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Technik für Automobile

DCS (Door control system)

Technical description / Overview

Scope

Technical description of the functional content of the DCS (Door Control System)

Content

Erstellt / Created	Geprüft / Checked	Ersatz für / Replacement for	
Name S.Franek	Name		
Unterschrift / Signature	Unterschrift / Signature	Ausgabedatum / Date of issue 14.02.13	

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DCS (Door control system)

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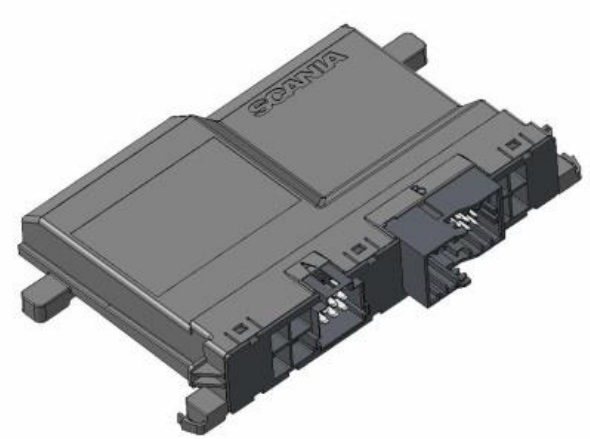
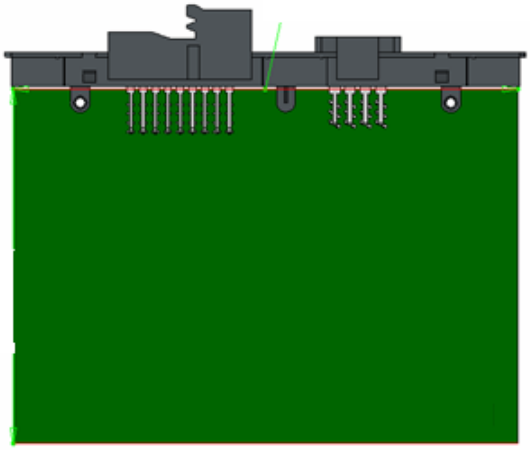
1 General description

