TDS-GQ29E

Dual-Band + RTK GNSS Module

(Onboard: Quectel LC29H-DA)

User Guide

Revision 2.01

Texas Datalink Solutions, Inc.
1505 Luna Road, Suite 180 | Carrollton, Texas 75006, USA
support@TexasDatalinkSolutions.com

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1. Introduction

1.1 Overview

The suitable for integration in variety of consumer devices such as Personal Navigation Device, Digital Camera Vehicle Navigation, Telematics and other applications requiring Position, Velocity and Time. High Sensitivity dual-band + RTK technology provides unprecedented indoor and outdoor positioning capability including urban canyon and under thick foliage. provides standard NMEA output for compatibility with all user applications, and map engines.

1.2 Features

The TDS-GQ29E is a dual-band (L1+L5) high-precision RTK GNSS module designed utilizing using the Quectel LC29H-DA module with the following features:

1. The modules uses the LC29H-DA module, which is compact and has excellent performance, supporting centimeter-level RTK positioning. It can be used as a mobile station.
2. The module has an SMA connector that supports connection with various active antennas. It is recommended to use a GPS/GNSS dual-mode active antenna. An antenna is included by default.
3. Compatible with 3.3V/5V voltage levels, the module can easily connect to various microcontroller systems.
4. The module includes a rechargeable backup battery that retains satellite ephemeris data during power loss, supporting quick positioning through warm or hot starts.

   Note: After the main power supply is disconnected, the backup battery can maintain GPS/GNSS ephemeris data for about half an hour, which supports warm or hot starts, allowing rapid positioning.
5. The module connects to external systems via serial communication, supporting baud rates of 9600, 19200, 38400, 57600, 115200, and other rates. It is compatible with 3.3V / 5V microcontroller systems, making it easy to connect with your product.
6. Supports USB-C power supply communication, and can switch between USB-C communication or pin header serial communication through the toggle switch on the board.

1.3 Helpful Resources:

LC29H(DA) documents: https://www.quectel.com/product/gnss-lc29h/

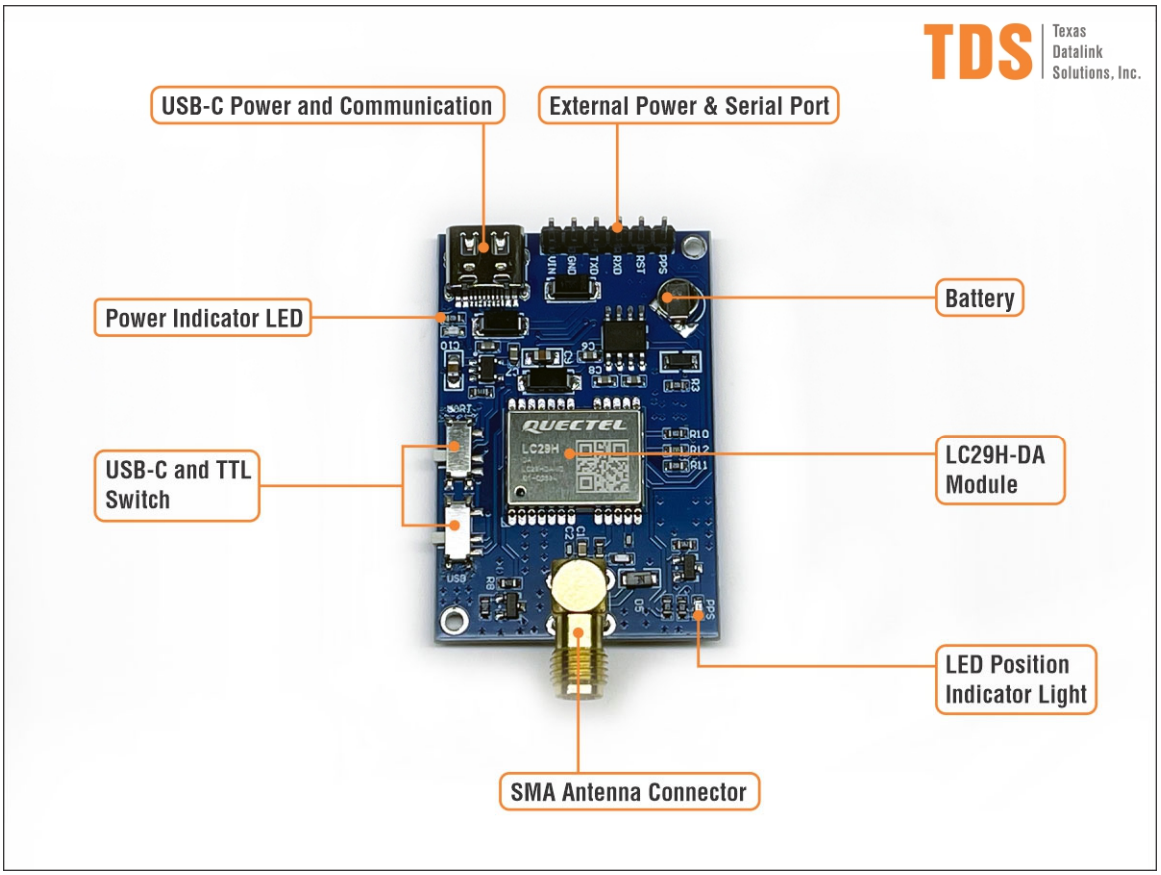
QGNSS: https://www.quectel.com/download/qgnss_v2-0_en/

