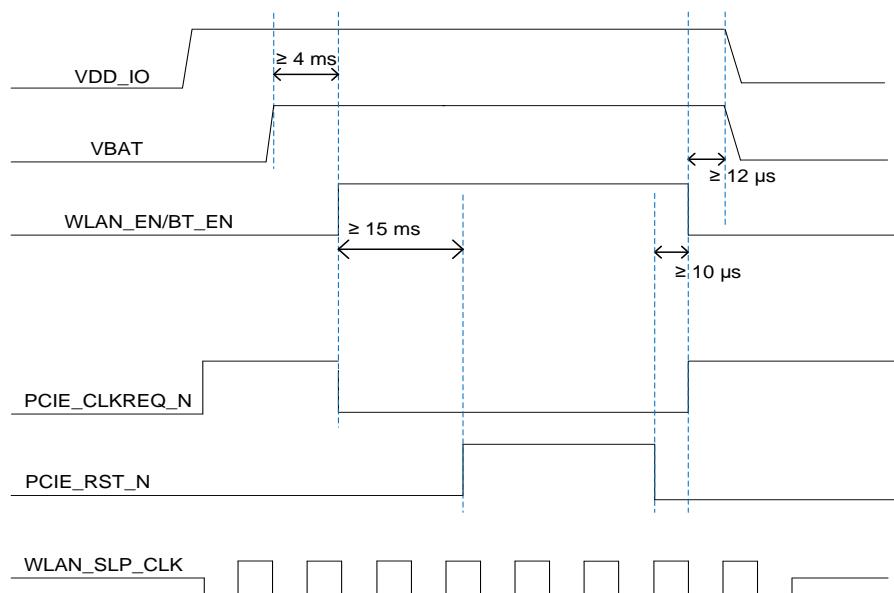
Figure 3: Power-up and power-down Timing

4.4. Wi-Fi Application Interfaces

The following figure shows the Wi-Fi application interface connection between the module and the host.
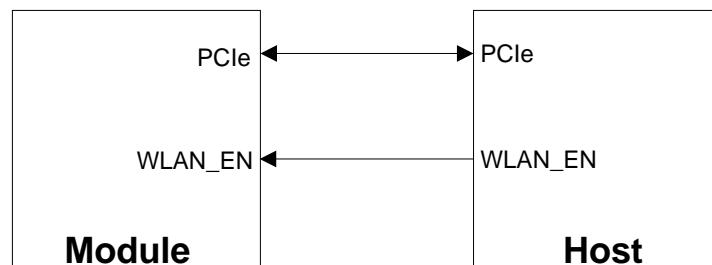
Figure 4: Wi-Fi Application Interface Connection

4.4.1. PCIe Interface

The module provides a PCIe 3.0 interface for Wi-Fi functions. The PCIe interface connection between the module and the host is illustrated in the following figure.
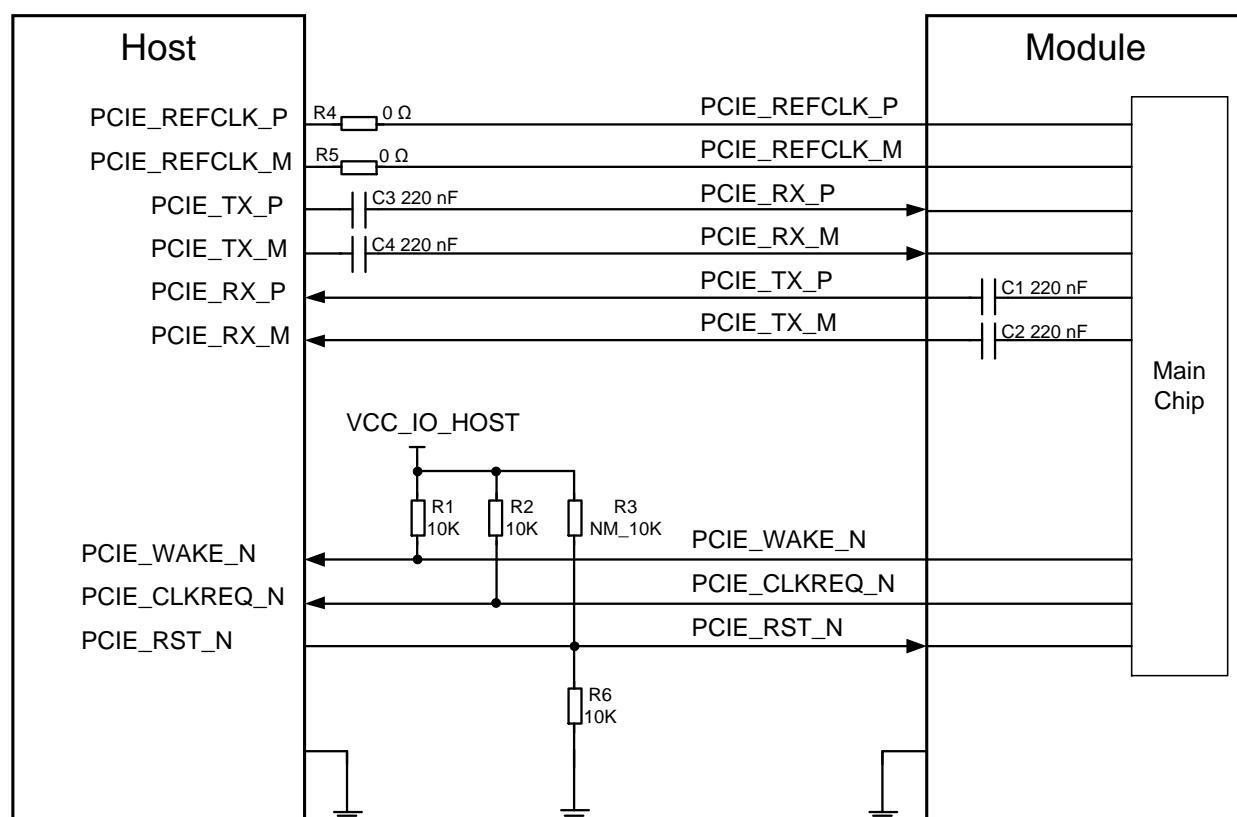
Figure 5: PCIe Interface Connection

To ensure the signal integrity of PCIe interface, C1 and C2 should be placed close to the module, and C3 and C4 should be placed close to the host. The extra stubs of traces must be as short as possible.

The following principles of PCIe interface design should be complied with to meet PCIe Gen 3 specifications.

● It is important to route PCIe Tx/Rx/REFCLK as differential pairs with ground surrounded. And the differential impedance should be 90 Ω ±10 %.
● The maximum trace length of each differential pair (PCIe Tx/Rx/REFCLK) should be less than 200 mm, and trace length matching within each differential pair should be less than 0.5 mm.
● The trace space between Tx and Rx signal lines should be greater than 3 times the trace width. And the trace space between Tx/Rx signal lines and all other signal lines should be greater than four times the trace width.
● Connect 220 nF capacitors in series on the Tx/Rx traces to protect against leakage current.
● Do not route signal traces under crystals, oscillators, magnetic devices, or RF signal traces. It is important to route the PCIe differential traces in inner-layer of the PCB and surround the traces with ground on that layer and with ground planes above and below.

4.5. Bluetooth Application Interfaces

The following figure shows the Bluetooth application interface connection between the module and the host.
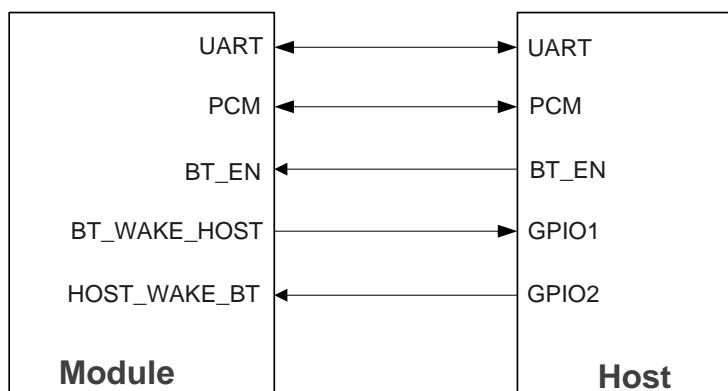
Figure 6: Bluetooth Application Interface Connection

NOTE
The GPIO1 of the host connected to BT_WAKE_HOST must be interruptible.

4.5.1. PCM Interface

The module provides 1 PCM interface for Bluetooth audio.

