Arm® Cortex®-M

32-bit Microcontroller

NuMaker-IoT-M263A
User Manual
NuMicro® M261/M262/M263 Series

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www.nuvoton.com

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1 OVERVIEW

This user manual is aimed to give users a fast introduction to the use of NuMaker-IoT-M263A board.

The NuMaker-IoT-M263A consists of two parts, a M263 platform with on-board modules, and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-IoT-M263A allows users to quickly develop IoT (Internet of Thing) application and easily program and debug application.

The NuMaker-IoT-M263A offers M263KIAAE with Arduino UNO compatible extension connectors and diversified power supply option. It is an easy-to-develop platform for user to expand the functionality and build the applications. The NuMaker-IoT-M263A also provides an ammeter connector, allows user to monitor the microcontroller's power consumption during development.

The NuMaker-IoT-M263A contains several common kinds of wireless modules, like Wi-Fi, Bluetooth and LoRa. The NuMaker-IoT-M263A also supports a mini PCIe connector. User can use other modules, such as NB-IoT, 3G/4G, GPS. Besides, the NuMaker-IoT-M263A supports CAN and RS485 transceiver to make user develop industrial IoT application. Furthermore, the NuMaker-IoT-M263A equips an environmental sensor and a 9-axis sensor for user application.

The Nu-Link2-Me is a debugger and programmer that supports on-line programming and debugging through SWD interface. The on-board 16 Mbit SPI Flash allows it to off-line program the target microcontroller. The Nu-Link2-Me provides virtual COM port (VCOM) function to print out messages on PC. The Nu-Link2-Me can be separated from NuMaker-IoT-M263A, allowing user to use it as a mass production programming tool.

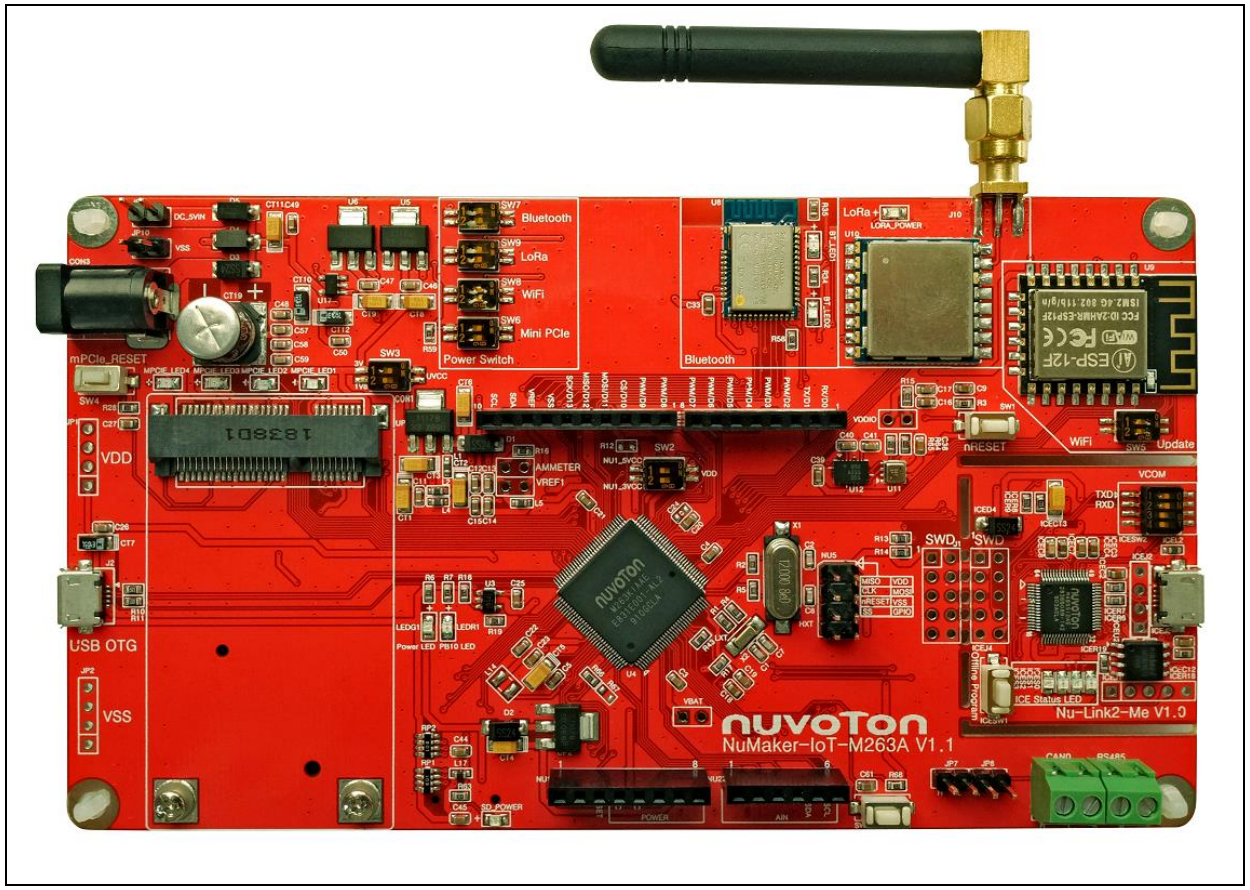

Figure 1-1 NuMaker-IoT-M263A Board

1.1 NuMaker-IoT-M263A Features

- NuMicro® M263KIAAE used as main microcontroller with functions downward compatible with:
  - M261ZIAAE
  - M261SIAAE
  - M261KIAAE
  - M262ZIAAE
  - M262SIAAE
  - M262KIAAE
  - M263ZIAAE
  - M263SIAAE
  - M263KIAAE
- On-board modules:
  - Wi-Fi module: ESP12-F
  - Bluetooth module: MDBT42Q-PAT
  - LoRa module: APC1278 (for 408/433/470 MHz)
  - LoRa antenna: ANT60-433LA (for 433 MHz)
- On-board sensors:
  - Environmental sensor: BME680
  - 9-axis sensor: BMX055
- Mini PCIe connector with SIM card connector
- CAN and RS485 transceiver
- MicroSD card connector
- Arduino UNO compatible extension connectors
- Ammeter connector for measuring the microcontroller's power consumption
- Fixable board power supply:
  - External V_{DD} power connector
  - Arduino UNO compatible extension connector VIN
  - USB OTG connector on M263 platform
  - ICE USB connector on Nu-Link2-Me
  - Power jack for mini PCIe connector
- On-board Nu-Link2-Me debugger and programmer:
  - Debug through SWD interface
  - On-line/off-line programming
  - Virtual COM port function

2 NUMAKER-IOT-M263A OVERVIEW

2.1 Front View

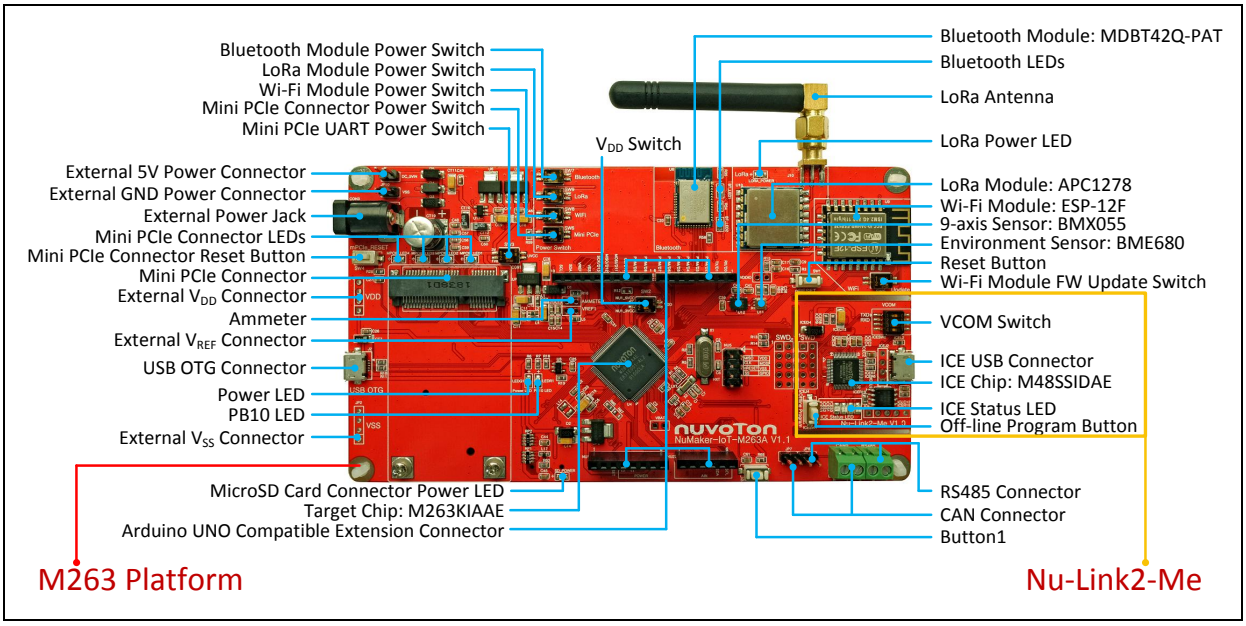

Figure 2-1 Front View of NuMaker-IoT-M263A

Figure 2-1 shows the main components and connectors from the front side of NuMaker-IoT-M263A. The following lists components and connectors from the front view:

- Target Chip: M263KIAAE (U4)
- On-board Modules:
  - Wi-Fi Module: ESP12-F (U9)
    - Firmware Update Switch (SW5)
    - Power Switch (SW8)
  - Bluetooth Module: MDBT42Q-PAT (U8)
    - Indicator LED and Connect LED (BT_LED1 and BT_LED2)
    - Power Switch (SW7)
  - LoRa Module: APC1278 (U10)
    - Antenna Connector (J10)
    - Power LED (LORA_POWER)
    - Power Switch (SW9)
- On-board Sensors:
  - Environmental Sensor: BME680 (U11)
  - 9-axis Sensor: BMX055 (U12)
- Mini PCIe Connector (CON1)
  - External Power Jack (CON3)
  - External 5V Power Connector (JP9)
  - External GND Power Connector (JP10)

  - Power Switch (SW6)
  - UART Power Switch (SW3)
  - Reset Button (SW4)
  - PG15, PD7 and PD6 LED (MPCIE_LED1, MPCIE_LED2 and MPCIE_LED3)
  - Indicator LED (MPCIE_LED4)
- CAN Connector (CAN0 and JP7)
- RS485 Connector (RS485 and JP8)
- MicroSD Card Connector Power LED (SD_POWER)
- USB OTG Connector (J2)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
- External V_{DD} Power Connector (JP1)
- External V_{SS} Power Connector (JP2)
- External V_{REF} Connector (VREF1)
- External V_{DDIO} Connector (VDDIO)
- VDD Switch (SW2)
- Ammeter Connector (AMMETER)
- Reset Button (SW1)
- Button1 (SW10)
- Power LED and PB10 LED (LEDG1 and LEDR1)
- 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)

2.2 Rear View

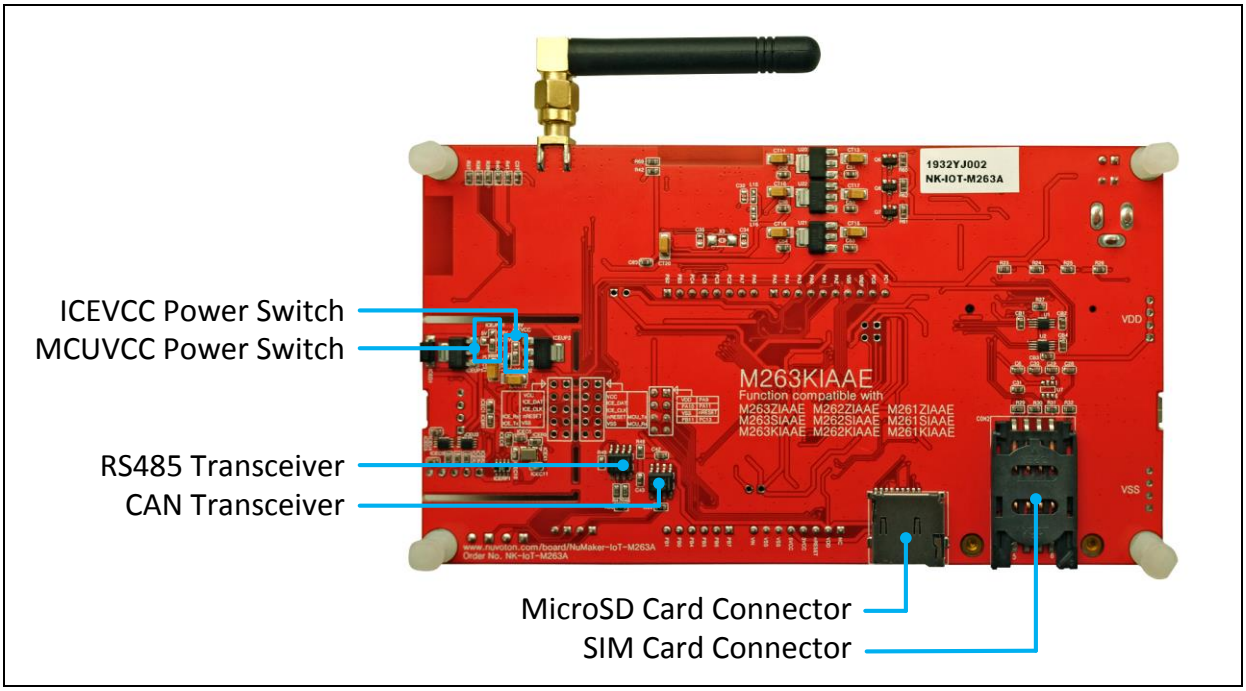

Figure 2-2 Rear View of NuMaker-IoT-M263A

Figure 2-2 shows the main components and connectors from the rear side of NuMaker-IoT-M263A.

The following lists components and connectors from the rear view:

- CAN Transceiver (U13)
- RS485 Transceiver (U14)
- SIM Card Connector (CON2)
- MicroSD Card Connector (U19)
- Nu-Link2-Me
  - MCUVCC Power Switch (ICEJPR1)
  - ICEVCC Power Switch (ICEJPR2)

2.3 Arduino UNO Compatible Extension Connectors

Figure 2-3 shows the Arduino UNO compatible extension connectors.

