NuMicro® Family

Arm® Cortex®-M23-based Microcontroller

NuMaker-M253LEB

User Manual

Evaluation Board for NuMicro® M253 Series

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1 OVERVIEW

The NuMaker-M253LEB is an evaluation board for Nuvoton NuMicro M253LE and M253LD microcontrollers. The NuMaker-M253LEB consists of two parts: an M253 target board and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-M253LEB is designed for project evaluation, prototype development and validation with power consumption monitoring function.

The M253 target board is based on NuMicro M253LE3BE. For the development flexibility, the M253BE target board provides the extension connectors, the Arduino UNO compatible headers and the capability of adopting multiple power supplies. Furthermore, the Nuvoton-designed ammeter connector can measure the power consumption instantly, which is essential for the prototype evaluation.

In addition, there is an attached on-board debugger and programmer “Nu-Link2-Me”. The Nu-Link2-Me supports on-chip debugging, online and offline ICP programming via SWD interface. The Nu-Link2-Me supports virtual COM (VCOM) port for printing debug messages on PC. Besides, the programming status could be shown on the built-in LEDs. Lastly, the Nu-Link2-Me could be detached from the evaluation board and become a stand-alone mass production programmer.

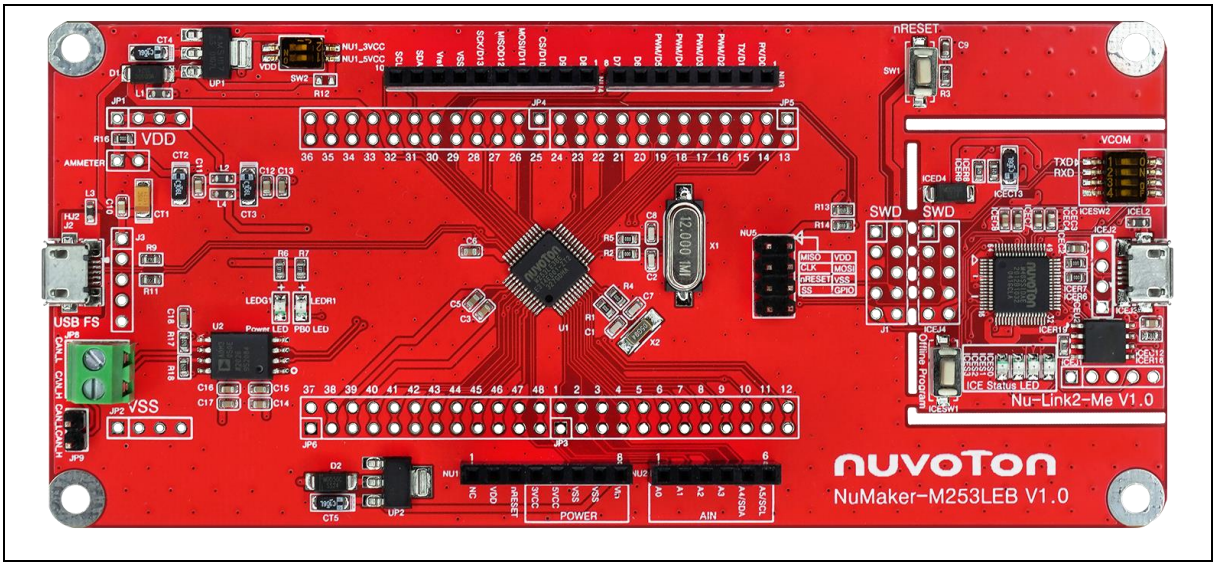


Figure 1-1 NuMaker-M253LEB Evaluation Board

2 FEATURES

- NuMicro M253LE3BE used as main microcontroller with function compatible with:
  - M253LD3BE
- M253LE3BE full pins extension connectors
- Arduino UNO compatible extension connectors
- Ammeter connector for measuring the microcontroller's power consumption
- Flexible board power supply:
  - External V_{DD} power connector
  - Arduino UNO compatible extension connector Vin
  - USB FS connector on M253BE target board
  - ICE USB connector on Nu-Link2-Me
- On-board Nu-Link2-Me debugger and programmer:
  - Debug through SWD interface
  - Online/offline programming
  - Virtual COM port function

3 HARDWARE CONFIGURATION

3.1 Front View

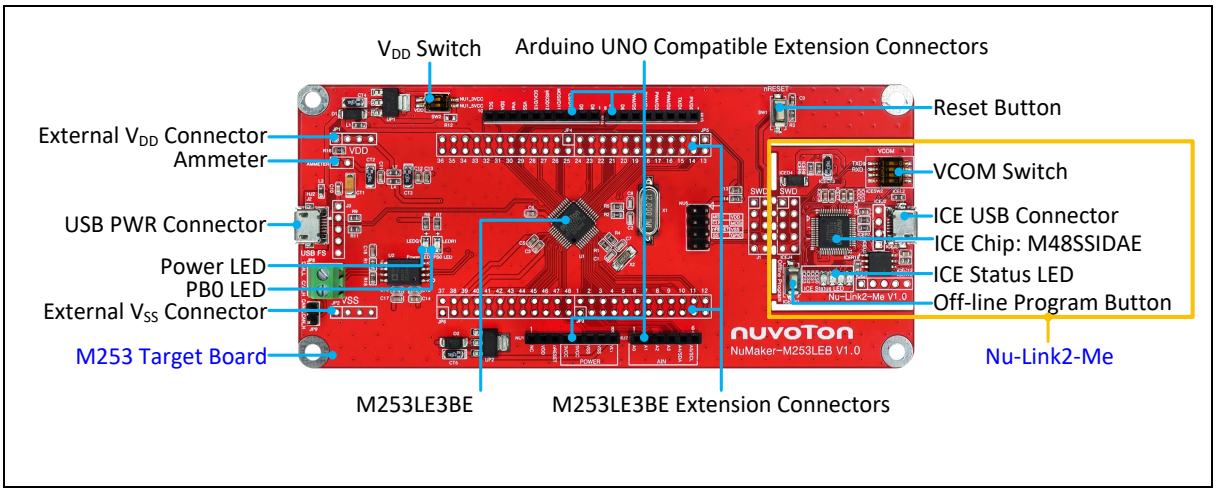


Figure 3-1 Front View of NuMaker-M253LEB

Figure 3-1 shows the main components and connectors from the front side of NuMaker-M253LEB. The following lists components and connectors from the front view:

- Target chip: M253LE3BE (U1)
- USB PWR Connector (J2)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
- M253LE3BE Extension Connectors (JP3, JP4, JP5 and JP6)
- External V_{DD} Power Connector (JP1)
- External V_{SS} Power Connector (JP2)
- V_{DD} Switch (SW2)
- Ammeter Connector (AMMETER)
- Reset Button (SW1)
- Power LED and PB0 LED (LEDG1 and LEDR1)
- Nu-Link2-Me
  - VCOM Switch
  - ICE Chip: M48SSIDAE (ICEU2)
  - ICE USB Connector (ICEJ3)
  - ICE Status LED (ICES0, ICES1, ICES2, ICES3)
  - Off-line Program Button (ICESW1)

3.2 Rear View

Figure 3-2 shows the main components and connectors from the rear side of NuMaker-M253LEB.

The following lists components and connectors from the rear view:

- Nu-Link2-Me
  - MCUVCC Power Switch (ICEJPR1)
  - ICEVCC Power Switch (ICEJPR2)

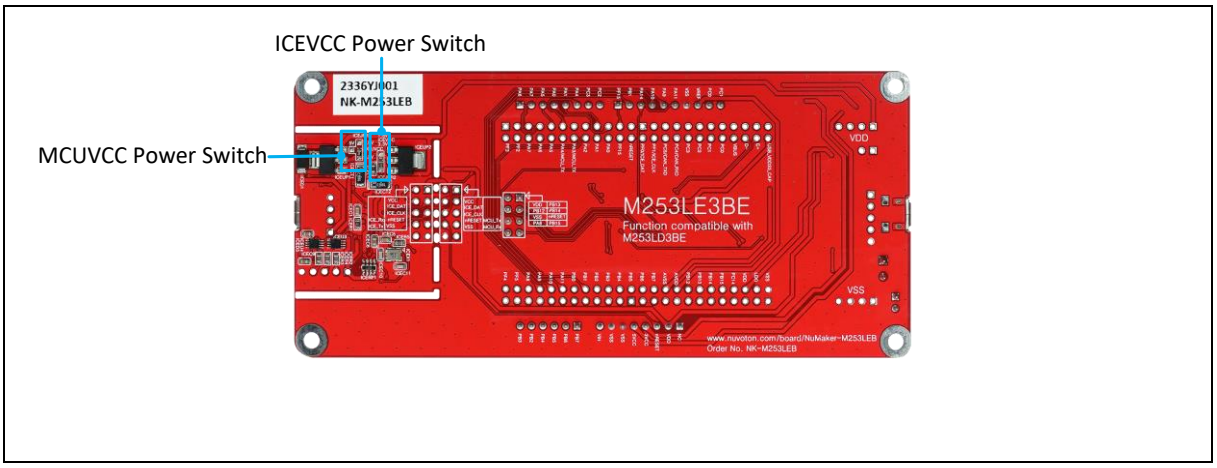


Figure 3-2 Rear View of NuMaker-M253LEB

3.3 Extension Connectors

Table 3-1 presents the extension connectors.

Connector	Description
JP3, JP4, JP5 and JP6	Full pins extension connectors on the NuMaker-M253LEB.
NU1, NU2, NU3 and NU4	Arduino UNO compatible pins on the NuMaker-M253LEB.

Table 3-1 Extension Connectors

3.3.1 Pin Assignment for Extension Connectors

The NuMaker-M253LEB provides the M253LE3BE onboard and extension connectors (JP3, JP4, JP5 and JP6). Figure 3-3 shows the M253LE3BE extension connectors.

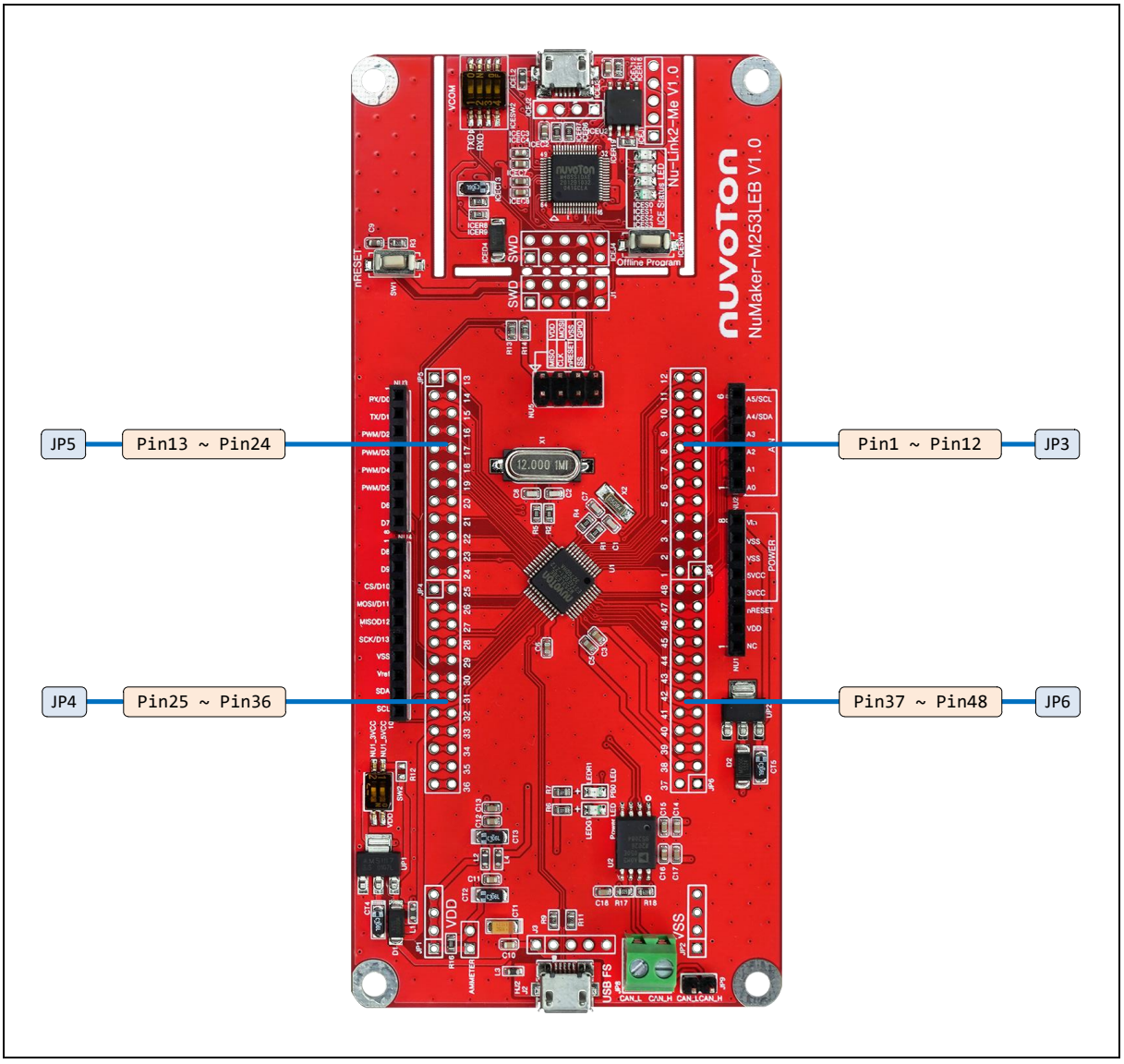


Figure 3-3 M253LE3BE Extension Connectors

Header		M253LE3BE	
		Pin No.	Function
JP3	JP3.1	1	PB.5 / EADC0_CH5 / I2C0_SCL / UART2_TXD / TM0 / INT0
	JP3.2	2	PB.4 / EADC0_CH4 / I2C0_SDA / UART2_RXD / TM1 / INT1
	JP3.3	3	PB.3 / EADC0_CH3 / I2C1_SCL / UART1_TXD / TM2 / INT2
	JP3.4	4	PB.2 / EADC0_CH2 / I2C1_SDA / UART1_RXD / TM3 / INT3
	JP3.5	5	PB.1 / EADC0_CH1 / UART2_TXD / I2C1_SCL
	JP3.6	6	PB.0 / EADC0_CH0 / UART2_RXD / SPI0_I2SMCLK / I2C1_SDA
	JP3.7	7	PA.11 / USCI0_CLK / BPWM0_CH0 / TM0_EXT
	JP3.8	8	PA.10 / USCI0_DAT0 / BPWM0_CH1 / TM1_EXT
	JP3.9	9	PA.9 / USCI0_DAT1 / UART1_TXD / BPWM0_CH2 / TM2_EXT
	JP3.10	10	PA.8 / USCI0_CTL1 / UART1_RXD / BPWM0_CH3 / TM3_EXT / INT4
	JP3.11	11	PF.5 / UART2_RXD / UART2_nCTS / BPWM0_CH4 / X32_IN / EADC0_ST
	JP3.12	12	PF.4 / UART2_TXD / UART2_nRTS / BPWM0_CH5 / X32_OUT
JP5	JP5.1	13	PF.3 / UART0_TXD / I2C0_SCL / XT1_IN
	JP5.2	14	PF.2 / UART0_RXD / I2C0_SDA / XT1_OUT
	JP5.3	15	PA.7 / UART0_TXD / I2C1_SCL / TM2 / INT1
	JP5.4	16	PA.6 / UART0_RXD / I2C1_SDA / TM3 / INT0
	JP5.5	17	PA.5 / CAN0_TXD / UART0_nCTS / UART0_TXD / I2C0_SCL / BPWM0_CH5
	JP5.6	18	PA.4 / CAN0_RXD / SPI0_I2SMCLK / UART0_nRTS / UART0_RXD / I2C0_SDA / BPWM0_CH4
	JP5.7	19	PA.3 / UART4_TXD / SPI0_SS / UART1_TXD / I2C1_SCL / BPWM0_CH3 / CLKO
	JP5.8	20	PA.2 / UART4_RXD / SPI0_CLK / UART1_RXD / I2C1_SDA / BPWM0_CH2
	JP5.9	21	PA.1 / SPI0_MISO / UART0_TXD / UART1_nCTS / BPWM0_CH1
	JP5.10	22	PA.0 / SPI0_MOSI / UART0_RXD / UART1_nRTS / BPWM0_CH0
	JP5.11	23	PF.15 / TM2 / CLKO / INT4
	JP5.12	24	nRESET
JP4	JP4.1	25	PF.0 / UART1_TXD / I2C1_SCL / UART0_TXD / ICE_DAT
	JP4.2	26	PF.1 / UART1_RXD / I2C1_SDA / UART0_RXD / ICE_CLK
	JP4.3	27	PC.5 / UART2_TXD / I2C1_SCL / CAN0_TXD / UART4_TXD
	JP4.4	28	PC.4 / UART2_RXD / I2C1_SDA / CAN0_RXD / UART4_RXD
	JP4.5	29	PC.3 / UART2_nRTS / UART3_TXD
	JP4.6	30	PC.2 / UART2_nCTS / UART3_RXD
	JP4.7	31	PC.1 / UART2_TXD / I2C0_SCL
	JP4.8	32	PC.0 / UART2_RXD / I2C0_SDA
	JP4.9	33	USB_VBUS
	JP4.10	34	USB_D-
	JP4.11	35	USB_D+

