

Technical training.
Product information.

G29 General Vehicle Electronics



BMW Service

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Technical Training

ST1834

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General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:



Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status: October 2018

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

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For changes/additions to the technical data, repair procedures, please refer to the current information issued by BMW of North America, LLC, Technical Service Department.

This information is available by accessing TIS at www.bmwcenternet.com.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application
- Aftersales Information Research (AIR)

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1. Introduction

1.1. Additional documents

This Product Information presents the new features of and changes to the general vehicle electrical system in the G29. The focus is particularly on **vehicle-specific** features. Basic, **system-specific** descriptions of the General Vehicle Electrical system, as well as other innovations in 2018, can be found in the product information **ST1856 General Vehicle Electronics 2018**, **ST1855 Displays and Controls 2018** and **ST1857 Infotainment 2018**.

G29 General Vehicle Electronics

2. Bus Overview

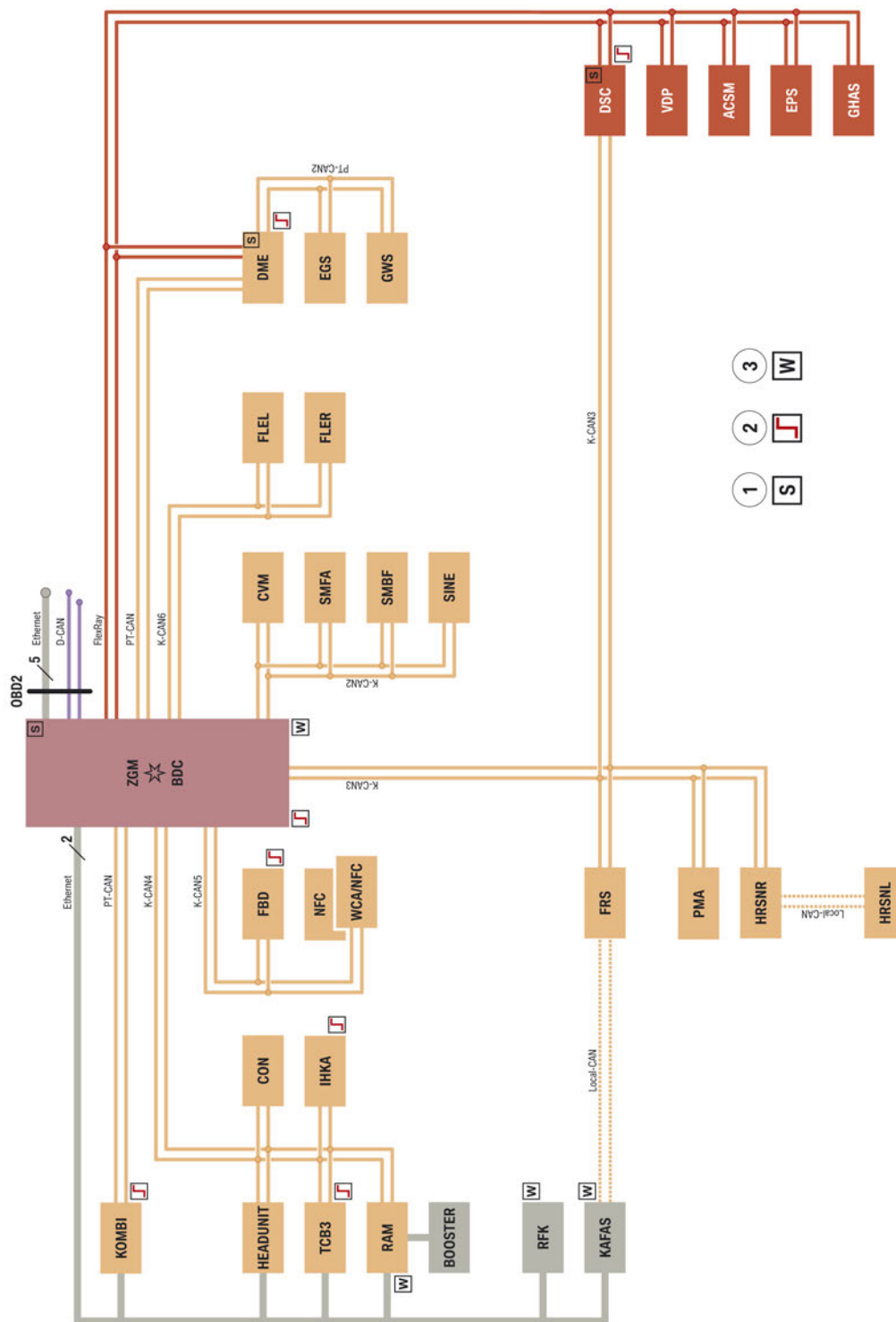
2.1. Bus overview

The G29 receives a bus system with the 2018 service pack. Special features of this bus system include:

- Omission of MOST bus
- Addition of a K-CAN6

G29 General Vehicle Electronics

2. Bus Overview



G29 bus overview

G29 General Vehicle Electronics

2. Bus Overview

Index	Explanation
ACSM	Advanced Crash Safety Module
BDC	Body Domain Controller
BOOSTER	Booster (audio amplifier)
CON	Controller
CVM	Convertible top module
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EGS	Electronic transmission control
EPS	Electronic Power Steering
FBD	Remote control receiver
FLEL	Frontal Light Electronics Left
FLER	Frontal Light Electronics Right
FRS	Front radar sensor
GHAS	Regulated rear axle differential lock
GWS	Gear selector switch
HEAD UNIT	Head unit
HRSNL	Rear radar sensor short range left
HRSNR	Rear radar sensor short range right
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver assistance systems
KOMBI	Instrument panel
NFC	Near Field Communication
PMA	Parking Manoeuvring Assistant
RAM	Receiver Audio Module
RFK	Rear view camera
SINE	Siren with tilt alarm sensor
SMBF	Front passenger seat module
SMFA	Driver's seat module
TCB3	Telematic Communication Box 3
VDP	Vertical Dynamic Platform
WCA	Wireless charging station
ZGM	Central Gateway Module
1	Start-up nodes
2	Wake-up authorization
3	Wake-up line

G29 General Vehicle Electronics

3. Voltage Supply

Index	Explanation
1	Digital Motor Electronics (DME)
2	Integrated supply module
3	Starter motor
4	Alternator
5	Power distribution box, engine compartment
6	Positive battery connection point
7	Advanced Crash Safety Module (ACSM)
8	Power distribution box, front right
9	Body Domain Controller (BDC)
10	Power distribution box, luggage compartment
11	Power distribution box, battery
12	Safety battery terminal
13	Battery
14	Intelligent battery sensor (IBS)

In the G29 vehicles with the (B46 engine) receive a dual storage system.

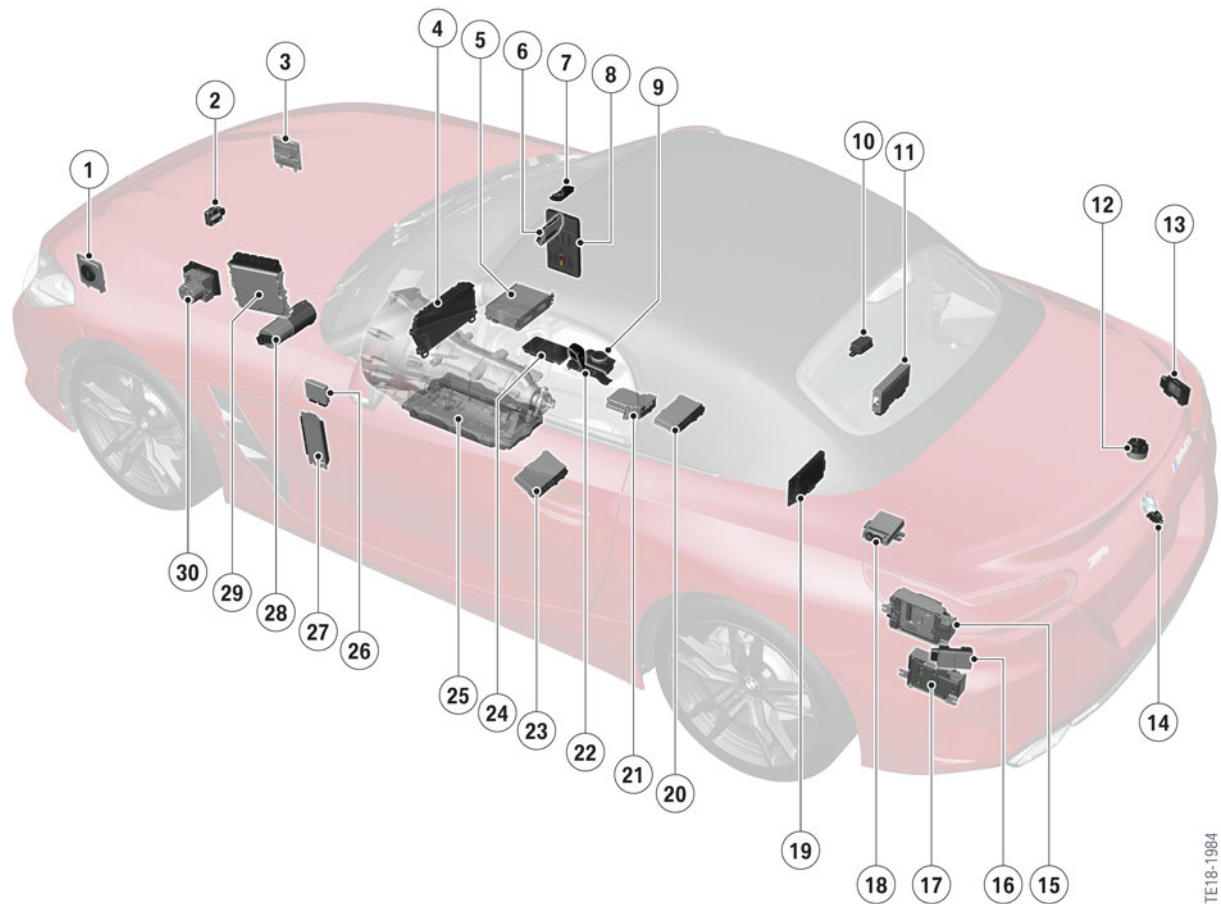
G29 General Vehicle Electronics

4. General Vehicle Electronics

4.1. Control units

4.1.1. Installation location

The following graphic shows the maximum equipment.



