NuMicro® Family

Arm® Cortex®-M4-based Microcontroller

NuMaker-HMI-M467

User Manual

Evaluation Board for NuMicro® M460 Series

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1 OVERVIEW

The NuMaker-HMI-M467 is an evaluation board for Nuvoton NuMicro M467SJ, M467KJ, M467JJ, M467HJ microcontrollers. The NuMaker-HMI-M467 consists of two parts: an NuMaker-M467HJ base board and an NuMaker-TFT-LCD43 daughter board. The NuMaker-HMI-M467 integrates touchscreen display, voice input/output, rich serial port service and I/O interface, providing multiple external storage methods. The NuMaker-HMI-M467 is designed for project evaluation, prototype development and validation with HMI (Human Machine Interface) function.

The NuMaker-M467HJ base board consists of two parts: an M467HJ target board and an on-board Nu-Link2-Me debugger and programmer. The M467HJ target board is based on NuMicro M467HJHAN. For the development flexibility, the M467HJ 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. The Nu-Link2-Me supports on-chip debugging, online and offline ICP programming via SWD interface. It also 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.

The NuMaker-TFT-LCD43 daughter board extends the NuMaker evaluation boards. The NuMaker-TFT-LCD43 requires NuMaker-M467HJ as the mother board to create a HMI development platform. It is equipped withs a 4.3” 480 x 272 RGB TFT-LCD and capacitive touch panel.

The NuMaker-HMI-M467 supports multiple graphics libraries, such as RT-Thread LVGL and emWin. It helps users build up dynamic GUI effects easily and provides another option in GUI development. Please refer to section 5.7 for more information about graphics libraries.

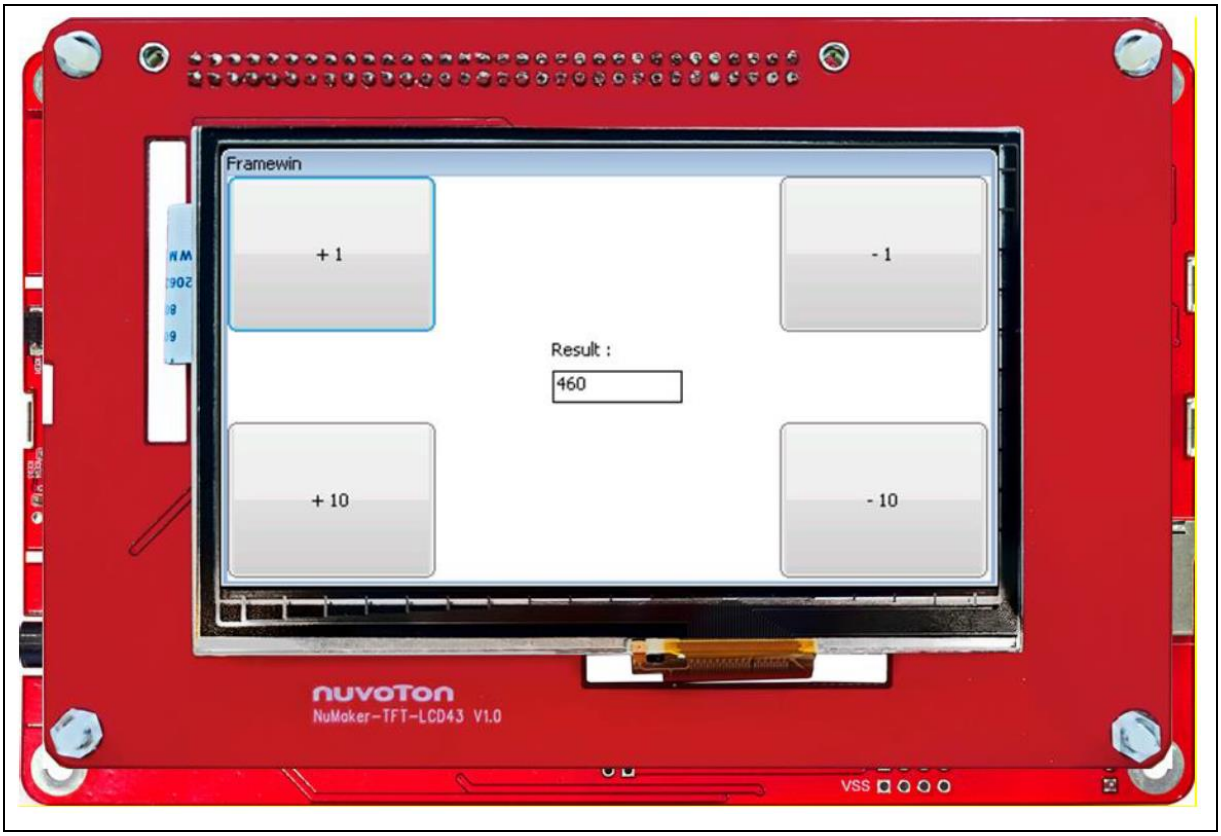


Figure 1-1 NuMaker-HMI-M467

Figure 1-2 NuMaker-TFT-LCD43 Daughter Board

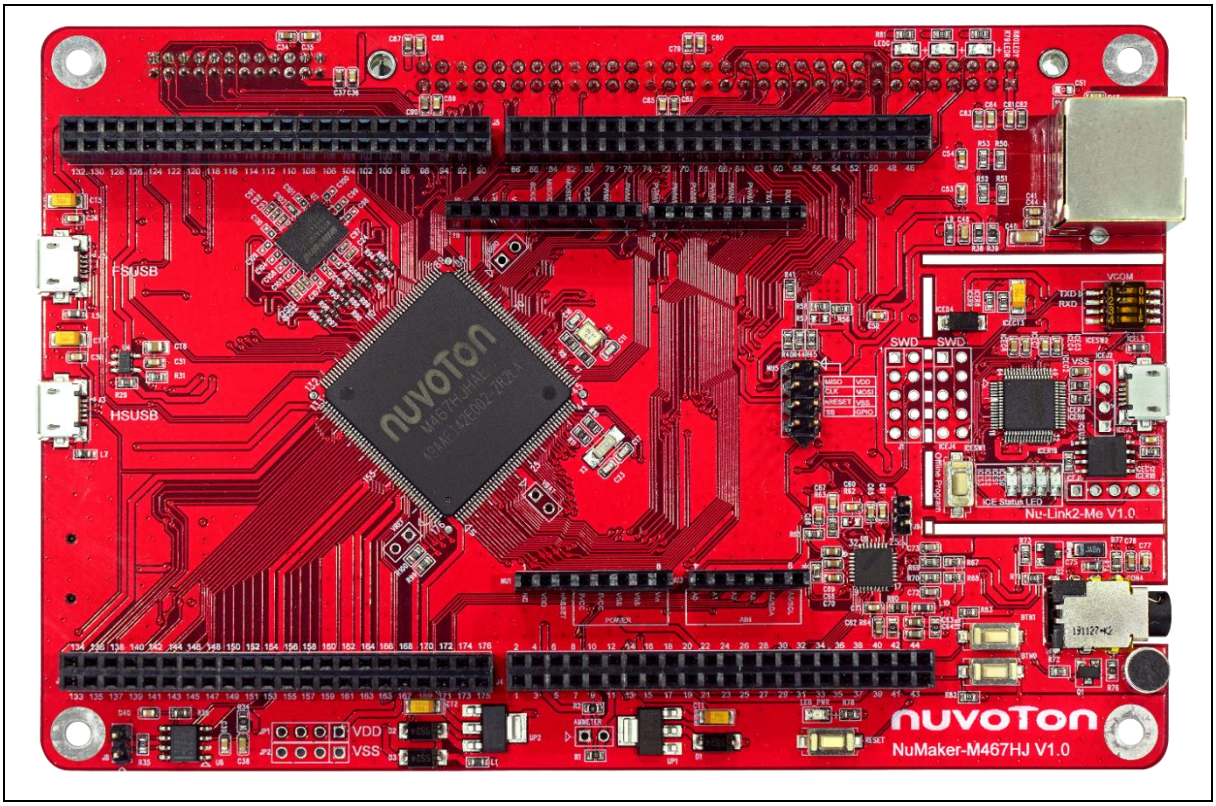


Figure 1-3 NuMaker-M467HJ Base Board

2 FEATURES

2.1 NuMaker-M467HJ Features

- NuMicro M467HJHAN used as main microcontroller with function compatible with:
  - M467SJHAN
  - M467KJHAN
  - M467JJHAN
  - M467HJHAN
- M467HJHAN 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 M467HJHAN target board
  - USB HS connector on M467HJHAN target board
  - ICE USB connector on Nu-Link2-Me
- On-board components:
  - 32 MB SPI Flash
  - 64 MB HyperRAM
  - Thermal sensor (Nuvoton NCT7717U)
  - User LEDs and user buttons
  - 10/100M ethernet PHY
  - FS-USB OTG and HS-USB OTG
  - Audio Codec
  - Micro SD Card slot
  - CAN FD transceiver
- On-board Nu-Link2-Me debugger and programmer:
  - Debug through SWD interface
  - Online/offline programming
  - Virtual COM port function

2.2 NuMaker-TFT-LCD43 Features

- 4.3" TFT-LCD
  - Resolution of 480 x 272
  - 8 bit / 16 bit interface supporting 65K (RGB565)
  - Capacitive touch panel

3 NUMAKER-M467HJ HARDWARE CONFIGURATION

3.1 Front View

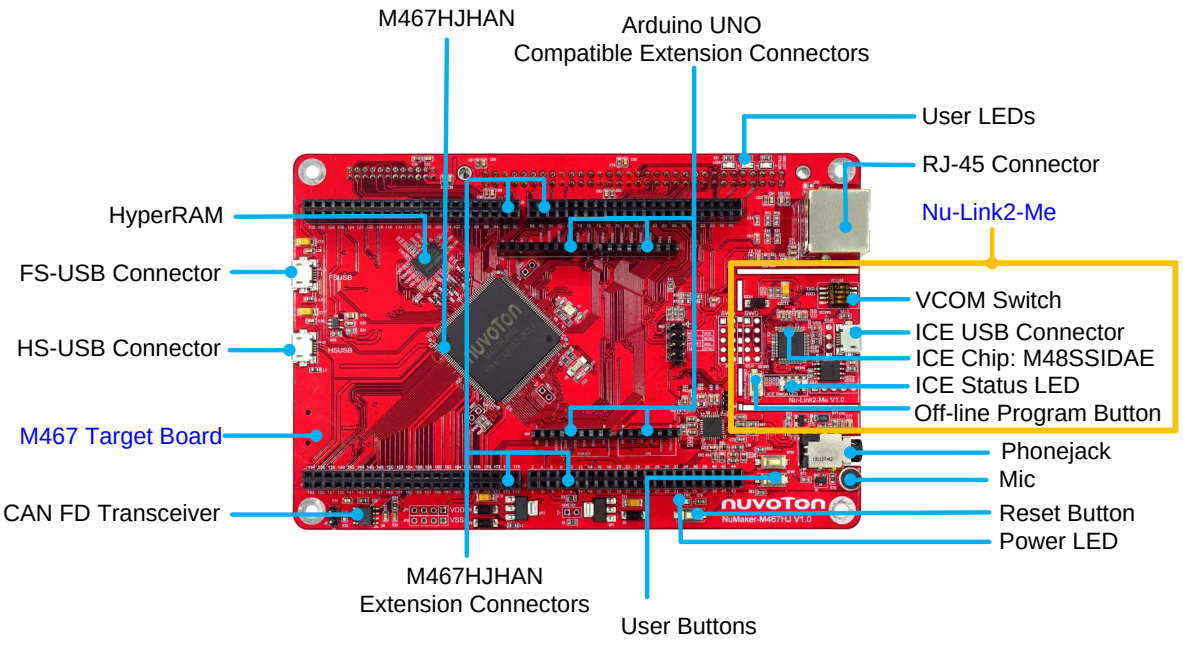


Figure 3-1 Front View of NuMaker-M467HJ

Figure 3-1 shows the main components and connectors from the front side of NuMaker-M467HJ. The following lists components and connectors from the front view:

- Target chip: M467HJHAN (U1)
- USB FS Connector (J2)
- USB HS Connector (J3)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4 and NU5)
- M467 Extension Connectors (J4, J5, J6 and J7)
- External V_{DD} Power Connector (JP1)
- External V_{SS} Power Connector (JP2)
- External V_{DDIO} Connector (VDDIO)
- External V_{BAT} Connector (VBAT)
- External V_{REF} Connector (VREF)
- Ammeter Connector (AMMETER)
- Reset Button (RESET)
- Power LED (LED_PWR), PH4 Red LED (LED_R), PH5 Yellow LED (LED_Y) and PH6 Green LED (LED_G)
- Nu-Link2-Me
  - VCOM Switch
  - ICE Chip: M48SSIDAE (ICEU2)

- ICE USB Connector (ICEJ3)
- ICE Status LED (ICES0, ICES1, ICES2, ICES3)
- Off-line Program Button (ICESW1)

3.2 Rear View

Figure 3-2 shows the main components and connectors from the rear side of NuMaker-M467HJ.

The following lists components and connectors from the rear view:

- CMOS Sensor Connector (CON1)
- TFT-LCD Daughter Board Connector (CON2)
- SD Card Connector (U5) and SD Card Power LED (SD_PWR)
- Thermal Sensor (U10, Nuvoton NCT7717U)
- SPI Flash (U11)
- Nu-Link2-Me
  - MCUVCC Power Switch (ICEJPR1)
  - ICEVCC Power Switch (ICEJPR2)

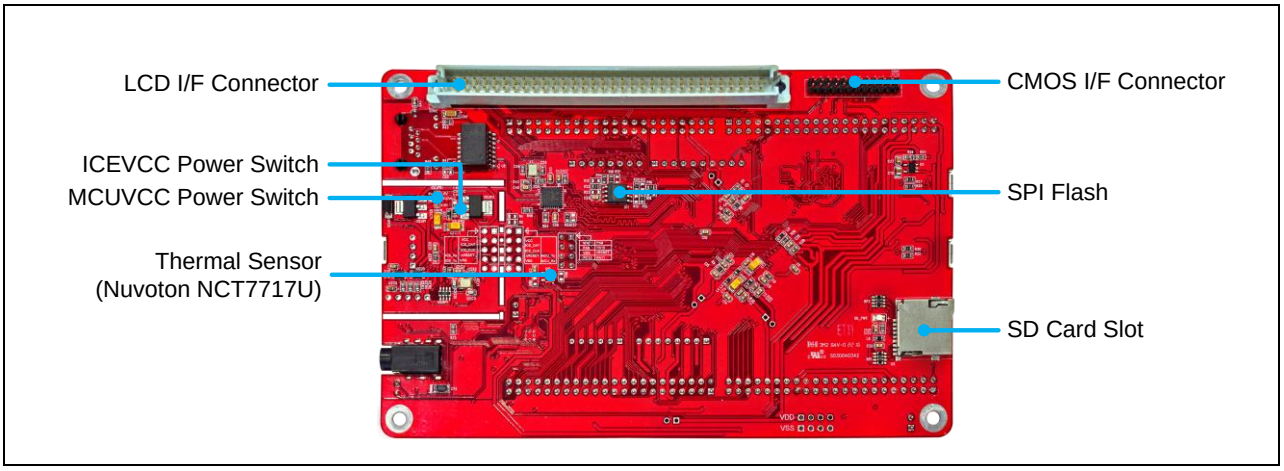


Figure 3-2 Rear View of NuMaker-M467HJ

3.3 Extension Connectors

Table 3-1 presents the extension connectors.

Connector	Description
J4, J5, J6 and J7	Full pins extension connectors on the NuMaker-M467HJ.
NU1, NU2, NU3, NU4 and NU5	Arduino UNO compatible pins on the NuMaker-M467HJ.
CON1	CMOS sensor connector on the NuMaker-M467HJ.
CON2	TFT LCD daughter board connector on the NuMaker-M467HJ

Table 3-1 Extension Connectors

3.3.1 Pin Assignment for Extension Connectors

The NuMaker-M467HJ provides the M467HJHAN onboard and extension connectors (J4, J5, J6 and J7). Figure 3-3 shows the M467HJHAN extension connectors.

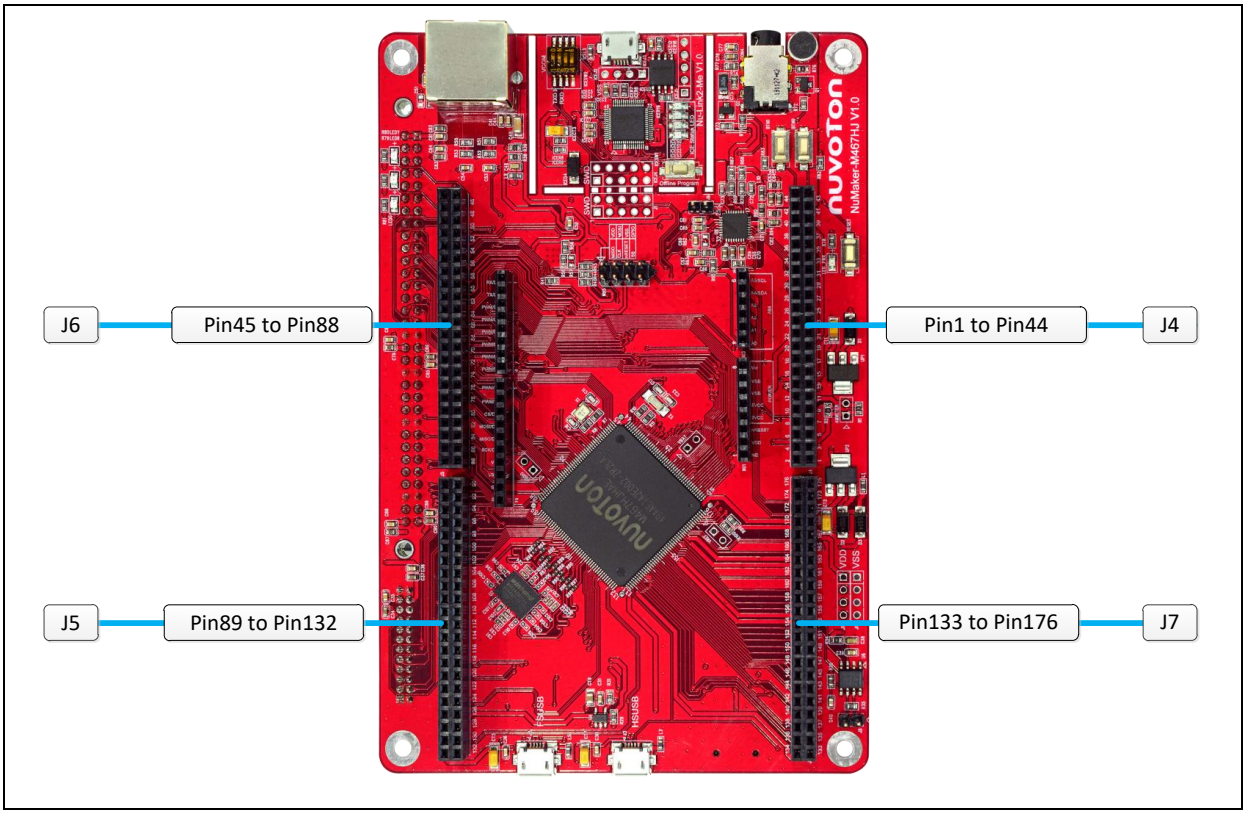


Figure 3-3 M467HJHAN Extension Connectors

Header		M467HJHAN	
		Pin No.	Function
JP4	JP4.1	1	PB.5 / EADC0_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 / PSIO0_CH4 / KPI_COL6
	JP4.2	2	PB.4 / EADC0_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 / PSIO0_CH5 / KPI_COL7
	JP4.3	3	PB.3 / EADC0_CH3 / EADC1_CH11 / 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 / PSIO0_CH6 / KPI_ROW0
	JP4.4	4	PB.2 / EADC0_CH2 / EADC1_CH10 / 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 / PSIO0_CH7 / KPI_ROW1
	JP4.5	5	PC.12 / EADC2_CH13 / EBI_ADR4 / UART0_TXD / I2C0_SCL / UART6_TXD / SPI3_MISO / SC0_nCD / I2C4_SCL / ECAP1_IC2 / EPWM1_CH0 / ACMP0_O
	JP4.6	6	PC.11 / EADC2_CH12 / ACMP3_P3 / EBI_ADR5 / UART0_RXD / I2C0_SDA / UART6_RXD / SPI3_MOSI / I2C4_SDA / ECAP1_IC1 / EPWM1_CH1 / ACMP1_O
	JP4.7	7	PC.10 / EADC2_CH11 / ACMP3_P2 / EBI_ADR6 / UART6_nRTS / SPI3_CLK / UART3_TXD / CAN1_TXD / I2C4_SMBAL / ECAP1_IC0 / EPWM1_CH2 / EADC1_ST
	JP4.8	8	PC.9 / EADC2_CH10 / ACMP3_P1 / EBI_ADR7 / UART6_nCTS / SPI3_SS / UART3_RXD / CAN1_RXD / I2C4_SMBSUS / EPWM1_CH3 / EADC1_ST
	JP4.9	9	PB.1 / EADC0_CH1 / EADC1_CH9 / EADC2_CH9 / 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 / KPI_ROW2
	JP4.10	10	PB.0 / EADC0_CH0 / EADC1_CH8 / EADC2_CH8 / 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 / KPI_ROW3
	JP4.11	11	V_{SS}
	JP4.12	12	V_{DD}
	JP4.13	13	PA.11 / EADC1_CH7 / EADC2_CH7 / ACMP0_P0 / EBI_nRD / SC2_PWR / SPI2_SS / SD1_DAT3 / USCI0_CLK / I2C2_SCL / UART6_TXD / BPWM0_CH0 / EPWM0_SYNC_OUT / I2S1_BCLK / TM0_EXT / DAC1_ST / KPI_ROW4
	JP4.14	14	PA.10 / EADC1_CH6 / EADC2_CH6 / 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
	JP4.15	15	PA.9 / EADC1_CH5 / EADC2_CH5 / 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
	JP4.16	16	PA.8 / EADC1_CH4 / EADC2_CH4 / 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
	JP4.17	17	PC.13 / EADC1_CH3 / EADC2_CH3 / EBI_ADR10 / SC2_nCD / SPI2_I2SMCLK / CAN1_TXD / USCI0_CTL0 / UART2_TXD / UART8_nCTS / BPWM0_CH4 / CLKO / EADC0_ST
	JP4.18	18	PD.12 / EADC1_CH2 / EADC2_CH2 / EBI_nCS0 / CAN1_RXD / UART2_RXD / UART8_nRTS / BPWM0_CH5 / EQEI0_INDEX / ECAP3_IC0 / CLKO / EADC0_ST / INT5
	JP4.19	19	PD.11 / EADC1_CH1 / EADC2_CH1 / EBI_nCS1 / UART1_TXD / CAN0_TXD / UART8_TXD / EQEI0_A / ECAP3_IC1 / INT6
	JP4.20	20	PD.10 / EADC1_CH0 / EADC2_CH0 / EBI_nCS2 / UART1_RXD / CAN0_RXD / UART8_RXD / EQEI0_B / ECAP3_IC2 / INT7
	JP4.21	21	V_{SS}
	JP4.22	22	V_{DD}
	JP4.23	23	PG.0 / EBI_ADR8 / I2C0_SCL / I2C1_SMBAL / UART2_RXD / CAN1_TXD / UART1_TXD / I2C3_SCL
	JP4.24	24	PG.1 / EBI_ADR9 / SPI2_I2SMCLK / I2C0_SDA / I2C1_SMBSUS / UART2_TXD / CAN1_RXD / UART1_RXD / I2C3_SDA
	JP4.25	25	PG.2 / EBI_ADR11 / SPI2_SS / I2C0_SMBAL / I2C1_SCL / CCAP_DATA7 / I2C3_SMBAL / TM0
	JP4.26	26	PG.3 / EBI_ADR12 / SPI2_CLK / I2C0_SMBSUS / I2C1_SDA / CCAP_DATA6 / I2C3_SMBSUS / TM1
	JP4.27	27	PG.4 / EBI_ADR13 / SPI2_MISO / CCAP_DATA5 / TM2

