ARM® Cortex®-M
32-bit Microcontroller

NuMicro® Family
NT-NM1120
User Manual

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

www.nuvoton.com

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1 OVERVIEW

NuTiny-EVB-NM1120(NT-NM1120E) is the specific development tool for NuMicro® NM1120 series. Users can use NuTiny-EVB-NM1120 to develop and verify the application program easily.

The ARM® Cortex®-M0 core within NuMicro® NM1120 series can run up to 48 MHz and offers 29.5K-bytes embedded program flash, size configurable Data Flash (shared with program flash), 2K-bytes Flash for the ISP, 1.5K-byte SPROM for security, and 4K-byte SRAM. Plentiful 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 NM1120 series in order to reduce component count, board space and system cost. These useful functions make the NM1120 series powerful for a wide range of motor driver applications.

2 NUTINY-EVB-NM1120 INTRODUCTION

NuTiny-EVB-NM1120 uses the NM1120EC1AE as the target microcontroller. Figure 2-1 is NuTiny-EVB-NM1120 for NM1120 series, the left portion is called NuTiny-EVB-NM1120 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-NM1120 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 NM1120 series features. The NuTiny-EVB-NM1120 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. 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.

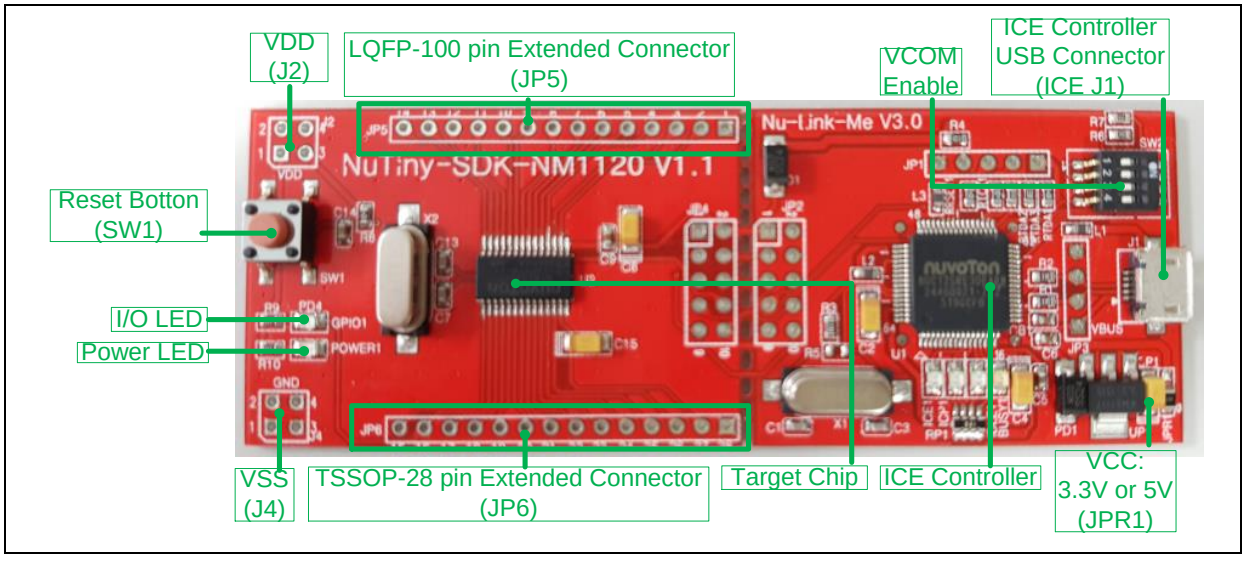


Figure 2-1 NuTiny-EVB-NM1120 (PCB Board)

2.1 NuTiny -EVB-NM1120 Jumper Description

2.1.1 Power Setting

- J1: USB port in Nu-Link-Me
- J2: VDD Voltage connecter in NuTiny-EVB-NM1120

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 2.5 V ~ 5.5 V Input	Voltage by J2 input

X: Unused.

2.1.2 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NM1120) for connecting with Nuvoton ICE adaptor (Nu-Link-Me V3.0)
- JP2: Connector in ICE adaptor (Nu-Link-Me V3.0) for connecting with a target board (for example NuTiny-EVB-NM1120)

2.1.3 USB Connector

- J1: Mini USB Connector in Nu-Link-Me V3.0 connected to a PC USB port

2.1.4 Extended Connector

- JP5, JP6: Show all chip pins in NuTiny-EVB-NM1120

2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-NM1120

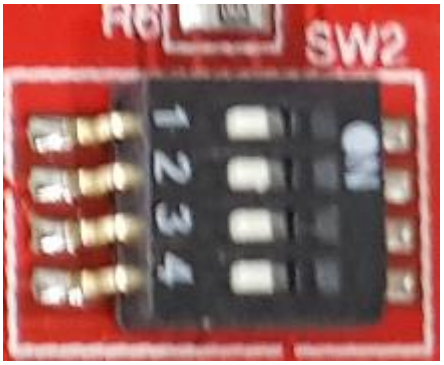
2.1.6 Power Connector

- J2: VDD connector in NuTiny-EVB-NM1120
- J4: VSS connector in NuTiny-EVB-NM1120

2.1.7 VCOM Enable

- **SW3**: VCOM function enable for NuTiny-EVB-NM1120. Switch SW2 on before power on to enable VCOM function. SW2 connects pin 31(P3.0/RXD) and pin 32(P3.1/TXD) in NuTiny-EVB-NM1120 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-NM1120 provides NM1120VE3AE on board and the extended connector for (**JP5**, **JP6**) for TSSOP28-pin. Table 2-1 is the pin assignment for NM1120.

