

GE863 Product Description


GE863-GPS, GE863-PY, GE863-QUAD, GE863-SIM

80278ST10016a Rev. 13 - 20/03/09



GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09

This document is relating to the following products:

GSM GPRS	
GE863-QUAD Embedded	
GE863-PY Embedded	
GE863-GPS Embedded	
GE863-GPS	GE863GPS***_***
GE863-PY	GE863PYT***_***
GE863-QUAD	GE863QUD***_***

The suffix “***_***” depends on the module HW/SW configuration. Please contact your Telit representative for details.

GSM GPRS	
GE863-SIM Embedded	
	
GE863-SIM	3990250700



Contents

- 1 Overview7**
- 2 General Product Description.....9**
 - 2.1 Dimensions9**
 - 2.2 Weight.....10**
 - 2.3 Environmental requirements11**
 - 2.3.1 Temperature range11
 - 2.3.2 Vibration Test (non functional).....11
 - 2.3.3 RoHS compliance11
 - 2.4 Operating Frequency11**
 - 2.5 Transmitter output power12**
 - 2.6 Reference sensitivity.....12**
 - 2.7 Antennas12**
 - 2.7.1 GSM Antenna12
 - 2.7.2 GPS Antenna.....13
 - 2.8 GPS Module features13**
 - 2.8.1 GPS Specifications13
 - 2.8.1.1 GPS Sensitivity13
 - 2.8.1.2 GPS Consumption14
 - 2.8.1.3 GPS Driving14
 - 2.8.1.4 GPS NMEA14
 - 2.8.1.5 NMEA sentences14
 - 2.9 Supply voltage15**
 - 2.10 GSM Power consumption15**
 - 2.11 Embodied Battery charger15**
 - 2.12 User Interface16**
 - 2.12.1 Speech Coding16
 - 2.12.2 SIM Reader.....16
 - 2.12.3 SMS16
 - 2.12.4 Real Time Clock and Alarm16
 - 2.12.5 Data/fax transmission17
 - 2.12.6 Local security management.....17
 - 2.12.7 Call control17
 - 2.12.8 Phonebook.....17
 - 2.12.9 Characters management17
 - 2.12.10 SIM related functions17
 - 2.12.11 Call status indication18
 - 2.12.12 Automatic answer (Voice, Data or FAX).....18
 - 2.12.13 Supplementary services (SS)18
 - 2.12.14 Acoustic signalling18
 - 2.12.15 Buzzer output.....19



GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09

2.12.16 RF Transmission Monitor 19

2.13 EMC 19

2.14 Logic level specifications 20

2.14.1 Reset signal 20

2.15 RTC Bypass out 20

2.16 VAUX1 power output 20

2.17 Audio levels specifications 21

2.18 Converter 21

2.18.1 ADC Converter 21

2.18.2 DAC Converter 21

2.19 Mounting the GE863 on the Application Board..... 22

2.19.1 General 22

2.19.2 Packing system..... 22

3 Evaluation Kit EVK2 24

4 Software Features 25

4.1 Enhanced Easy GPRS Extension..... 25

4.1.1 Overview 25

4.1.2 Easy GPRS definition 26

4.2 Multisocket..... 27

4.3 Jammed Detect & Report Extension..... 29

4.3.1 Overview 29

4.4 CMUX 30

4.4.1 Product architecture..... 30

4.4.2 Implementation feature and limitation..... 30

4.5 Easy Script Extension - Python interpreter 31

4.5.1 Overview 31

4.5.2 Python 1.5.2+ Copyright Notice..... 33

4.5.3 Python implementation description..... 34

4.5.4 Python core supported features..... 36

4.5.5 Python Build-in Custom Modules..... 37

4.6 SAP: SIM Access Profile 37

4.6.1 Product architecture..... 38

4.6.2 Implementation feature 38

4.6.3 Remote SIM Message Command Description 38

4.7 PFM (Premium FOTA Management) 39

4.7.1 FOTA (Firmware Over The Air) 39

5 AT Commands 40

6 Conformity Assessment Issues 41

6.1 GE863-GPS : Conformity Assessment 43

6.2 GE863-QUAD: Conformity Assessment 45



GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09

6.3	GE863-PY: Conformity Assessment.....	47
6.4	GE863- QUAD/PY/GPS: RoHS certificate	49
6.5	GE863-QUAD/PY: FCC Equipment Authorization.....	50
6.6	GE863-QUAD/PY: IC Equipment Authorization	51
6.7	GE863-GPS : FCC Equipment Authorization	52
6.8	GE863-GPS : IC Equipment Authorization	53
7	Safety Recommandations	54
8	GE863 Technical Support.....	55
9	List of acronyms	56
10	Document Change Log.....	58



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1 Overview

The GE863 family is the evolution of the TRIZIUM family, which combines the access to digital communication services in GSM 850, 900, DCS 1800, PCS1900 MHz networks with additional options like an integrated GPS receiver.

The GE863 form factor is a surface mount, low profile compact shielded assembly provided with BGA solder connections, introduced with the former GE863 modules family. This form factor and mounting technology is reducing cost in high-volume applications, saving space and weight in portable devices and with the GPS Option with EASY SCRIPT, it can form a self-controlled tracking device.

The GE863 module family consists of currently 4 models. Based on the standard model [GE863-QUAD](#), the [GE863-GPS](#) integrates a highly sensitive 20-channel GPS receiver. Moreover, the [GE863-GPS](#) and [GE863-PY](#) models, integrate the **EASY SCRIPT** functionality. This is a PYTHON engine script interpreter allowing self-controlled operations. With the **EASY SCRIPT** feature the [GE863-GPS](#) and [GE863-PY](#) become a finite product, it just needs your script to be run. The [GE863-SIM](#) has an embedded SIM chip integrated in the module. The interface is the same as standard model [GE-863-QUAD](#).

The [Telit GE863 modules](#) includes features like GPRS Class 10, Voice Communication, Circuit Switched Data Transfer, Fax, Phonebook, SMS support and '**EASY GPRS**' embedded TCP/IP stack. It is specifically designed and developed by [Telit](#) for OEM usage and dedicated to portable data, voice and telematic applications, such as:

- **Telemetry and Telecontrol**
- **Security systems**
- **Vending Machines**
- **POS terminals**
- **Mobile Computing**
- **Phones and Payphones**
- **Return channel for digital broadcasting**
- **Applications, where the external application processor can be replaced by the PYTHON engine provided by the GE863-GPS or GE863-PY**

Moreover, for the [GE863-GPS](#):

- **Automotive and Fleet Management applications**
- **Position reporting and tracking with integrated GPS**

Other than the above mentioned feature, all three models support the following functionalities:

- **EASY GPRS (AT driven embedded TCP/IP protocol stack, including FTP client)**
- **EASY SCAN (full GSM frequency scanning)**
- **JAMMING DETECT & REPORT (detect the presence of disturbing devices)**



- **CMUX**
- **SAP (SIM Access Profile)**
- **Multisocket**

From the interface point of view, the GE863 provides the following:

- **Full RS232 UART, CMOS level (ASC0) interface for AT commands:**
 - **Auto-bauding from 1.2 up to 115.2 Kbps**
 - **Fixed baud rate from 300 bit/s up to 115.2 Kbps**
- **Two wires RS232, CMOS level (ASC1) for PYTHON debug**
- **SIM card interface, 3 volts and 1.8 volts**
- **18 x GPIO ports (max)**
- **3 x A/D converters GE863-QUAD, PY only**
- **1 x A/D converter GE863-GPS only**
- **1 x D/A converter (PWM output)**
- **1 x buzzer output**
- **1 x led status output indicator**

In order to meet the competitive OEM and vertical market stringent requirements, Telit supports its customers with a dedicated Technical Support Policy with:

- [Telit Evaluation Kit EVK2](#) to help you to develop your application;
- a Website with all updated information available;
- a high level technical support to assist you in your development;

For more updated information concerning product Roadmap and availability, technical characteristics, commercial and other issues, please check on the Telit website www.telit.com > Products > Modules.

NOTE: Some of the performances of the [Telit GE863 modules](#) depend on the SW version installed on the module itself.

