

# NT1065 USER MANUAL

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## 1 PACKAGE CONTENTS

Package contents include:

- DMB PCB\_NT1065.1\_vx (demo-board NT1065)
- DMB USB\_adapter\_v2 (DMB USB adapter)
- SPI interface cable
- Power supply cable
- CD(DVD) disk with:
  - PCB NT1065 vx.pdf (demo-board NT1065.1 specification)
  - NT1065 LE DS vx.pdf (specification for NT1065 in QFN88 package)
  - NT1065 - User manual vx.x.pdf
  - NT1065\_vx.x.xCE.exe
  - NT1065 Configuration files description vx.pdf
  - Configuration files
  - DriverWinUsb (driver for USB loader)

## 2 CONNECTING THE DMB USB ADAPTER

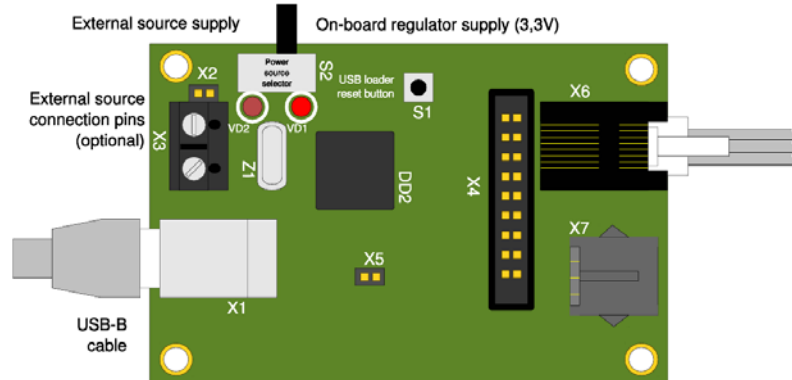


Figure 2.1: Schematic representation of USB loader

Connecting DMB USB adapter is as follows:

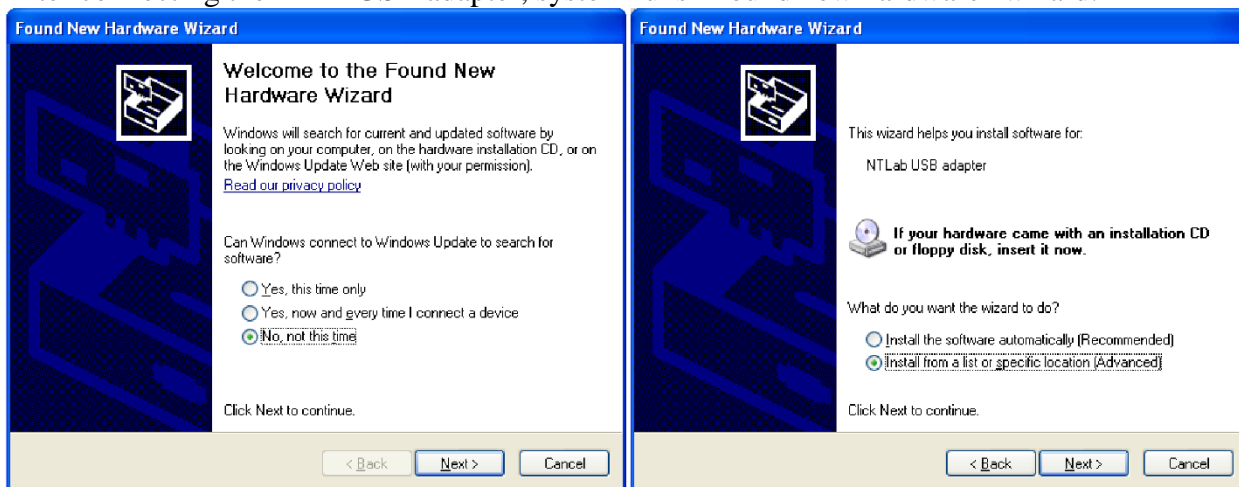
- connect DMB USB adapter to a PC with USB cable
- turn switch S2 (Figure 2.1) into “On-board regulator supply (3.3V)” position
- connect SPI interface cable to port X6
- install device driver in case operation system requests (see chapter 4 for details)
- adapter is ready

*Note:* Adapter takes supply voltage from USB port (5.0V) by default, and logical one level is 3.3V. If other output voltages are needed, it can be applied to ports X2, X3; S2 should be switched to “External source supply” position.

