# GE865-QUAD Product Description

80309ST10054A Rev.6 – 2013-09-05

Making machines talk.

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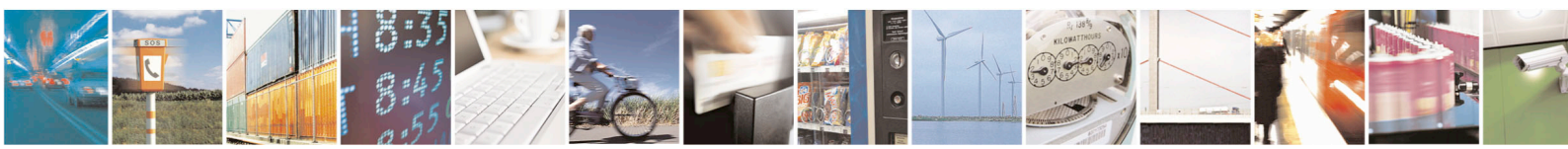
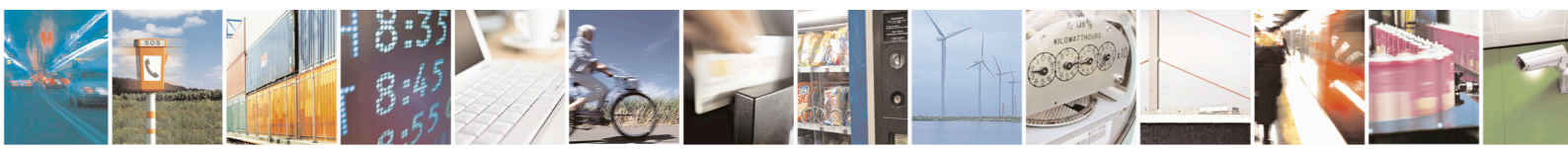
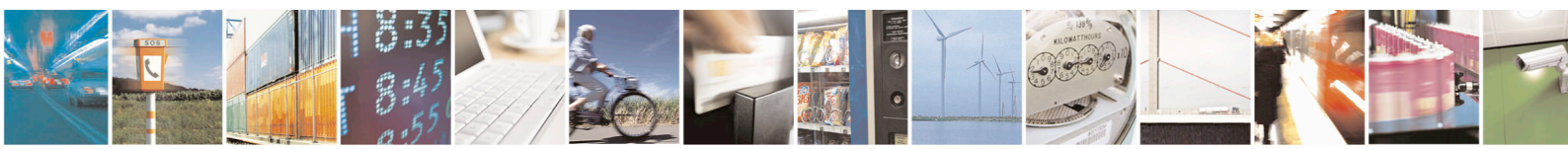


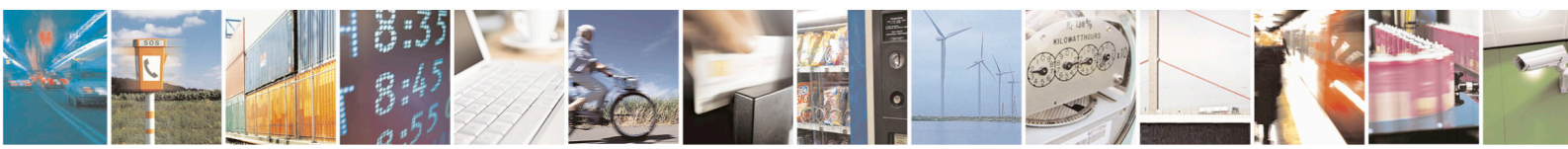
# Contents









# 1. Introduction

## 1.1. Scope

Scope of this document is giving an overview of the Telit GE865-QUAD module, which is a very small GSM/GPRS module with data and voice capabilities.

## 1.2. Audience

This document is intended for customers who are evaluating the GE865-QUAD.

## 1.3. Contact Information, Support

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

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

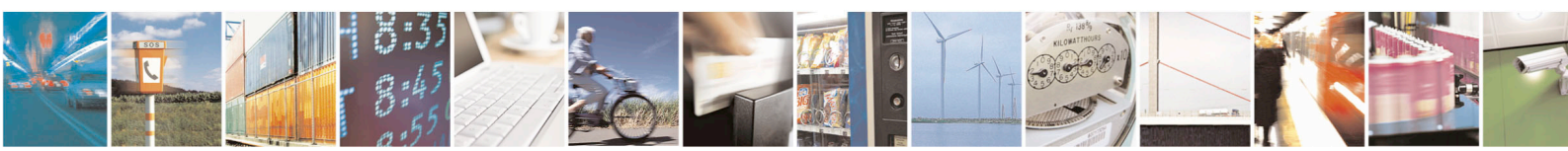
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

To register for product news and announcements or for product questions contact Telit's Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.



## 1.4. Document Organization

This document contains the following chapters:

"Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

"Chapter 2: "The GE865-QUAD" gives an overview of the features of the product.

"Chapter 3: "Product Description" describes in details the characteristics of the product.

"Chapter 4: "Evaluation Kit" provides some basic information about the Evaluation Kit.

"Chapter 5: "Software Features" provides an overview of the software features of the products.

"Chapter 6: "Conformity Assessment Issues" provides some fundamental hints about the conformity assessment that the final application might need.

"Chapter 7: "Safety Recommendation" provides some safety recommendations that must be follow by the customer in the design of the application that makes use of the GE865.

## 1.5. Text Conventions

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

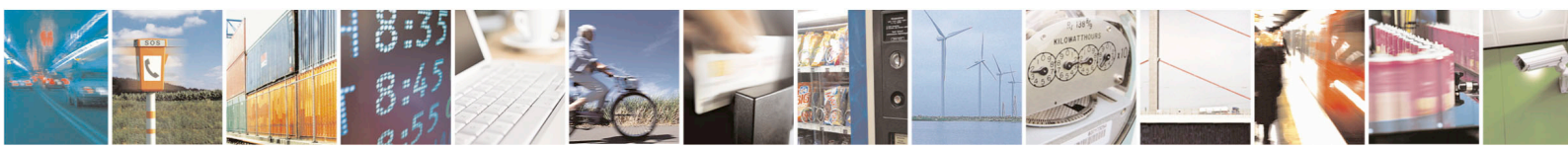
***Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.***

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

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

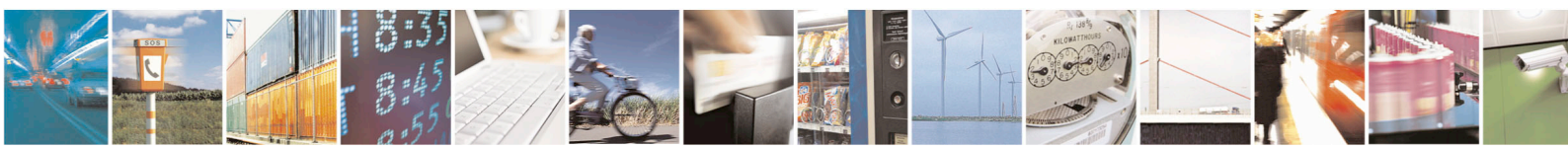
## 1.6. Related Documents

- Hardware User Guide
- Software User Guide
- AT Command User Guide
- CMUX User Guide
- SAP User Guide
- Easy Script User Guide
- Audio Settings User Guide
- Easy GPRS User Guide



## 1.7. Document History

| Revision | Date | Changes | Location |
|---|---|---|---|
| 0 | 2009-02-16 | First issue | Trieste |
| 1 | 2009-06-12 | DVI added<br>Update of power consumption data<br>FAX removed<br>Update on packing system<br>TTY support added<br>SMS over GPRS added<br>Multiple audio settings added<br>3GPP Release 4 compliance added<br>CSD transparent data removed<br>GERAN feature package 1 added<br>DARP/SAIC added<br>GSM, 8859-1 and UCS2 character sets added<br>Jamming Detection reviewed<br>ICMP protocol support added<br>SPI support removed | Trieste |
| 2 | 2009-07-17 | SIM Toolkit 3GPP reference spec added<br>NACC, Extended TBF added<br>Conformity Assessment Issues updated<br>RoHS certificate added<br>Safety Recommendations updated | Trieste |
| 3 | 2009-10-08 | Sensitivity updated<br>Power consumption figures updated<br>Enhanced Measurement Report added | Trieste |
| 4 | 2010-10-22 | Updated §6 about conformity assessment<br>Updated current consumption | Trieste |
| 5 | 2013-04-22 | Updated Chapter 6 Conformity Assessment Issues | Trieste |
| 6 | 2013-09-05 | Amended reel quantity | Trieste |



# 2. The GE865-QUAD

## 2.1. Product Overview

The new GE865-QUAD product introduces the smallest GSM/GPRS Ball-Grid-Array (BGA) module in the market.

The GE865-QUAD extends Telit's range of BGA products, incorporating a single-chip solution built on 0.13 µm CMOS technology into a 22 x 22 x 3 mm block.

The low profile and small size of the unique BGA package for the GE865-QUAD enable the design of extremely compact applications. Since connectors are eliminated, the solution cost is significantly reduced compared to conventional mounting.

With its ultra-compact design and extended temperature range, the Telit GE865-QUAD product is the perfect platform for high-volume m2m applications and mobile data devices. Additional features such as integrated TCP/IP protocol stack and serial multiplexer extend functionality of the application at no additional cost.

The GE865-QUAD makes it possible to run the customer's application inside the module using Python Script Interpreter, thus making it the smallest, complete platform for m2m solutions.