G29 installation location of control units

Index	Explanation
1	Frontal Light Electronics Left (FLEL)
2	Front radar sensor (FRS)
3	Frontal Light Electronics Right (FLER)
4	Instrument cluster (KOMBI)
5	Head unit
6	Integrated automatic heating/air conditioning (IHKA)
7	Camera-based driver support systems (KAFAS)
8	Body Domain Controller (BDC)
9	Controller (CON)

G29 General Vehicle Electronics

4. General Vehicle Electronics

Index	Explanation
10	Remote control receiver (FBD)
11	Soft top module (CVM)
12	Siren with tilt alarm sensor (SINE)
13	Rear radar sensor short range right (HRSNR)
14	Rear view camera (RFK)
15	Receiver Audio Module (RAM)
16	Rear radar sensor short range left (HRSNL)
17	Booster
18	Regulated rear axle differential lock (GHAS)
19	Telematic Communication Box 3 (TCB3)
20	Front passenger seat module (SMBF)
21	Advanced Crash Safety Module (ACSM)
22	Gear selector switch (GWS)
23	Driver's seat module (SMFA)
24	Wireless charging station (WCA)/Near Field Communication (NFC)
25	Electronic transmission control (EGS)
26	Parking Manoeuvring Assistant (PMA)
27	Vertical Dynamic Platform (VDP)
28	Electronic Power Steering (EPS)
29	Digital Motor Electronics (DME)
30	Dynamic Stability Control (DSC)

4.1.2. Telematic Communication Box 3

The G29 receives a **new** control unit, the Telematic Communication Box 3 (TCB3). The TCB3 is the latest generation of the telematics control units. The TCB3 in the G29 is installed in the luggage compartment.

G29 General Vehicle Electronics

4. General Vehicle Electronics



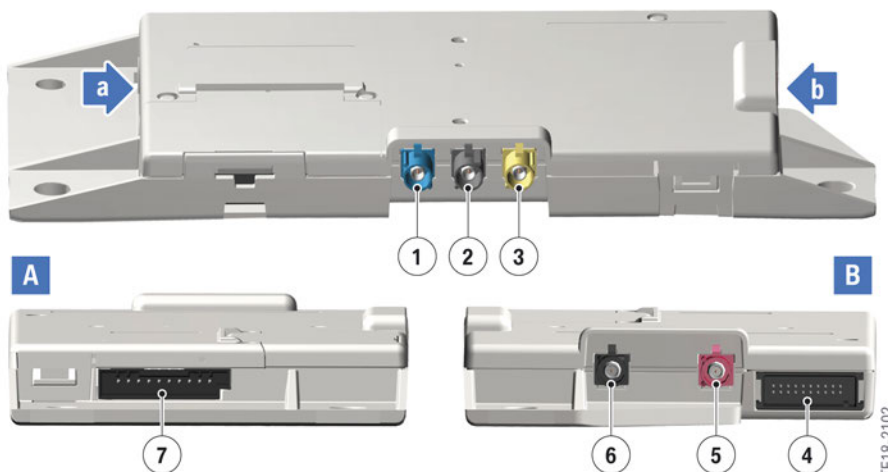
G29 installation location of the TCB3

Index	Explanation
1	Telematic Communication Box 3 (TCB3)

The differences between the TCB3 and the TCB2 are the following:

- LTE advanced (4.5 G)
- Higher data transfer (up to 300 MBit/s)
- New safety standard (IPSEC)
- No integrated Internet hotspot (in the Head Unit High 3)

Connections



G29 Telematic Communication Box 3 connections

G29 General Vehicle Electronics

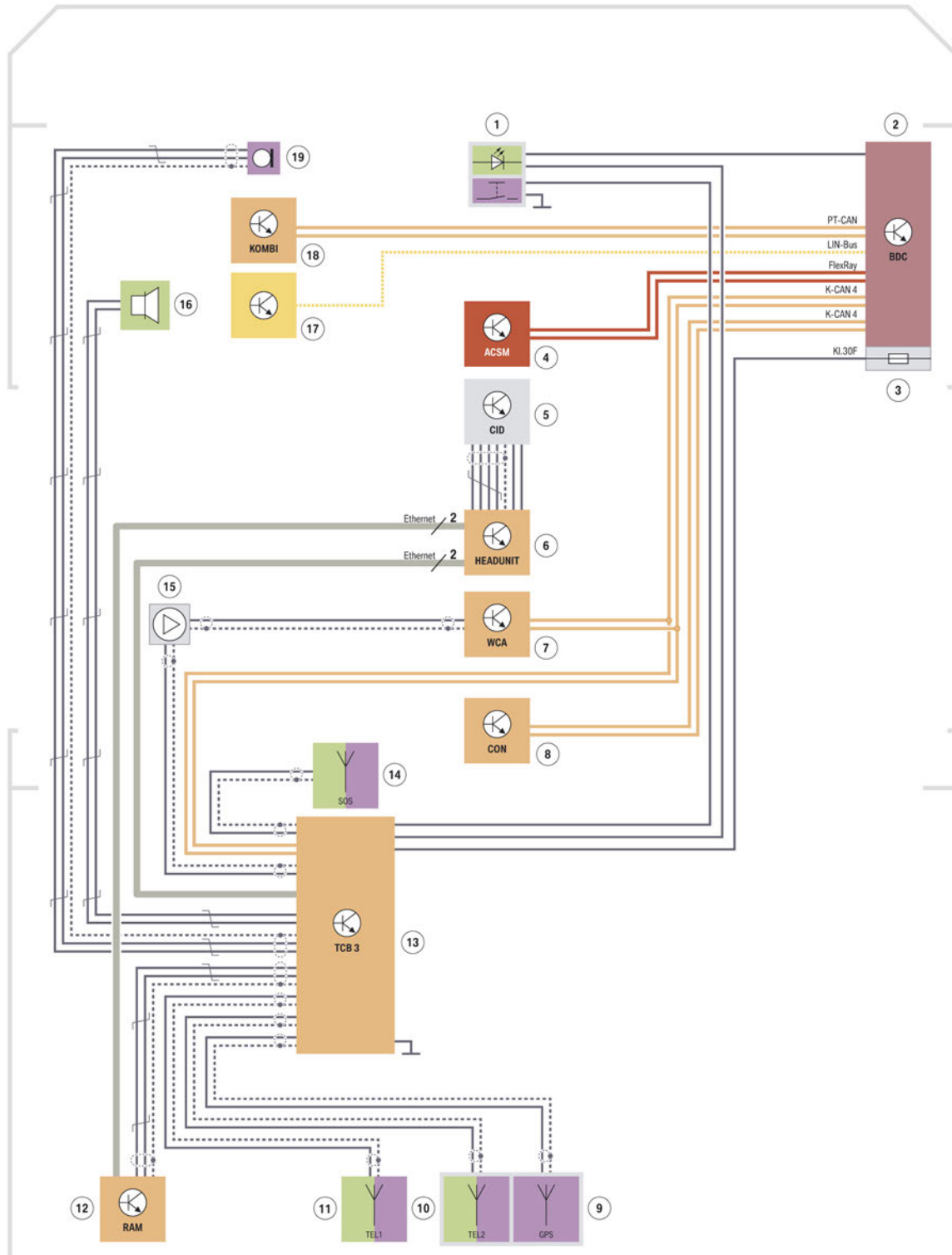
4. General Vehicle Electronics

Index	Explanation
1	GPS antenna
2	Telephone antenna
3	Telematic antenna
4	Ethernet, K-CAN4, microphone on driver's side
5	Wireless charging station (WCA)
6	Emergency GSM antenna
7	Emergency loudspeaker, voltage supply, emergency call button, emergency call LED

G29 General Vehicle Electronics

4. General Vehicle Electronics

System wiring diagram



G29 Telematics

TE18-2103

G29 General Vehicle Electronics

4. General Vehicle Electronics

Index	Explanation
1	Emergency call button and emergency call LED
2	Body Domain Controller (BDC)
3	Fuse for Body Domain Controller power distribution box
4	Advanced Crash Safety Module (ACSM)
5	Central Information Display (CID)
6	Head Unit High 3 (HU-H3)
7	Wireless charging station (WCA)
8	Controller (CON)
9	GPS antenna
10	Telematic antenna
11	Telephone antenna
12	Receiver Audio Module (RAM)
13	Telematic Communication Box 3 (TCB3)
14	GSM antenna for emergency
15	Line amplifier
16	Emergency speaker
17	Steering column switch cluster
18	Instrument cluster (KOMBI)
19	Microphone, driver's side