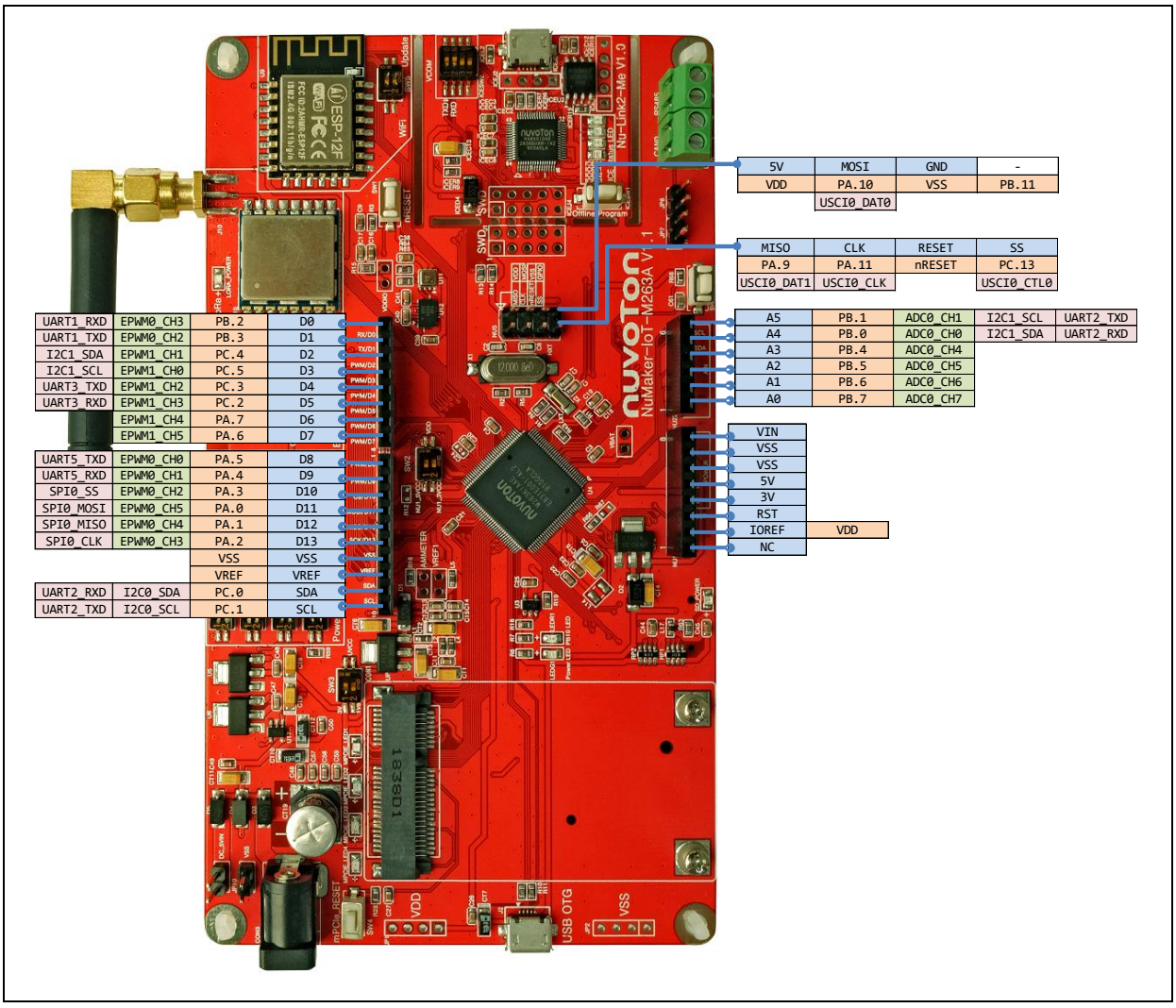

Figure 2-3 Arduino UNO Compatible Extension Connectors

Header		NuMaker-IoT-M263A		Header		NuMaker-IoT-M263A	
		Compatible to Arduino UNO	GPIO Pin of M263KIAAE			Compatible to Arduino UNO	GPIO Pin of M263KIAAE
NU3	NU3.1	D0	PB.2	NU2	NU2.6	A5	PB.1
	NU3.2	D1	PB.3		NU2.5	A4	PB.0
	NU3.3	D2	PC.4		NU2.4	A3	PB.4
	NU3.4	D3	PC.5		NU2.3	A2	PB.5
	NU3.5	D4	PC.3		NU2.2	A1	PB.6
	NU3.6	D5	PC.2		NU2.1	A0	PB.7
	NU3.7	D6	PA.7	NU1	NU1.8	VIN	-
	NU3.8	D7	PA.6		NU1.7	VSS	
NU4	NU4.1	D8	PA.5		NU1.6	VSS	
	NU4.2	D9	PA.4		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	PC.0				
	NU4.10	SCL	PC.1				

Table 2-1 Arduino UNO Extension Connectors and M263KIAAE Mapping GPIO List

2.4 Pin Assignment for On-board Modules, Sensors and Connectors

The NuMaker-IoT-M263A provides several on-board modules, sensors and connectors. Table 2-2 shows the mapping GPIO list.

On-board Module/Sensor/Connector		NuMaker-IoT-M263A	
		Function of GPIO Pin	GPIO Pin of M263KIAAE
Wi-Fi	UART_TX	UART4_RXD	PC.6
	UART_RX	UART4_TXD	PC.7
	UART_RTS	UART4_nCTS	PC.8
	UART_CTS	UART4_nRTS	PE.13
	RST	GPIO	PE.12
Bluetooth	UART_TX	UART3_RXD	PD.0
	UART_RX	UART3_TXD	PD.1
	UART_RTS	UART3_nCTS	PD.2
	UART_CTS	UART3_nRTS	PD.3
	Flash_Default	GPIO	PE.1
	UART_PD	GPIO	PE.0
	Wakeup	GPIO	PH.8
LoRa	MISO	SPI1_MISO	PH.4
	MOSI	SPI1_MOSI	PH.5
	SCK	SPI1_CLK	PH.6
	NSS	SPI1_SS	PH.7
	NRST	GPIO	PF.6
	DIO0	GPIO	PF.7
	DIO1	GPIO	PF.8
	DIO2	GPIO	PF.9
	DIO3	GPIO	PF.10
	DIO5	GPIO	PF.11
Environmental Sensor and 9-axis Sensor	SDI	I2C1_SDA	PD.4
	SCL	I2C1_SCL	PD.5
Mini PCIe Connector	UART_TXD	UART2_RXD	PE.14
	UART_RXD	UART2_TXD	PE.15
	UART_RTS	UART2_nCTS	PD.9

On-board Module/Sensor/Connector		NuMaker-IoT-M263A	
		Function of GPIO Pin	GPIO Pin of M263KIAAE
	UART_CTS	UART2_nRTS	PD.8
	UART_DTR	GPIO	PG.13
	UART_DCD	GPIO	PG.14
	WAKE#	GPIO	PG.9
	UART_RI	GPIO	PG.10
	W_DISABLE	GPIO	PG.11
	PERST#	GPIO	PG.12
	mPCIe_LED1	GPIO	PG.15
	mPCIe_LED2	GPIO	PD.7
	mPCIe_LED3	GPIO	PD.6
CAN Transceiver	CAN_D	CAN0_TXD	PD.11
	CAN_R	CAN0_RXD	PD.10
	Rs_Ctrl1	GPIO	PG.2
	Rs_Ctrl2	GPIO	PG.3
RS485 Transceiver	RS485_RO	USCI1_DAT0	PE.10
	RS485_DI	USCI1_DAT1	PE.11
	RS485_DE	USCI1_CTL1	PE.8
MicroSD Card Connector	CD	SD0_nCD	PD.13
	CMD	SD0_CMD	PE.7
	CLK	SD0_CLK	PE.6
	DAT0	SD0_DAT0	PE.2
	DAT1	SD0_DAT1	PE.3
	DAT2	SD0_DAT2	PE.4
	DAT3	SD0_DAT3	PE.5

Table 2-2 On-board Modules, Sensors, Connectors and M263KIAAE GPIO Function List

2.5 System Configuration

2.5.1 VIN Power Source

Table 2-3 presents the VIN power source.

Connector	Net Name in Schematic	Comment
NU1 pin8	NU1_VIN	Board external power source, with voltage range from 7 V to 12 V. The voltage regulator UP2 converts the NU1 pin8 input voltage to 5 V and supplies it to NuMaker-IoT-M263A.

Table 2-3 VIN Power Source

2.5.2 5 V Power Sources

Table 2-4 presents the 5 V power sources.

Connector	Net Name in Schematic	Comment
ICEJ3	USB_HS_VBUS	ICE USB connector supplies 5 V power from PC to M263 platform and Nu-Link2-Me.
J2	USB_VBUS	If target chip M263 acts as USB Device, USB connector on NuMaker-IoT-M263A supplies 5 V power from PC to M263 platform and Nu-Link2-Me.
		If target chip M263 acts as USB Host, USB connector on NuMaker-IoT-M263A supplies 5 V power from M263 platform to PC.
NU1 pin5	NU1_5VCC	ICEJ3, J2 or NU1 pin8 supplies 5 V power to NU1 pin5. NU1 pin5 supplies 5 V power to target chip or Arduino adapter board. **Note:** M263 operating voltage range is from 1.8 V to 3.6 V. Do not switch SW2.1 (NU1 5VCC) to ON.
CON3	DC5V_IN	External 5 V from power adapter to on-board modules. **Note:** It is necessary if user uses module on mini PCIe connector.

Table 2-4 5V Power Sources

2.5.3 3.3 V Power Sources

Table 2-5 presents the 3.3 V power sources.

Voltage Regulator	5V Source	Comment
ICEUP1	USB_HS_VBUS	ICEUP1 converts USB_HS_VBUS to 3.3 V and supplies 3.3V to M263 platform or ICE chip.
UP1	USB_VBUS	UP1 converts USB_VBUS to 3.3 V and supplies 3.3 V to M263 platform.

		Note: SW2.2 (NU1 3VCC) should be switched to ON.
UP1	NU1_5VCC	UP1 converts NU1_5VCC to 3.3 V and supplies 3.3 V to M263 platform. **Note:** SW2.2 (NU1 3VCC) should be switched to ON.

Table 2-5 3.3 V Power Sources

2.5.4 1.8V Power Sources

Table 2-6 presents the 1.8 V power source.

Voltage Regular	5V Source	Comment
ICEUP2	USB_HS_VBUS	ICEUP2 converts USB_HS_VBUS to 1.8V and supplies 1.8V to M263 platform or ICE chip.

Table 2-6 1.8V Power Sources

2.5.5 Power Connectors

Table 2-7 presents the power connectors.

Connector	Comment
JP1	V_{DD} (1.8 V ~ 3.6 V) connector on the NuMaker-IoT-M263A.
JP2	V_{SS} connector on the NuMaker-IoT-M263A.
JP9	5V connector on the NuMaker-IoT-M263A for on-board modules.
JP10	V_{SS} connector on the NuMaker-IoT-M263A.

Table 2-7 Power Connectors

2.5.6 USB Connectors

Table 2-8 presents the USB connectors.

Connector	Comment
ICEJ3	ICE USB connector on Nu-Link2-Me for power supply, debugging and programming from PC.
J2	USB OTG connector on NuMaker-IoT-M263A for USB function.

Table 2-8 USB Connectors

2.5.7 CAN Connectors

Table 2-9 presents the CAN connectors.

Connector	Comment
CAN0 and JP7	CAN connector on NuMaker-IoT-M263A for CAN function.

Table 2-9 CAN Connectors

2.5.8 RS485 Connectors

Table 2-10 presents the CAN connectors.

Connector	Comment
RS485 and JP8	RS485 connector on NuMaker-IoT-M263A for RS485 function.

Table 2-10 RS485 Connectors

2.5.9 Power Switches

Table 2-11 presents the power switches.

Switch	Comment
ICEJPR1	Configure the target chip operating voltage at 1.8V / 3.3V / 5V.
ICEJPR2	Configure the ICE chip operating voltage at 1.8V / 3.3V.
SW2	Configure the target chip operating voltage at 3.3V / 5V.
SW3	Configure the UART operating voltage of mini PCIe connector at 1.8V / 3.3V.
SW6	Turn on/off the power to mini PCIe connector. All pins should be the same side.
SW7	Turn on/off the power to Bluetooth module. All pins should be the same side.
SW8	Turn on/off the power to Wi-Fi module. All pins should be the same side.
SW9	Turn on/off the power to LoRa module. All pins should be the same side.

Table 2-11 Power Switches

2.5.10 Target Chip Power Supply Models

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

The external power supply source on Nu-Link2-Me is shown in Figure 2-4.

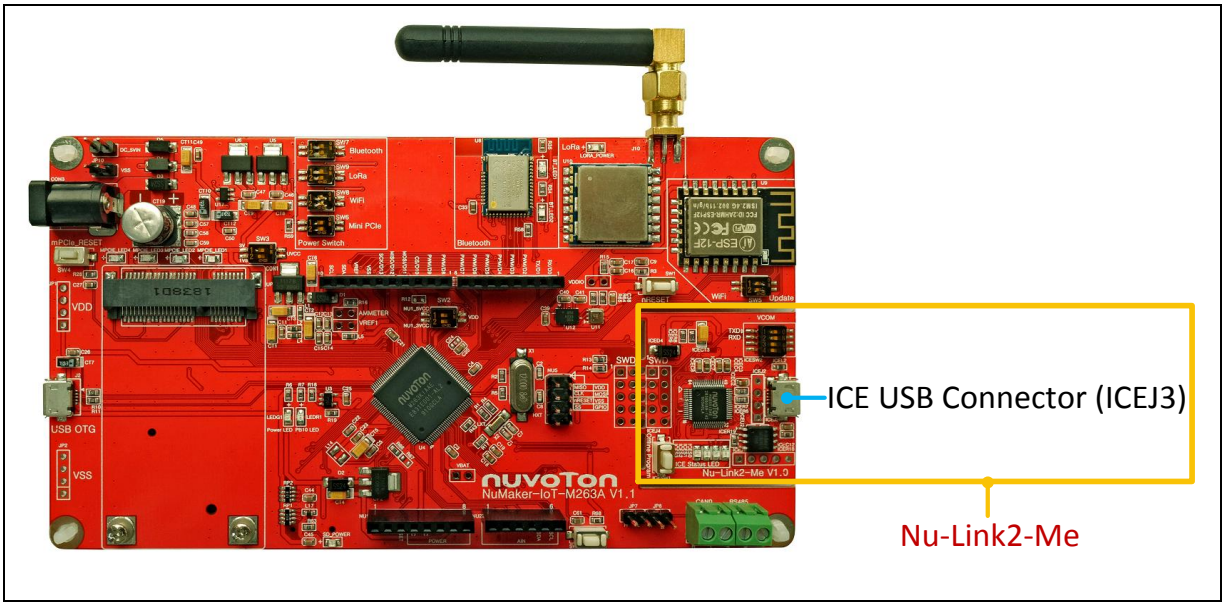

Figure 2-4 External Power Supply Sources on Nu-Link2-Me

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

1. Solder the resistor on ICEJPR1 (MCUVCC) depending on the target chip operating voltage.
2. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
3. Switch the SW2 to OFF.

Table 2-12 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	Ignore	Ignore	1.8 V output
2	3.3 V	Connect to PC	3.3 V (default)	3.3 V (default)	3.3 V	Off	Ignore	Ignore	3.3 V output
3	5 V	Connect to PC	5V	3.3 V (default)	3.3 V	Off	Ignore	Ignore	5 V output
X: Unused. **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.									

Table 2-12 Supply External Power through Nu-Link2-Me

2.5.10.2 External Power Supply through M263 Platform to Target Chip

The external power supply sources on the M263 Platform are shown in Figure 2-5.

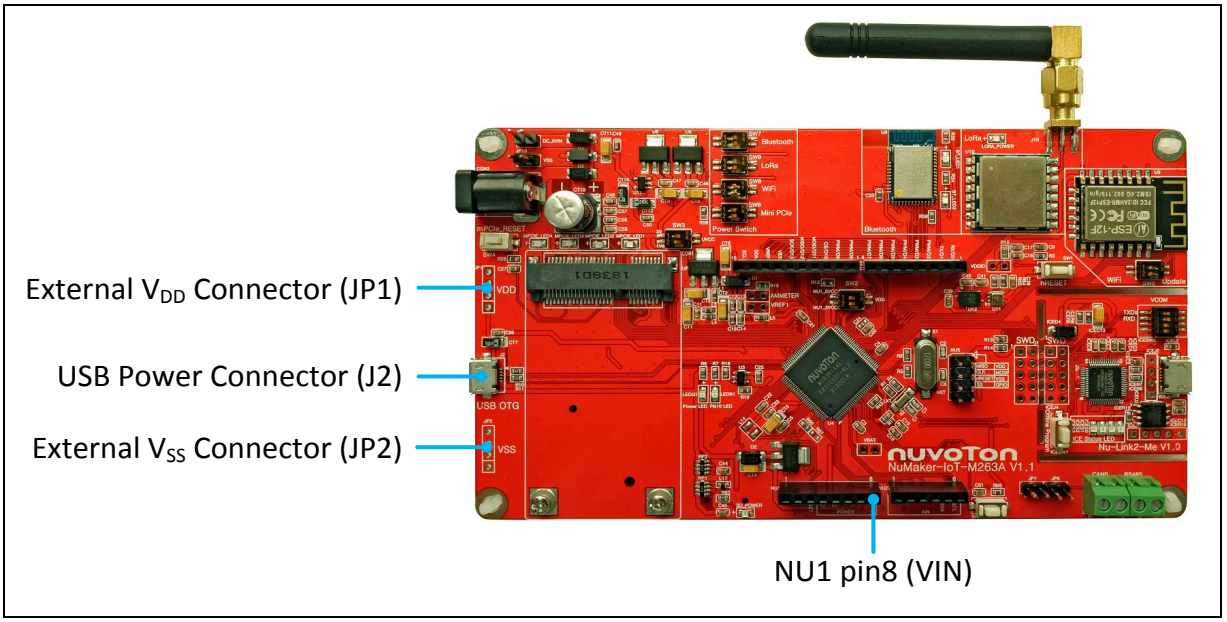

Figure 2-5 External Power Supply Sources on M263 Platform

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

1. Switch the SW2 depending on the target chip operating voltage.
2. Remove the resistor on ICEJPR1 (MCUVCC).
3. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
4. Connect the external power supply to VIN or J2.

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

1. Switch the SW2 to OFF.
2. Remove the resistor on ICEJPR1 (MCUVCC).
3. Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.
4. Connect ICEJ3 to PC.
5. Connect the external power supply to JP1.

To use VIN or J2 as external power supply source with Nu-Link2-Me when the Nu-Link2-Me is separated from NuMaker-IoT-M263A, please follow the steps below:

1. Switch the SW2 depending on the target chip operating voltage.
2. Separate the Nu-Link2-Me from NuMaker-IoT-M263A.
3. Connect the external power supply to VIN or J2.

