# GG863-SR Gateway
# Hardware User Guide

1vv0300835 Rev.0 - 20/07/09


Making machines talk.

# DISCLAIMER

The information contained in this document is the proprietary information of Telit Communications S.p.A. and its affiliates (“TELIT”). The contents are confidential and any disclosure to persons other than the officers, employees, agents or subcontractors of the owner or licensee of this document, without the prior written consent of Telit, is strictly prohibited.

Telit makes every effort to ensure the quality of the information it makes available. Notwithstanding the foregoing, Telit does not make any warranty as to the information contained herein, and does not accept any liability for any injury, loss or damage of any kind incurred by use of or reliance upon the information.

Telit disclaims any and all responsibility for the application of the devices characterized in this document, and notes that the application of the device must comply with the safety standards of the applicable country, and where applicable, with the relevant wiring rules.

Telit reserves the right to make modifications, additions and deletions to this document due to typographical errors, inaccurate information, or improvements to programs and/or equipment at any time and without notice. Such changes will nevertheless be incorporated into new editions of this document.



# Applicable Products


**Product**
**GG863-SR** ZigBee
**GG863-SR** Plus
**GG863-SR** Pro

For further information on how to order **GG863-SR** specific model, please contact your Telit representative

# Contents



# 1 Introduction

The aim of this document is the description of hardware details useful to develop an application or a solution with the **GG863-SR** Gateway.
This document will not consider all possible or potential hardware solutions and combinations that may be designed. General usage and installing recommendations will be accompanied by notices and warnings of misuse or discouraged use. The information given shall be used as a guide and a starting point for properly developing your product with the **GG863-SR**. For further hardware details that may not be explained in this document, please refer to the relevant application notes and design guidelines made available by Telit.

**NOTICE**

***(EN) The integration of the GG863-SR within user application shall be done according to the design rules described in this manual.***

***(IT) L'integrazione del GG863-SR all'interno dell'applicazione dell'utente dovrà rispettare le indicazioni progettuali descritte in questo manuale.***

***(DE) Die integration des GG863-SR in ein Gerät muß gemäß der in diesem Dokument beschriebenen Kunstruktionsregeln erfolgen.***

***(SL) Integracija GG863-SR v uporabniški aplikaciji bo morala upoštevati projektna navodila, opisana v tem piročniku.***

***(SP) La utilización del GG863-SR debe ser conforme a los usos para los cuales ha sido deseñado descritos en este manual del usuario.***

***(FR) L'intégration du GG863-SR dans l'application de l'utilisateur sera faite selon les règles de conception décri tes dans ce manuel.***

***האינטגרטור מתבקש ליישם את ההנחיות המפורטות במסמך זה בהתהליך האינטגרציה של מודם ה – GG863-SR עם המוצר***

*The information presented in this document is believed to be accurate and reliable. However, no responsibility is assumed by Telit Communication S.p.A. for its use, nor any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent rights of Telit Communication S.p.A. other than for circuitry embodied in Telit products. This document is subject to change without notice.*

## 1.1 Audience

This document is intended for customers and operators who are interested in installing **GG863-SR** Gateway for wireless network applications.

## 1.2 Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, please contact Telit Technical Support Center (TTSC) at:

ts-emea@telit.com
ts-northamerica@telit.com
ts-latinamerica@telit.com
ts-apac@telit.com

## 1.3 Text Conventions

***Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.***

***Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.***

**Tip or Information – Provides advice and suggestions that may be useful when integrating the module.**

## 1.4 Related documents

[1] 80322ST10058a GG863-Product Description
[2] 1vv0300836 GG863-SR Software User Guide
[3] 80000NT10006a Telit Battery Charger application note

## 1.5 Document History

| Revision | Date | Changes |
|---|---|---|
| ISSUE #0 | 20/07/2009 | First Issue |
| | | |
| | | |

# 2 Physical Characteristics

## 2.1 Dimensions

The **Telit GG863-SR** dimensions are:

- Housing Length: 83 mm (without connectors)
- Overall Length: 107 mm (including fixtures)
- Width: 64 mm
- Thickness: 33 mm

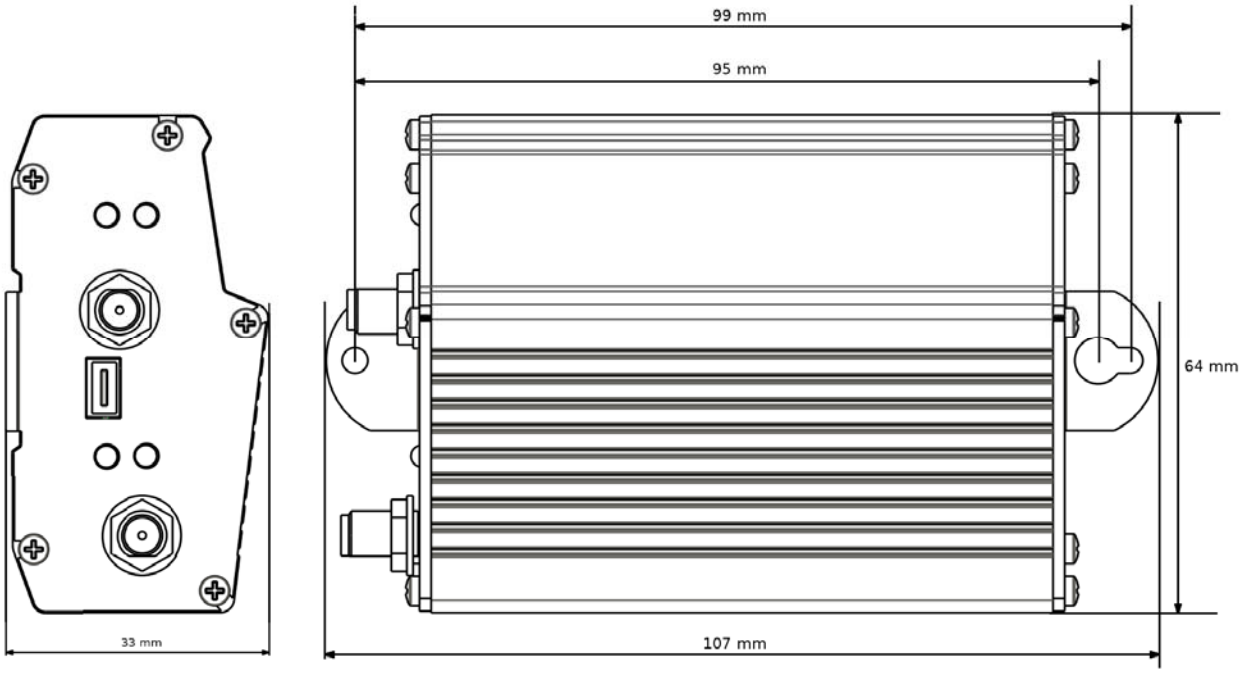



**Figure 1 - GG863-SR layout and dimensions**

## 2.2 Weight

The weight of **GG863-SR** is 150 grams.

# 3 Installation guidelines

The **GG863-SR** can be fixed on a suitable surface by two screws through the holes (3.3 / 5.8 mm diam.) in the lids forming part of the front and rear panels. **Figure 1** shows the maximum and minimum inter-axis distance between the fixing holes.
In case of a permanent vertical installation in dusty environment, it is recommended to cover the SIM slot with a self-adhesive tape.

***Caution - When connecting the antenna cables, please ensure sufficient space has been left to avoid twisting or sharp bends on the coaxial cable.***

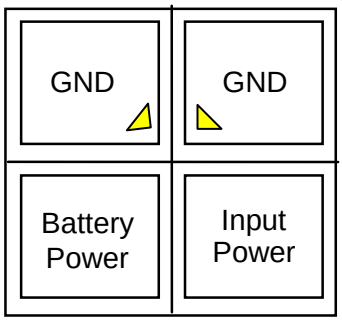
## 3.1 Power Connector

The power connector is on the left side of the terminal is Molex 4-pin connector (part no.:43045-0400 male).