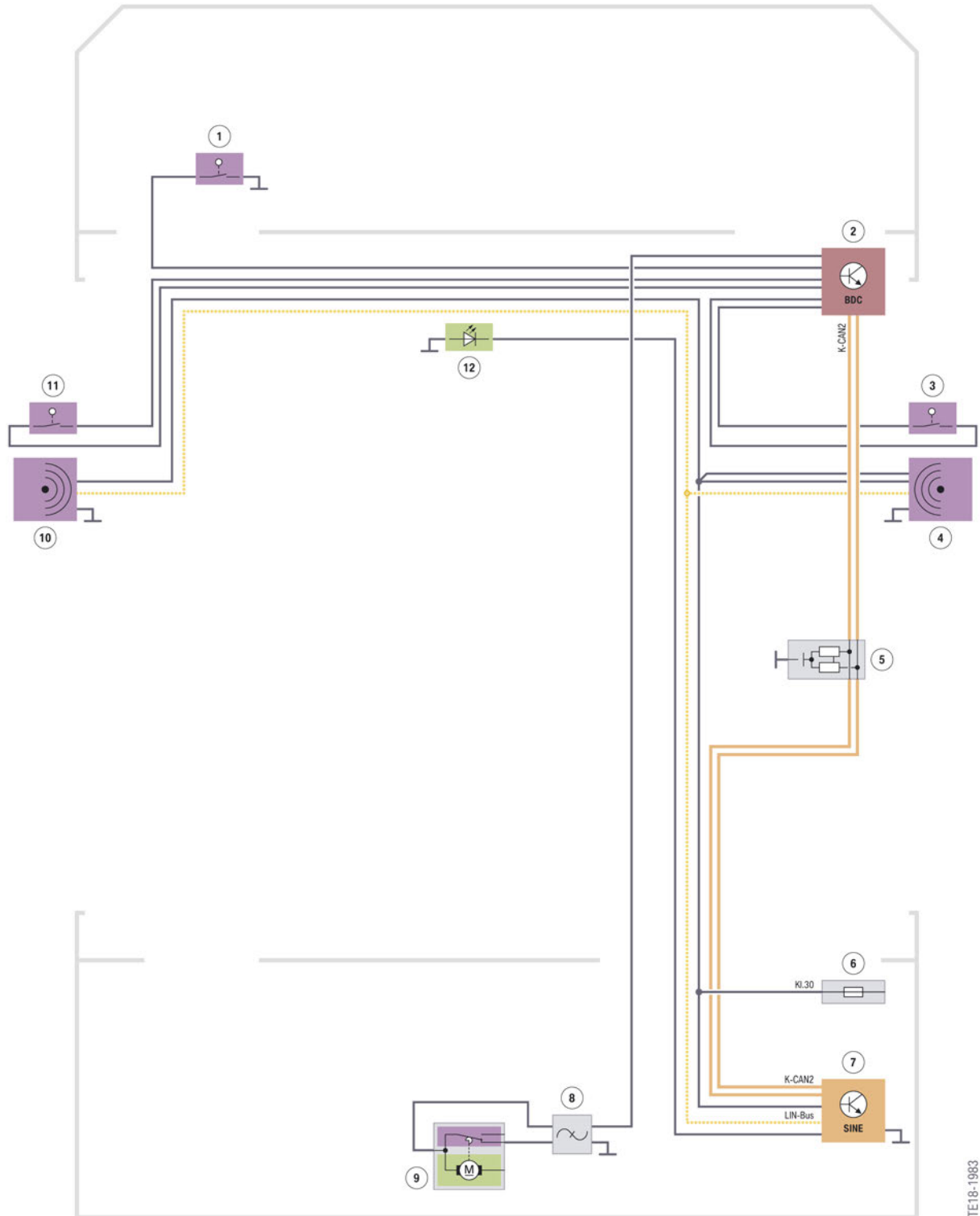
4.2. Alarm system

The G29 has microwave sensors for the alarm system in the driver's door and front passenger door. The control unit Siren with tilt alarm sensor (SINE) is also used in the convertible.

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.2.1. System wiring diagram



G29 alarm system

TE18-1983

G29 General Vehicle Electronics

4. General Vehicle Electronics

Index	Explanation
1	Engine compartment lid contact switch
2	Body Domain Controller (BDC)
3	Door lock, right
4	Microwave sensor, passenger's door
5	CAN terminator
6	Fuse for luggage compartment power distribution box
7	Siren with tilt alarm sensor (SINE)
8	Interference suppression filter
9	Tailgate lock
10	Microwave sensor, driver's door
11	Door lock, left
12	Alarm system LED

4.3. Comfort Access

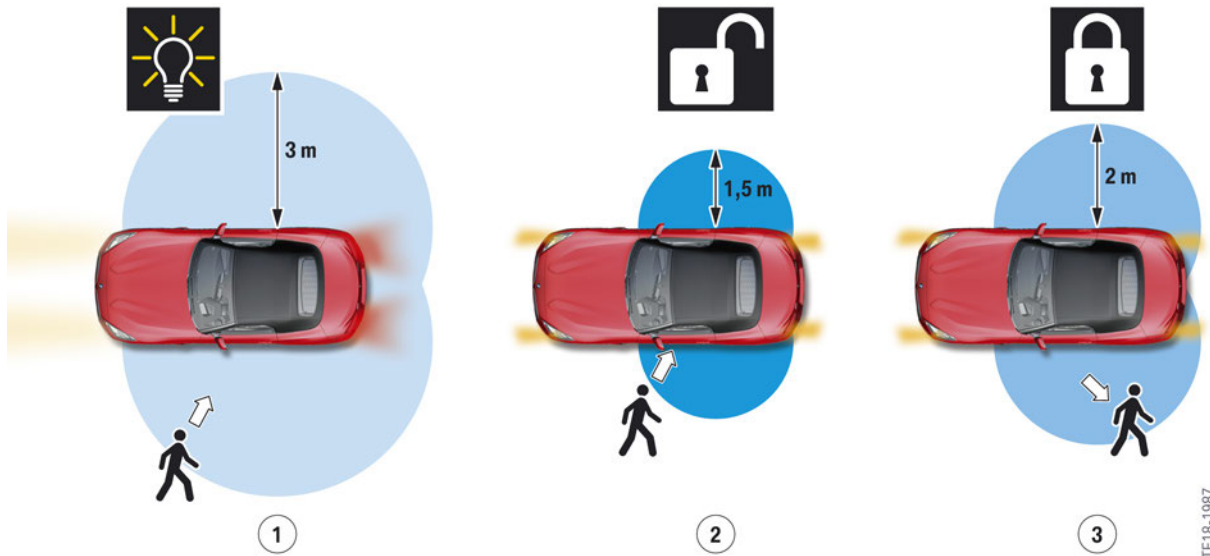
Comfort Access (SA 322) is available as optional equipment. Comfort Access includes locking and unlocking the vehicle without a key and the use of a BMW Digital Key. More information on the BMW Digital Key can be found in the following product information **ST1856 General Vehicle Electronics 2018**.

In the G29 the new Comfort Access 2.0 is used, with which the doors automatically unlock when approaching the vehicle and automatically lock on moving away from the vehicle.

