HE863 Family Product Description

Making machines talk.

APPLICABILITY TABLE

PRODUCT
HE863-EUG
HE863-EUR
HE863-EUD
HE863-AUG
HE863-AUR
HE863-AUD

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Such changes will, nevertheless be incorporated into new editions of this document.

Contents

1. Introduction

1.1. Scope

Scope of this document is to give an overview of the Telit HE863 family, which can be supported GSM/GPRS/EDGE and UMTS/HSPA with data/voice capabilities and optional GPS.

1.2. Audience

This document is intended for customers who are evaluating the HE863 family.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit 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 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 (sample):

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

"Chapter 2: "Overview" gives the information of product variants and the overview of the characteristics and features of the product.

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

"Chapter 4: "Evaluation Kit" provides a brief description of the Telit Evaluation Kit (EVK2) as far as these modules are concerned.

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

"Chapter 6: "AT Commands" provides the information of compliant.

"Chapter 7: "Conformity Assessment" provides some fundamental hints about the conformity assessment that the final application might need.

"Chapter 8: "Safety Recommendation" provides some safety recommendations that must be follow by the customer in the design of the application that makes use of the HE863 family.

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

- HE863 family Hardware User Guide, 1vv0300891

- HE863 Software User Guide, 1vv0300893

- HE863 AT Commands Reference Guide, xxx, 80377ST10083a

- Telit EVK2 User Guide, 1vv0300704

1.7. Document History

Revision	Date	Changes
0	2011-02-21	First issue

2. Overview

The new HE863 product family introduces the first low power consumption HSPA Ball-Grid-Array (BGA) module in the market incorporating a 2G/3G solution built on 65nm CMOS technology.

The HE863 family is small, lightweight, low power consumption 3G wireless module which combines the access to digital communication services in Quad band GSM/GPRS/ EDGE and Dual band UMTS/HSPA networks.

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

The HE863 is a quad-band GSM/GPRS/EDGE and dual-band HSPA module available in three main variants: EUx for EMEA/APAC region, NAx for Americas, AUx for Australian region (see §2.1 Product Variants).

The HE863 family includes features like EDGE Class 33, 3GPP protocol stack release 6 compliant, Circuit Switched Data Transfer, Phonebook, DARP/SAIC, SMS support and high speed data transfer up to 7.2Mbps in D/L (HSPA Cat.8) and up to 5.8Mbps in U/L (HSPA Cat. 6) with optional voice support.

Additional features such as integrated TCP/IP and UDP, three channels of ADC and one channel DAC provide extended functionality, adding value to the end application without additional cost.

Some variants of HE863 family are also provided with integrated high sensitivity stand-alone GPS receiver, with optional Assisted-GPS (A-GPS) functionality for indoor fixes and simultaneous GPS with voice and data.

As a part of Telit's corporate policy of environmental protection, all Telit products comply with the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU Directive 2002/95/EG)

NOTE:

Some of the performances of the Telit modules depend on S/W version installed on the module itself. The Telit modules S/W group is continuously working in order to add new features and improve the overall performances. The Telit modules are easily upgraded by the developer using the Telit Flash Programmer.

NOTE:

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

- Telit Evaluation Kit EVK2 to help you to develop your application;

- A website with all updated information available;

- An high level specialist technical support to assist you in your development;

2.1. Product variants

All HE863 variants are quad-band GSM/GPRS/EDGE and dual-band HSPA. The couple of HSPA band varies accordingly with the specific variant.

