



EVALUATION BOARD MANUAL

FOR RADIO MODULES

| WE order code | Former order code | Marketing Name |
|---------------|-------------------|----------------|
| 260603102100x | AMB2524(-TR) | Thalassa |
| 260603112100x | AMB2524-1(-TR) | Thalassa |
| 260603132100x | AMB2524-2(-TR) | Thalassa |

VERSION 3.3

MAY 21, 2019

Revision history

| Manual version | HW version | Notes | Date |
|----------------|------------|--|---------------|
| 1.0 - 2.7 | 2.0 | <ul style="list-style-type: none"> Initial version | June 2017 |
| 3.0 | 3.0 | <ul style="list-style-type: none"> New corporate design and structure | December 2018 |
| 3.1 | 3.0 | <ul style="list-style-type: none"> Added chapter Regulatory compliance information | February 2019 |
| 3.2 | 3.0 | <ul style="list-style-type: none"> Added Marketing name Moved product image to chapter Supported radio modules | March 2019 |
| 3.3 | 3.0 | <ul style="list-style-type: none"> Added chapter LEDs Correction of default jumper settings in chapter Jumpers | May 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 | Universal Asynchronous Receiver Transmitter 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:

| WE order code | Former order code | Marketing Name |
|---------------|-------------------|----------------|
| 260603102100x | AMB2524(-TR) | Thalassa |
| 260603112100x | AMB2524-1(-TR) | Thalassa |
| 260603132100x | AMB2524-2(-TR) | Thalassa |

| WE order code | Description |
|---------------|---|
| 260603102100x | 2.4GHz proprietary radio module with integrated antenna |
| 260603112100x | 2.4GHz proprietary radio module with antenna pad |
| 260603132100x | 2.4GHz proprietary radio module with UFL connector |

Table 1: Compatibility

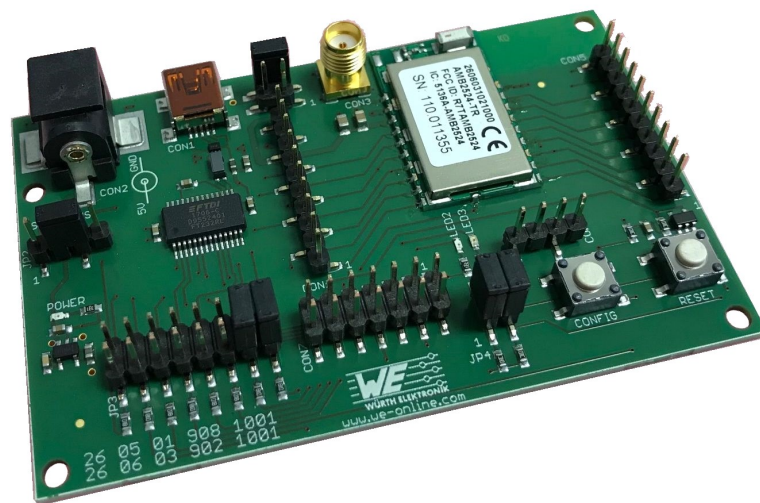


Figure 1: Product image

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 3.3.

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 a 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