The PCM interface timing and relevant parameters are shown below:
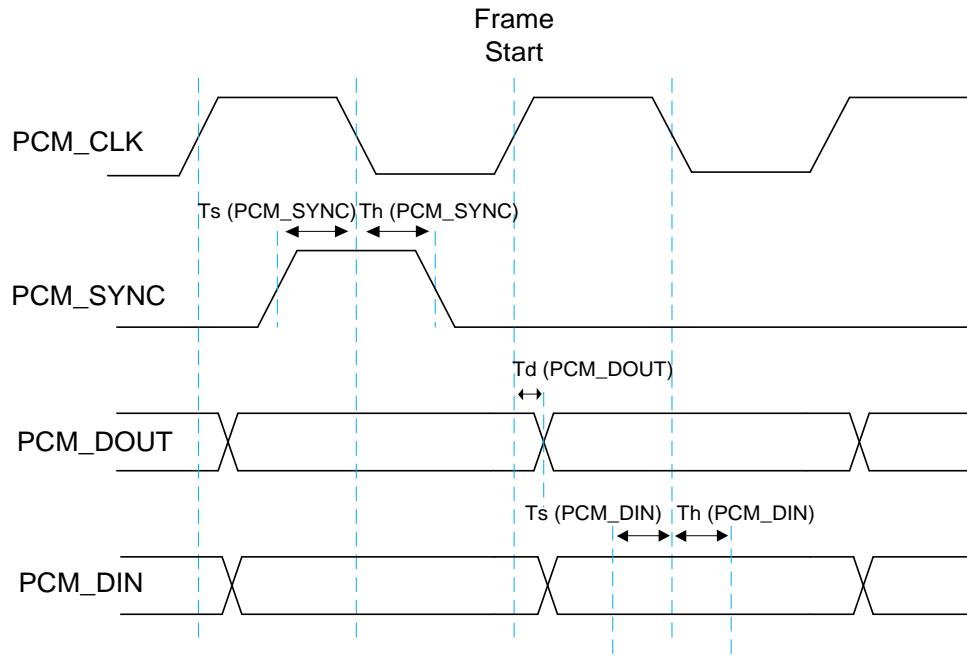
Figure 7: PCM Interface Timing

Table 7: PCM Interface Timing Parameters

Parameter	Description	Min.	Typ.	Max.	Unit
F (PCM_CLK)	PCM_CLK frequency	64	-	2048	kHz
Ts (PCM_SYNC)	Setup time from PCM_SYNC to PCM_CLK falling edge	0	-	-	ns
Th (PCM_SYNC)	Hold time from PCM_CLK falling edge to PCM_SYNC falling edge	150	-	-	ns
Td (PCM_DOUT)	Delay from PCM_CLK rising edge to PCM_DOUT	0	-	150	ns
Ts (PCM_DIN)	Setup time from PCM_DIN to PCM_CLK falling edge	0	-	-	ns
Th (PCM_DIN)	Hold time of PCM_DIN after PCM_CLK fall	150			ns

4.5.2. UART

The module supports an HCI UART as defined in *Bluetooth Core Specification Version 5.3*. The UART supports hardware flow control, and it is used for data transmission with MCU. It supports up to 3.125 Mbps baud rates.

The UART connection between the module and the MCU is as follows:
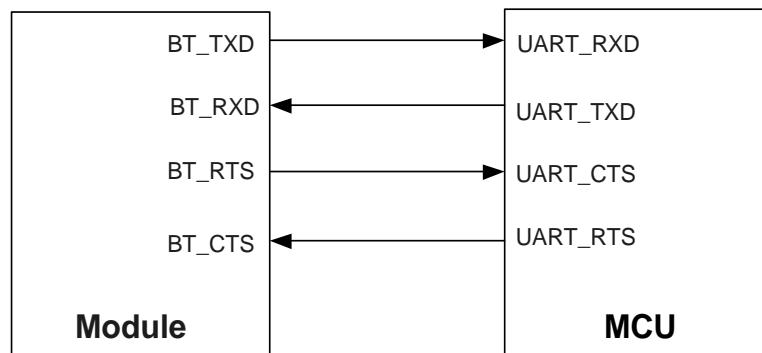
Figure 8：UART Connection block diagram

HCI UART Tx timing is shown below:
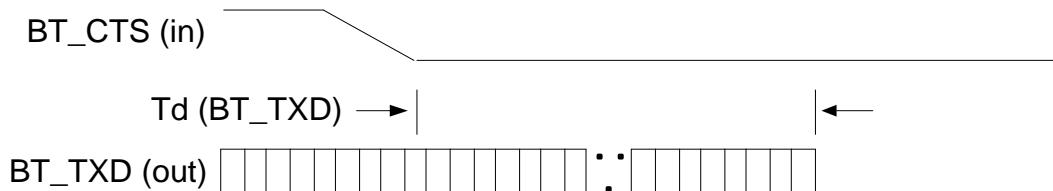
**Figure 9: HCI UART Tx Timing**

Table 8: HCI UART Tx Timing Parameters

Parameter	Description	Min.	Typ.	Max.	Unit
Td (BT_TXD)	Delay from BT_CTS to BT_TXD stop	-	-	8	byte

HCI UART Rx timing is shown below:
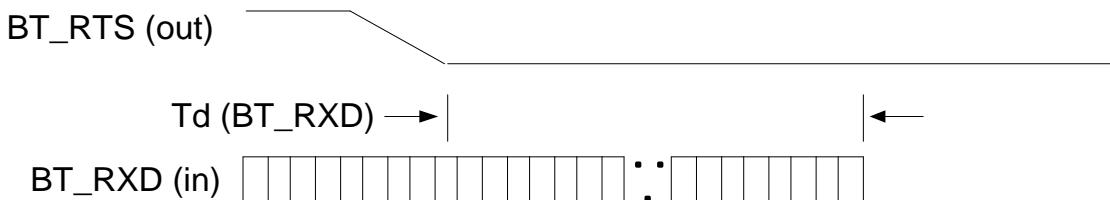
Figure 10: HCI UART Rx Timing

Table 9: HCI UART Rx Timing Parameters

Parameter	Description	Min.	Typ.	Max.	Unit
Td (BT_RXD)	Delay from BT_RTS to BT_RXD stop	-	-	8	byte

4.5.3. USB Interface

The USB interface connection between the module and the host computer is as follows：
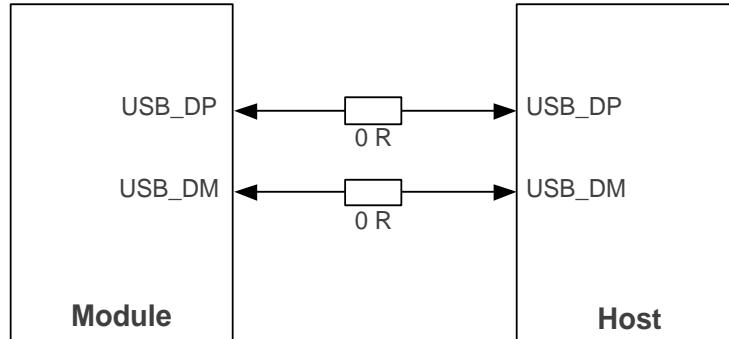
Figure 11：USB Interface Connection

To ensure compliance of interface design with the USB 1.1 specification, it is recommended to adopt the following principles:

● The impedance of USB signal trace is 90 Ω ±10 %. Route the USB traces in inner layer of the PCB, and surround the traces with ground on that layer and with ground planes above and below.
● Keep SDIO signals far away from power supply traces, crystal-oscillators, magnetic devices, sensitive signals such as RF signals, analog signals, as well as noise signals generated by clock, DC-DC.
● USB signal traces (USB_DP and USB_DM) need to be equal in length, width and distance (the distance between the traces should be less than 1 mm).

● The distance between USB signal line and other signals must be greater than twice the trace width, and the bus load capacitance must be less than 15 pF.

For more details about the USB specifications, please visit http://www.usb.org/home.

4.6. RF Coaxial Connector

Appropriate antenna type and design should be used with matched antenna parameters according to specific application. It is required to perform a comprehensive functional test for the RF design before mass production of terminal products. The entire content of this chapter is provided for illustration only. Analysis, evaluation and determination are still necessary when designing target products.

4.6.1. Antenna Design Requirements

Table 10: Antenna Requirements

Parameter	Requirement [3]
Frequency Ranges	**Wi-Fi:** ● 2.4 GHz: 2.400–2.4835 GHz ● 5 GHz: 5.150–5.850 GHz ● 6 GHz: 5.945–7.125 GHz **Bluetooth:** ● 2.4 GHz: 2.402–2.480 GHz
Cable Insertion Loss (dB)	● < 1
VSWR	≤ 2 (Typ.)
Gain (dBi)(max)	2.4GHz: 0.2dbi, 5GHz: -0.7dbi, 6GHz: 1.6dbi
Max. Input Power (W)	50
Input Impedance (Ω)	50
Polarization Type	Vertical

---

[3] For more details about the RF performances, see *Chapter 3*.

