

Sense T | Sense S

Asset Monitoring and Tracking Sensor

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Application Advantages

- ▶ Long battery lifetime resulting in less handling effort
- ▶ Simple and fast to mount
- ▶ Very compact design
- ▶ Maintenance free device
- ▶ Extremely robust device
- ▶ No configuration required
- ▶ Prepared for usage on board of airplanes
- ▶ Enables tracking transparency within the supply chain
- ▶ Creates valuable information about assets conditions

2 Radio Frequency Radiation Exposure and Further Information

The radiated output power of the device is far below the FCC radio frequency exposure limits. Nevertheless, the device shall be used in such a manner that the potential for human contact during normal operation is minimized.

3 Technical Specifications

MEASUREMENT PARAMETERS

Sense T	Temperature
Sense S	Temperature, Shock Acceleration, Intensity of Shock

TECHNICAL DATA

Dimension (L x W x H)	35mm x 35mm x 11.5mm	
Weight	approx. 21g	
Power Supply	CR2032	
Battery life		
Sense T	> 5 years Note: based on ambient temperature conditions (+25°C)	
Sense S	> 3 years Note: based on ambient temperature conditions (+25°C) and usage in standard transportation use cases	
RFID	Battery assisted passive wireless interface operating at a global frequency range of 856 MHz to 960 MHz. Supported region specific UHF communication frequencies: <ul style="list-style-type: none"> • 865 MHz ... 869 MHz (Europe) • 902 MHz ... 928 MHz (US) • 952 MHz ... 956 MHz (JPN) 2m ... 4m range	
Wireless Transmission		
Technology	802.15.1	2.4GHz

Protocol	Proprietary	
Range	>50m free line of sight	
Transmission Interval	15s	
Temperature Measurement		
Accuracy, typical	$\pm 1.0^{\circ}\text{C}$ $\pm 0.6^{\circ}\text{C}$	for $-30^{\circ}\text{C} \dots 60^{\circ}\text{C}$ for $-1^{\circ}\text{C} \dots 13^{\circ}\text{C}$
Accuracy, maximum	$\pm 2.0^{\circ}\text{C}$ $\pm 1.5^{\circ}\text{C}$	for $-30^{\circ}\text{C} \dots 60^{\circ}\text{C}$ for $-1^{\circ}\text{C} \dots 13^{\circ}\text{C}$
Time constant	<15min	for T_{63}
Sampling interval	5min	
Shock Measurement Sense S		
Acceleration per axis	$\pm 8\text{g}$	
Acceleration three-dimensional	$\pm 13.8\text{g}$	
Sampling	100Hz	
Housing		
Material	Plastic PA6	
Potting material	PU	
EN 60529 protection category	IPx7	
Certifications	RoHS, CE, FCC, DO-160 further on request	

OPERATING CONDITIONS

Operating Temperature	$-40^{\circ}\text{C} \dots +70^{\circ}\text{C}$
Storage Temperature	$+10^{\circ}\text{C} \dots +30^{\circ}\text{C}$
Storage Time	6 months Note: long storage can reduce battery life
Humidity	20% rH ... 100% rH, (non condensing)

Air freight ready

Time critical goods are usually shipped using the fastest possible ways. Therefore air freight becomes very relevant. Sense S and Sense T are air freight ready according to DO-160.

An agreement with your airline is required. Please consult your airline.

4 Ordering Information

Product number:	Sense T	Order Code:	3843.AU2.678
	Sense S	Order Code:	3843.AU2.679

For any sales information or support, please contact Bosch Connected Industry at Support.TnT@de.bosch.com

5 Mounting

In general the Sense S and Sense T devices can be mounted in any position as required. The attachment, depending on the specific requirements, can be carried out with double-sided adhesive tape or an available mounting fixture. In case of shock measurement a direct non-absorbing connection between the Sense S and the monitored asset is required. To achieve this, we recommend using a mounting fixture or a fiber-reinforced adhesive tape.

Note: To enable wireless transmission, do not place the device inside metal enclosures or cover device with metal.

