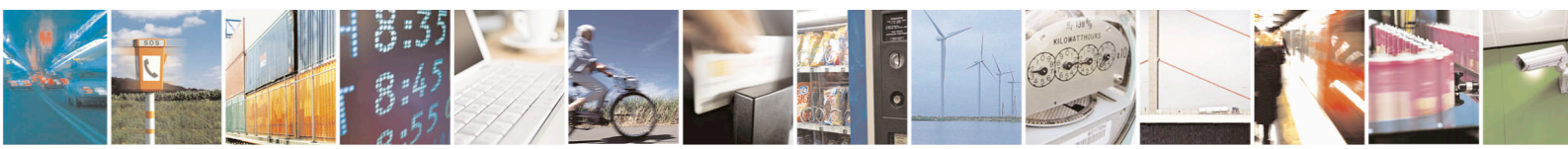
UE910 Family Product Description

80412ST10117A Rev.1 – 2013-03-21

Making machines talk.

APPLICABILITY TABLE

PRODUCT
UE910-EUR
UE910-EUD
UE910-NAR
UE910-NAD



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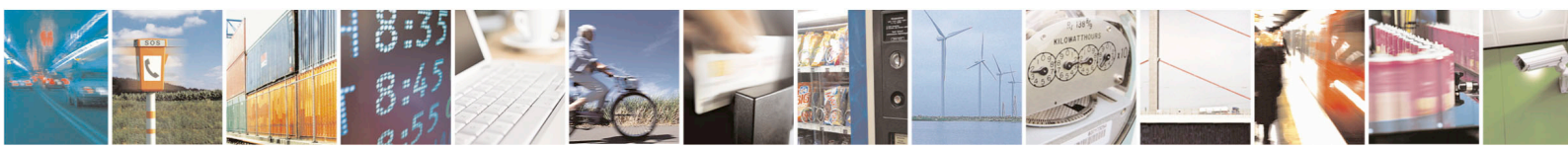

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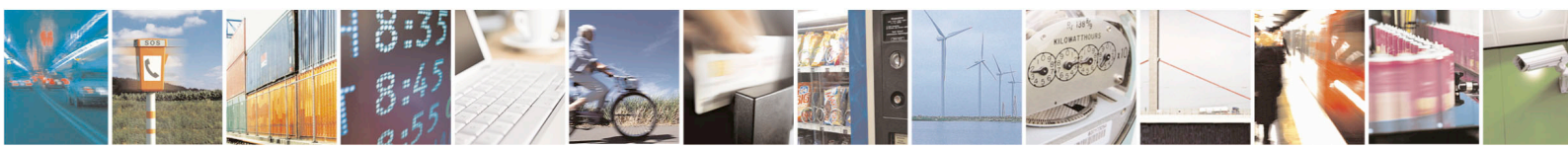
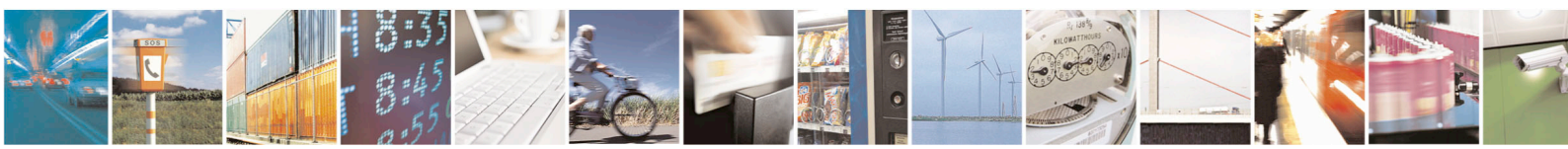




1. Introduction

1.1. Scope

Scope of this document is to give an overview of the Telit UE910 family, which can support GSM/GPRS/EDGE and WCDMA/HSPA with data/voice capabilities.

1.2. Audience

This document is intended for customers who are evaluating the UE910 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

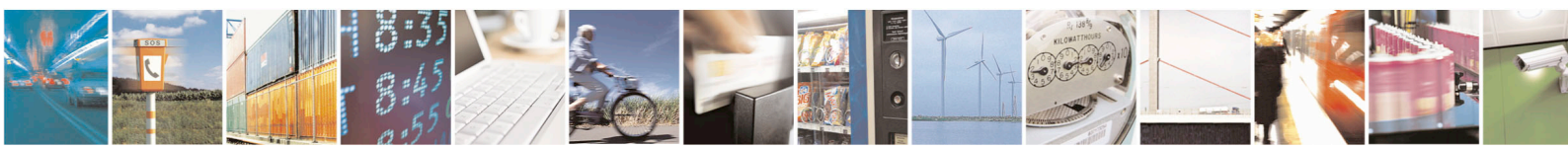
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

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. 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.

