DST-NUC980EVB
User Manual

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1 OVERVIEW

This document provides a quick start guide for the DST-NUC980EVB Development Board. Users can understand both software and hardware configurations for the DST-NUC980EVB. The platform provides Linux OS and plenty of industrial control protocol for users to implement the Ethernet control applications in a very short time.

The DST-NUC980EVB board uses NUC980DR61YC microprocessor run up to 300 MHz with built-in 64MB DDR2 memory, 16 KB I-cache, 16 KB D-cache and MMU, 16 KB embedded SRAM and 16.5 KB IBR (Internal Boot ROM) for system booting from USB and SPI flash, all functions of the NUC980DR61YC are placed on the board, including peripheral interfaces such as SPI Flash memory, UART, 10/100 Mb Ethernet MAC controller, high speed USB (Device, Host), JTAG, RS485 and CAN transceiver controller. Users can use it to develop and verify applications to emulate the real behavior.

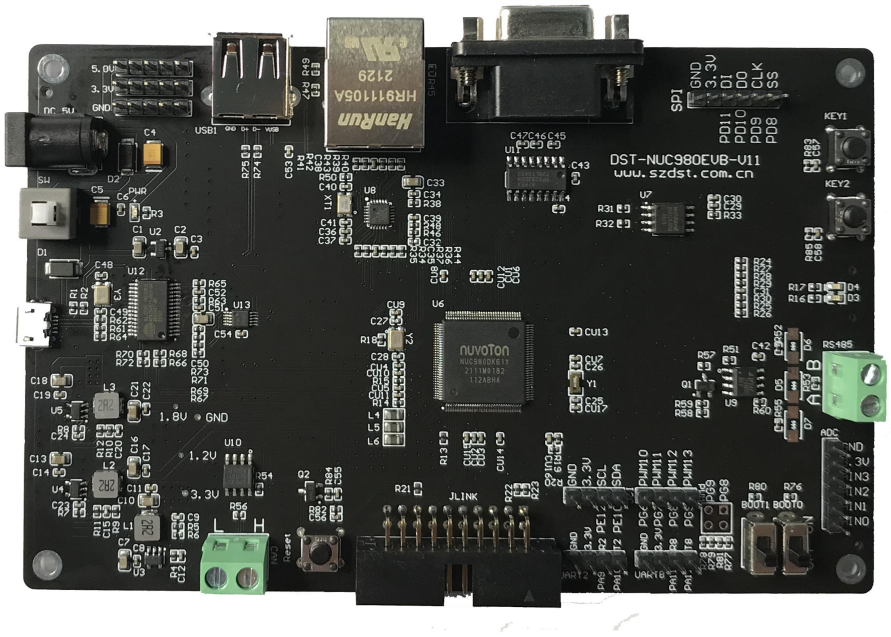


Figure 1-1 DST-NUC980EVB Development Board

2 FEATURES

- NUC980DR61YC: LQFP64 pin MCP package with DDR2 (64 MB), which can run up to 300MHz operating speed
- SPI Flash: Normal mode system booting or data storage, use W25Q128JV SPI-NOR (128M-Bit)
- Peripheral interface connector, including UART, SPI, I2C
- JTAG interface provided for software development
- RJ45 port (Ethernet0) connector
- UART8-RS485 header with transceiver controller interface
- CAN3 header with transceiver controller interface
- 2 sets of LED for status indication
- 1 sets of user-configurable push button keys
- 1 sets of system-reset push button keys
- 3.3V I/O power, 1.8V Memory power and 1.2V core power

3 HARDWARE CONFIGURATION

3.1 Front View

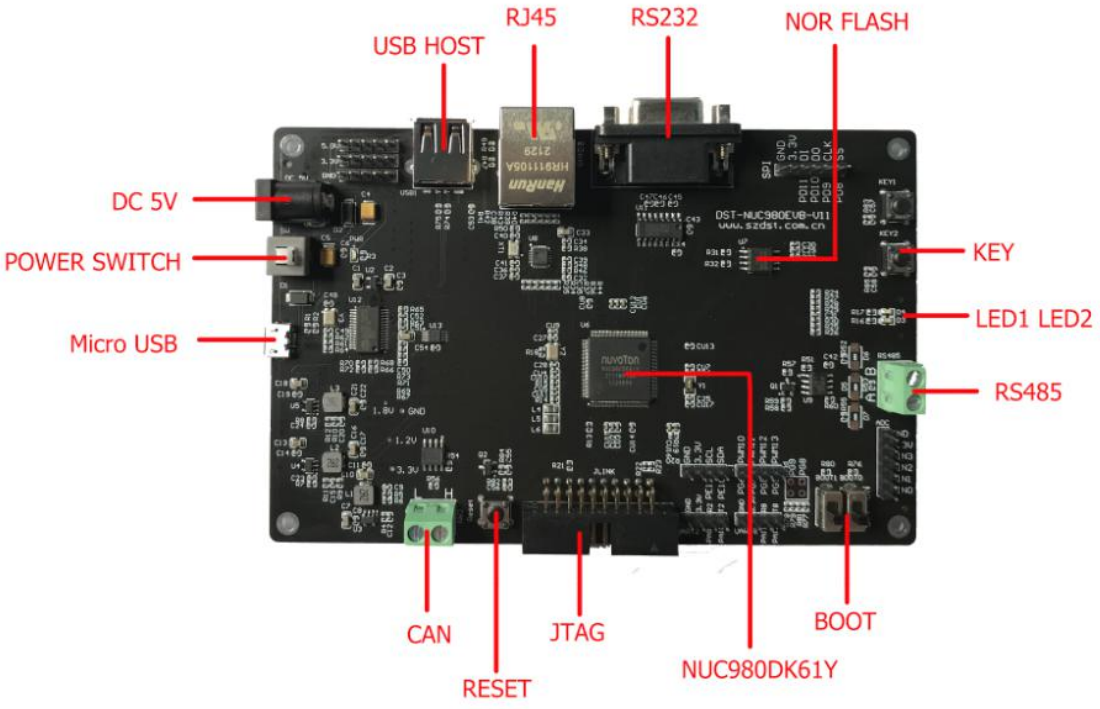


Figure 3-1 Front View of DST-NUC980EVB

Figure 3-1 shows the main components from the front view of DST-NUC980EVB Development Board

- +5V In : Power 5V input

Power Model	USB	DC 5V
Model 1	Connect to PC	-
Model 3	-	VDD5V Input

- System Reset：System will be reset if the RESET button is pressed

- User indication LEDs (LED1, LED2):

LED	Color	GPIO pin of NUC980
LED1	Green	PC11
LED2	Green	PC3

- SPI NOR Flash (U5): Use Winbond W25Q128JV 128M Bit (U5) for system booting, supporting normal mode

- JTAG interface

Connector	GPIO pin of NUC980	Function
JLINK.1	-	VDD33
JLINK.2	GPA6	nTRST
JLINK.3	GPA5	TDI
JLINK.4	GPA4	TMS
JLINK.5	GPA3	TCK
JLINK.6	GPA2	TDO
JLINK.7	-	nRESET
JLINK.8	-	VSS

- User Key SW (KEY1)

Key	GPIO pin of NUC980
K1	GPC15

- BOOT setting

Switch	Status	Function	GPIO pin of NUC980
BOOT0	ON/ON	Boot from USB	GPG1/GPG0
BOOT1	OFF/OFF	Boot from QSPI0 Flash	GPG1/GPG0

- CAN (JP2, U7): SN65HVD230 transceiver controller of CAN(U10), CAN header connect to device for communication

- Peripheral user interface(P1)

- SOC CPU：NUC980DR61YC (U6)

4 QUICK START

4.1 BSP Download

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

Please visit nuvoTon's NuMicro™ website https://www.nuvoton.com/products/iot-solution/iot-platform/numaker-server-nuc980/?group=Software&tab=2) to download the "NUC980_Linux-4.4_BSP_v1.02.001". 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. Simply follow the installation and optional steps to install USB Driver, included VCOM driver.

4.2 Driver Installation

The programming tool requires a Nuvoton USB driver to be installed on PC first. Please follow the steps below to install the WinUSB 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 request to install the driver.