The [Telit GE863 SW](#) group is continuously working in order to add new features and improve the overall performances.

The [Telit GE863 modules](#) are easily upgradeable by the developer using the [Telit GE863 module Flash Programmer](#).



2 General Product Description

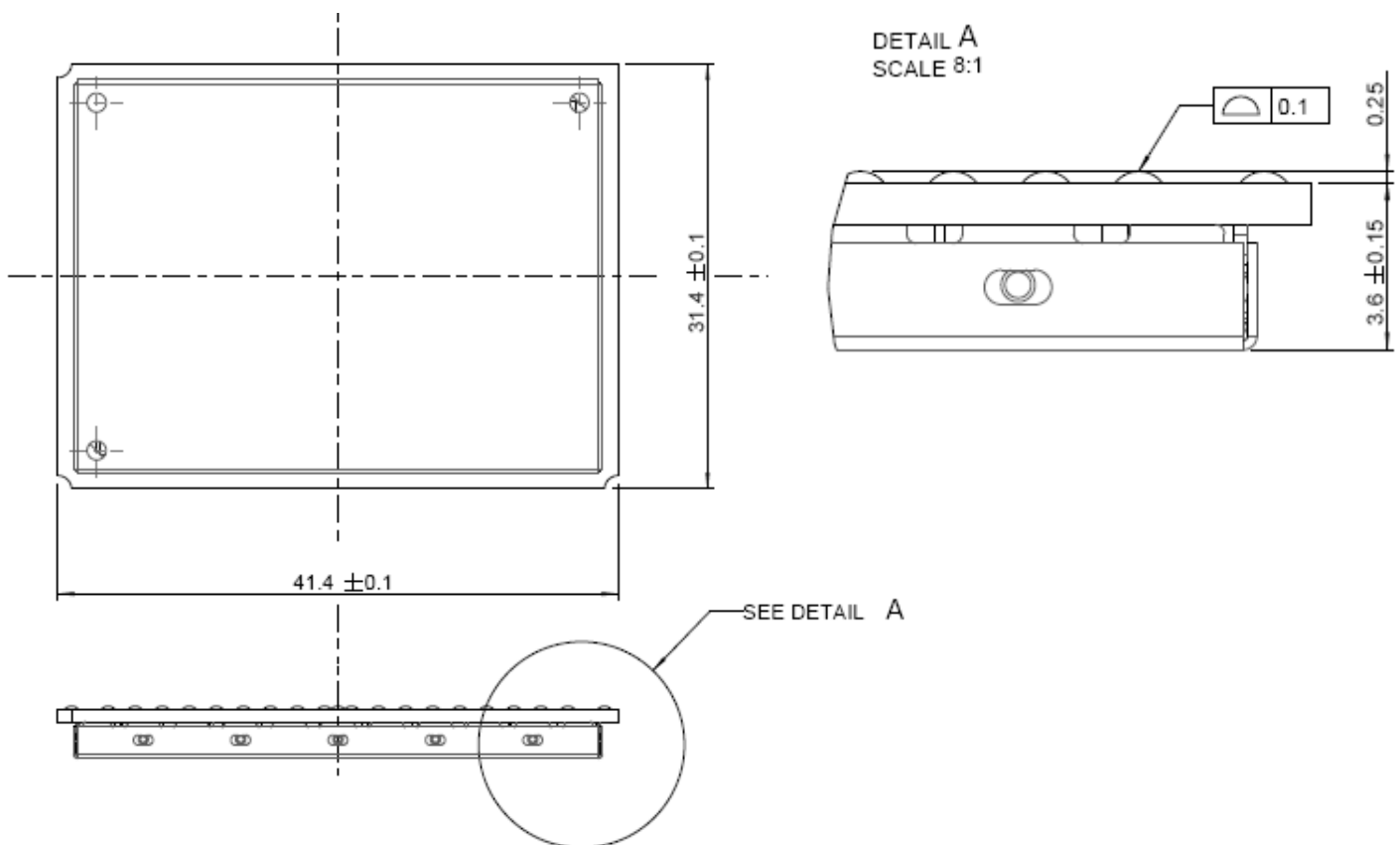
NOTE: The illustrations in this Product Description are only schematic and do not assure fidelity to construction or layout details, finishes, writings or colors.

2.1 Dimensions

The **Telit GE863 module** overall dimensions are:

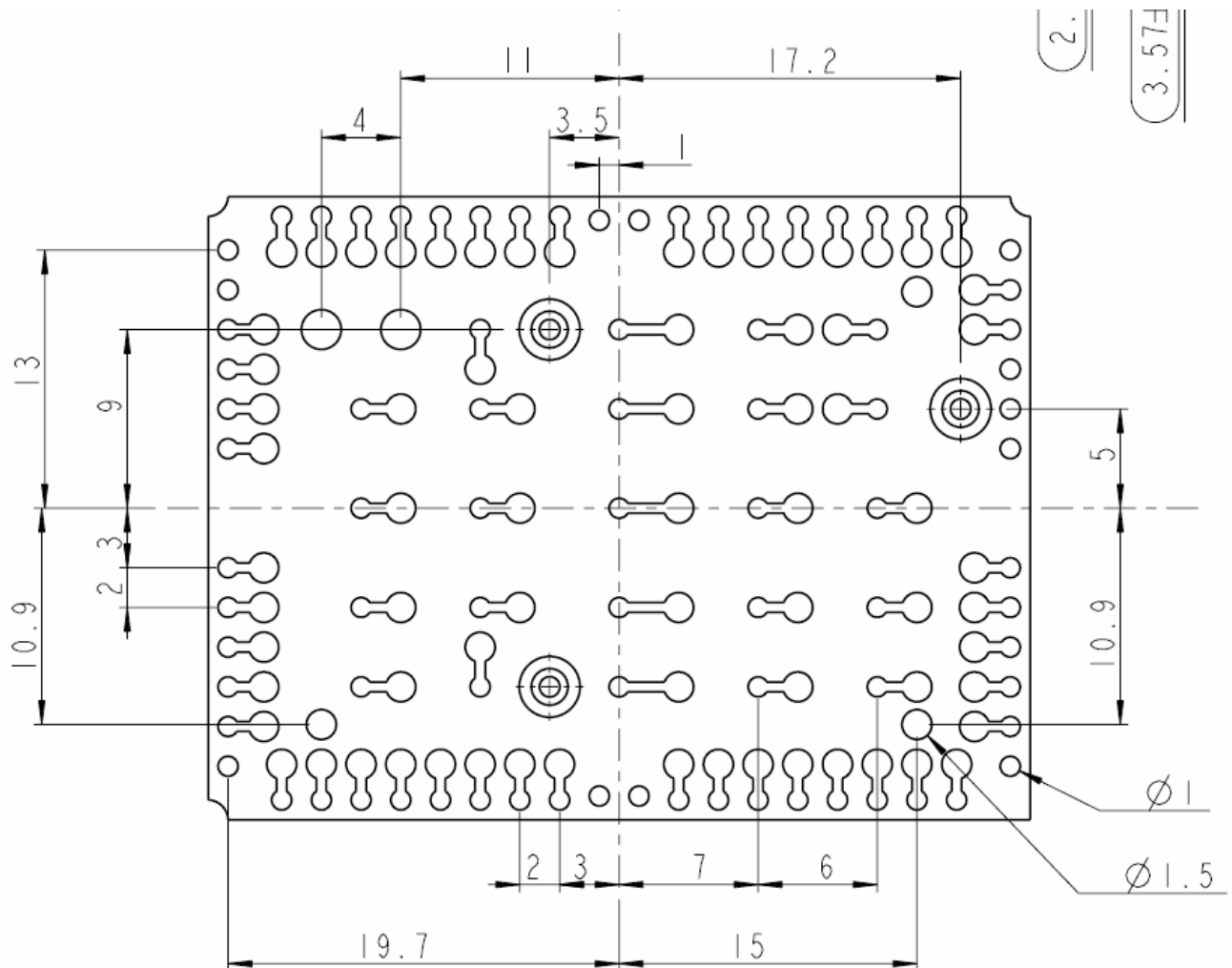
- **Length:** 41,4 mm
- **Width:** 31,4 mm
- **Thickness:** 3,6 mm

The layout of the **Telit GE863 module** is shown in the following figure:



Top View





2.2 Weight

The **Telit GE863** module weight is 9 gr.



GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09

GSM-850	824.2 - 848.8	869.2 - 893.8	128 - 251	45 MHz
E-GSM-900	890.0 - 914.8	935.0 - 959.8	0 – 124	45 MHz
	880.2 - 889.8	925.2 - 934.8	975 - 1023	45MHz
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

2.5 Transmitter output power

GSM-850 / 900

The [Telit GE863](#) modules in GSM-850 / 900 operating mode are of **class 4** in accordance with the specification which determine the nominal **2W** peak RF power (**+33dBm**) on 50 Ohm.

DCS-1800 / PCS-1900

The [Telit GE863](#) modules in DCS-1800/PCS-1900 operating mode are of **class 1** in accordance with the specifications, which determine the nominal **1W** peak RF power (**+30dBm**) on 50 Ohm.

2.6 Reference sensitivity

GSM-850 / 900

The sensitivity of the [Telit GE863](#) modules according to the specifications for the class 4 GSM-850/900 portable terminals is **-107 dBm** typical in normal operating conditions.

DCS-1800 / PCS-1900

The sensitivity of the [Telit GE863](#) modules according to the specifications for the class 1 portable terminals DCS-1800 / PCS-1900 is **-106 dBm** typical in normal operating conditions.

2.7 Antennas

2.7.1 GSM 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	70 MHz in GSM 850, 80 MHz in GSM 900, 170 MHz in DCS, 140 MHz PCS band

For further information please refer to the GE863 Hardware User Guide.



2.7.2 GPS Antenna¹

The active GPS antenna should fulfill the following requirements:

Frequency range	GPS L1 (1575.42 MHz),
Bandwidth	+/-1.023 MHz

The supply voltage to the active GPS antenna is provided by the GE863-GPS.
For further information please refer to the GE863 Hardware User Guide.

2.8 GPS Module features

The GE863-GPS includes a SiRFstarIII™ single chip GPS receiver, that supports real-time location in urban area and wherever a high sensitivity acquisition is needed. As main features of such GPS receiver, we can mention:

- High sensitivity for indoor reception, up to -159dBm (with active antenna)
- Extremely fast TTFF's at low signal levels
- Hot starts < 3 seconds
- 200,000+ effective correlators
- Supports 20-Channel GPS L1 1575.42 MHz
- Accuracy < 2.5m
- Extremely fast TTFF's at low signal levels
- GPS NMEA 0183 output format
- Date WGS-84
- Dedicated GPS AT commands
- SBAS (WAAS and EGNOS) support²
- Low power consumption³

2.8.1 GPS Specifications

2.8.1.1 GPS Sensitivity

Time to first fix	
Hot start	Autonomous <3s
Warm start	Autonomous <35s
Cold start	Autonomous <35s
Sensitivity ³	
Tracking	up to -159 dBm

¹ GE863-GPS only

² Available for the P/N: 3 990 250 690

³ **NOTE:** sensitivity is affected by the type of active GPS antenna used in the application.



2.8.1.2 GPS Consumption

The typical current consumption of the GPS part of the [GE863-GPS module](#) is:

	GE863-GPS
Operating current	55mA, including 35mA GPS for the GPS hardware and 20 mA for the antenna LNA

2.8.1.3 GPS Driving

The GPS functions are driven from the GSM Base Band processor through a dedicated AT command set available in a separate specification.

2.8.1.4 GPS NMEA

The GPS data stream (NMEA 0183 format) is also available on the pin-out in RS232 8N1 format, 4800 bps (9600, 19200, 38400, and 57600 bps are available too)

2.8.1.5 NMEA sentences

The following GPS sentences are available:

GGA - Global positioning system fix data (provides 3D location and accuracy data)

VTG – Course over ground and ground speed

GSA - GPS DOP and active satellites

RMC - Recommended Minimum Specific GPS Data

GLL - Geographic Latitude and Longitude



2.9 Supply voltage

The external power supply must be connected to VBATT signal pin (see Hardware User Guide) and must fulfill the following requirements:

POWER SUPPLY		
	SW rel. 7.02.xx4 or older	SW rel. 7.03.x00 or newer
Nominal Supply Voltage	3.8 V	3.8 V
Max Supply Voltage	4.2 V	4.5 V
Supply voltage range	3.4 V - 4.2 V	3.22 V – 4.5 V

NOTE: Operating voltage range must never be exceeded; care must be taken in order to fulfill min/max voltage requirements.

2.10 GSM Power consumption

The typical current consumption of GSM part of the [Telit GE863 module](#) is:

Power off current (typical)	< 26 μ A;
Stand-by current (GSM Idle)	< 17 mA (< 2.6 mA using command AT+CFUN)
Operating current in voice channel	< 200 mA @ worst network conditions
Operating current in GPRS class 10	< 370 mA @ worst network conditions

The total power consumption of GE863-GPS is the sum of the consumptions of GSM and GPS part.

2.11 Embodied Battery charger

The battery charger is suited for a 3.7V Li-Ion rechargeable battery (suggested capacity 500-1000mAH). The Charger needs only a CURRENT LIMITED power source input and charges the battery directly through VBATT connector pins.

Battery charger input pin	CHARGE
Battery pins	VBATT, GND
Battery charger input voltage min	5.0 V
Battery charger input voltage typical	5.5 V
Battery charger input voltage max	7.0 V



Battery charger input current max	400mA
Battery type	Li-Ion rechargeable

NOTE: If embodied battery charger is used, then a LOW ESR capacitor of at least 100µF must be mounted in parallel to VBATT pin.

NOTE: when power is supplied to the CHARGE pin, a battery must always be connected to the VBATT pins of the GE863.

2.12 User Interface

The user interface of [Telit GE863](#) is managed by AT commands specified on the ITU-T V.250, GSM 07.07 and GSM 07.05 specifications.

2.12.1 Speech Coding

The [Telit GE863 modules](#) voice codec supports the following rates:

- Half Rate
- Full rate
- Enhanced Full Rate
- Adaptive Multi Rate

2.12.2 SIM Reader

The [Telit GE863-QUAD](#), [GE863-PY](#) and [GE863-GPS](#) support phase 2 GSM11.14 - SIM 1.8V and 3V. For 5V SIM cards, an external level translator can be added. All three models need an external SIM card holder.

2.12.3 SMS

The [Telit GE863 modules](#) support the following SMS types, in text and PDU mode:

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

2.12.4 Real Time Clock and Alarm



GE863 Product Description

80278ST10016a Rev. 13 - 20/03/09

The [Telit GE863 modules](#) support the Real Time Clock and Alarm functions through AT commands; furthermore an alarm output pin (GPIO6) can be configured to indicate the alarm with a hardware line output.

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

2.12.5 Data/fax transmission

The Telit GE863 modules support:

- Packed Data transfer GPRS Class 10, Multi-slot Class B
- CSD up to 14.4 Kbps
- Fax service, Class 1 Group 3

2.12.6 Local security management

The local security management can be done with the lock of Subscriber Identity module (SIM), and security code request at power-up.

2.12.7 Call control

The call cost control function is supported.

2.12.8 Phonebook

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

2.12.9 Characters management

The [Telit GE863](#) supports:

- IRA character set (International Reference Alphabet), in TEXT and PDU mode;
- UCS2
- GSMDefault..

2.12.10 SIM related functions



GE863 Product Description

80278ST10016a Rev. 13 - 20/03/09

The activation and deactivation of the numbers stored in phone book, FDN, ADN and PINs are supported. The extension at the PIN2 for the PUK2 insertion capability for lock condition is supported too.

2.12.11 Call status indication

The call status indication by AT commands is supported.

2.12.12 Automatic answer (Voice, Data or FAX)

After a specified number of rings, the module will automatically answer. The user can set the number of rings by means of the command `ATS0=<n>`.

2.12.13 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)

2.12.14 Acoustic signalling

The acoustic signals of [Telit GE863 modules](#) 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.



