WÜRTH ELEKTRONIK

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	• Initial version	June 2017
3.0	3.0	• New corporate design and structure	December 2018
3.1	3.0	• Added chapter `Regulatory compliance information`	February 2019
3.2	3.0	• Added Marketing name • Moved product image to chapter `Supported radio modules`	March 2019
3.3	3.0	• 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	

Contents

1 Supported radio modules

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

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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

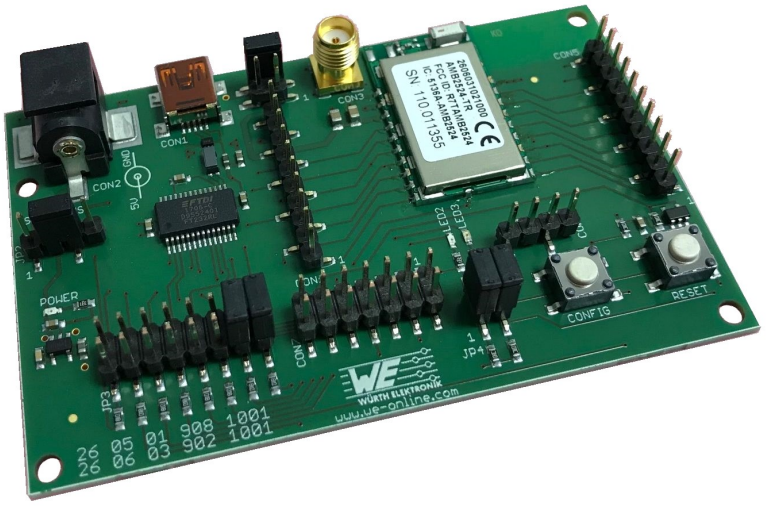

Figure 1: Product image

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

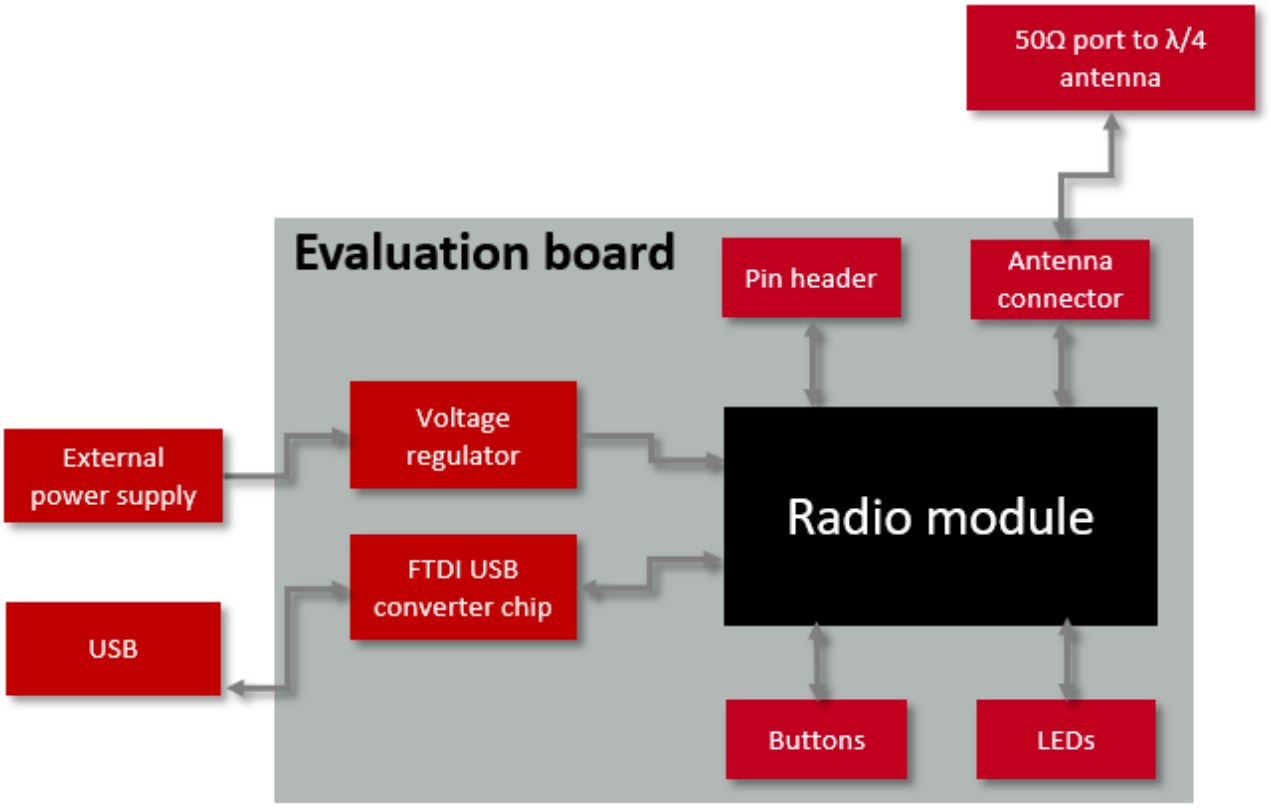

Figure 2: Block diagram

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 familar with it.

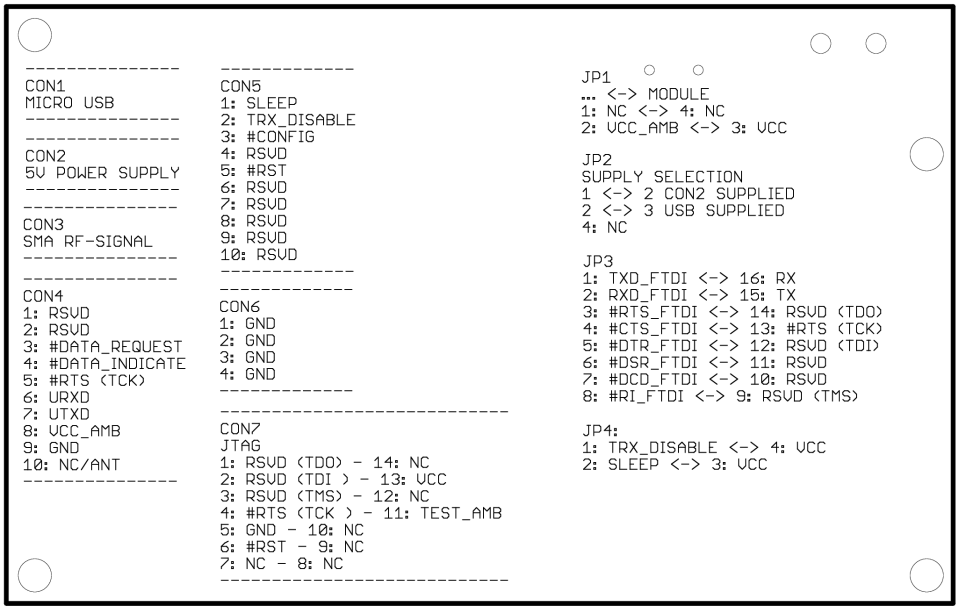

Figure 3: Printing on the back, table of connector and jumper

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.

