



USER MANUAL

EVALUATION KIT FOR CORDELIA-I
RADIO MODULE

2610019225011

VERSION 1.0

NOVEMBER 25, 2024

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.

Revision history

| Document version | HW version | Notes | Date |
|------------------|------------|---|---------------|
| 1.0 | 1.0 | <ul style="list-style-type: none">Initial version | November 2024 |

Abbreviations

| Abbreviation | Name | Description |
|--------------|---|---|
| BDM | Business Development 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 Cordelia-I EV-Board is exclusively for evaluation of the Cordelia-I module:

| WE order code | Description |
|---------------|------------------------|
| 2610011025010 | Cordelia-I WLAN module |

Table 1: Compatibility

| WE order code | Description |
|---------------|-------------------|
| 2610019225011 | Cordelia-I EV-kit |

Table 2: Order codes

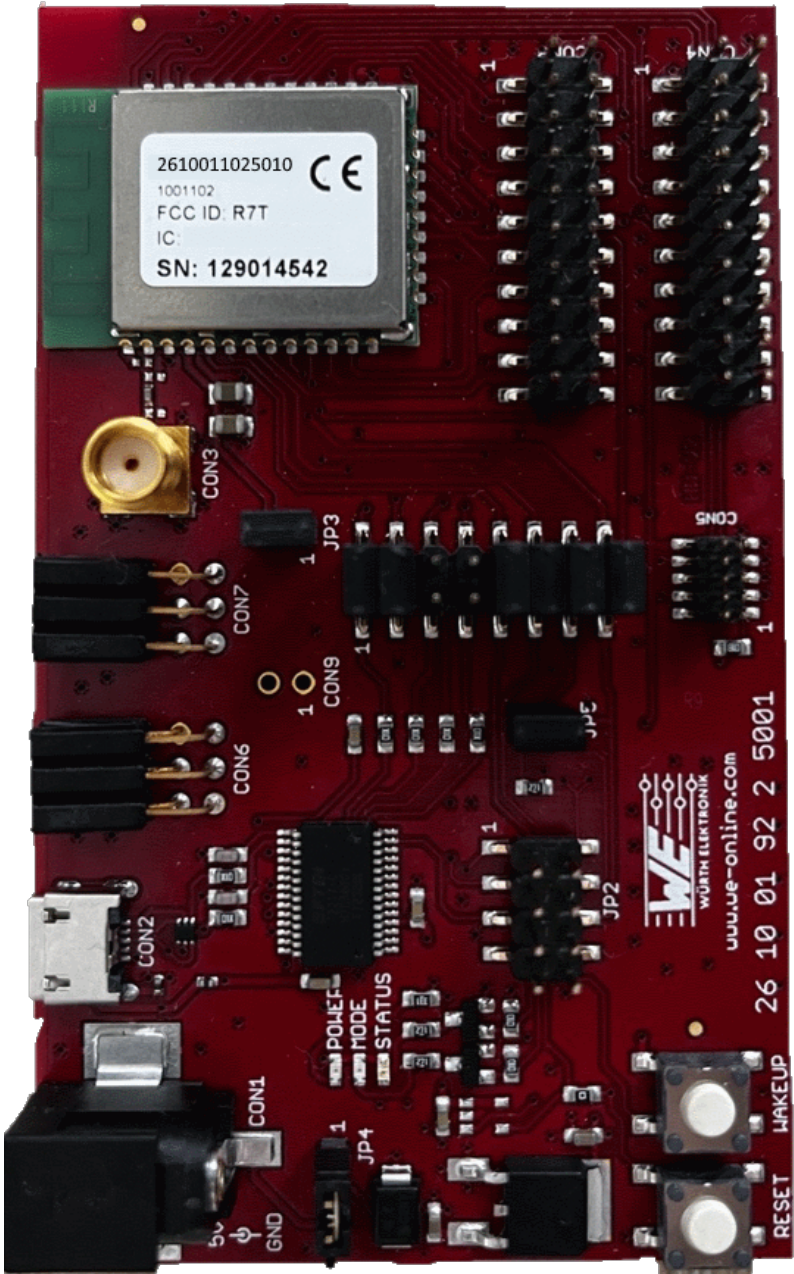


Figure 1: Product image - 2610019225011

| Kit content | Quantity |
|---|----------|
| EV-Board with Cordelia-I radio module | 1 |
| Himalia 2.4 GHz dipole antenna | 1 |
| USB-2.0-Typ-A to USB-2.0-Micro-B cable | 1 |
| Power supply | 1 |
| Packaging: Cardboard Box (230mmx230mmx78mm), ESD safe cover | 1 |

Table 3: Contents Coredelia-I EV-kit

2 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 and provides a serial (virtual) COM port for interfacing the communication interface of the module.



Due to high peak power consumption of the Cordelia-I radio module, this EV-Board must be operated with external power supply or an external powered USB Hub that can provide the peak current.

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 in the customers end application.

Feel free to check our YouTube channel:

www.youtube.com/user/WuerthElektronik/videos for video tutorials, hands-ons and webinars relating to our products.

