ARM® Cortex®-M
32-bit Microcontroller

NuMicro® Family
NT-NM1240
User Manual

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

www.nuvoton.com

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1 OVERVIEW

NuTiny-EVB-NM1240(NT-NM1244) is the specific development tool for NuMicro® NM1240 series. Users can use NuTiny-EVB-NM1240 to develop and verify the application program easily.

The NuMicro® NM1240 series 32-bit microcontrollers are embedded with ARM® Cortex®-M0 core for industrial applications which need high performance, high integration, and low cost. The Cortex®-M0 is the newest ARM® embedded processor with 32-bit performance at a cost equivalent to the traditional 8-bit microcontroller.

The NM1240 series can run up to 48(60) MHz and operate at 2.2V(3.3V) ~ 5.5V, -40℃ ~ 105℃, and thus can support a variety of industrial control applications which need high CPU performance. The NM1240 offers 48/64 Kbytes embedded program Flash, size configurable Data Flash (shared with program flash), 7.5 Kbytes Flash for the ISP, 1.5 Kbytes SPROM for security, and 8Kbytes SRAM.

Many system level peripheral functions, such as I/O Port, Timer, UART, SPI, I2 C, PWM, ADC, OP, Watchdog Timer, Analog Comparator and Brown-out Detector, have been incorporated into the NM1240 to reduce component count, board space and system cost. These useful functions make the NM1240 powerful for a wide range of applications.

Additionally, the NM1240 series is equipped with ISP (In-System Programming) and ICP (In-Circuit Programming) functions, which allow the user to update the program memory without removing the chip from the actual end product.

2 NUTINY-EVB-NM1240 INTRODUCTION

NuTiny-EVB-NM1240 uses the NM1234D as the target microcontroller. Figure 2-1 is NuTiny-EVB-NM1240 for NM1240 series, the left portion is called NuTiny-EVB-NM1240 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-NM1240 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 NM1240 series features. The NuTiny-EVB-NM1240 can be a real system controller to design users' target systems.

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. The Nu-Link-Me V3.0 also supports VCOM function, which gives users more flexibility when debug. 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. To use Nu-Link-Me 3.0 VCOM function, please refer to Chapter 5.

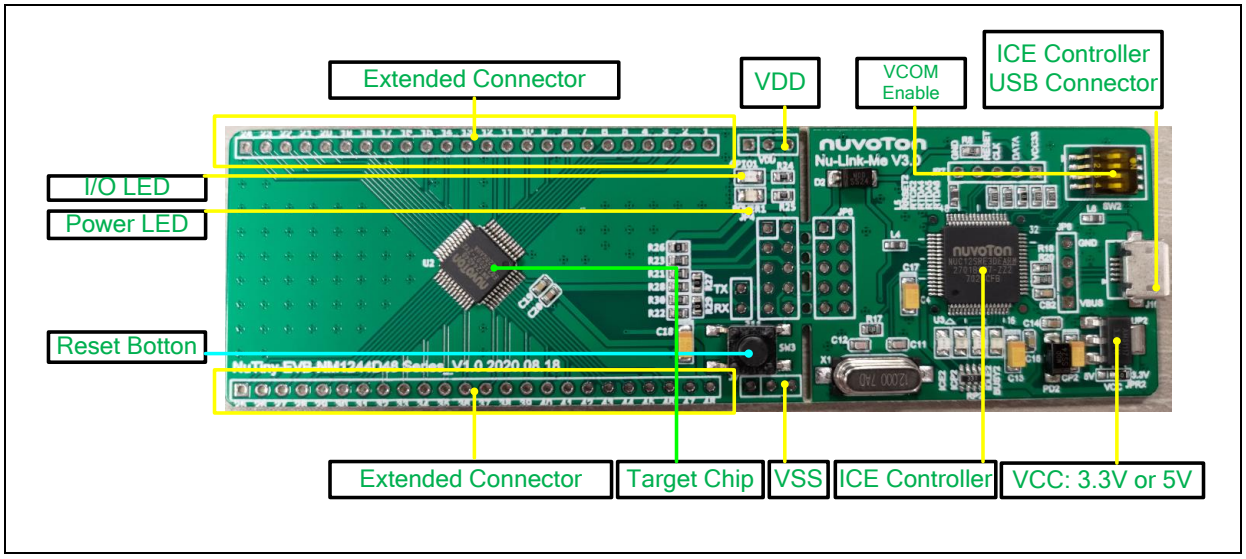


Figure 2-1 NuTiny-EVB-NM1240 (PCB Board)

2.1 NuTiny -EVB-NM1240 Jumper Description

2.1.1 Power Setting

- J10: USB port in Nu-Link-Me
- J8: VDD Voltage connecter in NuTiny-EVB-NM1240

Model	JPR2	J10 USB port	J8 VDD	MCU Voltage
Model 1	Select VCC33 (default)	Connect to PC	DC 3.3V output	DC 3.3V
Model 2	X	X	DC 2.5 V ~ 5.5 V Input	Voltage by J2 input

X: Unused.

2.1.2 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NM1240) for connecting with Nuvoton ICE adaptor (Nu-Link-Me V3.0)
- JP6: Connector in ICE adaptor (Nu-Link-Me V3.0) for connecting with a target board (for example NuTiny-EVB-NM1240)

2.1.3 USB Connector

- J10: Mini USB Connector in Nu-Link-Me V3.0 connected to a PC USB port

2.1.4 Extended Connector

- JP2, JP3: Show all chip pins in NuTiny-EVB-NM1240

2.1.5 Reset Button

- SW3: Reset button in NuTiny-EVB-NM1240

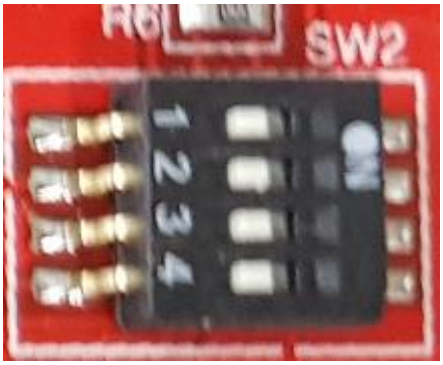
2.1.6 Power Connector

- J8: VDD connector in NuTiny-EVB-NM1240
- J7: VSS connector in NuTiny-EVB-NM1240

2.1.7 VCOM Enable

- **SW3**: VCOM function enable for NuTiny-EVB-NM1240. Switch SW2 on before power on to enable VCOM function. SW2 connects pin 6(PF2/RXD) and pin 55(PF3/TXD) in NuTiny-EVB-NM1240 with pin 19 (PD.5/TXD) and pin 2(PD.6/RXD) in Nuvoton ICE adaptor (Nu-Link-Me V3.0). SW2 connects pin 29(VCOM) in Nuvoton ICE adaptor (Nu-Link-Me V3.0) to GND to enable VCOM function.