4.6.2.   RF Coaxial Connector

4.6.2.1. Receptacle Specifications

The mechanical dimensions of the receptacle provided by the module are as follows:
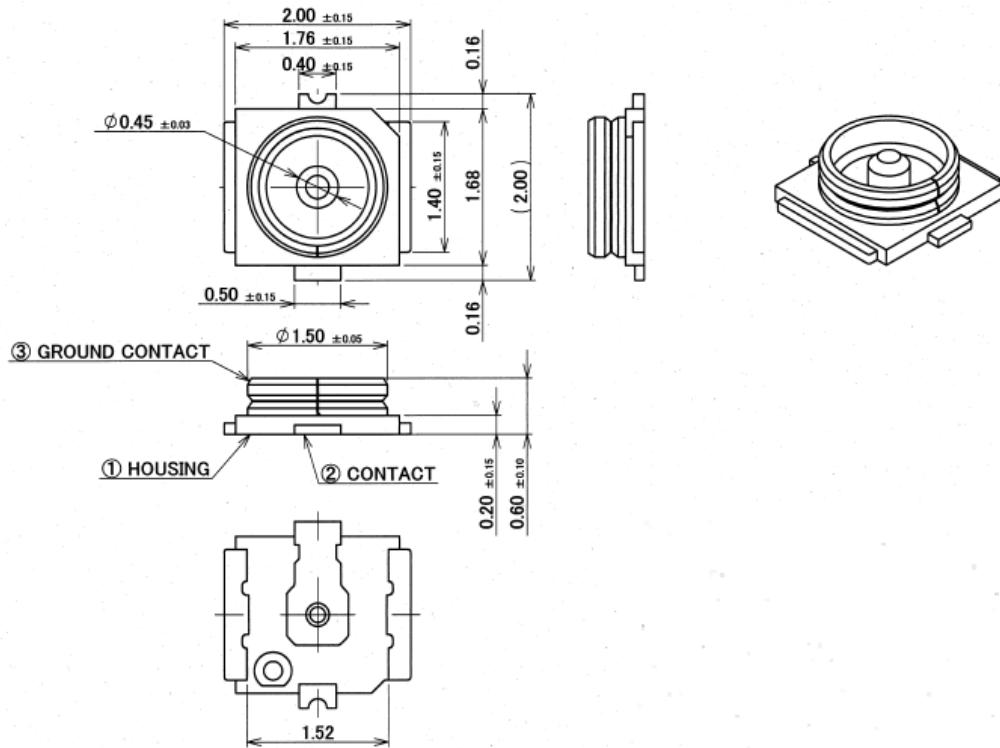
**Figure 12: Dimensions of the Receptacle (Unit: mm)**

Table 11: Major Specifications of the RF Connector

Item	Specification
Nominal Frequency Range	DC to 8 GHz
Nominal Impedance	50 Ω
Temperature Range	-40 °C to +85 °C
Voltage Standing Wave Ratio (VSWR)	Meet the requirements of: Max. 1.3 (DC–3 GHz) Max. 1.4 (3–6 GHz) Max. 1.5 (6–8 GHz)

4.6.2.2. Antenna Connector Installation

The receptacle mounted on the module accepts two types of mated plugs that will meet a maximum height of 1.2 mm when using a Ø 0.81 mm coaxial cable or a maximum height of 1.45 mm when utilizing a Ø 1.13 mm coaxial cable.

The following figure shows the dimensions of mated plugs using Ø 0.81 mm coaxial cables.
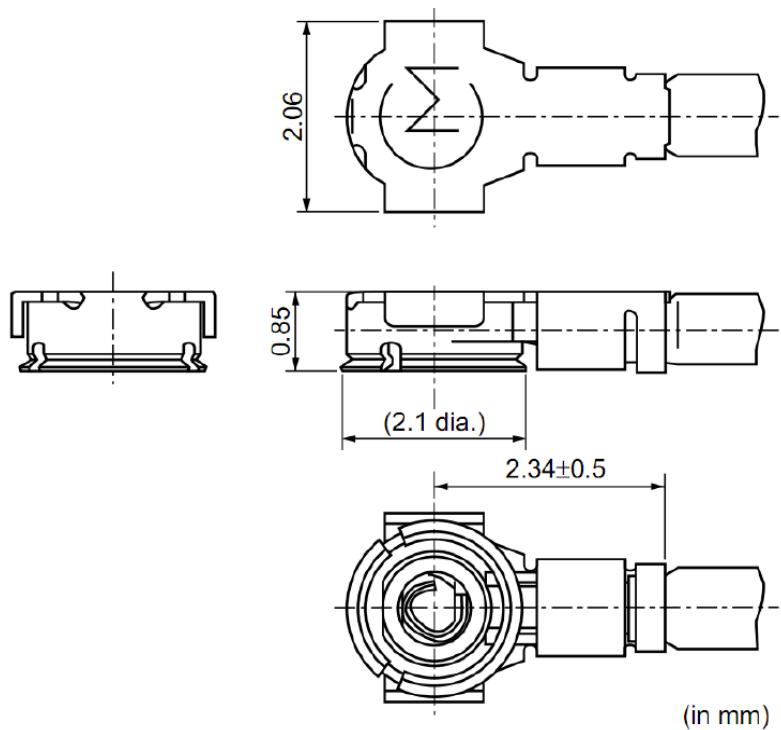
Figure 13: Dimensions of Mated Plugs (Ø 0.81 mm Coaxial Cables) (Unit: mm)

The following figure illustrates the connection between the receptacle on the module and the mated plug using a Ø 0.81 mm coaxial cable.
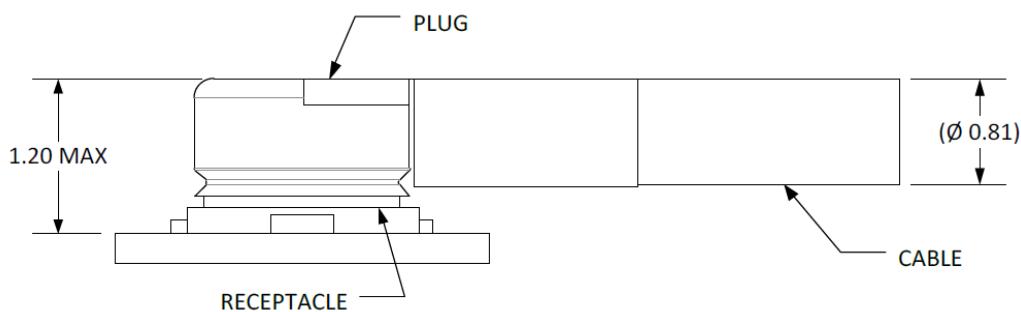
Figure 14: Space Factor of Mated Connectors (Ø 0.81 mm Coaxial Cables) (Unit: mm)

The following figure illustrates the connection between the receptacle on the module and the mated plug

using a Ø 1.13 mm coaxial cable.
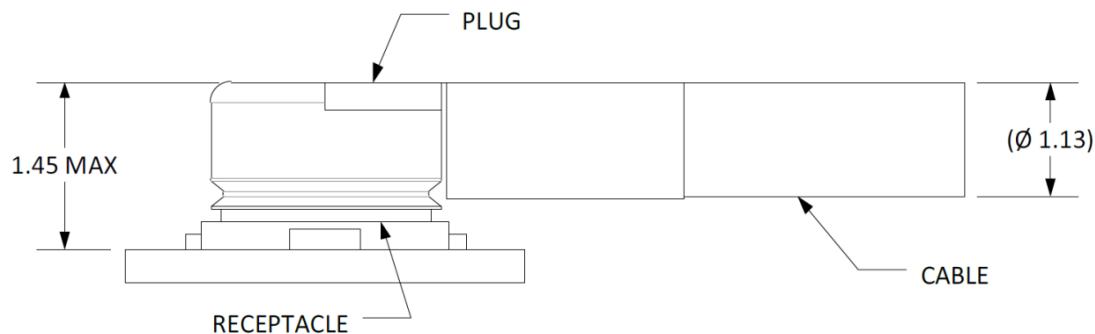
Figure 15: Space Factor of Mated Connectors (Ø 1.13 mm Coaxial Cables) (Unit: mm)

4.6.2.3. Assemble Coaxial Cable Plug Manually

The pictures for plugging in a coaxial cable plug is shown below, θ = 90° is acceptable, while θ ≠ 90° is not.

