

NuMicro[®] Family
Arm[®] Cortex[®]-M0-based Microcontroller

NuMaker-NUC240V
User Manual

Evaluation Board for NuMicro[®] NUC240V Series

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1 OVERVIEW

The NuMaker-NUC240V is an evaluation board for Nuvoton NuMicro NUC230/NUC240 series microcontrollers. The NuMaker-NUC240V consists of two parts: an NUC240V target board and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-NUC240V is designed for project evaluation, prototype development and validation with power consumption monitoring function. The NuMaker-NUC240V is suitable for automotive and industrial control applications developing which need reliable and robust CAN communication.

The NUC240V target board is based on NuMicro NUC240VE3AE. For the development flexibility, the NUC240V 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. Additionally, the NUC240V target board implements a CAN bus interface with an AEC-Q100 qualified high-speed CAN transceiver to realize new CAN design.

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.

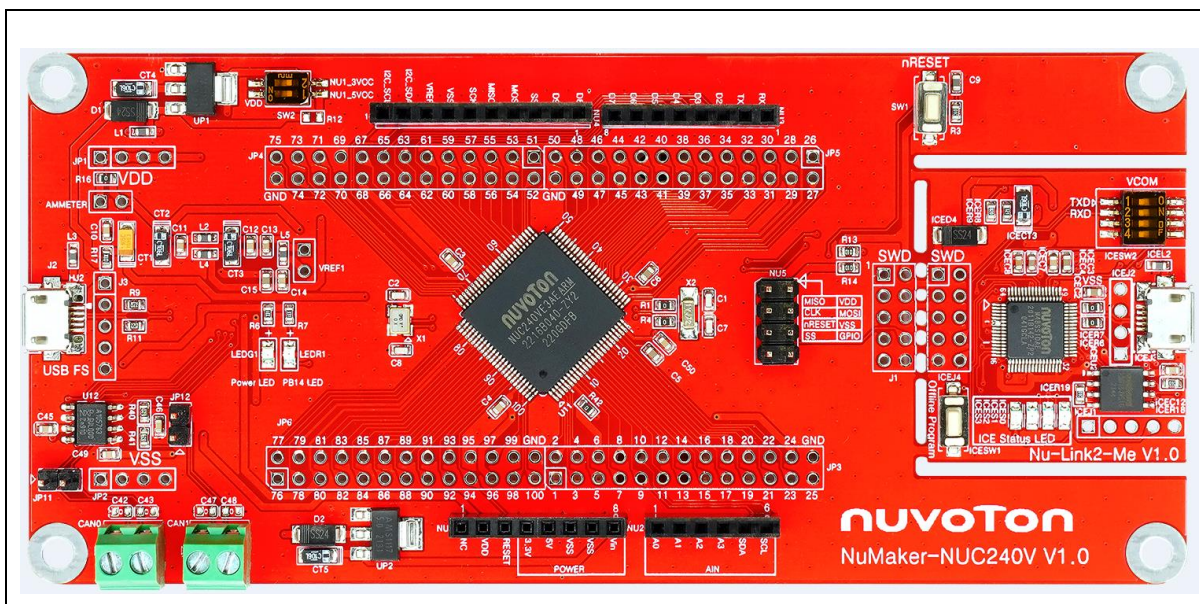


Figure 1-1 NuMaker-NUC240V Evaluation Board

2 FEATURES

- NuMicro NUC240VE3AE used as main microcontroller with function compatible with:
 - NUC230LC2AE
 - NUC230LD2AE
 - NUC230LE3AE
 - NUC230SC2AE
 - NUC230SD2AE
 - NUC230SE3AE
 - NUC230VE3AE
 - NUC240LC2AE
 - NUC240LD2AE
 - NUC240LE3AE
 - NUC240SC2AE
 - NUC240SD2AE
 - NUC240SE3AE
 - NUC240VE3AE
- NUC240V 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 V_{in}
 - USB FS connector on NUC240V 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

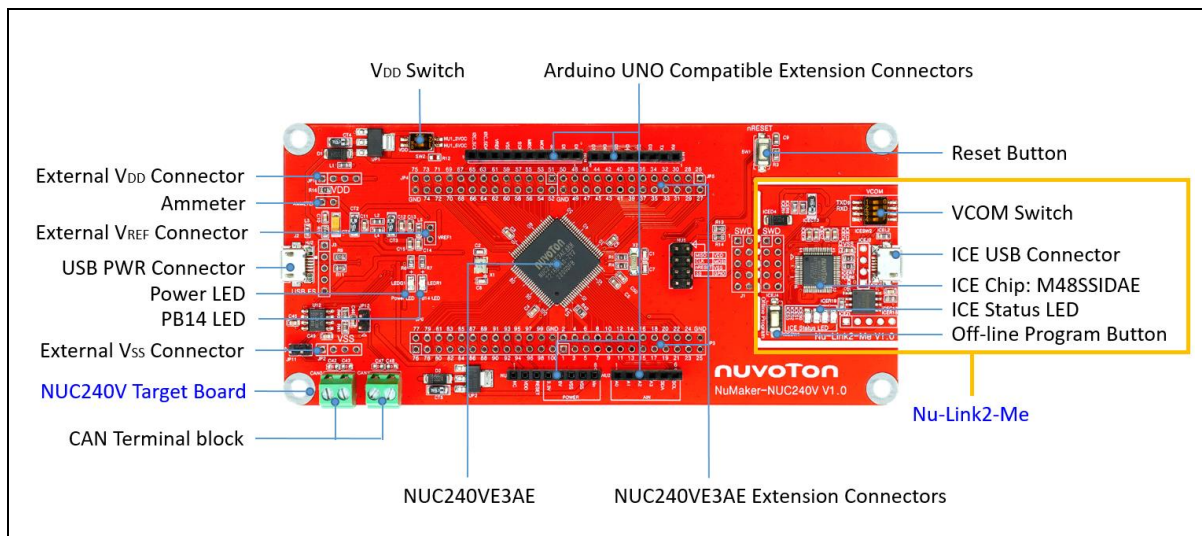


Figure 3-1 Front View of NuMaker-NUC240V

Figure 3-1 shows the main components and connectors from the front side of NuMaker-NUC240V. The following lists components and connectors from the front view:

- Target chip: NUC240VE3AE (U1)
- USB PWR Connector (J2)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
- NUC240V Extension Connectors (JP3, JP4, JP5 and JP6)
- External V_{DD} Power Connector (JP1)
- External V_{SS} Power Connector (JP2)
- External V_{REF} Connector (VREF1)
- V_{DD} Switch (SW2)
- Ammeter Connector (AMMETER)
- Reset Button (SW1)
- Power LED and PB14 LED (LEDG1 and LEDR1)
- CAN Terminal Block (CAN0, CAN1)
- 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-NUC240V.

The following lists components and connectors from the rear view:

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

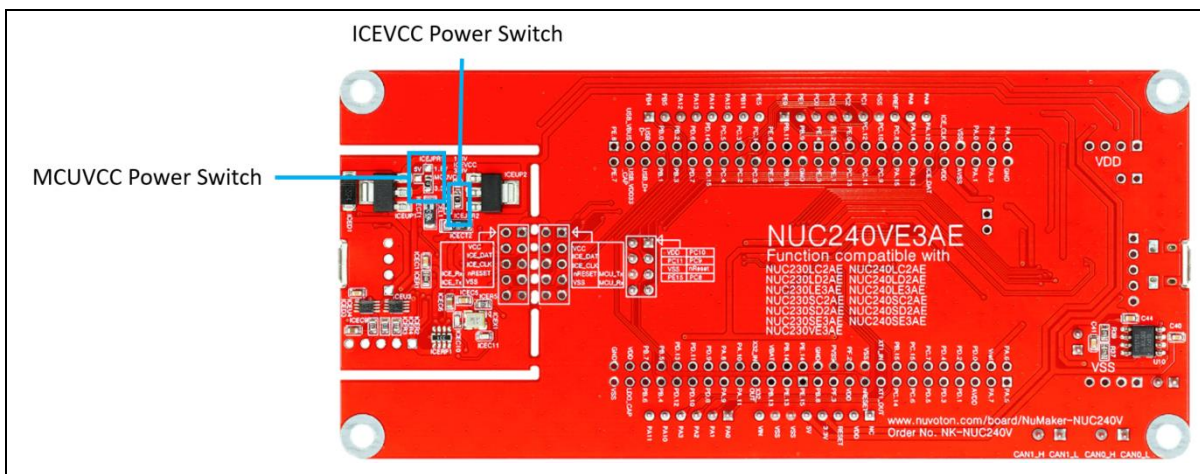


Figure 3-2 Rear View of NuMaker-NUC240V

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-NUC240V.
NU1, NU2, NU3 and NU4	Arduino UNO compatible pins on the NuMaker-NUC240V.

Table 3-1 Extension Connectors

3.3.1 Pin Assignment for Extension Connectors

The NuMaker-NUC240V provides the NUC240V onboard and extension connectors (JP3, JP4, JP5 and JP6). Figure 3-3 shows the NUC240V extension connectors.

