ARM® Cortex®-M

32-bit Microcontroller

NuMicro® Family
NuTiny-SDK-NUC029SGE
User Manual

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NUTINY-SDK-NUC029SGE USER MANUAL

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1 OVERVIEW

NuTiny-SDK-NUC029SGE is a specific development tool for NuMicro® NUC029SGE. With the NuTiny-SDK-NUC029SGE, user can develop and verify the application program easily.

The NuTiny-SDK-NUC029SGE includes two portions. One is NuTiny-EVB-NUC029SGE and the other is Nu-Link-Me. NuTiny-EVB-NUC029SGE is the evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, user does not need other additional ICE or debug equipment.

The NUC029SGE can bridge the gap and replace the cost equivalent to traditional 8- and 16-bit microcontroller by 32-bit performance and rich functions. The NUC029SGE supports a wide range of applications from low-end, price sensitive designs to computing-intensive ones and provides advanced high-end features in economical products.

The NuMicro® NUC029xGE of NUC029 series microcontroller based on the Arm® Cortex®-M0 core operates at up to 72 MHz. With its crystal-less USB 2.0 FS interface, it is able to generate precise frequency required by USB protocol without the need of external crystal. It features adjustable VDDIO pins for specific I/O pins with a wide range of voltage from 1.8 V to 5.5 V for various operating voltages of external components, a unique high-speed PWM with clock frequency up to 144 MHz for precision control, and an integrated hardware divider to speed up the calculation for the control algorithms. Apart from that, the NUC029xGE also integrates SPROM (Security Protection ROM) which provides a secure code execution area to protect the intelligent property of developers. The NuMicro® NUC029xGE of NUC029 series is ideal for industrial control, motor control and metering applications.

The NuMicro® NUC029xGE of NUC029 series supports the wide voltage range from 2.5 V to 5.5 V and temperature ranging from -40℃ to 105℃, up to 256 Kbytes of Flash memory, 20 Kbytes of SRAM, 4 Kbytes of ISP (In-System Programming) ROM as well as ICP (In-Circuit Programming) ROM and IAP (In-Application Programming) ROM in 48-, 64-, 128-pin packages. It also supports high immunity of 8KV ESD (HBM)/4KV EFT. It is also equipped with plenty of peripherals such as USB interface, Timers, Watchdog Timers, RTC, PDMA, EBI, UART, Smart Card Interface, SPI, I²S, I²C, GPIO, up to 12 channels of 16-bit PWM, up to 20 channels of 12-bit ADC, analog comparator, temperature sensor, low voltage reset, brown-out detector, 96-bit UID (Unique Identification), and 128-bit UCID (Unique Customer Identification).

Besides, the NUC029SGE 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. The NUC029SGE also supports In-Application-Programming (IAP) function, user switches the code executing without the chip reset after the embedded flash updated.

2   NUTINY-SDK-NUC029SGE INTRODUCTION

The NuTiny-SDK-NUC029SGE uses the NUC029SGE as the target microcontroller. Figure 2-1 is NuTiny-SDK-NUC029SGE for the NUC029SGE, the left portion is called NuTiny-EVB-NUC029SGE and the right portion is Debug Adaptor called Nu-Link-Me.

The NuTiny-EVB-NUC029SGE 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 NUC029SGE features. The NuTiny-EVB-NUC029SGE can be a real system controller to design user's 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 debugging. To use the 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.
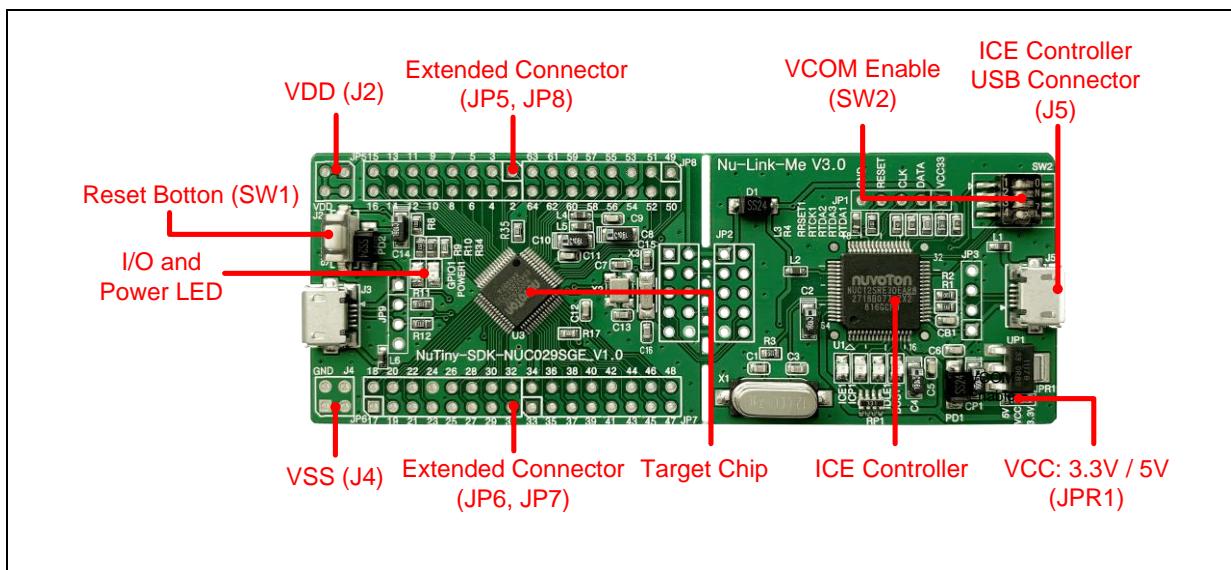

Figure 2-1 NuTiny-SDK-NUC029SGE (PCB Board)

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2.1 NuTiny-SDK-NUC029SGE Jumper Description

2.1.1 Power Setting

- J5: USB port in Nu-Link-Me
- J2: V_{DD} Voltage connecter in NuTiny-EVB-NUC029SGE

Model	JPR1	J5 USB port	J2 V_{DD}	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-NUC029SGE) 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-NUC029SGE)

2.1.3 USB Connector

- **J5:** Micro USB Connector in Nu-Link-Me V3.0 connected to a PC USB port

2.1.4 Extended Connector

- **JP5, JP6, JP7, JP8:** Show all chip pins in NuTiny-EVB-NUC029SGE

2.1.5 Reset Button
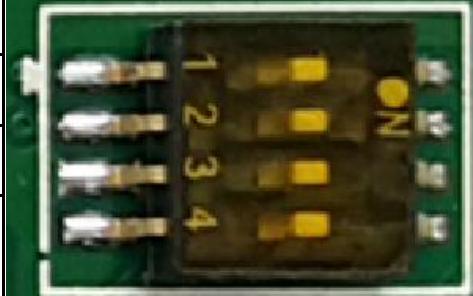
- **SW1:** Reset button in NuTiny-EVB-NUC029SGE

2.1.6 Power Connector

- **J2:** V_{DD} connector in NuTiny-EVB-NUC029SGE
- **J4:** V_{SS} connector in NuTiny-EVB-NUC029SGE

2.1.7 VCOM Enable

- **SW2**: VCOM function enable for the NuTiny-SDK-NUC029SGE. Switch SW2 on before power on to enable VCOM function. SW2 connects pin 49(PA.3/RXD) and pin 50(PA.2/TXD) in NuTiny-EVB-NUC029SGE with pin 22(PB.1/TXD) and pin 21(PB.0/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	SW2
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

The NuTiny-EVB-NUC029SGE provides NUC029SGE on board and the extended connector (**JP5, JP6, JP7 and JP8**) for LQFP-64 pin.

64 Pin	Pin Name	Type	Description
1	PB.15	I/O	General purpose digital I/O pin.
	ADC0_CH12	A	ADC0 channel 12 analog input.
	ACMP0_P3	A	Analog comparator 0 positive input 3 pin.
	EBI_nCS1	O	EBI chip select 1 output pin.
2	PB.5	I/O	General purpose digital I/O pin.
	ADC0_CH13	A	ADC0 channel 13 analog input.
	SPI0_MOSI	I/O	SPI0 MOSI (Master Out, Slave In) pin.
	SPI1_MOSI	I/O	SPI1 MOSI (Master Out, Slave In) pin.
	ACMP0_P2	A	Analog comparator 0 positive input 2 pin.
	SC1_RST	O	Smart Card 1 reset pin.
	EBI_AD6	I/O	EBI address/data bus bit 6.
	UART2_RXD	I	UART2 data receiver input pin.
3	PB.6	I/O	General purpose digital I/O pin.
	ADC0_CH14	A	ADC0 channel 14 analog input.
	SPI0_MISO	I/O	SPI0 MISO (Master In, Slave Out) pin.
	SPI1_MISO	I/O	SPI1 MISO (Master In, Slave Out) pin.
	ACMP0_P1	A	Analog comparator 0 positive input 1 pin.
	SC1_PWR	O	Smart Card 1 power pin.
	EBI_AD5	I/O	EBI address/data bus bit 5.
4	PB.7	I/O	General purpose digital I/O pin.
	ADC0_CH15	A	ADC0 channel 15 analog input.
	SPI0_CLK	I/O	SPI0 serial clock pin.
	SPI1_CLK	I/O	SPI1 serial clock pin.
	USCI2_CTL1	I/O	USCI2 control 1 pin.
	ACMP0_P0	A	Analog comparator 0 positive input 0 pin.
	SC1_DAT	I/O	Smart Card 1 data pin.
	EBI_AD4	I/O	EBI address/data bus bit 4.

