Transmitter Module
PTM 335 / 335C

October 6, 2011

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,
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REVISION HISTORY

The following major modifications and improvements have been made to the first version of this document:

No	Major Changes
0.5	Initial version
0.6	Updated version, delivered with B-samples
0.7	Output power data 868 MHz updated

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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.

TABLE OF CONTENT

1 GENERAL DESCRIPTION

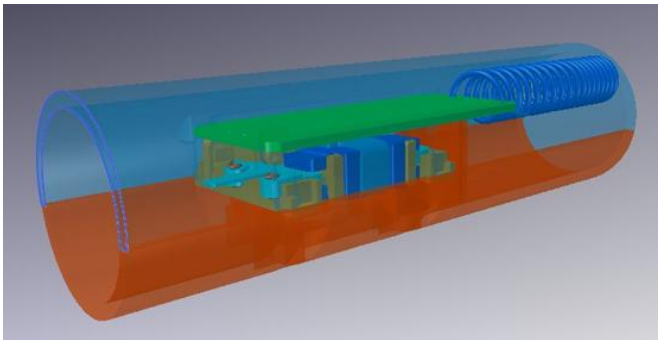
1.1 Basic Functionality

The radio transmitter module PTM 335 from EnOcean enables the implementation of wireless sensors door sensors without batteries.

Functional Principle

When an energy pulse is supplied by ECO 200 an RF telegram is transmitted including a unique 32-bit module ID, and information if an open or close event has happened. This information is derived from the polarity of the energy pulse.

PTM 335 is connected to ECO 200 via a contact spring.



