u-blox USB-NORA-W106 Evaluation Kit for NORA-W10 Series Modules User Guide
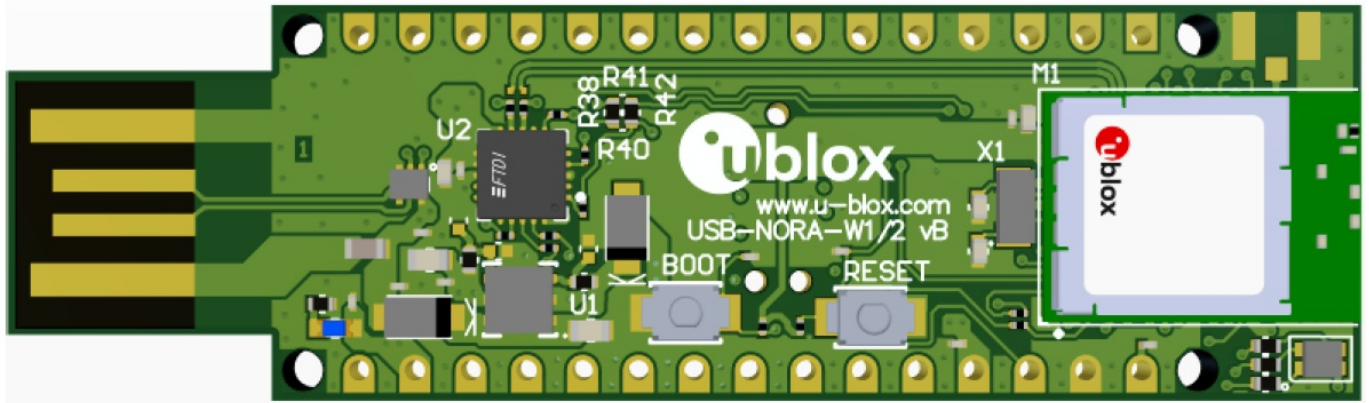
Contents

u-blox USB-NORA-W106 Evaluation Kit for NORA-W10 Series Modules

USB-NORA-W106 Evaluation Kit

The USB-NORA-W106 evaluation kit is designed for evaluating NORA-W10 series modules. The kit includes the USB-NORA-W106 evaluation board with an integrated antenna, but no external antenna is supplied.

Product Description

PRODUCT Key Features

- USB-NORA-W106 evaluation board
- NORA-W106 module equipped with an integrated antenna

Setting up the Evaluation Board

The USB-NORA-W106 is delivered without any software, and the software must be developed by the user. Follow the steps below to set up the evaluation board:

1. Connect an external power supply to the USB port as described in Powering the Board. The green status LED (D1) will light up when the internal USB 3.3 V supply is on.
2. Note that the inrush current when powering up the USB can be significantly higher than during normal operation.
3. The operating system will automatically install the correct COM port drivers. 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].
4. On Windows 10, open the Control Panel and click Hardware and Sound. Click Device Manager in Devices and Printers to view the assigned COM ports.

Note: This document applies to the USB-NORA-W106 evaluation kit for NORA-W10 series modules. For information about the hardware, software, and status of the available product types, see the NORA-W10 data sheet [1].

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

- Title USB-NORA-W106
- Subtitle Evaluation kit for NORA-W10 series modules
- Document type User guide
- Document number UBX-22019106 Revision and date
- R02 13-Apr-2023
- Disclosure restriction C1-Public

Product status Corresponding content status

- 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].

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 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.