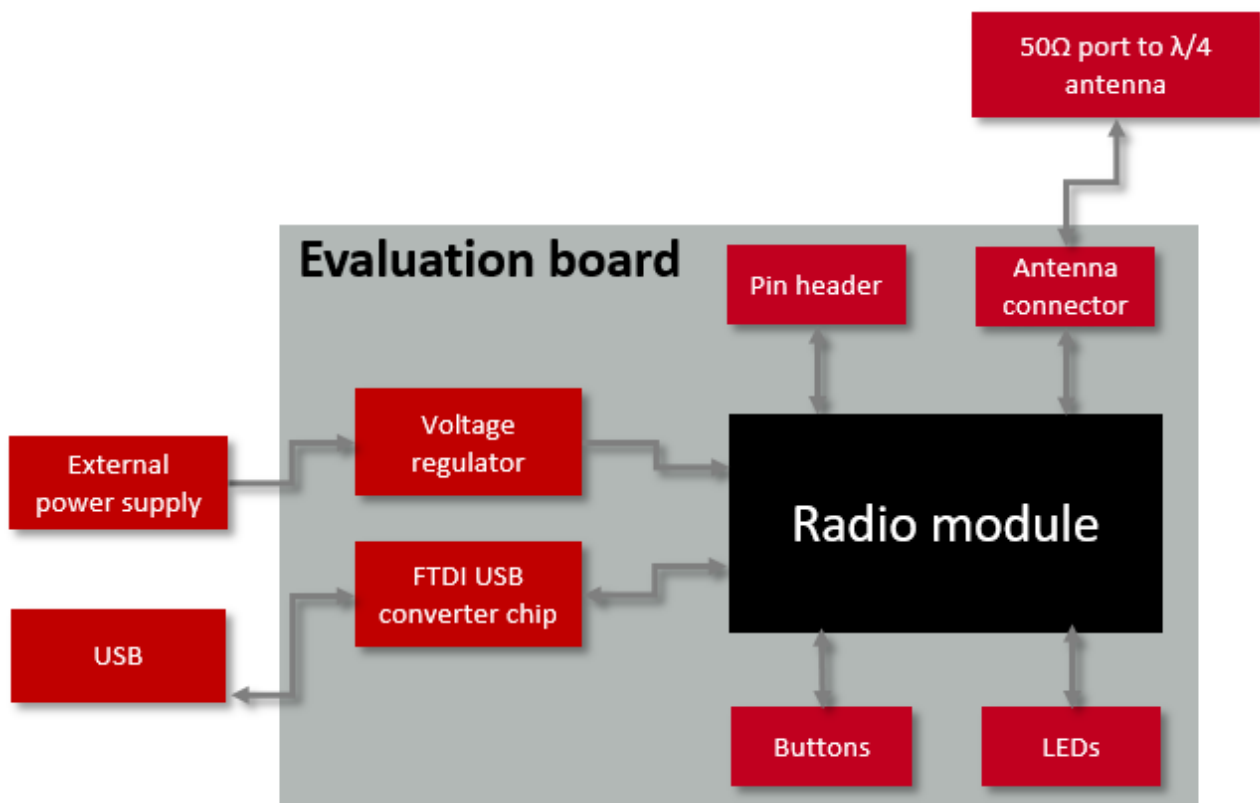


Figure 2: Block diagram

3.2 Overview

On the back of the module is a complete table of all connector and jumper pins printed for easy use of the evaluation board without using the manual once being familiar with it.

| | | |
|---|---|---|
| <p>----- CON1 MICRO USB -----</p> <p>CON2 5V POWER SUPPLY -----</p> <p>CON3 SMA RF-SIGNAL -----</p> <p>CON4 1: RSVD 2: RSVD 3: #DATA_REQUEST 4: #DATA_INDICATE 5: #RTS <TCK> 6: URXD 7: UTXD 8: UCC_AMB 9: GND 10: NC/ANT -----</p> | <p>----- CON5 1: SLEEP 2: TRX_DISABLE 3: #CONFIG 4: RSVD 5: #RST 6: RSVD 7: RSVD 8: RSVD 9: RSVD 10: RSVD -----</p> <p>CON6 1: GND 2: GND 3: GND 4: GND -----</p> <p>CON7 JTAG 1: RSVD <TDO> - 14: NC 2: RSVD <TDI> - 13: UCC 3: RSVD <TMS> - 12: NC 4: #RTS <TCK> - 11: TEST_AMB 5: GND - 10: NC 6: #RST - 9: NC 7: NC - 8: NC -----</p> | <p>JP1 ... <-> MODULE 1: NC <-> 4: NC 2: UCC_AMB <-> 3: UCC</p> <p>JP2 SUPPLY SELECTION 1 <-> 2 CON2 SUPPLIED 2 <-> 3 USB SUPPLIED 4: NC</p> <p>JP3 1: TXD_FTDI <-> 16: RX 2: RXD_FTDI <-> 15: TX 3: #RTS_FTDI <-> 14: RSVD <TDO> 4: #CTS_FTDI <-> 13: #RTS <TCK> 5: #DTR_FTDI <-> 12: RSVD <TDI> 6: #DSR_FTDI <-> 11: RSVD 7: #DCD_FTDI <-> 10: RSVD 8: #RI_FTDI <-> 9: RSVD <TMS></p> <p>JP4: 1: TRX_DISABLE <-> 4: UCC 2: SLEEP <-> 3: UCC</p> |
|---|---|---|