Header		M253LE3BE	
		Pin No.	Function
	JP4.12	36	USB_V_{DD}33_CAP
JP6	JP6.1	37	VSS
	JP6.2	38	LDO_CAP
	JP6.3	39	V_{DD}
	JP6.4	40	PC.14 / SPI0_I2SMCLK / USCI0_CTL0 / TM1
	JP6.5	41	PB.15 / EADC0_CH15 / SPI0_SS / USCI0_CTL1 / UART0_nCTS / UART3_TXD / TM0_EXT
	JP6.6	42	PB.14 / EADC0_CH14 / SPI0_CLK / USCI0_DAT1 / UART0_nRTS / UART3_RXD / TM1_EXT / CLKO
	JP6.7	43	PB.13 / EADC0_CH13 / SPI0_MISO / USCI0_DAT0 / UART0_TXD / UART3_nRTS / CAN0_TXD / TM2_EXT
	JP6.8	44	PB.12 / EADC0_CH12 / SPI0_MOSI / USCI0_CLK / UART0_RXD / UART3_nCTS / CAN0_RXD / TM3_EXT
	JP6.9	45	AV_{DD}
	JP6.10	46	AVSS
	JP6.11	47	PB.7 / EADC0_CH7 / UART1_TXD / INT5
	JP6.12	48	PB.6 / EADC0_CH6 / UART1_RXD / INT4

Table 3-2 M253LE3BE Full-pin Extension Connectors and GPIO Function List

3.3.2 Arduino UNO Compatible Extension Connectors

Figure 3-4 shows the Arduino UNO compatible extension connectors.

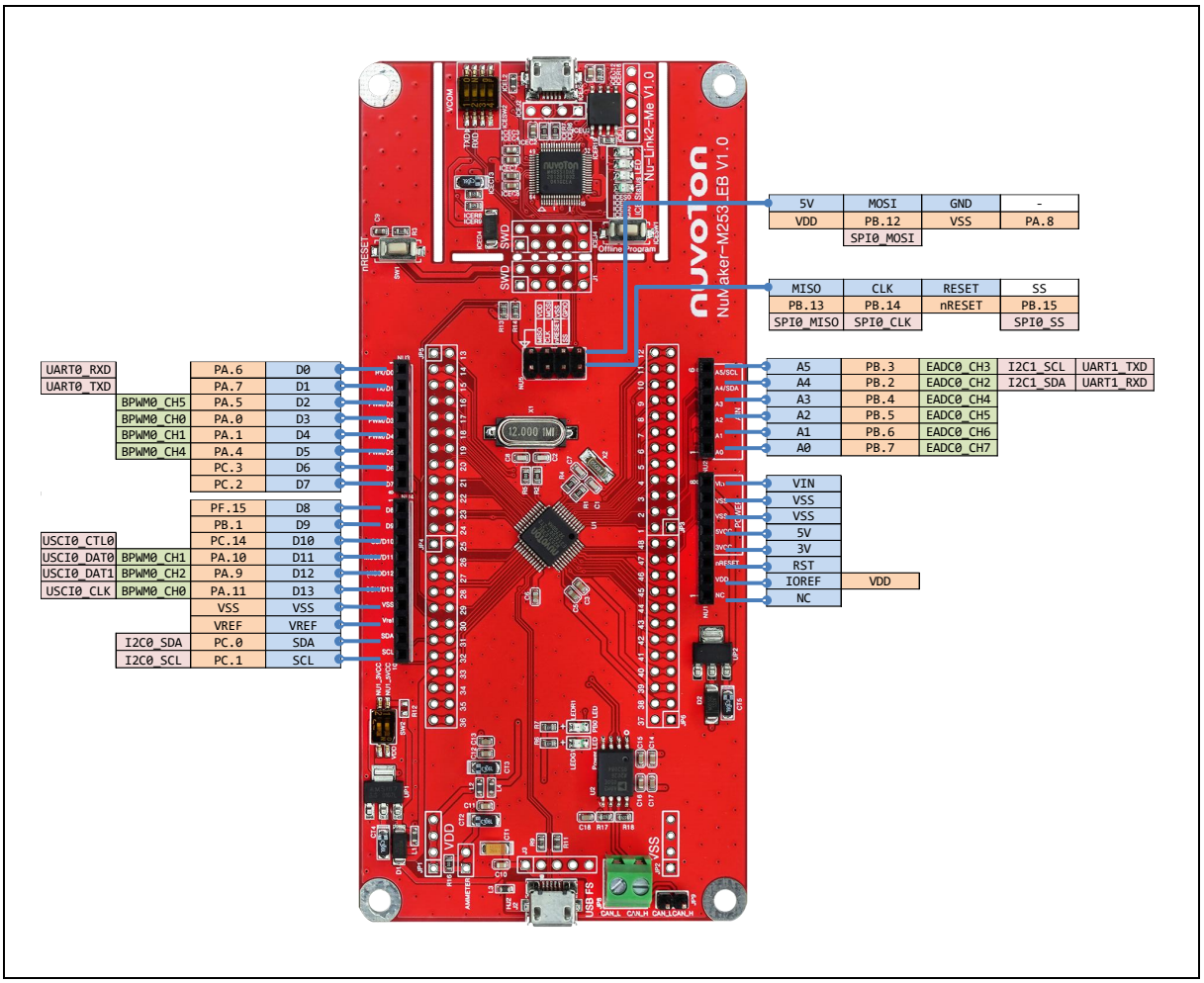


Figure 3-4 Arduino UNO Compatible Extension Connectors

Header		NuMaker-M253LEB		Header		NuMaker-M253LEB	
		Compatible to Arduino UNO	GPIO Pin of M253			Compatible to Arduino UNO	GPIO Pin of M253
NU3	NU3.1	D0	PA.6	NU2	NU2.6	A5	PB.3
	NU3.2	D1	PA.7		NU2.5	A4	PB.2
	NU3.3	D2	PA.5		NU2.4	A3	PB.4
	NU3.4	D3	PA.0		NU2.3	A2	PB.5
	NU3.5	D4	PA.1		NU2.2	A1	PB.6
	NU3.6	D5	PA.4		NU2.1	A0	PB.7
	NU3.7	D6	PC.3	NU1	NU1.8	VIN	-
	NU3.8	D7	PC.2		NU1.7	VSS	
NU4	NU4.1	D8	PF.15		NU1.6	VSS	
	NU4.2	D9	PB.1		NU1.5	5V	
	NU4.3	D10	PC.14		NU1.4	3V	
	NU4.4	D11	PA.10		NU1.3	RST	nRESET
	NU4.5	D12	PA.9		NU1.2	IOREF	V_{REF}
	NU4.6	D13	PA.11		NU1.1	NC	-
	NU4.7	VSS	V_{SS}				
	NU4.8	VREF	AVDD				
	NU4.9	SDA	PC.0				
	NU4.10	SCL	PC.1				

Table 3-3 Arduino UNO Extension Connectors and M253LE3BE Mapping GPIO List

3.4 Power Supply Configuration

The NuMaker-M253LEB is able to adopt multiple power supplies. External power sources include NU1 Vin (7 V to 12 V), V_{DD} (depending on the target chip operating voltage), and PC through USB connector. By using switches and voltage regulator, multiple power domains can be created on the NuMaker-M253LEB.

3.4.1 VIN Power Source

Table 3-4 presents the Vin power source.

Connector	Net Name in Schematic	Description
NU1 pin8	NU1_VIN	Board external power source, with voltage range from 7 V to 12 V. The voltage regulator UP2 converts the NU1 pin8 input voltage to 5 V and supplies it to NU1_5VCC.

Table 3-4 Vin Power Source

3.4.2 5 V Power Sources

Table 3-5 presents the 5 V power sources.

Connector	Net Name in Schematic	Description
ICEJ3	USB_HS_VBUS	ICE USB connector supplies 5 V power from PC to M253BE target board and Nu-Link2-Me.
J2	USB_VBUS	USB connector on NuMaker-M253LEB supplies 5 V power from PC to M253BE target board and Nu-Link2-Me.
NU1 pin5	NU1_5VCC	ICEJ3, J2 or NU1 pin8 supplies 5 V power to NU1 pin5. NU1 pin5 supplies 5 V power to target chip or Arduino adapter board.

Table 3-5 5 V Power Sources

3.4.3 3.3 V Power Sources

Table 3-6 presents the 3.3 V power sources.

Voltage Regulator	5 V Source	Description
ICEUP1	USB_HS_VBUS	ICEUP1 converts USB_HS_VBUS to 3.3 V and supplies 3.3 V to M253BE target board or ICE chip.
UP1	USB_VBUS	UP1 converts USB_VBUS to 3.3 V and supplies 3.3 V to M253BE target board. **Note:** SW2.2 (NU1 3VCC) should be switched to ON.
UP1	NU1_5VCC	UP1 converts NU1_5VCC to 3.3 V and supplies 3.3 V to M253BE target board. **Note:** SW2.2 (NU1 3VCC) should be switched to ON.

Table 3-6 3.3 V Power Sources

3.4.4 1.8 V Power Sources

Table 3-7 presents the 1.8 V power source.

Voltage Regular	5V Source	Description
ICEUP2	USB_HS_VBUS	ICEUP2 converts USB_HS_VBUS to 1.8 V and supplies 1.8 V to M253BE target board or ICE chip.

Table 3-7 1.8 V Power Sources

3.4.5 Power Connectors

Table 3-8 presents the power connectors.

Connector	Description
JP1	V_{DD} connector on the NuMaker-M253LEB.
JP2	V_{SS} connector on the NuMaker-M253LEB.

Table 3-8 Power Connectors

3.4.6 USB Connectors

Table 3-9 presents the USB connectors.

Connector	Description
ICEJ3	ICE USB connector on Nu-Link2-Me for power supply, debugging and programming from PC.
J2	USB FS connector on NuMaker-M253LEB for power supply.

Table 3-9 USB Connectors

3.4.7 Power Switches

Table 3-10 presents the power switches.

Switch	Description
ICEJPR1	Configures the target chip operating voltage at 1.8 V / 3.3 V / 5 V.
ICEJPR2	Configures the ICE chip operating voltage at 1.8 V / 3.3 V.
SW2	Configures the target chip operating voltage at 3.3 V / 5 V.

Table 3-10 Power Switches

3.4.8 Power Supply Models

3.4.8.1 External Power Supply through Nu-Link2-Me to Target Chip

The external power supply source on Nu-Link2-Me is shown in Figure 3-5.

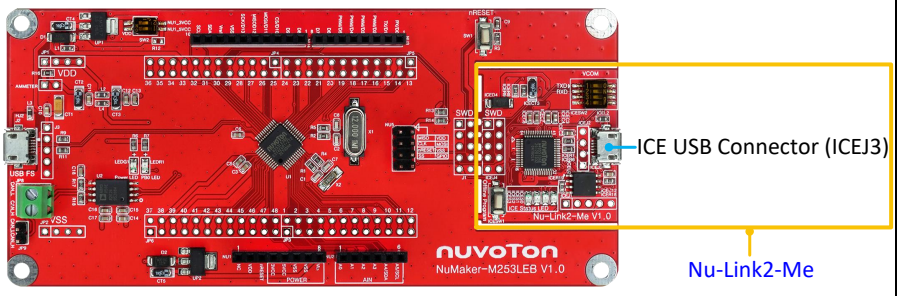


Figure 3-5 External Power Supply Sources on Nu-Link2-Me

To use ICEJ3 as external power supply source with Nu-Link2-Me, please follow the steps below:

1. Solder the resistor on ICEJPR1 (MCUVCC) depending on the target chip operating voltage.

2. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
3. Switch the SW2 to OFF.
4. Connect the external power supply to ICEJ3.

Table 3-11 presents all power models when supplying external power through Nu-Link2-Me. The Nu-Link2-Me external power sources are highlighted in yellow.

Model	Target Chip Voltage	ICEJ3	ICEJPR1 (MCUVCC) Selection [1]	ICEJPR2 (ICEVCC) Selection [2]	ICE Chip Voltage	SW2 Selection	J2	Vin	JP1
1	1.8 V	Connect to PC	1.8 V	1.8 V	1.8 V	Off	-	-	1.8 V output
2	3.3 V	Connect to PC	3.3 V (default)	3.3 V (default)	3.3 V	Off	-	-	3.3 V output
3	5 V	Connect to PC	5 V	3.3 V (default)	3.3 V	Off	-	-	5 V output
	Note: 1. 0 Ω should be soldered between ICEJPR1's MCUVCC and 1.8 V / 3.3 V / 5 V. 2. 0 Ω should be soldered between ICEJPR2's ICEVCC and 1.8 V / 3.3 V. 3. -: Unused.								

Table 3-11 Supply External Power through Nu-Link2-Me

3.4.8.2 External Power Supply through M253 Target Board to Target Chip

The external power supply sources on M253 target board are shown in Figure 3-6.

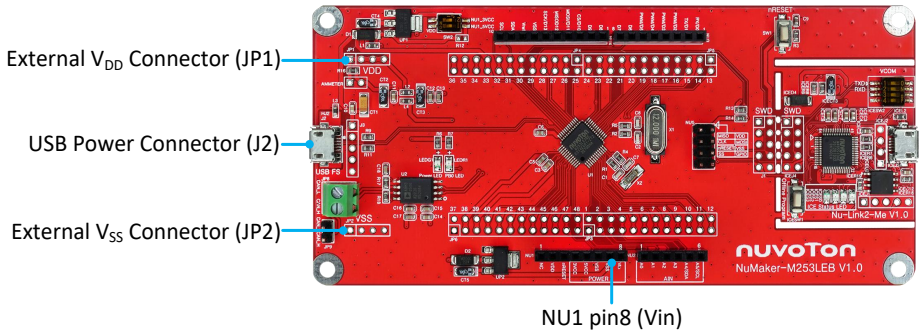


Figure 3-6 External Power Supply Sources on M253 Target Board

To use Vin or J2 as external power supply source, please follow the steps below:

1. Switch the SW2 depending on the target chip operating voltage.
2. Remove the resistor on ICEJPR1 (MCUVCC).
3. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
4. Connect the external power supply to Vin or J2.

