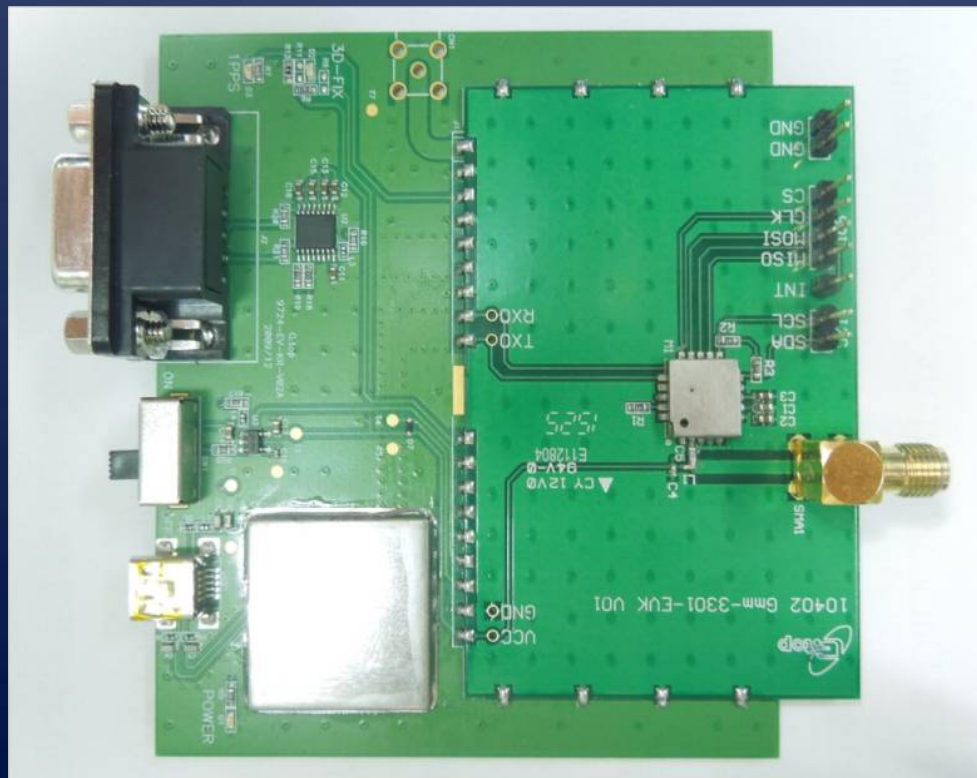


GlobalTop Technology Inc.

FireFly X1 EV-Kit User Manual (I²C & SPI function test with Arduino UNO)

Revision: A01



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Version History

Title: Gmm-3301 for Arduino UNO User Manual

Subtitle: GNSS Module

Doc Type: User Manual

Revision	Date	Author	Description
A00	2015-09-30	Benson Archie Lin	Preliminary
A01	2016-11-02	Archie Lin	Modifying the sections 4.2 & 4.3 Logo changed to new version

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Preface

- Global navigation satellite system (GNSS) is an overall category of GPS+GLONASS and BeiDou GPS+ Beidou-2(COMPASS).
 - ↪ GPS is the property of American Ministry of National Defense.
 - ↪ GLONASS is operated by Russian Aerospace Defense Forces for the Russian government.
 - ↪ Beidou-2 system, also known as “Compass”, is established by China. The system has been commercially operational since the end of 2012. Beidou-2 is currently a constellation of 16 satellites (will ultimately be 35) providing worldwide positioning, navigation and timing services to the Asia-Pacific region.

The abovementioned countries are fully responsible for the preciseness and maintenance of the systems. Any changes they implement to the system in the future may enhance or deteriorate the effectiveness and performance of the received GNSS data.

- The GNSS signal might be cut-off or become severely weakened if the EV-kit is operated inside any infrastructures such as buildings, tunnels, or any huge obstructive objects nearby. The kit works best under open sky.

Items in the Package

The package includes following:

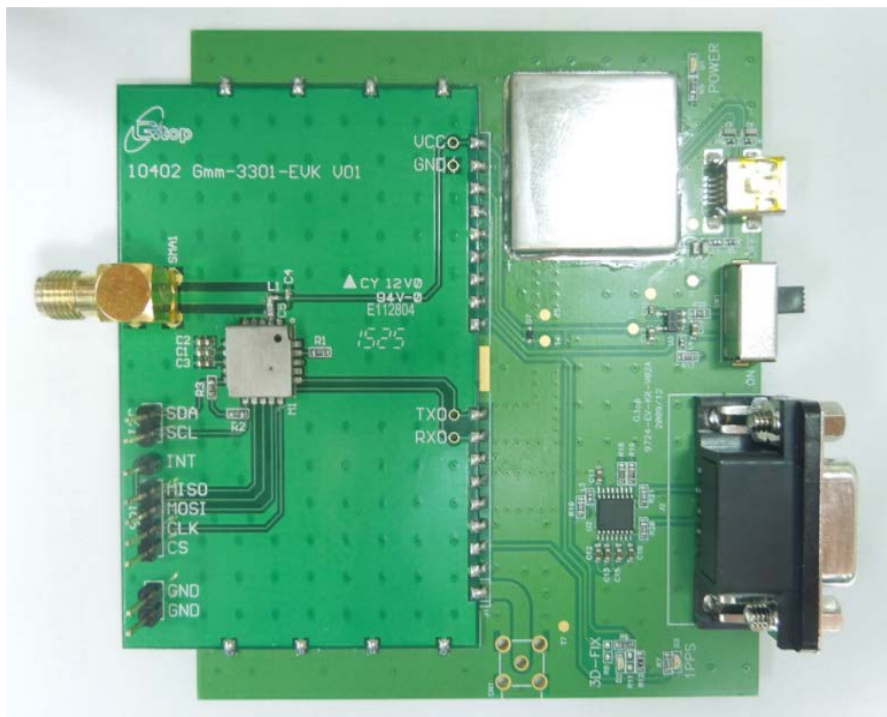
- Arduino tool with user manual*
- Arduino Project code*
- FireFly X1(Gmm-3301) EV-kit user manual*
- USB Cable
- FireFly X1(Gmm-3301) EV-Kit board
- External Antenna

Note: The items with an asterisk* will be delivered by E-mail. Please contact your dealer for the items for more information.

1. Introduction

The main purpose of the EV-kit is to simplify evaluation process for GNSS modules and to help testers operate our products with convenience and ease.

The FireFly X1 EV-kit can communicate with other interface via I2C/SPI (in this case, we use Arduino UNO board to connect Gmm-3301). It must be used in conjunction with the software “GPS Viewer”, for users to monitor all GNSS module data such as satellite status, time-to-first-fix (TTFF), date and time.

