NK-980ETH2P Quick Start Guide

For additional information or questions, please contact: Nuvoton Technology Corporation.

www.nuvoton.com

Table of Contents

1 OVERVIEW

This document will provide a quick start guide for NuDesign NK-980ETH2P demo board. Users can realize how to set up software and hardware to quickly start a NuDesign NJ-980ETH2P demo.

The NuDesign NK-980ETH2P demo board of Nuvoton is a specific development tool based on the NuvoTon NUC980DK61Y, providing customers with low cost and easy development. It can be easily customized for customers to provide their own UART-to-Ethernet device server products.

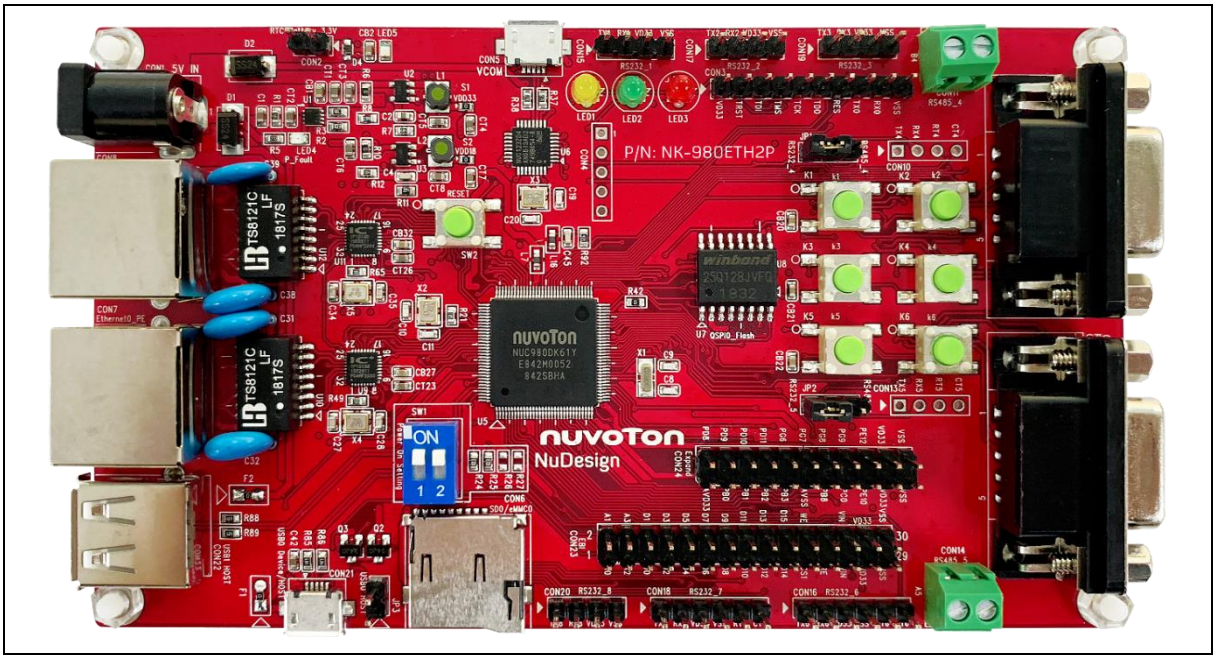


Figure 1-1 NuDesign NK-980ETH2P Demo Board

2 INSTALL LINUX BSP

Linux BSP contains three directories. Content of each directory listed in following table:

Directory Name	Content
BSP	A tar ball contains cross compiler, root file system, and pre-build tool chain.
Documents	BSP related documents.
Tools	NuWriter tool and its driver for Windows and SD writer tool.

Table 2-1 BSP content

You can use repo tool to download the source code. Below list the steps of doing so.

Make sure you have a bin/ directory in your home directory and that is included in your path.

```
$ mkdir ~/bin
$ export PATH=~/bin:$PATH
```

Download the repo tool and ensure it is executable.

```
$ curl https://storage.googleapis.com/git-repo-downloads/repo > ~/bin/repo
$ chmod a+x ~/bin/repo
```

Create an empty directory to hold working directory.

```
$ mkdir WORKING_DIR
$ cd WORKING_DIR
```

Configure git with your real name and email address.

```
$ git config --global user.name "Your Name"
$ git config --global user.email "you@example.com"
```

Use one of following commands to download manifest file for NUC980 BSP. The first command download from Github, and the second command download from Gitee. Users can use the command to select the site with faster download speed.

```
$ repo init -u git://github.com/OpenNuvoton/manifest.git -b nuc980-2019.01
-m github.xml
```

Or.

```
$ repo init -u https://gitee.com/OpenNuvoton/manifest.git -b nuc980-2019.01
-m gitee.xml
```

And then download source code.

```
$ repo sync
```

After download the source code, please copy the tar ball under BSP directory to Linux machine and use following command to extract the file.

```
$ tar zxvf nuc980bsp.tar.gz
```

After enter nuc980bsp directory, execute the installation script install.sh. This script requires the administrator privilege to execute. You can use “su” command to switch to root and execute the installation script.

```
$ su
```

```
Password: (Enter password of root)
# ./install.sh
```

Or execute this script as root by using sudo command. (This method works for those distributions do not open the root account privilege, such as Ubuntu)

```
# sudo ./install.sh
```

Below is the console output during installation, the path input should be the same as the WORKING_DIR set previously.

```
Now installing arm_linux_4.8 tool chain to /usr/local/
Setting tool chain environment
Installing arm_linux_4.8 tool chain successfully
Install rootfs, applications, u-boot and Linux kernel
Please enter absolute path for installing(eg:/home/<user name>) :
BSP will be installed in /<path you input>/nuc980bsp
/home/someone
Extract rootfs and pre-build images
...
...
NUC980 BSP installion complete
NUC980 BSP installion complete
```

For detailed Linux BSP develop environment, please refer to "**NUC980 Linux 4.4 BSP User Manual**" in the "Documents" directory.

3 QUICK STARTING TO USE NK-NUC980ETH2P

This chapter will help users easily to use NK-980ETH2P step by step.

