Technical Description
&
User's Manual
of
TMS Sensor S5.xF

Model: TMSS5B4

CONTENT

1 Introduction

The TPMS sensor is mounted in the wheels of the vehicle with the help of special TPMS valves. The sensor measures pressure, temperature, and acceleration in the tire and transmits the measuring data cyclically via the air interface to the TPMS Receiver.

The TPMS ECU will analyze the data on the tire pressure and temperature and location for each wheel on the vehicle.
Based on the data from the wheel sensors and an algorithm developed, the TPMS ECU will report warnings and tire pressures over the CAN bus to the drivers display.

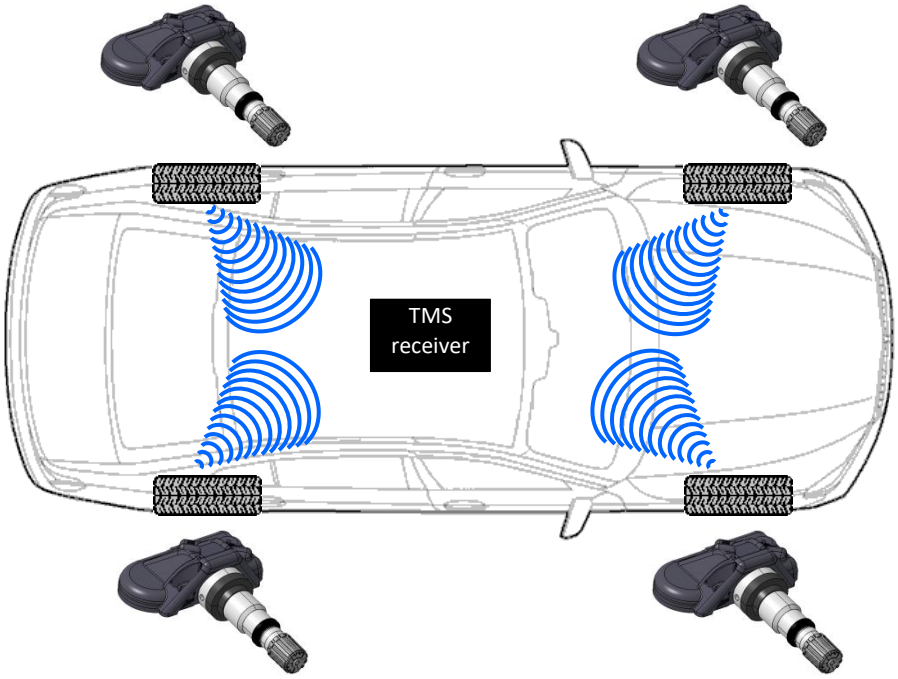


Figure 1: TMS application with wheel units and receiver unit

1.1 Installation

For the reliable installation in the vehicle the Huf handling guide is to be observed. Here you find instructions for proper mounting positions on the vehicle and the handling of the wheel sensors.

- AAE-0101v5 - Huf Installation Specification (TPMS Handling Guide)

2 Product mounting options

The TPMS Sensor S5.xF will be produced in different housing options to adapt the sensor housing to different valve types. Therefore, the plastic housings differ only in outer contour, the inner contour with PCBA & battery are identical.

The valve interface design (plastic material) has no impact to RF performance and EMC behavior.

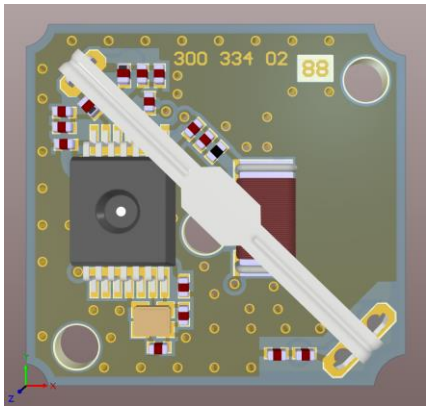
To fulfill customer needs, there are also different color options available.

2.1 Sensor electronic design

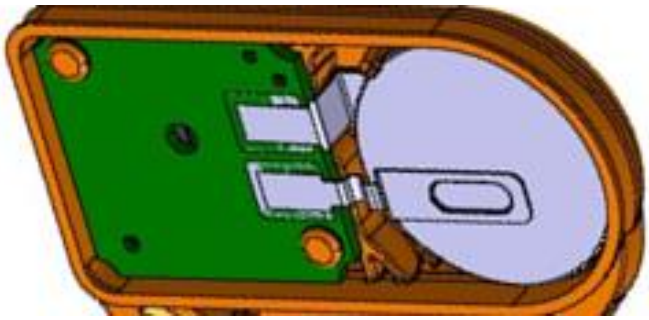
The electronic design of the TPMS Sensor S5.F consists of the **PCBA** with the electronic components and the connected lithium **battery CR2032**.
PCBA, battery, plastic housing and potting material create the EMC relevant unit of the device.