The downloaded file includes:
- QGNSS User Guide
- QGNSS

2. Usage Instructions

2.1 Module Usage Instructions

The image below shows module details. The board supports both USB-C and external header connections. Users can power the module through a data cable or connect it to a microcontroller. Switching between USB-C and TTL communication is done via the toggle switch: move both switches to the right for USB-C communication or to the left for external UART communication. Users can connect to STM32 or USB TTL for communication tests.



Hardware Details

- **External Power & Serial Port** - Left side port for external power and communication
- **USB-C Power and Communication** – USB-C port for both power and data communication
- **USB-C and TTL Switch** - Toggle switch to select between USB-C and TTL communication
- **LC29H-DA Module** – Quectel LC29H-DA module
- **LED Position Indicator Light** - LED indicator showing positioning status
- **SMA Antenna Connector** - Connector for attaching an SMA antenna.

*The **PPS** pin is connected to a status indicator LED labeled **PPS** on the module. This pin connects to the **1PPS** port of the LC29H module, whose output characteristics can be configured through software. By default, the PPS indicator LED has two states:

1. *Always off*: The module is operating but has not achieved positioning.
2. *Flashing*: The module has successfully positioned.

This allows users to determine the module's positioning status through the PPS indicator. For convenience, *there is a Power Indicator LED that lights up when powered*, allowing users to easily check if the module is working properly.

Additionally, the LC29H module requires an external GPS antenna for positioning. The board has an SMA connector for connecting an active antenna, enabling indoor placement of the module with the antenna outside to achieve indoor positioning.

2.2 Connecting the Module with a Microcontroller

To connect the module with a microcontroller, only four wires are required: **VCC**, **GND**, **TXD**, and **RXD**.

- **VCC** and **GND**: Powers the module.
- **TXD** and **RXD**: Connect to the RXD and TXD pins of the microcontroller.

The module is compatible with both 5V and 3.3V systems, making it easy to integrate into your system.

Note: Connecting the **PPS** pin to the microcontroller's GPIO is optional. You can decide to connect it depending on your needs. The PPS pin does not affect the module's operation but can output a pulse after positioning is achieved, which can be used for position verification or data synchronization.

Important: The **TXD** and **RXD** pins on the module use TTL levels and cannot be directly connected to a computer's RS232 port. A level conversion chip (e.g., MAX232) is needed to convert the levels before connecting.

