NuMicro® Family

1T 8051-based Microcontroller

NuMaker-CM1003DL8

User Manual

Evaluation Board for NuMicro® 1T 8051 Series

The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.

Nuvoton is providing this document only for reference purposes of NuMicro microcontroller and microprocessor based system design. Nuvoton assumes no responsibility for errors or omissions.

All data and specifications are subject to change without notice.

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

www.nuvoton.com

Table of Contents

1 OVERVIEW 6

2 FEATURES 7

3 HARDWARE CONFIGURATION 8

3.1 Front View 8

3.2 Rear View 9

3.3 Extension Connectors 10

3.3.1 Pin Assignment for Extension Connectors 10

3.3.2 Arduino UNO Compatible Extension Connectors 13

3.4 Power Supply Configuration 15

3.4.1 VIN Power Source 15

3.4.2 5 V Power Sources 15

3.4.3 3.3 V Power Sources 16

3.4.4 1.8 V Power Sources 16

3.4.5 Power Connectors 16

3.4.6 USB Connectors 17

3.4.7 Power Switches 17

3.4.8 Power Supply Models 17

3.5 Ammeter Connector 21

3.6 Push Buttons 22

3.7 LEDs 23

3.8 Nu-Link2-Me 24

3.8.1 VCOM Switches 24

3.8.2 Status LEDs 24

4 QUICK START 25

4.1 Toolchains Supporting 25

4.2 Nuvoton Nu-Link Driver Installation 26

4.3 BSP Firmware Download 28

4.4 Hardware Setup 28

4.5 Find the Example Project 30

4.6 Execute the Project under Toolchains 30

4.6.1 Keil MDK 30

4.6.2 IAR EWARM 34

5 NUMAKER-CM1003DL8 SCHEMATICS 36

5.1 Nu-Link2-Me 36

5.2 CM1003DL8 target board 37

5.3 Extension Connectors 38
5.4 PCB Placement 39
6 REVISION HISTORY 40

List of Figures

Figure 1-1 NuMaker-CM1003DL8 Evaluation Board 6
Figure 3-1 Front View of NuMaker-CM1003DL8 8
Figure 3-2 Rear View of NuMaker-CM1003DL8 9
Figure 3-3 CM1003DL8 Extension Connectors 10
Figure 3-4 Arduino UNO Compatible Extension Connectors 13
Figure 3-5 External Power Supply Sources on Nu-Link2-Me 17
Figure 3-6 External Power Supply Sources on CM1003DL8 Target Board 18
Figure 3-7 Detach the Nu-Link2-Me from NuMaker-CM1003DL8 19
Figure 3-8 Wiring between Ammeter Connector and Ammeter 21
Figure 3-9 Project Path of PowerDown_MinCurrent 21
Figure 4-1 Nu-Link USB Driver Installation Setup 26
Figure 4-2 Nu-Link USB Driver Installation 27
Figure 4-3 Open VCOM Function 28
Figure 4-4 ICE USB Connector 28
Figure 4-5 Device Manger 29
Figure 4-6 PuTTY Session Setting 29
Figure 4-7 Template Project Folder Path 30
Figure 4-8 Warning Message of “Device not found” 30
Figure 4-9 Project File Migrate to Version 5 Format 31
Figure 4-10 Debugger Setting in Options Window 31
Figure 4-11 Programming Setting in Options Window 32
Figure 4-12 Compile and Download the Project 32
Figure 4-13 Keil MDK Debug Mode 33
Figure 4-14 Debug Message on Serial Port Terminal Windows 33
Figure 4-15 IAR EWARM Window 34
Figure 4-16 Compile and Download the Project 34
Figure 4-17 IAR EWARM Debug Mode 35
Figure 4-18 Debug Message on Serial Port Terminal Windows 35
Figure 5-1 Nu-Link2-Me Circuit 36
Figure 5-2 CM1003DL8 Target Board Circuit 37
Figure 5-3 Extension Connectors Circuit 38
Figure 5-4 Front Placement 39
Figure 5-5 Rear Placement 39

List of Tables

Table 3-1 Extension Connectors 10
Table 3-2 CM1003DL8 Full-pin Extension Connectors and GPIO Function List 12
Table 3-3 Arduino UNO Extension Connectors and CM1003DL8AE Mapping GPIO List 14
Table 3-4 Vin Power Source 15
Table 3-5 5 V Power Sources 15
Table 3-6 3.3 V Power Sources 16
Table 3-7 1.8 V Power Sources 16
Table 3-8 Power Connectors 16
Table 3-9 USB Connectors 17
Table 3-10 Power Switches 17
Table 3-11 Supply External Power through Nu-Link2-Me 18
Table 3-12 Supply External Power for CM1003DL8 Target Board 20
Table 3-13 Ammeter Connector 21
Table 3-14 Push Buttons 22
Table 3-15 LEDs 23
Table 3-16 VCOM Function of Nu-Link2-Me 24
Table 3-17 Operation Status LED Patterns 24

1 OVERVIEW

The NuMaker-CM1003DL8 is an evaluation board for Nuvoton NuMicro CM1003DL8AE microcontrollers. The NuMaker-CM1003DL8 consists of two parts: an CM1003DL8 target board and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-CM1003DL8 is designed for project evaluation, prototype development and validation with power consumption monitoring function. The NuMaker-CM1003DL8 board is suitable for a wide range of applications such as home appliances, LED lighting controls, motor controls or Industrial automation.

The CM1003DL8AE target board is based on NuMicro CM1003DL8AE. For the development flexibility, the CM1003DL8target 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.

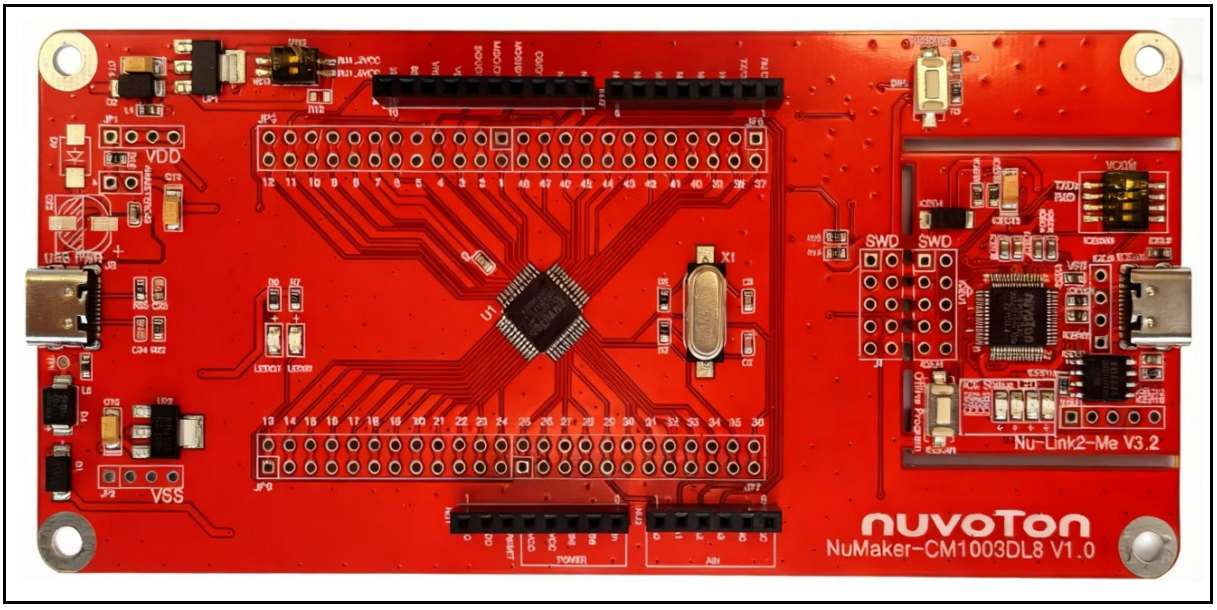

Figure 1-1 NuMaker-CM1003DL8 Evaluation Board

2 FEATURES

- NuMicro CM1003DL8AE used as main microcontroller with function compatible with:
  - CM1003CJ3AE
  - CM1003DJ3AE
- CM1003DL8AE full pins extension connectors
- Arduino UNO compatible extension connectors
- Ammeter connector for measuring the microcontroller's power consumption
- Flexible board power supply:
  - External VDD power connector
  - Arduino UNO compatible extension connector Vin
  - USB Power connector on CM1003DL8 target board
  - ICE USB connector on Nu-Link2-Me
- On-board Nu-Link2-Me debugger and programmer:
  - Debug through OCD interface
  - Online/offline programming
  - Virtual COM port function

3 HARDWARE CONFIGURATION

3.1 Front View

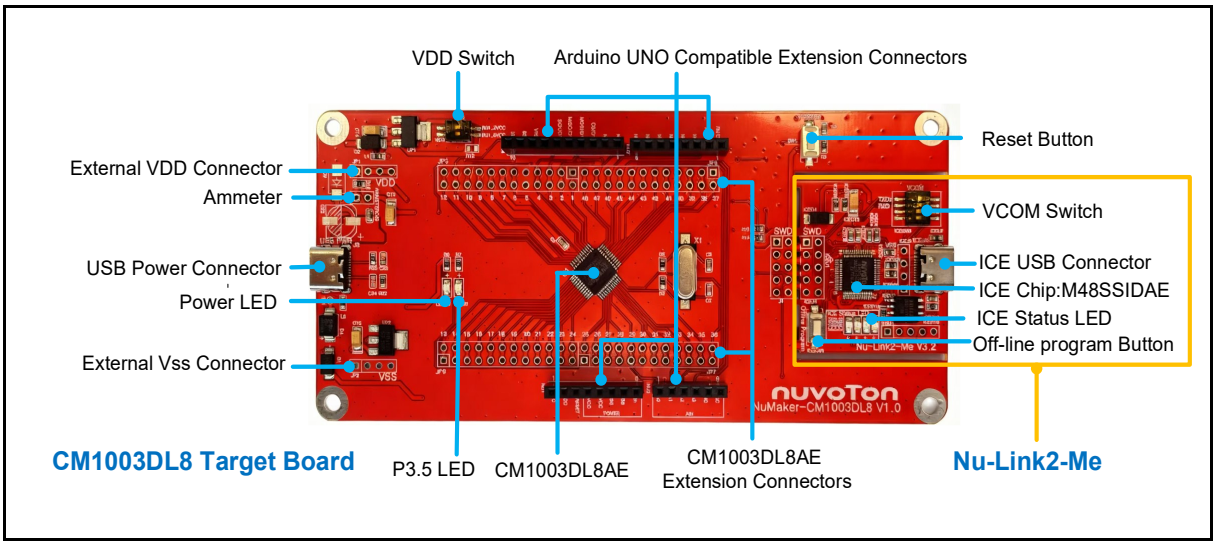

Figure 3-1 Front View of NuMaker-CM1003DL8

Figure 3-1 shows the main components and connectors from the front side of NuMaker-CM1003DL8. The following lists components and connectors from the front view:

- NuMicro CM1003DL8AE used as main microcontroller
- CM1003DL8AE 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 Power only connector on CM1003DL8AE 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

3.2 Rear View

Figure 3-2 shows the main components and connectors from the rear side of NuMaker-CM1003DL8.