The outer shape of the plastic housing has no further influence on the EMC behavior of the wheel electronics.

PCBA



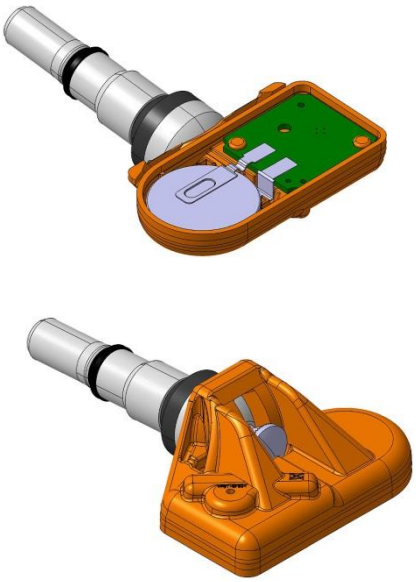
Assembly with battery and housing



2.2 Metal valves with ball calotte

The second one (S5.5) have additional small housing feet.

option **S5.0**

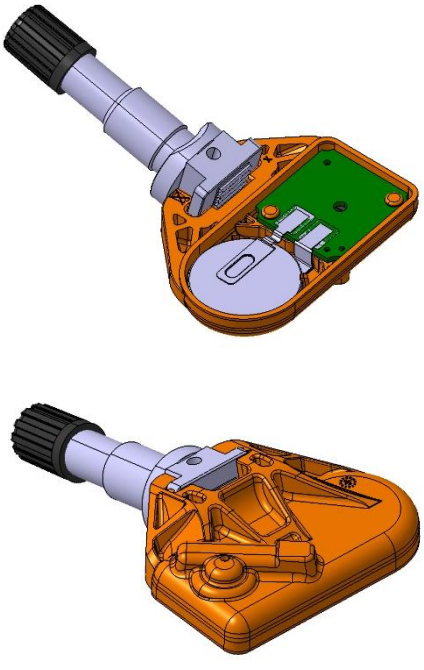


option **S5.5**

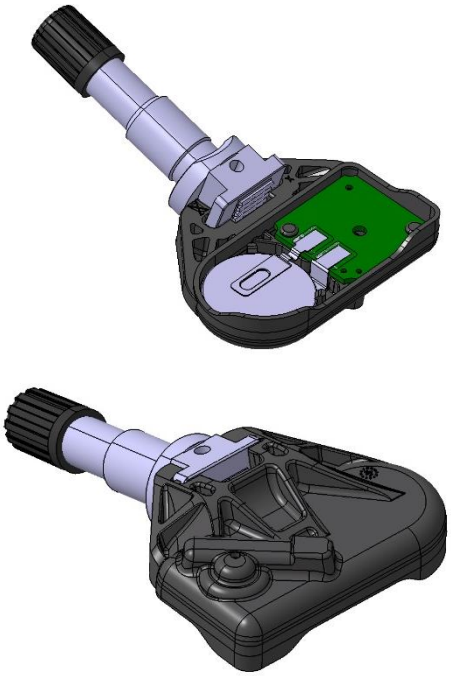
2.3 Metal valve with ratched design

The second one (S5.x) have additional small housing feet.

option **S5.3**



option **S5.7**

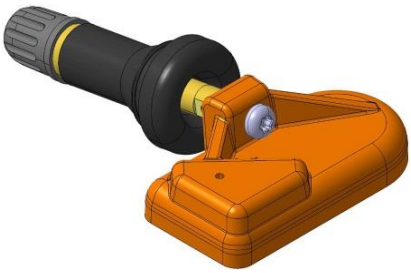


2.4 Rubber valve with radial OR axial fastening screw

There are two mounting options for rubber valves.

option **S5.1**

option **S5.2**



3 General product information

3.1 Technical short description

item	value
equipment type	Tire Monitoring System (TMS)
product description	TPMS Sensor S5.xF 433 MHz
type / model name	**TMSS5B4**
frequency range	433.92 MHz (ISM band)
number of channels	1
channel spacing	n/a
type of modulation	ASK / FSK
baud rata	variable
maximum radiated power	<10 mW (ERP)
antenna type	internal
voltage supply	3 VDC (lithium battery CR2032)

3.2 Trade mark

BH SENS

3.3 Company

Huf Baolong Electronics Bretten GmbH
Gewerbestr. 40
75015 Bretten
Germany

3.4 Manufacturer

Huf Baolong Electronics Bretten GmbH
Gewerbestr. 40
75015 Bretten
Germany

Baolong Huf Shanghai Electronics Co., Ltd.
5500, Shenzhuan Road, Songjiang District
Shanghai 201619
China

4 Operating modes

The TPMS Sensor operates in various modes depending on external conditions. Additional test modes can be activated by LF commands by the use of a workshop tester or in production line.

