

AB35TA

Hardware Design

Automotive Bluetooth Products

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Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local offices. For more information, please visit:

<http://www.quectel.com/support/sales.htm>.

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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. 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 fuelling 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

This document is a preliminary version and it is highly likely that pin or interface definitions, frequency bands, functionality, features, design, or other module specifications (if any) may be modified. Some parameters have been validated, while others are still under review. Revised or additional information will be provided in subsequent official releases. This version is intended for temporary use only. In case of any discrepancies between the preliminary and official versions, the latest version takes precedence. The revision history is as follows:

Revision History

Version	Date	Author	Description
-	2025-01-22	Bryan Li/ Lola Zhang	Creation of the document
1.0.0	2025-01-22	Bryan Li/ Lola Zhang	Preliminary

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1 Introduction

This document describes the AB35TA features, performance, and air interfaces and hardware interfaces connected to your applications. The document provides a quick insight into interface specifications, RF performance, electrical and mechanical specifications, and other module information as well.

2 Product Overview

AB35TA is a low-power, cost-effective Bluetooth module supporting Bluetooth 5.4 protocols. It features built-in power management unit, power amplifier, low noise amplifier and RF transceiver switch. The module has multiple interfaces including UART and PCM for various applications.

The module is an SMD module with compact packaging.

Table 1: Basic Information

Item	Description
Packaging type	LGA
Pin counts	48
Dimensions	(17.0 +0.3/-0.15) mm × (17.0 +0.3/-0.15) mm × (2.7 ±0.2) mm
Weight	TBD

2.1. Key Features

Table 2: Key Features

Basic Information	
Protocols and Standard	- Bluetooth protocol: Bluetooth 5.4 - All hardware components fully comply with EU RoHS directive
Supply Voltage	VBAT Power Supply: 1.71–1.89 V - Typ.: 1.8 V VDD_IO Power Supply: 1.62–1.89 V - Typ.: 1.8 V

Temperature Ranges	● Normal operating temperature ¹: -40 to 85 °C ● Storage temperature: -40 to 95 °C
EVB	V2X&5G EVB ²
RF Antenna Interface	
Bluetooth Antenna Interface	● ANT_BT ● 50 Ω characteristic impedance
Application Interfaces	
Bluetooth Application Interfaces	UART, PCM

¹ Within this range, the module's indicators comply with Bluetooth specification requirements.

² Quectel supplies a V2X&5G EVB with accessories to develop and test the module. For more details, see **document [1]**.

3 RF Specifications

3.1. Bluetooth Performances

Table 3: Bluetooth Performances

Operating Frequency				
2.400–2.4835 GHz				
Modulation				
GFSK, 8-DPSK, $\pi/4$ -DQPSK				
Operating Mode				
- Classic Bluetooth (BR + EDR) - BLE				
Condition (VBAT = 1.8 V; VDD_IO = 1.8 V; Temp.: 25 °C)	Transmitting Power (Unit: dBm; Tolerance: ± 4 dB)		Receiver Sensitivity (Unit: dBm)	
	Typ.	Max. (Worst Case)	Typ.	Min. (Best Case)
BR (GFSK)	6	-70	-89	-92
EDR ($\pi/4$ -DQPSK)	3	-70	-90	-91
EDR (8-DPSK)	3	-70	-84	-85
BLE (1 Mbps)	6	-70	-95	-97
BLE (2 Mbps)	6	-70	-92	-94
BLE (S = 2)	6	-75	-97	-99
BLE (S = 8)	6	-82	-101	-103

4 Application Interface

4.1. Pin Assignment

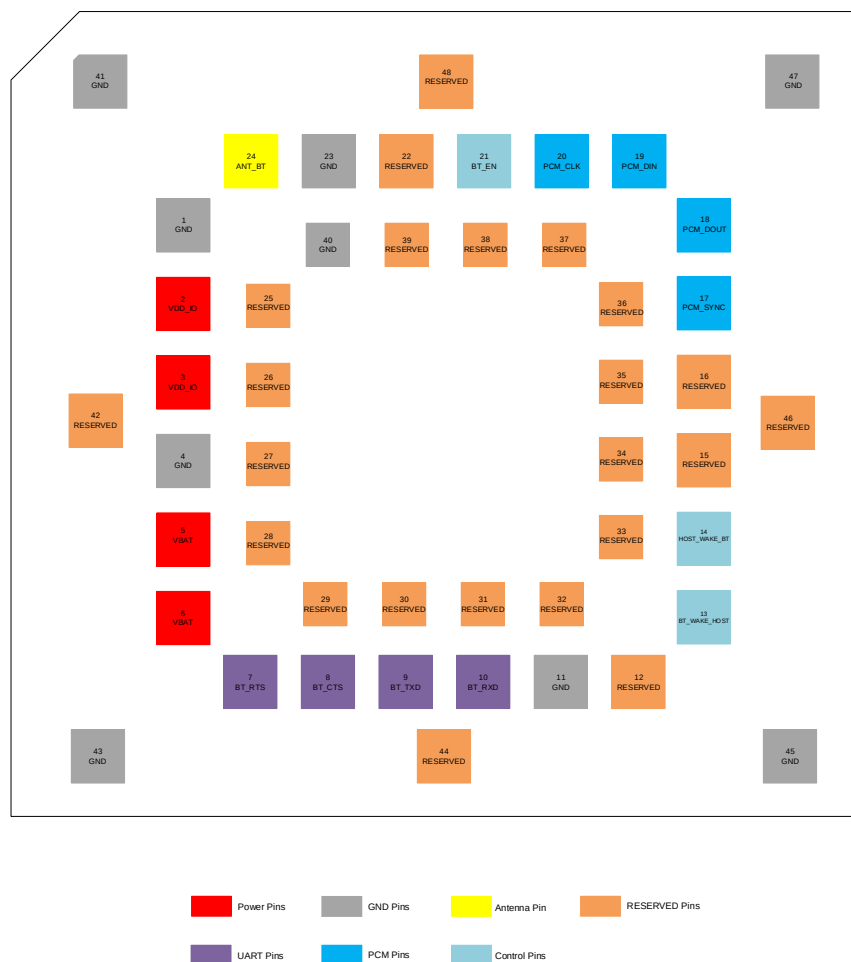


Figure 1: Pin Assignment (Top View)

NOTE

1. Keep all RESERVED pins and unused pins unconnected.
2. All GND pins should be connected to ground.
3. Ensure that there is no current sink on the module's pins before the module turns on.

4.2. Pin Definitions

Table 4: Parameter Definition

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

DC characteristics include power domain and rated current.

Table 5: Pin Description

Power Supply					
Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
VBAT	5, 6	PI	Power supply for the module	Vmin = 1.71 V Vnom = 1.8 V Vmax = 1.89 V	It must be provided with sufficient current up to 130 mA.
VDD_IO	2, 3	PI	Power supply for the module's I/O pins	Vmin = 1.62 V Vnom = 1.8 V Vmax = 1.89 V	It must be provided with sufficient current up to 20 mA.
GND	1, 4, 11, 23, 40, 41, 43, 45, 47				Connect these pins to ground.
Bluetooth Application Interfaces					
Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment

BT_EN	21	DI	Bluetooth enable control	VDD_IO	Active high. There is a 100 kΩ pull-down resistor inside the module.
HOST_WAKE_BT	13	DI	Host wakes up Bluetooth		
BT_WAKE_HOST	14	DO	Bluetooth wakes up host		
PCM_DIN	19	DI	PCM data input		
PCM_SYNC	17	DIO	PCM data frame sync		
PCM_CLK	20	DIO	PCM clock		
PCM_DOUT	18	DO	PCM data output		
BT_TXD	9	DO	Bluetooth UART transmit		
BT_RXD	10	DI	Bluetooth UART receive		
BT_RTS	7	DO	Request to send signal from the module		
BT_CTS	8	DI	Clear to send signal to the module		

RF Antenna Interface

Pin Name	Pin No.	I/O	Description	DC Characteristics	Comment
ANT_BT	24	AIO	Bluetooth antenna interface		50 Ω characteristic impedance.

