# SIM7600CE-T/E-H/A-H/G-H 4G Modules

## Introduction

4G/3G/2G/GSM/GPRS/GNSS HAT for Raspberry Pi, Based on SIM7600E-H

## Overview:

This is a 4G/3G/2G communication and GNSS positioning module designed for Jetson Nano, it supports global LTE CAT4 up to 150Mbps for downlink data transfer, with pretty low power consumption.
Just attach it onto the Jetson Nano Developer Kit, easily enable functions like 4G high speed connection, wireless communication, remote video monitoring, making telephone call, sending SMS, global positioning, and so on.

## Features:

1. 40PIN GPIO extension header for connecting Jetson Nano
2. Supports dial-up, telephone call, SMS, mail, TCP, UDP, DTMF, HTTP, FTP, etc.
3. Supports GPS, BeiDou, Glonass, LBS base station positioning
4. Onboard USB interface, to test AT Commands, get GPS positioning data, and so on
5. Breakout UART control pins, to connect with host boards like Arduino/STM32
6. SIM card slot, supports 1.8V/3V SIM card
7. Onboard 3.5mm audio jack with earphone and mic support, for making telephone call
8. 2x LED indicators, easy to monitor the working status
9. Onboard voltage translator, operating voltage can be configured to 3.3V or 5V via jumper
10. Baudrate: 300bps ~ 4Mbps (default: 115200bps)
11. Autobauding baudrate: 9600bps ~ 115200bps
12. Control via AT commands (3GPP TS 27.007, 27.005, and V.25TER command set)
13. Supports SIM application toolkit: SAT Class 3, GSM 11.14 Release 99, USAT
14. Comes with development resources and manual (examples for Jetson Nano/Raspberry Pi/Arduino/STM32)

## Communications Specifications:

| | | | | | | |
|---|---|---|---|---|---|---|
| | LTE | WCDMA / TD-SCDMA / CDMA 2000 | | | EDGE | GSM/GPRS |
| Band | LTE-TDD | UMTS/HSDPA/HSPA+ B1/B2/B4/B5/B6/B8/B19 | | | GSM/GPRS/EDGE | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | B34/B38/B39/B40/B41 | | | | 850/900/1800/1900MH | |
| | LTE-FDD B1/B2/B3/B4/B5/B7/B8 | | | | | |
| | /B12/B13/B18/B19/B20/B25/B26/B28/B66 | | | | | |
| Emitting power | 0.25W | | | | 0.5W@EGSM900 | 2W@GSM900 |
| | | | | | 0.4W@DCS1800 | 1W@DCS1800 |
| Data Speed | LTE CAT 4 | UMTS | TD-SCDMA | CDMA2000/EVDO | EDGE | GPRS |
| | Uplink≤50 Mbps | Uplink≤384Kbps | Uplink≤128Kbps | Uplink≤1.8Mbps | Uplink≤236.8kbps | Uplink≤85.6kbps |
| | Downlink≤150 Mbps | Downlink≤384Kbps | Downlink≤384Kbps | Downlink≤3.1Mbps | Downlink≤236.8kbps | Downlink≤85.6kbps |
| | | HSPA+ | TD-HSDPA/HSUPA | | | |
| | | Uplink≤5.76 Mbps | Uplink≤2.2Mbps | | | |
| | | Downlink≤42 Mbps | Downlink≤2.8Mbps | | | |
| SIM Card | Normal SIM (Not Included) | | | | | |
| Applicable Region | Global 4G/3G/2G | | | | | |

# GNSS Specifications:

Receiver type
  -16-channel
  -C/A code
Sensitivity
  -Tracking: -159 dBm (GPS) / -158 dBm (GLONASS) / TBD (BD)
  -Cold starts: -148 dBm
Time-To-First-Fix (open air)
  -Cold starts: <35s

-Hot starts: <1s

Accuracy

-Position: <2.5m CEP

# SMS and Audio Specifications:

SMS

-Supported types: MT, MO, CB, Text, PDU

-Storage: USIM card and ME (default)

Audio feature

-Supports echo cancellation

-Supports noise reduction

# Other Specifications:

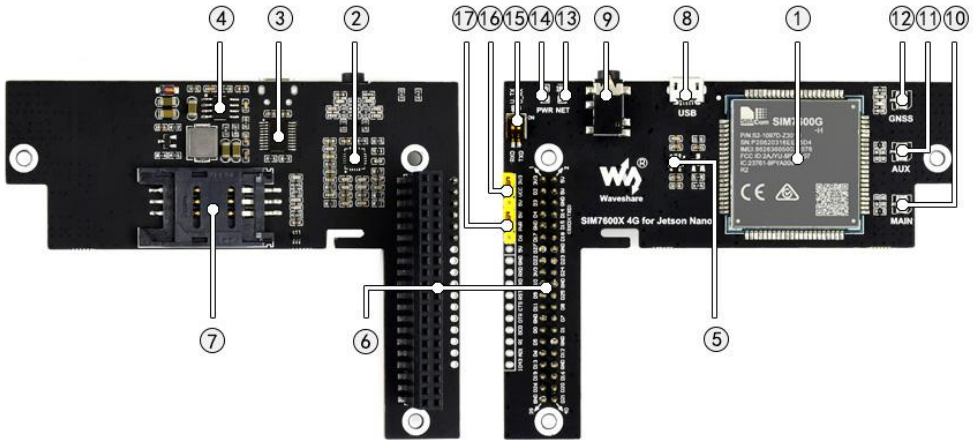
Power supply: 5V

Operating voltage: 5V/3.3V (configured via jumper)

