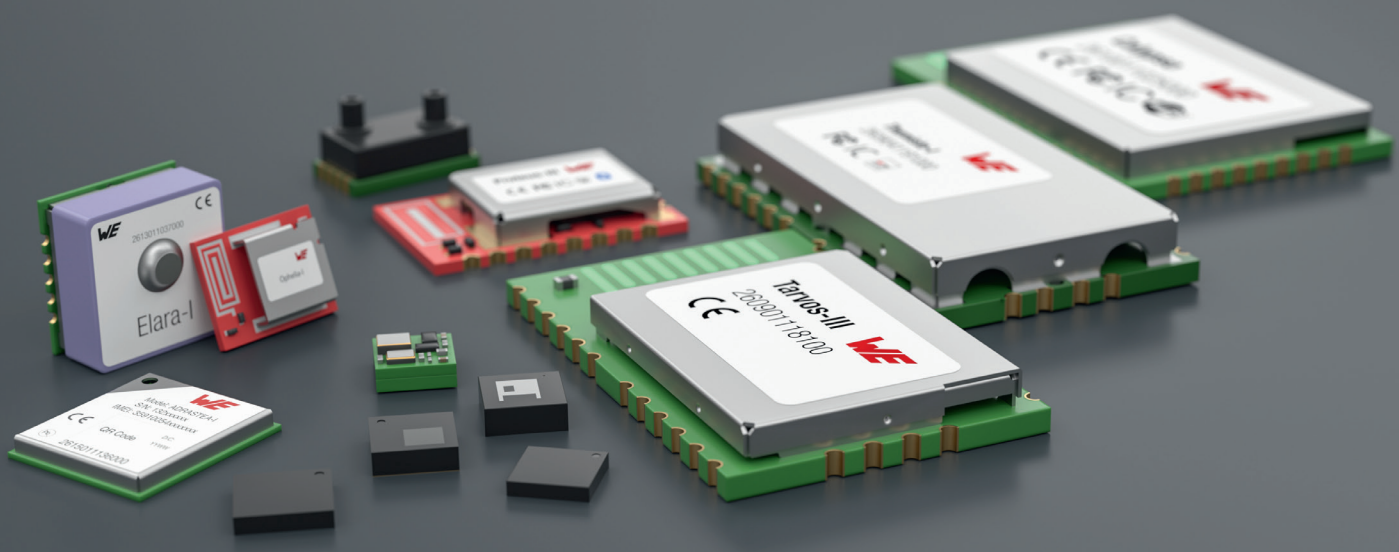

User manual

Evaluation board/kit for radio module Proteus-IV

2621129024001

Version 1.0

February 17, 2026

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

****

MUST READ

Check for firmware updates

Before using the product, make sure you use the most recent firmware version, data sheet, and user manual. This is especially important for Wireless Connectivity products that were not purchased directly from Würth Elektronik eiSos. A firmware update on these respective products may be required.

We strongly recommend including the possibility of a firmware update in the customer system design.

Contents

1 Abbreviations

Abbreviation	Name	Description
BDM	Business Development Engineer	Support and sales contact person responsible for limited sales area
EV	Evaluation	
ESD	Electro Static Discharge	
FTDI	Future Technology Devices International	USB to serial converter chip
GND	Ground	Ground signal level that corresponds to 0 V
HIGH	High signal level	Digital voltage level that is detected as high by the module
JTAG	Joint Test Action Group	Flash interface for the micro controller
LED	Light Emitting Diode	
LFCLK	Low frequency clock	
LFXO	Low frequency crystal oscillator	
LOW	Low signal level	Digital voltage level that is detected as low by the module
NFC	Near Field Communication	
PC	Personal Computer	
PCB	Printed Circuit Board	
RF	Radio frequency	Describes everything relating to the wireless transmission
SMA	SubMiniature version A	
SWD	Serial Wire Debug	Flash und debug interface
UART	Universal Asynchronous Receiver Transmitter	Universal Asynchronous Receiver Transmitter allows communicating with the module of a specific interface
USB	Universal Serial Bus	
VDD	Voltage Drain Drain	Supply voltage

2 Revision history

Manual version	HW version	Notes	Date
1.0	1.0	• Initial version	February 2026

3 Supported radio modules

The EV-Board described in this manual can be used to evaluate the following products:

Order code	Product name	Description
2621011024000	Proteus-IV	Bluetooth® LE 6.0 radio module with smart antenna configuration

Table 3: Compatibility

Order code	Product name
2621129024001	Proteus-IV Bluetooth 6.0 EV-Kit

Table 4: Order codes

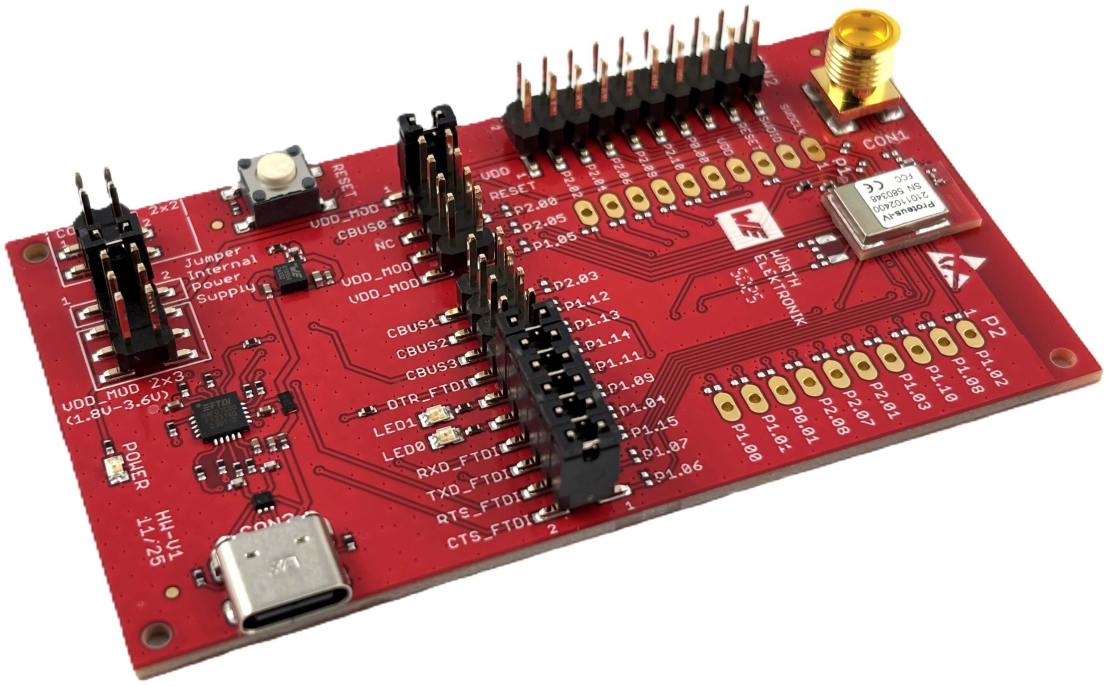

Figure 1: Product image

Kit content 2621129024001	Quantity
EV-Board with Proteus-IV	1
USB A to USB-C cable	1

Table 5: Content Proteus-IV Bluetooth 5.1 EV-Kit

4 Functional description

The EV-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 micro controller 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 such as the USB interface which are not required.

Feel free to check our YouTube channel:
www.youtube.com/user/WuerthElektronik/videos
for video tutorials, hands-ons and webinars relating to our products.

4.1 Taking into operation

To run the EV-Board place the jumpers on default location as shown in figure 3.
The corresponding FTDI driver package [1] has to be installed on your PC.

Connect the power jack or external power supply to the EV-Board and make sure the VDD 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 EV-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.

The WE UART Terminal PC tool [2] or any other serial terminal program (like hterm [3] 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 user manual to get the detailed module specific quick start instructions.