64 Pin	Pin Name	Type	Description
5	nRESET	I	External reset input: active LOW, with an internal pull-up. Set this pin low reset to initial state.
6	PD.0	I/O	General purpose digital I/O pin.
	SPI0_I2SMCLK	I/O	SPI0 I2S master clock output pin
	SPI1_I2SMCLK	I/O	SPI1 I2S master clock output pin
	UART0_RXD	I	UART0 data receiver input pin.
	USCI2_CTL0	I/O	USCI2 control 0 pin.
	ACMP1_N	A	Analog comparator 1 negative input pin.
	SC1_CLK	O	Smart Card 1 clock pin.
	INT3	I	External interrupt 3 input pin.
7	AVSS	P	Ground pin for analog circuit.
8	PD.8	I/O	General purpose digital I/O pin.
	ADC0_CH17	A	ADC0 channel 17 analog input.
	UART0_nCTS	I	UART0 clear to Send input pin.
	USCI2_CTL1	I/O	USCI2 control 1 pin.
	TM2	I/O	Timer2 event counter input/toggle output pin.
	EBI_nCS0	O	EBI chip select 0 output pin.
9	PD.9	I/O	General purpose digital I/O pin.
	ADC0_CH18	A	ADC0 channel 18 analog input.
	UART0_RXD	I	UART0 data receiver input pin.
	USCI2_CTL0	I/O	USCI2 control 0 pin.
	ACMP1_P3	A	Analog comparator 1 positive input 3 pin.
	TM3	I/O	Timer3 event counter input/toggle output pin.
	EBI_ALE	O	EBI address latch enable output pin.
10	PD.1	I/O	General purpose digital I/O pin.
	ADC0_CH19	A	ADC0 channel 19 analog input.
	PWM0_SYNC_IN	I	PWM0 counter synchronous trigger input pin.
	UART0_TXD	O	UART0 data transmitter output pin.
	USCI2_CLK	I/O	USCI2 clock pin.
	ACMP1_P2	A	Analog comparator 1 positive input 2 pin.

64 Pin	Pin Name	Type	Description
	TM0	I/O	Timer0 event counter input/toggle output pin.
	EBI_nRD	O	EBI read enable output pin.
11	PD.2	I/O	General purpose digital I/O pin.
	ADC0_ST	I	ADC0 external trigger input pin.
	TM0_EXT	I/O	Timer0 external capture input/toggle output pin.
	USCI2_DAT0	I/O	USCI2 data 0 pin.
	ACMP1_P1	A	Analog comparator 1 positive input 1 pin.
	PWM0_BRAKE0	I	PWM0 Brake 0 input pin.
	EBI_nWR	O	EBI write enable output pin.
	INT0	I	External interrupt 0 input pin.
12	PD.3	I/O	General purpose digital I/O pin.
	TM2	I/O	Timer2 event counter input/toggle output pin.
	SPI0_I2SMCLK	I/O	SPI0 I2S master clock output pin
	TM1_EXT	I/O	Timer1 external capture input/toggle output pin.
	USCI2_DAT1	I/O	USCI2 data 1 pin.
	ACMP1_P0	A	Analog comparator 1 positive input 0 pin.
	PWM0_BRAKE1	I	PWM0 Brake 1 input pin.
	EBI_MCLK	O	EBI external clock output pin.
	INT1	I	External interrupt 1 input pin.
13	VBAT	P	Power supply by batteries for RTC.
14	PF.0	I/O	General purpose digital I/O pin.
	X32_OUT	O	External 32.768 kHz crystal output pin.
	USCI2_CTL1	I/O	USCI2 control 1 pin.
	INT5	I	External interrupt 5 input pin.
15	PF.1	I/O	General purpose digital I/O pin.
	X32_IN	I	External 32.768 kHz crystal input pin.
	USCI2_CTL0	I/O	USCI2 control 0 pin.
	PWM1_BRAKE0	I	PWM1 Brake 0 input pin.
16	PF.2	I/O	General purpose digital I/O pin.
	USCI2_CLK	I/O	USCI2 clock pin.

64 Pin	Pin Name	Type	Description
	PWM1_BRAKE1	I	PWM1 Brake 1 input pin.
17	PD.12	I/O	General purpose digital I/O pin.
	USCI1_CTL0	I/O	USCI1 control 0 pin.
	SPI1_SS	I/O	SPI1 slave select pin.
	UART0_TXD	O	UART0 data transmitter output pin.
	PWM1_CH0	I/O	PWM1 channel 0 output/capture input.
	EBI_ADR16	O	EBI address bus bit 16.
18	PD.13	I/O	General purpose digital I/O pin.
	USCI1_DAT1	I/O	USCI1 data 1 pin.
	SPI1_MOSI	I/O	SPI1 MOSI (Master Out, Slave In) pin.
	UART0_RXD	I	UART0 data receiver input pin.
	PWM1_CH1	I/O	PWM1 channel 1 output/capture input.
	EBI_ADR17	O	EBI address bus bit 17.
19	PD.14	I/O	General purpose digital I/O pin.
	USCI1_DAT0	I/O	USCI1 data 0 pin.
	SPI1_MISO	I/O	SPI1 MISO (Master In, Slave Out) pin.
	UART0_nCTS	I	UART0 clear to Send input pin.
	PWM1_CH2	I/O	PWM1 channel 2 output/capture input.
	EBI_ADR18	O	EBI address bus bit 18.
20	PD.15	I/O	General purpose digital I/O pin.
	USCI1_CLK	I/O	USCI1 clock pin.
	SPI1_CLK	I/O	SPI1 serial clock pin.
	UART0_nRTS	O	UART0 request to Send output pin.
	PWM1_CH3	I/O	PWM1 channel 3 output/capture input.
	EBI_ADR19	O	EBI address bus bit 19.
21	PD.7	I/O	General purpose digital I/O pin.
	USCI1_CTL1	I/O	USCI1 control 1 pin.
	SPI0_I2SMCLK	I/O	SPI0 I2S master clock output pin
	PWM0_SYNC_IN	I	PWM0 counter synchronous trigger input pin.
	TM1	I/O	Timer1 event counter input/toggle output pin.

64 Pin	Pin Name	Type	Description
	ACMP0_O	O	Analog comparator 0 output pin.
	PWM0_CH5	I/O	PWM0 channel 5 output/capture input.
	EBI_nRD	O	EBI read enable output pin.
22	PF.3	I/O	General purpose digital I/O pin.
	XT1_OUT	O	External 4~20 MHz (high speed) crystal output pin.
	I2C1_SCL	I/O	I^{2}C1 clock pin.
23	PF.4	I/O	General purpose digital I/O pin.
	XT1_IN	I	External 4~20 MHz (high speed) crystal input pin.
	I2C1_SDA	I/O	I^{2}C1 data input/output pin.
24	VSS	P	Ground pin for digital circuit.
25	VDD	P	Power supply for I/O ports and LDO source for internal PLL and digital circuit.
26	LDO_CAP	A	LDO output pin.
27	PC.0	I/O	General purpose digital I/O pin.
	SC0_DAT	I/O	Smart Card 0 data pin.
	SPI0_CLK	I/O	SPI0 serial clock pin.
	UART2_nCTS	I	UART2 clear to Send input pin.
	USCI0_DAT0	I/O	USCI0 data 0 pin.
	ACMP0_WLAT	I	Analog comparator 0 window latch input pin
	PWM0_CH0	I/O	PWM0 channel 0 output/capture input.
	EBI_AD8	I/O	EBI address/data bus bit 8.
	INT2	I	External interrupt 2 input pin.
28	PC.1	I/O	General purpose digital I/O pin.
	CLKO	O	Clock Out
	SC0_CLK	O	Smart Card 0 clock pin.
	UART2_nRTS	O	UART2 request to Send output pin.
	USCI0_DAT1	I/O	USCI0 data 1 pin.
	ACMP1_WLAT	I	Analog comparator 1 window latch input pin
	PWM0_CH1	I/O	PWM0 channel 1 output/capture input.
	EBI_AD9	I/O	EBI address/data bus bit 9.

