

**ARM<sup>®</sup> Cortex<sup>®</sup>-M  
32-bit Microcontroller**

**NuMaker-M483KG  
User Manual  
NuMicro<sup>®</sup> M483 Series**

*The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.*

*Nuvoton is providing this document only for reference purposes of NuMicro microcontroller based system design. Nuvoton assumes no responsibility for errors or omissions.*

*All data and specifications are subject to change without notice.*

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

[www.nuvoton.com](http://www.nuvoton.com)

## ***Table of Contents***

|        |                                                  |    |
|--------|--------------------------------------------------|----|
| 1      | Overview.....                                    | 6  |
| 1.1    | NuMaker-M483KG Features.....                     | 6  |
| 2      | NuMaker-M483KG Overview.....                     | 8  |
| 2.1    | Front View.....                                  | 8  |
| 2.2    | Rear View .....                                  | 9  |
| 2.3    | Arduino UNO Compatible Extension Connectors..... | 10 |
| 2.4    | Pin Assignment for Extension Connectors.....     | 12 |
| 2.5    | System Configuration .....                       | 17 |
| 2.5.1  | VIN Power Source .....                           | 17 |
| 2.5.2  | 5 V Power Sources .....                          | 17 |
| 2.5.3  | 3.3 V Power Sources.....                         | 17 |
| 2.5.4  | 1.8V Power Sources .....                         | 18 |
| 2.5.5  | Power Connectors .....                           | 18 |
| 2.5.6  | USB Connectors .....                             | 18 |
| 2.5.7  | Power Switches .....                             | 18 |
| 2.5.8  | Power Supply Models .....                        | 19 |
| 2.5.9  | External Reference Voltage Connector .....       | 22 |
| 2.5.10 | Ammeter Connector .....                          | 22 |
| 2.5.11 | Extension Connectors.....                        | 22 |
| 2.5.12 | Push-Buttons .....                               | 23 |
| 2.5.13 | LEDs .....                                       | 23 |
| 2.6    | Nu-Link2-Me .....                                | 23 |
| 2.7    | PCB Placement .....                              | 24 |
| 3      | Quick Start .....                                | 25 |
| 3.1    | Toolchains Supporting .....                      | 25 |
| 3.2    | Nuvoton Nu-Link Driver Installation .....        | 25 |
| 3.3    | BSP Firmware Download.....                       | 27 |
| 3.4    | Hardware Setup.....                              | 27 |
| 3.5    | Find the Example Project.....                    | 29 |
| 3.6    | Execute the Project under Toolchains.....        | 29 |
| 3.6.1  | Keil MDK .....                                   | 29 |
| 3.6.2  | IAR EWARM.....                                   | 33 |
| 3.6.3  | NuEclipse .....                                  | 34 |

4 NuMaker-M483KG Schematics ..... 35

4.1 Nu-Link2-Me .....35

4.2 M483 platform .....36

4.3 Extension Connector .....37

4.4 Advance Connector .....38

5 REVISION HISTORY ..... 39

## List of Figures

|                                                                |    |
|----------------------------------------------------------------|----|
| Figure 1-1 NuMaker-M483KG Board .....                          | 6  |
| Figure 2-1 Front View of NuMaker-M483KG .....                  | 8  |
| Figure 2-2 Rear View of NuMaker-M483KG .....                   | 9  |
| Figure 2-3 Arduino UNO Compatible Extension Connectors.....    | 10 |
| Figure 2-4 M483KGCAE2A Extension Connectors .....              | 12 |
| Figure 2-5 External Power Supply Sources on Nu-Link2-Me .....  | 19 |
| Figure 2-6 External Power Supply Sources on M483 platform..... | 20 |
| Figure 2-7 Separate the Nu-Link2-Me from NuMaker-M483KG .....  | 21 |
| Figure 2-8 Wiring between Ammeter Connector and Ammeter.....   | 22 |
| Figure 2-9 Front Placement .....                               | 24 |
| Figure 2-10 Rear Placement.....                                | 24 |
| Figure 3-1 Nu-Link USB Driver Installation Setup.....          | 25 |
| Figure 3-2 Nu-Link USB Driver Installation .....               | 26 |
| Figure 3-3 Open VCOM Function .....                            | 27 |
| Figure 3-4 ICE USB Connector.....                              | 27 |
| Figure 3-5 Device Manger.....                                  | 28 |
| Figure 3-6 PuTTY Session Setting.....                          | 28 |
| Figure 3-7 Template Project Folder Path.....                   | 29 |
| Figure 3-8 Warning Message of “Device not found” .....         | 29 |
| Figure 3-9 Project File Migrate to Version 5 Format.....       | 30 |
| Figure 3-10 Debugger Setting in Options Window.....            | 30 |
| Figure 3-11 Programming Setting in Options Window.....         | 31 |
| Figure 3-12 Compile and Download the Project .....             | 31 |
| Figure 3-13 Keil MDK Debug Mode .....                          | 32 |
| Figure 3-14 Debug Message on Serial Port Terminal Windows..... | 32 |
| Figure 3-15 IAR EWARM Window .....                             | 33 |
| Figure 3-16 Compile and Download the Project .....             | 33 |
| Figure 3-17 IAR EWARM Debug Mode .....                         | 34 |
| Figure 3-18 Debug Message on Serial Port Terminal Windows..... | 34 |
| Figure 4-1 Nu-Link2-Me Circuit.....                            | 35 |
| Figure 4-2 M483 platform Circuit.....                          | 36 |
| Figure 4-3 Extension Connectors Circuit .....                  | 37 |
| Figure 4-4 Advance Connectors Circuit.....                     | 38 |

## List of Tables

|                                                                                    |    |
|------------------------------------------------------------------------------------|----|
| Table 2-1 Arduino UNO Extension Connectors and M483KGCAE2A Mapping GPIO List ..... | 11 |
| Table 2-2 Extended Connector JP3 Interface with M483KGCAE2A GPIO .....             | 13 |
| Table 2-3 Extended Connector JP5 Interface with M483KGCAE2A GPIO .....             | 14 |
| Table 2-4 Extended Connector JP4 Interface with M483KGCAE2A GPIO .....             | 15 |
| Table 2-5 Extended Connector JP6 Interface with M483KGCAE2A GPIO .....             | 16 |
| Table 2-6 Vin Power Source .....                                                   | 17 |
| Table 2-7 5V Power Sources .....                                                   | 17 |
| Table 2-8 3.3 V Power Sources .....                                                | 17 |
| Table 2-9 1.8V Power Sources .....                                                 | 18 |
| Table 2-10 Power Connectors .....                                                  | 18 |
| Table 2-11 USB Connectors .....                                                    | 18 |
| Table 2-12 Power Switches .....                                                    | 18 |
| Table 2-13 Supply External Power through Nu-Link2-Me .....                         | 19 |
| Table 2-14 Supply External Power for M483 platform .....                           | 21 |
| Table 2-15 External Reference Voltage Connector .....                              | 22 |
| Table 2-16 Ammeter Connector .....                                                 | 22 |
| Table 2-17 Extension Connectors.....                                               | 22 |
| Table 2-18 Push-Buttons .....                                                      | 23 |
| Table 2-19 LEDs .....                                                              | 23 |
| Table 2-20 VCOM Function of Nu-Link2-Me.....                                       | 23 |

## 1 OVERVIEW

This user manual is aimed to give users a fast introduction to the use of NuMaker-M483KG board.

The NuMaker-M483KG consists of two parts, a M483 platform and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-M483KG allows users to quickly develop and easily program and debug application.

The NuMaker-M483KG offers M483KGCAE2A full pins extension connectors and Arduino UNO compatible extension connectors. It is an easy-to-develop platform for user to expand the functionality and build the applications. The NuMaker-M483KG also provides an ammeter connector, allows user to monitor the microcontroller's power consumption during development.

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 able to off-line programming the target microcontroller. Nu-Link2-Me provides virtual COM port (VCOM) function to print out messages on PC. Nu-Link2-Me can be separated from NuMaker-M483KG, allowing user to use as a mass production programming tool.

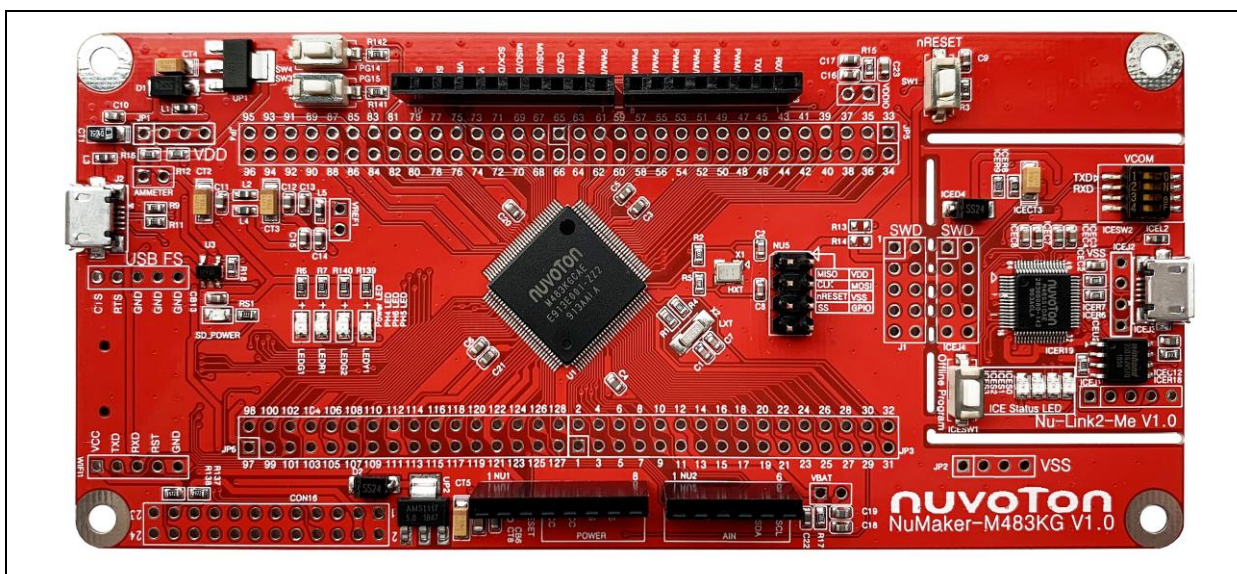


Figure 1-1 NuMaker-M483KG Board

### 1.1 NuMaker-M483KG Features

- NuMicro® M483KGCAE2A used as main microcontroller with function downward compatible with:
  - ◆ M483SGCAE
  - ◆ M482LGCAE
  - ◆ M482ZGCAE
- M483KGCAE2A full pins extension connectors
- 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  $V_{in}$
  - ◆ USB FS connector on M483 platform

- ◆ ICE USB connector on Nu-Link2-Me
- On-board Nu-Link2-Me debugger and programmer:
  - ◆ Debug through SWD interface
  - ◆ On-line/off-line programming
  - ◆ Virtual COM port function



## 2 NUMAKER-M483KG OVERVIEW

### 2.1 Front View

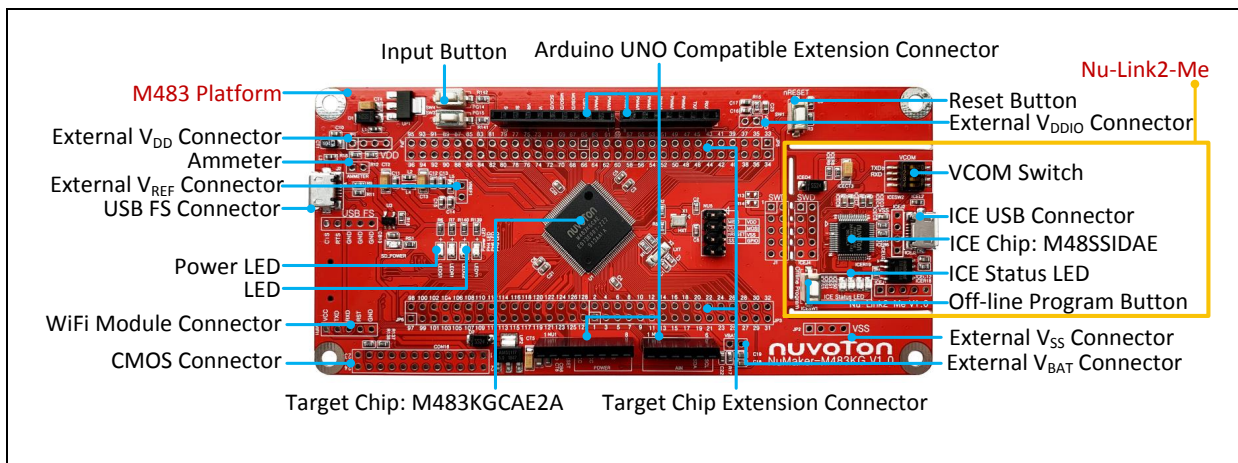


Figure 2-1 Front View of NuMaker-M483KG

Figure 2-1 shows the main components and connectors from the front side of NuMaker-M483KG. The following lists components and connectors from the front view:

- Target Chip: M483KGCAE2A(U1)
- USB FS Connector(J2)
- Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
- M483 Extension Connectors (JP3, JP4, JP5 and JP6)
- External  $V_{DD}$  Power Connector(JP1)
- External  $V_{SS}$  Power Connector(JP2)
- External  $V_{REF}$  Connector(VREF1)
- External  $V_{BAT}$  Connector(VBAT)
- External  $V_{DDIO}$  Connector(VDDIO)
- WiFi Module Connector(WIFI1)
- CMOS Connector(CON16)
- Input Button(SW3 and SW4)
- Ammeter Connector(AMMETER)
- Reset Button(SW1)
- Power LED, PH4 LED, PH5 LED and PH6 LED(LEDG1, LEDR1, LEDY1 and LEDG2)
- 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 shows the main components and connectors from the rear side of NuMaker-M483KG.