Several variants with different optional features and HSPA bands are available for each region:

Region	Product	Distinctive Features			
		HSPA Bands	Data	Voice	GPS
EUROPE	HE863-EUD	900/2100	√		
	HE863-EUR	900/2100	√	√	
	HE863-EUG	900/2100	√	√	√
AMERICAS	HE863-NAD	850/1900	√		
	HE863-NAG	850/1900	√	√	√
	HE863-NAR	850/1900	√	√	
AUSTRALIA	HE863-AUD	850/2100	√		
	HE863-AUR	850/2100	√	√	
	HE863-AUG	850/2100	√	√	√

2.2. Target Market

The HE863 family are designed and developed for the usage in applications such as:

- Telemetry and Telecontrol (SCADA applications)

- Telematics

- Security alarms

- Automated Meter Reading

- Vending machines

- POS terminals

- PDAs and Mobile Computing

- Phones and Payphones

- Location tracking and Fleet Management application with optional GPS

- Scalable applications sharing the same main board

2.3.   Features

- GSM/GPRS protocol stack 3GPP Release 6 compliant
- Control via AT commands according to 3GPP TS27.005, 27.007 and Telit customized AT commands
- Serial port multiplexer 3GPP TS27.010
- SIM application Tool Kits 3GPP TS 51.014
- Power consumption (typical values)
  - Power off: 60uA
  - idle (registered, power saving): <2 mA @ DRX=9
  - idle (registered, power saving): <2 mA @ DRX=512F
- Output power
  - -Class 4 (2W) @ 850 / 900 MHz, GSM
  - Class 1 (1W) @ 1800 / 1900 MHz, GSM
  - Class E2 (0.5W) @ 850/900 MHz, EDGE
  - Class E2 (0.4W) @ 1800/1900 MHz, EDGE
  - Class 3 (0.25W) @ 850/900/1700/1900/2100 MHz, WCDMA
- Sensitivity:
  - - 107 dBm (typ.) @ 850 / 900 MHz (GSM)
  - - 106 dBm (typ.) @ 1800 / 1900 MHz (GSM)
  - - 108 dBm (typ.) @ 850/900/1700/1800 / 1900 MHz (WCDMA)

Interfaces

- 22 general I/O ports maximum including multi-functional I/Os
- Buzzer output
- Status LED output
- 2 pairs of analog audio interface (Balanced type)
- PCM interface for Digital audio
- 3 A/D converters

- 1 D/A converter (PWM output)
- High Speed Serial Port, baud rate up to 6Mbps
- Reserved two wires CMOS UART for debugging
- USB 2.0 Hi-Speed, baud rate up to 480Mbps
- 1.8V/3V SIM interface

Audio

- Telephony, emergency call
- HR, FR, EFR, AMR for GSM and AMR for WCDMA voice codec
- DTMF

SMS

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

Data transmission

- HSPA: D/L up to 7.2Mbps, U/L up to 5.8Mbps
- EDGE:D/L up to 236.8kbps, U/L up to 118kbps
- GPRS: D/L up to 85.6kbps, U/L up to 42.8kbps
- Asynchronous non-transparent CSD up to 9.6kbps for GSM, 14.4kbps for WCDMA
- EDGE Class 33, MS class B
- Coding scheme 1 to 4 (GPRS) & Modulation Coding scheme 1 to 9 (EDGE)

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

- Local security management

- Call control & status indication

- SIM phonebook

- Character management (IRA, UCS2, GSM)

- SIM related functions [FDN, ADN, PIN]

