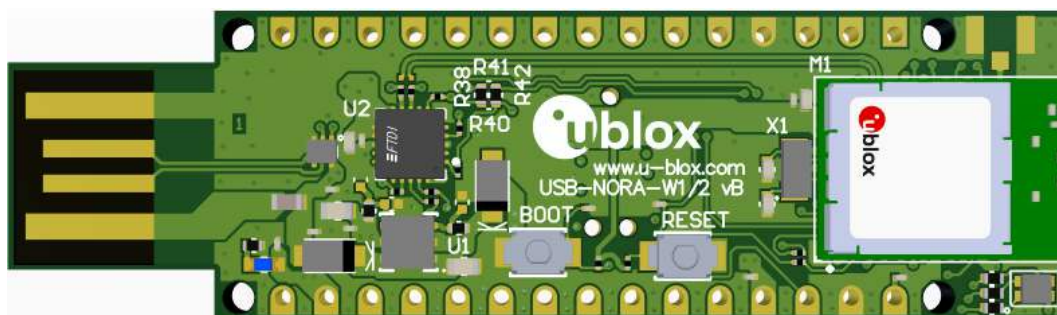


# USB-NORA-W106

## Evaluation kit for NORA-W10 series modules

### User guide



### Abstract

The document describes how to set up USB-NORA-W106 evaluation kits for evaluating NORA-W10 series modules. It provides setup instructions for starting development and describes the hardware functionality of USB-NORA-W106 boards.


# Document information

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In development / Prototype	Objective specification	Target values. Revised and supplementary data will be published later.
Engineering sample	Advance information	Data based on early testing. Revised and supplementary data will be published later.
Initial production	Early production information	Data from product verification. Revised and supplementary data may be published later.
Mass production / End of life	Production information	Document contains the final product specification.

This document applies to the following products:

Product name	Document status
USB-NORA-W106	Early production information

 For information about the hardware, software, and status of the available product types, see the NORA-W10 data sheet [\[1\]](#).

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# 1 Product description

The USB-NORA-W106 evaluation kit provides stand-alone use of the NORA-W10 series module.

The most essential features of NORA-W10 series modules are easily accessed from the evaluation board. A simple USB connection provides power, programming, and COM ports. Two user buttons are available, a RESET and a BOOT, as well as user LEDs.

GPIO signals are available on test points that are compatible with the Arduino Nano® form factor. This allows easy use of existing Arduino shields. The interface allows for measuring current into the module and into the shield.

## 1.1 Key features

- Used for evaluation of NORA-W10 series modules
- COM ports and debug ports over USB option
- Full GPIO of the NORA-W106
- Buttons and LEDs for user interaction
- 32.768 kHz crystal
- USB-A board connector
- Power via USB-A board or test points
- Current measurements via supply points

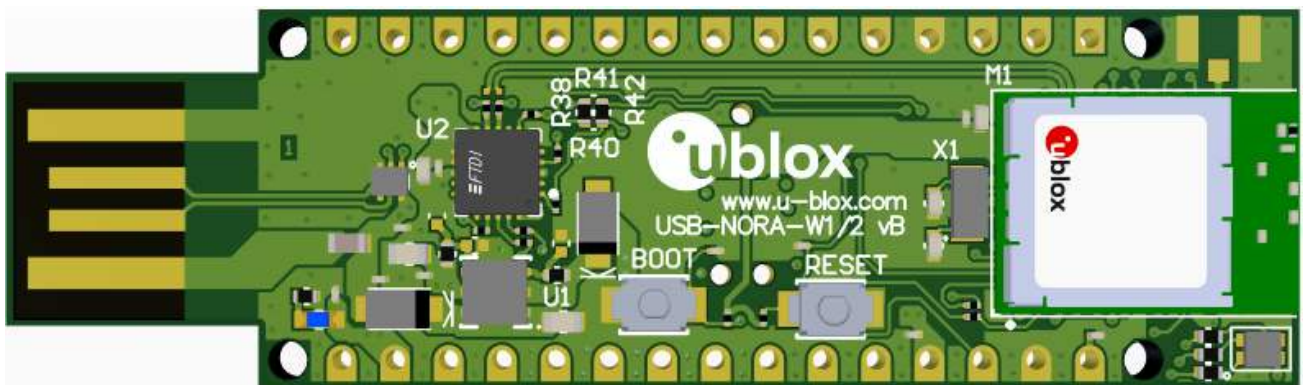


Figure 1: USB-NORA-W106 evaluation board (top view)


