WÜRTH ELEKTRONIK

EVALUATION BOARD MANUAL

FOR RADIO MODULES

WE order code	Former order code	Marketing Name
260701111x00x	AMB3626(-M)(-TR)	Titania, Mimas-I
260503114100x	AMB4426(-TR)	Thadeus
260504118x00x	AMB8426(-M)(-TR)	Tarvos-I, Metis-I
260702118x00x	AMB8626(-M)(-TR)	Tarvos-II, Metis-II
2609011x8x00x	AMB8826(-1)(-TR)	Tarvos-III
260702119100x	AMB9625(-TR)	Telesto-I
260702119101x	AMB9626(-TR)	Telesto-II
2609011x9100x	AMB9826(-1)(-TR)	Telesto-III
260903118100x	AMB8836(-TR)	Thebe-II
260904119100x	AMB9836(-TR)	Themisto-I

VERSION 2.4

OCTOBER 24, 2019

Revision history

Manual version	HW version	Notes	Date
1.0 - 1.11	-	• Initial version	July 2017
2.0	4.1	• New corporate design and structure	December 2018
2.1	4.1	• Corrected article number of Thebe-II • Added hint to use Thebe-II with external power supply	January 2019
2.2	4.1	• Added chapter `Regulatory compliance information`	February 2019
2.3	4.1	• Added Marketing name	March 2019
2.4	4.1	• Added Themisto-I • Specified Hardware Version of the evaluation board in detail.	October 2019

Abbreviations and abstract

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

Contents

1 Supported radio modules

The evaluation board described in this manual can be used to evaluate the following WE eiSos wireless connectivity modules:

Order code	Former order code	Marketing Name	Description
260701111100x	AMB3626(-TR)	Titania	169MHz proprietary
260701111300x	AMB3626-M(-TR)	Mimas-I	169MHz wireless M-BUS
260503114100x	AMB4426(-TR)	Thadeus	434MHz proprietary
260504118100x	AMB8426(-TR)	Tarvos-I	868MHz proprietary
260504118300x	AMB8426-M(-TR)	Metis-I	868MHz wireless M-BUS
260702118100x	AMB8626(-TR)	Tarvos-II	868MHz proprietary
260702118300x	AMB8626-M(-TR)	Metis-II	868MHz wireless M-BUS
260901108100x	AMB8826(-TR)	Tarvos-III	868MHz proprietary
260901118100x	AMB8826-1(-TR)	Tarvos-III	868MHz proprietary, PCB antenna
260702119100x	AMB9625(-TR)	Telesto-I	915MHz proprietary, -2dBm tx power for FCC
260702119101x	AMB9626(-TR)	Telesto-II	915MHz proprietary, FHSS for FCC
260901109100x	AMB9826(-TR)	Telesto-III	915MHz proprietary, broadband for FCC
260901119100x	AMB9826-1(-TR)	Telesto-III	915MHz proprietary, broadband for FCC, PCB antenna
260903118100x	AMB8836(-TR)	Thebe-II	869 MHz propietary, 500mW

Table 1: Compatibility

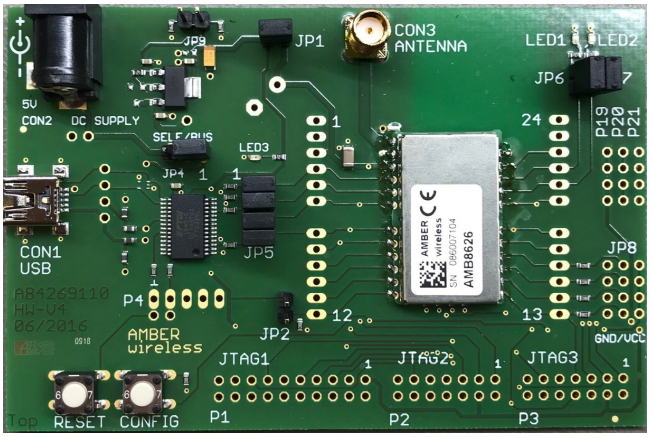


Figure 1: Product image

Contact our sales team to order the corresponding module EV kit.

2 Functional description

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

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

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

2.1 Taking into operation

To run the evaluation board place the jumpers on default position as described in chapter 3.2. The corresponding FTDI driver package (*www.ftdichip.com/Drivers/VCP.htm*) has to be installed on your PC.

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

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

A terminal program (like hterm for Windows) has to be run and the corresponding COM port has to be opened using the default settings of the mounted radio module.
After the module is powered through the USB jack or an alternative power supply, the reset button should be pressed to ensure a clean start-up of the module.

