

GL868-DUAL V3 Product Description

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APPLICABLE PRODUCTS

PRODUCT
GL868-DUAL V3



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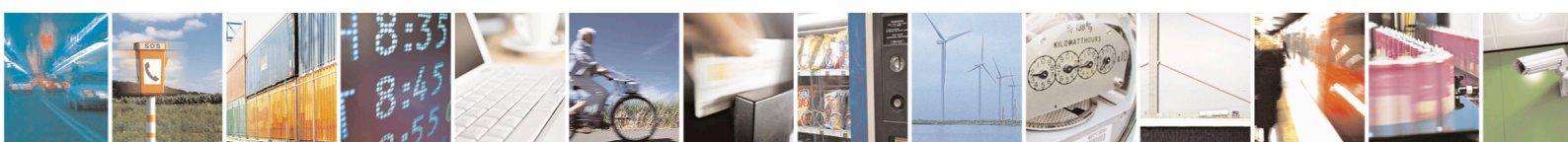
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1. Introduction

1.1. Scope

Scope of this document is giving an overview of the Telit GL868-DUAL V3 module, which is a compact GSM/GPRS module with data and voice capabilities.

1.2. Audience

This document is intended for customers who are evaluating the GL868-DUAL V3.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit's 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's 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: “The GL868-DUAL V3”](#) gives an overview of the features of the product.



2. The GL868-DUAL V3

2.1. Product Overview

The GL868-DUAL V3 is the new generation module in GL868 family. It is based on the latest Intel 2G chipset, protecting our customers' design investments with a long-term availability solution. The new V3 variant features VQFN packaging versus the LCC castellation in the original GL868, maintaining full pad-level compatibility and thereby providing a soft transition replacement to the highly popular and widely deployed GL868-DUAL.

It is highly recommended for new designs requiring 2G coverage in a sleek and robust QFN package, which implies easy integration and low impact on final application costs. Ease of production and small foot print makes it the ideal solution for applications in security alarms, automated meter reading, and POS terminals.

The new generation GL868-DUAL V3 operates with 1.8V GPIOs versus its predecessor's 2.8V, minimizing power consumption and making it even more ideally suited for battery powered and wearable device applications.

The GL868-DUAL V3 can be easily bundle-designed with Telit's GPS or GPS/GLONASS receivers for applications requiring location awareness such as fleet management and track-and-tracing; with the aid of available reference designs and global technical integration support from Telit.

The GL868-DUAL V3 makes it possible to run the customer's application inside the module by means its embedded Python Script Interpreter, thus making it a complete SMT platform for m2m solutions.

All Telit modules, support Over-the-Air firmware update by means Premium FOTA Management. By embedding Red Bend Software vRapid Mobile® agent, a proven and battletested technology powering hundreds of millions of cellular handsets world-wide Telit is able to update its products by transmitting only a delta file, which represents the difference between one firmware version and another.



- Weight: 2.8 grams
- Storage and Operating temperature range: -40°C to +85°C
- Country SIM lock for the following countries:
 - Russia
 - Ukraine
 - Belorussia
 - Moldova
 - Kazakhstan
 - Armenia
 - Azerbaijan
 - Georgia
 - Kyrgyzstan
 - Tajikistan
 - Turkmenistan
 - Uzbekistan
 - Estonia
 - Lettonia
 - Lituania
 - Bangladesh
 - China
 - Hong Kong
 - India
 - Laos
 - Macao
 - Malaysia
 - Mongolia
 - Nepal
 - Pakistan
 - Philippine
 - Singapore
 - Sri Lanka
 - Taiwan
 - Thailand
 - Vietnam



- India
- Abkhazia

Interfaces

- 8 I/O ports maximum
- Analog audio (balanced)
- Digital Voice Interface
- 2 A/D plus 1 D/A converters
- Buzzer output
- ITU-T V.24 serial link through CMOS UART:
 - Baud rate from 300 to 115.200 bps
 - Autobauding up to 115.200 bps

