



USER MANUAL

THALASSA USB RADIO STICK

2606046021001

VERSION 1.5

OCTOBER 21, 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

Manual version	HW version	Notes	Date
1.0	1.2	<ul style="list-style-type: none">Initial version of the manual	April 2019
1.1	1.2	<ul style="list-style-type: none">Corrected chapter Regulatory compliance information	June 2019
1.2	1.2	<ul style="list-style-type: none">Updated address of Division Wireless Connectivity & Sensors location	October 2019
1.3	1.2	<ul style="list-style-type: none">Updated Declaration of EU conformity Regulatory compliance information.Removed 2606046221001 from Ordering information as only the variant with integrated antenna is available.	March 2021
1.4	1.2	<ul style="list-style-type: none">Updated document styleFunction description is part of the Thalassa user manual [1]	April 2023
1.5	1.2	<ul style="list-style-type: none">Add chapter for important notice UKCAAdd chapter "Supported UART baud rates"General maintenance e.g. fixed typos and rephrasing	October 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 allows communicating with the module of a specific interface.
VDD	Supply voltage	

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1 Introduction

The Thalassa [1] is a radio sub module that provides wireless connectivity capabilities in the 2.4 GHz frequency band. The Thalassa USB radio stick contains the function of a Thalassa radio module in a USB stick form factor enabling easy interfacing with any USB enabled device like personal computer or laptop. The Thalassa USB radio stick allows quick set-up of a radio link between PC and any system with integrated Thalassa radio module.

1.1 Ordering information

WE order code	Former order code	Description
2606046021001	AMB2561	USB radio stick 2.4 GHz with integrated antenna

Table 1: Ordering information

2 Functional description

The Thalassa USB radio stick consists of radio chip along with an serial-to-USB adapter that enables direct connection to any USB compatible device. A FTDI serial-to-USB converter chip **FT231X** connects the USB interface of the Thalassa USB radio stick to the UART pins of the integrated radio chip. Besides UART, additional digital GPIO pins (CBUS) are connected to the radio chip to provide special functions like reset. Figure 1 illustrates all the functional components of Thalassa USB radio stick.

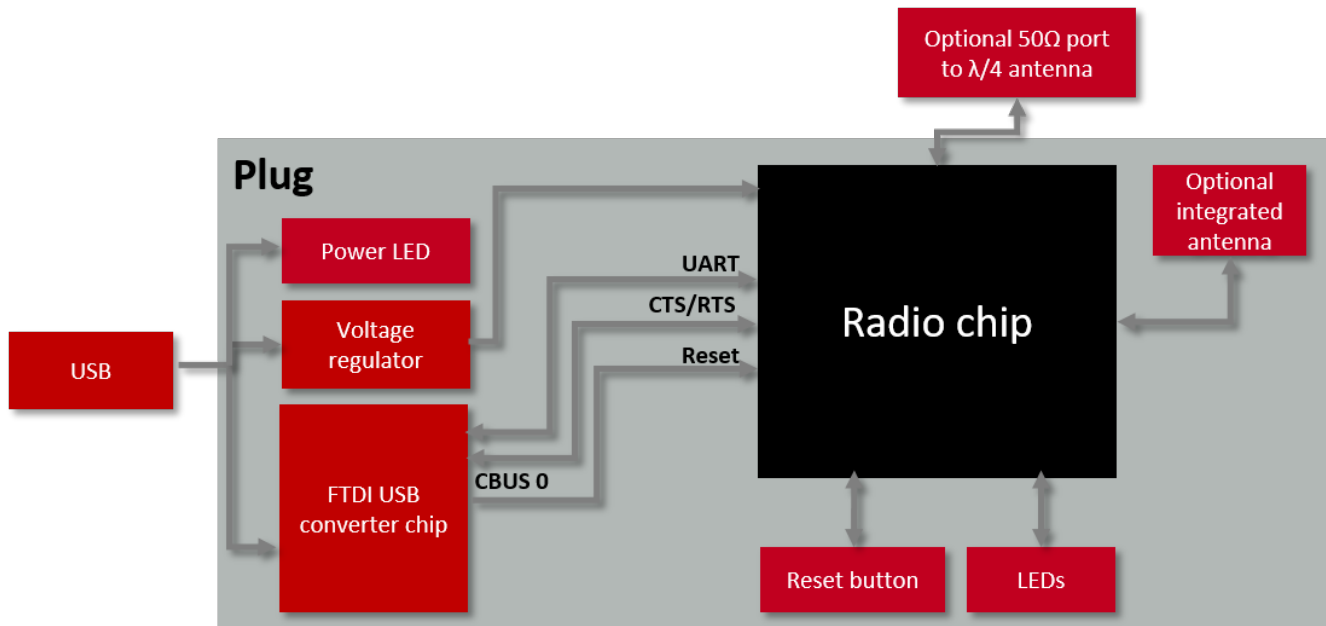


Figure 1: Block diagram of the Thalassa USB radio stick



For detailed function description of the Thalassa USB radio stick, please refer to the user manual of the underlying radio module Thalassa [1].