RESERVED Pins

Pin Name	Pin No.	Comment
RESERVED	12, 15, 16, 22, 25-39, 42, 44, 46, 48	Keep these pins open.

NOTE

To reduce the probability of module damage and extend module service life, do not power up and down frequently.

4.3. Reference Design for Power Supply

The module is powered by VBAT, VDD_IO, and it is recommended to use a power supply chip with sufficient current of 150 mA at least. For better power supply performance, it is recommended to parallel a 22 μ F decoupling capacitor, and two filter capacitors of 100 nF and 220 nF near the module's VBAT and VDD_IO pins. C4, C8 are reserved for debugging and are not mounted by default. In addition, it is recommended to add TVS near the VBAT and VDD_IO to improve the surge voltage bearing capacity of the module. As per design rule, the longer trace is, the wider it should be.

The reference design for the power supply is shown below:

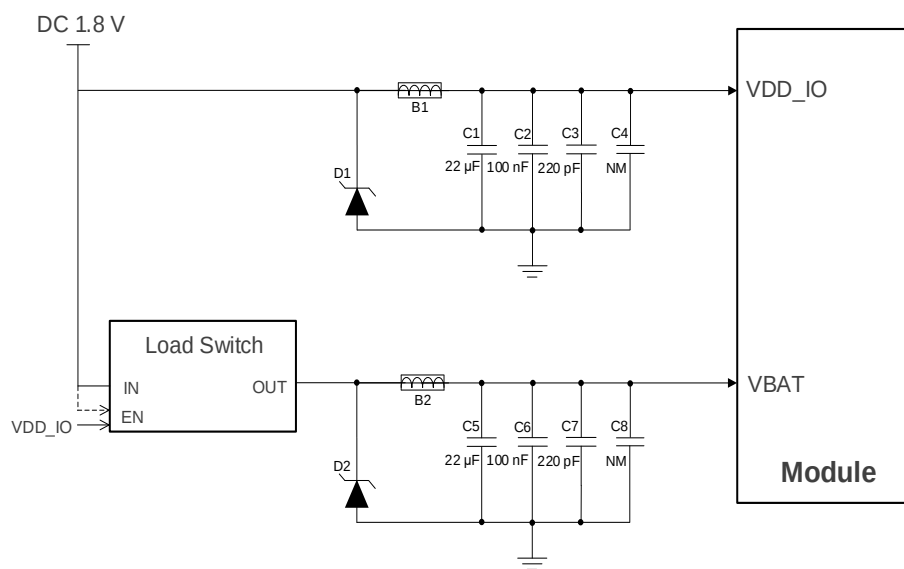


Figure 2: Reference Design of Power Supply

The power-up timing of the module is shown below:

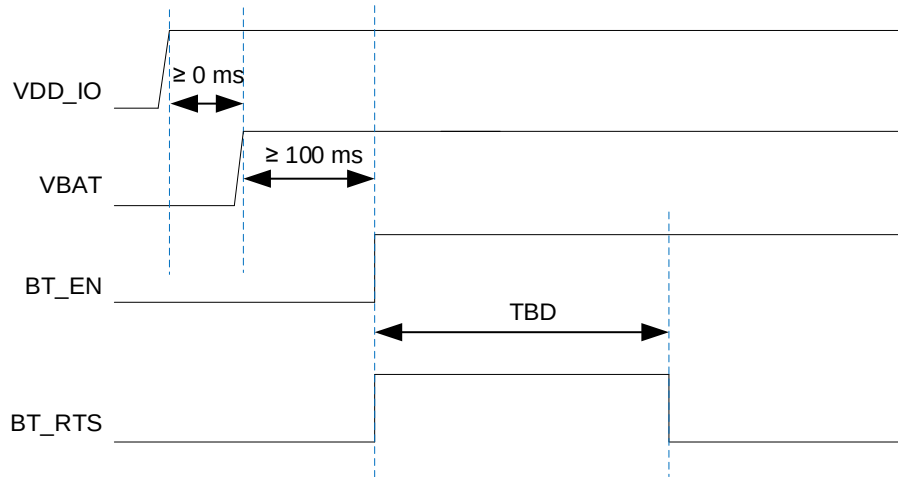


Figure 3: Turn-on Timing

NOTE

VDD_IO should be powered up before VBAT. VBAT should not be powered up first or be held high before VDD_IO is high.

4.4. Bluetooth Application Interfaces

The module supports in-band wake-up mode by default, it also supports GPIO wake-up mode. It is recommended to reserve a connection to the host.

The Bluetooth application interfaces connection between the module and the host is shown below:

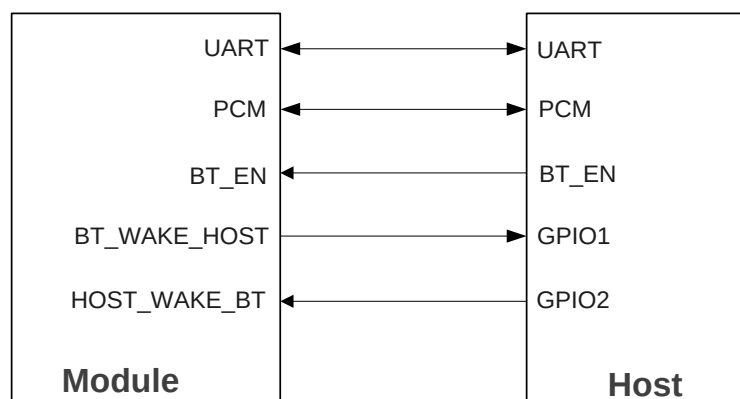


Figure 4: Bluetooth Application Interfaces Connection

NOTE

The host's GPIO1 connected to the module's BT_WAKE_HOST must be interruptible.

4.4.1. BT_EN

Bluetooth function of the module is controlled by BT_EN. When BT_EN is at a high level, Bluetooth function will be enabled.

4.4.2. PCM Interface

The module has 1 PCM interface for Bluetooth audio function, and the PCM interface connection between the module and the host is shown below:

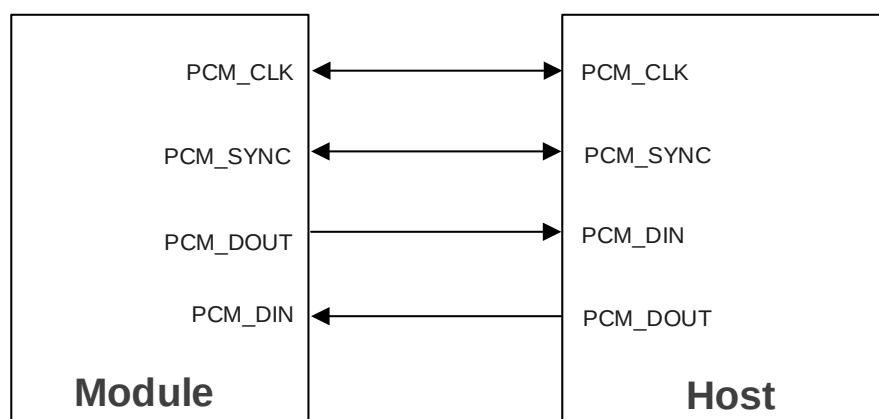


Figure 5: PCM Interface Connection

The PCM timing and relevant parameters are shown below:

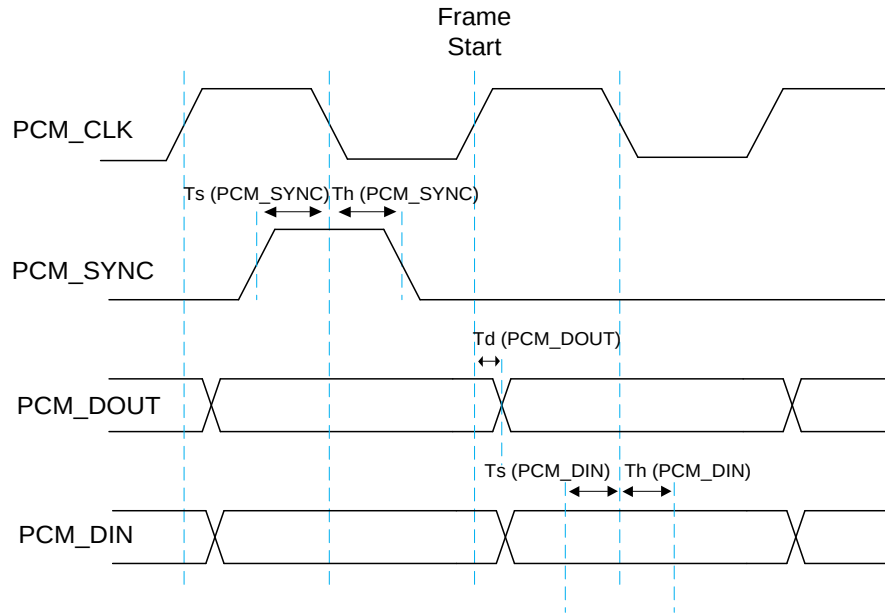


Figure 6: PCM Timing

Table 6: PCM Timing Parameters

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

4.4.3. UART Interface

The module supports Bluetooth HCI UART interface. The UART interface complies with the *Bluetooth Core Specification Version 5.0* and supports hardware flow control. It can be used for data transmission with a host and supports baud rates up to 3.2 Mbps.

The UART interface connection between the module and the host is shown below:

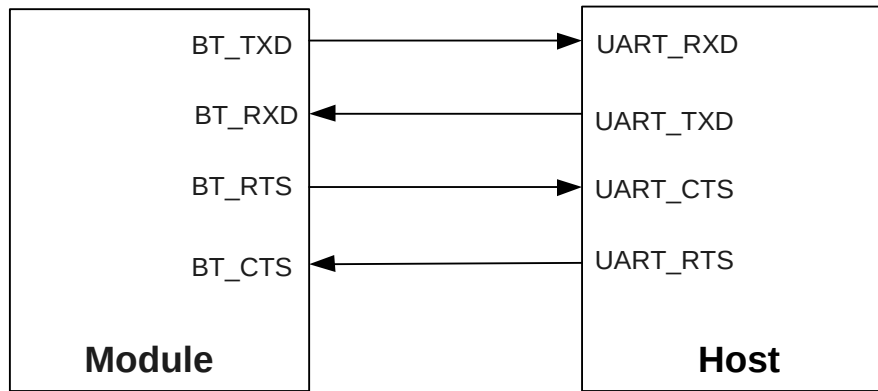


Figure 7: UART Interface Connection

NOTE

To increase the stability of UART communication, it is recommended to add UART hardware flow control design.

The HCI UART transmitting timing and relevant parameters are shown below:

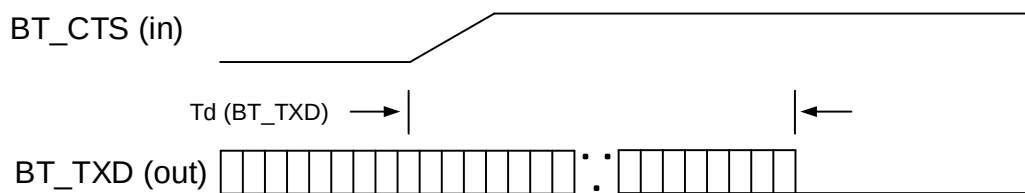


Figure 8: HCI UART Transmitting Control Timing

Table 7: HCI UART Transmitting Control Timing Parameters

Parameter	Description	Min.	Typ.	Max.	Unit
Td (BT_TXD)	Delay time from BT_CTS to BT_TXD stop bit	-	-	1	byte

The HCI UART receiving timing and relevant parameters are shown below:

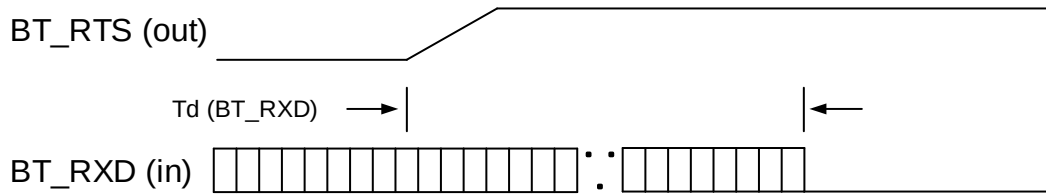


Figure 9: HCI UART Receiving Control Timing

Table 8: HCI UART Receiving Control Timing Parameters

Parameter	Description	Min.	Typ.	Max.	Unit
Td (BT_RXD)	Delay time from BT_RTS to BT_RXD stop bit	16	-	-	byte

4.5. Bootstrap Pins

Bootstrap pins are essential for operational boot-up. If the pin level state is incorrect at start-up, the module will go into an abnormal operational mode. Bootstrap pins are sampled within 100 ms after the first enable pin BT_EN is pulled up, and the sampled bootstrap level will be latched, after which the pins are used as the defined function pins.

Table 9: Bootstrap Pins

Pin Name	Pin No.	Resistor Inside the Module	Comment
PCM_DOUT	18	10 kΩ, pull-up	Please ensure that it is high during boot-up, and it is not recommended to add a pull-down resistor or connect it to GND outside the module.
BT_TXD	9	10 kΩ, pull-up	Please ensure that it is high during boot-up, and it is not recommended to add a pull-down resistor or connect it to GND outside the module.

NOTE

To avoid affecting the level status of Bootstrap pins, if they are connected to the host, level-shifting, A2B or other chips, please pay attention to the default status of the host or chip pins.

4.6. RF Antenna Interface

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. Reference Design

The circuit of RF antenna interface is shown below. For better RF performance, it is recommended to reserve a dual L-type circuit and a 100 pF DC-blocking capacitor. The reserved matching components (C1, C2, R1, D1) should be placed as close to the antenna as possible and mounted or not based on the actual situation. By default, ESD protection components are mounted. C1 and C2 are not mounted, and only a 0 Ω resistor is mounted at R1.

The following reference design takes ANT_BT as an example, and the reference designs of other antenna interfaces are the same.

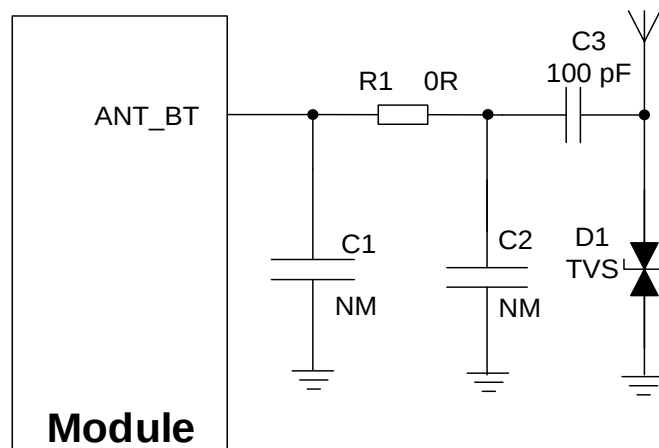


Figure 10: Reference Design of Antenna Interface (ANT_BT)

NOTE

1. A ESD protection component needs to be added close to the antenna to effectively prevent static electricity. Junction capacitance of ESD protection component on the antenna interface is recommended to be 0.05 pF.
2. C3 is used for DC-blocking and the capacitance value is recommended to be 100 pF.

