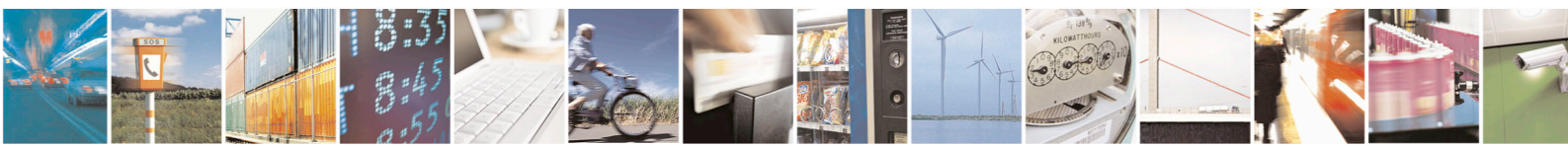
CE910 Series Product Description

80399ST10111A Rev.4 – 2015-05-20

Making machines talk.

APPLICABILITY TABLE

PRODUCT
CE910-DUAL
CE910-SC



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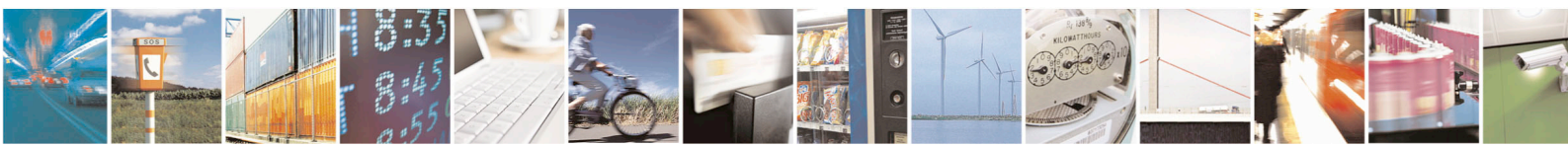

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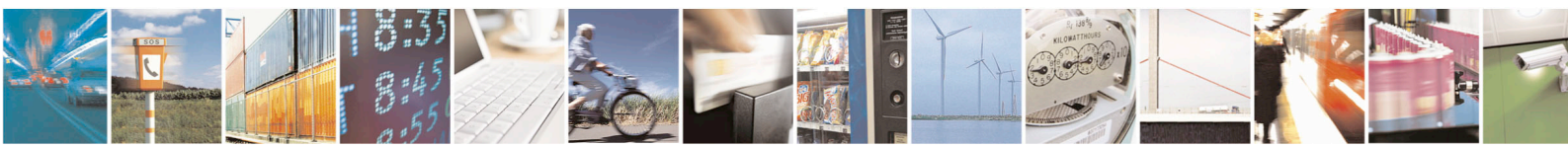

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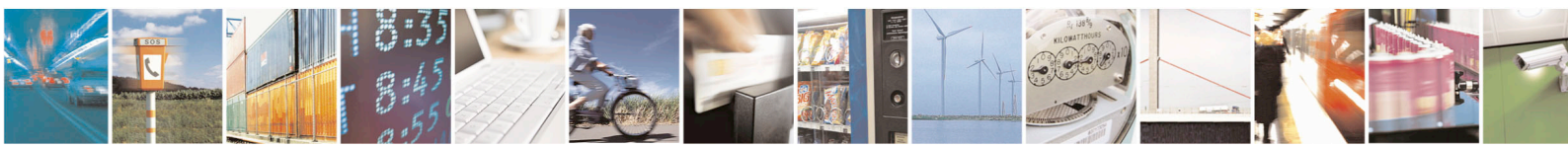
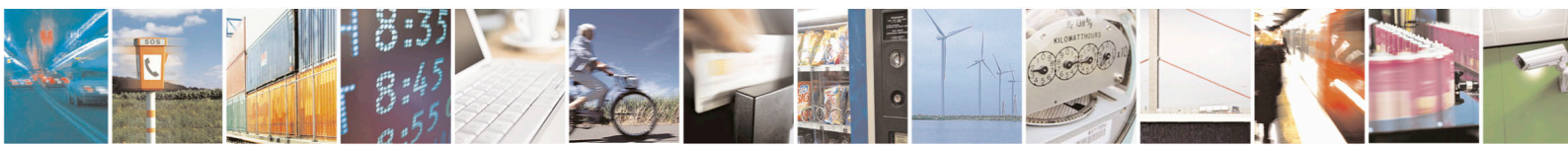
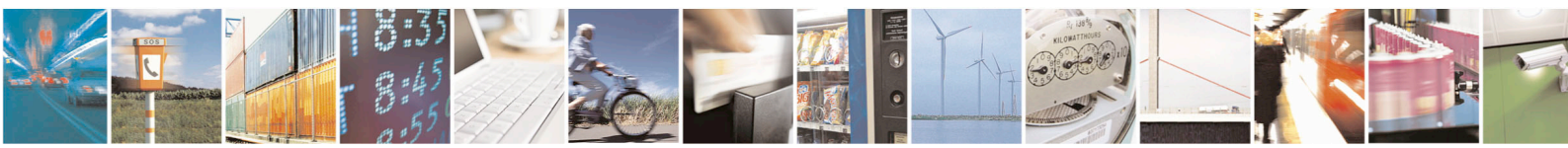






1. Introduction

1.1. Scope

The scope of this document is to give an overview of the CE910 Series modules which are dual band 800/1900MHz (CE910-DUAL) and single band 800 MHz (CE910-SC) CDMA2000 1xRTT modules with data and voice capability.