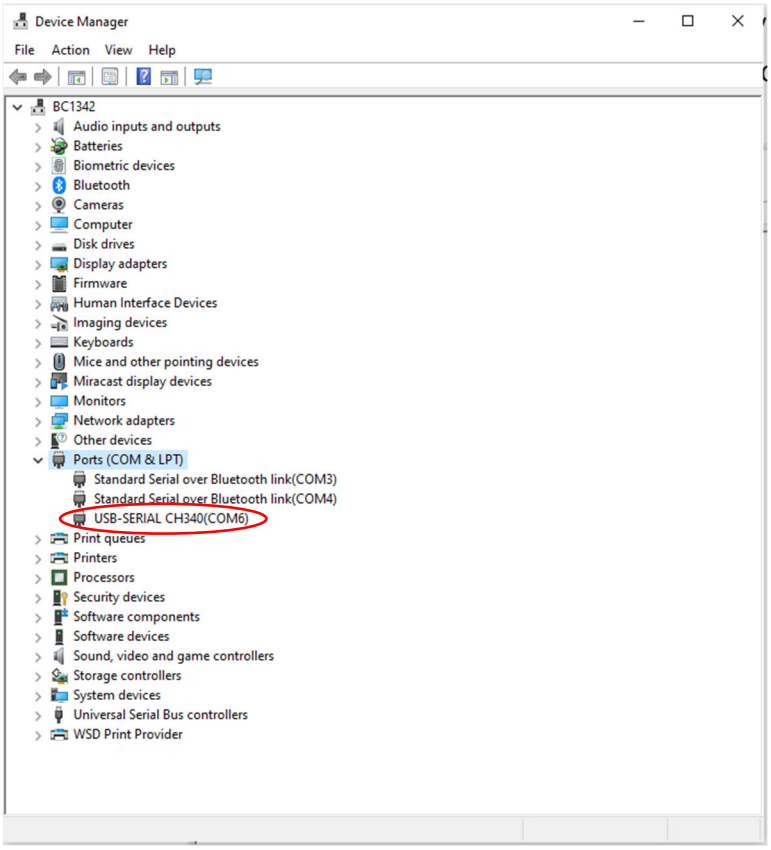
2.3 QGNSS Software Introduction

The QGNSS software (QGNSS_V2.0_EN), which can be downloaded from this link, includes a detailed user guide.

After downloading the "QGNSS_V2.0_EN.zip", unzip/extract the file and look for "QGNSS2" file. You can start the QGNSS by running the "QGNSS2" file. There is no need to install QGNSS2 on your computer to start using the application.

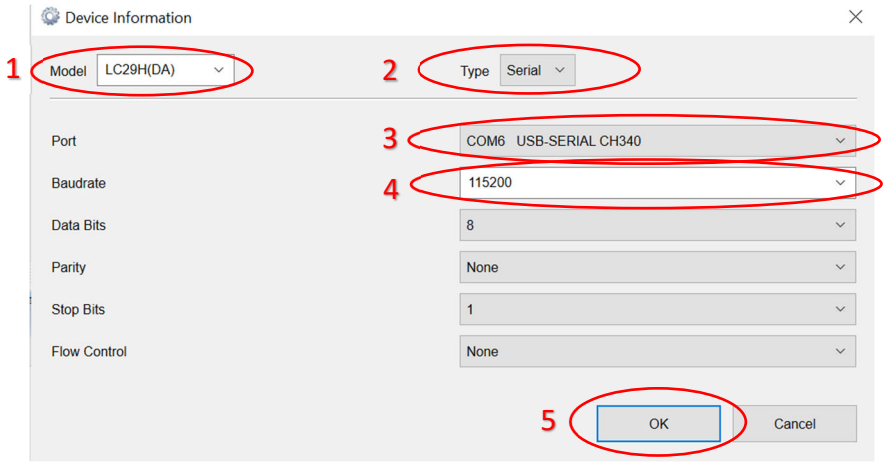
To Run TDS-GQ29E on QGNSS:

1. Connect TDS-GQ29E to USB port on your computer using USB-C cable.
    1. Make sure the antenna is connected to GNSS via SMA port.
    2. Once USB connection is made, the Power Indicator LED will stay lit up and LED Position Indicator Light will start to blink once the GNSS is start receiving signals.
2. Open the Device Manager on your window and locate the "COM Port" for GNSS' USB under Ports (COM & LPT)