The following lists components and connectors from the rear view:

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

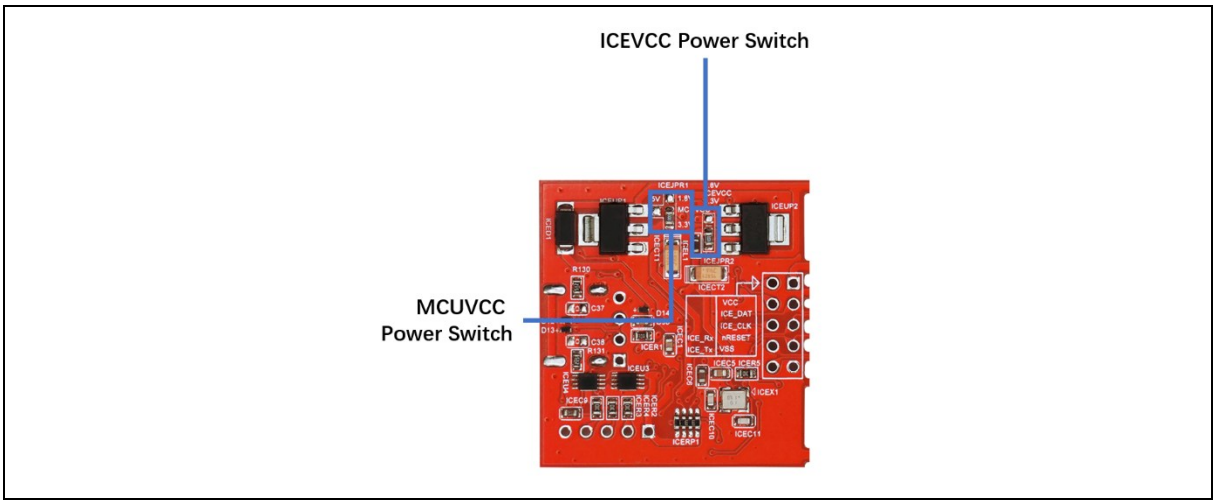

Figure 3-2 Rear View of NuMaker-CM1003DL8

3.3 Extension Connectors

Table 3-1 presents the extension connectors.

Connector	Description
JP3 and JP4	Full pins extension connectors on the NuMaker-CM1003DL8.
NU1, NU2, NU3 and NU4	Arduino UNO compatible pins on the NuMaker-CM1003DL8.

Table 3-1 Extension Connectors

3.3.1 Pin Assignment for Extension Connectors

The NuMaker-CM1003DL8 provides the CM1003DL8AE onboard and extension connectors (JP3 and JP4). Figure 3-3 shows the CM1003DL8 extension connectors.

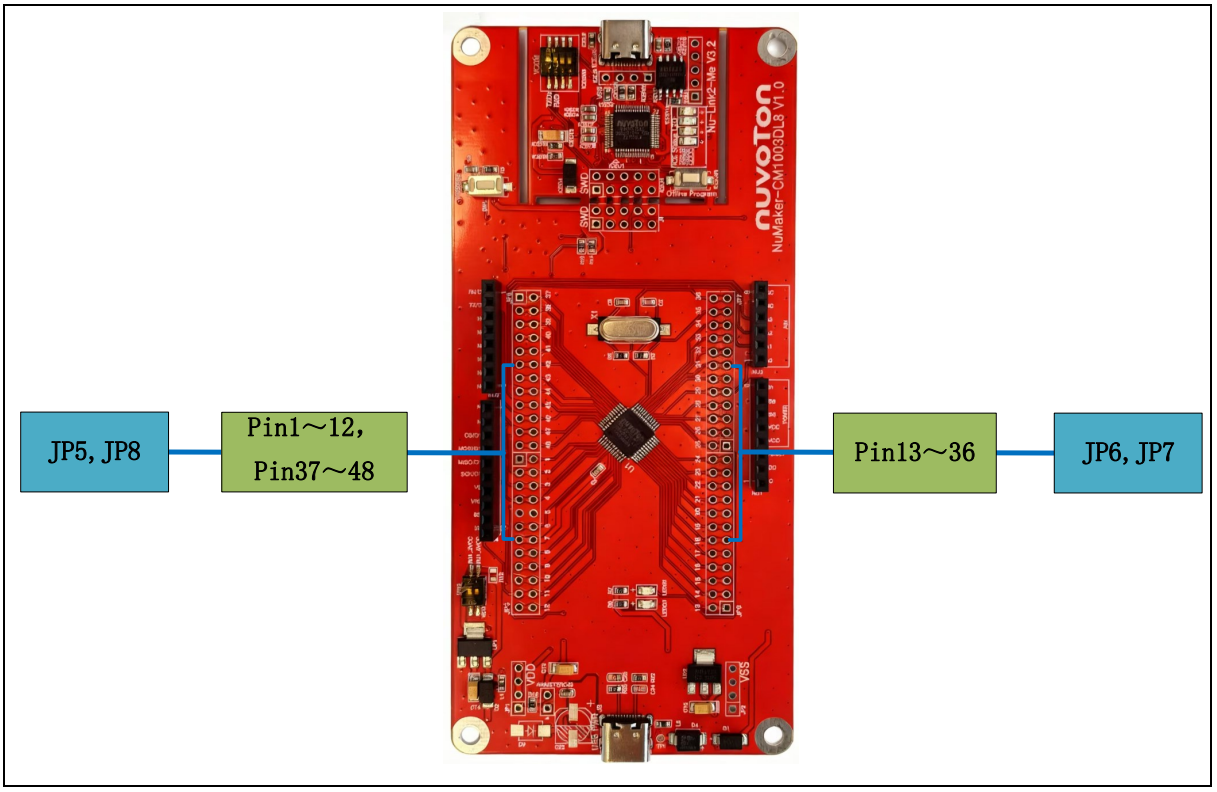

Figure 3-3 CM1003DL8 Extension Connectors

Header		CM1003DL8AE	
		Pin No.	Function
JP5	JP5.1	1	P5.4
	JP5.2	2	P2.0 / nRESET
	JP5.3	3	P3.0 / ADC_CH1 / OSCIN / INT0 / PWM2_CH1 / UART2_TXD / SPI0_MOSI
	JP5.4	4	P1.7 / ADC_CH0 / INT1 / PWM3_CH0 / UART2_RXD / SPI0_CLK
	JP5.5	5	VSS
	JP5.6	6	P1.6 / ICE_DAT / I2C0_SDA / UART1_TXD
	JP5.7	7	VDD
	JP5.8	8	P5.5
	JP5.9	9	P5.6
	JP5.10	10	P1.5 / PWM0_CH5 / SPI0_SS / IC7 / UART3_TXD / PWM3_CH1
	JP5.11	11	P2.5 / ADC_CH15 / UART3_RXD / SPI0_MISO
	JP5.12	12	P5.7
JP6	JP6.1	13	P3.6 / UART1_TXD
	JP6.2	14	P3.7 / UART1_RXD
	JP6.3	15	P1.4 / PWM0_CH1 / I2C0_SDA / PWM0_BRAKE / ADC_CH14 / PWM1_CH1
	JP6.4	16	P1.3 / STADC / I2C0_SCL / ADC_CH13
	JP6.5	17	P2.4 / ADC_CH12 / T0
	JP6.6	18	P2.3 / ADC_CH11 / PWM1_CH0 / UART4_TXD
	JP5.7	19	P2.2 / ADC_CH10 / PWM1_CH1 / UART4_RXD
	JP6.8	20	P2.1 / ADC_CH9 / PWM2_CH0
	JP6.9	21	P4.0
	JP6.10	22	P4.1
	JP6.11	23	P4.2
	JP6.12	24	P4.3
JP7	JP7.1	25	P3.5 / SPI0_SS
	JP7.2	26	P3.1 / PWM2_CH1
	JP7.3	27	P3.2 / PWM3_CH0
	JP7.4	28	P1.2 / PWM0_CH0 / IC0 / UART3_TXD / PWM1_CH0
	JP7.5	29	P1.1 / ADC_CH7 / CLKO / IC1 / PWM0_CH1 / UART3_RXD / PWM1_CH1
	JP7.6	30	P1.0 / PWM0_CH2 / SPI0_CLK / IC2 / UART1_TXD / PWM2_CH0
	JP7.7	31	P4.4
	JP7.8	32	P4.5
	JP7.9	33	P4.6
	JP7.10	34	P4.7
	JP7.11	35	P0.0 / PWM0_CH3 / SPI0_MOSI / IC3 / UART1_RXD / T1 / HXTIN / PWM2_CH1
	JP7.12	36	P0.1 / PWM0_CH4 / SPI0_MISO / IC4 / HXTOUT / PWM3_CH0
JP8	JP8.1	37	P5.0
	JP8.2	38	P5.1
	JP8.3	39	P5.2
	JP8.4	40	P5.3
	JP8.5	41	P3.3 / PWM0_CH0 / CLKO / PWM0_BRAKE
	JP8.6	42	P0.2 / ICE_CLK / I2C0_SCL / UART1_RXD
	JP8.7	43	P0.3 / ADC_CH6 / IC5 / PWM0_CH5 / UART2_TXD / PWM3_CH1

Header		CM1003DL8AE	
		Pin No.	Function
	JP8.8	44	P0.4 / ADC_CH5 / IC3 / PWM0_CH3 / STADC / UART2_RXD / PWM2_CH1
	JP8.9	45	P0.5 / ADC_CH4 / IC6 / PWM0_CH2 / T0 / UART3_TXD / PWM2_CH0
	JP8.10	46	P0.6 / ADC_CH3 / UART0_TXD
	JP8.11	47	P0.7 / ADC_CH2 / UART0_RXD
	JP8.12	48	P3.4 / PWM3_CH1 / UART3_RXD

Table 3-2 CM1003DL8 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.

