NuMicro® Family

Arm® Cortex®-M55-based Microcontroller

NuMaker-M5531

User Manual

Evaluation Board for NuMicro® M5531 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 7

2 FEATURES 8

3 HARDWARE CONFIGURATION 9

3.1 Front View 9

3.2 Rear View 10

3.3 Extension Connectors 11

3.3.1 Pin Assignment for Extension Connectors 11

3.3.2 Arduino UNO Compatible Extension Connectors 19

3.4 Power Supply Configuration 21

3.4.1 VIN Power Source 21

3.4.2 5V Power Sources 21

3.4.3 3.3V Power Sources 22

3.4.4 1.8V Power Sources 22

3.4.5 Power Connectors 22

3.4.6 USB Connectors 23

3.4.7 Power Switches 23

3.4.8 Power Supply Models 23

3.5 External Reference Voltage Connector 26

3.6 Ammeter Connector 26

3.7 Push Buttons 27

3.8 LEDs 27

3.9 Nu-Link2-Me 27

3.9.1 VCOM Switches 27

3.9.2 Status LEDs 28

4 QUICK START 29

4.1 Toolchains Supporting 29

4.2 Nuvoton Nu-Link Driver Installation 29

4.3 BSP Firmware Download 31

4.4 Hardware Setup 31

4.5 Find the Example Project 33

4.6 Execute the Project under Toolchains 33

4.6.1 Keil MDK 33

4.6.2 IAR EWARM 37

4.6.3 NuEclipse 39

5 NUMAKER-M5531 SCHEMATICS 45

5.1 Nu-Link2-Me 45

5.2 Power Source 46
5.3 M5531 Target Board 47
5.4 Extension Connectors 48
5.5 Arduino UNO I/F 49
5.6 Full-speed USB 50
5.7 High-speed USB 51
5.8 LEDs & Buttons 52
5.9 PCB Placement 53
6 REVISION HISTORY 54

List of Figures

Figure 1-1 NuMaker-M5531 Evaluation Board 7
Figure 3-1 Front View of NuMaker-M5531 9
Figure 3-2 Rear View of NuMaker-M5531 10
Figure 3-3 M5531H2LJAE Extension Connectors 11
Figure 3-4 Arduino UNO Compatible Extension Connectors 19
Figure 3-5 External Power Supply Sources on Nu-Link2-Me 23
Figure 3-6 External Power Supply Sources on M5531 Target Board 24
Figure 3-7 Detach the Nu-Link2-Me from NuMaker-M5531 25
Figure 3-8 Wiring between Ammeter Connector and Ammeter 26
Figure 3-9 Project Path of SYS_PowerDown_MinCurrent 26
Figure 4-1 Nu-Link USB Driver Installation Setup 29
Figure 4-2 Nu-Link USB Driver Installation 30
Figure 4-3 Open VCOM Function 31
Figure 4-4 ICE USB Connector 31
Figure 4-5 Device Manager 32
Figure 4-6 PuTTY Session Setting 32
Figure 4-7 Template Project Folder Path 33
Figure 4-8 Warning Message of “Device not found” 33
Figure 4-9 Project File Migrate to Version 5 Format 34
Figure 4-10 Debugger Setting in Options Window 34
Figure 4-11 Programming Setting in Options Window 35
Figure 4-12 Compile and Download the Project 35
Figure 4-13 Keil MDK Debug Mode 36
Figure 4-14 Debug Message on Serial Port Terminal Windows 36
Figure 4-15 IAR EWARM Window 37
Figure 4-16 Compile and Download the Project 37
Figure 4-17 IAR EWARM Debug Mode 38
Figure 4-18 Debug Message on Serial Port Terminal Windows 38
Figure 4-19 Import the Project in NuEclipse 39
Figure 4-20 Import Projects Windows 39
Figure 4-21 Open Project Properties Window 40
Figure 4-22 Project Properties Settings 40
Figure 4-23 Build Project 41
Figure 4-24 Open Debug Configuration 41
Figure 4-25 Main Tab Configuration 42
Figure 4-26 Debugger Tab Configuration 42

Figure 4-27 Startup Tab Configuration 43
Figure 4-28 NuEclipse Debug Mode 44
Figure 4-29 Debug Message on Serial Port Terminal Windows 44
Figure 5-1 Nu-Link2-Me Circuit 45
Figure 5-2 Power Source Circuit 46
Figure 5-3 M5531 Target Board Circuit 47
Figure 5-4 Extension Connectors Circuit 48
Figure 5-5 Arduino Uno I/F Circuit 49
Figure 5-6 Full-speed USB Circuit 50
Figure 5-7 High-speed USB Circuit 51
Figure 5-8 LEDs and Buttons Circuit 52
Figure 5-9 Front Placement 53
Figure 5-10 Rear Placement 53

List of Tables

Table 3-1 Extension Connectors 11
Table 3-2 M5531H2LJAE Full-pin Extension Connectors and GPIO Function List 18
Table 3-3 Arduino UNO Extension Connectors and M5531H2LJAE Mapping GPIO List 20
Table 3-4 Vin Power Source 21
Table 3-5 5V Power Sources 21
Table 3-6 3.3V Power Sources 22
Table 3-7 1.8V Power Sources 22
Table 3-8 Power Connectors 22
Table 3-9 USB Connectors 23
Table 3-10 Power Switches 23
Table 3-11 Supply External Power through Nu-Link2-Me 24
Table 3-12 Supply External Power for M5531 Target Board 26
Table 3-13 External Reference Voltage Connector 26
Table 3-14 Ammeter Connector 26
Table 3-15 Push Buttons 27
Table 3-16 LEDs 27
Table 3-17 VCOM Function of Nu-Link2-Me 28
Table 3-18 Operation Status LED Patterns 28

1 OVERVIEW

The NuMaker-M5531 is an evaluation board for Nuvoton NuMicro M5531 microcontrollers. The NuMaker-M5531 consists of two parts: an M5531 target board and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-M5531 is designed for project evaluation, prototype development and validation with power consumption monitoring function.

The M5531 target board is based on NuMicro M5531H2LJAE. For the development flexibility, the M5531 target board provides the extension connectors, the Arduino UNO compatible headers and the capability of adopting multiple power supplies. Furthermore, the Nuvoton-designed ammeter connector can measure the power consumption instantly, which is essential for the prototype evaluation.

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

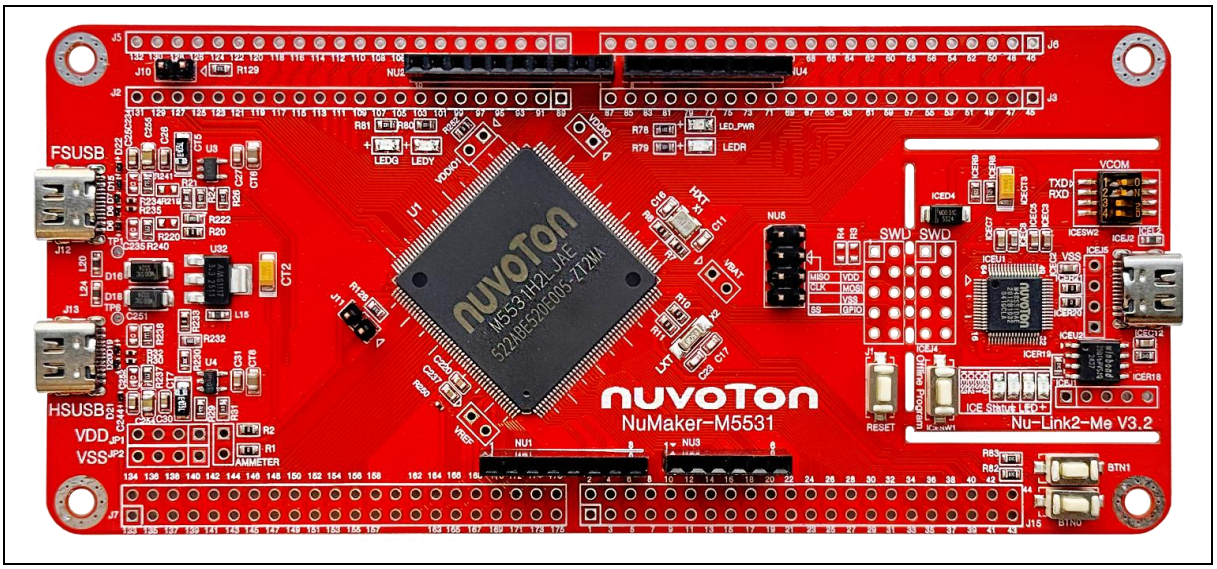


Figure 1-1 NuMaker-M5531 Evaluation Board

2 FEATURES

- NuMicro M5531H2LJAE used as main microcontroller
- M5531H2LJAE full pins extension connectors
- Arduino UNO compatible extension connectors
- Ammeter connector for measuring the microcontroller's power consumption
- Flexible board power supply:
  - External V_{DD} power connector
  - Arduino UNO compatible extension connector Vin
  - USB FS connector on M5531 target board
  - USB HS connector on M5531 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

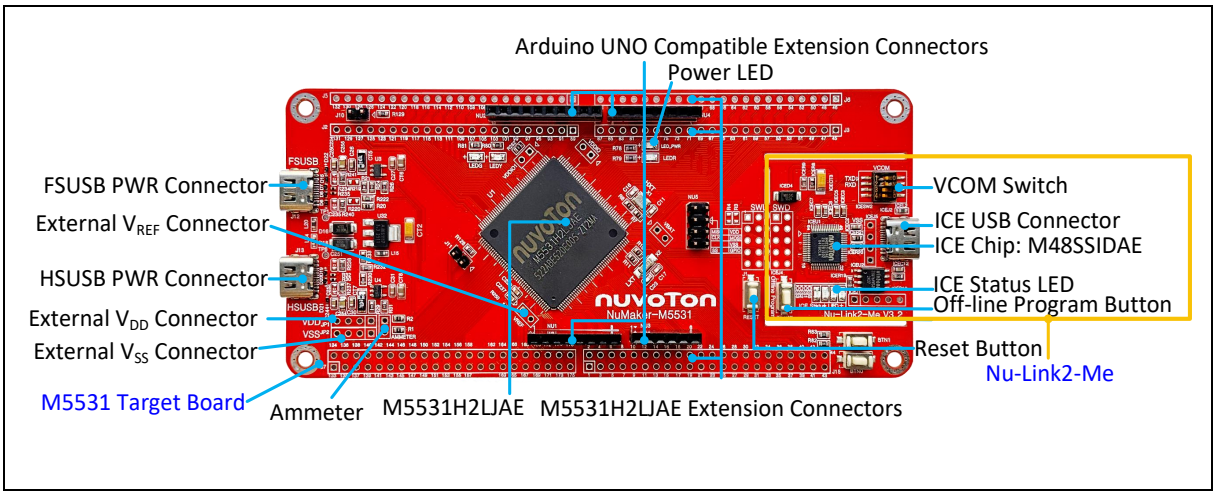


Figure 3-1 Front View of NuMaker-M5531

Figure 3-1 shows the main components and connectors from the front side of NuMaker-M5531. The following lists components and connectors from the front view:

- Target chip: M5531H2LJAE (U1)
- FSUSB PWR Connector (J12)
- HSUSB PWR Connector (J13)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
- M5531 Extension Connectors (J2, J3, J5, J6, J7 and JP15)
- External V_{DD} Power Connector (JP1)
- External V_{SS} Power Connector (JP2)
- External V_{REF} Connector (VREF)
- Ammeter Connector (AMMETER)
- Reset Button (J1)
- Power LED and PB14 LED (LEDG1 and LEDR1)
- Nu-Link2-Me
  - VCOM Switch
  - ICE Chip: M48SSIDAE (ICEU1)
  - ICE USB Connector (ICEJ2)
  - 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-M5531.

The following lists components and connectors from the rear view:

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

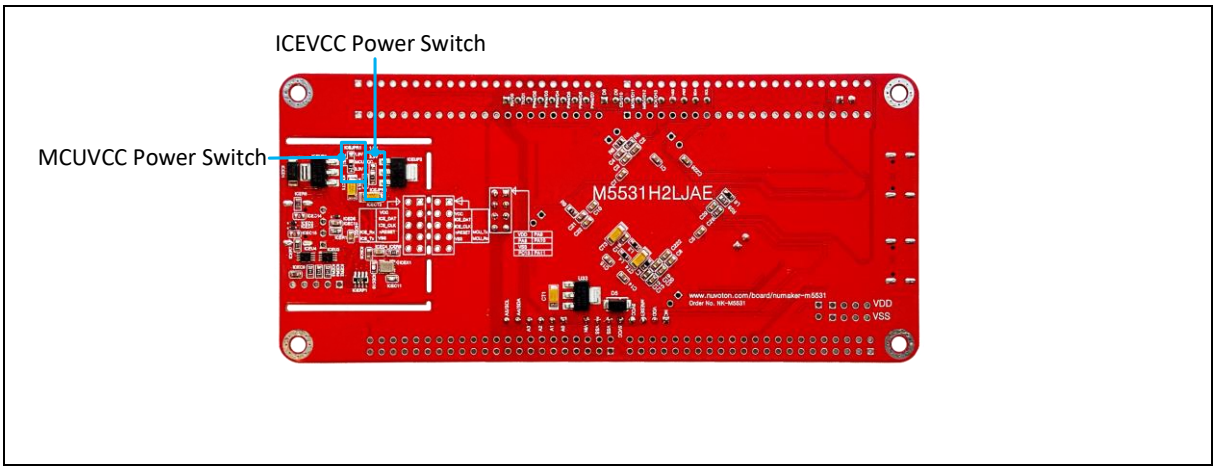


Figure 3-2 Rear View of NuMaker-M5531

3.3 Extension Connectors

Table 3-1 presents the extension connectors.

Connector	Description
J2, J3, J5, J6, J7, J15	Full pins extension connectors on the NuMaker-M5531.
NU1, NU2, NU3 and NU4	Arduino UNO compatible pins on the NuMaker-M5531.

Table 3-1 Extension Connectors

3.3.1 Pin Assignment for Extension Connectors

The NuMaker-M5531 provides the M5531H2LJAE onboard and extension connectors (J2, J3, J5, J6, J7 and J15). Figure 3-3 shows the M5531H2LJAE extension connectors.