Header		M467HJHAN	
		Pin No.	Function
	JP4.28	28	PI.6 / SC1_nCD / I2S0_BCLK / SPI1_I2SMCLK / UART2_TXD / I2C1_SCL / CAN3_TXD / USB_VBUS_ST
	JP4.29	29	PI.7 / SC1_PWR / I2S0_MCLK / SPI1_MISO / UART2_RXD / I2C1_SDA / CAN3_RXD / USB_VBUS_EN
	JP4.30	30	PI.8 / SC1_RST / I2S0_DI / SPI1_MOSI / UART2_nRTS / I2C0_SMBAL / CAN2_TXD
	JP4.31	31	PI.9 / SC1_DAT / I2S0_DO / SPI1_CLK / UART2_nCTS / I2C0_SMBSUS / CAN2_RXD
	JP4.32	32	PI.10 / SC1_CLK / I2S0_LRCK / SPI1_SS / UART2_TXD / I2C0_SCL / CAN3_TXD
	JP4.33	33	PI.11 / UART2_RXD / I2C0_SDA / CAN3_RXD
	JP4.34	34	PF.11 / EBI_ADR14 / SPI2_MOSI / UART5_TXD / CCAP_DATA4 / CAN3_TXD / TAMPER5 / UART9_nCTS / TM3
	JP4.35	35	PF.10 / EBI_ADR15 / SC0_nCD / I2S0_BCLK / SPI0_I2SMCLK / UART5_RXD / CCAP_DATA3 / CAN3_RXD / TAMPER4 / UART9_nRTS
	JP4.36	36	PF.9 / EBI_ADR16 / SC0_PWR / I2S0_MCLK / SPI0_SS / UART5_nRTS / CCAP_DATA2 / CAN1_TXD / TAMPER3 / UART9_TXD
	JP4.37	37	PF.8 / EBI_ADR17 / SC0_RST / I2S0_DI / SPI0_CLK / UART5_nCTS / CCAP_DATA1 / CAN1_RXD / TAMPER2 / UART9_RXD
	JP4.38	38	PF.7 / EBI_ADR18 / SC0_DAT / I2S0_DO / SPI0_MISO / UART4_TXD / CCAP_DATA0 / CAN2_TXD / TAMPER1
	JP4.39	39	PF.6 / EBI_ADR19 / SC0_CLK / I2S0_LRCK / SPI0_MOSI / UART4_RXD / EBI_nCS0 / CAN2_RXD / SPI3_I2SMCLK / TAMPER0 / EQEI2_INDEX / TRACE_SWO
	JP4.40	40	V_{BAT}
	JP4.41	41	PF.5 / UART2_RXD / EBI_AD1 / UART2_nCTS / EPWM0_CH0 / BPWM0_CH4 / EPWM0_SYNC_OUT / X32_IN / EADC0_ST / I2C4_SCL / EQEI2_A
	JP4.42	42	PF.4 / UART2_TXD / EBI_AD0 / UART2_nRTS / EPWM0_CH1 / BPWM0_CH5 / X32_OUT / EADC1_ST / I2C4_SDA / EQEI2_B
	JP4.43	43	PH.0 / EBI_ADR7 / UART5_TXD / TM0_EXT
	JP4.44	44	PH.1 / EBI_ADR6 / UART5_RXD / TM1_EXT
JP6	JP6.1	45	PH.2 / EBI_ADR5 / UART5_nRTS / UART4_TXD / I2C0_SCL / TM2_EXT
	JP6.2	46	PH.3 / EBI_ADR4 / SPI1_I2SMCLK / UART5_nCTS / UART4_RXD / I2C0_SDA / TM3_EXT
	JP6.3	47	PH.4 / EBI_ADR3 / SPI1_MISO / UART7_nRTS / UART6_TXD
	JP6.4	48	PH.5 / EBI_ADR2 / SPI1_MOSI / UART7_nCTS / UART6_RXD
	JP6.5	49	PH.6 / EBI_ADR1 / SPI1_CLK / UART7_TXD / UART9_nCTS
	JP6.6	50	PH.7 / EBI_ADR0 / SPI1_SS / UART7_RXD / UART9_nRTS
	JP6.7	51	PF.3 / EBI_nCS0 / UART0_TXD / I2C0_SCL / UART9_TXD / XT1_IN / BPWM1_CH0 / I2C4_SMBAL / ACMP2_O / EADC2_ST
	JP6.8	52	PF.2 / EBI_nCS1 / UART0_RXD / I2C0_SDA / QSPI0_CLK / UART9_RXD / XT1_OUT / BPWM1_CH1 / I2C4_SMBSUS / ACMP3_O
	JP6.9	53	V_{SS}
	JP6.10	54	V_{DD}
	JP6.11	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
	JP6.12	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
	JP6.13	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
	JP6.14	58	PE.11 / EBI_ADR13 / EMAC0_RMII_TXD1 / I2S0_DO / SPI2_SS / UART3_RXD / UART1_nCTS / EPWM0_CH3 / EPWM1_BRAKE1 / ECAP1_IC2 / TRACE_DATA0 / KPI_COL7
	JP6.15	59	PE.12 / EBI_ADR14 / EMAC0_RMII_TXEN / I2S0_LRCK / SPI2_I2SMCLK / UART1_nRTS / EPWM0_CH4 / ECAP1_IC1 / TRACE_CLK / KPI_COL6
	JP6.16	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

Header		M467HJHAN	
		Pin No.	Function
	JP6.17	61	PC.8 / EBI_ADR16 / EMAC0_RMII_REFCLK / I2C0_SDA / UART4_nCTS / UART1_RXD / EPWM1_CH1 / BPWM1_CH4 / KPI_COL4
	JP6.18	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 / CAN3_TXD / TM0 / INT3 / KPI_COL3
	JP6.19	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 / CAN3_RXD / TM1 / INT2 / KPI_COL2
	JP6.20	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 / KPI_COL1
	JP6.21	65	PA.6 / EBI_AD6 / EMAC0_RMII_RXERR / SPI1_SS / SD1_nCD / SC2_CLK / UART0_RXD / I2C1_SDA / QSPI1_MOSI1 / EPWM1_CH5 / BPWM1_CH3 / ACMP1_WLAT / TM3 / INT0 / KPI_COL0
	JP6.22	66	PI.12 / SPIM_SS / QSPI0_MISO1 / CAN0_TXD / UART4_TXD / EPWM1_CH0 / I2C3_SMBAL
	JP6.23	67	PI.13 / SPIM_MISO / QSPI0_MOSI1 / CAN0_RXD / UART4_RXD / EPWM1_CH1 / I2C3_SMBSUS
	JP6.24	68	PI.14 / SPIM_D2 / QSPI0_SS / UART8_nCTS / CAN1_TXD / UART3_TXD / EPWM1_CH2 / I2C3_SCL
	JP6.25	69	PI.15 / SPIM_D3 / QSPI0_CLK / UART8_nRTS / CAN1_RXD / UART3_RXD / EPWM1_CH3 / I2C3_SDA
	JP6.26	70	PJ.0 / SPIM_CLK / QSPI0_MISO0 / UART8_TXD / CAN2_TXD / EPWM1_CH4
	JP6.27	71	PJ.1 / SPIM_MOSI / QSPI0_MOSI0 / UART8_RXD / CAN2_RXD / EPWM1_CH5
	JP6.28	72	V_{SS}
	JP6.29	73	V_{DD}
	JP6.30	74	LDO_CAP
	JP6.31	75	PA.5 / SPIM_D2 / QSPI0_MISO1 / SPI1_I2SMCLK / SD1_CMD / SC2_nCD / UART0_nCTS / UART5_TXD / I2C0_SCL / CAN0_TXD / UART0_TXD / BPWM0_CH5 / EPWM0_CH0 / EQEI0_INDEX
	JP6.32	76	PA.4 / SPIM_D3 / QSPI0_MOSI1 / SPI0_I2SMCLK / SD1_CLK / SC0_nCD / UART0_nRTS / UART5_RXD / I2C0_SDA / CAN0_RXD / UART0_RXD / BPWM0_CH4 / EPWM0_CH1 / EQEI0_A
	JP6.33	77	PA.3 / SPIM_SS / QSPI0_SS / SPI0_SS / SD1_DAT3 / SC0_PWR / UART4_TXD / UART1_TXD / I2C1_SCL / I2C0_SMBAL / BPWM0_CH3 / EPWM0_CH2 / EQEI0_B / EPWM1_BRAKE1 / PSIO0_CH4
	JP6.34	78	PA.2 / SPIM_CLK / QSPI0_CLK / SPI0_CLK / SD1_DAT2 / SC0_RST / UART4_RXD / UART1_RXD / I2C1_SDA / I2C0_SMBSUS / BPWM0_CH2 / EPWM0_CH3 / EQEI3_INDEX / PSIO0_CH5
	JP6.35	79	PA.1 / SPIM_MISO / QSPI0_MISO0 / SPI0_MISO / SD1_DAT1 / SC0_DAT / UART0_TXD / UART1_nCTS / I2C2_SCL / CCAP_DATA7 / BPWM0_CH1 / EPWM0_CH4 / EQEI3_A / DAC1_ST / PSIO0_CH6
	JP6.36	80	PA.0 / SPIM_MOSI / QSPI0_MOSI0 / SPI0_MOSI / SD1_DAT0 / SC0_CLK / UART0_RXD / UART1_nRTS / I2C2_SDA / CCAP_DATA6 / BPWM0_CH0 / EPWM0_CH5 / EQEI3_B / DAC0_ST / PSIO0_CH7
	JP6.37	81	V_{DDIO}
	JP6.38	82	PE.14 / EBI_AD8 / UART2_TXD / CAN0_TXD / SD1_nCD / UART6_TXD / PSIO0_CH0
	JP6.39	83	PE.15 / EBI_AD9 / UART2_RXD / CAN0_RXD / UART6_RXD / PSIO0_CH1
	JP6.40	84	nRESET
	JP6.41	85	PF.0 / UART1_TXD / I2C1_SCL / UART0_TXD / SC1_DAT / I2S0_DO / UART2_TXD / I2C0_SCL / CAN2_TXD / EPWM1_CH4 / BPWM1_CH0 / ACMP0_O / ICE_DAT / EADC0_ST
	JP6.42	86	PF.1 / UART1_RXD / I2C1_SDA / UART0_RXD / SC1_CLK / I2S0_LRCK / UART2_RXD / I2C0_SDA / CAN2_RXD / EPWM1_CH5 / BPWM1_CH1 / ACMP1_O / ICE_CLK / EADC1_ST
	JP6.43	87	PD.9 / EBI_AD7 / I2C2_SCL / UART2_nCTS / UART7_TXD / CAN2_TXD / PSIO0_CH2
	JP6.44	88	PD.8 / EBI_AD6 / I2C2_SDA / UART2_nRTS / UART7_RXD / CAN2_RXD / PSIO0_CH3
JP5	JP5.1	89	PC.5 / EBI_AD5 / SPIM_D2 / QSPI0_MISO1 / UART2_TXD / I2C1_SCL / CAN0_TXD / UART4_TXD / EPWM1_CH0 / CCAP_DATA5 / QSPI1_SS / I2C3_SMBAL / HBI_nCK / PSIO0_CH0 / KPI_ROW0

Header		M467HJHAN	
		Pin No.	Function
	JP5.2	90	PC.4 / EBI_AD4 / SPIM_D3 / QSPI0_MOSI1 / SC1_nCD / I2S0_BCLK / SPI1_I2SMCLK / UART2_RXD / I2C1_SDA / CAN0_RXD / UART4_RXD / EPWM1_CH1 / CCAP_DATA4 / QSPI1_CLK / I2C3_SMBSUS / HBI_CK / PSIO0_CH1 / KPI_ROW1
	JP5.3	91	PC.3 / EBI_AD3 / SPIM_SS / QSPI0_SS / SC1_PWR / I2S0_MCLK / SPI1_MISO / UART2_nRTS / I2C0_SMBAL / CAN1_TXD / UART3_TXD / EPWM1_CH2 / CCAP_DATA3 / QSPI1_MISO0 / I2C3_SCL / HBI_nCS / PSIO0_CH2 / KPI_ROW2
	JP5.4	92	PC.2 / EBI_AD2 / SPIM_CLK / QSPI0_CLK / SC1_RST / I2S0_DI / SPI1_MOSI / UART2_nCTS / I2C0_SMBSUS / CAN1_RXD / UART3_RXD / EPWM1_CH3 / CCAP_DATA2 / QSPI1_MOSI0 / I2C3_SDA / HBI_nRESET / PSIO0_CH3 / KPI_ROW3
	JP5.5	93	PC.1 / EBI_AD1 / SPIM_MISO / QSPI0_MISO0 / SC1_DAT / I2S0_DO / SPI1_CLK / UART2_TXD / I2C0_SCL / CAN2_TXD / EPWM1_CH4 / CCAP_DATA1 / ACMP0_O / EADC0_ST / HBI_RWDS / KPI_ROW4
	JP5.6	94	PC.0 / EBI_AD0 / SPIM_MOSI / QSPI0_MOSI0 / SC1_CLK / I2S0_LRCK / SPI1_SS / UART2_RXD / I2C0_SDA / CAN2_RXD / EPWM1_CH5 / CCAP_DATA0 / ACMP1_O / EADC1_ST / HBI_D2 / KPI_ROW5
	JP5.7	95	V_{SS}
	JP5.8	96	V_{DD}
	JP5.9	97	PG.9 / EBI_AD0 / SD1_DAT3 / SPIM_D2 / QSPI1_MISO1 / CCAP_PIXCLK / I2C4_SCL / ECAP2_IC0 / BPWM0_CH5 / HBI_D4
	JP5.10	98	PG.10 / EBI_AD1 / SD1_DAT2 / SPIM_D3 / QSPI1_MOSI1 / CCAP_SCLK / I2C4_SDA / ECAP2_IC1 / BPWM0_CH4 / HBI_D3
	JP5.11	99	PG.11 / EBI_AD2 / SD1_DAT1 / SPIM_SS / QSPI1_SS / UART7_TXD / CCAP_SFIELD / I2C4_SMBAL / ECAP2_IC2 / BPWM0_CH3 / HBI_D0
	JP5.12	100	PG.12 / EBI_AD3 / SD1_DAT0 / SPIM_CLK / QSPI1_CLK / UART7_RXD / CCAP_VSYNC / I2C4_SMBSUS / BPWM0_CH2 / HBI_D1
	JP5.13	101	PG.13 / EBI_AD4 / SD1_CMD / SPIM_MISO / QSPI1_MISO0 / UART6_TXD / CCAP_HSYNC / BPWM0_CH1 / HBI_D5
	JP5.14	102	PG.14 / EBI_AD5 / SD1_CLK / SPIM_MOSI / QSPI1_MOSI0 / UART6_RXD / BPWM0_CH0 / HBI_D6
	JP5.15	103	PG.15 / SD1_nCD / CLKO / EADC0_ST / HBI_D7
	JP5.16	104	PJ.2 / EBI_AD5 / UART8_nCTS / QSPI1_SS / CCAP_DATA5 / CAN0_TXD / HBI_nRESET
	JP5.17	105	PJ.3 / EBI_AD4 / UART8_nRTS / QSPI1_CLK / CCAP_DATA4 / CAN0_RXD / HBI_D3
	JP5.18	106	PJ.4 / EBI_AD3 / UART8_TXD / QSPI1_MISO0 / CCAP_DATA3 / CAN1_TXD / HBI_D2
	JP5.19	107	PJ.5 / EBI_AD2 / UART8_RXD / QSPI1_MOSI0 / CCAP_DATA2 / CAN1_RXD / HBI_D1
	JP5.20	108	PJ.6 / EBI_AD1 / UART9_nCTS / CCAP_DATA1 / CAN2_TXD / HBI_D0
	JP5.21	109	PJ.7 / EBI_AD0 / UART9_nRTS / CCAP_DATA0 / CAN2_RXD / HBI_nCS
	JP5.22	110	PH.12 / EBI_AD0 / UART9_TXD / QSPI1_MISO1 / CCAP_PIXCLK / CAN3_TXD / HBI_nCK
	JP5.23	111	PH.13 / EBI_AD1 / UART9_RXD / QSPI1_MOSI1 / CCAP_SCLK / CAN3_RXD / HBI_CK
	JP5.24	112	PH.14 / EBI_AD2 / QSPI1_SS / CCAP_SFIELD / HBI_RWDS
	JP5.25	113	PH.15 / EBI_AD3 / QSPI1_CLK / CCAP_VSYNC / HBI_D4
	JP5.26	114	PD.7 / EBI_AD4 / UART1_TXD / I2C0_SCL / SPI1_MISO / QSPI1_MISO0 / CCAP_HSYNC / SC1_PWR / HBI_D5 / PSIO0_CH4
	JP5.27	115	PD.6 / EBI_AD5 / UART1_RXD / I2C0_SDA / SPI1_MOSI / QSPI1_MOSI0 / SC1_RST / ACMP0_O / EADC0_ST / HBI_D6 / PSIO0_CH5
	JP5.28	116	PD.5 / I2C1_SCL / SPI1_CLK / SC1_DAT / ACMP1_O / EADC1_ST / HBI_D7 / PSIO0_CH6
	JP5.29	117	PD.4 / USCI0_CTL0 / I2C1_SDA / SPI1_SS / SC1_CLK / USB_VBUS_ST / PSIO0_CH7
	JP5.30	118	PD.3 / EBI_AD10 / USCI0_CTL1 / SPI0_SS / UART3_nRTS / SC2_PWR / SC1_nCD / UART0_TXD / I2S1_BCLK / EQEI3_A
	JP5.31	119	PD.2 / EBI_AD11 / USCI0_DAT1 / SPI0_CLK / UART3_nCTS / SC2_RST / UART0_RXD / I2S1_MCLK / EQEI3_B
	JP5.32	120	PD.1 / EBI_AD12 / USCI0_DAT0 / SPI0_MISO / UART3_TXD / I2C2_SCL / SC2_DAT / I2S1_DI / EQEI2_INDEX / ECAP2_IC0

Header		M467HJHAN	
		Pin No.	Function
	JP5.33	121	PD.0 / EBI_AD13 / USCI0_CLK / SPI0_MOSI / UART3_RXD / I2C2_SDA / SC2_CLK / I2S1_DO / EQEI2_A / ECAP2_IC1 / TM2
	JP5.34	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
	JP5.35	123	PA.12 / I2S0_BCLK / UART4_TXD / I2C1_SCL / SPI2_SS / CAN0_TXD / SC2_PWR / SD1_nCD / QSPI1_MISO0 / BPWM1_CH2 / EQEI1_INDEX / ECAP3_IC0 / USB_VBUS / PSIO0_CH4
	JP5.36	124	PA.13 / I2S0_MCLK / UART4_RXD / I2C1_SDA / SPI2_CLK / CAN0_RXD / SC2_RST / QSPI1_MOSI0 / BPWM1_CH3 / EQEI1_A / ECAP3_IC1 / USB_D- / PSIO0_CH5
	JP5.37	125	PA.14 / I2S0_DI / UART0_TXD / EBI_AD5 / SPI2_MISO / I2C2_SCL / SC2_DAT / BPWM1_CH4 / EQEI1_B / ECAP3_IC2 / USB_D+ / PSIO0_CH6
	JP5.38	126	PA.15 / I2S0_DO / UART0_RXD / SPIM_MOSI / SPI2_MOSI / I2C2_SDA / SC2_CLK / BPWM1_CH5 / EPWM0_SYNC_IN / EQEI3_INDEX / USB_OTG_ID / PSIO0_CH7
	JP5.39	127	HSUSB_VRES
	JP5.40	128	HSUSB_VDD33
	JP5.41	129	HSUSB_VBUS
	JP5.42	130	HSUSB_D-
	JP5.43	131	HSUSB_VSS
	JP5.44	132	HSUSB_D+
JP7	JP7.1	133	HSUSB_VDD12_CAP
	JP7.2	134	HSUSB_ID
	JP7.3	135	PE.7 / SD0_CMD / SPIM_D2 / UART5_TXD / CAN1_TXD / UART9_nCTS / EQEI1_INDEX / EPWM0_CH0 / BPWM0_CH5 / ACMP2_O / PSIO0_CH0
	JP7.4	136	PE.6 / SD0_CLK / SPIM_D3 / SPI3_I2SMCLK / SC0_nCD / USCI0_CTL0 / UART5_RXD / CAN1_RXD / UART9_nRTS / EQEI1_A / EPWM0_CH1 / BPWM0_CH4 / ACMP3_O / PSIO0_CH1
	JP7.5	137	PE.5 / EBI_nRD / SD0_DAT3 / SPIM_SS / SPI3_SS / SC0_PWR / USCI0_CTL1 / UART6_TXD / UART7_nRTS / UART9_TXD / EQEI1_B / EPWM0_CH2 / BPWM0_CH3 / PSIO0_CH2
	JP7.6	138	PE.4 / EBI_nWR / SD0_DAT2 / SPIM_CLK / SPI3_CLK / SC0_RST / USCI0_DAT1 / UART6_RXD / UART7_nCTS / UART9_RXD / EQEI0_INDEX / EPWM0_CH3 / BPWM0_CH2 / PSIO0_CH3
	JP7.7	139	PE.3 / EBI_MCLK / SD0_DAT1 / SPIM_MISO / SPI3_MISO / SC0_DAT / USCI0_DAT0 / UART6_nRTS / UART7_TXD / UART8_nCTS / EQEI0_A / EPWM0_CH4 / BPWM0_CH1
	JP7.8	140	PE.2 / EBI_ALE / SD0_DAT0 / SPIM_MOSI / SPI3_MOSI / SC0_CLK / USCI0_CLK / UART6_nCTS / UART7_RXD / UART8_nRTS / EQEI0_B / EPWM0_CH5 / BPWM0_CH0
	JP7.9	141	V_{SS}
	JP7.10	142	V_{DD}
	JP7.11	143	PE.1 / EBI_AD10 / QSPI0_MISO0 / SC2_DAT / I2S0_BCLK / SPI1_MISO / UART3_TXD / I2C1_SCL / UART4_nCTS / UART8_TXD
	JP7.12	144	PE.0 / EBI_AD11 / QSPI0_MOSI0 / SC2_CLK / I2S0_MCLK / SPI1_MOSI / UART3_RXD / I2C1_SDA / UART4_nRTS / UART8_RXD
	JP7.13	145	PH.8 / EBI_AD12 / QSPI0_CLK / SC2_PWR / I2S0_DI / SPI1_CLK / UART3_nRTS / I2C1_SMBAL / I2C2_SCL / UART1_TXD / UART9_nCTS
	JP7.14	146	PH.9 / EBI_AD13 / QSPI0_SS / SC2_RST / I2S0_DO / SPI1_SS / UART3_nCTS / I2C1_SMBSUS / I2C2_SDA / UART1_RXD / UART9_nRTS
	JP7.15	147	PH.10 / EBI_AD14 / QSPI0_MISO1 / SC2_nCD / I2S0_LRCK / SPI1_I2SMCLK / UART4_TXD / UART0_TXD / UART9_TXD
	JP7.16	148	PH.11 / EBI_AD15 / QSPI0_MOSI1 / UART4_RXD / UART0_RXD / EPWM0_CH5 / UART9_RXD
	JP7.17	149	PD.14 / EBI_nCS0 / SPI3_I2SMCLK / SC1_nCD / SPI0_I2SMCLK / I2S1_BCLK / EPWM0_CH4
	JP7.18	150	PJ.8 / EBI_nRD / SD1_DAT3 / SPIM_SS / UART7_TXD / CAN2_TXD / BPWM0_CH5
	JP7.19	151	PJ.9 / EBI_nWR / SD1_DAT2 / SPIM_MISO / UART7_RXD / CAN2_RXD / BPWM0_CH4
	JP7.20	152	PJ.10 / EBI_MCLK / SD1_DAT1 / SPIM_D2 / UART6_TXD / I2C4_SCL / ECAP2_IC0 / CAN0_TXD / BPWM0_CH3

Header		M467HJHAN	
		Pin No.	Function
	JP7.21	153	PJ.11 / EBI_ALE / SD1_DAT0 / SPIM_D3 / UART6_RXD / I2C4_SDA / ECAP2_IC1 / CAN0_RXD / BPWM0_CH2
	JP7.22	154	PJ.12 / EBI_nCS0 / SD1_CMD / SPIM_CLK / I2C4_SMBAL / ECAP2_IC2 / CAN1_TXD / BPWM0_CH1 / HSUSB_VBUS_ST
	JP7.23	155	PJ.13 / SD1_CLK / SPIM_MOSI / I2C4_SMBSUS / CAN1_RXD / BPWM0_CH0 / HSUSB_VBUS_EN
	JP7.24	156	PG.5 / EBI_nCS1 / SPI3_SS / SC1_PWR / I2C3_SMBAL / I2S1_MCLK / EPWM0_CH3
	JP7.25	157	PG.6 / EBI_nCS2 / SPI3_CLK / SC1_RST / I2C3_SMBSUS / I2S1_DI / EPWM0_CH2
	JP7.26	158	PG.7 / EBI_nWRL / SPI3_MISO / SC1_DAT / I2C3_SCL / I2S1_DO / EPWM0_CH1
	JP7.27	159	PG.8 / EBI_nWRH / SPI3_MOSI / SC1_CLK / I2C3_SDA / I2S1_LRCK / EPWM0_CH0
	JP7.28	160	V_{SS}
	JP7.29	161	LDO_CAP
	JP7.30	162	V_{DD}
	JP7.31	163	PC.14 / EBI_AD11 / SC1_nCD / SPI0_I2SMCLK / USCI0_CTL0 / QSPI0_CLK / TRACE_SWO / EPWM0_SYNC_IN / ETMC_TRACE_CLK / TM1 / USB_VBUS_ST / HSUSB_VBUS_ST
	JP7.32	164	PB.15 / EADC0_CH15 / EADC1_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
	JP7.33	165	PB.14 / EADC0_CH14 / EADC1_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
	JP7.34	166	PB.13 / EADC0_CH13 / EADC1_CH13 / DAC1_OUT / ACMP0_P3 / ACMP1_P3 / EBI_AD14 / SC1_DAT / SPI0_MISO / USCI0_DAT0 / UART0_TXD / UART3_nRTS / I2C2_SCL / CCAP_PIXCLK / EPWM1_CH2 / ETMC_TRACE_DATA2 / TM2_EXT / CAN3_TXD / PSIO0_CH2 / KPI_COL2
	JP7.35	167	PB.12 / EADC0_CH12 / EADC1_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 / CAN3_RXD / PSIO0_CH3 / KPI_COL3
	JP7.36	168	AV_{DD}
	JP7.37	169	V_{REF}
	JP7.38	170	AV_{SS}
	JP7.39	171	PB.11 / EADC0_CH11 / EBI_ADR16 / EMAC0_RMII_MDC / UART0_nCTS / UART4_TXD / I2C1_SCL / CAN0_TXD / SPI0_I2SMCLK / BPWM1_CH0 / SPI3_CLK / CCAP_SFIELD / HSUSB_VBUS_ST
	JP7.40	172	PB.10 / EADC0_CH10 / ACMP2_P3 / EBI_ADR17 / EMAC0_RMII_MDIO / UART0_nRTS / UART4_RXD / I2C1_SDA / CAN0_RXD / BPWM1_CH1 / SPI3_SS / CCAP_VSYNC / HSUSB_VBUS_EN
	JP7.41	173	PB.9 / EADC0_CH9 / ACMP2_P2 / EBI_ADR18 / EMAC0_RMII_TXD0 / UART0_TXD / UART1_nCTS / I2C1_SMBAL / UART7_TXD / I2C0_SCL / BPWM1_CH2 / SPI3_MISO / CAN2_TXD / INT7 / CCAP_HSYNC
	JP7.42	174	PB.8 / EADC0_CH8 / ACMP2_P1 / EBI_ADR19 / EMAC0_RMII_TXD1 / UART0_RXD / UART1_nRTS / I2C1_SMBSUS / UART7_RXD / I2C0_SDA / BPWM1_CH3 / SPI3_MOSI / CAN2_RXD / INT6 / EADC2_ST
	JP7.43	175	PB.7 / EADC0_CH7 / EADC2_CH15 / ACMP2_P0 / EBI_nWRL / EMAC0_RMII_TXEN / CAN1_TXD / UART1_TXD / SD1_CMD / EBI_nCS0 / BPWM1_CH4 / EPWM1_BRAKE0 / EPWM1_CH4 / INT5 / USB_VBUS_ST / ACMP0_O / KPI_COL4
	JP7.44	176	PB.6 / EADC0_CH6 / EADC2_CH14 / ACMP2_N / EBI_nWRH / EMAC0_PPS / CAN1_RXD / UART1_RXD / SD1_CLK / EBI_nCS1 / BPWM1_CH5 / EPWM1_BRAKE1 / EPWM1_CH5 / INT4 / USB_VBUS_EN / ACMP1_O / KPI_COL5

Table 3-2 M467HJHAN 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.

