

Cinterion[®] Device Gateway LTE

Hardware Interface Description

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0 Document History

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 09
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version **09a**

Chapter	What is new
5.3	Revised Table 14 regarding RF output tolerance of Band 2
7.5	Revised Table 17 regarding highest reported SAR value

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 08
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 09

Chapter	What is new
1.1	Added reference for Java Midlet to control Status LEDs
4.10	Revised chapter related to installed Java Midlet

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 07
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 08

Chapter	What is new
1, 2.1	Clarified that DGL61-W incorporates a Cinterion® PLS62-W Java module.
1.4	Revised label information.

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 06
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 07

Chapter	What is new
1.3.1	Added standards/regulations regarding RF exposure to Table 3 and Table 4
1.3.1	Updated version of standard in Table 4
1.4	Revised Figure 1 Product Label
4.2	Added block diagrams of Java Module (Figure 6 and Figure 7)
4.10	Added description to control the LEDs
5.3	Revised Table 14 RF output power for some bands
5.5	Revised Table 15 regarding operating temperature
7.5	New chapter "RF Exposure Information"

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 05
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 06

Chapter	What is new
1.3.1	Revised standards and versions in Table 3 and Table 4
3.2	Revised chapter (product and company name)
7.6	Revised FCC ID

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 04
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 05

Chapter	What is new
1.3.1	Revised IP classification in Table 5
2.1, 5.2	Revised maximum supply current (Table 13)
2.1, 5.5	Revised ambient temperature (Table 15)

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 03
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 04

Chapter	What is new
1.3.3	Added chapter about Disposal
1.4	Revised Label (Figure 1) and Label description (Table 8)

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 02
 New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 03

Chapter	What is new
2.1	Revised Table Feature of the Glance
4.3	Removed former Chapter "Terminal Circuit"
2.1, 6.1	Revised size of DGL61-W
4.6.1 to 4.7	Revised chapter to behavior of DGL61-W
4.10	Revised chapter regarding color of the LEDs
5.1, 5.2	Revised in power supply voltage Table 11 and Table 12
5.3	New Chapter regarding RF output power
5.5	Revised values in Table 15
6.2	New Chapter for Mounting Clip
8	Added Mounting Clip to Table 18

Preceding Document: Cinterion® Device Gateway LTE Hardware Interface Description" Version 01
New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 02

Chapter	What is new
4.10	Changed sequence of LEDs in Figure 9

New document: "Cinterion® Device Gateway LTE Hardware Interface Description" Version 01

Chapter	What is new
--	Initial document setup.

1 Introduction

This document¹ describes the hardware of the Cinterion® Device Gateway LTE:

- **DGL61-W** implements a USB 2.0 interface with a USB-A connector

The Device Gateway LTE contains a Cinterion® PLS62-W Java module with internal antennas and has a fixed connected USB 2.0 cable with a USB-A connector.

The scope of this document includes interface specifications, electrical as well as mechanical characteristics of the Device Gateway LTE. It specifies standards pertaining to wireless applications and outlines requirements that must be adhered to for successful product design. The Device Gateway LTE is a compact LTE/UMTS/GSM modem for the transfer of data in LTE/UMTS/GSM networks. Industrial standard interfaces and an integrated SIM card reader allow using the Device Gateway LTE easily as UMTS/GPRS/GSM terminal.

1.1 Related Documents

- [1] PLS62-W AT Command Set
- [2] Getting Started with DGL61-W
- [3] Java User's Guide
- [4] Developer Zone article [DGL61-W status LEDs driver with Connection Manager](#)

1. The document is effective only if listed in the appropriate Release Notes as part of the technical documentation delivered with your Thales product.

1.2 Terms and Abbreviations

Table 1: Terms and abbreviations

Abbreviation	Description
ARP	Antenna Reference Point
ATC	AT Command
BTS	Base Transceiver Station
CB	Cell Broadcast
CODEC	Coder-Decoder
DAI	Digital Audio Interface
DCE	Data Circuit terminating Equipment
DSR	Data Set Ready
DTR	Data Terminal Ready
EFR	Enhanced Full Rate
EGSM	Enhanced GSM
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
ETS	European Telecommunication Standard
FDMA	Frequency Division Multiple Access
G.C.F.	GSM Conformity Forum
GSM	Global Standard for Mobile Communication
HW	Hardware
I ² C	Inter Integrated Circuit
IC	Integrated Circuit
IF	Intermediate Frequency
IMEI	International Mobile Equipment Identifier
I/O	Input/ Output
IGT	Ignition
ISO	International Standards Organization
ITU	International Telecommunications Union
kbps	kbits per second
LVD	Low voltage Directive
Mbps	Mbits per second
MMI	Machine Machine Interface
MO	Mobile Originated
MS	Mobile Station
MT	Mobile Terminated

1.2 Terms and Abbreviations

Table 1: Terms and abbreviations

Abbreviation	Description
NC	Not Connected
NTC	Negative Temperature Coefficient
PA	Power Amplifier
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PCS	Personal Communication System
PD	Power Down
PDU	Protocol Data Unit
PoE	Power over Ethernet
RED	Radio Equipment Directive
RF	Radio frequency
RI	Ring Indication
RX	Receive direction
SIM	Subscriber Identification Module
SMS	Short Message Service
SW	Software
TDD	Time Division Duplex
TDMA	Time Division Multiple Access
TX	Transmit direction
UART	Universal Asynchronous Receiver and Transmitter

1.3 Regulatory and Type Approval Information

1.3 Regulatory and Type Approval Information

1.3.1 Directives and Standards

Device Gateway LTE have been designed to comply with the directives and standards listed below.

Table 2: Directives


2014/53/EU	Directive of the European Parliament and of the council of 16 April 2014 on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/ 05/EC. The product is labeled with the CE conformity mark - see Section 7.3 .
2002/95/EC (RoHS 1) 2011/65/EU (RoHS 2) 2015/863/EU (RoHS 3)	Directive of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS). Revised on 8 June 2011. Further revision on 31 March 2015 - amending Annex II to Directive 2011/ 65/EU of the European Parliament and of the Council as regards the list of restricted substances. 
2002/96/EC	Directive of the European Parliament and of the Council on waste electrical and electronic equipment (WEEE)
2003/108/EC	Directive of the European Parliament and of the Council of 8 December 2003 amending directive 2002/96/ec on waste electrical and electronic equipment (WEEE)

Table 3: Standards of North American type approval

CFR Title 47	"Code of Federal Regulations, Part 15 B, Part 22 and Part 24 (Telecommunications, PCS)"; US Equipment Authorization FCC
47CFR §2.1093	Radio frequency Radiation Exposure Evaluation: Portable Devices FCC published RF Exposure KDB procedures
OET Bulletin 65 (Edition 97-01)	Evaluating Compliance with FCC Guidelines for Human Exposure to Radio frequency Electromagnetic Fields
CSA/UL 62368-1:2014, Ed 2.0	Product Safety Certification (Safety requirements)
NAPRD.03 V5.32	"Overview of PCS Type certification review board Mobile Equipment Type Certification and IMEI control" PCS Type Certification Review board (PTCRB)
RSS102 RSS132 RSS133	Canadian Standard
IEEE Std. C95.1-1999	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
IEEE 1528-2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Technique

1.3 Regulatory and Type Approval Information

Table 4: Standards of European type approval

3GPP TS 51.010-1	“Digital cellular telecommunications system (Phase 2); Mobile Station (MS) conformance specification”
ETSI EN 301 511 V12.5.1	Global System for Mobile communications (GSM); Mobile Stations (MS) equipment; Harmonized Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
ETSI EN 301 489-1 V2.1.1	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
ETSI EN 301 489-52 V1.1.0	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 52: Specific conditions for Cellular Communication Mobile and portable (UE) radio and ancillary equipment; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
EN 55032:2015 +A11:2020	Electromagnetic compatibility of multimedia equipment - Emission Requirements (CISPR 32:2015)
ETSI EN 301 908-1 V13.1.1	IMT cellular networks; Harmonized Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements
ETSI EN 301 908-2 V13.1.1	IMT cellular networks; Harmonized Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)
ETSI EN 301 908-13 V13.1.1	IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU; Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)
ICNIRP (1998)	Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and electromagnetic Fields (up to 300 GHz)
EN 50566 (2017)	Product standard to demonstrate the compliance of wireless communication devices with the basic restriction and exposure limit values related to human exposure to electromagnetic fields in the range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body
IEC 62209-2 (2010), EN 62209-2 (2010)	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)
EN 62311-2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)
EN 62368-1:2014 + AC:2015 + A11:2017	Safety of information technology equipment

Table 5: Requirements of quality

IEC 60068	Environmental testing
DIN EN 60529	IP codes. The Device Gateway LTE comply with IP30.