To use JP1 as external power supply source, please follow the steps below:

1. Switch the SW2 to OFF.

2. Remove the resistor on ICEJPR1 (MCUVCC).
3. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
4. Connect ICEJ3 to PC.
5. Connect the external power supply to JP1.

To use Vin or J2 as external power supply source with Nu-Link2-Me detached from NuMaker-M253LEB, please follow the steps below:

1. Switch the SW2 depending on the target chip operating voltage.
2. Detach the Nu-Link2-Me from NuMaker-M253LEB.
3. Connect the external power supply to Vin or J2.

To use JP1 as external power supply source with Nu-Link2-Me detached from NuMaker-M253LEB, please follow the steps below:

1. Switch the SW2 to OFF.
2. Detach the Nu-Link2-Me from NuMaker-M253LEB.
3. Connect the external power supply to JP1.

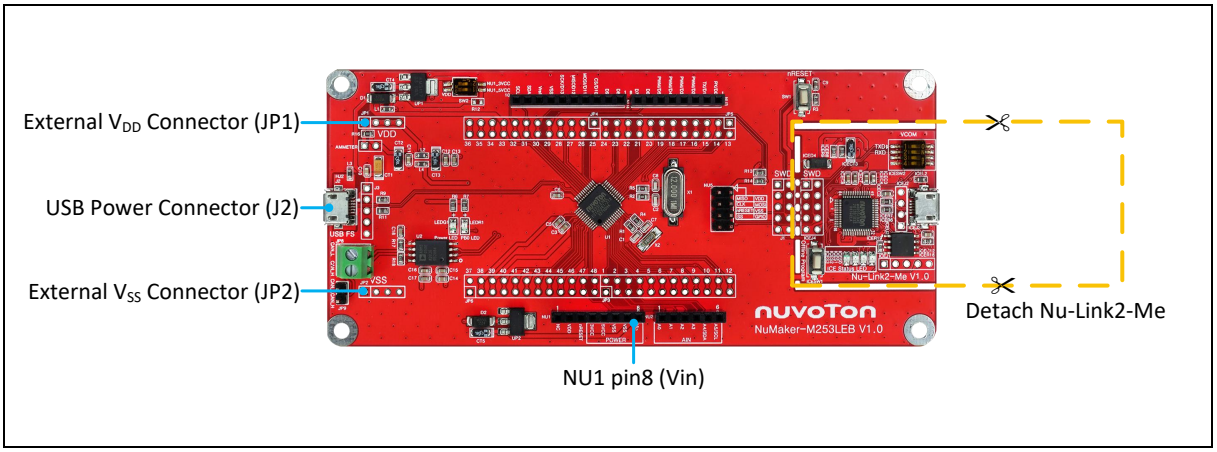


Figure 3-7 Detach the Nu-Link2-Me from NuMaker-M253LEB

Table 3-12 presents all power models when supplies external power through M253BE target board. The M253 target board external power sources are highlighted in yellow.

Model	Target Chip Voltage	Vin [1]	J2[1]	ICEJ3	SW2 Selection	JP1[2]	ICEJPR1 (MCUVCC) Selection [3]	ICEJPR2 (ICEVCC) Selection [4]	ICE Chip Voltage [5]
4	3.3 V	7 V ~ 12 V Input	-	-	NU1 3VCC	3.3 V output	Remove resistor	3.3 V	3.3 V
5	3.3 V	-	Connect to PC	-	NU1 3VCC	3.3 V output	Remove resistor	3.3 V	3.3 V
6	5 V	7 V ~ 12 V Input	-	-	NU1 5VCC	5 V output	Remove resistor	3.3 V	3.3 V
7	5 V	-	Connect to PC	-	NU1 5VCC	5 V output	Remove resistor	3.3 V	3.3 V
8	1.8 V ~ 3.6 V	-	-	Connect to PC	OFF	DC Input 1.8 V ~ 3.6 V	Remove resistor	1.8 V / 3.3 V	1.8 V / 3.3 V
9	1.8 V ~ 3.6 V	-	-	Nu-Link2-Me removed	OFF	DC Input 1.8 V ~ 3.6 V	-	-	-

Note:

1. The Vin input voltage will be converted by voltage regulator UP2 to 5 V. Supplying external power to Vin or J2 can provide 5 V to NU1 pin5 (5V) and 3.3 V to NU1 pin4 (3VCC).
2. JP1 external power input only provides voltage to target chip.
3. 0 Ω should be removed from ICEJPR1's MCUVCC and 1.8 V / 3.3 V / 5 V.
4. 0 Ω should be soldered between ICEJPR2's ICEVCC and 1.8 V / 3.3 V.
5. The ICE chip voltage should be close to the target chip voltage.
6. -: Unused

Table 3-12 Supply External Power for M253 Target Board

3.5 External Reference Voltage Connector

Table 3-14 presents the external reference voltage connector.

Connector	Description
VREF1	Connector for user to connect to the external reference voltage pin of the target chip. User needs to remove the L5 ferrite bead.

Table 3-13 External Reference Voltage Connector

3.6 Ammeter Connector

User can refer to the sample code in M253 series BSP - SYS_PowerDown_MinCurrent and Figure 3-8 to measure the minimum current in Power-down mode. Figure 3-9 shows the path of the sample code, which has relative settings of entering Power-down mode.

Table 3-14 presents the ammeter connector.

Connector	Description
AMMETER	Connector for user to measure the target chip power consumption easily. User needs to remove the R16 resistor.

Table 3-14 Ammeter Connector

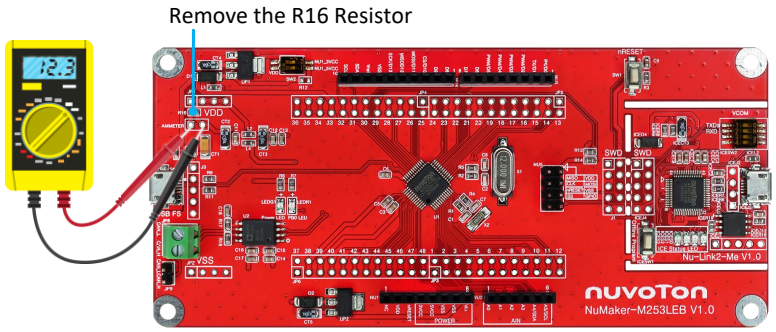


Figure 3-8 Wiring between Ammeter Connector and Ammeter

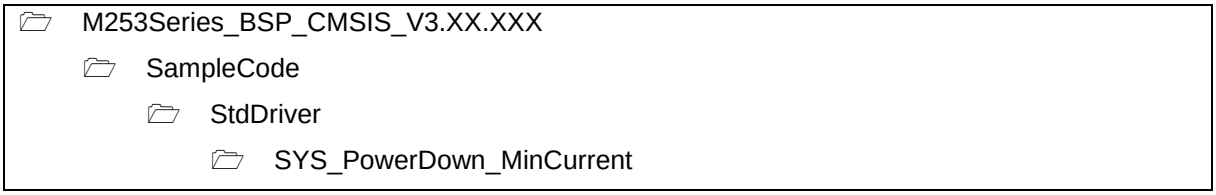


Figure 3-9 Project Path of SYS_PowerDown_MinCurrent

3.7 Push Buttons

Table 3-15 presents the push buttons.

Component	Description
ICESW1	Offline program button to start offline ICP programming the target chip.
SW1	Reset button to reset the target chip.

Table 3-15 Push Buttons

3.8 LEDs

Table 3-16 presents the LEDs.

Component	Description
Power LED	The power LED indicates that the NuMaker-M253LEB is powered.
PB0 LED	The LED is connected to the target chip PB.0.
ICES0, ICES1, ICES2 and ICES3	Nu-Link2-Me status LED.

Table 3-16 LEDs

3.9 Nu-Link2-Me

The Nu-Link2-Me is an attached on-board debugger and programmer. The Nu-Link2-Me supports on-chip debugging, online and offline ICP programming through SWD interface. The Nu-Link2-Me also supports virtual COM port (VCOM) for printing debug messages on PC. Besides, the programming status could be shown on the built-in LEDs. Lastly, the Nu-Link2-Me could be detached from the evaluation board and become a stand-alone mass production programmer. For more information about Nu-Link2-Me, please refer to *Nu-Link2-Pro Debugger and Programmer User Manual*.

3.9.1 VCOM Switches

Table 3-17 presents how to set the VCOM function by ICESW2.

ICESW2		
Pin	**Function**	**Description**
1	TXD	**On**: Connect target chip PA.3 (UART4_TXD) to Nu-Link2-Me. **Off**: Disconnect target chip PA.3 (UART4_TXD) to Nu-Link2-Me.
2	RXD	**On**: Connect target chip PA.2 (UART4_RXD) to Nu-Link2-Me. **Off**: Disconnect target chip PA.2 (UART4_RXD) to Nu-Link2-Me.
Note: Pin 3 and 4 is unused.		

Table 3-17 VCOM Function of Nu-Link2-Me

3.9.2 Status LEDs

Table 3-16 presents the status LEDs patterns for different operation on Nu-Link2-Me.

Operation Status	Status LED			
	ICES0	ICES1	ICES2	ICES3
Boot	Flash x 3	Flash x 3	Flash x 3	Flash x 3
Idle	On	-	-	-
One Nu-Link2-Me is selected to connect	Flash x 3	Flash x 3	Flash x 3	On
ICE online (Not connected to a target chip)	On	-	Flash x 3	Flash x 3
ICE online (Connected to a target chip)	On	-	-	On
ICE online (Failed to connect to a target chip)	On	Any	Flash	On
During offline programming	-	On	-	Flash
Offline programming completed	On	-	-	-
Offline programming completed (Auto mode)	On	On	-	-
Offline programming failed	On	Flash	-	-
Note: “Online” means Nu-Link2-Me is connected to ICP Programming Tool, IDE or NuTool.				

Table 3-18 Operation Status LED Patterns

4 QUICK START

4.1 Toolchains Supporting

Install the preferred toolchain. Please make sure at least one of the toolchains has been installed.

- KEIL MDK Nuvoton edition M23/M23
- IAR EWARM
- NuEclipse GCC (for Windows)
- NuEclipse GCC (for Linux)

4.2 Nuvoton Nu-Link Driver Installation

Download and install the latest Nuvoton Nu-Link Driver.

- Download and install Nu-Link_Keil_Driver when using Keil MDK.
- Download and install Nu-Link_IAR_Driver when using IAR EWARM.
- Skip this step when using NuEclipse.

Please install the Nu-Link USB Driver as well at the end of the installation. The installation is presented in Figure 4-1 and Figure 4-2.

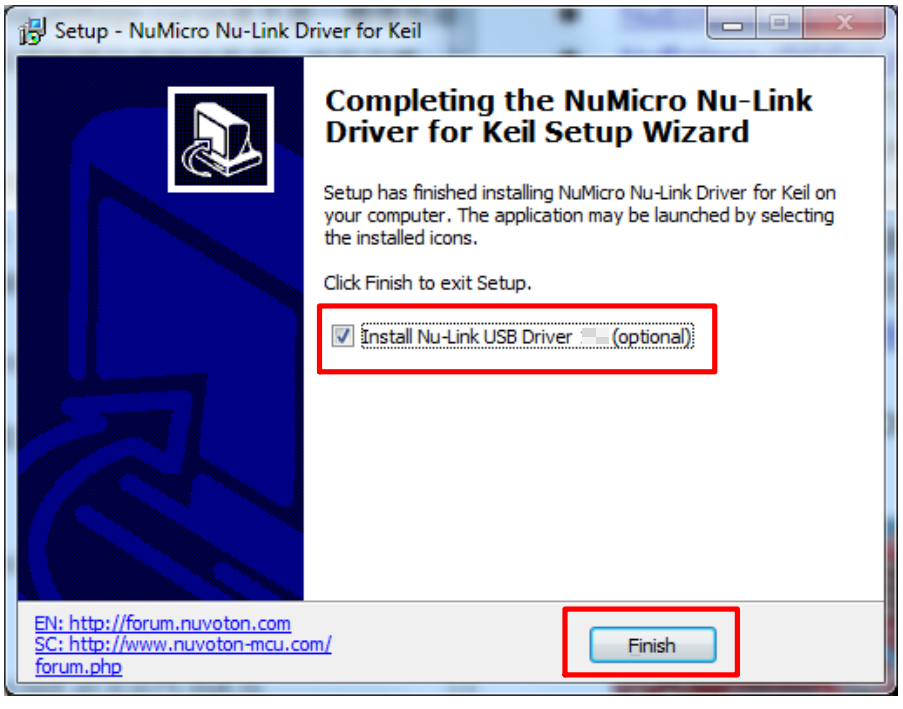


Figure 4-1 Nu-Link USB Driver Installation Setup

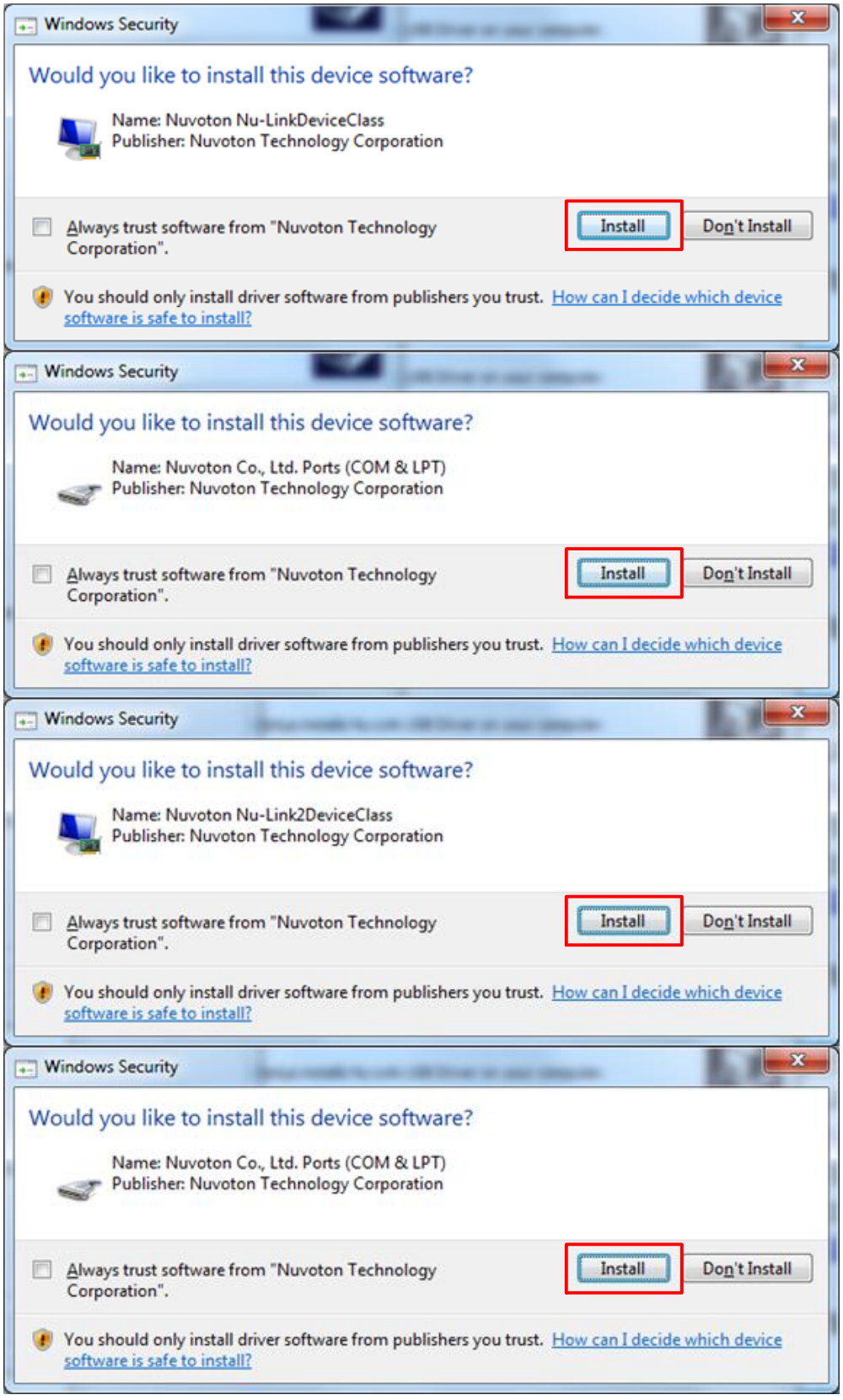


Figure 4-2 Nu-Link USB Driver Installation

4.3 BSP Firmware Download

Download and unzip the Board Support Package (BSP).

