

GR-9029

User's Quick Guide

Revision History

Ver.	Date	Description
0.1	Dec. 16 th , 2021	Initial release
0.2	Jan. 6 th , 2022	Sec 1.1 Product configuration added, minor corrections
0.3	May. 2 nd , 2023	10Hz support and APP enhancements

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Contents

1	OVERVIEW.....	1
1.1	PRODUCT CONFIGURATION.....	1
1.2	FIXING SCREW HOLES	1
1.3	POWER ON/OFF.....	2
1.4	CHARGING.....	3
1.5	RTCM.....	3
2	BLUETOOTHLE RTK APP.....	5
2.1	WHERE IS THE APP.....	5
2.2	MAJOR FUNCTIONS	6
2.3	SETTINGS.....	7
2.4	MAP SETTING	8
2.5	LOGGED FILES.....	11
2.6	MAP SELECTION	13

1 Overview

1.1 Product Configuration

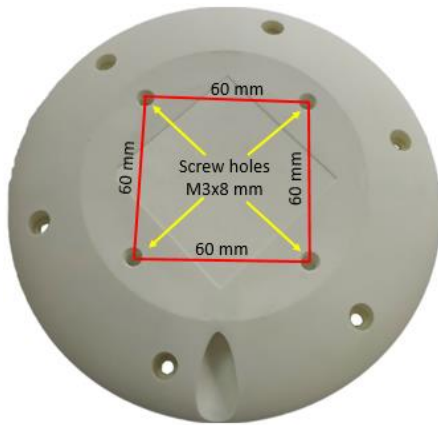
GR-9029 includes a disk body and a control cable.

- The control cable is by default 70cm long. The cable length is customizable with MOQ.
 - The button is used to control power ON/OFF and position tagging.
 - The USB type C connector is used for charging.



1.2 Fixing Screw Holes

At the bottom of the GR-9029 disk, there are four screw holes of M3x8 (mm). These four screw holes are located at the four corners of a rectangle with edge length of 60 mm as shown below.



One can attach a tripod, a selfie stick, or anything else via these 4 screw holes with screws of size M3x8.

For example, one option of pedestal with four magnets at the feet is attached to the



disk with 4 M3x8 screws as shown above.

Another example shown below is to attach a selfie stick to the disk via a metal plate.



1.3 Power ON/OFF

At the end of the cable, there is a button for power control and position tagging.



- When power is OFF, touch the button, LED blinks to indicate power ON.
- When power is ON, a button press would tag the current position for reference.
- Hold the button (for about 3 seconds), LED would be OFF to indicate power OFF.
- In case of BLE connection loss for 3 minutes, it would power OFF automatically to save power.

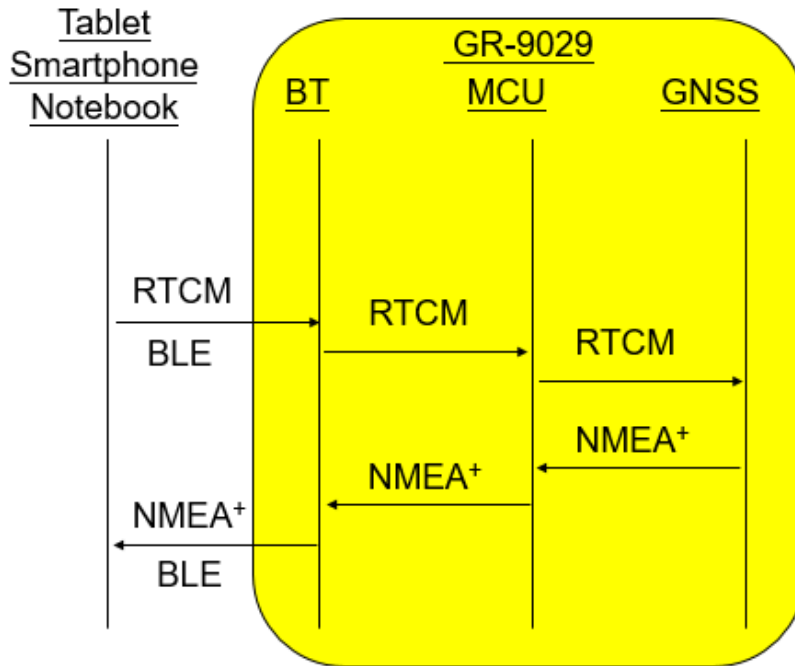
1.4 Charging

A USB type C cable is used for charging. Amber LED is OFF when charging is done.



