## ARM® Cortex®-M
## 32-bit Microcontroller

# NuMicro® Family
# NT-NM1200
# User Manual



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

www.nuvoton.com

## Table of Contents

# 1 OVERVIEW

NuTiny-EVB-NM1200(NT-NM1200) is the specific development tool for NuMicro® NM1200 series. Users can use NuTiny-EVB-NM1200 to develop and verify the application program easily.

The ARM® Cortex®-M0 core within NuMicro® NM1200 series can run up to 48 MHz and operate at 2.1V ~ 5.5V, -40℃ ~ 105℃, and thus can afford to support a variety of industrial control and applications which need high CPU performance. The NM1200/NM1100 series offers 17.5K-bytes embedded program flash, size configurable Data Flash (shared with program flash), 2K-byte flash for the ISP, and 2K-byte SRAM.

Many system level peripheral functions, such as I/O Port, Timer, UART, SPI, $I^2C$, PWM, ADC, Watchdog Timer, Analog Comparator and Brown-out Detector, have been incorporated into the NM1200/NM1100 series in order to reduce component count, board space and system cost. These useful functions make the NM1200/NM1100 series powerful for a wide range of applications.

## 2 NUTINY-EVB-NM1200 INTRODUCTION

NuTiny-EVB-NM1200 uses the NM1200EC1AE as the target microcontroller. Figure 2-1 is NuTiny-EVB-NM1200 for NM1200 series, the left portion is called NuTiny-EVB-NM1200 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-NM1200 is similar to other development boards. Users can use it to develop and verify applications to emulate the real behavior. The on board chip covers NM1200 series features. The NuTiny-EVB-NM1200 can be a real system controller to design users' target systems, supports usb high speed interface, audio headphone out, audio line in and sdcad slot.

Nu-Link-Me is a Debug Adaptor. The Nu-Link-Me Debug Adaptor connects your PC's USB port to your target system (via Serial Wired Debug Port) and allows you to program and debug embedded programs on the target hardware. To use Nu-Link-Me Debug adaptor with IAR or Keil, please refer to "Nuvoton NuMicro® IAR ICE driver user manual "or Nuvoton NuMicro® Keil ICE driver user manual" in detail. These two documents will be stored in the local hard disk when the user installs each driver.

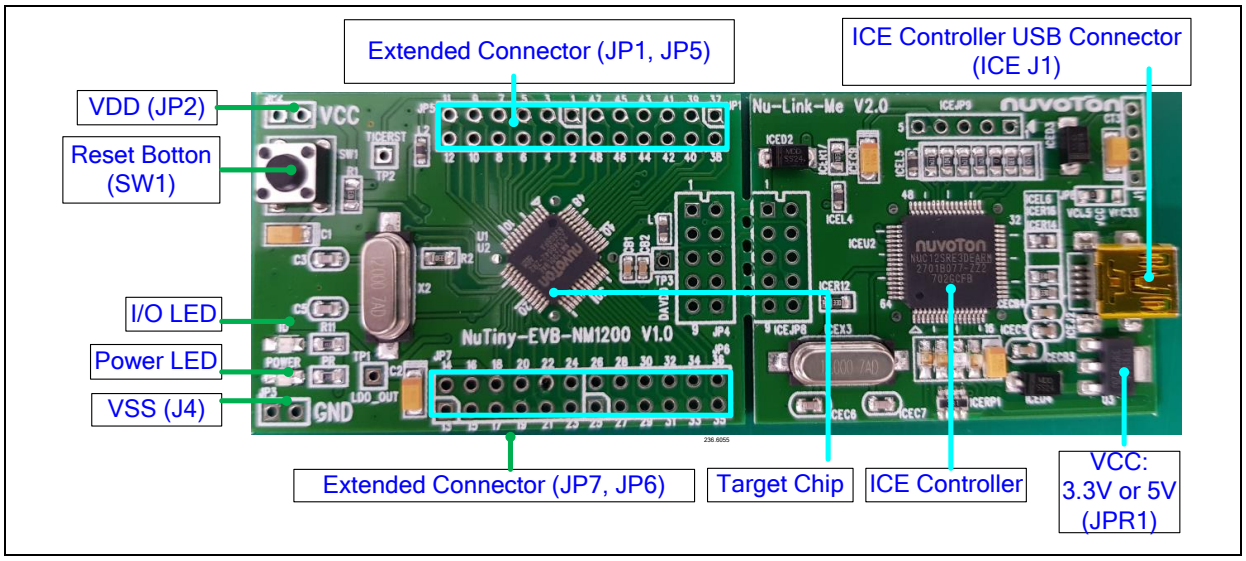



Figure 2-1 NuTiny-EVB-NM1200 (PCB Board)

## 2.1 NuTiny -EVB-NM1200 Jumper Description

### 2.1.1 Power Setting

- J1: USB port in Nu-Link-Me
- J2: VDD Voltage connecter in NuTiny-EVB-NM1200

| Model | JPR1 | J1 USB port | J2 VDD | MCU Voltage |
|---|---|---|---|---|
| Model 1 | Select VCC33 (default ) | Connect to PC | DC 3.3V output | DC 3.3V |
| Model 2 | X | X | DC 2.1 V ~ 5.5 V Input | Voltage by J2 input |

X: Unused.

### 2.1.2 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NM1200) for connecting with Nuvoton ICE adaptor (Nu-Link-Me V2.0)
- JP8: Connector in ICE adaptor (Nu-Link-Me V2.0) for connecting with a target board (for example NuTiny-EVB-NM1200)

### 2.1.3 USB Connector

- J2: Mini USB Connector in Nu-Link-Me V2.0 connected to a PC USB port

### 2.1.4 Extended Connector

- JP1,JP5, JP6,JP7: Show all chip pins in NuTiny-EVB-NM1200

### 2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-NM1200

### 2.1.6 Power Connector

- JP2: VDD connector in NuTiny-EVB-NM1200
- JP3: VSS connector in NuTiny-EVB-NM1200

## 2.2 Pin Assignment for Extended Connector

NuTiny-EVB-NM1200 provides NM1200VE3AE on board and the extended connector for (JP1, **JP5**, **JP6, JP7**) for TSSOP28-pin. Table 2-1 is the pin assignment for NM1200.