Figure 3: Printing on the back, table of connector and jumper

3.3 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.

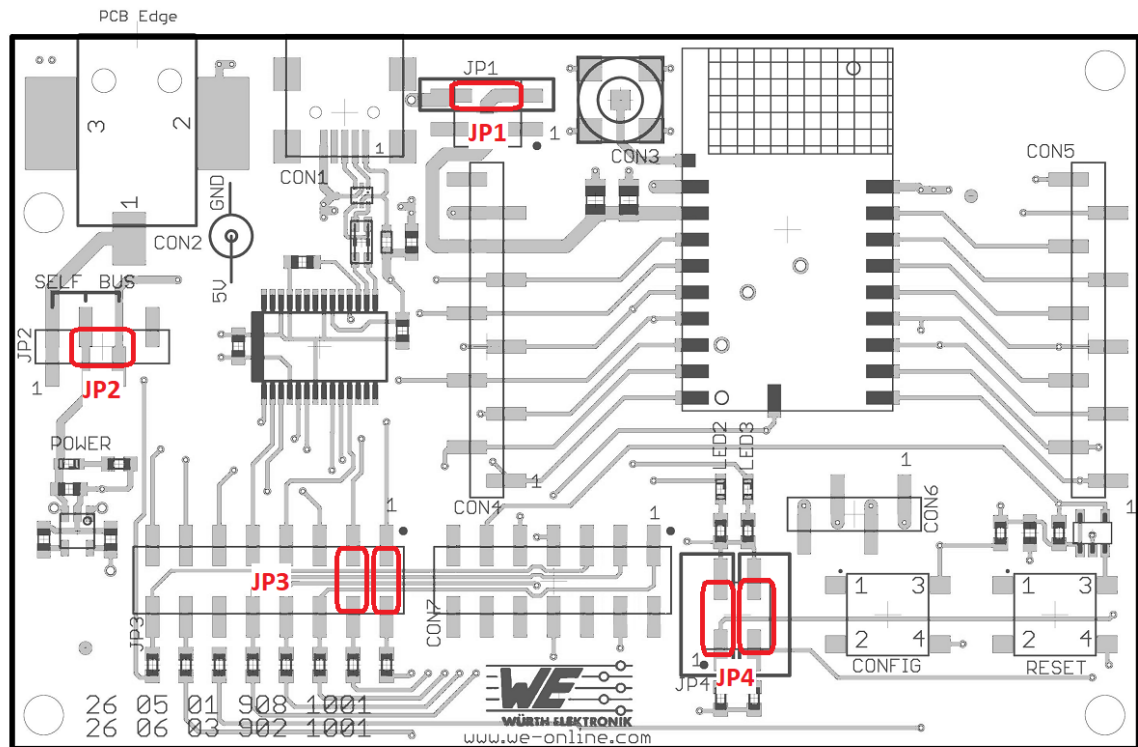


Figure 4: Jumpers in default position

JP1 connects the power supply to the module and can be replaced by an ampere meter for current consumption measurement.

| JP1 | Module Pin Function | Jumper set (default) |
|-----|---|----------------------|
| 2,3 | Connect VCC to voltage regulator output | Yes |
| 1,4 | NC, not connected | No |

With JP2 the supply voltage source can be chosen.

| JP2 | Module Pin Function | Jumper set (default) |
|-----|----------------------------------|----------------------|
| 1,2 | Connect LDO to voltage jack CON2 | No |
| 2,3 | Connect LDO to USB 5V | Yes |
| 3,4 | No function, pin4 not connected | No |