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

3 Development board

3.1 Block diagram

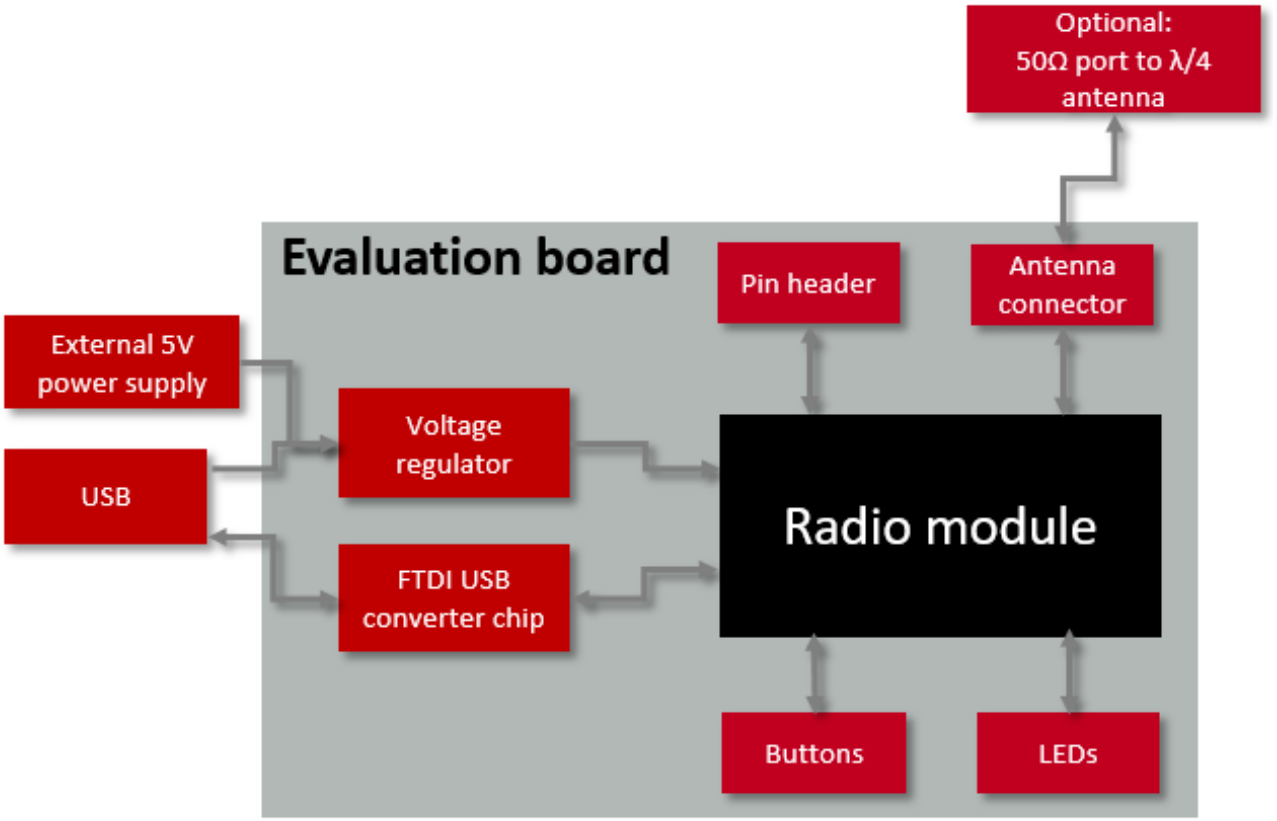


Figure 2: Block diagram

3.2 Jumpers

The following figure shows the default positioning (marked in red) of all jumpers on the EV board.