5 Development board

5.1 Block diagram

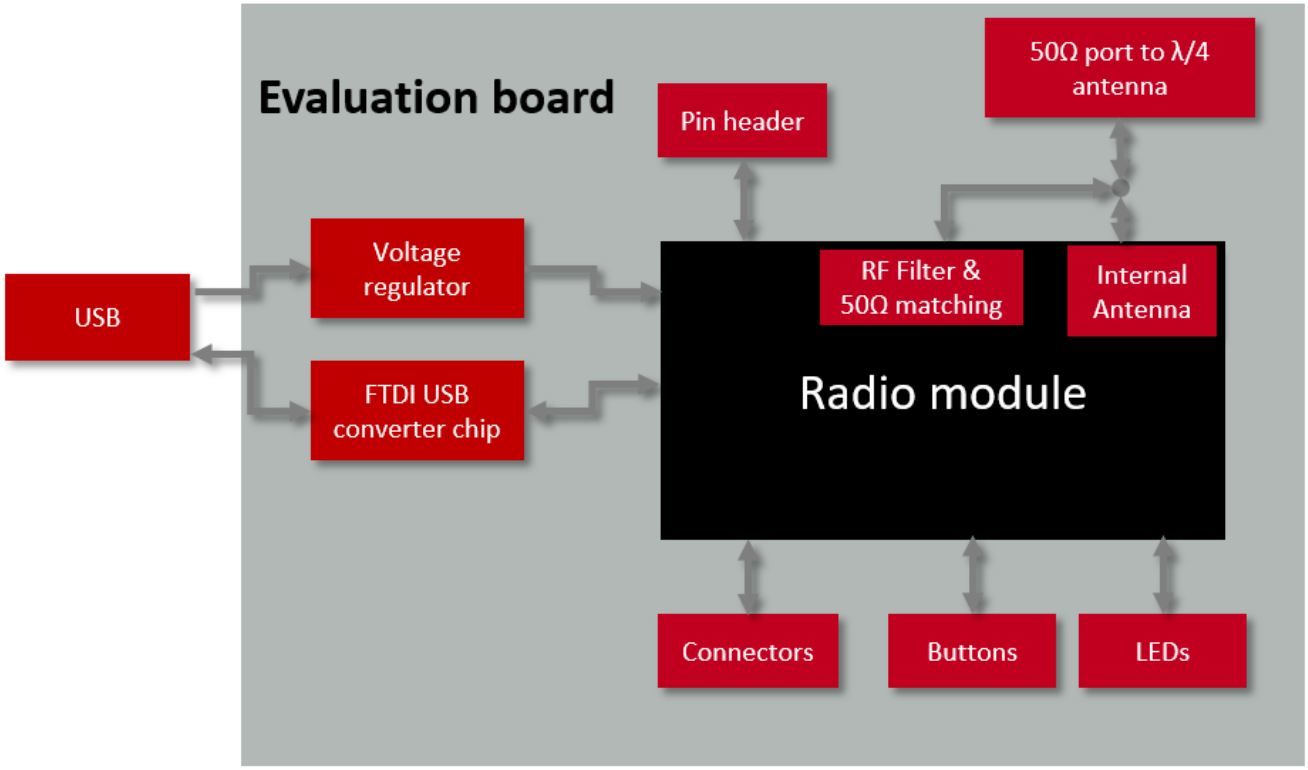

Figure 2: Block diagram

5.2 Jumpers

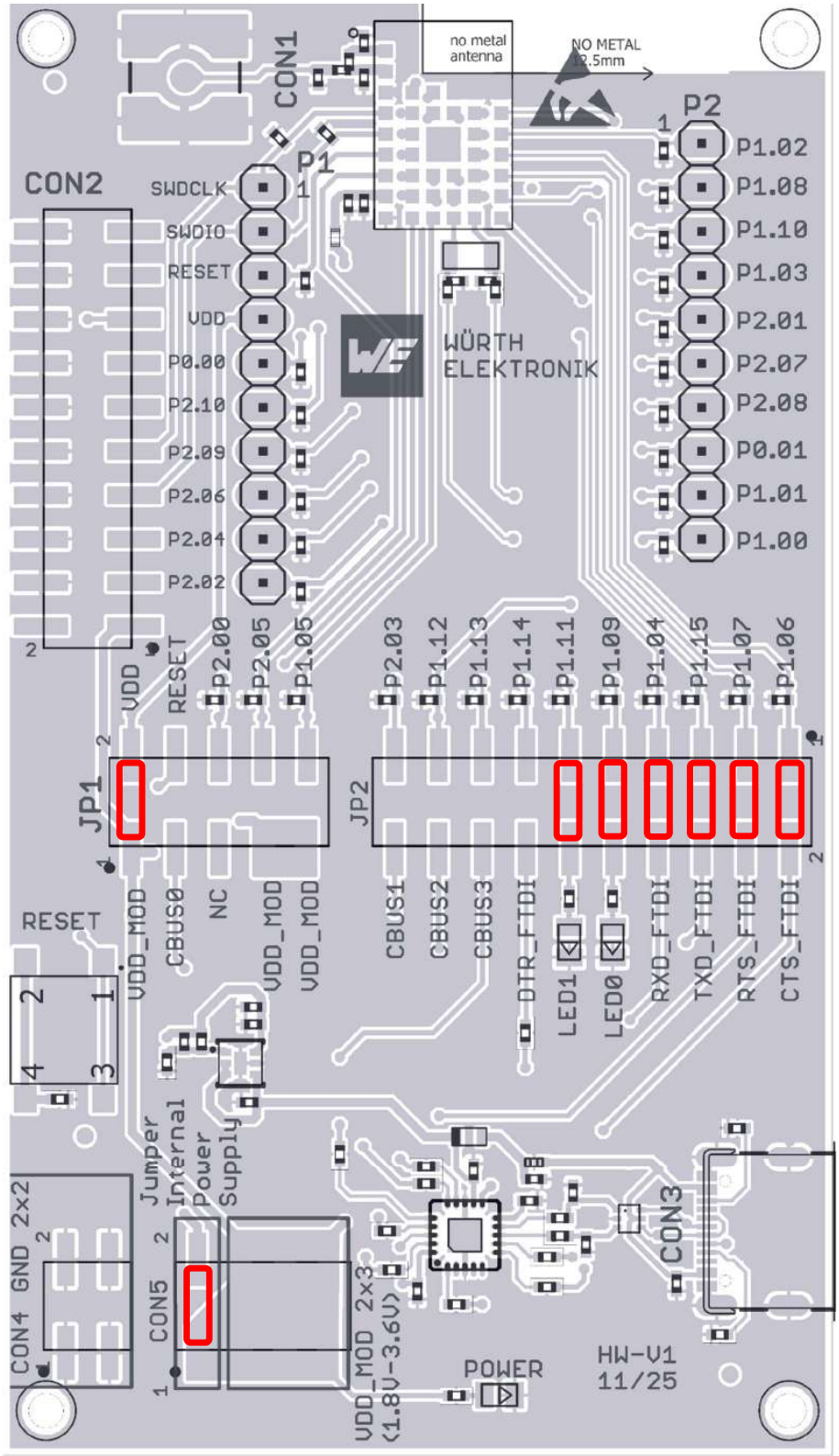

Figure 3: Jumpers, defaults

Pin	Function	Pin	Module pin (Function)	set (default)
1	VDD_MOD	2	VDD	Yes
3	CBUS0	4	RESET	No
5	NC	6	P2.00 (RESERVED)	No
7	VDD_MOD	8	P2.05 (MODE_1)	No
9	VDD_MOD	10	P1.05 (MODE_0)	No

Table 6: Jumper JP1

Pin	Function	Pin	Module pin (Function)	set (default)
1	CTS_FTDI	20	P1.06 (module-/RTS)	Yes
3	RTS_FTDI	18	P1.07 (module-/CTS)	Yes
5	TXD_FTDI	16	P1.15 (module-URXD)	Yes
7	RXD_FTDI	14	P1.04 (module-UTXD)	Yes
9	LED0	12	P1.09 (LED_0)	Yes
11	LED1	10	P1.11 (LED_1)	Yes
13	DTR_FTDI	8	P1.14 (RESERVED)	No
15	CBUS3	6	P1.13 (UART_ENABLE)	No
17	CBUS2	4	P1.12 (RESERVED)	No
19	CBUS1	2	P2.03 (RESERVED)	No

Table 7: Jumper JP2

Pin	Function	Pin	Function	set (default)
1	VDD_MOD	2	LDO_OUT	Yes

Table 8: Jumper JP3 in CON5

5.3 Connectors and pin headers

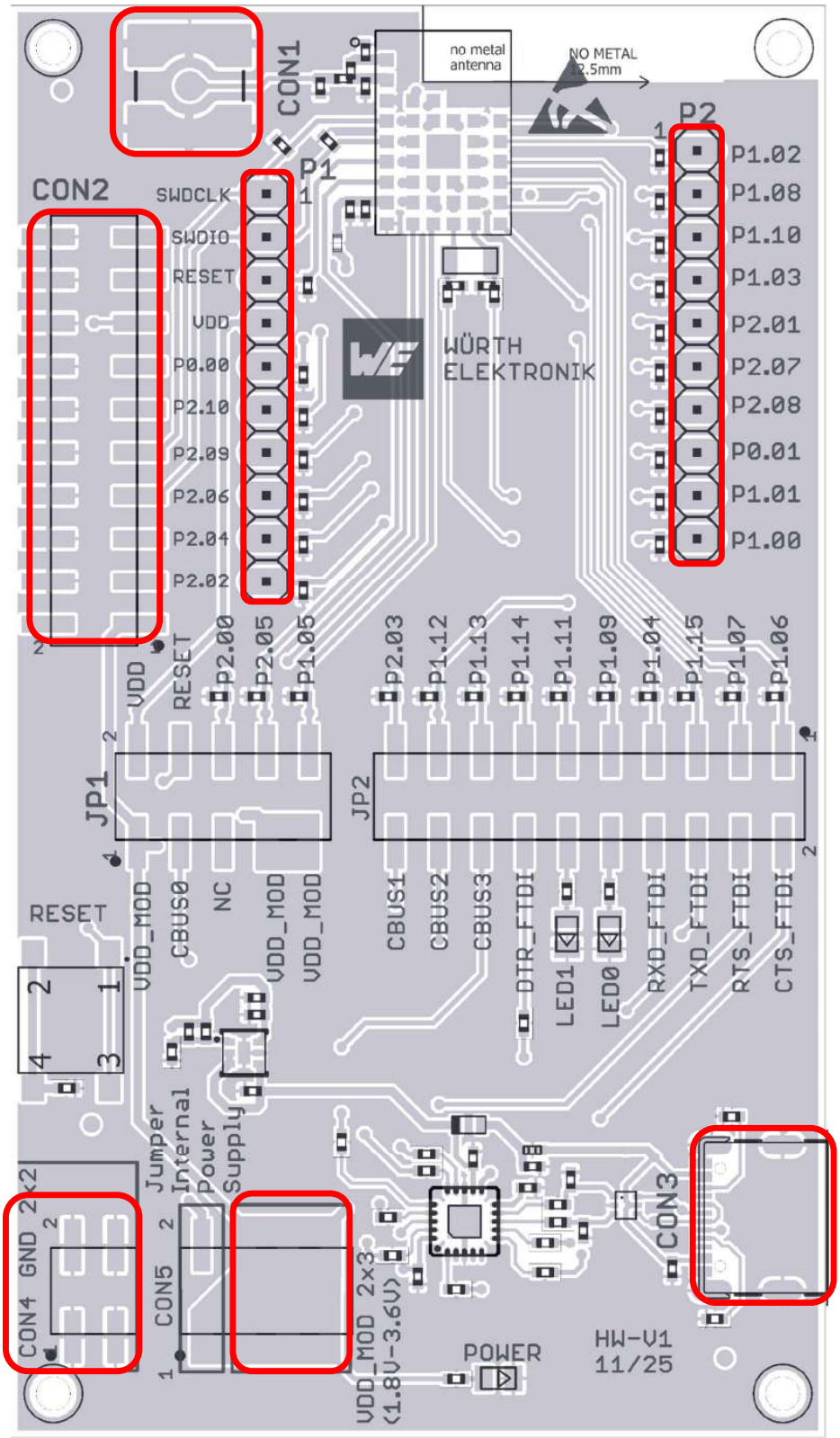

Figure 4: Connectors

Connector	Function
CON1	SMA connector for external antenna
CON2	2×10 JTAG/SWD connector
CON3	USB-C connector for host connection and VDD bus supply
CON4	Ground connection for external power suppply
CON5	VDD_MOD connection for external power suppply

Table 9: Connector overview

5.3.1 CON1

Connector CON1 (SMA receptacle) is used to connect an external antenna. The 2.4 GHz antenna Himalia-2600130021 shall be used.

CON4	Function
Inner	RF signal
Outer	GND

In order to use the internal PCB antenna of the module, C2 has to be populated with a 22pF capacitor *885012005027* and C1 should be left unpopulated.

