LE910 Family Product Description

80421ST10587a Rev.4 – 2014-09-04

Making machines talk.

APPLICABILITY TABLE

PRODUCT
LE910-NAG
LE910-NVG
LE910-EUG
LE910-SVG
LE910-SKG

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1. Introduction

1.1. Scope

Scope of this document is to give an overview of the Telit LE910 series, which can support

LTE, with data/voice capabilities, and GSM/GPRS/UMTS/HSPA+ as fall-back technologies (single-mode variants are described in this document as well)

1.2. Audience

This document is intended for customers who are evaluating the LE910 series.

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.

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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 LE910 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.

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1.6. Related Documents

- LE910 Hardware User Guide, 1vv0301089
- LE910 AT command User Guide, 80421ST10585A
- Telit EVK2 User Guide, 1vv0300704

1.7. Document History

Revision	Date	Changes
0	2012-11-28	First issue
1	2013-09-12	General Review of the document
2	2013-10-08	Product variants update
3	2014-04-28	Product variants update (introduction of LTE single-mode). Ch.2.4-3.1-3.9-3.11 updated
4	2014-09-04	Ch.2.3-2.4 (updated frequency table and minor edits). Added Ch.6 (approvals)

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2. The LE910

2.1. Product Overview

The new Telit LE910 represents the next generation of Telit wireless connectivity with xE910 form factor.

The LE910 combines the two cutting edge technologies HSPA+ and LTE. As a matter of fact, LE910 is a 3.5G wireless data module offering HSPA+ connectivity with download speeds up to 42 Mbps, and a 4G M2M module at the same time, providing an ultra high-speed downlink at 100 Mbps.

The LE910 is the most compact module in the market incorporating 2G/3G/4G solution and an embedded GNSS receiver.

Designed for use in the most demanding industrial and consumer applications, the LE910 offers LGA packaging with cost effective mating solution. Five LE910 regional versions are available: three for the North American market (in different configurations for AT&T and Verizon), one for European market (suitable also for the Australia) and one for the Korean market.
Developers can take advantage of Telit's xE910 Unified Form Factor that enables a “design once, use anywhere” strategy.

Due to its low profile, low consumption and advanced connectivity features, LE910 is particularly suitable for applications such as mobile computing devices, PDAs, smartphones, table PCS and consumer or industrial electronics in general.

Design your application once and choose the technology that best fits the regional requirements for a truly seamless deployment. The LE910 is also fully backwards compatible to existing EDGE and GSM/GPRS networks through integrated quad-band radios. Additional features, such as integrated TCP/IP and UDP stack, ADC channels and an extensive set of GPIOs and interfaces, provide ease of integration of peripherals and actuators, extended functionality, adding value to the final application with no additional costs.

Moreover LE910 is also available with embedded GPS/GLONASS receiver.
MIMO DL 2x2 and Antenna diversity are supported by the module as well.

As a part of Telit’s corporate policy of environmental protection, LE910 as all Telit products comply with the RoHS (Restriction of Hazardous Substance) directive of the European Union (Eu Directive 2011/65/EU).

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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;

2.2. Target Market

The LE910 is designed and developed for applications requiring high throughput, devices requiring worldwide coverage and for applications in areas such as telematics for in-vehicle infotainment, video security and surveillance, outdoor signs and displays, business terminals and consumer products such as routers, mobile hot-spots, etc.

2.3. Product variants

Multi-mode variants (with fallback in 2G/3G)

Variant	2G Frequencies (MHz)	WCDMA Frequencies (MHz/Band)	LTE Frequencies (MHz/Band)	HSPA+ Data – Rates DL/UL [Mbps]	LTE Data – Rates DL/UL [Mbps]
LE910-EUG	900/1800	850 (B5) 900 (B8) 2100 (B1)	800 (B20) 1800 (B3) 2600 (B7)	42/5.7	100/50
LE910-NAG (AT&T)	850/1900	850 (B5) 1900 (B2)	700 (B17) 850 (B5) AWS1700 (B4) 1900 (B2)	21/5.7	100/50
LE910-NVG (Verizon)	-	850 (B5) 1900 (B2)	700 (B13) AWS1700 (B4)	42/5.7	100/50

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Single-mode variants (LTE-only)

Variant	2G Frequencies (MHz)	WCDMA Frequencies (MHz/Band)	LTE Frequencies (MHz/Band)	HSPA+ Data – Rates DL/UL [Mbps]	LTE Data – Rates DL/UL [Mbps]
LE910-SVG (Verizon)	-	-	700 (B13) AWS1700 (B4)	42/5.7	100/50
LE910-SKG (SKT-Korea)	-	-	850(B5) 1800(B3)	42/5.7	100/50

