EXPERIMENT: 3

STTS751 TEMPERATURE SENSOR INTERFACING WITH DEV BOARD/NODE

What will you learn from this module:

➤ Interfacing with the help of I2C protocol.
➤ Temperature measurement using STTS751 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.
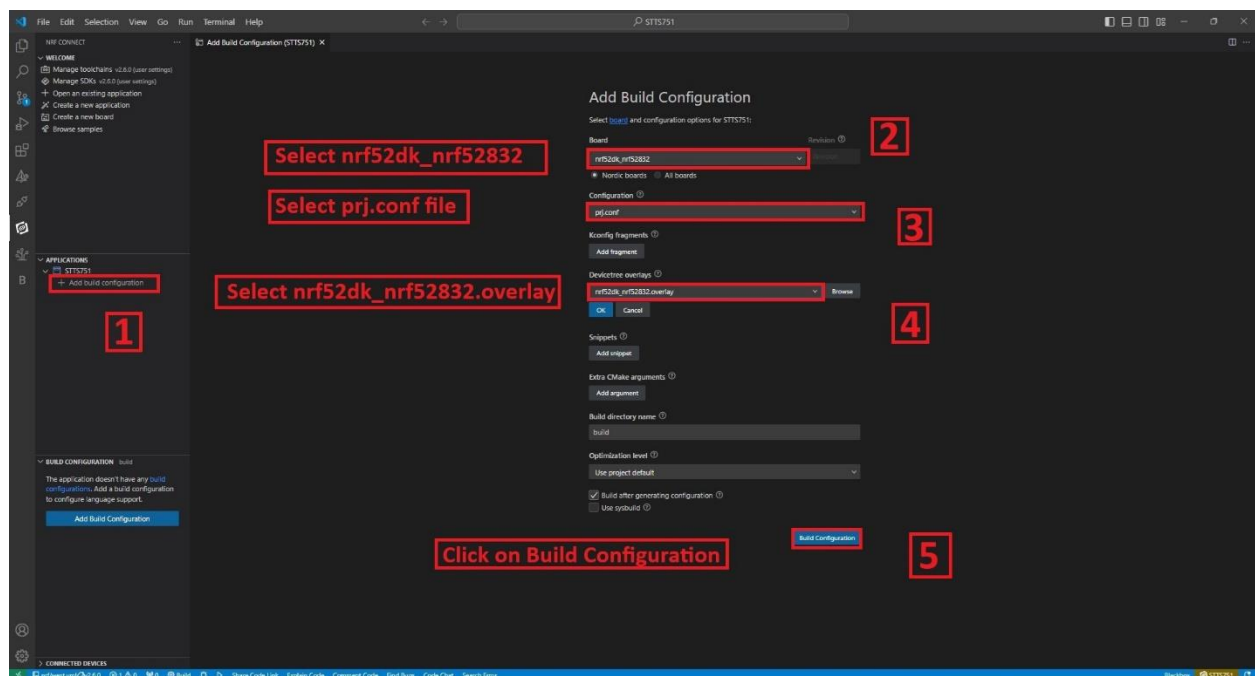➤ STTS751 Sensor.
➤ TTL Device.

Prerequisites:

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

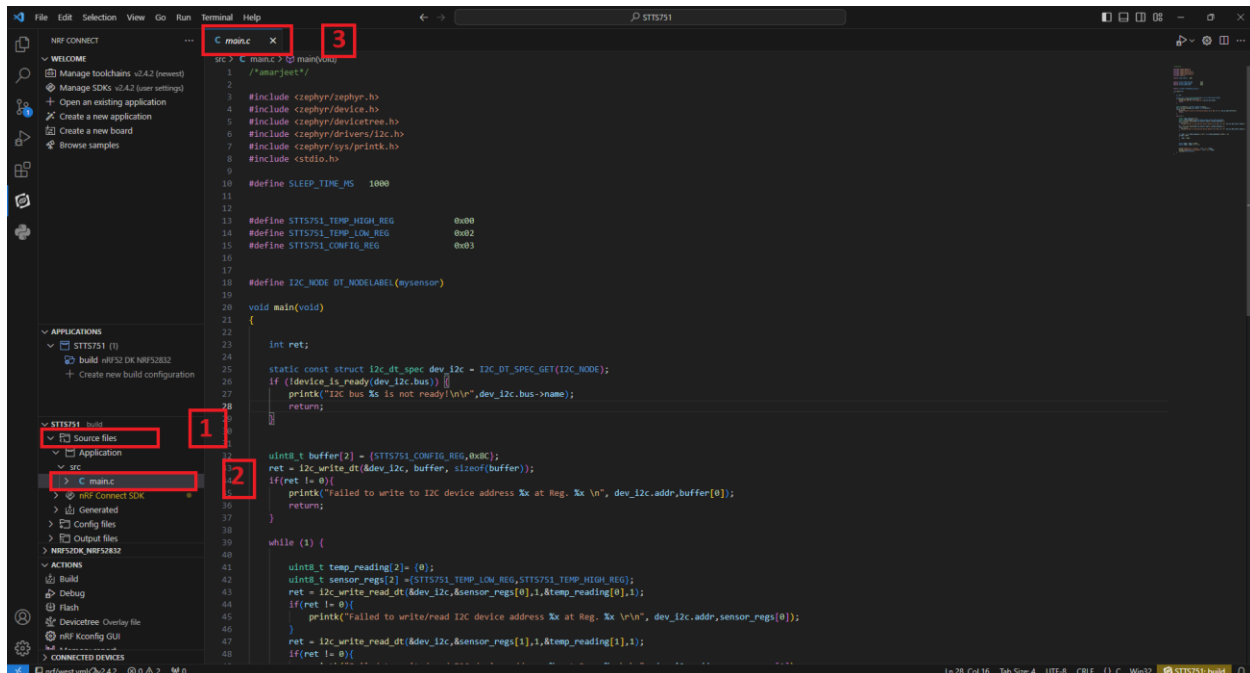## Setup and Configuration:

> ➢ Open VS Code and click on **Open Existing Application [1]** > click on **STTS751 [2]** > **Open [3]** as shown in the picture below.
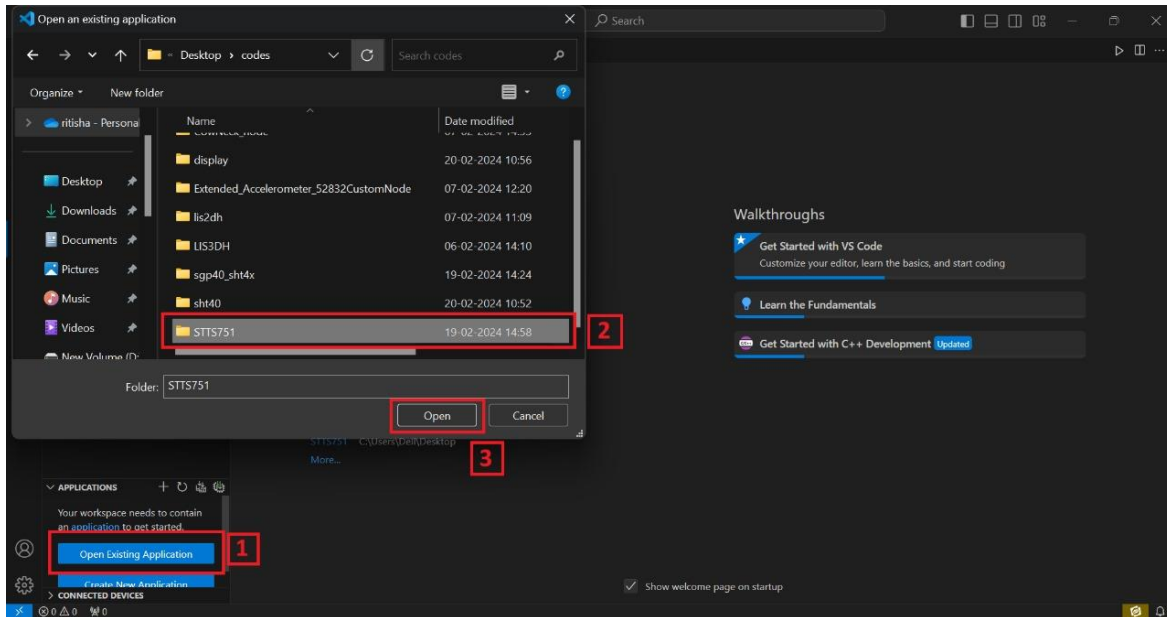