4.6.2. Requirements for Antenna Design

Table 10: Requirements for Antenna Design

Parameter	Requirements ³
Frequency Range (GHz)	● 2.4 GHz: 2.400–2.4835 GHz
Cable Insertion Loss (dB)	< 1
VSWR	≤ 2 (Typ.)
Gain (dBi)	1 (Typ.)
Max. Input Power (W)	50
Input Impedance (Ω)	50
Polarization	Vertical polarization

NOTE

1. Antenna isolation:
 - > 20 dB @ above 1000 MHz;
 - > 15 dB @ 600–1000 MHz;
 - > 10 dB @ 400–600 MHz.
2. The isolation between each antenna traces on PCB is recommended to be over 75 dB.

4.6.3. RF Routing Guidelines

For user's PCB, the characteristic impedance of all RF traces should be controlled as 50 Ω . The impedance of the RF traces is usually determined by the trace width (W), the materials' dielectric constant, the height from the reference ground to the signal layer (H), and the spacing between the RF traces and the ground (S). Microstrip or coplanar waveguide is typically used in RF layout to control characteristic impedance. The following are reference designs of microstrip or coplanar waveguide with different PCB structures.

³ For more information about RF characteristics, see **Chapter 3**.

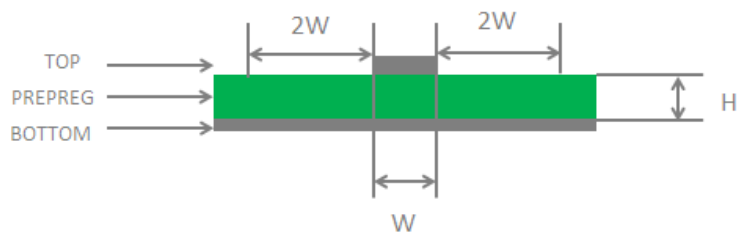


Figure 11: Microstrip Design on a 2-layer PCB

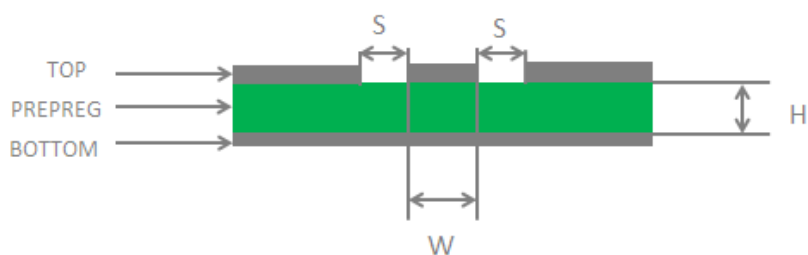


Figure 12: Coplanar Waveguide Design on a 2-layer PCB

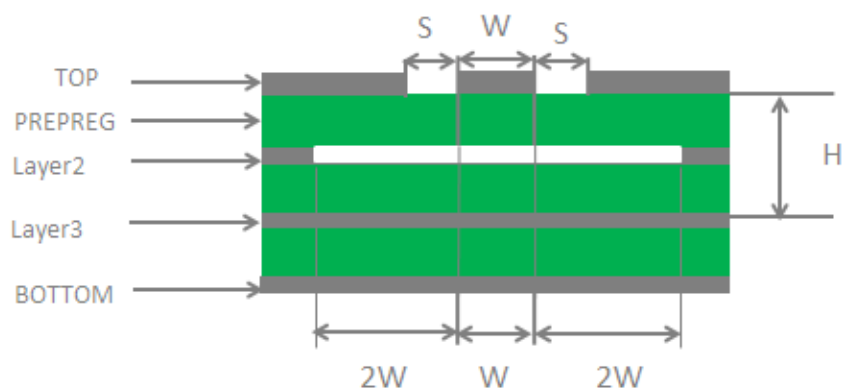


Figure 13: Coplanar Waveguide Design on a 4-layer PCB (Layer 3 as Reference Ground)

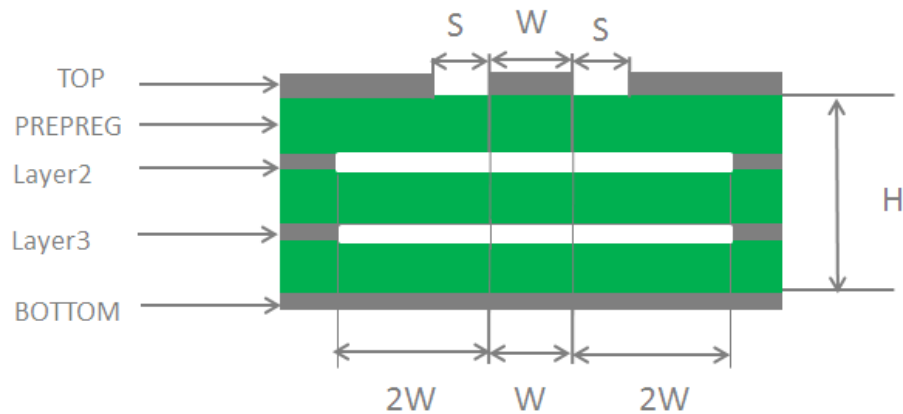


Figure 14: Coplanar Waveguide Design on a 4-layer PCB (Layer 4 as Reference Ground)

To ensure RF performance and reliability, follow the principles below in RF layout design:

- Use an impedance simulation tool to accurately control the characteristic impedance of RF traces to $50\ \Omega$.
- The GND pins adjacent to RF pins should not be designed as thermal relief pads, and should be fully connected to ground.
- The distance between the RF pins and the RF connector should be as short as possible and all the right-angle traces should be changed to curved ones. The recommended trace angle is 135° .
- There should be clearance under the signal pin of the antenna connector or solder joint.
- The reference ground of RF traces should be complete. Meanwhile, adding some ground vias around RF traces and the reference ground could help to improve RF performance. The distance between the ground vias and RF traces should be at least twice the width of RF signal traces ($2 \times W$).
- Keep RF traces away from interference sources (such as DC-DC, (U)SIM/USB/SDIO high frequency digital signals, display signals, and clock signals), and avoid intersection and paralleling between traces on adjacent layers.

For more details about RF layout, see **document [2]**.

4.6.4. RF Connector Recommendation

If RF connector is used for antenna connection, it is recommended to use the HFM connector provided by Rosenberger.

HFM - Products

Products

- HFM Cable plugs and jacks
single, double, quad, quint
straight and right angle
Cable diameter: 1.2 mm; 2.9 mm; 3.6 mm
- HFM PCB connectors
single, double, quad, quint
- HFM Cable connectors waterproof
under development

Features

- Frequency up to 15 GHz
- High data rates up to 20 Gbit/s
- Optimized used of space
- Saving up of installation space up to 80%
- Cost optimized

Figure 15: HFM Connector

For more details, visit <https://www.rosenbergerap.com>.

5 Electrical Characteristics and Reliability

5.1. Absolute Maximum Ratings

Table 11: Absolute Maximum Ratings (Unit: V)

Parameter	Min.	Max.
VBAT	-0.5	1.98
VDD_IO	-0.5	1.98

NOTE

Exceeding the conditions of use as shown above may cause permanent damage to the module.