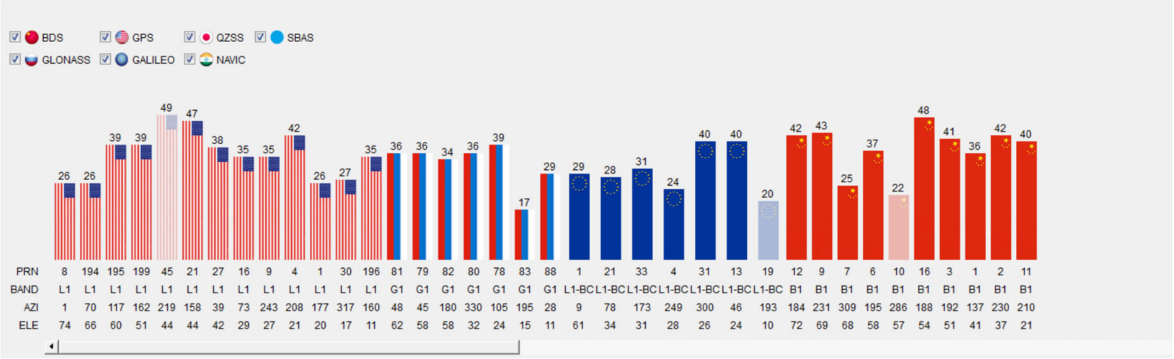


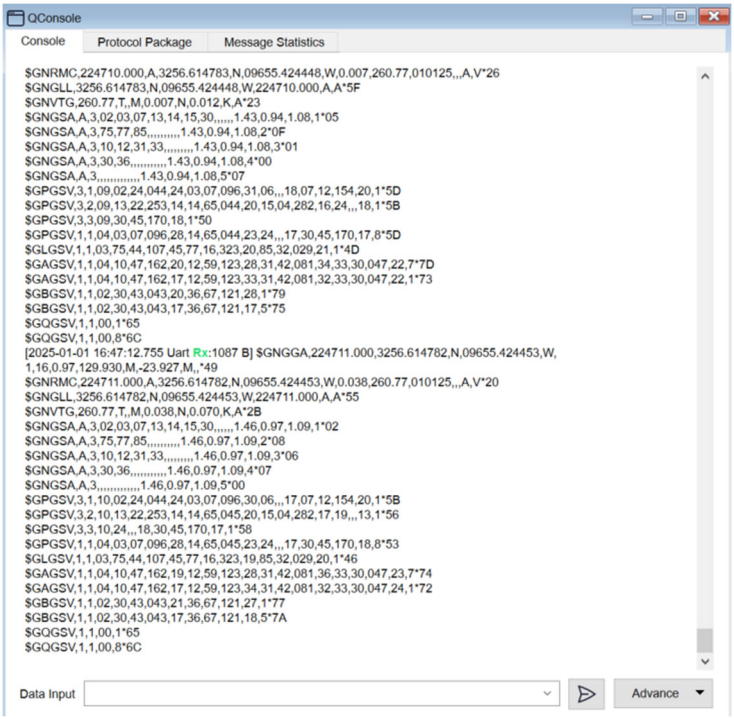
3. Open the QGNSS and under the **Device** menu, select Set **Device Information**. Once the Device Information window opens, select as below:

    1. From the **Model** dropdown menu, select **LC29H(DA).**
    2. For **Type** dropdown menu, select **Serial**.
    3. Referencing the "COM *number*" from the Device Manager, select **COM*** from the **Port** dropdown menu.
    4. Set Baudrate to **115200** (the factory default). If you have changed the baud rate, set it accordingly.
    5. Click **OK**.



4. Once the connection is made between QGNSS and TDS-GQ29E, the GNSS' position information will automatically start populating like below:





With these settings, QGNSS can now access the module.

The acquired latitude and longitude data is converted for direct positioning on a map. The software displays NMEA data and positioning information, such as latitude and longitude.