> ➢ Click on **Create new build configuration [1]**. Here you can change the board version, if you are using nRF52832, then select **nrf52dk_nrf52832 [2]** or you can change from dropdown menu for another version like nRF52833 etc.
> ➢ Click on the Configuration and select **prj.conf [3]** from dropdown 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.
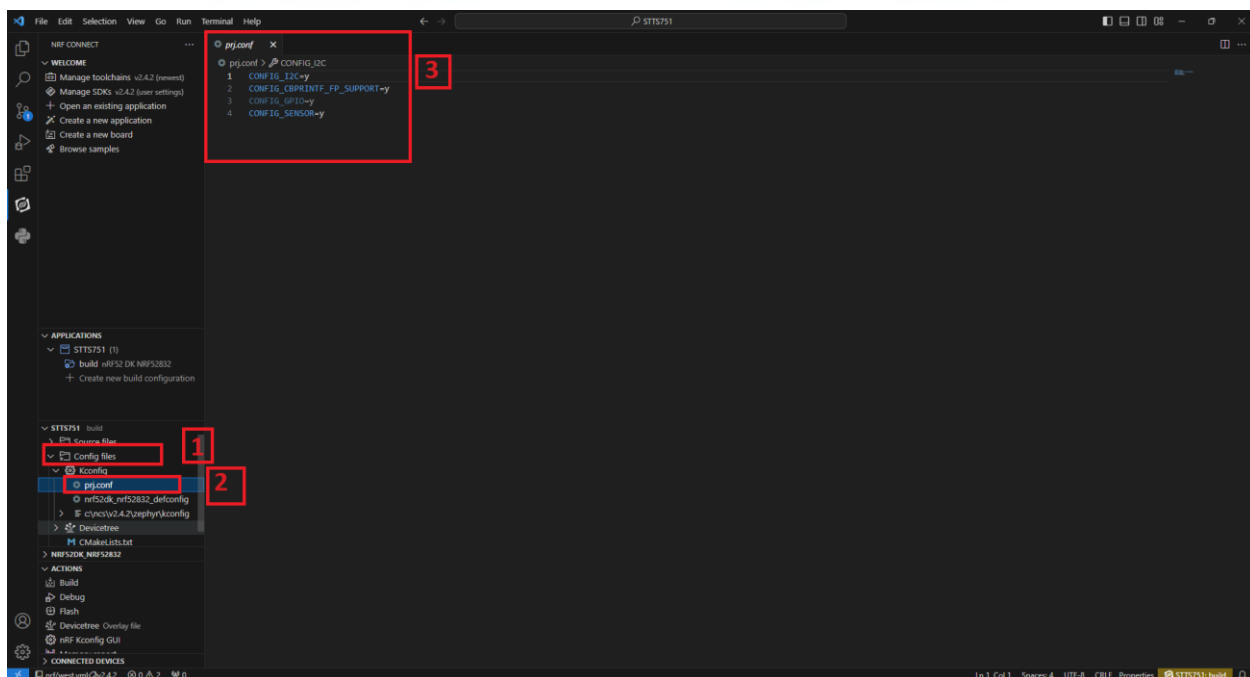
- ➢ To configure the i2c protocol, you have to enable it in the **.overlay file**.
- ➢ Click on the **Config files [1]** > click on **Kconfig** > click on **Devicetree [2]** > click on **nrf52dk_nrf52832.overlay [3]**.