## 1.2 Kit includes

USB-NORA-W106 evaluation board with NORA-W106 module equipped with an integrated antenna (no external antenna supplied).

## 2 Setting up the evaluation board

USB-NORA-W106 is delivered without any software (open CPU) and the software must be developed by the user.

Connect external power supply to the USB as described in [Powering the board](#). The green status LED (D1) is lit when the internal USB 3.3 V supply is on.

-  Observe that the inrush current when powering-up the USB can be significantly higher than during normal operation.

The operating system installs the correct COM port drivers automatically. The drivers need to be installed only when you connect the unit to a new computer for the first time. For more information about the COM ports and their configuration, see the FTDI FT231XQ-R Datasheet [\[3\]](#).

Windows OS automatically assigns one COM port to the unit. To view the assigned COM ports on Windows 10:

1. Open the **Control Panel** and click **Hardware and Sound**.
2. Click **Device Manager** in **Devices and Printers**. This opens the Device Manager window where you can view the assigned COM ports.

NORA-W10 open CPU module variants are used for developing custom software based on the Espressif IoT Development Framework (ESP-IDF) that provides a self-sufficient SDK and API for application development. Before compiling custom software, the ESP-IDF must be configured for the NORA-W10 open CPU variant. For information about setting up the ESP-IDF work environment, see the NORA-W10 system integration manual [\[2\]](#).

## 3 Hardware description

Design files for the USB-NORA-W106 PCB are available from your local [u-blox support team](#).

### 3.1 Power

USB-NORA-W106 has two possible power sources:

- USB from the board USB interface
- VIN NANO interface (J5, pin 30) for supplying + 5 V [ 3.6–5.5 V ]

Both power sources are separated using a Schottky diode (D2–D3, MBR120VLSFT3G). This prevents any reverse voltage to other supplies, which means that the different power sources can be connected simultaneously.

- ⚠ Provided the power protection circuits are left intact the USB can safely be connected at the same time as the external power. This makes programming of the module easier.
- ⚠ The USB-A board connector is only capable of handling 5 V input. Do not use 12 V.

#### 3.1.1 Powering the board

When inserted in the USB host, USB-NORA-W106 is powered from a 5 V supply through the **VBUS** pin. The module is otherwise powered through the 3.3 V LDO regulator (U1) when **VIN** is connected to 5 V. The regulator also powers the **+3V3**, **VDD**, and **VDD-IO** power rails. The green LED (D1) is lit when power is applied. See also [LEDs](#).

Resistors R50, R5 and R6 are not fitted in the design implementation shown in [Figure 2](#). Optionally, move resistors R49 to R50 to use an NCP691 regulator instead of the NCP692MN33T2G regulator.

