

USER MANUAL

TARVOS-III USB RADIO STICK

AMB8865 / 2609026281001

VERSION 1.5

OCTOBER 10, 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	2.0	<ul style="list-style-type: none">• Initial version of the manual	July 2019
1.1	2.0	<ul style="list-style-type: none">• Added table for CBUS pins.• Correction of block diagramm, wake up has not been connected.	August 2019
1.2	2.0	<ul style="list-style-type: none">• Updated address of Division Wireless Connectivity & Sensors location	October 2019
1.3	2.0	<ul style="list-style-type: none">• Updated Declaration of EU conformity in chapter Regulatory compliance information.	December 2020
1.4	2.0	<ul style="list-style-type: none">• Updated document style• Function description is part of the Tarvos-III user manual [1]	April 2023
1.5	2.2	<ul style="list-style-type: none">• Added chapter Supported UART baud rates and Important notice UKCA• Update of discontinued subcomponents without any change in form, fit or function	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 Tarvos-III is a radio sub module that provides wireless connectivity capabilities in the 868 MHz frequency band. The Tarvos-III USB radio stick incorporates the Tarvos-III in a USB stick form factor enabling easy interfacing with any USB enabled device like personal computer or laptop. The Tarvos-III USB radio stick allows quick set-up of a radio link between PC and any system with integrated Tarvos-III radio module.

1.1 Ordering information

WE order code	Former order code	Description
2609026281001	AMB8865	Radio dongle 868 MHz with SMA connector

Table 1: Ordering information

2 Functional description

The Tarvos-III USB radio stick consists of Tarvos-III radio module along with an serial-to-USB adapter that enables direct connection to any USB compatible device. An FTDI serial-to-USB converter chip **FT232R** connects the USB interface of the Tarvos-III USB radio stick 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 Tarvos-III USB radio stick.

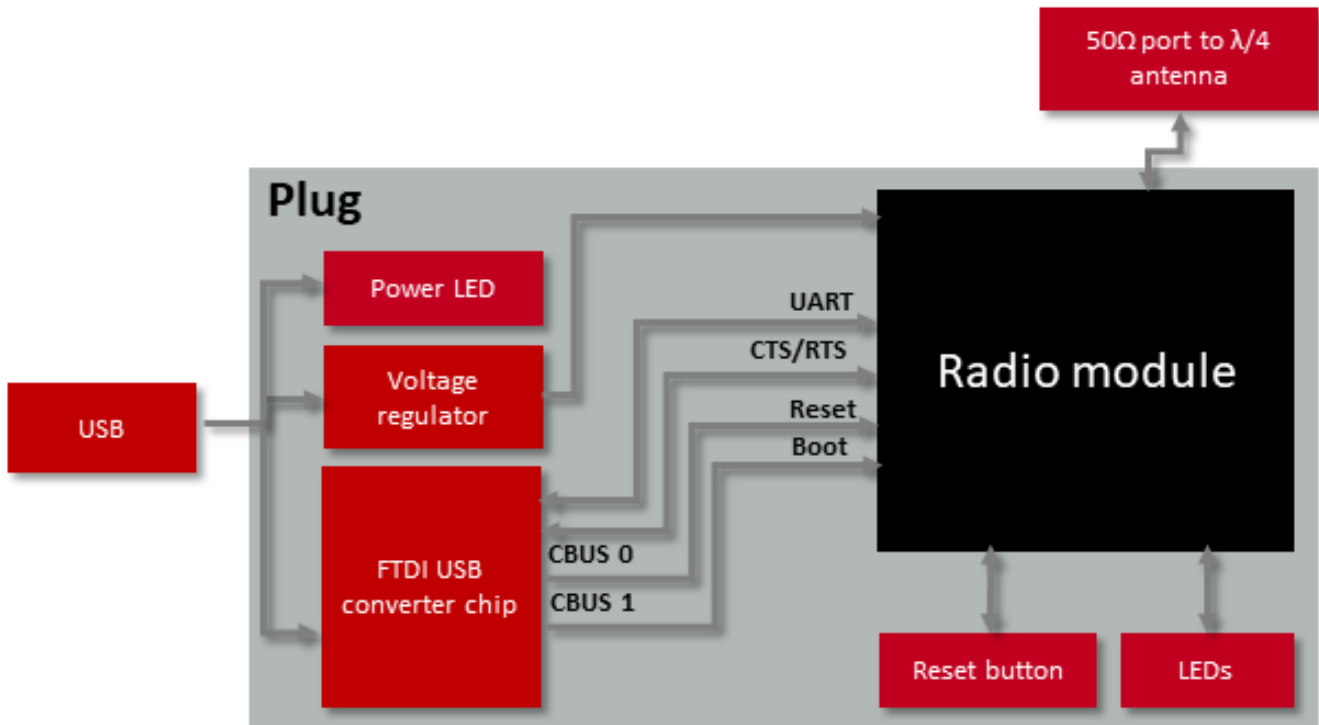


Figure 1: Block diagram of the Tarvos-III USB radio stick



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

2.1 Taking into operation

To use the Tarvos-III 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 module responds to commands in a specific format. Please refer to the corresponding user manual [1] 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 :

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

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 Tarvos-III radio module, 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>



The stick works properly as intended without the need of setting the CBUS pins. CBUS pins can be used for additional functionality as resetting the module via USB interface.

CBUS pin	Module Pin	Function
CBUS0	19	/RESET internally pulled high
CBUS1	12	BOOT internally pulled low

Table 3: CBUS functions

3 Regulatory compliance information

3.1 Important notice EU

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



EU DECLARATION OF CONFORMITY

Radio equipment: 2609026281001

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: 2609026281001

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation Directive 2014/53/EU and 2011/65/EU with its amending Annex II EU 2015/863. Following harmonised norms or technical specifications have been applied:

EN 300 220-1 V3.1.1 (2017-02)
EN 300 220-2 V3.1.1 (2017-02)
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, 21th of December 2020
Place and date of issue

4 References

- [1] Würth Elektronik. Tarvos-III user manual. <https://www.we-online.de/katalog/de/manual/2609011081000>.

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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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