1.5 RTCM

Applications running on devices like smartphones, tablets, notebooks etc. could communicate with GR-9029 via BLE/RTCM to get the RTK precise positions which could be used for precise navigation, measurement, data logging etc. The RTCM data is typically encapsulated in NTRIP.



In following description, we take an example of NTRIP application running on an iPad.

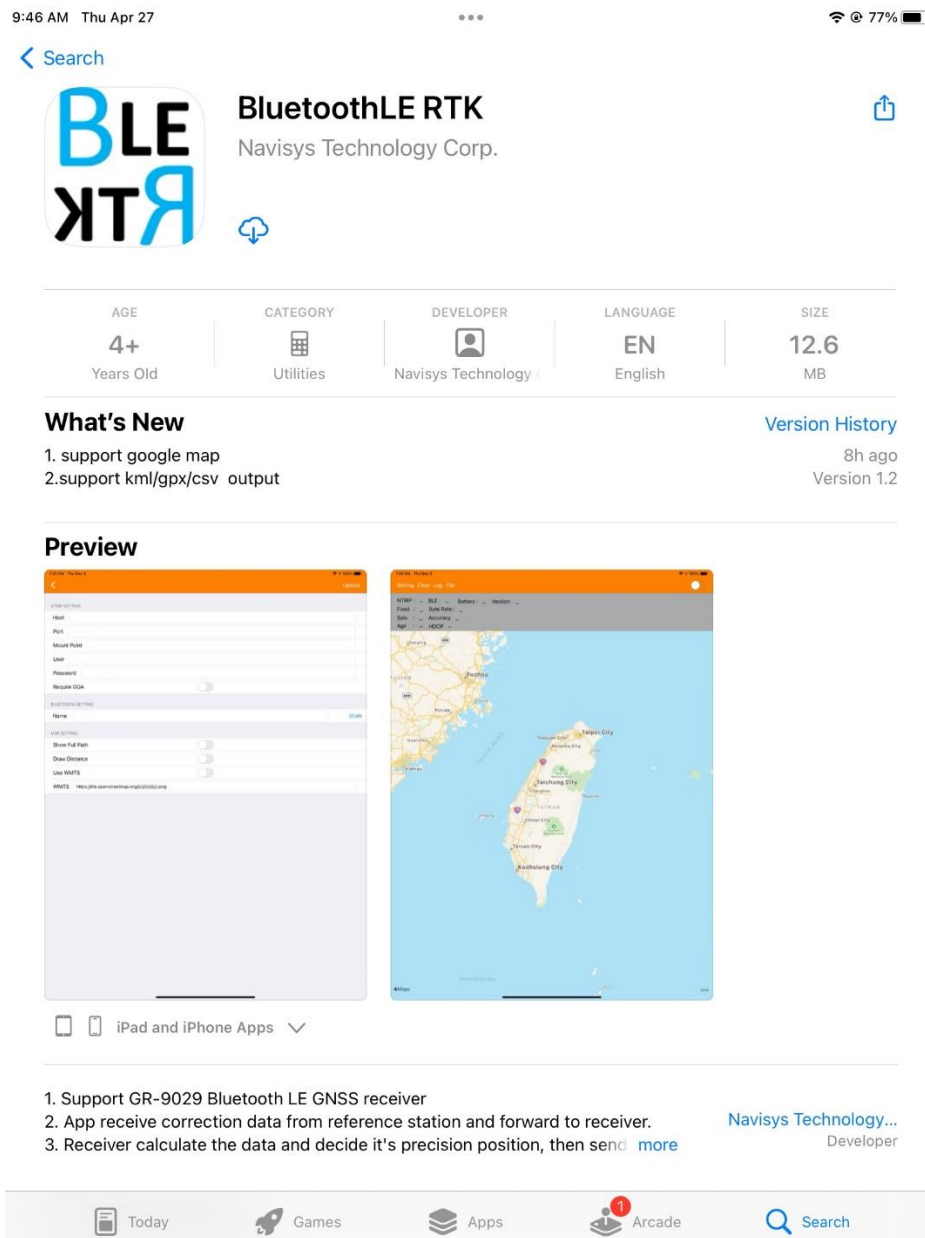
- The iPad should have the internet access to receive the RTK correction data from a base or caster. Before having the correction data, one needs to setup the caster information on the iPad. Please see next section for an example.
 - iPad sends the RTK correction data continuously to GR-9029 via a BLE connection.
 - iPad receives the RTK calibrated position data from GR-9029 via a BLE connection. The NMEA+ data is by default 1Hz RMC sentence and 10Hz u-blox proprietary PUBX sentence.
- ☛ Please be noted that the maximum update rate of internal RTK chip is 8Hz. Output in 10Hz would result in some data loss. The loss is for a full, not partial, sentence. In following example, sentence of 064524.90 was lost. The observed loss rate is up to about 7% with good communication quality.

```
$PUBX,00,064524.60,2446.41789,N,12100.36826,E,122.777,D3,0.014,0.013,35.397,293.23,-0.044,1.6,0.56,0.87,0.58,28,0,0*64
$PUBX,00,064524.70,2446.41810,N,12100.36773,E,122.778,D3,0.014,0.015,35.351,293.29,-0.083,1.7,0.56,0.87,0.58,28,0,0*66
$PUBX,00,064524.80,2446.41832,N,12100.36719,E,122.803,D3,0.014,0.013,35.442,293.42,-0.052,0.8,0.60,0.95,0.64,28,0,0*63
$PUBX,00,064525.00,2446.41873,N,12100.36611,E,122.820,D3,0.014,0.014,35.534,292.82,-0.094,1.0,0.60,0.95,0.64,28,0,0*6E
$PUBX,00,064525.10,2446.41894,N,12100.36557,E,122.836,D3,0.014,0.012,35.530,292.72,-0.084,1.1,0.60,0.95,0.64,28,0,0*6D
$PUBX,00,064525.20,2446.41916,N,12100.36504,E,122.846,D3,0.014,0.012,35.693,292.76,-0.108,1.2,0.60,0.95,0.64,28,0,0*6C
```