Pin No	Pin Name
01	VDD
02	PD6, UART0_RXD
03	PB0,ADC0_CH0,ACMP0_P0,CAP_P0
04	PB1,ADC0_CH1,ACMP0_P1,ECAP_P1
05	PB2, ADC0_CH2, BPWM_CH1, ACMP0_P2, ECAP_P2
06	PB4,ADC1_CH0,ACMP0_N, TM1
07	PC1, ADC0_CH4, STADC, ACMP0_P3, ACMP1_P1, SPI0_MOSI, SPI1_MISO
08	RESET
09	PB3,ACMP1_N,PGA_I, TM0
10	PC2,ADC1_CH2,BRAKE, CCAP_P1, I2C1_SDA, SPI0_MISO, SPI1_MOSI, UART1_RXD
11	PD2,ICE_DAT,ADC1_CH1,CCAP_P0,I2C0_SDA, SPI0_MOSI, SPI1_MISO, UART0_RXD
12	PD3, BPWM_CH1, UART1_TXD
13	NC
14	NC
15	PC0,ADC0_CH3,BPWM_CH0,ACMP1_P0,I2C1_SCL, SPI0_SS, SPI1_CLK, UART1_TXD
16	PD4, BPWM_CH0, UART1_RXD
17	PD1, ICE_CLK, ACMP1_P2, I2C0_SCL, SPI0_CLK, SPI1_SS, UART0_TXD
18	PC3,ACMP1_O,PGA_O, SPI0_CLK, SPI1_SS
19	PD5, UART0_TXD
20	PA5, XT_OUT, EPWM_CH5, ACMP0_O
21	PA4, XT_IN, EPWM_CH4
22	PA3, EPWM_CH3, I2C0_SCL, SPI0_CLK, SPI1_SS, UART0_TXD
23	PA2, EPWM_CH2, I2C0_SDA, SPI0_MOSI, SPI1_MISO, UART0_RXD
24	PA1, EPWM_CH1, I2C1_SDA, SPI0_MISO, SPI1_MOSI, UART1_RXD
25	PA0, CLKO, EPWM_CH0, I2C1_SCL, SPI0_SS, SPI1_CLK, UART1_TXD
26	PC4, ECAP_P3
27	LDO_CAP
28	VSS

Table 2-1 Pin Assignment for NM1120

3 HOW TO START NUTINY-EVB-NM1120 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.

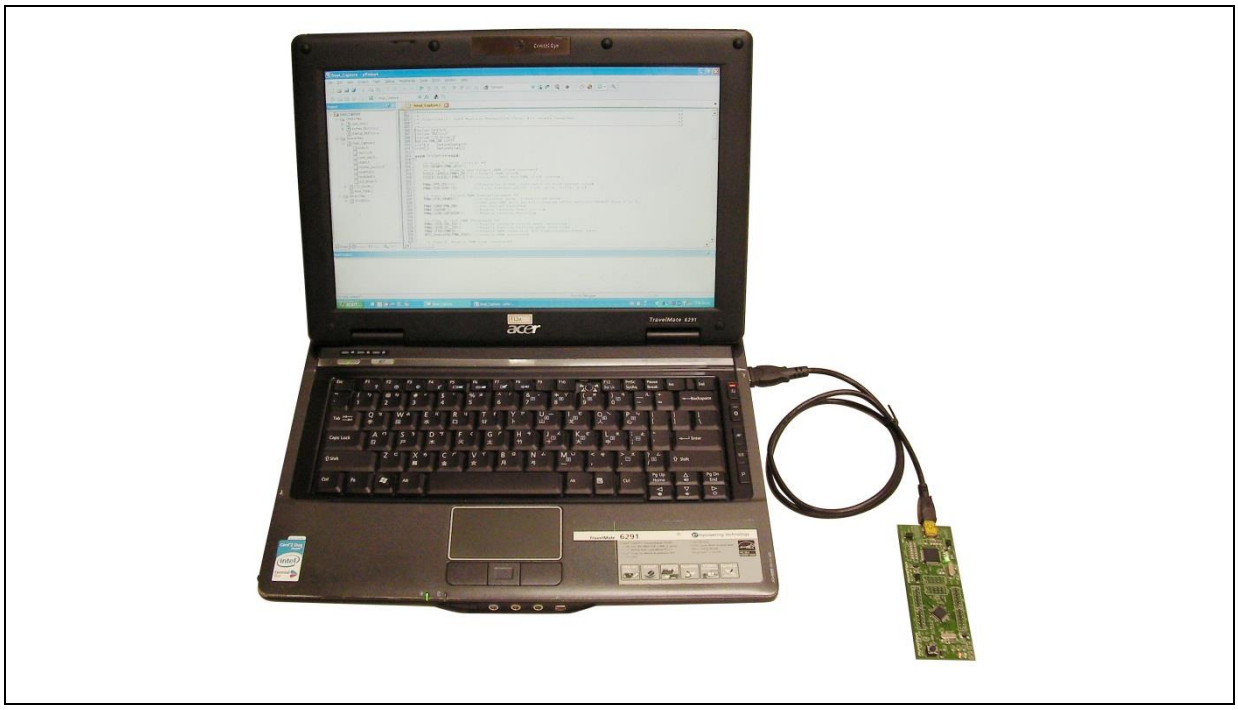


Figure 3-1 NuTiny-EVB-NM1120 Hardware Setup

3.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-EVB-NM1120 board. It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro® website.

