Document title	Component description for front SAM control unit with fuse and relay module
Document number	gf5421p6070fl

MODEL 212

N10/1 Front SAM control unit with fuse and relay module

Task

Two microprocessors are installed in the front SAM control unit, one for control of the basic functions, e.g. the exterior lights, and the second for control of the central gateway functions. Both processors communicate internally with each other over the interior CAN (CAN B) and they can undergo separate diagnosis.

The front SAM control unit also has a 3-D acceleration sensor integrated into it, which is used to detect any crash events.

The processor for controlling the central gateway-functions has the following tasks:

- **Central gateway (interface CAN)**
- **Data container**
- **System diagnosis**
- **Global variant coding**
- **Monitoring of the CAN bus idle**

The processor responsible for controlling the basic functions has the following tasks:

- **Interior CAN and LIN interface**

Central gateway (interface CAN)

The processor for controlling the central gateway functions also acts as an interface between the following data bus systems:

- Interior CAN
- Diagnostic CAN (CAN D)

Data container

The data container represents a nonvolatile, mobile data memory and is managed by the processor for controlling the central gateway functions.

System diagnosis

The system diagnosis is integrated as a software module in the processor for controlling central gateway functions.

For off-board diagnosis, the following on-board functions are realized by the processor responsible for controlling the central gateway functions:

Location

The front SAM control unit is located in the left front of the engine compartment.

- **Reading in of sensors and signals**
- **Evaluation of input factors**
- **Controlling functions**
- **Actuation of components**

The fuse and relay module of the front SAM control unit supplies various systems and control units with power through limit switches to match the function sequence.

The following tasks are the responsibility of the fuse and relay module:

- **Voltage supply to components**
- **Power supply and relay switching**
- **Switching consumers using relays**

Detailed information is available in the "Fuse and relay box, as-built configuration" function description.

- Chassis CAN (CAN E) (up to 28.02.2013)
- Chassis CAN 1 (CAN E1) (as of 01.03.2013)
- Chassis CAN 2 (CAN E2) (as of 01.03.2013)
- Front end CAN (CAN G) (up to 28.02.2013)

Use: During production, vehicle-specific, test location-specific and control unit-specific data are stored in the data container (e.g. production number, test status, partial tests not completed). These data can be used in the subsequent tests for test sequence control. The total size of the data memory is 128 bytes.

- CAN line diagnosis
- CAN specified/actual configuration
- Data logger for telediagnosis

Global variant coding

The processor responsible for controlling the central gateway functions sends global information such as model series and national version via the various CAN buses to the networked control units. The control units perform part of their configuration process to match this information.

Monitoring CAN bus idle

The monitoring of the CAN bus idle enables control units to be determined, which keep the CAN bus active at what otherwise is expected to be a CAN bus idle period. This information is filed in a nonvolatile memory. This in turn serves to ensure that even when the on-board electrical system battery (G1) has been discharged and following a reset of the networked control units, it is still possible to determine whether the discharging of the on-board electrical system battery was caused by the network or by an individual CAN user.

Interior CAN and LIN interface

The processor for controlling the basic functions also acts as an interface between the following bus systems:

- Instrument panel LIN (LIN 1)
- Wiper/inside rear-view mirror LIN (LIN 2)
- Interior CAN

Reading in of sensors and signals

The input factors are read in via the following connections:

- **Direct line**
- **Instrument panel LIN**
- **Wiper/inside rearview mirror LIN**
- **CAN**

Direct line

The processor for actuating the base functions reads in the signals of the following components over direct lines:

- Refrigerant pressure sensor (B12)
- Outside temperature sensor (B14)
- ECO start/stop function additional battery (G1/13) (up to 30.11.2014 with CODE B03 (ECO start/stop function), as of 01.12.2014 with CODE B03 (ECO start/stop function) and engine 642 or CODE 460 (Canada version) or CODE 494 (USA version))
- Interior lamp automatic function switch (N70/3s3) (except CODE 414 (Electric glass tilting/sliding roof))
- Exterior lights switch (S1) (model 212.077, model 212.2 and model 212.0 as of 01.12.2009)
- Right front brake wear sensor (S10/2), (50%)
- Right front brake wear sensor (S10/2), (100%)
- Right rear brake wear sensor (S10/4), (100%)
- Brake fluid level switch (S11)
- Parking brake indicator switch (S12)
- Backup lamp switch (S16/2) (transmission 711, 716)
- Coolant level switch (S41)
- Windshield washer system fluid level switch (S42)
- Right engine hood contact switch (S62/42) (with CODE B03 (ECO start/stop function) and except CODE U60 (Pedestrian protection))