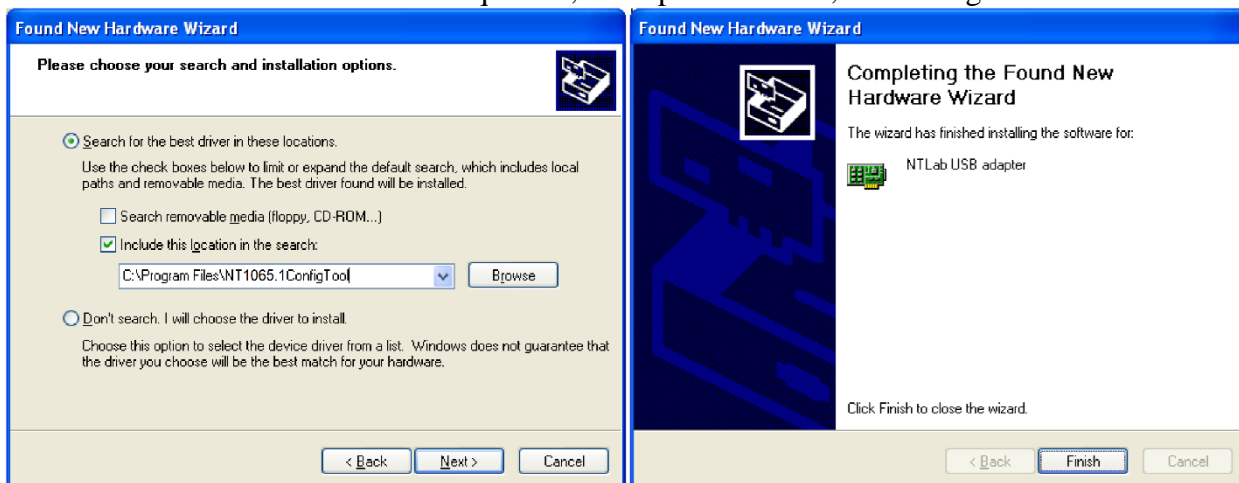
## 3 DMB USB ADAPTER DRIVER INSTALLATION

### 3.1 For Windows XP

After connecting the DMB USB adapter, system runs “Found new hardware” wizard:



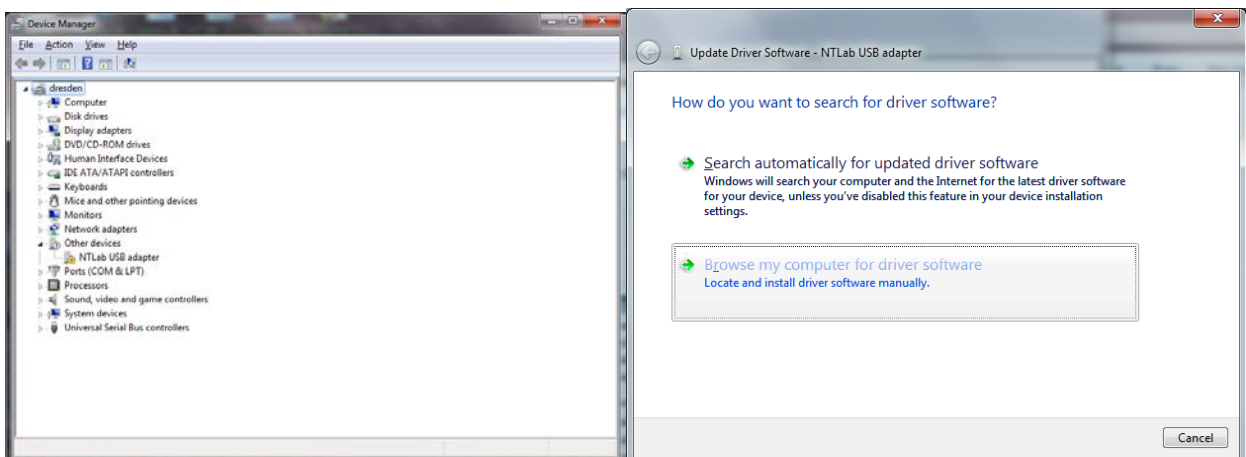
Follow wizard instructions. When requested, enter path to folder, containing software.