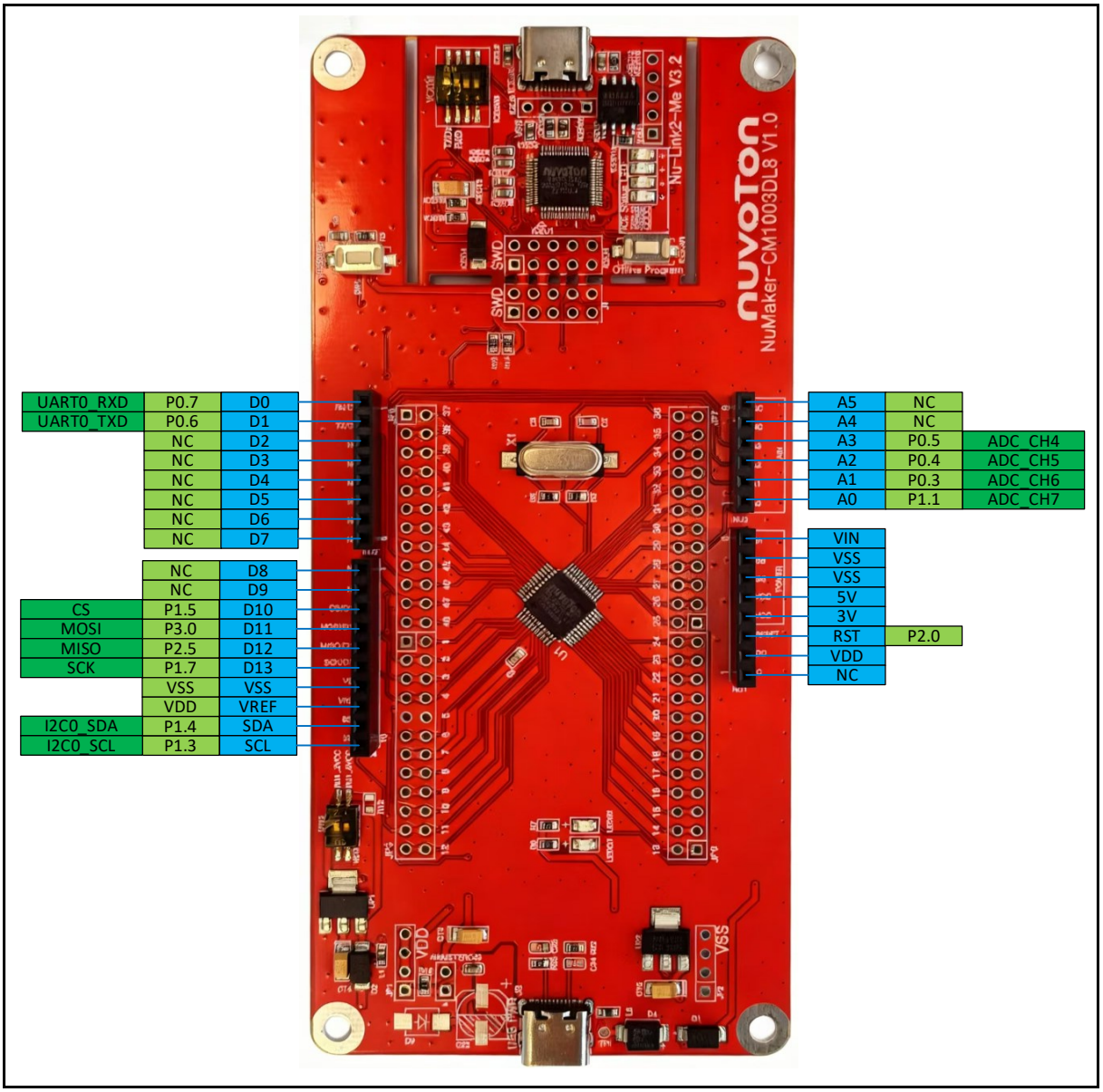

Figure 3-4 Arduino UNO Compatible Extension Connectors

Header		NuMaker-CM1003DL8		Header		NuMaker-CM1003DL8	
		Compatible to Arduino UNO	GPIO Pin of CM1003DL8			Compatible to Arduino UNO	GPIO Pin of CM1003DL8
NU3	NU3.1	RX	P0.7	NU2	NU2.6	SCL	NC
	NU3.2	TX	P0.6		NU2.5	SDA	NC
	NU3.3	D2	NC		NU2.4	A3	P0.5
	NU3.4	D3	NC		NU2.3	A2	P0.4
	NU3.5	D4	NC		NU2.2	A1	P0.3
	NU3.6	D5	NC		NU2.1	A0	P1.1
	NU3.7	D6	NC	NU1	NU1.8	VIN	-
	NU3.8	D7	NC		NU1.7	VSS	
NU4	NU4.1	D8	NC		NU1.6	VSS	
	NU4.2	D9	NC		NU1.5	5V	
	NU4.3	SS/D10	P1.5		NU1.4	3V	
	NU4.4	MOSI	P3.0		NU1.3	RST	nRESET/P2.0
	NU4.5	MISO	P2.5		NU1.2	IOREF	VDD
	NU4.6	SCK	P1.7		NU1.1	NC	-
	NU4.7	VSS	VSS				
	NU4.8	VREF	AVDD				
	NU4.9	SDA	P1.4				
	NU4.10	SCL	P1.3				

Table 3-3 Arduino UNO Extension Connectors and CM1003DL8AE Mapping GPIO List

3.4 Power Supply Configuration

The NuMaker-CM1003DL8 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-CM1003DL8.

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
ICEJ2	USB_HS_VBUS	ICE USB connector supplies 5 V power from PC to CM1003DL8 target board and Nu-Link2-Me.
J3	USB_VBUS	USB connector on NuMaker-CM1003DL8 supplies 5 V power from PC to CM1003DL8 target board and Nu-Link2-Me.
NU1 pin5	NU1_5VCC	ICEJ2, J3 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 CM1003DL8 target board or ICE chip.
UP1	USB_VBUS	UP1 converts USB_VBUS to 3.3 V and supplies 3.3 V to CM1003DL8 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 CM1003DL8 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 CM1003DL8 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-CM1003DL8.
JP2	V_{SS} connector on the NuMaker-CM1003DL8.

Table 3-8 Power Connectors

3.4.6 USB Connectors

Table 3-9 presents the USB connectors.

Connector	Description
ICEJ2	ICE USB connector on Nu-Link2-Me for power supply, debugging and programming from PC.
J3	USB FS connector on NuMaker-CM1003DL8 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.

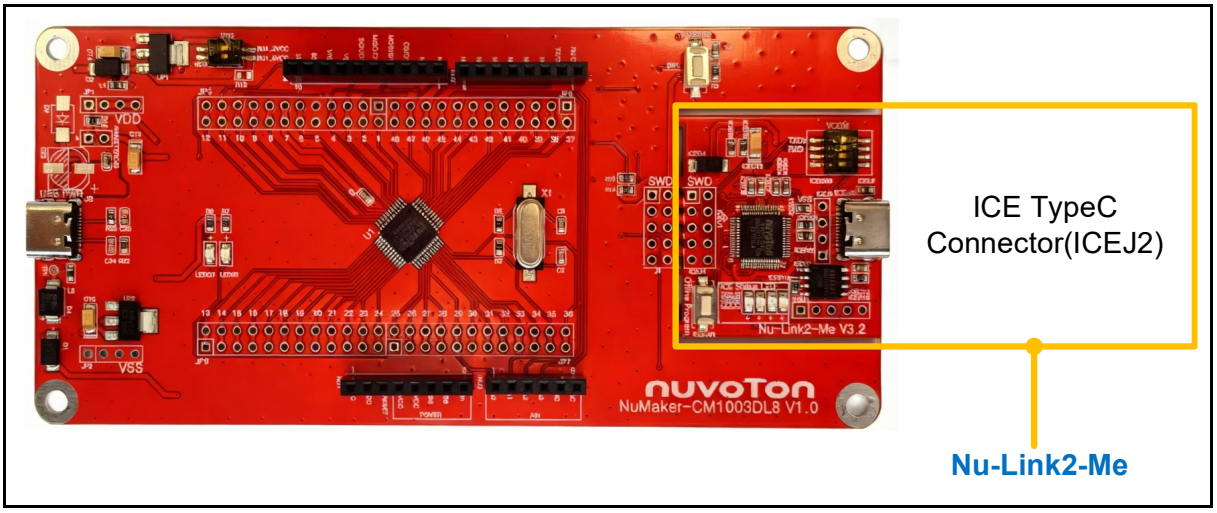

Figure 3-5 External Power Supply Sources on Nu-Link2-Me

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 ICEJ2.

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	ICEJ2	ICEJPR1 (MCUVCC) Selection [1]	ICEJPR2 (ICEVCC) Selection [2]	ICE Chip Voltage	SW2 Selection	J3	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 CM1003DL8 Target Board to Target Chip

The external power supply sources on CM1003DL8 target board are shown in Figure 3-6.

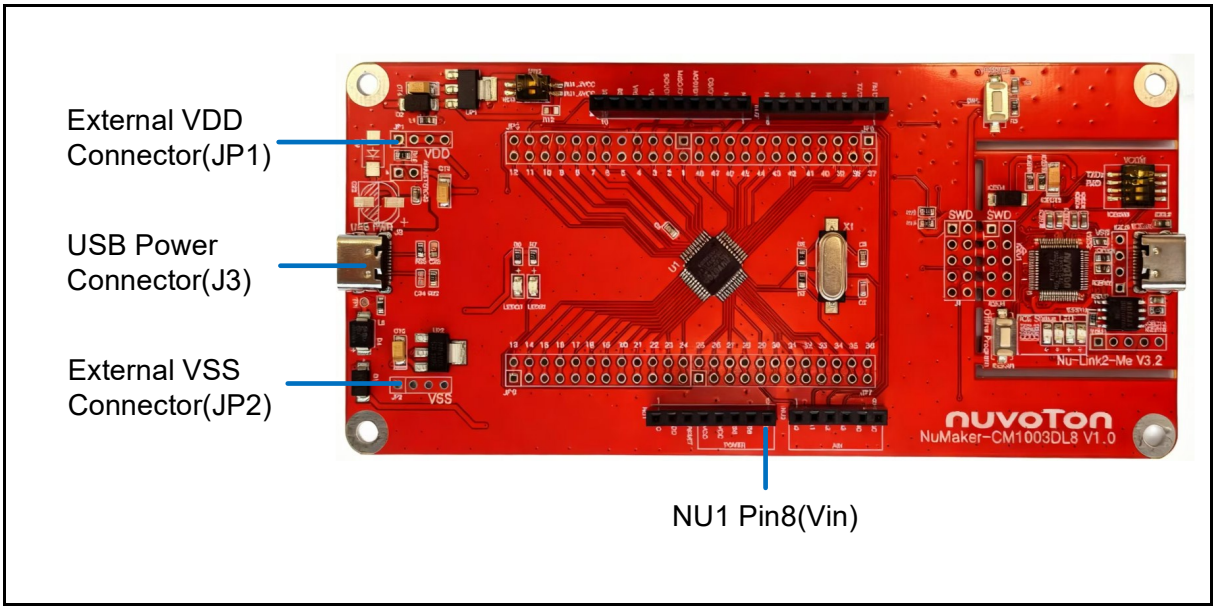

Figure 3-6 External Power Supply Sources on CM1003DL8 Target Board

To use Vin or J3 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 J3.

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 J3 as external power supply source with Nu-Link2-Me detached from NuMaker-CM1003DL8, please follow the steps below:

1. Switch the SW2 depending on the target chip operating voltage.
2. Detach the Nu-Link2-Me from NuMaker-CM1003DL8.
3. Connect the external power supply to Vin or J3.

To use JP1 as external power supply source with Nu-Link2-Me detached from NuMaker-CM1003DL8, please follow the steps below:

1. Switch the SW2 to OFF.
2. Detach the Nu-Link2-Me from NuMaker-CM1003DL8.
3. Connect the external power supply to JP1.

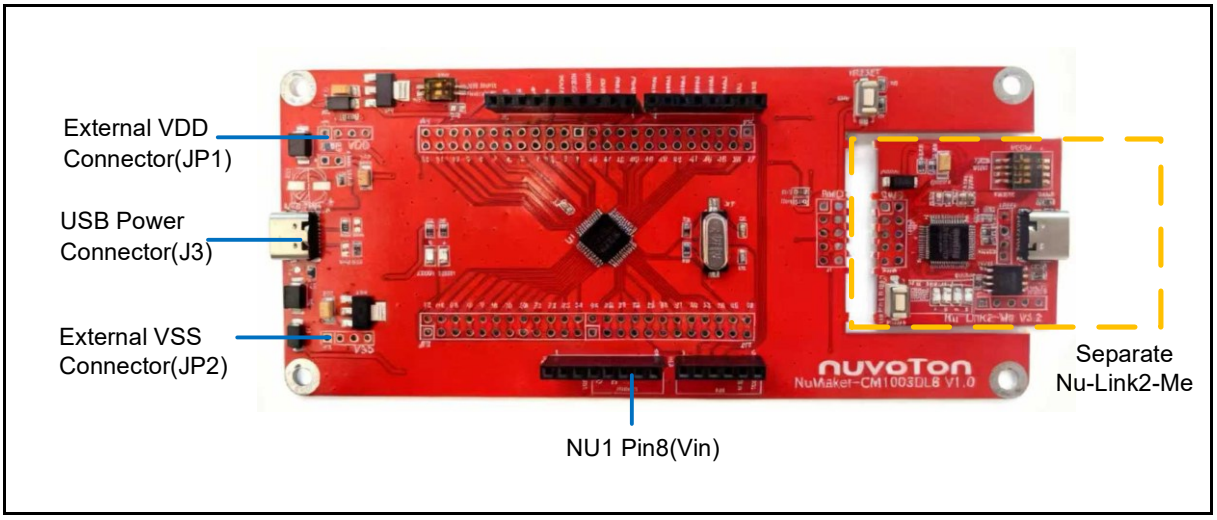

Figure 3-7 Detach the Nu-Link2-Me from NuMaker-CM1003DL8

Table 3-12 presents all power models when supplies external power through CM1003DL8 target board. The CM1003DL8 target board external power sources are highlighted in yellow.