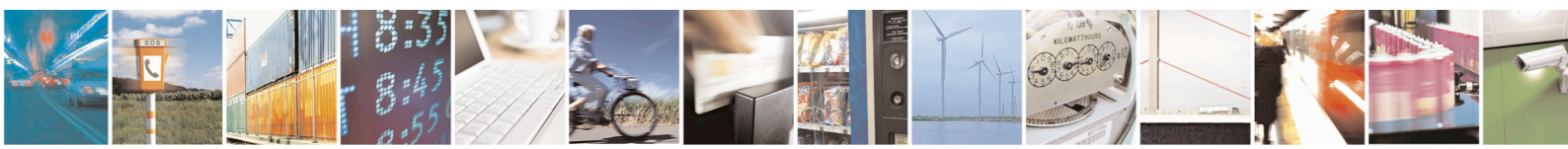
All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

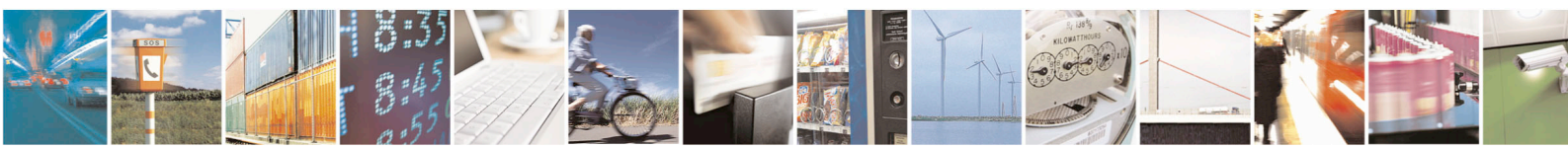
1.5. Related Documents

- UE910 family Hardware User Guide, 1VV0301012
- Telit Modules Software User Guide, 1VV0300784
- Telit IP Easy User Guide, 80000ST10028A
- HE Family Ports Arrangements, 1VV0300971
- HE910 Digital Voice Interface Application Note, 80000NT10050A
- SPI Port Application Note, 80000NT10053A
- SIM Holder Design Guides, 80000NT10001a
- Telit EVK2 User Guide, 1vv0300704

1.6. Document History

Revision	Date	Changes
0	2012-09-17	First issue
1	2013-03-21	Updated product features





2. Overview

The UE910 product family complete the offering of products based on HSPA technology. It includes low cost 3.5G modules, dual-band, designed on the xE910 LGA unified form factor. The UE910 offers "voice capable" variants, featuring both analog or digital audio, and data-only variants.

In addition to pin-to-pin compatibility, also the AT command interface is fully compatible with the companion HE910 module.

It features an internal codec that gives customers the choice between digital or analog voice. Moreover an embedded SIM-chip is also available as mounting option.

It is ideal for low cost application that do not require a global coverage and, due to the great variety of features within the xE910 family, it allows customers to tailor their choice according the specific needs of their application: design once and deploy globally.

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)

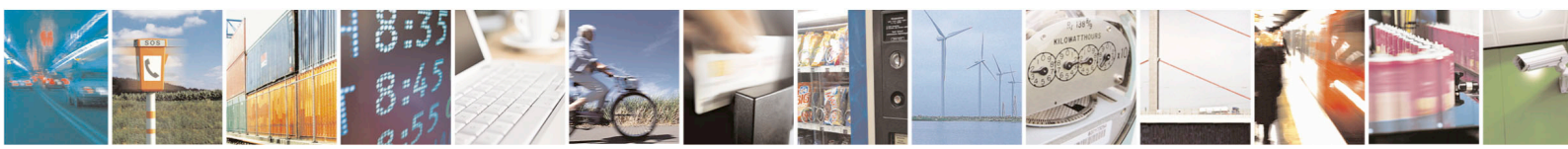
NOTE:

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 UE910 variants are dual-band GSM/GPRS/EDGE and dual band UMTS/HSPA

Variant name	Upload	Download	Frequencies		Features	
	HSUPA (Mbps)	HSDPA (Mbps)	UMTS|HSPA+ bands (MHz)	GSM | GPRS | EDGE bands (MHz)	Data	Voice
EMEA / APAC / Latin America markets						
UE910-EUR	5.76	7.2	900/2100	900/1800	■	■
UE910-EUD	5.76	7.2	900/2100	900/1800	■	
North America market						
UE910-NAR	5.76	7.2	850/1900	850/1900	■	■
UE910-NAD	5.76	7.2	850/1900	850/1900	■	

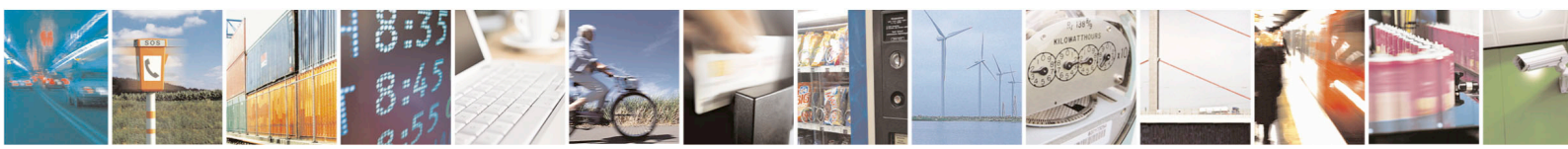
2.2. Target Market

The UE910 family is designed and developed for applications such as:

- Telemetry
- Telematics
- Security alarms
- AMR (automated meter reading)
- Low-cost 3G applications
- High-bandwidth applications
- Regional markets

2.3. Features

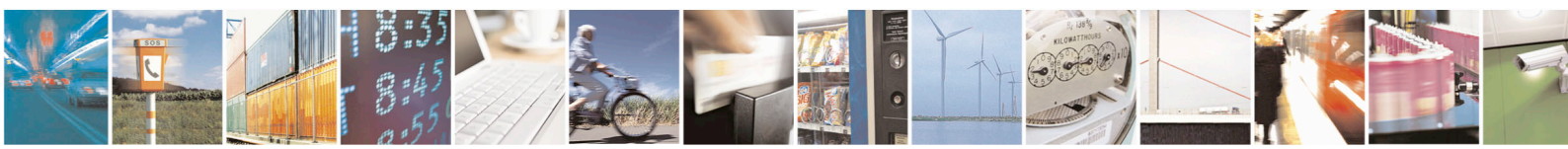
- Advanced E-GPRS/WCDMA/HSDPA/HSUPA Software protocol stack (Layer 1 to 3) – Version: 3GPP Release 7
- GSM Quad band (900/1800 MHz for EUx, 850/1900 MHz for NAx)
- WCDMA dual-band: B1&B8 for the EUx models and B2&B5 for the NAx models
- HSDPA up 7.2Mbps
- HSUPA up to 5.76Mbps
- WCDMA up to 384kbps downlink/uplink
- DTM (Dual Transfer Mode)



- CPC (DRX/DTX) (Continuous Packet Connectivity)
- DARP
- 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)
  - Stand-by current 2G, DRX5, 1.1 mA
  - Stand-by current 3G, DRX7, 1.2 mA
- 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) @ 850/900/1900/2100 MHz, WCDMA
- Sensitivity:
  - - 109 dBm (typ.) @ 850 / 900 MHz (GSM)
  - - 110 dBm (typ.) @ 1800 / 1900 MHz (GSM)
  - - 111 dBm (typ.) @ 850/900/1900 / 2100 MHz (WCDMA)

Interfaces

- 10 general I/O ports maximum including multi-functional I/Os
- I2S for digital audio interface
- Analog audio (balanced)
- USB 2.0 HS
- 1 UART
- 1 Auxiliary serial port (RX/TX only)
- SPI
- 1 I2C
- 1.8V/3V SIM interface



Audio

- Telephony, emergency call
- HR, FR, EFR, AMR for GSM and AMR for WCDMA voice codec
- Spatial Noise Suppression
- Multiple audio profiles pre-programmed and fully configurable
- DTMF

SMS

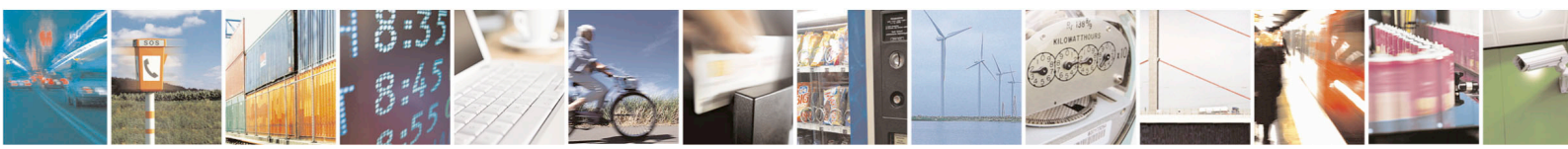
- Point to point mobile originated and mobile terminated SMS
- Concatenated SMS supported
- SMS cell broadcast
- Text and PDU mode
- SMS over GPRS

Data transmission

- HSPA: category 8 in downlink e category 6 in uplink
  - DL up to 7.2Mbps
  - UL up to 5.76Mbps
- WCDMA: up to 384kbps downlink/uplink
- Asynchronous non-transparent CSD up to 9.6kbps
- GPRS class 10 for NAx variants and class 33 for EUX variants
- EDGE class 10 for NAx variants and class 33 for EUX variants
- 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]



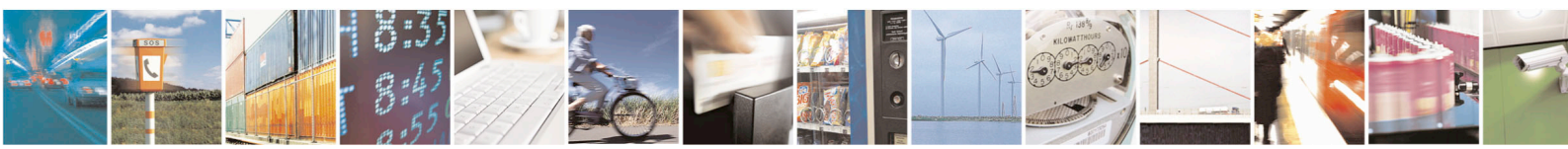
- Unstructured supplementary services mobile originated data [USSD]
- Closed user group