2.1 Taking into operation

Before starting to work with the EV-Board make sure that,

- The jumpers on the EV-Board are placed on the default locations.
- FTDI driver package is installed on the PC. The latest version of the drivers can be downloaded from (www.ftdichip.com/Drivers/VCP.htm). Please use the setup executable package or follow the install instructions from FTDI.
- A stable and adequately dimensioned voltage source is connected to the power jack or external power source.
- EV-Board is connected to the PC via USB-cable.
- COM port is detected and installed on the PC. The (COM) port name of the EV-Board can be found using the device manager on Windows and the display message (dmesg) on Linux. For example, the EV-Board might appears as "COM12" on windows and "/dev/ttyUSB0" on Linux.
- A terminal program like hterm for Windows has to be run and the corresponding COM port chosen and opened using the default UART settings of the mounted radio module (e.g. 115200 Baud, 8n1).
- To ensure a proper start-up of the module after applying VCC to the EV-Board the reset button should be pressed to perform a reset and clean restart before proceeding.

A detailed module specific quick start instruction is available in the module user manual which can be found under the link:

<https://www.we-online.com/components/products/manual/2610011025010>

3 Development board

3.1 Block diagram

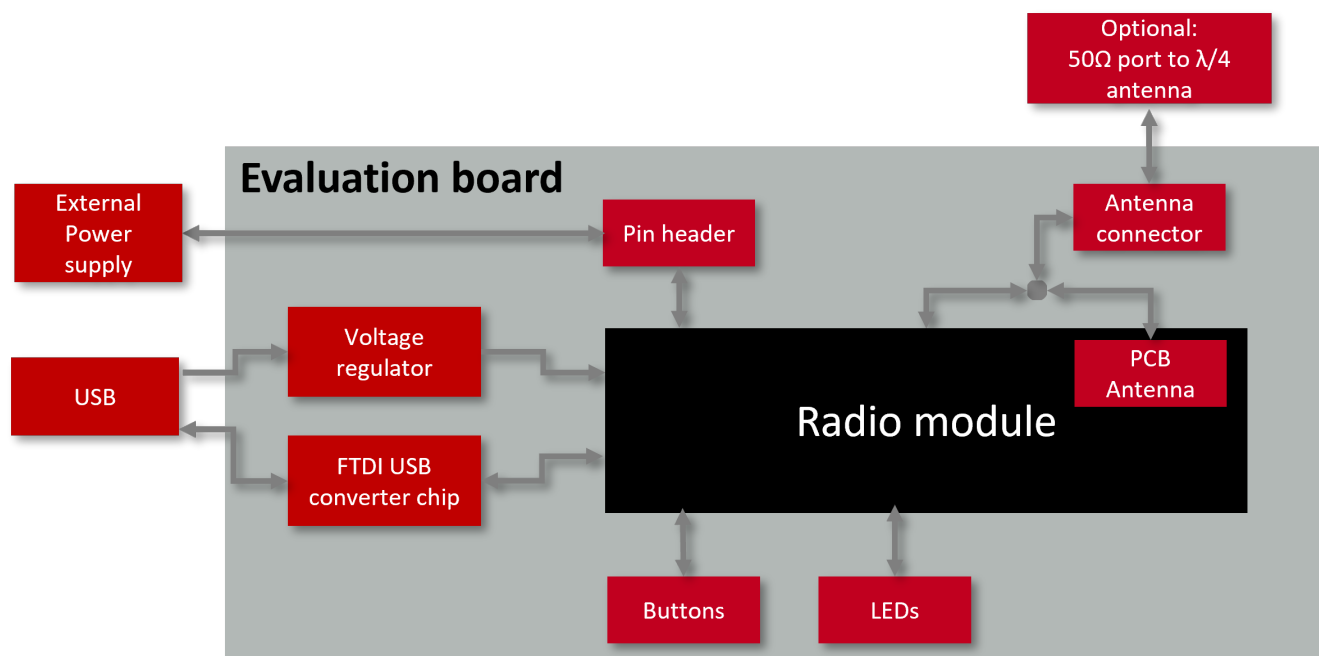


Figure 2: Block diagram

3.2 Overview

The EV-Board is equipped with a number of jumpers and connectors. This allows the user to access to every signal/pin enabling complete evaluation of the radio module. In the following a detailed description of the jumpers and connectors is provided. As a quick reference, a table of all jumpers and connectors with the corresponding signals are printed on the back of the EV-Board.

| | | |
|---|---|---|
| ----- CON1 5V POWER SUPPLY ----- CON2 MICRO USB ----- CON3 SMA RF-SIGNAL ----- CON4 SERIAL_FLASH_INTERFACE ----- 1: UCC- 2: NC 3: NC - 4:GND 5: SFL_DOUT - 6: GND 7: SFL_CS - 8: GND 9: SFL_CLK- 10: GND 11: NC 12: GND 13: SFL_DIN - 14: NC 15: NRESET 16: NC 17: NC - 18: NC 19: NC - 20: NC ----- CON5 JTAG ----- 1: UCC - 2: TMS 3: GND - 4: TCK 5: GND - 6: TDO 7: GND - 8: TDI 9: GND - 10: NRESET | ----- CON6 WE-SPI-SENSOR ----- CON7 WE-I2C-SENSOR ----- CON8 SPI/I2C/GPIO ----- 1: GND - 2: SPI_CLK 3: SPI_MISO - 4: SPI_CS_N 5: SPI_MOSI - 6: UCC 7: GND - 8: I2C_SCL 9: I2C_SDA - 10: UCC 11: GPIO12 - 12: GPIO22 13: GPIO0 - 14: GPIO30 15: GPIO3 - 16: GPIO4 17: GPIO5 - 18: NC 19: GND - 20: NC ----- CON9 DIRECT POWER SUPPLY ----- 1: GND 2: UCC 3.3V | ----- JP1 ... <-> MODULE 1: TXD_FTDI <-> 2: UART0_RX 3: RXD_FTDI <-> 4: UART0_TX 5: RTS#_FTDI <-> 6: UART0_CTS 7: CTS#_FTDI <-> 8: UART0_RTS 9: LED_G <-> 10: STATUS 11: LED_Y <-> 12: MODE 13: WAKEUP <-> 14: GPIO4 15: BOOT <-> 16: BOOT ----- JP2 1: CBUS0_FTDI <-> 2: NRESET 3: CBUS1_FTDI <-> 4: WAKEUP 5: CBUS2_FTDI <-> 6: BOOT 7: NC <-> 8: NC ----- JP3 CURRENT MEASUREMENT ----- JP4 SUPPLY SELECTION 1-2 USB SUPPLIED 2-3 CON1 SUPPLIED ----- JP5 Connect Boot to pull up |
|---|---|---|