The GE865-QUAD module, support Over-the-Air firmware update by means Premium FOTA Management. By embedding the RedBend's vCurrent Mobile® agent, a proven and battle-tested technology powering hundreds of millions of cellular handsets world-wide, Telit is able to update its products by transmitting only a delta file, which represents the difference between one firmware version and another.

## 2.2. Target Market

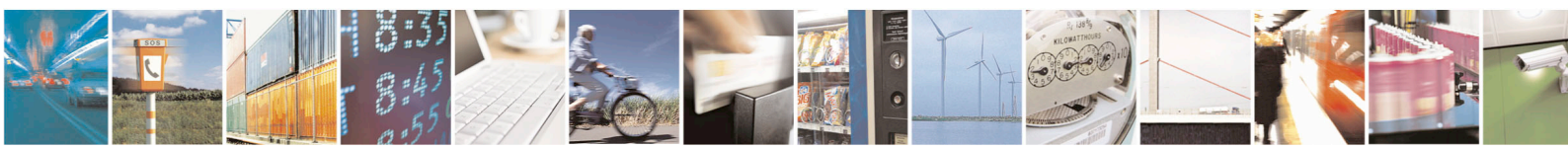
The GE865-QUAD is designed and developed for the usage in applications such as:

- Telemetry
- Telematics
- Security alarms
- Automated Meter Reading (AMR)
- POS terminals
- PDAs and Mobile Computing
- Automotive and Fleet Management applications

## 2.3. Product Features

- Quad-band EGSM 850 / 900 / 1800 / 1900 MHz
- GSM/GPRS protocol stack 3GPP Release 4 compliant
- Output power

  - Class 4 (2W) @ 850 / 900 MHz



- Class 1 (1W) @ 1800 / 1900 MHz

- Control via AT commands according to 3GPP 27.005, 27.007 and Telit custom AT commands
- Control via Remote AT commands
- Power consumption (typical values)

  - Power off: ‹ 62 uA

  - Idle (registered, power saving): 1.5 mA @ DRX=9
- Serial port multiplexer 3GPP 27.010
- SIM Application Toolkit 3GPP TS 51.014
- SIM Access Profile
- Extended Supply voltage range: 3.22 – 4.5 V DC (3.8 V DC nominal)
- TCP/IP stack access via AT commands
- Sensitivity:

  ≤- 107 dBm (typ.) @ 850 / 900 MHz

  ≤- 106 dBm (typ.) @ 1800 / 1900 MHz
- DARP/SAIC support
- Enhanced Measurement Report support
- Dimensions: 22 x 22 x 3 mm
- Weight: 3.2 grams
- Extended temperature range

  -40°C to +85°C (operational)

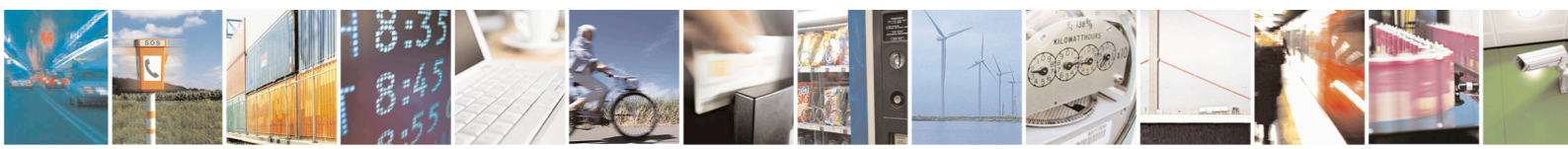
  -40°C to +85°C (storage temperature)
- RoHS compliant

**Interfaces**

- 10 I/O ports maximum
- Analog audio (balanced)
- Digital Voice Interface
- 2 A/D plus 1 D/A converters
- Buzzer output
- ITU-T V.24 serial link through CMOS UART:

  - Baud rate from 300 to 115.200 bps

  - Autobauding up to 115.200 bps



**Audio**

- Telephony, emergency call
- Half rate, full rate, enhanced full rate and adaptive multi rate voice codecs (HR, FR, EFR, AMR)
- Superior echo cancellation & noise reduction
- Multiple audio profiles pre-programmed and fully configurable
- DTMF

**Approvals**

- Fully type approved conforming with R&TTE directive
- CE, GCF, FCC, PTCRB, IC

**SMS**

- Point-to-point mobile originated and mobile terminated SMS
- Concatenated SMS supported
- SMS cell broadcast
- Text and PDU mode
- SMS over GPRS

**Circuit switched data transmission**

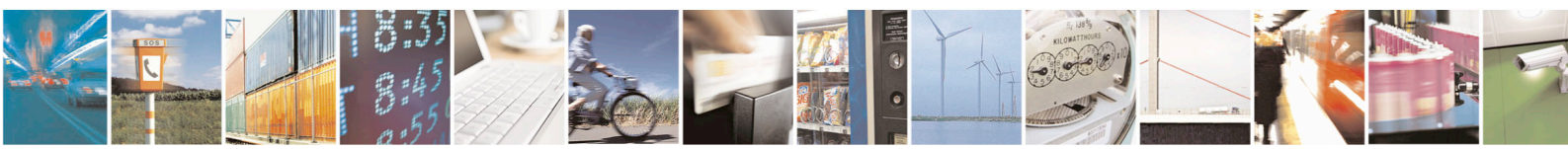
- Asynchronous non-transparent CSD up to 9.6 kbps
- V.110

**GPRS data**

- GPRS class 10
- Mobile station class B
- Coding scheme 1 to 4
- PBCCH support
- GERAN Feature Package 1 support (NACC, Extended TBF)

**GSM Supplementary Services**

- Call forwarding



- Call barring
- Call waiting & call hold
- Advice of charge
- Calling line identification presentation (CLIP)
- Calling line identification restriction (CLIR)
- Unstructured supplementary services mobile originated data (USSD)
- Closed user group

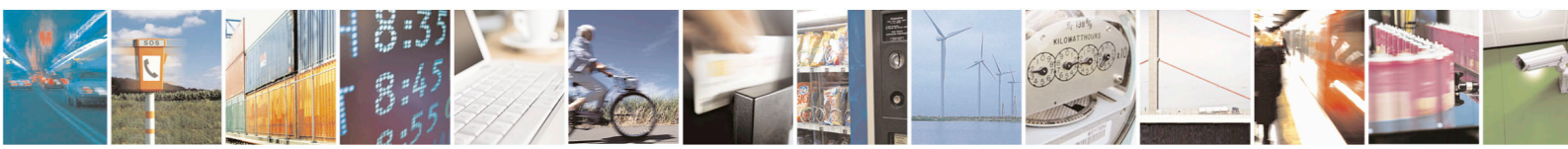
**Additional features**

- SIM phonebook
- Fixed dialling number (FDN)
- Real Time Clock
- Alarm management
- Network LED support
- IRA, GSM, 8859-1 and UCS2 character sets
- Jamming detection
- Embedded TCP/IP stack, including TCP, IP, UDP, SMTP, ICMP and FTP protocols
- EASY SCAN ® automatic scan over GSM frequencies (also without SIM card)

**Python* application resources**

- Python* script interpreter (module takes the application code directly in the Python* language)
- Memory: 800 kB of NV memory for the user scripts and 1 MB RAM for the Python* engine usage
- Over-the-air application SW update



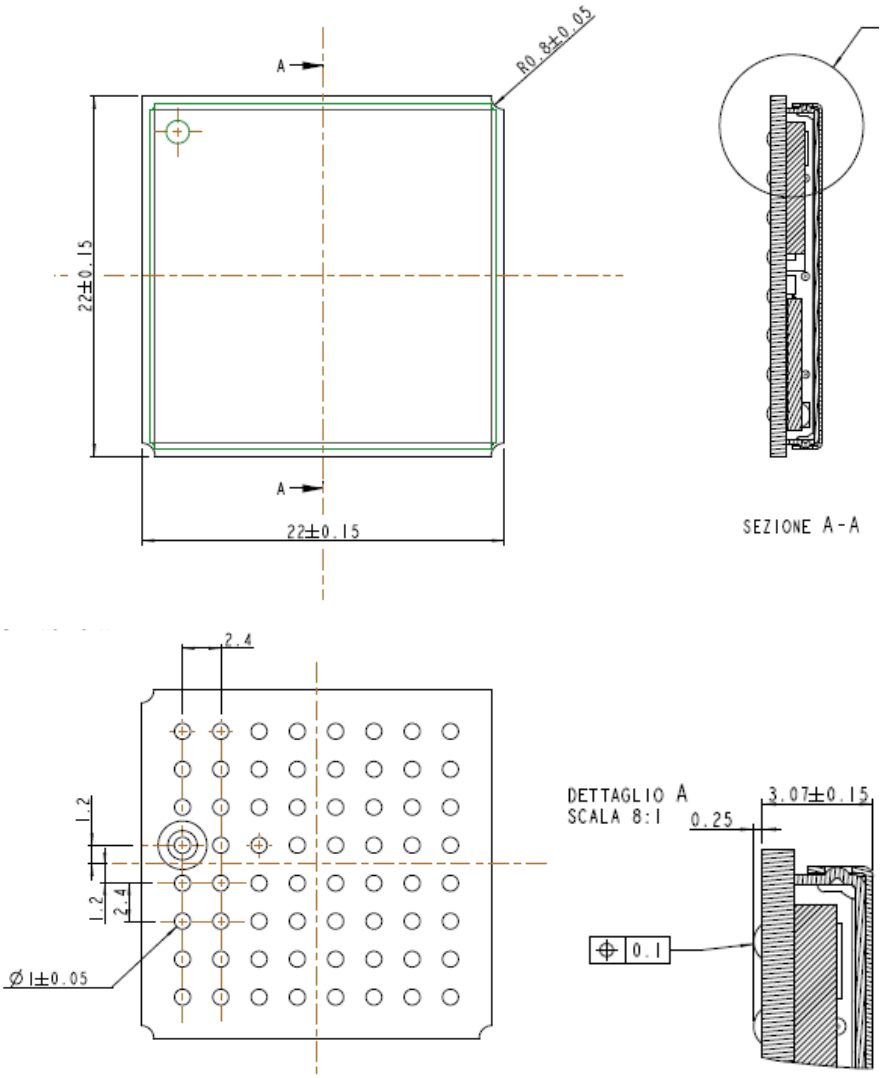


# 3. Product Description

## 3.1. Size and 2D mechanical drawing

The Telit GE865-QUAD module overall dimensions are:

- Length: 22 mm
- Width: 22 mm
- Thickness: 3 mm



## 3.2. Weight

The weight of the GE865-QUAD is 3.2 grams.