64 Pin	Pin Name	Type	Description
29	PC.2	I/O	General purpose digital I/O pin.
	SC0_RST	O	Smart Card 0 reset pin.
	SPI0_SS	I/O	SPI0 slave select pin.
	UART2_TXD	O	UART2 data transmitter output pin.
	USCI0_CTL1	I/O	USCI0 control 1 pin.
	ACMP1_O	O	Analog comparator 1 output pin.
	PWM0_CH2	I/O	PWM0 channel 2 output/capture input.
	EBI_AD10	I/O	EBI address/data bus bit 10.
30	PC.3	I/O	General purpose digital I/O pin.
	SC0_PWR	O	Smart Card 0 power pin.
	SPI0_MOSI	I/O	SPI0 MOSI (Master Out, Slave In) pin.
	UART2_RXD	I	UART2 data receiver input pin.
	USCI0_CTL0	I/O	USCI0 control 0 pin.
	PWM0_CH3	I/O	PWM0 channel 3 output/capture input.
	EBI_AD11	I/O	EBI address/data bus bit 11.
31	PC.4	I/O	General purpose digital I/O pin.
	SC0_nCD	I	Smart Card 0 card detect pin.
	SPI0_MISO	I/O	SPI0 MISO (Master In, Slave Out) pin.
	I2C1_SCL	I/O	I^2C1 clock pin.
	USCI0_CLK	I/O	USCI0 clock pin.
	PWM0_CH4	I/O	PWM0 channel 4 output/capture input.
	EBI_AD12	I/O	EBI address/data bus bit 12.
32	PC.5	I/O	General purpose digital I/O pin.
	SPI0_I2SMCLK	I/O	SPI0 I2S master clock output pin
	I2C1_SDA	I/O	I^2C1 data input/output pin.
	USCI0_DAT0	I/O	USCI0 data 0 pin.
	PWM0_CH5	I/O	PWM0 channel 5 output/capture input.
	EBI_AD13	I/O	EBI address/data bus bit 13.
33	PC.6	I/O	General purpose digital I/O pin.
	USCI0_DAT1	I/O	USCI0 data 1 pin.

64 Pin	Pin Name	Type	Description
	ACMP1_O	O	Analog comparator 1 output pin.
	PWM1_CH0	I/O	PWM1 channel 0 output/capture input.
	EBI_AD14	I/O	EBI address/data bus bit 14.
34	PC.7	I/O	General purpose digital I/O pin.
	USCI0_CTL1	I/O	USCI0 control 1 pin.
	PWM1_CH1	I/O	PWM1 channel 1 output/capture input.
	EBI_AD15	I/O	EBI address/data bus bit 15.
35	PE.6	I/O	General purpose digital I/O pin.
	ICE_CLK	I	Serial wired debugger clock pin.
	I2C0_SCL	I/O	I^2C0 clock pin.
	UART0_RXD	I	UART0 data receiver input pin.
36	PE.7	I/O	General purpose digital I/O pin.
	ICE_DAT	O	Serial wired debugger data pin.
	I2C0_SDA	I/O	I^2C0 data input/output pin.
	UART0_TXD	O	UART0 data transmitter output pin.
37	PE.8	I/O	General purpose digital I/O pin.
	UART1_TXD	O	UART1 data transmitter output pin.
	TM0	I/O	Timer0 event counter input/toggle output pin.
	I2C1_SCL	I/O	I^2C1 clock pin.
	SC0_PWR	O	Smart Card 0 power pin.
38	PE.9	I/O	General purpose digital I/O pin.
	UART1_RXD	I	UART1 data receiver input pin.
	TM1	I/O	Timer1 event counter input/toggle output pin.
	I2C1_SDA	I/O	I^2C1 data input/output pin.
	SC0_RST	O	Smart Card 0 reset pin.
39	PE.10	I/O	General purpose digital I/O pin.
	SPI1_MISO	I/O	SPI1 MISO (Master In, Slave Out) pin.
	SPI0_MISO	I/O	SPI0 MISO (Master In, Slave Out) pin.
	UART1_nCTS	I	UART1 clear to Send input pin.
	SC0_DAT	I/O	Smart Card 0 data pin.

64 Pin	Pin Name	Type	Description
	SPI1_CLK	I/O	SPI1 serial clock pin.
	EBI_AD7	I/O	EBI address/data bus bit 7.
	TM0_EXT	I/O	Timer0 external capture input/toggle output pin.
40	PE.11	I/O	General purpose digital I/O pin.
	SPI1_MOSI	I/O	SPI1 MOSI (Master Out, Slave In) pin.
	SPI0_MOSI	I/O	SPI0 MOSI (Master Out, Slave In) pin.
	UART1_nRTS	O	UART1 request to Send output pin.
	SC0_CLK	O	Smart Card 0 clock pin.
	SPI1_MISO	I/O	SPI1 MISO (Master In, Slave Out) pin.
	EBI_AD6	I/O	EBI address/data bus bit 6.
	TM1_EXT	I/O	Timer1 external capture input/toggle output pin.
41	PE.12	I/O	General purpose digital I/O pin.
	SPI1_SS	I/O	SPI1 slave select pin.
	SPI0_SS	I/O	SPI0 slave select pin.
	UART1_TXD	O	UART1 data transmitter output pin.
	I2C0_SCL	I/O	I^2C0 clock pin.
	SPI1_MOSI	I/O	SPI1 MOSI (Master Out, Slave In) pin.
	EBI_AD5	I/O	EBI address/data bus bit 5.
	TM2_EXT	I/O	Timer2 external capture input/toggle output pin.
42	PE.13	I/O	General purpose digital I/O pin.
	SPI1_CLK	I/O	SPI1 serial clock pin.
	SPI0_CLK	I/O	SPI0 serial clock pin.
	UART1_RXD	I	UART1 data receiver input pin.
	I2C0_SDA	I/O	I^2C0 data input/output pin.
	SPI1_SS	I/O	SPI1 slave select pin.
	EBI_AD4	I/O	EBI address/data bus bit 4.
	TM3_EXT	I/O	Timer3 external capture input/toggle output pin.
43	VDDIO	P	Power supply for PE.1, PE.8~PE.13.
44	USB_VBUS	P	Power supply from USB host or HUB.

64 Pin	Pin Name	Type	Description
45	USB_D-	A	USB differential signal D-.
46	USB_D+	A	USB differential signal D+.
47	PF.7	I/O	General purpose digital I/O pin.
48	USB_VDD33_CAP	A	Internal power regulator output 3.3V decoupling pin.
49	PA.3	I/O	General purpose digital I/O pin.
	UART0_RXD	I	UART0 data receiver input pin.
	UART0_nRTS	O	UART0 request to Send output pin.
	I2C0_SCL	I/O	I^{2}C0 clock pin.
	SC0_PWR	O	Smart Card 0 power pin.
	PWM1_CH2	I/O	PWM1 channel 2 output/capture input.
	EBI_AD3	I/O	EBI address/data bus bit 3.
	USCI1_CLK	I/O	USCI1 clock pin.
50	PA.2	I/O	General purpose digital I/O pin.
	UART0_TXD	O	UART0 data transmitter output pin.
	UART0_nCTS	I	UART0 clear to Send input pin.
	I2C0_SDA	I/O	I^{2}C0 data input/output pin.
	SC0_RST	O	Smart Card 0 reset pin.
	PWM1_CH3	I/O	PWM1 channel 3 output/capture input.
	EBI_AD2	I/O	EBI address/data bus bit 2.
	USCI1_CTL0	I/O	USCI1 control 0 pin.
51	PA.1	I/O	General purpose digital I/O pin.
	UART1_nRTS	O	UART1 request to Send output pin.
	UART1_RXD	I	UART1 data receiver input pin.
	USCI1_CTL1	I/O	USCI1 control 1 pin.
	SC0_DAT	I/O	Smart Card 0 data pin.
	PWM1_CH4	I/O	PWM1 channel 4 output/capture input.
	EBI_AD1	I/O	EBI address/data bus bit 1.
52	PA.0	I/O	General purpose digital I/O pin.
	UART1_nCTS	I	UART1 clear to Send input pin.

64 Pin	Pin Name	Type	Description
	UART1_TXD	O	UART1 data transmitter output pin.
	USCI1_CTL0	I/O	USCI1 control 0 pin.
	SC0_CLK	O	Smart Card 0 clock pin.
	PWM1_CH5	I/O	PWM1 channel 5 output/capture input.
	EBI_AD0	I/O	EBI address/data bus bit 0.
	INT0	I	External interrupt 0 input pin.
53	VSS	P	Ground pin for digital circuit.
54	VDD	P	Power supply for I/O ports and LDO source for internal PLL and digital circuit.
55	AVDD	P	Power supply for internal analog circuit.
56	VREF	A	ADC reference voltage input. Note: This pin needs to be connected with a 1uF capacitor.
57	PB.0	I/O	General purpose digital I/O pin.
	ADC0_CH0	A	ADC0 channel 0 analog input.
	VDET_P0	A	Voltage detector positive input 0 pin.
	UART2_RXD	I	UART2 data receiver input pin.
	TM2	I/O	Timer2 event counter input/toggle output pin.
	USCI1_DAT0	I/O	USCI1 data 0 pin.
	EBI_nWRL	O	EBI low byte write enable output pin.
	INT1	I	External interrupt 1 input pin.
	TM1_EXT	I/O	Timer1 external capture input/toggle output pin.
58	PB.1	I/O	General purpose digital I/O pin.
	ADC0_CH1	A	ADC0 channel 1 analog input.
	VDET_P1	A	Voltage detector positive input 1 pin.
	UART2_TXD	O	UART2 data transmitter output pin.
	TM3	I/O	Timer3 event counter input/toggle output pin.
	SC0_RST	O	Smart Card 0 reset pin.
	PWM0_SYNC_OUT	O	PWM0 counter synchronous trigger output pin.
	EBI_nWRH	O	EBI high byte write enable output pin
	USCI1_DAT1	I/O	USCI1 data 1 pin.