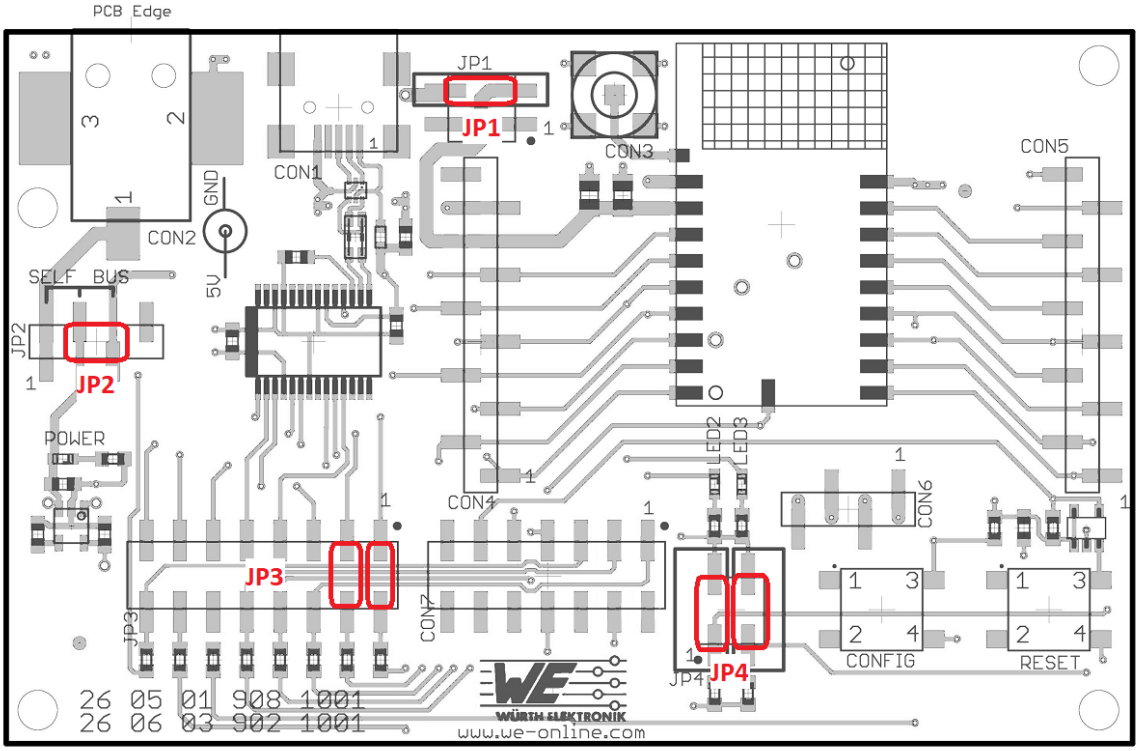

Figure 4: Jumpers in default position

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

3.4 Connectors and pin headers

This section explains all connectors on the EV board.