To use JP1 as external power supply source with Nu-Link2-Me when the Nu-Link2-Me is separated from NuMaker-IoT-M263A, please follow the steps below:

1. Switch the SW2 to OFF.
2. Separate the Nu-Link2-Me from NuMaker-IoT-M263A.
3. Connect the external power supply to JP1.

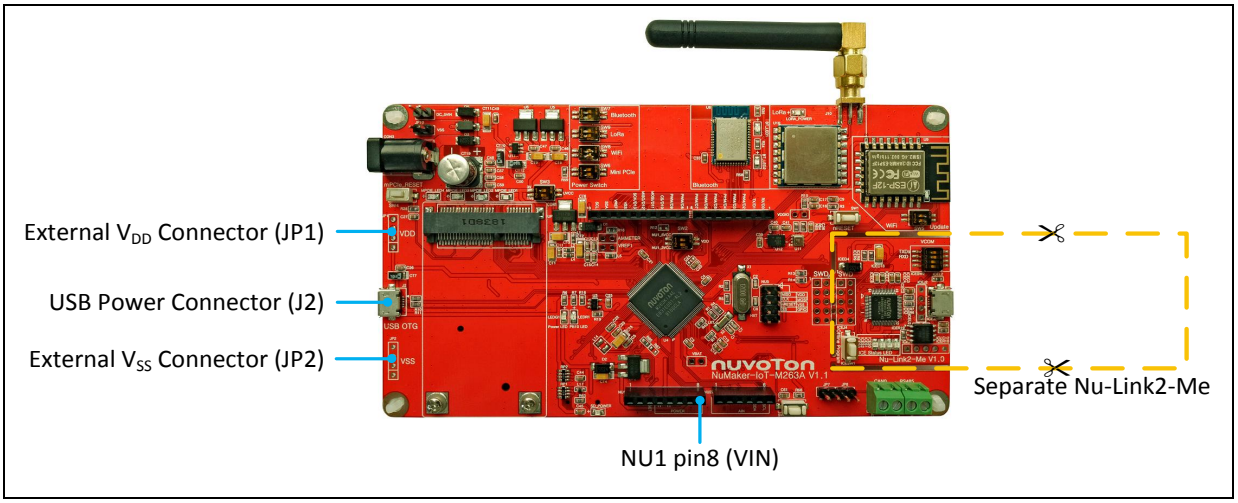

Figure 2-6 Separate the Nu-Link2-Me from NuMaker-IoT-M263A

Table 2-13 presents all power models when supplying external power through the M263 platform. The M263 platform external power sources are highlighted in yellow.

Model	Target Chip Voltage	VIN [1]	J2	ICEJ3	SW2 Selection	JP1	ICEJPR1 (MCUVCC) Selection [2]	ICEJPR2 (ICEVCC) Selection [3]	ICE Chip Voltage [4]
4	3.3 V	7 V ~ 12 V Input	X	Ignore	NU1 3VCC	3.3 V output	Remove resistor	3.3 V	3.3 V
5	3.3 V	X	Connect to PC	Ignore	NU1 3VCC	3.3 V output	Remove resistor	3.3 V	3.3 V
6	5 V	7 V ~ 12 V Input	X	Ignore	NU1 5VCC	5 V output	Remove resistor	3.3 V	3.3 V
7	5 V	X	Connect to PC	Ignore	NU1 5VCC	5 V output	Remove resistor	3.3 V	3.3 V
8	1.8 V ~ 3.6 V	Ignore [5]	Ignore [5]	Connect to PC	OFF	DC Input 1.8 V ~ 3.6 V	Remove resistor	1.8 V / 3.3 V	1.8 V / 3.3 V
9	1.8 V ~ 3.6 V	Ignore [5]	Ignore [5]	Nu-Link2-Me removed	OFF	DC Input 1.8 V ~ 3.6 V	X	X	X

X: Unused.

Note:

1. The VIN input voltage will be converted by voltage regulator UP2 to 5 V.
2. 0Ω should be removed from ICEJPR1's MCUVCC and 1.8 V / 3.3 V / 5 V.
3. 0Ω should be soldered between ICEJPR2's ICEVCC and 1.8 V / 3.3 V.
4. The ICE chip voltage should be close to the target chip voltage.
5. JP1 external power input only provides voltage to target chip. Supply external power to VIN or J2 can provide 5V to NU1 pin5 (5V) and 3.3V to NU1 pin4 (3VCC).

Table 2-13 Supply External Power for M263 Platform

2.5.11 On-board Module Power Supply Models

The external power supply sources on NuMaker-IoT-M263A to on-board modules are shown in Figure 2-7.

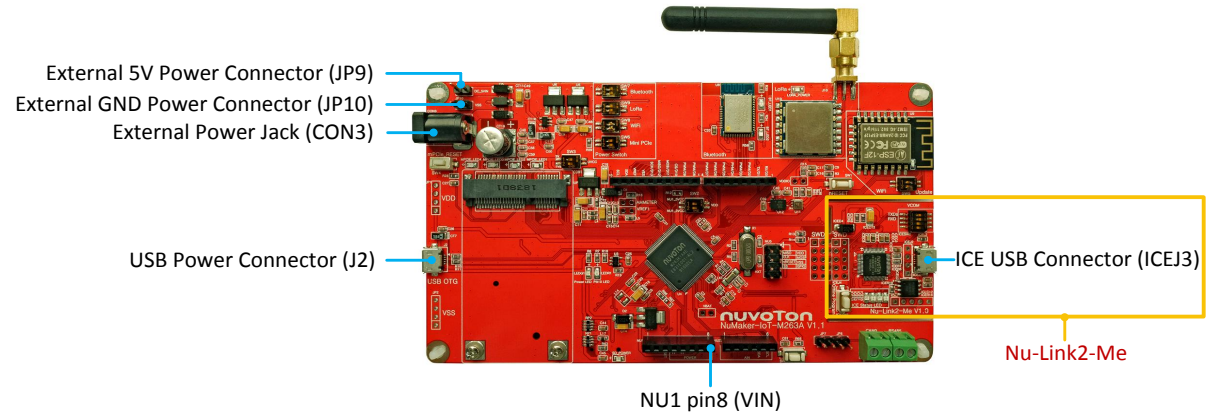

Figure 2-7 External Power Supply Sources on NuMaker-IoT-M263A for On-board Modules

Table 2-14 presents all power models when supplying external power through NuMaker-IoT-M263A. The external power sources are highlighted in yellow.

Model	Wi-Fi Module Voltage [1]	Bluetooth Module Voltage [2]	LoRa Module Voltage [3]	ICEJ3	VIN [4]	J2	CON3	JP9 [5]
1	3.3 V	3.3 V	3.3 V	Connect to PC	Ignore	Ignore	Ignore	Ignore
2	3.3 V	3.3 V	3.3 V	Ignore	7 V ~ 12 V Input	Ignore	Ignore	Ignore
3	3.3 V	3.3 V	3.3 V	Ignore	Ignore	Connect to PC	Ignore	Ignore
4	3.3 V	3.3 V	3.3 V	Ignore	Ignore	Ignore	DC Input 5 V	Ignore
5	3.3 V	3.3 V	3.3 V	Ignore	Ignore	Ignore	Ignore	DC Input 5 V

X: Unused.

Note:

1. All of the input voltage will be converted by voltage regulator U21 to 3.3 V.
2. All of the input voltage will be converted by voltage regulator U20 to 3.3 V.
3. All of the input voltage will be converted by voltage regulator U22 to 3.3 V.
4. The VIN input voltage will be converted by voltage regulator UP2 to 5 V.
5. JP9 external power input only provides voltage to on-board modules.

Table 2-14 Supply External Power for On-board Modules

2.5.12 Mini PCIe Connector Power Supply Models

The external power supply sources on NuMaker-IoT-M263A to mini PCIe connector are shown in Figure 2-8.

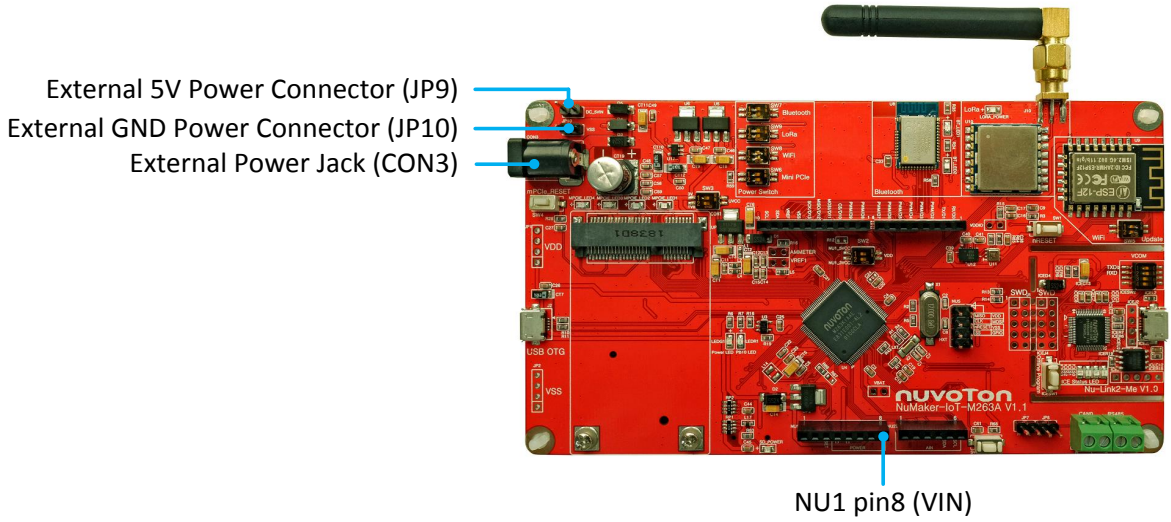

Figure 2-8 External Power Supply Sources on NuMaker-IoT-M263A for Mini PCIe Connector

Table 2-15 presents all power models when supplying external power through NuMaker-IoT-M263A. The external power sources are highlighted in yellow.

Model	Module Voltage[1]	SW3 Selection	UART Operation Voltage	VIN [2]	CON3	JP9 [3]
1	3.3 V	3V	3.3 V	7 V ~ 12 V Input	Ignore	Ignore
2	3.3 V	1V8	1.8 V	7 V ~ 12 V Input	Ignore	Ignore
3	3.3 V	3V	3.3 V	Ignore	DC Input 5 V	Ignore
4	3.3 V	1V8	1.8 V	Ignore	DC Input 5 V	Ignore
5	3.3 V	3V	3.3 V	Ignore	Ignore	DC Input 5 V
6	3.3 V	1V8	1.8 V	Ignore	Ignore	DC Input 5 V

X: Unused.

Note:

6. All of the input voltage will be converted by voltage regulator U5 and U17 to 3.3 V.
7. All of the input voltage will be converted by voltage regulator U20 to 3.3 V.
8. All of the input voltage will be converted by voltage regulator U22 to 3.3 V.
9. The VIN input voltage will be converted by voltage regulator UP2 to 5 V.
10. JP9 external power input only provides voltage to on-board modules.

Table 2-15 Supply External Power through NuMaker-IoT-M263A

2.5.13 External Reference Voltage Connector

Table 2-16 presents the external reference voltage connector.

Connector	Comment
VREF1	Connector for user to easily connect to the external reference voltage pin of the target chip. User needs to remove the L5 ferrite bead.

Table 2-16 External Reference Voltage Connector

2.5.14 Ammeter Connector

Table 2-17 presents the ammeter connector.

Connector	Comment
AMMETER	Connector for user to easily measure the target chip power consumption. User needs to remove the R16 resistor.

Table 2-17 Ammeter Connector

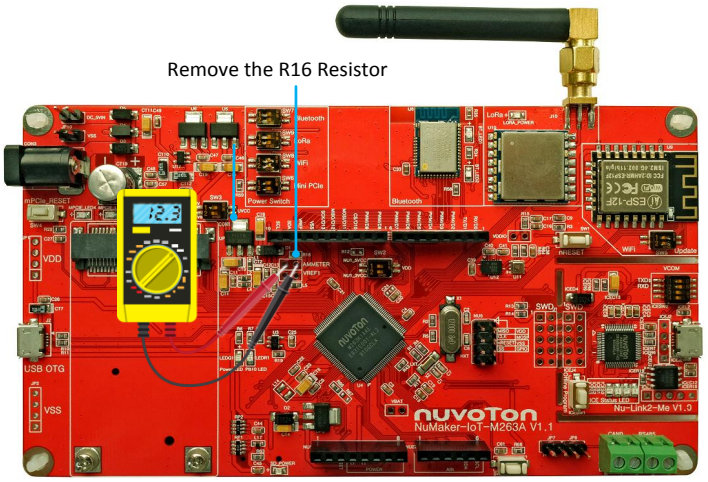

Figure 2-9 Wiring between Ammeter Connector and Ammeter

2.5.15 Wi-Fi Module Update Switch

Table 2-18 presents the Wi-Fi module update switch.

Switch	Comment
SW5	Turn on the switch to enable Wi-Fi update. All pins should be the same side.

Table 2-18 Wi-Fi Module Update Switch

2.5.16 Extension Connectors

Table 2-19 presents the extension connectors.

Connector	Comment
NU1, NU2, NU3 and NU4	Arduino UNO compatible pins on the NuMaker-IoT-M263A.

Table 2-19 Extension Connectors

2.5.17 Push-Buttons

Table 2-20 presents the push-buttons.

Component	Comment
ICESW1	Off-line program button to start off-line programming the target chip.
SW1	Reset button to reset the target chip.
SW4	Reset button to reset the module on mini PCIe connector.
SW10	Customize button is connected to the target chip PG.4.

Table 2-20 Push-Buttons

2.5.18 LEDs

Table 2-21 presents the LEDs.

Component	Comment
Power LED	The power LED indicates that the NuMaker-IoT-M263A is powered.
PB10 LED	The LED is connected to the target chip PB.10.
MPCIE_LED1, MPCIE_LED2 and MPCIE_LED3	Customize LEDs are connected to the target chip PG.15, PD.7 and PD.6.
MPCIE_LED4	The indicator LED controlled by the module on mini PCIe connector.
BT_LED1	The indicator LED controlled by the Bluetooth module.
BT_LED2	The connection status LED controlled by the Bluetooth module.
LoRa_Power	The power LED indicates that the LoRa module is powered.
SD_POWER	The power LED indicates that the microSD card connector is powered.
ICES0, ICES1, ICES2 and ICES3	Nu-Link2-Me status LED.

Table 2-21 LEDs

2.6 Nu-Link2-Me

The Nu-Link2-Me is a debugger and programmer that supports on-line programming and debugging through SWD interface. The on-board 16 Mbit SPI Flash allows it to off-line program the target microcontroller. Additionally, the Nu-Link2-Me provides virtual COM port (VCOM) function to print out messages on PC. Table 2-22 presents how to set the VCOM function by ICESW2.

ICESW2		
Pin	**Function**	**Comment**
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 Pin 4 of ICESW2 are unused.		

Table 2-22 VCOM Function of Nu-Link2-Me

2.7 PCB Placement

Figure 2-10 and Figure 2-11 show the front and rear placement of NuMaker-IoT-M263A.