4.4 Hardware Setup

1. Open the virtual COM (VCOM) function by changing Nu-Link2-Me VCOM Switch No. 1 and 2 to ON.

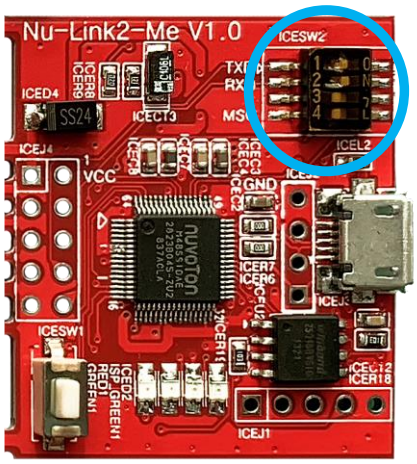


Figure 4-3 Open VCOM Function

2. Connect the ICE USB connector shown in Figure 4-4 to the PC USB port through a USB cable.

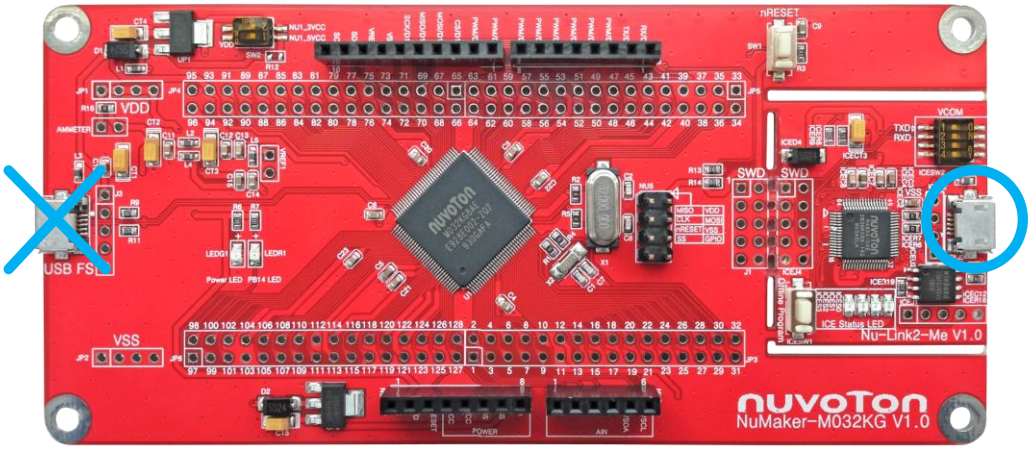


Figure 4-4 ICE USB Connector

3. Find the “Nuvoton Virtual COM Port” on the Device Manger as Figure 4-5.

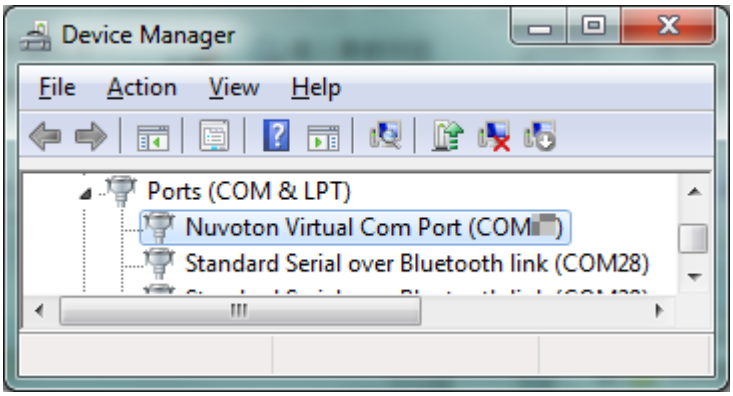


Figure 4-5 Device Manger

4. Open a serial port terminal, PuTTY for example, to print out debug message. Set the speed to 115200. Figure 4-6 presents the PuTTY session setting.

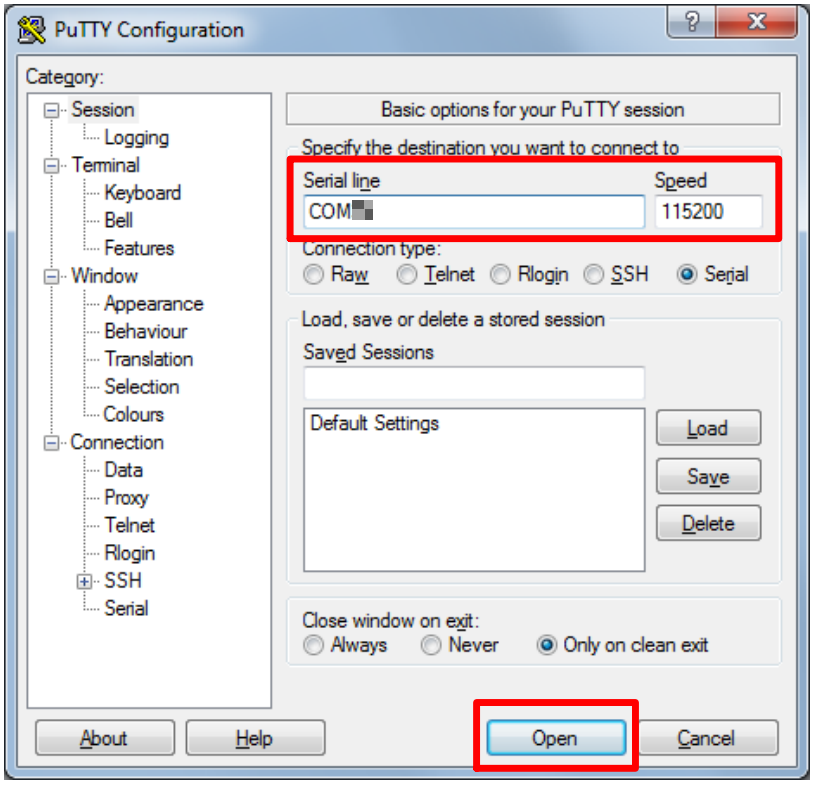


Figure 4-6 PuTTY Session Setting

4.5 Find the Example Project

Use the “Template” project as an example. The project can be found under the BSP folder as shown in Figure 4-7.

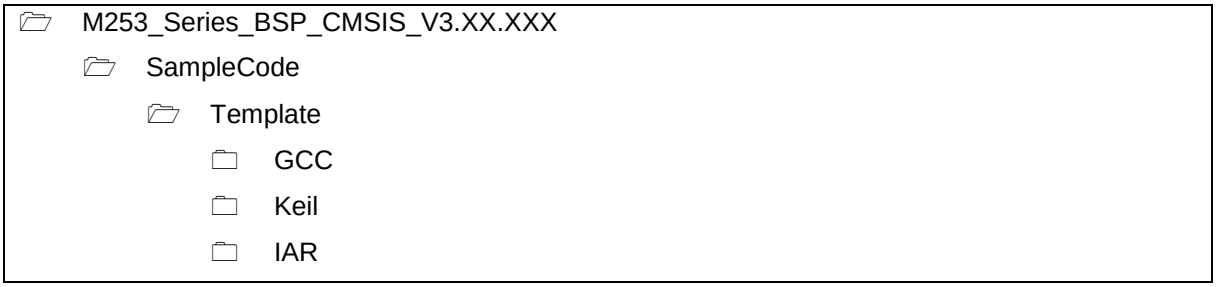


Figure 4-7 Template Project Folder Path

4.6 Execute the Project under Toolchains

Open and execute the project under the toolchain. The section 4.6.1, 4.6.2, and 4.6.3 describe the steps of executing project in Keil MDK, IAR EWARM and NuEclipse, respectively.

4.6.1 Keil MDK

This section provides steps to beginners on how to run a project by using Keil MDK.

1. Double-click the “Template.uvproj” to open the project.

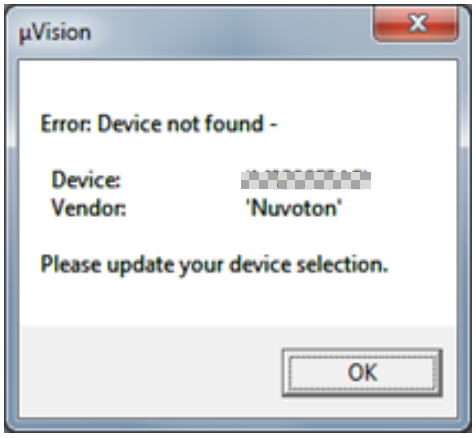


Figure 4-8 Warning Message of “Device not found”

Note: If Figure 4-8 warning message jumps out, please migrate to version 5 format as shown in Figure 4-9. The “.uvproj” filename extension will change to “.uvprojx”.

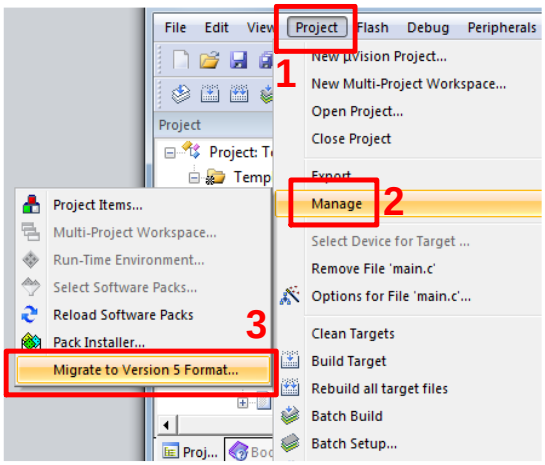


Figure 4-9 Project File Migrate to Version 5 Format

2. Make sure the debugger is “Nuvoton Nu-Link Debugger” as shown in Figure 4-10 and Figure 4-11.

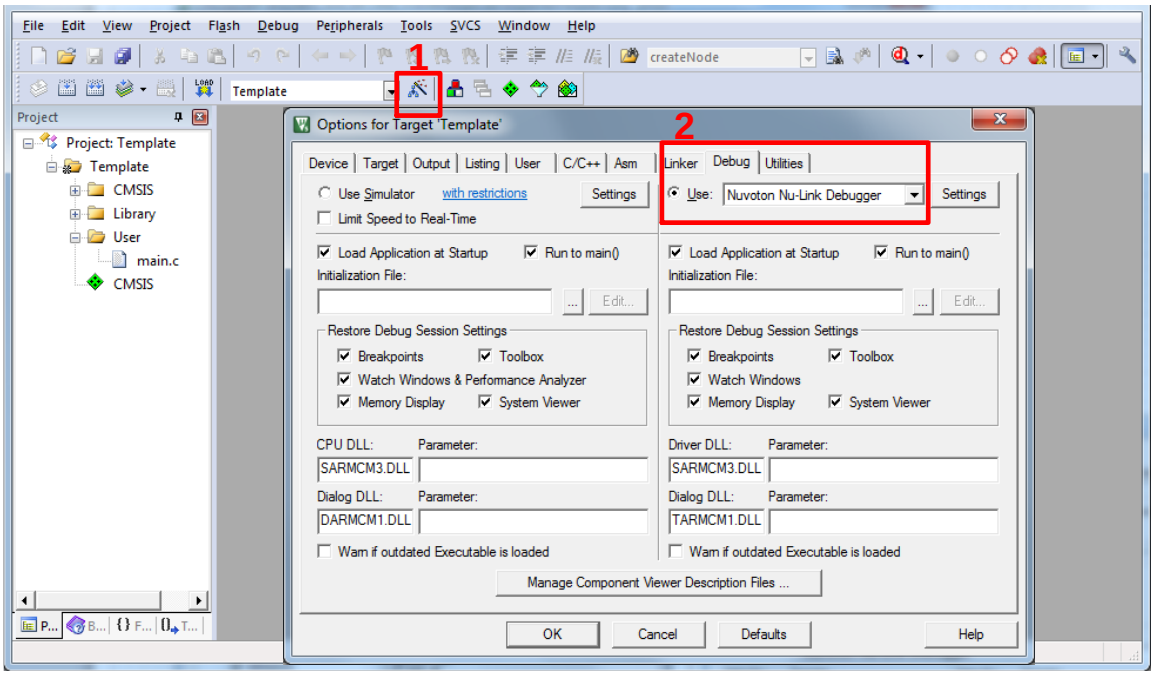


Figure 4-10 Debugger Setting in Options Window

Note: If the dropdown menu in Figure 4-10 does not contain “Nuvoton Nu-Link Debugger” item, please rework section 4.2.

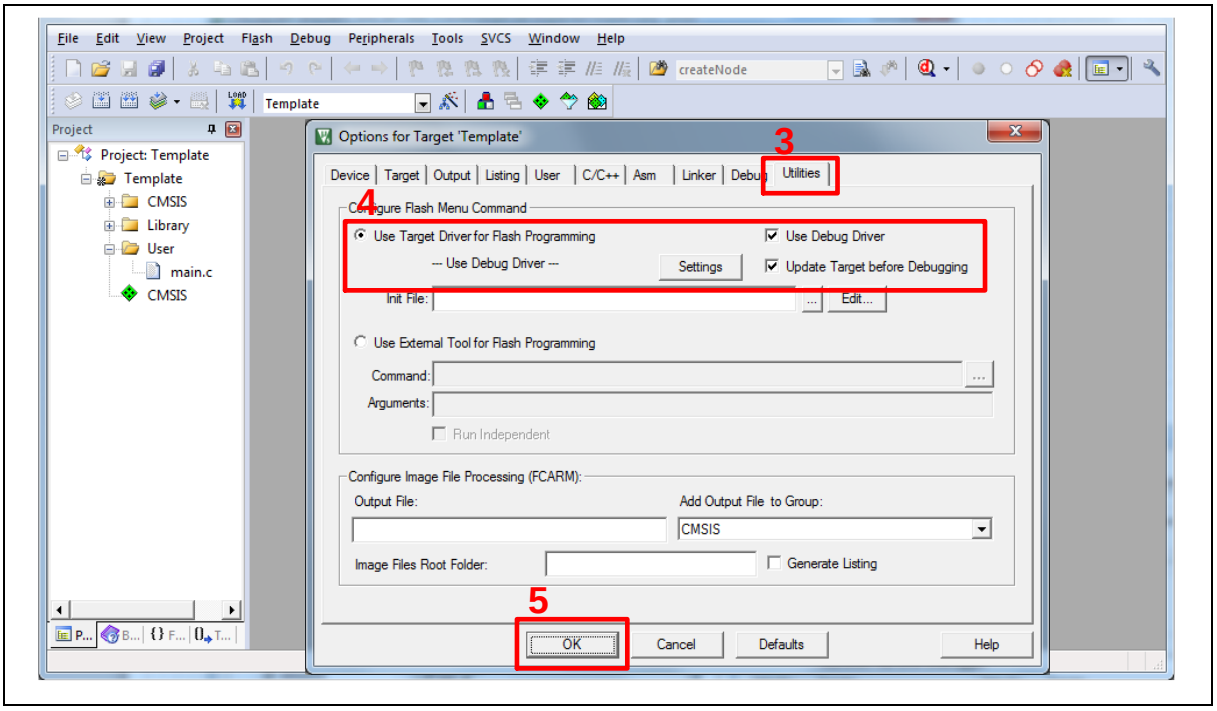


Figure 4-11 Programming Setting in Options Window

3. Rebuild all target files. After successfully compiling the project, download code to the Flash memory. Click "**Start/Stop Debug Section**" button to enter debug mode.