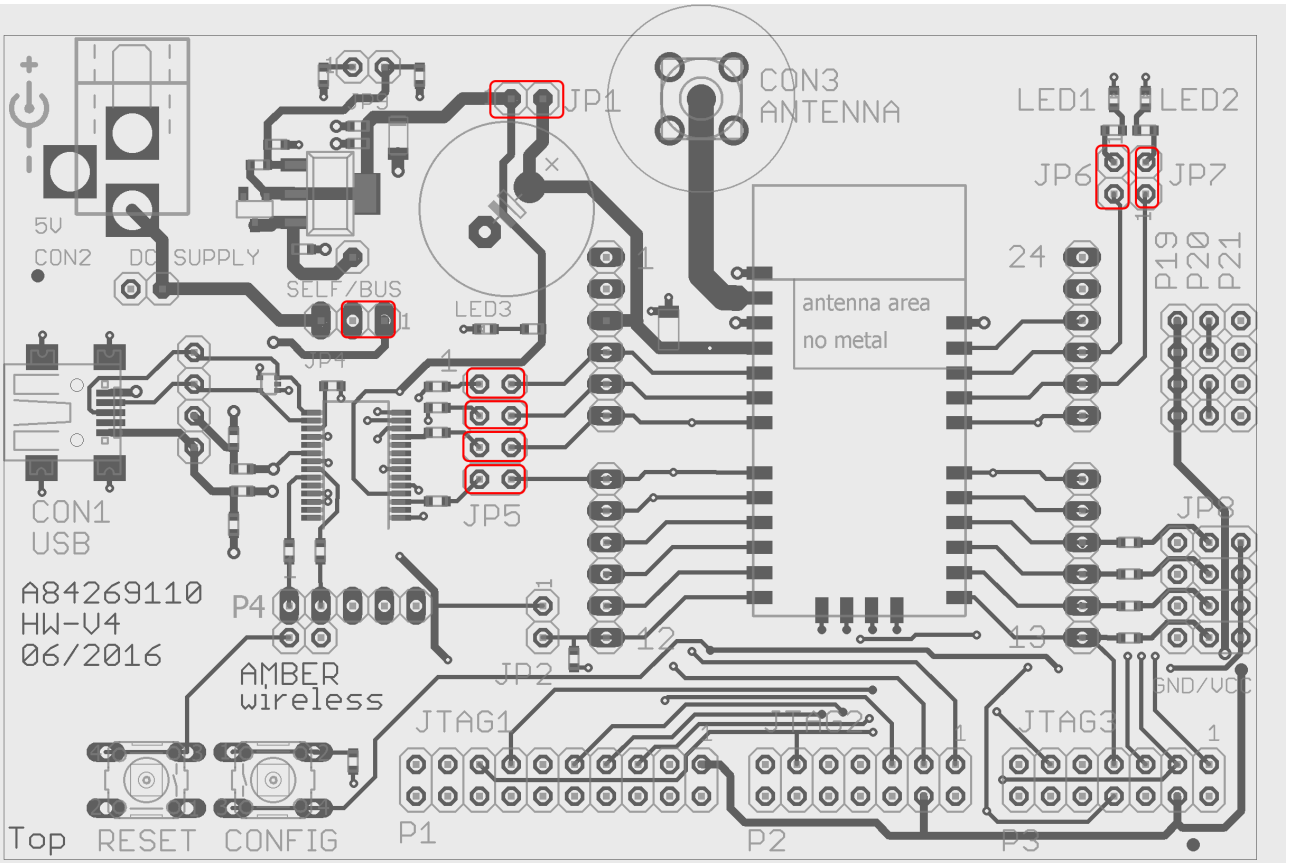


Figure 3: Jumpers in default position

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

JP2	Jumper placed (default)	Description
1,2	Not set	Connects module pin to VCC level. Only to be used in case of a module of the Tarvos-III, Telesto-III and Thebe-II family: Set jumper and press reset to start the boot loader.

JP4	Jumper placed (default)	Description
1,2,3	Set 1-2	Selection of the power supply, set left for external power supply, otherwise USB powered. 500mW high power modules shall only use ext. power supply as the USB is not guaranteed to deliver the required current.

JP5	Jumper placed (default)	Description
1,2	Set 1-2	Connects module pin UTXD to USB converter
3,4	Set 3-4	Connects module pin URXD to USB converter
5,6	Set 5-6	Connects module pin RTS to USB converter
7,8	Set 7-8	Connects module pin CTS to USB converter

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

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

JP8	Jumper placed (default)	Description
-	Not set	Pulling module pins to high or low level

JP9	Jumper placed (default)	Description
1, 2	Not set	Set jumper to reduce supply voltage to 2.2V instead of 3.3V. You shall take the module specific electrical characteristics into account when changing VCC to 2.2V.

3.3 Connectors and pin headers

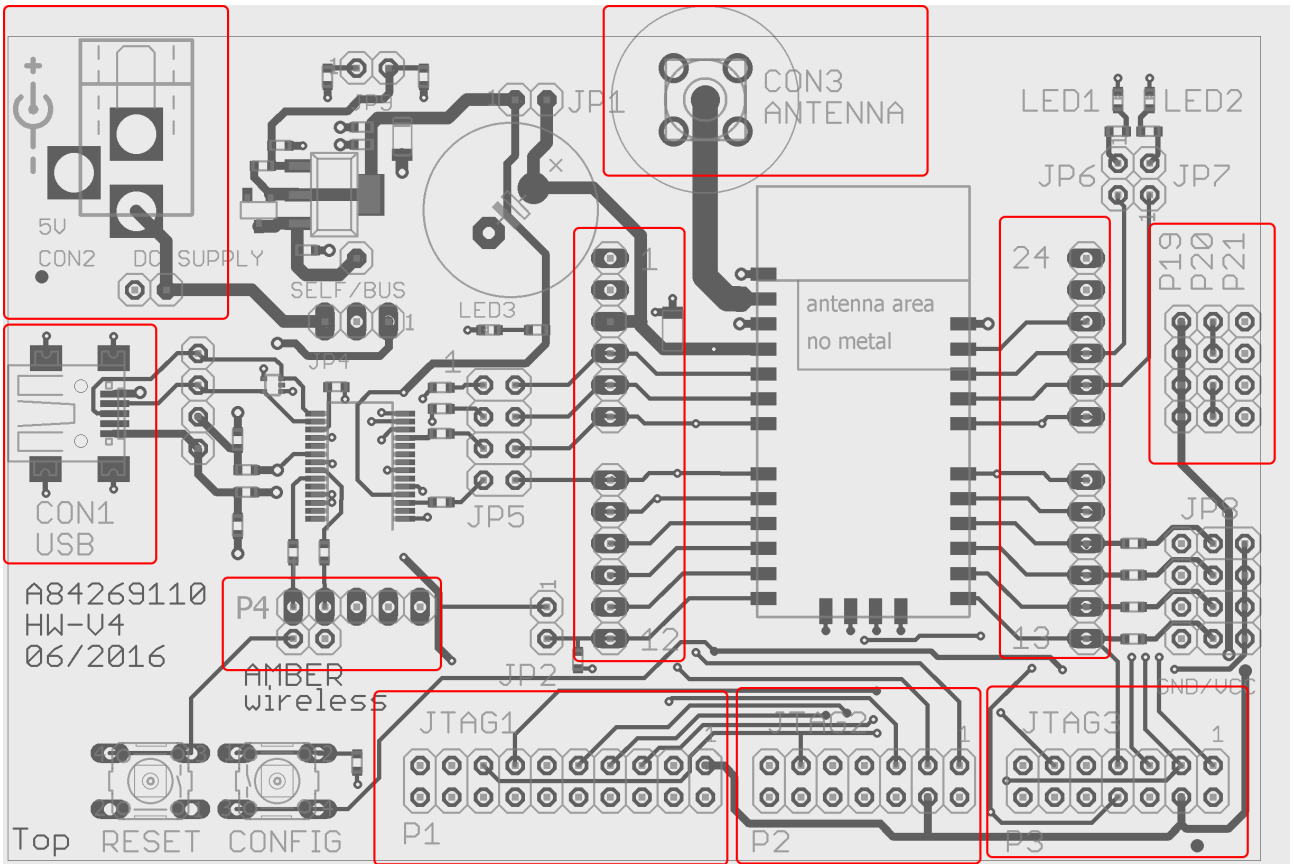


Figure 4: Connectors

All reserved pins shall be handled/terminated as described in the module specific manual.