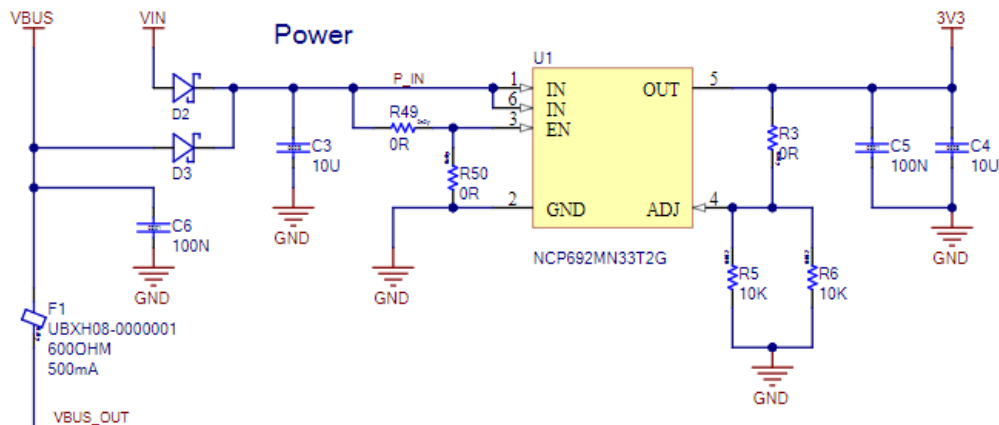


Figure 2: USB schematic - power supply

Figure 3 shows the IOREF separation circuit in the USB schematic. By default, resistors R51 and R52 are not fitted.

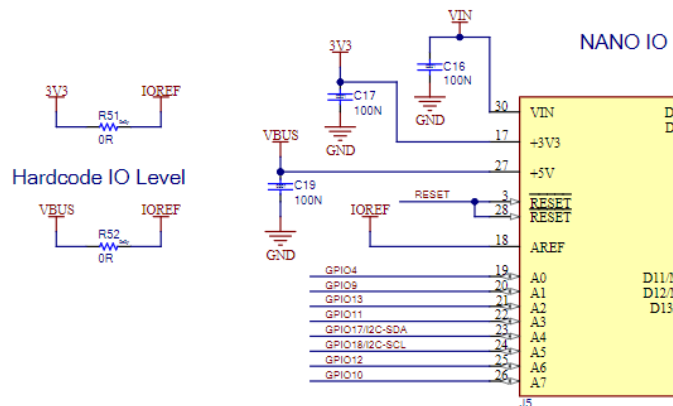


Figure 3: USB schematic - IOREF separation

+3V3 (J5 pin 17) can source max 50 mA to supply external parts.

IOREF (J5 pin 18) is the external supply input to the IO voltage.

## 3.2 COM and debug ports

The default configuration is USB to UART via the FTDI chip (U2). To take advantage of COM and debug ports over USB, resistors R12 and R14 must be moved to R10 and R17 positions respectively. See Figure 4.

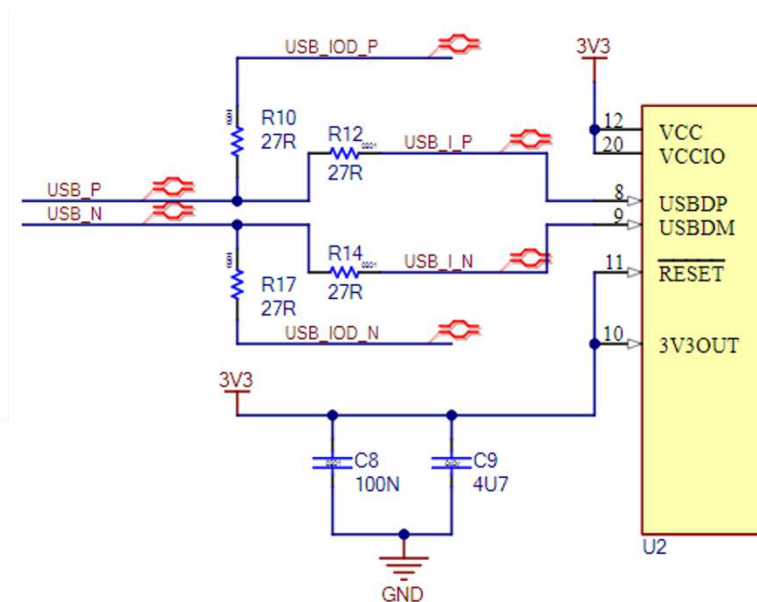


Figure 4: USB configuration options

### 3.3 Reset

USB-NORA-W106 provides a hardware reset to the NORA-W106 module. The Reset button (SW1) is connected to the module **RESETn** signal.

