

**EDK 350** 868 MHz

**EDK 350U** 902 MHz

**EDK 400J** 928 MHz

## **EnOcean Developer Kits**



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

## REVISION HISTORY

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

No	Major Changes
1.0	Converted to new Dolphin layout and merged EDK 350/350U with EDK 400J user manual
1.1	Update PTM 330 -> PTM 535
1.2	Update USB 300U -> USB 500U, PTM 21x -> PTM 215

**Published by EnOcean GmbH, Kolpingring 18a, 82041 Oberhaching, Germany**  
**www.enocean.com, info@enocean.com, phone ++49 (89) 6734 6890**

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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.

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## 1 GENERAL DESCRIPTION

### 1.1 Overview

EDK contains everything you need to start implementing innovative solutions with EnOcean's energy harvesting and ultra-low power radio technologies. The kit will help you to demonstrate and configure EnOcean products. Additionally, you can easily design new hardware and start software programming.



EnOcean Developer Kit example image

Updates and Software tools are available for download at [www.enocean.com](http://www.enocean.com)

### 1.2 EDK 350 Content

- EOP 350 Programmer/demo board
- USB 300 USB gateway
- TCM 320 transceiver module
- STM 300 sensor module on adapter
- STM 330 solar powered temperature sensor
- PTM 215 push button transmitter
- ECO 200 mechanical energy generator
- PTM 535 transmitter module
- USB cable and user manual
- DolphinView and DolpinStudio for download

### 1.3 EDK 350U Content

- EOP 350 Programmer/demo board
- USB 500U USB gateway
- TCM 320U transceiver module
- STM 300U sensor module on adapter
- STM 33xU solar powered temperature sensor
- PTM 215U push button transmitter
- ECO 200 mechanical energy generator
- PTM 535U transmitter module
- USB cable and user manual
- DolphinView and DolpinStudio for download

## 1.4 EDK 400JU Content

- EOP 350 Programmer/demo board
- USB 400J USB gateway
- STM 400J sensor module on adapter
- STM 431J solar powered temperature sensor
- PTM 215J push button transmitter
- ECO 200 mechanical energy generator
- PTM 535J transmitter module
- USB cable and user manual
- DolphinView and DolpinSuite for download

## 2 FIRST STEPS

### 2.1 Demonstration of 'Relay Switch' (EDK 350 / EDK 350U only)

TCM 320 / TCM 320U module has already several pre-implemented features for building automation. The 1-channel relay mode is used to switch on and off a module pin. If you connect a relay to this pin you can switch a line-powered device.

1. Plug TCM 320 into EOP 350 and set jumper to 1-CH ACT

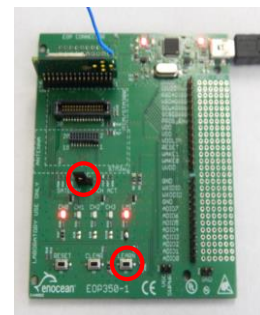


2. Connect EOP 350 with USB power (e.g. PC)

3. Learn PTM switch ID to TCM 320:

- Press LEARN button on EOP 350 > 0.5s  
→ LMI LED will light, CH0 will flash
- Push switch rocker one time to send learn telegram
- Finish learn mode with LEARN button > 0.5s

4. Push PTM switch to toggle CH0 LED (relay pin)



### **Attention:**

- Example works only with TCM 320 standard firmware and rocker on PTM switch module.
- If you have replaced TCM firmware, load TCM 320 default firmware from website.
- Pushing the switch, a second time during learn mode will delete the ID.
- Operating mode can only be changed after deleting all IDs.
- During learn mode supply voltage needs to be stable to avoid flash corruption.

## 2.2 Software Installation

- Please register at EnOcean.com, download and install software  
<http://www.enocean.com/en/download/>

### DolphinView

- Visualize properties (e.g. RSSI and EEP) of EnOcean radio nodes
- Receives, sends and analyses radio telegrams according to the EnOcean standard
- Get detailed information e.g. sub-telegram timing and signal strength
- Content of telegrams can be analyzed online and logged with time stamp
- Supports remote management features like ping, query and remote learn