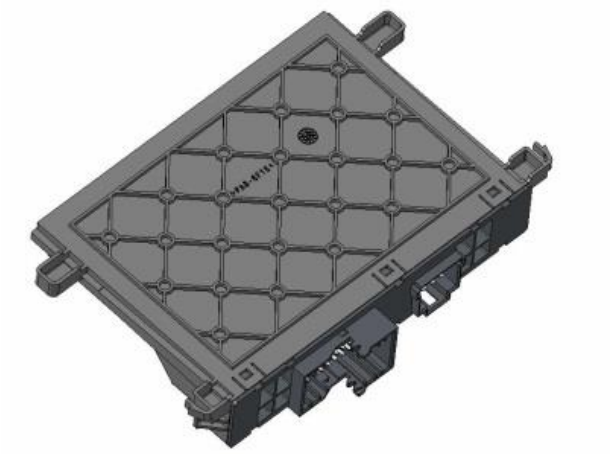
1.1 ECU Pictures



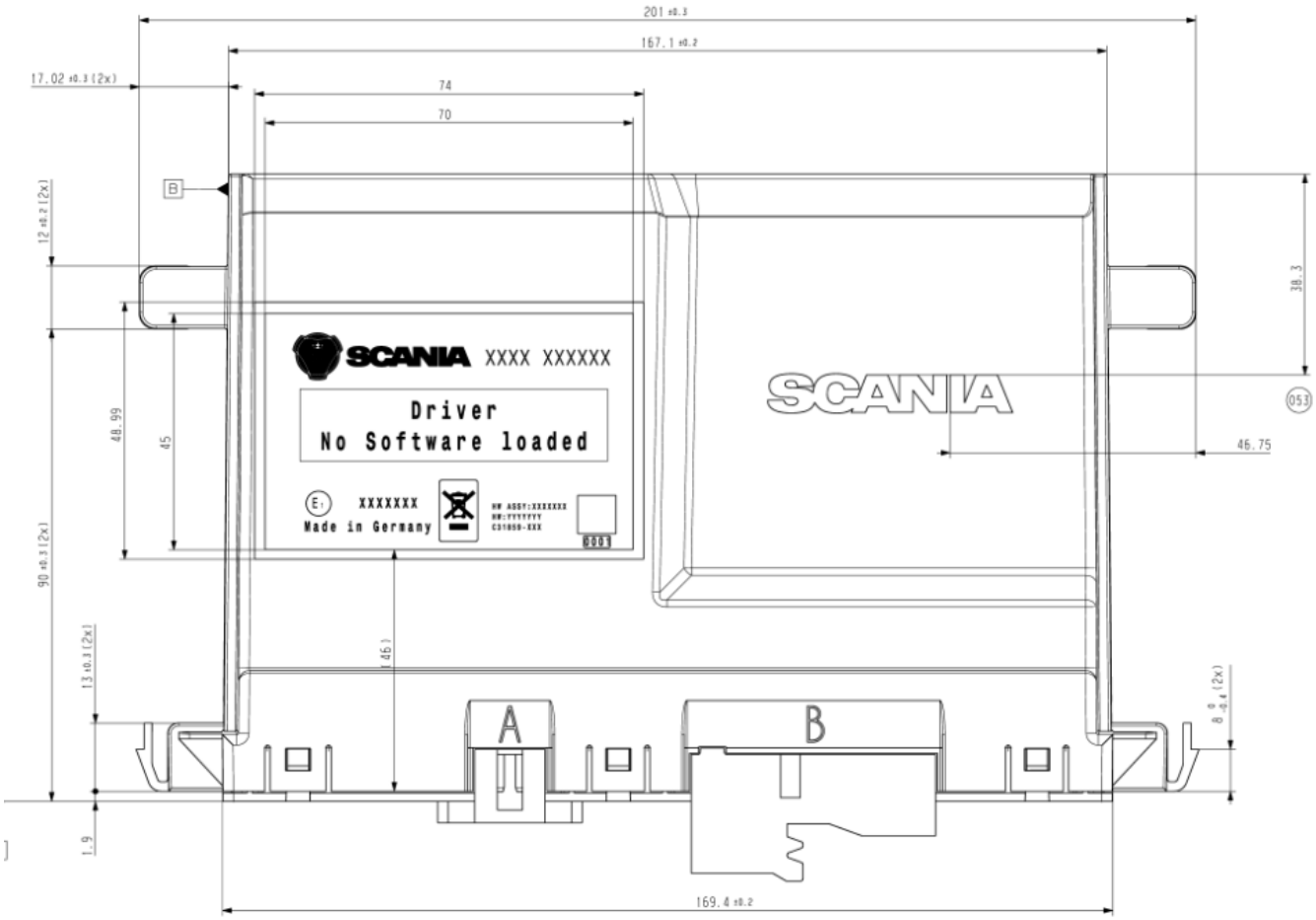
ECU housing



PCB including mounted connector part



1.2 ECU Dimensions



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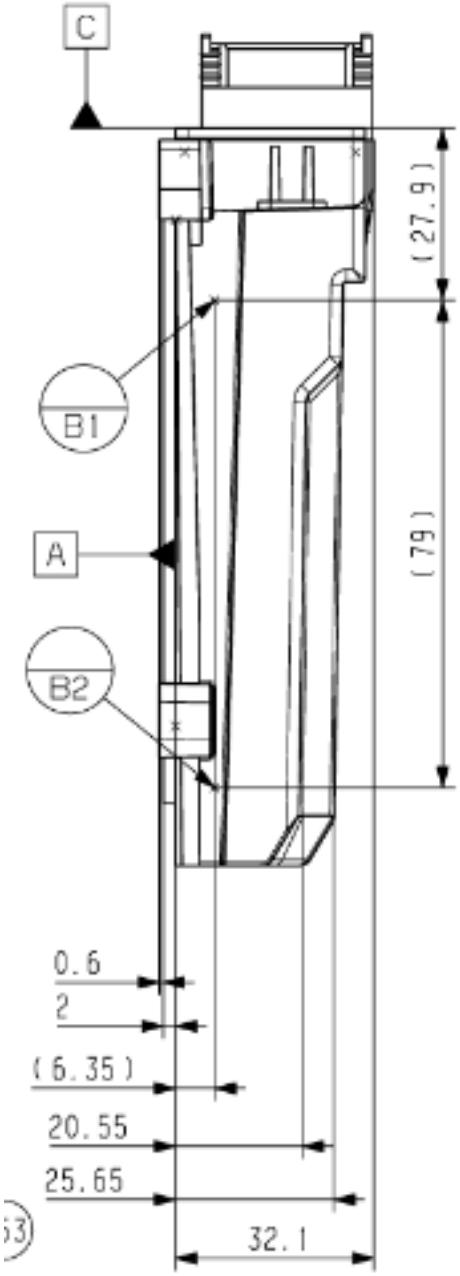