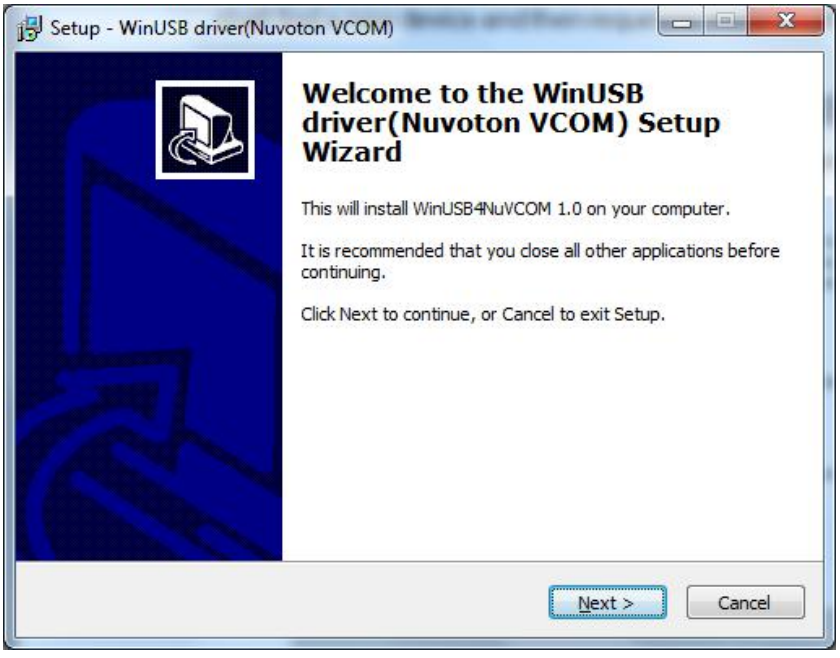
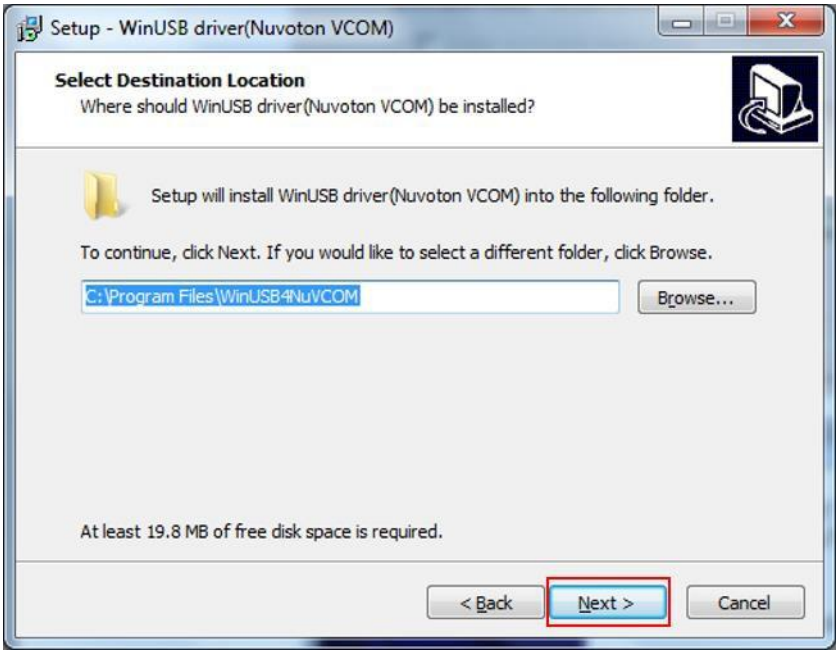
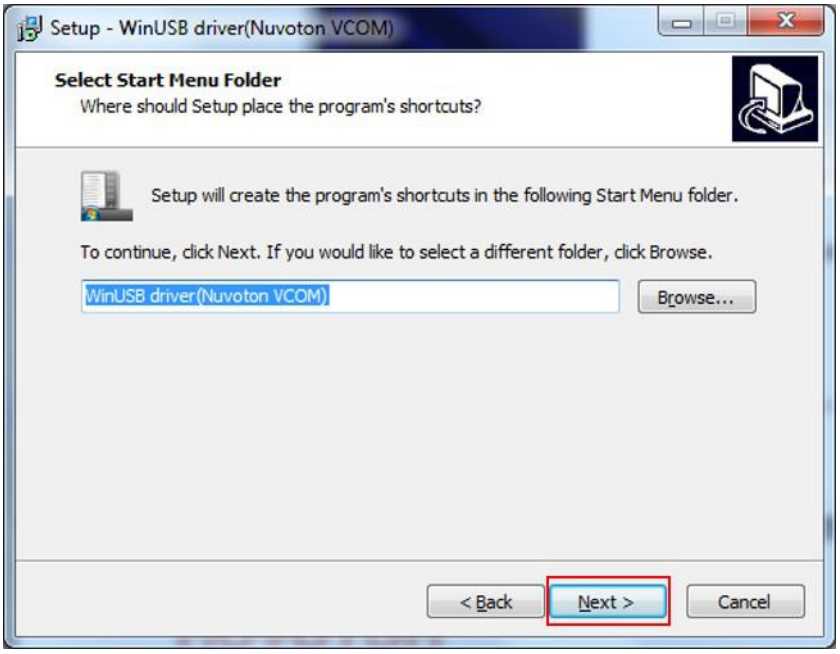


Figure 4-1 Nuvoton USB Driver Installation Setup

Click "**Next**". The WinUSB driver Setup Wizard will be started.


Setup - WinUSB driver(Nuvoton VCOM)
Select Destination Location
Where should WinUSB driver(Nuvoton VCOM) be installed?
Setup will install WinUSB driver(Nuvoton VCOM) into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\WinUSB4NuVCOM
Browse...
At least 19.8 MB of free disk space is required.
< Back
Next >
Cancel


Setup - WinUSB driver(Nuvoton VCOM)
Select Start Menu Folder
Where should Setup place the program's shortcuts?
Setup will create the program's shortcuts in the following Start Menu folder.
To continue, click Next. If you would like to select a different folder, click Browse.
WinUSB driver(Nuvoton VCOM)
Browse...
< Back
Next >
Cancel