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.3.1. Function



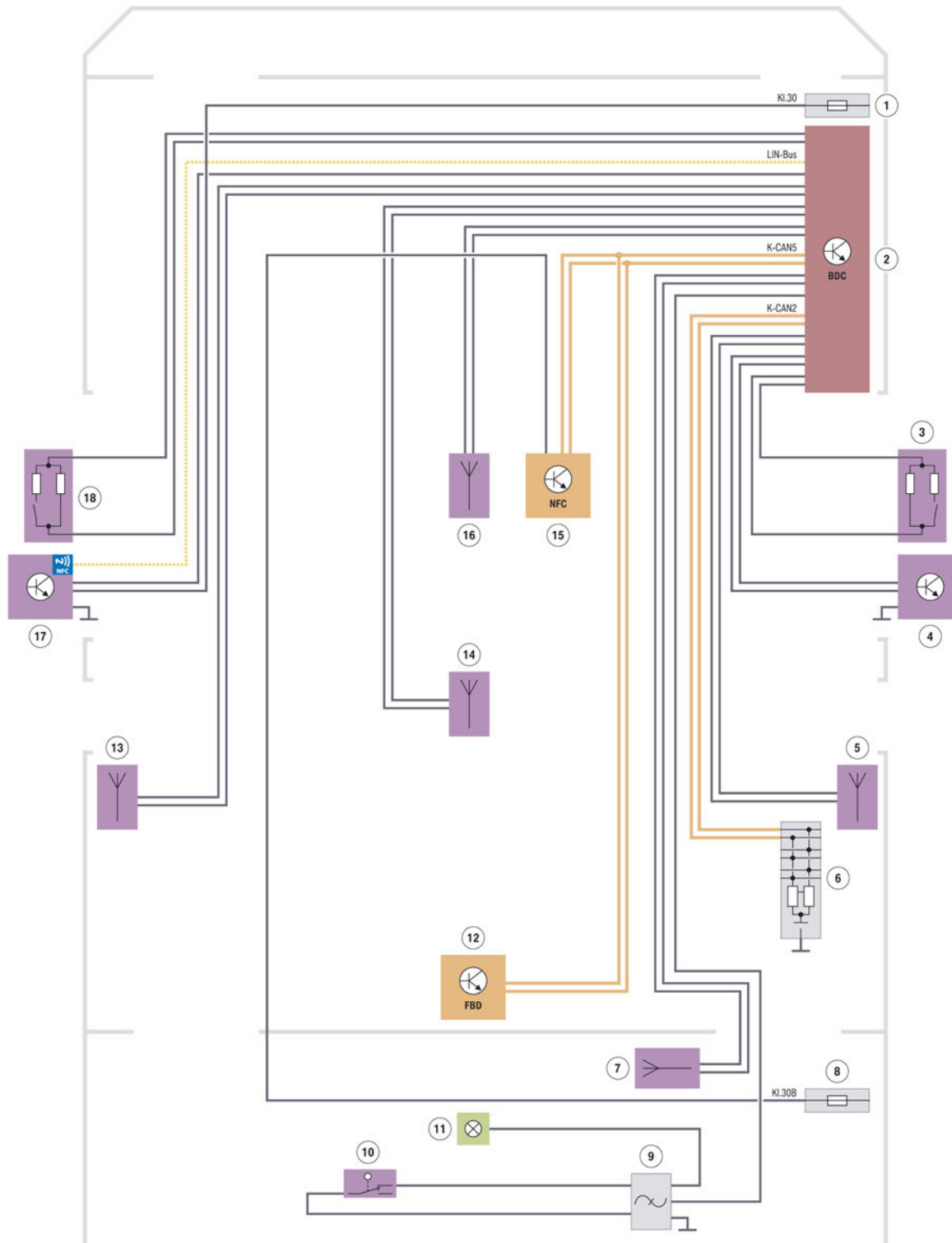
G29 operating principle of Comfort Access 2.0

Index	Explanation
1	Welcome light on approaching the vehicle
2	Automatic release of door locks on approaching the vehicle further
3	Automatic central locking system on moving away from the vehicle

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.3.2. System wiring diagram



TE18-1982

G29 Comfort Access

G29 General Vehicle Electronics

4. General Vehicle Electronics

Index	Explanation
1	Fuse for front right power distribution box
2	Body Domain Controller (BDC)
3	Door lock, right
4	Outside door handle electronics (TAGE), right
5	Exterior antenna, right
6	CAN terminator
7	Luggage compartment antenna
8	Fuse for luggage compartment power distribution box
9	Interference suppression filter
10	Tailgate lock
11	Luggage compartment light
12	Remote control receiver (FBD)
13	Exterior antenna, left
14	Interior antenna
15	Near Field Communication (NFC)
16	Interior antenna
17	Outside door handle electronics (TAGE), left, incl. Near Field Communication
18	Door lock, left

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.3.3. BMW Digital Key

A BMW Digital Key is available in conjunction with the optional equipment Comfort Access (SA 322). With Comfort Access the vehicle can be unlocked via a compatible Samsung® smartphone and also able to start the engine.



G29 Near Field Communication

Only the driver's door can be unlocked with the digital key since the relevant NFC electronics are located in the drivers door handle.



G29 antenna, Near Field Communication

Index	Explanation
1	NFC antenna and electronics

The smartphone must be placed in the wireless charging smartphone tray to start the engine. The NFC electronics are also located in the smartphone tray.

G29 General Vehicle Electronics

4. General Vehicle Electronics



G29 smartphone tray

4.4. Lighting

There are 2 different equipment specifications available for the lighting:

- LED headlights (standard equipment)
- Adaptive Full LED lights (SA 552)

The LED modules are activated via the two control units Frontal Light Electronics Left (FLEL) and Frontal Light Electronics Right (FLER).

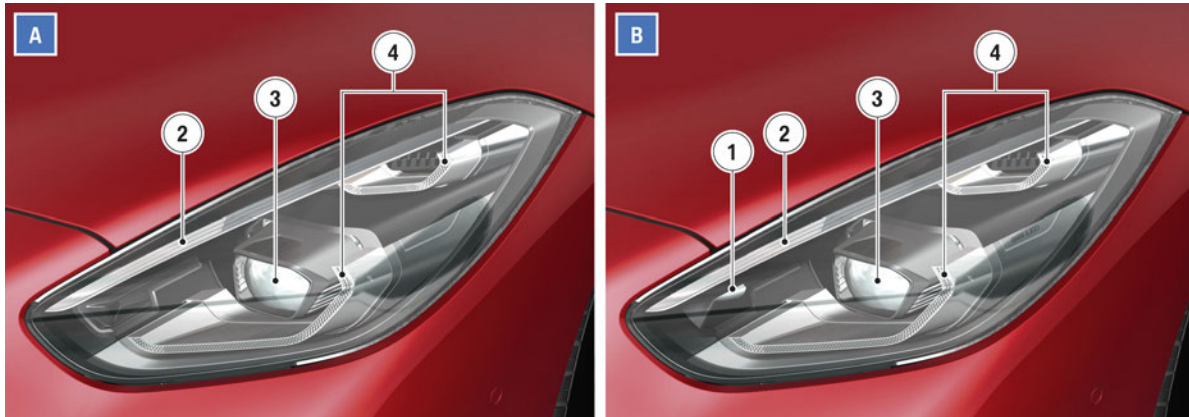
The G29 does **not** have a headlight cleaning system. This is not required by law for these LED headlights.

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.4.1. Headlight

The headlights only have one projection module per side. The low-beam headlight and the high beam are produced via this projection module. The projection modules can only be swivelled **vertically**.



G29 LED headlights

Index	Explanation
A	LED headlights (standard equipment)
B	Adaptive Full LED lights (SA 552)
1	Cornering light
2	Turn indicator
3	Low beam/high beam
4	Side light/ daytime driving light

G29 General Vehicle Electronics

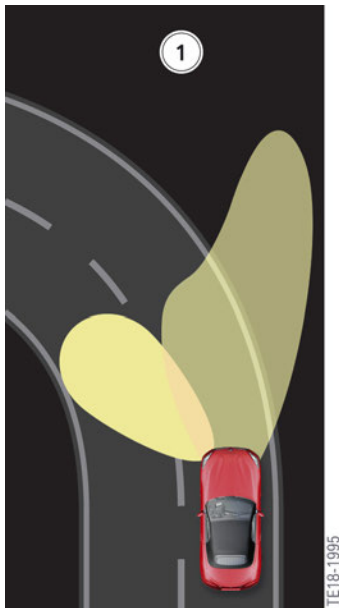
4. General Vehicle Electronics

4.4.2. Light distributions

The following light distributions are also available with the adaptive LED headlight:

- Static adaptive light
- Cornering light distribution

Adaptive light distributions



G29 adaptive light distributions

Index	Explanation
1	Static adaptive headlight with cornering light

For the function of the static Adaptive Headlight the LED of the cornering light is switched on for the low-beam headlight in order to better illuminate the inside area of the bend. The prerequisites are:

- Bend detected (steering angle and yaw rate)
- Speed up to 70 km/h (45 mph)

Cornering light

For a cornering manoeuvre the LED for the cornering light is switched on at the respective side in order to better illuminate the area at the side. The prerequisites for activating the cornering light are:




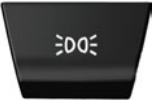
- Cornering detected (steering angle or turn indicator)
- Speed up to 40 km/h (25 mph)

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.4.3. Lighting functions

With the introduction of the new light switch (buttons) in the 2018 service pack and as a result of statutory provisions, the **operating logic** of the lighting functions is changing. The following table should illustrate the logic in the different driving conditions:

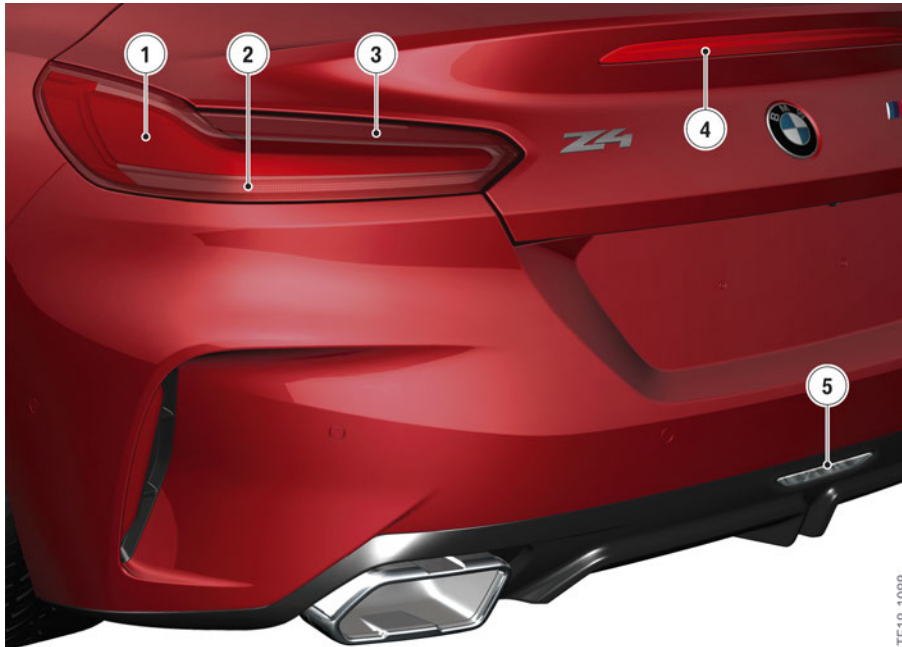
Position of light switch	Parking	Residing	Driving
OFF 	Light OFF	Light OFF	Daytime driving lights, from engine start change to AUTO
AUTO 	Light OFF	Light OFF	With sufficient ambient brightness daytime driving lights, in the case of insufficient ambient brightness low-beam headlight
Low-beam headlight 	Light OFF	Light OFF; if the low-beam headlight is switched on directly in "Residing" condition, then this is on.	Low-beam headlight, without adaptive light distributions
Side light 	Side light	Side light	Side light, from engine start change to AUTO

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.4.4. Rear lights

All light functions in the rear light assembly, additional brake light and reverse light are now LEDs.