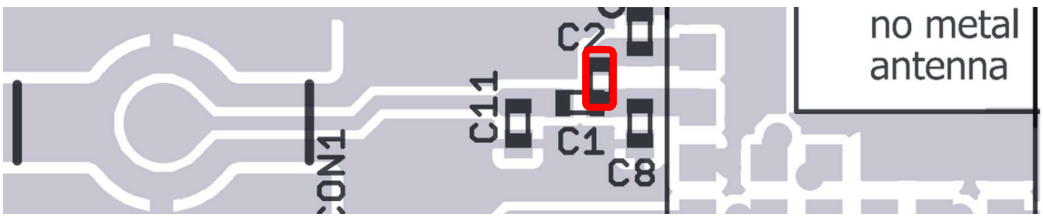

Figure 5: Capacitor connection to internal antenna

By default the SMA connector is not connected to the module

The board supports 50 Ω connection by just soldering/unsoldering one component to use either module's internal PCB antenna or to connect an external antenna.

In order to use the external antenna for long range tests, Capacitor C1 has to be populated with a 22pF capacitor *885012005027* and C2 should be left unpopulated.

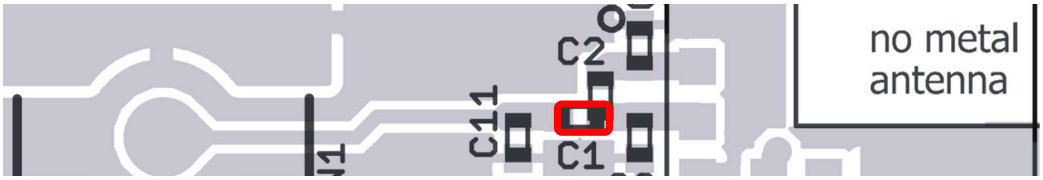

Figure 6: Capacitor connection to external antenna

5.3.2 CON2

Connector CON2 is the JTAG debugging interface.

CON2	nRF54L15	Function
1		VDD
7	SWDIO	SWDIO
9	SWCLK	SWCLK
15	P0.18	RESET
4,6,8,10,12,14,16,18,20		GND
2,3,5,11,13,17,19		Not connected

Table 10: Connector CON2

5.3.3 CON3

Connector CON3 is a USB-C connector that enables connection to PC via standard USB-C cable.

CON3	Function
	USB-C connector for host connection and VDD bus supply

5.3.4 CON4

Connector CON4 is a connector with Ground connection for external power supply.

CON4	Function
1	GND
2	GND
3	GND
4	GND

5.3.5 CON5

Connector CON5 is a connector with VDD_MOD connection for external power supply.

CON5	Function
3	VDD_MOD
4	VDD_MOD
5	VDD_MOD
6	VDD_MOD

P1	nRF54L15	Function
1	SWDCLK	SWDCLK
2	SWDIO	SWDIO
3	RESET	RESERVED
4	P0.00	RESERVED
5	P2.10	RESERVED
6	P2.09	RESERVED
7	P2.06	RESERVED
8	P2.04	RESERVED
9	P2.02	RESERVED

Table 11: 2.54mm pitch Pin header P1 placeholder

P2	nRF54L15	Function
1	P1.02	RESERVED
2	P1.08	RESERVED
3	P1.10	RESERVED
4	P1.03	RESERVED
5	P2.01	RESERVED
6	P2.07	RESERVED
7	P2.08	RESERVED
8	P0.01	RESERVED
9	P1.01	RESERVED
10	P1.00	RESERVED

Table 12: 2.54mm pitch Pin header P2 placeholder

5.4 Buttons

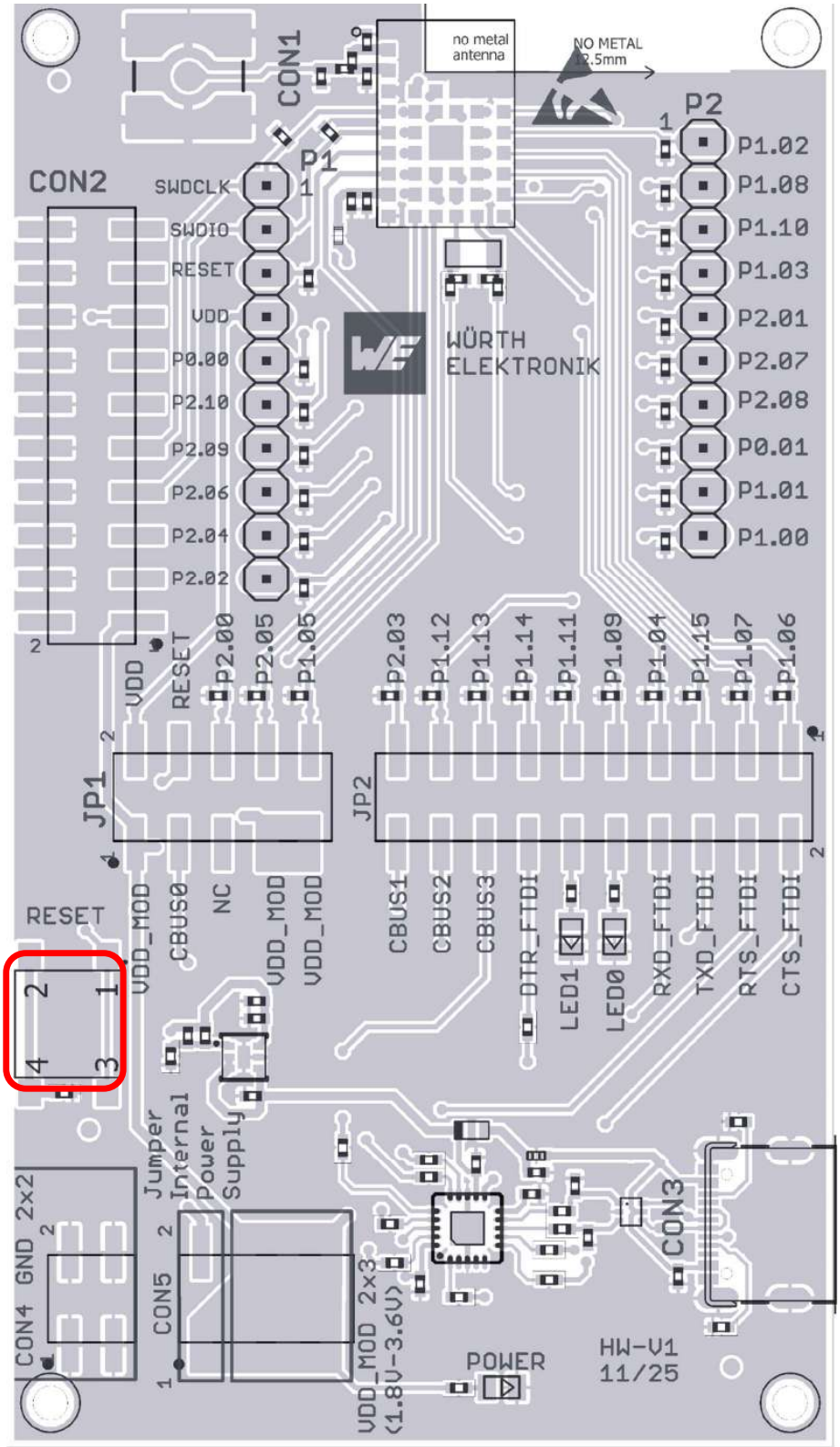

Figure 7: Buttons

5.4.1 RESET button

Internally the active low reset input of the micro processor is connected via a RC combination with the power supply to ensure a proper startup of the module. Any module provides a */RESET* pin that is connected to this button so the module can be restarted properly. Most modules provide an internal pull-up resistor. Please refer to the module specific manual for detailed information.

5.5 Function blocks

5.5.1 Power supply

5.5.1.1 Bus powered, power supply through USB

The development board can be run via USB. The integrated voltage regulator regulates the connected USB voltage 5 V down to 3V and supplies the remaining parts of the circuit. If the EV-Board is power sourced the power *Power LED* lights up.

5.5.2 JP1 - Current measurement

By default, JP1 is bridged for normal operation. If a current meter is connected in place of the jumper, the power consumption of the radio module can be measured.

Pin	Function	Pin	Function	set (default)
1	VDD_MOD	2	VDD	Yes

Table 13: Jumper JP1

5.5.3 UART / USB

The UART of the module can be connected to the USB converter by setting the bridge JP2. In this case it is available on the USB jack. Using the FTDI-driver the PC will show a virtual COM-Port which can be used to communicate with the module.

The USB cable length must not exceed 3 meters.

In order to establish a stable UART communication between the FTDI USB to UART converter and the radio module's chipset, the difference between the baud rates of each entity must not exceed the respective immunity level. Both devices use an internal clock to generate the configured UART baud rate. Due to the fixed clock frequency, only specific baud rates can be run without frequency error.
To figure out which baud rates of the radio module can be evaluated using the FTDI USB to UART converter (FT232R or FT231X), it is important to know the real baud rate B with its

introduced error. To get them, the FTDI's clock of 3000 kHz must be divided by the respective prescaler P:

$$B = \frac{3000}{P} \text{ [kBaud]}$$

The supported prescalers P can be chosen as:

$$P \in \{1, 1.5\} \text{ or } P = 2 + (N \cdot 0.125) \text{ with } N \in \{0, 1, 2, 3, 4, \ldots\}$$

When a baud rate is configured in the FTDI USB to UART converter, the prescaler is chosen that meets the closest baud rate. In that case, the real baud rate differs from the configured one, introducing a UART clock error, which may lead to UART communication issues.

Example: In case the desired baud rate $B_{desired} = 1250$ kBaud, the desired prescaler is $P_{desired} = \frac{3000}{1250} = 2.4$. The closest prescaler P is determined by $P = 2 + (N \cdot 0.125) = 2.375$ with $N = 3$. This results in a real baud rate $B = \frac{3000}{2.375} = 1263$ kBaud, which introduces an error of $\frac{B - B_{desired}}{B_{desired}} = 1.04$ % with respect to the desired baud rate.

Desired baud rate [kBaud]	Closest prescaler P	Real baud rate B [kBaud]	Error [%]
3000	1	3000	0
2500	1.5	2000	-20
2000	1.5	2000	0
1500	2	1500	0
1250	2.375	1263	1.04
1411.764706	2.125	1411.764706	0
⋮	⋮	⋮	⋮
1000	3	1000	0
921.6	3.25	923.0769231	0.16
⋮	⋮	⋮	⋮
230.4	13	230.7692308	0.16
⋮	⋮	⋮	⋮
115.2	26	115.3846154	0.15
⋮	⋮	⋮	⋮
38.4	78.125	38.4	0
⋮	⋮	⋮	⋮
19.2	156.25	19.2	0
⋮	⋮	⋮	⋮
9.6	312.5	9.6	0
⋮	⋮	⋮	⋮

Table 14: Example baud rates

5.5.4 UART direct

If a micro-controller is to be connected to the module, remove the bridges on JP2. The UART can be connected directly on the pin strip JP2 (Pins 1,3,5,7). Beware of I/O level incompatibility. The host must obey the values stated in the module's manual. Especially the I/O level restrictions must be implemented by a host system (i.e. using a level shifter to use the allowed I/O levels).

