

User Manual

FBD6

**Smart Car access, Ranging and
Vital Sign Detection (VSD)
devices.**

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Document History

MKS version	Date	Status	Description
1.1	2024-08-12	Draft	Initial version
1.2	2024-10-11	Final	Updated
1.3	2024-11-06		Technical data summary table updated

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1 FBD6 overview

This document is to describe the Hella FBD6 car access, secure ranging, and Vital Sign Detection (VSD) devices in the context of the radio type approval process. FBD6 devices are anchor devices intended to communicate with multiple associated mobile devices (smartphones) or with the key fob that act as a user interface to operate the locking system, engine start / stop system and several comfort functions of a vehicle in a very convenient way. Communication with the mobile devices takes part utilizing **Ultra-Wide Band** (UWB) and **Bluetooth Low Energy** (BLE) technology.

Mobile devices and key fobs mentioned are not in the scope of this document.

There may be multiple devices mounted at a single vehicle. Mounting positions may be in the interior of the vehicle and on the exterior periphery (e.g. bumper area).

The devices can be assigned to the different mounting positions via coding inputs. Depending on the mounting position and vehicle type, different settings for the radiated power of the devices can be assigned. The interface to the vehicle is realized via a connector.

Images of the devices are given in chapter 4.

2 Communication technologies

There are two basic communication technologies implemented in the FBD6 devices:

- **Bluetooth Low Energy** (BLE) communication, used for device pairing, activate UWB based ranging and data transfer
- **Ultra-Wide Band** (UWB) communication, used for secure ranging operations and Vital Sign Detection (VSD)

3 FBD6 Technical data summary

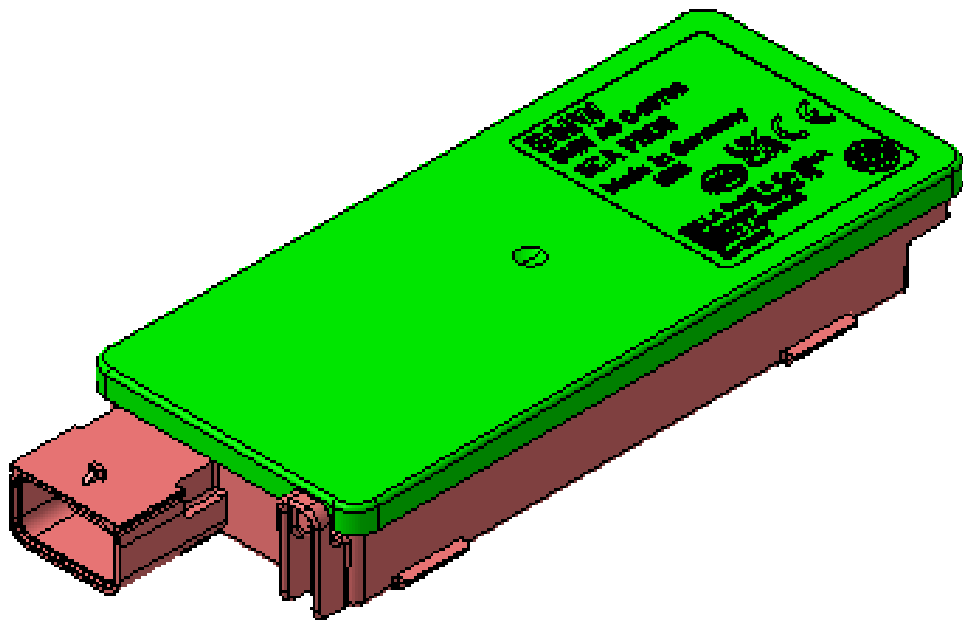
The following table shows the basic technical characteristics of the FBD6 devices:

Designation		FBD6
Function		satellite anchor device for car access, ranging and Vital Sign Detection (VSD) system
Power supply		12V DC from vehicle power supply system
Max Input Current at 12V supply		150mA
Operating temperature range		-40 to +105°C
Communication technologies		• UWB • BLE
HW Version		7.1
SW Version		S08, SXX (future SW updates)
UWB	Standard	IEEE15.802.4x
	Frequency range	CH8: : 7.238 – 7.738 GHz CH9: 7.7372 – 8.2372 GHz
	Modulation method	Impulse radio
	-10 dB RF bandwidth	Approx. 500 MHz
	Max. radiated spectral power density	-41.3 dBm / MHz
	Mode of operation	Half duplex
	Antenna	Integrated PCB-Antenna
BLE	Standard	Bluetooth Low Energy 6
	Number of RF-channels	40 according to BT 6.0 standard
	Frequency range	2400 MHz... 2483.5 MHz
	RF channel spacing	2 MHz
	Modulation method	GFSK
	Radiated power (EIRP)	Max: +12.5 dBm
	Max. data rate	1 Mbit/s
	Mode of operation	Half duplex
	Antenna	Integrated PCB-Antenna

- (1) For detailed country list see separate document
- (2) Selection of Channel 8 and 9 will be controlled by vehicle ECU based on country specific regulations.
- (3) Not all channels may be used for every mode of operation.
- (4) Other variants with less population in digital circuit may exist. The RF part in all variants remain the same.

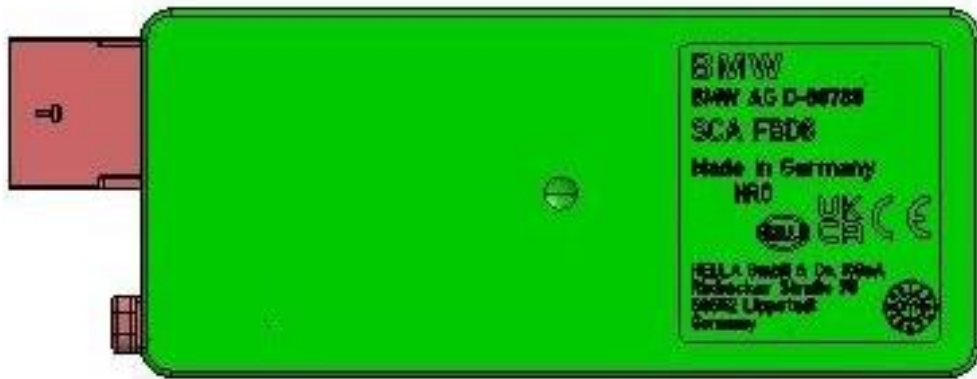
4 FBD6 pictures

The following illustrations show the exterior view of the FBD6 devices.



Picture 1: FBD6 3D View

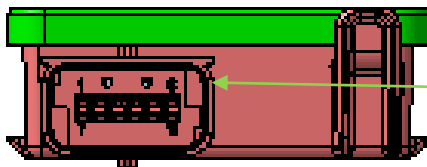
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Picture 2: FBD6 bottom view



Picture 3: FBD6 side view 1



Connector pins

Picture 4: FBD6 side view 2

5 FBD6 Modes of operation

The following chapter describes the mode of operation that can be carried out by the FBD6 devices.

5.1 Ranging mode

5.1.1 Ranging with mobile devices (Smart Phone)

The fastest Ranging-Cycle is 96ms, but can be a multiple of 96ms (will be negotiated between smartphone and vehicle). FBD6 is only transmitting STS frames. Those are 140µs long and have a max. power of -41,3 dB/MHz because the mitigation technique according to ETSI is used (trigger before transmit).

FBD6 is using only channel 9 for CCC function.

5.1.2 Ranging With Key fob

The key fob typically will use Channel 8 or channel 9 and will send UWB-Frames only on user demand (entry-authentication). The frame type doesn't have to be CCC-compliant, hence even shorter UWB-frames are used to save energy in the key fob.

The ranging with key fob is not under the scope because the PSD is lower than the Ranging with mobile devices.

5.2 Vital Sign Detection (VSD)

This feature is using UWB-Frames as radar for up to three interior UWB-Nodes to detect living beings in the vehicle. This VSD UWB-frames are cyclically triggered (e.g. 48 or 96 ms). The frame type and used UWB-channel don't have to be CCC-compliant, so anything what is beneficial can be used, e.g. longer frames, other UWB-channel. Vital sign detection will only take place after car locking event. Transmission Timeout is 7s (typical value).

VSD can use both UWB channel 8 or 9.