



EVALUATION BOARD MANUAL

FOR RADIO MODULES

| WE order code | Former order code | Marketing Name |
|---------------|-------------------|----------------|
| 2607031281001 | AMB8636 | Thebe-I |

VERSION 2.2

MARCH 5, 2019

Revision history

| Manual version | HW version | Notes | Date |
|----------------|------------|---|---------------|
| 1.0-1.1 | 2.0 | <ul style="list-style-type: none"> Initial Version | June 2017 |
| 2.0 | 2.0 | <ul style="list-style-type: none"> New corporate design and structure | December 2018 |
| 2.1 | 2.0 | <ul style="list-style-type: none"> Added chapter Regulatory compliance information | February 2019 |
| 2.2 | 2.0 | <ul style="list-style-type: none"> Added Marketing name | March 2019 |

Abbreviations and abstract

| Abbreviation | Name | Description |
|--------------|---|---|
| FSE | Field Sales Engineer | Support and sales contact person responsible for limited sales area |
| HIGH | High signal level | |
| LOW | Low signal level | |
| RF | Radio frequency | Describes everything relating to the wireless transmission. |
| UART | Universal Asynchronous Receiver Transmitter | Interface which allows communicating with the module of a specific interface. |
| VDD | Supply voltage | |

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1 Supported radio modules

The evaluation board described in this manual can be used to evaluate the following products:

| Order code | Former order code | Marketing Name |
|---------------|-------------------|----------------|
| 2607031281001 | AMB8636 | Thebe-I |

| Order code | Description |
|---------------|---|
| 2607031281001 | 869MHz 500mW proprietary radio module, Band P |

Table 1: Compatibility



Figure 1: Product image

2 Functional description

The evaluation board offers the user the possibility to develop hard- and software for the compatible radio module. It can be connected to an USB port of a PC.

For the connection to a microcontroller system the development board is equipped with a multi-pin connector which is connected to all pins of the RF module. Jumpers allow the module to be disconnected from components which are not required such as the USB interface.

Feel free to check our youtube channel for video tutorials, hands-ons and webinars related to our products:

www.youtube.com/user/WuerthElektronik/videos

2.1 Taking into operation

To run the evaluation board place the jumpers on default position as described in chapter 3.2.

The corresponding FTDI driver package (www.ftdichip.com/Drivers/VCP.htm) has to be installed on your PC.

Connect the power jack or external power supply to the EV board and make sure the VCC is stable and able to reliably supply the module's static and peak current consumption as specified by the module manual.

The next step is to connect the evaluation board to the PC using an USB-cable. In that way a COM port can be detected and installed on your PC. Check the device manager to acquire the COM port name of the EV board. A typical name is "COM12" in Windows systems or /dev/ttyUSB0 in Linux systems.

A terminal program (like hterm for Windows) has to be run and the corresponding COM port has to be opened using the default settings of the mounted radio module.

After the module is powered through the USB jack or an alternative power supply, the reset button should be pressed to ensure a clean start-up of the module.

Please refer to the module reference manual to get the detailed module specific quick start instructions.

