

ETHSA / ETHSU - ENOCEAN TEMPERATURE AND HUMIDITY SENSOR

ETHSA / ETHSU

EnOcean Easyfit Temperature and Humidity Sensor



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

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REVISION HISTORY

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

Version	Author	Reviewer	Date	Major Changes
1.0	MKA	MKA	22.12.2017	First release (902 MHz Version)
1.1	AA	MKA	26.02.2018	Addition of 868 MHz version Addition of enhanced security feature Addition of packaging info and drawings
1.2	AA	AA	28.05.2018	Added information on backup battery
2.0	AA	AA	04.01.2019	Added information on mounting
2.1	AA	AA	01.02.2019	Added information on tray packaging
3.0	AA	MK	18.11.2019	Product Update (Step Code DE) Addition of information about QR Code. Update of Regulatory Notes
3.1	MK	MK	11.04.2022	UK market approval and UKCA added
3.2	MKA	MKA	28.04.2025	Document maintenance and clean-up

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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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1 Related Documents

This document describes set-up and operation of the ETHSx unit. Related documents are as follows:

1.1 Installation Instructions

The installation instructions are contained in the single-unit packaging box and can also be found on the product website of EnOcean ETHSx.

1.2 Range Planning

We recommend following our application notes, in particular AN001 "EnOcean Wireless Systems - Installation Notes" (PDF) available as download at:

www.enocean.com/en/application-notes/

1.3 Radio Telegram Description

ETHSx transmits radio telegrams according to EnOcean Equipment Profile EEP A5-04-03 (temperature & humidity measurement value), EEP SIGNAL 0x06 (Energy Level Reporting) and EEP SIGNAL 0x0E (Entering Transport Mode) as defined in the EnOcean Equipment Profiles specification:

www.enocean-alliance.org/eep/

If the device shall be operated in Secure Mode please refer to the EnOcean Security Specification:

www.enocean.com/security-specification

1.4 Functional description (STM 350 module)

User Manuals of the electronic modules inside of the ETHSx unit:

868 MHz: www.enocean.com/en/products/enocean_modules/stm-350

902 MHz: www.enocean.com/en/products/enocean_modules_902mhz/stm-350u

1.5 Declaration of Conformity

The Declaration of Conformity can be found on the EnOcean ETHSA / ETHSU product webpage.

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2 General Description

This user manual specifies the functionality of ETHSA / ETHSU units with product revision DE. Contact EnOcean if documentation of older revisions is required. Refer to the instructions in chapter 2.8.1 on how to determine the product revision.

2.1 Basic Functionality

ETHSx is a wireless and maintenance free temperature & humidity sensor for EnOcean systems. It periodically measures temperature and humidity using an integrated sensor. Significant changes in the measured temperature or humidity will be reported immediately while periodic updates (signs-of-life) will be provided at regular intervals. Telegram transmission or user input will be indicated using an LED.

ETHSx will transmit a teach-in telegram if the LRN button is pressed. ETHSx provides the option to use enhanced security mode with encryption and authentication using a rolling code and will transmit a security teach-in telegram in that case.

ETHSx is powered by a solar cell allowing it to work maintenance-free under the specified ambient light conditions. The integrated energy store allows operation for several days in total darkness. ETHSx allows using a backup battery for cases of insufficient lighting.

ETHSx can easily be mounted to walls or furniture using the included adhesive pad or using the included wall plate. Single packaged units additionally provided a metal stand and a triangular cap (which can replace the standard rectangular cap) for placing the sensor on horizontal surfaces. Figure 1 below shows ETHSx.



Figure 1 – ETHSx with standard housing and with metal stand / triangular cap

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2.2 Technical Data

Auxiliary power supply	Option for backup battery ()
Antenna	Internal helix antenna
Radio frequency / modulation	
ETHSA	868.300 MHz / 125kbps / ASK
ETHSU	902.875 MHz / 125kbps / FSK
Radiated Output Power	
ETHSA	+5dBm
ETHSU	+99 dBµV/m
Temperature sensor	
Measurement range	-20°C ... +60 °C
Resolution	0.1 K
Accuracy	±0.5 K across entire range
Humidity sensor performance	
Measurement range	0 % ... 100 % r.h.
Resolution	0.4 % r.h.
Accuracy	±4.5 % r.h. for entire range ±3.0 % r.h. between 20...80 % r.h.
Measurement cycle time	Once every 100s
Immediate transmission threshold	
Temperature	Change by more than 0.5 K
Humidity	Change by more than 3 % r.h.
Sign-of-life transmission	Measurement data update once every 11-24 minutes (Using random intervals)
Teach-in telegram trigger	Pushbutton (accessible via hole in the housing)
Teach-in telegram indicator	LED (inside the housing)
Primary power supply	Ambient light (via solar cell)
Light level for self-supplied operation	200 lux for 6 hours per day
Start-up time with empty energy store	typ. < 2.5 min @ 400 lx
Light level for full charge	400 lux for 16 hours
Operation time in total darkness	> 10 days (After full charge)
Backup battery	CR1225 (Not included)
Operation time with backup battery	5 years (Without ambient light)
EnOcean module integrated	
ETHSA	STM 350 (for EU / UK with CE / UKCA approval)
ETHSU	STM 350U (for US / CA with FCC / ISED approval)
EnOcean Equipment Profile (EEP)	A5-04-03 SIGNAL 0x06 (Energy Level Reporting) SIGNAL 0x0E (Entering Transport Mode)

