Functional Description / User manual

PEPS ECU

1.1 PEPS ECU

The main tasks of the PEPS ECU are: Entry/Exit functionality with lock sensor signal analysis and unlatch motor activation, Keyless Go functionality, Backup Power Mode Master Operation, PEPS protocol with random number generator and LF-Message transmission, communication with other ECUs on GMLAN, and provides the low-side driver for the Electric Steering Column Lock (ESCL) function (also called the ESCL_Enable function).

1.2 PEPS Variations

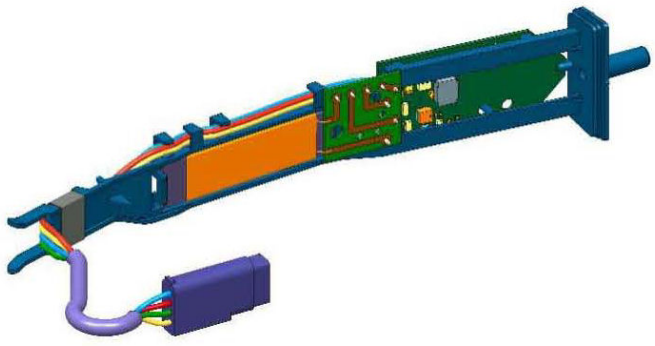
The PEPS system provides options for two variations. The first variation uses the functions passive entry & passive start, support and diagnostic. This variation is called either the “High level PEPS” or the “Up level PEPS” depending on the context of the reference (usually Hella reference or GM reference, respectively). The second variation eliminates the passive entry (and exit) functionality but retains the passive start, the support and the diagnostic functionality. This variation does not include the door handle parts from Hella and does not include the unlatch motor parts.

3 LF-Antennas

The LF antennas transmit the LS challenge signals and the LF carrier wave signals. They are activated by the PEPS ECU using a controlled current.

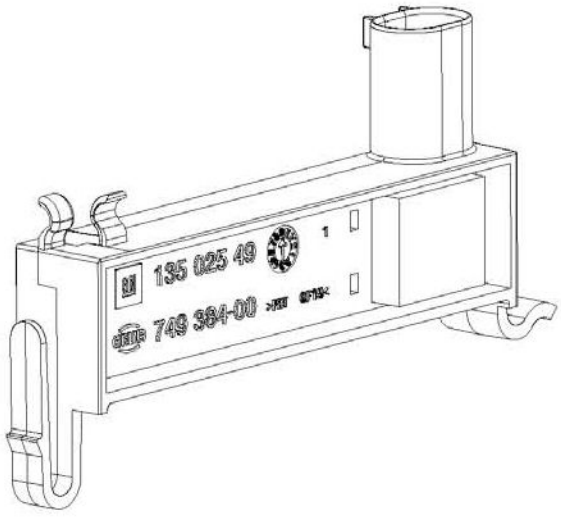
3.1 Door Handle Exterior Antenna

E- Parameter Antenna	
Antenna-Type	Door Handle Exterior Antenna *placed inside door handle with chrome stripe on the surface*
Connector	4 Pin, Terminal 0.35² Pin 1: Signal + Pin 2: Signal – (GND)
Car Body Harness	0.35², twisted pair, full twist every 4cm
Protection	After molding :IP6k9k
Circuit	Ferrite coil with capacitor (series-resonant circuit)
$I_{antenna}$ @ 125kHz	$I_{antenna,effective}$ = 180mA … 720mA $I_{antenna,peak}$ = 250mA … 1050mA
$U_{Antenna}$	$U_{antenna,effective} = V_{bat}$ … 46V
Interface/ output	LC-series resonant circuit
resonant frequency	$f_{res,\ without\ dh}$ = 115.5 +1Khz / -0.8kHz $f_{res,\ within\ dh}$ = 125kHz +/-1.5kHz
Inductance	L_{air} = 863µH
Coil Q-factor	$Q_{without\ dh}$ = 130 +50 / -30 $Q_{within\ dh}$ = 45 +/- 15
Series capacity	C = 2.2nF +/-2.5 % / 400Vac, 1000Vdc
Magnetic field strength H @1m	H *(@1m, I_{peak} = 500mA, without dh)* = 75.2dBµA/m +/- 1.5dB H *(@1m, I_{peak} = 500mA, within dh)* = 73.5dBµA/m +/- 1.5dB
Ferrite material	MBT-1 / μ_i = 3400
Operation Voltage level (ECU)	9 – 16V (ECU is power supply)
ECU-Output	Programmable Sine Wave Current, Open Load Detection, Short Circuit Protected
Performance	Release after agreement + confirmation of GM
Coding	CECDB (connector water protected acc. to IP67)



