

USB 500J  
USB Gateway for EnOcean Radio

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Observe precautions! Electrostatic sensitive devices!

Patent protected:

WO98/36395, DE 100 25 561, DE 101 50 128,  
WO 2004/051591, DE 103 01 678 A1, DE 10309334,  
WO 04/109236, WO 05/096482, WO 02/095707,  
US 6,747,573, US 7,019,241

USB 500J  
USB Gateway for EnOcean Radio**REVISION HISTORY**

The following major modifications and improvements have been made to this document:

Version	Author	Reviewer	Date	Major Changes
1.0	MKA	MKA	14.04.2023	Initial Release for USB 500J

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**Important!**

This information describes the type of component and shall not be considered as assured characteristics. No responsibility is assumed for possible omissions or inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications, refer to the EnOcean website: <http://www.enocean.com>.

As far as patents or other rights of third parties are concerned, liability is only assumed for modules, not for the described applications, processes and circuits.

EnOcean does not assume responsibility for use of modules described and limits its liability to the replacement of modules determined to be defective due to workmanship. Devices or systems containing RF components must meet the essential requirements of the local legal authorities.

The modules must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.

Components of the modules are considered and should be disposed of as hazardous waste. Local government regulations are to be observed.

Packing: Please use the recycling operators known to you.

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## USB 500J USB Gateway for EnOcean Radio

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### 1 Introduction

USB 500J is an EnOcean transceiver module with gateway controller software and USB interface. It can be directly connected to PC's, WiFi access points or smart home servers.

USB 500J provides bidirectional EnOcean radio protocol to devices with USB interface. Radio messages are sent and received through a virtual serial interface (Virtual COM Port).

USB 500J operates on the frequency of 928.350 MHz under ARIB approval (Japan) based on the TCM 515J radio module. Detailed information about supported commands and features can be found within the TCM 515J User Manual.

USB 500J is delivered as Easyfit finished product in a white plastic housing. The bottom side of USB 500J contains the device label described in chapter 5.3 which identifies key product parameters as shown below.



**Figure 1 – Bottom view of USB 500J with product label**

USB 500J provides on its top side an oval area for attaching an OEM label as described in chapter 5.4. Additionally, USB 500J includes a protective cap for covering the USB interface during transport as shown in Figure 2 below.



**Figure 2 – Top view of USB 500J with OEM label area and USB interface cap**

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## 2 Technical parameters

The table below summarizes key technical parameters of USB 500J. These parameters are typical values at room temperature.

<b>Frequency</b>	928.350 MHz
<b>Data rate</b>	125 kbit/s
<b>Modulation type</b>	FSK
<b>Radio standard</b>	ISO/IEC 14543-3-11 (ERP2)
<b>Antenna</b>	PCB antenna
<b>Receiver sensitivity</b> (at 25°C) <sup>(1)</sup>	typ. -95 dBm <sup>(1)</sup>
<b>Tx output power</b>	typ. 0 dBm (conducted)
<b>Serial interface type</b>	Virtual COM Port over USB (FTDI)
<b>Serial interface bit rate</b>	57600 bps
<b>Serial interface protocol</b>	EnOcean Serial Protocol v3 (ESP3)
<b>USB connector type</b>	Typ A
<b>USB power supply current</b>	typ. 50 mA / max. 90 mA
<b>Housing dimensions</b> (incl. cap)	71 x 23 x 8.7 mm
<b>OEM label area dimensions</b>	34 x 12 mm
<b>Operating temperature</b>	-20°C to +50°C (max. 90% r.h.)
<b>Radio Regulations</b>	ARIB (Japan)

(1) Based on 0.1% telegram error rate for the combination of 3 received sub-telegrams.  
Use of an USB extension cable is recommended for best performance.

