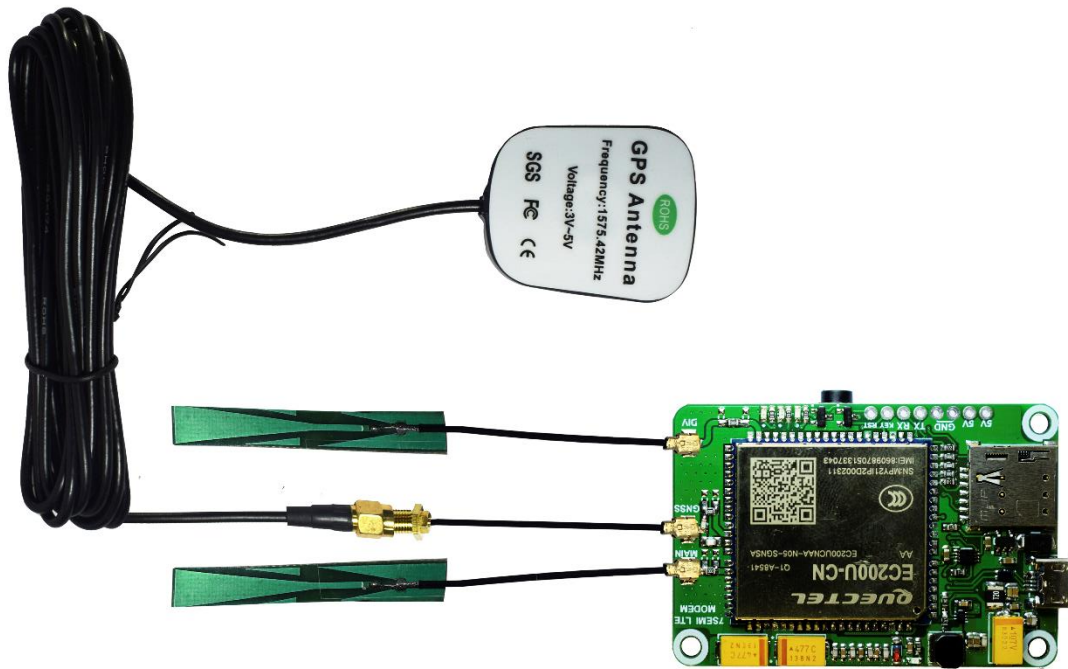


7SEMI EC200U-CN LTE 4G GNSS Mini Modem



Contents

1	Introduction	3
2	Product Concept.....	4
2.1	General Description.....	4
2.2	Modem Key Features	4
3	Application Interfaces.....	6
3.1	Pinout	6
3.2	Pin Description	6
3.3	Hardware Interface –	7
3.4	Antenna Interfaces connector	9
4	Mechanical Dimensions	12

1 Introduction

This document defines the 7Semi EC200U-CN LTE 4G GNSS Mini Modem and describes their air interfaces and hardware interfaces which are connected with customers' applications.

This document can help customers quickly understand modem interface specifications, electrical and mechanical details, as well as other related information of 7Semi EC200U-CN LTE 4G GNSS Mini Modem. To facilitate its application in different fields, relevant reference interface is also provided for customers' reference. Associated with application note and user guide, customers can use 7Semi EC200U-CN LTE 4G GNSS Mini Modem to design and set up mobile applications easily.

This document is applicable to following modules :

- 7Semi EC200U-CN LTE 4G GNSS Mini Modem

2 Product Concept

2.1 General Description

The 7Semis's LTE 4G Mini Modem incorporates EC200U-CN LTE Cat 1 wireless communication module designed and developed by Quectel. The EC200U series QuecOpen are wireless communication modules, which support LTE-FDD, LTE-TDD, and GSM/GPRS network data connection. The EC200U series QuecOpen module can meet almost all requirements for M2M applications such as automotive, metering, tracking system, security, router, wireless POS, mobile computing device, PDA phone, tablet PC, etc.

A Wide Band, 700-2700 MHz frequency range, 4G LTE antenna provides a wide enough range for a number of applications including BLE & LoRa/RF. This antenna is 52mm x 24mm with a coaxial cable ending in an IPEX (u.FL equivalent) connector. The antenna has a 3M adhesive backing making it easy to fix it to your project.

