



HELLA GmbH & Co. KGaA  
59552 Lippstadt

FS197R

CONFIDENTIAL

# User Manual

## FS197R

### Passive Entry / Passive Start radio identification devices

Date:  
2024-02-12

Processed:  
O. Kushova E-CA-D-HW

Revision: 1.1

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## 1 FS197R family overview

This document is to describe the FS197R family of Radio Identification Devices (RID) intended for use in automotive Passive Entry / Passive Start systems. All family members use the same PCB layout and basic type of housing. There are different variants regarding number of buttons, finish of the housing, labelling of the housing etc. Images of the devices are given in chapter 5.

## 2 Safety warnings and precautions

	<b>Do not ingest battery, Chemical Burn Hazard</b>
	This product contains a coin / button cell battery. If the coin / button cell battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death.
	Keep new and used batteries away from children. Should a child swallow a battery, consult a physician immediately.
	If the battery compartment does not close securely, stop using the product and keep it away from children.  If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.

	<b>CAUTION</b>
	Risk of explosion if the battery is replaced by an incorrect Type.
	Keep batteries away from direct sunlight, high temperature, and high humidity.

Please be sure to observe the following warnings. As batteries contains flammable substances such as lithium or other organic solvents, they may cause heating, rupture or ignition

### Warning

1. Do not charge, short, disassemble, deform or heat batteries. Do not throw batteries into fire.
2. When discarding batteries, insulate the positive and negative terminals of batteries with insulating tape, etc. When disposed of improperly, lithium batteries may short, causing them to become hot, burst or ignite

### Caution

1. Be sure to connect the positive and negative electrodes correctly.
2. Avoid mixed use of batteries, i.e. new, used or different types.
3. Avoid direct soldering to batteries

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## 3 Communication technologies

There are three basic communication technologies implemented in the FS197R devices:

- Low Frequency (LF) communication, used for waking up the devices and for communication with the immobilizer system of the vehicle.
- RF (UHF) communication, used for communication between radio identification devices and vehicle.
- Ultra-Wide Band (UWB) communication, used for ranging operations.

## 4 FS197R Technical data summary

Markets	USA, Canada & Others	
Model name	FS197R	
DC Supply voltage range	Approx. 2.2V to 3.2 V	
<b>Technology</b>		
<b>RF (UHF)</b>	Number of RF channels <sup>(1)</sup>	3
	RF channel frequencies <sup>(1)</sup>	433.46 MHz 433.92 MHz 434.36 MHz
	RF radiated power	Approx. 75dBμV/m @3m (average)
	Mode of operation	Simplex TX only (RKE mode) Half duplex TRX (PKE mode)
	Modulation method	FSK (F1D)
	Frequency deviation	+/- 7.8 KHz (RKE mode) +/- 20 KHz (PKE mode)
	Data rate	7.8 Kbit / s (RKE mode) 19.2 Kbit / s (PKE mode)
	RF Antenna	Integrated PCB loop
<b>LF</b>	Operating frequency	125 KHz
	Modes of operation	LF detector Passive Transponding
<b>UWB <sup>(2)</sup></b>	Operating frequencies	Ch6: 6988.8 MHz Ch8: 7488.0 MHz
	Mode of operation	Half duplex (TRX)
	Modulation method	BPM-BPSK
	UWB antenna	PCB Integrated Monopole Antenna
	-10dB RF bandwidth	approx. 500 MHz
	Spectral power density	approx. -41.3dBm / MHz

<sup>(1)</sup> Not all channels may be used for every RF mode of operation.

<sup>(2)</sup> UWB is an assembly option that will not be present at all devices manufactured.

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## 5 FS197R pictures

The following illustrations show the exterior view of the FS197R devices.  
The images are exemplary, other designs e.g. with less buttons or less side buttons or different button labels or different button positions or different colours or different customer label or different finish may exist.