θ = 90° Allowed   θ ≠ 90° Prohibited
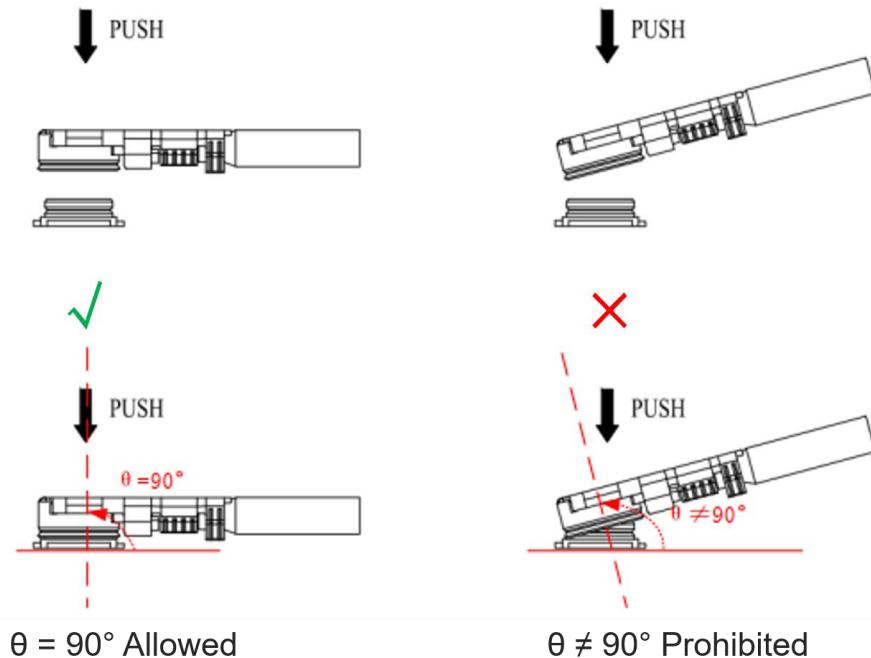
Figure 16: Plug in a Coaxial Cable Plug

The pictures of pulling out the coaxial cable plug is shown below, θ = 90° is acceptable, while θ ≠ 90° is not.
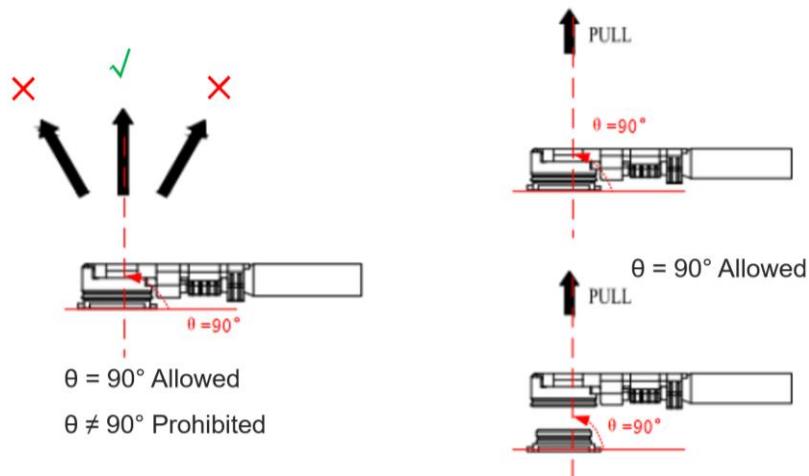
Figure 17: Pull out a Coaxial Cable Plug

4.6.2.4. Assemble Coaxial Cable Plug with Jig

The pictures of installing the coaxial cable plug with a jig is shown below, θ = 90° is acceptable, while θ ≠ 90° is not.
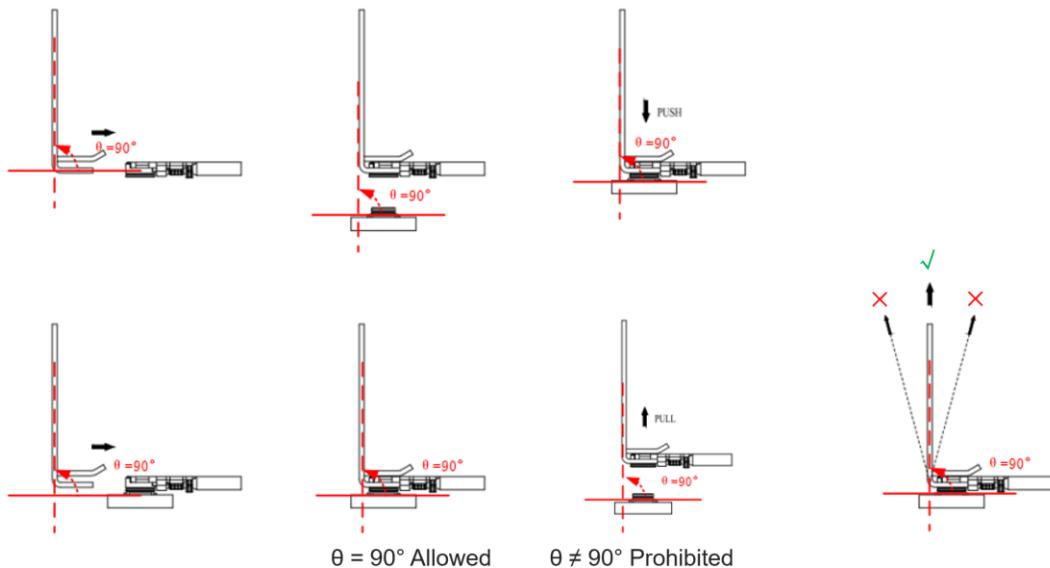
Figure 18: Install the Coaxial Cable Plug with Jig

4.6.2.5. Recommended Manufacturers of RF Connector and Cable

RF connectors and cables by I-PEX are recommended. For more details, visit https://www.i-pex.com.

5 Electrical Characteristics & Reliability

5.1. Absolute Maximum Ratings

Table 12: Absolute Maximum Ratings (Unit: V)

Parameter	Min.	Max.
VBAT	-0.3	3.6
VDD_IO	-0.3	1.89
Voltage at digital pins	-0.3	$V_{DDX} + 0.3$

NOTE

V_{DDX} is the external supply voltage for the corresponding power input pins.

5.2. Power Supply Ratings

Table 13: Module Power Supply Ratings (Unit: V)

Parameter	Description	Conditions	Min.	Typ.	Max.
VBAT	Power supply for the module	The actual input voltages must be kept between the minimum and maximum values.	3.0	3.3	3.6
VDD_IO	Power supply for the module's I/O pins	-	1.71	1.8	1.89

5.3. Power Consumption

5.3.1. Wi-Fi Power Consumption

Table 14: Power Consumption in Non-signaling Mode (Typ.; Unit: mA)

Condition			I_{VDD_IO}	I_{VBAT}
2.4 GHz	802.11n	HT20 @ MCS 0	0.37	590.57
		HT40 @ MCS 7	0.37	545.06
	802.11ax	HE40 @ MCS 11	0.37	598.77
	802.11be	EHT40 @ MCS 13	0.37	597.97
5 GHz	802.11n	HT20 @ MCS 0	0.34	631.06
		HT40 @ MCS 7	0.34	646.14
	802.11ax	HE160 @ MCS 11	0.35	797.05
	802.11be	EHT160 @ MCS 13	0.35	783.32
6 GHz	802.11ax	HE20 @ MCS 11	0.34	488.30
		HE160 @ MCS 11	0.35	798.20
	802.11be	EHT160 @ MCS 13	0.34	789.38
2.4 GHz + 5 GHz	802.11n	HT20 @ MCS 0	0.38	1151.00
		HT40 @ MCS 7	0.38	1131.00
	802.11ax	HE20 @ MCS 0	0.38	1043.00
		HE20 @ MCS 11	0.38	1017.00
		HE40 @ MCS 11 + HE160 @ MCS 11	0.29	1195.00
	802.11be	EHT20 @ MCS 0	0.37	1225.0
		EHT40 @ MCS 13 + EHT160 @ MCS 13	0.39	1159.00
2.4 GHz + 6 GHz	802.11ax	HE20 @ MCS 0	0.39	1373.00
		HE40 @ MCS 11 + HE160 @ MCS 11	0.23	1214.00
	802.11be	EHT20 @ MCS 0	0.37	1056.00

| EHT40 @ MCS 13 + EHT160 @ MCS 13 | 0.39 | 1159.00 |

5.3.2. Bluetooth Power Consumption

Table 15: Bluetooth Power Consumption in Non-signalling Mode (Typ.; Unit: mA)

Condition	Transmitting Power	I_{VDD_IO}		I_{VBAT}	
		ANT0	ANT1	ANT0	ANT1
BR	16 dBm	0.38	0.36	94.46	86.04
EDR(π/4-DQPSK)	11.5 dBm	0.38	0.37	85.49	85.51
EDR (8-DPSK)	11.5 dBm	0.38	0.36	85.43	85.30
BLE (1 Mbps)	7 dBm	0.38	0.37	73.35	76.89
BLE (2 Mbps)	7 dBm	0.38	0.37	57.47	59.70

5.4. Digital I/O Characteristics

Table 16: VDD_IO I/O Requirements (Unit: V)

Parameter	Description	Min.	Max.
V_{IH}	High-level input voltage	$0.7 \times VDD\_IO$	$VDD\_IO + 0.3$
V_{IL}	Low-level input voltage	-0.3	$0.3 \times VDD\_IO$
V_{OH}	High-level output voltage	$VDD\_IO - 0.45$	VDD_IO
V_{OL}	Low-level output voltage	0	0.45

5.5. ESD Protection

Static electricity occurs naturally and it may damage the module. Therefore, applying proper ESD countermeasures and handling methods is imperative. For example, wear anti-static gloves during the development, production, assembly and testing of the module; add ESD protection components to the ESD sensitive interfaces and points in the product design.

Table 17: Electrostatic Discharge Characteristics (Unit: kV)

Model	Test Result	Standard
Human Body Model (HBM)	TBD	TBD
Charged Device Model (CDM)	TBD	TBD
Machine Model (MC)	TBD	TBD

5.6. Thermal Dissipation

The module offers the best performance when all internal IC chips are working within their operating temperatures. When the IC chip reaches or exceeds the maximum junction temperature, the module may still work but the performance and functions (such as RF output power, data rate, etc.) will be affected to a certain extent. Therefore, the thermal design should be maximally optimized to ensure all internal IC chips always work within the recommended operating temperature range.