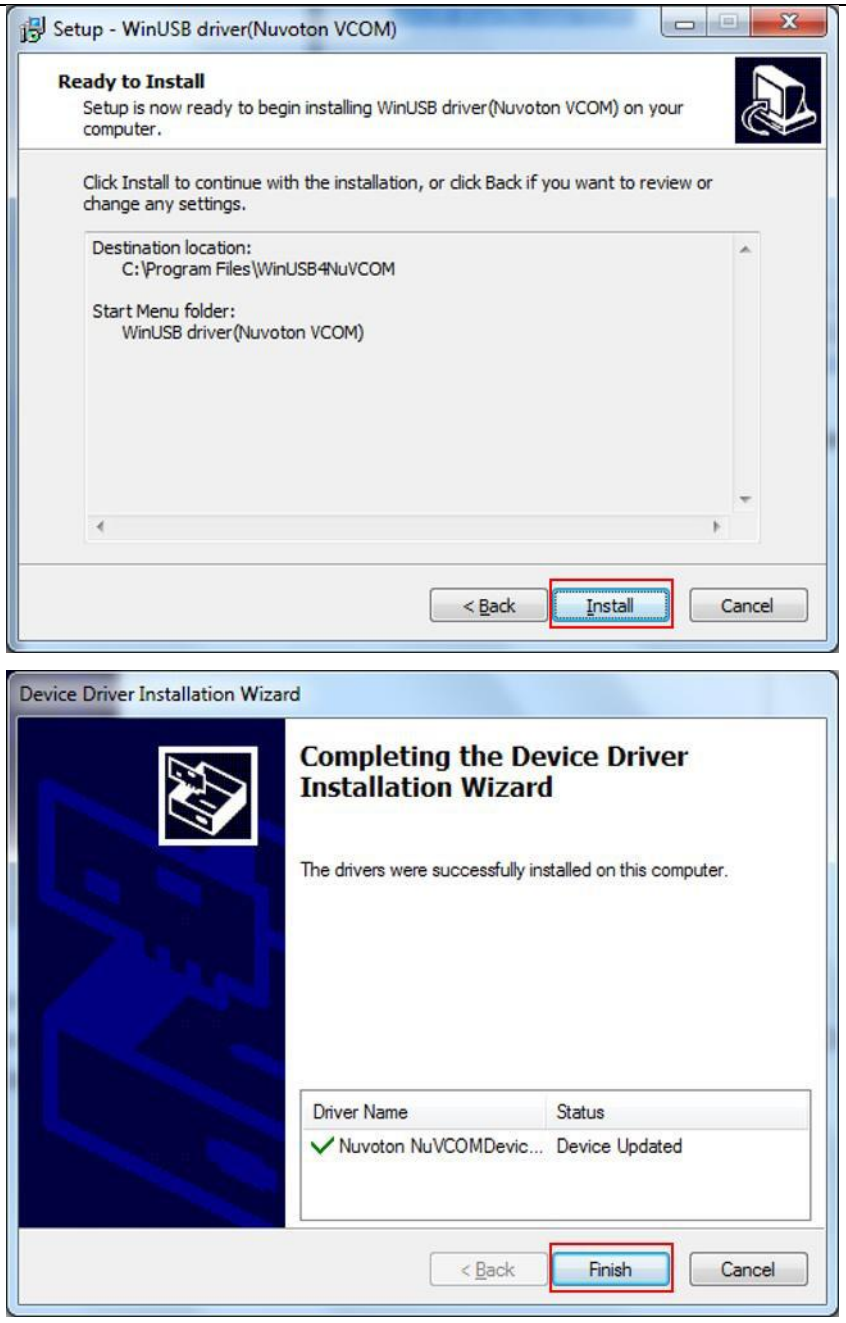


Figure 4-2 Nuvoton USB Driver Installation

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

4.3 Hardware Setting

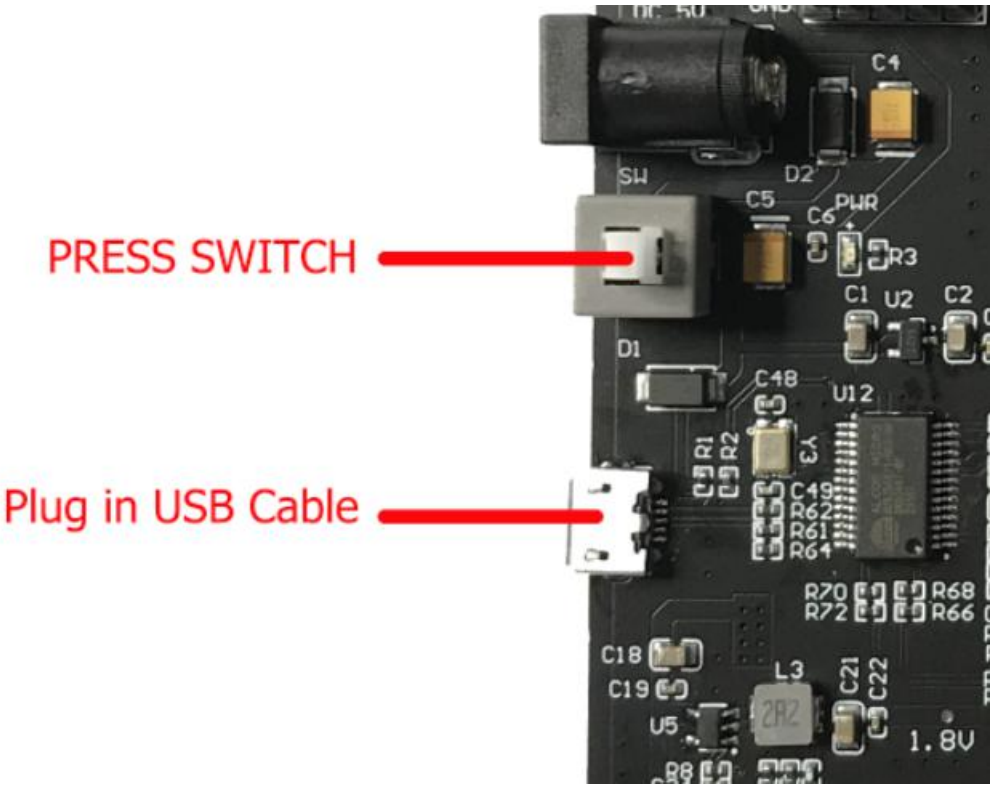


Figure 4-3 Hardware Setting

1. DST-NUC980EVB provides BOOT0, BOOT1 to select boot-up conditions. The BOOT0 and BOOT1 ON to select USB ISP mode.

Switch	Status	Function	GPIO pin of NUC980
BOOT0	ON/ON	Boot from USB	GPG1/GPG0
BOOT1	OFF/OFF	Boot from QSPI0 Flash	GPG1/GPG0

Table 4-1 Power On Setting

2. Plug in the USB cable

   If the installation is successful, a virtual COM port can be found in the “Device Manager”.

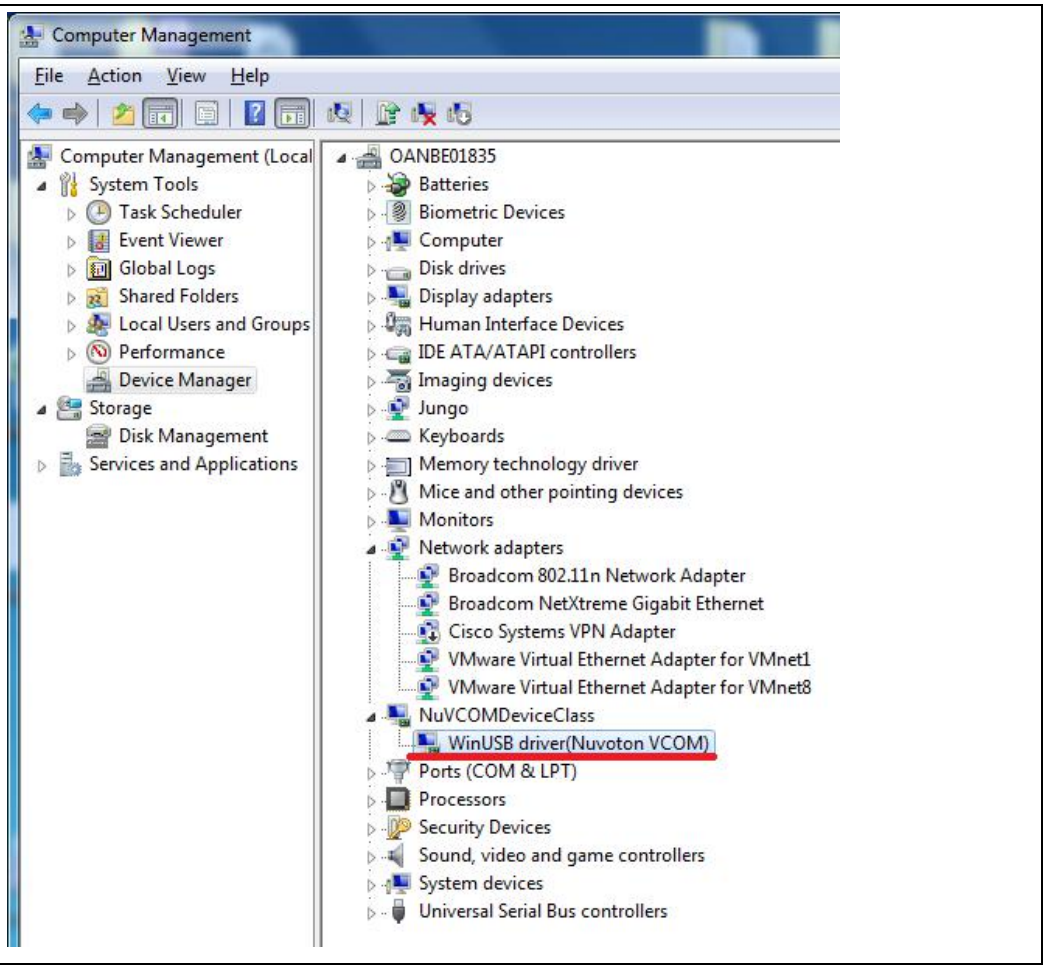


Figure 4-4 Nuvoton VCOM

4.4 Programing Kernel and U-Boot to SPI NAND Flash

1. Install NuWriter Driver. (Please refer to "**NUC980 NuWriter User Manual**")
2. Set SW1(Power On Setting) to Boot from USB(shown in Table 4-1 and Figure 4-3). Connect USB0 to PC and connect UART console to PC.
3. Double click "**NuWriter.exe**" on PC. Select target chip as "NUC980 series" and select DDR parameter is "NUC980DR61YC.ini". And then, press "**Continue**" button.