To enter bootloader mode, hold down the Boot button (SW2) during the USB power on. To enter the programming mode, assert a reset in bootloader mode.

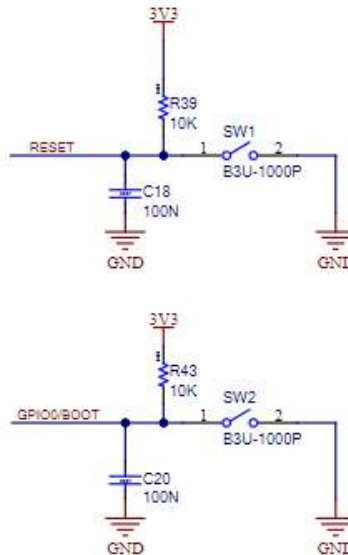


Figure 5: USB schematic - Reset and Boot buttons

Signal name	Description
GPIO0/BOOTn	GPIO0 input to module interface during normal operation. Drive low during power-up to enter bootloader mode on NORA-W106 module.
RESETn	NORA-W106 reset signal.

Table 1: USB reset signals

### 3.4 LEDs

The green power LED (D1) is lit to indicate that the board is powered on.

An RGB LED is provided on the evaluation board. It is powered by **+3V3** and turned on by pulling the associated GPIO low. The purpose with RGB is indicating system status. The RGB LED can be disconnected from the GPIO by removing the associated resistor R2, R4 and R7.

RGB LED	Associated GPIO	Comments
Red (pin1)	GPIO5/ADC1-CH4	Remove R7 to disconnect R-LED
Green (pin2)	GPIO2/ADC-CH1	Remove R4 to disconnect G-LED
Blue (pin3)	GPIO8/ADC1-CH7	Remove R2 to disconnect B-LED

Table 2: RGB LED signals



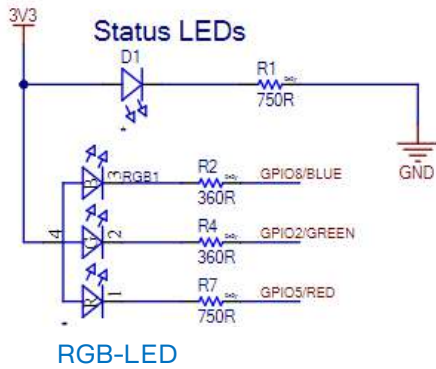


Figure 6 Schematic – RGB and power LED

### 3.5 Serial communication

The evaluation board allows for easy serial communication with the NORA-W106 module and a connected computer. By default, the USB uses a single FTDI interface IC providing one COM port.

The single port is connected to module UART0 through 1kΩ resistors. This allows for simultaneously connecting UART0 signals to Arduino Nano interface, J5. See also [Table 3](#).

NORA-W10 pin name	NORA-W10 function	Resistor/Jumper enable	Interface IC function
G9	GPIO44/UART0-RxD	R8	FTDI-TxD
G8	GPIO43/UART0-TxD	R9	FTDI-RxD
F9	GPIO6/UART0-CTS	R11	FTDI-RTS
F8	GPIO45/UART0-RTS	R13	FTDI-CTS
E9	GPIO7/UART0-DSR	R15	FTDI-DTR
E8	GPIO1/UART0-DTR	R16	FTDI-DSR