## 3.3. Environmental requirements

### 3.3.1. Temperature range

| | | Note |
|---|---|---|
| Operating Temperature Range | –20°C ÷ +55°C | The module is fully functional(*) in all the temperature range, and it fully meets the 3GPP specifications. |
| | –40°C ÷ +85°C | The module is fully functional (*) in all the temperature range. |
| Storage and non operating Temperature Range | –40°C ÷ +85°C | |

(*)Functional: the module is able to make and receive voice calls, data calls, SMS and make GPRS traffic.

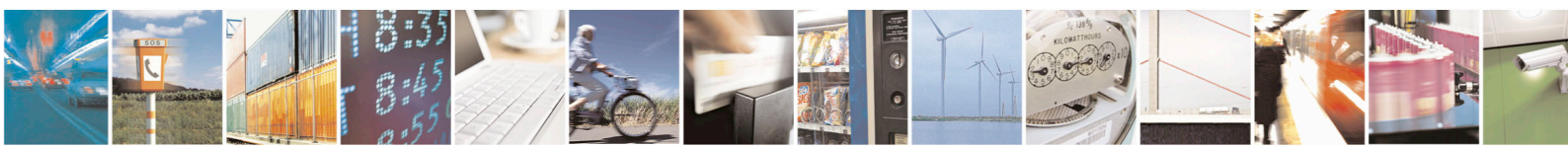
### 3.3.2. RoHS compliance

As a part of Telit's corporate policy of environmental protection, the GE865-QUAD product comply to the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU Directive 2002/95/EG).

## 3.4. Operating Frequency

The operating frequencies in GSM, DCS, PCS modes are conform to the GSM specifications.

| Mode | Freq. TX (MHz) | Freq. RX (MHz) | Channels (ARFC) | TX - RX offset |
|---|---|---|---|---|
| **GSM 850** | 824.2÷848.8 | 869.2÷893.8 | 124 ÷ 251 | 45 MHz |
| **EGSM 900** | 890.0 - 914.8 | 935.0 - 959.8 | 0 ÷ 124 | 45 MHz |
| | 880.2 - 889.8 | 925.2 - 934.8 | 975 ÷ 1023 | 45 MHz |
| **DCS-1800** | 1710.2 - 1784.8 | 1805.2 - 1879.8 | 512 ÷ 885 | 95 MHz |
| **PCS-1900** | 1850.2 - 1909.8 | 1930.2 - 1989.8 | 512 ÷ 810 | 80 MHz |



## 3.5. Transmitter output power

The GE865-QUAD transceiver modules in GSM–850/900 operating mode is class 4 in accordance with the specifications which determine the nominal 2W peak RF power (+33dBm) on 50 Ohm. In the DCS–1800/PCS–1900 bands, the operating mode is class 1 in accordance with the specifications which determine the nominal 1W peak RF power (+30dBm) on 50 Ohm.

## 3.6. Receiver sensitivity

Sensitivity of GE865-QUAD module in GSM 850/900 bands is better than –107 dBm (2.4% BER Class II - static channel) in normal operating conditions.

Sensitivity of GE865-QUAD module in GSM 1800/1900 bands is better than –106 dBm (2.4% BER Class II - static channel) in normal operating conditions.

The GE865-QUAD supports also the Downlink Advance Receiver Performance (DARP) feature for single antenna interference cancellation (SAIC).

## 3.7. Antenna

The antenna that the customer chooses to use should fulfill the following requirements:

| | |
|---|---|
| **Frequency range** | Depending by frequency band(s) provided by the network operator, the customer shall use the most suitable antenna for that/those band(s). |
| **Bandwidth** | 80 MHz in EGSM 900, 70 MHz if GSM 850, 170 MHz in DCS, 140 MHz PCS band |

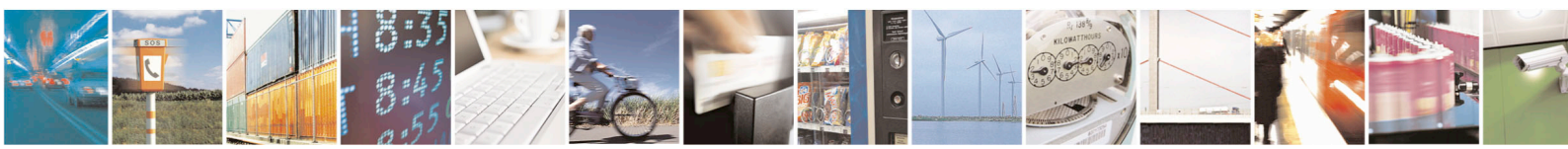
For further information please refer to the GE865-QUAD Hardware User Guide.

## 3.8. Supply voltage

The external power supply must be connected to VBATT signal and must fulfill the following requirements:

| | |
|---|---|
| Nominal Supply Voltage | 3.8 V |
| Normal Operating Voltage Range | 3.4 V – 4.2 V |
| Extended Operating Voltage Range (*) | 3.22 V – 4.5 V |

(*) Please refer to the GE865-QUAD Hardware User Guide for using the product with the extended operating voltage range.



## 3.9. Power consumption

The current consumptions of the Telit GE865-QUAD in power-off and idle are:

| | |
|---|---|
| **Power off current typical (RTC running)** | < 62 µA; |
| **Idle registered, power saving** | 1.5 mA @ DRX=9 (AT+CFUN=5) |

Please check the HW User Guide for further details about all other power consumption figures.

## 3.10. The user interface

The user interface is managed by AT commands according to ITU-T V.250, 3GPP 27.007 and 27.005 specifications. Moreover, custom AT commands are also available. Please refer to the AT Command User Guide for details.

## 3.11. Speech CODEC

The GE865-QUAD supports the following voice codec:

- HR - Half Rate
- FR - Full Rate
- EFR - Enhanced Full Rate
- AMR-HR, AMR Half Rate
- AMR-FR, AMR Full Rate

## 3.12. SIM Reader

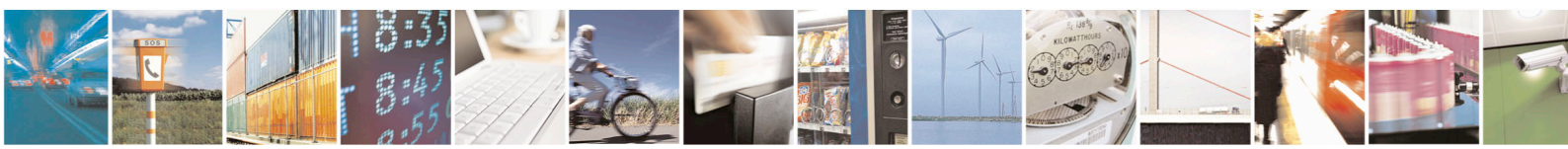
The GE865-QUAD supports phase 2 SIM at 1.8V and 3V ONLY with an external SIM connector. For 5V SIM, an external level translator can be added.

## 3.13. SMS

The GE865-QUAD supports the following SMS types:

- Mobile Terminated (MT) class 0 – 3 with signaling of new incoming SMS, SIM full, SMS read
- Mobile Originated class 0 – 3 with writing, saving in SIM and sending
- Cell broadcast compatible with CB DRX with signaling of new incoming SMS.

The GE865-QUAD also supports SMS over GPRS



## 3.14. Real Time Clock and Alarm

The GE865-QUAD supports the Real Time Clock and Alarm functions through AT commands. An alarm output pin can be configured to indicate the alarm with a hardware line output.

Furthermore the Voltage Output of the RTC power supply is provided so that a backup capacitor can be added externally to increase the RTC autonomy.

## 3.15. Enhanced Measurement Report

The GE865-QUAD supports the Enhanced Measurement Report on SACCH channel according to 3GPP TS 44.018 version 4.22.0 Release 4 (par. 3.4.1.2, 9.1.54, 9.1.55) and 3GPP TS 45.008 version 4.17.0 Release 4 (par. 8.4.8).

## 3.16. Data transmission capabilities

The Telit GE865-QUAD is a mobile station class B supporting GPRS Class 10, coding schemes 1 to 4 and PBCCH. Moreover, it supports GERAN feature package 1, which consist in supporting the Extended Uplink TBF and Network Assisted Cell Change (NACC).

As for circuit switched data, the GE865-QUAD supports asynchronous non-transparent data up to 9.6 Kbps. Moreover, it supports the V.110.

## 3.17. Local security management

The local security management can be done with the lock of Subscriber Identity module (SIM). The security code will be requested at power–up.

## 3.18. Call control

The call cost control function is supported.