G29 rear lights

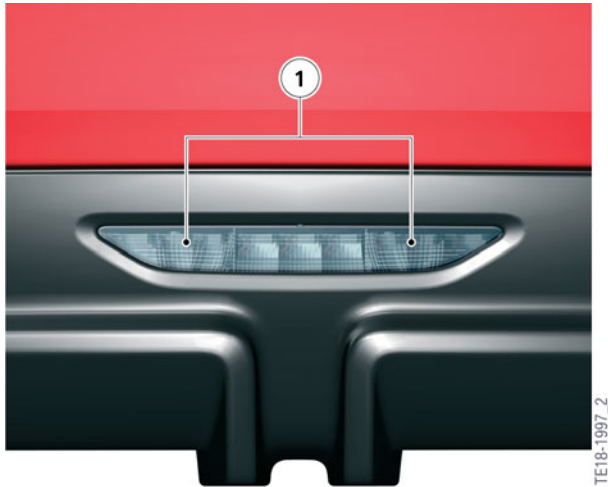
Index	Explanation
1	Tail light
2	Turn indicator
3	Brake light
4	Additional brake light
5	Reverse light

G29 General Vehicle Electronics

4. General Vehicle Electronics

4.4.5. Reverse light

The reversing light is now in the center of the vehicle.



G29 reversing light

Index	Explanation
1	Reversing light

4.5. Heating and air conditioning system

The following climate control system is installed:

- 2/1-zone Automatic air conditioning

From a technical perspective the climate control is divided into zones (e.g. driver, front passenger). The first digit represents the individually adjustable temperature settings, whilst the second digit represents the zones in which the amount of air can be individually adjusted.

4.5.1. Control panel

The following graphic shows the air conditioning control panel of a 2/1-zone automatic heating/air conditioning system:

G29 General Vehicle Electronics

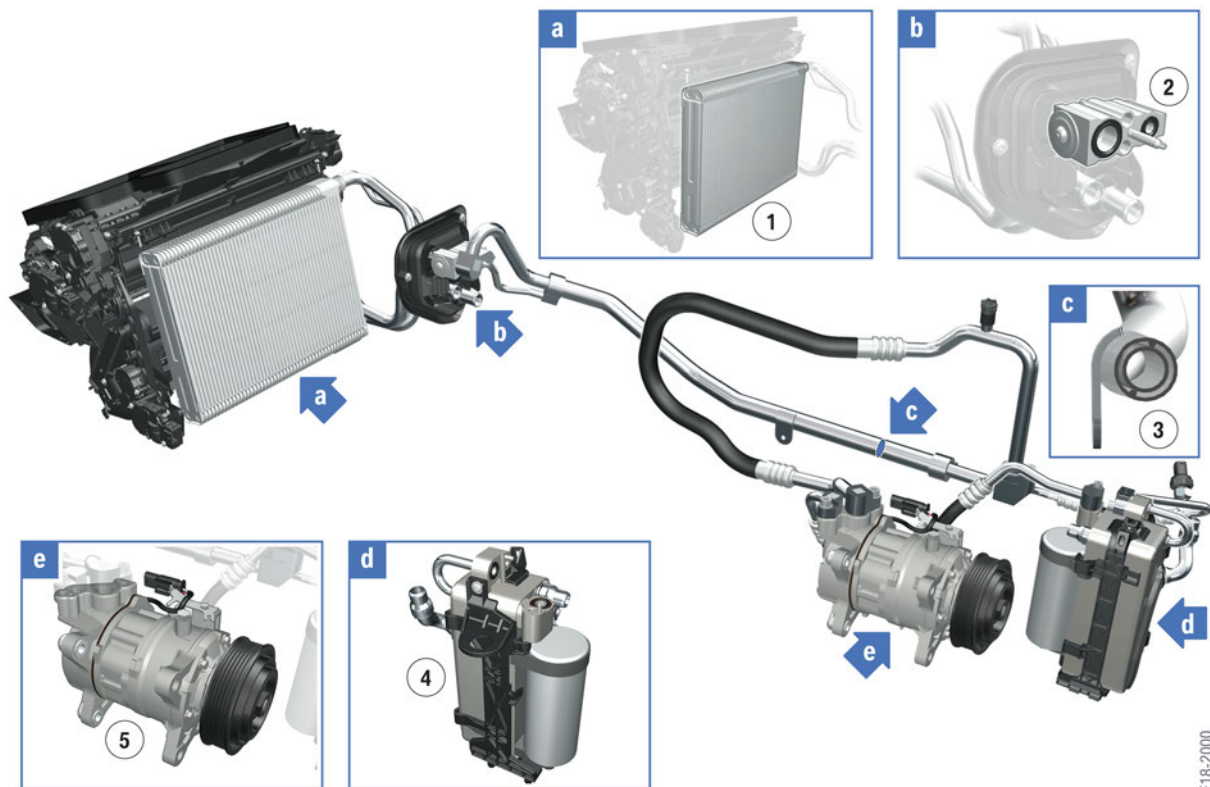
4. General Vehicle Electronics



G29 control panel of 2/1-zone automatic heating/air conditioning system

4.5.2. Overview of refrigerant circuit

A compact coolant-cooled condenser is installed. The line from the evaporator to the air conditioning compressor and from the air conditioning condenser to the evaporator is double-walled. The refrigerant for the evaporator is already pre-cooled.



G29 Refrigerant circuit

TE18-2000

G29 General Vehicle Electronics

4. General Vehicle Electronics

Index	Explanation
1	Evaporator
2	Expansion valve
3	Refrigerant line with inner heat exchanger
4	Coolant-cooled condenser
5	Air conditioning compressor

G29 General Vehicle Electronics

5. Driver Assistance Systems

The G29 receives assistance systems and sensors introduced with the 2018 service pack. This product information shows only an overview of the available assistance systems and sensors. Further information on the assistance systems is provided in the product information **ST1858 Driver Assistance Systems 2018**.

5.1. Overview

The purpose of the following tables is to provide an overview of the dependencies between the offer structure and assistance systems used as well as their system components. Furthermore, they also list all assistance systems available in the G29.

5.1.1. Offer structure "Driving"

Standard equipment

Active Guard (SA 5AV) and Dynamic Cruise Control (SA 544) are standard in the G29. All G29 vehicles are always equipped with the KAFAS-Mid-Camera.

Optional equipment

In the G29 the customer has a choice of optional equipment for Advanced Driver Assistance Systems (ADAS).

Below you can see the standard and options that are available:

Active Guard (5AV standard)

- Lane Departure Warning
- Front Collision Mitigation
- Daytime Pedestrian Protection
- Speed Limit Info
- Speed Limiter



G29 General Vehicle Electronics

5. Driver Assistance Systems

Active Driving Assistant (OE 5AS optional)

- Blind Spot Collision Warning
- Cross Traffic Warning, Rear



Active cruise control with Stop&Go function (OE 5DF optional)

- Active cruise control with Stop&Go (up to 160 km/h (100 mph))



Driving Assistance Package (ZDA)

Includes all features of the **Active Driving Assistant (OE 5AS)** and the following:

- Blind Spot Detection
- Lane Departure Warning



Dynamic Cruise Control (standard)

- Cruise Control with braking function
- Speed Limiter

G29 General Vehicle Electronics

5. Driver Assistance Systems

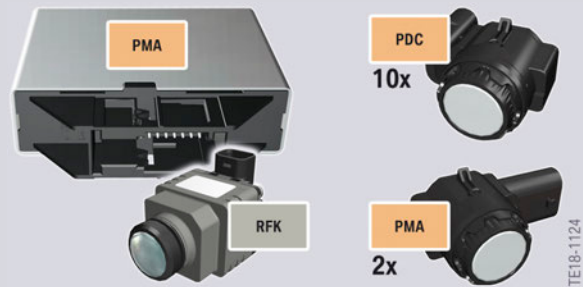
5.1.2. Offer structure "Parking"

The familiar optional equipment Park Distance Control (PDC) (SA 508) and Parking Assistant (SA 5DM) are also offered in the G29.