Table 3: COM port connections

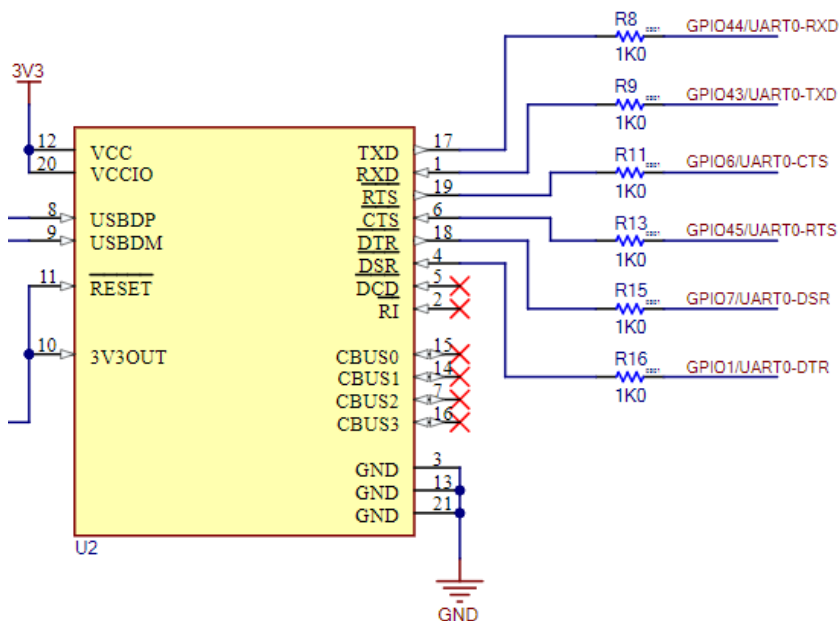


Figure 7: FTDI drawing, 1 port default

### 3.6 Low frequency clock

The evaluation board has a 32.768 kHz crystal oscillator connected to the NORA-W106 module. The crystal is optionally used to source the RTC slow clock, which can also be sourced from the internal slow RC oscillator and the divided clock in the internal fast RC oscillator.

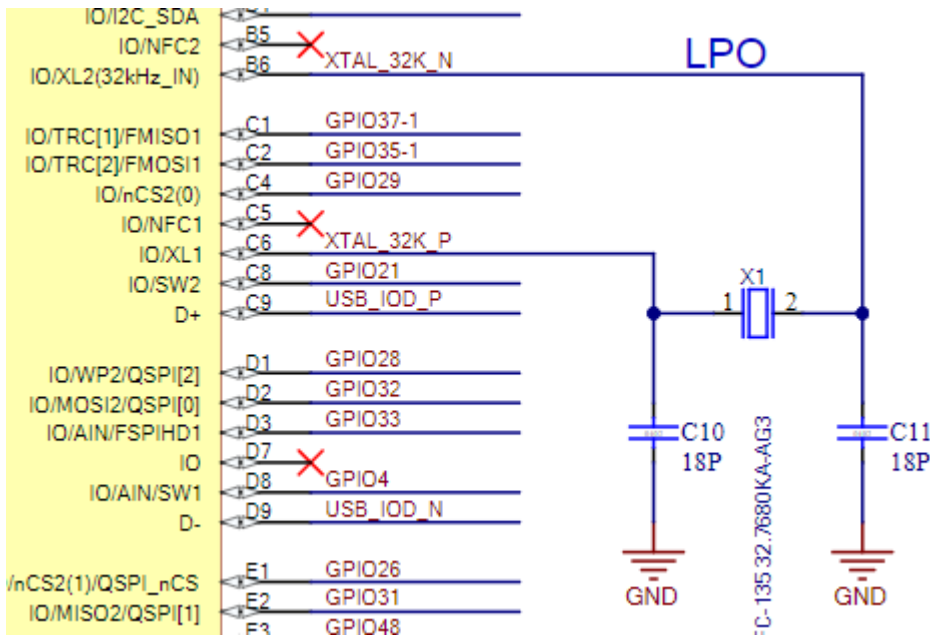


Figure 8: Schematic – 32 kHz crystal connected to NORA-W10

### 3.7 External JTAG debug interface

A JTAG connector can be used to connect an external debugger to the NORA-W106 module. The JTAG debug interface can be seen in [Figure 9](#).

J4 is implemented with a 2x5, header with 1.27 mm pitch. The connector J4 is by default not populated.