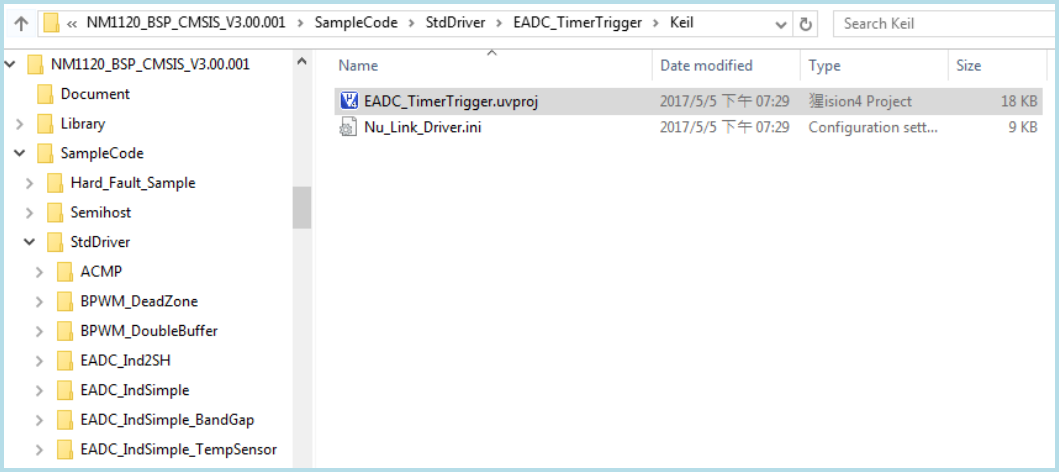
Directory	C:\ Nuvoton\BSP Library\NM1120BSP\SampleCode \StdDriver\SYS\KEIL
Project File	

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-NM1120 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-NM1120 Hardware Setup

4.4 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-EVB-NM1120 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro® website.

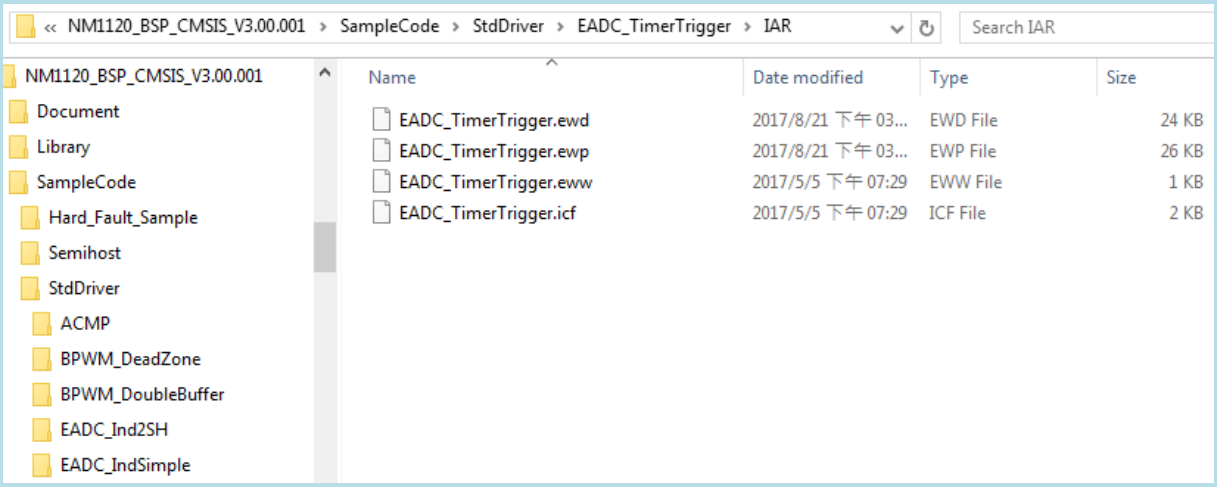
Directory	C:\ Nuvoton\BSP Library\NM1120BSP\SampleCode \StdDriver\SYS\IAR
Project File	

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.