Model	Target Chip Voltage	Vin [1]	J3[1]	ICEJ2	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	2.5 V ~ 5.5 V	-	-	Connect to PC	OFF	DC Input 2.5 V ~ 5.5 V	Remove resistor	1.8 V / 3.3 V	1.8 V / 3.3 V
9	2.5 V ~ 5.5 V	-	-	Nu-Link2-Me removed	OFF	DC Input 2.5 V ~ 5.5 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 CM1003DL8 Target Board

3.5 Ammeter Connector

User can refer to the sample code in CM1003 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 3-13 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 3-13 Ammeter Connector

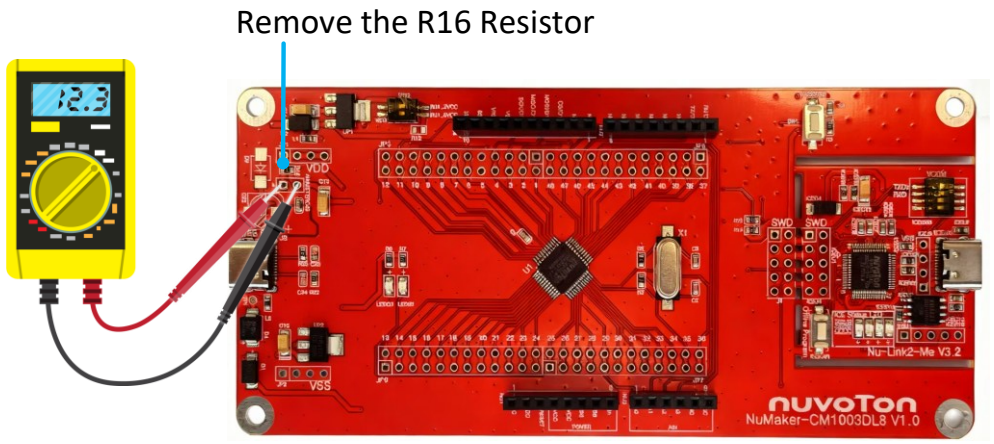

Figure 3-8 Wiring between Ammeter Connector and Ammeter

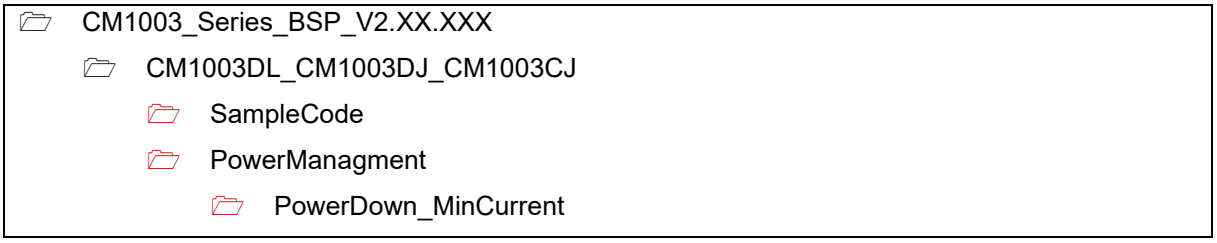

Figure 3-9 Project Path of PowerDown_MinCurrent

3.6 Push Buttons

Table 3-14 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 3-14 Push Buttons

3.7 LEDs

Table 3-15 presents the LEDs.

Component	Description
Power LED	The power LED indicates that the NuMaker-CM1003DL8 is powered.
P3.5 LED	The LED is connected to the target chip P3.5.
ICES0, ICES1, ICES2 and ICES3	Nu-Link2-Me status LED.

Table 3-15 LEDs

3.8 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*.

3.8.1 VCOM Switches

Table 3-16 presents how to set the VCOM function by ICESW2.

ICESW2		
Pin	**Function**	**Description**
1	TXD	**On**: Connect target chip Pin2(UART0_TXD) to Nu-Link2-Me. **Off**: Disconnect target chip Pin2 (UART0_TXD) to Nu-Link2-Me.
2	RXD	**On**: Connect target chip Pin3 (UART0_RXD) to Nu-Link2-Me. **Off**: Disconnect target chip Pin3(UART0_RXD) to Nu-Link2-Me.
Note: Pin 3 and 4 is unused.		

Table 3-16 VCOM Function of Nu-Link2-Me

3.8.2 Status LEDs

Table 3-17 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 3-17 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 PK51 Professional Developer's Kit
- IAR EMBEDDED WORKBENCH FOR 8051
- NuEclipse_Windows (For NuMicro 8051)
- NuEclipse_Linux (For NuMicro 8051)

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.

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.

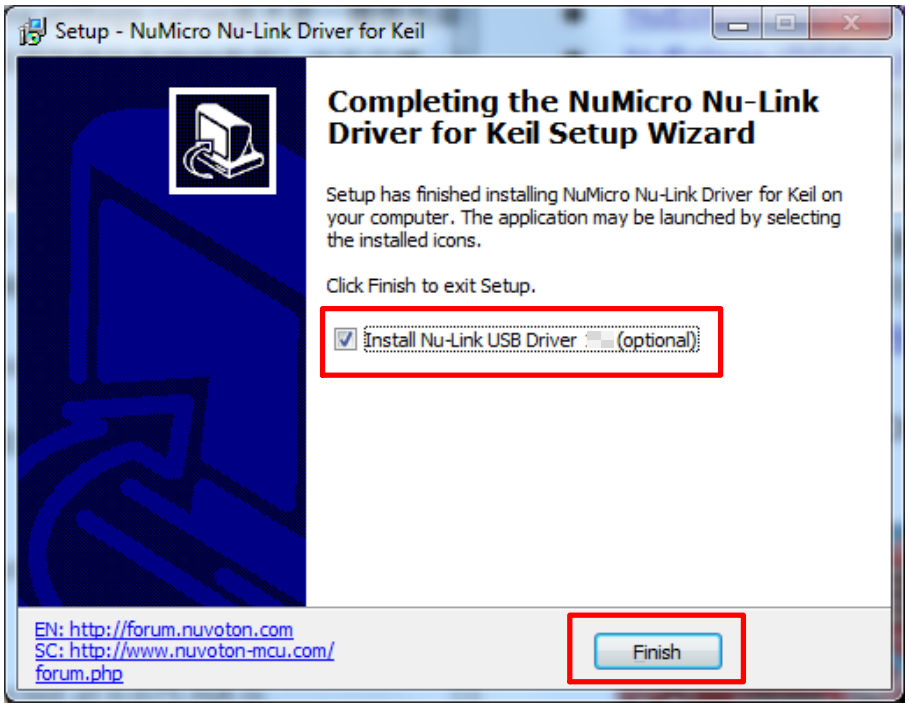

Figure 4-1 Nu-Link USB Driver Installation Setup

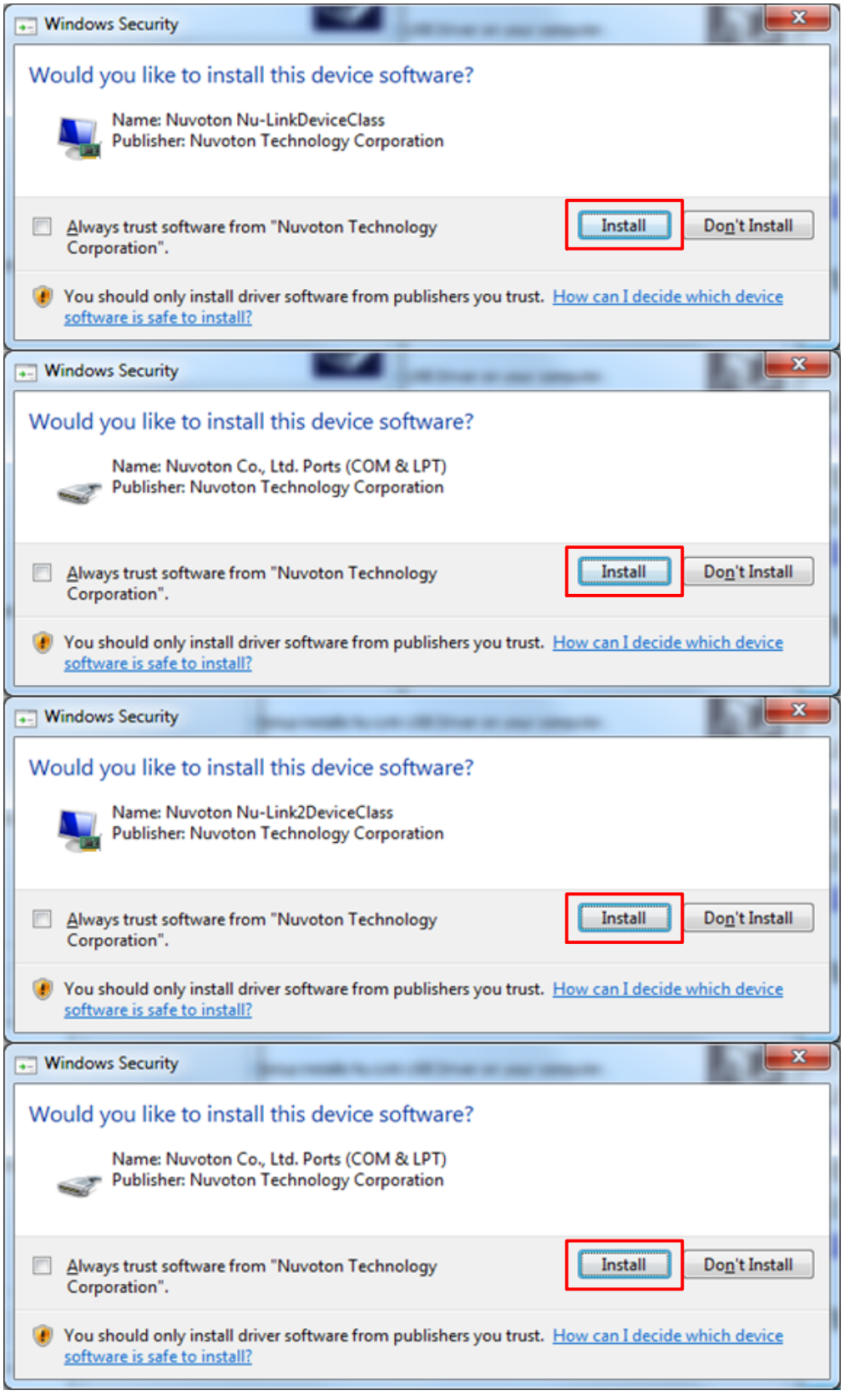

Figure 4-2 Nu-Link USB Driver Installation

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.