Switch Pin Number	Function Name	UART0 Mode	VCOM Mode
1	ICE_TX	Off	On
2	ICE_RX	Off	On
3	VCOM_EN	Off	On
4	X	X	X



X: Unused.

2.2 Pin Assignment for Extended Connector

NuTiny-EVB-NM1240 provides NM1234D on board and the extended connector for (**J2**, **J3**) for LQFP48-pin. Table 2-1 is the pin assignment for NM1240.

Pin No	Pin Name
01	NC
02	PE7,UART2_TXD,I2C2_SCL,SPI1_MOSI
03	PD2,ADC1_CH1,CCAP_P0,SPI1_MISO
04	PF0,UART2_RXD,I2C2_SDA,SPI1_SS,ECAP0
05	PF1,UART2_TXD,I2C2_SCL,ECAP1,EPWM_CH3
06	PF2,UART2_RXD,I2C2_SDA,ECAP2,EPWM_CH2
07	nRESET
08	PF3,ADC1_CH3,EPWM_CH1
09	PF4,ADC1_CH4,EPWM_CH0
10	PB0,ADC0_CH0,UART1_TXD,ACMP0_P0,ECAP0
11	PB1,ADC0_CH1,UART1_RXD,ACMP0_P1,ECAP1
12	PB2,ADC0_CH2,BPWM_CH1,ACMP0_P2,ECAP2
13	PB3,T0,UART1_RXD,ADC0_CH9
14	PB4,T1,ACMP0_N,SPI1_SS,UART2_TXD,ADC1_CH0
15	PB5,DAC0,CCAP_P0,SPI1_CLK,UART2_RXD,ADC0_CH5
16	PB6,T1,ECAP1,SPI1_MISO,CCAP_P0,PWM_BRK_P1,ADC0_CH6
17	PB7,ECAP0,SPI1_MOSI,CCAP_P0,PWM_BRK_P2,EPWM_CH1,EPWM_CH0,ADC0_CH7
18	PC5,ECAP2,CCAP_P1,PWM_BRK_P0,EPWM_CH3,EPWM_CH1,ADC1_CH5
19	PC6,T2,DAC1,I2C2_SCL,UART2_TXD,EPWM_CH5,EPWM_CH2,ADC1_CH6
20	PC7,ECAP1,ADC1_CH7
21	PC0,IC21_SCL,SPI1_CLK,UART1_TXD,BPWM_CH0,ADC0_CH3
22	PC1,STADC,ACMP0_P3,CCAP_P1,I2C1_SDA,SPI1_MISO,UART1_RXD,ADC0_CH4
23	PC2,CCAP_P1,I2C1_SDA,SPI1_MOSI,UART1_RXD,PWM_BRK_P0,ADC1_CH2
24	PC3,EXT_CLK,SPI1_SS,EPWM_BRK_P1
25	PC4,ECAP0,ECAP2,UART2_TXD,I2C2_SCL,SPI1_SS,EPWM_BRK_P2
26	PA0,CLKO,UART1_TXD,I2C1_SCL,SPI1_CLK,EPWM_CH1,EPWM_CH0
27	PA1,T2,UART1_RXD,I2C1_SDA,SPI1_MOSI,SPI1_MISO,EPWM_CH1,EPWM_CH3
28	PA2,T0,/SPI1_MOSI,SPI1_MISO,EPWM_CH2,EPWM_CH5

29	PA3,CLKO,SPI1_SS,EPWM_CH0,EPWM_CH3
30	PA4,UART2_TXD,I2C2_SCL,EPWM_CH2,EPWM_CH4
31	PA5,ACMP0_O,UART2_RXD,I2C2_SDA,EPWM_CH4,EPWM_CH5
32	PA6,I2C2_SCL,EPWM_CH5,BPWM_CH0
33	PA7,ACMP0_O,I2C2_SDA,EPWM_CH4,BPWM_CH1
34	PD1,SPI1_SS,ICE_CLK
35	PD3,UART1_TXD,I2C1_SCL,BPWM_CH1
36	PD4,ECAP0,UART1_RXD,I2C1_SDA,BPWM_CH0
37	PD5,ICE_DAT,UART1_TXD,UART2_TXD,ECAP1
38	PD6,UART1_RXD,UART2_RXD,SPI1_SS,I2C2_SDA,ECAP2
39	PD7,UART2_TXD,SPI1_CLK,I2C2_SCL,ECAP0,ECAP2
40	PE0,UART2_RXD,SPI1_MISO,I2C1_SCL,ECAP0
41	PE1,SPI1_MOSI,I2C1_SDA,ECAP1
42	PE2,UART2_TXD,OP1_O,I2C2_SCL,BPWM_CH1
43	PE3,UART2_RXD,OP1_N,I2C2_SDA,ADC1_CH8,T1
44	PE4,ADC1_CH9,OP1_P
45	PE5,UART1_TXD,I2C1_SCL,SPI1_CLK,BPWM_CH0
46	PE6,UART1_RXD,I2C1_SDA,SPI1_MISO,T0
47	VSS
48	VDD