3 Development board

3.1 Block diagram

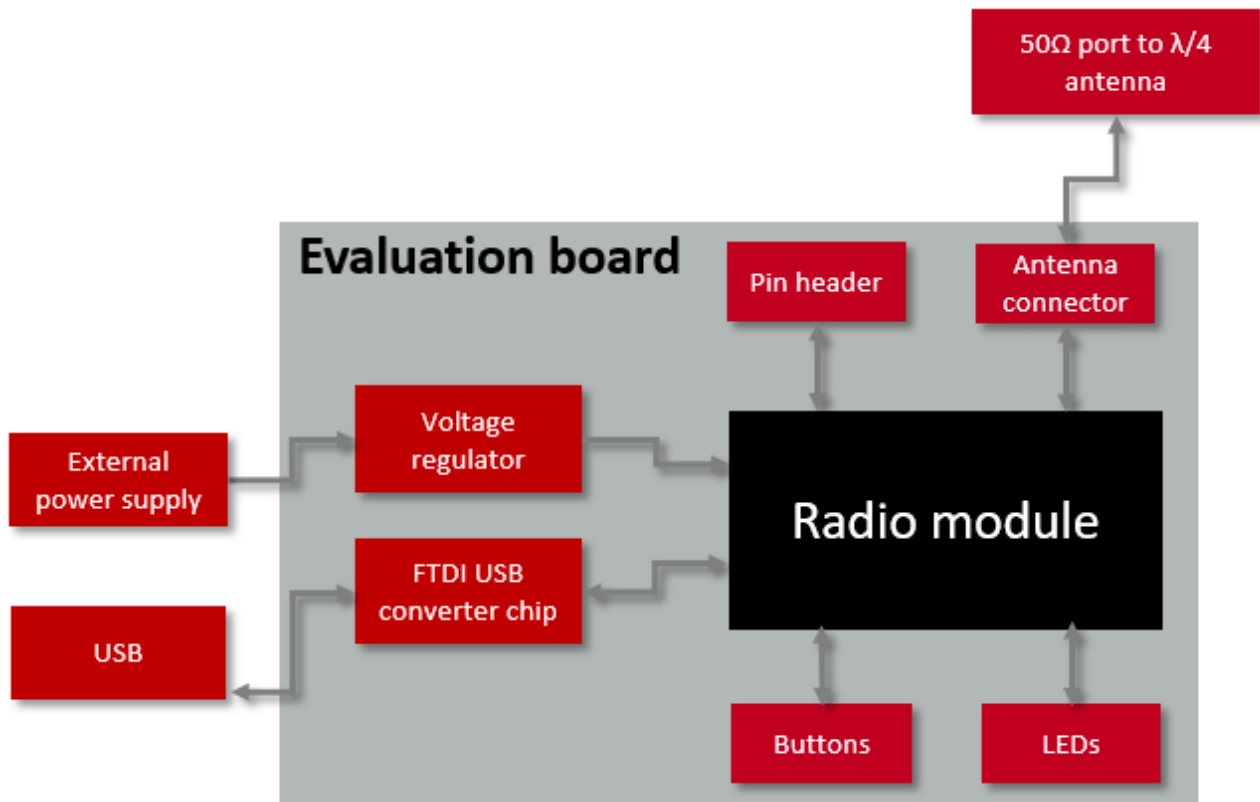


Figure 2: EV board block diagram

3.2 Jumpers

The following figure shows the default positioning (marked in red) of all jumpers on the EV board. This section also contains the details to any jumper connection that is supported by the EV board.

