NuMicro® Family

Arm® Cortex®-M23-based Microcontroller

NuMaker-M2L31KI

User Manual

Evaluation Board for NuMicro® M2L31 Series

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

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1 OVERVIEW

The NuMaker-M2L31KI is an evaluation board for Nuvoton NuMicro M2L31KIDAE, M2L31KGDAE, M2L31SIDAE, M2L31SGDAE, M2L31CIDAE, M2L31CGDAE, M2L31LIDAE, M2L31LGDAE M2L31YIDAE and M2L31YGDAE microcontrollers. The NuMaker-M2L31KI consists of two parts: an M2L31 target board and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-M2L31KI is designed for project evaluation, prototype development and validation with power consumption monitoring function.

The M2L31 target board is based on NuMicro M2L31KIDAE. For the development flexibility, the M2L31 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.

The NuMaker-M2L31KI evaluation board supports USB PD 3.0 sink mode power delivery protocol, including different voltage levels such as 5 V, 9 V, 15 V, and 20 V, capable of receiving up to 100W of power. Through BSP configuration, it can also communicate with commercially available USB PD 3.0 adapters, dynamically adjusting power according to their charging needs, and enabling developers to obtain safe and flexible power supply according to the specific requirements of the development project.

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.

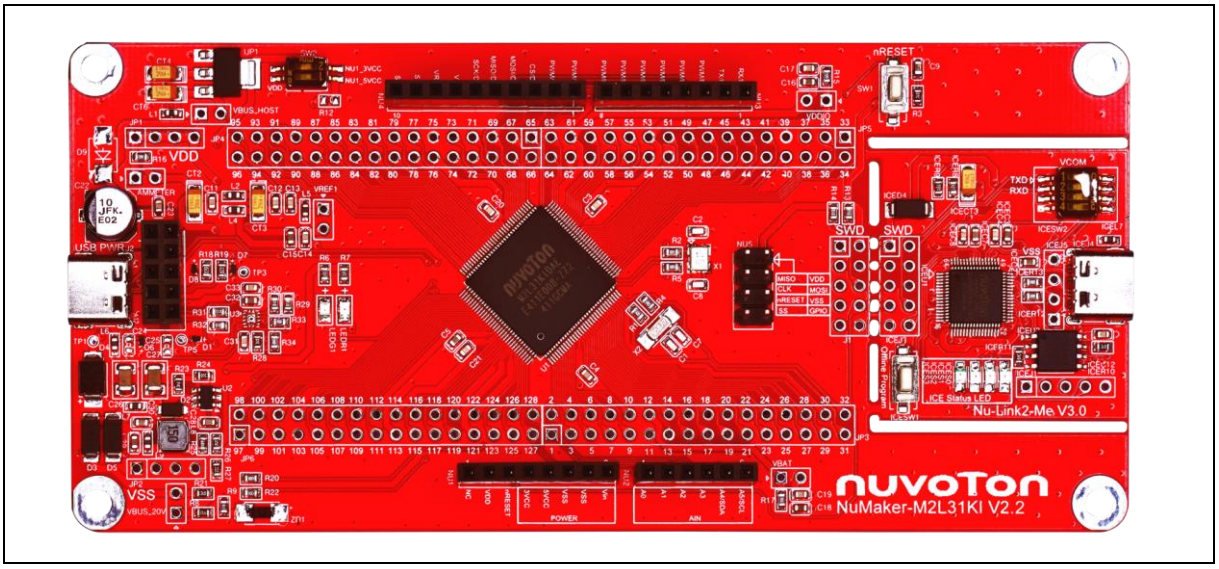


Figure 1-1 NuMaker-M2L31KI Evaluation Board

2 FEATURES

- NuMicro M2L31KIDAE used as main microcontroller with function compatible with:
  - M2L31KIDAE
  - M2L31KGDAE
  - M2L31SIDAE
  - M2L31SGDAE
  - M2L31CIDAE
  - M2L31CGDAE
  - M2L31LIDAE
  - M2L31LGDAE
  - M2L31YIDAE
  - M2L31YGDAE
- M2L31KIDAE full pins extension connectors
- Arduino UNO compatible extension connectors
- USB Type-C Connector (USB PWR) on M2L31 target board:
  - USB power delivery port control through CC pins
  - USB full speed Host/Device role
- 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 PWR connector on M2L31 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

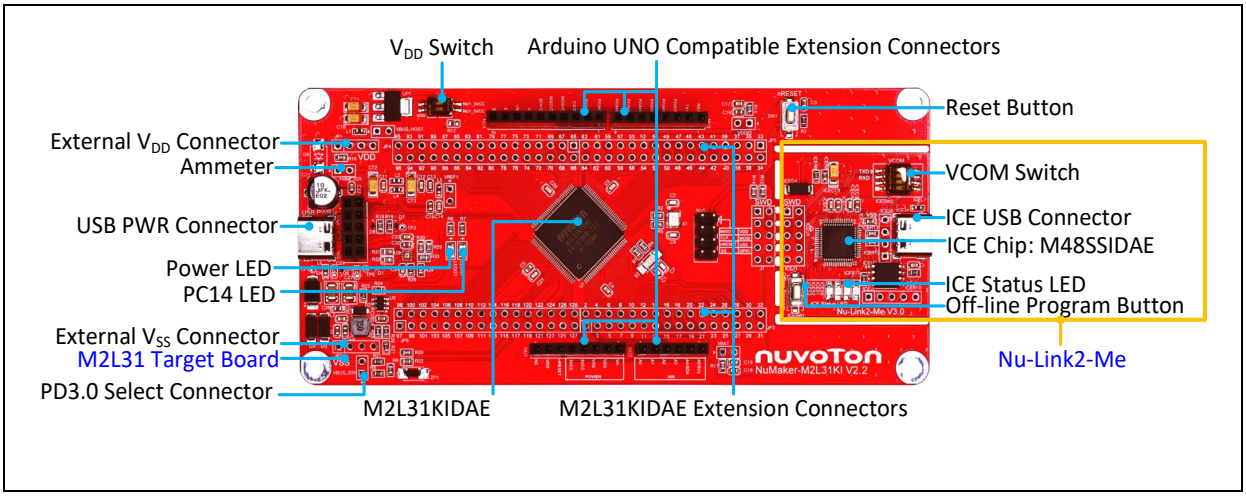


Figure 3-1 Front View of NuMaker-M2L31KI

Figure 3-1 shows the main components and connectors from the front side of NuMaker-M2L31KI. The following lists components and connectors from the front view:

- Target chip: M2L31KIDAE (U1)
- USB PD3.0 PWR Connector (J2)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
- M2L31KI Extension Connectors (JP3, JP4, JP5 and JP6)
- External V_{DD} Power Connector (JP1)
- External V_{SS} Power Connector (JP2)
- PD3.0 Voltage Detection Option Connector (VBUS_20V)
- V_{DD} Switch (SW2)
- Ammeter Connector (AMMETER)
- Reset Button (SW1)
- Power LED and PC14 LED (LEDG1 and LEDR1)
- Nu-Link2-Me
  - VCOM Switch
  - ICE Chip: M48SSIDAE (ICEU2)
  - ICE USB Connector (ICEJ2)
  - ICE Status LED (ICES0, ICES1, ICES2, ICES3)
  - Offline Program Button (ICESW1)

3.2 Rear View

Figure 3-2 shows the main components and connectors from the rear side of NuMaker-M2L31KI.

The following lists components and connectors from the rear view:

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

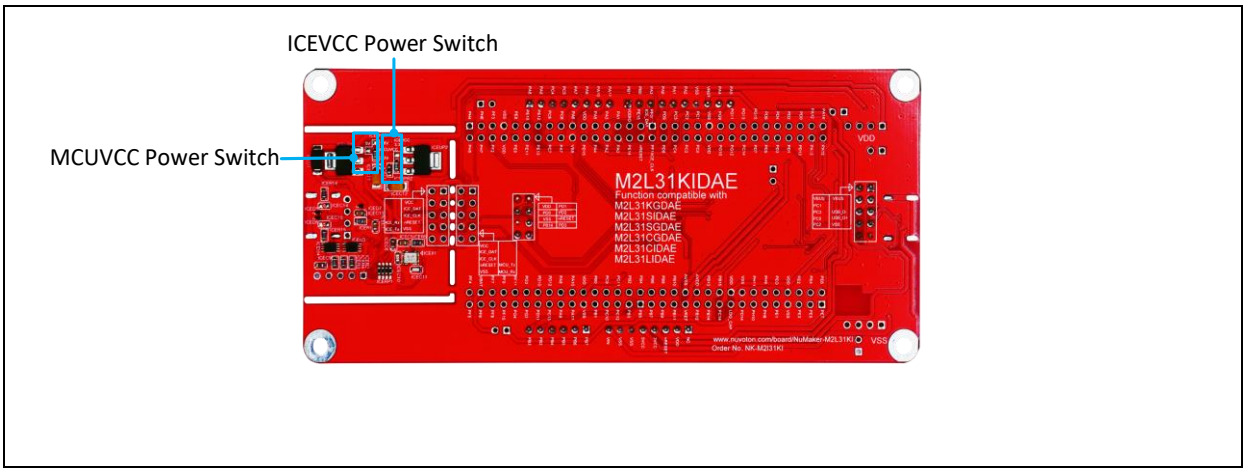


Figure 3-2 Rear View of NuMaker-M2L31KI

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-M2L31KI.
NU1, NU2, NU3 and NU4	Arduino UNO compatible pins on the NuMaker-M2L31KI.

Table 3-1 Extension Connectors

3.3.1 Pin Assignment for Extension Connectors

The NuMaker-M2L31KI provides the M2L31KIDAE onboard and extension connectors (JP3, JP4, JP5 and JP6). Figure 3-3 shows the M2L31KIDAE extension connectors.