Pin description:

- GND = Ground reference (1x POWER, 1x Signal)
- Input Power = 5 – 36 VDC
- Battery Power = 3.7 – 4.2 V

FRONT VIEW




***Warning – Only one power source must be electrically connected at a time.***

## 3.2 Supply voltage

The external power supply must be connected to Power supply input as described in the following subsection and must fulfill the following requirements:

| | |
|---|---|
| **Nominal Supply Voltage** | 12 volts |
| **Min Supply Voltage** | 5 volts |
| **Max Supply Voltage** | 36 volts |

**Table 1 - Supply voltage**

***DANGER - Operating voltage range must never be exceeded; care must be taken in order to fulfill Min/Max voltage requirements.***

### 3.2.1 Battery source

Battery voltage range is 3.7V-4.2V.
The battery capacity should be dimensioned on the customer's application and battery life requirements.
Please, refer to [3] for further information regarding type and battery usage.

## 3.3 Switching the GG863-SR Gateway ON and OFF

### 3.3.1 Switching ON

The **GG863-SR** Gateway switches on automatically each time the Power Supply is connected the first time or re-connected.
The gateway operating system is fully operational after 20 seconds. Logging onto a GSM or SR network may take longer than this and it is beyond the control of the GSM/GPRS and SR modules.

**Note –** When the power supply cable is disconnected, it is recommended to wait for approximately 5 seconds before applying the power again.

### 3.3.2 Switching OFF

The **GG863-SR** can be switched off either by disconnecting the power supply or by software command.

***Warning – Please note that hardware power off should be done only after a proper GSM logoff. Any GSM device is requested to issue a "detach" request at turning off.***

# 4 Antenna

## 4.1 Antenna Output

***Warning – BEFORE connecting the GG863-SR to a Power Supply source, suitable Antennas shall be connected and properly installed.***

The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

For a good efficiency of the antenna and minimum interference with other electronic systems, a space of min. 40 cm around the radiating part should be left free of electrically conducting materials.

The less distance and the fewer obstacles between the **GG863-SR** antenna and the antenna of the GSM/GPRS network base station, the less power is radiated by the gateway and the better signal quality is achieved.

## 4.2 Antenna Connector

The **GG863-SR** includes two SMA bulkhead female, class 4 (2W) co-axial connectors for the external antennas.

## 4.3 GSM Antenna Requirements

The GSM antenna for **GG863-SR** device shall fulfill the following requirements:

| GSM ANTENNA REQUIREMENTS | |
|---|---|
| **Frequency range** | Standard Dual Band GSM/DCS frequency range or<br>Standard Quad Band GSM/DCS/PCS frequency range if used for all four bands |
| **Bandwidth** | 70 MHz in GSM850, 80 MHz in GSM & 170 MHz in DCS & 140 MHz PCS band |
| **Gain** | Gain < 3dBi |
| **Impedance** | 50 ohm |
| **Input power** | > 2 W peak power |
| **VSWR absolute max** | <= 10:1 |
| **VSWR recommended** | <= 2:1 |

**Table 2 - GSM Antenna requirements**

## 4.4 Short range Antenna Requirements

The short range antenna for **GG863-SR** device shall fulfill the following requirements, depending on the short range technology mounted on the **GG863-SR**.

| Zigbee ANTENNA REQUIREMENTS | |
|---|---|
| **Frequency range** | 2.4GHz |
| **Bandwidth** | 2.30 – 2.50 GHz |
| **Gain** | Gain < 4dBi |
| **Impedance** | 50 ohm |
| **VSWR recommended** | <= 1.5:1 |