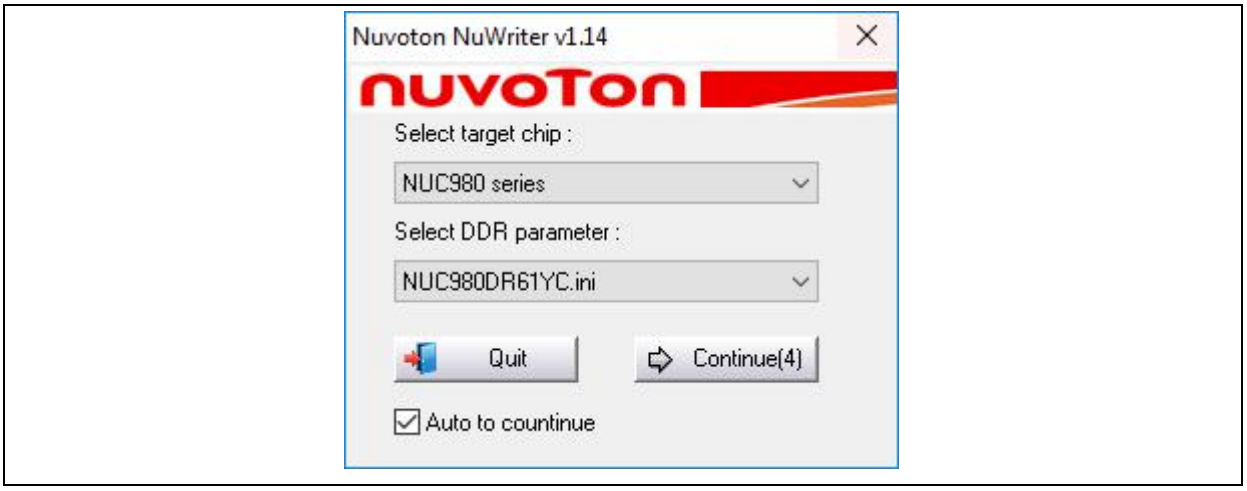


Figure 4-5 NuWriter Setting

4. According to Figure 4-6, following the steps below to program u-boot.bin:
   a. Select the "**SPI** " type.
   b. Fill in the image information：
      - Image Name: u-boot.bin
      - Image Type: Loader
      - Image execute address: 0xe00000
   c. Click "**Program**".
   d. Waiting for the progress bar to be finished.
   e. After "**Program**" the image, click the "**Verify**" button to read back the image data to make sure the burning status.

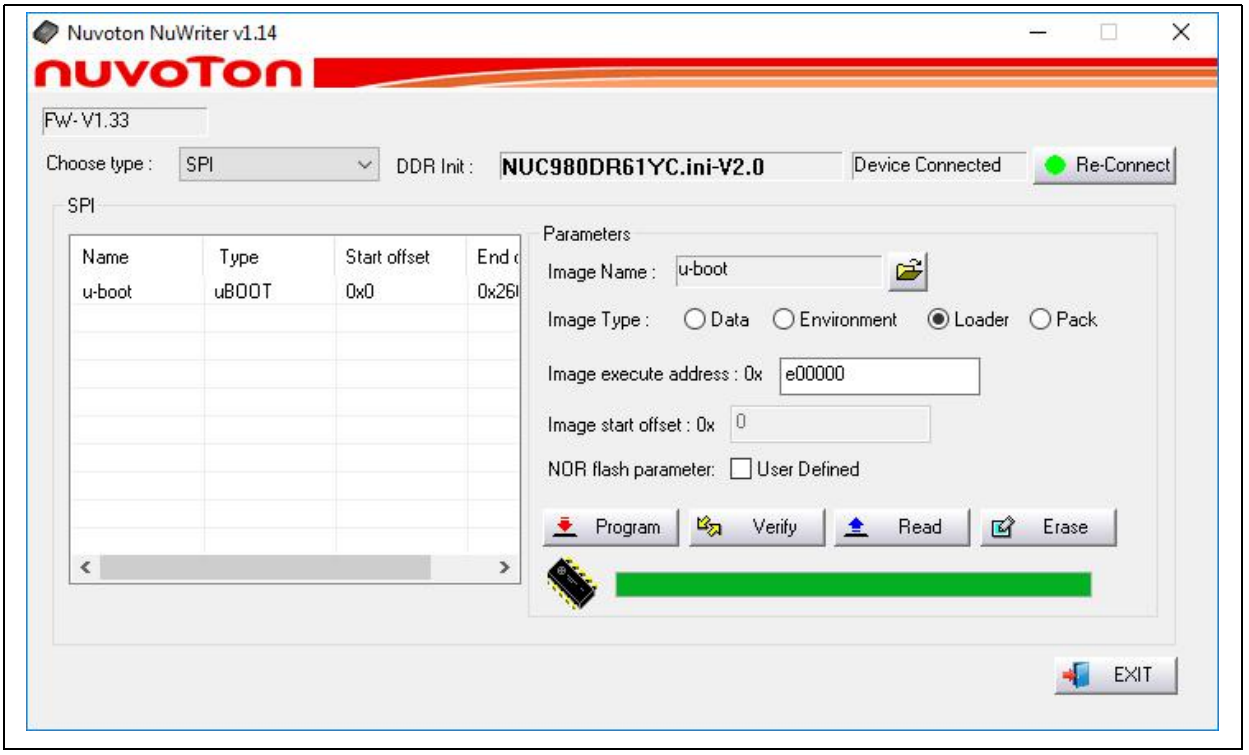


Figure 4-6 Program u-boot

5. According to Figure 4-7, following the steps to program kernel image:

   a. Select the "**SPI**" type.
   b. Fill in the image information：
      - Image Name: uimage
      - Image Type: Data
      - Image execute address: 0x200000
   c. Click "**Program**".
   d. Waiting the progress bar to be finished.
   e. After "**Program**" the image, click the "**Verify**" button to read back the image data to make sure the burning status.

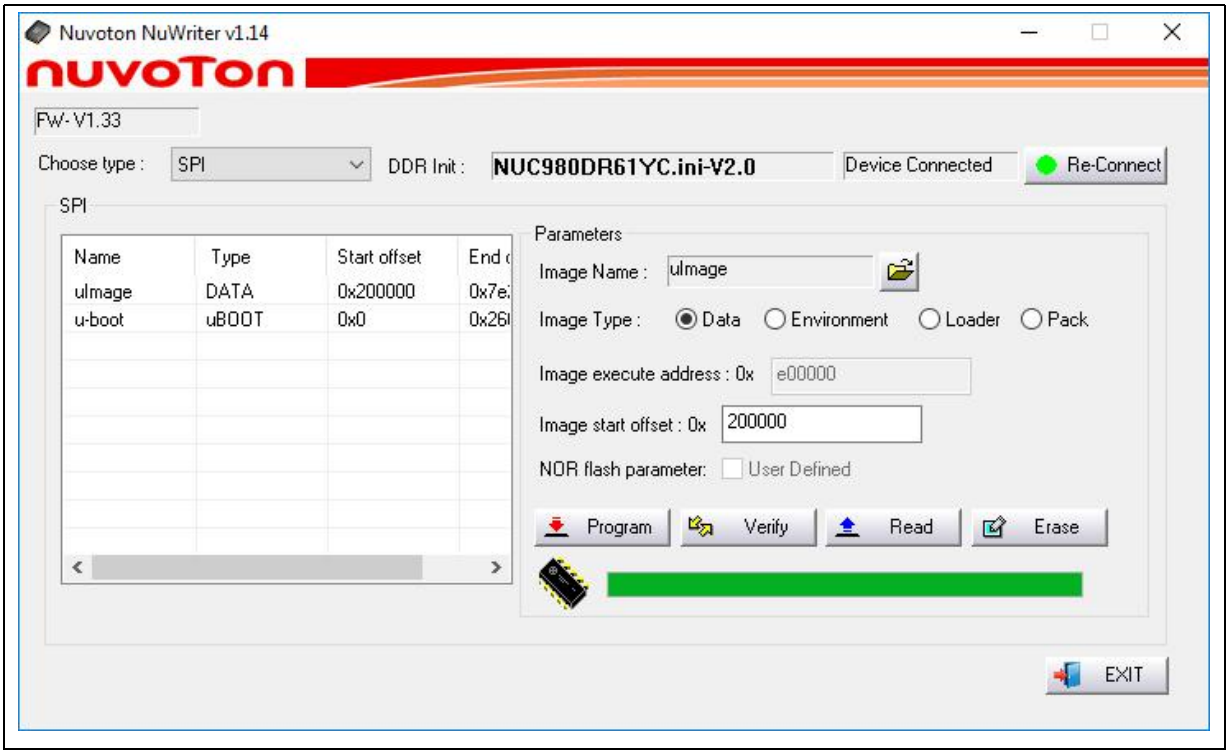


Figure 4-7 Program uimage

6. According to Figure 4-8, following the steps below to program environment:

   a. Select the "**SPI**" type.
   b. Fill in the image information：
      - Image Name: env.txt
      - Image Type: environment
      - Image start offset address: 0x80000
   c. Click "**Program**".
   d. Waiting for the progress bar to be finished.
   e. After "**Program**" the image, click the "**Verify**" button to read back the image data to make sure the burning status.