1.2. Audience

This document is intended for customers who need to understand the HW form factor, SW features and technical specifications of CE910 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

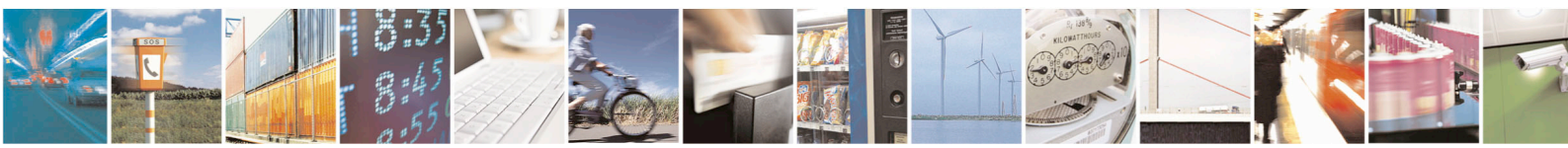
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

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.



1.4. Document Organization

This document contains the following chapters:

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

"Chapter 2: "Overview" provides information regarding product variants and an overview of the characteristics and features of the product.

"Chapter 3: "Mechanical specification" describes the details of dimensions, weight and connector information.

"Chapter 4: "Environmental requirements" describes the environmental requirements such as temperature ranges and RoHS compliance.

"Chapter 5: "Electrical characteristics and external interfaces" provides a brief description of electrical characteristics and external interfaces.

"Chapter 6: "Software Features" provides an overview of the software features of the product.

"Chapter 7: "AT Commands" provides the information on AT commands.

"Chapter 8: "Packing Information" provides the packing information of the product.

"Chapter 9: "Evaluation Kit" provides a brief description of the Telit Evaluation Kit (EVK2) for customer verification.

"Chapter 10: "Conformity Assessment Issues" provides some fundamental hints about the conformity assessment that the final application might need.

"Chapter 11: "Safety Recommendation" provides some safety recommendations that must be followed by the customer in the design of the application that makes use of the module.

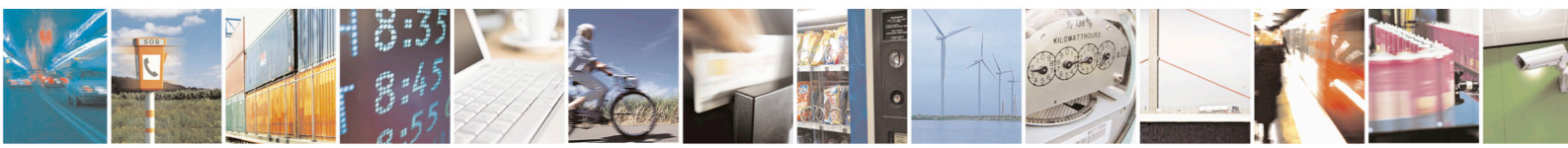
1.5. Text Conventions

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.

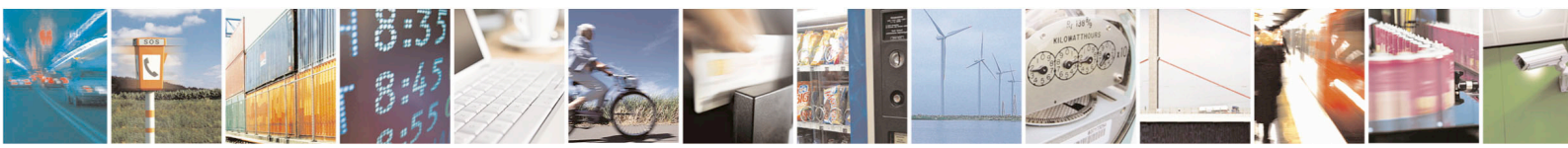
Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

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



1.6. Related Documents

- CE910 Series Hardware User Guide, 1vv0301010
- CE910 Series Software User Guide, 1vv0301011
- CE910 Series AT Commands Reference Guide, 80399ST10110A
- Telit EVK2 User Guide, 1vv0300704



2. Overview

The CE910-DUAL is a dual band 1xRTT wireless module supporting up/down link data rates up to 153.6kbps. It is designed to have the same form factor of its GSM/UMTS/HSPA/EV-DO counterparts of the xE910Series: GE910, HE910 and DE910-DUAL respectively.

The CE910-DUAL enriches the Telit xE910 Series Form Factor offer, enabling integrators and developers to design their applications once and take advantage of the truly global coverage and service flexibility afforded by the combination of the most prevalent cellular technologies worldwide.

With its ultra-compact design and extended operating temperature range, the Telit CE910-DUAL is the perfect platform for low throughput wireless data applications on CDMA 1xRTT networks, such as telemetry, telematics, smart metering, health care, tracking applications electronics and security. Additional features such as integrated TCP/IP and UDP Stack provide extended functionality, adding value to the customer application without adding cost.

The extensive interface set, which includes user definable GPIOs, provides ease of integration for peripherals and actuators.

Aiming to protect customers' investments in developing and deploying solutions based on Telit modules, the CE910-DUAL boasts a range of functions for over-the-air maintenance and management of software in the module.

The CE910-SC is a single-band 800MHz CDMA 1xRTT wireless module. It is specifically designed the Chinese CDMA and most of APAC networks requiring R-UIM card technology. Its compact LGA form factor is pin-to-pin compatible with the xE910 Series, allowing for easy integration of different 2G to 3G wireless technologies into the same design.

