THine Solutions

THSCJ101
Start Guide

Rev. 1.00

1. The Items You Need

- Jetson Orin NX module
- JNX42-M.2 Auvidea carrier board
  - https://auvidea.eu/product/70784/
- Heat sink and fan
  - https://auvidea.eu/product/70812/
- Power supply
  - 12V/3A
- Display and HDMI cable
  - Display with HDMI port
  - HDMI cable
- USB mouse and keyboard
- USB micro B cable
- PC
  - Windows 10
- USB memory stick (optional)
- Linux binary for Jetson and other files
  - Follow the manual and get the Jetson Linux and other files.
    https://auvidea.eu/download/Software
- THSCJ101 driver binary
  - Request the driver binary to THine Solutions.
    https://www.thinesolutions.com/support-request
- THSCJ101
  - Camera board (THSCG101)
  - FFC cable

1. Install Jetson Linux

Step 1 : Install Jetson Linux and File system

- Follow the steps in the following manual of Auvidea.
  https://auvidea.eu/download/Software

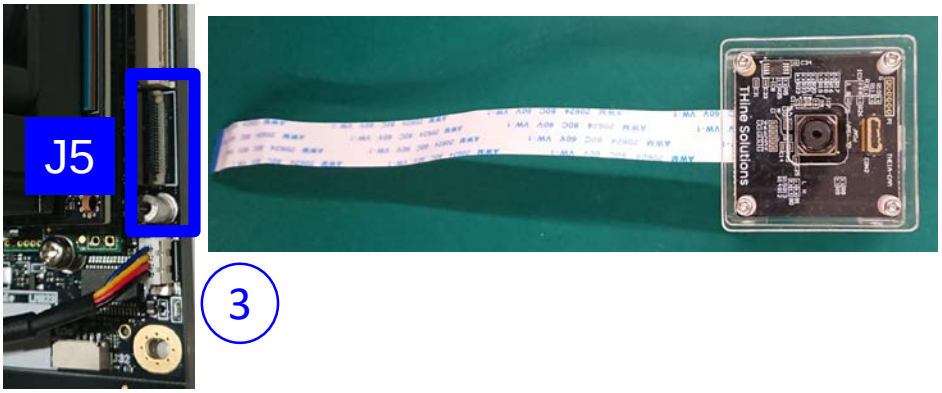
2. Setup Account of Ubuntu on Jetson Orin NX

Step 1: Setup the account information of Ubuntu on Jetson Orin NX.

Step 2: Power off the Jetson Orin NX to connect THSCJ101 to the carrier board.

DO NOT CHANGE THE PARTITION SIZE.

3. Jetson Orin NX Hardware Setup (1/2)

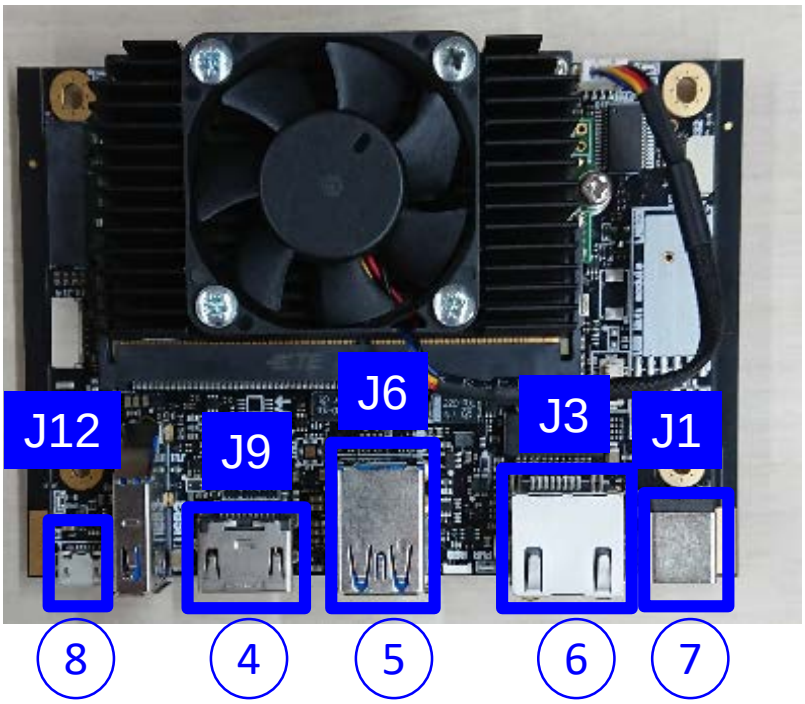


① Remove the camera from the case, then set the DIP switch of the camera board to program the latest firmware binary.
② Loose the screws to pull up the Jetson Orin NX for connecting the camera board easily.
③ Connect FFC with the carrier board.