Audio

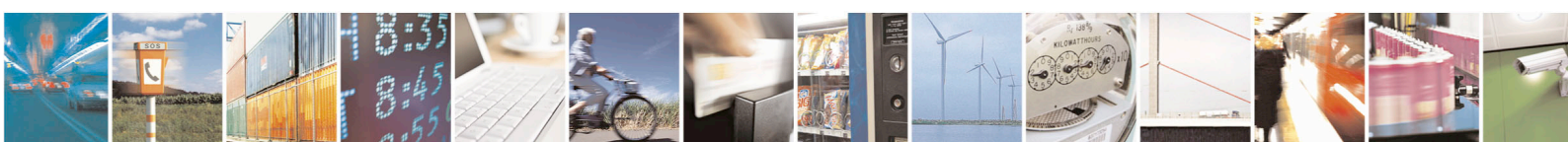
- Telephony, emergency call
- Half rate, full rate, enhanced full rate and adaptive multi rate voice codecs (HR, FR, EFR, AMR)
- Superior echo cancellation & noise reduction
- Multiple audio profiles pre-programmed and fully configurable
- Embedded DTMF decoder

Approvals

- CCC, SRRC

SMS

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



Circuit switched data transmission

- Asynchronous non-transparent CSD up to 9.6 kbps
- V.110

GPRS data

- GPRS class 10
- 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

Additional features

- SIM phonebook
- Fixed dialling number (FDN)
- Real Time Clock
- Alarm management
- Network LED support
- IRA, GSM, 8859-1 and UCS2 character sets
- Jamming detection
- Embedded TCP/IP stack, including TCP, IP, UDP, SMTP, ICMP and FTP protocols
- EASY SCAN ® automatic scan over GSM frequencies (also without SIM card)



Python* application resources

- Python* script interpreter (module takes the application code directly in the Python* language)
- Memory: 800 kB of NV memory for the user scripts and 1 MB RAM for the Python* engine usage
- Over-the-air application SW update

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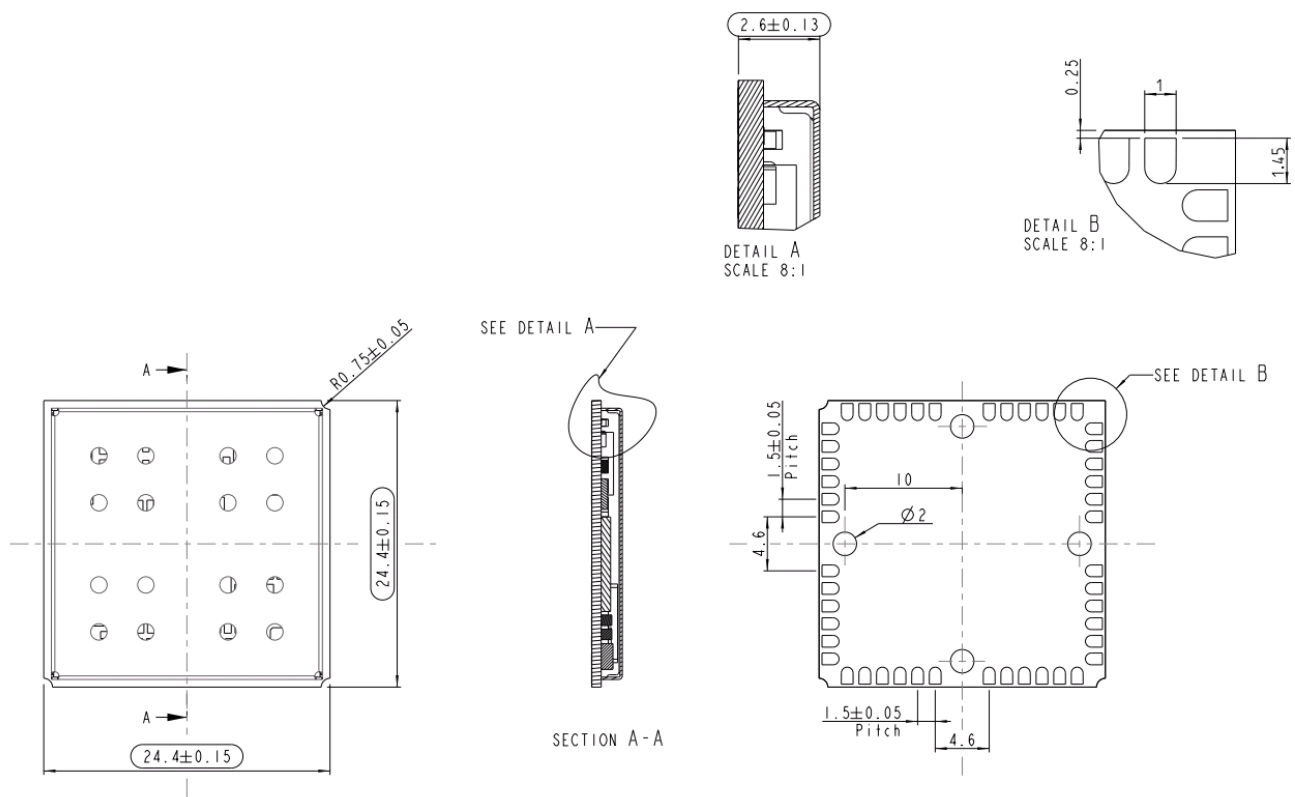