1.3 Regulatory and Type Approval Information

Table 6: Standards of the Ministry of Information Industry of the People’s Republic of China

SJ/T 11363-2006	“Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products” (2006-06).
SJ/T 11364-2006	<p>“Marking for Control of Pollution Caused by Electronic Information Products” (2006-06).</p> <p>According to the “Chinese Administration on the Control of Pollution caused by Electronic Information Products” (ACPEIP) the EPUP, i.e., Environmental Protection Use Period, of this product is 20 years as per the symbol shown here, unless otherwise marked. The EPUP is valid only as long as the product is operated within the operating limits described in the Hardware Interface Description.</p> <p>Please see Table 1.3.2 for an overview of toxic or hazardous substances or elements that might be contained in product parts in concentrations above the limits defined by SJ/T 11363-2006.</p>



Table 7: Toxic or hazardous substances or elements with defined concentration limits






部件名称 Name of the part	有毒有害物质或元素 Hazardous substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件 (Metal Parts)	○	○	○	○	○	○
电路模块 (Circuit Modules)	X	○	○	○	○	○
电缆及电缆组件 (Cables and Cable Assemblies)	○	○	○	○	○	○
塑料和聚合物部件 (Plastic and Polymeric parts)	○	○	○	○	○	○

O:
表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。
Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.




X:
表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。
Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part *might exceed* the limit requirement in SJ/T11363-2006.

1.3.2 Safety Precautions

The following safety precautions must be observed during all phases of the operation, usage, service or repair of any cellular terminal or mobile incorporating Device Gateway LTE. Manufacturers of the cellular terminal are advised to convey the following safety information to users and operating personnel and incorporate these guidelines into all manuals supplied with the product. Failure to comply with these precautions violates safety standards of design, manufacture and intended use of the product. THALES DIS AIS Deutschland GmbH assumes no liability for customer's failure to comply with these precautions.

	<p>When in hospitals or other health care facilities, observe the restrictions on the use of mobiles. Switch off the cellular terminal or mobile if to be instructed to do so by the guidelines posted in sensitive areas. Medical equipment may be sensitive to RF energy.</p> <p>The operation of cardiac pacemakers, other implanted medical equipment and hearing aids can be affected by interference from cellular terminals or mobiles placed close to the device. If in doubt about potential danger, contact the physician or the manufacturer of the device to verify that the equipment is properly shielded. Pacemaker patients are advised to keep their hand-held mobile away from the pacemaker, while it is on. This personal subgroup always should check the distance to the mobile.</p>
	<p>Switch off the cellular terminal or mobile before boarding an aircraft. Make sure it cannot be switched on inadvertently. The operation of wireless appliances in an aircraft is forbidden to prevent interference with communications systems. Failure to observe these instructions may lead to the suspension or denial of cellular services to the offender, legal action, or both.</p> <p>Check the local and actual laws about these themes.</p>
	<p>Do not operate the cellular terminal or mobile in the presence of flammable gases or fumes. Switch off the cellular terminal when you are near petrol stations, fuel depots, chemical plants or where blasting operations are in progress. Operation of any electrical equipment in potentially explosive atmospheres can constitute a safety hazard.</p>
	<p>Your cellular terminal or mobile receives and transmits radio frequency energy while switched on. Remember that interference can occur if it is used close to TV sets, radios, computers or inadequately shielded equipment. Follow any special regulations and always switch off the cellular terminal or mobile wherever forbidden, or when you suspect that it may cause interference or danger.</p>
	<p>Road safety comes first! Do not use a hand-held cellular terminal or mobile while driving a vehicle unless it is securely mounted in a holder for speakerphone operation. Before making a call with a hand-held terminal or mobile park the vehicle. Speaker phones must be installed by qualified personnel. Faulty installation or operation can constitute a safety hazard.</p> <p>Check the actual and local laws about these themes.</p>

1.3 Regulatory and Type Approval Information

	<p>IMPORTANT! Cellular terminals or mobiles operate using radio signals and cellular networks. In that case connections cannot be guaranteed at all times under all conditions. Therefore, you should never rely solely upon any wireless device for essential communications, for example emergency calls.</p> <p>Remember, in order to make calls or receive calls the cellular terminal or mobile must be switched on in a service area with adequate cellular signal strength.</p> <p>Some networks do not allow for emergency calls if certain network services or phone features are in use (e.g. lock functions, fixed dialing etc.). You may need to deactivate those features before you can make an emergency call. Some networks require a valid SIM card to be properly inserted in the cellular terminal or mobile.</p>
	<p>If a power supply unit is used to supply the device it must meet the demands placed on SELV circuits in accordance with EN62386. The maximum permissible connection length between the device and the supply source should not exceed 3m.</p>
	<p>According to the guidelines for human exposure to radio frequency energy, an antenna connected to the FME jack of the device should be placed at least 20cm away from human bodies.</p>

1.3.3 Disposal



Electronic waste may not be disposed of with household waste.

1.4 Product Label

1.4 Product Label

The label fixed to the bottom of a Device Gateway LTE comprises the following information.

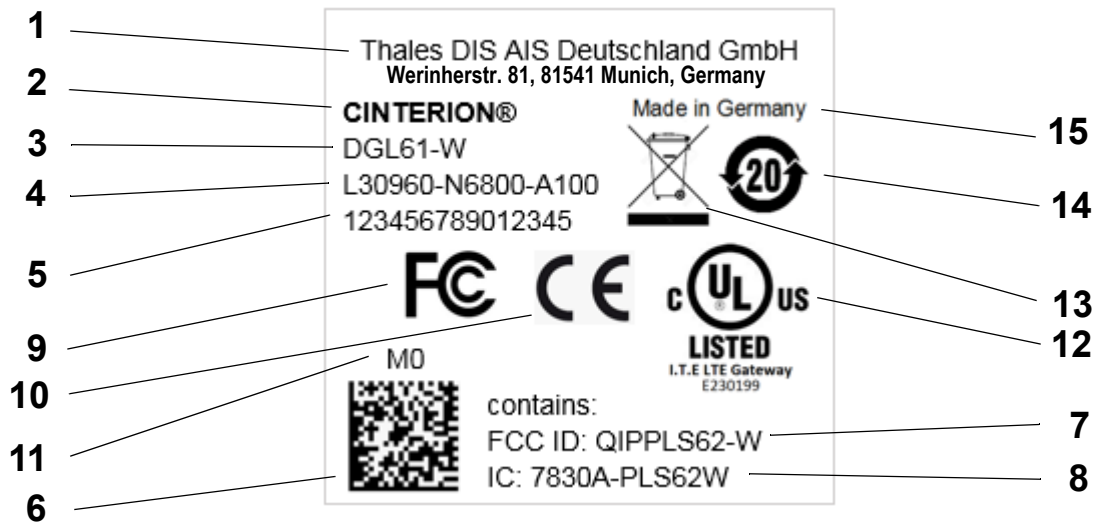


Figure 1: Sample Device Gateway LTE label DGL61-W

Table 8: Device Gateway LTE label information

No.	Information
1	Company name and address of the manufacturer
2	Cinterion Logo (trademark)
3	Product name
4	Product ordering number
5	Product IMEI
6	Product IMEI code (2D)
7	FCC ID for Java module contained in Device Gateway
8	IC ID for Java module contained in Device Gateway
9	FCC Declaration of Conformity logo
10	CE logo. May be replaced for samples with "Not for sale" (see also Section 7.3)
11	Date code
12	UL logo
13	WEEE symbol (see Table 2 and Section 1.3.3)
14	Chinese RoHS symbol (see Table 6)
15	Marking "Made in Germany"

2 Product Concept

2.1 Key Features at a Glance

Feature	Implementation
General	
Incorporates Cinterion® PLS62-W Java module	The PLS62-W Java module handles all signal and data processing within the Device Gateway LTE. Internal software runs the application interface and the complete LTE/UMTS/GSM protocol stack.
Frequency bands	<p>LTE: (1, 2, 3, 4, 5, 7, 8, 12, 18, 19, 20, 28): Twelve band LTE: 700/800/850/900/1700/2100/1800/1900/2100/2600MHz</p> <p>UMTS/HSPA+ (I, II, IV, V, VIII, IX, XIX): seven band: UMTS 800/850/900/(1700/2100)/1800/1900/2100MHz</p> <p>GSM/GPRS/EDGE: Quad band GSM: 850/900/1800/1900MHz</p>
LTE features	
3GPP Release 9	UE CAT 1 supported DL 10.2Mbps, UL 5.2Mbps
HSPA features	
3GPP Release 6,7	DL 7.2Mbps, UL 5.7Mbps HSDPA Cat.8 / HSUPA Cat.6 data rates Compressed mode (CM) supported according to 3GPP TS25.212
UMTS features	
3GPP Release 4	PS data rate – 384 kbps DL / 384 kbps UL CS data rate – 64 kbps DL / 64 kbps UL