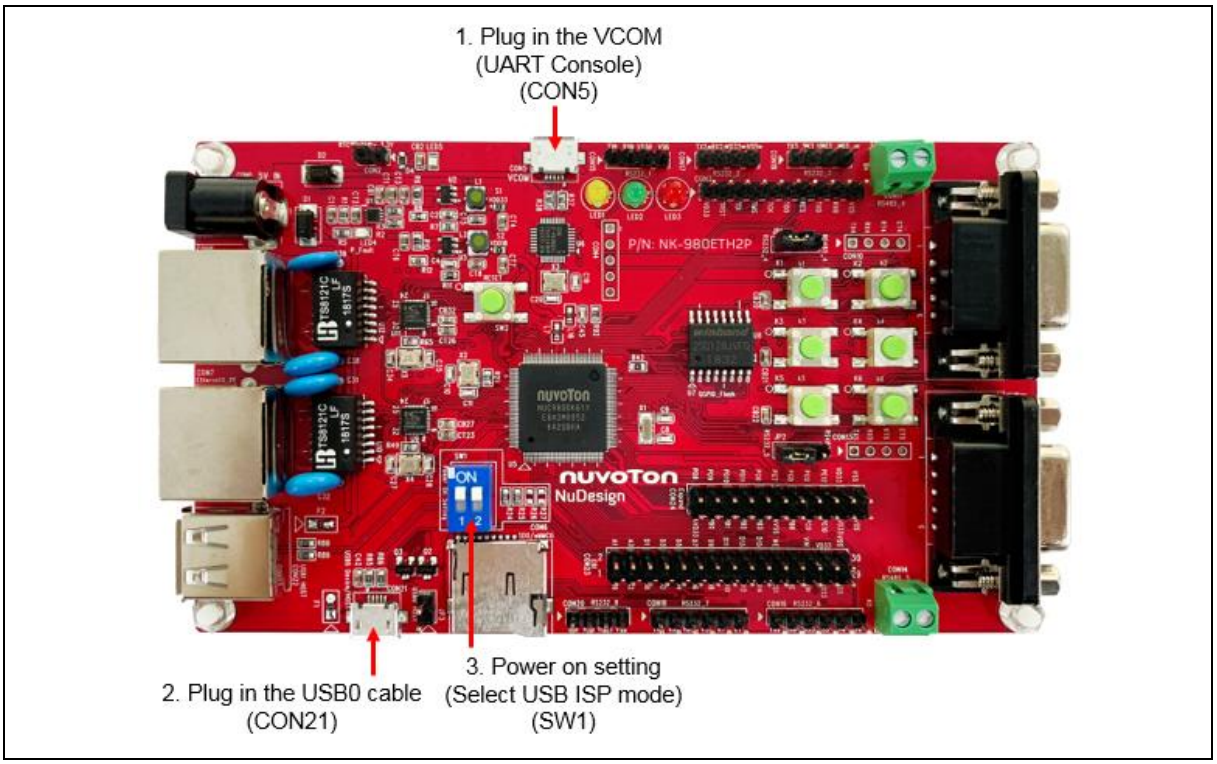


Figure 3-1 NuDesign NK-980ETH2P Demo Board

1. Connect to PC HOST

Connect the USB micro-B port (CON5) to the PC HOST.

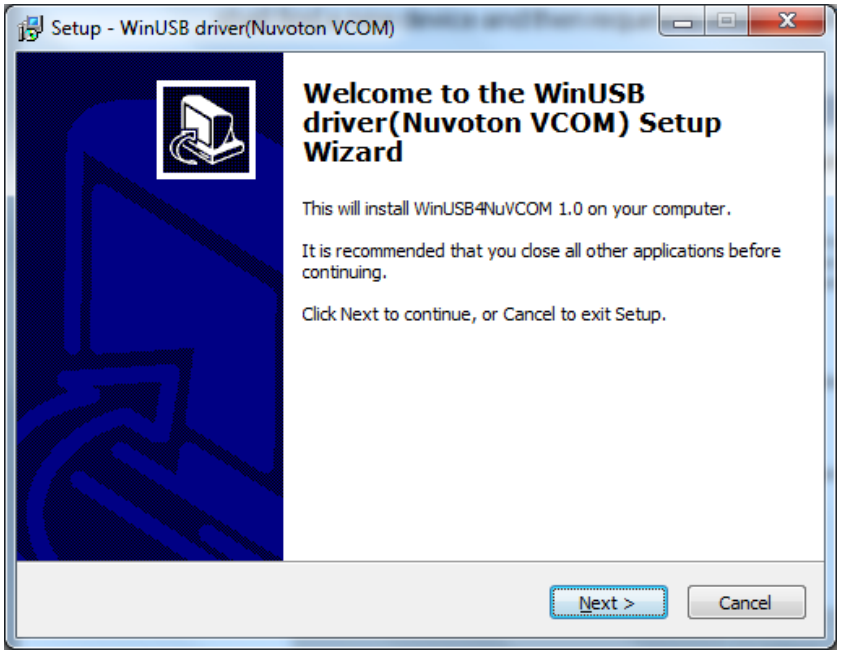
The PC HOST will supply 5V power to the NuDesign NK-980ETH2P demo board and will recognize the board as a USB composite device.

The VCOM port function is used to print some messages on PC API, such as Tera Term, through the standard UART protocol to help user to debug program.

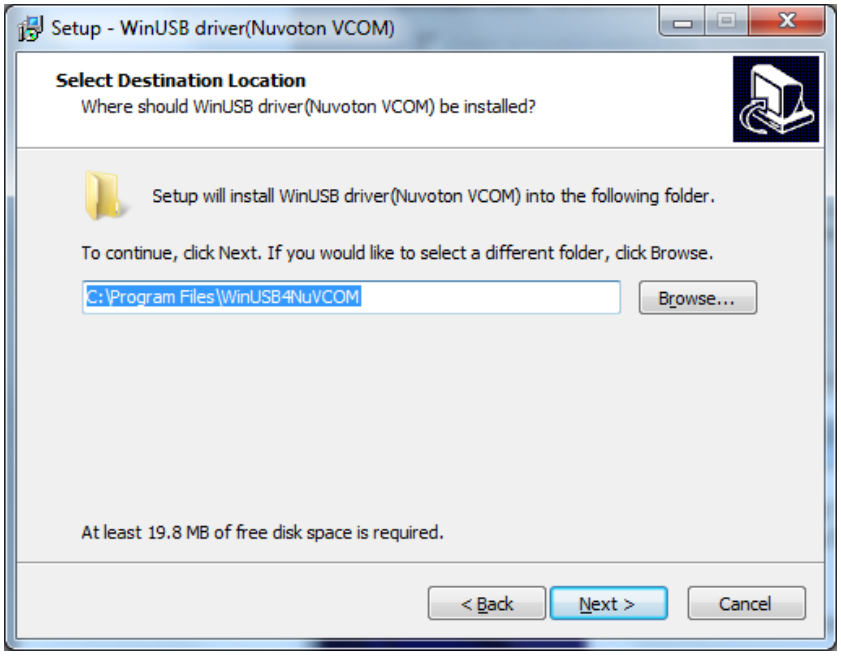
2. Plug in the USB0 cable (CON21)