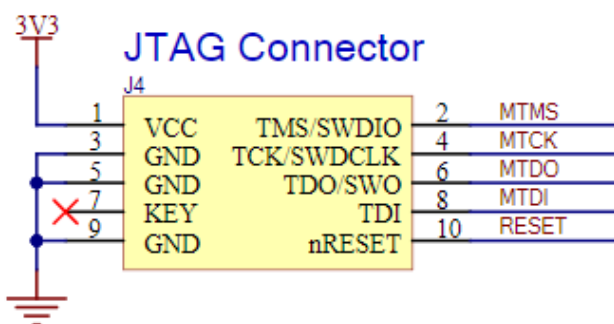


Figure 9: External J-Link debug interface

Figure 10 shows the external JTAG Needle connector that can be used for connecting a SEGGER J-link probe or similar equipment.

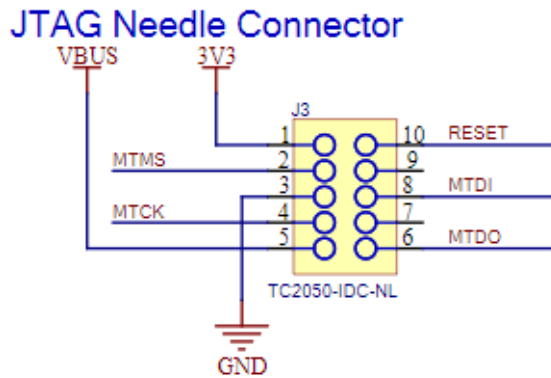


Figure 10: External JTAG Needle connector

### 3.8 Interface pin-out

Figure 11 shows the Arduino Nano interface J5, JTAG J4 and test points that provides access to I/O signals originating from NORA-W106 module. The corresponding pinout list can be seen in Table 4, Table 5 and Table 6.

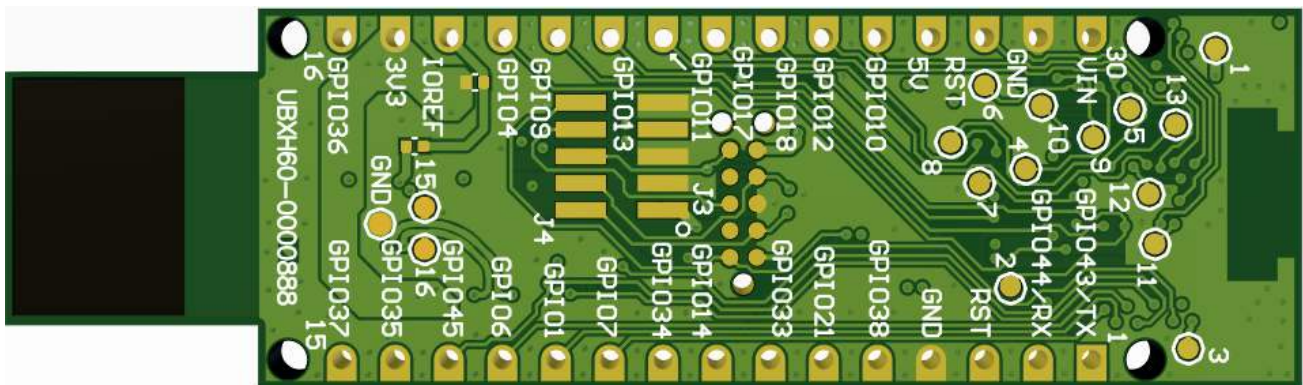


Figure 11: USB-NORA-W106 I/O access points

- ⚠ To configure the USB-NORA-W106 I/O pins to handle 5 V signals, **IOREF** must be supplied with +5 V with R52 populated and R51 not populated. When using 3.3 V on the USB-NORA-W106 I/O pins, the Arduino Uno® style shields must be configured to use a +3.3 V I/O voltage reference.

Table 4 shows the pin assignments of Arduino Nano interface, J5.