-	Description
1-24	Direct access to the signals of the radio module

CON1	Description
-	Mini USB jack for USB interface

CON2	Description
-	Power jack, External 5V power supply

CON3	Description
-	SMA Antenna connector for modules variants wit RF pad (i.e. without integrated antenna)

P1	Function	Description
1-20	JTAG	2×10 pin JTAG interface access for ARM Cortex M

P2	Function	Description
1-20	JTAG	2×7 pin JTAG interface access for modules with MSP430x5xx

P3	Function	Description
1-20	JTAG	2×7 pin JTAG interface access for modules with MSP430x2xx

P4	Function	Description
1,2,3,4,5	FTDI CBUSx	Access to FTDI CBUSx lines

P19	Description
1,2,3,4	Access to VCC

P20	Description
1-2	Prototyping area, internally connected
3-4	Prototyping area, internally connected

P21	Description
1,2,3,4	Access to GND

3.4 Buttons

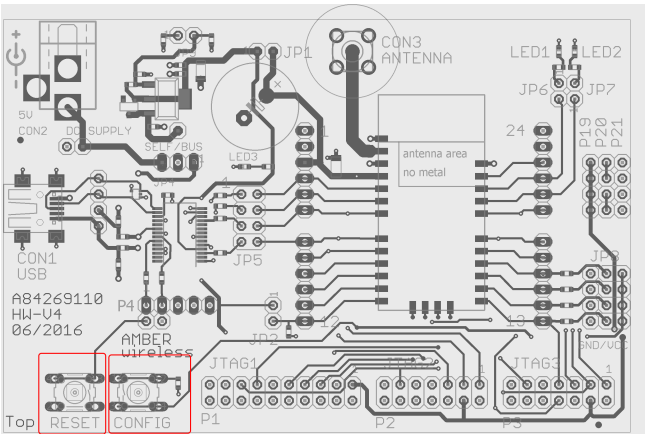


Figure 5: Buttons in layout

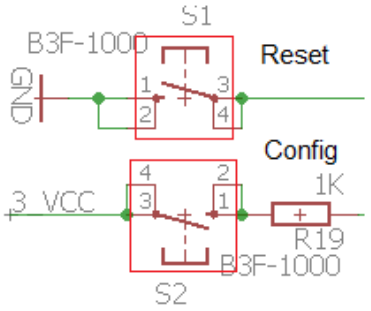


Figure 6: Buttons in circuit

3.4.1 Reset button

Every module provides a */RESET pin* that is connected to this RESET button so the module can be (re)started properly. A pressed button connects the */RESET* to LOW logic level and holds the module in reset until it is released. Most modules provide an internal pull-up resistor.
Please refer to the module specific manual for detailed information upon the module's */RESET* pin and recommended start-up sequences for the module.

3.4.2 Config button

Some proprietary wireless connectivity modules use the CONFIG button connected to their */CONFIG* pin to toggle the OpMode of the module. Please refer to the module specific manual for detailed information.

3.5 Function blocks

3.5.1 Power supply

3.5.1.1 Bus powered, power supply through USB

JP4 is to be set to 2-3 position.
The development board can be powered via USB. The integrated voltage regulator regulates the connected USB voltage 5V down to 3V and supplies the remaining parts of the circuit. If the evaluation board is power sourced the power *LED1* lights up.

3.5.1.2 Self powered, power supply through power jack

JP4 is to be set to 1-2 position.
The USB for communication must be connected only after the Power jack was connected and VCC is stable.
The development board can be powered via 5V Power Jack. The integrated voltage regulator regulates the connected voltage 5V down to 3V and supplies the remaining parts of the circuit. If the evaluation board is power sourced the power *LED1* lights up.

For 500mW modules such as Thebe-II we highly recommend to use the power jack for power supply to avoid damage of the USB interface when pulling high transmission currents.

3.5.2 Current measurement

JP1 can be used to measure the power consumption of the module. By default a bridge is set on JP1 to close the circuit. Remove the bridge and connect a current meter in place of the jumper to measure the power consumption of the module.
If the meter is not attached and the bridge is not set, the module will not receive any supply voltage. However, the power LED may be active, as it is connected prior to the current measurement bridge in order not to distort the module's power consumption.
Parts connected to the module, such as LEDs, can be separated from the module via JP6 and JP7.

To achieve the stated low power current the module pins must be terminated as stated in the module specific manual.

3.5.3 UART / USB

The UART of the module can be connected to the USB converter by setting the bridge JP5. 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 FTDI converter IC has the VCCIO line connected to the Module VCC line to match the logic-levels of both components.

The USB cable length must not exceed 3 meters.