5.5.5 LFXO crystal

For higher LFCLK accuracy (better than ±250 ppm) a low frequency crystal oscillator of 32.768 kHz (LFXO) shall be used. A crystal, 3.2 ×1.6 mm package, for example *830009706*, can be placed on the EV-Board to position Q1. The needed load capacitance can be reached with capacitors C9 and C10, 0402 package.

nRF54L15 pin P1.00/XL1 and P1.01/XL12 are connected to module pad 12 and 13 respectively. If a LFXO is mounted to the EV-Board the resistors R1 and R2 shall not be connected.

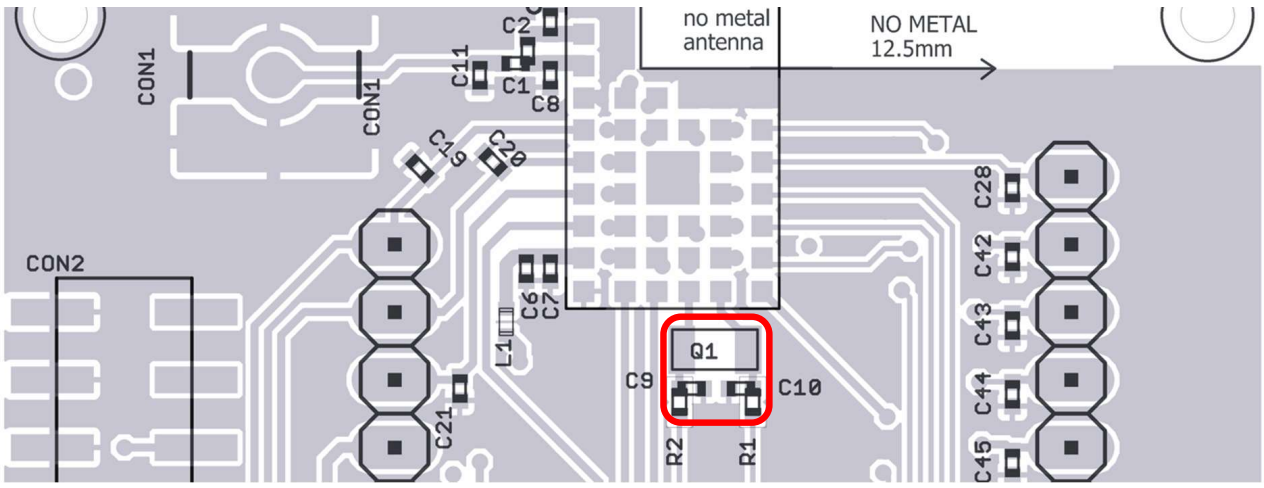

Figure 8: LFXO mounting

The input capacitance of the pad 12 and 13 are 1 pF. The values of C9 and C10 can be calculated as follows.

The load capacitance of LFXO is given by

$$C_l = \frac{C9_l * C10_l}{C9_l + C10_l} \tag{1}$$

If $C9_l$= $C10_l$ = C, then

$$C_l = \frac{C}{2} \tag{2}$$

whereas,

$$C9 = C - C_{XL1} - C_{PCB} \tag{3}$$

$$C10 = C - C_{XL2} - C_{PCB} \quad (4)$$

C_l = Load capacitance of LFXO crystal.
C_{XL1} = Input capacitance of Pad 12 (1 pF)
C_{XL2} = Input capacitance of Pad 13 (1 pF)
C_{PCB} = Parasitic capacitance of PCB Parasitic capacitance of the PCB can vary depending on design and track length. It can vary from 0.5 pF to 2 pF.

For the crystal *830009706* with load capacitance of 9pF and parasitic capacitance of 2 pF. The value of C9 and C10 results in 15 pF which was also tested on the evauation board.

Depending on parasitic capacitance of Host PCB, a capacitance of 12 pF may be a good starting value for C9 and C10.

Using standard firmware the external crystal is not needed. To enable use of the LFXO a custom firmware is required.

5.5.6 Programming interface

The EV-Board provides a 2×10 pin connector to connect directly to a JTAG flash adapter used for development. Please take care of the correct mounting of the flash adapter. The recommended flash adapter is one of the "Segger J-Link" family.