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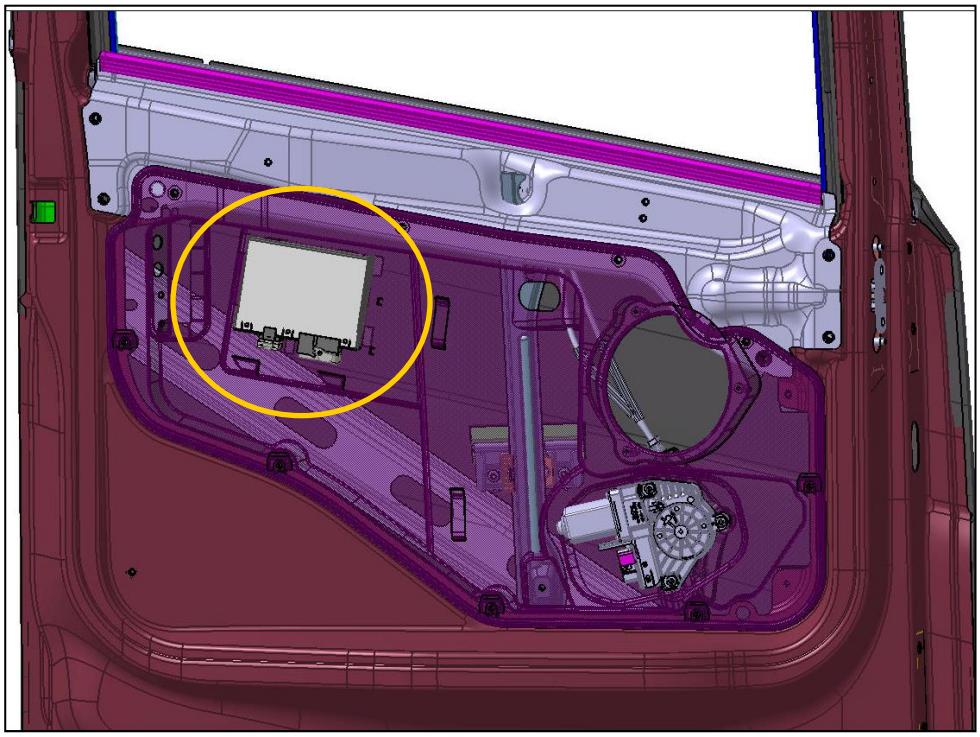
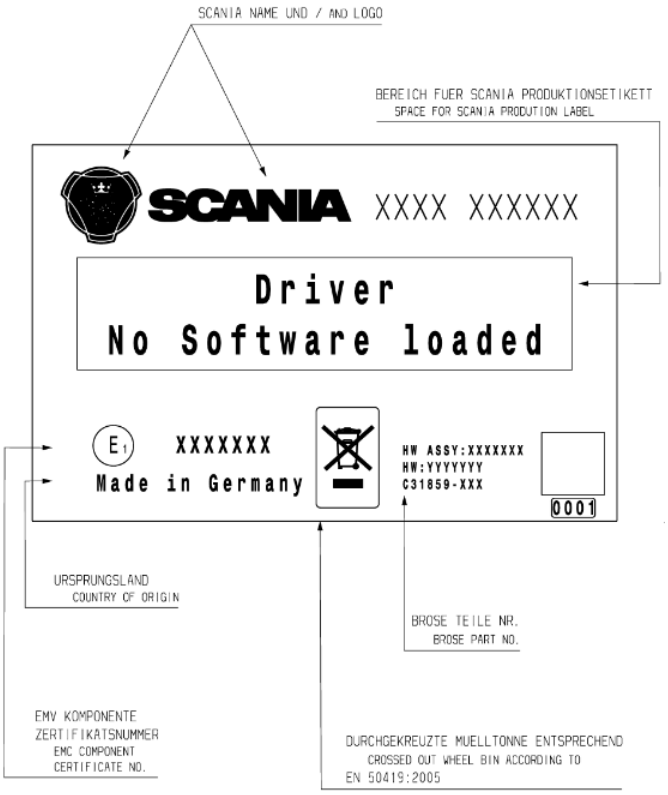
1.3 ECU position in the door



Position of ECU in the door (example driver door)

1.4 Label and content



DCS (Door control system)

1.5 System description

The main functionality of the DCS is to handle the electrical functions (e.g. window regulator, mirrors, latches etc.) in the doors and the wireless communication with the remote control key fob to open and close the vehicle.