JP3 serves to connect module pins to the USB converter.

| JP3 | Module Pin Function | Jumper set (default) |
|------|---------------------|----------------------|
| 1,16 | URXD | Yes |
| 2,15 | UTXD | Yes |
| 3,14 | RESERVED | No |
| 4,13 | RESERVED | No |
| 5,12 | RESERVED | No |
| 6,11 | RESERVED | No |
| 7,10 | RESERVED | No |
| 8,9 | RESERVED | No |

JP4 connects the configuration pins to pull ups.

| JP4 | Module Pin Function | Jumper set (default) |
|-----|---------------------|----------------------|
| 2,3 | TRX_DISABLE | No |
| 1,4 | SLEEP | No |

Connector CON2 suits to connect to power supply.

| CON2 | I/O | Function |
|-------|--------|----------|
| inner | Supply | 5V |
| outer | Supply | GND |

Connector CON3 is a coaxial SMA female connector for an external antenna.

| CON3 | I/O | Function |
|-------|-----|-----------|
| inner | I/O | RF signal |
| outer | I/O | GND |

Connectors CON4 and CON5 make all module pins available for testing purpose.

| CON4 | I/O | Function |
|------|--------|----------------|
| 1 | - | RESERVED |
| 2 | - | RESERVED |
| 3 | I | /DATA_REQUEST |
| 4 | O | /DATA_INDICATE |
| 5 | O | /RTS (TCK) |
| 6 | I | URXD |
| 7 | O | UTXD |
| 8 | Supply | VCC |
| 9 | Supply | GND |
| 10 | - | NC |

| CON5 | I/O | Function |
|------|-----|-------------|
| 1 | I | SLEEP |
| 2 | I | TRX_DISABLE |
| 3 | I | /CONFIG |
| 4 | - | RESERVED |
| 5 | I | /RST |
| 6 | - | RESERVED |
| 7 | - | RESERVED |
| 8 | - | RESERVED |
| 9 | - | RESERVED |
| 10 | - | RESERVED |

Connector CON6 gives the possibility to connect ground.

| CON6 | I/O | Function |
|------|--------|----------|
| 1 | Supply | GND |
| 2 | Supply | GND |
| 3 | Supply | GND |
| 4 | Supply | GND |

Connector CON7 is the JTAG debugging interface. It can be used in case of custom firmware development with "debug" firmware and is locked when using a "production" firmware.

| CON7 | Function | CON7 | Function |
|------|----------|------|----------|
| 1 | TDO | 14 | NC |
| 2 | TDI | 13 | VCC |
| 3 | TMS | 12 | NC |
| 4 | TCK | 11 | TEST |
| 5 | GND | 10 | NC |
| 6 | /RST | 9 | NC |
| 7 | NC | 8 | NC |

3.5 Buttons

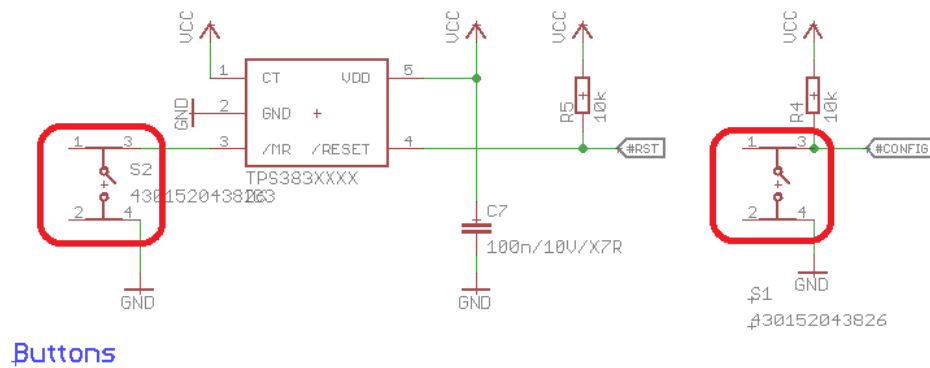


Figure 6: Buttons

3.5.1 CONFIG button, S2

By means of the S2 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 button S2) 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).