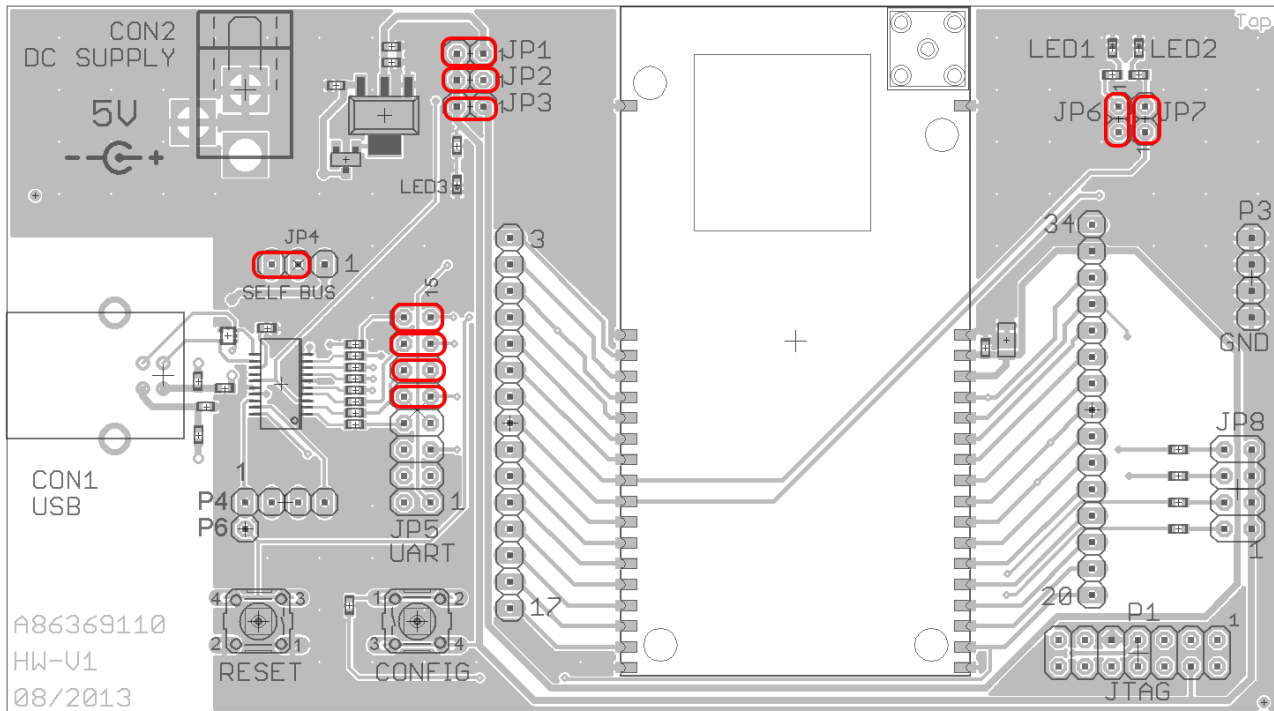


Figure 3: Jumpers, default

| JP1 | Jumper placed (default) | Description |
|-----|-------------------------|--------------------------------|
| 1,2 | Set | Connection of the power supply |

| JP2 | Jumper placed (default) | Description |
|-----|-------------------------|--|
| 1,2 | Set | Connection for the power supply of the USB converter |

| JP3 | Jumper placed (default) | Description |
|-----|-------------------------|--|
| 1,2 | Set | Connection of the power supply toward the radio module (current measurement) |

| JP4 | Jumper placed (default) | Description |
|-------|-------------------------|---|
| 1,2,3 | 2-3 | Selection of the power supply, 1-2 USB powered, 2-3 external power supply |

| JP5 | Jumper placed (default) | Description |
|-------|-------------------------|-------------------------------|
| 1,2 | Not set | RI host - PJ.2 module |
| 3,4 | Not set | DCD host - PJ.1 module |
| 5,6 | Not set | DSR host - PJ.0 module |
| 7,8 | Not set | DTR host - PJ.3 module |
| 9,10 | Set | /CTS host - /RTS module |
| 11,12 | Set | /RTS host - /CTS module |
| 13,14 | Set | UART RX host - UART TX module |
| 15,16 | Set | UART TX host - UART RX module |

| JP6 | Module pin function | Jumper placed (default) | Description |
|-----|---------------------|-------------------------|----------------------------------|
| 1,2 | TX_LED | Set | Connection of the red status LED |

| JP7 | Module pin function | Jumper placed (default) | Description |
|-----|---------------------|-------------------------|------------------------------------|
| 1,2 | RX_LED | Set | Connection of the green status LED |