64 Pin	Pin Name	Type	Description
59	PB.2	I/O	General purpose digital I/O pin.
	ADC0_CH2	A	ADC0 channel 2 analog input.
	SPI0_CLK	I/O	SPI0 serial clock pin.
	SPI1_CLK	I/O	SPI1 serial clock pin.
	UART1_RXD	I	UART1 data receiver input pin.
	SC0_nCD	I	Smart Card 0 card detect pin.
	TM_BRAKE0	I	TM_BRAKE0 I Timer Brake * input pin.
	EBI_nCS0	O	EBI chip select 0 output pin.
	USCI0_DAT0	I/O	USCI0 data 0 pin.
	TM2_EXT	I/O	Timer2 external capture input/toggle output pin.
60	PB.3	I/O	General purpose digital I/O pin.
	ADC0_CH3	A	ADC0 channel 3 analog input.
	SPI0_MISO	I/O	SPI0 MISO (Master In, Slave Out) pin.
	SPI1_MISO	I/O	SPI1 MISO (Master In, Slave Out) pin.
	UART1_TXD	O	UART1 data transmitter output pin.
	TM_BRAKE1	I	TM_BRAKE1 I Timer Brake * input pin.
	EBI_ALE	O	EBI address latch enable output pin.
	USCI0_DAT1	I/O	USCI0 data 1 pin.
	TM0_EXT	I/O	Timer0 external capture input/toggle output pin.
61	PB.4	I/O	General purpose digital I/O pin.
	ADC0_CH4	A	ADC0 channel 4 analog input.
	SPI0_SS	I/O	SPI0 slave select pin.
	SPI1_SS	I/O	SPI1 slave select pin.
	UART1_nCTS	I	UART1 clear to Send input pin.
	ACMP0_N	A	Analog comparator 0 negative input pin.
	SC1_nCD	I	Smart Card 1 card detect pin.
	EBI_AD7	I/O	EBI address/data bus bit 7.
	USCI0_CTL1	I/O	USCI0 control 1 pin.
	UART2_RXD	I	UART2 data receiver input pin.
	TM1_EXT	I/O	Timer1 external capture input/toggle output pin.

64 Pin	Pin Name	Type	Description
62	PB.8	I/O	General purpose digital I/O pin.
	ADC0_CH5	A	ADC0 channel 5 analog input.
	UART1_nRTS	O	UART1 request to Send output pin.
	TM_BRAKE2	I	TM_BRAKE2 I Timer Brake * input pin.
	PWM0_CH2	I/O	PWM0 channel 2 output/capture input.
	USCI0_CTL0	I/O	USCI0 control 0 pin.
63	PB.11	I/O	General purpose digital I/O pin.
	ADC0_CH8	A	ADC0 channel 8 analog input.
64	PE.2	I/O	General purpose digital I/O pin.
	ADC0_CH9	A	ADC0 channel 9 analog input.
	UART1_nRTS	O	UART1 request to Send output pin.
	TM_BRAKE3	I	TM_BRAKE3 I Timer Brake * input pin.
	PWM0_CH2	I/O	PWM0 channel 2 output/capture input.
	USCI0_CTL0	I/O	USCI0 control 0 pin.

Note: Pin Type I = Digital Input, O = Digital Output; AI = Analog Input; P = Power Pin; AP = Analog Power

Table 2-1 Pin Assignment for NUC029SGE

2.3 NuTiny-SDK-NUC029SGE PCB Placement

Figure 2-2 shows the NuTiny-SDK-NUC029SGE PCB placement.
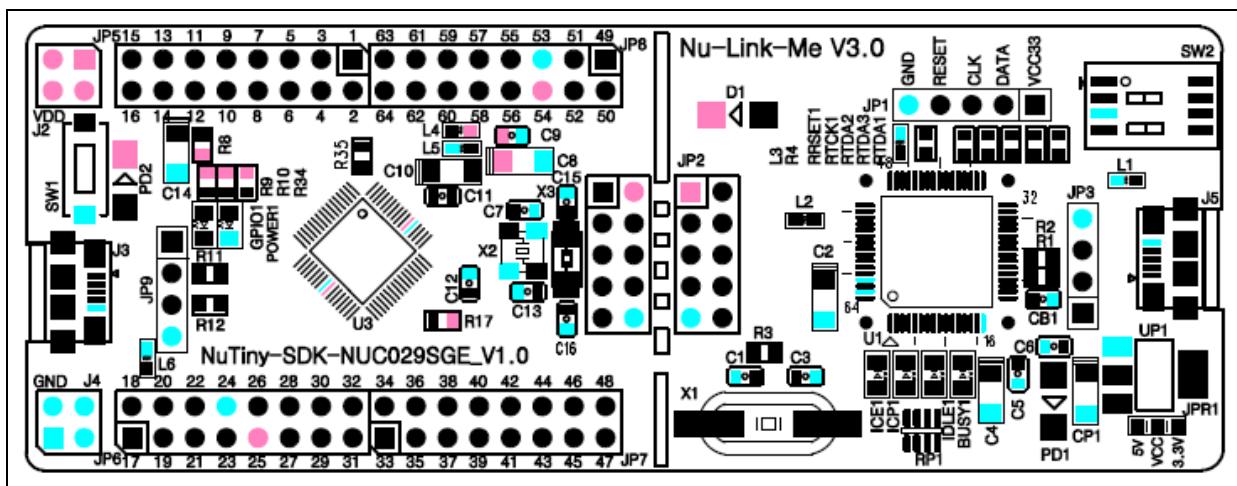
Figure 2-2 NuTiny-SDK-NUC029SGE PCB Placement

3   HOW TO START NUTINY-SDK-NUC029SGE ON THE KEIL MDK ENVIRONMENT

3.1   Downloading and Installing Keil MDK Software

Please visit the Keil company website (http://www.keil.com) to download and install the Keil MDK.

3.2   Downloading and Installing Nuvoton Nu-Link Driver

Please visit the official Nuvoton 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.
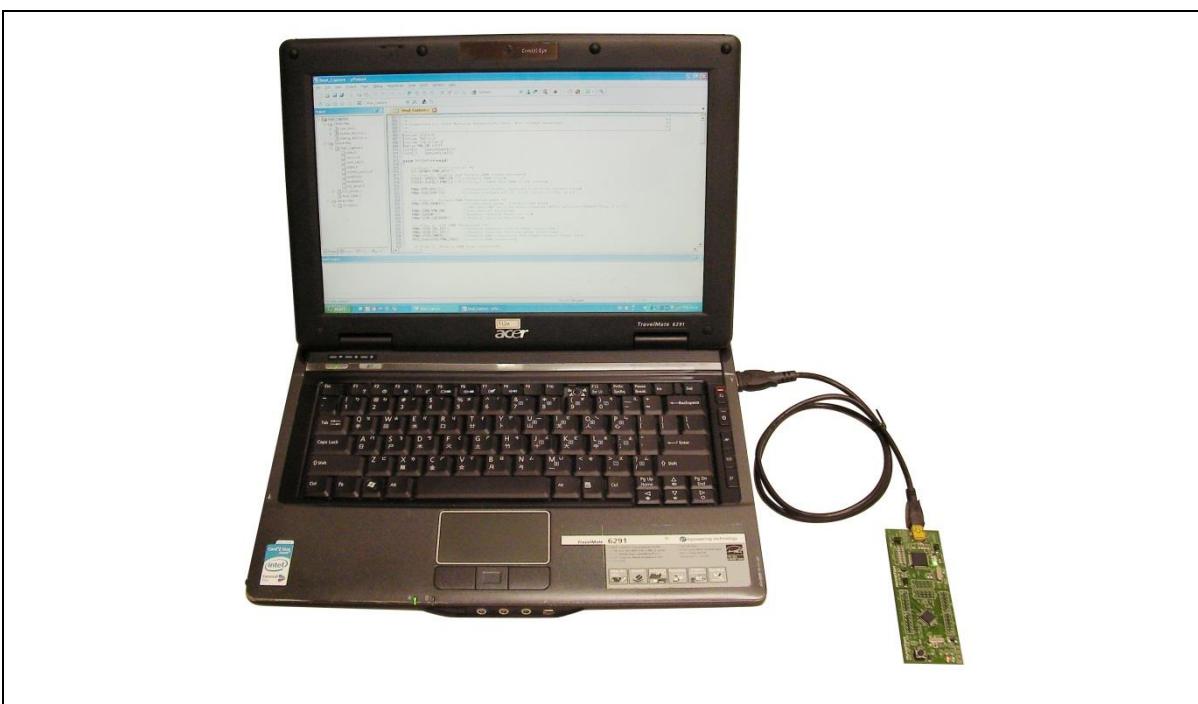
Figure 3-1 NuTiny-SDK-NUC029SGE Hardware Setup

3.4   Example Program

This example demonstrates downloading and debugging an application on a NuTiny-SDK-NUC029SGE board. It can be found on the list directory and downloaded from Nuvoton NuMicro® website.