### DolphinStudio (EDK 350 / EDK 350U) and DolphinSuite (EDK 400J)

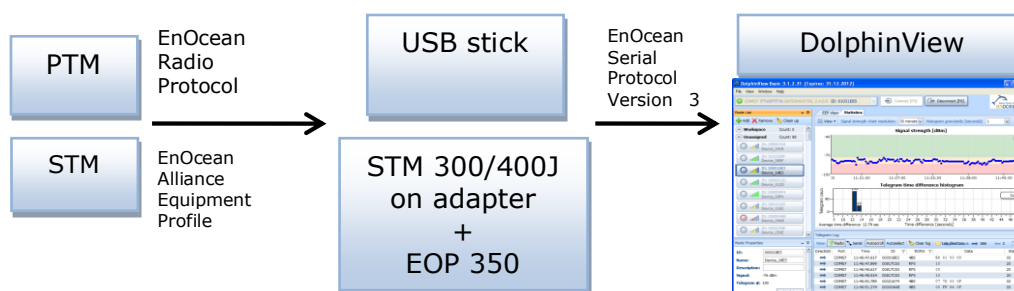
- DolphinStudio/Suite software provides a graphical user interface allowing easy configuration and programming of EnOcean modules with Dolphin chip.

### DolphinAPI

- Operating system for self-powered applications
- Source code samples in C-Code for switching, dimming etc.
- Comprehensive software libraries (wireless communication, energy management, ...)

## 2.3 DolphinView

- EnOcean DolphinView visualizes and interprets EnOcean radio telegrams. It receives EnOcean telegrams via USB stick, TCM 320 (EDK 350/350U) and STM 300/400J on adapter with DolphinSniffer software.



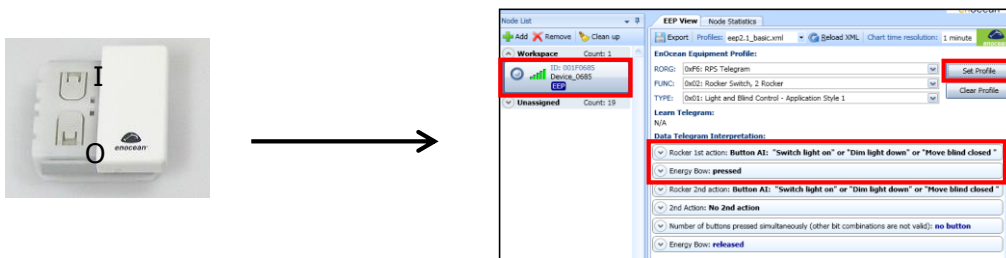
- Download DolphinView from EnOcean's Software download website
- Execute the DolphinView setup program and follow instructions
- Connect USB stick to your PC or notebook.  
 With the USB stick gateway you will get basic information of EnOcean telegrams.  
 With TCM 320 or STM on adapter and DolphinSniffer FW you will get more detailed information (e.g. telegram timing)
- Execute DolphinView and press the connect button

**Remark:** DolphinView firmware download will overwrite existing firmware. In order to get the original function of the modules you need to download and program the corresponding firmware from <http://www.enocean.com/en/download/>

## 2.4 Demonstration of PTM 215 switch module (standard mode)

The push button radio transmitter module enables the implementation of wireless remote controls without batteries. Key applications are wall-mounted flat rocker switches, as well as handheld remote controls with up to 4 single push-buttons.

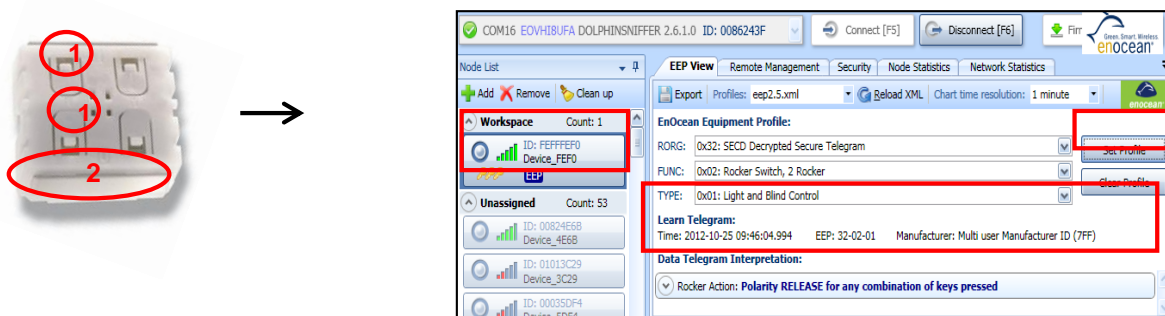
- Radio telegrams will be received and shown by DolphinView
- Press rocker to send switch telegram → PTM switch will be shown in node list
- Double click on PTM within the node list → PTM will be added to the node list
- Select node and press "Set Profile" button to interpret Equipment Profile
- Press rocker on I-side (marking on PTM switch) to send "switch on telegram"
- Press rocker on O-side (marking on PTM switch) to send "switch off telegram"



## 2.5 Demonstration of PTM 215 security mode

PTM 215 switch comes with implemented security feature. PTM telegram contains a rolling code to prevent copying. PTM 215 supports normal mode and secure mode.