Note: All values based on operation at room temperature with telegrams being sent every 15 minutes

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2.3 Environmental Conditions

Operating and storage temperature ⁽¹⁾

Maximum	-20 °C ... +60 °C
Recommended	0 °C ... +40 °C

Operating and storage humidity

Maximum	0% ... 93% r.h., non-condensing
Recommended	< 60% r.h.

Shelf life (in absolute darkness) ⁽²⁾

36 months after delivery
(in delivery condition)

Note 1:

Recommended conditions for maximum life of the internal energy store.
The following effects will reduce the performance of the energy store:

- Long time exposure to temperatures higher 30°C will gradually degrade the energy store performance over lifetime.
- Lower temperatures than 10°C will temporarily reduce the capacity of energy store. Operation below 0°C is not recommended due to the significantly reduced capacity.

Note 2:

The internal energy store can sustain storage for up to 36 months in total darkness. After that, the device must either be put into operation and exposed to ambient light or the energy store must be manually recharged.

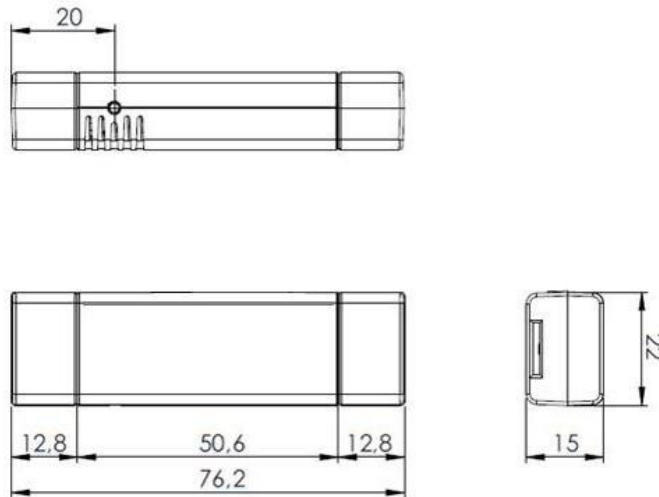
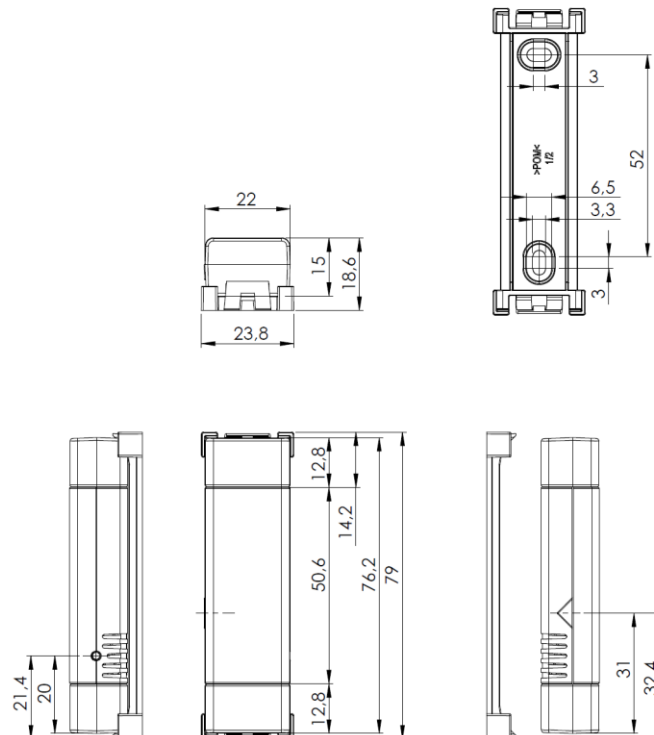
2.4 Ordering Information

Type	Ordering Code	Frequency	Packaging
ETHSA	S3001-C350	868.300MHz	Single Unit Packaging
ETHSA	S3001-T350	868.300MHz	Tray Packaging
ETHSU	S3051-C350	902.875MHz	Single Unit Packaging

2.5 Physical Dimensions

Colour of unit	White, similar to RAL 9010
Material of unit housing and mounting plate	PC-ABS (housing), POM (mounting plate)
Dimensions of unit without mounting plate (no stand, 2 square caps)	76.2 x 22 x 15 mm
Dimensions of unit with mounting plate	79 x 23.8 x 18.6 mm
Dimensions of unit with stand and triangle cap (single pack only)	30 x 30 x 85 mm
Dimensions of stand	30 x 30 x 1.2 mm (without slide-flap)
Dimensions of housing adhesive	50 x 18 x 0.8 mm

