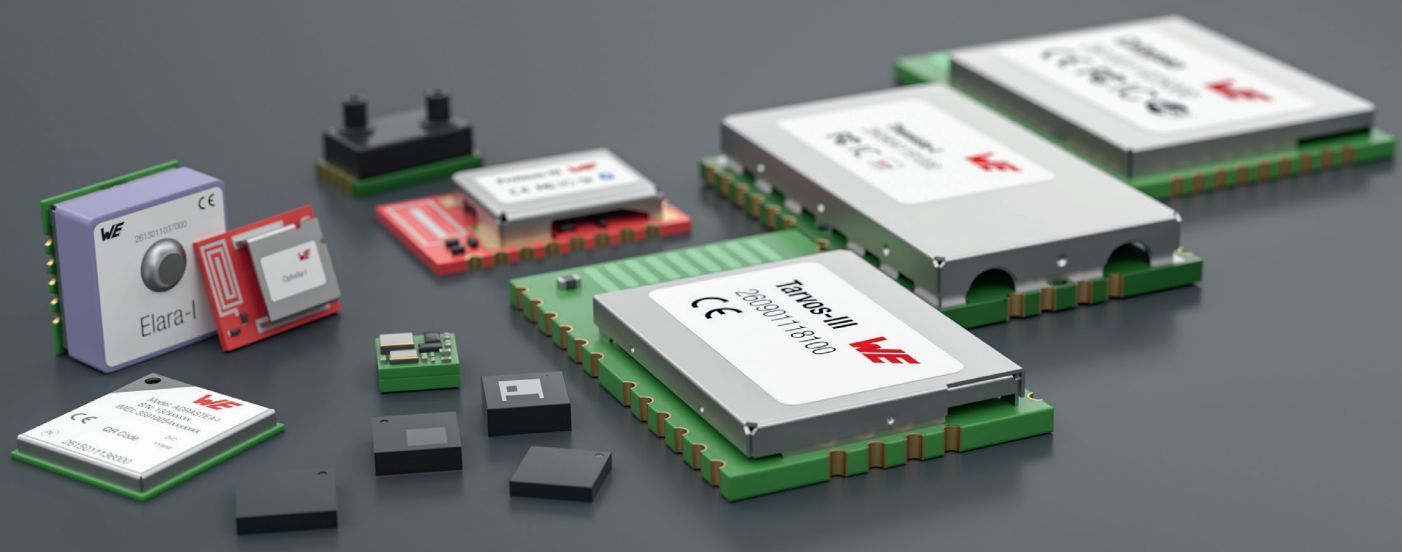

User manual

Thyone-I USB radio stick

2611036021001

Version 1.5

January 19, 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 Revision history

Manual version	HW version	Notes	Date
1.0	1.1	• Initial version of the manual	February 2020
1.1	1.1	• Updated Declaration of EU conformity to latest Version of EN 300 328 after successfully passing corresponding delta test in chapter `Regulatory compliance information.`	November 2020
1.2	1.1	• Updated Declaration of EU conformity in chapter `Regulatory compliance information.`	December 2020
1.3	1.1	• Updated document style • Function description is part of the Thyone-I user manual [1]	April 2023
1.4	1.2	• Added chapter `Supported UART baud rates` and `Important notice UKCA`	October 2024
1.5	1.2	• Update CE declaration in chapter `Regulatory compliance information.`	January 2026

2 Abbreviations

Abbreviation	Name	Description
API	Application Programming Interface	
BDM	Business Development Engineer	Support and sales contact person responsible for limited sales area
COM Port	Communication Port	
FCC	Federal Communications Commission	
FTDI	Future Technology Devices International	USB-to-Serial converter chip
GPIO	General Purpose Input/Output	
HIGH	High signal level	Digital voltage level that is detected as high by the module
LOW	Low signal level	Digital voltage level that is detected as low by the module
MCU	Micro Controller Unit	
PC	Personal Computer	
RED	Radio Equipment Directive	
RF	Radio frequency	Describes everything relating to the wireless transmission
UART		Universal Asynchronous Receiver Transmitter allows communicating with the module of a specific interface
USB	Universal Serial Bus	
VCP	Virtual COM Port	
VDD	Voltage Drain Drain	Supply voltage
WE	Würth Elektronik	