Operating temperature: -30°C ~ 80°C

Storage temperature: -45°C ~ 90°C

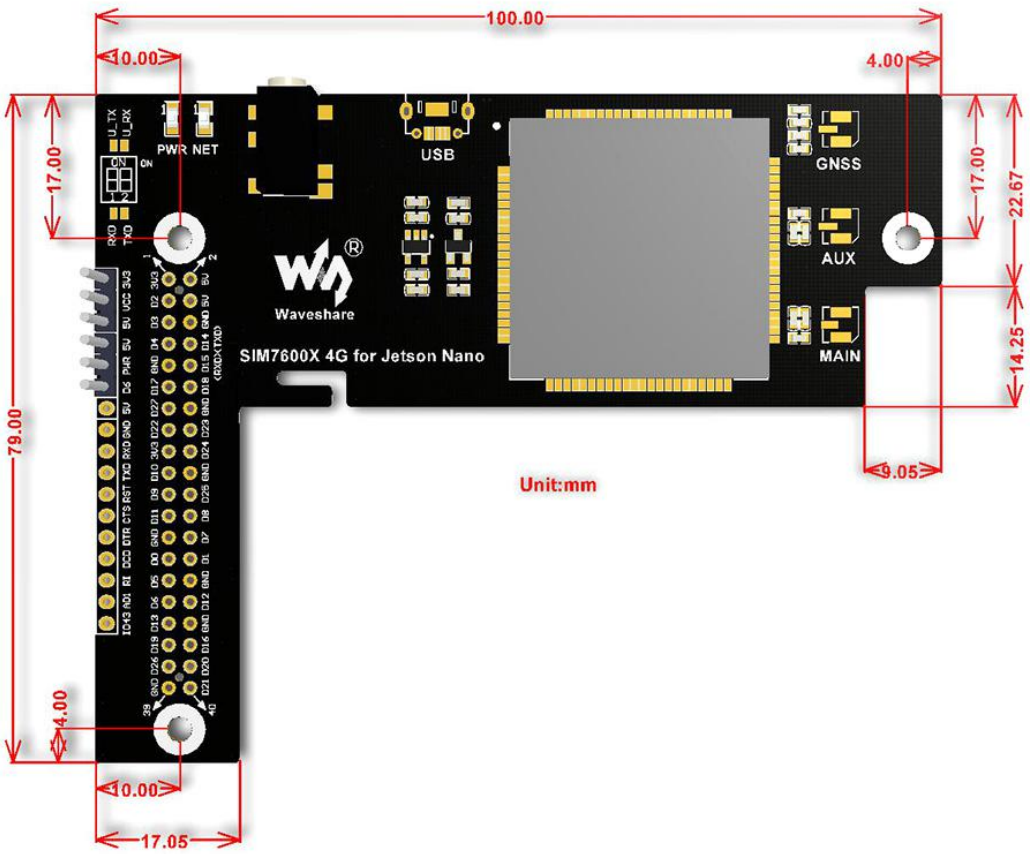
What's on Board:




1. SIM7600G-H
2. NAU8810 audio decoder
3. TXS0108EPWR voltage translator: translates 3.3V/5V into 1.8V
4. MP1482 power chip
5. RT9193-33 voltage translator: translates 5V into 3.3V
6. 40PIN GPIO header: for connecting with Jetson Nano Developer Kit
7. SIM card slot: supports 1.8V/3V SIM card
8. USB interface: for testing AT Commands, getting GPS positioning data, etc.

9. 3.5mm earphone/mic jack
10. MAIN antenna connector
11. AUX antenna connector
12. GNSS antenna connector
13. Network status indicator
14. Power indicator
15. UART enable switch:
  -ON: connect UART ports of SIM7600 and Jetson Nano
  -OFF: disconnect UART ports of SIM7600 and Jetson Nano
16. Operating voltage selection jumper:
  -VCC - 3.3V: set operating voltage as 3.3V
  -VCC - 5V: set operating voltage as 5V
17. PWR control config:
  -PWR - 5V: SIM7600 auto startup on power up
  -PWR - D6: SIM7600 will be turned on/off by D6 pin of Jetson Nano

# Dimension:




# Hardware connection

Attach the SIM7600G-H 4G for Jetson Nano (SIM7600 hereafter) on 40PIN GPIO of Jetson Nano.
Inset the USB connector, connect the micro USB interface of SIM7600 to Jetson Nano

-If you want to communicate SIM7600 via Serial port, you can also turn the DIP switcher into ON