Table 2-1 Pin Assignment for NM1240

3 HOW TO START NUTINY-EVB-NM1240 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.

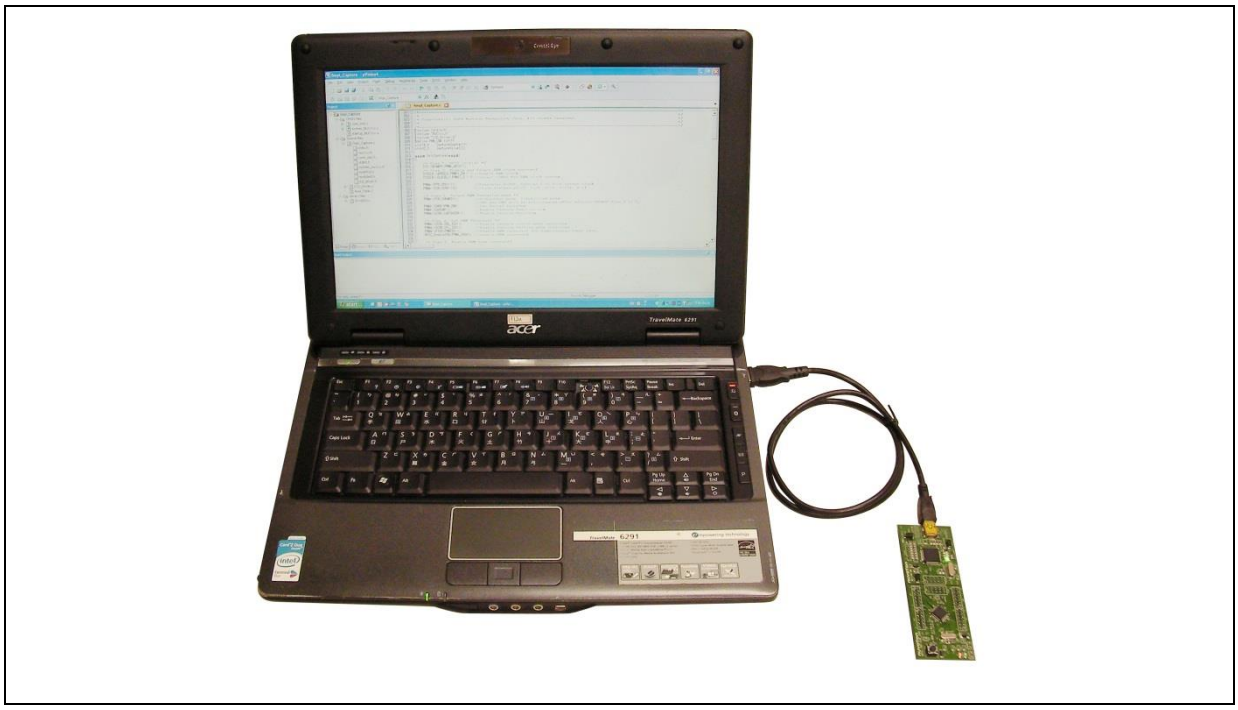


Figure 3-1 NuTiny-EVB-NM1240 Hardware Setup

3.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-EVB-NM1240 board. It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro® website.

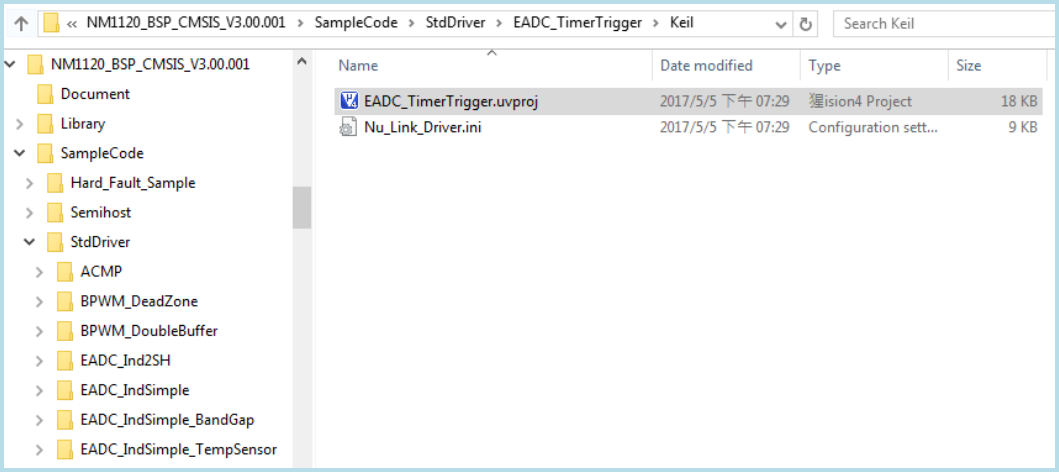
Directory	C:\ Nuvoton\BSP Library\NM1240BSP\SampleCode \StdDriver\SYS\KEIL
Project File	

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-NM1240 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-NM1240 Hardware Setup

4.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-EVB-NM1240 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro® website.

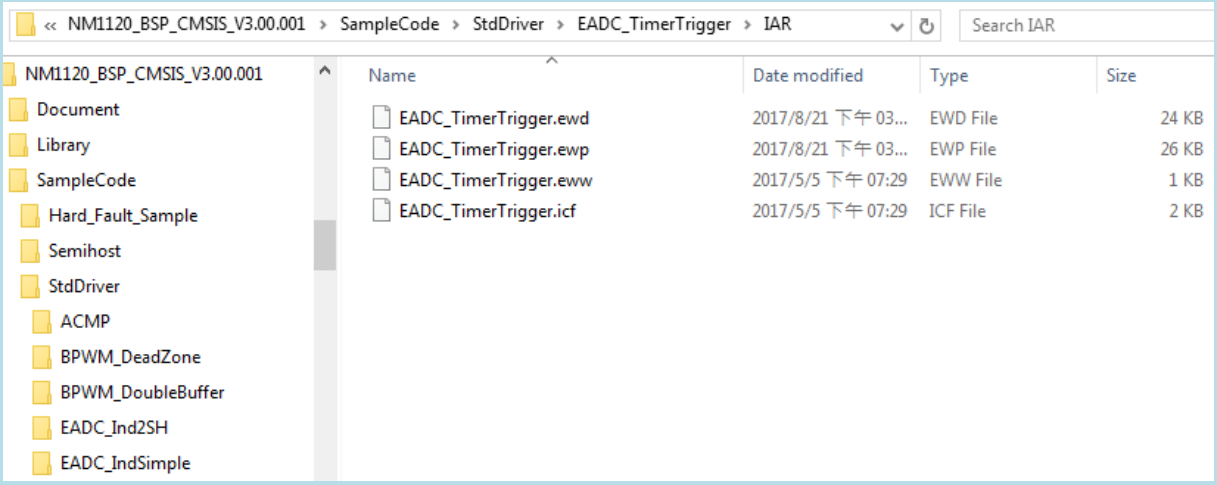
Directory	C:\ Nuvoton\BSP Library\NM1240BSP\SampleCode \StdDriver\SYS\IAR
Project File	

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 3.0 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.

