

UE910-EU V2 AUTO Product Description

80419ST10598A rev.0 - 2013-11-11





APPLICABILITY TABLE

PRODUCT

UE910-EU V2 AUTO



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1. Introduction

1.1. Scope

Scope of this document is to give an overview of the Telit UE910-EU V2 AUTO: the automotive grade variant of the UE910-V2 series which can support GSM/GPRS/UMTS/HSDPA technologies.

1.2. 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.

1.3. Text Conventions



<u>Danger – This information MUST be followed or catastrophic equipment failure or bodily</u> 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.

1.4. Related Documents

- UE910-EU V2 AUTO Hardware User Guide, 1vv0301072
- AT Command User Guide, 80419ST10124A



2. The UE910-EU V2 AUTO

2.1. Product Overview

The UE910-EU V2 AUTO is a new and hardened variant of the dual-band UE910 V2 series designed for use in the most demanding automotive applications, delivering a downlink speed of up to 3.6 Mbps and uplink of up to 384 Kbps. Both products are based on market's latest release chipsets and slated for long-term availability protecting OEM's and Integrator's design investments.

The products include a 3GPP TS26.267 compliant in-band modem according to the eCall EU directive, leveraging Telit's expertise in audio processing and tuning, accessible via a wide set of dedicated AT commands. The modules are developed and manufactured under ISO TS16949 quality specifications meeting or exceeding supply chain requirements from OEM automotive.

The UE910-EU V2 AUTO is designed specifically for European automotive and telematics applications leveraging dual-band UMTS/HSDPA 900/2100MHz and 900/1800MHz GSM/GPRS/EDGE. It is voice-capable, also supporting both analog and digital interfaces. The module is equipped with a high-speed USB 2.0 interface, UART port, ten 1.8V I/O ports and an ADC converter. Upcoming support for Java J2ME makes the UE910-EU V2 AUTO ideal for projects requiring an embedded application framework.



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 UE910-EU V2 AUTO is designed and developed for the usage in most demanding automotive applications.

The deal platform for all embedded mobile data applications in the line-fitted automotive, telematics, fleet and logistics management segments.

2.3. Product Features

- Dual-band EGSM 900 / 1800 MHz class 12
- Dual-band UMTS/HSDPA 900 / 2100 MHz
- 3GPP protocol stack release 5 compliant
- Supply voltage range: 3.4 4.2 V DC (3.8 V DC nominal)
- Output power
 - Class 4 (2 W, 33 dBm) @ GSM 850 / 900
 - Class 1 (1 W, 30 dBm) @ GSM 1800 / 1900
 - Class E2 (0.5 W, 27 dBm) @ EDGE 850 / 900
 - Class E2 (0.4 W, 26 dBm) @ EDGE 1800 / 1900
 - Class 3 (0.25 W, 24 dBm) @ UMTS
- 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
- IP stack with TCP and UDP protocol
- E-Call compliant
- Dimensions: 28.2 x 28.2 x 2.2 mm
- Weight: 6 grams
- Extended temperature range
 - -40°C to +85°C (Operating range)
 - -40°C to +90°C (Storage temperature)
- RoHS and REACH compliant
- Manufactured under TS16949 Quality specifications

Interfaces

- 10 I/O ports
- Digital voice support





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- Analog voice support
- 2 ADC
- 1 DAC
- USB 2.0 High Speed
- 2 UART

Data transmission

- HSDPA:
 - DL up to 3.6Mbps
 - UL up to 384 kbps
- WCDMA: up to 384kbps downlink/uplink
- EDGE: DL up to 236.8 kbps, UL up to 236.8 kbps
- GPRS: DL up to 85,6 kbps, UL up to 85.6kbps
- Asynchronous non-transparent CSD up to 9.6kbps

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
- Concatenated SMS supported
- SMS cell broadcast
- Text and PDU mode
- SMS over GPRS

GPRS data

- GPRS class 12
- Mobile station class B
- Coding scheme 1 to 4
- PBCCH support
- GERAN Feature Package 1 support (NACC, Extended TBF)





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

Approvals

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

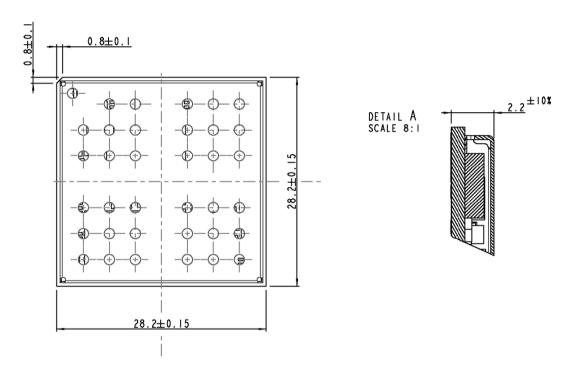


3. **Product Description**

3.1. Size and 2D mechanical drawing

The UE910-EU V2 AUTO overall dimensions are:

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



3.2. Weight

The weight of the UE910-EU V2 AUTO is about 5 grams.