Directory	..\NUC029xGE_BSPv3.00.001\SampleCode\Template\Keil

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-SDK-NUC029SGE 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 visit the official Nuvoton 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.
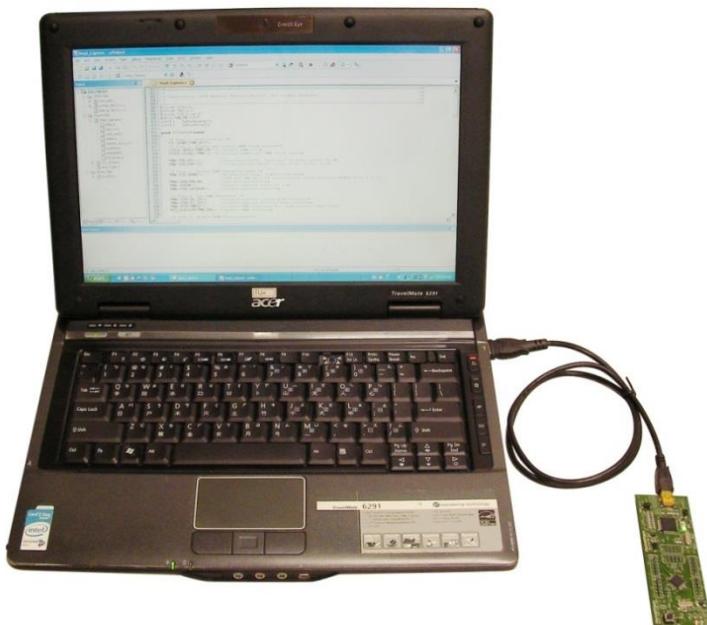
Figure 4-1 NuTiny-SDK-NUC029SGE Hardware Setup

4.4   Example Program

This example demonstrates downloading and debugging an application on a NuTiny-SDK-NUC029SGE board. It can be found on the list directory and downloaded from Nuvoton NuMicro® website.

Directory	..\NUC029xGE_BSPv3.00.001\SampleCode\Template\IAR

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.
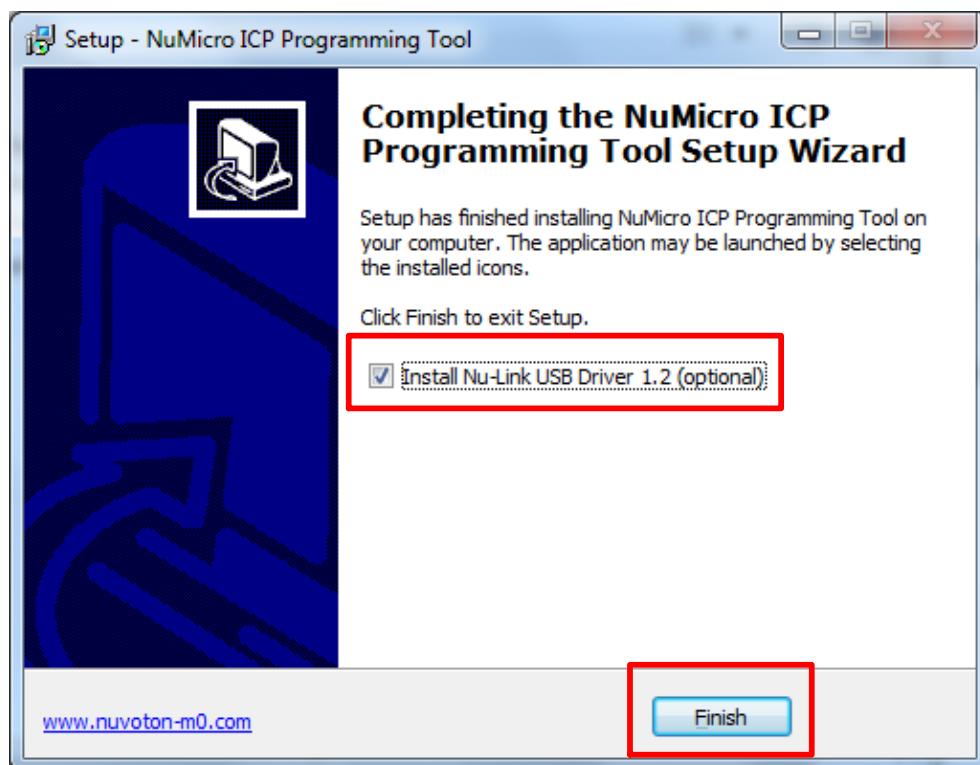
Figure 5-1 Optional Step after ICP Programming Tool Installation
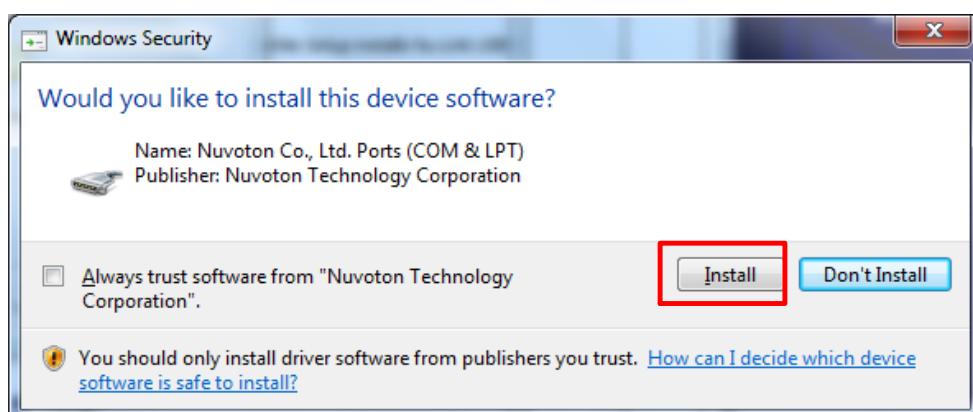
Figure 5-2 Install Nuvoton COM&LPT Driver
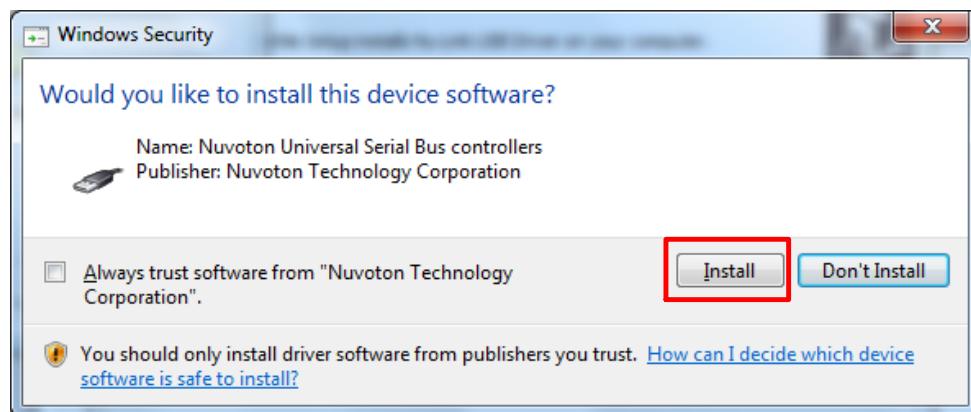
Figure 5-3 Install Nuvoton Universal Serial Bus Controllers

5.2 VCOM Mode Setting on NuTiny-SDK-NUC029SGE
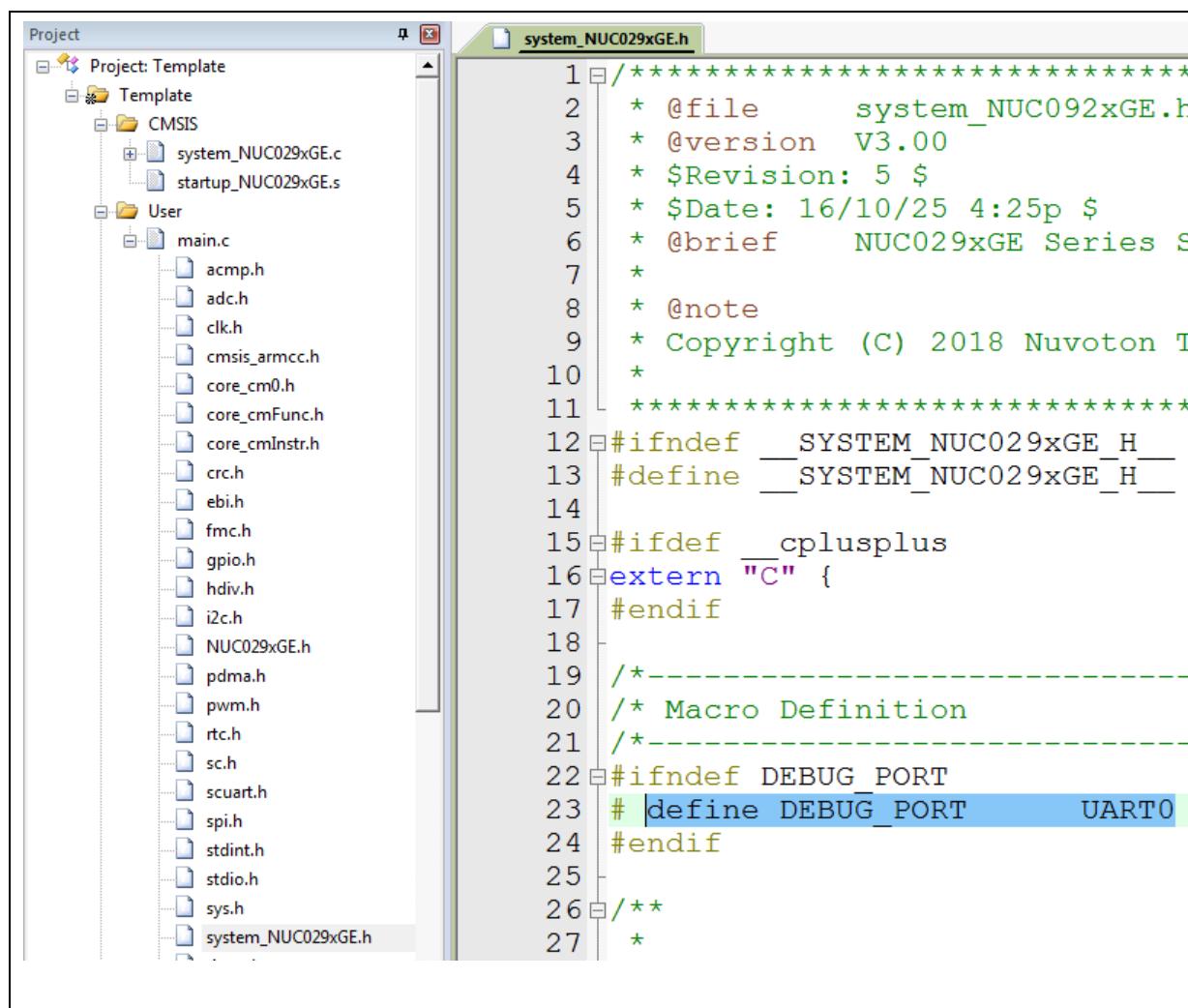
Before the NuTiny-SDK-NUC029SGE is connected to the PC, please enable VCOM function by switching on SW2. The NuTiny-EVB-NUC029SGE transmits through UART0 to VCOM to send out data. Switch SW2 off when using UART0 function without VCOM function.