2 BluetoothLE RTK APP

2.1 Where is the APP

An iOS-based APP (BluetoothLE RTK) is prepared for the evaluation of GR-9029. One can download to test it from the **App Store** as shown below. That is to say, this APP could be used on iPad, iMac, or iPhone. You are welcome to give us suggestions on this APP. APP customization is welcome to meet your specific demand. We sincerely hope that it could be helpful to your business.



2.2 Major Functions

Three rectangles were marked below for description of different functions.



The green rectangle is for the major menu including following functions.

- **Setting** for NTRIP caster, Bluetooth, Map etc.
- **Clear**: to clear the path on the map
- **Log**: to start or stop the logging. The logged filename is default to be Logyyyy-mm-dd-hh-mm.ubx similar to the right one `Log2023-04-21-17-30.ubx`. Where, yyyy-mm-dd-hh-mm is the time that one starts the log.
- **File**: the logged files are visible here.
- : to select a suitable map for display

2. Red rectangle: Toggle the switch to connect or disconnect the BLE of GR-9029.

3. Blue rectangle is for the connection status (BLE), battery level (GR-9029), firmware version (GR-9029), base communication status, battery level (reserved for local base), RTCM data rate in byte/sec, position (GR-9029) fix status, number of satellites used in fix, RTCM data age, HDOP etc.

In addition, there are three colors associated with a human icon on the map to indicate different position fix status.