6 Operations

The 2.4 GHz wireless radio is a 802.15.1 compatible wireless communication interface. The device is transmitting information packages in configurable constant intervals (e.g. every 15s) on frequencies 2.402 GHz, 2.426 GHz and 2.480 GHz.

The RFID UHF radio interface is a battery assisted passive wireless interface operating at a global frequency range of 856 MHz to 960 MHz.

Supported region specific UHF communication frequencies:

- 865 MHz ... 869 MHz (Europe)
- 902 MHz ... 928 MHz (US)
- 952 MHz ... 956 MHz (JPN)

An external reader device activates the RFID communication.

RFID communication can read and write information to the Sense S / Sense T.

Activation:

The Sense S and Sense T are delivered with activated measurement of environmental parameters and wireless transmission. An activation or configuration is not required.

Operation

The Sense S and Sense T automatically measure the environmental parameters and transmit measured data together with electronic device IDs via the integrated wireless 2.4GHz interface.

Within the Nexeed Track&Trace solution, the data is received and processed by Bosch Connect Gateways. The gateways transfer the received data with additional gateway data to the Bosch IoT Cloud.

Temperature Measurement

Temperature values are captured by Sense T and Sense S every 5 minutes. The Sense T and S can provide an actual temperature with a resolution of 0.5°C/digit to the Bosch IoT Cloud in case of a gateway in range during measurement. Sense T also provides historical temperature measurements of 110 minutes in the past with a resolution of 1°C/digit.

Shock Measurement

The Sense S is able to detect and measure shock events. A shock measurement is triggered when an acceleration value of more than 3g occurred at least in one axis.

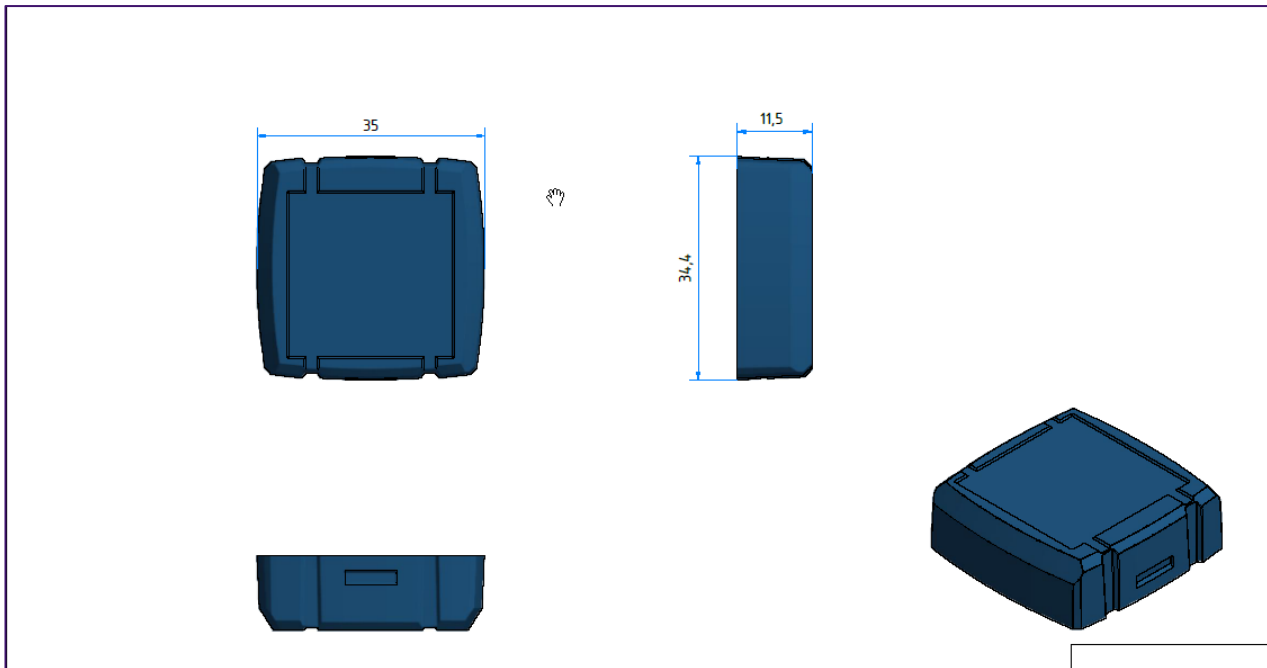
A shock is characterized with two parameters:

- Peak acceleration: Three-dimensional peak acceleration value with a resolution of 0.5g
- Shock intensity: Digital integration of all acceleration samples > 3g during a shock event over time.
Resolution is 25gms.