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### 3 Product functionality

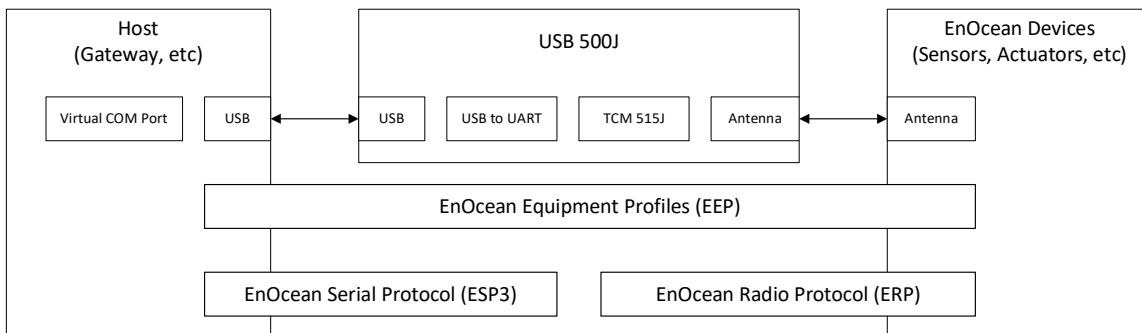
#### 3.1 EnOcean radio gateway

USB 500J provides a gateway between a host system (such as a gateway) and devices communicating according to the EnOcean radio standard using the TCM 515J EnOcean gateway controller.

USB 500J communicates with the host system using a virtual COM port with USB interface. The implementation of the virtual COM port is based on an FTDI device. The data format used for communication with the host system over the virtual COM port is defined by the EnOcean Serial Protocol (ESP3).

USB 500J communicates with EnOcean devices using EnOcean Radio Protocol (ERP) as defined by ISO/IEC 14543-3-10 (ERP1) and ISO/IEC 14543-3-11 (ERP2); USB 500J uses ERP2.

Figure 3 below illustrates the functionality of USB 500J.



**Figure 3 – USB 500J product functionality**

#### 3.2 Additional functionality

USB 500J can be configured as repeater of EnOcean telegrams to extend the range of radio devices. USB 500J can filter and selectively repeat EnOcean telegrams to reduce the number of processed and repeated telegrams. The filter and repeater configuration is stored persistently in USB 500J and therefore does not need to be re-initialized upon each power-up.

USB 500J supports remote management of self-powered radio nodes. For details see ESP3 command description of REMOTE\_MAN command.

USB 500J supports smart acknowledge of self-powered radio nodes internally. This feature enables bidirectional communication for self-powered radio nodes.

For details regarding these functions and for additional technical documentation, please refer to the documentation of TCM 515J.

## 4 Documentation and resources

### 4.1 Documentation of EnOcean functionality

Documentation of TCM 515 is available at:

<https://www.enocean.com/en/product/tcm-515/>

Documentation of the ESP3 interface standard is available at:

<https://www.enocean.com/esp>

Documentation of ISO/IEC 14543-3-10 (ERP1) is available here:

<https://www.iso.org/standard/80934.html>

Documentation of ISO/IEC 14543-3-11 (ERP2) is available here:

<https://www.iso.org/standard/66628.html>

The data model used by EnOcean data telegrams is defined by EnOcean Equipment Profiles (EEP) of EnOcean Alliance. Technical specifications of EnOcean Alliance are available here:

<https://www.enocean-alliance.org/specifications/>

### 4.2 Resources related to the USB interface (FTDI)

Device drivers for the operating systems Microsoft Windows, Linux and Apple Mac OS are available from USB interface manufacturer FTDI:

<https://ftdichip.com/drivers/>

Note that these resources are provided by FTDI; EnOcean cannot provide support or documentation for FTDI USB interface functionality.

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## 5 Product interface

### 5.1 Product housing

USB 500J is integrated into a white, protective housing as shown in Figure 4 below.

The bottom side of the housing contains the product label described in chapter 5.3. Two status LED (green and orange) are visible from the bottom side as described in chapter 5.5.

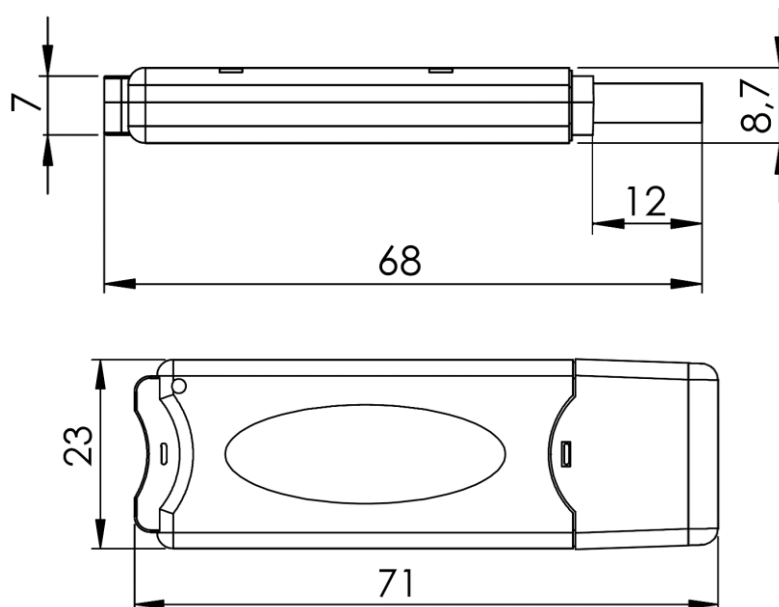
The top side of the housing provides an oval area for an OEM label as described in chapter 5.4.



