AWaDH
Agriculture and Water
Technology Development Hub

EXPERIMENT

TLV493D 3D MAGNETOMETER INTERFACING WITH DEV BOARD/NODE

What will you learn from this module:

- Interfacing with the help of I2C protocol.
- Measurement of 3D movements using TLV493D sensor using nrf dev board/node.
- Configuration of overlay file, device tree and prj file for enabling hardware device.

Requirements:

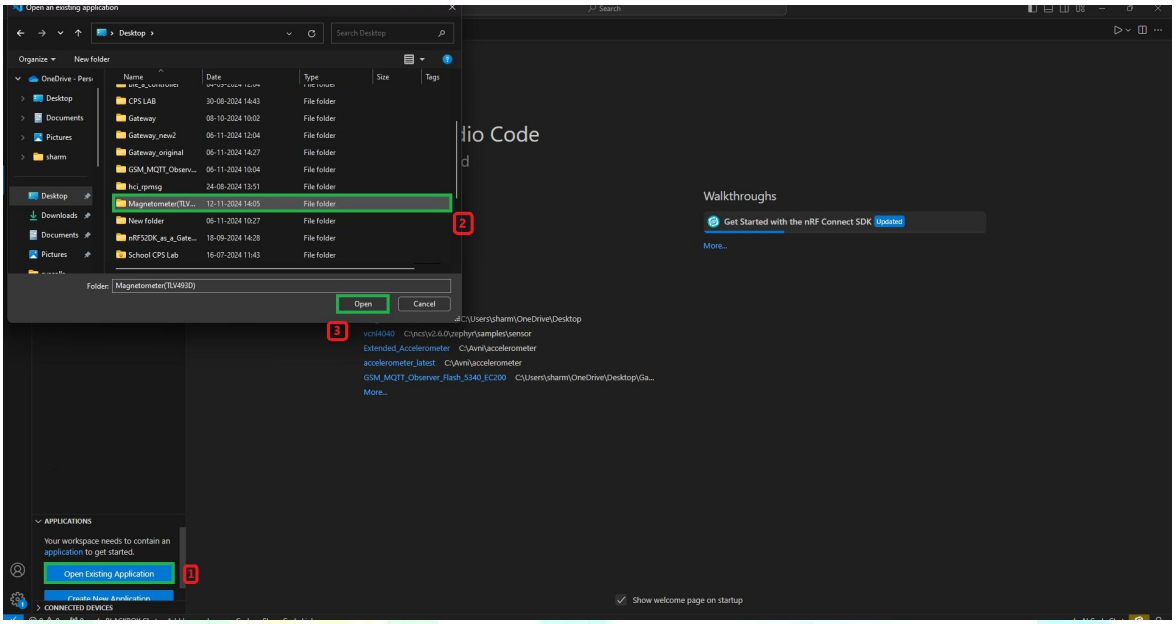
- nRF connect desktop software.
- nRF Command line tools.
- Visual studio code.
- USB cable.
- nRF52832 Development Board/Node.
- TLV493D Sensor.
- TTL Device.

Prerequisites:

- Basic knowledge of C/C++.
- Basic knowledge of communication protocol.
- Basic project setup.

➢ Setup and Configuration:

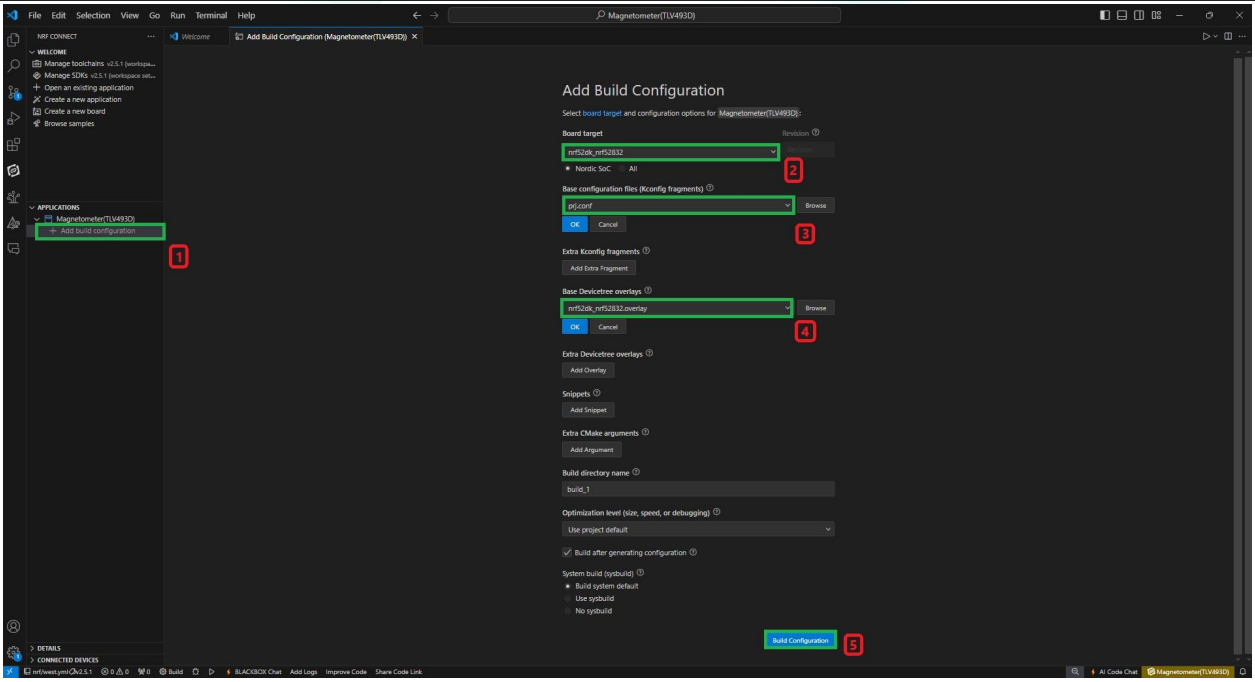
➢ Open VS Code and click on **Open Existing Application [1]** > click on TLV493D **[2]** > **Open [3]** as shown in the picture below.