The burning tool requires a NuWriter driver to be installed on PC first. Please follow the steps below to install the driver.

Run the "**WinUSB4NuVCOM.exe**" before the USB cable is plugged in. The "**WinUSB4NuVCOM.exe**" can be found in the "Tool" directory. Power on the NUC980 Series MPU EVB and plug the USB cable into PC, the Windows shall find a new device and then request to install its driver.

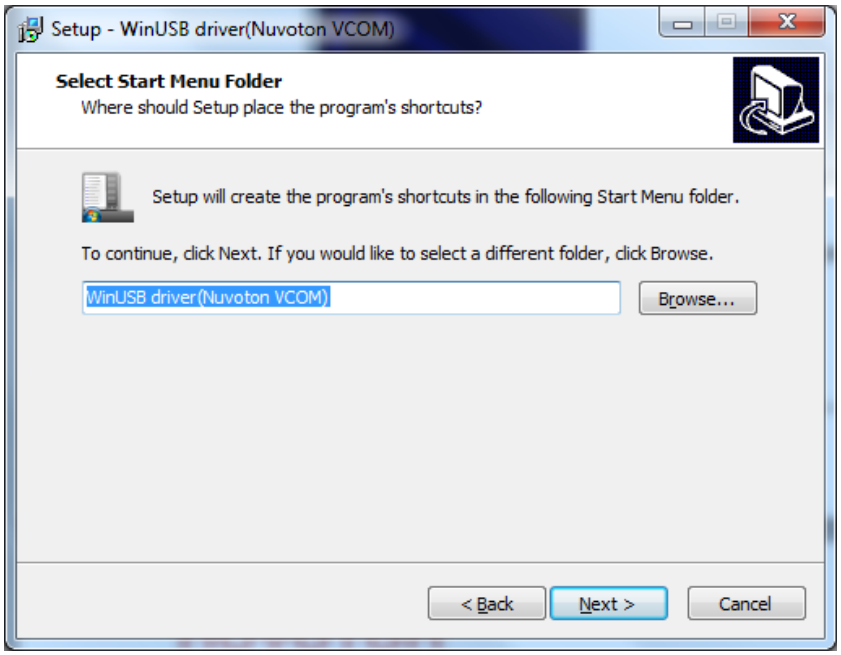


Click "**Next**". The software installation will ask you how to install the driver.

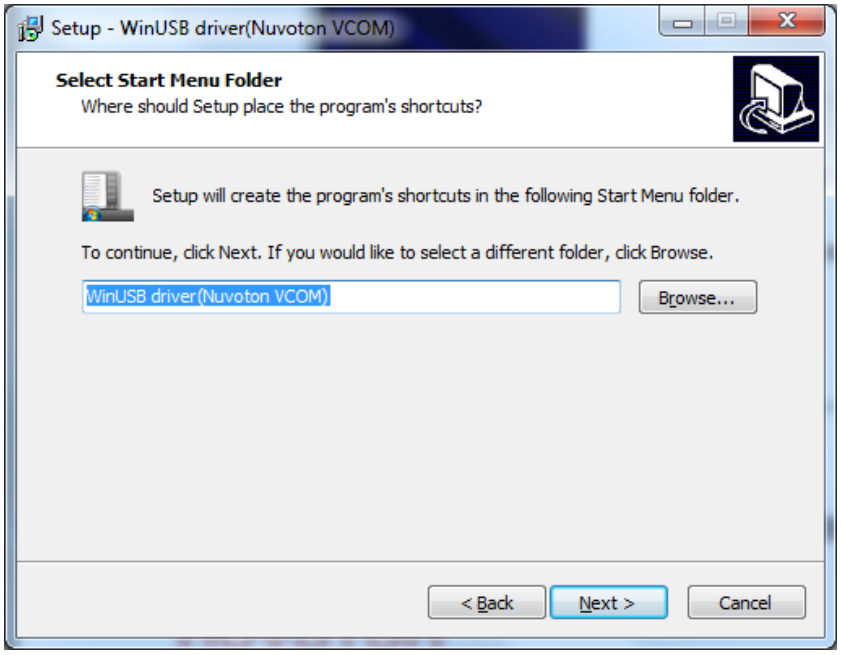


Select "setup path" to specific location (Advanced), and then click "**Next**". The installation software will ask you the option.

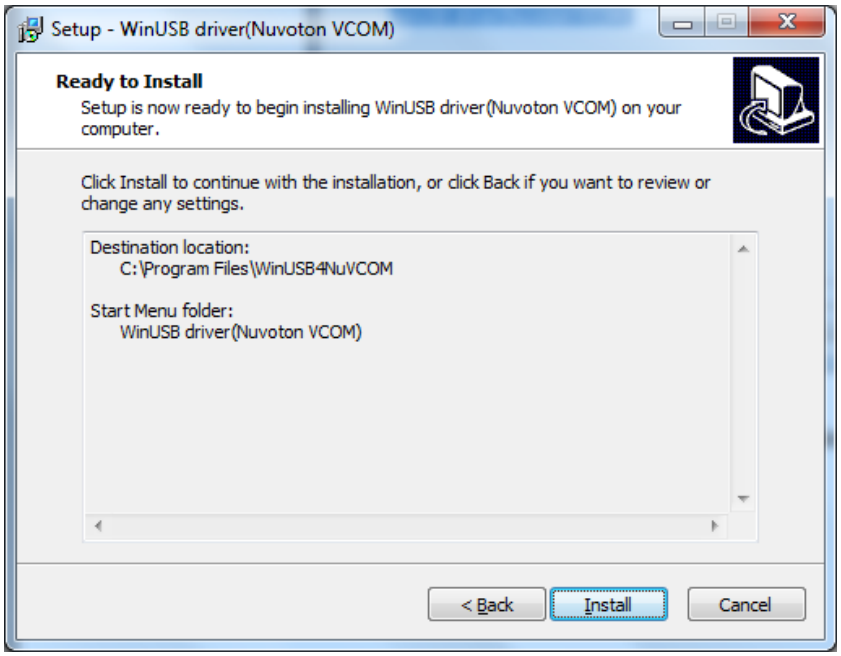
Click “**Next**”. As follows.