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2.6 Device Drawings**Figure 2 – ETHSx Mechanical Outline (with 2 square caps, without stand)****Figure 3 – ETHSx Mechanical Outline (with mounting plate)**

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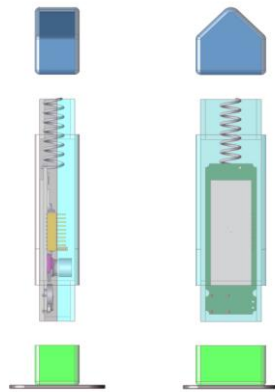


Figure 4 – ETHSx Mechanical Outline (with triangle cap and stand)

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2.7 Packaging Information**2.7.1 Single Unit Packaging**

Single unit packaged devices are delivered in a transport box with 5 units where each unit package contains the following items:

1. ETHSA / ETHSU sensor
2. Mounting Plate (for mounting the sensor onto a wall)
3. Adhesive Tape (double-sided, for easy gluing the sensor onto a smooth surface)
4. Metal Stand (fixed to unit, removable)
5. Triangle Cap (separate in a little plastic bag)
6. Installation Instructions

Weight of sensor unit (with 2 square caps, without stand)	20 g
Weight of single unit box (sensor unit, stand, mounting plate, packaging)	43 g
Size of single unit card box	32 x 32 x 99 mm
Minimum order quantity (transport packaging)	50 units
Dimensions of transport card box (50 single unit boxes)	232 x 176 x 174 mm
Weight of transport box (including 50 single unit boxes)	2.3 kg

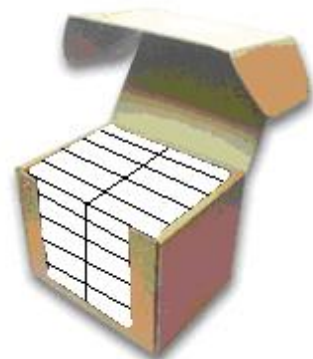


Figure 5 – Content of single unit box and organization in transport box

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2.7.2 Tray Packaged Units

Tray packaged units are delivered in a cardboard box with 56 ETHSA / ETHSU devices provided on 7 plastic trays with 8 ETHSA / ETHSU devices (with assembled mounting plates) on each of them. Additionally, there is one tray containing adhesive tapes.

Minimum order quantity (transport packaging)	56 units
Dimensions of transport box (56 units)	232 x 176 x 174 mm
Weight of transport box (56 units)	2.2 kg

2.8 Device Label

The structure of the ETHSx device label is shown in following Figure:



Figure 6 – Unit Label

2.8.1 Step Code

The Step Code describes the functional product status of the device and can be found on the product label between the product ordering code and the unit’s serial number. In the upper figure the step code is “DA”.

2.8.2 QR-Code

Each ETHSx unit provides QR code as part of the unit label. This QR code encodes the product parameter according to the ANSI/MH10.8.2-2013 industry standard.



Figure 7 – QR Code Example

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2.8.3 QR Code Structure

The QR code shown in Figure 7 encodes the following string:
30S000001234567+30PS3001-C350+2PDA01+S01123456123456

Table 1 below shows the interpretation of the data therein:

Identifier	Length of data (excluding identifier)	Content	Format
30S	12 characters	EnOcean EURID	Hexadecimal
30P	10 characters	Ordering Code	ASCII
2P	4 characters	Step code and revision	ASCII
S	14 characters	Serial Number	