**Table 3 - Zigbee Antenna requirements**

| Short Range ANTENNA REQUIREMENTS | | | |
|---|---|---|---|
| **Frequency range** | 868MHz | 915 MHz | 433 MHz |
| **Bandwidth** | 868 +/- 25 MHz | 915 +/- 25 MHz | 433,05 – 434.79 MHz |
| **Gain** | 0 dBi | 0 dBi | 0 dBi |
| **Impedance** | 50 ohm | 50 ohm | 50 ohm |
| **VSWR recommended** | <= 1.5:1 | <= 1.5:1 | <= 1.5:1 |
| **Radiation pattern** | Omni directional | Omni directional | Omni directional |
| **Polarization** | Vertical | Vertical | Vertical |

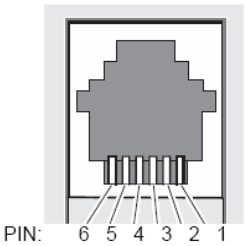
**Table 4 – Short range Antenna requirements**

# 5 RJ11 connector

The RJ11 connector type is used to provide General purpose I/Os and UART debug interface.

All General Purpose input / output lines on the RJ11 GPIO are connected to the Telit GE863-PRO$^3$ module over a 100 Ohms series resistor.
Table below shows the RJ11 pin-out, depending on the chosen jumper configuration




| PIN | Signal | Description |
|---|---|---|
| 1 | GND | GROUND |
| 2 | GPIO(PC29) | GPIO |
| 3 | GPIO(PC28) | GPIO |
| 4 | RX_ARM | RX UART Debug ARM |
| 5 | TX_ARM | TX UART Debug ARM |
| 6 | VMOD | Low Power Supply Output (3.5V) |

**Table 5 - RJ11 Pin out**

VMOD = direct connection to the pin of the power supply voltage input of the Telit module (3.8V typical) and the output of the internal switching voltage regulator. The presence of this line at pin6 is to be considered as a low power output (<30mA) for pull-up potential (requires external reduction of voltage to max. 2.9V DC).

**Note –** Connections to VMOD shall be made only when familiar with designing circuits conforming to EMC requirements.

## 5.1 Logic level specifications

The two GPIO, PC28 and PC29, are 1.8V CMOS signals and their interface levels are:

| Level | MIN | MAX |
|---|---|---|
| Input high level | 1.6V | 3.3V |
| Input low level | 0V | 0.4V |
| Output high level | 1,65V | 2.2V |
| Output low level | 0V | 0.35V |

**Table 6: Operating Range - Interface levels (CMOS 1.8V)**

The logic levels of the debug signals are:

| Level | MIN | MAX |
|---|---|---|
| Input high level | 2V | 3.3V |
| Input low level | 0V | 0.8V |
| Output high level | 2.7V | 3.3V |
| Output low level | 0V | 0.4V |

**Table 7: Operating Range – Debug signals**

# 6 Mini USB type connector

Pin-out of mini USB connector is shown in the following table:

| PIN | Signal |
|---|---|
| 1 | USBCNX |
| 2 | DDM |
| 3 | DDP |
| 4 | NC |
| 5 | GND |

**Table 8 - Mini USB Pin out**

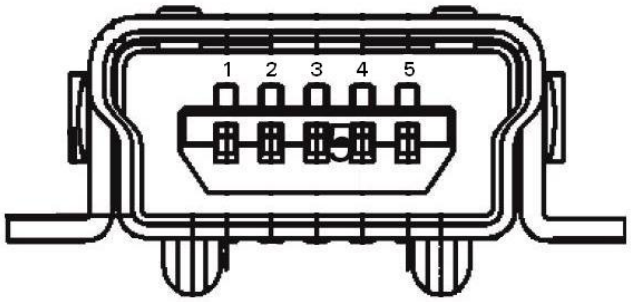



**Figure 2 – Mini USB**

# 7 Led indicators

The **GG863-SR** has two double led indicators, one pair for the GSM technology and one pair for the ZB/RF technology.