2.4 RTK Configuration Instructions

The TDS-GQ29E module supports RTK positioning. To achieve RTK, the device must send GGA data to services like pointonenav.com or to your selected NTRIP service provider, which provide RTCM data to the LC29H. The module processes this data to achieve RTK positioning.

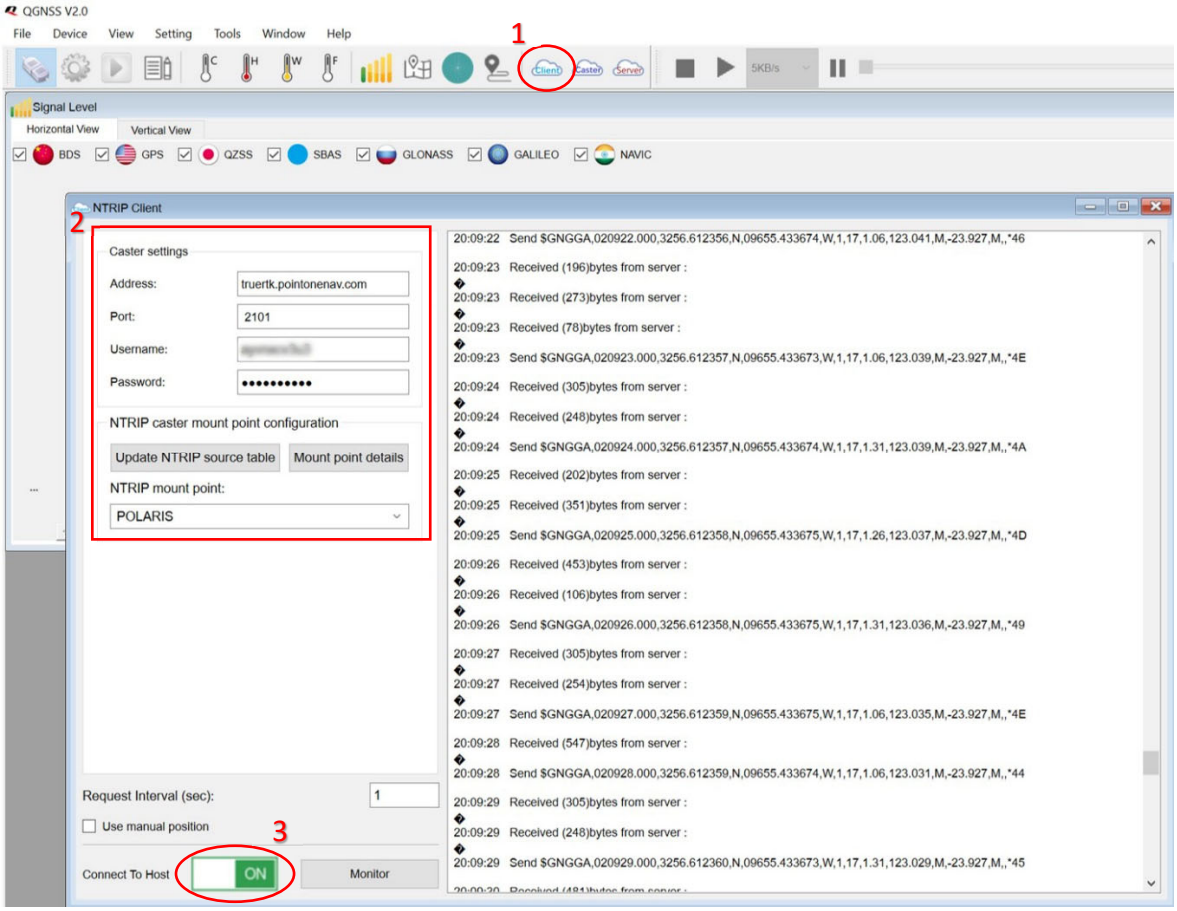
Important:

- The antenna used must be an L1/L5 dual-frequency active antenna.
- Positioning must be attempted in an open environment, as obstacles (such as walls or buildings) can prevent RTK from achieving fixed positioning.

