SHORT RANGE

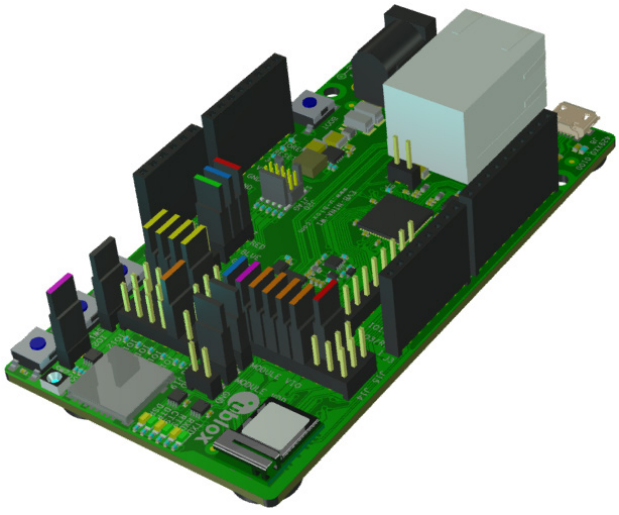
EVK-NINA-W10

Evaluation Kit for NINA-W10 modules

User Guide

Abstract

This document describes how to set up the EVK-NINA-W10x evaluation kits to evaluate NINA-W10 series stand-alone multiradio (2.4 GHz Wi-Fi and Bluetooth) modules. It also describes the different options for debugging and the development capabilities included in the evaluation board.



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UBX-17057549 - R03

Document Information		
Title	**EVK-NINA-W10**	
Subtitle	Evaluation Kit for NINA-W10 modules	
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Disclosure restriction		

This document applies to the following products:

Product name	Type number	Software version	PCN reference
EVK-NINA-W101	EVK-NINA-W101-00	N/A	-
EVK-NINA-W102	EVK-NINA-W102-00	N/A	-

Contents

1 Product description

1.1 Overview

The EVK-NINA-W10 evaluation kit includes an evaluation board, which can be used as a reference design for the NINA-W10 series multiradio (2.4 GHz Wi-Fi and Bluetooth) modules, a quick start guide and a USB cable. For the NINA-W101 module, the evaluation board is populated with an U.FL coaxial connector for connecting the external antenna. The NINA-W102 module has an onboard antenna; thus the EVK-NINA-W102 evaluation board does not have an U.FL connector.

The main features of the EVK-NINA-W10 are:

- Available in two variants - NINA-W101 and NINA-W102
- All of the NINA-W10 module pins are available at connectors or jumpers
  (except "reset-n" on module pin-19 that is controlled via reset delay logic)
- Can be powered through USB (J8) or external power supply (J23)
- Equipped with a Quad High Speed USB to Multipurpose UART/MPSSE IC (FT4232) that allows serial communication and flashing over USB
- RMII to 10Base-T/100Base-TX PHY using KSZ8081RNACA

The EVK-NINA-W10 evaluation kits are available in the following two variants, depending on which NINA-W10 module is mounted on the EVK:

- EVK-NINA-W101 – Evaluation kit for NINA-W101 module, RF port available on U.FL connector (J21)
- EVK-NINA-W102 – Evaluation kit for NINA-W102 module with onboard antenna

Figure 1 and Figure 2 show the two variants of the EVK-NINA-W10 evaluation board - EVK-NINA-W101 and EVK-NINA-W102.

⚠ **Take care while handling the EVK-NINA-W102.**
Applying force to the NINA-W102 module might damage the internal antenna.

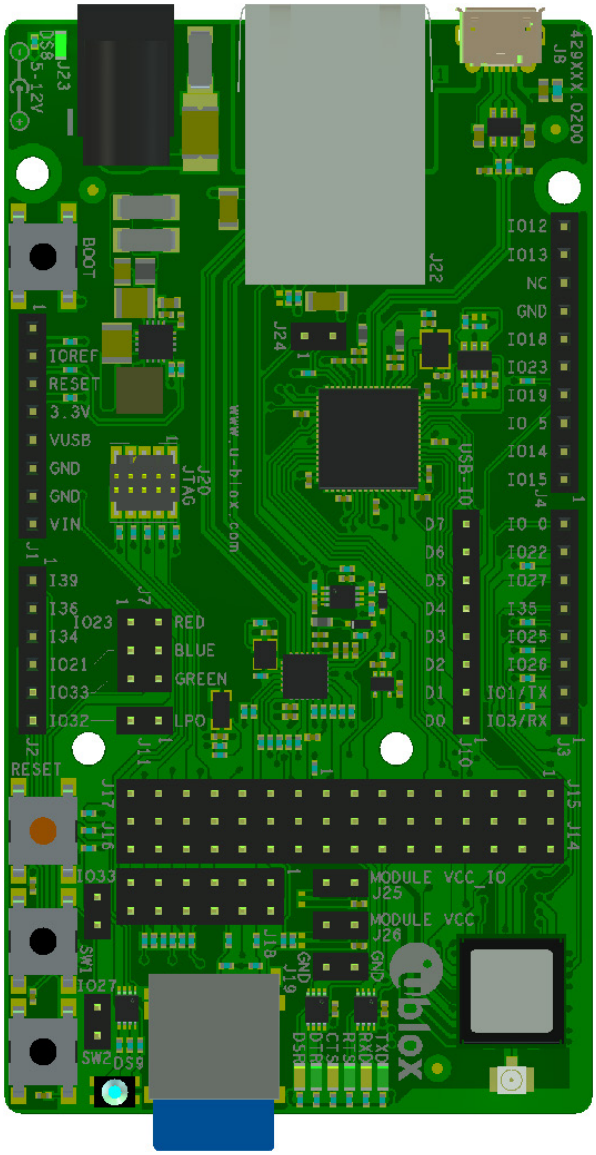


Figure 1: EVK-NINA-W101 evaluation board

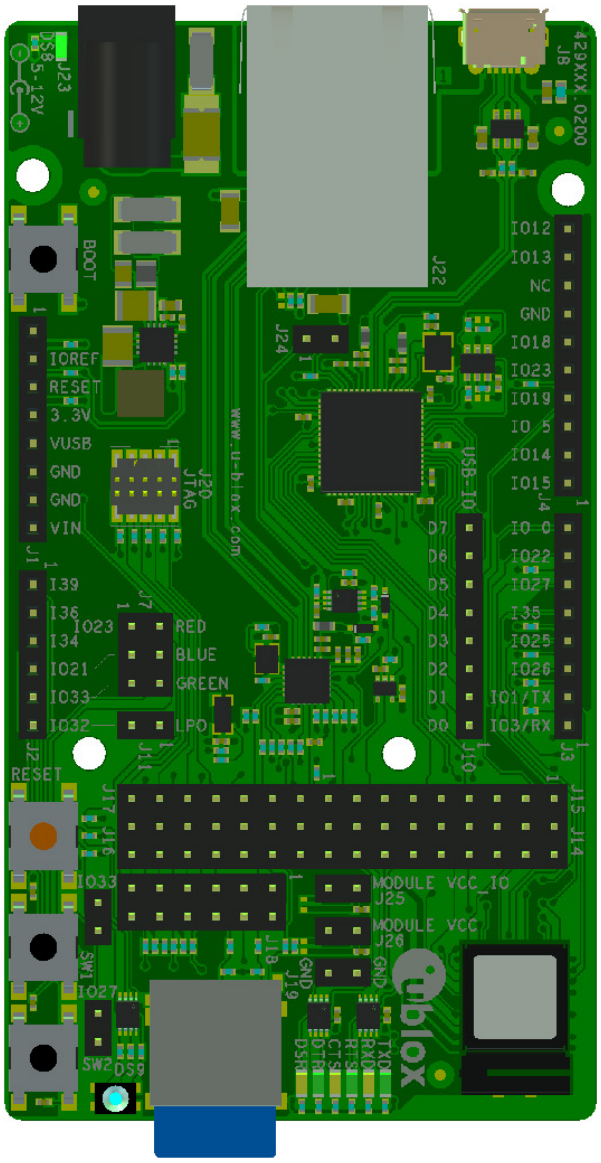


Figure 2: EVK-NINA-W102 evaluation board

1.2 Kit includes

1.2.1 EVK-NINA-W101

The EVK-NINA-W101 evaluation kit includes the following:

- EVK-NINA-W101 evaluation board
- 2.4 GHz foldable antenna (Ex-It 2400) with reverse polarity SMA connector
- RP-SMA - U.FL cable assembly, 100 mm length
- USB cable
- Quick Start guide

1.2.2 EVK-NINA-W102

The EVK-NINA-W102 evaluation kit includes the following:

- EVK-NINA-W102 evaluation board
- USB cable
- Quick Start guide

1.3 I/O allocation

The block diagram in Figure 3 provides a better understanding of how I/O signals from the module are made available at connectors and/or interfaces of the EVK.

Sixteen (16) I/O signals are available at the middle row of the I/O allocator. These signals can be distributed to connectors and/or interfaces on the EVK by use of jumpers to connect the associated middle and outer row pin(s).

The signals IO-12, IO-13, IO-14 and IO-15 can be disconnected from the J4 connector by not populating the corresponding jumpers at J18. This can be useful if the SDIO signals D2, D3, CLK, and CMD are directed to the SD card reader (J19).

Eight signals are connected directly between the module and the J2 or J3 connector.

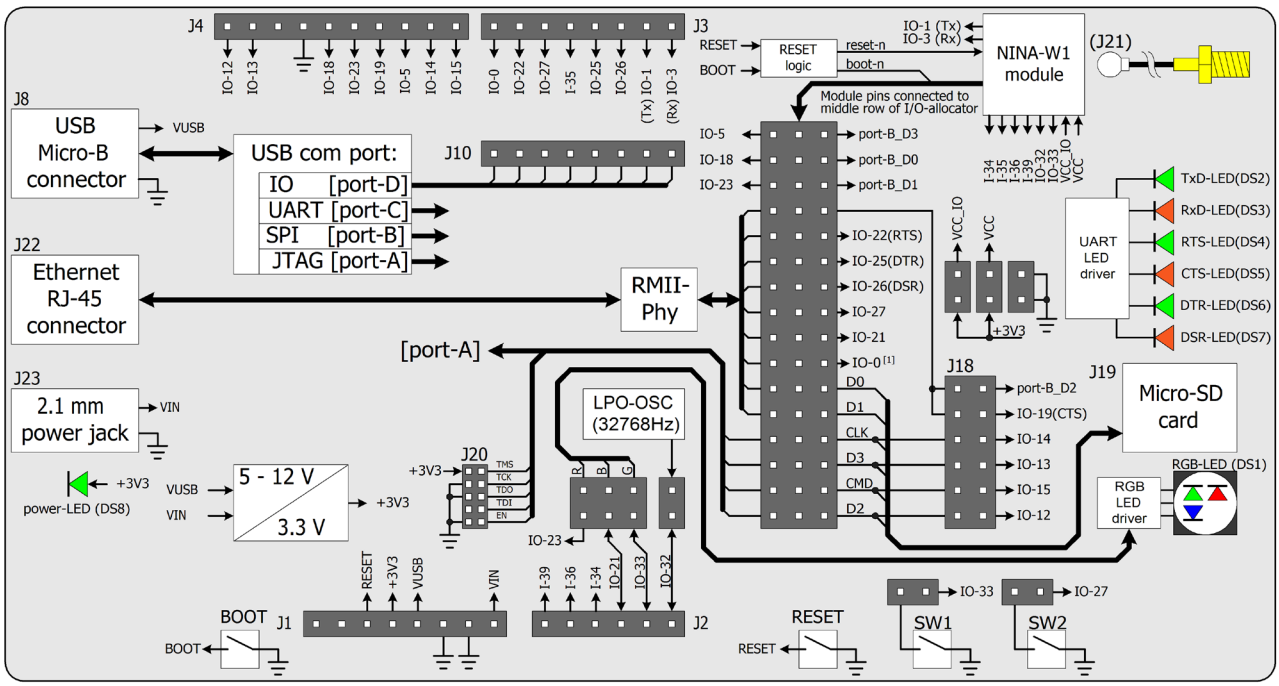


Figure 3: Block diagram of EVK-NINA-W10

☞ When reset-n is released, the module pin 27 is read as boot-n. When IO-0 is connected to the module, it must be held high during start up.

1.4 Jumper description

Parameter	Description	Name	Default
Enable SW1	Jumper at [J5-1_J5-2] connects switch 1 to module pin-7	J5	☑
Enable SW2	Jumper at [J6-1_J6-2] connects switch 2 to IO-27 (Jumper at [J14-15_J14-16] must be populated to connect IO-27 to module pin-18)	J6	☑
Enable RGB-LED	Jumper at [J7-1_J7-2] connects RED LED to IO-23 (Jumper at [J15-3_J14-5] must be populated to connect IO-23 to module pin-1)	J7-RED	☑
	Jumper at [J7-3_J7-4] connects BLUE LED to IO-21 (Jumper at [J16-1_J16-2] must be populated to connect IO-21 to module pin-8)	J7-BLUE	☑
	Jumper at [J7-5_J7-6] connects GREEN LED to IO-33	J7-GREEN	☑
IO-Interface select	Module pin to IO-allocator	J14	See Table 3
IO-Interface select	Module pin to IO-allocator	J15	See Table 3
IO-Interface select	Module pin to IO-allocator	J16	See Table 3
IO-Interface select	Module pin to IO-allocator	J17	See Table 3
IO-Interface select	Module pin to IO-allocator	J18	See Table 3
Enable VCC_IO	Connects the evaluation board internal 3.3 V to module pin-9 to supply module VCC_IO	J25	☑
Enable VCC	Connects the evaluation board internal 3.3 V to module pin-10 to supply module VCC	J26	☑