Vehicles not equipped with the Parking Manoeuvre Assistant (PMA) but with the Park Distance Control (PDC) have a separate control unit, which is recognized as the PMA control unit by the diagnosis and is also referred to by this name in the bus diagram. In other words, there is no longer a difference in the naming of the PDC and PMA control unit (there are however differences in the hardware design between the control units and the software is adapted to the equipment specification).

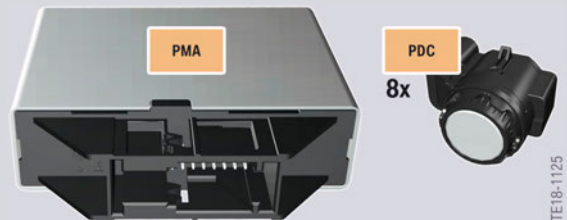
Parking Assistant (SA 5DM) is included in M Sport Package (ZMP) and Convenience Package (ZCV)

- Automatic Parking with parallel parking and manoeuvring out of parking spaces
- Back-up Assistant
- Auto PDC
- Front and rear Park Distance Control (PDC)
- Side protection
- Rear view camera



Park Distance Control PDC (SA 508)

- Front and rear
- Auto PDC



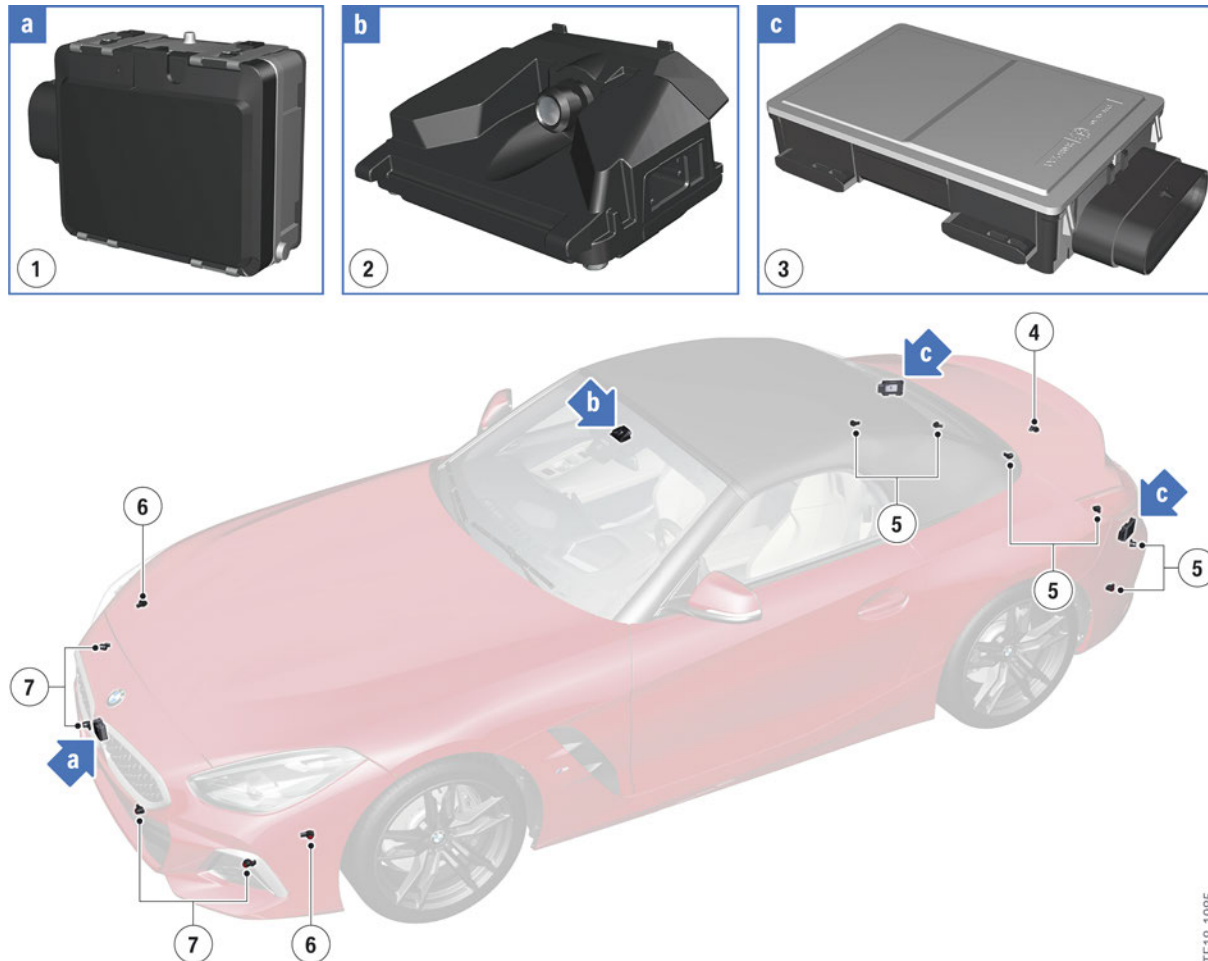
As can be seen in the overview, the G29 does not have the optional equipment system SAS control unit. Therefore, the PMA and DSC control units assume the longitudinal and lateral guidance of the Parking Manoeuvring Assistant PMA.

G29 General Vehicle Electronics

5. Driver Assistance Systems

5.2. Sensor installation locations

Depending on the vehicle equipment, the sensors shown are used:



G29 overview of sensors of assistance systems

TE18-1965

Index	Explanation
1	Front radar sensor (FRS)
2	KAFAS-Mid-Camera
3	Side rear radar sensor (HRSNR, HRSNL)
4	Rear view camera (RFK)
5	Ultrasonic sensors for Park Distance Control (PDC), rear
6	PMA ultrasonic sensors, front
7	Ultrasonic sensors for Park Distance Control (PDC), front

G29 General Vehicle Electronics

5. Driver Assistance Systems

5.3. Operating elements

The assistance systems are operated when the vehicle is in motion via 3 operating elements:

- Control panel on the multifunction steering wheel
- Intelligent Safety button
- Center console control panel.



G29 control elements for assistance systems

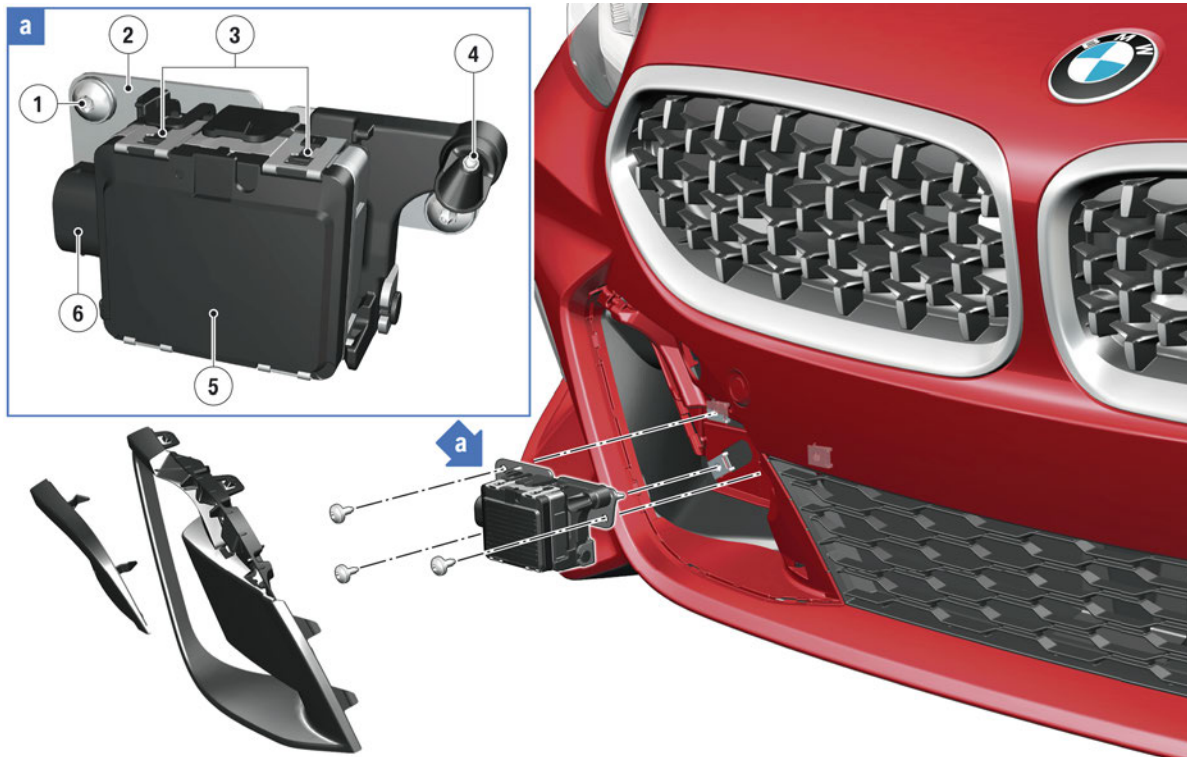
Index	Explanation
1	Control panel for assistance systems on the multifunction steering wheel for standard equipment
2	Control panel for assistance systems on the multifunction steering wheel for optional equipment "Active Cruise Control with Stop&Go function" (SA 5DF)
3	Intelligent Safety button
4	Parking Assistance button

G29 General Vehicle Electronics

5. Driver Assistance Systems

5.4. Front radar sensor

The front radar sensor FRS is located in the front bumper under the right radiator grill behind a cover.