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

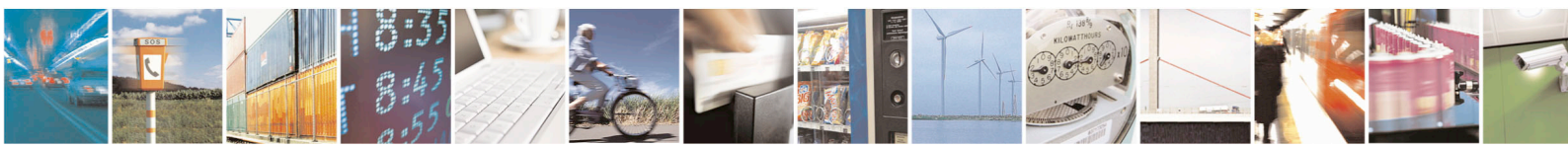
NOTE:

Some of the features of the Telit modules depend on the software version installed on the module itself. The Telit software group is continuously working to add new features and to improve the overall performance. 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, including:

- Telit Evaluation Kit EVK2 to help you to develop your application;
- A website with all updated information available;
- High level technical support to assist in your development;



2.1. The applications

The CE910 Series is designed for applications such as:

- Telemetry
- Telematics
- Automatic Meter Reading (AMR)
- Health care
- Tracking applications electronics
- Surveillance
- Security

2.2. H/W characteristics and environmental conditions

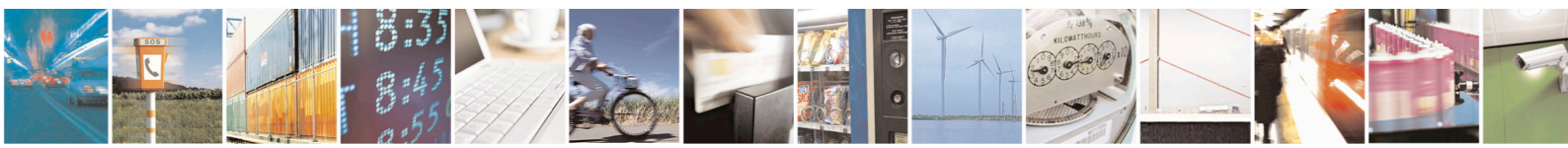
- Dual band CDMA2000 1xRTT in 800/1900 MHz band (CE910-DUAL)
- Single band CDMA2000 1xRTT 800 MHz band (CE910-SC)
- Transmitter output power: 24.5 dBm
- Receiver Sensitivity: ≤ -108 dBm in CDMA BC0, ≤ -107 dBm in CDMA BC1
- Supply voltage: DC 3.8 V nominal
- Logical interface voltage: 1.8 V (Typical)
- Dimensions: 28.2 x 28.2 x 2.05 mm
- Weight: 4.7 grams
- Storage and Operating Temperature Range: -40°C ~ +85°C

2.3. Interfaces

- 144 pads Land-Grid-Array (LGA)
- Maximum 10 ports user definable GPIO including multi-functional I/Os
- State LED output
- 1 A/D converter
- 1 Full RS232 CMOS UART
- 1 two-wire CMOS UART
- USB 2.0 Full Speed: baud rate up to 12 Mbps

2.4. Features

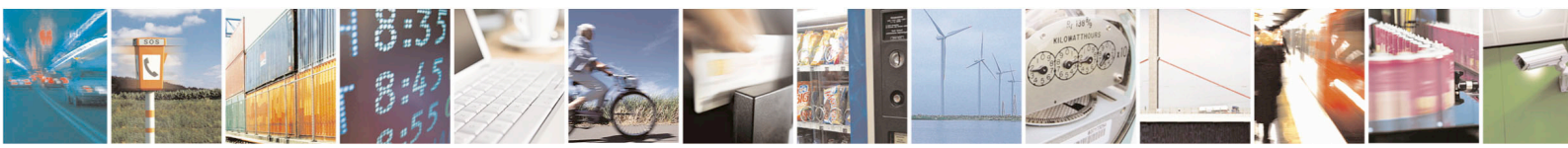
- Air interface: CDMA2000 1xRTT
- Peak data rates: UL/DL up to 153.6 kbps



- Standard and Telit unified AT command sets
- Embedded TCP/IP stack with server and client functions
- Built in FTP client
- Built in SMTP (email) client
- SMS related
- Clock/Alarm
- Phone as Modem (PAM)
- OTA provisioning, device management and firmware upgrade

2.5. Approvals

- FCC and IC
- CCF-57 CCF Certification with Cabled-IOT (Level 2) Endorsement
- CDMA carrier approvals (Verizon, Sprint, Aeris)
- CCC and SRRC (CE910-SC)
- EU RoHS compliant