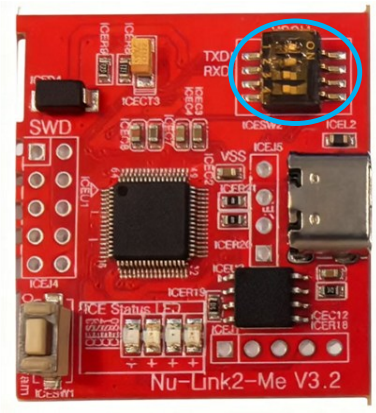

Figure 4-3 Open VCOM Function

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.

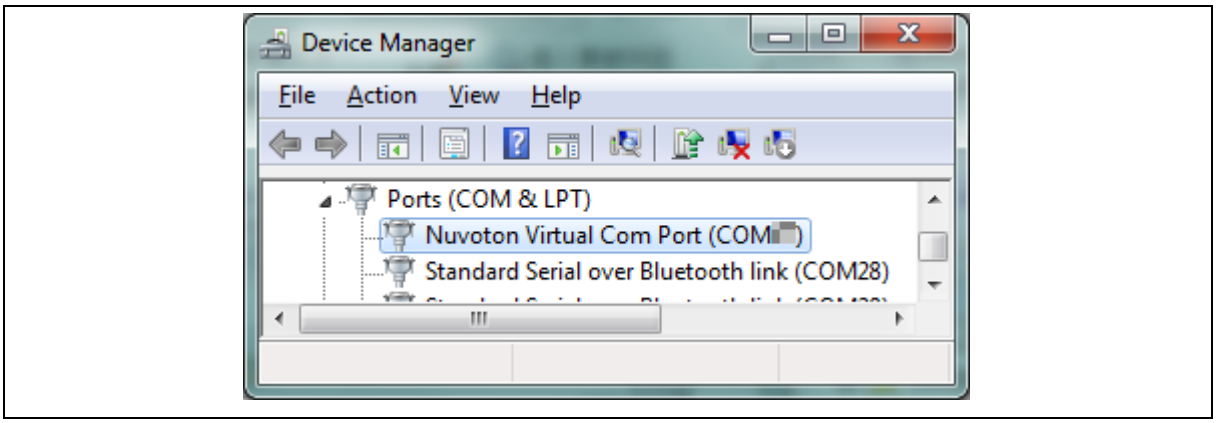

Figure 4-5 Device Manger

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.

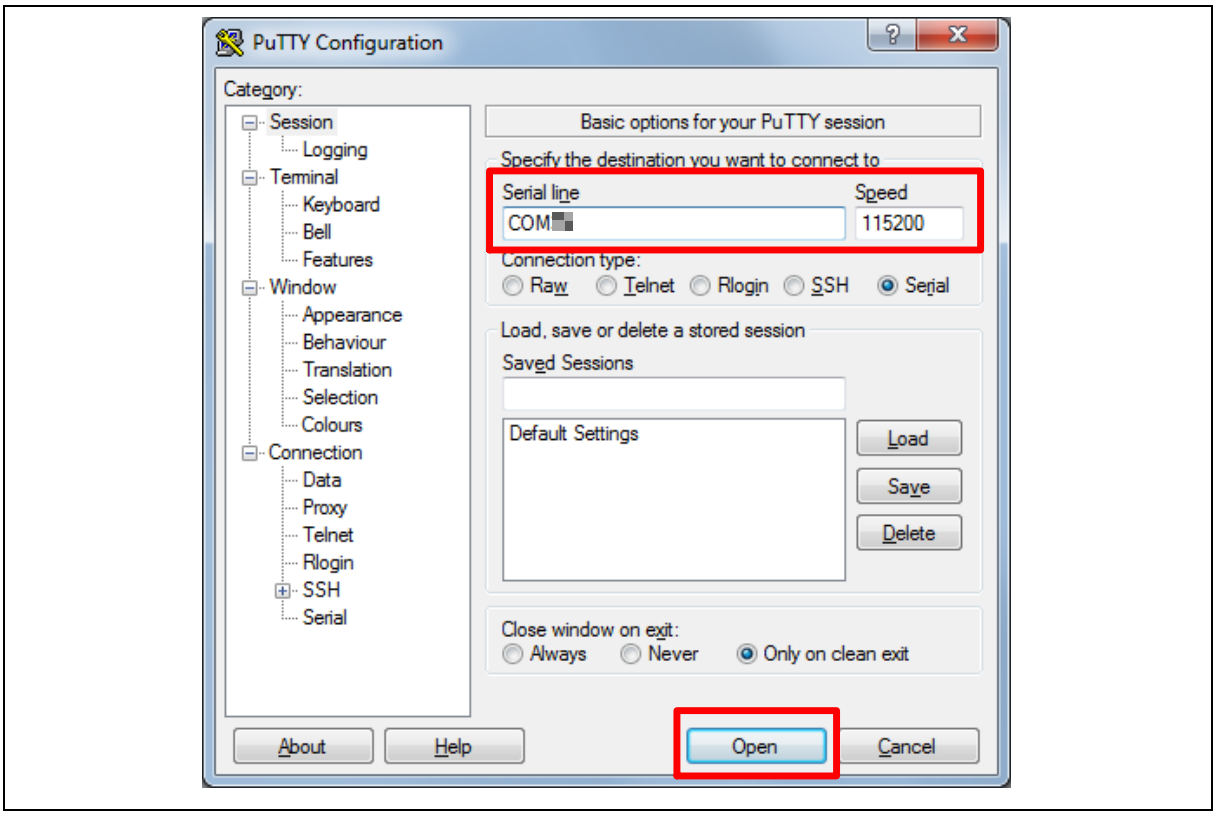

Figure 4-6 PuTTY Session Setting

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.

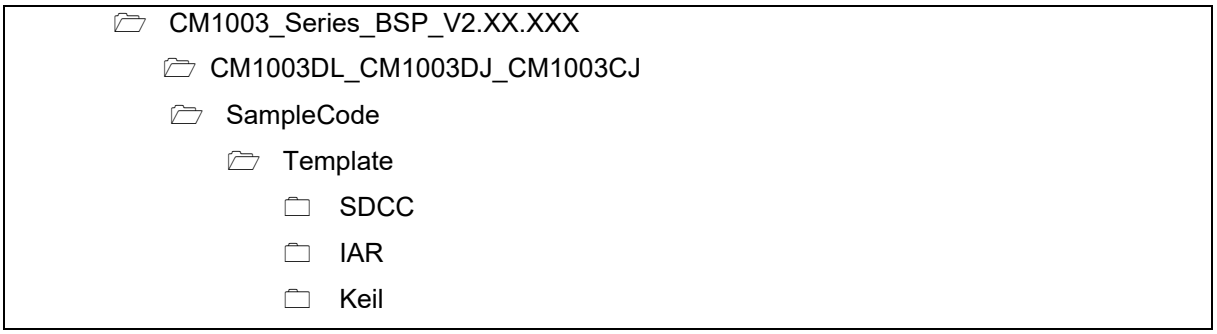

Figure 4-7 Template Project Folder Path

4.6 Execute the Project under Toolchains

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

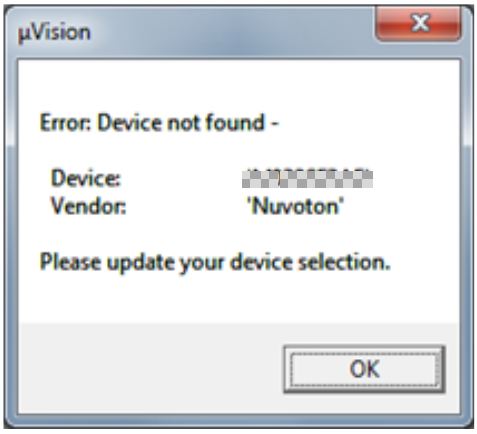

Figure 4-8 Warning Message of “Device not found”

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”.

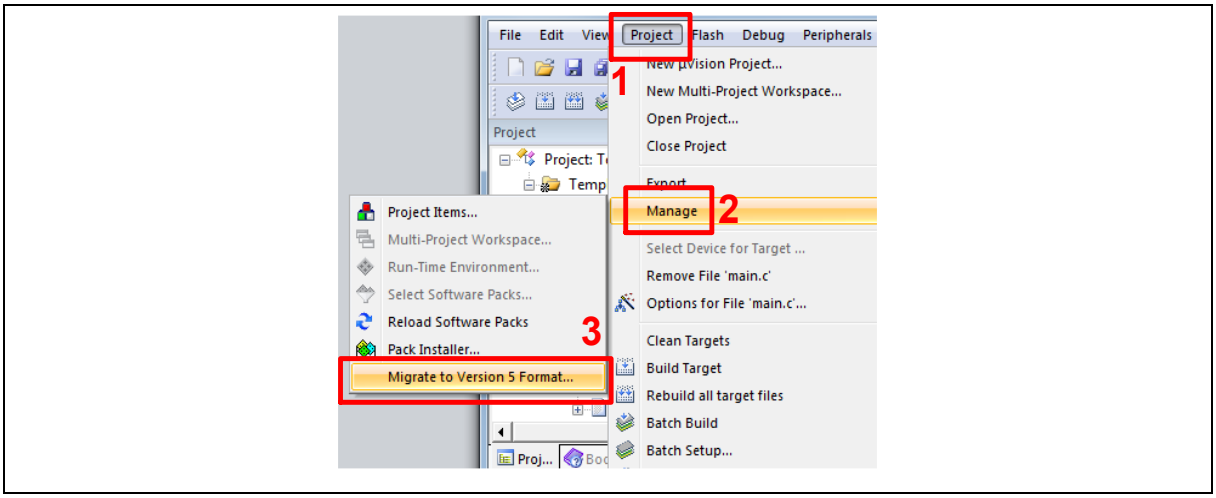

Figure 4-9 Project File Migrate to Version 5 Format

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

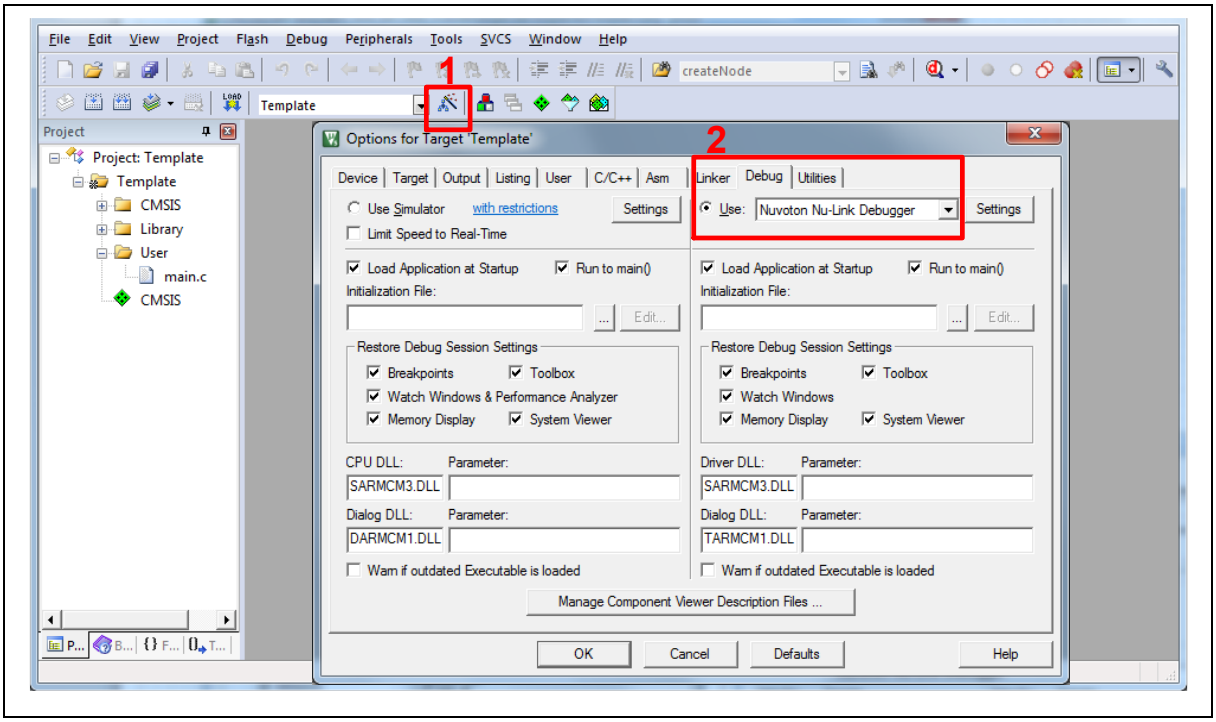

Figure 4-10 Debugger Setting in Options Window

Note: If the dropdown menu in Figure 4-10 does not contain “Nuvoton Nu-Link Debugger” item, please rework section4.2.

