

NuTiny-SDK-M0519 User Manual

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1 Overview

The NuTiny-SDK-M0519 is a specific development tool for NuMicro™ M0519 series by which users can develop and verify the application program easily. The NuTiny-SDK-M0519 includes two portions: NuTiny-EVB-M0519 (an evaluation board) and Nu-Link-Me V3.0 (Debug Adaptor). With the NuTiny-SDK-M0519, users do not need additional ICE or debug equipment.

2 NuTiny SDK Board Introduction

The following figure shows the NuTiny-SDK-M0519 for M0519 series, in which the left portion is called NuTiny-EVB-M0519 and the right portion is Debug Adaptor called Nu-Link-Me V3.0.

The NuTiny-EVB-M0519 is similar to other development board. Users can use it to develop and verify applications to emulate the real behavior. In fact, the real chip M0519VE3AE is mounted on the board. The NuTiny-EVB-M0519 can be a real system controller to design user target system.

The Nu-Link-Me V3.0 is a Debug Adaptor which connects the USB port of your PC to your target system (via Serial Wired Debug Port) and allows you to program and debug embedded programs on the target hardware. Nu-Link-Me V3.0 is not only supports all function Nu-Link-Me has, but also support VCOM function, which gives users more flexibility when debug. To use the Nu-Link-Me V3.0 Debug adaptor with Keil or IAR, please refer to “Nuvoton NuMicro™ IAR ICE Driver User Manual” or Nuvoton NuMicro™ Keil ICE Driver User Manual” for details. To use Nu-Link-Me 3.0 VCOM function, please refer to Chapter 5.

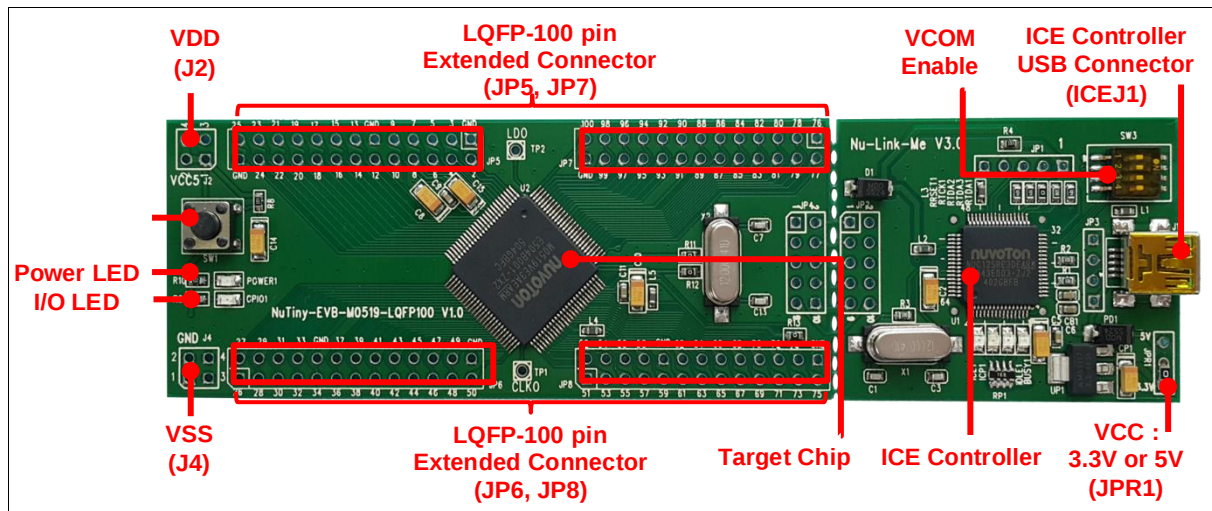


Figure 2-1 NuTiny-EVB-M0519 (Green PCB Board)

2.1 NuTiny-SDK-M0519 Jumper Description

2.1.1 Power Settings

- **J2**: VDD Voltage connector in NuTiny-EVB-M0519
- **J1**: USB port in Nu-Link-Me

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 Connectors

- **JP4**: Connector in target board (NuTiny-EVB-M0519) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- **JP2**: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (e.g. NuTiny-EVB-M0519)

2.1.3 USB Connectors

- **J1**: Mini USB Connector in Nu-Link-Me connected to a PC USB port

2.1.4 Extended Connectors

- **JP5, JP6, JP7** and **JP8**: Show all chip pins in NuTiny-EVB-M0519

2.1.5 Buttons

- **SW1**: Reset button in NuTiny-EVB-M0519

2.1.6 Power Connectors

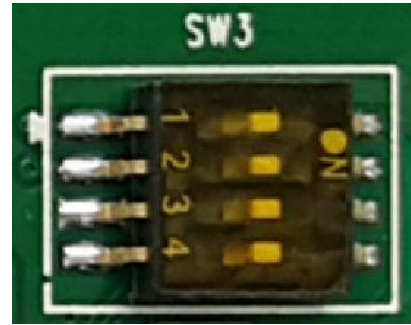
- **J2**: VDD connector in NuTiny-EVB-M0519
- **J4**: VSS connector in NuTiny-EVB-M0519

2.1.7 VCOM Enable

- **SW3**: VCOM function enable for NuTiny-SDK-M0519. Switch SW3 on before power on to enable VCOM function. SW3 connects pin 31(P3.0/RXD) and pin 32(P3.0/TXD) in NuTiny-EVB-M0519 with pin

22(PB.1/TXD) and pin 21(PB.0/RXD) in Nuvoton ICE adaptor (Nu-Link-Me V3.0). SW3 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	GND	Off	On
4	X	X	X



X: Unused.

2.2 Pin Assignment for Extended Connectors

The NuTiny-EVB-M0519 provides the M0519 target chip on board and the extended connectors (**JP5**, **JP6**, **JP7** and **JP8**) for LQFP100-pin. The following table is the pin assignment for M0519.