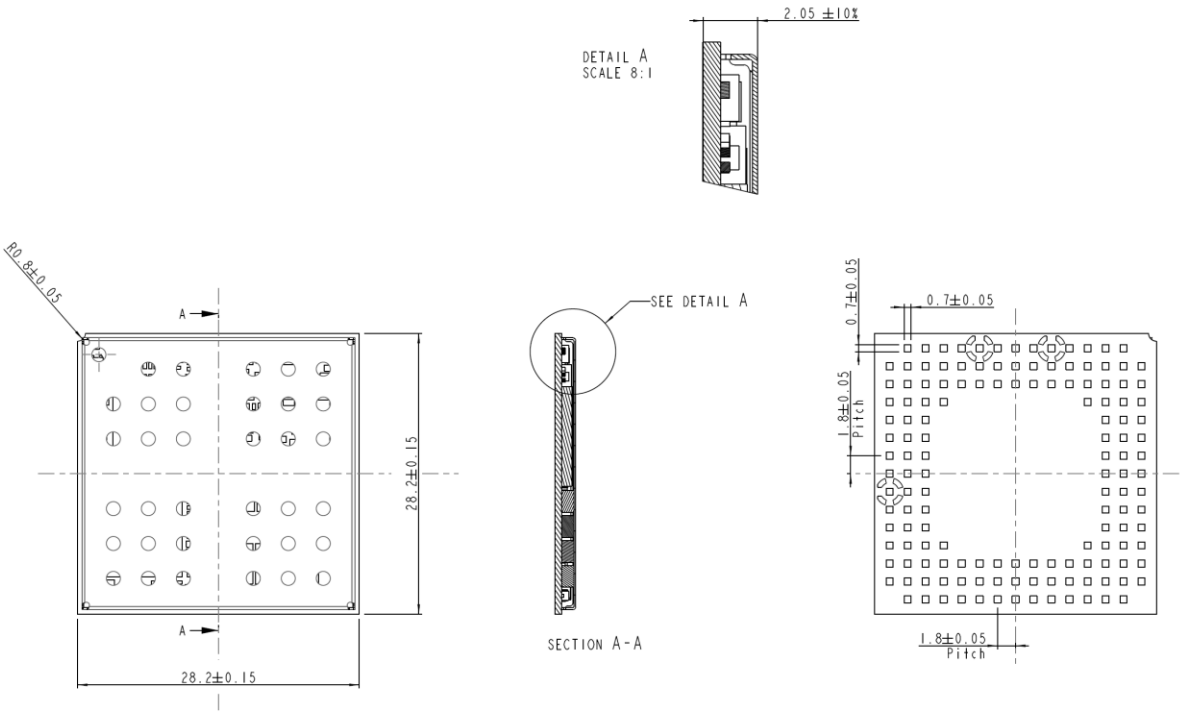


3. Mechanical specifications

3.1. Dimensions and 2D mechanical drawing

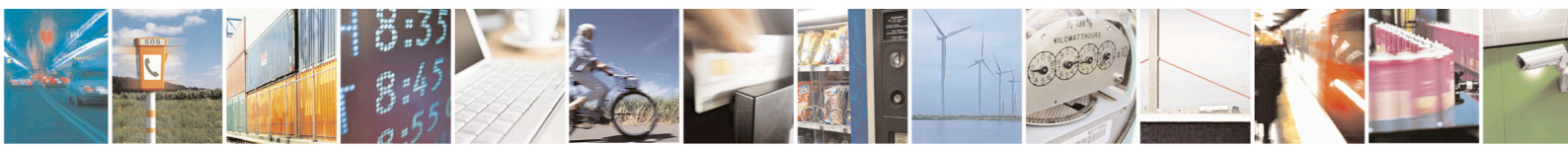
The overall dimensions of CE910 Series modules are:

- Length: 28.2 mm
- Width: 28.2 mm
- Thickness: 2.05 mm



3.2. Weight

The module weight of CE910 Series modules is 4.7 grams.



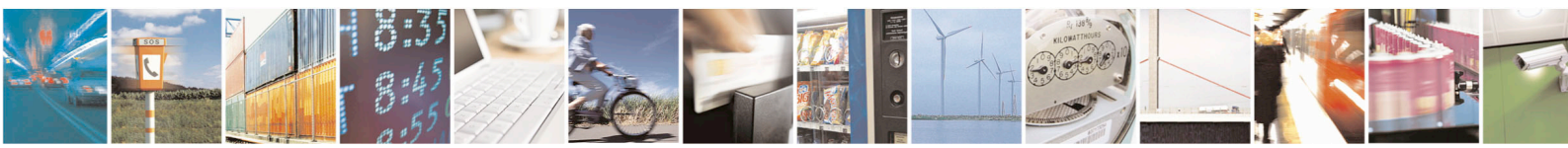
4. Environmental requirements

4.1. Temperature range

Item	Temp. range
Storage and Operating Temperature Range	–40°C ~ +85°C

4.2. RoHS compliance

As a part of Telit's corporate policy of environmental protection, the module complies with the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU Directive 2011/65/EU).



5. Electrical characteristics and external interfaces

5.1. Radio specification

5.1.1. Operating Frequency

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels	TX-RX offset (MHz)
CDMA BC0	824 ~ 849	869 ~ 894	1 ~ 799, 991 ~ 1023	45
CDMA BC1	1850 ~ 1910	1930 ~ 1990	0 ~ 1199	80

5.1.2. Transmitter output power

The TX output power in CDMA BC0 and CDMA BC1 operating mode is class III and class II accordance with the specifications which determine the power from 23dBm to 27dBm. The nominal output power is 24.5 dBm with 50 Ohm load.

5.1.3. Receiver sensitivity

The RX sensitivity of the module is better than -108 dBm in CDMA BC0 and better than -107 dBm in CDMA BC1 in normal operating conditions.