2.4. Product Features

- Dual/Quad-band EGSM (class 10 for the NAG variant, class 33 for the EUG variant)
- Multi-band UMTS/HSPA+
  - 850/900/2100 MHz (EUG variant)
  - 850/1900 MHz (North American variants with 3G fall-back: NAG & NVG)
- Multi-band LTE
  - 850/1800/2100 MHz (EUG variant)
  - 700/850/AWS1700/1900 MHz (AT&T variant)
  - 700/AWS1700 MHz (Verizon variant)
  - 850/1800 MHz (Korean variant)
- 3GPP protocol stack release 9 compliant, LTE Cat.3
- Supply voltage range: 3.3 – 4.2 V DC (3.8 V DC nominal)
- Output power
  - Class 4 (2 W, 33 dBm) @ GSM 900
  - Class 1 (1 W, 30 dBm) @ GSM 1800
  - Class E2 (0.5 W, 27 dBm) @ EDGE 900
  - Class E2 (0.4 W, 26 dBm) @ EDGE 1800
  - Class 3 (0.25 W, 24 dBm) @ UMTS
  - Class 3 (0.2 W, 23 dBm) @ LTE
- Digital Audio
- Control via AT commands according to 3GPP 27.005, 27.007 and Telit custom AT commands
- SIM Application Toolkit 3GPP TS 51.014
- SIM Access Profile
- E-Call compliant
- Embedded GPS/Glonass
- Rx Diversity & MIMO (DL 2x2)
- Dimensions: 28.2 x 28.2 x 2.2 mm
- Weight: 9 grams
- REACH & RoHS compliant

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Interfaces

- 10 I/O ports
- Digital voice support
- USB 2.0 HS
- UART
- 1.8V SIM Interface
- 1 ADC

Data transmission

- LTE Cat.3
  - DL up to 100 Mbps
  - UL up 50 Mbps
- HSPA+: category 20 in downlink e category 6 in uplink
  - DL up to 42.0Mbps
  - UL up to 5.76Mbps
- WCDMA: up to 384kbps downlink/uplink
- EDGE:
  - Class 33: DL up to 296 kbps, UL up to 236.8 kbps
  - Class 10: DL up to 236.8 kbps, UL up to 118.4 kbps
- Coding scheme 1 to 4 (GPRS) & Modulation Coding scheme 1 to 9 (EDGE)

Audio

- Telephony
- Half rate, full rate, enhanced full rate and adaptive multi rate voice codecs (HR, FR, EFR, AMR)
- Superior echo cancellation & noise reduction
- DTMF

SMS

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

Additional features

- SIM phonebook
- Real Time Clock
- Automatic answer
- Alarm management
- Embedded TCP/IP stack
- Event Monitor
- Antenna detection

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Approvals

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

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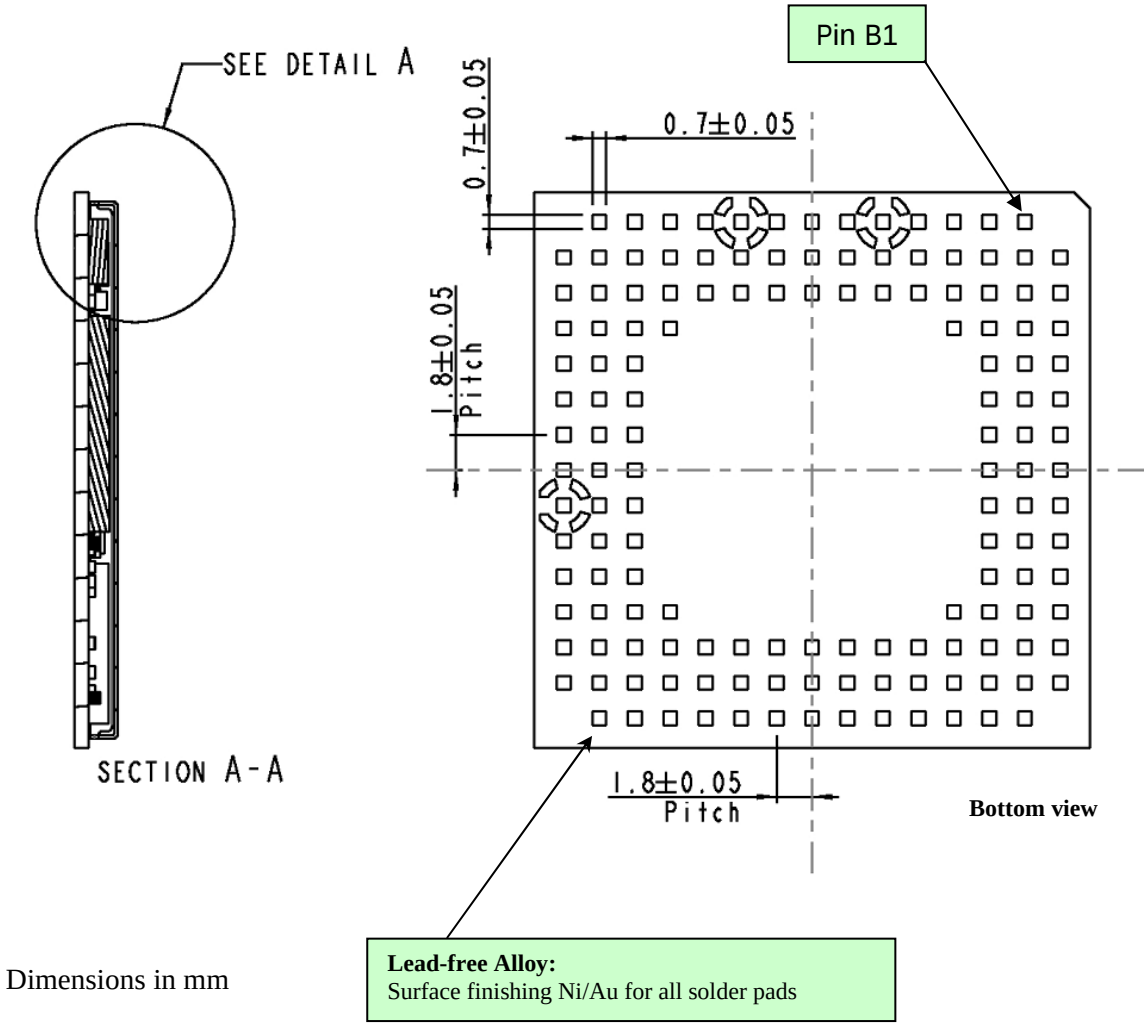
3. Product Description