Pin No	Pin Name	Pin No	Pin Name
01	PVSS	51	P5.3,SPI2_CLK
02	P9.7,SPI1_SS	52	P5.4,SPI2_SS
03	P3.7	53	P5.5,CLKO
04	P3.6	54	P0.3,PWM0_CH3,STADC
05	P3.5,TM1,I2C0_SCL	55	P0.2,PWM0_CH2,ECAP1_IC2
06	P3.4,TM0,I2C0_SDA	56	P0.1,PWM0_CH1,ECAP1_IC1
07	P3.2,INT0	57	P0.0,PWM0_CH0,ECAP1_IC0
08	P1.7,PWM1_BRAKE0	58	P8.7,ACMP0_O
09	LDO_CAP	59	P8.6
10	VDD	60	VSS
11	VSS	61	VDD
12	PA.1,UART1_RXD,I2C0_SCL	62	P6.7,ADC0_CH7
13	PA.0,UART1_TXD,I2C0_SDA	63	P6.6,ADC0_CH6
14	P5.7,PWM0_CH1	64	P6.5,ADC0_CH5,ACMP1_P
15	P5.6,PWM0_CH0	65	P6.4,ADC0_CH4,ACMP1_N
16	P1.6,PWM0_BRAKE0	66	P6.3,ADC0_CH3
17	P1.5,PWM1_CH5	67	P6.2,ADC0_CH2
18	P1.4,PWM1_CH4	68	P6.1,ADC0_CH1
19	P1.3,PWM1_CH3	69	P6.0,ADC0_CH0
20	P1.2,PWM1_CH2	70	P8.2,OP0_O
21	P4.4	71	P8.1,OP0_N
22	P4.5	72	P8.0,OP0_P
23	P4.0,ECAP1_IC0	73	AVSS
24	P4.1,ECAP1_IC1	74	AVDD
25	P4.2,ECAP1_IC2	75	VREF
26	P4.3	76	P7.7,ADC1_CH7
27	P3.3,INT1	77	P7.6,ADC1_CH6
28	P4.6,TM2	78	P7.5,ADC1_CH5,ACMP2_P
29	P1.1,PWM1_CH1	79	P7.4,ADC1_CH4,ACMP2_N
30	P1.0,PWM1_CH0	80	P7.3,ADC1_CH3
31	P3.0,UART0_RXD	81	P7.2,ADC1_CH2
32	P3.1,UART0_TXD,ACMP0_O	82	P7.1,ADC1_CH1
33	P4.7,TM3	83	P7.0,ADC1_CH0
34	VDD	84	P8.4,ACMP0_P
35	VSS	85	P8.3,ACMP0_N

36	P5.0,SPI0_MOSI,UART0_nRTS	86	P9.0,OP1_O
37	P5.1,SPI0_MISO,UART0_nCTS	87	P9.1,OP1_N
38	P2.7,SPI0_CLK,UART1_nRTS	88	P9.2,OP1_P
39	P2.6,SPI0_SS,UART1_nCTS	89	VDD
40	P2.5	90	VSS
41	P2.4	91	P8.5
42	P0.7,STADC	92	P9.3,PWM1_BRAKE1
43	P0.6,PWM0_BRAKE1	93	nRESET
44	P0.5,PWM0_CH5	94	XT1_OUT
45	P0.4,PWM0_CH4	95	XT1_IN
46	P2.3,ECAP0_IC0	96	ICE_DAT
47	P2.2,ECAP0_IC1	97	ICE_CLK
48	P2.1,ECAP0_IC2	98	P9.4,SPI1_CLK
49	P2.0,SPI2_MOSI,ACMP2_O	99	P9.5,SPI1_MISO
50	P5.2,SPI2_MISO,ACMP1_O	100	P9.6,SPI1_MOSI

Table 2-1 Pin Assignment for M0519

2.3 NuTiny-SDK-M0519 PCB Placement

The following figure shows the NuTiny-SDK-M0519 PCB placement.

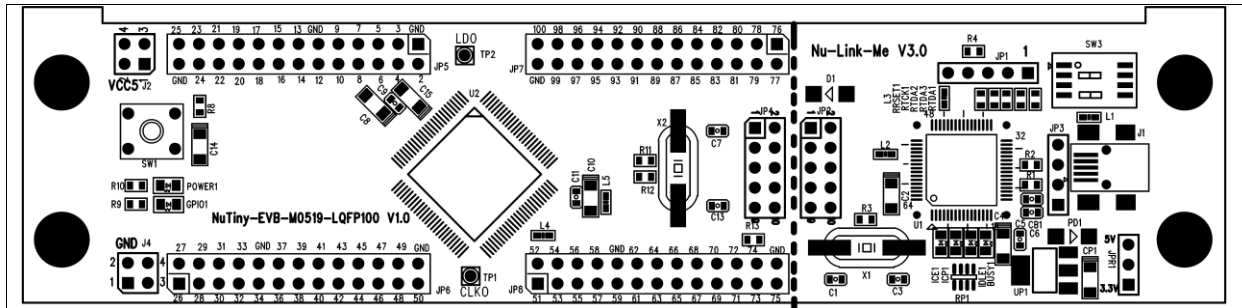


Figure 2-2 NuTiny-SDK-M0519 PCB Placement

3 Starting to Use NuTiny-SDK-M0519 on the Keil μ Vision[®] IDE

3.1 Downloading and Installing Keil μ Vision[®] IDE Software

Please connect to the Keil company website (<http://www.keil.com>) to download the Keil μ Vision[®] IDE and install RVMDK.

3.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton NuMicro[™] website (<http://www.nuvoton.com/NuMicro>) to download the “NuMicro[™] Keil μ Vision[®] IDE driver” file. Please refer to section 6.1 for the detailed download flow. After the Nu-Link driver is 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 in the following figure.



Figure 3-1 NuTiny-SDK-M0519 Hardware Setup

3.4 Example Program

This example demonstrates how to download and debug an application on a NuTiny-SDK-M0519 board.

The example file can be found in the directory list shown in the following figure.