The DCS consists of two to four ECUs, depending of the door configuration of the vehicle.

The ECUs are connected by a sub CAN bus.
The driver door ECU is the only ECU in the DCS that is connected to the vehicle CAN bus and acts as a gateway to the rest of the DCS.

Connected on the DCS sub CAN bus are also several control panels.
These control panels exists in different variants with different sets of switches (e.g. window lifter switches, latch control)

The ECU handles the following functions:
- Window control with auto up/down and anti pinch functionality
- Mirror position control
- Mirror heating
- Roof hatch control
- Door control panel interface and power supply
- Power supply to Illumination sources with dimming function
- Door latch and central locking
- Alarm arming and unarming

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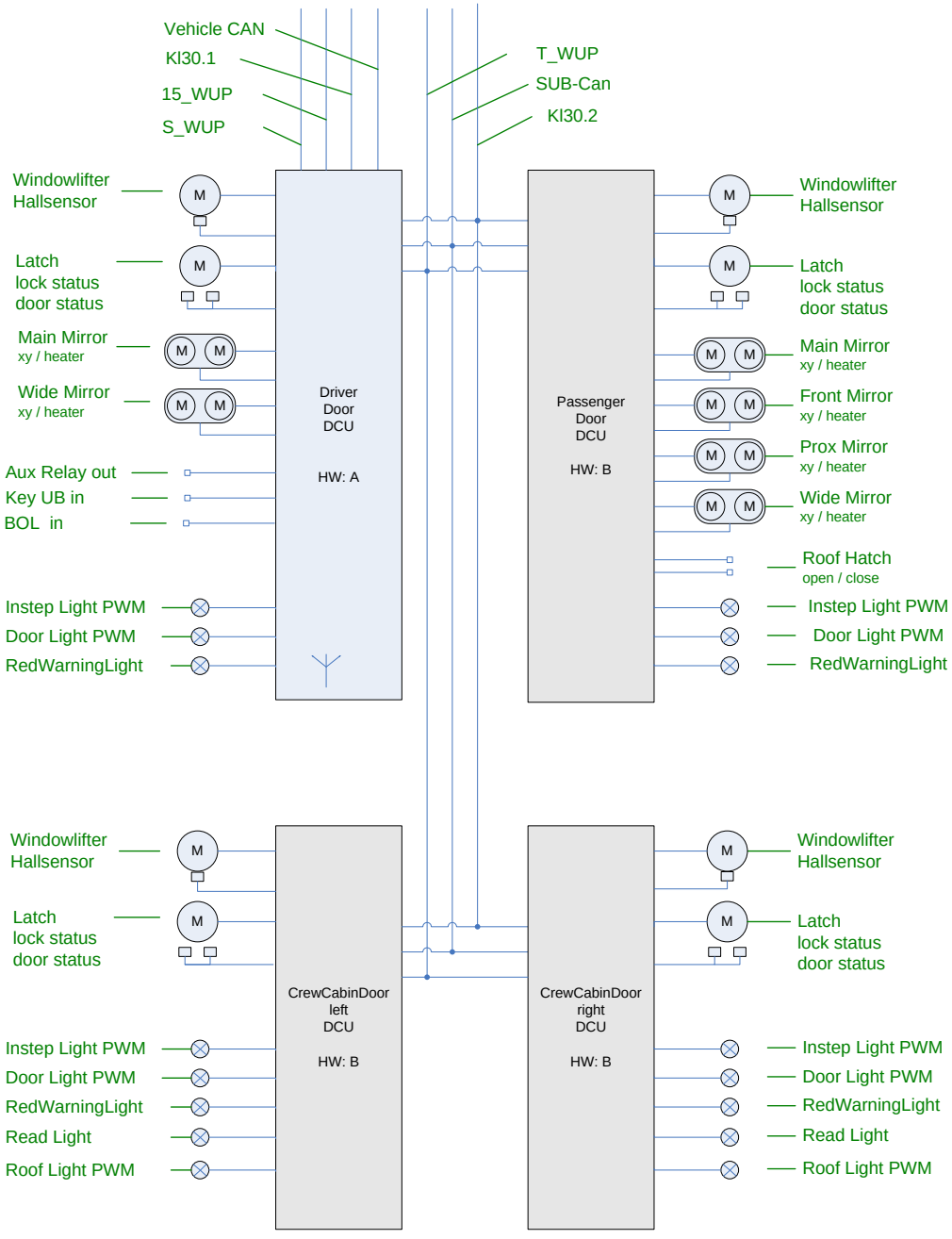

Architecture of the DCS (Driver door, Passenger door, Rear doors)

1.6 Variants

Two different ECU hardware variants exists. One hardware variant for the driver door (DD) and one hardware variant for the passenger door (PD). The functional differences are shown in the table below.

