USER MANUAL

E9T-210U

Kinetic Switch Module

902 MHz Frequency

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1. GENERAL DESCRIPTION

The E9T-210U pushbutton transmitter from Ad Hoc Electronics is a drop-in replacement for the EnOcean PTM 210U module. This module enables the implementation of wireless switches and remote controls without batteries. The E9T-210U is self-powered (no batteries) and therefore maintenance-free. The power is provided by a built-in electro-dynamic power generator.

The main application is wireless switches in smart buildings. Products based on E9T-210U modules can also be used in hermetically sealed systems or in remote (not easily accessible) locations.

The E9T-210U operates at 902.875 MHz and is compliant with FCC and Industry Canada regulatory requirements for the North American market.

1.1 Product Specifications

Parameter	Specification
Model	E9T-210U
Frequency	902.875 MHz (FSK)
Power Supply	Electro-dynamic power generator
Antenna	Integrated PCB antenna
Data Rate	125 kbps
Conducted Output Power	+10 dBm
Transmission Range	Typical 300 m free field, typical 30 m indoor
Channels	Two channels with two pushbuttons per channel
Device Identifier	Individual 32-bit ID (factory programmed)
Redundant Sub-telegrams	3 per transmission
Radio Standard	ERP2 based on ISO/IEC 14543-3-11
Equipment Profile	F6-02-04, F6-04-02

1.2 Mechanical Interface

Parameter	Specification
Device Dimensions	40.0 x 40.0 x 11.2 mm
Device Weight	20 g ± 1 g

Energy Bow Travel	1.8 mm
Operating Force	Typical 9 N at room temperature
Restoring Force	Typical 0.7 N to 4 N (min 0.5 N required)
Number of Operations	Typical 100,000 actuations at 25°C
Cover Material	Hostaform (POM)
Energy Bow Material	PBT (50% GV)

1.3 Environmental Conditions

Parameter	Specification
Operating Temperature	-25°C to +65°C
Storage Temperature	-25°C to +65°C
Humidity	0% to 95% r.h.

2. FUNCTIONAL DESCRIPTION

The E9T-210U contains an electro-dynamic energy transducer which is actuated by a bow. This bow is pushed by an appropriate push button, switch rocker or a similar construction mounted onto the device. An internal spring will release the energy bow as soon as it is not pushed down anymore.

When the energy bow is pushed down, electrical energy is harvested and a radio telegram is transmitted. Releasing the energy bow similarly generates energy which is used to transmit another radio telegram.

2.1 Contact Nipples Assignment

The E9T-210U provides four contact nipples. They are grouped into two channels (Channel A and Channel B) each containing two contact nipples (State O and State I). The nipples are therefore referred to as: AO, AI, BO and BI.

The state of all four contact nipples is transmitted together with a unique device identification whenever the energy bow is pressed or released as a part of an EnOcean radio telegram.

2.2 EnOcean Equipment Profiles

The EnOcean Equipment Profile (EEP) defines how the data within an EnOcean telegram is encoded. The E9T-210U supports the following ERP2 profiles:

- F6-02-04 - Rocker switch, 2 rockers
- F6-04-02 - Key card switch

Note: There is no EEP Teach-in message sent by the E9T-210U. The receiver must be configured to recognize these profile types.

3. PRODUCT LABEL SPECIFICATIONS

The product label is a critical component for product identification, traceability, and regulatory compliance. This section provides comprehensive specifications for the label design, content, and QR code structure.

3.1 Label Layout and Content

The product label must contain the following information:

Field	Content / Example
Model	E9T-210U
Frequency	902.875 MHz
Company Name	Ad Hoc Electronics
EnOcean ID	Unique 32-bit ID in hexadecimal format (8 hex digits) Example: 0x00500100
FCC ID	FCC: [Your FCC ID]
IC ID	IC: [Your IC ID]
Production Date	Week / Year format Example: 03 / 26 (3rd week of 2026)
QR Code	Machine-readable code containing product tracking information (See Section 3.2 for detailed QR code structure)

3.2 QR Code Structure

The QR code is CRITICAL for product traceability and must encode information according to the EnOcean Alliance Labeling standard (ANSI MH10.8.2 format). The QR code contains a text string with multiple information containers separated by the "+" character.

3.2.1 QR Code Example

Example QR code string:

`30S00500100+1P000800000023+30PE9T-210U+2PA01`

3.2.2 QR Code Field Definitions

Identifier	Description	Length	Example Value
30S	EnOcean Radio ID (32-bit format)	11 characters (3 + 8 hex digits)	`30S00500100`
+	Field Separator	1 character	+
1P	EnOcean Alliance Product ID	14 characters (2 + 12 hex digits)	`1P000800000023`
+	Field Separator	1 character	+
30P	Product Model Number	13 characters (3 + 10 alphanumeric)	`30PE9T-210U`
+	Field Separator	1 character	+
2P	Step Code and Revision	6 characters (2 + 4 alphanumeric)	`2PA01`

Example QR Code:

Encoding: 30S00500100+1P000800000023+30PE9T-210U+2PA01

3.2.3 Field-by-Field Requirements

30S - EnOcean Radio ID

- Format: 32-bit hexadecimal ID (8 hex digits)
- This must match the unique EnOcean ID programmed into the module
- Example: 00500100 represents ID 0x00500100
- Total length: 11 characters including identifier (30S)

1P - EnOcean Alliance Product ID

- Format: Manufacturer ID (4 hex digits) + Product ID (8 hex digits)
- Manufacturer ID: 0008 (assigned to Ad Hoc Electronics by EnOcean Alliance)
- Product ID: 00000023 (assigned internally by Ad Hoc Electronics for E9T-210U)
- Total length: 14 characters including identifier (1P)