The following lists components and connectors from the rear view:

- SD Card Slot(U9)
- Nu-Link2-Me
  - ◆ MCUVCC Power Switch (ICEJPR1)
  - ◆ ICEVCC Power Switch (ICEJPR2)

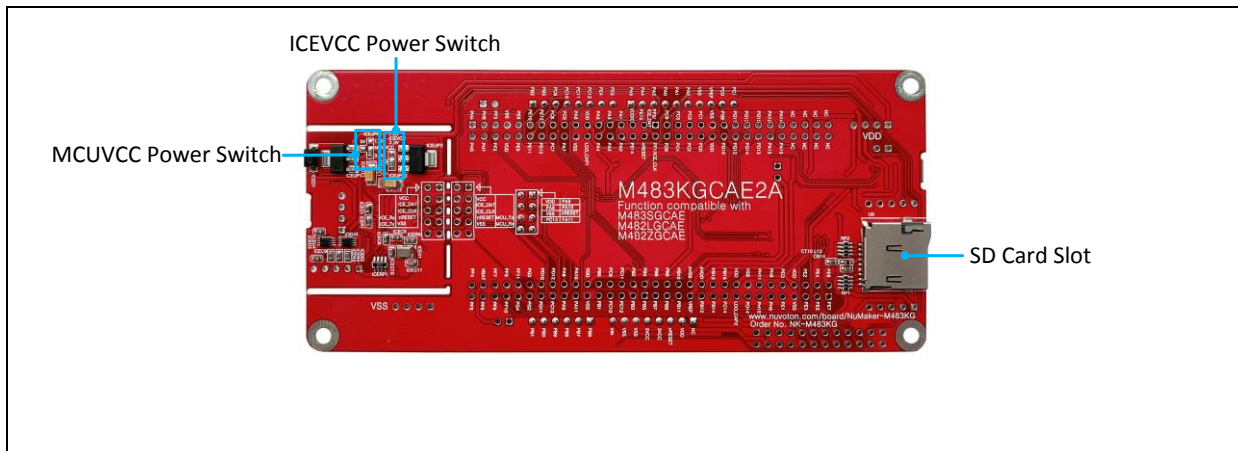


Figure 2-2 Rear View of NuMaker-M483KG

2.3 Arduino UNO Compatible Extension Connectors

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

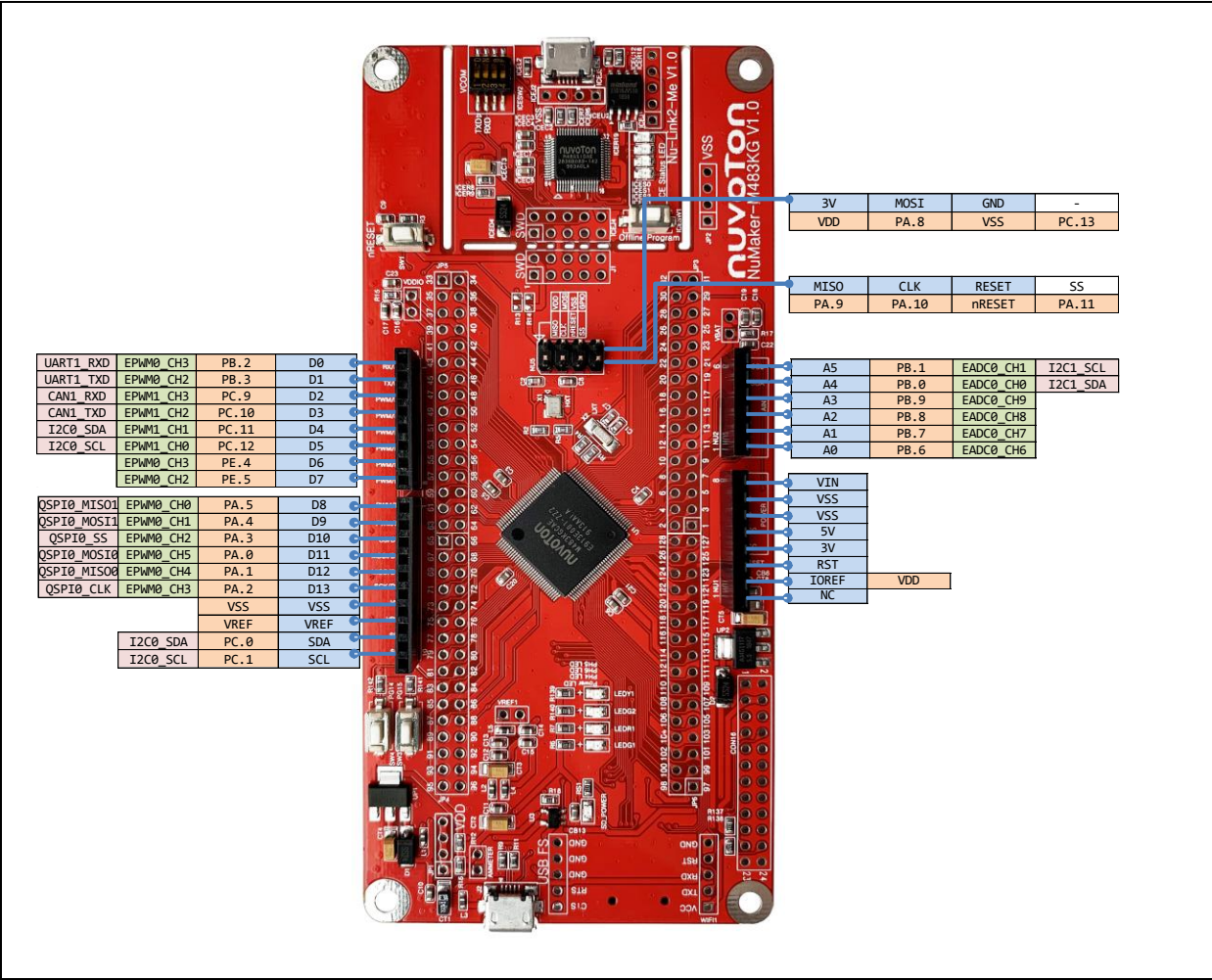


Figure 2-3 Arduino UNO Compatible Extension Connectors

| Header               |        | NuMaker-M483KG            |                  | Header               |       | NuMaker-M483KG            |                  |
|----------------------|--------|---------------------------|------------------|----------------------|-------|---------------------------|------------------|
|                      |        | Compatible to Arduino UNO | GPIO Pin of M483 |                      |       | Compatible to Arduino UNO | GPIO Pin of M483 |
| <b>N<br/>U<br/>3</b> | NU3.1  | D0                        | PB.2             | <b>N<br/>U<br/>2</b> | NU2.6 | A5                        | PB.1             |
|                      | NU3.2  | D1                        | PB.3             |                      | NU2.5 | A4                        | PB.0             |
|                      | NU3.3  | D2                        | PC.9             |                      | NU2.4 | A3                        | PB.9             |
|                      | NU3.4  | D3                        | PC.10            |                      | NU2.3 | A2                        | PB.8             |
|                      | NU3.5  | D4                        | PC.11            |                      | NU2.2 | A1                        | PB.7             |
|                      | NU3.6  | D5                        | PC.12            |                      | NU2.1 | A0                        | PB.6             |
|                      | NU3.7  | D6                        | PE.4             | <b>N<br/>U<br/>1</b> | NU1.8 | VIN                       | -                |
|                      | NU3.8  | D7                        | PE.5             |                      | NU1.7 | VSS                       |                  |
| <b>N<br/>U<br/>4</b> | 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 <sub>DD</sub>  |
|                      | NU4.6  | D13                       | PA.2             |                      | NU1.1 | NC                        | -                |
|                      | NU4.7  | VSS                       | V <sub>SS</sub>  |                      |       |                           |                  |
|                      | NU4.8  | VREF                      | V <sub>REF</sub> |                      |       |                           |                  |
|                      | NU4.9  | SDA                       | PC.0             |                      |       |                           |                  |
|                      | NU4.10 | SCL                       | PC.1             |                      |       |                           |                  |

| Header               |       | NuMaker-M483KG       |                  | Header               |       | NuMaker-M483KG       |                  |
|----------------------|-------|----------------------|------------------|----------------------|-------|----------------------|------------------|
|                      |       | Extension Connectors | GPIO Pin of M483 |                      |       | Extension Connectors | GPIO Pin of M483 |
| <b>N<br/>U<br/>5</b> | NU5.1 | SPI0_MISO            | PA.9             | <b>N<br/>U<br/>5</b> | NU5.2 | VCC                  |                  |
|                      | NU5.3 | SPI0_CLK             | PA.10            |                      | NU5.4 | SPI0_MOSI            | PA.8             |
|                      | NU5.5 | RST                  |                  |                      | NU5.6 | GND                  |                  |
|                      | NU5.7 | SPI0_SS              | PA.11            |                      | NU5.8 | GPIO                 | PC.13            |

Table 2-1 Arduino UNO Extension Connectors and M483KGCAE2A Mapping GPIO List

## 2.4 Pin Assignment for Extension Connectors

The NuMaker-M483KG provides the M483KGCAE2A target chip onboard and full pins extension connectors (JP3, JP4, JP5 and JP6). The Figure 2-4 shows the M483KGCAE2A extension connectors.