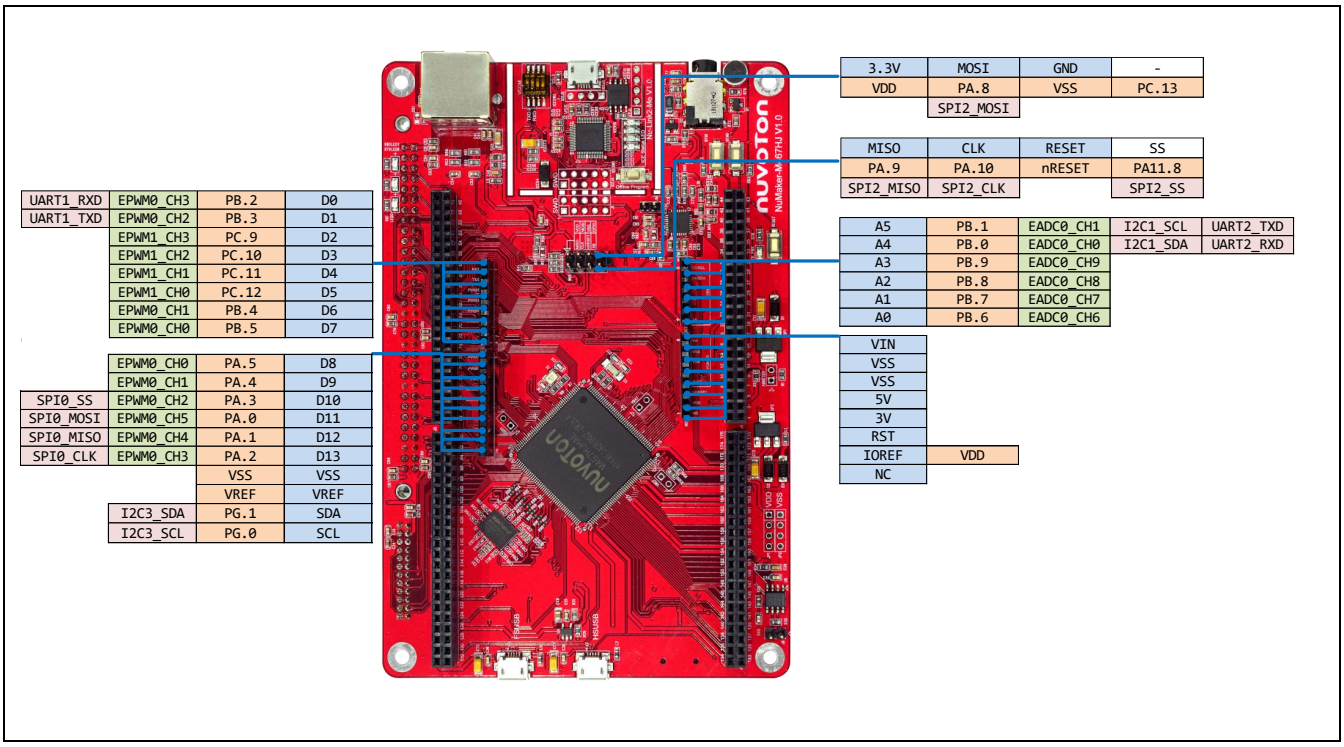


Figure 3-4 Arduino UNO Compatible Extension Connectors

Header		NuMaker-M467HJ		Header		NuMaker-M467HJ	
		Compatible to Arduino UNO	GPIO Pin of M467			Compatible to Arduino UNO	GPIO Pin of M467
NU4	NU4.1	D0	PB.2	NU3	NU3.6	A5	PB.6
	NU4.2	D1	PB.3		NU3.5	A4	PB.7
	NU4.3	D2	PC.9		NU3.4	A3	PB.8
	NU4.4	D3	PC.10		NU3.3	A2	PB.9
	NU4.5	D4	PC.11		NU3.2	A1	PB.0
	NU4.6	D5	PC.12		NU3.1	A0	PB.1
	NU4.7	D6	PB.4	NU1	NU1.8	VIN	-
	NU4.8	D7	PB.5		NU1.7	VSS	
NU2	NU2.1	D8	PA.5		NU1.6	VSS	
	NU2.2	D9	PA.4		NU1.5	5V	
	NU2.3	D10	PA.3		NU1.4	3V	
	NU2.4	D11	PA.0		NU1.3	RST	nRESET
	NU2.5	D12	PA.1		NU1.2	IOREF	V_{REF}
	NU2.6	D13	PA.2		NU1.1	NC	-
	NU2.7	VSS	V_{SS}				
	NU2.8	VREF	V_{REF}				
	NU2.9	SDA	PG.0				
	NU2.10	SCL	PG.1				

Table 3-3 Arduino UNO Extension Connectors and M467HJHAN Mapping GPIO List

3.3.3 CMOS Sensor Connector

Table 3-4 shows the CMOS sensor connector.

CON1		M467HJHAN		CON1		M467HJHAN	
Pin No.	Net Name	Pin No.	Function	Pin No.	Net Name	Pin No.	Function
CON1.1	VSS	-	V_{SS}	CON1.2	VSS	-	V_{SS}
CON1.3	CCAP_PIXCLK	97	PG.9/ CCAP_PIXCLK	CON1.4	CCAP_SCLK	98	PG.10/ CCAP_SCLK
CON1.5	CCAP_DATA0	38	PF.7/ CCAP_DATA0	CON1.6	CCAP_DATA1	37	PF.8/ CCAP_DATA1
CON1.7	CCAP_DATA2	36	PF.9/ CCAP_DATA2	CON1.8	CCAP_DATA3	35	PF.10/ CCAP_DATA3
CON1.9	CCAP_DATA4	34	PF.11/ CCAP_DATA4	CON1.10	CCAP_DATA5	27	PG.4/ CCAP_DATA5
CON1.11	CCAP_DATA6	26	PG.3/CCAP_DATA6	CON1.12	CCAP_DATA7	25	PG.2/ CCAP_DATA7
CON1.13	NC	-	-	CON1.14	NC	-	-
CON1.15	CCAP_VSYNC	100	PG.12/ CCAP_VSYNC	CON1.16	CCAP_HSYNC	101	PG.13/ CCAP_HSYNC
CON1.17	COMS_PWDN	18	PD.12	CON1.18	CMOS_RST	99	PG.11
CON1.19	I2C0_SCL	45	PH.2/ I2C0_SCL	CON1.20	I2C0_SDA	46	PH.3/I2C0_SDA
CON1.21	VDD	-	V_{DD}	CON1.22	VDD	-	V_{DD}
CON1.23	VSS	-	V_{SS}	CON1.24	VSS	-	V_{SS}

Table 3-4 CMOS Sensor Connectors and M467HJHAN Mapping GPIO List

3.3.4 TFT-LCD Daughter Board Connector

Table 3-5 shows the TFT-LCD daughter board connector CON2.

CON2		M467HJHAN		CON2		M467HJHAN	
Pin No.	Net Name	Pin No.	Function	Pin No.	Net Name	Pin No.	Function
CON2.1	VDD	-	V_{DD}	CON2.2	VDD	-	V_{DD}
CON2.3	LCD_BL_E	156	PG.5	CON2.4	LCD_RS	50	PH.7/ERI_ADR0
CON2.5	LCD_WR	151	PJ.0/EBI_nWR	CON2.6	LCD_RD	150	PJ.8/EBI_nRD
CON2.7	LCD_DB0	94	PC.0/EBI_AD0	CON2.8	LCD_DB1	93	PC.1/EBI_AD1
CON2.9	LCD_DB2	92	PC.2/EBI_AD2	CON2.10	LCD_DB3	91	PC.3/EBI_AD3
CON2.11	LCD_DB4	90	PC.4/EBI_AD4	CON2.12	LCD_DB5	89	PC.5/EBI_AD5
CON2.13	LCD_DB6	88	PD.8/EBI_AD6	CON2.14	LCD_DB7	87	PD.9/EBI_AD7
CON2.15	LCD_DB8	82	PE.14/EBI_AD8	CON2.16	LCD_DB9	83	PE.15/EBI_AD9
CON2.17	LCD_DB10	143	PE.1/EBI_AD10	CON2.18	LCD_DB11	144	PE.0/EBI_AD11

CON2.19	LCD_DB12	145	PH.8/EBI_AD12	CON2.20	LCD_DB13	146	PH.9/EBI_AD13
CON2.21	LCD_DB14	147	PH.10/EBI_AD14	CON2.22	LCD_DB15	148	PH.11/EBI_AD15
CON2.23	NC	-	-	CON2.24	LCD_CTP_INT	157	PG.6
CON2.25	LCD_CS	149	PD.14/EBI_nCS0	CON2.26	LCD_RST	158	PG.7
CON2.27	LCD_DISP_ON	159	PG.8	CON2.28	NC	-	-
CON2.29	LCD_XL/LCD_SCL	171	PB.11/EADC0_CH11	CON2.30	LCD_YU/LCD_SDA	172	PB.10/EADC_CH10
CON2.31	LCD_XR/LCD_CTP_RST	20	PD.10/EADC1_CH0	CON2.32	LCD_YD	19	PD.11/EADC1_CH1
CON2.33	VSS	-	V_{SS}	CON2.34	VSS	-	V_{SS}
CON2.35	VDD	-	V_{DD}	CON2.36	VDD	-	V_{DD}
CON2.37	NC	-	-	CON2.38	NC	-	-
CON2.39	VSS	-	V_{SS}	CON2.40	VSS	-	V_{SS}
CON2.41	NC	-	-	CON2.42	NC	-	-
CON2.43	NC	-	-	CON2.44	NC	-	-
CON2.45	NC	-	-	CON2.46	NC	-	-
CON2.47	VSS	-	V_{SS}	CON2.48	VSS	-	V_{SS}
CON2.49	NC	-	-	CON2.50	NC	-	-
CON2.51	NC	-	-	CON2.52	NC	-	-
CON2.53	NC	-	-	CON2.54	NC	-	-
CON2.55	NC	-	-	CON2.56	NC	-	-
CON2.57	NC	-	-	CON2.58	NC	-	-
CON2.59	VSS	-	V_{SS}	CON2.60	VSS	-	V_{SS}
CON2.61	NC	-	-	CON2.62	NC	-	-
CON2.63	LDO_5V	-	-	CON2.64	LDO_5V	-	-

Table 3-5 TFT-LCD Daughter Board Connector and M467HJHAN Mapping GPIO List

3.4 Power Supply Configuration

The NuMaker-M467HJ is able to adopt multiple power supplies. External power sources include NU1 Vin (7 V to 12 V), V_{DD} (depending on the target chip operating voltage), and PC through USB connector. By using switches and voltage regulator, multiple power domains can be created on the NuMaker-M467HJ.

3.4.1 VIN Power Source

Table 3-6 presents the Vin power source.

Connector	Net Name in Schematic	Description
NU1 pin8	NU1_VIN	Board external power source, with voltage range from 7 V to 12 V. The voltage regulator UP1 converts the NU1 pin8 input voltage to 5 V and supplies it to NU1_5VCC.

Table 3-6 Vin Power Source

3.4.2 5V Power Sources

Table 3-7 presents the 5 V power sources.

Connector	Net Name in Schematic	Description
ICEJ3	USB_HS_VBUS	ICE USB connector supplies 5 V power from PC to M467HJ target board and Nu-Link2-Me.
J2	USB_VBUS	FS USB connector on NuMaker-M467HJ supplies 5 V power from PC to M467HJ target board and Nu-Link2-Me.
J3	HSUSB_VBUS	HS USB connector on NuMaker-M467HJ supplies 5 V power from PC to M467HJ target board and Nu-Link2-Me.
NU1 pin5	UNO_5V	ICEJ3, J2, J3 or NU1 pin8 supplies 5V power to NU1 pin5. NU1 pin5 supplies 5V power to target chip or Arduino adapter board. **Note:** M467 operating voltage range is from 1.8 V to 3.6 V.

Table 3-7 5V Power Sources

3.4.3 3.3V Power Sources

Table 3-8 presents the 3.3 V power sources.

Voltage Regulator	3V Source	Description
ICEUP1	USB_HS_VBUS	ICEUP1 converts USB_HS_VBUS to 3.3 V and supplies 3.3 V to M467HJ target board or ICE chip.
UP2	FSUSB_VBUS	UP2 converts FSUSB_VBUS to 3.3 V and supplies 3.3 V to M467HJ target board.
UP2	HSUSB_VBUS	UP2 converts HSUSB_VBUS to 3.3 V and supplies 3.3 V to M467HJ target board.
UP2	UNO_5VCC	UP1 converts NU1_5VCC to 3.3 V and supplies 3.3 V to M467HJ target board.

Table 3-8 3.3 V Power Sources

3.4.4 Power Connectors

Table 3-9 presents the power connectors.

Connector	Description
JP1	V_{DD} connector on the NuMaker-M467HJ. **Note:** M467 operating voltage range is from 1.8 V to 3.6 V.
JP2	V_{SS} connector on the NuMaker-M467HJ.

Table 3-9 Power Connectors

3.4.5 USB Connectors

Table 3-10 presents the USB connectors.

Connector	Description
ICEJ3	ICE USB connector on Nu-Link2-Me for power supply, debugging and programming from PC.
J2	USB FS connector on NuMaker-M467HJ.
J3	USB HS connector on NuMaker-M467HJ.

Table 3-10 USB Connectors

3.4.6 Power Switches

Table 3-11 presents the power switches.

Switch	Description
ICEJPR1	Configures the target chip operating voltage at 1.8 V / 3.3 V / 5 V. **Note:** M467 operating voltage range is from 1.8 V to 3.6 V. Do not switch ICEJPR1 (MCUVCC) to 5 V.
ICEJPR2	Configures the ICE chip operating voltage at 1.8 V / 3.3 V.

Table 3-11 Power Switches

3.4.7 Power Supply Models

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

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

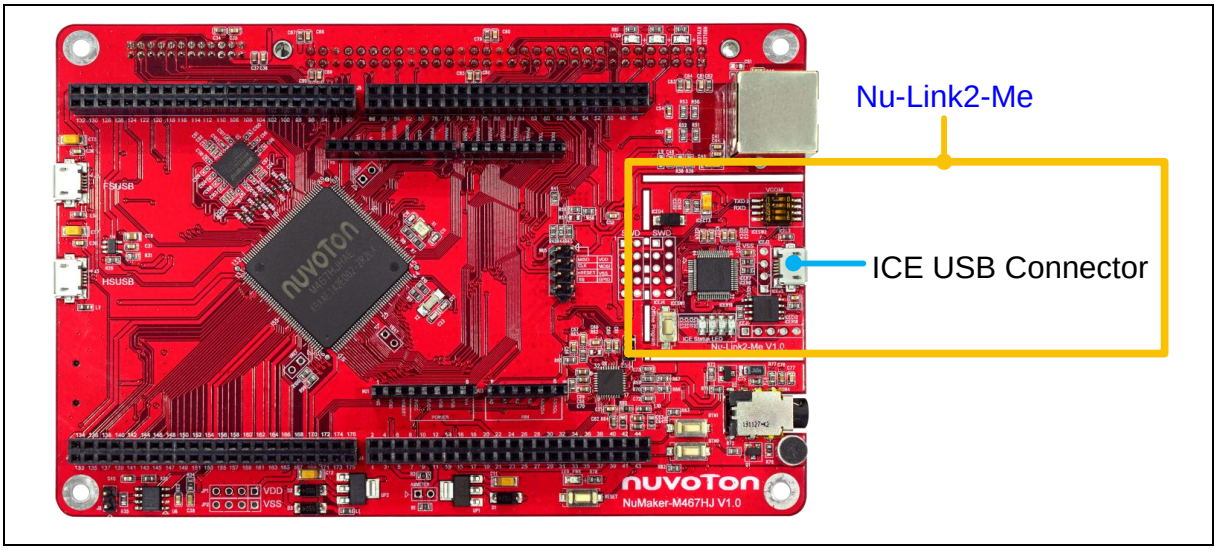


Figure 3-5 External Power Supply Sources on Nu-Link2-Me

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

1. Solder the resistor on ICEJPR1 (MCUVCC) depending on the target chip operating voltage.
2. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
3. Connect the external power supply to ICEJ3.

Table 3-12 presents all power models when supplying external power through Nu-Link2-Me. The Nu-Link2-Me external power sources are highlighted in yellow.

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

Table 3-12 Supply External Power through Nu-Link2-Me

3.4.7.2 External Power Supply through M467HJ Target Board to Target Chip

The external power supply sources on M467HJ target board are shown in Figure 3-6.

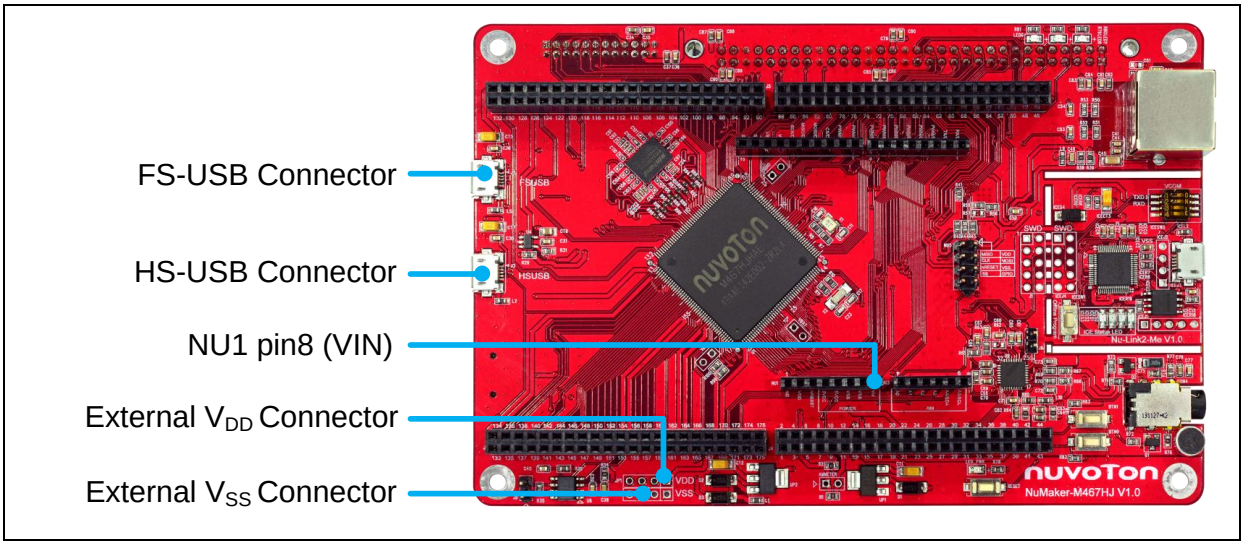


Figure 3-6 External Power Supply Sources on M467HJ Target Board

To use Vin or J2 or J3 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 or J2 or J3.

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 ICEJ3 to PC.
4. Connect the external power supply to JP1.

To use Vin or J2 or J3 as external power supply source with Nu-Link2-Me detached from NuMaker-M467HJ, please follow the steps below:

1. Detach the Nu-Link2-Me from NuMaker- M467HJ.
2. Connect the external power supply to Vin or J2 or J3.

To use JP1 as external power supply source with Nu-Link2-Me detached from NuMaker-M467HJ, please follow the steps below:

1. Detach the Nu-Link2-Me from NuMaker-M467HJ.
2. Connect the external power supply to JP1.

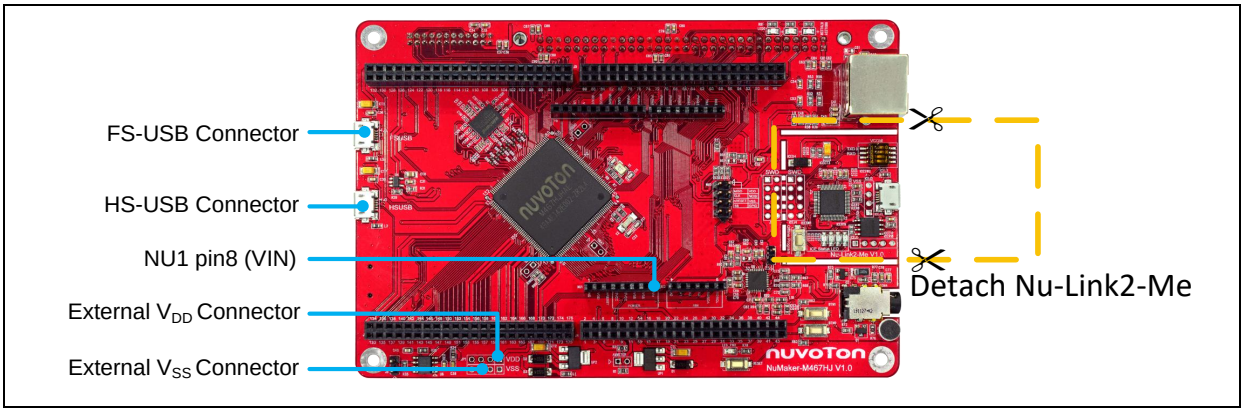


Figure 3-7 Detach the Nu-Link2-Me from NuMaker-M467HJ

Table 3-13 presents all power models when supplies external power through M467HJ target board. The M467HJ target board external power sources are highlighted in yellow.

Model	Target Chip Voltage	Vin [1]	J2[1]	J3[1]	ICEJ3	JP1[2]	ICEJPR1 (MCUVCC) Selection [3]	ICEJPR2 (ICEVCC) Selection [4]	ICE Chip Voltage [5]
4	3.3 V	7 V ~ 12 V Input	-	-	-	3.3 V output	Remove resistor	3.3 V	3.3 V
5	3.3 V	-	Connect to PC	-	-	3.3 V output	Remove resistor	3.3 V	3.3 V
6	3.3V	-	-	Connect to PC	-	3.3 V output	Remove resistor	3.3 V	3.3 V
7	1.8 V ~ 3.6 V	-	-	-	Connect to PC	DC Input 1.8 V ~ 3.6 V	Remove resistor	1.8 V / 3.3 V	1.8 V / 3.3 V
8	1.8 V ~ 3.6 V	-	-	-	Nu-Link2-Me removed	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 or J3 can provide 5 V to NU1 pin5 (5V) and 3.3 V to NU1 pin4 (3VCC).
2. JP1 external power input only provides voltage to target chip.
3. 0 Ω should be removed from ICEJPR1's MCUVCC and 1.8 V / 3.3 V / 5 V.
4. 0 Ω should be soldered between ICEJPR2's ICEVCC and 1.8 V / 3.3 V.
5. The ICE chip voltage should be close to the target chip voltage.
6. -: Unused

Table 3-13 Supply External Power for M467HJ Target Board

3.5 External Reference Voltage Connector

Table 3-15 presents the external reference voltage connector.

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

Table 3-14 External Reference Voltage Connector

3.6 Ammeter Connector

Table 3-15 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 3-15 Ammeter Connector

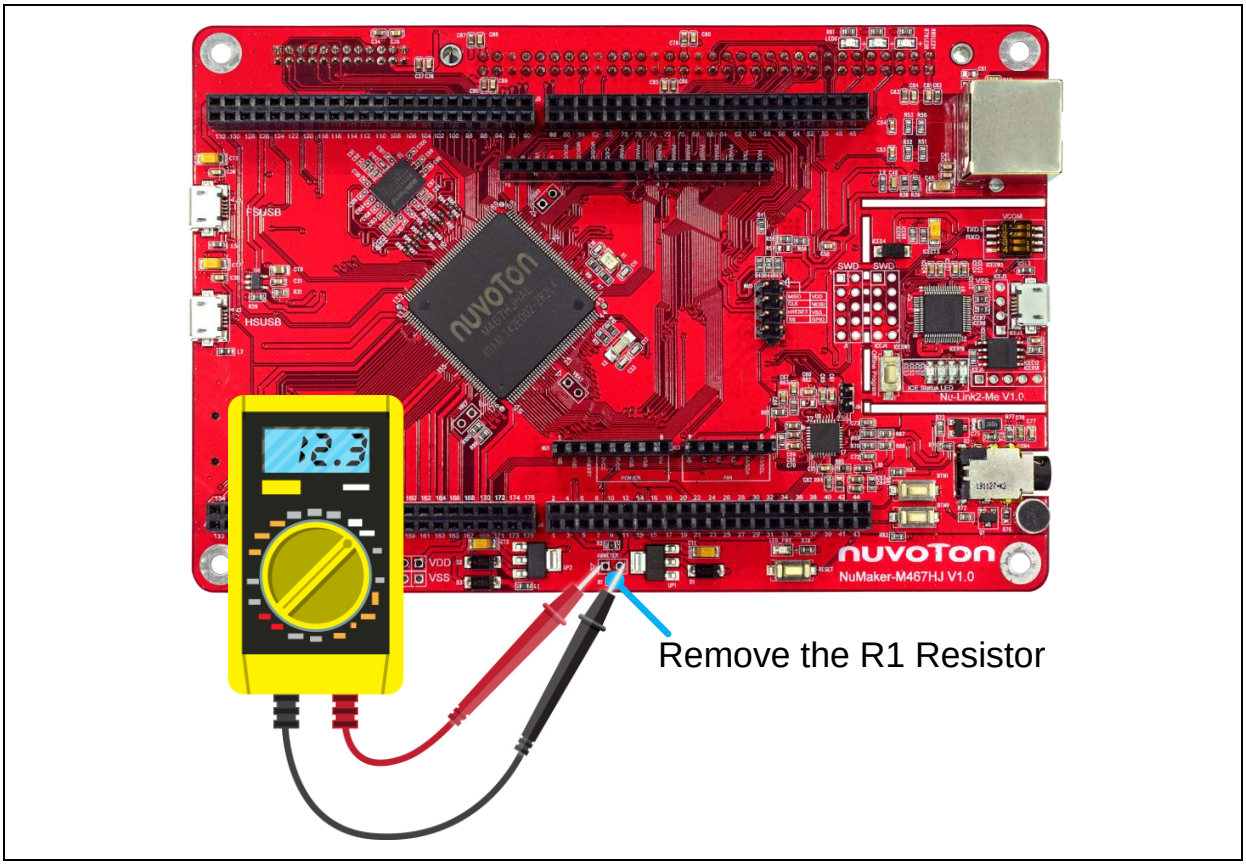


Figure 3-8 Wiring between Ammeter Connector and Ammeter

3.7 Push Buttons

Table 3-16 presents the push buttons.

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

Table 3-16 Push Buttons

3.8 LEDs

Table 3-17 presents the LEDs.

Component	Description
LED PWR	The power LED indicates that the NuMaker-M467HJ is powered.
LEDR, LEDY, LEDG	User LEDs for application usage. LEDR is connected to the target chip PH.4. LEDY is connected to the target chip PH.5. LEDG is connected to the target chip PH.6.
ICES0, ICES1, ICES2 and ICES3	Nu-Link2-Me status LED.

Table 3-17 LEDs

3.9 External Storage

Table 3-18 presents the main components of each external storage.