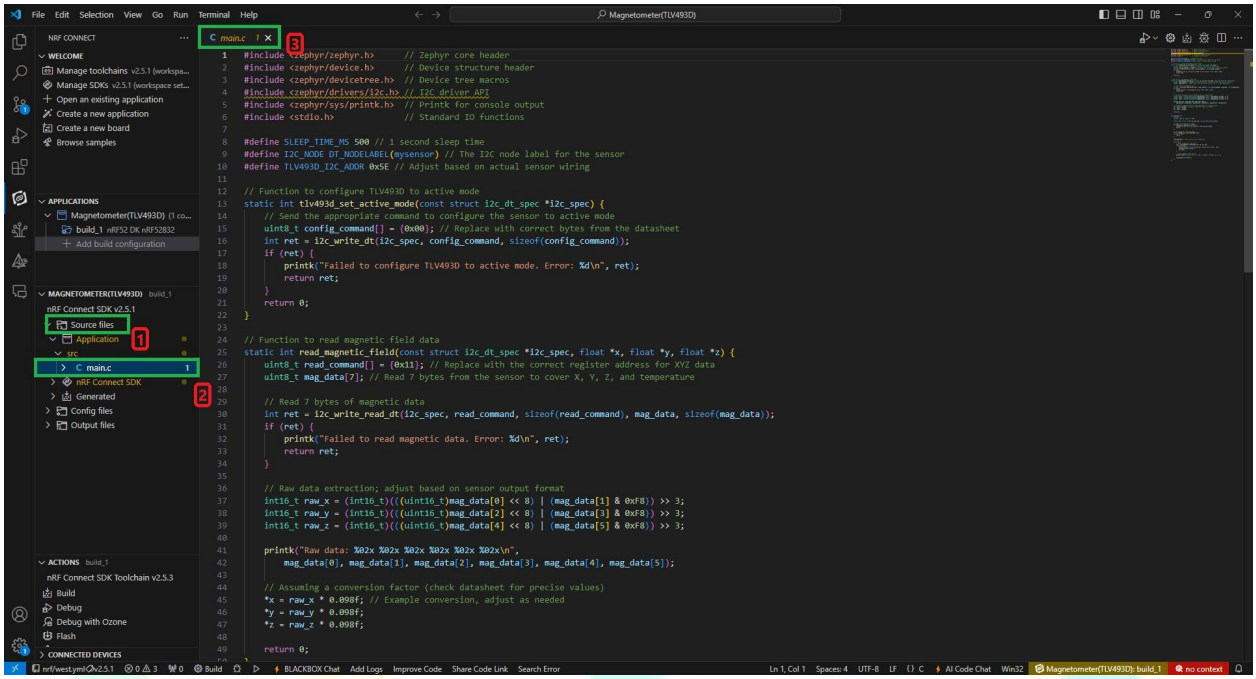
➢ Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.

➢ Click on the Configuration and select **prj.conf [3]** from dropdown menu and then click on the device tree overlays and select **nrf52dk_nrf52832.overlay[4]**.

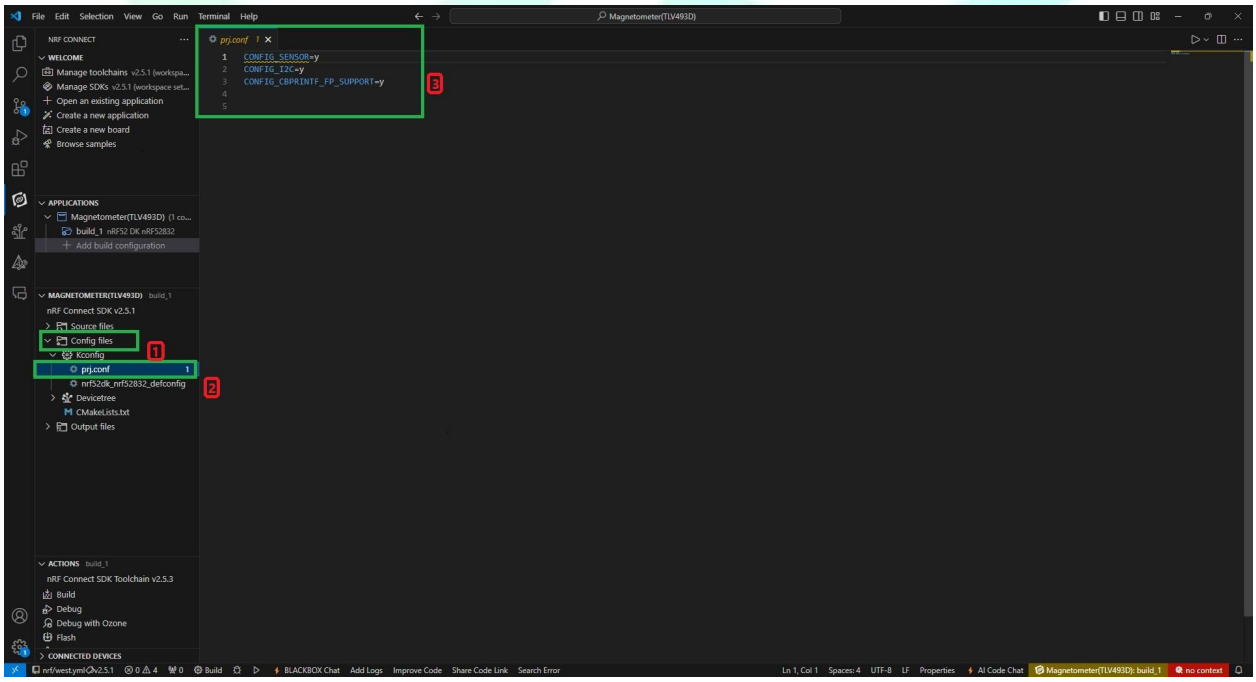
➢ Then click on the **Build Configuration [5]** as shown below in the picture.



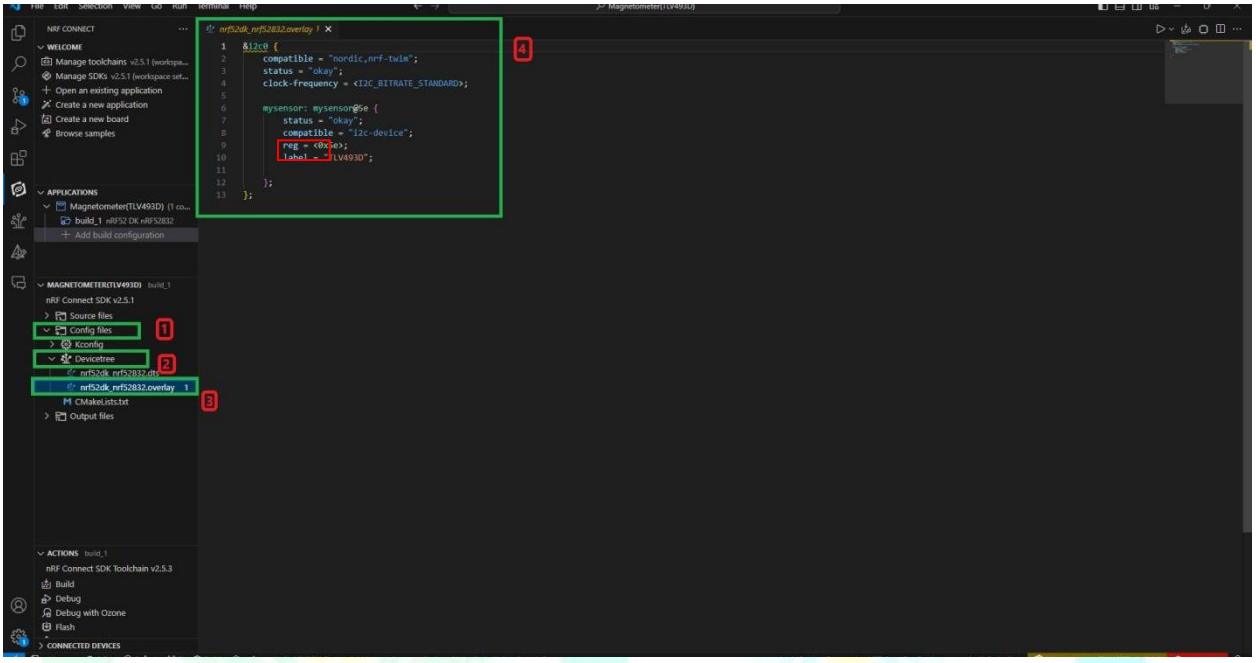
- Go to source file, click **source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By Clicking on **main.c** file and you will see the code on your screen **[3]**.