| Pin No | Pin Name |
|---|---|
| 01 | NC |
| 02 | P1.5, ADC_CH5, ACMP0_P0, UART1_TX0 |
| 03 | /RESET |
| 04 | P3.0, ADC_CH6, ACMP1_N, CCAP |
| 05 | AVSS |
| 06 | P5.4, ADC_CH8 |
| 07 | P3.1, ADC_CH7, ACMP1_P0, CCAP |
| 08 | P3.2, INT0, STADC, TM0_EXT, ACMP1_P1 |
| 09 | P3.4, TM0, I2C_SDA, ACMP1_P2, ADC_CH9 |
| 10 | P3.5, TM1, I2C_SCL, ACMP1_P3, ADC_CH10 |
| 11 | P3.7 |
| 12 | NC |
| 13 | NC |
| 14 | P3.6, ACMP0_O, CKO, TM1_EXT, ADC_CH11 |
| 15 | P5.1, XTAL2 |
| 16 | P5.0, XTAL1 |
| 17 | VSS |
| 18 | LDO_CAP |
| 19 | P5.5 |
| 20 | P5.2, INT1, CCAP |
| 21 | NC |
| 22 | P2.2, PWM0 |
| 23 | P2.3, PWM1 |
| 24 | P2.4, PWM2, UART1_RX1 |
| 25 | P2.5, PWM3, UART1_TX1 |
| 26 | P2.6, PWM4, ACMP1_O |
| 27 | P2.7 |
| 28 | NC |

| | |
|---|---|
| 29 | P4.6, ICE_CLK |
| 30 | P4.7, ICE_DAT |
| 31 | NC |
| 32 | P0.7, SPI_CLK, CCAP |
| 33 | P0.6, SPI_MISO, CCAP |
| 34 | P0.5, SPI_MOSI, CCAP |
| 35 | P0.4, SPI_SS, PWM5, CCAP |
| 36 | NC |
| 37 | P0.1, nRTS, UART0_RX0, SPI_SS |
| 38 | P0.0, nCTS, UART0_TX0 |
| 39 | NC |
| 40 | NC |
| 41 | P5.3, ADC_CH0, |
| 42 | VDD |
| 43 | AVDD |
| 44 | P1.0, ADC_CH1, ACMP0_P1 |
| 45 | P1.2, ADC_CH2, UART0_RX1, ACMP0_P2 |
| 46 | P1.3, ADC_CH3, UART0_TX1, ACMP0_P3, INT0 |
| 47 | P1.4, ADC_CH4, ACMP0_N, UART1_RX0 |
| 48 | P1.6 |

Table 2-1 Pin Assignment for NM1200

# 3 HOW TO START NUTINY-EVB-NM1200 ON THE KEIL MVISION® IDE

## 3.1 Keil uVision® IDE Software Download and Install

Please visit the Keil company website (http://www.keil.com) to download the Keil µVision® IDE and install the RVMDK

## 3.2 Nuvoton Nu-Link Driver Download and Install

Please visit the Nuvoton company NuMicro® website (http://www.nuvoton.com/NuMicro ) to download "NuMicro® Keil µVision® IDE driver" file. When the Nu-Link driver has been well downloaded, please unzip the file and execute the "Nu-Link_Keil_Driver.exe" to install the driver.

## 3.3 Hardware Setup

The hardware setup is shown as Figure 3-1.

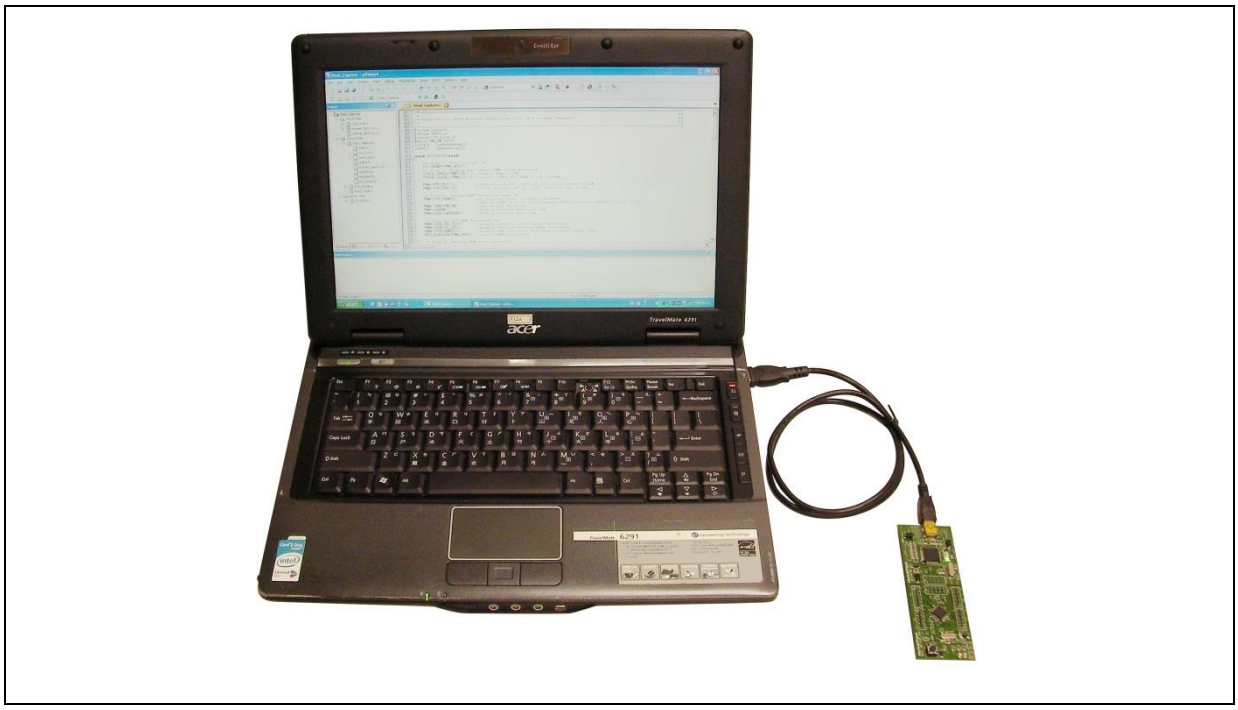


Figure 3-1 NuTiny-EVB-NM1200 Hardware Setup

## 3.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-EVB-NM1200 board. It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro® website.