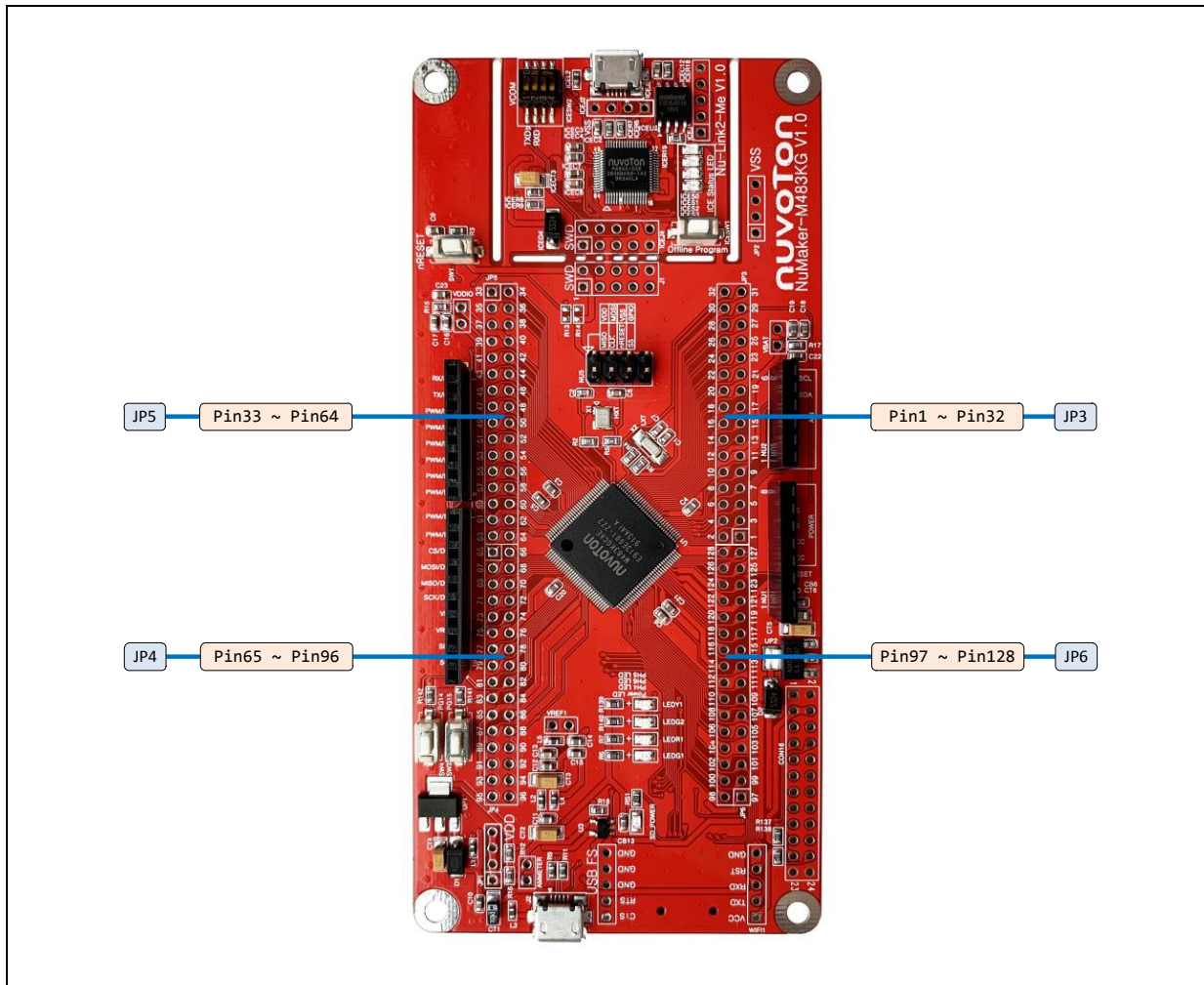


Figure 2-4 M483KGCAE2A Extension Connectors

| Header     |        | M483KGCAE2A |          | Header     |        | M483KGCAE2A |          |
|------------|--------|-------------|----------|------------|--------|-------------|----------|
|            |        | Pin No.     | Function |            |        | Pin No      | Function |
| <b>JP3</b> | JP3.1  | 1           | SD0_DAT3 | <b>JP3</b> | JP3.2  | 2           | SD0_DAT2 |
|            | JP3.3  | 3           | PB.3     |            | JP3.4  | 4           | PB.2     |
|            | JP3.5  | 5           | PC.12    |            | JP3.6  | 6           | PC.11    |
|            | JP3.7  | 7           | PC.10    |            | JP3.8  | 8           | PC.9     |
|            | JP3.9  | 9           | PB.1     |            | JP3.10 | 10          | PB.0     |
|            | JP3.11 | 11          | GND      |            | JP3.12 | 12          | 3VCC     |
|            | JP3.13 | 13          | PA.11    |            | JP3.14 | 14          | PA.10    |
|            | JP3.15 | 15          | PA.9     |            | JP3.16 | 16          | PA.8     |
|            | JP3.17 | 17          | PC.13    |            | JP3.18 | 18          | PD.12    |
|            | JP3.19 | 19          | PD.11    |            | JP3.20 | 20          | PD.10    |
|            | JP3.21 | 21          | PG.2     |            | JP3.22 | 22          | PG.3     |
|            | JP3.23 | 23          | PG.4     |            | JP3.24 | 24          | PF.11    |
|            | JP3.25 | 25          | PF.10    |            | JP3.26 | 26          | PF.9     |
|            | JP3.27 | 27          | PF.8     |            | JP3.28 | 28          | PF.7     |
|            | JP3.29 | 29          | PF.6     |            | JP3.30 | 30          | VBAT     |
|            | JP3.31 | 31          | XT32_IN  |            | JP3.32 | 32          | XT32_OUT |

Table 2-2 Extended Connector JP3 Interface with M483KGCAE2A GPIO

| Header |        | M483KGCAE2A |            | Header |        | M483KGCAE2A |            |
|--------|--------|-------------|------------|--------|--------|-------------|------------|
|        |        | Pin No.     | Function   |        |        | Pin No      | Function   |
| JP5    | JP5.1  | 33          | LED_R      | JP5    | JP5.2  | 34          | LED_Y      |
|        | JP5.3  | 35          | LED_G      |        | JP5.4  | 36          | PH.7       |
|        | JP5.5  | 37          | XT1_IN     |        | JP5.6  | 38          | XT1_OUT    |
|        | JP5.7  | 39          | GND        |        | JP5.8  | 40          | 3VCC       |
|        | JP5.9  | 41          | PE.8       |        | JP5.10 | 42          | PE.9       |
|        | JP5.11 | 43          | PE.10      |        | JP5.12 | 44          | PE.11      |
|        | JP5.13 | 45          | PE.12      |        | JP5.14 | 46          | PE.13      |
|        | JP5.15 | 47          | PC.8       |        | JP5.16 | 48          | PC.7       |
|        | JP5.17 | 49          | PC.6       |        | JP5.18 | 50          | PA.7       |
|        | JP5.19 | 51          | PA.6       |        | JP5.20 | 52          | GND        |
|        | JP5.21 | 53          | 3VCC       |        | JP5.22 | 54          | LDO_CAP1   |
|        | JP5.23 | 55          | EPWM0_CH0  |        | JP5.24 | 56          | EPWM0_CH1  |
|        | JP5.25 | 57          | QSPIO_SS   |        | JP5.26 | 58          | QSPIO_CLK  |
|        | JP5.27 | 59          | QSPIO_MISO |        | JP5.28 | 60          | QSPIO_MOSI |
|        | JP5.29 | 61          | VDDIO      |        | JP5.30 | 62          | PE.14      |
|        | JP5.31 | 63          | PE.15      |        | JP5.32 | 64          | nRESET     |

Table 2-3 Extended Connector JP5 Interface with M483KGCAE2A GPIO

| Header     |        | M483KGCAE2A |          | Header     |        | M483KGCAE2A |          |
|------------|--------|-------------|----------|------------|--------|-------------|----------|
|            |        | Pin No.     | Function |            |        | Pin No.     | Function |
| <b>JP4</b> | JP4.1  | 65          | ICEDAT   | <b>JP4</b> | JP4.2  | 66          | ICECLK   |
|            | JP4.3  | 67          | I2C2_SCL |            | JP4.4  | 68          | I2C2_SDA |
|            | JP4.5  | 69          | PC.5     |            | JP4.6  | 70          | PC.4     |
|            | JP4.7  | 71          | PC.3     |            | JP4.8  | 72          | PC.2     |
|            | JP4.9  | 73          | I2C0_SCL |            | JP4.10 | 74          | I2C0_SDA |
|            | JP4.11 | 75          | GND      |            | JP4.12 | 76          | 3VCC     |
|            | JP4.13 | 77          | PG.9     |            | JP4.14 | 78          | PG.10    |
|            | JP4.15 | 79          | PG.11    |            | JP4.16 | 80          | PG.12    |
|            | JP4.17 | 81          | PG.13    |            | JP4.18 | 82          | SW3      |
|            | JP4.19 | 83          | SW2      |            | JP4.20 | 84          | SD0_nCD  |
|            | JP4.21 | 85          | USB_VBUS |            | JP4.22 | 86          | USB_D-   |
|            | JP4.23 | 87          | USB_D+   |            | JP4.24 | 88          | USB_ID   |
|            | JP4.25 | 89          | -        |            | JP4.26 | 90          | -        |
|            | JP4.27 | 91          | -        |            | JP4.28 | 92          | -        |
|            | JP4.29 | 93          | -        |            | JP4.30 | 94          | -        |
|            | JP4.31 | 95          | -        |            | JP4.32 | 96          | -        |

Table 2-4 Extended Connector JP4 Interface with M483KGCAE2A GPIO



| Header     |        | M483KGCAE2A |             | Header     |        | M483KGCAE2A |             |
|------------|--------|-------------|-------------|------------|--------|-------------|-------------|
|            |        | Pin No.     | Pin Name    |            |        | Pin No      | Pin Name    |
| <b>JP6</b> | JP6.1  | 97          | SD0_CMD     | <b>JP6</b> | JP6.2  | 98          | SD0_CLK     |
|            | JP6.3  | 99          | EPWM0_CH2   |            | JP6.4  | 100         | EPWM0_CH3   |
|            | JP6.5  | 101         | SD0_DAT1    |            | JP6.6  | 102         | SD0_DAT0    |
|            | JP6.7  | 103         | GND         |            | JP6.8  | 104         | 3VCC        |
|            | JP6.9  | 105         | PE.1        |            | JP6.10 | 106         | PE.0        |
|            | JP6.11 | 107         | PH.8        |            | JP6.12 | 108         | PH.9        |
|            | JP6.13 | 109         | PH.10       |            | JP6.14 | 110         | PH.11       |
|            | JP6.15 | 111         | PD.14       |            | JP6.16 | 112         | GND         |
|            | JP6.17 | 113         | LDO_CAP2    |            | JP6.18 | 114         | 3VCC        |
|            | JP6.19 | 115         | USB_VBUS_ST |            | JP6.20 | 116         | USB_VBUS_EN |
|            | JP6.21 | 117         | PB.14       |            | JP6.22 | 118         | UART0_TX    |
|            | JP6.23 | 119         | UART0_RX    |            | JP6.24 | 120         | AVDD        |
|            | JP6.25 | 121         | VREF        |            | JP6.26 | 122         | AVSS        |
|            | JP6.27 | 123         | PB.11       |            | JP6.28 | 124         | PB.10       |
|            | JP6.29 | 125         | EADC0_CH9   |            | JP6.30 | 126         | EADC0_CH8   |
|            | JP6.31 | 127         | EADC0_CH7   |            | JP6.32 | 128         | EADC0_CH6   |

Table 2-5 Extended Connector JP6 Interface with M483KGCAE2A GPIO

## 2.5 System Configuration

### 2.5.1 VIN Power Source

Table 2-6 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-M483KG. |

Table 2-6 Vin Power Source

### 2.5.2 5 V Power Sources

Table 2-7 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 M483 platform and Nu-Link2-Me.                                                                                                                                            |
| J2        | USB_VBUS              | USB connector on NuMaker-M483KG supplies 5 V power from PC to M483 platform and Nu-Link2-Me.                                                                                                                              |
| NU1 pin5  | NU1_5VCC              | ICEJ3, J2 or NU1 pin8 supplies 5 V power to NU1 pin5. NU1 pin5 supplies 5 V power to target chip or Arduino adapter board.<br><b>Note:</b> M483 operating voltage range is from 1.8 V to 3.6 V. Do not connect 5V to VDD. |

Table 2-7 5V Power Sources

### 2.5.3 3.3 V Power Sources

Table 2-8 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 M483 platform or ICE chip.                         |
| UP1               | USB_VBUS    | UP1 converts USB_VBUS to 3.3 V and supplies 3.3 V to M483 platform.<br><b>Note:</b> R12 should be connected. |
| UP1               | NU1_5VCC    | UP1 converts NU1_5VCC to 3.3 V and supplies 3.3 V to M483 platform.<br><b>Note:</b> R12 should be connected. |

Table 2-8 3.3 V Power Sources

### 2.5.4 1.8V Power Sources

Table 2-9 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 M483 platform or ICE chip. |

Table 2-9 1.8V Power Sources

### 2.5.5 Power Connectors

Table 2-10 presents the power connectors.

| Connector | Comment                                                          |
|-----------|------------------------------------------------------------------|
| JP1       | V <sub>DD</sub> (1.8 V ~ 3.6 V) connector on the NuMaker-M483KG. |
| JP2       | V <sub>SS</sub> connector on the NuMaker-M483KG.                 |

Table 2-10 Power Connectors

### 2.5.6 USB Connectors

Table 2-11 presents the USB connectors.

| Connector | Comment                                                                               |
|-----------|---------------------------------------------------------------------------------------|
| ICEJ3     | ICE USB connector on Nu-Link2-Me for power supply, debugging and programming from PC. |
| J2        | USB FS connector on NuMaker-M483KG for power supply.                                  |

Table 2-11 USB Connectors

### 2.5.7 Power Switches

Table 2-12 presents the power switches.

| Switch  | Comment                                                              |
|---------|----------------------------------------------------------------------|
| ICEJPR1 | Configures the target chip operating voltage at 1.8 V / 3.3 V / 5 V. |
| ICEJPR2 | Configures the ICE chip operating voltage at 1.8 V / 3.3 V.          |

Table 2-12 Power Switches

## 2.5.8 Power Supply Models

### 2.5.8.1 External Power Supply through Nu-Link2-Me to Target Chip

The external power supply source on Nu-Link2-Me is shown in Figure 2-5.

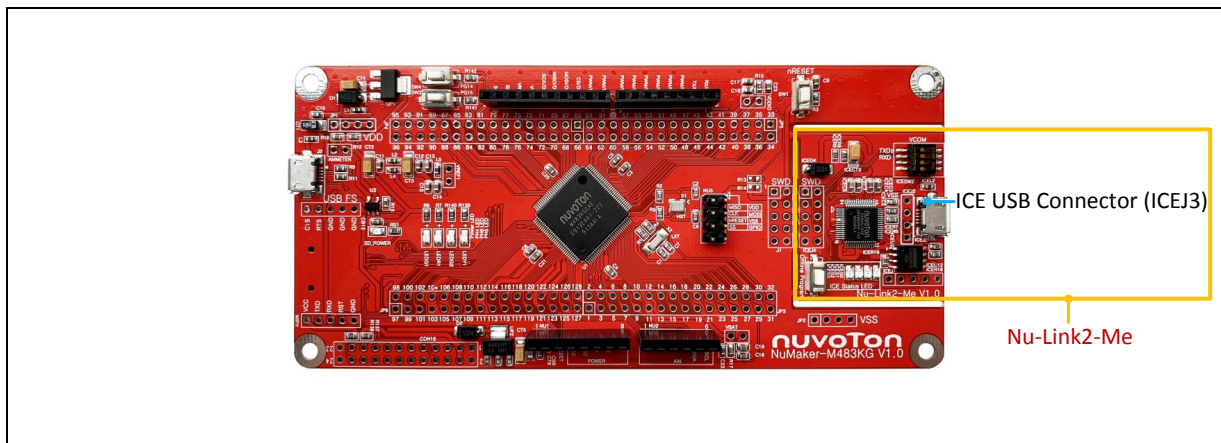


Figure 2-5 External Power Supply Sources on Nu-Link2-Me

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

1. Solder the resistor on ICEJPR1 (MCUVCC) depends on the target chip operating voltage.
2. Solder the resistor on ICEJPR2 (ICEVCC) depends on the ICE chip operating voltage.
3. Connect the external power supply to JP1.