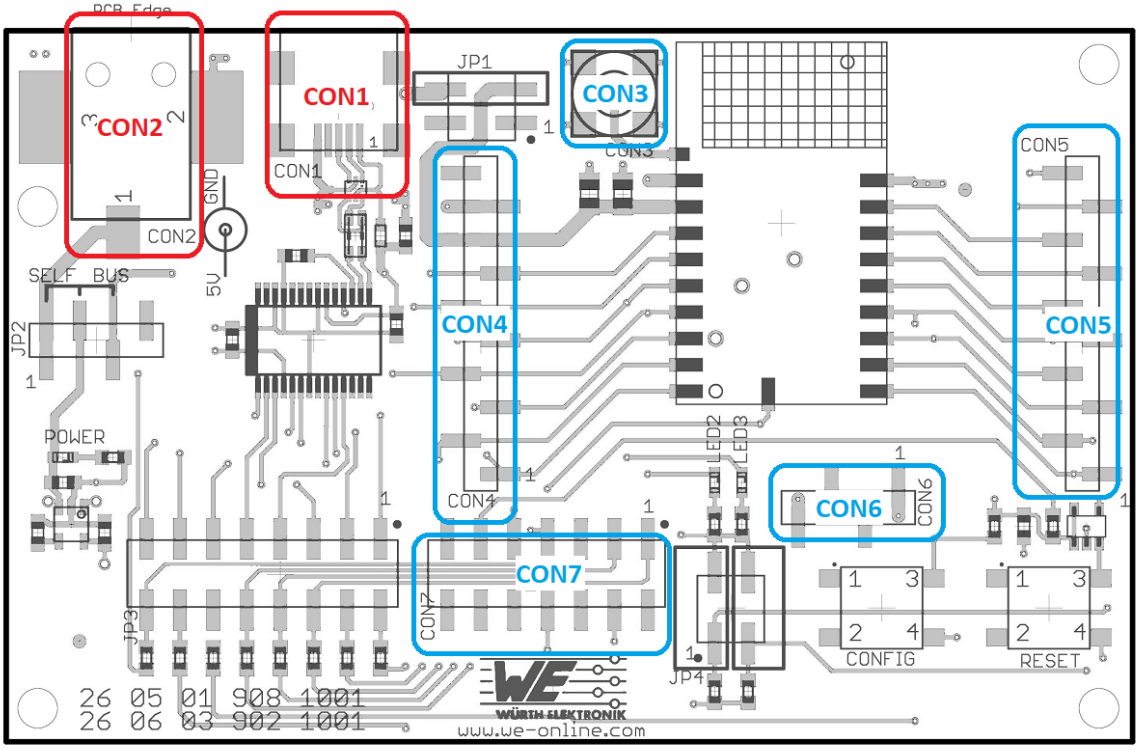

Figure 5: Connectors

The red marked connectors are needed for the main functions of the module. The blue marked connectors are optional for additional equipment and future functions.

STOP

In this chapter all available pins and connectors are described. This does not mean that these functions are or can be enabled in the firmware version currently running on the module.

Connector CON1 is used to connect the UART after converted into an USB signal towards a PC.