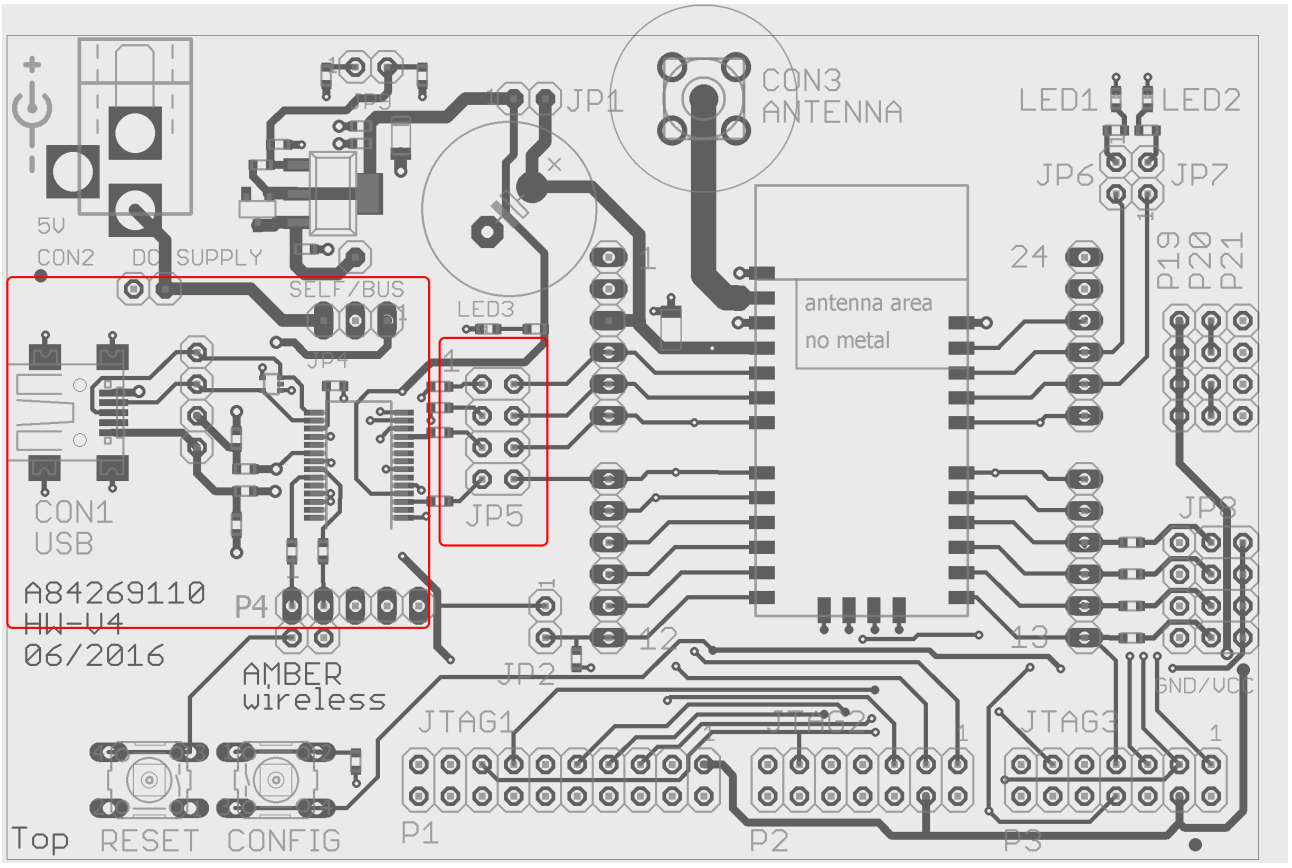


Figure 7: USB interface in layout

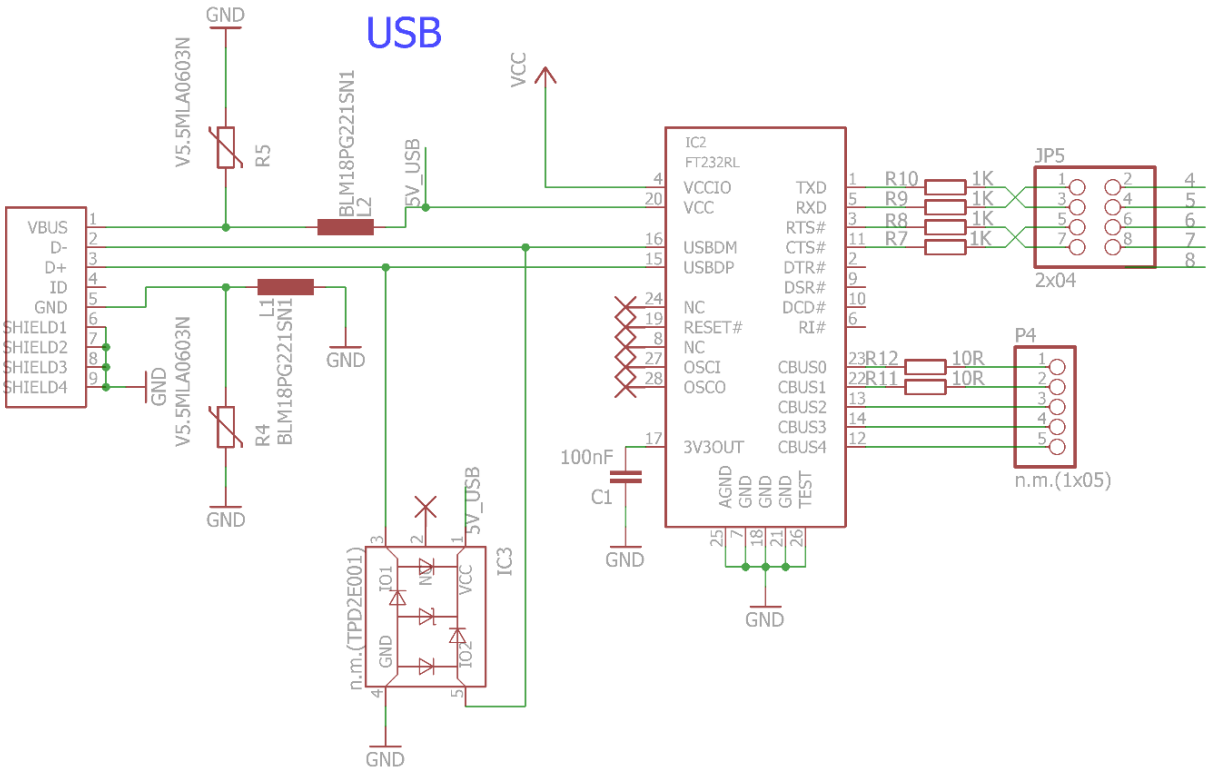


Figure 8: USB interface in circuit

3.5.4 UART direct

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

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

3.5.5 Programming interface

Please choose the correct programmer connection pin header for the type of module mounted on the EV board.

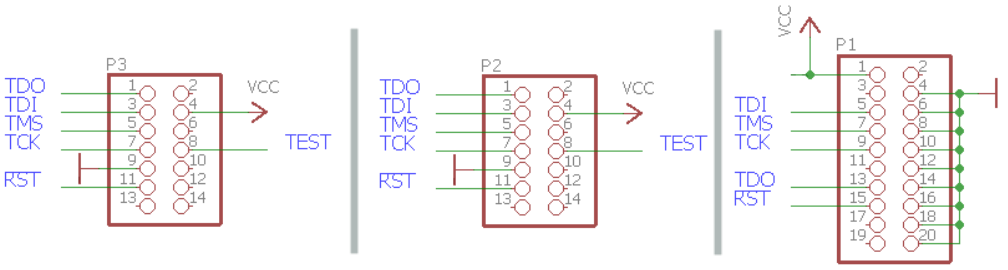


Figure 9: P1, P2 and P3 JTAG connectors

3.5.5.1 P1 ARM JTAG 2*10

The evaluation board provides a 2×10 pin connector in RM2.54 to connect directly to a JTAG flash adapter used for development. Please take care of the correct mounting of the flash adapter. Depending on your flasher an additional adapter may be required.
The recommended flash adapter is one of the "Segger J-Link" family with JTAG support.