3 Introduction

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

3.1 Ordering information

WE order code	Description
2611036021001	Radio dongle including Thyone-I

Table 3: Ordering information

4 Functional description

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

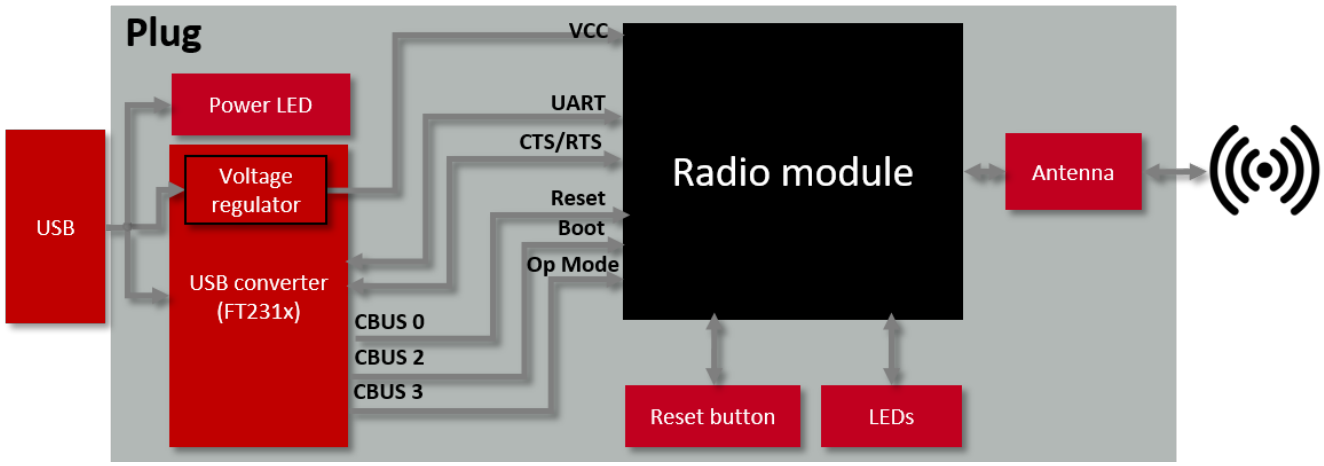

Figure 1: Block diagram of the Thyone-I USB radio stick

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

4.1 Typical Setup

The Thyone-I USB radio stick offers either a Command API (default) or a Transparent Mode on it's UART interface.

Two modules or USB dongles can communicate with each other if they share the same radio configuration (radio profile and channel). Based on the network configuration, data can be broadcast, multicast to a group or unicast to a specific module. The default module settings are selected in such a way that an plug and play experience is possible by using 2 dongles and the PC tool WE UART Terminal [2].

4.2 Taking into operation

The serial-to-USB FTDI converter chip **FT231X** requires special drivers to be installed for proper operation. The Virtual COM Port (VCP) drivers have to be installed by following the "Installation Guides" found under: *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 (ttyUSBx on Linux, COMx on Windows) in case of the VCP driver use. This COM port can be opened in any serial emulator program or user written software to communicate with the radio module.
The radio module responds to commands in a specific format. Please refer to the corresponding Thyone-I user manual [1] for the complete description of the command set.

When connecting the USB radio stick to the PC, it is recommended to reset the USB radio stick once. This can be done using the USB radio stick's reset button or using the CBUS0 pin (see chapter 4.2.2.1). This reset procedure is also recommended after each reboot of the PC.