Instrument panel LIN

The processor for controlling the basic functions reads in the signals from the following components over an instrument panel LIN:

- Upper control panel control unit (N72/1)
- Exterior lights switch (model 212.0 up to 30.11.2009 except model 212.077)
- Instrument panel switch group (S6/1)
- Automatic transmission mode button (S16/12) (transmission 722, 724, 725)
- Chassis button group (S77) (with CODE 488 (Steel/air suspension) or CODE 489 (AIRMATIC (air suspension with continuous adjustment damping)))

Wiper/inside rearview mirror LIN

The processor responsible for controlling the basic functions reads in the signals from the following components over a wiper/inside rear-view mirror LIN:

With CODE 249 (Automatic dimming inside and outside rearview mirrors including folding outside mirror) except CODE 494 (USA version) or CODE 249 (Automatic dimming inside rearview mirror and outside mirror (driver)) and CODE 494 (USA version):

- Forward mirror dimming light sensor (A67h1)
- Rearward dimming mirror light sensor (A67h2)
- Garage door opener (A67n2) (with CODE 232 (Garage door opener with frequency 284-390 MHz) or CODE 231 (Garage door opener))
- Rain/light sensor (B38/2)

i The communication with the processor responsible for controlling the central gateway functions can also send the data read in by the processor responsible for controlling the basic functions to control units that are not connected to the interior CAN.

CAN

The processor responsible for controlling the basic functions reads in function-relevant data over the interior CAN.

Information from control units that are not connected to the interior CAN are sent by the processor responsible for controlling the central gateway functions over the interior CAN. This can be information from control units, which are connected to one of the following CANs:

- Diagnostic CAN
- Chassis CAN (up to 28.02.2013)
- Chassis CAN 1 (as of 01.03.2013)
- Chassis CAN 2 (as of 01.03.2013)
- Front end CAN (up to 28.02.2013)

The functions that use these signals are described in the individual function descriptions (see block diagram or function schematic).

Evaluation of input factors

The input factors are evaluated by the processor responsible for controlling the basic functions whereupon the corresponding components are then actuated.

Controlling functions

The processor responsible for controlling the basic functions manages the following functions:

- Exterior lights (ABL)
- Interior illumination (IBL)
- Windshield wiper system (SWA)
- Windshield washer system heater (with CODE 875 (Heated windshield washer system))
- Headlamp cleaning system (SRA) (with CODE 600 (Headlamp cleaning system))
- Sliding roof (SD) rain closing (with CODE 414 (Power glass tilting/sliding roof)) or panoramic sliding sunroof (with CODE 413 (Panoramic glass sunroof with top sliding sunroof))
- Decoupling of on-board electrical system battery and activation of ECO start/stop function additional battery (up to 30.11.2014 with CODE B03 (ECO start/stop function), as of 01.12.2014 with CODE B03 (ECO start/stop function) and engine 642 or CODE 460 (Canada version) or CODE 494 (USA version))

Actuation of components

The actuation of the components takes place via the following connections:

- **Direct line**
- **Instrument panel LIN**
- **Wiper/inside rearview mirror LIN**

Direct line

- Front passenger instrument panel ambiance illumination (E43/8)
- Left horn (H2) and right horn (H2/1) over horn relay (N10/1kO)
- Up to 30.11.2014 with CODE B03 (ECO start/stop function), as of 01.12.2014 with CODE B03 (ECO start/stop function) and engine 642 or CODE 460 (Canada version) or CODE 494 (USA version):
  - On-board electrical system decoupling relay (K19/7) (transmission 711, 716)

The following components are actuated over direct lines by the processor responsible for controlling the basic functions:

- Refrigerant compressor regulating valve (A9y1) (except CODE B09 (Refrigerant compressor with magnetic clutch))
- Refrigerant compressor regulating valve (A97y1) (with CODE B09 (Refrigerant compressor with magnetic clutch))
- Refrigerant compressor magnetic clutch (A9/7y2) (with CODE B09 (Refrigerant compressor with magnetic clutch))
- Left front lamp unit (E1)
- Left daytime running lamps headlamp (E1/3) (up to 28.02.2013 except CODE 498 (Japan version))
- Right front lamp unit (E2)
- Right daytime running lamps headlamp (E2/3) (up to 28.02.2013 except CODE 498 (Japan version))
- Up to 28.02.2013 with CODE 498 (Japan version) or except CODE 615 (Bi-xenon headlamp unit with integrated curve illumination) and except CODE 616 (Bi-xenon headlamp unit with integrated asymmetric curve illumination) and except CODE 621 (Intelligent Light System (left-hand traffic)) and except CODE 622 (Intelligent Light System (right-hand traffic)):
  - Left front fog lamp (E5/1)
  - Right front fog lamp (E5/2)
- Up to 28.02.2013 with CODE 460 (Canada version) or CODE 494 (USA version):
  - Left front side marker lamp (E6/1)
  - Right front side marker lamp (E6/2)
- Glove compartment lamp (E13/1)
- With CODE 954 (Avantgarde) or CODE 955 (Elegance):
- Right front footwell lamp (E17/15)
- Left front footwell lamp (E17/16)
- Left rear footwell lamp (E17/17)
- Right rear footwell lamp (E17/18)
- Center console ambiance illumination (E43/6)
- Driver instrument panel ambiance illumination (E43/7)
  - Additional battery relay for ECO start/stop function (K114)
  - ECO start/stop function diode (V19) (transmission 722, 724, 725)
- Windshield washer system pump (M5/1)
- Headlamp cleaning system pump (M5/2) (with CODE 600 (Headlamp cleaning system))
- Coolant circulation pump (M13/5) (with CODE 581 (Comfort automatic air conditioning), CODE 965 (Electrical preinstallation for rental vehicles), CODE 228 (Stationary heater) or CODE B03 (ECO start/ stop function))
- Exterior lights switch (model 212.077, model 212.2 and model 212.0 as of 01.12.2009)
- Wiper park position heater (R2/10)
- With CODE 875 (Heated windshield washer system):
  - Spray nozzle hose heater (R2/11)
  - Spray nozzle heater (R2/1)
- Ashtray illumination (R3e1)
- Fresh air/recirculated air flap switchover valve (Y13)

Instrument panel LIN

The following components are actuated over an instrument panel LIN by the processor responsible for controlling the basic functions:

- Upper control panel control unit
- Exterior lights switch (model 212.0 up to 30.11.2009 except model 212.077)
- Instrument panel switch group
- Automatic transmission mode button (transmission 722, 724, 725)
- Chassis button group (with CODE 488 (Steel/air suspension) or CODE 489 (AIRMATIC (air suspension with continuous adjustment damping)))

Wiper/inside rearview mirror LIN

The following components are actuated over a wiper/inside rear-view mirror-LIN by the processor responsible for controlling the basic functions:

- Inside rear-view mirror (A67)
- Garage door opener (with CODE 232 (Garage door opener with frequency 284-390 MHz) or CODE 231 (Garage door opener))
- Wiper motor (M6/1)

	Wiring diagram for front SAM control unit with fuse and relay module (N10/1)	MODEL 212Sheet 1	PE54.21-P-2106-97DAA
		MODEL 212Sheet 2	PE54.21-P-2106-97DAB
		MODEL 212Sheet 3	PE54.21-P-2106-97DAC
		MODEL 212Sheet 4	PE54.21-P-2106-97DAD
		MODEL 212Sheet 5	PE54.21-P-2106-97DAE
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		MODEL 212Sheet 7	PE54.21-P-2106-97DAG
		MODEL 212Sheet 8	PE54.21-P-2106-97DAH
		MODEL 212Sheet 9	PE54.21-P-2106-97DAI
		MODEL 212Sheet 10	PE54.21-P-2106-97DAJ