3.3 Connectors and pin headers

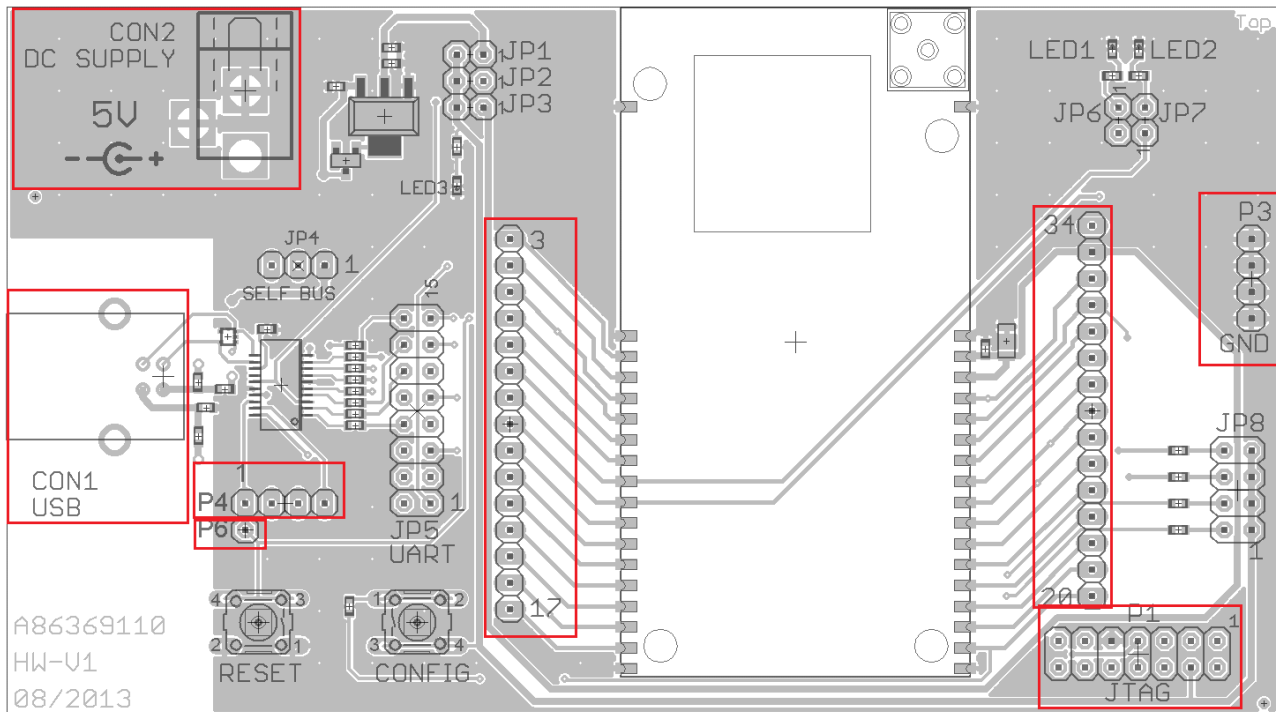


Figure 4: Connectors

| CON1 | Function | Description |
|------|----------|----------------------------|
| - | USB | USB jack for USB interface |

| CON2 | Function | Description |
|------|--------------|--------------------------------|
| - | Power supply | Power jack for 5V power supply |

| P1 | Function | Description |
|------|----------|---|
| 1-14 | JTAG | JTAG-interface for programming, see chapter 3.5.5 |

| P3 | Function | Description |
|-----|----------|-------------|
| 1-4 | GND | Ground |

| P4 | Function | Description |
|-----|---------------|--------------------------------------|
| 1-4 | FTDI CBUS 0.3 | connector to the 4 CBUS pins of FTDI |

| P6 | Function | Description |
|----|----------|---|
| 1 | RESET | connector to <i>/RESET</i> pin of module, can be connected to P4-1 to provide access to the <i>/RESET pin</i> through FTDI CBUS0. |

| | Description |
|-------|--|
| 3-17 | Direct access to the signals of the radio module |
| 20-34 | Direct access to the signals of the radio module |

3.4 Buttons

3.4.1 Reset button

Internally the active low reset input of the microprocessor is connected via a RC combination with the power supply to ensure a proper startup of the module. The module provides a */RESET* pin that is connected to this button so the module can be restarted properly. Please refer to the module specific manual for detailed information.

The reset is also available on pin 19 (P8) and P6.

3.4.2 Config button

By means of the Config pushbutton the module can be switched between the command mode and transparent mode.

The switching takes place after recognition of a falling edge on the */CONFIG* pin (pushing Config button) and is acknowledged through a respective command. The switching of the modes can only take place while no data is being received via RF (*/RTS* has to be low). Please refer to the module specific manual for detailed information.