3.1. Dimensions and 2D mechanical drawing

The LE910 has a Land-Grid-Array (LGA) package, with 144 pads.

The overall dimensions of LE910 family are:

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



Dimensions in mm

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3.2. Weight

The module weight of LE910 family is about 9 grams.

3.3. Environmental requirements

3.3.1. Temperature range

Operating Temperature Range	–40°C ~ +85°C

3.3.2. RoHS compliance

As a part of Telit corporate policy of environmental protection, the LE910 family complies with RoHS (Restriction of Hazardous Substances) directive of the European Union (EU directive 2011/65/EU). REACH compliant as well.

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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
EGSM900	890.0 ~ 915	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
WCDMA2100 – B1	1922.4 ~ 1977.6	2112.4 ~ 2167.6	Tx: 9612 ~ 9888 Rx: 10562 ~ 10838	190MHz
WCDMA1900 – B2	1852.4 ~ 1907.6	1932.4 ~ 1987.6	Tx: 9262 ~ 9538 Rx: 9662 ~ 9938	80MHz
WCDMA1800 – B3	1710 ~ 1785	1805 ~ 1880	Tx: 937 ~ 1288 Rx: 1162 ~ 1513	95MHz
WCDMA850 – B5	826.4 ~ 846.6	871.4 ~ 891.6	Tx: 4132 ~ 4233 Rx: 4357 ~ 4458	45MHz
WCDMA900 –B8	882.4 ~ 912.6	927.4 ~ 957.6	Tx: 2712 ~ 2863 Rx: 2937 ~ 3088	45MHz
LTE2100 – B1	1920 ~ 1980	2110 ~ 2170	Tx: 18000 ~ 18599 Rx: 0 ~ 599	190MHz
LTE1900 – B2	1850 ~ 1910	1930 ~ 1990	Tx: 18600 ~ 19199 Rx: 600 ~ 1199	80MHz
LTE1800 – B3	1710 ~ 1785	1805 ~ 1880	Tx: 19200 ~ 19949 Rx: 1200 ~ 1949	95MHz
LTE1700 – B4	1710~ 1755	2110 ~ 2155	Tx: 19950 ~ 20399 Rx: 1950 ~ 2399	400MHz
LTE850 – B5	824 ~ 849	869 ~ 894	Tx: 20400 ~ 20649 Rx: 2400 ~ 2649	45MHz
LTE700 – B17	704 ~ 716	734 ~ 746	Tx: 23730 ~ 23849 Rx: 5730 ~ 5849	30MHz

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3.5. Antenna

The antenna connection and board layout design are the most important parts in the full product design and they strongly reflect on the product's overall performances. Read carefully and follow the requirements described in the Hardware User Guide.

3.6. 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	3.3 ~ 4.2V

3.7. The user interface

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

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3.8. Input and Outputs

3.8.1. 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.

3.8.2. Power on monitor (PWRMON)

The PWRMON indicates the status of the module running properly.

3.8.3. Power on/off control (ON_OFF)

External power on/off control input. Refer to the LE910 family Hardware User Guide for more details of Power on timing.

3.8.4. Auxiliary power output for accessory (VAUX)

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

3.8.5. SIM Reader

The LE910 family supports 1 SIM/USIM at 1.8V/3V.

3.8.6. Serial ports

Two serial ports are available.