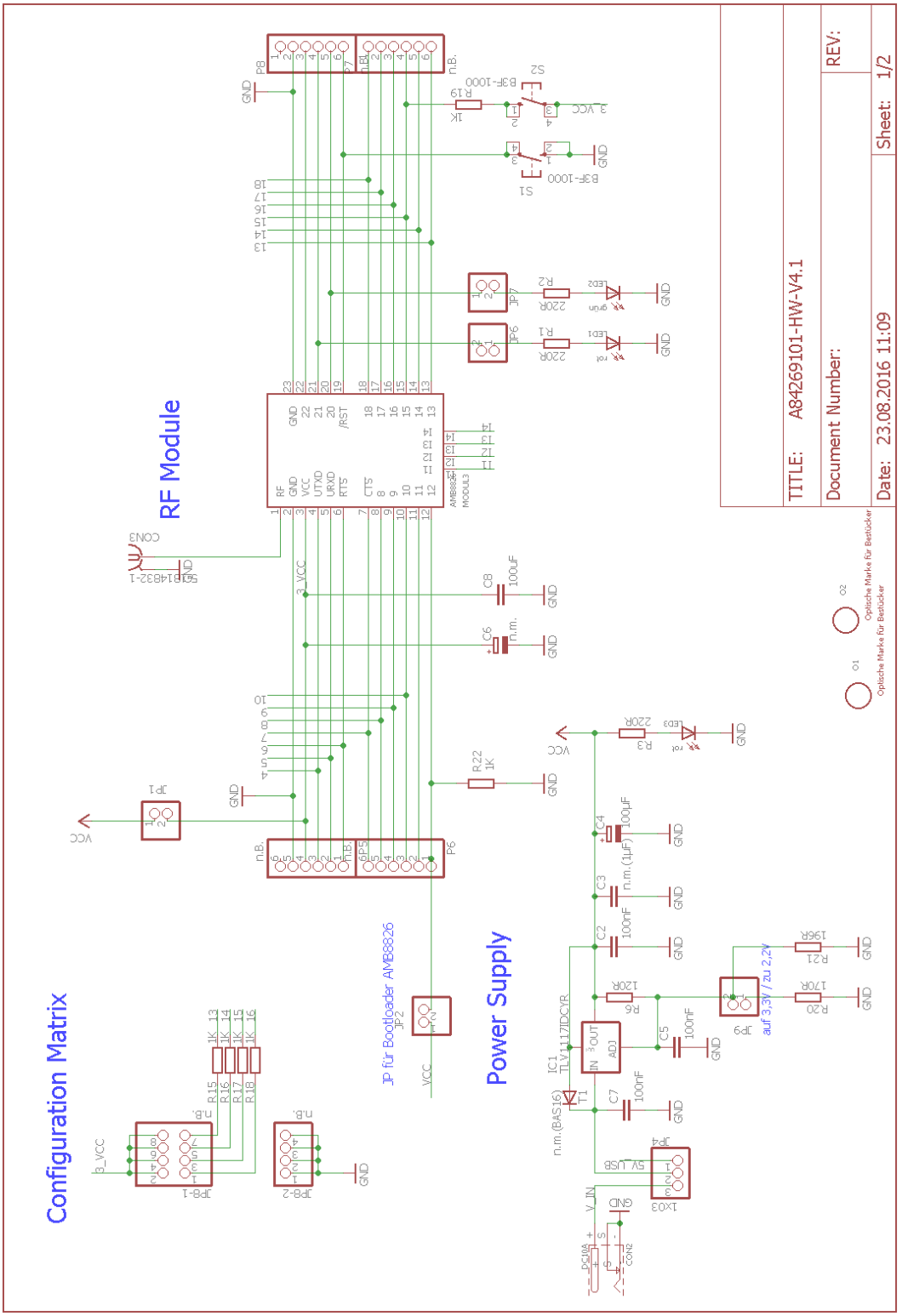
3.5.5.2 P2 MSP430 JTAG connector 2*7

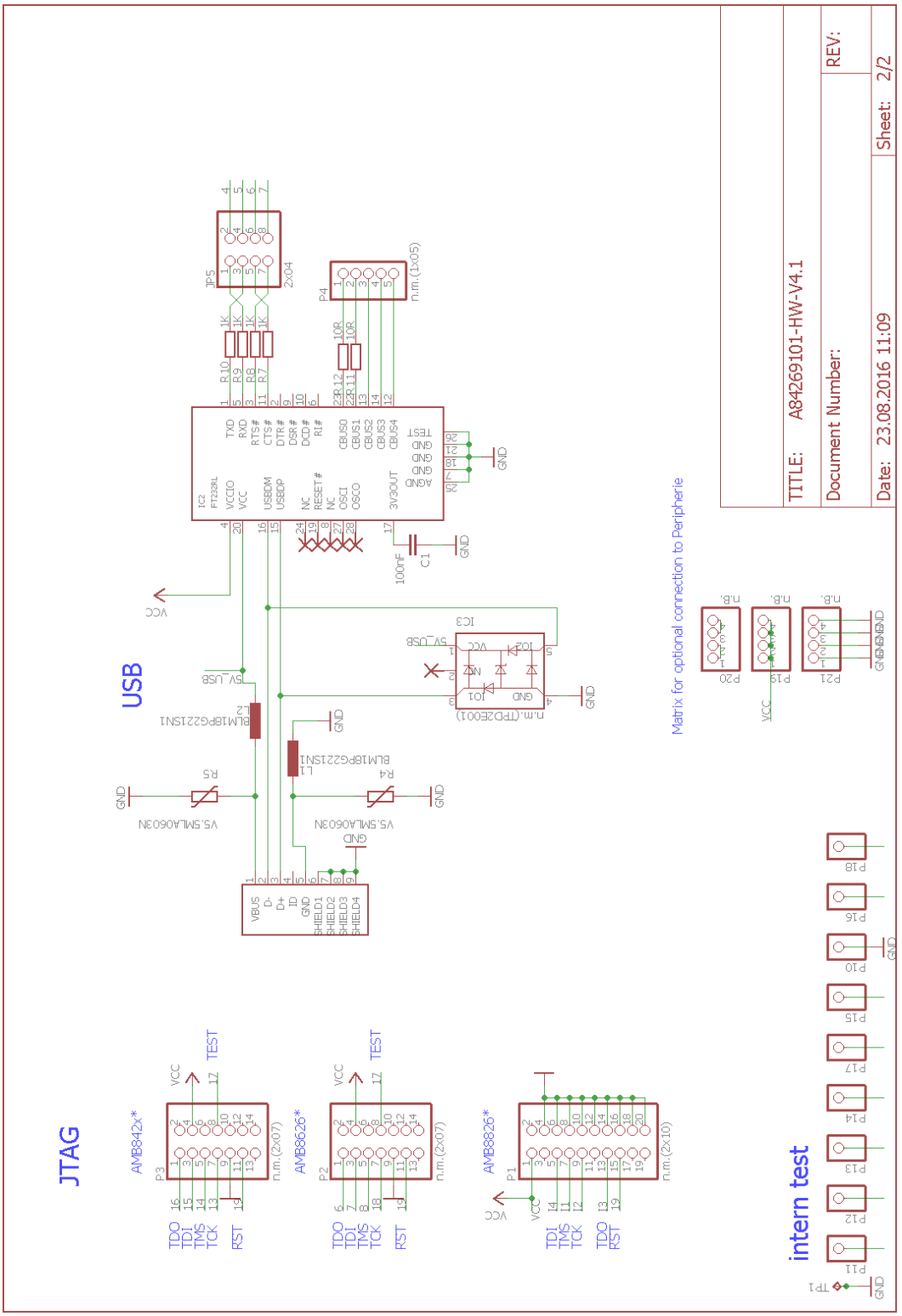
The evaluation board provides a 2*7 pin connector in RM2.54 to connect directly to a JTAG flash adapter used for development. Please take care of the correct mounting of the flash adapter (pin 1 is marked as such). Depending on your flasher an additional adapter may be required.
The recommended flash adapters are the "Elprotronic FlashPro-430" and "Ti MSP-FET" family.

3.5.5.3 P3 MSP430 JTAG connector 2*7

The evaluation board provides a 2*7 pin connector in RM2.54 to connect directly to a JTAG flash adapter used for development. Please take care of the correct mounting of the flash adapter (pin 1 is marked as such). Depending on your flasher an additional adapter may be required.
The recommended flash adapters are the "Elprotronic FlashPro-430" and "Ti MSP-FET" family.