Table 1: EVK-NINA-W10 jumper descriptions

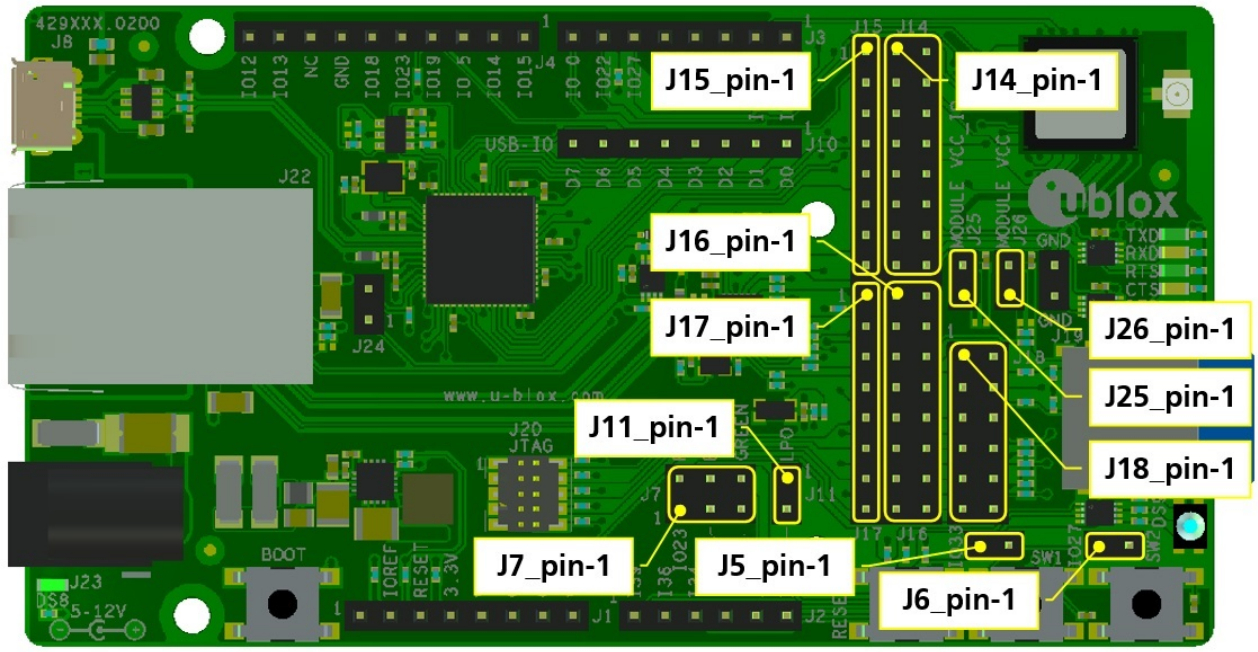


Figure 4: Jumper positions on the EVK-NINA-W10

Middle row of IO-allocator	Connects to
J14-1	Module pin-28
J14-3	Module pin-29
J14-5	Module pin-1
J14-7	Module pin-21
J14-9	Module pin-20
J14-11	Module pin-16
J14-13	Module pin-17
J14-15	Module pin-18
J16-1	Module pin-8
J16-3	Module pin-27
J16-5	Module pin-25
J16-7	Module pin-24
J16-9	Module pin-31
J16-11	Module pin-35
J16-13	Module pin-32
J16-15	Module pin-36

Table 2: Available module pins at the middle row of IO-allocators J14 and J16

Connected to	Left row jumper pin	Middle row jumper pin	Right row jumper pin	Connected to	Default
IO-5, J4 pin-3	J15-1	J14-1	J14-2	SPI_CS, U5-PB-3	[J15-1_J14-1]
IO-18, J4 pin-6	J15-2	J14-3	J14-4	SPI_CLK, U5-PB-0	[J15-2_J14-3]
IO-23, J4 pin-5	J15-3	J14-5	J14-6	SPI_MOSI, U5-PB-1	[J15-3_J14-5]
RMII-TxD0	J15-4	J14-7	J14-8	J18 pin-1_3	[J14-7_J14-8]
RMII-TxD1	J15-5	J14-9	J14-10	IO-22, J3 pin-6 (RTS)	[J14-9_J14-10]
RMII-RxD0	J15-6	J14-11	J14-12	IO-25, J3 pin-4 (DTR)	[J14-11_J14-12]
RMII-RxD1	J15-7	J14-13	J14-14	IO-26, J3 pin-3 (DSR)	[J14-13_J14-14]
RMII-CRSDV	J15-8	J14-15	J14-16	IO-27, J3 pin-7	[J14-15_J14-16]
RMII-TxEN	J17-1	J16-1	J16-2	IO-21, J2 pin-3	[J16-1_J16-2]
RMII-REFCLK	J17-2	J16-3	J16-4	IO-0, J3 pin-8	[J16-3_J16-4]
RMII-MDC	J17-3	J16-5	J16-6	SDIO-D0, J19	
RMII-MDIO	J17-4	J16-7	J16-8	SDIO-D1, J19	
JTAG-TMS, J20_pin-2	J17-5	J16-9	J16-10	SDIO-CLK, J19 / J18 pin-5	[J16-9_J16-10]
JTAG-TCK, J20_pin_4	J17-6	J16-11	J16-12	SDIO-D3, J19 / J18 pin-7	[J16-11_J16-12]
JTAG-TDO, J20_pin-6	J17-7	J16-13	J16-14	SDIO-CMD, J19 / J18 pin-9	[J16-13_J16-14]
JTAG-TDI, J20_pin-8	J17-8	J16-15	J16-16	SDIO-D2, J19 / J18 pin-11	[J16-15_J16-16]

Table 3: IO-allocation via jumpers J14, J15, J16, and J17, default positions shaded

Connected to	Left row jumper pin	Right row jumper pin	Connected to	Default
J14-8	J18-1	J18-2	SPI_MISO, U5-PB-2	
J14-8	J18-3	J18-4	IO-19, J4 pin-4 (CTS)	[J18-3_J18-4]
J16-10	J18-5	J18-6	IO-14, J4 pin-2	[J18-5_J18-6]
J16-12	J18-7	J18-8	IO-13, J4 pin-9	[J18-7_J18-8]
J16-14	J18-9	J18-10	IO-15, J4 pin-1	[J18-9_J18-10]
J16-16	J18-11	J18-12	IO-12, J4 pin-10	[J18-11_J18-12]

Table 4: IO-allocation via jumper J18, default positions shaded

1.4.1 Default jumper configuration

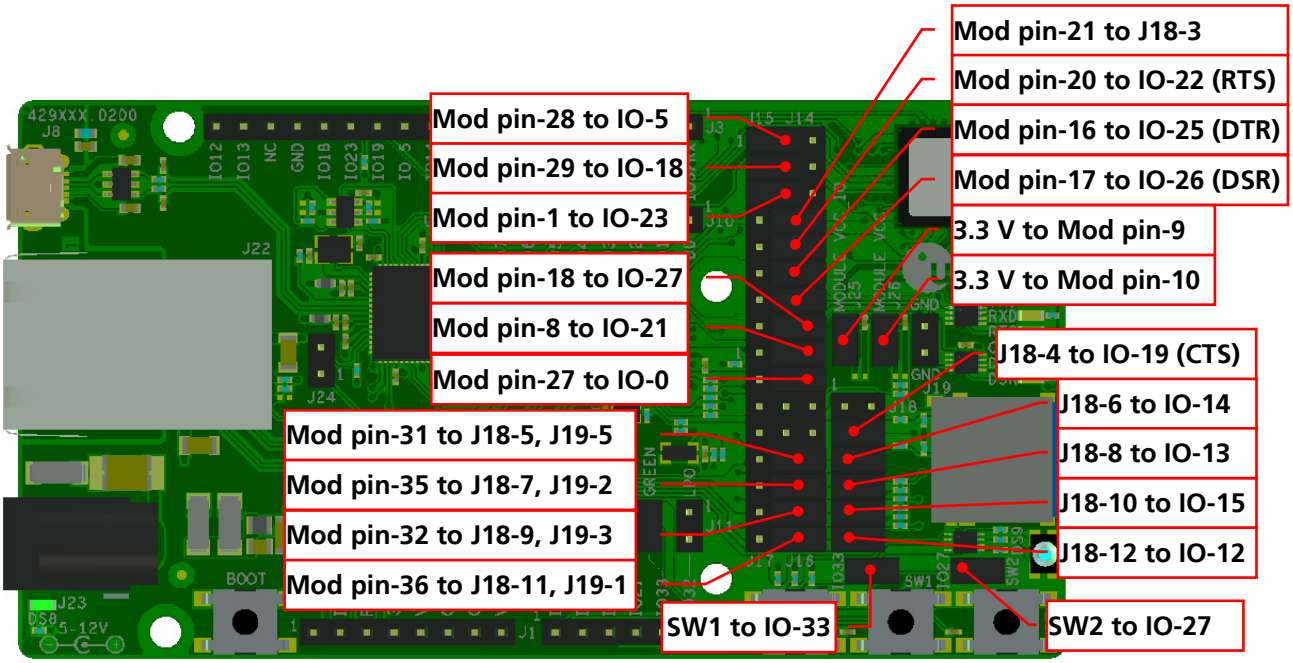


Figure 5: Jumper configuration to enable UART, IOs, and switches 1 and 2

1.4.2 RMII to PHY jumper configuration

The jumpers shown in Figure 6 must be inserted to connect the 10Base-T/100Base-TX PHY with the associated module RMII interface pins.