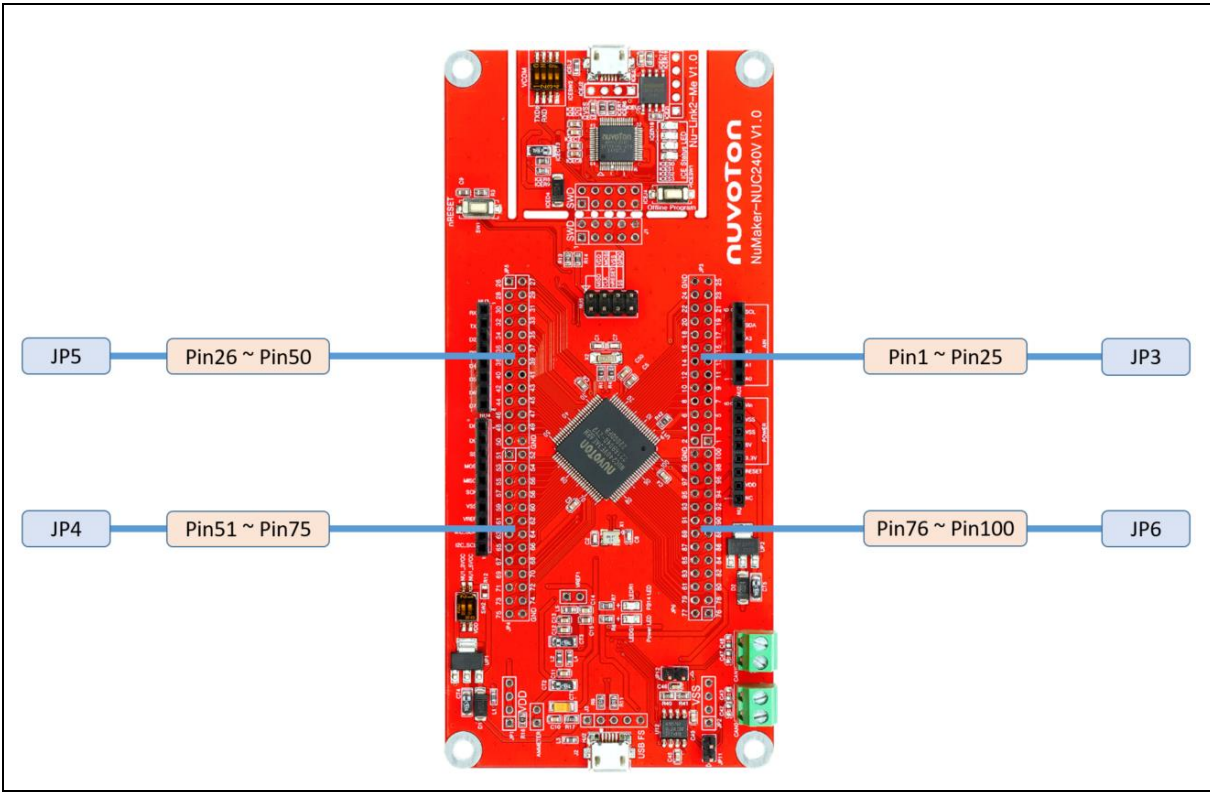


Figure 3-3 NUC240V Extension Connectors

Header		NUC240VE3AE	
		Pin No.	Function
JP3	JP3.1	1	PE.15
	JP3.2	2	PE.14
	JP3.3	3	PE.13
	JP3.4	4	PB.14 / AD0 / INT0 / SPI3_SS1
	JP3.5	5	PB.13 / AD1 / ACMP1_O
	JP3.6	6	VBAT
	JP3.7	7	X32_OUT
	JP3.8	8	X32_IN
	JP3.9	9	PA.11 / I2C1_SCL / CAN1_RXD / nRD
	JP3.10	10	PA.10 / I2C1_SDA / CAN1_TXD / nWR
	JP3.11	11	PA.9 / I2C0_SCL
	JP3.12	12	PA.8 / I2C0_SDA
	JP3.13	13	PD.8 / SPI3_SS0
	JP3.14	14	PD.9 / SPI3_CLK
	JP3.15	15	PD.10 / SPI3_MISO0
	JP3.16	16	PD.11 / SPI3_MOSI0
	JP3.17	17	PD.12 / SPI3_MISO1
	JP3.18	18	PD.13 / SPI3_MOSI1
	JP3.19	19	PB.4 / UART1_RXD
	JP3.20	20	PB.5 / UART1_TXD
	JP3.21	21	PB.6 / ALE / UART1_nRTS
	JP3.22	22	PB.7 / nCS / UART1_nCTS
	JP3.23	23	LDO_CAP
	JP3.24	24	VDD
	JP3.25	25	VSS
	JP3.26	GND	GND
JP5	JP5.1	26	PE.8
	JP5.2	27	PE.7
	JP5.3	28	USB_VBUS
	JP5.4	29	USB_VDD33_CAP
	JP5.5	30	USB_D-
	JP5.6	31	USB_D+
	JP5.7	32	PB.0 / UART0_RXD
	JP5.8	33	PB.1 / UART0_TXD
	JP5.9	34	PB.2 / nWRL / UART0_nRTS / TM2_EXT / TM2 / ACMP0_O

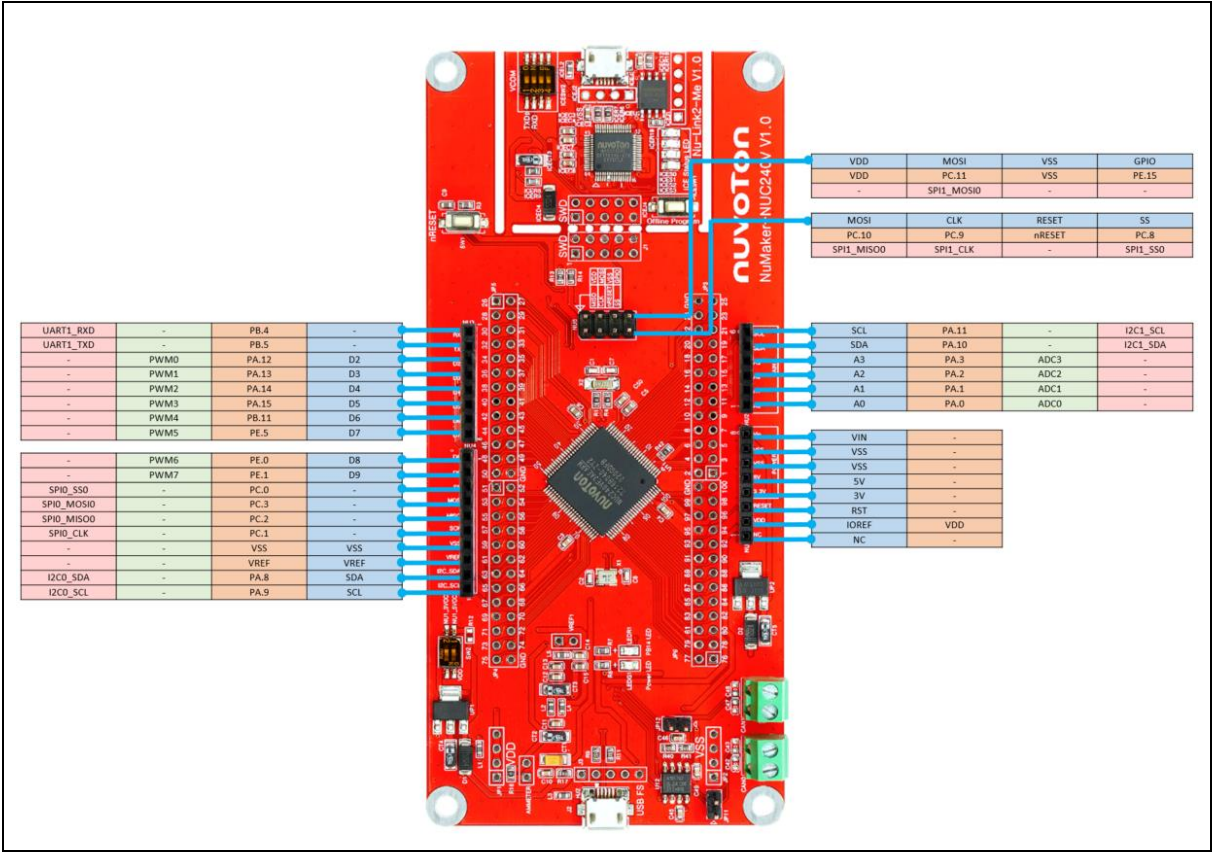
Header	NUC240VE3AE		
	Pin No.	Function	
JP5	JP5.10	35	PB.3 / UART0_nCTS / nWRH / TM3_EXT / TM3 / SC2_CD
	JP5.11	36	PD.6 / CAN0_RXD
	JP5.12	37	PD.7 / CAN0_TXD
	JP5.13	38	PD.14 / UART2_RXD / CAN1_RXD
	JP5.14	39	PD.15 / UART2_TXD / CAN1_TXD
	JP5.15	40	PC.5 / SPI0_MOSI1
	JP5.16	41	PC.4 / SPI0_MISO1
	JP5.17	42	PC.3 / SPI0_MOSI0 / I2S_DO
	JP5.18	43	PC.2 / SPI0_MISO0 / I2S_DI
	JP5.19	44	PC.1 / SPI0_CLK / I2S_BCLK
	JP5.20	45	PC.0 / SPI0_SS0 / I2S_LRCLK
	JP5.21	46	PE.6
	JP5.22	47	PE.5 / PWM5 / TM1_EXT / TM1
	JP5.23	48	PB.11 / TM3 / PWM4
	JP5.24	49	PB.10 / TM2 / SPI0_SS1
	JP5.25	50	PB.9 / TM1 / SPI1_SS1
	JP5.26	GND	GND
JP4	JP4.1	51	PE.4
	JP4.2	52	PE.3
	JP4.3	53	PE.2
	JP4.4	54	PE.1 / PWM7
	JP4.5	55	PE.0 / PWM6
	JP4.6	56	PC.13 / SPI1_MOSI1
	JP4.7	57	PC.12 / SPI1_MISO1
	JP4.8	58	PC.11 / SPI1_MOSI0
	JP4.9	59	PC.10 / SPI1_MISO0
	JP4.10	60	PC.9 / SPI1_CLK
	JP4.11	61	PC.8 / MCLK / SPI1_SS0
	JP4.12	62	PA.15 / PWM3 / I2S_MCLK / SC2_PWR
	JP4.13	63	PA.14 / PWM2 / AD15 / SC2_RST
	JP4.14	64	PA.13 / PWM1 / AD14 / SC2_CLK / UART5_TXD
	JP4.15	65	PA.12 / PWM0 / AD13 / SC2_DAT / UART5_RXD
	JP4.16	66	ICE_DAT
	JP4.17	67	ICE_CLK
	JP4.18	68	VDD

Header		NUC240VE3AE	
		Pin No.	Function
	JP4.19	69	VSS
	JP4.20	70	AVSS
	JP4.21	71	PA.0 / ADC0 / SC0_PWR
	JP4.22	72	PA.1 / ADC1 / SC0_RST / AD12
	JP4.23	73	PA.2 / ADC2 / SC0_CLK / UART3_TXD / AD11
	JP4.24	74	PA.3 / ADC3 / SC0_DAT / UART3_RXD / AD10
	JP4.25	75	PA.4 / ADC4 / AD9 / SC1_PWR
	JP4.26	GND	GND
JP6	JP6.1	76	PA.5 / ADC5 / AD8 / SC1_RST
	JP6.2	77	PA.6 / ADC6 / AD7 / SC1_CLK / UART4_TXD
	JP6.3	78	PA.7 / ADC7 / AD6 / SC1_DAT / UART4_RXD / SPI2_SS1
	JP6.4	79	VREF
	JP6.5	80	AVDD
	JP6.6	81	PD.0 / SPI2_SS0
	JP6.7	82	PD.1 / SPI2_CLK
	JP6.8	83	PD.2 / SPI2_MISO0
	JP6.9	84	PD.3 / SPI2_MOSI0
	JP6.10	85	PD.4 / SPI2_MISO1
	JP6.11	86	PD.5 / SPI2_MOSI1
	JP6.12	87	PC.7 / ACMP0_N / AD5 / SC1_CD
	JP6.13	88	PC.6 / ACMP0_P / SC0_CD / AD4
	JP6.14	89	PC.15 / AD3 / ACMP1_N
	JP6.15	90	PC.14 / AD2 / ACMP1_P
	JP6.16	91	PB.15 / INT1 / TM0_EXT / TM0 / AD6
	JP6.17	92	PF.0 / XT1_OUT
	JP6.18	93	PF.1 / XT1_IN
	JP6.19	94	nRESET
	JP6.20	95	VSS
	JP6.21	96	VDD
	JP6.22	97	PF.2 / PS2_DAT
	JP6.23	98	PF.3 / PS2_CLK
	JP6.24	99	PVSS
	JP6.25	100	PB.8 / STADC / TM0 / CLKO
	JP6.26	GND	GND

Table 3-2 NUC240V 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.