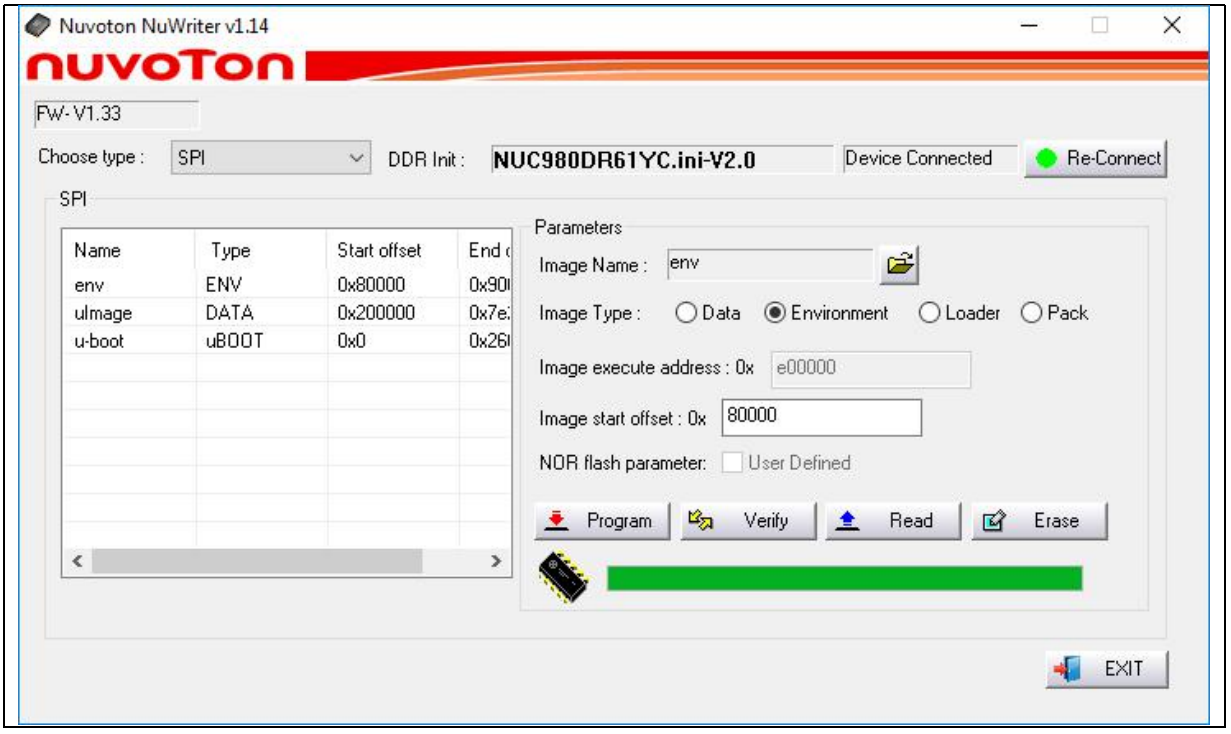


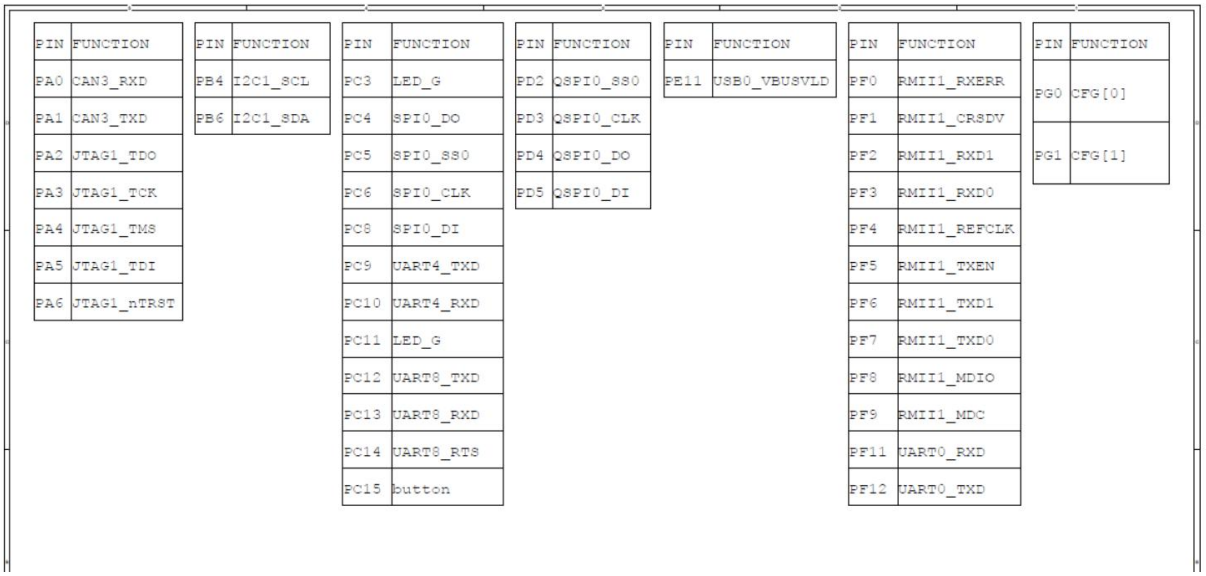
Figure 4-8 Program environment

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

For more details about kernel image and uboot, please refer to "**NUC980_970 Linux environment on VMware User Manual**" from Nuvoton website.
URL: https://www.nuvoton.com/products/iot-solution/iot-platform/numaker-server-nuc980/?group=Document&tab=2

5 BLOCK DIAGRAM SCHEMATIC

5.1 GPIO List Schematic



PIN	FUNCTION
PA0	CAN3_RXD
PA1	CAN3_TXD
PA2	JTAG1_TDO
PA3	JTAG1_TCK
PA4	JTAG1_TMS
PA5	JTAG1_TDI
PA6	JTAG1_nTRST

PIN	FUNCTION
PB4	I2C1_SCL
PB6	I2C1_SDA

PIN	FUNCTION
PC3	LED_G
PC4	SPI0_DO
PC5	SPI0_SS0
PC6	SPI0_CLK
PC8	SPI0_DI
PC9	UART4_TXD
PC10	UART4_RXD
PC11	LED_G
PC12	UART8_TXD
PC13	UART8_RXD
PC14	UART8_RTS
PC15	button

PIN	FUNCTION
PD2	QSPI0_SS0
PD3	QSPI0_CLK
PD4	QSPI0_DO
PD5	QSPI0_DI

PIN	FUNCTION
PE11	USB0_VBUSVLD

PIN	FUNCTION
PF0	RMII1_RXERR
PF1	RMII1_CRSDV
PF2	RMII1_RXD1
PF3	RMII1_RXD0
PF4	RMII1_REFCLK
PF5	RMII1_TXEN
PF6	RMII1_TXD1
PF7	RMII1_TXD0
PF8	RMII1_MDIO
PF9	RMII1_MDC
PF11	UART0_RXD
PF12	UART0_TXD

PIN	FUNCTION
PG0	CFG[0]
PG1	CFG[1]