Table 1 – QR code content

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3 Functional Description

3.1 Block Diagram

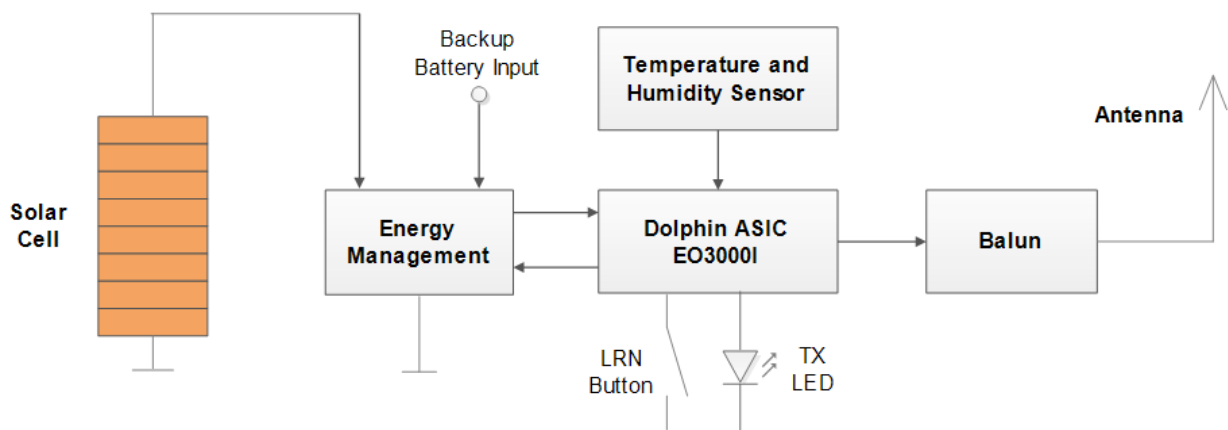


Figure 8 – Functional block diagram

3.2 Measurement and Transmission Timing

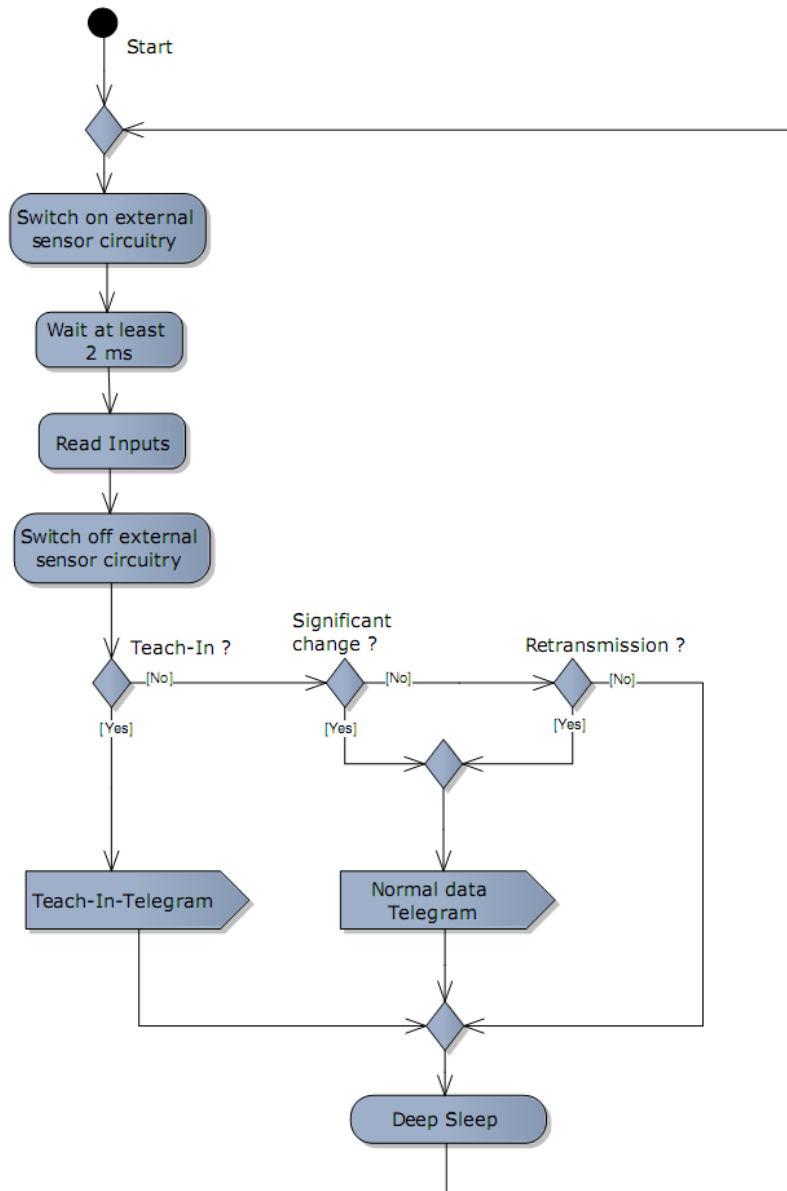
ETHSx wakes up approximately once every 100 seconds to measure temperature and humidity. The measured values are then compared against the last reported (transmitted) values. If there is a significant change then the measured values are transmitted immediately. Significant change is defined as follows:

- Temperature: The measured temperature deviates from the last reported temperature by more than 0.5 K
- Humidity: The measured humidity deviates from the last reported humidity by more than 3% r.h.

In absence of a significant change, a heartbeat telegram reporting the currently measured values is transmitted for every 7 to 14 measurements (affected at random). In addition, ETHSx measures and reports the energy level of its internal energy storage element approximately every 100 measurements.

With each default transmission cycle, 3 identical sub-telegrams are transmitted within 40ms. Transmission of a sub-telegram lasts approximately 1.2ms. The delay between the three transmission bursts is affected at random. This setup of the transmission timing allows avoiding possible collisions with data packages of other EnOcean transmitters as well as disturbances from the environment.

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3.3 Software Flow Chart**Figure 9 – Software flow chart (simplified)**

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3.4 Teach-in to a Receiver Unit

Push the LRN button (located behind the hole in the side wall) to trigger a teach-in telegram. You will see a LED shining at the housing side as telegram indicator (pay attention to sufficiently dark environment).