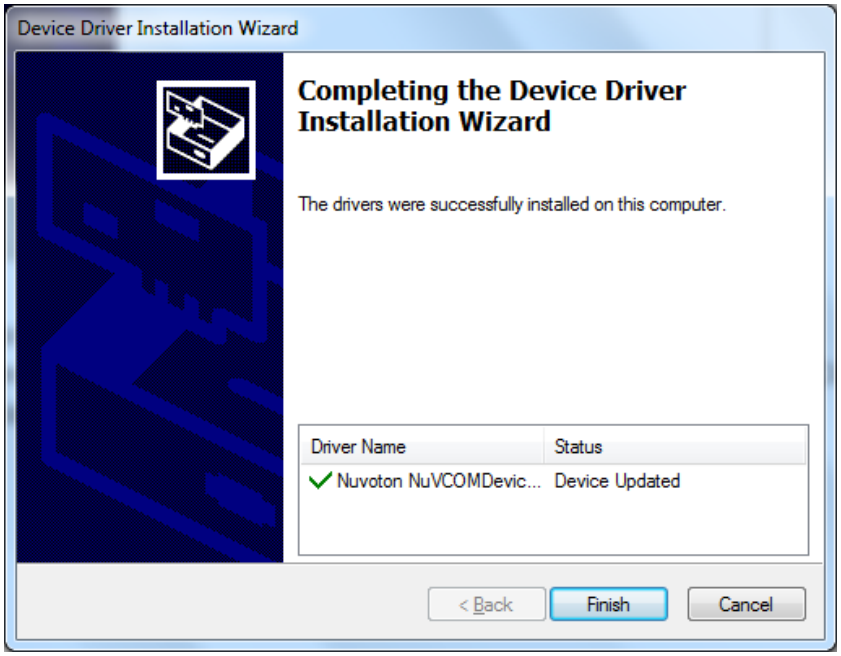
Click “**Next**”. As follows.



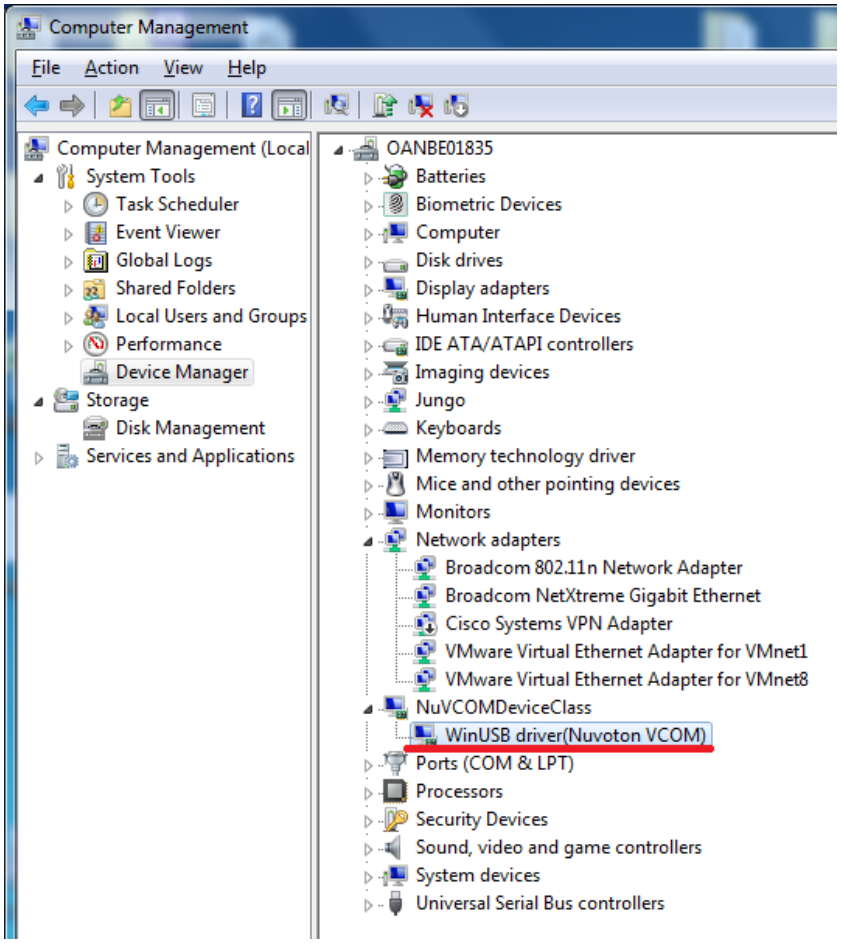
Click “**Install**”. As follows.



Click “**Finish**” to finish install driver. As follows.



If the installation is successful, a virtual COM port named “**WinUSB driver (Nuvoton VCOM)**” can be found by using “Device Manager” to check the ports devices.



3. Select the USB mode(SW1) Plug in the USB to UART cable (CON2)

Set power on setting(SW1) to ON/ON to Boot from USB.

SW	Description (Status and Function)	GPIO pin of NUC980
SW1.2/ SW1.1	**Power on setting** ON/ON = Boot from USB. ON/OFF = Boot from SD/eMMC. OFF/OFF = Boot from QSPI0 Flash.	GPG1/GPG0

Table 3-1 Power On Setting

4. Open the Serial Port Terminal and Reset chip

After pressing the reset button(SW2), the chip will reprogram application and print out debug message on the terminal.