5.6 Schematic

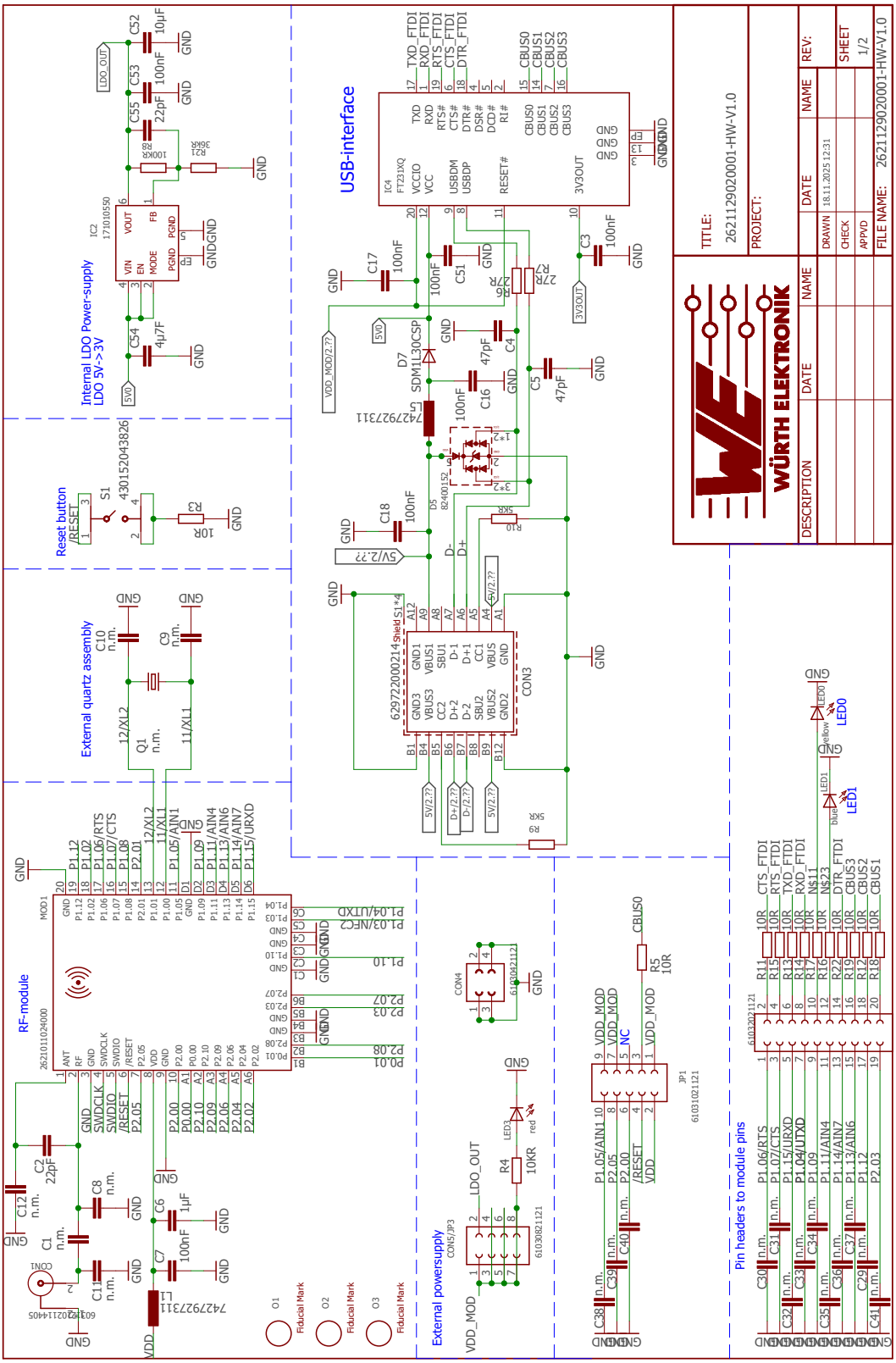

Figure 9: Schematic sheet-1

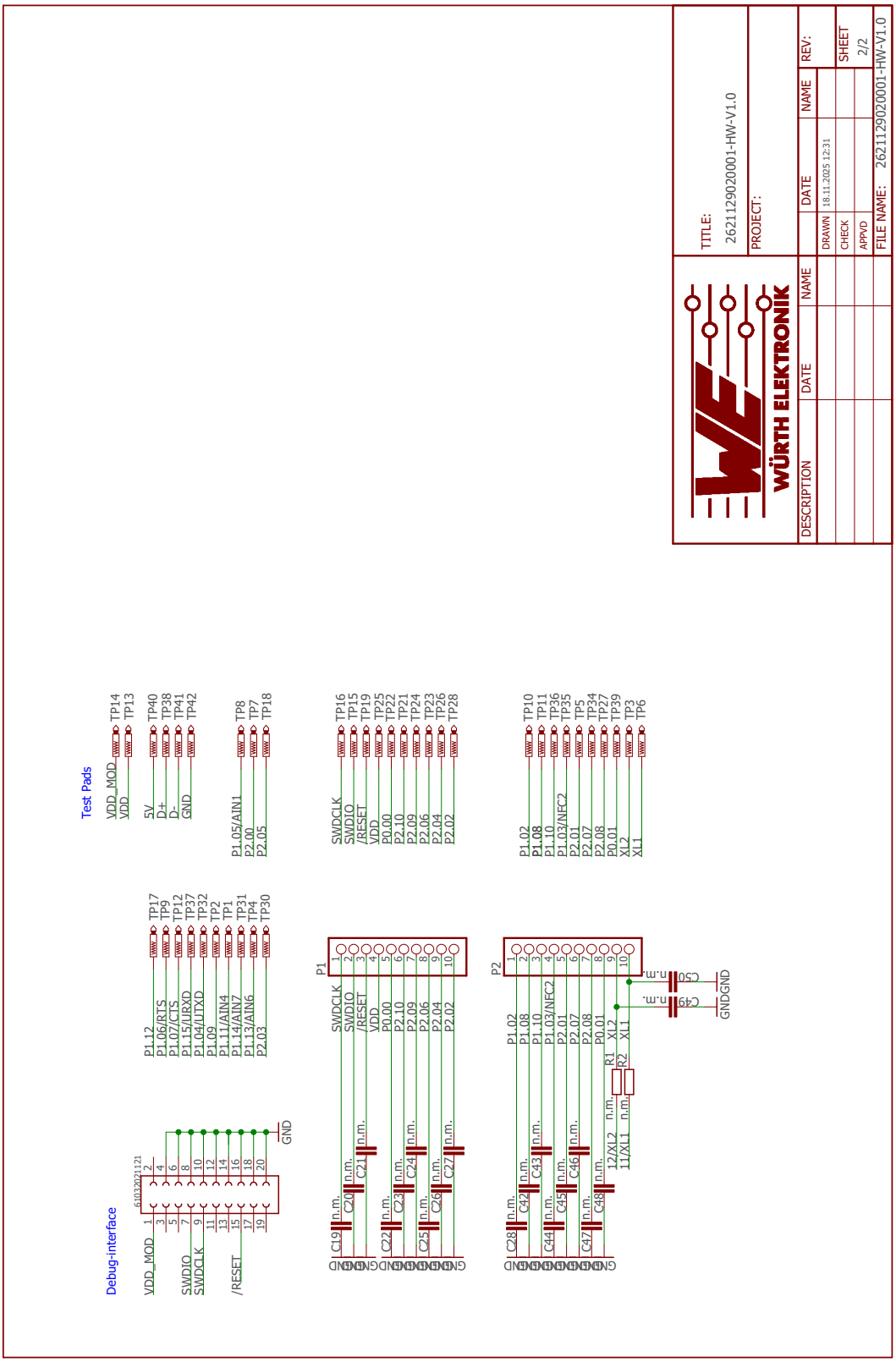

Figure 10: Schematic sheet-2

5.7 Layout

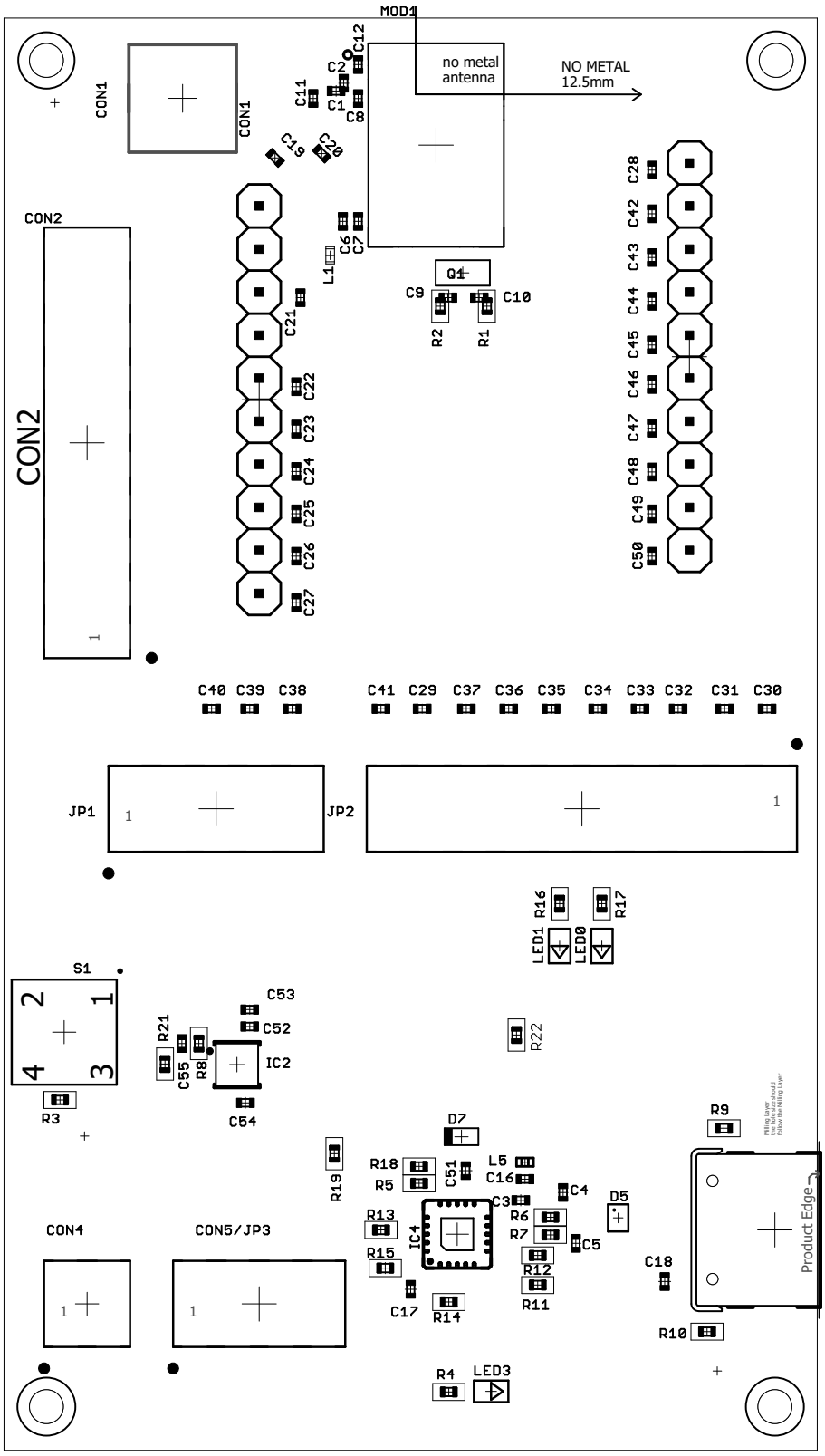

Figure 11: Assembly diagram

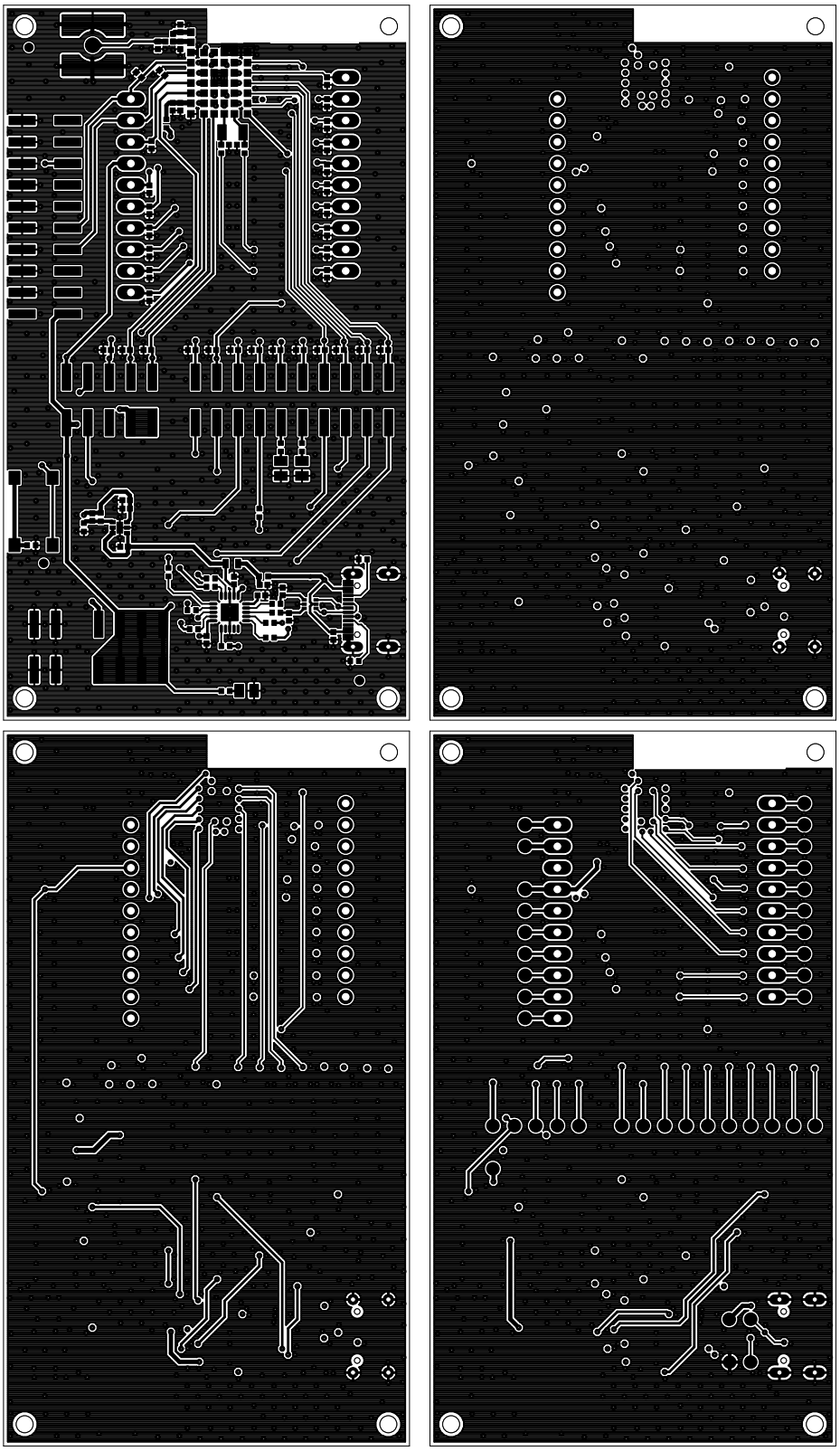

Figure 12: Top bottom and internal layers

5.8 Bill of materials

Part	Value	Package	MANUFACTURER	NR
C1	n.m.	C0402_IPC		
C2	22pF	C0402_IPC	Würth Elektronik	885392005114
C3	100nF	C0402_IPC	Würth Elektronik	885012205037
C4	47pF	C0402_IPC	Würth Elektronik	885012005059
C5	47pF	C0402_IPC	Würth Elektronik	885012005059
C6	1µF	C0402_IPC	Würth Elektronik	885012105012
C7	100nF	C0402_IPC	Würth Elektronik	885012205037
C8	n.m.	C0402_IPC		
C9	n.m.	C0402_IPC		
C10	n.m.	C0402_IPC		
C11	n.m.	C0402_IPC		
C12	n.m.	C0402_IPC		
C16	100nF	C0402_IPC	Würth Elektronik	885012205037
C17	100nF	C0402_IPC	Würth Elektronik	885012205037
C18	100nF	C0402_IPC	Würth Elektronik	885012205037
C19	n.m.	C0402_IPC		
C20	n.m.	C0402_IPC		
C21	n.m.	C0402_IPC		
C22	n.m.	C0402_IPC		
C23	n.m.	C0402_IPC		
C24	n.m.	C0402_IPC		
C25	n.m.	C0402_IPC		
C26	n.m.	C0402_IPC		
C27	n.m.	C0402_IPC		
C28	n.m.	C0402_IPC		
C29	n.m.	C0402_IPC		
C30	n.m.	C0402_IPC		
C31	n.m.	C0402_IPC		
C32	n.m.	C0402_IPC		
C33	n.m.	C0402_IPC		
C34	n.m.	C0402_IPC		
C35	n.m.	C0402_IPC		
C36	n.m.	C0402_IPC		
C37	n.m.	C0402_IPC		
C38	n.m.	C0402_IPC		
C39	n.m.	C0402_IPC		
C40	n.m.	C0402_IPC		
C41	n.m.	C0402_IPC		
C42	n.m.	C0402_IPC		
C43	n.m.	C0402_IPC		