### 7.1.1 GSM Led indicators

The green Power LED indicates whether the GSM Engine is powered: if permanently ON, the GSM is powered, if OFF, the GSM is not powered.
The red LED shows information on the network service availability and Call status.

| LED STATUS | DEVICE STATUS |
|---|---|
| permanently on | a call is active |
| fast interrupt sequence (period 0,5s, Ton 1s) | Net search / Not registered / turning off |
| slow interrupt sequence (period 0,3s, Ton 3s) | Registered full service |
| permanently off | device off |

### 7.1.2 ZB/RF Led indicators

The green Power LED indicates that the ZB/RF Engine inside the **GG863-SR** is powered.
The red LED shows information on the network service availability.

# 8 Safety and Product Care

**Please read the information in this section and the information contained in "Installation of the Gateway", before starting your integration work!**

## 8.1 General precautions

The **GG863-SR** Gateway as a standalone item is designed for indoor use only. Before using it outdoor, it must be integrated into a weatherproof enclosure. Do not exceed the environmental and electrical limits as specified in [1].

- Avoid exposing the gateway to lighted cigarettes, naked flames or to extreme hot or cold temperature.
- Never try to tamper the gateway yourself. There are no components inside the modem that can be serviced by the user. If you attempt to tamper the modem, you may invalidate the warranty.
- The **GG863-SR** Terminal must not be installed or located where the surface temperature of the plastic case may exceed 85°C.
- All cables connected to the **GG863-SR** Gateway must be secured or clamped, immediately adjacent to the connectors, to provide strain relief and to avoid transmitting excessive vibration to the case in the installation.
- Do not connect any incompatible component or product to the **GG863-SR**.

## 8.2 SIM card precautions

Before handling the SIM card in your application, ensure that you are not charged with static electricity. Use proper precautions to avoid electrostatic discharges.

- The connector is a push-push SIM connector. Just insert the SIM and push once to lock it.
- To release the SIM, push again and the SIM will be released. Gently pull it with your finger tips to remove completely the SIM from the SIM holder.

***Caution – Do not use screwdrivers, knifes or other similar tools to retrieve the SIM: this may seriously damage the device, the SIM or both.***

## 8.3 Antenna precautions

If the antenna is to be mounted outside, consider the risk of lightning. Follow the instructions provided by the antenna manufacturer.

- Never connect more than one device to a single antenna. The device can be damaged by radio frequency energy from the transmitter of another transmitting device.
- Like any mobile station, the antenna emits radio frequency energy. To avoid EMI (electromagnetic interference), you must determine whether the application itself, or equipment in the application's proximity, needs further protection against radio emission and the disturbances it might cause. Protection is secured either by shielding the surrounding electronics or by moving the antenna away from the electronics and the external signals cable.
- The device and antenna may be damaged if either come into contact with ground potentials other than the one in your application.
- Using the gateway without properly connected antennas (i.e. without properly terminating the RF paths) may cause permanent damage to the RF power amplifier.

# 9 Installation of the gateway

## 9.1 Where to install the gateway

There are several conditions which need to be taken into consideration when designing your application as they might affect the gateway and its function. They are:

**Environmental conditions:** The gateway must be installed so that the environmental conditions stated in [1] such as temperature, humidity and vibration are satisfied. Additionally, the electrical specifications in the Technical Data section must not be exceeded.

**GSM Signal strength:** The gateway has to be placed in a way that ensures sufficient RF signal strength. To improve signal strength, the antenna can be moved to another position. Signal strength may depend on how close the gateway is to a radio base station. You must ensure that the location at which you intend to use the gateway is within the network coverage area. Degradation in signal strength can be the result of a disturbance from another source, for example an electronic device in the immediate vicinity.

**Connections of components to GG863-SR:** The integrator is responsible for the final integrated system. Incorrectly designed or installed external components may cause radiation limits to be exceeded. For instance, improperly made connections or improperly installed antennas can disturb the network and lead to malfunctions in the gateway or equipment.

**Network and Subscription:** Before your application is used, you must ensure that your chosen network provides the necessary telecommunication services. Contact your service provider to obtain the necessary information.

## 9.2 How to install the gateway

### 9.2.1 Power supply

Use a high-quality power supply cable with low resistance. This ensures that the voltages at the connector pins are within the allowed range, even during the maximum peak current.