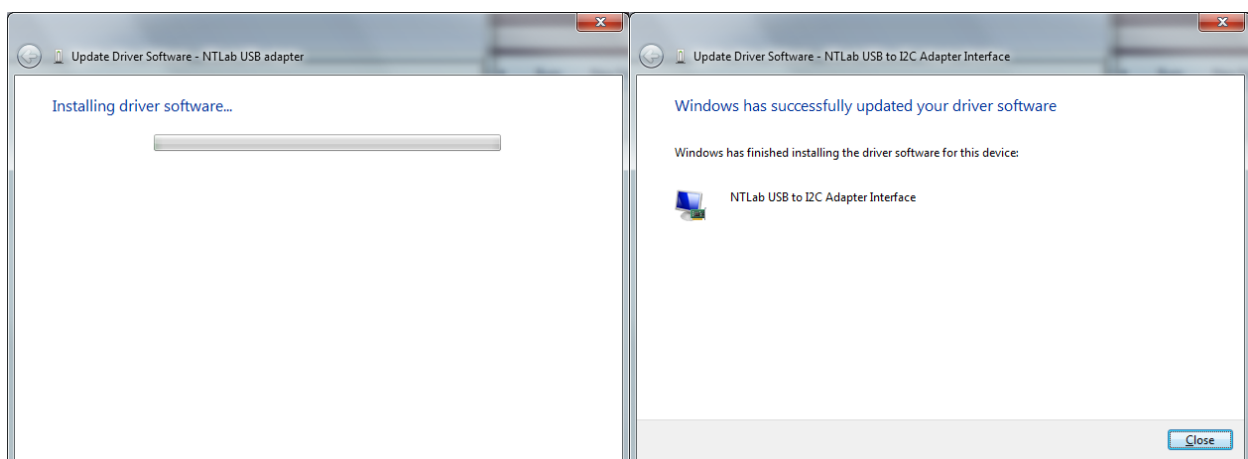
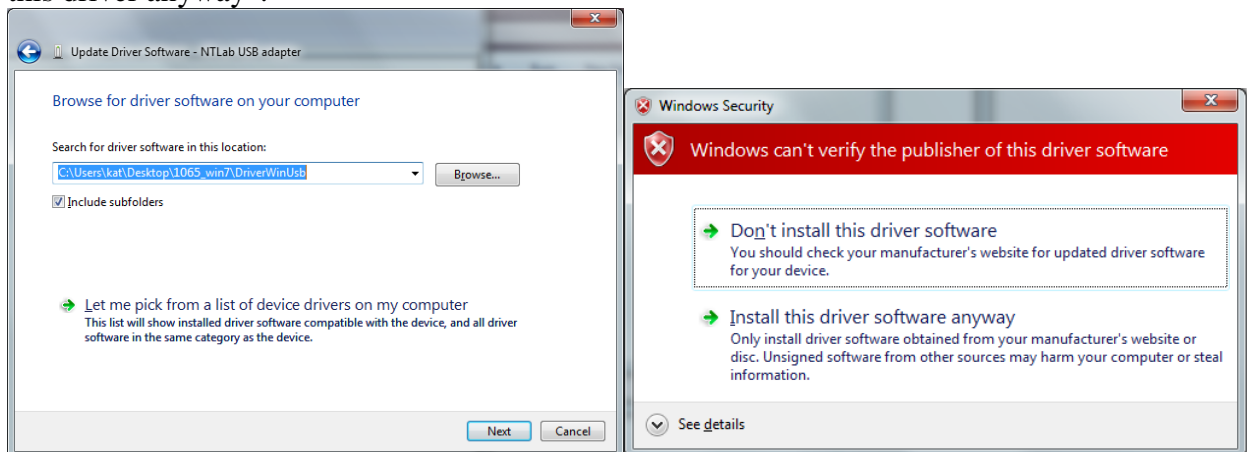
Driver is installed, now you can run receiver control program.