- Real Time Clock

- Automatic answer

- Alarm management

- Embedded TCP/IP stack, including TCP, IP, UDP, and FTP protocols

2.4.   Approvals

- Fully type approved confirming with R&TTE directive
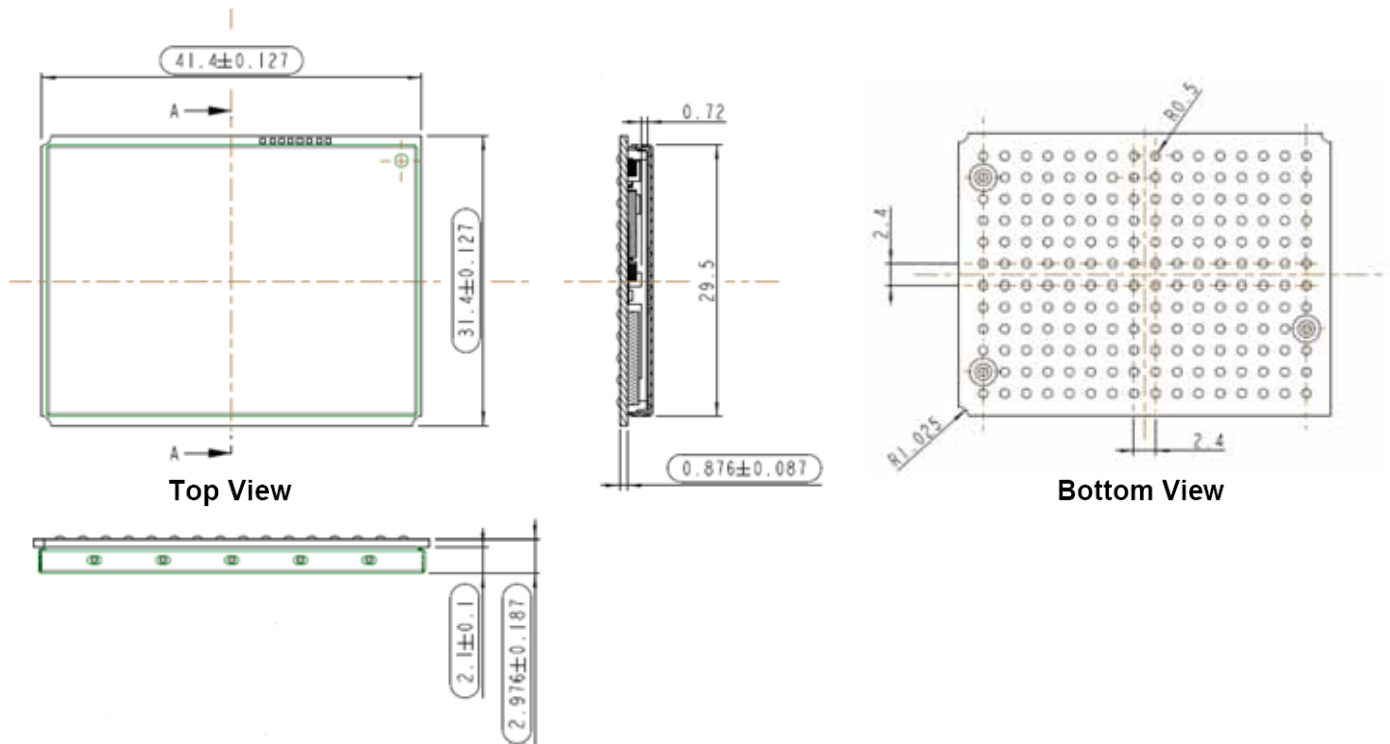- CE, GCF
- FCC, PTCRB,
- A-Tick
- RoHS (all versions)

3. General Product Description

3.1. Dimensions and 2D mechanical drawing

The overall dimensions of HE863 family are:

- Length: 41.4 mm
- Width: 31.4 mm
- Thickness: 3.0 mm

Top View   Bottom View

3.2. Weight

The module weight of HE863 family is about 9 gram.

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 ETSI specifications.
	–30°C ~ +85°C	The module is fully functional(*) in all the temperature range. Temperatures outside of the range –20°C ÷ +55°C might slightly deviate from ETSI specifications.
Storage and non operating Temperature Range	–40°C ~ +85°C	

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

3.3.2.   RoHS compliance

As a part of Telit corporate policy of environmental protection, the HE863 family complies with the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU directive 2002/95/EG).

3.4.   Operating Frequency

The operating frequencies in GSM850, EGSM900, DCS1800, PCS1900, WCDMA modes are confirm to the 3GPP and WCDMA specifications.