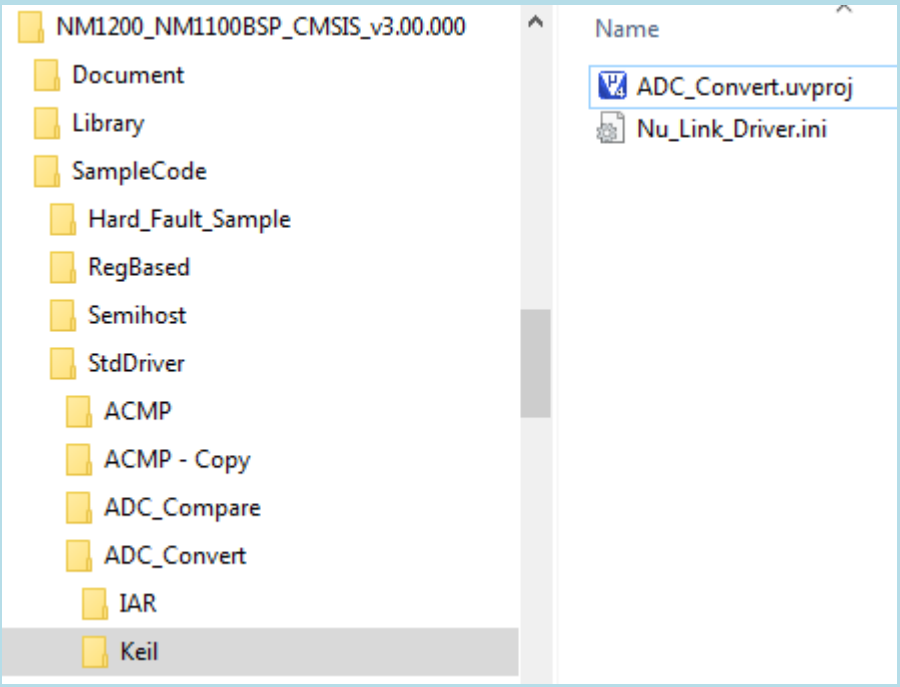
| Directory | C:\ Nuvoton\BSP Library\NM1200BSP\SampleCode \StdDriver\SYS\KEIL |
|---|---|
| Project File |  |



Figure 3-2 Example Directory

This sample code will show some functions about system manager controller and clock controller.

- Start uVision®
- Project – Open
  Open the SYS.uvproj project file
- Project – Build
  Compile and link the SYS application
- Flash – Download
  Program the application code into on-chip Flash ROM
- Start debug mode
  When using the debugger commands, you may:
  - Review variables in the watch window
  - Single step through code
  - Reset the device
  - Run the application

# 4 HOW TO START NUTINY -EVB-NM1200 ON THE IAR EMBEDDED WORKBENCH

## 4.1 IAR Embedded Workbench Software Download and Install

Please connect to IAR company website (http://www.iar.com) to download the IAR Embedded Workbench and install the EWARM.

## 4.2 Nuvoton Nu-Link Driver Download and Install

Please visit the Nuvoton company NuMicro® website (http://www.nuvoton.com/NuMicro ) to download the "NuMicro® IAR EWARM Driver" file. When the Nu-Link driver has been well downloaded, please unzip the file and execute the "Nu-Link_Keil_Driver.exe" to install the driver.

## 4.3 Hardware Setup

The hardware setup is shown as Figure 4-1.

Figure 4-1 NuTiny-EVB-NM1200 Hardware Setup

## 4.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-EVB-NM1200 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro® website.

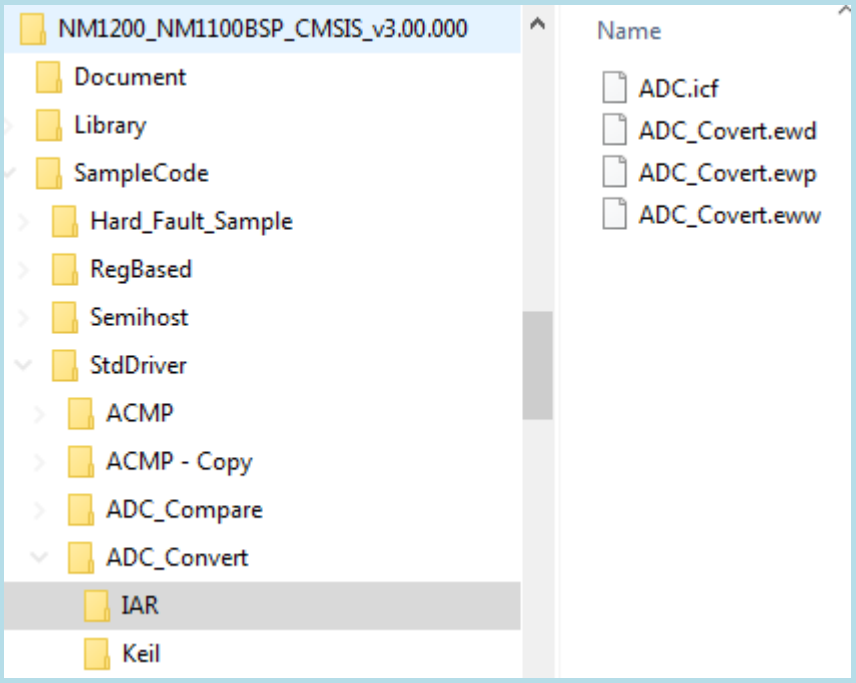
| Directory | C:\ Nuvoton\BSP Library\NM1200BSP\SampleCode \StdDriver\SYS\IAR |
|---|---|
| Project File |  |



Figure 4-2 Example Directory

This sample code will show some functions about system manager controller and clock controller.

- Start IAR Embedded Workbench
- File-Open-Workspace
  Open the SYS.eww workspace file
- Project - Make
  Compile and link the SYS application
- Project – Download and Debug
  Program the application code into on-chip Flash ROM
- Single step through code
- Reset the device
- Run the application

# 5 STARTING TO USE NU-LINK-ME 2.0 VCOM FUNCTION

## 5.1 Downloading and Installing VCOM Driver

Please connect to Nuvoton NuMicro® website (http://www.nuvoton.com/NuMicro) to download the "NuMicro® ICP Programming Tool" file. After the ICP Programming Tool driver is downloaded, please unzip the file and execute the "ICP Programming Tool.exe". Simply follow the installation and optional steps to install ICP Programming Tool and Nu-Link USB Driver, which included VCOM driver.