Once RTK positioning is fixed, accuracy can reach around 2.5 cm, achieving true centimeter-level positioning.

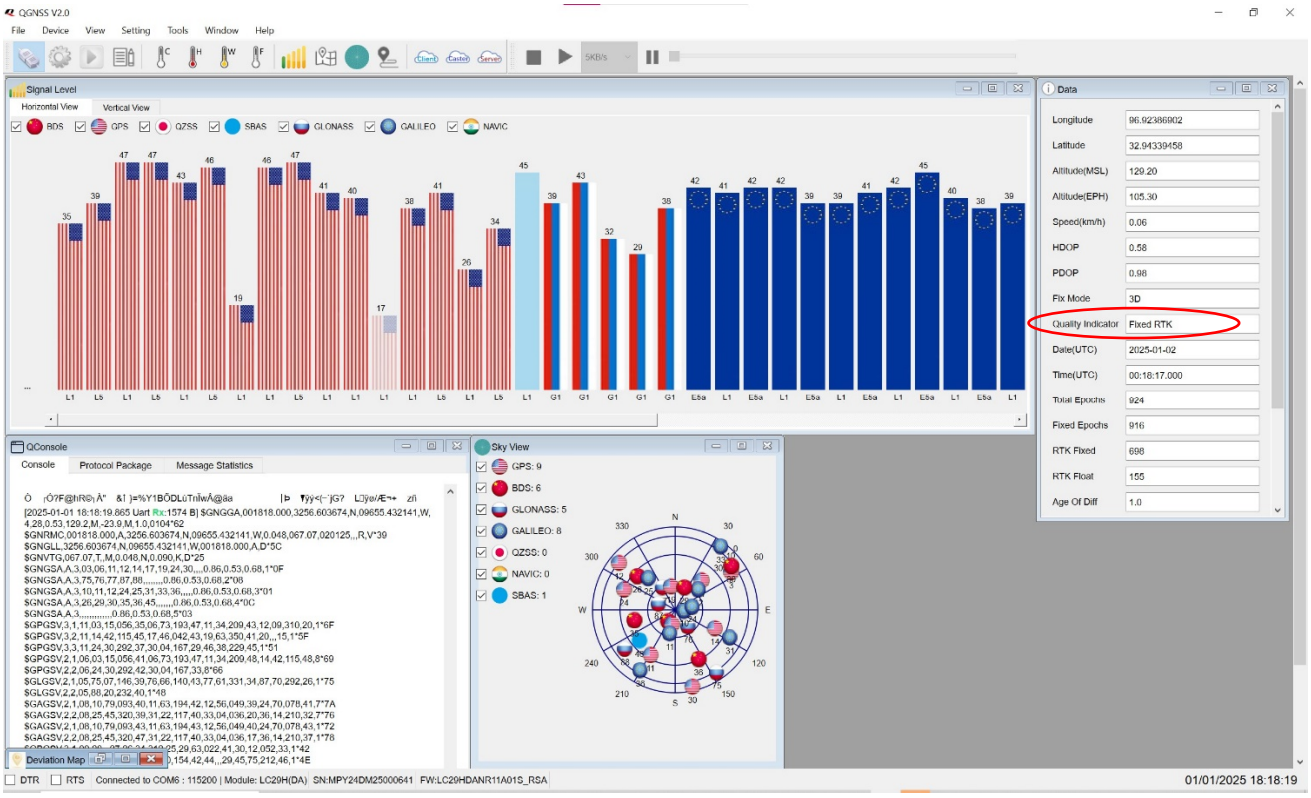
1. Using QGNSS:

    1. Configure the NTRIP client by clicking “Client” cloud icon at the top of the tool bar.
    2. Enter the server address and other parameters from the selected NTRIP data provider (below example is based on using pointonenav.com).
    3. After setting the parameters, remember to click **Connect to Host** and switch **ON**.