Table 2-13 presents all power models when supplies 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 <sup>[1]</sup> | ICEJPR2 (ICEVCC) Selection <sup>[2]</sup> | ICE Chip Voltage | J2     | Vin    | JP1          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|-------------------------------------------|-------------------------------------------|------------------|--------|--------|--------------|
| 1                                                                                                                                                                                               | 1.8 V               | Connect to PC | 1.8 V                                     | 1.8 V                                     | 1.8 V            | Ignore | Ignore | 1.8 V output |
| 2                                                                                                                                                                                               | 3.3 V               | Connect to PC | 3.3 V (default)                           | 3.3 V (default)                           | 3.3 V            | Ignore | Ignore | 3.3 V output |
| 3                                                                                                                                                                                               | 5 V                 | Connect to PC | 5V                                        | 3.3 V (default)                           | 3.3 V            | Ignore | Ignore | 5 V output   |
| X: Unused.<br><b>Note:</b><br>1. 0 $\Omega$ should be soldered between ICEJPR1's MCVCC and 1.8 V / 3.3 V / 5 V.<br>2. 0 $\Omega$ should be soldered between ICEJPR2's ICEVCC and 1.8 V / 3.3 V. |                     |               |                                           |                                           |                  |        |        |              |

Table 2-13 Supply External Power through Nu-Link2-Me

### 2.5.8.2 External Power Supply through M483 platform to Target Chip

The external power supply sources on M483 platform are shown in Figure 2-6.

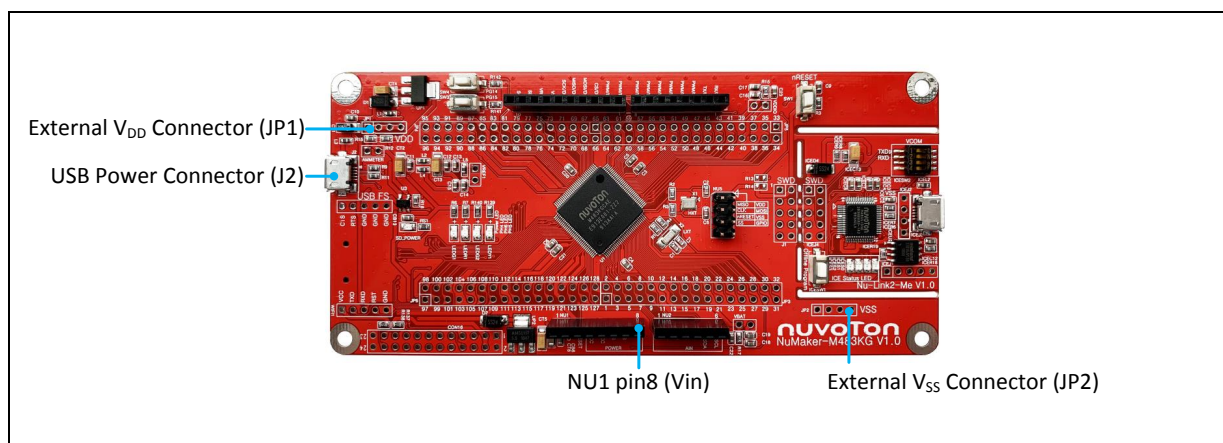


Figure 2-6 External Power Supply Sources on M483 platform

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

1. Remove the resistor on ICEJPR1 (MCUVCC).
2. Solder the resistor on ICEJPR2 (ICEVCC) depends on the ICE chip operating voltage.
3. Connect the external power supply to Vin or J2.

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

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

To use Vin or J2 as external power supply source with Nu-Link2-Me separated from NuMaker-M483KG, please follow the below steps:

1. Separate the Nu-Link2-Me from NuMaker-M483KG.
2. Connect the external power supply to Vin or J2.

To use JP1 as external power supply source with Nu-Link2-Me separated from NuMaker-M483KG, please follow the below steps:

1. Separate the Nu-Link2-Me from NuMaker-M483KG.
2. Connect the external power supply to JP1.

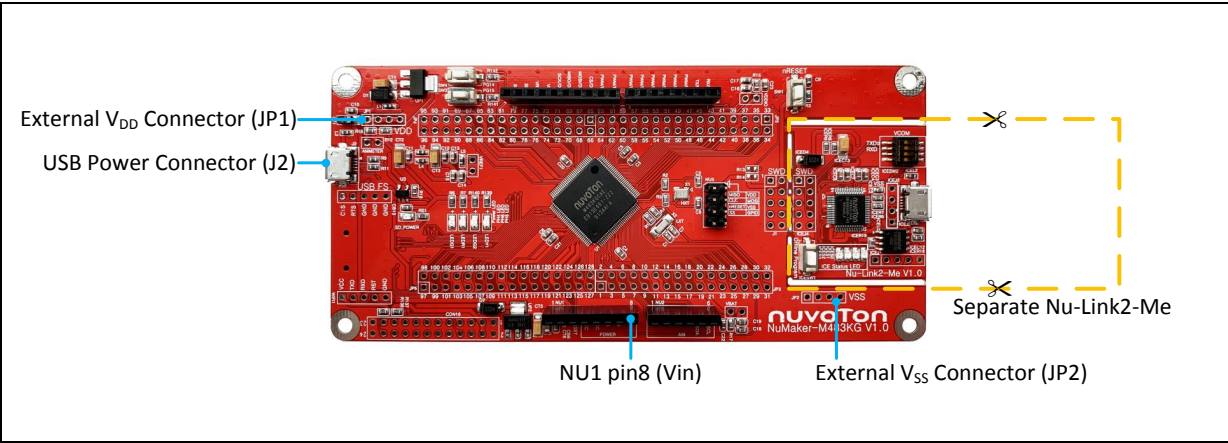


Figure 2-7 Separate the Nu-Link2-Me from NuMaker-M483KG

Table 2-14 presents all power models when supplies external power through M483 platform. The M483 platform external power sources are highlighted in yellow.

| Model | Target Chip Voltage | Vin <sup>[1]</sup>    | J2                    | ICEJ3               | R12 | JP1                    | ICEJPR1 (MCUVCC) Selection <sup>[2]</sup> | ICEJPR2 (ICEVCC) Selection <sup>[3]</sup> | ICE Chip Voltage <sup>[4]</sup> |
|-------|---------------------|-----------------------|-----------------------|---------------------|-----|------------------------|-------------------------------------------|-------------------------------------------|---------------------------------|
| 4     | 3.3 V               | 7 V ~ 12 V Input      | X                     | Ignore              | ON  | 3.3 V output           | Remove resistor                           | 3.3 V                                     | 3.3 V                           |
| 5     | 3.3 V               | X                     | Connect to PC         | Ignore              | ON  | 3.3 V output           | Remove resistor                           | 3.3 V                                     | 3.3 V                           |
| 8     | 1.8 V ~ 3.6 V       | Ignore <sup>[5]</sup> | Ignore <sup>[5]</sup> | 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 <sup>[5]</sup> | Ignore <sup>[5]</sup> | 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 MCVCC 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 2-14 Supply External Power for M483 platform

2.5.9 External Reference Voltage Connector

Table 2-15 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 2-15 External Reference Voltage Connector

2.5.10 Ammeter Connector

Table 2-16 presents the ammeter connector.

| Connector | Comment                                                                                                                |
|-----------|------------------------------------------------------------------------------------------------------------------------|
| AMMETER   | Connector for user to easily measure the target chip power consumption. User needs to remove the R16 and R12 resistor. |

Table 2-16 Ammeter Connector

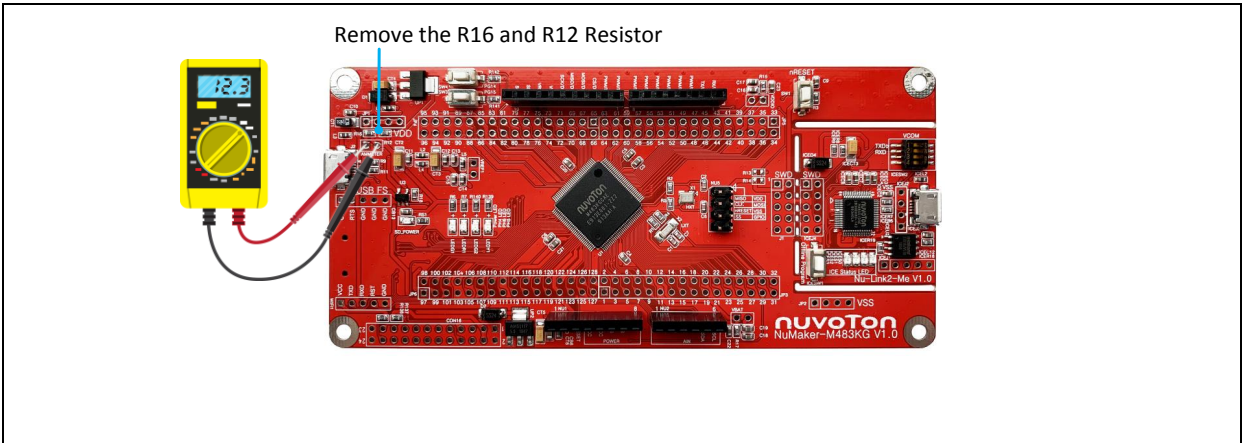


Figure 2-8 Wiring between Ammeter Connector and Ammeter

2.5.11 Extension Connectors

Table 2-17 presents the extension connectors.

| Connector             | Comment                                               |
|-----------------------|-------------------------------------------------------|
| JP3, JP4, JP5 and JP6 | Full pins extension connectors on the NuMaker-M483KG. |
| NU1, NU2, NU3 and NU4 | Arduino UNO compatible pins on the NuMaker-M483KG.    |

Table 2-17 Extension Connectors



## 2.5.12 Push-Buttons

Table 2-18 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.                                 |
| SW3       | GPIO input button for PG.15.                                           |
| SW4       | GPIO input button for PG.14.                                           |

Table 2-18 Push-Buttons

## 2.5.13 LEDs

Table 2-19 presents the LEDs.

| Component                     | Comment                                                     |
|-------------------------------|-------------------------------------------------------------|
| Power LED                     | The power LED indicates that the NuMaker-M483KG is powered. |
| PH4 LED                       | The LED is connected to the target chip PH.4.               |
| PH5 LED                       | The LED is connected to the target chip PH.5.               |
| PH6 LED                       | The LED is connected to the target chip PH.6.               |
| SD_POWER                      | The power LED indicates that the SD slot is powered.        |
| ICES0, ICES1, ICES2 and ICES3 | Nu-Link2-Me status LED.                                     |

Table 2-19 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 2-20 presents how to set the VCOM function by ICESW2.

| ICESW2                              |          |                                                                                                                                          |
|-------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------|
| Pin                                 | Function | Comment                                                                                                                                  |
| 1                                   | TXD      | <b>On:</b> Connect target chip PB.13 (UART0_TXD) to Nu-Link2-Me.<br><b>Off:</b> Disconnect target chip PB.13 (UART0_TXD) to Nu-Link2-Me. |
| 2                                   | RXD      | <b>On:</b> Connect target chip PB.12 (UART0_RXD) to Nu-Link2-Me.<br><b>Off:</b> Disconnect target chip PB.12 (UART0_RXD) to Nu-Link2-Me. |
| <b>Note:</b> Pin 3 and 4 is unused. |          |                                                                                                                                          |

Table 2-20 VCOM Function of Nu-Link2-Me

## 2.7 PCB Placement

Figure 2-9 and Figure 2-10 show the front and rear placement of NuMaker-M483KG.