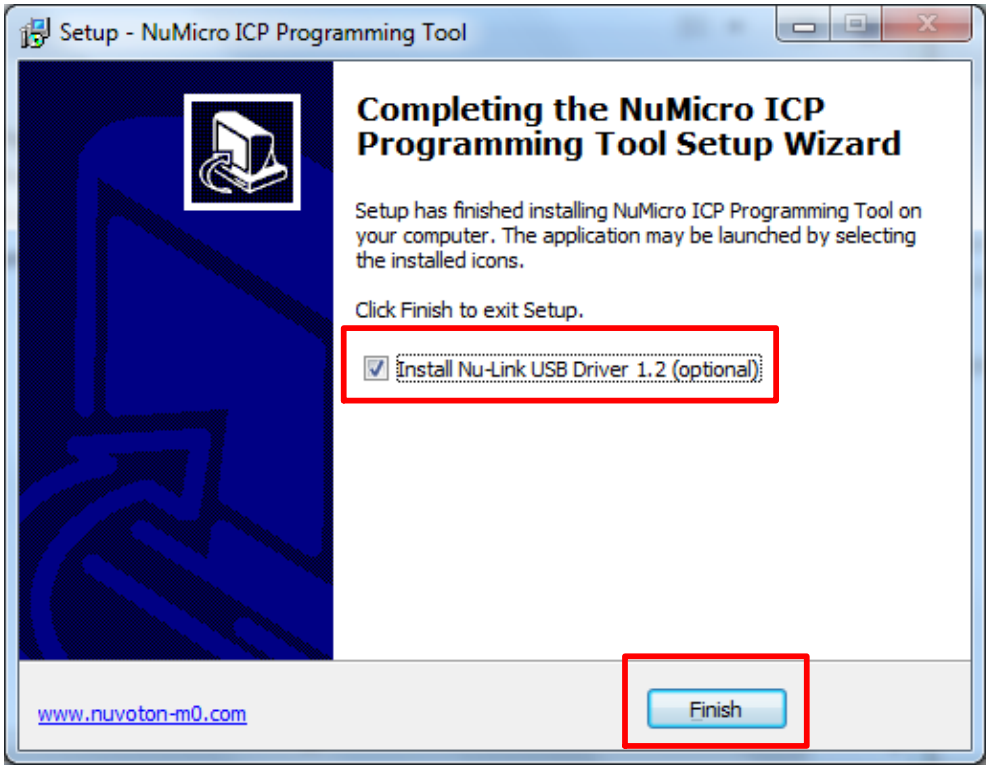



Figure 5-1 Optional Step after ICP Programming Tool Installation

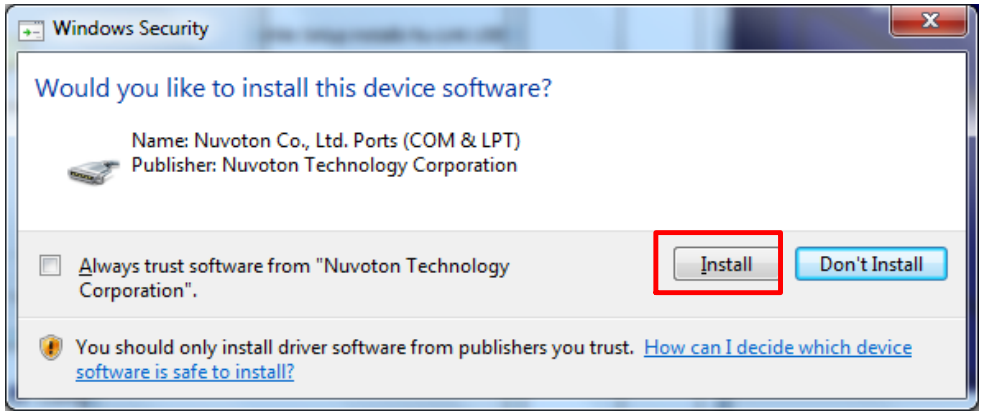



Figure 5-2 Install Nuvoton COM&LPT Driver

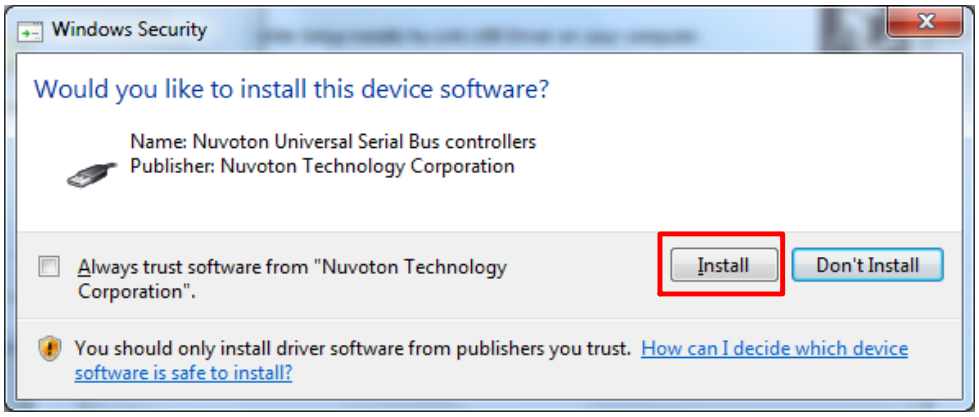



Figure 5-3 Install Nuvoton Universal Serial Bus Controllers

## 5.2 VCOM Mode Setting on NuTiny-EVB-NM1200

Before the NuTiny-EVB-NM1200 is connected to the PC, please enable SW2 VCOM function by switching on SW2. The NuTiny-EVB-NM1200 transmits through UART0 to VCOM to send out data. Switch SW2 off when using UART0 function without VCOM function.

## 5.3 Setup on the Development Tool

The example is demonstrated on the Keil µVision® IDE.

### 5.3.1 Check the Using UART on the Keil µVision® IDE

Please open the project and find system_NM1200.h to check the using UART in DEBUG_PORT, which has to be the same as the using UART in the NuTiny-EVB-NM1200.