For detailed NK-980RTH2P board introduction, please refer to "**NuDesign NK-980ETH2P User Manual**" in the "Documents" directory.

4 PROGRAM KERNEL AND U-BOOT TO SPI FLASH

This section introduces how to program U-Boot and kernel to SPI flash. Below list the steps of doing so.

A. Install NuWriter Driver. (Please refer to "**NUC980 NuWriter User Manual**")

B. Set SW1(Power On Setting) to Boot from USB (show in Table 3-1 and Figure 4-1). Connect USB0 to PC and connect UART console to PC.

C. double click "**NuWriter.exe**" on PC. Select target chip as "NUC980 series" and select DDR parameter is "NUC980DK61Y.ini". And then, press "Continue" button.

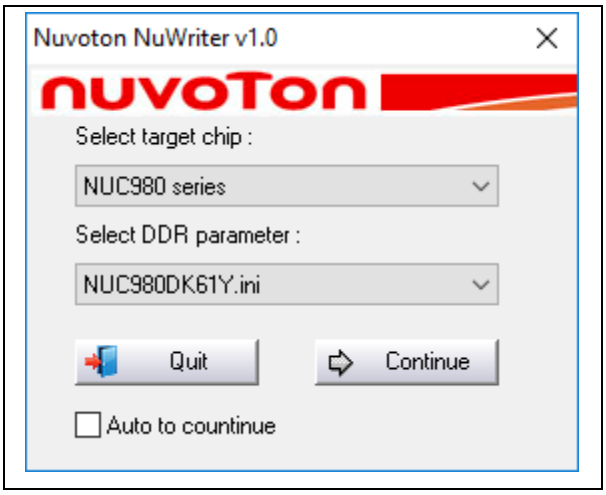


Figure 4-1 Nu-Writer Setting

D. According to the figure below and follow the steps below to program u-boot.bin in the "uboot_v2016.11" folder:

1. Select the "**SPI**" type.
2. Fill in the image information：
   - Image Name: u-boot.bin()
   - Image Type: Loader
   - Image execute address: 0xe00000
3. Click "Program".
4. Waiting for finishing progress bar.
5. After "Program" the image, click the "**Verify**" button to read back the image data to make sure the burning status.

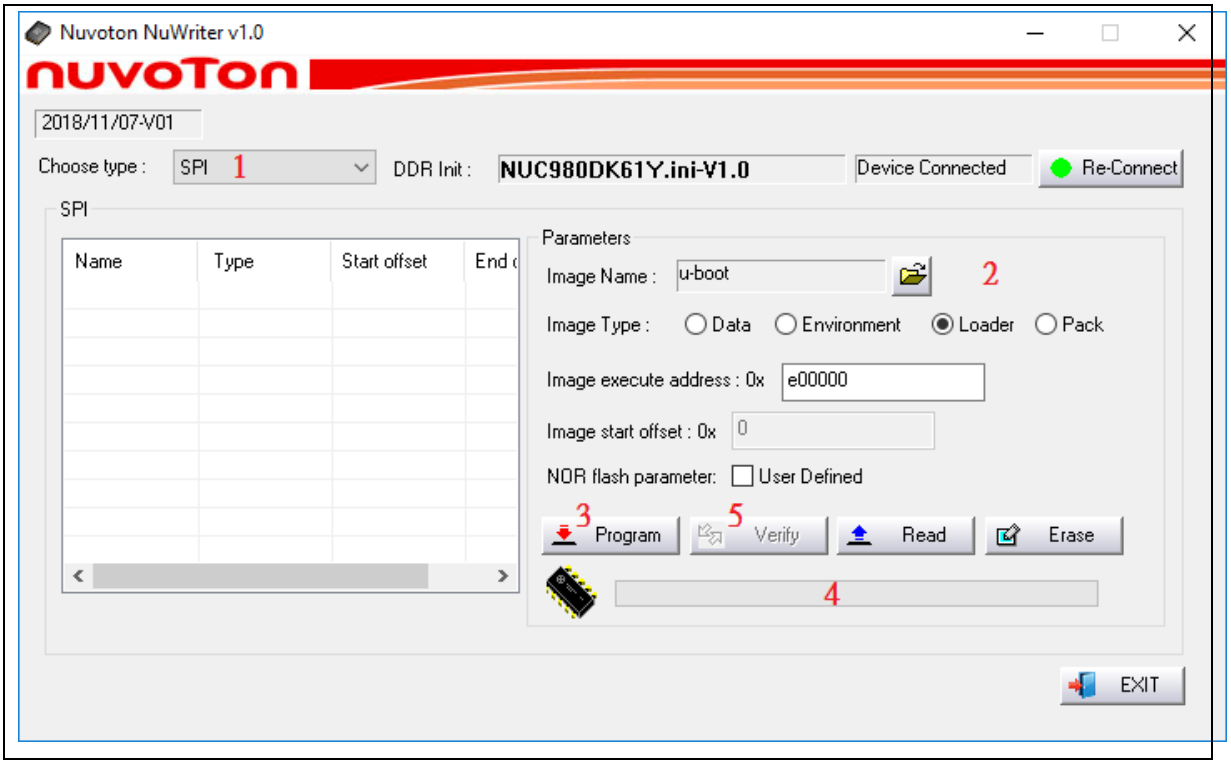


Figure 4-2 Program u-boot

E. According to the figure below and follow the steps below to program kernel image:

1. Select the "**SPI**" type.
2. Fill in the image information：
   - Image Name: 980uimage.bin
   - Image Type: Data
   - Image start offset address: 0x200000
3. Click "Program".
4. Waiting for finishing progress bar.
5. After "Program" the image, click the "**Verify**" button to read back the image data to make sure the burning status.

