

tensor

SENSORS

IoT Solutions for the Aerospace Industry

User Guide

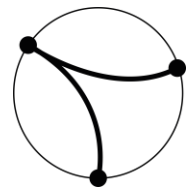
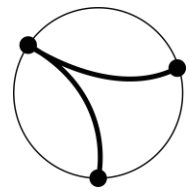


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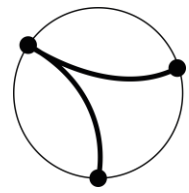
Getting Started

Included in your order should be a Gateway USB node and at least one sensor node. The Gateway node is how we downlink and log all sensor data from the mesh network, whereas the sensor nodes are for interfacing directly with the sensors used in your network, i.e.; temperature, pressure, strain, accelerometers, etc...



Figure 1 - Tensor USB Gateway Node

1. Open and unpack the USB Gateway Node.
2. When ready, plug the Gateway Node into a free USB port on the user's computer.
3. Upon plugging in, the Windows drivers should automatically be downloaded and installed on the computer.
4. You are now ready to begin using the Tensor USB Gateway Node.



Node Setup

You are now ready to start placing sensor nodes in and around your system. To begin, open and unpack sensor nodes included in your order. The block diagram of an example Thermocouple (TC) Node is shown below for reference.

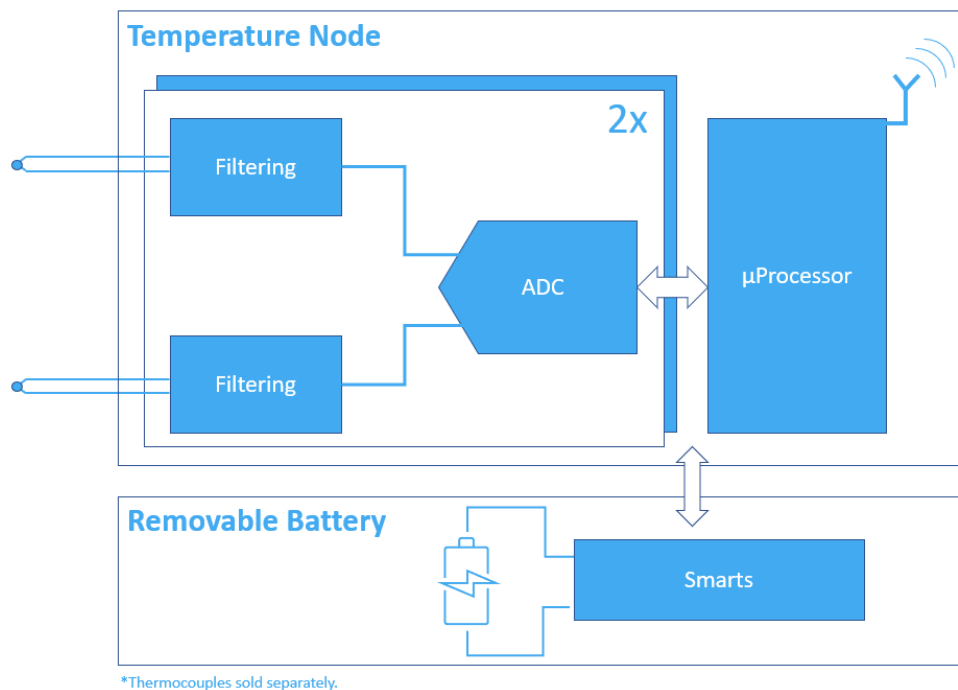
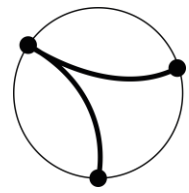


Figure 2 - Tensor Thermocouple Node Block Diagram

At the moment, minimal installation setup is required from the user to combine the Tensor sensor Node with the sensor desired.

- Using the thermocouple example, a TC of your choosing will have to be joined to the *Input Channel(s)* shown above.
- A power supply of your choosing (supply unit, battery, etc..) will have to be joined at the *Voltage Input* shown above; based on the specific sensor Node used.
 - The voltage requirement information can be found in the specific sensor Node datasheet.
 - If running Nodes on battery supply, it is recommended to install a miniature switch in series with the battery to preserve power when Node is not in use.
- The Debug Port can be used to flash the latest software version available from Tensor Sensors.
 - Updates will be provided by Tensor Sensors when available.



User Interface

1. To install the Tensor User Interface, unzip the folder named; “Tensor GUI.zip”, which you received from Tensor Sensors.
2. Open the executable (.exe) file named; “Tensor GUI.exe”. We recommend creating a shortcut and adding it to your desktop for ease of running across tests.
 - a. At the moment, only Windows machines are supported with the Tensor UI.
3. The following screen will be displayed in full screen, but feel free to resize as necessary.