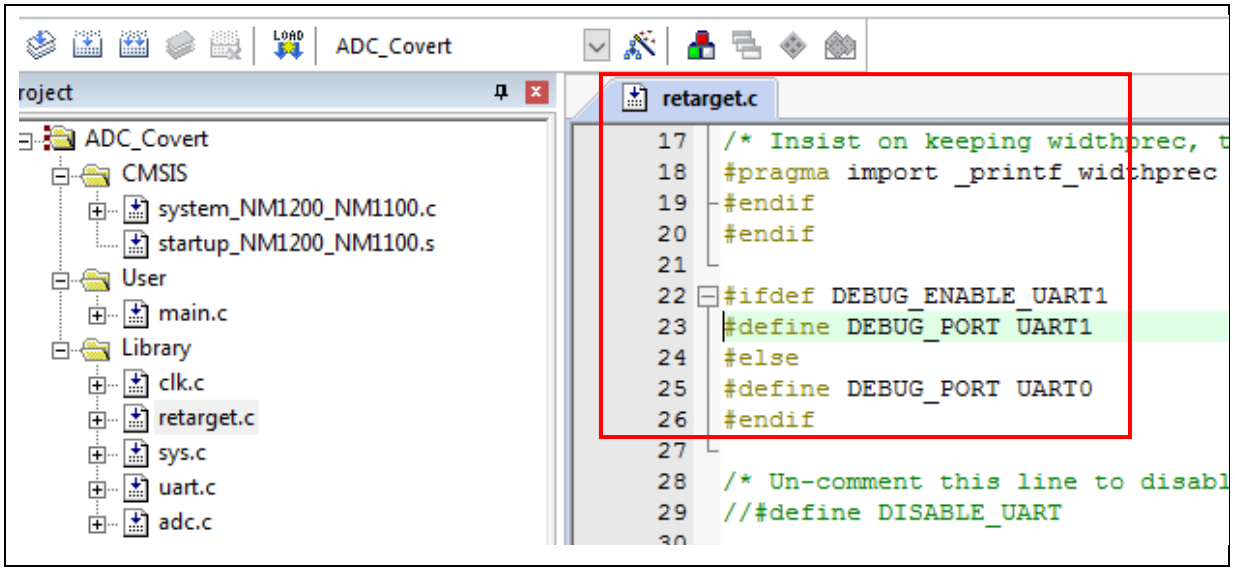


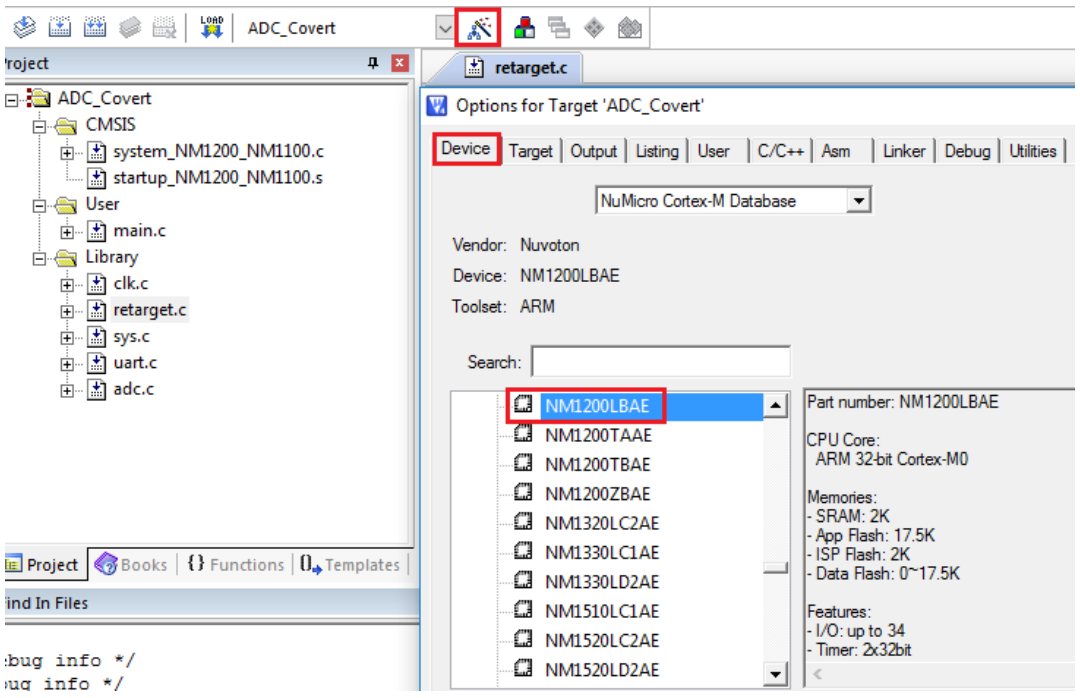

Figure 5-4 The Using UART on Keil µVision® IDE

### 5.3.2 Check the Target Device and Debug Setting

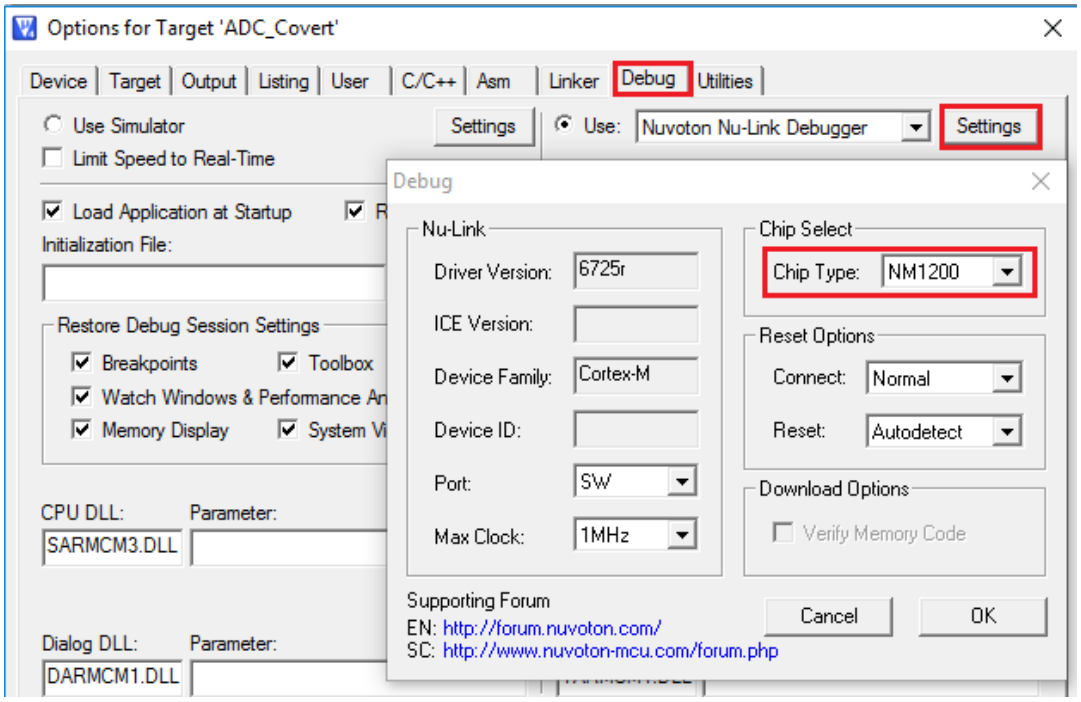
The target device has to be the same as the setting in Debug. Please click “Target Option” to