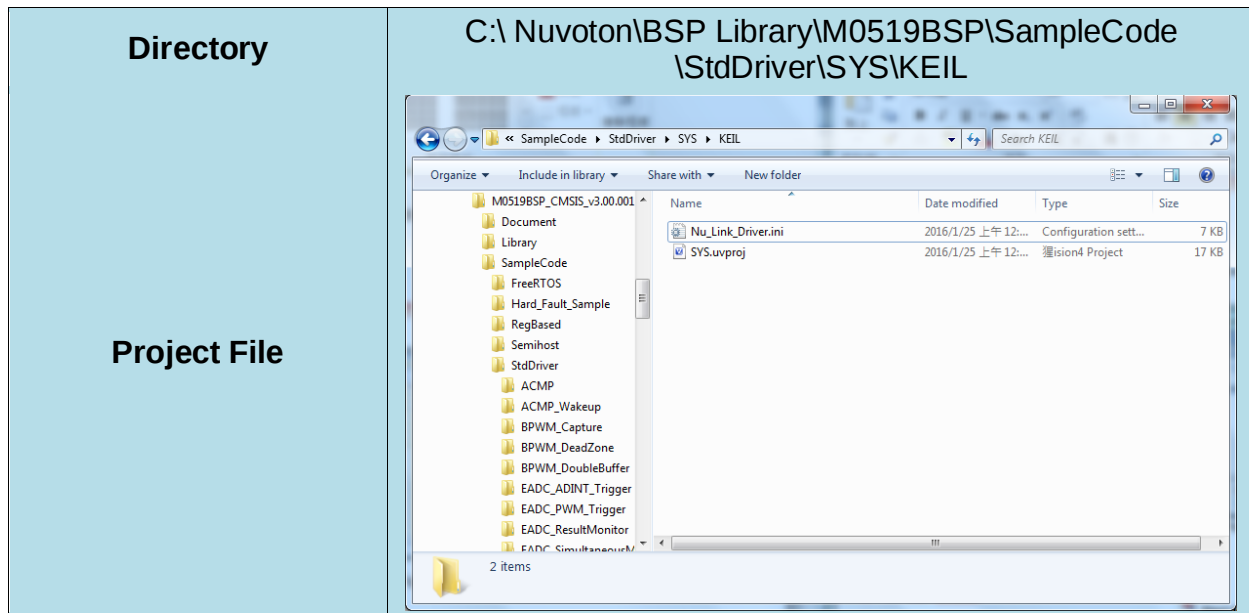


Figure 3-2 Example Directory

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 Starting to Use NuTiny-SDK-M0519 on the IAR Embedded Workbench

4.1 Downloading and Installing IAR Embedded Workbench Software

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

4.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download the “NuMicro™ IAR EWARM Driver” file. Please refer to section 6.2 for the detail download flow. After the Nu-Link driver is downloaded, please unzip the file and execute the “Nu-Link_IAR_Driver.exe” to install the driver.

4.3 Hardware Setup

The hardware setup is shown in the following figure.



Figure 4-1 NuTiny-SDK-M0519 Hardware Setup

4.4 Example Program

This example demonstrates how to download and debug an application on a NuTiny-SDK-M0519 board.

The example file can be found in the directory list shown in the following figure.

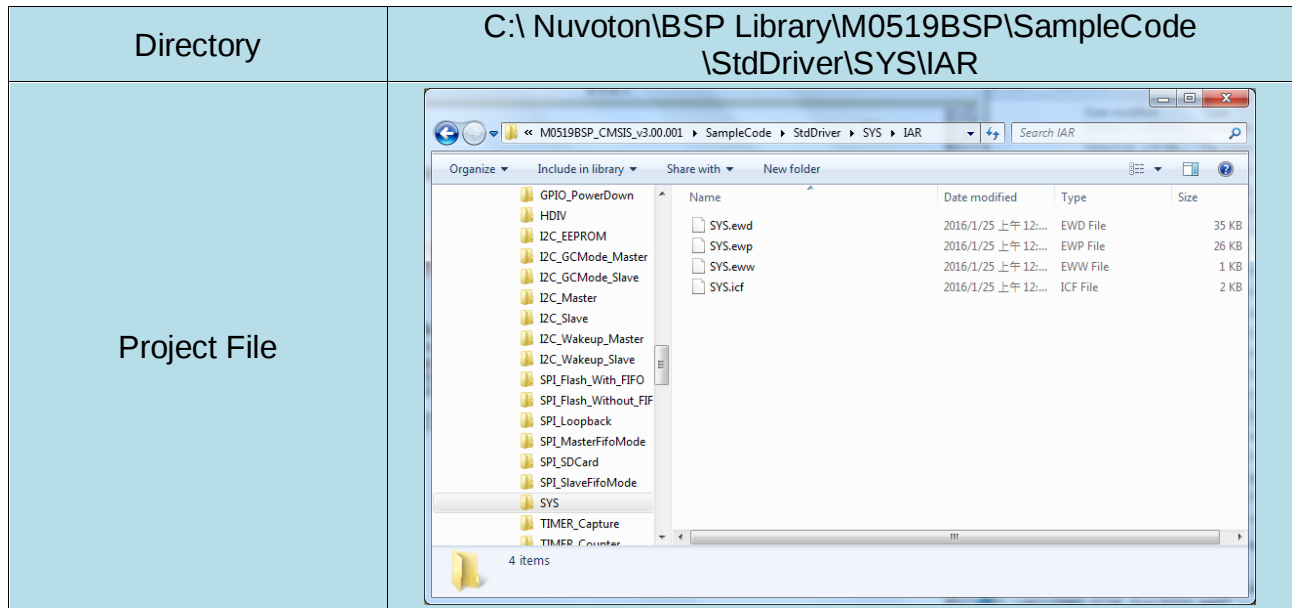


Figure 4-2 Example Directory

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 VCOM Mode Setting on NuTiny-SDK-M0519

Before the NuTiny-SDK-M0519 is connected to the PC, please enable SW3 VCOM function by switching on SW3. The NuTiny-EVB-M0519 transmits through UART0 to VCOM to send out data. Switch SW3 off when using UART0 function without VCOM function.

5.2 Setup on the Development Tool

The example is demonstrated on the Keil μ Vision[®] IDE.

5.2.1 Check the Using UART on the Keil μ Vision[®] IDE

Open the project and find system_M0519.h to check the using UART in DEBUG_PORT, which has to be the same as the using UART in the NuTiny-EVB-M0519.