## 3.19. Phonebook

This function allows the storing of the telephone numbers in SIM memory. The capability depends on SIM version and its embedded memory.

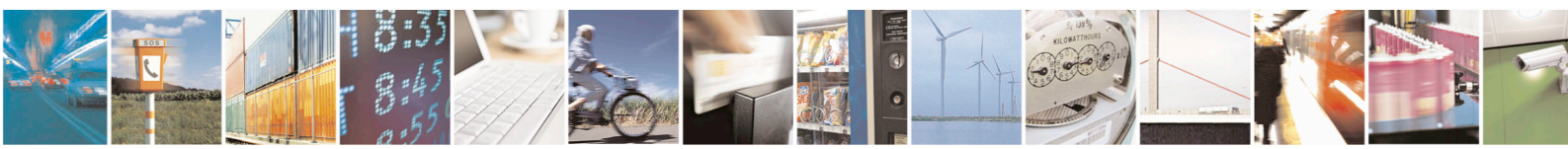
## 3.20. Characters management

The GE865-QUAD supports the IRA, GSM, 8859-1 and UCS2 characters sets, in TEXT and PDU mode.

## 3.21. SIM related functions

Fixed Dialing Numbers (FDN), Abbreviated Dialing Number (ADN) and PIN insertion are supported

Extension at the PIN2 for the PUK2 insertion capability for lock condition is supported too.



## 3.22. Call status indication

The call status indication is supported.

## 3.23. Automatic answer (Voice, Data)

The automatic answer is supported. The user/application can specify the number of rings after which the module will automatically answer.

The user/application can set the number of rings by means of the command ATS0=<n>.

## 3.24. Supplementary services (SS)

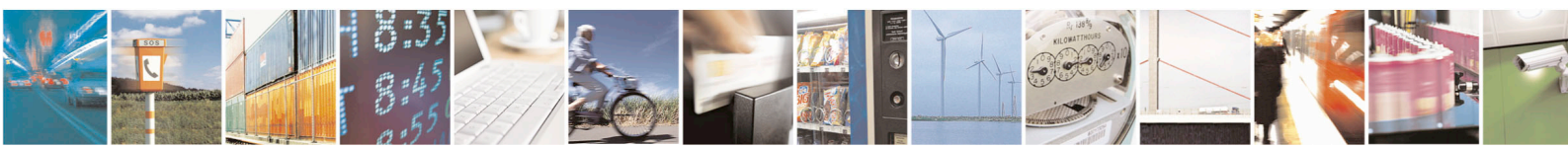
The following supplementary services are supported:

- Call Barring,
- Call Forwarding,
- Calling Line Identification Presentation (CLIP),
- Calling Line Identification Restriction (CLIR),
- Call Waiting, other party call Waiting Indication,
- Call Hold, other party Hold / Retrieved Indication,
- Closed User Group supplementary service (CUG),
- Advice of Charge,
- Unstructured SS Mobile Originated (MO)

## 3.25. Acoustic signaling

The acoustic signaling of the GE865-QUAD on the selected acoustic device are the following:

- Call waiting;
- Ringing tone;
- SMS received tone;
- Busy tone;
- Power on/off tone;
- Off Hook dial tone;
- Congestion tone;
- Connected tone;
- Call dropped;
- No service tone;
- Alarm tone.



## 3.26. Buzzer output

A general purpose I/O pin can be configured to output the BUZZER output signal. With an external MOSFET or transistor and a diode, a buzzer can be directly driven.

The ringing tone and the other signaling tones can be redirected to this buzzer output with a specific AT command.

## 3.27. RF Transmission Monitor (RFTXMON)

As alternate function of the GPIO5, the GE865-QUAD can provide the RF transmission monitor. When the alternate function is activated, the pin of GPIO5 changes to HIGH every time the module transmits an RF signal and remains HIGH for the duration of the transmission sequence, i.e. it does not change with every GSM signal burst.

## 3.28. RF Transmission Control

As alternate function of the GPIO4 pin, when configured as RF Transmission Control Input, it allows to disable the Transmitter when the GPIO is set to Low by the application.

## 3.29. TTY (Telephone Text)

The TTY feature is supported. Please refer to 3GPP TS 26.226 and 3GPP TS 26.231 for details.

## 3.30. Logic level specifications

Where not specifically stated, all the interface circuits work at 2.8V CMOS logic levels. To get more detailed information about the logic level specifications used in the GE865-QUAD, please check with the Hardware User Guide.

## 3.31. Audio

### 3.31.1. Analog

The GE865-QUAD offers one audio line balanced. The GE865-QUAD has a built-in echo canceller and a noise suppressor. For more details, please refer to the GE865-QUAD Hardware User Guide.

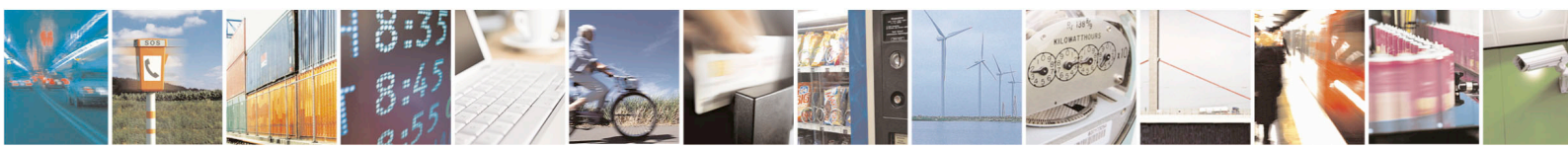
### 3.31.2. Digital

The GE865-QUAD offers the digital voice interface. For more details, please refer to the Digital Voice Interface Application Note.

## 3.32. Serial Ports

Two serial ports are available on the module:

- Main serial port (full RS232), auto-bauding up to 115,200 bps
- AUX serial port (RX & TX only), 115,200 bps



## 3.33. Converters

### 3.33.1. ADC Converter

The GE865-QUAD has two on board ADC, which are 11-bit converter. They are able to read a voltage level in the range of 0÷2 volts applied on the ADC pin input, store and convert it into 11 bit word.

### 3.33.2. DAC Converter

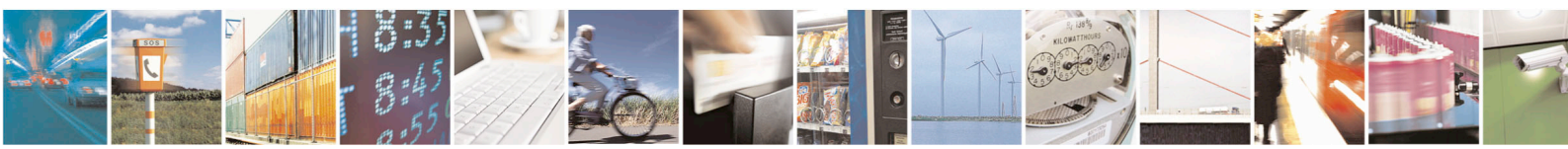
The GE865-QUAD has one on board DAC, which is a 10 bit converter, able to generate an analogue value based a specific input in the range from 0 up to 1023. However, an external low-pass filter is necessary. See the HW User Guide for the details.

## 3.34. Mounting the GE865-QUAD on your Board

The Telit GE865-QUAD module has been designed in order to be compliant with a standard lead-free SMT process. For detailed information about PCB pad design and conditions to use in SMT process please check with the GE865-QUAD Hardware User Guide.

## 3.35. Packing system

The Telit GE865-QUAD is supplied on trays of 50 pieces each or, in Tape&Reel of 200 pcs per reel.



# 4. Evaluation Kit

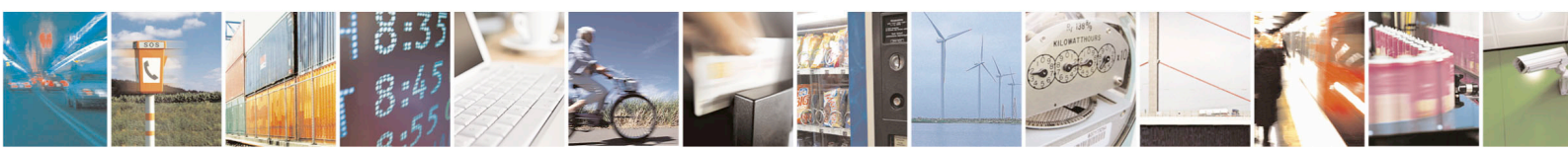
In order to assist the customer in the development of the application, Telit offers the EVK2 Evaluation Kit that can be ordered separately. The EVK2 has a SIM card holder, the RS 232 serial port level translator, a direct UART connection, audio and antenna connector.

The EVK2 provides a fully functional solution for a complete data or phone application. The standard serial RS232 9 pin connector placed on the Evaluation Kit allows the connection of the EVK2 system with a PC or other DTE.

The development of the applications utilizing the Telit GE865-QUAD module must present a proper design of all the interfaces towards and from the module (e.g. power supply, audio paths, level translators), otherwise a decrease in the performances will be introduced or, in the worst case, a wrong design can even lead to an operating failure of the module.

In order to assist the hardware designer in his project phase, the EVK2 board presents a series of different solutions, which will cover the most common design requirements on the market, and which can be easily integrated in the OEM design as building blocks or can be taken as starting points to develop a specific one.

For a detailed description of the Telit Evaluation Kit, please refer to the documentation provided with the Telit GE865-QUAD Hardware User Guide and EVK2 User Manual.