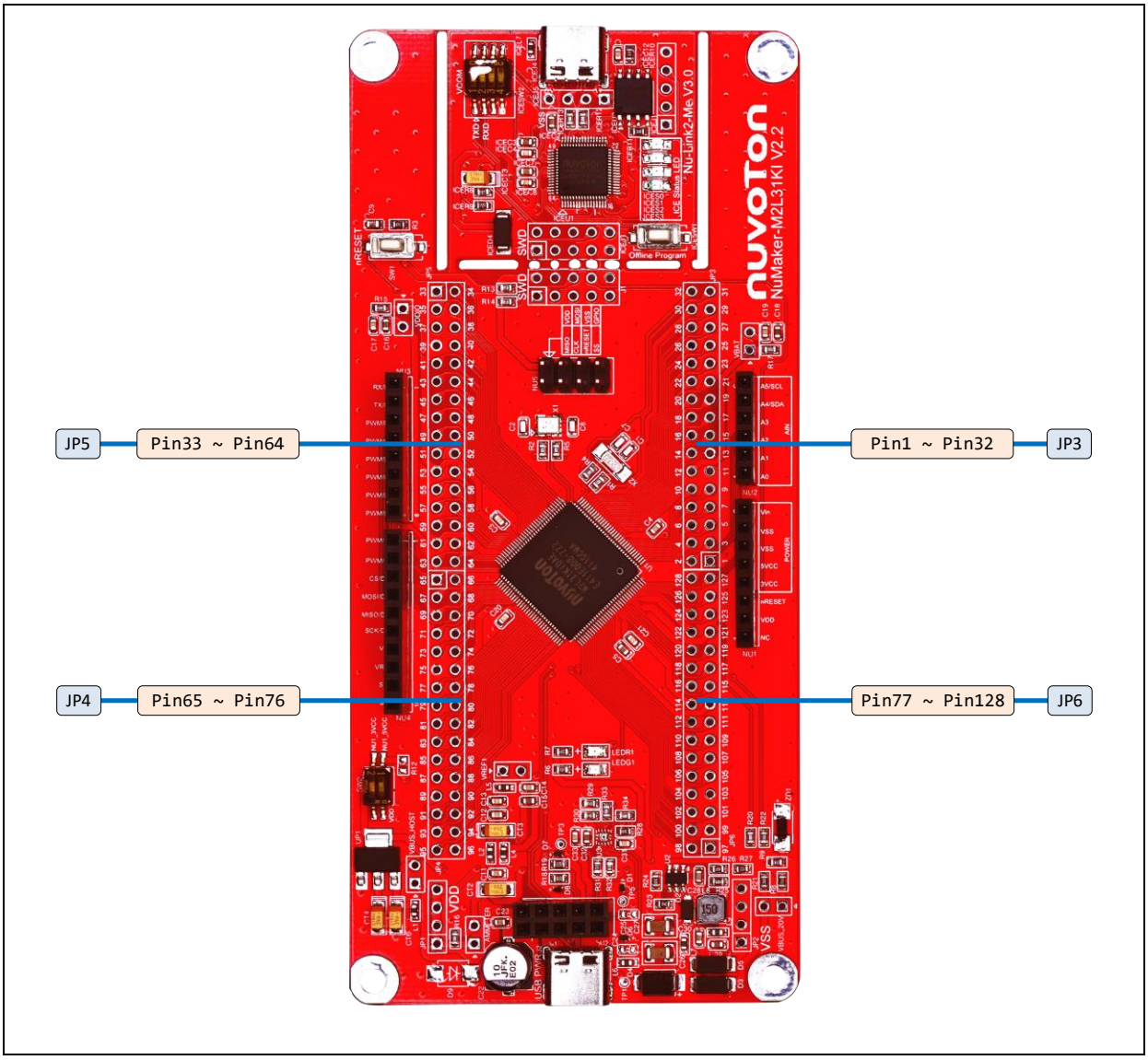


Figure 3-3 M2L31KIDAE Extension Connectors

Header		M2L31KIDAE	
		Pin No.	Function
JP3	JP3.1	1	PB.5/EADC0_CH5/LPADC0_CH5/ACMP1_N/OPA1_P1/EBI_ADR0/SPI1_MISO/I2C0_SCL/UART5_TXD/USCI1_CTL0/EPWM0_CH0/UART2_TXD/TM0/INT0/LPI2C0_SCL/LPTM0
	JP3.2	2	PB.4/EADC0_CH4/LPADC0_CH4/ACMP1_P1/OPA2_N0/EBI_ADR1/SPI1_MOSI/I2C0_SDA/UART5_RXD/USCI1_CTL1/EPWM0_CH1/UART2_RXD/TM1/INT1/LPI2C0_SDA/LPTM1
	JP3.3	3	PB.3/EADC0_CH3/LPADC0_CH3/ACMP0_N/OPA2_P0/EBI_ADR2/I2C1_SCL/SPI1_CLK/UART1_TXD/UART5_nRTS/USCI1_DAT1/EPWM0_CH2/PWM0_BRAKE0/TM2/INT2/LPIO7
	JP3.4	4	PB.2/EADC0_CH2/LPADC0_CH2/ACMP0_P1/OPA0_O/EBI_ADR3/I2C1_SDA/SPI1_SS/UART1_RXD/UART5_nCTS/USCI1_DAT0/EPWM0_CH3/TM3/INT3/LPIO6
	JP3.5	5	PC.12/EBI_ADR4/UART0_TXD/I2C0_SCL/UART6_TXD/SPI3_MISO/ECAP1_IC2/EPWM1_CH0/ACMP0_O/LPUART0_TXD/LPI2C0_SCL
	JP3.6	6	PC.11/EBI_ADR5/UART0_RXD/I2C0_SDA/UART6_RXD/SPI3_MOSI/ECAP1_IC1/EPWM1_CH1/ACMP1_O/LPUART0_RXD/LPI2C0_SDA
	JP3.7	7	PC.10/EBI_ADR6/UART6_nRTS/SPI3_CLK/UART3_TXD/CANFD1_TXD/ECAP1_IC0/EPWM1_CH2
	JP3.8	8	PC.9/EBI_ADR7/UART6_nCTS/SPI3_SS/UART3_RXD/CANFD1_RXD/EPWM1_CH3
	JP3.9	9	PB.1/EADC0_CH1/LPADC0_CH1/ACMP2_N/OPA0_N0/EBI_ADR8/UART2_TXD/USCI1_CLK/I2C1_SCL/QSPI0_MISO1/EPWM0_CH4/EPWM1_CH4/EPWM0_BRAKE0/PWM0_BRAKE0/UTCPD0_VBDCHG/LPIO3
	JP3.10	10	PB.0/EADC0_CH0/LPADC0_CH0/ACMP2_P1/OPA0_P0/EBI_ADR9/SPI3_I2SMCLK/USCI0_CTL0/UART2_RXD/SPI0_I2SMCLK/I2C1_SDA/QSPI0_MOSI1/EPWM0_CH5/EPWM1_CH5/EPWM0_BRAKE1/PWM0_BRAKE1/UTCPD0_VCNEN2/LPIO2
	JP3.11	11	V_{SS}
	JP3.12	12	V_{DD}
	JP3.13	13	PA.11/EADC0_CH23/LPADC0_CH23/ACMP0_P0/OPA2_O/EBI_nRD/SPI3_SS/USCI0_CLK/I2C2_SCL/UART6_TXD/PWM0_CH0/EPWM0_SYNC_OUT/TM0_EXT/DAC1_ST/LPTM0_EXT
	JP3.14	14	PA.10/EADC0_CH22/LPADC0_CH22/ACMP1_P0/OPA1_O/EBI_nWR/SPI3_CLK/USCI0_DAT0/I2C2_SDA/UART6_RXD/PWM0_CH1/EQEI1_INDEX/ECAP0_IC0/TM1_EXT/DAC0_ST/LPTM1_EXT
	JP3.15	15	PA.9/EADC0_CH21/LPADC0_CH21/ACMP2_P0/OPA1_N0/EBI_MCLK/SPI3_MISO/USCI0_DAT1/UART1_TXD/UART7_TXD/PWM0_CH2/EQEI1_A/ECAP0_IC1/TM2_EXT/I2C2_SMBAL
	JP3.16	16	PA.8/EADC0_CH20/LPADC0_CH20/OPA1_P0/EBI_ALE/SPI3_MOSI/USCI0_CTL1/UART1_RXD/UART7_RXD/PWM0_CH3/EQEI1_B/ECAP0_IC2/TM3_EXT/I2C2_SMBSUS/INT4
	JP3.17	17	PC.13/EADC0_CH19/LPADC0_CH19/EBI_ADR10/SPI2_I2SMCLK/CANFD1_TXD/USCI0_CTL0/UART2_TXD/PWM0_CH4/CLKO/EADC0_ST/TK_SE/LPADC0_ST
	JP3.18	18	PD.12/EADC0_CH18/LPADC0_CH18/EBI_nCS0/CANFD1_RXD/UART2_RXD/PWM0_CH5/EQEI0_INDEX/CLKO/EADC0_ST/INT5/TK_SE/LPADC0_ST
	JP3.19	19	PD.11/EADC0_CH17/LPADC0_CH17/EBI_nCS1/UART1_TXD/CANFD0_TXD/EQEI0_A/INT6
	JP3.20	20	PD.10/EADC0_CH16/LPADC0_CH16/EBI_nCS2/UART1_RXD/CANFD0_RXD/EQEI0_B/INT7
	JP3.21	21	PG.2/EBI_ADR11/SPI2_SS/I2C0_SMBAL/I2C1_SCL/I2C3_SMBAL/TM0/LPTM0
	JP3.22	22	PG.3/EBI_ADR12/SPI2_CLK/I2C0_SMBSUS/I2C1_SDA/I2C3_SMBSUS/TM1/LPTM1
	JP3.23	23	PG.4/EBI_ADR13/SPI2_MISO/TM2
	JP3.24	24	PF.11/EBI_ADR14/SPI2_MOSI/UART5_TXD/TM3
	JP3.25	25	PF.10/EBI_ADR15/SPI0_I2SMCLK/UART5_RXD
	JP3.26	26	PF.9/EBI_ADR16/SPI0_SS/UART5_nRTS/CANFD1_TXD
	JP3.27	27	PF.8/EBI_ADR17/SPI0_CLK/UART5_nCTS/CANFD1_RXD/TAMPER2
	JP3.28	28	PF.7/EBI_ADR18/SPI0_MISO/UART4_TXD/TAMPER1/TM3/INT5
	JP3.29	29	PF.6/EBI_ADR19/SPI0_MOSI/UART4_RXD/EBI_nCS0/EPWM1_BRAKE0/TAMPER0/EPWM0_BRAKE0/EPWM0_CH4/PWM1_BRAKE0/PWM0_BRAKE0/CLKO
	JP3.30	30	VBAT
	JP3.31	31	PF.5/UART2_RXD/UART2_nCTS/EPWM0_CH0/PWM0_CH4/EPWM0_SYNC_OUT/X32_IN/EADC0_ST/UTCPD0_VBSNKEN/LPADC0_ST

Header		M2L31KIDAE	
		Pin No.	Function
	JP3.32	32	PF.4/UART2_TXD/UART2_nRTS/EPWM0_CH1/PWM0_CH5/X32_OUT/EQEI1_INDEX/ECAP1_IC0/UTCPD0_VBSRCEN
JP5	JP5.1	33	PH.4/EBI_ADR3/SPI1_MISO/UART7_nRTS/UART6_TXD
	JP5.2	34	PH.5/EBI_ADR2/SPI1_MOSI/UART7_nCTS/UART6_RXD
	JP5.3	35	PH.6/EBI_ADR1/SPI1_CLK/UART7_TXD
	JP5.4	36	PH.7/EBI_ADR0/SPI1_SS/UART7_RXD
	JP5.5	37	PF.3/EBI_nCS0/UART0_TXD/I2C0_SCL/XT1_IN/PWM1_CH0/EQEI1_A/ECAP1_IC1/LPUART0_TXD/LPI2C0_SCL
	JP5.6	38	PF.2/EBI_nCS1/UART0_RXD/I2C0_SDA/QSPI0_CLK/XT1_OUT/PWM1_CH1/EQEI1_B/ECAP1_IC2/LPUART0_RXD/LPI2C0_SDA
	JP5.7	39	V_{SS}
	JP5.8	40	V_{DD}
	JP5.9	41	PE.8/EBI_ADR10/SPI2_CLK/USCI1_CTL1/UART2_TXD/PWM0_BRAKE0/EPWM0_CH0/EPWM0_BRAKE0/ECAP0_IC0
	JP5.10	42	PE.9/EBI_ADR11/SPI2_MISO/USCI1_CTL0/UART2_RXD/PWM0_BRAKE1/EPWM0_CH1/EPWM0_BRAKE1/ECAP0_IC1
	JP5.11	43	PE.10/EBI_ADR12/SPI2_MOSI/USCI1_DAT0/UART3_TXD/PWM1_BRAKE0/EPWM0_CH2/EPWM1_BRAKE0/ECAP0_IC2
	JP5.12	44	PE.11/EBI_ADR13/SPI2_SS/USCI1_DAT1/UART3_RXD/UART1_nCTS/PWM1_BRAKE1/EPWM0_CH3/EPWM1_BRAKE1/ECAP1_IC2
	JP5.13	45	PE.12/EBI_ADR14/SPI2_I2SMCLK/USCI1_CLK/UART1_nRTS/EPWM0_CH4/ECAP1_IC1
	JP5.14	46	PE.13/EBI_ADR15/I2C0_SCL/UART4_nRTS/UART1_TXD/EPWM0_CH5/EPWM1_CH0/PWM1_CH5/ECAP1_IC0/LPI2C0_SCL
	JP5.15	47	PC.8/EBI_ADR16/I2C0_SDA/UART4_nCTS/UART1_RXD/EPWM1_CH1/PWM1_CH4/LPI2C0_SDA
	JP5.16	48	PC.7/EBI_AD9/SPI1_MISO/UART4_TXD/UART0_nCTS/UART6_TXD/EPWM1_CH2/PWM1_CH0/TM0/INT3/LPUART0_nCTS/LPTM0
	JP5.17	49	PC.6/EBI_AD8/SPI1_MOSI/UART4_RXD/UART0_nRTS/UART6_RXD/EPWM1_CH3/PWM1_CH1/TM1/INT2/LPUART0_nRTS/LPTM1
	JP5.18	50	PA.7/EBI_AD7/SPI1_CLK/UART0_TXD/I2C1_SCL/EPWM1_CH4/PWM1_CH2/ACMP0_WLAT/TM2/INT1/TK_TK0/UTCPD0_VBSNKEN/LPUART0_TXD/LPIO5
	JP5.19	51	PA.6/EBI_AD6/SPI1_SS/UART0_RXD/I2C1_SDA/EPWM1_CH5/PWM1_CH3/ACMP1_WLAT/TM3/INT0/TK_TK1/UTCPD0_VBSRCEN/LPUART0_RXD/LPIO4
	JP5.20	52	V_{SS}
	JP5.21	53	V_{DD}
	JP5.22	54	PD.15/EPWM0_CH5/ACMP2_WLAT/TM3/INT1/TK_TK2/UTCPD0_FRSTX2/UTCPD0_DISCHG
	JP5.23	55	PA.5/QSPI0_MISO1/SPI1_I2SMCLK/UART0_nCTS/UART0_TXD/I2C0_SCL/CANFD0_TXD/UART5_TXD/PWM0_CH5/EPWM0_CH0/EQEI0_INDEX/TK_TK3/UTCPD0_VBSNKEN/LPUART0_TXD/LPUART0_nCTS/LPI2C0_SCL
	JP5.24	56	PA.4/QSPI0_MOSI1/SPI0_I2SMCLK/UART0_nRTS/UART0_RXD/I2C0_SDA/CANFD0_RXD/UART5_RXD/PWM0_CH4/EPWM0_CH1/EQEI0_A/TK_TK4/UTCPD0_VBSRCEN/LPUART0_RXD/LPUART0_nRTS/LPI2C0_SDA
	JP5.25	57	PA.3/QSPI0_SS/SPI0_SS/UART4_TXD/TK_SE/I2C0_SMBAL/UART1_TXD/I2C1_SCL/PWM1_BRAKE1/EQEI0_B/PWM0_CH3/EPWM0_CH2/CLKO/EPWM1_BRAKE1/TK_TK5/UTCPD0_VBSNKEN/LPSPI0_SS
	JP5.26	58	PA.2/QSPI0_CLK/SPI0_CLK/UART4_RXD/I2C0_SMBSUS/UART1_RXD/I2C1_SDA/EQEI0_A/PWM0_CH2/EPWM0_CH3/TK_TK6/UTCPD0_VBSRCEN/LPSPI0_CLK
	JP5.27	59	PA.1/QSPI0_MISO0/SPI0_MISO/UART0_TXD/UART1_nCTS/I2C2_SCL/CANFD1_TXD/EQEI0_INDEX/PWM0_CH1/EPWM0_CH4/ACMP2_O/DAC1_ST/TK_TK7/UTCPD0_FRSTX1/UTCPD0_DISCHG/LPSPI0_MISO/LPUART0_TXD/LPIO1
	JP5.28	60	PA.0/QSPI0_MOSI0/SPI0_MOSI/UART0_RXD/UART1_nRTS/I2C2_SDA/CANFD1_RXD/EPWM0_BRAKE0/PWM0_CH0/EPWM0_CH5/ACMP2_WLAT/DAC0_ST/TK_TK8/UTCPD0_VCNEN1/LPSPI0_MOSI/LPUART0_RXD/LPIO0
	JP5.29	61	VDDIO

Header		M2L31KIDAE	
		Pin No.	Function
	JP5.30	62	PE.14/EBI_AD8/UART2_TXD/CANFD0_TXD/UART6_TXD/EPWM0_CH1/TM2/CLKO/INT4/TK_TK9
	JP5.31	63	PE.15/EBI_AD9/UART2_RXD/CANFD0_RXD/UART6_RXD
	JP5.32	64	nRESET
JP4	JP4.1	65	PF.0/UART1_TXD/I2C1_SCL/UART0_TXD/EPWM1_CH4/PWM1_CH0/ICE_DAT/UTCPD0_FRSTX2/UTCPD0_DISCHG/LPUART0_TXD/LPIO2
	JP4.2	66	PF.1/UART1_RXD/I2C1_SDA/UART0_RXD/SPI3_I2SMCLK/EPWM1_CH5/PWM1_CH1/ICE_CLK/UTCPD0_FRSTX1/UTCPD0_DISCHG/LPUART0_RXD/LPIO3
	JP4.3	67	PD.9/EBI_AD7/I2C2_SCL/UART2_nCTS/UART7_TXD
	JP4.4	68	PD.8/EBI_AD6/I2C2_SDA/UART2_nRTS/UART7_RXD
	JP4.5	69	PC.5/EBI_AD5/QSPI0_MISO1/SPI3_SS/UART2_TXD/I2C1_SCL/CANFD0_TXD/UART4_TXD/EPWM1_CH0/I2C3_SMBAL/TK_TK10/UTCPD0_FRSTX2/UTCPD0_DISCHG
	JP4.6	70	PC.4/EBI_AD4/QSPI0_MOSI1/SPI3_CLK/SPI1_I2SMCLK/UART2_RXD/I2C1_SDA/CANFD0_RXD/UART4_RXD/EPWM1_CH1/I2C3_SMBSUS/TK_TK11/UTCPD0_FRSTX1/UTCPD0_DISCHG
	JP4.7	71	PC.3/EBI_AD3/QSPI0_SS/SPI3_MISO/SPI1_MISO/UART2_nRTS/I2C0_SMBAL/UART3_TXD/EPWM1_CH2/I2C3_SCL/TK_TK12/UTCPD0_CCDB2
	JP4.8	72	PC.2/EBI_AD2/QSPI0_CLK/SPI3_MOSI/SPI1_MOSI/UART2_nCTS/I2C0_SMBSUS/EQEI0_INDEX/UART3_RXD/EPWM1_CH3/ECAP0_IC0/I2C3_SDA/TK_TK13/UTCPD0_CCDB
	JP4.9	73	PC.1/EBI_AD1/QSPI0_MISO0/SPI1_CLK/UART2_TXD/I2C0_SCL/EQEI0_A/EPWM1_CH4/ECAP0_IC1/ACMP0_O/EADC0_ST/UTCPD0_CC2/LPADC0_ST/LPI2C0_SCL/LPIO5
	JP4.10	74	PC.0/EBI_AD0/QSPI0_MOSI0/SPI1_SS/UART2_RXD/I2C0_SDA/EQEI0_B/EPWM1_CH5/ECAP0_IC2/ACMP1_O/UTCPD0_CC1/LPI2C0_SDA/LPIO4
	JP4.11	75	V_{SS}
	JP4.12	76	V_{DD}
	JP4.13	77	PG.9/EBI_AD0/PWM0_CH5
	JP4.14	78	PG.10/EBI_AD1/PWM0_CH4
	JP4.15	79	PG.11/EBI_AD2/UART7_TXD/PWM0_CH3
	JP4.16	80	PG.12/EBI_AD3/UART7_RXD/PWM0_CH2
	JP4.17	81	PG.13/EBI_AD4/UART6_TXD/PWM0_CH1
	JP4.18	82	PG.14/EBI_AD5/UART6_RXD/PWM0_CH0
	JP4.19	83	PG.15/CLKO/EADC0_ST/TK_SE/LPADC0_ST
	JP4.20	84	PD.7/UART1_TXD/I2C0_SCL/USCI1_CLK/TK_TK14/LPI2C0_SCL
	JP4.21	85	PD.6/UART1_RXD/I2C0_SDA/USCI1_DAT1/TK_TK15/LPI2C0_SDA
	JP4.22	86	PD.5/I2C1_SCL/USCI1_DAT0/TK_TK16
	JP4.23	87	PD.4/USCI0_CTL0/I2C1_SDA/USCI1_CTL1/TK_TK17
	JP4.24	88	PD.3/EBI_AD10/USCI0_CTL1/SPI0_SS/UART3_nRTS/USCI1_CTL0/UART0_TXD/TK_TK14/LPSPI0_SS/LPUART0_TXD
	JP4.25	89	PD.2/EBI_AD11/USCI0_DAT1/SPI0_CLK/UART3_nCTS/UART0_RXD/TK_TK15/LPSPI0_CLK/LPUART0_RXD
	JP4.26	90	PD.1/EBI_AD12/USCI0_DAT0/SPI0_MISO/UART3_TXD/TK_TK16/LPSPI0_MISO/LPIO7
	JP4.27	91	PD.0/EBI_AD13/USCI0_CLK/SPI0_MOSI/UART3_RXD/TM2/TK_TK17/LPSPI0_MOSI/LPIO6
	JP4.28	92	PD.13/EBI_AD10/SPI0_I2SMCLK/SPI1_I2SMCLK/PWM0_CH0/CLKO/EADC0_ST/TK_SE/LPADC0_ST
	JP4.29	93	PA.12/UART4_TXD/I2C1_SCL/SPI2_SS/CANFD1_TXD/SPI0_SS/PWM1_CH2/EQEI1_INDEX/ECAP1_IC0/USB_VBUS/LPSPI0_SS
	JP4.30	94	PA.13/UART4_RXD/I2C1_SDA/SPI2_CLK/CANFD1_RXD/SPI0_CLK/PWM1_CH3/EQEI1_A/ECAP1_IC1/USB_D-/LPSPI0_CLK