2.1 Key Features at a Glance

Feature	Implementation
GSM / GPRS / EDGE features	
Data transfer	<p>GPRS:</p> <ul style="list-style-type: none"> • Multislot Class 12 • Full PBCCH support • Mobile Station Class B • Coding Scheme 1 – 4 <p>EGPRS:</p> <ul style="list-style-type: none"> • Multislot Class 12 • EDGE E2 power class for 8 PSK • Downlink coding schemes – CS 1-4, MCS 1-9 • Uplink coding schemes – CS 1-4, MCS 1-9 • SRB loopback and test mode B • 8-bit, 11-bit RACH • PBCCH support • 1 phase/2 phase access procedures • Link adaptation and IR • NACC, extended UL TBF • Mobile Station Class B <p>CSD:</p> <ul style="list-style-type: none"> • V.110, RLP, non-transparent • 2.4, 4.8, 9.6, 14.4kbps • USSD
SMS	<ul style="list-style-type: none"> • Point-to-point MT and MO • Cell broadcast • Text and PDU mode
GSM class	Small MS
Power supply	Single supply voltage 5V via USB, max. 630mA
Operating temperature	Normal operation: -25°C to +60°C
Physical	Dimensions: 114.5 mm x 73.5 mm x 19.5mm (excluding USB interface cable) Weight: 105 g (approx.)
RoHS, WEEE	All hardware components are fully compliant with the EU RoHS and WEEE Directives
Software	
AT commands	Hayes 3GPP TS 27.007, TS 27.005, Thales
Java™ Open Platform	<p>Java™ Open Platform with</p> <ul style="list-style-type: none"> • Java™ profile IMP-NG & CLDC 1.1 HI • Secure data transmission via HTTPS/SSL • Multi-threading programming and multi-application execution <p>Major benefits: seamless integration into Java applications, ease of programming, no need for application micro-controller, extremely cost-efficient hardware and software design – ideal platform for industrial GSM applications.</p> <p>The memory space available for Java programs is around 31MB in the flash file system and around 18MB RAM. Application code and data share the space in the flash file system and in RAM.</p>
SIM Application Toolkit	SAT Release 99

2.1 Key Features at a Glance

Feature	Implementation
TCP/IP stack	Protocols: TCP server/client, UDP, DNS, Ping, HTTP, FTP, SMTP Access by AT commands
Firmware update	Upgradeable via USB interface
Antenna	two internal antennas for maximum RF performance
Interfaces	
USB interface	USB 2.0 Slave interface, cable length 200 mm
SIM card reader	Supported micro SIM cards: 3V, 1.8V
Power on/off, Reset	
Power on	automatically with USB connection
Power off	Airplane Mode supported protected against sudden power loss (USB disconnection) Automatic restart in case of critical temperature conditions
Reset	Reset by AT command,
Special features	
Real time clock	Timer functions via AT commands, running as long as USB is connected and powered by Host
Phonebook	SIM card and Device Gateway LTE

3 Getting Started with DGL61-W

3.1 Technical Requirements for Using DGL61-W

- Device Gateway LTE DGL61-W.
- micro SIM Card and PIN, if SIM card is PIN protected
- Thales PLS62-W USB driver package
- Computer running Windows 7 (or Windows 8 or Windows 10), USB 2.0 High Speed compatible
- Local administrator privileges on the particular Windows computer to install and uninstall the drivers
- Appropriate application for controlling the module from within a PC's operating system. For Windows, e.g. Windows Hyperterminal.

3.2 Start Up the DGL61-W

Note: If the USB interface is to be employed, the USB drivers provided by Thales need to be available. Copy the supplied driver files to a folder on the Windows computer. Be sure to use the latest USB driver software supplied by Thales.

Also, if the module's Java functionality is to be employed, the Cinterion Mobility Toolkit (CMTK) as distributed on the Java CD install package needs to be installed. For more information on the CMTK (including installation) please refer to [\[3\]](#).

- Start the Windows PC.
- Insert the micro SIM card into DGL61-W (see [Section 4.9](#)).
- If the USB cable of DGL61-W is plugged into the PC, and the USB drivers provided by Thales were not yet installed on the computer, you will be prompted to install them:
 - On Windows 7 (or Windows 8 or Windows 10), wait a few seconds until all USB devices show up in the Windows Device Manager under "Other devices" as devices without installed drivers. Then - from top to bottom - right-click each "PLSx" device, select the option "Update Driver Software...", browse to the folder you copied the Thales USB drivers to, and select this folder to update the driver software from.
 - In any case, cancel any Windows instructions to update the software automatically. For each USB device take care to browse to the folder containing the unzipped driver software.

After successful USB driver installation the installed USB devices are listed in the Windows Device Manager under "Modems", "Network adapters", and "Ports (COM & LPT)" as shown in [Figure 2](#).

3.2 Start Up the DGL61-W

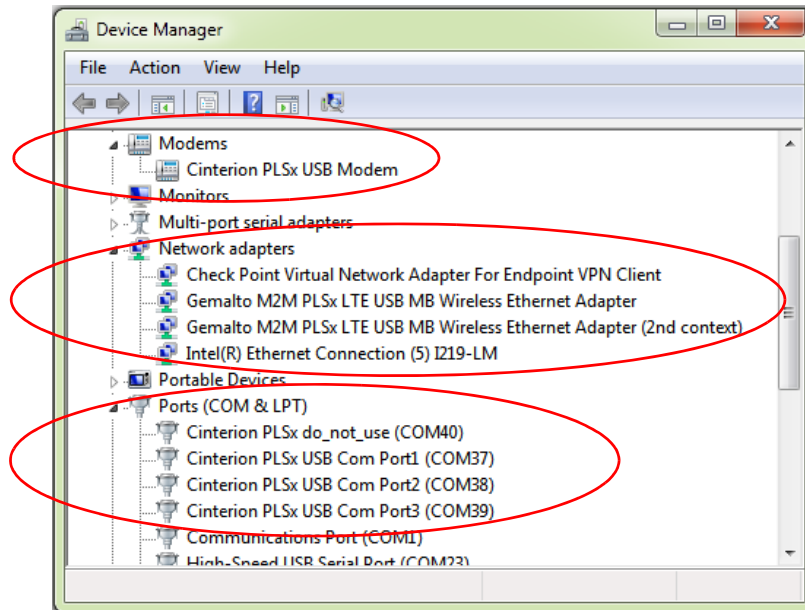


Figure 2: Installed USB devices

- To connect to the DGL61-W via USB interface, check the properties of the enumerated USB devices for the configured COM ports, for example the "Cinterion PLSx USB Modem", call a terminal program on the PC and connect to the configured COM port. Type the AT command ATI to display module identification information.

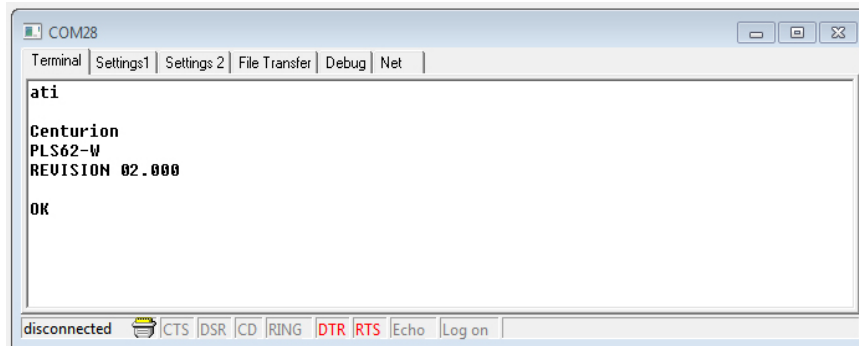


Figure 3: Connection via USB interface (USB modem)

For a complete AT Command Set description see [1]. This includes AT commands to configure the communication interfaces.