**Figure 4 – USB 500J product housing**

### 5.2 Housing dimensions

Figure 5 below provides the approximate dimensions of USB 500J in millimetres both with and without the protective cover of the USB interface. Minor variations of these dimensions are possible due to the snap-in assembly of the individual parts.



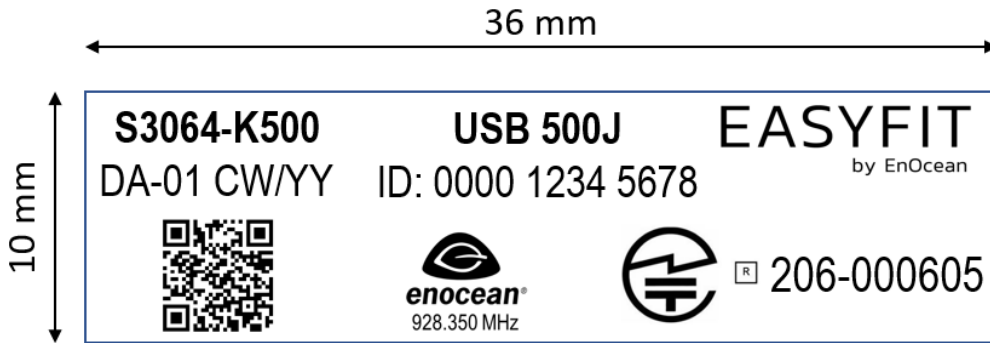
**Figure 5 – USB 500J product housing dimensions**



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**5.3 Device label**

USB 500J contains a product label that identifies key parameters. The dimensions and the structure of the USB 500J product label are shown in Figure 6 below.



**Figure 6 – USB 500J product label**

**5.3.1 QR code format**

The USB 500J product label contains a QR code for the automated reading of important product parameters according to the EnOcean Alliance product labelling specification. Each parameter is prefixed by a defined identifier resulting in the structure shown in Table 1 below.

Identifier	Length of data (excl. identifier)	Content
30S	12 characters	EURID (EnOcean Radio ID, 6 byte hexadecimal format)
+	1 character	Separator
30P	10 characters	Product Order Code (S3064-K500)
+	1 character	Separator
2P	4 characters	Product Revision (DA-01)
+	1 character	Separator
S	14 characters	Product Serial Number (14 digits, decimal format)

**Table 1 – USB 500J QR code parameter format**

**5.3.2 QR code content example**

The QR code shown on the product label in Figure 6 encodes the following parameters:

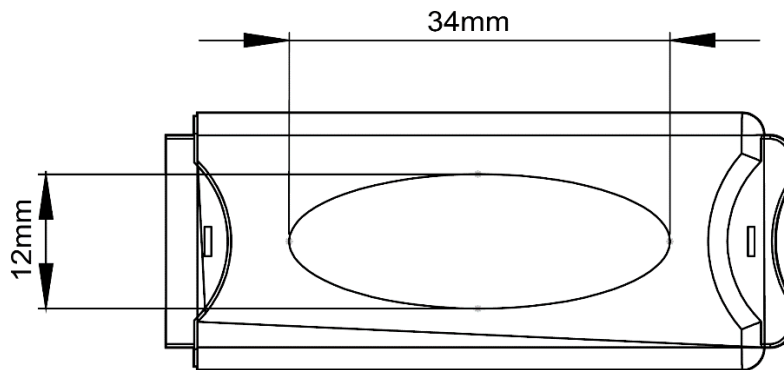
30S0123456789AB+30PS3064-K500+2PDA01+S012345678901

This means that this USB 500J would have the following parameters:

- EURID: 0123456789AB
- Order code: S3064-K500
- Revision: DA-01
- Serial number: 012345678901

**USB 500J**  
**USB Gateway for EnOcean Radio****5.4 OEM label area**

In addition to that, the opposite side of USB 500J contains an oval area where OEM customers can add their own product label. The dimensions and the structure of the OEM label area is shown in Figure 7 below.