Header		M2L31KIDAE	
		Pin No.	Function
	JP4.31	95	PA.14/UART0_TXD/EBI_AD5/SPI2_MISO/I2C2_SCL/SPI0_MISO/PWM1_CH4/EQEI1_B/ECAP1_IC2/USB_D+/LPSPI0_MISO
	JP4.32	96	PA.15/UART0_RXD/SPI2_MOSI/I2C2_SDA/SPI0_MOSI/PWM1_CH5/EPWM0_SYNC_IN/USB_OTG_ID/LPSPI0_MOSI
JP6	JP6.1	97	PE.7/UART5_TXD/CANFD1_TXD/EQEI1_INDEX/EPWM0_CH0/PWM0_CH5
	JP6.2	98	PE.6/SPI3_I2SMCLK/USCI0_CTL0/UART5_RXD/CANFD1_RXD/EQEI1_A/EPWM0_CH1/PWM0_CH4
	JP6.3	99	PE.5/EBI_nRD/SPI3_SS/USCI0_CTL1/UART6_TXD/UART7_nRTS/EQEI1_B/EPWM0_CH2/PWM0_CH3
	JP6.4	100	PE.4/EBI_nWR/SPI3_CLK/USCI0_DAT1/UART6_RXD/UART7_nCTS/EQEI0_INDEX/EPWM0_CH3/PWM0_CH2
	JP6.5	101	PE.3/EBI_MCLK/SPI3_MISO/USCI0_DAT0/UART6_nRTS/UART7_TXD/EQEI0_A/EPWM0_CH4/PWM0_CH1
	JP6.6	102	PE.2/EBI_ALE/SPI3_MOSI/USCI0_CLK/UART6_nCTS/UART7_RXD/EQEI0_B/EPWM0_CH5/PWM0_CH0
	JP6.7	103	VSS
	JP6.8	104	VDD
	JP6.9	105	PE.1/EBI_AD10/QSPI0_MISO0/SPI1_MISO/UART3_TXD/I2C1_SCL/UART4_nCTS/LPIO1
	JP6.10	106	PE.0/EBI_AD11/QSPI0_MOSI0/SPI1_MOSI/UART3_RXD/I2C1_SDA/UART4_nRTS/LPIO0
	JP6.11	107	PH.8/EBI_AD12/QSPI0_CLK/SPI1_CLK/UART3_nRTS/I2C1_SMBAL/I2C2_SCL/UART1_TXD
	JP6.12	108	PH.9/EBI_AD13/QSPI0_SS/SPI1_SS/UART3_nCTS/I2C1_SMBSUS/I2C2_SDA/UART1_RXD
	JP6.13	109	PH.10/EBI_AD14/QSPI0_MISO1/SPI1_I2SMCLK/UART4_TXD/UART0_TXD/LPUART0_TXD
	JP6.14	110	PH.11/EBI_AD15/QSPI0_MOSI1/UART4_RXD/UART0_RXD/EPWM0_CH5/LPUART0_RXD
	JP6.15	111	PD.14/EBI_nCS0/SPI3_I2SMCLK/SPI0_I2SMCLK/EPWM0_CH4
	JP6.16	112	V_{SS}
	JP6.17	113	LDO_CAP
	JP6.18	114	V_{DD}
	JP6.19	115	PC.14/EBI_AD11/SPI0_I2SMCLK/USCI0_CTL0/QSPI0_CLK/EBI_nCS2/EPWM0_SYNC_IN/TM1/USB_VBUS_ST/ACMP2_O/LPTM1
	JP6.20	116	PB.15/EADC0_CH15/LPADC0_CH15/OPA0_P1/EBI_AD12/SPI0_SS/USCI0_CTL1/UART0_nCTS/UART3_TXD/I2C2_SMBAL/EPWM0_BRAKE1/EPWM1_CH0/TM0_EXT/USB_VBUS_EN/UTCPD0_VBSNKEN/LPSPI0_SS/LPUART0_nCTS/LPTM0_EXT
	JP6.21	117	PB.14/EADC0_CH14/LPADC0_CH14/OPA0_N1/EBI_AD13/SPI0_CLK/USCI0_DAT1/UART0_nRTS/UART3_RXD/I2C2_SMBSUS/EQEI0_INDEX/EPWM1_CH1/ECAP0_IC0/TM1_EXT/CLKO/TK_SE/UTCPD0_VBSRCEN/LPSPI0_CLK/LPUART0_nRTS/LPTM1_EXT
	JP6.22	118	PB.13/EADC0_CH13/LPADC0_CH13/DAC1_OUT/ACMP0_P3/ACMP1_P3/OPA1_N1/EBI_AD14/SPI0_MISO/USCI0_DAT0/UART0_TXD/UART3_nRTS/I2C2_SCL/CANFD0_TXD/EPWM1_CH2/TM2_EXT/LPSPI0_MISO/LPUART0_TXD
	JP6.23	119	PB.12/EADC0_CH12/LPADC0_CH12/DAC0_OUT/ACMP0_P2/ACMP1_P2/EBI_AD15/SPI0_MOSI/USCI0_CLK/UART0_RXD/UART3_nCTS/I2C2_SDA/CANFD0_RXD/EPWM1_CH3/TM3_EXT/LPSPI0_MOSI/LPUART0_RXD
	JP6.24	120	AV_{DD}
	JP6.25	121	V_{REF}
	JP6.26	122	AV_{SS}
	JP6.27	123	PB.11/EADC0_CH11/LPADC0_CH11/EBI_ADR16/UART0_nCTS/UART4_TXD/I2C1_SCL/CANFD1_TXD/SPI0_I2SMCLK/PWM1_CH0/LPUART0_nCTS
	JP6.28	124	PB.10/EADC0_CH10/LPADC0_CH10/EBI_ADR17/USCI1_CTL0/UART0_nRTS/UART4_RXD/I2C1_SDA/CANFD1_RXD/PWM1_CH1/LPUART0_nRTS
	JP6.29	125	PB.9/EADC0_CH9/LPADC0_CH9/EBI_ADR18/USCI1_CTL1/UART0_TXD/UART1_nCTS/UART7_TXD/PWM1_CH2/LPUART0_TXD

Header		M2L31KIDAE	
		Pin No.	Function
	JP6.30	126	PB.8/EADC0_CH8/LPADC0_CH8/EBI_ADR19/USCI1_CLK/UART0_RXD/UART1_nRTS/UART7_RXD/PWM1_CH3/LPUART0_RXD
	JP6.31	127	PB.7/EADC0_CH7/LPADC0_CH7/ACMP2_P3/OPA2_N1/EBI_nWRL/USCI1_DAT0/UART1_TXD/EBI_nCS0/PWM1_CH4/EPWM1_BRAKE0/EPWM1_CH4/INT5/PWM1_BRAKE0/ACMP0_O
	JP6.32	128	PB.6/EADC0_CH6/LPADC0_CH6/ACMP2_P2/OPA2_P1/EBI_nWRH/USCI1_DAT1/UART1_RXD/EBI_nCS1/PWM1_CH5/EPWM1_BRAKE1/EPWM1_CH5/INT4/PWM1_BRAKE1/ACMP1_O

Table 3-2 M2L31KIDAE 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.

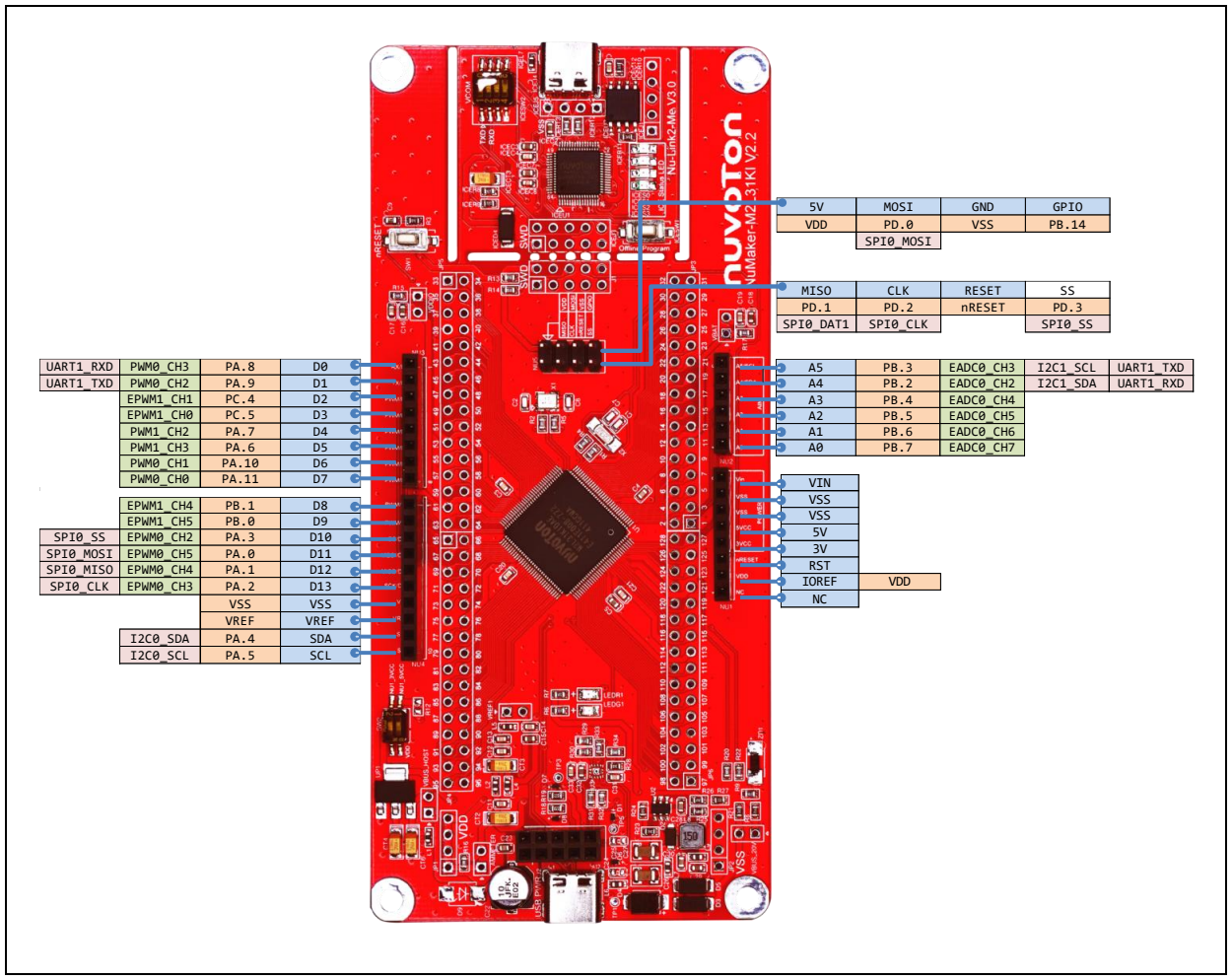


Figure 3-4 Arduino UNO Compatible Extension Connectors

Header		NuMaker-M2L31KI		Header		NuMaker-M2L31KI	
		Compatible to Arduino UNO	GPIO Pin of M2L31			Compatible to Arduino UNO	GPIO Pin of M2L31
NU3	NU3.1	D0	PA8	NU2	NU2.6	A5	PB3
	NU3.2	D1	PA9		NU2.5	A4	PB2
	NU3.3	D2	PC4		NU2.4	A3	PB4
	NU3.4	D3	PC0		NU2.3	A2	PB5
	NU3.5	D4	PA7		NU2.2	A1	PB6
	NU3.6	D5	PA6		NU2.1	A0	PB7
	NU3.7	D6	PA10	NU1	NU1.8	VIN	-
	NU3.8	D7	PA11		NU1.7	VSS	
NU4	NU4.1	D8	PB1		NU1.6	VSS	
	NU4.2	D9	PB0		NU1.5	5V	
	NU4.3	D10	PA3		NU1.4	3V	
	NU4.4	D11	PA0		NU1.3	RST	nRESET
	NU4.5	D12	PA1		NU1.2	VDD	V_{DD}
	NU4.6	D13	PA2		NU1.1	NC	-
	NU4.7	VSS	V_{SS}				
	NU4.8	VREF	AV_{DD}				
	NU4.9	SDA	PA4				
	NU4.10	SCL	PA5				

Table 3-3 Arduino UNO Extension Connectors and M2L31KIDAE Mapping GPIO List

3.4 Power Supply Configuration

The NuMaker-M2L31KI is able to adopt multiple power supplies. External power sources include NU1 Vin (7 V to 48 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-M2L31KI.

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 48 V. The voltage converter U2 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 M2L31 target board and Nu-Link2-Me.
J2	USB_VBUS	USB PD connector on NuMaker-M2L31KI supplies 5 V power from PC to M2L31 target board and Nu-Link2-Me. To support dead battery (DB) mode, the NU6 Pin8 (CC1) / Pin10 (DBCC1) and Pin4 (CC2) / Pin6 (DBCC2) need to be shorted individually. This also means if the system power only comes from J2, the NU6 Pin8 (CC1) / Pin10 (DBCC1) and Pin4 (CC2) / Pin6 (DBCC2) must be shorted individually.
NU1 pin5	NU1_5VCC	ICEJ2, J2 or NU1 pin8 supplies 5 V power to NU1 pin5. NU1 pin5 supplies 5 V power to target chip or Arduino adapter board. **Note:** M2L31 operating voltage range is from 1.8 V to 3.6 V. Do not switch SW2.1 (NU1 5VCC) to ON.

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 M2L31 target board or ICE chip.
UP1	USB_VBUS	UP1 converts USB_VBUS to 3.3 V and supplies 3.3 V to M2L31 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 M2L31 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 M2L31 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-M2L31KI.
JP2	V_{SS} connector on the NuMaker-M2L31KI.

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.
J2	USB PWR connector on NuMaker-M2L31KI is for USB PD3.0 power supply or general 5 V V_{BUS} power supply. If it connects with USB PD adapter or USB PD port, the V_{BUS} voltage can be required from 3.3 V to 20 V through M2L31 CC pin based on USB PD3.0 definition. To support dead battery (DB) mode, the NU6 Pin8 (CC1) / Pin10 (DBCC1) and Pin4 (CC2) / Pin6 (DBCC2) need to be shorted individually. This also means if the system power only comes from J2, the NU6 Pin8 (CC1) / Pin10 (DBCC1) and Pin4 (CC2) / Pin6 (DBCC2) must be shorted individually. To avoid reset command of NuLink2-Me after system power on in dead battery condition, the pin 4 of ICESW2 needs to be turned on. PB.15 and PA.12 of M2L31 connects with resistor voltage divider circuit to detect and to measure V_{BUS} voltage of USB PWR connector. The VBUS_20V is used to change resistor voltage divider ratio for 1/10 and 1/20 ratio selection. **Note:** To support USB PD3.0 power supply, the USB PD sample code should be downloaded firstly.

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. **Note:** M2L31 operating voltage range is from 1.8 V to 3.6 V. Do not switch SW2.1 (NU1 5VCC) to ON.

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.

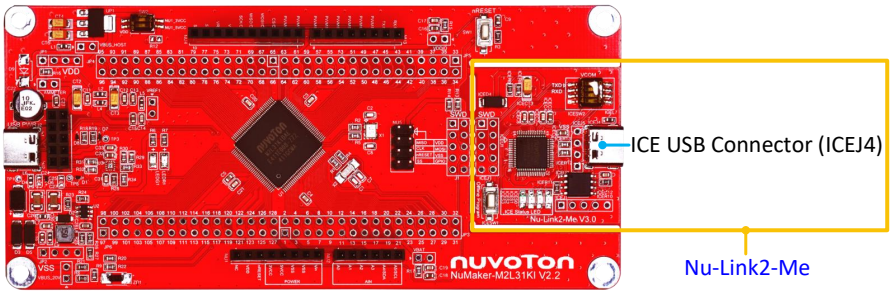


Figure 3-5 External Power Supply Sources on Nu-Link2-Me

To use ICEJ4 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 ICEJ4.

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	ICEJ4	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

Note:

1. 0 Ω should be soldered between ICEJPR1's MCUVCC and 1.8 V / 3.3 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 M2L31 Target Board to Target Chip

The external power supply sources on M2L31 target board are shown in Figure 3-6.