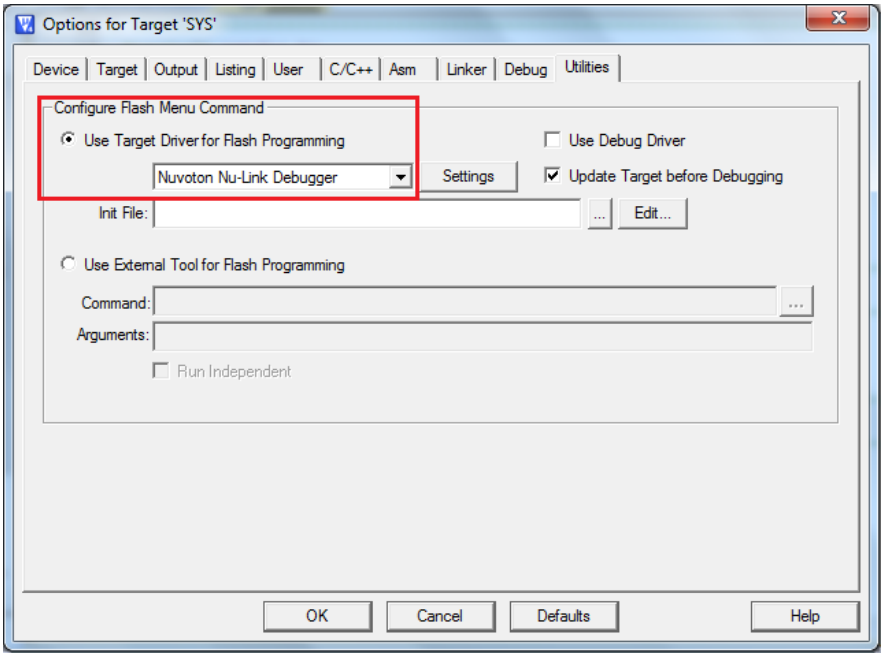
open the Option windows, and find the setting in “Device”, “Debug”, and “Utilities” page. Please follow the steps below to check the setting.

**Step 1**




**Step 2**



| | |
|---|---|
| **Step 3** |  |



### 5.3.3 Build and Download Code to NuTiny-EVB-NM1200

Please build the project and download code to NuTiny-EVB-NM1200.

### 5.3.4 Open the Serial Port Terminal

User can use serial port terminal, PuTTY for example, to print out debug message.

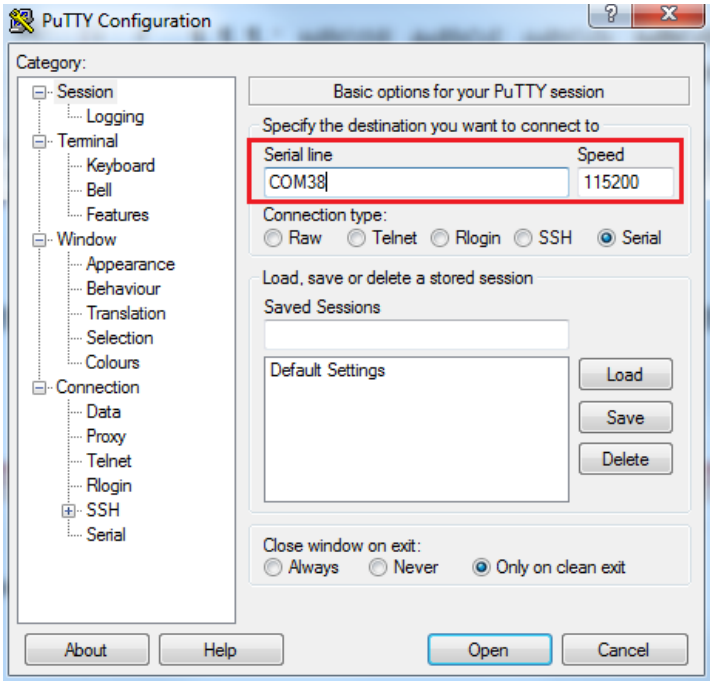




Figure 5-5 Set Baud Rate

### 5.3.5 Reset Chip

After pushing the reset button, the chip will reprogram application and print out debug message.

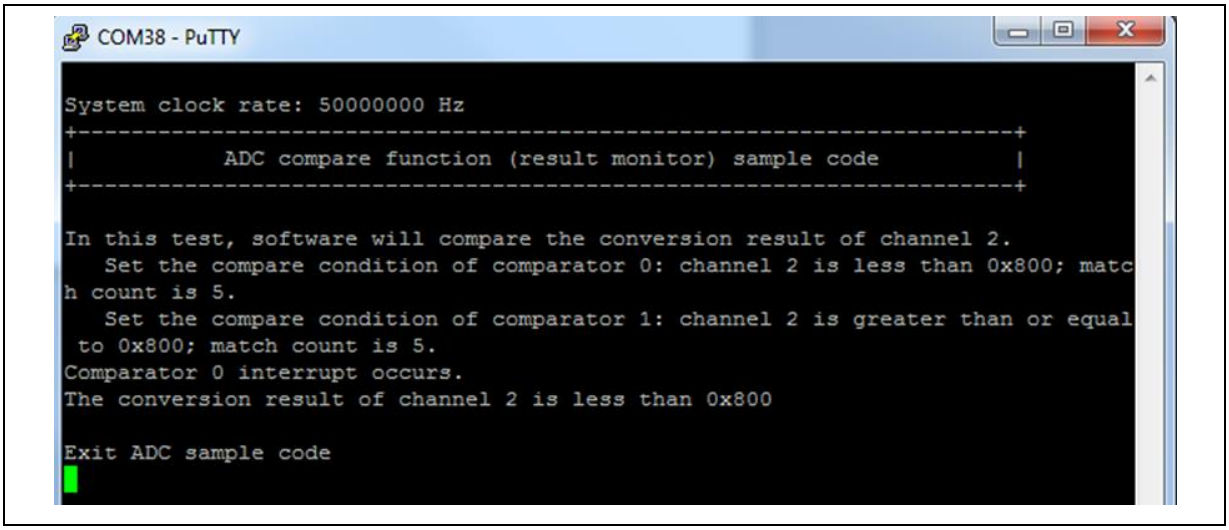



Figure 5-6 Serial Port Terminal Windows

**Notice**: Please switch SW2 on before the NuTiny-EVB-NM1200 connects to the PC. When the NuTiny-EVB-NM1200 connects to the PC with SW2 switch on, PC will detect VCOM as a USB device and the detection will only be processed once. VCOM will not function if switch on SW2 after the connection.