### 3.2 For Windows 7

After connecting the DMB USB adapter, open “Device manager”. Right-click on “NTLab USB adapter” in “Other devices” and choose “Update driver software”.



Follow instructions. When requested, enter path to folder, containing software and check “Install this driver anyway”.



Driver is installed, now you can run receiver control program.

## 4 CONNECTING THE PCB NT1065 QFN88

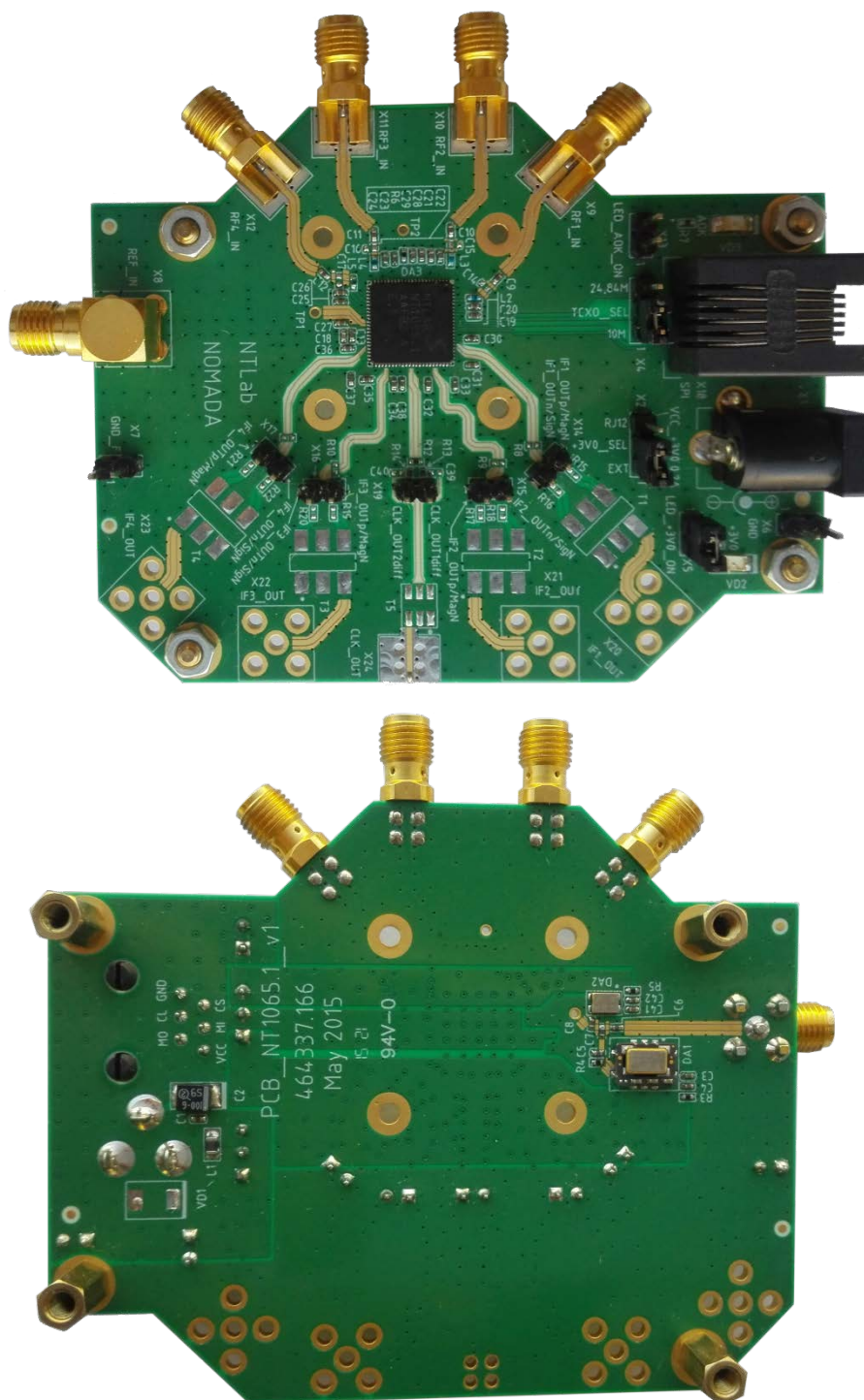


Figure 4.1: PCB NT1065 QFN88

Board may look different from above, depending on the version (PCB NT1065 vx.pdf).