Component	Description
U2	64 MB HyperRAM W956A8MBYA5I
U5	Micro SD card slot
U11	32 MB SPI Flash W25Q32JVSSIQ

Table 3-18 External Storage

3.10 10/100M ethernet PHY

Table 3-19 presents the 10/100M ethernet PHY and related components.

Component	Description
U7	10/100 Mbps Ethernet PHY

U8	10/100 BASE-T Ethernet isolation transformer
CON3	RJ45 8P8C connector

Table 3-19 10/100M ethernet PHY

3.11 CAN FD Transceiver

Table 3-20 presents the CAN FD transceiver and related components.

Component	Description
U6	3.3 V CAN transceivers with CAN FD
J8	CAN bus interface

Table 3-20 CAN FD Transceiver

3.12 Audio Codec

The NAU88C22YG connects to the NuMaker-M467HJ via I²C bus (M467HJHAN is I²C master) for control, the I²C address of NAU88C22YG is 0x1A by default, and via I²S bus (M467HJHAN is I²S slave) for audio digital data. Table 3-21 presents the audio codec and related components.

Component	Description		
U9	Audio Codec NAU88C22YG		
J9	Audio Codec speaker output		
	Pin No.	Pin Name	Functions
	1	RSPKOUT	U9 BTL speaker positive output or right high current output.
	2	LSPKOUT	U9 BTL Speaker Negative Output or Left high current output.
CON4	3.5 mm audio jack		

Table 3-21 Audio Codec

3.13 Thermal sensor

Table 3-22 presents the thermal sensor.

Component	Description
U10	Thermal sensor NCT7717U Click here for more information of NCT7717U.

Table 3-22 Thermal sensor

3.14 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*.

3.14.1 VCOM Switches

Table 3-23 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 3-23 VCOM Function of Nu-Link2-Me

3.14.2 Status LEDs

Table 3-17 presents the status LEDs patterns for different operation on Nu-Link2-Me.

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

Table 3-24 Operation Status LED Patterns

4 NUMAKER-TFT-LCD43 HARDWARE CONFIGURATION

4.1 Front View

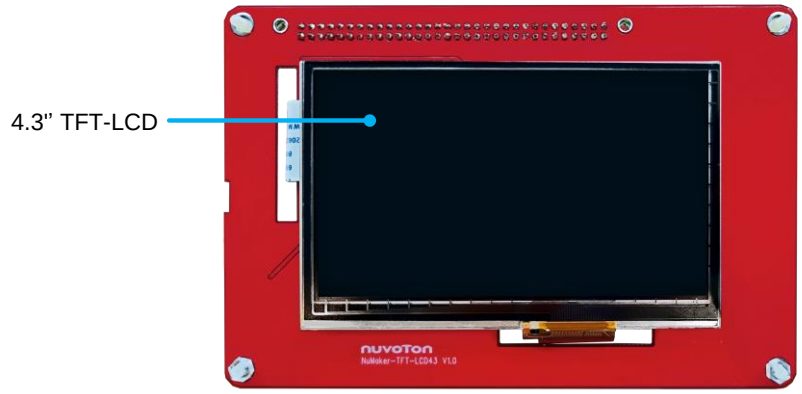


Figure 4-1 Front View of NuMaker-TFT-LCD43

Figure 3-1 shows the main components and connectors from the front side of NuMaker-TFT-LCD43. The following lists components and connectors from the front view:

- 4.3" TFT-LCD

4.2 Rear View

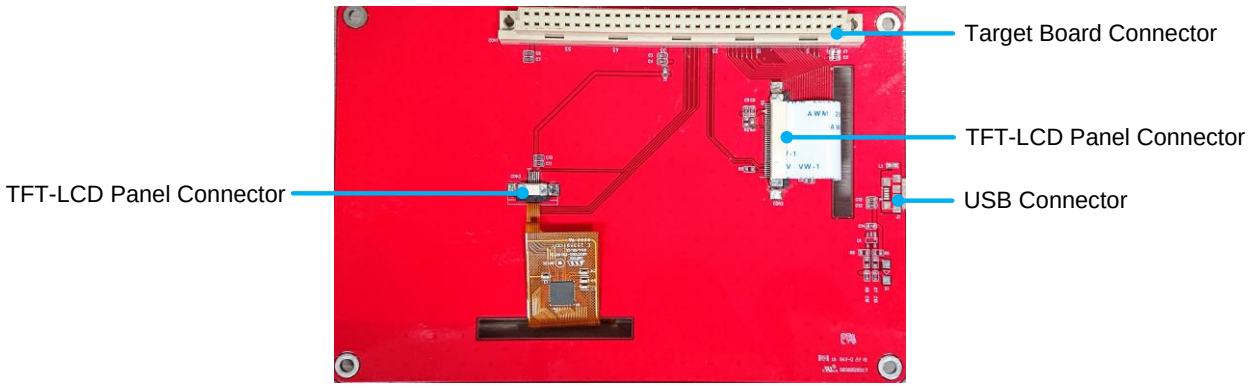


Figure 4-2 Rear View of NuMaker-TFT-LCD43

Figure 3-2 shows the main components and connectors from the rear side of NuMaker-TFT-LCD43.

The following lists components and connectors from the rear view:

- Target Board Connector (CON1)
- TFT-LCD Panel Connector (CON2, CON3)
- USB Connector (J1)

4.3 Connectors

Table 3-1 presents the extension connectors.

Connector	Description
CON1	Target board connector on NuMaker-TFT-LCD43 that can connects to NuMaker-M467HJHAN CON2.
CON2, CON3	TFT LCD panel connector on NuMaker-TFT-LCD43

Table 4-1 Connectors

4.3.1 Target Board Connector

Table 4-2 presents the target board connector CON1 on NuMaker-TFT-LCD43 that can connects to M467HJ target board CON2. Please refer to Table 3-5 for the pin mapping information.

CON1			
Pin No.	**Net Name**	**Pin No.**	**Net Name**
CON1.1	VDD	CON1.2	VDD
CON1.3	PWM	CON1.4	RS
CON1.5	/WR	CON1.6	/RD
CON1.7	DB0	CON1.8	DB1
CON1.9	DB2	CON1.10	DB3
CON1.11	DB4	CON1.12	DB5
CON1.13	DB6	CON1.14	DB7
CON1.15	DB8	CON1.16	DB9
CON1.17	DB10	CON1.18	DB11
CON1.19	DB12	CON1.20	DB13
CON1.21	DB14	CON1.22	DB15
CON1.23	NC	CON1.24	INT
CON1.25	/CS	CON1.26	/RESET
CON1.27	NC	CON1.28	NC
CON1.29	SCL	CON1.30	SDA
CON1.31	XRES	CON1.32	NC
CON1.33	VLED-	CON1.34	VLED-
CON1.35	VLED+	CON1.36	VLED+
CON1.37	NC	CON1.38	NC
CON1.39	VSS	CON1.40	VSS

CON1.41	NC	CON1.42	NC
CON1.43	NC	CON1.44	NC
CON1.45	NC	CON1.46	NC
CON1.47	VSS	CON1.48	VSS
CON1.49	NC	CON1.50	NC
CON1.51	NC	CON1.52	NC
CON1.53	NC	CON1.54	NC
CON1.55	NC	CON1.56	NC
CON1.57	NC	CON1.58	NC
CON1.59	VSS	CON1.60	VSS
CON1.61	NC	CON1.62	NC
CON1.63	VDD5V	CON1.64	VDD5V

Table 4-2 Target Board Connector Net Name List

4.3.2 TFT LCD Panel Connector

Table 4-3 presents the TFT LCD panel connector on NuMaker-TFT-LCD43 that connects to 4.3” TFT-LCD.

CON2		CON3	
Pin No.	**Net Name**	**Pin No.**	**Net Name**
CON2.1	VSS	CON3.1	VSS
CON2.2	VSS	CON3.2	SDA
CON2.3	LED_A/PWM	CON3.3	SCL
CON2.4	LED_K	CON3.4	VDD3V3
CON2.5	/RESET	CON3.5	INT
CON2.6	RS	CON3.6	XRES
CON2.7	/CS	CON3.7	VSS
CON2.8	/WR	CON3.8	VSS
CON2.9	/RD		
CON2.10	DB0		
CON2.11	DB1		
CON2.12	DB2		
CON2.13	DB3		
CON2.14	DB4		
CON2.15	DB5		
CON2.16	DB6		
CON2.17	DB7		
CON2.18	DB8		
CON2.19	DB9		
CON2.20	DB10		
CON2.21	DB11		
CON2.22	DB12		
CON2.23	DB13		
CON2.24	DB14		
CON2.25	DB15		
CON2.26	DB16		
CON2.27	DB17		
CON2.28	65K/262K		
CON2.29	VSS		

CON2.30	NC
CON2.31	NC
CON2.32	NC
CON2.33	NC
CON2.34	NC
CON2.35	VDD3V3
CON2.36	VDD3V3
CON2.37	VDD3V3
CON2.38	VSS
CON2.39	VSS
CON2.40	VSS

Table 4-3 TFT LCD Panel Connector

4.4 Power Source

The NuMaker-TFT-LCD43 power source includes CON1 VDD and PC through USB connector.

Connector	Net Name in Schematic	Description
CON1 pin1, 2, 35, 36	VDD	Supplies 3 V power from M467HJ target board.
CON1 pin63, 64	VDD5V	Supplies 5 V power from M467HJ target board.
J1	USB_VBUS	USB connector on NuMaker-TFT-LCD43 supplies 5 V power from PC.

Table 4-4 Power Source

5 QUICK START

5.1 Toolchains Supporting

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

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

5.2 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 5-1 and Figure 5-2.

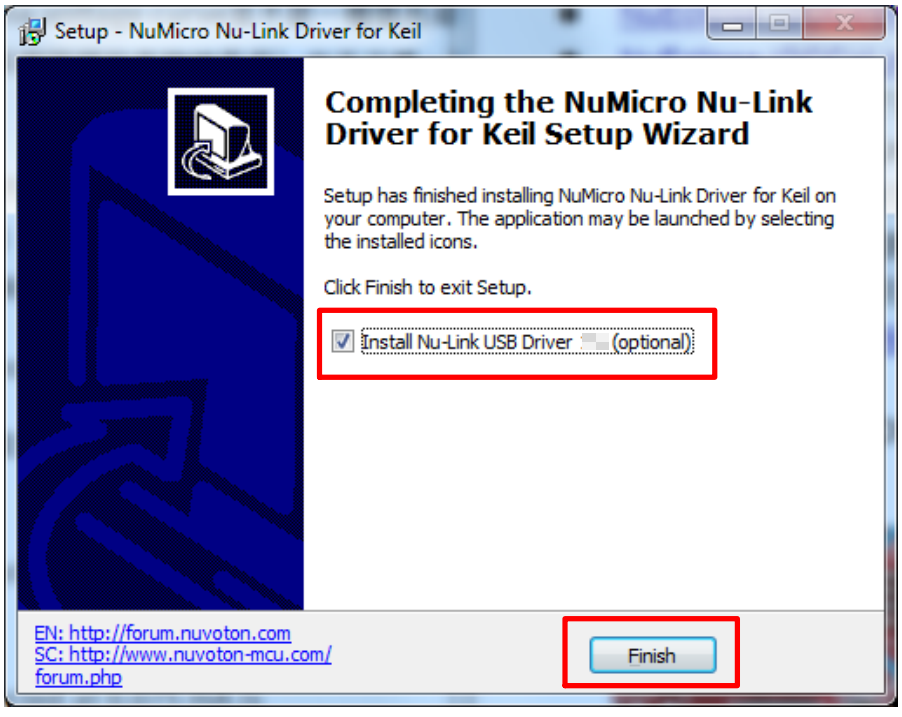


Figure 5-1 Nu-Link USB Driver Installation Setup

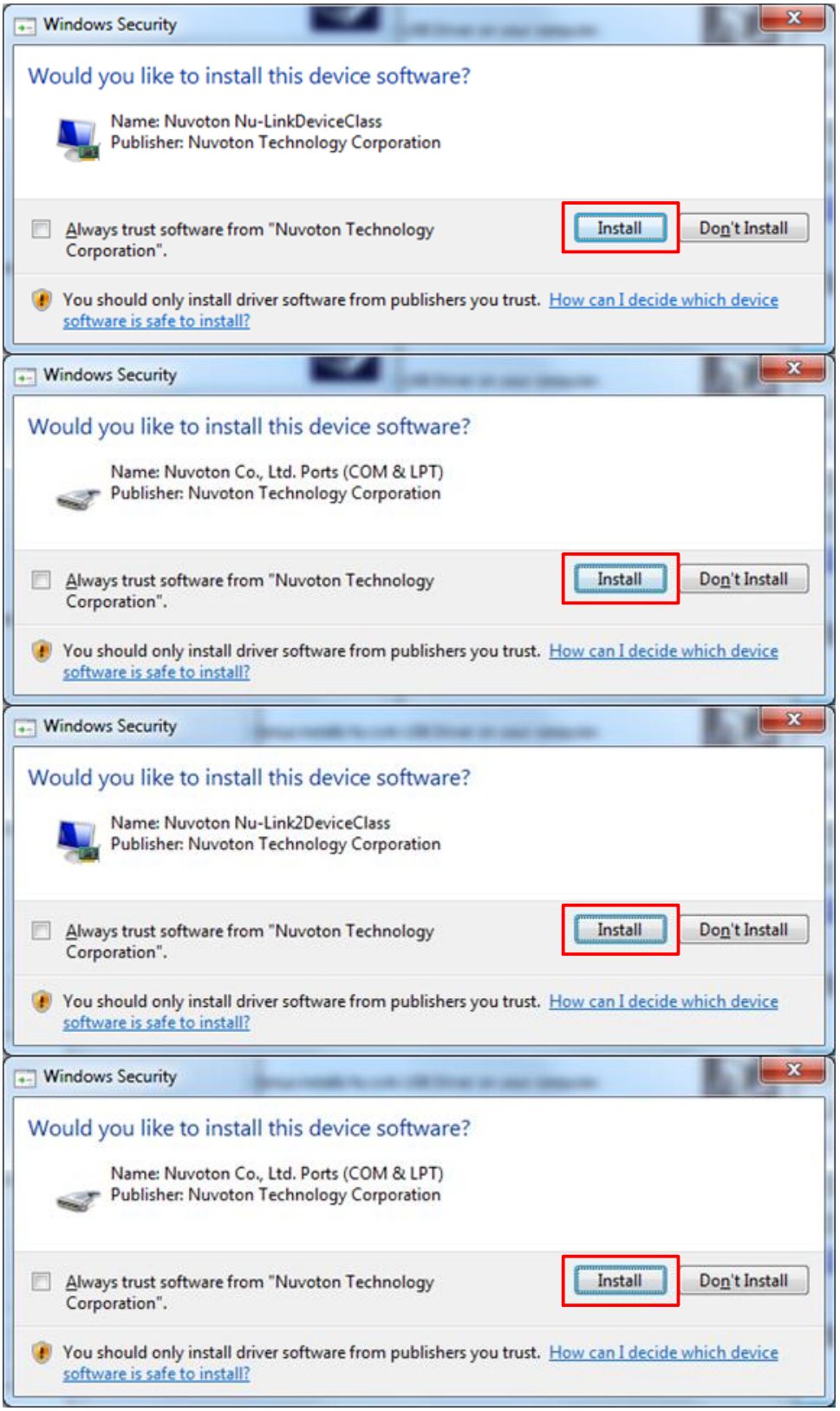


Figure 5-2 Nu-Link USB Driver Installation

5.3 BSP Firmware Download

Download and unzip the Board Support Package (BSP).

5.4 Hardware Setup

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

Figure 5-3 Open VCOM Function

2. Connect the ICE USB connector shown in Figure 5-4 to the PC USB port through a USB cable.

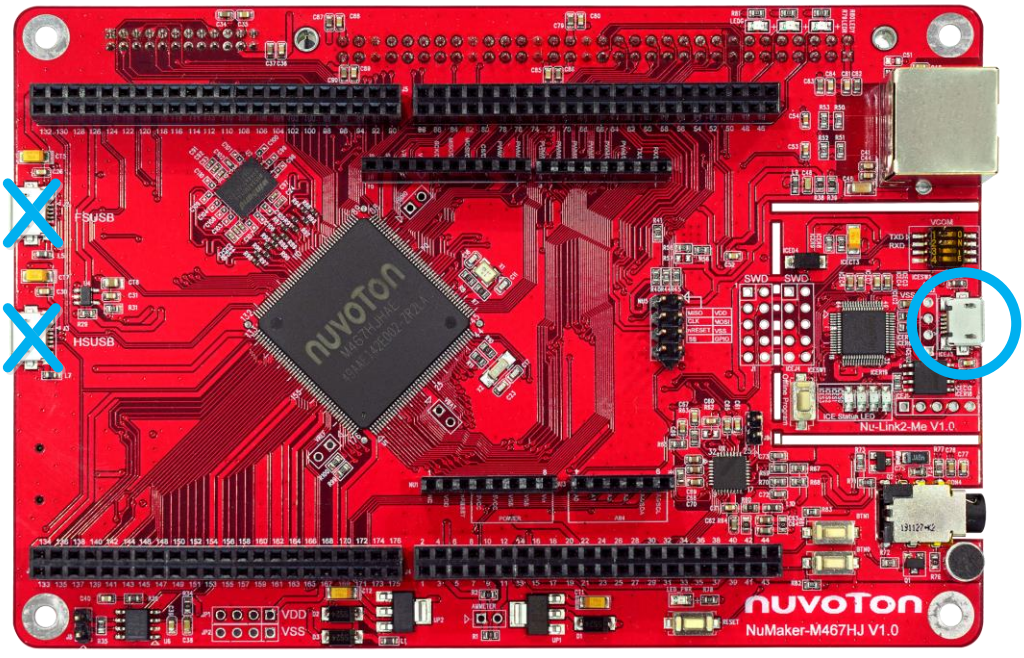


Figure 5-4 ICE USB Connector

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

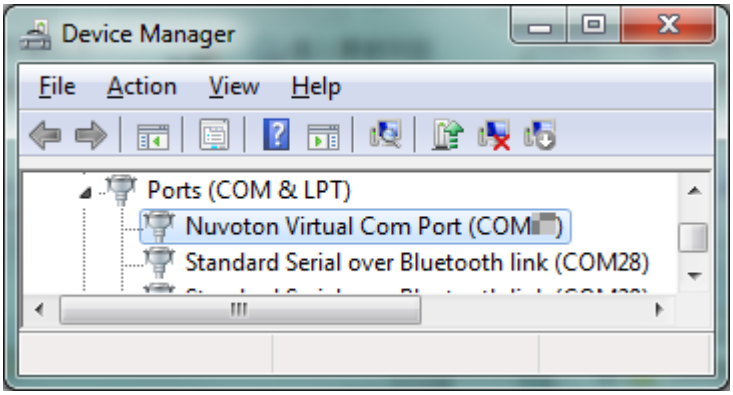


Figure 5-5 Device Manger

4. Open a serial port terminal, PuTTY for example, to print out debug message. Set the speed to 115200. Figure 5-6 presents the PuTTY session setting.

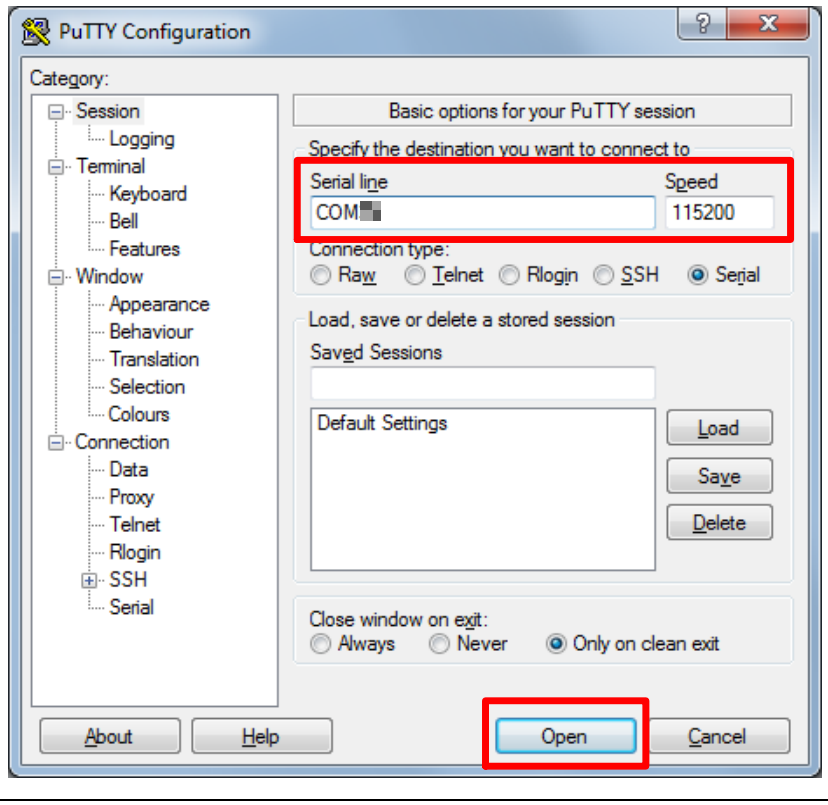


Figure 5-6 PuTTY Session Setting

5.5 Find the Example Project

Use the “Template” project as an example. The project can be found under the BSP folder as shown in Figure 5-7.

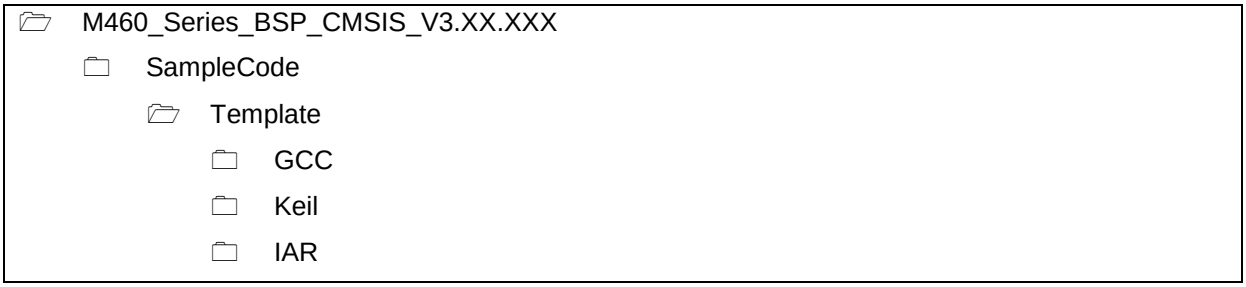


Figure 5-7 Template Project Folder Path

5.6 Execute the Project under Toolchains

Open and execute the project under the toolchain. The section 5.6.1, 5.6.2, and 5.6.3 describe the steps of executing project in Keil MDK, IAR EWARM and NuEclipse, respectively.

5.6.1 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.

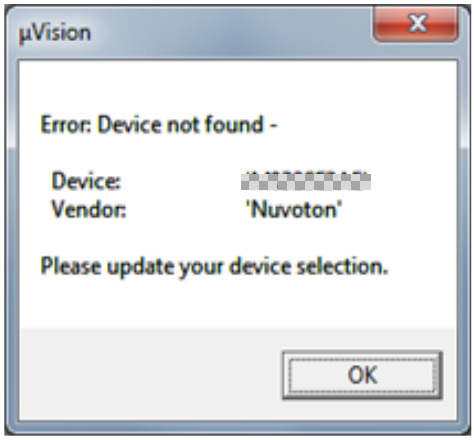


Figure 5-8 Warning Message of “Device not found”

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

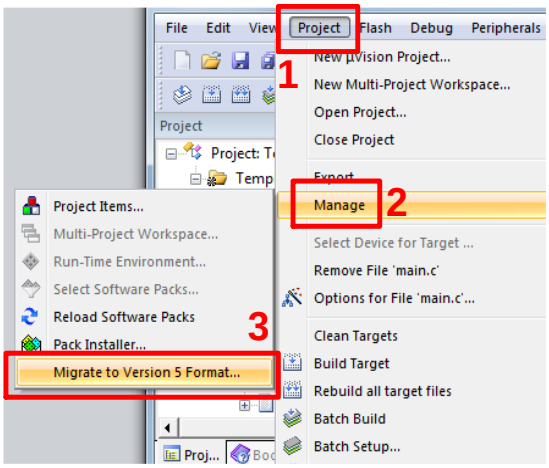


Figure 5-9 Project File Migrate to Version 5 Format

2. Make sure the debugger is “Nuvoton Nu-Link Debugger” as shown in Figure 5-10 and Figure 5-11.

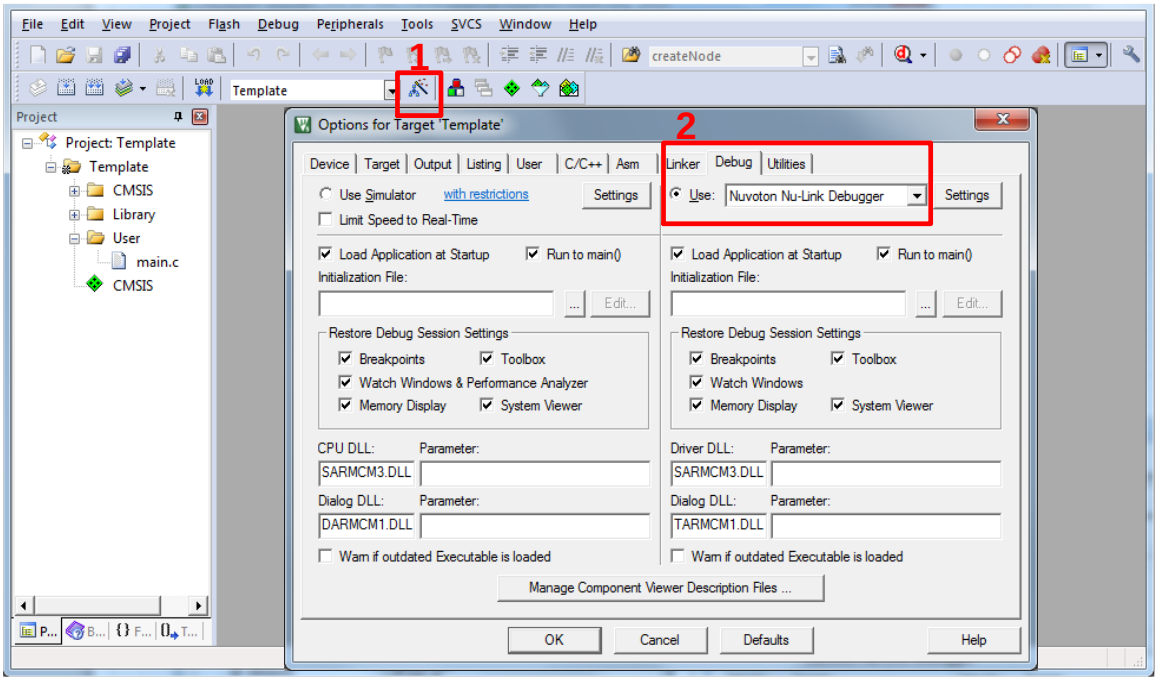


Figure 5-10 Debugger Setting in Options Window

Note: If the dropdown menu in Figure 5-10 does not contain “Nuvoton Nu-Link Debugger” item, please rework section 5.2.