Header		NuMaker-NUC240V		Header		NuMaker-NUC240V	
		Compatible to Arduino UNO	GPIO Pin of NUC240V			Compatible to Arduino UNO	GPIO Pin of NUC240V
NU3	NU3.1	RX	PB4	NU2	NU2.6	SCL	PA11
	NU3.2	TX	PB5		NU2.5	SDA	PA10
	NU3.3	D2	PA12		NU2.4	A3	PA3
	NU3.4	D3	PA13		NU2.3	A2	PA2
	NU3.5	D4	PA14		NU2.2	A1	PA1
	NU3.6	D5	PA15		NU2.1	A0	PA0
	NU3.7	D6	PB11	NU1	NU1.8	VIN	-
	NU3.8	D7	PE5		NU1.7	VSS	
NU4	NU4.1	D8	PE0		NU1.6	VSS	
	NU4.2	D9	PE1		NU1.5	5V	
	NU4.3	SS/D10	PC0		NU1.4	3V	nRESET
	NU4.4	MOSI	PC3		NU1.3	RST	
	NU4.5	MISO	PC2		NU1.2	IOREF	V _{REF}
	NU4.6	SCK	PC1		NU1.1	NC	-
	NU4.7	VSS	V _{SS}				
	NU4.8	VREF	V _{REF}				
	NU4.9	SDA	PA8				
	NU4.10	SCL	PA9				

Table 3-3 Arduino UNO Extension Connectors and NUC240V Mapping GPIO List

3.4 Power Supply Configuration

The NuMaker-NUC240V 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-NUC240V.

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 NUC240V target board and Nu-Link2-Me.
J2	USB_VBUS	USB connector on NuMaker-NUC240V supplies 5 V power from PC to NUC240V 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 NUC240V target board or ICE chip.
UP1	USB_VBUS	UP1 converts USB_VBUS to 3.3 V and supplies 3.3 V to NUC240V 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 NUC240V 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 NUC240V 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-NUC240V.
JP2	V _{SS} connector on the NuMaker-NUC240V.

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-NUC240V 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.

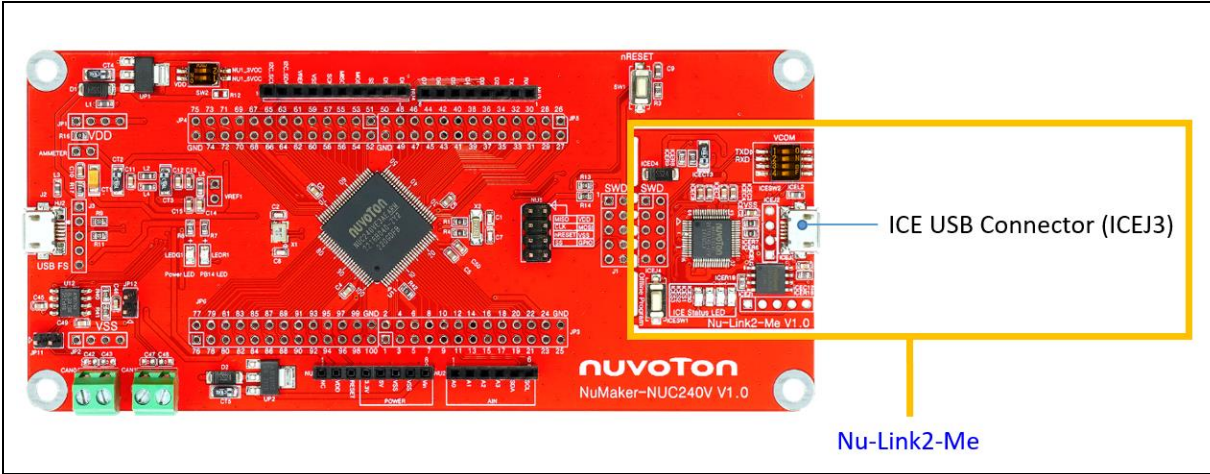


Figure 3-5 External Power Supply Sources on Nu-Link2-Me

To use ICEJ3 as external power supply source with Nu-Link2-Me, please follow the steps below:
Solder the resistor on ICEJPR1 (MCUVCC) depending on the target chip operating voltage.
Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.

Switch the SW2 to OFF.

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 MCVCC 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 NUC240V Target Board to Target Chip

The external power supply sources on NUC240V target board are shown in Figure 3-6.

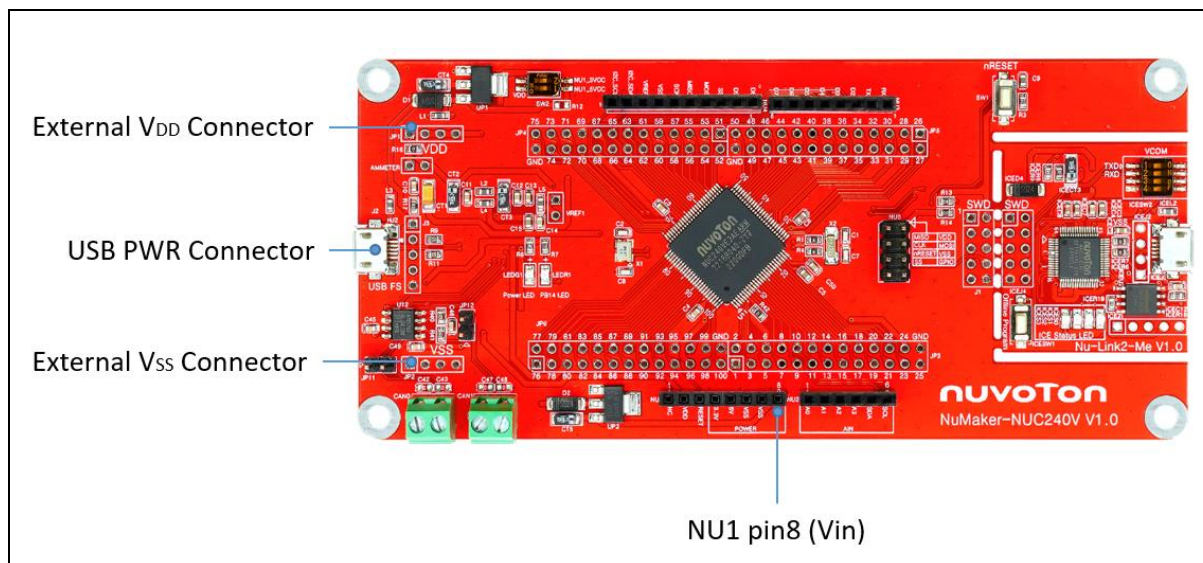


Figure 3-6 External Power Supply Sources on NUC240V Target Board

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

Switch the SW2 depending on the target chip operating voltage.

Remove the resistor on ICEJPR1 (MCUVCC).

Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.

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.

Remove the resistor on ICEJPR1 (MCUVCC).

Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.

Connect ICEJ3 to PC.

Connect the external power supply to JP1.

To use Vin or J2 as external power supply source with Nu-Link2-Me detached from NuMaker-NUC240V, please follow the steps below:

1. Switch the SW2 depending on the target chip operating voltage.

Detach the Nu-Link2-Me from NuMaker-NUC240V.

Connect the external power supply to Vin or J2.

To use JP1 as external power supply source with Nu-Link2-Me detached from NuMaker-NUC240V, please follow the steps below:

1. Switch the SW2 to OFF.

Detach the Nu-Link2-Me from NuMaker-NUC240V.

Connect the external power supply to JP1.

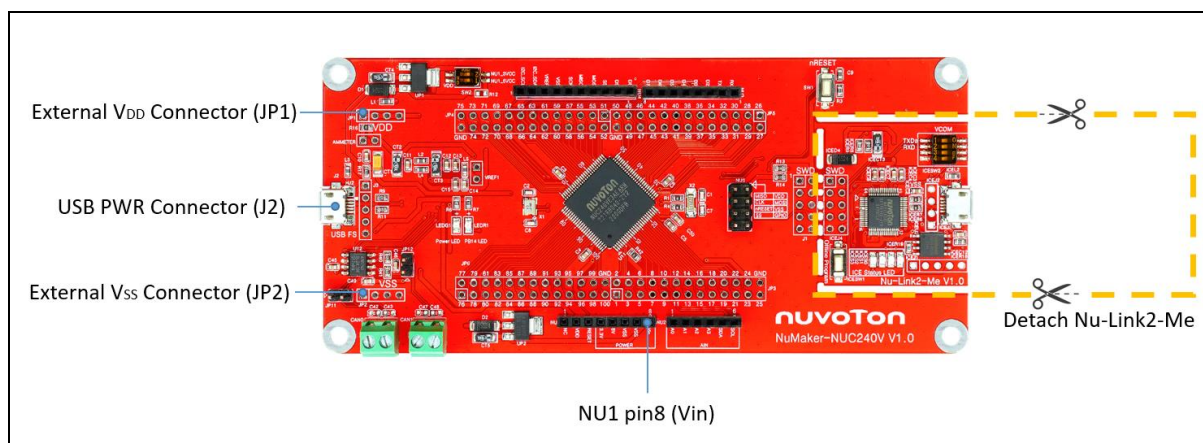


Figure 3-7 Detach the Nu-Link2-Me from NuMaker-NUC240V

Table 3-12 presents all power models when supplies external power through NUC240V target board. The NUC240V 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	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 MCVCC 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 NUC240V Target Board

3.5 External Reference Voltage Connector

Table 3-13 External Reference Voltage Connector 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 NUC230_240 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

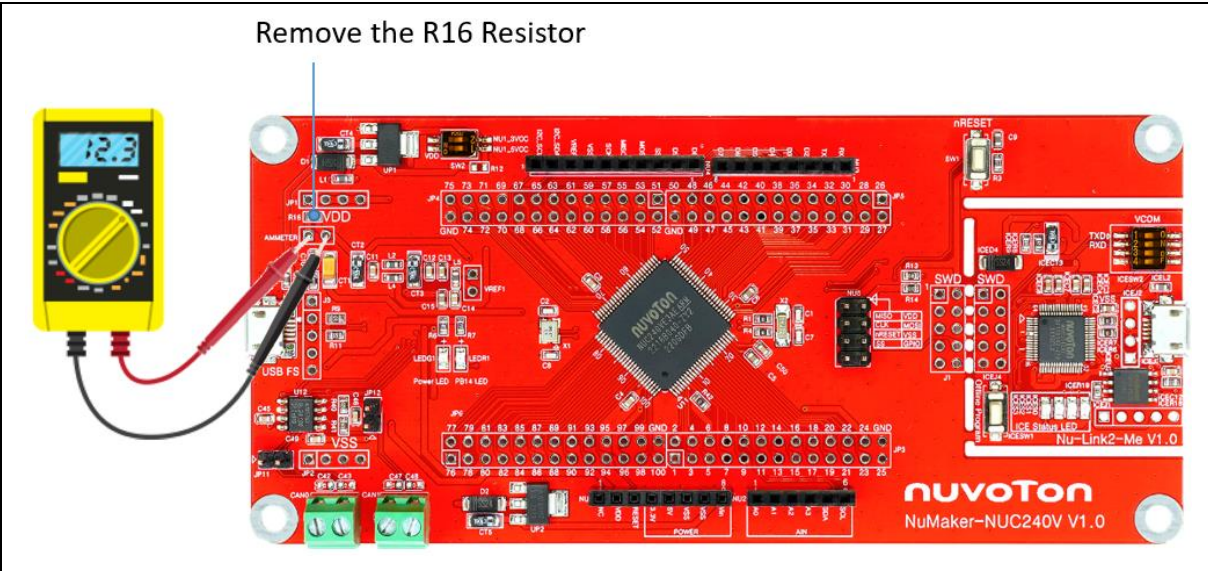


Figure 3-8 Wiring between Ammeter Connector and Ammeter

NUC230_240_Series_BSP_CMSIS
SampleCode
StdDriver
SYS_PowerDown_MinCurrent

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-NUC240V is powered.
PB14 LED	The LED is connected to the target chip PB14.
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 PD.1 (UART0_TXD) to Nu-Link2-Me. Off: Disconnect target chip PD.1 (UART0_TXD) to Nu-Link2-Me.
2	RXD	On: Connect target chip PD.0 (UART0_RXD) to Nu-Link2-Me. Off: Disconnect target chip PD.0 (UART0_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 3-18 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

3.10 CAN Bus Interface

The NuMaker-NUC240V is implemented a CAN bus interface with an AEC-Q100 qualified high-speed CAN transceiver TJA1057GT/3. Table 3-19 presents the CAN bus interface and Table 3-20, Table 3-21 presents the CAN transceiver pin connection.