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
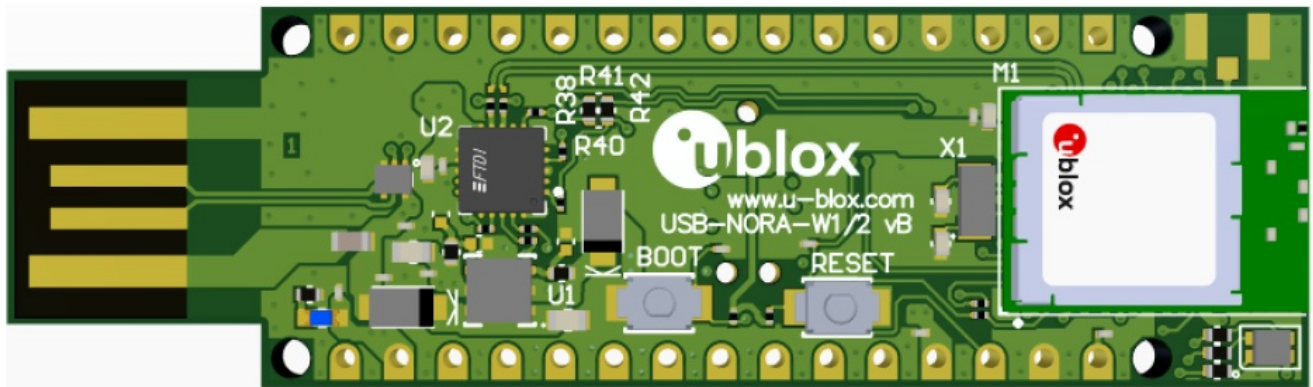- Current measurements via supply points

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

Kit includes

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

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].

Hardware description

Design files for the USB-NORA-W106 PCB are available from your local u-blox support team.

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.

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.
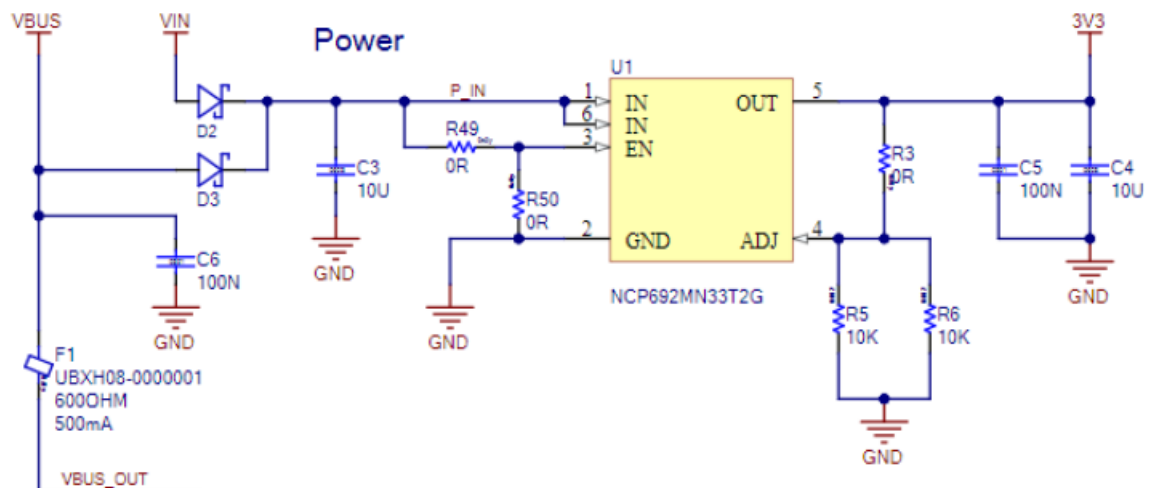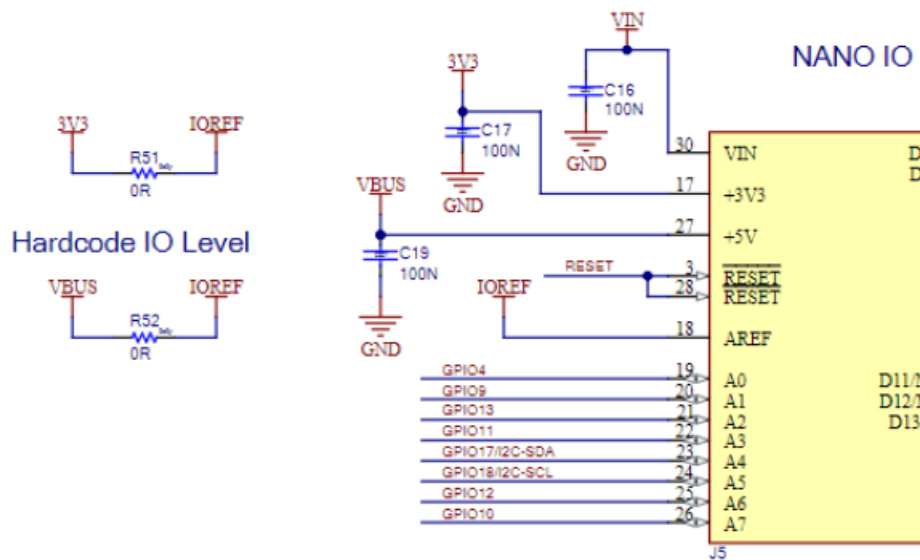