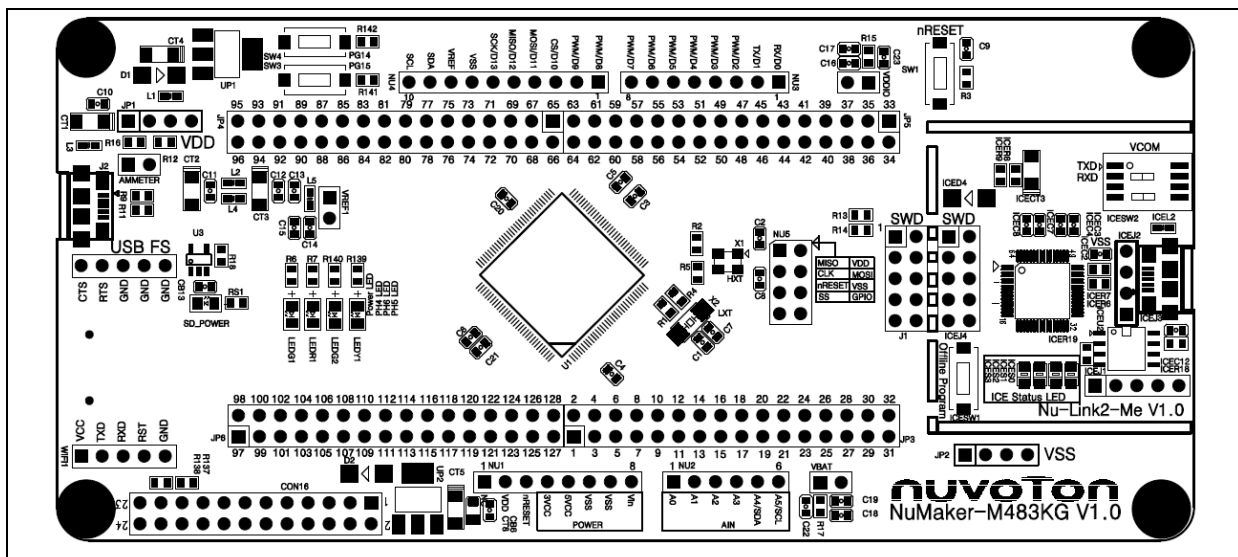


Figure 2-9 Front Placement

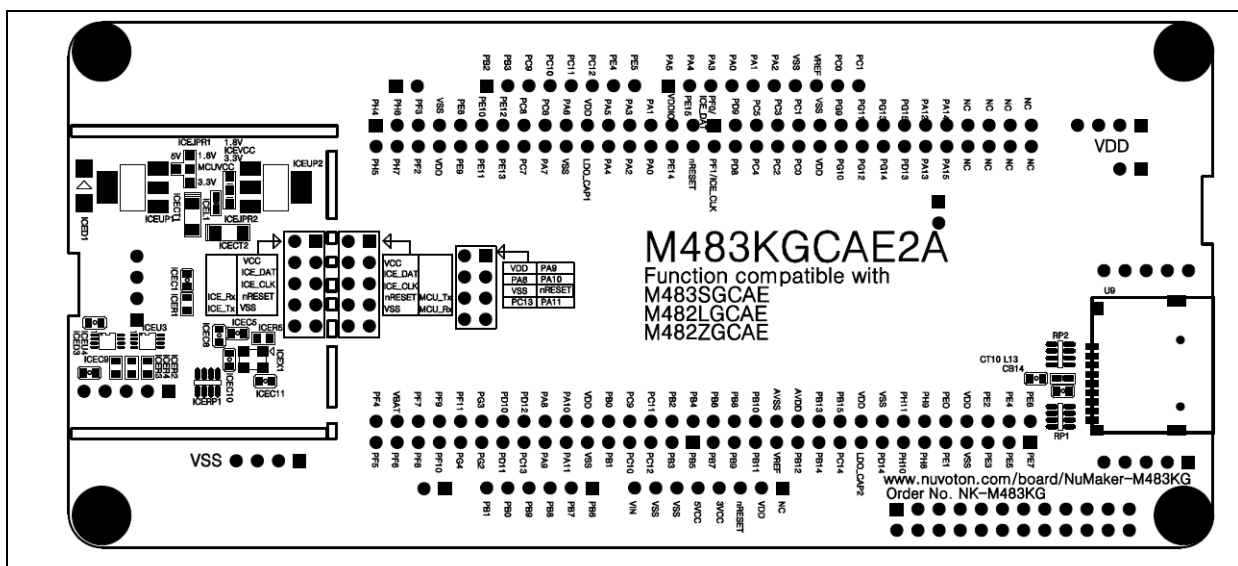


Figure 2-10 Rear Placement

### 3 QUICK START

#### 3.1 Toolchains Supporting

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

- [KEIL MDK Nuvoton edition M0/M23](#)
- [IAR EWARM](#)
- [NuEclipse \(GCC\)\(Windows\)](#)
- [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.

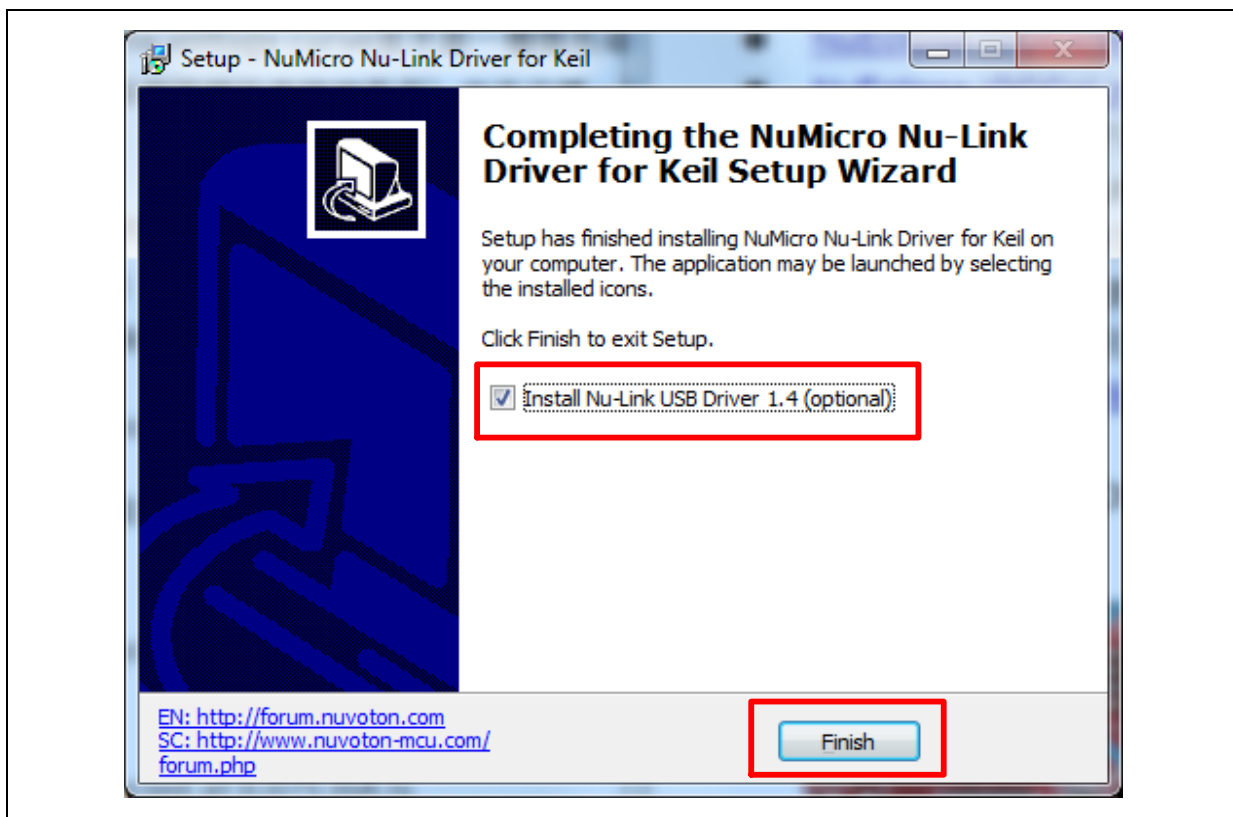


Figure 3-1 Nu-Link USB Driver Installation Setup



Figure 3-2 Nu-Link USB Driver Installation



### 3.3 BSP Firmware Download

Download and unzip the M480 [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.

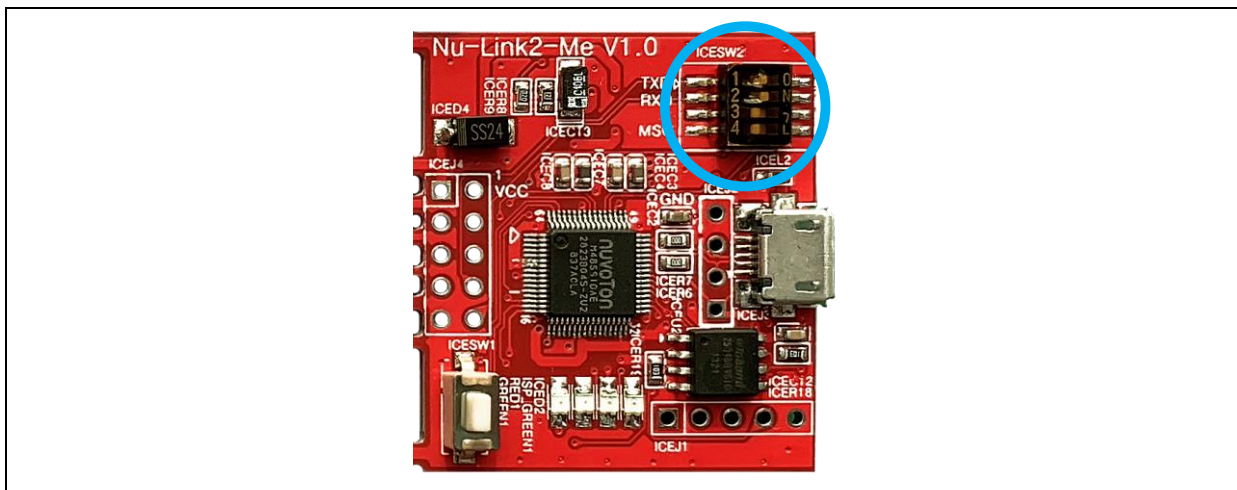


Figure 3-3 Open VCOM Function

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

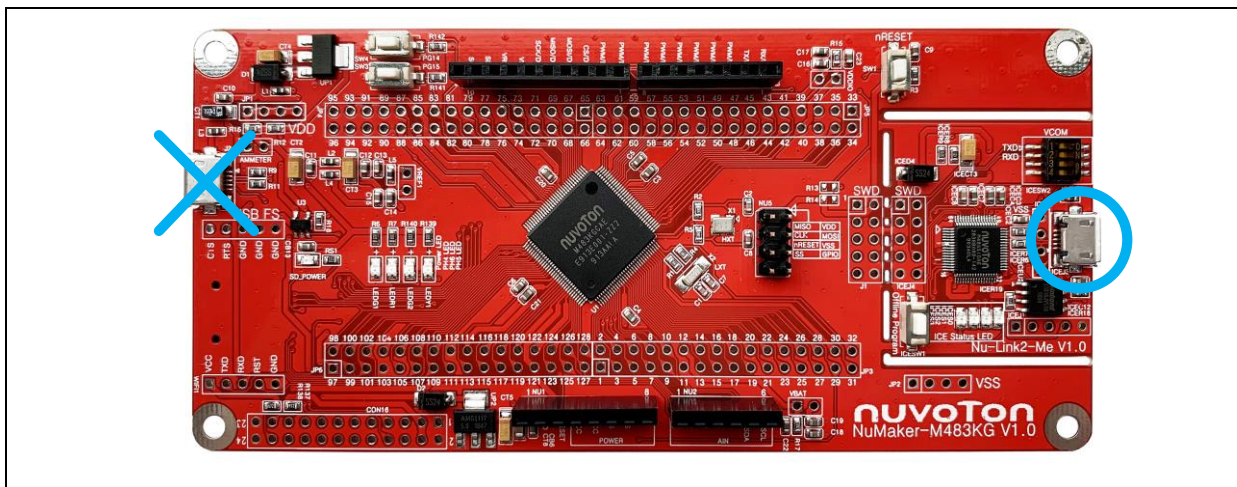


Figure 3-4 ICE USB Connector

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

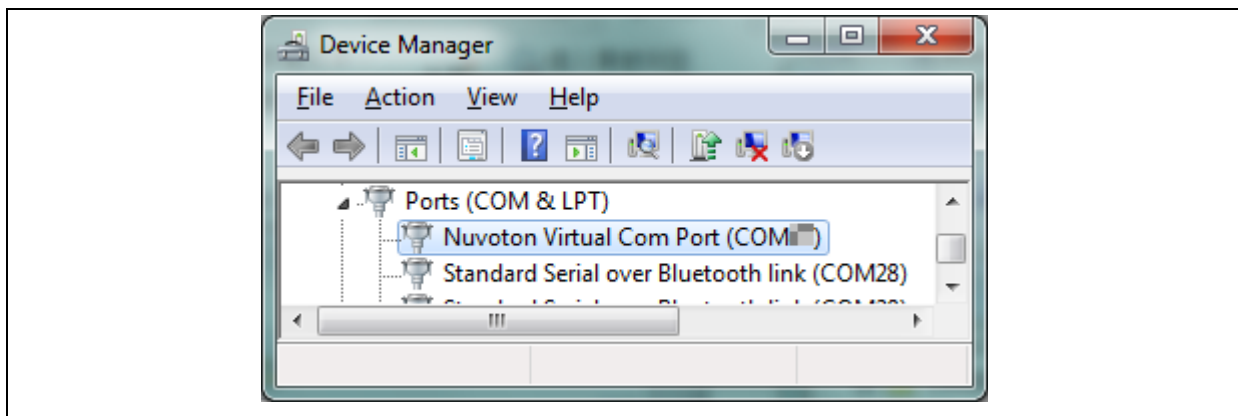


Figure 3-5 Device Manger

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.