Component	Description
U10	CAN0 transceiver TJA1057GT/3. For more information, please refer to TJA1057 product data sheet.
U12	CAN1 transceiver TJA1057GT/3. For more information, please refer to TJA1057 product data sheet.
CAN0	CAN0 bus line connector. Connect to U10 pin6 and pin7.
CAN1	CAN1 bus line connector. Connect to U12 pin6 and pin7.
JP11	CAN0 bus line connector. Connect to U10 pin6 and pin7.
JP12	CAN1 bus line connector. Connect to U12 pin6 and pin7.

Table 3-19 CAN Bus Interface

U10		
Pin	Function	Description
1	TXD	Connects to target chip PD.7 (CAN0_TXD).
2	GND	Ground
3	VCC	Connects to NU1_5VCC for transceiver power supply.
4	RXD	Connects to target chip PD.6 (CAN0_RXD).
5	VIO	Connects to target chip supply voltage VDD for transceiver I/O voltage level adjustment.
6	CANL	Connects to CAN0 pin1 and JP11 pin1.
7	CANH	Connects to CAN0 pin2 and JP11 pin2
8	S	Connects to target chip PB.3 for operating mode control.

Table 3-20 U10 Pin Connection

U12		
Pin	Function	Description
1	TXD	Connects to target chip PD.15 (CAN1_TXD).
2	GND	Ground
3	VCC	Connects to NU1_5VCC for transceiver power supply.
4	RXD	Connects to target chip PD.14 (CAN1_RXD).
5	VIO	Connects to target chip supply voltage VDD for transceiver I/O voltage level adjustment.
6	CANL	Connects to CAN1 pin1 and JP12 pin1.
7	CANH	Connects to CAN1 pin2 and JP12 pin2
8	S	Connects to target chip PC.5 for operating mode control.

Table 3-21 U12 Pin Connection

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 M0/M23](#)
- [IAR EWARM](#)

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.

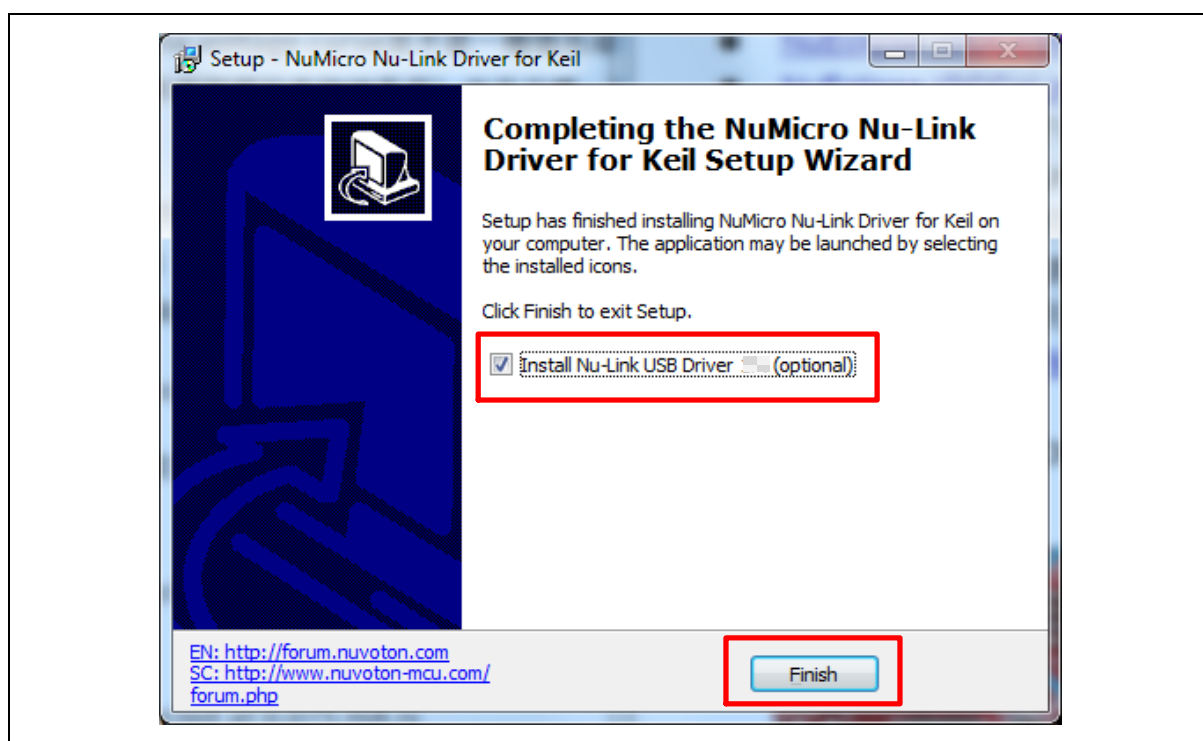


Figure 4-1 Nu-Link USB Driver Installation Setup

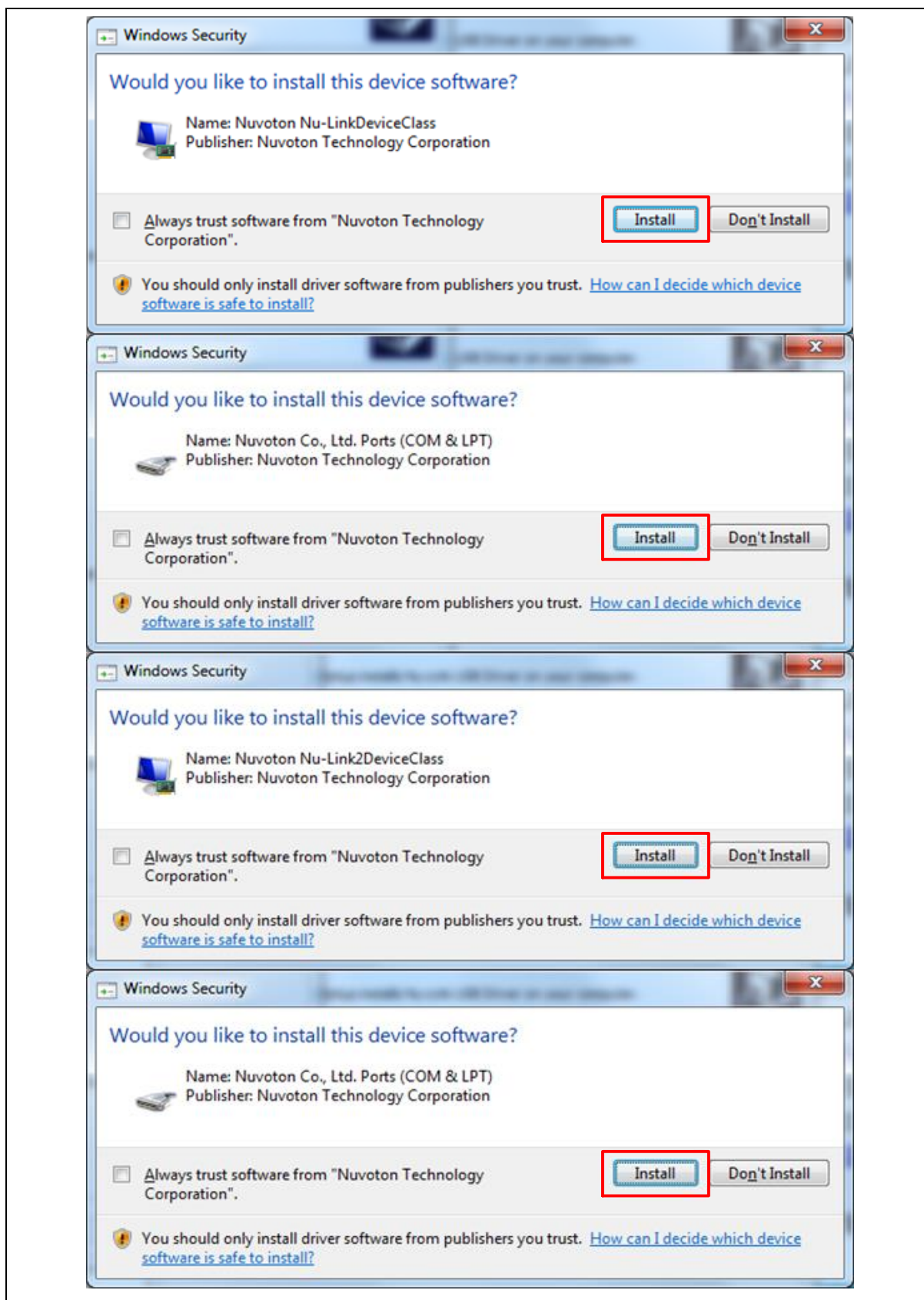


Figure 4-2 Nu-Link USB Driver Installation

4.3 BSP Firmware Download

Download and unzip the [Board Support Package \(BSP\)](#).

