Annex acc. to FCC Title 47 CFR Part 95 M
relating to
HELLA GmbH & Co. KGaA
RS6

Annex no. 5
User Manual
Functional Description

Title 47 - Telecommunication
Part 15 - Radio Frequency Devices
Subpart C – Intentional Radiators
Measurement Procedure:
ANSI C63.4-2014
ANSI C63.10-2013

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User manual/ Functional description of the test equipment (EUT)

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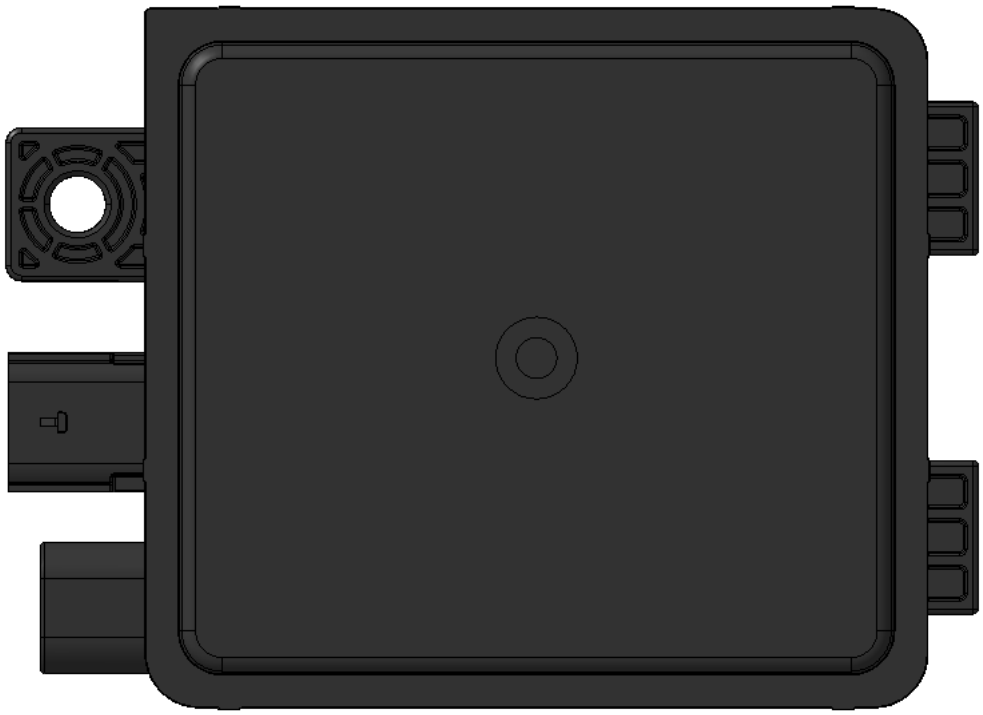
RS6 – User's Guide



The RS6 is an advanced driver assistant system, to warn the driver of the ego vehicle against potential collisions with other road users to the side, to the rear and to the front of the ego vehicle.

This system is not meant to encourage aggressive driving. The absence of a warning will not guarantee the absence of other road users. Responsibility for the safe operation of the vehicle remains with the driver.

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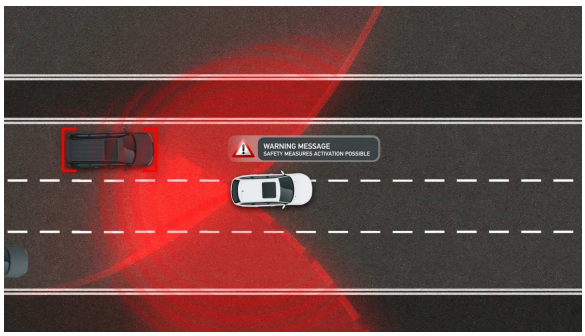
1 Functions

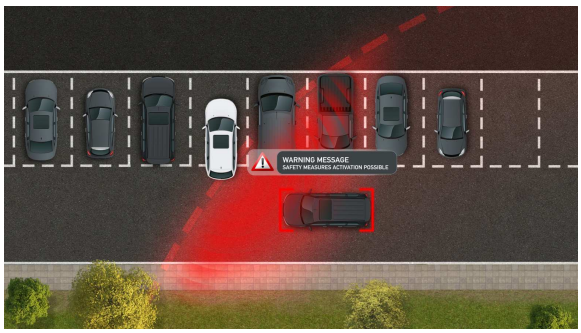
The sensor is capable to detect other objects. With this recognition capability it can cover the following functionalities:

1.1 Blind-spot detection and lane-change warning



These functions monitor the neighboring lanes and warn the driver of the ego vehicle when an intended lane change could cause a collision with other traffic participants.

1.2 Rear traffic alert



This function monitors the difficult to see zone at the rear side of the ego vehicle and warns the driver against possible collisions with other moving road users when reversing out of a parking space.