3.6 LEDs

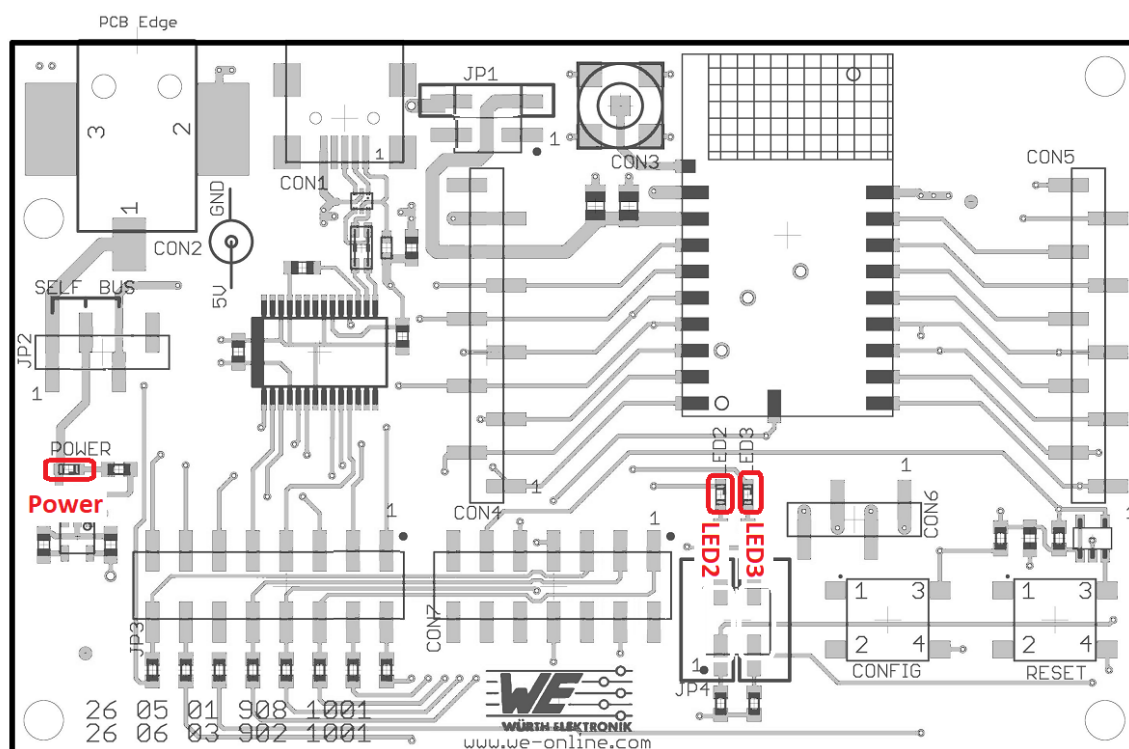


Figure 7: LEDs

| LED | Function |
|-------|--------------------------------------|
| Power | 5V Power supply is attached |
| LED2 | /DATA_IND, packet receive indication |
| LED3 | /RTS UART activity |

LED2 and LED3 eases range measurements in transparent mode by visualising over the air received data (LED2) and sent data (LED3) by blinkin corresponding to the table above.



Attention: The LED 'POWER' also lights up with removed jumper JP1 as it is connected before the current measurement bridge so that its current is not accumulated into the module current when measuring.