Interface	DD	PD
Auxiliary relay interface	X	
Door control panel interface	X	X
Door lock	X	X
Dual power supply	X	
Front and close proximity mirror control and heating		X
Vehicle CAN	X	
Illumination power supply	X	X
Main and wide mirror control and heating	X	X
Roof hatch control		X
DCS sub CAN	X	X
Window control	X	X
Wireless communication	X	

Hardware variants differences

The box size of the two hardware variants DD and PD is identically.
Each drive units has to connectors. A 12pin connector A and a 36pin connector B as shown in the drawing below.

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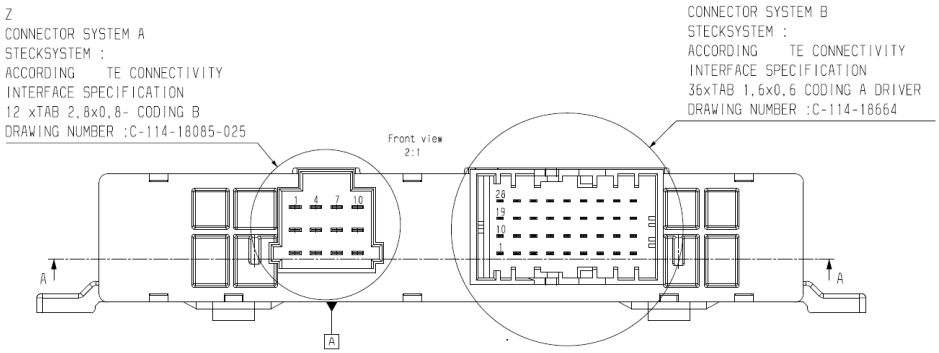

The connector coding of connector A is identical between DD and PD variants.
The connector coding of connector B is different between DD and PD variants.

The rear door ECU variants will be configured by software.

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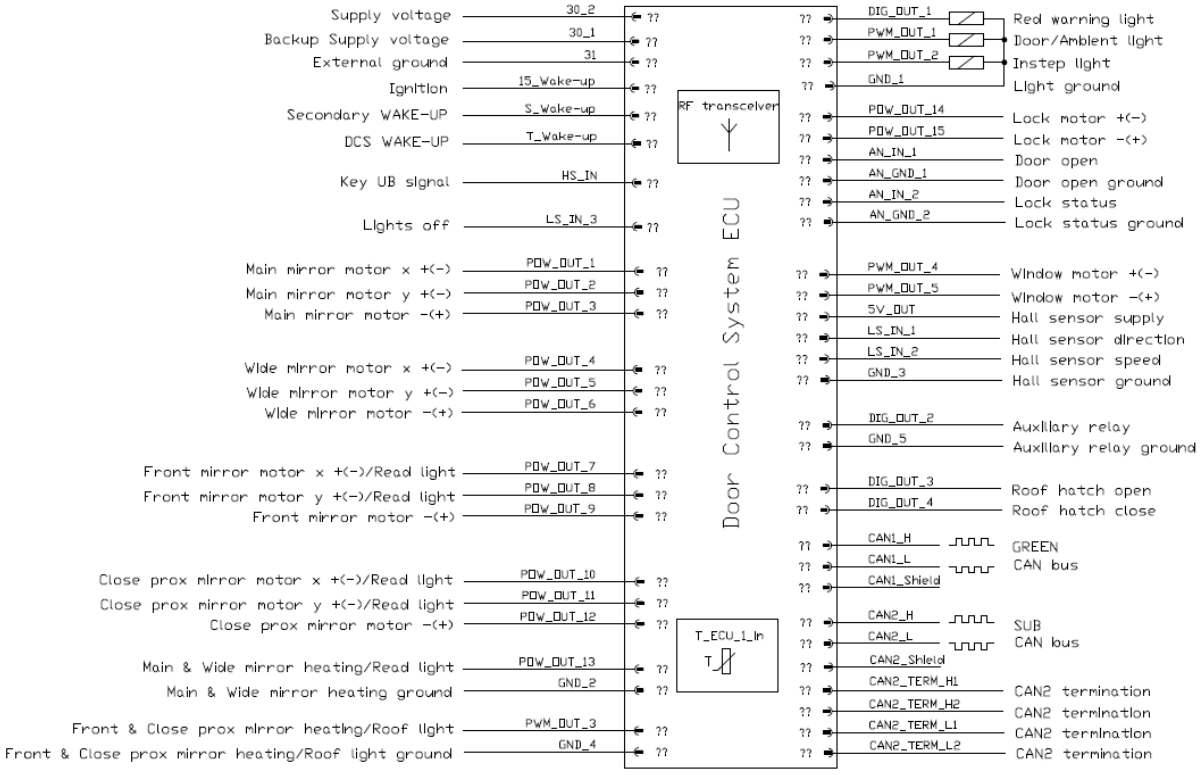
2 Technical description