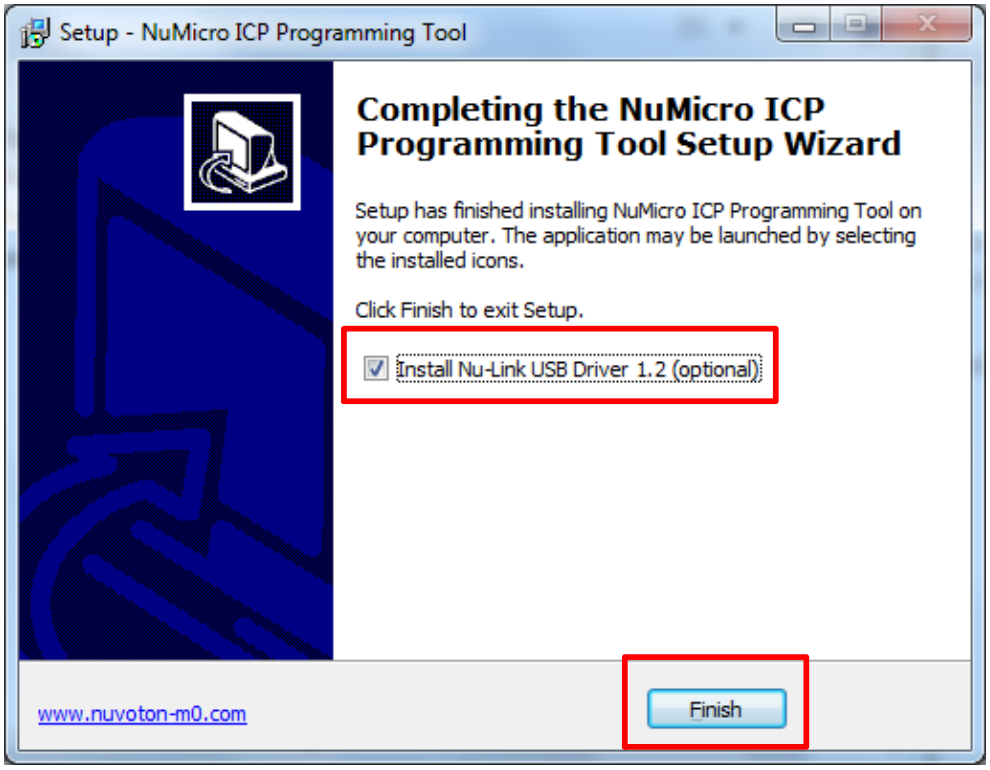


Figure 5-1 Optional Step after ICP Programming Tool Installation

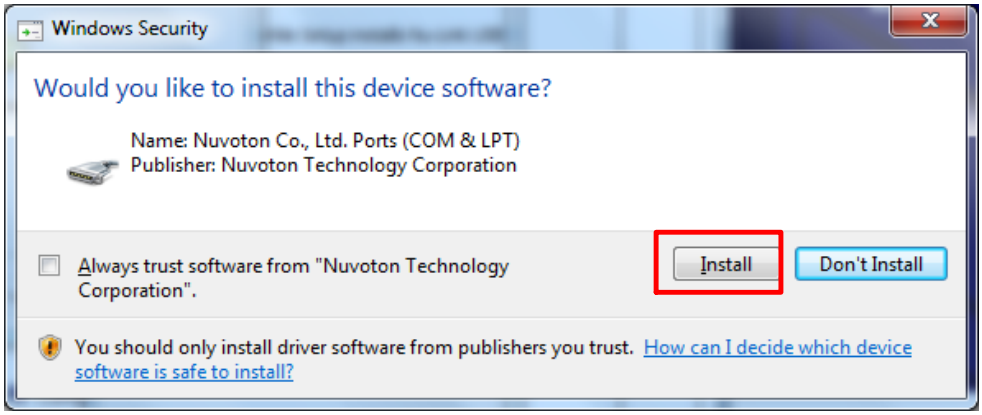


Figure 5-2 Install Nuvoton COM&LPT Driver

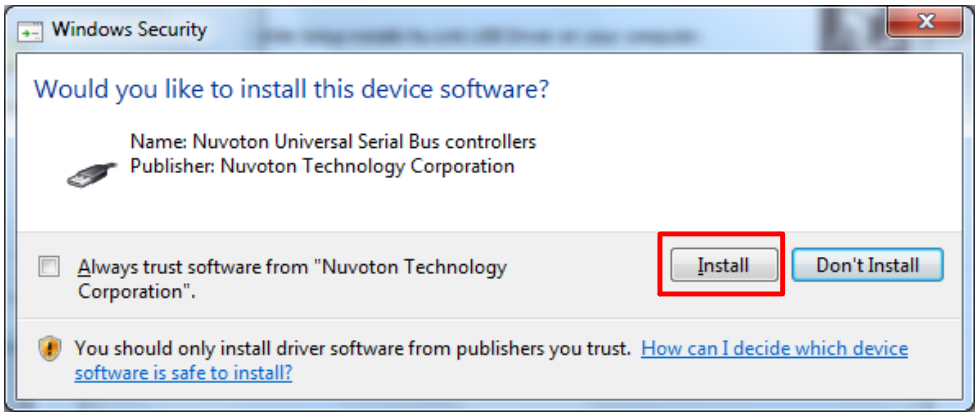


Figure 5-3 Install Nuvoton Universal Serial Bus Controllers

5.2 VCOM Mode Setting on NuTiny-EVB-NM1120

Before the NuTiny-EVB-NM1120 is connected to the PC, please enable SW2 VCOM function by switching on SW2. The NuTiny-EVB-NM1120 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_NM1120.h to check the using UART in DEBUG_PORT, which has to be the same as the using UART in the NuTiny-EVB-NM1120.