- ➢ The .overlay file will appear on your screen and add the given code to the .overlay file as shown in the picture given below **[4]**.
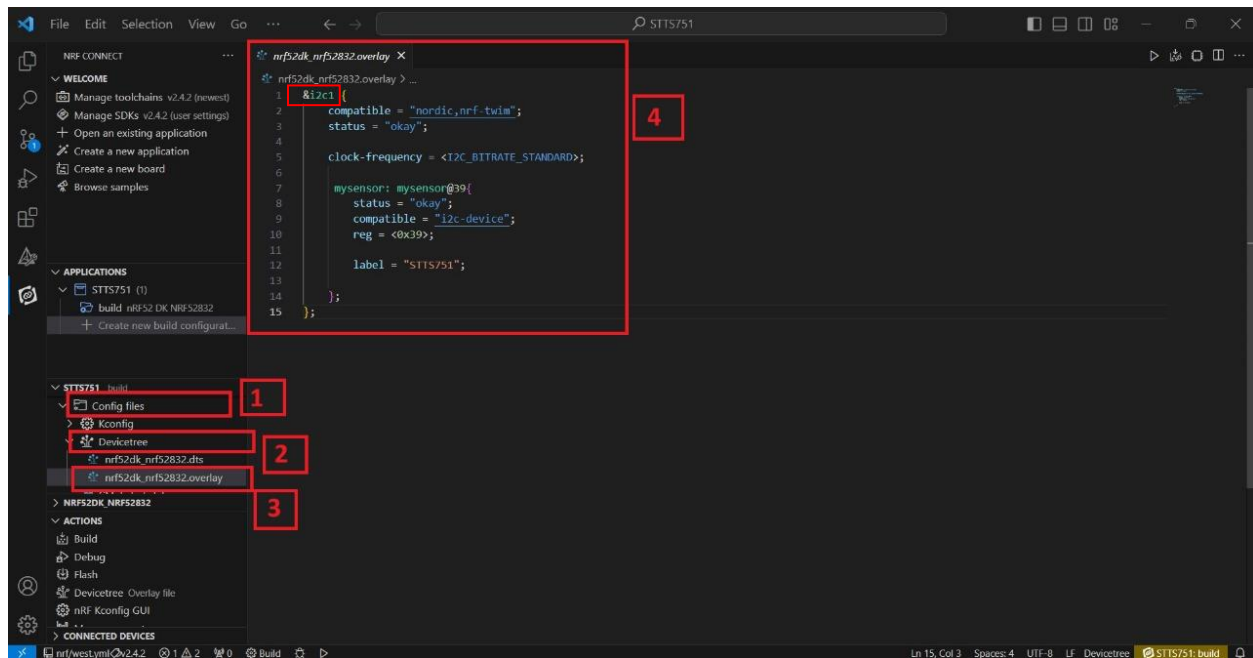
- ➢ Click on **Build [1]** configuration again and check the **CONNECTED DEVICES [2]**.
- ➢ If device id is visible, then **Flash [3]** the code in Dev Kit.
- ➢ If **flashed successfully [4]** message is displayed on serial terminal, then flash process is complete.
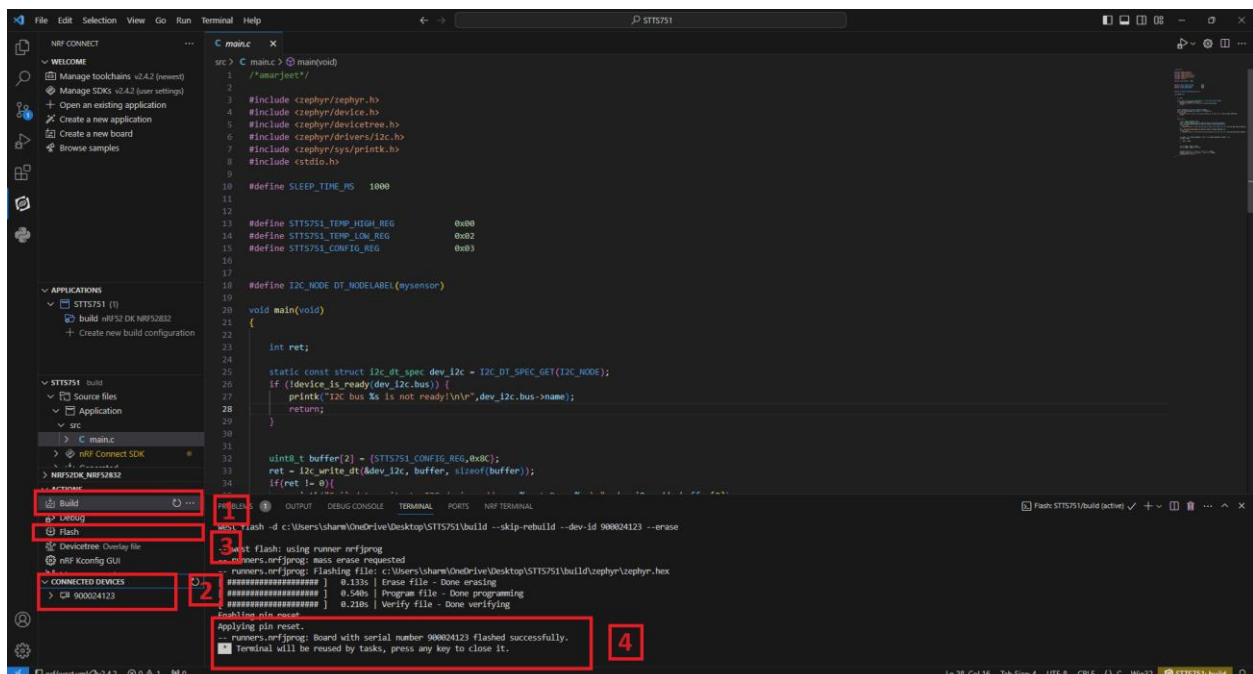
❖ PIN CONFIGURATION
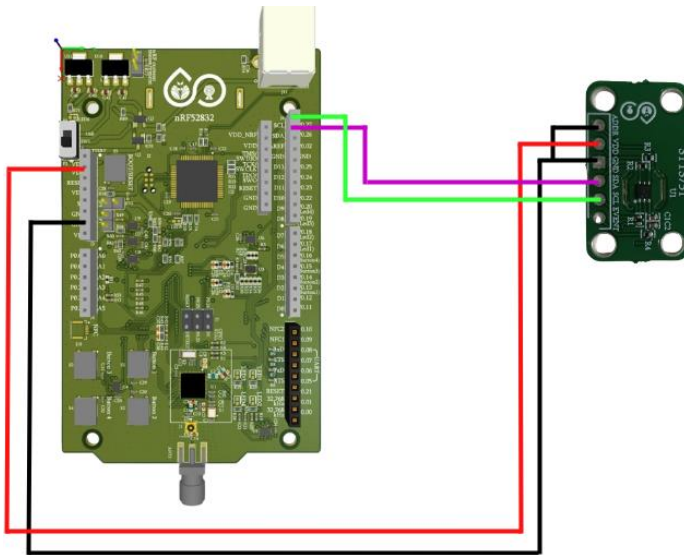
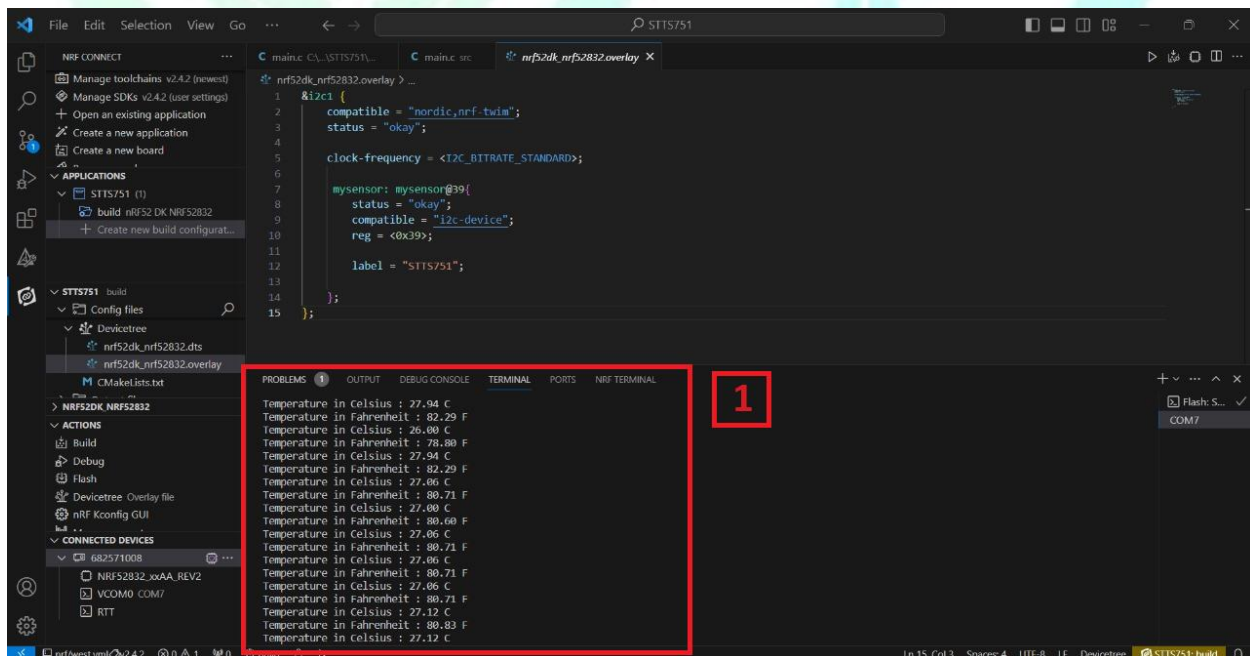
Board Pins -> Sensor Pins