The TPMS sensor includes already all possible application cases in its program memory and is configured once by a professional installer.
Upon manually activated LF request (through special configuration tool at a vehicle dealership), the EUT respond with a single RF transmission (sensor type information). In the second step the tool will send the configuration data on LF and the EUT will respond with a single confirmation transmission. Now the TPMS sensor is configured for the target vehicle application.
When the EUT is mounted in the vehicle tire in the worst case, periodically RF transmission where the duration of each transmission is always less than 1 second and the silent period is at least 30 times the duration of the transmission, and never less than 10 seconds.
In the case of an emergency condition (rapid pressure loss), the devise will transmit tire pressure and temperature information throughout the duration of the condition.

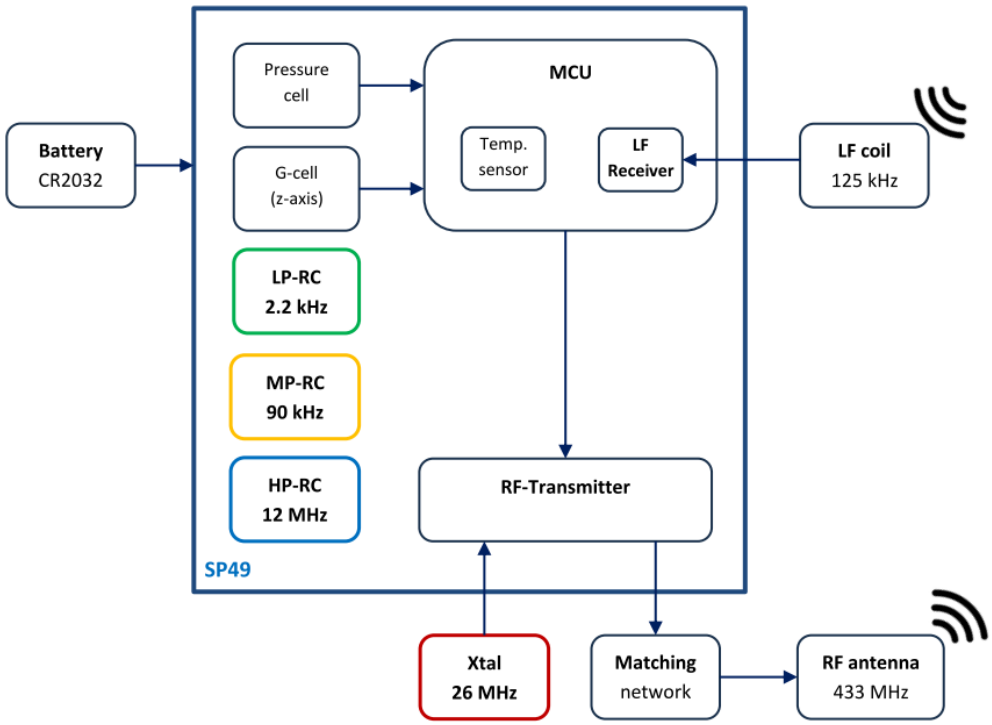
The CW lower and CW upper mode represent the upper and lower frequency of FSK modulation.

#	EUT test mode	repetitionrepetitionrate (sec)	number of frames	overall trans-mission time (sec)	Frame Length (msec)	Frame Period (msec)	frame encoding
1	CWL	single event					
2	CWU	single event					
3	ASK*	15	9	< 1	8.5	52.5	manchester encoded frames / ASK modulated / 9k6bps / 10 bytes frame length
4	FSK*	15	4	< 1	8.5	52.5	manchester encoded frames / FSK modulated / 9k6bps / 10 bytes frame length

* Note: Device modes are bounded by these two worst case modulations.
Devices are professional installed and configured by the vehicle dealership at the time of installation.

5 Block Diagram

The central component of the device is the highly integrated TPMS sensor IC SP49 from Infineon. There are only a few external SMD components used and a lithium button cell for powering.