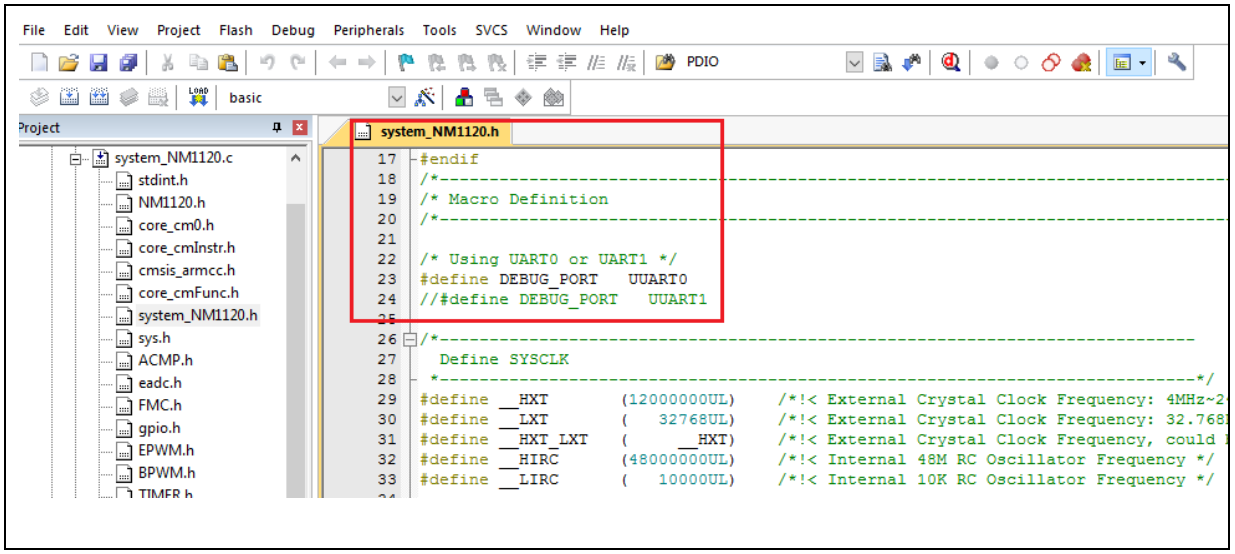


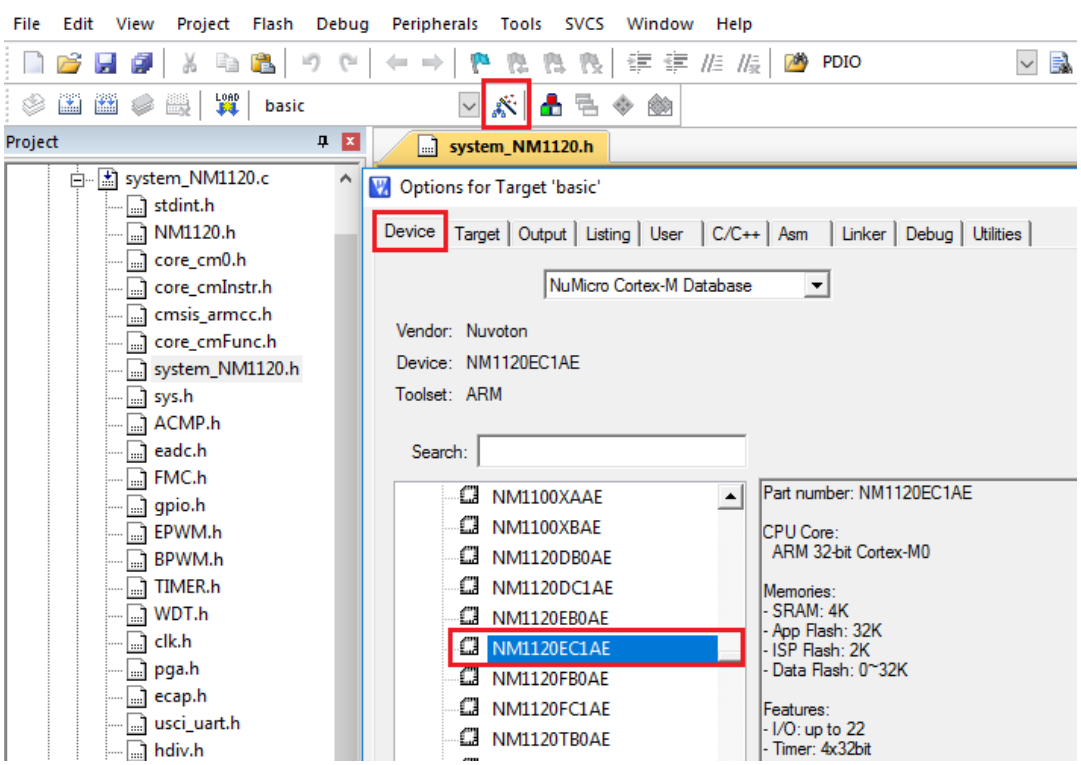
Figure 5-4 The Using UART on Keil µVision® IDE

5.3.2 Check the Target Device and Debug Setting

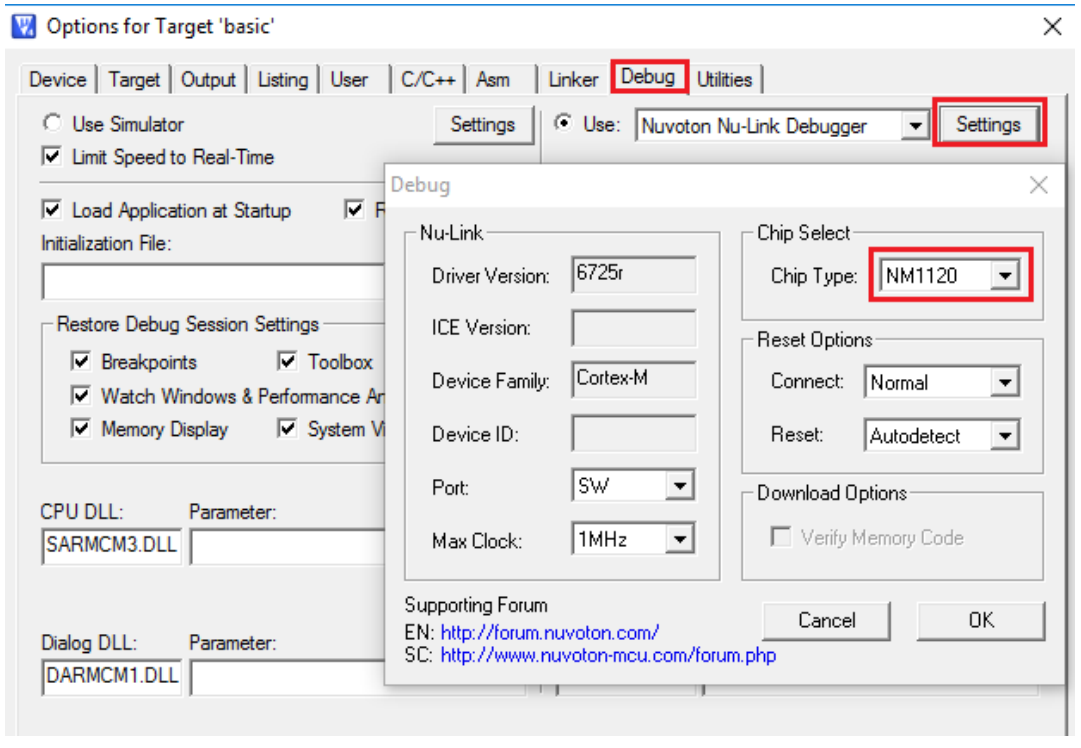
The target device has to be the same as the setting in Debug. Please click “Target Option” to

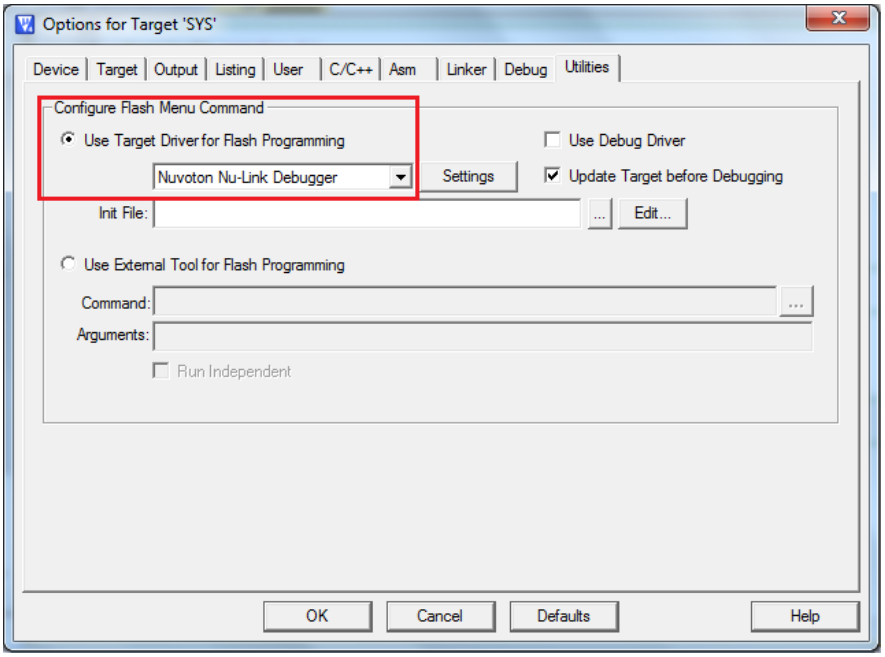
open the Option windows, and find the setting in “Device”, “Debug”, and “Utilities” page. Please follow the steps below to check the setting.

