Self Study Program 871213

The ID.4 Electrical and Communication Systems

Tablet Format



Volkswagen Group of America, LLC
Volkswagen Academy
Published in U.S.A.
6/2021

Course Number SSP 871213

©2021 Volkswagen Group of America, LLC.

All rights reserved. All information contained in this manual is based on the latest information available at the time of publishing and is subject to the copyright and other intellectual property rights of Volkswagen Group of America, LLC., its affiliated companies and its licensors. All rights are reserved to make changes at any time without notice. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, nor may these materials be modified or reposted to other sites without the prior expressed written permission of the publisher.

All requests for permission to copy and redistribute information should be referred to Volkswagen Group of America, LLC.

Always check Technical Bulletins and the latest electronic repair information for information that may supersede any information included in this booklet.

Trademarks: All brand names and product names used in this manual are trade names, service marks, trademarks, or registered trademarks; and are the property of their respective owners.

Table of Contents

Introduction 1

High-speed Communication Systems 2

Lighting 11

Energy Management 30

Terminal Control 34

Keyless Access (KESSY) 46

Infotainment 53

Introduction

The ID.4 Electrical System Introduction

The MEB (Modular Electric Baukasten (Drive)) is a completely new platform for the Volkswagen Group. This required a fresh look at vehicle the electrical system architecture and how it could be designed. In addition, this electrical system needed to be integrated with the high-voltage electrical system of the vehicle. As a result, there are many redesigned and new electrical technologies implemented in the Volkswagen ID.4.

This SSP covers the networking and electrical systems for the Volkswagen ID.4. These systems condense multiple control modules into single physical modules while using new and faster communication protocols.



High Speed Communications

High Speed Communication Overview

EV CAN-Bus	Battery CAN-Bus	Multifunction Steering Wheel CAN-Bus	Running Gear CAN-Bus	Powertrain CAN-Bus	Convenience CAN-Bus
2,000 kbit/s	500 kbit/s	500 kbit/s	2,000 kbit/s	2,000 kbit/s	500 kbit/s



Driver Assistance CAN-Bus	Ethernet	Ethernet	Connectivity CAN-Bus	MIB CAN-Bus	Display CAN-Bus
2,000 kbit/s	100 Mbit/s	1 Gbit/s	500 kbit/s	500 kbit/s	2,000 kbit/s

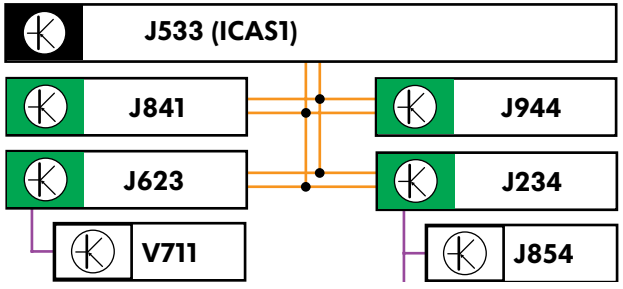
High Speed Communications

CAN-Busses

The Powertrain and Running Gear CAN-Busses both operate at a speed of 2,000 kbit/s.

Powertrain CAN-Bus

Just as the Powertrain CAN-Bus is responsible for managing the engine (drive motor) in a combustion engine vehicle, in MEB vehicles it is responsible for managing the drive motors in the ID.4. It responsibilities are expanded and also has integrated airbag functions.

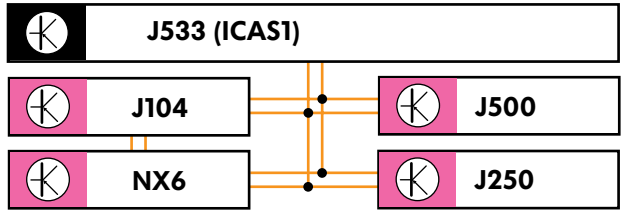


Legend

J234 Airbag Control Module
J533 Data Bus Onboard Diagnostic Interface (ICAS1)
J623 Engine/Motor Control Module
J841 Electric Drive Control Module
J854 Left Front Seat Belt Tensioner Control Module
J855 Right Front Seat Belt Tensioner Control Module
J944 Electric Drive Control Module 2
V711 Radiator Blind Adjustment Motor

Running Gear CAN-Bus

The Running Gear CAN-Bus has similar functions to other Volkswagen vehicles, but it's communication speed has been increased.



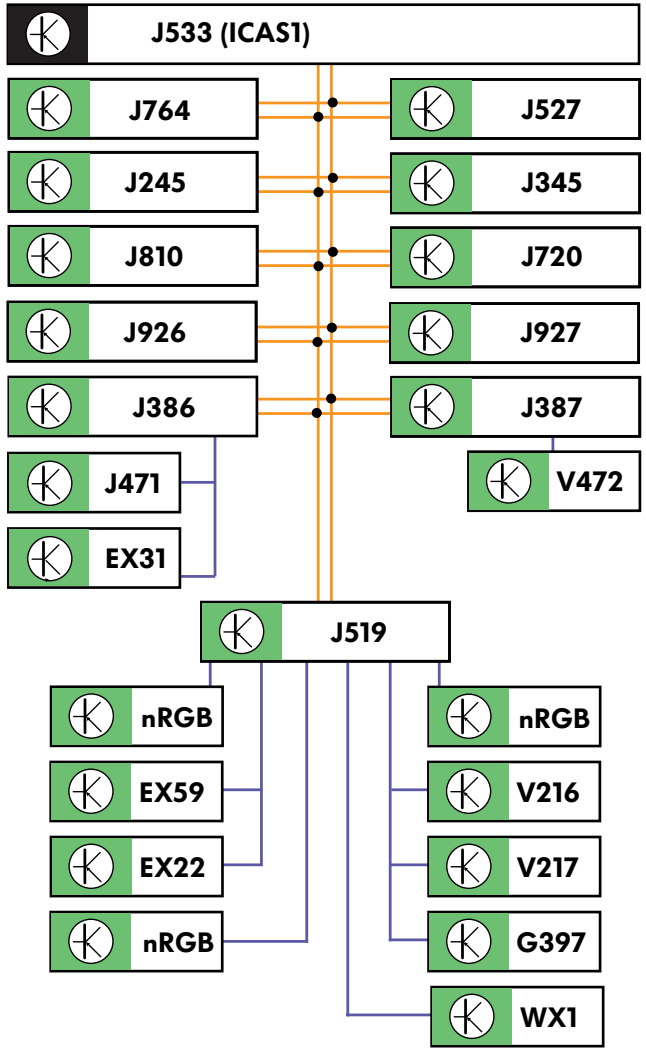
Legend

J104 Airbag Control Module
J250 Electronic Damping Control Module
J500 Power Steering Control Module
J533 Data Bus Onboard Diagnostic Interface (ICAS1)
NX6 Brake Booster

High Speed Communications

Comfort and Convenience CAN-Bus

The Comfort and Convenience CAN-Bus has a similar function to other Volkswagen vehicles, controlling lighting, door functions, etc. It communicates at 500 kbit/s.



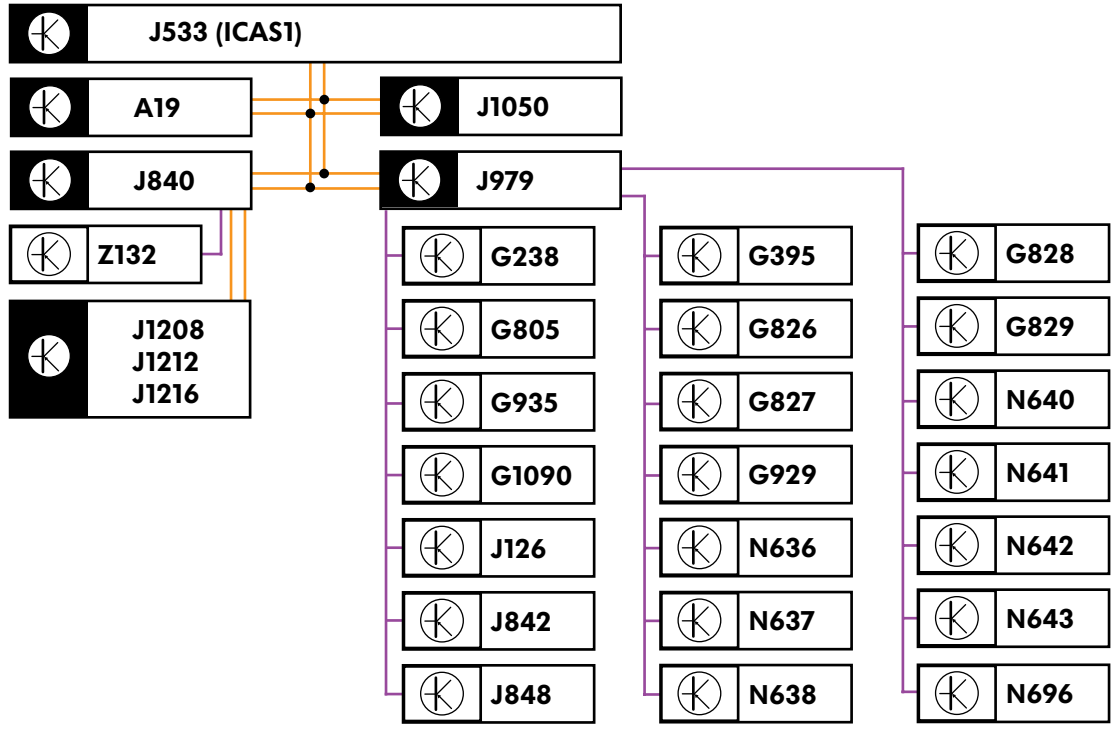
Legend

EX22	Switch Module in Instrument Panel, Center
EX31	Window Regulator Control Head
EX59	Illumination Control Head
G397	Rain/Light Recognition Sensor
J245	Sunroof Control Module
J345	Towing Recognition Control Module
J386	Driver Door Control Module
J387	Front Passenger Door Control Module
J471	Remote Start System Relay
J519	Vehicle Electrical System Control Module
J527	Steering Column Electronics Control Module
J533	Data Bus on Board Diagnostic Interface (ICAS1)
J764	Electronic Steering Column Lock Control Module
J720	Front Passenger Seat Adjustment Control Module
J810	Driver Seat Adjustment Control Module
J926	Driver Side Rear Door Control Module
J927	Passenger Side Rear Door Control Module
V216	Driver Windshield Wiper Motor
V217	Front Passenger Windshield Wiper Motor
V471	Driver Side Rear Window Regulator Motor
V472	Passenger Side Rear Window Regulator Motor
WX1	Front Interior Lamp
nRGB	(LIN 5)
	- L251 Left Front Door Contour Illumination Lamp
	- L296 Left Front Door Contour Illumination Lamp 2
nRGB	(LIN 9)
	- L193 Front Center Console Ambient Lighting Bulb 1
	- L243 Instrument Panel Contour Illumination Lamp 1
	- L244 Instrument Panel Contour Illumination Lamp 2
	- L245 Instrument Panel Contour Illumination Lamp 3
nRGB	(LIN 10)
	- L252 Right Front Door Contour Illumination Lamp
	- L297 Right Front Door Contour Illumination Lamp 2

High Speed Communications

EV and Battery CAN-Busses

This is the data bus for the high-voltage components, as well as many components in the air conditioning system. It's main communication speed is 500 kbit/s. The J840 Battery Regulation Control Module also has a sub-bus to the battery control modules.



Legend

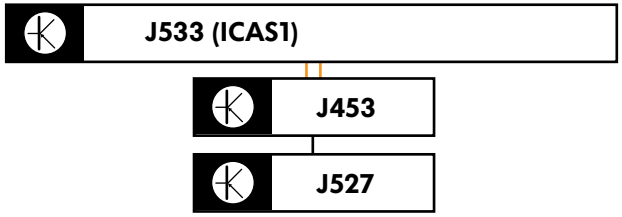
A19 Voltage Converter
G238 Air Quality Sensor
G395 A/C Pressure/Temperature Sensor
G805 Refrigerant Circuit Pressure Sensor
G826 A/C Pressure/Temperature Sensor 2
G827 A/C Pressure/Temperature Sensor 3
G828 A/C Pressure/Temperature Sensor 4
G829 A/C Pressure/Temperature Sensor 5
G929 Vehicle Interior Carbon Dioxide Concentration Sensor
G935 Exterior Air Quality and Humidity Sensor
G1090 Vehicle Interior Temperature Sensor
J126 Fresh Air Blower Control Module
J533 Data Bus on Board Diagnostic Interface (ICAS1)
J840 Battery Regulation Control Module
J842 A/C Compressor Control Module
J848 High-Voltage Heater (PTC) Control Module
J979 Heating and Air Conditioning Control Module
J1050 High-Voltage Battery Charger Control Module
J1208 Battery Module Control Module
J1212 Battery Module Control Module 5
J1216 Battery Module Control Module 9
N636 Refrigerant Expansion Valve 1
N637 Refrigerant Expansion Valve 2
N638 Refrigerant Expansion Valve 3
N640 Refrigerant Shut-Off Valve 2
N641 Refrigerant Shut-Off Valve 3
N642 Refrigerant Shut-Off Valve 4
N643 Refrigerant Shut-Off Valve 5
N696 Refrigerant Shut-Off Valve 1
Z132 Heating Element (PTC) 3

High Speed Communications

CAN-Busses

Multifunction Steering Wheel CAN-Bus

The multifunction steering wheel is now a standalone CAN-Bus system.

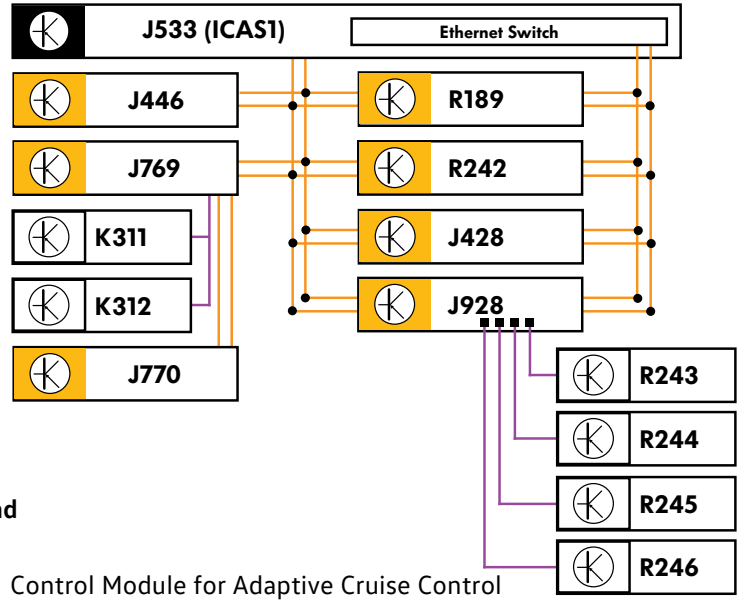


Legend

J453 Multifunction Steering Wheel Control Module
J527 Steering Column Electronics Control Module
J533 Data Bus on Board Diagnostic Interface (ICAS1)

Driver Assistance Systems CAN-Bus

The Driver Assistance System CAN-Bus incorporates all of the driver assistance system on the ID.4.



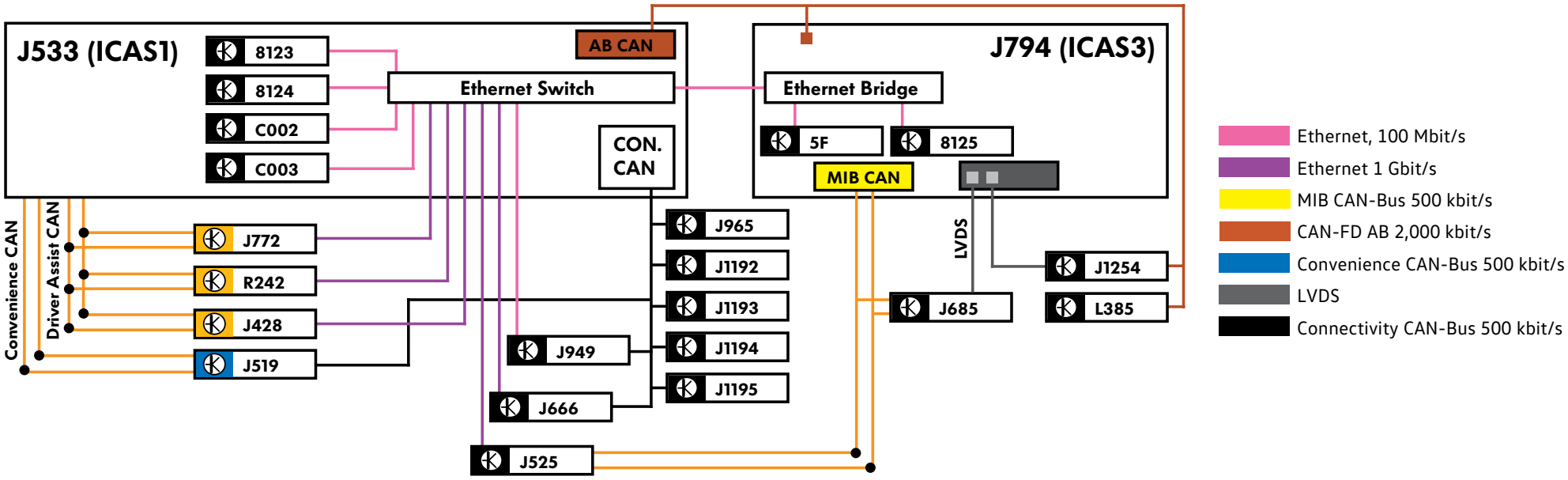
Legend

J428 Control Module for Adaptive Cruise Control
J446 Parking Aid Control Module
J533 Data Bus on Board Diagnostic Interface (ICAS1)
J769 Lane Change Assistance Control Module
J770 Lane Change Assistance Control Module 2
J928 Peripheral Camera Control Module
K311 Lane Change Assistance Warning Lamp in Right Exterior Rearview Mirror
K312 Lane Change Assistance Warning Lamp in Left Exterior Mirror
R189 Rearview Camera
R242 Driver Assistance Systems Front Camera
R243 - R246 Front, Left, Right and Rear Peripheral Cameras

High Speed Communications

Ethernet, Connectivity CAN-Bus, MIB CAN-Bus, FD CAN-Bus, LVDS

The ID.4 has new and extensive high speed communication channels with speeds that range between 500 kbit/s and 1 Gbit/s. These high-speed networks rely on the processing power of two new control modules, J533 (iCAS1) and J794 (ICAS3). ICAS stands for In-Car Application Server. Although J533 and J794 have been used in previous vehicles, the functions of these control modules have drastically changed.



Legend

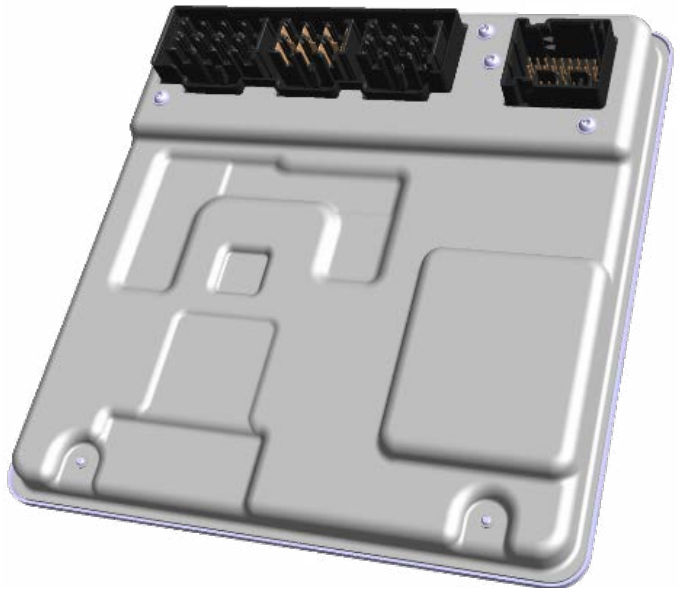
5F Information Electronics Display Control
8123 Application Server 1 System 1 Adaptive
8124 Application Server 1 System 2 Java
8125 Application Server 3, System 1 for Infotainment
C002 Software Cluster, Imbedded 1
C003 Software Cluster, Housekeeping 1
J428 Control Module for Adaptive Cruise Control
J519 Vehicle Electrical System Control Module
J525 Digital Sound System Control Module
J533 Data Bus on Board Diagnostic Interface (ICAS1)
J666 Internet Access Control Module
J685 Front Information Display Control Head
J794 Information Electronics Control Module 1
J949 Control Module for Emergency Call Module and Communication Unit
J965 Access/Start System Interface
J1192 Burglary Protection Control Module 2
J1193 Burglary Protection Control Module 3
J1194 Burglary Protection Control Module 4
J1195 Burglary Protection Control Module 5
J1254 Driver Information System Control Module with Display Unit
L385 Dynamic Lighting Strip 1 for Information in Instrument Panel
R242 Driver Assistance Systems Front Camera

High Speed Communications

iCAS Description

ICAS (In-Car Application Server) modules are central computers/servers that bring together many basic services and vehicle functions to control the vehicle systems. Computing tasks by other control modules may be performed in the ICAS instead of in the separate modules. This reduces the number of control modules. Distributed functions (multiple control units responsible for a single function) will be centralized.