4.4 Hardware Setup

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

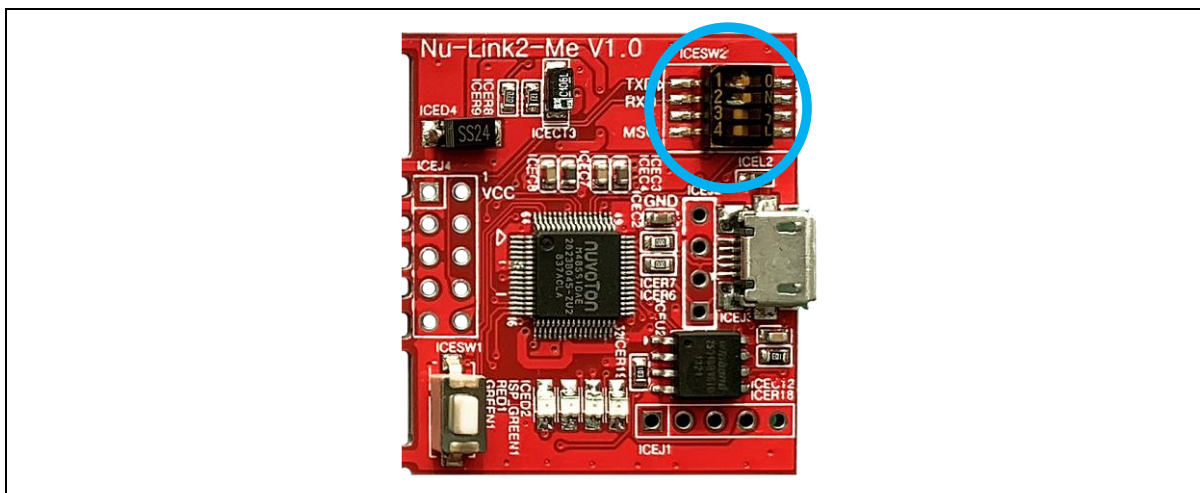


Figure 4-3 Open VCOM Function

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

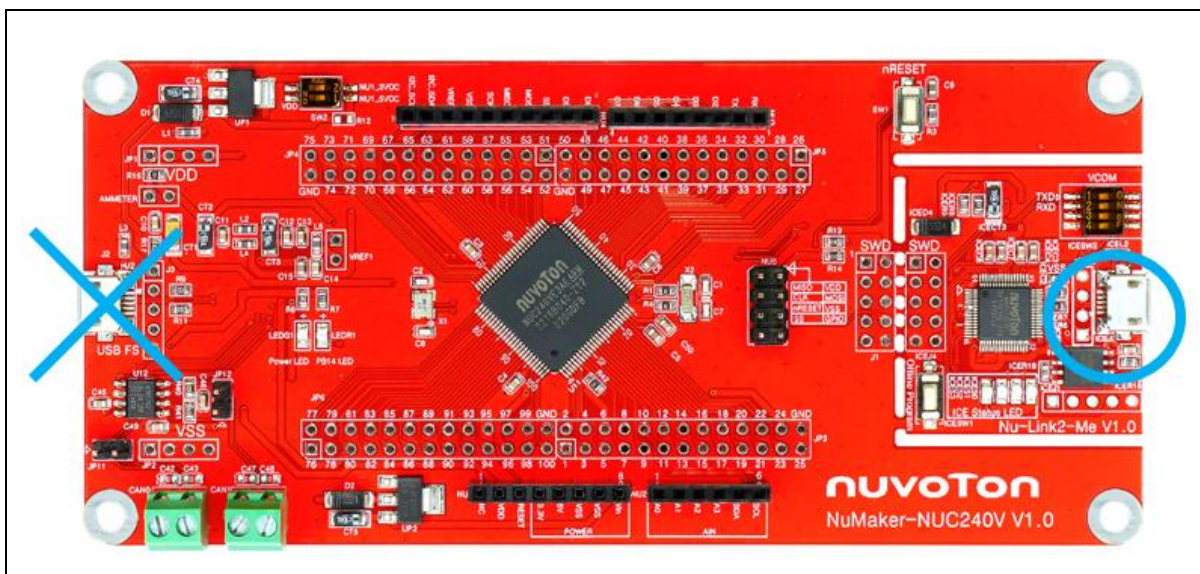


Figure 4-4 ICE USB Connector

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

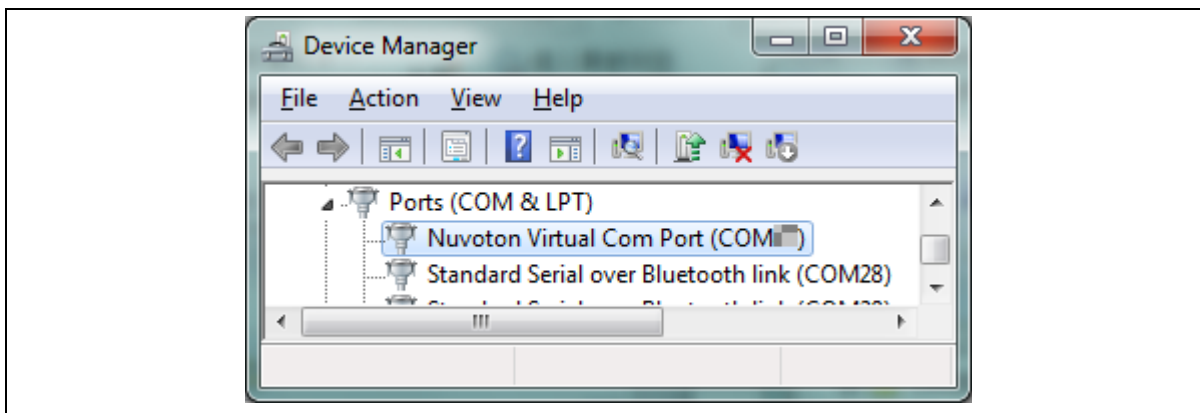


Figure 4-5 Device Manger

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.

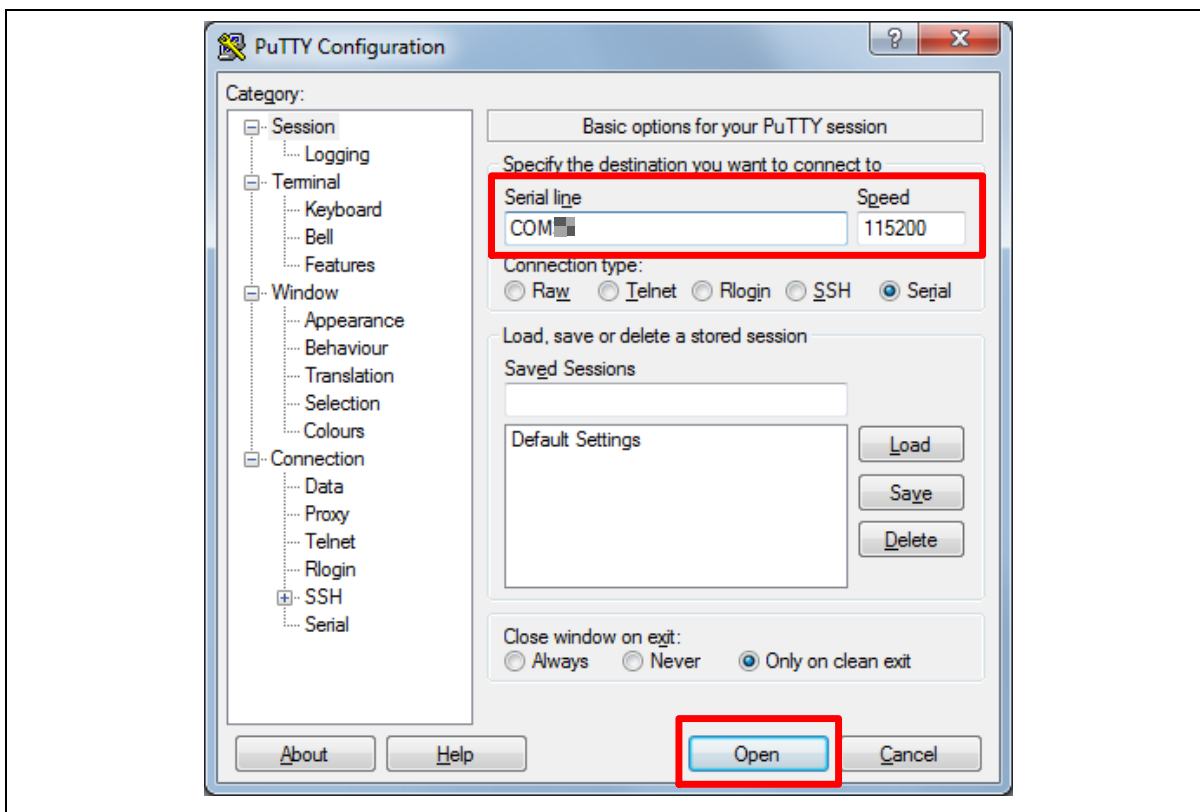


Figure 4-6 PuTTY Session Setting

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.

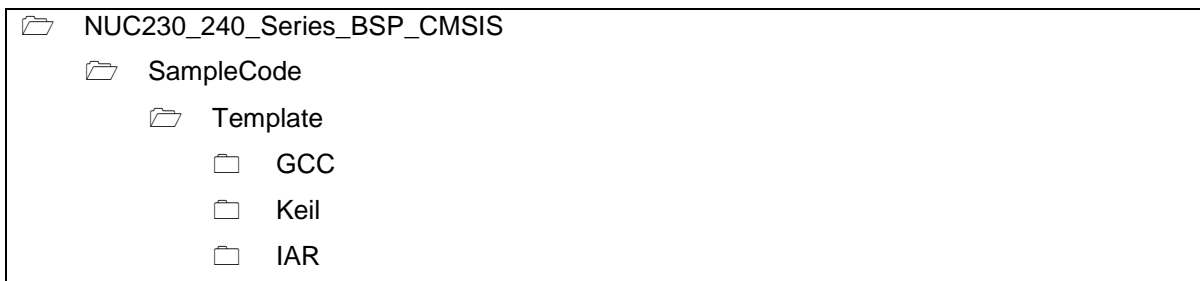


Figure 4-7 Template Project Folder Path

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.

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

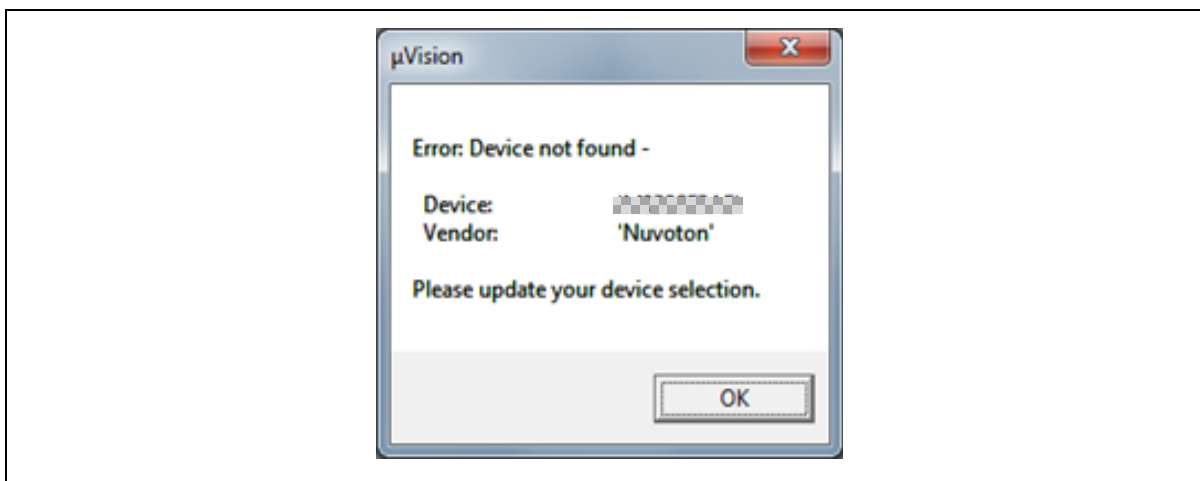


Figure 4-8 Warning Message of “Device not found”

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”.