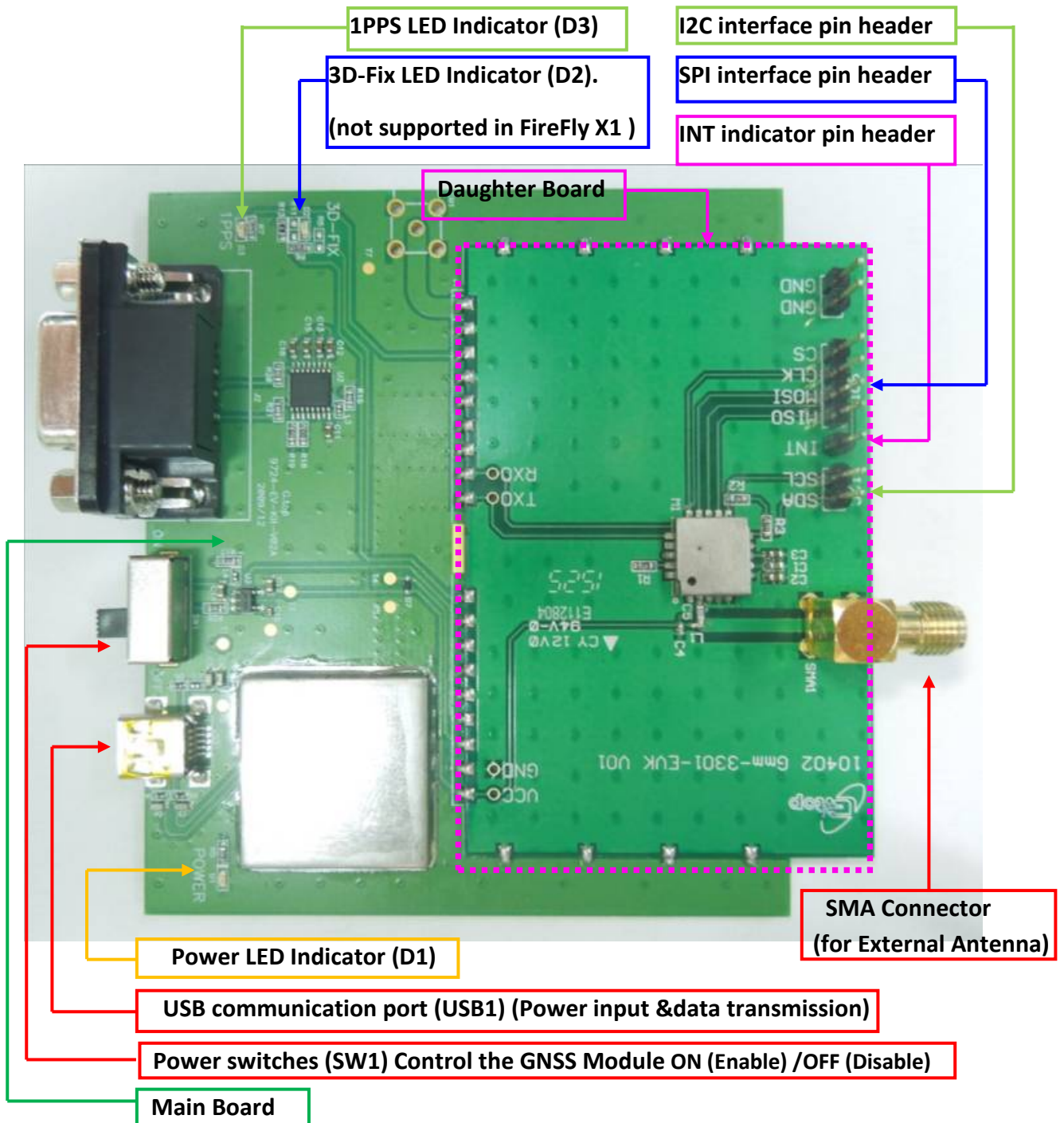


FireFly X1 (Gmm-3301) EV-kit

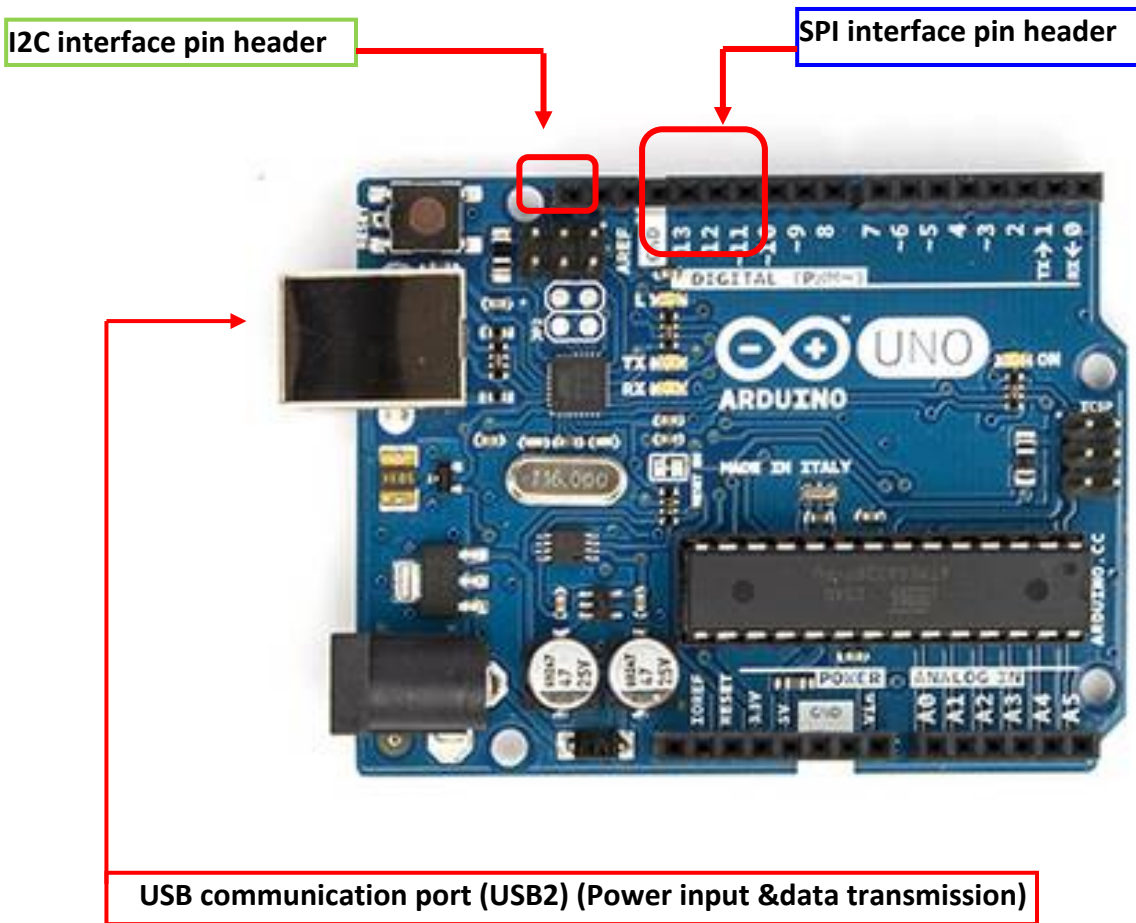
2. Function Description

2.1 Hardware overview:

a. FireFly X1 Gmm-3301 EV-kit



b. Arduino UNO Board



3. Operation Instruction

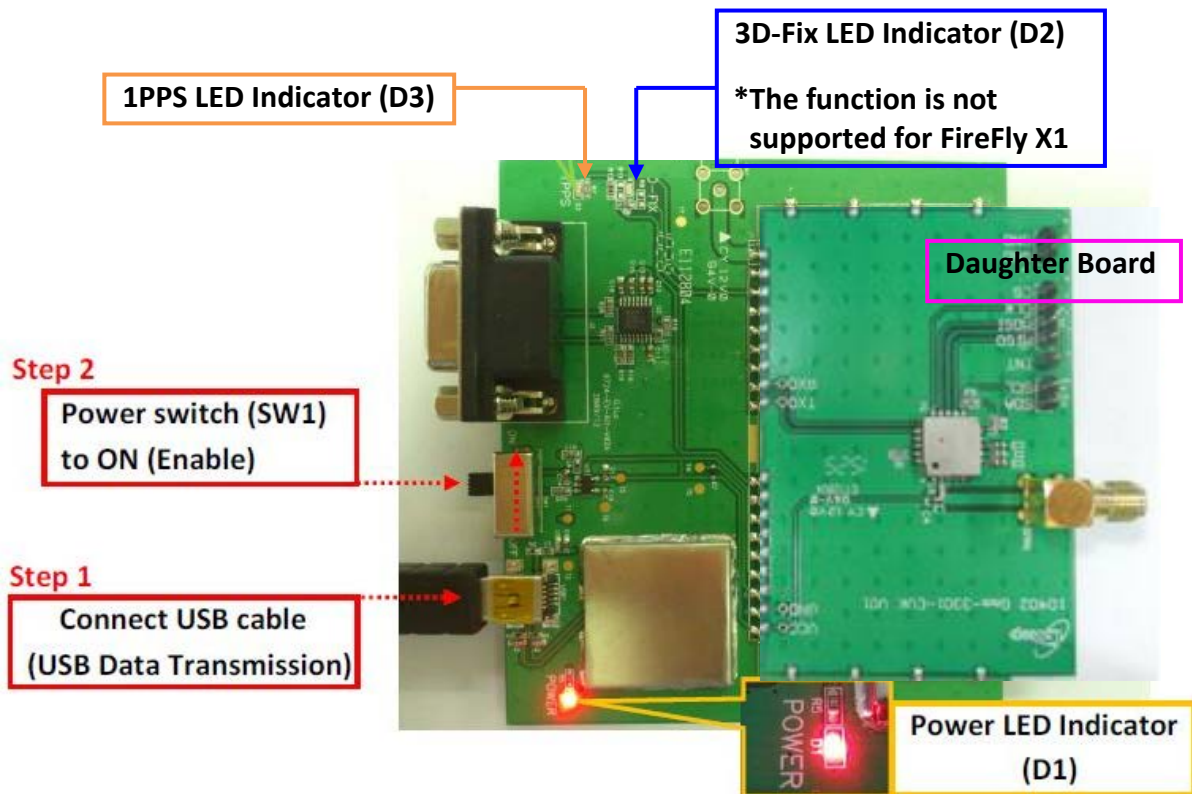
3.1 Connecting FireFly X1 EV-kit

Step 1. Connect USB cable to the EV kit and PC:

- The USB cable supplies power for the EV-Kit and transmits data between EV-kit & PC.
- *Make sure the Power LED Indicator (D1) is lighted on.

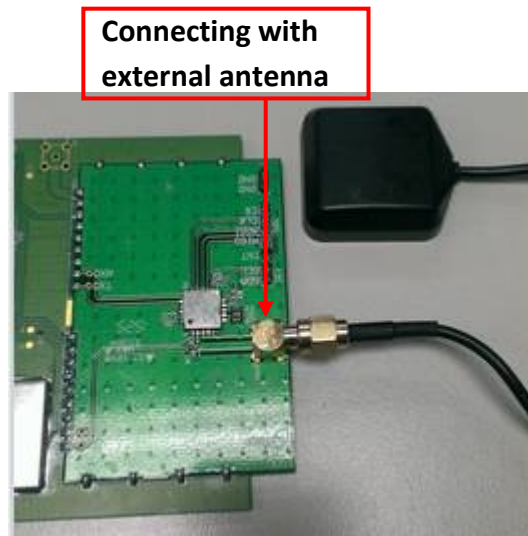
Step 2. Toggle the switch (SW1) from right to left for power supplying to GNSS module:

- Once the Power LED Indicator(D1) is on and switch(SW1) is toggled, the power will go through to the mother board (D1) and the daughterboard.



3.2 Application for external RF reception

a. Attaching external antenna with GNSS modules on FireFly X1 EV-kit:



3.3 Application for Arduino UNO Board (connecting to HOST)

Step 1. connect USB cable to the board and PC :

- Connect the USB cable to the PC and the EV-Kit board. The USB cable is used to power on the EV-Kit and to transmit data.
- * Make sure the Power LED Indicator (ON) is lighted on.