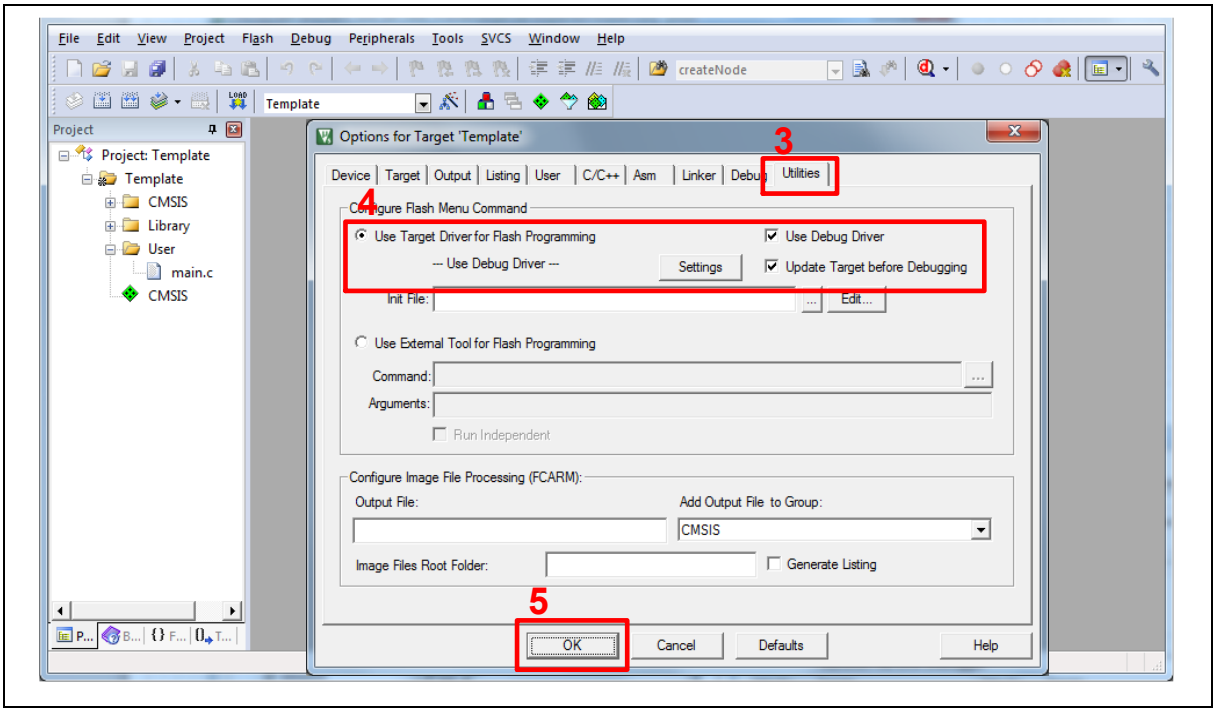

Figure 4-11 Programming Setting in Options Window

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.

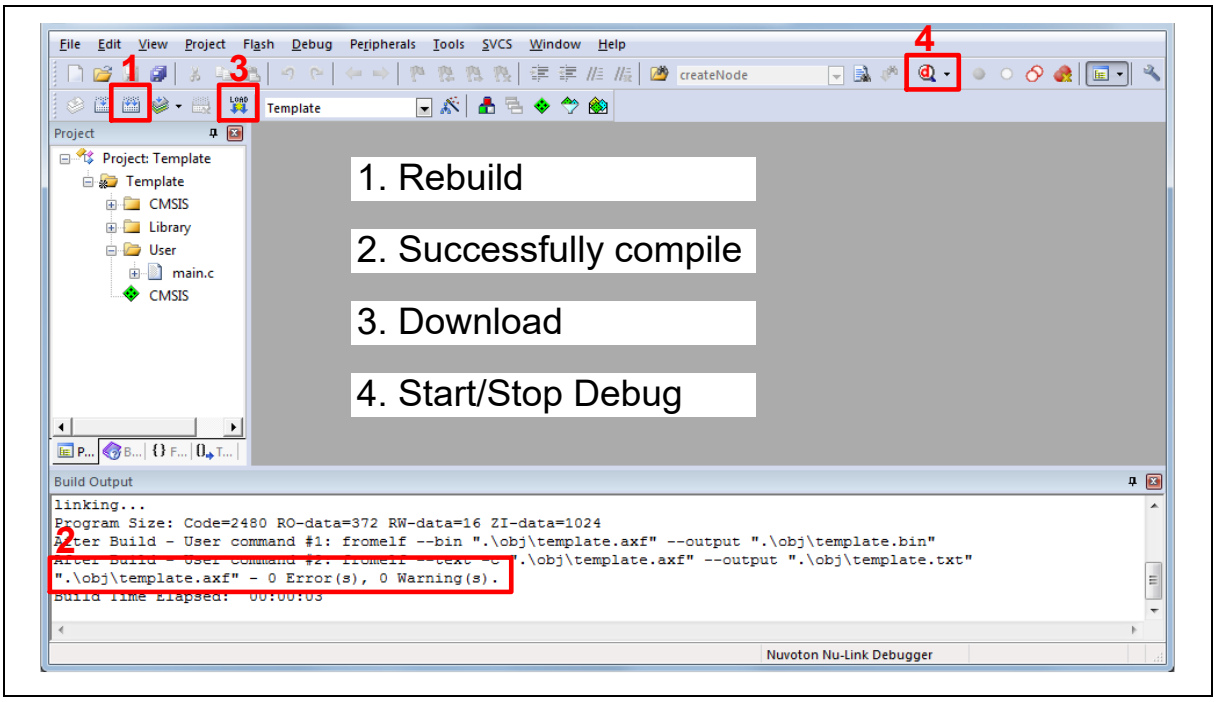

Figure 4-12 Compile and Download the Project

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.

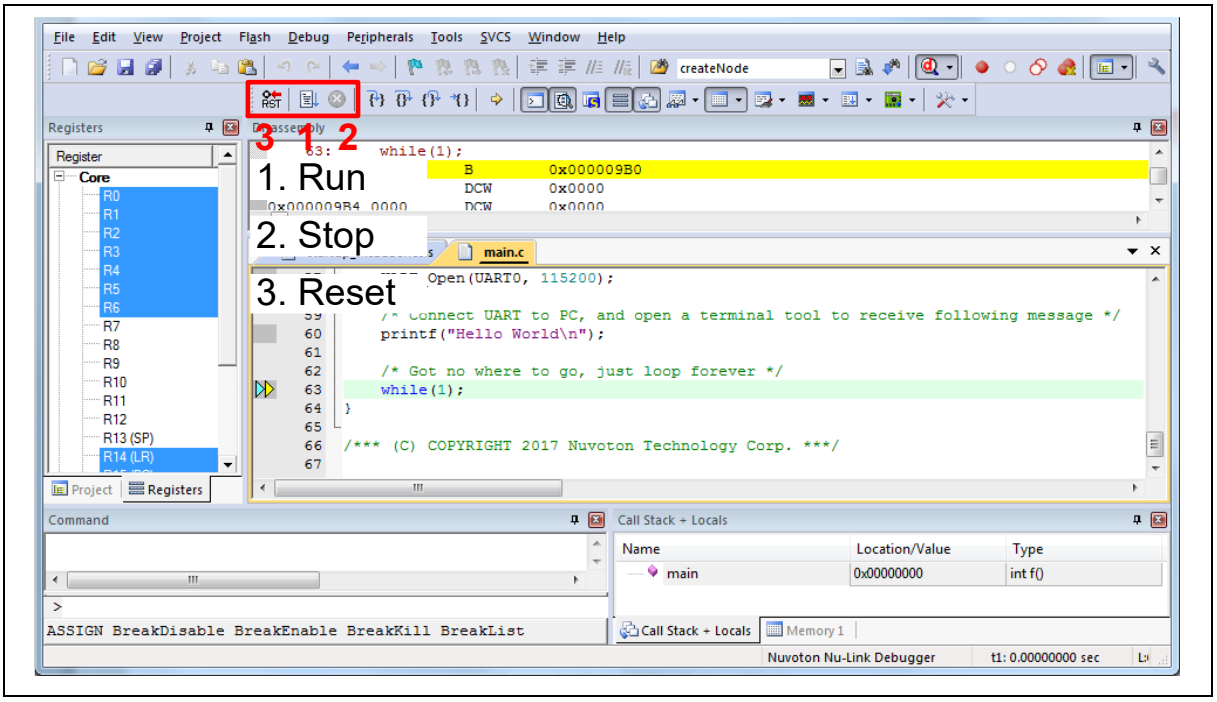

Figure 4-13 Keil MDK Debug Mode

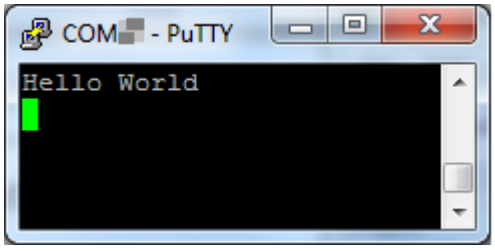

Figure 4-14 Debug Message on Serial Port Terminal Windows

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 section4.2.

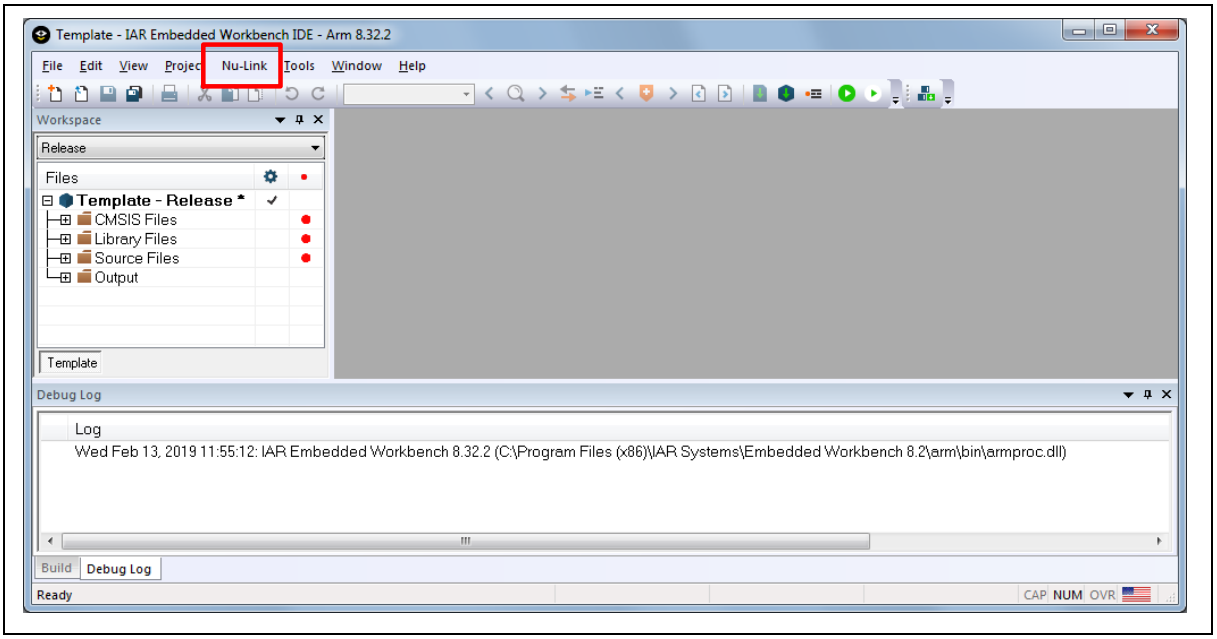

Figure 4-15 IAR EWARM Window

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.