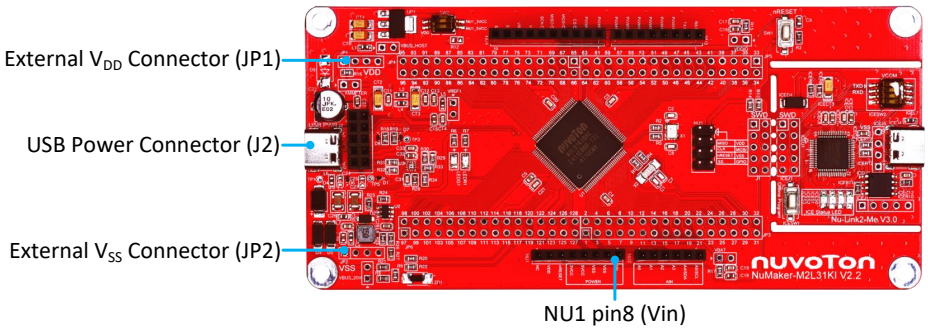


Figure 3-6 External Power Supply Sources on M2L31 Target Board

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 ICEJ2 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-M2L31KI, please follow the steps below:

1. Switch the SW2 depending on the target chip operating voltage.
2. Detach the Nu-Link2-Me from NuMaker-M2L31.
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-M2L31KI, please follow the steps below:

1. Switch the SW2 to OFF.
2. Detach the Nu-Link2-Me from NuMaker-M2L31.
3. Connect the external power supply to JP1.

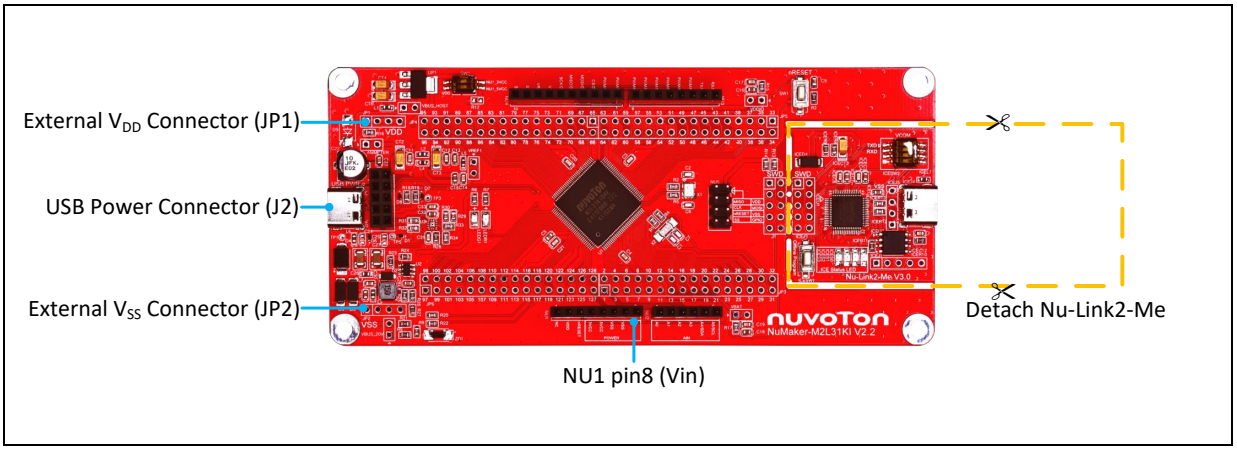


Figure 3-7 Detach the Nu-Link2-Me from NuMaker-M2L31KI

Table 3-12 presents all power models when supplies external power through M2L31 target board. The M2L31 target board external power sources are highlighted in yellow.

Model	Target Chip Voltage	Vin [1]	J2[1]	ICEJ2	SW2 Selection	JP1[2]	ICEJPR1 (MCUVCC) Selection [3]	ICEJPR2 (ICEVCC) Selection [4]	ICE Chip Voltage [5]
3	3.3 V	7 V ~ 48 V Input	-	-	NU1 3VCC	3.3 V output	Remove resistor	3.3 V	3.3 V
4	3.3 V	-	Connect to PC or Adapter (3.3 V ~ 20 V)	-	NU1 3VCC	3.3 V output	Remove resistor	3.3 V	3.3 V
5	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
6	1.8 V ~ 3.6 V	-	-	Detach Nu-Link2-Me	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.
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 M2L31KI Target Board

3.5 Ammeter Connector

User can refer to the sample code in M2L31KxxAE 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

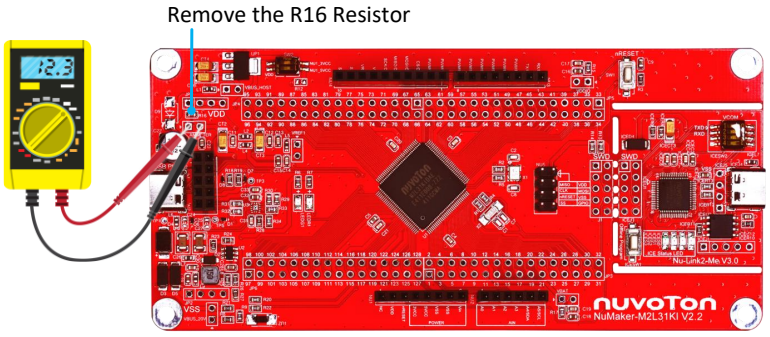


Figure 3-8 Wiring between Ammeter Connector and Ammeter

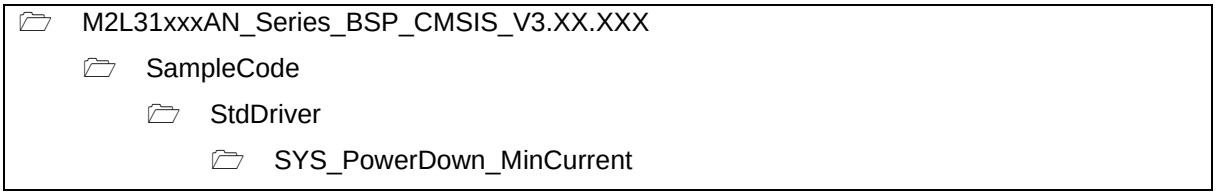


Figure 3-9 Project Path of SYS_PowerDown_MinCurrent

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
LEDG1	The power LED indicates that the NuMaker-M2L31KI is powered.
LEDR1	The LED is connected to the target chip PC.14.
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 PB.13 (UART0_TXD) to Nu-Link2-Me. **Off**: Disconnect target chip PB.13 (UART0_TXD) to Nu-Link2-Me.
2	RXD	**On**: Connect target chip PB.12 (UART0_RXD) to Nu-Link2-Me. **Off**: Disconnect target chip PB.12 (UART0_RXD) to Nu-Link2-Me.
4	MSG_EN	**On**: 1. Disable drag and drop programming of Nu-Link2-Me. 2. Disable reset target board of Nu-Link2-Me function when power is supplied. **Off**: Enable drag and drop programming of Nu-Link2-Me.
Note: Pin 3 is unused.		

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

3.8.2 Status LEDs

Table 3-15 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 MDK Nuvoton edition M0/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.

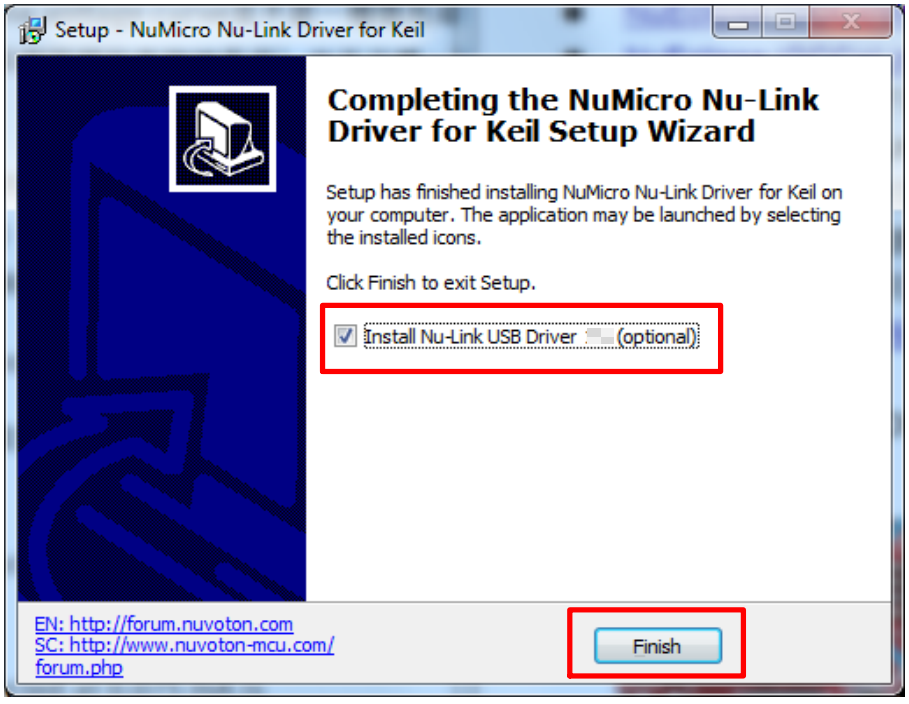


Figure 4-1 Nu-Link USB Driver Installation Setup

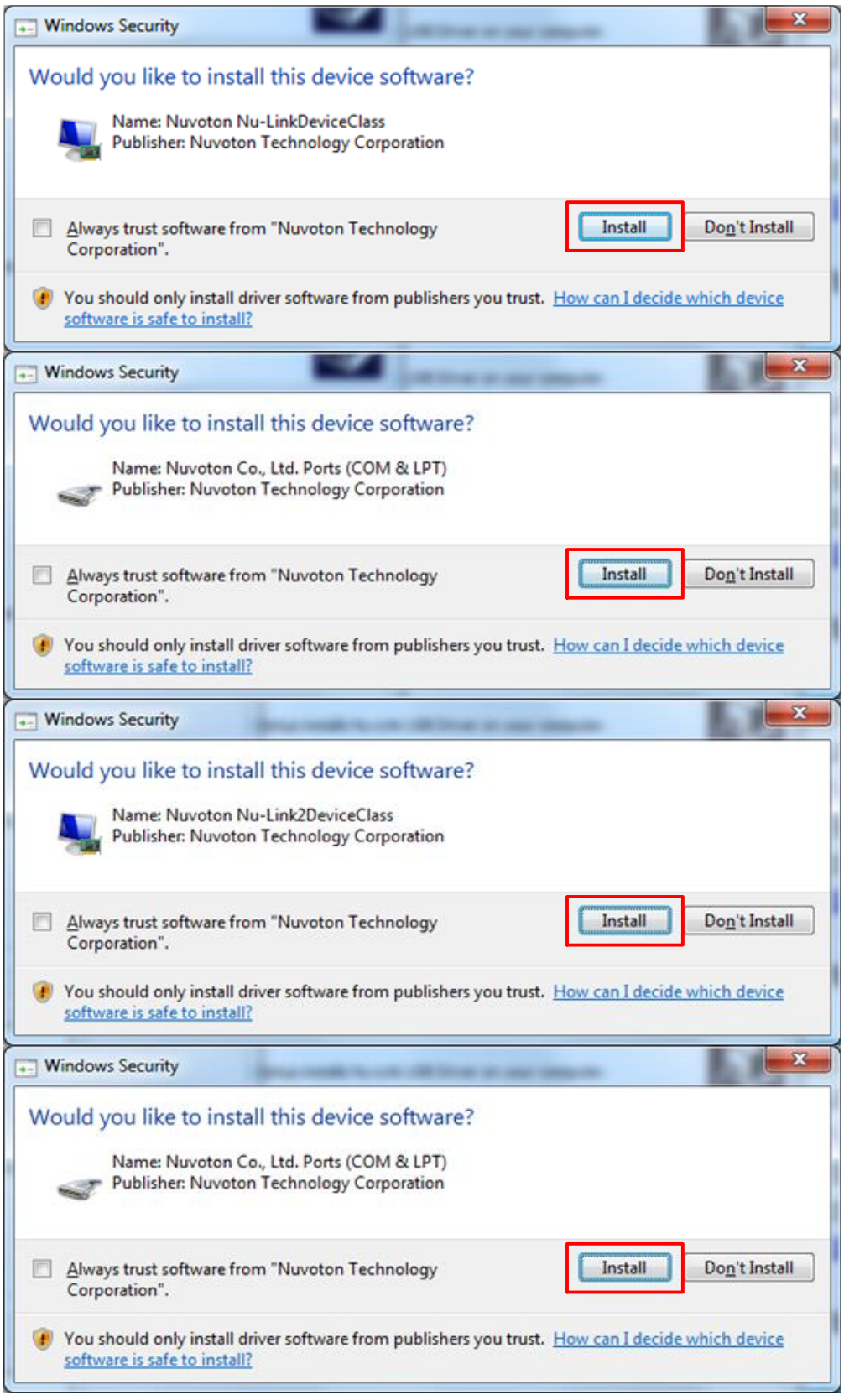


Figure 4-2 Nu-Link USB Driver Installation

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.

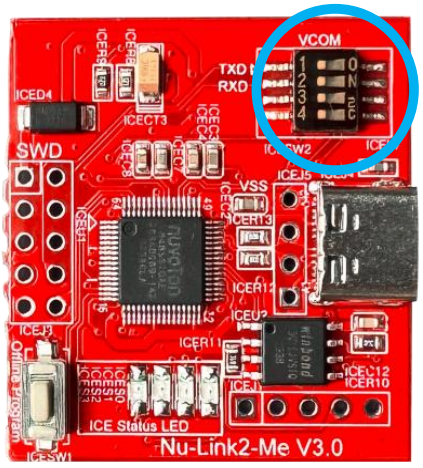


Figure 4-3 Open VCOM Function

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

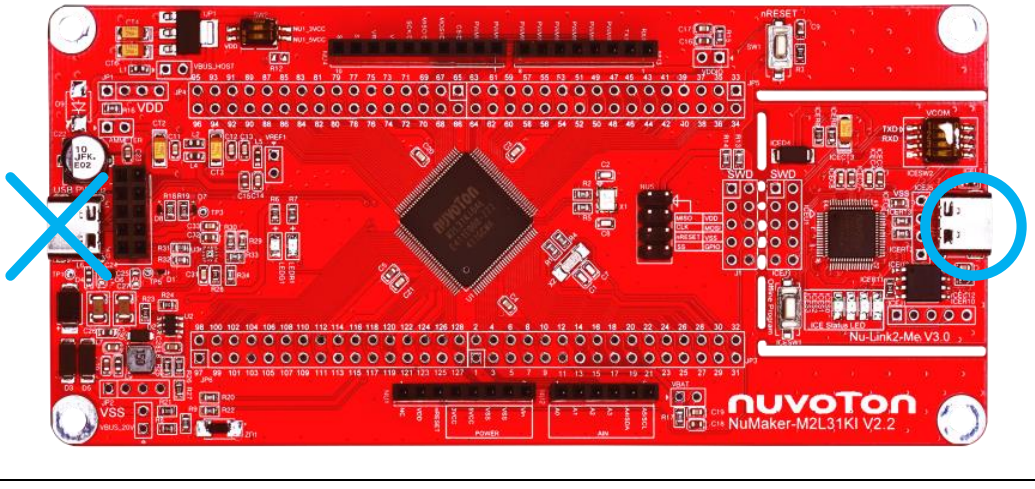


Figure 4-4 ICE USB Connector

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

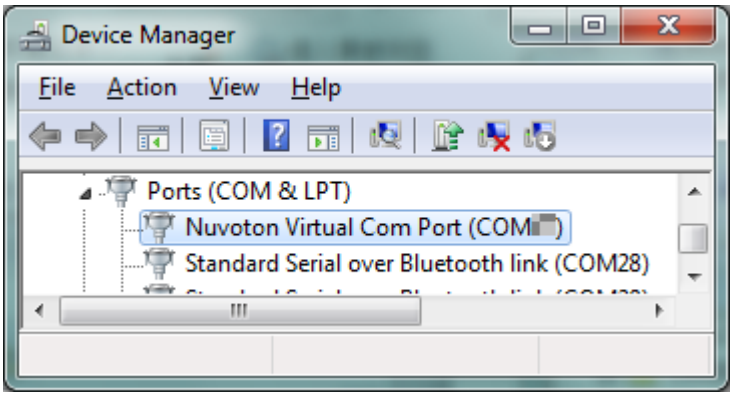


Figure 4-5 Device Manger

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.

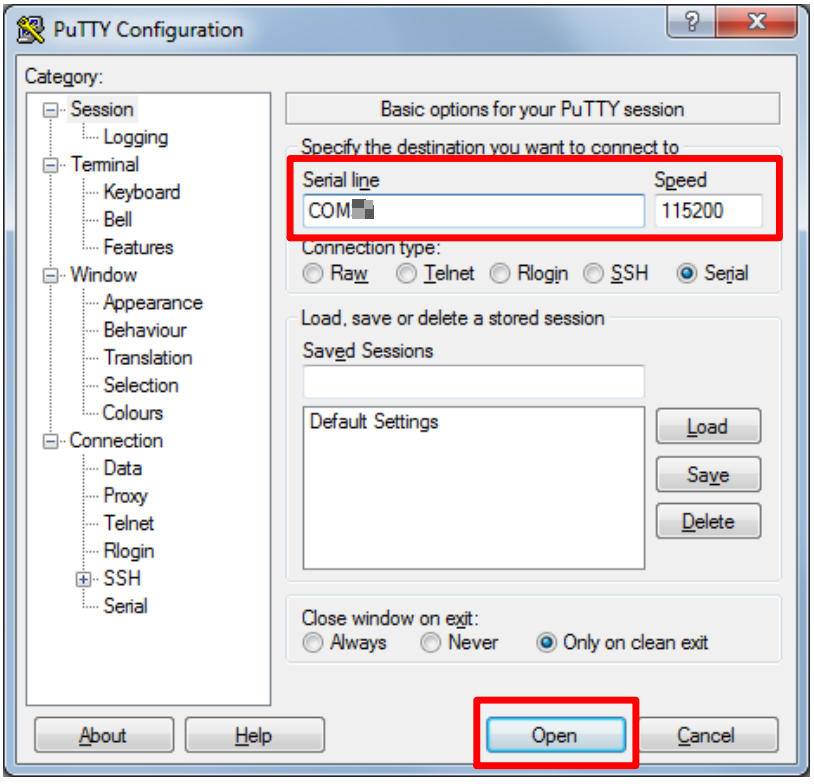


Figure 4-6 PuTTY Session Setting

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.