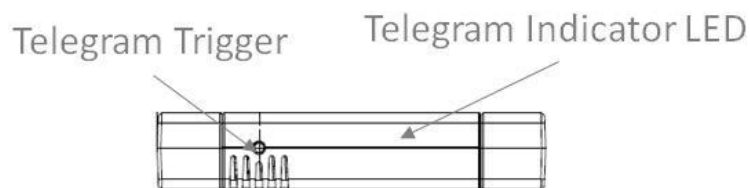


Figure 10 – Teach-in telegram trigger

When pressing the LRN button, the module sends a teach-in telegram to a suited receiver according to the currently selected communication mode (4BS teach-in telegram for Standard Mode, secure teach-in telegram for Security Mode).

The teach-in telegram identifies the device manufacturer and the function and type of the device via the EEP used. For EASYFIT devices, EnOcean is set as manufacturer with ID 0x00B.

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3.5 Commissioning and Mode Change

ETHSx is shipped in Transport Mode (Mode 3) to switch off the energy store for long term shelf storage and to comply with regulations for air transport.

Normal operation of ETHSx can be enabled by pressing the learn button. Make sure that sufficient light is available to the solar cell for normal operations.

The following mode transitions are supported by ETHSx:

- Change from Transport Mode to Standard Mode:
After pressing learn button 1x short (around 1s) the radio module will enter Standard Mode (Mode 1). A standard learn telegram will be sent and the LED will flash 2x.
- Change from Standard Mode to Secure Mode:
After pressing learn button 2x long (2x around 5s, pause <1s) the radio module will enter Secure Mode (Mode 2). A secure learn telegram will be sent and the LED will flash 2x.
- Change from Secure or Standard Mode to Transport Mode:
After pressing learn button 1x long (around 5s) the radio module will enter Transport Mode (Mode 3). A SIGNAL telegram will be sent and the LED will flash 3x.

The following diagram illustrates these mode transitions:

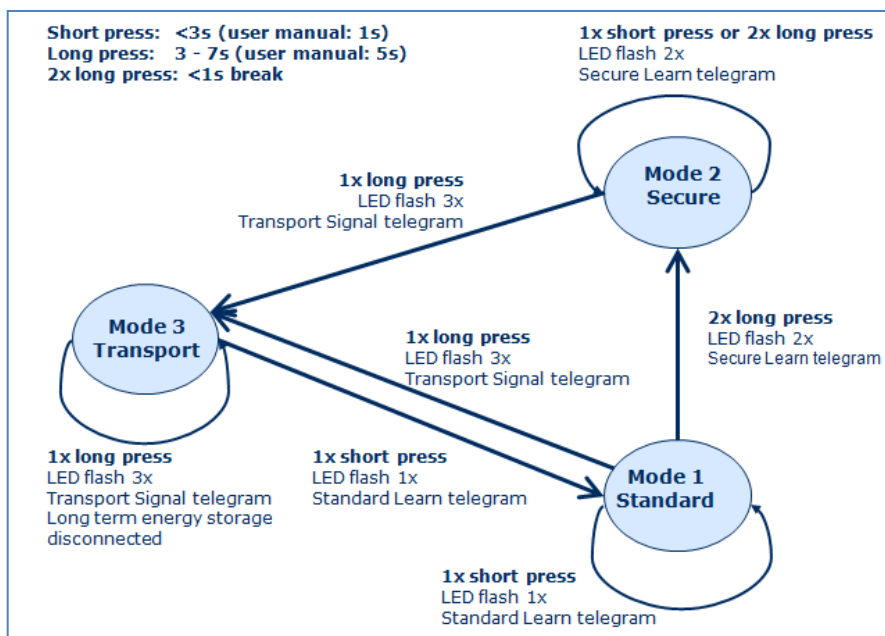


Figure 11 – Mode Transitions

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3.5.1 LRN Button timing

The following LRN button timing is required for mode transitions:

- Short press: approximately 1 second
- Long press: around 5 seconds
- 2x long press with a short pause of maximum 1 second between the presses



Before changing the operating mode, please make sure to clear the device from all receivers which have been configured to work with this device before. Otherwise, these receivers may ignore received telegrams, and their application may not work.



If ETHSx restarts after power loss, then the previously selected mode will be activated. ETHSx supports up to 50 mode changes. In normal application scenarios, only one mode change (during installation) is required.

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3.6 Radio Telegram Format, EEP**3.6.1 Data Telegrams in Standard Mode**

ETHSx transmits a radio telegram according to EnOcean Equipment Profile EEP A5-04-03 as defined in the EEP EnOcean Equipment Profiles specification:

www.enocean-alliance.org/EEP/

3.6.2 EEP Teach-in (Learn) Telegrams in Standard Mode

In standard mode, a 4BS teach-in telegram is transmitted by pressing the LRN button. This teach-in telegram will provide the receiver with the required information for processing subsequent telegram data.

3.6.3 Secure and EEP Teach-in Telegrams in Secure Mode

In secure mode, the payload content of the telegram is protected with advanced security features. These security features used are defined by the Security Level format – SLF; its value is set to 0xAB for ETHSx devices representing the following properties:

- 24-bit RLC which starts from 0 at production
- RLC sent as part of the telegram
- 3-byte CMAC
- VAES encryption

Please refer to the EnOcean Security Specification for further details:

<http://www.enocean.com/en/security-specification/>.