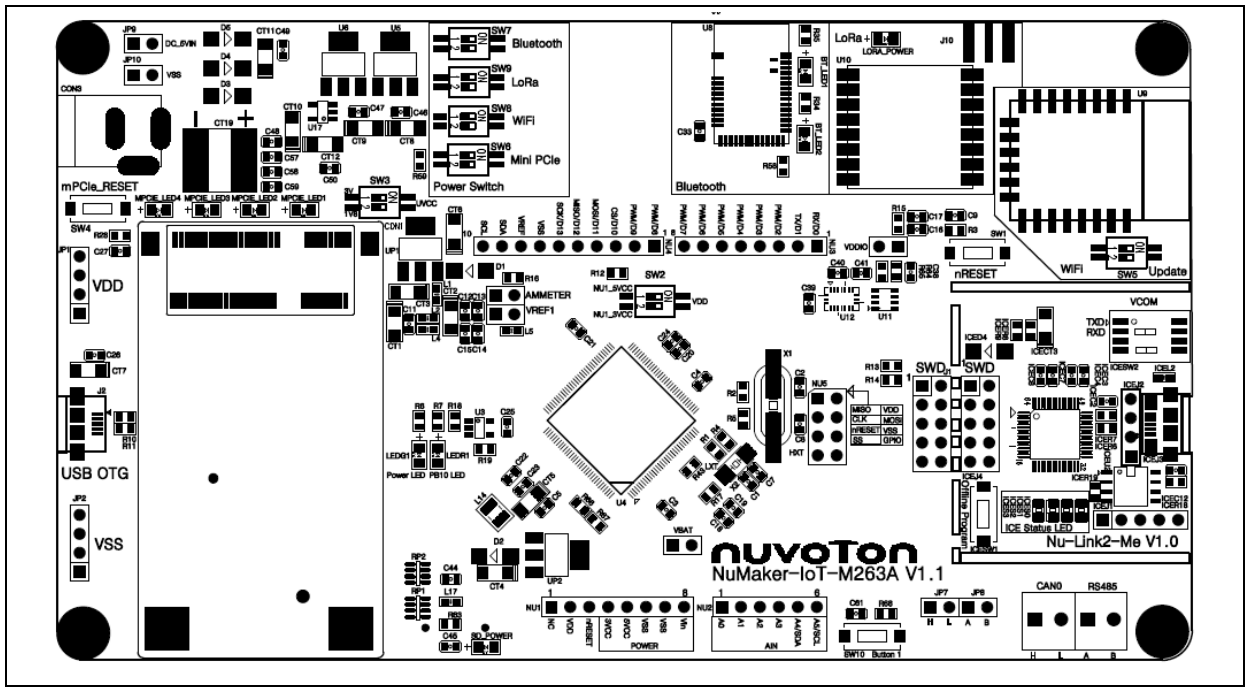

Figure 2-10 Front Placement

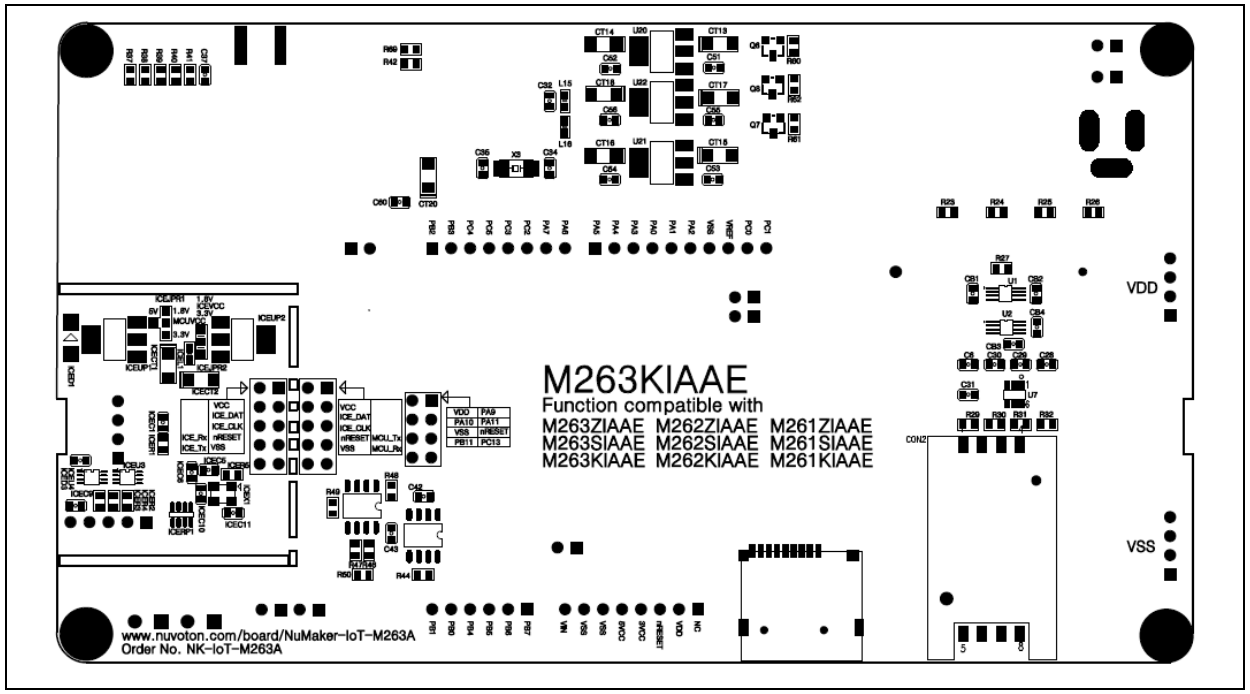

Figure 2-11 Rear Placement

3 QUICK START

3.1 Toolchains Support

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

- KEIL MDK Nuvoton edition M0/M23
- IAR EWARM
- NuEclipse (GCC)(Windows)
- NuEclipse (GCC)(Linux)

3.2 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 3-1 and Figure 3-2.

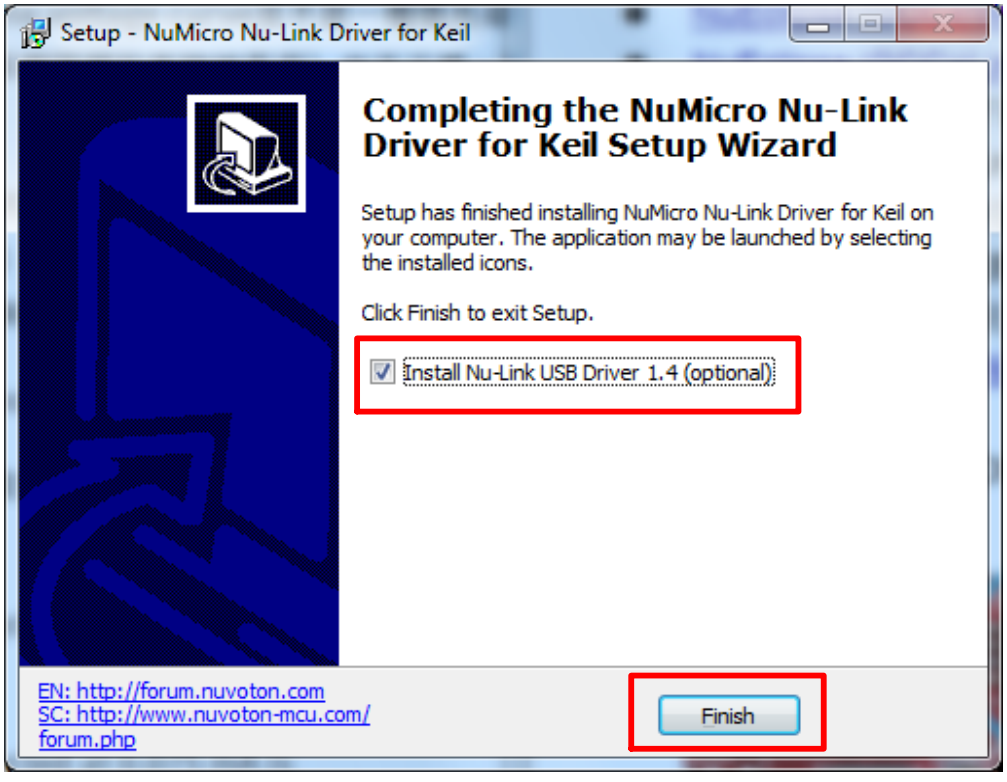

Figure 3-1 Nu-Link USB Driver Installation Setup

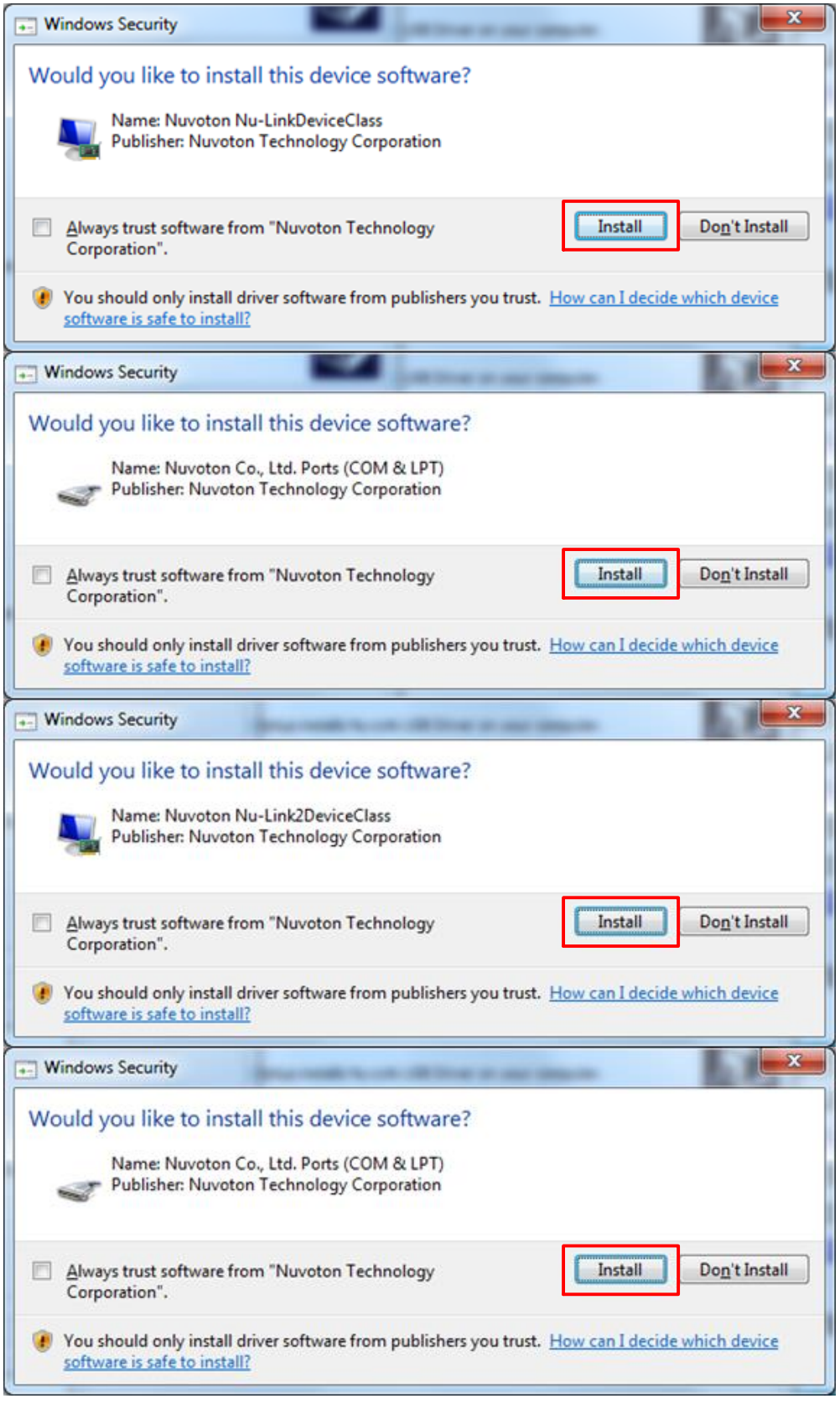

Figure 3-2 Nu-Link USB Driver Installation

3.3 BSP Firmware Download

Download and unzip the Board Support Package (BSP).

3.4 Hardware Setup

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

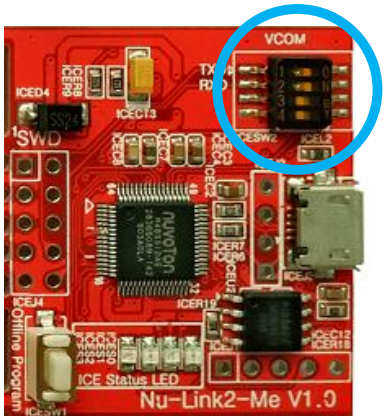

Figure 3-3 Open VCOM Function

2. Connect the ICE USB connector shown in Figure 3-4 to the PC USB port through USB cable.

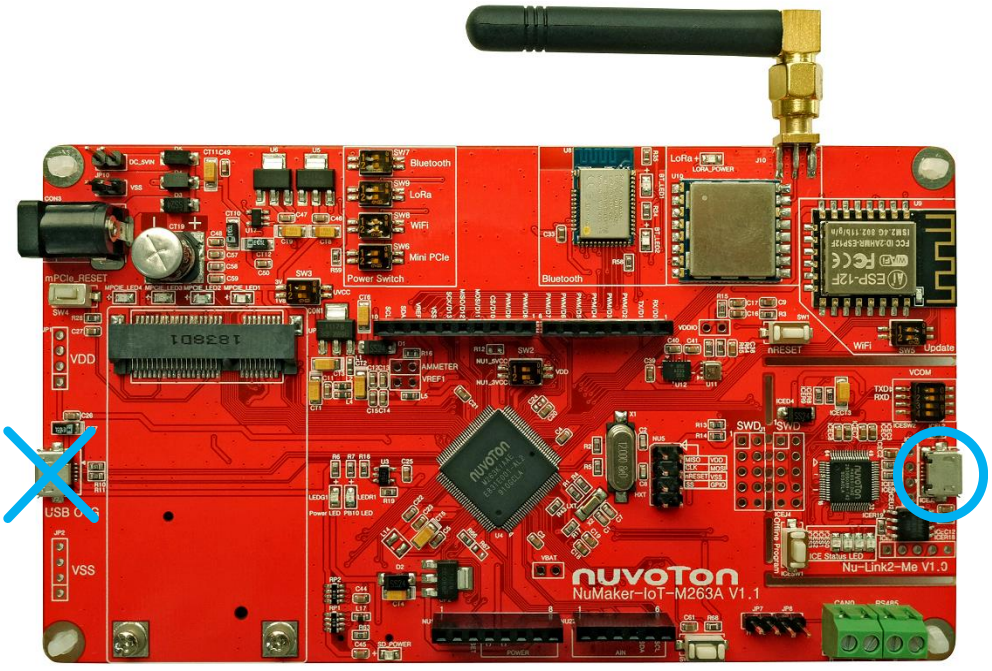

Figure 3-4 ICE USB Connector

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

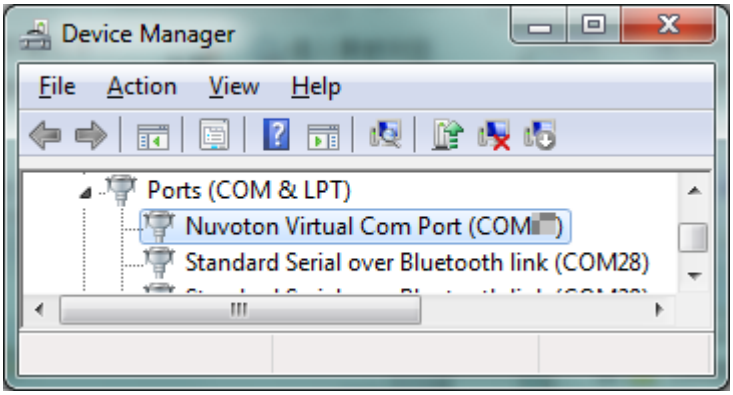

Figure 3-5 Device Manger

4. Open a serial port terminal, PuTTY for example, to print out debug message. Set the speed to 115200. Figure 3-6 presents the PuTTY session setting.

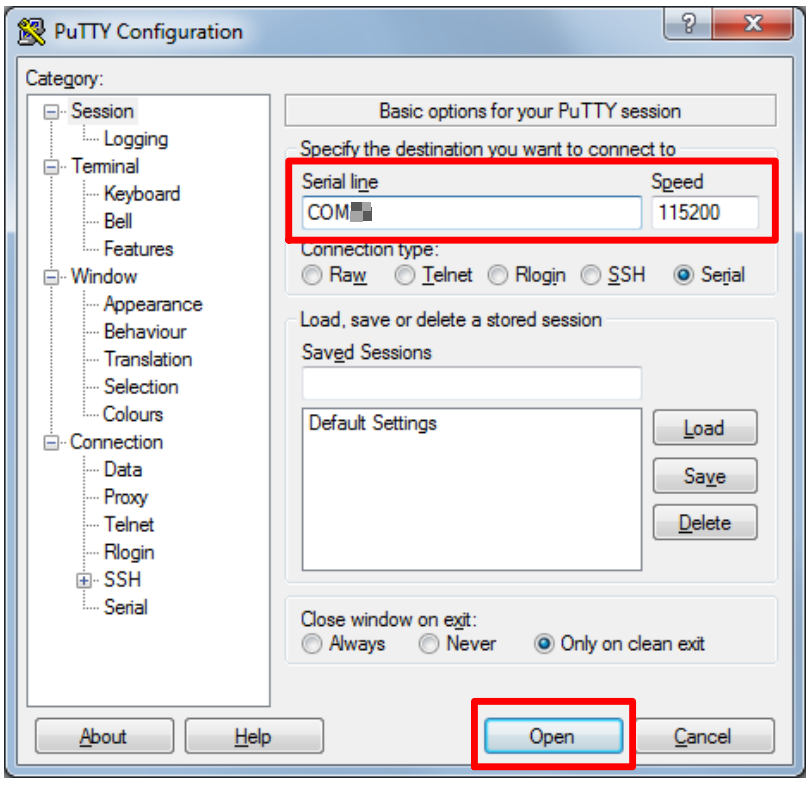

Figure 3-6 PuTTY Session Setting

3.5 Find the Example Project

Use the “Template” project as an example. The project can be found under the BSP folder as shown in Figure 3-7.