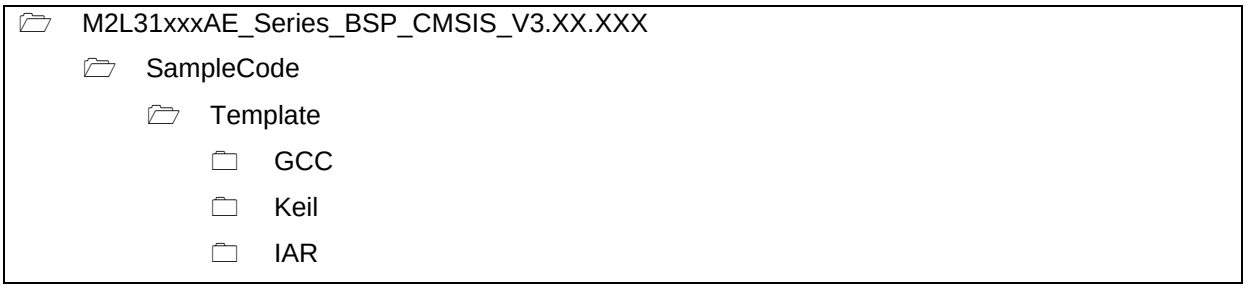


Figure 4-7 Template Project Folder Path

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.

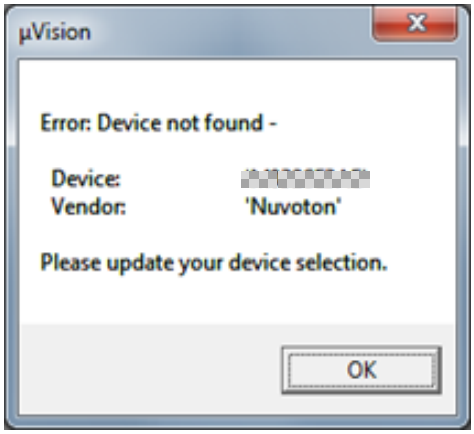


Figure 4-8 Warning Message of “Device not found”

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”.

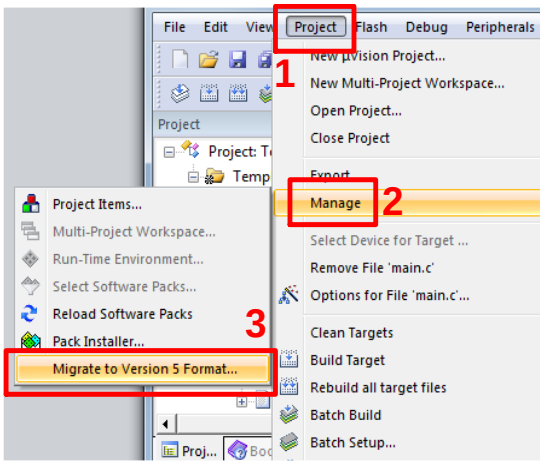


Figure 4-9 Project File Migrate to Version 5 Format

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

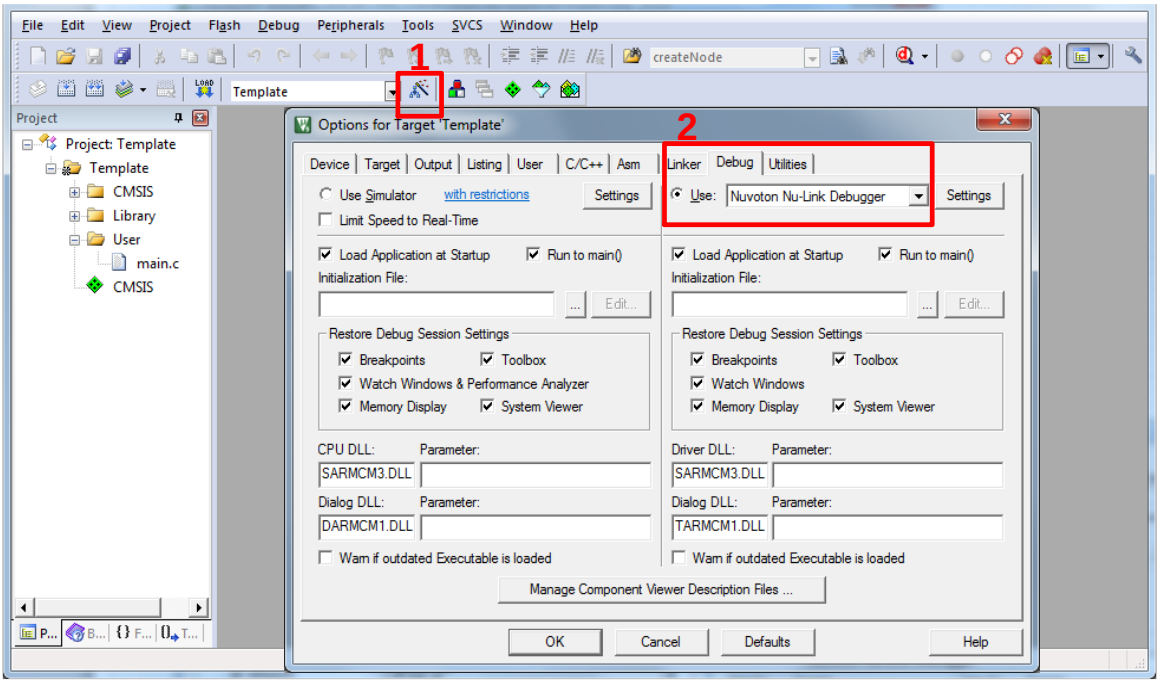


Figure 4-10 Debugger Setting in Options Window

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

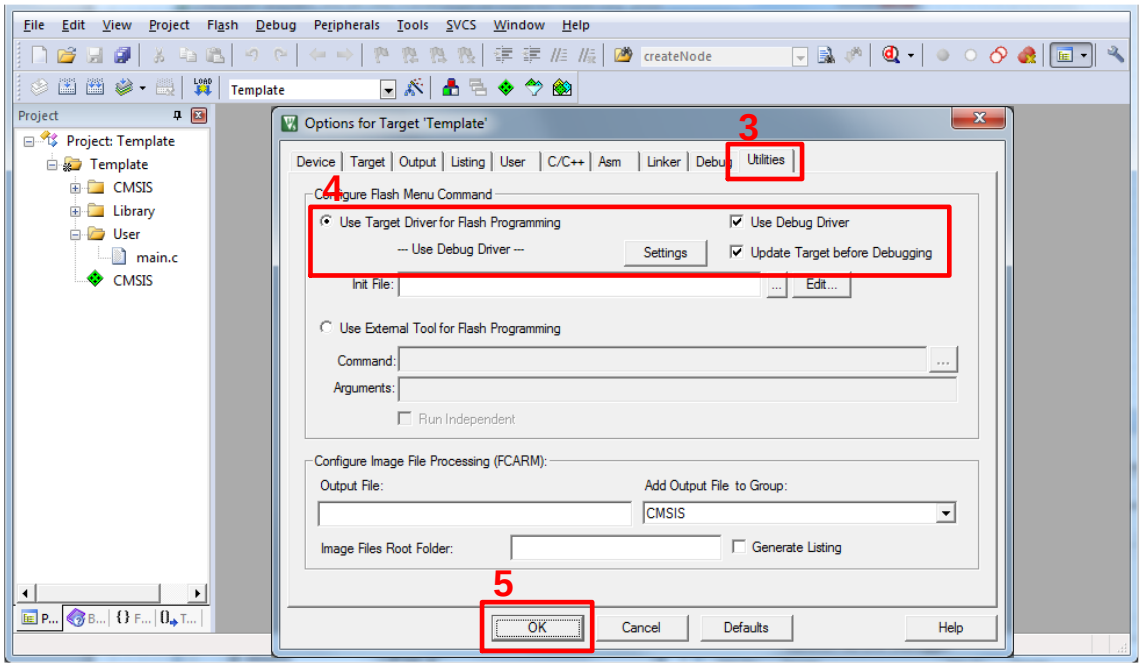


Figure 4-11 Programming Setting in Options Window

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.

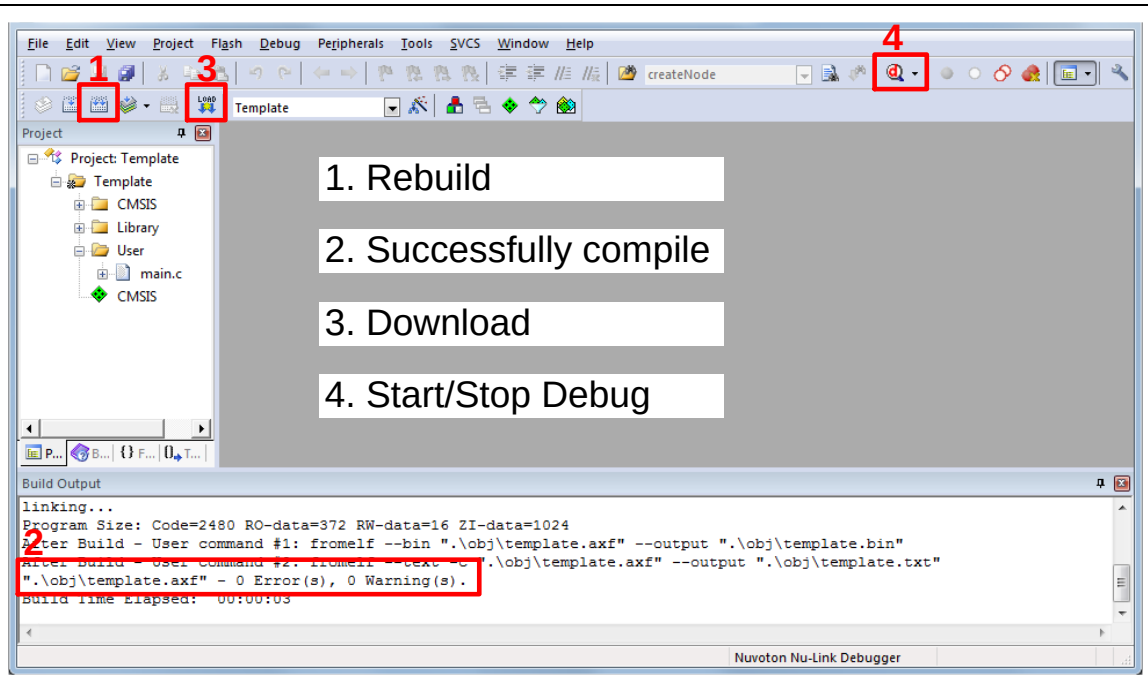


Figure 4-12 Compile and Download the Project

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.

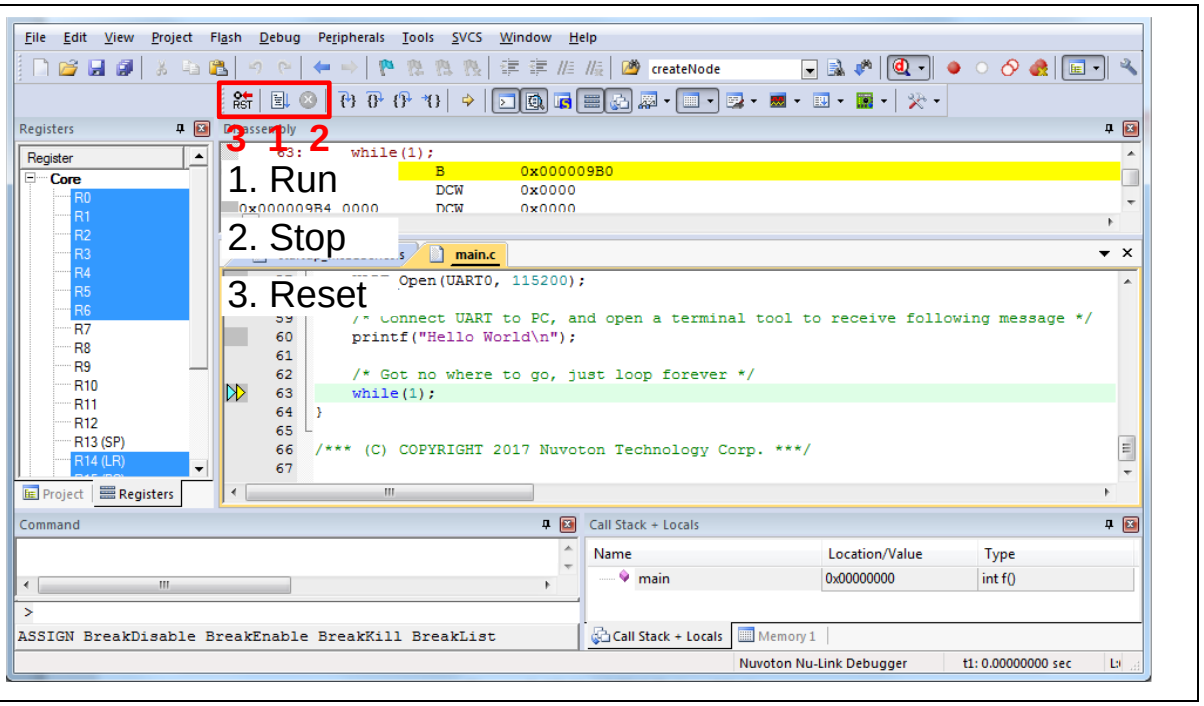


Figure 4-13 Keil MDK Debug Mode

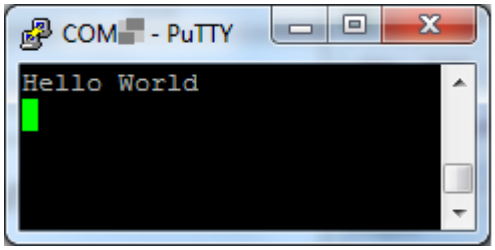


Figure 4-14 Debug Message on Serial Port Terminal Windows

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.

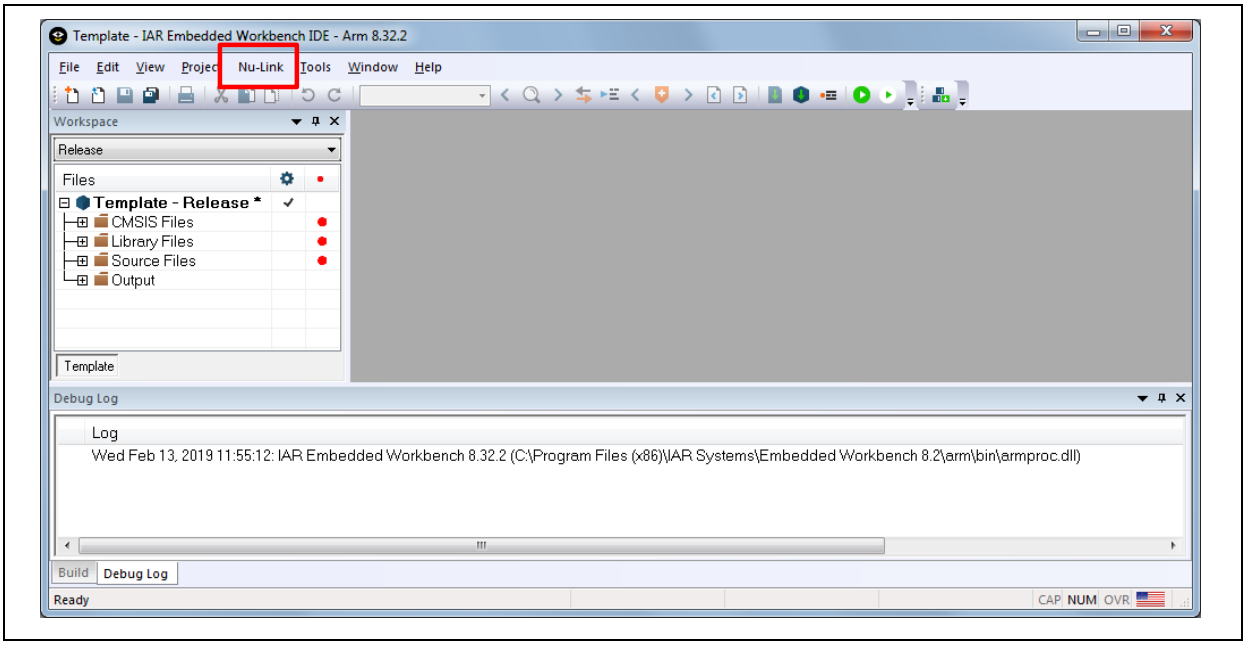


Figure 4-15 IAR EWARM Window

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.