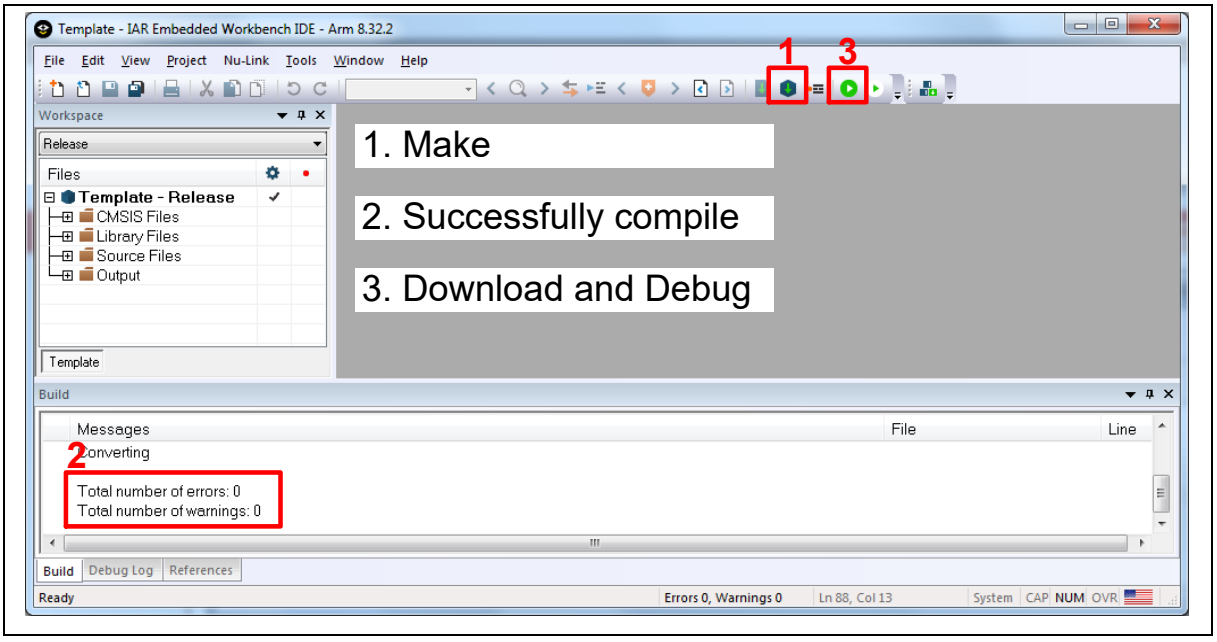

Figure 4-16 Compile and Download the Project

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.

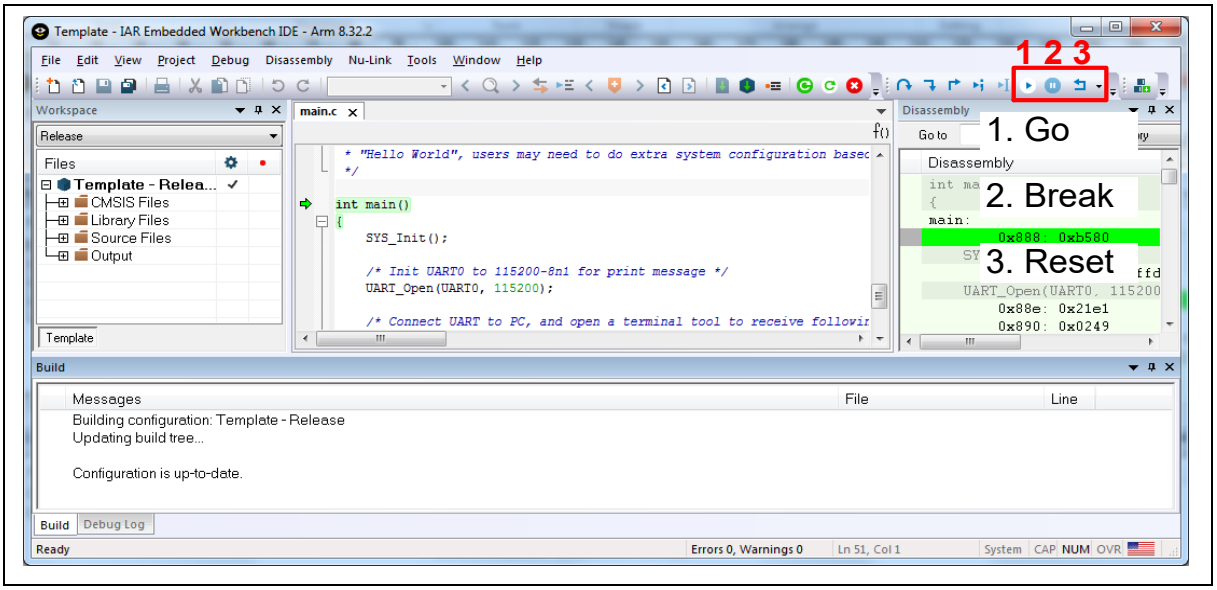

Figure 4-17 IAR EWARM Debug Mode

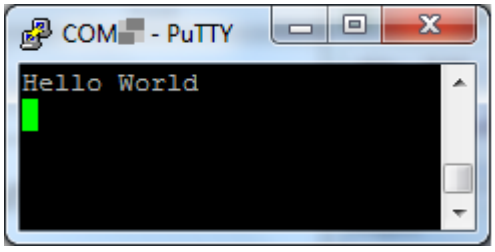

Figure 4-18 Debug Message on Serial Port Terminal Windows

5 NUMAKER-CM1003DL8 SCHEMATICS

5.1 Nu-Link2-Me

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

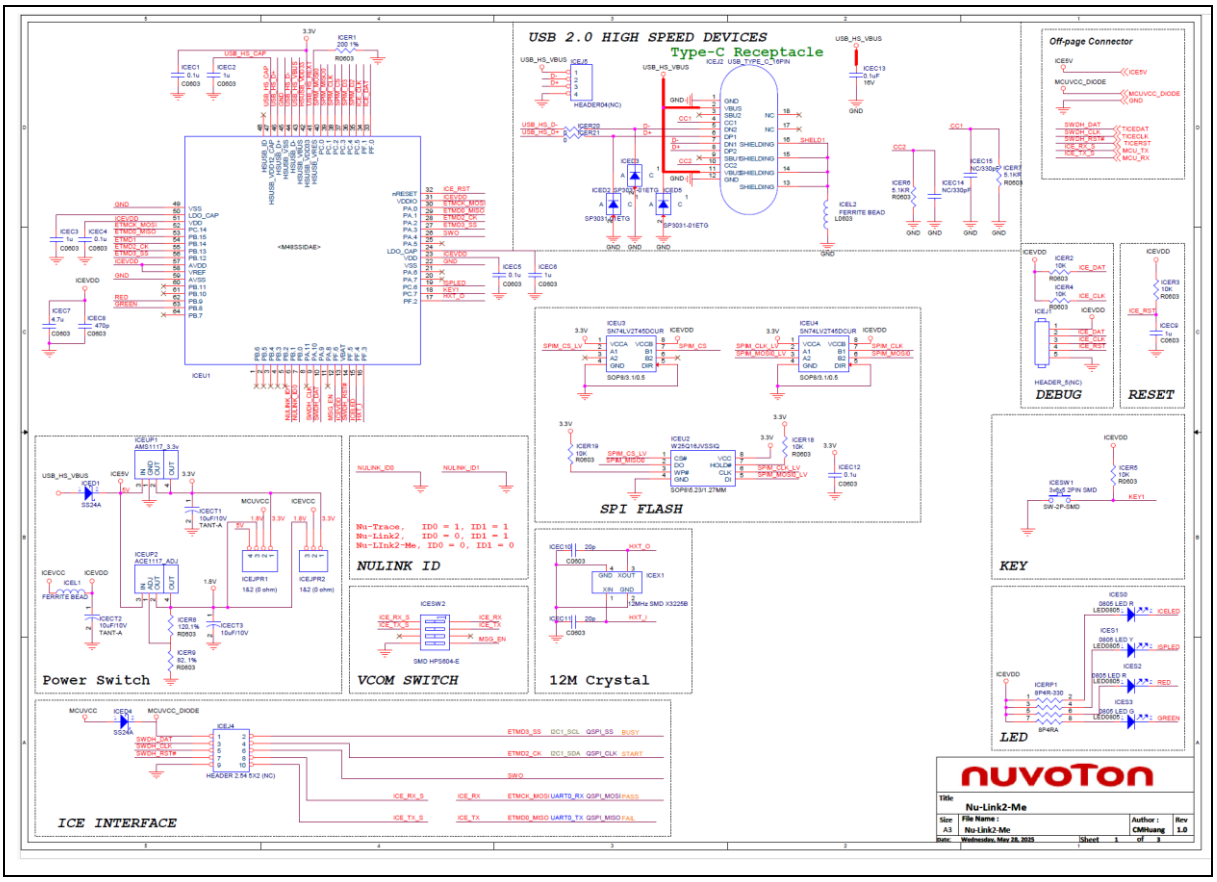

Figure 5-1 Nu-Link2-Me Circuit

5.2 CM1003DL8 target board

Figure 5-2 shows the CM1003DL8 target board circuit.

