**NuMicro® Family**

**Arm® Cortex®-M0-based Microcontroller**

**NuMaker-NUC1311L**

**User Manual**

***Evaluation Board for NuMicro® NUC1311 Series***

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# Overview

The NuMaker-NUC1311L is an evaluation board for NuMicro NUC1311LC and NUC1311LD microcontrollers. The NuMaker-NUC1311L consists of two parts: an NUC1311 target board and an on-board Nu-Link2-Me debugger and programmer. The NuMaker-NUC1311L is designed for project evaluation, prototype development and validation with power consumption monitoring function.

The NUC1311 target board is based on NuMicroNUC1311LD2AE. For the development flexibility, the NUC1311 target board provides the extension connectors, the Arduino UNO compatible headers and the capability of adopting multiple power supplies. Furthermore, the Nuvoton-designed ammeter connector can measure the power consumption instantly, which is essential for the prototype evaluation.

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

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Figure 1‑1 NuMaker-NUC1311L Evaluation Board

# Features

* NuMicro NUC1311LD2AE used as main microcontroller with function compatible with:
  + - * NUC1311LC2AE
      * NUC1311LD2AE
* NUC1311LD2AE full pins extension connectors
* Arduino UNO compatible extension connectors
* Ammeter connector for measuring the microcontroller’s power consumption
* Flexible board power supply:
  + - * External VDD power connector
      * Arduino UNO compatible extension connector Vin
      * USB FS connector on NUC1311 target board
      * ICE USB connector on Nu-Link2-Me
* On-board Nu-Link2-Me debugger and programmer:
  + - * Debug through SWD interface
      * Online/offline programming
      * Virtual COM port function

# Hardware Configuration

## Front View

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Figure 3‑1 Front View of NuMaker-NUC1311L

Figure 3‑1 shows the main components and connectors from the front side of NuMaker-NUC1311L. The following lists components and connectors from the front view:

* Target chip:NUC1311LD2AE (U1)
* USB PWR Connector (J2)
* Arduino UNO Compatible Extension Connectors (NU1, NU2, NU3, NU4)
* NUC1311 Extension Connectors (JP3, JP4, JP5 and JP6)
* External VDD Power Connector (JP1)
* External VSS Power Connector (JP2)
* External VREF Connector (VREF1)
* VDD Switch (SW2)
* Ammeter Connector (AMMETER)
* Reset Button (SW1)
* Power LED and PB12 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)

## Rear View

Figure 3‑2 shows the main components and connectors from the rear side of NuMaker-NUC1311L.

The following lists components and connectors from the rear view:

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

|  |
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|  |

Figure 3‑2 Rear View of NuMaker-NUC1311L

## Extension Connectors

Table 3‑1 presents the extension connectors.

|  |  |
| --- | --- |
| **Connector** | **Description** |
| JP3, JP4, JP5 and JP6 | Full pins extension connectors on the NuMaker-NUC1311L. |
| NU1, NU2, NU3 and NU4 | Arduino UNO compatible pins on the NuMaker- NUC1311L. |

Table 3‑1 Extension Connectors

### Pin Assignment for Extension Connectors

The NuMaker-NUC1311L provides the NUC1311LD2AE onboard and extension connectors (JP3, JP4, JP5 and JP6). Figure 3‑3 shows the NUC1311LD2AE extension connectors.

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Figure 3‑3 NUC1311LD2AE Extension Connectors