5.3 Development Tool Setup

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_NUC029xGE.h to check the using UART in DEBUG_PORT, which has to be the same as the using UART in the NuTiny-EVB-NUC029SGE.
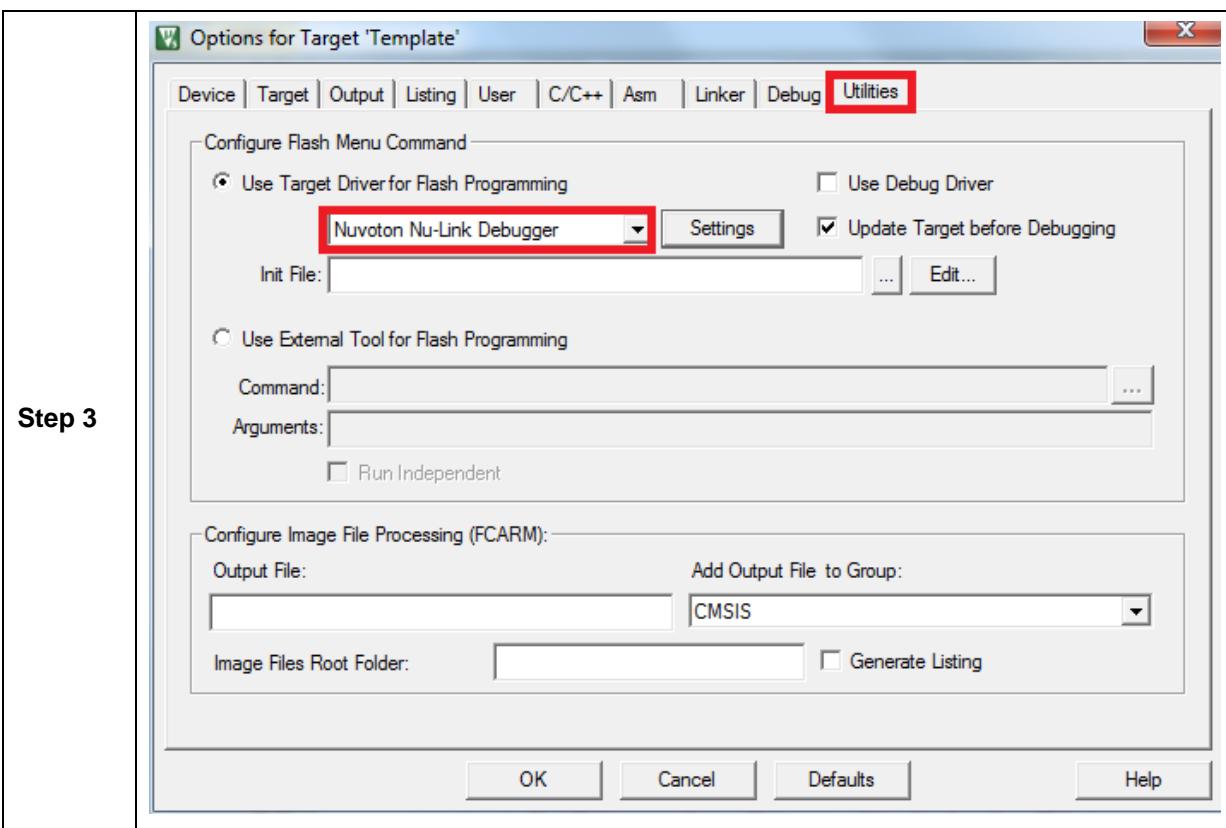
Figure 5-4 Using UART on Keil μVision® IDE

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	

NUTINY-SDK-NUC029SGE USER MANUAL

Step 3	

5.3.3 Build and Download Code to NuTiny-SDK-NUC029SGE

Please build the project and download code to the NuTiny-SDK-NUC029SGE.

5.3.4 Open the Serial Port Terminal

User can use serial port terminal, PuTTY for example, to print out debug message.
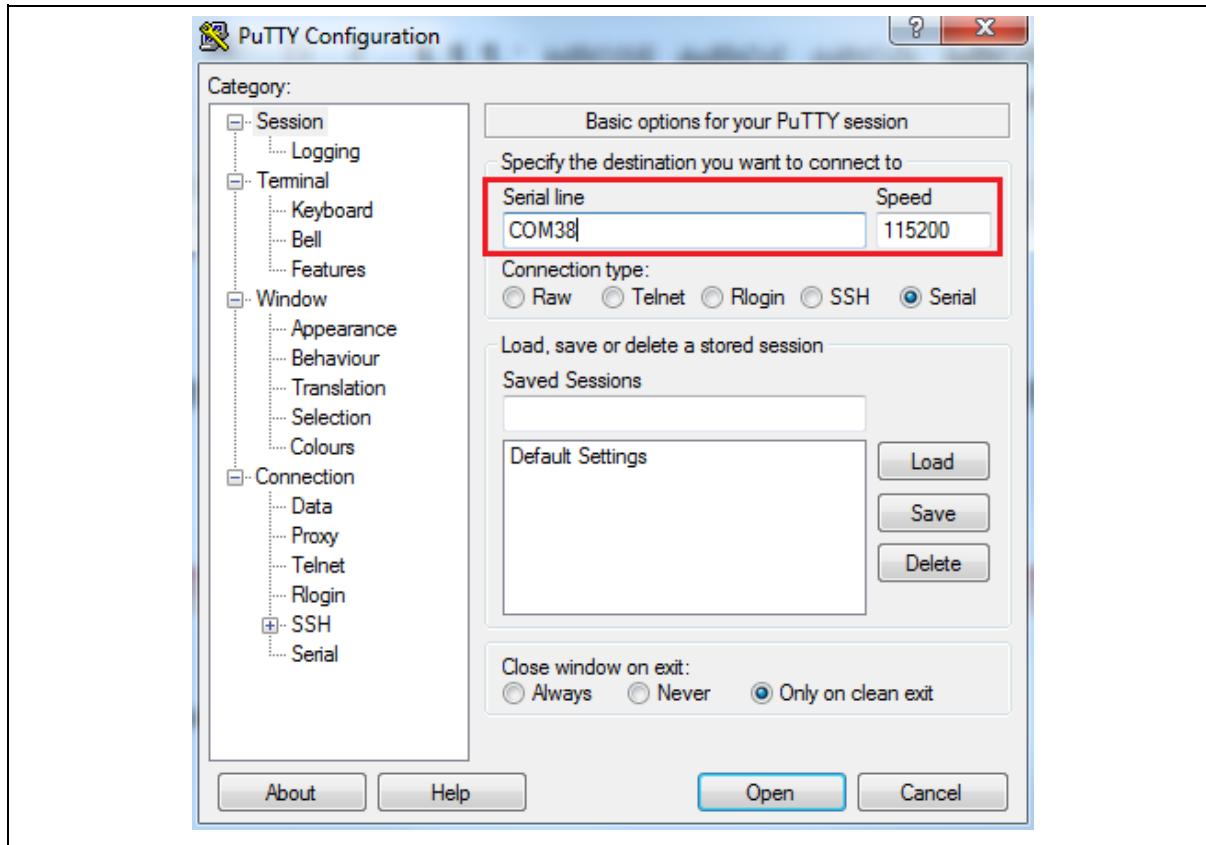
Figure 5-5 Set Baud Rate