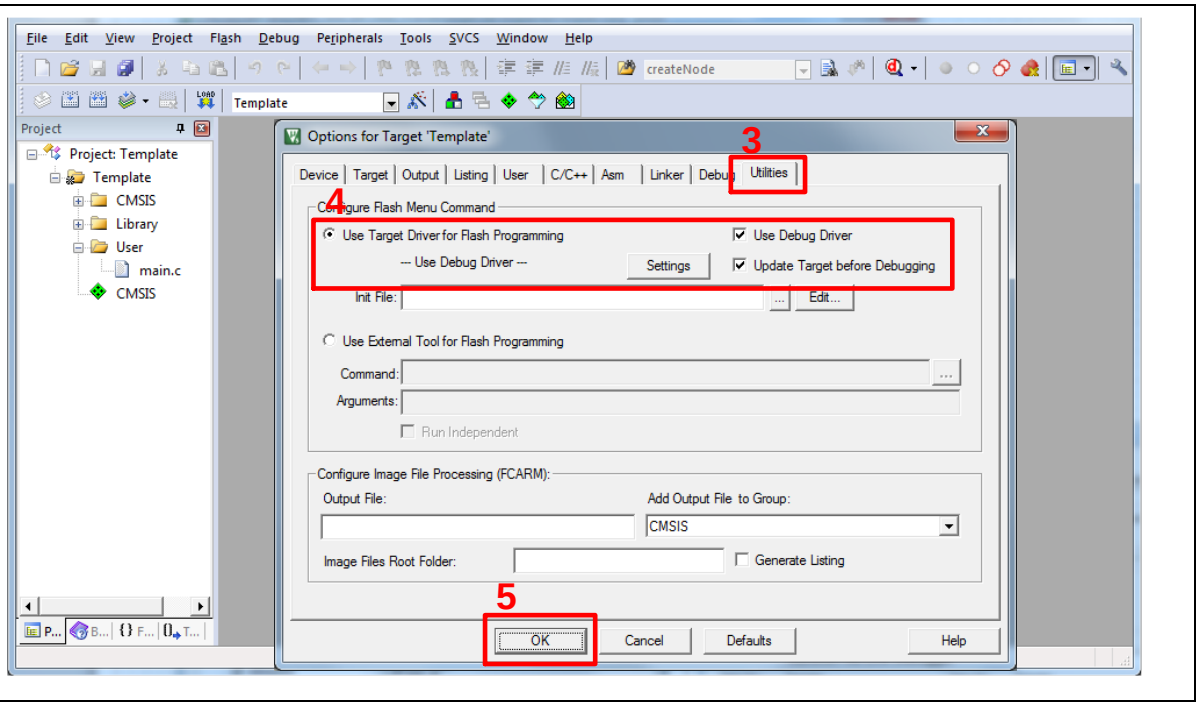


Figure 5-11 Programming Setting in Options Window

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.

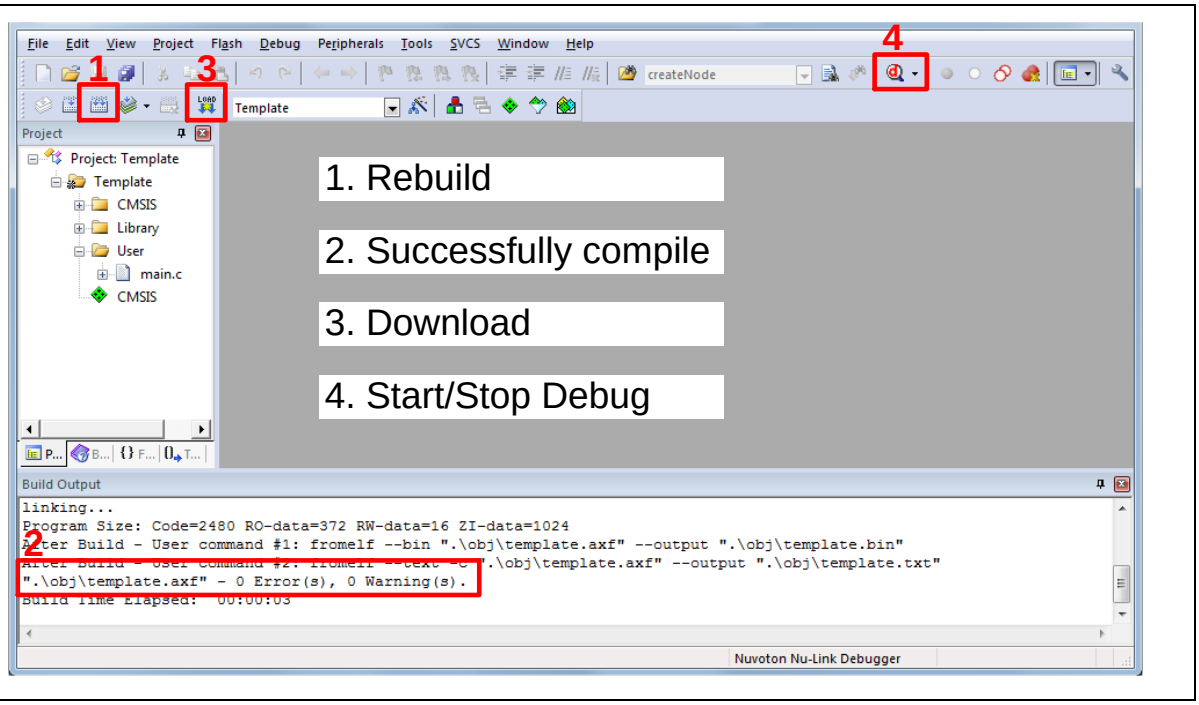


Figure 5-12 Compile and Download the Project

4. Figure 5-13 shows the debug mode under Keil MDK. Click "**Run**" and the debug message will

be printed out as shown in Figure 5-14. User can debug the project under debug mode by checking source code, assembly language, peripherals' registers, and setting breakpoint, step run, value monitor, etc.

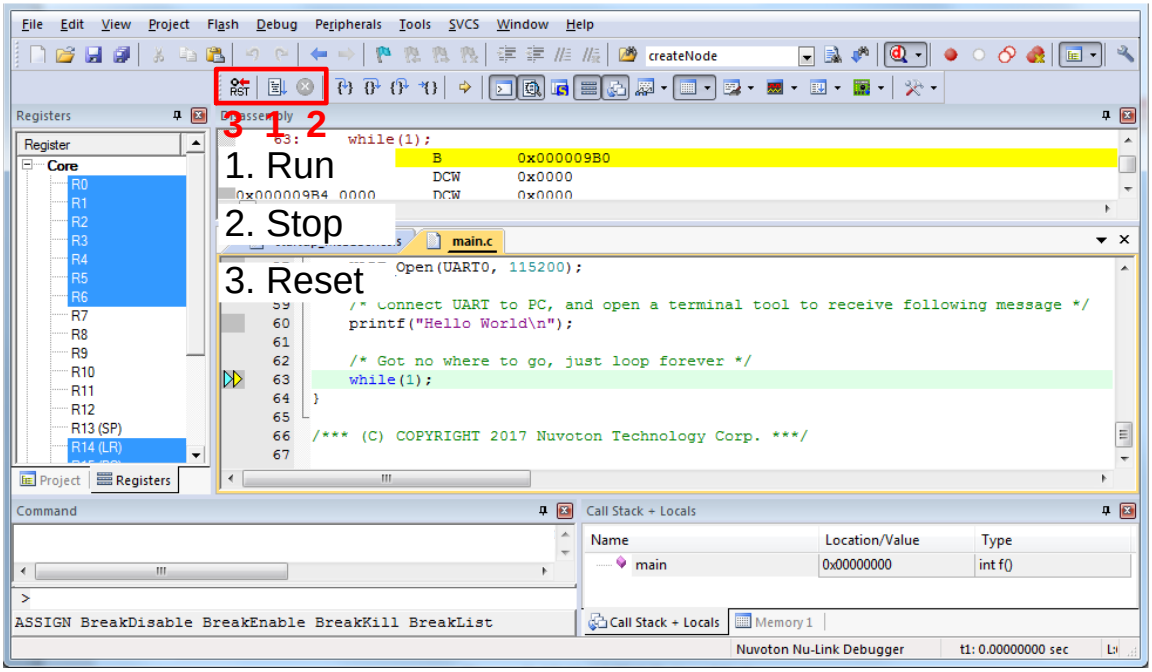


Figure 5-13 Keil MDK Debug Mode

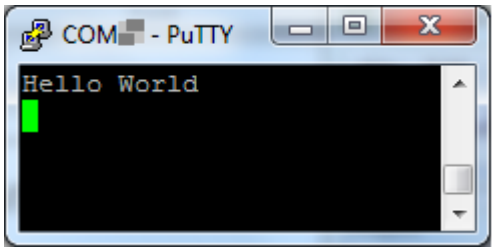


Figure 5-14 Debug Message on Serial Port Terminal Windows

5.6.2 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 5-15.

Note: If the toolbar does not contain “Nu-Link” item, please rework section 5.2.

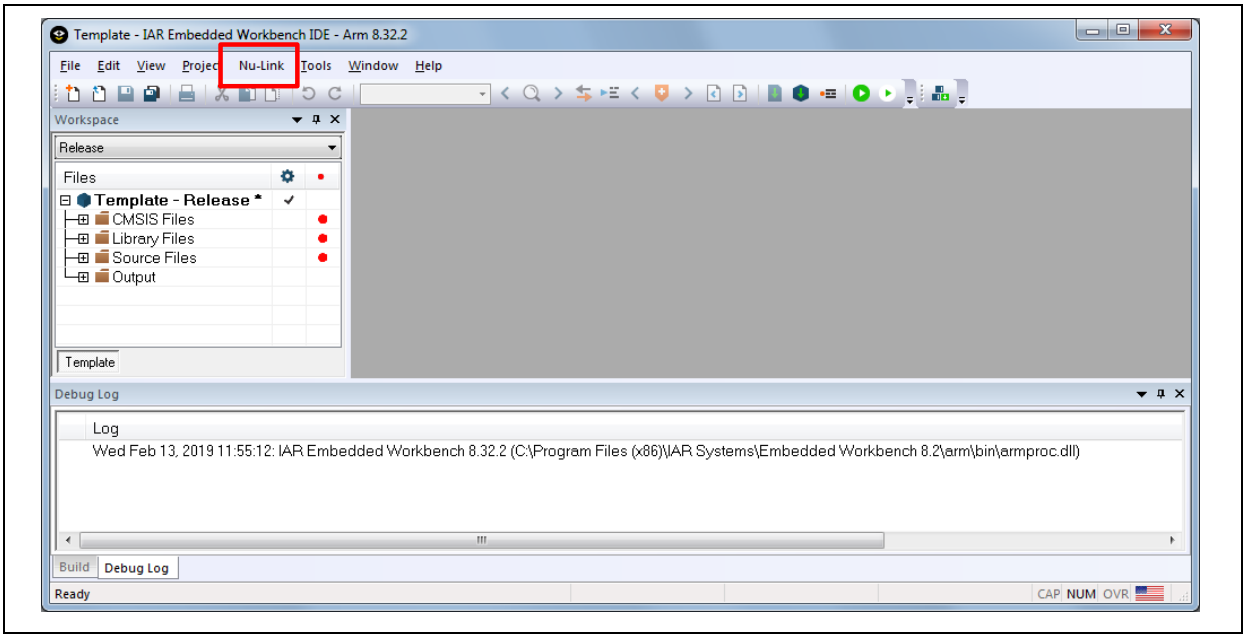


Figure 5-15 IAR EWARM Window

3. Make a target file as presented in Figure 5-16. After successfully compiling the project, download code to the Flash memory and enter debug mode.

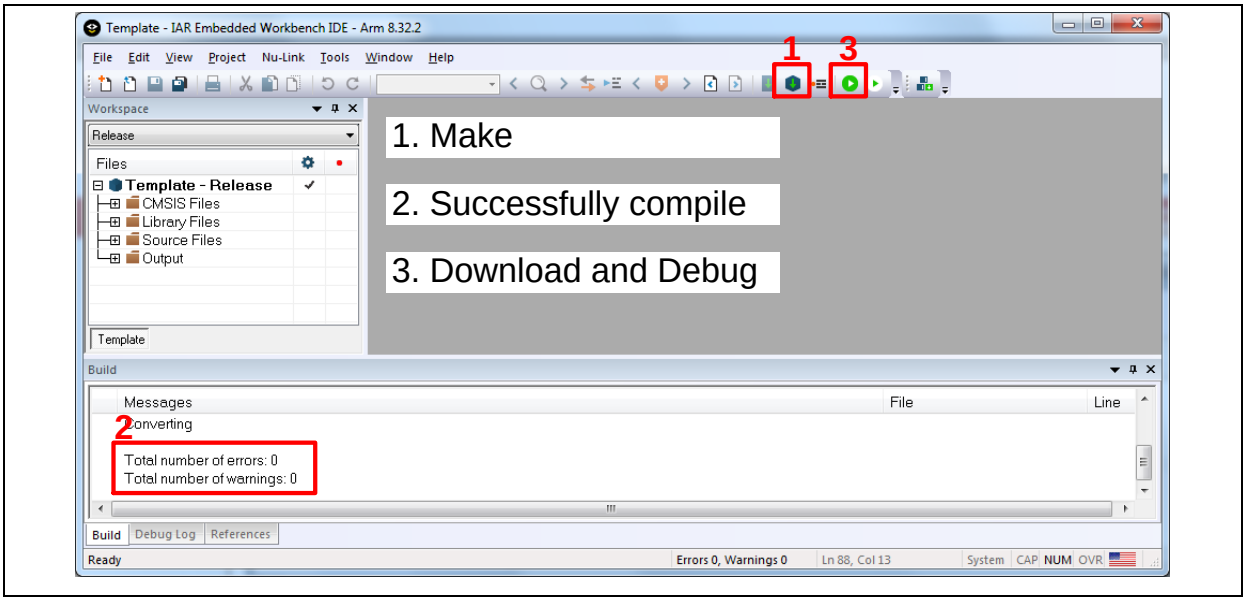


Figure 5-16 Compile and Download the Project

4. Figure 5-17 shows the debug mode under IAR EWARN. Click “**Go**” and the debug message will

be printed out as shown in Figure 5-18. User can debug the project under debug mode by checking source code, assembly language, peripherals' registers, and setting breakpoint, step run, value monitor, etc.

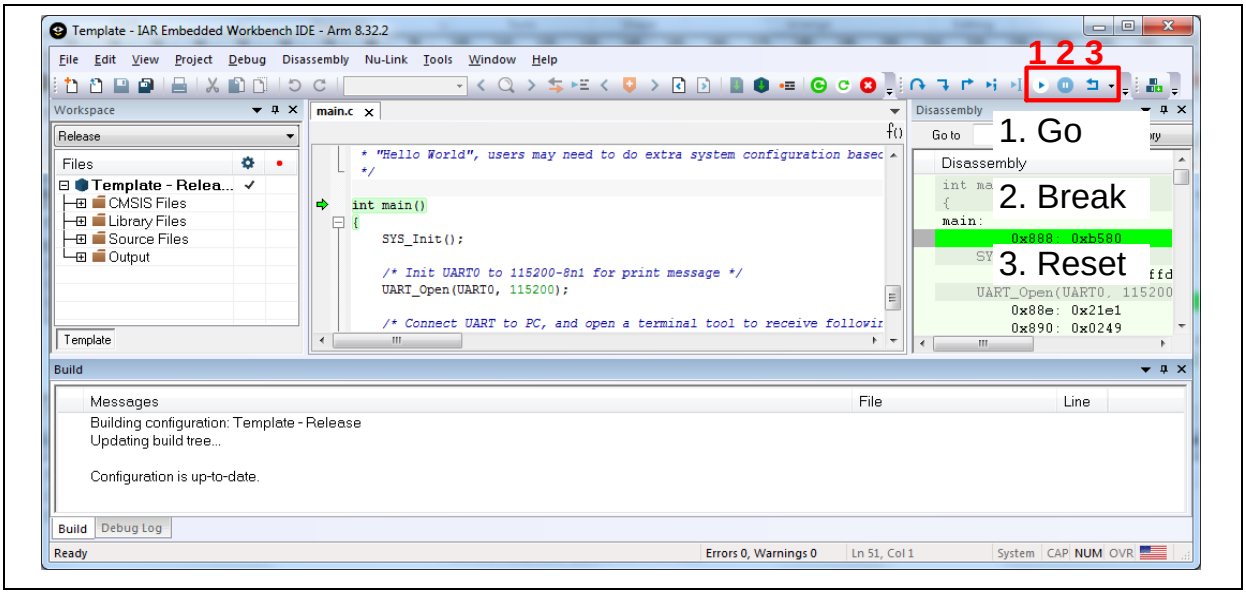


Figure 5-17 IAR EWARM Debug Mode

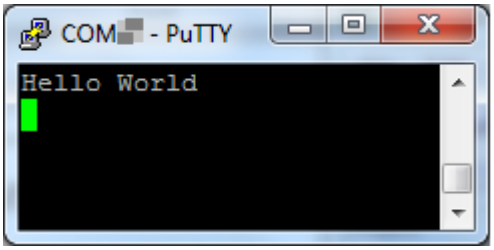


Figure 5-18 Debug Message on Serial Port Terminal Windows

5.6.3 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 5-19 and Figure 5-20.

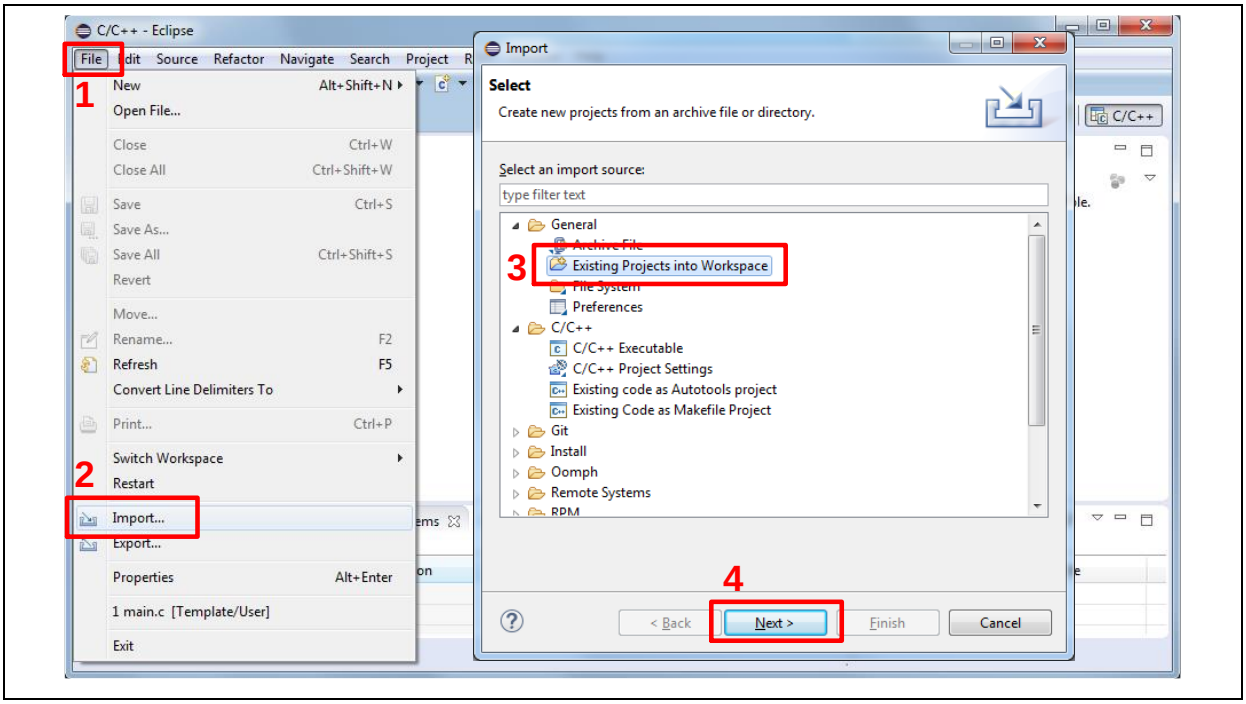


Figure 5-19 Import the Project in NuEclipse

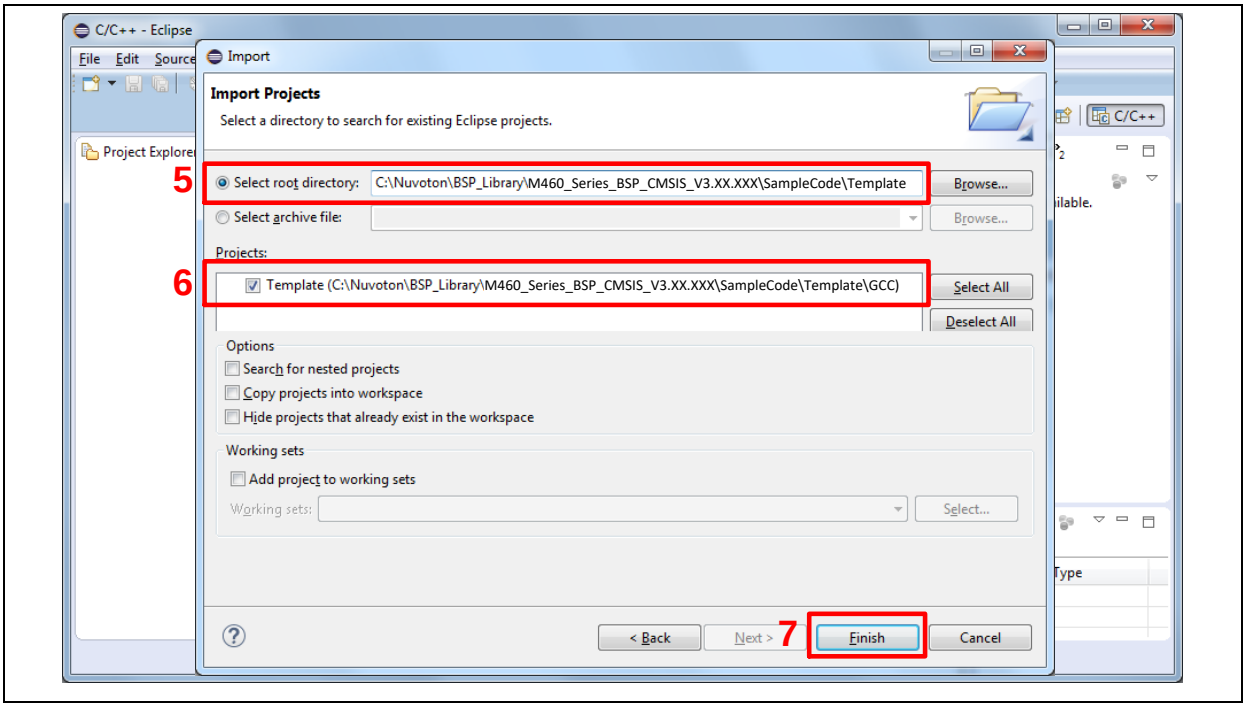


Figure 5-20 Import Projects Windows

3. Click the “Template” project and find the project properties as shown in Figure 5-21. Make sure the settings are the same as settings in Figure 5-22.