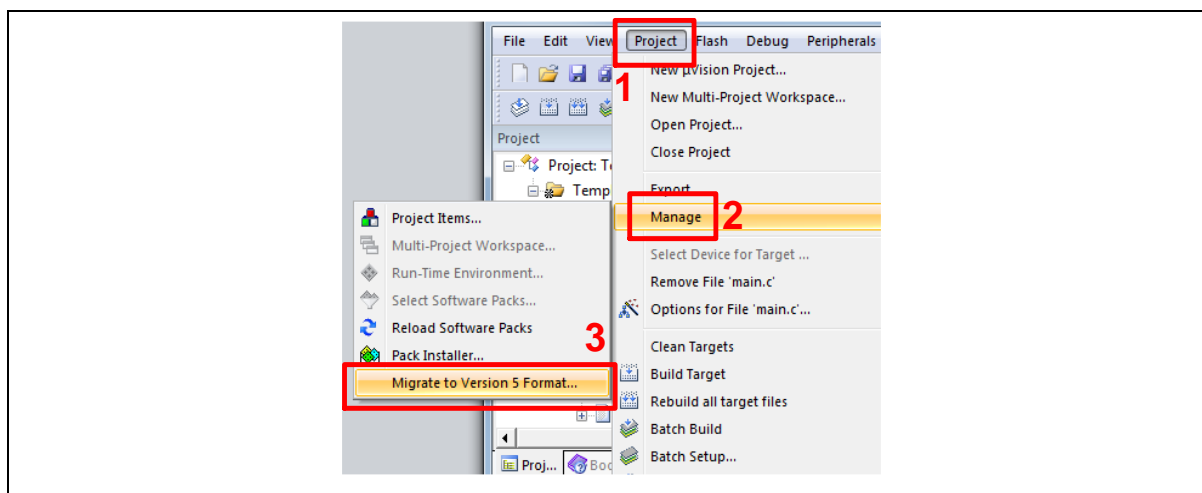


Figure 4-9 Project File Migrate to Version 5 Format

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

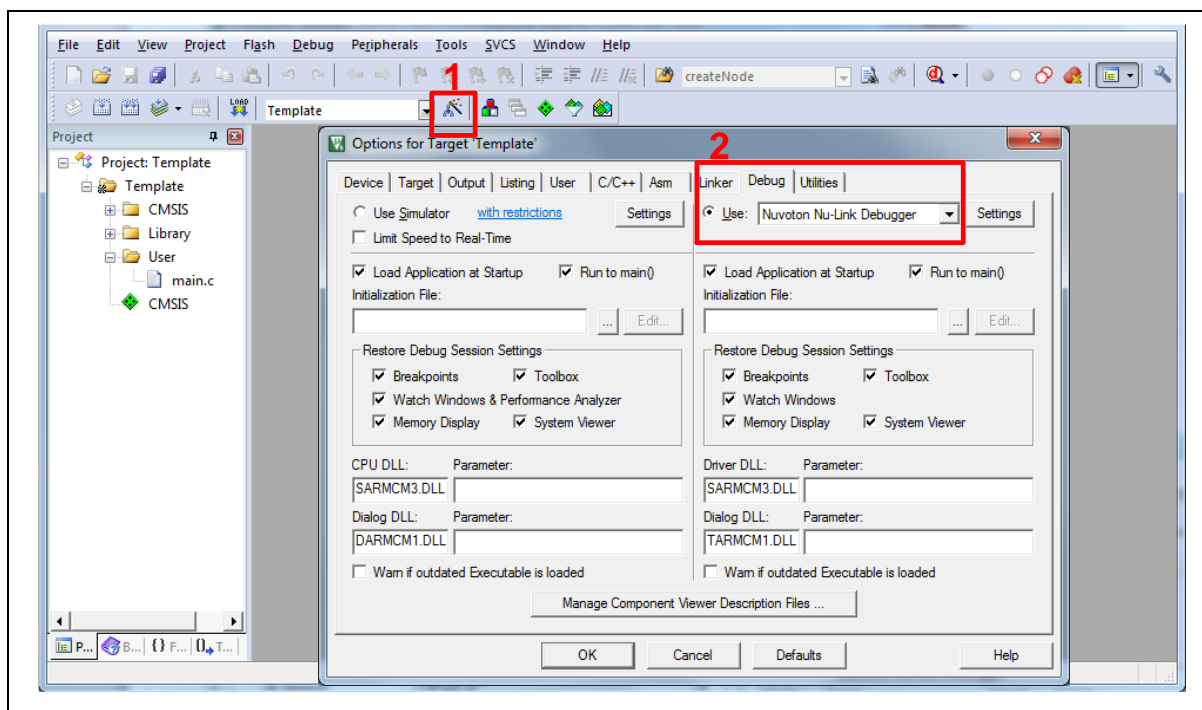


Figure 4-10 Debugger Setting in Options Window

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

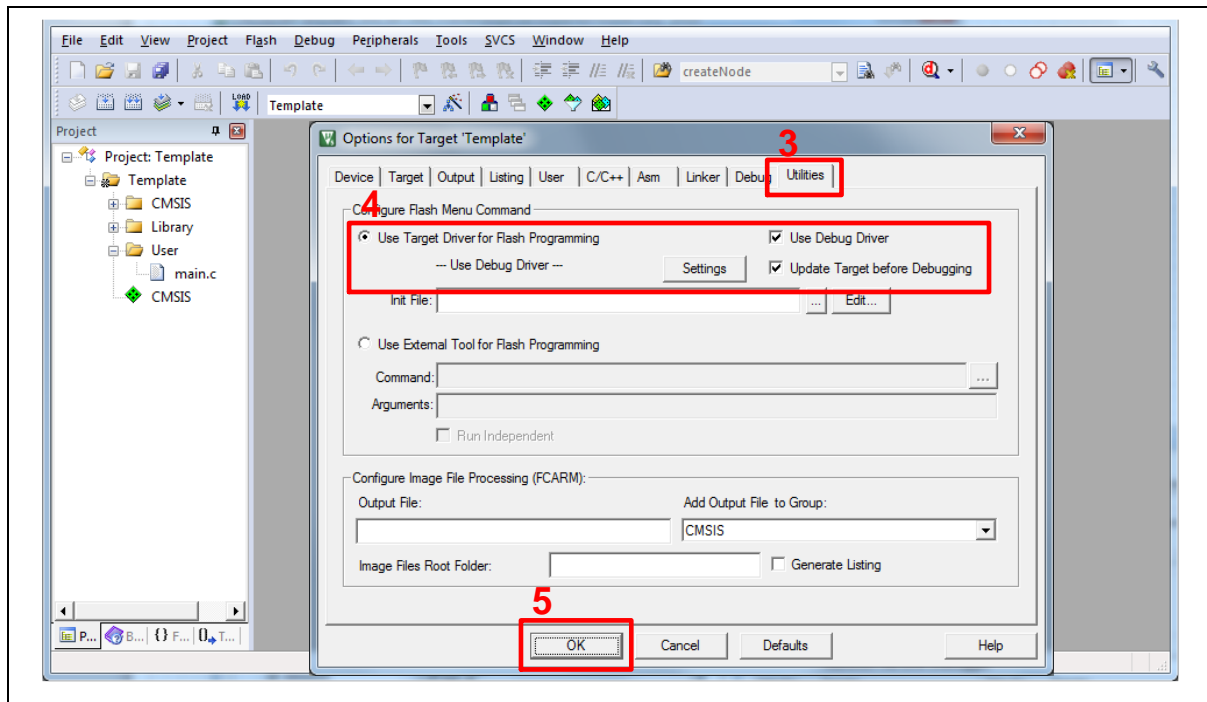


Figure 4-11 Programming Setting in Options Window

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.

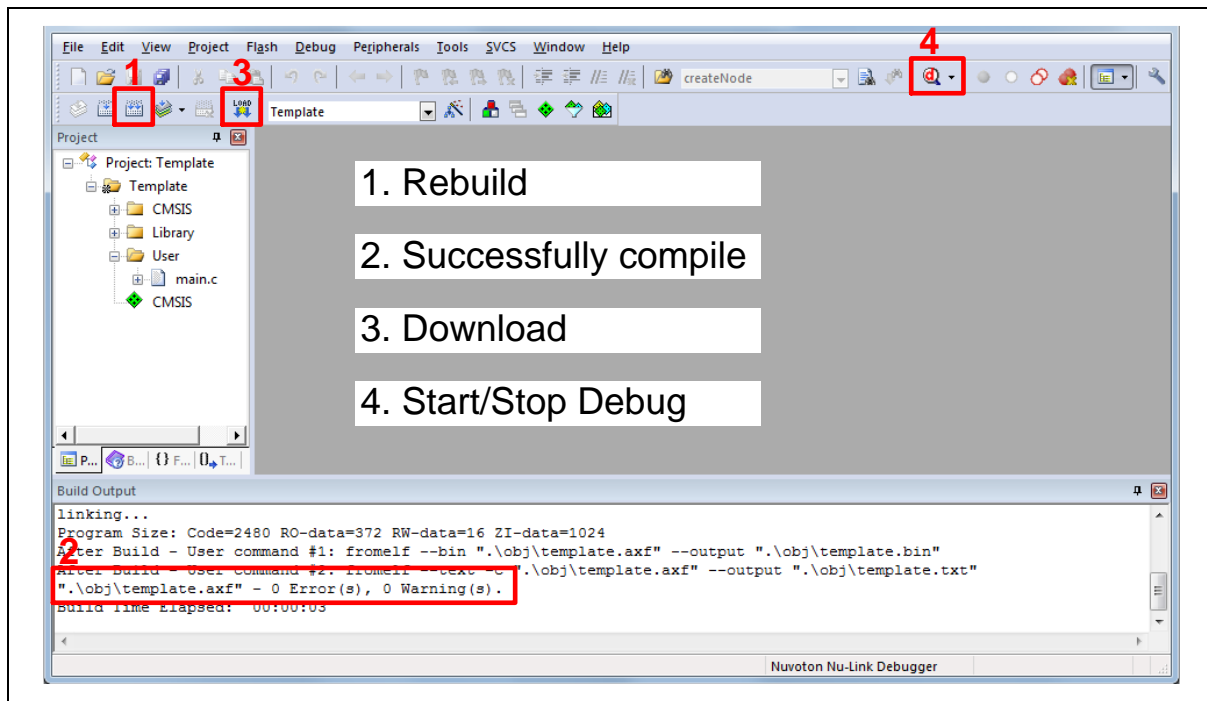


Figure 4-12 Compile and Download the Project

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.