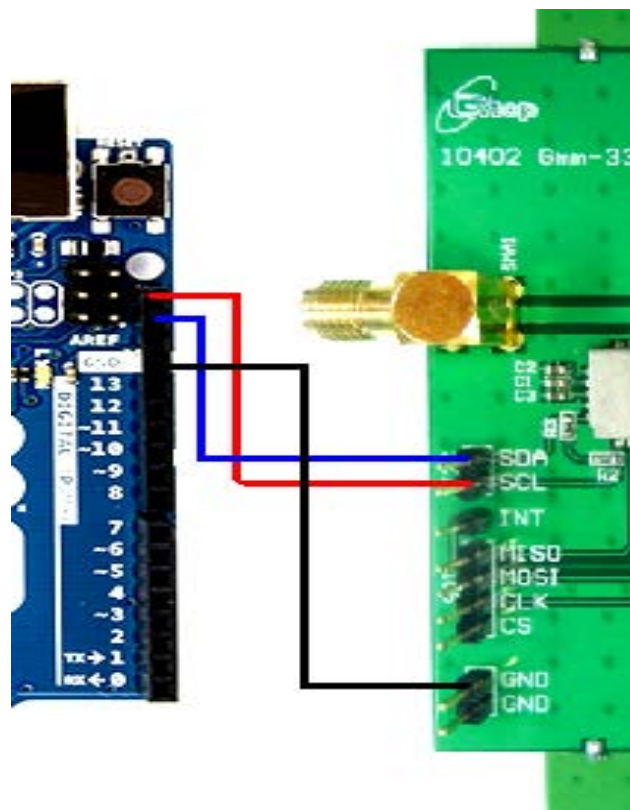
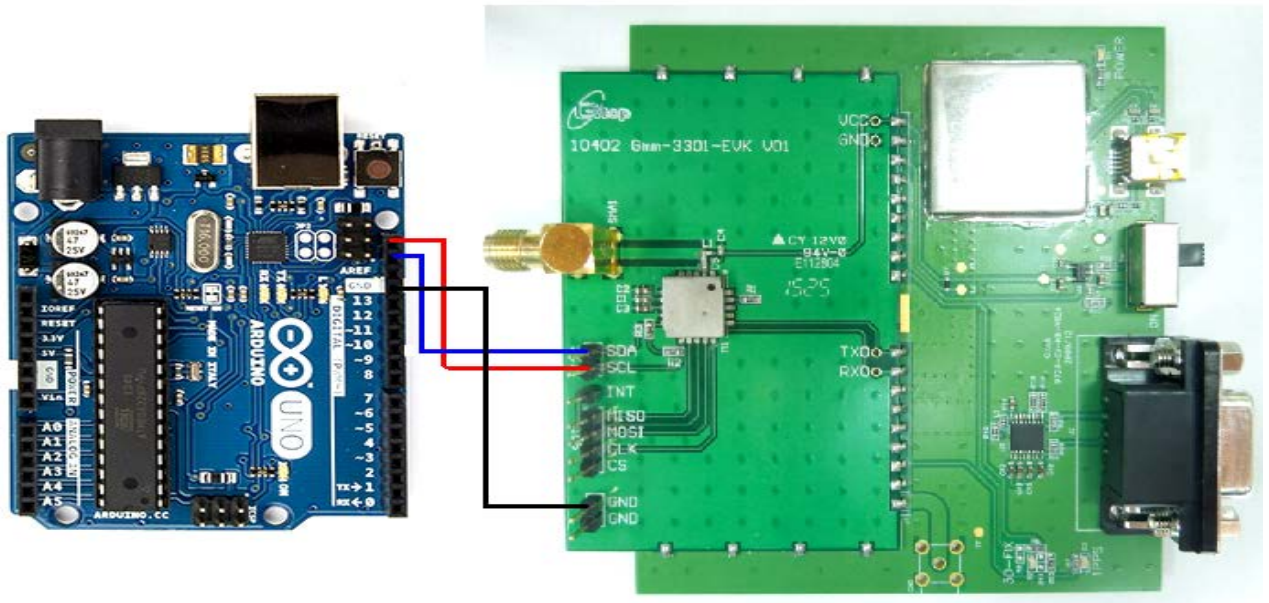
Step 2. Connecting Arduino UNO board with FireFly X1 EV-Kit

a. I²C interface

SDA: SDA on FireFly X1 ↔ SDA on ARDUINO UNO board

SCL: SCL on FireFly X1 ↔ SCL on ARDUINO UNO board

GND: GND on FireFly X1 ↔ GND on ARDUINO UNO board



b. SPI interface

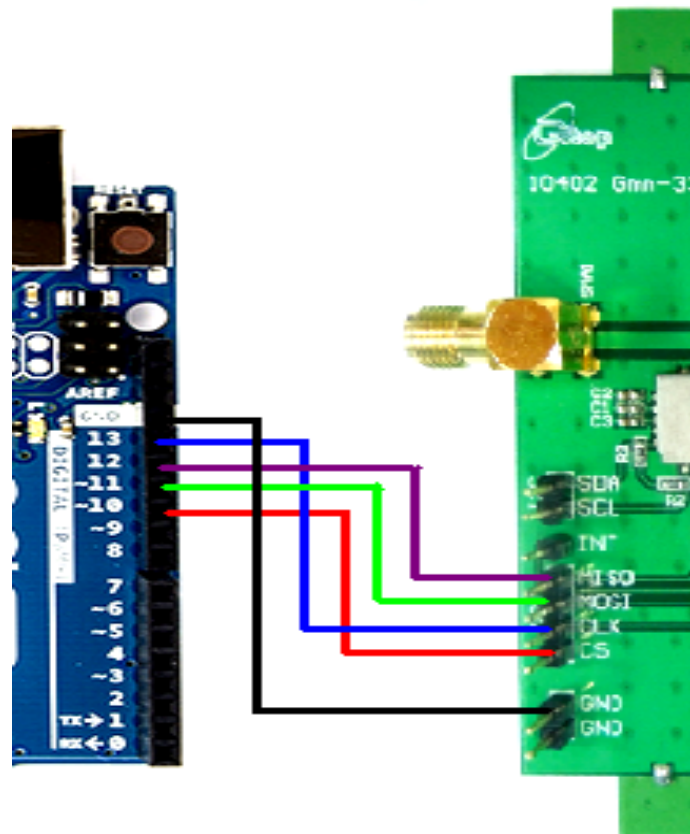
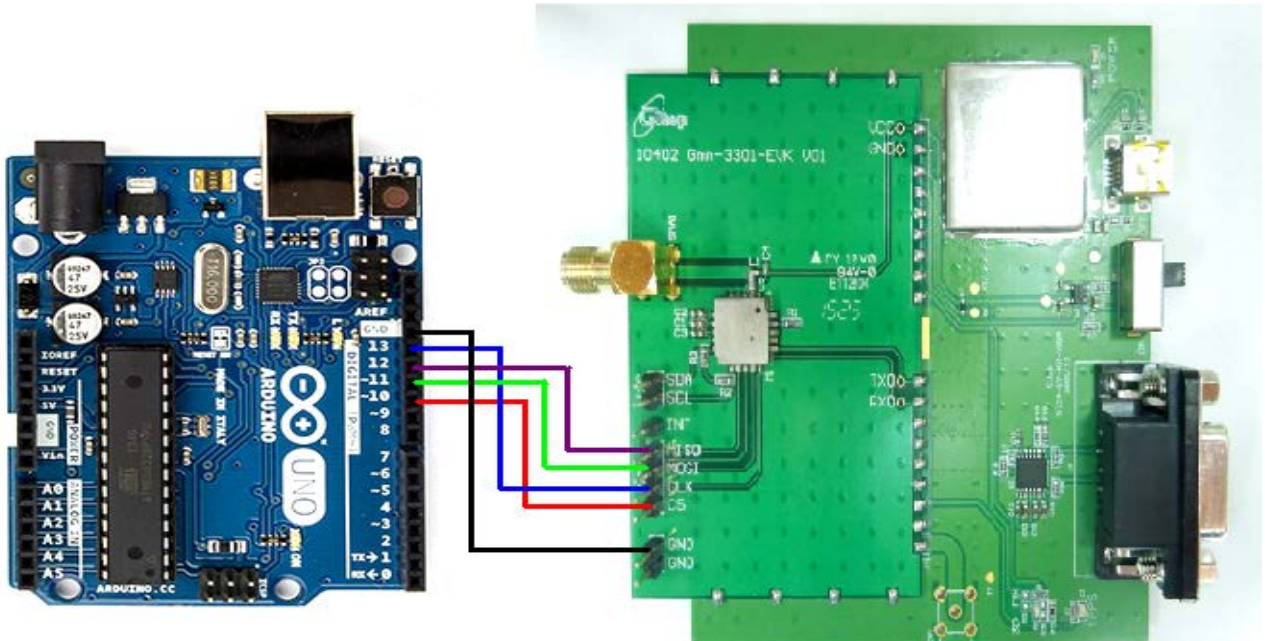
MISO: MISO on FireFly X1 \leftrightarrow pin 12 on ARDUINO UNO board