5.2. Power Supply Ratings

Table 12: Module's Power Supply Ratings (Unit: V)

Parameter	Description	Condition	Min.	Typ.	Max.
VBAT	Power supply for the module	The actual input voltages must be kept between the minimum and maximum values.	1.71	1.8	1.89
VDD_IO	Power supply for the module's I/O pins	-	1.62	1.8	1.89

5.3. Power Consumption

Table 13: Bluetooth Power Consumption in Non-signaling Mode (Unit: mA)

Condition	I _{VDD_IO} (AVG)	I _{VBAT} (AVG)
BR (GFSK) @ {TBD} dBm	TBD	TBD
EDR ($\pi/4$ -DQPSK) @ {TBD} dBm	TBD	TBD
EDR (8-DPSK) @ {TBD} dBm	TBD	TBD
BLE (1 Mbps) @ {TBD} dBm	TBD	TBD
BLE (2 Mbps) @ {TBD} dBm	TBD	TBD
BLE (S = 2) @ {TBD} dBm	TBD	TBD
BLE (S = 8) @ {TBD} dBm	TBD	TBD

NOTE

1. The above power consumption data are tested under 50 Ω impedance.
2. Test conditions: ambient temperature 25 °C, and typical power domain 1.8 V.
3. The above power consumption data are the typical values for your reference only. Actual values may vary among different modules due to differences in internal components, software versions and test ambient temperatures. For more details, please contact Quectel Technical Support.

5.4. Digital I/O Characteristics

Table 14: VDD_IO I/O Requirements-(Unit: V)

Parameter	Description	Min.	Max.
V _{IH}	High-level input voltage	1.32	1.98
V _{IL}	Low-level input voltage	-0.3	0.45
V _{OH}	High-level output voltage	1.40	1.98
V _{OL}	Low-level output voltage	1.17	1.98

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 15: ESD Characteristics (Temperature: 25–30 °C, Humidity: 40 ±5 %; Unit: kV)

Tested Interfaces	Contact Discharge	Air Discharge
VABT	8	12
VDD_IO	8	12
GND	8	12
Antenna	6	10

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

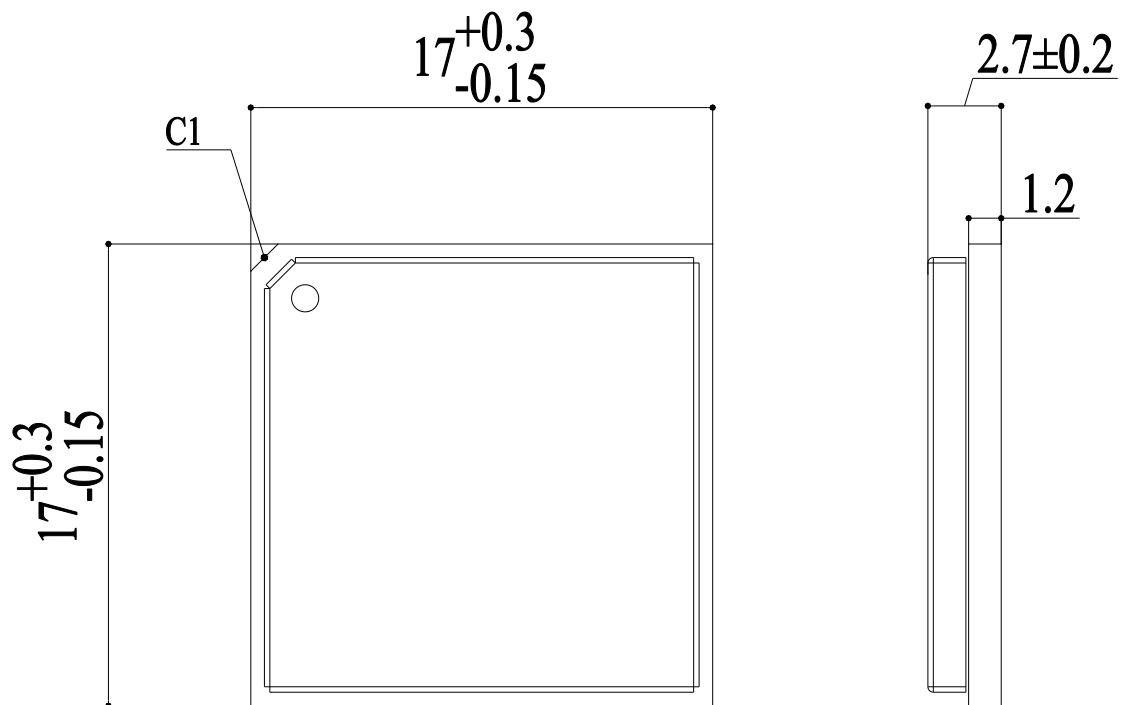


Figure 16: Module Top and Side Dimensions

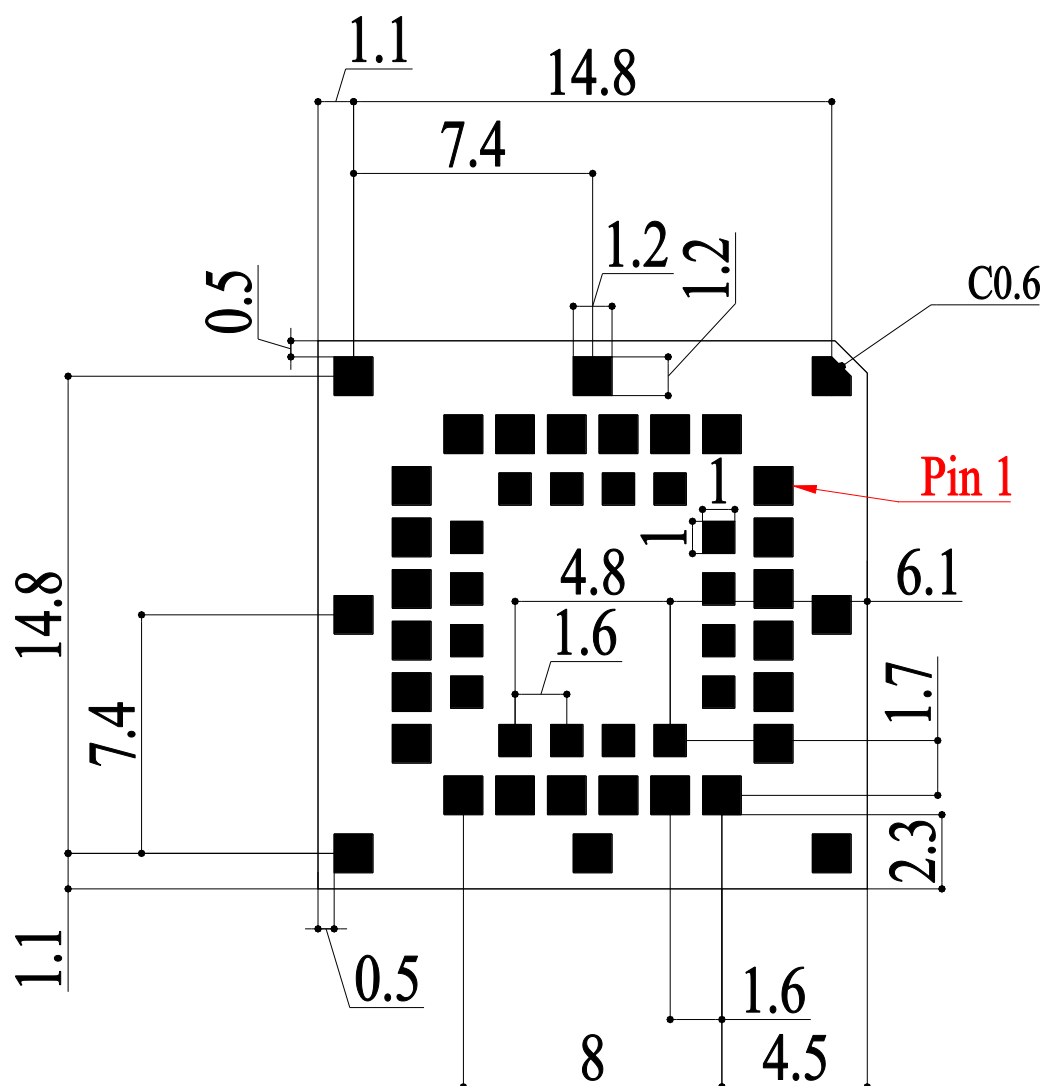


Figure 17: Bottom Dimensions (Bottom View)

NOTE

The module's coplanarity standard: ≤ 0.13 mm.