Additional features

- SIM phonebook
- Fixed Dialling Number (FDN)
- Call control & status indication
- SIM phonebook
- Character management (IRA, UCS2, GSM)
- USIM 3GPP Rel.7
- Real Time Clock
- Automatic answer
- Alarm management
- Embedded TCP/IP stack, including TCP, IP, UDP, and FTP protocols
- CSD for Video Telephony support

2.4. Approvals

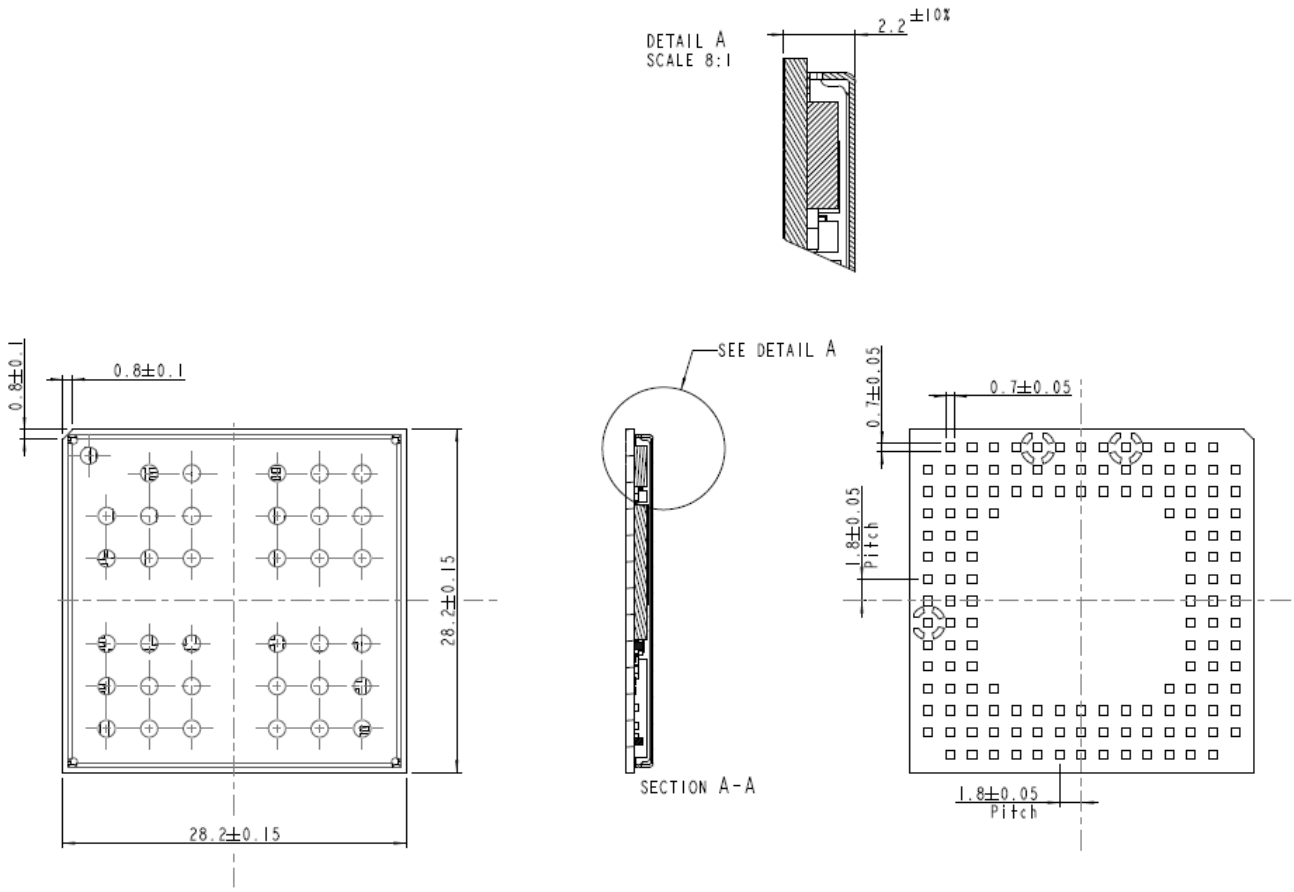
- Fully type approved confirming with R&TTE directive
- CE, GCF
- FCC, IC, PTCRB,
- RoHS (all versions)



3. General Product Description

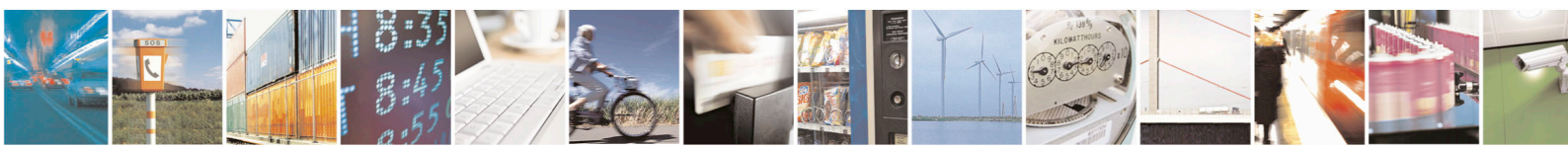
3.1. Dimensions and 2D mechanical drawing

UE910 has a Land-Grid-Array (LGA) package, with 144 pads.