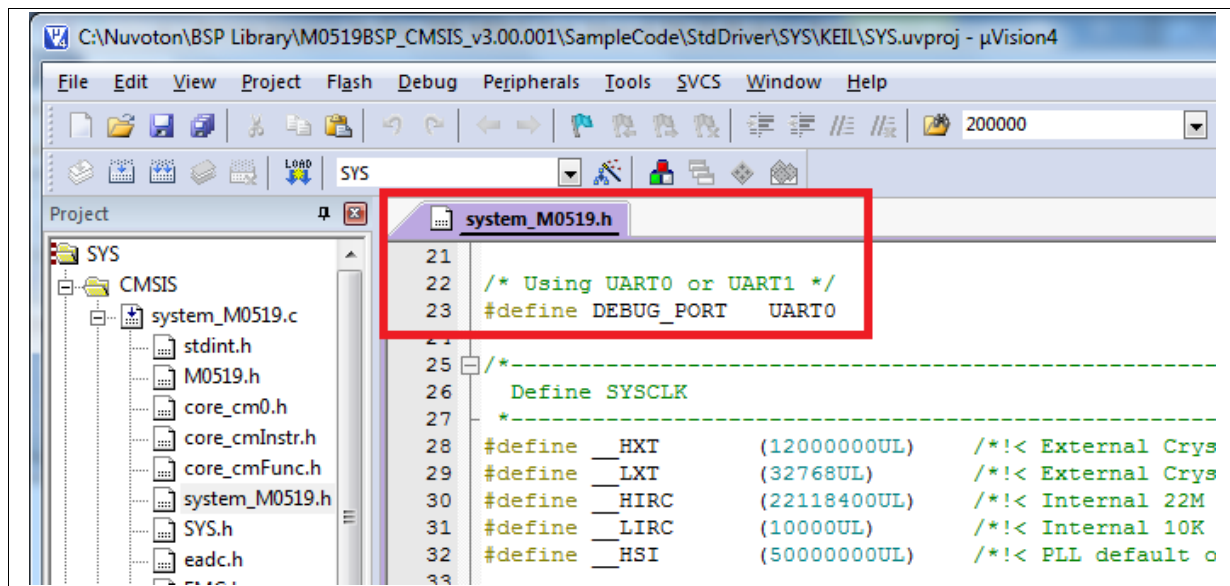
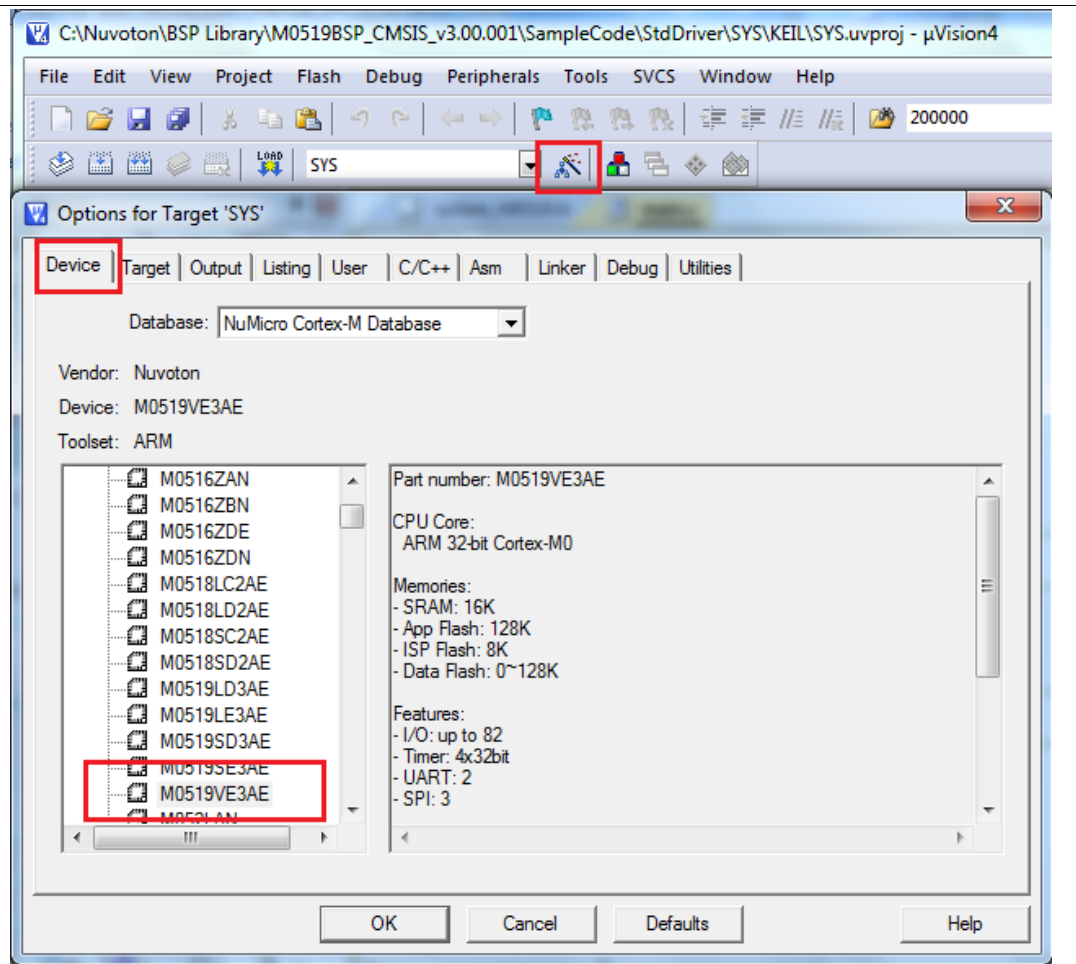