ICAS technology is needed for autonomous driving and for software update processes. Neither a dealer visit nor vehicle diagnostic tester are required for software updates. Updates are downloaded incrementally using CAR-Net. When the software download is complete and ready to install, vehicle owners receive a prompt on the ID.Cockpit.





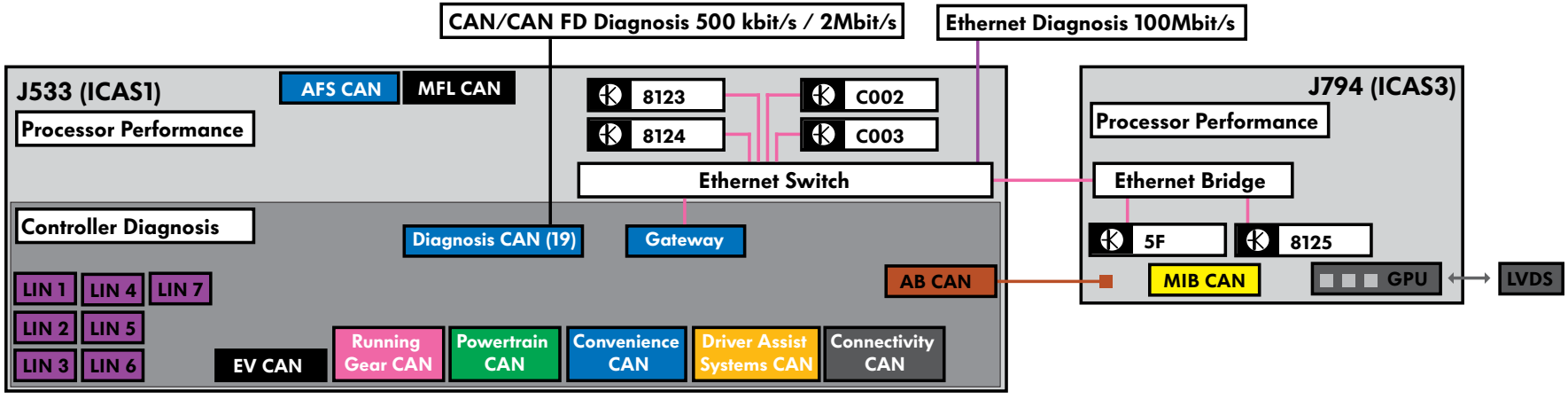
High Speed Communications

iCAS1 and iCAS3 - Modules, Functions and Addresses

The J533 Data Bus on Board Diagnostic Interface (19) inside of ICAS1 has been significantly redesigned and has more functions than before. It has a high-performance microprocessor that has been internally divided into 4 partitions. Each partition has it's own diagnostic address.

Because the diagnostic processor (19) CAN transceiver cannot operate more than 8 processors, an additional CAN transceiver was added for the MFL and AFS CAN.

The ICAS3 processor is divided into 2 partitions. One partition (5F information electronics 1) includes all functions that should be available to the customer as soon as possible when starting. The second partition is the IVI or "in-vehicle infotainment" (8125 application server 3, system 1 infotainment) contains the functions that require much more memory and computing power to ramp-up.



J533 iCAS1
Controller Diagnosis

Single partition
Address:

- 19 Data-Bus Onboard Diagnostic Interface

J533 iCAS1
Processor Performance

Four partitions
Addresses:

- 8123 Application Server 1 System 1 Adaptive
- 8124 Application Server 1 System 2 Java
- C002 Software Cluster, Imbedded 1
- C003 Software Cluster, Housekeeping 1

J794 iCAS3
Processor Performance

Two partitions
Addresses:

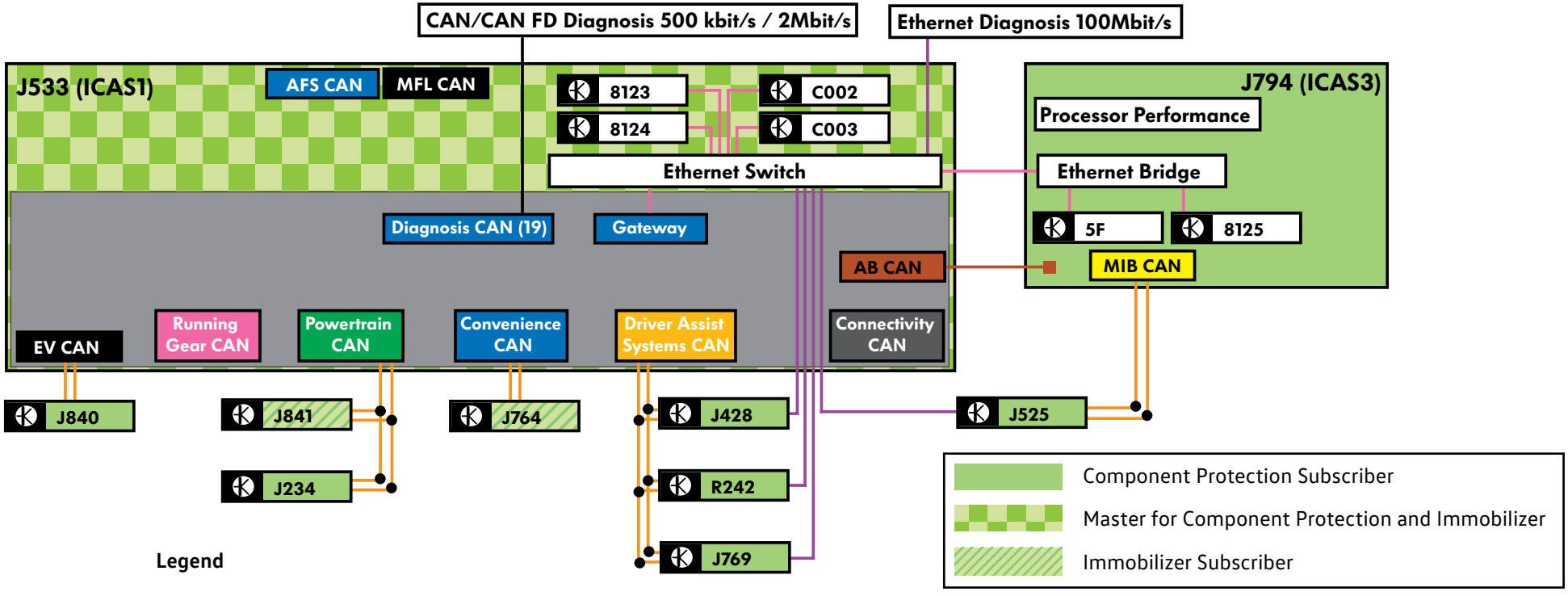
- 5F Information Electronics Display Control
- 8125 Application Server 3, System 1 for Infotainment

High Speed Communications

Immobilizer

The ID.4 has the Generation 5D Immobilizer system. The immobilizer prevents theft of the vehicle, while component protection prevents theft of components or makes it possible to track them. The master immobilizer and master for component protection are now combined in the J533 Data Bus Diagnostic Interface.

Because the ID.4 is an electric vehicle, the J623 ECM is no longer an immobilizer component. Most of its functions have been taken over by the J841 Electric Drive Control Module.



Legend

5F	Information Electronics Display Control
8123	Application Server 1 System 1 Adaptive
8124	Application Server 1 System 2 Java
8125	Application Server 3, System 1 for Infotainment
C002	Software Cluster, Imbedded 1
C003	Software Cluster, Housekeeping 1
J234	Airbag Control Module
J428	Control Module for Adaptive Cruise Control
J525	Digital Sound System Control Module
J533	Data Bus on Board Diagnostic Interface (ICAS1)
J769	Lane Change Assistance Control Module
J764	Electronic Steering Column Lock Control Module
J794	Information Electronics Control Module 1 (ICAS3)
J840	Battery Regulation Control Module
J841	Electric Drive Control Module
R242	Driver Assistance Systems Front Camera

Lighting

Front Lighting

Two headlight assemblies are available for the ID.4:

- Basic
- High Headlight

Basic Headlight



High Headlight





Lighting

Basic LED Headlight













Basic LED Headlight

The Basic headlight features LEDs as lights. Only the turn signal is a bulb and can be replaced.

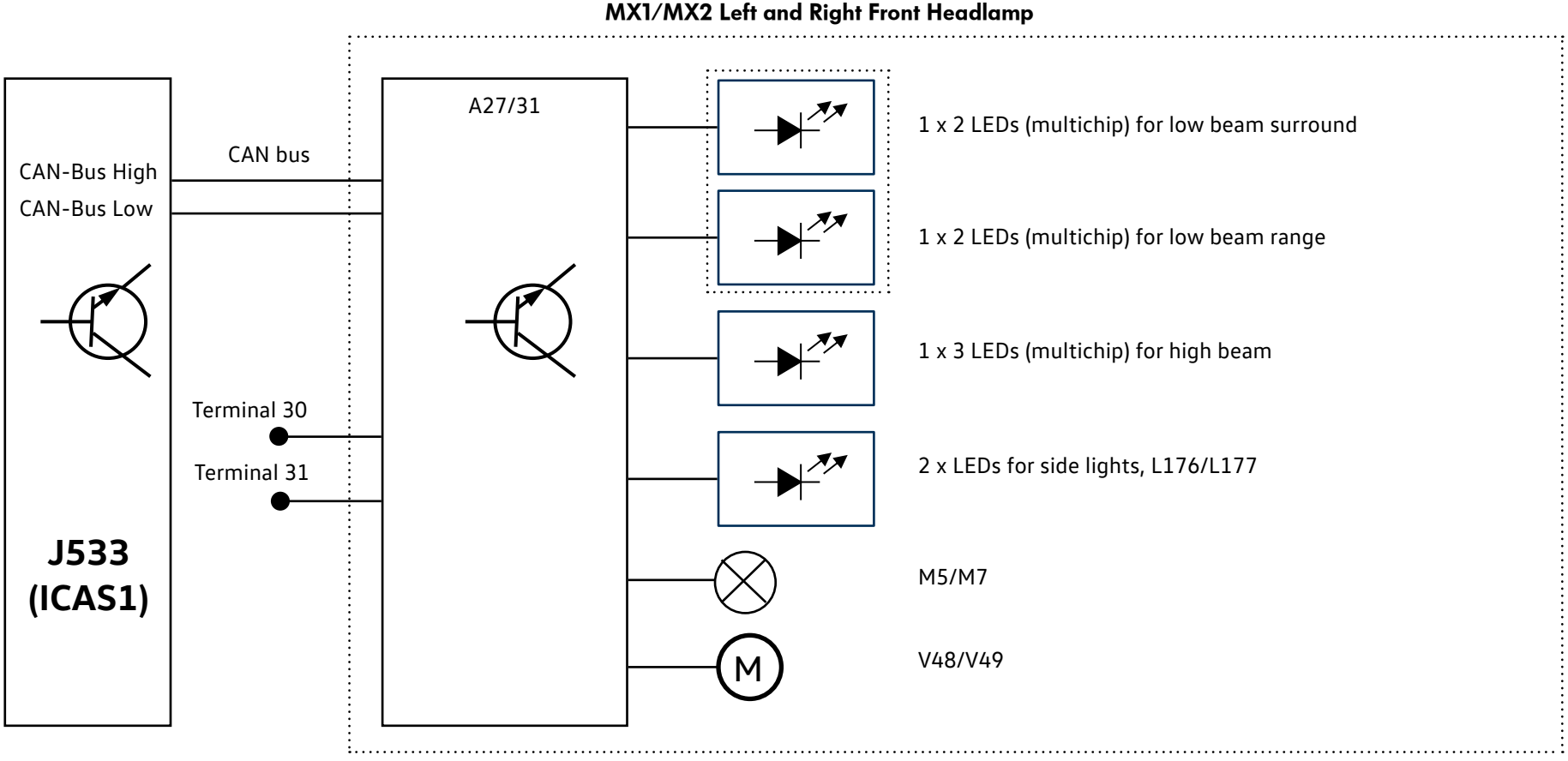
High Beam Assist is available with this headlamp. This detects oncoming traffic and switches the high beam off and on, depending on oncoming traffic and lighting conditions.



Basic LED Headlight

The A27/A31 Right and Left LED Headlamp Power Output Module 1 is responsible for activation of the LED modules, the M5/M7 Left and Right Front Turn Signal Bulb and the Left and Right Headlamp Range Control Adjustment Motor V48/V49.

ICAS1 – In Car Application Server 1



High LED Headlight

The High headlight uses only LED technology.

In addition to the normal light functions, it has a Dynamic Light Assist (DLA) with the following features:

- Dynamic cornering light
- Cornering light (static cornering light)
- All-weather light
- High beam assist

The LEDs for side lights, daytime running lights and turn signals are all on the same printed circuit of an LED unit. However, they feed their light into different fiber-optic cables.

If the temperature is too high, the power output of the LEDs is reduced automatically.



Lighting

High LED Headlight Light Functions

















Lighting

High LED Headlight



LED Light Strip

The High headlight version is equipped the Lightline, which is two LED light strips in the front trim.

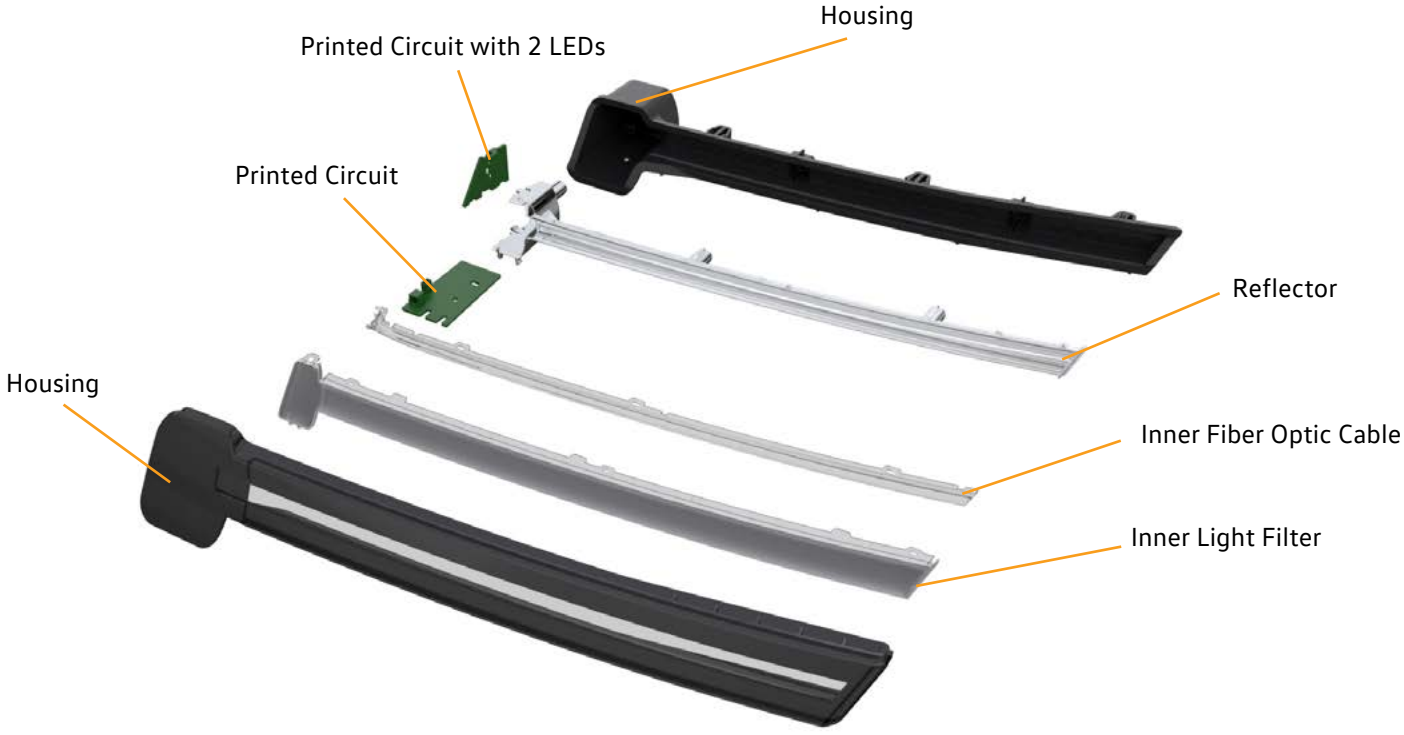
These are used for the entry lighting and exit lighting function. It is always activated to 100%.



LED Light Strip

The Lightline LED light strips have fiber optic cables and reflectors. Each light strip is connected to the headlight and Ground through a plug located directly behind the Volkswagen badge.

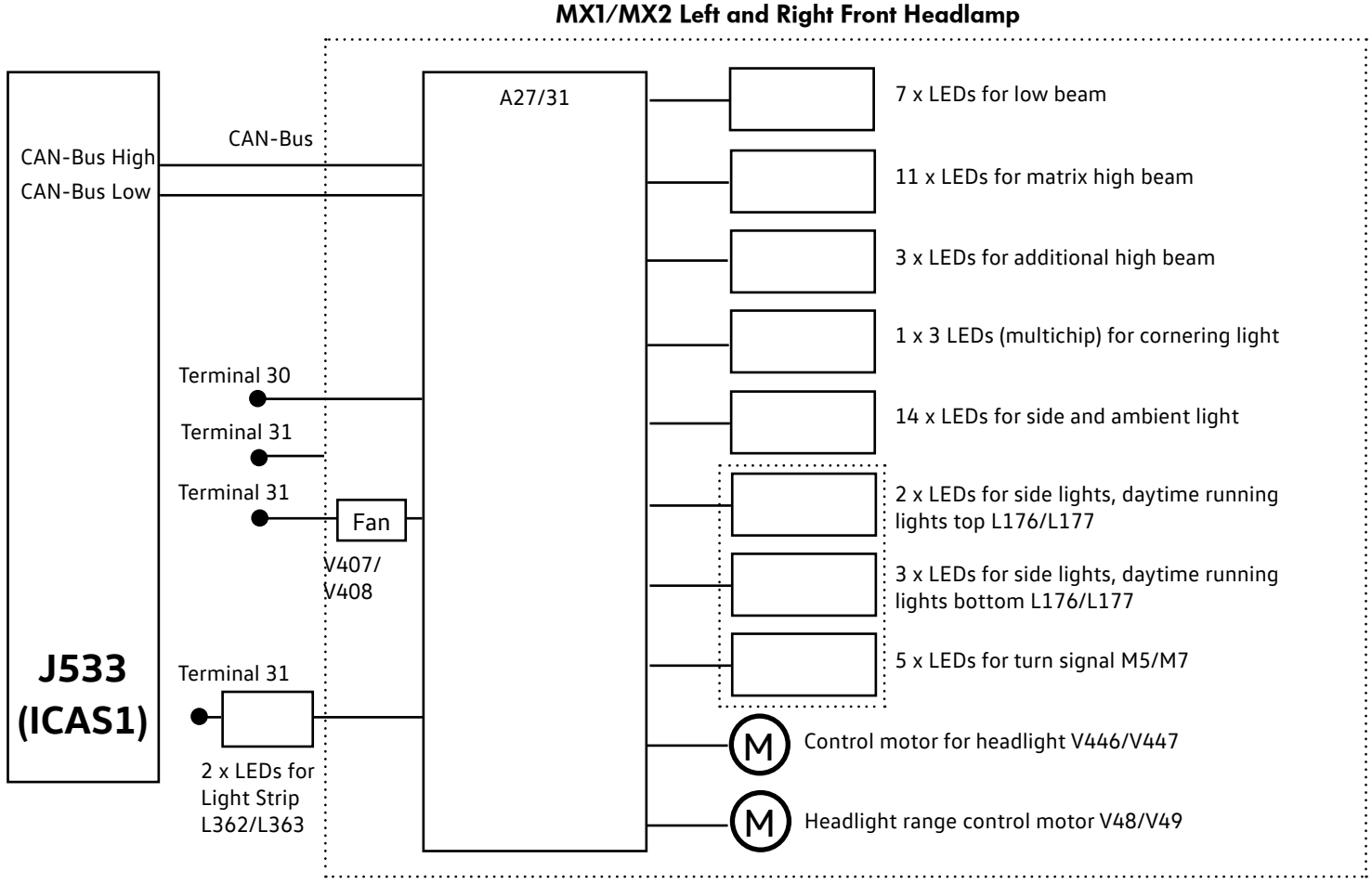
The LED light strips can be replaced. The front bumper cover has to be completely removed for replacement.