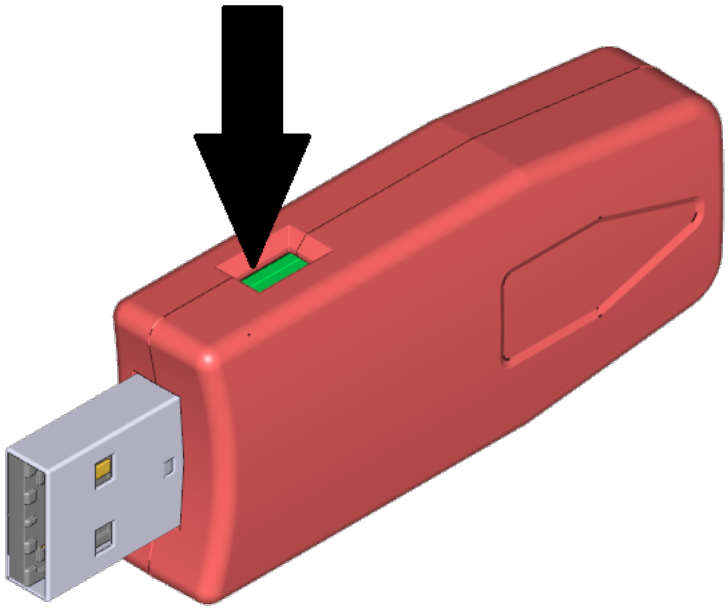

Figure 2: Reset button on the Thyone-I USB radio stick

4.2.1 Supported UART baud rates

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 4: Example baud rates

4.2.2 Usage of CBUS pins

To switch the CBUS pins static HIGH or LOW and thus to use the provided pins functions of the Thyone-I radio module, the D2XX driver of FTDI has to be used. This driver is part of the previous mentioned VCP driver installation in case of Windows OS. In case of Linux a manual installation is required.
Please follow FTDI's "Installation Guides" for proper D2XX install:
https://www.ftdichip.com/Drivers/D2XX.htm
Examples codes and tutorials 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

4.2.2.1 Resetting the Thyone-I USB radio stick using the CBUS pin

The */RESET* pin of the Thyone-I can be used to reset the integrated radio module. As the */RESET* pin is connected to the CBUS0 pin of the integrated FTDI chip, the radio module can be reset by pulling the CBUS0 pin low for at least 100 ms and releasing it to high level again.
By default, the CBUS0 pin of the FT231X is configured as `FT_CBUS_GPIO` (bit bang), such that the FTDI D2XX driver function `SetBitMode` can be used.

```
/* prep: create and connect an FTDI device intance */

/* set CBUS0 to output level LOW */
SetBitMode(0x10, FTDI.FT_BIT_MODES.FT_BIT_MODE_CBUS_BITBANG);

/* hold CBUS0 for at least 100~ms on LOW level */
wait_ms(100);

/* clear FTDI receive and send buffers */
Purge(FTDI.FT_PURGE.FT_PURGE_RX | FTDI.FT_PURGE.FT_PURGE_TX);

/* set CBUS0 to output level HIGH */
SetBitMode(0x00, FTDI.FT_BIT_MODES.FT_BIT_MODE_RESET);

/* a delay according to the reset timing parameter will occur (see manual) */

/* disconnect and close the FTDI device instance */
```

Code 1: Pin reset via CBUS0 using the D2XX driver

4.2.2.2 Switching from command mode to transparent mode and vice versa

The operation mode of the Thyone-I USB radio stick can be defined by applying the right voltage level at the *OP_MODE* pin of the Thyone-I during its start-up phase. As this pin is connected to the CBUS3 pin of the built-in FTDI converter chip, the CBUS3 pin can be controlled by the host.

