

**ARM<sup>®</sup> Cortex<sup>®</sup>-M0**  
**32-bit Microcontroller**

**NuMicro<sup>®</sup> Family**  
**NuTiny-SDK-NUC121**  
**NuTiny-SDK-NUC125**  
**User Manual**

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## 1 OVERVIEW

NuTiny-SDK-NUC121 and NuTiny-SDK-NUC125 are the specific development tools for NuMicro<sup>®</sup> NUC121/125 series. The NuTiny-SDK-NUC121 and NuTiny-SDK-NUC125 can be used to develop and verify the application program easily.

### NuTiny-SDK-NUC121

The NuTiny-SDK-NUC121 includes the two portions. One is NuTiny-EVB-NUC121 and the other is Nu-Link-Me. NuTiny-EVB-NUC121 is the evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, user does not need other additional ICE or debug equipment.

### NuTiny-SDK-NUC125

The NuTiny-SDK-NUC125 includes the two portions. One is NuTiny-EVB-NUC125 and the other is Nu-Link-Me. NuTiny-EVB-NUC125 is the evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, user does not need other additional ICE or debug equipment.

### Difference Between NuTiny-SDK-NUC121 and NuTiny-SDK-NUC125

The NuTiny-SDK-NUC125 has an independent power input pin  $V_{DDIO}$ . The  $V_{DDIO}$  supports GPIO (PA.10, PA.11, PB.4 ~ PB.7, PB.12 ~ PB.14 and PD.8 ~ 11) which belongs to  $V_{DDIO}$  power domain to work under another operating voltage from 1.8V to 5.5V. The  $V_{DDIO}$  is defaulted to being connected with  $V_{DD}$ . User can remove resistor R17 and supply external power for  $V_{DDIO}$ .

## 1.1 General Description

The NuMicro<sup>®</sup> NUC121/125 series is a 32-bit Cortex<sup>®</sup>-M0 microcontroller with USB 2.0 Full-speed device, a 12-bit ADC and 4 sets of 6-channel BPWM. The NUC121/125 series provides the high 50 MHz operating speed, 8 Kbytes SRAM, 8 USB endpoints and 24 channels of BPWM, which make it powerful in USB communication and data processing. The NUC121/125 series is ideal for industrial control, consumer electronics, and communication system applications such as printers, touch panel, gaming keyboard, gaming joystick, USB audio, PC peripherals, and alarm systems.

The NUC121/125 series runs up to 50 MHz and supports 32-bit multiplier, structure NVIC (Nested Vector Interrupt Control), dual-channel APB and PDMA (Peripheral Direct Memory Access) with CRC function. Besides, the NUC121/125 series is equipped with 32 Kbytes Flash memory, 8 Kbytes SRAM, and 4 Kbytes loader ROM for the ISP. It operates at a wide voltage range of 2.5V ~ 5.5V and temperature range of -40°C ~ +105°C. It is also equipped with plenty of peripheral devices, such as 8-channel 12-bit ADC, USCI, UART, SPI, I<sup>2</sup>C, I<sup>2</sup>S, USB 2.0 FS device, and offers low-voltage reset and Brown-out detection, PWM (Pulse-width Modulation), capture and compare features, four sets of 32-bit timers, Watchdog Timer, and internal RC oscillator. All these peripherals have been incorporated into the NUC121/125 series to reduce component count, board space and system cost.

Additionally, the NUC121/125 series is equipped with ISP (In-System Programming), IAP (In-Application-Programming) and ICP (In-Circuit Programming) functions, which allows the user to update the program under software control through the on-chip connectivity interface, such as SWD, UART and USB. Also all series support SPROM. Moreover, the NUC125 support Voltage Adjustable Interface with individual I/O (1.8V-5.5V) for saving additional cost on adjusting the interface voltage difference of peripheral components.

## 1.2 Key Features Support Table

\* USCI can be set to UART, I<sup>2</sup>C or SPI.

Product Line	USB D	USCI	UART	I <sup>2</sup> C	SPI/ I <sup>2</sup> S	Timer	BPWM	ADC
NUC121	1	1	1	2	1	4	24	12
NUC125	1	1	1	2	1	4	23	11

Table 1.2-1 Key Features Support Table

The NuMicro<sup>®</sup> NUC121/125 series is suitable for a wide range of applications such as:

- USB Keyboard / Mouse
- Gaming - Joystick
- Industrial Automation
- Home Automation
- VR peripheral application
- USB audio
- Alarm system

## 2 INTRODUCTION TO NUTINY-SDK-NUC121

NuTiny-SDK-NUC121 uses the NUC121SC2AE as the target microcontroller. Figure 2.1-1 shows the NuTiny-SDK-NUC121 for the NUC121 series, wherein the left portion is called NuTiny-EVB-NUC121 and the right portion is a Debug Adaptor called Nu-Link-Me.

### NuTiny-EVB-NUC121

The NuTiny-EVB-NUC121 is similar to other development boards. It can be used to develop and verify applications to emulate the real behavior. The on-board chip covers NUC121 series features. The NuTiny-EVB-NUC121 can be a real system controller to design user's target systems.

### Nu-Link-Me

- Debug Adaptor

The Nu-Link-Me Debug Adaptor connects your PC's USB port to the user's target system (via Serial Wired Debug Port) and allows user 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 user installs each driver.

- Virtual COM Port

The Nu-Link-Me also supports virtual COM port function. The Nu-Link-Me can be used as a USB to UART virtual COM port, which connects to on-board NUC121SC2AE UART0. Virtual COM port function is defaulted to off. User can turn on all of the positions of switch to enable it.

### 2.1 NuTiny-SDK-NUC121 (PCB Board)

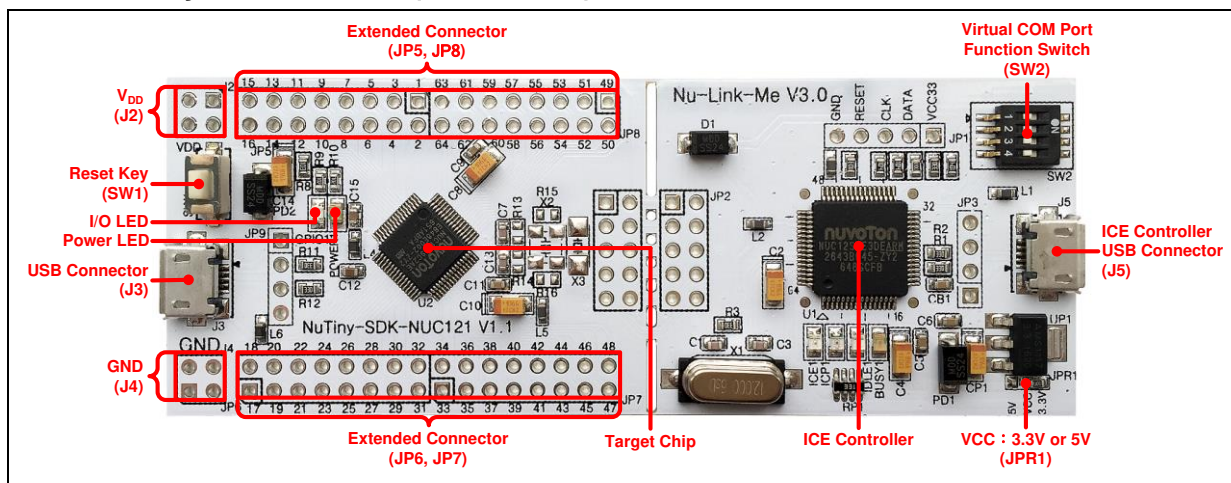


Figure 2.1-1 NuTiny-SDK-NUC121 (PCB Board)

### 2.2 Virtual COM Port Switch Description

The switch in Nu-Link-Me, SW2, determines that the virtual COM port function is enabled or disabled. When user turns on all of the positions of switch, the virtual COM port function will be enabled. By using virtual COM port function, user can access the USB device in the same way as it would access a standard COM port to NUC121SC2AE UART0. To use this function, user needs to install "VCOM Driver" at first. User can get "VCOM Driver" from NuMicroDVD in the folder "Software Utilities".

## 2.3 NuTiny-SDK-NUC121 Power Setting and Connector

### 2.3.1 Power Setting

- J2:  $V_{DD}$  Voltage connector in NuTiny-EVB-NUC121
- J3: USB port in NuTiny-EVB-NUC121
- J5: USB port in Nu-Link-Me

Model	JPR1	J2 $V_{DD}$	J3 USB Port	J5 ICE USB Port	MCU Voltage
Model 1	Select 3.3V (default)	DC 3.3V Output	X	Connect to PC	DC 3.3V
Model 2	Select 5V	DC 5V Output	X	Connect to PC	DC 5V
Model 3	Select 3.3V or 5V	DC 5V Output	Connect to PC	Connect to PC	DC 5V
Model 4*	X	DC 5V Output	Connect to PC	X	DC 5V
Model 5	Select 3.3V or 5V	DC 2.5V ~ 5.5V Input	X	Connect to PC	Voltage by J2 input
Model 6*	X	DC 2.5V ~ 5.5V Input	X	X	Voltage by J2 input

X: Unused

**Note** \*: Need to separate NuTiny-EVB-NUC121 and Nu-Link-Me.

### 2.3.2 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NUC121) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- JP2: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (NuTiny-EVB-NUC121)

### 2.3.3 USB Connector

- J3: Micro USB Connector in NuTiny-EVB-NUC121 for application use
- J5: Micro USB Connector in Nu-Link-Me connected to a PC USB port

### 2.3.4 Extended Connector

- JP5, JP6, JP7 and JP8: Show all chip pins in NuTiny-EVB-NUC121

### 2.3.5 Reset Button

- SW1: Reset button in NuTiny-EVB-NUC121

### 2.3.6 Power Connector

- J2:  $V_{DD}$  connector in NuTiny-EVB-NUC121
- J4: GND connector in NuTiny-EVB-NUC121

### 2.3.7 Virtual COM Port Function Switch

- SW2: Switch ON/OFF to enable or disable Nu-Link-Me virtual COM port function.

Function	Switch				Descriptions
	1	2	3	4	
Enable	ON	ON	ON	ON	Enable Nu-Link-Me virtual COM port function
Disable	OFF	OFF	OFF	OFF	Disable Nu-Link-Me virtual COM port function

### 2.3.8 Crystal Selection

- X1: Used for 4 ~ 24 MHz crystal
- X2: Used for 32.768 kHz crystal

Crystal Selection	X2	X3	R13	R14	R15	R16
Crystal-less (default)	X	X	NC	NC	NC	NC
4 ~ 24 MHz	V	X	0Ω	0Ω	NC	NC
32.768 kHz	X	V	NC	NC	0Ω	0Ω

X: Unused

V: Used



## 2.4 Pin Assignment for Extended Connector

The NuTiny-EVB-NUC121 provides NUC121SC2AE on board and the extended connector for LQFP-64 pin. Table 2.4-1 is the pin assignment for NUC121SC2AE.