3.3. Operating Frequency

The operating frequencies in GSM, DCS, PCS modes are conform to the GSM specifications.

| Mode | Freq. TX (MHz) | Freq. RX (MHz) | Channels | TX - RX offset |
|----------------|----------------|----------------|--------------------------------------|-------------------|
| EGSM900 | 890 ~ 915 | 935 ~ 960 | 0 ~ 124 | 45 MHz |
| EGSM900 | 880 ~ 890 | 925 ~ 935 | 975 ~ 1023 | offset |
| DCS1800 | 1710 ~ 1785 | 1805 ~ 1880 | 512 ~ 885 | 95MHz |
| WCDMA2100 – B1 | 1920 ~ 1980 | 2110 ~ 2170 | Tx: 9612 ~ 9888 Rx: 10562 ~ 10838 | 190MHz |
| WCDMA900 – B8 | 880 ~ 915 | 925 ~ 960 | Tx: 2712 ~ 2863 Rx: 2937 ~ 3088 | 45MHz |

3.4. Transmitter output power

The UE910-EU V2 AUTO family transceiver output of GSM/GPRS mode in 900MHz band is class 4 in accordance with the specifications which determine the nominal 2W peak RF power (+33dBm) on 50ohm. In the 1800 MHz band is class 1 in accordance with the specification which determines the nominal 1W peak RF power (+30dBm) on 50ohm.

The UE910-EU V2 AUTO family transceiver output of EDGE mode in 900MHz band is class E2 in accordance with the specifications which determine the nominal 0.5W peak RF power (+27dBm) on 50ohm. In the 1800 MHz band is class E2 in accordance with the specification which determine the nominal 0.4W peak RF power (+26dBm) on 50ohm.

The UE910-EU V2 AUTO family transceiver output of WCDMA mode (900/2100MHz bands) is class 3 in accordance with the specifications which determine the nominal 0.25W peak RF power (+24dBm) on 50ohm.

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:





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| Nominal Supply Voltage | 3.8 V |
|--------------------------------|---------------|
| Normal Operating Voltage Range | 3.4 V – 4.2 V |

(*) Please refer to the UE910-EU V2 AUTO Hardware User Guide for using the product with the extended operating voltage range.

3.7. Power consumption

Please refer to the UE910-EU V2 AUTO Hardware User Guide

3.8. 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.

3.9. Inputs and Outputs

3.9.1. 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.

3.9.2. Power on monitor (PWR_MON)

The PWR MON indicates the status of the module running properly.

3.9.3. Power on/off control (ON_OFF)

External power on/off control input. Refer to the UE910-EU V2 AUTO Hardware User Guide for more details of Power on timing.

3.9.4. Auxiliary power output for accessory (VAUX)

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

3.9.5. SIM Reader

The UE910-EU V2 AUTO family supports 1 SIM/USIM at 1.8V and 3V ONLY with an external SIM connector. For 5V SIM, an external level translator can be added. Refer to the UE910-EU V2 AUTO Hardware User Guide.

3.9.6. Serial Port

Full RS232 CMOS UART: baud rate up to 4Mbps

3.9.7. USB port

USB High speed 2.0: baud rate up to 480Mbps





3.10. Converters

3.10.1. ADC Converter

The UE910-EU V2 AUTO has one on board ADC, which is an 12-bit converter. It is able to read a voltage level in the range of 0÷1.2 volts applied on the ADC pin input, store and convert it into 12 bit word.

3.11. 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 UE910-EU V2 AUTO, please check with the Hardware User Guide.

3.12. Audio

3.12.1. Analog

The UE910-EU V2 AUTO has an analog voice interface.

For more details, please refer to the UE910-EU V2 AUTO Hardware User Guide.

3.12.2. Digital

The UE910-EU V2 AUTO offers the digital voice interface. For more details, please refer to the Digital Voice Interface Application Note.

3.13. Other features

3.13.1. Speech CODEC

The UE910-EU V2 AUTO 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

3.13.2. **SMS**

The UE910-EU V2 AUTO supports the following SMS types:

- Mobile Terminated (MT) class 0 3 with signaling 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 signaling of new incoming SMS.

The UE910-EU V2 AUTO also supports SMS over GPRS





3.13.3. Phonebook

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

3.13.4. Call status indication

The call status indication is supported.

3.13.5. eCall Compliance

eCall is a project of the European Commission intended to bring rapid assistance to motorists involved in a collision anywhere in the European Union. The projects aims to employ a hardware black box installed in vehicles that will wirelessly send vehicle location information, time stamp, number of passengers, Vehicle Identification Number (VIN), and other relevant accident information to local emergency agencies eCall builds on emergency voice call (E112).