When the RMII PHY is connected to the module, the "BLUE-LED" is not available at IO-21.

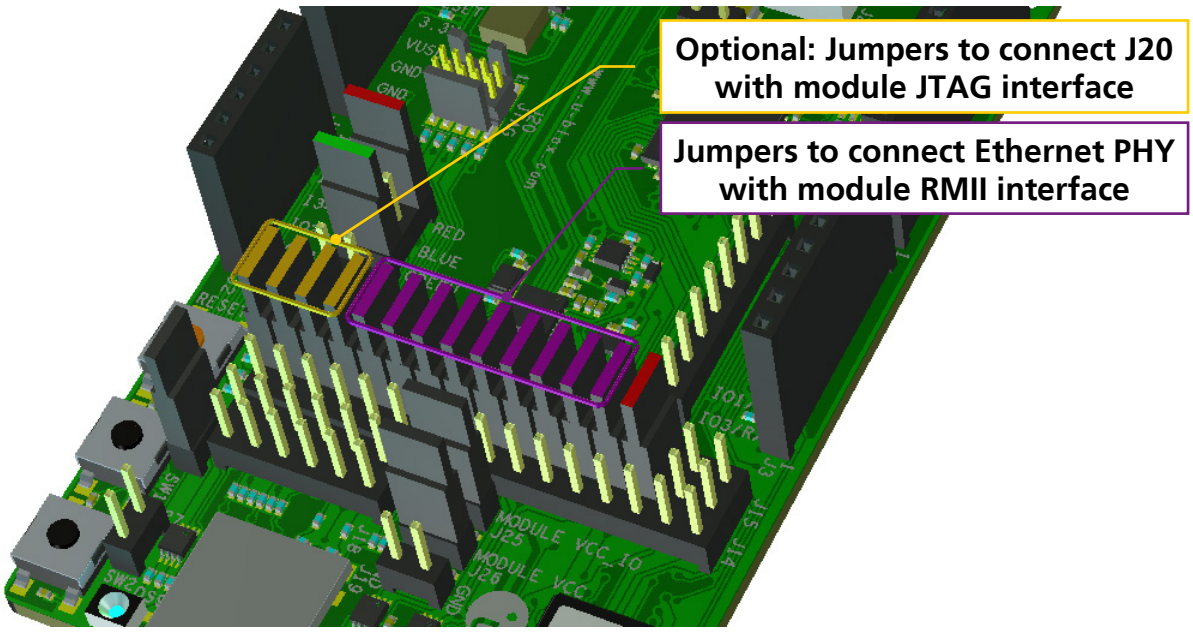


Figure 6: RMII to PHY jumper configuration

1.5 LEDs

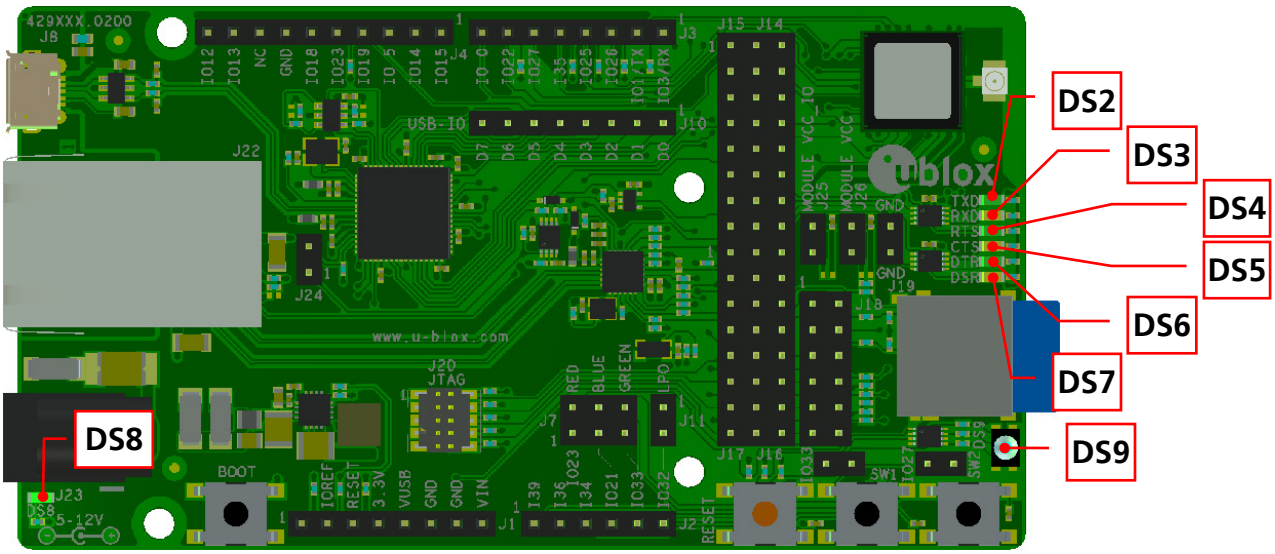


Figure 7: Position of LEDs on EVK-NINA-W101 and EVK-NINA-W102

Function	Description	Name	Color
Power LED	Supplied from the evaluation board 3.3 V DC/DC converter	DS8	Green
UART TxD	Flashing LED indicates UART Tx activity (output from NINA-W1)	DS2	Green
UART RxD	Flashing LED indicates UART Rx activity (input to NINA-W1)	DS3	Amber
UART RTS	LED indicates UART RTS status (output from NINA-W1)	DS4 [1]	Green
UART CTS	LED indicates UART CTS status (input to NINA-W1)	DS5 [1]	Amber
UART DTR	LED indicates UART DTR status (output from NINA-W1)	DS6 [1]	Green
UART DSR	LED indicates UART DSR status (input to NINA-W1)	DS7 [1]	Amber
Status	RGB LED to present module status	DS9 [2]	RGB

Table 5: EVK-NINA-W10 LED descriptions

☞ To control these LEDs, the associated UART signal jumpers described in Table 3 and Table 4 must be populated.

☞ To control DS9, the associated signal jumpers as shown in Figure 8 must be populated.

1.5.1 RGB-LED Jumper configuration

The jumpers shown in Figure 8 must be inserted to connect the RGB-LED driver with the associated module pins.

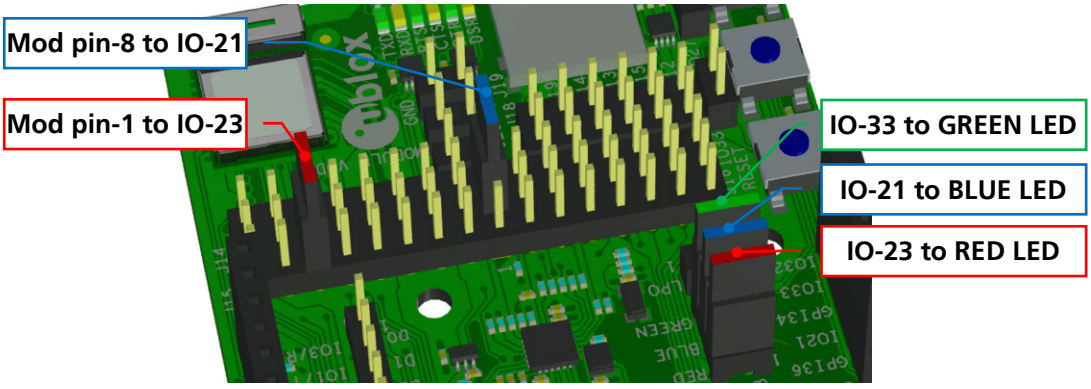


Figure 8: RGB-LED to IO signal jumpers

1.6 Connectors

The available connectors on the EVK-NINA-W10 evaluation board are shown in Figure 9.