If secure mode has been selected, then ETHSx must send a security teach-in telegram to the receiver to communicate the used security profile, AES key and initial RLC counter. This security teach-in telegram must be transmitted before any other communication can occur as it provides the foundation for secure communication.

To send a security teach-in telegram, press the LRN button of ETHSx. This will cause the device to transmit first a security teach-in telegram. After establishing the security foundation via this telegram, EEP will shortly thereafter send an already secured EEP teach-in telegram.

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3.7 Radio Telegram Timing

The setup of the ETHSx transmission timing reliably avoids possible collisions with data packages of other EnOcean transmitters as well as disturbances from the environment.

3.7.1 Standard Mode Transmission Timing

In Standard Mode, three identical subtelegrams are transmitted within 40 milliseconds for each transmission cycle. Transmission of each subtelegram lasts approximately 1.2 milliseconds and the delay between these three subtelegrams is affected at random.

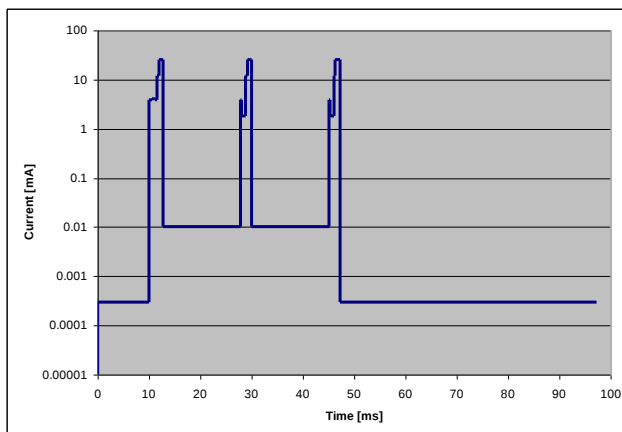


Figure 12 – Transmission timing in Standard Mode

3.7.2 Secure Mode Transmission Timing

In Secure Mode, two identical subtelegrams are transmitted within 20 milliseconds. Transmission of each subtelegram lasts approximately 1.9 milliseconds and the delay between these three subtelegrams is affected at random.

3.8 Storing the Rolling Code Counter

ETHSx uses a rolling code (RLC) counter to ensure the originality of each telegram. The value of the RLC counter is incremented by every transmitted telegram.

The value of the RLC is stored in RAM memory during normal operation and periodically backed up (persistently stored) in flash memory.

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4 Application Information

4.1 General Installation Instructions

The small sensor housing can easily be mounted to walls or furniture using the included double-sided adhesive pad. Using the included metal stand the sensor can be positioned on horizontal surfaces. One end cap can be replaced by the enclosed triangle cap. To mount the sensor to walls with uneven ground, for example rough plaster, the sensor can be fixed by the enclosed mounting plate that was previously fastened to the wall by screws.



To achieve the desired measurement result, avoid direct sunlight on the device and do not place the device close to HVAC systems or similar heating or cooling devices. Consult the installation notes provided with the device.

4.2 Lighting Conditions

4.2.1 Required Lighting Conditions

ETHSx is designed to operate autonomously (self-supplied) based on an available illumination (ambient light level) of 200 lux for at least 6 hours per day. This value applies both to day-light, artificial light and mixed light.

For cases where the required lighting conditions cannot be guaranteed, ETHSx provides the option to mount a back-up battery.

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4.2.2 Typical Lighting Conditions

The following numbers are provided for reference values only and should be verified at the actual installation location.

If possible, ETHSx should be mounted with the solar cell facing the window while avoiding direct sunlight exposure which might affect the temperature measurement. The installation site should also be chosen such that shading by furniture is minimized.

Illumination Area	Type Destination / Workspace	Typical Brightness
Home	Usually	100 – 500 lx
Schools	Corridor	100 – 300 lx
	Classroom in general	300 – 750 lx
	Reading room, laboratory	500 – 1500 lx
Offices	PC room, working at PC	200 – 500 lx
	Meeting room	300 – 700 lx
	Canteen	150 – 300 lx
	Corridors	50 – 100 lx
	Reception	300 – 700 lx
	Restroom	100 – 300 lx
Factories	Production hall	500 – 1500 lx
	Development, office	300 – 750 lx
	Design CAD	500 – 1500 lx
	Laboratory, inspection work	750 – 1500 lx
	Packaging of products	150 – 500 lx
	Storage	100 – 300 lx
Hospitals	Visitor room	300 – 500 lx
	First aid, surgery	500 – 1500 lx
	Bedroom	100 – 300 lx
	Pharmacies	500 – 1000 lx
	Wash rooms	150 – 300 lx
Hotels	Reception	200 – 500 lx
	Entrance area	100 – 300 lx
	Restaurant	150 – 300 lx
	Restroom	100 – 300 lx
	Bars	50 – 150 lx
	Corridors	50 – 100 lx
	Staircases	50 – 150 lx
Stores	Saleroom	300 – 1000 lx
	Show room	500 – 1500 lx
	Packaging area	200 – 300 lx
	Lounge	300 – 500 lx
	Conference room	300 – 700 lx
Trade Show	Booth	300 – 500 lx
Sports Arena	Indoor area	200 – 500 lx