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX - RX offset
GSM850	824.2 ~ 848.8	869.2 ~ 893.8	128 ~ 251	45 MHz
EGSM900	890.0 ~ 914.8	935.0 ~ 959.8	0 ~ 124	45 MHz
	880.2 ~ 889.8	925.2 ~ 934.8	975 ~ 1023	45 MHz
DCS1800	1710.2 ~ 1784.8	1805.2 ~ 1879.8	512 ~ 885	95MHz
PCS1900	1850.2 ~ 1909.8	1930.2 ~ 1989.8	512 ~ 810	80MHz
WCDMA850	826.4 ~ 846.6	871.4 ~ 891.6	Tx: 4132 ~ 4233 Rx: 4357 ~ 4458	45MHz
WCDMA900	882.4 ~ 912.6	927.4 ~ 957.6	Tx: 2712 ~ 2863 Rx: 2937 ~ 3088	45MHz
WCDMA1900	1852.4 ~ 1907.6	1932.4 ~ 1987.6	Tx: 9262 ~ 9538 Rx: 9662 ~ 9938	80MHz
WCDMA2100	1922.4 ~ 1977.6	2112.4 ~ 2167.6	Tx: 9612 ~ 9888 Rx: 10562 ~ 10838	190MHz

3.5.   Transmitter output power

The HE863 family transceiver output of GSM/GPRS mode in 850/900MHz bands are class 4 in accordance with the specifications which determine the nominal 2W peak RF power (+33dBm) on 50ohm. In the 1800/1900MHz bands are class 1 in accordance with the specification which determines the nominal 1W peak RF power (+30dBm) on 50ohm.

The HE863 family transceiver output of EDGE mode in 850/900MHz bands are class E2 in accordance with the specifications which determine the nominal 0.5W peak RF power (+27dBm) on 50ohm. In the 1800/1900MHz bands are class E2 in accordance with the specification which determine the nominal 0.4W peak RF power (+26dBm) on 50ohm.

The HE863 family transceiver output of WCDMA mode in 850/900/AWS1700/1900/2100MHz bands is class 3 in accordance with the specifications which determine the nominal 0.25W peak RF power (+24dBm) on 50ohm.

3.6.   Reference sensitivity

The receiver sensitivity of HE863 family of GSM/GPRS/EDGE mode in 800/900MHz bands is better than -107dBm (2.4% BER Class II – static channel) at normal operating condition.

The receiver sensitivity of HE863 family of GSM/GPRS/EDGE mode in 1800/1900MHz bands is better than -106dBm (2.4% BER Class II – static channel) at normal operating condition.

The receiver sensitivity of HE863 family of WCDMA mode in 850/900/1900/2100MHz bands is better than -108dBm (0.1% BER – static channel) at normal operating condition.

3.7.   Antenna

3.7.1.   Frequency band of GSM/WCDMA antenna

The antenna that the customer chooses 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	70MHz in GSM/WCDMA 850MHz band, 80MHz in GSM/WCDMA 900MHz band, 170MHz in DCS1800, 140MHz in GSM/WCDMA 1900MHz band, 250MHz in WCDMA 2100MHz band and 445MHz

	in WCDMA AWS band.

For further information, please refer to the HE863 family Hardware User Guide.

3.7.2. Frequency band of GPS antenna (for HE863-xxG variant only)

The GPS antenna should be an active antenna which is fulfilled the following requirements.

Frequency range	1575.42MHz (GPS L1 band)
Bandwidth	+/- 2MHz

The supply voltage to the active GPS antenna is provided by the module, HE863-xxG. For further information, please refer to the HE863 family 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	3.8V
Operating Voltage Range	3.4 ~ 4.2V

CAUTION:

The operating voltage should not be exceeded; Special care must be taken in order to fulfill min/max supply voltage requirement.