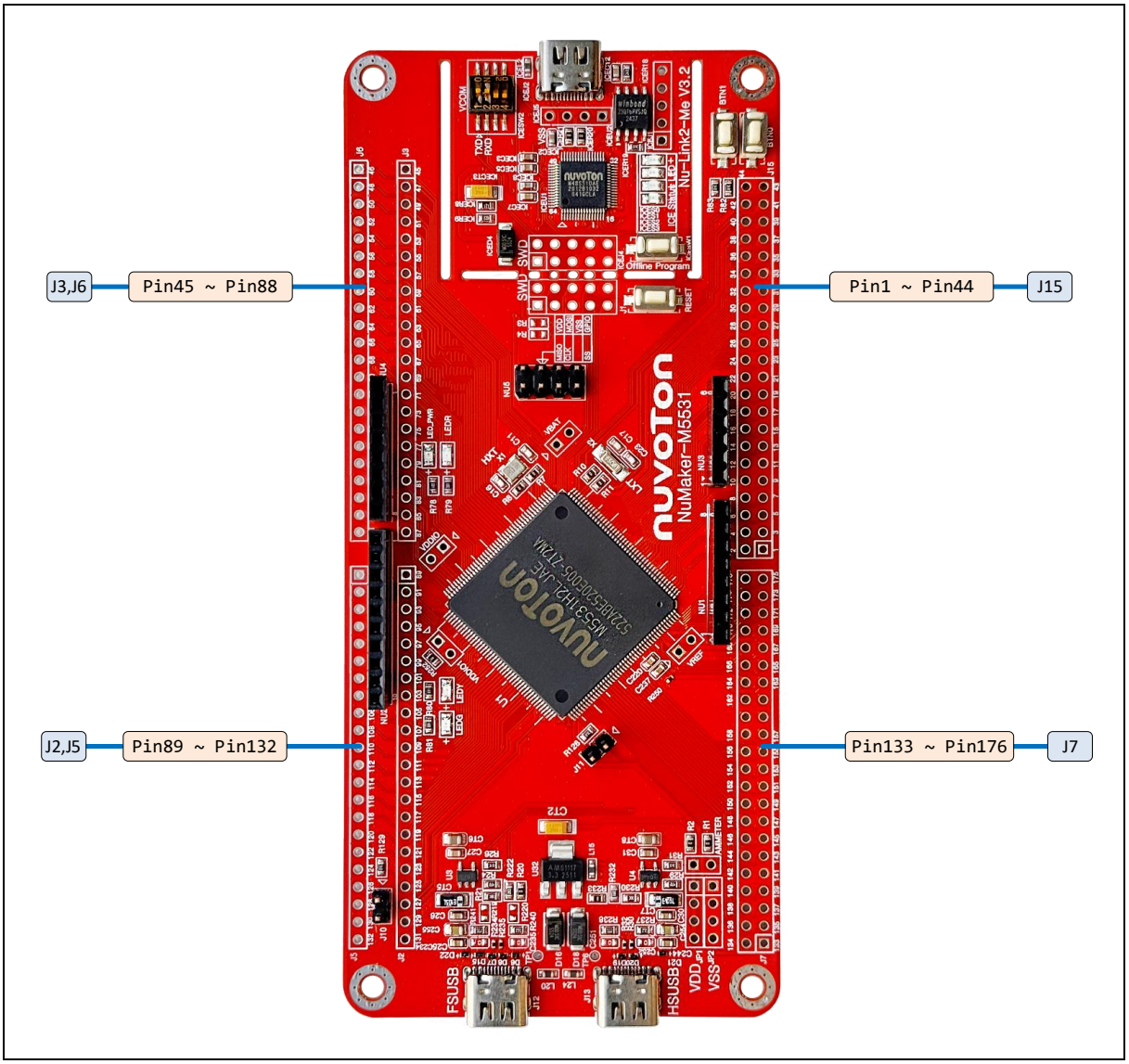


Figure 3-3 M5531H2LJAE Extension Connectors

Header		M5531	
		Pin No.	Function
J15	J15.1	1	PB.5/EADC0_CH5/LPADC0_CH5/ACMP1_N/EBI_ADR0/SD0_DAT3/EMAC0_RMII_REFCLK/SPI1_MISO/I2C0_SCL/UART5_TXD/SC0_CLK/I2S0_BCLK/EPWM0_CH0/UART2_TXD/TM0/INT0/DMIC0_DAT/PSIO0_CH4/KPI_COL6/LPI2C0_SCL/LPTM0
	J15.2	2	PB.4/EADC0_CH4/LPADC0_CH4/ACMP1_P1/EBI_ADR1/SD0_DAT2/EMAC0_RMII_RXD0/SPI1_MOSI/I2C0_SDA/UART5_RXD/SC0_DAT/I2S0_MCLK/EPWM0_CH1/UART2_RXD/TM1/INT1/DMIC0_CLK/PSIO0_CH5/KPI_COL7/LPI2C0_SDA/LPTM1
	J15.3	3	PB.3/EADC0_CH3/LPADC0_CH3/ACMP0_N/EBI_ADR2/SD0_DAT1/EMAC0_RMII_RXD1/SPI1_CLK/UART1_TXD/UART5_nRTS/SC0_RST/I2S0_DI/EPWM0_CH2/I2C1_SCL/TM2/INT2/DMIC1_DAT/PSIO0_CH6/KPI_ROW0/LPIO7
	J15.4	4	PB.2/EADC0_CH2/LPADC0_CH2/ACMP0_P1/EBI_ADR3/SD0_DAT0/EMAC0_RMII_CRSDV/SPI1_SS/UART1_RXD/UART5_nCTS/SC0_PWR/I2S0_DO/EPWM0_CH3/I2C1_SDA/TM3/INT3/DMIC1_CLK/PSIO0_CH7/KPI_ROW1/LPIO6
	J15.5	5	PC.12/EBI_ADR4/UART0_TXD/I2C0_SCL/UART6_TXD/SPI3_MISO/SC0_nCD/ECAP1_IC2/EPWM1_CH0/ACMP0_O/LPUART0_TXD/LPI2C0_SCL
	J15.6	6	PC.11/ACMP3_P3/EBI_ADR5/UART0_RXD/I2C0_SDA/UART6_RXD/SPI3_MOSI/ECAP1_IC1/EPWM1_CH1/ACMP1_O/LPUART0_RXD/LPI2C0_SDA
	J15.7	7	PC.10/ACMP3_P2/EBI_ADR6/UART6_nRTS/SPI3_CLK/UART3_TXD/CANFD1_TXD/ECAP1_IC0/EPWM1_CH2
	J15.8	8	PC.9/ACMP3_P1/EBI_ADR7/UART6_nCTS/SPI3_SS/UART3_RXD/CANFD1_RXD/EPWM1_CH3/I3C0_PUPEN
	J15.9	9	PB.1/EADC0_CH1/LPADC0_CH1/ACMP3_P0/EBI_ADR8/SD0_CLK/EMAC0_RMII_RXERR/SPI1_I2SMCLK/SPI3_I2SMCLK/UART2_TXD/I2C1_SCL/I2S0_LRCK/EPWM0_CH4/EPWM1_CH4/EPWM0_BRAKE0/ACMP2_O/QSPI0_MISO1/I3C0_SCL/UTCPD0_VBDCHG/KPI_ROW2/LPIO3
	J15.10	10	PB.0/EADC0_CH0/LPADC0_CH0/ACMP3_N/EBI_ADR9/SD0_CMD/SPI2_I2SMCLK/USCI0_CTL0/UART2_RXD/SPI0_I2SMCLK/I2C1_SDA/I2S1_LRCK/EPWM0_CH5/EPWM1_CH5/EPWM0_BRAKE1/ACMP3_O/QSPI0_MOSI1/I3C0_SDA/UTCPD0_VCNEN2/KPI_ROW3/LPIO2
	J15.11	11	V_{SS}
	J15.12	12	V_{DD}
	J15.13	13	PA.11/EADC0_CH23/LPADC0_CH23/ACMP0_P0/EBI_nRD/SC2_PWR/SPI2_SS/SD1_DAT3/USCI0_CLK/I2C2_SCL/UART6_TXD/BPWM0_CH0/EPWM0_SYNC_OUT/EPWM0_BRAKE1/I2S1_BCLK/TM0_EXT/DAC1_ST/KPI_ROW4/LPTM0_EXT
	J15.14	14	PA.10/EADC0_CH22/LPADC0_CH22/ACMP1_P0/EBI_nWR/SC2_RST/SPI2_CLK/SD1_DAT2/USCI0_DAT0/I2C2_SDA/UART6_RXD/BPWM0_CH1/EQEI1_INDEX/ECAP0_IC0/I2S1_MCLK/TM1_EXT/DAC0_ST/SWDH_CLK/KPI_ROW5/LPTM1_EXT
	J15.15	15	PA.9/EADC0_CH21/LPADC0_CH21/EBI_MCLK/SC2_DAT/SPI2_MISO/SD1_DAT1/USCI0_DAT1/UART1_TXD/UART7_TXD/BPWM0_CH2/EQEI1_A/ECAP0_IC1/I2S1_DI/TM2_EXT/SWDH_DAT
	J15.16	16	PA.8/EADC0_CH20/LPADC0_CH20/EBI_ALE/SC2_CLK/SPI2_MOSI/SD1_DAT0/USCI0_CTL1/UART1_RXD/UART7_RXD/BPWM0_CH3/EQEI1_B/ECAP0_IC2/I2S1_DO/TM3_EXT/INT4
	J15.17	17	PC.13/EADC0_CH19/LPADC0_CH19/EBI_ADR10/SC2_nCD/SPI2_I2SMCLK/CANFD1_TXD/USCI0_CTL0/UART2_TXD/UART8_nCTS/BPWM0_CH4/CLKO/EADC0_ST/LPADC0_ST
	J15.18	18	PD.12/EADC0_CH18/LPADC0_CH18/EBI_nCS0/CANFD1_RXD/UART2_RXD/UART8_nRTS/BPWM0_CH5/EQEI0_INDEX/ECAP3_IC0/CLKO/EADC0_ST/INT5/LPADC0_ST
	J15.19	19	PD.11/EADC0_CH17/LPADC0_CH17/EBI_nCS1/UART1_TXD/CANFD0_TXD/UART8_TXD/EQEI0_A/ECAP3_IC1/INT6
	J15.20	20	PD.10/EADC0_CH16/LPADC0_CH16/EBI_nCS2/UART1_RXD/CANFD0_RXD/UART8_RXD/EQEI0_B/ECAP3_IC2/INT7
	J15.21	21	V_{SS}
	J15.22	22	V_{DD}
	J15.23	23	PG.0/EBI_ADR8/I2C0_SCL/I2C1_SMBAL/UART2_RXD/CANFD1_TXD/UART1_TXD/I2C3_SCL/I2S1_DO/EPWM0_CH1/CCAP_PIXCLK
	J15.24	24	PG.1/EBI_ADR9/SPI2_I2SMCLK/I2C0_SDA/I2C1_SMBSUS/UART2_TXD/CANFD1_RXD/UART1_RXD/I2C3_SDA/I2S1_LRCK/EPWM0_CH0/CCAP_SCLK
	J15.25	25	PG.2/EBI_ADR11/SPI2_SS/I2C0_SMBAL/I2C1_SCL/CCAP_DATA7/I2C3_SMBAL/SC1_nCD/SPI0_I2SMCLK/TM0/LPTM0
	J15.26	26	PG.3/EBI_ADR12/SPI2_CLK/I2C0_SMBSUS/I2C1_SDA/CCAP_DATA6/I2C3_SMBSUS/UART4_RXD/UART0_RXD/TM1/LPTM1
	J15.27	27	PG.4/EBI_ADR13/SPI2_MISO/CCAP_DATA5/TM2
	J15.28	28	PI.6/SC1_nCD/I2S0_BCLK/SPI1_I2SMCLK/UART2_TXD/I2C1_SCL/USB_VBUS_ST

Header		M5531	
		Pin No.	Function
	J15.29	29	PI.7/SC1_PWR/I2S0_MCLK/SPI1_MISO/UART2_RXD/I2C1_SDA/USB_VBUS_EN
	J15.30	30	PI.8/SC1_RST/I2S0_DI/SPI1_MOSI/UART2_nRTS/I2C0_SMBAL
	J15.31	31	PI.9/SC1_DAT/I2S0_DO/SPI1_CLK/UART2_nCTS/I2C0_SMBSUS
	J15.32	32	PI.10/SC1_CLK/I2S0_LRCK/SPI1_SS/UART2_TXD/I2C0_SCL
	J15.33	33	PI.11/UART2_RXD/I2C0_SDA
	J15.34	34	PF.11/EBI_ADR14/SPI2_MOSI/UART5_TXD/CCAP_DATA4/TAMPER5/UART9_nCTS/TM3
	J15.35	35	PF.10/EBI_ADR15/SC0_nCD/I2S0_BCLK/SPI0_I2SMCLK/UART5_RXD/CCAP_DATA3/TAMPER4/UART9_nRTS
	J15.36	36	PF.9/EBI_ADR16/SC0_PWR/I2S0_MCLK/SPI0_SS/UART5_nRTS/CCAP_DATA2/CANFD1_TXD/TAMPER3/UART9_TXD
	J15.37	37	PF.8/EBI_ADR17/SC0_RST/I2S0_DI/SPI0_CLK/UART5_nCTS/CCAP_DATA1/CANFD1_RXD/TAMPER2/UART9_RXD
	J15.38	38	PF.7/EBI_ADR18/SC0_DAT/I2S0_DO/SPI0_MISO/UART4_TXD/CCAP_DATA0/TAMPER1
	J15.39	39	PF.6/EBI_ADR19/SC0_CLK/I2S0_LRCK/SPI0_MOSI/UART4_RXD/EBI_nCS0/SPI3_I2SMCLK/TAMPER0/EQEI2_INDEX/TRACE_SWO
	J15.40	40	VBAT
	J15.41	41	PF.5/UART2_RXD/EBI_AD1/UART2_nCTS/UART0_nCTS/UART3_TXD/EPWM0_CH0/BPWM0_CH4/EPWM0_SYNC_OUT/X32_IN/EADC0_ST/EQEI2_A/PSIO0_CH0/KPI_COL0/UTCPD0_VBSNKEN/LPADC0_ST
	J15.42	42	PF.4/UART2_TXD/EBI_AD0/UART2_nRTS/UART0_nRTS/UART3_RXD/EPWM0_CH1/BPWM0_CH5/X32_OUT/EQEI2_B/PSIO0_CH1/KPI_COL1/SWODEC_SWO/UTCPD0_VBSRCEN
	J15.43	43	PH.0/EBI_ADR7/SPI3_MISO/UART5_TXD/SC1_DAT/I2C3_SCL/TM0_EXT
	J15.44	44	PH.1/EBI_ADR6/SPI3_MOSI/UART5_RXD/SC1_CLK/I2C3_SDA/TM1_EXT
J3/J6	J3.1	45	PH.2/EBI_ADR5/UART5_nRTS/UART4_TXD/I2C0_SCL/UART9_RXD/TM2_EXT
	J6.1	46	PH.3/EBI_ADR4/SPI1_I2SMCLK/UART5_nCTS/UART4_RXD/I2C0_SDA/TM3_EXT
	J3.2	47	PH.4/EBI_ADR3/SPI1_MISO/UART7_nRTS/UART6_TXD/SPI3_I2SMCLK/EPWM0_CH5
	J6.2	48	PH.5/EBI_ADR2/SPI1_MOSI/UART7_nCTS/UART6_RXD/EPWM0_CH4
	J3.3	49	PH.6/EBI_ADR1/SPI1_CLK/UART7_TXD/UART9_nCTS
	J6.3	50	PH.7/EBI_ADR0/SPI1_SS/UART7_RXD/UART9_nRTS/I2S1_BCLK
	J3.4	51	PF.3/EBI_nCS0/UART0_TXD/I2C0_SCL/UART9_TXD/I2C2_SMBAL/EPWM1_CH0/XT1_IN/BPWM1_CH0/ACMP2_O/SC1_PWR/TM0_EXT/LPUART0_TXD/LPI2C0_SCL
	J6.4	52	PF.2/EBI_nCS1/UART0_RXD/I2C0_SDA/QSPI0_CLK/UART9_RXD/I2C2_SMBSUS/EPWM1_CH1/XT1_OUT/BPWM1_CH1/ACMP3_O/SC1_RST/TM1_EXT/LPUART0_RXD/LPI2C0_SDA
	J3.5	53	V_{SS}
	J6.5	54	V_{DD}
	J3.6	55	PE.8/EBI_ADR10/EMAC0_RMII_MDC/I2S0_BCLK/SPI2_CLK/UART2_TXD/EPWM0_CH0/EPWM0_BRAKE0/ECAP0_IC0/EQEI2_INDEX/TRACE_DATA3/ECAP3_IC0/DMIC0_DAT
	J6.6	56	PE.9/EBI_ADR11/EMAC0_RMII_MDIO/I2S0_MCLK/SPI2_MISO/UART2_RXD/EPWM0_CH1/EPWM0_BRAKE1/ECAP0_IC1/EQEI2_A/TRACE_DATA2/ECAP3_IC1/DMIC0_CLK
	J3.7	57	PE.10/EBI_ADR12/EMAC0_RMII_TXD0/I2S0_DI/SPI2_MOSI/UART3_TXD/EPWM0_CH2/EPWM1_BRAKE0/ECAP0_IC2/EQEI2_B/TRACE_DATA1/ECAP3_IC2/DMIC0_CLKLP
	J6.7	58	PE.11/EBI_ADR13/EMAC0_RMII_TXD1/I2S0_DO/SPI2_SS/UART3_RXD/UART1_nCTS/EPWM0_CH3/EPWM1_BRAKE1/ECAP1_IC2/TRACE_DATA0/DMIC1_DAT/KPI_COL7
	J3.8	59	PE.12/EBI_ADR14/EMAC0_RMII_TXEN/I2S0_LRCK/SPI2_I2SMCLK/UART1_nRTS/EPWM0_CH4/ECAP1_IC1/TRACE_CLK/DMIC1_CLK/KPI_COL6
	J6.8	60	PE.13/EBI_ADR15/EMAC0_PPS/I2C0_SCL/UART4_nRTS/UART1_TXD/EPWM0_CH5/EPWM1_CH0/BPWM1_CH5/ECAP1_IC0/TRACE_SWO/KPI_COL5/LPI2C0_SCL
	J3.9	61	PC.8/EBI_ADR16/EMAC0_RMII_REFCLK/I2C0_SDA/UART4_nCTS/UART1_RXD/EPWM1_CH1/BPWM1_CH4/SWODEC_SWO/KPI_COL4/LPI2C0_SDA

Header		M5531	
		Pin No.	Function
	J6.9	62	PC.7/EBI_AD9/EMAC0_RMII_RXD0/SPI1_MISO/UART4_TXD/SC2_PWR/UART0_nCTS/I2C1_SMBAL/UART6_TXD/ACMP2_WLAT/EPWM1_CH2/BPWM1_CH0/TM0/INT3/KPI_COL3/LPUART0_nCTS/LPTM0
	J3.10	63	PC.6/EBI_AD8/EMAC0_RMII_RXD1/SPI1_MOSI/UART4_RXD/SC2_RST/UART0_nRTS/I2C1_SMBSUS/UART6_RXD/ACMP3_WLAT/EPWM1_CH3/BPWM1_CH1/TM1/INT2/UTCPD0_FRSTX2/KPI_COL2/UTCPD0_DISCHG/LPUART0_nRTS/LPTM1
	J6.10	64	PA.7/EBI_AD7/EMAC0_RMII_CRSDV/SPI1_CLK/SC2_DAT/UART0_TXD/I2C1_SCL/QSPI1_MISO1/EPWM1_CH4/BPWM1_CH2/ACMP0_WLAT/TM2/INT1/UTCPD0_VBSNKEN/KPI_COL1/LPUART0_TXD/LPIO5
	J3.11	65	PA.6/UTCPD0_DISCHG/EMAC0_RMII_RXERR/SPI1_SS/SD1_nCD/SC2_CLK/UART0_RXD/I2C1_SDA/QSPI1_MOSI1/EPWM1_CH5/BPWM1_CH3/ACMP1_WLAT/TM3/INT0/UTCPD0_VBSRCEN/KPI_COL0/LPUART0_RXD/LPIO4
	J6.11	66	PI.12/QSPI0_MISO1/CANFD0_TXD/UART4_TXD/EPWM1_CH0/I2C3_SMBAL
	J3.12	67	PI.13/QSPI0_MOSI1/CANFD0_RXD/UART4_RXD/EPWM1_CH1/I2C3_SMBSUS
	J6.12	68	PI.14/QSPI0_SS/UART8_nCTS/CANFD1_TXD/UART3_TXD/EPWM1_CH2/I2C3_SCL
	J3.13	69	PI.15/QSPI0_CLK/UART8_nRTS/CANFD1_RXD/UART3_RXD/EPWM1_CH3/I2C3_SDA
	J6.13	70	PJ.0/UTCPD0_DISCHG/QSPI0_MISO0/UART8_TXD/EPWM1_CH4
	J3.14	71	PJ.1/QSPI0_MOSI0/UART8_RXD/EPWM1_CH5
	J6.14	72	V_{SS}
	J3.15	73	V_{DD}
	J6.15	74	NC
	J3.16	75	PA.5/EBI_AD0/QSPI0_MISO1/SPI1_I2SMCLK/SD1_CMD/SC2_nCD/UART0_nCTS/UART5_TXD/I2C0_SCL/CANFD0_TXD/UART0_TXD/BPWM0_CH5/EPWM0_CH0/EQEI0_INDEX/CCAP_PIXCLK/DMIC0_DAT/I3C0_SCL/UTCPD0_VBSNKEN/LPUART0_TXD/LPUART0_nCTS/LPI2C0_SCL
	J6.16	76	PA.4/EBI_AD1/QSPI0_MOSI1/SPI0_I2SMCLK/SD1_CLK/SC0_nCD/UART0_nRTS/UART5_RXD/I2C0_SDA/CANFD0_RXD/UART0_RXD/BPWM0_CH4/EPWM0_CH1/EQEI0_A/CCAP_SCLK/DMIC0_CLK/I3C0_SDA/UTCPD0_VBSRCEN/LPUART0_RXD/LPUART0_nRTS/LPI2C0_SDA
	J3.17	77	PA.3/QSPI0_SS/SPI0_SS/SD1_DAT3/SC0_PWR/UART4_TXD/UART1_TXD/I2C1_SCL/I2C0_SMBAL/CCAP_DATA3/BPWM0_CH3/EPWM0_CH2/EQEI0_B/EPWM1_BRAKE1/DMIC0_CLKLP/PSIO0_CH4/UTCPD0_VBSNKEN/LPSPI0_SS
	J6.17	78	PA.2/QSPI0_CLK/SPI0_CLK/SD1_DAT2/SC0_RST/UART4_RXD/UART1_RXD/I2C1_SDA/I2C0_SMBSUS/CCAP_DATA2/BPWM0_CH2/EPWM0_CH3/EQEI3_INDEX/DMIC1_DAT/PSIO0_CH5/I3C0_PUPEN/UTCPD0_VBSRCEN/LPSPI0_CLK
	J3.18	79	PA.1/QSPI0_MISO0/SPI0_MISO/SD1_DAT1/SC0_DAT/UART0_TXD/UART1_nCTS/I2C2_SCL/CCAP_DATA7/I3C0_SCL/BPWM0_CH1/EPWM0_CH4/EQEI3_A/DAC1_ST/DMIC1_CLK/PSIO0_CH6/UTCPD0_DISCHG/UTCPD0_FRSTX1/LPSPI0_MISO/LPUART0_TXD/LPIO1
	J6.18	80	PA.0/QSPI0_MOSI0/SPI0_MOSI/SD1_DAT0/SC0_CLK/UART0_RXD/UART1_nRTS/I2C2_SDA/CCAP_DATA6/I3C0_SDA/BPWM0_CH0/EPWM0_CH5/EQEI3_B/DAC0_ST/PSIO0_CH7/UTCPD0_VCNEN1/LPSPI0_MOSI/LPUART0_RXD/LPIO0
	J3.19	81	V_{DDIO0}
	J6.19	82	PE.14/EBI_AD8/UART2_TXD/CANFD0_TXD/SD1_nCD/UART6_TXD/UART3_TXD/I2C1_SCL/UART4_nCTS/UART8_TXD/PSIO0_CH0
	J3.20	83	PE.15/EBI_AD9/UART2_RXD/CANFD0_RXD/UART6_RXD/UART3_RXD/I2C1_SDA/UART4_nRTS/UART8_RXD/PSIO0_CH1
	J6.20	84	nRESET
	J3.21	85	PF.0/UART1_TXD/I2C1_SCL/UART0_TXD/SC1_DAT/I2S0_DO/USCI0_CTL1/UART2_TXD/I2C0_SCL/EPWM1_CH4/BPWM1_CH0/ACMP0_O/ICE_DAT/EADC0_ST/I3C0_SCL/UTCPD0_FRSTX2/UTCPD0_DISCHG/LPUART0_TXD/LPADC0_ST/LPIO2
	J6.21	86	PF.1/UART1_RXD/I2C1_SDA/UART0_RXD/SC1_CLK/I2S0_LRCK/USCI0_DAT1/UART2_RXD/I2C0_SDA/EPWM1_CH5/BPWM1_CH1/ACMP1_O/ICE_CLK/I3C0_SDA/UTCPD0_FRSTX1/UTCPD0_DISCHG/LPUART0_RXD/LPIO3
	J3.22	87	PD.9/EBI_AD7/I2C2_SCL/UART2_nCTS/UART7_TXD/PSIO0_CH2