# 6 NUTINY-EVB-NM1200 SCHEMATIC

## 6.1 NuTiny-EVB-NM1200 PCB Placemen (TOP)

Users can refer to Figure 6-1 for the NuTiny-EVB-NM1200 PCB placements.

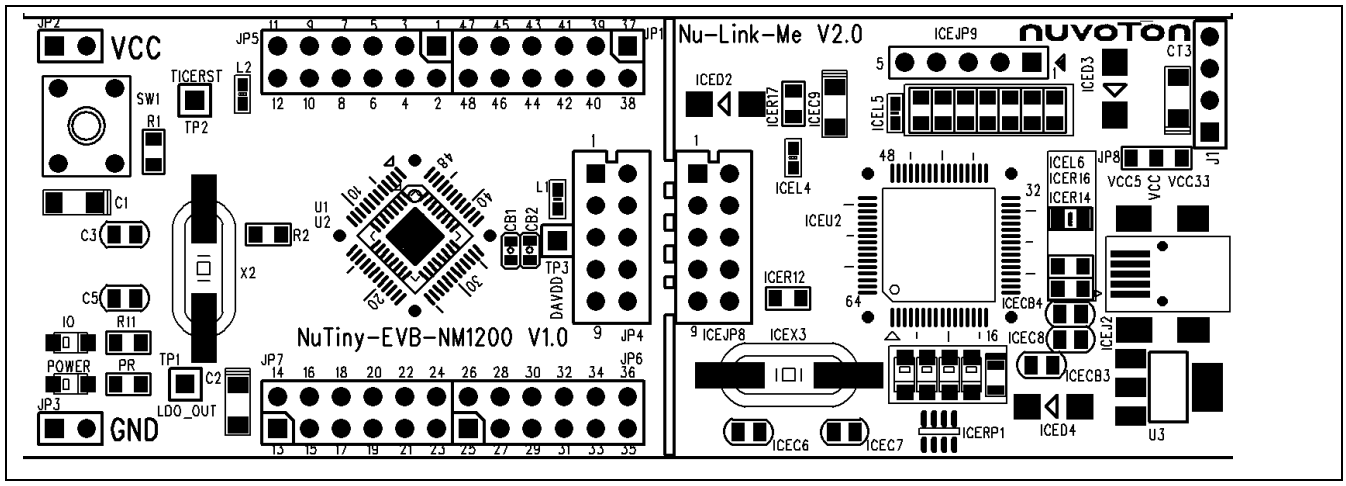



Figure 6-1 NuTiny-EVB-NM1200 PCB Placement

## 6.2 NuTiny-EVB-NM1200 PCB Placemen (Bottom)

Users can refer to Figure 6-1 for the NuTiny-EVB-NM1200 PCB placements.