The overall dimensions of UE910 family are:

- Length: 28.2 mm
- Width: 28.2mm
- Thickness: 2.2 mm



3.2. Weight

The module weight of UE910 family is about 10 grams.

3.3. Environmental requirements

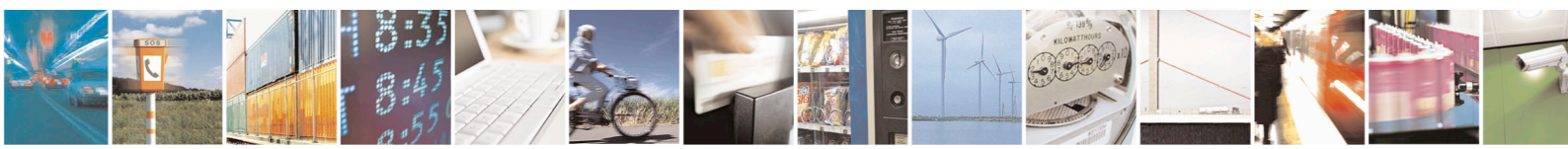
3.3.1. Temperature range

		Note
Operating Temperature Range	–20°C ~ +55°C	The module is fully functional(*) in all the temperature range, and it fully meets the 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

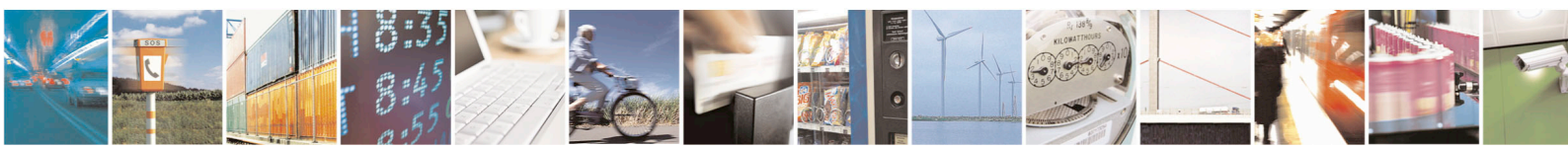
As a part of Telit corporate policy of environmental protection, the UE910 family complies with the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU directive 2002/95/EG).



3.4. Operating Frequency

The operating frequencies in GSM850, EGSM900, DCS1800, PCS1900, WCDMA modes are compliant 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 (band V)	826.4 ~ 846.6	871.4 ~ 891.6	Tx: 4132 ~ 4233 Rx: 4357 ~ 4458	45MHz
WCDMA900 (band VIII)	882.4 ~ 912.6	927.4 ~ 957.6	Tx: 2712 ~ 2863 Rx: 2937 ~ 3088	45MHz
WCDMA1900 (band II)	1852.4 ~ 1907.6	1932.4 ~ 1987.6	Tx: 9262 ~ 9538 Rx: 9662 ~ 9938	80MHz
WCDMA2100 (Band I)	1922.4 ~ 1977.6	2112.4 ~ 2167.6	Tx: 9612 ~ 9888 Rx: 10562 ~ 10838	190MHz



3.5. Transmitter output power

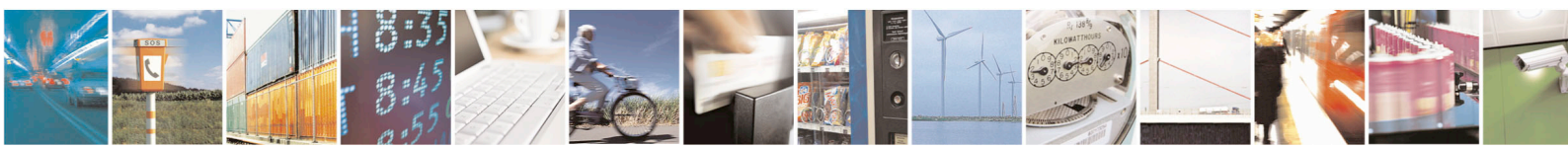
The UE910 family transceiver output of GSM/GPRS mode in 850/900MHz bands are class 4 in accordance with the specifications which determine the nominal 2W peak RF power (+33dBm) on 50ohm. In the 1800/1900MHz bands are class 1 in accordance with the specification which determines the nominal 1W peak RF power (+30dBm) on 50ohm.

The UE910 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 UE910 family transceiver output of WCDMA mode in 850/900/1900/2100MHz bands is class 3 in accordance with the specifications which determine the nominal 0.25W peak RF power (+24dBm) on 50ohm.