Figure 3: Quick Reference - Table of connectors and jumper



The silk screen on the EV-Board may show the order code of Calypso-I EV-kit, please note that Calypso and Cordelia-I are the same radio module hardware and differ only in the pre-installed radio module software.

3.3 Jumpers

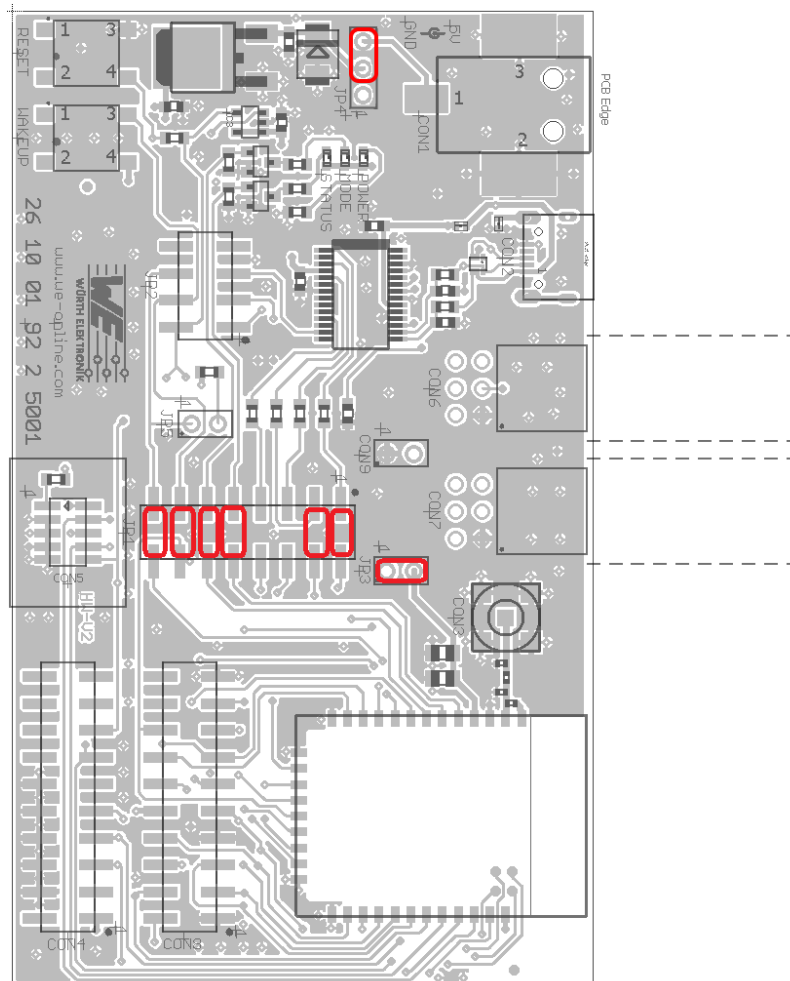


Figure 4: Jumpers, defaults

3.3.1 JP1

JP1 enables connection to functionally essential signals including the primary UART interface, *BOOT*, *WAKE_UP* as well as the status indication signals *STATUS_IND_x*. In its default configuration, the UART interface is connected to the USB via serial-USB (FTDI) adapter, *WAKEUP* to the push button and the *STATUS_IND_x* to the two LEDs.

| JP1 | Module Pin Function | Jumper set (default) |
|-------|----------------------------|----------------------|
| 1,2 | <i>URXD</i> | Yes |
| 3,4 | <i>UTXD</i> | Yes |
| 5,6 | <i>/RTS</i> | No |
| 7,8 | <i>/CTS</i> | No |
| 9,10 | <i>STATUS_IND_0, LED_G</i> | Yes |
| 11,12 | <i>STATUS_IND_1, LED_Y</i> | Yes |
| 13,14 | <i>WAKE_UP</i> | Yes |
| 15,16 | <i>BOOT</i> | Yes |

3.3.2 JP2

JP2 allows *nReset*, *WAKE_UP* and the *BOOT* to be optionally driven from PC via the FTDI *CBUSx* pins.

| JP2 | Module Pin Function | Jumper set (default) |
|-----|-----------------------|----------------------|
| 1,2 | <i>nReset, CBUS0</i> | No |
| 3,4 | <i>WAKE_UP, CBUS1</i> | No |
| 5,6 | <i>BOOT, CBUS2</i> | No |
| 7,8 | not connected | No |

3.3.3 JP3

JP3 allows connection of an ammeter in series with the power supply to measure the current consumption of the radio module.

| JP3 | Module Pin Function | Jumper set (default) |
|-----|---|----------------------|
| 1,2 | Connect VCC to voltage regulator output | Yes |

3.3.4 JP4

JP4 determines the source of the supply voltage.

| JP4 | Module Pin Function | Jumper set (default) |
|-----|-------------------------------------|----------------------|
| 1,2 | Connect LDO to USB 5 V | No |
| 2,3 | Connect LDO to CON1 (barrel socket) | Yes |

3.3.5 JP5

JP5 connects the *BOOT* pin to a logic HIGH level.