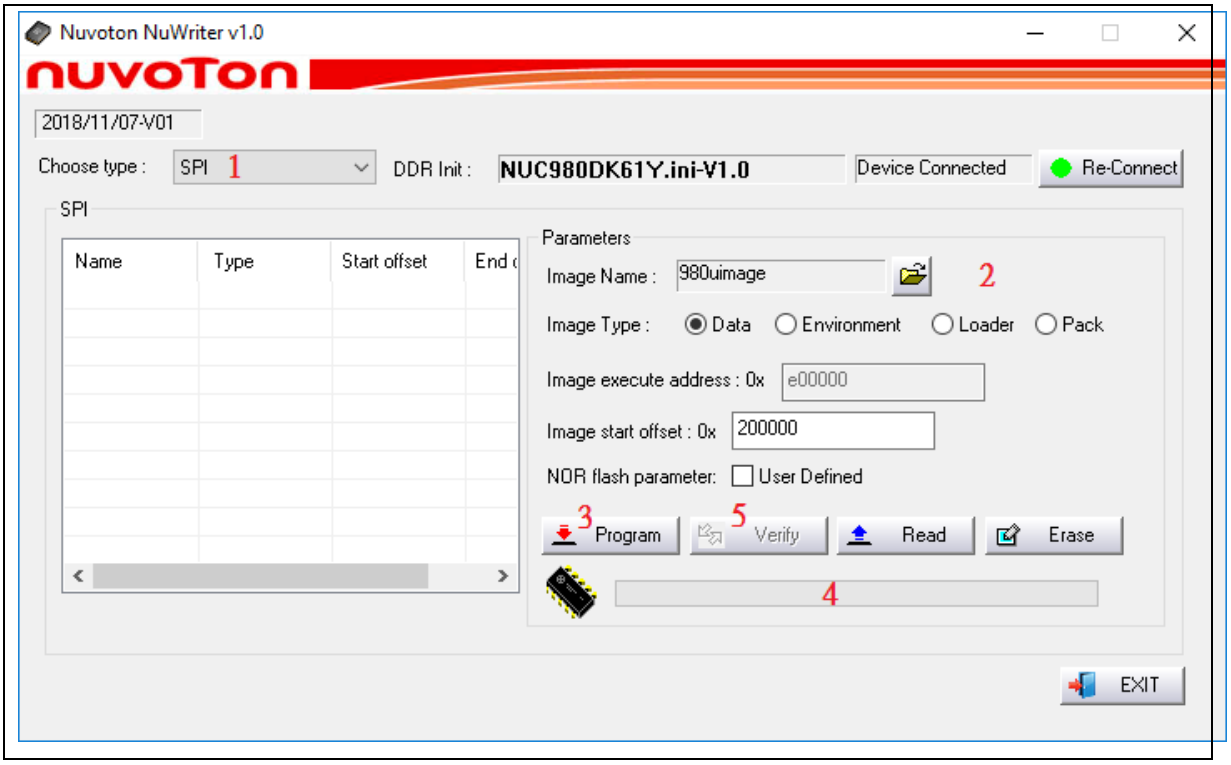


Figure 4-3 Program Kernel image

For more detailed NuWriter tool, please refer to "**NUC980 NuWriter User Manual**" in the "Documents" directory.

5 BOOTING LINUX KERNEL

This section describes how to boot up Linux kernel.

A. Set SW1(Power On Setting) to Boot from QSPI 0 Flash(refer to Table 5-2).

B. Press Reset button on demo board. From console can find system enter to U-Boot. User can use following commands to launch Linux kernel after enter U-Boot shell.

1. Type “sf probe 0 18000000” to set SPI speed (optinoal)
2. Type “sf read 0x7FC0 0x200000 0x760000” to read kernel image from SPI flash to DDR.
3. Type “bootm 0x7FC0” to boot Linux kernel image.

```
U-Boot 2016.11-g9618a94-dirty (Dec 25 2018 - 08:46:04 +0800)


CPU: NUC980
Board: NUC980
DRAM:  64 MiB
NAND:  NAND Flash not found !
NUC980 NAND CONTROLLER IS NOT SUPPORT THE PAGE SIZE. (0, 0)
0 MiB
SF: Detected W25Q128BV with page size 256 Bytes, erase size 4 KiB, total 16
MiB
*** Warning - bad CRC, using default environment


In:    serial
Out:   serial
Err:   serial
Net:   Net Initialization Skipped
No ethernet found.
=> sf probe 0 18000000
SF: Detected W25Q128BV with page size 256 Bytes, erase size 4 KiB, total 16
MiB
=> sf read 0x7FC0 0x200000 0x760000
device 0 offset 0x200000, size 0x760000
SF: 7733248 bytes @ 0x200000 Read: OK
=> bootm 0x7FC0
## Booting kernel from Legacy Image at 00007fc0 ...
   Image Name:   Linux-4.4.115+
   Image Type:   ARM Linux Kernel Image (uncompressed)
   Data Size:    7573624 Bytes = 7.2 MiB
   Load Address: 00008000
   Entry Point:  00008000
   Verifying Checksum ... OK
   XIP Kernel Image ... OK
```

```
Starting kernel ...
```

C. After boot Linux kernel image, user can see following information from UART console.

```
Freeing unused kernel memory: 5456K
[Mount JFFS2]: /dev/mtdblock0 --> /mnt/mtdblock0
nuc980-emac0 nuc980-emac0: eth0 is OPENED
nuc980-emac1 nuc980-emac1: eth1 is OPENED
random: arm-linux-light: uninitialized urandom read (8 bytes read, 7 bitsof
entropy available



BusyBox v1.22.1 (2016-02-03 14:11:04 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.


~ #
```

For the detail kernel compile and setting, please refer to "**NUC980 Linux BSP User Manual**" in the "Documents" directory.

6 EXECUTING SAMPLE CODE

First, make sure UART console connect to PC. Below list the steps of doing so.