GND -> GND

VDD(3.3V) -> VDD
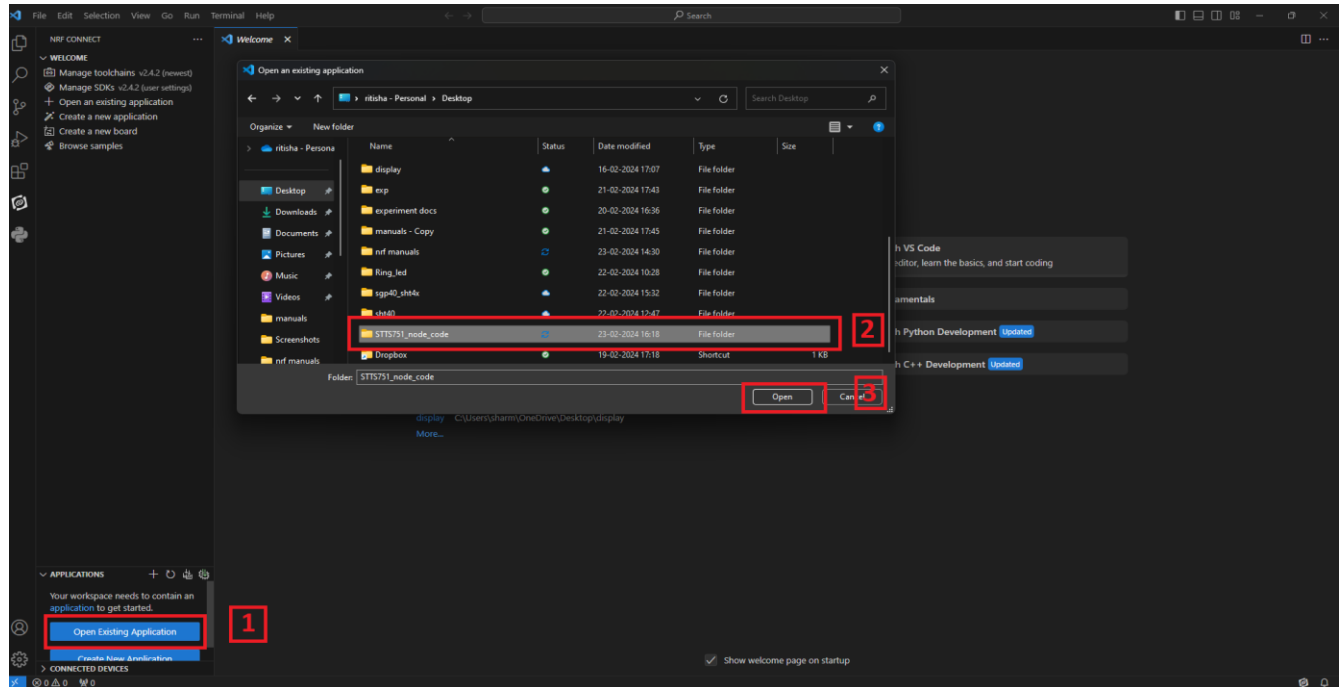
PO.26 -> SDA

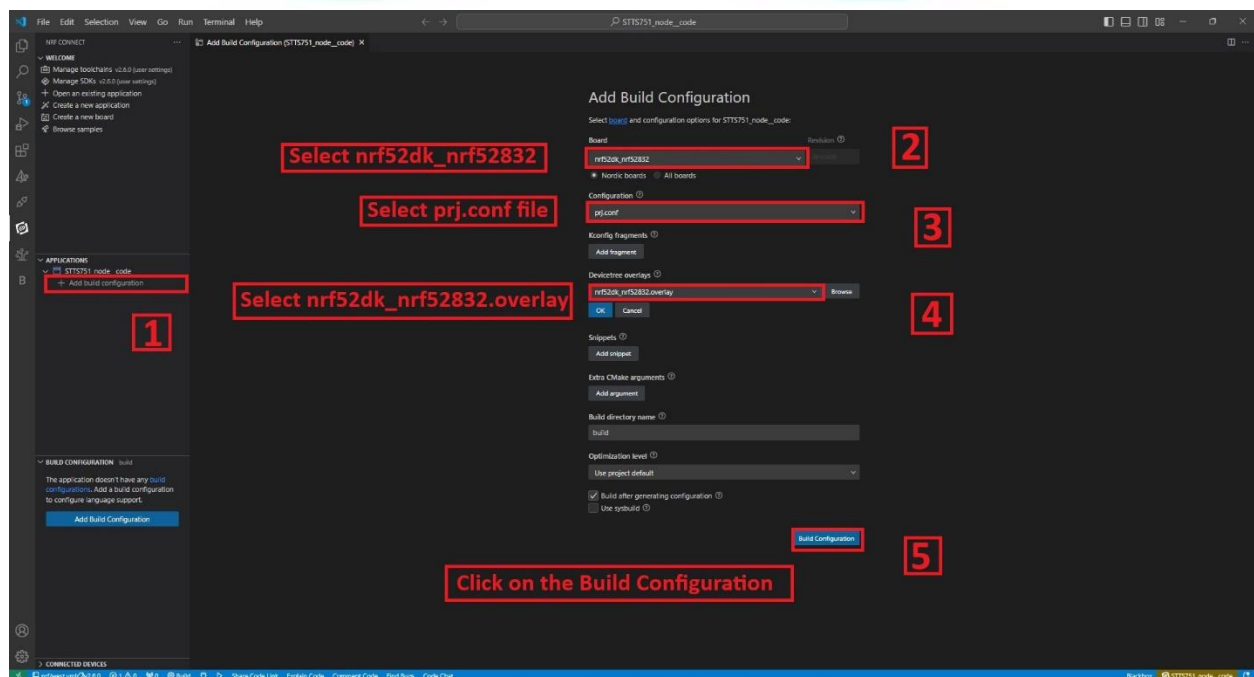**PO.27 -> SCL**

GND -> ADDR

❖ OUTPUT

INTERFACING WITH THE HELP OF NODE

➢ Open VS Code and click on **Open Existing Application [1]** > click on **STTS751_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.
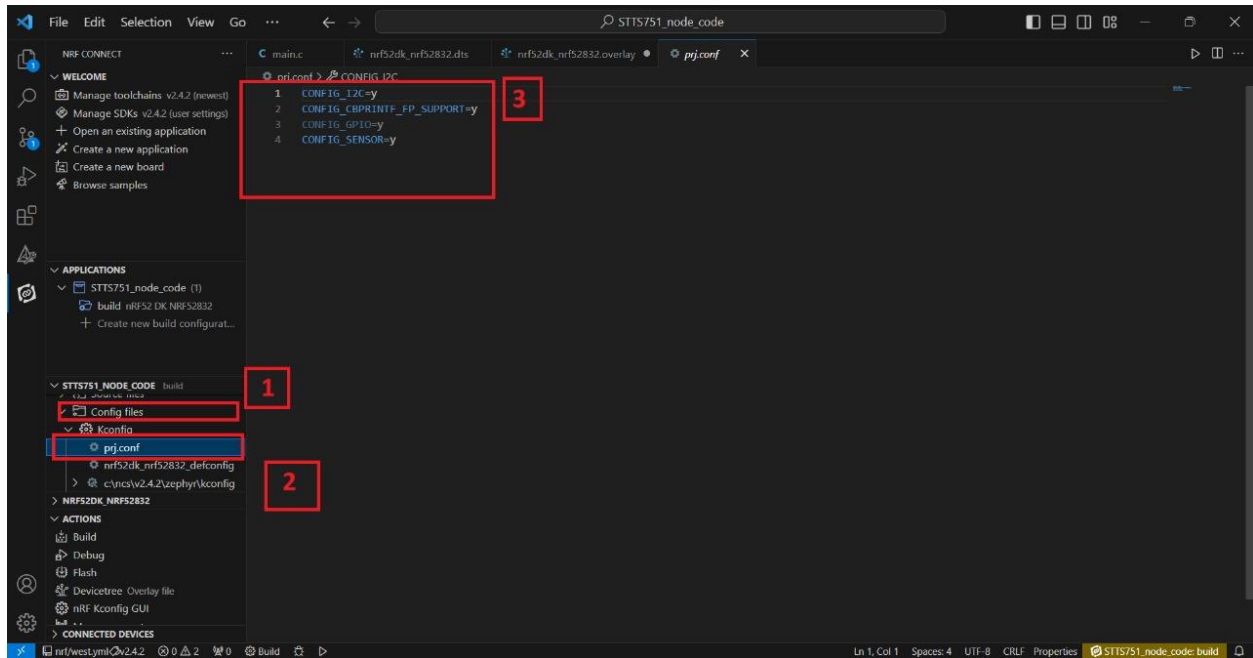
- ➤ You need to enable sensor in **dts** file for communication as shown below.
- ➤ Click on **Config files [1]** > then click on **Devicetree** > click on **nrf52dk_nrf52832.dts** [2]