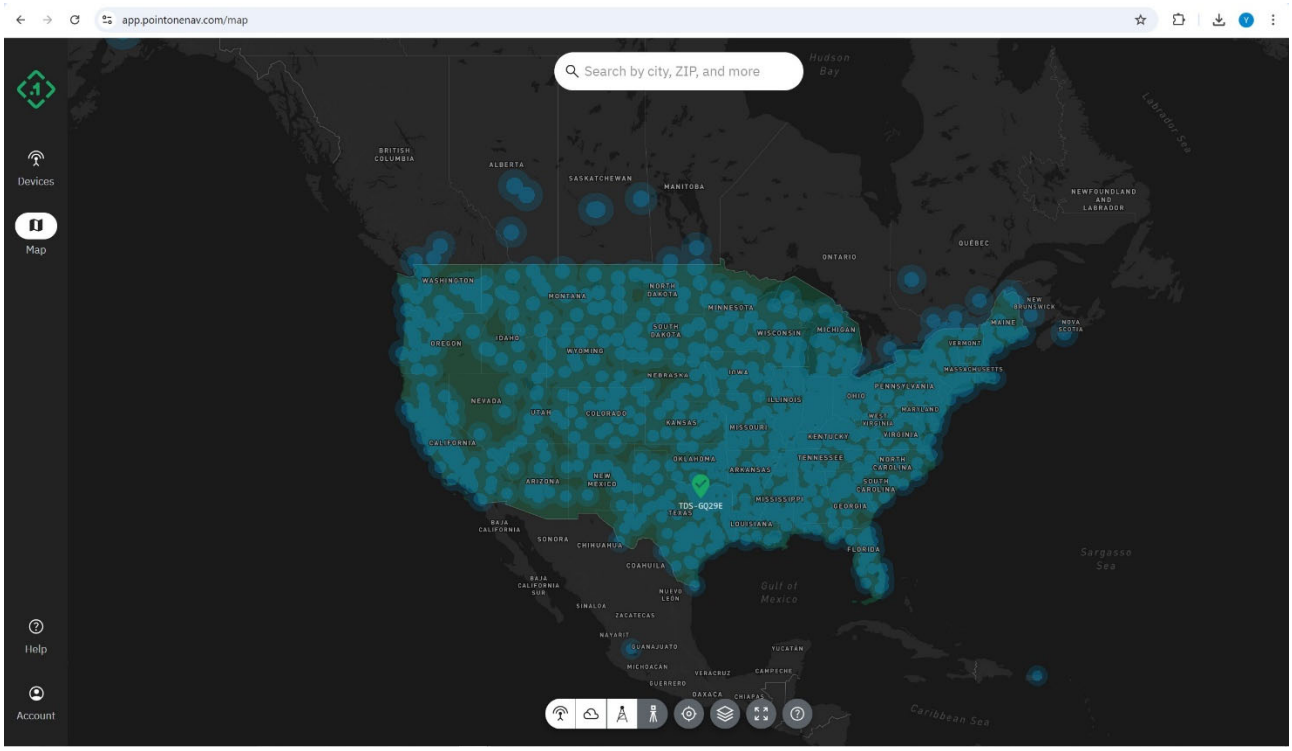
2. The module will then automatically send GGA data, and the server will return RTCM correction data to the module.