Figure 2: USB schematic - power supply

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

- +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.

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.
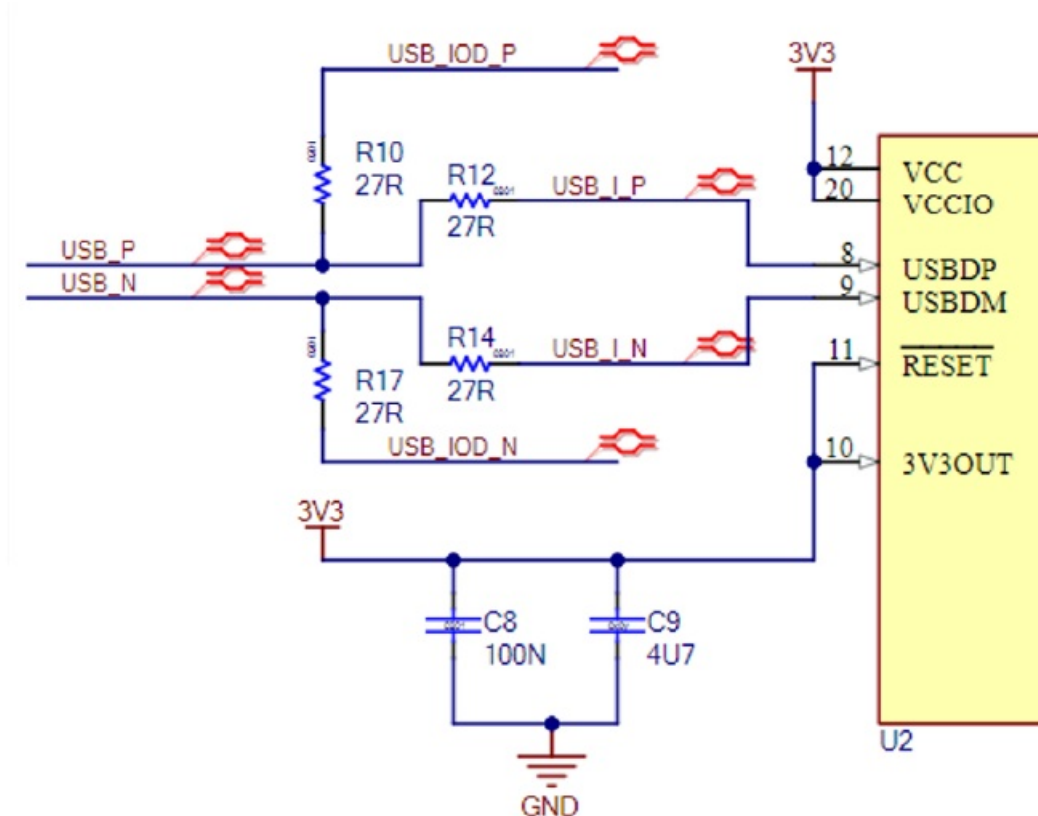