- ➤ The **dts file** will appear on your screen and add the details in your **dts file** as shown in the picture given below **[3]**.
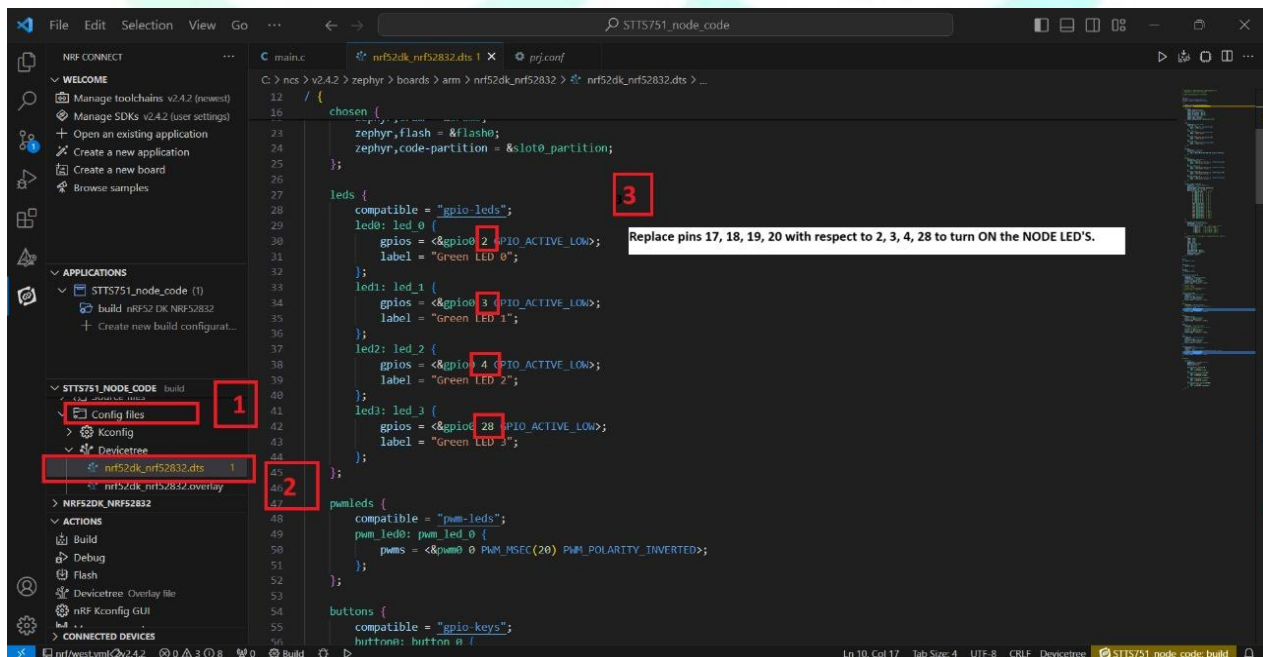
➢ For Node programing remove the jumper **J2** from the development board.
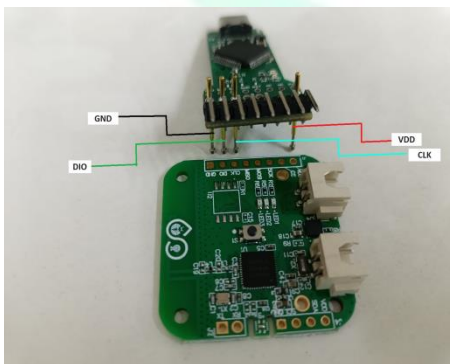➢ Now flash the code with the help of nRF52832 development board as shown below in the figure.

Remove the jumper J2 from here.
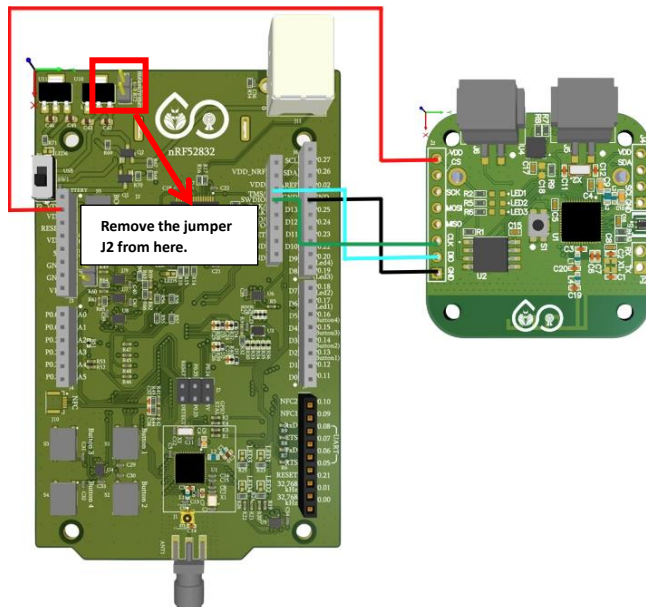
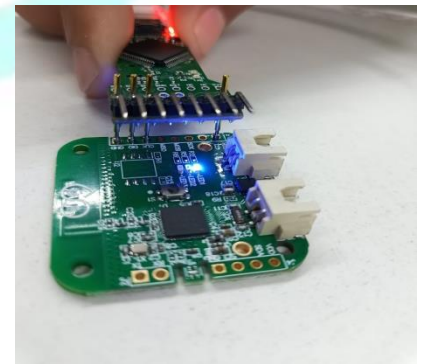| Board Pins -> NODE Pins |
| :---: |
| VDD(3.3V) -> VDD |
| GND -> GND |
| CLK -> CLK |
| DIO -> DIO |