G29 installation location, front radar sensor (FRS)

Index	Explanation
1	Mounting bolt of the holder
2	Holder
3	Latch mechanism for front radar sensor at the holder
4	Adjusting screw
5	Front radar sensor (FRS)
6	Electrical connection for front radar sensor

The fault-free function of the FRS is very much dependent on the exact setting. With the adjustment option the FRS can be adjusted during start-up using special tools. The start-up of the FRS must be carried out in the following situations:

- In the case of a fault memory entry
- After the removal and installation of the front radar sensor
- After the installation of a new front radar sensor

G29 General Vehicle Electronics

5. Driver Assistance Systems



In the case of an incorrectly set front radar sensor FRS it can happen that objects and vehicles are not properly detected or not detected at all. The functions of the related assistance systems may be restricted or fail. Therefore, the instructions and conditions for a start-up from the current version of the repair instructions must be observed.

G29 General Vehicle Electronics

6. Infotainment

6.1. Head unit

The G29 is standard with the Live Cockpit Pro which includes a navigation system (SA 6U3) in the **standard equipment**. The head unit is the Head Unit High 3 (HU-H3).

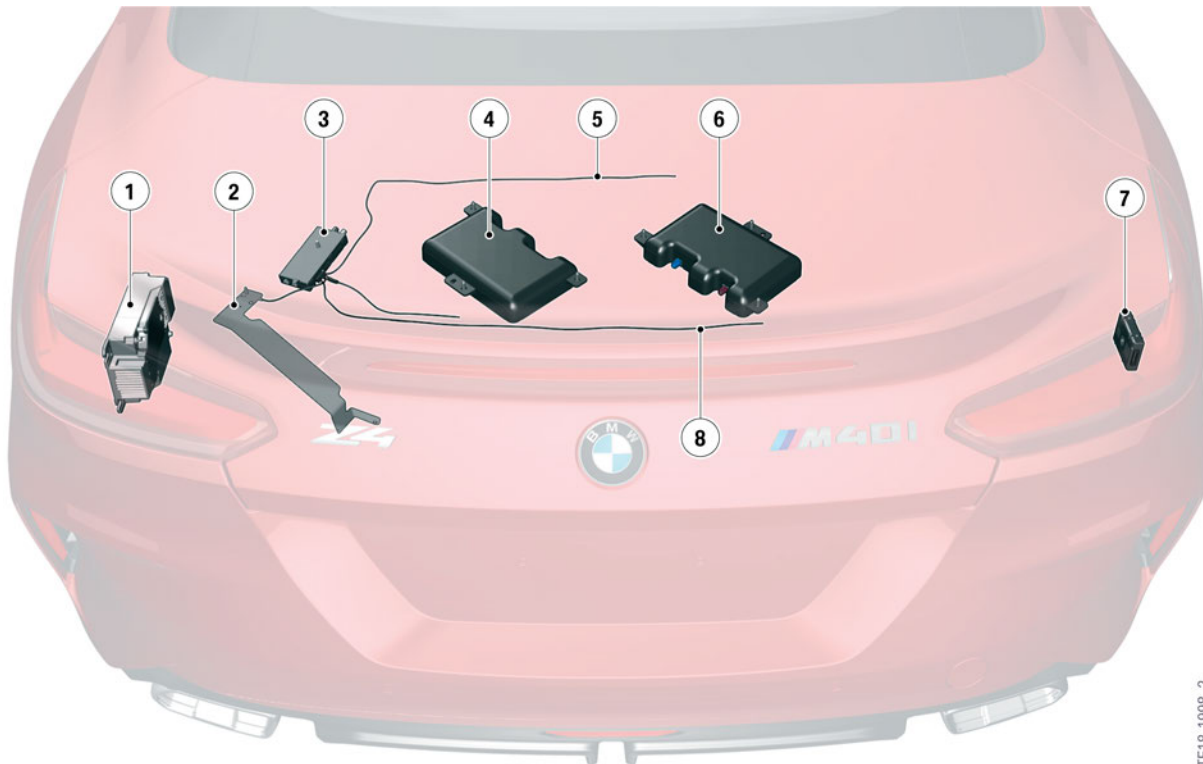


G29 Head Unit High 3

TE17-2197

6.2. Antennas

6.2.1. Components



G29 antennas, installation location of components

TE18-1998_2

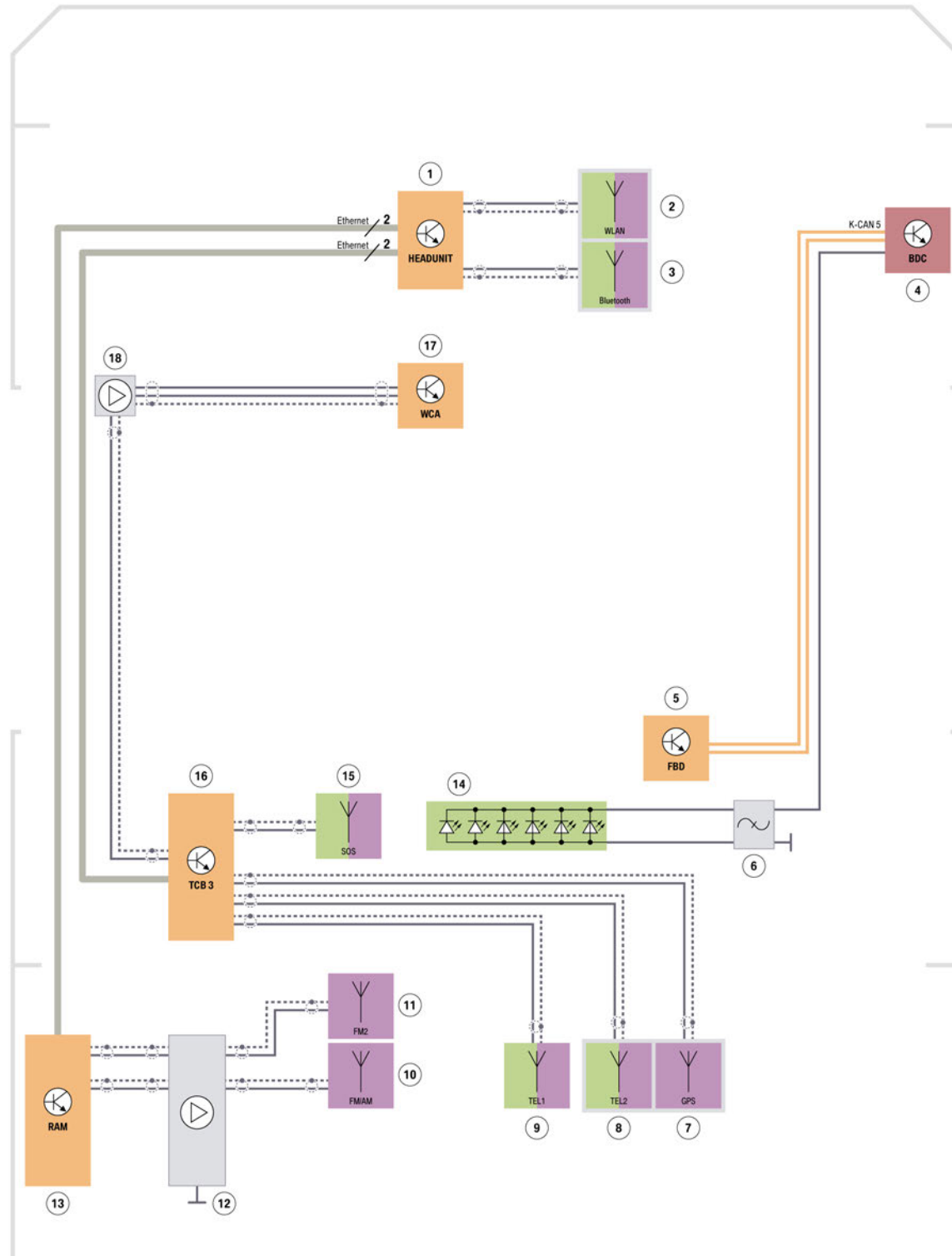
G29 General Vehicle Electronics

6. Infotainment

Index	Explanation
1	Receiver Audio Module (RAM)
2	AM antenna
3	Antenna amplifier
4	Telephone antenna and SDARS antenna
5	FM2 antenna
6	Telematics/GPS antenna
7	Emergency GSM antenna
8	FM1 antenna

6. Infotainment

6.2.2. System wiring diagram



TE18-2104_2

G29 Antennas

G29 General Vehicle Electronics

6. Infotainment

Index	Explanation
1	Head Unit High 3 (HU-H3)
2	WLAN antenna
3	Bluetooth antenna
4	Body Domain Controller (BDC)
5	Remote control receiver (FBD)
6	Interference suppression filter
7	GPS antenna
8	Telephone antenna 1
9	Telephone antenna 2
10	FM/AM antenna
11	FM2 antenna
12	Antenna amplifier
13	Receiver Audio Module (RAM)
14	Additional brake light
15	Emergency GSM antenna
16	Telematic Communication Box 3 (TCB3)
17	Wireless charging station (WCA)
18	Amplifier