With JP5 set, the module will not start any of its implemented application modes and will not behave as explained in the manual.

| JP5 | Module Pin Function | Jumper set (default) |
|-----|---------------------|----------------------|
| 1,2 | BOOT Pin to pull up | No |

3.4 Connectors and pin headers

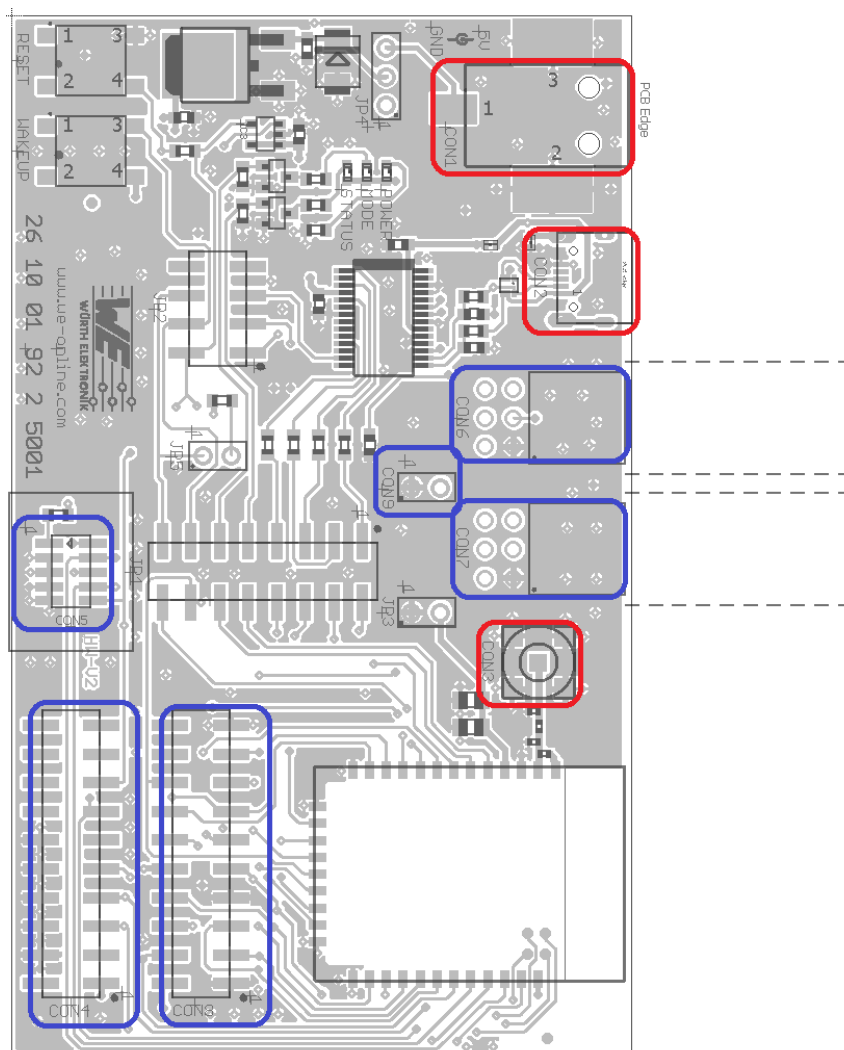


Figure 5: Connectors

The connectors marked red in figure 5 need to be connected appropriately to ensure essential functionality of the module. The connectors marked blue can be optionally connected to additional equipment and/or are reserved for future functions.



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.

3.4.1 CON1

CON1 is a barrel connector socket that can be used to provide the supply voltage through a 5.5 x 2.1 mm barrel connector plug. The USB for communication must be connected only after

the Power jack was connected and VCC is stable. If the evaluation board is power sourced, the power lights up.



It is recommended to always power-up the EV-Board using the power supply provided in the EV-Kit.

| CON1 | Function |
|-------|----------|
| Inner | 5 V |
| Outer | GND |

3.4.2 CON2

Connector CON2 is a micro-USB socket that enables connection to PC via standard micro-USB cable.

| CON2 | Function |
|------|--|
| | Micro-USB connector for host connection and VCC bus supply |

3.4.3 CON3

Connector CON3 (SMA receptacle) is used to connect an external antenna.



By default, capacitor C1 is populated and the capacitor C13 is not populated to enable the use the external antenna.



In order use the on-board PCB antenna, capacitor C13 has to be populated and C1 not populated.

| CON3 | Function |
|-------|-----------|
| Inner | RF signal |
| Outer | GND |

3.4.4 CON4

Connector CON4 is the serial flash interface used in the production for programming.

| CON4 | Function | CON4 | Function |
|------|---------------|------|---------------|
| 1 | VCC | 2 | Not connected |
| 3 | Not connected | 4 | GND |
| 5 | SFL_DOUT | 6 | GND |
| 7 | SFL_CS | 8 | GND |
| 9 | SFL_CLK | 10 | GND |
| 11 | Not connected | 12 | GND |
| 13 | SFL_DIN | 14 | Not connected |
| 15 | nRESET | 16 | Not connected |
| 17 | Not connected | 18 | Not connected |
| 19 | Not connected | 20 | Not connected |

3.4.5 CON5

Connector CON5 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.