3.6 Schematic

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Document Number:
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USB
JTAG
intern test
Matrix for optional connection to Peripherie
AMB842x*
AMB8626*
AMB8826*
TEST
VCC
GND
TDO
TDI
TMS
TCK
RST

3.7 Full layout

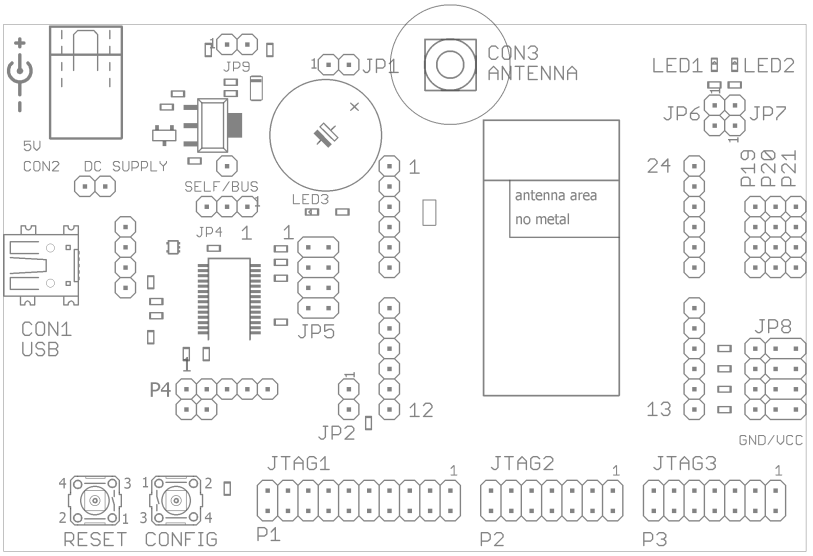

Figure 10: Assembly diagram

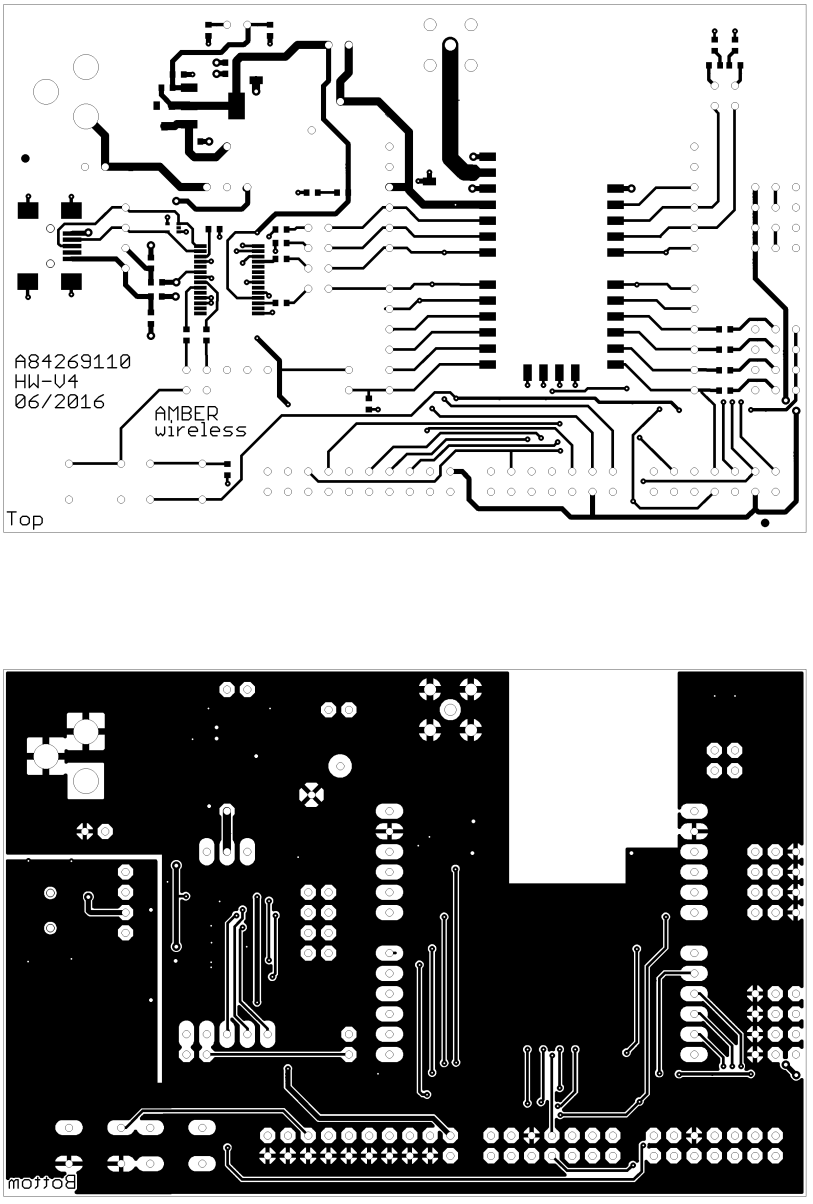

Figure 11: Top and Bottom Layer

4 Regulatory compliance information

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

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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 field sales engineer or the internal sales person in charge should be contacted who will be happy to support in this matter.

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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.

7.3 Ownership

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

7.4 Firmware update(s)

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

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7.9 Miscellaneous

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We recommend you to be updated about the status of new firmware and software, which is available on our website or in our data sheet and manual, and to implement new software in your device where appropriate.
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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

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