6 Technical data

6.1 Voltages and currents

item	min.	typ.	max.	unit
battery voltage	2.8	3.0	3.4	V
battery type	lithium cell of type CR 2032			
current RF transmission	4.0	---	8.0	mA
current standby	0.1	---	10	µA

6.2 Temperature & humidity

item	min.	typ.	max.	unit
operating temperature	-40	---	+125	°C
operating relative humidity	---	65	100	%
storage temperature	-10	---	+55	°C
storage relative humidity	---	---	85	%

6.3 Oscillator Frequencies

item	min.	typ.	max.	unit
low power RC	---	2.2	---	kHz
medium power RC	---	90	---	kHz
high power RC (CPU)	---	12	---	MHz
crystal oscillator transmitter	---	26	---	MHz

6.4 Antenna specification

item	min.	typ.	max.	unit
topology	metal bracket soldered to PCB			
dimensions (LxWxH)	21.5 x 1.3 x 6.0			mm
bandwith @433.92MHz	10	---	---	MHz
gain @433.92MHz	---	---	-25	dBi

6.5 RF transmitter

item	min.	typ.	max.	unit
center frequency	433.81	433.92	434.03	MHz
field strength peak[1]	76	79	82	dBµV/m
Rated output power (EIRP average)	---	---	-16.2	dBm
channel	---	1	---	---
bandwith	---	120	---	kHz
modulation	FSK / ASK			---
frequency deviation	40	60	80	kHz
data rate	---	9.6 / 19.2	---	kBaud

[1]measured according FCC Part 15 @ 3 m

6.6 LF receiver

item	min.	typ.	max.	unit
center frequency	---	125	---	kHz
sensitivity	2	15	20	nTp
modulation	ASK /PWM			

6.7 Service Life

Service life in the field: 10 years

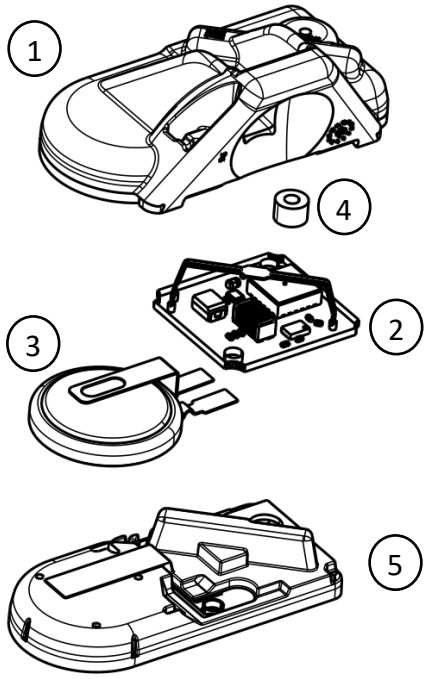
7 Mechanical specification

7.1 Complete unit

item	value	unit
dimensions (L x W x H)	46.5 x 29.5 x 18.4	mm
Weight (without valve)	16	g

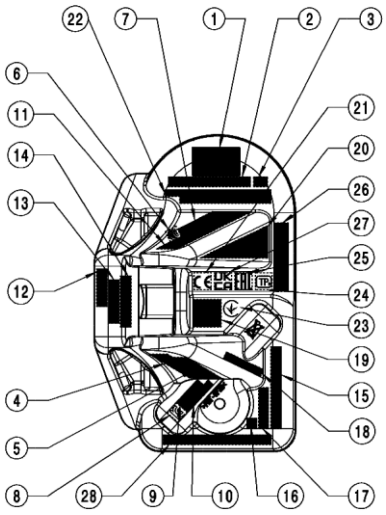
7.2 Materials

item	value	pos.
housing	PBT-GF30	1
PCB	FR-4	2
battery	Lithium	3
sealing ring	Silicone	4
potting	Polybutadien	5



8 Labeling and location

The labeling with radio certification marks, manufacturer logo, model number, country code, serial number and production date can be found at the housing.