MOSI: MOSI on FireFly X1 \leftrightarrow pin 11 on ARDUINO UNO board

CLK: CLK on FireFly X1 \leftrightarrow pin 13 on ARDUINO UNO board

CS: CS on FireFly X1 \leftrightarrow pin 10 on ARDUINO UNO board

GND: GND on FireFly X1 \leftrightarrow GND on ARDUINO UNO board



4. Using the Software

4.1 System requirement

PC: IBM, Pentium or above or compatible PC ◦

Operation system: Windows 7/XP/2003/Vista

Arduino tool: Arduino UNO

4.2 Arduino and GPS viewer



Please check whether you have the correct USB driver before you proceed to next step.
Without correct driver, the EV-Kit will not function.

➤ **Arduino software download link:**

<https://www.arduino.cc/en/Main/Software>

➤ For **GPS viewer.exe**, please contact your distributor or Gtop sales
(sales@gtop-tech.com) for these 2 files.

4.3 Arduino Software operation for I²C or SPI

Step 1. Open ARDUINO tool

- Click “GPS_I²C.ino” or “GPS_SPI.ino” to open the file



GPS_I2C.ino
Arduino file
24 KB



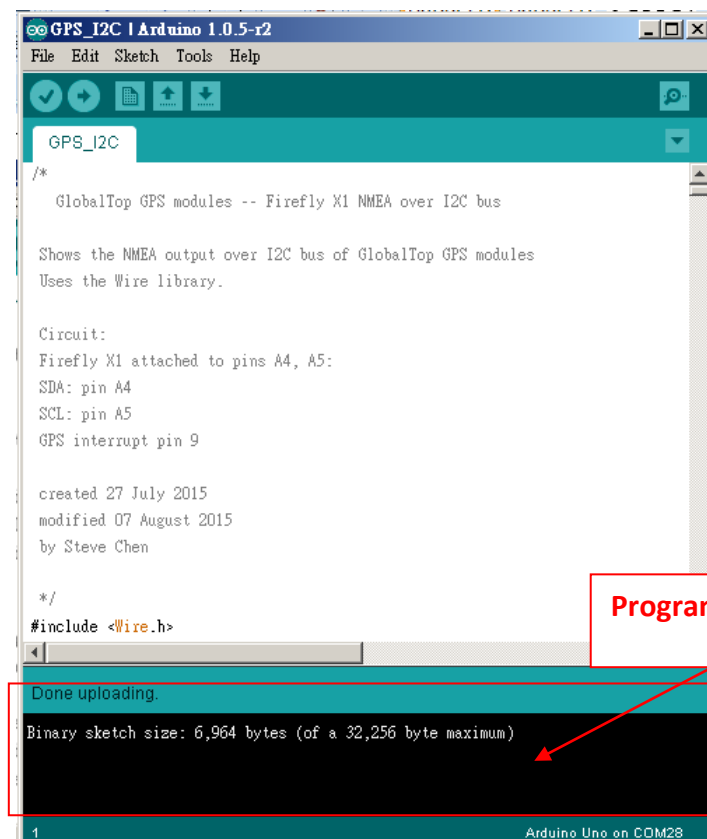
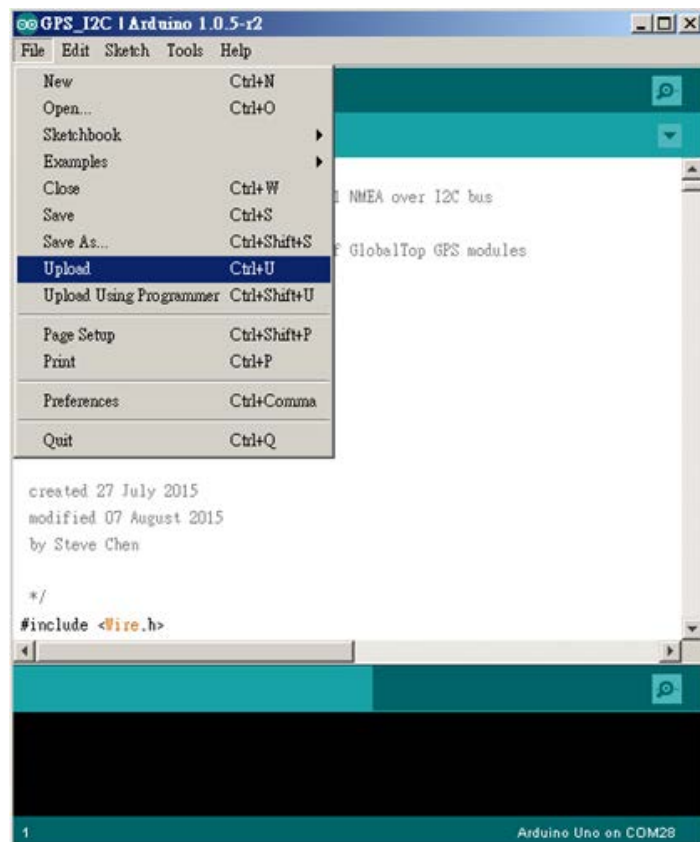
GPS_SPI.ino
Arduino file
25 KB