- Red No RTCM data for RTK fix,
 - Fixed_GPS: normal GPS fix, in multi-meter-level accuracy
 - Fixed_DGPS: Differential GPS fix, in meter-level accuracy
- Blue Fixed_FloatRTK: receiving RTCM data, not yet RTK fix or RTK fix just lost, in submeter-level accuracy

- Green  Fixed_RTK: in cm-level accuracy

2.3 Settings

Click the **Setting** function in green rectangle described above, one would be able to configure RTK Base/Bluetooth/Map settings and will see window below.

<
Update

BASE SETTING

Enable

BASE SOURCE

NTRIP Server >

Host

Port

Mount Point

User

Password

Require GGA

BLUETOOTH ROVER SETTING

Name SCAN

MAP SETTING

Show Full Path

Draw Distance

Use Meric System >

Use WMTS

WMTS

- RTK Base setting

- **Enable** If RTK function would be used, please enable the base setting.
- Requires the host address, port number, mounting point, authentication (user, password) information for accessing the caster/private base.
- **Require GGA** Some RTK servers support multiple RTK bases. To provide the nearest RTK correction data (i.e. shortest baseline), the server may require the GGA for the position of the RTK rover so that correction data from nearest RTK base could be provided. In this case, turn on this function and the APP will send the location, by GGA, of the iPad to the server automatically (currently once per 10sec) to keep shortest baseline. If a local base is used, turn off this function.

- Bluetooth setting

- **Name** gives the Bluetooth name of the discovered GR-9029. Please click the **SCAN** function to discover all Bluetooth devices in the neighborhood. The default name of GR-9029 is started with "NPASP-".

- Map setting

- Allows one to choose GPS position display option, measure distance, and use one's own map for display. For the details, please see next section.

☞ Editing in this window is not effective until **Update** is applied. Please remember to click the **Update** icon on the upper right corner to enable the changings made on **Setting**.