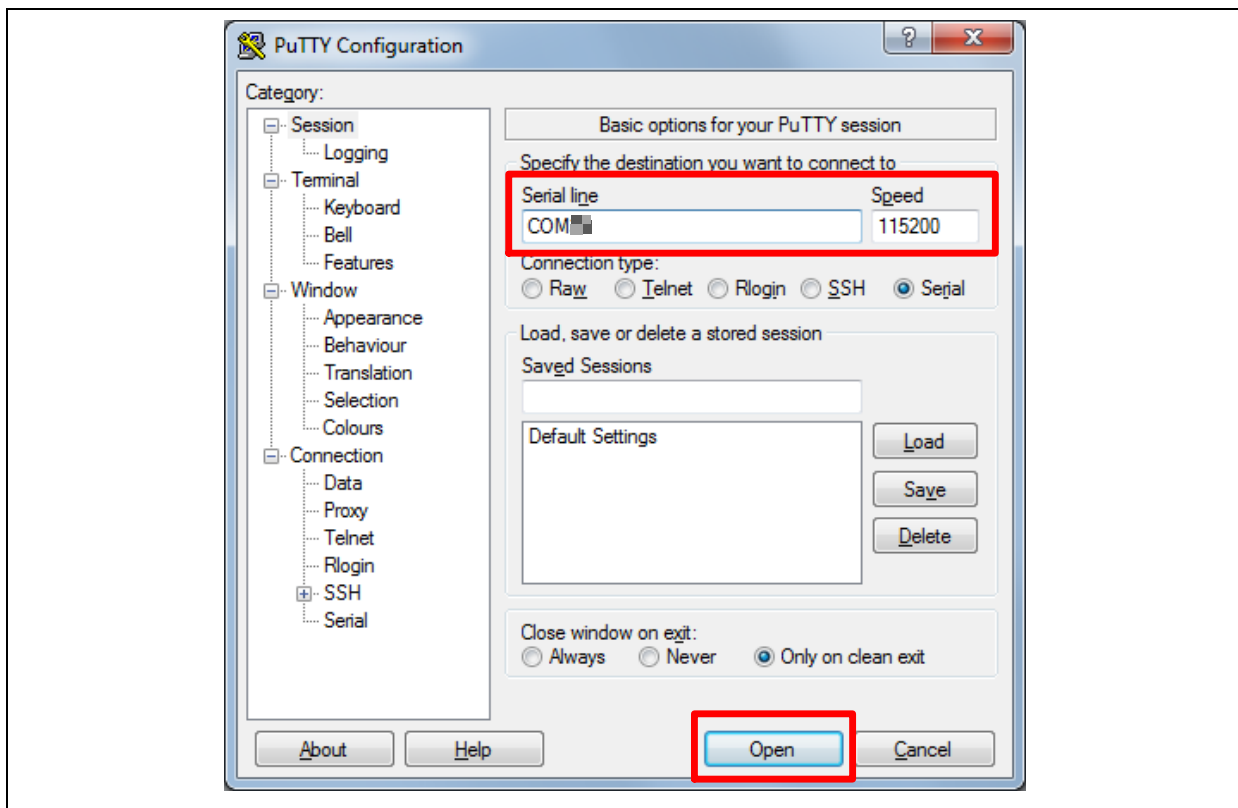


Figure 3-6 PuTTY Session Setting

### 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.

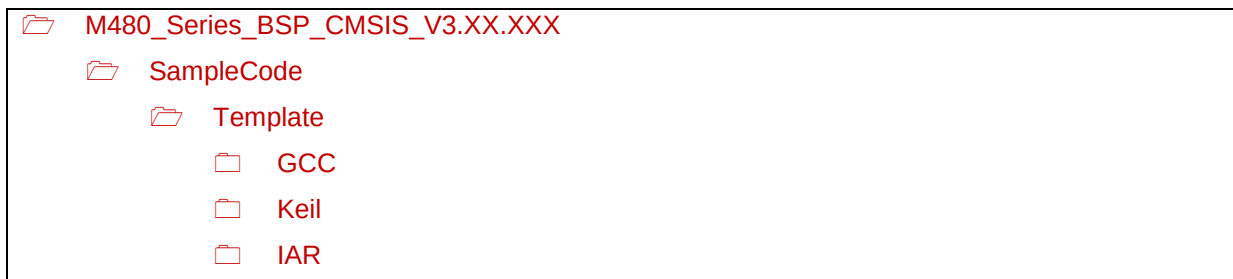


Figure 3-7 Template Project Folder Path

### 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 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 Figure 3-8 warning message jumps out, please migrate to version 5 formats as shown in Figure 3-9. The “.uvproj” filename extension will change to “.uvprojx”.

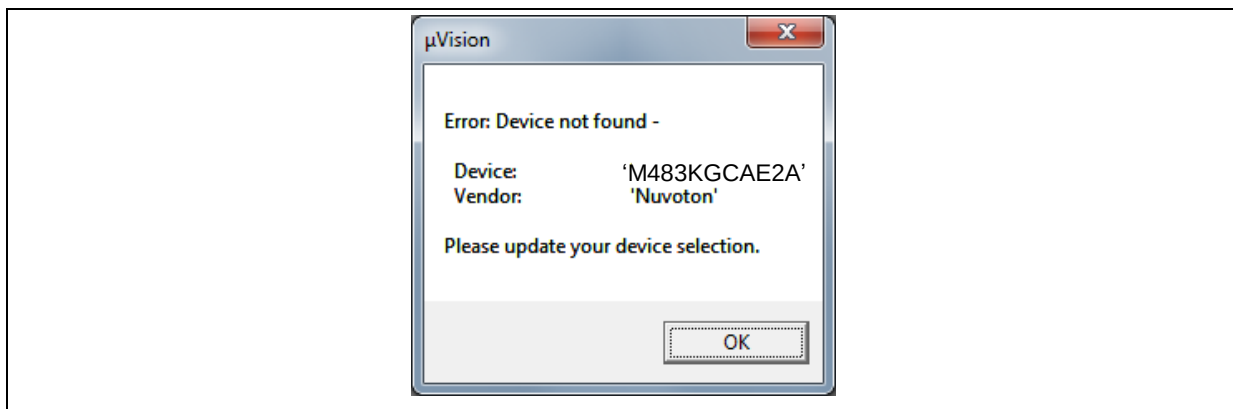


Figure 3-8 Warning Message of “Device not found”



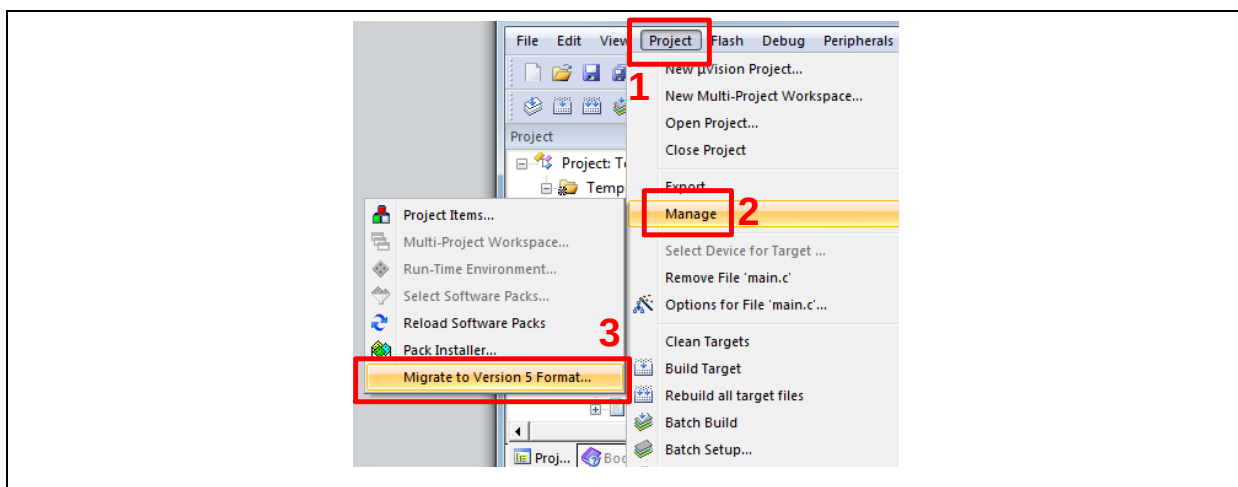


Figure 3-9 Project File Migrate to Version 5 Format

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.

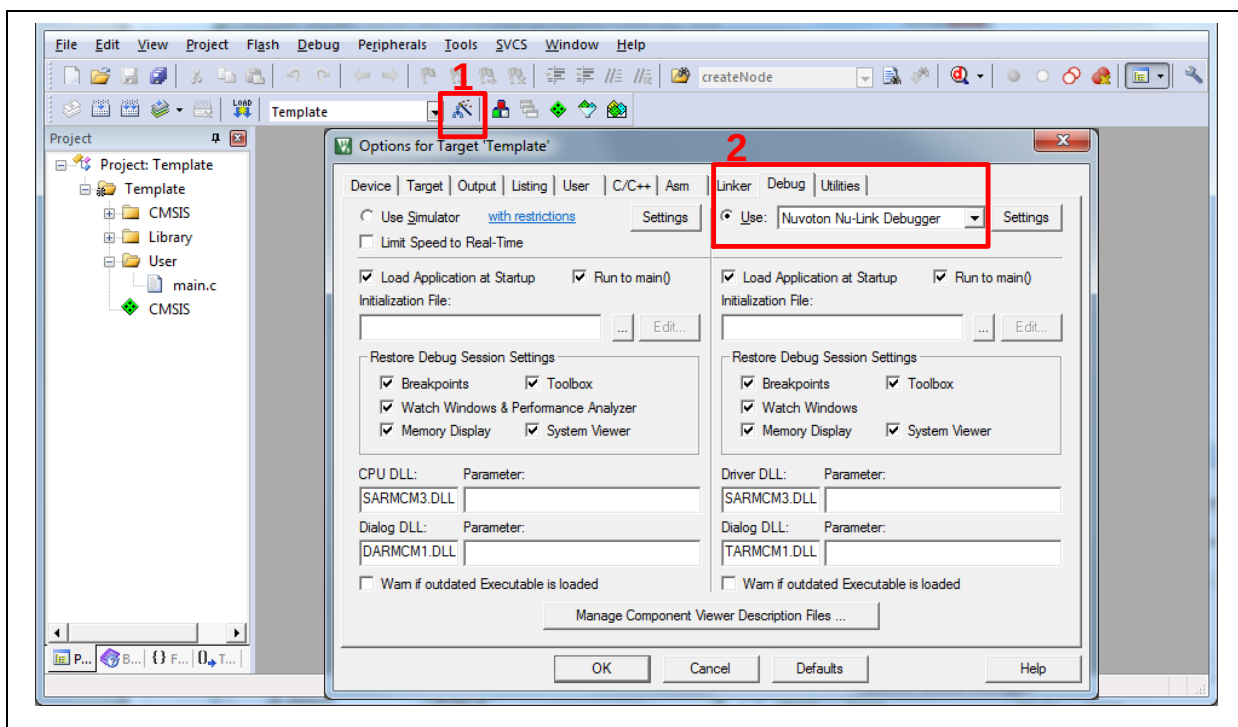


Figure 3-10 Debugger Setting in Options Window

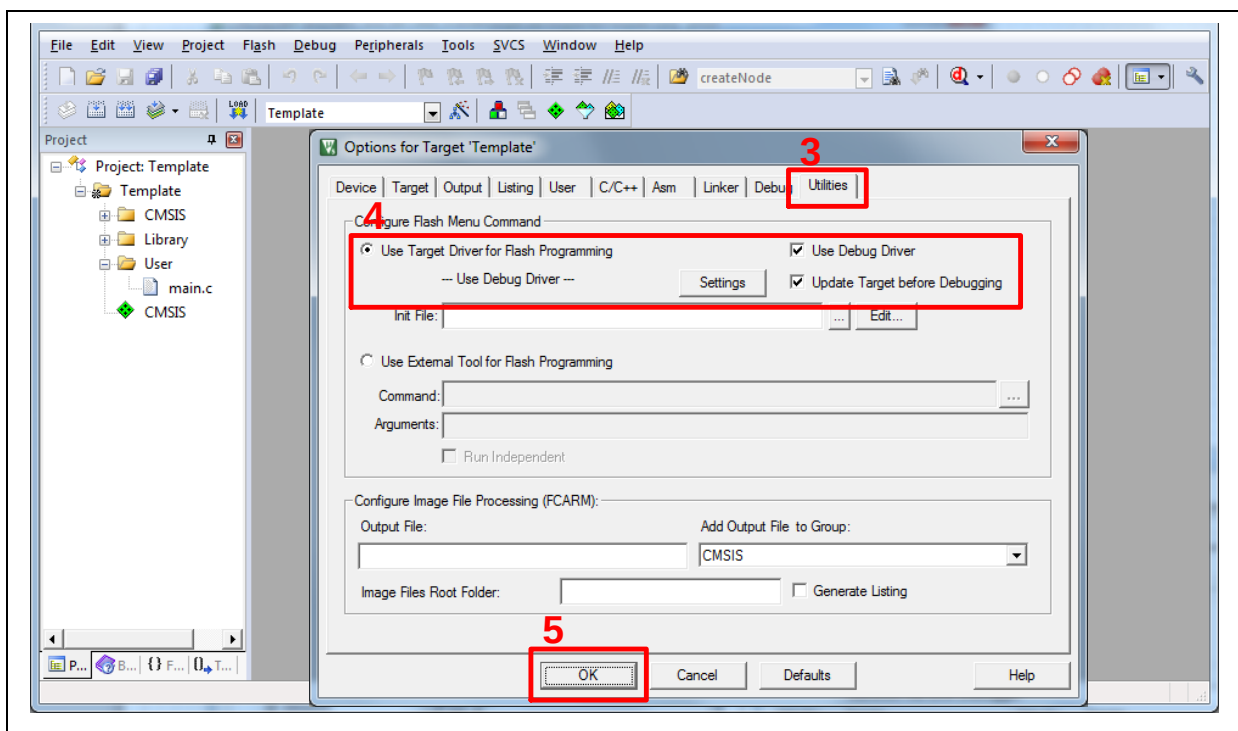


Figure 3-11 Programming Setting in Options Window

3. Rebuild all target files. After successfully compile the project, download code to the flash memory. Click "Start/Stop Debug Section" button can enter debug mode.