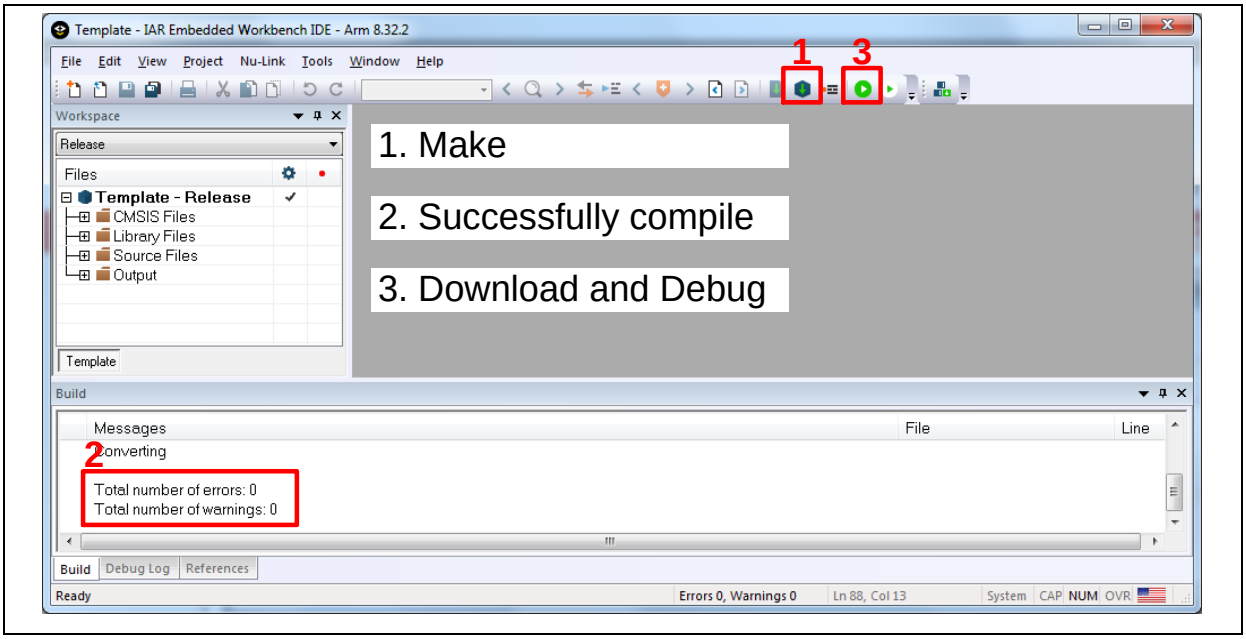


Figure 4-16 Compile and Download the Project

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.

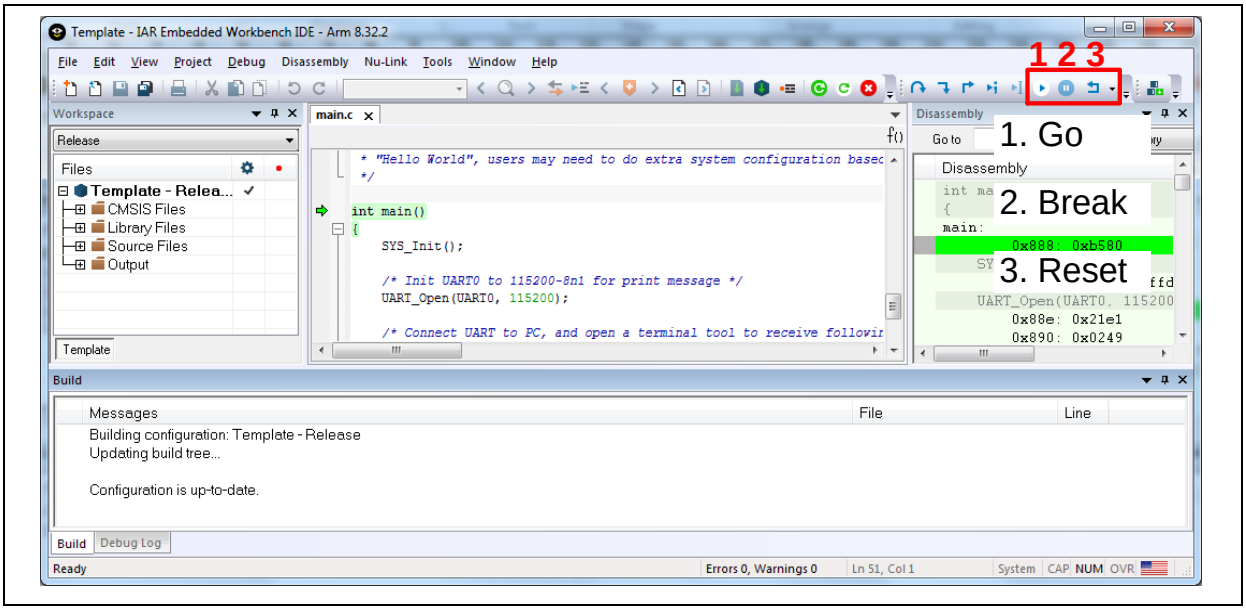


Figure 4-17 IAR EWARM Debug Mode

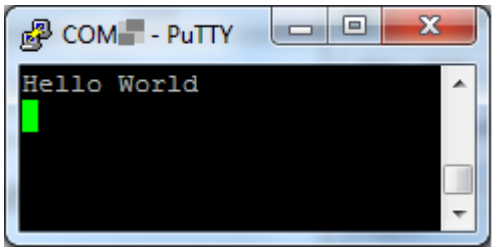


Figure 4-18 Debug Message on Serial Port Terminal Windows

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.

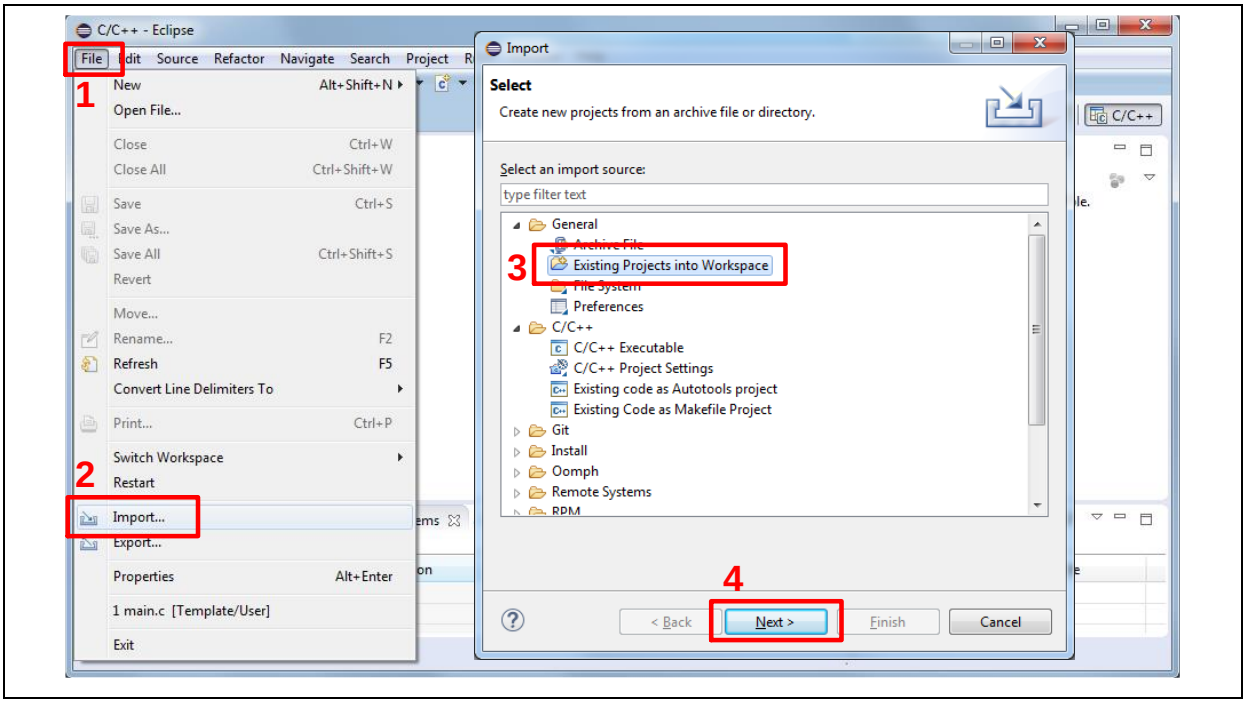


Figure 4-19 Import the Project in NuEclipse

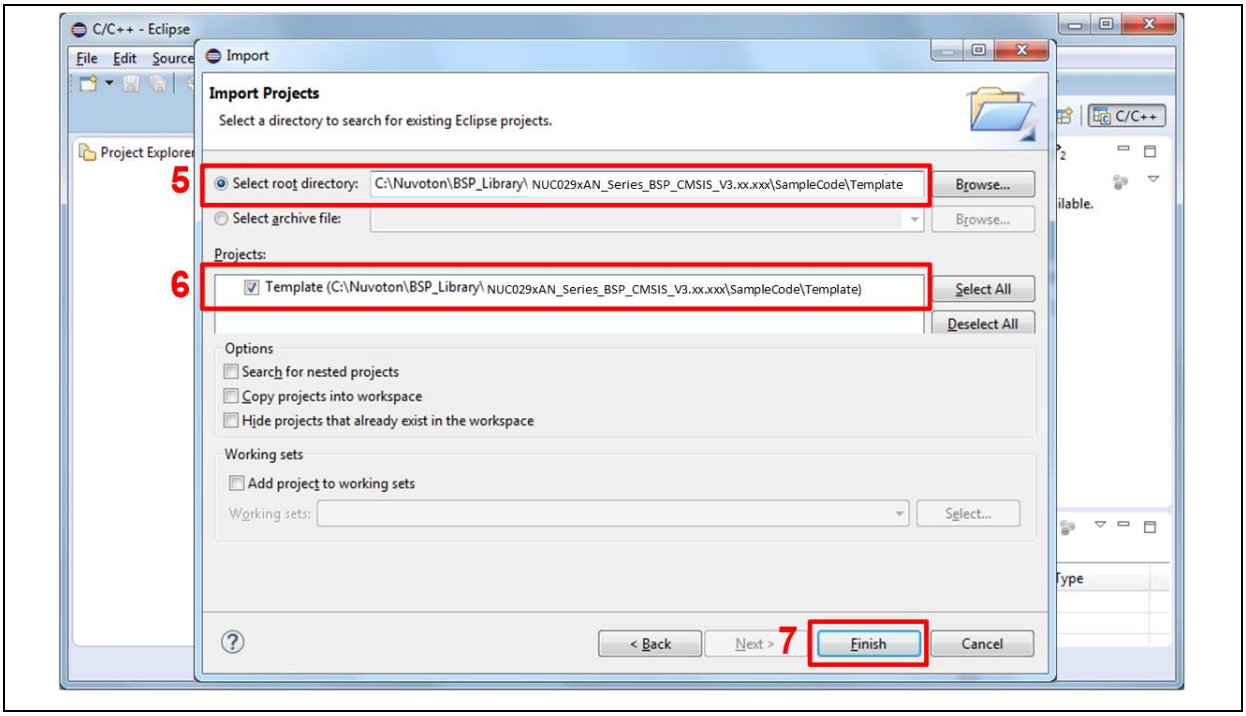


Figure 4-20 Import Projects Windows

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.