3.5 Function blocks

3.5.1 Power supply

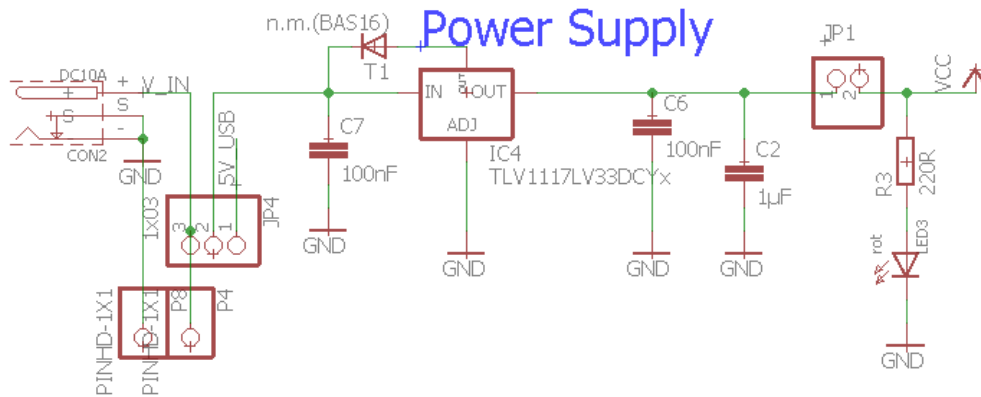


Figure 5: Power Supply Circuit

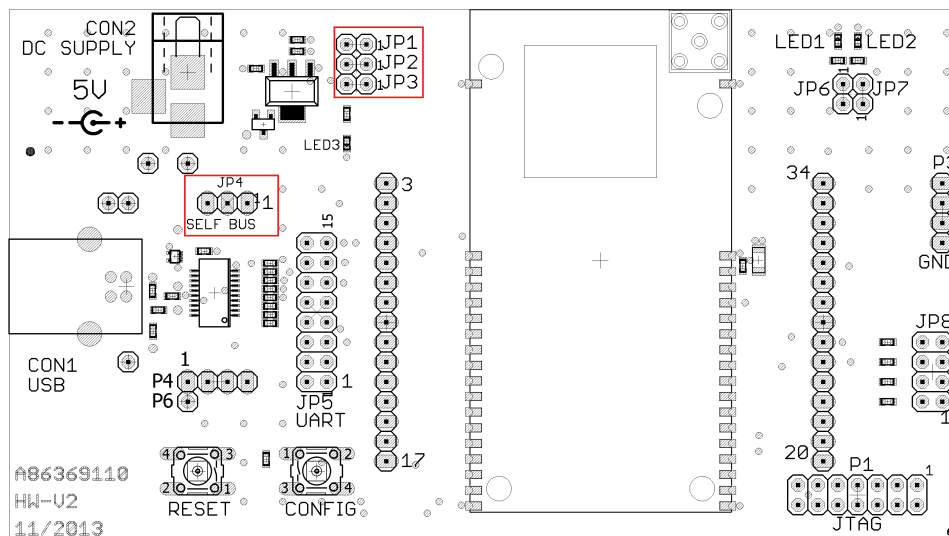


Figure 6: Power Supply Layout

3.5.1.1 Self powered, power jack

Make sure JP4 is in default position (2-3, "self powered") and JP2 jumper set.

The development board can be operated by connecting a 5V voltage source to the power jack. Pay special attention to the polarity before connecting the power jack to the board.

If the power supply is connected and the bridges on JP1, JP2, JP3 and JP4 are set correctly (as in the factory state), then the power LED3 should be ON.

The integrated voltage regulator regulates the connected 5V down to 3.3V with which the remaining parts of the circuit are supplied. Make sure that the power jack (or external power supply) is connected to the module and VCC is stable before the USB is connected to a PC.

3.5.1.2 Self powered, external power supply through JP1-2

Remove the JP1 jumper.

JP1 should not be set in order to avoid voltage on the output of the integrated voltage regulator.

The radio module may be powered via pin 2 of JP1 (JP1-2) behind the voltage regulator. Applying GND to the board can take place via any P3 pin. Using the USB-interface in parallel to this power supply method (with JP2 jumper set) the voltage range of the external supply has to be kept in between 3.0V and 3.6V to operate the USB converter in its specified range.

When the power is connected the power LED3 will be on. Make sure that the power jack (or external power supply) is connected to the module and VCC is stable before the USB is connected to a PC.

3.5.1.3 Bus powered, power supply through USB

The radio module may be powered via USB connector (requires the JP4 to be placed at 1-2). As the module's peak current in TX mode is higher (see product specific manual) than the "Max Bus Power" configured in the FTDI IC this method is not recommended to be used as it may damage the connected PC permanently.

Supplying the board solely via USB is only recommended in case of receiving. When sending with high output power the supply of the board must be done via the power jack with jumper setting "self" to avoid damaging the USB-host through to too high power drain.

3.5.2 Current measurement

JP3 can be used to measure the power consumption of the module. By default a bridge is set on JP3 to close the circuit. Remove the bridge and connect a current meter in place of the jumper to measure the power consumption of the module.

If the meter is not attached and the bridge is not set, the module will not receive supply voltage. However, the power LED may be active, as it is connected prior to the current measurement bridge in order not to distort the module's power consumption.

Parts connected to the module, such as LEDs, can be separated from the module via JP6 and JP7. Power may also be supplied to the module via JP3 (2.0V - 3.6V). However, in this

case the USB converter will not be powered.