Step 1



Step 2



Step 3	

5.3.3 Build and Download Code to NuTiny-EVB-NM1120

Please build the project and download code to NuTiny-EVB-NM1120.

5.3.4 Open the Serial Port Terminal

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

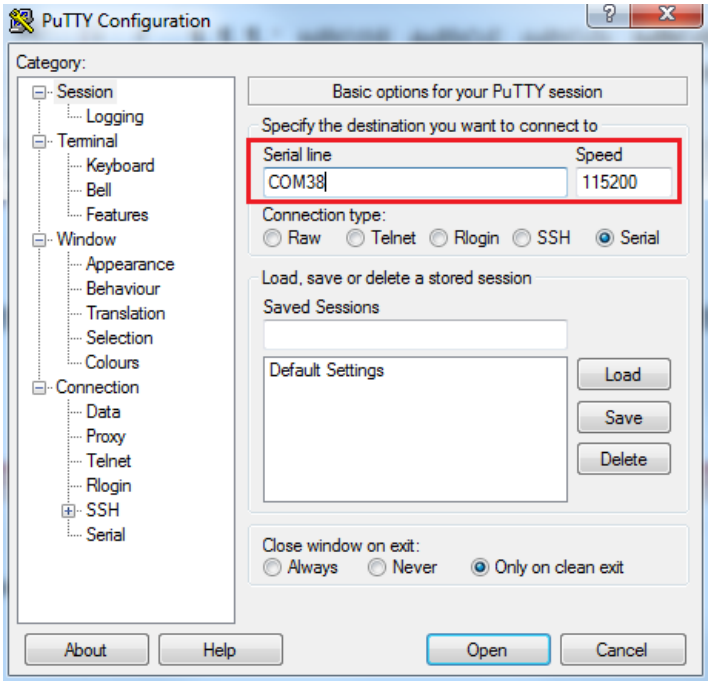


Figure 5-5 Set Baud Rate

5.3.5 Reset Chip

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

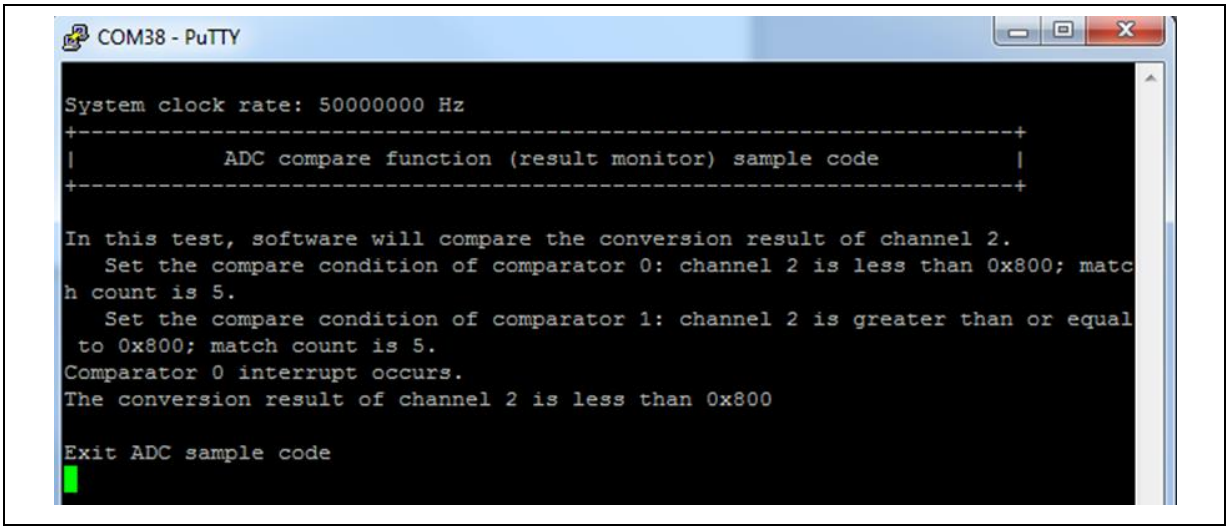


Figure 5-6 Serial Port Terminal Windows

Notice: Please switch SW2 on before the NuTiny-EVB-NM1120 connects to the PC. When the NuTiny-EVB-NM1120 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-NM1120 SCHEMATIC

6.1 NuTiny-EVB-NM1120 PCB Placemen (TOP)

Users can refer to Figure 6-1 for the NuTiny-EVB-NM1120 PCB placements.