- Pull up the black actuator of J5 to release the connector lock.
- Connect the camera board to the camera port connector J5 of Jetson Orin NX carrier board by FFC. Contacts are board side.

④ Screw the Jetson Orin NX module on the carrier board.

3. Jetson Orin NX Hardware Setup (2/2)



④ Connect with HDMI display via HDMI cable.
⑤ Connect J6 with the USB mouse and USB key board.
⑥ Connect J3 Ethernet cable to get the software from internet.
⑦ Connect J1 with the power outlet with the power adapter. Jetson Orin NX and the carrier board power on.
⑧ Connect with PC via USB micro B cable after the login prompt is displayed on the HDMI display.

You might need to connect the USB cable after the login prompt is shown in the display if you cannot see the L4T-README window.

4. Get the THSCJ101 Driver File

Step 1: Get THEIA-CAM_J101_BIN.zip.

- Request the driver file to THine Solutions.
  https://www.thinesolutions.com/support-request

Step 2: Unzip THEIA-CAM_J101_BIN.zip.

5. Login Linux on Jetson Orin NX (1/3)

Step 1 : Launch “device manager”

- Type in “device manager” in Windows search bar.

Step 2 : Check COM port number.

- Scroll down in the device manager to “Ports (COM & LPT)” & verify the correct port.
- There should be “USB Serial Port (COM<N>)”.

Step 3 : Launch “Putty” on your Windows PC,

- You may need to install VCP driver.
  - http://www.ftdichip.com/Drivers/VCP.htm

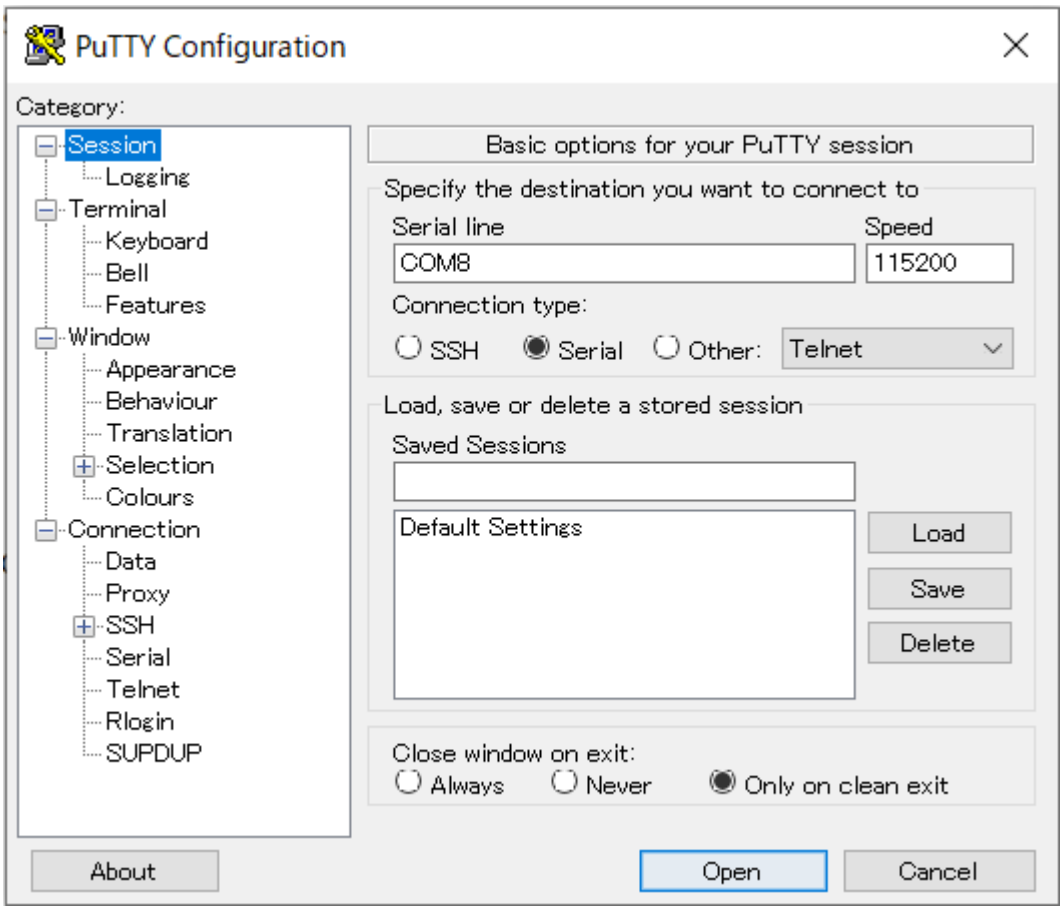
Step 4: Launch the terminal emulator, PuTTY.