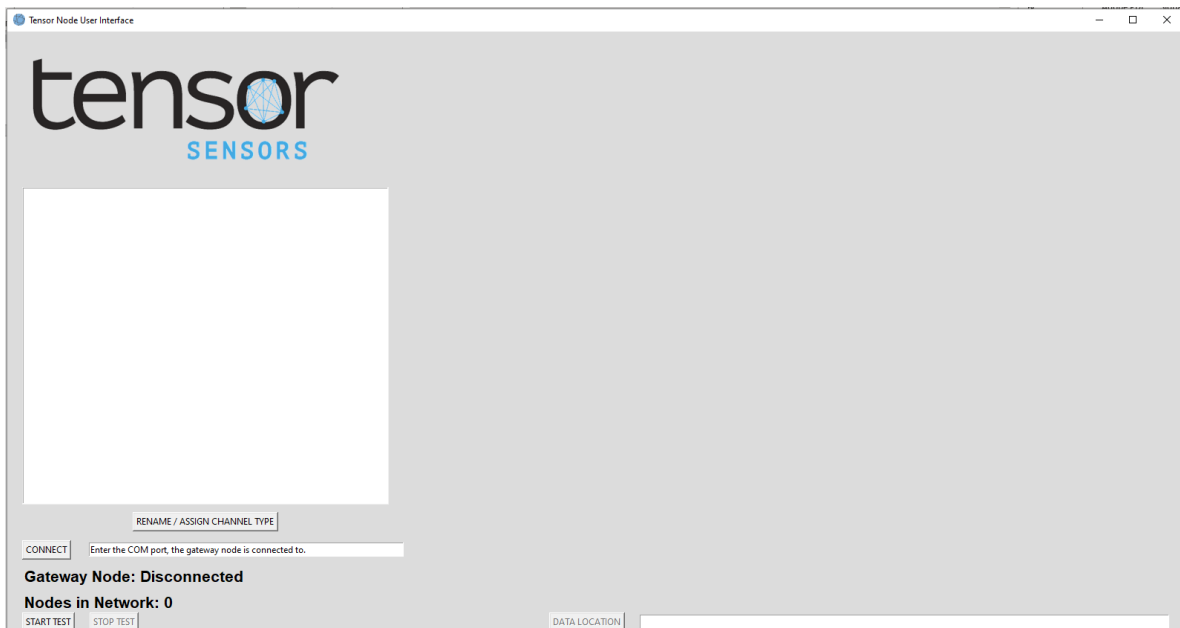
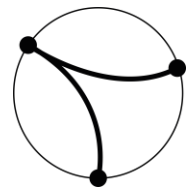


Figure 3 - Tensor User Interface (UI)

4. Verify the Gateway Node is physically connected to your computer, if it is not connected, connect now and wait for drivers to install if needed.
5. Once the Gateway Node is physically connected and drivers are installed, navigate to and open Device Manager on your computer.



6. Under the “Ports (COM & LPT)” section, find the device listed as “Silicon Labs CP210x USB to UART Bridge (COMX)”. This can be seen in the image below where the device is listed as COM3.
 - a. Note this COM Port.

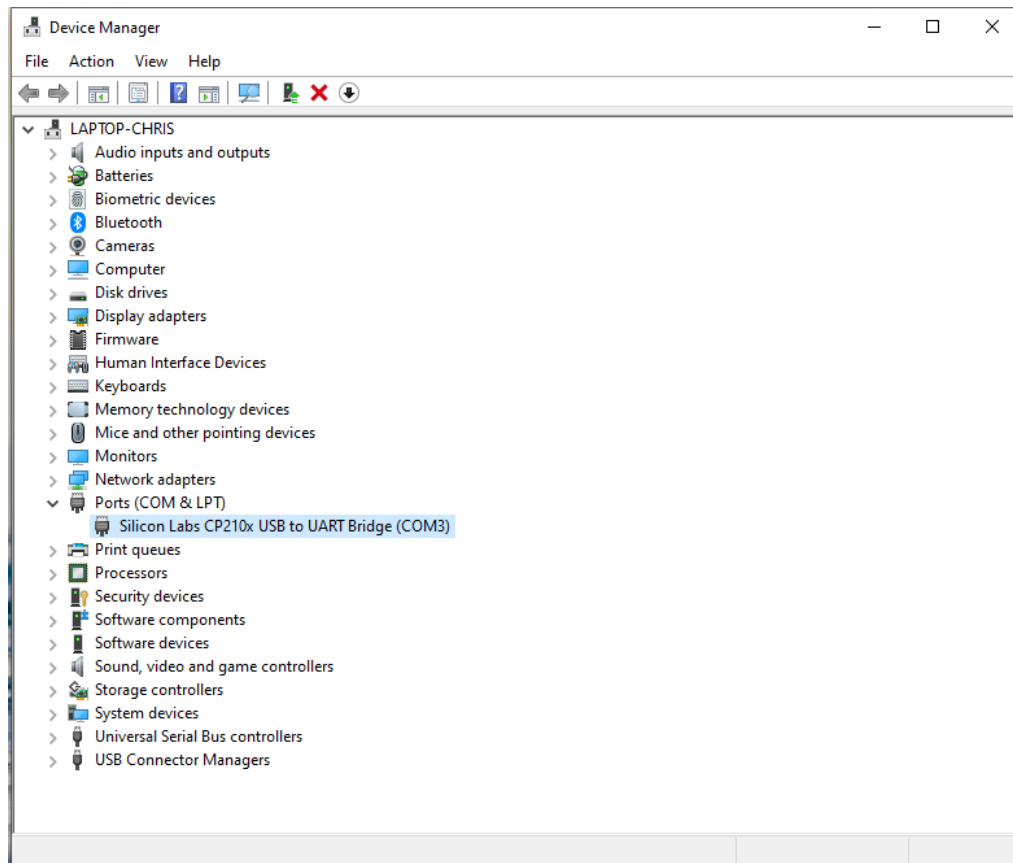
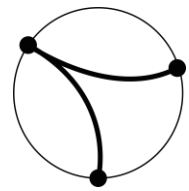