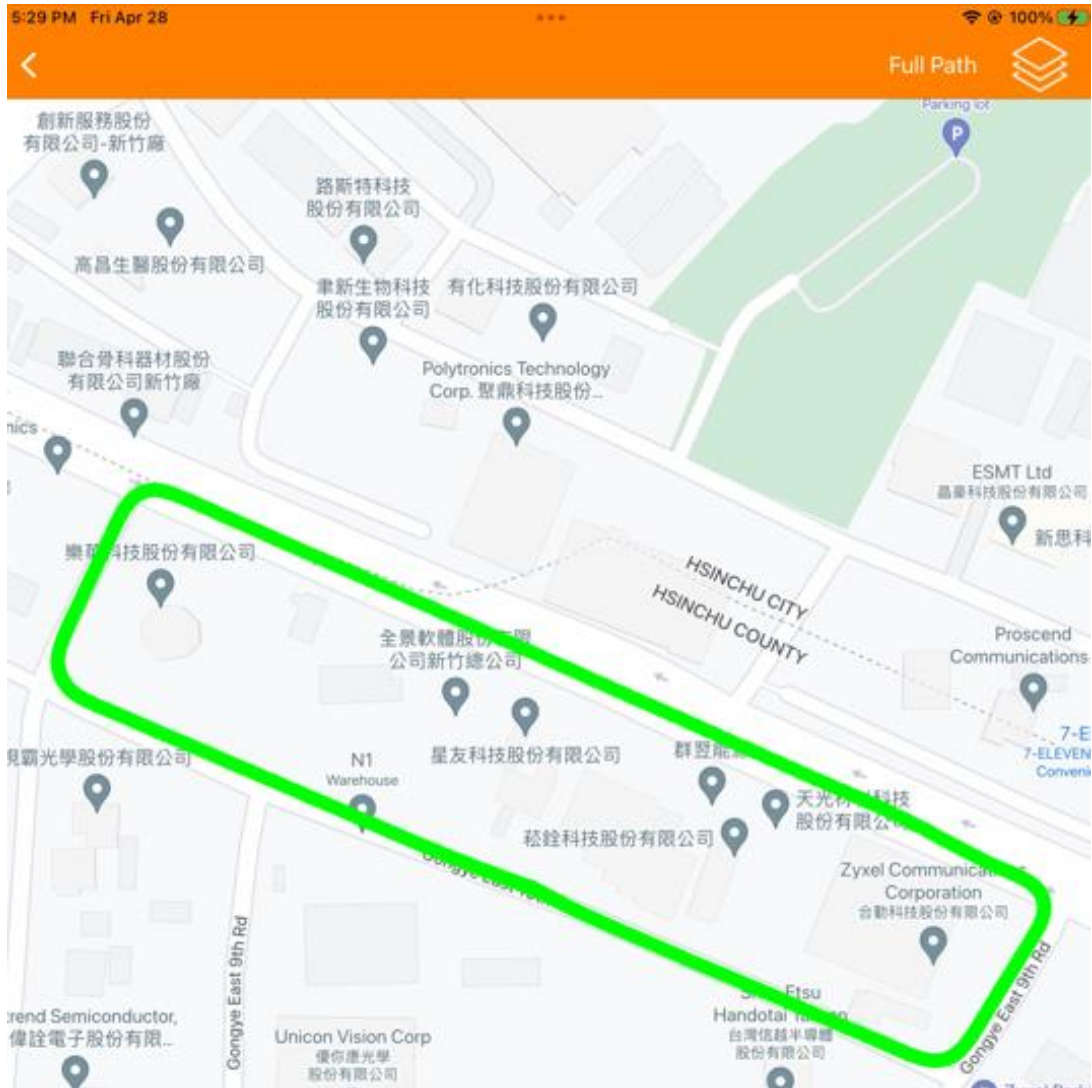
2.4 Map Setting

There are four sub-functions under this item.

1. Show Full Path

This option controls the display of received data or a logged file on a map.

- If **Show Full Path** option is turned on, all logged data would be displayed on the map. Here is an example path around a block in Hsinchu Science Park, Taiwan.



- If **Show Full Path** option is turned off, only the position data tagged by the button of GR-9029 is displayed on the map. If a position is tagged, a line with “\$KEYPRESSED” would be following it. The tag means the user has pressed the button on the control cable of GR-9029. For example, following two lines were received by the APP. However, only the second line data is displayed because of the \$KEYPRESSED line is following it.