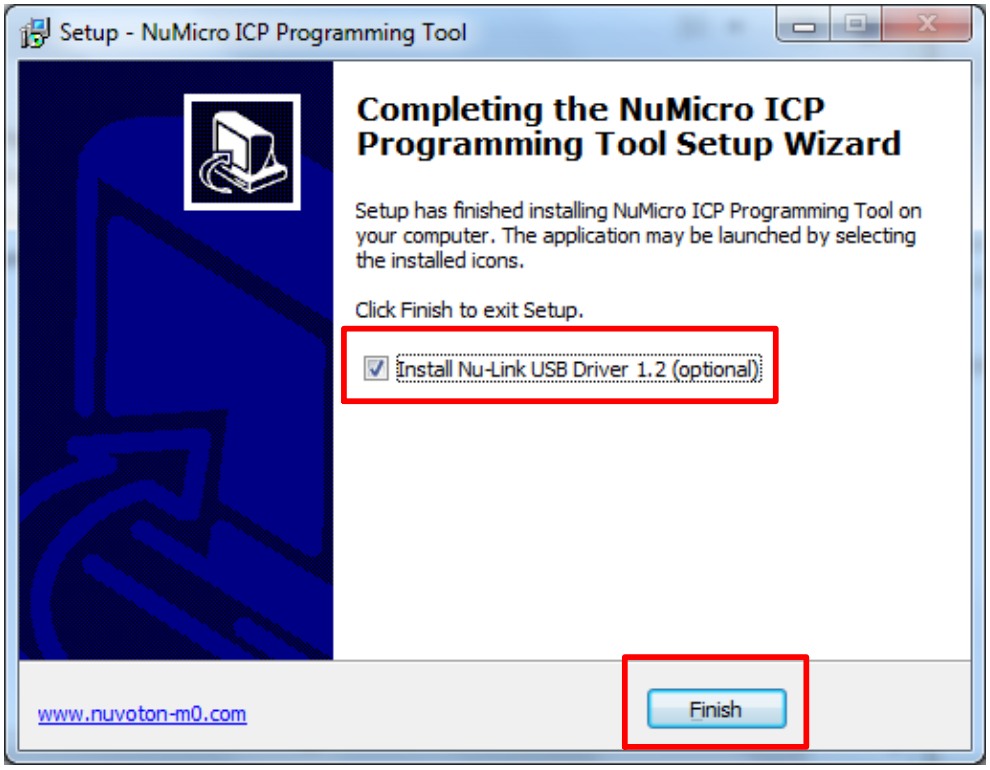


Figure 5-1 Optional Step after ICP Programming Tool Installation

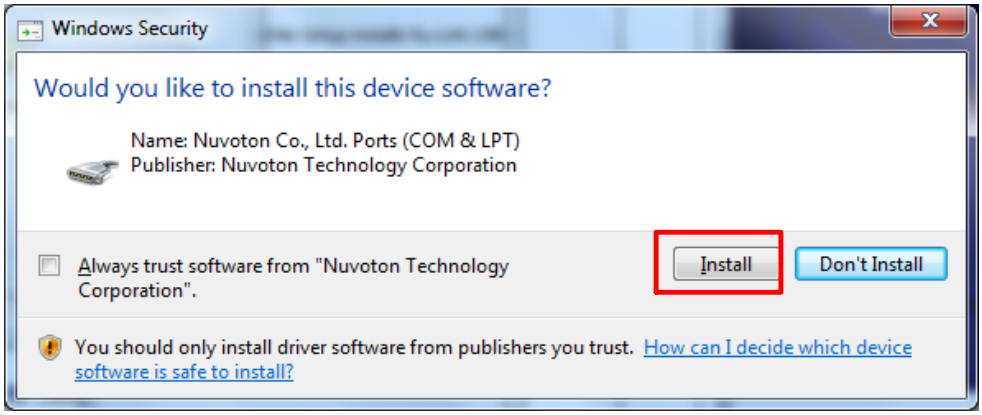


Figure 5-2 Install Nuvoton COM&LPT Driver

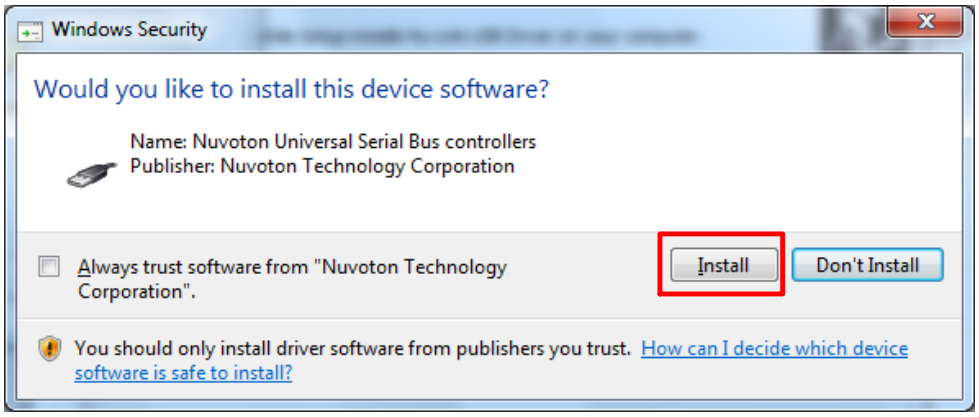


Figure 5-3 Install Nuvoton Universal Serial Bus Controllers

5.2 VCOM Mode Setting on NuTiny-EVB-NM1240

Before the NuTiny-EVB-NM1240 is connected to the PC, please enable SW2 VCOM function by switching on SW2. The NuTiny-EVB-NM1240 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_NM1240.h to check the using UART in DEBUG_PORT, which has to be the same as the using UART in the NuTiny-EVB-NM1240.