Step 2. Monitor showing the tool and code

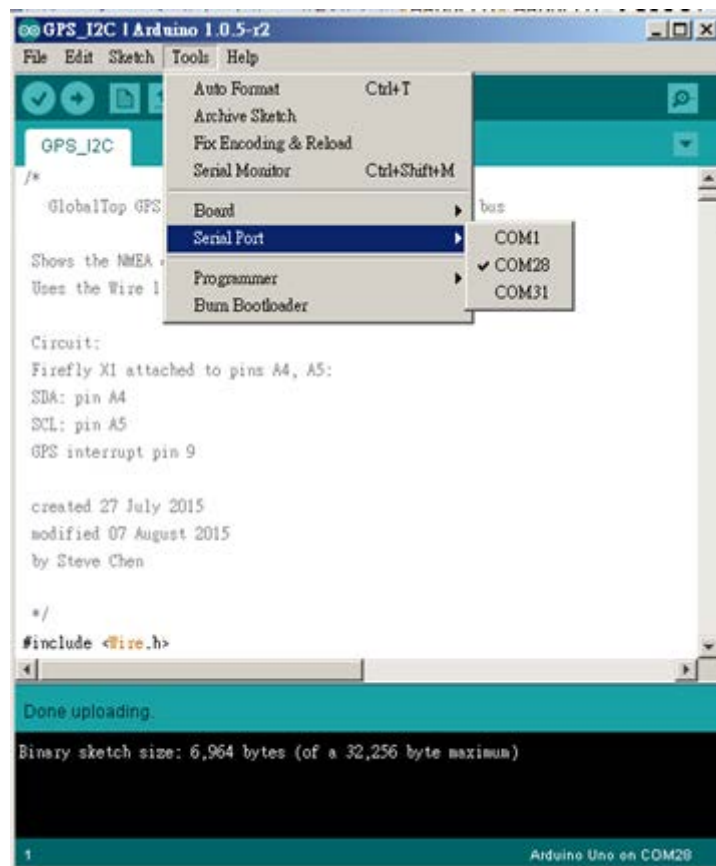
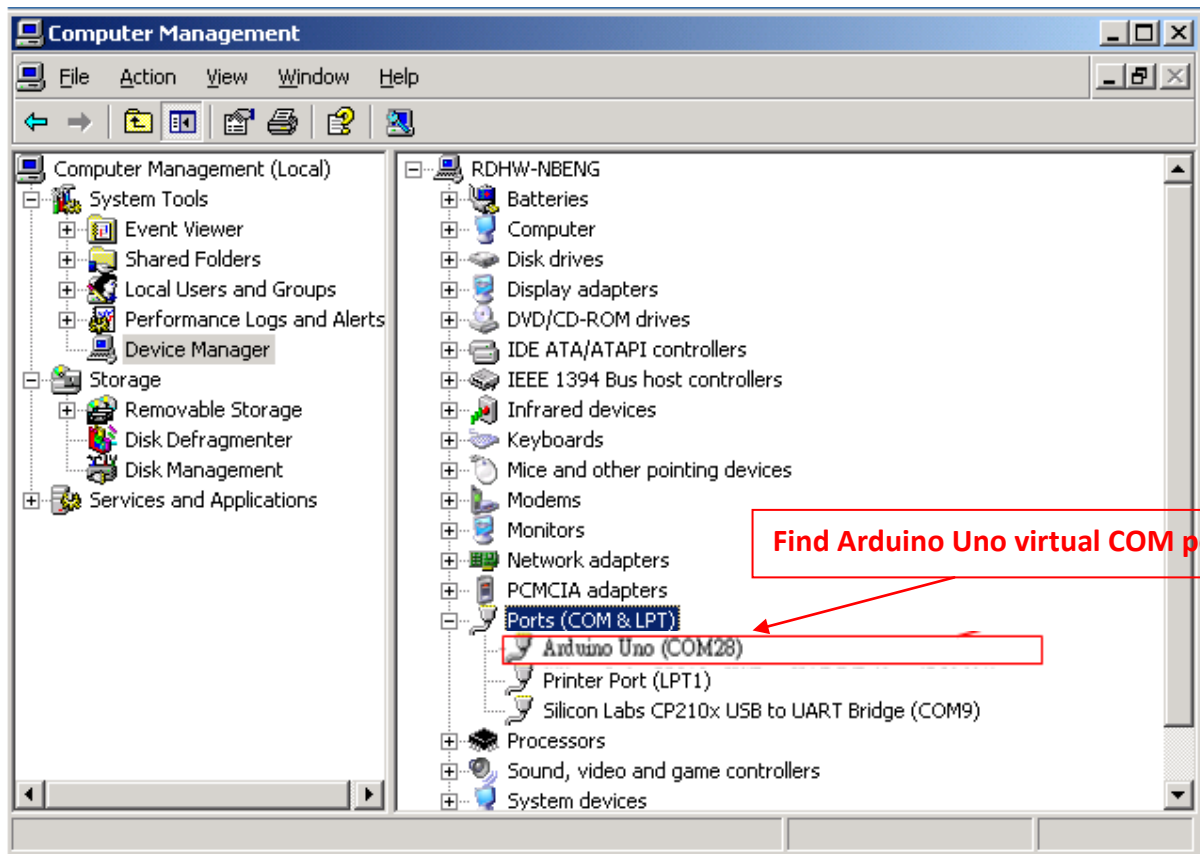
```
/*  
  GlobalTop GPS modules -- Firefly X1 NMEA over I2C bus  
  
  Shows the NMEA output over I2C bus of GlobalTop GPS modules  
  Uses the Wire library.  
  
  Circuit:  
  Firefly X1 attached to pins A4, A5:  
  SDA: pin A4  
  SCL: pin A5  
  GPS interrupt pin 9  
  
  created 27 July 2015  
  modified 07 August 2015  
  by Steve Chen  
*/  
#include <Wire.h>
```

Step 3. Programming ARDUINO UNO

- Click “File”, then select “Upload ” from the drop-down menu for programming.



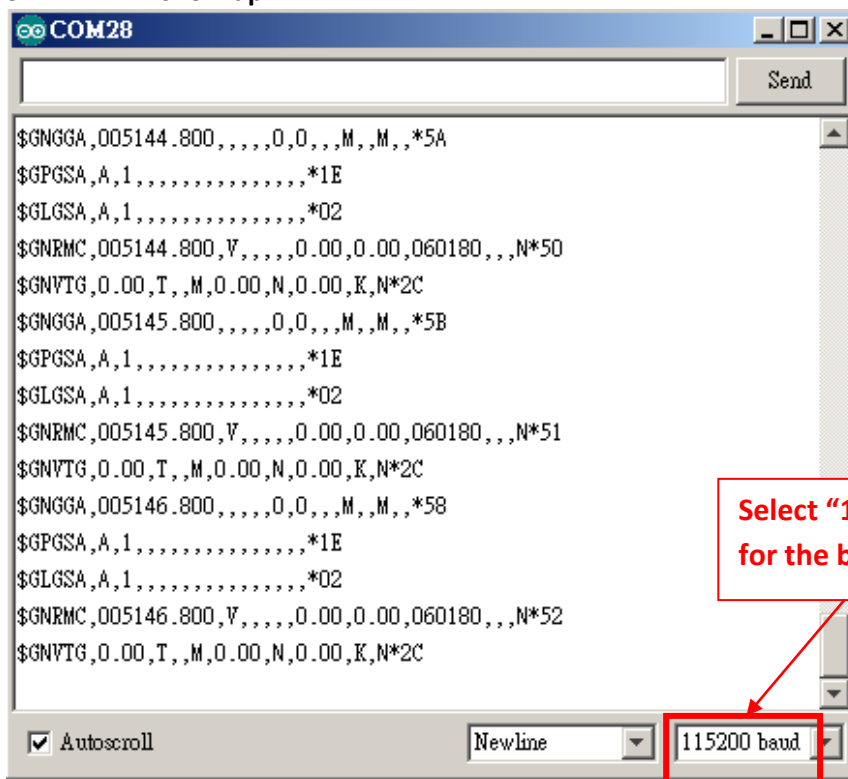
Step 4. Setup the COM port



Step5. Click “Tools” and then open “Serial Monitor”