High LED Headlights

The A27/A31 Right and Left LED Headlamp Power Output Module 1 is responsible for activating:

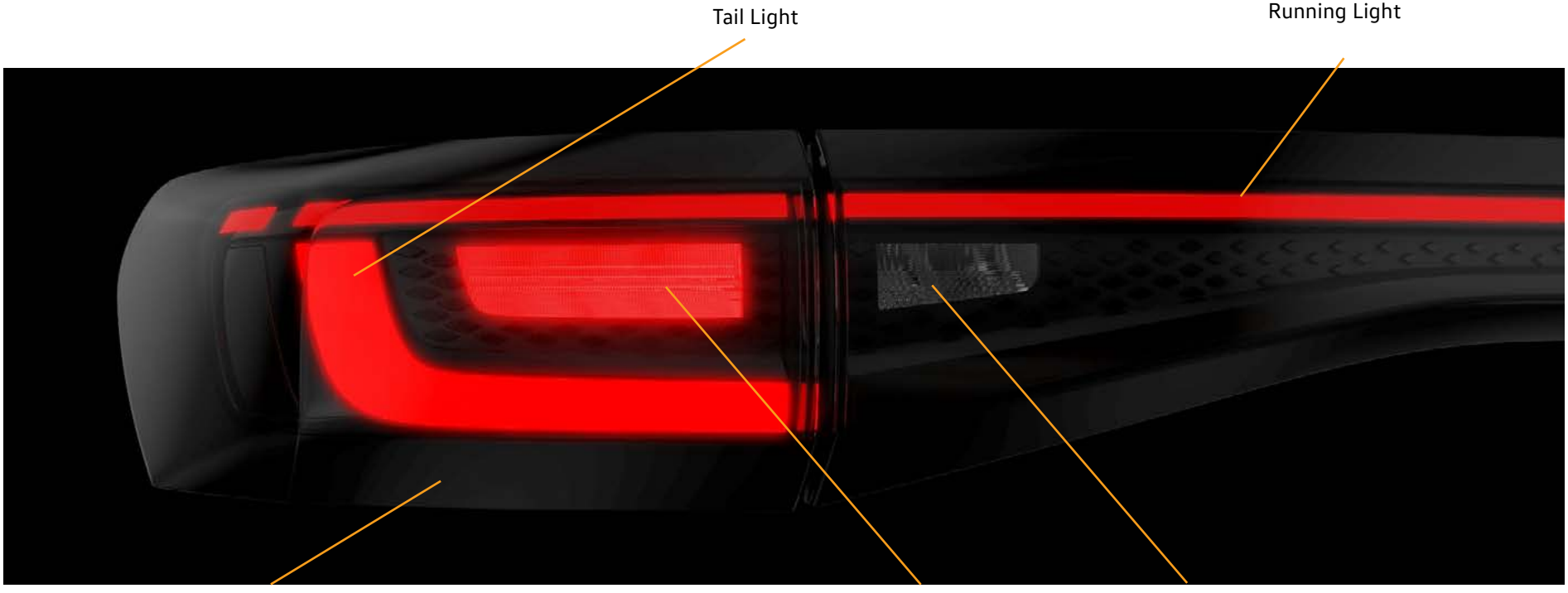
- The LED modules
- The V48/V49 Left and Right Headlamp Range Control Adjustment Motor
- The headlight V446/V447 Left and Right Variable Headlamp Positioning Motors
- The V407/V408 Left and Right Headlamp Fan



Lighting

Tail Light Cluster

The tail light cluster is connected to the J519 Vehicle Electrical System Control Module. It uses LED technology, and each light function has its own wire.



Lighting

Basic Tail Light Cluster Light Functions

















The Ambient Light in the Vehicle Interior

The ID 3 has ambient lighting to illuminate different areas of the vehicle interior.

The color tone of the lighting has two versions of ambient lighting, either with 10 colors or 30 colors. The two versions of the ambient light with 10 colors or 30 colors provide pre configured lighting profiles and also the option of customizing the background light in individual colors. In addition, individual colors can be individually assigned to the zones within the vehicle interior.

The following areas of the vehicle interior are illuminated in the color chosen:

- The operating cluster for the doors
- The trim strip in the dash panel
- The storage compartment for the mobile telephone

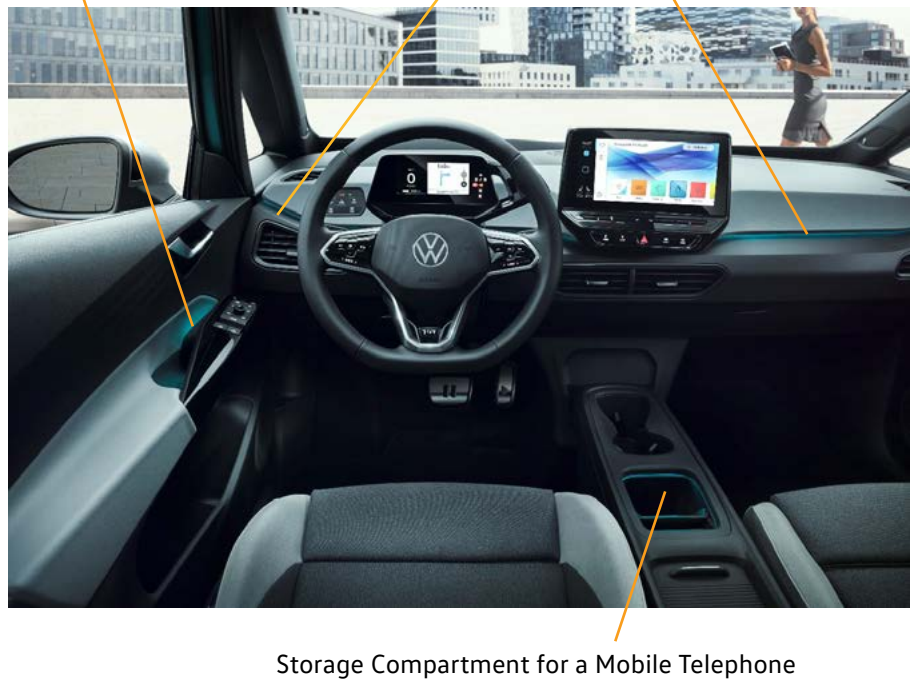
The Infotainment system adopts the color tone selected for the contour lighting of the dash panel.

The equipment options for the ambient light in the ID.4:

QQ8 – 10-color ambient light

QQ9 – 30-color ambient light and multi-color ambient light in the mobile telephone storage compartment

3D2 – L193 Light 1 for front center console background lighting; is only installed with the high center console



Lighting

The Menus for Adjusting the Ambient Light

The brightness and color of the ambient light are selected in the vehicle settings of the Infotainment system. The ambient lighting either goes out when the vehicle is locked or automatically a few minutes after the ignition is switched off. Automatic deactivation prevents discharging of the 12 volt battery.



Lighting

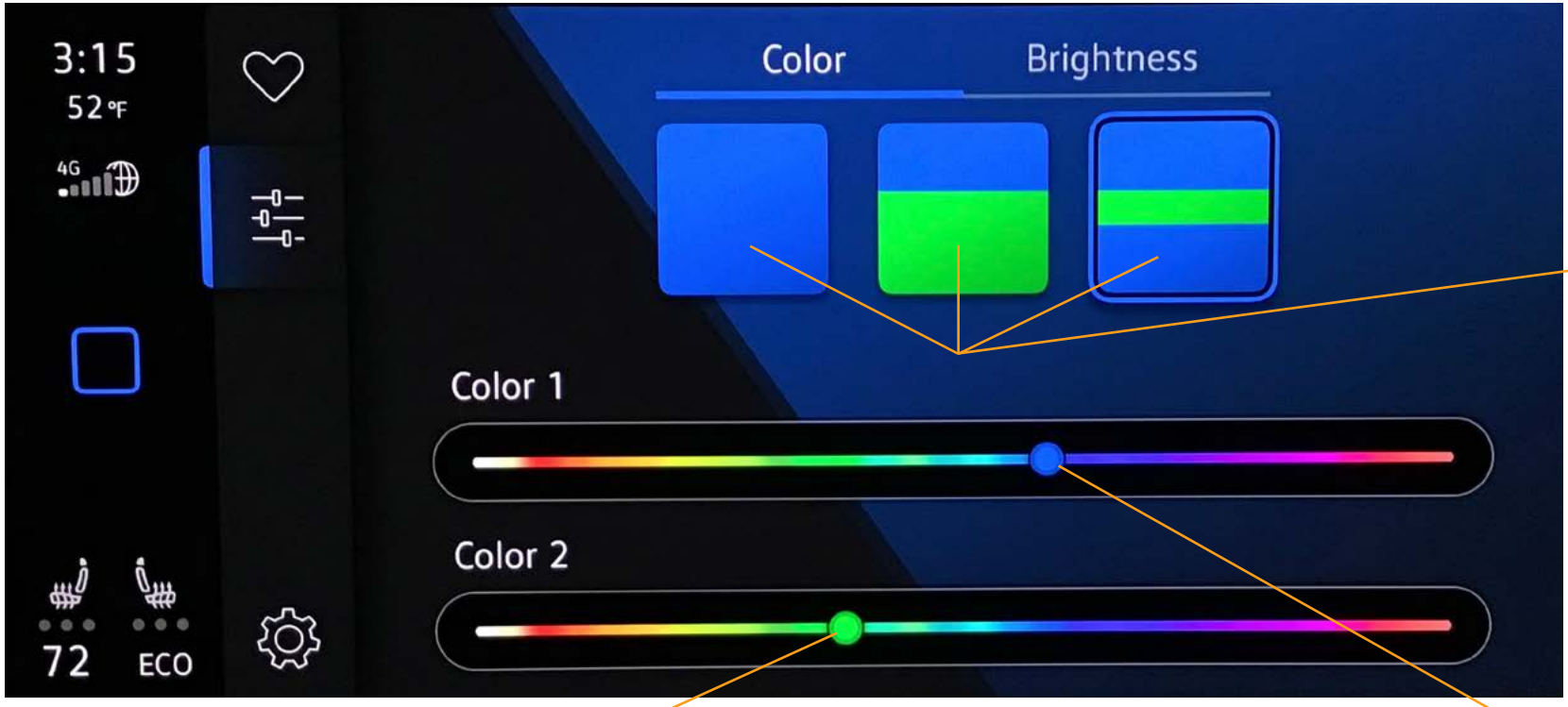
The Menus for Adjusting the Ambient Light

The three touch surfaces can be used to set the three zones at the top, center and bottom of the vehicle.

- Top: dash panel contour lighting
- Middle: door lighting
- Bottom: lighting of the storage compartment for the mobile telephone

The example of the three touch surfaces on the slide shows that

- The left touch surface generates a color in all three zones
- The middle touch surface generates a blue dash panel contour lighting and a green color for the door illumination and the mobile phone storage compartment
- The right-hand touch surface generates blue lighting for the dash panel contour and the mobile telephone storage compartment, and green lighting for the door illumination



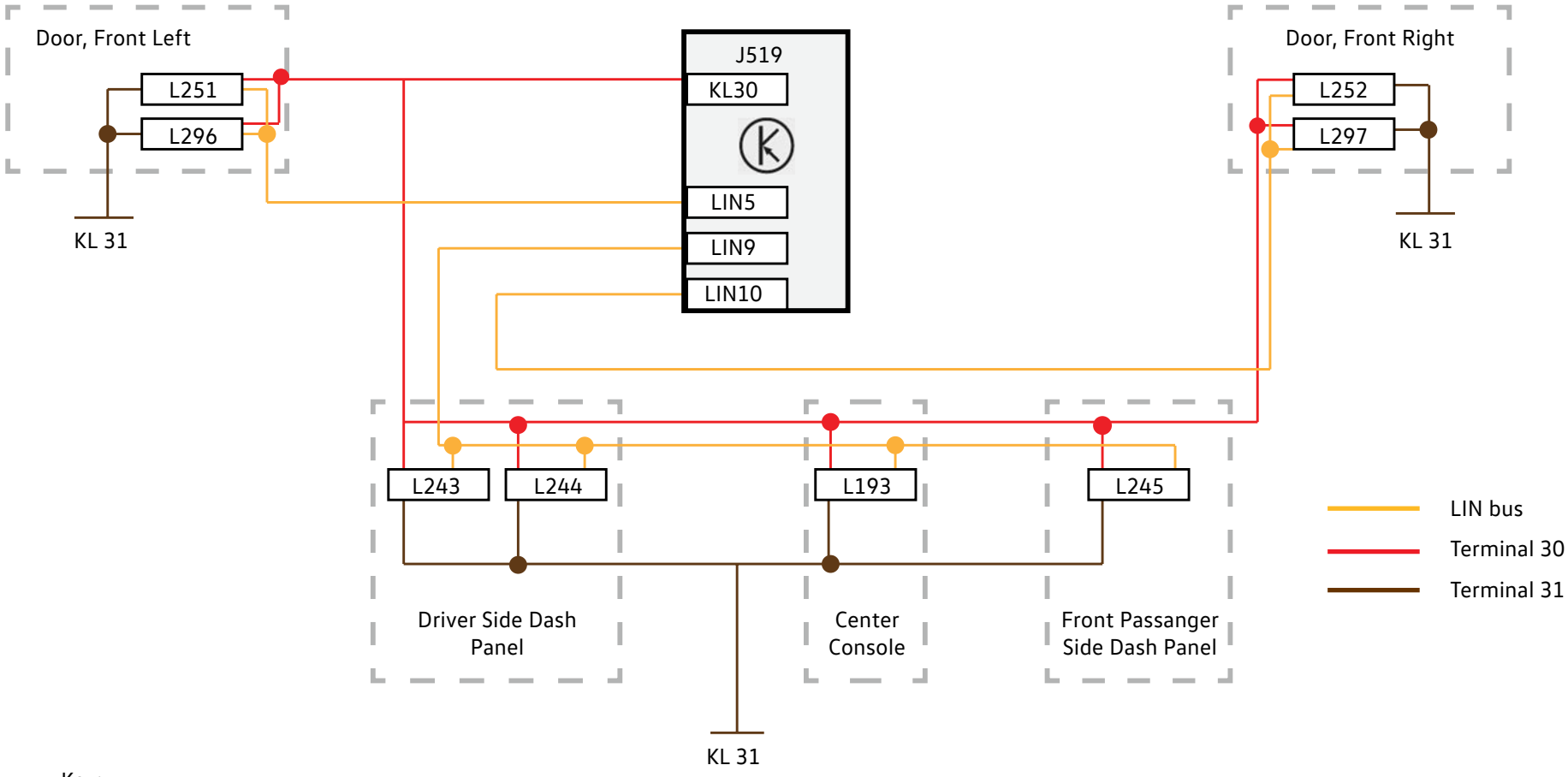
Options for Adjusting the Color Distribution of the Ambient Light

Slider for Adjusting the Second Color Content of the Ambient Light

Slider for Adjusting the First Color Content of the Ambient Light

Lighting

Ambient Light Electrical Connections



Key:

J519 Vehicle Electrical System Control Module

L193 Front Center Console Ambient Lighting Bulb 1

L243 Instrument Panel Contour Illumination Lamp 1

L244 Instrument Panel Contour Illumination Lamp 2

L245 Instrument Panel Contour Illumination Lamp 3

L251 Left Front Door Contour Illumination Lamp

L252 Right Front Door Contour Illumination Lamp

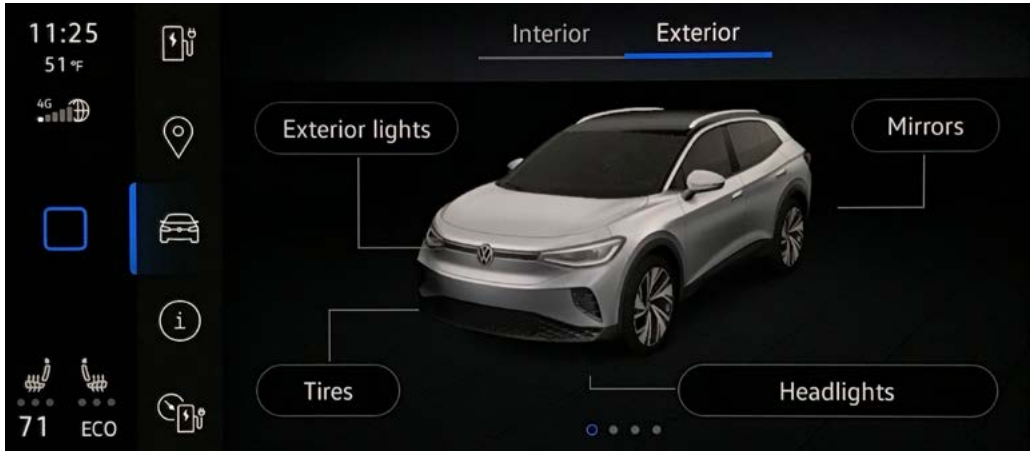
L296 Left Front Door Contour Illumination Lamp 2

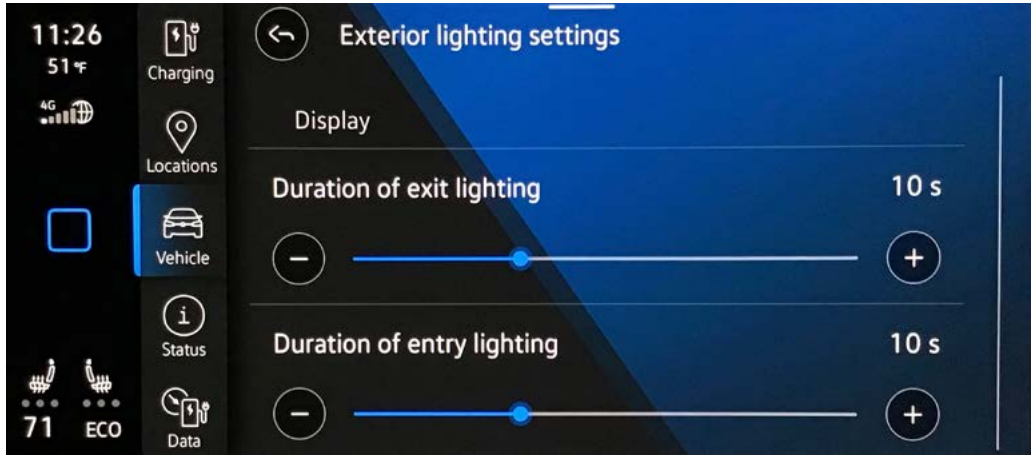
L297 Right Front Door Contour Illumination Lamp 2

Lighting

Entry and Exit Light Settings in the Infotainment System

In the Exterior Light Settings, both the duration of exit and entry lighting can be set. Select Vehicle, then Exterior Lighting to access the menu for adjusting the duration of exterior lighting.





Lighting

Prerequisites for Entry Lighting

Entry Lighting is enabled in the Infotainment System



+

Light Sensor Detects Darkness



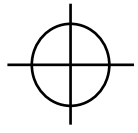
+

Unlocking with key (remote control function)



OR

Key approaches within a radius of 5.5 m from the middle of the vehicle, if Entry Lighting is enabled



OR

When the door handle is touched, if “Unlock Vehicle when Approaching" is deactivated in the infotainment system (Active with Keyless Access)



OR

Standing next to the vehicle if “Unlock Vehicle when Approaching" is activated in the infotainment system



=

Entry Lighting Active

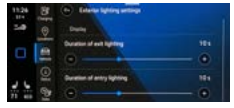
The entry lighting sequence can run up to three times without entering the vehicle. The entry lighting sequence takes place again after the ignition is switched off and the prerequisites are repeated.

Lighting

Prerequisites for Exit Lighting

The exit lighting function can take place once. The function can happen again after the ignition is cycled ON and OFF, and the prerequisites are repeated.