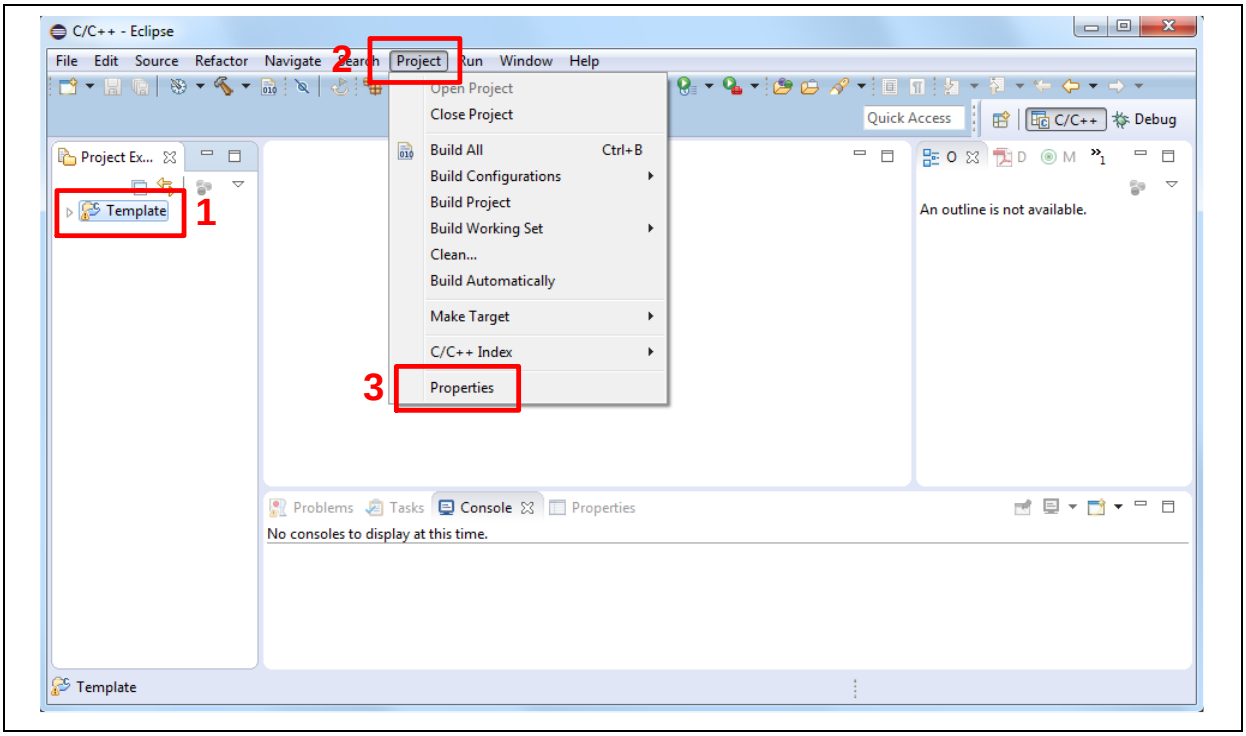


Figure 4-21 Open Project Properties Window

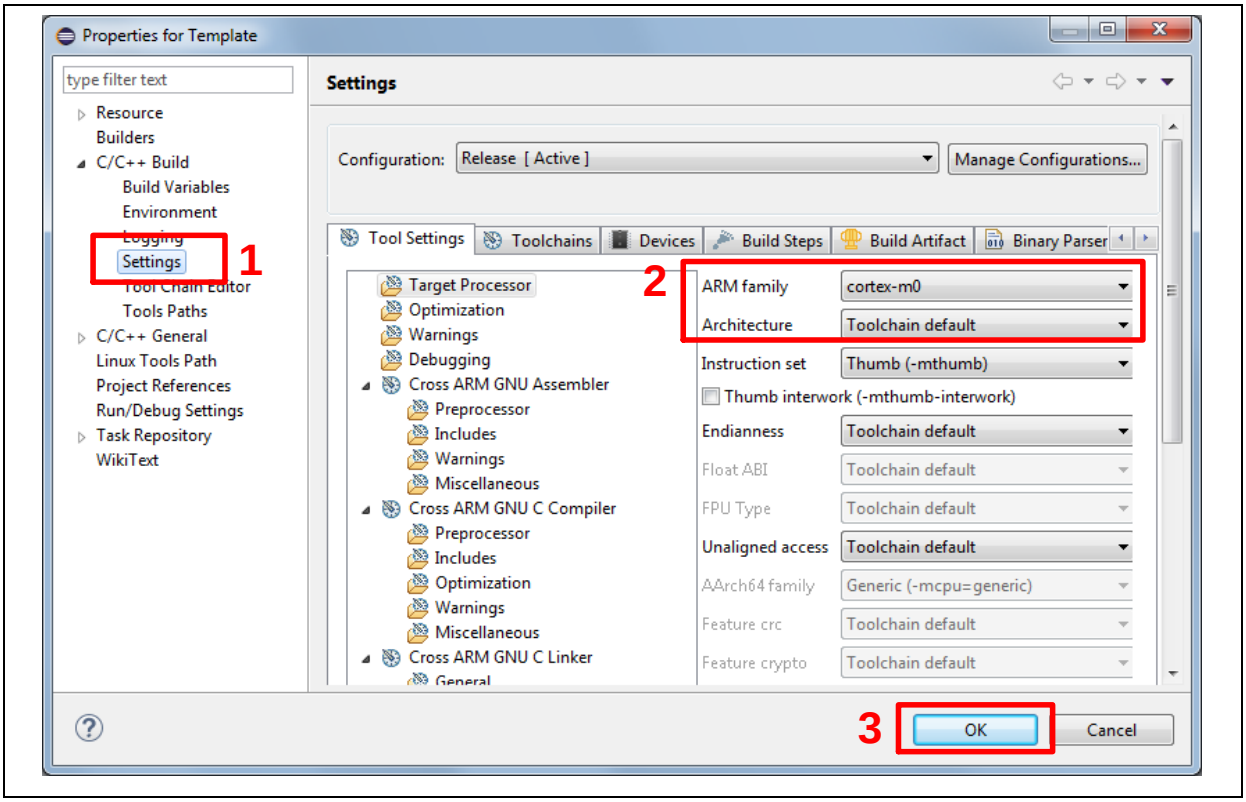


Figure 4-22 Project Properties Settings

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

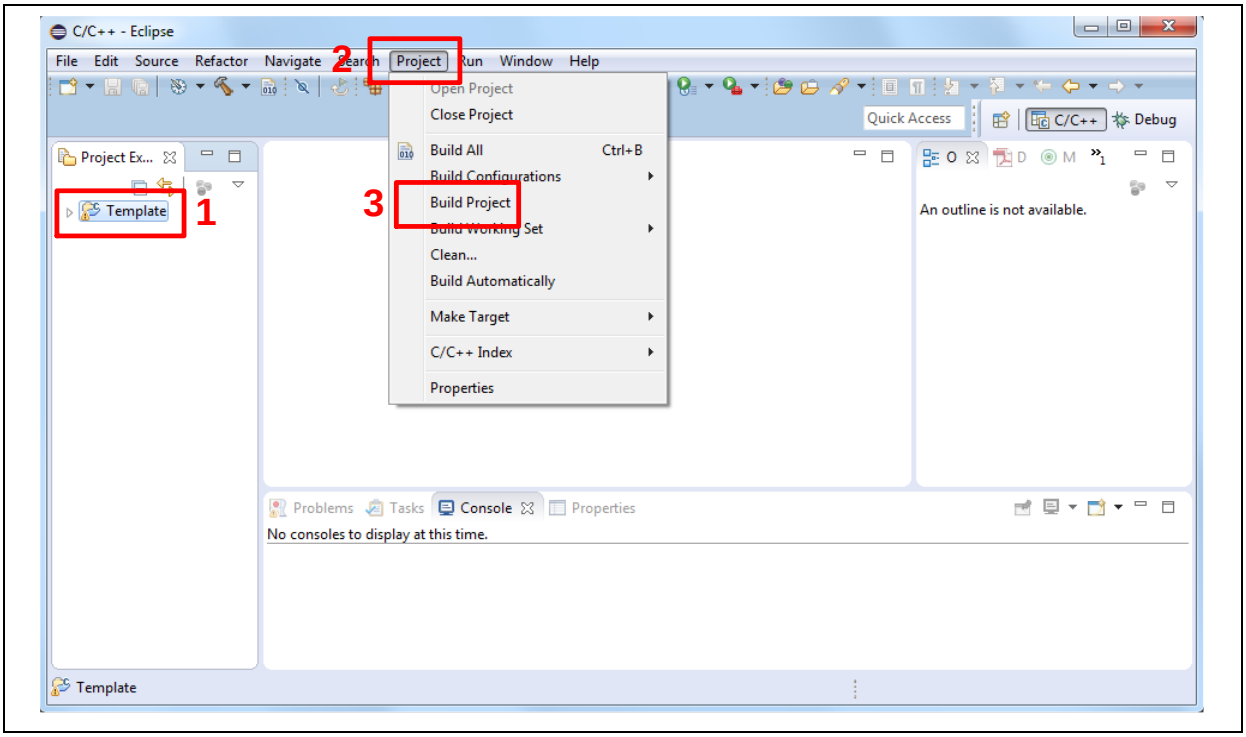


Figure 4-23 Build Project

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.

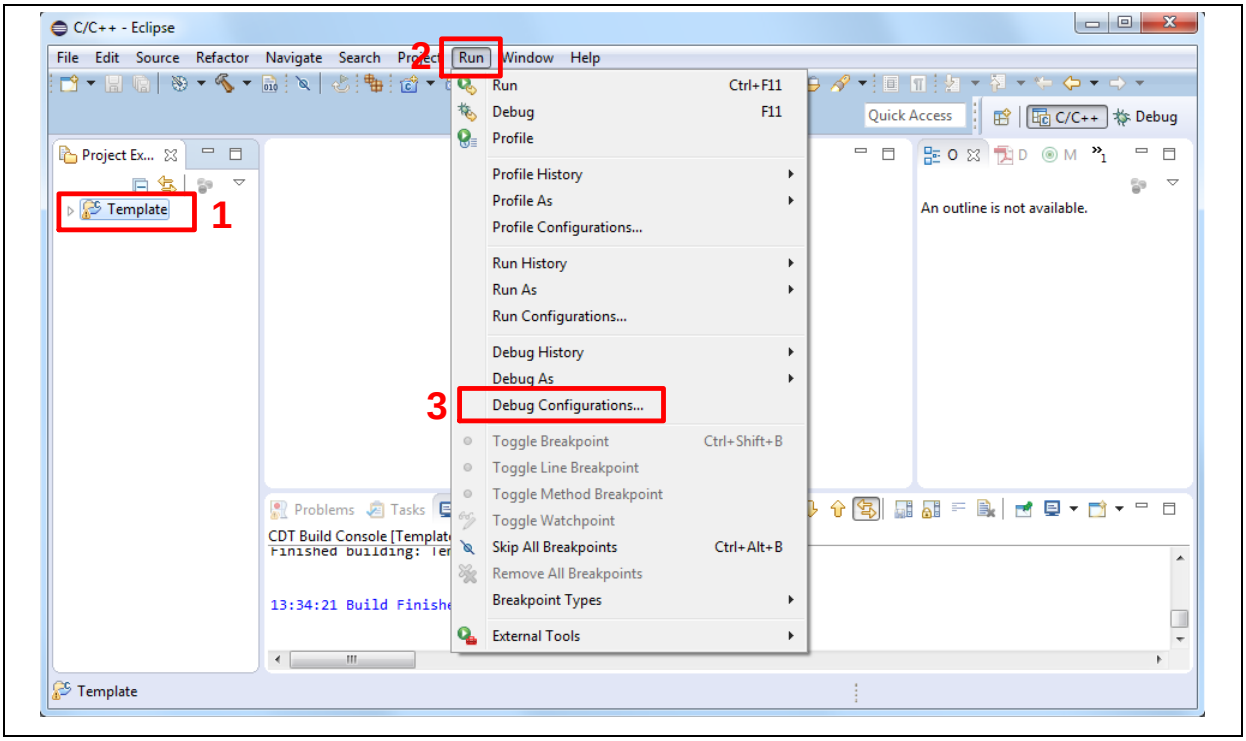
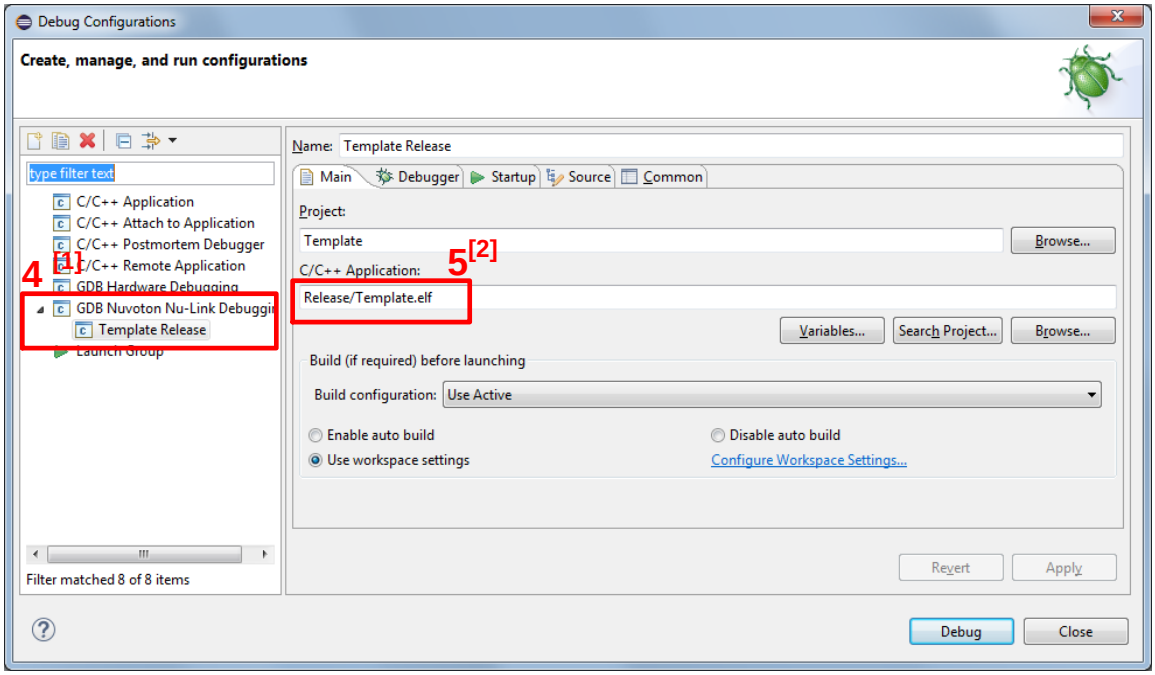


Figure 4-24 Open Debug Configuration



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

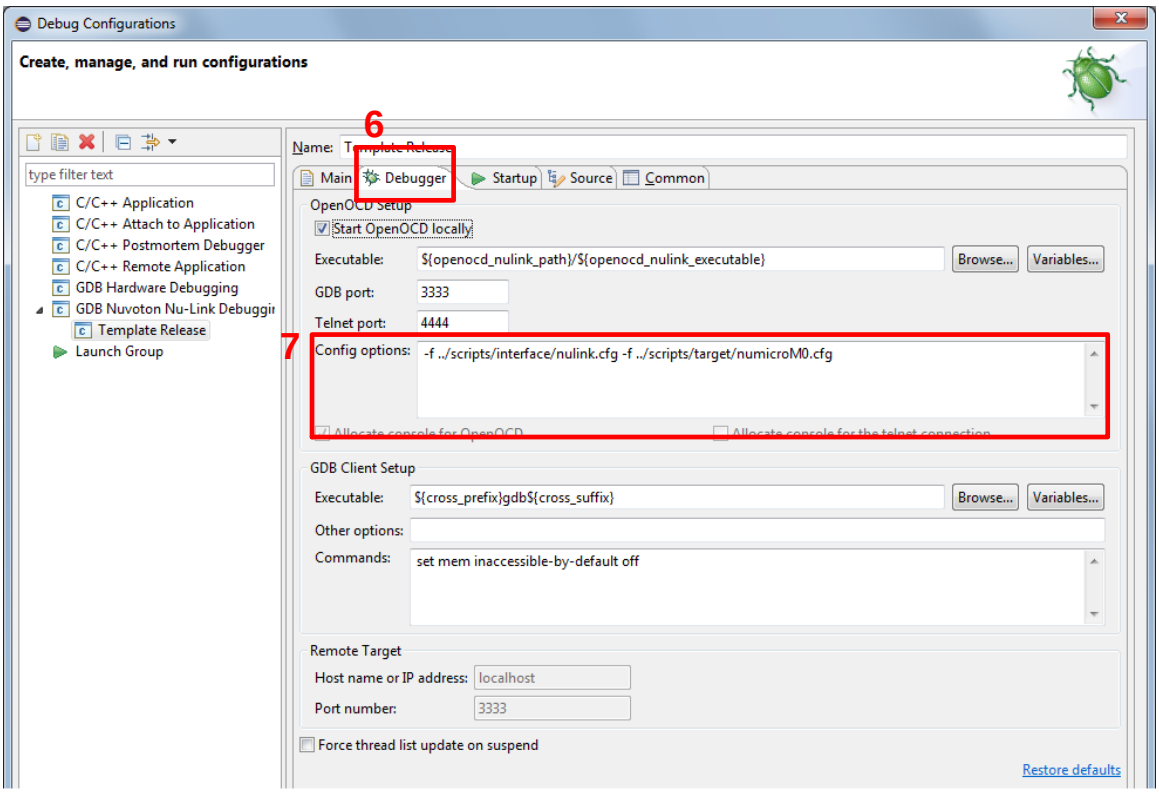
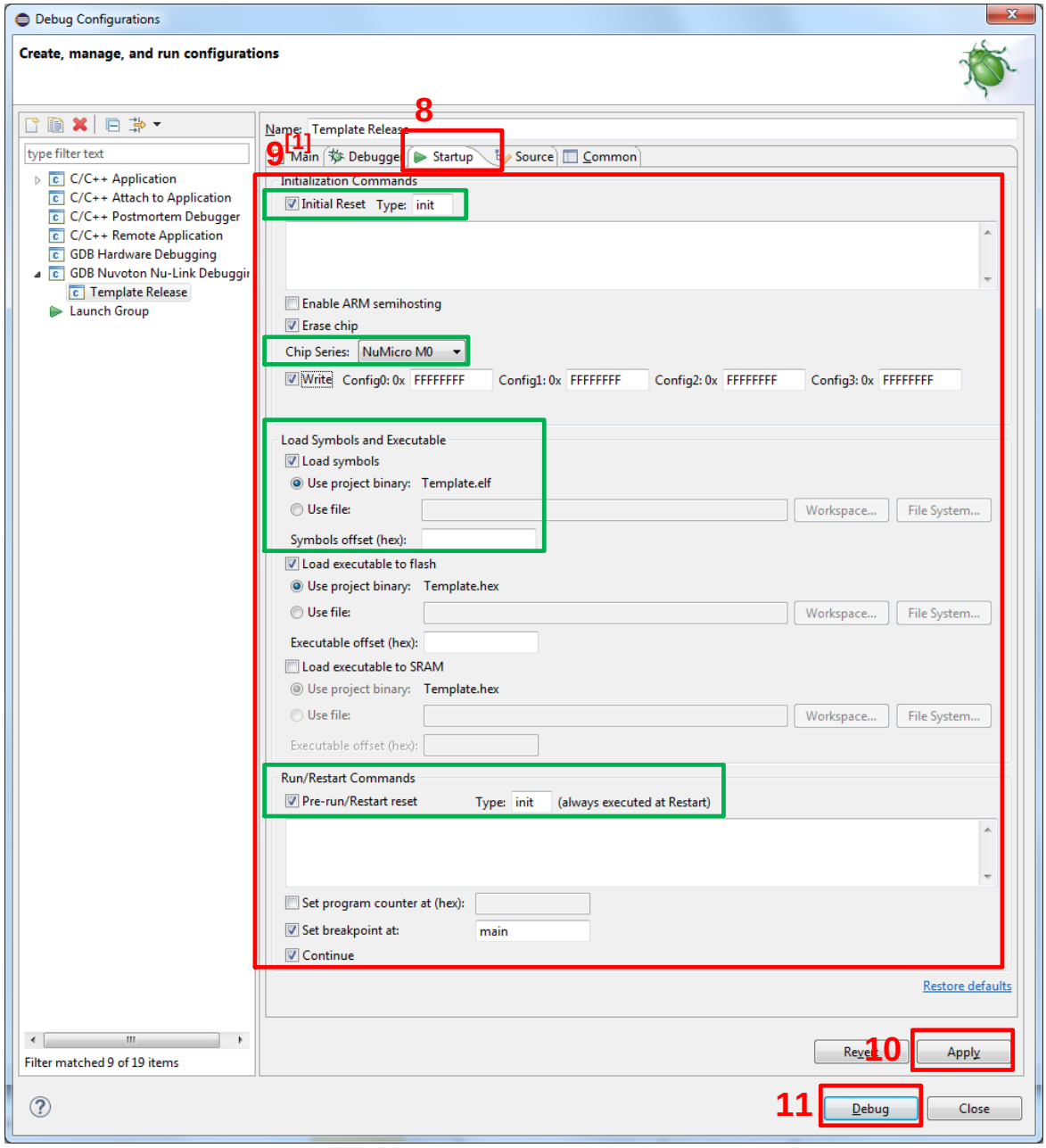


Figure 4-26 Debugger Tab Configuration



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*.