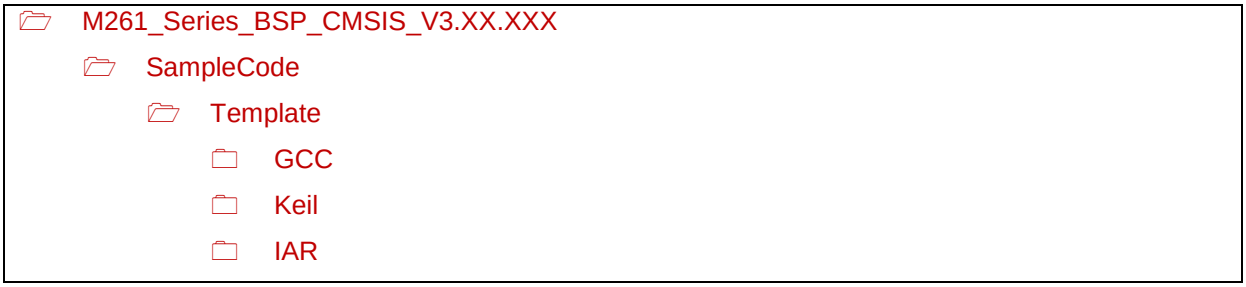

Figure 3-7 Template Project Folder Path

3.6 Execute the Project under Toolchains

Open and execute the project under the toolchain. The section 3.6.1, 0, and 3.6.3 describe the steps of executing a project in Keil MDK, IAR EWARM and NuEclipse, respectively.

3.6.1 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.

   Note: If the warning message shown in Figure 3-8 appears, please migrate to version 5 formats as shown in Figure 3-9. The “.uvproj” filename extension will change to “.uvprojx”.

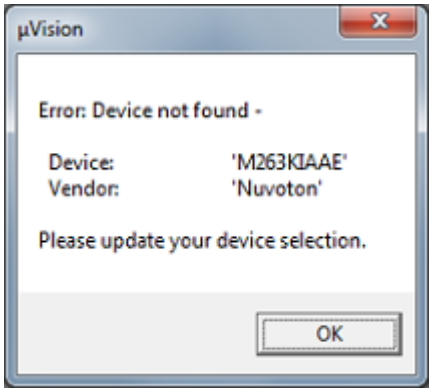

Figure 3-8 Warning Message “Device not found”

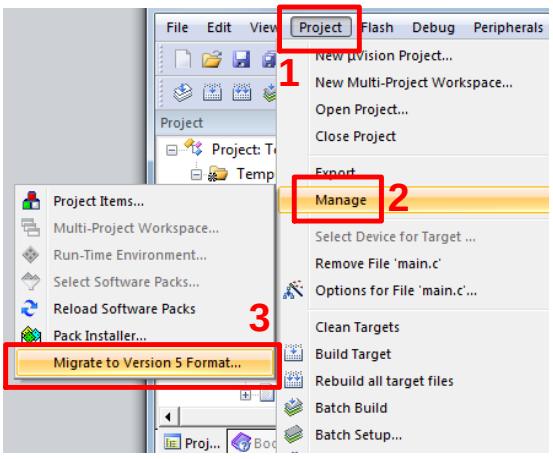

Figure 3-9 Project File Migrate to Version 5 Format

2. Make sure the debugger is “Nuvoton Nu-Link Debugger” as shown in Figure 3-10 and Figure 3-11.

   Note: If the dropdown menu in Figure 3-10 does not contain “Nuvoton Nu-Link Debugger” item, please rework section 3.2.

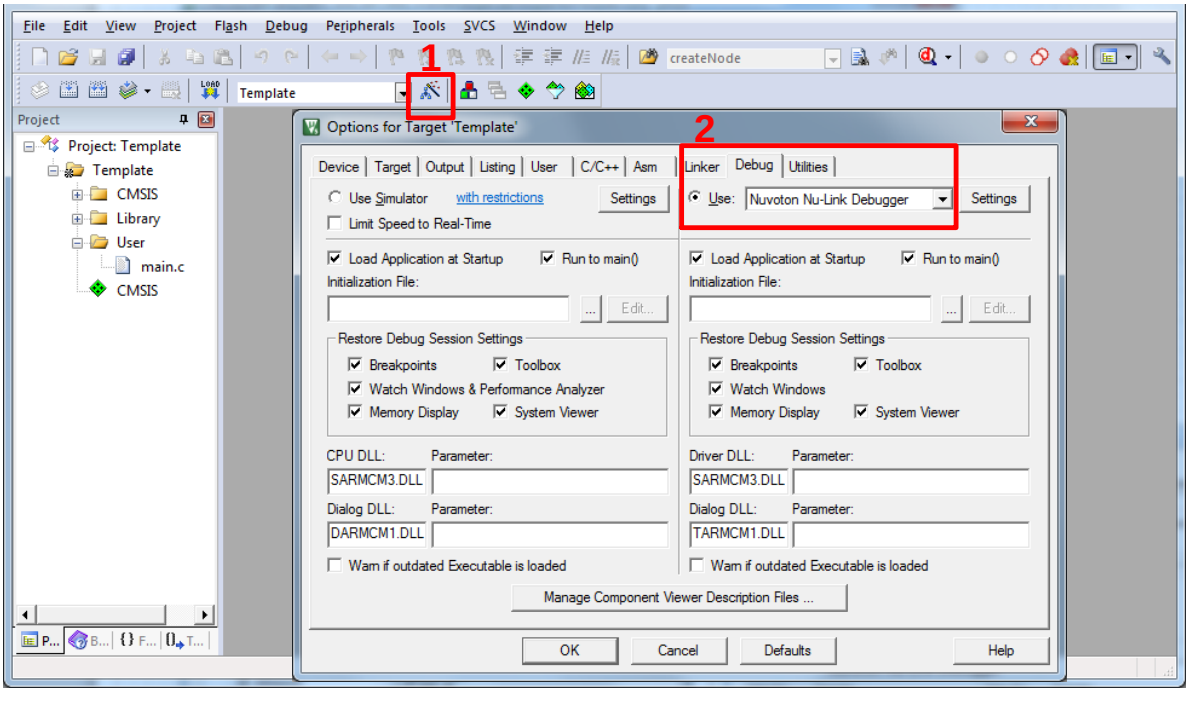

Figure 3-10 Debugger Setting in Options Window

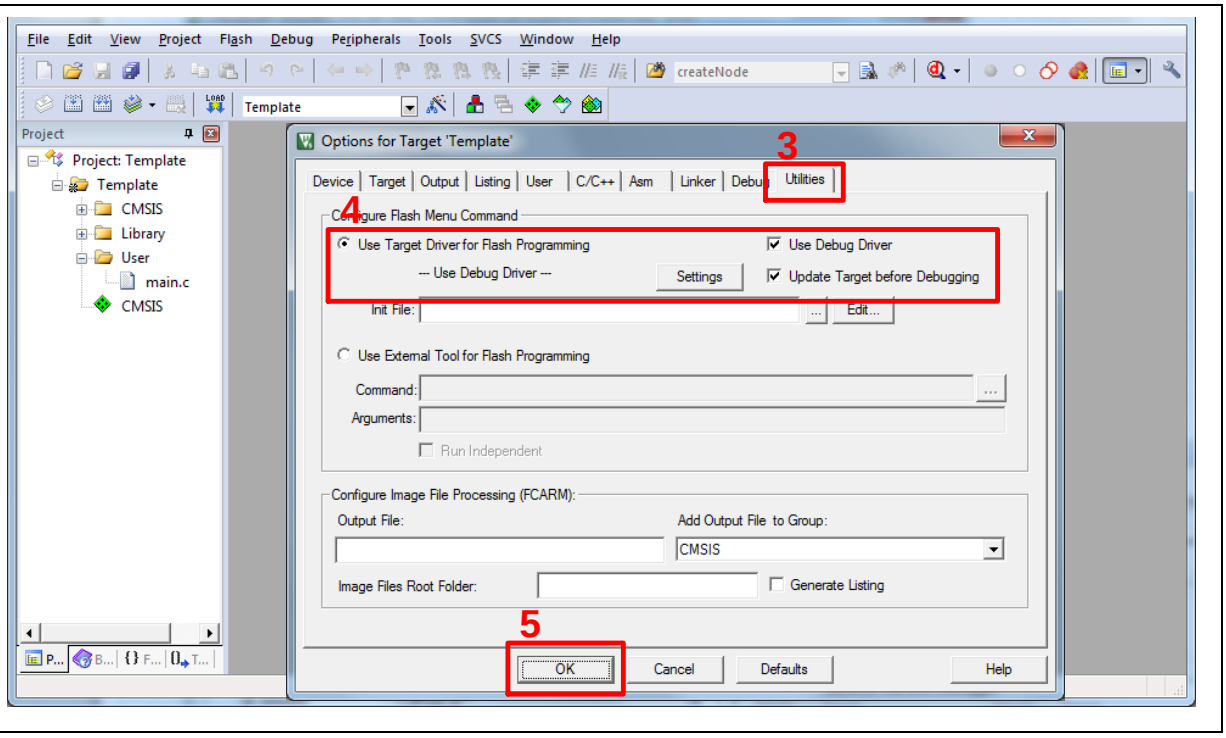

Figure 3-11 Programming Setting in Options Window

3. Rebuild all target files. After successfully compiling the project, download code to the Flash memory. Clicking “Start/Stop Debug Section” button can enter debug mode.

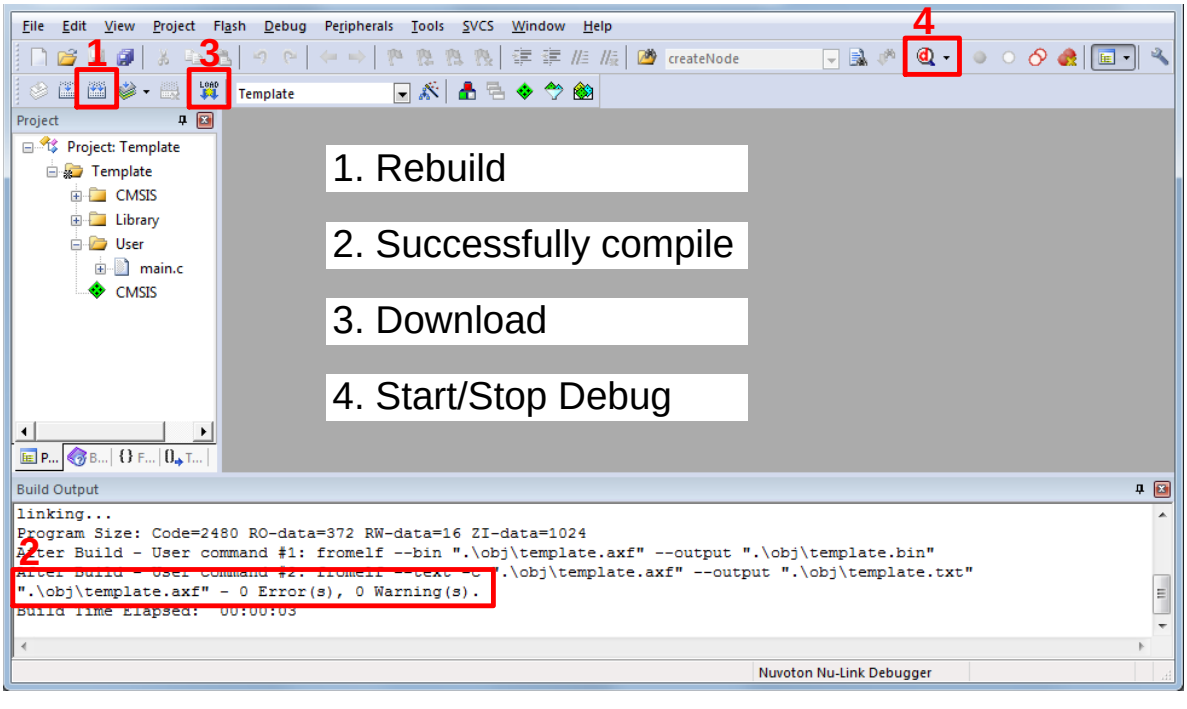

Figure 3-12 Compile and Download the Project

4. Figure 3-13 shows the debug mode under Keil MDK. Click “Run” and the debug message will be printed out as shown in Figure 3-14. User can debug the project under debug mode by checking

source code, assembly language, peripherals' registers, and setting breakpoint, step run, value monitor, etc.

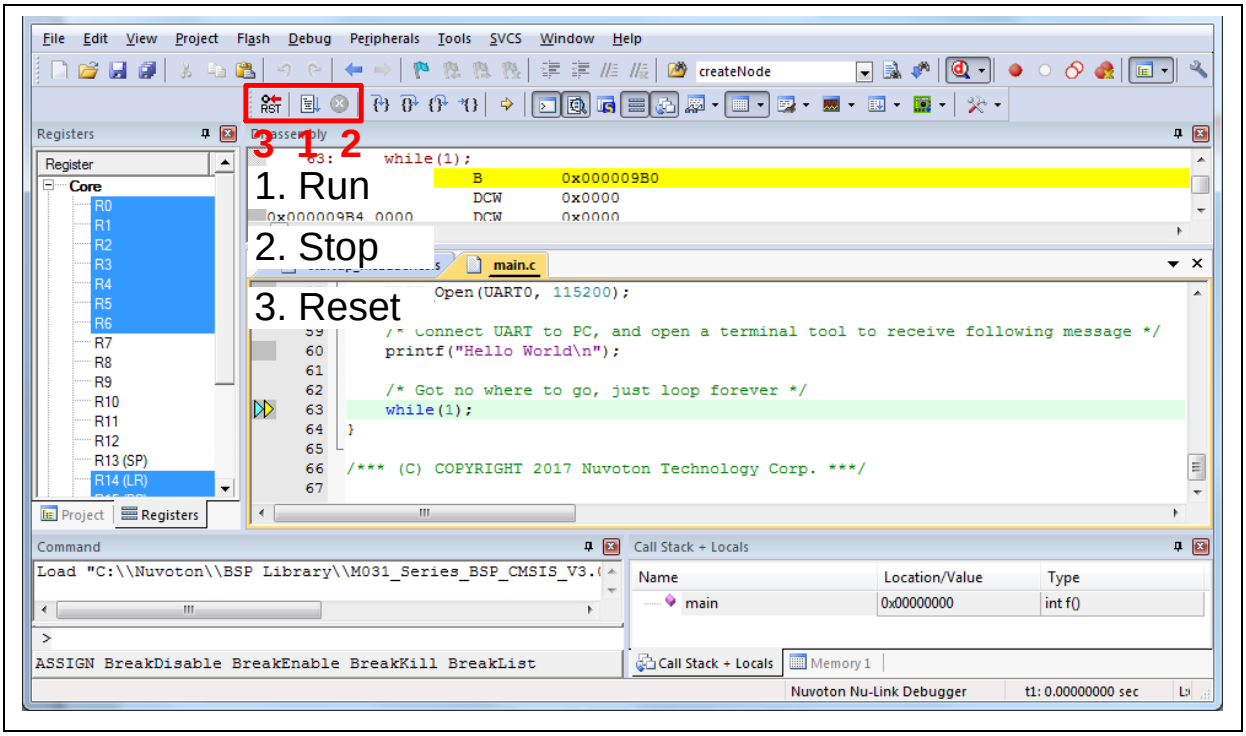

Figure 3-13 Keil MDK Debug Mode

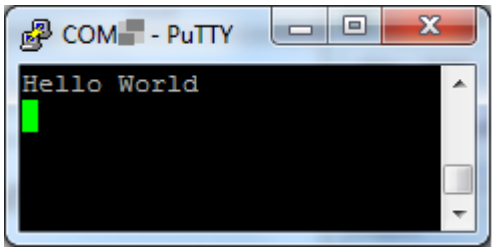

Figure 3-14 Debug Message on Serial Port Terminal Windows

3.6.2 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 contain “Nu-Link” item as shown in Figure 3-15.

   Note: If the toolbar does not contain “Nu-Link” item, please rework section 3.2.