Table 1 : Frequency Bands of EC200U-CN QuecOpen Module

Network Mode	EC200U-CN QuecOpen
LTE-FDD	B1/B3/B5/B8
LTE-TDD	B34/B38/B39/B40/B41
GSM	900 MHz/1800 MHz
GNSS	GPS, GLONASS, BeiDou, Galileo, QZSS

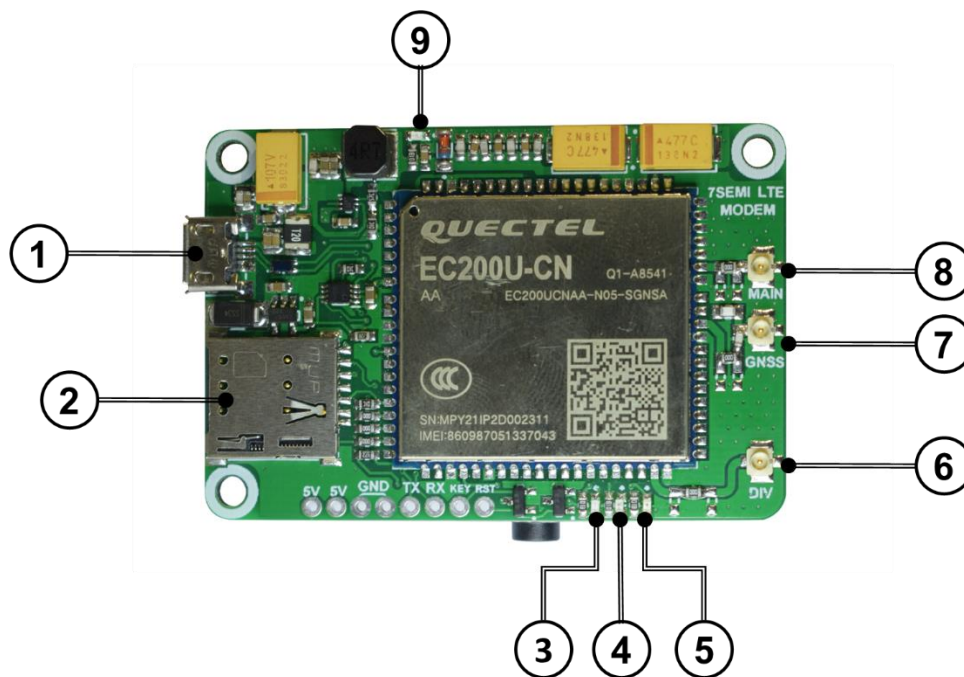
2.2 Modem Key Features

Feature	Details
Power Supply	<ul style="list-style-type: none"> ➤ Supply voltage: 5V
Transmitting Power	<ul style="list-style-type: none"> ➤ Class 4 for GSM850 ➤ Class 4 for EGSM900 ➤ Class 1 for DCS1800 ➤ Class 1 for PCS1900 ➤ Class 3 for LTE-FDD bands ➤ Class 3 for LTE-TDD bands

LTE Features	<ul style="list-style-type: none"> ➤ Support Cat 1 FDD and TDD ➤ Support 1.4/3/5/10/15/20 MHz RF bandwidth ➤ Support MIMO in DL direction ➤ FDD: Max 10 Mbps (DL), Max 5 Mbps (UL) ➤ TDD: Max 8.96 Mbps (DL), Max 3.1 Mbps (UL)
GSM Features	<p>GPRS:</p> <ul style="list-style-type: none"> ➤ Support GPRS multi-slot class 12 ➤ Coding scheme: CS-1, CS-2, CS-3 and CS-4 ➤ Max 85.6Kbps (DL)/Max 85.6Kbps (UL)
Internet Protocol Features	<ul style="list-style-type: none"> ➤ Support TCP/UDP/PPP/NTP/NITZ/FTP/HTTP/PING/CMUX/HTTPS/FTPS/SSL/FILE/MQTT/MMS protocols ➤ Support PAP and CHAP for PPP connections
SMS	<ul style="list-style-type: none"> ➤ Text and PDU mode ➤ Point to point MO and MT ➤ SMS cell broadcast ➤ SMS storage
SIM Interface	<ul style="list-style-type: none"> ➤ Support Nano SIM card: 1.8 V, 3.0 V
USB Interface	<ul style="list-style-type: none"> ➤ Compliant with USB 2.0 specification (slave only); the data transfer rate can reach up to 480 Mbps ➤ Used for AT command communication, data transmission, software debugging, firmware upgrade ➤ Support USB serial drivers for Windows 7/8/8.1/10, Linux 2.6/3.x/4.1~4.14, Android 4.x~9.x, etc.
UART Interfaces	<p>Main UART:</p> <ul style="list-style-type: none"> ➤ Used for AT command communication and data transmission ➤ Baud rates reach up to 921600 bps; 115200 bps by default
AT Commands	<ul style="list-style-type: none"> ➤ Compliant with 3 GPP TS 27.007, 27.005 and Quectel enhanced AT commands
Network Indications	<ul style="list-style-type: none"> ➤ Two LED including NET_MODE and NET_STATUS to indicate network
Antenna Interfaces	<ul style="list-style-type: none"> ➤ Main antenna interface (ANT_MAIN) ➤ Wi-Fi Scan/Bluetooth antenna interface (ANT_BT/WIFI_SCAN) ➤ GNSS antenna interface (ANT_GNSS)
Firmware Upgrade	<ul style="list-style-type: none"> ➤ USB interface and DFOTA