2.12.15 Buzzer output

The General Purpose I/O pin GPIO7 can be configured to output the BUZZER output signal, with only an external MOSFET/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.

2.12.16 RF Transmission Monitor

As alternate function of the GPIO5, the GE863-GPS, QUAD-PY and QUAD 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.

2.13 EMC

Compliant to EN301-489-1 and EN301-489-7 and all applicable GSM Specifications. Compliant to Directive 1999/05/CE.



2.14 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 [Telit GE863](#) interface circuits please consult the Hardware User Guide.

2.14.1 Reset signal

The RESET is used to reset the [Telit GE863 modules](#). Whenever this signal is pulled low, the GE863 is reset. When the device is reset it stops any operation. After the release of the reset GE863-QUAD and GE863-PY are unconditionally rebooted, while GE863-GPS is unconditionally shut down, without doing any detach operation from the network where it is registered to. This behavior is not like a proper shut down because any GSM device is requested to issue a detach request on turn off. For this reason the Reset signal must be used only as an emergency exit in the rare case the device remains stuck waiting for some network response.

NOTE: do not use this signal to power off the [Telit GE863 module](#). Use the ON/OFF signal (BGA Ball 46) to perform this function or the AT#SHDN command.

2.15 RTC Bypass out

The VRTC pin brings out the Real Time Clock supply, which is separate from the rest of the digital part, allowing having only RTC going on when all the other parts of the device are off. To this power output a backup capacitor can be added in order to increase the RTC autonomy during power off of the battery. NO Devices must be powered from this pin.

2.16 VAUX1 power output

A regulated power supply output is provided in order to supply small devices from the module. This output is active when the module is ON and goes OFF when the module is shut down. The operating range characteristics of the supply are:

Operating Range – VAUX1 power supply

	Min	Typical	Max
Output voltage	2.75V	2.85V	2.95V
Output current			100mA / 50mA ⁴
Output bypass capacitor			2.2µF

⁴ value 50mA is for GE863-GPS



2.17 Audio levels specifications

The audio of the [Telit GE863 modules](#) is organized into two main paths:

- Internal path (called also MT)
- External path (called also HF)

These two paths are meant respectively for handset and headset/hands-free use. The [Telit GE863 modules](#) have a built in echo canceller and a noise suppressor, tuned separately for the two audio paths; for the internal path the echo canceller parameters are suited to cancel the echo generated by a handset, while for the external audio path they are suited for a hands-free use.

For more information on the audio refer to the GE863 Hardware User Guide.

2.18 Converter

2.18.1 ADC Converter

The on board ADCs 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, and convert it into 11 bit word.

	Min	Max	Units
Voltage range	0	2	Volt
AD conversion	11	11	bits
Resolution	1	1	mV
Sampling rate	1 (idle)	60 (on traffic)	secs

2.18.2 DAC Converter

The on board DAC is able to generate a PWM signal based a specific percentage of duty cycle decided by the user. With the appropriate AT command, a value in the range from 0% up to 100% of duty cycle is issued. An external RF filter is necessary to convert the PWM signal into a constant voltage.

	Min	Max	Units
Voltage range	2.8	2.8	Volt
Duty Cycle range	0	100	%
Resolution	1	1	%



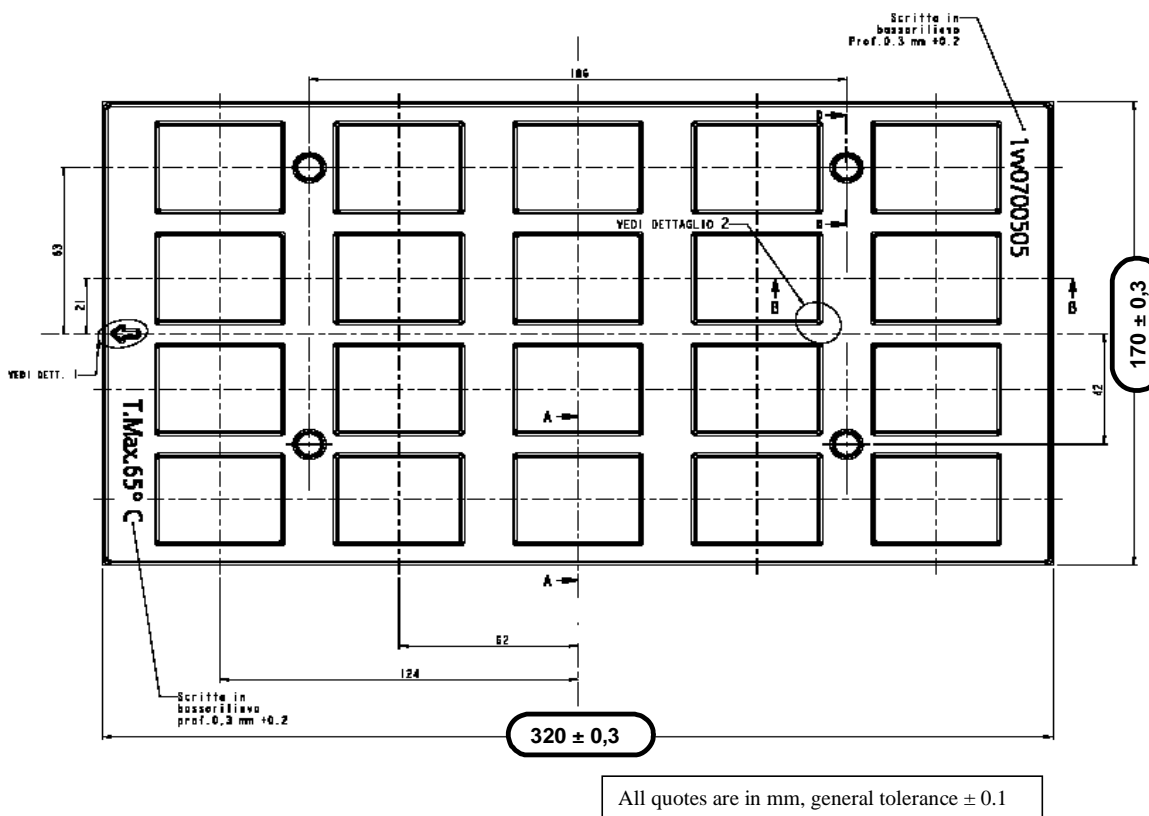
2.19 Mounting the GE863 on the Application Board

2.19.1 General

The [Telit GE863 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 consult Hardware User Guide.

2.19.2 Packing system

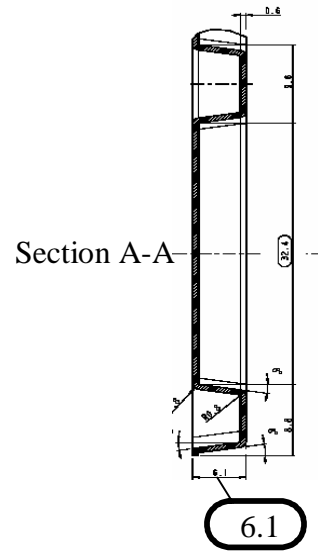
According to SMT processes for pick & place movement requirements, [Telit GE863 modules](#) are packaged on trays, each tray contains 20 pieces. Tray dimensions are:



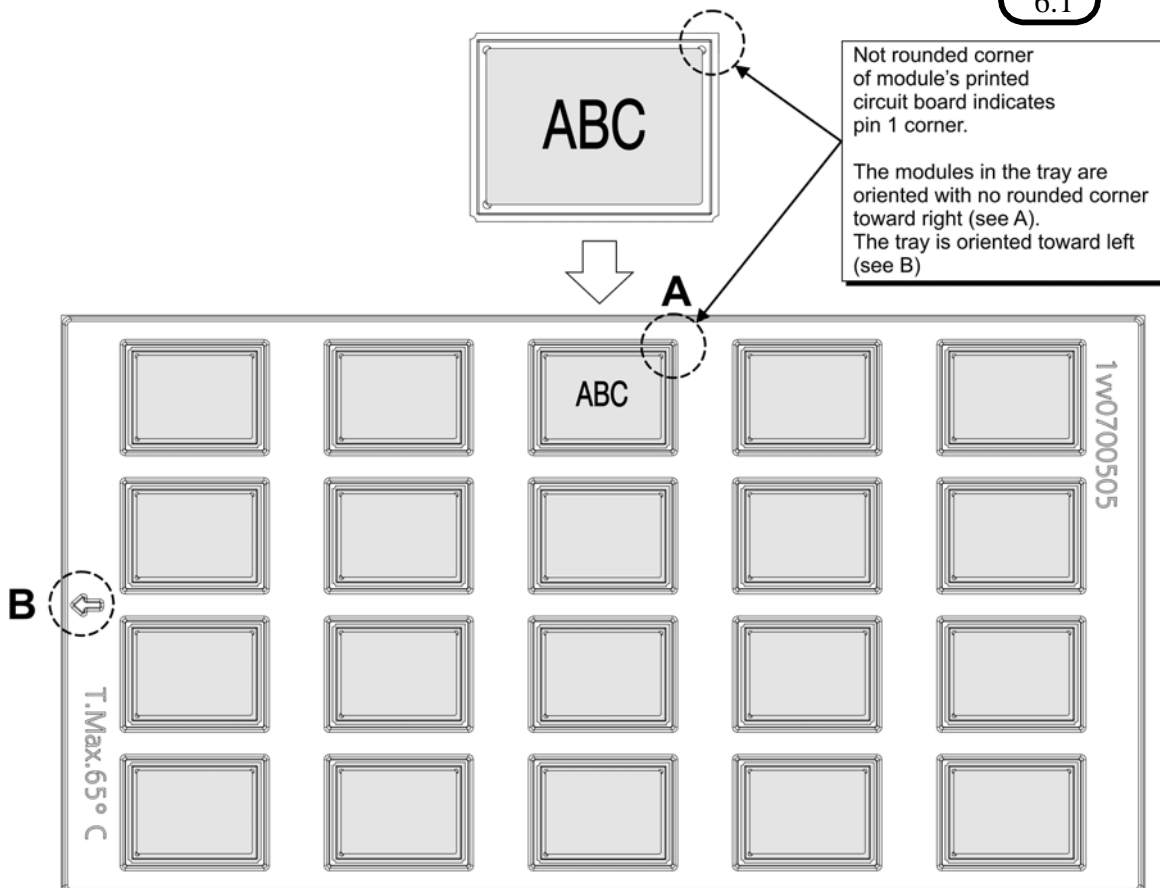
Note that trays can withstand a maximum temperature of 65° C.



GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09



Modules orientation on tray:



4.2 Multisocket

New functionality of the Telit modules, 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.

The basic idea of multisocket is the possibility of suspend a socket connection with the escape sequence +++.

With IP Easy we can use a SKTD to open a socket connection and go online. After online activities we use +++ sequence to close the connection (see the figure below).

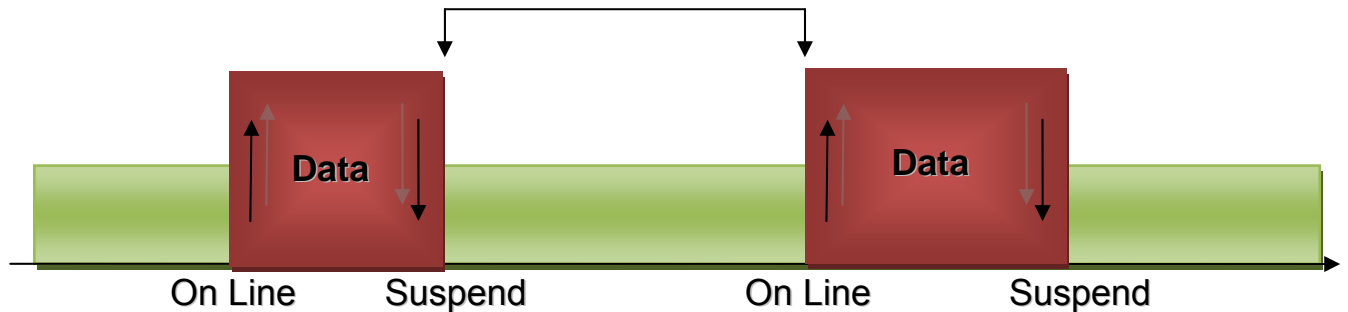


Where the green part represents the module command mode while the red part is the online mode.

Now, the online mode can be suspended with the escape sequence by using the multisocket feature. During suspend mode the data received by the socket will be buffered. These data will be displayed after socket resumption, as shown in the figure below:

Socket is still alive





This new feature allows the user to switch between online mode and command mode without closing the connection and eventually opening another socket (or resuming the suspended one) or FTP connection.

Another feature is the possibility to associate any socket connection to a specific context, this means that we can use different IP addresses for the connections (max 2). Socket identifier is called Connection Id (selects which socket we want to use from 1 up to 6) and every Connection Id is associated to a context.

For more detailed information please consult Easy GPRS User Guide.



4.4 CMUX

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

4.4.1 Product 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 fax/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.

4.4.2 Implementation feature and limitation

- 7.10 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.
- In case of GPS product one serial port can be dedicated to NMEA output.
- Every CMUX instance has its own independent flow control

NOTE: More details about the Multiplexer mode are available in the Cmux Product Specification

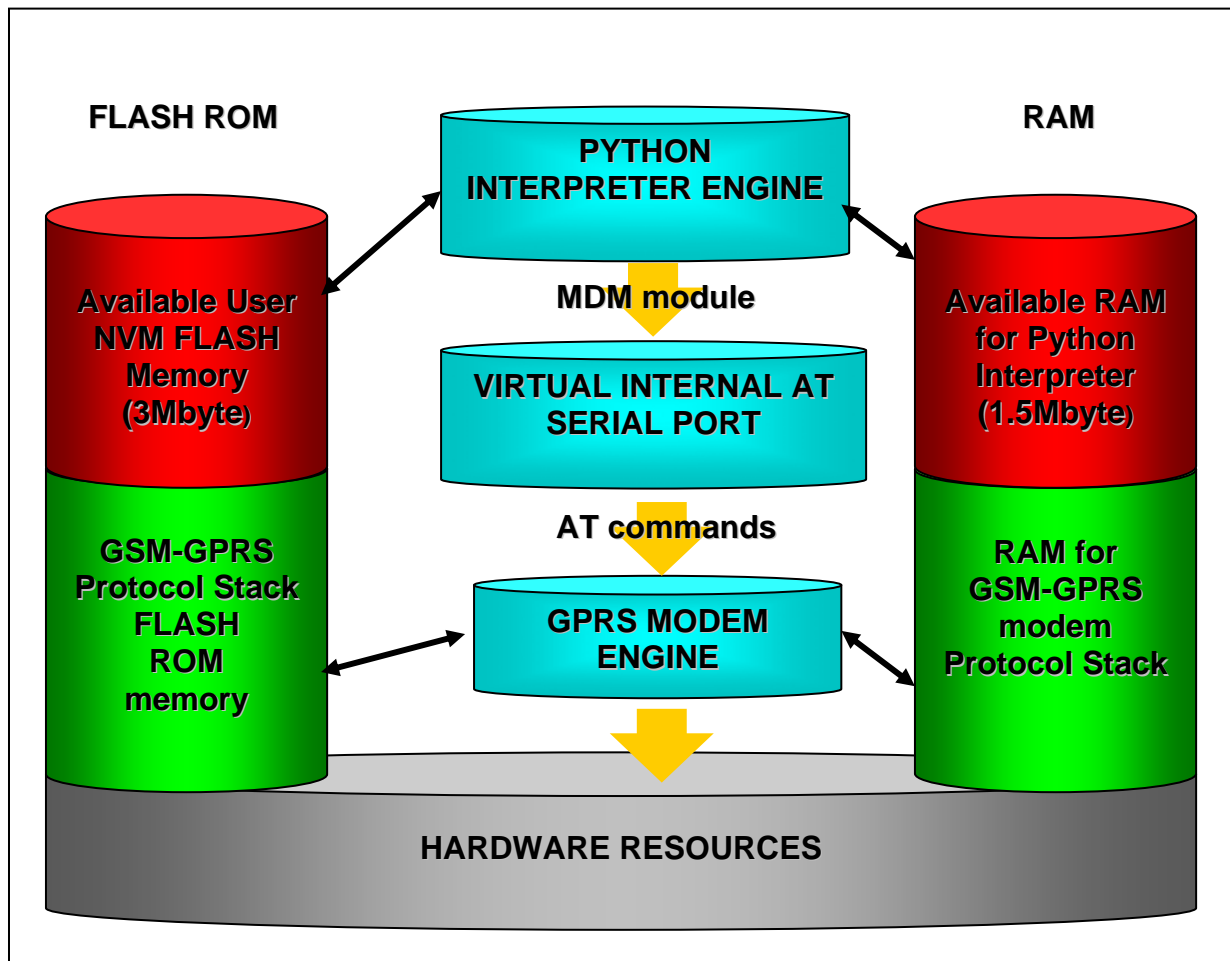
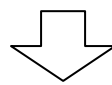


GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09

In order to eliminate this external controller, and further simplify the programming of the sequence of operations, inside the GE863-PY / GE863-GPS it is included:

- Python script interpreter engine v. 1.5.2+
- around 3MB of Non Volatile Memory room for the user scripts and data
- 1.2 MB RAM reserved for Python engine usage

A schematic of this approach is:



4.5.2 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.

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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.



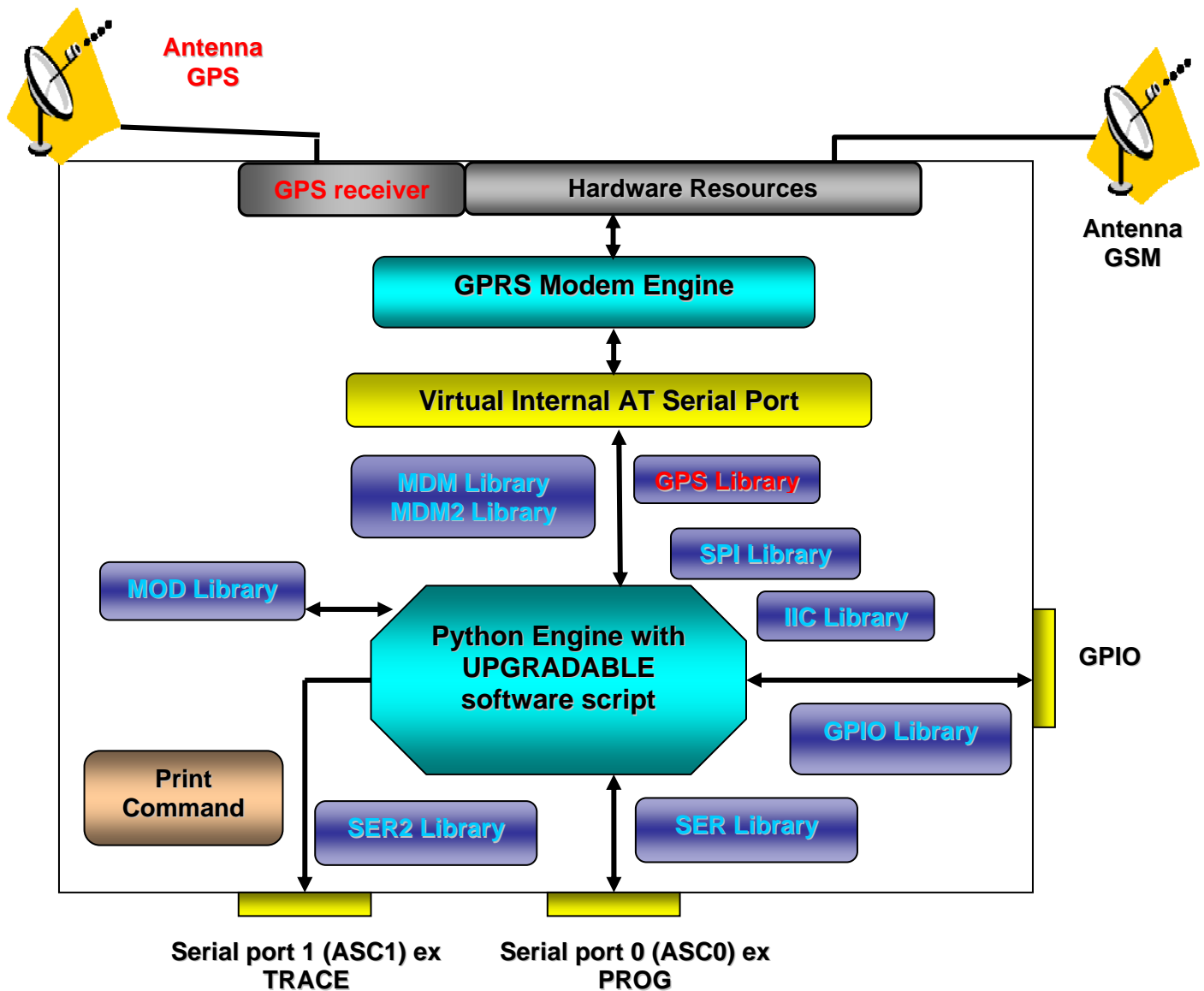
4.5.3 Python implementation description

Python scripts are text files stored in NVM inside the **Telit GE863-PY** and **GE863-GPS**. There's a file system inside the module that allows to write and read files with different names on one single level (no subdirectories are supported).

Attention: it is possible to run only one Python script at the time.

The Python script is executed in a task inside the **Telit module** at the lowest priority, making sure this does not interfere with GSM/GPRS normal operations. This allows serial ports, protocol stack etc. to run independently from the Python script.

The Python script interacts with the **Telit module** functionality through four build-in interfaces.



GE863 Product Description

80278ST10016a Rev. 13 - 20/03/09

NOTE: Antenna GPS, GPS receiver and GPS Library are available exclusively for GPS module **GE863-GPS**. Moreover SER2 Library can not be used by the GPS modules since their TRACE port is not available.

- **The MDM interface** is the most important one. It allows Python script to send AT commands, receive responses and unsolicited indications, send data to the network and receive data from the network during connections. It is quite the same as the usual serial port interface in the **Telit module**. The difference is that this interface is not a real serial port but just an internal software bridge between Python and mobile internal AT command handling engine. All AT commands working in the **Telit module** are working in this software interface as well. Some of them have no meaning on this interface, such as those regarding serial port settings. The usual concept of flow control keeps its meaning over this interface, but it's managed internally.
- **The MDM2 interface** is the second interface between Python and mobile internal AT command handling. It is used to send AT commands from Python script to mobile and receive AT responses from mobile to Python script when the classic MDM built-in module already in use.
- **The SER interface** allows Python script to read from and write to the *real* physical serial port ASC0, that is usually used to send the AT commands to the module, for example to read information from external device. When Python is running this serial port is free to be used by Python script because it is not used as AT command interface since the AT parser is mapped into the internal virtual serial port. No flow control is available from Python on this port.
- **The SER2 interface** allows Python script to read from and write to the *real* physical serial port ASC1, that is usually available for trace and debug.
- **The GPIO interface** allows Python script to handle general purpose input output faster than through AT commands, skipping the command parser and going directly to control the pins.
- **The MOD interface** is a collection of useful functions.
- **The IIC interface** is an implementation on the Python core of the IIC bus Master. It allows Python to create one or more IIC bus on the available GPIO pins.
- **The SPI interface** is an implementation on the Python core of the SPI bus Master. It allows Python to create one or more SPI bus on the available GPIO pins.
- **The GPS interface** is the interface between Python and mobile internal GPS controller. It is used in order to handle GPS controller without dedicated AT commands through MDM built-in module.

For the debug, the print command is directly forwarded on the EMMI TX pin (second serial port) at baud rate 115200bps 8N1.



4.5.4 Python core supported features

The Python core version is 1.5.2+ (string methods added to 1.5.2).
You can use all Python statements and almost all Python built-in types and functions.