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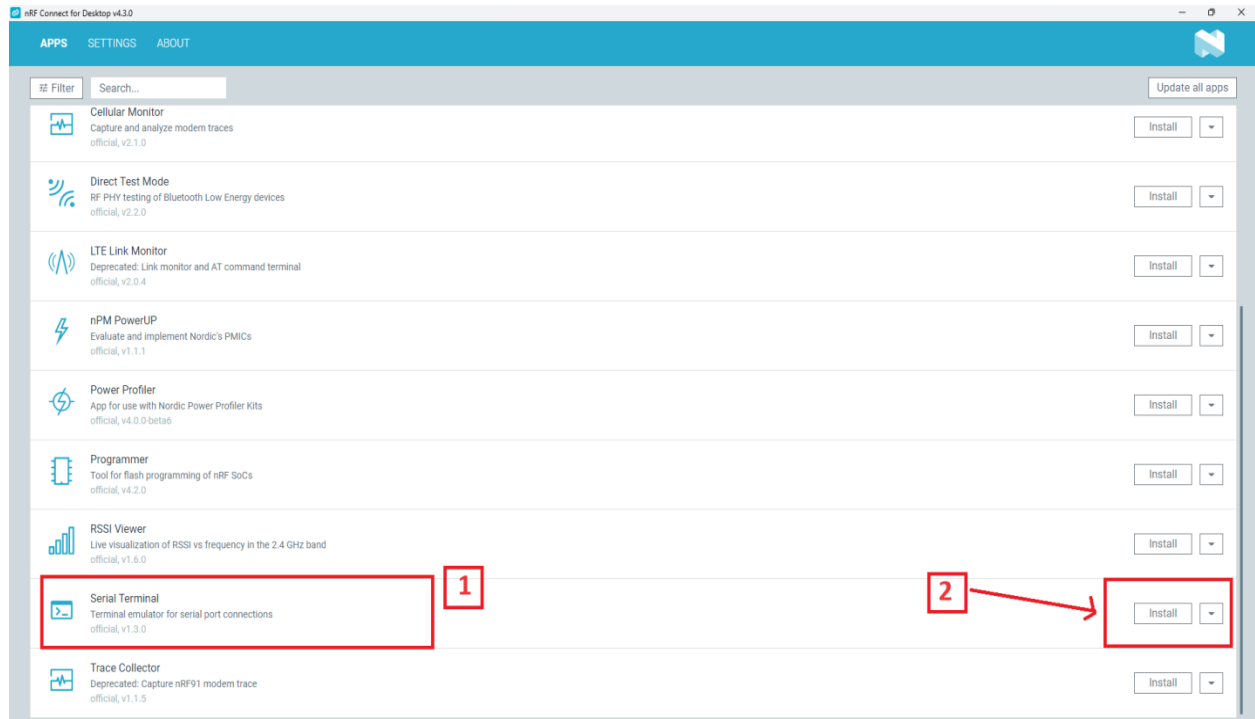

➢   NODE without connection.
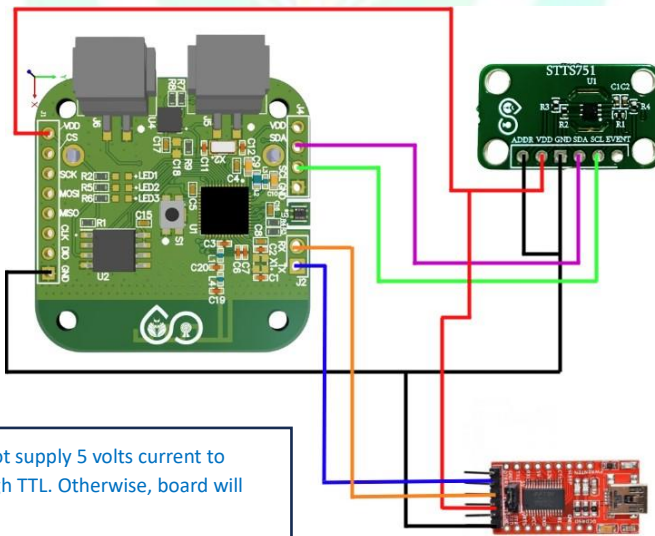
➢   NODE with connection.