CON1	Function
	Micro-USB connector for host connection and VCC bus supply

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

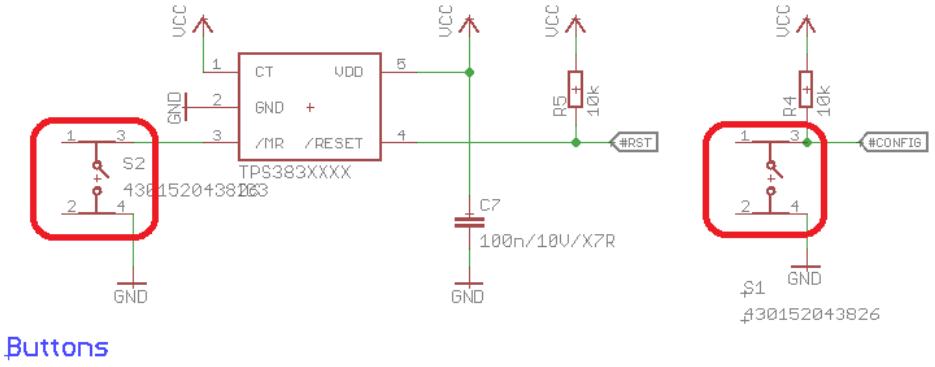

Figure 6: Buttons

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

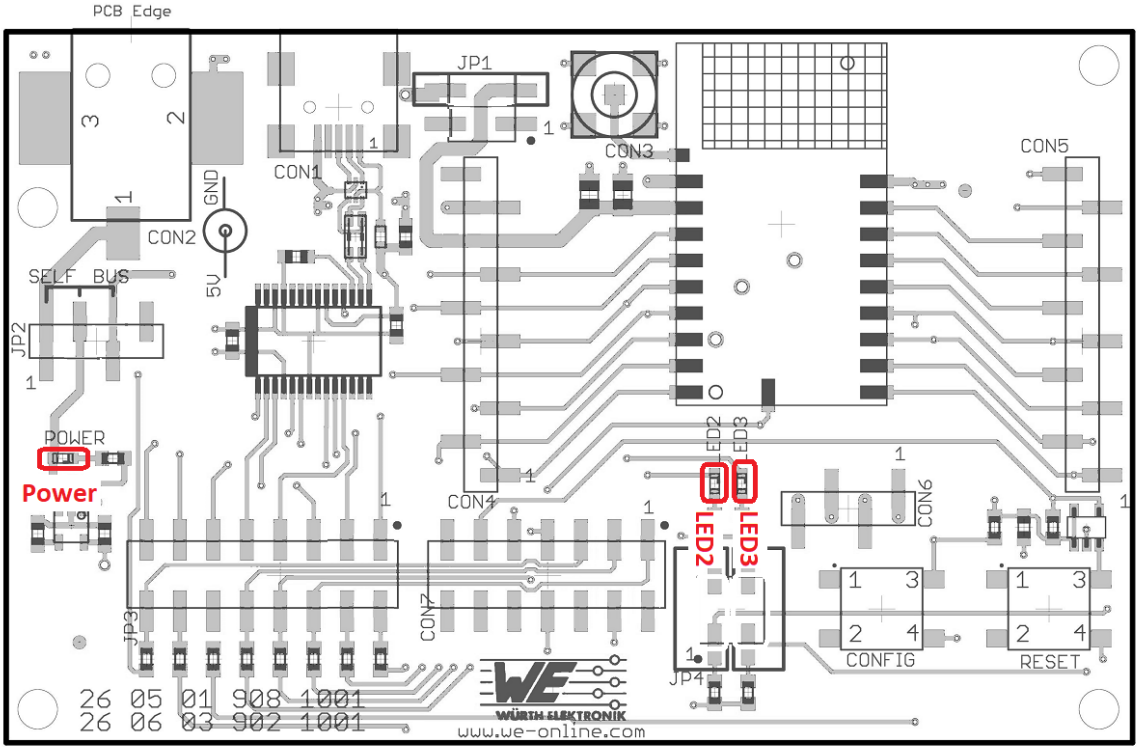

Figure 7: LEDs

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 blinkgin corresponding to the table above.

3.7 Function blocks

3.7.1 Power supply

The development board can be operated via USB or an other 5V Voltage source using the on board LDO 3.3V voltage regulator. When the power is connected LED1, the power LED will be on.

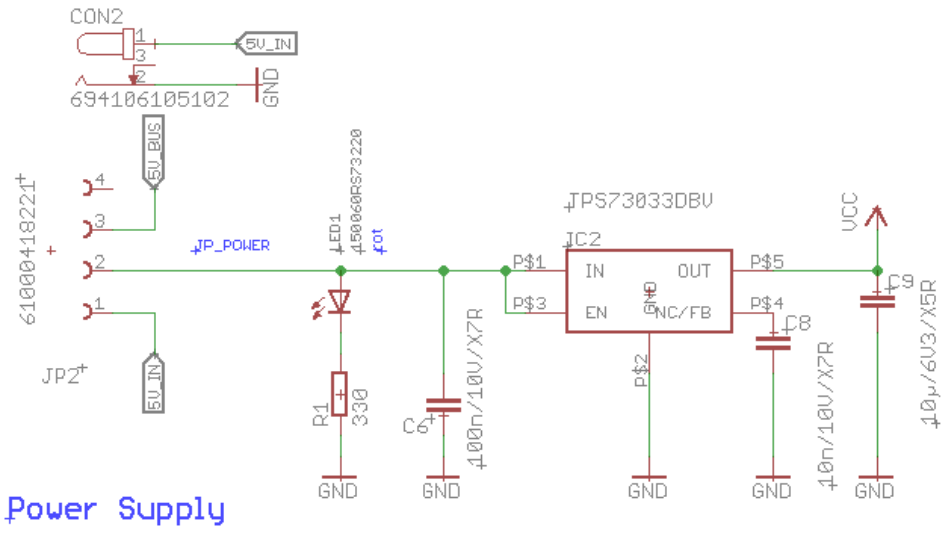

Figure 8: Power Supply

3.7.1.1 Self powered, power jack

The power supply is connected to the connector CON2 by setting the jumper JP2 to SELF (connecting pin 1 to pin 2). LED1, the power LED shows that the board is supplied.