- Full RS232-C
- Simplified serial port (RX/TX only) for debugging

3.8.7. USB port

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

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3.9. Converters

3.9.1. ADC Converter

The LE910 has one on board ADC. It is able to read a voltage level in the range of 0÷1.7 volts applied on the ADC pin input, store and convert it into 8 bit word.

3.10. Logic level specifications

Where not specifically stated, all the interface circuits work at 1.8V CMOS logic levels. To get more detailed information about the logic level specifications used in the LE910, please check with the Hardware User Guide.

3.11. Audio

Future proof support for VoLTE (Voice over LTE). Not enabled on the first release of the product. The multimode variants could automatically falls back to HSPA+ , supporting CSFB (circuit switched fallback) allowing the modules to sustain voice services. The Single-Mode variants are data-only.

3.12. Other features

3.12.1. Speech CODEC

The LE910 supports the following voice codec:

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

3.12.2. SMS

The LE910 supports the following SMS types:

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

The LE910 also supports SMS over GPRS.

3.12.3. Phonebook

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

3.12.4. Call status indication

The call status indication is supported.

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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, LE910 family is packaged on trays. Each tray contains 20 pieces in size of 176 x 329.

The level of moisture sensibility of LE910 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.

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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 LE910 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.

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5. AT Commands

The Telit LE910 module can be driven via the serial and USB interface using the standard AT commands.
The module is compliant with:

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

Moreover the LE910 module supports also Telit proprietary AT commands for special purposes.
For a more information about AT commands supported by the LE910 module please refer to the document AT Commands Reference Guide.

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6. Conformity assessment issues

6.1. FCC

TCB | **GRANT OF EQUIPMENT AUTHORIZATION** | **TCB**

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

TUV SUD BABT
Forsyth House Churchfield Road
Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 07/02/2014
Application Dated: 07/02/2014

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

Attention: Brian Tucker , Global VP, Quality

NOT TRANSFERABLE

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

FCC IDENTIFIER: RI7LE910NA
Name of Grantee: Telit Communications S.p.A.
Equipment Class: PCS Licensed Transmitter
Notes: LTE/3G/2G Module
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	22H	824.2 - 848.2	1.64059	1.0 PM	248KGXW
	22H	824.2 - 848.2	0.42554	1.0 PM	248KG7W
	24E	1850.2 - 1909.8	0.93325	1.0 PM	253KGXW
	24E	1850.2 - 1909.8	0.23439	1.0 PM	246KG7W
	22H	826.4 - 846.6	0.21727	1.0 PM	4M16G9W
	22H	826.4 - 846.6	0.20845	1.0 PM	4M18G9W
	22H	826.4 - 846.6	0.20989	1.0 PM	4M17G9W
	24E	1852.4 - 1907.6	0.22336	1.0 PM	4M15G9W
	24E	1852.4 - 1907.6	0.19231	1.0 PM	4M17G9W
	24E	1852.4 - 1907.6	0.18155	1.0 PM	4M17G9W
	27	706.5 - 713.5	0.18408	1.0 PM	4M52G7W
	27	706.5 - 713.5	0.16406	1.0 PM	4M52D7W
	27	709.0 - 711.0	0.18967	1.0 PM	8M98G7W
	27	709.0 - 711.0	0.17458	1.0 PM	9M01D7W
	22H	826.5 - 846.5	0.20559	1.0 PM	4M51G7W
	22H	826.5 - 846.5	0.16904	1.0 PM	4M50D7W
	22H	829.0 - 844.0	0.19409	1.0 PM	9M00G7W
	22H	829.0 - 844.0	0.16331	1.0 PM	9M00D7W
	27	1712.5 - 1752.5	0.17378	1.0 PM	4M51G7W
	27	1712.5 - 1752.5	0.17906	1.0 PM	4M51D7W
	27	1715.0 - 1750.0	0.1803	1.0 PM	9M01G7W
	27	1715.0 - 1750.0	0.1766	1.0 PM	8M89D7W
	27	1720.0 - 1745.0	0.18113	1.0 PM	17M9G7W
	27	1720.0 - 1745.0	0.19454	1.0 PM	18M0D7W
	24E	1852.5 - 1907.5	0.19815	1.0 PM	4M50G7W
	24E	1852.5 - 1907.5	0.18793	1.0 PM	4M51D7W
	24E	1855.0 - 1905.0	0.18155	1.0 PM	9M01G7W
	24E	1855.0 - 1905.0	0.18323	1.0 PM	8M97D7W
	24E	1860.0 - 1900.0	0.1803	1.0 PM	17M9G7W
	24E	1860.0 - 1900.0	0.17579	1.0 PM	17M9D7W

Single Modular Approval. Power output listed is conducted. This device is approved for mobile and fixed use with respect to RF exposure compliance, and may only be marketed to OEM installers. The antenna(s) used for this transmitter, as described in this filing, must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Installers and end-users must be provided with operating conditions for satisfying RF exposure compliance. Maximum permitted antenna gain/cable loss: 700 MHz: 8.74 dBi, 850 MHz: 6.93 dBi, 1700 MHz: 5.0 dBi, 1900 MHz: 2.51 dBi.