3. Product Description

3.1. Size and 2D mechanical drawing

The Telit GL868-DUAL V3 module overall dimensions are:

- Length: 24.4 mm
- Width: 24.4 mm
- Thickness: 2.6 mm



3.2. Weight

The weight of the GL868-DUAL V3 is 2.8 grams.



3.3. Environmental requirements

3.3.1. Temperature range

Storage and Operating Temperature Range	-40°C ÷ +85°C
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3.4. Operating Frequencies

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

Mode	Freq. TX (MHz)	Freq. RX (MHz)	Channels (ARFC)	TX - RX offset
GSM-900	890.0 - 914.8	935.0 - 959.8	0 ÷ 124	45 MHz
	880.2 - 889.8	925.2 - 934.8	975 ÷ 1023	45 MHz
DCS-1800	1710.2 - 1784.8	1805.2 - 1879.8	512 ÷ 885	95 MHz

3.5. Transmitter output power

The GL868-DUAL V3 transceiver modules operating mode in GSM-900 band is Class 4 in accordance with the specifications which determine the nominal 2W peak RF power (+33dBm) on 50 Ohm. In the DCS-1800 band, the operating mode is Class 1 in accordance with the specifications, which determine the nominal 1W peak RF power (+30dBm) on 50 Ohm.

3.6. Receiver sensitivity

Sensitivity of the module in GSM 900 band is better than -108 dBm (2.4% BER Class II - static channel) in normal operating conditions.

Sensitivity of the module in GSM 1800 band is better than -107 dBm (2.4% BER Class II - static channel) in normal operating conditions.

The GL868-DUAL V3 supports also the Downlink Advance Receiver Performance (DARP) feature for single antenna interference cancellation (SAIC).



3.11. Speech CODEC

The GL868-DUAL V3 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. SIM Reader

The GL868-DUAL V3 supports phase 2 SIM at 1.8V and 3V ONLY with an external SIM connector. For 5V SIM, an external level translator can be added.

3.13. SMS

The GL868-DUAL V3 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 GL868-DUAL V3 also supports SMS over GPRS

3.14. Real Time Clock and Alarm

The GL868-DUAL V3 supports the Real Time Clock and Alarm functions through AT commands. An alarm output pin can be configured to indicate the alarm with a hardware line output.

