Parking Lot Sensor | PLS110

LoRaWAN parking occupancy detection sensor

Wireless LoRaWAN sensor detects and reports parking space occupancy, thus enable active parking lot management features, such as search, navigation and booking.

Our sensor is designed for easy installation (within minutes on any indoor or outdoor surface) and for high reliability in occupancy detection.



PRODUCT DESCRIPTION

The Parking Lot Sensor is made of a sensor core (TPS110) and of a set of mounting elements (base, screw, cap) that enable its fixation to the floor.

The sensor core embeds 2 independent detection technologies to ensure high detection levels.

It leverages the LoRaWAN protocol to communicate with an open communication interface for easy integration in any parking management system with a LoRaWAN network.

Magnetometer

Radar

TECHNICAL PARAMETERS OF SENSOR CORE

- Operating temperature range: -20° C / + 65° C
- Operating humidity range: up to 95%
- Resistance to mechanical influences: IK10
- Protection index: IPx9K / IP68[1]
- Power supply: Lithium battery (Li-SOCI2, 3.6V, 1200 mAh)
- Radar frequency: 2.4-2.4835 GHz; transmission power max. -28 dBm EIRP
- Country of origin: France

SENSOR KEY PERFORMANCE CHARACTERISTICS

- Over 96 % average parking state change detection performance
- Reporting of parking state changes within 35 sec. (typical)
- Typical product lifetime: up to 5 years[2]
- LoRaWAN Certified Product with Over-The-Air Activation and unique product key
- System security: Penetration test performed by an external lab

SENSOR INSTALLATION AND MAINTENANCE

- Installation: Sensor base to be glued to different surfaces
  Technical instruction of the user manual to be followed
- Calibration: Self-learning over the first ten parking events
- Maintenance: No maintenance needed
- Replacement: Core exchangeable without removing the base from the ground



LoRaWAN CHARACTERISTICS

The Bosch sensor operates under LoRaWAN protocol. An open communication interface is supplied to enable integration in any LoRaWAN network, private or operated.

The sensor is a LoRa Alliance® certified product and comes under variants for the different regional channel plans.

TPS variant	Target markets and certifications	LoRa frequencies	Transmitting power
TPS110 EU	European Union (CE) Singapore (IMDA)	863-865/868-868.6/869.4-869.65 MHz (EU868) Supported channel frequencies: 864.1 MHz, 864.3 MHz, 864.5 MHz, 868.1 MHz, 868.3 MHz, 868.5 MHz, 869.525 MHz	max. 14 dBm ERP
TPS110 JP	Japan (MIC) Australia (ACMA) Singapore (IMDA)	920-923.4 MHz (AS923-1)	max. 14 dBm ERP
TPS110 US	United States (FCC)	902-914 MHz (US902-925)	max. 14 dBm ERP
TPS110 IN	India (WPC/ETA)	865-867 MHz (IN865)	max. 14 dBm ERP

FEATURES

- Data rate: can be remotely adjusted – ADR can be remotely enabled
- ACK message enabled by default – feature can be deactivated[3]
- Device sends daily heartbeat message
- Estimated battery level indication available in MAC messages
- Security with unique product key
- Over The Air Activation (OTAA)
- Device is Class A according to the LoRaWAN specification

NETWORK PARAMETERS FOR APPROPRIATE OPERATIONS

Our sensor core is designed to operate appropriately under the following network conditions:

- Spreading factor inferior or equal to 10
- RSSI above – 120 dBm
- SNR above – 7 dB
- Software reset with network root cause[4] to be exceptional; maximum number of resets: 200 across sensor lifetime

INTENDED USE AND CERTIFICATIONS

The intended use of the PLS is the detection of parking states on parking lots for passenger cars and light commercial vehicles. The stated performances have been achieved during tests in Europe under the following conditions of use: parking ground with clearly separated parking lots, sufficient coverage, and throughput from LoRaWAN network as described above, operating conditions as stated in the data sheet, passenger cars with ground clearance <30 cm.

The PLS does not implement any requirements on functional safety. Therefore, the PLS is particularly not approved by Bosch for applications in which it has the role to ensure safety and health of people.

The TPS110 EU fulfils the requirements of the directives 2014/53/EU (Radio Equipment Directive) and 2011/65/EU (RoHS Directive). Bosch has proven the compliance with the LoRaWAN communication protocol v1.0.2. by means of the certification by LoRa Alliance®.

Installation



Installation: base is glued on a flat clean surface; sensor core is fastened in the base by a screw; cap is inserted. See installation manual.

Suitable for such situations as: general indoor and outdoor parking lot monitoring; curb-site parking monitoring; on any hard and level surface.

SCOPE OF DELIVERY	**Sensor core TPS110, base, cap, screw[5]**
Mechanical resistance	Passenger cars and light commercial vehicles (class N1)[6]
Assembled weight	215 g (of which core 148 g)
Assembled dimensions	Diameter 14,5 cm Height 3,0 cm
Materials	PA6 GF35 for the core PA6 GF35 for the base* (* plasma treated on the lower face)
Colors	RAL 9005 (black) for the core and cap RAL 7011 (iron grey) for the base
Bosch article reference	EU 0273.600.011-600

[1] 1m, 24 hours.

[2] Expected battery lifetime largely depends on network quality as well as operating conditions and environment. Sensor operating under SF7, 200 messages per week including heartbeat, max 200 resets over lifetime, typical operating temperature 15° to 25°C, ACK on. When battery reaches end of life, the sensor core must be replaced.

[3] Except for heartbeat ACK that cannot be deactivated.

[4] Reset with network root cause includes network unavailability and network not sending ACK messages where required by the sensors.

[5] Glue not included in the scope of Bosch delivery.

[6] Definition of Commercial Vehicles Categories: 2007/46/EC as last amended by 385/2009 and mechanical influences on the sensor only through the tires of the vehicles.

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