| **Header** | | **NUC1311LD2AE** | |
| --- | --- | --- | --- |
| **Pin No.** | **Function** |
| **JP3** | JP3.1 | 1 | PB.12 / CLKO |
| JP3.2 | 2 | PF.5 / I2C0\_SCL / PWM1\_CH5 |
| JP3.3 | 3 | PF.4 / I2C0\_SDA / PWM1\_CH4 |
| JP3.4 | 4 | PA.11 / PWM1\_CH3 |
| JP3.5 | 5 | PA.10 / PWM1\_CH2 |
| JP3.6 | 6 | PA.9 / I2C0\_SCL / UART1\_nCTS |
| JP3.7 | 7 | PA.8 / I2C0\_SDA / UART1\_nRTS |
| JP3.8 | 8 | PB.4 / UART1\_RXD |
| JP3.9 | 9 | PB.5 / UART1\_TXD |
| JP3.10 | 10 | LDO\_CAP |
| JP3.11 | 11 | VDD |
| JP3.12 | 12 | VSS |
| **JP5** | JP5.1 | 13 | PB.0 / UART0\_RXD |
| JP5.2 | 14 | PB.1 / UART0\_TXD |
| JP5.3 | 15 | PB.2 / UART0\_nRTS / TM2\_EXT / TM2 / PWM1\_BRAKE1 |
| JP5.4 | 16 | PB.3 / UART0\_nCTS / TM3\_EXT / TM3 / PWM1\_BRAKE0 |
| JP5.5 | 17 | PD.6 / CAN0\_RXD |
| JP5.6 | 18 | PD.7 / CAN0\_TXD |
| JP5.7 | 19 | PD.14 / UART2\_RXD |
| JP5.8 | 20 | PD.15 / UART2\_TXD |
| JP5.9 | 21 | PC.3 / SPI0\_MOSI0 |
| JP5.10 | 22 | PC.2 / SPI0\_MISO0 |
| JP5.11 | 23 | PC.1 / SPI0\_CLK |
| JP5.12 | 24 | PC.0 / SPI0\_SS0 |
| **JP4** | JP4.1 | 25 | PA.15 / PWM0\_CH3 |
| JP4.2 | 26 | PA.14 / PWM0\_CH2 |
| JP4.3 | 27 | PA.13 / PWM0\_CH1 |
| JP4.4 | 28 | PA.12 / PWM0\_CH0 |
| JP4.5 | 29 | PF.7 / ICE\_DAT |
| JP4.6 | 30 | PF.6 / ICE\_CLK |
| JP4.7 | 31 | AVSS |
| JP4.8 | 32 | PA.0 / ADC\_CH0 / PWM0\_CH4 |
| JP4.9 | 33 | PA.1 / ADC\_CH1 / PWM0\_CH5 |
| JP4.10 | 34 | PA.2 / ADC\_CH2 / PWM1\_CH0 / UART3\_TXD |
| JP4.11 | 35 | PA.3 / ADC\_CH3 / PWM1\_CH1 / UART3\_RXD |
| JP4.12 | 36 | PA.4 / ADC\_CH4 |
| **JP6** | JP6.1 | 37 | PA.5 / ADC\_CH5 / UART3\_RXD |
| JP6.2 | 38 | PA.6 / ADC\_CH6 / UART3\_TXD |
| JP6.3 | 39 | PA.7 / ADC\_CH7 / VREF |
| JP6.4 | 40 | AVDD |
| JP6.5 | 41 | PC.7 / I2C0\_SCL / PWM0\_BRAKE1 |
| JP6.6 | 42 | PC.6 / I2C0\_SDA / PWM0\_BRAKE0 |
| JP6.7 | 43 | PB.15 / INT1 / TM0\_EXT / TM0 |
| JP6.8 | 44 | PF.0 / XT1\_OUT |
| JP6.9 | 45 | PF.1 / XT1\_IN |
| JP6.10 | 46 | nRESET |
| JP6.11 | 47 | PF.8 / CLKO |
| JP6.12 | 48 | PB.8 / STADC / TM0 / CLKO |

Table 3‑2 NUC1311LD2AE Full-pin Extension Connectors and GPIO Function List

### 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-NUC1311L** | | **Header** | | **NuMaker-NUC1311L** | |
| **Compatible to Arduino UNO** | **GPIO Pin of NUC1311LD2AE** | **Compatible to Arduino UNO** | **GPIO Pin of NUC1311LD2AE** |
| **NU3** | NU3.1 | RX | PB.4 | **NU2** | NU2.6 | SCL | PA.9 |
| NU3.2 | TX | PB.5 | NU2.5 | SDA | PA.8 |
| NU3.3 | D2 | PA.12 | NU2.4 | A3 | PA.3 |
| NU3.4 | D3 | PA.13 | NU2.3 | A2 | PA.2 |
| NU3.5 | D4 | PA.14 | NU2.2 | A1 | PA.1 |
| NU3.6 | D5 | PA.15 | NU2.1 | A0 | PA.0 |
| NU3.7 | D6 | PA.10 | **NU1** | NU1.8 | VIN | - |
| NU3.8 | D7 | PA.11 | NU1.7 | VSS |
| **NU4** | NU4.1 | D8 | PF.4 | NU1.6 | VSS |
| NU4.2 | D9 | PF.5 | NU1.5 | 5V |
| NU4.3 | SS | PC.0 | NU1.4 | 3V |
| NU4.4 | MOSI | PC.3 | NU1.3 | RST | nRESET |
| NU4.5 | MISO | PC.2 | NU1.2 | VDD | VDD |
| NU4.6 | SCK | PC.1 | NU1.1 | NC | - |
| NU4.7 | VSS | VSS |  | | | |
| NU4.8 | VREF | VREF |
| NU4.9 | SDA | PA.8 |
| NU4.10 | SCL | PA.9 |