Built-in types and functions not supported	Available modules (all others are not supported)
complex	marshal
float	imp
long	_main_
docstring	_builtin_
	sys
	md5



4.5.5 Python Build-in Custom Modules

Several build in custom modules have been included in the python core, specifically aimed at the hardware environment of the module.

The build in modules included are:

MDM	interface between Python and mobile internal AT command handling
MDM2	second interface between Python and mobile internal AT command handling
SER	interface between Python and mobile internal serial port ASC0 direct handling
SER2	interface between Python and mobile internal serial port ASC1 direct handling
GPIO	interface between Python and mobile internal general purpose input output direct handling
MOD	interface between Python and mobile miscellaneous functions
IIC	custom software Inter IC bus that can be mapped on creation over almost any GPIO pin available
SPI	custom software Serial Protocol Interface bus that can be mapped on creation over almost any GPIO pin available
GPS	interface between Python and mobile internal GPS controller

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

4.6 SAP: SIM Access Profile



4.6.1 Product architecture

The SAP feature allow 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.

4.6.2 Implementation feature

- SAP is based on 7.10 CMUX Basic Option used
- Only SAP Client features
- Logic HW flow control is recommended on the Virtual instance selected for the SAP command.

4.6.3 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 sent to the module.

The module satisfies 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



5 AT Commands

The [Telit GE863 modules](#) can be driven via the serial interface using the standard AT commands⁵.

The Telit GE863 modules are compliant with:

- Hayes standard AT command set, in order to maintain the compatibility with existing SW programs.
- ETSI GSM 07.07 specific AT command and GPRS specific commands.
- ETSI GSM 07.05 specific AT commands for SMS (Short Message Service) and CBS (Cell Broadcast Service)
- FAX Class 1 compatible commands

Moreover the [Telit GE863 modules](#) support also Telit proprietary AT commands for special purposes. For a detailed description of GE863 modules AT Commands refer to document AT Commands Reference Guide, code 80000ST10025a.

⁵ The AT is an ATTENTION command and is used as a prefix to other parameters in a string. The AT command combined with other parameters can be set up in the communications package or typed in manually as a command line instruction.



6 Conformity Assessment Issues

The **Telit GE863 modules** are assessed to be conform to the R&TTE Directive.

If the antenna connected to the module is conforming to the requirements specified under this document, it requires no further evaluation under **Article 3.2** of the R&TTE Directive and do not require further involvement of an 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 the 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.

The **Telit GE863 modules** are conforming 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 GE863 module 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

Furthermore the **Telit GE863 modules** are FCC Approved as module to be installed in other devices. These devices have 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 ID is required.

The **Telit GE863 modules** are conforming to the following US Directives:

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

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

- The 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 antenna(s) used for this module must not exceed 3 dBi for mobile and fixed or mobile operating configurations.



ZERTIFIKAT • CERTIFICATE • 認証証書 • СЕРТИФИКАТ • CERTIFICADO • CERTIFICAT



Certificate

This certificate is issued to

TELIT Communications S.p.A.

of

Via Stazione di Prosecco 5/B
34010 Sgonico
Trieste
Italy

to certify that the Equipment known as

GE863-GPS

as described in the Annex to this certificate conforms to the essential requirements of Directive 1999/5/EC of the European Parliament and European Council on the basis of Technical Construction File number 23133_GE863-GPS_rev1 in relation to the essential requirements of Articles 3.1(a), 3.1(b) & 3.2 of the Directive.

Signed:

On Behalf of BABT

Issue Date: 30 June 2006

Number: NC/12829 Issue: 01

This certificate is issued by BABT and represents a formal Notified Body opinion under Annex IV of Directive 1999/5/EC permitting the use of the BABT (C0168) mark on the equipment described above subject to the equipment meeting the compliance requirements of all applicable EU directives. This certificate is not transferable and remains the property of BABT.

British Approvals Board for Telecommunications • TÜV SÜD Group •
Ballin House • Churchfield Road • Walton-on-Thames • Surrey • KT12 2TD • United Kingdom



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Certificate

This certificate is issued to

TELIT Communications S.p.A.

of

Via Stazione di Prosecco 5/B
34010 Sgonico
Trieste
Italy

to certify that the Equipment known as

GE863-QUAD

as described in the Annex to this certificate conforms to the essential requirements of Directive 1999/5/EC of the European Parliament and European Council on the basis of Technical Construction File number 23133_GE863-QUAD_rev1 in relation to the essential requirements of Articles 3.1(a), 3.1(b) & 3.2 of the Directive.

Signed:


On Behalf of BABT

Issue Date: 27 July 2006


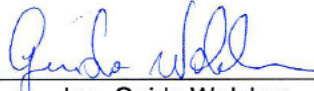
Number: NC/12868 Issue: 01

This certificate is issued by BABT and represents a formal Notified Body opinion under Annex IV of Directive 1999/5/EC permitting the use of the BABT CE0168 mark on the equipment described above subject to the equipment meeting the compliance requirements of all applicable EU directives. This certificate is not transferable and remains the property of BABT.

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6.3 GE863-PY: Conformity Assessment

	<h3>DECLARATION OF CONFORMITY</h3>
<p>We, Telit Communications S.p.A</p> <p>Of: Via Stazione di Prosecco, 5/b 34010 Sgonico (TRIESTE) ITALY</p>	
<p>declare under our sole responsibility that the product</p> <p>GE863-PY</p>	
<p>to which this declaration relates is in conformity with all the essential requirements of Directive 1999/05/EC</p>	
<p>The conformity with the essential requirements of the European Directive 1999/05/EC has been verified against the following harmonized standards:</p> <ul style="list-style-type: none"> • ETSI EN 301 511 v.9.0.2; • CENELEC EN 60950:2001; • ETSI EN 301 489-1: v.1.4.1; • ETSI EN 301 489-7: v.1.2.1. 	
<p>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:</p> <p>BABT, Balfour House, Churchfield Road, Walton-on-Thames, Surrey, KT12 2TD, United Kingdom</p>	
<p>Identification mark:</p>	<p>0168</p>
<p>The technical documentation relevant to the above equipment will be held at:</p> <p>Telit Communications S.p.A Via Stazione di Prosecco, 5/b 34010 Sgonico (TRIESTE) ITALY</p>	
<p>Trieste, 28 July 2006</p>	 <hr/> <p>Ing. Guido Walcher Quality Assurance Director</p>
<p>06DOC9 MOD.003 02/06 REV.9</p>	



ZERTIFIKAT • CERTIFICATE • 証書 • CERTIFICADO • CERTIFICAT



Certificate

This certificate is issued to

TELIT Communications S.p.A.

of

Via Stazione di Prosecco 5/B
34010 Sgonico
Trieste
Italy

to certify that the Equipment known as

GE863-PY

as described in the Annex to this certificate conforms to the essential requirements of Directive 1999/5/EC of the European Parliament and European Council on the basis of Technical Construction File number 23133_GE863-PY_rev1 in relation to the essential requirements of Articles 3.1(a), 3.1(b) & 3.2 of the Directive.

Signed:


On Behalf of BABT

Issue Date: 27 July 2006

Number: NC/12867 Issue: 01

This certificate is issued by BABT and represents a formal Notified Body opinion under Annex IV of Directive 1999/5/EC permitting the use of the BABT 0168 mark on the equipment described above subject to the equipment meeting the compliance requirements of all applicable EU directives. This certificate is not transferable and remains the property of BABT.

British Approvals Board for Telecommunications • TÜV SÜD Group •
Balfour House • Churchfield Road • Walton-on-Thames • Surrey • KT12 2TD • United Kingdom



6.5 GE863-QUAD/PY: FCC Equipment Authorization

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

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

MET Laboratories, Inc.
914 W. Patapsco Avenue
Baltimore, MD 21230-3432

Date of Grant: 07/17/2006
Application Dated: 07/17/2006

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

Attention: Andrea Fragiaco, Ing.