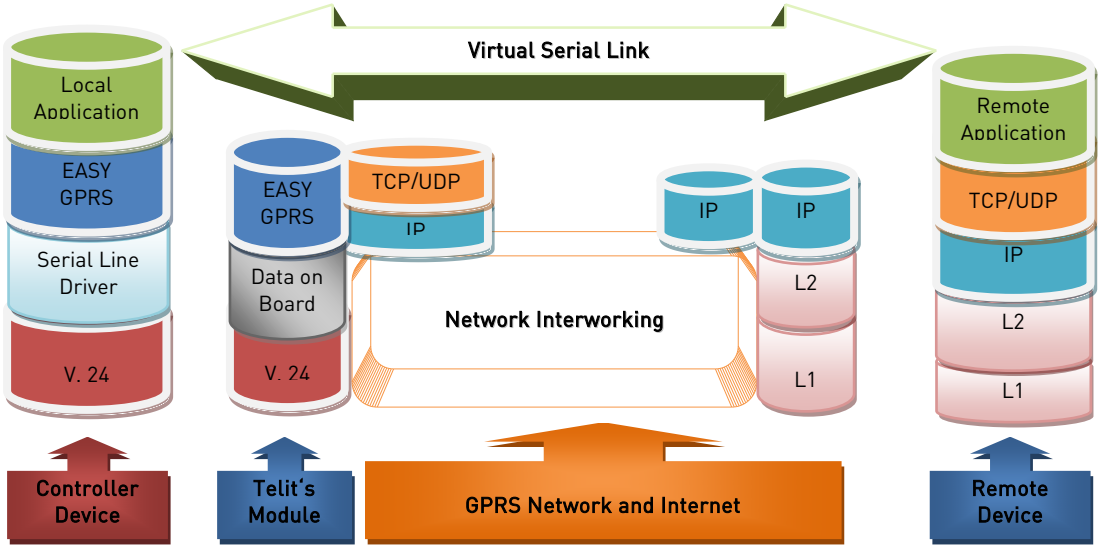
# 5. Software Features

## 5.1. Easy GPRS Extension

### 5.1.1. Overview

The Easy GPRS feature allows the Telit GE865-QUAD user to contact a device in internet and establish with it a raw data flow over the GPRS and Internet networks.

This feature can be seen as a way to obtain a "virtual" serial connection between the Application Software on the Internet machine involved and the controller of the Telit GE865-QUAD module, regardless of all the software stacks underlying.



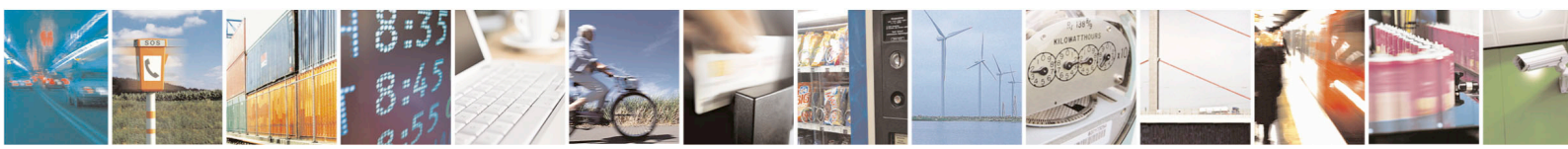

This particular implementation allows to the devices interfacing to the Telit GE865-QUAD module the use of the GPRS and Internet packet service without the need to have an internal TCP/IP stack since this function is embedded in the module.

For more detailed information regarding the use of the Easy GPRS feature, please consult Easy GPRS User Guide and AT Commands Reference Guide.

## 5.2. Multisocket

The multisocket is an extension of Telit Easy GPRS feature, which allows the user to have two contexts activated (that means two different IP address), more than one socket connection (with a maximum of 6) and simultaneous FTP client service.

For more detailed information please consult the Easy GPRS User Guide.



## 5.3. Jamming Detection

### 5.3.1. Overview

The Jammed Detect feature allows the GE865-QUAD to detect the presence of a disturbing device such as a Communication Jammer and give indication to the user.

This feature can be very important in alarm, security and safety applications that rely on the module for the communications. In these applications, the presence of a Jammer device can compromise the whole system reliability and functionality and therefore shall be recognized and reported to the local system for countermeasure actions.

## 5.4. CMUX

CMUX (Converter-Multiplexer) is a multiplexing protocol implemented in the GE865-QUAD that can be used to send any data, SMS, or TCP data.

### 5.4.1. Architecture

The Multiplexer mode enables one serial interface to transmit data to four different customer applications. This is achieved by providing four virtual channels using a Multiplexer (MUX).

This is especially advantageous when a data/GPRS call is ongoing. Using the Multiplexer features, e.g. controlling the module or using the SMS service can be done via the additional channels without disturbing the data flow; access to the second UART is not necessary.

Furthermore, several accesses to the module can be created with the Multiplexer. This is of great advantage when several independent electronic devices or interfaces are used.

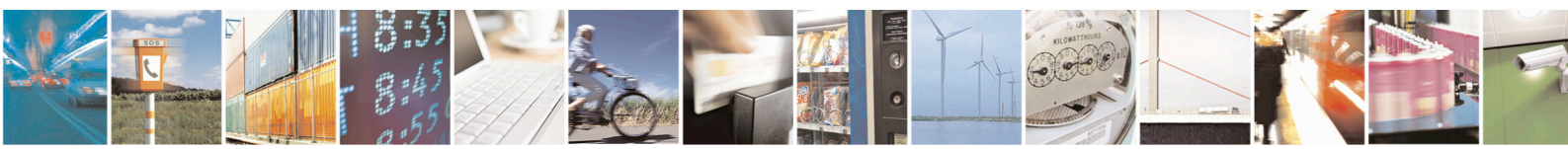
To access the three virtual interfaces, both the GSM engine and the customer application must contain MUX components, which communicate over the multiplexer protocol.

In Multiplexer mode, AT commands and data are encapsulated into packets. Each packet has channel identification and may vary in length.

### 5.4.2. Features

- 3GPP 27.010 CMUX Basic Option used
- CMUX implementation support four full DLCI (Serial Port)
- Every CMUX instance has its own user profile storage in NVM
- Independent setting of unsolicited message.
- Every CMUX instance has its own independent flow control

NOTE: More details about the Multiplexer mode are available in the CMUX User Guide.



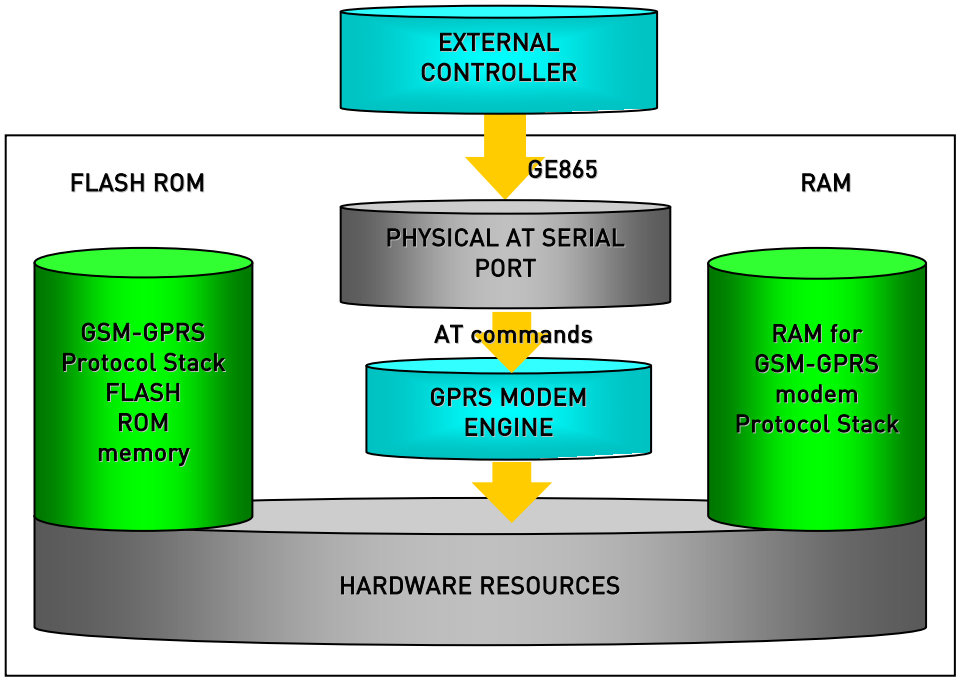
## 5.5. Easy Script Extension - Python interpreter

### 5.5.1. Overview

The Easy Script Extension is a feature that allows driving the modem "internally", writing the controlling application directly in a nice high level language: Python.

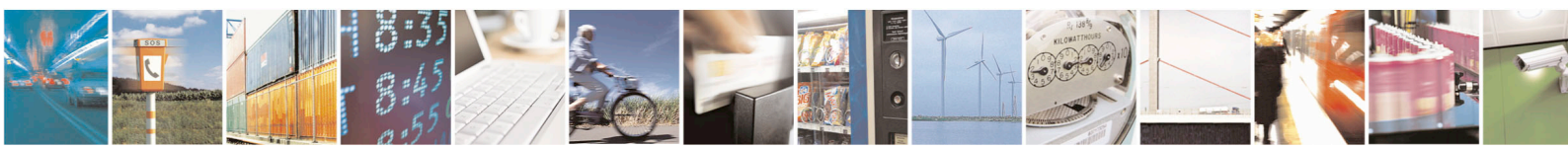
The Easy Script Extension is aimed at low complexity applications where the application was usually done by a small microcontroller that managed some I/O pins and the GE865-QUAD through the AT command interface.