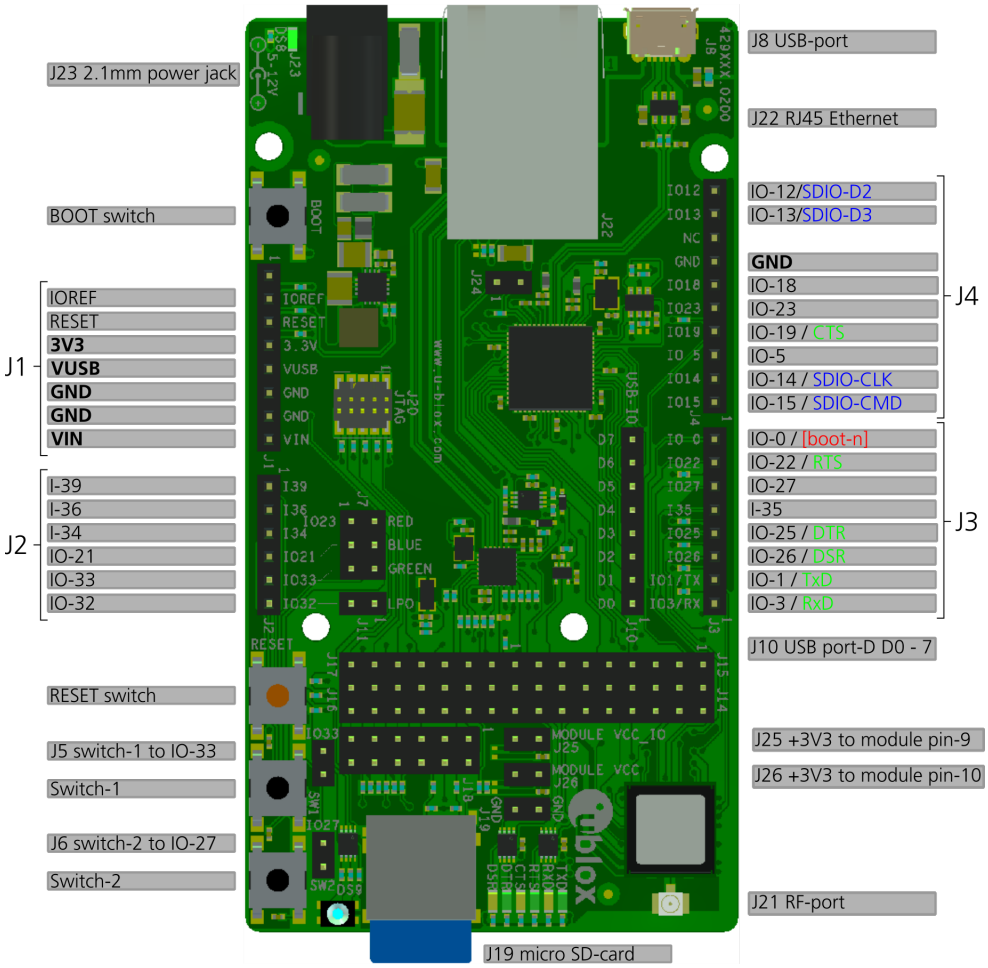


Figure 9: EVK-NINA-W10 connectors

Connector	Description
J1, J2, J3, J4	Connectors for accessing the NINA-W1 IO signals (GPIO)
J8	USB connector; type Micro-B
J10	USB port-D D0 – D7
J21	RF-port at U.FL coaxial connector for external antenna (connector J21 is not populated on EVK-NINA-W102)
J22	RJ45 connector, reserved for future use (RMII to PHY)
J23	2.1 mm power jack, positive center pin, 5 – 12 V

Table 6: EVK-NINA-W10 connector descriptions

1.7 Buttons

The EVK-NINA-W10 evaluation board has four buttons, as mentioned in Table 7. Two of them can be connected to NINA-W1 pins via jumper configuration.

Button	Description
RESET	Reset button, triggers the reset logic that pulls module pin-19 low
BOOT	When reset is asserted, pressing BOOT-switch will pull module pin-27 low
SW1	General function button connected to jumper J5 pin-2
SW2	General function button connected to jumper J6 pin-2

Table 7: EVK-NINA-W10 button descriptions

1.8 Configuration options

Module pin number	IO-signal	Primary function	Accessible at Jumper/Connector	Module pin number	IO-signal	Primary function	Accessible at Jumper/Connector
1	GPIO-23		J14-5, [J4-5, J7-1] (1)	20	GPIO-22	UART_RTS	J14-9, [J3-7] (1)
2	GPI-34		J2-3	21	GPIO-19	UART_CTS	J14-7, [J4-4] (1)(2)
3	GPI-39		J2-1	22	GPIO-1	UART_TXD	J3-2
4	GPI-36		J2-2	23	GPIO-3	UART_RXD	J3-1
5	GPIO-32		J2-6, J11-2	24	GPIO-4		J16-7
6,12, 14	GND		J1-6,-7, J4-7, J12-1,-2	25	GPIO-2		J16-5
7	GPIO-33		J2-5, J5-1, J7-5	26, 30	GND		J1-6,-7, J4-7, J12-1,-2
8	GPIO-21		J16-1, [J2-4, J7-3] (1)	27	GPIO-0		J16-3, [J3-8] (1)
9	VCC_IO		J25-2	28	GPIO-5		J14-1, [J4-3] (1)
10	VCC		J26-2	29	GPIO-18		J14-3, [J4-6] (1)
13	RF-port	Antenna	J21	31	GPIO-14		J16-9, [J4-2] (1)(2)
16	GPIO-25	UART_DTR	J14-11, [J3-4] (1)	32	GPIO-15		J16-13, [J4-1] (1)(2)
17	GPIO-26	UART_DSR	J14-13, [J3-3] (1)	34	GPI-35		J3-5
18	GPIO-27		J14-15, [J3-6, J6-1] (1)	35	GPIO-13		J16-11, [J4-9] (1)(2)
19	RESET-N	RESET	(J1-3 via logic)	36	GPIO-12		J16-15, [J4-10] (1)(2)

Table 8: Module pin to I/O signal mapping

☞ Connector/jumper placed inside the brackets indicates that a jumper must be positioned at the corresponding position of the IO-allocation jumpers J14 – J17 if the I/O signal is to be presented at the designated connector/jumper, as described in Table 3.

☞ These I/O signals require a second jumper to be positioned at the I/O distribution jumper J18, as described in Table 4.

1.9 Power supply

The supply voltage to the EVK-NINA-W10 evaluation board can be sourced from the following connectors:

- USB (J8)
- External power supply (J23): The external supply voltage must be in the range 5 – 12 V

☞ Depending on your USB source, the USB current supply may be insufficient.

2 Setting up the evaluation board

2.1 Starting up

Connect J8 (USB type Micro B) to a USB host using the USB cable. If necessary, connect an external power supply to the J23 connector. The status light (DS8) will turn green, indicating that the internal EVK 3.3 V is on.