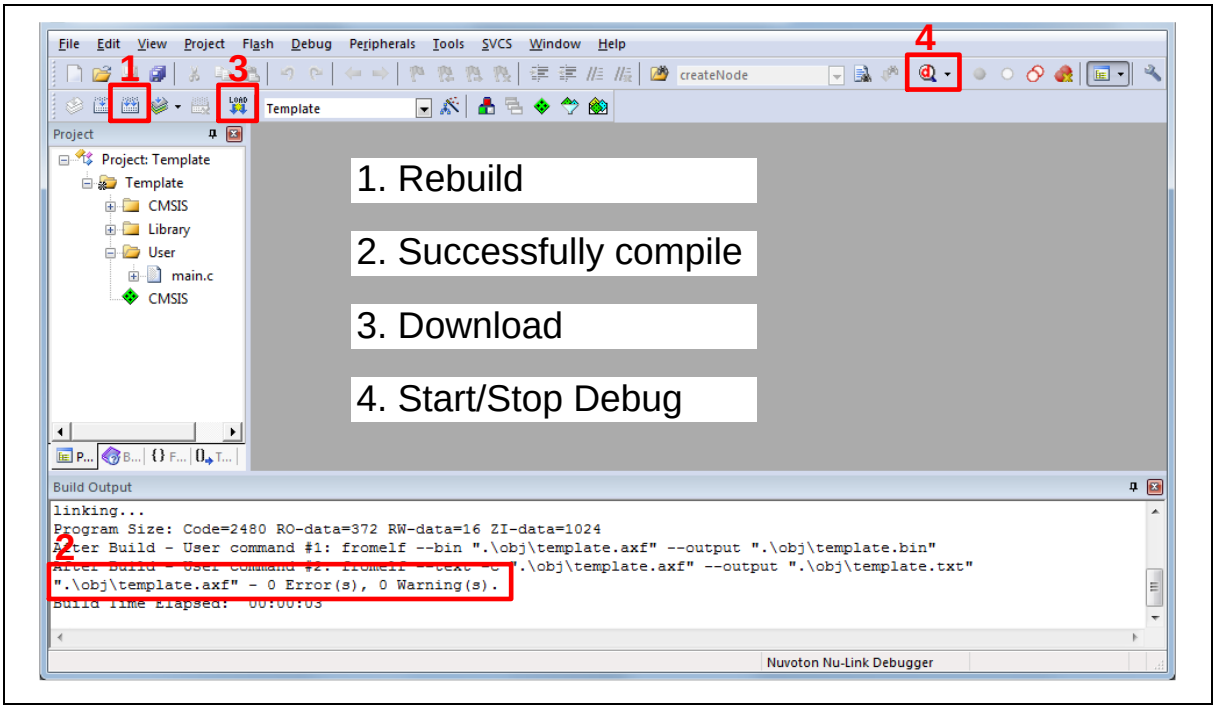


Figure 4-12 Compile and Download the Project

4. Figure 4-13 shows the debug mode under Keil MDK. Click "**Run**" and the debug message will be printed out as shown in Figure 4-14. User can debug the project under debug mode by checking source code, assembly language, peripherals' registers, and setting breakpoint, step run, value monitor, etc.

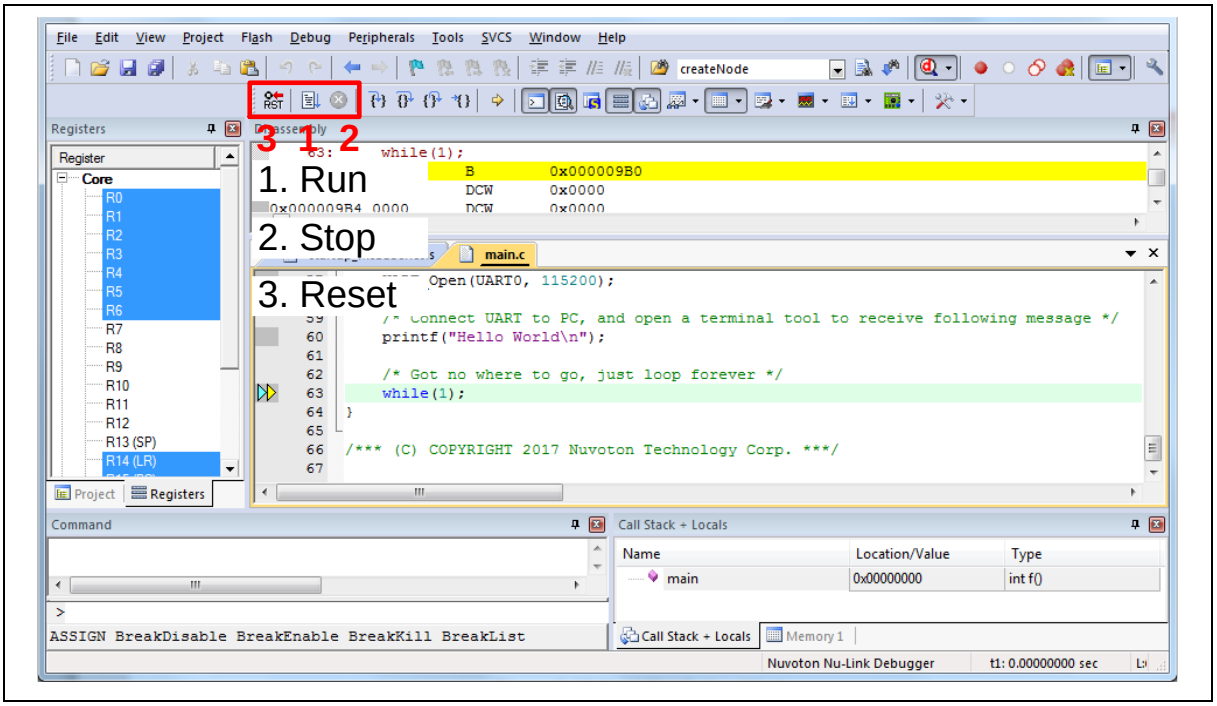


Figure 4-13 Keil MDK Debug Mode

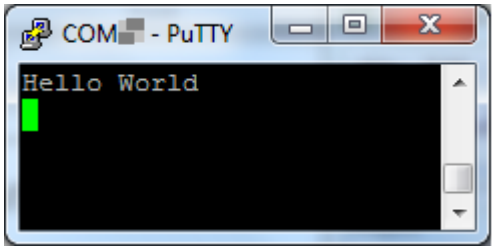


Figure 4-14 Debug Message on Serial Port Terminal Windows

4.6.2 IAR EWARM

This section provides steps to beginners on how to run a project by using IAR EWARM.

1. Double click the “Template.eww” to open the project.
2. Make sure the toolbar contains “Nu-Link” item as shown in Figure 4-15.

Note: If the toolbar does not contain “Nu-Link” item, please rework section 4.2.

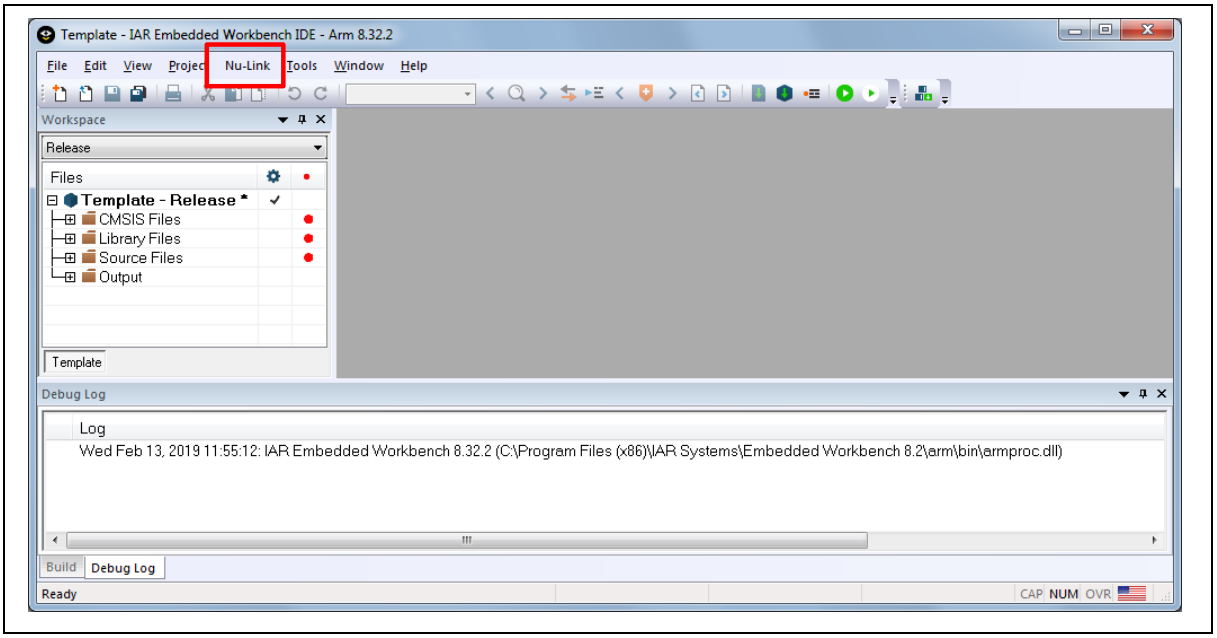


Figure 4-15 IAR EWARM Window

3. Make a target file as presented in Figure 4-16. After successfully compiling the project, download code to the Flash memory and enter debug mode.

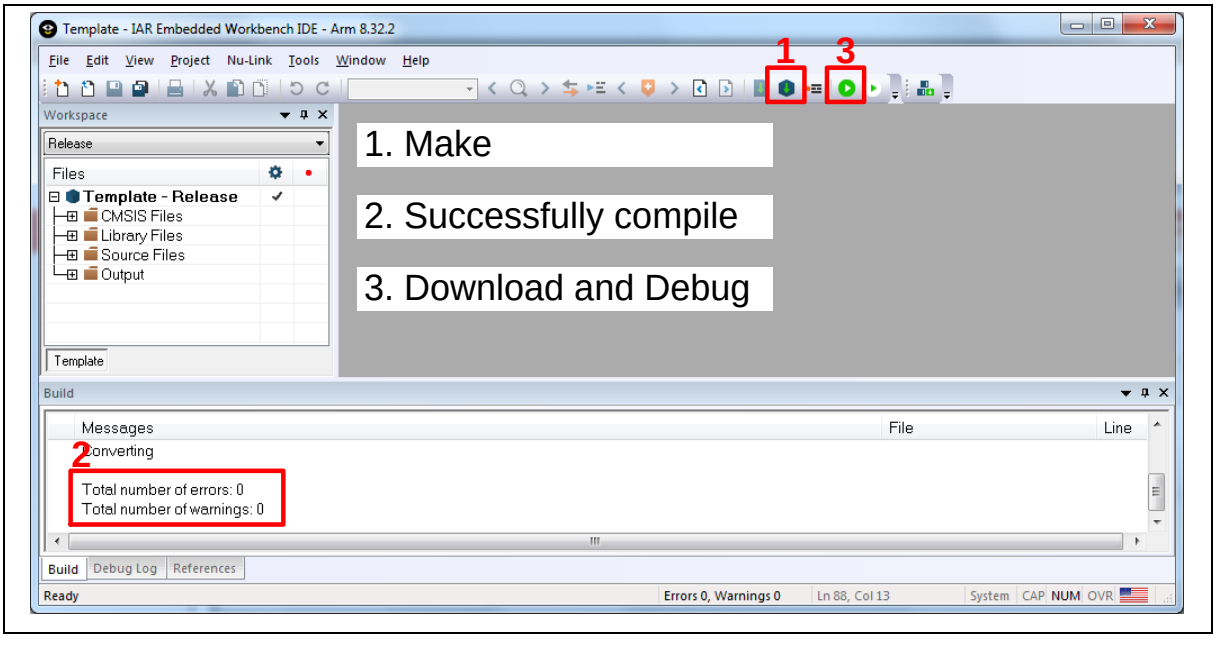


Figure 4-16 Compile and Download the Project

4. Figure 4-17 shows the debug mode under IAR EWARN. Click "**Go**" and the debug message will be printed out as shown in Figure 4-18. User can debug the project under debug mode by checking source code, assembly language, peripherals' registers, and setting breakpoint, step run, value monitor, etc.

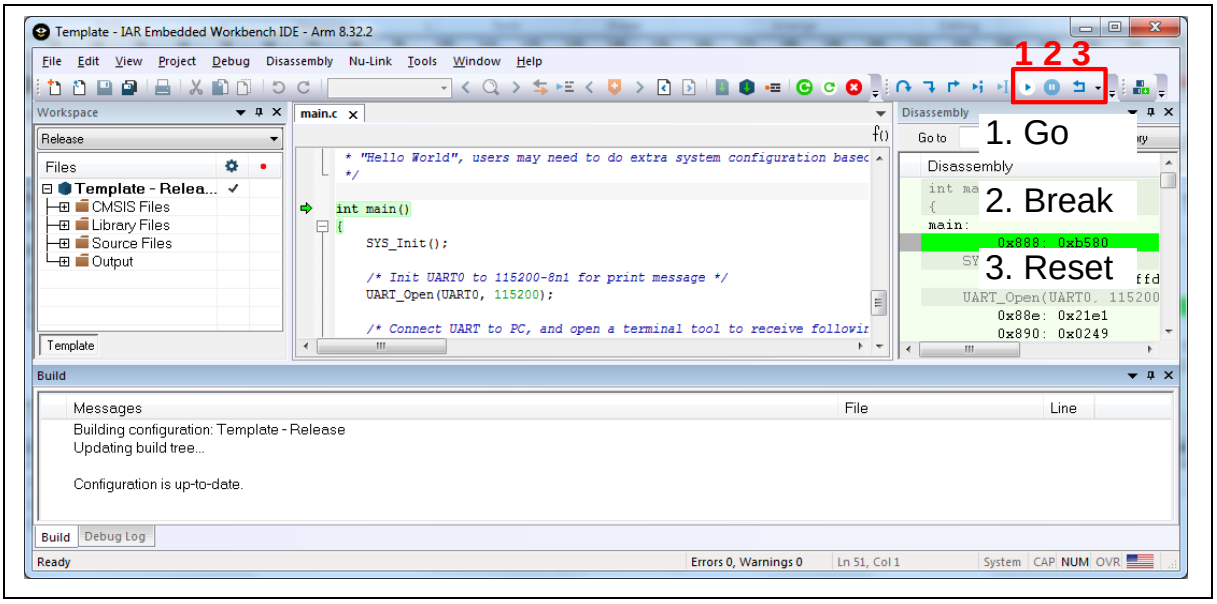


Figure 4-17 IAR EWARM Debug Mode

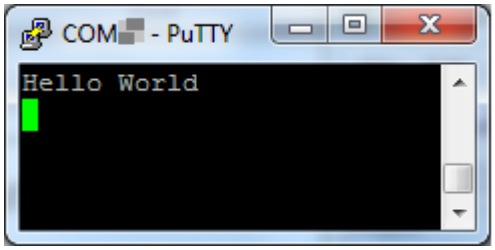


Figure 4-18 Debug Message on Serial Port Terminal Windows

4.6.3 NuEclipse

This section provides steps to beginners on how to run a project by using NuEclipse. Please make sure the filenames and project folder path contain neither invalid character nor space.