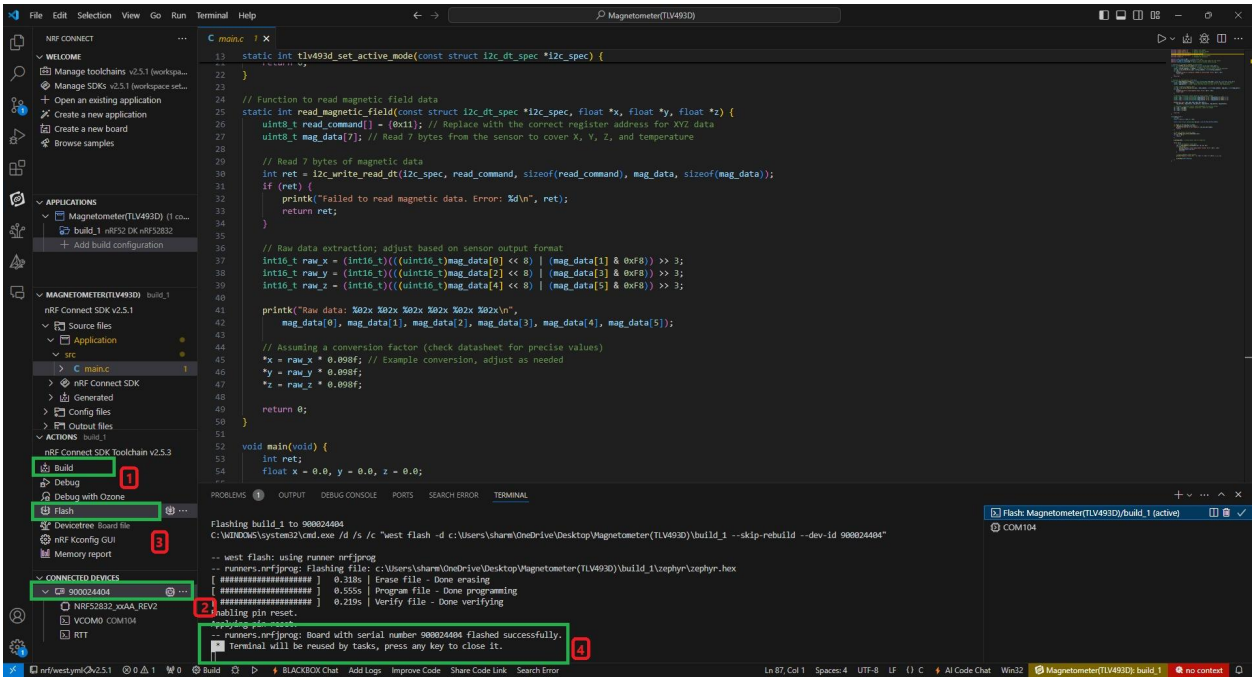
- To configure the prj configuration, click on **Config files [1]** > click on **Kconfig** > click on **prj.conf [2]**.
- The prj configuration will appear on your screen **[3]** as shown in the picture below.



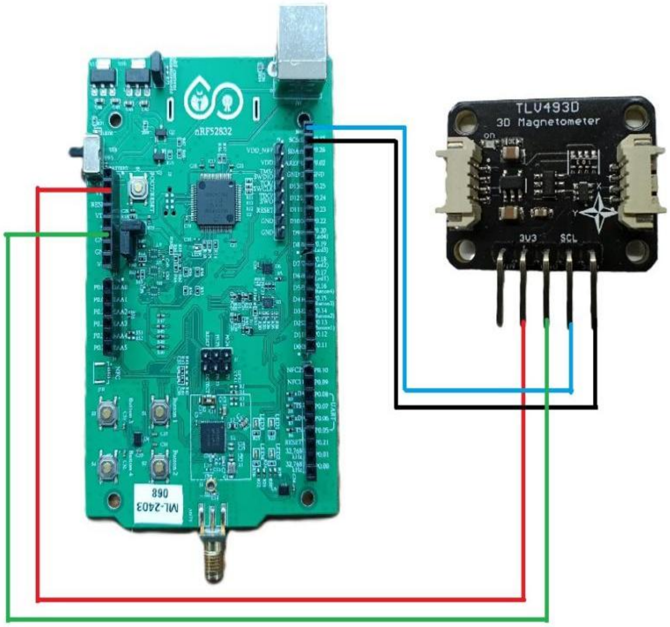
- To configure the i2c protocol, you have to enable it in the **.overlay file**.
- Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree [2]** > click on **nrf52dk_nrf52832.overlay [3]**.
- The .overlay file will appear on your screen and add the given code to the .overlay file as shown in the picture given below **[4]**.



- Click on **Build [1]** configuration again and check the **CONNECTED DEVICES [2]**.
- If device id is visible, then **Flash [3]** the code in Dev Kit.
- If **flashed successfully [4]** message is displayed on serial terminal, then flash process is complete.