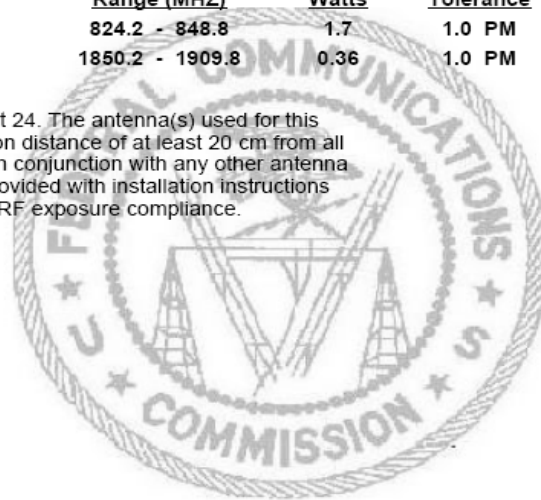
NOT TRANSFERABLE

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: RI7GE863L
Name of Grantee: Telit Communications S.p.A.
Equipment Class: PCS Licensed Transmitter
Notes: Quad-Band GSM/GPRS module - Type: GE863

<u>Grant Notes</u>	<u>FCC Rule Parts</u>	<u>Frequency Range (MHZ)</u>	<u>Output Watts</u>	<u>Frequency Tolerance</u>	<u>Emission Designator</u>
	22H	824.2 - 848.8	1.7	1.0 PM	290KGXW
	24E	1850.2 - 1909.8	0.36	1.0 PM	290KGXW

Power Output is ERP for Part 22 and EIRP for Part 24. 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. Installers and end-users must be provided with installation instructions and transmitter operating conditions for satisfying RF exposure compliance.



6.7 GE863-GPS : FCC Equipment Authorization

TCB

**GRANT OF EQUIPMENT
AUTHORIZATION**

TCB

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

MET Laboratories, Inc.
914 W. Patapsco Avenue
Baltimore, MD 21230-3432

Date of Grant: 07/13/2006
Application Dated: 07/13/2006

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

Attention: Andrea Fragiaco , Ing.

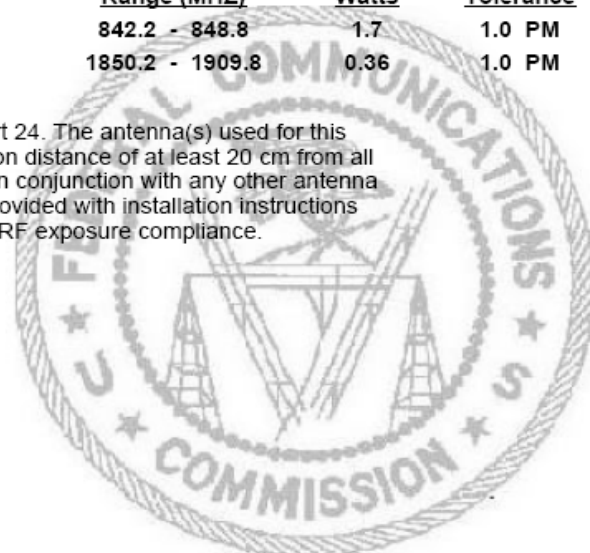
NOT TRANSFERABLE

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: RI7GE863G
Name of Grantee: Telit Communications S.p.A.
Equipment Class: PCS Licensed Transmitter
Notes: GSM 850/1900MHz Module

<u>Grant Notes</u>	<u>FCC Rule Parts</u>	<u>Frequency Range (MHZ)</u>	<u>Output Watts</u>	<u>Frequency Tolerance</u>	<u>Emission Designator</u>
	22H	842.2 - 848.8	1.7	1.0 PM	290KGXW
	24E	1850.2 - 1909.8	0.36	1.0 PM	290KGXW

Power Output is ERP for Part 22 and EIRP for Part 24. 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. Installers and end-users must be provided with installation instructions and transmitter operating conditions for satisfying RF exposure compliance.



8 GE863 Technical 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

Or use:

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

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.



10 Document Change Log

Revision	Date	Changes
ISSUE#0	18/04/05	Release First ISSUE
ISSUE #1	01/09/05	Company name, 2.16, 2.19, 6
ISSUE #2	12/11/05	Paragraphs reviewed: 1 Overview 2.3.1 Temperature range 2.6 Reference sensitivity 2.7.1 GSM Antenna 2.8 GPS Module features 2.8.1.1 GPS Sensitivity 2.8.1.2 GPS Consumption 2.12.9 Character management 2.12.12 Indication of network service availability 2.18.1 ADC Converter 2.18.2 DAC Converter 2.19 Board to Board interface of GE863 vs TRIZIUM pin 64, not TX monitor indicator while is on GPIO5 2.20.3 Recommended foot-print for the application 2.20.10 Packing system 4 AT Commands (FTP cmds, GPS cmds, #NITZ, #SKIPESC)
ISSUE#3	24/01/06	Added products order codes table on page 2
ISSUE#4	31/01/06	- Overview: changed the total A/D converters, that is different for the GPS model - Board to Board interface of GE863 vs TRIZIUM: RFTXMON on TRIZIUM added as per GE863 (pin 53) - Sn-Pb soldering profile added (GE863 with Pb balls) - Conformity Assessment Issues changed - Declaration of Conformity added - Notify Body Opinion added
ISSUE#5	04/05/06	Added RoHS certificate for GE863-QUAD and GE863-PY Reset signal: unconditionally reboot page 20
ISSUE#6	04/08/06	2.12.16DTMF Tones: changed minimum duration of DTMF Tone 2.19 Board to Board interface of GE863 vs TRIZIUM: Added NOTE after the pin table (page 31); added note for SIMVCC line (page 30) 2.20.5 Debug of the GE863 in production 2.13.1 Reset signal: unconditional shutdown for GE863-GPS 5.4 CMUX: new paragraph dedicated to the products with the following P/N: 3990250660, 3990250661 and 3990250662 5.4 SAP: new paragraph dedicated to the products with the following P/N: 3990250660, 3990250661 and 3990250662 6 AT Commands: updated AT command list (CMUX, SAP, GPS)



GE863 Product Description
80278ST10016a Rev. 13 - 20/03/09

		and others: see rows in yellow) and added columns for the new products 7.2 Declaration of conformity for GE863-GPS 7.5 Declaration of conformity for GE863-QUAD 7.6 Declaration of conformity for GE863-PY 7.9 GE863-GPS: RoHS certificate 7.10 GE863 : FCC Equipment Authorization 7.11 GE863 : IC Equipment Authorization 7.12 GE863-GPS : FCC Equipment Authorization 7.13 GE863-GPS : IC Equipment Authorization
ISSUE#7	29/01/07	2.12.13 SMS: added foot note 2.15 VAUX1 Power Output: added value for GE863-GPS 2.16 Audio levels specifications: updated microphone and speaker characteristics 2.19 Board to Board interface of GE863 vs TRIZIUM: changed description for RX_TRACE and TX_TRACE, updated info for pin PWRMON 6 AT Commands: updated AT command list (#E2SMSRI) 7.3 GE863-QUAD(p/n:3990250653 and 3990250664) / GE863-PY(p/n:3990250654 and 3990250665): FCC Equipment Authorization 7.4 GE863-QUAD(p/n:3990250653 / GE863-PY(p/n:3990250654): IC Equipment Authorization 7.11 GE863-QUAD/PY(3990250662/3990250661):RoHS certificate GE863 with Pb ballas removed form the document
ISSUE#8	28/06/07	Introduced new disclaimer Updated temperature range 2.12.12 Automatic Answer: modified Added Python's new features Added Multisocket paragraph Introduced new GPS low power
ISSUE#9	12/11/07	updated RoHS declaration
ISSUE#10	14/01/08	-Added CE mark -Removed notes regarding phased out models from the GE863 family (Please refer to the previous version of this document if you need information for the products with the following P/N: 3990250653 & 3990250654)
ISSUE#11	11/03/08	-Updated temperature specification
ISSUE#12	03/09/08	Updated applicability list Added GE863-SIM with P/N to applicability list Updated operating temperature range Updated operating voltage range Updated RoHS certification Added FOTA service description
ISSUE#3	20/03/09	Updated baudrate range in autobauding. Updated image of packaging system Added UCS2 and GSMDefault to supported character set. Updated current consumption in idle mode. Update firmware over the air updating service name.