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TCB

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Certification

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TUV SUD BABT
Forsyth House Churchfield Road
Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 07/02/2014

Application Dated: 07/02/2014

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

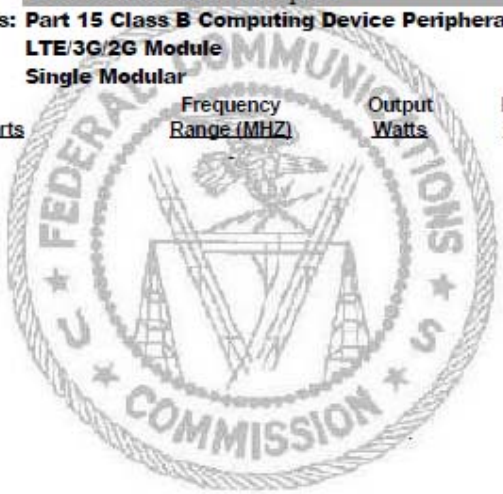
Attention: Brian Tucker , Global VP, Quality

NOT TRANSFERABLE

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

FCC IDENTIFIER: RI7LE910NA
Name of Grantee: Telit Communications S.p.A.
Equipment Class: **Part 15 Class B Computing Device Peripheral**
Notes: **LTE/3G/2G Module**
Modular Type: **Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15B				



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TCB

GRANT OF EQUIPMENT AUTHORIZATION

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

TCB

TUV SUD BABT
Forsyth House Churchfield Road
Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 07/02/2014

Application Dated: 07/02/2014

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

Attention: Brian Tucker , Global VP, Quality

NOT TRANSFERABLE

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

FCC IDENTIFIER: RI7LE910NV
Name of Grantee: Telit Communications S.p.A.
Equipment Class: **PCS Licensed Transmitter**
Notes: **LTE/3G Module**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	22H	826.4 - 846.6	0.17179	1.0 PM	4M17G9W
	22H	826.4 - 848.6	0.17179	1.0 PM	4M18G9W
	22H	826.4 - 846.6	0.17824	1.0 PM	4M18G9W
	24E	1852.4 - 1907.6	0.18967	1.0 PM	4M17G9W
	24E	1852.4 - 1907.6	0.19861	1.0 PM	4M18G9W
	24E	1852.4 - 1907.6	0.19231	1.0 PM	4M18G9W
	27	779.5 - 784.5	0.19543	1.0 PM	5M52G7W
	27	779.5 - 784.5	0.20749	1.0 PM	4M53D7W
	27	782.0 - 782.0	0.19543	1.0 PM	8M95G7W
	27	782.0 - 782.0	0.17824	1.0 PM	8M95D7W
	27	1712.5 - 1752.5	0.22856	1.0 PM	4M52G7W
	27	1712.5 - 1752.5	0.21928	1.0 PM	4M53D7W
	27	1715.0 - 1750.0	0.22336	1.0 PM	8M95G7W
	27	1715.0 - 1750.0	0.19231	1.0 PM	8M94D7W
	27	1720.0 - 1745.0	0.21928	1.0 PM	17M9G7W
	27	1720.0 - 1745.0	0.20559	1.0 PM	17M9D7W

Single Modular Approval. Power output listed is conducted. This device is approved for mobile and fixed use with respect to RF exposure compliance, and may only be marketed to OEM installers. The antenna (s) used for this transmitter, as described in this filing, must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Installers and end-users must be provided with operating conditions for satisfying RF exposure compliance. Maximum permitted antenna gain/cable loss: 700 MHz: 9.16 dBi, 850 MHz: 9.42 dBi, 1700 MHz: 5.0 dBi, 1900 MHz: 8.01 dBi.

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TCB

TUV SUD BABT
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Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 07/02/2014

Application Dated: 07/02/2014

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

Attention: Brian Tucker , Global VP, Quality

NOT TRANSFERABLE

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

FCC IDENTIFIER: RI7LE910NV
Name of Grantee: Telit Communications S.p.A.
Equipment Class: **Part 15 Class B Computing Device Peripheral**
Notes: **LTE/3G Module**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15B	-			

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Federal Communications Commission
By:

TCB

TUV SUD BABT
Forsyth House Churchfield Road
Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 06/26/2014