4 Interface Description

4.1 Overview

Device Gateway LTE provide the following interfaces for power supply/ data transfer and micro SIM card:

Table 9: Device Gateway LTE' interfaces

No.	Description
1	USB 2.0 cable with USB-A connector
2	4 Status LEDs
3	micro SIM card reader

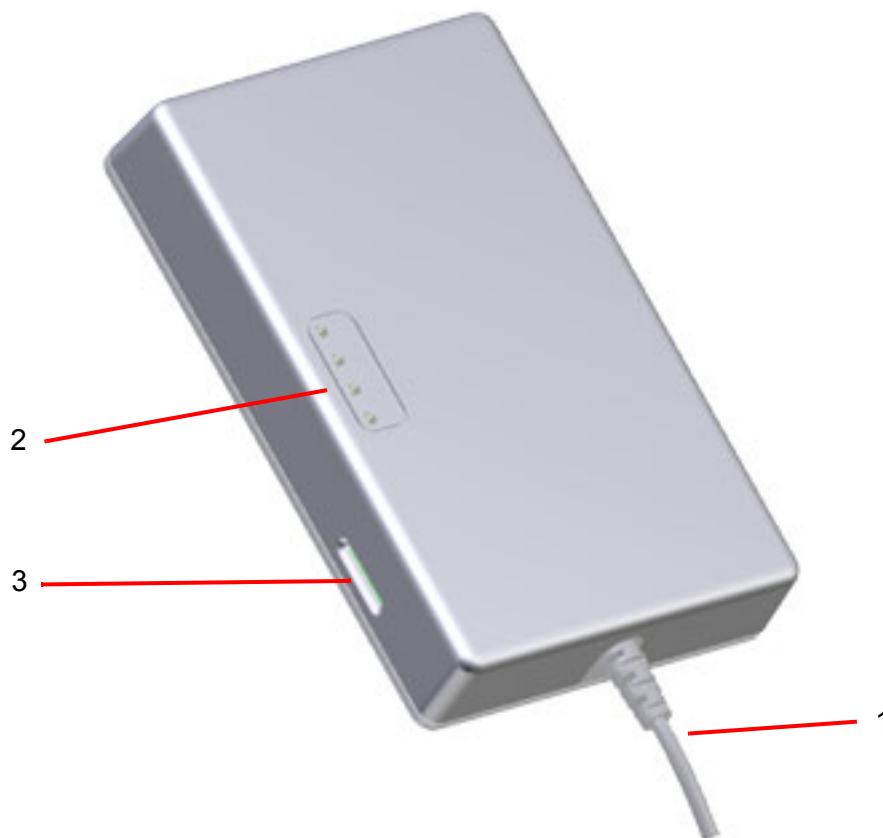


Figure 4: Device Gateway LTE 3D view

4.2 Block Diagram

Figure 5 shows a block diagram of a sample configuration that incorporates a Device Gateway and typical accessories.

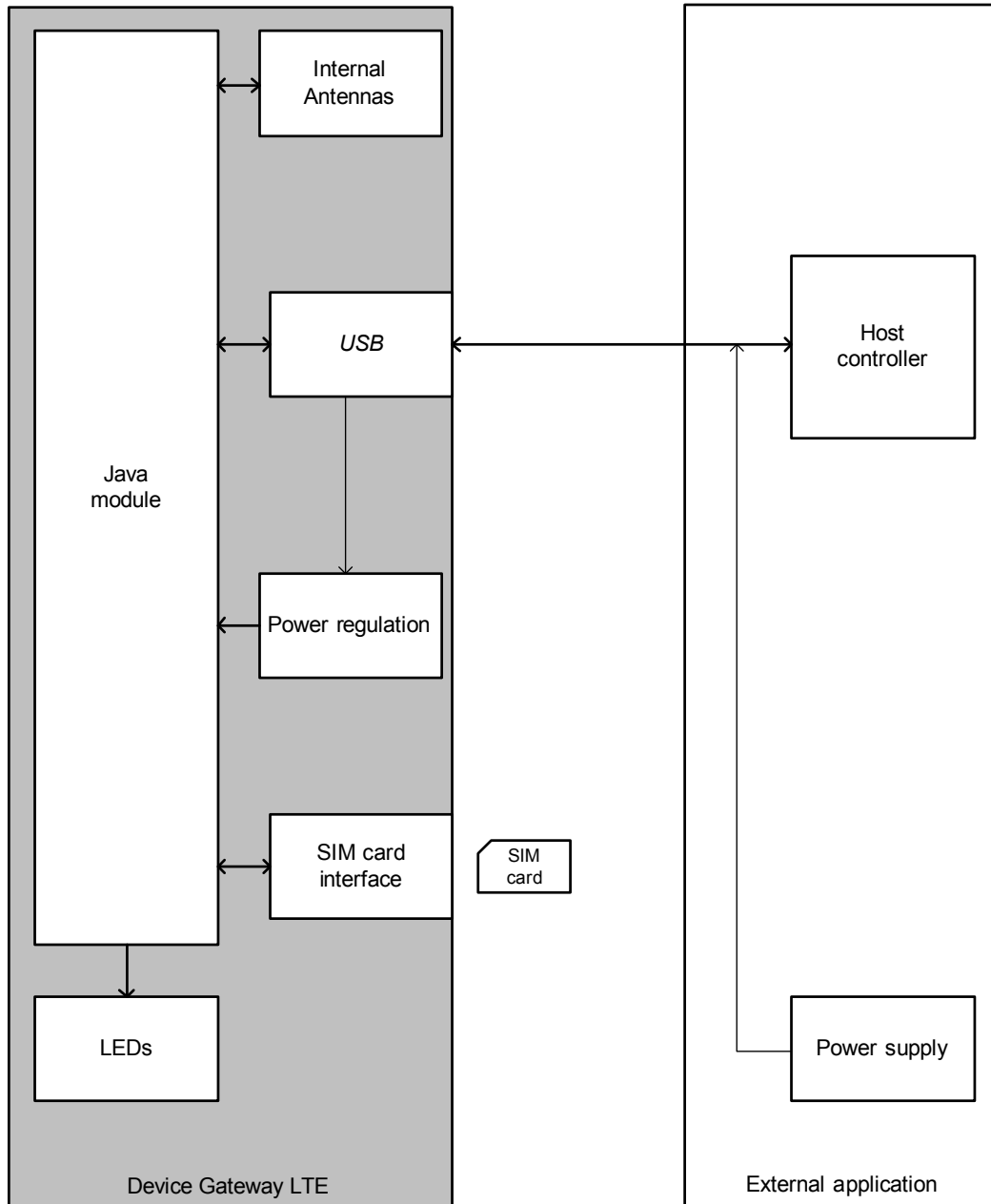


Figure 5: Block diagram

Figure 6 and Figure 7 show block diagrams of the Java Module included in Device Gateway LTE module and illustrate the major functional components:

4.2 Block Diagram

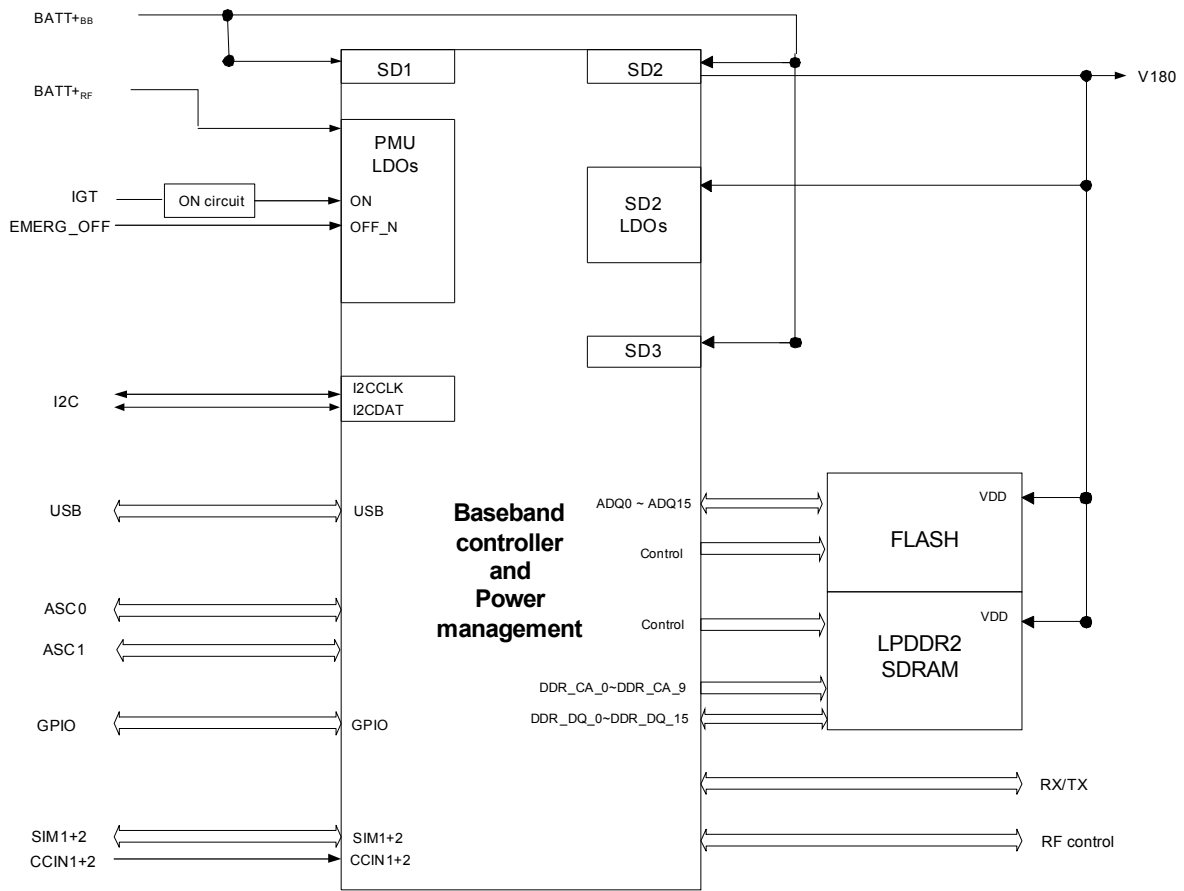


Figure 6: Java Module block diagram (digital part)

4.2 Block Diagram

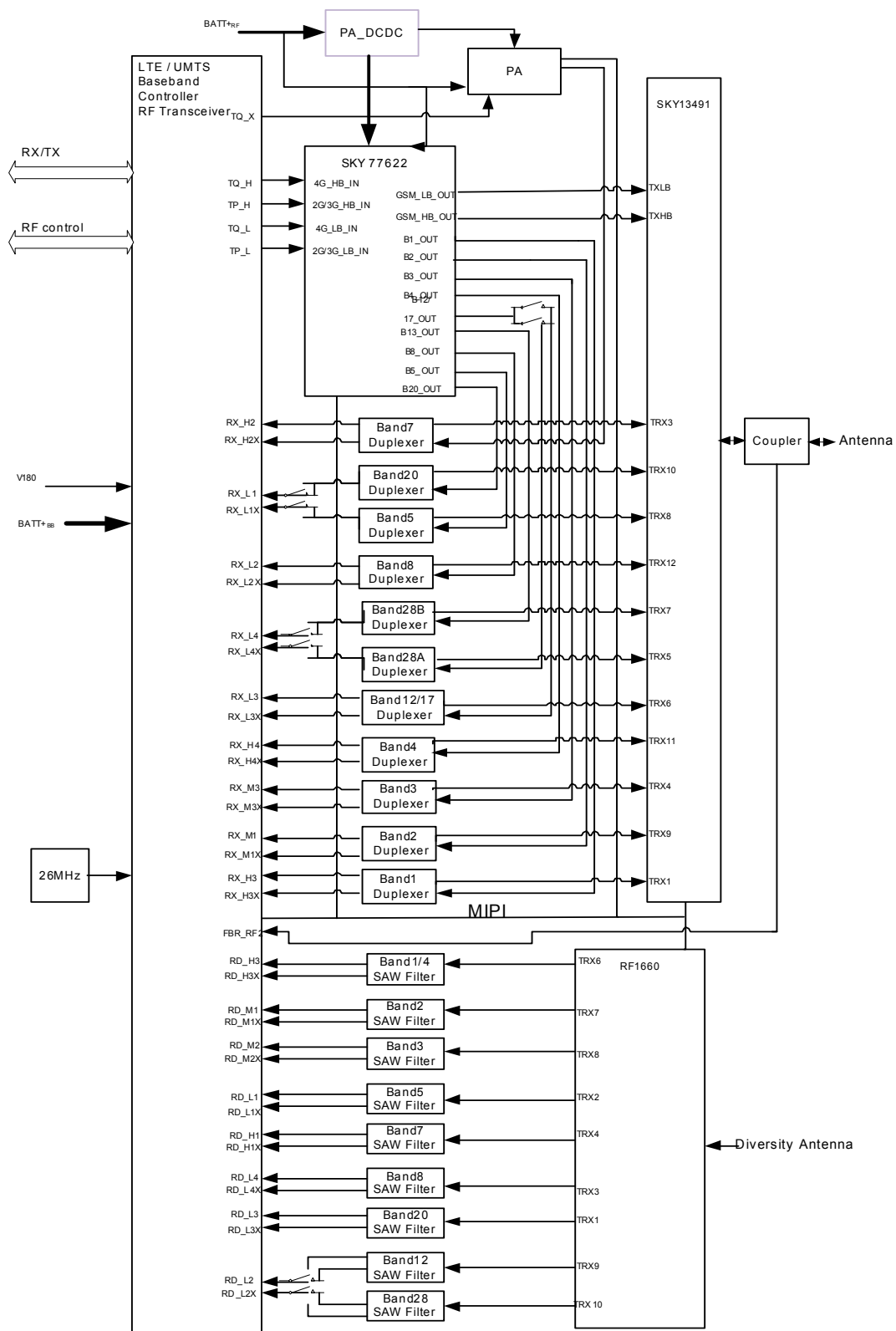


Figure 7: Java Module RF section block diagram

4.3 Operating Modes

The table below briefly summarizes the various operating modes referred to in the following chapters.

Table 10: Overview of operating modes

Normal operation	GSM IDLE	Software is active. Once registered to the GSM network paging with BTS is carried out. The Device Gateway is ready to send and receive.
	GSM DATA	Connection between two subscribers is in progress. Power consumption depends on network coverage individual settings, such as DTX off/on, hopping sequences, antenna.
	GPRS/UMTS/HSPA IDLE	Device Gateway is ready for GPRS data transfer, but no data is currently sent or received. Power consumption depends on network settings and GPRS configuration (e.g. multislot settings).
	GPRS DATA	GPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates, GPRS configuration (e.g. used multislot settings) and reduction of maximum output power.
	EGPRS DATA	EGPRS data transfer in progress. Power consumption depends on network settings (e.g. power control level), uplink / downlink data rates, EGPRS configuration (e.g. used multislot settings) and reduction of maximum output power.
	UMTS DATA	UMTS data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.
	HSPA DATA	HSPA data transfer in progress. Power consumption depends on network settings (e.g. TPC Pattern) and data transfer rate.
Power Down	Power Down is only an intermediate state, because Device Gateway LTE will be automatically started as long as USB is connected and powered by the Host. The RTC works continuously as long as powered by the Host via USB.	

4.4 USB Interface

The DGL61-W supports a USB 2.0 High Speed (480Mbit/s) device interface that is Full Speed (12Mbit/s) compliant too.

The USB interface can be used as command and data interface and for downloading Java module firmware. It is only available as a slave device.

4.5 Power Supply

The DGL61-W power supply via USB has to be a single voltage source of 5V DC.

When power fails for >1ms, DGL61-W safely power down and restarts when power is back and valid. The RTC doesn't support longer power fails, this will reset the RTC.

4.6 Power Up/Power Down Scenarios

In general, be sure not to turn on the DGL61-W while it is beyond the safety limits of voltage and temperature stated in [Section 5.1](#). DGL61-W immediately switch off after having started and detected these inappropriate conditions. In extreme cases this can cause permanent damage to the DGL61-W.

4.6.1 Turn Device Gateway LTE on

The DGL61-W is switched on automatically, when the USB cable is connected to an USB Host (e.g. PC) or started again, when the DGL61-W enters the Power Down mode.

4.6.2 Reset/Restart Device Gateway LTE

There are various possibilities to reset/restart Device Gateway LTE:

- DGL61-W can be reset/restarted by entering the command AT+CFUN=x,1. For details on AT+CFUN please see [\[1\]](#).
- DGL61-W can be reset/restarted by simply shutting them down as described in [Section 4.6.3](#) and will be automatically started afterwards as described in [Section 4.6.1](#).

4.6.3 Turn Device Gateway LTE off

Normal shutdown:

- The DGL61-W supports no permanent power down mode, because the Device Gateway LTE will be immediately started again after entering the power down mode.
- AT^SMSO command will do only a restart of the Device Gateway LTE. This switch off procedure lets the DGL61-W log off from the network and allows the software to enter a secure state and save data before disconnecting the power supply. After AT^SMSO has been entered the DGL61-W returns the following result codes:

```
^SMSO: MS OFF
OK
^SHUTDOWN
```

The "^SHUTDOWN" result code indicates that the DGL61-W turns off in less than 1 second. The RTC is still running during this restart.

4.6.4 Disconnecting power supply

The DGL61-W can be disconnected at any time because the DGL61-W is protected against sudden power loss (USB disconnection).

4.7 Automatic thermal shutdown

An on-board NTC measures the temperature of the built-in Java module. If over- or under-temperature is detected on the module the DGL61-W automatically resets to avoid thermal damage to the system. [Table 15](#) specifies the ambient and internal board temperature threshold for the DGL61-W.

The automatic restart procedure is equivalent to the power-down initiated with the AT^SMSO command, i.e. DGL61-W log off from the network and the software enters a secure state avoiding loss of data.

Alert messages transmitted before the DGL61-W switch off are implemented as Unsolicited Result codes (URCs). For details see the description of AT^SCTM command provided in [\[1\]](#).

4.8 RTC

The internal Real Time Clock (RTC) of the DGL61-W retains the time and date as long as the DGL61-W is connected to the Host and handles the alarm function. The AT+CCLK command serves to set the time and date, and AT+CALA specifies a reminder message. See [\[1\]](#) for details.