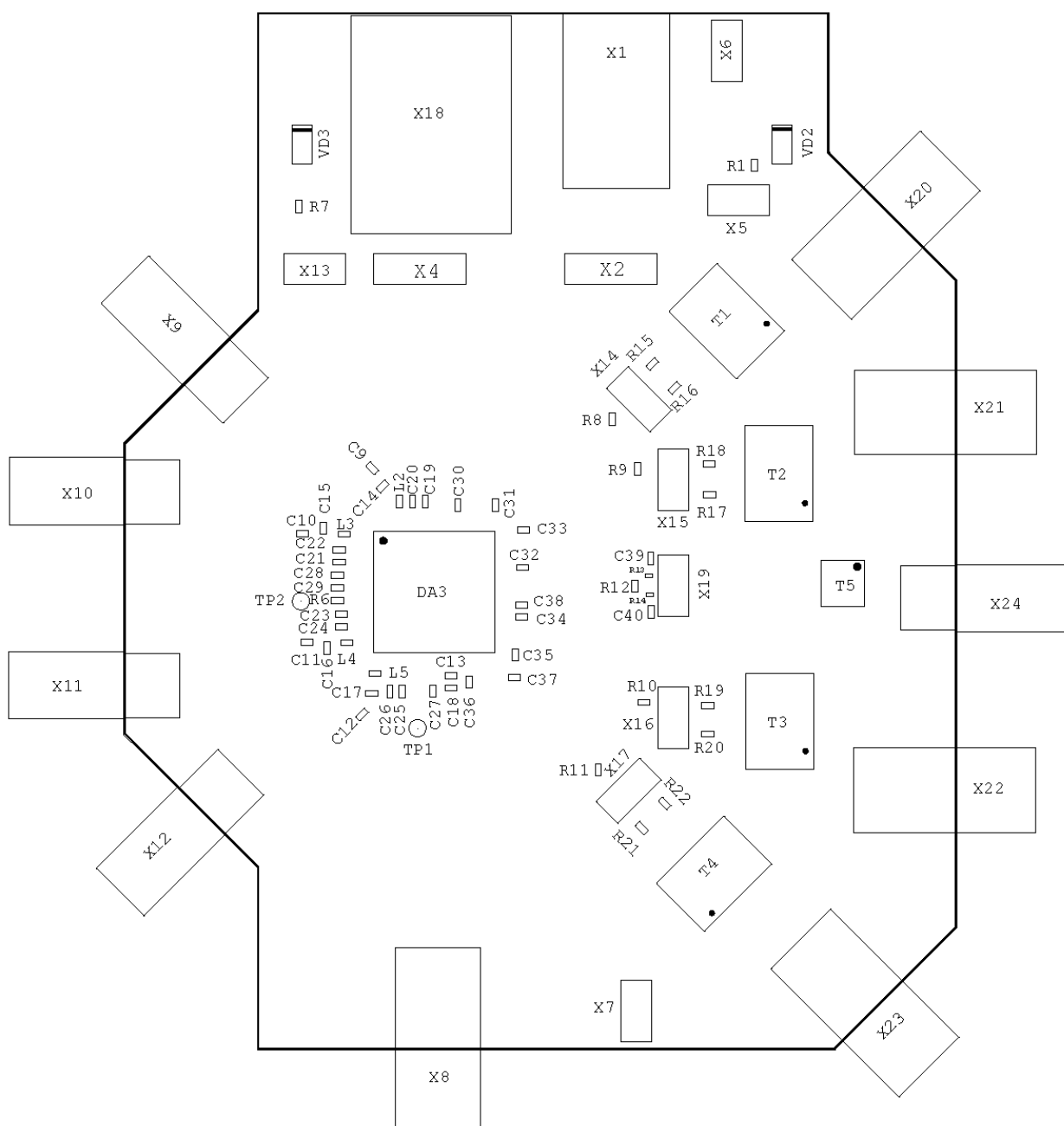


Figure 4.2: Schematic representation of the PCB NT1065 QFN88 of the top

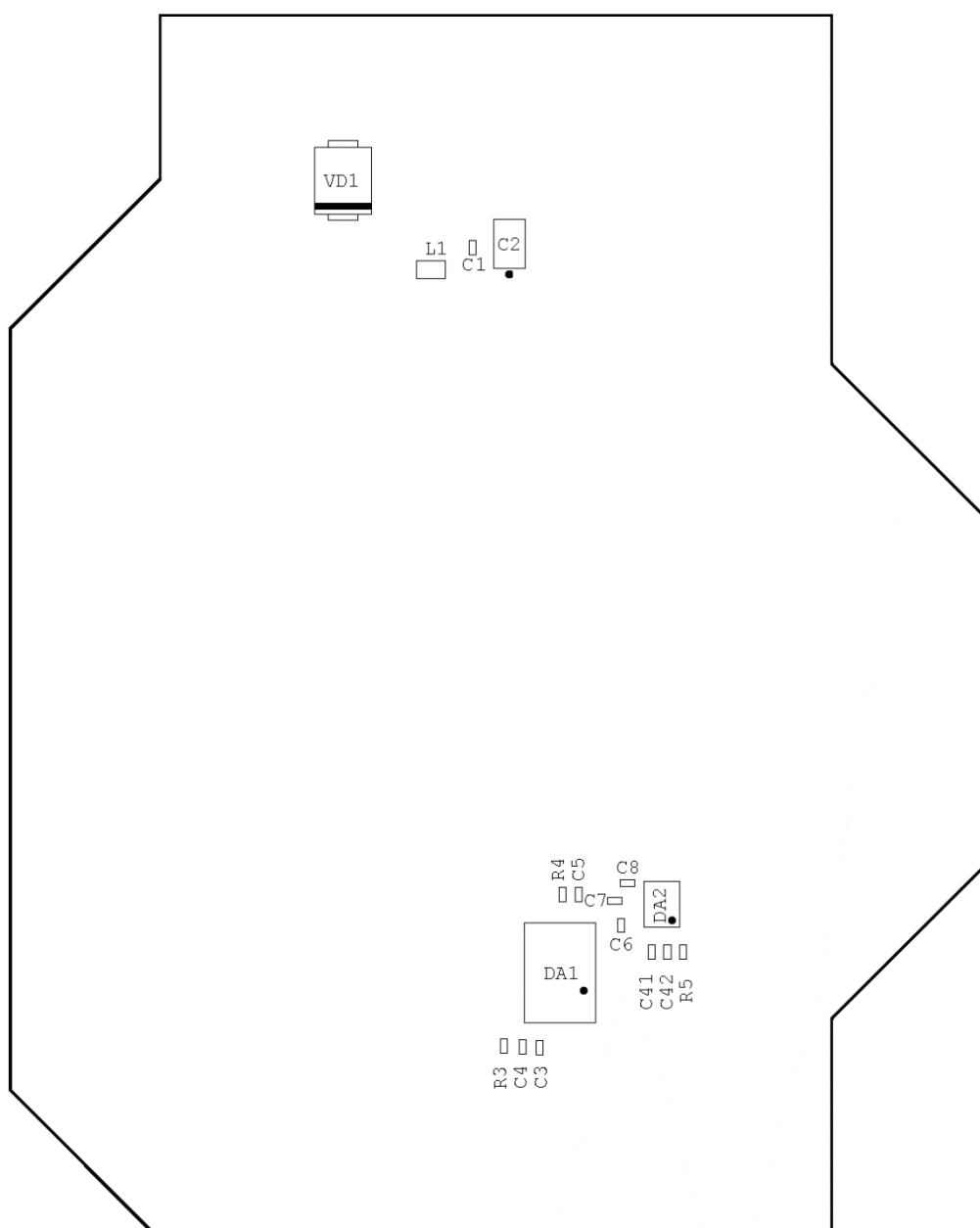


Figure 4.3: Schematic representation of the PCB NT1065 QFN88 of the bottom

Table 4.1: Test board connectors setting

Port num.	Description	Notes
X1	External power supply (3V)	200mA current limit should be set
X2	Switch between power sources: 1) 1-2 position – external power source (X1) 2) 2-3 position – RJ-12 (SPI) power source (X18)	1-2 position by default
X4	Switch between frequency reference sources: 1) 1-2 position – 10MHz 2) 2-3 position – 24.84MHz 3) Is not set – external, from connector X8	1-2 position by default
X5	LED “Power indication” switch	Set by default