Exit Lighting is enabled in the Infotainment System



+

Light Sensor Detects Darkness



+

The ignition is switched off



+

The Driver Door is Closed after Exiting the Vehicle



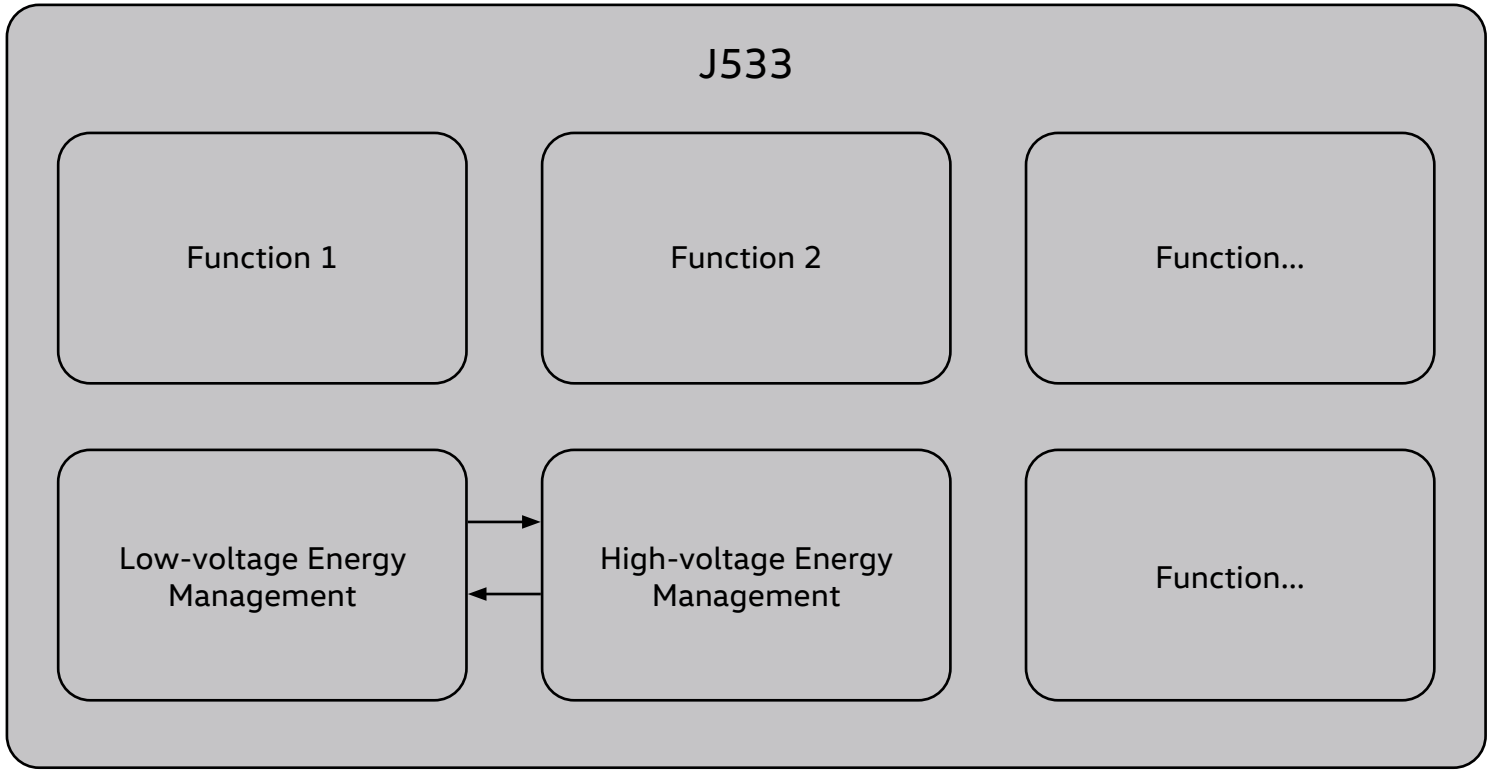
=

Exit Lighting Active

Distribution of Functions

The J533 Data Bus on Board Diagnostic Interface controls several vehicle functions, including high-voltage energy management and low-voltage energy management. These functions are responsible for the energy management in both circuits. Their interaction ensures that the vehicle is ready to start. The energy requirements of the individual electrical consumers are prioritized. If necessary, certain consumers are switched off or their performance is reduced.

The 12V on-board electrical system is supplied with energy from the high-voltage electrical system. The energy requirement for the 12V electrical system is always has top priority for high-voltage energy management since the 12V electrical system must have enough voltage in order to operate the high-voltage system. The 12V electrical system is always supported by the DC/DC converter as soon as the high-voltage system is active.

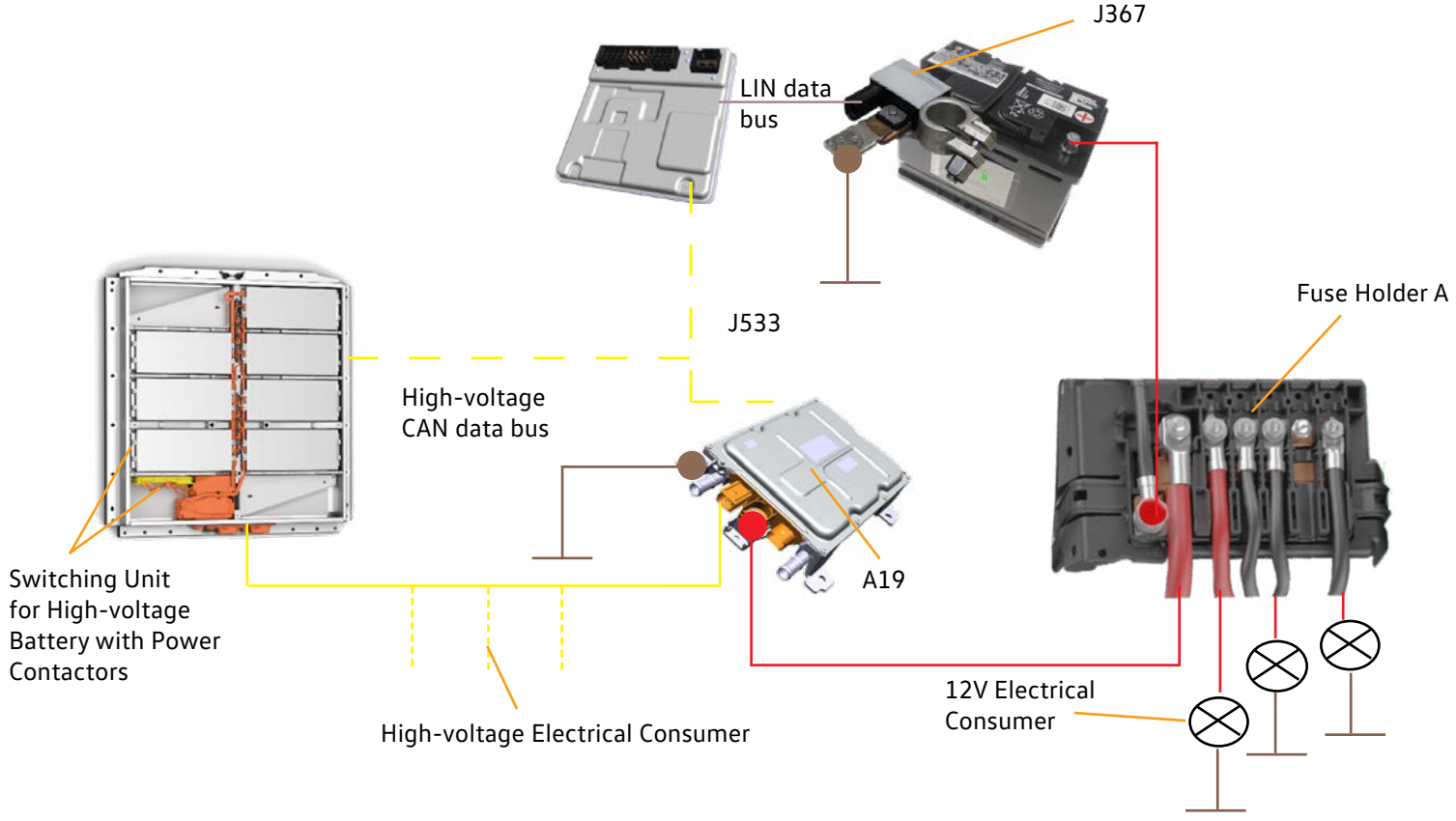


Energy Management

Low-voltage Power Supply

The A19 Voltage Converter (also known as the DC/DC converter) is the interface of the high-voltage and low-voltage energy management. It converts high-voltage direct voltage into low-voltage direct voltage for the 12V electrical system. This means it is an electrical consumer in the high-voltage system and also acts as a power source for the 12V electrical system. The voltage in the low-voltage electrical system can be up to 15.5 V when the A19 is active. The low-voltage electrical system is only supplied with energy when the high-voltage battery power contactors are closed (high-voltage system is activated).

The DC/DC converter is controlled by the low-voltage energy management in the J533 Data Bus on Board Diagnostic Interface. The J533 receives information about the current state of the low-voltage electrical system and the 12V battery from the J367 Battery Monitoring Control Module across the LIN-Bus. Depending on the energy requirement in the low-voltage electrical system, the low-voltage management system requests a certain voltage from the voltage converter. The aim of low-voltage energy management system is to maintain the 12V battery charge level at 90%. When a charge level of 90% is reached, the 12V battery is no longer charged. In other words, the requested voltage is selected so that the battery is neither charged nor discharged (zero current regulation).



Energy Management

Vehicle States

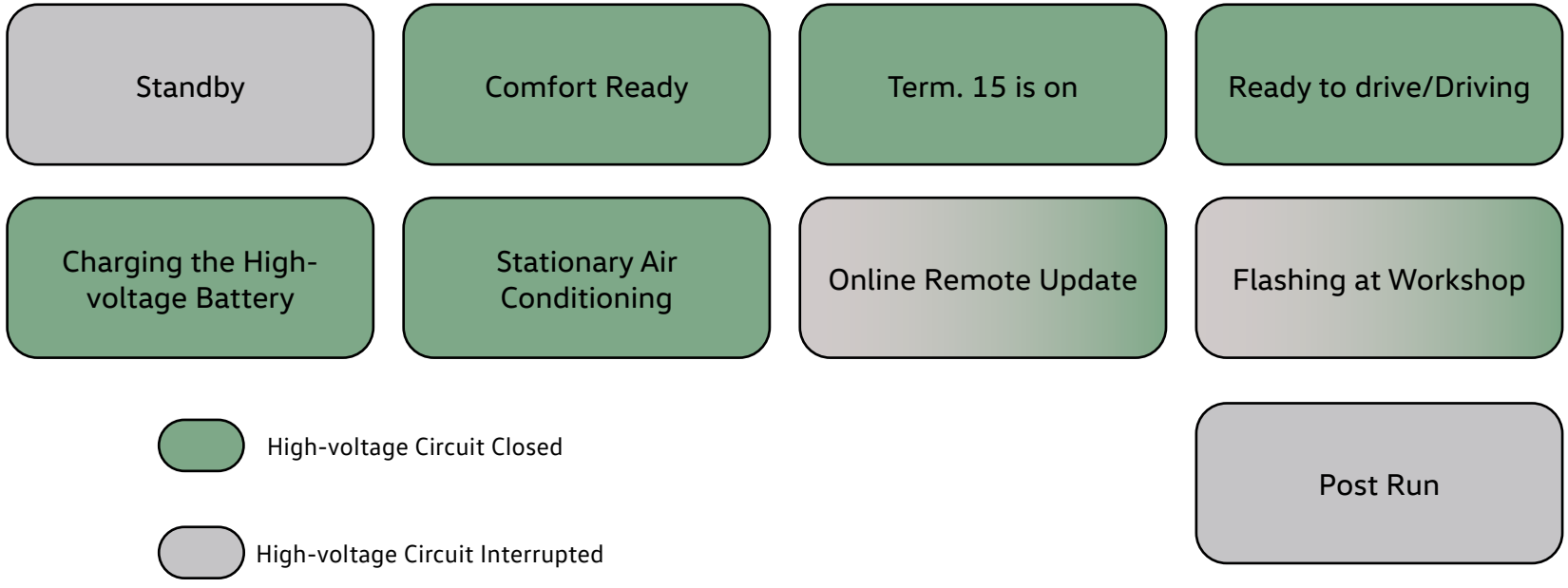
In the MEB, the vehicle can be in the following states:

- Comfort Ready (driver present)
- Terminal 15 ON
- Ready to drive / driving
- Charging the high-voltage battery
- Stationary air conditioning
- Online remote update
- Software update in the workshop
- Post-run of the control modules
- Standby

In the states marked in green, the high-voltage system is active. The power contactors of the high-voltage battery power are closed and the high-voltage modules are powered. Whenever the high-voltage system is active, the low-voltage system is supplied with voltage.

When the vehicle is stationary and OFF, the high-voltage systems is primarily off as well. However, a function called Autonomous charging may activate the high-voltage system to charge the low-voltage system if the 12V battery voltage drops too low.

During a software update, the high-voltage system may be activated or deactivated depending on the control module that is being updated.

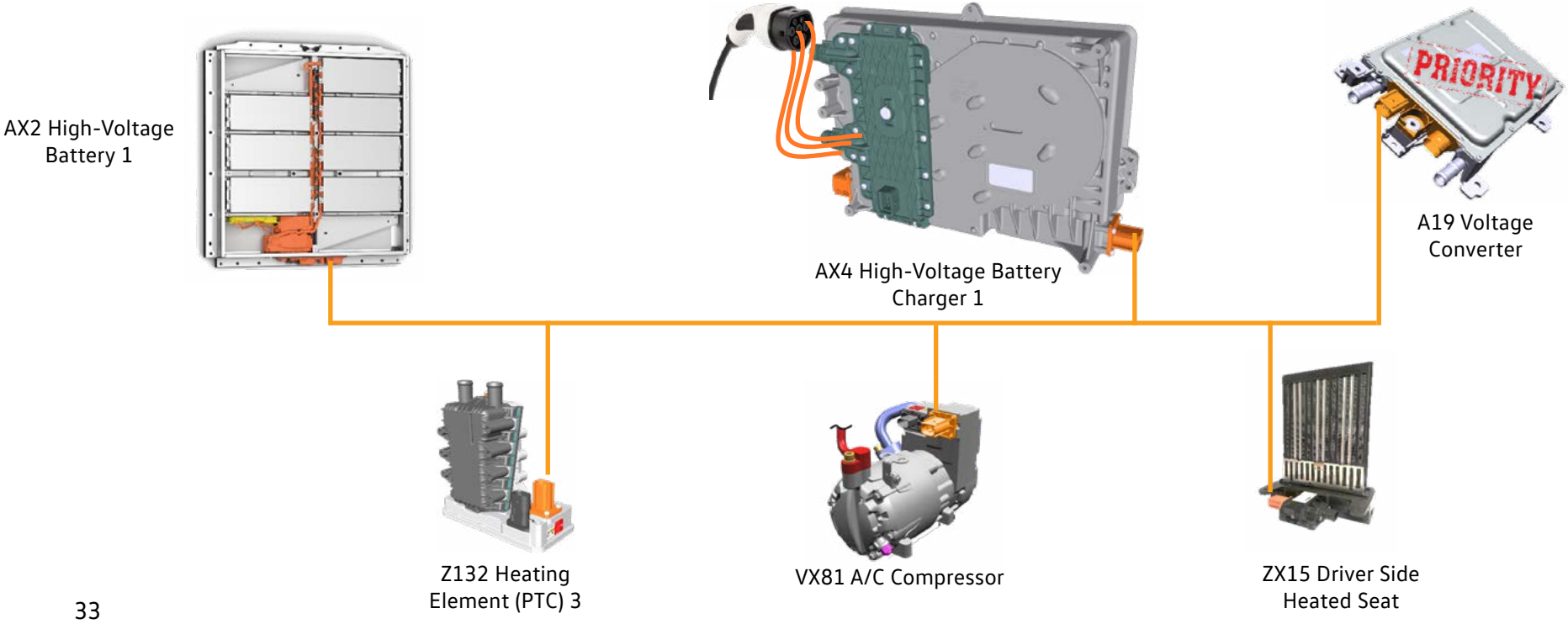


High-Voltage Energy Management

The A19 Voltage Converter always has the highest priority in energy management. Next in line is climate control. The climate control requests are the next highest level of priority. If the charge level of the high-voltage battery becomes very low, the occupants are warned.

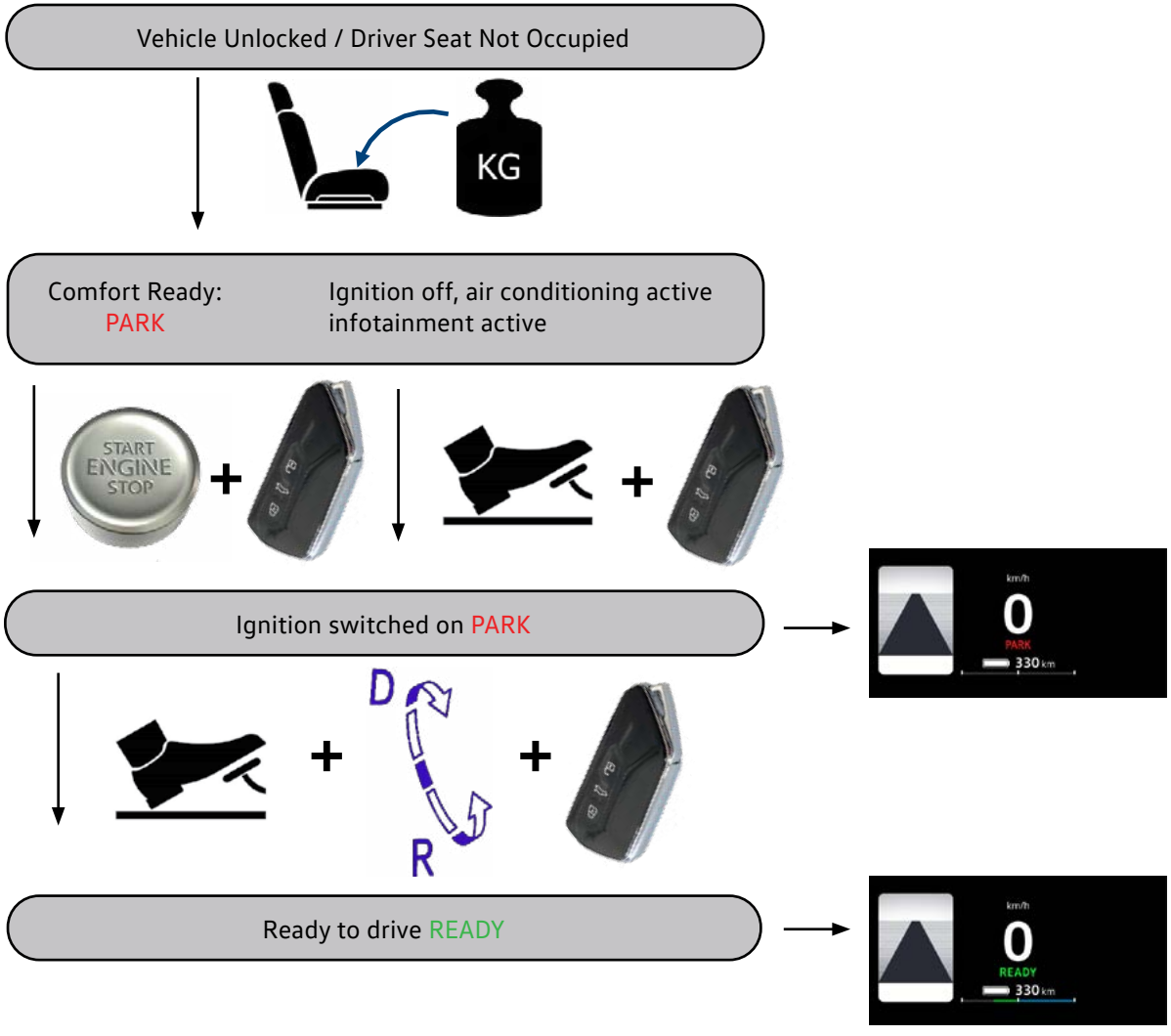
Special prioritization takes place in the following cases:

- The high-voltage battery has to be cooled: the climate control request of the occupants is given lower priority
- The driver has activated the maximum defrost function touch button: all other climate control requests are given lower priority
- High-voltage battery charging: only power that cannot be charged to the battery or is not used for battery cooling is made available for the interior climate control. For example, interior climate control may be restricted when the battery has to be heated in cold weather. Charging infrastructure also has an impact.



Terminal Control

Starting the Vehicle



The terminal control in the MEB is controlled by the J533 Data Bus on Board Diagnostic Interface (ICAS1) and the J519 Vehicle Electrical System Control Module. The J533 performs the master function and J519 is responsible for reading out the ignition and starter button, and for activating the terminal 15 relay.

A new terminal state called “Comfort Ready” allows the driver to operate the infotainment system and the air conditioning in the vehicle even when the ignition is off. It is activated when the seat occupied sensor detects a person in the driver’s seat. The ignition key does not have to be in the vehicle. The high-voltage circuit connects upon activation.