Figure 5-1 GPIO List Schematic

5.2 Power Schematic

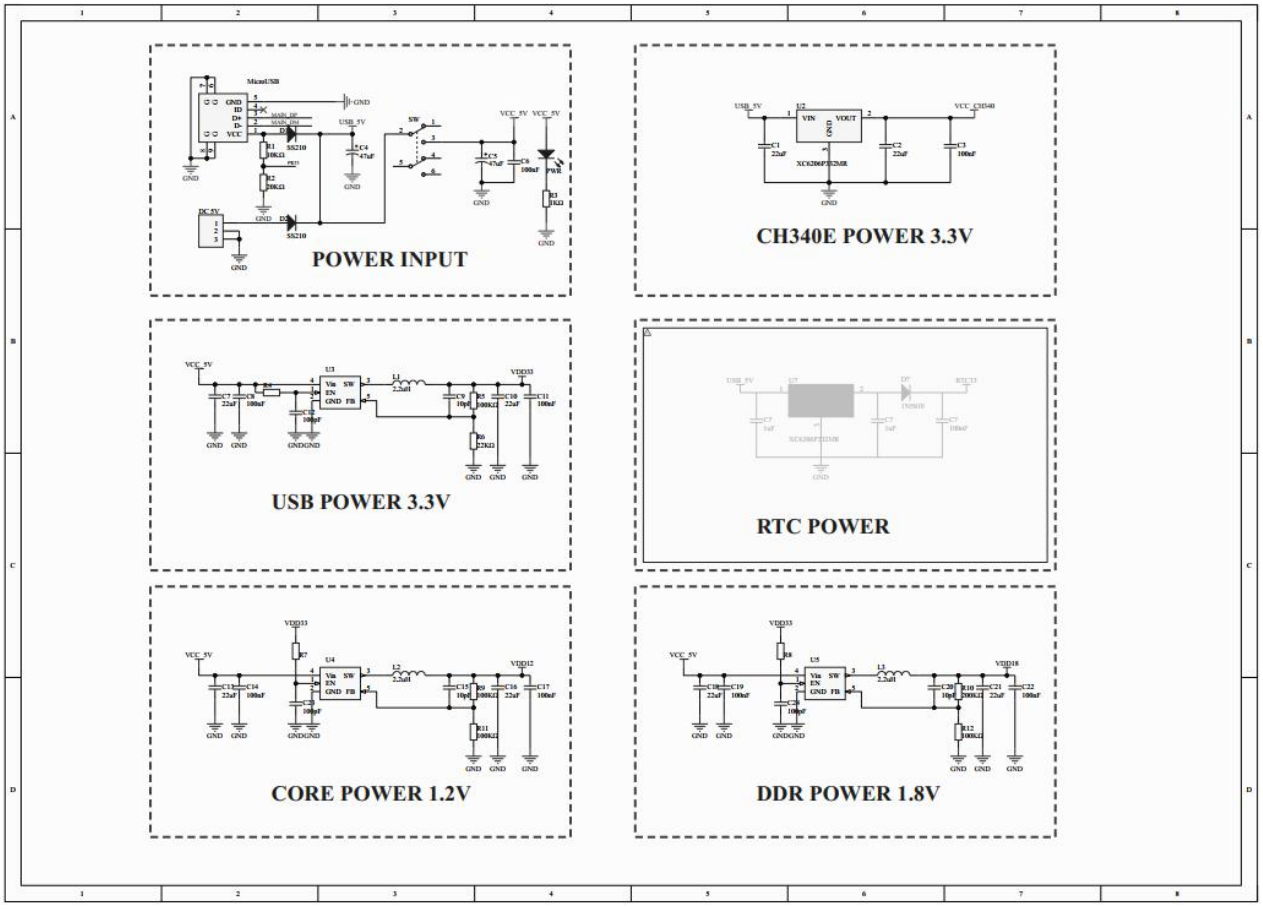


Figure 5-2 Power Schematic

5.3 NUC980DK Schematic

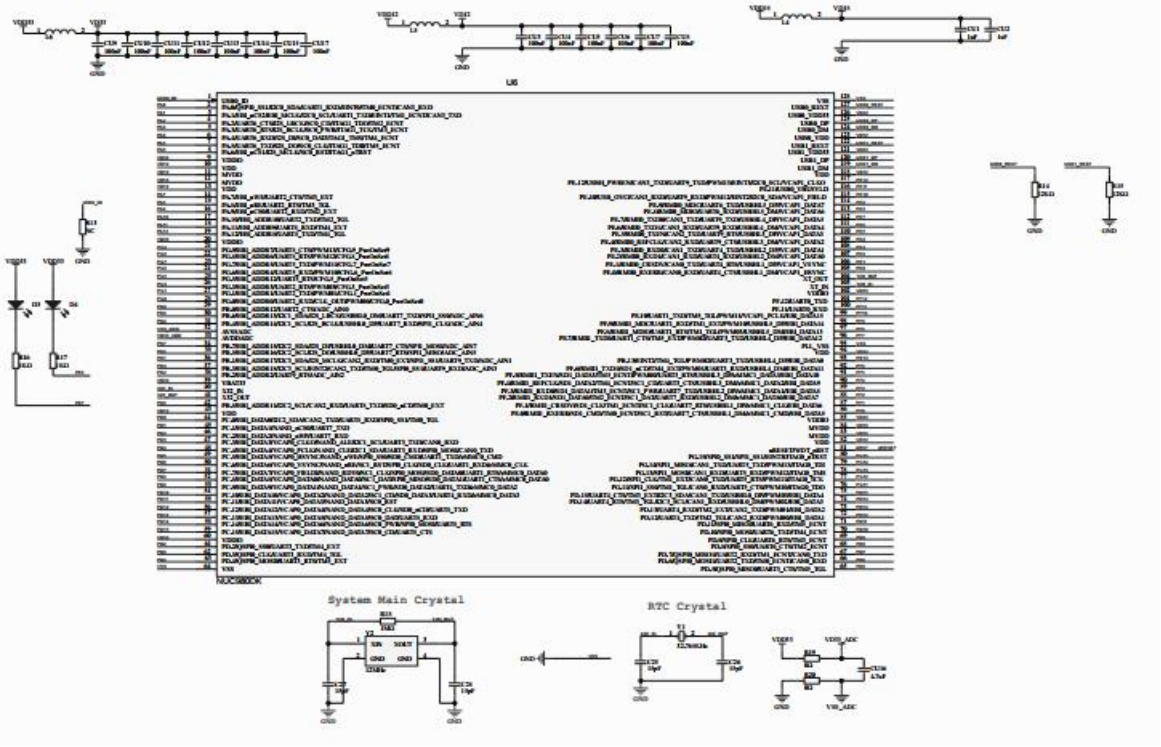


Figure 5-3 NUC980DK Schematic

5.5 Configure Schematic

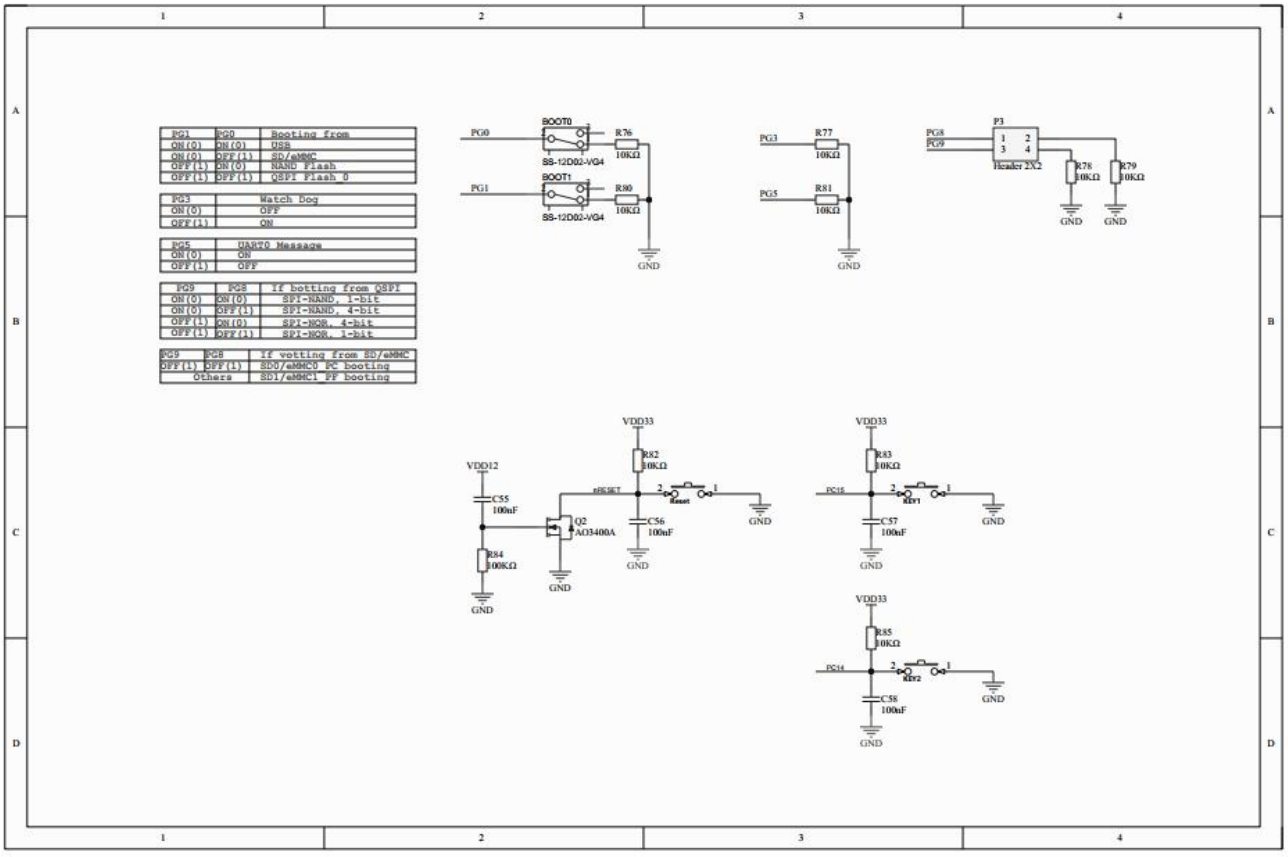


Figure 5-5 Configure Schematic