5.3.5 Reset Chip

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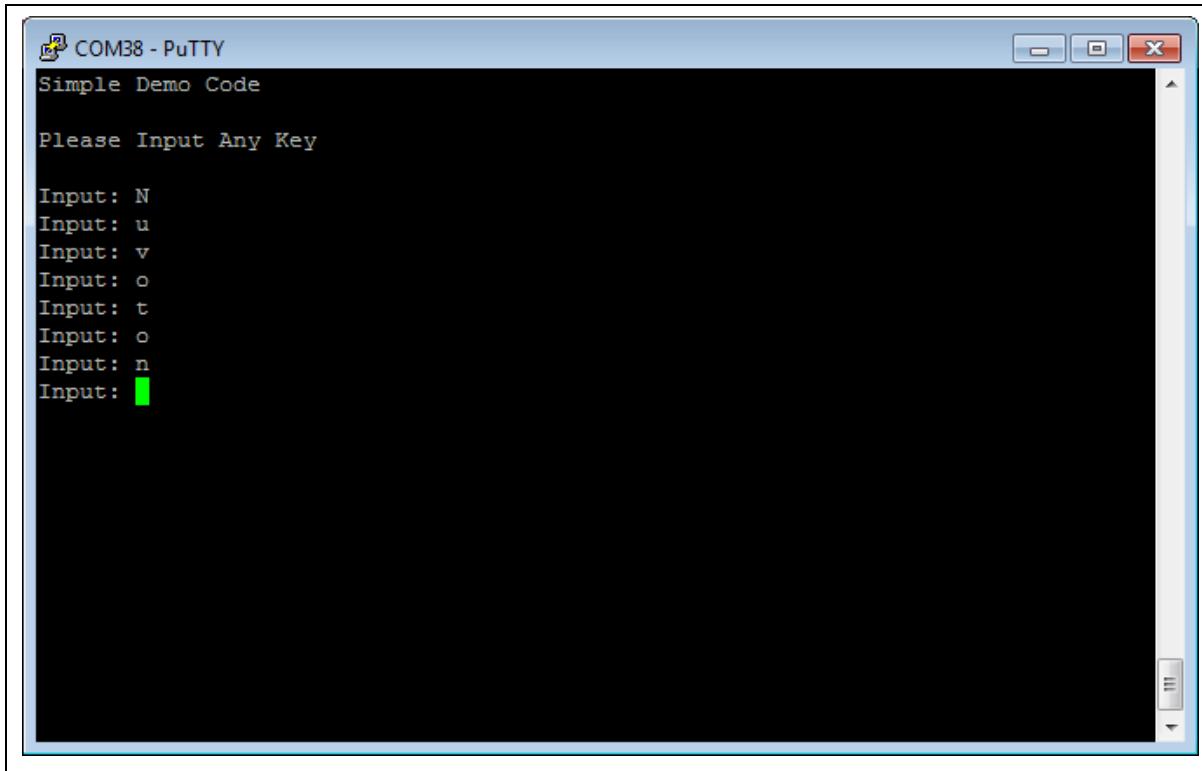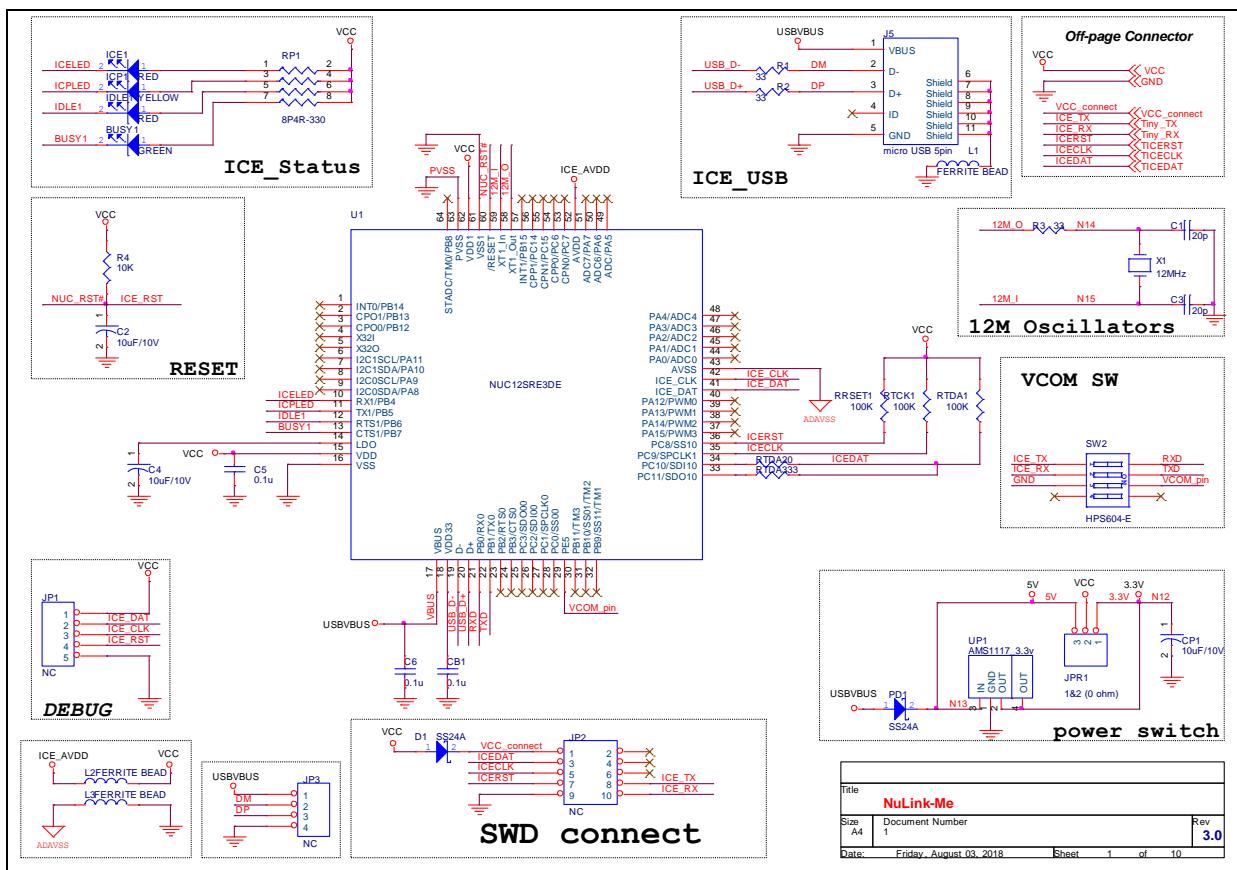

Figure 5-6 Serial Port Terminal Windows
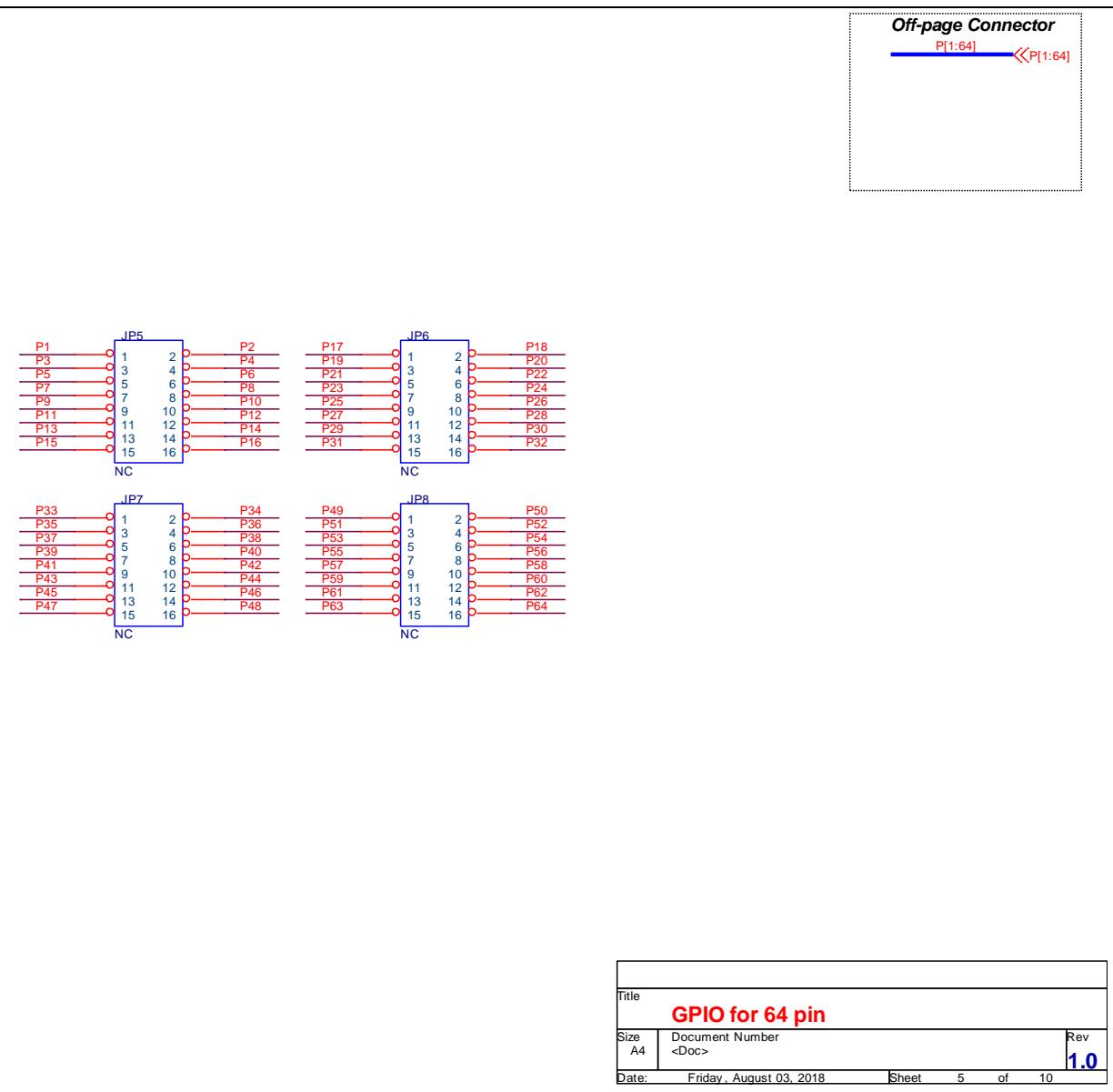
Note: Please switch SW2 on before the NuTiny-SDK-NUC029SGE is connected to the PC. When the NuTiny-SDK-NUC029SGE is connected to the PC with SW2 switch on, PC will detect VCOM as a USB device and the detection will only be processed once. VCOM will not function if SW2 switched on after the connection.