However, please note that the Alarm function described in [\[1\]](#), Section AT+CALA, can only be used to set a reminder message, but not to configure the DGL61-W to wake up from Power Down mode, because the DGL61-W will be started automatically after shutdown.

4.9 SIM Interface

The SIM interface is intended for 1.8V and 3V micro SIM cards in accordance with GSM 11.12 Phase 2. The card holder is a five wire interface according to GSM 11.11. A sixth pin has been added to detect whether or not a SIM card is inserted.

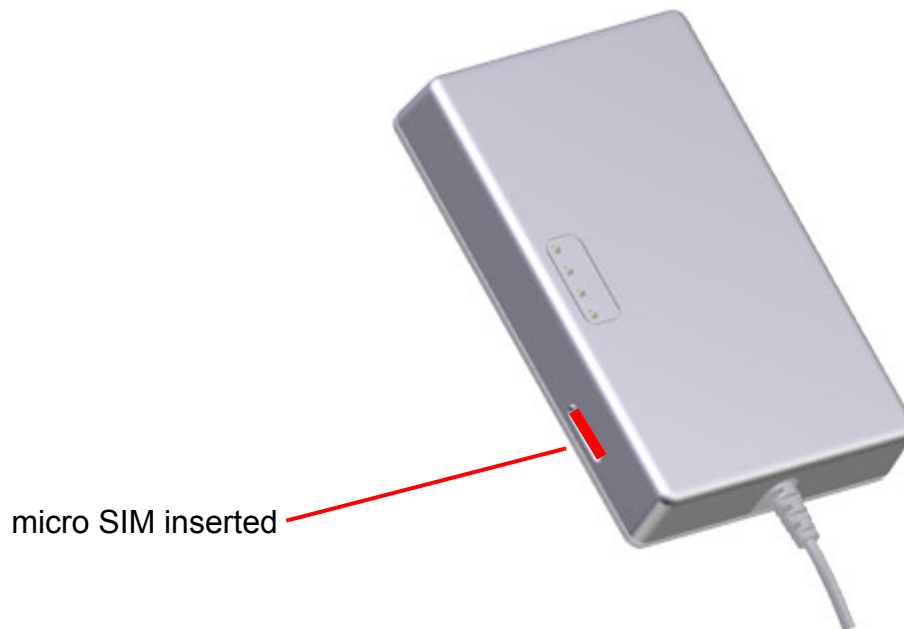


Figure 8: SIM interface

The SIM - with the circuit side facing upwards - is inserted by gently pushing it into the SIM card holder until it snaps hold. It is now protected from accidental removal. The SIM can be removed from the card holder by using a flat object such as a screwdriver to carefully press the inserted SIM until it snaps out again.

All signals of the SIM interface are protected from electrostatic discharge.

Removing and inserting the SIM card during operation requires the software to be reinitialized. Therefore, after reinserting the SIM card it is necessary to restart Device Gateway LTE.

Note: No guarantee can be given, nor any liability accepted, if loss of data is encountered after removing the SIM card during operation. Also, no guarantee can be given for properly initializing any SIM card that the user inserts after having removed a SIM card during operation. In this case, the application must restart the Device Gateway LTE.

4.10 Status LEDs

Device Gateway LTE has four LEDs indicating its operating states:

- A green LED indicates whether the Device Gateway LTE is powered or not
- A green LED indicates the network registration state of the Device Gateway LTE.
- A green LED, off by default, FW controlled by AT commands or midlet only, for customer purpose like service status (2G: off, 3G/4G: on).
- A green/red LED, off by default, FW controlled by AT commands or midlet only, for customer purpose like cellular coverage, static color green yellow red by AT commands and blinking states by midlet.

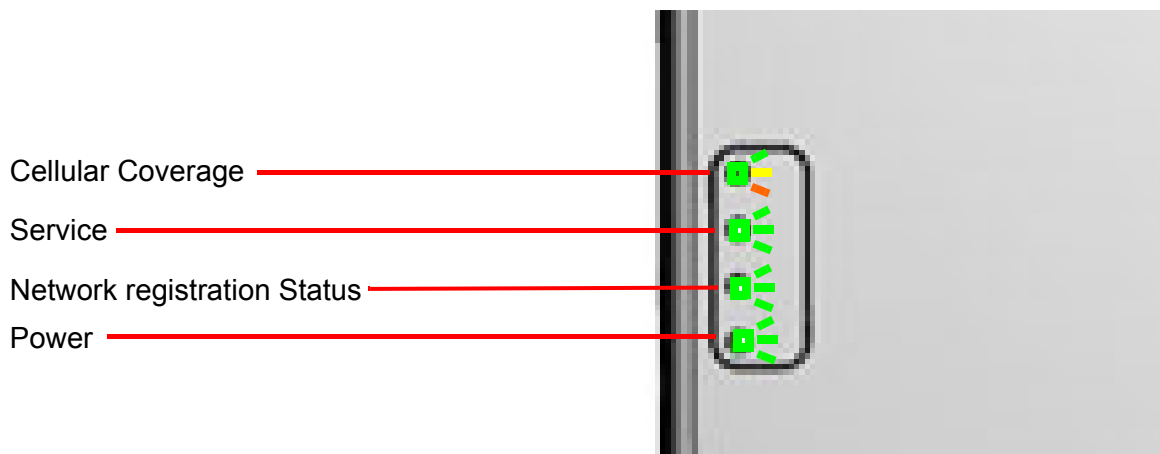


Figure 9: Status LEDs

The Device Gateway LTE will be delivered with a Java Midlet, which controls the LEDs. Please refer for details to [\[4\]](#).

The Network Registration Status LED is connected to GPIO5/STATUS of the Java module and can be configured by using the `AT^SLED` command to show status in different modes. To get the status information on GPIO5/STATUS, the interface must be configured by `AT^SCFG="Gpio/mode/SYNC","std"`. For details on the AT command please refer to [\[1\]](#).

The Cellular Coverage LED is connected to GPIO7 (red) and GPIO8 (green) of the Java module and can be controlled by the GPIO AT commands.

The Service LED is connected to GPIO6 of the Java module and can be controlled by the GPIO AT commands.

For Cellular Coverage and Service LED use first `AT^SCPIN` to configure the required GPIO as output and then use `AT^SSIO` to set the state of the GPIO. For details on the AT command please refer to [\[1\]](#).

5 Electrical and Environmental Characteristics

5.1 Absolute Maximum Ratings

Table 11: Absolute maximum ratings

Parameter	Port / Description	Min.	Max.	Unit
Supply voltage			6	V
USB interface	All electrical characteristics according to USB Implementers' Forum, USB 2.0 Specification.	--	--	--
Immunity against discharge of static electricity	SIM Interface			
	Contact discharge	-4	+4	kV
	Air discharge	-8	+8	kV

5.2 Operating Power Supply

Table 12: Operating supply voltage for Device Gateway LTE

Parameter	Min	Typ	Max	Unit
Supply voltage	4.75	5	5.25	V

Table 13: Maximal supply current for Device Gateway LTE

Parameter	Min	Typ	Max	Unit
Supply current			630	mA

5.3 RF Output Power

The RF output power for each technology and each band is shown in the following table.

Table 14: RF Output Power

Technology	RF Output Power
LTE Output power (according to Release 9)	Class 3 (+23dBm +1/-2dB) for LTE 700, LTE FDD Bd12 <MFBI Bd17> Class 3 (+23dBm +1/-2dB) for LTE 700, LTE FDD Bd28 Class 3 (+23dBm +1/-2dB) for LTE 800, LTE FDD Bd18 Class 3 (+23dBm +1/-2dB) for LTE 800, LTE FDD Bd19 Class 3 (+23dBm +1/-2dB) for LTE 800, LTE FDD Bd20 Class 3 (+23dBm +1/-2dB) for LTE 850, LTE FDD Bd5 Class 3 (+23dBm +1/-2dB) for LTE 900, LTE FDD Bd8 Class 3 (+23dBm +1/-2dB) for LTE AWS, LTE FDD Bd4 Class 3 (+23dBm +1/-2dB) for LTE 1800, LTE FDD Bd3 Class 3 (+23dBm +0.4/-2dB) for LTE 1900, LTE FDD Bd2 Class 3 (+23dBm +0.5/-2dB) for LTE 2100, LTE FDD Bd1 Class 3 (+23dBm +1.1/-2dB) for LTE 2600, LTE FDD Bd7

5.4 USB Interface

Table 14: RF Output Power

Technology	RF Output Power
UMTS Output power (according to Release 8)	Class 3 (+24dBm +1/-3dB) for UMTS 800, WCDMA FDD BdXIX Class 3 (+24dBm +1/-3dB) for UMTS 850, WCDMA FDD BdV Class 3 (+24dBm +1/-3dB) for UMTS 900, WCDMA FDD BdVIII Class 3 (+23.8dBm +0.1/-2.8dB) for UMTS AWS, WCDMA FDD BdIV Class 3 (+24dBm +1/-3dB) for UMTS 1800, WCDMA FDD BdIX Class 3 (+24dBm +0.4/-3dB) for UMTS 1900, WCDMA FDD BdII Class 3 (+23.8dBm +0.1/-2.8dB) for UMTS 2100, WCDMA FDD BdI
GSM/GPRS Output power (according to release 99)	Class 4 (+33dBm ±2dB) for EGSM850 Class 4 (+33dBm ±2dB) for EGSM900 Class 1 (+30dBm ±2dB) for GSM1800 Class 1 (+30dBm ±2dB) for GSM1900 Class E2 (+27dBm ± 3dB) for GSM 850 8-PSK Class E2 (+27dBm ± 3dB) for GSM 900 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1800 8-PSK Class E2 (+26dBm +3 /-4dB) for GSM 1900 8-PSK

5.4 USB Interface

All electrical characteristics according to USB Implementers' Forum, USB 2.0 Specification.