The following principles for thermal consideration are provided for reference:

● Keep the module away from heat sources on your PCB, especially high-power components such as processor, power amplifier, and power supply.
● Maintain the integrity of the PCB copper layer and drill as many thermal vias as possible.
● Follow the principles below when the heatsink is necessary:
  – Do not place large size components in the area where the module is mounted on your PCB to reserve enough place for heatsink installation;
  – Attach the heatsink to the shielding cover of the module; In general, the base plate area of the heatsink should be larger than the module area to cover the module completely;
  – Choose the heatsink with adequate fins to dissipate heat;
  – Choose a TIM (Thermal Interface Material) with high thermal conductivity, good softness and good wettability and place it between the heatsink and the module;
  – Fasten the heatsink with four screws to ensure that it is in close contact with the module to prevent the heatsink from falling off during the drop, vibration test, or transportation.
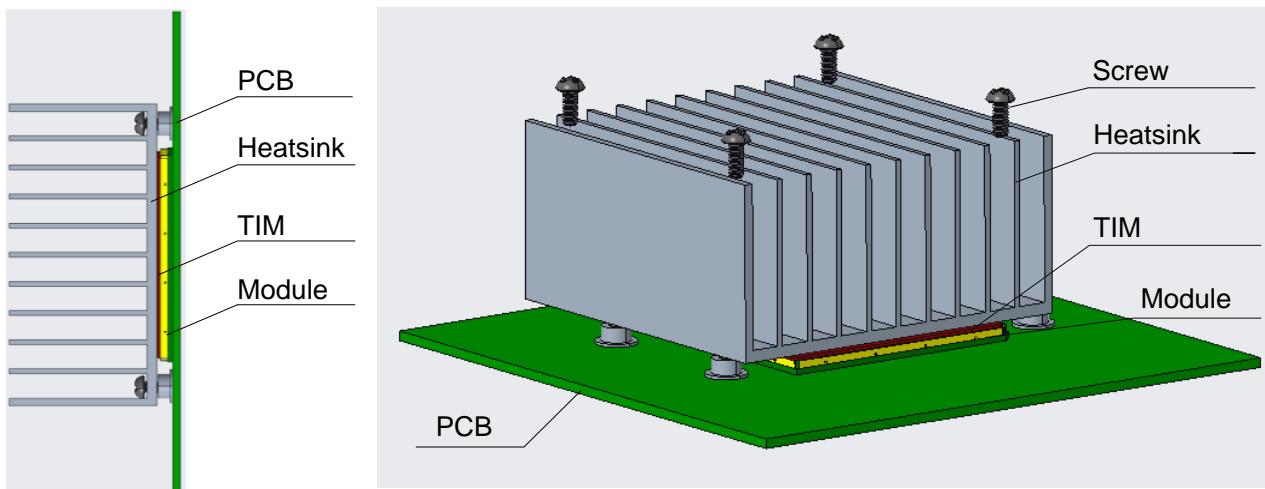
Figure 19: Placement and Fixing of the Heatsink

6 Mechanical Information

This chapter describes the mechanical dimensions of the module. All dimensions are measured in millimeter (mm), and the dimensional tolerances are ±0.2 mm unless otherwise specified.

6.1. Mechanical Dimensions
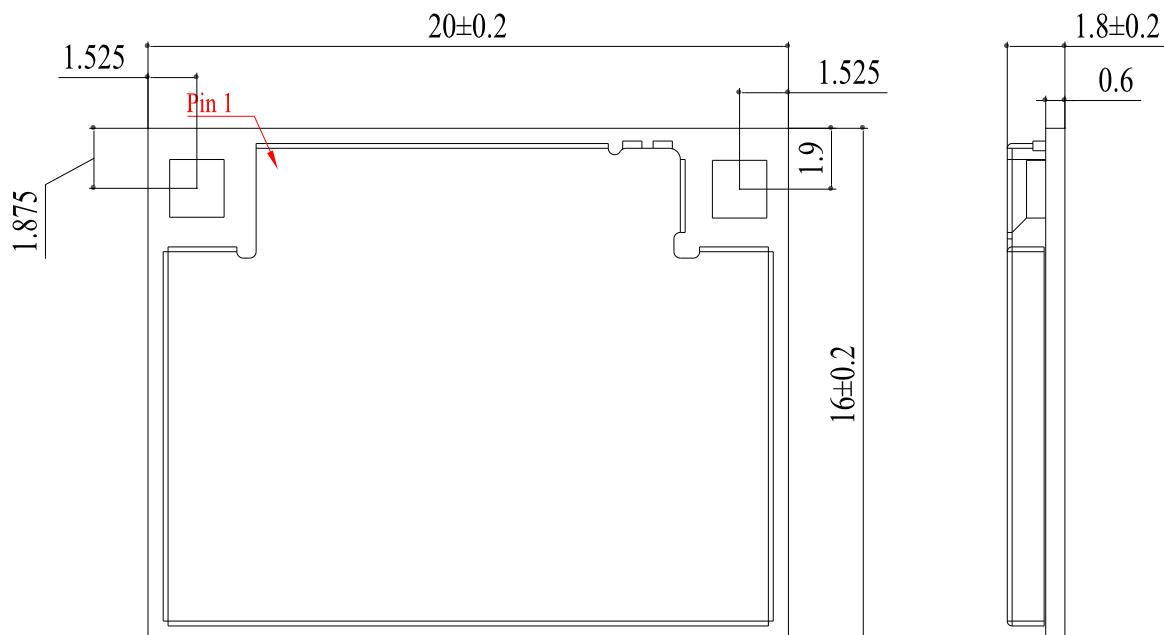
Figure 20: Top and Side Dimensions
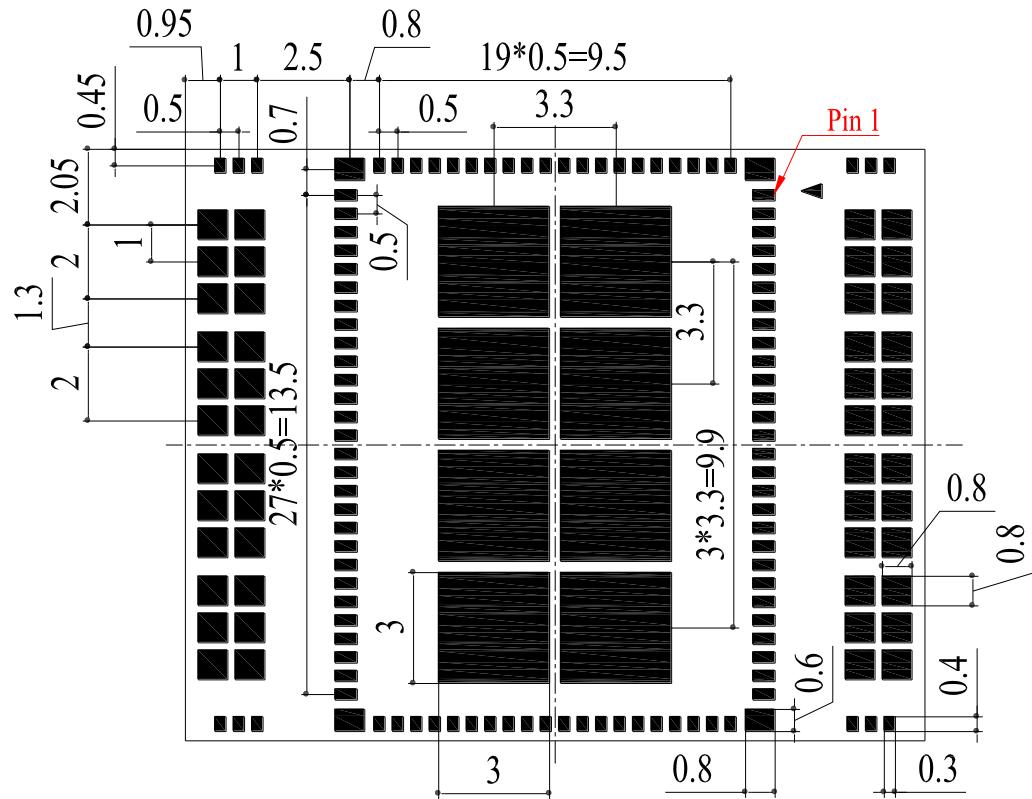
Figure 21: Bottom Dimensions (Bottom View)

> **NOTE**
>
> The package warpage level of the module refers to *JEITA ED-7306* standard.