Step6. GPS NMEA will show up

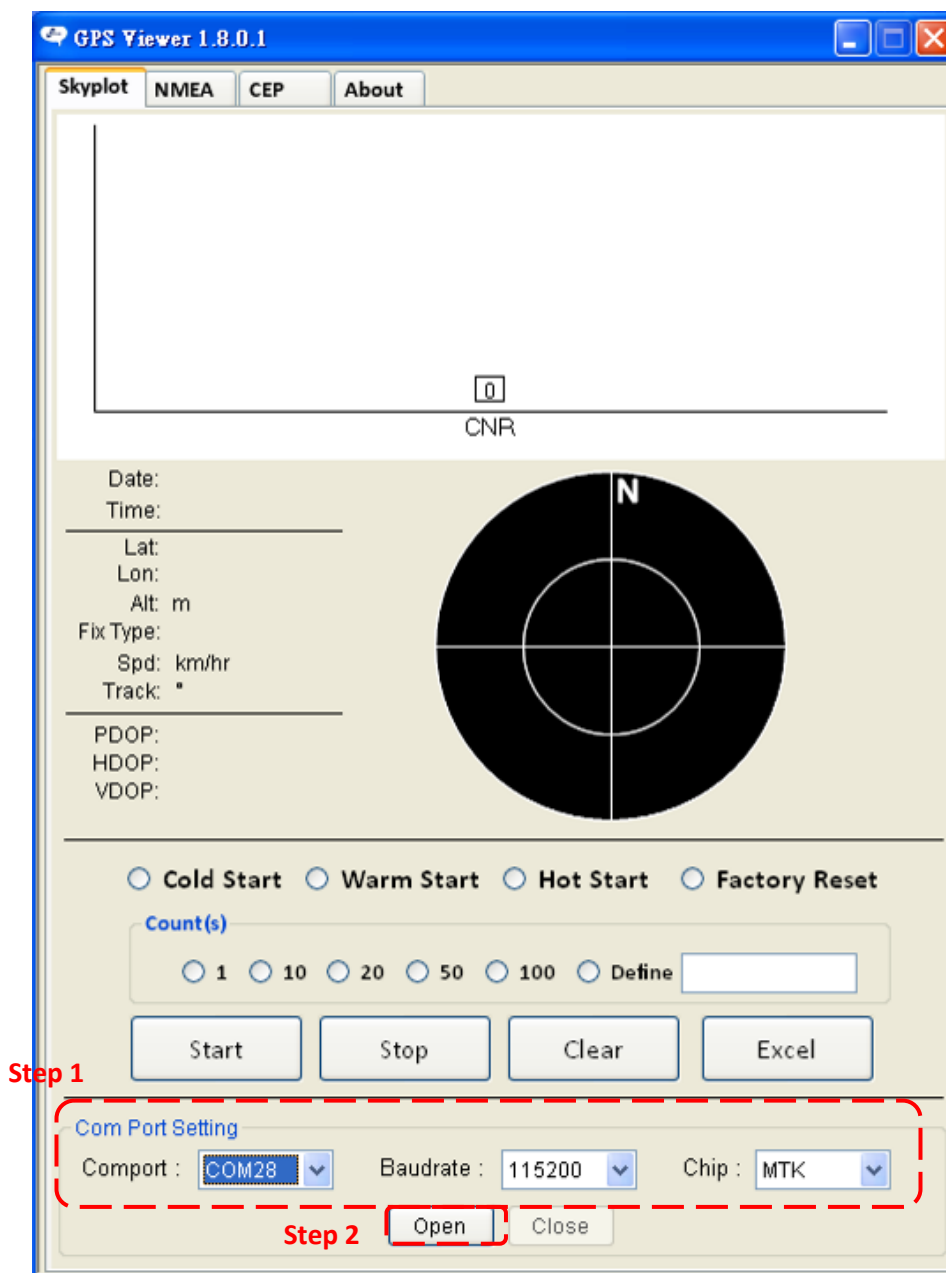


4.4 Using GPS Viewer

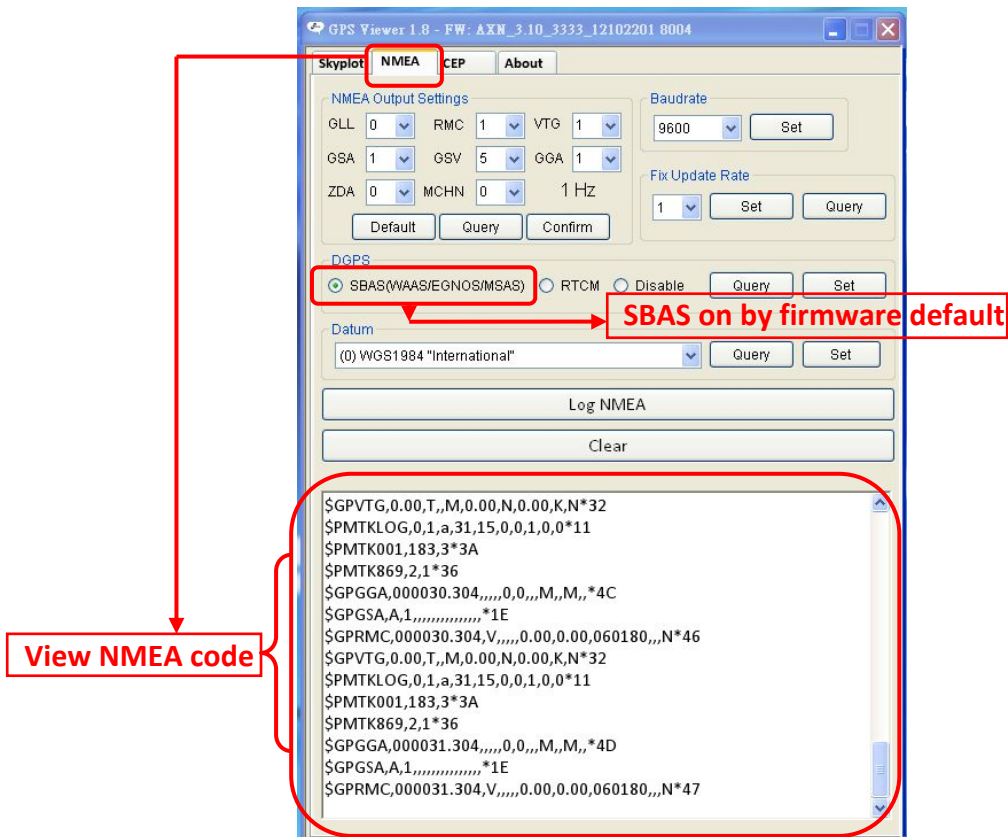
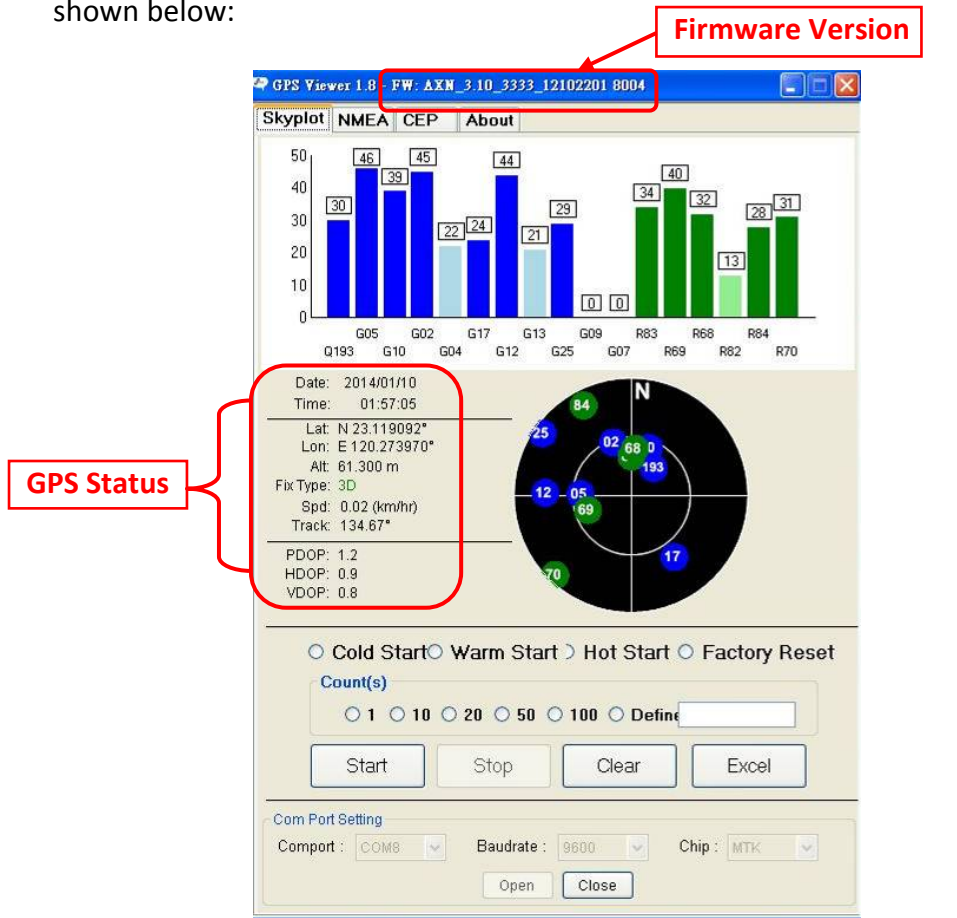
- To open **GPS Viewer**, **Microsoft Framework 3.5 or later version** is required.
- Double click < **GPS Viewer.exe**> to open it.

Step1. Select corresponding & desired values for <**COM Port**>, <**Baud Rate** > and <**Chip** >, then

Step 2. Click <**Open**>.



After <Open> is clicked, the screen should display information as the figure shown below:



5. Trouble-shooting

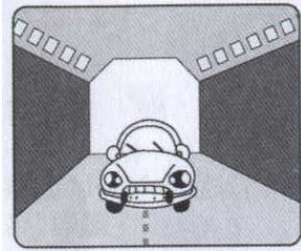
5.1 Problem with Setup

Problem	Possible Cause	Trouble shooting
No NMEA data or GNSS signals	<ul style="list-style-type: none"> (1) USB cable is not connected properly. (2) COM Port or Baud rate is incorrect. 	<ul style="list-style-type: none"> (1) Check to see if the USB cable is properly connected to computer and EV-Kit. (2) Double check to see if proper COM Port and Baud rate are set/selected.
Poor GNSS Signal Reception	<ul style="list-style-type: none"> (1) If it is used inside a vehicle, the anti-sunscreen film on the windshield may interfere and weaken the GNSS signal reception. (2) If it is used inside a vehicle, the vehicle might be under some area with dense overhead canopy such as forest, buildings, open tunnels, etc. 	