1. Double-click “NuEclipse.exe" to open the toolchain.
2. Import the “Template” project by following the steps presented in Figure 4-19 and Figure 4-20.

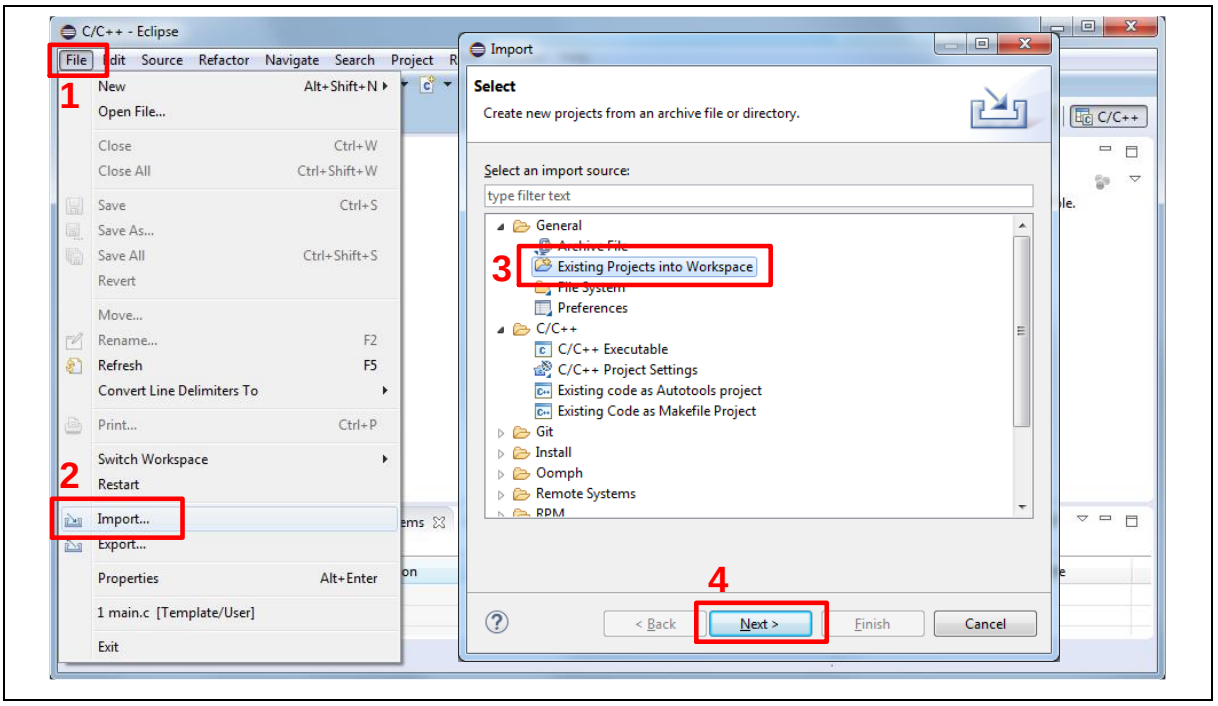


Figure 4-19 Import the Project in NuEclipse

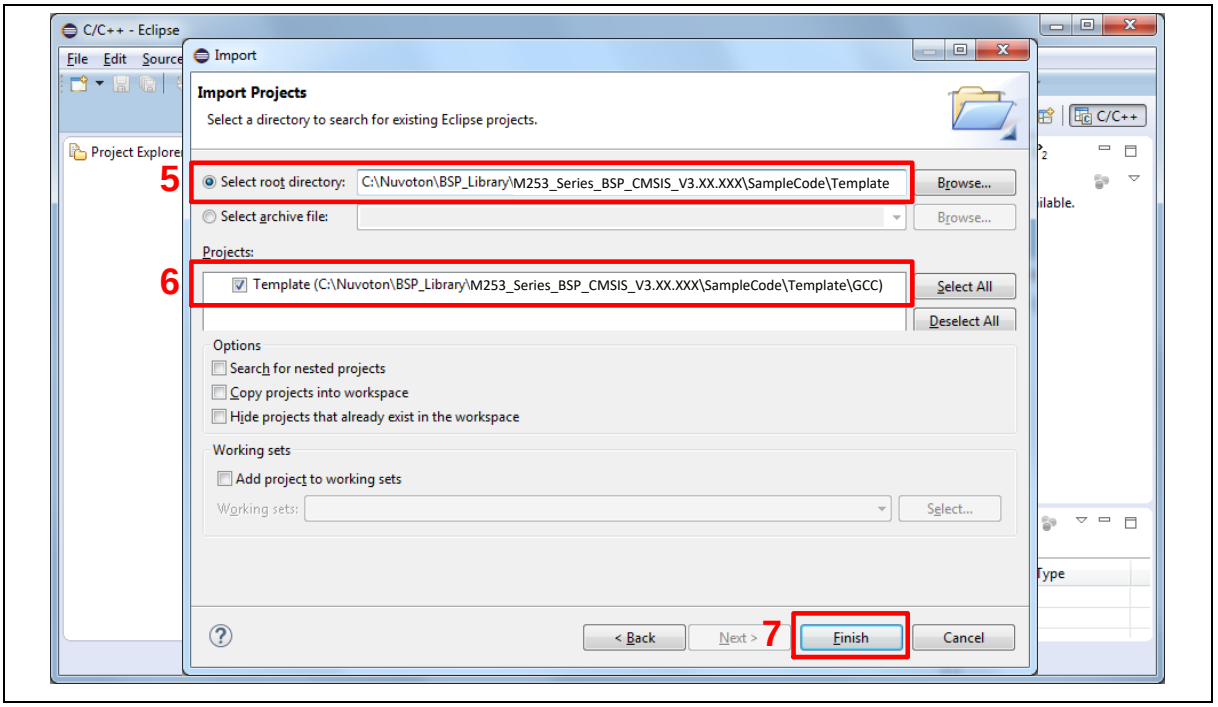


Figure 4-20 Import Projects Windows

3. Click the “Template” project and find the project properties as shown in Figure 4-21. Make sure the settings are the same as settings in Figure 4-22.

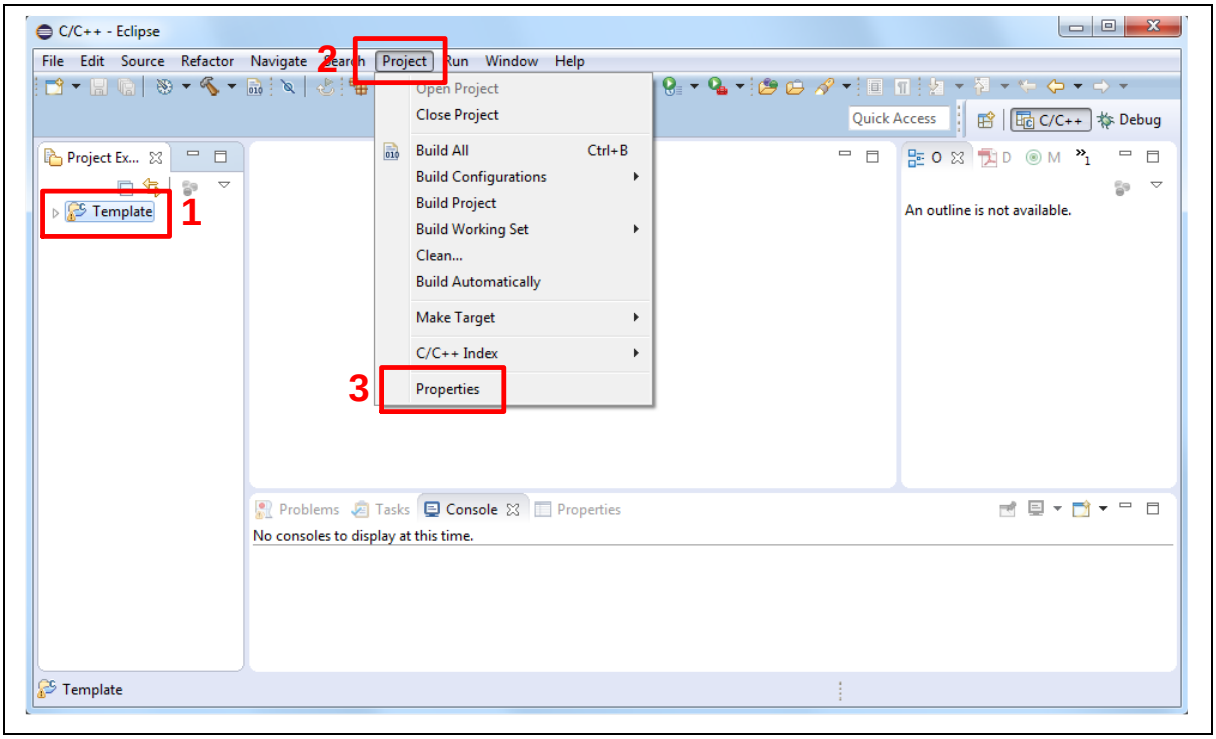


Figure 4-21 Open Project Properties Window

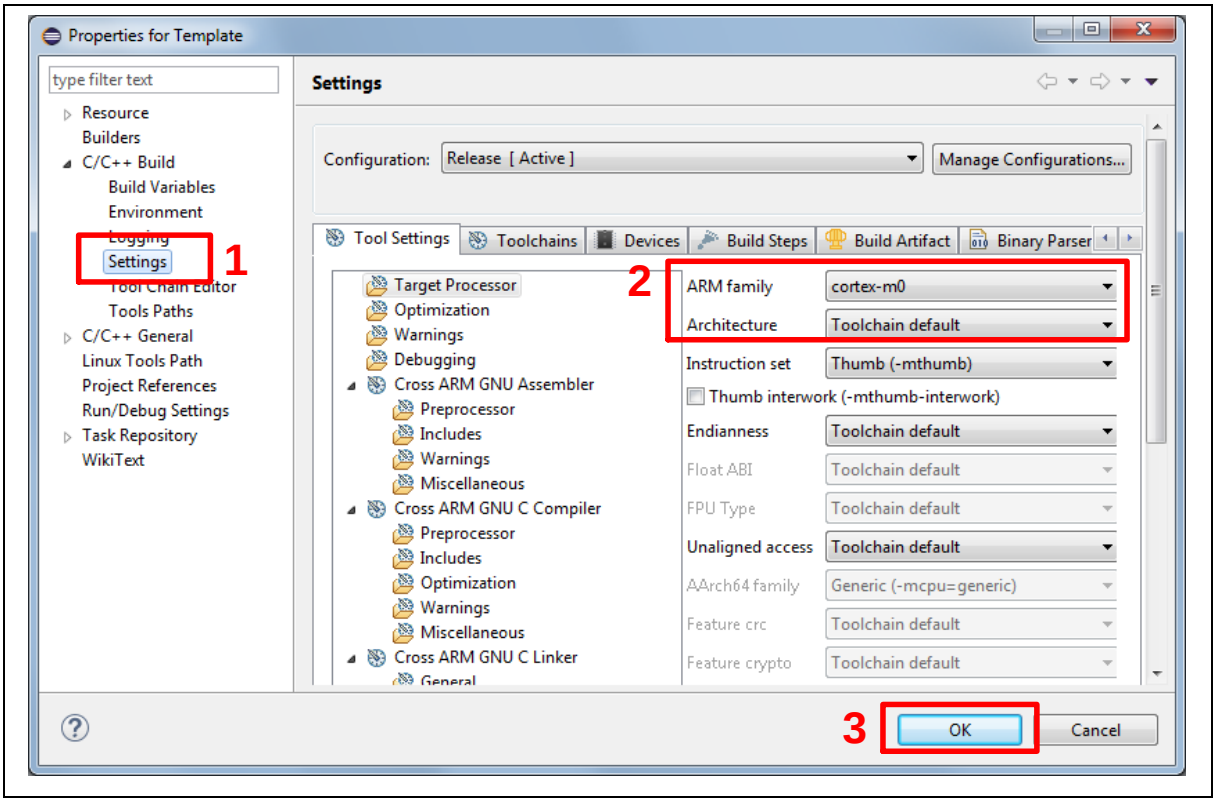


Figure 4-22 Project Properties Settings

4. Click the “Template” project and build the project.

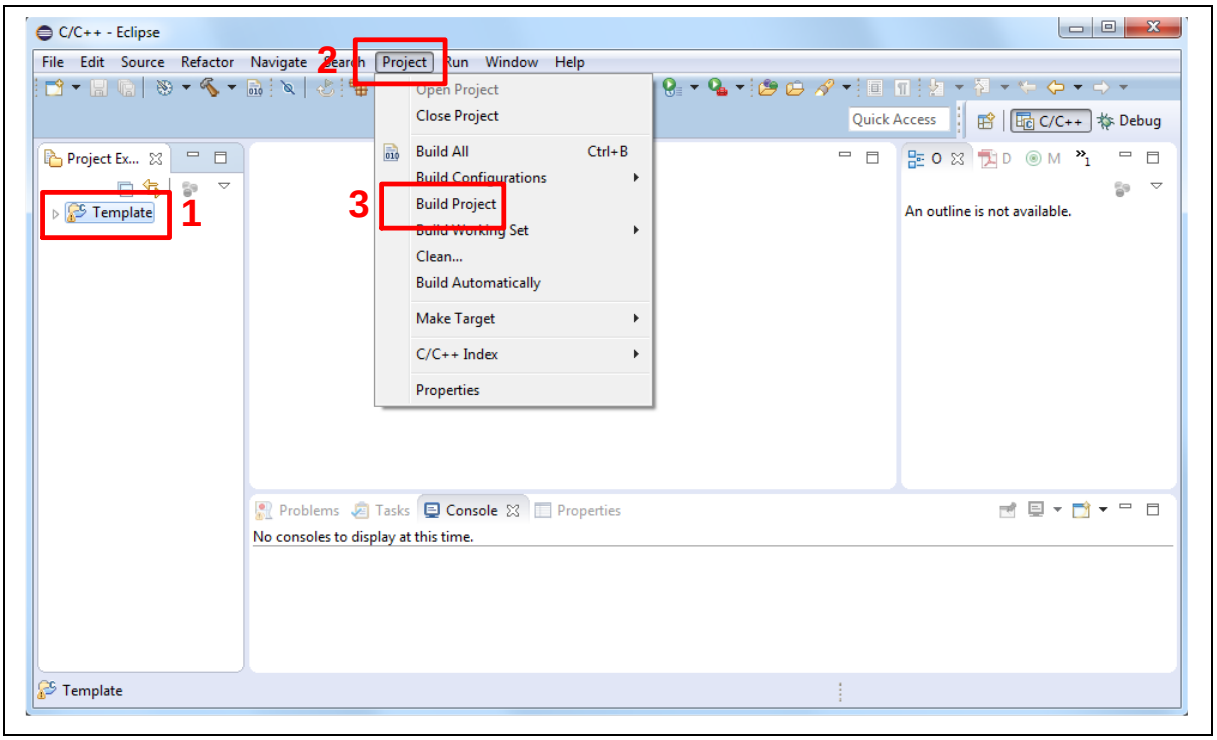


Figure 4-23 Build Project

5. After the project is built, click the “Template” project and set the “Debug Configuration” as shown in Figure 4-24. Follow the settings presented in Figure 4-25, Figure 4-26 and Figure 4-27 to enter debug mode.