3.9. Power consumption

The current consumption of HE863 family is:

Power off current (Typical)	60 uA
Standby current at GSM Idle state	<2 mA @DRX=9
Standby current at WCDMA Idle state	<2 mA @ DRX=512F

For further information, please refer to the HE863 family Hardware User Guide.

3.10. Logic level

Where not specifically stated, the most of interface circuits work at 1.8V CMOS logic levels. To get more detailed information about the logic level specifications used for HE863 family, please refer to the HE863 family Hardware User Guide.

3.11. Input and Outputs

3.11.1. General Purpose I/Os

22 pins of general purpose I/Os can be configured by AT command in three different ways as input, output and alternative function.

The GPIOs listed below can be configured as an alternative function as well.

- TGPIO_06 : Alarm output

3.11.2. Indication of Network Service Availability (STAT_LED)

The STAT_LED indicates the network service availability and call connection status. This function usually needs an external circuit for LED driving.

3.11.3. Power on monitor (PWR_MON)

The PWR_MON indicates the status of the module running properly.

3.11.4. Power on/off control (ON_OFF)

External power on/off control input. Refer to the HE863 family Hardware User Guide for more details of Power on timing.

3.12. Auxiliary power output for accessory (VAUX1)

A regulated 1.8V, 100mA (max) power output is provided for an external device.

3.13. SIM Reader

The HE863 family supports R5 and R99 3GPP TS 31.114 – USIM 1.8V and 3V ONLY with an external SIM socket. For 5V SIM operation, an external level translator needs to be added. Refer to the HE863 family Hardware User Guide.

3.14. Converters

The HE863 family has 1 DAC and 3 ADCs.

3.15. Audio Interface

The HE863-xxG and HE863-xxR family support for both analog and digital audio interfaces (This is feature is not available for HE863-xxD variant)

- 2 pairs of balanced analog audio
- PCM interface for digital audio interface

3.16. Serial ports

Two serial ports are available.

- Full RS232-C, with baud rate up to 6Mbps
- Simplified serial port (RX/TX only) for debugging

3.17. USB port

The USB2.0 High speed supports data speed up to 480Mbps.

3.18. User Interface

The user interface is managed by AT commands according to ITU-T V.250, 3GPP 27.007 and 27.005 specifications. Please refer to the HE863 AT command User Guide for complete details.

3.19. Features

3.19.1. Speech Coding

The HE863-xxG and HE863-xxR family support the following voice codecs (Not available for HE863-xxD variants):

- Adaptive Multi Rate for WCDMA
- Half Rate, Full Rate, Enhanced Full Rate, Adaptive Multi Rate for GSM

3.19.2. SMS

The HE863 family supports the following SMS types:

- Mobile Terminated (MT) class 0 ~ 3 with signaling of new incoming SMS, SIM full, SMS read
- Mobile Originated class (MO) 0 ~ 3 with writing, saving in SIM and sending

3.19.3. Real Time Clock and Alarm

The HE863 family 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 output of the RTC power supply is provided to external so that a backup capacitor can be added to increase the RTC autonomy.

3.19.4. Data Transmission capabilities

The HE863 family supports:

- HSPA: D/L up to 7.2Mbps, U/L up to 5.8Mbps

- UMTS: D/L up to 384Kbps, U/L up to 384Kbps

- EDGE: D/L up to 236.8Kbps, U/L up to 118Kbps

- GPRS: D/L up to 85.6Kbps, U/L up to 42.8Kbps

- Asynchronous non transparent CSD up to 9.6kbps for GSM, 14.4kbps for WCDMA

- GPRS/EDGE Class 33, MS class B

3.19.5. Local security management

The local security management can be done with the lock of Universal Subscriber Identity Module (USIM), and the security code will be requested at power-up.

3.19.6. Call control

The calling cost control function is supported.