Figure 4 - Windows Device Manager Showing the Tensor Device's COM Port

7. Going back to the Tensor UI, enter the COM Port which was noted in Step 8, here in the entry box next to the Connect button.
 - a. For example, using COM3 as the COM Port for the Tensor Gateway Node, either “COM3” or “3” can be entered in the entry box.
8. Once the COM Port is entered, click the Connect button to connect the UI to the Gateway Node.
9. At this point, you should see that the Disconnected message next to “Gateway Node” changes to a Connected message.
10. After connecting the Gateway Node to the UI, individual-specific sensor Nodes can now be added, for example; Thermocouple Nodes.



11. After turning on specific sensor Nodes per the Node Setup section above, you should start to see Nodes that are connected to the mesh network beginning to appear in the list as shown below.
12. To indicate data a sensor Node is connected to the network and data is being passed through the network and downlinked at the Gateway, LEDs on each Node will begin blinking.

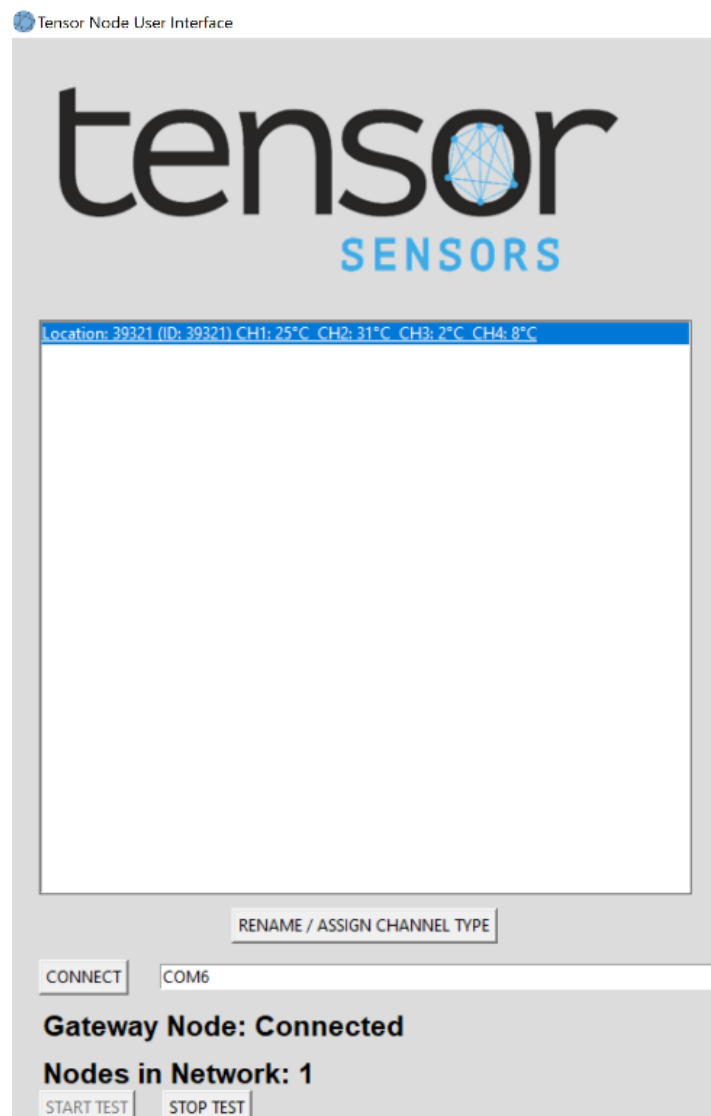
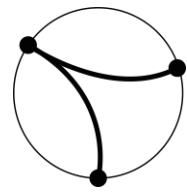


Figure 5 - Tensor UI showing Nodes appearing in Mesh Network

13. Each Node should appear with their respective location and unique identifier ID.
14. Additionally, each current channel temperature is listed next to the corresponding channel for each Node appearing in the list.