Port num.	Description	Notes
X6,X7	GND	Used for probe “GND” connector
X8	External frequency reference input connector	–
X9-X12	1-4 channels RF inputs	–
X13	LED “AOK” switch	Set by default
X14-X17	1-4 channels analog differential outputs & 2-bit ADC digital outputs data – MAGN/SIGN	–
X18	RJ-12 connector for serial interface (SPI) connection	–
X19	Clock frequency analog differential output & CMOS output	–
X20-X23	1-4 channels IF single-ended outputs	Available per request
X24	Single-ended clock output	Available per request

To start:

- Connect the test board power supply, complying polarity shown in Figure 3.1 (connector X1). The recommended supply voltage is 3.0 V. To prevent chip damage in case of incorrect connection or board elements short circuit it is recommended to set the current limitation on the voltage source in the range of 200 mA
- To use a reference frequency signal from the external oscillator, remove the jumper on connector X4 and then connect the reference generator signal to the connector X8
- Connect SPI interface cable to the X18 connector



## 5 RUNNING AND USING NT1065 CONTROL TOOL

Go to the software folder and run **NT1065\_v2.1.xCE.exe** or later. Program interface window (Figure 5.1).

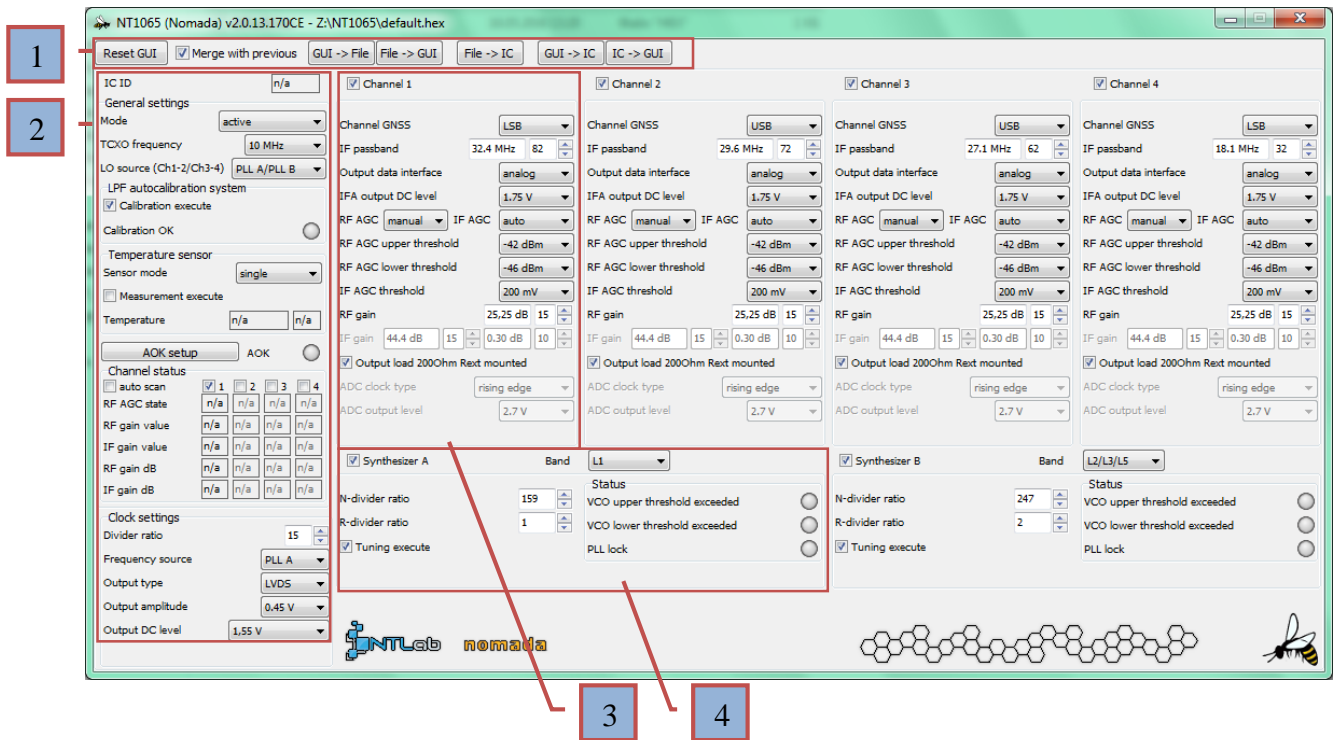


Figure 5.1: Receiver settings tab

The program allows you to perform the following operations:

1. Figure 5.1 Block 1:

- **IC -> GUI** – Reads current state of all IC registers and displays them in the GUI.
- **GUI -> IC** – Writes displayed register states from GUI to IC. Only changes from the latest IC reading are written. If IC was never read after program start, all registers are written.
- **File -> IC** – Writes a file containing register states directly to IC. Writing is sequential; if file contains several values of the same register, register will be overwritten several times with those values.
- **File -> GUI<sup>1</sup>** – Reads a file containing register states and displays them in the GUI. If file contains several values of the same register, only the last value is displayed.
- **GUI -> File** – Writes displayed register states from GUI to a file:
  - If **“Merge with previous”** option is **enabled**:
    - Copies last opened file, adds register state changes to the end of a new file.
    - Existing file: adds register state changes to the end of existing file (Only changes from the latest opened file (file path is shown in the program header) are written)