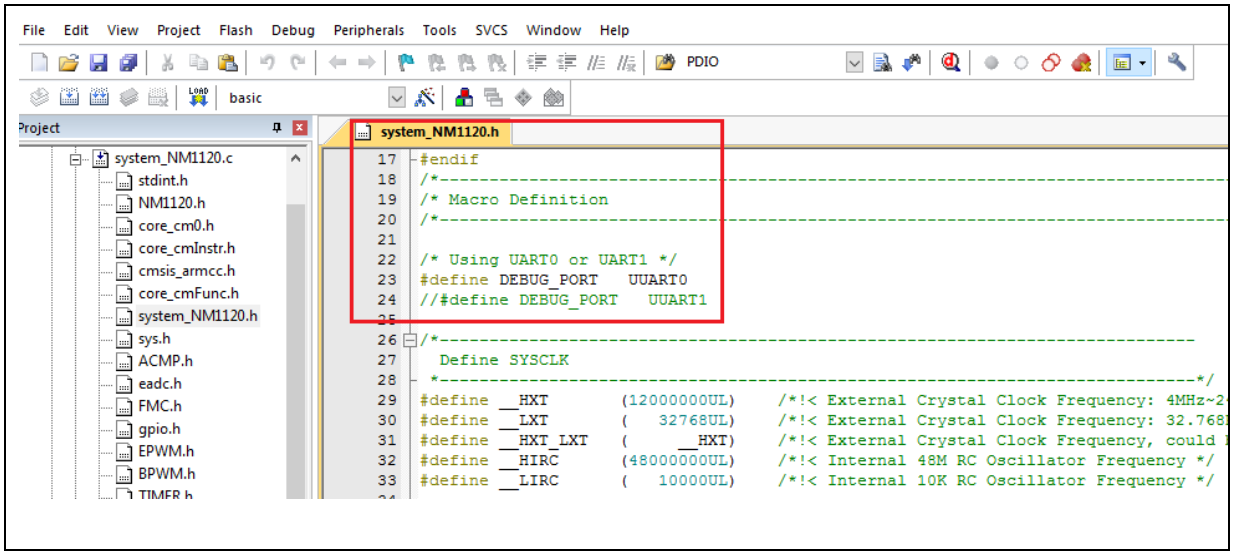


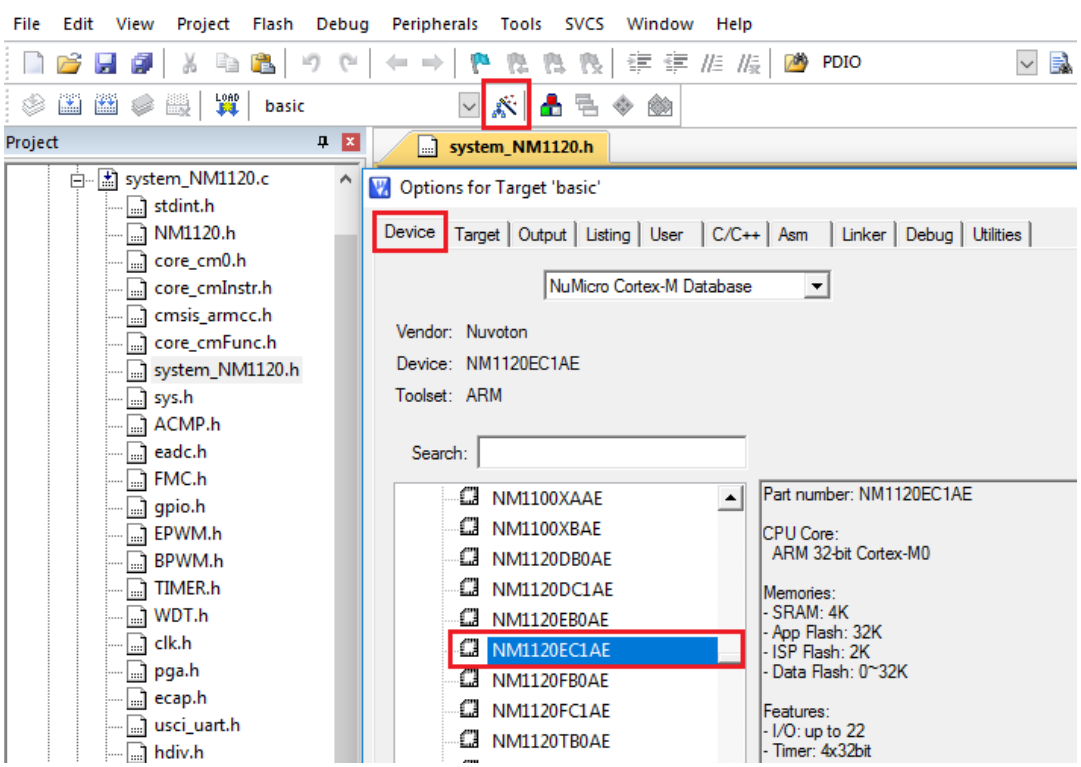
Figure 5-4 The Using UART on Keil µVision® IDE

5.3.2 Check the Target Device and Debug Setting

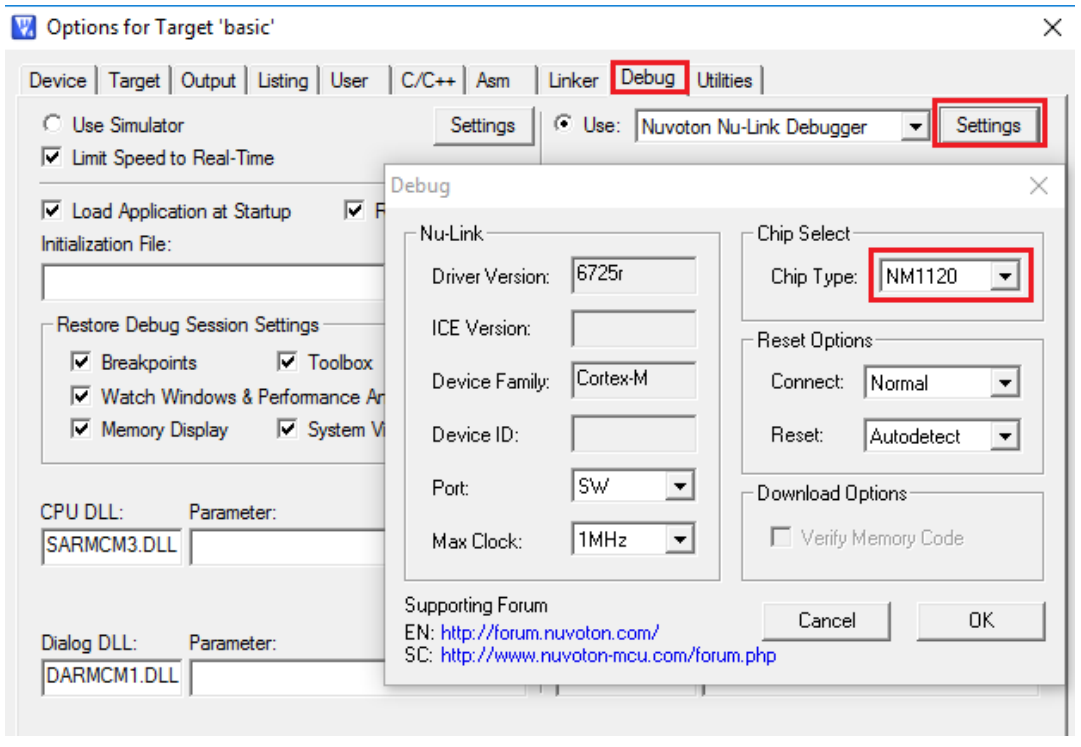
The target device has to be the same as the setting in Debug. Please click “Target Option” to