3.5.3 UART / USB

The UART of the module can be connected to the USB converter by setting the according jumpers (see defaults) to JP5 and is available on the USB jack so that the module can be connected directly to a PC or host . Using the FTDI-driver the PC will show a virtual COM-Port which can be used to communicate with the module.

Verify that the JP2 jumper is mounted (important for correct IO levels) and make sure that the power jack (or external power supply) is connected to the module and VCC is stable before the USB is connected to a PC.

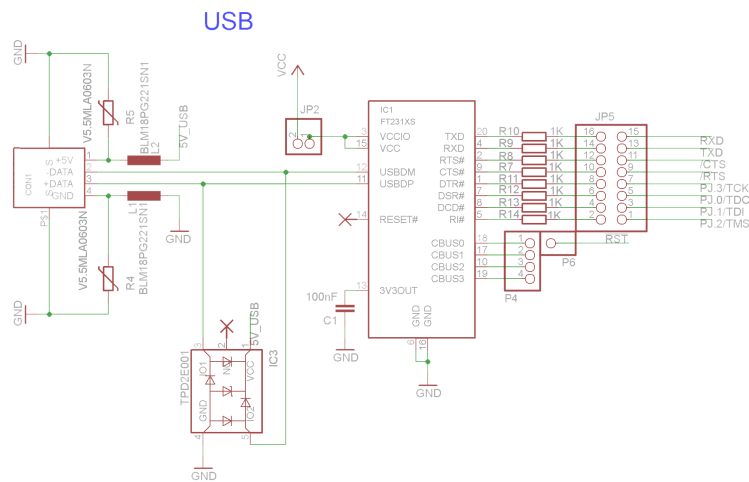


Figure 7: USB

3.5.4 UART direct

If a microcontroller is to be connected to the module, remove the bridges on JP5. The UART can be connected directly on the pin strip JP5 (all odd numbered pins). The module RXD line must be handled accordingly by your host (i.e. pulled up while inactive and during module boot-up).

Beware of IO level incompatibility. The host must obey the values stated in the module's manual. Especially the IO level restrictions must be implemented by a host system (i.e. using a level shifter to use the allowed IO levels).

3.5.5 Programming interface

The evaluation board provides a 2*7 pin connector (P1) in 2.54 RM to connect directly to a JTAG flash adapter used for development. Please take care of the correct mounting of the flash adapter (Pin 1 is marked as such).