➢   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 -> VDD
GND -> GND

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

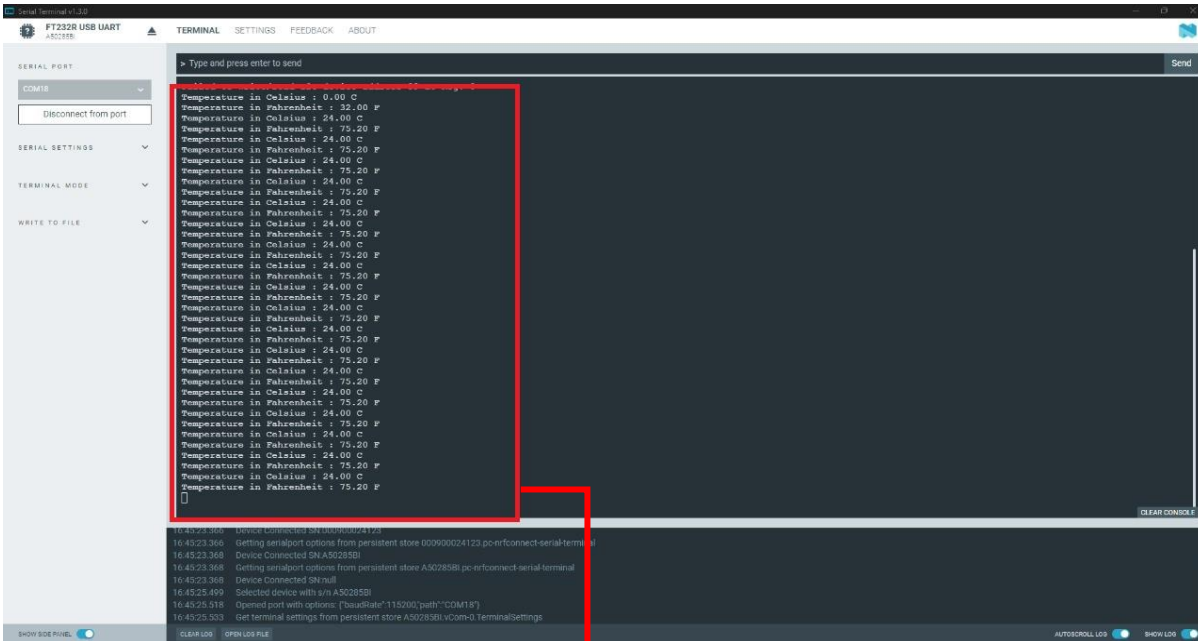> ➢ Click on **Open** as shown below in the picture.
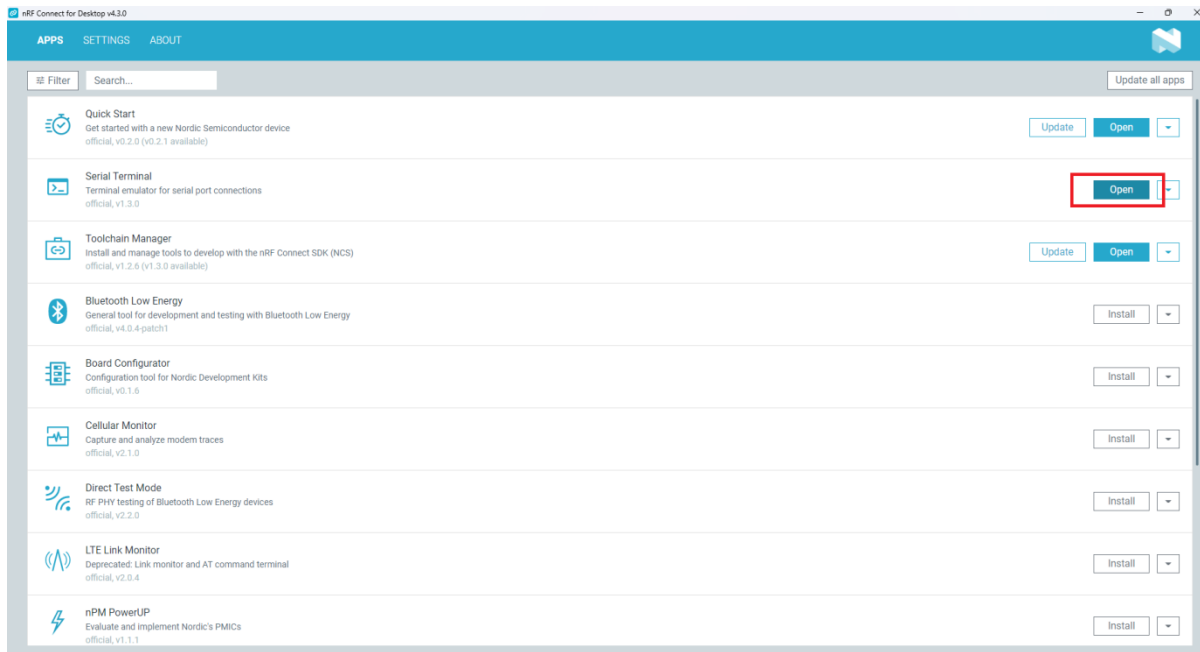
> ➢ Click on **Select Device [1]** > click on **FT232R USB UART [2]** as shown below in the picture.
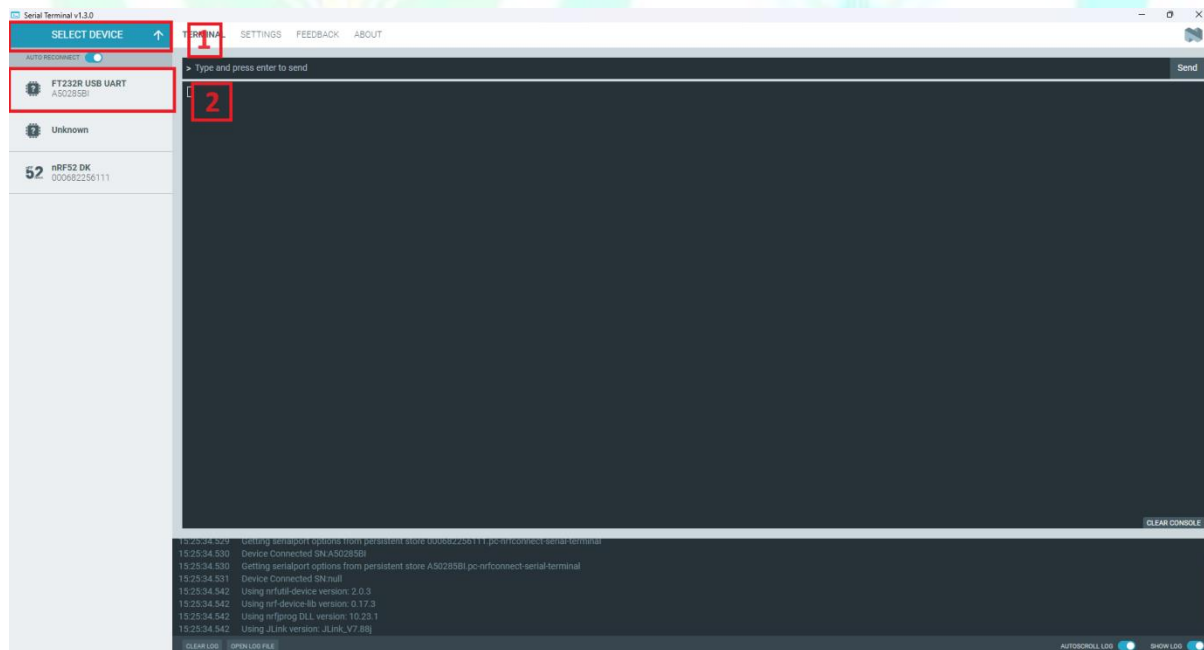
> ➢ Now the output will appear on your screen as shown below.

❖ OUTPUT