Table 3‑3 Arduino UNO Extension Connectors and NUC1311LD2AE Mapping GPIO List

## Power Supply Configuration

The NuMaker-NUC1311L is able to adopt multiple power supplies. External power sources include NU1 Vin (7 V to 12 V), VDD (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-NUC1311L.

### VIN Power Source

Table 3‑4 presents the Vin power source.

|  |  |  |
| --- | --- | --- |
| **Connector** | **Net Name in Schematic** | **Description** |
| NU1 pin8 | NU1\_VIN | Board external power source, with voltage range from 7 V to 12 V. The voltage regulator UP2 converts the NU1 pin8 input voltage to 5 V and supplies it to NU1\_5VCC. |

Table 3‑4 Vin Power Source

### 5 V Power Sources

Table 3‑5 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 NUC1311 target board and Nu-Link2-Me. |
| J2 | USB\_VBUS | USB connector on NuMaker-NUC1311L supplies 5 V power from PC to NUC1311 target board 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.  **Note:** NUC1311 operating voltage range is from 1.8 V to 3.6 V. Do not switch SW2.1 (NU1 5VCC) to ON. |

Table 3‑5 5 V Power Sources

### 3.3 V Power Sources

Table 3‑6 presents the 3.3 V power sources.

|  |  |  |
| --- | --- | --- |
| **Voltage Regulator** | **5 V Source** | **Description** |
| ICEUP1 | USB\_HS\_VBUS | ICEUP1 converts USB\_HS\_VBUS to 3.3 V and supplies 3.3 V to NUC1311 target board or ICE chip. |
| UP1 | USB\_VBUS | UP1 converts USB\_VBUS to 3.3 V and supplies 3.3 V to NUC1311 target board.  **Note:** SW2.2 (NU1 3VCC) should be switched to ON. |
| UP1 | NU1\_5VCC | UP1 converts NU1\_5VCC to 3.3 V and supplies 3.3 V to NUC1311 target board.  **Note:** SW2.2 (NU1 3VCC) should be switched to ON. |

Table 3‑6 3.3 V Power Sources

### 1.8 V Power Sources

Table 3‑7 presents the 1.8 V power source.

|  |  |  |
| --- | --- | --- |
| **Voltage Regular** | **5V Source** | **Description** |
| ICEUP2 | USB\_HS\_VBUS | ICEUP2 converts USB\_HS\_VBUS to 1.8 V and supplies 1.8 V to NUC1311 target board or ICE chip. |

Table 3‑7 1.8 V Power Sources

### Power Connectors

Table 3‑8 presents the power connectors.

|  |  |
| --- | --- |
| **Connector** | **Description** |
| JP1 | VDD connector on the NuMaker-NUC1311L.  **Note:** NUC1311 operating voltage range is from 1.8 V to 3.6 V. |
| JP2 | VSS connector on the NuMaker-NUC1311L. |

Table 3‑8 Power Connectors

### USB Connectors

Table 3‑9 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-NUC1311L for power supply. |

Table 3‑9 USB Connectors

### Power Switches

Table 3‑10 presents the power switches.

|  |  |
| --- | --- |
| **Switch** | **Description** |
| ICEJPR1 | Configures the target chip operating voltage at 1.8 V / 3.3 V / 5 V.  **Note:** NUC1311 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. |
| SW2 | Configures the target chip operating voltage at 3.3 V / 5 V.  **Note:** NUC1311 operating voltage range is from 1.8 V to 3.6 V. Do not switch SW2.1 (NU1 5VCC) to ON. |

Table 3‑10 Power Switches

### Power Supply Models

#### 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:

Solder the resistor on ICEJPR1 (MCUVCC) depending on the target chip operating voltage.

Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.

Switch the SW2 to OFF.

Connect the external power supply to ICEJ3.