15. The total number of Nodes connected to the network will appear next to the Nodes in Network message.
 - a. For instance, in the above image, 1 Node is in the Network.
16. If desired, the user can rename the Node name (location) by clicking the Rename/ Assign Channel Type button, after selecting the Node of interest.
17. To set which type of thermocouple which is being used, highlight the node of interest, and click the Rename/ Assign Channel Type button and select which thermocouple type is used for each channel.
18. To begin a test and log any data being captured, click the Start Test button.
 - a. Once this button is clicked, data from the nodes will begin to log and be stored in the file location where the GUI has been opened with the Date and Time as the folder name.
19. Additionally, once the test has started, clicking a Node of interest will display a graph on the right-hand side of the UI automatically to help view more of the data for each Node in graphical format.
 - a. Data for that Node will begin to populate as shown below.

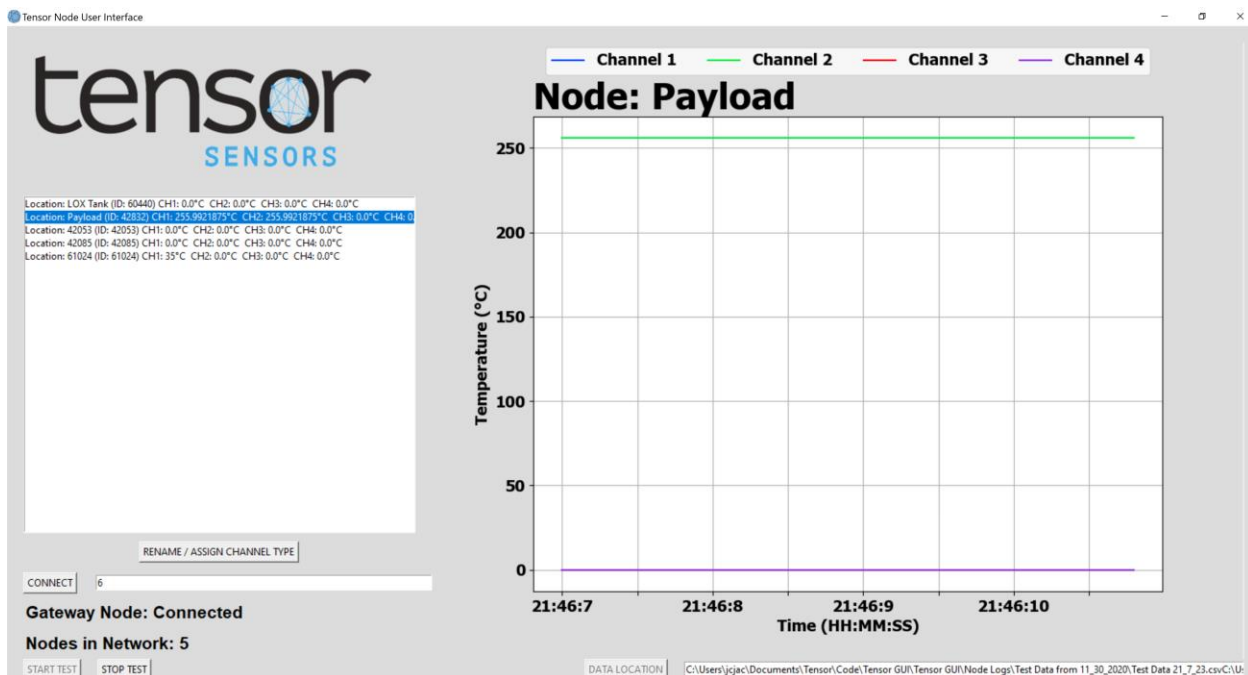


Figure 6 - Tensor UI Plotting Temperature Data from a Node Connected to the Mesh Network

20. Once testing has been finished, press the Stop Test button.
 - a. The data file will be closed out with this button press.
21. To access the folder where the data was stored, select the Data Location button and a file explorer window will be opened to that data folder.
 - a. The folder location is also shown in the textbox next to the Data Location button.