**Figure 7 – USB 500J OEM label area****5.5 Status LED**

USB 500J provides status information by a green and an orange LED that are visible from the bottom side of USB 500J as shown in Figure 8 below.

**Figure 8 – USB 500J Status LED**

These LED provide the following status information:

- **Green LED**  
The green LED indicates that USB 500J is powered by the USB interface and can be used to verify power supply from the host system to USB 500J via USB interface
- **Orange LED**  
The orange LED indicates transmission or reception of data telegrams by the USB interface of USB 500J and can be used to monitor radio telegram activity if USB 500J is connected to an external host via USB interface.

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### 6 Application information

#### 6.1 Radio conditions

The installation location of EnOcean radio nodes should be carefully planned. Application note AN001 provides guidance for the installation of EnOcean radio nodes:

<http://www.enocean.com/en/application-notes/>

The main factors that influence the radio performance are:

- Type and location of the antennas of receiver and transmitter
- Type of area between sender and receiver and degree of obstruction of the link path
- Sources of interference affecting the receiver
- "Dead spots" caused by signal reflections from nearby conductive objects.

Since the expected transmission range strongly depends on this system conditions, range tests should always be performed to determine the reliably achievable range under the given conditions.

USB 500J should not be mounted directly onto metallic surfaces as this might severely degrade the antenna performance.

USB 500J should not be installed close to radio noise emitting devices such as PC, laptops, monitors, LTE gateways or WiFi access points. It is recommended to use an USB extension cable to separate USB 500J from the noise emissions of the host.

USB 500J is designed for cyclic sending and receiving status values and not for continuous data communication in line with applicable radio regulations and duty cycle restrictions. Operation at higher telegram rates (transmission of more than 10 telegrams per second, reception of more than 50 telegrams per second) might lead to telegram loss.

#### 6.2 Environmental conditions

USB 500J should not be exposed to rapid temperature changes shortly before or during operation. Condensation of moisture might damage the device. USB 500J is not intended to be used in rough environment with heavy vibrations or mechanical shocks.

The USB 500J front cap is intended for protection during delivery.

#### 6.3 USB interface

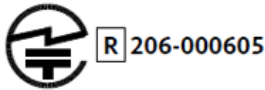
Microsoft Windows assigns a unique COM port number for each installed device that uses a virtual COM port; this also applies to installed USB 500J devices.

The maximum number of supported COM ports in Microsoft Windows is 255. Once 255 virtual COM ports have been setup in a Windows system, it might be required to reset the virtual COM port driver.

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## 7 Market Approvals

USB 500J uses TCM 515J which has been approved according to ARIB STD-T108. When the product is placed on the Japanese market, it must carry the following Specified Radio Equipment marking:



### 7.1 ARIB construction type conformity certificate



Notified Body EMC Directive 2014/30/EU  
Notified Body Directive 2014/53/EU  
RF CAB under the Japan-EC MRA  
FCB under the Canada-EC MRA  
TCB under the USA-EC MRA

RF CAB ID No. 206

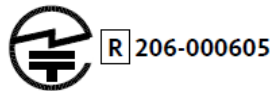
Designated by the German Regulator Bundesnetzagentur to act as a  
Recognised Foreign Conformity Assessment Body in accordance with the Japan-EC MRA

#### CONSTRUCTION TYPE CONFORMITY CERTIFICATE

for  
Specified Radio Equipment

Registration No.	JU000605M
Certificate Holder	EnOcean GmbH Kolpingring 18a 82041 Oberhaching Germany
Product Category	Article 2, Paragraph 1, Item 8 (Y)
Product Designation	TCM 500J, TCM 501J, TCM 515J, STM 550J, EMSIJ, EMDCJ
Product Description	Wireless Transceiver
Software Release No.	--
Manufacturer	Katek GmbH Bahnhofstraße 108 83224 Grassau Germany


When the product is placed on the Japanese market, it must carry the Specified Radio Equipment marking as shown on the right



The scope of evaluation relates to the submitted documents only.

This Certificate confirms that the listed product has demonstrated conformity with the relevant technical regulations defined in the attached Annex. It is only valid in conjunction with the Annex.

Unterleinleiter,  
2020-09-02

  
Karlheinz Kraft  
Recognised Foreign Conformity Assessment Body

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