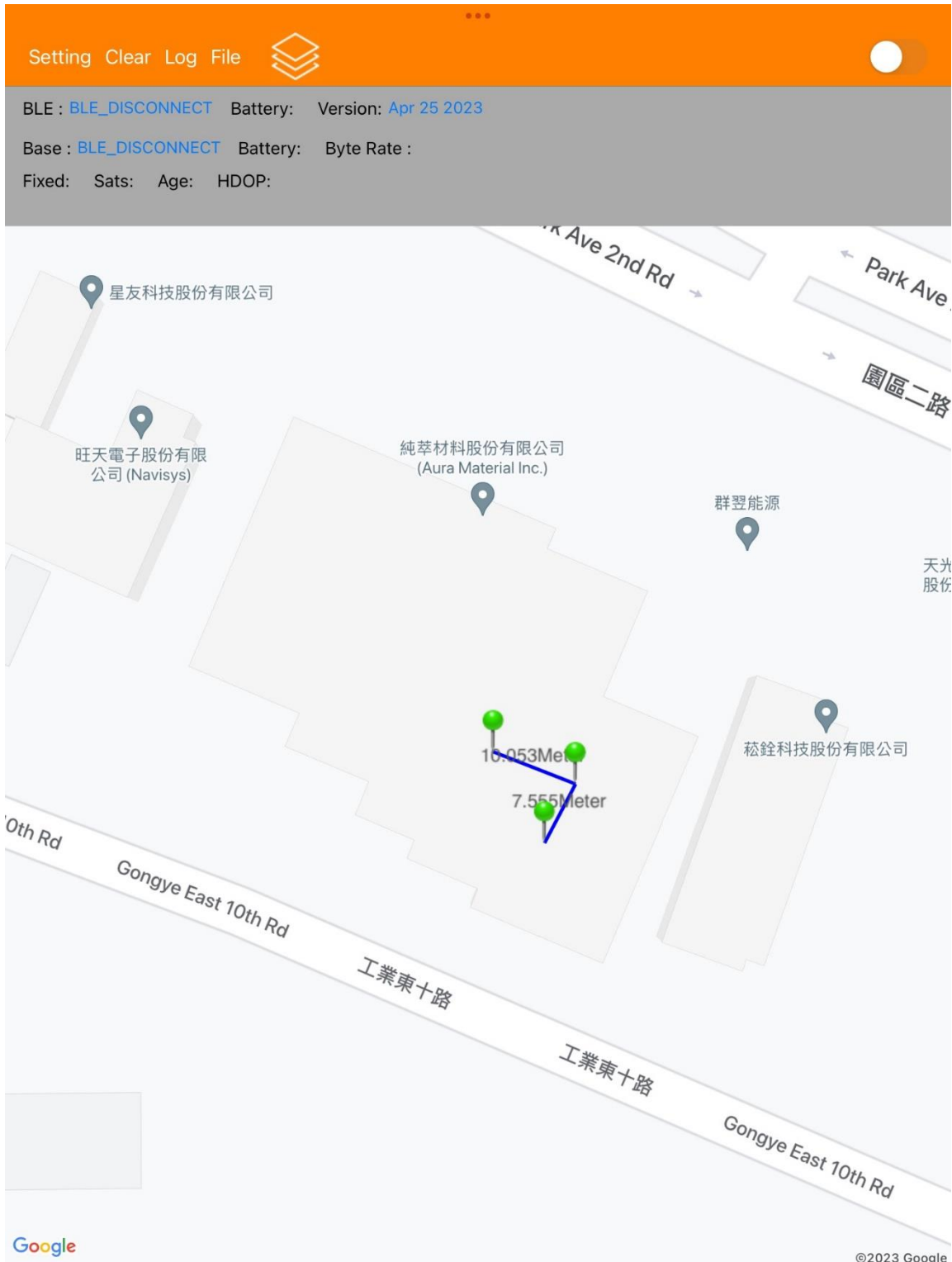
```
$PUBX,00,090544.60,2446.41394,N,12100.43551,E,138.562,D3,0.014,0.010,0.037,351.01,0.016,0.6,0.57,1.22,0.84,27,0,0*7A
```

```
$PUBX,00,090544.70,2446.41394,N,12100.43551,E,138.565,D3,0.014,0.010,0.050,351.01,-0.037,0.7,0.57,1.22,0.84,27,0,0*52
```

```
$KEYPRESSED
```

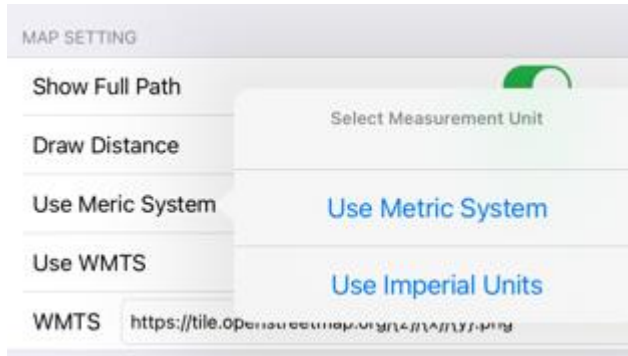
2. Draw Distance

There could be multiple points shown on the map. This function allows one to measure the distance between any two points. Following picture is an example.



3. Unit System Selection

Clicking on **Use Metric System** or **Use Imperial Units** allows one to change between two unit systems.



The estimated horizontal accuracy (hAcc) and vertical accuracy (vAcc) would also be displayed with the selected unit system.