3.6. Sensitivity

Band	Typical	Note
GSM 850	-109.5 dBm	BER Class II <2.44%
GSM 900	-109 dBm	BER Class II <2.44%
DCS1800	-110 dBm	BER Class II <2.44%
PCS 1900	-109.5 dBm	BER Class II <2.44%
WCDMA FDD B1	-111 dBm	BER <0.1%
WCDMA FDD B2	-110 dBm	BER <0.1%
WCDMA FDD B5	-111 dBm	BER <0.1%
WCDMA FDD B8	-110 dBm	BER <0.1%



3.7. Antenna

3.7.1. Frequency band of GSM/WCDMA antenna

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

ANTENNA 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 (GSM/EDGE)	70 MHz in GSM850, 80 MHz in GSM900, 170 MHz in DCS & 140 MHz PCS band
Bandwidth (WCDMA)	70 MHz in WCDMA Band V 80 MHz in WCDMA Band VIII 140 MHz in WCDMA Band II 250 MHz in WCDMA Band I
Gain	1.4dBi @900 and 3dBi @1800 1.4dBi @850 and 3dBi @1900 1.43 dBi (WCDMA)
Impedance	50 ohm
Input power	> 33dBm(2 W) peak power in GSM > 24dBm Average power in WCDMA
VSWR absolute max	≤ 5:1 (limit to avoid permanent damage)
VSWR recommended	≤ 2:1 (limit to fulfil all regulatory requirements)

For further information, please refer to the UE910 family Hardware User Guide.

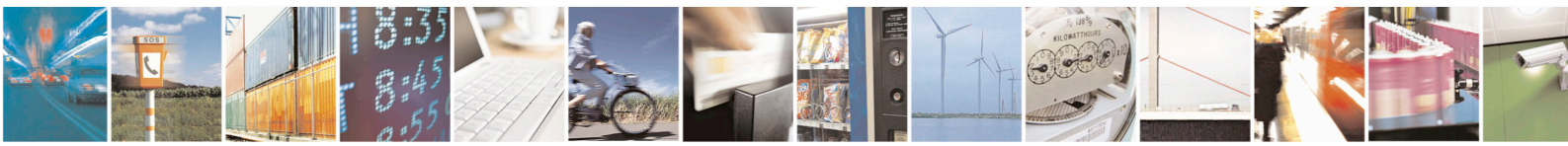
3.8. Supply voltage

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
Extended Operating Voltage Range	3.1 ~ 4.5V

CAUTION:

The operating voltage MUST not be exceeded; Special care must be taken when designing the application's power supply section to avoid an excessive voltage drop. If the voltage drop is exceeding the limits it could cause a Power Off of the module.



3.9. Power consumption

The UE910 power consumptions are described in the following table

UE910		
Mode	**Average (mA)**	**Mode description**
SWITCHED OFF		Module supplied but Switched Off
Switched Off	40uA	
IDLE mode (WCDMA)		
AT+CFUN=5	1.2	Disabled TX and RX; DRX7
IDLE mode (GSM/EDGE)		
AT+CFUN=1	19	Normal mode: full functionality of the module
AT+CFUN=4	16.5	Disabled TX and RX; module is not registered on the network
AT+CFUN=5	0.8	Disabled TX and RX; DRX9 (1.1mA in case of DRX5)
Operative mode (WCDMA)		
WCDMA Voice	152	WCDMA voice call (TX = 10dBm)
WCDMA HSDPA (0dBm)	TBD	WCDMA data call (Cat 8, TX = 0dBm)
WCDMA HSDPA (22dBm)	TBD	WCDMA data call (Cat 8, TX = 22dBm)
Operative mode (EDGE)		
EDGE 4TX+2RX		EDGE Sending data mode
GSM900 PL5	495	
DCS1800 PL0	484	
Operative mode (GSM)		
CSD TX and RX mode		GSM VOICE CALL
GSM900 CSD PL5	220	
DCS1800 CSD PL0	167	
GPRS 4TX+2RX		GPRS Sending data mode
GSM900 PL5	580	
DCS1800 PL0	438	

Depending on network configuration and not under module control

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 UE910 family, please refer to the UE910 family Hardware User Guide.

3.11. Input and Outputs

3.11.1. General Purpose I/Os

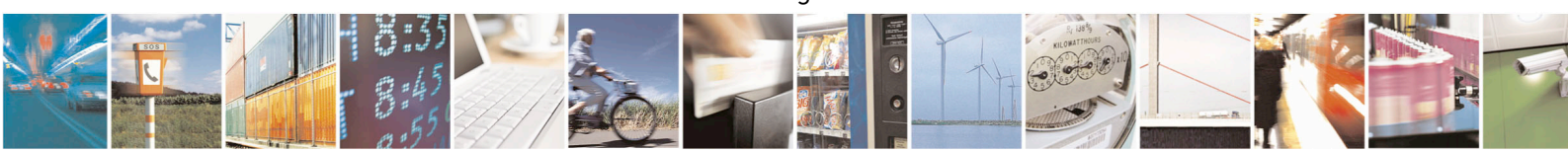
10 pins of general purpose I/Os can be configured by AT command in three different ways as input, output and alternative function.

3.11.2. Power on monitor (PWR_MON)

The PWR_MON indicates the status of the module running properly.