C44	n.m.	C0402_IPC		
C45	n.m.	C0402_IPC		
C46	n.m.	C0402_IPC		
C47	n.m.	C0402_IPC		
C48	n.m.	C0402_IPC		
C49	n.m.	C0402_IPC		
C50	n.m.	C0402_IPC		
C51	100nF	C0402_IPC	Würth Elektronik	885012205037
C52	10µF	C0402_IPC	Würth Elektronik	885012105020
C53	100nF	C0402_IPC	Würth Elektronik	885012205037
C54	4µ7F	C0402_IPC	Würth Elektronik	885012105008
C55	22pF	C0402_IPC	Würth Elektronik	885012005057
CON1	60312102114405	60312102114405	Würth Elektronik	60312102114405
CON3	629722000214	629722000214	Würth Elektronik	629722000214
CON4	61030421121	610X0421121	Würth Elektronik	61030421121
CON5/JP3	61030821121	610X0821121	Würth Elektronik	61030821121
D5	82400152	WE-TVS_SOT563	Würth Elektronik	82400152
D7	SDM1L30CSP	X2-WLB2010-2	Diodes Incorporated	SDM1L30CSP
IC2	171010550	MAGI³C-VDMM_1710105	Würth Elektronik	171010550
IC4	FT231XQ	QLP20	FTDI	FT231XQ-R
JP1	61031021121	610X1021121	Würth Elektronik	61031021121
JP2	61032021121	610X2021121	Würth Elektronik	61032021121
CON2	61032021121	610X2021121	Würth Elektronik	61032021121
L1	7427927311	L0402_WE_FERRIT	Würth Elektronik	7427927311
L5	7427927311	L0402_WE-MK	Würth Elektronik	7427927311
LED0	yellow	0805	Würth Elektronik	150080YS75000
LED1	blue	0805	Würth Elektronik	150080BS75000
LED3	red	0805	Würth Elektronik	150080RS75000
MOD1	2621011024000	WE-FP-4++	Würth Elektronik	2621011024000
O1	OPT_MARKE	OPTISCHE_MARKE		
O2	OPT_MARKE	OPTISCHE_MARKE		
O3	OPT_MARKE	OPTISCHE_MARKE		
P1	n.m.	1X10		
P2	n.m.	1X10		
Q1	n.m.	CC7V-T1A		
R1	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R2	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R3	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R4	10KR	R0402_IPC	Yageo	RC0402FR-0710KL

R5	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R6	27R	R0402_IPC	Yageo	RC0402FR-0727RL
R7	27R	R0402_IPC	Yageo	RC0402FR-0727RL
R8	100KR	R0402_IPC	Yageo	RC0402FR-07100KL
R9	5KR	R0402_IPC	Yageo	RC0402FR-075KL
R10	5KR	R0402_IPC	Yageo	RC0402FR-075KL
R11	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R12	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R13	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R14	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R15	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R16	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R17	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R18	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R19	10R	R0402_IPC	Yageo	RC0402FR-0710RL
R21	36kR	R0402_IPC	Yageo	RC0402FR-0736KL
R22	10R	R0402_IPC	Yageo	RC0402FR-0710RL
S1	430152043826	430152043826	Würth Elektronik	430152043826

5.9 Internal antenna radiation characteristics

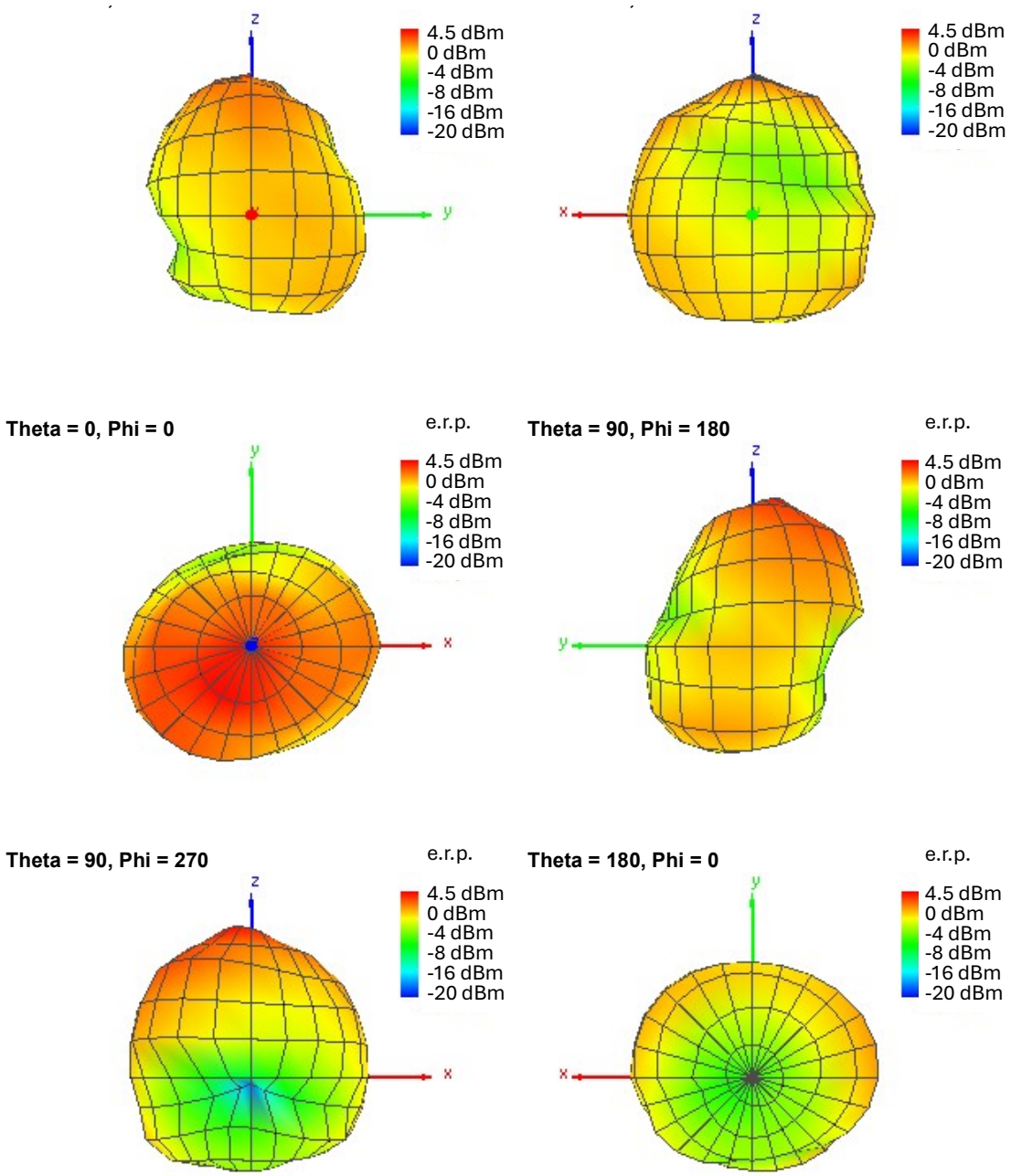

Figure 13: Antenna characteristic from integrated antenna measured on official EV-Board[1]

[1] Radiation characteristic shown is valid for the module on the EV-Board. It is important to be aware that size of groundplane and placement of module has influence on the radiation pattern.

6 Hardware history

Version 1.0:

- Initial release

7 Marking

7.1 Lot number

The 15 digit lot number is printed in numerical digits as well as in form of a machine readable bar code. It is divided into 5 blocks as shown in the following picture and can be translated according to the following table.

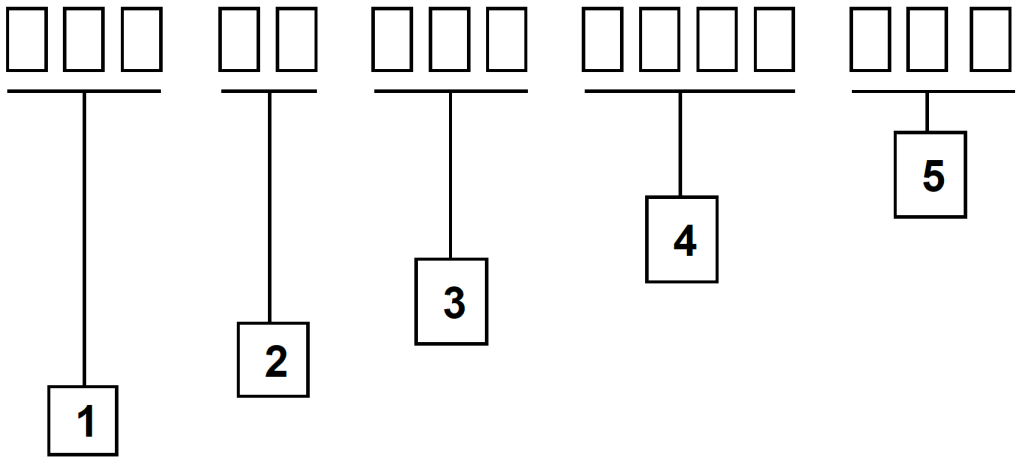

Figure 14: Lot number structure

Block	Information	Example(s)
1	eiSos internal, 3 digits	438
2	eiSos internal, 2 digits	01
3	Radio module hardware version, 3 digits	V2.4 = 024, V12.2 = 122
4	Date code, 4 digits	1703 = week 03 in year 2017, 1816 = week 16 in year 2018
5	Radio module firmware version, 3 digits	V3.2 = 302, V5.13 = 513

Table 15: Lot number details

As the user can perform a firmware update the printed lot number only shows the factory delivery state. The currently installed firmware can be requested from the module using the corresponding product specific command. The firmware version as well as the hardware version are restricted to show only major and minor version not the patch identifier. Block 5 is not applicable for products without firmware.

8 Regulatory compliance information

8.1 European Conformity

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 EV-Kits designed for professionals to be used solely at research and development facilities for such purposes.