❖ PIN CONFIGURATION



Board Pins -> Sensor Pins

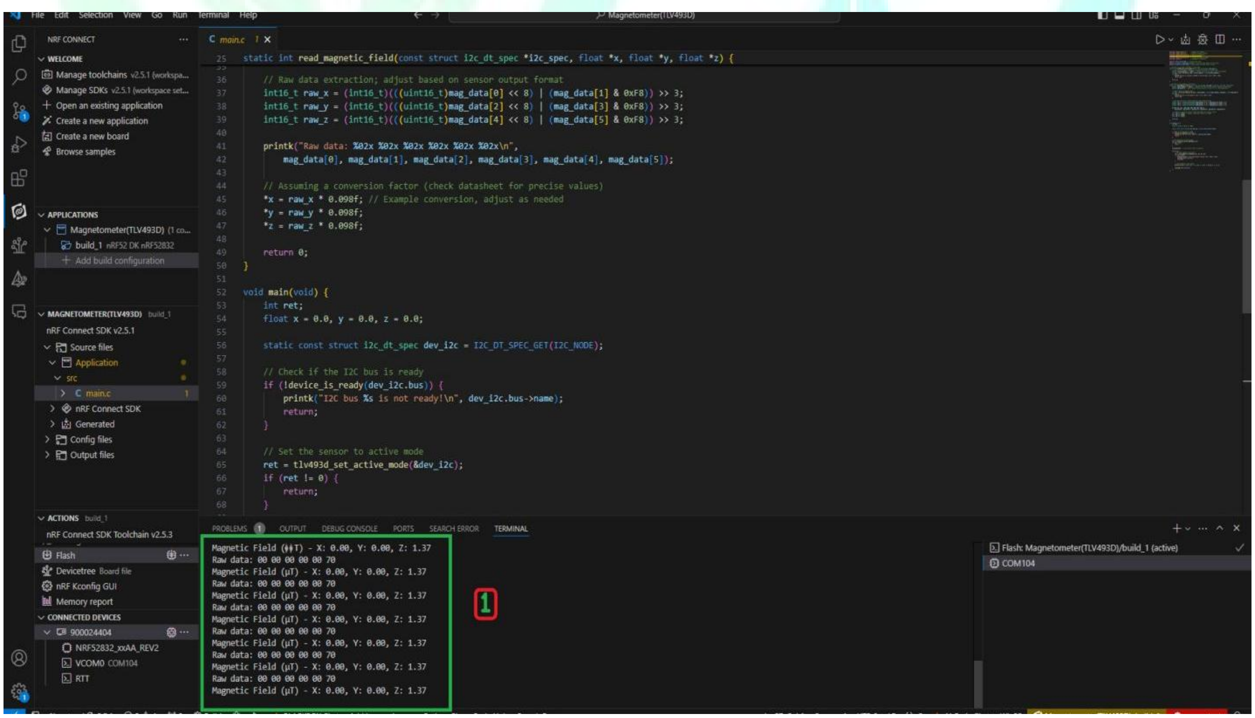
GND -> GND

VDD(3.3V) -> VDD

PO.26 -> SDA

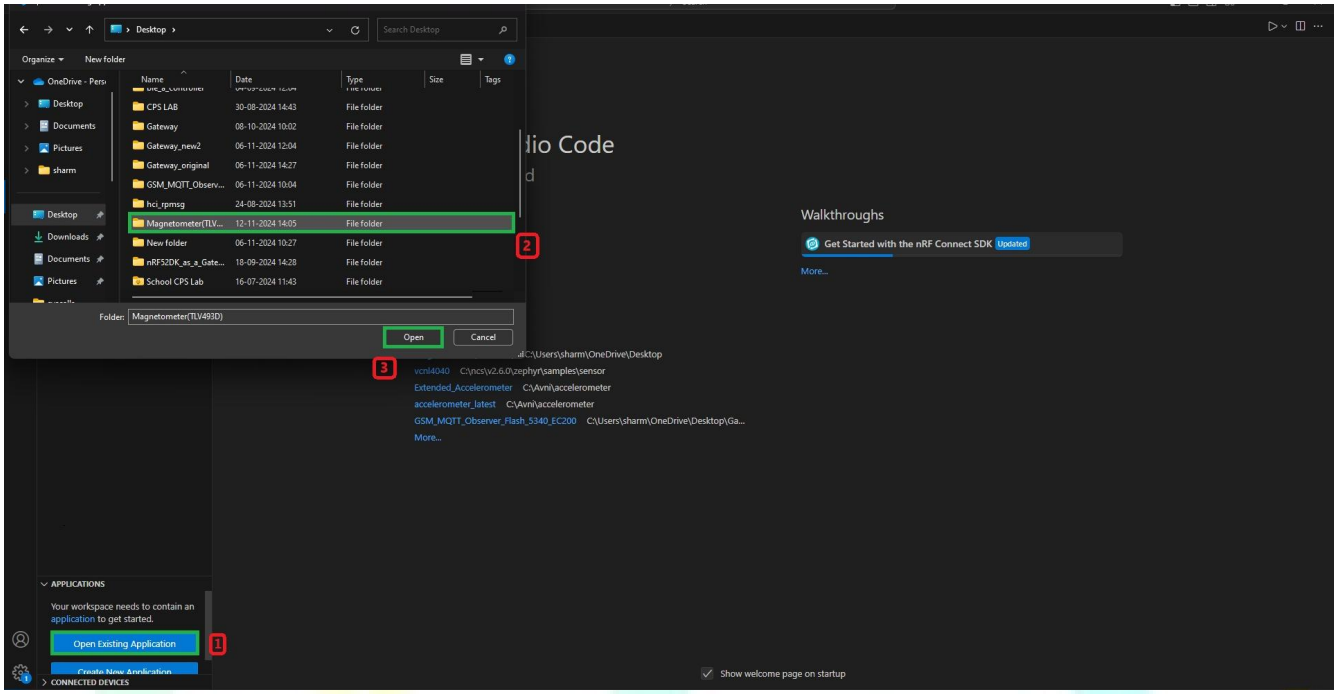
PO.27 -> SCL

❖ OUTPUT

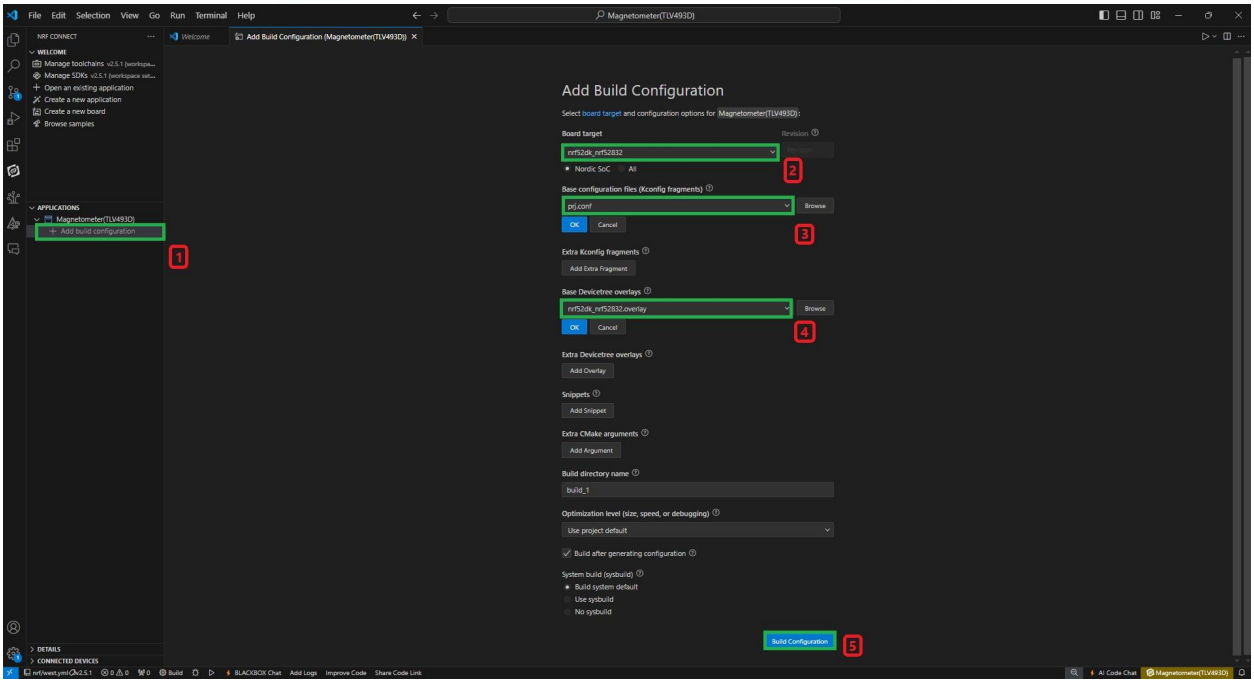


INTERFACING WITH THE HELP OF NODE

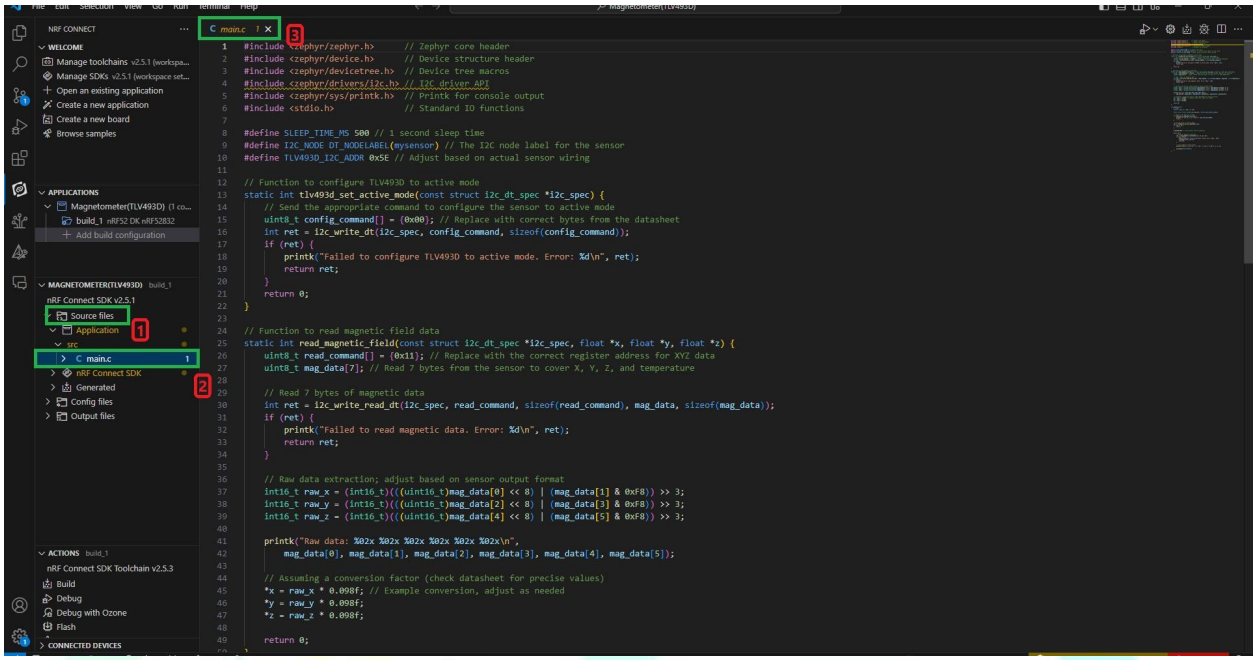
- Open VS Code and click on **Open Existing Application [1]** > click on **TLV493D_node_code [2]** > **Open [3]** as shown in the picture below.



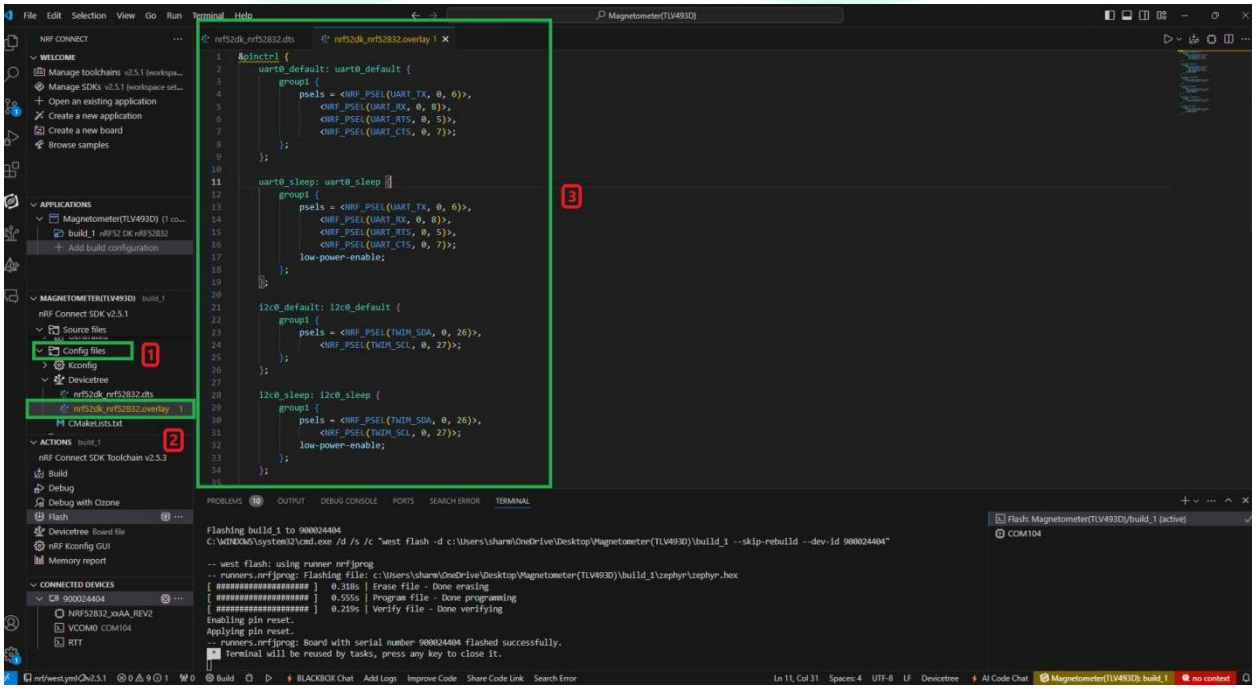
- Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.
- Click on the Configuration and select **prj.conf [3]** from dropdown menu and then click on the device tree overlays and select **nrf52dk_nrf52832.overlay[4]**.
- Then click on the **Build Configuration [5]** as shown below in the picture.