6.2. Recommended Footprint

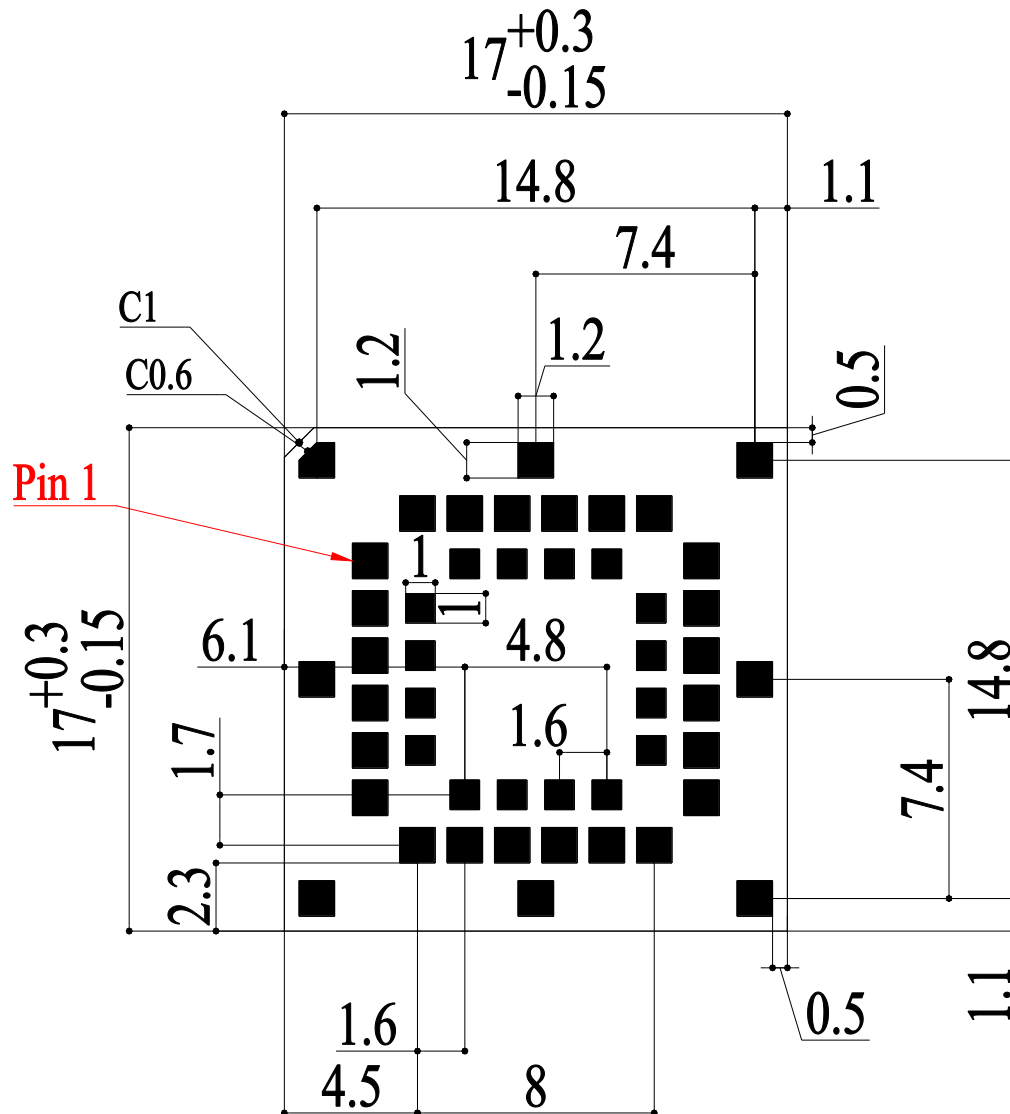


Figure 18: Recommended Footprint

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

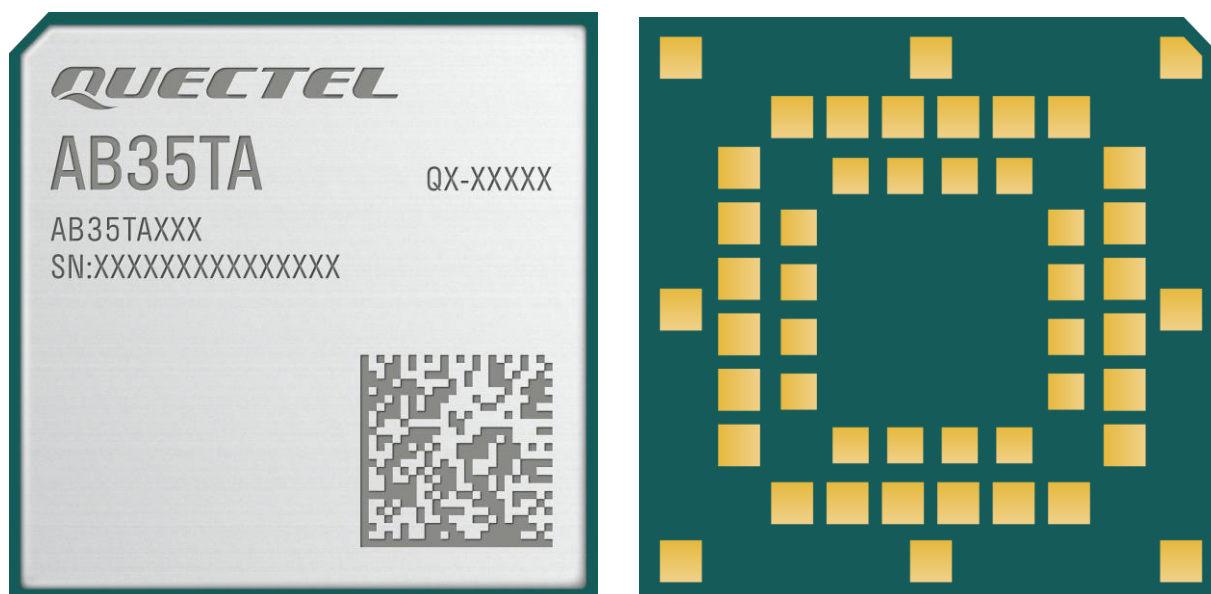


Figure 19: Top and Bottom Views of the Module

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 & 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;
5. If needed, the pre-baking should follow the requirements below:
 - The module should be baked for 24 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.

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 module until they are ready for soldering.

NOTE

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 0.10–0.12 mm. For more details, see **document [3]**.