G29 General Vehicle Electronics

6. Infotainment

6.3. Speaker systems

Three speaker systems are offered depending on the equipment:

- Hi-fi sound system (SA 676)
- Harman Kardon Surround Sound System (SA 688)

The following table provides an overview of the speaker systems:

Speaker system	Speakers	Amplifier
Hi-fi sound system (205 W)	<ul style="list-style-type: none">• Total of 10 speakers• 3 tweeters• 5 mid-range speakers• 2 bass speakers	Receiver Audio Module (RAM)
Harman Kardon Surround Sound system (464 W)	<ul style="list-style-type: none">• Total of 12 speakers• 5 tweeters• 5 mid-range speakers• 2 bass speakers	Receiver Audio Module (RAM) and booster

6.3.1. Receiver Audio Module

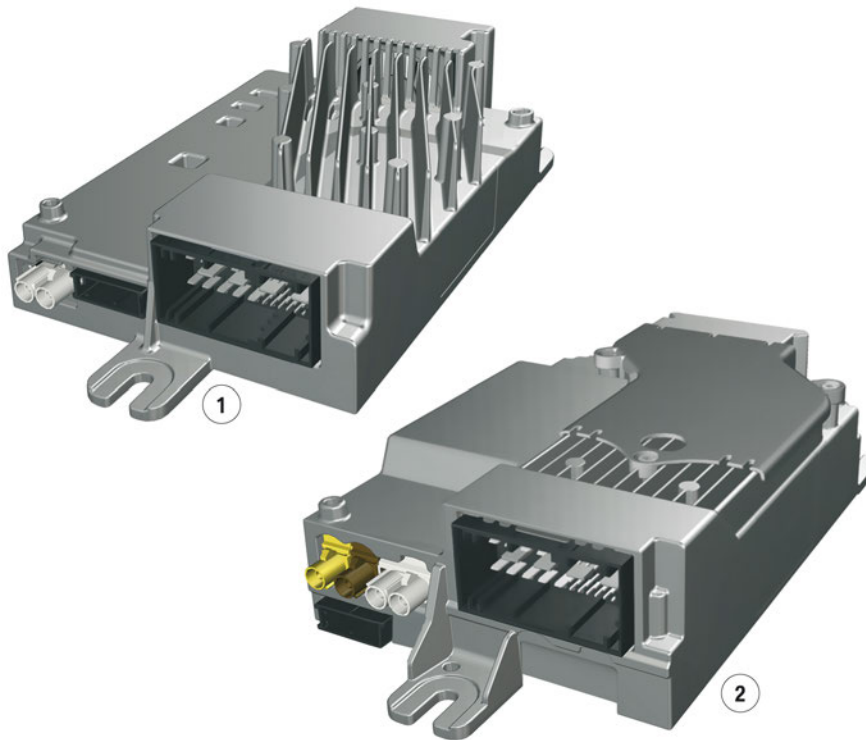
In the G29 the Receiver Audio Module RAM is used.

Depending on the equipment, the following functions are integrated in the RAM:

- AM/FM tuner
- Antenna diversity
- Audio amplifier for hi-fi sound system
- Active Sound Design
- Turn indicator sound in the instrument cluster.

G29 General Vehicle Electronics

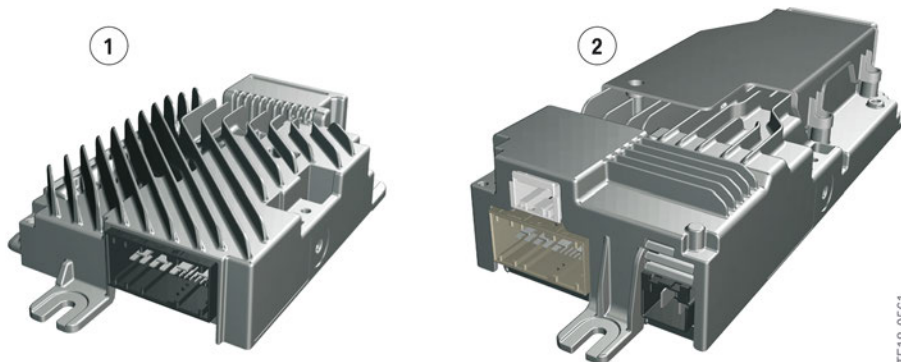
6. Infotainment



G29 Receiver Audio Module (RAM)

Index	Explanation
1	Receiver Audio Module (RAM) basic
2	Receiver Audio Module (RAM) high

6.3.2. Booster



G29 Booster

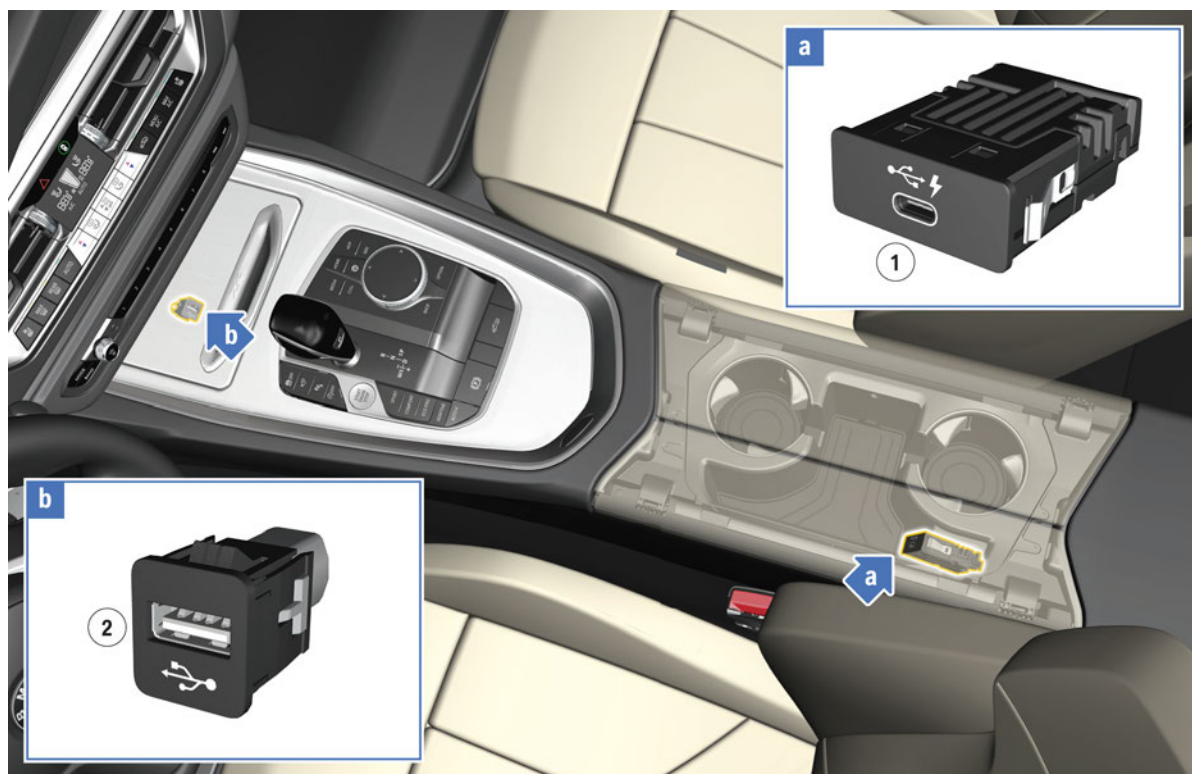
G29 General Vehicle Electronics

6. Infotainment

Index	Explanation
1	Booster for hi-fi sound system
2	Booster for Harman Kardon Surround Sound system

6.4. USB port

The G29 receives a USB port, type A and type C. Both USB ports are responsible for charging and for data transfer. Both USB ports are connected directly to the head unit.



G29 USB ports

Index	Explanation
1	USB type C
2	USB type A

The charge current of the two USB variants is:

- USB port, type A, maximum 1.5 A
- USB port, type C, maximum 3 A

G29 General Vehicle Electronics

6. Infotainment

6.5. Telephone

The standard equipment configuration of the G29 comprises a hands-free system with USB port. Wireless charging is available as optional equipment (SA 6NW). An WiFi hotspot (SA 6WD) can be ordered in conjunction with wireless charging.

The **WiFi hotspot** in conjunction with Telematic Communication Box 3 (TCB3) is integrated in the **head unit** and no longer in the Telematic Communication Box. The antenna for the WiFi hotspot is the familiar vehicle WLAN antenna. This is used for both functions in the vehicle.

G29 General Vehicle Electronics

7. Displays and Operation

7.1. Cockpit

The following graphic shows the components of the display and operation.

- Light switch
- Steering column switches
- Instrument panel
- Head-Up Display
- Central Information Display
- Air conditioning control panel
- Radio control panel
- Controller
- Center Operation Unit

The light switch is only operated using buttons.

The content of the instrument cluster is displayed on a 12.3" TFT display.

The Central Information Display is 10.25" and can be controlled by touch. With the Head Unit High 3 the display-operating concept ID7 is used.

The controller has 8 direct access keys and a touch control box.



G29 Displays and Controls

G29 General Vehicle Electronics

7. Displays and Operation

7.2. Head-Up Display

The G29 receives a full-color Head-Up Display as optional equipment.



G29 Head-Up Display

TE18-2313