Application Dated: 06/26/2014

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

Attention: Brian Tucker , Global VP, Quality

NOT TRANSFERABLE

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

FCC IDENTIFIER: RI7LE910SV
Name of Grantee: Telit Communications S.p.A.
Equipment Class: **Licensed Non-Broadcast Station Transmitter**
Notes: **LTE Module**
Modular Type: **Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	27	779.5 - 784.5	0.19543	14.0 Hz	5M52G7D
	27	779.5 - 784.5	0.20749	14.0 Hz	4M53D7D
	27	782.0 - 782.0	0.19231	14.0 Hz	8M95G7D
	27	782.0 - 782.0	0.17824	14.0 Hz	8M95D7D
	27	1712.5 - 1752.5	0.22856	27.0 Hz	4M52G7D
	27	1712.5 - 1752.5	0.21928	27.0 Hz	4M53D7D
	27	1715.0 - 1750.0	0.22336	27.0 Hz	8M95G7D
	27	1715.0 - 1750.0	0.19231	27.0 Hz	8M94D7D
	27	1720.0 - 1745.0	0.21928	27.0 Hz	17M9G7D
	27	1720.0 - 1745.0	0.20559	27.0 Hz	17M9D7D

Single Modular Approval. Power output listed is conducted. This device is approved for mobile and fixed use with respect to RF exposure compliance, and may only be marketed to OEM installers. The antenna(s) used for this transmitter, as described in this filing, must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Installers and end-users must be provided with operating conditions for satisfying RF exposure compliance. Maximum permitted antenna gain/cable loss: LTE Band 4: 5.0 dBi, LTE Band 13: 9.16 dBi.

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Walton-on-Thames, Surrey, KT12 2TD
United Kingdom

Date of Grant: 06/26/2014

Application Dated: 06/26/2014

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

Attention: Brian Tucker , Global VP, Quality

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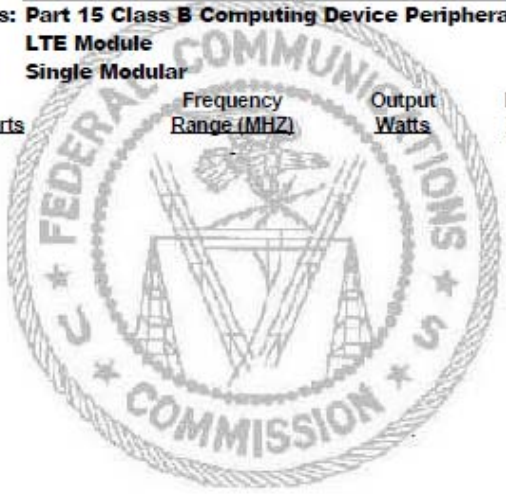
EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: RI7LE910SV
Name of Grantee: Telit Communications S.p.A.
Equipment Class: **Part 15 Class B Computing Device Peripheral**
Notes: **LTE Module**
Modular Type: **Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15B				



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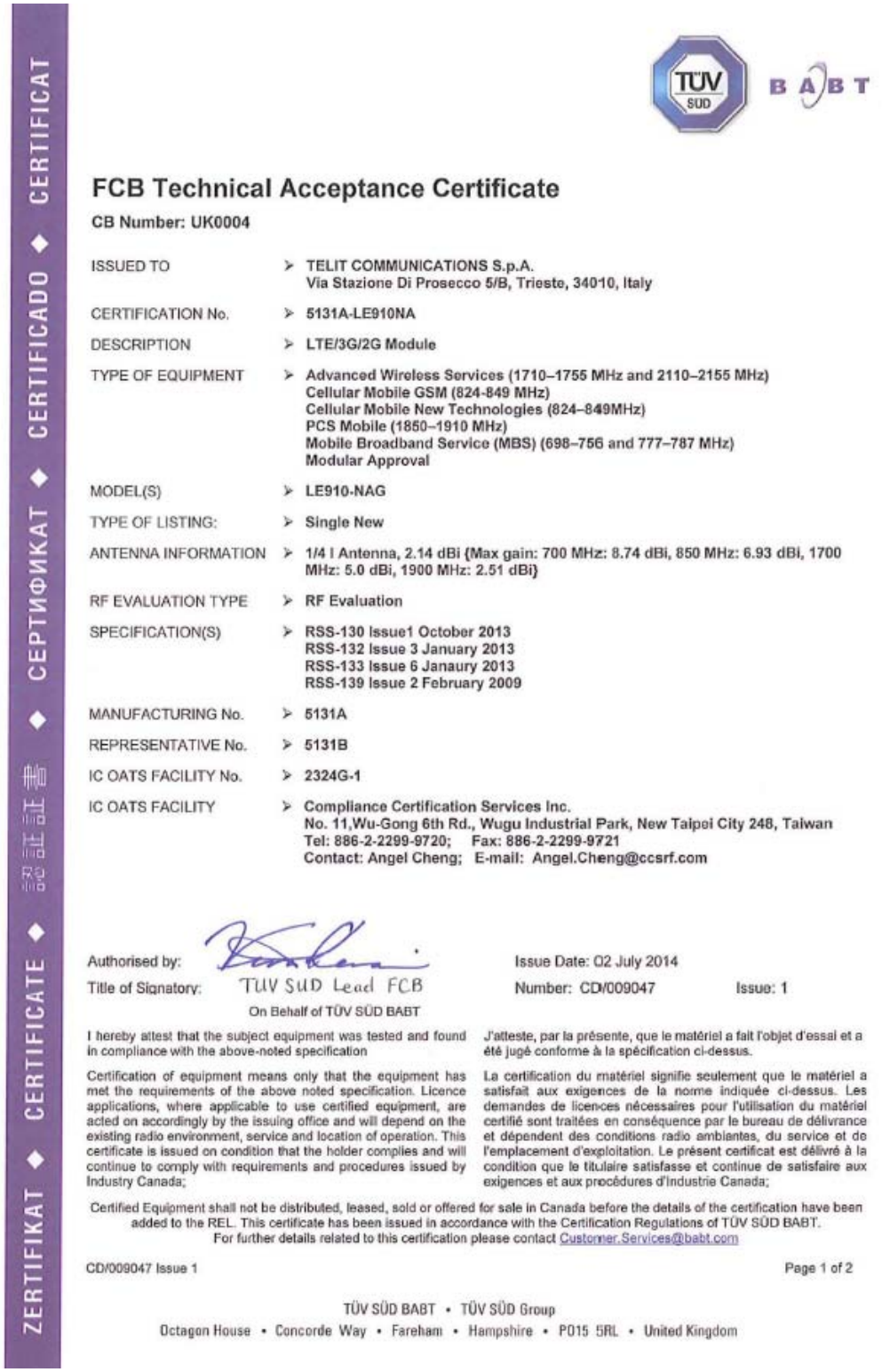
6.2. IC certificates



ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD BABT

FCB Technical Acceptance Certificate

CB Number: UK0004

ISSUED TO	➢ TELIT COMMUNICATIONS S.p.A. Via Stazione Di Prosecco 5/B, Trieste, 34010, Italy
CERTIFICATION No.	➢ 5131A-LE910NA
DESCRIPTION	➢ LTE/3G/2G Module
TYPE OF EQUIPMENT	➢ Advanced Wireless Services (1710–1755 MHz and 2110–2155 MHz) Cellular Mobile GSM (824-849 MHz) Cellular Mobile New Technologies (824–849MHz) PCS Mobile (1850–1910 MHz) Mobile Broadband Service (MBS) (698–756 and 777–787 MHz) Modular Approval
MODEL(S)	➢ LE910-NAG
TYPE OF LISTING:	➢ Single New
ANTENNA INFORMATION	➢ 1/4 l Antenna, 2.14 dBi (Max gain: 700 MHz: 8.74 dBi, 850 MHz: 6.93 dBi, 1700 MHz: 5.0 dBi, 1900 MHz: 2.51 dBi)
RF EVALUATION TYPE	➢ RF Evaluation
SPECIFICATION(S)	➢ RSS-130 Issue1 October 2013 RSS-132 Issue 3 January 2013 RSS-133 Issue 6 Janaury 2013 RSS-139 Issue 2 February 2009
MANUFACTURING No.	➢ 5131A
REPRESENTATIVE No.	➢ 5131B
IC OATS FACILITY No.	➢ 2324G-1
IC OATS FACILITY	➢ Compliance Certification Services Inc. No. 11,Wu-Gong 6th Rd., Wugu Industrial Park, New Taipei City 248, Taiwan Tel: 886-2-2299-9720; Fax: 886-2-2299-9721 Contact: Angel Cheng; E-mail: Angel.Cheng@ccsrf.com

Authorised by:

Title of Signatory: TUV SUD Lead FCB

On Behalf of TÜV SÜD BABT

Issue Date: 02 July 2014

Number: CD/009047 Issue: 1

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specification

J'atteste, par la présente, que le matériel a fait l'objet d'essai et a été jugé conforme à la spécification ci-dessus.

Certification of equipment means only that the equipment has met the requirements of the above noted specification. Licence applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with requirements and procedures issued by Industry Canada;

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada;

Certified Equipment shall not be distributed, leased, sold or offered for sale in Canada before the details of the certification have been added to the REL. This certificate has been issued in accordance with the Certification Regulations of TÜV SÜD BABT.
For further details related to this certification please contact Customer.Services@babt.com

CD/009047 Issue 1 Page 1 of 2

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FCB Technical Acceptance Certificate