5. Login Linux on Jetson Orin NX (2/3)

Step 5: Select “Session” in the Category.

Step 6: Fill in the connection settings as follows

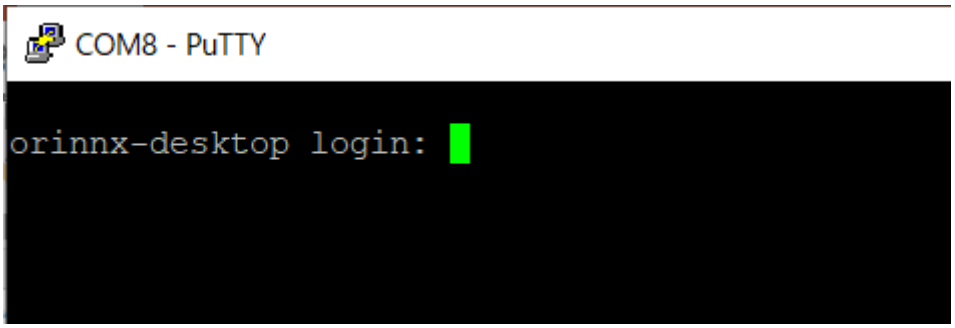
- Select “Serial” in the Connection type:
- COM<N> might be different from the following figure, but <N> should be the number checked in the Step 2.
- Type “115200” in the Speed box.



5. Login Linux on Jetson Orin NX (3/3)

Step 6: Press enter key, then Putty displays the following message.

- Assuming “orin-nx” is the user name.



Step 7: Login as your user name.

- The password might be required.

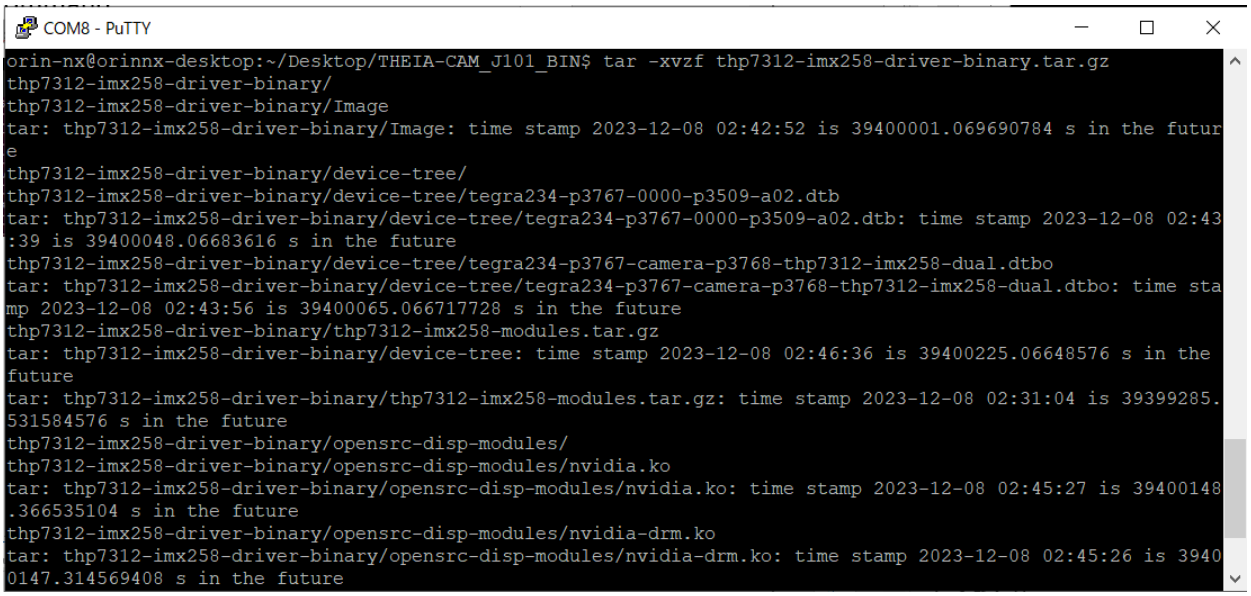
6. Setup THSCJ101 Driver Binary (1/4)

Step 1: Copy thp7312-imx258-driver-binary.tar.gz into Jetson Orin NX. For example, you can use USB stick to copy the file.