Product variants

- PTM 335: 868 MHz variant
- PTM 335C: 315 MHz variant

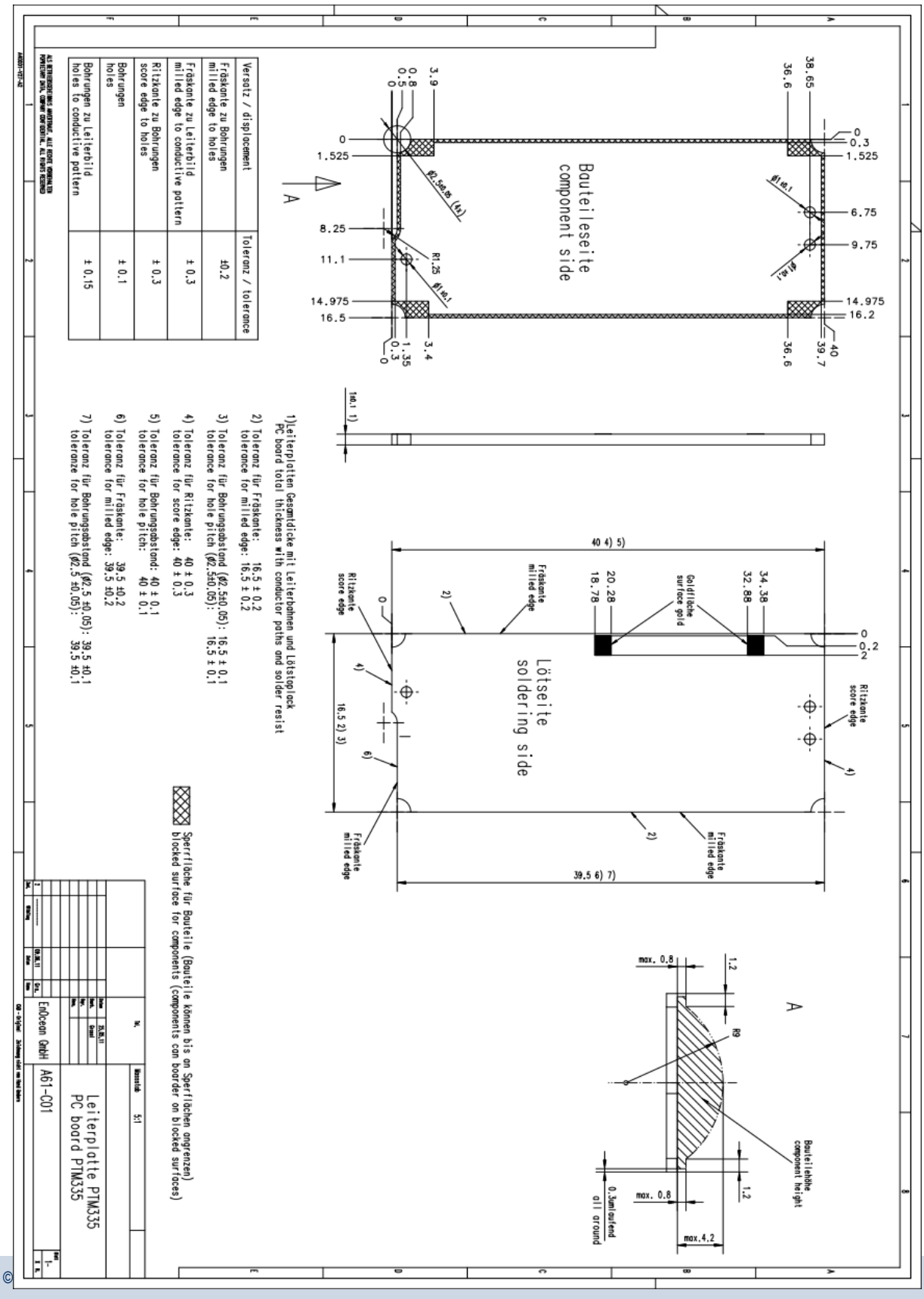
1.2 Technical Data

Power supply		ECO 200
Antenna		helical antenna
Frequency		315.0 MHz/868 MHz
Transmission power radiated	315 MHz: 90…95 dBµV/m	868 MHz: typ. 0 dBm EIRP
EnOcean Telegram type		EEP F6-10-00
EMI resistance		3 V/m according to EN 61000-6-1
Transmission range		up to 200 m free field, up to 30 m indoor Largely depends on antenna design and integration into housing Potential reduction of range when integrated in/adjacent to metal doors or frames or other metal objects[1]
Approvals		FCC/IC limited modular approval (315 MHz) / R&TTE (868 MHz)

1.3 Physical Dimensions

Module dimensions (excluding antenna)	16.5 x 40.0 x 3.0 mm

[1] Not suited for use within metal enclosures.



1.4 Environmental Conditions

Operating temperature	-25 °C … +65 °C
Storage temperature	-40 °C … +85 °C
Humidity	0% … 93% r.h., non-condensing

1.5 Ordering Information

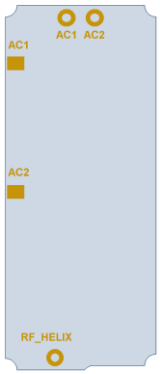
Type	Ordering Code	Frequency
PTM 335	**S3001-A335**	**868.3 MHz**
PTM 335C	**S3031-A335**	**315.0 MHz**

2 FUNCTIONAL DESCRIPTION

2.1 Block diagram

At power-up by an energy pulse at AC1, AC2 a DC voltage is provided to the internal micro controller. The microcontroller reads the polarity of the supply voltage pulse.
After that 3 identical radio telegrams containing polarity information and 32 bit module ID are transmitted.

2.2 Pin out and pin description



Symbol	Function	Characteristics
AC1	Input for ECO 200	ECO 200 or equivalent energy pulse
AC2	Input for ECO 200	ECO 200 or equivalent energy pulse
RF_HELIX	RF output	Output for pre-installed helical antenna

2.3 Absolute maximum ratings (non operating)

Symbol	Parameter	Min	Max	Units
AC1 AC2	Supply voltage	0	17	V

2.4 Maximum Ratings (operating)

Symbol	Parameter	Min	Max	Units
AC1 AC2	Supply voltage	0	15	V

2.5 Radio telegram

PTM 335 transmits a radio telegram according to EEP F6-10-00.

- Status "open" is represented by 0xC0
  (ECO 200 tension spring "up" = towards PCB)
- Status "closed" is represented by 0xF0
  (ECO 200 tension spring "down" = away from PCB)

http://www.enocean-alliance.org/fileadmin/redaktion/enocean_alliance/pdf/EnOcean_Equipment_Profiles_EEP2.1.pdf

2.6 Transmit timing

The setup of the transmission timing allows avoiding possible collisions with data packages of other EnOcean transmitters as well as disturbances from the environment. With each transmission cycle, 3 identical subtelegrams are transmitted within 40 ms. The transmission of a subtelegram lasts approximately 0.7 ms. The delay between the three transmission bursts is affected at random.