The operating system will install the correct COM port drivers automatically. The drivers will 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 FT4232H Datasheet [3].*

One COM port will automatically be assigned to the unit by the Windows OS. To view the assigned COM ports on Windows 7, follow the steps mentioned below:

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

⚠ **When using the EVK-NINA-W101, before powering up the EVK, ensure that you have connected the 2.4 GHz antenna with the U.FL antenna connector (J21). Failing to do so may cause undesired operations. The EVK-NINA-W102 has an onboard antenna.**

⚠ **Be careful to check the polarity before connecting external power supply to the EVK-NINA-W10 evaluation board. The center conductor is positive (+) and the ring is negative (-).**

⚠ **The current consumption during startup of the EVK can be high.**

2.2 Programming the NINA-W10 open CPU

When using the NINA-W10 open CPU variant, it is not possible to download the u-blox connectivity software. Use the software developed and compiled using the Espressif SDK on this variant.

Information on how to build and FLASH the module when using Espressif SDK is available at the following URL - http://esp-idf.readthedocs.io/en/latest/get-started/index.html.

This URL webpage provides information on how to set up the software environment using the hardware based on the Espressif ESP32 such as NINA-W10 and also how to use the ESP-IDF (Espressif IoT Development Framework).

The following steps must be performed to compile, flash, and execute a program on NINA-W10:

- **Set up the Toolchain**
  - Windows, Mac, and Linux is supported
- **Get the ESP-IDF**
  - Download the GIT repository provided by Espressif
- **Setup Path to ESP-IDF**
  - The toolchain program can access the ESP-IDF using the IDF_PATH environment variable
- **Build and Flash**
  - Start a Project, Connect, Configure, Build and Flash a program

More information about this is available at http://esp-idf.readthedocs.io/en/latest/index.html

More information on this topic can be found in the *NINA-W10 series Data Sheet [1]* and *NINA-W1 System Integration Manual [2].*

Appendix

A Layouts

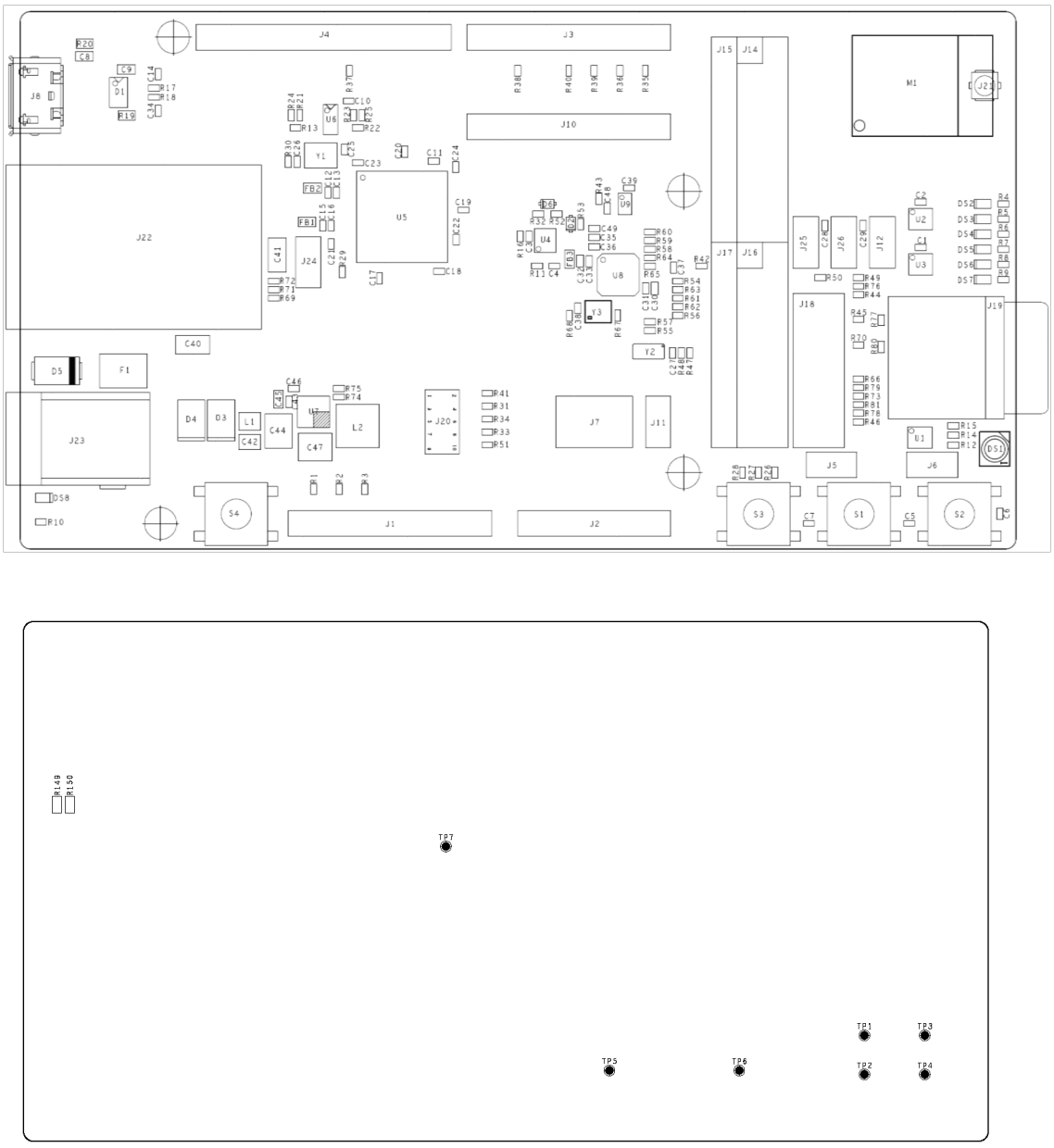
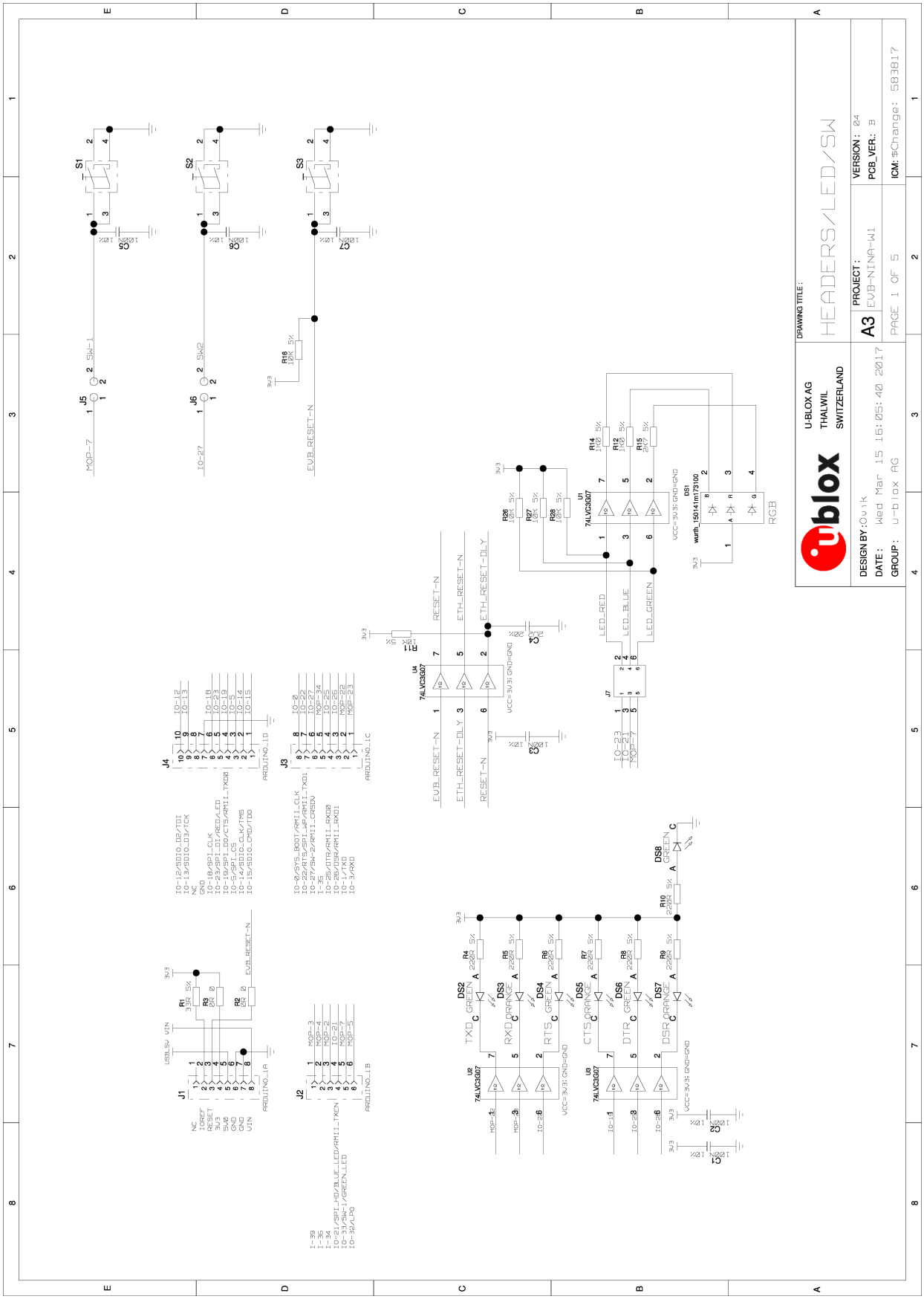
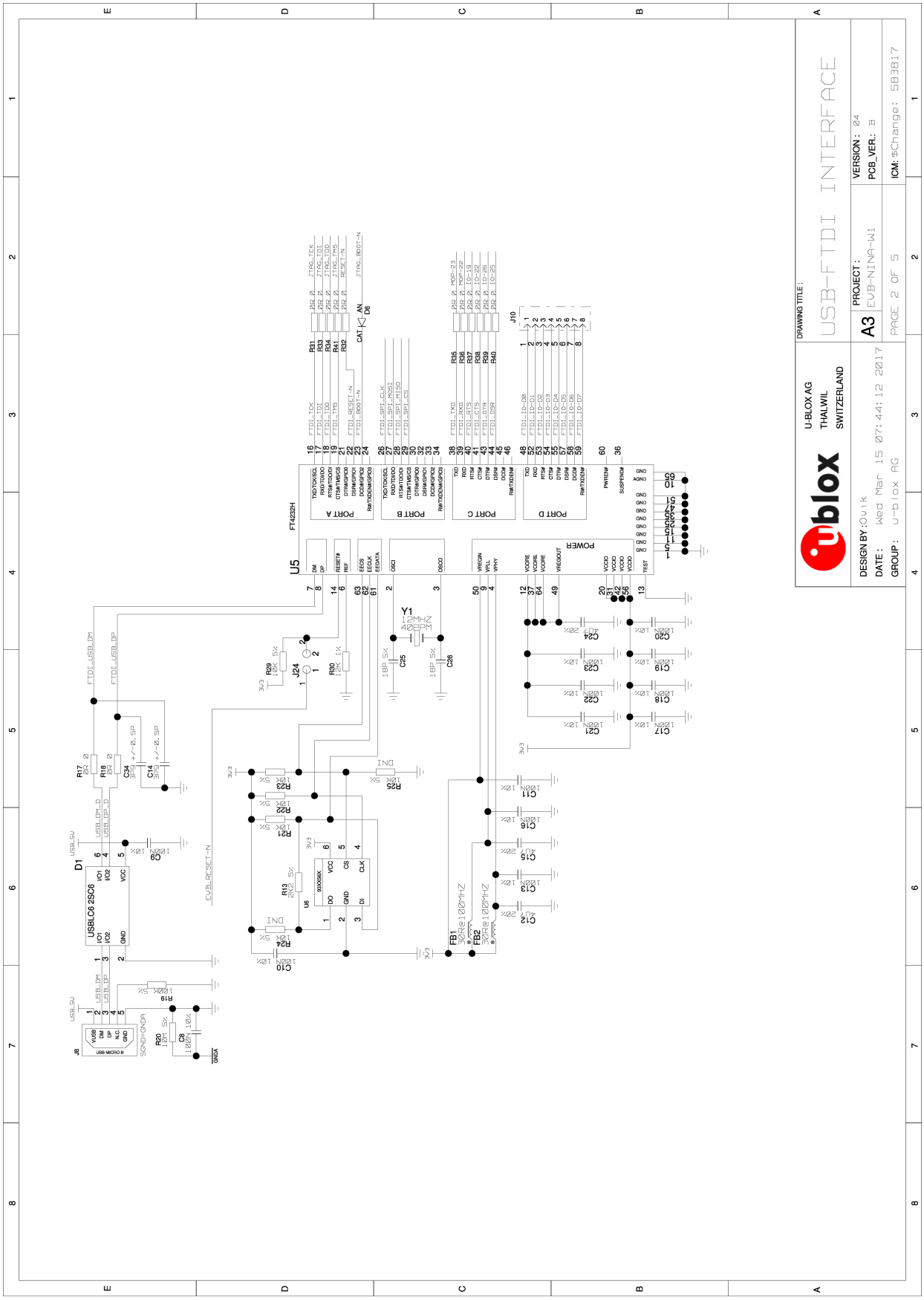