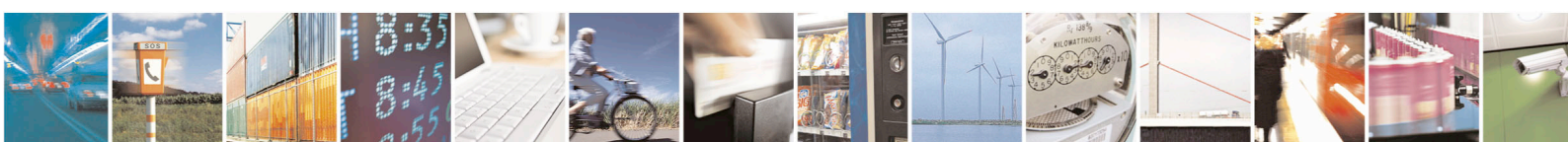
Furthermore the Voltage Output of the RTC power supply is provided so that a backup battery can be added to increase the RTC autonomy during power off of the main battery (power supply).

3.15. Enhanced Measurement Report

The GL868-DUAL V3 supports the Enhanced Measurement Report on SACCH channel according to 3GPP TS 44.018 version 4.22.0 Release 4 (par. 3.4.1.2, 9.1.54, 9.1.55) and 3GPP TS 45.008 version 4.17.0 Release 4 (par. 8.4.8).

3.16. Data transmission capabilities

The Telit GL868-DUAL V3 is a mobile station class B supporting GPRS Class 10, coding schemes 1 to 4 and PBCCH. Moreover, it supports GERAN feature package 1, which consist in supporting the Extended Uplink TBF and Network Assisted Cell Change (NACC).



As for circuit switched data, the GL868-DUAL V3 supports asynchronous non-transparent data up to 9.6 Kbps. Moreover, it supports the V.110.

3.17. Local security management

The local security management can be done with the lock of Subscriber Identity module (SIM). The security code will be requested at power-up.

3.18. Call control

The call cost control function is supported.

3.19. Phonebook

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

3.20. Characters management

The GL868-DUAL V3 supports the IRA, GSM, 8859-1 and UCS2 characters sets, in TEXT and PDU mode.

3.21. SIM related functions

Fixed Dialing Numbers (FDN), Abbreviated Dialing Number (ADN) and PIN insertion are supported.

Extension at the PIN2 for the PUK2 insertion capability for lock condition is supported too.

3.22. Call status indication

The call status indication is supported.

3.23. Automatic answer (Voice, Data)

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

The user/application can set the number of rings by means of the command `ATS0=<n>`.

3.24. Supplementary services (SS)

The following supplementary services are supported:

- Call Barring,
- Call Forwarding,
- Calling Line Identification Presentation (CLIP),
- Calling Line Identification Restriction (CLIR),
- Call Waiting, other party call Waiting Indication,



- Call Hold, other party Hold / Retrieved Indication,
- Closed User Group supplementary service (CUG),
- Advice of Charge,
- Unstructured SS Mobile Originated (MO)

3.25. Acoustic signaling

The acoustic signaling of the GL868-DUAL V3 on the selected acoustic device are the following:

- Call waiting;
- Ringing tone;
- SMS received tone;
- Busy tone;
- Power on/off tone;
- Off Hook dial tone;
- Congestion tone;
- Connected tone;
- Call dropped;
- No service tone;
- Alarm tone.

3.26. Buzzer output

The GPIO7 pad, when configured as Buzzer Output, is controlled by the GL868-DUAL V3 module and will drive a Buzzer driver with appropriate square waves.

This permits to your application to easily implement Buzzer feature with ringing tones or melody played at the call incoming, tone playing on SMS incoming or simply playing a tone or melody when needed.

3.27. RF Transmission Monitor (RFTXMON)

As alternate function of the GPIO5, the GL868-DUAL V3 can provide the RF transmission monitor. When the alternate function is activated, the pin of GPIO5 will rise when the transmitter is active and fall after the transmitter activity is completed. Please refer to the GL868-DUAL V3 Hardware User Guide for further information.

3.28. RF Transmission Control

The GPIO4 pin, when configured as RF Transmission Control Input, permits to disable the Transmitter when the GPIO is set to Low by the application.



In the design is necessary to add a resistor 47K pull up to 2.8V, this pull up must be switched off when the module is in off condition.