2.1 Communication interfaces

Communication Bus
CAN vehicle (only DD) : 500kb/s
CAN sub bus : 500 kb/s
Protocol: SAE J1939
Diagnostic protocol: UDS

RF / wireless module: (Driver door only)
Transceiver at the ECU: Bidirectional tranceiver, encrypted; Band: 426 MHz or 433 MHz

2.2 Function pictogram



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2.3 Function details

Functionality	Signal	Type	Comment	Diagnosis									Variant		
													Variant 1	Variant 2	
													Driver Door	Passenger Door	Crew Cab Door
													110Tpa	110Tpa	1,7Tpa
Power KL30_2 (MAIN)	30_2	Power	fuse = 20A										X		
Backup Power KL30_1	30_1	Input	connected to 12V or 24V										X		
Vehicle CAN1 communication 250kBaud & 500kBaud		Communication	250kBaud, 500kBaud, 1MBaud										X		
Sub CAN2 communication 250kBaud & 500kBaud		Communication	250kBaud, 500kBaud, 1MBaud										X		
RF-communication		Internal			Scania			HW capability					X		
15_WakeUp Ignition	15_Wake-up	Input (High Active)			Min	Typ	Max	Min	Typ	Max	OFF-State Diag	ON-State Diag	X		
S_WakeUp Secondary WakeUp (only to Driver)	S_Wake-up	Input (High Active) and HighSide Output		Load ShortCircuit	0mA -	- -	150mA 0.2A	0mA -	- -	150mA 0.3Arms	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~	X		
T_WakeUp DCS WakeUp (SubSystem)	T_Wake-up	Input (High Active) and HighSide Output		Load ShortCircuit	0mA -	- -	150mA 0.2A	0mA -	- -	150mA 0.3Arms	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~	X		
Hardware Watchdog	-	Internal											X		
Lock cylinder state	HS_In	Input (external HighSide Switch)											X		
Door Ajar	AN_IN_1	Input Analog											X		
Lock Status	AN_IN_2	Input Analog			Scania			HW capability					X		
Black Out Light Input **(variant)**	LS_IN_3	Digital Input			Min	Typ	Max	Min	Typ	Max	OFF-State Diag	ON-State Diag	X		