5.2. Antenna requirement

5.2.1. CDMA antenna

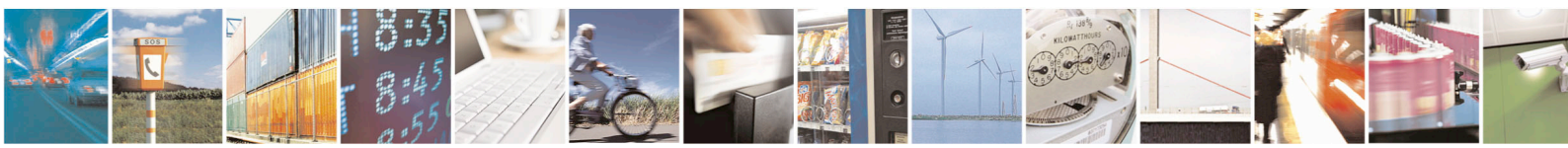
Customer should choose an antenna that complies with the frequency bands of both CDMA BC0 and CDMA BC1 for CE910-DUAL, BC0 only for CE910-SC. Please refer to the CDMA antenna section in the CE910 Series HW User Guide for further details.

5.3. Power supply

5.3.1. Supply voltage

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

Nominal Supply Voltage	3.8 V
Supply Voltage Range	3.4 V ~ 4.2 V
Extended Operating Voltage Range	3.4V ~ 4.5V



CAUTION:

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

5.3.2. Current consumption

Following the current consumption of the Telit CE910 Series modules:

Power off current	140 uA
Idle mode	1.1 mA
Traffic mode (Max power level)	<750 mA

The power supply should be designed to ensure 1A peak current at least.

For further information, please refer to the power supply section in the CE910 Series Hardware User Guide.

5.3.3. Reference power source

Three kinds of reference power source design guide are available to generate the nominal output of 3.8 V. The input sources are +5 V (typically PC internal regulator output), +12 V (typically automotive) and Li-Ion battery source.

Refer to the Electrical Design Guidelines in the CE910 Series Hardware User Guide for further details.

5.3.4. AUX power output (VAUX)

A 1.8V, 200mA general purpose power output is provided. Refer to the VAUX/PWRMON Power Output section in the CE910 Series Hardware User Guide and the Auxiliary Voltage Output Control section of CE910 Series AT Commands Reference Guide.

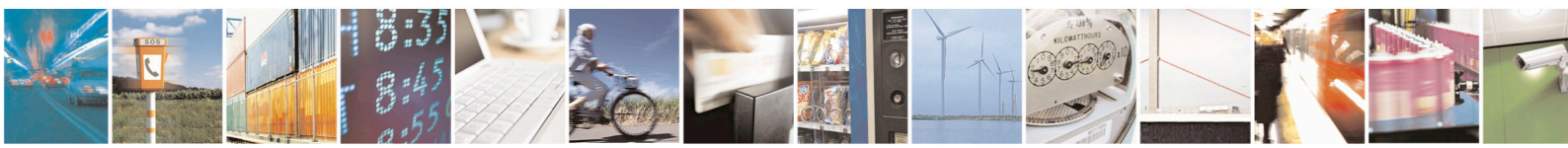
5.4. Logic level specifications

The logical interface works at 1.8 V CMOS level. Refer to the Logic level specification in the CE910 Series Hardware User Guide for further details.

5.5. Serial Interfaces

5.5.1. Full RS232 CMOS UART

Full RS232 CMOS UART can be used for control and data transfer. Refer to the Serial Port section in the CE910 Series Hardware User Guide and the V24 Output Pins section in CE910Series AT Commands Reference Guide for further details.



5.5.2. Two-wire UART

The secondary serial port on the CE910 is a CMOS 1.8V with only RX and TX signals.

5.5.3. USB port

The module has a USB 2.0 compliant port supporting data speed up to 12 Mbps that can be used for diagnostics monitoring, control and data transfer. Refer to the USB Port section in the CE910 Series Hardware User Guide and the Fixed DTE Interface Rate section in the CE910 Series AT Reference Guide for further details.

5.6. Audio Interfaces and control

5.6.1. Analog and digital audio interfaces

The CE910 Series provides one differential input for audio to be transmitted (Uplink) and a balanced output for audio to be received(Downlink). Refer to the Audio section in the CE910 Series Hardware User Guide for further details.

Moreover, the CE910 Series supports a PCM interface for digital audio. The PCM interface can be configured and controlled by AT-commands. Refer to the DVI related section in the CE910 Series AT Commands Reference Guide for further details.

5.7. Converters

5.7.1. A/D Converter

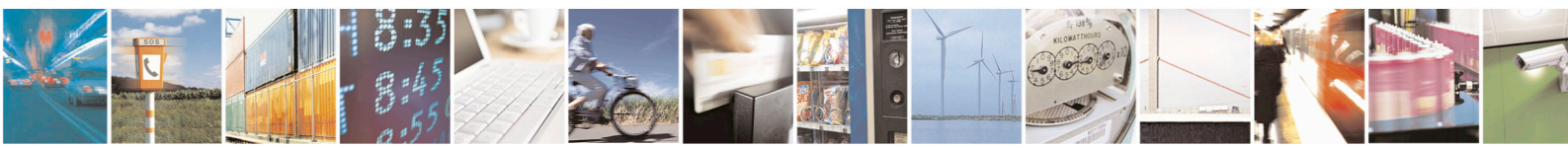
The CE910 Series modules provide an on board ADC, which is 12-bit analog to digital converter able to read a voltage level in the range of 0 ~ 1.2 V applied on the ADC pin input and store and convert it into 12 bit word. Refer to the ADC section in the CE910 Series Hardware User Guide and the ADC related section in the CE910 Series AT Commands Reference Guide for further details.