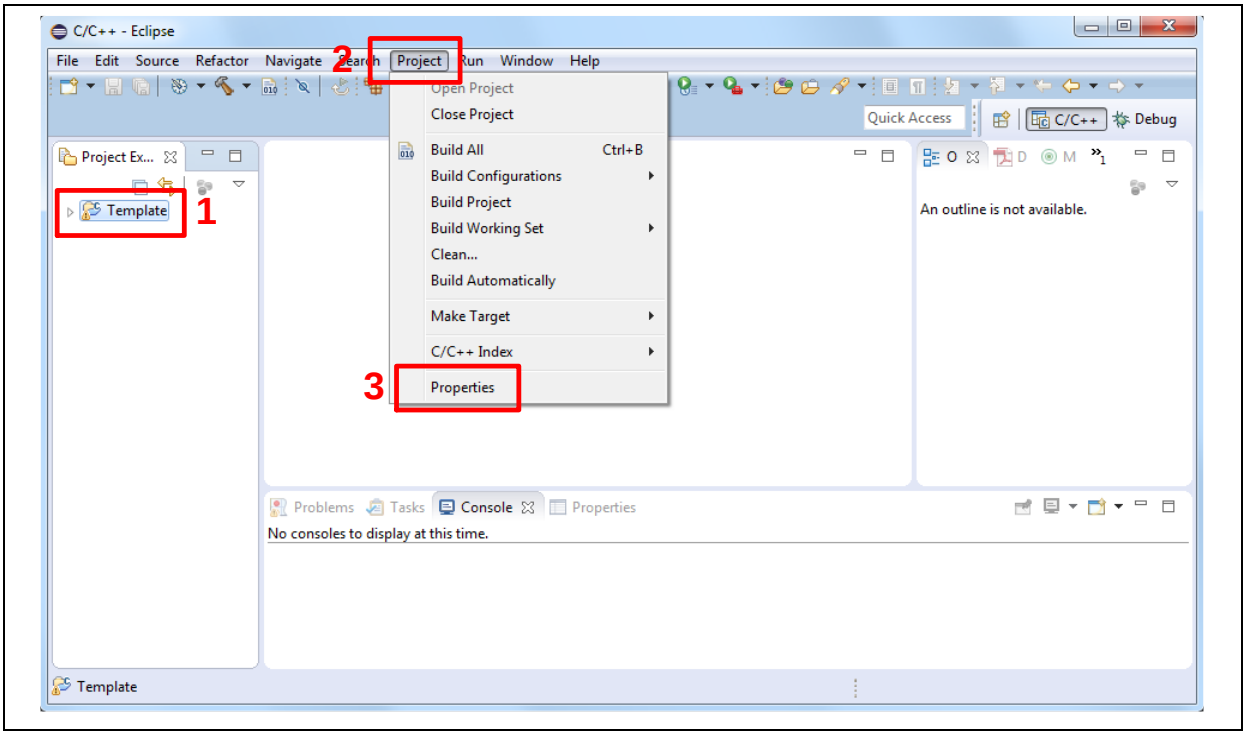


Figure 5-21 Open Project Properties Window

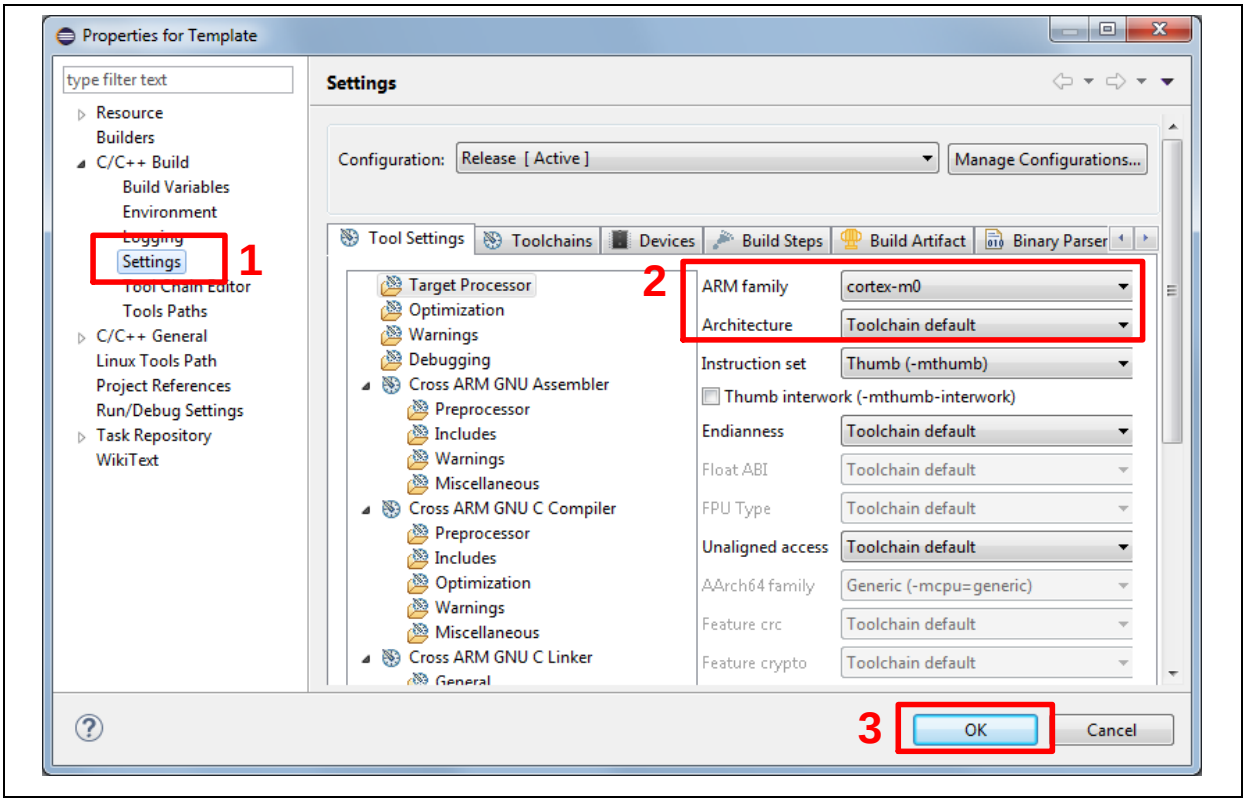


Figure 5-22 Project Properties Settings

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

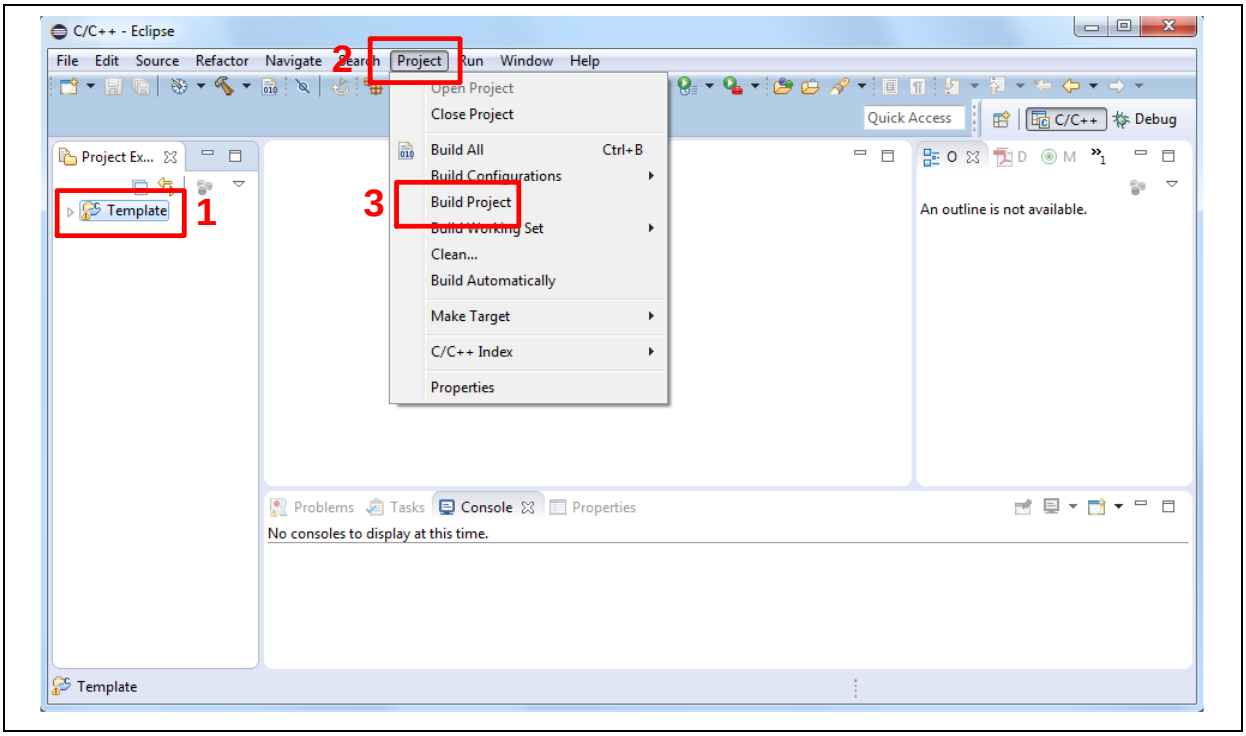


Figure 5-23 Build Project

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

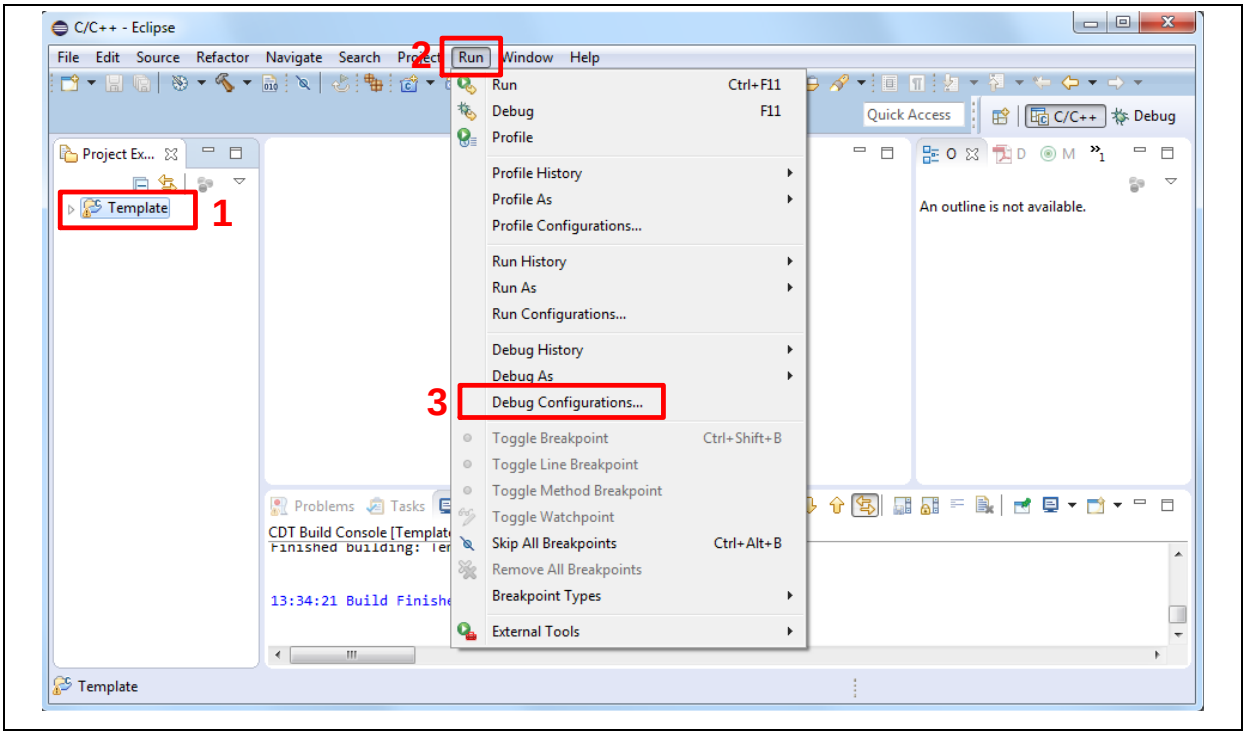
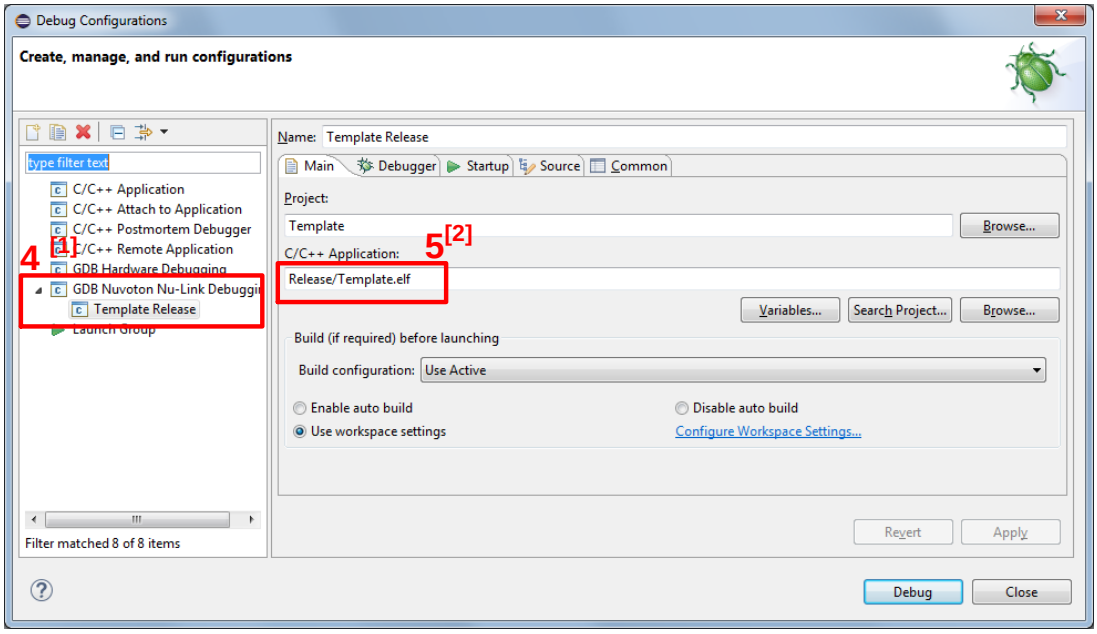


Figure 5-24 Open Debug Configuration



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 5-25 Main Tab Configuration

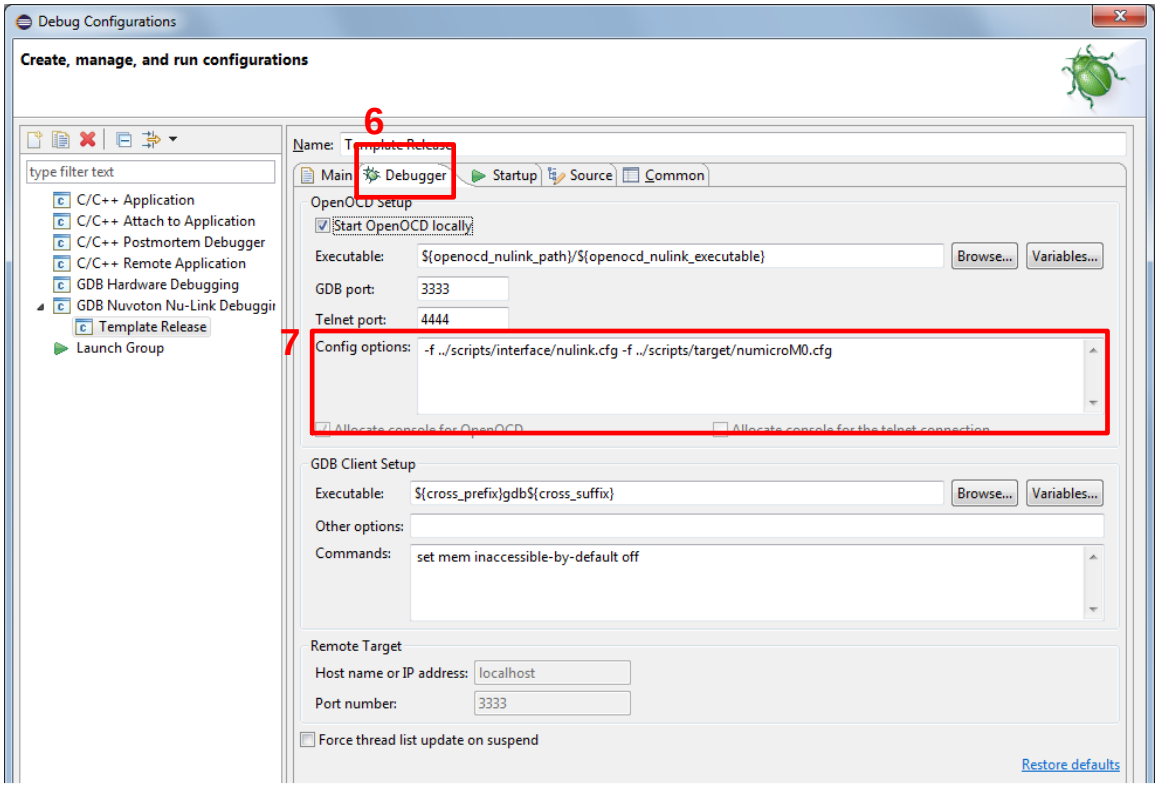
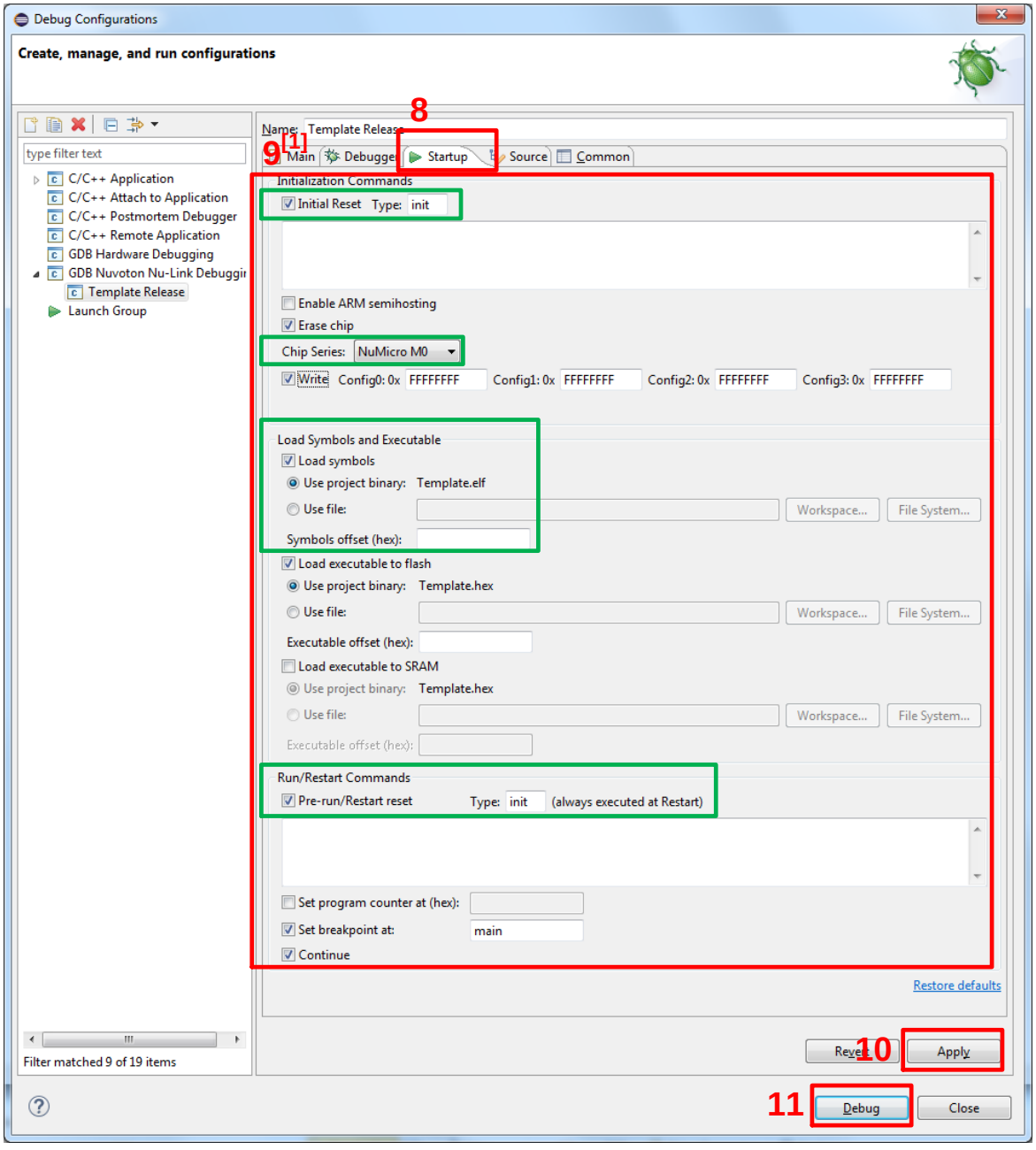


Figure 5-26 Debugger Tab Configuration



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

Figure 5-27 Startup Tab Configuration

6. Figure 5-28 shows the debug mode under NuEclipse. Click "**Resume**" and the debug message will be printed out as shown in Figure 5-29. 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*.

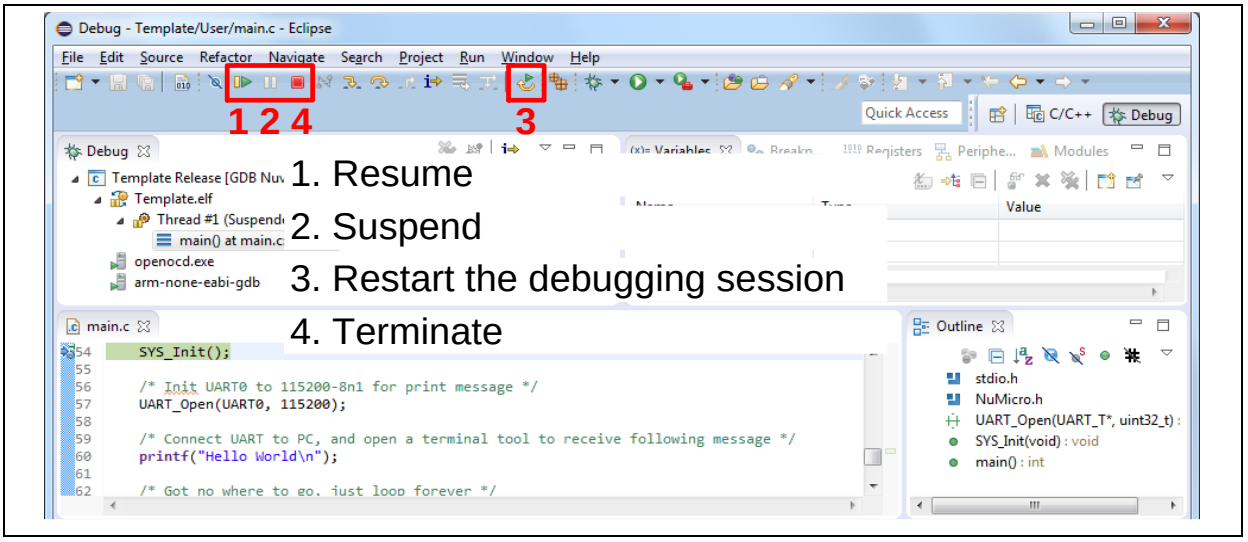


Figure 5-28 NuEclipse Debug Mode

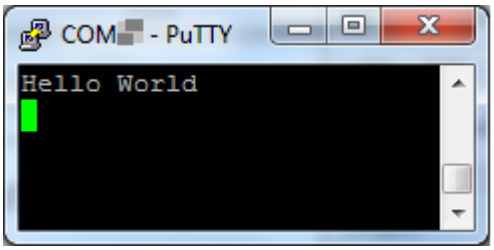


Figure 5-29 Debug Message on Serial Port Terminal Windows

5.7 Application Library Support

5.7.1 emWin GUI Library

Download and unzip the emWin GUI Library Package and move those folders into Board Support Package (BSP) by following the guideline in *M460 emWin Quick Start Guide*. The *M460 emWin Quick Start Guide* is under the emWin GUI library package folder as shown in Figure 5-30.

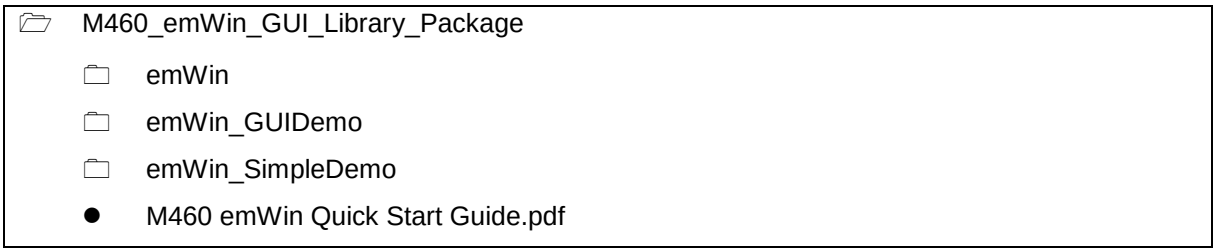


Figure 5-30 M460 emWin Quick Start Guide Folder Path

5.7.2 RT-Thread Library

Please refer to RT-Thread website for *NuMaker-M467HJ Quick Start*.

- RT-Thread website
- RT-Thread GitHub

6 NUMAKER-HMI-M467 SCHEMATICS

6.1 NuMaker-M467 Schematics

6.1.1 Nu-Link2-Me

Figure 6-1 shows the Nu-Link2-Me circuit.

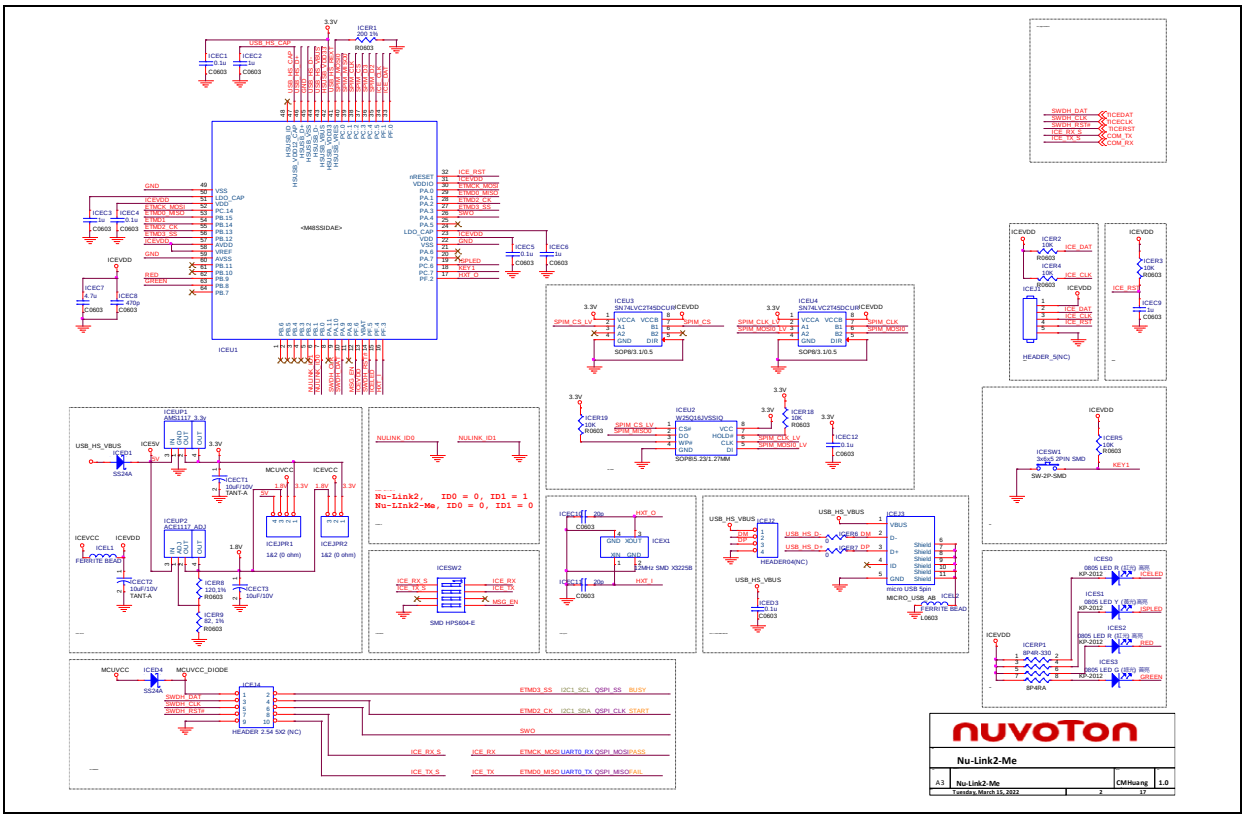


Figure 6-1 Nu-Link2-Me Circuit

6.1.2 M467HJ Target Board

6.1.2.1 Power Source

Figure 6-2 shows the power source circuit.