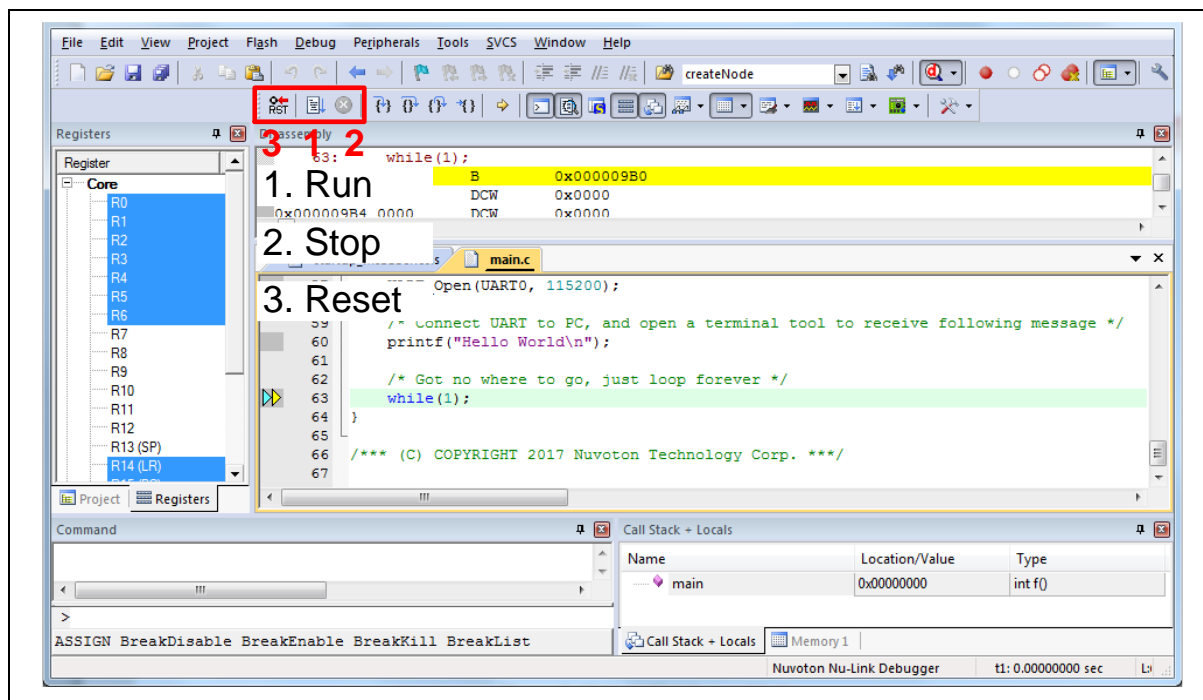


Figure 4-13 Keil MDK Debug Mode

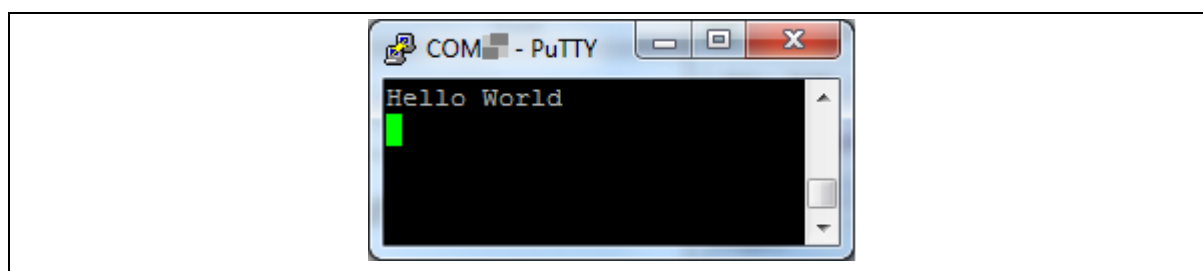


Figure 4-14 Debug Message on Serial Port Terminal Windows

4.6.2 IAR EWARM

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

Double click the “Template.eww” to open the project.

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.

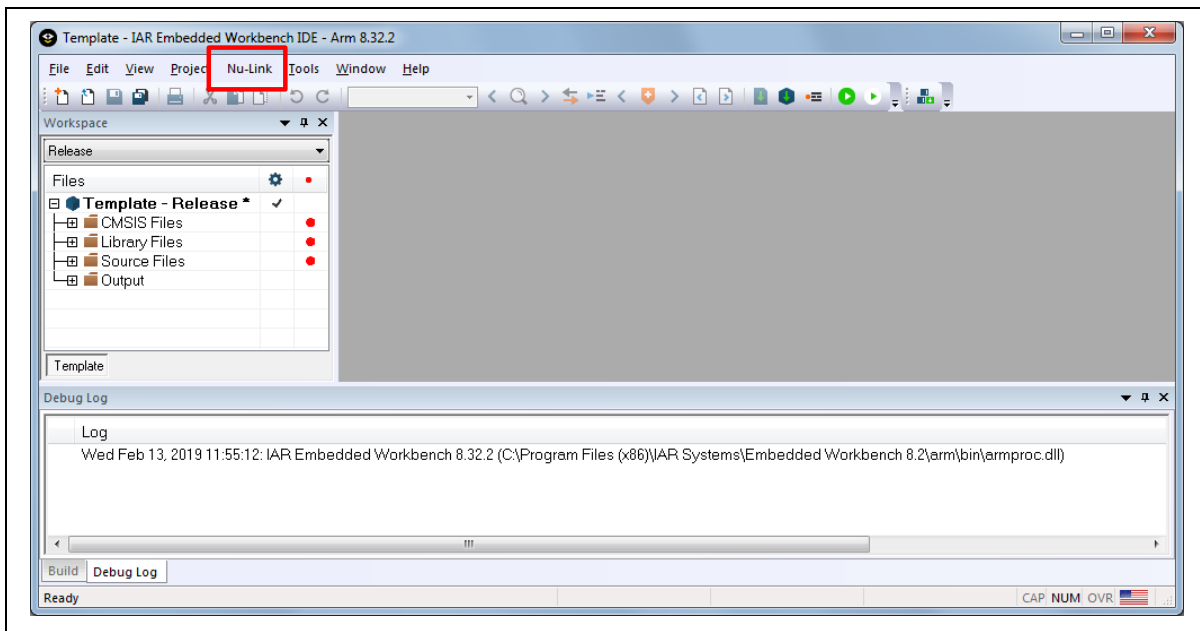


Figure 4-15 IAR EWARM Window

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.

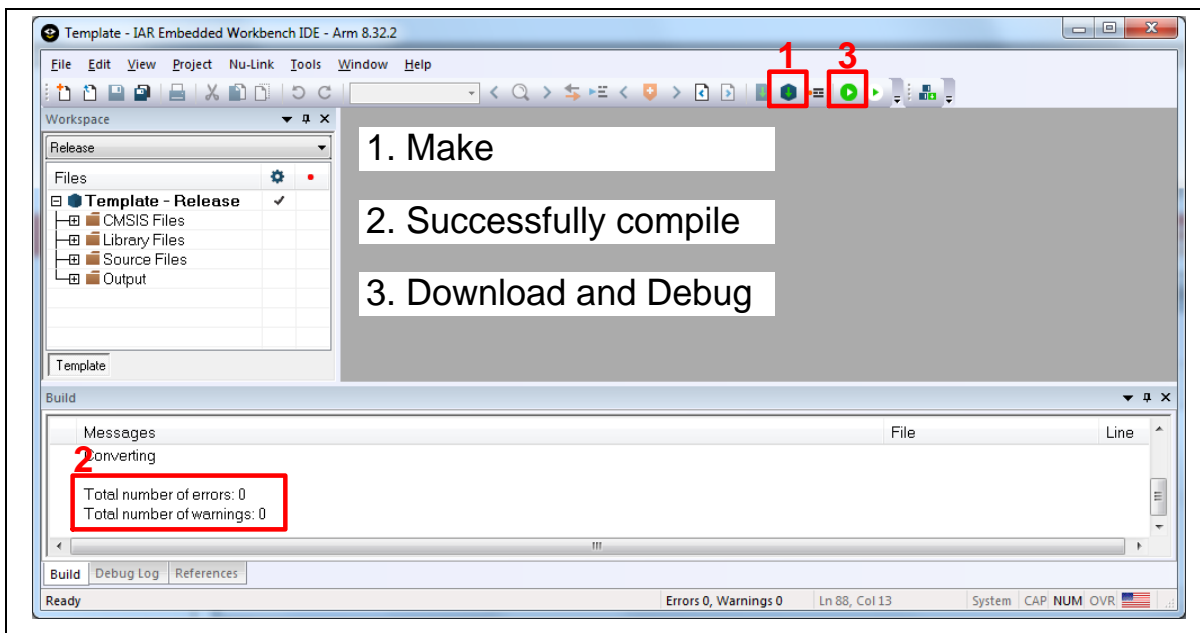


Figure 4-16 Compile and Download the Project

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.