5.8. General purpose I/O

10 general purposes 1.8V I/Os can be configured to act in three different ways:

- Input: Input pads can only be read and report the digital value (high or low) present on the pin at the read time.
- Output: Output pads can be written to set the value of the pad or queried.
- Alternate function (internally controlled): An alternate function pad is internally controlled by the CE910 firmware and acts depending on the selected function.

Refer to the General Purpose I/O section in the CE910 Series Hardware User Guide for further details.



5.8.1. Dedicated I/Os

5.8.1.1. VRTC

The CE910 module is provided by an internal RTC section.

The RTC function of CE910 cannot be operated with VRTC only because the RTC section is not an independent part in CE910 unlike other Telit's products. So the external RTC backup capacitor will be also useless and VBATT must be connected to the CE910 to use the RTC feature.

VRTC is the supply for the internal RTC section and it is generated from VBATT inside the CE910 so the customer must not connect any power supply to the VRTC pin of the CE910.

WARNING:

Powering a device from this pin is not allowed.

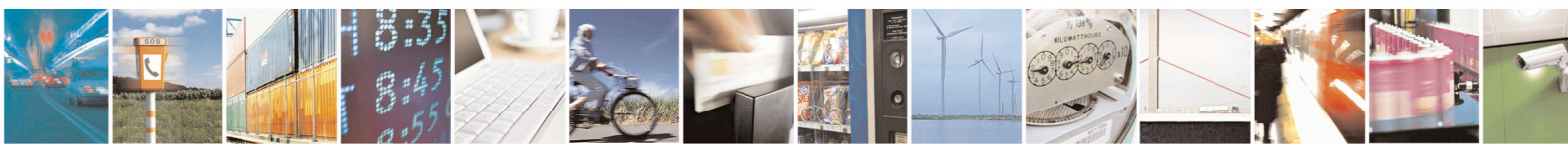
WARNING:

For CE910 the RTC feature cannot be operated with VRTC only so VBATT must be connected to the CE910 to use the RTC feature.

5.8.1.2. STAT_LED (Output)

The STAT_LED pin shows information on the network service availability and call status. An external transistor is required to drive an external LED. As a consequence, the status indicated in the following table is reversed with respect to the pin status:

LED status	Device status
Permanently off	Device off
Fast blinking (Period 1s, Ton 0.5 s)	Network searching/Not registered/Turning off
Slow blinking (Period 3s, Ton 0.3 s)	Registered full service
Permanently on	Active call



6. SW features

The SW features of CE910 are briefly described below. Refer to the CE910 Series Software User Guide and the CE910 Series AT Commands Reference Guide for further details.

6.1. User Interface

The user interface is managed by AT commands.

6.2. Basic operations

- Power ON/OFF
- Module and network status indication
- Provisioning and air interface
- Voice/Data call
- Automatic answer supported on both voice/data call
- Phonebook handling

6.3. Data transmission capabilities

- CDMA2000 1xRTT: 153.6 kbps on both UL and DL

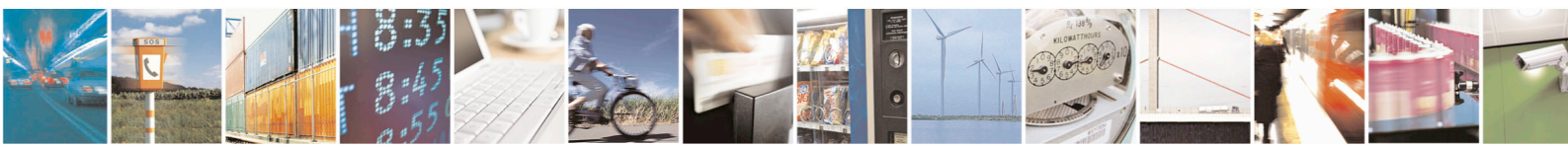
6.4. Supplementary services

- Call waiting
- Call holding
- Calling Line Identification Presentation (CLIP)
- Calling Line Identification Restriction (CLIR)

6.5. Acoustic signaling

The acoustic signaling of the Telit CE910 on the selected acoustic devices are the following:

- Call waiting (Network)
- Busy tone (Network)
- Ring tone
- Alarm tone
- Power off tone



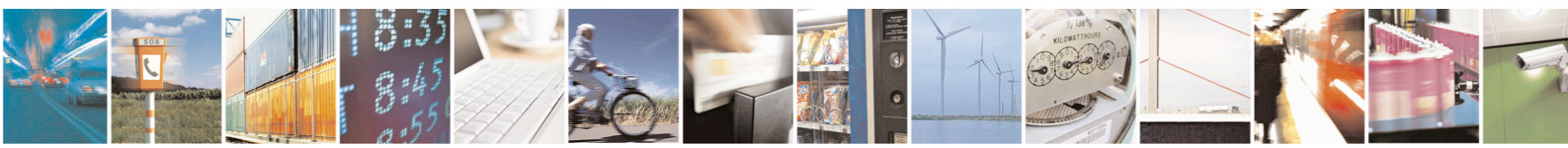
6.6. Advanced Operations

- Power saving
- SMS
- Programmable GPIOs
- Clock/Alarm function
- Multi-socket data session
- FTP operations
- Phone as Modem (PAM)
- Email

6.7. Carrier specific Operations

The features listed below depend on the carrier specification.

- Provisioning
- Call forwarding
- FOTA/OMA-DM
- Carrier specific AT commands



7. AT Commands

The CE910 can be driven by standard AT commands via the serial interface.