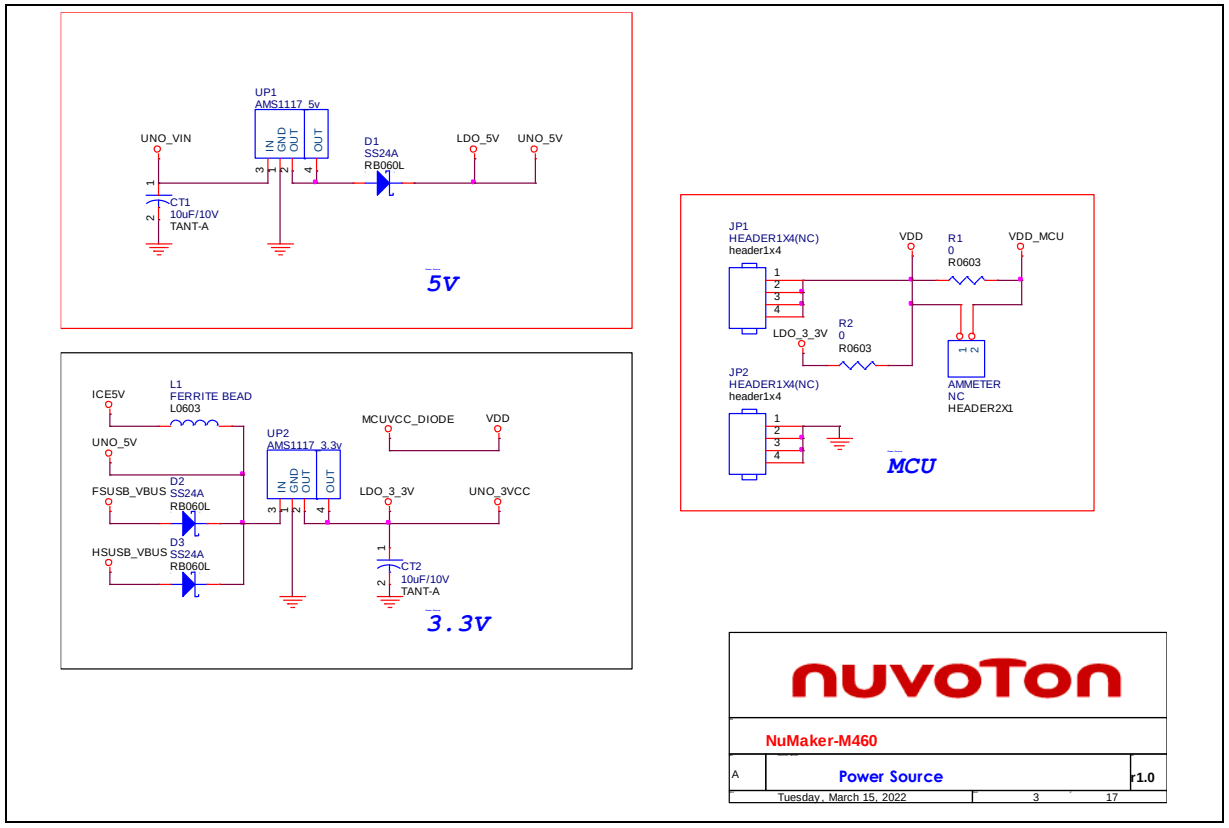


Figure 6-2 Power Source Circuit

6.1.2.2 M467HJHAN

Figure 6-3 shows the M467HJHAN circuit.

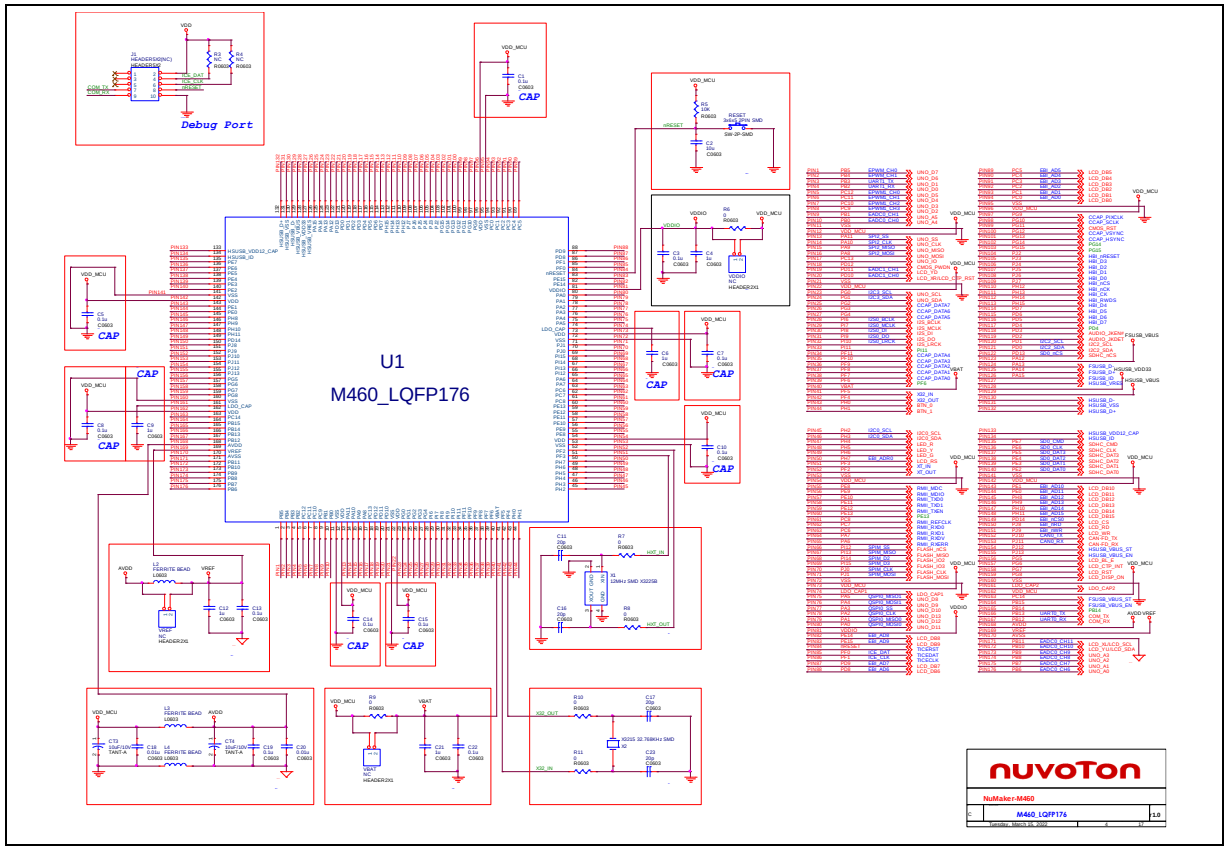


Figure 6-3 M467HJHAN Circuit

6.1.2.3 HyperRAM

Figure 6-4 shows the HyperRAM circuit.

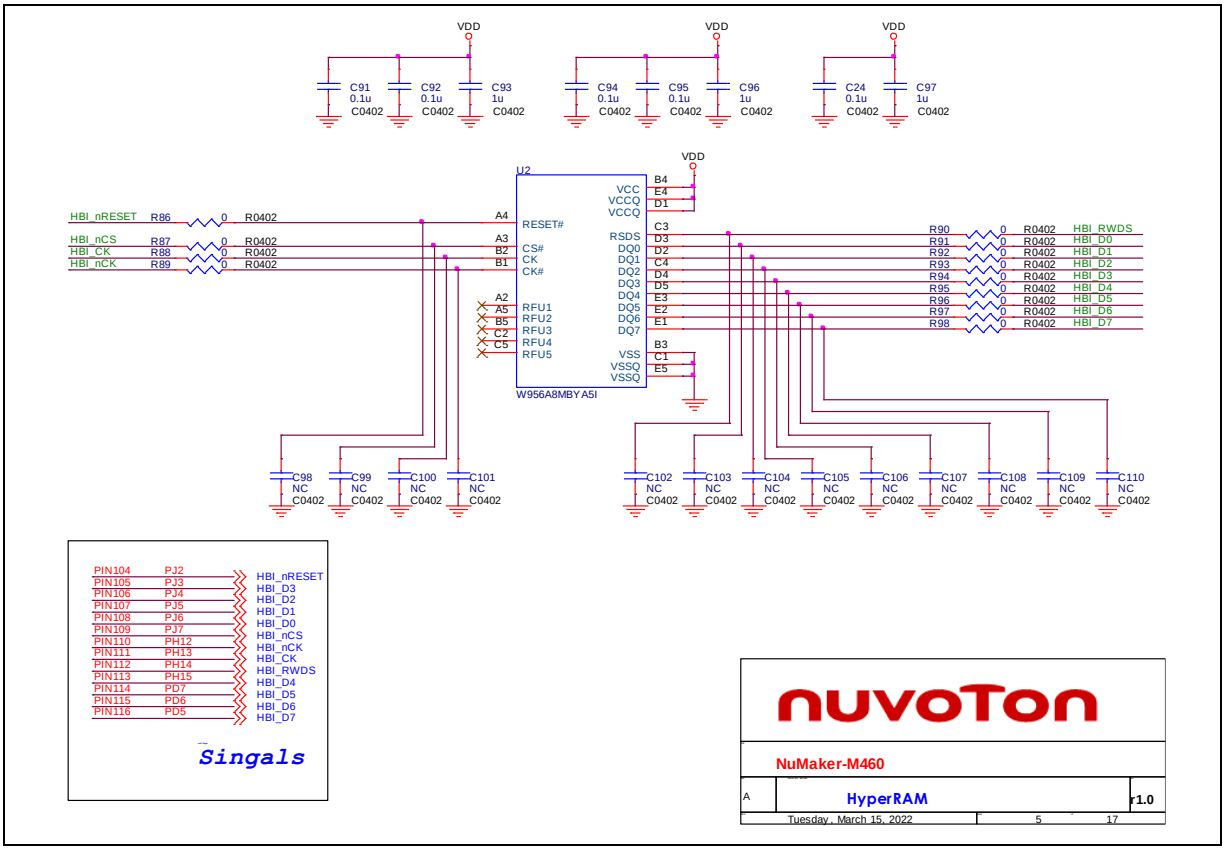


Figure 6-4 HyperRAM Circuit

6.1.2.4 SPI Flash

Figure 6-5 shows the SPI flash circuit.

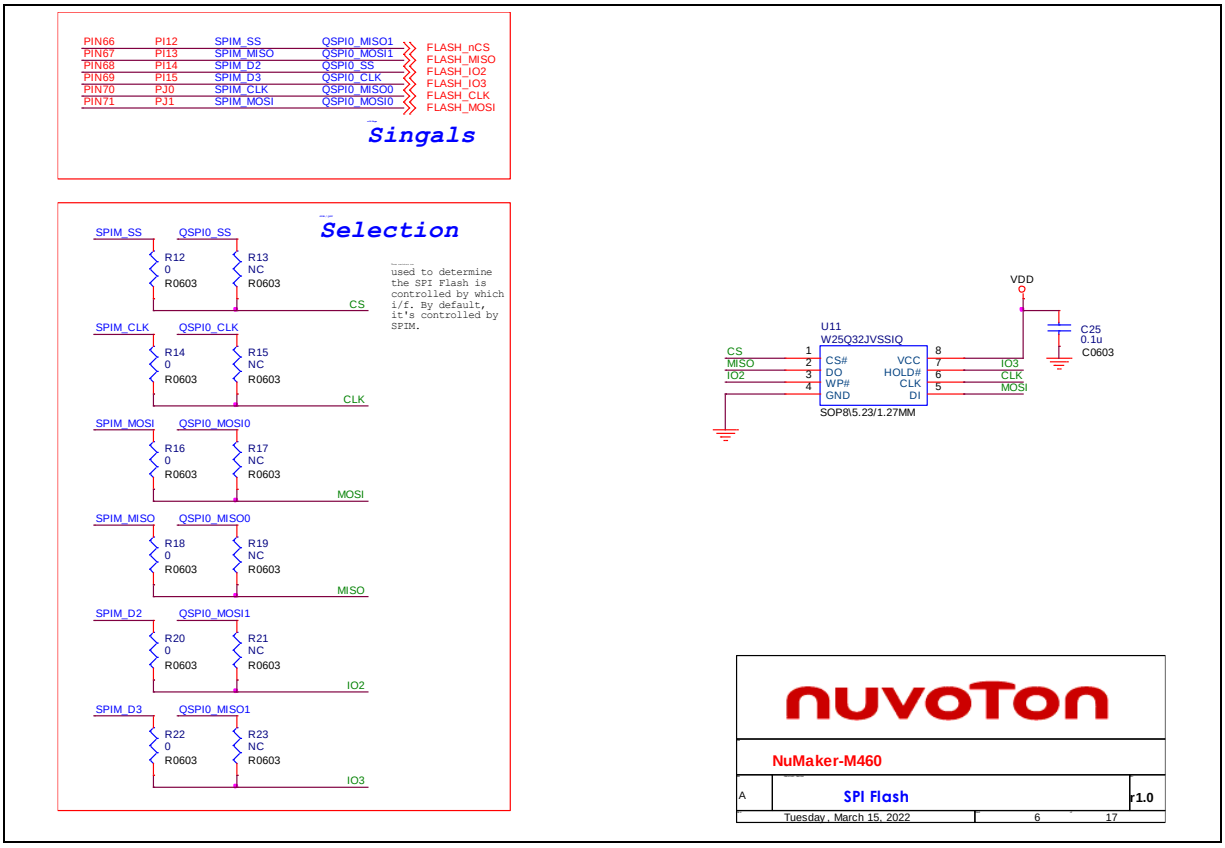


Figure 6-5 SPI Flash Circuit

6.1.2.5 *Full-speed USB*

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

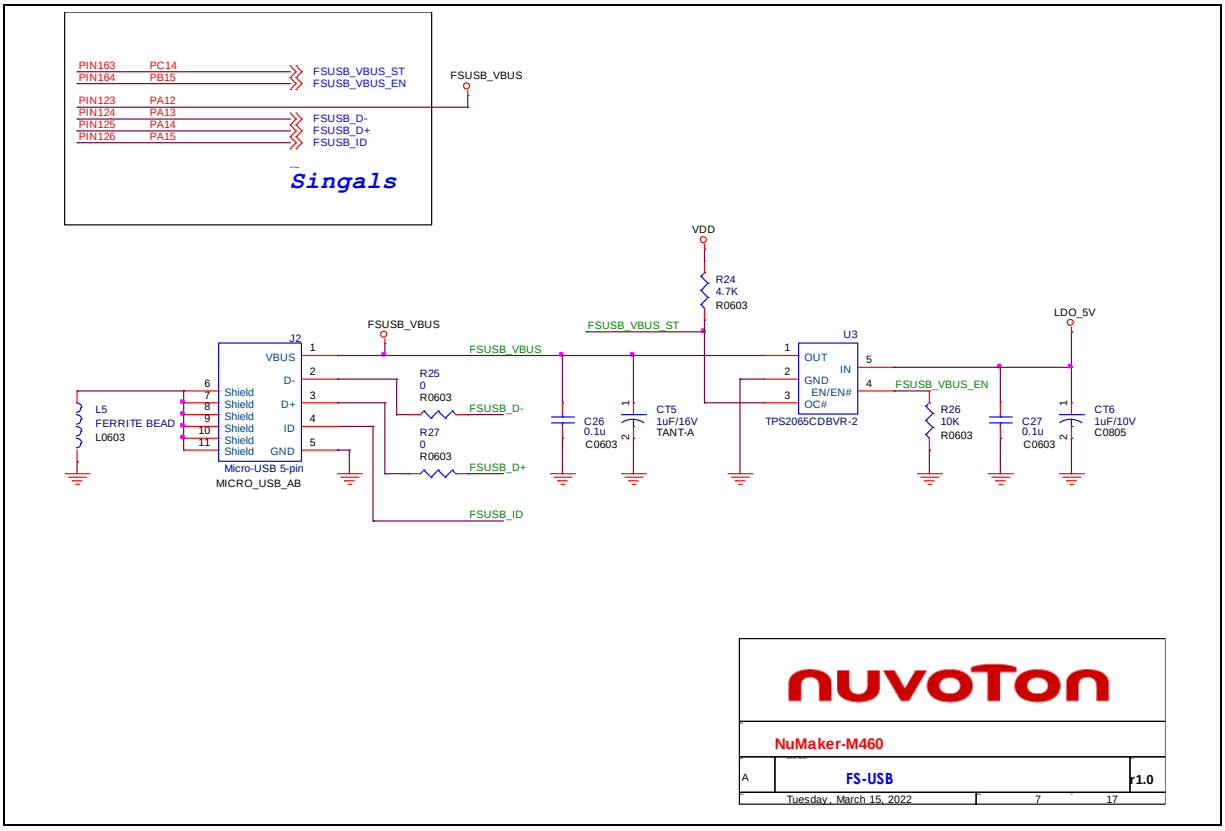


Figure 6-6 Full-speed USB Circuit

6.1.2.6 High-speed USB

Figure 6-7 shows the high-speed USB circuit.

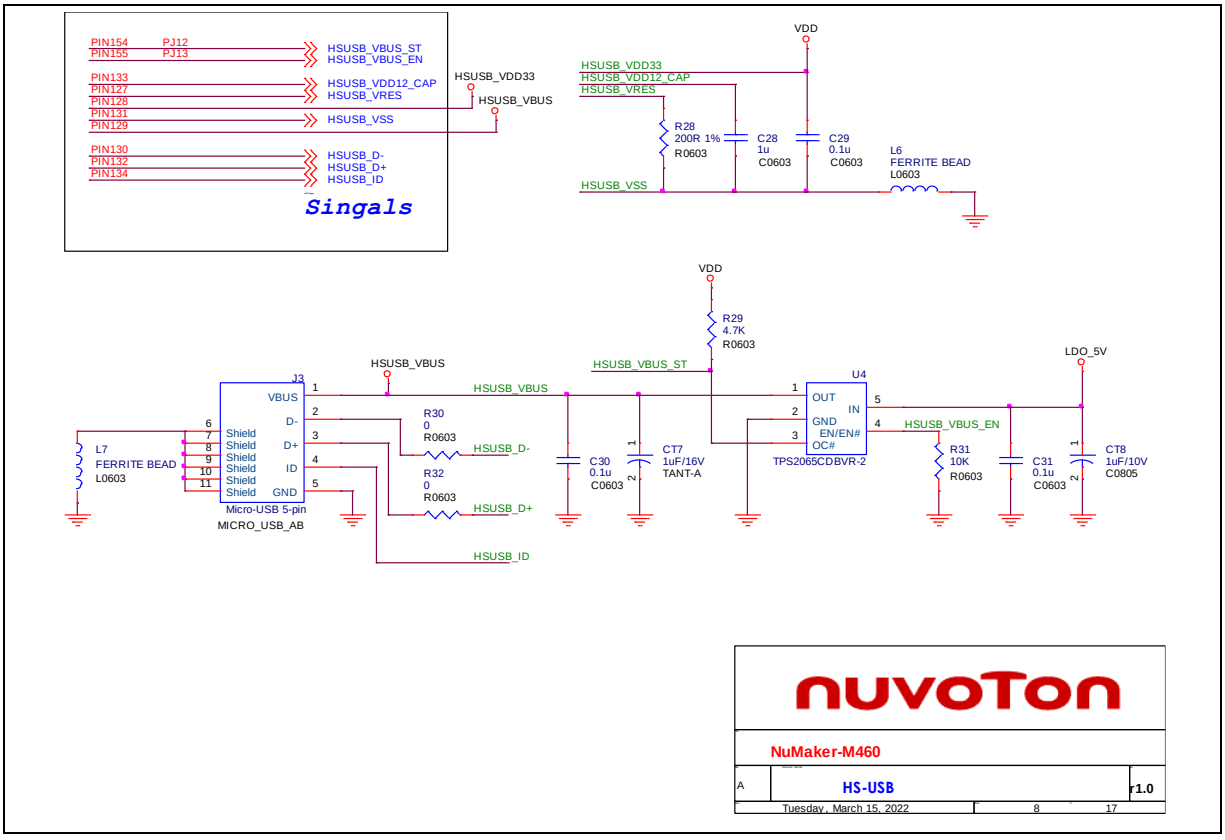


Figure 6-7 High-speed Circuit

6.1.2.7 SD Card

Figure 6-8 shows the SD card circuit.

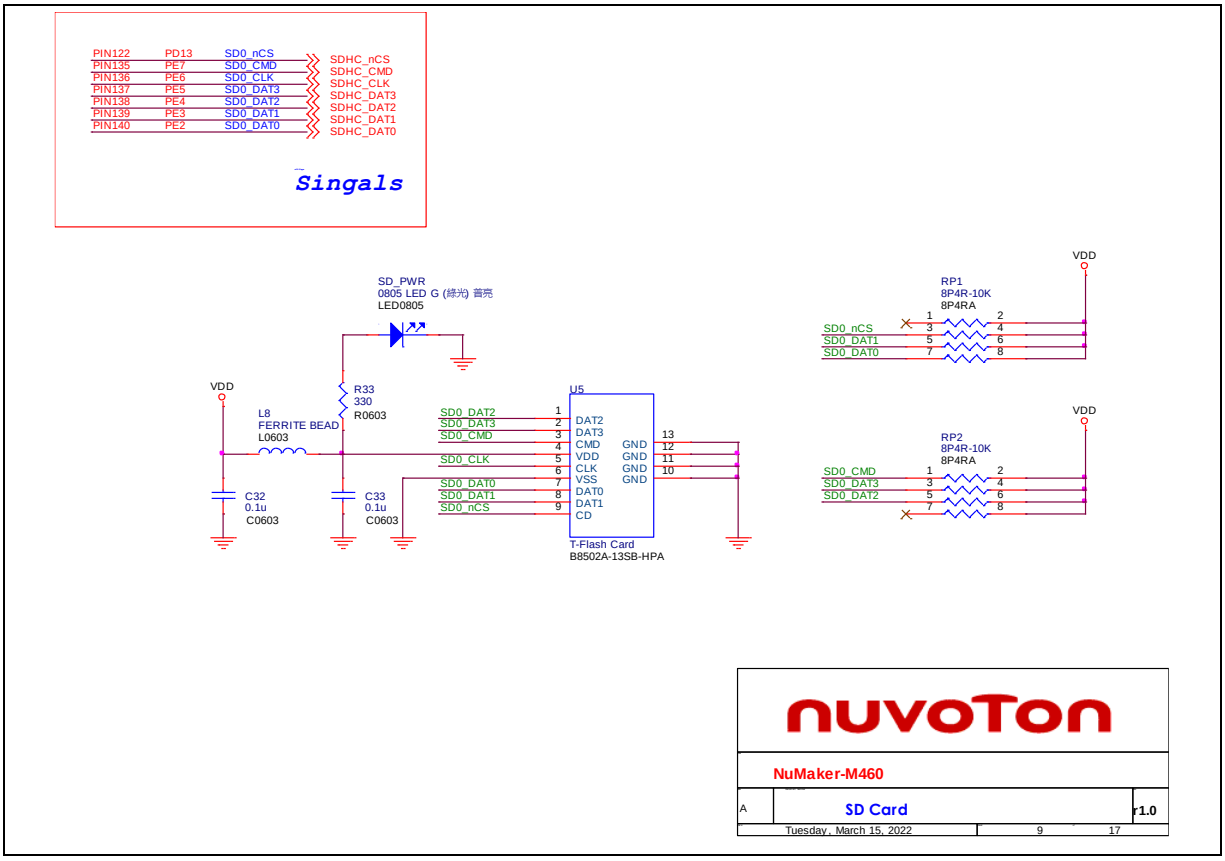


Figure 6-8 SD Card Circuit

6.1.2.8 Extension Connectors

Figure 6-9 shows the extension connectors circuit.

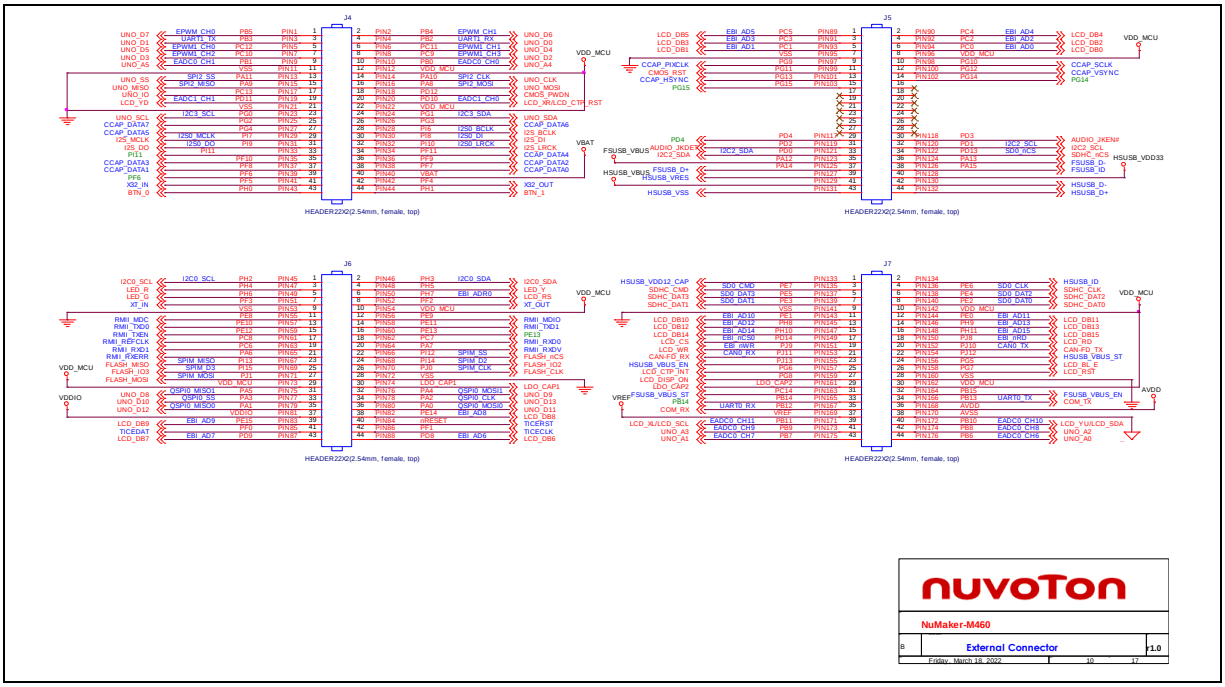


Figure 6-9 Extension Connectors Circuit

6.1.2.9 *Arduino UNO I/F*

Figure 6-10 shows the Arduino UNO interface circuit.