3.9 UART / USB

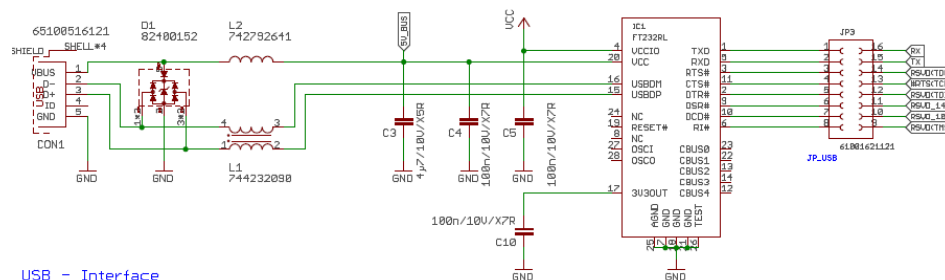


Figure 9: USB Interface

In order to use the USB interface the corresponding USB driver has to be installed on the PC.

On JP3 the UART has to be connected, jumpers have to be placed on pin 1-16 and 2-15 for UTXD and URXD.

3.9.1 UART direct

If a microcontroller is to be connected to the module, the jumpers on JP3 have to be removed. The UART can be connected directly on the pin strip CON4. 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).

3.10 Programming interface

The evaluation board provides a 2*7 pin connector in RM2.54 to connect directly to a JTAG flash adapter used for development. Please take care of the correct mounting of the flash adapter.