The Sense S is using a first-in-first-out (FIFO) structure to store and transmit shock events. The storage size is 7 events. If the storage structure is completely filled with shock events, every new event will overwrite the oldest existing one. Shock events older than 10 hours are deleted.

7 Dimensions

The following figure shows the dimensions of the Sense S and Sense T.



8 Handling and Shipping Information

Please contact Bosch Track & Trace support at Support.TnT@de.bosch.com.

9 Support

For any questions or inquiries please contact Bosch Track & Trace support at Support.TnT@de.bosch.com.

10 Disposal

Disposing this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point. Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

11 Regulatory Notes

Disposal according to the WEEE Directive 2012/19/EU



The unit, accessories and packaging should be sorted for environmental-friendly recycling. Do not dispose of the device into the household waste! According to the European Guideline 2012/19/EU, electric and electronic devices that are no longer usable must be collected separately and disposed of in an environmentally correct manner.

Bosch Connected Industry will collect, reuse or recycle all used Sense T and Sense S units.

To have your device collected, please contact us at: Support.TnT@de.bosch.com.

EU Declaration of Conformity

Hereby, Robert Bosch Manufacturing Solutions GmbH – Bosch Connected Industry declares that the radio equipment type Sense S and Sense T is in compliance with Directive IEC 60950-1, EN 60950-1, EN 301 489-1, EN 301 489-3, EN 301 489-17, EN 300 328, EN 302 208 and EN 62479.



The full text of the EU declaration of conformity is available at the following internet address:

<http://eu-doc.bosch.com/documents/35710/46810/Sense/070270f3-ea29-0e89-e16d-ded681d97307>

Operating the device in countries out of the EU

The Sense S and Sense T carry the CE mark and are certified for operation in the European Union. For countries out of the EU validate that local legal regulation allows the operation of the Sense S and Sense T.

Export Restrictions

Due to legal regulations the device must not be exported into the following countries or regions: Cuba, Crimea, Iran, North Korea, Syria and Ukraine.

Federal Communications Commission (FCC) Notice

FCC has issued an EQUIPMENT AUTHORIZATION to Robert Bosch Manufacturing Solutions GmbH – Bosch Connected Industry for Sense S and Sense T according to FCC rule parts 15 C with the FCC ID: 2AOSY-SENSE01

FCC warning statement:

- 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.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

Note:

This device 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.

12 Intended Use

The Bosch Sense T and Sense S beacons are designed according to the information provided in section 3 of this document. Any use or operation which requires specific requirements and standards which are not explicitly mentioned in this document must be validated and tested on customer's own responsibility.

The housing of the Sense beacon is not to be opened or tampered with. The Sense beacon is designed for use within environmental conditions as further detailed in the technical specifications in chapter 2. Any intent to use or operate the product under deviating environmental conditions must be subjected to renewed validation and testing by the customer.

Neither the Sense nor a potential product derivation, are designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Bosch product could create a situation where personal injury or death may occur. The same applies for any kind of weapon, or any device or application which is potentially dangerous to human life.

The Sense beacon is designed for monitoring and tracking purposes and shall not be used as an element of control and safety in machines under the scope of the Machinery Directive 2006/42/EC.

Bosch Connected Industry shall not hold liable for any damages resulting from any use of the Sense beacon outside/beyond the certified types of operation and/or defined field of application.

Radio frequency radiation exposure information: this equipment complies with the radiation exposure limits prescribed for an uncontrolled environment for fixed and mobile use conditions.

13 Safety Notes

CAUTION: Lithium Battery!

The device contains a lithium battery. Handling the battery incorrectly could cause fire. Read and follow the valid transportation regulations. Do not damage or cut the device.

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