| CON5 | Function | CON5 | Function |
|------|----------|------|----------|
| 1 | VCC | 2 | TMS |
| 3 | GND | 4 | TCK |
| 5 | GND | 6 | TDO |
| 7 | GND | 8 | TDI |
| 9 | GND | 10 | nRESET |

3.4.6 CON6

Connector CON6 is the SPI interface to connect a Würth Elektronik Sensor Board. The interface is not enabled and will not be supported by the firmware.

| CON6 | Function | CON6 | Function |
|------|----------|------|----------|
| 1 | GND | 2 | SPI_CLK |
| 3 | SPI_MOSI | 4 | SPI_CS_N |
| 5 | SPI_MISO | 6 | VCC |

3.4.7 CON7

Connector CON7 is the I2C interface to connect a Würth Elektronik Sensor Board. The interface is not enabled and will not be supported by the firmware.

| CON7 | Function | CON7 | Function |
|------|----------------|------|----------------|
| 1 | <i>GND</i> | 2 | <i>I2C_SCL</i> |
| 3 | <i>I2C_SDA</i> | 4 | Not connected |
| 5 | <i>GPIO</i> | 6 | <i>VCC</i> |

3.4.8 CON8

On Connector CON8 several module pins are available.

| CON8 | Function | CON8 | Function |
|------|--------------------------|------|---------------------------|
| 1 | <i>GND</i> | 2 | <i>SPI_CLK, GPIO14</i> |
| 3 | <i>SPI_MISO, GPIO15</i> | 4 | <i>SPI_CS_N, GPIO17</i> |
| 5 | <i>SPI_MOSI, GPIO16</i> | 6 | <i>VCC</i> |
| 7 | <i>GND</i> | 8 | <i>I2C_SCL, GPIO10</i> |
| 9 | <i>I2C_SDA, GPIO11</i> | 10 | <i>VCC</i> |
| 11 | <i>GPIO12</i> | 12 | <i>GPIO22, APP_MODE_0</i> |
| 13 | <i>GPIO0, APP_MODE_1</i> | 14 | <i>GPIO30</i> |
| 15 | <i>GPIO3</i> | 16 | <i>GPIO4</i> |
| 17 | <i>GPIO5</i> | 18 | Not connected |
| 19 | <i>GND</i> | 20 | Not connected |

Pins 10 (*APP_MODE_0*, *GPIO22*) and 11 (*APP_MODE_1*, *GPIO0*) determine the mode of operation of the module on boot-up and needs to be set accordingly. To start the Cordelia-I Default Operation mode no connection needs to be done on the EV-Board, as both *APP_MODE_0* and *APP_MODE_1* use an internal weak pull-down leading to a LOW level ("0") during the check procedure.

For any other mode one or both *APP_MODE* pins need to be connected to logic HIGH (*CON8_10*) in order to achieve a "1" during the check procedure.

Connecting HIGH to an internal pull-down of one or both *APP_MODE* pins will lead to leakage current during the time the app mode evaluation takes place.

The following table shows the application modes as implemented in firmware version 1.0.0. Please check the Cordelia-I manual for possible changes in other firmware versions.

| <i>APP_MODE_1, CON8_13</i> | <i>APP_MODE_0, CON8_12</i> | Description |
|----------------------------|----------------------------|-------------------|
| 0 | 0 | AT command mode |
| 0 | 1 | OTA mode |
| 1 | 0 | Provisioning mode |
| 1 | 1 | Transparent mode |

3.4.9 CON9

Connector CON9 enables connection of an external power supply directly to the radio module and thereby the possibility to test the application power source.



The supply voltage connected here has to be between 2.1V and 3.6 V. Refer to the module specific manual for more details.



When connecting power to CON9 the Jumper on JP4 should not be set.

| CON9 | Function | CON9 | Function |
|------|------------|------|------------|
| 1 | <i>GND</i> | 2 | <i>VCC</i> |

