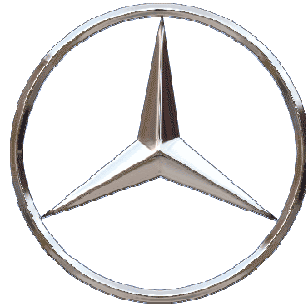




HERMES

("Hardware for Enhanced Remote-, Mobility- & Emergency Services")

User Manual



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1 Technical Description

1.1.1 Disclaimer

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2 Introduction HERMES

2.1.1 Intended usage

The project name HERMES has the meaning “**H**ardware for **E**nhanced **R**emote-, **M**obility- & **E**mergency **S**ervices” and thus describes the main features of this device. This unit was designed for automotive usage and contains the following features:
GSM, UMTS, LTE , USB, Bluetooth, Wireless LAN.

It provides different telematic services and is the interface between different types of Daimler car headunits and the public network. Therefore you can connect the headunit either over USB or BT or Wireless LAN with the HERMES Box and over GSM/UMTS/LTE it provides access to public network.

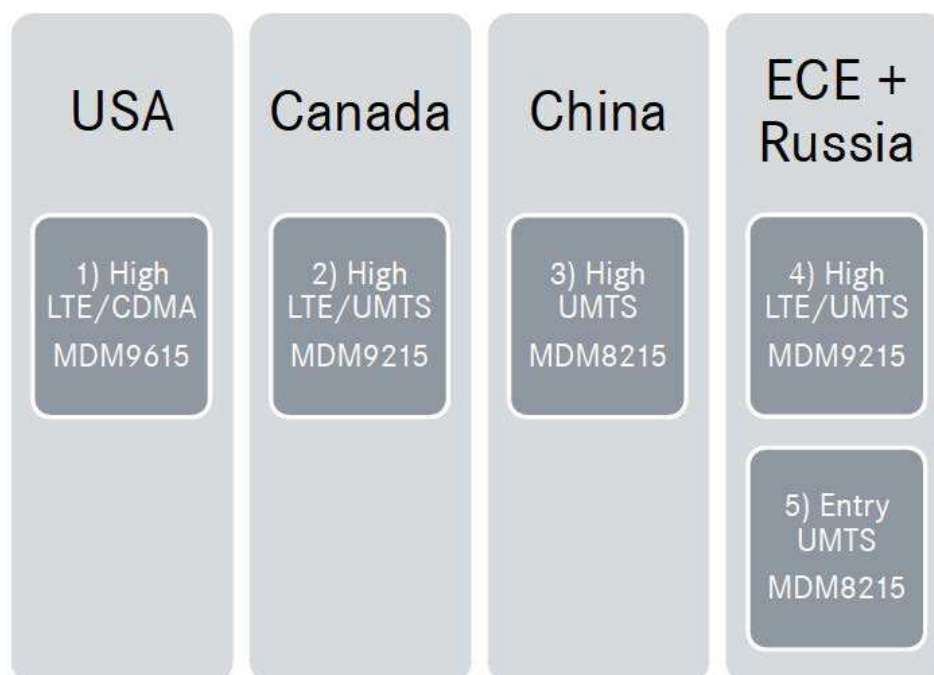
Due to the fact that Conectivity Box is used for different target markets we provide different versions that will support different GSM/UMTS/LTE-bands – depending on the target markets.

The Hermes unit will be used as gateway module for different Daimler Entry and High platforms. These are NTG4.5, NTG5 Star1, NTG5 Star2 and NTG5.5. The leading carline with first market access will be the new E-Class (W213), beside of that it will be used for the following target cars:

- Lead Carline W213 (new E-Class) ...

2.1.2 Hermes – variants

Due to the use withind different car platforms and different target markets we have 5 different variants. They have in common, that they are all using the same housing and the same hardware- and software platform. In the picture below you will find an overview over the different versions with the different NAD modules (NAD: Network Access Device) from Huawei:



3 System Description

3.1.1 System features

In the past Daimler had already PASS v3.1 System that has provided the following features:

- CDMA/EVDO Network Connectivity
- Circuit Switched I/R/E Voicecalls (realized by Verizon Telematics)
- Remote Diagnostics
- HU Internet Connectivity (via Bluetooth/WiFi)
- Remote Door Lock/Unlock
- Flash Lights Sound Horn
- POI/Route Download
- Freetext (with URL/Phone#)
- Geofencing
- Speed Alert
- Remote Update of PASS
- Periodic Reconciliation
- Interrogation
- Stolen Vehicle Tracking
- Anti Theft / Panic Alarm Notification
- Vehicle Remote Start (coming with PASS v3.1)
- Low Battery Notification
- Periodic Vehicle Usage

The HERMES Box – also called PASS 4G – is the successor of the PASS 3G and provides the following additional features:

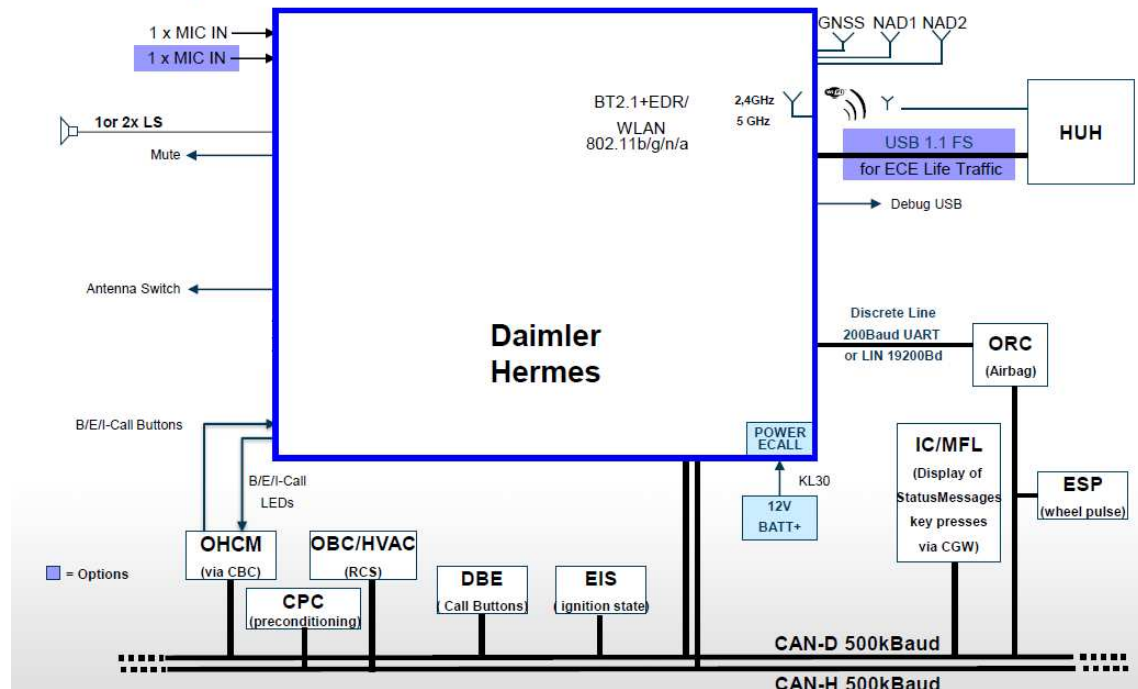
- LTE Connectivity
- EU E-Call
- ERA Glonass E-Call
- Encrypted ATP Communication
- IPv6
- I/R/E Voicecalls over VoLTE
- ADAPT
- Auxiliary Heating
- Preconditioning
- Departure Time
- Maintenance Popup Suppression
- OnboardDataCollector (Remote Diagnostics)
- Browser Push
- Charge Optimization
- Trigger Configuration
- Base Dataset Configuration

3.1.2 Hermes Block Diagram

The following diagram shows the HERMES PASS 4G unit. The main functionalities of this box are:

- 1) Providing Network access for different telematic services
- 2) Providing E-Call (Emergency Call), R-Call (Road Service Call), I-Call (Information Call)

Block diagram: System



The network access will be realised by connecting a headunit over USB, BT or WLAN to the HERMES Pass4G unit. Regarding Bluetooth the unit only supports the Bluetooth DUN profile according IEEE 802.15. For WLAN connectivity it supports IEEE 802.11 a/b/g/n/ac. The HERMES unit can be configured either to support BT or WLAN or USB. It is not possible to use BT and WLAN at the same time. BT and WLAN are using the same pcb antenna. It is depending on the Daimler headunit how the connection will be established (over BT, WLAN or USB).

The E/R/I-Call is implemented in that way that after pressing one of these buttons the HERMES unit will dial a predefined number. These numbers are depending on the target markets.

For Europe these predefined numbers are:



```

PSAP test number: +49731184990
Automatic E-Call Primary: +4970317020076
Automatic E-Call Secondary: +4970317020076
Manual E-Call Primary: +4970317020076
Manual E-Call Secondary: +4970317020076
R-Call Primary (V_SC_PHONENUM_RA): +4953170222606
R-Call Secondary (V_SC_PHONENUM_RA2): +4953170222606
I-Call Primary (V_SC_PHONENUM_ICALL): +40721278485
I-Call Secondary (V_SC_PHONENUM_ICALL2): +40215294590
  
```

To cover different target markets the HERMES unit provides four different NAD-modules. These are:

- ME909Tu-120 (ECE LTE => M055)
- MU809Tu-8 (ECE UMTS => M090)
- ME909Tu-565 (USA => M088)
- ME909Tu-820 (China => M087)

This HERMES provides different interfaces. For the car passenger there are only the E/R/I-Call buttons visible. To the car it is connected over CAN interfaces (CAN-D/CAN-H). Beside of that there are several UART and USB interfaces for debugging purpose.

For BT/WLAN functionality it uses one internal PCB antenna. For GSM/UMTS/LTE it has two HF antenna ports and one HF GNSS antenna port for GPS and Glonass.

3.1.3 Audio

The PASS-4G provides the following audio connections:

- Microphone in (Connection for up to two external microphones (single ended or differential))
- ECall Speaker output (Connection for an external eCall speaker 10W (differential))

It is possible to configure the microphone inputs as single ended or differential. For converting the analog microphone lines and to feed the analog power-amplifier it is necessary to have an AD-DA converter. The Hermes uses for this purpose the stereo Audio CODEC from TI (type: TLV320AIC3104)

The following requirements have to be fulfilled and adjusted by the CODEC.

Digital Audio Interface:

- Bit Clock: 2.048MHz
- Sync: 8kHz
- Frame: Short frame
- Data format: 16Bit MSB first
- Mode: Slave

Line out:

- Type: differential
- Output level: 0,707Veff max

Microphone in:

- Type: single ended and differential (selectable)
- Input level: 0,707Veff max.
- Mic1R: Left channel, max. Gain
- Mic1L: Right channel, max. Gain

eCall speaker:

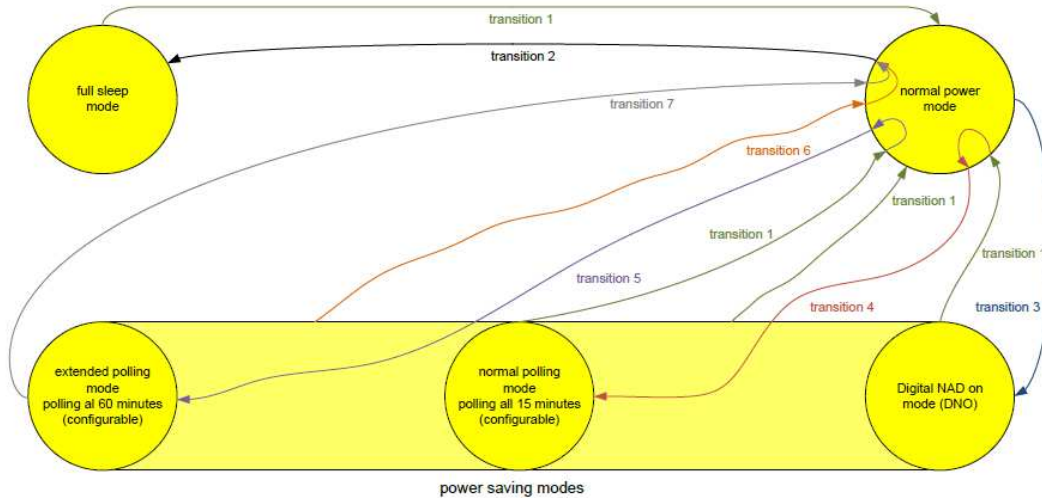
- 10W class D power amplifier. The amplifier is only used in case of an eCall.
- The audio downlink path from the NAD is directly connected to the power amplifier.

All settings have to be done via the I2C control interface. The TLV320AIC3104 supports the I2C control protocol using 7-bit addressing and is capable of both standard and fast modes.

3.1.4 Operating States

The following picture shows the possible HERMES operating states – these are:

Full Sleep mode, Normal Power mode, DNO mode, Normal Polling mode, Extended polling mode