Additional care has to be taken when configuring the pins on the FTDI converter. The EEPROM content of the chip is changed by this action. Any misconfiguration may prevent the normal operation of the USB dongle. This method is not intended for periodic use. The factory defaults of the CBUS pins are: CBUS0 to CBUS2 - GPIO, CBUS3 - CBUS_Drive_0

By default, the CBUS3 pin of the FT231X is configured as `FT_CBUS_Drive_0` (static LOW) such that the Thyone-I USB radio stick starts in command mode. To start the USB radio stick in transparent mode, configure the CBUS3 pin as `FT_CBUS_Drive_1` (static HIGH) and perform a reset of the device, as specified in chapter `4.2.2.1` .
In case the USB radio stick shall start in command mode again, configure the CBUS3 pin as `FT_CBUS_Drive_0` (static LOW) and perform a reset of the device, as specified in chapter `4.2.2.1`.

5 Regulatory compliance information

5.1 Important notice EU

The use of RF frequencies is limited by national regulations. The Thyone-I USB radio stick has been designed to comply with the RED directive 2014/53/EU of the European Union (EU).
The Thyone-I 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.

Modifications (2014/53/EU article 3 (i))
Caution: Changes or modifications for this equipment not expressly approved by Würth Elektronik eiSos may void the CE conformity to operate this equipment.

5.2 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 Thyone-I 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*

5.3 Important notice FCC

The use of RF frequencies is limited by national regulations. The Thyone-I USB radio stick has been designed to comply with the FCC Part 15.
The Thyone-I 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.

5.4 EU Declaration of conformity

CE

EU DECLARATION OF CONFORMITY

Radio equipment: **2611036021001**

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: 2611036021001

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation Directive 2014/53/EU. Following harmonised norms or technical specifications have been applied:

EN 300 328 V2.2.2 (2019-07)
EN 301 489-1 V2.2.3
EN 301 489-17 V3.3.1 (2024-09)
EN 62479 : 2010
EN 62368-1:2014 + AC:2015
2011/65/EU with its amending Annex II EU 2015/863

i.A. G. Eschlandt

Trier, 13th of January 2026
Place and date of issue

5.5 RED-DA Cybersecurity statement

Cybersecurity as per articles 3.3d, 3.3e and 3.3f of the Radio Equipment Directive Delegated Act. The RED-DA mandates to comply to the EN 18031-1, 18031-2 and 18031-3 in order to fulfill the requirements of the cybersecurity chapters (d, e and f).

- EN 18031-1: Common security requirements for radio equipment - Part 1: Internet connected radio equipment
- EN 18031-2: Common security requirements for radio equipment - Part 2: Radio equipment processing data, namely internet connected radio equipment, childcare radio equipment, toys radio equipment and wearable radio equipment
- EN 18031-3: Common security requirements for radio equipment - Part 3: Internet connected radio equipment processing virtual money or monetary value

Requirements	Statement and conditions
(d) Radio equipment does not harm the network or its functioning nor misuses network resources, thereby causing an unacceptable degradation of service	"Not applicable": The product is not capable itself to communicate over the internet. The product is only able to communicate via the following protocols and interfaces. None of the protocols contained in the product are "internet-connectable". Radio communication protocols: WE-ProWare is Würth Elektronik eiSos industry approved proprietary set of radio protocol combining our own MAC and PHY layers. The WE-ProWare protocol is payload agnostic. Host Interface, wired: The host interface of the product does not support internet connectivity. UART is used as a wired communication and control channel towards the customers host.
(e) Radio equipment incorporates safeguards to ensure that the personal data and privacy of the user and of the subscriber are protected	"Not applicable": The product is not internet connected. The product does not pose a risk to the users or subscribers privacy, as it does not store or process any personal data.
(f) Radio equipment supports certain features ensuring protection from fraud	"Not applicable": The product is not internet connected. The product does not pose a risk of fraud because it does not store or process financial data or enables financial transactions.

5.6 FCC - Federal Communications Commission

The device has been FCC Part 15 B tested.

Contains FCC ID: R7T1101102
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.

5.7 IC - Industry Canada

This device contains ISED: 5136A-1101102
This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

6 References

[1] Würth Elektronik. Thyone-I user manual. https://www.we-online.de/katalog/de/manual/2611011021000.

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

7 Important notes

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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.

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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
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