3 Application Interfaces

3.1 Pinout

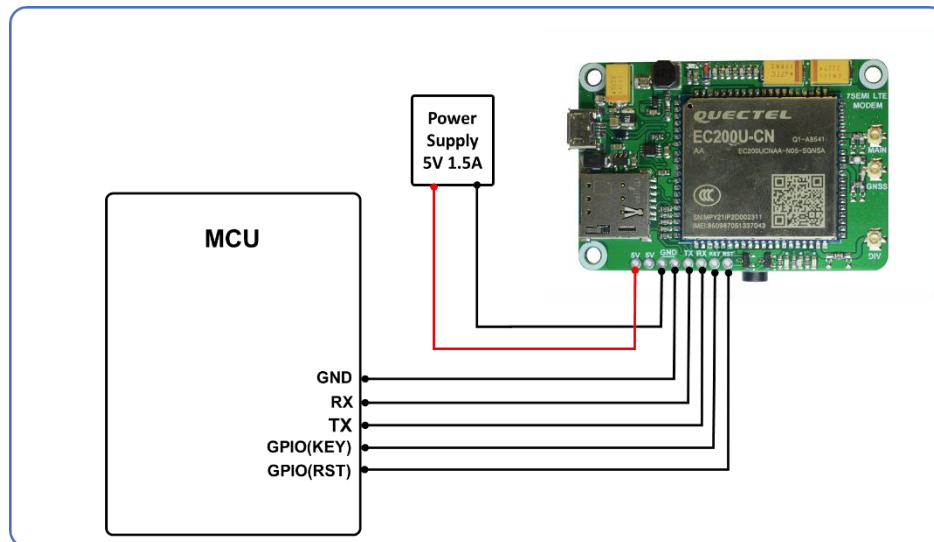


3.2 Pin Description

1. USB Interface
2. SIM card Holder
3. Network Status Indication - Indicate the Modem network activity status
4. Modem Status Indication - Indicate the Modem operation status
5. Network Status Indication - Indicate the Modem network registration mode
6. Main antenna interface Connector
7. GNSS Antenna Interface Connector
8. Wi-Fi Scan/Bluetooth antenna interface connector
9. Power Indicator

3.3 Hardware Interface –

3.3.1 Hardware Interface with MCU and Control Signals–



The 7SEMI LTE modem interfaced with Host/MCU using Main UART of Quectel EC200 .The main UART interface supports 9600bps, 19200bps, 38400bps, 57600bps, and 115200bps and 230400bps baud rates.

The signal level of main UART interface is 3.3V. When connecting to the peripheral MCU/RAM.

3.3.1.1 Control Signals

PWRKEY: When 7SEMI Modem is in power down mode, it can be turned on to normal mode by driving PWRKEY pin to a High level for at least 2 s.

When supply is connected initially modem is turn on by default without applying any pulse to PWRKEY pin.

Turn off Module: The following procedures can be used to turn off the module

- **Turn off the module using PWRKEY pin** - Driving the PWRKEY pin to a low level voltage for at least 3 S, the Modem will execute power-down procedure after the PWRKEY is released
- **Turn off the module using AT+QPOWD command** - It is also a safe way to use AT+QPOWD command to turn off the Modem, which is similar to the procedure of turning off the module via PWRKEY pin.

RST - Reset the Module - The RST pin can be used to reset the Modem. The Modem can be reset by applying High Pulse 3.3V to the RST pin for at least 100 ms and then releasing it.

3.3.2 USB Interface

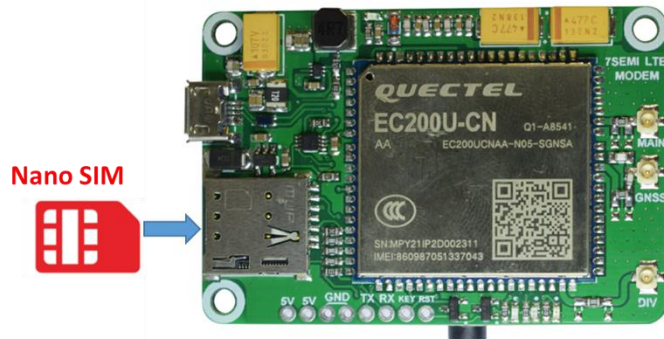
7SEMI LTE 4G Modem contains one integrated Universal Serial Bus (USB) interface which complies with the USB 2.0 specification and supports high-speed (480 Mbps) and full-speed (12 Mbps) modes. The USB interface only supports USB slave mode.