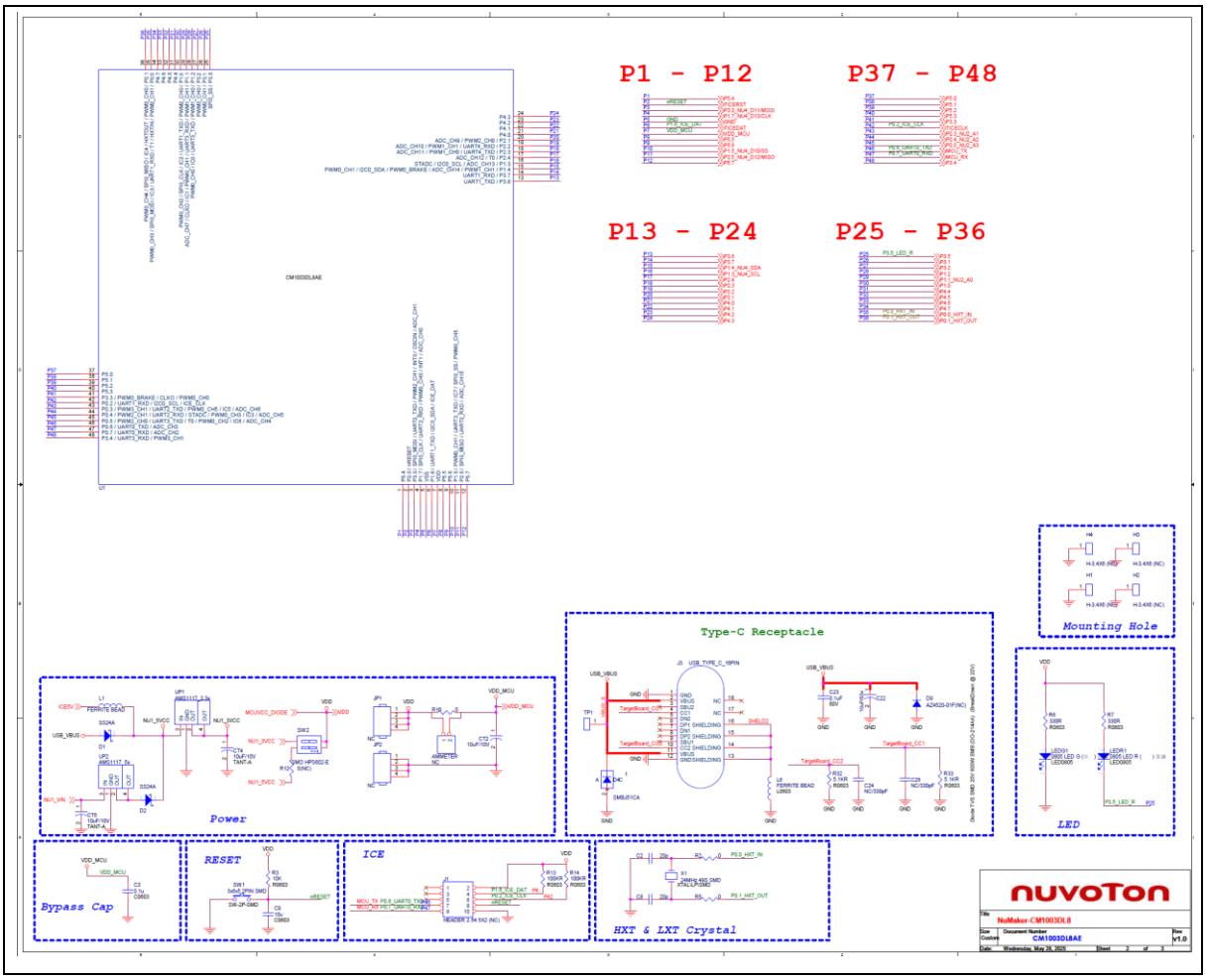

Figure 5-2 CM1003DL8 Target Board Circuit

5.3 Extension Connectors

Figure 5-3 shows extension connectors of NuMaker-CM1003DL8.

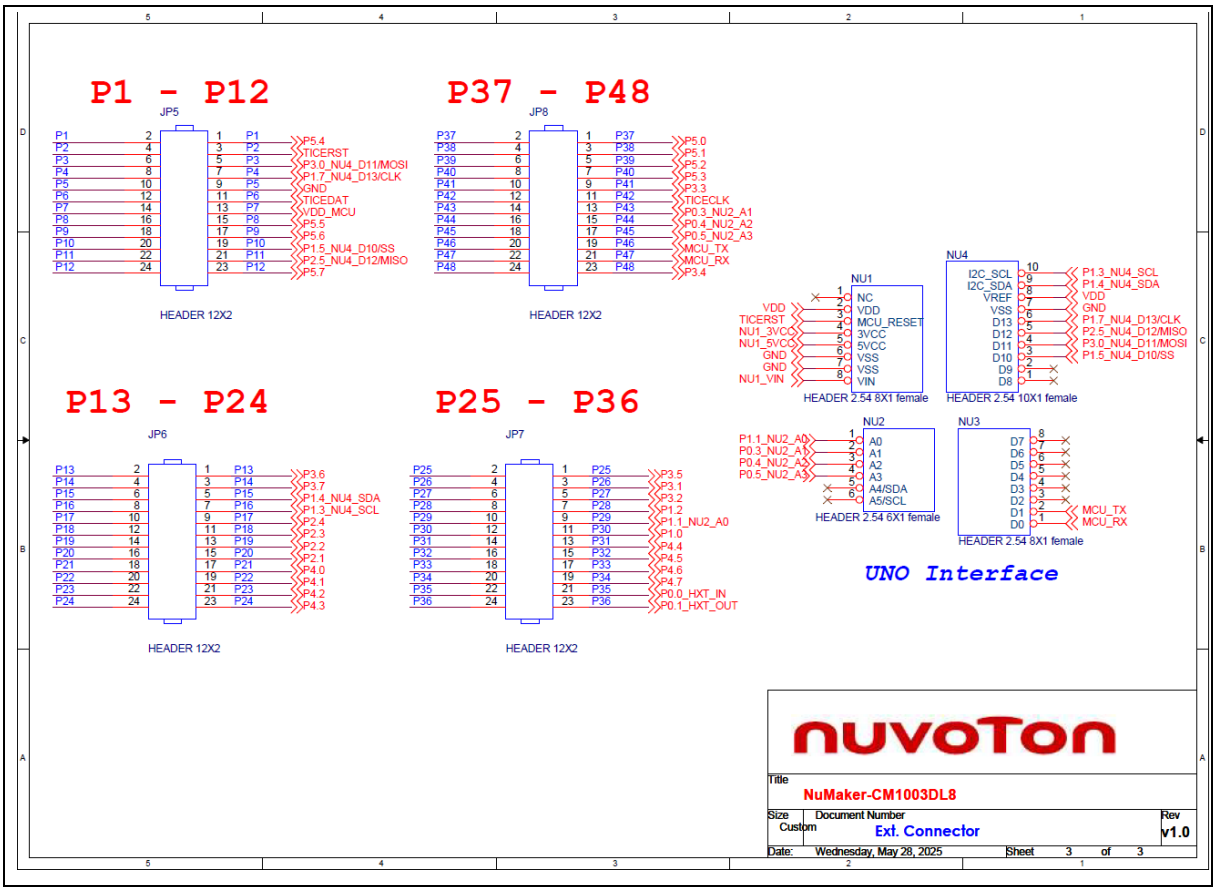

Figure 5-3 Extension Connectors Circuit

5.4 PCB Placement

Figure 5-4 and Figure 5-5 show the front and rear placement of NuMaker-CM1003DL8.

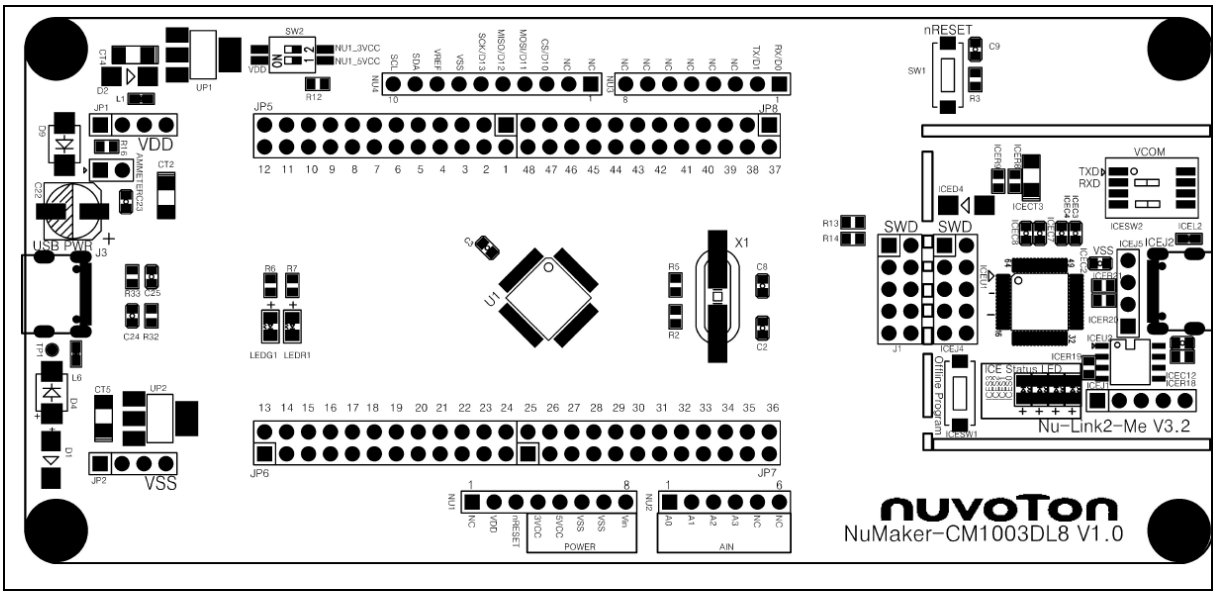

Figure 5-4 Front Placement

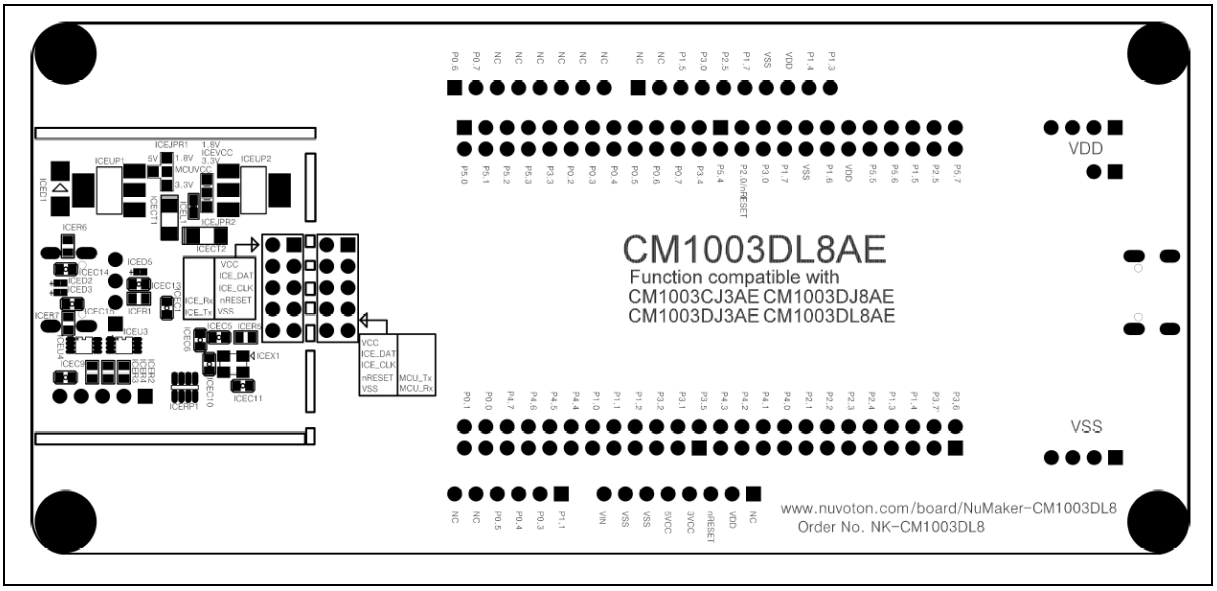

Figure 5-5 Rear Placement

6 REVISION HISTORY

Date	Revision	Description
2025.11.25	1.00	Initial version
2026.02.09	1.01	Update the BSP download link

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.

Please note that all data and specifications are subject to change without notice.
All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.