Figure 4: USB configuration options

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.
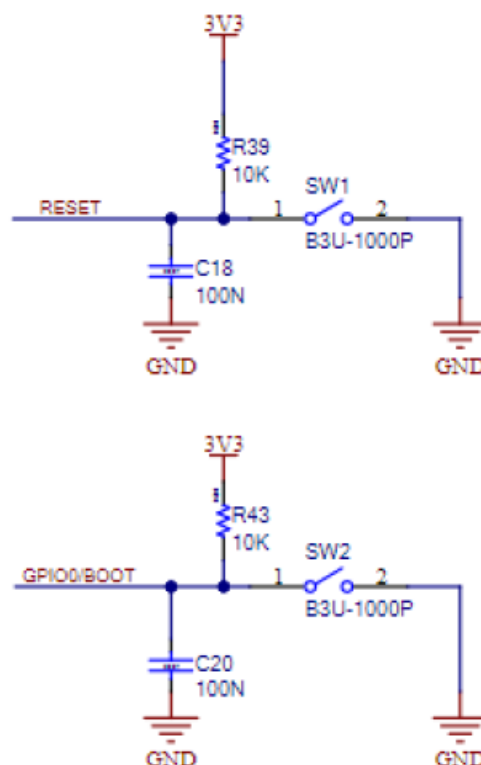
Figure 5: USB schematic - Reset and Boot buttons

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.

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
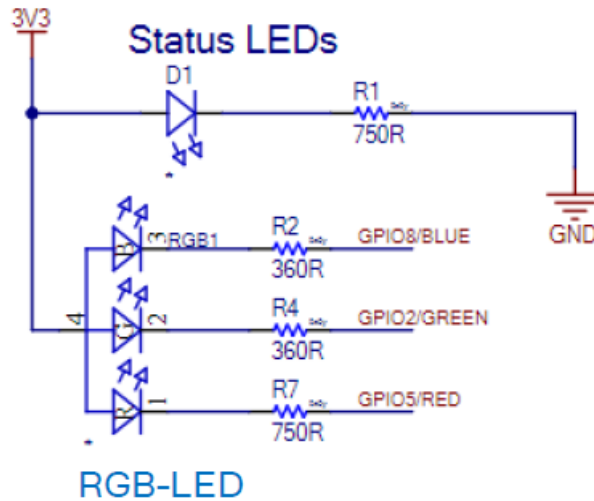
Figure 6 Schematic – RGB and power LED