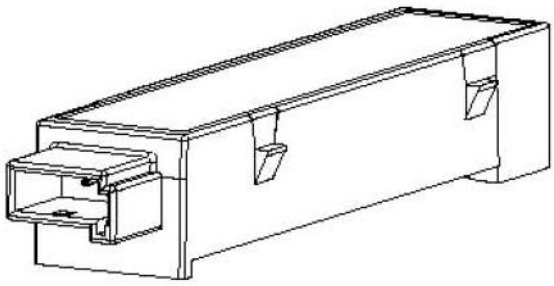
3.2 Inside Ferrite Antenna Passenger room

E- Parameter Antenna	
Antenna-Type	Inside Ferrite Antenna Passenger room Center Console front / rear
Connector	2 Pin, Terminal 0.63mm² Pin 1: Signal + Pin 2: Signal – (GND)
Harness	0.35mm², twisted pair, full twist every 4cm
Protection	IP5K2
Circuit	Ferrite coil with capacitor (series-resonant circuit)
$I_{antenna}$ @ 125kHz,	$I_{antenna,effective}$ = 180mA … 720mA $I_{antenna,peak}$ = 250mA … 1050mA
$U_{Antenna}$	$U_{antenna,effective} = V_{bat}$ … 46V
Interface/ output	LC-series resonant circuit
resonant frequency	$f_{res,air}$ = 125kHz +/- 2kHz
Inductance	L = 736µH
Coil Q-factor	60 +20 / - 20
Series capacity	C = 2.2nF +/-2.5 % / 400Vac, 1000Vdc
Magnetic field strength H @1m	H (@1m, I_{peak} = 500mA) = 72.1dBµA/m +/- 1.5dB
Ferrite material	MBT-1 / μ_i = 3400
Operation Voltage level (ECU)	9 – 16V (ECU is power supply)
ECU-Output	Programmable Sine Wave Current, Open Load Detection, Short Circuit Protected
Performance	Release after agreement + confirmation of GM
Housing material	PBT GF15
Coding	CDADB



3.3 Inside Ferrite Antenna trunk

E- Parameter Antenna	
Antenna-Type	Inside Ferrite Antenna trunk *placed in the direct near of bar #5*
Connector	2 Pin, Terminal 0.63mm² Pin 1: Signal + Pin 2: Signal – (GND)
Harness	0.35mm², twisted pair, full twist every 4cm
Protection	IP5K2
Circuit	Ferrite coil with capacitor (series-resonant circuit)
$I_{antenna}$ @ 125kHz	$I_{antenna,effective}$ = 180mA … 720mA $I_{antenna,peak}$ = 250mA … 1050mA
$U_{Antenna}$	$U_{antenna,effective}$ = V_{bat} … 46V
Interface/ output	LC-series resonant circuit
resonant frequency	$f_{res,\ air}$ = 121.5kHz +/-1.5kHz $f_{res,\ metal}$ = 125kHz +/-1.5kHz
Inductance	L_{air} = 780µH
Coil Q-factor	$Q_{without\ dh}$ = 160 +/-30 $Q_{within\ dh}$ = 45 +/- 15
Series capacity	C = 2.2nF +/-2.5 % / 400Vac, 1000Vdc
Magnetic field strength H @1m	H *(@1m, I_{peak} = 500mA, in air)* = 72.8dBµA/m +/- 1.5dB H *(@1m, I_{peak} = 500mA, at metal)* = 72.3dBµA/m +/- 1.5dB
Ferrite material	MBT-1 / μ_i = 3400
Operation Voltage level (ECU)	9 – 16V (ECU is power supply)
ECU-Output	Programmable Sine Wave Current, Open Load Detection, Short Circuit Protected
Performance	Release after agreement + confirmation of GM
Housing material	PBT GF15
Coding	CDADB



3.4 Outside Ferrite Antenna

E- Parameter Antenna	
Antenna-Type	Outside Ferrite Antenna Outside Trunk area below bumper
Connector	2 Pin, Terminal 0.63mm² Pin 1: Signal + Pin 2: Signal – (GND)
Harness	0.35mm², twisted pair, full twist every 4cm
Protection	IP5K3
Circuit	Ferrite coil with capacitor (series-resonant circuit)
$I_{antenna}$ @ 125kHz	$I_{antenna,effective}$ = 180mA … 720mA $I_{antenna,peak}$ = 250mA … 1050mA
$U_{Antenna}$	$U_{antenna,effective} = V_{bat}$ … 46V
Interface/ output	LC-series resonant circuit
resonant frequency	$f_{res,air}$ = 125kHz +/-2.5kHz
Inductance	L_{air} = 491µH
Coil Q-factor	60 +20 / -30
Series capacity	C = 3.3nF +/-2.5 % / 400Vac, 1000Vdc
Magnetic field strength H @1m	H (@1m, I_{peak} = 500mA) = 70.3dBµA/m +/-2dB
Ferrite material	MBT-1 / μ_i = 3400
Operation Voltage level (ECU)	9 – 16V (ECU is power supplier)
ECU-Output	Programmable Sine Wave Current, Open Load Detection, Short Circuit Protected
Performance	Release after agreement + confirmation of GM
Housing material	PBT GF15
Coding	CECDB