Figure 5-1 The Using UART on Keil μ Vision[®] IDE

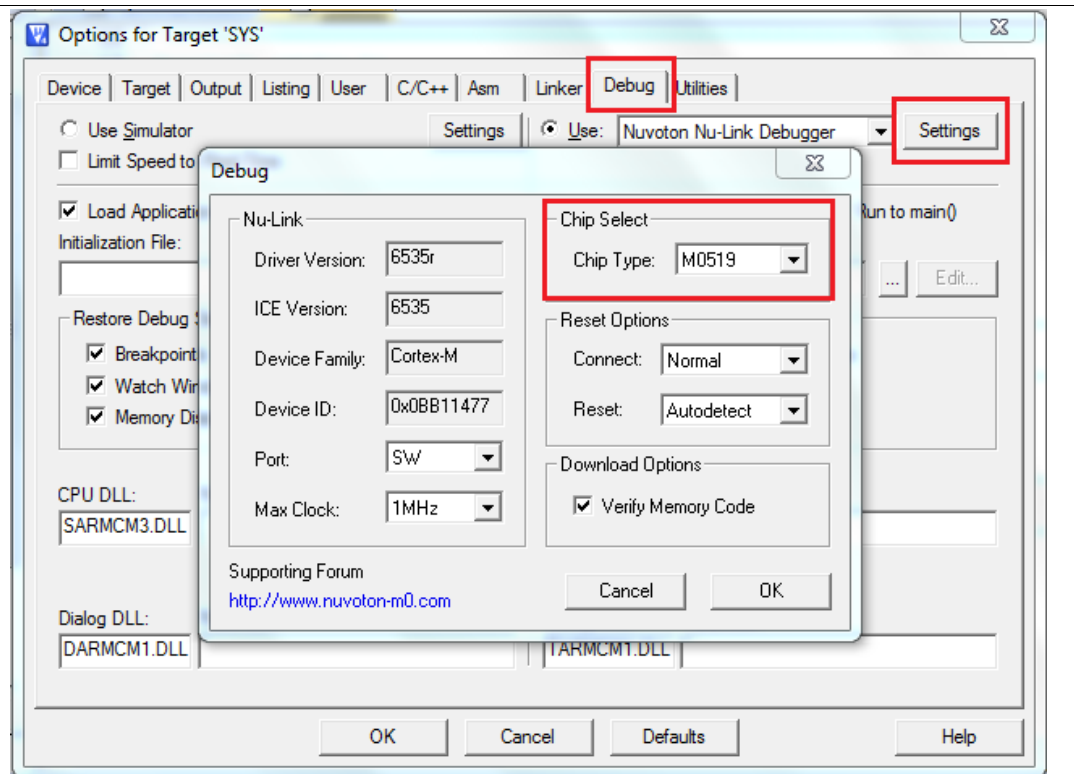
5.2.2 Check the Target Device and Debug Setting

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.

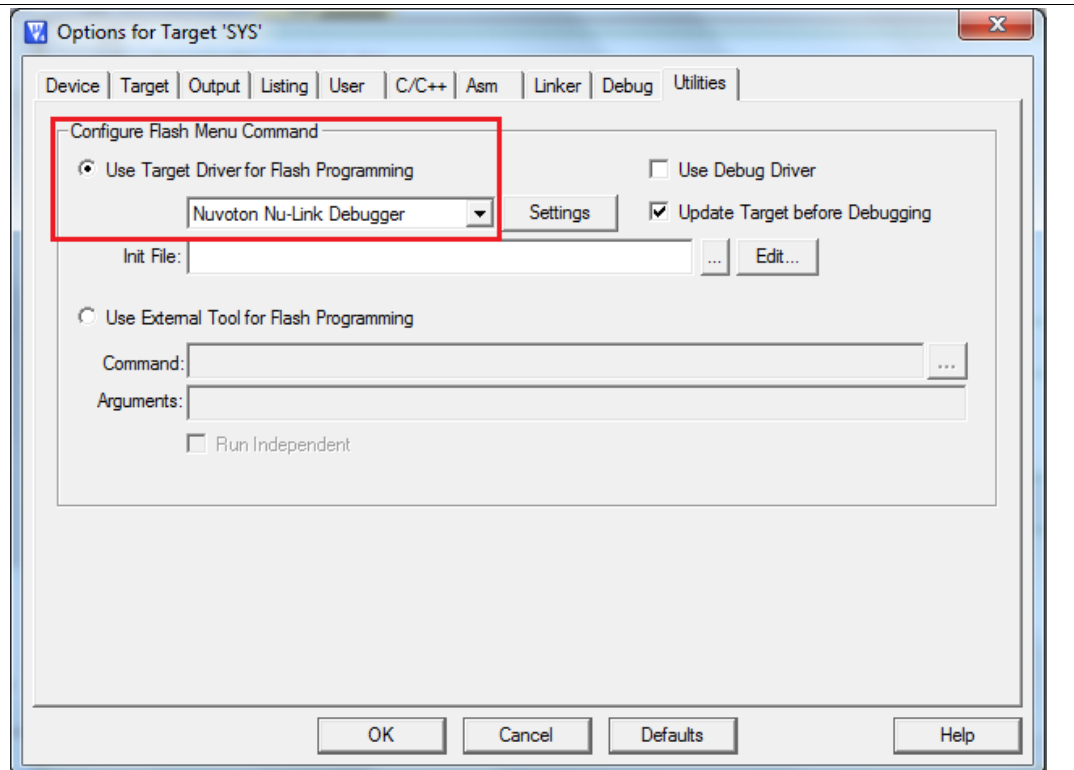
Step 1



Step 2



Step 3



5.2.3 Build and Download Code to NuTiny-SDK-M0519

Please build the project and download code to NuTiny-SDK-M0519.