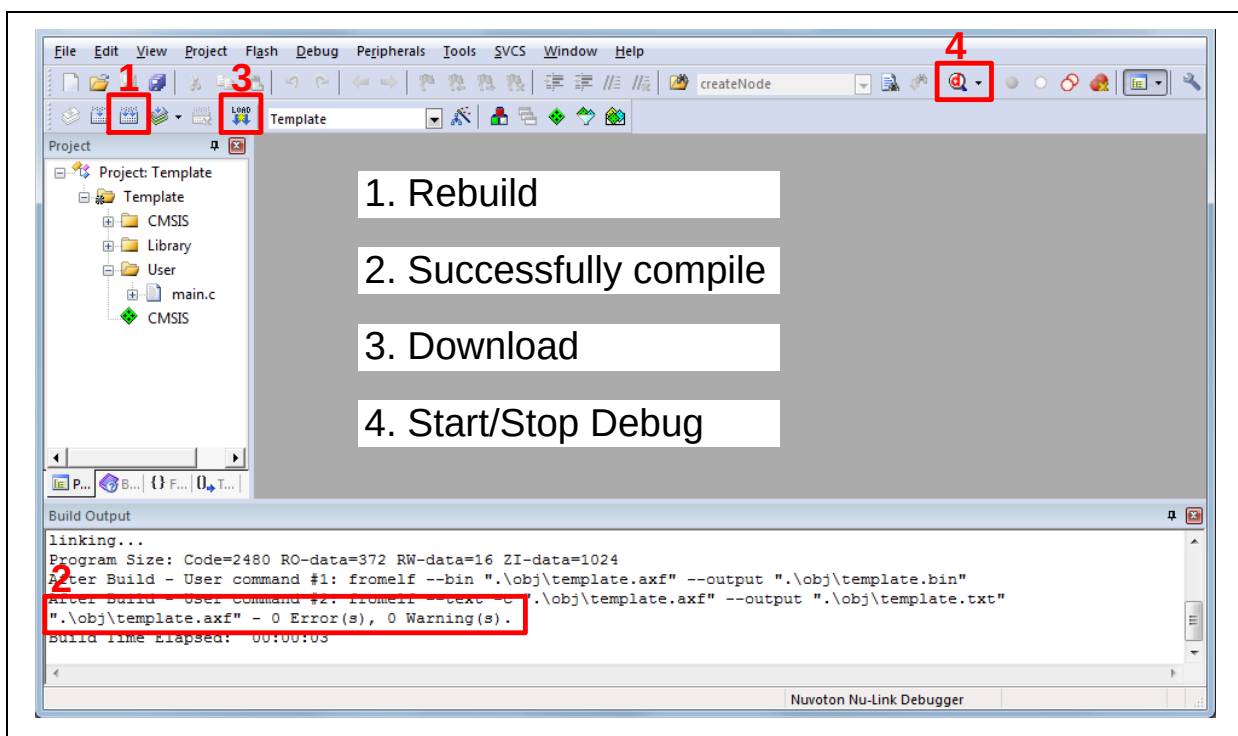


Figure 3-12 Compile and Download the Project

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.

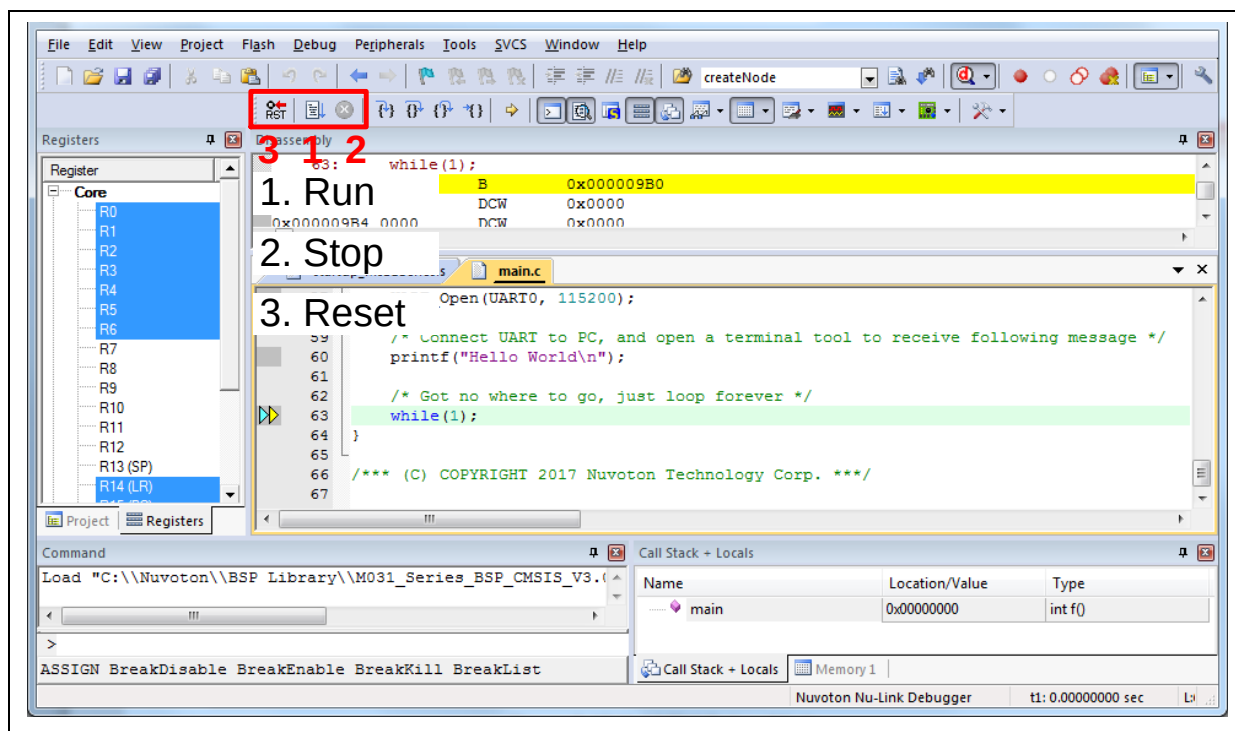


Figure 3-13 Keil MDK Debug Mode

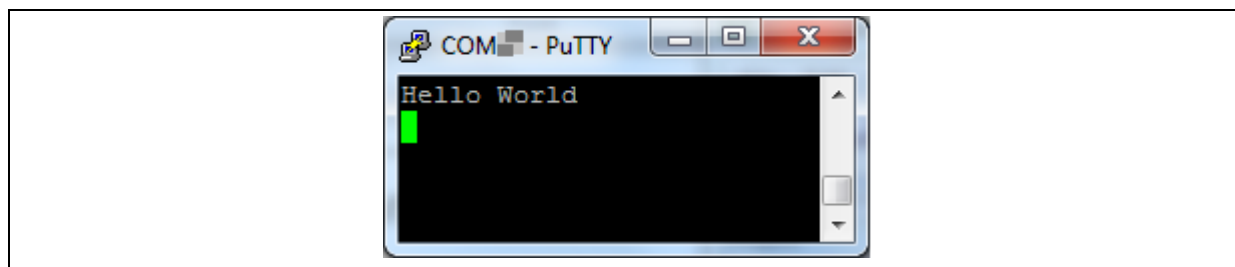


Figure 3-14 Debug Message on Serial Port Terminal Windows

### 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.

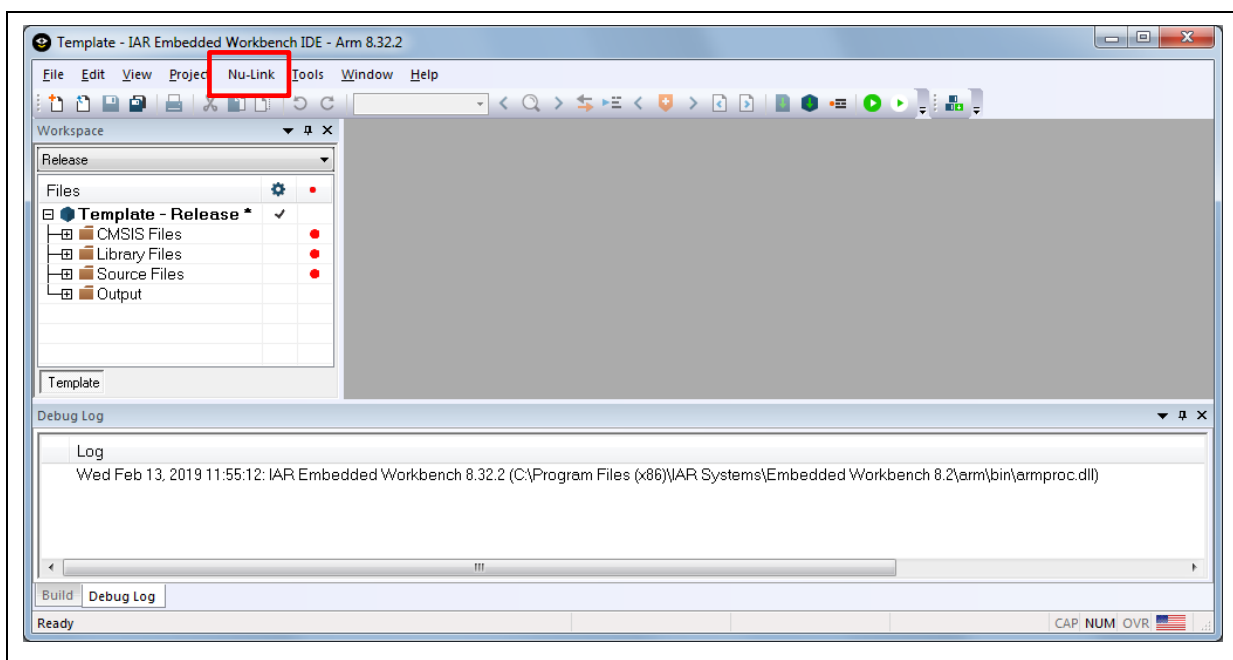


Figure 3-15 IAR EWARM Window

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

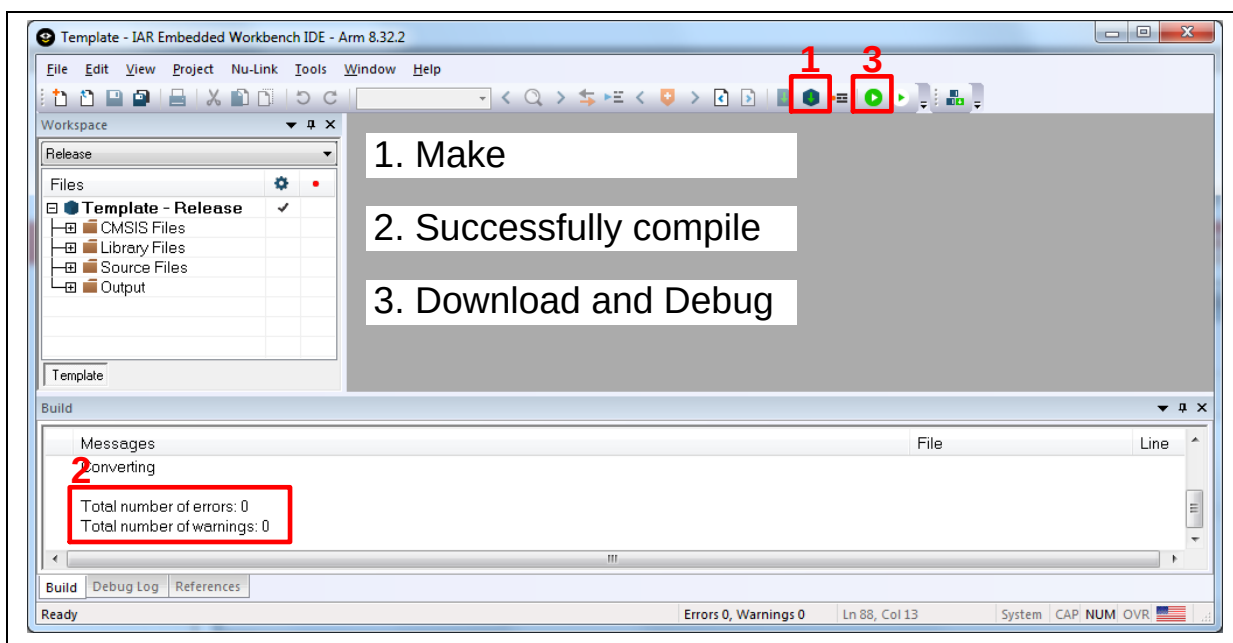


Figure 3-16 Compile and Download the Project

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.