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

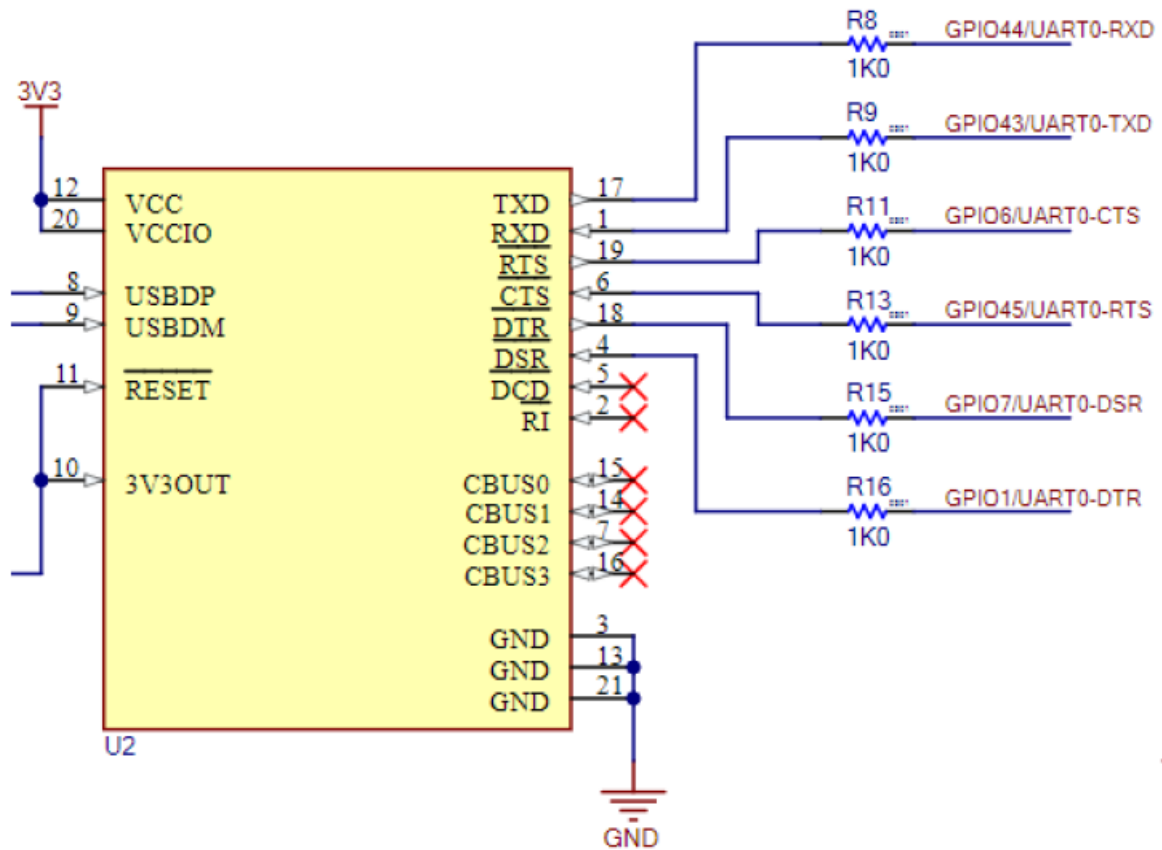**Low frequency clock**

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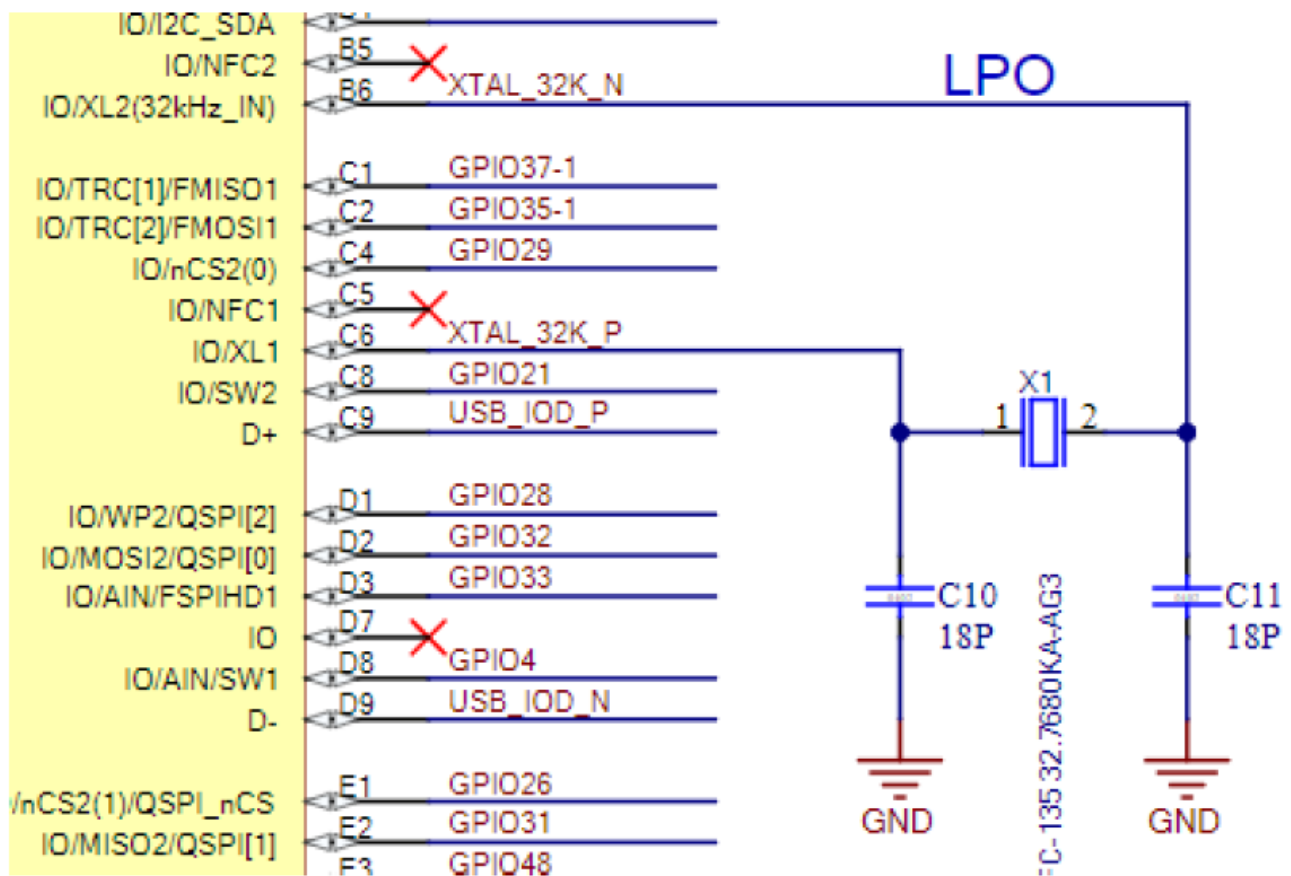
Figure 8: Schematic – 32 kHz crystal connected to NORA-W10