3.29. TTY (Telephone Text)

The TTY feature is supported. Please refer to 3GPP TS 26.226 and 3GPP TS 26.231 for details.

3.30. Logic level specifications

Where not specifically stated, all the interface circuits work at 1.8V CMOS logic levels (versus 2.8V of the original GL868-DUAL). To get more detailed information about the logic level specifications used in the GL868-DUAL V3, please check the Hardware User Guide.

3.31. Audio

3.31.1. Analog

The GL868-DUAL V3 offers one audio line balanced. The GL868-DUAL V3 has a built-in echo canceller and a noise suppressor. For more details, please refer to the GL868-DUAL V3 Hardware User Guide.

3.31.2. Digital

The GL868-DUAL V3 offers the digital voice interface. For more details, please refer to the Digital Voice Interface Application Note.

3.32. Serial Ports

Two serial ports are available on the module:

- MODEM SERIAL PORT 1 (Main, ASC0)
- MODEM SERIAL PORT 2 (Auxiliary, ASC1)

3.33. Converters

3.33.1. ADC Converter

The GL868-DUAL V3 has two on board ADC, which are 11-bit converters. They are able to read a voltage level in the range of 0÷2 volts applied on the ADC pin input, store and convert it into 11 bit word.

3.33.2. DAC Converter

The GL868-DUAL V3 has one on board DAC, which is a 10 bit converter, able to generate an analogue value based a specific input in the range from 0 up to 1023. However, an external low-pass filter is necessary. See the Hardware User Guide for the details.



3.34. Mounting the GL868-DUAL V3 on your Board

The Telit GL868-DUAL V3 module has been designed 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 GL868-DUAL V3 Hardware User Guide.

3.35. Packing system

The Telit GL868-DUAL V3 is supplied on trays of 20 pieces each.

The GL868-DUAL V3 can be also packaged on reels of 200 pieces each.

For further information on GL868-DUAL V3 packing system please refer to the GL868-DUAL V3 Hardware User Guide.

The level of moisture sensibility of GL868-DUAL V3 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 GL868-DUAL V3 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 performance 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 GL868-DUAL V3 Hardware User Guide and EVK2 User Manual.



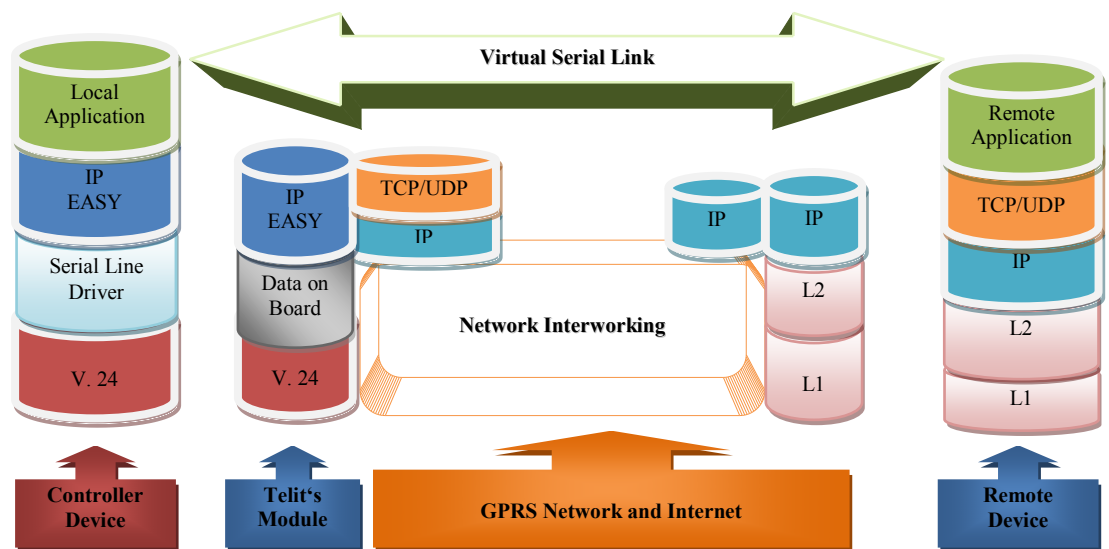
5. Software Features

5.1. IP Easy Extension

5.1.1. Overview

The IP Easy feature allows the Telit GL868-DUAL V3 user to contact a device in internet and establish with it a raw data flow over the GPRS and Internet networks.