Picture 1: FS197R Top



Picture 2: FS197R Back



Picture 3 : FS197R (S-line Lettering) Back



Picture 4: FS197R (with Panic Button) Back



Picture 5: FS197R (S-line Lettering, with Panic Button) Back

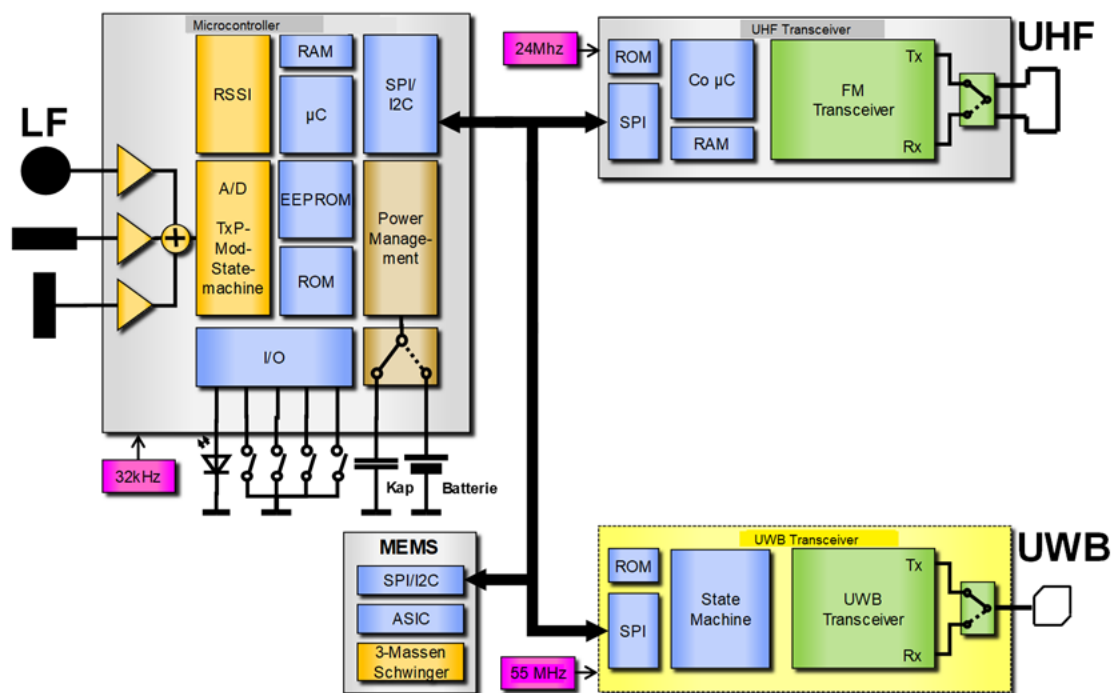
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## 6 FS197R electrical circuit block diagram



Picture 6: FS197R family block diagram

The individual functions/operation are explained in the following subsections.



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## 7 FS197R Modes of operation

The following chapters describe the modes of operation that can be carried out by the FS197R devices.

### 7.1 Remote keyless entry (RKE)

The Remote Keyless Entry (RKE) functions enable the user to control the central locking system and other functions of a vehicle from a distance. It is always manually activated by pressing one of the buttons on the device. When activated, the device will transmit a sequence of UHF messages on two of the available UHF channels.

### 7.2 Keyless Entry / Keyless Go (PKE)

Keyless Entry / Keyless Go functions allow the user control of the central locking system and engine start / stop without manual operation of the key. For these functions the devices can be woken up by a 125 kHz low frequency (LF) signal generated by the vehicle. For recognition of LF signals the devices contain a set of 3 orthogonal sensor coils (LF antenna array) and a detection circuit that is integrated in the main  $\mu$ C. For Keyless Entry / Keyless Go functions UHF communication takes place in half duplex mode on two of the available UHF channels.

### 7.3 Transponder mode

The transponder mode serves as a backup means for communication with the immobilizer system if the Keyless Go function is not available for any reason. In transponder mode the device is supplied from the magnetic field generated by the immobilizer system of the vehicle and communicates with the vehicle using damping modulation. The nominal working frequency of the transponder system is 125 KHz. No active RF communication is used in transponder mode. Therefore, the device does not generate or emit any RF energy in this mode.

### 7.4 Ranging mode

In ranging mode, the devices communicate with the vehicle mounted parts of the system using ultra wide band (UWB) modulation. Due to the very high bandwidth of the signal, it is possible to determine the distance between the identification device and the vehicle.

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## 8 Changing the Battery

The following pictures show how to change the battery of the samples:



**Picture 7: FS197R, rear cover removed**

- Remove the rear cover of the FS197R device by de-latching.
- Unlock the battery by inserting a small screwdriver between the battery locking (red markings in Picture ) and pushing the battery in the direction of the blue arrow against the contact spring. The battery will be unlocked and can be removed.
- Insert a new battery (CR2032 type) with the positive terminal upwards and push it in the direction of the blue arrow until it slides under the locking.
- Reassemble the rear cover by applying some pressure until the locking hooks of the cover snap in.

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## Declaration:

### • Canada

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

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

### • Mexico

“La operación de este equipo está sujeta a las siguientes dos condiciones:  
(1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.”

### • U.S.A

This device complies with art 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 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.

### The 15.521 Technical requirements applicable to all UWB devices.

(a) UWB devices may not be employed for the operation of toys. Operation onboard an aircraft, a ship or a satellite is prohibited.

### The 15.21 Information to user.

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

### CAUTION TO USERS

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

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