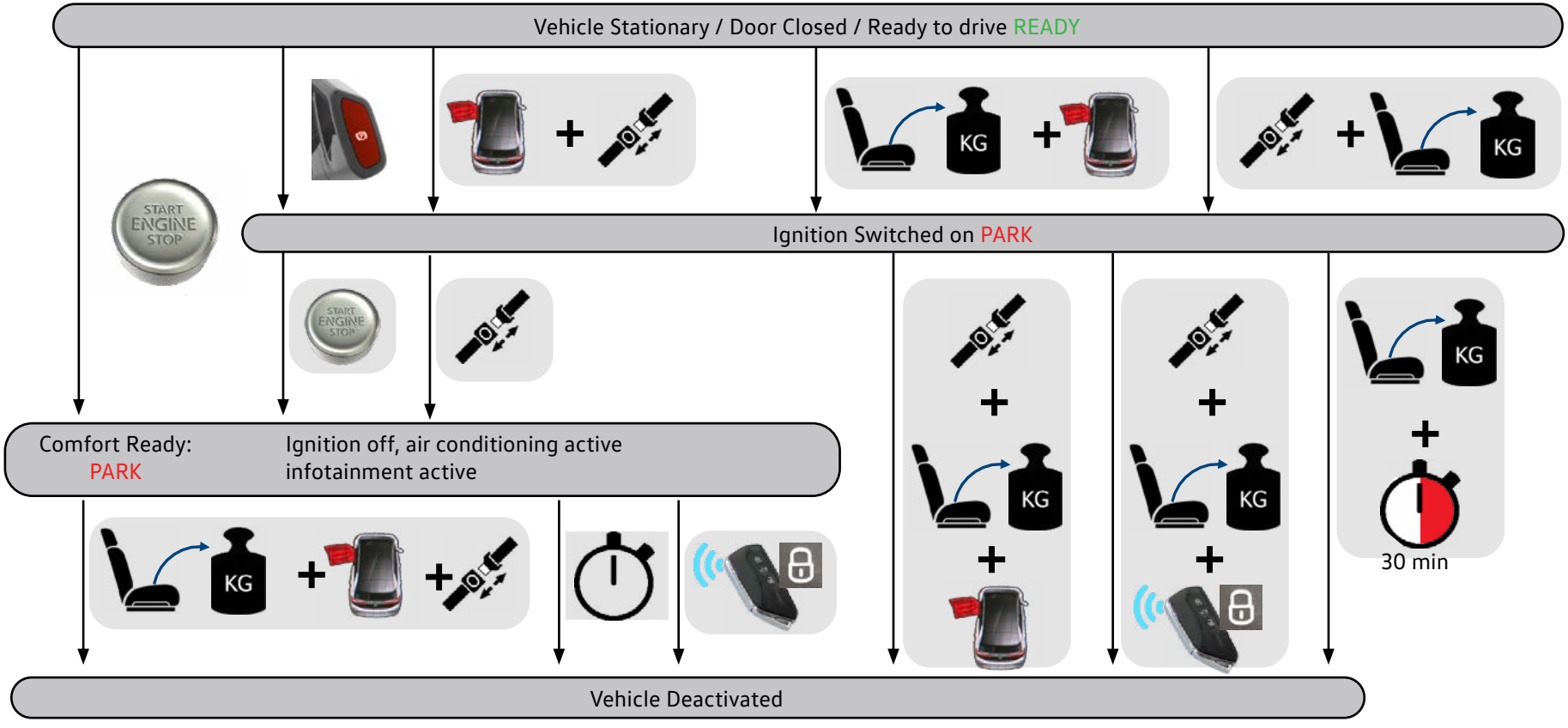
The ignition can be activated using either the ignition/ start button or by pressing the brake pedal (with a key in the vehicle). The display in the instrument cluster switches to the standard view. In addition, all of the control displays are shown briefly. The word PARK informs the driver that the parking brake is active.

To prepare the vehicle for driving, the driver needs to press the brake pedal and select a gear. The word READY will then appear in the instrument cluster.

The vehicle will begin to move slowly once the driver releases the brake pedal.

Terminal Control

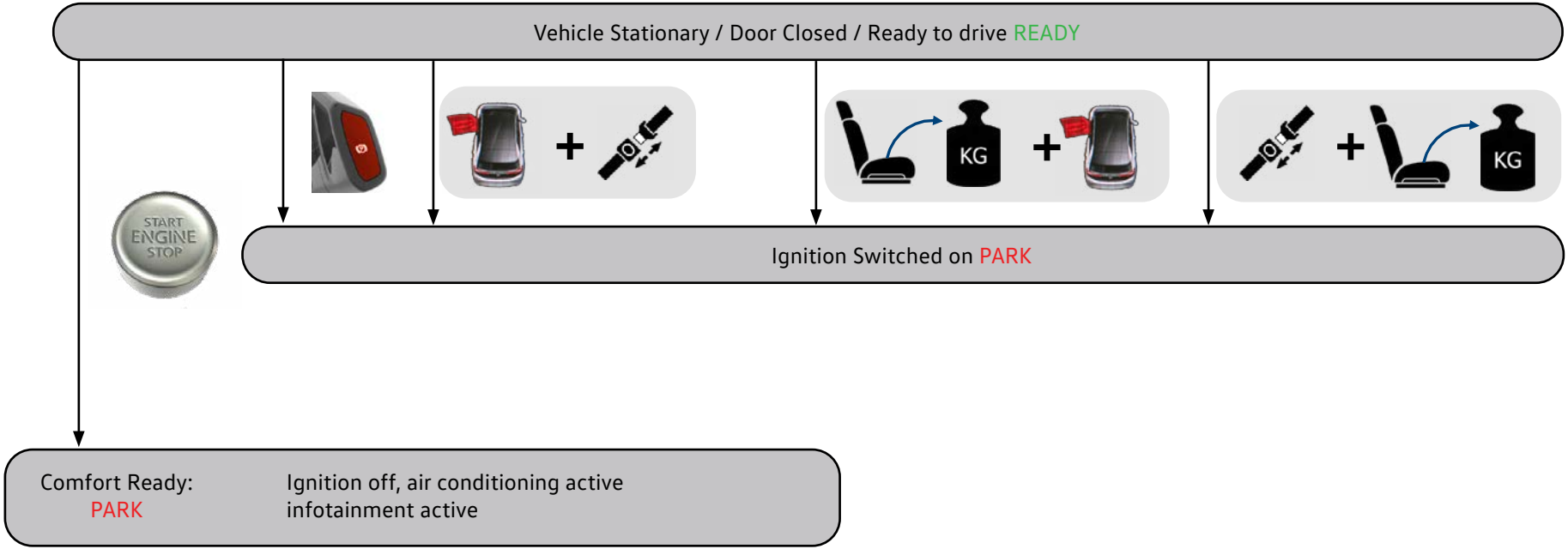
MEB Exiting Concept



MEB vehicles have a noiseless electric motor, a new gear selector and a keyless start system. All of this requires a safe and integrated vehicle exit sequence. This combines multiple shut-down conditions to ensure the vehicle is parked properly and cannot roll.

Terminal S is listed in the measured value blocks in the MEB, although its function (infotainment system power supply) is performed by Comfort Ready. It is switched off at the same time as terminal 15 or Comfort Ready.

MEB Exiting Concept - Turning off the Vehicle Drive System



At the end of a trip, the drive system can be turned off by pressing the ignition/starter button or the parking brake button.

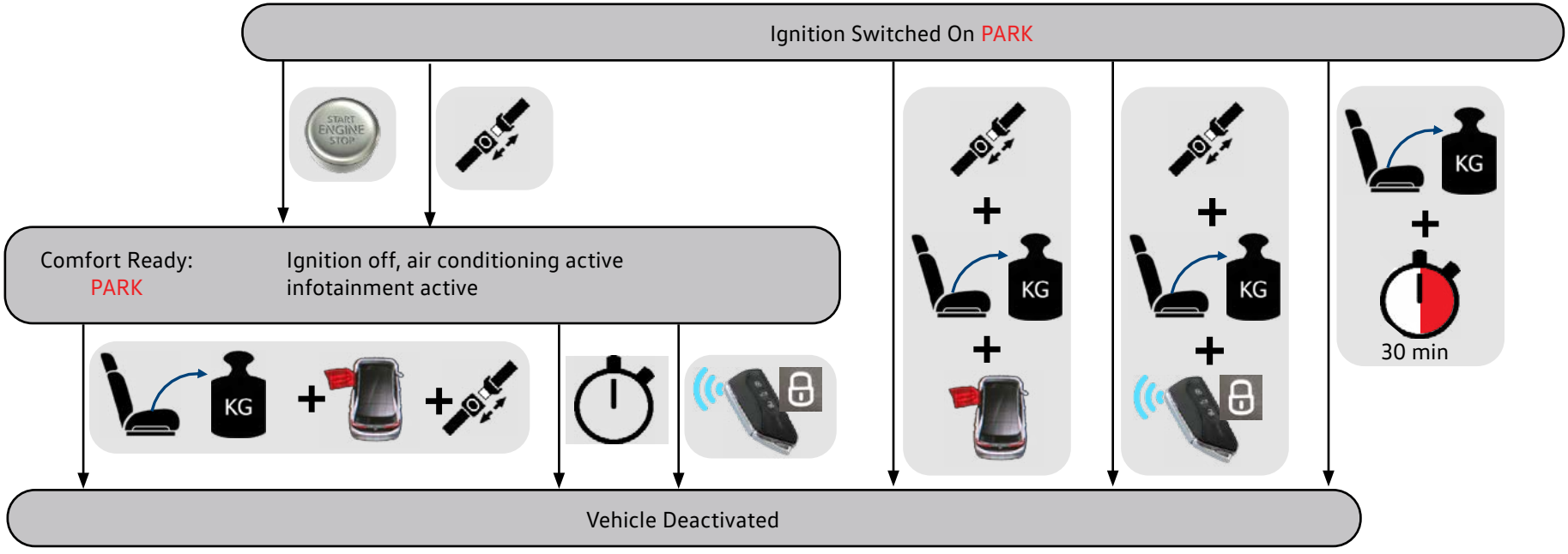
In addition, the immobilizer turns off the vehicle's drive system and activates the parking brake when two of the following three conditions occur at the same time:

- Driver's door opens
- Driver's seat belt unfastened
- Driver's seat not occupied

When the vehicle's drive system is deactivated, the parking brake is automatically activated.

Terminal Control

MEB Exiting Concept - Turning Off the Ignition



The driver can turn off the ignition by pressing the ignition/starter button. The vehicle goes into the "Comfort Ready" state. Unlatching the driver's seat belt has the same effect.

In addition, there are three options for automatically turning off the ignition. The following conditions must be met for this purpose:

- Driver's seat belt unfastened, driver seat unoccupied and driver door open
- Driver's seat belt unfastened, driver seat unoccupied and vehicle is locked
- No diagnosis active and driver seat unoccupied for more than 30 minutes

The Comfort Ready state ends if one of the following conditions is met:

- Driver's seat belt unfastened, driver seat unoccupied and driver door open
- Vehicle is locked
- Comfort Ready active for more than 60 minutes

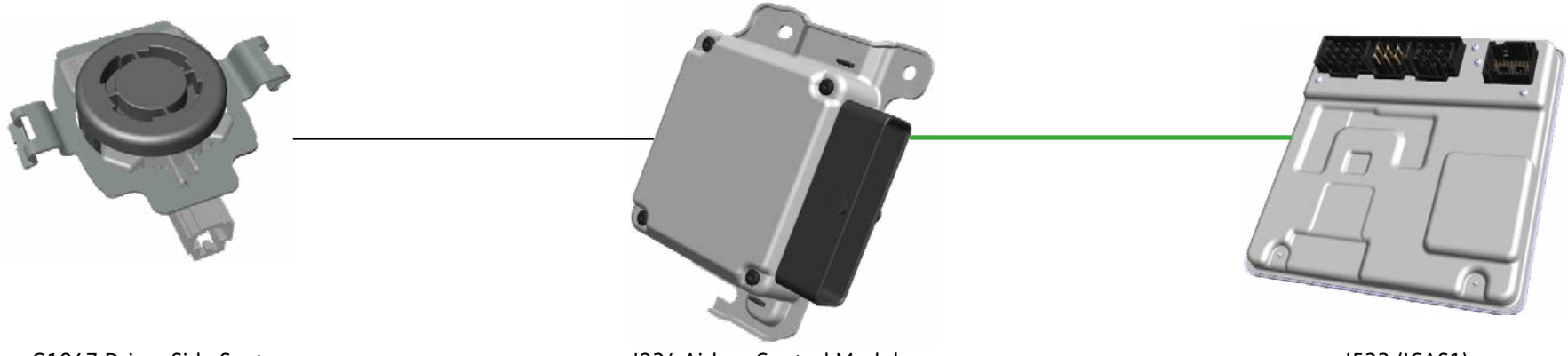


In addition to the listed conditions, the energy management system can also turn off the ignition or Comfort Ready state. This can happen when the 12V battery is almost depleted.

Terminal Control

Comfort Ready

Comfort Ready status is activated by the J533 Data Bus on Board Diagnostic Interface (ICAS1) if the driver is present, verified by the seat occupant detection sensor. The seat occupant detection sensor is read by the J234 Airbag Control Module.



G1067 Driver Side Seat Occupant Detection Sensor

J234 Airbag Control Module

J533 (ICAS1)

Signal Sequence for Detecting Driver Presence

Comfort Ready

When the driver door is opened, the Powertrain CAN-Bus is woken up and kept alert for the next 90 seconds. This allows the status of the seat occupant detection sensor to be read out and transmitted to ICAS1.

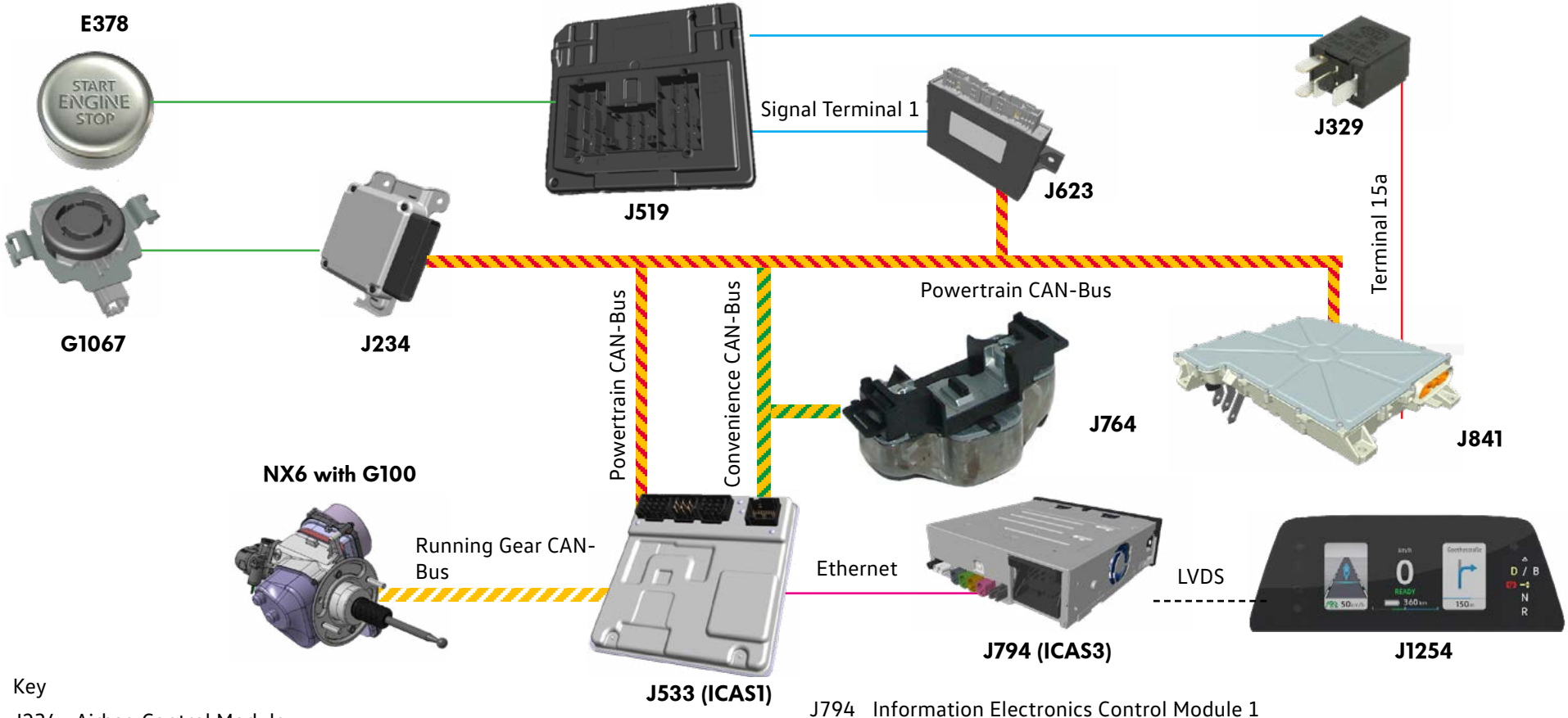
If the driver seat is not occupied until after the initial 90 seconds, Comfort Ready will not automatically activate when the driver sits down.

When Comfort Ready is active, all the infotainment and air conditioning functions are functional.



Terminal Control

Network for Terminal Management Component Overview



Key

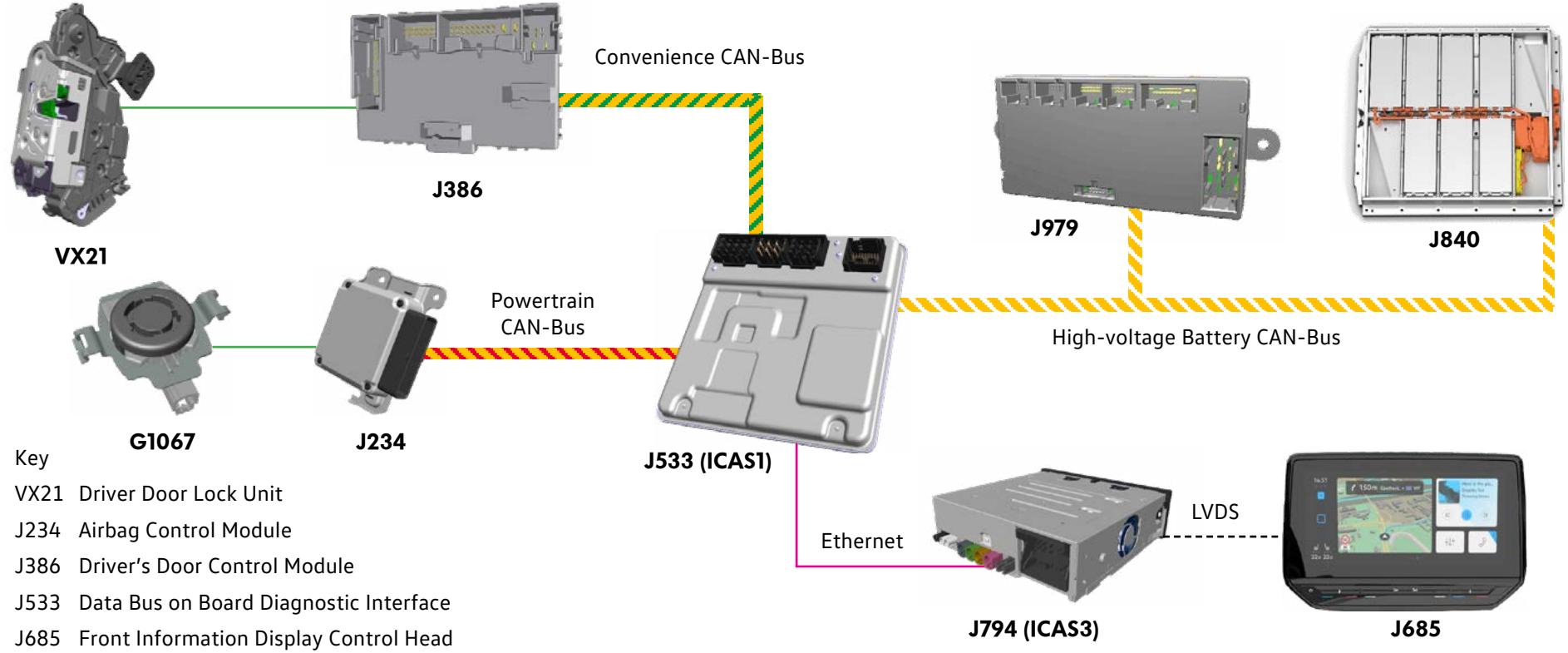
J234 Airbag Control Module
J329 Terminal 15 Power Supply Relay
J519 Vehicle Electrical System Control Module
J533 Data Bus on Board Diagnostic Interface
J623 Engine/Motor Control Module
J764 Electronic Steering Column Lock Control Module

J794 Information Electronics Control Module 1
J841 Electric Drive Control Module
J1254 Driver Information System Control Module with Display Unit
E378 Start System Button
G100 Brake Pedal Position Sensor
G1067 Driver Side Seat Occupant Detection Sensor
NX6 Brake Booster

Terminal Control

Comfort Ready Signal Sequence

This scenario starts with a vehicle unlocked and the doors closed. When the driver door opens, J533 wakes up the powertrain CAN-Bus. This waking phase lasts 90 seconds. During this time, G1067 Driver Side Seat Occupant Detection Sensor can detect whether the driver seat is occupied and transmit this information to the J533. J533 then activates Comfort Ready status - the infotainment system and the air conditioning are operational. At the same time, J840 enables the high-voltage circuit for high-voltage air conditioning components.