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Functionality	Signal	Type	Comment	Diagnosis								customer req in general: Short Circuit to Supply, Short Circuit to GND, Open Load, Diag during Active and Inactive state note ⓘ: OpenLoad detection threshold can be disabled	Variant		
Hallsensor Speed, Direction, Supply	LS_IN1/2, 5V_OUT	Power Output	open load for future usage with higher load current	Load ShortCircuit OpenLoadⓘ	0mA - 1mA	-	100mA 0.2A 3mA	0mA - 1mA	-	100mA 0.2A 3mA	- Supply, ~~Ground~~ Open Load	- Supply, Ground ~~Open Load~~		X		
Main Mirror X/Y	POW_OUT1/2/3	Power Output	only one motor per time	Load ShortCircuitHS ShortCircuitLS OpenLoadHSⓘ OpenLoadLSⓘ	0mA - - 1mA 1mA	-	700mA 2.0A 2.0A 3mA 3mA	0mA - - 1mA 6mA	-	700mA 2.0A 2.0A 3mA 13mA	- Supply, Ground Supply, Ground Open Load Open Load	- ~~Supply~~, Ground Supply, ~~Ground~~ ~~Open Load~~ ~~Open Load~~		X	X	
Wide Mirror X/Y	POW_OUT4/5/6	Power Output	only one motor per time											X	X	
Front Mirror X/Y	POW_OUT7/8/9 (ReadLight: Out7/8)	Power Output Low/HighSide	only one motor per time												X	
Reading Light		LowSide Power Output	2xbulb (10W each)													X
Close Prox Mirror X/Y	POW_OUT10/11/12 (ReadLight: Out10/11)	Power Output Low/HighSide	only one motor per time												X	
Reading Light		LowSide Power Output	2xbulb (10W each)													X
Mirror Heating for Main and Wide	POW_OUT_13	Power Output	resistor	Load ShortCircuit OpenLoadⓘ	0mA - 1mA	-	6A 7A 3mA	0mA - 1mA	-	6A 7A 3mA	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~		X	X	
Reading Light		HighSide Power Output	4bulbs (10W each)													X
Mirror Heating for Front and Close Prox	PWM_OUT_3	PWM Output	resistor	Load ShortCircuit OpenLoadⓘ	0mA - 1mA	-	2.5 / 4A 5A 3mA	0mA - 1mA	-	2.5 / 4A 5A 3mA	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~			X	
Roof Light **(PWM)**			4bulbs (10W each) 0..200Hz adjustable													X
Central Lock Functionality	POW_OUT_14/15	Power Output		Load ShortCircuitHS ShortCircuitLS OpenLoadⓘ	0mA - - 1mA	-	1A 4A 4A 3mA	0mA - - 1mA	-	1A 4A 4A 3mA	- Supply, Ground Supply, Ground Open Load	- ~~Supply~~, Ground ~~Supply, Ground~~ ~~Open Load~~		X		

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Functionality	Signal	Type	Comment	Diagnosis									Variant
Windowlifter **(PWM)**	PWM_OUT_4/5	PWM Output	frequency adjustable 0..25kHz	Load ShortCircuitHS ShortCircuitLS OpenLoad①	0mA - - 1mA	-	7A tbd tbd 3mA	0mA - - 1mA	-	7A tbd tbd 3mA	- Supply, Ground Supply, Ground Open Load	- ~~Supply~~, Ground Supply, ~~Ground~~ Open Load	customer req in general: Short Circuit to Supply, Short Circuit to GND, Open Load, Diag during Active and Inactive state note ①: OpenLoad detection threshold can be disabled	X
Door Light **(PWM)** Ambient Light **(PWM)**	PWM_OUT_1	PWM Output (High Side Out)	0..200Hz adjustable Cabine: 4LEDs in addition 0..200Hz adjustable	Load ShortCircuit OpenLoad①	0mA - 1mA	-	1A 2A 3mA	0mA - 1mA	-	1A 2A 3mA	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~		X X X
Red Warning Light Auxiliary relay **(variant: vehicle Bus)**	DIG_OUT_1 DIG_OUT_2	Digital Output (High Side Out) Digital Output (High Side Out)	 relay coil or LEDs	Load ShortCircuit OpenLoad①	0mA - 1mA	-	0.2A 1A 3mA	0mA - 1mA	-	0.2A 1A 3mA	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~		X X
Roof Hatch Control	DIG_OUT_3/4	Digital Output (Low Side Out)		Load ShortCircuit OpenLoad①	0mA - 1mA	-	100mA 1.0A 3mA	0mA - 1mA	-	100mA 1.0A 3mA	- ~~Supply~~, ~~Ground~~ ~~Open Load~~	- Supply, ~~Ground~~ ~~Open Load~~		X
Instep Light **(PWM)**	PWM_OUT_2	PWM Output (High Side Out)	0..200Hz adjustable	Load ShortCircuit OpenLoad①	0mA - 1mA	-	1A 2A 3mA	0mA - 1mA	-	1A 2A 3mA	- Supply, ~~Ground~~ Open Load	- ~~Supply~~, Ground ~~Open Load~~		X
Temperature Sensor (during development)	-	Internal	-40 .. +125°C tol +-3°C											X

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Vorgang / Änderung Modification	Datum / Date	Erstellt / Prepared Name	Prüfung Normung Check Standardis.
First version	14.02.13	franest	
Update variants / dimensions	11.07.13	franest	
Update housing, views, label	16.01.15	franest	

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