The inner pin of the DC plug (ST_POWER) is the positive pole.

3.7.1.2 Bus powered, power supply through USB

Connecting a USB and setting the jumper JP2 to BUS (connecting pin2 to pin3), the module is supplied via USB. In this case it is not needed to connect Power to CON2. The 'POWER' LED shows that the module is supplied with power. The regulated voltage defines the UART TTL voltage level for the USB-to-UART converter.

3.8 Current measurement

The supply voltage of 3.3 V is available on JP1 pin 3. In the default configuration it is connected by placing a jumper on pin 3 - pin 2. After removing the jumper a current meter can be connected to monitor the current consumption of the module.

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

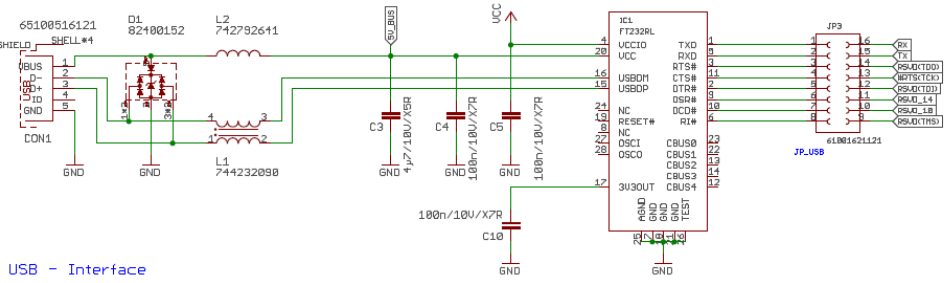

Figure 9: USB Interface

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.