Pin	Pin name	NORA-W10 pin	Function
1	GPIO43/UART0-TX	G8	
2	GPIO44/UART0-RX	G9	
3	RST	J3	RESET
4	GND		Ground
5	GPIO38	A2	
6	GPIO21	C8	
7	GPIO33	D3	
8	GPIO14	A5	
9	GPIO34	B3	
10	GPIO7	E9	UART0-DSR
11	GPIO1	E8	UART0-DTR
12	GPIO6	F9	UART0-CTS
13	GPIO45	F8	UART0-RTS
14	GPIO35	C2	
15	GPIO37	C1	
16	GPIO36	B1	
17	3V3	A7, A8, B7	Supply
18	IOREF	-	Supply
19	GPIO4	D8	
20	GPIO9	E7	
21	GPIO13	A6	
22	GPIO11	G3	
23	GPIO17	A3	I2C-SDA
24	GPIO18	B4	I2C-SCL
25	GPIO12	G2	
26	GPIO10	H3	
27	5V	-	Supply
28	RST	J3	RESET
29	GND		Ground
30	VIN	-	Supply

**Table 4: Arduino Nano interface J5**

Table 5 shows the pin assignments for Header J4.

Pin	Pin name	NORA-W10 pin	Function
1	+3V3	-	Supply
2	JTAG-TMS	H2	
3	GND	-	Ground
4	JTAG-TCK	J2	
5	GND	-	Ground
6	JTAG-TDO	G1	
7	NC.	-	No connection
8	JTAG-TDI	H1	
9	GND	-	Ground
10	RESET	J3	Module reset

**Table 5: Header J4**

Table 6 shows the test point, TP, assignment. Their positions be seen in Figure 11.

TP	Pin name	NORA-W10/J2 pin	Function
1	VDD_SPI	-	Supply
2	GPIO0/BOOT	F7	Boot-up
3	GPIO3	J9	
4	GPIO26	E1	
5	GPIO27	F2	
6	GPIO28	D1	
7	GPIO29	C4	
8	GPIO30	F1	
9	GPIO31	E2	
10	GPIO32	D2	
11	GPIO46	H7	
12	GPIO47	F3	
13	GPIO48	E3	
14	GND	-	Ground
15	USB_P	J2:3	USB
16	USB_N	J2:2	USB

**Table 6: The test points on board**

# Appendix


## A Glossary

Abbreviation	Definition
ARM	Arm (Advanced RISC Machines) Holdings
CPU	Central Processing Unit
CTS	Clear To Send
DC	Direct Current
DC-DC	DC to DC converter
DFU	Device Firmware Update
USB	Evaluation Kit
FICR	Factory Information Configuration Register
GPIO	General Purpose Input / Output
LDO	Low Drop-Out voltage regulator
LE	Low Energy
LED	Light Emitting Diode
LF	Low Frequency
LiPo	Lithium-Polymer battery
NCS	nRF Connect SDK
NFC	Near-Field Communications
QSPI	Quad Serial Peripheral Interface
RC	Resistor-Capacitor network
RTS	Request To Send
RXD	Receive data signal
SES	SEGGER Embedded Studio
SIG	Special Interest Group
SoC	System on Chip
SPI	Serial Peripheral Interface
TXD	Transmit data signal
UICR	User Information Configuration Register
USB	Universal Serial Bus

**Table 7: Explanation of the abbreviations and terms used**

## Related documentation

- [1] NORA-W10 data sheet, [UBX-21036702](#)
- [2] NORA-W10 system integration manual, [UBX-22005601](#)
- [3] FTDI FT231XQ-R Datasheet, [FT231X \(ftdichip.com\)](#)

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## Revision history

Revision	Date	Name	Comments
R01	27-Mar-2023	hekf	Initial release for USB-NORA-W106
R02	13-Apr-2023	hekf	Updated IP status in <a href="#">Document information</a> and updated all product images to reflect hardware version revision B.

## Contact

For further support and contact information, visit us at [www.u-blox.com/support](http://www.u-blox.com/support).