This feature can be seen as a way to obtain a "virtual" serial connection between the Application Software on the Internet machine involved and the controller of the Telit GL868-DUAL V3 module, regardless of all the software stacks underlying.



This particular implementation allows to the devices interfacing to the Telit GL868-DUAL V3 module the use of the GPRS and Internet packet service without the need to have an internal TCP/IP stack since this function is embedded in the module.

For more detailed information regarding the use of the IP Easy feature, please consult IP Easy User Guide and AT Commands Reference Guide.

5.2. Multisocket

The multisocket is an extension of Telit IP Easy feature, which allows the user to have two contexts activated (that means two different IP address), more than one socket connection (with a maximum of 6) and simultaneous FTP client service.

For more detailed information please consult the IP Easy User Guide.



5.3. Jamming Detection

5.3.1. Overview

The Jammer Detect feature allows the GL868-DUAL V3 to detect the presence of a disturbing device such as a Communication Jammer and give indication to the user.

This feature can be very important in alarm, security and safety applications that rely on the module for the communications. In these applications, the presence of a Jammer device can compromise the whole system reliability and functionality and therefore shall be recognized and reported to the local system for countermeasure actions.

5.4. CMUX

CMUX (Converter-Multiplexer) is a multiplexing protocol implemented in the GL868-DUAL V3 that can be used to send any data, SMS, or TCP data.

5.4.1. Architecture

The Multiplexer mode enables one serial interface to transmit data to four different customer applications. This is achieved by providing four virtual channels using a Multiplexer (MUX).

This is especially advantageous when a data/GPRS call is ongoing. Using the Multiplexer features, e.g. controlling the module or using the SMS service can be done via the additional channels without disturbing the data flow; access to the second UART is not necessary.

Furthermore, several accesses to the module can be created with the Multiplexer. This is of great advantage when several independent electronic devices or interfaces are used.

To access the three virtual interfaces, both the GSM engine and the customer application must contain MUX components, which communicate over the multiplexer protocol.

In Multiplexer mode, AT commands and data are encapsulated in packets. Each packet has channel identification and may vary in length.

5.4.2. Features

- 3GPP 27.010 CMUX Basic Option used
- CMUX implementation support four full DLCI (Serial Port)
- Every CMUX instance has its own user profile storage in NVM
- Independent setting of unsolicited message.
- Every CMUX instance has its own independent flow control

NOTE: More details about the Multiplexer mode are available in the CMUX User Guide.



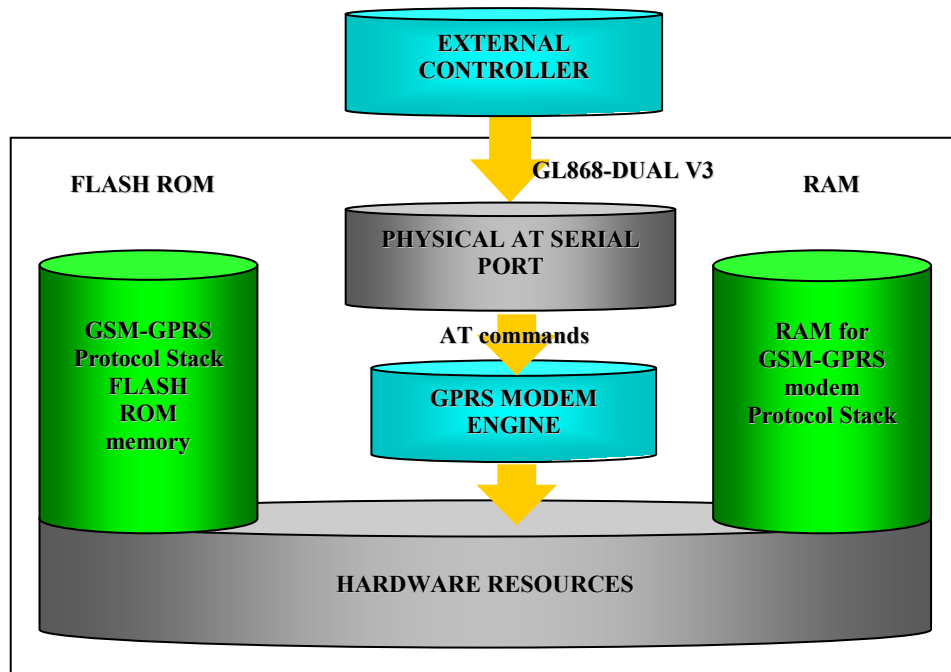
5.5. Easy Script Extension - Python interpreter