  - If **“Merge with previous”** option is **disabled**:
    - Write full register map. Overwrites any existing file.
- **Reset GUI** – Restores GUI to initial register states (file **default.hex**).

<sup>1</sup> The program folder contains the recommended configuration files, which are described in detail in **NT1065 LE DS vx.x.pdf** Section 7 – "Application notes".

2. Figure 5.1 Block 2:

The "General" tab sets chip operating modes (standby mode, synthesizer-only mode, active mode), LPF autocalibration procedure and status, temperature sensor control and measured value, channels systems status and AOK status.

For proper synthesizer offset of required frequency range, switch the reference oscillator (TCXO frequency, MHz) frequency to 10 MHz or 24.8 MHz<sup>2</sup>.

To read status of all channels simultaneously checkbox "auto scan" could be set.

3. Figure 5.1 Block 3:

The "Channel" group tab sets receiver operating modes for the selected channel, RF and IF AGC, mixer, LPF, IFA settings. To select required frequency band related to carrier, setup mixer preset "Channel GNSS" to "USB" (upper side band) or "LSB" (lower side band) mode. There is an option to select output channel: analog or digital (2-bit ADC). For other channels settings control is similar.

4. Figure 5.1 Block 4:

The "Synthesizer" tab sets synthesizers settings. Local oscillator frequency is calculated using the following equation:

$$F_{LO} = F_{TCXO} * N / R,$$

where:

$F_{TCXO}$  – reference clock frequency,

$N$  – PLL divider ratio (N-divider),

$R$  – reference clock divider ratio (R-divider).

For example, to receive the signal at L1 frequency with 10 MHz reference oscillator frequency,  $N=159$   $R=1$  could be set, than  $F_{LO} = 10 * 159 / 1 = 1590$  MHz. After changing the coefficients you should perform autotuning: execute PLL "A" and PLL "B" (if intended to use) tuning system – **Reg43 D[0]** and **Reg47 D[0]** correspondingly. For synthesizer B settings control is similar.

Note: For more information on control bits purposes refer to subsection 4.4.6 description in **NT1065 LE DS vx.x.pdf**.

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<sup>2</sup> By default used 10 MHz generator (DA1). To use 24.84 MHz generator (DA2), set the X4 jumper into 2-3 position and also set frequency of the reference generator in the software window (Block 2, "TCXO frequency" to 24.84 MHz).