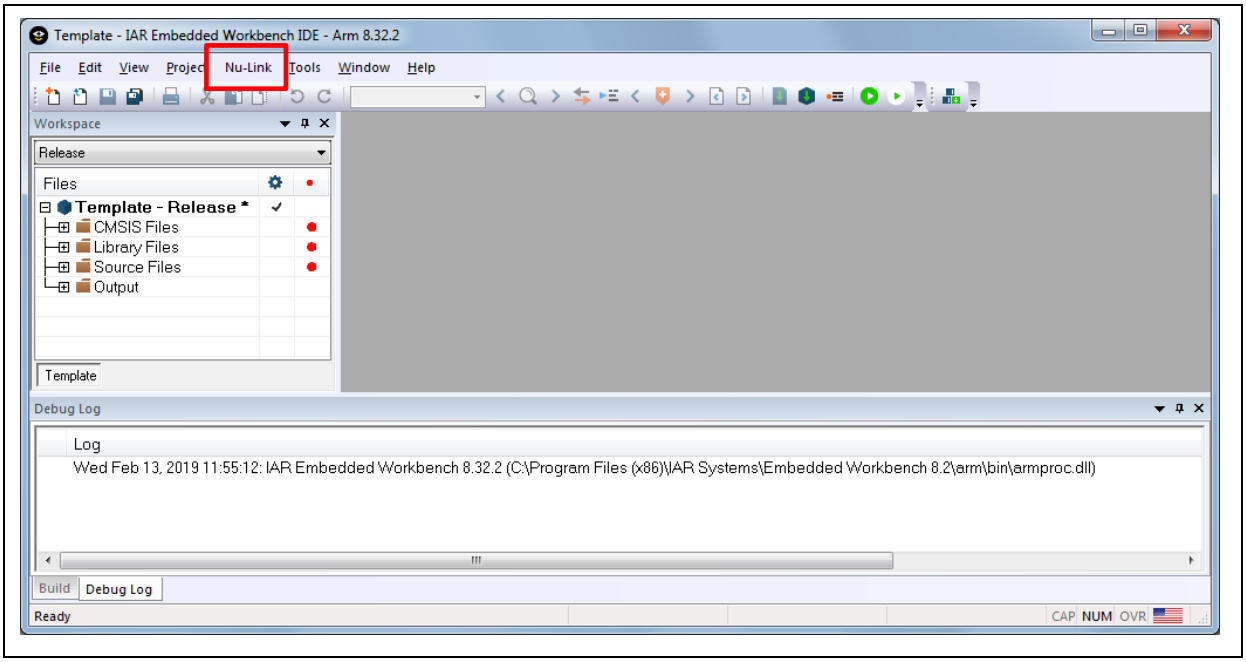

Figure 3-15 IAR EWARM Window

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

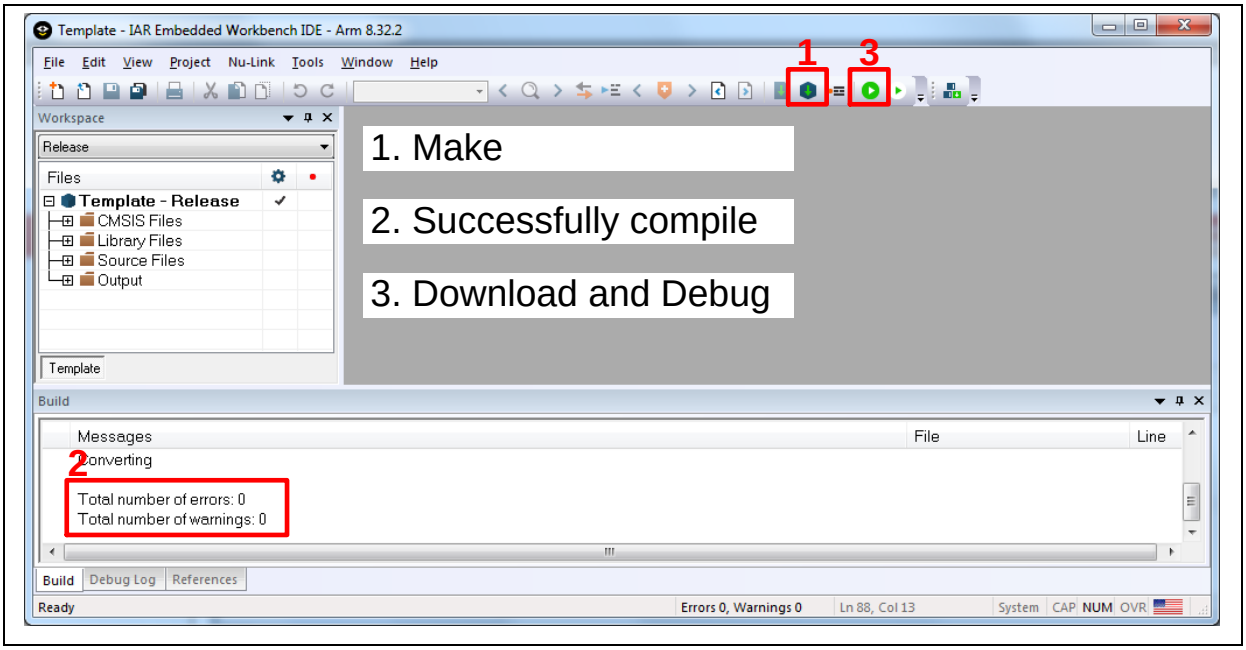

Figure 3-16 Compile and Download the Project

4. Figure 3-17 shows the debug mode under IAR EWARN. Click “Go” and the debug message will be printed out as shown in Figure 3-18. User can debug the project under debug mode by checking source code, assembly language, peripherals’ registers, and setting breakpoint, step run, value monitor, etc.

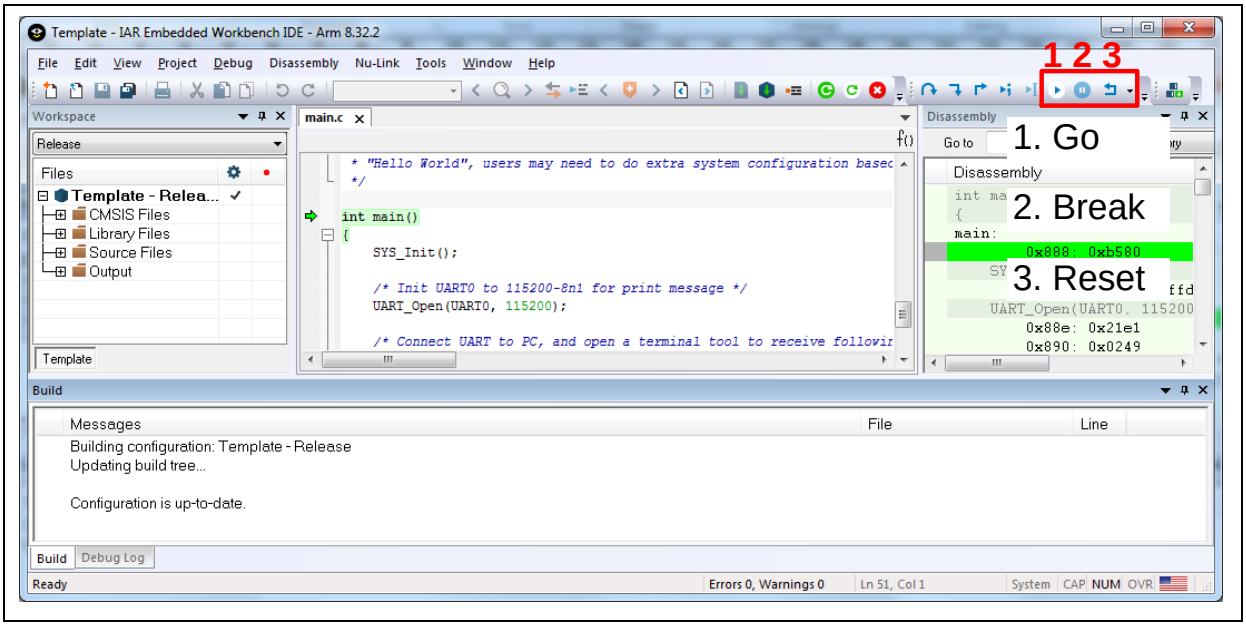

Figure 3-17 IAR EWARM Debug Mode

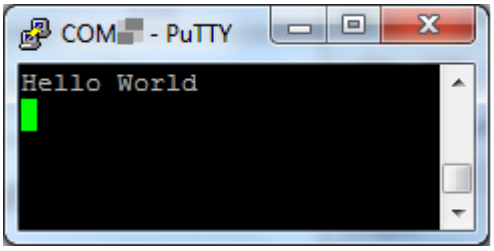

Figure 3-18 Debug Message on Serial Port Terminal Windows

3.6.3 NuEclipse

For more information about how to use NuEclipse, please refer to the NuEclipse User Manual.

4 NUMAKER-IOT-M263A SCHEMATICS

4.1 Nu-Link2-Me

Figure 4-1 shows the Nu-Link2-Me circuit. The Nu-Link2-Me is a debugger and programmer that supports on-line programming and debugging through SWD interface.

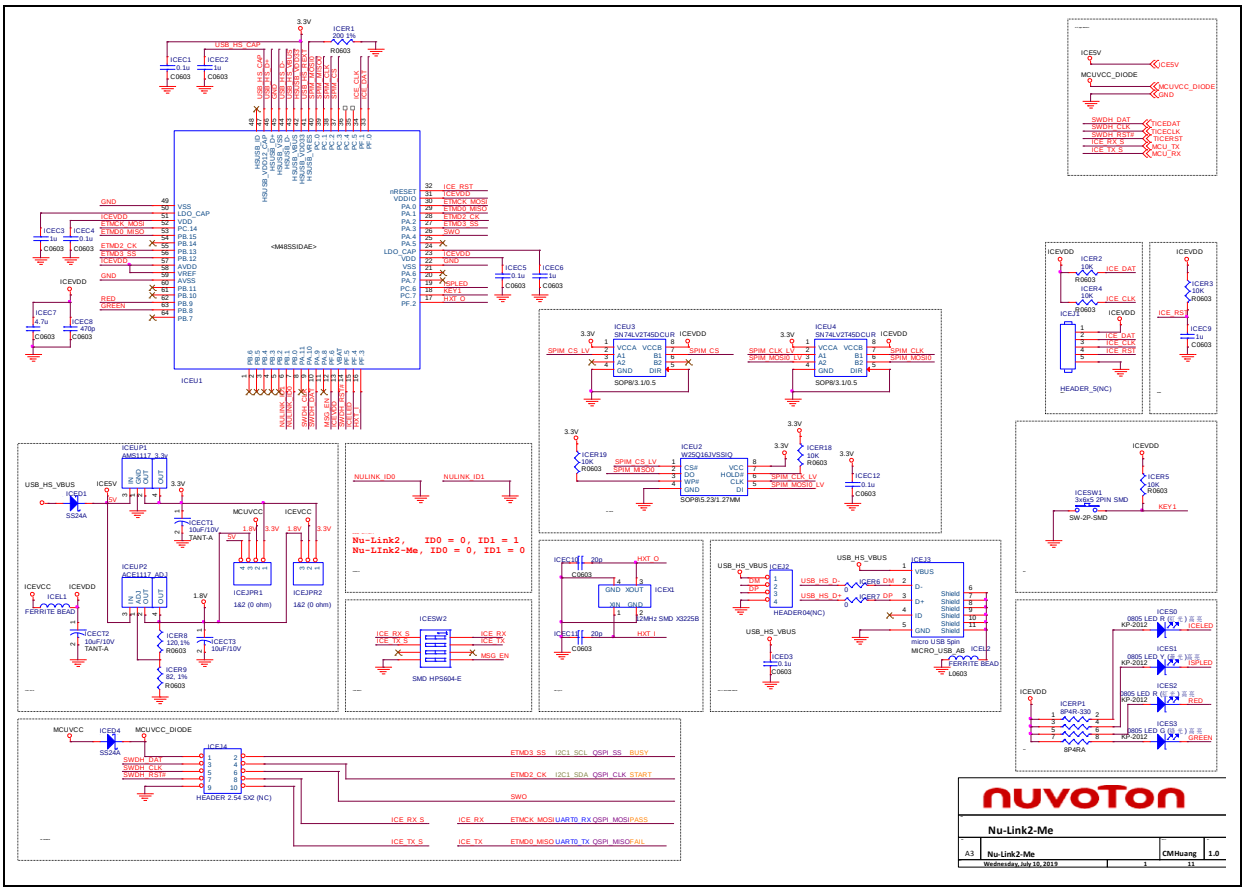

Figure 4-1 Nu-Link2-Me Circuit

4.2 M263 Platform

Figure 4-2 shows the M263 platform circuit.

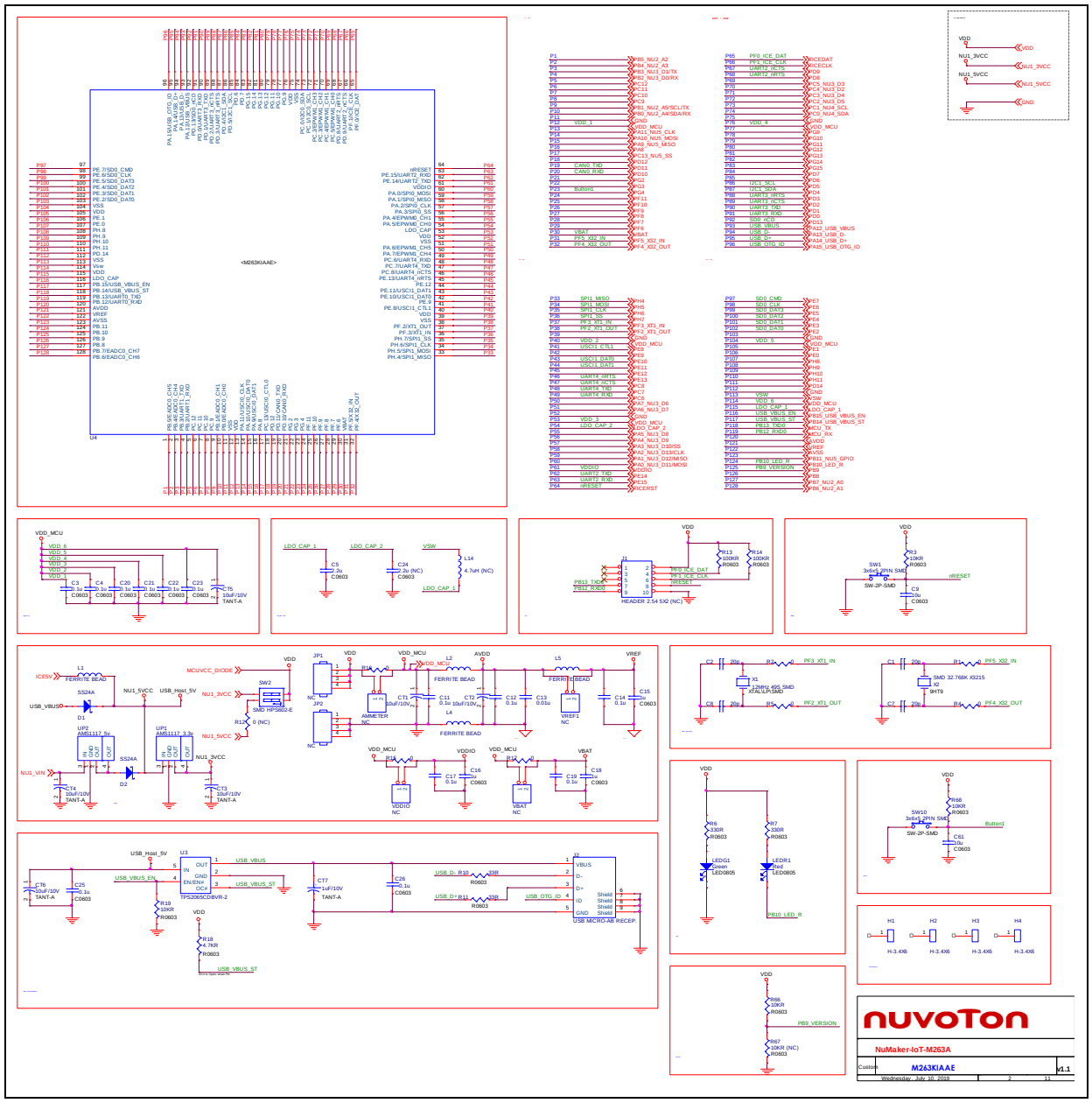

Figure 4-2 M263 Platform Circuit

4.3 Extension Connector

Figure 4-3 shows extension connectors of NuMaker-IoT-M263A.