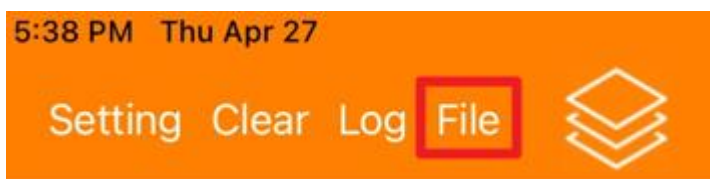


4. Use WMTS (Web Map Tile Service)

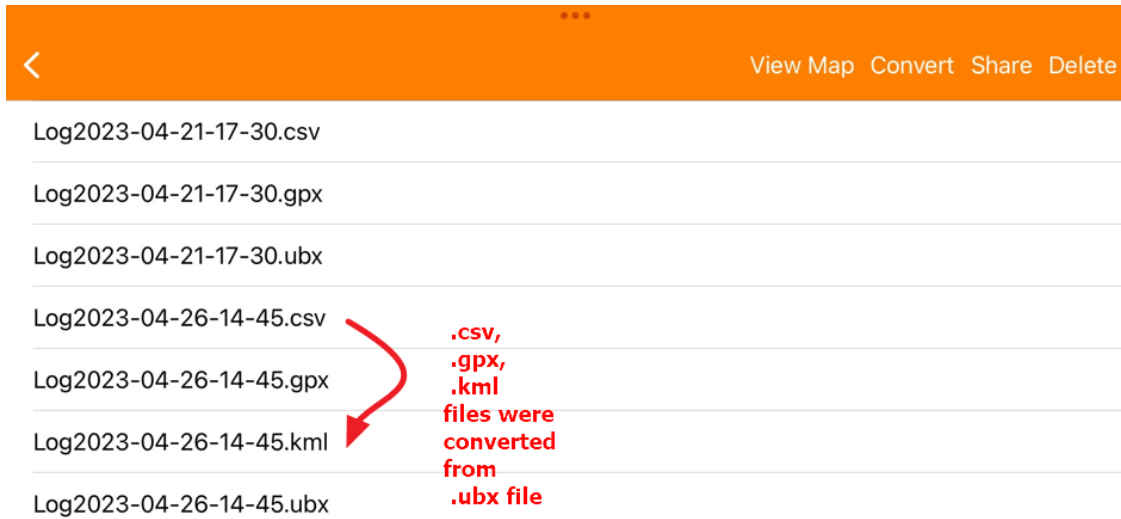
In addition to the default map, one can add one's own map by the WMTS service function.

- Just key in the WMTS URL for the new map is ok. The default one is Google map. The one shown in the screenshot above is for an Open Street Map.
- For example, if you have a pipeline map, and you want to find the specific location of a pipe, this would be a very useful function.

2.5 Logged Files



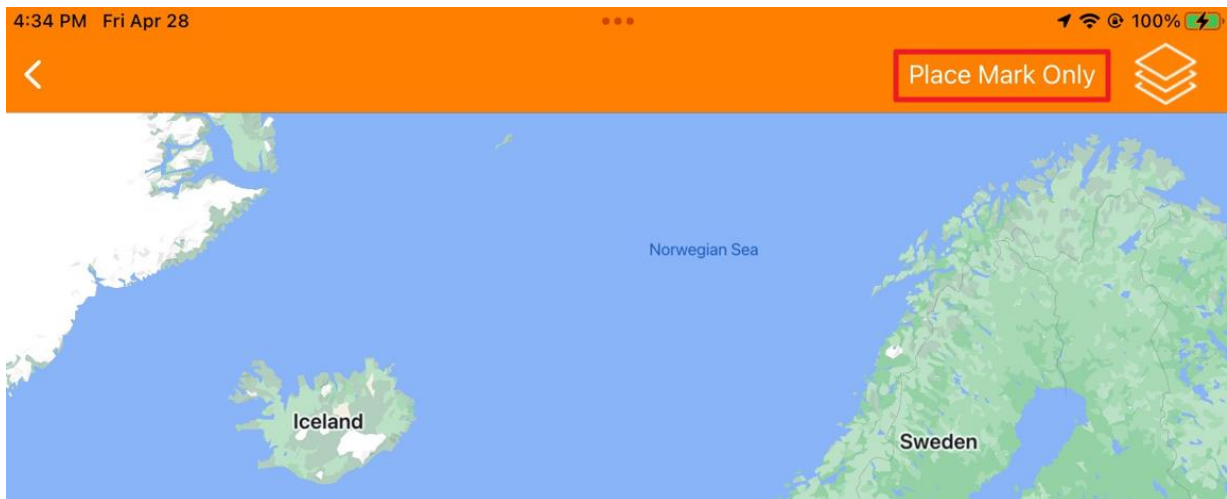
As the log function is enabled, a new file is created. Clicking on **File**, one would see all the logged files similar to following snapshot.