5.5 Operating Temperatures

Table 15: Temperature characteristics

Parameter	Min	Typical	Max	Unit
Normal (unlimited) Operation	-30		+50°C	°C
Extended Operation			+60 ¹ to +70 ²	°C
Automatic thermal restart ^{3,4}	<-40		>+90	°C

1. Maximum time to transmit to keep DGL61-W below the automatic thermal restart limit. 50s
Maximum transmit to idle ratio to keep DGL61-W below the automatic thermal restart limit: 1:3
Both condition, max time and ratio, mustn't be violated to keep DGL61-W in a safe operation condition without thermal restart, e.g. 10/30s, 20/60s etc. If one condition is violated, e.g. transmit time 60s or ratio 1:2, the DGL61-W will automatic restart when it reached the maximum board temperature (dependent on the transmit level).
Test condition: LTE upload @23dBm, still air.
2. Maximum time to transmit to keep DGL61-W below the automatic thermal restart limit. 30s
Maximum transmit to idle ratio to keep DGL61-W below the automatic thermal restart limit: 1:6
Both condition, max time and ratio, mustn't be violated to keep DGL61-W in a safe operation condition without thermal restart, e.g. 10/60s, 20/120s etc. If one condition is violated, e.g. transmit time 60s or ratio 1:5, the DGL61-W will automatic restart when it reached the maximum board temperature (dependent on the transmit level).
Test condition: LTE upload @23dBm, still air.
3. PCB Board temperature of module.
4. Due to temperature measurement uncertainty, a tolerance of $\pm 3^{\circ}\text{C}$ on these switching thresholds may occur.

Note: Within the specified operating temperature ranges the board temperature may vary to a great extent depending on operating mode, used frequency band, radio output power and current supply voltage. Note also the differences and dependencies that usually exist between board (PCB) temperature of the Java module and its ambient temperature.

5.6 Storage Conditions

5.6 Storage Conditions

Table 16: Storage conditions

Type	Condition	Unit	Reference
Air temperature: Low High	-30 +75	°C	ETS 300 019-2-1: T1.2, IEC 60068-2-1 Ab ETS 300 019-2-1: T1.2, IEC 60068-2-2 Bb
Humidity relative: Low High Condens.	10 90 at 30°C 90-100 at 30°C	%	--- ETS 300 019-2-1: T1.2, IEC 60068-2-56 Cb ETS 300 019-2-1: T1.2, IEC 60068-2-30 Db
Air pressure: Low High	70 106	kPa	IEC TR 60271-3-1: 1K4 IEC TR 60271-3-1: 1K4
Movement of surrounding air	1.0	m/s	IEC TR 60271-3-1: 1K4
Water: rain, dripping, icing and frosting	Not allowed	---	---
Radiation: Solar Heat	1120 600	W/m ²	ETS 300 019-2-1: T1.2, IEC 60068-2-2 Bb ETS 300 019-2-1: T1.2, IEC 60068-2-2 Bb
Chemically active substances	Not recommended		IEC TR 60271-3-1: 1C1L
Mechanically active substances	Not recommended		IEC TR 60271-3-1: 1S1
Vibration sinusoidal: Displacement Acceleration Frequency range	1.5 5 2-9 9-200	mm m/s ² Hz	IEC TR 60271-3-1: 1M2
Shocks: Shock spectrum Duration Acceleration	semi-sinusoidal 1 50	ms m/s ²	IEC 60068-2-27 Ea

The conditions stated above are only valid for devices in their original packed state in weather protected, non-temperature-controlled storage locations. Normal storage time under these conditions is 12 months maximum.

6 Mechanics, Mounting and Packaging

6.1 Mechanical Dimensions

Figure 10 shows a 3D view of the Device Gateway and provides an overview of the mechanical dimensions of the device. For further details see Figure 11 and Section 6.3. To allow for an easier mechanical implementation into an external application 3D STP data for the Device Gateway is attached to this PDF. Please open the Attachments navigation panel to view and save this information.

Length:	114.5 mm (excluding USB cable)
Width:	73.5 mm
Height:	19.5 mm
Cable length:	200 mm
Weight:	105 g

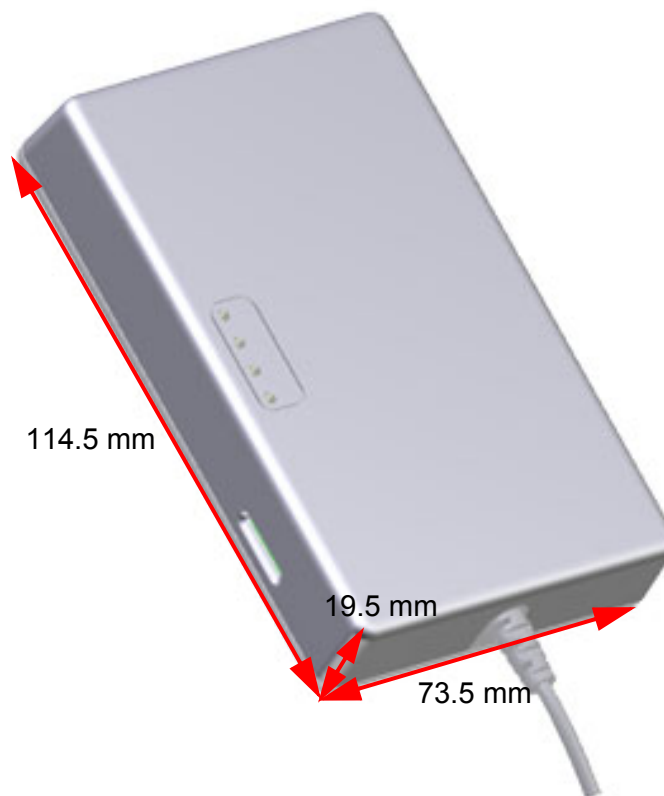


Figure 10: Device Gateway LTE 3D overview

6.2 Mounting Clip (optional)

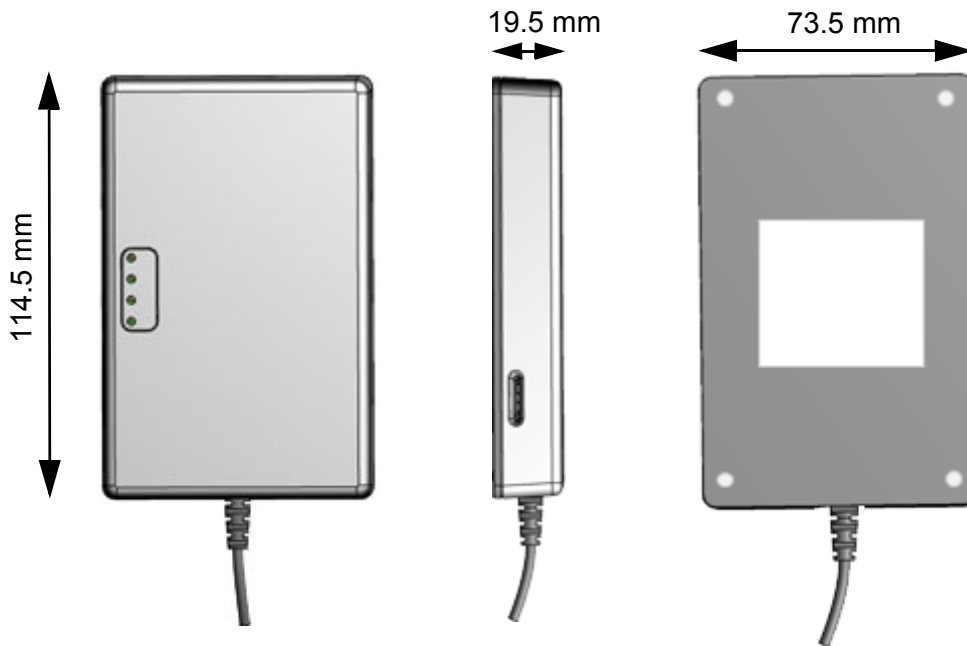


Figure 11: Device Gateway LTE mechanical dimensions

6.2 Mounting Clip (optional)

For mounting the DGL61-W there is a mounting clip available (see [Figure 12](#)).