6.2. Recommended Footprint
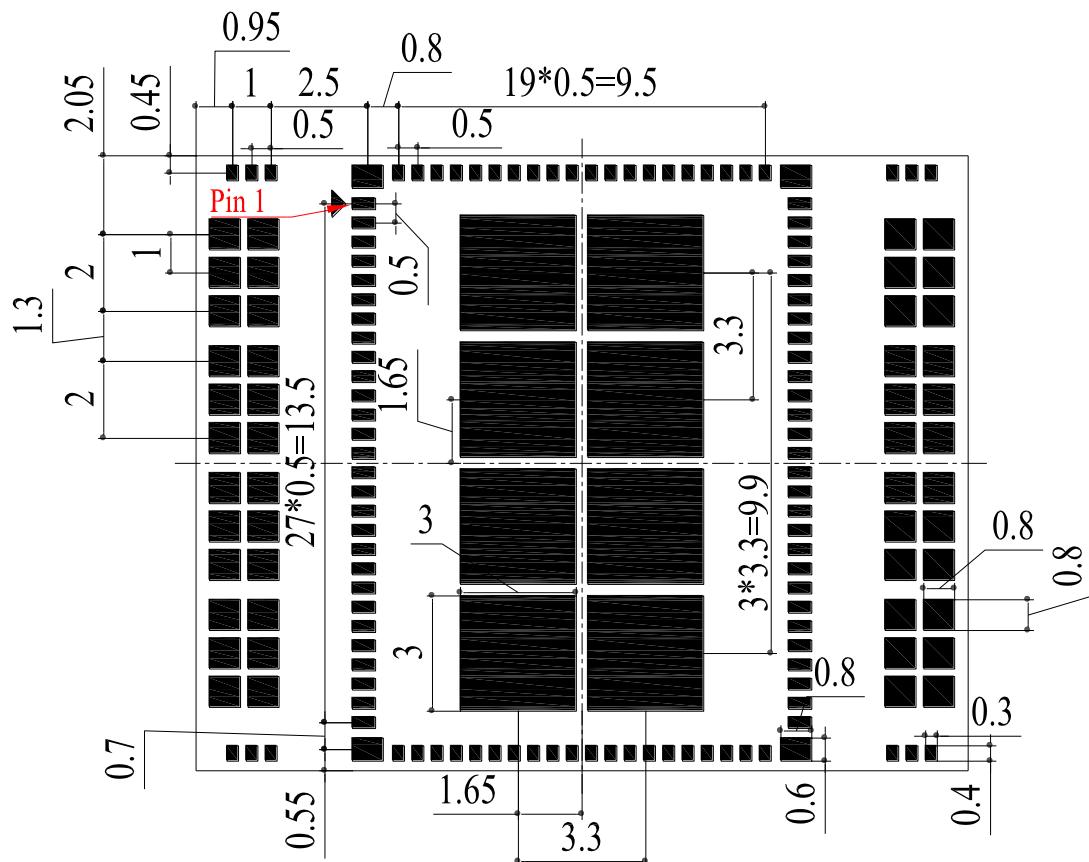
Figure 22: Recommended Footprint

NOTE

Keep at least 3 mm between the module and other components on the motherboard to improve soldering quality and maintenance convenience.

6.3. Top and Bottom Views
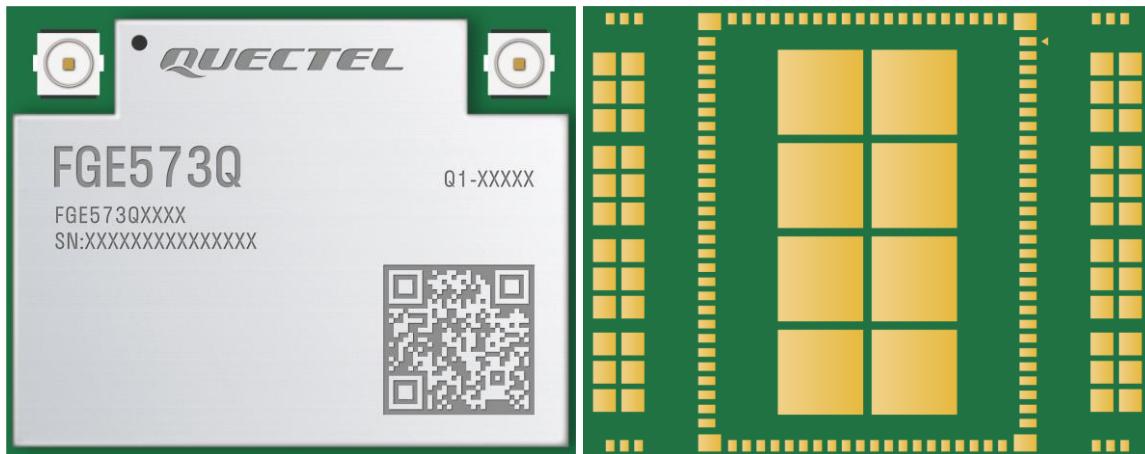
Figure 23: FGE573Q Top and Bottom Views
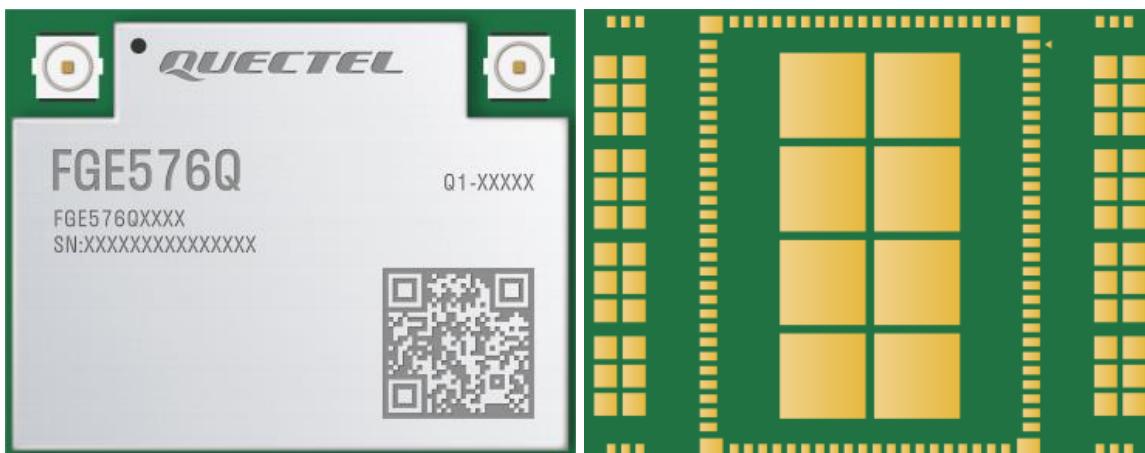
Figure 24: FGE576Q Top and Bottom Views

NOTE

Images above are for illustration purpose only and may differ from the actual module. For authentic appearance and label, please refer to the module received from Quectel.

7 Storage, Manufacturing and Packaging

7.1. Storage Conditions

The module is provided with vacuum-sealed packaging. MSL of the module is rated as 3. The storage requirements are shown below.

1. Recommended Storage Condition: the temperature should be 23 ±5 °C and the relative humidity should be 35–60 %.

2. Shelf life (in a vacuum-sealed packaging): 12 months in Recommended Storage Condition.

3. Floor life: 168 hours [4] in a factory where the temperature is 23 ±5 °C and relative humidity is below 60 %. After the vacuum-sealed packaging is removed, the module must be processed in reflow soldering or other high-temperature operations within 168 hours. Otherwise, the module should be stored in an environment where the relative humidity is less than 10 % (e.g., a dry cabinet).

4. The module should be pre-baked to avoid blistering, cracks and inner-layer separation in PCB under the following circumstances:

   ● The module is not stored in Recommended Storage Condition;
   ● Violation of the third requirement mentioned above;
   ● Vacuum-sealed packaging is broken, or the packaging has been removed for over 24 hours;
   ● Before module repairing.

5. If needed, the pre-baking should follow the requirements below:

   ● The module should be baked for 8 hours at 120 ±5 °C;
   ● The module must be soldered to PCB within 24 hours after the baking, otherwise it should be put in a dry environment such as in a dry cabinet.

NOTE

[4] This floor life is only applicable when the environment conforms to *IPC/JEDEC J-STD-033*. It is recommended to start the solder reflow process within 24 hours after the package is removed if the temperature and moisture do not conform to, or are not sure to conform to *IPC/JEDEC J-STD-033*. And do not unpack the modules in large quantities until they are ready for soldering.

---

1. To avoid blistering, layer separation and other soldering issues, extended exposure of the module to the air is forbidden.
2. Take out the module from the package and put it on high-temperature-resistant fixtures before baking. If shorter baking time is desired, see *IPC/JEDEC J-STD-033* for the baking procedure.
3. Pay attention to ESD protection, such as wearing anti-static gloves, when touching the modules.

7.2. Manufacturing and Soldering

Push the squeegee to apply the solder paste on the surface of stencil, thus making the paste fill the stencil openings and then penetrate to the PCB. Apply proper force on the squeegee to produce a clean stencil surface on a single pass. To guarantee module soldering quality, the thickness of stencil for the module is recommended to be 80 μm-120 μm. For more details, see *document [2]*.