Header		M5531	
		Pin No.	Function
	J6.22	88	PD.8/EBI_AD6/I2C2_SDA/UART2_nRTS/UART7_RXD/PSIO0_CH3
J2/J5	J2.1	89	PC.5/EBI_AD5/QSPI0_MISO1/UART2_TXD/I2C1_SCL/CANFD0_TXD/UART4_TXD/EPWM1_CH0/CCAP_DATA5/QSPI1_SS/I2C3_SMBAL/PSIO0_CH0/KPI_ROW0/UTCPD0_FRSTX2/UTCPD0_DISCHG/I3C0_PUPEN
	J5.1	90	PC.4/EBI_AD4/QSPI0_MOSI1/SC1_nCD/I2S0_BCLK/SPI1_I2SMCLK/UART2_RXD/I2C1_SDA/CANFD0_RXD/UART4_RXD/EPWM1_CH1/CCAP_DATA4/QSPI1_CLK/I2C3_SMBSUS/PSIO0_CH1/KPI_ROW1/UTCPD0_FRSTX1/UTCPD0_DISCHG
	J2.2	91	PC.3/EBI_AD3/QSPI0_SS/SC1_PWR/I2S0_MCLK/SPI1_MISO/UART2_nRTS/I2C0_SMBAL/CANFD1_TXD/UART3_TXD/EPWM1_CH2/CCAP_DATA3/QSPI1_MISO0/I2C3_SCL/PSIO0_CH2/KPI_ROW2/UTCPD0_CCDB2
	J5.2	92	PC.2/EBI_AD2/QSPI0_CLK/SC1_RST/I2S0_DI/SPI1_MOSI/UART2_nCTS/I2C0_SMBSUS/CANFD1_RXD/UART3_RXD/EPWM1_CH3/CCAP_DATA2/QSPI1_MOSI0/I2C3_SDA/PSIO0_CH3/KPI_ROW3/UTCPD0_CCDB1
	J2.3	93	PC.1/EBI_AD1/QSPI0_MISO0/SC1_DAT/I2S0_DO/SPI1_CLK/UART2_TXD/I2C0_SCL/EPWM1_CH4/CCAP_DATA1/ACMP0_O/EADC0_ST/KPI_ROW4/UTCPD0_CC2/LPADC0_ST/LPI2C0_SCL/LPIO5
	J5.3	94	PC.0/EBI_AD0/QSPI0_MOSI0/SC1_CLK/I2S0_LRCK/SPI1_SS/UART2_RXD/I2C0_SDA/EPWM1_CH5/CCAP_DATA0/ACMP1_O/KPI_ROW5/UTCPD0_CC1/LPI2C0_SDA/LPIO4
	J2.4	95	V_{SS}
	J5.4	96	V_{DD}
	J2.5	97	PG.9/EBI_AD0/SD1_DAT3/QSPI1_MISO1/CCAP_PIXCLK/ECAP2_IC0/BPWM0_CH5
	J5.5	98	PG.10/EBI_AD1/SD1_DAT2/QSPI1_MOSI1/CCAP_SCLK/ECAP2_IC1/BPWM0_CH4
	J2.6	99	PG.11/EBI_AD2/SD1_DAT1/QSPI1_SS/UART7_TXD/CCAP_SFIELD/ECAP2_IC2/BPWM0_CH3
	J5.6	100	PG.12/EBI_AD3/SD1_DAT0/QSPI1_CLK/UART7_RXD/CCAP_VSYNC/BPWM0_CH2
	J2.7	101	PD.7/EBI_AD4/SD1_CMD/QSPI1_MISO0/UART6_TXD/CCAP_HSYNC/BPWM0_CH1
	J5.7	102	PD.6/EBI_AD5/SD1_CLK/QSPI1_MOSI0/UART6_RXD/BPWM0_CH0
	J2.8	103	PD.5/EBI_AD15/SD1_nCD/EBI_nCS0/CLKO/EADC0_ST/LPADC0_ST
	J5.8	104	V_{DDIO1}
	J2.9	105	PJ.2/EBI_AD5/UART8_nCTS/I2C3_SMBAL/QSPI1_SS/CCAP_DATA5/CANFD0_TXD/SPIM0_RESETN
	J5.9	106	PJ.3/EBI_AD4/UART8_nRTS/I2C3_SMBSUS/QSPI1_CLK/CCAP_DATA4/CANFD0_RXD/SPIM0_MOSI
	J2.10	107	PJ.4/EBI_AD3/UART8_TXD/I2C3_SCL/QSPI1_MISO0/CCAP_DATA3/CANFD1_TXD/SPIM0_MISO
	J5.10	108	PJ.5/EBI_AD2/UART8_RXD/I2C3_SDA/QSPI1_MOSI0/CCAP_DATA2/CANFD1_RXD/SPIM0_D2
	J2.11	109	PJ.6/EBI_AD1/UART9_nCTS/CCAP_DATA1/SPIM0_D3
	J5.11	110	PJ.7/EBI_AD0/UART9_nRTS/CCAP_DATA0/SPIM0_SS
	J2.12	111	PH.12/EBI_AD0/UART9_TXD/QSPI1_MISO1/CCAP_PIXCLK/SPIM0_CLKN
	J5.12	112	PH.13/EBI_AD1/UART9_RXD/QSPI1_MOSI1/CCAP_SCLK/SPIM0_CLK
	J2.13	113	PH.14/EBI_AD2/QSPI1_SS/CCAP_SFIELD/SPIM0_D4
	J5.13	114	PH.15/EBI_AD3/QSPI1_CLK/CCAP_VSYNC/SPIM0_D5
	J2.14	115	PG.13/EBI_AD4/UART1_TXD/I2C0_SCL/SPI1_MISO/QSPI1_MISO0/CCAP_HSYNC/SC1_PWR/SPIM0_D6/PSIO0_CH4/LPI2C0_SCL
	J5.14	116	PG.14/EBI_AD5/UART1_RXD/I2C0_SDA/SPI1_MOSI/QSPI1_MOSI0/SC1_RST/SPIM0_D7/ACMP0_O/EADC0_ST/PSIO0_CH5/LPI2C0_SDA
	J2.15	117	PG.15/I2C1_SCL/SPI1_CLK/SC1_DAT/SPIM0_RWDS/ACMP1_O/PSIO0_CH6
	J5.15	118	PD.3/EBI_AD10/USCI0_CTL1/SPI0_SS/UART3_nRTS/SC2_PWR/SC1_nCD/UART0_TXD/I2S1_BCLK/EQEI3_A/LPSPI0_SS/LPUART0_TXD

Header		M5531	
		Pin No.	Function
	J2.16	119	PD.2/EBI_AD11/USCI0_DAT1/SPI0_CLK/UART3_nCTS/SC2_RST/UART0_RXD/I2S1_MCLK/EQEI3_B/LPSPI0_CLK/LPUART0_RXD
	J5.16	120	PD.1/EBI_AD12/USCI0_DAT0/SPI0_MISO/UART3_TXD/I2C2_SCL/SC2_DAT/I2S1_DI/EQEI2_INDEX/ECAP2_IC0/LPSPI0_MISO/LPIO7
	J2.17	121	PD.0/EBI_AD13/USCI0_CLK/SPI0_MOSI/UART3_RXD/I2C2_SDA/SC2_CLK/I2S1_DO/EQEI2_A/ECAP2_IC1/TM2/LPSPI0_MOSI/LPIO6
	J5.17	122	PD.13/EBI_AD10/SD0_nCD/SPI0_I2SMCLK/SPI1_I2SMCLK/QSPI1_MOSI0/SC2_nCD/SD1_CLK/UART6_RXD/I2S1_LRCK/BPWM0_CH0/EQEI2_B/ECAP2_IC2/CLKO/EADC0_ST/LPADC0_ST
	J2.18	123	PA.12/I2S0_BCLK/UART4_TXD/I2C1_SCL/SPI2_SS/CANFD0_TXD/SC2_PWR/SD1_nCD/QSPI1_MISO0/BPWM1_CH2/EQEI1_INDEX/ECAP3_IC0/USB_VBUS/PSIO0_CH4/LPSPI0_SS
	J5.18	124	PA.13/I2S0_MCLK/UART4_RXD/I2C1_SDA/SPI2_CLK/CANFD0_RXD/SC2_RST/QSPI1_MOSI0/BPWM1_CH3/EQEI1_A/ECAP3_IC1/USB_D_MINUS/PSIO0_CH5/LPSPI0_CLK
	J2.19	125	PA.14/I2S0_DI/UART0_TXD/EBI_AD5/SPI2_MISO/I2C2_SCL/SC2_DAT/BPWM1_CH4/EQEI1_B/ECAP3_IC2/USB_D_PLUS/PSIO0_CH6/LPSPI0_MISO
	J5.19	126	PA.15/I2S0_DO/UART0_RXD/SPI2_MOSI/I2C2_SDA/SC2_CLK/BPWM1_CH5/EPWM0_SYNC_IN/EQEI3_INDEX/USB_OTG_ID/PSIO0_CH7/LPSPI0_MOSI
	J2.20	127	HSUSB_VRES
	J5.20	128	HSUSB_VDD33
	J2.21	129	HSUSB_VBUS
	J5.21	130	HSUSB_D-
	J2.22	131	HSUSB_VSS
	J5.22	132	HSUSB_D+
J7	J7.1	133	HSUSB_VDD12
	J7.2	134	HSUSB_ID
	J7.3	135	PE.7/EBI_AD10/SD0_CMD/UART5_TXD/CANFD1_TXD/UART9_nCTS/EQEI1_INDEX/EPWM0_CH0/BPWM0_CH5/ACMP2_O/QSPI0_MISO0/PSIO0_CH0
	J7.4	136	PE.6/EBI_AD11/SD0_CLK/SPI3_I2SMCLK/SC0_nCD/USCI0_CTL0/UART5_RXD/CANFD1_RXD/UART9_nRTS/EQEI1_A/EPWM0_CH1/BPWM0_CH4/ACMP3_O/QSPI0_MOSI0/PSIO0_CH1
	J7.5	137	PE.5/EBI_nRD/SD0_DAT3/SPI3_SS/SC0_PWR/USCI0_CTL1/UART6_TXD/UART7_nRTS/UART9_TXD/EQEI1_B/EPWM0_CH2/BPWM0_CH3/SPI1_MISO/PSIO0_CH2
	J7.6	138	PE.4/EBI_nWR/SD0_DAT2/SPI3_CLK/SC0_RST/USCI0_DAT1/UART6_RXD/UART7_nCTS/UART9_RXD/EQEI0_INDEX/EPWM0_CH3/BPWM0_CH2/SPI1_MOSI/PSIO0_CH3
	J7.7	139	PE.3/EBI_MCLK/SD0_DAT1/SPI3_MISO/SC0_DAT/USCI0_DAT0/UART6_nRTS/UART7_TXD/UART8_nCTS/EQEI0_A/EPWM0_CH4/BPWM0_CH1/I2S0_BCLK/SC2_DAT
	J7.8	140	PE.2/EBI_ALE/SD0_DAT0/SPI3_MOSI/SC0_CLK/USCI0_CLK/UART6_nCTS/UART7_RXD/UART8_nRTS/EQEI0_B/EPWM0_CH5/BPWM0_CH0/I2S0_MCLK/SC2_CLK
	J7.9	141	V_{SS}
	J7.10	142	V_{DD}
	J7.11	143	PE.1/EBI_AD10/QSPI0_MISO0/SC2_DAT/I2S0_BCLK/SPI1_MISO/UART3_TXD/I2C1_SCL/UART4_nCTS/UART8_TXD/LPIO1
	J7.12	144	PE.0/EBI_AD11/QSPI0_MOSI0/SC2_CLK/I2S0_MCLK/SPI1_MOSI/UART3_RXD/I2C1_SDA/UART4_nRTS/UART8_RXD/LPIO0
	J7.13	145	PH.8/EBI_AD12/QSPI0_CLK/SC2_PWR/I2S0_DI/SPI1_CLK/UART3_nRTS/I2C1_SMBAL/I2C2_SCL/UART1_TXD/UART9_nCTS/I3C0_SCL
	J7.14	146	PH.9/EBI_AD13/QSPI0_SS/SC2_RST/I2S0_DO/SPI1_SS/UART3_nCTS/I2C1_SMBSUS/I2C2_SDA/UART1_RXD/UART9_nRTS/I3C0_SDA
	J7.15	147	PH.10/EBI_AD14/QSPI0_MISO1/SC2_nCD/I2S0_LRCK/SPI1_I2SMCLK/UART4_TXD/UART0_TXD/UART9_TXD/I3C0_PUPEN/LPUART0_TXD
	J7.16	148	PH.11/EBI_AD15/QSPI0_MOSI1/UART4_RXD/UART0_RXD/EPWM0_CH5/UART9_RXD/LPUART0_RXD
	J7.17	149	PD.14/EBI_nCS0/SPI3_I2SMCLK/SC1_nCD/SPI0_I2SMCLK/QSPI0_MOSI1/I2S1_BCLK/EPWM0_CH4
	J7.18	150	PJ.8/EBI_nRD/SD1_DAT3/UART7_TXD/BPWM0_CH5
	J7.19	151	PJ.9/EBI_nWR/SD1_DAT2/UART7_RXD/BPWM0_CH4

Header		M5531	
		Pin No.	Function
	J7.20	152	PJ.10/EBI_MCLK/SD1_DAT1/UART6_TXD/ECAP2_IC0/CANFD0_TXD/BPWM0_CH3
	J7.21	153	PJ.11/EBI_ALE/SD1_DAT0/UART6_RXD/ECAP2_IC1/CANFD0_RXD/BPWM0_CH2
	J7.22	154	PJ.12/EBI_nCS0/SD1_CMD/ECAP2_IC2/CANFD1_TXD/BPWM0_CH1/HSUSB_VBUS_ST
	J7.23	155	PJ.13/SD1_CLK/CANFD1_RXD/BPWM0_CH0/HSUSB_VBUS_EN
	J7.24	156	PG.5/EBI_nCS1/SPI3_SS/SC1_PWR/EBI_nWRL/I2C3_SMBAL/I2S1_MCLK/EPWM0_CH3
	J7.25	157	PG.6/EBI_nCS2/SPI3_CLK/SC1_RST/EBI_nWRH/I2C3_SMBSUS/I2S1_DI/EPWM0_CH2
	J7.26	158	V_{SS}
	J7.27	NC	NC
	J7.28	NC	NC
	J7.29	NC	NC
	J7.30	162	VDD
	J7.31	163	LDO_CAP
	J7.32	164	PB.15/EADC0_CH15/LPADC0_CH15/EBI_AD12/SC1_PWR/SPI0_SS/USCI0_CTL1/UART0_nCTS/UART3_TXD/I2C2_SMBAL/CCAP_DATA1/EPWM0_BRAKE1/EPWM1_CH0/ETMC_TRACE_DATA0/TM0_EXT/USB_VBUS_EN/HSUSB_VBUS_EN/PSIO0_CH0/KPI_COL0/UTCPD0_VBSNKEN/LPSPI0_SS/LPUART0_nCTS/LPTM0_EXT
	J7.33	165	PB.14/EADC0_CH14/LPADC0_CH14/EBI_AD13/SC1_RST/SPI0_CLK/USCI0_DAT1/UART0_nRTS/UART3_RXD/I2C2_SMBSUS/CCAP_DATA0/EPWM1_CH1/ETMC_TRACE_DATA1/TM1_EXT/CLKO/USB_VBUS_ST/PSIO0_CH1/KPI_COL1/UTCPD0_VBSRCEN/LPSPI0_CLK/LPUART0_nRTS/LPTM1_EXT
	J7.34	166	PB.13/EADC0_CH13/LPADC0_CH13/DAC1_OUT/ACMP0_P3/ACMP1_P3/EBI_AD14/SC1_DAT/SPI0_MISO/USCI0_DAT0/UART0_TXD/UART3_nRTS/I2C2_SCL/CLKO/CCAP_PIXCLK/EPWM1_CH2/ETMC_TRACE_DATA2/TM2_EXT/USB_VBUS_ST/HSUSB_VBUS_ST/PSIO0_CH2/KPI_COL2/USCI0_CTL0/LPSPI0_MISO/LPUART0_TXD/UTCPD0_VBSNKEN/LPTM1
	J7.35	167	PB.12/EADC0_CH12/LPADC0_CH12/DAC0_OUT/ACMP0_P2/ACMP1_P2/EBI_AD15/SC1_CLK/SPI0_MOSI/USCI0_CLK/UART0_RXD/UART3_nCTS/I2C2_SDA/SD0_nCD/CCAP_SCLK/EPWM1_CH3/ETMC_TRACE_DATA3/TM3_EXT/EBI_AD11/SPI0_I2SMCLK/SWODEC_SWO/PSIO0_CH3/KPI_COL3/QSPI0_CLK/LPSPI0_MOSI/LPUART0_RXD/UTCPD0_VBSRCEN
	J7.36	168	AV_{DD}
	J7.37	169	V_{REF}
	J7.38	170	AV_{SS}
	J7.39	171	PB.11/EADC0_CH11/LPADC0_CH11/EBI_ADR16/EMAC0_RMII_MDC/UART0_nCTS/UART4_TXD/I2C1_SCL/CANFD0_TXD/SPI0_I2SMCLK/BPWM1_CH0/SPI3_CLK/CCAP_SFIELD/HSUSB_VBUS_ST/ETMC_TRACE_CLK/LPUART0_nCTS
	J7.40	172	PB.10/EADC0_CH10/LPADC0_CH10/ACMP2_P3/EBI_ADR17/EMAC0_RMII_MDIO/UART0_nRTS/UART4_RXD/I2C1_SDA/CANFD0_RXD/BPWM1_CH1/SPI3_SS/CCAP_VSYNC/HSUSB_VBUS_EN/ETMC_TRACE_DATA0/LPUART0_nRTS
	J7.41	173	PB.9/EADC0_CH9/LPADC0_CH9/ACMP2_P2/EBI_ADR18/EMAC0_RMII_TXD0/UART0_TXD/UART1_nCTS/I2C1_SMBAL/UART7_TXD/I2C0_SCL/BPWM1_CH2/SPI3_MISO/INT7/CCAP_HSYNC/USB_VBUS_ST/ETMC_TRACE_DATA1/LPUART0_TXD

Header		M5531	
		Pin No.	Function
	J7.42	174	PB.8/EADC0_CH8/LPADC0_CH8/ACMP2_P1/EBI_ADR19/EMAC0_RMII_TXD1/CCAP_DATA1/UART0_RXD/UART1_nRTS/I2C1_SMBSUS/UART7_RXD/I2C0_SDA/BPWM1_CH3/SPI3_MOSI/INT6/USB_VBUS_ST/USB_VBUS_EN/ETMC_TRACE_DATA2/LPUART0_RXD
	J7.43	175	PB.7/EADC0_CH7/LPADC0_CH7/ACMP2_P0/EBI_nWRL/EMAC0_RMII_TXEN/CCAP_DATA0/CANFD1_TXD/UART1_TXD/SD1_CMD/EBI_nCS0/SPI0_SS/BPWM1_CH4/EPWM1_BRAKE0/EPWM1_CH4/INT5/USB_VBUS_ST/ACMP0_O/ETMC_TRACE_DATA3/KPI_COL4/TRACE_SWO/HSUSB_VBUS_ST
	J7.44	176	PB.6/EADC0_CH6/LPADC0_CH6/ACMP2_N/EBI_nWRH/EMAC0_PPS/CANFD1_RXD/UART1_RXD/SD1_CLK/EBI_nCS1/SPI0_CLK/BPWM1_CH5/EPWM1_BRAKE1/EPWM1_CH5/INT4/USB_VBUS_EN/ACMP1_O/DMIC0_CLKLP/EPWM0_SYNC_IN/KPI_COL5/SC1_nCD/HSUSB_VBUS_EN/TM1

Table 3-2 M5531H2LJAE 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.

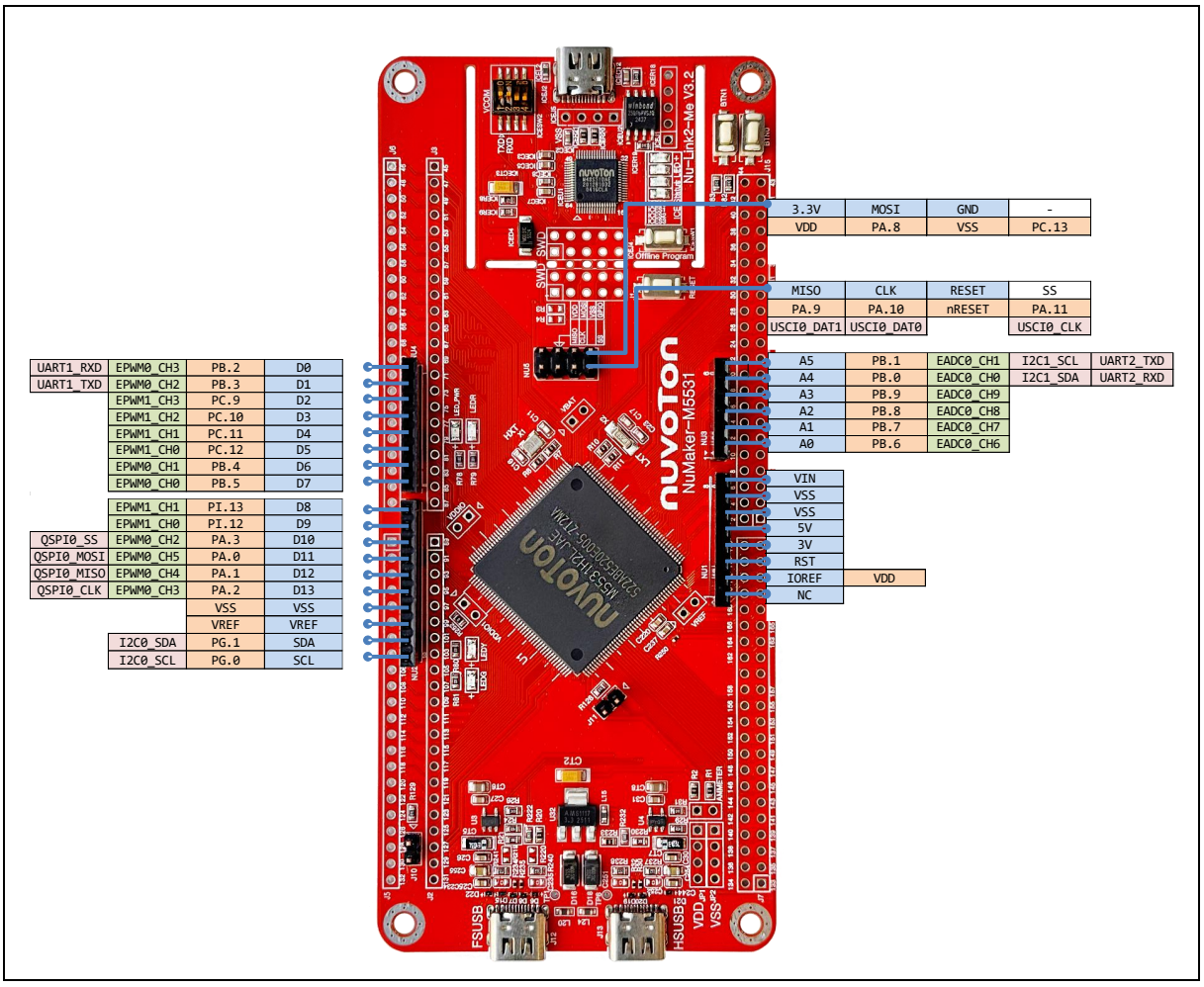


Figure 3-4 Arduino UNO Compatible Extension Connectors

Header		NuMaker-M5531		Header		NuMaker-M5531	
		Compatible to Arduino UNO	GPIO Pin of M5531			Compatible to Arduino UNO	GPIO Pin of M5531
NU4	NU3.1	D0	PB.2	NU3	NU2.6	A5	PB.1
	NU3.2	D1	PB.3		NU2.5	A4	PB.0
	NU3.3	D2	PC.9		NU2.4	A3	PB.9
	NU3.4	D3	PC.10		NU2.3	A2	PB.8
	NU3.5	D4	PC.11		NU2.2	A1	PB.7
	NU3.6	D5	PC.12		NU2.1	A0	PB.6
	NU3.7	D6	PB.4	NU1	NU1.8	VIN	-
	NU3.8	D7	PB.5		NU1.7	VSS	
NU2	NU4.1	D8	PI.13		NU1.6	VSS	
	NU4.2	D9	PI.12		NU1.5	5V	
	NU4.3	D10	PA.3		NU1.4	3V	
	NU4.4	D11	PA.0		NU1.3	RST	nRESET
	NU4.5	D12	PA.1		NU1.2	IOREF	V_{DD}
	NU4.6	D13	PA.2		NU1.1	NC	-
	NU4.7	VSS	V_{SS}				
	NU4.8	VREF	V_{REF}				
	NU4.9	SDA	PG.1				
	NU4.10	SCL	PG.0				

Table 3-3 Arduino UNO Extension Connectors and M5531H2LJAE Mapping GPIO List

3.4 Power Supply Configuration

The NuMaker-M5531 is able to adopt multiple power supplies. External power sources include NU1 Vin (7V to 12V), 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-M5531.