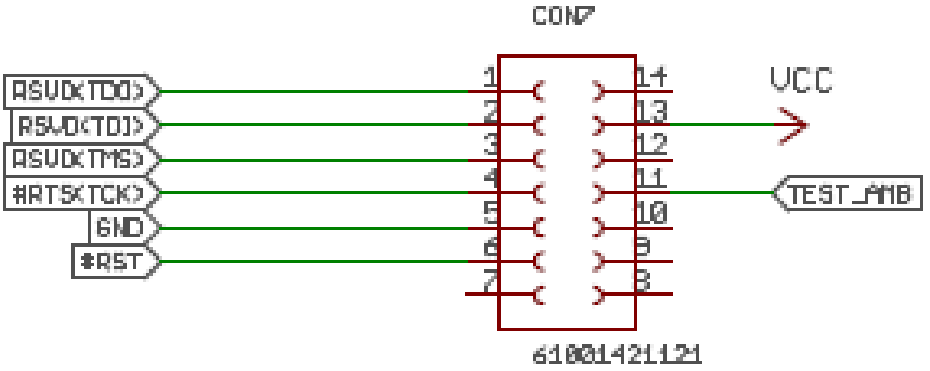

Figure 10: JTAG Interface

3.11 Schematic

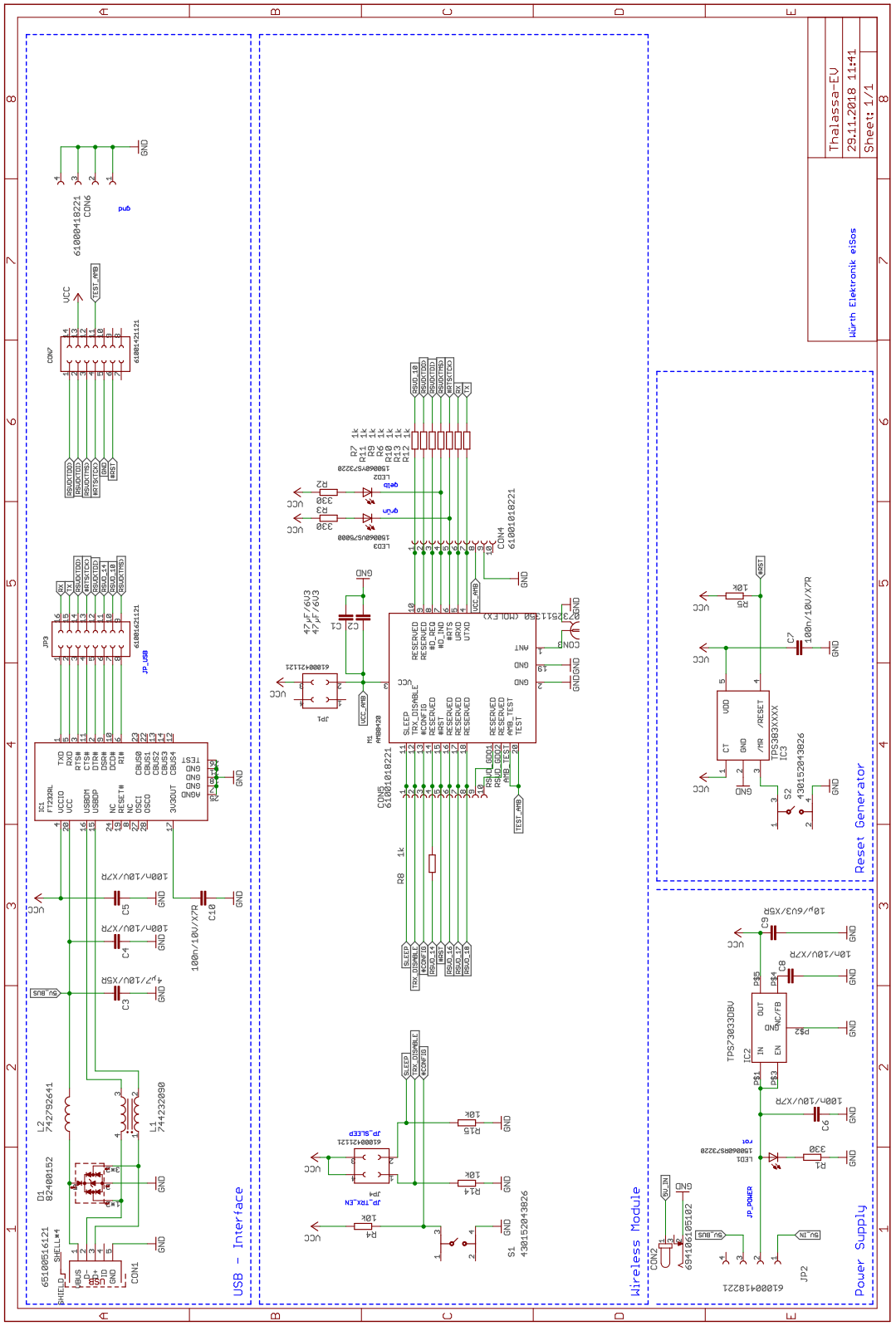

Figure 11: Circuit diagram

3.12 Layout

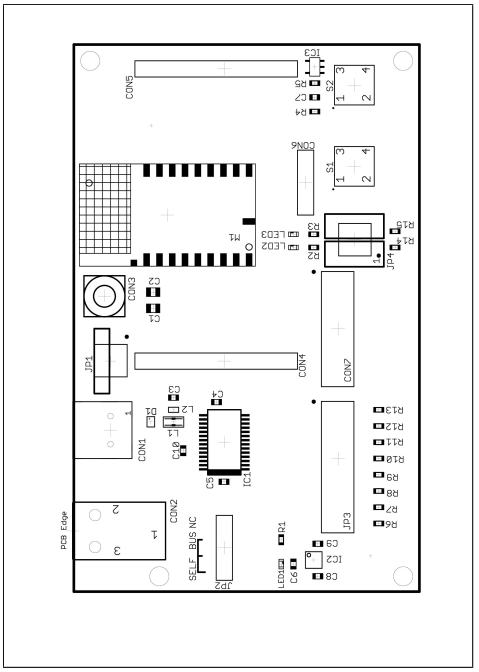

Figure 12: Assembly diagram

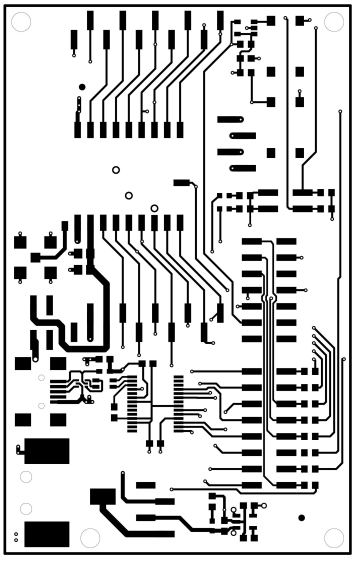

Figure 13: Top Layer

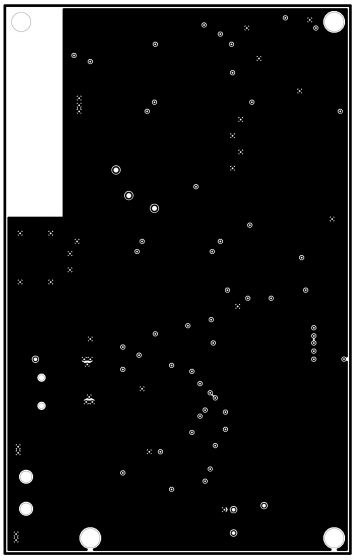

Figure 14: Internal Layer 2

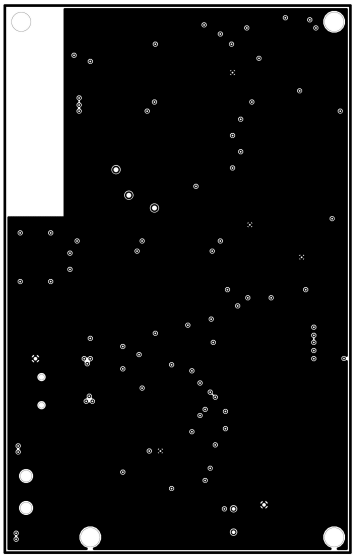

Figure 15: Internal Layer 3

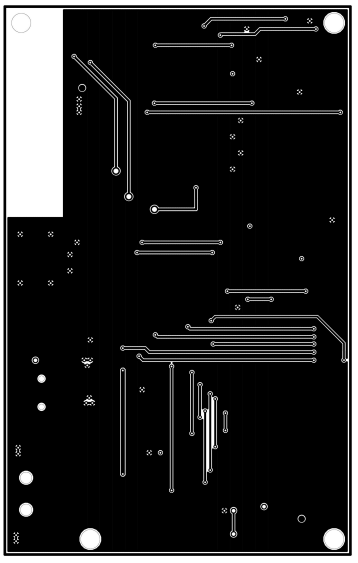

Figure 16: Bottom Layer

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.

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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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If a provision of this license terms is or becomes invalid, unenforceable or null and void, this shall not affect the remaining provisions of the terms. The parties shall replace any such provisions with new valid provisions that most closely approximate the purpose of the terms.

7.9 Miscellaneous

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We recommend you to be updated about the status of new firmware and software, which is available on our website or in our data sheet and manual, and to implement new software in your device where appropriate.
By ordering a wireless connectivity product, you accept this license terms in all terms.

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Contact:
Würth Elektronik eiSos GmbH & Co. KG
Division Wireless Connectivity & Sensors

Rudi-Schillings-Str. 31
54296 Trier
Germany

Tel.: +49 651 99355-0
Fax.: +49 651 99355-69
www.we-online.com/wireless-connectivity