Table 3‑11 presents all power models when supplying external power through Nu-Link2-Me. The Nu-Link2-Me external power sources are highlighted in yellow.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Target Chip Voltage** | **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 3‑11 Supply External Power through Nu-Link2-Me

#### External Power Supply through NUC1311 Target Board to Target Chip

The external power supply sources on NUC1311 target board are shown in Figure 3‑6.

|  |
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|  |

Figure 3‑6 External Power Supply Sources on NUC1311 Target Board

* + - * 1. To use Vin or J2 as external power supply source, please follow the steps below:

Switch the SW2 depending on the target chip operating voltage.

Remove the resistor on ICEJPR1 (MCUVCC).

Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.

Connect the external power supply to Vin or J2.

* + - * 1. To use JP1 as external power supply source, please follow the steps below:

Switch the SW2 to OFF.

Remove the resistor on ICEJPR1 (MCUVCC).

Solder the resistor on ICEJPR2 (ICEVCC) depending on the ICE chip operating voltage.

Connect ICEJ3 to PC.

Connect the external power supply to JP1.

* + - * 1. To use Vin or J2 as external power supply source with Nu-Link2-Me detached from NuMaker-NUC1311L, please follow the steps below:

Switch the SW2 depending on the target chip operating voltage.

Detach the Nu-Link2-Me from NuMaker-NUC1311L.

Connect the external power supply to Vin or J2.

* + - * 1. To use JP1 as external power supply source with Nu-Link2-Me detached from NuMaker-NUC1311L, please follow the steps below:

Switch the SW2 to OFF.

Detach the Nu-Link2-Me from NuMaker-NUC1311L.

Connect the external power supply to JP1.

|  |
| --- |
|  |

Figure 3‑7 Detach the Nu-Link2-Me from NuMaker-NUC1311L

Table 3‑12 presents all power models when supplies external power through NUC1311 target board. The NUC1311 target board external power sources are highlighted in yellow.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | **Target Chip Voltage** | **Vin [1]** | **J2[1]** | **ICEJ3** | **SW2 Selection** | **JP1[2]** | **ICEJPR1 (MCUVCC) Selection [3]** | **ICEJPR2 (ICEVCC) Selection [4]** | **ICE Chip Voltage [5]** |
| 4 | 3.3 V | 7 V ~ 12 V Input | - | - | NU1 3VCC | 3.3 V output | Remove resistor | 3.3 V | 3.3 V |
| 5 | 3.3 V | - | Connect to PC | - | NU1 3VCC | 3.3 V output | Remove resistor | 3.3 V | 3.3 V |
| 6 | 5 V | 7 V ~ 12 V Input | - | - | NU1 5VCC | 5 V output | Remove resistor | 3.3 V | 3.3 V |
| 7 | 5 V | - | Connect to PC | - | NU1 5VCC | 5 V output | Remove resistor | 3.3 V | 3.3 V |
| 8 | 1.8 V ~ 3.6 V | - | - | Connect to PC | OFF | DC Input 1.8 V ~ 3.6 V | Remove resistor | 1.8 V / 3.3 V | 1.8 V / 3.3 V |
| 9 | 1.8 V ~ 3.6 V | - | - | Nu-Link2-Me removed | OFF | DC Input 1.8 V ~ 3.6 V | - | - | - |
| **Note**:   1. The Vin input voltage will be converted by voltage regulator UP2 to 5 V. Supplying external power to Vin or J2 can provide 5 V to NU1 pin5 (5V) and 3.3 V to NU1 pin4 (3VCC). 2. JP1 external power input only provides voltage to target chip. 3. 0 Ω should be removed from ICEJPR1’s MCUVCC and 1.8 V / 3.3 V / 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 3‑12 Supply External Power for NUC1311 Target Board

## External Reference Voltage Connector

Table 3‑14 presents the external reference voltage connector.

|  |  |
| --- | --- |
| **Connector** | **Description** |
| VREF1 | Connector for user to connect to the external reference voltage pin of the target chip. User needs to remove the L5 ferrite bead. |

Table 3‑13 External Reference Voltage Connector

## Ammeter Connector

Table 3‑14 presents the ammeter connector.