The CE910 is compliant with:

- TIA/EIA/707-A.3 AT Command
- Partial Hayes standard AT command set
- Partial 3GPP 27.005 specific AT Commands for sending and writing SMS (Short Message Service)
- Partial ETSI GSM 27.007 specific AT Commands for controlling voice and phonebook

The CE910 Series modules also support Telit proprietary unified AT commands for special purposes. For more information about AT commands supported by CE910, please refer to the CE910 Series AT Commands Reference Guide.

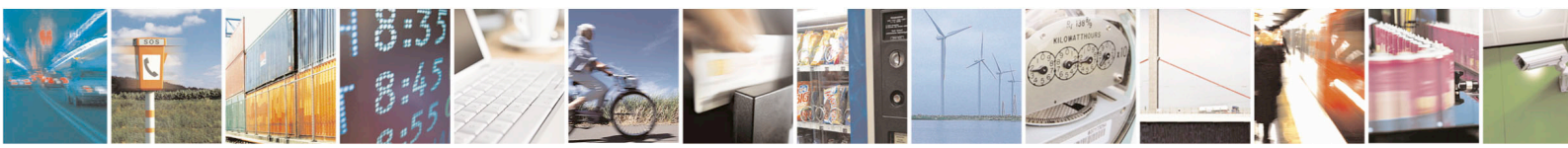
8. Packing information

The CE910 Series modules are packaged on trays of 36pcs each.

The CE910 modules can be also packaged on reels of 200 pieces each.

The CE910 is a Moisture Sensitive Device level 3, according to the standard IPC/JEDEC J-STD-020, special care for handling is highly required.

Please refer to the CE910 Series Hardware user Guide for further details.



9. Evaluation kit

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

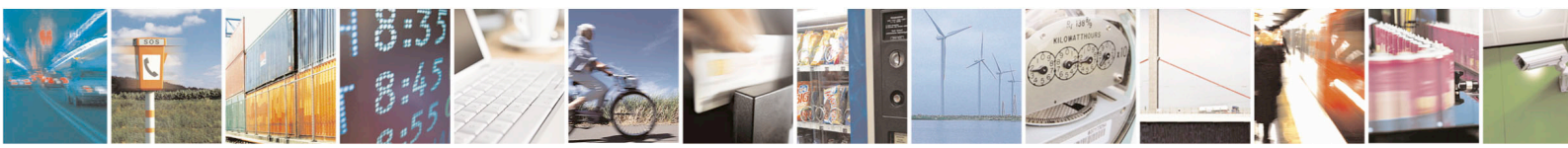
The EVK2 provides a fully functional solution for a complete data or phone application.

The standard serial RS-232 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 module must present a proper design of all the interfaces to 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, the EVK2 board presents a series of different solutions which will cover the most common design requirements on the market and which can be easily integrated in the OEM design as building blocks or can be taken as starting points to develop a specific one.

For a detailed description of the Telit Evaluation Kit, please refer to the documentation provided with the respective Hardware User Guide, EVK2 User Guide and EVK Drivers Installation Guide.



10. Conformity Assessment

10.1. FCC Certificate

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

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

Nemko Canada Inc.
303 River Road
Ottawa, Ontario, K1V 1H2
Canada

Date of Grant: 08/07/2012
Application Dated: 08/07/2012

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

Attention: Brian Tucker , Global VP, Quality

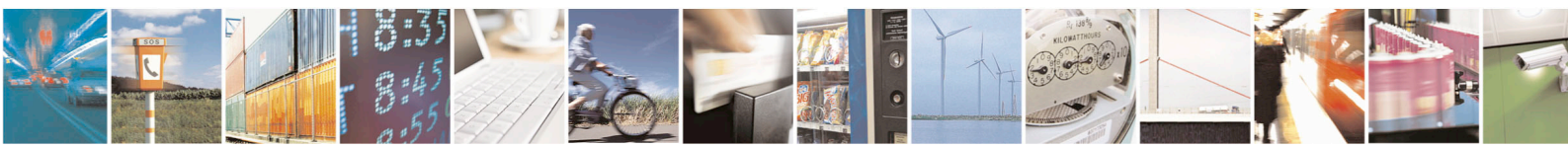
NOT TRANSFERABLE

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: R17CE910-DUAL
Name of Grantee: Telit Communications S.p.A.
Equipment Class: PCS Licensed Transmitter
Notes: DUAL BAND CDMA MODULE
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	22H	824.7 - 848.31	0.292	2.5 PM	1M28F9W
	24E	1851.25 - 1908.75	0.278	2.5 PM	1M28F9W

Power listed is conducted. The maximum antenna gain including cable loss for compliance with radiated power limits. RF exposure requirements and the categorical exclusion requirements of 2.1091 is 5.12dBi for part 22H and 6.12dBi for part 24E. The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not transmit simultaneously with any other antenna or transmitter. This device is allowed only for OEM integration into host products. Consumer or end-user installation is not allowed. End-users and OEM integrators must be provided with specific information required to satisfy RF exposure compliance.