2.1 Taking into operation

To use the Thalassa USB radio stick, the VCP driver of FTDI has to be installed by following the installation guides of FTDI:

<https://www.ftdichip.com/Drivers/VCP.htm>



It is recommended to restart the PC after installation of drivers.

On proper installation of the drivers, the module appears as a virtual COM port on the PC. This COM port can be opened in any serial emulator program to communicate with the radio module. The radio chip responds to commands in a specific format. Please refer to the user manual [1] of the Thalassa radio module for the complete description of the command set.

2.1.1 Supported UART baud rates

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 $B_{desired} = 1250$ kBaund, 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 $B = \frac{3000}{2.375} = 1263$ kBaund, which introduces an error of $\frac{B - B_{desired}}{B_{desired}} = 1.04\%$ with respect to the desired baud rate.

Desired baud rate [kBaund]	Closest prescaler P	Real baud rate B [kBaund]	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 2: Example baud rates

2.1.2 Usage of CBUS pins

To switch the CBUS pins high or low and thus to use the provided pins functions of the radio chip, the D2XX driver of FTDI has to be used. This driver is part of the previous mentioned VCP driver installation.

Examples codes for "how to use the D2XX driver within your own software tool" can be found in the software example section of:

<https://www.ftdichip.com/Support/SoftwareExamples/CodeExamples.htm>

3 Regulatory compliance information

3.1 Important notice EU

The use of RF frequencies is limited by national regulations. The Thalassa USB radio stick has been designed to comply with the RED directive 2014/53/EU of the European Union (EU). The Thalassa USB radio stick can be operated without notification and free of charge in the area of the European Union. However, according to the RED directive, restrictions (e.g. in terms of duty cycle or maximum allowed RF power) may apply.

3.2 Important notice UKCA

The UK's government has laid legislation to continue recognition of current EU requirements for a range of product regulations, including the CE marking. The Radio Equipment Regulation 2017/1206 is within the scope of this announcement, among others. Consequently, the Thalassa USB radio stick can be sold and utilized in the UK with the CE marking, without the need of UKCA declaration of conformity or UKCA marking.

Source: <https://www.gov.uk/guidance/ce-marking>

3.3 Important notice FCC

The use of RF frequencies is limited by national regulations. The Thalassa USB radio stick has been designed to comply with the FCC Part 15. The Thalassa USB radio stick can be operated without notification and free of charge in the area of the United States of America. However, according to the FCC Part 15, restrictions (e.g. in terms of maximum allowed RF power and antenna) may apply.

3.4 EU Declaration of conformity



EU DECLARATION OF CONFORMITY

Radio equipment: 2606046021001

The manufacturer: Würth Elektronik eiSos GmbH & Co. KG
Max-Eyth-Straße 1
74638 Waldenburg

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration: 2606046021001 & 2606046221001

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation: Directive 2014/53/EU and 2011/65/EU.

Following harmonised norms or technical specifications have been applied:

EN 300 440 V2.1.1 (2017-03)
EN 301 489-1 V2.2.3 (2019-11)
EN 301 489-3 V2.1.1 (2019-03)
EN 62479 : 2010
EN 62368-1: 2014/AC: 2015/A11: 2017

i.A. G. Eslerdt

Trier, 11th of February 2021
Place and date of issue

3.5 FCC - Federal Communications Commission

The device has been FCC Part 15 B tested.

Contains FCC ID: R7TAMB2561

The enclosed device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- (i.) this device may not cause harmful interference and
- (ii.) this device must accept any interference received, including interference that may cause undesired operation.

4 References

- [1] Würth Elektronik. Thalassa user manual. <https://www.we-online.de/katalog/de/manual/2606031021000>.

5 Important notes

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It has to be clearly pointed out that the possibility of a malfunction of electronic components or failure before the end of the usual lifetime cannot be completely eliminated in the current state of the art, even if the products are operated within the range of the specifications. The same statement is valid for all software 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.

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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 5 and 5 remains unaffected.

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By ordering a product, you accept these license terms in all terms.

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