1.3 Pre-crash rear

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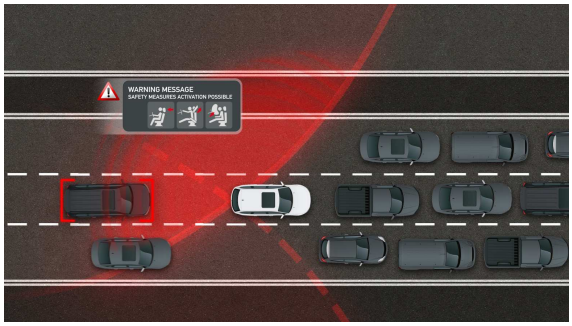
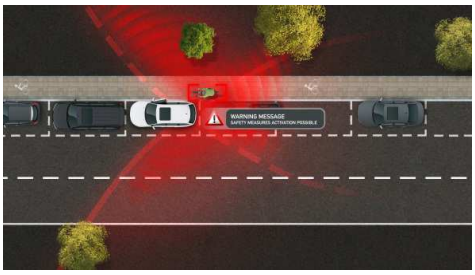


This function monitors the lane behind the ego vehicle and initiates safety measures when a crash from behind is unavoidable.

1.4 Safe exit



This function monitors the area next to the car doors on the passenger's and on the driver's side to the back and to the front and warns the driver if the car door cannot be opened safely.

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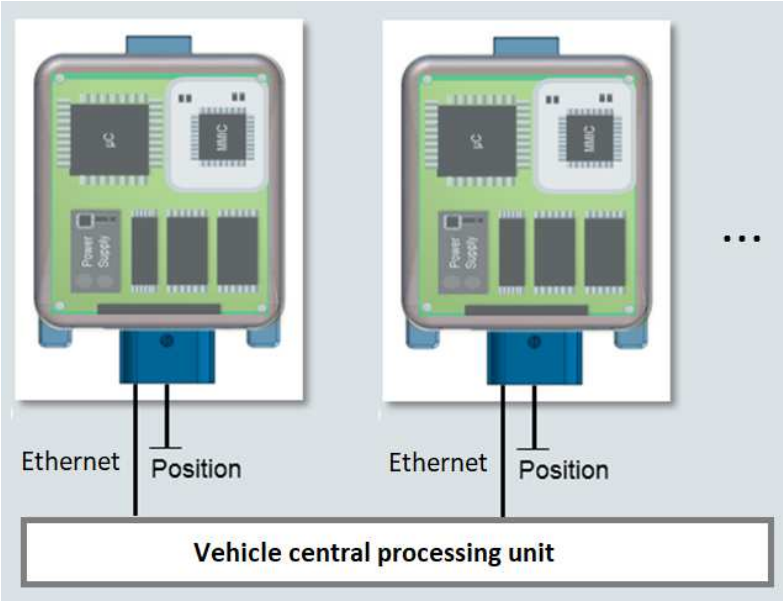
2 System Architecture

The system consists of two or more radar sensor units which are mounted hidden behind plastic surfaces in the corners and/or the sides of a vehicle.
Each unit communicates with a vehicle central processing unit via ethernet.



Block diagram of system architecture.

Technical Data

Supply voltage	+9 V … +18 V
Power consumption	Typ. 4.3 W
Operating temperature range	-40°C ... +85°C
Operating frequency range	77000 MHz ... 79000 MHz (CS12, CS13) 76000 MHz….77000 MHz (CS11, CS14)
Modulation bandwidth	870 MHz (CS11), 1720 MHz (CS12), 630 MHz (CS13 and CS14)
Modulation	FMCW (fast chirps) plus phase-coding
Antenna feed power	10 dBm (peak), 4 dBm (average)
Antenna type	Waveguide slot array
Transmit antenna Tx1 gain	11 dBi
Transmit antenna Tx2 gain	11 dBi
Transmit antenna Tx3 gain	11 dBi
Rated maximum transmission power EIRP	20 dBm (average), 30 dBm (peak)

Because of the simultaneous operation of all three transmitters with identical frequency, from outside of the radar sensor a single effective transmitter can be assumed with an effective gain of 11 dBi + 20 log(3) = 20.5 dBi for peak power and of 11 dBi + 10 log(3) = 15.77 dBi for average power.

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3 Vehicle Integration

Since RADAR waves can penetrate plastics, the sensor integration is possible behind the bumper fascia and thus invisible from the exterior. However, the plastic and other materials which surround the sensor may cause bending, refraction and reflection of the RADAR waves. Distances, clearances, selected radii and other constructive elements in their arrangement can lead to constructive or destructive interference of the RADAR waves. That must be avoided by choosing a suitable integration position.

The sensors should be positioned in the vehicle at a height of 400 to 850 mm above the road surface. If that cannot be fulfilled, then the deviating installation height must be agreed upon with HELLA GmbH. & Co. KGaA.

3.1 Spatial orientation of the sensors

The RS6 sensors can be mounted in the front and/or rear area of a vehicle under defined angles:

Front-side integration (depending on the required functionality):

- Typically: LH side 60 deg / RH side 300 deg

Side integration (depending on the required functionality):

- Typically: LH side 90 deg / RH side 270 deg

Rear-side integration (depending on the required functionality):

- Typically: LH side 135 deg / RH side 225 deg

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Note: This User's Guide is not intended for the end user. The RS6 Advanced Driver Assistance System is not sold separately from the vehicle and the end user instructions of the radar will be provided by the OEM.

USA:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This device complies with part 95M 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.

Radio frequency radiation exposure Information: This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Canada (both English and French language required):

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(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.

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps. Ce transmetteur ne doit pas etre place au meme endroit ou utilise simultanement avec un autre transmetteur ou antenne.

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