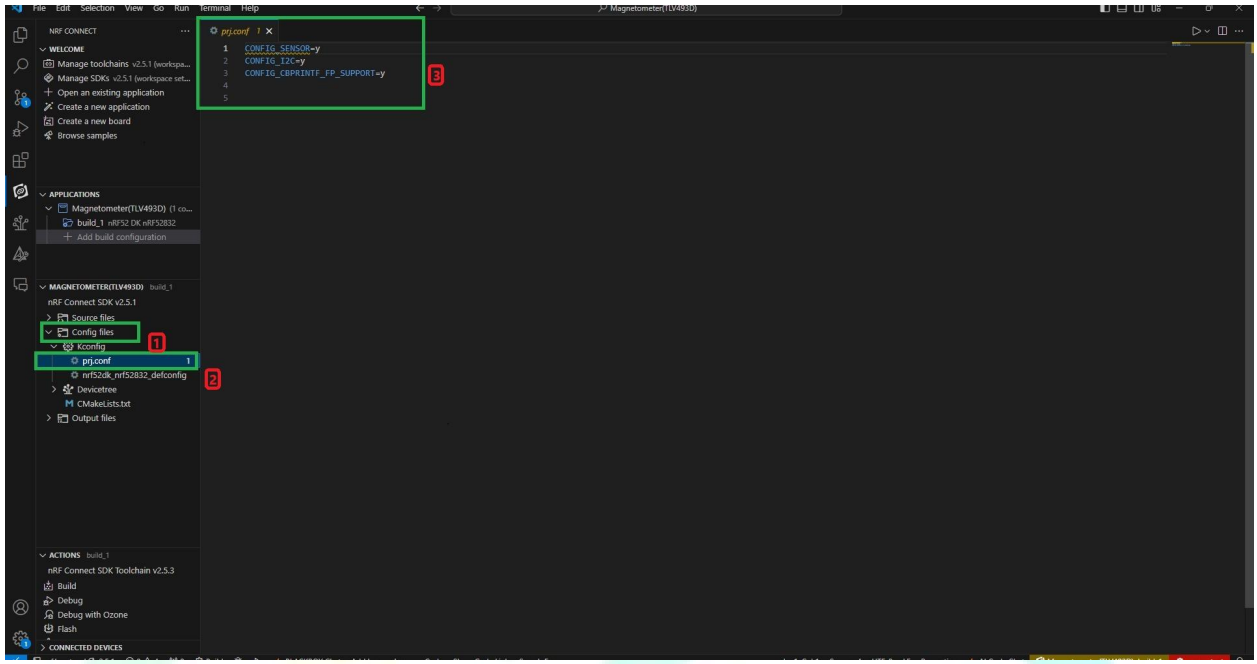
- Go to source file, click **source file [1]** > click on **Application** > click on **src** > click on **main.c [2]**.
- By clicking on **main.c** file and you will see the code on your screen.



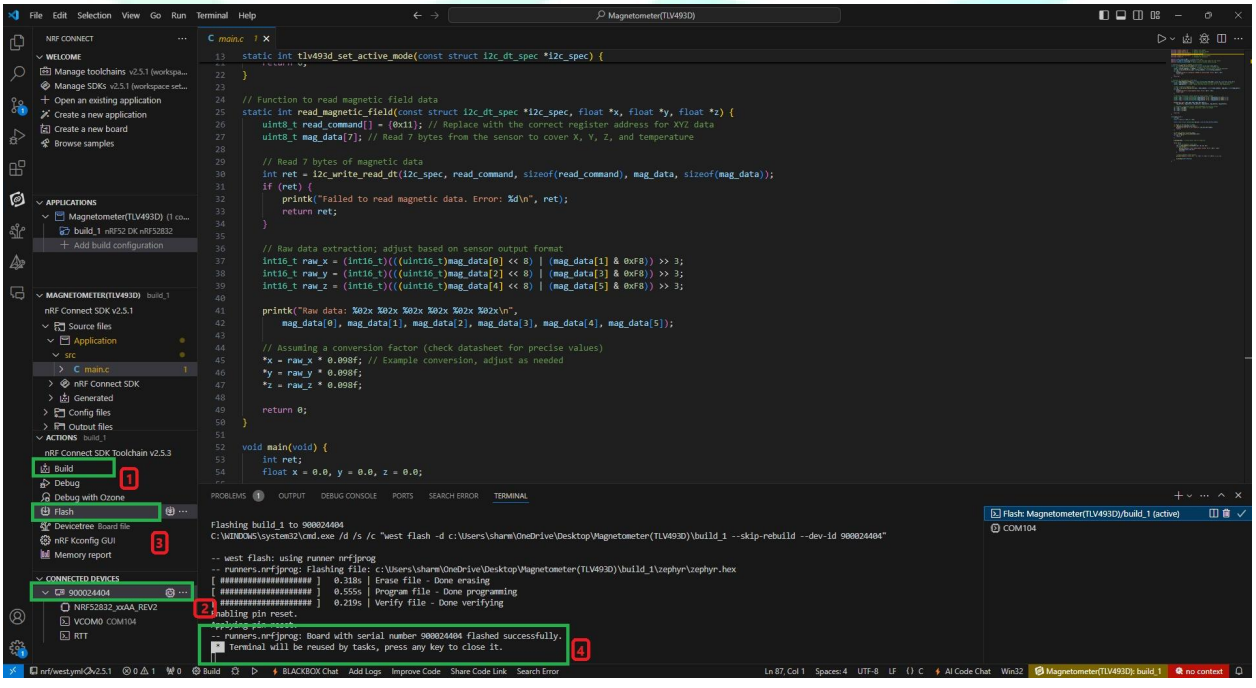
- To configure the i2c & UART protocols, you have to enable it in the **overlay file**.
- Click on the **Config files[1]** > click on **Kconfig** > click on **Devicetree** > click on **nrf52dk_nrf52832.overlay [2]**.
- The overlay file will appear on your screen and add the given code to the **overlay file** as shown in the picture given below **[3]**.



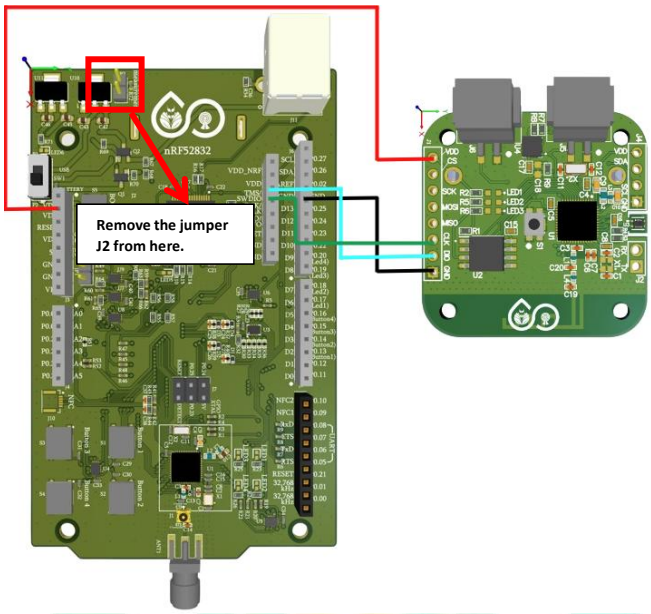
- You need to enable sensor in prj file for communication as shown below.
- Click on **Config files [1]** > then click on **Kconfig files** > click on **prj.conf [2]**.
- The **prj.conf** will appear on the screen **[3]** as shown below in the picture.



- Click on **Build [1]** configuration again and check the **CONNECTED DEVICES [2]**.
- If device id is visible, then **Flash [3]** the code in Dev Kit.

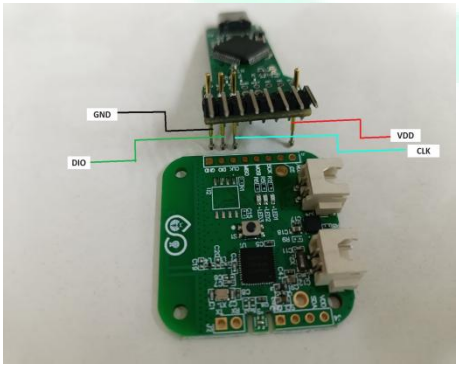


- For Node programming remove the jumper **J2** from the development board.
- Now flash the code with the help of nRF52832 development board as shown below in the figure.