Connect MAIN antenna and the GPS antenna


# Software setup

Open a terminal and install libraries by the following commands

```
sudo apt-get update
sudo apt-get python3-pip
sudo pip3 install pyserial
mkdir -p ~/Documents/SIM7600X_4G_for_JETSON_NANO
wget -P ~/Documents/SIM7600X_4G_for_JETSON_NANO/ https://www.waveshare.com/w/upload/6/64/SIM7600X_4G_for_JETSON_NANO.tar.gz
cd ~/Documents/SIM7600X_4G_for_JETSON_NANO/
tar -xvf SIM7600X_4G_for_JETSON_NANO.tar.gz
sudo pip3 install Jetson.GPIO
sudo groupadd -f -r gpio
sudo usermod -a -G gpio your_user_name
sudo udevadm control --reload-rules && sudo udevadm trigger
sudo apt-get install minicom
```

**Note: you should replace your_user_name with the actual user name.**

# Testing

## Testing with minicom

Before you test the SIM7600, you need to intail it with the following commands

```
echo 200 > /sys/class/gpio/export
echo out > /sys/class/gpio200/direction
echo 1 > /sys/class/gpio200/value
echo 0 > /sys/class/gpio200/value
```

Make sure that the NET is blinking normally.

Run minicom and type AT commands to test

```
sudo minicom -D /dev/ttyTHS1 -b 115200
```

If you cannot get response, please check if you have set the DIP switch into ON

## Python examples

Make sure that all the hardware are connected properly. Start Jetson Nano and open a terminal

AT examples

You should run the following commands to run the codes and type AT commands for testing

```
cd ~/Documents/SIM7600X_4G_for_JETSON_NANO/AT/
sudo python3 AT.py
```

GPS examples

Connect the GPS antenna and set the receiver at open place.

You should run the following commands to run the codes to test GPS.

```
cd ~/Documents/SIM7600X_4G_for_JETSON_NANO/GPS/
sudo python3 GPS.py
```

PhoneCall examples

Modify the PhoneCall.py file, change the phone number to yours by vi tool and save

Finally use the following command to run the code

```
cd ~/Documents/SIM7600X_4G_for_JETSON_NANO/PhoneCall/
vi PhoneCall.py #modify the phone number
sudo python3 PhoneCall.py
```

SMS example

Run the following commands

```
cd ~/Documents/SIM7600X_4G_for_JETSON_NANO/SMS/
sudo python3 SMS.py
```

TCP example

Run the following commands

```
cd ~/Documents/SIM7600X_4G_for_JETSON_NANO/TCP/
sudo python3 TCP.py
```

# 4G connecting

Please connect all the hardware and start Jetson Nano.

-Check and make sure that the module work normally by demo codes above.

-Open minicom by command

```
sudo minicom -D /dev/ttyUSB2
```

Type the following command to check

```
AT+CNMP=38
AT+CSQ
AT+CREG?
AT+COPS?
AT+CPSI?
```

Download driver

```
cd
wget https://www.waveshare.com/w/upload/4/46/Simcom_wwan.zip
tar zxvf Simcom_wwan.zip
cd Simcom_wwan
sudo make
```

Use root permission to install driver

```
sudo su
insmod simcom_wwan.ko
lsmod
dmesg
```

Check if the wwan0 interface is recognized

```
ifconfig -a
```

Enable the wwan0 interface

```
ifconfig wwan0 up
```

Dailing by minicom

```
minicom -D /dev/ttyUSB2
AT$QCRMCALL=1,1
```

Allocate IP

```
apt-get install udhcpc
udhcpc -i wwan0
```

Now you can use 4G network

If you get dns error, please fix it by this command

```
route add -net 0.0.0.0 wwan0
```

# Resources

- Manual
- SIM7600X 4G for Jetson Nano Schematic
- Demo codes
- SIM7600 Driver
- driver for wwan0

# Related Instruction

- Raspberry Pi networked via RNDIS
- SIM868 PPP Dail-up Networking
- gprs
- Setup wwan0 interface for 4G network

# Tools

- sscom (with sim7600 AT commands)
- SIMCom GPS
- NetAssist

# SIM7600 Related

**Datasheets**

- SIM7600X-H SPEC
- SIM7600G-H SPEC
- AT Command Manual_V1.08

## Application Note

- SIM7X00 Series_GPIO_Application Note
- SIM7X00 Series_SAT_Application Note
- SIM7X00 Series_SMS_Application Note
- SMS Application notes
- SIM7X00 Series_TCPIP_Application Note
- SIM7600 Series_HTTP_AT Command Manual
- SIM7600 Series_SSL_AT Command Manual
- SIM7X00 Series_UART_Application Note
- SIM7X00 Series_GPS_Application Note
- SIM7600 Series_MQTT_ATC
- SIM7X00_Audio_Application_Note
- SIM7600_Sleep Mode_Application Note
- SIM7600 Series_LBS_Application Note
- SIM7600 Series_USB AUDIO_Application Note
- SIM7600 Series_UIM HOT SWAP_Application Note
- SIM7600M22 Series_TTS_Application Note
- SIM7600 Series_HSIC_LAN_Application_Note
- SIM7600 Series Hardware Design
- SIM7600G-H Hardware Design