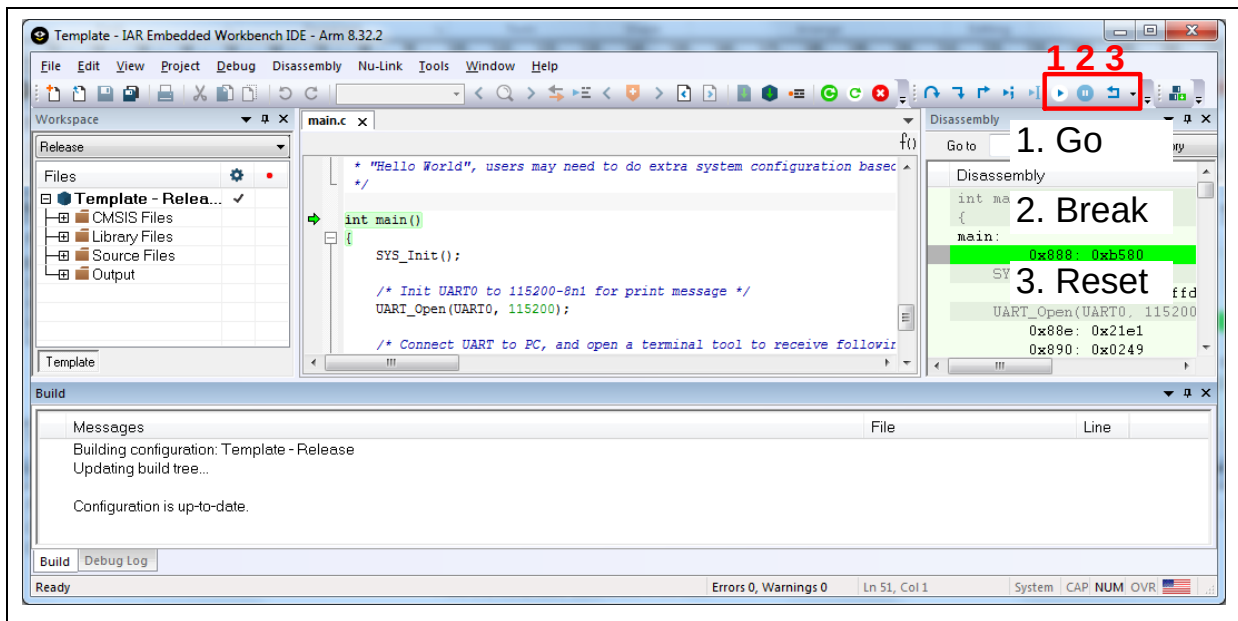


Figure 3-17 IAR EWARM Debug Mode

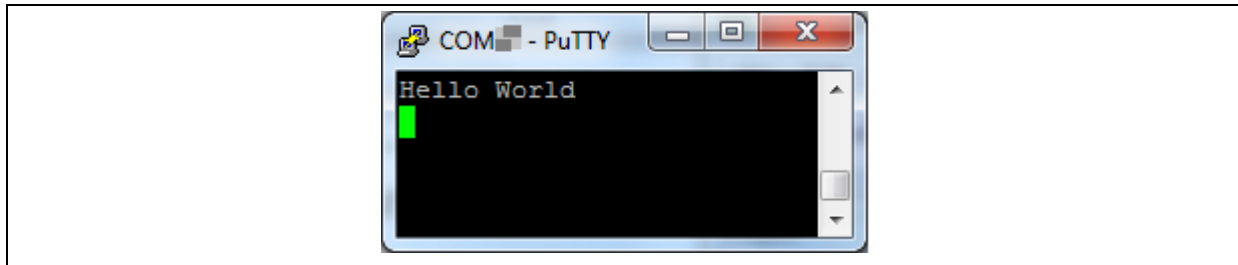


Figure 3-18 Debug Message on Serial Port Terminal Windows

### 3.6.3 NuEclipse

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



## 4.2 M483 platform

Figure 4-2 shows the M483 platform circuit.

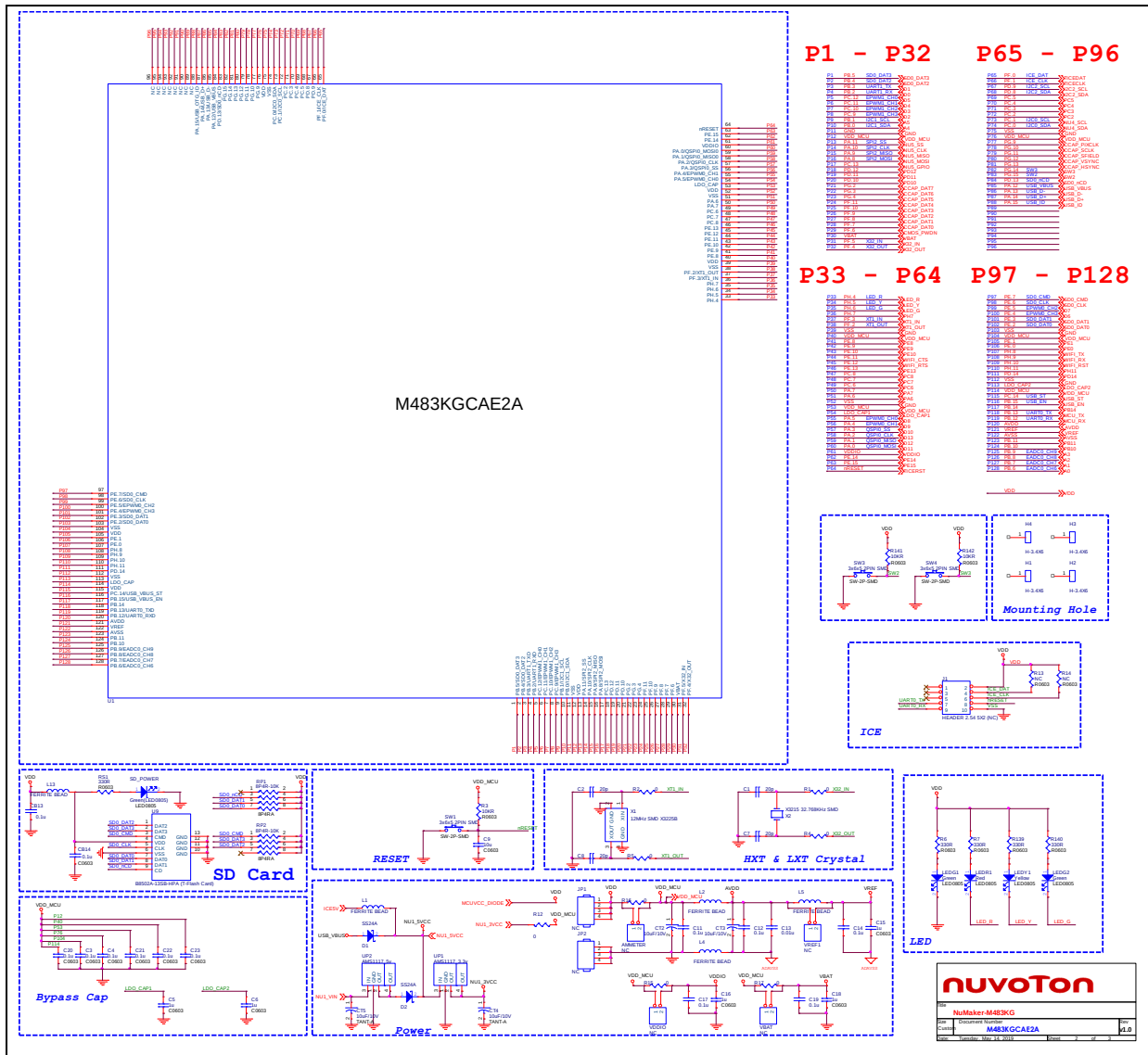


Figure 4-2 M483 platform Circuit



### 4.3 Extension Connector

Figure 4-3 shows extension connectors of NuMaker-M483KG.

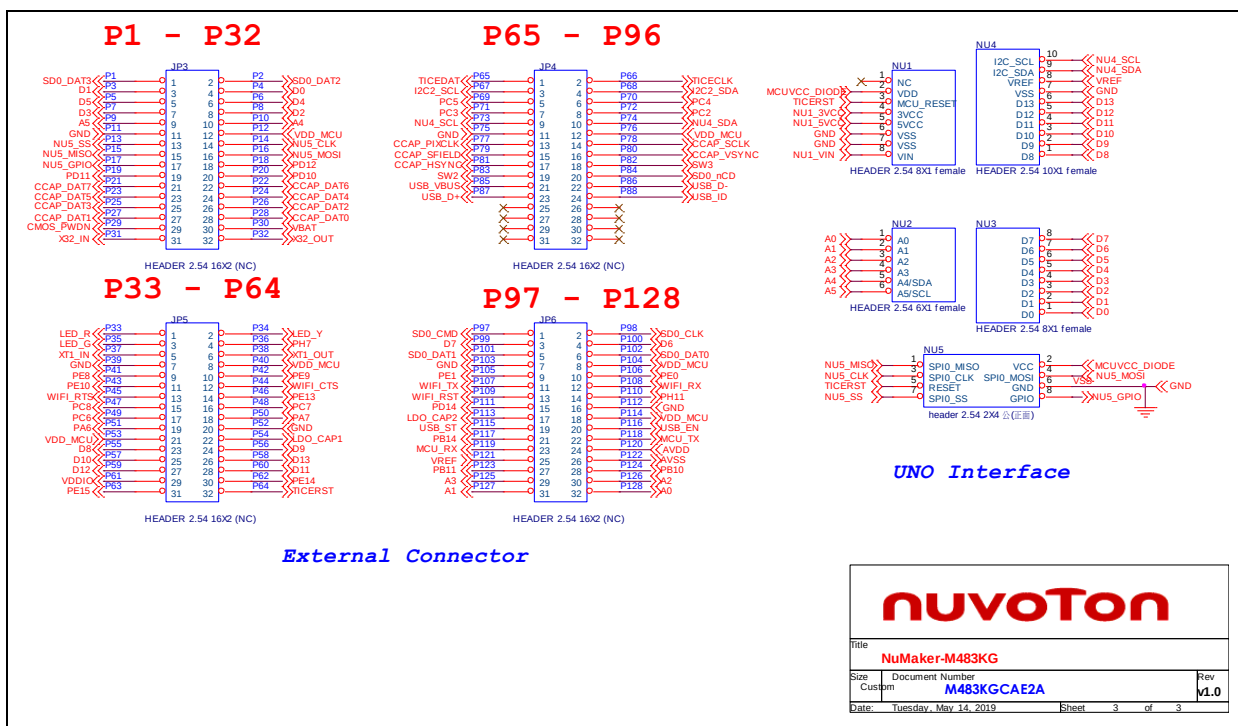


Figure 4-3 Extension Connectors Circuit

#### 4.4 Advance Connector

Figure 4-3 shows advance connectors of NuMaker-M483KG.

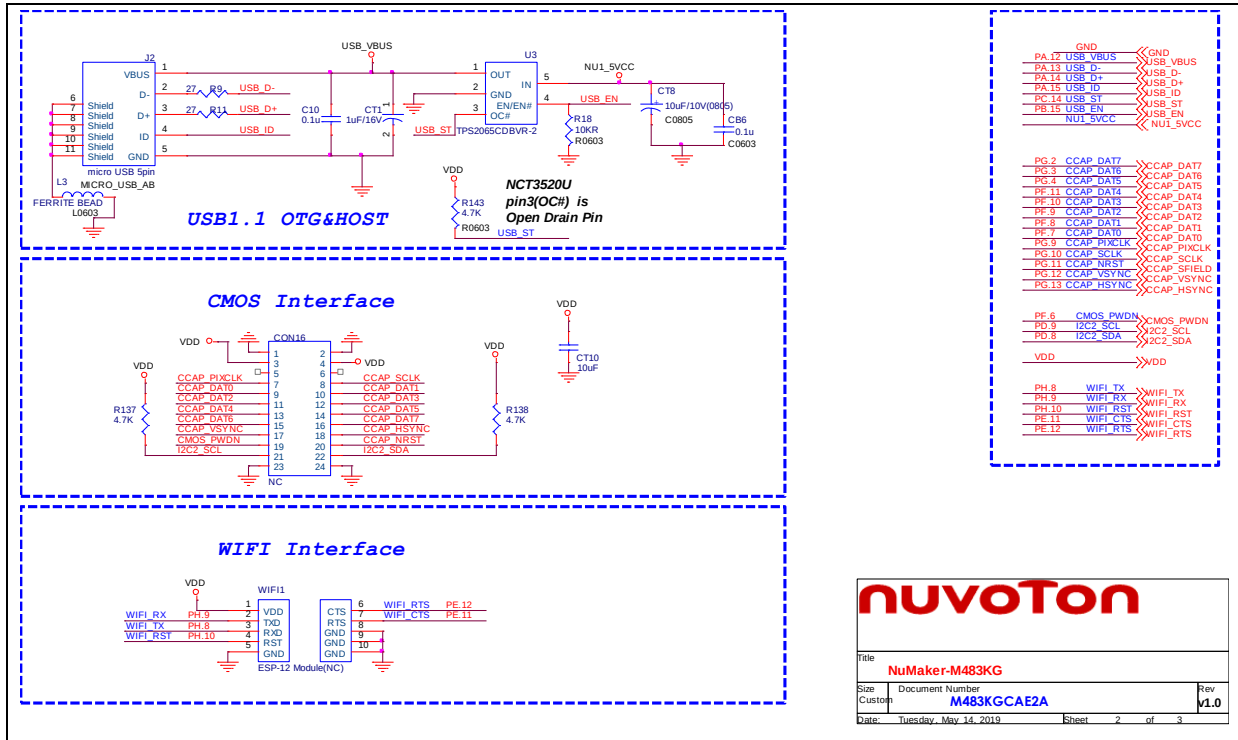


Figure 4-4 Advance Connectors Circuit

## 5 REVISION HISTORY

| Date       | Revision | Description          |
|------------|----------|----------------------|
| 2019.05.10 | 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.

---

*Please note that all data and specifications are subject to change without notice.  
All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.*

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Nuvoton:](#)

[NK-M483KG](#)