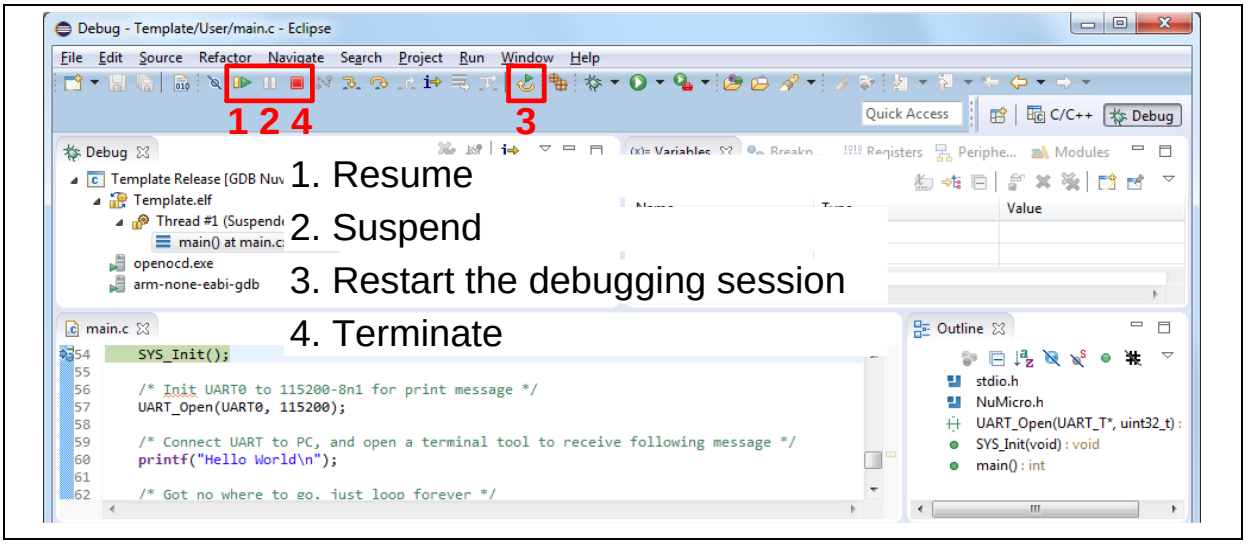


Figure 4-28 NuEclipse Debug Mode

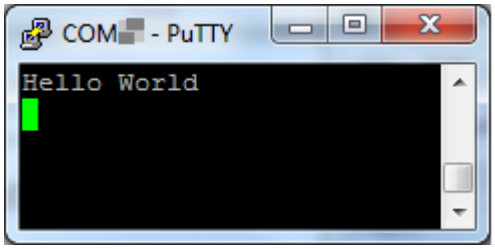


Figure 4-29 Debug Message on Serial Port Terminal Windows

5 NUMAKER-M2L31KI SCHEMATICS

5.1 Nu-Link2-Me

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

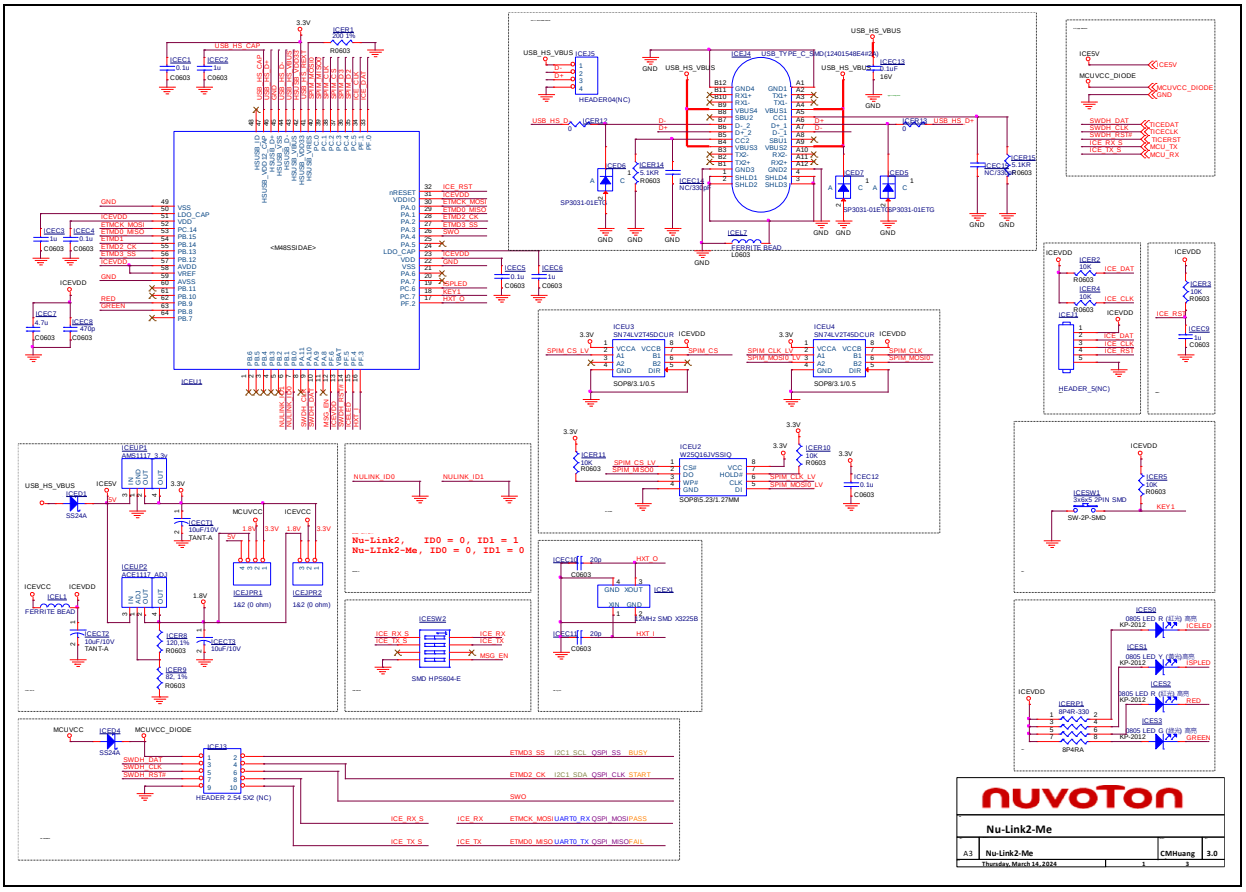


Figure 5-1 Nu-Link2-Me Circuit

5.2 M2L31 Target Board

Figure 5-2 shows the M2L31 target board circuit.

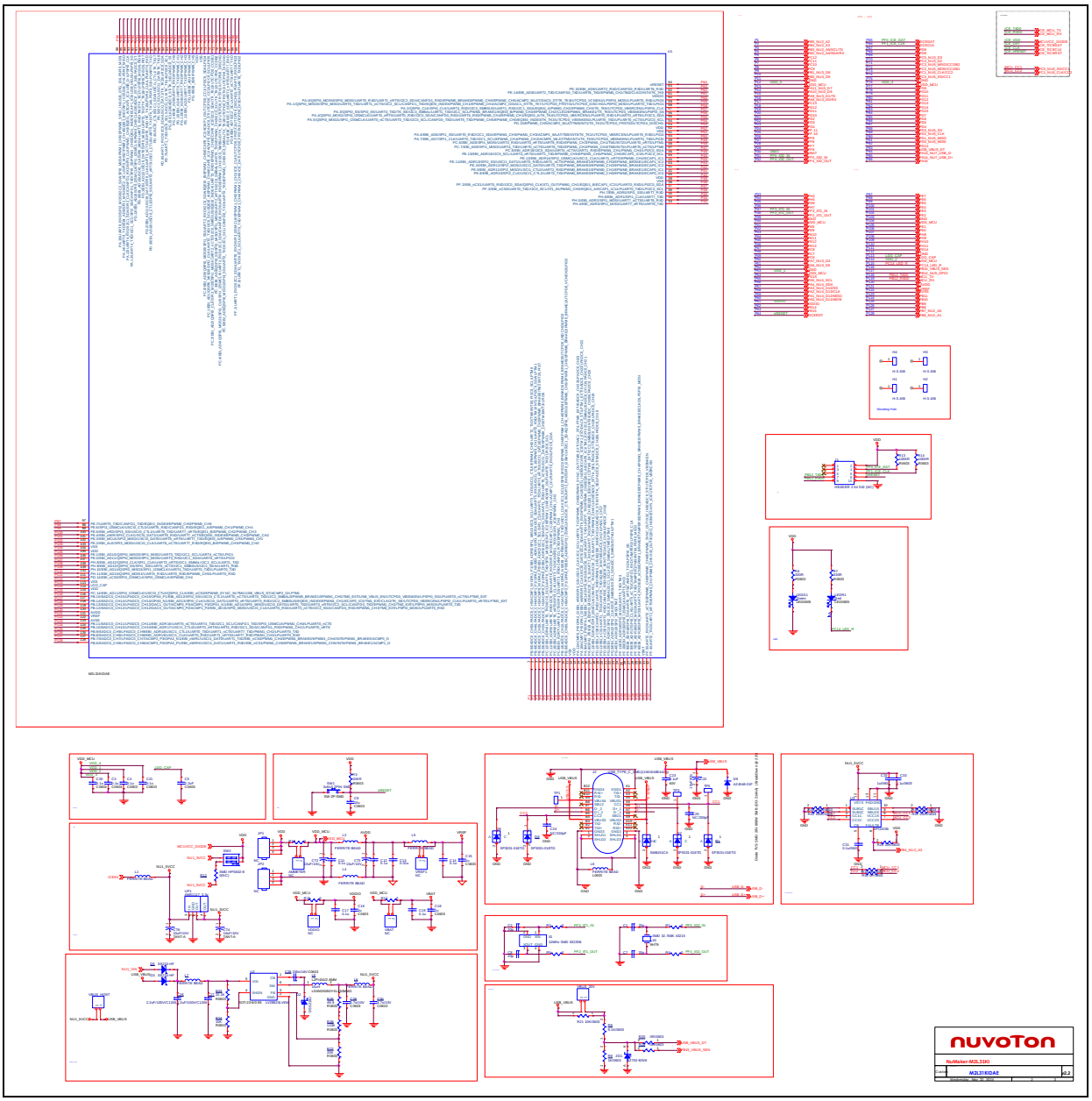


Figure 5-2 M2L31 Target Board Circuit

5.3 Extension Connectors

Figure 5-3 shows extension connectors of NuMaker-M2L31KI.

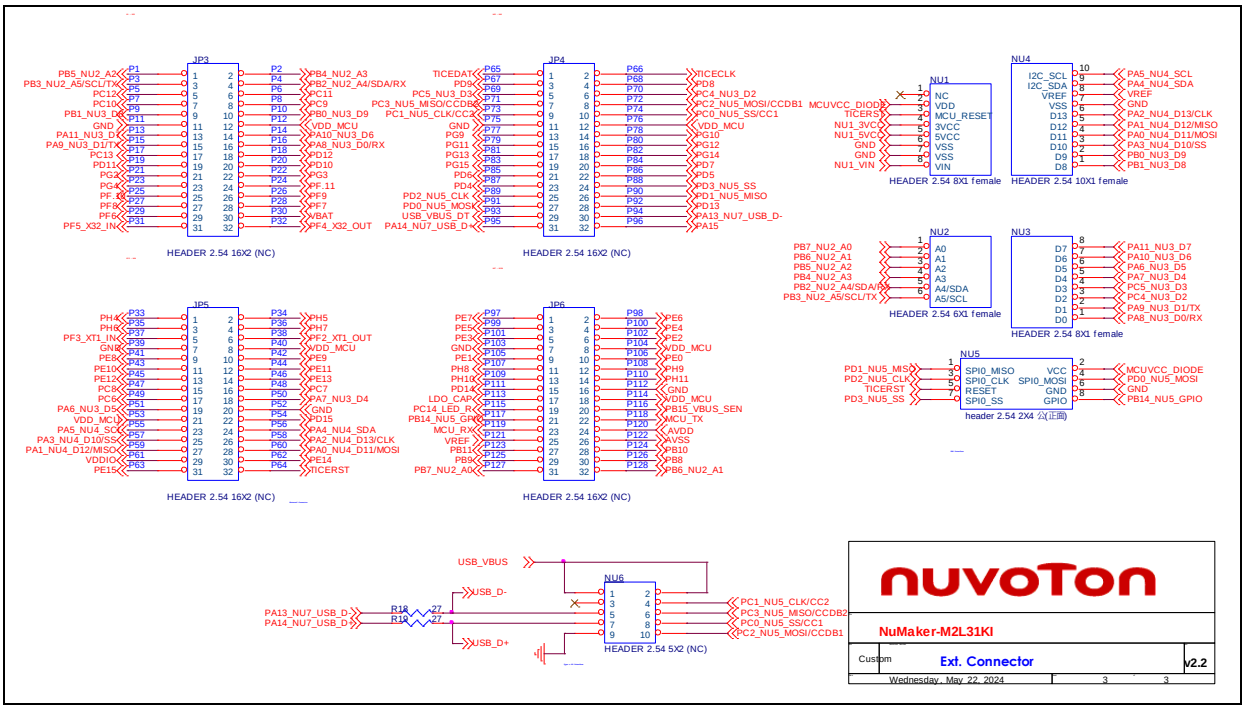


Figure 5-3 Extension Connectors Circuit

5.4 PCB Placement

Figure 5-4 and Figure 5-5 show the front and rear placement of NuMaker-M2L31KI.

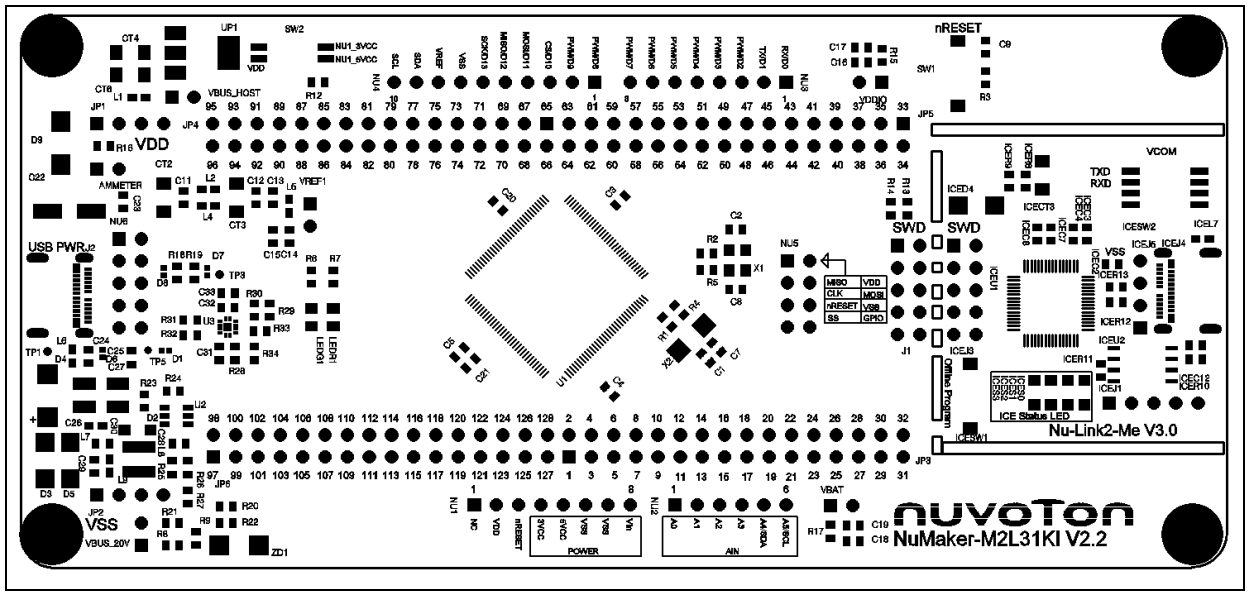


Figure 5-4 Front Placement

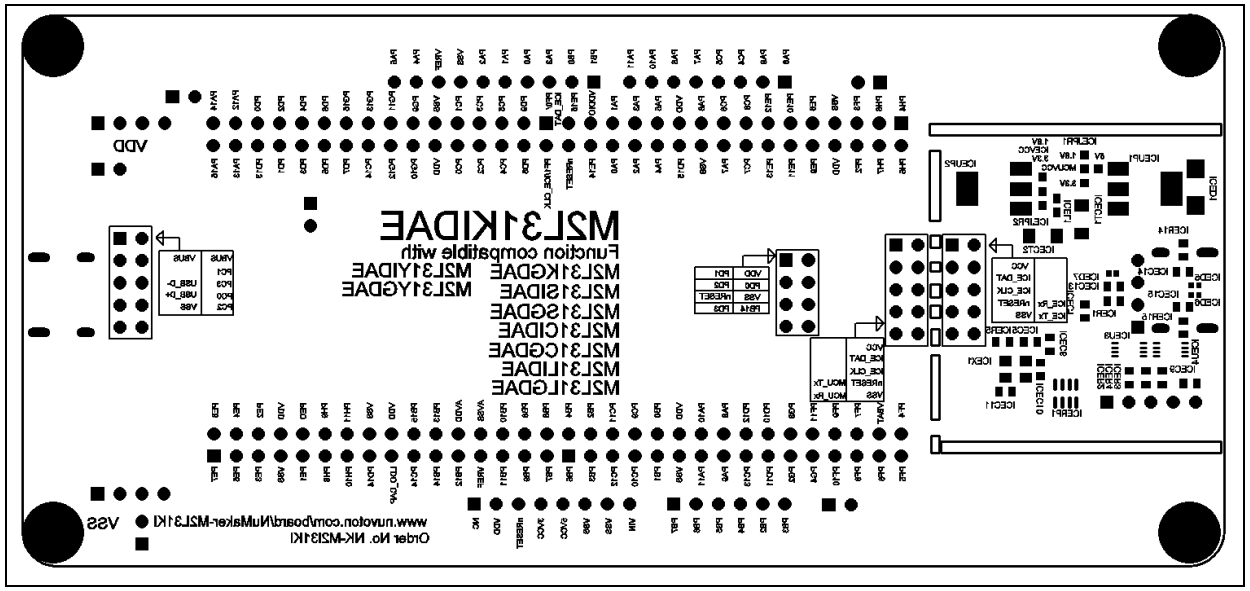


Figure 5-5 Rear Placement

6 REVISION HISTORY

Date	Revision	Description
2024.06.20	1.00	Initial version.

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.