3.11.3. Power on/off control (ON_OFF)

External power on/off control input. Refer to the UE910 family Hardware User Guide for more details of Power on timing.



3.11.4. Auxiliary power output for accessory (VAUX)

A regulated 1.8V power output is provided for an external device.

3.11.5. SIM Reader

The UE910 family supports 1 SIM/USIM at 1.8V and 3V ONLY with and external SIM connector. For 5V SIM, an external level translator can be added. Refer to the UE910 family Hardware User Guide.

3.11.6. Converters

The UE910 family has 1 ADC and 1DAC.

3.11.7. Audio Interface

The UE910 Module is provided by an Analog Audio section.
A Digital Audio bus is available as well (not simultaneously with the analog one).

3.11.8. Serial ports

Two serial ports are available.

- Full RS232-C
- Auxiliary serial port (RX/TX only)

3.11.9. USB port

The USB2.0 High Speed has a clock rate of 480MHz

3.11.10. User Interface

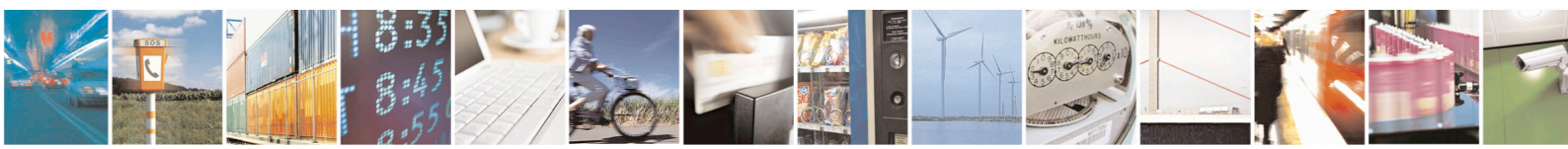
The user interface is managed by AT commands according to ITU-T V.250, 3GPP 27.007 and 27.005 specifications. Please refer to the UE910 AT command User Guide for complete details.

3.12. Features

3.12.1. Speech Coding

The UE910 family support the following voice codecs:

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



3.12.2. SMS

The UE910 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
- Cell broadcast compatible with CB DRX signaling of new incoming SMS.

The UE910 supports also SMS over GPRS

3.12.3. 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.

3.12.4. Data Transmission capabilities

The UE910 family supports:

- HSPA: D/L up to 7.2Mbps, U/L up to 5.76Mbps
- Asynchronous non-transparent CSD up to 9.6kbps for GSM, 14.4kbps for WCDMA
- EDGE Class 10 for NAx variants and Class 33 for EUx variants
- Coding scheme 1 to 4 (GPRS) & Modulation Coding scheme 1 to 9 (EDGE)

3.12.5. 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.

3.12.6. Call control

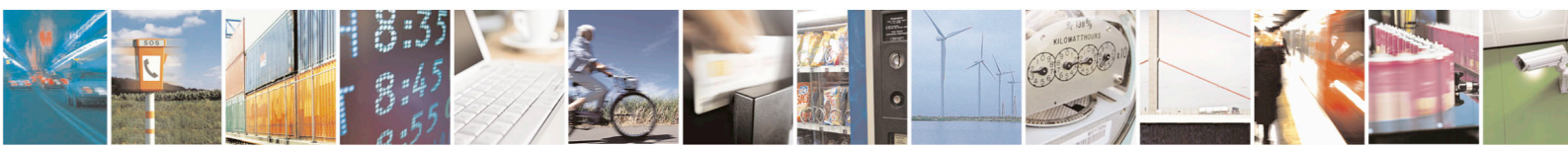
The calling cost control function is supported.

3.12.7. Phonebook

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

3.12.8. Characters management

The UE910 family supports the IRA, GSM, PCCP437, 8859-1 and UCS2 character sets,



in TEXT and PDU mode.

3.12.9. 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.

3.12.10. Call status indication

The call status indication is supported.

3.12.11. 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.

3.12.12. Supplementary services

The following supplementary services are supported:

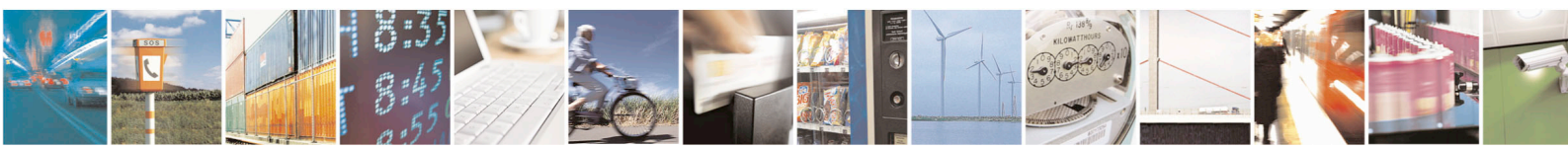
- Call Barring
- Call Forwarding
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)
- Call Waiting, other party call Waiting Indication
- Call Hold, other party Hold/Retrieved Indication
- Closed User Group supplementary service (CUG)
- Advice of Charge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