5.6 PORT Schematic

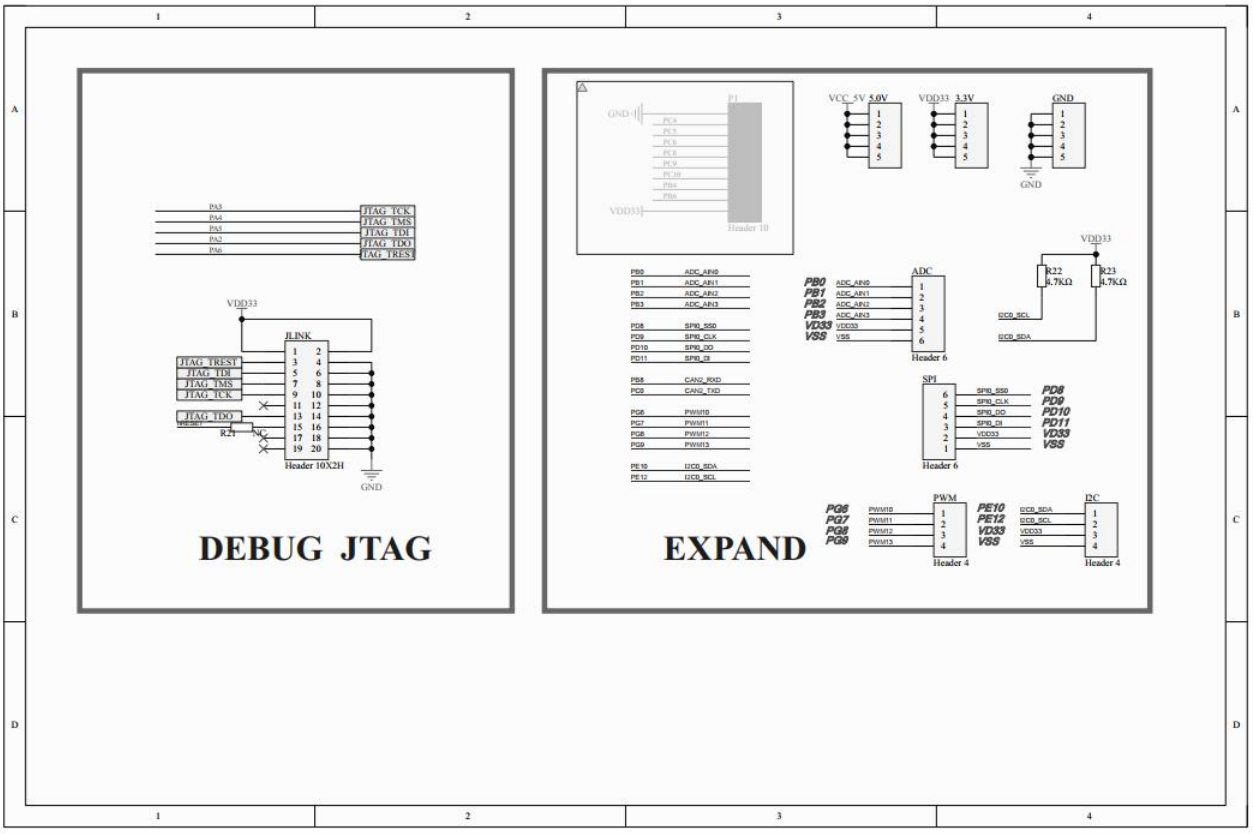


Figure 5-6 PORT Schematic

5.7 Memory Schematic

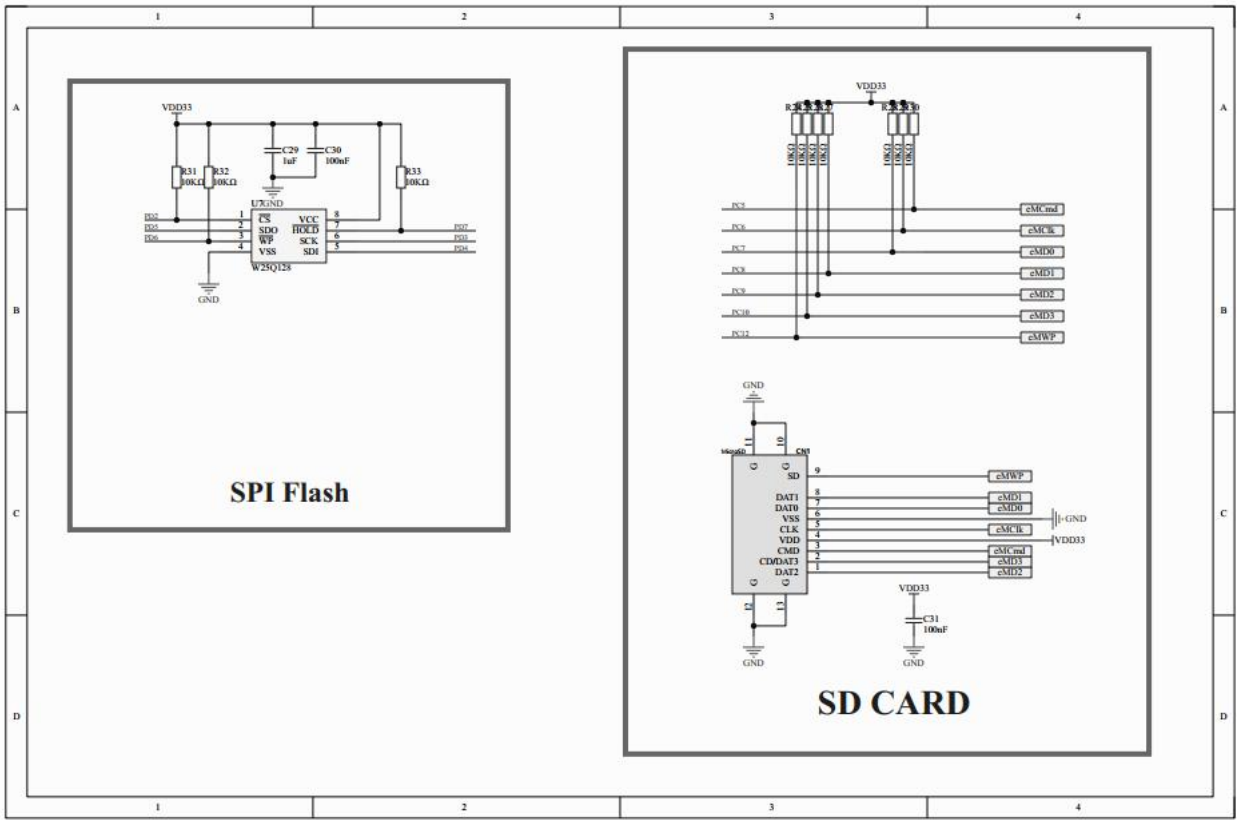


Figure 5-7 Memory Schematic

5.8 Ethernet connector Schematic

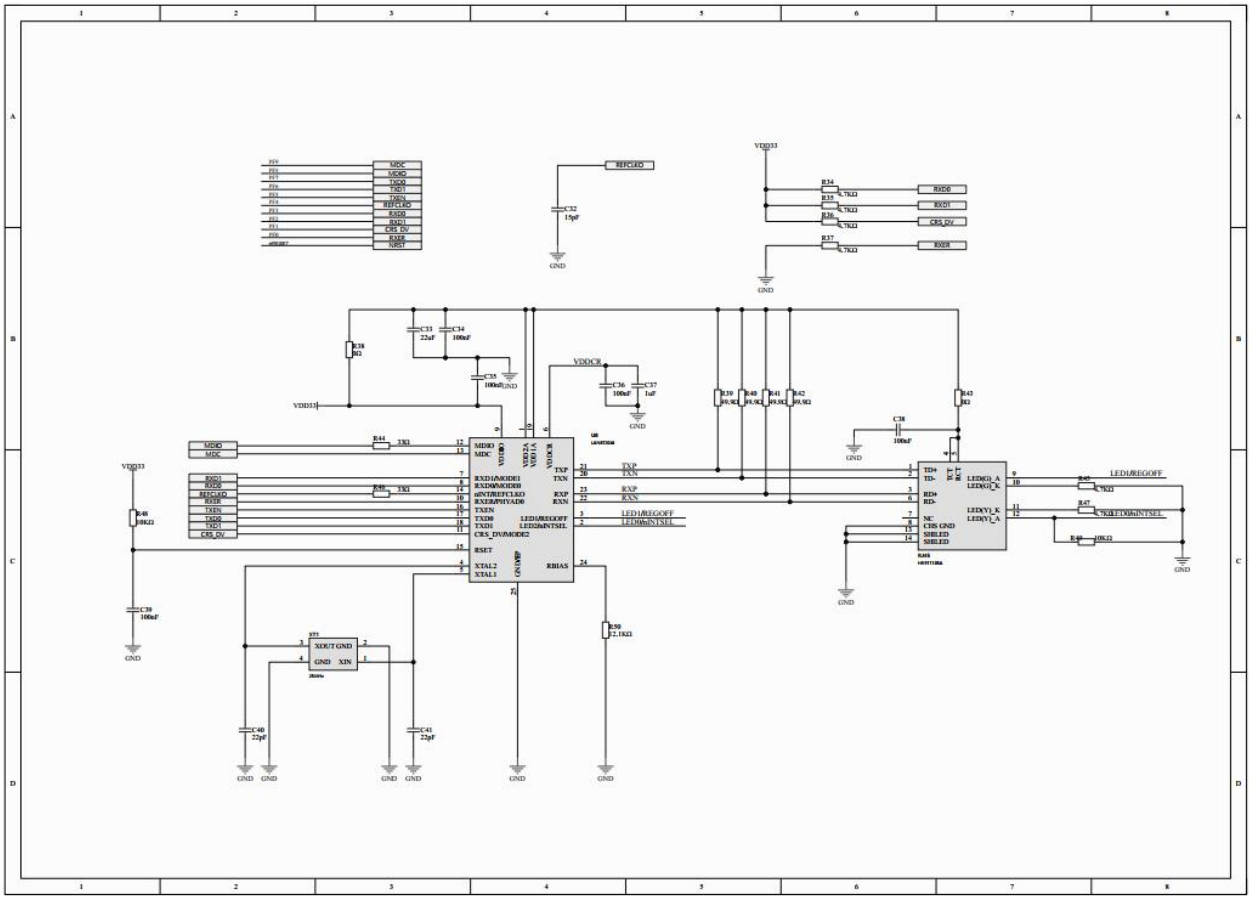


Figure 5-8 Ethernet connector Schematic