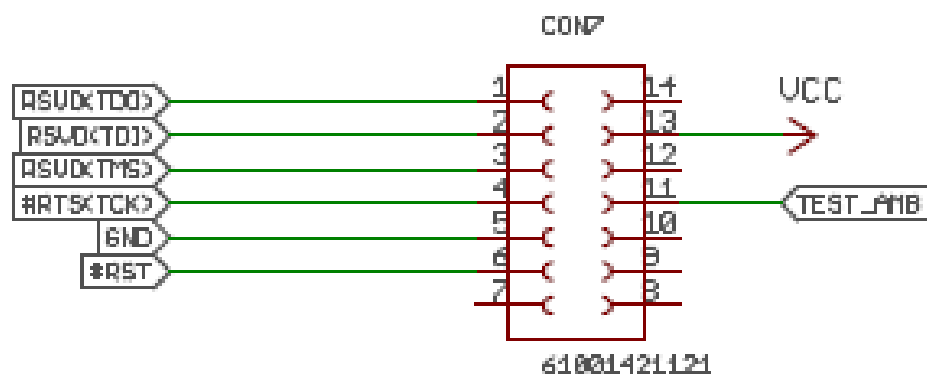


Figure 10: JTAG Interface

3.11 Schematic

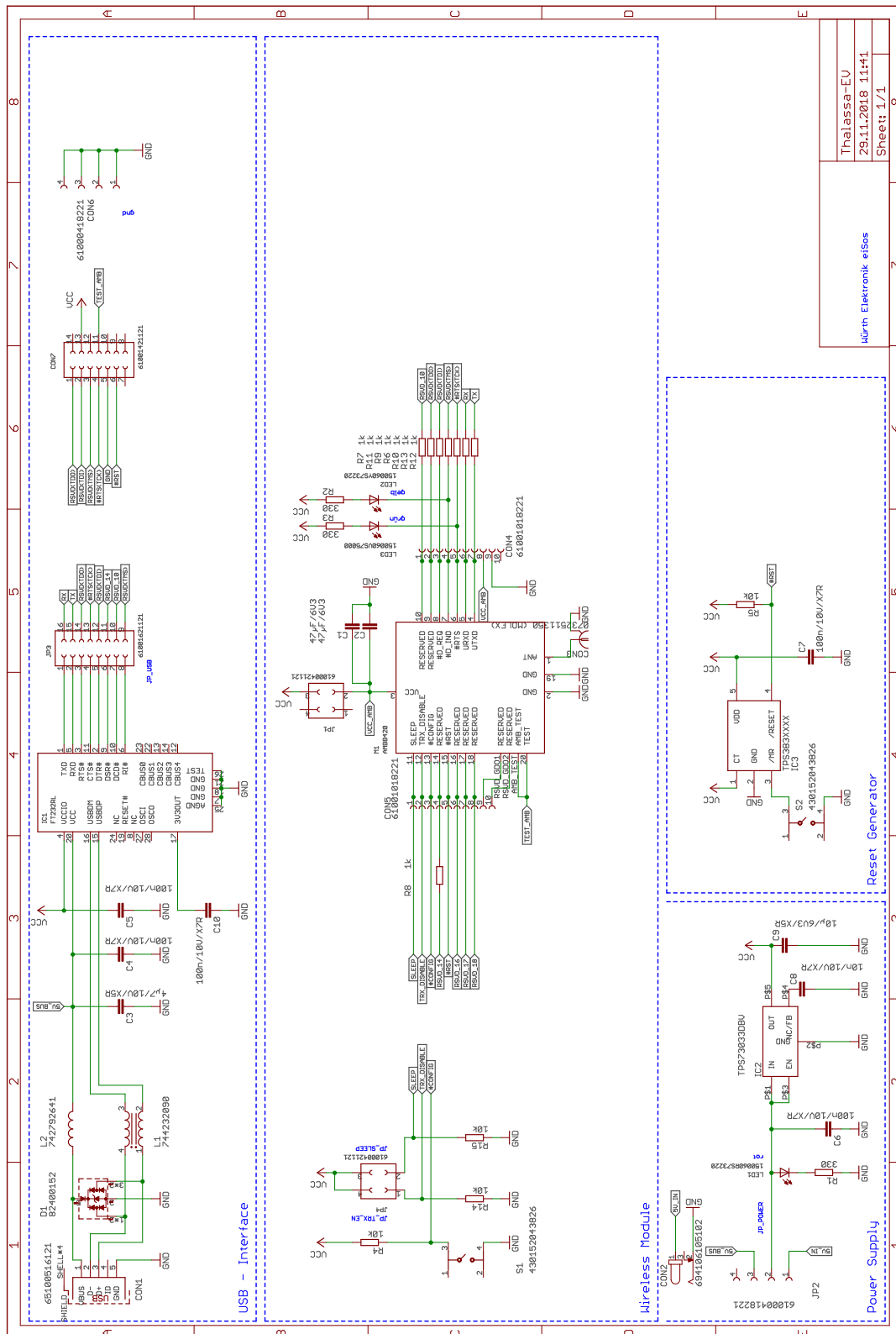


Figure 11: Circuit diagram

3.12 Layout

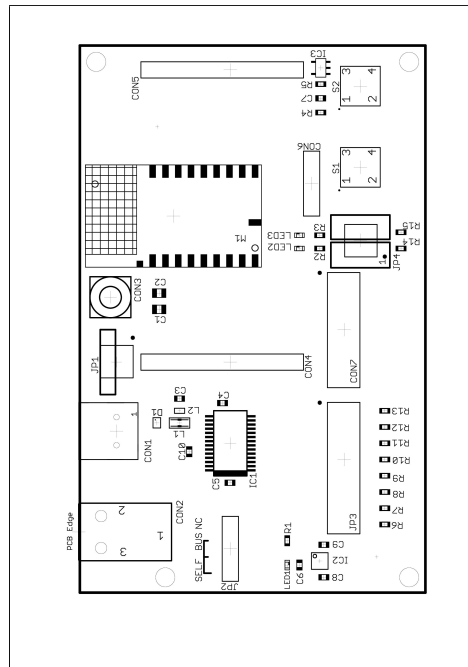


Figure 12: Assembly diagram

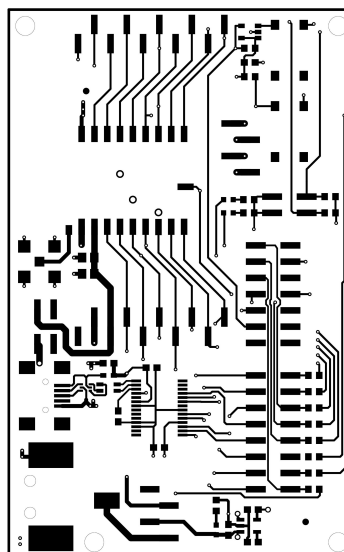


Figure 13: Top Layer

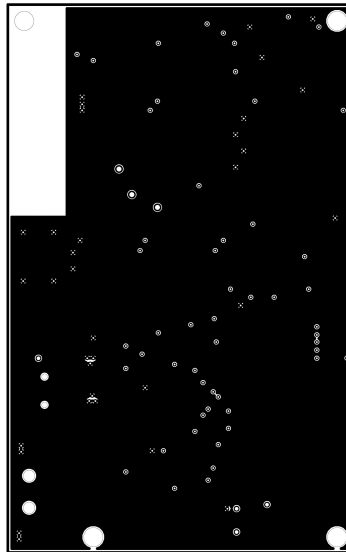


Figure 14: Internal Layer 2

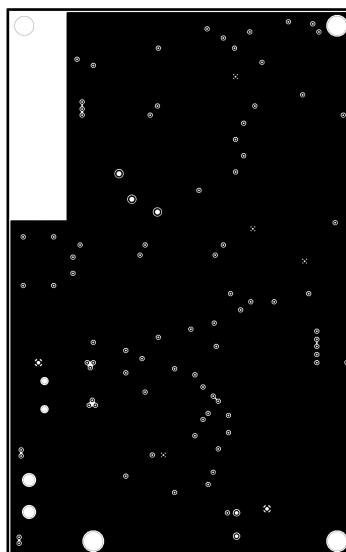


Figure 15: Internal Layer 3

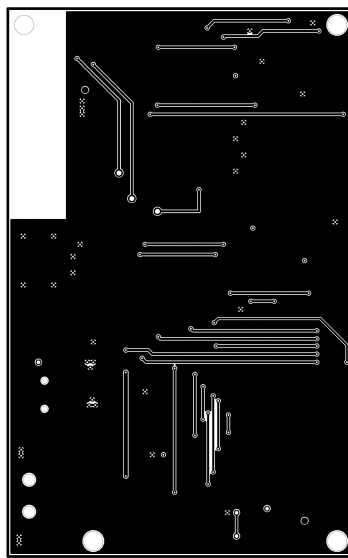


Figure 16: Bottom Layer

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

Relevant regulation requirements are subject to change. Würth Elektronik eiSos does not guarantee the accuracy of the before mentioned information. Directives, technical standards, procedural descriptions and the like may be interpreted differently by the national authorities. Equally, the national laws and restrictions may vary with the country. In case of doubt or uncertainty, we recommend that you consult with the authorities or official certification organizations of the relevant countries. Würth Elektronik eiSos is exempt from any responsibilities or liabilities related to regulatory compliance.

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It has to be clearly pointed out that the possibility of a malfunction of electronic components or failure before the end of the usual lifetime cannot be completely eliminated in the current state of the art, even if the products are operated within the range of the specifications. The same statement is valid for all software sourcecode and firmware parts contained in or used with or for products in the wireless connectivity and sensor product range of Würth Elektronik eiSos GmbH & Co. KG. In certain customer applications requiring a high level of safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health, it must be ensured by most advanced technological aid of suitable design of the customer application that no injury or damage is caused to third parties in the event of malfunction or failure of an electronic component.

5.3 Best care and attention

Any product-specific data sheets, 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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7.3 Ownership

The incorporated Firmware created by Würth Elektronik eiSos is and will remain the exclusive property of Würth Elektronik eiSos.

7.4 Firmware update(s)

You have the opportunity to request the current and actual Firmware for a bought wireless connectivity Product within the time of warranty. However, Würth Elektronik eiSos has no obligation to update a modules firmware in their production facilities, but can offer this as a service on request. The upload of firmware updates falls within your responsibility, e.g. via ACC or another software for firmware updates. Firmware updates will not be communicated automatically. It is within your responsibility to check the current version of a firmware in the latest version of the product manual on our website. The revision table in the product manual provides all necessary information about firmware updates. There is no right to be provided with binary files, so called "Firmware images", those could be flashed through JTAG, SWD, Spi-Bi-Wire, SPI or similar interfaces.

7.5 Disclaimer of warranty

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7.9 Miscellaneous

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