8.2 FCC

Pursuant to §2.803 (c) of Title 47 Chapter I Subchapter A Part 2 Subpart I, the EV-Kit falls under the FCC exception. Therefore it is marked as "For evaluation only; not FCC approved for resale".

8.3 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.

Notwithstanding the above, Würth Elektronik eiSos makes no representations and warranties of any kind related to their accuracy, correctness, completeness and/or usability for customer applications. No responsibility is assumed for inaccuracies or incompleteness.

9 References

[1] FTDI virtual COM port driver. https://ftdichip.com/drivers/vcp-drivers/.

[2] Würth Elektronik. WE UART Terminal PC tool (Smart Commander). https://www.we-online.de/wcs-software.

[3] hterm. Terminal program. https://www.der-hammer.info/pages/terminal.html.

10 Important notes

The following conditions apply to all goods within the wireless connectivity and sensors product range of Würth Elektronik eiSos GmbH & Co. KG:

General customer responsibility
Some goods within the product range of Würth Elektronik eiSos GmbH & Co. KG contain statements regarding general suitability for certain application areas. These statements about suitability are based on our knowledge and experience of typical requirements concerning the areas, serve as general guidance and cannot be estimated as binding statements about the suitability for a customer application. The responsibility for the applicability and use in a particular customer design is always solely within the authority of the customer. Due to this fact, it is up to the customer to evaluate, where appropriate to investigate and to decide whether the device with the specific product characteristics described in the product specification is valid and suitable for the respective customer application or not. Accordingly, the customer is cautioned to verify that the documentation is current before placing orders.

Customer responsibility related to specific, in particular safety-relevant applications
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 source code 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.

Best care and attention
Any product-specific data sheets, manuals, application notes, PCNs, warnings and cautions must be strictly observed in the most recent versions and matching to the products revisions. These documents can be downloaded from the product specific sections on the wireless connectivity and sensors homepage.

Customer support for product specifications
Some products within the product range may contain substances, which are subject to restrictions in certain jurisdictions in order to serve specific technical requirements. Necessary information is available on request. In this case, the Business Development Engineer (BDM) or the internal sales person in charge should be contacted who will be happy to support in this matter.

Product improvements
Due to constant product improvement, product specifications may change from time to time. As a standard reporting procedure of the Product Change Notification (PCN) according to the JEDEC-Standard, we inform about major changes. In case of further queries regarding the PCN, the Business Development Engineer (BDM), the internal sales person or the technical support team in charge should be contacted. The basic responsibility of the customer as per section 10 and 10 remains unaffected.
All software like ¨wireless connectivity SDK¨, ¨Sensor SDK¨ or other source codes as well as all PC software tools are not subject to the Product Change Notification information process.

Product life cycle
Due to technical progress and economical evaluation, we also reserve the right to discontinue production and delivery of products. As a standard reporting procedure of the Product Termination Notification (PTN) according to the JEDEC-Standard we will inform at an early stage about inevitable product discontinuance. According to this, we cannot ensure that all products within our product range will always be available. Therefore, it needs to be verified with the Business Development Engineer (BDM) or the internal sales person in charge about the current product availability expectancy before or when the product for application design-in disposal is considered. The approach named above does not apply in the case of individual agreements deviating from the foregoing for customer-specific products. The approach named above does not apply in the case of EV-Boards. EV-Boards may be changed without any notification.

Property rights
All the rights for contractual products produced by Würth Elektronik eiSos GmbH & Co. KG on the basis of ideas, development contracts as well as models or templates that are subject to copyright, patent or commercial protection supplied to the customer will remain with Würth Elektronik eiSos GmbH & Co. KG. Würth Elektronik eiSos GmbH & Co. KG does not warrant or represent that any license, either expressed or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, application, or process in which Würth Elektronik eiSos GmbH & Co. KG components or services are used.

General terms and conditions
Unless otherwise agreed in individual contracts, all orders are subject to the current version of the "General Terms and Conditions of Würth Elektronik eiSos Group", last version available at *www.we-online.com*.

11 Terms of Use for Würth Elektronik eiSos GmbH & Co. KG EV-Boards, evaluation kits and evaluation modules

Würth Elektronik eiSos GmbH & Co. KG provide you as a user with technical data (including data sheets), design resources (including reference designs), recommendations for use or other design recommendations, web tools, safety information and other information in the form of evaluation-boards, -kits or -modules (hereinafter jointly referred to as "EVB") in accordance with the terms and conditions contained here. The EVB is provided in the "as is" state. WE disclaims all express and implied warranties, in particular those concerning the suitability for a certain purpose, the absence of defects or non-violation of third-party rights. The EVB is intended for experienced developers to develop

their application with WE components. As a user, you are solely responsible for: (1) selection of the appropriate WE components for the application, (2) design, validation and testing the application, and (3) assurance that the application meets the applicable standards and all other safety requirements and other applicable requirements. WE may change the EVB without prior notice. WE grants you permission to use the EVB only for developing an application suitable for using WE components. Any other duplication, representation or transfer of the EVB is expressly prohibited. WE does not grant any licenses for the use of the intellectual property rights from WE or third parties. WE is fully indemnified from all claims, damages, costs, losses and liabilities arising from the misuse of this EVB The WE components are provided in accordance with WE's conditions of sale or other applicable conditions available either at *https://katalog.we-online.com* or in conjunction with such WE components. WE's provision of the EVB does not constitute an extended warranty in relation to the WE components.

General warnings
Do not touch the EVB when it is live, and allow charged components, such as capacitors, to discharge completely before handling the EVB. Depending on the individual application, high voltages can occur on the EVB and some components can reach temperatures above 50 °C. Even after disconnecting the EVB from the power source, these conditions remain for a significant time. Please ensure that the appropriate safety precautions are taken when installing and operating this EVB, as one of the following may occur if you handle or use this EVB without observing the relevant safety precautions: - Death - Serious injury - Electric shock - Electric burns - Severe heat burns -
When using the EVB, you undertake to read the instructions for use in full together with the relevant information supplied and/or available on the homepage *www.we-online.de/wcs-manuals* before putting this EVB into operation. The following points have to be observed in particular:
- Do not touch the EVB while it is live.
- The EVB must be fully assembled and all devices to be tested must be connected before voltage is applied to the EVB.
- The EVB should never be left unattended during operation.
- Capacitors must be completely discharged. The capacitors must be actively discharged using a suitable resistor.

Protection against static electricity
Use the unpackaged product only in ESD protected areas. Wear the ESD personal protective equipment prescribed for these areas. Ground all conductive components, including personnel, as prescribed in ESD protected areas. Ensure that the product is only used by trained personnel.

Purpose and use
The EVB is not a finished product and is not intended for general use by the consumer. The EVB is intended exclusively for use in the evaluation of WE components in the lab or in development environments by highly qualified technicians or engineers, familiar with the risks involved in handling electrical or mechanical components, systems and subsystems. The use of the EVB is your full and independent responsibility. The EVB is expressly not intended to be installed in a terminal device or to be part of a terminal device in whole or in part. WE reserves the right, at its own discretion, to make corrections, improvements, adjustments or other changes to the EVB or to discontinue the EVB. The EVB is not intended for use in devices and applications for which a higher safety and reliability standard is prescribed. It is also not approved for use in safety-relevant applications or where personal injury or fatal consequences must be expected in the event of failure.

Operation of the EVB
The EVB may only be operated within the specifications and environmental parameters recommended by WE, as described in the instructions for use. Exceeding the specified parameters (including, but not limited to, input and output voltage, current, power, and ambient conditions) may result in damage to property. If you have questions about these electrical parameters, please contact WE at (regulatory-compliance@we-online.com) prior to connecting peripheral electronics (including the input voltage and intended loads). Any load outside a certain power range may lead to negative consequences, including, but not limited to, unintended or inaccurate evaluations or possibly permanent damage to the EVB or the electronics connected to it. Please ensure that the appropriate safety precautions are taken when working with the EVB, as serious injuries, including severe or even fatal injuries from electric shock or electric burns, may occur if you do not follow the appropriate safety precautions. Under no circumstances should the EVB be touched while live. When the EVB is connected to a power source, some of its components are electrically charged and/or have temperatures above 50 °C. This condition also applies for a short time after disconnecting from the supply voltage until the capacitors are completely discharged and hot components have cooled down. These components include connectors, linear regulators, switching transistors, heat sinks, resistors, diodes, inductors and other components, which can be identified from the documentation in the instructions for use. As with all electronic lab work, only qualified persons with knowledge of electronic performance evaluation, measurement and diagnostic tools, should use the EVB.

Hazards and warnings
Before putting the EVB into operation, please read the instructions for use and especially the various hazards and warnings described therein. The instructions for use contain important safety information on voltages and temperatures. You take full responsibility and liability for the proper and safe handling of the EVB. You agree to comply with all safety requirements, rules and regulations related to the use of the EVB. You also take full responsibility for: (1) establishing safeguards to ensure that the use of the EVB does not cause damage to property, personal injury or death, even if the EVB does not function as described, intended or expected, (2) the test setup in which the EVB is integrated, all safety requirements, rules and regulations and also that no damage to property, personal injury or other hazardous situation occurs even if the EVB fails, and (3) ensuring the safety of all activities performed by you or your employees when using the EVB. In particular, this means that the technical rules VDE [German Electrical Engineering, Electronic and Information Technology Association] 0105-100 and BGI [German trade association information] 891 (or corresponding applicable safety regulations outside Germany) for the operation of electrical test setups must be observed, the test area is protected against unauthorized access or accidental touching, current limitations, and emergency stop mechanisms are functional and test setups are never operated unattended. If you have any questions about the safe use of the EVB, please contact WE at *regulatory-compliance@we-online.com* for more information.

Your responsibility with regard to the applicable laws
- You are responsible for being sufficiently informed about and complying with all international, national, state and local applicable laws, rules and regulations that apply to the handling or use of the EVB by you or your employees.
- The EVB generates, uses and radiates radio frequency energy, but has not been tested for conformity with the limits applicable to the product category, which are applicable according to the European Union regulations for protection against radio frequency interference. Operation of the EVB may cause interference with radio communication. In this case, the costs incurred for necessary measures to remedy the interference are to be borne by the user.

As the EVB is not a finished product, it may not comply with applicable regulatory, safety or certification standards that are normally as-

sociated with other products, such as Directive 2011/65/EC of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of hazardous substances and Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). You take full responsibility for compliance with such standards that apply to the EVB. You also take responsibility for the proper disposal of the components and materials of the EVB.