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

Table 3‑14 Ammeter Connector

|  |
| --- |
|  |

Figure 3‑8 Wiring between Ammeter Connector and Ammeter

## Push Buttons

Table 3‑15 presents the push buttons.

|  |  |
| --- | --- |
| **Component** | **Description** |
| ICESW1 | Offline program button to start offline ICP programming the target chip. |
| SW1 | Reset button to reset the target chip. |

Table 3‑15 Push Buttons

## LEDs

Table 3‑16 presents the LEDs.

|  |  |
| --- | --- |
| **Component** | **Description** |
| Power LED | The power LED indicates that the NuMaker-NUC1311 is powered. |
| PB12 LED | The LED is connected to the target chip PB.12. |
| ICES0, ICES1, ICES2 and ICES3 | Nu-Link2-Me status LED. |

Table 3‑16 LEDs

## 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*.

### VCOM Switches

Table 3‑17 presents how to set the VCOM function by ICESW2.

|  |  |  |
| --- | --- | --- |
| **ICESW2** | | |
| **Pin** | **Function** | **Description** |
| 1 | TXD | **On**: Connect target chip PB.1 (UART0\_TXD) to Nu-Link2-Me.  **Off**: Disconnect target chip PB.1 (UART0\_TXD) to Nu-Link2-Me. |
| 2 | RXD | **On**: Connect target chip PB.0 (UART0\_RXD) to Nu-Link2-Me.  **Off**: Disconnect target chip PB.0 (UART0\_RXD) to Nu-Link2-Me. |
| **Note:** Pin 3 and 4 is unused. | | |

Table 3‑17 VCOM Function of Nu-Link2-Me

### Status LEDs

Table 3‑16 presents the status LEDs patterns for different operation on Nu-Link2-Me.

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

Table 3‑18 Operation Status LED Patterns

# Quick Start

## Toolchains Supporting

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

* [KEIL MDK Nuvoton edition M0/M23](http://www2.keil.com/nuvoton/M0-M23)
* IAR [EWARM](https://www.iar.com/iar-embedded-workbench/?architecture=Arm#!)
* [NuEclipse GCC (for Windows)](https://www.nuvoton.com/resource-download.jsp?tp_GUID=SW1120200401182901)
* [NuEclipse GCC (for Linux)](https://www.nuvoton.com/resource-download.jsp?tp_GUID=SW1120200401185819)

## Nuvoton Nu-Link Driver Installation

Download and install the latest Nuvoton Nu-Link Driver.

* Download and install [Nu-Link\_Keil\_Driver](https://www.nuvoton.com/resource-download.jsp?tp_GUID=SW1120200221180521) when using Keil MDK.
* Download and install [Nu-Link\_IAR\_Driver](https://www.nuvoton.com/resource-download.jsp?tp_GUID=SW1120200221180914) when using IAR EWARM.
* Skip this step when using NuEclipse.

Please install the Nu-Link USB Driver as well at the end of the installation. The installation is presented in Figure 4‑1 and Figure 4‑2.

|  |
| --- |
|  |

Figure 4‑1 Nu-Link USB Driver Installation Setup

|  |
| --- |
|  |

Figure 4‑2 Nu-Link USB Driver Installation

## BSP Firmware Download

Download and unzip the [Board Support Package (BSP)](https://www.nuvoton.com/hq/resource-download.jsp?tp_GUID=SW0720180824184314).

## Hardware Setup

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

|  |
| --- |
|  |

Figure 4‑3 Open VCOM Function

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

|  |
| --- |
|  |

Figure 4‑4 ICE USB Connector

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

|  |
| --- |
|  |

Figure 4‑5 Device Manger

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

|  |
| --- |
|  |

Figure 4‑6 PuTTY Session Setting

## Find the Example Project

Use the “Template” project as an example. The project can be found under the BSP folder as shown in Figure 4‑7.

|  |
| --- |
| * NUC1311\_Series\_BSP\_CMSIS\_V3.XX.XXX   + SampleCode     - Template       * GCC       * Keil       * IAR |

Figure 4‑7 Template Project Folder Path

## Execute the Project under Toolchains

Open and execute the project under the toolchain. The section 4.6.1, 4.6.2, and 4.6.3 describe the steps of executing project in Keil MDK, IAR EWARM and NuEclipse, respectively.

### Keil MDK

This section provides steps to beginners on how to run a project by using Keil MDK.

Double-click the “Template.uvproj” to open the project.