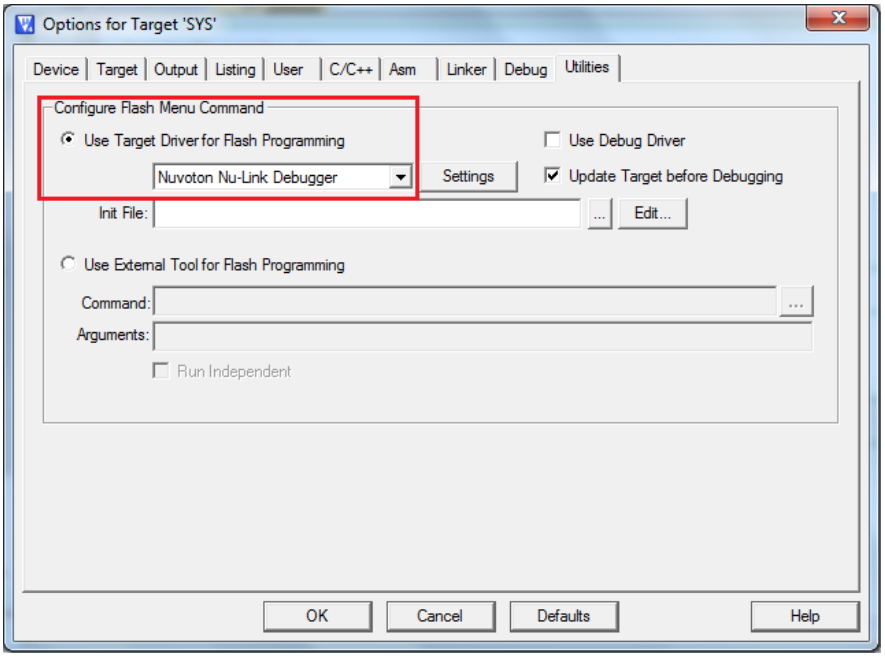
open the Option windows, and find the setting in “Device”, “Debug”, and “Utilities” page. Please follow the steps below to check the setting.

Step 1



Step 2



Step 3	

5.3.3 Build and Download Code to NuTiny-EVB-NM1240

Please build the project and download code to NuTiny-EVB-NM1240.