30P - Product Model Number

- Format: Up to 10 alphanumeric characters
- Value: E9T-210U (product model designation)
- Total length: 13 characters including identifier (30P)

2P - Step Code and Revision

- Format: 4 alphanumeric characters
- This identifies the hardware revision and step code of the product
- Example: A01 represents Step Code A, Revision 01
- Total length: 6 characters including identifier (2P)

3.2.4 Complete QR Code String Format

The complete QR code string follows this structure:

`30S[8-digit-hex-ID]+1P000800000023+30PE9T-210U+2P[4-char-step]`

Total approximate length: 50 characters

CRITICAL NOTES:

- The EnOcean Radio ID (30S field) MUST exactly match the ID programmed into the module's firmware
- The Product ID (1P field) must use the assigned value 000800000023
- All hexadecimal values should use uppercase letters
- Field separators (+) are mandatory between fields
- QR code should use Error Correction Level M (15% error correction)

4. RADIO COMMUNICATION

The E9T-210U transmits radio telegrams based on the EnOcean Radio Protocol 2 (ERP2) standard, which is based on ISO/IEC 14543-3-11. This protocol is optimized for the North American 902 MHz frequency band.

4.1 ERP2 Communication

The E9T-210U uses the standard ERP2 frame structure with the following key parameters:

- ADDRESS CONTROL: Originator-ID 32 bit; no Destination-ID
- EXT. HEADER: No extended header
- TELEGRAM TYPE: RPS telegram (0xF6)

4.2 Redundant Transmission

To increase communication reliability, each data transmission is repeated 3 times as redundant sub-telegrams with random timing offsets. The redundant sub-telegrams are 100% identical. Therefore, it is sufficient for the receiver to successfully receive at least one sub-telegram.

5. APPLICATION INFORMATION

5.1 Typical Applications

E9T-210U modules are commonly used in the following areas:

- Building installation - wall-mounted wireless switches
- Industrial automation - wireless control panels
- Consumer electronics - handheld remote controls

Key products include wall-mounted switches and handheld remote controls supporting up to two rockers or up to four pushbuttons.

5.2 Construction of Switch Rockers

Polycarbonate is recommended as rocker material since it is both buckling resistant and wear-proof. It is also recommended to apply Teflon varnish in the areas of actuation.

IMPORTANT DESIGN CONSIDERATIONS:

- Use non-conductive material for rockers to ensure best transmission range. Avoid metallic materials or plastics with conducting ingredients such as graphite.
- If the rocker is not mounted on the rotation axis, consider tolerances. The measure from support plane to top of the energy bow is 7.70 mm +/- 0.3 mm.
- The movement of the energy bow must not be limited by mounted rockers.
- Catwalks of the switch rocker must not exert continuous forces on contact nipples.

5.3 Device Mounting

CRITICAL MOUNTING REQUIREMENTS:

- It is recommended NOT to mount the device directly onto metal surfaces or into metal frames since this can lead to significant loss of transmission range.
- The E9T-210U is powered by an electromagnetic generator. For proper function, magnets or ferromagnetic materials are not permitted within a keep-out zone of 60mm around the center of the module.

5.4 Transmission Range

The transmission range depends on several factors:

- Type and location of antennas
- Type of terrain and degree of obstruction
- Sources of interference
- Dead spots caused by signal reflections

Expected transmission ranges (approximate):

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

NOTE: Range tests should always be performed to determine the reliably achievable range under actual installation conditions.

6. REGULATORY INFORMATION

6.1 FCC Compliance

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT: Any changes or modifications not expressly approved by Ad Hoc Electronics could void the user's authority to operate this equipment.

6.2 Industry Canada Compliance

This device complies with Industry Canada ICES-003. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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.

6.3 End Product Requirements

The final product including the E9T-210U module must meet all necessary application-specific requirements including:

- FCC and IC compliance for the complete system
- Product safety standards compliance
- RoHS compliance for frame and rockers
- Proper product labeling and documentation

7. PRODUCT SAFETY INSTRUCTIONS

E9T-210U modules are not end-customer sold final products. Final products (e.g., switches) which include E9T-210U modules are to be prepared by partners.

7.1 Intended Use

- Switch products are intended for indoor usage in closed dry rooms.
- The product must not be used in any relation with equipment that supports, directly or indirectly, human/animal health or life or with applications that can result in danger for people, animals or real value.
- The product is not suitable for use in mechanically or environmentally challenging environments including (but not limited to) environments with heavy vibrations, mechanical shocks, very high humidity, very dusty or explosive atmospheres.
- The installation and assembly of electrical equipment may only be performed by a skilled electrician.

7.2 Basic Safety Instructions

- Risk of suffocation! Do not leave the packaging material lying around. Children could swallow the small parts and choke on them.
- Install and operate product according to user manual and do not modify the product.
- The product should not be exposed to rapid temperature changes shortly before or during operation; condensation of moisture has to be avoided.
- Wrong cleaning may damage the product; we suggest cleaning with soft and damp tissue.
- Do not disassemble!

8. DISPOSAL AND ENVIRONMENTAL INFORMATION

Components of the devices 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. By agreement we will take packing material back if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or that we are not obliged to accept, we shall have to invoice you for any costs incurred.

9. CONTACT INFORMATION

Ad Hoc Electronics

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For technical support, product specifications, or additional documentation, please visit our website or contact us via email.

FCC Warning
This 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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

Note: The Grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. such modifications could void the user's authority to operate the equipment.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

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