Table 2 – Typical Indoor Light Levels

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4.2.3 Start-up

Before commencing normal operation, the internal energy storage of ETHSx should be re-charged by exposing it to bright daylight for at least 5 minutes. After that initial charge, ETHSx can gradually accumulate additional energy based on available ambient light.

4.3 Installing a Backup Battery (Optional)

If ETHSx is installed at a location with unfavorable lighting conditions, then a backup battery can be used to supplement the energy provided by the solar cell. ETHSx supports using CR1225 backup batteries only.

To install a backup battery, follow these steps:

1. Pull off the cap of the ETHSx housing which rests directly at the solar cell.
2. Insert the battery with the larger positive pole (+) directed towards the solar cell and slide it between the two contact terminals (see following figure).
3. Put the cap back on.



Figure 13 – Properly inserted backup battery

NOTE

It is strongly recommended to wear protective gloves while handling coin cell batteries. Failure to do so might result in the formation of a conductive layer on the battery surface due to skin moisture and a much shorter battery lifetime.



WARNING:

Ensure the battery is properly oriented. Improper handling of lithium batteries may result in heat generation, explosion, or fire.

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4.4 Transmission Range

Mounting ETHS on metal surfaces will reduce the transmission range and shall therefore be avoided.

Other factors that influence the system transmission range include:

- Type and location of the antennas of ETHSx and the receiver
- Obstruction of the direct path between ETHSx and the receiver
- "Dead" spots caused by signal reflections from nearby conductive objects.
- Sources of interference (e.g. power supplies or WiFi access points) in close proximity to the receiver. The distance between EnOcean receivers and other transmitting devices such as computers, audio and video equipment that also emit high-frequency signals should be at least 0.5 m.

Since the expected transmission range strongly depends on system conditions, range tests should be performed as part of the installation. The following figures for expected transmission range may be used as a rough guide:

- Line-of-sight connections: Typically 30 m range in corridors, up to 100 m in halls
- Plasterboard walls / dry wood: Typically 30 m range, through max. 5 walls
- Ferroconcrete walls / ceilings: Typically 10 m range, through max. 1 ceiling
- Fire-safety walls, elevator shafts, staircases and supply areas should be considered as screening.

The angle at which the transmitted signal hits the wall is very important. The effective wall thickness – and with it the signal attenuation – varies according to this angle. Signals should be transmitted as directly as possible through the wall. Wall niches should be avoided.

Other factors restricting transmission range include:

- Switch mounted on metal surfaces (up to 30% loss of transmission range)
- Hollow lightweight walls filled with insulating wool on metal foil
- False ceilings with panels of metal or carbon fiber
- Lead glass or glass with metal coating, steel furniture

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5 Regulatory Notes

5.1 ETHSA Market Approval for European Union (CE)

Hereby, EnOcean GmbH declares that the radio equipment ETHSA is in compliance with the essential requirements and other relevant provisions of Radio Equipment Directive 2014/53/EU (RED). A copy of the Declaration of Conformity can be obtained from the product webpage. The OEM customer (B2B) is responsible for country specific local documentation.

Waste & Battery:

WEEE-Reg-No.: DE 93770561

UBA Reg-No.: 21008516

Since the European Union requires country specific recycling, for all other countries than Germany the OEM customer (B2B) must register at country specific recycling organizations.

5.2 ETHSA Market Approval for United Kingdom (UKCA)

Till end of 2022 UK will accept EU (CE) market approval (see above). From 2023 UK will introduce its own market approval system, which is derived from the EU CE (EU directives will be UK statutory instruments, EU standards will be British standards). EnOcean will provide the UK declaration of conformity (UK DoC) document at the product website for download.

The final product package including EnOcean ETHSA must meet all necessary application specific requirement for UK conformity (e.g., building automation application, UK WEEE registration and documentation with UKCA). The OEM customer (B2B) is responsible for the final product documentation and must register at UK specific recycling organizations.

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5.3 ETHSU Market Approval for US (FCC)

FCC Certificate

TCB

GRANT OF EQUIPMENT
AUTHORIZATION

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

TCB

EnOcean GmbH
Kolpingring 18a
Oberhaching, 82041
Germany

Timco Engineering, Inc.
849 NW State Road 45
P.O. Box 370,
Newberry, FL 32669

Date of Grant: 01/30/2018
Application Dated: 01/30/2018

Attention: Armin Anders , Director Product Marketing

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is
VALID ONLY for the equipment identified hereon for use under the Commission's
Rules and Regulations listed below.