# 6 NUTINY-SDK-NUC029SGE SCHEMATICS
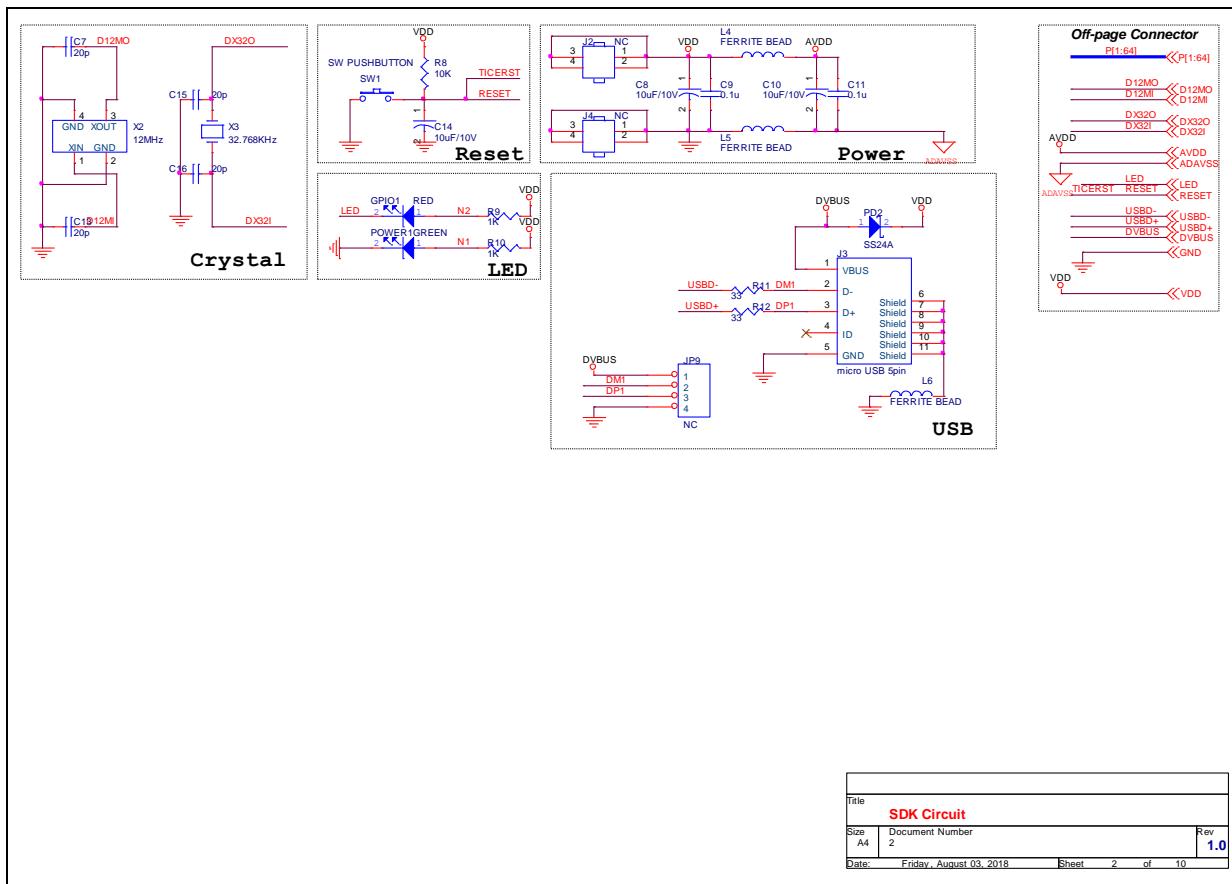
6.1 Nu-Link-Me V3.0 Schematic
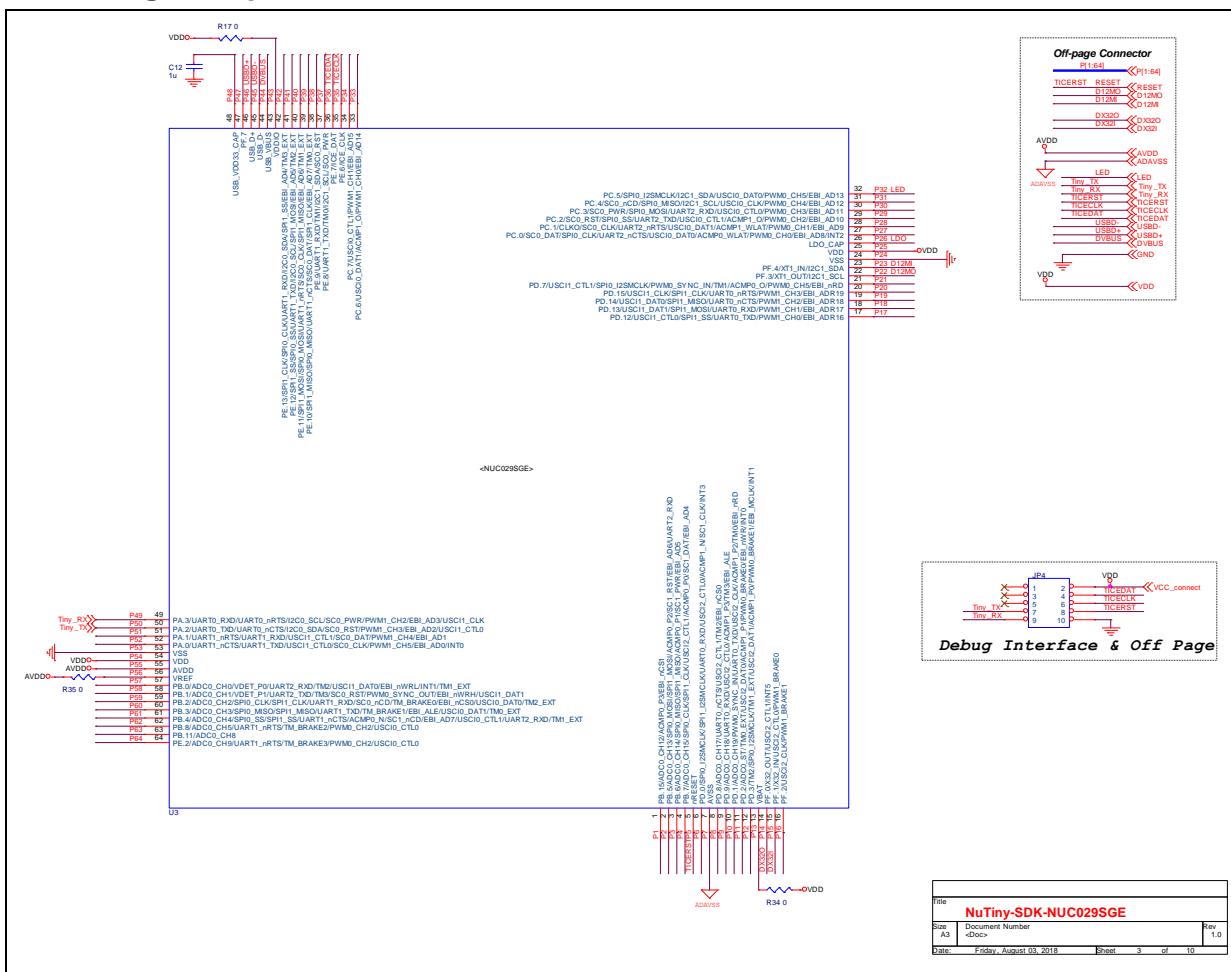
6.2 GPIO for 64 pin Schematic

NUTINY-SDK-NUC029SGE USER MANUAL

6.3 SDK Circuit Schematic

6.4 Target Chip

7   REVISION HISTORY

Date	Revision	Description
2019.01.21	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.