The main actors are the IVS (In-Vehicle System) and the PSAP (Public Safety Answering Point). When a collision happens the IVS sends to PSAP the MSD (Minimum Set of Data) via the speech channel of cellular and PSTN networks.

eCall provides reliable full-duplex data communications between IVS and PSAP in addition to emergency voice call, and can be initiated either automatically or manually. The eCall Inband Modem uses the same voice channel as used for the emergency voice call. eCall allows reliable transmission of MSD alternating with a speech conversation through the existing voice communication paths in cellular mobile phone systems.

Telit, understanding the importance of the eCall standard, developed its own eCall in band modem solution. The extra-rugged UE910 AUTO V2 is able to act as IVS in-band modem. IVS in-band modem functionality is completely transparent because user has only to enable it and manage unsolicited messages coming for AT commands interface.

3.14. Environmental requirements

Environmental tests according to ISO 16750-1/-3/-4

Manufactured according to ISO TS 16949

3.14.1. RoHS compliance

As a part of Telit's corporate policy of environmental protection, the UE910-EU V2 AUTO product comply to the RoHS (Restriction of Hazardous Substances) directive of the European Union (EU Directive 2002/95/EG).

3.15. Mounting the UE910-EU V2 AUTO on your Board

The Telit UE910-EU V2 AUTO module has been designed in order to be compliant with a standard lead-free SMT process. For detailed information about PCB pad design and conditions to use in SMT process please check with the UE910-EU V2 AUTO Hardware User Guide.





3.16. Packing system

According to SMT process, for picking & placing movement requirements, UE910-EU V2 AUTO family is packaged on trays.

The level of moisture sensibility of UE910-EU V2 AUTO 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-EU V2 AUTO module 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 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 Telit UE910-EU V2 AUTO Hardware User Guide and EVK2 User Manual.

4.1. AT Commands

The Telit UE910-EU V2 AUTO 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 UE910-EU V2 AUTO module supports also Telit proprietary AT commands for special purposes.

For a more information about AT commands supported by the UE910-EU V2 AUTO module please refer to document AT Commands Reference Guide.



4.2. 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 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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5. List of acronyms

| ACM | Accumulated Call Meter | | |
|------------|--|--|--|
| ASCII | American Standard Code for Information Interchange | | |
| AT | Attention commands | | |
| СВ | Cell Broadcast | | |
| CBS | Cell Broadcasting Service | | |
| CCM | Call Control Meter | | |
| CLIP | Calling Line Identification Presentation | | |
| CLIR | Calling Line Identification Restriction | | |
| CMOS | Complementary Metal-Oxide Semiconductor | | |
| CR | Carriage Return | | |
| CTS | Clear To Send | | |
| DAI | Digital Audio Interface | | |
| DCD | Data Carrier Detected | | |
| DCE | Data Communications Equipment | | |
| DRX | Data Receive | | |
| DSR | Data Set Ready | | |
| DTA | Data Terminal Adaptor | | |
| DTE | Data Terminal Equipment | | |
| DTMF | Dual Tone Multi Frequency | | |
| DTR | Data Terminal Ready | | |
| EMC | Electromagnetic Compatibility | | |
| ETSI | European Telecommunications Equipment Institute | | |
| FTA | Full Type Approval (ETSI) | | |
| GPRS | General Radio Packet Service | | |
| GSM | Global System for Mobile communication | | |
| HF | Hands Free | | |
| IMEI | International Mobile Equipment Identity | | |
| IMSI | International Mobile Subscriber Identity | | |
| IRA | International Reference Alphabet | | |
| ITU | International Telecommunications Union | | |
| IWF | Inter-Working Function | | |
| LCD | Liquid Crystal Display | | |
| LED | Light Emitting Diode | | |
| LF | Linefeed | | |
| ME | Mobile Equipment | | |
| MMI | Man Machine Interface | | |
| MO | Mobile Originated | | |
| MS | Mobile Station | | |
| MT | Mobile Terminated | | |
| OEM | Other Equipment Manufacturer | | |
| PB | Phone Book | | |
| PDU | Protocol Data Unit | | |
| PH | Packet Handler | | |
| PIN | Personal Identity Number | | |



| PLMN | Public Land Mobile Network | |
|-------------|---|--|
| PUCT | Price per Unit Currency Table | |
| PUK | PIN Unblocking Code | |
| RACH | Random Access Channel | |
| RLP | Radio Link Protocol | |
| RMS | Root Mean Square | |
| RTS | Ready To Send | |
| RI | Ring Indicator | |
| SCA | Service Center Address | |
| SIM | Subscriber Identity Module | |
| SMD | Surface Mounted Device | |
| SMS | Short Message Service | |
| SMSC | Short Message Service Center | |
| SS | Supplementary Service | |
| TIA | Telecommunications Industry Association | |
| UDUB | User Determined User Busy | |
| USSD | Unstructured Supplementary Service Data | |



6. Document History

| Revision | Date | Changes |
|----------|------------|-------------|
| 0 | 2013-11-11 | First issue |