Please be noted that a file is created with filename extension of .ubx. One can select a file to view path on map, convert to another format, share, or delete it as shown below.

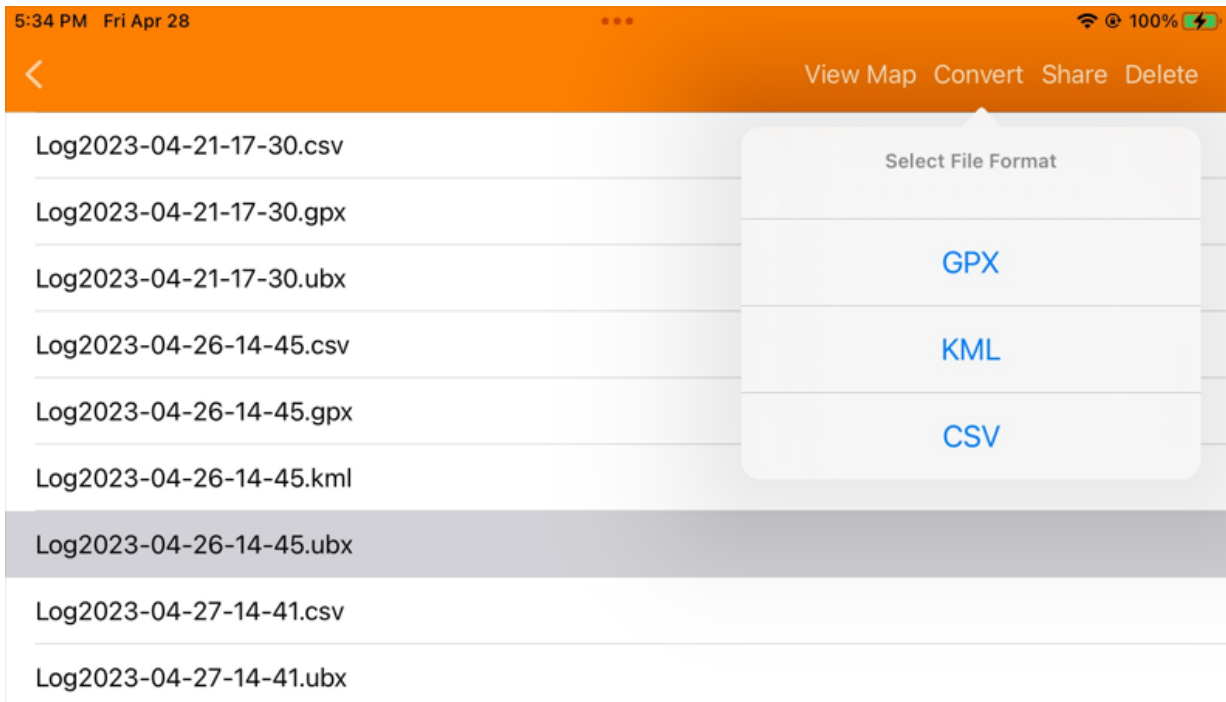
View Map

In case the map does not show the expected location, please try to tap **Place Mark Only** on the upper right.



Convert

One can convert the logged .ubx file to other formats. Currently, GPS, KML, and CSV are supported. Please be noted that in case multiple files were selected, only the first one would be used for conversion.



The Share and Delete functions are straightforward, just select the file and then the function to do it.

2.6 Map Selection



When view a file, one can choose different maps as shown below.