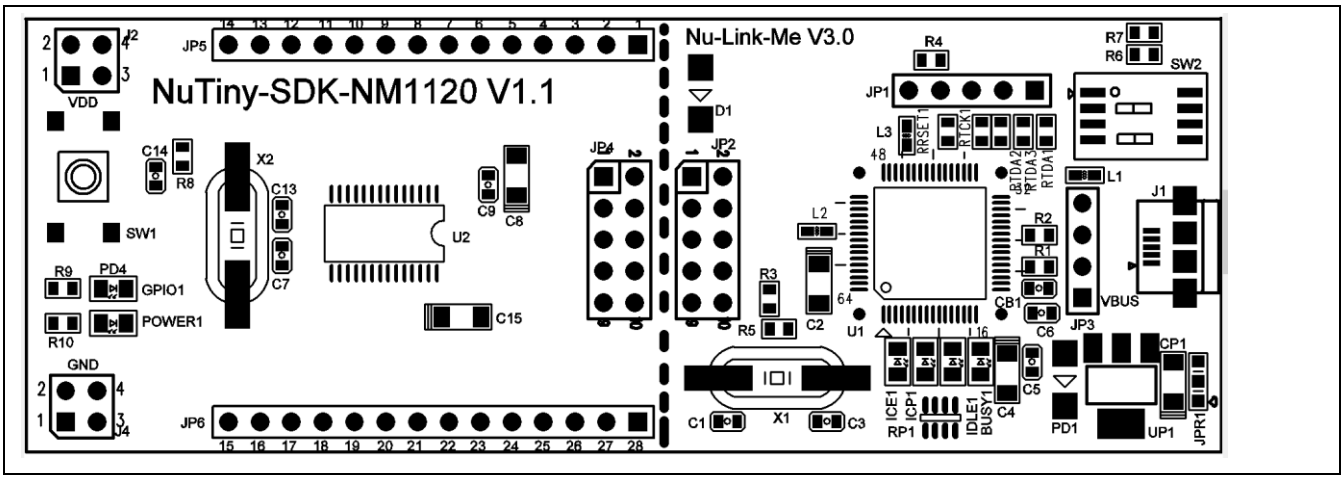


Figure 6-1 NuTiny-EVB-NM1120 PCB Placement

6.2 NuTiny-EVB-NM1120 PCB Placemen (Bottom)

Users can refer to Figure 6-1 for the NuTiny-EVB-NM1120 PCB placements.