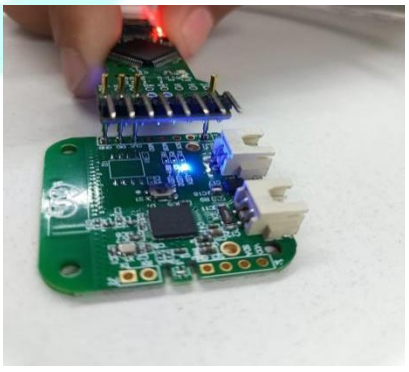
Board Pins -> NODE Pins
VDD(3.3V) -> VDD
GND -> GND
CLK -> CLK
DIO -> DIO

- There is another way of flashing the code with the help of Node Programmer as shown in the picture below.



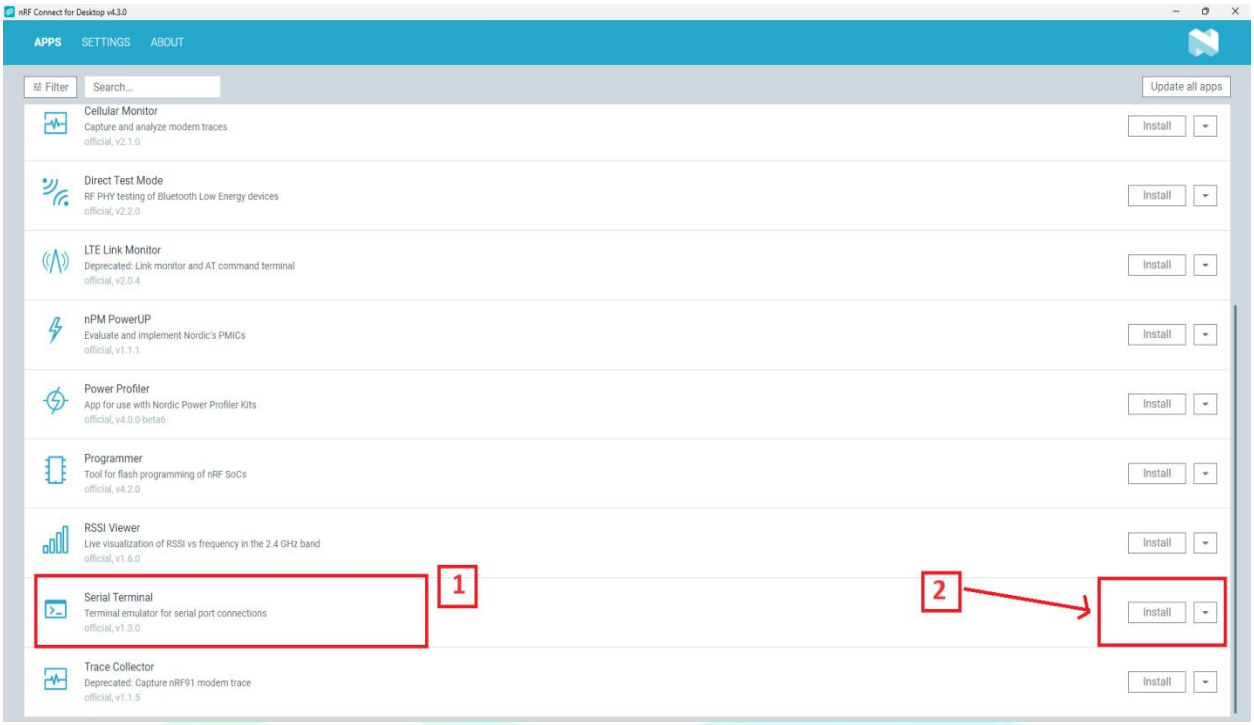
- NODE without connection.

- NODE with connection.

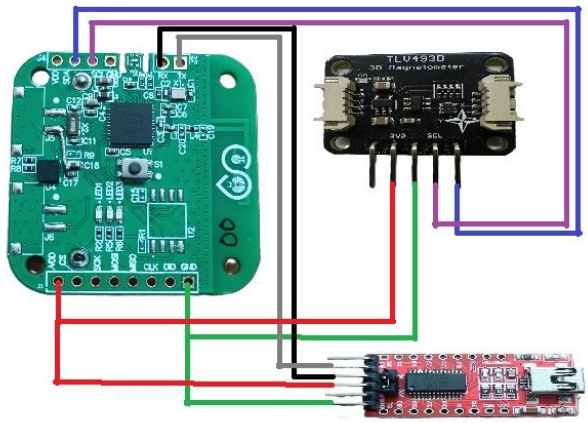


- NODE after program.

- Firstly, you have to **Install [2]** the nRF **Serial Terminal [1]** in nRF Connect for Desktop application as shown below.



- Connect the **TTL Device** for UART communication so that the data must appear on the serial terminal.
- Connect the **TTL Device** as shown below in the picture.