10.2. IC Certificate

Nemko

Nemko Canada Inc

Certificate of Conformity — *Certificat de conformité*

Certification Number/ Numéro de Certification	:	5131A-CE910DUAL	**Certificate Number/ Numéro de Certificat** :	1-04367
Issued to/ Délivré a	:	Telit Communications S.p.A. Via Stazione di Prosecco 5/B Trieste 34010 Italy		
Model Name/ Modèle	:	CE910-DUAL		
Type of Equipment/ Genre de matériel	:	Cellular Mobile New Technologies (824–849MHz) PCS Mobile (1850–1910 MHz) Modular Approval		
Specifications/ Spécification	:	RSS-132 Issue 2 RSS-133 Issue 5		
Test Laboratory/ Laboratoire d'essai	:	Nemko Korea Co., Ltd. 300-2,Osan-Ri,Mohyeon-Myeon, Cheoin-Gu, Yongin-Si, Gyunggi-Do, KOREA 449-852 Tel) +82-31-322-1700 Fax) +82-31-322-2332 www.nemko.com		
Laboratory number/ Numéro de laboratoire	:	2040E		
Antenna Information/ Renseignements sur l'antenne	:	External		

Frequency/Fréquences (MHz)	Power/Puissance (Watts)	Emission Designation/Genre d'émission
824.7 – 848.31	0.292	1M28F9W
1851.25 – 1908.75	0.278	1M28F9W

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 Industry Canada 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 the requirements and procedures issued by Industry Canada. The equipment for which this certificate is issued shall not be manufactured, imported, distributed, leased, offered for sale or sold unless the equipment complies with the applicable technical specifications 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 d'Industrie Canada 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. Le matériel à l'égard duquel le présent certificat est délivré ne doit pas être fabriqué, importé, distribué, loué, mis en vente ou vendu à moins d'être conforme aux procédures et aux spécifications techniques applicables publiées par Industrie Canada.

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.

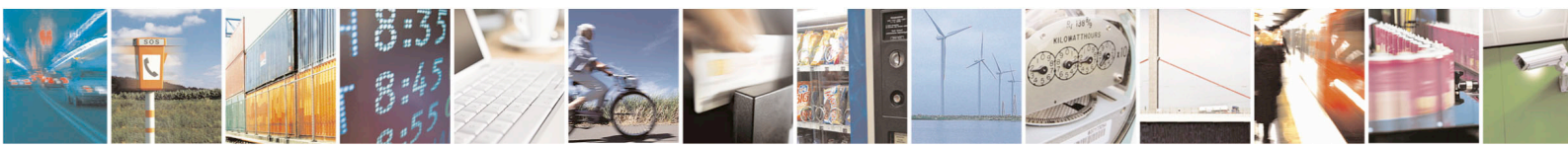
August 9, 2012
Date

Russell Grant
Senior Technical Assessor
Nemko Canada

Nemko Canada Inc, 303 River Road, Ottawa, Ontario, K1V 1H2, Canada
Tel: (613) 737 9680, Fax (613) 737 9691

Cert-001 Issue 5

The certification system, as described in ISO/IEC Guide 67 (Conformity Assessment – Fundamentals of Product Certification), most closely resembles System 1.



11. Safety Recommendations

11.1. Local regulations

Verify that the use of this product is permitted in the country intended and in the required product environment.

The use of this product may be dangerous and thus must be avoided where:

- Interfacing with other electronic devices in environments such as hospitals, airports, etc. is a concern.
- A risk of explosion exists, such as in the proximity of gasoline, oil refineries, etc.

The integrator is responsible for enforcing local and specific environmental regulations on the product.

11.2. Wiring and Installation

Always follow the instructions in this guide when wiring the product.

The module must be supplied with a stable voltage source, and the wiring must conform to security and fire prevention regulations.

The installation of external components must be well designed in order to ensure the proper functioning of the module.

11.3. Electrostatic Discharge

Avoid any contact with the pins because electrostatic discharge can damage the product.

11.4. Antennas

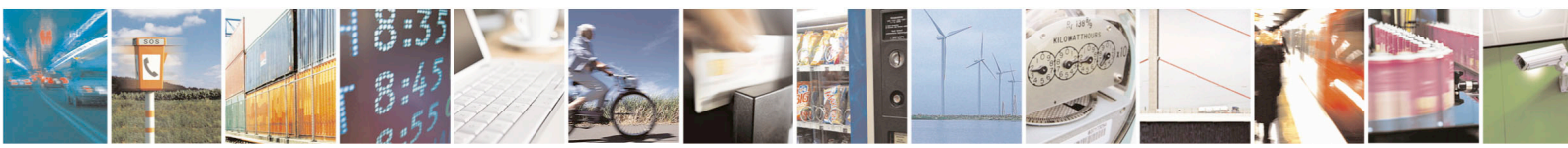
Every module must be equipped with a compatible antenna.

The antenna must be installed in a manner which avoids interference with other electronic devices.

Reusing the Telit FCC ID for the end product may be possible if the antenna is greater than 20cm from the human body when in use and there are no co-located transmitters. Otherwise additional FCC testing such as SAR may be required. The system integrator must assess the final product against the applicable FCC regulations.

11.5. Disassembly

Do not disassemble the product. Any evidence of tampering will void the warranty.



12. Document History

Revision	Date	Changes
0	2012-07-20	First issue
1	2013-01-03	Added FCC and IC Certificates Updated device dimensions and 2D mechanical drawing Updated current consumption
2	2013-06-20	Added CE910-SC to the Applicability Table Updated Storage and Operating Temperature Range Added Extend Operating Voltage Range
3	2014-01-02	Naming convention changed from “CE910 Family” to “ CE910 Series” Updated RTC info (section 5.8.1.1)
4	2015-05-20	Updated trays quantity in section 8 “Packing information” Renamed section 10 “Conformity Assessment”