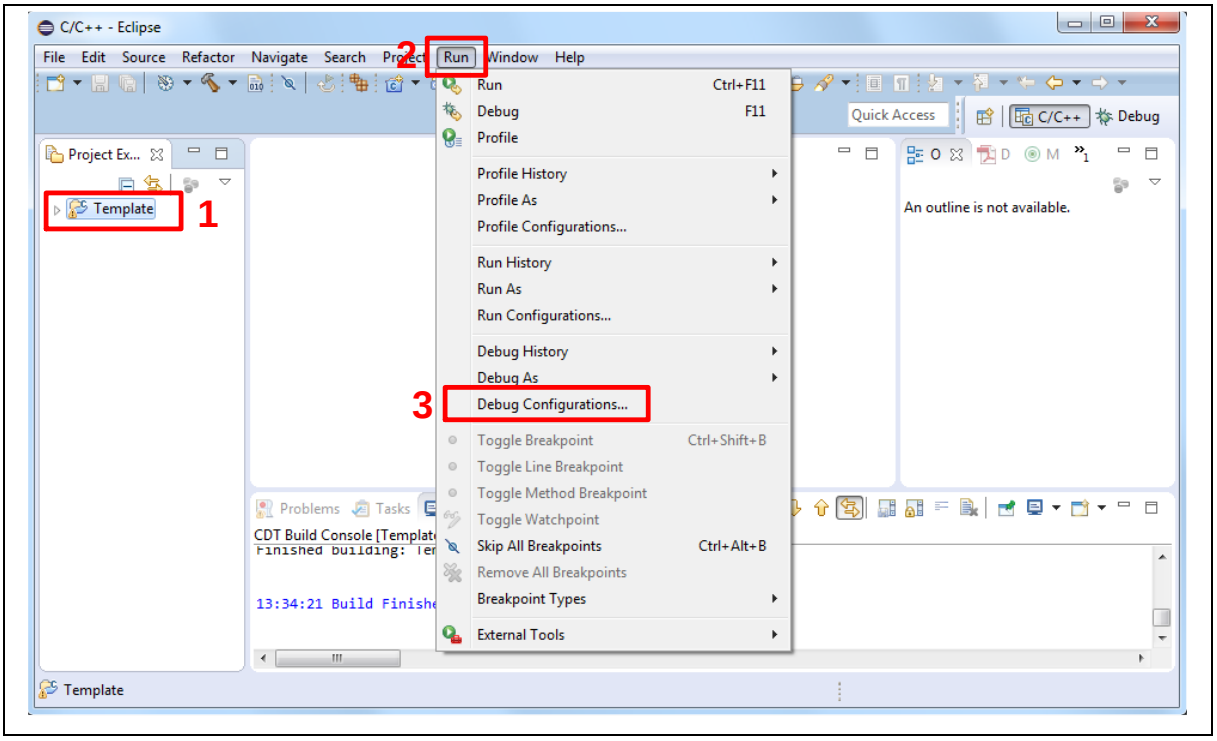
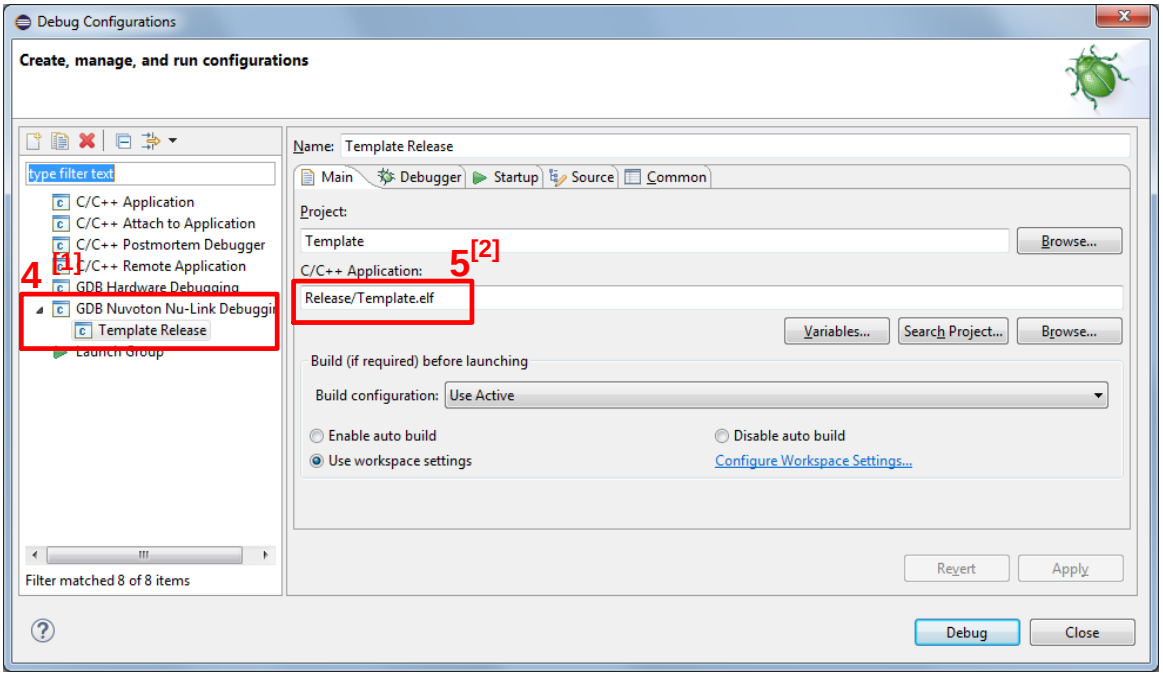


Figure 4-24 Open Debug Configuration



Note 1: Double-click the “GDB Nuvoton Nu-Link Debugging” to create the sub item.

Note 2: After the project is built, the “*.elf” file will be shown in “C/C++ Application” frame.

Figure 4-25 Main Tab Configuration

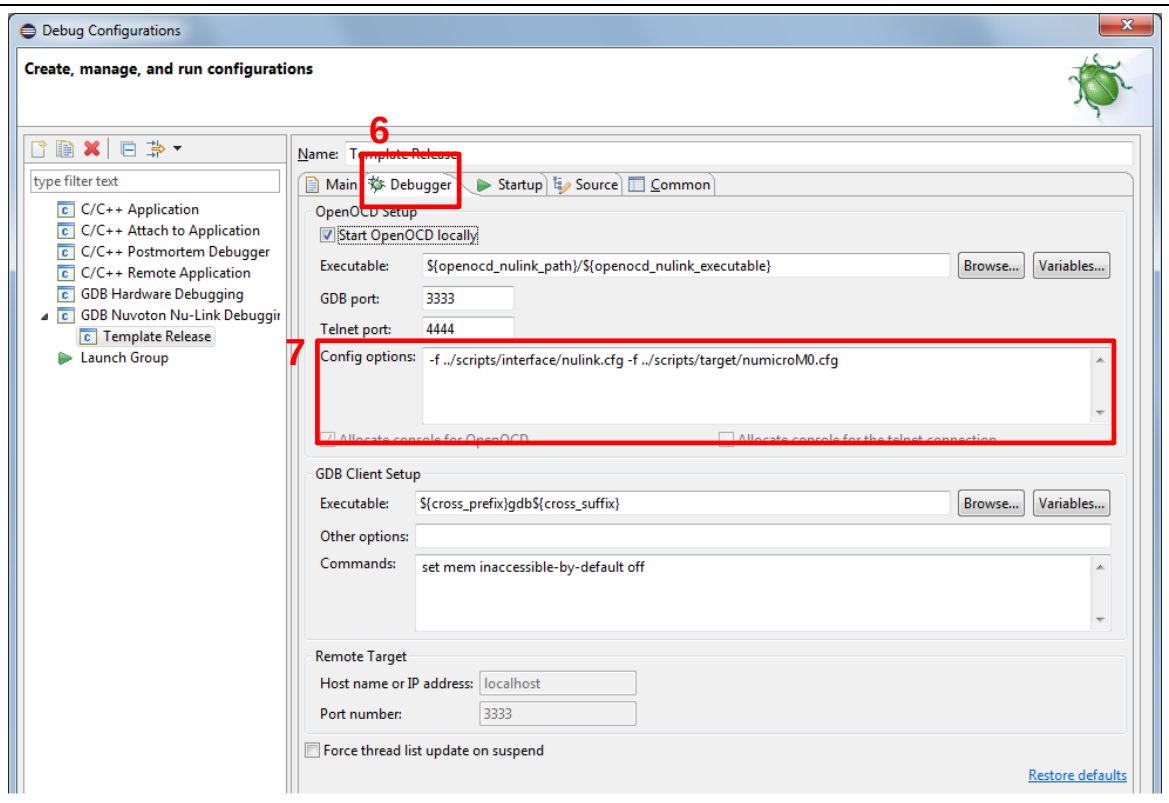
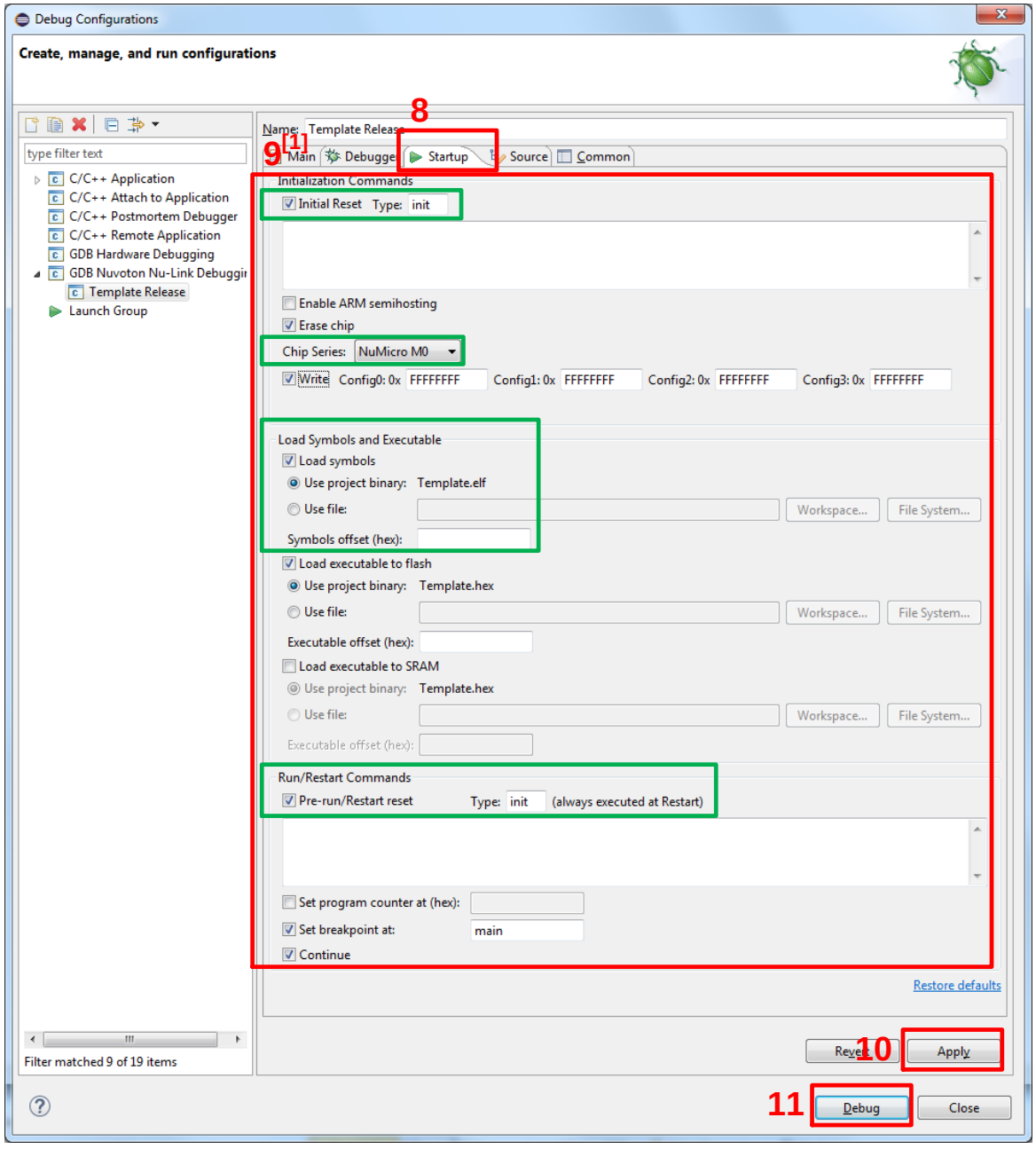


Figure 4-26 Debugger Tab Configuration



Note: User must follow those settings highlighted in green, and configure other settings depending on the needs.

Figure 4-27 Startup Tab Configuration

6. Figure 4-28 shows the debug mode under NuEclipse. Click "**Resume**" and the debug message will be printed out as shown in Figure 4-29. User can debug the project under debug mode by checking source code, assembly language, peripherals' registers, and setting breakpoint, step run, value monitor, etc. For more information about how to use NuEclipse, please refer to the *NuEclipse User Manual*.

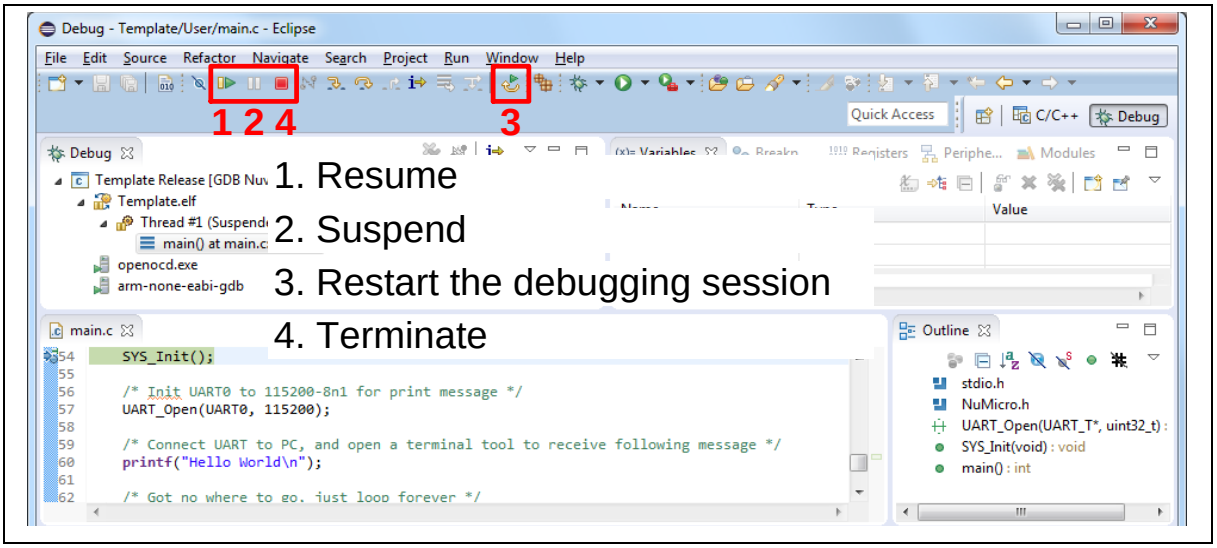


Figure 4-28 NuEclipse Debug Mode

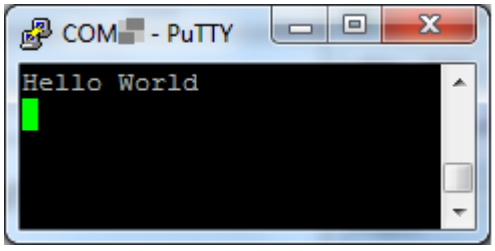


Figure 4-29 Debug Message on Serial Port Terminal Windows

5 NUMAKER-M253LEB SCHEMATICS

5.1 Nu-Link2-Me

Figure 5-1 shows the Nu-Link2-Me circuit.