Key

VX21 Driver Door Lock Unit
J234 Airbag Control Module
J386 Driver's Door Control Module
J533 Data Bus on Board Diagnostic Interface
J685 Front Information Display Control Head
J794 Information Electronics Control Module 1
J840 Battery Regulation Control Module
J979 Heating and Air Conditioning Control Module
G1067 Driver Side Seat Occupant Detection Sensor

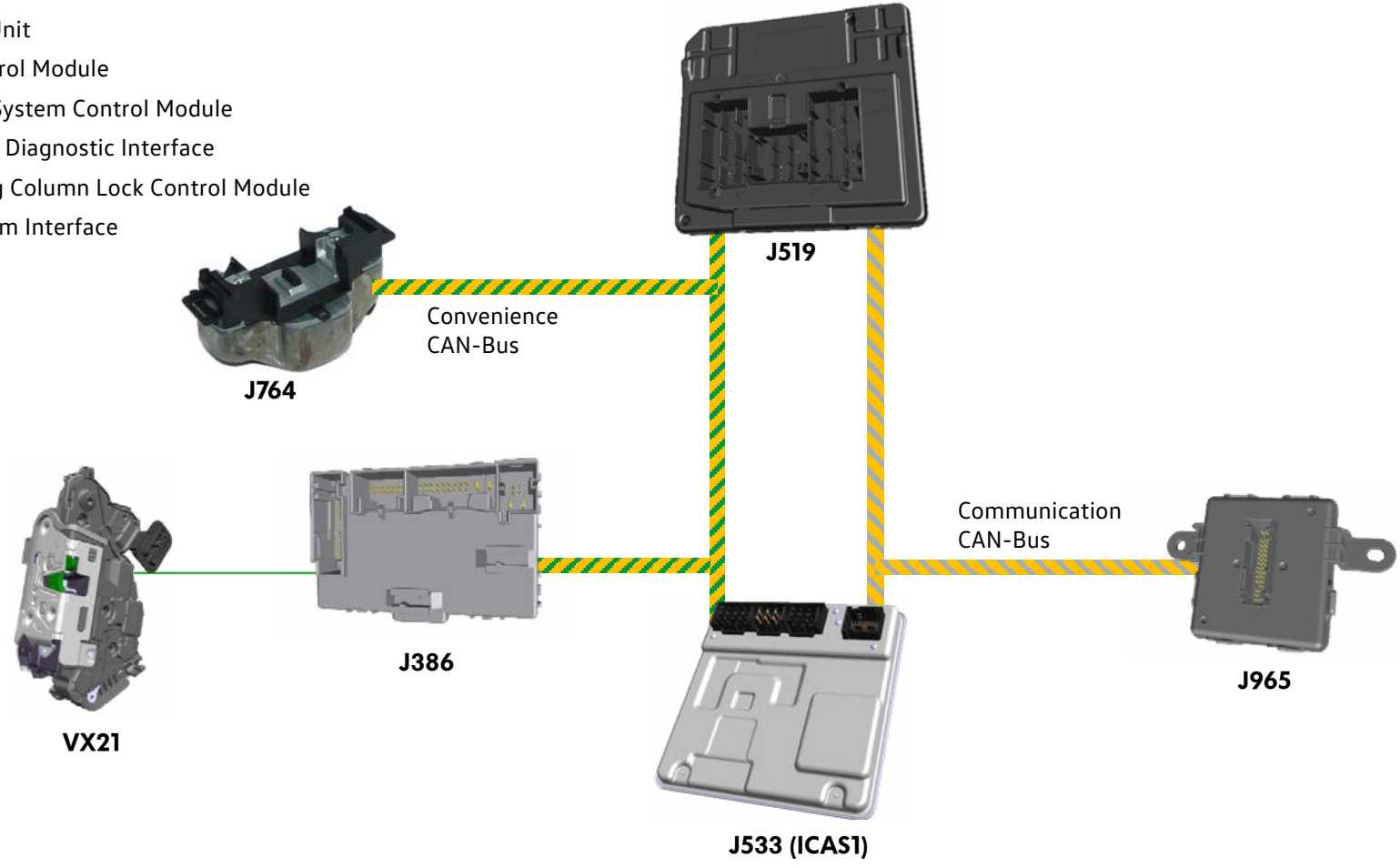
Terminal Control

Signal Sequence for Unlocking the Steering Column

This scenario starts with the driver's seat occupied, Comfort Ready active and the driver's door open. When the driver's door is closed, J965 initiates a key search in the vehicle interior. J519 receives the wireless response from vehicle key and transmits it to J533 for checking. J533 also checks the immobilizer data from J764. If the result is acceptable, the steering column is unlocked. J764 reports complete unlocking of the steering column via the Convenience CAN-Bus.

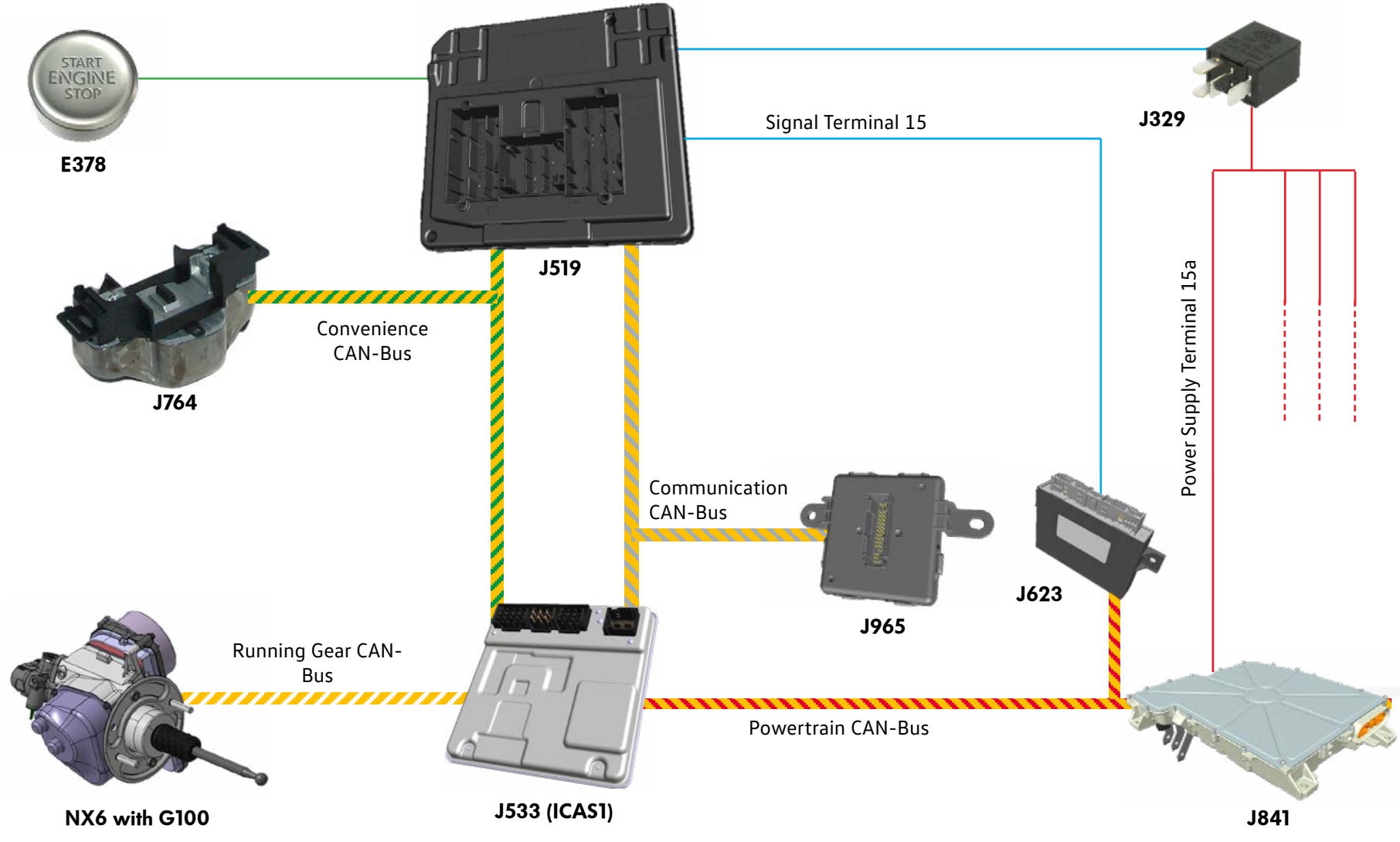
Key

VX21 Driver Door Lock Unit
J386 Driver's Door Control Module
J519 Vehicle Electrical System Control Module
J533 Data Bus on Board Diagnostic Interface
J764 Electronic Steering Column Lock Control Module
J965 Access/Start System Interface



Terminal Control

Terminal 15 Signal Sequence (additional information and component key on following page)



Terminal Control

Terminal 15 Signal Sequence (this information correlates to the previous page)

This scenario starts with the driver's seat occupied, driver's door closed and the steering column unlocked. J533 receives the driver's request to activate the ignition either by brake pedal actuation (through Running Gear CAN-Bus) or by pressing the ignition and starter button (through the Convenience CAN -Bus). J965 initiates a key search in the vehicle interior. J519 receives the wireless response from the vehicle key and transmits it to J533 for checking. If the result is acceptable, J533 sends the message "Terminal 15 active" on all data buses. J519 also sends a discrete terminal 15 signal to the J623 and activates the J329 relay to the voltage supply of terminal 15. The potential switched by J329 supplies several components in the vehicle, including the J841 to provide vehicle movement.

Key

J329 Terminal 15 Power Supply Relay
J519 Vehicle Electrical System Control Module
J533 Data Bus on Board Diagnostic Interface
J623 Engine/Motor Control Module
J764 Electronic Steering Column Lock Control Module
J841 Electric Drive Control Module
J965 Access/Start System Interface
E378 Start System Button
G100 Brake Pedal Position Sensor
NX6 Brake Booster

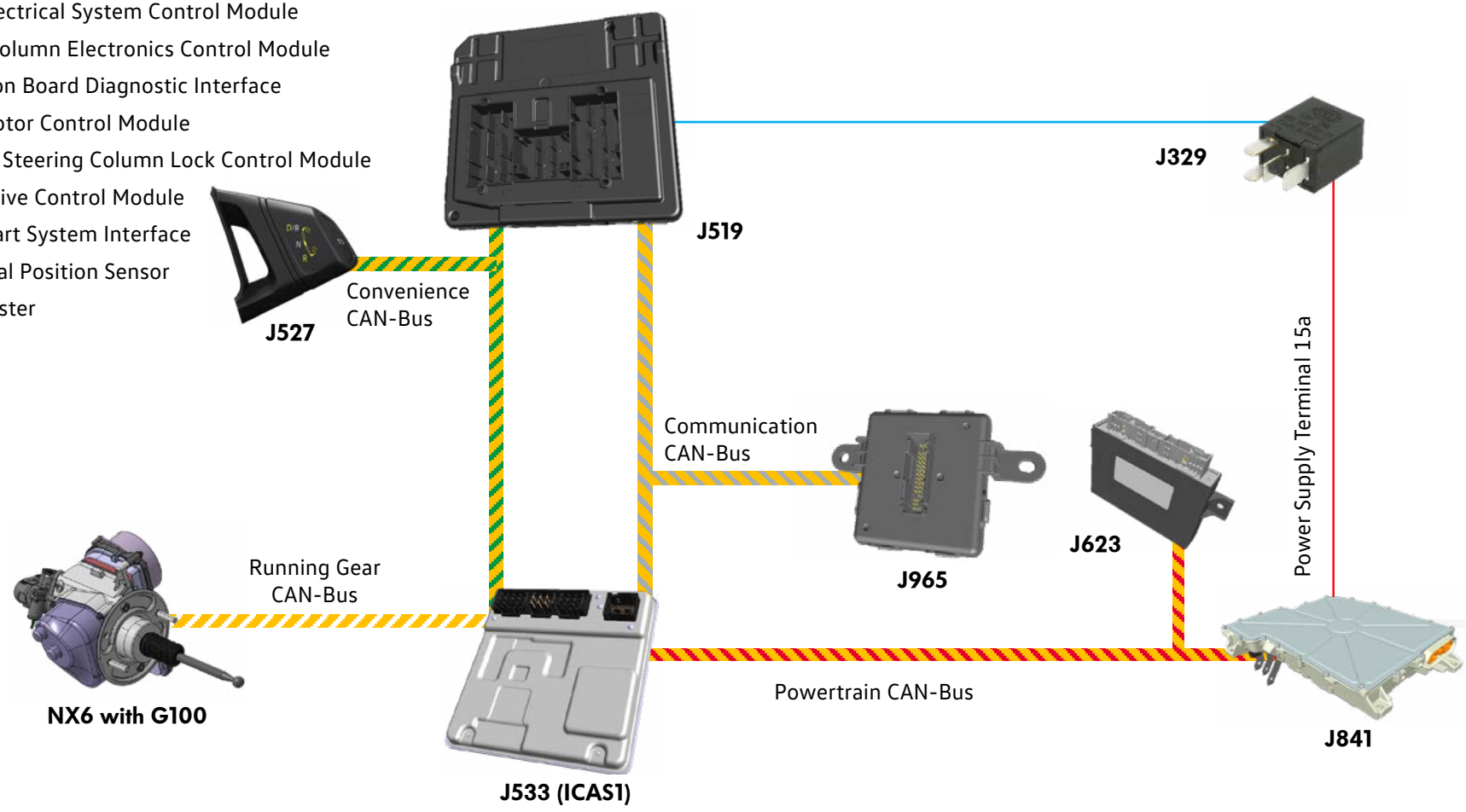
Terminal Control

Signal Sequence for Vehicle's Drive System

This scenario starts with the driver's seat occupied and terminal 15 active. J533 receives the status of the brake pedal through the Running Gear CAN-Bus. J527 transmits the position of the driving mode selector through the Convenience CAN-Bus. If the last key search in interior was completed more than 12 seconds ago, the results are considered obsolete and J533 initiates a key search via J965. J519 receives the remote response from the vehicle key and transfers it to the J533 for checking. If the result is acceptable, J533 sends the message "Terminal 50 active" on all data buses.

Key

J329 Terminal 15 Power Supply Relay
J519 Vehicle Electrical System Control Module
J527 Steering Column Electronics Control Module
J533 Data Bus on Board Diagnostic Interface
J623 Engine/Motor Control Module
J764 Electronic Steering Column Lock Control Module
J841 Electric Drive Control Module
J965 Access/Start System Interface
G100 Brake Pedal Position Sensor
NX6 Brake Booster



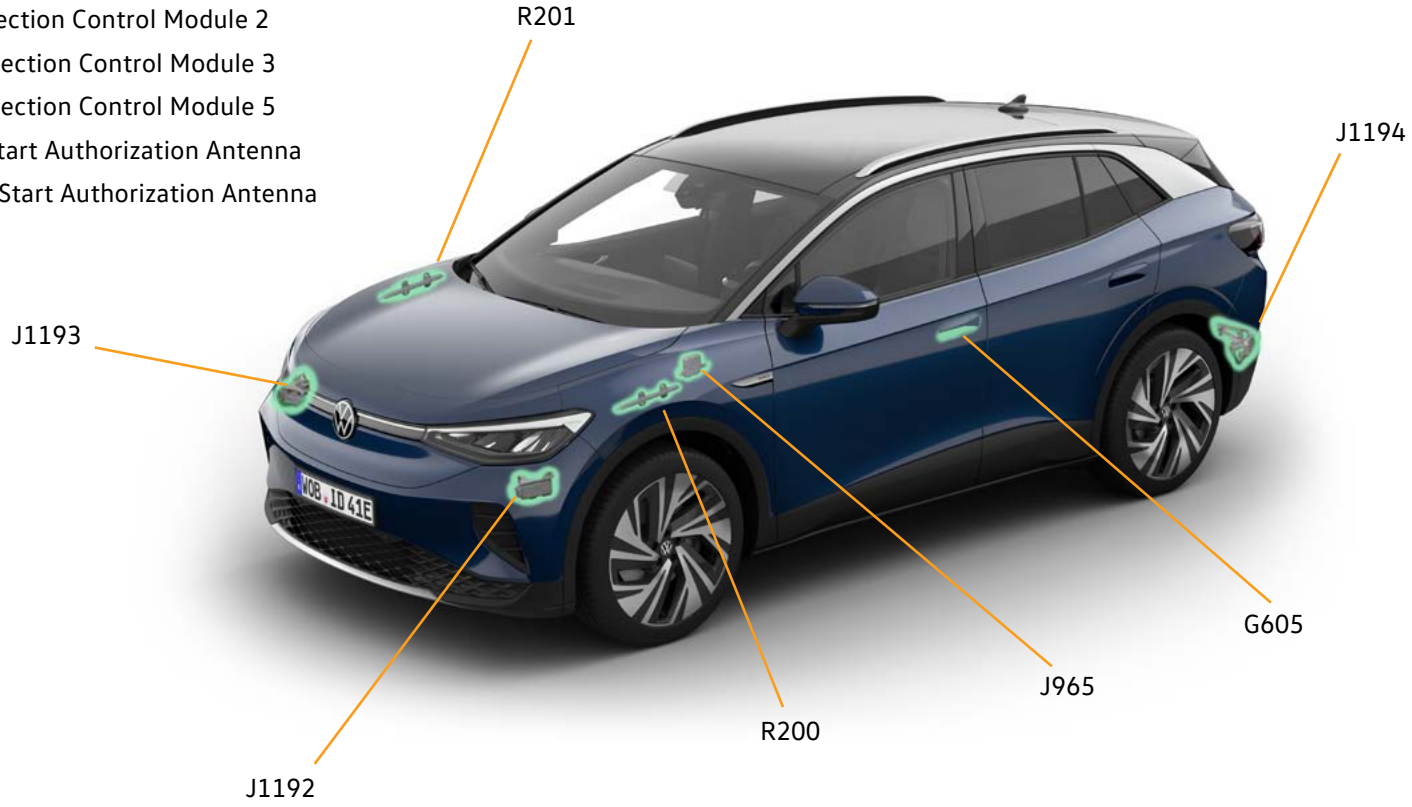
Keyless Entry and Access (KESSY)

KESSY Component Locations

In addition to KESSY antennas, Relay Station Attack Defense (RSAD) is used to block wireless attempts to break into the vehicle. Burglary Protection Modules are located on all four corners and work in the UWB range (ultra wide band) from 6.5 to 7.5 GHz.

Key:

G605 Left Front Exterior Door Handle Touch Sensor
J965 Access/Start System Interface
J1192 Burglary Protection Control Module 2
J1193 Burglary Protection Control Module 3
J1194 Burglary Protection Control Module 5
R200 Left Access/Start Authorization Antenna
R201 Right Access/Start Authorization Antenna





J1195 under the right rear fender is shown on the next page.

Keyless Entry and Access (KESSY)

Installation Locations

Key:

G605 Left Front Exterior Door Handle Touch Sensor

G606 Right Front Exterior Door Handle Touch Sensor

J1193 Burglary Protection Control Module 3

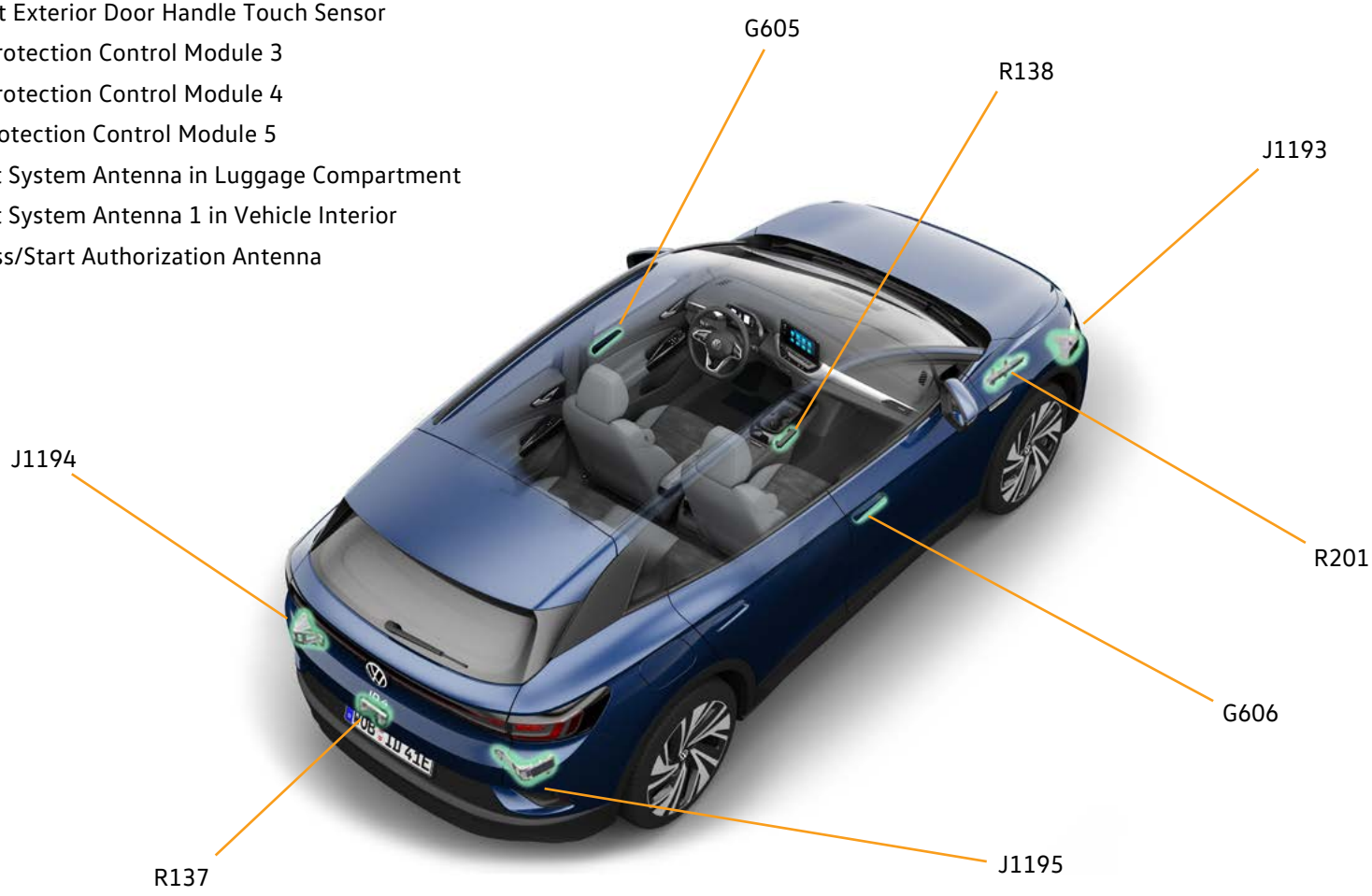
J1194 Burglary Protection Control Module 4

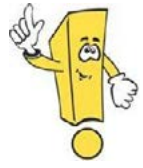
J1195 Burglary Protection Control Module 5

R137 Access/Start System Antenna in Luggage Compartment

R138 Access/Start System Antenna 1 in Vehicle Interior

R201 Right Access/Start Authorization Antenna





R200 under the left front fender is shown on the previous page.