The recommended peak reflow temperature should be 235–246 ºC, with 246 ºC as the absolute maximum reflow temperature. To avoid damage to the module caused by repeated heating, it is recommended that the module should be mounted only after reflow soldering for the other side of PCB has been completed. The recommended reflow soldering thermal profile (lead-free reflow soldering) and related parameters are shown below.
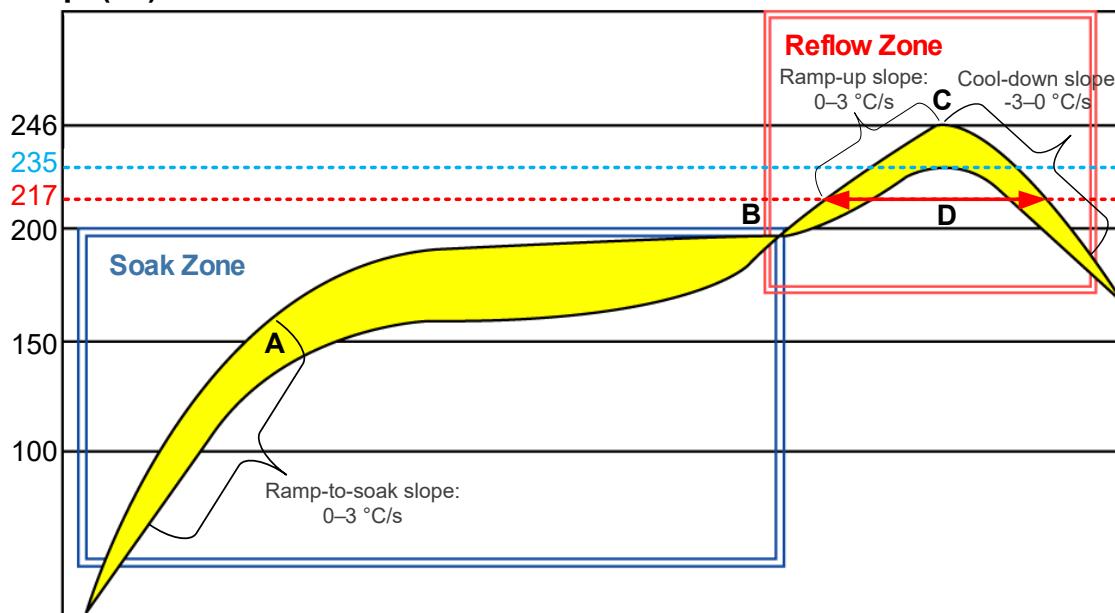

Figure 25: Recommended Reflow Soldering Thermal Profile

Table 18: Recommended Thermal Profile Parameters

Factor	Recommended Value
Soak Zone	
Ramp-to-soak slope	0–3 °C/s
Soak time (between A and B: 150 °C and 200 °C)	70–120 s
Reflow Zone	
Ramp-up slope	0–3 °C/s
Reflow time (D: over 217 °C)	40–70 s
Max. temperature	235–246 °C
Cool-down slope	-3–0 °C/s
Reflow Cycle	
Max. reflow cycle	1

NOTE

1. The above profile parameter requirements are for the measured temperature of the solder joints. Both the hottest and coldest spots of solder joints on the PCB should meet the above requirements.
2. During manufacturing and soldering, or any other processes that may contact the module directly, NEVER wipe the module's shielding can with organic solvents, such as acetone, ethyl alcohol, isopropyl alcohol, trichloroethylene, etc. Otherwise, the shielding can may become rusted.
3. The shielding can for the module is made of Cupro-Nickel base material. It is tested that after 12 hours' Neutral Salt Spray test, the laser engraved label information on the shielding can is still clearly identifiable and the QR code is still readable, although white rust may be found.
4. If a conformal coating is necessary for the module, do NOT use any coating material that may chemically react with the PCB or shielding cover, and prevent the coating material from flowing into the module.
5. Avoid using ultrasonic technology for module cleaning since it can damage crystals inside the module.
6. Due to the complexity of the SMT process, please contact Quectel Technical Support in advance for any situation that you are not sure about, or any process (e.g. selective soldering, ultrasonic soldering) that is not mentioned in *document [2]*.

7.3. Packaging Specification

This chapter outlines the key packaging parameters and processes. All figures below are for reference purposes only, as the actual appearance and structure of packaging materials may vary in delivery.

The modules are packed in a tape and reel packaging as specified in the sub-chapters below.

7.3.1. Carrier Tape

Carrier tape dimensions are illustrated in the following figure and table:
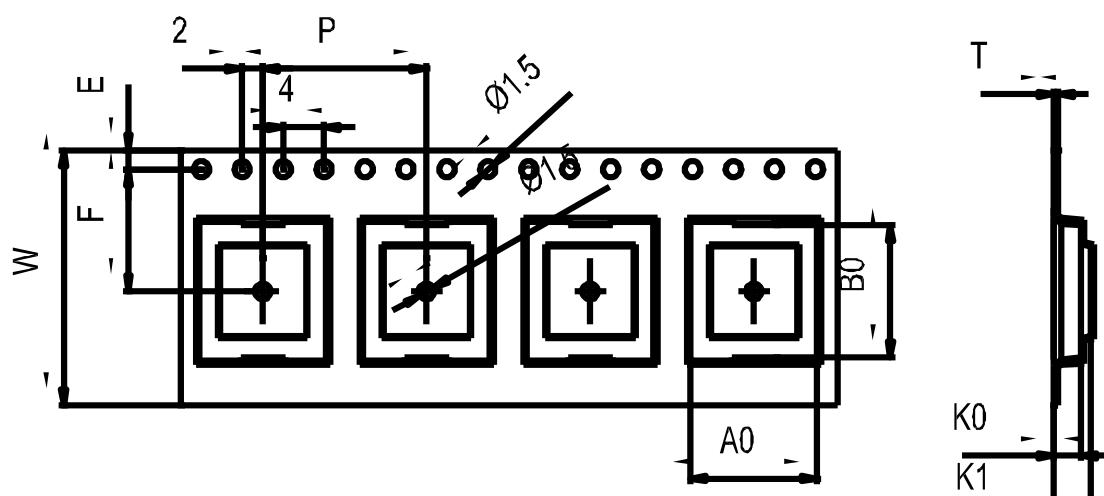
Figure 26: Carrier Tape Dimension Drawing (Unit: mm)

Table 19: Carrier Tape Dimension Table (Unit: mm)

W	P	T	A0	B0	K0	K1	F	E
44	32	0.4	20.4	16.4	2.3	6.8	20.2	1.75

7.3.2. Plastic Reel

Plastic reel dimensions are illustrated in the following figure and table:
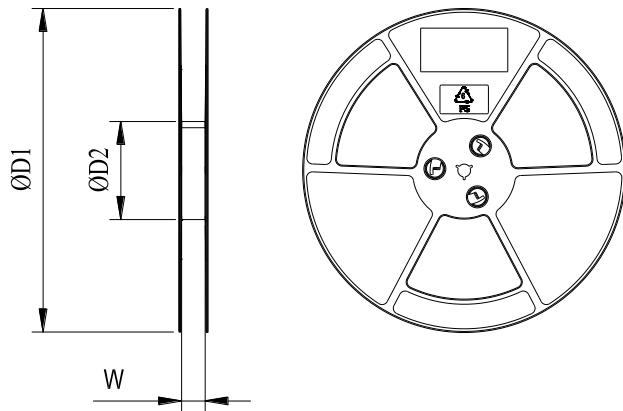
Figure 27: Plastic Reel Dimension Drawing

Table 20: Plastic Reel Dimension Table (Unit: mm)

øD1	øD2	W
330	100	44.5

7.3.3. Mounting Direction
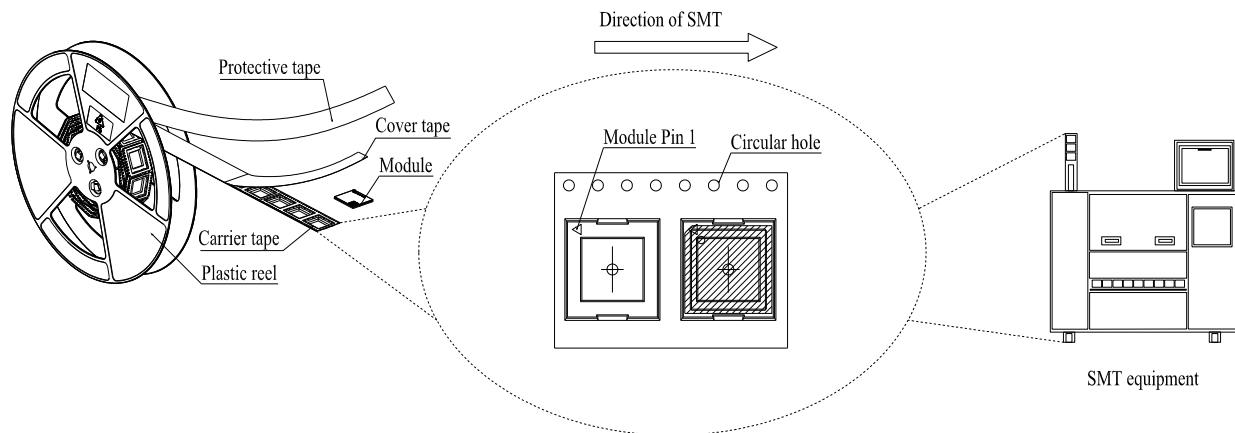
Figure 28: Mounting Direction

7.3.4. Packaging Process
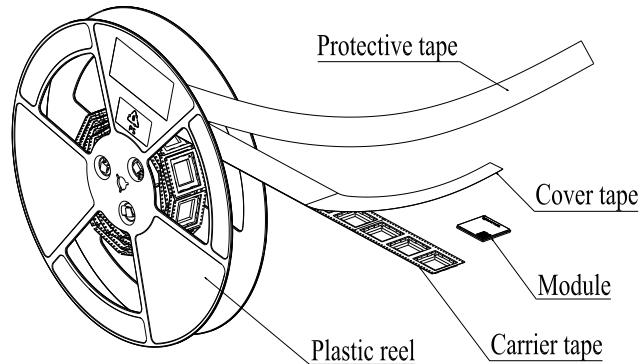
Place the modules onto the carrier tape cavity and cover them securely with cover tape. Wind the heat-sealed carrier tape onto a plastic reel and apply a protective tape for additional protection. 1 plastic reel can pack 250 modules.