Try external antenna instead of patch antenna. Place the external antenna on the roof or top surface to improve signal reception.

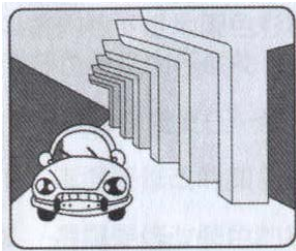
Note: if the troubleshooting guide does not fix the encountered issue, please contact us or send the device back for us to check.

5.2 Regarding to Poor GNSS Signal

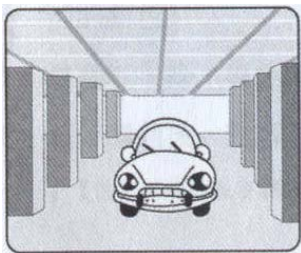
It is possible to have weak GNSS signal reception under the following situations:



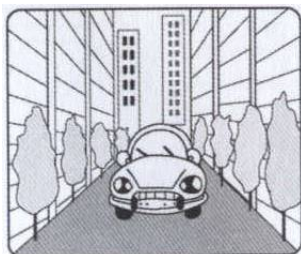
Inside a tunnel, where GNSS signal is blocked.



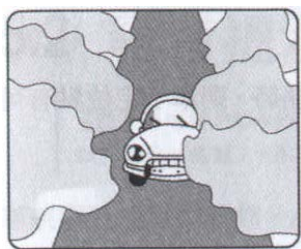
Underneath an infrastructure (e.g., a bridge), where GNSS signal is blocked.



Inside a building, where GNSS signal is blocked.



Next to tall buildings, where GNSS signal is weakened.



Underneath forests or any other kinds of canopy where GNSS signal is weakened.

- If the EV-Kit is used inside a car with anti-sunlight windshield film on the car windows, the GPS signal will be severely weakened, and may result in no GPS reception.
- GNSS satellite is a property of United States Army. Sometimes they will tune-down the accuracy for unknown reasons. In such cases, the GNSS position may not be accurate.