Keyless Entry and Access (KESSY)

Installation Locations

The Keyless Access antenna located in the center console under the front storage compartment has two functions. Its primary functions is the Keyless Access interior antenna for key location However, if keys have to be adapted, it also serves as a transponder reader coil. The key then has to be placed in the storage compartment. The same applies if key batteries have died and wireless detection is no longer possible.

Key:

J519 Vehicle Electrical System Control Module

J533 Data Bus on Board Diagnostic Interface

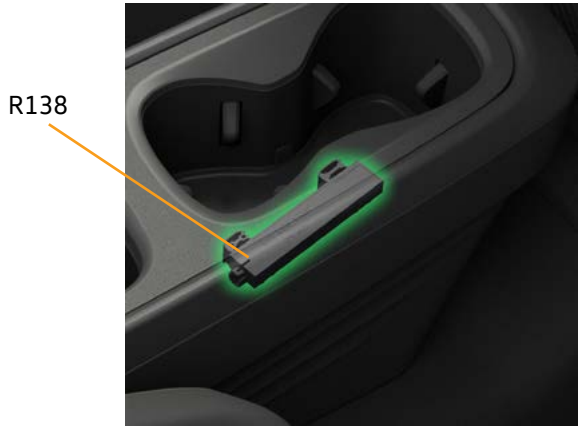
J965 Access/Start System Interface

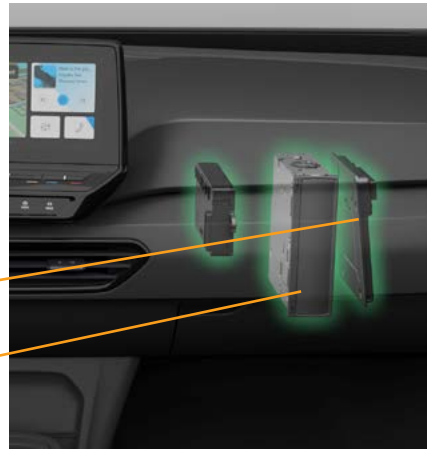
J794 Information Electronics Control Module 1

R138 Access/Start System Antenna 1 in Vehicle Interior



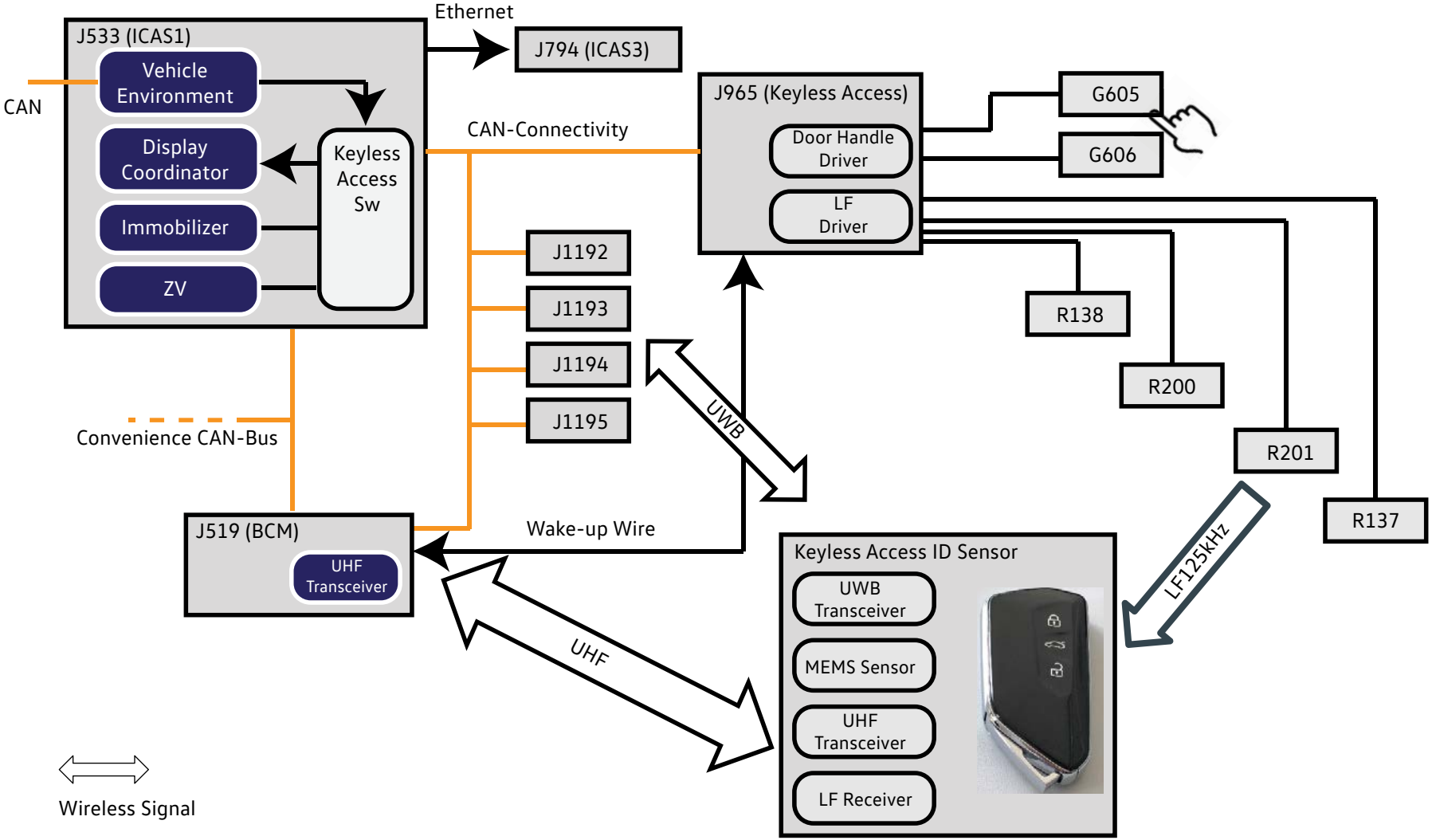






Keyless Entry and Access (KESSY)

Component Overview (component key is on the next page)



Keyless Entry and Access (KESSY)

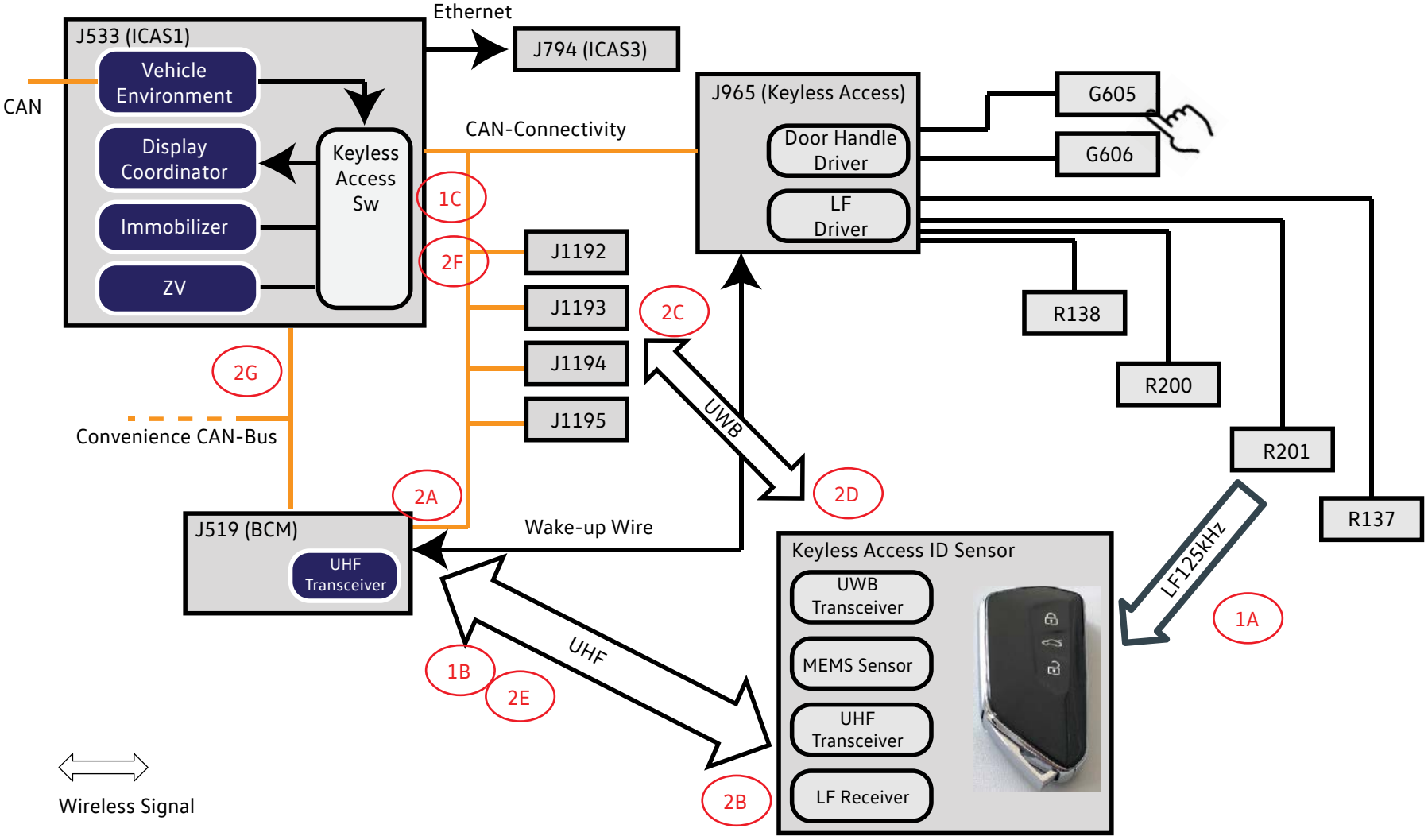
Component Overview (this information correlates to the previous page)

G605 Left Front Exterior Door Handle Touch Sensor
G606 Right Front Exterior Door Handle Touch Sensor
J519 Vehicle Electrical System Control Module
J533 Data Bus on Board Diagnostic Interface
J965 Access/Start System Interface
J794 Information Electronics Control Module 1
J1192 Burglary Protection Control Module 2
J1193 Burglary Protection Control Module 3
J1194 Burglary Protection Control Module 4
J1195 Burglary Protection Control Module 5
R137 Access/Start System Antenna in Luggage Compartment
R138 Access/Start System Antenna 1 in Vehicle Interior
R200 Left Access/Start Authorization Antenna
R201 Right Access/Start Authorization Antenna
UWB Ultra wide band. Frequency range used by VW 6.5 to 7.5 GHz
UHF 433/315 Hz frequency range (ultra high frequency)
MEMS sensor Micro electromechanical systems. Movement sensor in the key (internal transceiver is switched off after applied time and lack of motion)

Normally, the Low Frequency (LF) communication always goes from the LF aerials to the key. For emergency reading (key battery drained) or key modification in the workshop, the front Keyless Access aerial (R138) is used as a transponder reader coil and communication is bidirectional.

Keyless Entry and Access (KESSY)

Functional Overview (component key and communication information is on the next page)



Keyless Entry and Access (KESSY)

Functional Overview (this information correlates to the previous page)

Communication sequence for vehicle access:

1A J965 Access/Start System Interface monitors the access/start system antennas to detect a key within range, such as contact with one of the two capacitive door handle sensors. The key identification is sent via the LF aerials (125 kHz, low frequency). At the same time, the J519 Vehicle Electrical System Control Module is woken up through a discrete line.

1B Response 1 of the key (ID sender) is sent to the J519 by UHF (315 MHz North American Region)

1C Because the J519 only has the UHF transceiver but is not the master for access approval, it sends the signals as CAN messages via CAN-Connectivity to the access master, ICAS1.

2A Request from ICAS1 to the J519 to signal the key to send additional identification data, including the information to be requested of the RSAD control units (J1192-J1195) through CAN.

2B The J519 forwards the request to the ID sender/key (UHF).

2C Request by the key RSAD control modules for identification and individual location data (UWB).

2D Response of the RSAD control modules to the key with identification and individual location data (UWB). The RSAD control modules also transmit this data redundantly to ICAS1.

2E Response 2 by the key sent to the J519 with all identification and individual location data location data (UHF)

2F The J519 transmits the signals via CAN messages on CAN-Connectivity to the access master, ICAS1. The data is then verified by ICAS1 (including the reference data of the RSAD control modules through CAN). The data and signal times are verified through CAN in real time by ICAS1, including the reference data for the Burglary Protection Control Modules. Key responses must occur in the time it would take if the key were physically located in the action areas of the vehicle.

2G If the calculation in ICAS1 is successful, the unlock command is sent via Convenience-CAN to the front door control module, as well as to the J519 for deactivating the closing modules of the rear doors.

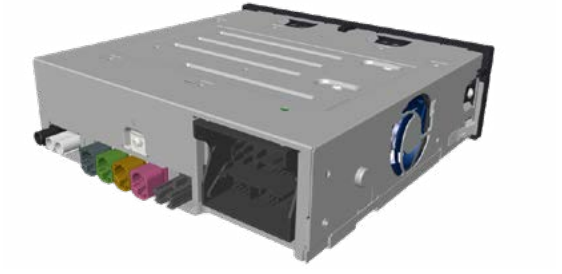
All display data is controlled via Ethernet connection from the ICAS1 to the ICAS3 to visualize the Keyless Access information and settings on the center display and the dash panel insert.

Infotainment

Overview

The ID.4 has the Discover Pro navigation system. The system has a control module, and a display and control panel.





Discover Pro Navigation System

- 10″ (Discover Pro) or 12″ (Discover Pro Max) display and control panel screen
- Screen resolution: 1,560 × 700 pixels (172 dpi)
- Control module behind the glove compartment
- Navigation map display on the infotainment display
- Contact-free gesture control
- Touch slider
- FM & DAB+ radio reception
- Data bus connections:
  - Ethernet 1 Gbit/s
  - Operation and display CAN-Databus

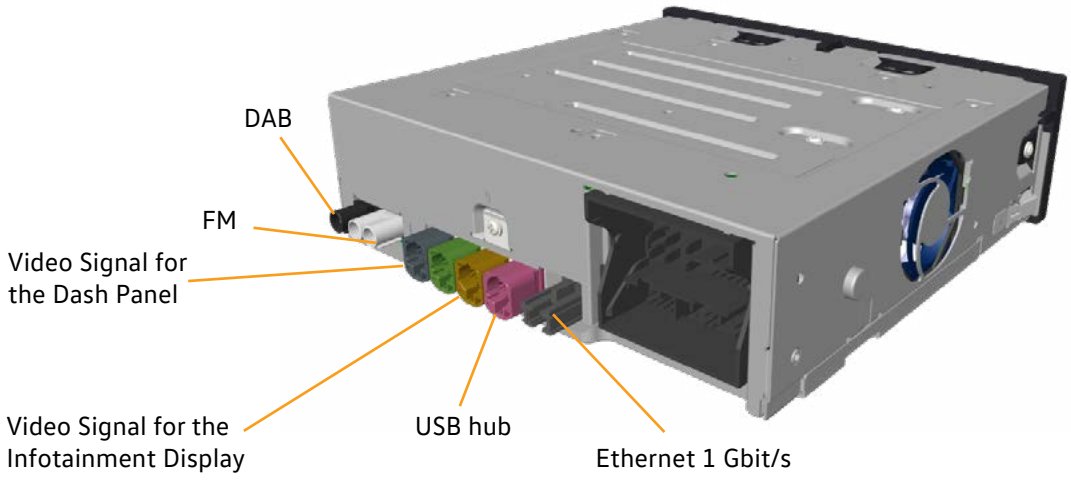
J794 Information Electronics Control Module 1 (ICAS3)

The ID.4 uses the latest generation of the Volkswagen infotainment system. The information electronics control module is one of the two high-performance computers in the vehicle. This component is often referred to as ICAS3. ICAS stands for In Car Application Server. This means that the hardware in the module is used by multiple virtual control modules. In the case of the ICAS3, these are the control modules with diagnostic addresses 5F and 8125. The functions and services are performed based on the following conditions:

- Time required to start the function
- Required computing power
- Data-Bus connection

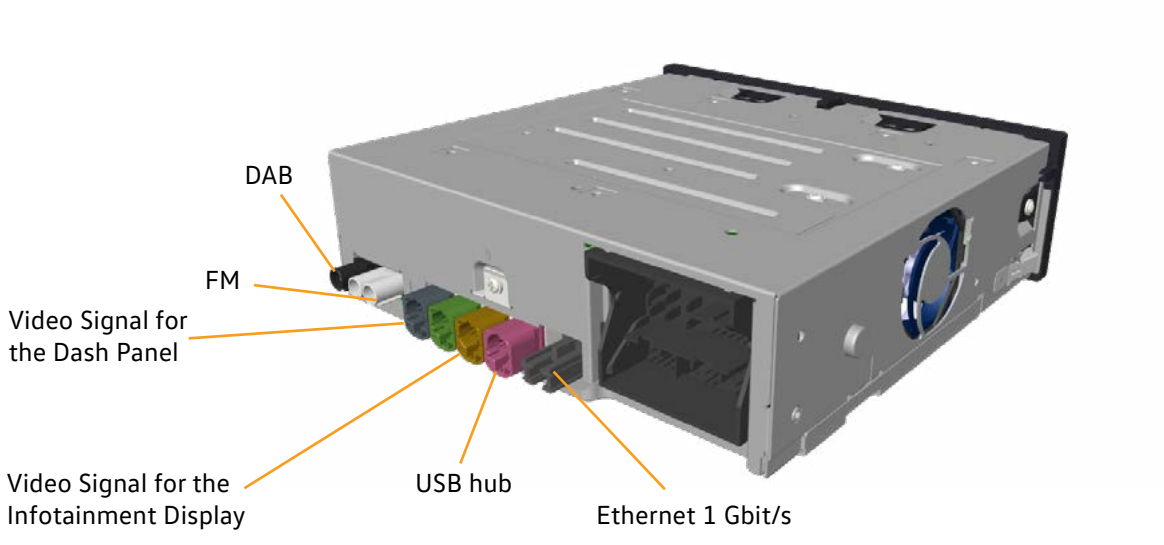
For example, functions that are required immediately after entering the vehicle are combined in a virtual control module. Functions that require a high computing power and that are not required immediately after entering the vehicle are combined in the second virtual control module. This results in two diagnostic addresses in the vehicle diagnostic tester.

The 1 Gbit/s ethernet connection ensures rapid data transmission to the second high-performance computer in the vehicle (J533 or ICAS1).