Place the packaged plastic reel, humidity indicator card and desiccant bag into a vacuum bag, and vacuumize it.
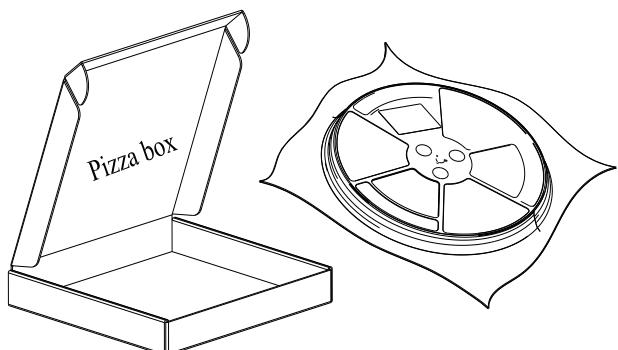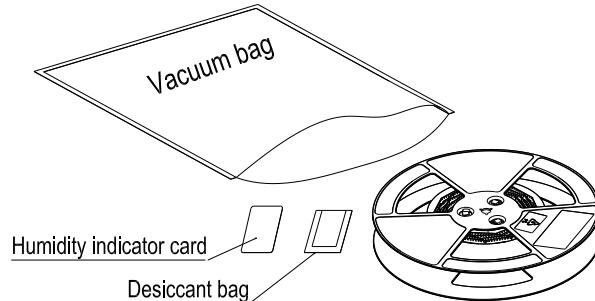
Place the vacuum-packed plastic reel into a pizza box.

Place the 4 packaged pizza boxes into 1 carton and seal it. 1 carton can pack 1000 modules.
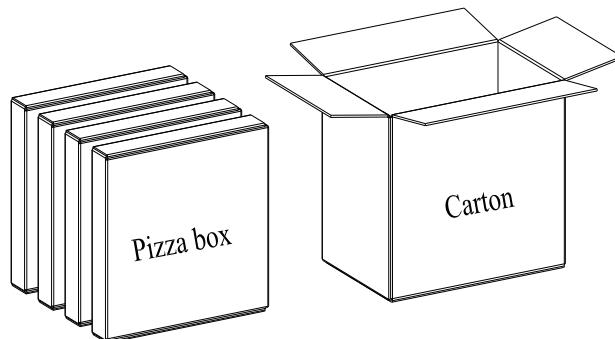
Figure 29: Packaging Process

8 Appendix References

Table 21: Related Documents

Document Name
[1] Quectel_RK3568-WF_EVB_User_Guide
[2] Quectel_Module_SMT_Application_Note

Table 22: Terms and Abbreviations

Abbreviation	Description
AP	Access Point
BLE	Bluetooth Low Energy
BPF	Band Pass Filter
BPSK	Binary Phase Shift Keying
BR	Basic Rate
CCK	Complementary Code Keying
CTS	Clear To Send
DBPSK	Differential Binary Phase Shift Keying
DBS	Dual Band Simultaneous
DPSK	Differential Phase Shift Keying
DQPSK	Differential Quadrature Phase Shift Keying
EDR	Enhanced Data Rate
EHT	Extremely High Throughput

ESD	Electrostatic Discharge
EVB	Evaluation Board
EVM	Error Vector Magnitude
FEM	Front-End Module
Gbps	Gigabits Per Second
GFSK	Gauss frequency Shift Keying
GND	Ground
HCI	Host Controller Interface
HE	High Efficiency
HT	High Throughput
I/O	Input/Output
IC	Integrated Circuit
IEEE	Institute of Electrical and Electronics Engineers
LAA	License Assisted Access
LCC	Leadless chip carrier
LGA	Land Grid Array
LNA	Low-Noise Amplifier
LTE	Long Term Evolution
MAC	Media Access Control
Mbps	Megabits per second
MCS	Modulation and Coding Scheme
MLO	Multi-link Operation
MSL	Moisture Sensitivity Levels
MU-MIMO	Multi-User Multiple-Input Multiple-Output
PCB	Printed Circuit Board

PCIe	Peripheral Component Interconnect Express
PCM	Pulse Code Modulation
PHY	Physical
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
RoHS	Restriction of Hazardous Substances
RTS	Request To Send
Rx	Receive
RXD	Receive Data
SDR	Software-Defined Radio
SMD	Surface Mount Device
SMT	Surface Mount Technology
STA	Station
TBD	To Be Determined
TVS	Transient Voltage Suppressor
Tx	Transmit
TXD	Transmit Data
UART	Universal Asynchronous Receiver/Transmitter
VBAT	Voltage at Battery (Pin)
VHT	Very High Throughput
V_{IH}	High-level Input Voltage
V_{IL}	Low-level Input Voltage
Vmax	Maximum Voltage
Vmin	Minimum Voltage

Vnom	Nominal Voltage
V_{OH}	High-level Output Voltage
V_{OL}	Low-level Output Voltage
VSWR	Voltage Standing Wave Ratio
WPA	Wi-Fi Protected Access

FCC Statement

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

The device must not be co-located or operating in conjunction with any other antenna or transmitter. 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.

FCC Radiation Exposure Statement

This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Does not comply with the use restrictions of the product:

Portable devices used close with human's body (within 20cm), Like Cell phone, Notebook etc.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

FCC Part 15 Subpart C 15.247 & 15.209 &15.407.

2.3 Specific operational use conditions

The module can be used for mobile applications with a maximum 0.2dBi antenna. The host manufacturer installing this module into their product must ensure that the final compos it product

complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module The end user manual shall include all required regulatory information/warning as show in this manual.

2.4 Limited module procedures

Not applicable The module is a Single module and complies with the requirement of FCC Part 15 212.

2.5 Trace antenna designs

Not applicable The module has its own antenna, and doesn't need a hosts printed board micro strip trace antenna etc.

2.6 RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users" body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application The FCC ID of the module cannot be used on the final product In these circumstances, the host manufacturer will be responsible for reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

2.7 Antennas

Antenna Specification are as follows:

Type: External Antenna

Gain: 2.4G:0.2dBi;5G:-0.7dBi;

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna; The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a "unique" antenna coupler.

As long as the conditions above are met, further transmitter test will not be required However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc).

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: XMR2024FGE576Q" with their finished product.

2.9 Information on test modes and additional testing requirements

Host manufacturer must perform test of radiated & conducted emission and spurious emission, e.t.c according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product. Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15 209 &15.407 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Federal Communication Commission Statement (FCC, U S)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules These limits are designed to provide reasonable protection against harmful interference in a residential installation This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications However, there is no guarantee that interference will not occur in a particular installation If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna

- Increase the separation between the equipment and receiver

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

- Consult the dealer or an experienced radio/TV technician for help

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.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTES

Co-location warning:

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

OEM integration instructions:

This device is intended only for OEM integrators under the following conditions:

The transmitter module may not be co-located with any other transmitter or antenna The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance

requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End product labeling:

The final end product must be labeled in a visible area with the following: "Contains Transmitter Module **FCC ID: XMR2024FGE576Q**"

Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module The end user manual shall include all required regulatory information/warning as show in this manual.

IC Statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

The device is compliance with RF field strength limits, users can obtain Canadian information on RF exposure and compliance.

IC Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

The user manual for local area network devices shall contain instructions related to the restrictions

mentioned in the above sections, namely that:

(i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(ii) the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and

(iii) the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

(i)Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

(ii) le gain d'antenne maximal autorisé pour les appareils dans les bandes 5250-5350 MHz et 5470-5725 MHz doivent respecter le pire limiter; et

(iii) le gain d'antenne maximal autorisé pour les appareils dans la bande 5725-5825 MHz doivent respecter le pire limites spécifiées pour le point-à-point et l'exploitation non point à point, le cas échéant.

Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.