The recommended peak reflow temperature should be 235–246 °C, with 246 °C 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:

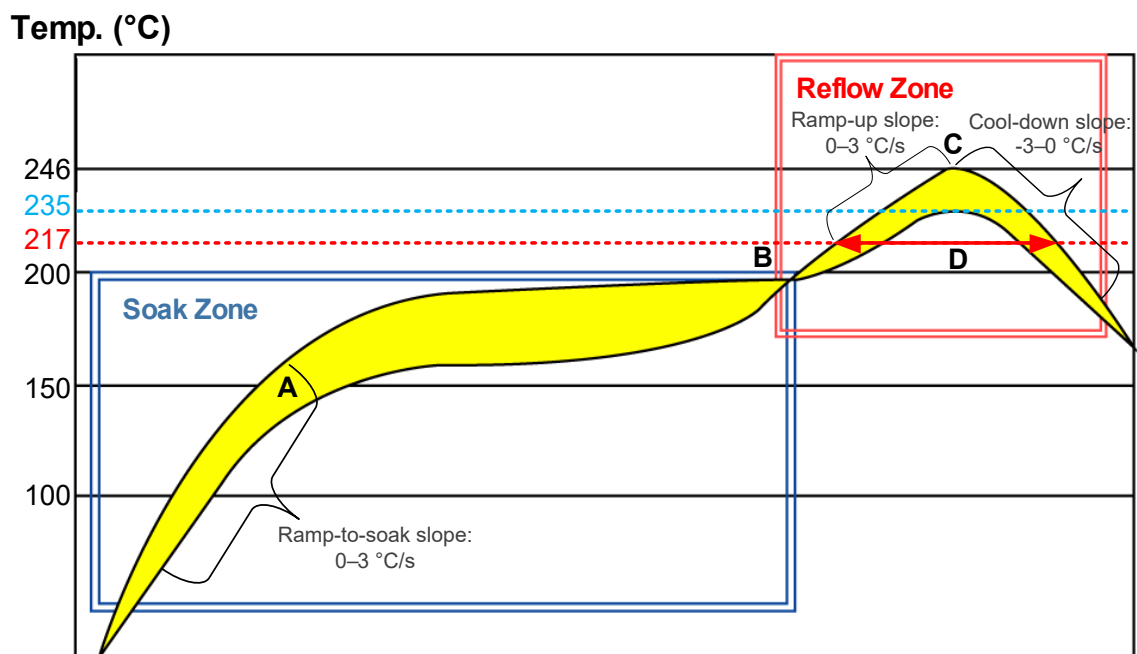


Figure 20: Recommended Reflow Soldering Thermal Profile

Table 16: 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. 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. Avoid using materials that contain mercury (Hg), such as adhesives, for module processing, even if the materials are RoHS compliant and their mercury content is below 1000 ppm (0.1 %).
7. Corrosive gases may corrode the electronic components inside the module, affecting their reliability and performance, and potentially leading to a shortened service life that fails to meet the designed lifespan. Therefore, do not store or use unprotected modules in environments containing corrosive gases such as hydrogen sulfide, sulfur dioxide, chlorine, and ammonia.
8. 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 [4]**.

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:

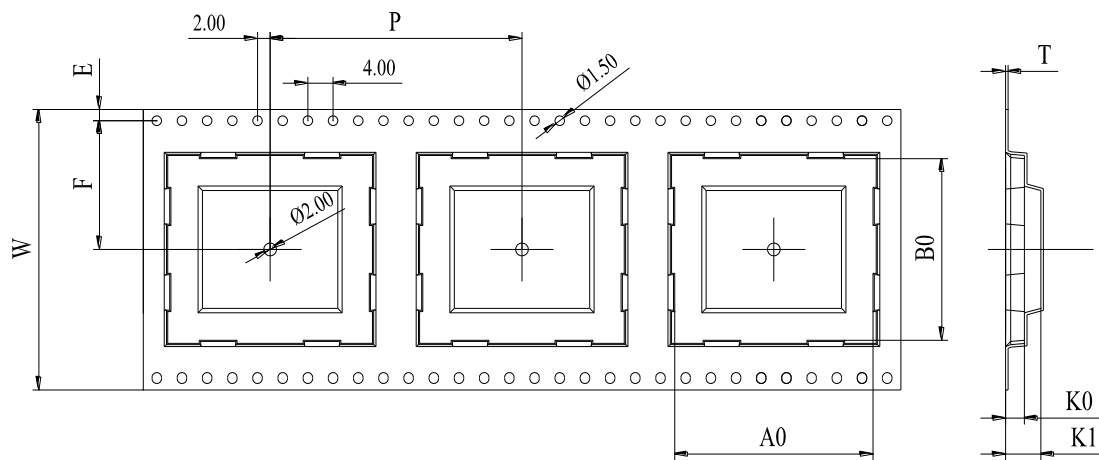


Figure 21: Carrier Tape Dimension Drawing (Unit: mm)

Table 17: Carrier Tape Dimension Table (Unit: mm)

W	P	T	A0	B0	K0	K1	F	E
32	24	0.4	17.4	17.4	3.2	4.6	14.2	1.75

7.3.2. Plastic Reel

Plastic reel dimensions are illustrated in the following figure and table:

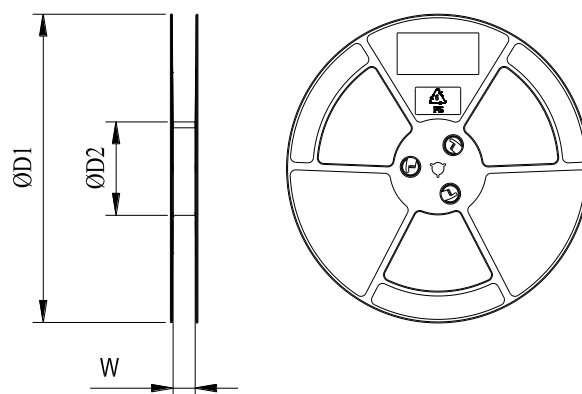


Figure 22: Plastic Reel Dimension Drawing

Table 18: Plastic Reel Dimension Table (Unit: mm)

ØD1	ØD2	W
330	100	32.5

7.3.3. Mounting Direction

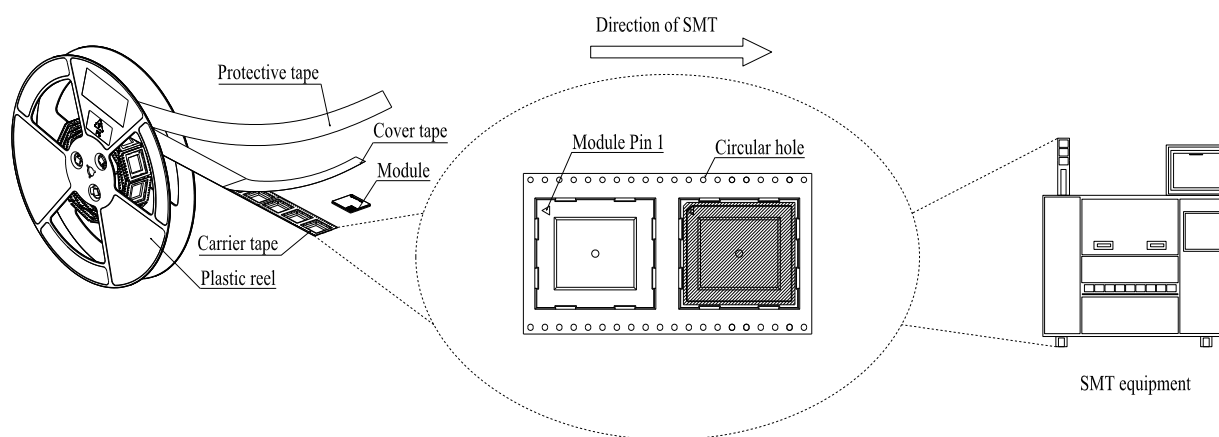
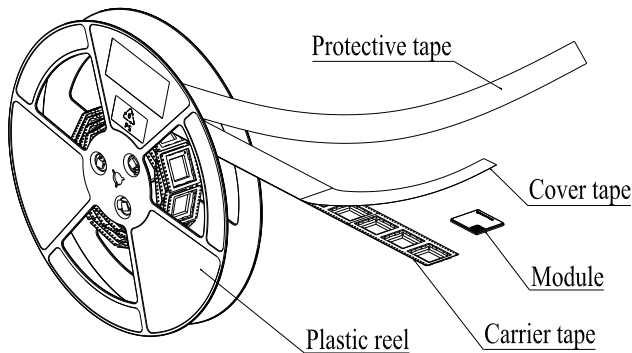