5.5.1. Overview

The Easy Script Extension is a feature that allows driving the modem "internally", writing the controlling application directly in a nice high level language: Python.

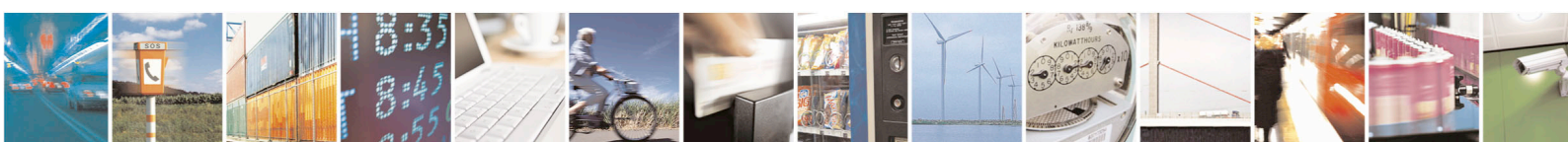
The Easy Script Extension is aimed at low complexity applications where the application was usually done by a small microcontroller that managed some I/O pins and the GL868-DUAL V3 through the AT command interface.

A schematic of such a configuration can be:



In order to not use any external controller, and further simplify the programming of the sequence of operations, the customer can benefit of these feature already embedded in the GL868:

- Python script interpreter engine v. 1.5.2+
- 800 kB of Non Volatile Memory room for the user scripts and data
- 1 MB RAM reserved for Python engine usage



5.6.2. Implementation features

- SAP is based on 3GPP 27.010 CMUX Basic Option used
- Only SAP Client features
- Logic HW flow control is recommended on the Virtual instance selected for the SAP command.

5.6.3. Remote SIM Message Command Description

The module sends request commands to the client application through a binary message that is crowned in the CMUX message. The client application shall extract the message and send it to the SAP server, through the appropriate protocols (e.g. by RFCOMM, that is the Bluetooth serial port emulation entity).

The client application shall extract all the messages sent by SAP server and put them in the CMUX message, to be sent to the module.

The module fulfills the following feature requirements:

- Connection management
- Transfer APDU
- Transfer ATR
- Power SIM on
- Report Status
- Error Handling

Every feature needs some procedures support:

Feature	Procedure
Connection Management	Connect
	Report Status
	Transfer ATR
	Disconnection Initiated by the Client
	Disconnection Initiated by the Server
Transfer APDU	Transfer APDU
Transfer ATR	Transfer ATR
Power SIM on	Power SIM on
	Transfer ATR
Report Status	Report Status
Error Handling	Error Response

Report Status, Disconnection Initiated by the Server and Error Response are independent messages sent by server. The other procedures consist of couples of messages, started by client.

NOTE: More details about the SAP are available in the SAP User Guide.



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



8. Document History

Revision	Date	Changes
0	2013-04-05	First issue
1	2013-07-18	Updated Temperature Range Updated Mechanical Drawing
2	2013-08-06	Updated Supply voltage Updated Packing system