3.5 Buttons

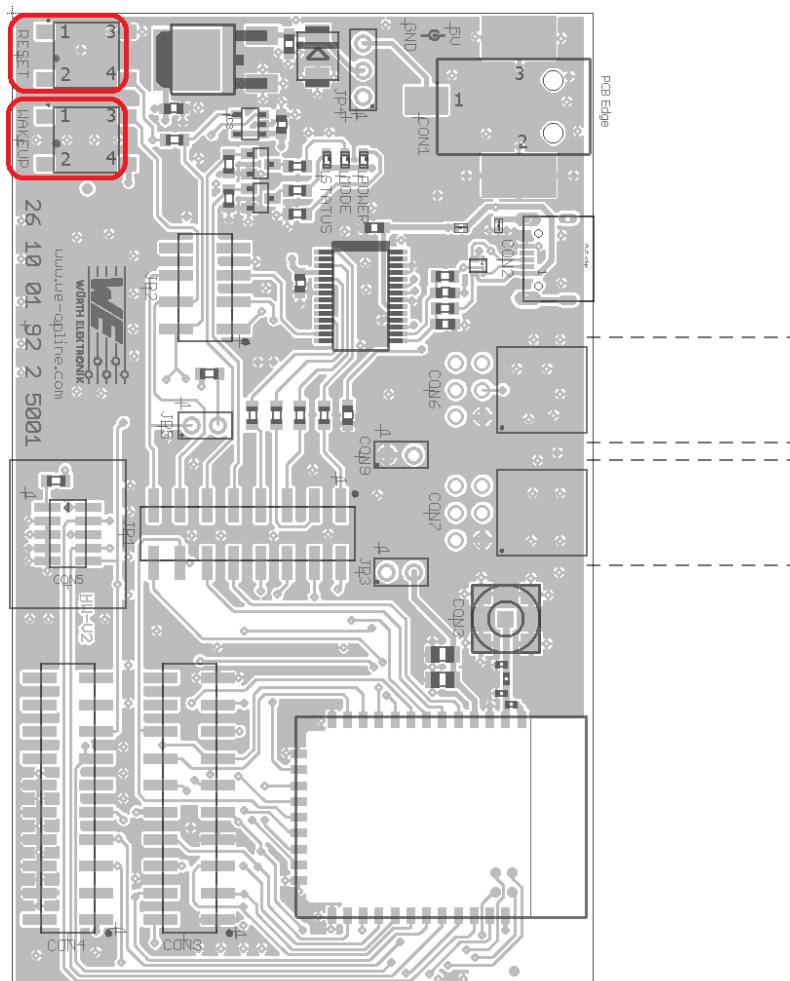


Figure 6: Buttons

3.5.1 *nRESET* 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. Please refer to the module specific manual for detailed information.

3.5.2 Wake-up button

The wake-up button is connected to *WAKE_UP* pin in order to trigger wake up of the module from sleep mode. Please refer to the module specific manual for detailed information.

3.6 LEDs

This EV-Board has three LEDs

3.6.1 Power

An active power LED indicates that the power supply to the EV-Board is active. See Section 3.7.1 for more details.

3.6.2 Mode

The mode LED is connected to the *STATUS_IND_0* pin of the module and indicates specific events based on the application mode. Please refer to the module specific manual for detailed information.

3.6.3 Status

The status LED is connected to the *STATUS_IND_1* pin of the module and indicates specific events based on the application mode. Please refer to the module specific manual for detailed information.

3.7 Function blocks

3.7.1 Power supply

The development board can be run and supplied via USB when the module's current draw is not exceeding the USB specification. The integrated voltage regulator regulates the connected USB voltage 5 V down to 3.3 V and supplies the remaining parts of the circuit. If the EV-Board is power sourced the power *LED1* lights up.

3.7.2 JP3 - Current measurement

By default, JP3 is set for normal operation. If a current meter is connected in place of the jumper, the power consumption of the radio module can be measured.

If the meter is not attached and the bridge is not set, the module will not receive a supply voltage. However, the power *LED1* may be active, as it is connected prior to the current measurement bridge in order not to distort the module's power consumption measurement.

3.7.3 UART via USB

The UART of the module can be connected to the USB converter by setting the corresponding jumpers on JP1. 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 shall not exceed 3 meters.

In order to establish a stable UART communication between the FTDI USB to UART converter chipset 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 mounted FTDI chipset (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:

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

When a baud rate is configured in the FTDI chip, 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 4: Example baud rates

3.7.4 UART direct

If a micro-controller is to be connected to the module, remove the corresponding jumpers on JP1. The UART can be connected directly on pin 2 and pin 4 on JP1. 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).

3.8 Schematic



The Cordelia-I shares its EV-Board with the Calypso radio module, the silk screen on the PCB and the schematics provided here may show Calypso specific article numbers or names. The radio module marking will show Cordelia-I / 2610011025010.