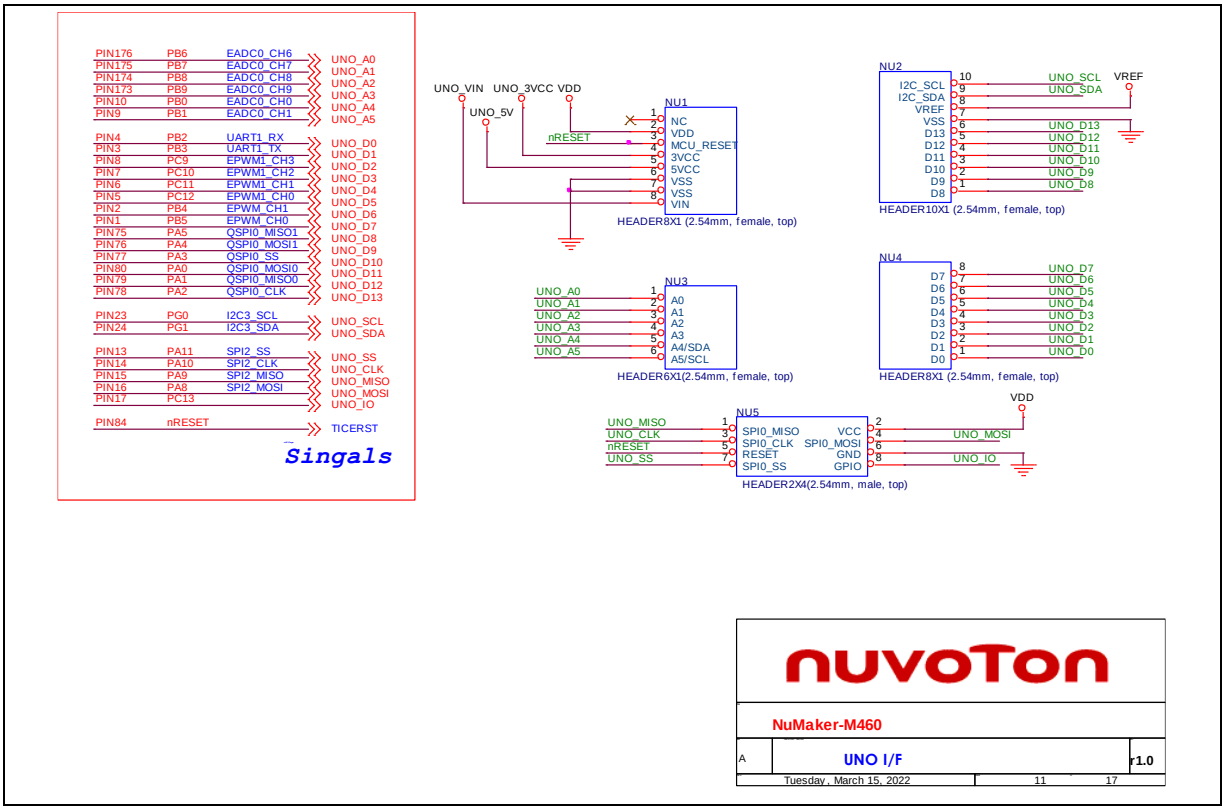


Figure 6-10 Arduino Uno I/F Circuit

6.1.2.10 COMS I/F & LCD I/F

Figure 6-11 shows the COMS and LCD interface circuit.

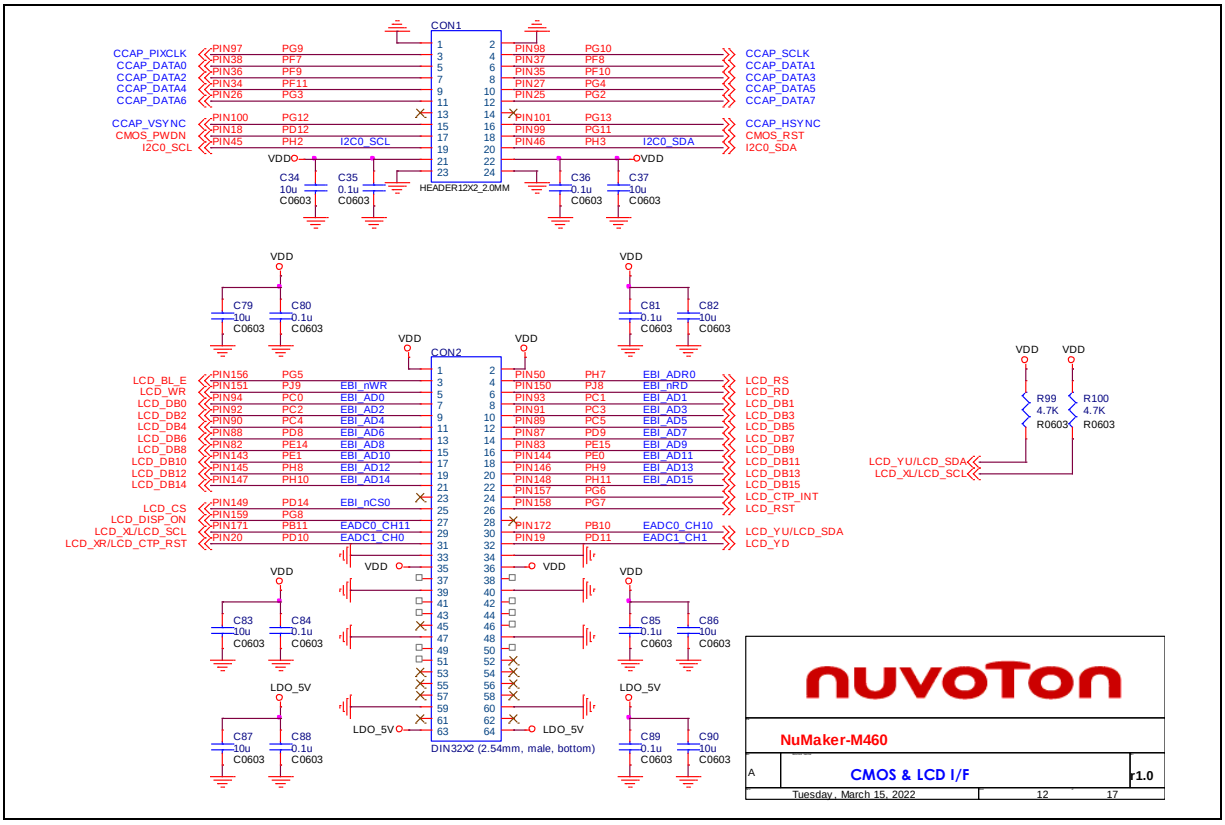


Figure 6-11 COMS and LCD I/F Circuit

6.1.2.11 CAN FD Transceiver

Figure 6-12 shows the CAN FD transceiver circuit.

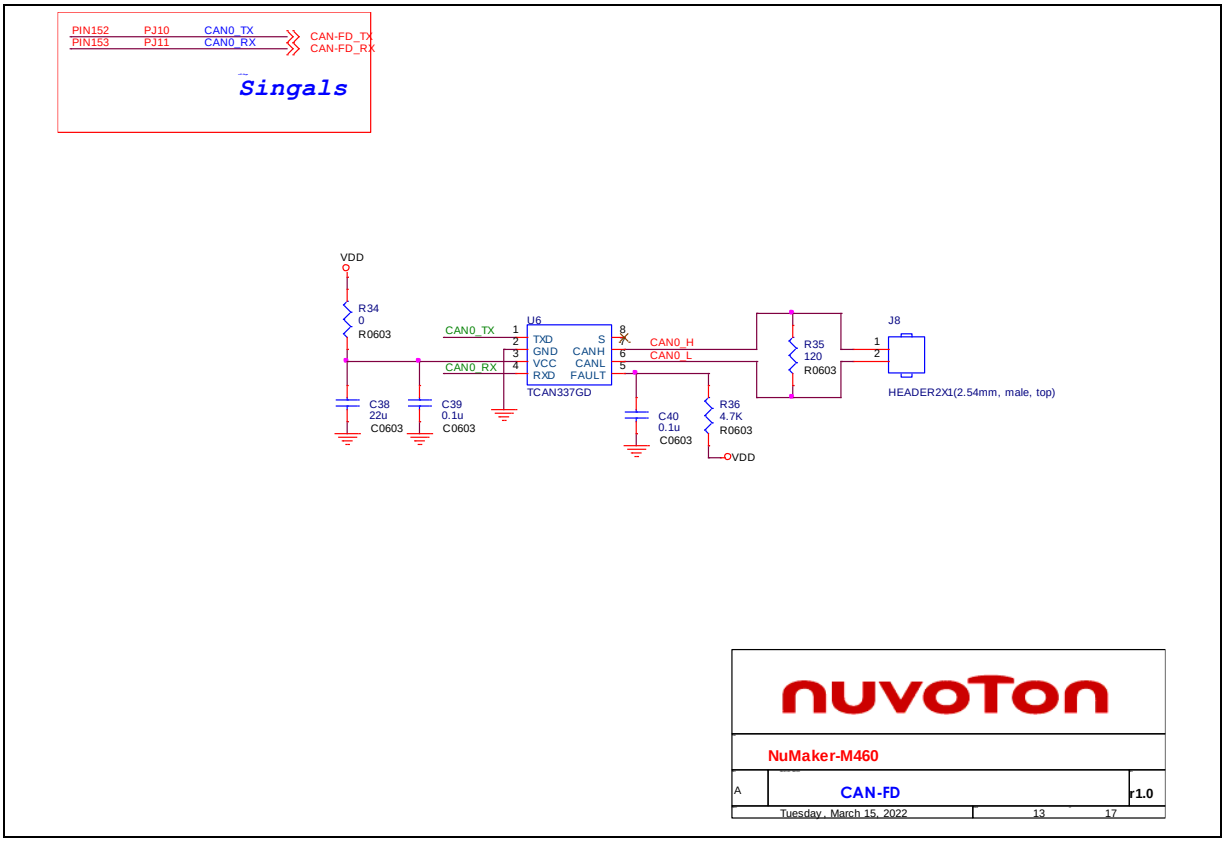


Figure 6-12 CAN FD Transceiver Circuit

6.1.2.12 Ethernet PHY

Figure 6-13 shows the Ethernet PHY circuit.

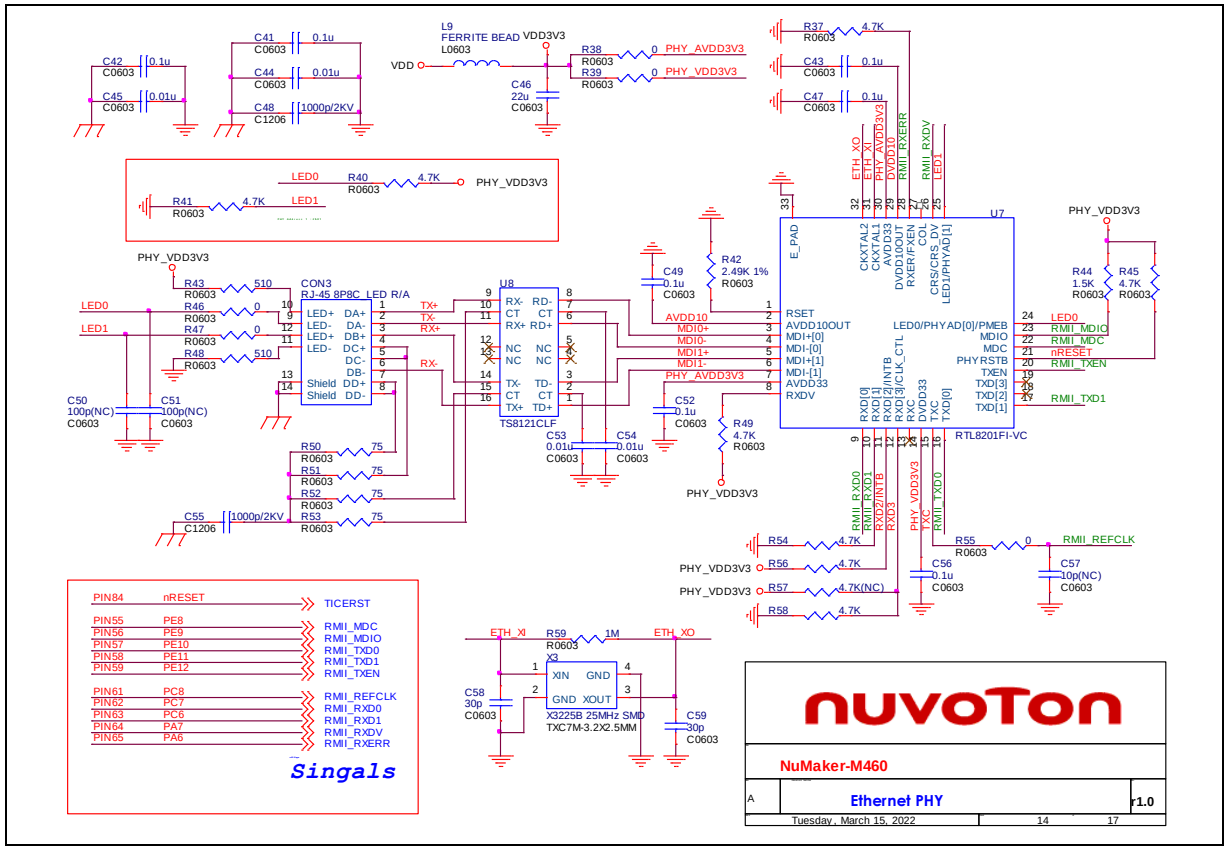


Figure 6-13 Ethernet PHY Circuit

6.1.2.13 Audio

Figure 6-14 shows the audio circuit.

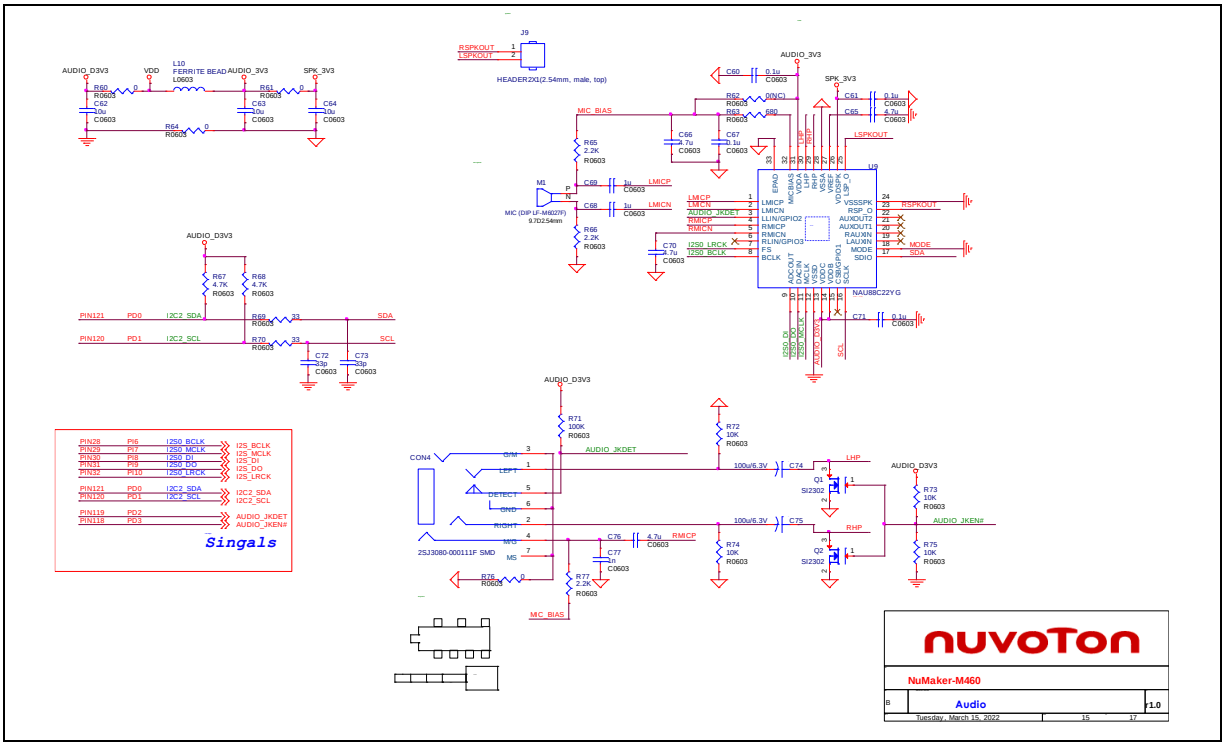


Figure 6-14 Audio Circuit

6.1.2.14 Thermal Sensor

Figure 6-15 shows the thermal sensor circuit.

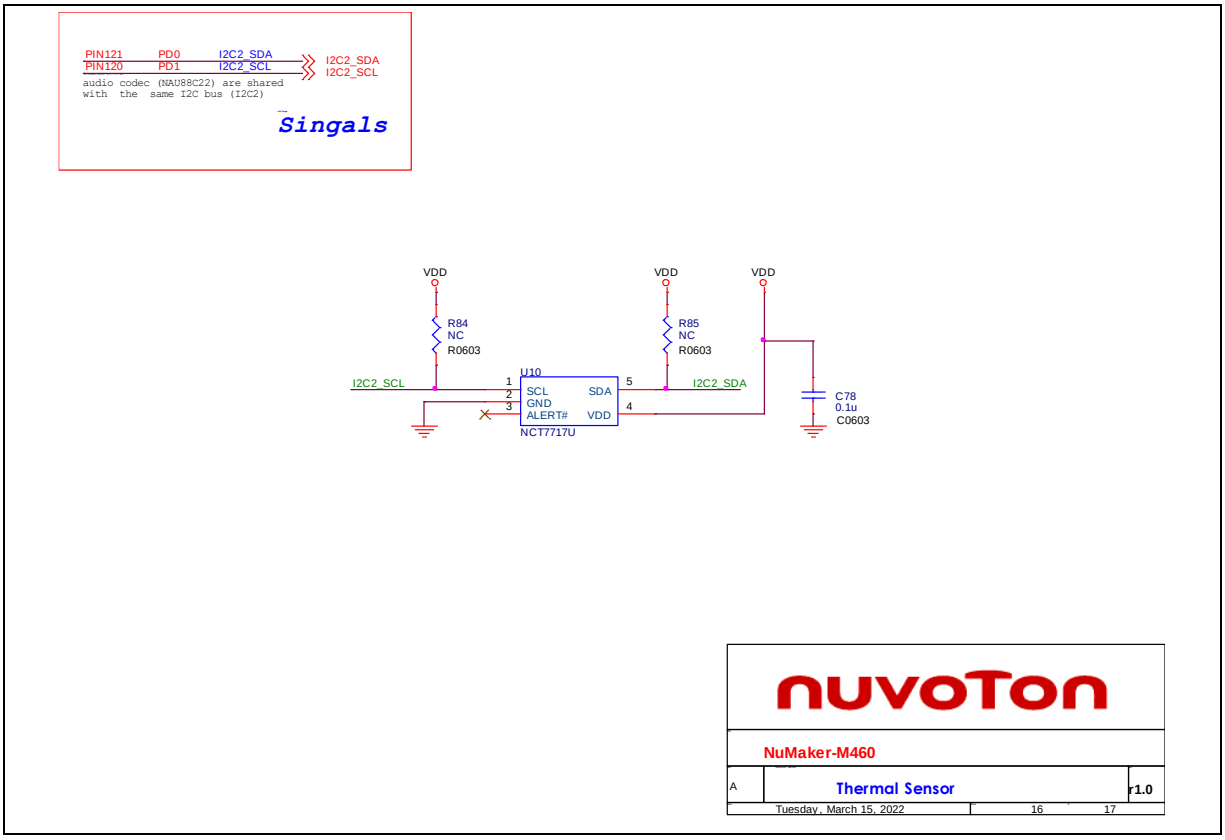


Figure 6-15 Thermal Sensor Circuit

6.1.2.15 LEDs & Buttons

Figure 6-16 shows the LEDs and buttons circuit.

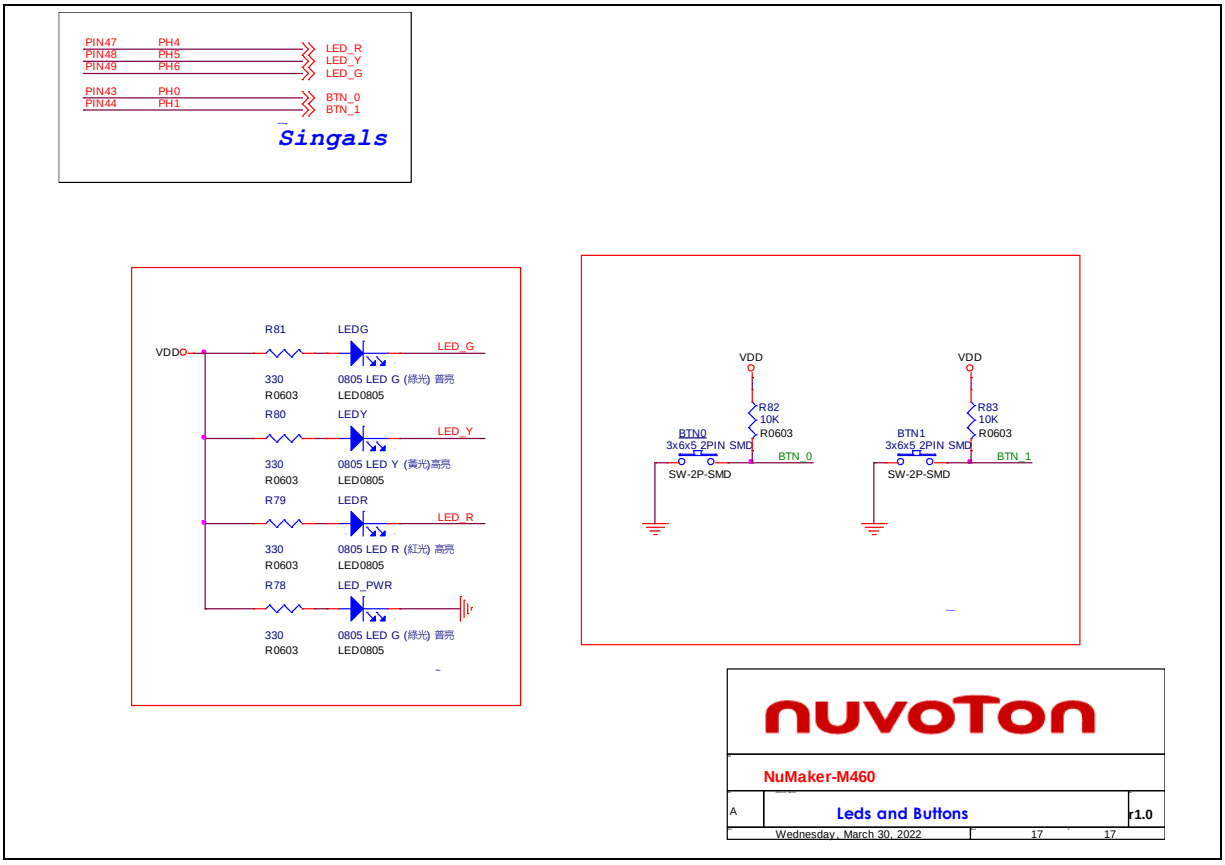


Figure 6-16 LEDs and Buttons Circuit

6.2 NuMaker-TFT-LCD43 Schematics

Figure 6-17 shows the NuMaker-TFT-LCD43 circuit.

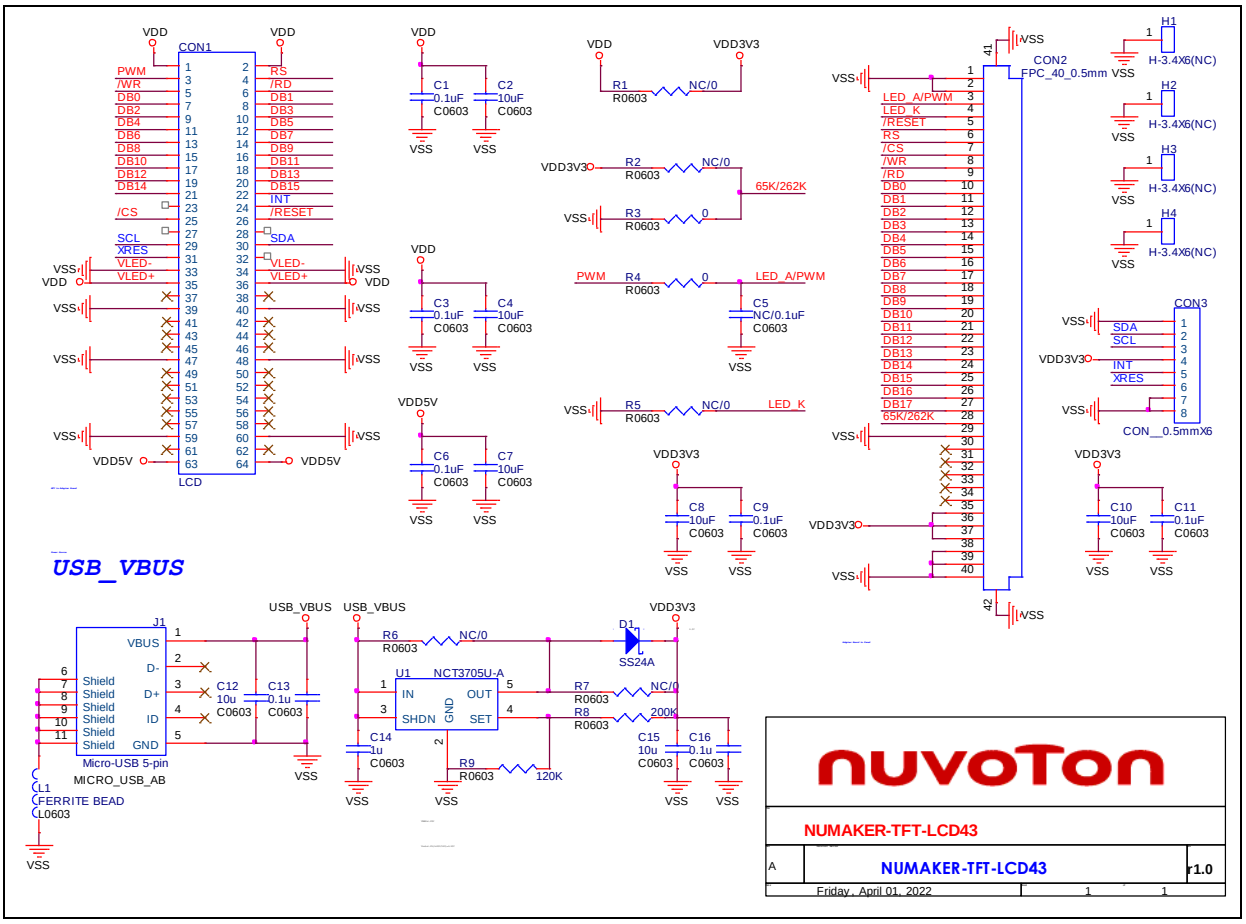


Figure 6-17 NuMaker-TFT-LCD43 Circuit

7 REVISION HISTORY

Date	Revision	Description
2022.11.11	1.00	Initial version.

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