5.2.4 Open the Serial Port Terminal

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

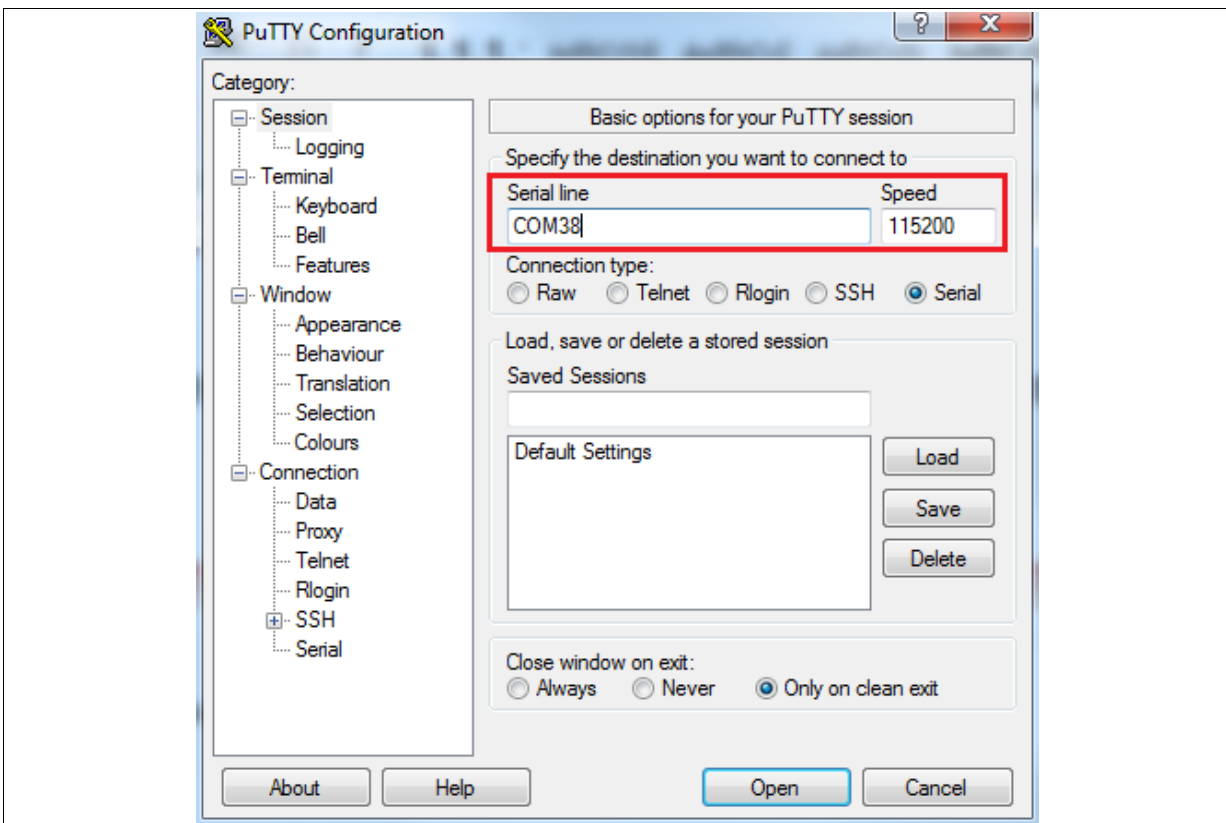
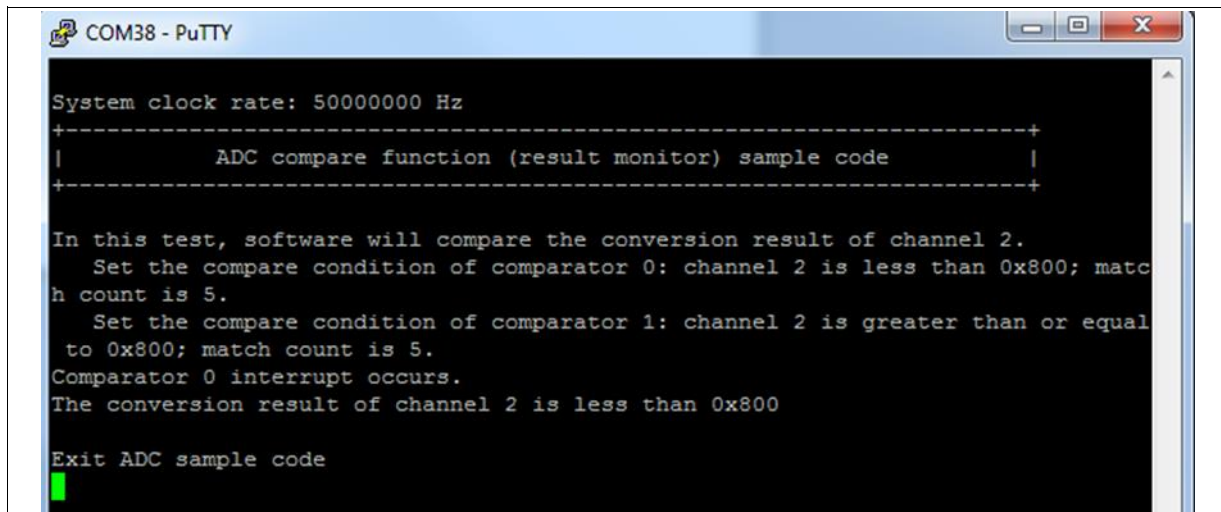