- Start DolphinView and connect to USB 300
- PTM 215 DB or higher: Hold down two contacts (1) and press the energy bow (2) two times (for details see PTM 215 user manual)  
PTM will send a learn and synchronization telegram to the receiver
- Received (telegram log) and interpreted telegram (EEP view) will be shown
- Additional documentation is available at PTM 215 user manual

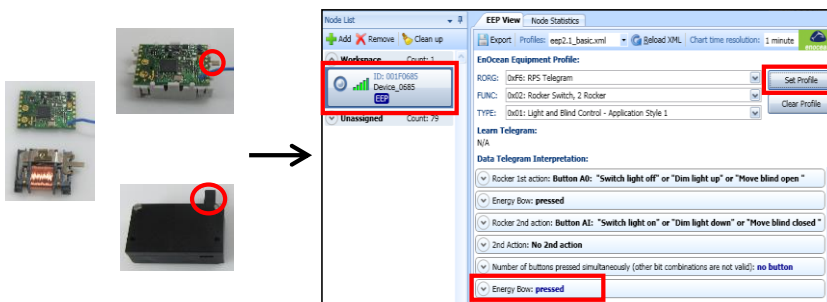


**Remark:** PTM 215 can be switched from secure mode to normal mode by simultaneously hold down four contact nipples and actuating the energy bow. Before changing the operating mode, make sure to clear the device from all learned receivers/gateways, otherwise receivers will ignore the telegrams and the application will not work.

## 2.6 Push Button Generator & Radio Module

The ECO 200 is an energy converter for linear motion. It can be used to power the PTM 535, PTM 535U or PTM 535J radio module. The energy output at every actuation is sufficient to transmit 3 sub-telegrams with a free field range of 300m. Possible applications are miniaturized switches and sensors in building technology and industrial automation.

- Radio telegrams will be received and shown by DolphinView
- Press spring to send telegram -> PTM 535/535U/535J will be shown in the node list
- Select node and press "Set Profile" button to interpret Equipment Profile
- Press spring to send telegram "Energy Bow: pressed"
- Pull spring to send telegram "Energy Bow: release"



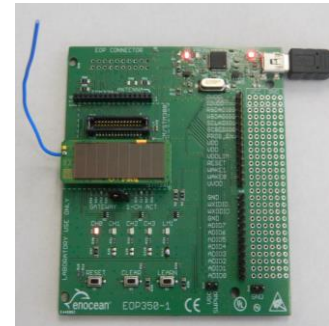
**Remark:** In order to send EnOcean standard radio telegrams according to the EEP specification, you need to set the right contact pins on PTM. Without doing this PTM can't control a standard receiver/actuator. For details see PTM specific user manual.



### 3 WORKING WITH DOLPHINSTUDIO (EDK 350/350U) OR DOLPHINSUITE (EDK 400J)

#### 3.1 Installation

1. DolphinStudio is used for EDK 350 & EDK 350U with Dolphin V1.2 chip and DolphinSuite is used for EDK 400J with Dolphin V4.x chip
2. Download DolphinStudio or DolphinSuite according to you EDK <http://www.enocean.com/en/download/>
3. Install DolphinStudio/Suite via setup program
4. Unplug jumper on STM 33x/43xJ and keep for later usage
5. Plug STM 33x/43x temperature sensor on top of EOP 350 (antenna to the left side)
6. Connect EOP 350 via USB cable to PC
7. Start DolphinStudio/Studio and select COM port



#### 3.2 Check Firmware Version and Update

EDK 350/350U:

1. Start DolphinStudio and select "Programmer" tab
2. Select "Chip information" and press "Retrieve" button
3. Current application type and version will be shown

EDK 400J:

1. Start DolphinProgrammer and select "Module Information"
2. Press "Retrieve Module Information" button
3. Current application type and version will be shown

#### 3.3 Update or change Firmware

EDK 350/350U:

1. Program and compile your own FW or download update from EnOcean website e.g. <http://www.enocean.com/en/download/>
2. Start DolphinStudio and select "EOPX (Programmer)" tab
3. Select "Programmer"
4. Select FW file via "Browse..." button; chip configuration file will be automatically recognized by ending \*.cfg.hex
5. Press "Execute" button to start the update process

EDK 400J:

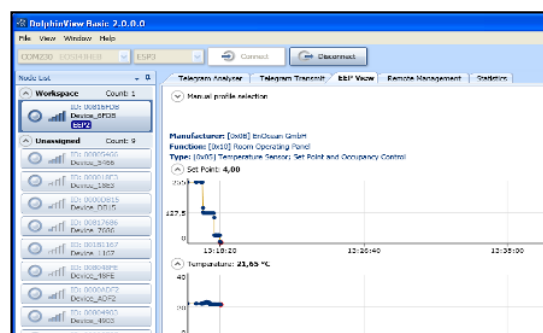
1. Program and compile your own FW or download update from EnOcean website e.g. <http://www.enocean.com/en/download/>
2. Program radio module via DolphinProgrammer and "Write Flash"
3. Select firmware file via "Browse..." button; chip configuration file will be automatically recognized by ending \*.cfg.hex
4. Press "Write to Flash" button to start the update process
5. Firmware programming was successful when all reported actions are ok

### 3.4 Configuration of Temperature Sensor

**STM 33x / STM 33xU:** Use DolphinStudio and "Configuration" tab

**STM 43xJ:** Use Dolphin V4 Module Configurator "STM 43xJ" tab

1. Click on read configuration button
2. You will get on overview of the temperature sensor pre-defined configuration
3. STM 33x/43xJ will only send a LEARN telegram if an "Manufacturer ID" is configured. (Change "Manufacturer ID" for example to EnOcean GmbH if not set before.)
4. You can change the wake up cycle, but keep in mind, this will heavily affect the energy budget. For details see STM user manual.
5. Typical values for OEM products are:  
 Cyclic wake-up cycle: 100s (wake up and check temperature value)  
 Redundant retransmission min: 7 (min send interval every 7. wake up)  
 Redundant retransmission mx: 14 (max send interval every 14. wake up)
6. Unplug STM 330/430J from EOP 350 and set jumper as before (near learn button)
7. Start DolphinView Advanced
8. Connect to USB 300/400J or STM 300/400J with DolphinSniffer as gateway
9. Press learn button on STM 33x/43xJ  
 → Learn telegram will be sent, and DolphinView will automatically recognize the temperature sensor (see EEP symbole in node list)
10. Select EEP tab and wait for the first telegram send by the sensor after the retransmission interval  
 → Sensor values will be automatical interpreted and plotted into a diagram



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## 4 WRITE YOUR OWN FIRMWARE

1. Download DolphinAPI and install from <http://www.enocean.com/en/download/>
2. Acquire PK 51 with C51 compiler and Keil  $\mu$ Vision IDE from ARM: <http://www.keil.com/c51/pk51kit.asp>
3. A description and C-cod samples of DolphinAPI can be found within the installation folder
4. Implement your application and upload the firmware as described before

### STM 300 / STM 400J for sensor applications:

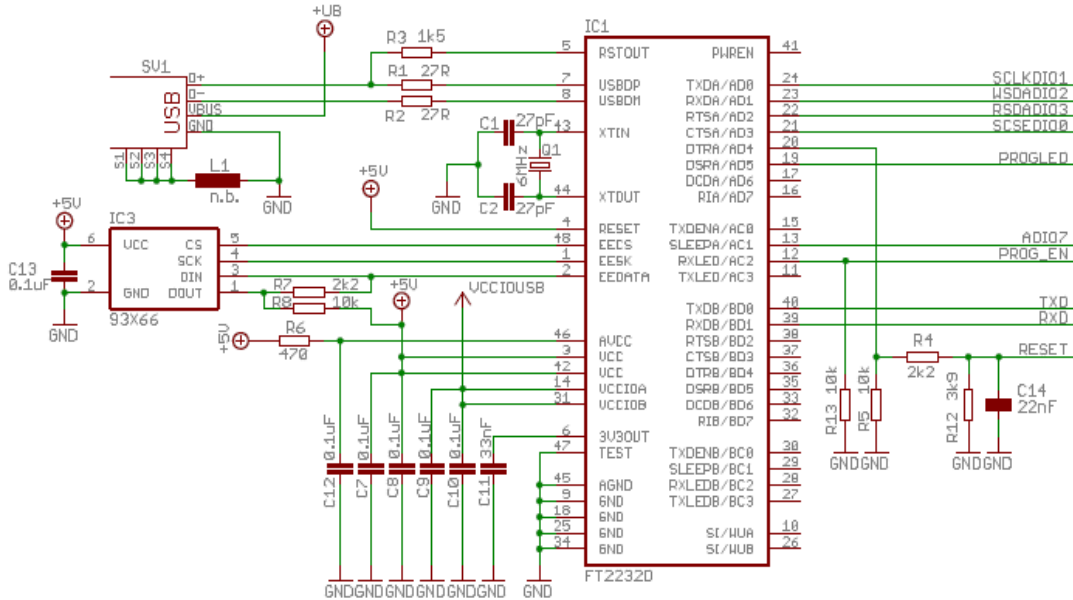
The programmer board EOP 350 has been designed for the demonstration of line powered applications and for programming of EnOcean modules. Due to different wiring for STM 300 / STM 400J sensor applications (e.g. ADIO3/4 as analogue input) we recommend to contact our application engineering to get hints and tips: [support@enocean.com](mailto:support@enocean.com)