5.3.4 Open the Serial Port Terminal

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

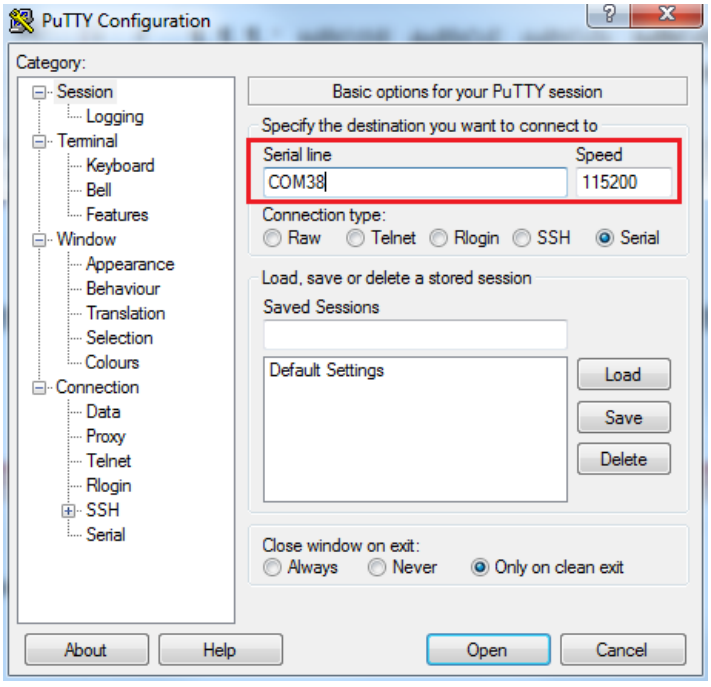


Figure 5-5 Set Baud Rate

5.3.5 Reset Chip

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

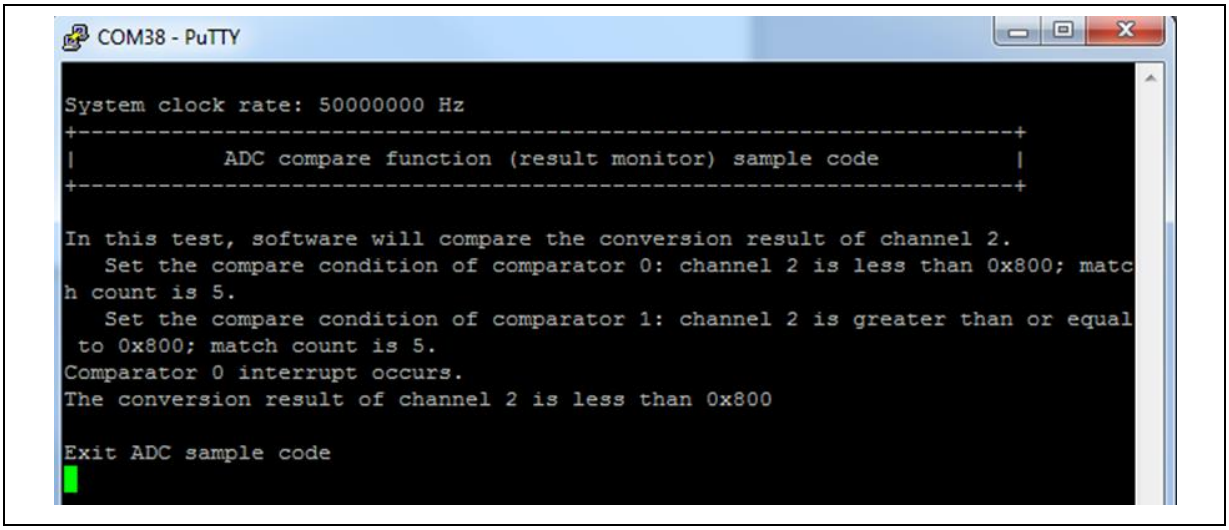


Figure 5-6 Serial Port Terminal Windows

Notice: Please switch SW2 on before the NuTiny-EVB-NM1240 connects to the PC. When the NuTiny-EVB-NM1240 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-NM1244D SCHEMATIC

6.1 NuTiny-EVB-NM1244D PCB Placemen (TOP)

Users can refer to Figure 6-1 for the NuTiny-EVB-NM1240 PCB placements.

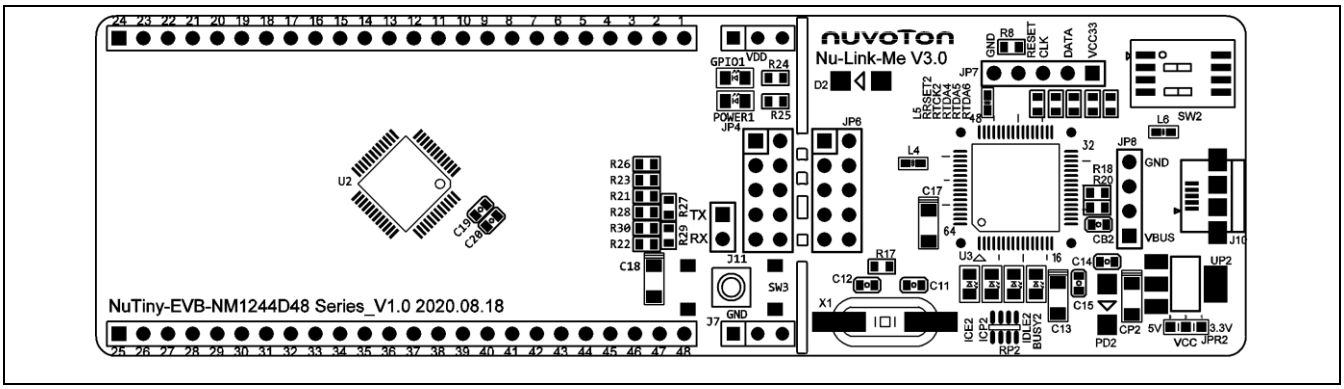


Figure 6-1 NuTiny-EVB-NM1244D PCB Placement

6.2 NuTiny-EVB-NM1244D PCB Placemen (Bottom)

Users can refer to Figure 6-1 for the NuTiny-EVB-NM1244D PCB placements.