Figure 5-2 Set Baud Rate

5.2.5 Reset Chip

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



```
COM38 - PuTTY

System clock rate: 50000000 Hz
+-----+
|          ADC compare function (result monitor) sample code          |
+-----+

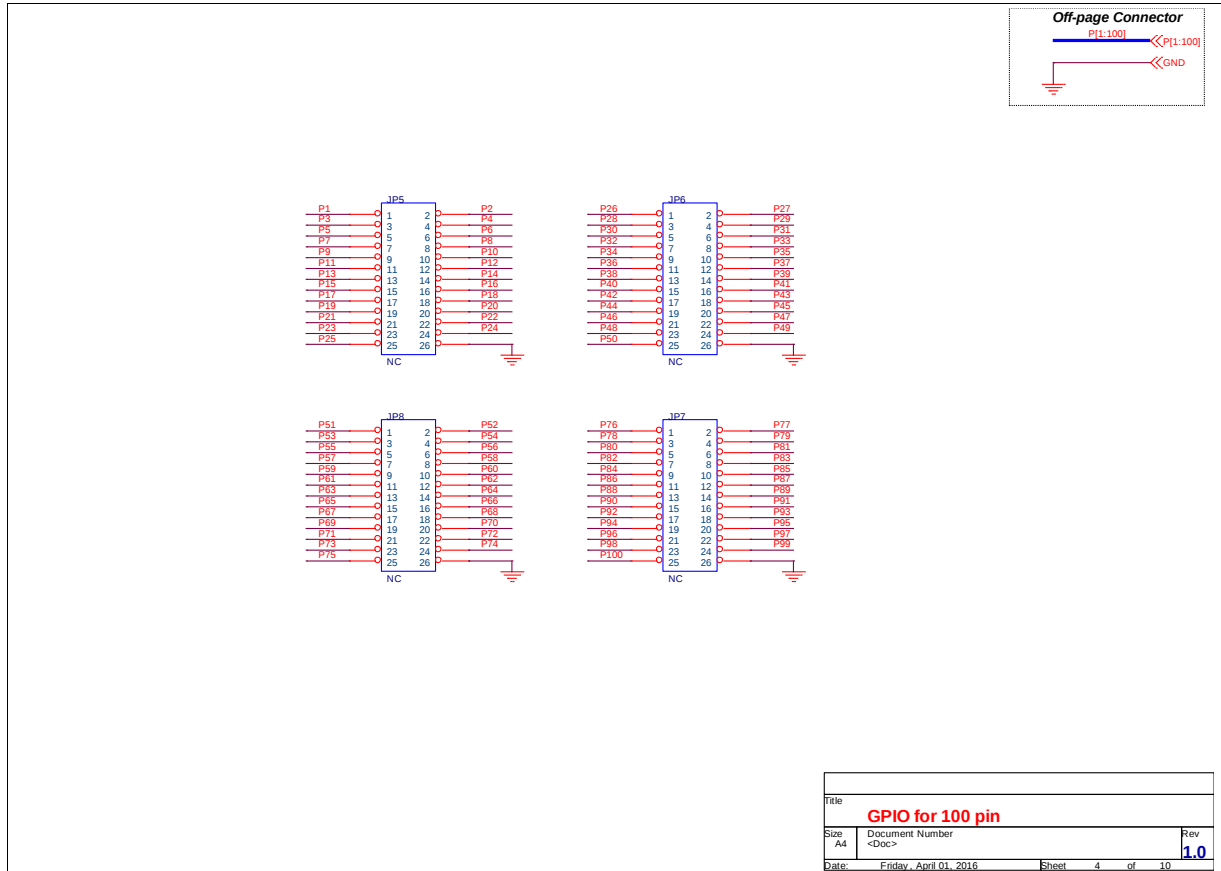
In this test, software will compare the conversion result of channel 2.
  Set the compare condition of comparator 0: channel 2 is less than 0x800; match count is 5.
  Set the compare condition of comparator 1: channel 2 is greater than or equal to 0x800; match count is 5.
  Comparator 0 interrupt occurs.
  The conversion result of channel 2 is less than 0x800

Exit ADC sample code
█
```

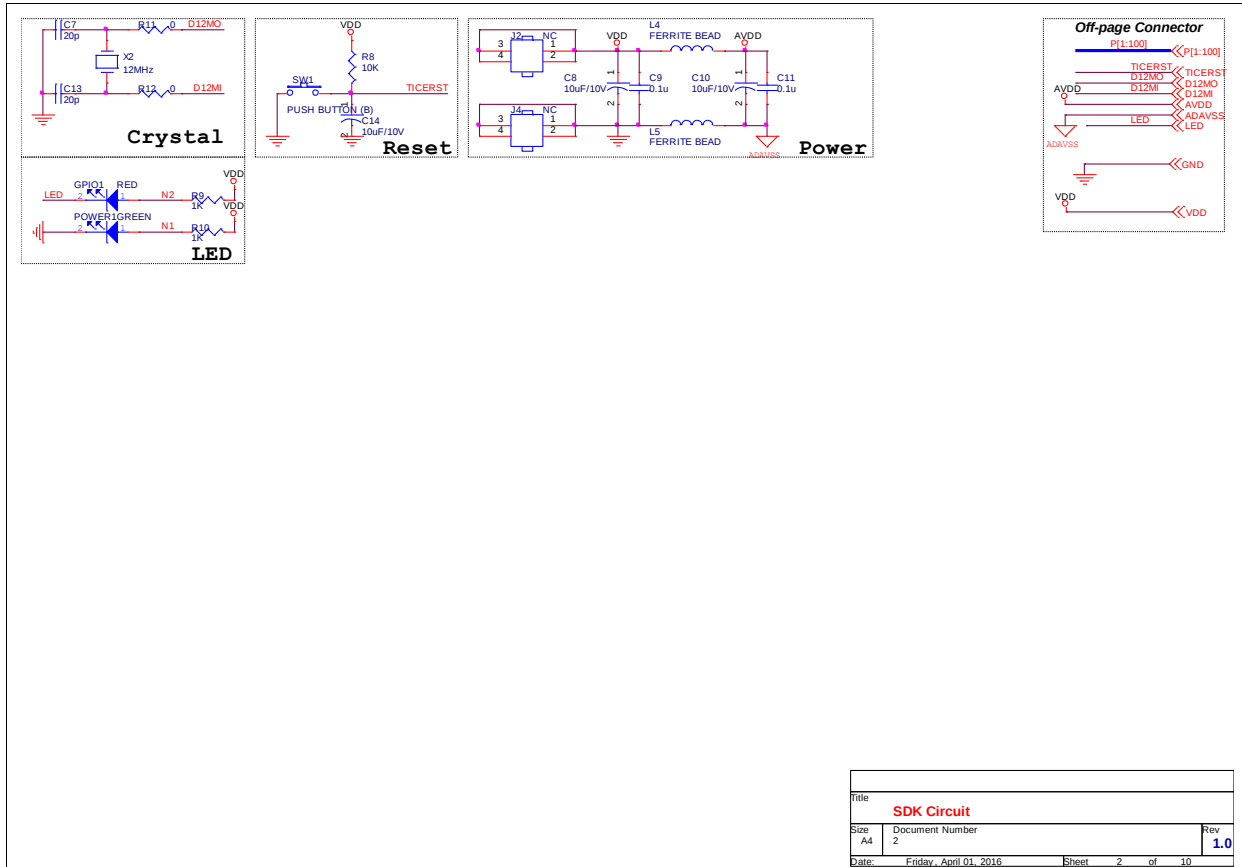
Figure 5-3 Serial Port Terminal Windows

Notice: Please switch SW3 on before the NuTiny-SDK-M0519 connects to the PC. When the NuTiny-SDK-M0519 connects to the PC with SW3 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 SW3 after the connection.