A schematic of such a configuration can be:




In order to not use any external controller, and further simplify the programming of the sequence of operations, the customer can benefit of these feature already embedded in the GE865:

- Python script interpreter engine v. 1.5.2+
- 800 kB of Non Volatile Memory room for the user scripts and data
- 1 MB RAM reserved for Python engine usage



### 5.5.2. Python 1.5.2+ Copyright Notice

The Python code implemented into the Telit module is copyrighted by Stichting Mathematisch Centrum, this is the license:

Copyright © 1991-1995 by Stichting Mathematisch Centrum, Amsterdam, The Netherlands. All Rights Reserved

Copyright (c) 1995-2001 Corporation for National Research Initiatives; All Rights Reserved.

Copyright (c) 2001, 2002, 2003, 2004 Python Software Foundation; All Rights Reserved.

Copyright (c) 2001-2008 Python Software Foundation; All Rights Reserved.

All Rights Reserved are retained in Python.

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While CWI is the initial source for this software, a modified version is made available by the Corporation for National Research Initiatives (CNRI) at the Internet address ftp://ftp.python.org.

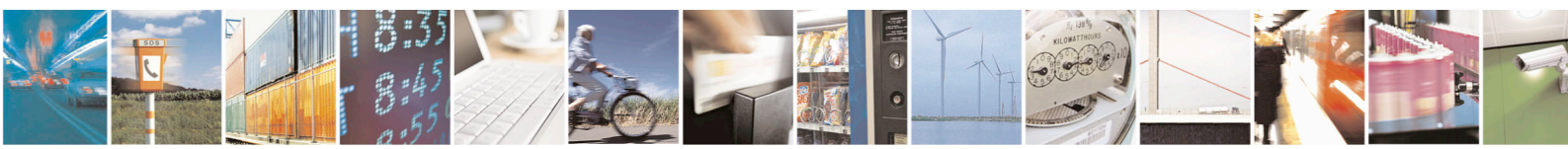
STICHTING MATHEMATISCH CENTRUM AND CNRI DISCLAIM ALL WARRANTIES WITH REGARD TO THIS SOFTWARE, INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS, IN NO EVENT SHALL STICHTING MATHEMATISCH CENTRUM OR CNRI BE LIABLE FOR ANY SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

NOTE: More details about the Python modules are available in the Easy Script in Python User Guide.

## 5.6. SAP: SIM Access Profile

### 5.6.1. Architecture

The SAP feature allows the module to use the SIM of a remote SIM Server. This feature is implemented using special AT Command on a Virtual circuit of the CMUX interface.



### 5.6.2. Implementation features

- SAP is based on 3GPP 27.010 CMUX Basic Option used
- Only SAP Client features
- Logic HW flow control is recommended on the Virtual instance selected for the SAP command.

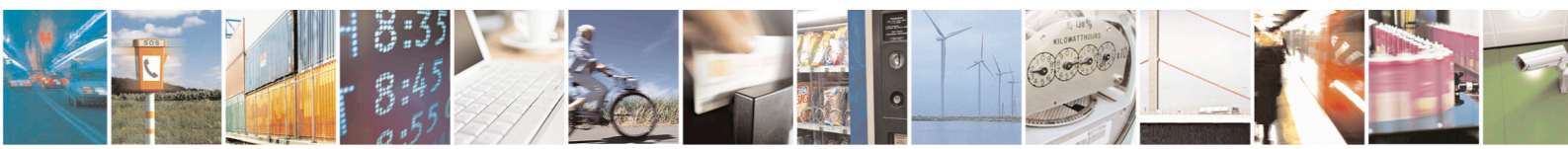
### 5.6.3. Remote SIM Message Command Description

The module sends request commands to the client application through a binary message that is crowned in the CMUX message. The client application shall extract the message and send it to the SAP server, through the appropriate protocols (e.g. by RFCOMM, that is the Bluetooth serial port emulation entity).

The client application shall extract all the messages sent by SAP server and put them in the CMUX message, to be sent to the module.

The module fulfill the following feature requirements:

- Connection management
- Transfer APDU
- Transfer ATR
- Power SIM on
- Report Status
- Error Handling



Every feature needs some procedures support:

| Feature | Procedure |
|---|---|
| Connection Management | Connect |
| | Report Status |
| | Transfer ATR |
| | Disconnection Initiated by the Client |
| | Disconnection Initiated by the Server |
| Transfer APDU | Transfer APDU |
| Transfer ATR | Transfer ATR |
| Power SIM on | Power SIM on |
| | Transfer ATR |
| Report Status | Report Status |
| Error Handling | Error Response |

Report Status, Disconnection Initiated by the Server and Error Response are independent messages sent by server. The other procedures consist of couples of messages, started by client.

NOTE: More details about the SAP are available in the SAP User Guide.

## 5.7. Premium FOTA Management (PFM) Service

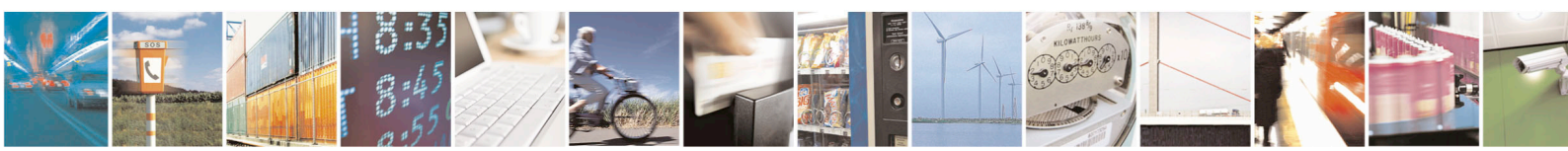
The premium FOTA Management Service provides a cost-effective, fast, secure and reliable way for wirelessly reflashing the firmware on mobile devices, ensuring that embedded software is up-to-date with the latest enhancements and features.

Customers, who want to benefit from this service, must pass through the Telit certification program, where Telit will assist the customer in validating the correct implementation of FOTA.

### 5.7.1. FOTA (Firmware Over The Air)

Telit, which has signed a partnership agreement with the worldwide leader of Firmware OTA technology Red Bend, has integrated its unique vCurrent® Mobile client software for use in its m2m product portfolio. Telit is therefore able to upgrade its products by transmitting only a delta file, which represents the difference between one firmware version and another.

See “PFM Application Note” for details in www.telit.com > Product > GSM/GPRS > Product Family > Application Notes.



## 5.8. AT Commands

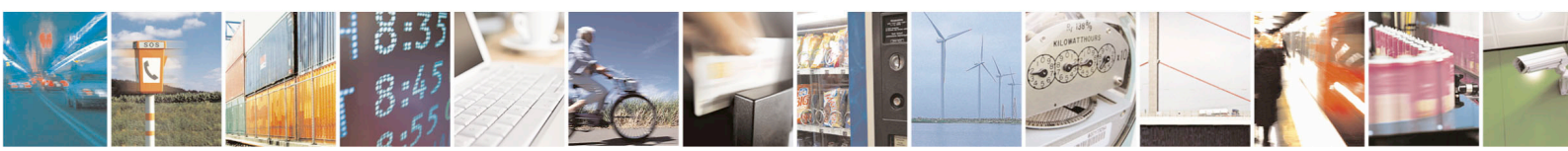
The Telit GE865-QUAD module can be driven via the serial interface using the standard AT commands.

The Telit GE865-QUAD module is compliant with:

1. Hayes standard AT command set, in order to maintain the compatibility with existing SW programs.
2. 3GPP 27.007 specific AT command and GPRS specific commands.
3. 3GPP 27.005 specific AT commands for SMS (Short Message Service) and CBS (Cell Broadcast Service)

Moreover the GE865-QUAD module supports also Telit proprietary AT commands for special purposes.

For a more information about AT commands supported by the GE865-QUAD module please refer to document AT Commands Reference Guide.



# 6. Conformity Assessment Issues

The Telit GE865-QUAD has been assessed in order to satisfy the essential requirements of the R&TTE Directive 1999/05/EC (Radio Equipment & Telecommunications Terminal Equipments) to demonstrate the conformity against the harmonized standards with the final involvement of a Notified Body.

CE 0889

By using our certified module, the evaluation under Article 3.2 of the R&TTE is considerably reduced, allowing significant savings in term of cost and time in the certification process of the final product.

In all cases the 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.

This Product Description, the Hardware User Guide and Software User Guide contain all the information you may need for developing a product meeting the R&TTE Directive.

Furthermore the GE865-QUAD module is FCC Approved as module to be installed in other devices. This device is to be used only for fixed and mobile applications. If the final product after integration is intended for portable use, a new application and FCC is required.