FCC IDENTIFIER: SZV-STM350U
Name of Grantee: EnOcean GmbH
Equipment Class: Part 15 Security/Remote Control
Transmitter
Notes: Temperature and Humidity Sensor with
transmitter

Grant Notes

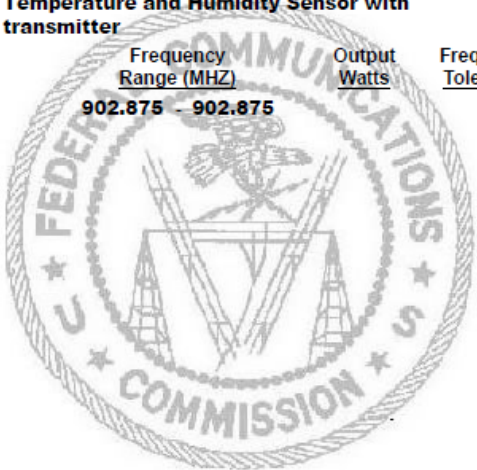
FCC Rule Parts
15.231

Frequency
Range (MHZ)
902.875 - 902.875

Output
Watts

Frequency
Tolerance

Emission
Designator



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5.3.1 FCC Regulatory Statement

The ETHSU device complies with part 15 of the FCC Rules. 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

5.3.2 FCC Usage Conditions

STM 350U is a RF module approved for Single Modular use. It is incorporated into ETHSU as OEM installation using an approved antenna.

The module is optimized to operate using small amounts of energy, and may be powered by a battery. The module transmits short radio packets comprised of control signals, (in some cases the control signal may be accompanied with data) such as those used with alarm systems, door openers, remote switches, and the like.

The module does not support continuous streaming of voice, video, or any other forms of streaming data; it sends only short packets containing control signals and possibly data. The module is designed to comply with, has been tested according to 15.231(a-c), and has been found to comply with each requirement.

Thus, ETHSU containing the STM 350U radio module can be operated in the United States without additional Part 15 FCC approval (approval(s) for unintentional radiators may be required for the OEM's finished product), under EnOcean's FCC ID number if the OEM requirements are met.

5.3.3 FCC OEM Requirements

To use EnOcean's FCC ID number, the OEM must ensure that the following conditions are met by the end product:

- **FCC labelling requirements**
This includes a clearly visible label on the outside of the final product. Attaching a label to a removable portion of the final product, such as a battery cover, is not permitted. The label must include the following text:
Contains FCC ID: SZV-STM350U
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.
- The FCC identifier or the unique identifier, as appropriate, must be displayed on the device.
- The user manual for the end product must also contain the text given above.

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5.4 ETHSU Market Approval for CA (ISED)

ISED Certificate

TIMCO ENGINEERING INC.

849 NW State Road 45
Newberry, Florida 32669
<http://www.timcoengr.com>
888.472.2424 F 352.472.2030 email: cb@timcoengr.com

No. ➤ 83IC18

TECHNICAL ACCEPTANCE CERTIFICATE

Certification No.

➤ IC: 5713A-STM350U

Issued To

➤ EnOcean GmbH
Kolpingring 18A,
Oberhaching, 82041, Germany

Tested By

➤ VPI LABORATORIES, INC.
Company No: 2041A
29145 Old Lincoln Hwy,
Wanship, Utah 84017 USA
801-260-4056; 866-307-0033
joej@vpitech.com

Type of Equipment

➤ Low Power Device (902-928 MHz)

Type of Service

➤ New Certification (Single)

Hardware Version Id Number (HVIN)

➤ STM 350U

Product Marketing Name: (PMN)

➤ STM 350U

Firmware Version Id Number (FVIN)

➤ N/A

Host Marketing (HMN)

➤ N/A

FREQUENCY RANGE	EMISSION DESIGNATIONS NECESSARY BANDWIDTH & EMISSION CLASSIFICATION	R.F. POWER	ANTENNA INFO	SPECIFICATION/ ISSUE & DATE
902.875 MHz	342KF1D	80.3 dBuV/@ 3m	Helical 0 dBi	RSS-210 Issue 9; Aug 16

Note1: This equipment also complies with RSS-102, Issue 5 (March 2015) and RSS-Gen, Issue 4 (Nov 2014)

Certification of equipment means only that the equipment has met the requirements of the above noted specifications. License applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation.

This certificate is issued on condition that the holder complies and will continue to comply with the requirements of the radio standards specifications and procedures issued by Industry Canada.

Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada.

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specifications.

J'atteste par la présente que le matériel a fait l'objet d'essai et jugé conforme à la spécification ci-dessus.

ISSUED UNDER THE AUTHORITY OF MINISTER OF INDUSTRY
DÉLIVRÉ AVEC L'AUTORISATION DU MINISTRE DES INDUSTRIES



Bruno Clavier, General Manager

DATE: January 31, 2018

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5.4.1 ISED Regulatory Statement

The ETHSU device contains the EnOcean module STM 350U that complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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."