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 7V to 12V. The voltage regulator U33 converts the NU1 pin8 input voltage to 5V and supplies it to NU1_5VCC.

Table 3-4 Vin Power Source

3.4.2 5V Power Sources

Table 3-5 presents the 5V power sources.

Connector	Net Name in Schematic	Description
ICEJ2	USB_HS_VBUS	ICE USB connector supplies 5V power from PC to M5531 target board and Nu-Link2-Me.
J12	FSUSB_VBUS	USB connector on NuMaker-M5531 supplies 5V power from PC to M5531 target board and Nu-Link2-Me.
J13	HSUSB_VBUS	USB connector on NuMaker-M5531 supplies 5V power from PC to M5531 target board and Nu-Link2-Me.
NU1 pin5	NU1_5VCC	ICEJ2, J12, J13 or NU1 pin8 supplies 5V power to NU1 pin5. NU1 pin5 supplies 5V power to target chip or Arduino adapter board.

Table 3-5 5V Power Sources

3.4.3 3.3V Power Sources

Table 3-6 presents the 3.3V power sources.

Voltage Regulator	5V Source	Description
ICEUP1	USB_HS_VBUS	ICEUP1 converts USB_HS_VBUS to 3.3V and supplies 3.3V to M5531 target board or ICE chip.
U32	FSUSB_VBUS	U32 converts FSUSB_VBUS to 3.3V and supplies 3.3V to M5531 target board.
U32	HSUSB_VBUS	U32 converts HSUSB_VBUS to 3.3V and supplies 3.3V to M5531 target board.

Table 3-6 3.3V Power Sources

3.4.4 1.8V Power Sources

Table 3-7 presents the 1.8V power source.

Voltage Regular	5V Source	Description
ICEUP2	USB_HS_VBUS	ICEUP2 converts USB_HS_VBUS to 1.8V and supplies 1.8V to M5531 target board or ICE chip.

Table 3-7 1.8V Power Sources

3.4.5 Power Connectors

Table 3-8 presents the power connectors.

Connector	Description
JP1	V_{DD} connector on the NuMaker-M5531. **Note:** M5531 operating voltage range is from 1.71V to 3.6V.
JP2	V_{SS} connector on the NuMaker-M5531.

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.
J12	USB FS connector on NuMaker-M5531 for power supply.
J13	USB HS connector on NuMaker-M5531 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 1.8V / 3.3V / 5V. **Note:** M5531 operating voltage range is from 1.71V to 3.6V. Do not switch ICEJPR1 (MCUVCC) to 5V.
ICEJPR2	Configures the ICE chip operating voltage at 1.8V / 3.3V.

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.

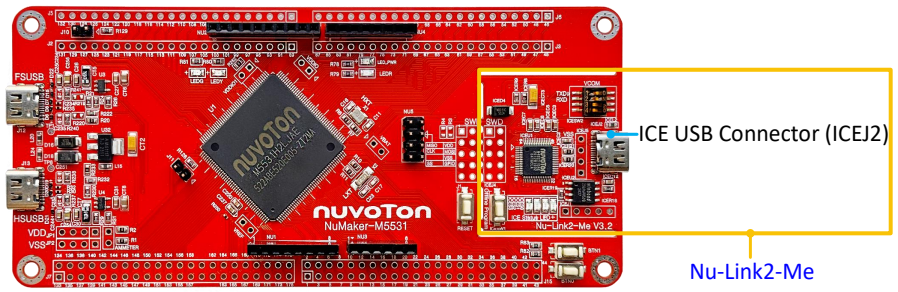


Figure 3-5 External Power Supply Sources on Nu-Link2-Me

To use ICEJ2 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. 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	J2	Vin	JP1
1	1.8V	Connect to PC	1.8V	1.8V	1.8V	Off	-	-	1.8V output
2	3.3V	Connect to PC	3.3V (default)	3.3V (default)	3.3V	Off	-	-	3.3V output
3	5V	Connect to PC	5V	3.3V (default)	3.3V	Off	-	-	5V output

Note:

1. 0 Ω should be soldered between ICEJPR1's MCUVCC and 1.8V / 3.3V / 5V.
2. 0 Ω should be soldered between ICEJPR2's ICEVCC and 1.8V / 3.3V.
3. -: Unused.

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

3.4.8.2 External Power Supply through M5531 Target Board to Target Chip

The external power supply sources on M5531 target board are shown in Figure 3-6.

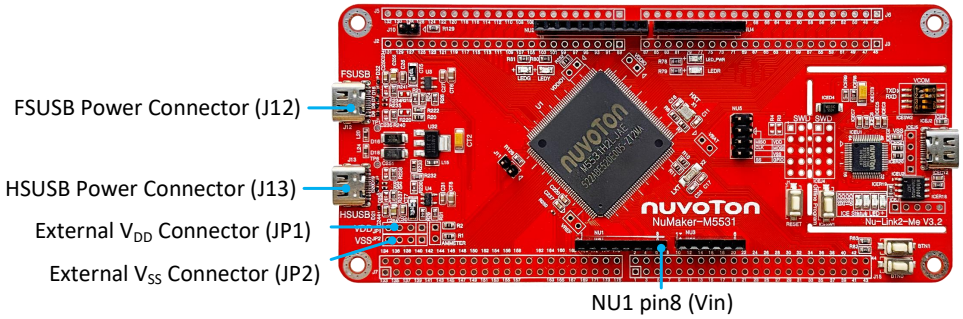


Figure 3-6 External Power Supply Sources on M5531 Target Board

To use Vin, J12 or J13 as external power supply source, please follow the steps below:

1. Remove the resistor on ICEJPR1 (MCUVCC).
2. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
3. Connect the external power supply to Vin, J12 or J13.

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

1. Remove the resistor on ICEJPR1 (MCUVCC).
2. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
3. Connect ICEJ2 to PC.
4. Connect the external power supply to JP1.

To use Vin, J12 or J13 as external power supply source with Nu-Link2-Me detached from NuMaker-M5531, please follow the steps below:

1. Detach the Nu-Link2-Me from NuMaker-M5531.
2. Connect the external power supply to Vin, J12 or J13.

To use JP1 as external power supply source with Nu-Link2-Me detached from NuMaker-M5531, please follow the steps below:

1. Detach the Nu-Link2-Me from NuMaker-M5531.
2. Connect the external power supply to JP1.

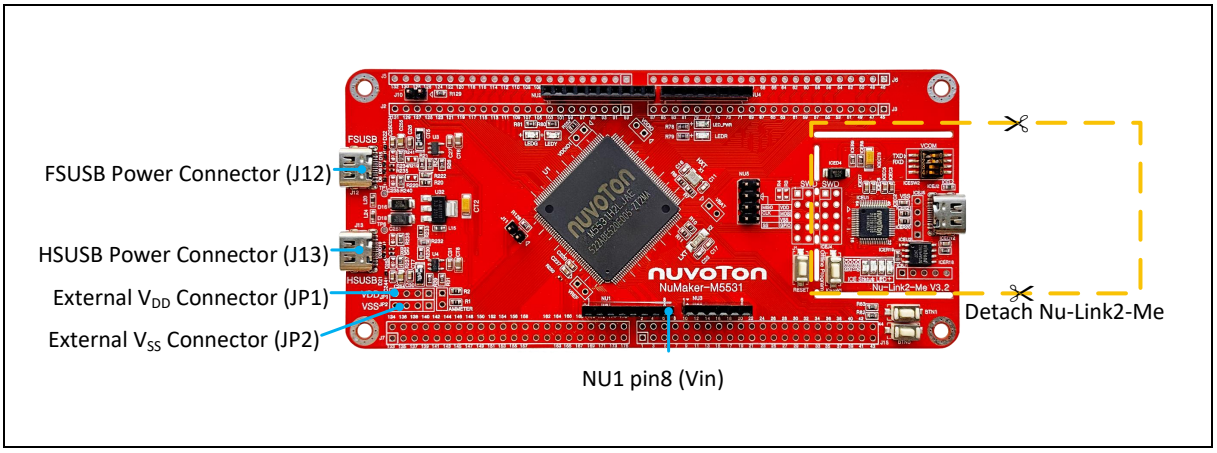


Figure 3-7 Detach the Nu-Link2-Me from NuMaker-M5531

Table 3-12 presents all power models when supplies external power through M5531 target board. The M5531 target board external power sources are highlighted in yellow.

Model	Target Chip Voltage	Vin [1]	J12[1]	J13[1]	ICEJ2	JP1[2]	ICEJPR1 (MCUVCC) Selection [3]	ICEJPR2 (ICEVCC) Selection [4]	ICE Chip Voltage [5]
4	3.3V	7V ~ 12V Input	-	-	-	3.3 V output	Remove resistor	3.3V	3.3V
5	3.3V	-	Connect to PC	-	-	3.3 V output	Remove resistor	3.3V	3.3V
6	3.3V	-	-	Connect to PC	-	3.3 V output	Remove resistor	3.3V	3.3V
7	1.8V ~ 3.6V	-	-	-	Connect to PC	DC Input 1.8V ~ 3.6V	Remove resistor	1.8V / 3.3V	1.8V / 3.3V
8	1.8V ~ 3.6V	-	-	-	Nu-Link2-Me removed	DC Input 1.8V ~ 3.6V	-	-	-

Note:

1. The Vin input voltage will be converted by voltage regulator UP2 to 5V. Supplying external power to Vin, J12 or J13 can provide 5V to NU1 pin5 (5V) and 3.3V 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 1.8V / 3.3V / 5V.
4. 0 Ω should be soldered between ICEJPR2's ICEVCC and 1.8V / 3.3V.
5. The ICE chip voltage should be close to the target chip voltage.
6. -: Unused

Table 3-12 Supply External Power for M5531 Target Board

3.5 External Reference Voltage Connector

Table 3-14 presents the external reference voltage connector.

Connector	Description
VREF1	Connector for user to connect to the external reference voltage pin of the target chip. User needs to remove the L2 ferrite bead.

Table 3-13 External Reference Voltage Connector

3.6 Ammeter Connector

User can refer to the sample code in M5531 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 R1 resistor.

Table 3-14 Ammeter Connector



Figure 3-8 Wiring between Ammeter Connector and Ammeter

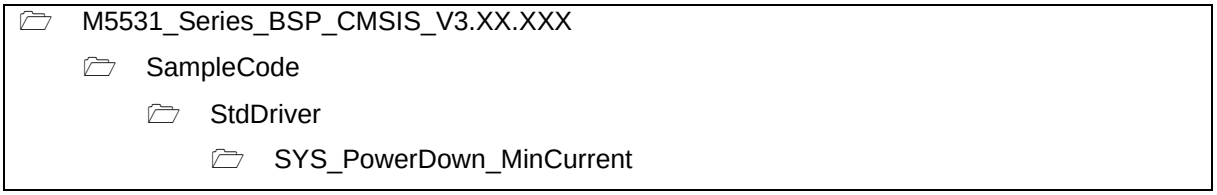


Figure 3-9 Project Path of SYS_PowerDown_MinCurrent

3.7 Push Buttons

Table 3-15 presents the push buttons.

Component	Description
ICESW1	Offline program button to start offline ICP programming the target chip.
J1	Reset button to reset the target chip.
BTN0, BTN1	User buttons for application usage

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-M5531 is powered.
Red LED	The LED is connected to the target chip PH.4.
Yellow LED	The yellow LED is connected to the target chip PD.6.
Green LED	The green LED is connected to the target chip PD.5.
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 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.
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

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 – Full Cortex-M
- 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.

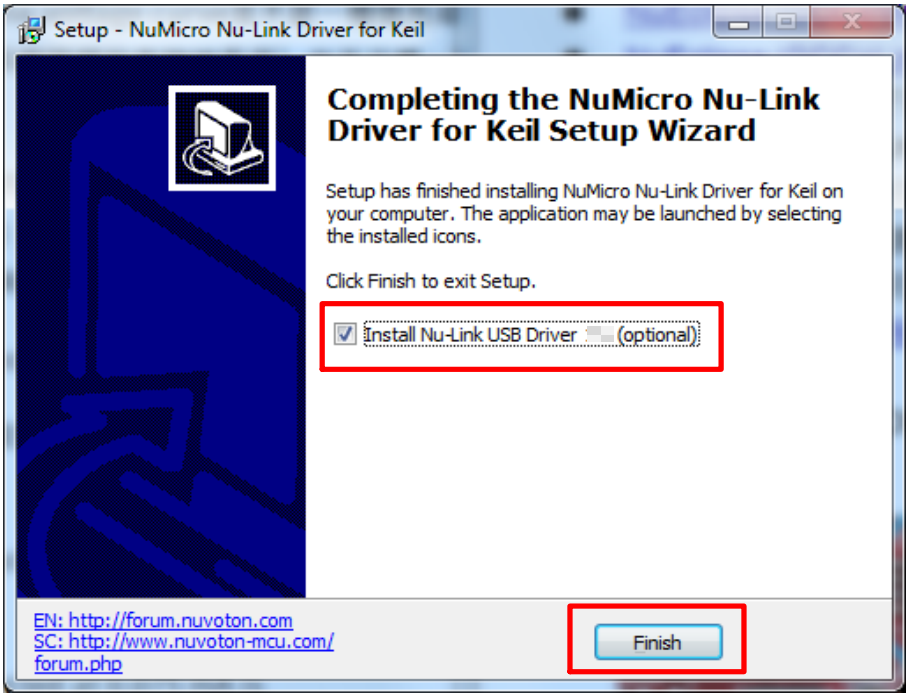


Figure 4-1 Nu-Link USB Driver Installation Setup

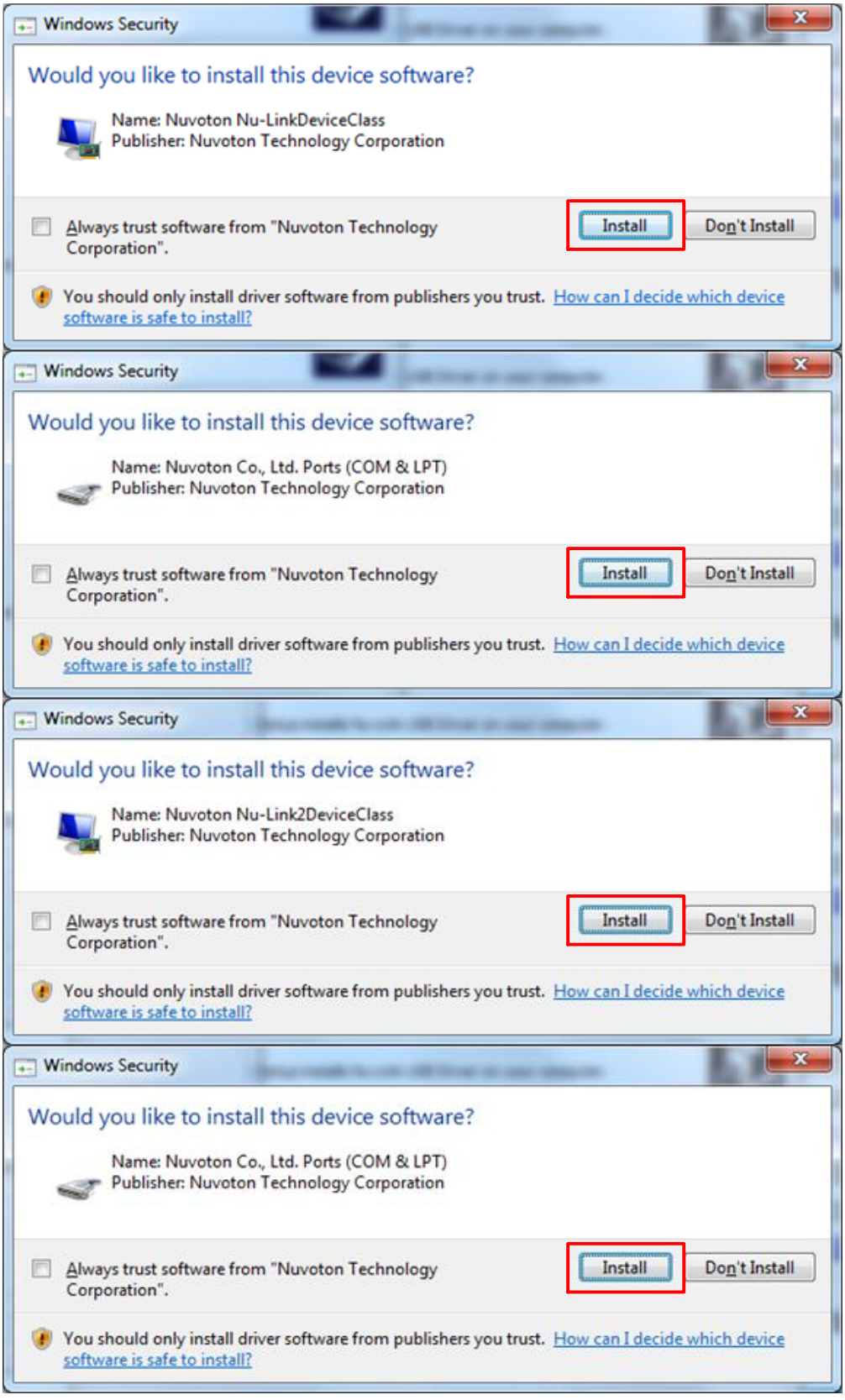


Figure 4-2 Nu-Link USB Driver Installation

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.

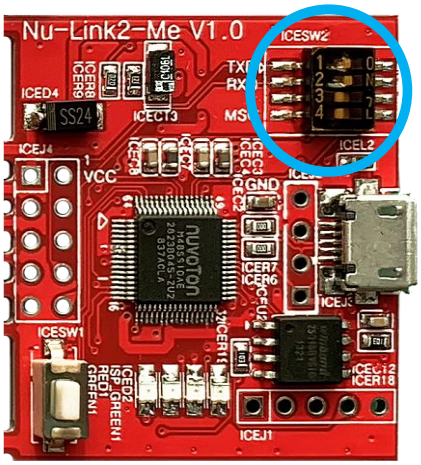


Figure 4-3 Open VCOM Function

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 Manager as Figure 4-5.

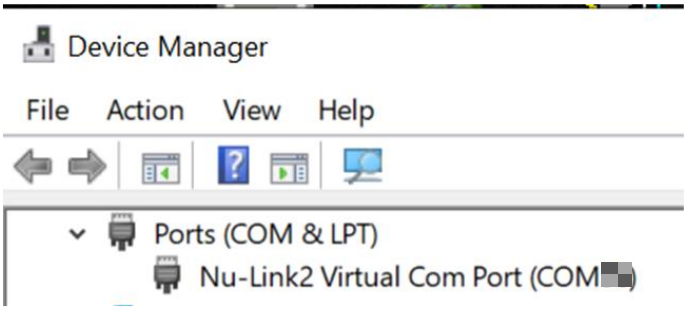


Figure 4-5 Device Manager

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.

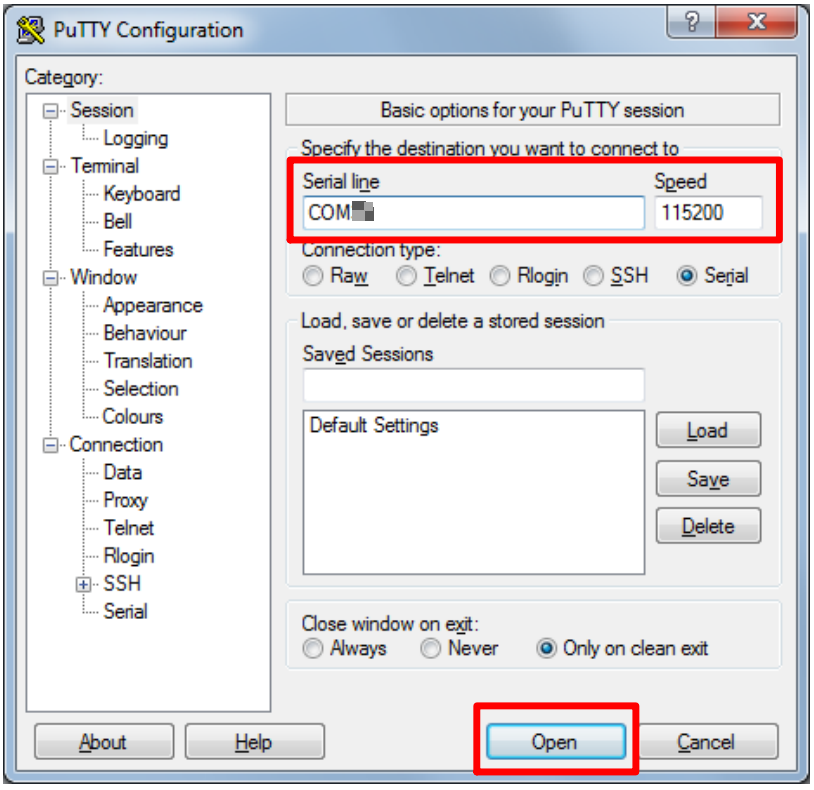


Figure 4-6 PuTTY Session Setting

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.

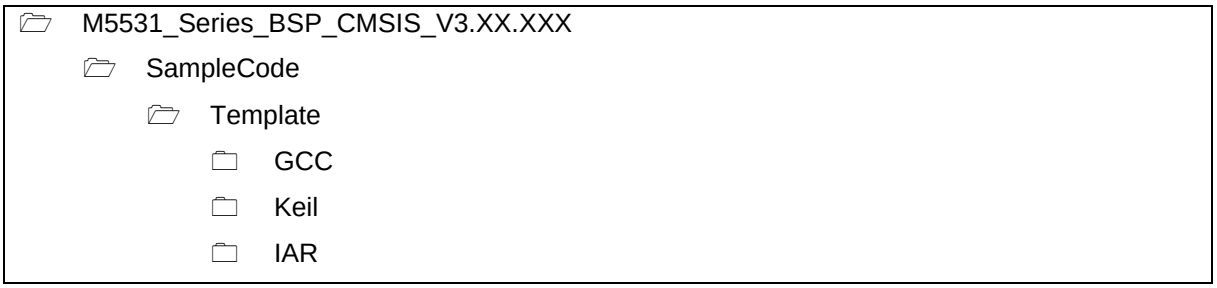


Figure 4-7 Template Project Folder Path

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.

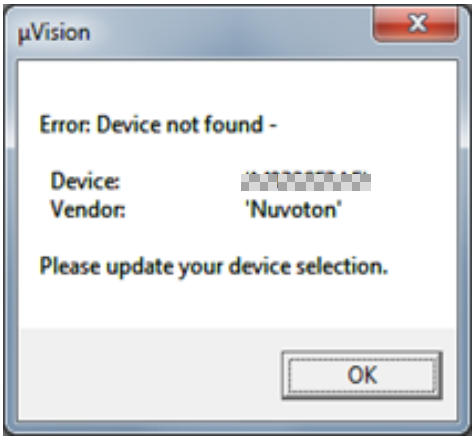


Figure 4-8 Warning Message of “Device not found”

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”.

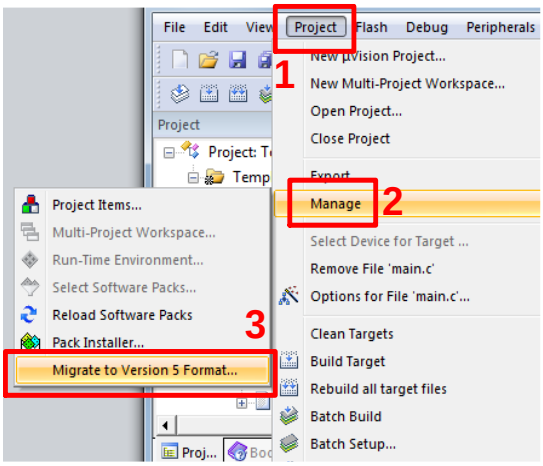


Figure 4-9 Project File Migrate to Version 5 Format

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

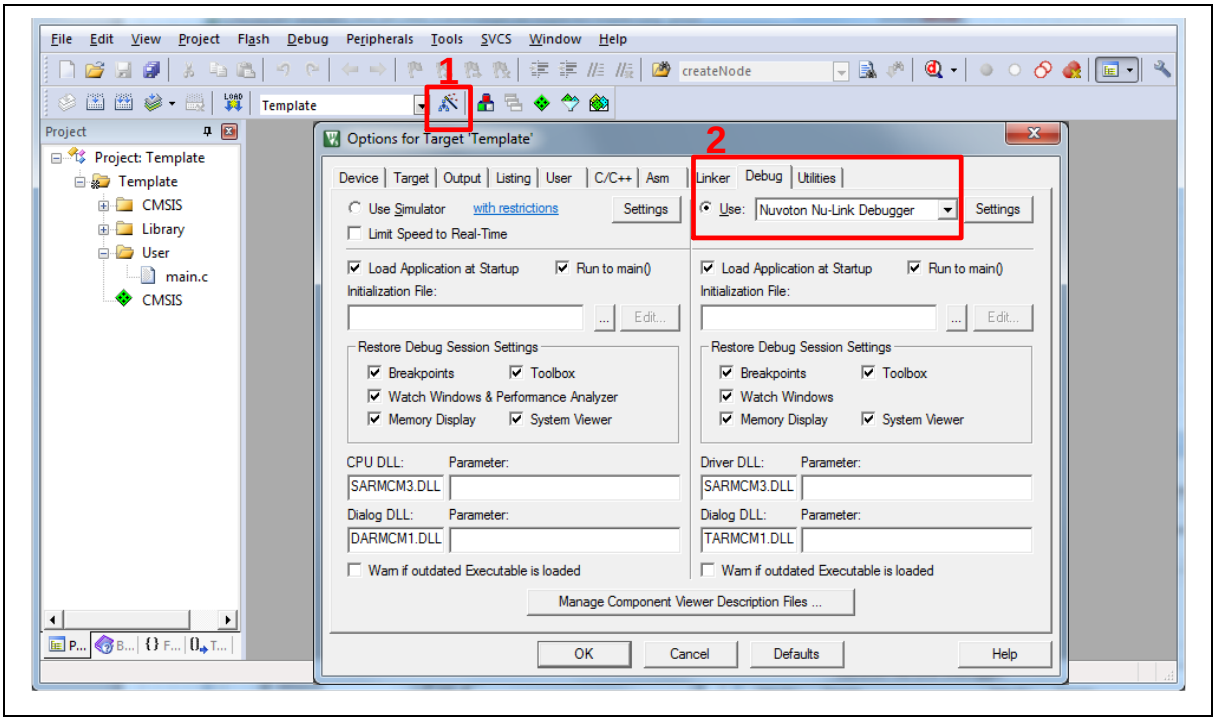


Figure 4-10 Debugger Setting in Options Window

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

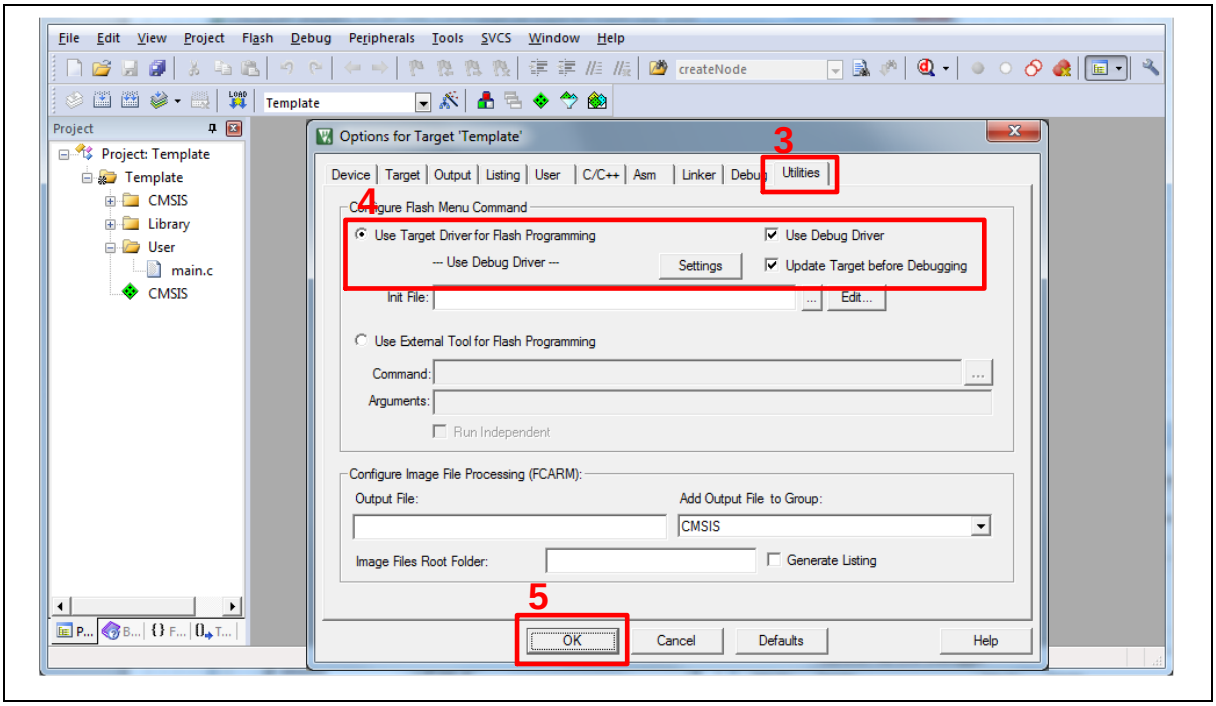


Figure 4-11 Programming Setting in Options Window

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.

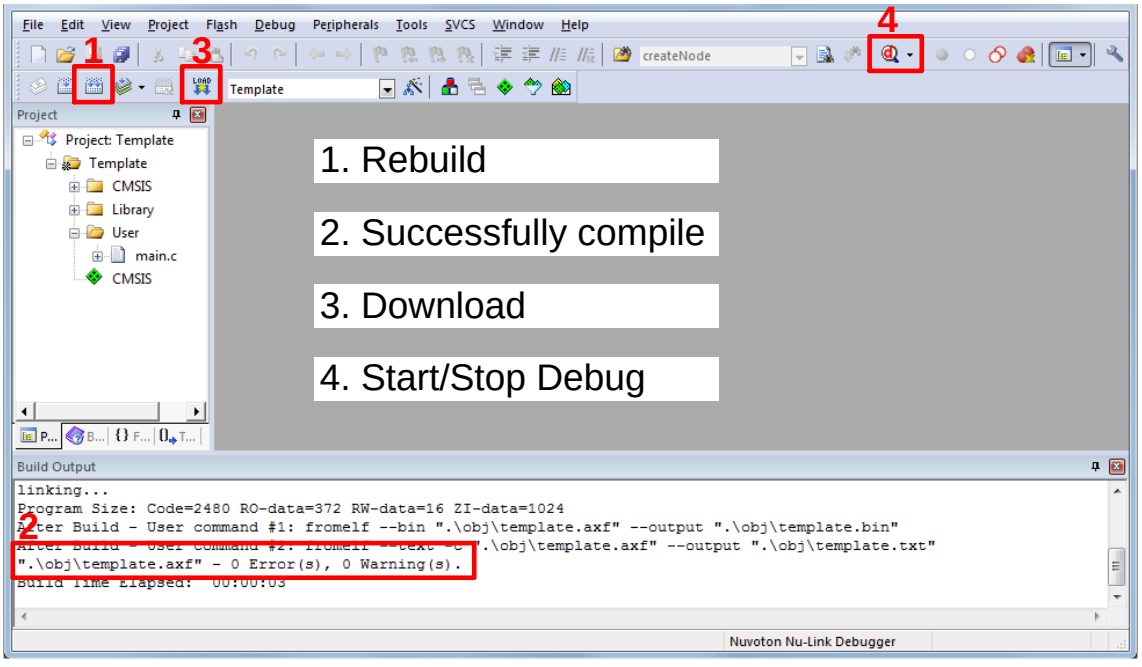


Figure 4-12 Compile and Download the Project

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.

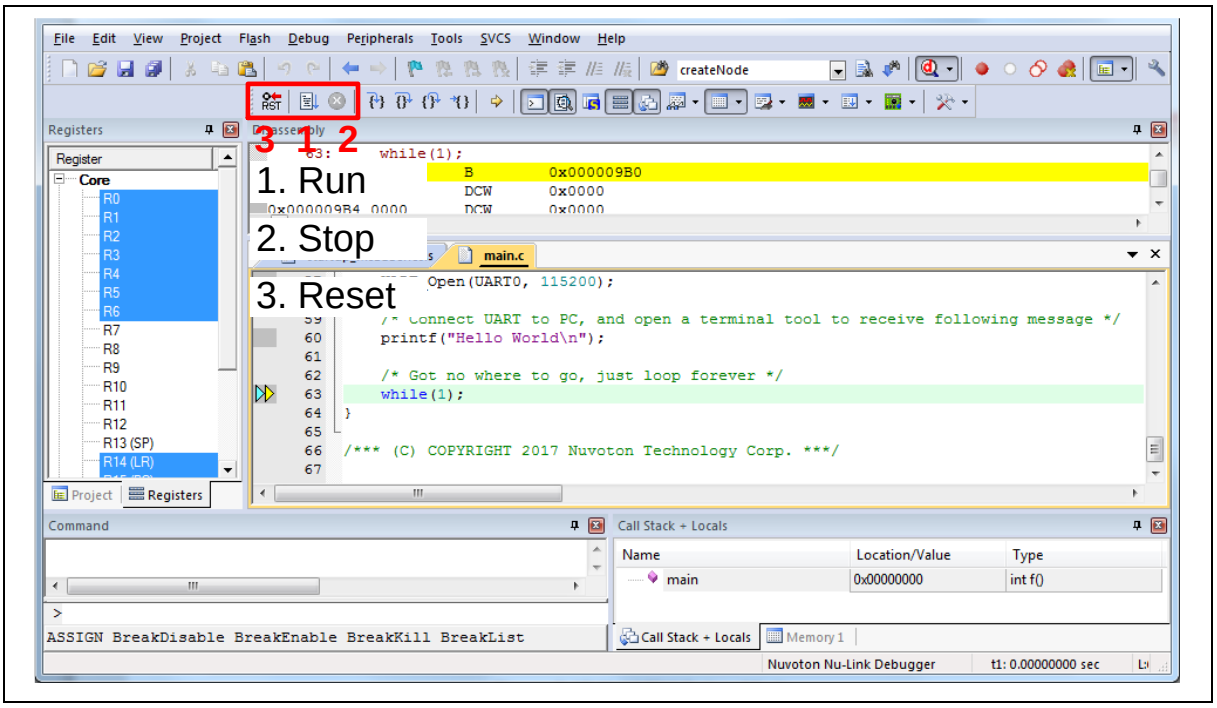


Figure 4-13 Keil MDK Debug Mode

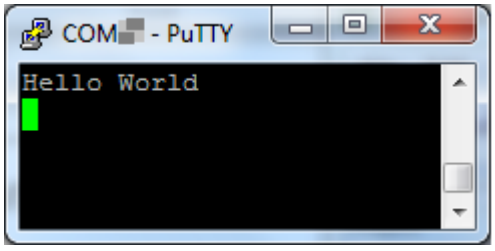


Figure 4-14 Debug Message on Serial Port Terminal Windows

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.

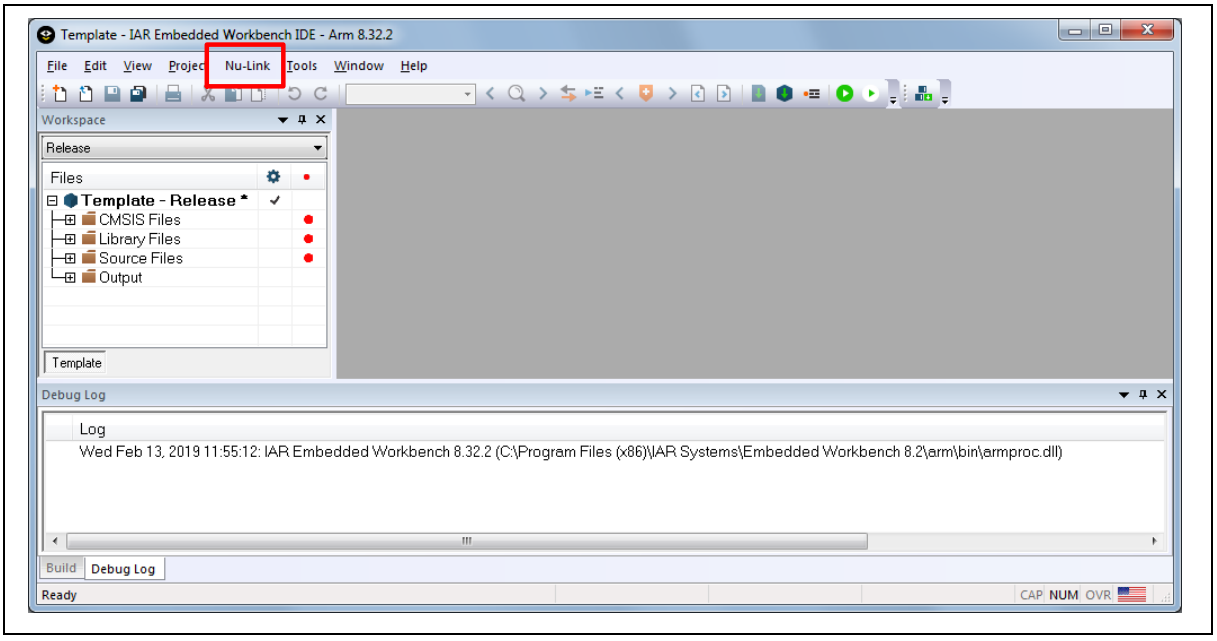


Figure 4-15 IAR EWARM Window

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.

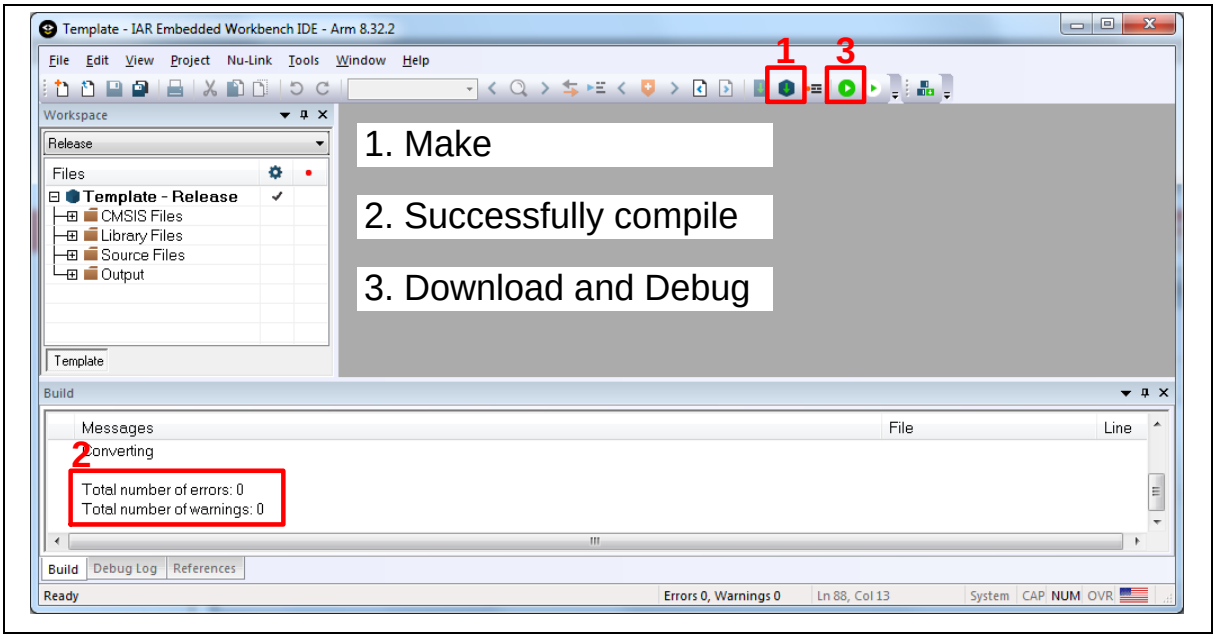


Figure 4-16 Compile and Download the Project

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.

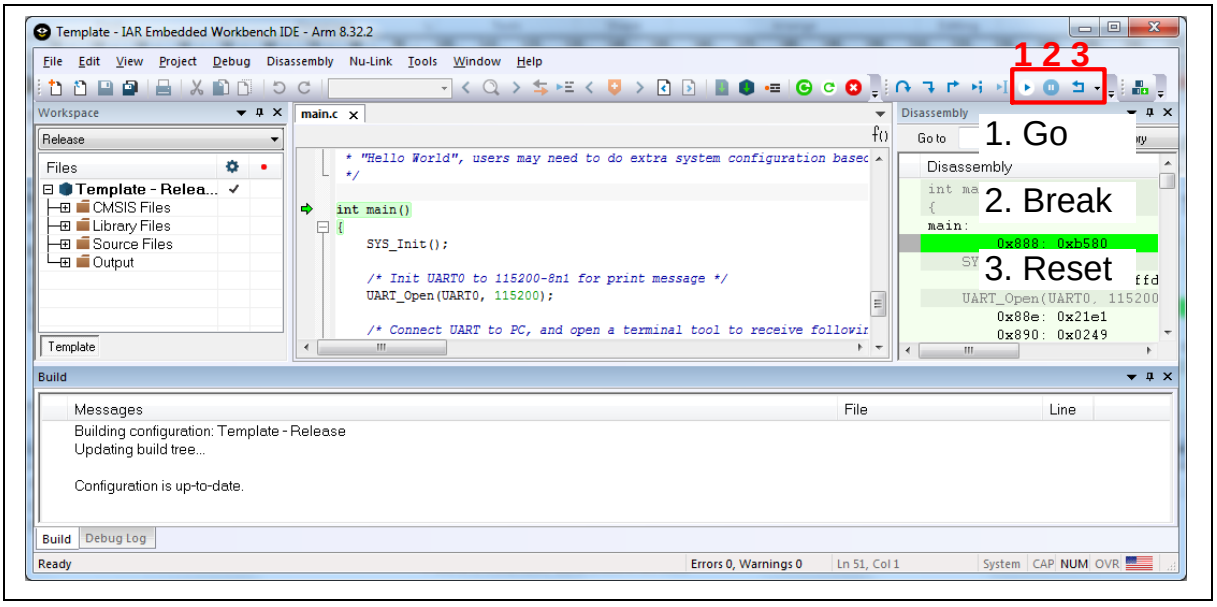


Figure 4-17 IAR EWARM Debug Mode

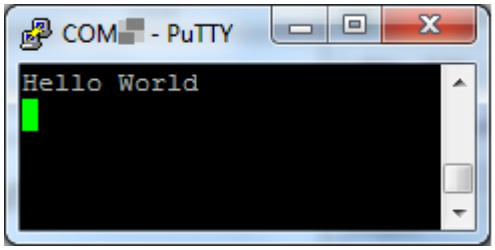


Figure 4-18 Debug Message on Serial Port Terminal Windows

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.

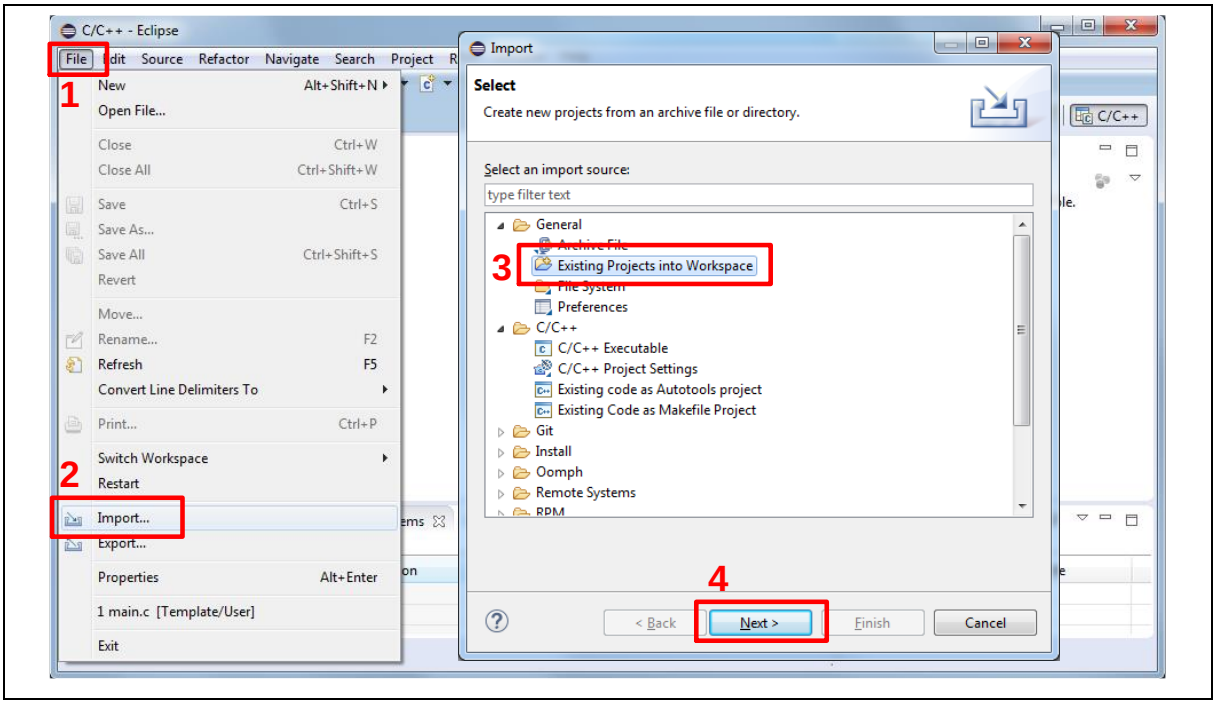


Figure 4-19 Import the Project in NuEclipse

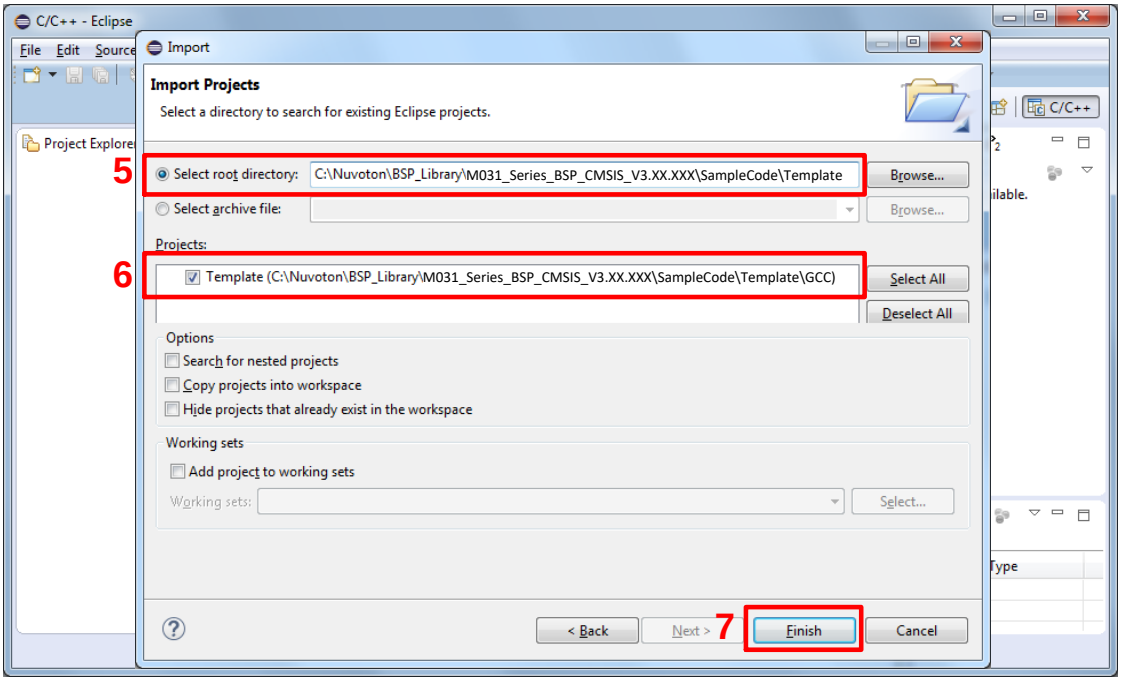


Figure 4-20 Import Projects Windows

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.

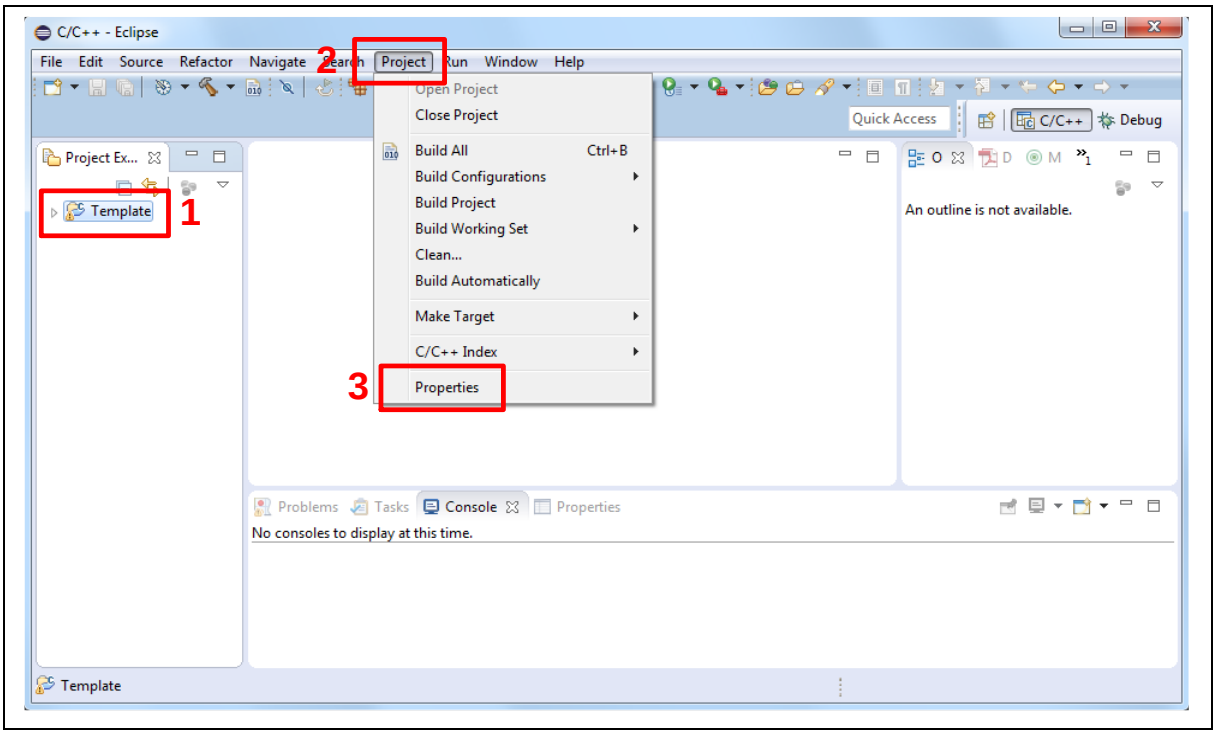


Figure 4-21 Open Project Properties Window

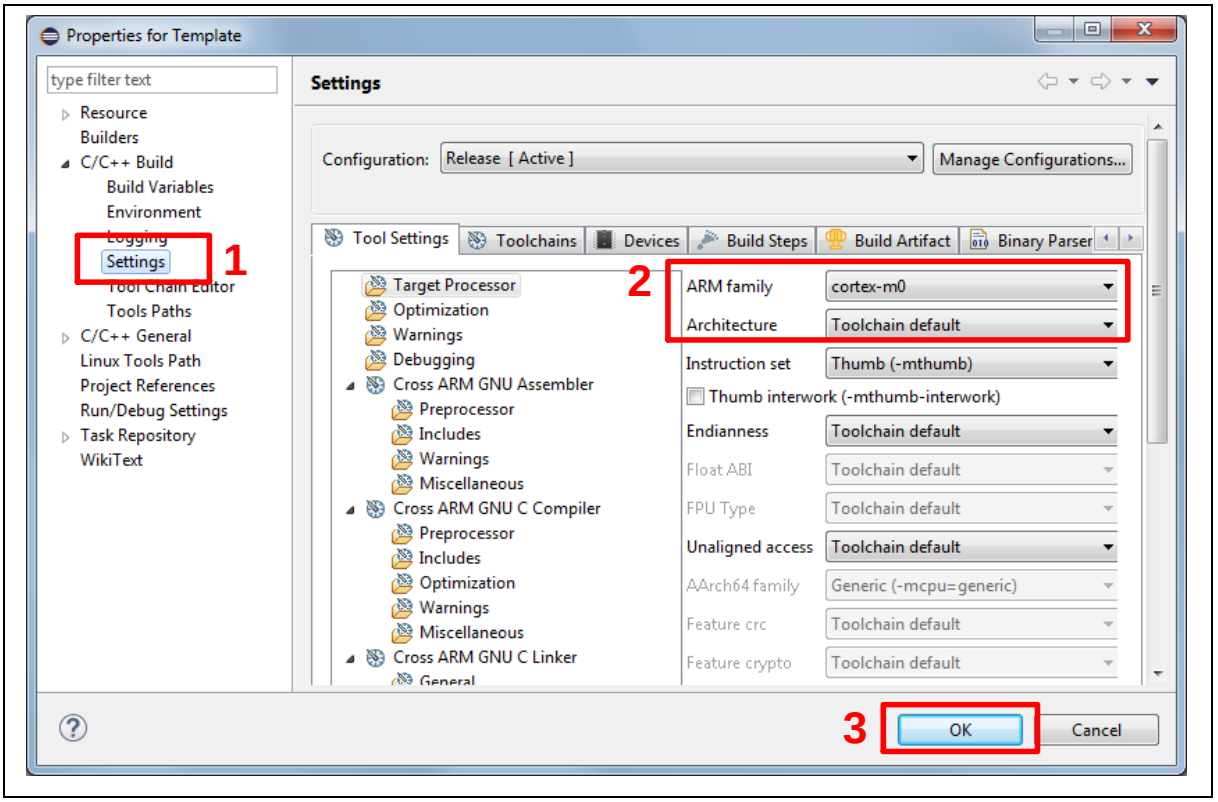


Figure 4-22 Project Properties Settings

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

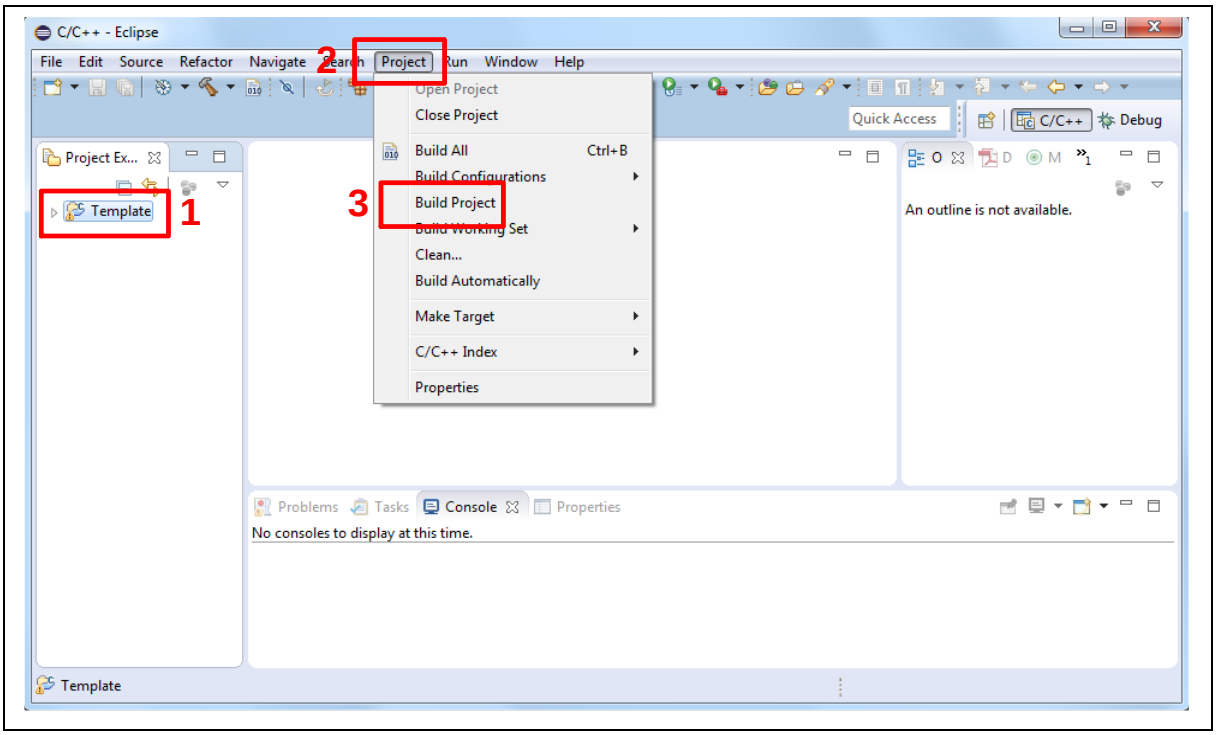


Figure 4-23 Build Project

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.

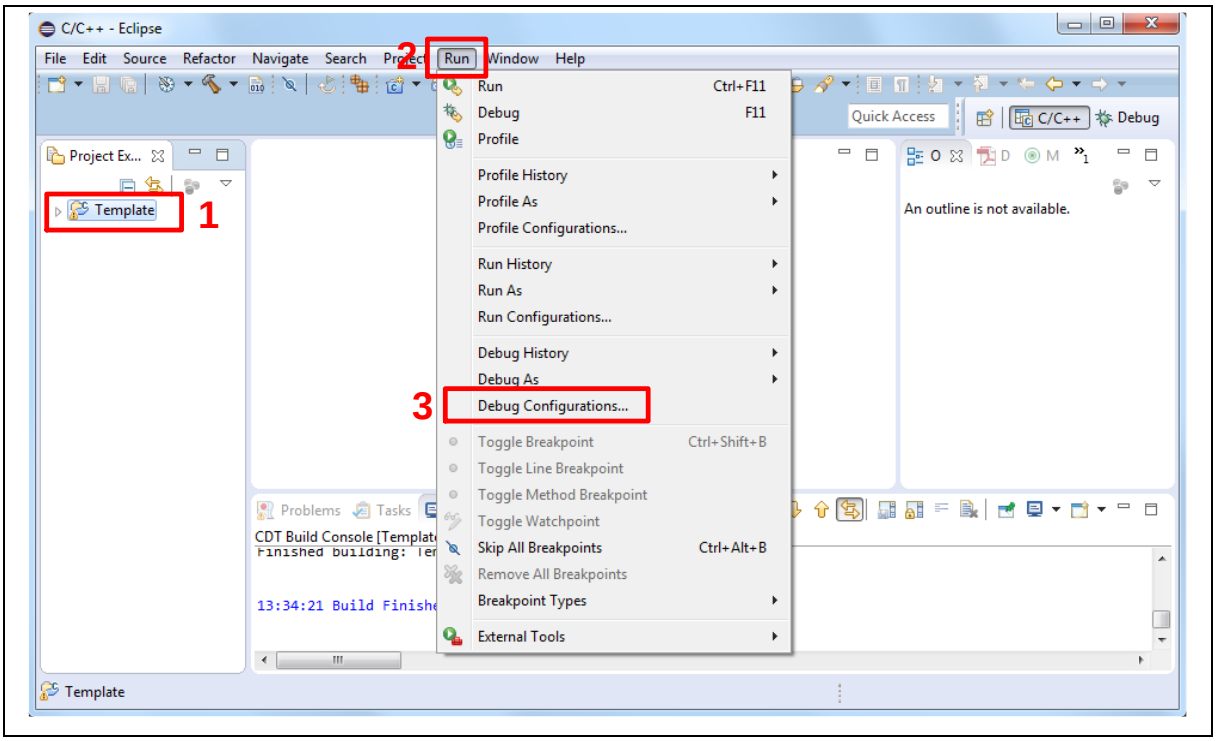
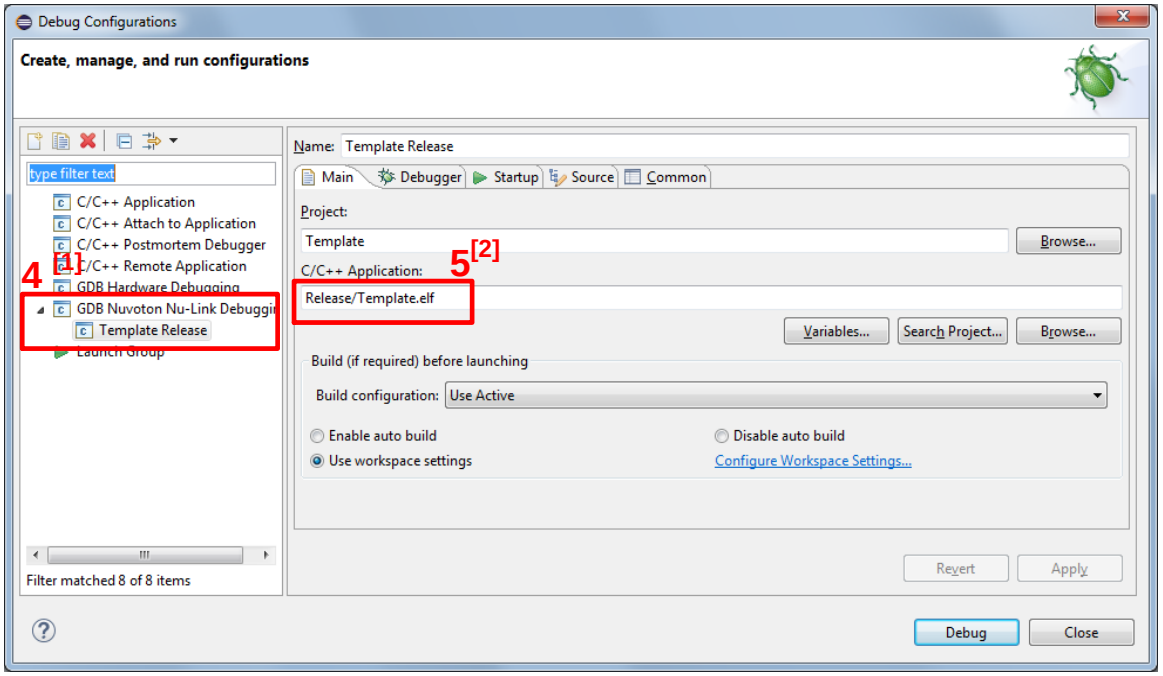