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| --- |
|  |

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

**Note:** If Figure 4‑8 warning message jumps out, please migrate to version 5 format as shown in Figure 4‑9. The “.uvproj” filename extension will change to “.uvprojx”.

|  |
| --- |
|  |

Figure 4‑9 Project File Migrate to Version 5 Format

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

|  |
| --- |
|  |

Figure 4‑10 Debugger Setting in Options Window

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

|  |
| --- |
|  |

Figure 4‑11 Programming Setting in Options Window

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

|  |
| --- |
|  |

Figure 4‑12 Compile and Download the Project

Figure 4‑13 shows the debug mode under Keil MDK. Click “**Run**” and the debug message will be printed out as shown in Figure 4‑14. User can debug the project under debug mode by checking source code, assembly language, peripherals’ registers, and setting breakpoint, step run, value monitor, etc.

|  |
| --- |
|  |

Figure 4‑13 Keil MDK Debug Mode

|  |
| --- |
|  |

Figure 4‑14 Debug Message on Serial Port Terminal Windows

### IAR EWARM

This section provides steps to beginners on how to run a project by using IAR EWARM.

Double click the “Template.eww” to open the project.

Make sure the toolbar contains “Nu-Link” item as shown in Figure 4‑15.

**Note:** If the toolbar does not contain “Nu-Link” item, please rework section 4.2.

|  |
| --- |
|  |

Figure 4‑15 IAR EWARM Window

Make a target file as presented in Figure 4‑16. After successfully compiling the project, download code to the Flash memory and enter debug mode.

|  |
| --- |
|  |

Figure 4‑16 Compile and Download the Project

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

|  |
| --- |
|  |

Figure 4‑17 IAR EWARM Debug Mode

|  |
| --- |
|  |

Figure 4‑18 Debug Message on Serial Port Terminal Windows

### 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.

Double-click “NuEclipse.exe" to open the toolchain.

Import the “Template” project by following the steps presented in Figure 4‑19 and Figure 4‑20.

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| --- |
|  |

Figure 4‑19 Import the Project in NuEclipse

|  |
| --- |
|  |

Figure 4‑20 Import Projects Windows

Click the “Template” project and find the project properties as shown in Figure 4‑21. Make sure the settings are the same as settings in Figure 4‑22.

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| --- |
|  |

Figure 4‑21 Open Project Properties Window

|  |
| --- |
|  |

Figure 4‑22 Project Properties Settings

Click the “Template” project and build the project.

|  |
| --- |
|  |

Figure 4‑23 Build Project

After the project is built, click the “Template” project and set the “Debug Configuration” as shown in Figure 4‑24. Follow the settings presented in Figure 4‑25, Figure 4‑26 and Figure 4‑27 to enter debug mode.

|  |
| --- |
|  |

Figure 4‑24 Open Debug Configuration

|  |
| --- |
| **Note 1:** Double-click the “GDB Nuvoton Nu-Link Debugging” to create the sub item.  **Note 2:** After the project is built, the “\*.elf” file will be shown in “C/C++ Application” frame. |

Figure 4‑25 Main Tab Configuration

|  |
| --- |
|  |

Figure 4‑26 Debugger Tab Configuration

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

Figure 4‑27 Startup Tab Configuration

Figure 4‑28 shows the debug mode under NuEclipse. Click “**Resume**” and the debug message will be printed out as shown in Figure 4‑29. User can debug the project under debug mode by checking source code, assembly language, peripherals’ registers, and setting breakpoint, step run, value monitor, etc. For more information about how to use NuEclipse, please refer to the *NuEclipse User Manual*.

|  |
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|  |

Figure 4‑28 NuEclipse Debug Mode

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| --- |
|  |

Figure 4‑29 Debug Message on Serial Port Terminal Windows

# NuMaker-NUC1311L Schematics

## Nu-Link2-Me

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

|  |
| --- |
|  |

Figure 5‑1 Nu-Link2-Me Circuit

## NUC1311 Target Board

Figure 5‑2 shows the NUC1311 target board circuit.

|  |
| --- |
|  |

Figure 5‑2 NUC1311 Target Board Circuit

## Extension Connectors

Figure 5‑3 shows extension connectors of NuMaker-NUC1311L.

|  |
| --- |
|  |

Figure 5‑3 Extension Connectors Circuit

## PCB Placement

Figure 5‑4 and Figure 5‑5 show the front and rear placement of NuMaker-NUC1311L.

|  |
| --- |
|  |

Figure 5‑4 Front Placement

|  |
| --- |
|  |

Figure 5‑5 Rear Placement

# REVISION HISTORY

|  |  |  |
| --- | --- | --- |
| **Date** | **Revision** | **Description** |
| 2021.05.20 | 1.00 | Initial version. |
| 2022.08.12 | 1.01 | Changed the name from NuTiny-SDK-NUC1311L to NuMaker-NUC1311L. |

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