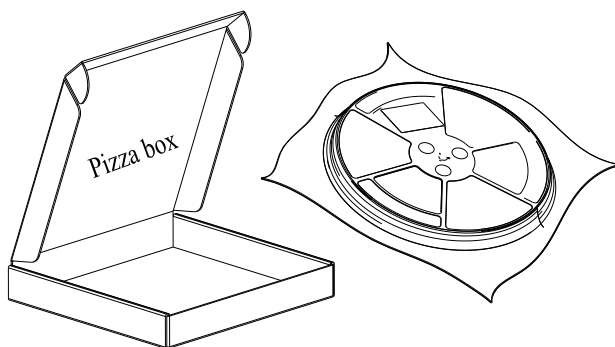
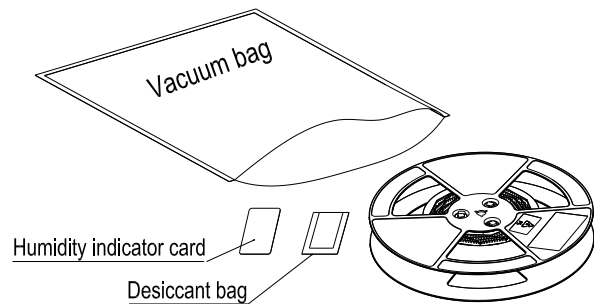
Figure 23: Mounting Direction

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 500 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 2000 modules.

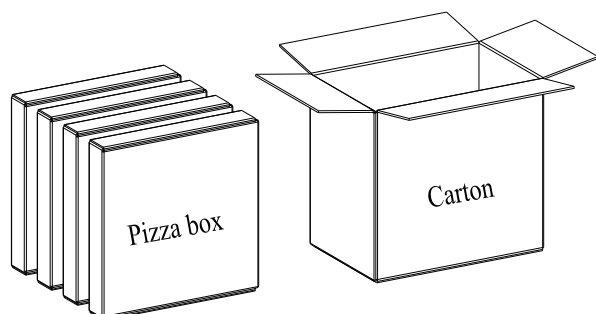


Figure 24: Packaging Process

8 Appendix References

Table 19: Related Documents

Document Name
[1] Quectel_V2X&5G_EVB_User_Guide
[2] Quectel_RF_Layout_Application_Note
[3] Quectel_Module_Stencil_Design_Requirements
[4] Quectel_Module_SMT_Application_Note

Table 20: Terms and Abbreviations

Abbreviation	Description
BLE	Bluetooth Low Energy
BR	Basic Rate
BT	Bluetooth
CTS	Clear To Send
DPSK	Differential Phase Shift Keying
DQPSK	Differential Quadrature Reference Phase Shift Keying
EDR	Enhanced Data Rate
ESD	Electrostatic Discharge
EVB	Evaluation Board
GFSK	Gaussian Frequency Shift Keying
GND	Ground
GPIO	General-Purpose Input/Output

HCI	Host Controller Interface
I/O	Input/Output
LGA	Land Grid Array
Mbps	Megabits per second
MSL	Moisture Sensitivity Levels
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
RF	Radio Frequency
RoHS	Restriction of Hazardous Substances
RTS	Request To Send
RXD	Receive Data (Pin)
SDIO	Secure Digital Input/Output
SMD	Surface Mount Device
SMT	Surface Mount Technology
TBD	To Be Determined
Tx	Transmit
TXD	Transmit Data (Pin)
UART	Universal Asynchronous Receiver/Transmitter
V _{max}	Maximum Voltage
V _{nom}	Nominal Voltage
V _{min}	Minimum Voltage
VSWR	Voltage Standing Wave Ratio
WLAN	Wireless Local Area Network

FCC Certification Requirements. FCC ID: XMR202508AB35TA

According to the definition of mobile and fixed device is described in Part 2.1091(b), this device is a mobile device.

And the following conditions must be met:

1. This Modular Approval is limited to OEM installation for mobile and fixed applications only. The antenna installation and operating configurations of this transmitter, including any applicable source-based time-averaging duty factor, antenna gain and cable loss must satisfy MPE categorical Exclusion Requirements of 2.1091.
2. The EUT is a mobile device; maintain at least a 20 cm separation between the EUT and the user's body and must not transmit simultaneously with any other antenna or transmitter.
3. A label with the following statements must be attached to the host end product: This device contains FCC ID: XMR202508AB35TA.
4. To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, maximum antenna gain (including cable loss) must not exceed:

❑ Bluetooth/Bluetooth LE:0.2dBi

5. This module must not transmit simultaneously with any other antenna or transmitter

6. The host end product must include a user manual that clearly defines operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

For portable devices, in addition to the conditions 3 through 6 described above, a separate approval is required to satisfy the SAR requirements of FCC Part 2.1093

If the device is used for other equipment that separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

For this device, OEM integrators must be provided with labeling instructions of finished products. Please refer to KDB784748 D01 v07, section 8. Page 6/7 last two paragraphs:

A certified modular has the option to use a permanently affixed label, or an electronic label. For a permanently affixed label, the module must be labeled with an FCC ID - Section 2.926 (see 2.2 Certification (labeling requirements) above). The OEM manual must provide clear instructions explaining to the OEM the labeling requirements, options and OEM user manual instructions that are required (see next paragraph).

For a host using a certified modular with a standard fixed label, if (1) the module's FCC ID is not visible when installed in the host, or (2) if the host is marketed so that end users do not have straightforward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: "Contains Transmitter Module FCC ID: XMR202508AB35TA." or "Contains FCC ID: XMR202508AB35TA." must be used. The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID.

The final host / module combination may also need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may

be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

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.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

IC Certification Requirements. IC: 10224A-2025AB35TA

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

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

To comply with IC regulations limiting both maximum RF output power and human exposure to RF radiation, maximum antenna gain (including cable loss) must not exceed:

□ Bluetooth/Bluetooth LE: 0.2dBi

L'appareil contient un émetteur / récepteur exempté de licence conforme au CNR exempté de licence d'innovation, sciences et développement économique Canada. Les opérations sont soumises aux deux conditions suivantes:

1. Cet appareil peut ne pas causer d'interférence.

L'appareil doit accepter toute interférence, y compris celles qui peuvent entraîner un fonctionnement indésirable de l'appareil.

This equipment complies with ISSED radiation exposure limits set forth for an uncontrolled environment. To comply with RSS-102 RF Exposure compliance requirements, this grant is applicable to only Mobile Configurations. The antennas used for the transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The host product shall be properly labelled to identify the modules within the host product.

The Innovation, Science and Economic Development Canada certification label of a module shall be clearly visible at all times when installed in the host product; otherwise, the host product must be labeled to display the Innovation, Science and Economic Development Canada certification number for the module, preceded by the word "Contains" or similar wording expressing the same meaning, as follows: "Contains IC: 10224A-2025AB35TA" or "where: 10224A-2025AB35TA is the module's certification number" .