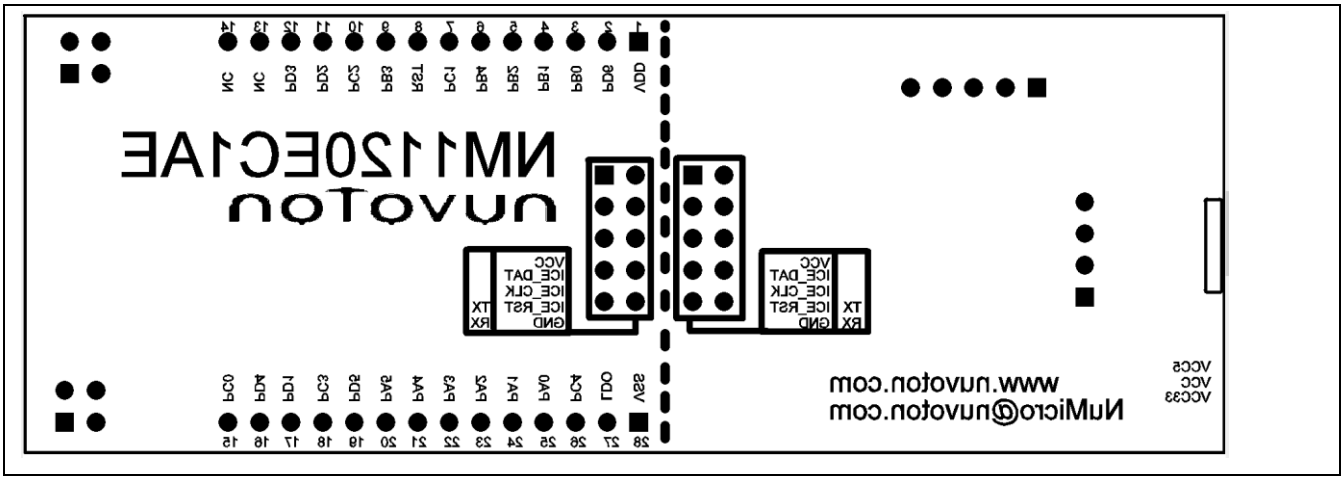
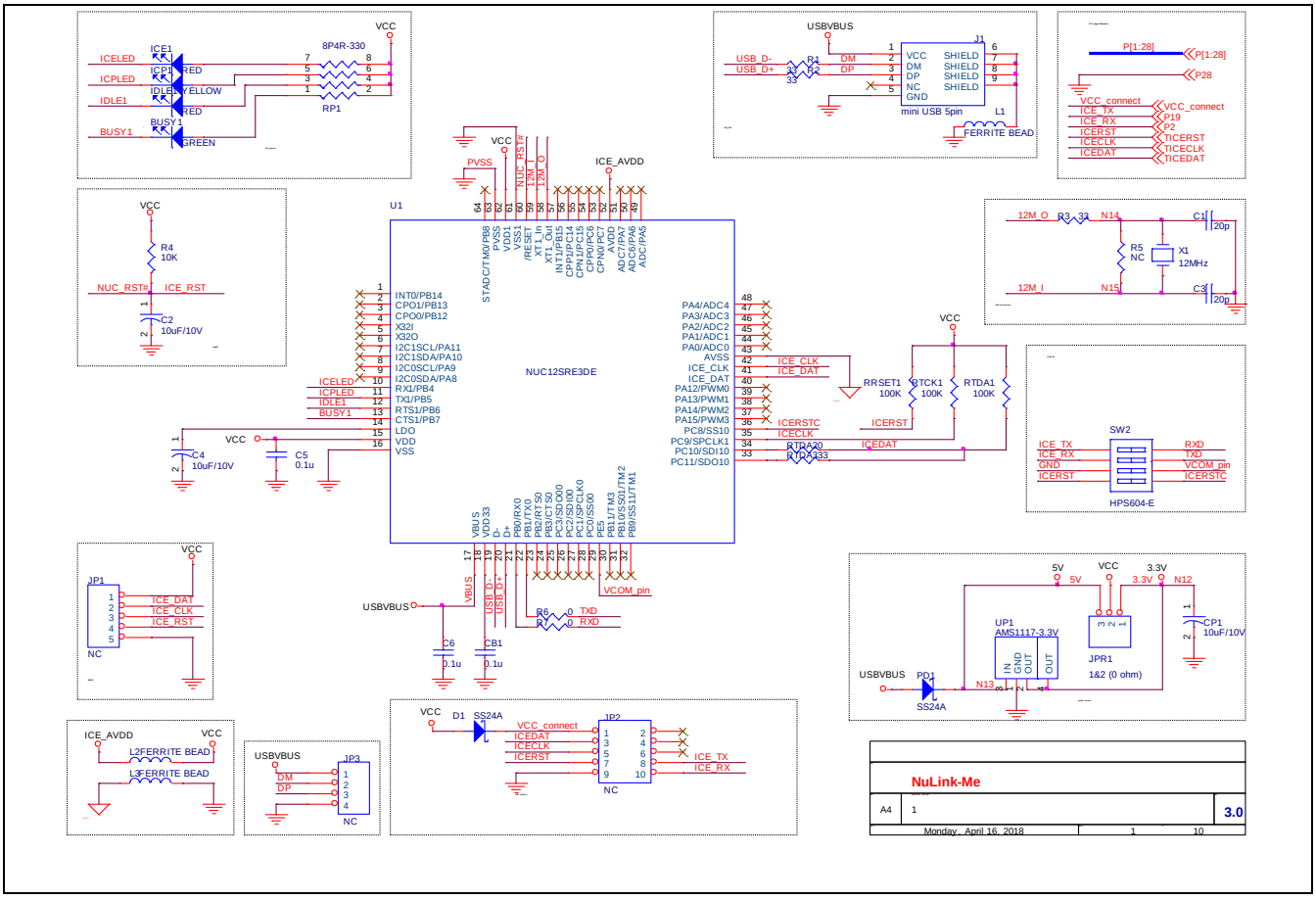
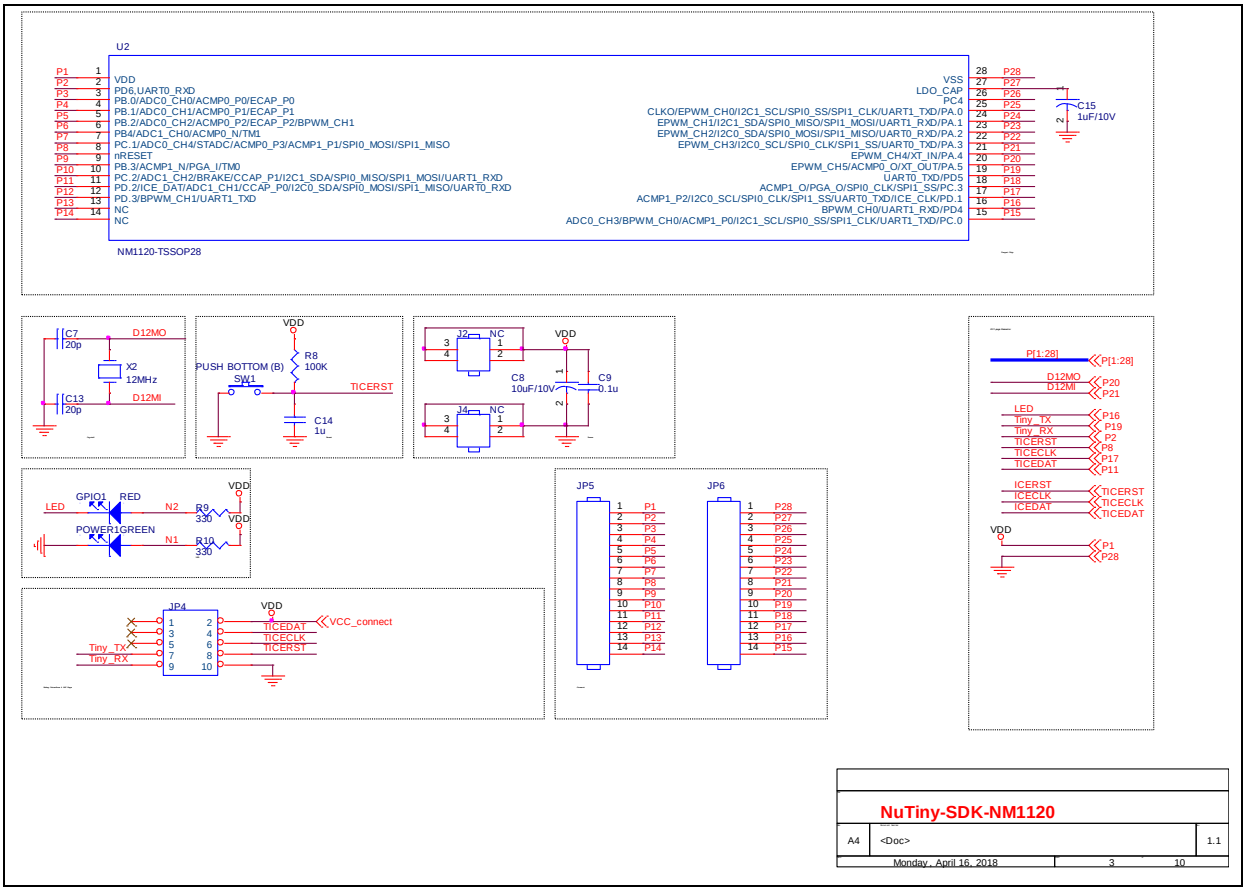


Figure 6-2 NuTiny-EVB-NM1120 PCB Placement

6.3 Nu-Link-Me V3.0 Schematic



6.4 NuTiny-EVB-NM1120 Schematic



7 REVISION HISTORY

Date	Revision	Description
2018.04.16	1.00	1. Initially issued.

Important Notice

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