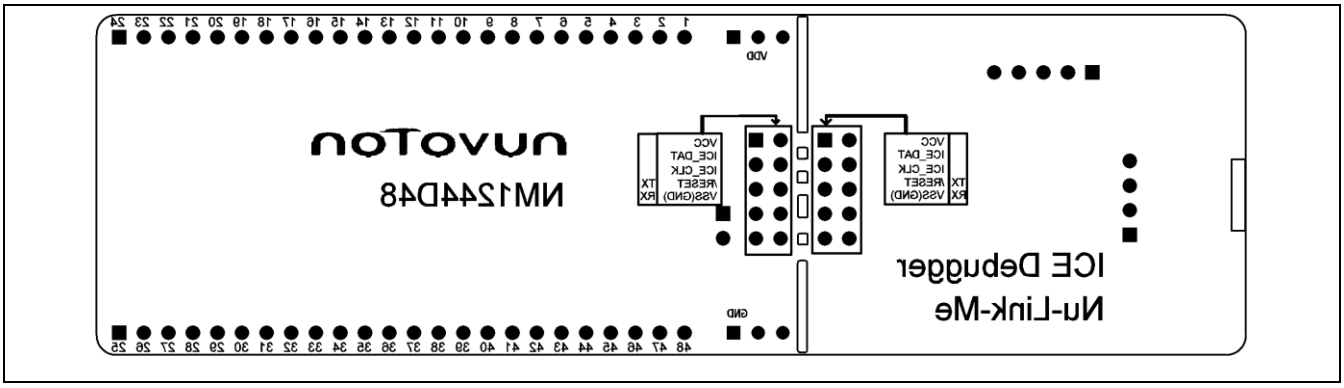
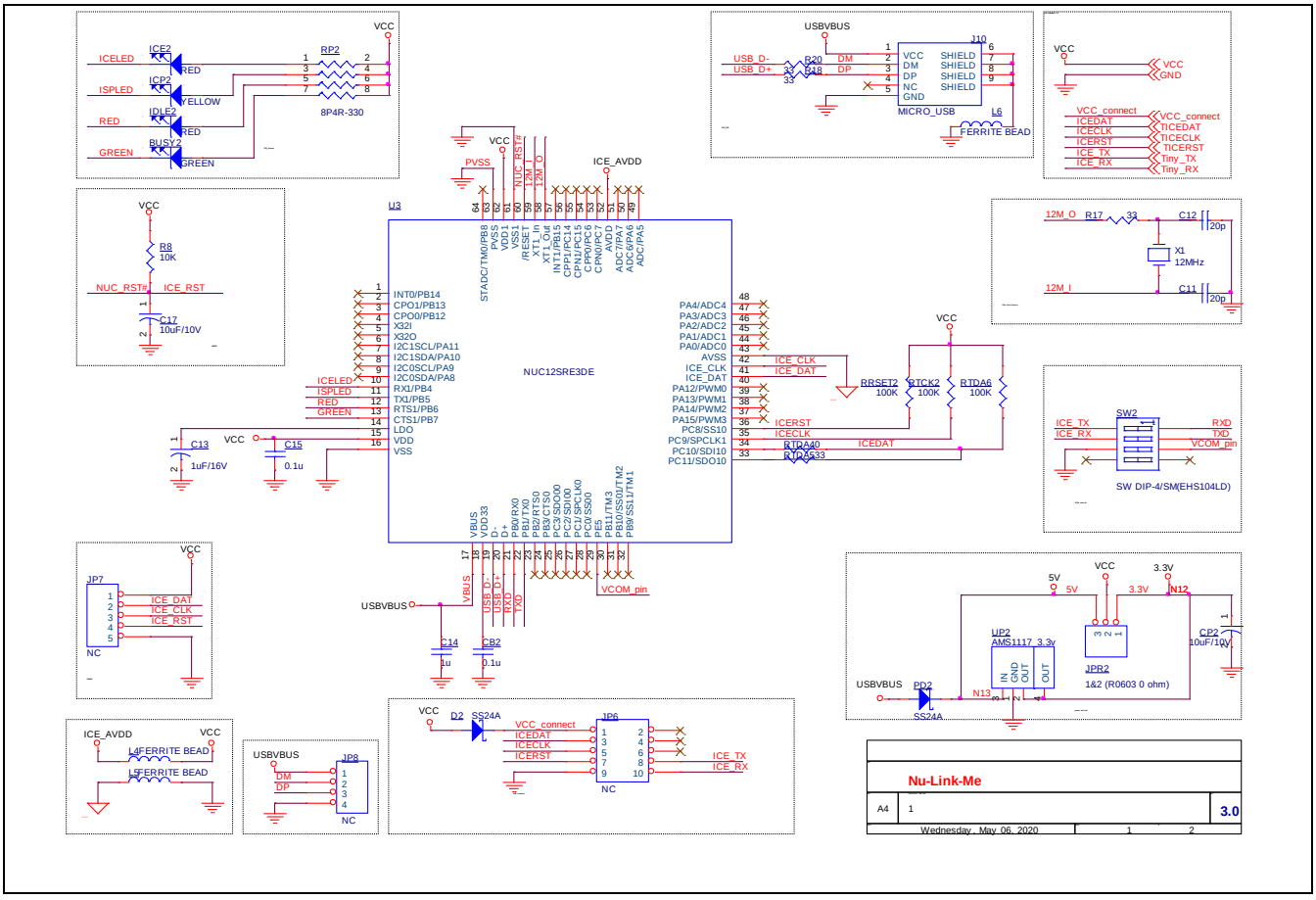
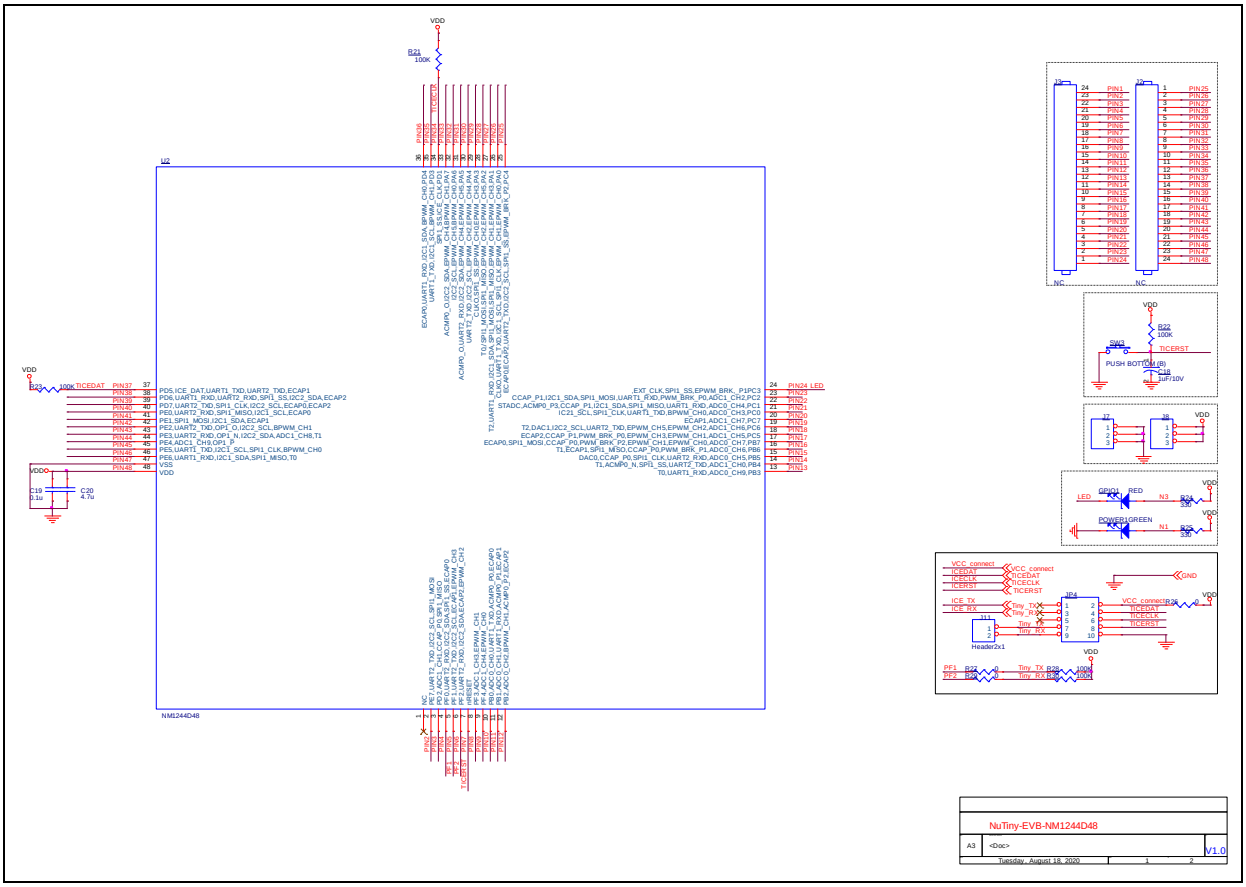


Figure 6-2 NuTiny-EVB-NM1244D PCB Placement

6.3 Nu-Link-Me V3.0 Schematic



6.4 NuTiny-EVB-NM1244D Schematic



7 REVISION HISTORY

Date	Revision	Description
2022.05.26	1.00	1. Initially issued.

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.