A. Set SW1(Power On Setting) to Boot from QSPI 0 Flash(refer to Table 3-1 and Figure 3-1).

B. Connect UART console port.

C. Connect Ethernet0 to PC and connect UART1~8 to other UART device (ex:PC COM port).

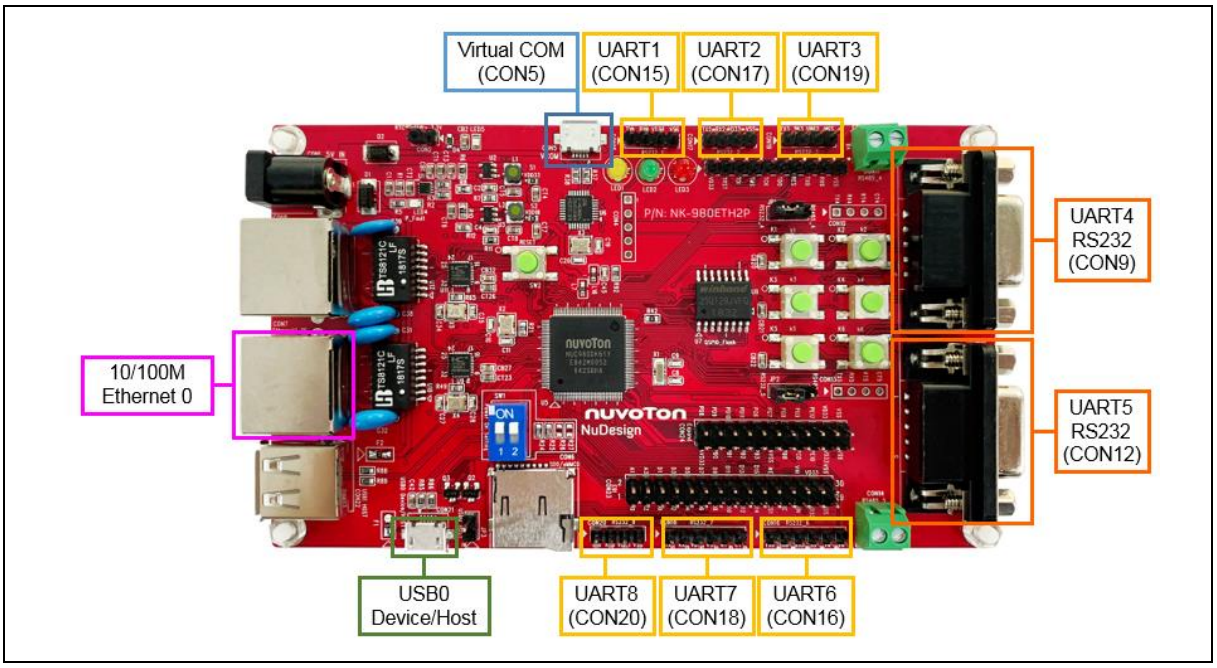


Figure 6-1 NuDesign NK-980ETH2P Board Setup

Then, use Terminal tool, such as Putty or Teraterm to open the serial COM port. The COM port configuration is 115200bps, 8-bit data length and no-parity.

User also needs to ensure that the PC Ethernet port is connected to the demo board Ethernet0 (or Ethernet1) port. PC Internet settings can refer to the figure below.

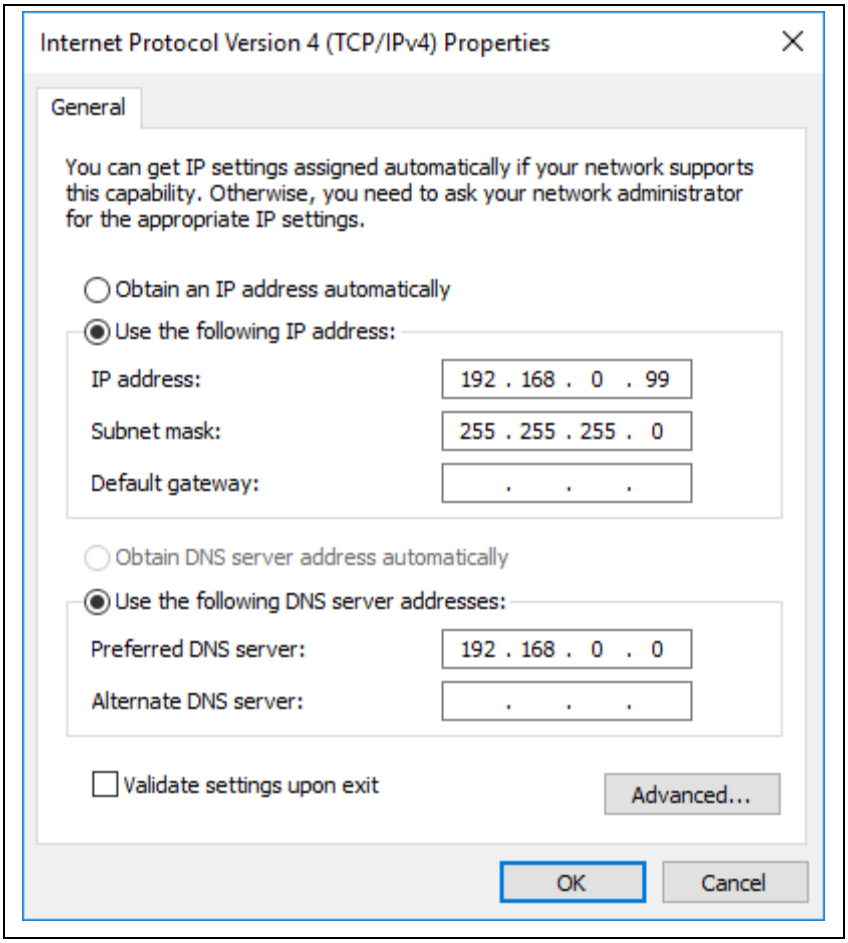


Figure 6-2 Serial COM Port

Power ON or push the Reset key and boot system.

```
Freeing unused kernel memory: 5456K
[Mount JFFS2]: /dev/mtdblock0 --> /mnt/mtdblock0
nuc980-emac0 nuc980-emac0: eth0 is OPENED
nuc980-emac1 nuc980-emac1: eth1 is OPENED
random: arm-linux-light: uninitialized urandom read (8 bytes read, 7 bits
of entropy available)


BusyBox v1.22.1 (2016-02-03 14:11:04 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.


~ #
```

Use Terminal tool to open serial COM port (from UART1 to UART8)

And use Terminal tool open TCP/IP connection. Ethernet 0 IP Address is 192.168.0.100, Port number from 50001 to 50008. Ethernet 1 IP Address is 192.168.10.100, Port number from 50001 to 50008.

Where Transmitting and receiving of port numbers 50001~50008 maps to to UART1~8 respectively.

Below is an example transmit data from Ethernet to UART. When type “123” in TCP/IP connection window which port number is 50001. The UART1 serial COM port window will show “123”.