The GE865-QUAD is conforming to the following US Directives:

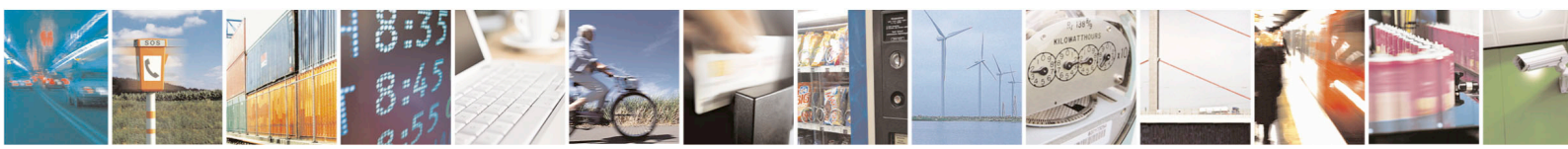
- Use of RF Spectrum. Standards: FCC 47 Part 24 (GSM 1900)
- EMC (Electromagnetic Compatibility). Standards: FCC47 Part 15

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

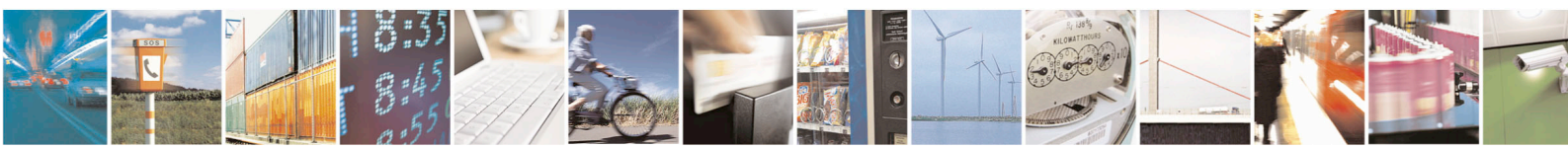
(2) this device must accept any interference received, including interference that may cause undesired operation.

To meet the FCC's RF exposure rules and regulations:



- The system antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all the persons and must not be co-located or operating in conjunction with any other antenna or transmitter.
- The system antenna(s) used for this module must not exceed 1.4dBi (850MHz) and 3.0dBi (1900MHz) for mobile and fixed or mobile operating configurations.
- Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Manufacturers of mobile, fixed or portable devices incorporating this module are advised to clarify any regulatory questions and to have their complete product tested and approved for FCC compliance.



## 6.1. RoHS Certificate

Telit
Communications S.p.A.

### DECLARATION OF EU RoHS Compliance

We,
*Telit Communications S.p.A*

Of:
*Via Stazione di Prosecco, 5/b*
*34010 Sgonico (TRIESTE)*
*ITALY*

declare under our sole responsibility that the:

***GE865 products family***

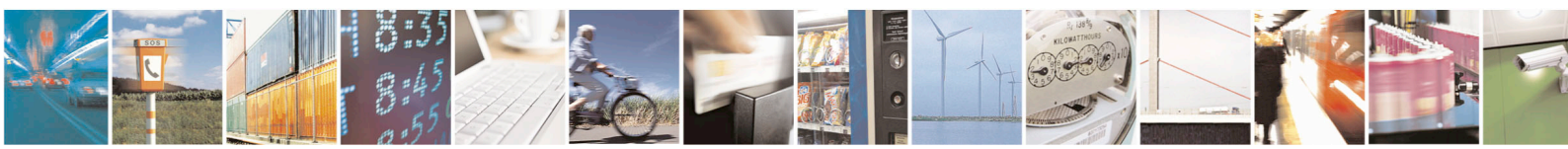
to which this declaration relates, is in full compliance with EU Directive 2002/95/EC on Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS), subsequent amendments and the European Court of Justice decision on Deca-BDE substances from July 1, 2008.
This information represents Telit's knowledge and belief as of the date that it is provided. Telit bases its material content knowledge on information provided by third parties and has taken and continues to take commercially reasonable steps to provide representative and accurate information, but may not have conducted chemical analysis on incoming materials and chemicals.

The technical documentation or other information showing that the product which has put on the market complies the requirements of regulation, and the applicable compliance process description P32-EN dated April 20th, 2009, are held at:

***Telit Communications S.p.A***
***Via Stazione di Prosecco, 5/b***
***34010 Sgonico (TRIESTE)***
***ITALY***

Trieste ***July 13, 2009***

Brian Tucker
Global Quality Management



## 6.2. GE865-QUAD CE Conformity Assessment

Telit Communications S.p.A.

### DECLARATION OF CONFORMITY

We,

***Telit Communications S.p.A***

Of:

***Via Stazione di Prosecco, 5/b***
***34010 Sgonico (TRIESTE)***
***ITALY***

declare under our sole responsibility that the product:

***GE865-QUAD***

Quad Band GSM850/EGSM900/DCS1800/PCS1900 GPRS Modules

to which this declaration relates is in conformity with all the essential requirements of the European Directive 1999/05/EC (R&TTE).

The conformity with the essential requirements of the European Directive 1999/05/EC has been demonstrated against the following harmonized standard:

| | |
|---|---|
| RF spectrum use (R&TTE art. 3.2) | EN 301 511 v9.0.2 (2003-03) |

The module has also been verified as a module against the following harmonized standards:

| | |
|---|---|
| EMC (R&TTE art. 3.1b) | EN 301 489-1 v1.8.1 (2008-04); -7 v1.3.1 (2005-11) |
| Health & Safety (R&TTE art. 3.1a) | EN 60950-1:2006 |

The conformity assessment procedure referred to in Article 10 and detailed in Annex IV of Directive 1999/5/EC has been followed with the involvement of the following Notified Body Notified Body for Article 3.2:

RFI Global Services Ltd.

Pavilion A, Ashwood Park, Ashwood way
RG23 8BG BASINGSTOKE
United Kindom

RFI File number: RFI-NOTA2-SC76937JD10 dated 21/06/10

TCF No. 76937JD09A (Hardware version 3) dated 21/06/2010

Identification mark: **0889**

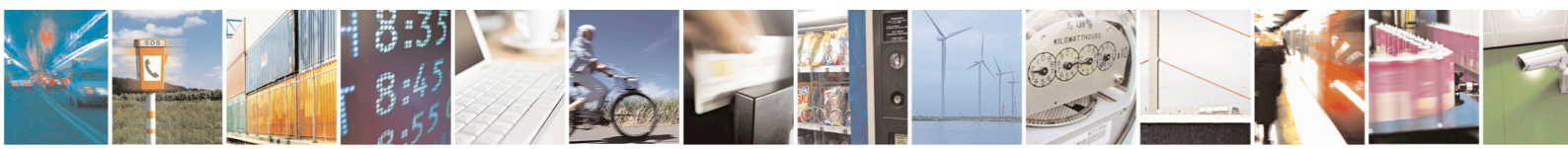
The technical documentation relevant to the above equipment is held at:

***Telit Communications S.p.A***
***Via Stazione di Prosecco, 5/b***
34010 Sgonico (TRIESTE) ITALY

Trieste, ***22th June 2010***

2.5G R&D Director
Antonino Sgroi

EMEA Quality Director
Guido Walcher



NOTIFIED BODY OPINION

# NOTIFIED BODY STATEMENT OF OPINION

**(For Council Directive 1999/5/EC)**

## This opinion is issued to

**Telit Communications S.p.A.**

Via Stazione di Prosecco 5/B
34010 Sgonico (TS)
Italy

## to state that the equipment known as

**GE865-QUAD**

(Hardware version 3)

in our opinion, conforms (following an evaluation of its associated Technical Construction File and subject to any restrictions stated in the attached Annex) with the essential requirements of Annex IV of Council Directive 1999/5/EC on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity, in relation to the essential requirements of :

Article 3.2 Radio Spectrum.

Details of the scope of this opinion, standards used, RF parameters of this equipment and other information necessary for the correct interpretation and application, including any remarks, restrictions or observations that are detailed in the attached Annex.

Signed:

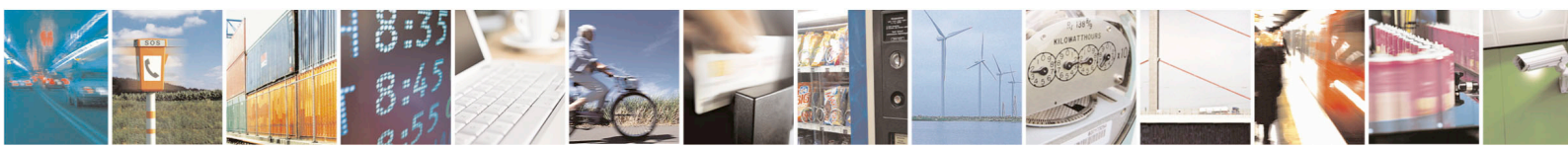
*John Bellairs on behalf of RFI Global Services Ltd.*

Issue Date: 21 June 2010

Notified Body Opinion No: RFI-NOTA2-SC76937JD10

RFI Global Services Ltd, Pavilion A, Ashwood Park,
Ashwood Way, Basingstoke, Hampshire, RG23 8BG, UK
Tel: +44 (0) 1256 312000 Fax: +44 (0) 1256 312001
Web Address: www.rfi-global.com email: contactus@rfi-global.com

CE 0889



## 6.3. GE865-QUAD FCC Conformity Assessment

TCB GRANT OF EQUIPMENT AUTHORIZATION TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

RFI Global Services Ltd
Pavilion A Ashwood Park, Ashwood Way
Basingstoke, Hampshire, RG23 8BG
United Kingdom