Pin No	Pin Function	Pin No	Pin Function
01	PB.14, INT0, UART0_nRTS, ADC_CH9, BPWM1_CH0, SPI0_SS	19	USB_D-
02	PB.13, ADC_CH10, USCI0_CTL1	20	USB_D+
03	PB.12, CLKO, ADC_CH11, USCI0_CTL0	21	PB.0, UART0_RXD, PWM1_CH0
04	PA.11, I2C1_SCL, BPWM0_CH5, TM0, USCI0_CLK, USCI0_DAT0	22	PB.1, UART0_TXD, PWM1_CH1
05	PA.10, I2C1_SDA, BPWM0_CH4, PWM0_BRAKE0, USCI0_DAT1	23	PB.2, UART0_nRTS, TM2_EXT, PWM1_CH2
06	PD.8, USCI0_DAT0	24	PB.3, UART0_nCTS, TM3_EXT, PWM1_CH3
07	PD.9, PWM0_BRAKE1	25	PC.5, UART0_TXD, PWM1_CH5, USCI0_DAT0
08	PD.10, CLKO, BPWM0_CH5	26	PC.4, UART0_RXD, SPI0_I2SMCLK, PWM1_CH4, USCI0_DAT1
09	PD.11, INT1, BPWM0_CH4	27	PC.3, SPI0_MOSI, I2C1_SDA, PWM1_CH3, UART0_nRTS, USCI0_DAT0
10	PB.4, BPWM0_CH3, TM2_EXT, USCI0_CTL0, USCI0_DAT0	28	PC.2, SPI0_MISO, I2C1_SCL, PWM1_CH2, UART0_nCTS, USCI0_DAT1
11	PB.5, BPWM0_CH2, TM3, USCI0_CLK, USCI0_DAT1	29	PC.1, SPI0_CLK, PWM1_CH1, UART0_TXD, USCI0_CTL0
12	PB.6, BPWM0_CH1, USCI0_DAT0, USCI0_CTL1	30	PC.0, SPI0_SS, PWM1_CH0, TM2, UART0_RXD, USCI0_CLK
13	PB.7, BPWM0_CH0, USCI0_DAT1, USCI0_CTL0	31	PB.10, TM2, SPI0_I2SMCLK, PWM0_CH5
14	LDO_CAP	32	PB.9, TM1, SPI0_I2SMCLK, PWM0_CH4
15	V <sub>DD</sub>	33	PE.2, INT1, TM0_EXT, I2C0_SCL, USCI0_CTL1
16	V <sub>SS</sub>	34	PC.13, PWM0_CH3, CLKO, INT0, I2C0_SDA
17	USB_VBUS	35	PC.12, PWM0_CH2, SPI0_I2SMCLK, CLKO, INT0, I2C0_SCL, USCI0_CTL1
18	USB_VDD33_CAP	36	PC.11, SPI0_MOSI, PWM0_CH1, TM1, I2C0_SDA, USCI0_DAT0

37	PC.10, SPI0_MISO, PWM0_CH0, USCIO_DAT1	51	PD.2, ADC_CH2, TM3, UART0_TXD, USCIO_DAT1, SPI0_MISO
38	PE.1, STADC, CLKO, TM3, USCIO_DAT1	52	PD.3, ADC_CH3, TM1_EXT, UART0_nCTS, USCIO_DAT0, SPI0_MOSI
39	PC.9, SPI0_CLK, PWM0_CH5, PWM0_BRAKE1, USCIO_CLK	53	PD.4, ADC_CH4, BPWM1_CH5, UART0_nRTS, USCIO_CTL0, SPI0_SS
40	PC.8, STADC, SPI0_SS, PWM0_CH4, PWM1_BRAKE0, USCIO_CTL0	54	PD.5, ADC_CH5, BPWM1_CH4
41	PA.15, PWM0_CH3, SPI_I2SMCLK, CLKO, PWM1_BRAKE1, UART0_nRTS	55	PB.15, INT1, TM0_EXT, BPWM1_CH5
42	PE.0, INT0, CLKO, PWM0_CH3, TM1_EXT, USCIO_DAT0	56	PF.0, XT_OUT, BPWM1_CH3, TM3
43	PA.14, PWM0_CH2, UART0_nCTS, PWM0_BRAKE0	57	PF.1, XT_IN, BPWM1_CH2, TM1_EXT
44	PA.13, PWM0_CH1, I2C1_SDA, UART0_TXD	58	nRESET
45	PA.12, PWM0_CH0, I2C1_SCL, UART0_RXD	59	V <sub>SS</sub>
46	PF.4, ICE_DAT, I2C0_SDA, UART0_TXD, PWM0_CH3	60	V <sub>DD</sub>
47	PF.5, ICE_CLK, I2C0_SCL, UART0_RXD	61	PF.2, ICE_DAT, I2C0_SDA, ADC_CH6, BPWM1_CH3
48	AV <sub>DD</sub>	62	PF.3, ICE_CLK, I2C0_SCL, ADC_CH7, BPWM1_CH2
49	PD.0, ADC_CH0, UART0_nRTS, USCIO_CTL0, SPI0_SS	63	V <sub>SS</sub>
50	PD.1, ADC_CH1, TM0_EXT, UART0_RXD, USCIO_CLK, SPI0_CLK	64	PB.8, TM0, ADC_CH8, BPWM1_CH1

Table 2.4-1 Pin Assignment for NUC121SC2AE

## 2.5 NuTiny-SDK-NUC121 PCB Placement

Refer to Figure 2.5-1 for the NuTiny-SDK-NUC121 PCB placements.

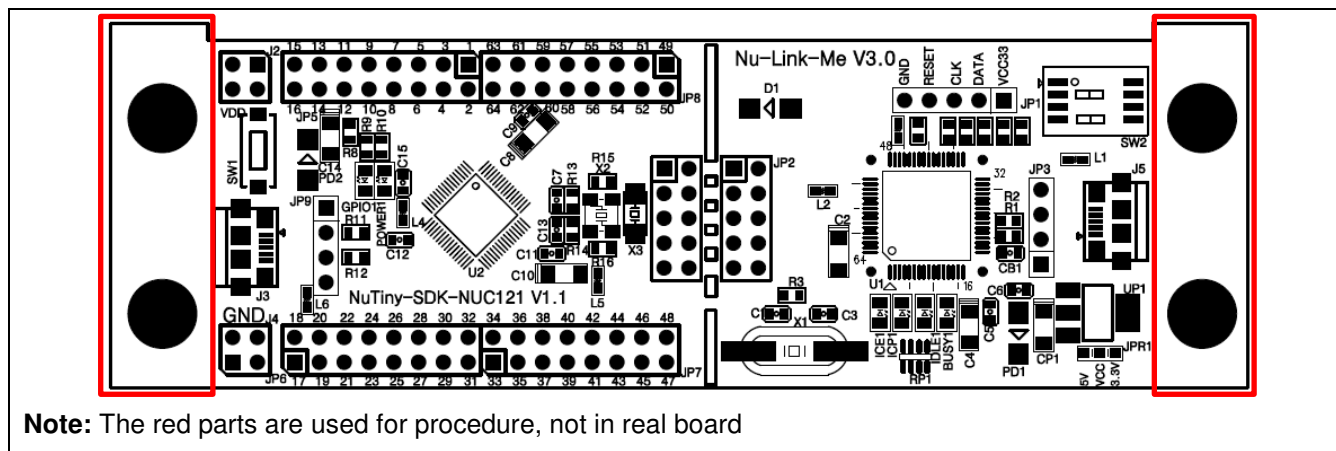


Figure 2.5-1 NuTiny-SDK-NUC121 PCB Placement

### 3 INTRODUCTION TO NUTINY-SDK-NUC125

NuTiny-SDK-NUC125 uses the NUC125SC2AE as the target microcontroller. Figure 3.1-1 shows the NuTiny-SDK-NUC125 for the NUC125 series, the left portion is called NuTiny-EVB-NUC125 and the right portion is Debug Adaptor called Nu-Link-Me.

#### NuTiny-EVB-NUC125

The NuTiny-EVB-NUC125 is similar to other development boards. It can be used to develop and verify applications to emulate the real behavior. The on-board chip covers NUC125 series features. The NuTiny-EVB-NUC125 can be a real system controller to design user's target systems.

#### Nu-Link-Me

- Debug Adaptor

The Nu-Link-Me Debug Adaptor connects your PC's USB port to the user's target system (via Serial Wired Debug Port) and allows user 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 user installs each driver.

- Virtual COM Port

The Nu-Link-Me also supports virtual COM port function. The Nu-Link-Me can be used as a USB to UART virtual COM port, which connects to on-board NUC125SC2AE UART0. Virtual COM port function is defaulted to off. User can turn on all of the positions of switch to enable it.

### 3.1 NuTiny-SDK-NUC125 (PCB Board)

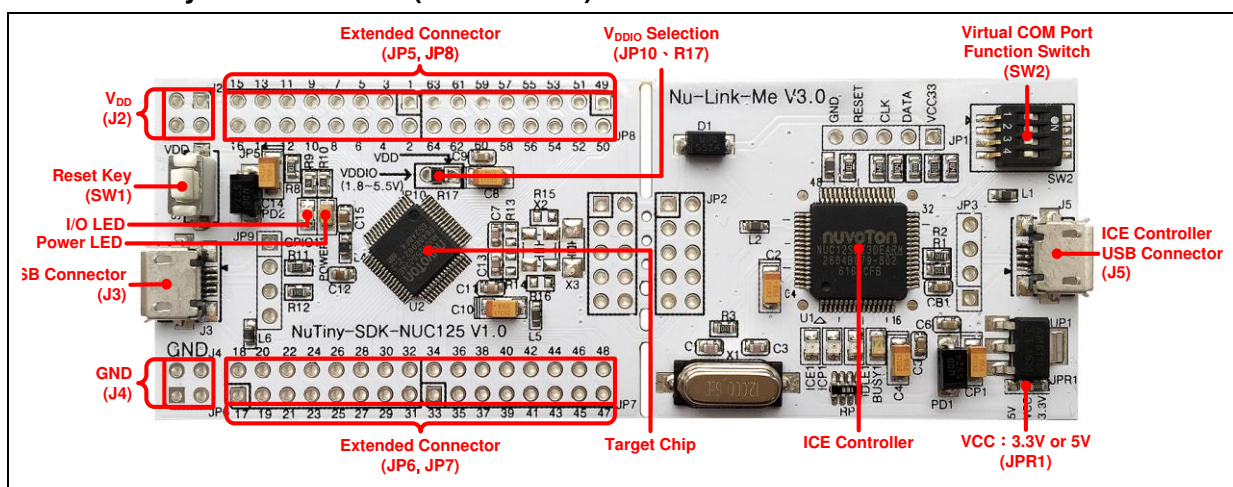


Figure 3.1-1 NuTiny-SDK-NUC125 (PCB Board)

### 3.2 Virtual COM Port Switch Description

The switch in Nu-Link-Me, SW2, determines that the virtual COM port function is enabled or disabled. When user turns on all of the positions of switch, the virtual COM port function will be enabled. By using virtual COM port function, user can access the USB device in the same way as it would access a standard COM port to NUC125SC2AE UART0. To use this function, user needs to install "VCOM Driver" at first. User can get "VCOM Driver" from NuMicroDVD in the folder

“Software Utilities”.