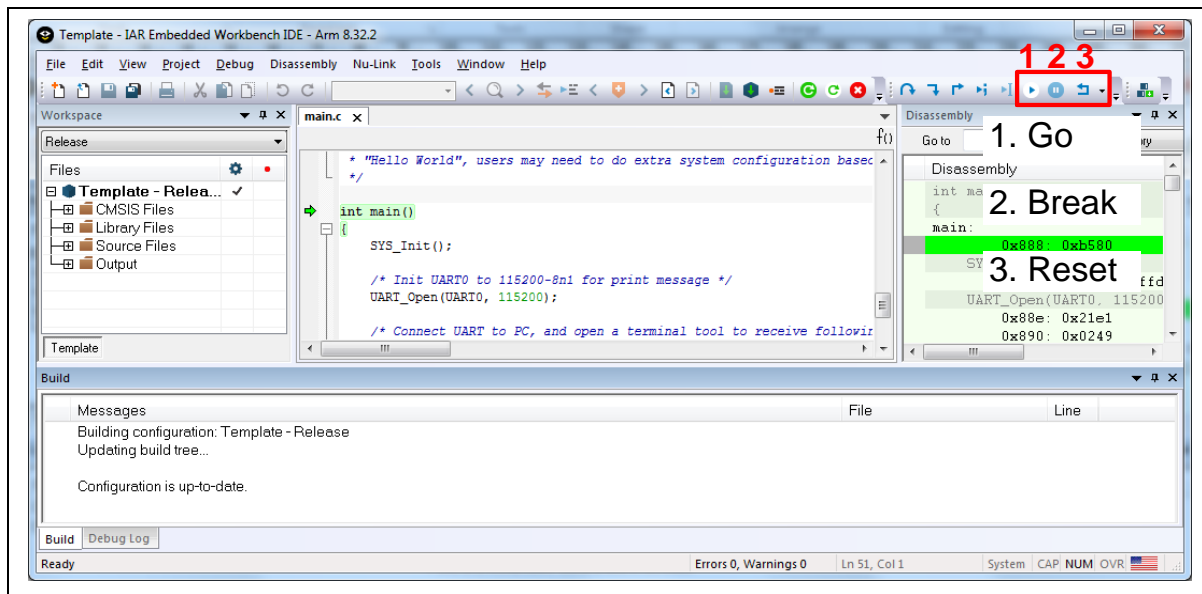


Figure 4-17 IAR EWARM Debug Mode

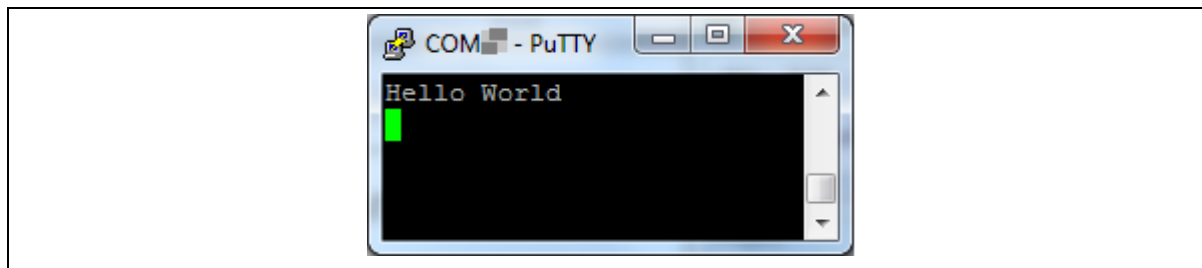


Figure 4-18 Debug Message on Serial Port Terminal Windows

5.1 Nu-Link2-Me

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

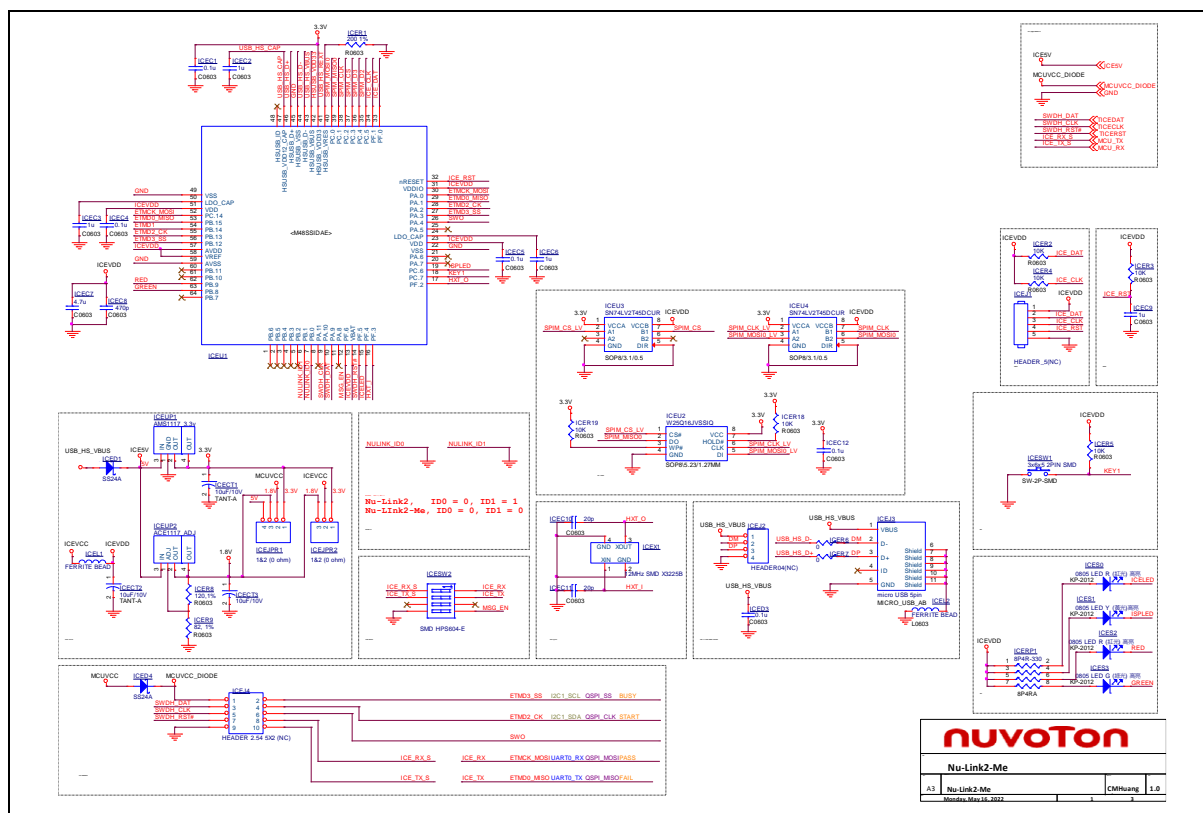


Figure 5-1 Nu-Link2-Me Circuit

5.2 NuMaker-NUC240V Schematics

Figure 5-2 shows the NUC240V target board circuit.

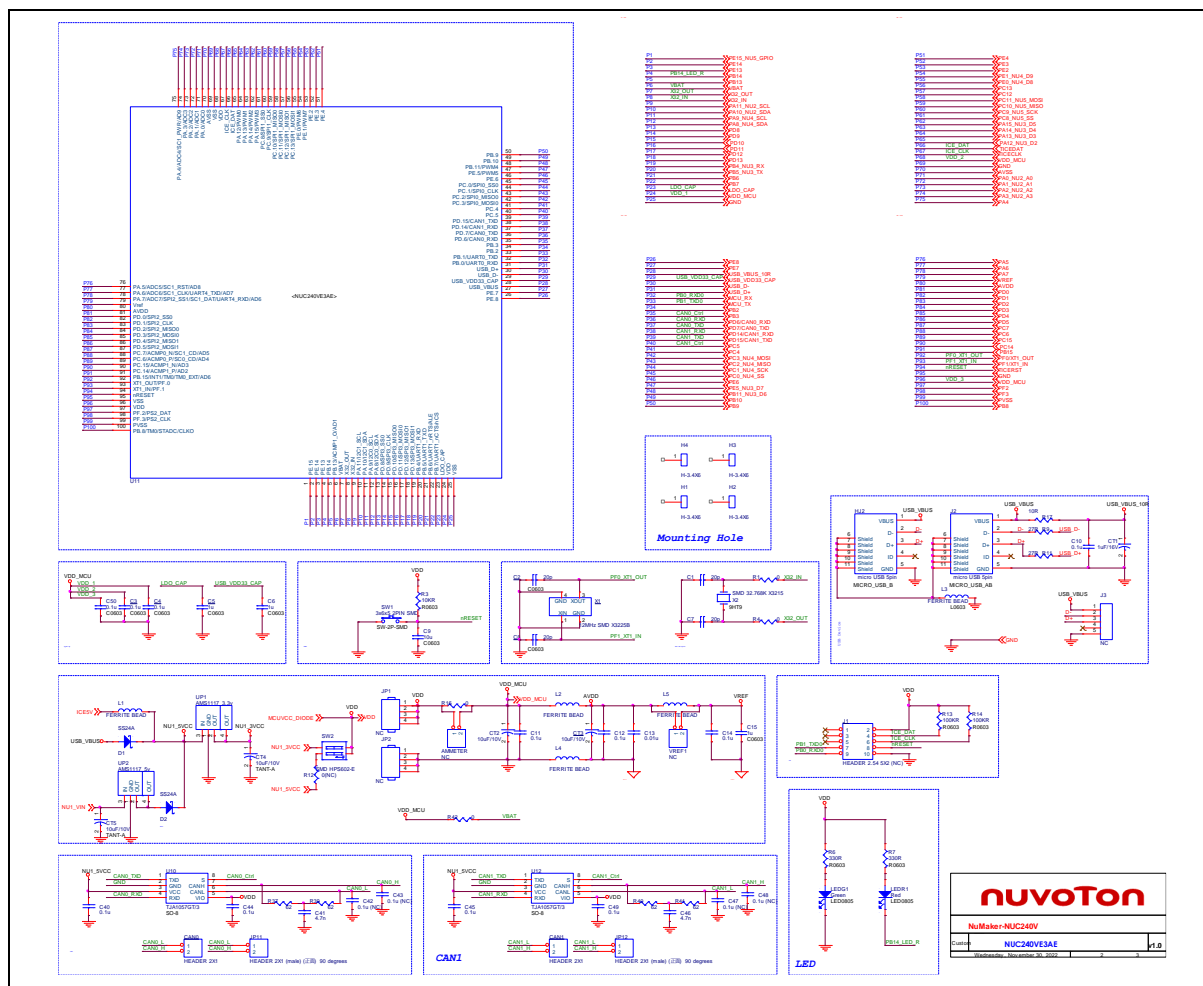


Figure 5-2 NUC240V Target Board Circuit

5.3 Extension Connectors

Figure 5-3 shows extension connectors of NuMaker-NUC240V.

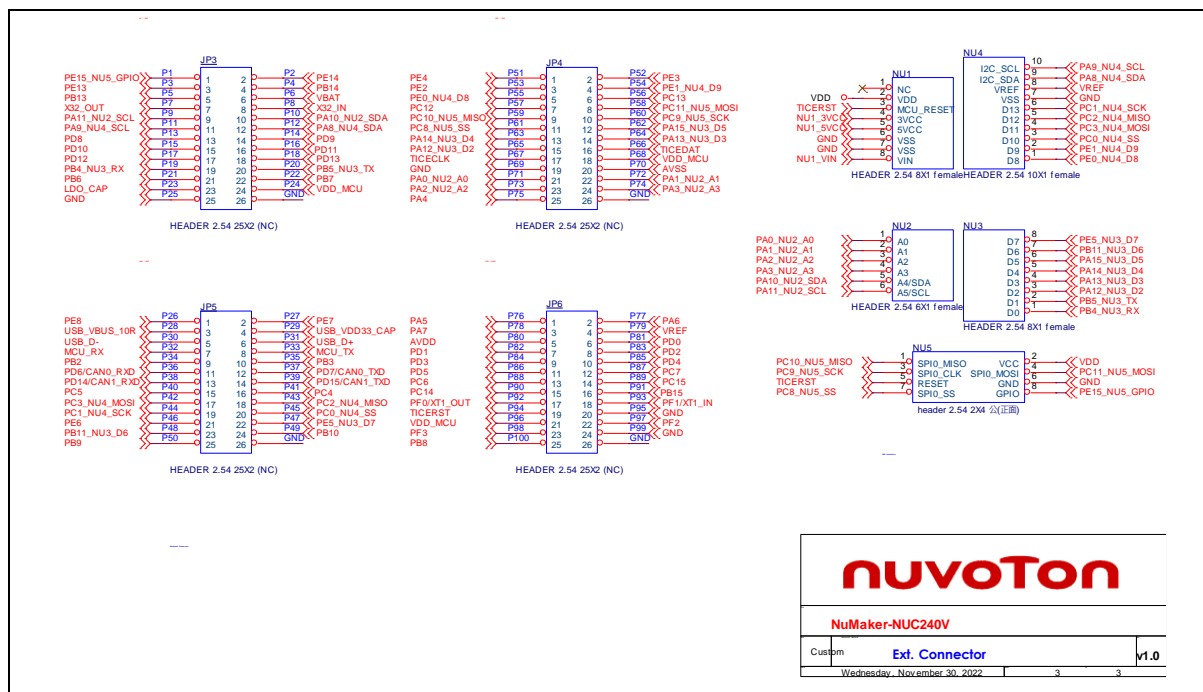


Figure 5-3 Extension Connectors Circuit

Figure 5-4 and Figure 5-5 show the front and rear placement of NuMaker-NUC240V.



6 REVISION HISTORY

Date	Revision	Description
2022.12.22	1.00	Initial version.

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