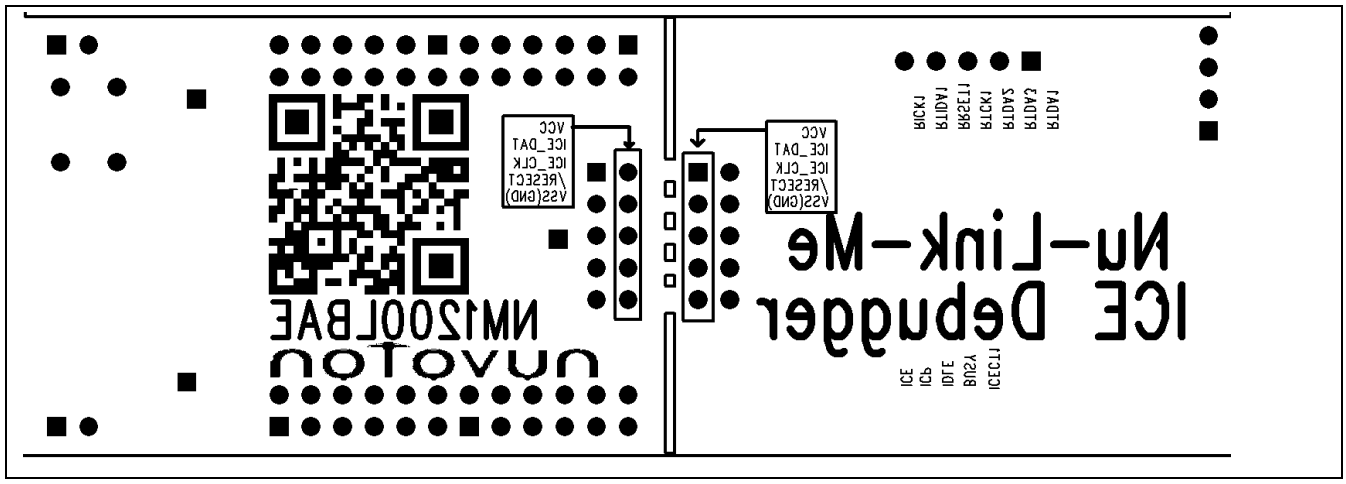
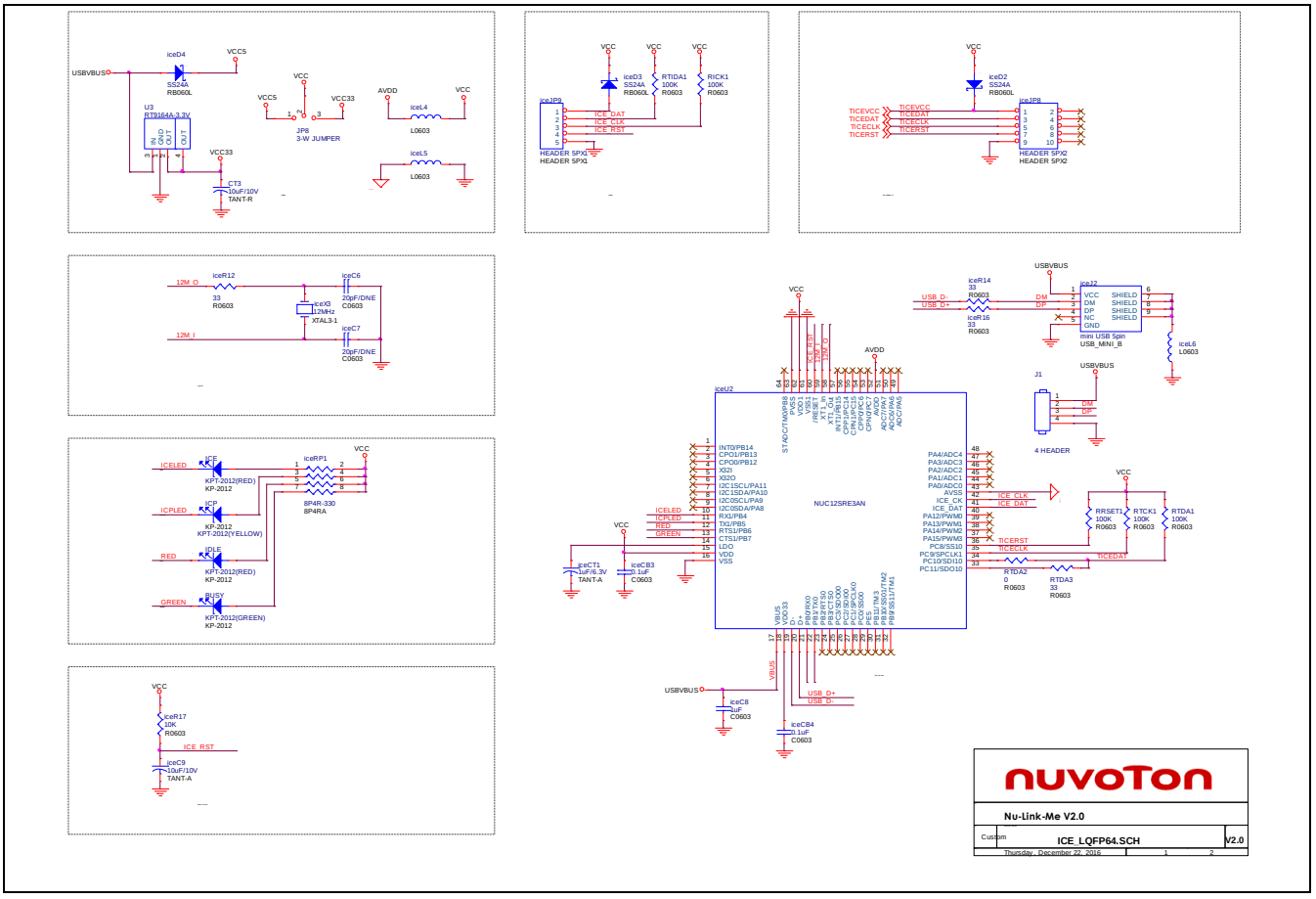
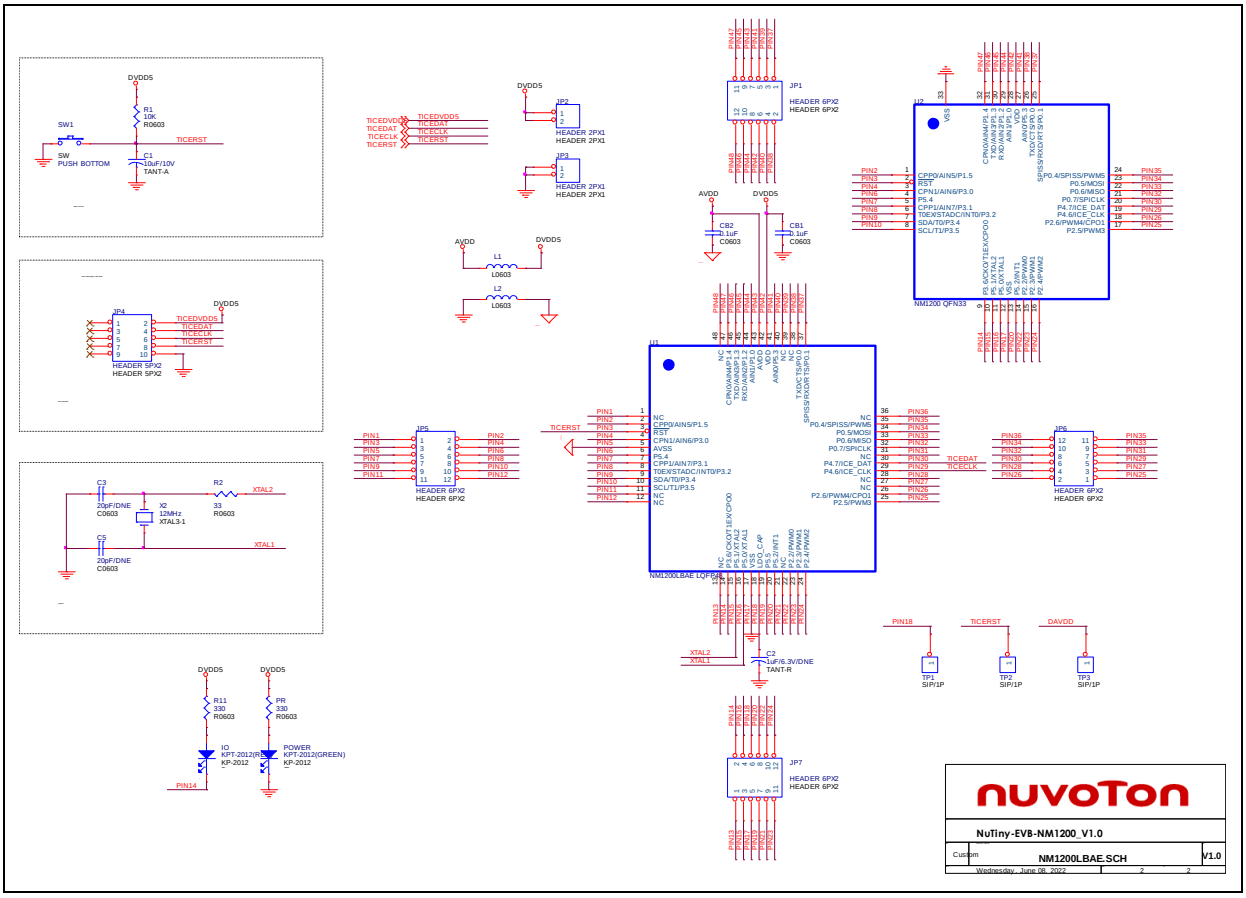



Figure 6-2 NuTiny-EVB-NM1200 PCB Placement

## 6.3 Nu-Link-Me V2.0 Schematic



## 6.4 NuTiny-EVB-NM1200 Schematic



# 7 REVISION HISTORY

| Date | Revision | Description |
|---|---|---|
| 2018.04.16 | 1.00 | 1. Initially issued. |

## Important Notice

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