Step 2: Change the working directory where the driver is placed.

Step 3: Unzip the tar file on the terminal with the following command.

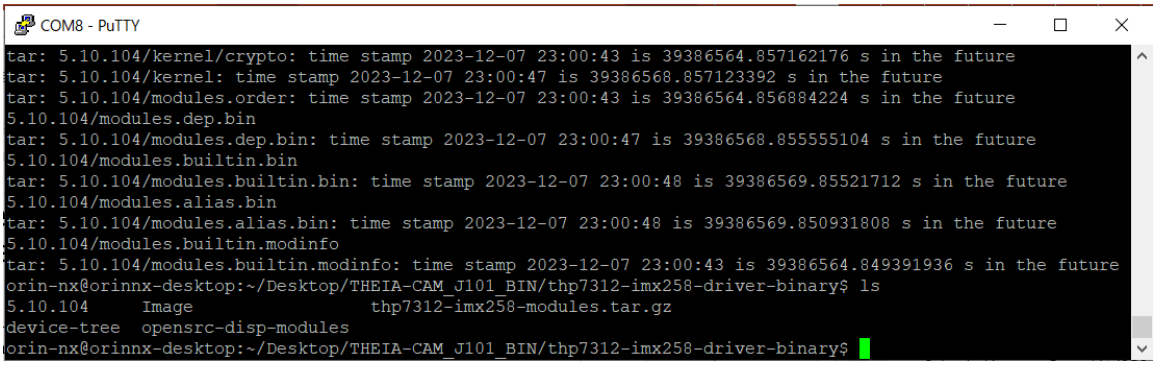
- `tar -xvzf thp7312-imx258-driver-binary.tar.gz`



6. Setup THSCJ101 Driver Binary (2/4)

Step 4: Change the working directory the unzipped directory of Step 4. Then unzip the thp7312-imx258-modules.tar.gz

- `cd thp7312-imx258-driver-binary`
- `tar -xvzf thp7312-imx258-modules.tar.gz`



Step 5: Copy the unzipped following files to the designated directory as follows.

Kernel

- `sudo cp ./Image /boot/`

Device Tree

- `sudo cp ./device-tree/tegra234-p3767-0000-p3509-a02.dtb /boot/dtb/kernel_tegra234-p3767-0000-p3509-a02.dtb`
- `sudo cp ./device-tree/tegra234-p3767-camera-p3768-thp7312-imx258-dual.dtbo /boot/`

Modules

- `sudo cp -r ./5.10.104/ /lib/modules/`
- `sudo ln -s /lib/modules/5.10.104 /lib/modules/5.10.104-tegra`

Display Modules

- `sudo mkdir /lib/modules/5.10.104/extra`
- `sudo mkdir /lib/modules/5.10.104/extra/opensrc-disp`
- `sudo cp ./opensrc-disp-modules/nvidia*.ko /lib/modules/5.10.104/extra/opensrc-disp`

6. Setup THSCJ101 Driver Binary (3/4)

Step 6: Copy thscg101_thp7312.bin into Jetson Orin NX.

Step 7: Change the working directory to the firmware binary placed.

Step 8: Make the /lib/firmware/thine directory to place the firmware binary

- `sudo mkdir /lib/firmware/thine`

Step 9: Copy the firmware binary to the directory.

- `sudo cp ./thscg101_thp7312.bin /lib/firmware/thine/thscg101_thp7312.bin`

Step 10: Reboot the Jetson Linux

- `sudo reboot`

Step 11: Close inactive PuTTY, launch the new PuTTY Window and log in after L4T-README window is shown.

6. Setup THSCJ101 Driver Binary (4/4)

Step 12: Rebuild the module dependency.

- `sudo depmod -a`

Step 13: Apply the device tree overlay by running the jetson.io script.

- `sudo /opt/nvidia/jetson-io/jetson-io.py`

Step 14: Select the following in the jetson.io scrip.

- Select “Configure Jetson 24pin CSI connector”
- Select “Configure for compatible hardware”
- Select “Camera THP7312/IMX258 Dual”
- Select “Save pin changes”
- Select “Save and reboot to reconfigure pins”

Step 15: Press any key to reboot and wait until the reboot is complete.