CB Number: UK0004

ISSUED TO	➢ **TELIT COMMUNICATIONS S.p.A.** **Via Stazione Di Prosecco 5/B, Trieste, 34010, Italy**
CERTIFICATION No.	➢ **5131A-LE910NV**
DESCRIPTION	➢ **LTE/3G Module**
TYPE OF EQUIPMENT	➢ **Advanced Wireless Services (1710–1755 MHz)** **Cellular Mobile New Technologies (824–849MHz)** **PCS Mobile (1850–1910 MHz)** **Mobile Broadband Service (MBS) (777–787 MHz)** **Modular Approval**
MODEL(S)	➢ **LE910-NVG**
TYPE OF LISTING:	➢ **Single New**
ANTENNA INFORMATION	➢ **1/4 l Antenna, 2.14 dBi {Max gain: 700 MHz: 9.16 dBi, 850 MHz: 9.42 dBi, 1700 MHz: 5.0 dBi, 1900 MHz: 8.01 dBi}**
RF EVALUATION TYPE	➢ **RF Evaluation**
SPECIFICATION(S)	➢ **RSS-130 Issue 1 October 2013** **RSS-132 Issue 3 January 2013** **RSS-133 Issue 6 Janaury 2013** **RSS-139 Issue 2 February 2009**
MANUFACTURING No.	➢ **5131A**
REPRESENTATIVE No.	➢ **5131B**
IC OATS FACILITY No.	➢ **2324G**
IC OATS FACILITY	➢ **Compliance Certification Services Inc.** **No. 11,Wu-Gong 6th Rd., Wugu Industrial Park, New Taipei City 248, Taiwan** **Tel: 886-3-3240332; Fax: 886-3-3245235** **Contact: Kurt Chen; E-mail: kurt.chen@ccsrf.com**

Authorised by:

Title of Signatory: TUV SUD Lead FCB

On Behalf of TÜV SÜD BABT

Issue Date: 02 July 2014

Number: CD/009045 Issue: 1

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specification

Certification of equipment means only that the equipment has met the requirements of the above noted specification. Licence applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with requirements and procedures issued by Industry Canada;

J'atteste, par la présente, que le matériel a fait l'objet d'essai et a été jugé conforme à la spécification ci-dessus.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada;

Certified Equipment shall not be distributed, leased, sold or offered for sale in Canada before the details of the certification have been added to the REL. This certificate has been issued in accordance with the Certification Regulations of TÜV SÜD BABT.
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CD/009045 Issue 1

Page 1 of 2

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

FCB Technical Acceptance Certificate

CB Number: UK0004

ISSUED TO	➢ **TELIT COMMUNICATIONS S.p.A.** **Via Stazione Di Prosecco 5/B, Trieste, 34010, Italy**
CERTIFICATION No.	➢ **5131A-LE910SV**
DESCRIPTION	➢ **LTE Module**
TYPE OF EQUIPMENT	➢ **Advanced Wireless Services (1710–1755 MHz and 2110–2155 MHz)** **Mobile Brcadband Service (MBS) (698–756 and 777–787 MHz)** **Modular Approval**
MODEL(S)	➢ **LE910-SVG**
TYPE OF LISTING:	➢ **Single New**
ANTENNA INFORMATION	➢ **1/4 l Antenna, 2.14 dBi {Max gain: 9.16dBi (700MHz), 5.0dBi (1700MHz)}**
RF EVALUATION TYPE	➢ **RF Evaluation**
SPECIFICATION(S)	➢ **RSS-139 Issue 2 February 2009** **RSS-130 Issue1 October 2013**
MANUFACTURING No.	➢ **5131A**
REPRESENTATIVE No.	➢ **5131B**
IC OATS FACILITY No.	➢ **2324G-1**
IC OATS FACILITY	➢ **Compliance Certification Services Inc.** **No. 11,Wu-Gong 6th Rd., Wugu Industrial Park, New Taipei City 248, Taiwan** **Tel: 886-2-2299-9720; Fax: 886-2-2299-9721** **Contact: Angel Cheng; E-mail: Angel.Cheng@ccsrf.com**

Frequency Range (MHz)	Power Output (W)	Occupied Bandwidth (KHz)	Emission Designator
779.5 - 784.5	0.19543	5520	5M52G7D
779.5 - 784.5	0.20749	4530	4M53D7D
782.0 - 782.0	0.19231	8952	8M95G7D
782.0 - 782.0	0.17824	8949	8M95D7D
1712.5 – 1752.5	0.22856	4517	4M52G7D
1712.5 – 1752.5	0.21928	4529	4M53D7D
1715.0 – 1750.0	0.22336	8952	8M95G7D
1715.0 – 1750.0	0.19231	8942	8M94D7D
1720.0 – 1745.0	0.21928	17876	17M9G7D
1720.0 – 1745.0	0.20569	17869	17M9D7D

Authorised by: Issue Date: 26 June 2014

Title of Signatory: TUV SUD Lead FCB Number: CD/009043 Issue: 1

On Behalf of TÜV SÜD BABT

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specification

J'atteste, par la présente, que le matériel a fait l'objet d'essai et a été jugé conforme à la spécification ci-dessus.

Certification of equipment means only that the equipment has met the requirements of the above noted specification. Licence applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with requirements and procedures issued by Industry Canada;

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For further details related to this certification please contact Customer.Services@babt.com

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7. Safety Recommendations

READ CAREFULLY

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

- Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc.
- Where there is risk of explosion such as gasoline stations, oil refineries, etc. It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to the security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself. Same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.
The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue, because the risk of disturbing the 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/

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8. 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

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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

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