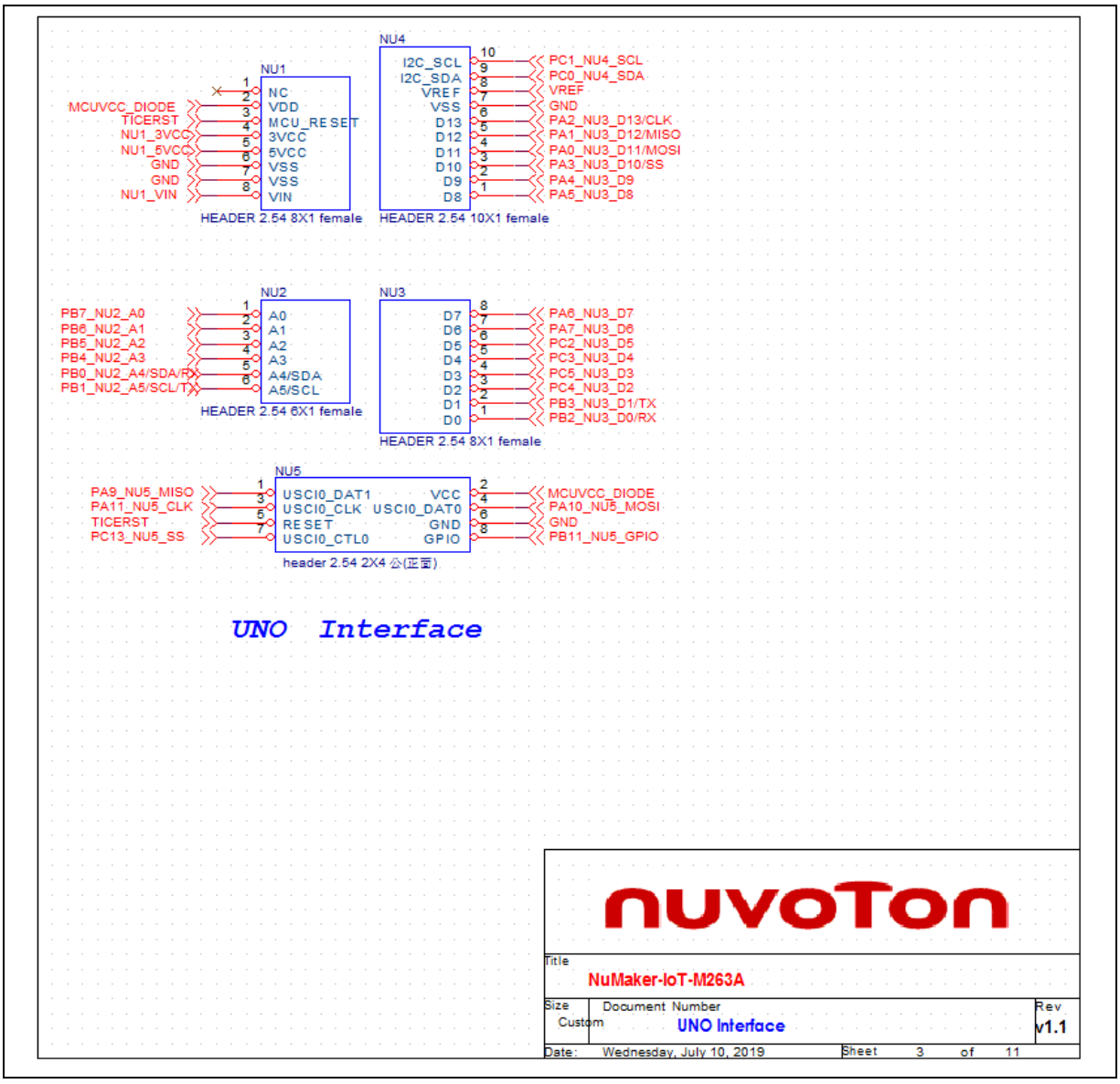

Figure 4-3 Extension Connectors Circuit

4.4 Mini PCIe Connector

Figure 4-4 shows mini PCIe connector of NuMaker-IoT-M263A.

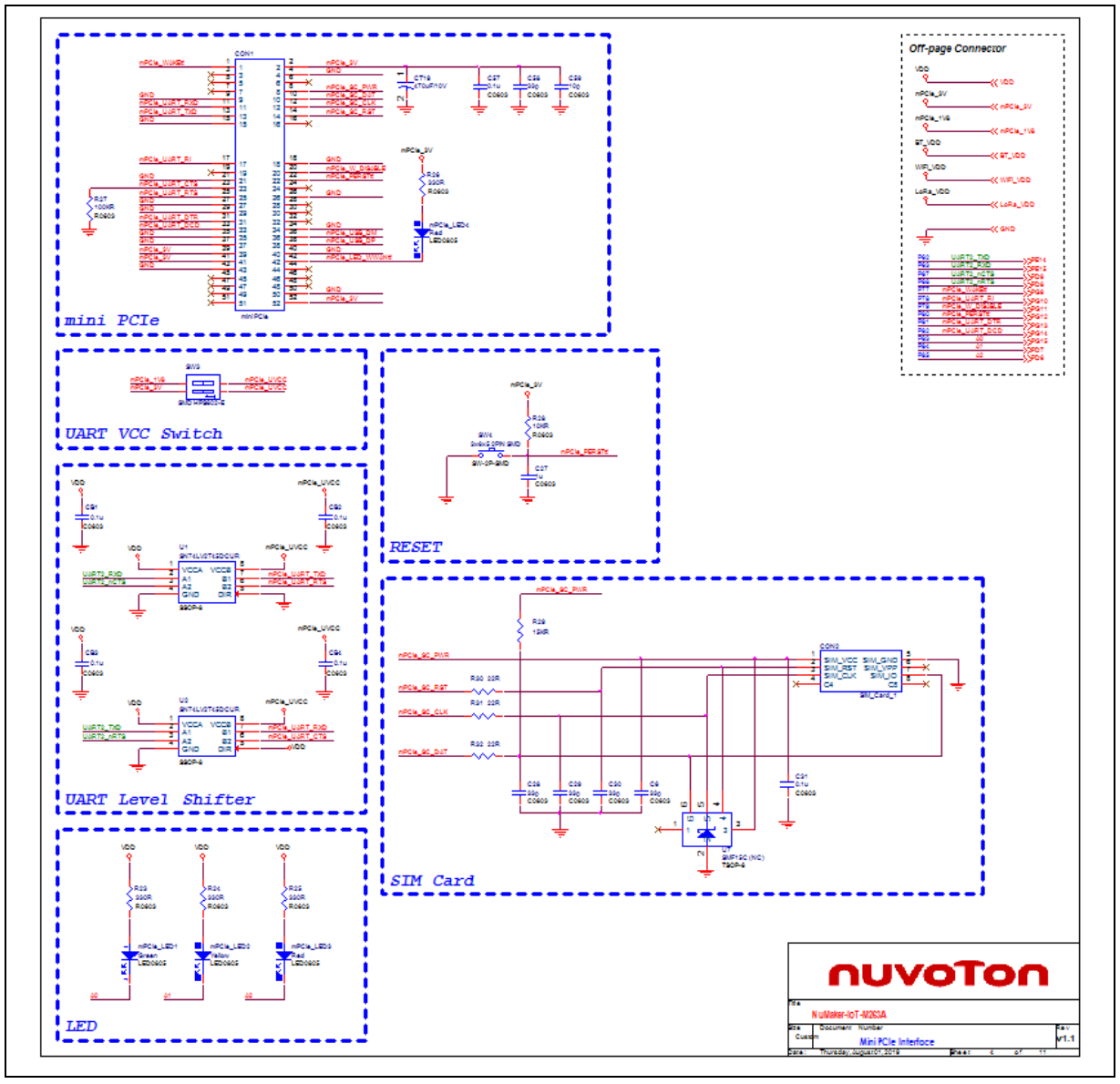

Figure 4-4 Mini PCIe Connector Circuit

4.5 On-board Bluetooth Module

Figure 4-5 shows on-board Bluetooth module of NuMaker-IoT-M263A.

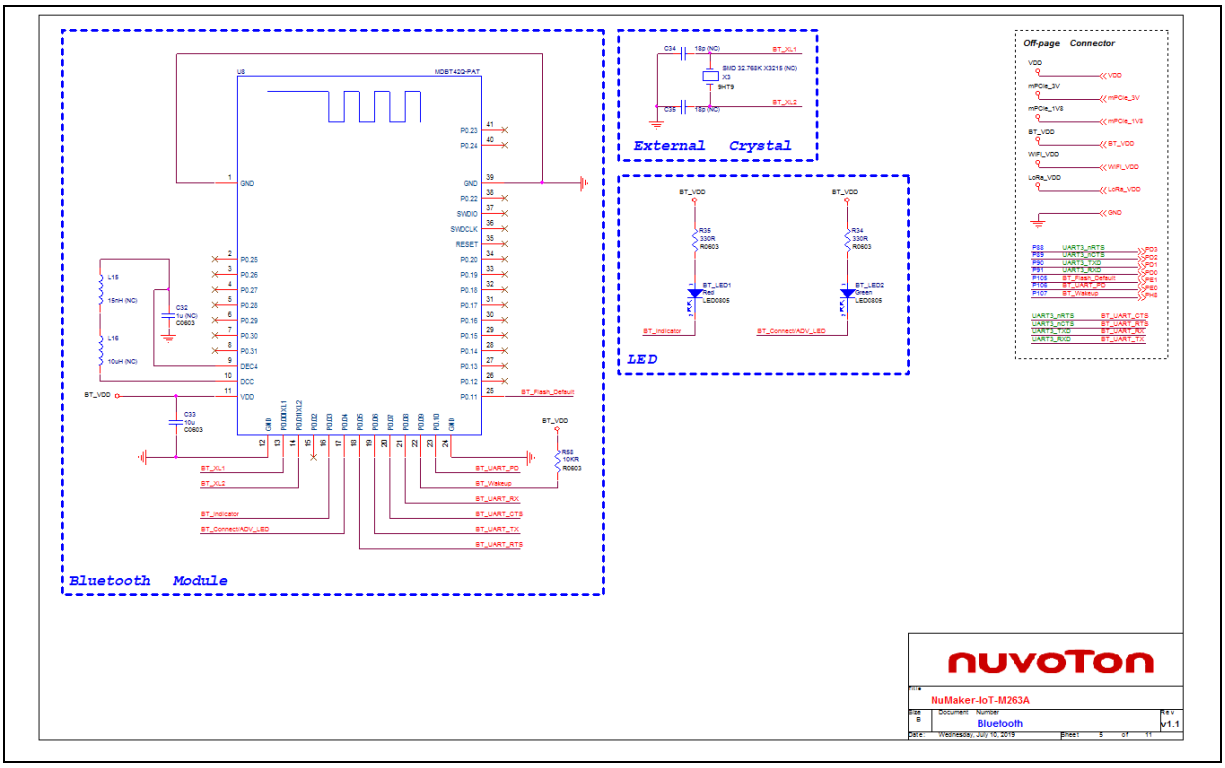

Figure 4-5 On-board Bluetooth Module Circuit

4.6 On-board Wi-Fi Module

Figure 4-6 shows on-board Wi-Fi module of NuMaker-IoT-M263A.

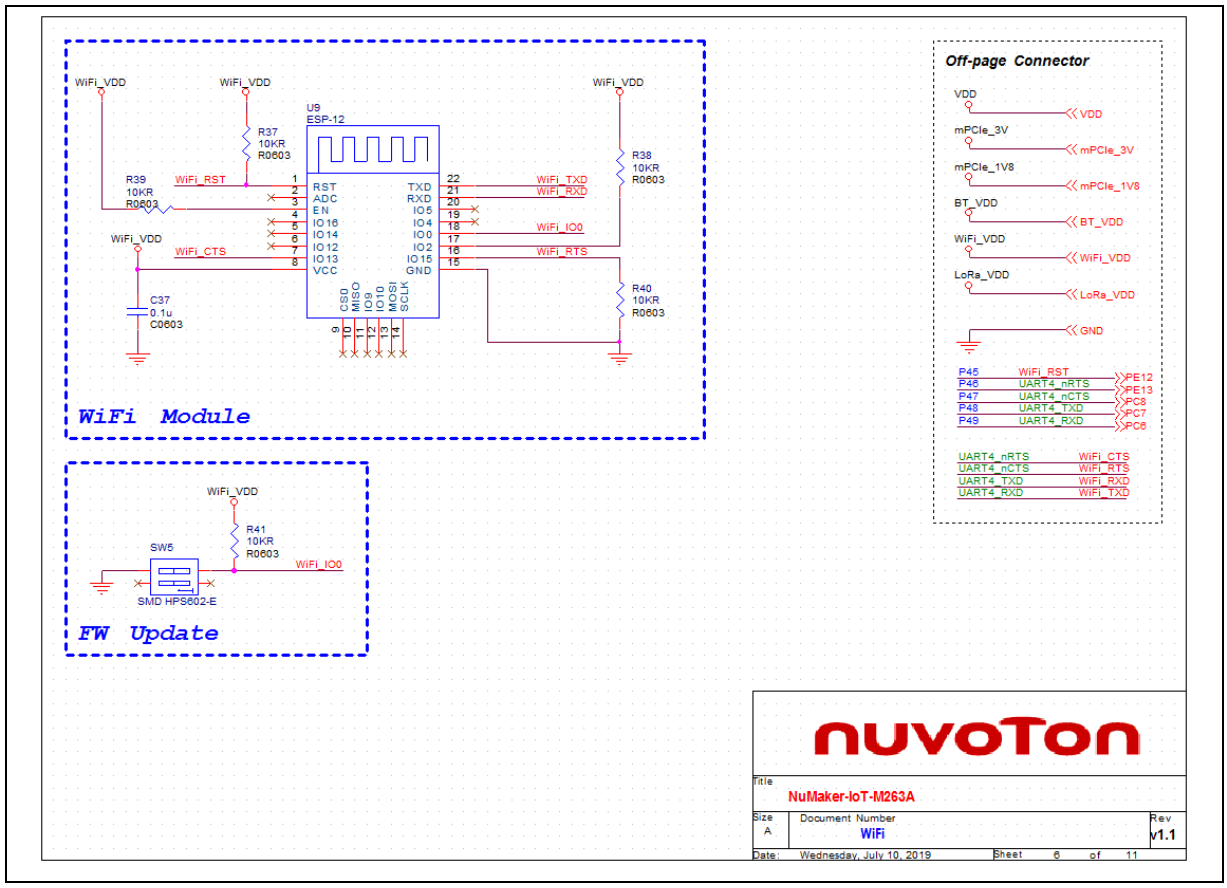

Figure 4-6 On-board Wi-Fi Module Circuit

4.7 On-board LoRa Module

Figure 4-7 shows on-board LoRa module of NuMaker-IoT-M263A.

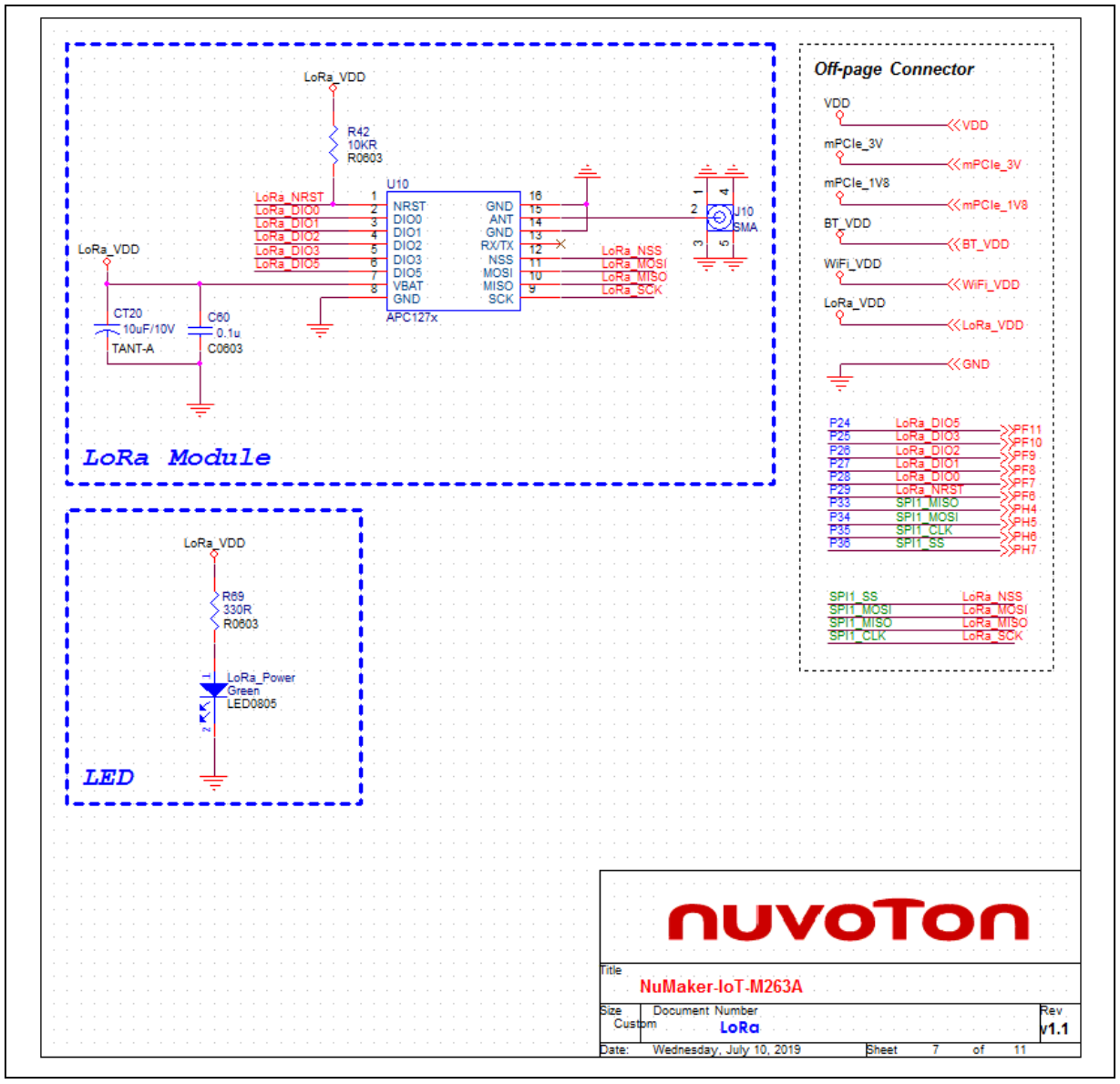

Figure 4-7 On-board LoRa Module Circuit

4.8 On-board Sensors

Figure 4-8 shows on-board sensors of NuMaker-IoT-M263A.