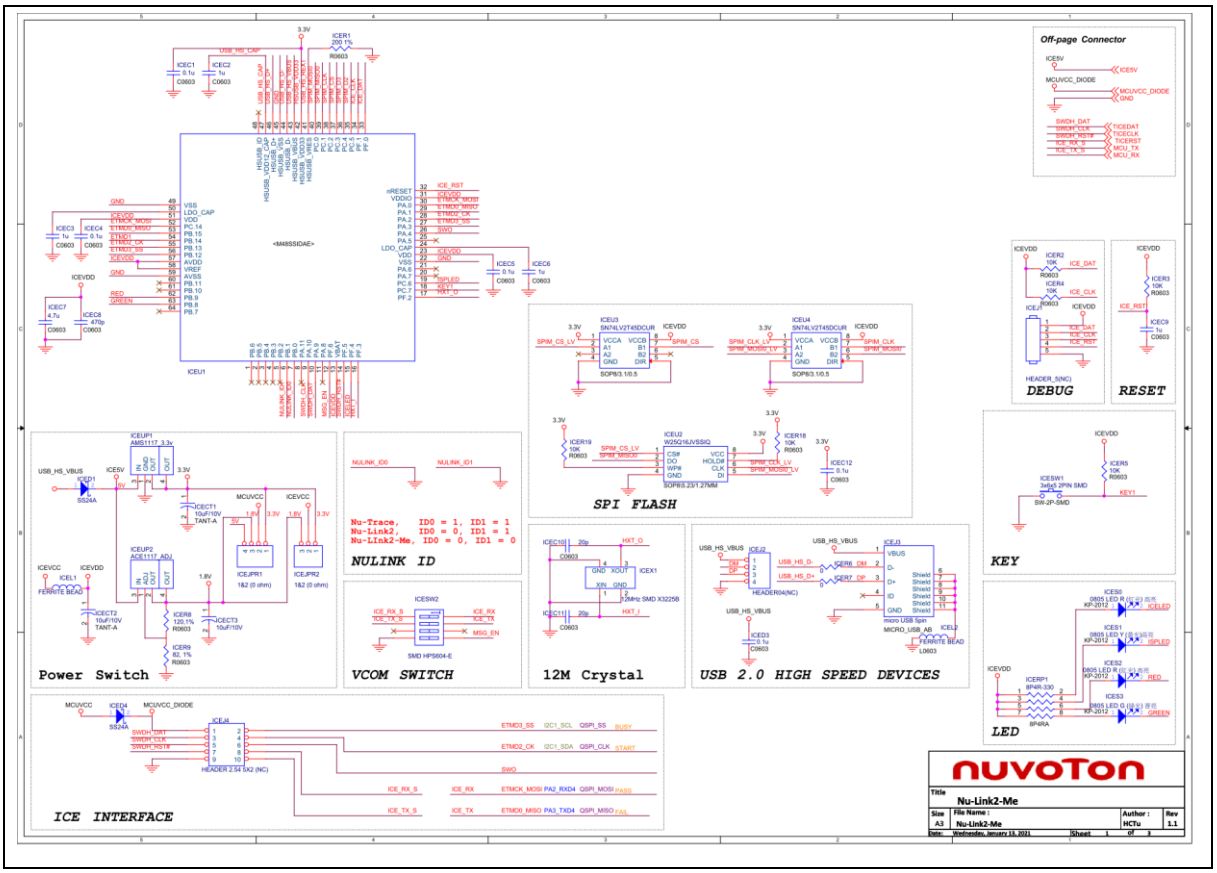


Figure 5-1 Nu-Link2-Me Circuit

M253BE Target Board

Figure 5-2 shows the M253BE target board circuit.

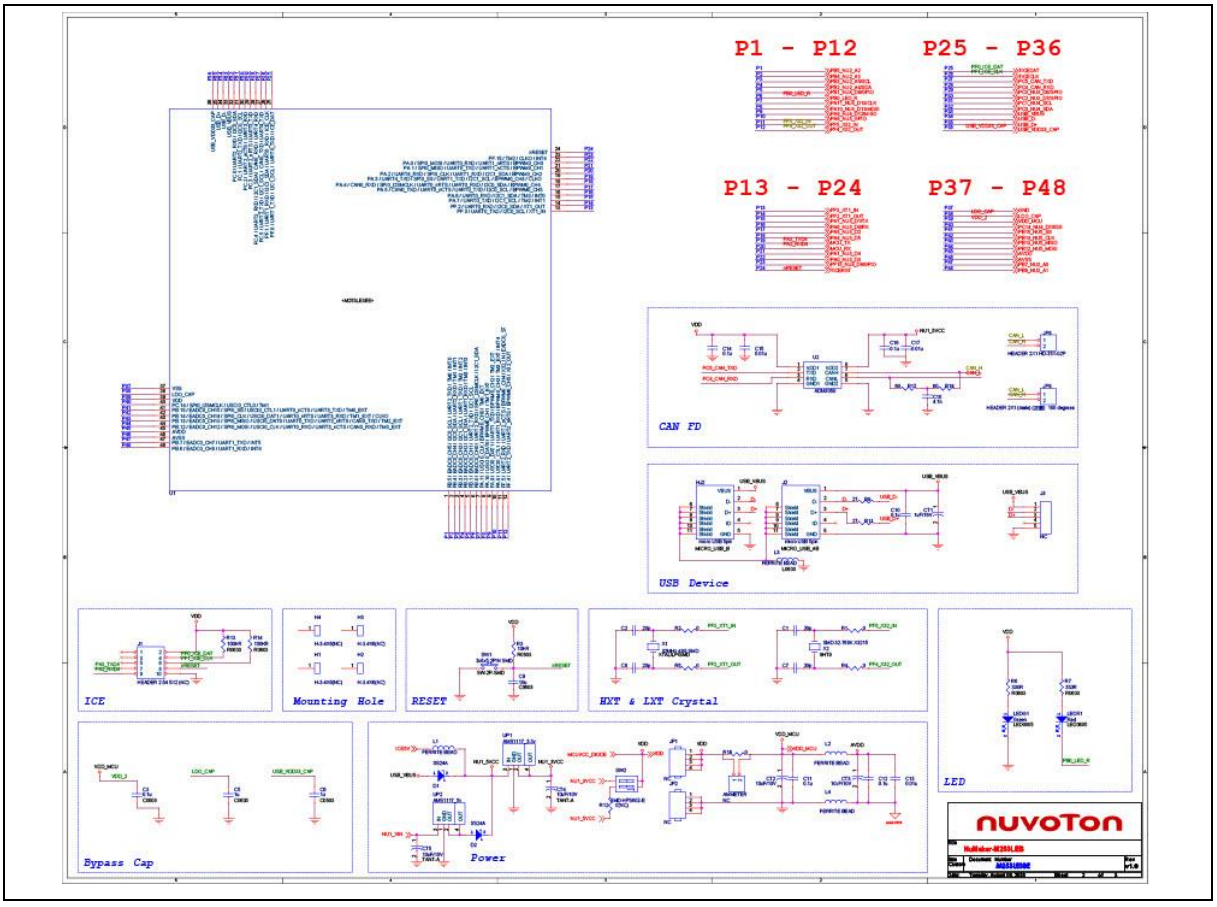


Figure 5-2 M253 Target Board Circuit

5.2 Extension Connectors

Figure 5-3 shows extension connectors of NuMaker-M253LEB.

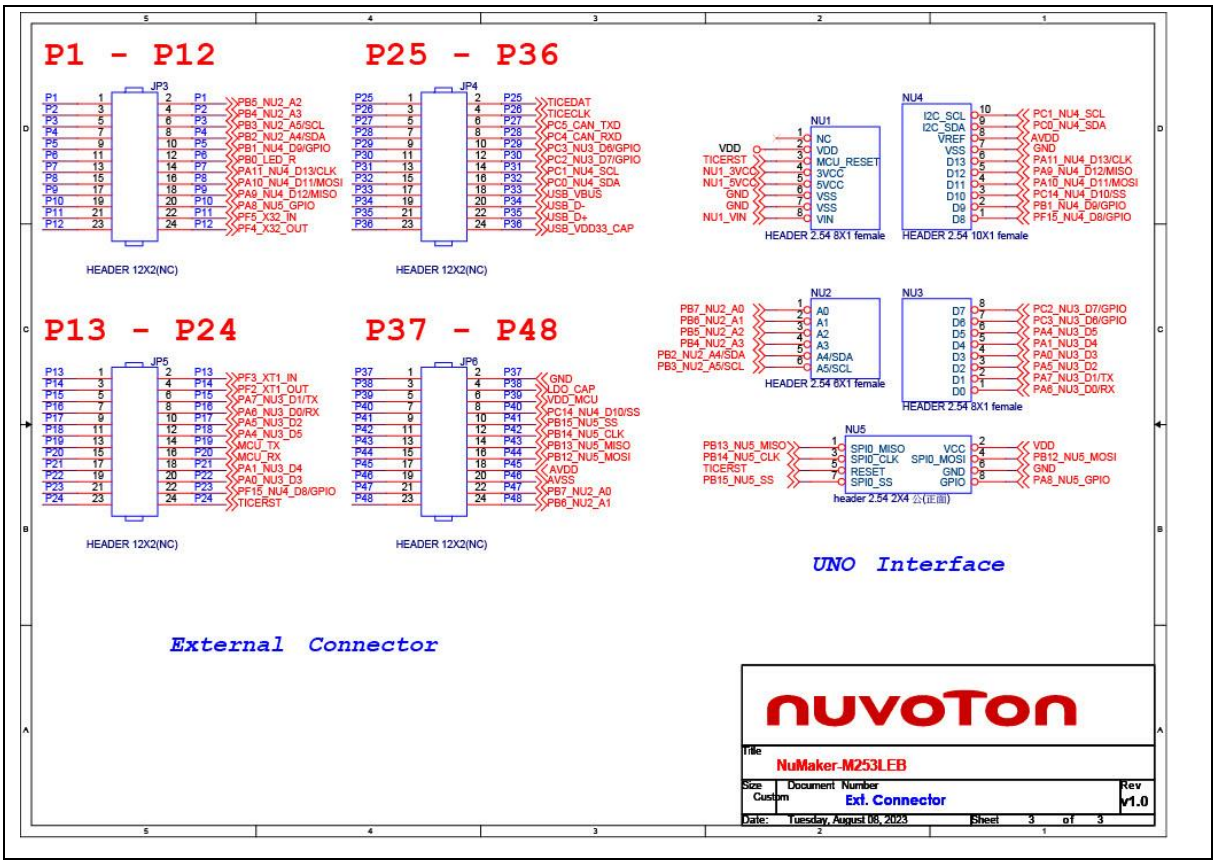


Figure 5-3 Extension Connectors Circuit

5.3 PCB Placement

Figure 5-4 and Figure 5-5 show the front and rear placement of NuMaker-M253LEB.

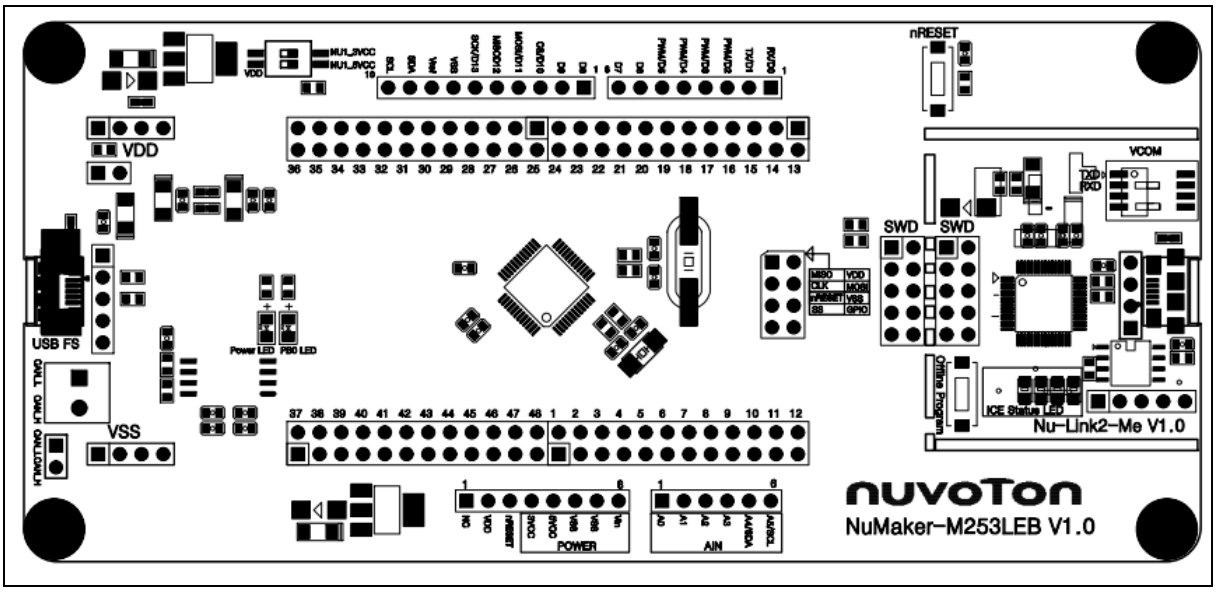


Figure 5-4 Front Placement

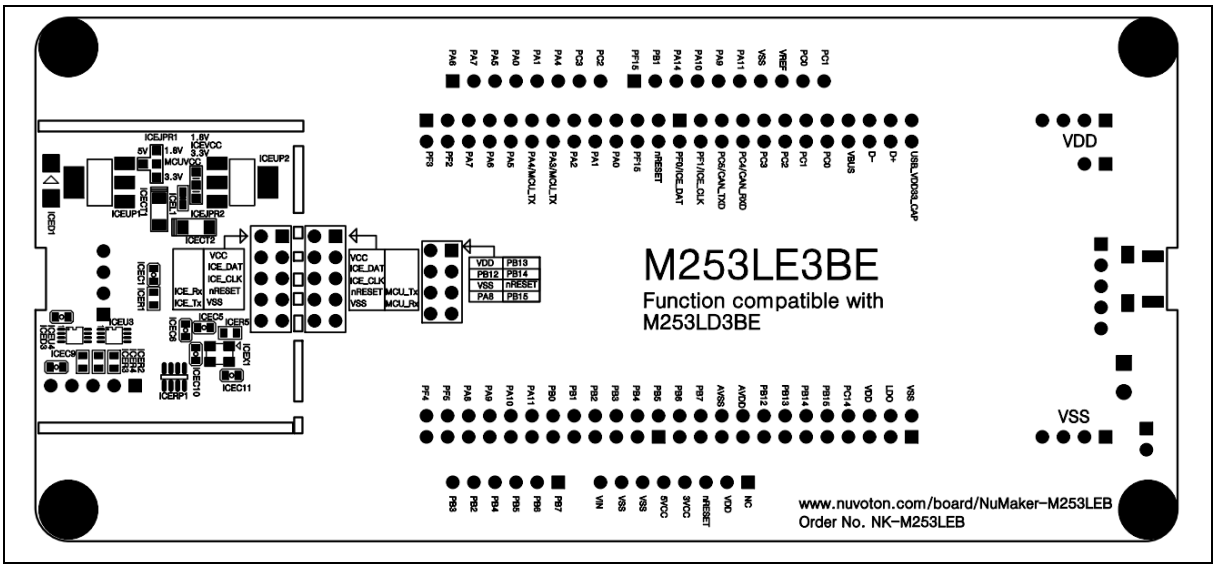


Figure 5-5 Rear Placement

6 REVISION HISTORY

Date	Revision	Description
2023.10.31	0.01	• Initial version

Important Notice

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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.

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