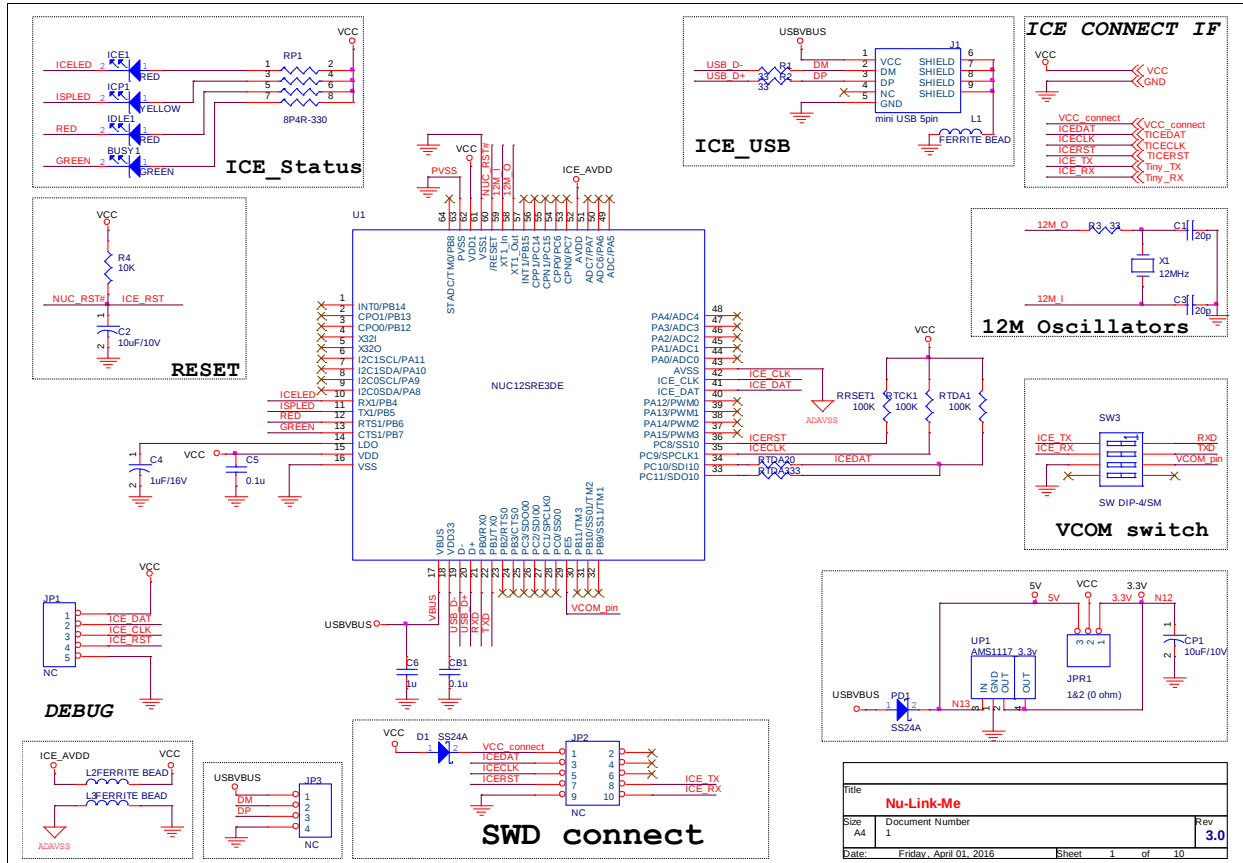
6.2 GPIO for 100 pin Schematic



6.3 SDK Circuit Schematic



6.4 Nu-Link-Me Schematic



7 Downloading NuMicro™ Related Files from Nuvoton Website

7.1 Downloading NuMicro™ Keil µVision® IDE Driver

Step1 Visit the Nuvoton NuMicro™ website: <http://www.nuvoton.com/NuMicro>.

Step2

2-1. Move to "Support"

2-2. Click here to enter Tool & Software

Step3

Click here to enter Software download page

Step4	Programmer Software Tools Package			
	File name	Description	Version	Date
	 ICP Programming Tool V1.27.6340.zip  Revision History	NuMicro ICP tool & user manual	V1.27.6340	2014-10-30
	 ISP Programming Tool V1.44.zip  Revision History	NuMicro ISP Programming Tool & user manual	V1.44	2014-09-01
	 NuGang Programmer V6.23.zip  Revision History	NuMicro NuGang Programmer V6.23 user manual	V6.23	2014-12-17
	Nu-Link Driver			
	File name	Description	Version	Date
	 Nu-Link Driver for Keil RVMDK V1.27.6340.zip  Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.27.6340	2014-10-30
Step5	 Nu-Link Driver for IAR EWARM V1.27.6340.zip  Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.27.6340	2014-10-30
	Download the NuMicro™ Keil μVision® IDE driver.			

Click here to download the file.

7.2 Downloading NuMicro™ IAR EWARM Driver

Step1 Visit the Nuvoton NuMicro™ website: <http://www.nuvoton.com/NuMicro>.

Step2

2-1. Move to "Support"

2-2. Click here to enter Tool & Software

Step3

Click here to enter Software download page

Step4	Programmer Software Tools Package			
	File name	Description	Version	Date
	 ICP Programming Tool V1.27.6340.zip  Revision History	NuMicro ICP tool & user manual	V1.27.6340	2014-10-30
	 ISP Programming Tool V1.44.zip  Revision History	NuMicro ISP Programming Tool & user manual	V1.44	2014-09-01
	 NuGang Programmer V6.23.zip  Revision History	NuGang Programmer software & user manual	V6.23	2014-12-17
	Nu-Link Driver			
	File name	Description	Version	Date
	 Nu-Link Driver for Keil RVMDK V1.27.6340.zip  Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.27.6340	2014-10-30
	 Nu-Link Driver for IAR EWARM V1.27.6340.zip  Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.27.6340	2014-10-30
Step5	Download the NuMicro™ IAR EWARM driver.			

Click here to download the file.

7.3 Downloading NuMicro™ M0519 Series BSP Software Library

Step1 Visit the Nuvoton NuMicro™ website: <http://www.nuvoton.com/NuMicro>.

Step2

2-1. Move to "Support"

2-2. Click here to enter Tool & Software

Step3

Click here to enter Software download page

Step4 Download the NuMicro™ M0519 Series CMSIS BSP.

8 Revision History

Revision	Date	Description
1.00	Apr. 01, 2016	Preliminary version

Important Notice

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