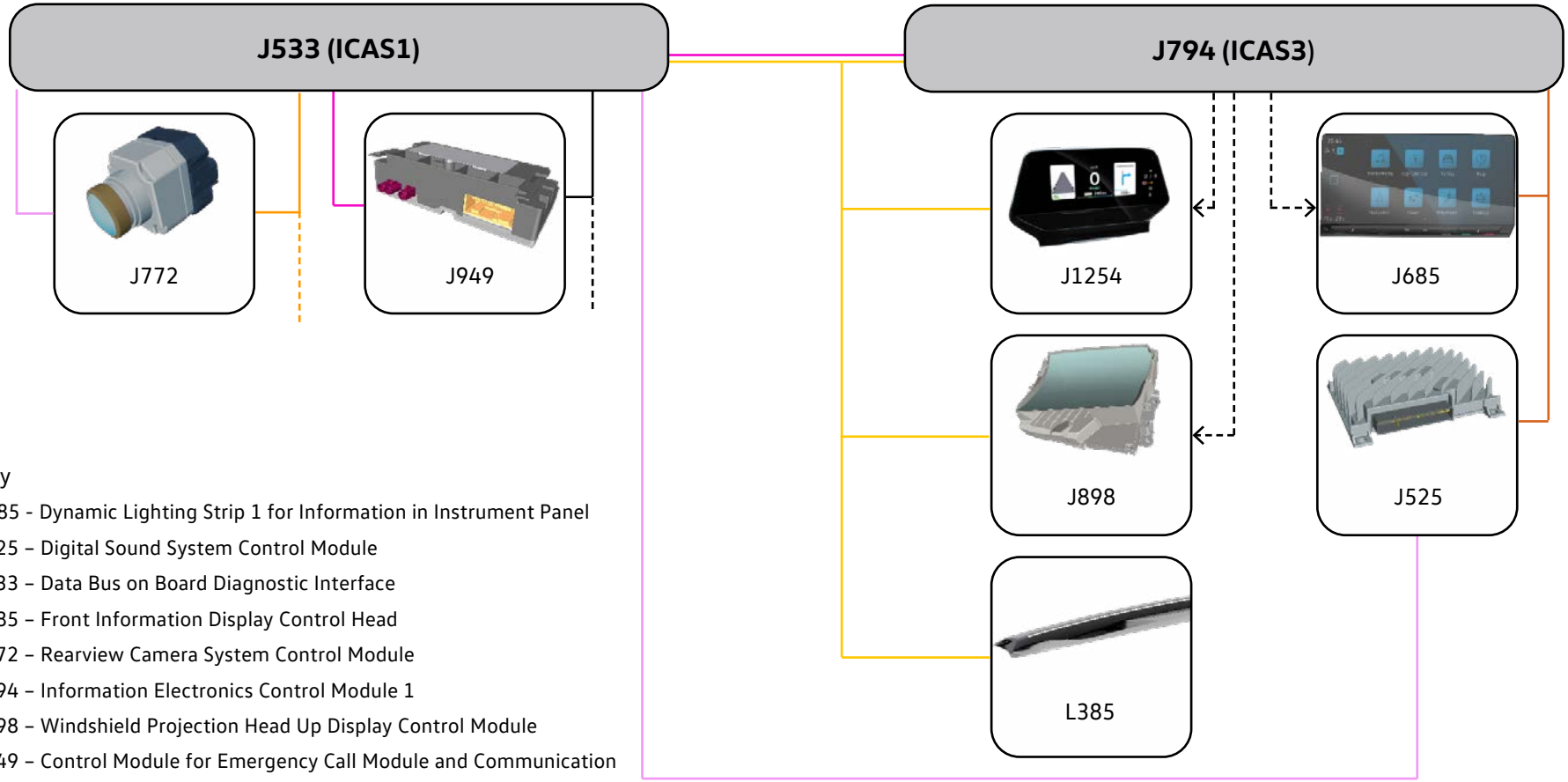
J794 Information Electronics Control Module 1 (ICAS3)

The ICAS3 module generates the graphic content for the Display and Control Panel and in the Dash Panel Insert (ID. Cockpit). The video signals are transmitted using HSD cables (high speed data) to the control modules. The LVDS (low voltage differential signal) is used for data transmission.



Infotainment

Network



Key

L385 - Dynamic Lighting Strip 1 for Information in Instrument Panel

J525 – Digital Sound System Control Module

J533 – Data Bus on Board Diagnostic Interface

J685 – Front Information Display Control Head

J772 – Rearview Camera System Control Module

J794 – Information Electronics Control Module 1

J898 – Windshield Projection Head Up Display Control Module

J949 – Control Module for Emergency Call Module and Communication Unit

J1254 –Driver Information System Control Module with Display Unit

Infotainment

Scope of Function

ID.Light is a light strip that stretches across the entire dash panel and performs both a functional and an emotional role. Dynamic light patterns are displayed using 54 RGB LEDs. It is standard equipment for the ID.4. The ID.Light is controlled by the J794 Information Electronics Control Module 1. It is only used as a secondary display of the vehicle functions for a supplementary and supportive effect.



Supporting display for the following functions:

- Welcome and goodbye
- Locking and unlocking
- Charging process
- Navigation
- Voice control
- Incoming telephone call
- Braking request from Front Assist
- Activation of absolute reserve mode (when battery charge is very low)



Absolute reserve mode is activated when the battery charge level is very low to save energy. More information about this mode can be found in the Owner's Manual.

Infotainment

Lighting Logic

The functions have different display areas along the light strip. The animations are played in the marked areas.

Driver Centered					A
Vehicle Centered					B
Across Complete Width					C
Note for Driver or Front Passenger					D



Welcome & Goodbye	A, C
Lock and Unlock	C
Charging Process	C
Navigation	C
Voice Control	D
Incoming Telephone Call	B
Braking Request	C
Absolute reserve Mode	C

L385 Dynamic Lighting Strip 1 for Information in Instrument Panel

L385 is located in the front of the dash panel and stretches over its entire width. It is secured by clips and can be removed even when the windshield and dash panel are installed.

The housing is made up of two halves. The light duct is located between these two halves.





ID.3 dash panel and components shown for illustration purposes. The ID.4 is the same construction.

Internal Structure

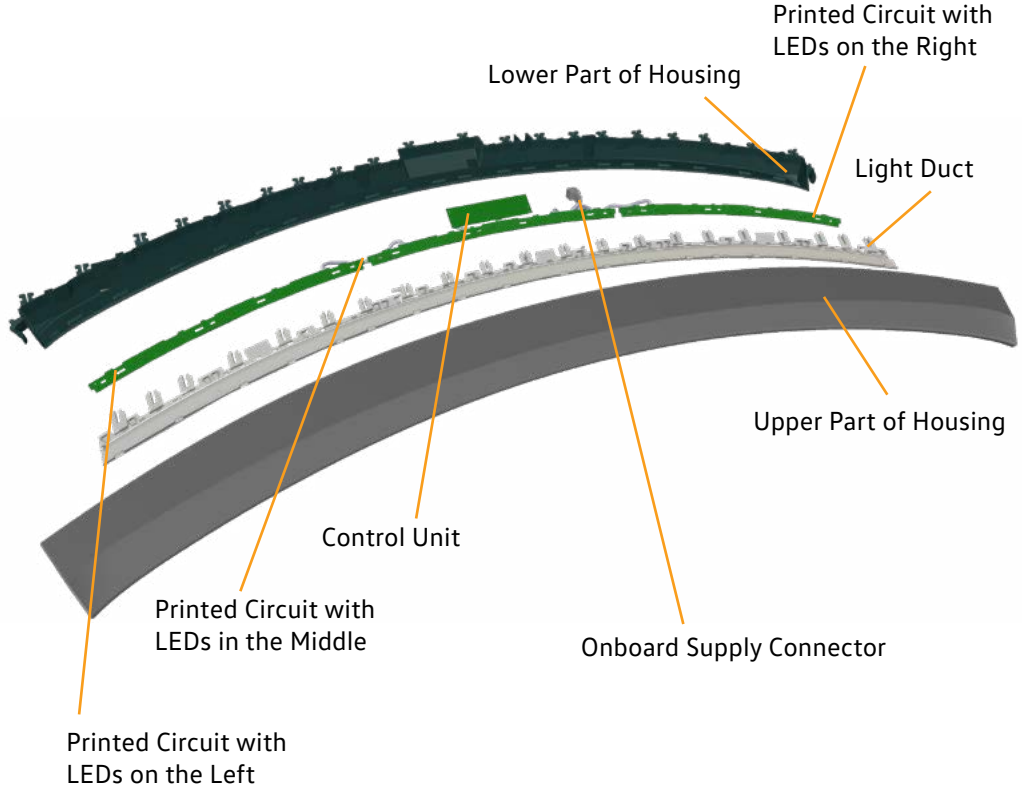
The 54 RGB LEDs are distributed on three electronic printed circuits with specific spacing. The control module is connected to the middle printed circuit. The outer printed circuits are connected to the middle printed circuit by wires.

The L385 Dynamic Lighting Strip 1 for Information in Instrument Panel is on the Display and Operation CAN-Bus and supplied with Terminal 30 voltage. It's diagnostic address is 8128.

The light animations are stored in its internal memory. Depending on the situation, ICAS3 (J794 Information Electronics Control Module 1) calls up the respective animation. ICAS3 controls all animations except for the lock/unlock function, which are controlled by ICAS1 (J533 Data Bus on Board Diagnostic Interface).

After L385 is replaced, the memory of the new component does not initially contain any animations. Only a few LEDs at both ends of the light strip are active. The light animations are automatically transmitted by the ICAS3 during the first bus sleep mode. This transmission process takes approximately five minutes.

Be very cautious removing light, especially at the connector in the right center. The strip connector can be easily torn.



J1254 Driver Information System Control Module with Display Unit

Instead of the classic dash panel insert, the ID.3 is equipped with a digital display for the driver information system. The J1254 is located in housing along with the driving mode selector and the parking brake button. Acoustic warnings and alerts are output using the stereo system loudspeakers. The functions of J1254 are very different from previous instrument clusters. For example, no infotainment content, vehicle status or driving data are displayed. Also, it is not a part of the Immobilizer or component protection systems.

- Display size: 5.3"
- Display resolution: 800x400 pixel (169dpi)
- Graphics provided via ICAS3
- Integrated driving mode indicator via LEDs next to the display
- Four warning lamps as LEDs
- Participant in Display and Operation CAN-Bus





Driving Position
Selector Housing

Infotainment

Views

The driver can switch between three views using the VIEW touch control of the multifunction steering wheel:

- Driver assist systems
- Standard
- Navigation

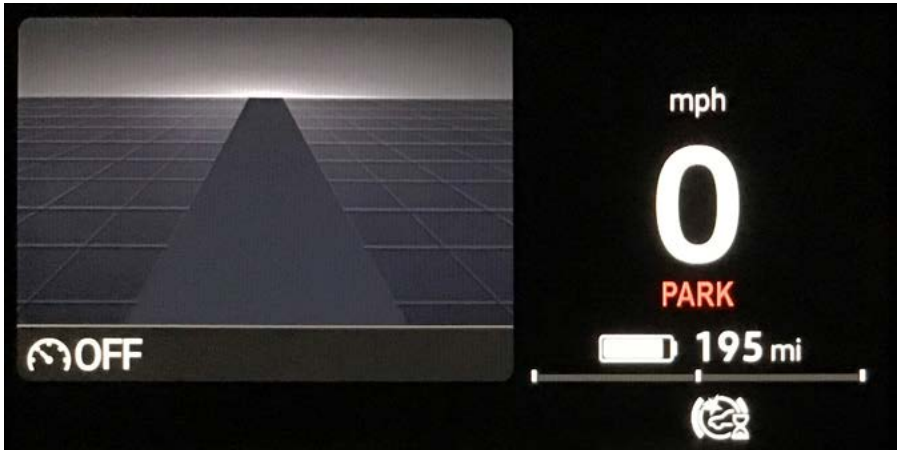
The vehicle always starts in the standard view.



Touch Control



Standard View



Driver Assist Systems View

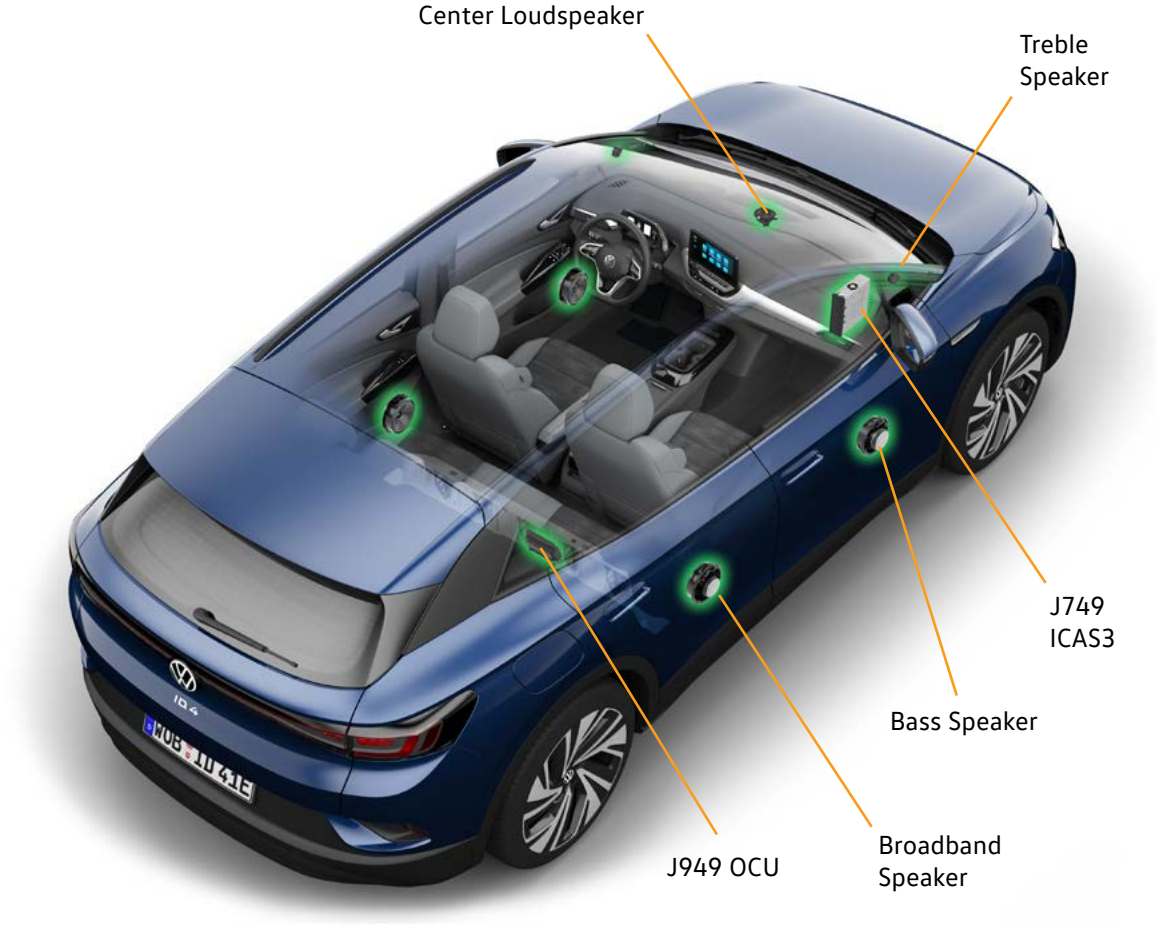


Navigation View

Sound Systems

The ID.4 sound system has 7 loudspeakers. The standard center loudspeaker has a double function. It is used for both music playback and for emergency call communication. To ensure it functions in an emergency, it is connected to the J949 Control Module for Emergency Call Module and Communication Unit (OCU). The remaining loudspeakers are driven by the J794 Information Electronics Control Module 1 (ICAS3).

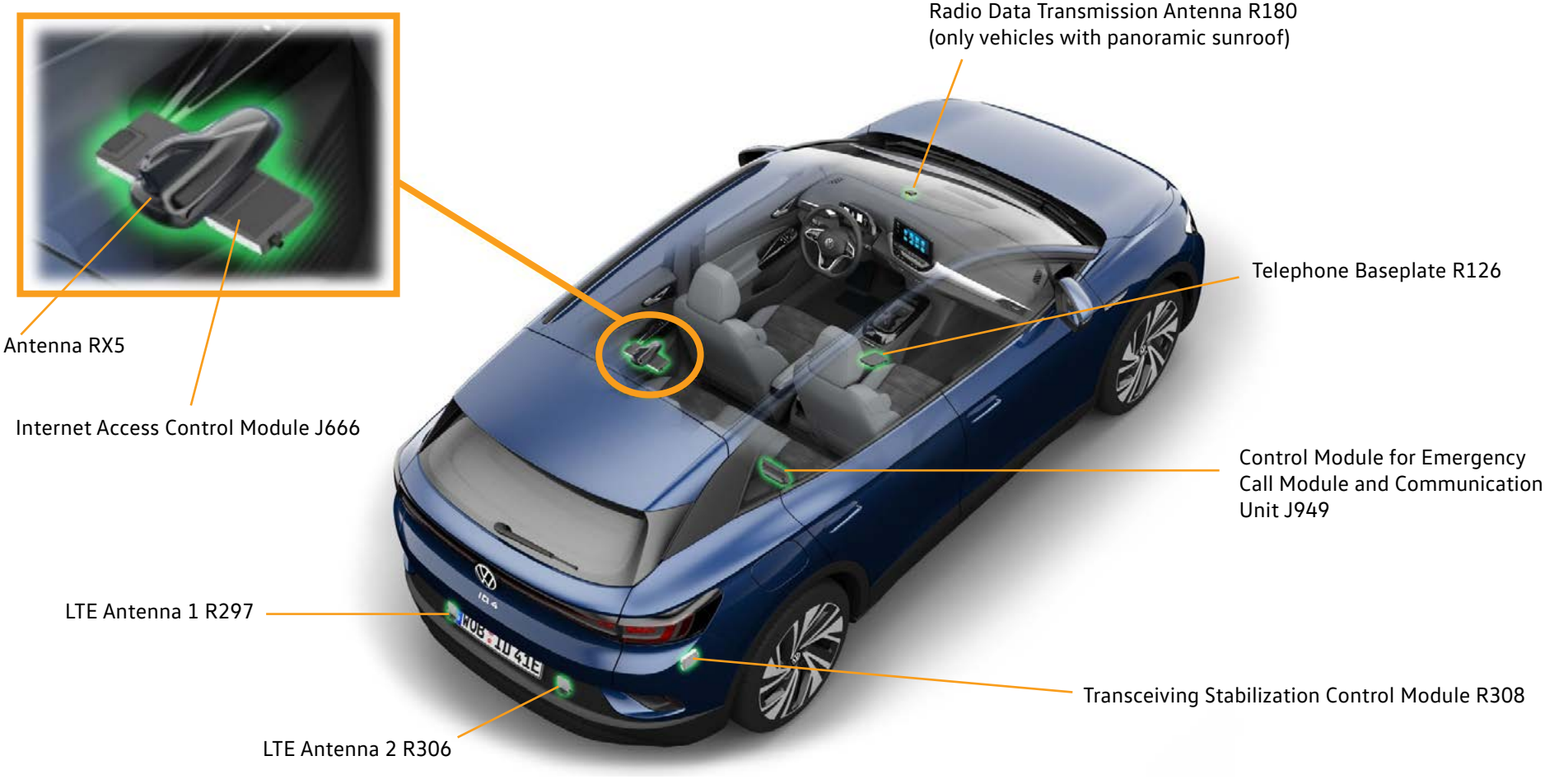
All acoustic warnings in the vehicle (parking aid and instrument cluster) come through the sound system loudspeakers.



Antenna Systems

Mobile Communications Antennas

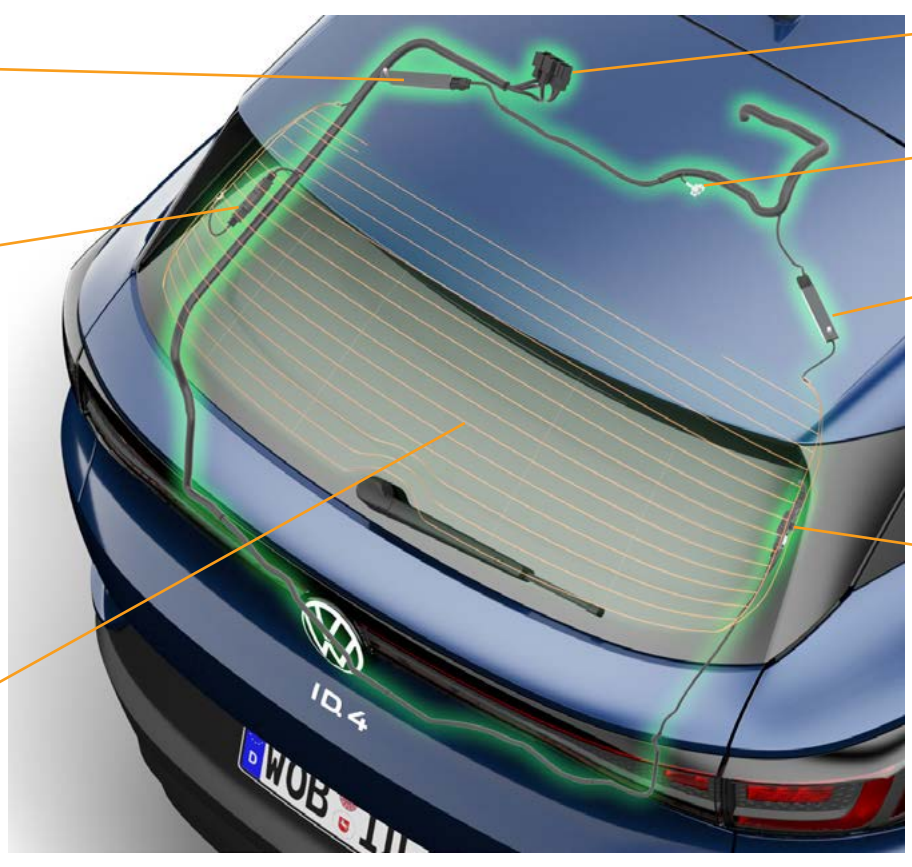
The illustration shows the mobile communication aerials. In vehicles with a panoramic sunroof, the Radio Data Transmission Antenna R180 and the Roof Antenna RX5 are located above the front camera.



Antenna Systems

Radio Antennas

This illustration shows the antenna components.





Volkswagen Group of America
2200 Ferdinand Porsche Drive
Herndon, VA 20171
June 2021