3.6 Schematic

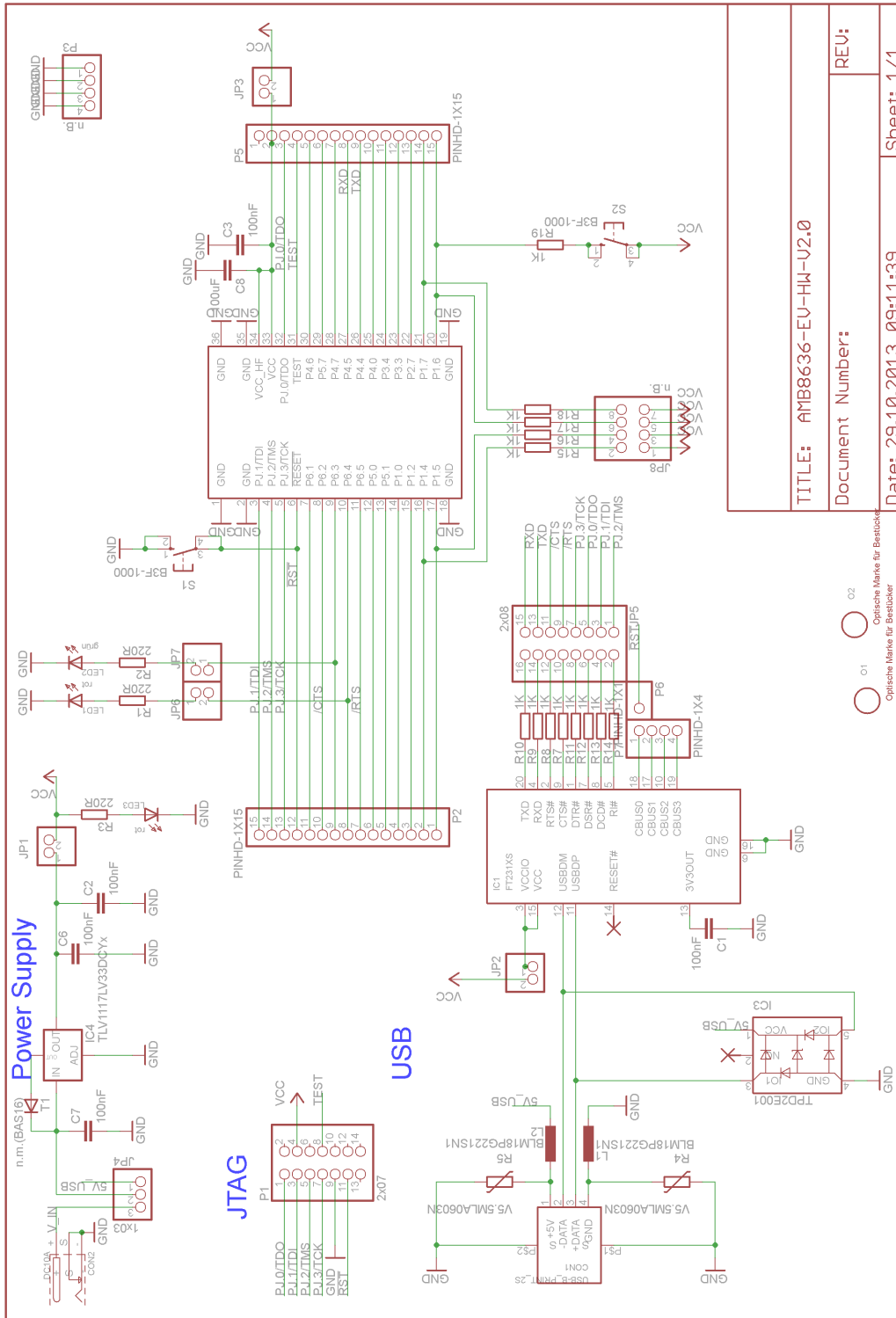


Figure 8: Wiring diagram

TITLE: AMB8636-EU-HW-U2.0

Document Number:

REV:

Date: 29.10.2013 09:11:39

Sheet: 1/1

○ 01 Optische Marke für Bestückler
○ 02 Optische Marke für Bestückler

3.7 Full layout

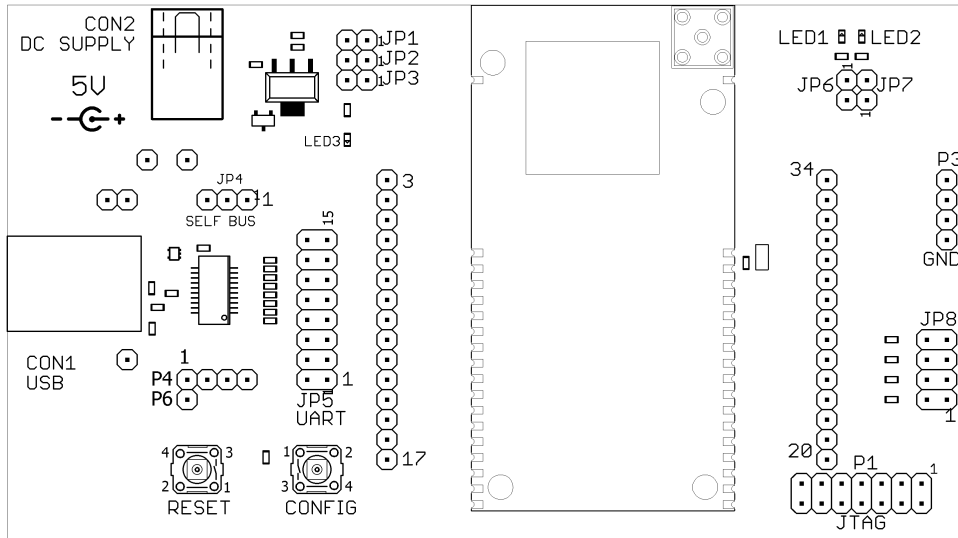


Figure 9: Assembly diagram

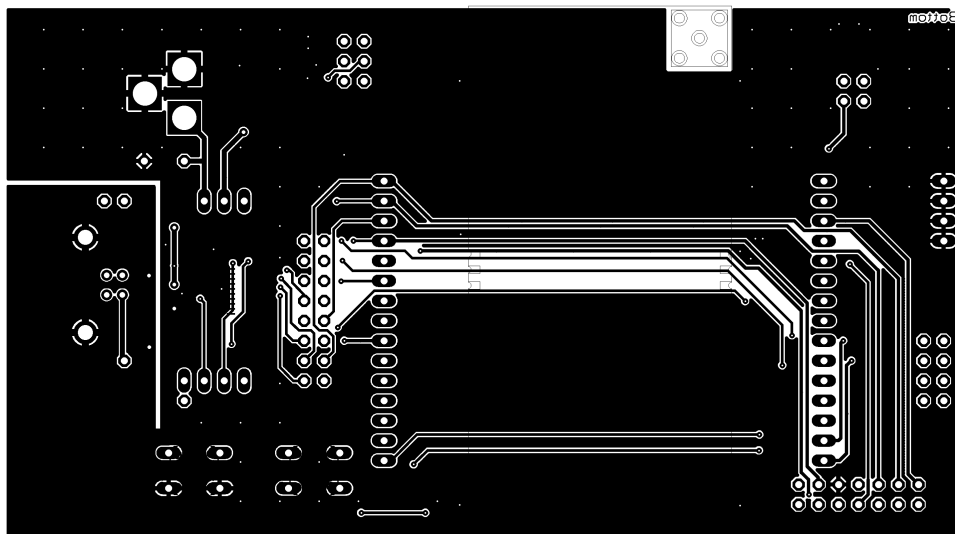
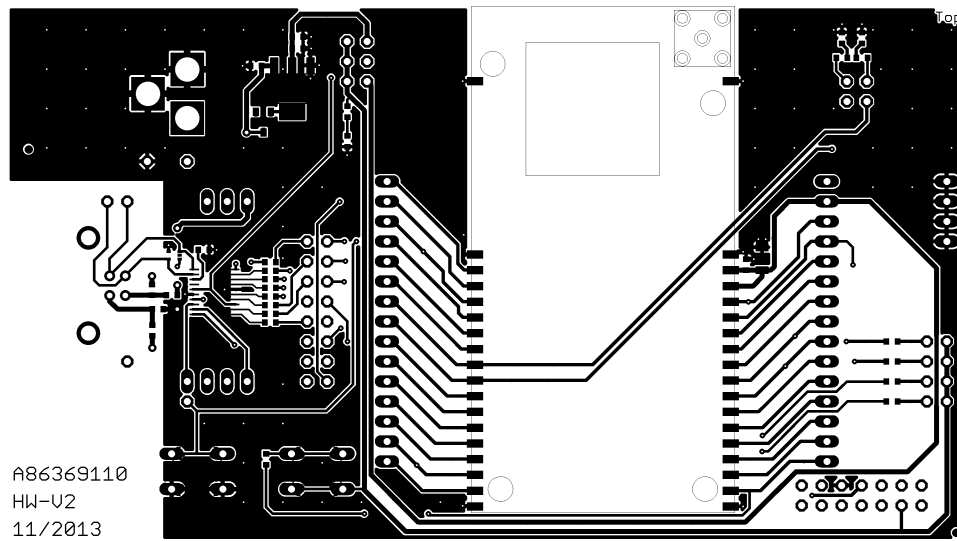


Figure 10: Top and Bottom Layer

4 Regulatory compliance information

Pursuant to Article 1 (2.) of the EU directive 2014/53/EU, Article 1 (2.) the directive does not apply to equipment listed in Annex I (4.): custom-built evaluation kits destined for professionals to be used solely at research and development facilities for such purposes.

4.1 Exemption clause

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5.3 Best care and attention

Any product-specific datasheets, manuals, application notes, PCN's, warnings and cautions must be strictly observed in the most recent versions and matching to the products firmware revisions. This documents can be downloaded from the product specific sections on the wireless connectivity homepage.

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7.4 Firmware update(s)

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We recommend you to be updated about the status of new firmware, which is available on our website or in our data sheet, and to implement new firmware in your device where appropriate. In case only firmware is provided, we expressly exclude the automatic receipt of PCN information. Thus, new firmware will also not be provided automatically.

By ordering a wireless connectivity Product, you accept this license agreement in all terms.

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