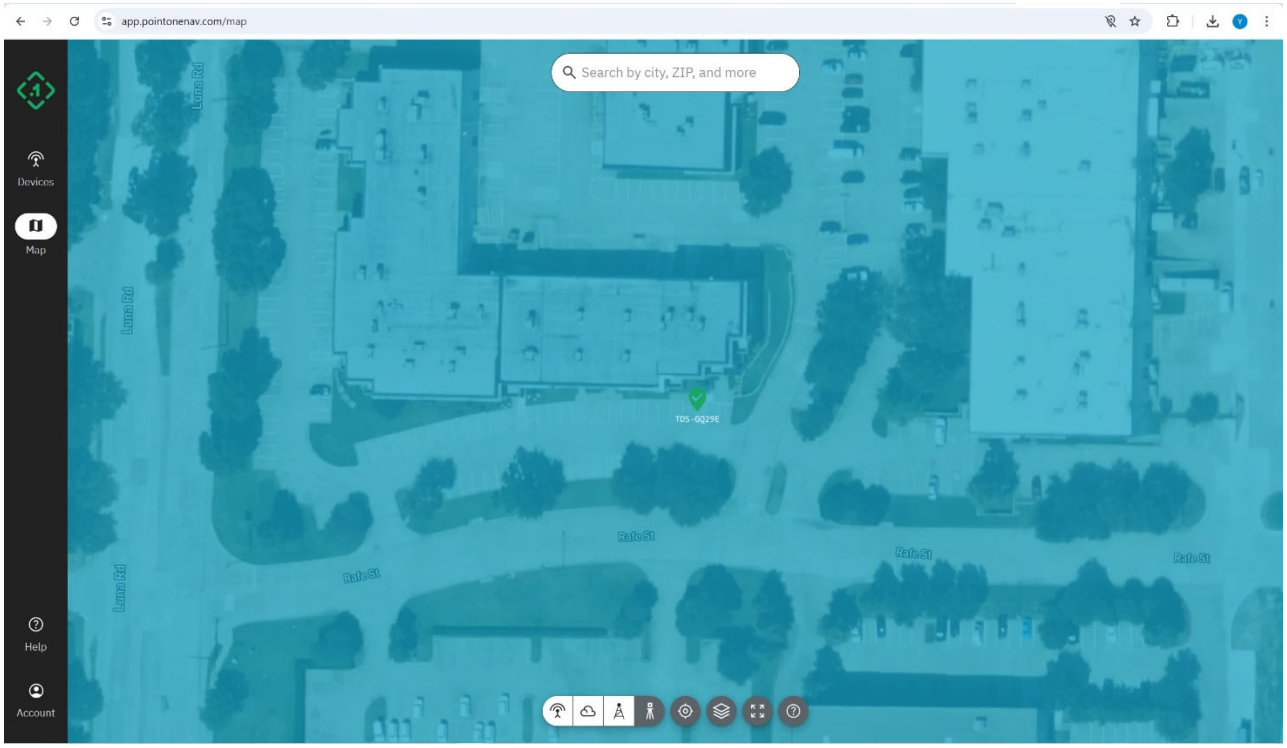
3. In RTK mode, the QGNSS will display **RTK Fixed**, indicating successful RTK positioning. If the display shows **RTK Float**, it means the module is in a floating state and has not achieved a fixed solution. In this case, check the environment for adequate openness, ensure the antenna meets requirements, and verify the NTRIP account settings and source node settings if necessary.



4. In the **QNGGA** data, a parameter of **4** after **E** indicates fixed RTK positioning, while **5** indicates floating RTK positioning.

5. Below shows generated data from pointonenav.com based on above:





6. FAQs

Q: What is the recommended antenna type and placement?
A: Use a dual-band GNSS antenna (L1 + L5) with high gain and low noise figure. Place the antenna in a position with a clear sky view, away from sources of interference such as power supplies or high-speed digital signals.

Q: How do I enable dual-band (L1 + L5) operation?
A: Dual-band operation is automatically supported by the module. Ensure your antenna and RF design support both L1 and L5 frequencies.

Q: What is the maximum update rate for positioning data?
A: The module supports an update rate of up to 1 Hz, meaning it can output positional data 1 times per second.

Q: What do I do if the module doesn't acquire satellites?
A: Check the following:
- Antenna connection and orientation.
- Open-sky visibility.
- RF interference or noise in the environment.
- Ensure the module is powered correctly and outputs NMEA data.

Q: How do I ensure compatibility with other GNSS modules or systems?
A: The LC29H-DA uses standard NMEA protocols, making it compatible with most GNSS systems and applications. Ensure matching baud rates, interfaces, and data parsing settings when integrating with third-party devices or software.

7. Contact Information

Address: 1505 Luna Road, Suite 18o, Carrollton, Texas 75006, USA

E-Mail: support@TexasDatalinkSolutions.com