## 5 REFERENCES

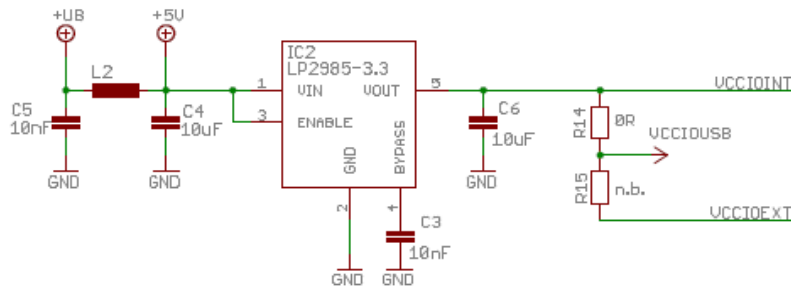
- Data sheets and user manuals for specific radio modules:
  - 868 MHz: [http://www.enocean.com/en/enocean\\_modules/](http://www.enocean.com/en/enocean_modules/)
  - 902 MHz: [http://www.enocean.com/en/enocean\\_modules\\_902mhz/](http://www.enocean.com/en/enocean_modules_902mhz/)
  - 928 MHz: [http://www.enocean.com/en/enocean\\_modules\\_928mhz/](http://www.enocean.com/en/enocean_modules_928mhz/)
- Software can be found at: [www.enocean.com/download](http://www.enocean.com/download)
- Additional information: <http://www.enocean.com/knowledge-base/>
- Technical support: [support@enocean.com](mailto:support@enocean.com)
- EnOcean Equipment Profiles: <http://www.enocean-alliance.org/eep/>

## 6 EOP 350-2 CIRCUIT & LAYOUT

USB serial converter



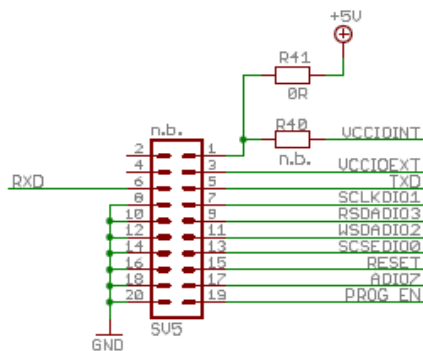
3.3V DC/DC converter



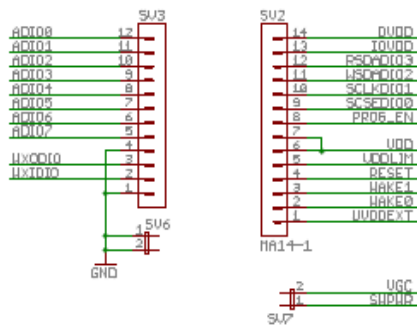
Programmer interface

Remarks:

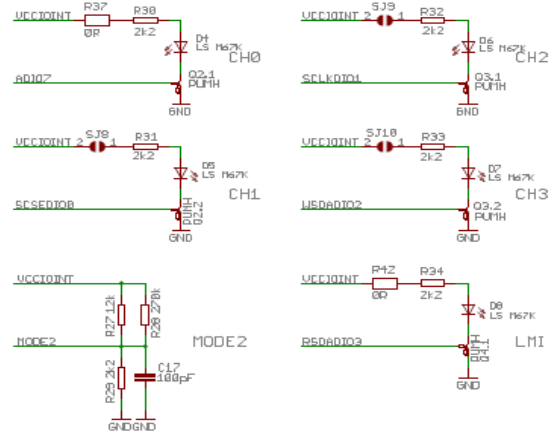
- Interface is only for special purposes e.g. bed of needle adapter
- Connector is not soldered
- Compared to EOP 300, RxD (pin 6) has been changed with TxD (pin 5)



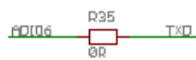
EXT PINS



1-CH ACTUATOR



GATEWAY



BUTTONS