### 3.3 NuTiny-SDK-NUC125 Power Setting and Connector

#### 3.3.1 Power Setting

- J2: V<sub>DD</sub> Voltage connector in NuTiny-EVB-NUC125
- J3: USB port in NuTiny-EVB-NUC125
- J5: USB port in Nu-Link-Me

Model	JPR1	J2 V <sub>DD</sub>	J3 USB port	J5 ICE USB port	MCU Voltage
Model 1	Select 3.3V (default)	DC 3.3V Output	X	Connect to PC	DC 3.3V
Model 2	Select 5V	DC 5V Output	X	Connect to PC	DC 5V
Model 3	Select 3.3V or 5V	DC 5V Output	Connect to PC	Connect to PC	DC 5V
Model 4*	X	DC 5V Output	Connect to PC	X	DC 5V
Model 5	Select 3.3V or 5V	DC 2.5V ~ 5.5V Input	X	Connect to PC	Voltage by J2 input
Model 6*	X	DC 2.5V ~ 5.5V Input	X	X	Voltage by J2 input

X: Unused

**Note** \*: Need to separate NuTiny-EVB-NUC125 and Nu-Link-Me

#### 3.3.2 V<sub>DDIO</sub> Selection

- R17: 0Ω resistor, to connect V<sub>DDIO</sub> with V<sub>DD</sub>
- JP10: User can input external power from 1.8V ~ 5.5V to V<sub>DDIO</sub> for V<sub>DDIO</sub> power domain

V <sub>DDIO</sub> Input	R17	JP10	Description
V <sub>DD</sub> (default)	0Ω	X	V <sub>DDIO</sub> power domain is the same as V <sub>DD</sub>
External Power (1.8V ~ 5.5V)	X	V <sub>DDIO</sub> side connects to external power	V <sub>DDIO</sub> power domain is based on external power (from 1.8V ~ 5.5V)

X: Unused

**Note:** PA.10, PA.11, PB.4 ~ PB.7, PB.12 ~ PB.14 and PD.8 ~ 11 belong to V<sub>DDIO</sub> power domain

#### 3.3.3 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NUC125) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- JP2: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (NuTiny-EVB-NUC125)

### 3.3.4 USB Connector

- J3: Micro USB Connector in NuTiny-EVB-NUC125 for application use
- J5: Micro USB Connector in Nu-Link-Me connected to a PC USB port

### 3.3.5 Extended Connector

- JP5, JP6, JP7 and JP8: Show all chip pins in NuTiny-EVB-NUC125

### 3.3.6 Reset Button

- SW1: Reset button in NuTiny-EVB-NUC125

### 3.3.7 Power Connector

- J2: V<sub>DD</sub> connector in NuTiny-EVB-NUC125
- J4: GND connector in NuTiny-EVB-NUC125

### 3.3.8 Virtual COM Port Function Switch

- SW2: Switch ON/OFF to enable or disable Nu-Link-Me virtual COM port function.

Function	Switch				Description
	1	2	3	4	
Enable	ON	ON	ON	ON	Enable Nu-Link-Me virtual COM port function
Disable	OFF	OFF	OFF	OFF	Disable Nu-Link-Me virtual COM port function

### 3.3.9 Crystal Selection

- X1: Used for 4 ~ 24 MHz crystal
- X2: Used for 32.768 kHz crystal

Crystal Selection	X2	X3	R13	R14	R15	R16
Crystal-less (default)	X	X	NC	NC	NC	NC
4 ~ 24 MHz	V	X	0Ω	0Ω	NC	NC
32.768 kHz	X	V	NC	NC	0Ω	0Ω

X: Unused

V: Used

### 3.4 Pin Assignment for Extended Connector

The NuTiny-EVB-NUC125 provides NUC125SC2AE on board and the extended connector for LQFP-64 pin. Table 3.4-1 is the pin assignment for NUC125SC2AE.

Pin No	Pin Function	Pin No	Pin Function
01	PB.14, INT0, UART0_nRTS, ADC_CH9, BPWM1_CH0, SPI0_SS	19	USB_D-
02	PB.13, ADC_CH10, USCI0_CTL1	20	USB_D+
03	PB.12, CLKO, ADC_CH11, USCI0_CTL0	21	PB.0, UART0_RXD, PWM1_CH0
04	PA.11, I2C1_SCL, BPWM0_CH5, TM0, USCI0_CLK, USCI0_DAT0	22	PB.1, UART0_TXD, PWM1_CH1
05	PA.10, I2C1_SDA, BPWM0_CH4, PWM0_BRAKE0, USCI0_DAT1	23	PB.2, UART0_nRTS, TM2_EXT, PWM1_CH2
06	PD.8, USCI0_DAT0	24	PB.3, UART0_nCTS, TM3_EXT, PWM1_CH3
07	PD.9, PWM0_BRAKE1	25	PC.5, UART0_TXD, PWM1_CH5, USCI0_DAT0
08	PD.10, CLKO, BPWM0_CH5	26	PC.4, UART0_RXD, SPI0_I2SMCLK, PWM1_CH4, USCI0_DAT1
09	PD.11, INT1, BPWM0_CH4	27	PC.3, SPI0_MOSI, I2C1_SDA, PWM1_CH3, UART0_nRTS, USCI0_DAT0
10	PB.4, BPWM0_CH3, TM2_EXT, USCI0_CTL0, USCI0_DAT0	28	PC.2, SPI0_MISO, I2C1_SCL, PWM1_CH2, UART0_nCTS, USCI0_DAT1
11	PB.5, BPWM0_CH2, TM3, USCI0_CLK, USCI0_DAT1	29	PC.1, SPI0_CLK, PWM1_CH1, UART0_TXD, USCI0_CTL0
12	PB.6, BPWM0_CH1, USCI0_DAT0, USCI0_CTL1	30	PC.0, SPI0_SS, PWM1_CH0, TM2, UART0_RXD, USCI0_CLK
13	PB.7, BPWM0_CH0, USCI0_DAT1, USCI0_CTL0	31	PB.10, TM2, SPI0_I2SMCLK, PWM0_CH5
14	LDO_CAP	32	PB.9, TM1, SPI0_I2SMCLK, PWM0_CH4
15	V <sub>DD</sub>	33	PE.2, INT1, TM0_EXT, I2C0_SCL, USCI0_CTL1
16	V <sub>SS</sub>	34	PC.13, PWM0_CH3, CLKO, INT0, I2C0_SDA
17	USB_VBUS	35	PC.12, PWM0_CH2, SPI0_I2SMCLK, CLKO, INT0, I2C0_SCL, USCI0_CTL1
18	USB_VDD33_CAP	36	PC.11, SPI0_MOSI, PWM0_CH1, TM1, I2C0_SDA, USCI0_DAT0

37	PC.10, SPI0_MISO, PWM0_CH0, USCIO_DAT1	51	PD.2, ADC_CH2, TM3, UART0_TXD, USCIO_DAT1, SPI0_MISO
38	PE.1, STADC, CLKO, TM3, USCIO_DAT1	52	PD.3, ADC_CH3, TM1_EXT, UART0_nCTS, USCIO_DAT0, SPI0_MOSI
39	PC.9, SPI0_CLK, PWM0_CH5, PWM0_BRAKE1, USCIO_CLK	53	PD.4, ADC_CH4, BPWM1_CH5, UART0_nRTS, USCIO_CTL0, SPI0_SS
40	PC.8, STADC, SPI0_SS, PWM0_CH4, PWM1_BRAKE0, USCIO_CTL0	54	PD.5, ADC_CH5, BPWM1_CH4
41	PA.15, PWM0_CH3, SPI_I2SMCLK, CLKO, PWM1_BRAKE1, UART0_nRTS	55	PB.15, INT1, TM0_EXT, BPWM1_CH5
42	PE.0, INT0, CLKO, PWM0_CH3, TM1_EXT, USCIO_DAT0	56	PF.0, XT_OUT, BPWM1_CH3, TM3
43	PA.14, PWM0_CH2, UART0_nCTS, PWM0_BRAKE0	57	PF.1, XT_IN, BPWM1_CH2, TM1_EXT
44	PA.13, PWM0_CH1, I2C1_SDA, UART0_TXD	58	nRESET
45	PA.12, PWM0_CH0, I2C1_SCL, UART0_RXD	59	V <sub>SS</sub>
46	PF.4, ICE_DAT, I2C0_SDA, UART0_TXD, PWM0_CH3	60	V <sub>DD</sub>
47	PF.5, ICE_CLK, I2C0_SCL, UART0_RXD	61	PF.2, ICE_DAT, I2C0_SDA, ADC_CH6, BPWM1_CH3
48	AV <sub>DD</sub>	62	PF.3, ICE_CLK, I2C0_SCL, ADC_CH7, BPWM1_CH2
49	PD.0, ADC_CH0, UART0_nRTS, USCIO_CTL0, SPI0_SS	63	V <sub>SS</sub>
50	PD.1, ADC_CH1, TM0_EXT, UART0_RXD, USCIO_CLK, SPI0_CLK	64	V <sub>DDIO</sub>

Table 3.4-1 Pin Assignment for NUC125SC2AE



### 3.5 NuTiny-SDK-NUC125 PCB Placement

Refer to Figure 3.5-1 for the NuTiny-SDK-NUC121 PCB placements.

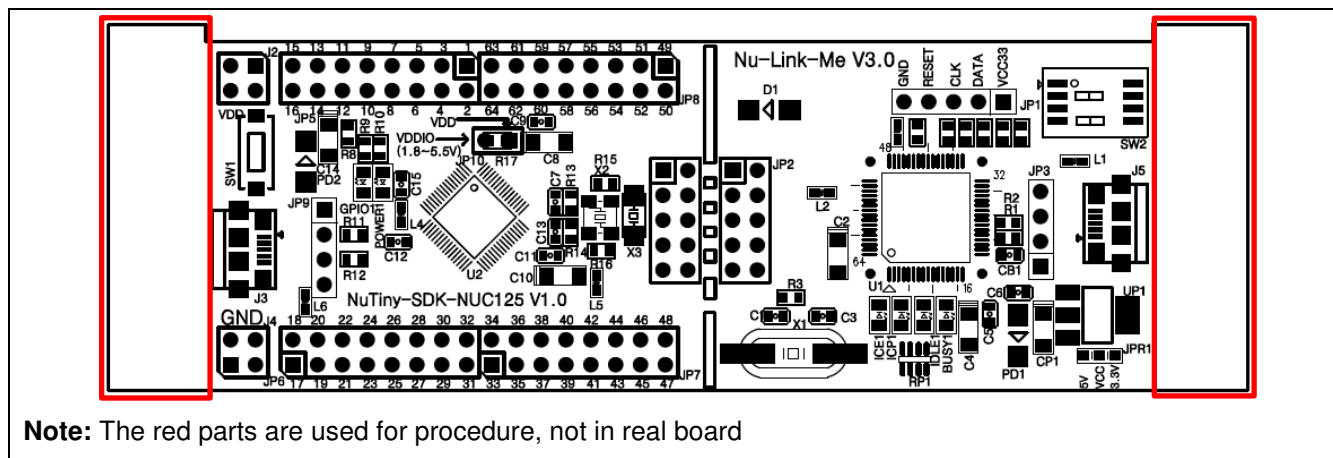


Figure 3.5-1 NuTiny-SDK-NUC125 PCB Placement

## 4 HOW TO START NUTINY-SDK-NUC121/125 ON THE KEIL UVISION® IDE

### 4.1 Downloading and Installing Keil µVision® IDE Software

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

### 4.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton NuMicro® website (<http://www.nuvoton.com/NuMicro>) to download the “NuMicro® Keil µVision® IDE driver” file. Please refer to section 7.1 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.

### 4.3 Hardware Setup

The hardware setup is shown as Figure 4.3-1.



Figure 4.3-1 NuTiny-SDK-NUC121/125 Hardware Setup

### 4.4 Example Program

This example demonstrates downloading and debugging an application on a NuTiny-SDK-NUC121/125 board. The example file can be downloaded from Nuvoton NuMicro® website and found in the directory list shown in Figure 4.4-1.