Length: 119.25 mm
Width: 69.0 mm
Height: 15.7 mm
Weight: t.b.d. g

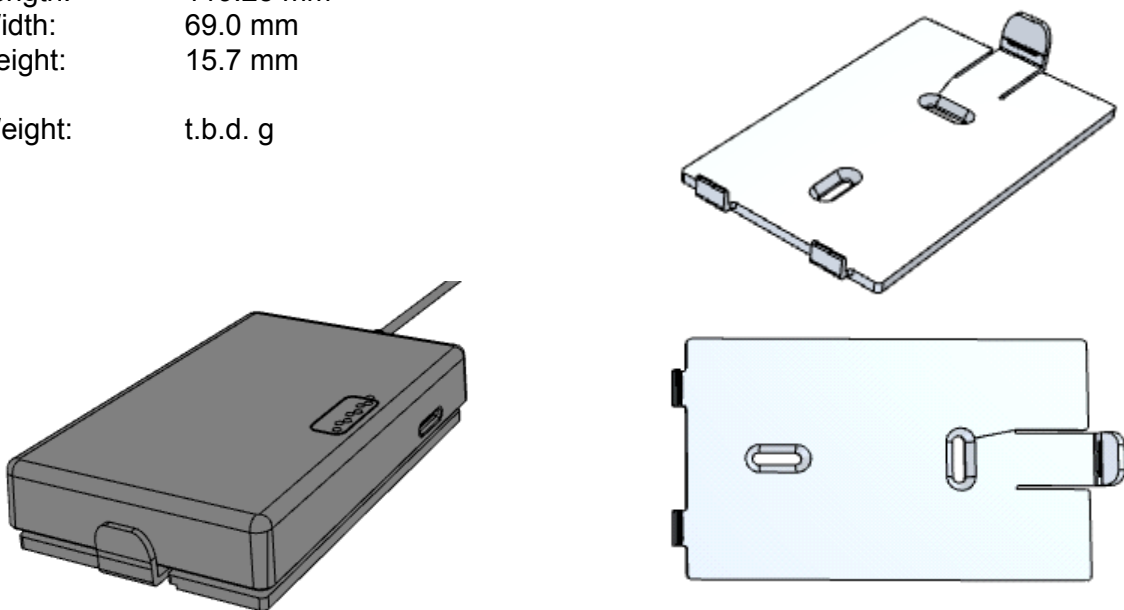


Figure 12: DGL61-W Mounting Clip

For ordering information of DGL61-W Mounting Clip please refer to [Chapter 8](#).

6.3 Packaging

Device Gateway LTE come in boxes:

- Box size: 183 mm x 141 mm x 32mm

7 Full Type Approval

7.1 Thales Reference Setup

The Thales reference setup submitted to type approve Device Gateway LTE consists of the following components:

- Device Gateway LTE with approved Java module
- PC as MMI and Power Supply

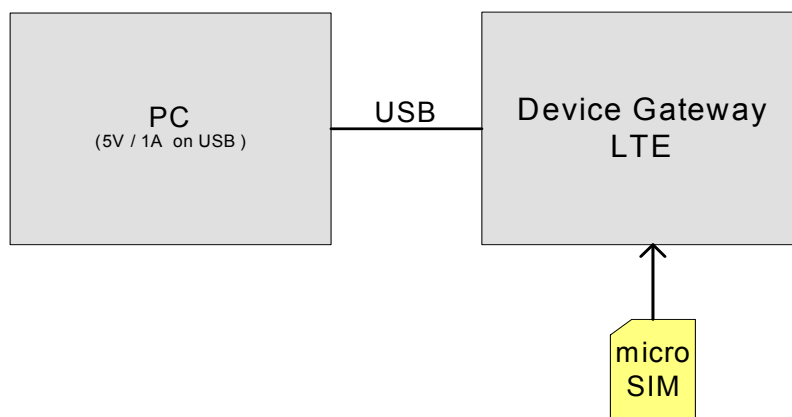


Figure 13: Reference equipment for approval

For ordering information of DGL61-W please refer to [Chapter 8](#).

7.2 Restrictions

Later enhancements and modifications beyond the certified configuration require extra approvals. Each supplementary approval process includes submittal of the technical documentation as well as testing of the changes made.

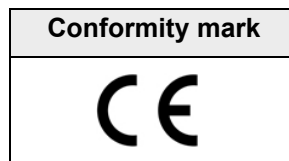
- No further approvals are required for customer applications that comply with the approved DGL61-W configuration.
- Extra approval must be obtained for applications using other accessories than those included in the approved DGL61-W configuration (power supply, MMI implementation supported by AT commands).

7.3 CE Conformity

The DGL61-W meet the requirements of the EU directives listed below:

- RED Directive 2014/53/EU

The Device Gateway LTE are marked with the CE conformity mark (without a notified body number):



7.4 EMC

The DGL61-W comply with the equipment requirements specified in EN 301489-1, and -52 are covered by the RED Directive. For details see [Section 1.3](#).

7.5 RF Exposure Information

DGL61-W has been tested and meets applicable limits for radio frequency (RF) exposure. The SAR (Specific Absorption Rate) limit is 1.6 watts per kilogram in countries that set the limit averaged over 1 gram of tissue, and 2.0 watts per kilogram in countries that set the limit averaged over 10 grams of tissue. During testing, DGL61-W radios are set to their highest transmission levels and SAR is evaluated according to the regulations. DGL61-W is evaluated in positions that simulate uses when worn or carried against the torso of the body, with 5mm and 10mm separation.

Table 17: Highest reported SAR

Condition	DGL61-W highest reported SAR	Limit
1g(W/kg) in body-worn condition, 10mm separation distance according to FCC	1.59 W/kg	1.6 W/kg
10g(W/kg) in body-worn condition, 5mm separation distance according to RED Directive	1.98 W/kg	2.0 W/kg

7.6 Compliance with FCC and ISED Rules and Regulations

As an integrated product, the Device Gateway LTE DGL61-W is fully compliant with the grant of the FCC Equipment Authorization and the ISED Certificates issued for the built-in Java modules, and therefore, bear the labels “Contains FCC ID: QIPPLS62-W”, and accordingly “Contains IC: 7830A-PLS62W”.

The Equipment Authorization Certification for the Cinterion® Java modules is listed under the following identifiers:

FCC Identifier: QIPPLS62-W

ISED Certification Number: 7830A-PLS62W

Granted to THALES DIS AIS Deutschland GmbH

Notes (FCC):

Radiofrequency radiation exposure information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with part 15 of the FCC Rules. 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.

This terminal equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications made to this equipment not expressly approved by Thales may void the FCC authorization to operate this equipment.

This device contains UMTS, GSM and GPRS class functions in the 900 and 1800 MHz bands that are not operational in U.S. Territories. This device is to be used only for mobile and fixed applications.

Please contact us for more information on the FCC Compliance details mentioned above:

Thales
Edgar Canizales
Arboretum Plaza II
9442 Capital of Texas Highway, Suite 400
Austin, TX 78759
Tel: +1 512 215 7326
Email: edgar.canizales@thalesgroup.com

Notes (ISED):

(EN) This Class B digital apparatus complies with Canadian ICES-003 and RSS-210. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

(FR) Cet appareil numérique de classe B est conforme aux normes canadiennes ICES-003 et RSS-210. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.

(EN) Radio frequency (RF) Exposure Information

The radiated output power of the Wireless Device is below the Innovation, Science and Economic Development Canada (ISED) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has also been evaluated and shown compliant with the ISED RF Exposure limits under mobile exposure conditions. (antennas are greater than 20cm from a person's body).

(FR) Informations concernant l'exposition aux fréquences radio (RF)

La puissance de sortie émise par l'appareil de sans fil est inférieure à la limite d'exposition aux fréquences radio d'Innovation, Sciences et Développement économique Canada (ISDE). Utilisez l'appareil de sans fil de façon à minimiser les contacts humains lors du fonctionnement normal.

Ce périphérique a également été évalué et démontré conforme aux limites d'exposition aux RF d'ISED dans des conditions d'exposition à des appareils mobiles (les antennes se situent à moins de 20cm du corps d'une personne).

8 Ordering Information

Table 18: Ordering Information

Description	Supplier	Ordering information
DGL61-W	Thales	L30960-N6800-A100 USB Cable length: 200mm Other USB Cable length (0.5m, 1m) on request
DGL61-W Mounting Clip	Thales	t.b.d.



THALES DIS AIS Deutschland GmbH
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81541 Munich
Germany

THALES