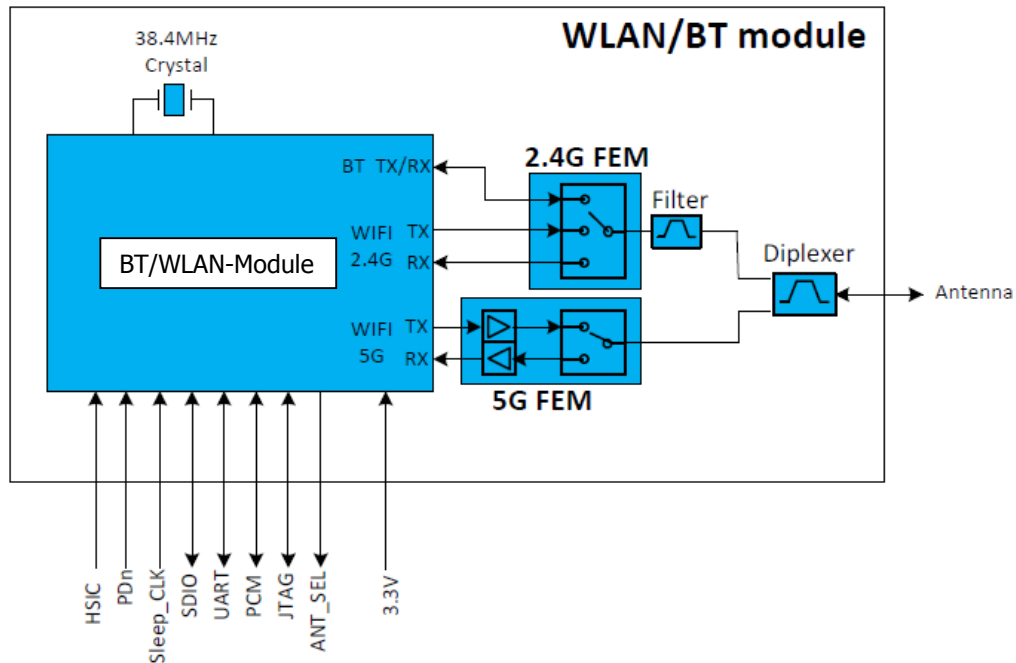


3.1.5 NAD-Module (Network Access Device)

Hermes Region Version	M055 ECE LTE	M090 ECE UMTS	M088 USA	M087 CHN
Huawei NAD	LTE ME909Tu-120	MU809Tu-8	ME909Tu-565	ME909Tu-820
Features	LTE FDD: Band 1, Band 2, Band 3, Band 4, Band 5, Band 7, Band 8, Band 20 WCDMA/HSPA+: Band 1, Band 2, Band 5, Band 8 GSM/GPRS/EDGE: 850/900/1800/1900 MHz	WCDMA/HSPA+: B1/B2/B5/B8 GSM/GPRS/EDGE: 850/900/1800/1900 MHz	LTE FDD: Band 4, Band 13 WCDMA/HSPA+: Band 2, Band 4, Band 5 GSM/GPRS/EDGE: 850 MHz/1900 MHz	LTE FDD: Band 1, Band 3 LTE TDD: Band 38, 39, 40, 41 WCDMA/HSPA+: Band 1 GSM/GPRS/EDGE: 900 MHz/1800 MHz CDMA:1x/EV-DO: BC0

3.1.6 BT/WLAN Interface

The HERMES PASS 4G module includes Bluetooth (IEEE 802.15) and WLAN (IEEE 802.11a/b/g/n) technology for connecting different types of Daimler headunits over GSM/UMTS/LTE to public network. The unit can use either Bluetooth or WLAN as transition medium. It is not possible to use both at the same time! The BT/WLAN functionality was realized by using the Harman CWM-03 module. This module has the following block diagram:



The module supports IEEE 802.11g payload data rates of 6, 9, 12, 18, 24, 36, 48, and 54 Mbps, as well as 802.11b data rates of 1, 2, 5.5 and 11 Mbps for WLAN operation and 802.11n. The CMW-03 module would also support 802.11ac 20/40/80 MHz channel bandwidth (2,4 and 5GHz bands) – however this is for Hermes not requested by customer and so not used by the application software of Hermes. For Bluetooth operation, the module supports Bluetooth 3.0 + High Speed (HS) (compliant with Bluetooth 2.1 + EDR).

For security, the Module supports the IEEE 802.11i security standard through implementation of the Advanced Encryption Standard (AES)/Counter Mode CBC-MAC Protocol (CCMP), and Wired Equivalent Privacy (WEP) with Temporal Key Integrity Protocol (TKIP) security mechanisms. The module also supports Internet Protocol Security (IPsec) with DES//3DES/AES encryption and MD5/SHA-1 authentication as well as 802.11e Quality of Service (QoS). WAPI is also supported. The module supports SDIO host interface for connecting the WLAN and high-speed UART (up to 4MB/s) for connecting Bluetooth.

Bluetooth Parameter:

Standard:	IEEE 802.15
Frequenz:	2,402-2,480 GHz
Modulation:	GFSK, p/4-DQPSK, 8DPSK
Typical RF power:	15dBm ±1dBm
Antenna:	internal pcb antenna
Antenna gain:	1,823dB @2,4GHz

WLAN Parameter:

Standard:	IEEE 802.11 a/b/g/n
Frequenz:	2,401-2,4835 GHz; 4,9-5,845GHz
Modulation:	BPSK, DBPSK, QPSK, DQPSK,8PSK,16QAM, 64QAM
Typical RF power:	15dBm ±1dBm
Antenna:	internal pcb antenna
Antenna gain:	6,598 @5GHz

The following picture shows the different Hermes connectors.



3.1.8 Pictures Hermes



3.1.9 Regulatory Compliance Content

FCC ID: T8GHERMES
IC: 6434A-HERMES

FCC § 15.19 Labelling requirements

This device complies with part 15 of the FCC Rules and Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC § 15.21 Information to user

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure Requirements

To comply with FCC RF exposure compliance requirements, the device must be installed to provide a separation distance of at least 20 cm from all persons.

INDUSTRY CANADA Statements

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Requirements

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.