Figure 10: Primary and secondary side layouts of EVK-NINA-W10

B Schematic drawings

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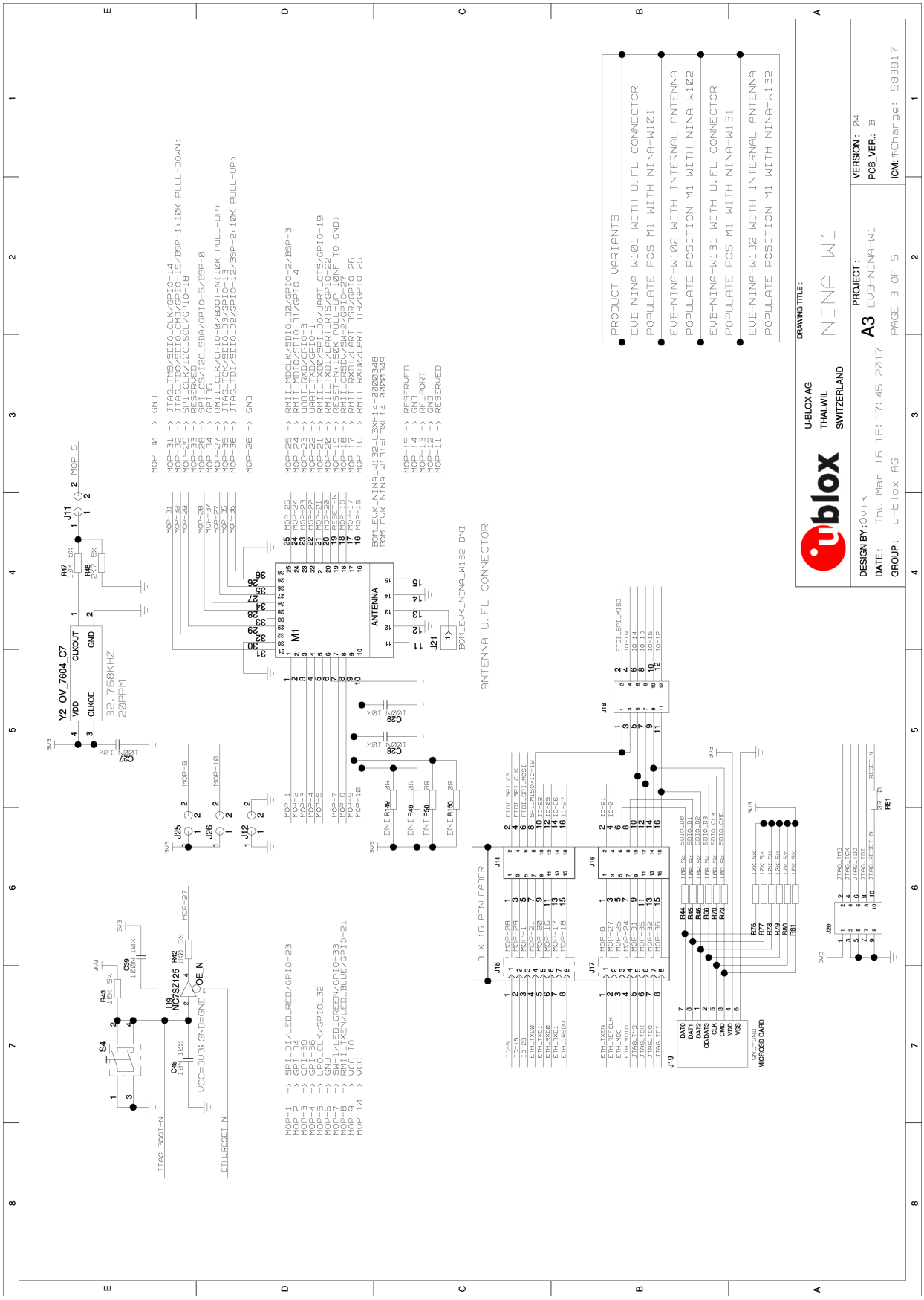
PRODUCT VARIANTS
EVK-NINA-W101 WITH U.FL CONNECTOR
POPULATE POS M1 WITH NINA-W101
EVK-NINA-W102 WITH INTERNAL ANTENNA
POPULATE POSITION M1 WITH NINA-W102
EVK-NINA-W131 WITH U.FL CONNECTOR
POPULATE POS M1 WITH NINA-W131
EVK-NINA-W132 WITH INTERNAL ANTENNA
POPULATE POSITION M1 WITH NINA-W132
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J16
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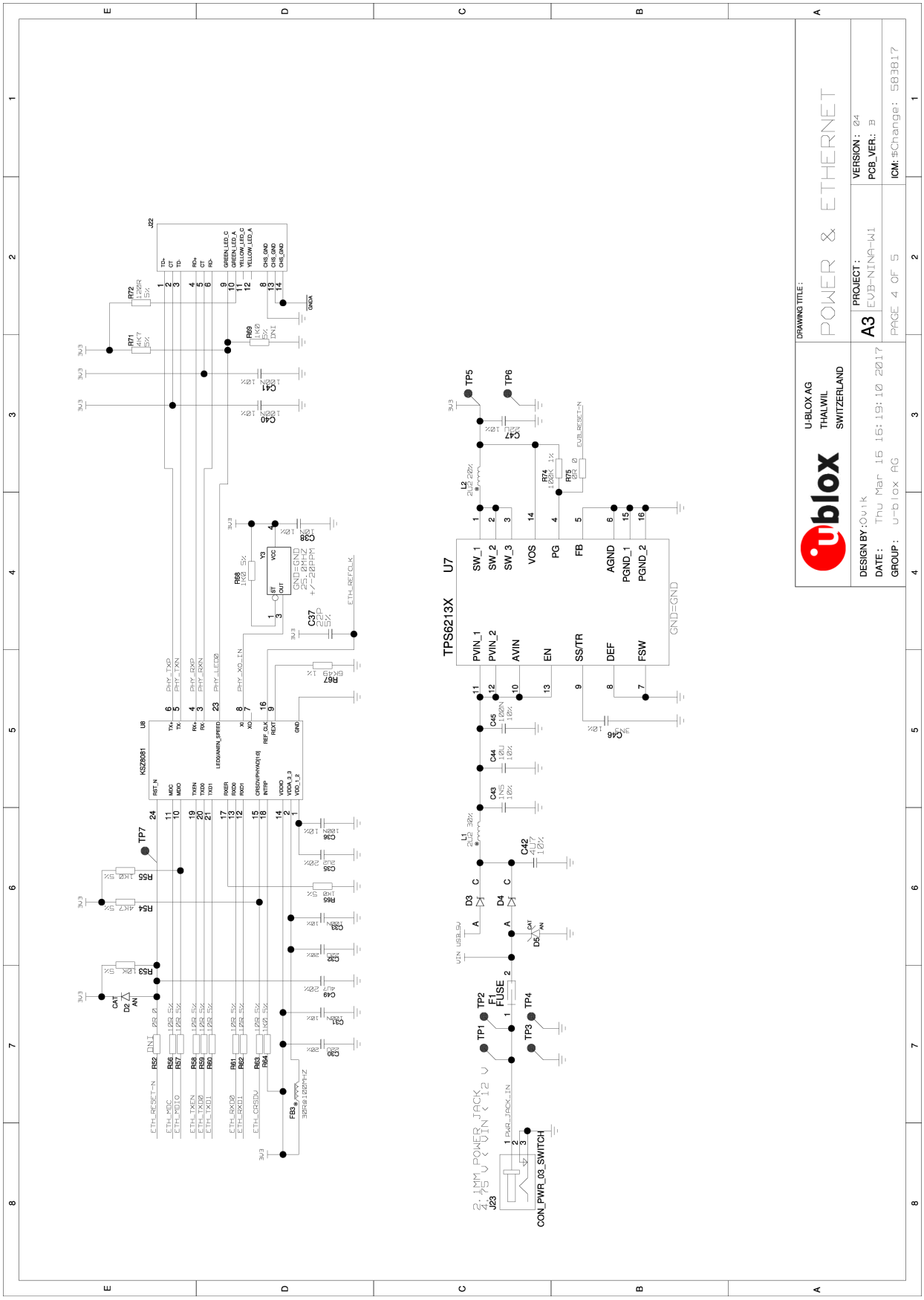
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J22
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C Glossary

Name	Definition
COM	Communication
CTS	Clear To Send
DSR	Data Set Ready
DTR	Data Terminal Ready
EVK	Evaluation Kit
GND	Ground
GPI	General Purpose Input
GPIO	General Purpose Input/Output
IO	Input-Output
LED	Light-Emitting Diode
PHY	Physical layer
U.FL	Miniature coaxial RF connector
USB	Universal Serial Bus
RF	Radio frequency
RMII	Reduced Media-Independent Interface
RTS	Request To Send
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
VCC	IC power-supply pin

Table 9: Explanation of abbreviations used

Related documents and links

[1] NINA-W10 Data Sheet, document number UBX-17065507

[2] NINA-W1 System Integration Manual, document number UBX-17005730

[3] FTDI FT4232H Datasheet, QUAD HIGH SPEED USB TO MULTIPURPOSE UART/MPSSE IC
http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_FT4232H.pdf

[4] KSZ8081 Datasheet, 10Base-T/100Base-TX PHY with RMII Support
http://www.microchip.com/wwwproducts/en/KSZ8081

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Revision history

Revision	Date	Name	Comments
R01	27-Oct-2017	ovik, kgom	Initial release.
R02	27-Nov-2017	ajah	Updated Figure 5 with module pin-1, module pin-18, and module pin-8 connection to IOs.
R03	12-Mar-2018	cmag	Minor updates in the last table on page 2. Also updated the "Related documents and links" section.

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