pos.	designation	content	
1	OEM logo	OEM logo	
2	OEM part number	OEM part number	
3	OEM change index	*<optional>*	
4	radio approval USA	FCC ID: OYGTMSS5B4	
5	radio approval Canada	IC: 3702A-TMSS5B4	
6	radio approval Taiwan	*<symbol>*	
7	radio approval Taiwan	CCXXxxYYyyyZzW	
8	radio approval Korea	*<symbol>*	
9	radio approval Korea	R-C-	
10	radio approval Korea	HEB-TMSS5B4	
11	radio approval Brazil	ANATEL: XXXXX-XX-XXXXX	
12	manufacturer	BH SENS	
13	model	Model:	
14	model name	TMSS5B4	
15	approval hint	Other homologations see owner manual	
16	number EOL test station	XX	
17	production date	YYYY-MM-DD	
18	country of origin	Germany	
19	DATA-MATRIX-CODE (optional)	4.5 x 4.5 mm	
20	frequency variant	433	
21	radio approval Europe	*<symbol>*	
22	manufacturer address	Huf Baolong Electronics Bretten GmbH, Gewerbestr. 40, 75015 Bretten	
23	radio approval Ukraine	*<symbol>*	
24	radio approval Belarus	*<symbol>*	
25	radio approval Russia (EAC)	*<symbol>*	
26	Serial number (ID)	00000000	
27	radio approval United Kingdom	*<symbol>*	
28	radio approval Argentina	X-nnnnn	

8.1 Example for laser marking

9 Owner Manual

The user manual must contain the following marks and statements.

9.1 Europe

CE

Hereby, Huf Baolong Electronics Bretten GmbH declares that the radio equipment type TMSS5B4 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: http:// www.huf-group.com/eudoc

Frequency band: 433.92 MHz
Maximum transmission power: <10 mW
Manufacturer: Huf Baolong Electronics Bretten GmbH, Gewerbestr. 40, 75015 Bretten, Germany

9.2 USA & Canada

FCC ID: OYGTMSS5B4
IC: 3702A-TMSS5B4

This device complies with Part 15 of the FCC rules and with RSS-210 of Industry Canada.
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.

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.

WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

9.3 Ukraine

Справжнім Huf Baolong Electronics Bretten GmbH заявляє, що тип радіообладнання TMSS5B4 відповідає Технічному регламенту радіообладнання;
повний текст декларації про відповідність доступний на веб-сайті за такою адресою:
http://www.huf-group.com/eudoc

Виробник: Huf Baolong Electronics Bretten GmbH, Gewerbestr. 40, 75015 Bretten, Germany
Робоча частота: 433,92 МГц
Максимальна вихідна потужність: < 10 дБм

9.4 United Kingdom

Hereby, Huf Baolong Electronics Bretten GmbH declares that the radio equipment type TMSS5B4 is in compliance with radio regulation 2017.
The full text of the UK declaration of conformity is available at the following internet address:
http://www.huf-group.com/eudoc

Frequency band: 433.92 MHz
Maximum Transmit Power: < 10 mW
Manufacturer: Huf Baolong Electronics Bretten GmbH,
Gewerbestr. 40, 75015 Bretten, Germany

9.5 Korea South

R-C-HEB-TMSS5B4

상호명 (Trade Name)	Huf Baolong Electronics Bretten GmbH
기자재의 명칭 (Product	특정소출력 무선기기(데이터전송용 무선기기)
모델명 (Model Name)	TMSS5B4
제조년월 (Production Date)	2023-11-06
제조자 (Manufacturer)	Huf Baolong Electronics Bretten GmbH
제조국가 (Country Of Origin)	Made in Germany

9.6 Taiwan

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射 頻器材之使用不得影響飛航安全及干擾合法通信;經發現有干擾現象時，應 立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理 法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及 醫療用電波輻射性電機設備之干擾。

10 Safety instructions

The TPMS Sensors are intended exclusively for measuring the tire pressure and temperature in suitable wheels. Data reporting can only take place to original equipment tire pressure monitoring system for which the Sensor has been approved.

Any changes or modifications made to this device that are not expressly approved by BH SENS may void the user's authority to operate the equipment.

! W A R N I N G !

(1) The TPMS Sensors are intended exclusively for measuring the tire pressure and temperature in suitable wheels. Data reporting can only take place to original equipment tire pressure monitoring system for which the Sensor has been approved.

(2) Any changes or modifications made to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

(3) This device has a non-user-serviceable battery. Please do not attempt to open the device. To prevent user of predictable misuse the battery is soldered to PCB and the plastic housing of the device cannot be open without destruction. The two halves of the housing are laser welded together.

(4) Do not place the device in or near fire, on stoves or other high temperature locations.

11 Disposal instructions

This device has a non-user-serviceable battery. Please do not attempt to open the device.
It must be given to an authorized vehicle parts dealer or an authorized central collection point to be disposed to protect the environment and prevent violation of laws in force.

The product contains batteries covered by the European Directive 2006/66/EC, which cannot be disposed with normal household waste. Please inform yourself about the local rules on separate collection of batteries because correct disposal helps to prevent negative consequences for the environmental and human health.

12 Logistic

Harmonized System Code (HS Code): 90262020