Figure 4-24 Open Debug Configuration



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

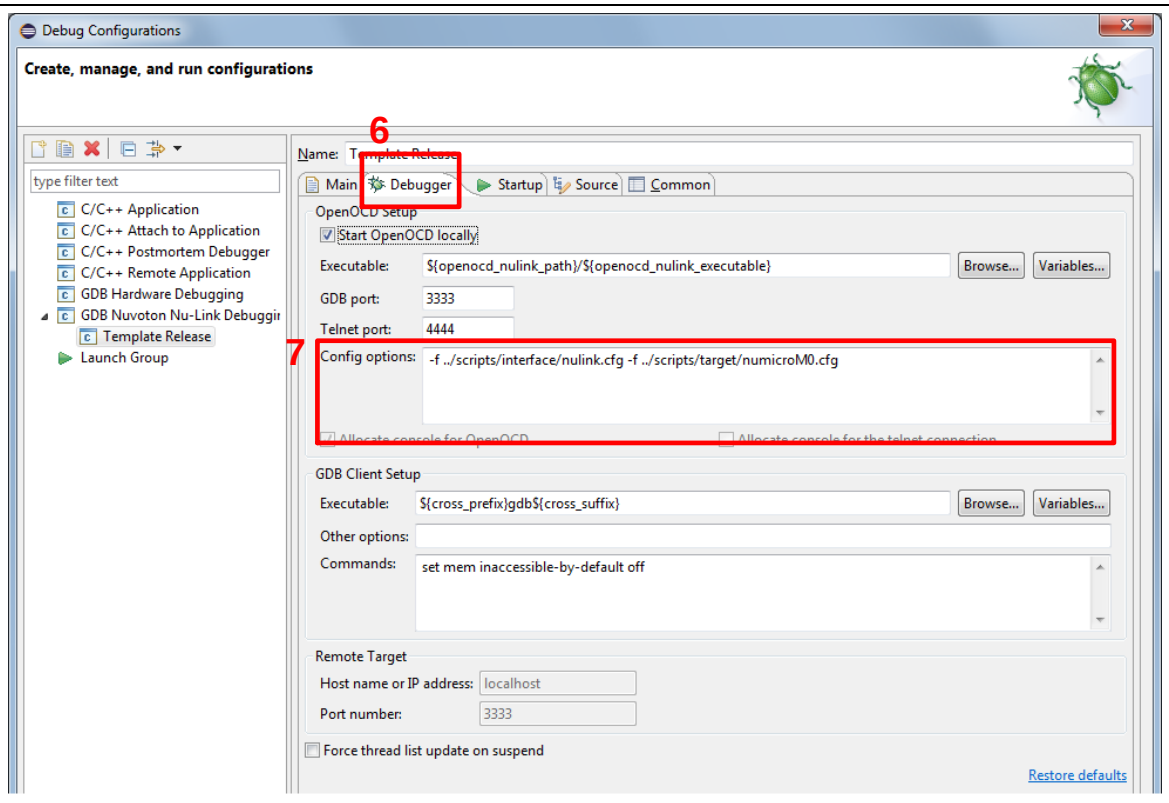
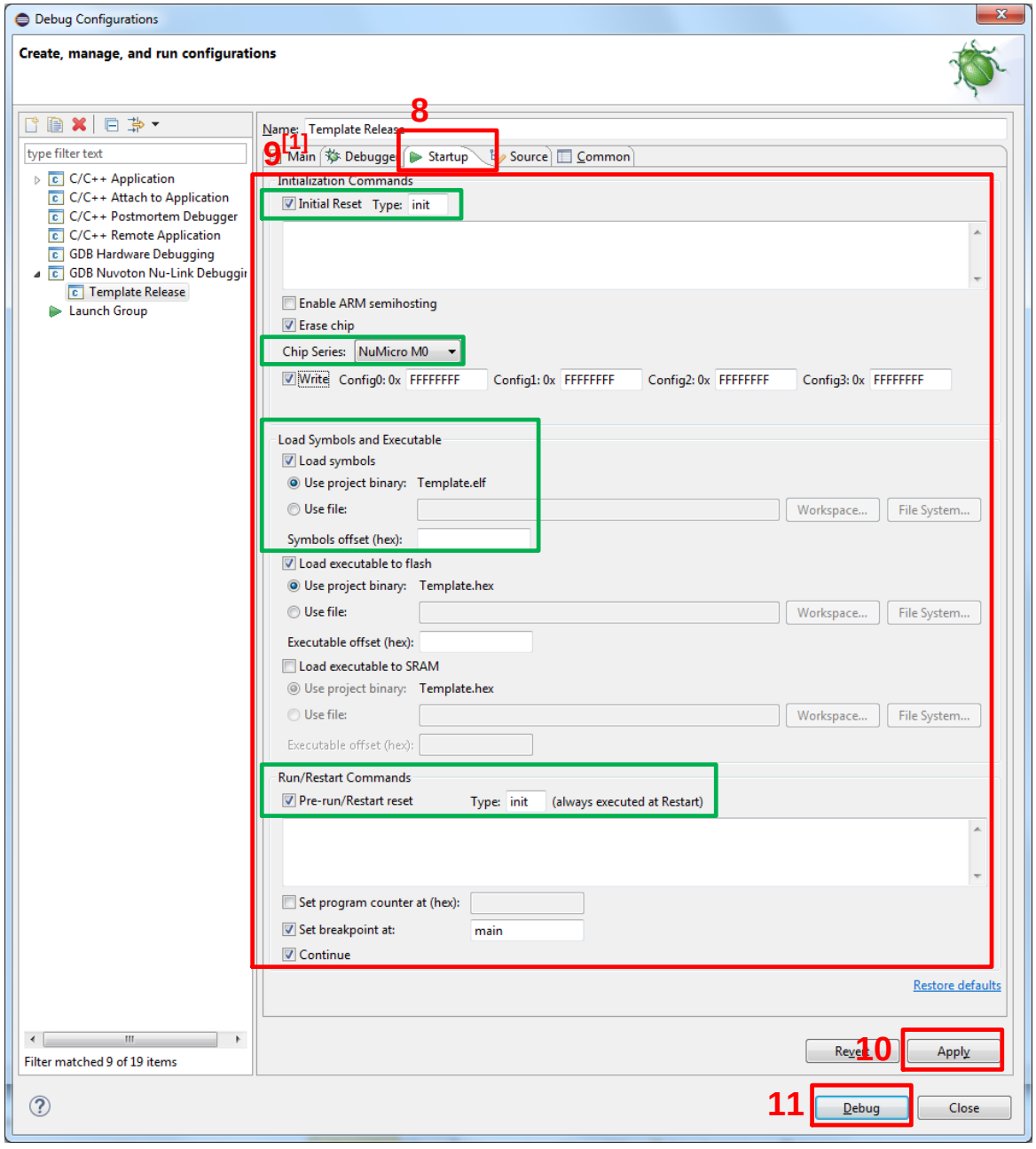


Figure 4-26 Debugger Tab Configuration



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*.

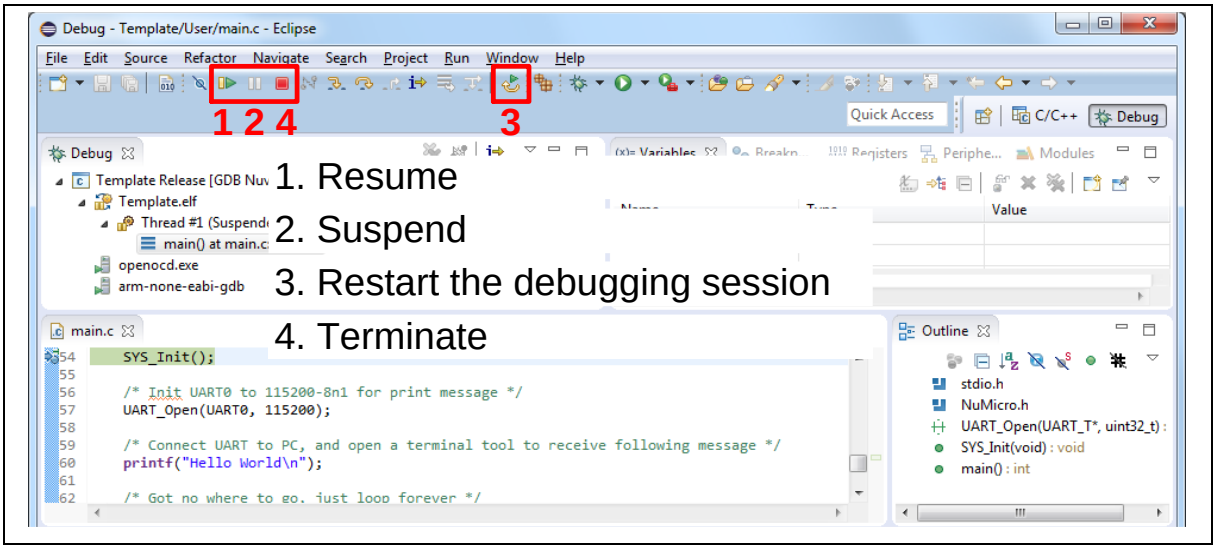


Figure 4-28 NuEclipse Debug Mode

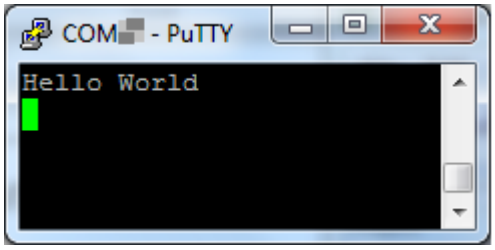


Figure 4-29 Debug Message on Serial Port Terminal Windows

5 NUMAKER-M5531 SCHEMATICS

5.1 Nu-Link2-Me

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

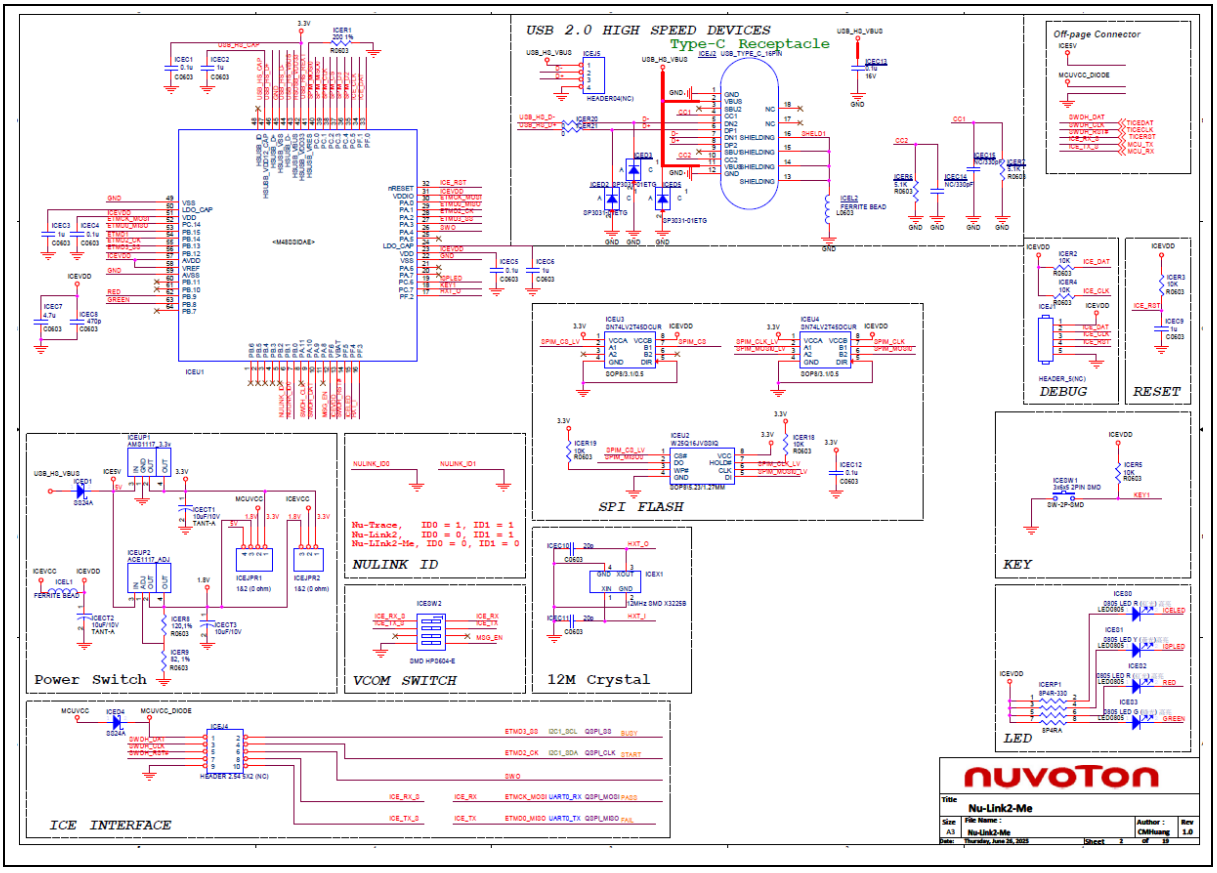


Figure 5-1 Nu-Link2-Me Circuit

5.2 Power Source

Figure 5-3 shows the power source circuit.

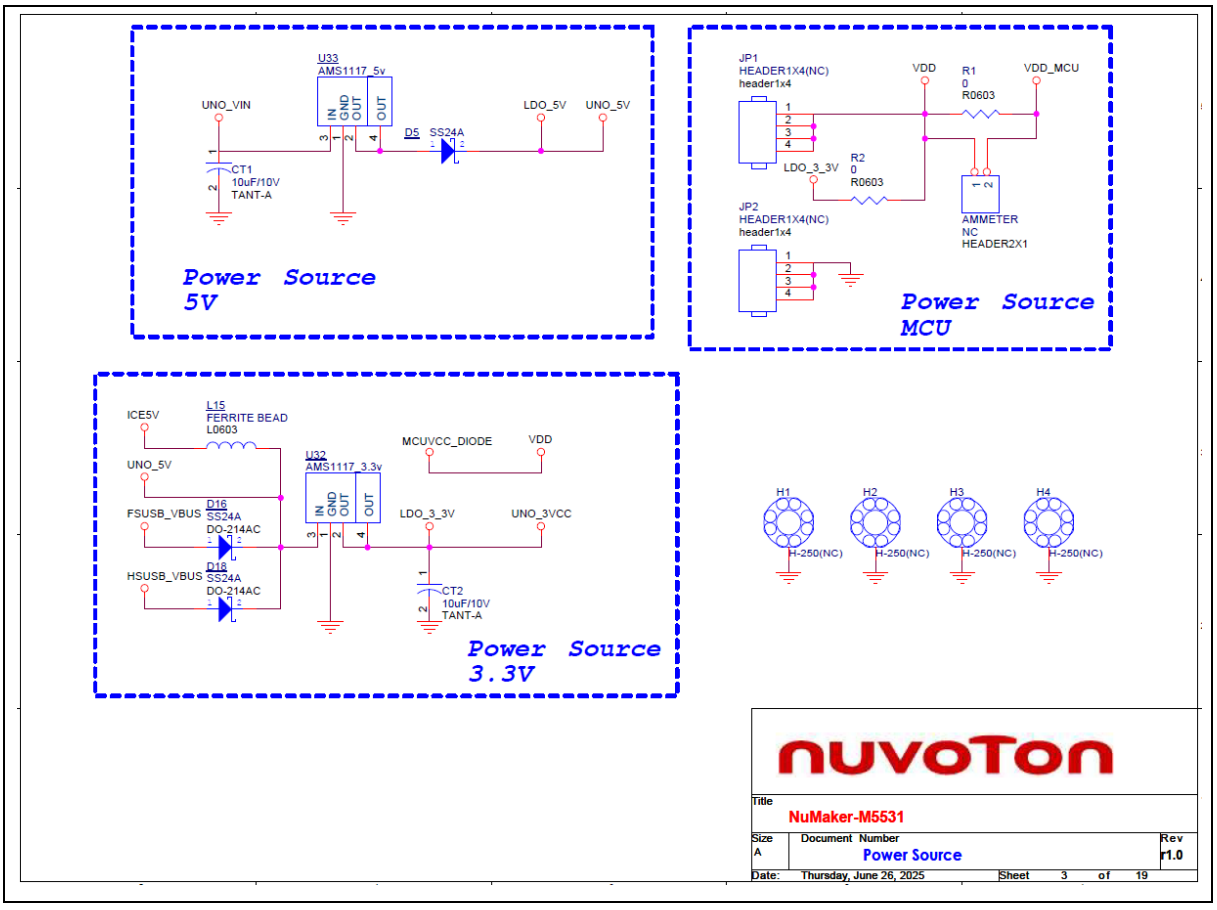


Figure 5-2 Power Source Circuit

5.3 M5531 Target Board

Figure 5-3 shows the M5531 target board circuit.

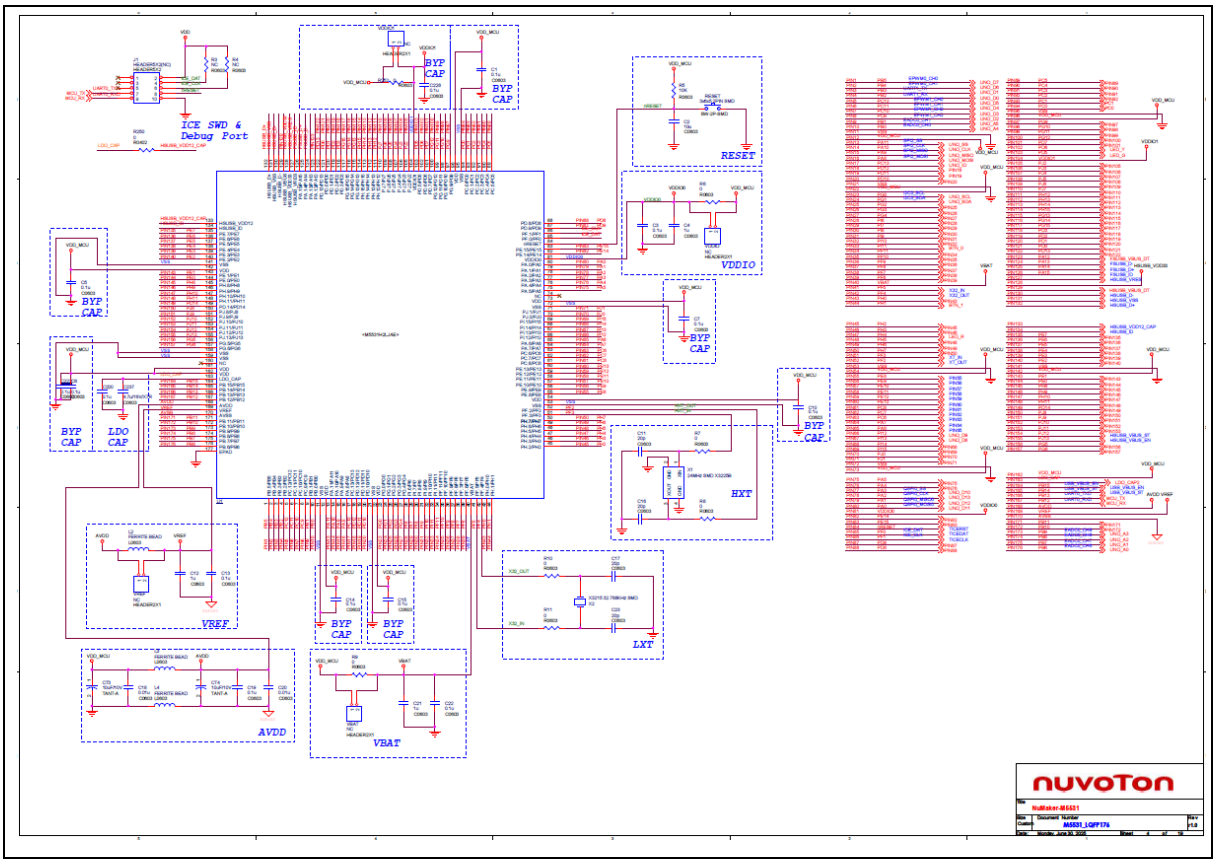


Figure 5-3 M5531 Target Board Circuit

5.4 Extension Connectors

Figure 5-4 shows extension connectors of NuMaker-M5531.