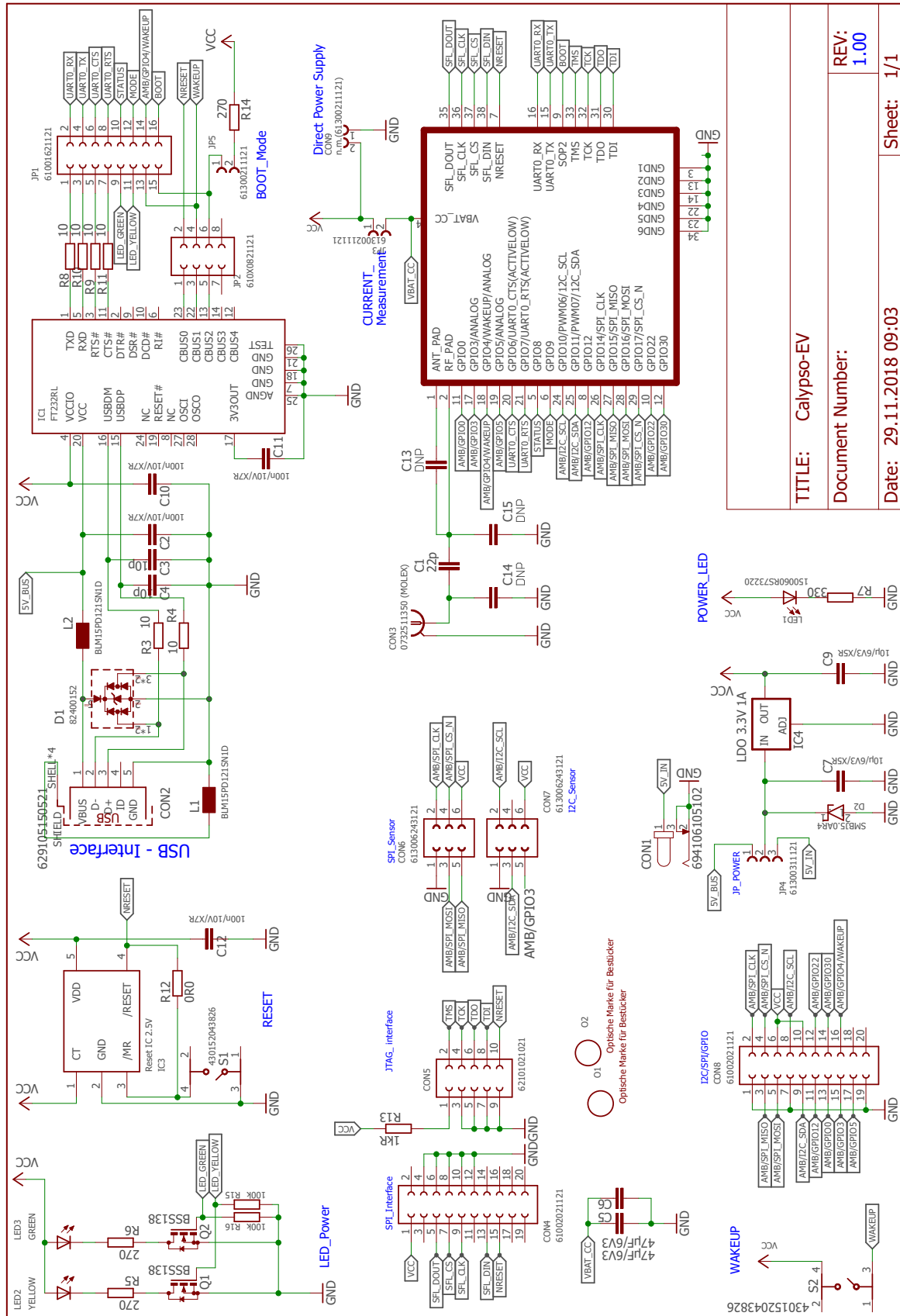


Figure 7: Circuit diagram

3.9 Layout

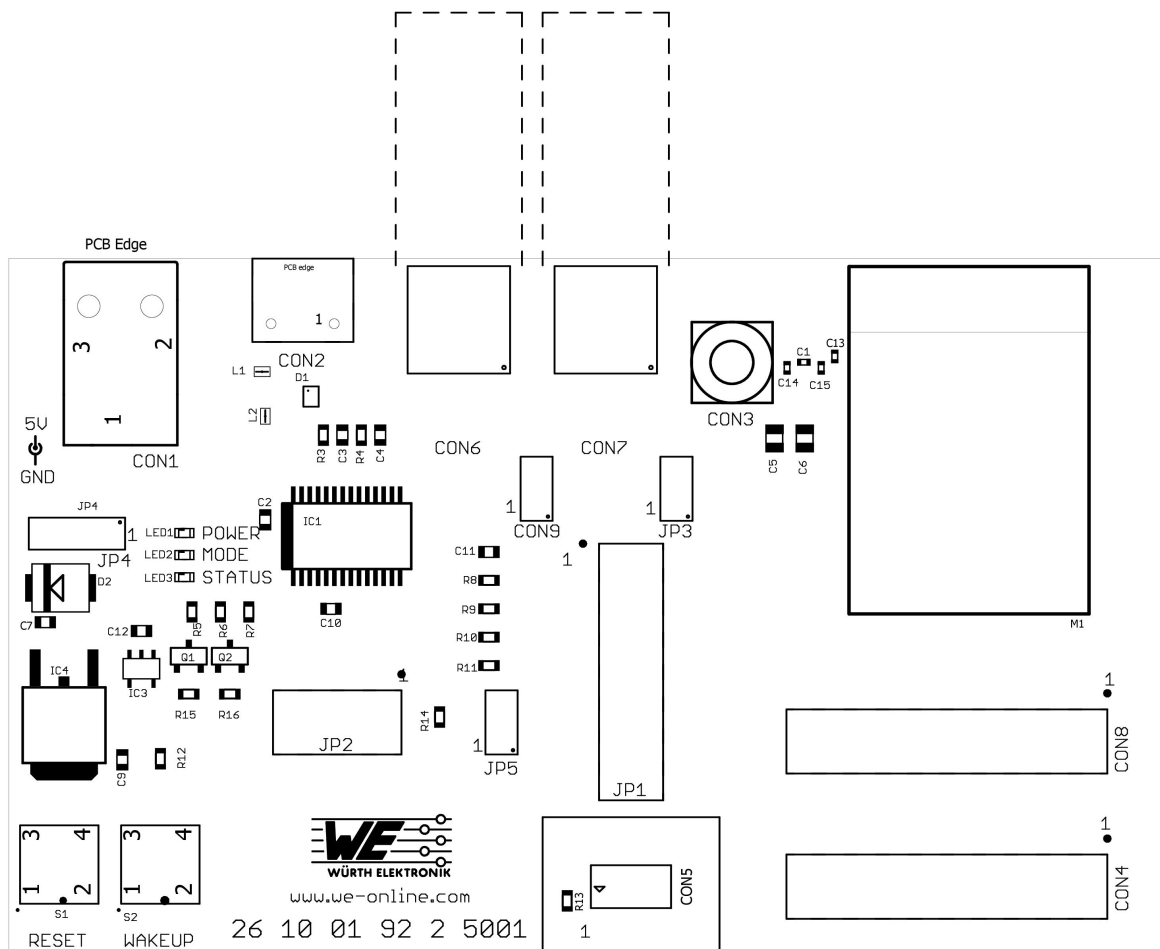


Figure 8: Assembly diagram

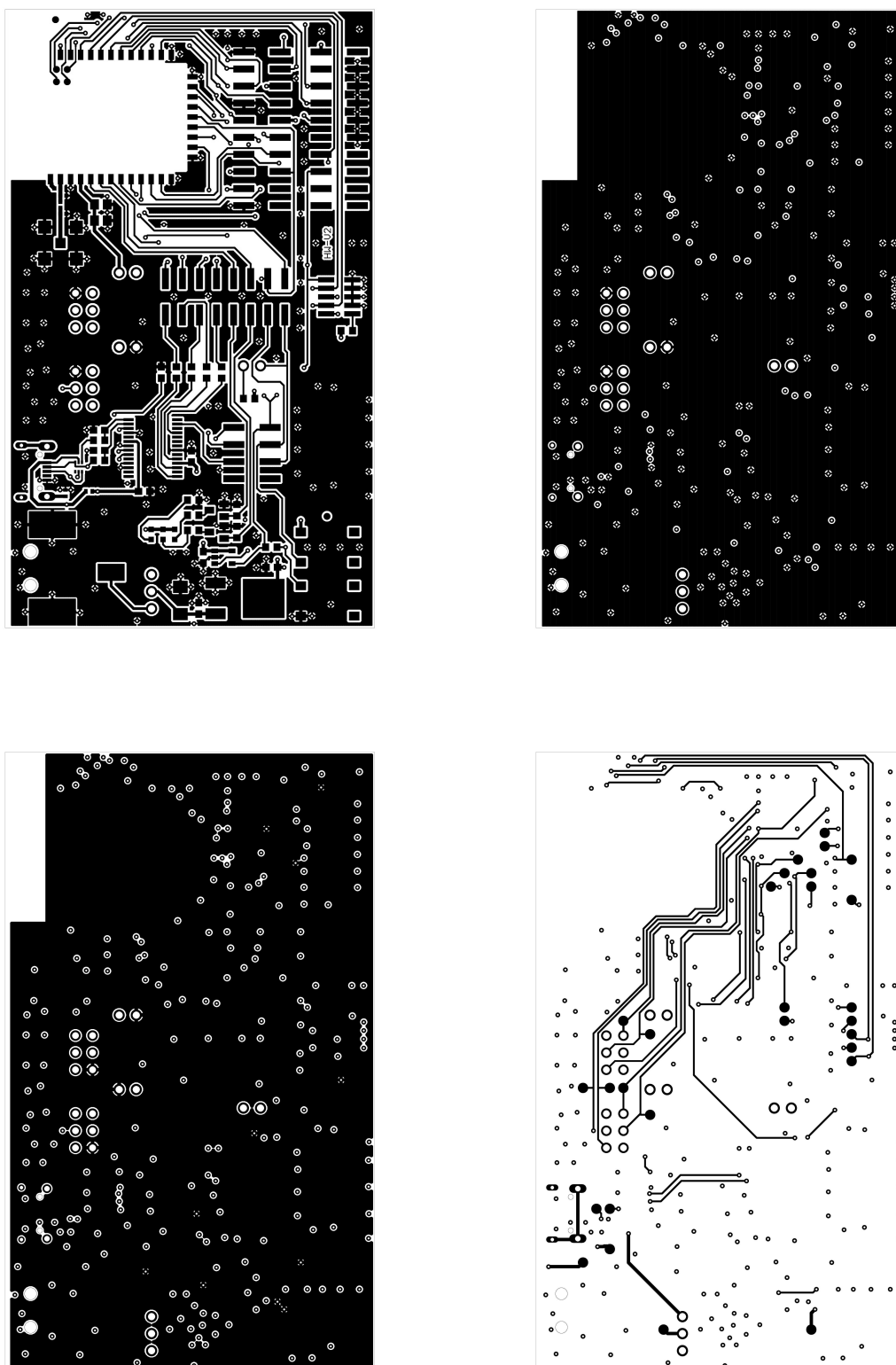


Figure 9: Top, inner & bottom Layers

4 Marking

4.1 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.

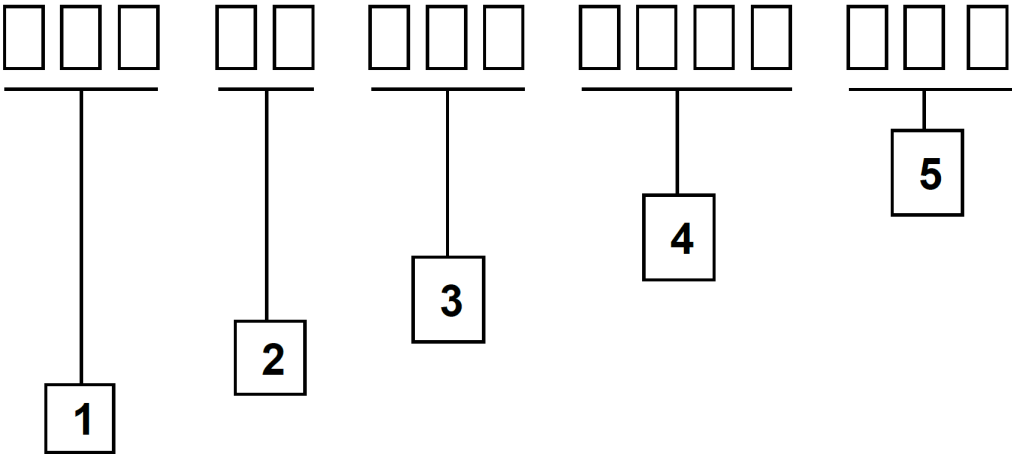


Figure 10: Lot number structure

| 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 5: 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.

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

5.1 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.

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.

6 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 6 and 6 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.

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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.

7 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

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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

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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.

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8 Legal notice

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9 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.

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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.**

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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.

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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 product, you accept these license terms in all terms.

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