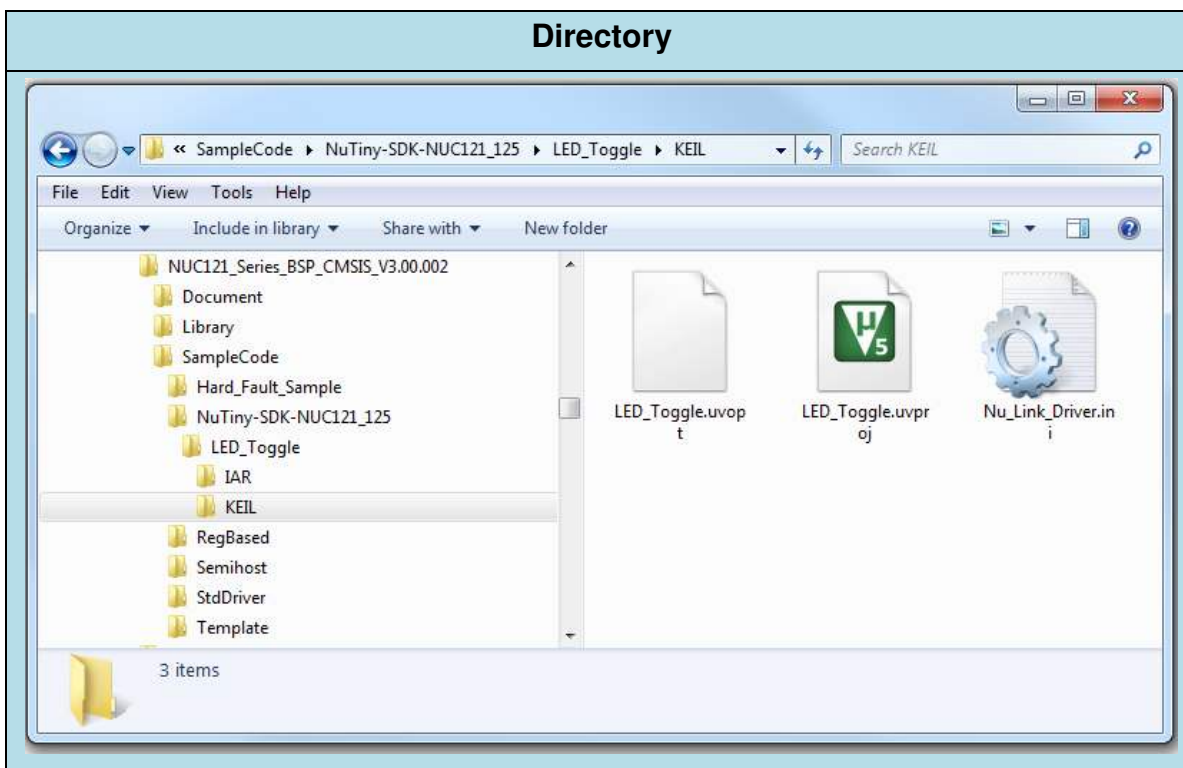
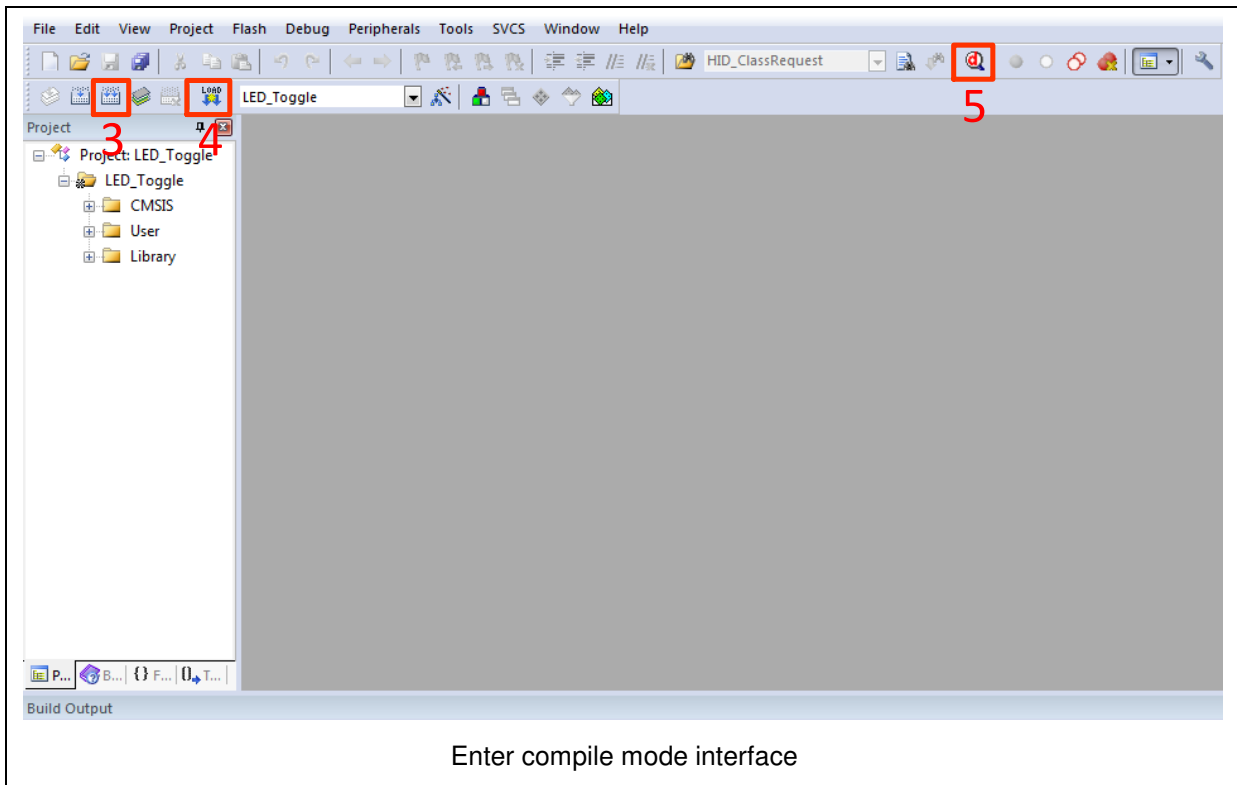





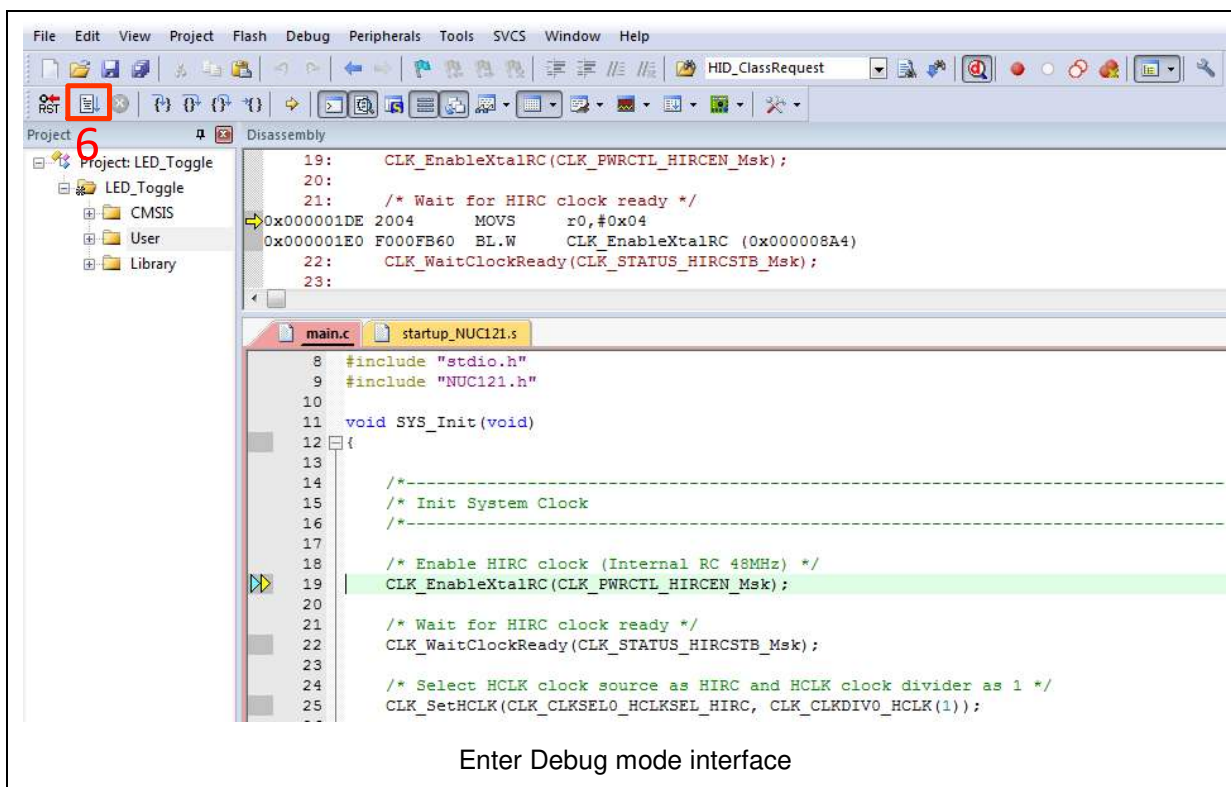
Figure 4.4-1 Example Directory


To use this example:

1. Open a project from the BSP installation folder (default as C:\Nuvoton) using the following path:  
 \NUC121\_Series\_BSP\_CMSIS\_V3.xx.xxx\SampleCode\NuTiny-SDK-NUC121\_125\LED\_Toggle\KEIL
2. Execute “**LED\_Toggle.uvproj**”



- 3.  Compile
- 4.  Download the program code to Flash
- 5.  Enter / Exit Debug mode



6.  Execute the program
7. The I/O LED on the NuTiny-EVB-NUC121/125 board will be toggled on.

## 5 HOW TO START NUTINY-SDK-NUC121/125 ON THE IAR EMBEDDED WORKBENCH

### 5.1 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.

### 5.2 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 7.2 for the detailed 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.

### 5.3 Hardware Setup

The hardware setup is shown as Figure 5.3-1.

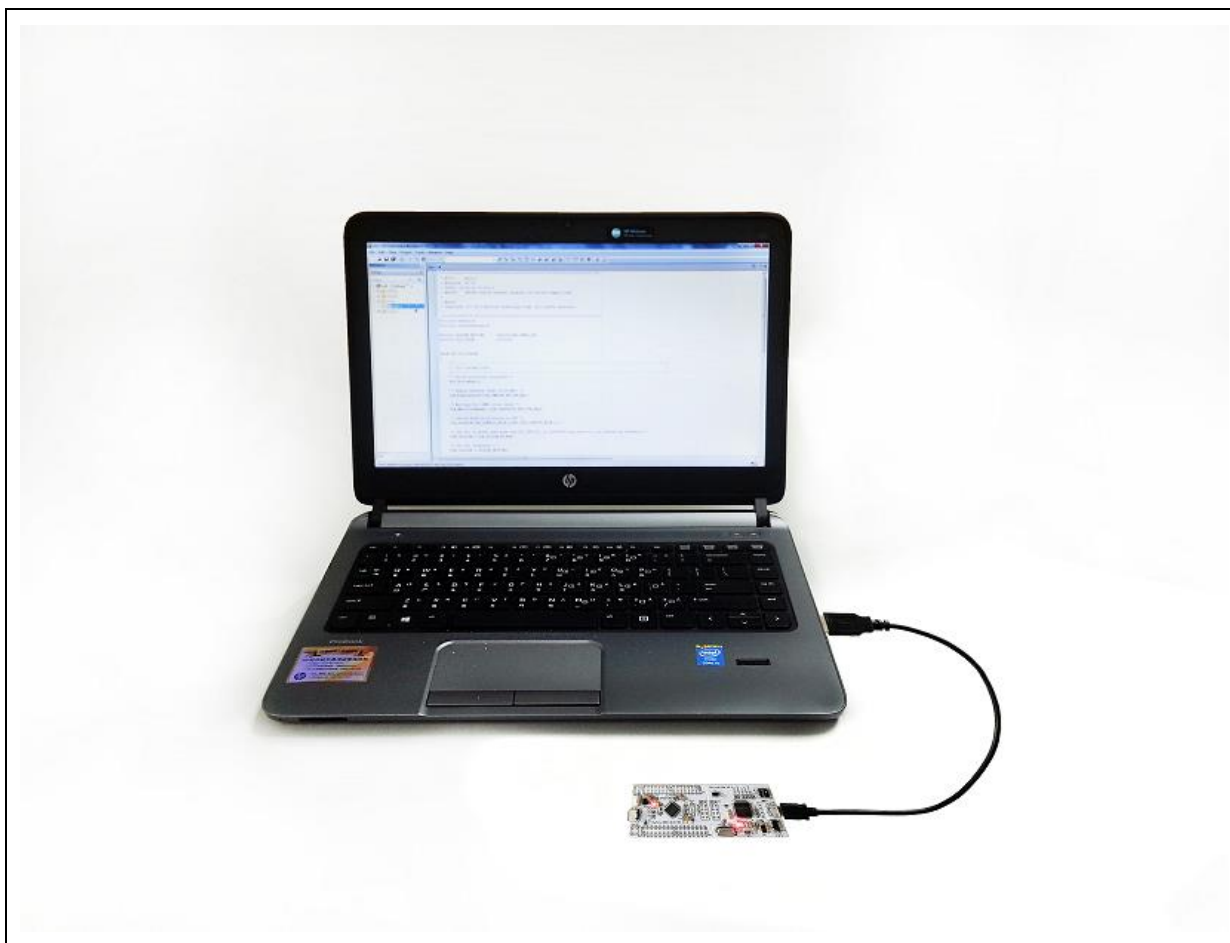


Figure 5.3-1 NuTiny-SDK-NUC121/125 Hardware Setup

### 5.4 Example Program

This example demonstrates downloading and debugging an application on a NuTiny-SDK-NUC121/125 board. The example file can be downloaded from Nuvoton NuMicro® website and found in the directory list shown in Figure 5.4-1.

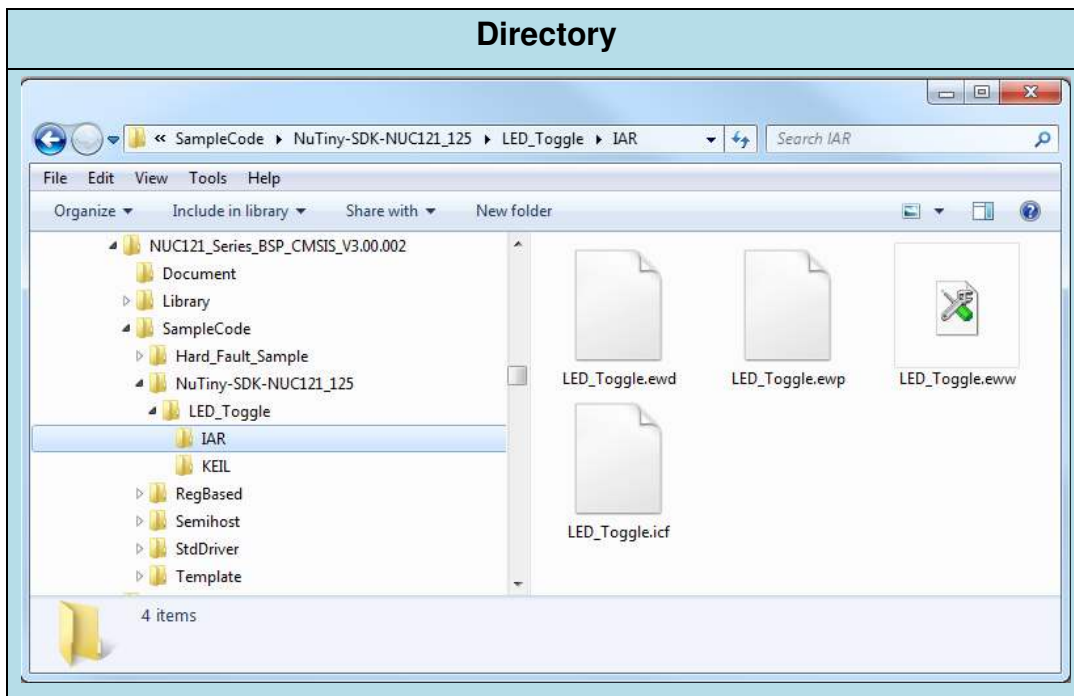
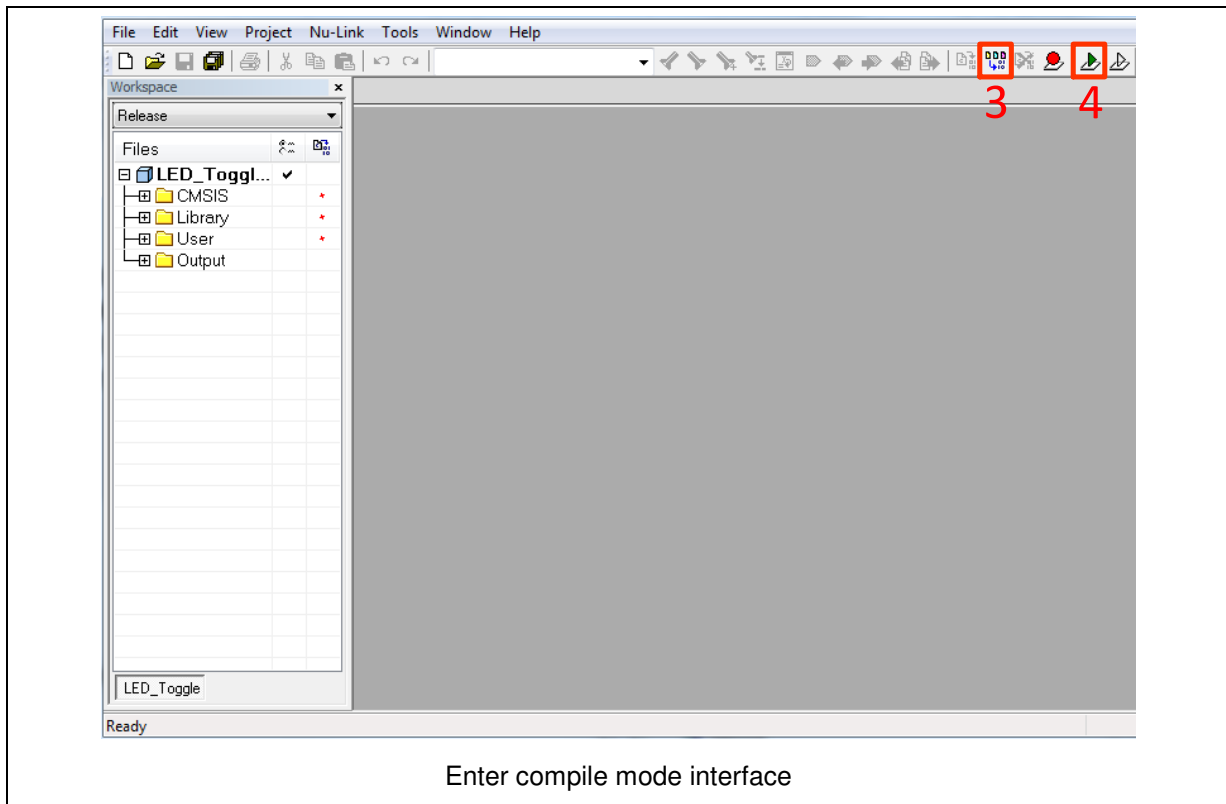




Figure 5.4-1 Example Directory

To use this example:

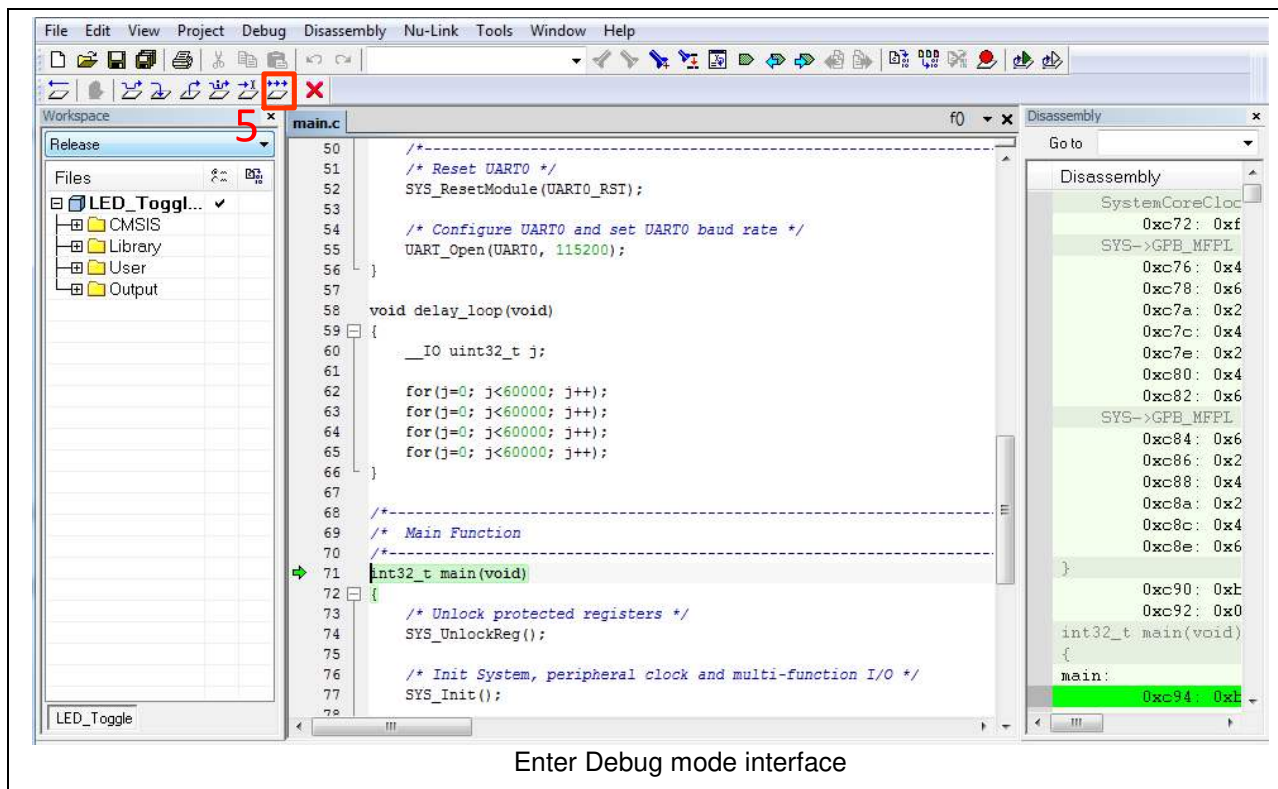
1. Open a project from the BSP installation folder (default as C:\Nuvoton) using the following path:  
 \NUC121\_Series\_BSP\_CMSIS\_V3.xx.xxx\SampleCode\NuTiny-SDK-NUC121\_125\LED\_Toggle\IAR
2. Execute “**LED\_Toggle.eww**”




Enter compile mode interface

3.  Compile and make
4.  Download the program code to Flash and Enter Debug mode



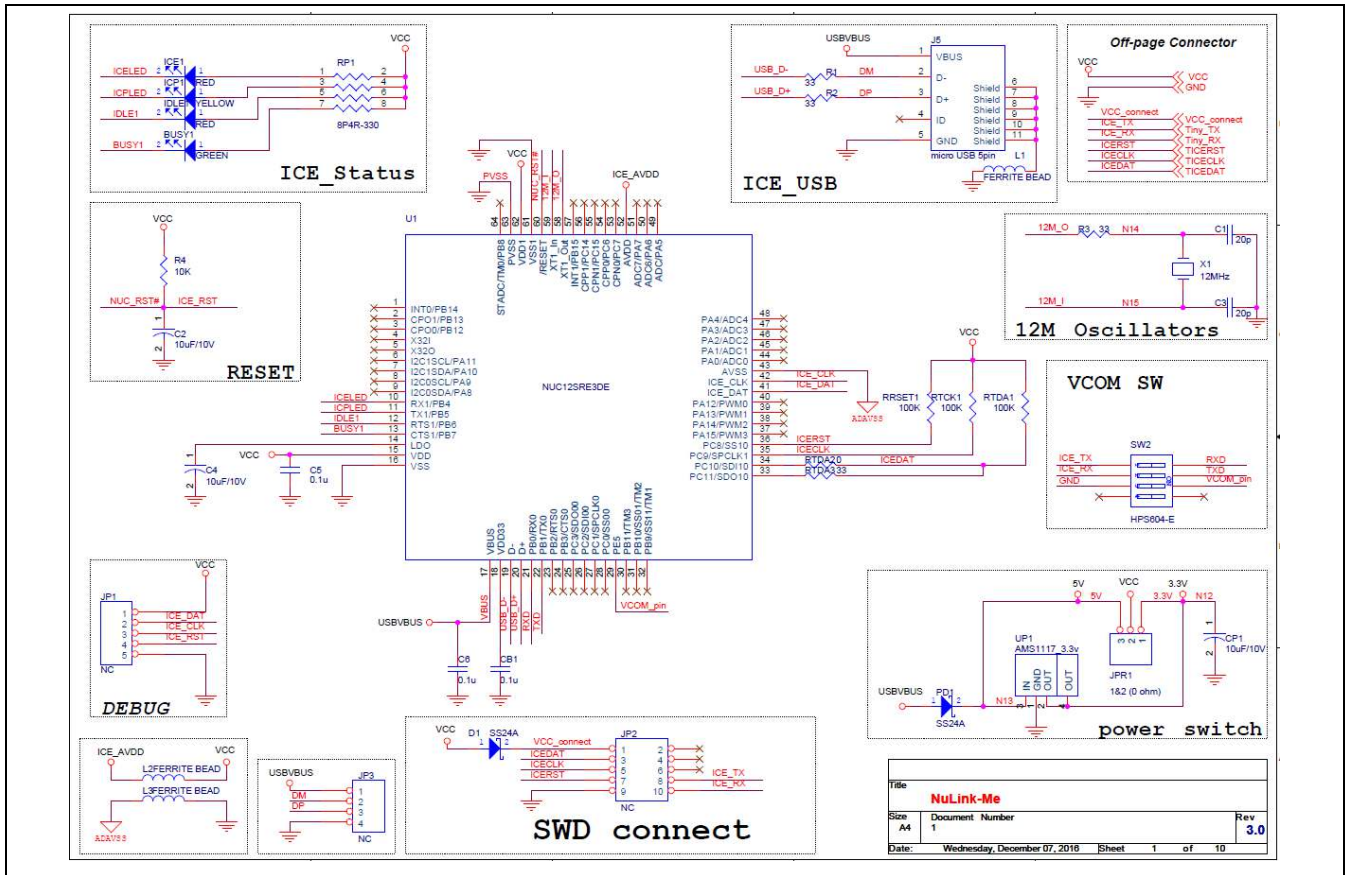


5.  Execute the program
6. The I/O LED on the NuTiny-EVB-NUC121/125 board will be toggled on.

6 SCHEMATICS

6.1 NuTiny-SDK-NUC121

6.1.1 Nu-Link-Me Schematic



Title		
NuLink-Me		
Size	Document Number	Rev
A4	1	3.0
Date:	Wednesday, December 07, 2016	Sheet 1 of 10

NUKITINY-SDK-NUC121/125 USER MANUAL

6.1.2 SDK Circuit Schematic

**Crystal Selection**

	X2	X3	R13	R14	R15	R16
Crystal-less (Default)	X	X	NC	NC	NC	NC
12 MHz	V	X	0Ω	0Ω	NC	NC
32.768 kHz	X	V	NC	NC	0Ω	0Ω

**Off-page Connector**

Pin 1: P1:641

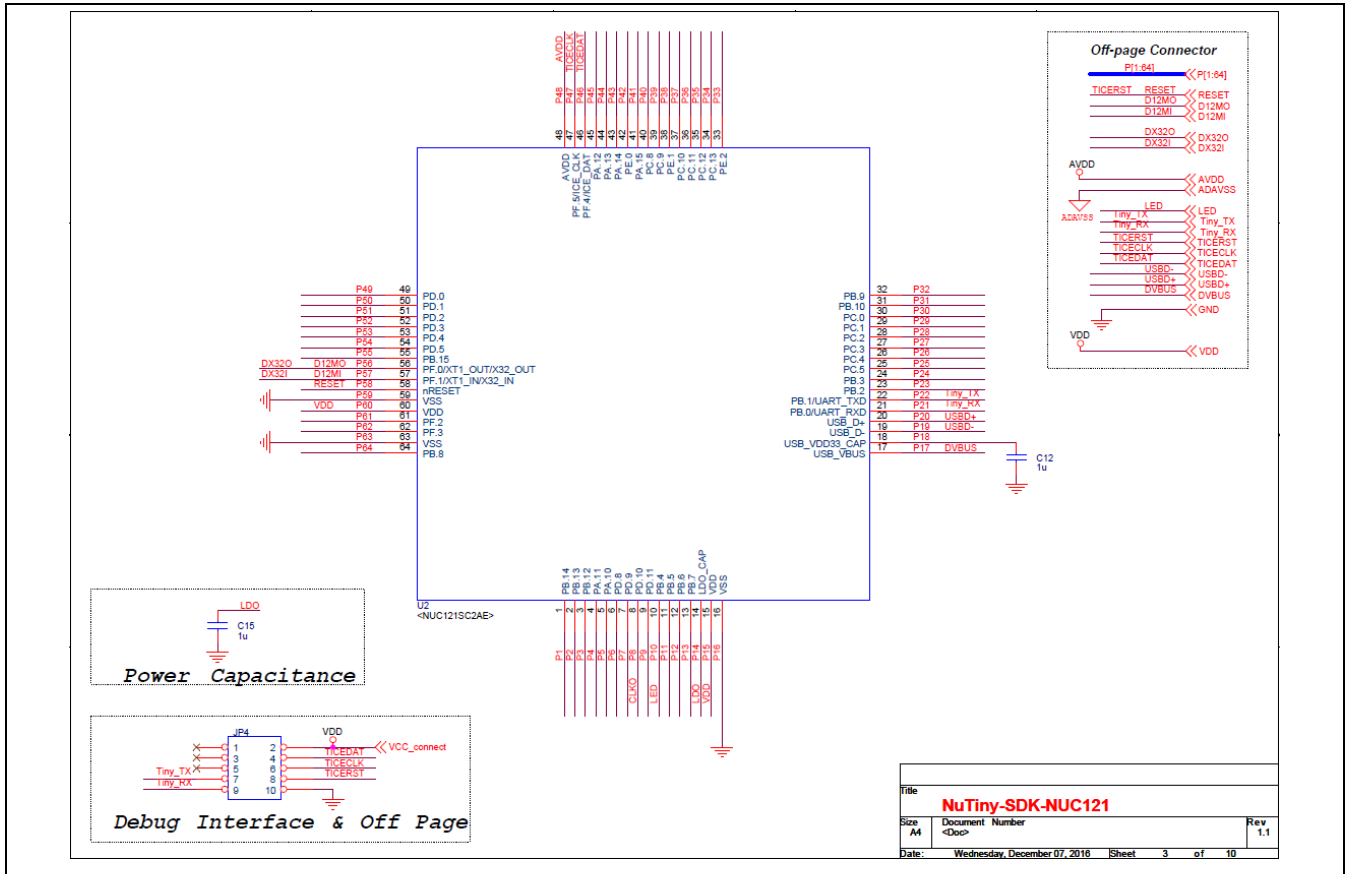
- Pin 2: D12MO, D12MI
- Pin 3: DX320, DX321
- Pin 4: AVDD
- Pin 5: AVDD, ADAVSS
- Pin 6: LED, TIGERST
- Pin 7: LED, RESET
- Pin 8: USBD-, USBD+
- Pin 9: DVBUS-, DVBUS
- Pin 10: VDD

**SDK Circuit**

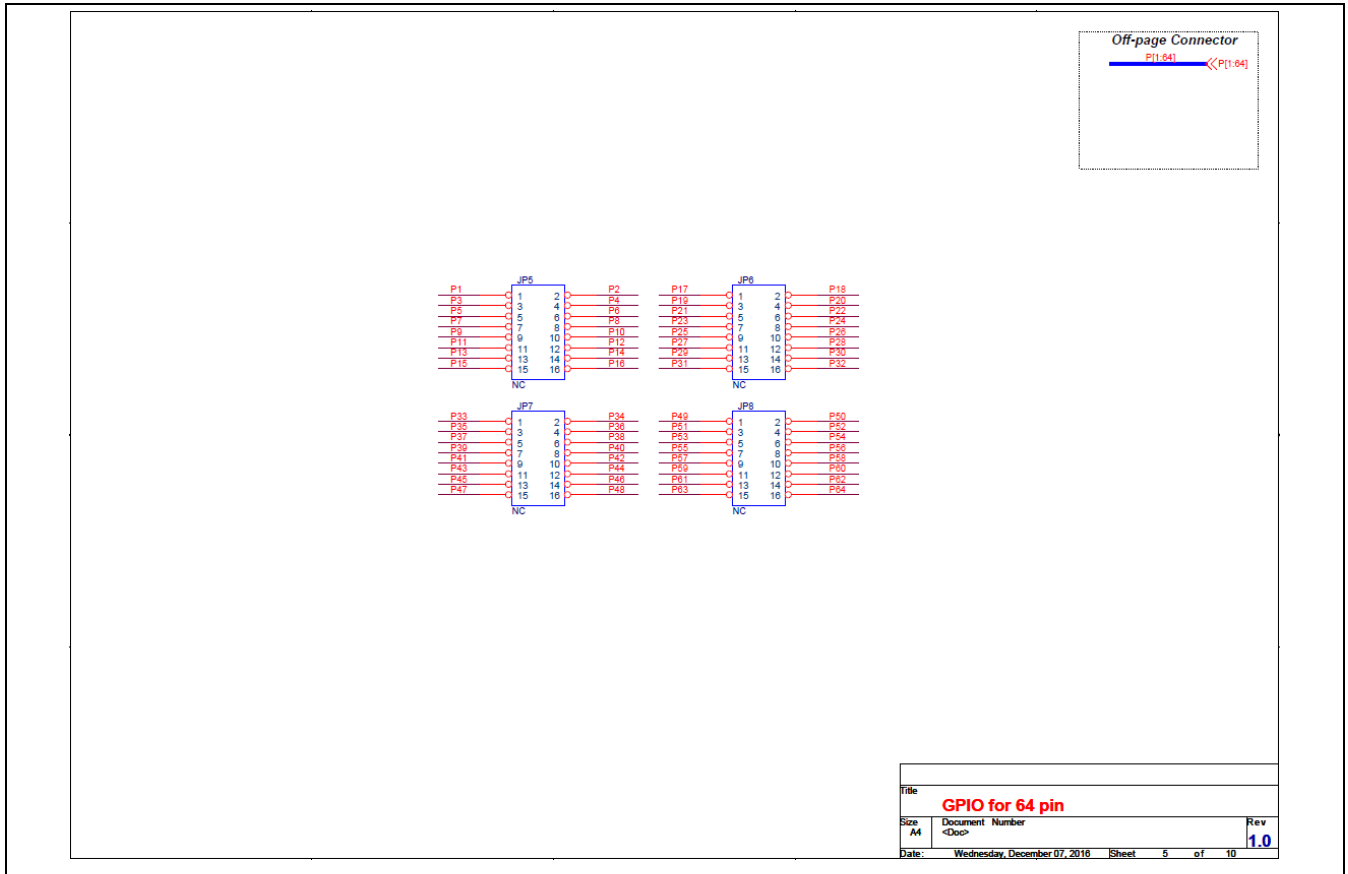
Size: A4, Document Number: 2, Rev: 1.0

Date: Wednesday, December 07, 2016, Sheet: 2 of 10

6.1.3 NuTiny-EVB-NUC121 Schematic

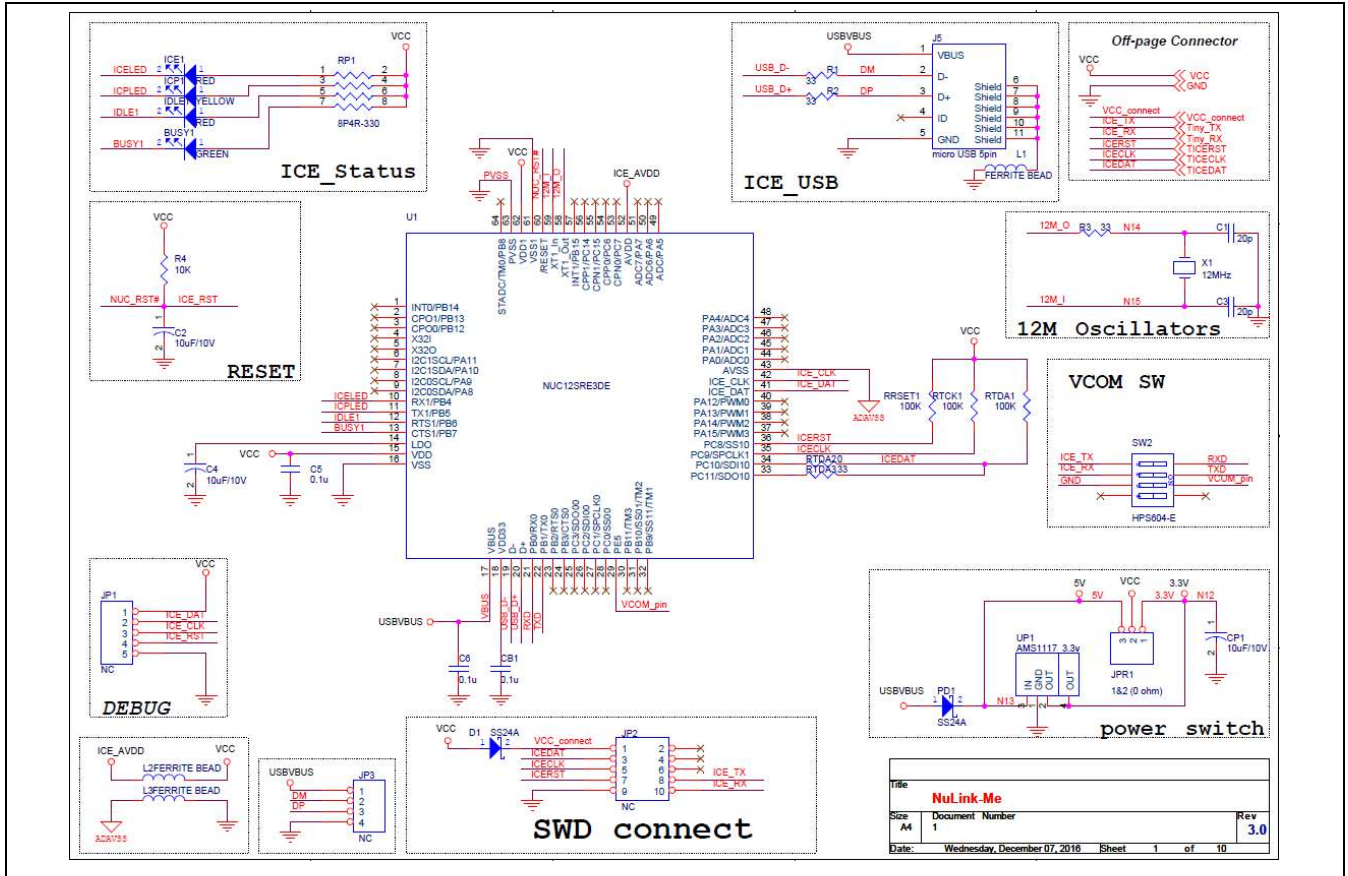


6.1.4 GPIO for 64 pin Schematic



6.2 NuTiny-SDK-NUC125

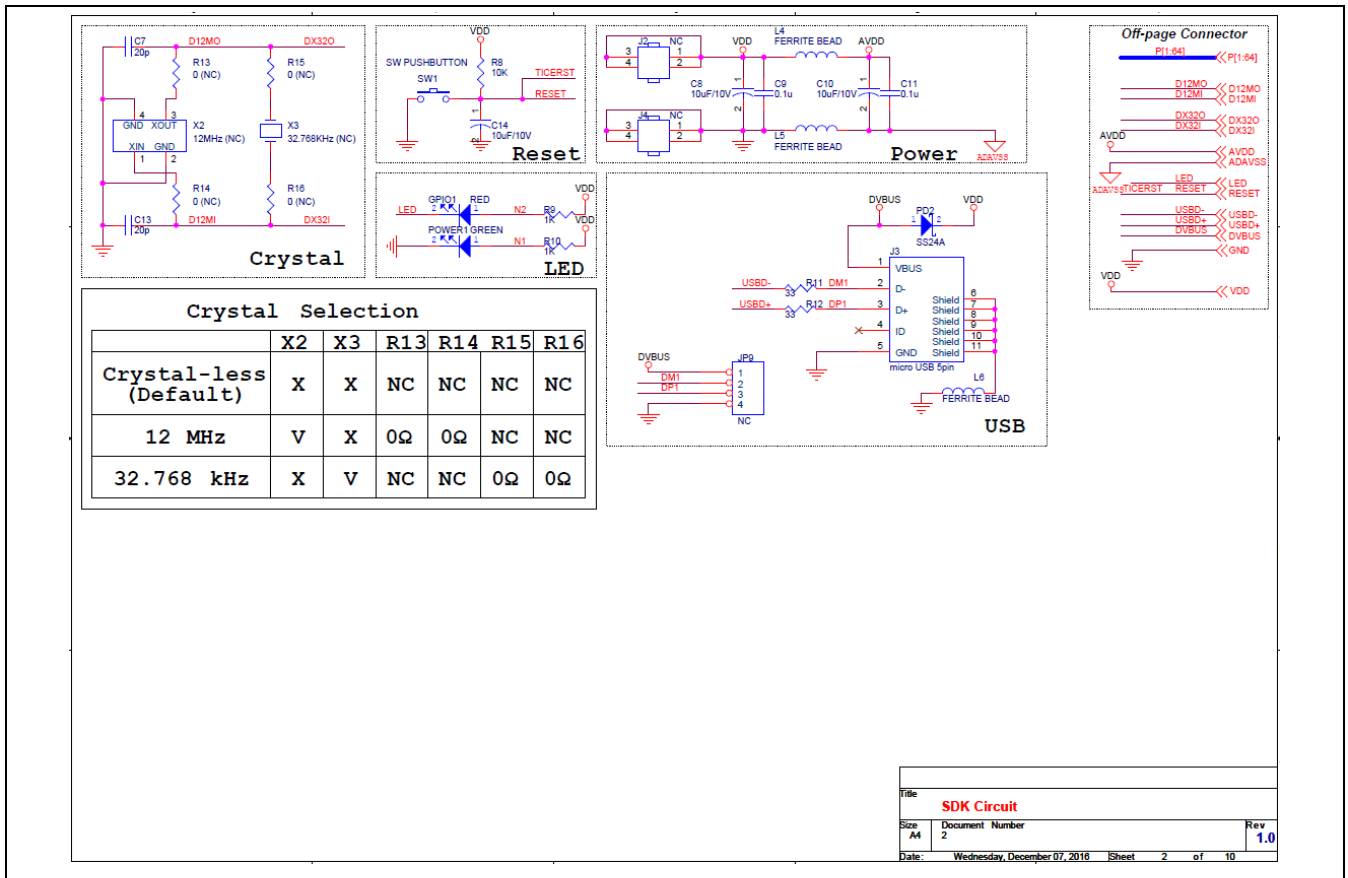
6.2.1 Nu-Link-Me Schematic



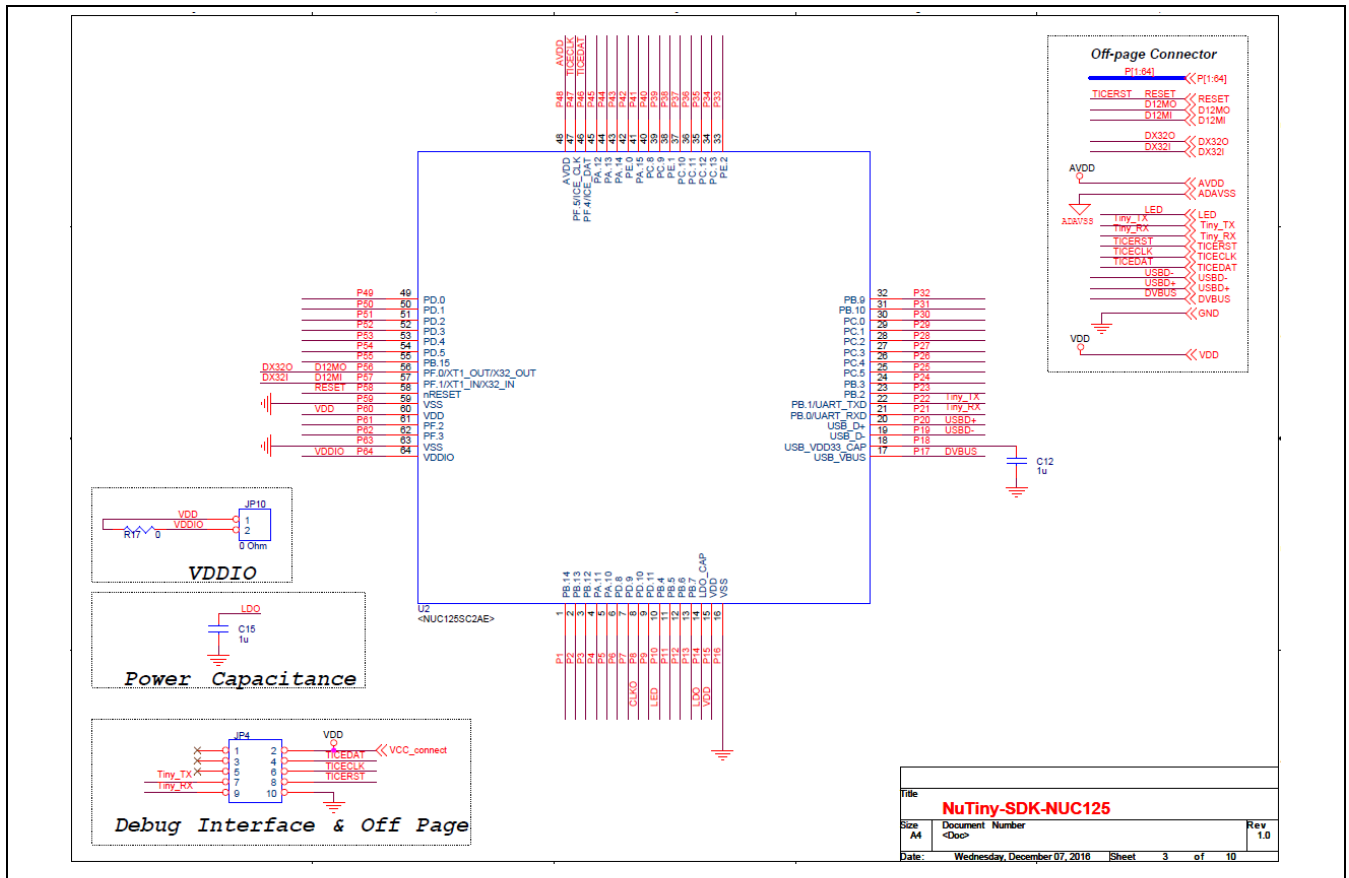
Title			NuLink-Me		
Size	Document Number			Rev	3.0
A4	1				
Date:	Wednesday, December 07, 2016	Sheet	1	of	10

NUTINY-SDK-NUC121/125 USER MANUAL

6.2.2 SDK Circuit Schematic



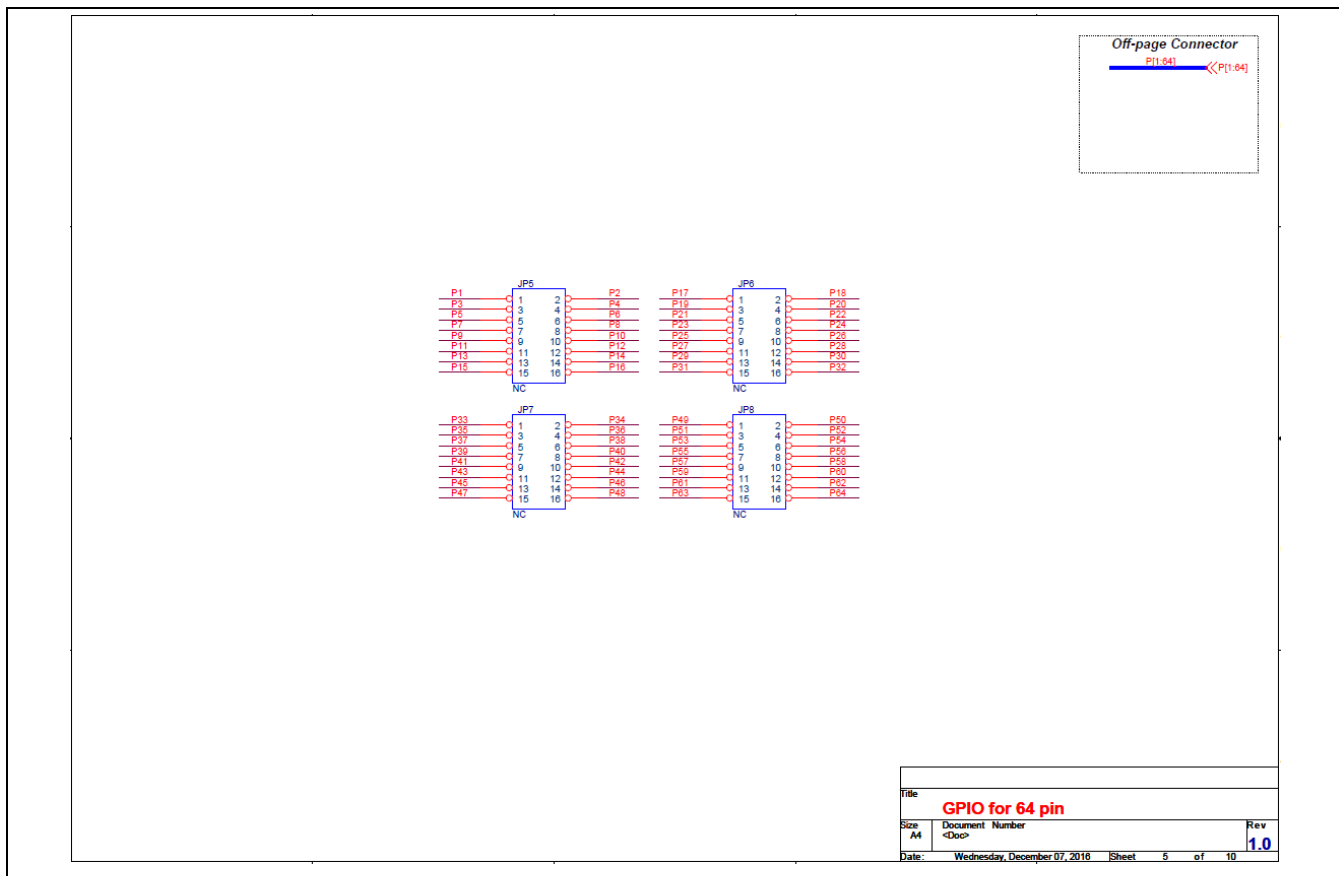
6.2.3 NuTiny-EVB-NUC125 Schematic



NU TINY-SDK-NUC121/125 USER MANUAL



6.2.4 GPIO for 64 pin 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**

The screenshot shows the Nuvoton NuMicro website interface. A yellow oval labeled "2-1. Move to 'Support'" points to the "Support" link in the top navigation bar. A second yellow oval labeled "2-2. Click here to enter Tool & Software" points to the "Tool & Software" option in the dropdown menu that appears under "Support". The main content area features a product matrix with various NuMicro series (e.g., NUC100, Nano120, NUC120, NUC230, NUC140, NUC130, NUC100, Nano110, Nano100, NUC122, NUC123, Nano102, Nano112, Mini51, M051, AU9110, NUC220, NUC240, AU9120\*) plotted against memory size (16K, 32K, 64K) and application categories (Industrial Control, Low Power, USB Application, Automotive Application, Audio Application). A "Developing" label is present for the Mini51 series. The right sidebar includes sections for "Online Support" (Online Training, Forum, FAQ), "Featured Products" (M0516LDE, MINI54FDE, NANO130KE3BN), "Featured Videos" (M0 Introduction(06:35)), and "Featured Applications".

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**Programmer Software Tools Package**

File name	Description	Version	Date
ICP Programming Tool V1.25.6287.zip Revision History	NuMicro ICP tool & user manual	V1.25.6287	2014-01-16
ISP Programming Tool V1.44.zip Revision History	NuMicro ISP tool & user manual	V1.44	2014-01-20
NuGang Programmer V6.21.zip Revision History	NuMicro NuGang Programmer user manual	V6.21	2014-01-24

**Click here to download**

**Nu-Link Driver**

File name	Description	Version	Date
Nu-Link Driver for Keil RVMDK V1.25.6287.zip Revision History	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16
Nu-Link Driver for IAR EWARM V1.25.6287.zip Revision History	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16

User Feedback
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**Step5** Download the NuMicro® Keil μVision® IDE driver.

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

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- Learning Board
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- Software**
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- Reference Design
- FAQ
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- Technical Support
- Forum

**Click here to enter Software download page**

**Programmer Software Tools Package**

File name	Description	Version	Date
<a href="#">ICP Programming Tool V1.25.6287.zip</a> <a href="#">Revision History</a>	NuMicro ICP tool & user manual	V1.25.6287	2014-01-16
<a href="#">ISP Programming Tool V1.44.zip</a> <a href="#">Revision History</a>	NuMicro ISP Programming Tool & user manual	V1.44	2014-01-20
<a href="#">NuGang Programmer V6.21.zip</a> <a href="#">Revision History</a>	NuGang Programmer software & user manual	V6.21	2014-01-24

**Nu-Link Driver**

File name	Description	Version	Date
<a href="#">Nu-Link Driver for Keil RVMDK V1.25.6287.zip</a> <a href="#">Revision History</a>	This driver is to support Nu-Link to work under Keil RVMDK Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16
<a href="#">Nu-Link Driver for IAR EWARM V1.25.6287.zip</a> <a href="#">Revision History</a>	This driver is to support Nu-Link to work under IAR EWARM Development Environment for all NuMicro Family Devices.	V1.25.6287	2014-01-16

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**Click here to download**

**Step5** Download the NuMicro® IAR EWARM driver.

### 7.3 Downloading NuMicro® NUC121/125 Series BSP Software Library

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

The screenshot shows the Nuvoton website interface. At the top, there is a navigation bar with 'Products', 'Applications', 'Support', and 'Foundry Service'. A red dashed box highlights the 'Support' menu item, with a yellow callout bubble pointing to it containing the text '2-1. Move to "Support"'. Below the 'Support' menu, a sub-menu is visible with 'Tool & Software' highlighted by a red dashed box and a yellow callout bubble containing '2-2. Click here to enter Tool & Software'. The main content area features a product matrix for ARM Cortex-M0 MCUs, with various series like NUC100, Nano120, NUC120, NUC230, NUC140, NUC130, M051, Nano102, Nano112, Mini51, NUC122, and NUC123. A vertical axis on the left indicates memory sizes: 64K, 32K, and 16K. A horizontal axis at the bottom indicates application categories: Industrial Control, Low Power, USB Application, Automotive Application, and Audio Application. On the right side, there are sections for 'Online Support' (including Online Training, Forum, and FAQ), 'Featured Products' (listing M0516LDE, MINI54FDE, and NANO130KE3BN), and 'Featured Videos' (including 'M0 Introduction(06:35)').

<p><b>Step3</b></p>	<p>The screenshot shows the NuvoTon website's 'Tool &amp; Software' page. A yellow callout bubble with the text 'Click here to enter Software download page' points to the 'Software' link in the left-hand navigation menu. The main content area is divided into three columns: 'Evaluation Board', 'Mass Production', and 'Upgrade'. The 'Evaluation Board' column includes links for 'Evaluation Board', 'Customer Target Board', and 'NuTiny Board'. The 'Mass Production' column includes links for 'On-Line In Circuit Programming', 'Off-Line In Circuit Programming', and 'IC Programming'. The 'Upgrade' column includes links for 'In System Programming' and 'Through -UART -USB -I2C -SPI -CAN -I/O'. A search bar and navigation links are visible at the top of the page.</p>
<p><b>Step4</b></p>	<p>Download the NuMicro<sup>®</sup> NUC121/125 Series CMSIS BSP.</p>

**8 REVISION HISTORY**

Date	Revision	Description
2017.02.15	1.00	Initial version.



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