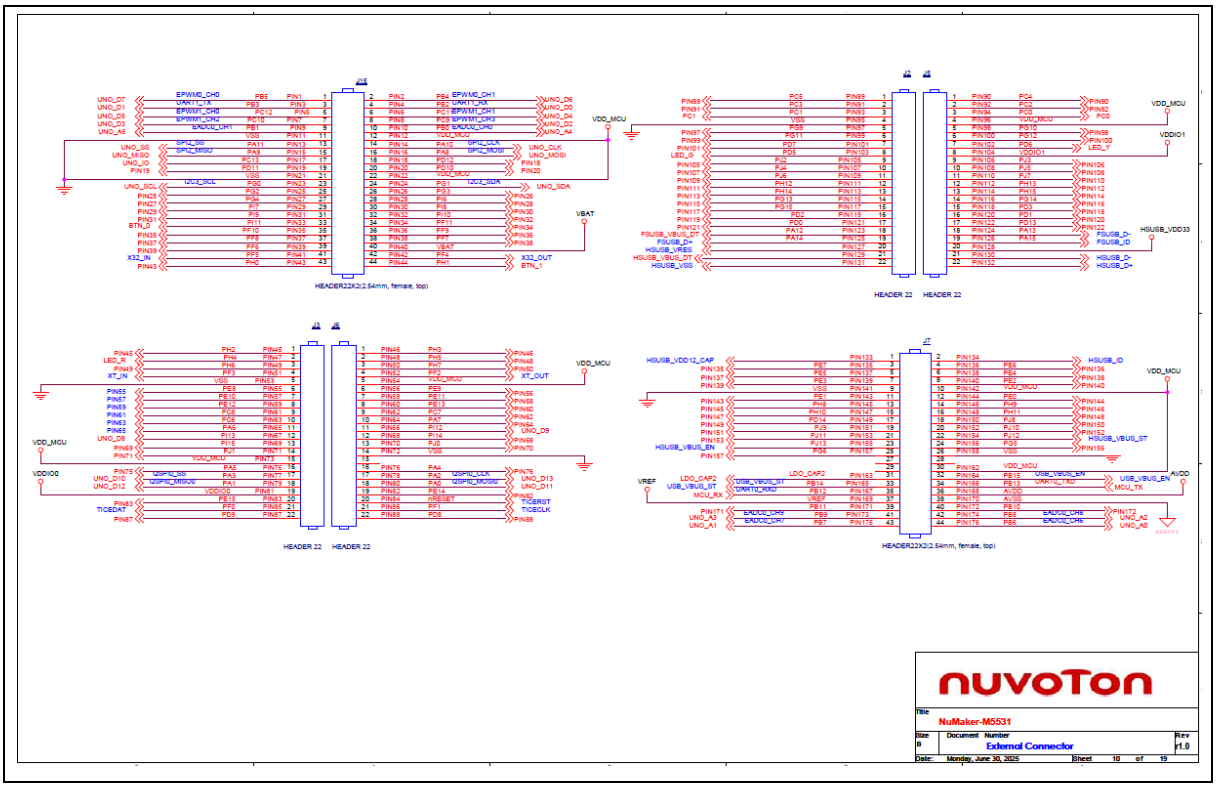


Figure 5-4 Extension Connectors Circuit

5.5 Arduino UNO I/F

Figure 5-5 shows the Arduino UNO interface circuit.

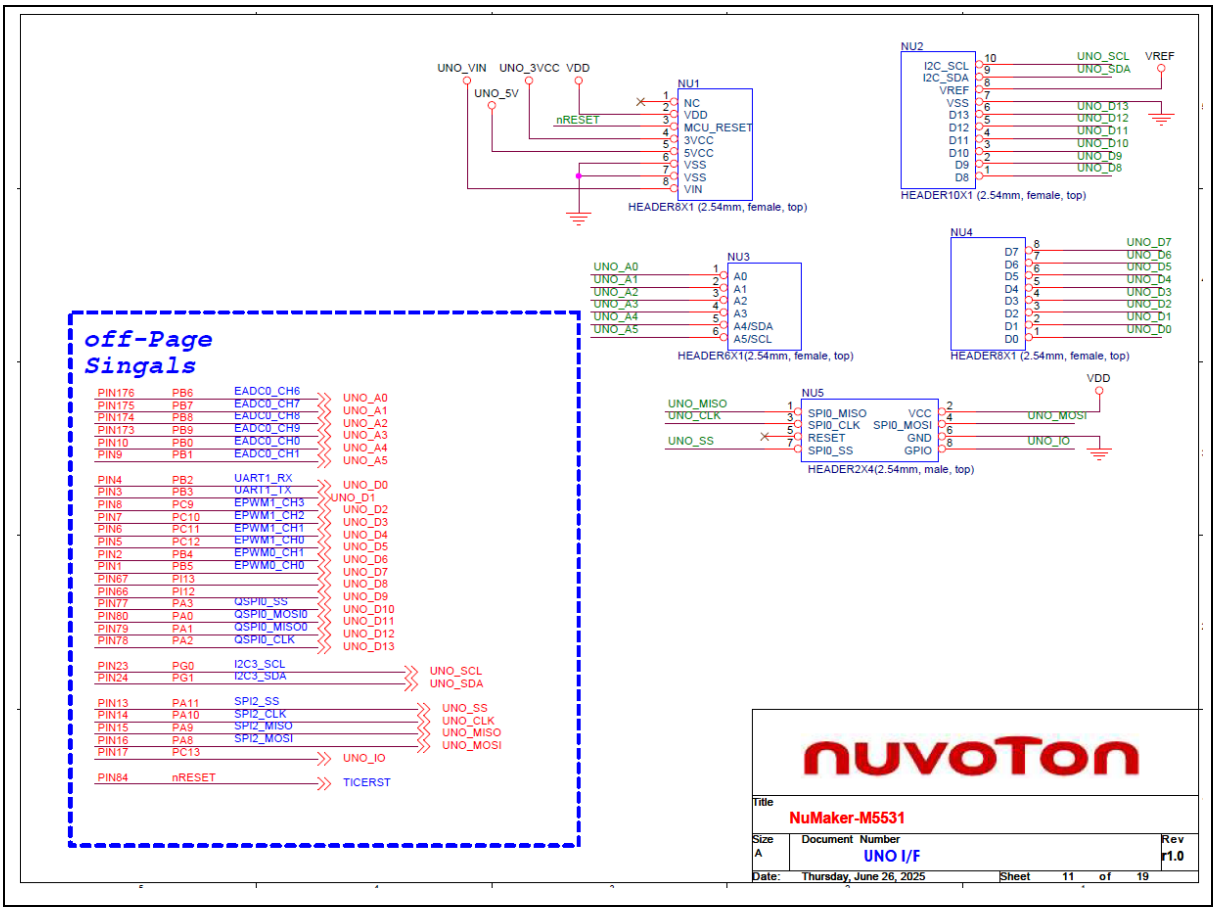


Figure 5-5 Arduino Uno I/F Circuit

5.6 Full-speed USB

Figure 5-6 shows the full-speed USB circuit.

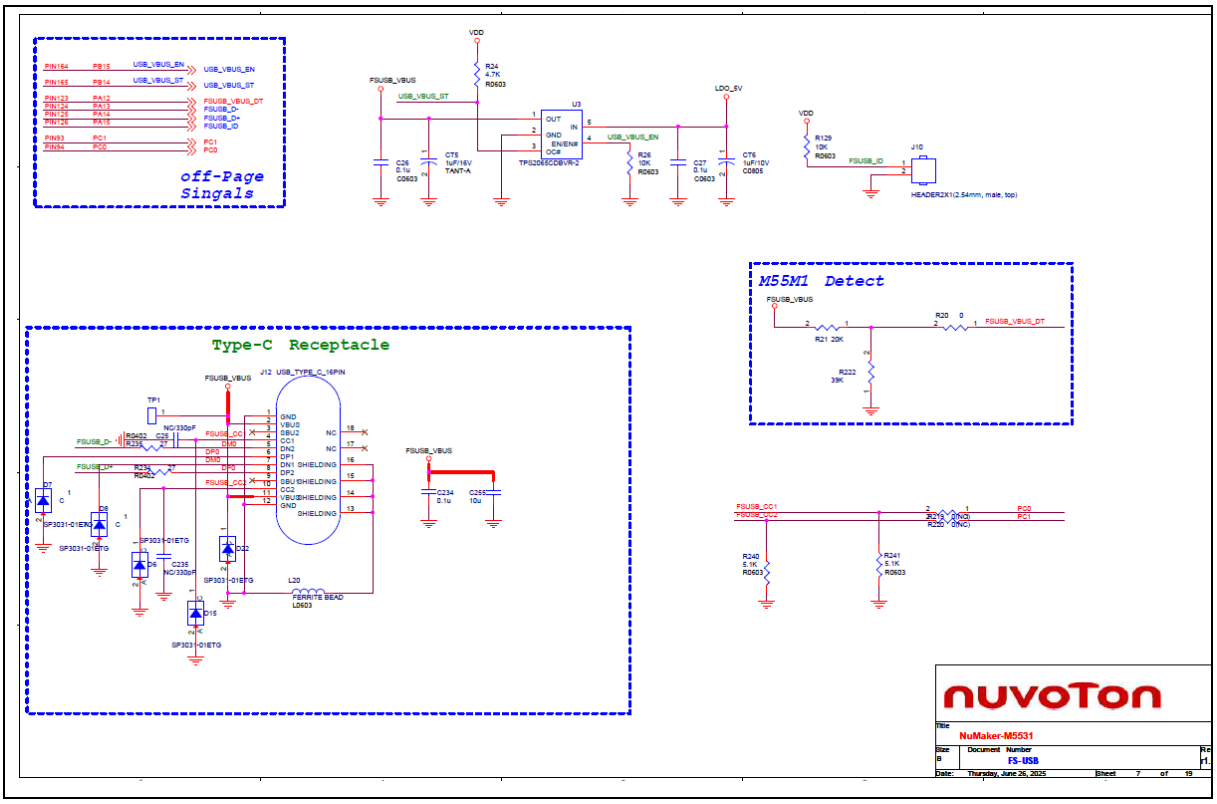


Figure 5-6 Full-speed USB Circuit

5.7 High-speed USB

Figure 5-7 shows the high-speed USB circuit.

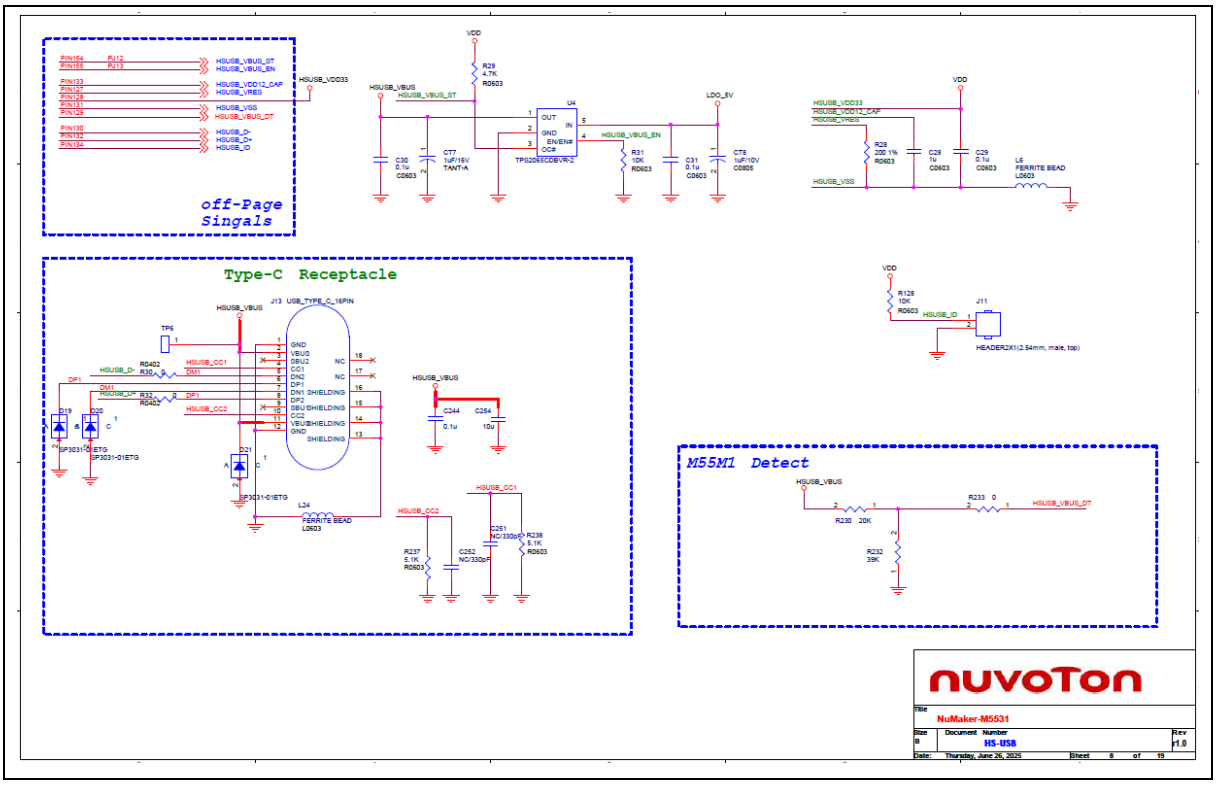


Figure 5-7 High-speed USB Circuit

5.8 LEDs & Buttons

Figure 5-8 shows the LEDs and buttons circuit.

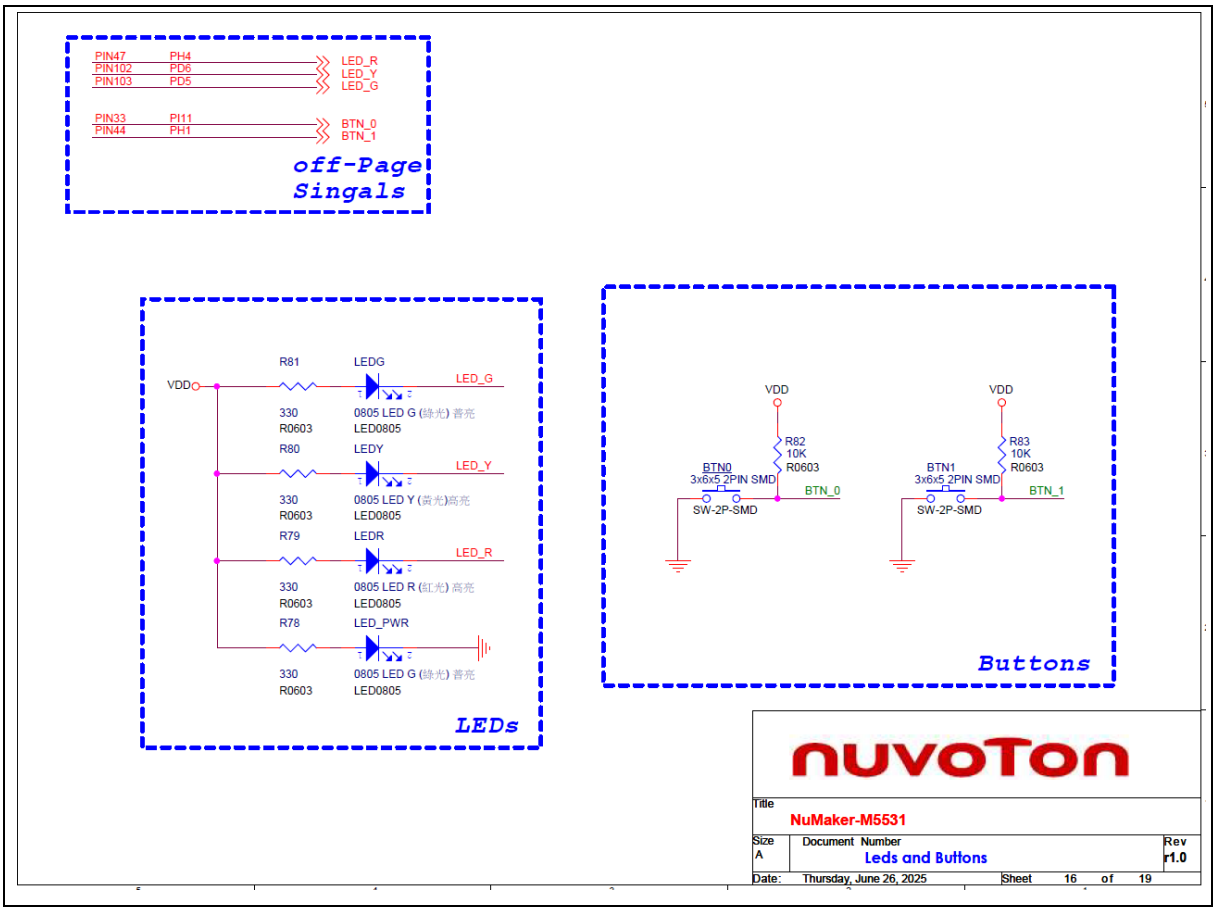


Figure 5-8 LEDs and Buttons Circuit

5.9 PCB Placement

Figure 5-9 and Figure 5-10 show the front and rear placement of NuMaker-M5531.

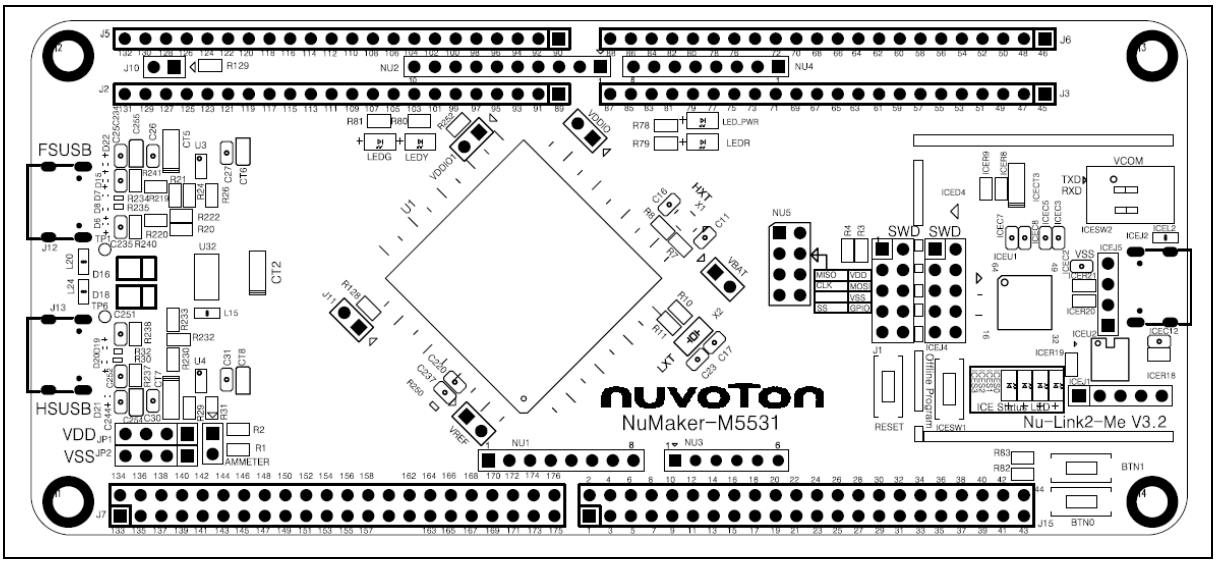


Figure 5-9 Front Placement

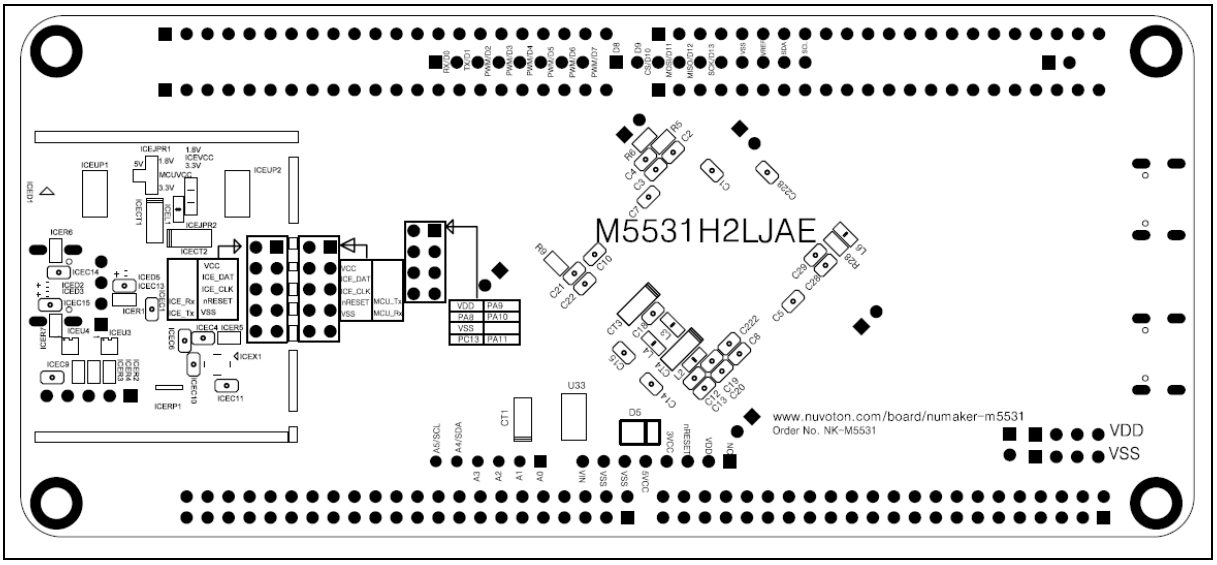


Figure 5-10 Rear Placement

6 REVISION HISTORY

Date	Revision	Description
2025.09.02	1.00	● Initial version.
2025.10.08	1.01	● Modified operation voltage from 1.7V to 1.71V

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.