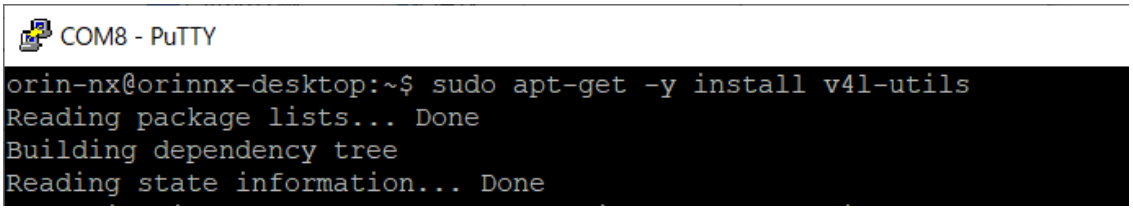
Step 16: Close inactive PuTTY, launch the new PuTTY Window and log in after L4T-README window is shown.

It might be takes about 10 minutes to show L4T-README window.

7. Install V4L2 Utilities and Gstreamer

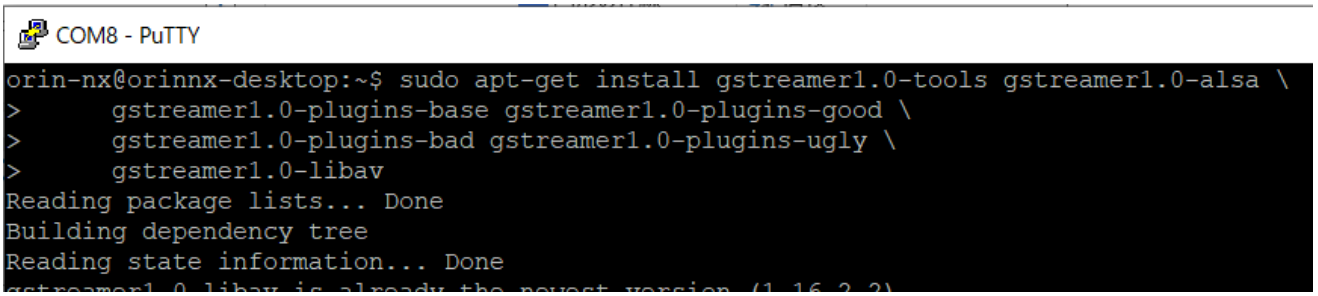
Step 1: Install V4L2 utilities.

- `sudo apt-get update`
- `sudo apt-get -y install v4l-utils`



Step 2: Install gstreamer.

- ```
  sudo apt-get install gstreamer1.0-tools gstreamer1.0-alsa \
      gstreamer1.0-plugins-base gstreamer1.0-plugins-good \
      gstreamer1.0-plugins-bad gstreamer1.0-plugins-ugly \
      gstreamer1.0-libav
  ```
- ```
  sudo apt-get install libgstreamer1.0-dev \
      libgstreamer-plugins-base1.0-dev \
      libgstreamer-plugins-good1.0-dev \
      libgstreamer-plugins-bad1.0-dev
  ```



8. Program the Firmware Binary

Step 1: Program the firmware binary.

- `v4l2-ctl -d /dev/video0 --set-ctrl=isp_firmware_update=1`

Step 2: Wait 35 second, and check the following message is shown in the terminal.

- `sudo dmesg | grep 7312`

[XXX.XXXXXX (*1)] thp7312 10-0061: Flash Memory: THP7312 Firmware update is completed

(*1) XXX.XXXXXX is number. e.g. 216.833438

Step 3: Set the DIP switch of the camera board to the streaming mode.

Step 4: Reboot the Jetson Orin NX.

- `sudo reboot`

Step 5: Wait until the reboot is complete.

Step 6: Close inactive PuTTY, launch the new PuTTY Window and log in after L4T-README window is shown.

Step 7: Launch the terminal and check the firmware version.

- `sudo dmesg | grep 7312 | grep Firmware`

[XXX.XXXXXX (*1)] thp7312 10-0061: thp7312_board_setup: Firmware version NN (*2)
[XXX.XXXXXX (*1)] thp7312 10-0061: thp7312_board_setup: Firmware subversion NN (*2)

(*1) XXX.XXXXXX is number. e.g. 216.833438
(*2) NN is the number. The firmware version number is in README.txt.

9. Stream 4K@30fps Images

Step 1: Login to the Jetson Orin Linux.

Step 2: Enter the following command to stream 4K 30fps image.

- v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=3
- gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2, width=3840,height=2160,framerate=30/1 ! xvimagesink

You can see the streaming images on the display.