3.19.7. Phonebook

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

3.19.8. Characters management

The HE863 family support the following character sets:

- IRA (International Reference Alphabet), in TEXT and PDU mode.
- UCS – 16-bits universal multiple-octet coded character set (ISO/IEC10646)

3.19.9. SIM related functions

Activation and deactivation of the numbers stored in phone book FDN (Fixed Dialing Numbers), ADN (Abbreviated Dialing Number) and PIN insertion are supported. Extension at the PIN2 for the PUK2 insertion capability for lock condition is supported too.

3.19.10. Call status indication

The call status indication is supported by AT commands.

3.19.11. Automatic answer

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

3.19.12. Supplementary services

The following supplementary services are supported for HE863-xxG and HE863-xxR family:

- 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)

3.19.13. Acoustic signaling

The acoustic signaling of the HE863-xxG and HE863-xxR family on the selected acoustic device are the following:

- Call waiting tone
- Ring back tone
- SMS received tone
- Busy tone
- Power on/off tone
- Congestion tone
- Call drop indication tone
- No service indication tone
- Alarm/warning tone

3.20. Mounting the modules on your board

The modules have 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 refer to the respective Hardware User Guide.

3.21. Packing system

According to SMT process, for picking & placing movement requirements, HE863 family is packaged on trays. Each tray contains 20 pieces in size of 170 x 320.

The level of moisture sensibility of HE863 family is "3", according with standard IPC/JEDEC J-STD-020, take care of all the relative requirements for using this kind of components. Special care for handling is highly required.

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 HE863 family 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 family 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 respective Hardware User Guide and EVK2 User Manual.

5.   AT Commands

The HE863 family can be driven via the serial and USB interface using the standard AT commands.

The modules are compliant with:
1. Hayes standard AT command set, in order to maintain the compatibility with existing S/W programs.
2. 3GPP TS 27.007 specific AT command and WCDMA/GPRS specific commands.
3. 3GPP TS 27.005 specific AT commands for SMS (Short Message Service) and CBS (Cell Broadcast Service)

Moreover, the modules support also Telit proprietary AT commands for special purposes.

For more information about the AT commands supported by the modules, please refer to the AT Commands Reference Guide.

6.   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 WCDMA/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/sectors/rtte/documents/

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/sectors/electrical/

7.   List of acronyms

3GPP	3rd Generation Partnership Project
ADC	Analog to Digital Converter
ADN	Abbreviated Dialing Number
A-GPS	Assisted GPS
AMR	Adaptive Multi Rate
AT	Attention Commands
AWS	Advanced Wireless Services
BER	Bit Error Rate
BGA	Ball Grid Array
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CMOS	Complementary Metal-Oxide Semiconductor
CSD	Circuit Switched Data
DAC	Digital to Analog Converter
DARP	Downlink Advanced Receiver Performance
DTMF	Dual Tone Multi Frequency
FDN	Fixed Dialing Number
FTP	File Transfer Protocol
GSM	Global System for Mobile communication
GPRS	General Packet Radio Service
GPS	Global Positioning System
HSPA	High Speed Packet Access
HSUPA	High Speed Uplink Packet Access
H/W	Hardware
LED	Light Emitting Diode
MO	Mobile Originated

MT	Mobile Terminated
OEM	Other Equipment Manufacturer
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PDA	Personal Digital Assistant
PDU	Protocol Data Unit
PIN	Personal Identification Number
POS	Point Of Sales
PWM	Pulse Width Modulation
RF	Radio Frequency
RoHS	Restriction of Hazardous Substances
RTC	Real Time Clock
SAIC	Single Antenna Interface Cancellation
SIM	Subscriber Identity Module
SMD	Surface Mounted Device
SMS	Short Message Service
S/W	Software
TBD	To Be Determined
TCP/IP	Transmission Control Protocol/Internet Protocol
TTSC	Telit Technical Support Center
UART	Universal Asynchronous Receiver and Transmitter
USB	Universal Serial Bus
USIM	Universal Subscriber Identity Module
WCDMA	Wideband Code Division Multiple Access