3 APPLICATIONS INFORMATION

3.1 Transmission range

The main factors that influence the system transmission range are type and location of the antennas of the receiver and the transmitter, type of terrain and degree of obstruction of the link path, sources of interference affecting the receiver, and "dead" spots caused by signal reflections from nearby conductive objects. Since the expected transmission range strongly depends on this system conditions, range tests should categorically be performed before notification of a particular range that will be attainable by a certain application.

The following figures for expected transmission range are considered by using a PTM, a STM or a TCM radio transmitter device and the TCM radio receiver device with preinstalled whip antenna and may be used as a rough guide only:

- 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:

- 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

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.

A summarized application note to determine the transmission range within buildings is available as download from www.enocean.com.

PTM 335 / PTM 335C is optimized for use in wooden door frames.
(Performance was tested with wood adjacent to simulated plastic housing around PTM 335)

Radio performance may vary due to proximity of other material in installation (e.g. plastic). Any metal parts close to PTM 335/PTM 335C will degrade performance or at least change radiation pattern.

4 AGENCY CERTIFICATIONS (after release for series production)

The modules have been tested to fulfil the approval requirements for CE (PTM 335) and FCC/IC (PTM 335C) based on the built-in firmware.

4.1 CE approval

The module bears the EC conformity marking CE and conforms to the R&TTE EU-directive on radio equipment. The assembly conforms to the European and national requirements of electromagnetic compatibility. The conformity has been proven and the according documentation has been deposited at EnOcean. The modules can be operated without notification and free of charge in the area of the European Union, and in Switzerland. The following provisos apply:

- EnOcean RF modules must not be modified or used outside their specification limits.
- EnOcean RF modules may only be used to transfer digital or digitized data. Analog speech and/or music are not permitted.

- The final product incorporating EnOcean RF modules must itself meet the essential requirement of the R&TTE Directive and a CE marking must be affixed on the final product and on the sales packaging each. Operating instructions containing a Declaration of Conformity has to be attached.
- If the transmitter is used according to the regulations of the 868.3 MHz band, a so-called "Duty Cycle" of 1% per hour must not be exceeded. Permanent transmitters such as radio earphones are not allowed.

4.2 FCC (United States) Certification

PTM 335C LIMITED MODULAR APPROVAL

This is an RF module approved for Limited Modular use operating as an intentional transmitting device with respect to 47 CFR 15.231(a-c) and is limited to OEM installation. 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, a finished device containing the PTM 335C 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. This greatly simplifies and shortens the design cycle and development costs for OEM integrators. The module can be triggered manually or automatically, which cases are described below.

Manual Activation

The radio module can be configured to transmit a short packetized control signal if triggered manually. The module can be triggered, by pressing a switch, for example.
The packet contains one (or more) control signals that is(are) intended to control something at the receiving end. The packet may also contain data. Depending on how much energy is available from the energy source, subsequent manual triggers can initiate the transmission of additional control signals. This may be necessary if prior packet(s) was (were) lost to fading or interference. Subsequent triggers can also be initiated as a precaution if any doubt exists that the first packet didn't arrive at the receiver. Each packet that is transmitted, regardless of whether it was the first one or a subsequent one, will only be transmitted if enough energy is available from the energy source.

OEM Requirements

In order to use EnOcean's FCC ID number, the OEM must ensure that the following conditions are met:

- End users of products, which contain the module, must not have the ability to alter the firmware that governs the operation of the module. The agency grant is valid only when the module is incorporated into a final product by OEM integrators.
- The end-user must not be provided with instructions to remove, adjust or install the module.
- The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. 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-PTM335C
  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.

When the device is so small or for such use that it is not practicable to place the statement above on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, 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.

- Changes or modifications not expressly approved by EnOcean could void the user's authority to operate the equipment.
- The module must be used with only the pre-installed helical antenna.
- The OEM must ensure that timing requirements according to 47 CFR 15.231(a-c) are met.
- The OEM must sign the OEM Limited Modular Approval Agreement with EnOcean.

4.3 IC (Industry Canada) Certification

In order to use EnOcean's IC number, the OEM must ensure that the following conditions are met:

- Labeling requirements for Industry Canada are similar to those required by the FCC. The Original Equipment Manufacturer (OEM) must ensure that IC labeling requirements are met. A clearly visible label on the outside of a non-removable part of the final product must include the following text:

  Contains IC: 5713A-PTM335C

- The OEM must sign the OEM Limited Modular Approval Agreement with EnOcean