5.9 RS485 and CAN Schematic

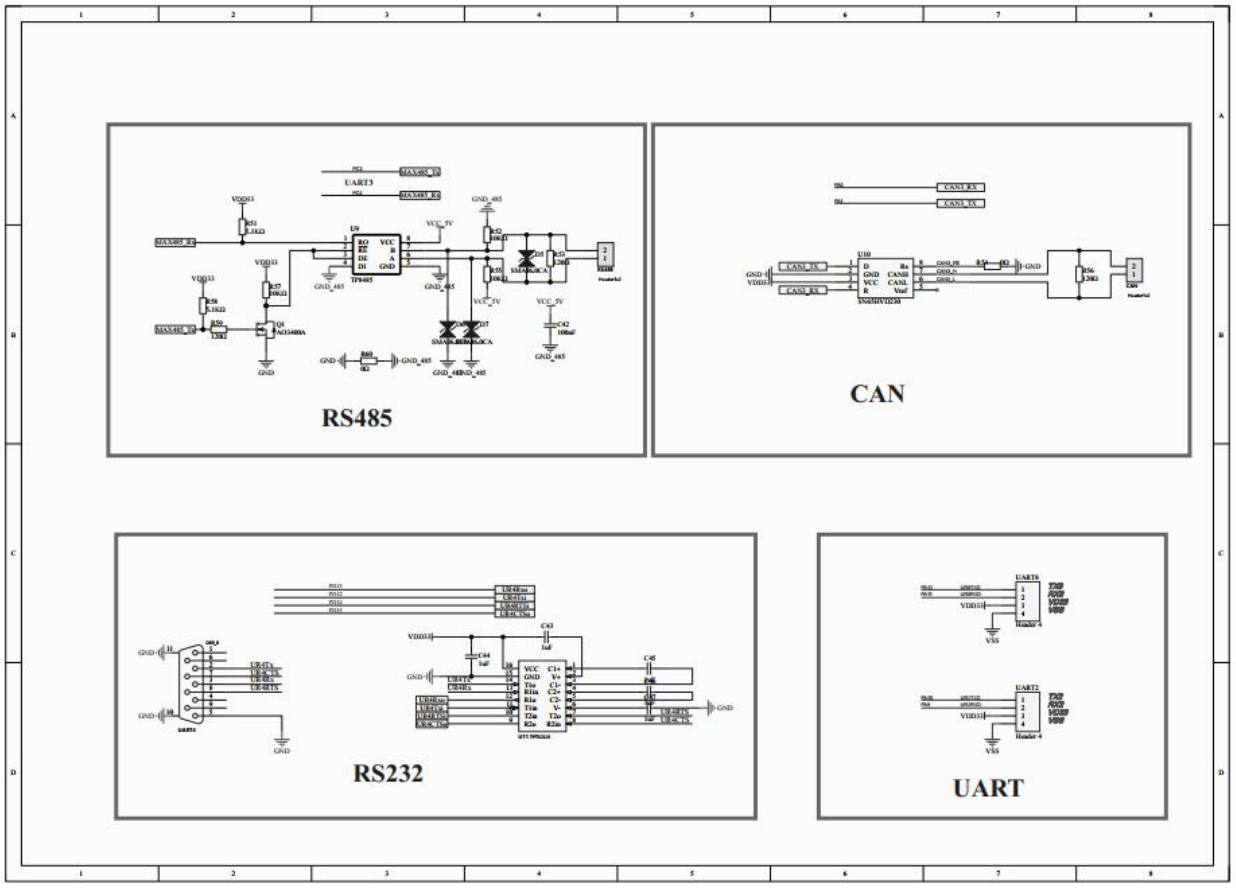


Figure 5-9 RS485 and CAN Schematic

5.10 USB Hub

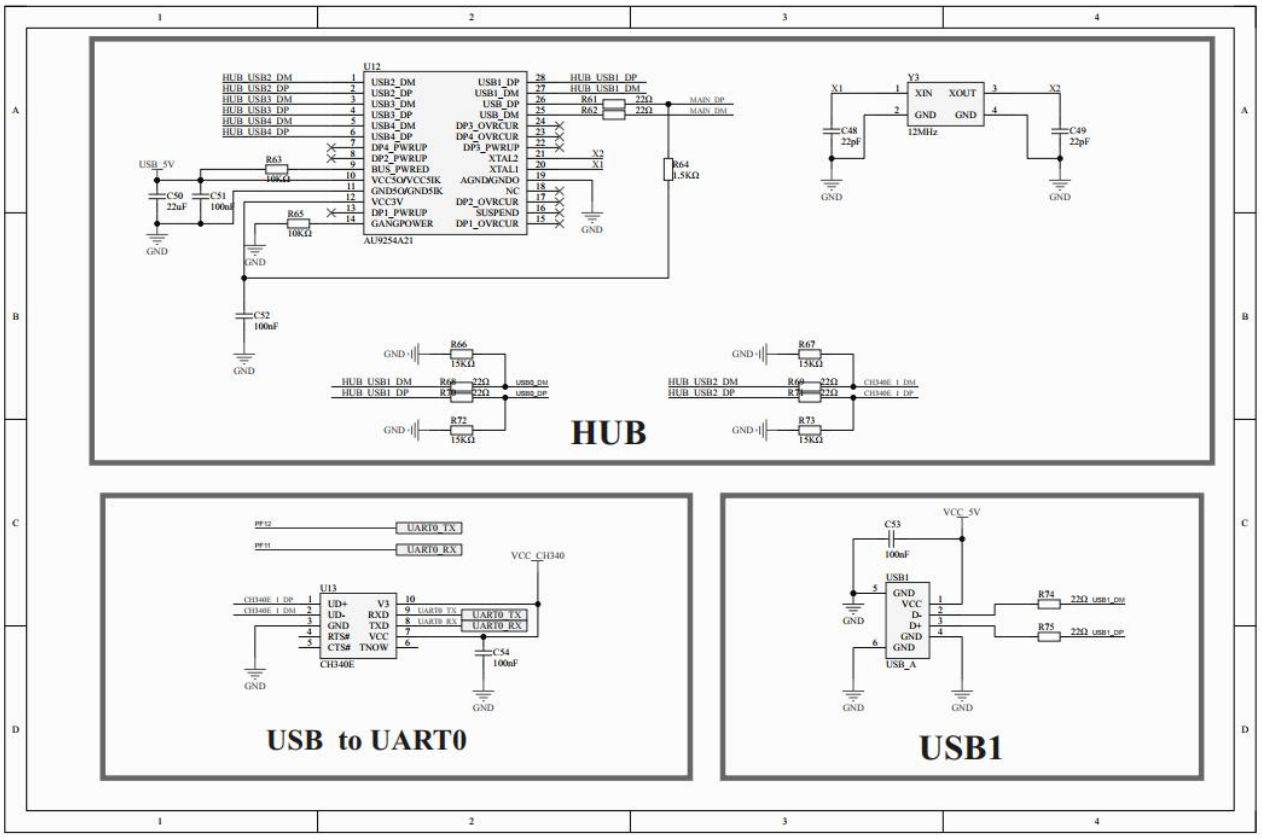


Figure 5-10 USB Hub

5.11 PCB Placement

Figure 5-11 Front PCB Placement

6 REVISION HISTORY

Date	Revision	Description
2021.08.26	1.00	1. Initial version