3.13. Mounting the modules on your board

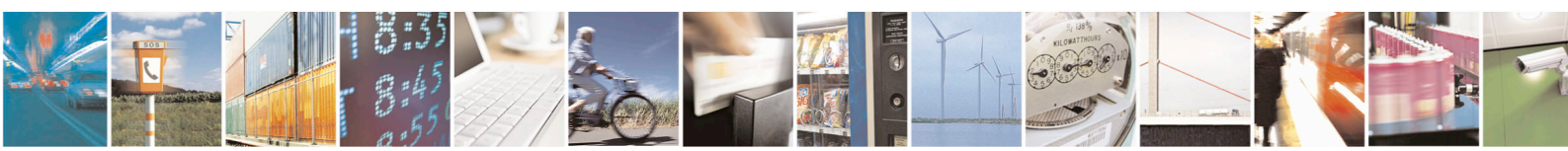
The modules have been designed in order to be compliant with a standard lead-free SMT process. For detailed information about PCB pad design and conditions to use in SMT process, please refer to the respective Hardware User Guide.

3.14. Packing system

According to SMT process, for picking & placing movement requirements, UE910 family is packaged on trays. Each tray contains 20 pieces in size of 176 x 329.



The level of moisture sensibility of UE910 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

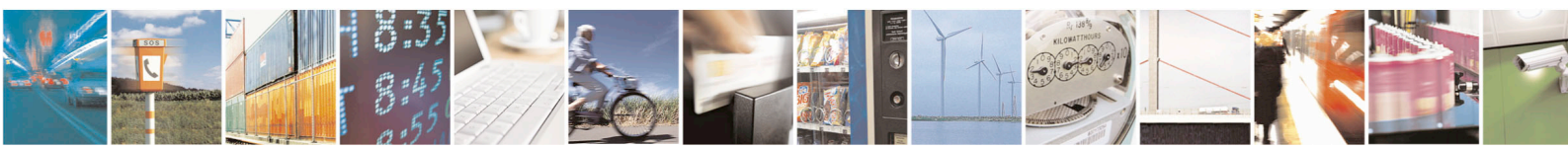
In order to assist the customer in the development of the application, Telit offers the EVK2 Evaluation Kit that can be ordered separately. The EVK2 has a SIM card holder, the RS 232 serial port level translator, a direct UART connection, audio and antenna connector.

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 UE910 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

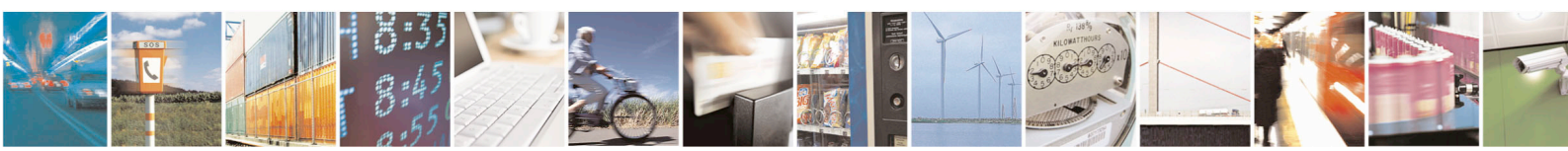
The UE910 family can be driven via the serial and USB interface using the standard AT commands.

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.

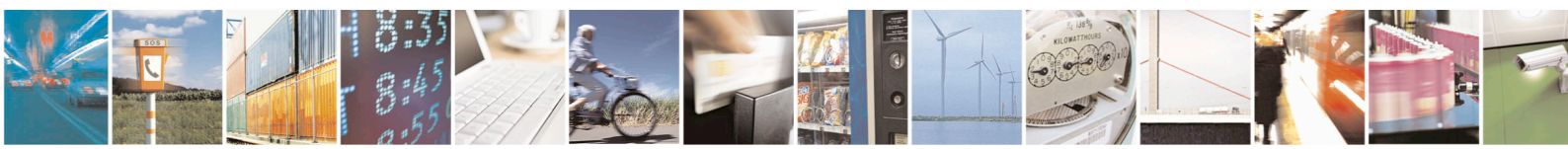
Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to 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/

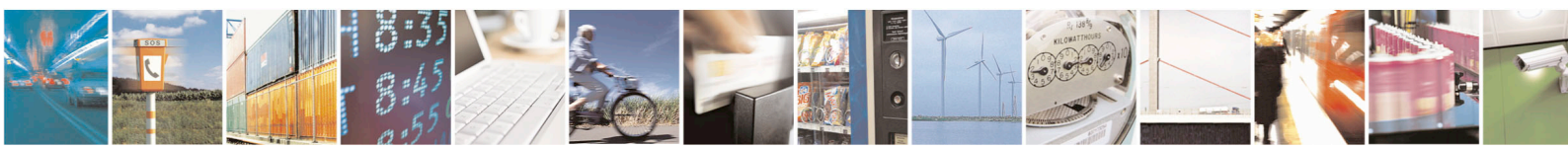
The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

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