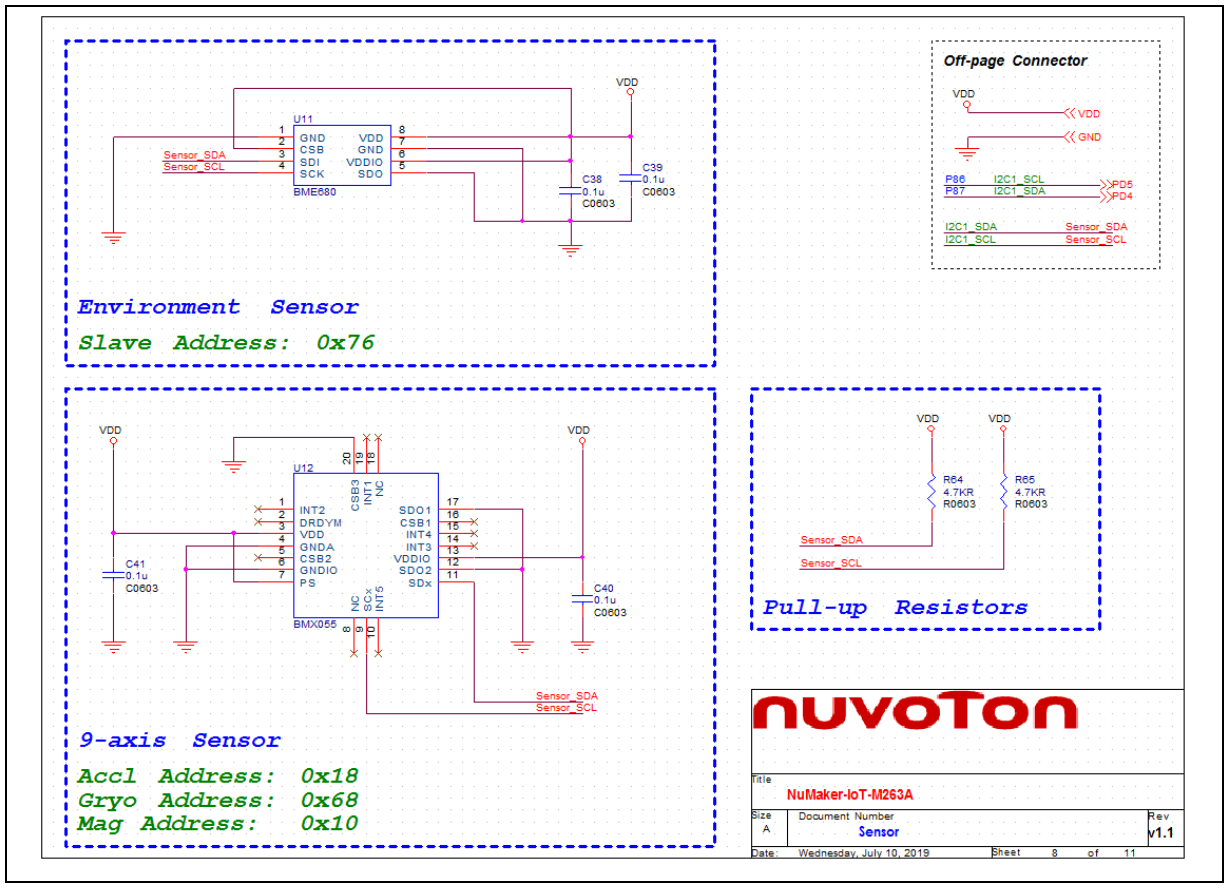

Figure 4-8 On-board Sensors Circuit

4.9 CAN and RS485 Connector

Figure 4-9 shows CAN and RS485 connector of NuMaker-IoT-M263A.

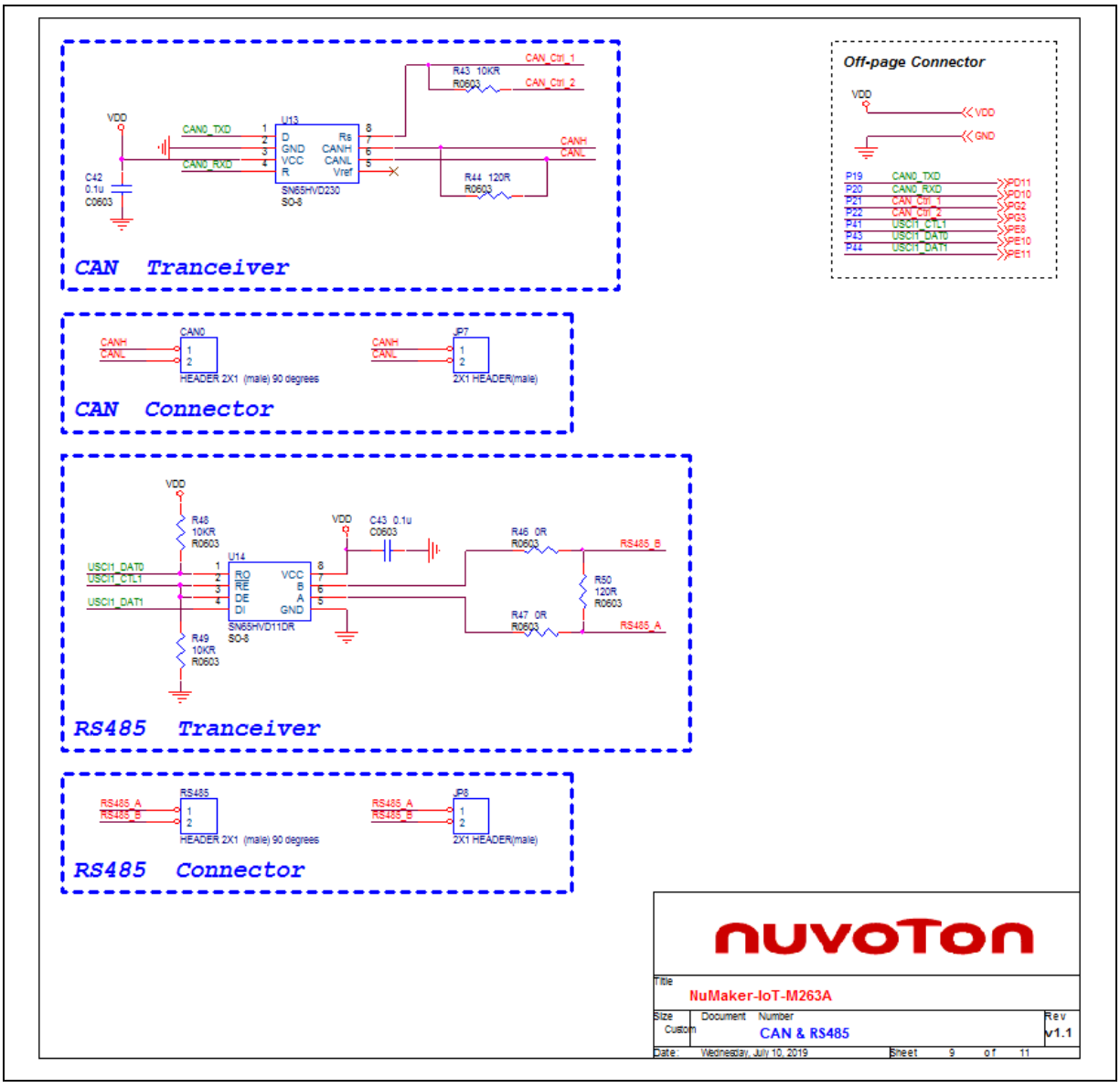

Figure 4-9 CAN and RS485 Connector Circuit

4.10 MicroSD Card Connector

Figure 4-10 shows microSD card connector of NuMaker-IoT-M263A.

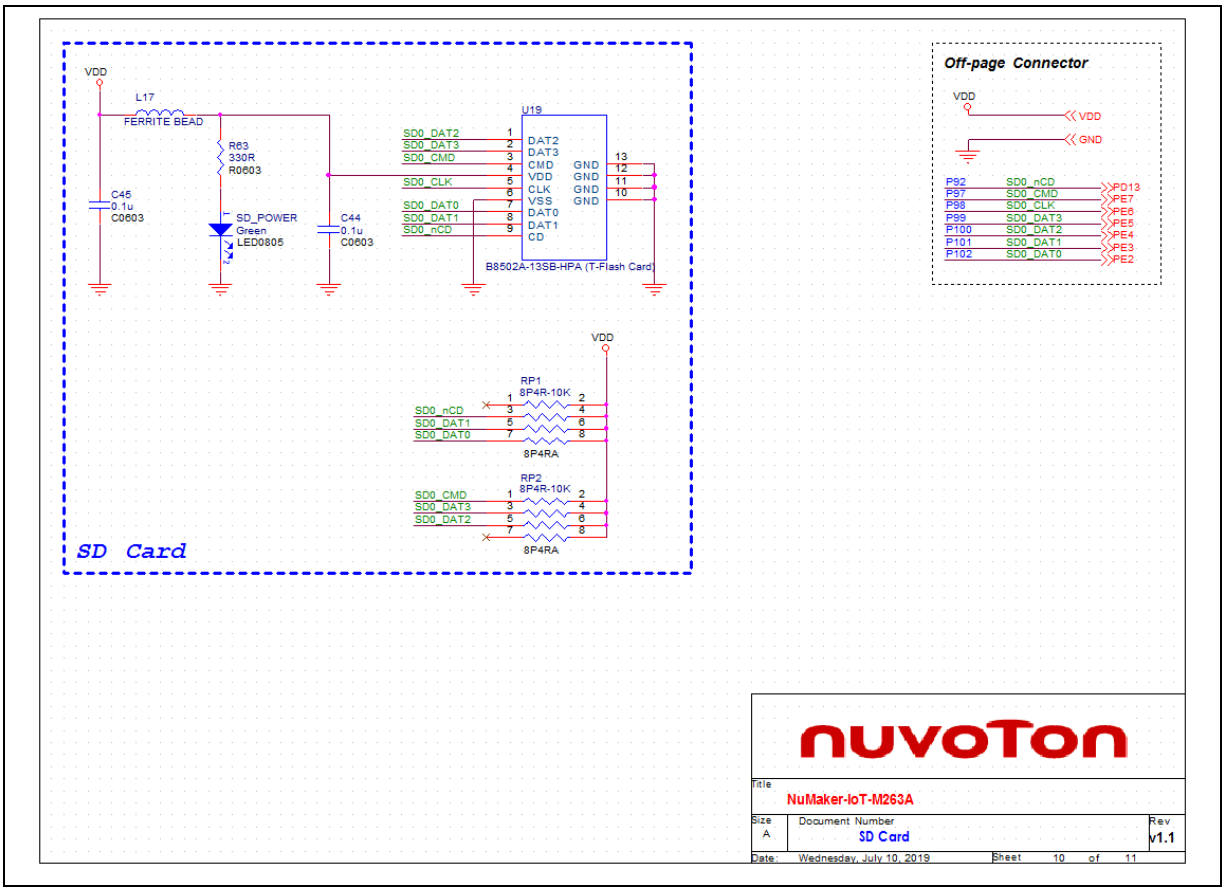

Figure 4-10 MicroSD Card Connector Circuit

4.11 On-board Modules and Mini PCIe Connector Power

Figure 4-11 shows on-board modules and mini PCIe connector power of NuMaker-IoT-M263A.

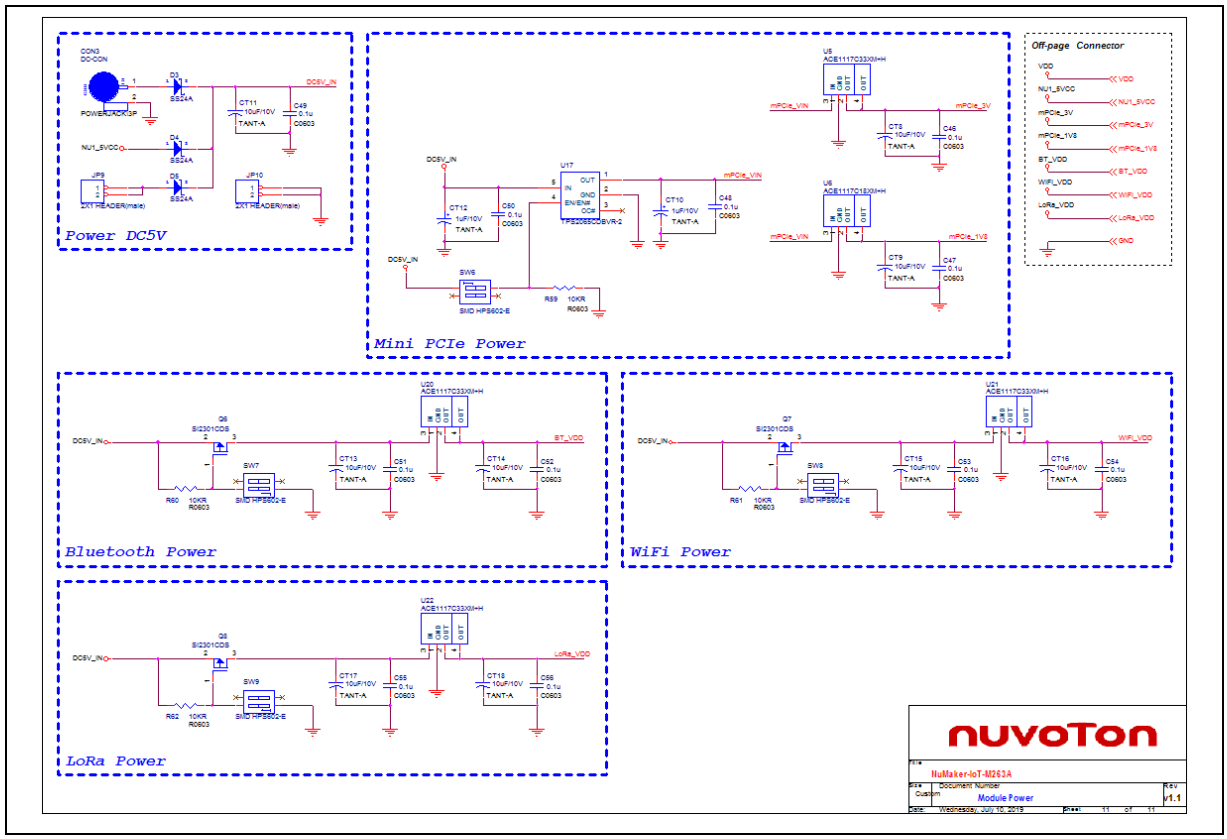

Figure 4-11 On-board Modules and Mini PCIe Connector Power Circuit

5 REVISION HISTORY

Date	Revision	Description
2019.08.06	1.00	1. Initially issued.

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.