This interface is used for AT command communication, data transmission, software debugging, firmware upgrade and voice over USB.

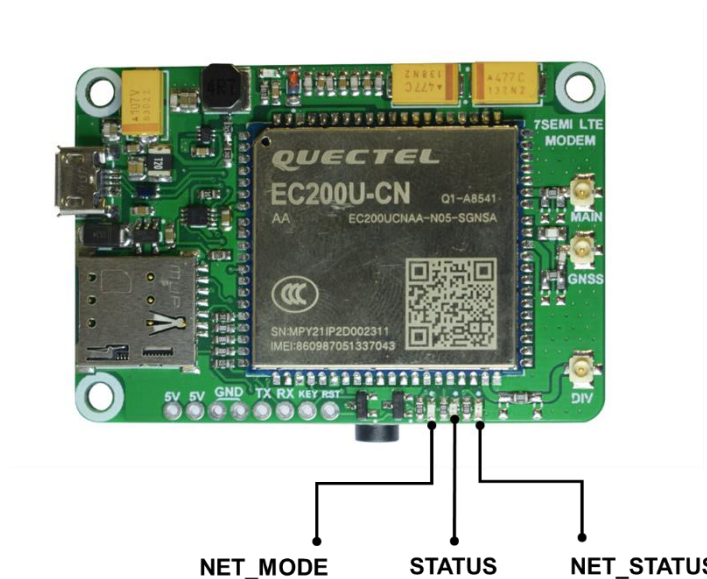
3.3.3 SIM Card Holder

The Nano SIM card Holder connects with the EC200 Module. The EC200 module uses the SIM card with the different functions: SMS, Phone Calls & Internet.

Sim card orientation:



3.3.4 Status Indicator



3.3.4.1 Network Status Indication –

The Modem provides two LEDs for network status indication, which are NET_MODE and NET_STATUS.

NET_MODE - Indicate the module's network activity status.

LED Name	Logic Level Changes	Network Status
NET_MODE	Flicker slowly (200 ms high/1800 ms low)	Network searching
	Flicker quickly (234 ms high/266 ms low)	Idle
	Flicker repeatedly (62 s high/63 s low)	Data transfer is ongoing
	Always high	Voice calling

NET_STATUS - Indicate the module's network registration mode.

Pin Name	Logic Level Changes	Network Status
NET_STATUS	Always high	Registered on LTE network
	Always low	Others

3.3.4.2 Status –

The STATUS LED is for Modems operation status indication. When the Modem is turned on normally, the STATUS will present the high state.

3.4 Antenna Interfaces connector

7SEMI 4G LTE Modem antenna interfaces include a main antenna interface connector, a WiFi Scan&BT shared antenna interfaces connector which is used to resist the fall of signals caused by high speed movement and multipath effect.

The antenna connectors have an impedance of 50 Ω.

3.4.1 Main and BT Antenna Interfaces – Operating Frequency –

3 GPP Band	Transmit	Receive	Unit
EGSM900	880~915	925~960	MHz
DCS1800	1710~1785	1805~1880	MHz
LTE-FDD B1	1920~1980	2110~2170	MHz
LTE-FDD B3	1710~1785	1805~1880	MHz
LTE-FDD B5	824~849	869~894	MHz
LTE-FDD B8	880~915	925~960	MHz
LTE-TDD B34	2010~2025	2010~2025	MHz
LTE-TDD B38	2570~2620	2570~2620	MHz
LTE-TDD B39	1880~1920	1880~1920	MHz
LTE-TDD B40	2300~2400	2300~2400	MHz
LTE-TDD B41	2535~2675	2535~2675	MHz

3.4.2 GNSS Antenna Interface

Type	Frequency	Unit
GPS	1575.42±1.023	MHz
GLONASS	1597.5~1605.8	MHz
Galileo	1575.42±2.046	MHz
BeiDou (Compass)	1561.098±2.046	MHz
QZSS	1575.42	MHz

3.4.3 Antenna Requirement

The following table shows the requirements on main and GNSS antenna.

Type	Requirements
GNSS	Frequency range 1: 1559–1609 MHz Polarization: RHCP or linear VSWR: < 2 (typ.) Passive antenna gain: > 0 dBi Active antenna noise factor: < 1.5 dB Active antenna gain: > 0 dBi Active antenna internal LNA gain: < 17 dB
GSM/LTE	VSWR: ≤ 2 Efficiency: > 30 %

4 Mechanical Dimensions