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 2×5, header with 1.27 mm pitch. The connector J4 is by default not populated.
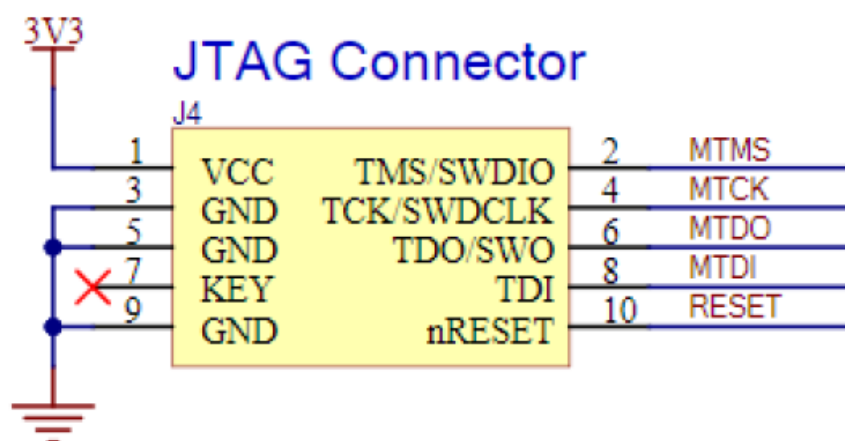
Figure 9: External J-Link debug interface

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

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, and 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**)

For product change notifications and regular updates of u-blox documentation, register on our website, **www.u-blox.com**.

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 Document information 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.**

Documents / Resources

u-blox USB-NORA-W106 Evaluation Kit for NORA-W10 Series Modules [pdf] User Guide USB-NORA-W106, USB-NORA-W106 Evaluation Kit for NORA-W10 Series Modules, USB-NORA-W106 Evaluation Kit, Evaluation Kit, Evaluation Kit for NORA-W10 Series Modules, NORA-W10 Series Modules Evaluation Kit

References

- **Home - FTDI**
- **Home | u-blox**
- **Home | u-blox**
- **Technical Support | u-blox**
- **portal.u-blox.com/s/contactsupport**

- ⊙ u-blox.com/docs/UBX-21036702
- ⊙ u-blox.com/docs/UBX-22005601

- ⊙ u-blox.com/docs/UBX-21036702
- ⊙ u-blox.com/docs/UBX-22005601