Date of Grant: 09/20/2010
Application Dated: 09/20/2010

Telit Communications S.p.A.
Viale Stazione di Prosecco 5/b
Trieste, 34010
Italy

Attention: Brian Tucker , Global VP, Quality

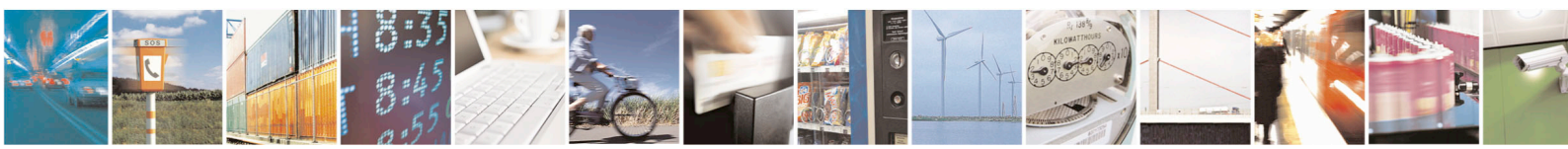
NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: RI7GE865
Name of Grantee: Telit Communications S.p.A.
Equipment Class: PCS Licensed Transmitter
Notes: Quadband GSM/ GPRS Module
Modular Type: Single Modular

| Grant Notes | FCC Rule Parts | Frequency Range (MHZ) | Output Watts | Frequency Tolerance | Emission Designator |
|---|---|---|---|---|---|
| | 22H | 824.2 - 848.8 | 1.51 | 1.0 PM | 300KGXW |
| | 24E | 1850.2 - 1909.8 | 0.87 | 1.0 PM | 300KGXW |

Single modular approval. Power Output listed is conducted. This device contains functions that are not operational in U.S. Territories. This filing is only applicable for US operations. The antenna gain, including cable loss, must not exceed 3.0dBi at 1900 MHz / 1.4dBi at 850 MHz as defined in 2.1091 and 1.1307 of the rules for satisfying RF exposure compliance. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter within a host device, except in accordance with FCC multi-transmitter product procedures. OEM integrators and end-users must be provided with specific operating instructions for satisfying RF exposure compliance requirements. Class II Permissive Change for module hardware revision HW3 as documented in this filing



# 6.4. GE865-QUAD IC Conformity Assessment

Industry Canada Industrie Canada

Submission No. > 141738

**TECHNICAL ACCEPTANCE CERTIFICATE**

**CERTIFICAT D'APPROBATION TECHNIQUE**

CERTIFICATION No. / No. DE CERTIFICATION > **5131A-GE865**

ISSUED TO / DÉLIVRÉ A > **TELIT COMMUNICATIONS S.p.A.**

TYPE OF EQUIPMENT / GENRE DE MATÉRIEL > GSM Module

TRADE NAME AND MODEL / MARQUE ET MODELE > GE865-QUAD

| FREQUENCY RANGE / BANDE DE FRÉQUENCES | EMISSION TYPE / GENRE D'ÉMISSION | R.F. POWER / PUISSANCE H.F. | SPECIFICATION/ ISSUE / SPÉCIFICATION/ ÉDITION | |
|---|---|---|---|---|
| 1.8502 to 1.9098 GHz | 245KGXW | 1.00 W | RSS133 | 5 |
| 824.2000 to 848.8000 MHz | 243KGXW | 1.74 W | RSS132 | 2 |

Certification of equipment means only that the equipment has met the requirements of the above noted specifications. License applications, were applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation.

L'homologation de matériel signife seulement qu'il est conforme aux exigences du cahier des charges mentionné ci-dessus. Les demandes de licence, le cas échéant en vue de l'utilisation de matériel certifié seront traitées en conséquence par le bureau chargé de délivrer les dites licences, en tenant compte du milieu radioélectrique ambiant, du service radio existant et de l'emplacement de la station.

This certificate is issued on condition that the holder complies and will continue to comply with the requirements of the radio standards specifications and procedures issued by the Department.

Le présent certificat est délivré à la condition que le détenteur se conforme et continue à se conformer aux cahiers des charges et procédures publiées par le ministère.

**ISSUED UNDER THE AUTHORITY OF MINISTER OF INDUSTRY**
**DÉLIVRÉ AVEC L'AUTORISATION DU MINISTRE DE L'INDUSTRIE**

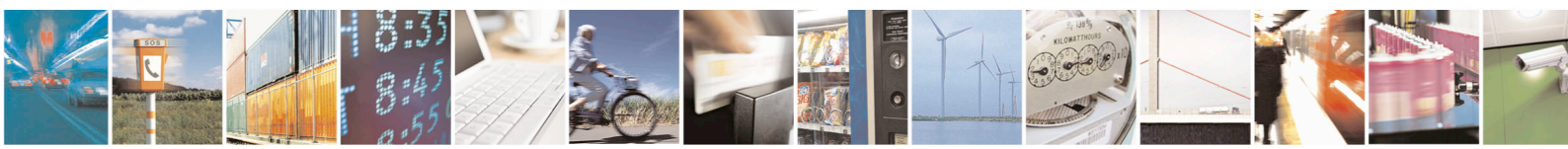
DATE **August 4 2010**

Nicolas DesMarais

FOR
DIRECTOR GENERAL
ENGINEERING, PLANNING
AND STANDARDS

POUR
DIRECTEUR GÉNÉRAL
DU GÉNIE, DE LA
PLANIFICATION ET
DES NORMES

Canada



# 7. SAFETY RECOMMENDATIONS

**READ CAREFULLY**

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 compromise 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.

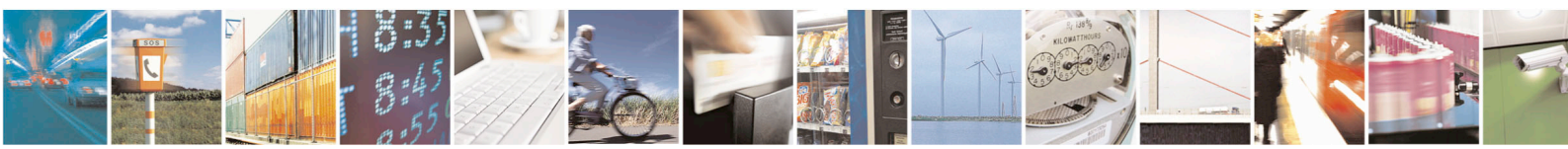
Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case of this requirement cannot be satisfied,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

The European Community provides some Directives for the electronic equipments introduced on the market. All the relevant information's are available on the European Community website:

http://ec.europa.eu/enterprise/rtte/dir99-5.htm

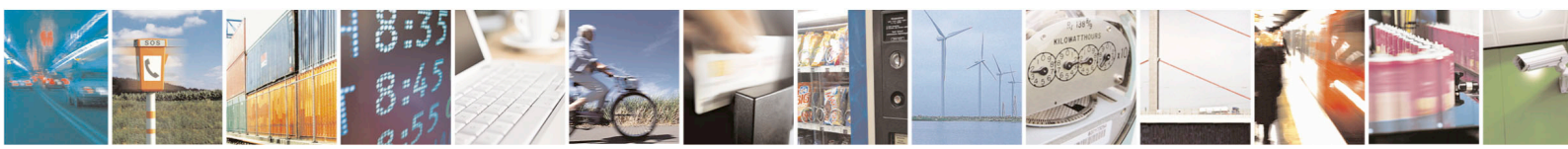
The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

http://ec.europa.eu/enterprise/electr_equipment/index_en.htm



# 8. List of acronyms

| | |
|---|---|
| **ACM** | Accumulated Call Meter |
| **ASCII** | American Standard Code for Information Interchange |
| **AT** | Attention commands |
| **CB** | Cell Broadcast |
| **CBS** | Cell Broadcasting Service |
| **CCM** | Call Control Meter |
| **CLIP** | Calling Line Identification Presentation |
| **CLIR** | Calling Line Identification Restriction |
| **CMOS** | Complementary Metal-Oxide Semiconductor |
| **CR** | Carriage Return |
| **CSD** | Circuit Switched Data |
| **CTS** | Clear To Send |
| **DAI** | Digital Audio Interface |
| **DCD** | Data Carrier Detected |
| **DCE** | Data Communications Equipment |
| **DRX** | Data Receive |
| **DSR** | Data Set Ready |
| **DTA** | Data Terminal Adaptor |
| **DTE** | Data Terminal Equipment |
| **DTMF** | Dual Tone Multi Frequency |
| **DTR** | Data Terminal Ready |
| **EMC** | Electromagnetic Compatibility |
| **ETSI** | European Telecommunications Equipment Institute |
| **FTA** | Full Type Approval (ETSI) |
| **GPRS** | General Radio Packet Service |
| **GSM** | Global System for Mobile communication |
| **HF** | Hands Free |
| **IMEI** | International Mobile Equipment Identity |
| **IMSI** | International Mobile Subscriber Identity |
| **IRA** | International Reference Alphabet |
| **ITU** | International Telecommunications Union |
| **IWF** | Inter-Working Function |
| **LCD** | Liquid Crystal Display |
| **LED** | Light Emitting Diode |
| **LF** | Linefeed |
| **ME** | Mobile Equipment |
| **MMI** | Man Machine Interface |
| **MO** | Mobile Originated |
| **MS** | Mobile Station |
| **MT** | Mobile Terminated |
| **OEM** | Other Equipment Manufacturer |
| **PB** | Phone Book |
| **PDU** | Protocol Data Unit |
| **PH** | Packet Handler |
| **PIN** | Personal Identity Number |



| | |
|---|---|
| **PLMN** | Public Land Mobile Network |
| **PUCT** | Price per Unit Currency Table |
| **PUK** | PIN Unblocking Code |
| **RACH** | Random Access Channel |
| **RLP** | Radio Link Protocol |
| **RMS** | Root Mean Square |
| **RTS** | Ready To Send |
| **RI** | Ring Indicator |
| **SCA** | Service Center Address |
| **SIM** | Subscriber Identity Module |
| **SMD** | Surface Mounted Device |
| **SMS** | Short Message Service |
| **SMSC** | Short Message Service Center |
| **SS** | Supplementary Service |
| **TIA** | Telecommunications Industry Association |
| **UDUB** | User Determined User Busy |
| **USSD** | Unstructured Supplementary Service Data |