Node Pins -> TTL Pins

Tx -> Rx

Rx -> Tx

VDD -> VDD

GND -> GND

Node Pins -> Sensor Pins

SDA -> SDA

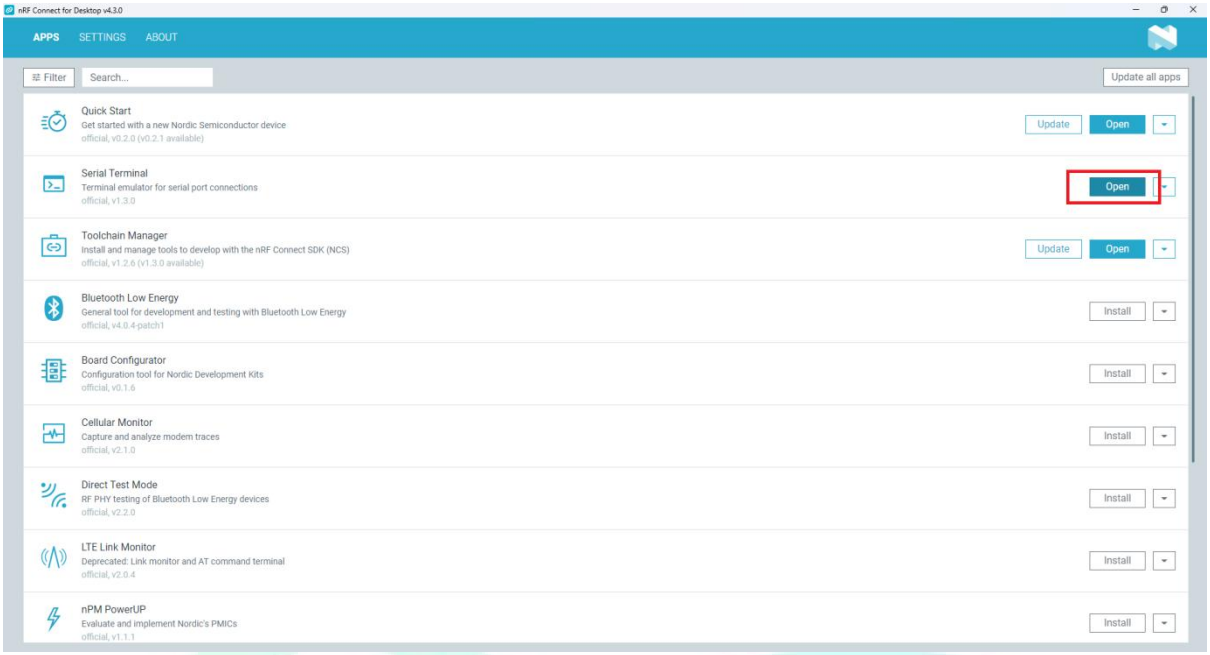
SCL -> SCL

VDD(3V3) -> VDD

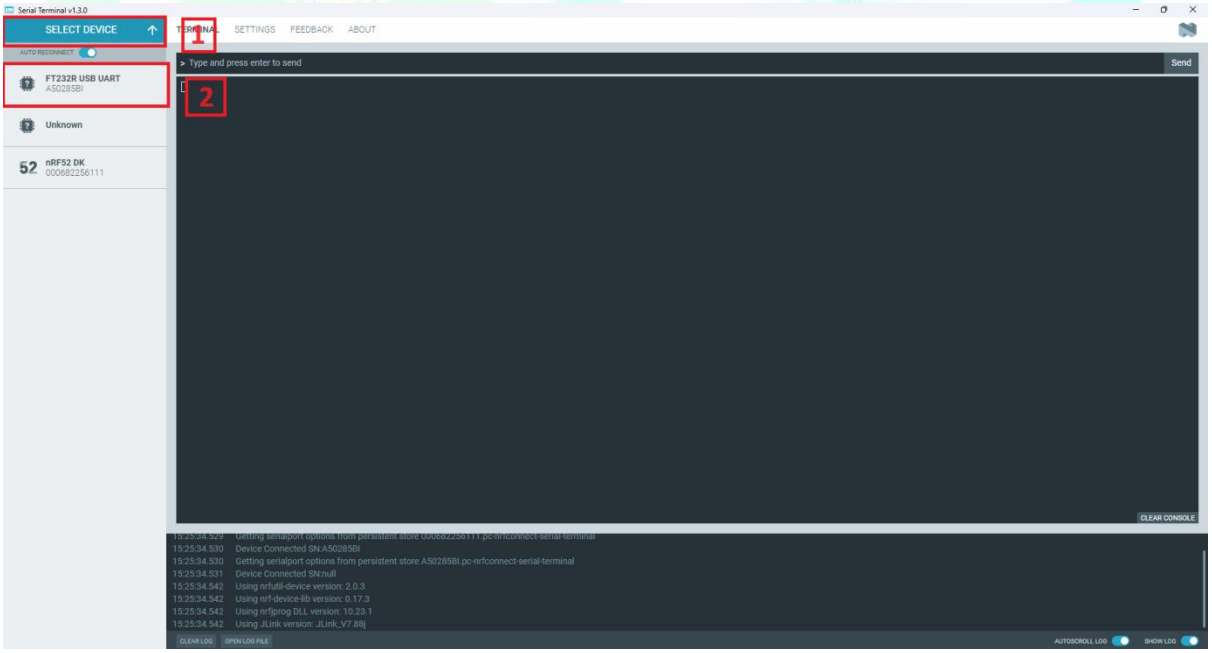
GND -> GND

Note: - Do not supply 5 volts current to board through TTL. Otherwise, board will damage.

- Click on **Open** as shown below in the picture.

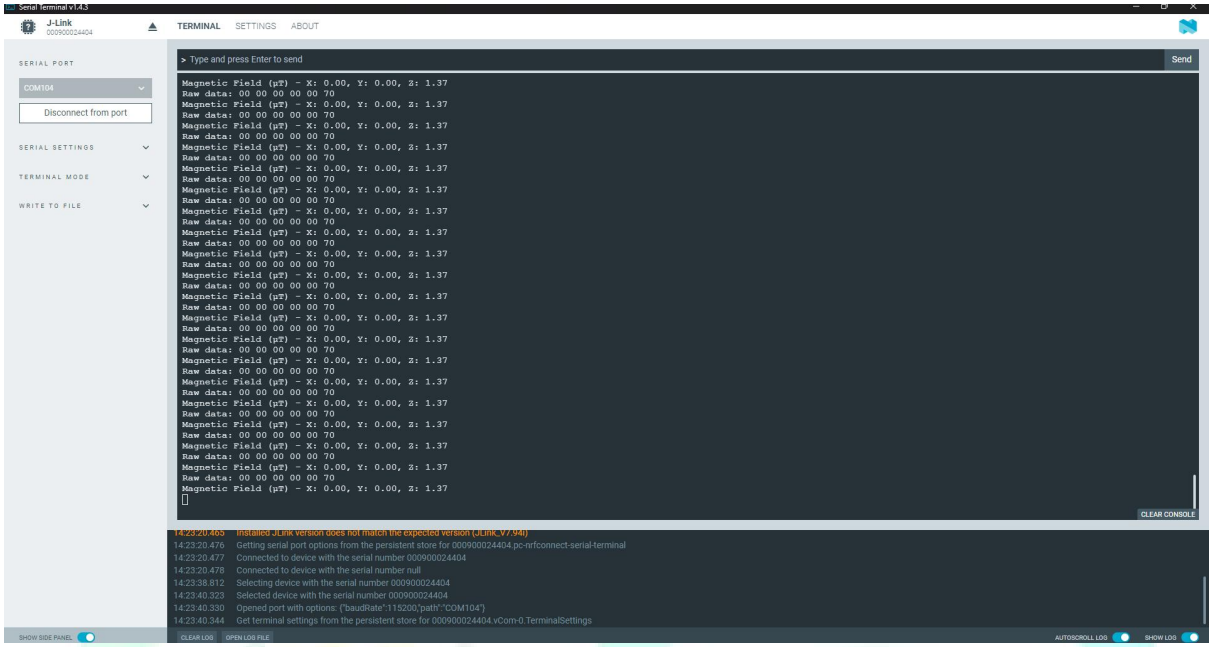


- Click on **Select Device [1]** > click on **FT232R USB UART [2]** as shown below in the picture.



- Now the output will appear on your screen as shown below.

❖ OUTPUT


Serial Terminal v1.4.3
J-Link
000900024404
TERMINAL
SETTINGS
ABOUT
SERIAL PORT
COM104
Disconnect from port
SERIAL SETTINGS
TERMINAL MODE
WRITE TO FILE
> Type and press Enter to send
Send
Magnetic Field (μT) - X: 0.00, Y: 0.00, Z: 1.37
Raw data: 00 00 00 00 00 70
CLEAR CONSOLE
14:23:20.476 Getting serial port options from the persistent store for 000900024404.pc-nrfconnect-serial-terminal
14:23:20.477 Connected to device with the serial number 000900024404
14:23:20.478 Connected to device with the serial number null
14:23:38.812 Selecting device with the serial number 000900024404
14:23:40.323 Selected device with the serial number 000900024404
14:23:40.330 Opened port with options: {"baudRate":115200,"path":"COM104"}
14:23:40.344 Get terminal settings from the persistent store for 000900024404.vCom-0.TerminalSettings
SHOW SIDE PANEL
CLEAR LOG
OPEN LOG FILE
AUTOSCROLL LOG
SHOW LOG