### 9.2.2 Securing the gateway

Before securing the gateway take into account the amount of additional space required for the mating connectors and cables that will be used in the application.

- Where access is restricted, it may be easier to connect all the cables to the gateway prior to securing it in the application.
- Securely attach the **GG863-SR** gateway to the host application using two 3 mm diameter pan-head screws

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

- ❑ Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc.
- ❑ Where there is risk of explosion such as gasoline stations, oil refineries, etc.

It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will void the warranty validity.

We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to the security and fire prevention regulations.

The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself. Same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.

The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue, because the risk of disturbing the GSM network or external devices or having impact on the security. Should there be any doubt, please refer to the technical documentation and the regulations in force.

Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case of this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

## 9.3 Disposal of this product in the European Union

According to the directives 2002/95/CE, 2002/96/CE and 2003/108/CE, which have been transposed in Italian Legislative Decree of July 25, 2005, n. 151, Telit Communications S.p.A informs that:

- The symbol of the crossed-out wheeled bin reproduced on the product or on the packaging, indicates that the product, at the end of life cycle, must be gathered separately from the other waste.

- The separate collection of rubbish for this product at the end of its life cycle is arranged and managed by the manufacturer. The user, who wants to dispose the product, must contact the manufacturer and follow the available system that allows the separate collection of rubbish for this product that has reached the end of the life cycle.
- The suitable separate collection of rubbish, necessary for the subsequent transfer of the obsolete product for the recycling, the treatment and the compatible environment disposal, contributes to avoid possible negative effects to the environment and the health, and helps in the re-use and/or recycle of the materials from which this product is composed.
- The illegitimate disposal of the product by the holder implies the enforcement of the administrative penalties provided for the regulations in force.
- The company is enrolled on the register of the manufacturers of Electric and Electronic Equipment (EEE) of the Italian Minister for the Environment with the number: **IT08020000002357**

| | |
|---|---|
| 2002/95/EC | 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) |
| 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) |
| Italian Legislative Decree of July 25, 2005, n. 151 | Attuazione delle direttive 2002/95/CE, 2002/96/CE e 2003/108/CE, relative alla riduzione dell'uso di sostanze pericolose nelle apparecchiature elettriche ed elettroniche, nonche' allo smaltimento dei rifiuti |

# 10 Conformity Assessment Issues

The **GG863-SR** is assessed to be conforming to the R&TTE Directive as stand-alone products, so If the **GG863-SR** is installed in conformance with Telit installation instructions require no further evaluation under Article 3.2 of the R&TTE Directive and do not require further involvement of a R&TTE Directive Notified Body for the final product.
In all other cases, or if the manufacturer of the final product is in doubt then the equipment integrating the radio module must be assessed against Article 3.2 of the R&TTE Directive**.**
In all cases assessment of the final product must be made against the Essential requirements of the R&TTE Directive Articles 3.1(a) and (b), safety and EMC respectively, and any relevant Article 3.3 requirements.

The **GG863-SR** conforms to the following European Union Directives:

- R&TTE Directive 1999/5/EC (Radio Equipment & Telecommunications Terminal Equipments)
- Low Voltage Directive 73/23/EEC and product safety
- Directive 89/336/EEC for conformity for EMC

In order to satisfy the essential requisite of the R&TTE 99/5/EC directive, the **GG863-SR** is compliant with the following standards:

- GSM (Radio Spectrum). Standard: EN 301 511 and 3GPP 51.010-1
- EMC (Electromagnetic Compatibility). Standards: EN 301 489-1 and EN 301 489-7
- LVD (Low Voltage Directive) Standards: EN 60 950

NOTE: The device can be used in all EU and in other countries on 2,4 Ghz ISM band. When operating outdoor in France, the emission shall be limited to 10mW in the 2454-2483.5 MHz range.

In this document and the Product Description, Software User Guide all the information you may need for developing a product meeting the R&TTE Directive is included.