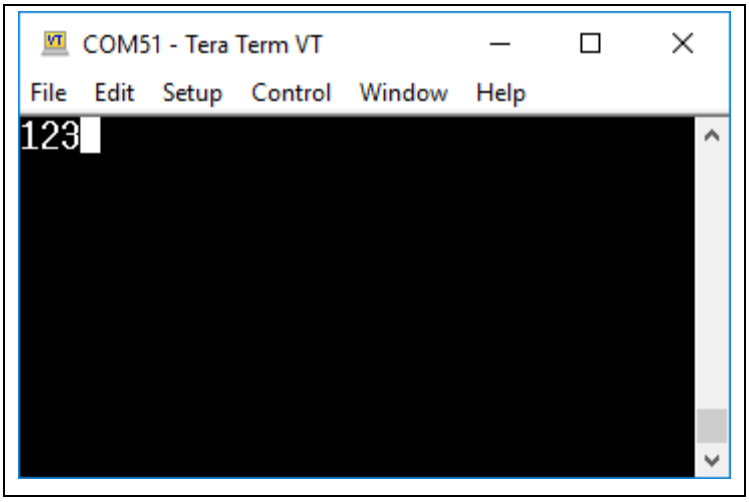


Figure 6-3 Serial COM Port

And below is an example with other direction, transmit data from UART to Ethernet. When type “123” in UART1 serial COM port. The TCP/IP connection window which port number is 50001 will show “123”

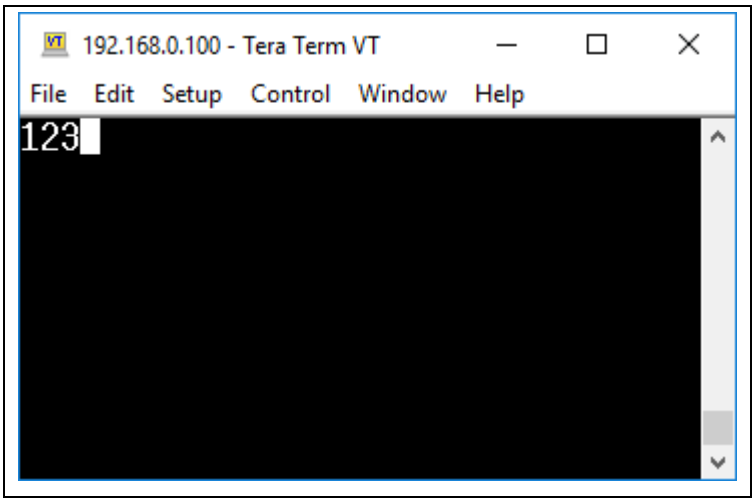


Figure 6-4 TCP/IP connection window

User can configure UART port via browser with following steps.

1. Use browser connect to http://192.168.0.100 (Ethernet 0) or http://192.168.10.100 (Ethernet 1).
2. Configure UARTs’ attribute. Including UART port, baud-rate, data length, parity, stop bit, flow control, enable/diable RS485.
3. Press Submit

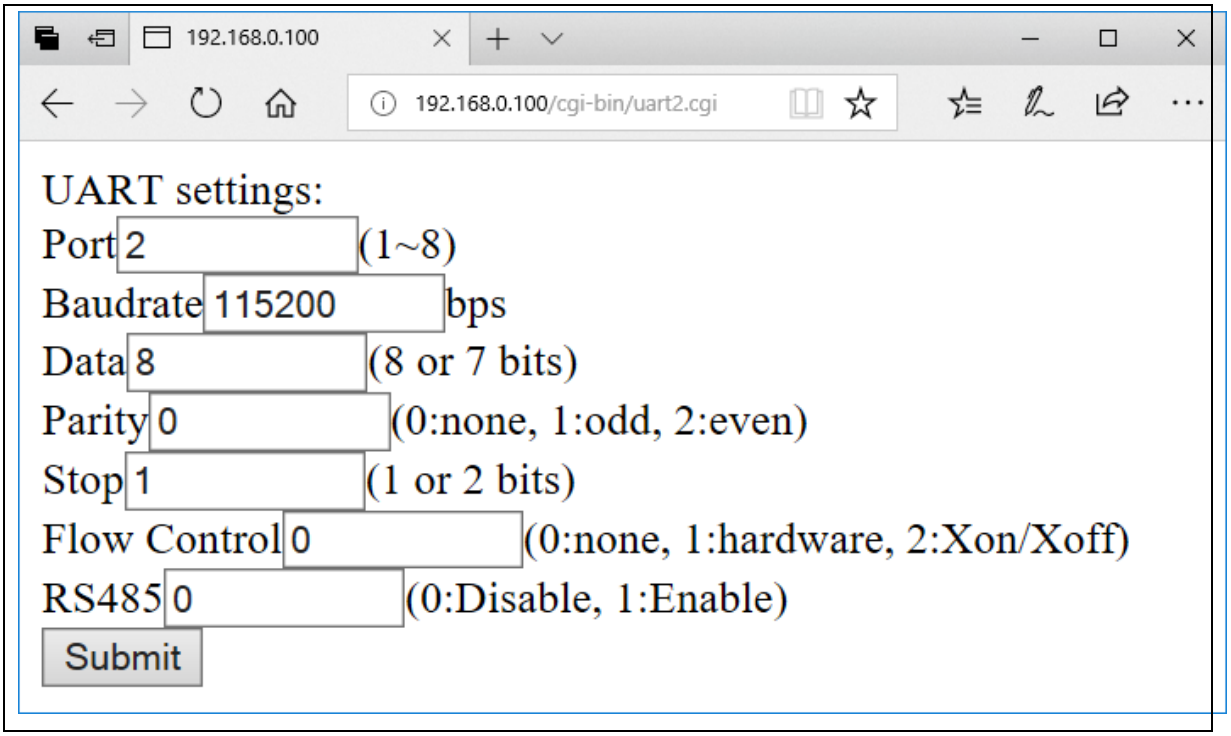


Figure 6-5 UART Setting Web Page

For more detailed NuDesign NK-980ETH2P Demo , please visit Nuvoton official website to download "**NuDesign NK-980ETH2P User Manual**".

7 REVISION HISTORY

Date	Revision	Description
2019.03.27	1.00	Initial release

Important Notice

Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".

Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.