Exclusion of further rights and rights of use for intellectual property of EVB
The sale of an EVB does not constitute the granting by WE of any license or other right of any kind - expressly or implicitly - including, but not limited to, any patent, copyright, trademark or other proprietary rights. All rights from such patent, copyright, trademark or other proprietary rights are expressly reserved by WE. The EVB must not be used in any manner that directly or indirectly infringes any patent, copyright, trademark or other proprietary rights of WE.

Warranty of EVB
WE ensures that the EVB meets the specifications given in the instructions for use (within the deviations stated therein) for a period of 12 months from the date of purchase and functions in accordance with the instructions for use. On the basis of the underlying statutory provisions, WE shall rectify defects or offer free replacement of the EVB to which damage occurs that is evidently attributable to a defect for which WE is responsible and is at fault. A warranty claim is subject to the user having complied with the statutory duties of inspection and notification of defects and that the EVB has been received by WE no later than ten (10) days after expiry of the warranty period. This warranty is not transferable to others. This warranty does not apply to defects or impairments in performance resulting from incorrect use, use contrary to WE's instructions, improper installation, improper operation or misuse. WE accepts no liability whatsoever for the failure of equipment or other items not manufactured by or for WE, including, but not limited to, equipment or items to which the EVB is attached or for which the EVB is used. WE DOES NOT GRANT ANY WARRANTIES OR ASSURANCES WHATSOEVER, EXPRESS OR IMPLIED, WITH RESPECT TO THE EVB, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MARKETABILITY OR SUITABILITY FOR A PARTICULAR PURPOSE.

Limitation of liability for EVB
WE'S OVERALL LIABILITY FOR DAMAGE CAUSED BY WE IS LIMITED TO DAMAGE THAT TYPICALLY OCCURS. WE DOES NOT ACCEPT ANY LIABILITY FOR LOSS OF PROFIT, CONSEQUENTIAL OR SPECIAL LOSSES, OR SPECIAL, INDIRECT, INCIDENTAL AND CONSEQUENTIAL DAMAGE. HOWEVER, THIS LIMITATION OF LIABILITY DOES NOT APPLY IN THE CASE OF INTENTIONAL OR GROSSLY NEGLIGENT ACTS AND FOR THE DAMAGE RESULTING FROM LOSS OF LIFE, PHYSICAL INJURY, HARM TO HEALTH OR IN CASE OF LEGAL MANDATORY LIABILITY [AS IN GERMAN PRODUCT LIABILITY LAW, ProdHaftG].

12 Legal notice

Exclusion of liability
Würth Elektronik eiSos GmbH & Co. KG considers the information in this document to be correct at the time of publication. However, Würth Elektronik eiSos GmbH & Co. KG reserves the right to modify the information such as technical specifications or functions of its products or discontinue the production of these products or the support of one of these products without any written announcement or notification to customers. The customer must make sure that the information used corresponds to the latest published information. Würth Elektronik eiSos GmbH & Co. KG does not assume any liability for the use of its products. Würth Elektronik eiSos GmbH & Co. KG does not grant licenses for its patent rights or for any other of its intellectual property rights or third-party rights.
Notwithstanding anything above, Würth Elektronik eiSos GmbH & Co. KG makes no representations and/or warranties of any kind for the provided information related to their accuracy, correctness, completeness, usage of the products and/or usability for customer applications. Information published by Würth Elektronik eiSos GmbH & Co. KG regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof.

Suitability in customer applications
The customer bears the responsibility for compliance of systems or units, in which Würth Elektronik eiSos GmbH & Co. KG products are integrated, with applicable legal regulations. Customer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of Würth Elektronik eiSos GmbH & Co. KG components in its applications, notwithstanding any applications-related information or support that may be provided by Würth Elektronik eiSos GmbH & Co. KG. Customer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences lessen the likelihood of failures that might cause harm and take appropriate remedial actions. The customer will fully indemnify Würth Elektronik eiSos GmbH & Co. KG and its representatives against any damages arising out of the use of any Würth Elektronik eiSos GmbH & Co. KG components in safety-critical applications.

Trademarks
AMBER wireless is a registered trademark of Würth Elektronik eiSos GmbH & Co. KG. All other trademarks, registered trademarks, and product names are the exclusive property of the respective owners.

Usage restriction
Würth Elektronik eiSos GmbH & Co. KG products have been designed and developed for usage in general electronic equipment only. This product is not authorized for use in equipment where a higher safety standard and reliability standard is especially required or where a failure of the product is reasonably expected to cause severe personal injury or death, unless the parties have executed an agreement specifically governing such use. Moreover, Würth Elektronik eiSos GmbH & Co. KG products are neither designed nor intended for use in areas such as military, aerospace, aviation, nuclear control, submarine, transportation (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. Würth Elektronik eiSos GmbH & Co. KG must be informed about the intent of such usage before the design-in stage. In addition, sufficient reliability evaluation checks for safety must be performed on every electronic component, which is used in electrical circuits that require high safety and reliability function or performance. By using Würth Elektronik eiSos GmbH & Co. KG products, the customer agrees to these terms and conditions.

13 License terms

These License terms will take effect upon the purchase and usage of the Würth Elektronik eiSos GmbH & Co. KG wireless connectivity products. You hereby agree that these license terms are applicable to the product and the incorporated software, firmware and source codes (collectively, "Software") made available by Würth Elektronik eiSos in any form, including but not limited to binary, executable or source code form. The software included in any Würth Elektronik eiSos wireless connectivity product is purchased to you on the condition that you accept the terms and conditions of these license terms. You agree to comply with all provisions under these license terms.

Limited license
Würth Elektronik eiSos hereby grants you a limited, non-exclusive, non-transferable and royalty-free license to use the software and under the conditions that will be set forth in these license terms. You are free to use the provided software only in connection with one of the products from Würth Elektronik eiSos to the extent described in these license terms. You are entitled to change or alter the source code for the sole purpose of creating an application embedding the Würth Elektronik eiSos wireless connectivity product. The transfer of the source code to third parties is allowed to the sole extent that the source code is used by such third parties in connection with our product or another hardware provided by Würth Elektronik eiSos under strict adherence of these license terms. Würth Elektronik eiSos will not assume any liability for the usage of the incorporated software and the source code. You are not entitled to transfer the source code in any form to third parties without prior written consent of Würth Elektronik eiSos.
You are not allowed to reproduce, translate, reverse engineer, decompile, disassemble or create derivative works of the incorporated software and the source code in whole or in part. No more extensive rights to use and exploit the products are granted to you.

Usage and obligations
The responsibility for the applicability and use of the Würth Elektronik eiSos wireless connectivity product with the incorporated firmware in a particular customer design is always solely within the authority of the customer. Due to this fact, it is up to you to evaluate and investigate, where appropriate, and to decide whether the device with the specific product characteristics described in the product specification is valid and suitable for your respective application or not.
You are responsible for using the Würth Elektronik eiSos wireless connectivity product with the incorporated firmware in compliance with all applicable product liability and product safety laws. You acknowledge to minimize the risk of loss and harm to individuals and bear the risk for failure leading to personal injury or death due to your usage of the product.
Würth Elektronik eiSos' products with the incorporated firmware are not authorized for use in safety-critical applications, or where a failure of the product is reasonably expected to cause severe personal injury or death. Moreover, Würth Elektronik eiSos' products with the incorporated firmware are neither designed nor intended for use in areas such as military, aerospace, aviation, nuclear control, submarine, transportation (automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network etc. You shall inform Würth Elektronik eiSos about the intent of such usage before design-in stage. In certain customer applications requiring a very high level of safety and in which the malfunction or failure of an electronic component could endanger human life or health, you must ensure to have all necessary expertise in the safety and regulatory ramifications of your applications. You acknowledge and agree that you are solely responsible for all legal, regulatory and safety-related requirements concerning your products and any use of Würth Elektronik eiSos' products with the incorporated firmware in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by Würth Elektronik eiSos. YOU SHALL INDEMNIFY WÜRTH ELEKTRONIK EISOS AGAINST ANY DAMAGES ARISING OUT OF THE USE OF WÜRTH ELEKTRONIK EISOS' PRODUCTS WITH THE INCORPORATED FIRMWARE IN SUCH SAFETY-CRITICAL APPLICATIONS.

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

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.

Disclaimer of warranty
THE FIRMWARE IS PROVIDED "AS IS". YOU ACKNOWLEDGE THAT WÜRTH ELEKTRONIK EISOS MAKES NO REPRESENTATIONS AND WARRANTIES OF ANY KIND RELATED TO, BUT NOT LIMITED TO THE NON-INFRINGEMENT OF THIRD PARTIES' INTELLECTUAL PROPERTY RIGHTS OR THE MERCHANTABILITY OR FITNESS FOR YOUR INTENDED PURPOSE OR USAGE. WÜRTH ELEKTRONIK EISOS DOES NOT WARRANT OR REPRESENT THAT ANY LICENSE, EITHER EXPRESS OR IMPLIED, IS GRANTED UNDER ANY PATENT RIGHT, COPYRIGHT, MASK WORK RIGHT, OR OTHER INTELLECTUAL PROPERTY RIGHT RELATING TO ANY COMBINATION, MACHINE, OR PROCESS IN WHICH THE WÜRTH ELEKTRONIK EISOS' PRODUCT WITH THE INCORPORATED FIRMWARE IS USED. INFORMATION PUBLISHED BY WÜRTH ELEKTRONIK EISOS REGARDING THIRD-PARTY PRODUCTS OR SERVICES DOES NOT CONSTITUTE A LICENSE FROM WÜRTH ELEKTRONIK EISOS TO USE SUCH PRODUCTS OR SERVICES OR A WARRANTY OR ENDORSEMENT THEREOF.

Limitation of liability
Any liability not expressly provided by Würth Elektronik eiSos shall be disclaimed.
You agree to hold us harmless from any third-party claims related to your usage of the Würth Elektronik eiSos' products with the incorporated firmware, software and source code. Würth Elektronik eiSos disclaims any liability for any alteration, development created by you or your customers as well as for any combination with other products.

Applicable law and jurisdiction
Applicable law to these license terms shall be the laws of the Federal Republic of Germany. Any dispute, claim or controversy arising out of or relating to these license terms shall be resolved and finally settled by the court competent for the location of Würth Elektronik eiSos registered

office.

Severability clause
If a provision of these 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.

Miscellaneous
Würth Elektronik eiSos reserves the right at any time to change these terms at its own discretion. It is your responsibility to check at Würth Elektronik eiSos homepage for any updates. Your continued usage of the products will be deemed as the acceptance of the change.
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 product, you accept these license terms in all terms.

List of Figures

List of Tables

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

Max-Eyth-Straße 1
74638 Waldenburg
Germany

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

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT