

IPC/WLB-GU, -WBGU, -WB

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1 Introduction

1.1. General Remarks

The content and presentation of this document has been carefully checked. No responsibility is accepted for any errors or omissions in the documentation.

Note that the documentation for the products is constantly revised and improved. The right to change this documentation at any time without notice is therefore reserved.

Syslogic is grateful for any help referring to errors or for suggestions for improvements.

The following registered trademarks are used:

IBM-PC, PC/AT, PS/2

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Windows

trademark of Microsoft Corporation

1.2. Contents of this Documentation

This document addresses to system integrators, programmers and instructed installation and maintenance personal working with the IPC/WLB-WBGU system. It provides all information needed to configure, setup and program the IPC/WLB-WBGU board. For complete information also the documentation of the CPU base board and communications and I/O boards must be consulted.

1.3. Additional Products and Documents

1.3.1. Hardware Products

The following hardware products are useful together with the IPC/WLB-WBGU board:

1. DOC/COMPACT71-MLE
2. DOC/COMPACT71-SLE

1.3.2. Software Products

The following software products are useful together with the IPC/WLB-WBGU board:

3. IPC_DEBIAN_USER_MANUAL.pdf
4. DOC/WINESTD7-71A

1.3.3. Documents

The following documents are *required* for correct installation and operation of the COMPACT base board:

5. DOC/IPC_WLB (this document)
6. u-blox_AT_Commands_Manual_(WLS-SW-11000).pdf: U-Blox communication protocol description for UMTS and GPS modules.

1.4. Installation

The IPC/WLB-WBGU comes already preinstalled into the compliant COMPACT system. Therefore there is no need to install the hardware.

1.5. Safety Recommendations and Warnings

The products are intended for measurement, control and communications applications in industrial environments. The products must be assembled and installed by specially trained people. The strict observation of the assembly and installation guidelines is mandatory.

The use of the products in systems in which the life or health of persons is directly dependent (e.g. life support systems, patient monitoring systems, etc.) is not allowed.

The antenna for UMTS may be harmful if people are exposed to the radiation for too long. Therefore place the antenna way that there is always a distance of 45cm to places people stay.

Important Note

The antenna for UMTS may be harmful if people are exposed to the radiation for too long. Therefore place the antenna that way that there is always a distance of 45cm to places people stay.

Important Note

The antenna for Wireless LAN may be harmful if people are exposed to the radiation for too long. Therefore place the antenna that way that there is always a distance of 5cm to places people stay.

The use of the products in potentially explosive atmospheres requires additional external protection circuitry which is not provided with the products.

In case of uncertainty or of believed errors in the documentation please immediately contact the manufacturer (address see chapter 7). Do not use or install the products if you are in doubt. In any case of misuse of the products, the user is solely liable for the consequences.

1.6. Electro-Static Discharge

Electronic boards are sensitive to Electro-Static Discharge (ESD). Please ensure that the product is handled with care and only in an ESD protected environment. Otherwise a proper operation is not guaranteed.

1.7. Life Cycle Information

1.7.1. Transportation and Storage

During transportation and storage the products must be in their original packing. The original packing contains an antistatic bag and shock-absorbing material. It is recommended, to keep the original packing in case of return of the product to the factory for repair. Note that the packing is recyclable.

1.7.2. Assembly and Installation

Observe the EMI-precautions against Electro-Static Discharge (ESD). Carefully read the assembly and installation documentation. Make sure you have all the necessary items ready. The installation procedures must be strictly observed. Note that deviations from the installation guidelines may result in degraded operational reliability or in unfavorable EM-radiation or EM-susceptibility.

1.7.3. Operation

The operating environment must guarantee the environmental parameters (temperature, power supply, etc.) specified in the technical specification section of the COMPACT system.

The main functionality of the IPC/WLB-WBGU is defined by the application programs running on the processor board. The application programs are not part of the delivery by Syslogic but are defined, developed and tested by the customer or a system-integrator for each specific application. Refer to the respective documentation for more information.

1.7.4. Maintenance and Repair

In case of a module hardware-failure or malfunction, the complete module should be exchanged. The faulty module must be returned to the factory for repair. Please use whenever possible the original packing for return of the product (EMI and mechanical protection).

1.7.5. Disposal

At the end of the lifespan the product must be properly disposed. This product contains a multitude of elements and must be disposed like computer parts.

1.8. Warranty

Our products are covered by a world-wide manufacturer's warranty. The warranty period starts at the delivery time from our official distributor to the customer. The duration of the warranty period is specified in the respective product catalogs and the offers. All products carry a date code and a job number for identification. The manufacturing data and deliveries are registered in a high level Quality Management System.

The warranty covers material and manufacturing defects. All products must be returned via the official distributor to the factory for repair or replacement. The warranty expires immediately if the products are damaged or operation outside of the specified recommended operating conditions. The warranty also expires if the date code or job number listed on the product is altered or rendered unintelligible. The warranty does not include damage due to errors in firmware or software delivered with the products.

1.8.1. RoHS

The product is designed and produced according to the Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC).

1.8.2. WEEE

This product is not designed ready for operation for the end-user and intended for consumer applications. Therefore the Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) is not applicable. But users should still dispose the product properly at the end of life.

2 Product Description

2.1. Product Identification

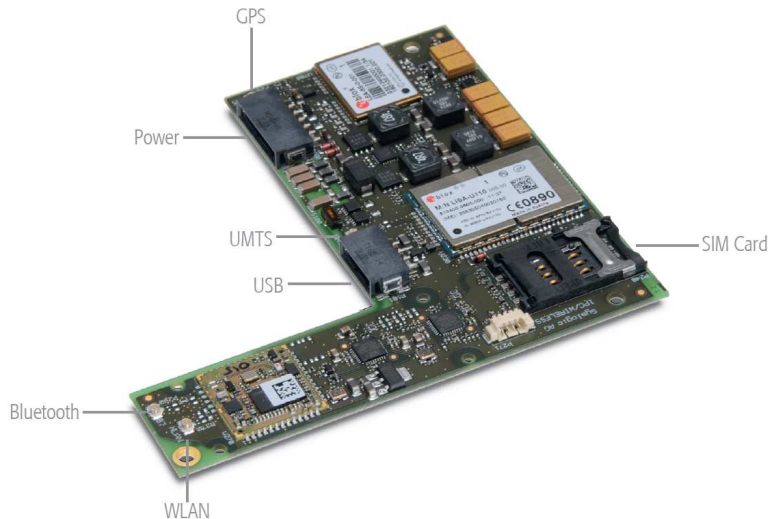


Fig. 1 Wireless Module

2.2. Features

The IPC_WLB-WBGU features the following main functions:

- UMTS/GSM
- GPS/Glonass
- Wireless LAN
- Bluetooth
- Smart Card Interface

2.2.1. Features Table

Product	USB Hub	UMTS	GPS	Wireless LAN	Blue-tooth	Smart Card	Aux Power	Conformal Coating
IPC/WLB-GU	Yes	Yes	Yes	No	No	No	No	No
IPC/WLB-GUC	Yes	Yes	Yes	No	No	No	No	Yes
IPC/WLB-S	No	No	No	No	No	Yes	No	No
IPC/WLB-WBGU	Yes	Yes	Yes	Yes	Yes	No	No	No
IPC/WLB-WB	No	No	No	Yes	Yes	No	No	No

Tab. 1 Features Table

2.3.

2.3.1. Block Diagram IPC/WLB-GU

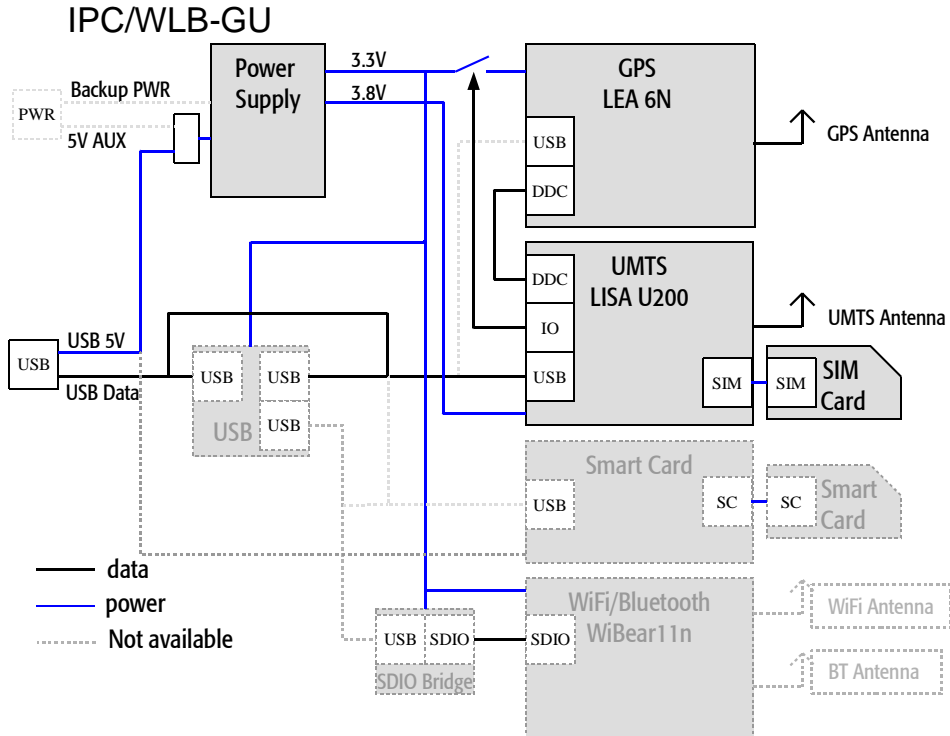


Fig. 2 Block diagram IPC/WLB-GU

2.4. Block Diagram IPC/WLB-S

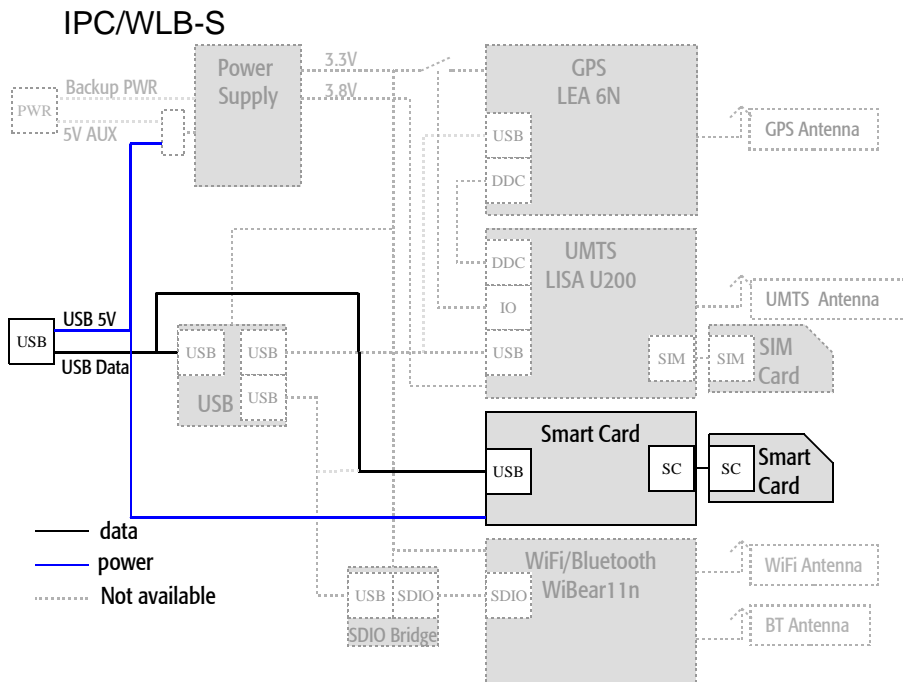


Fig. 3 Block diagram IPC/WLB-S

2.1. Block Diagram IPC/WLB-WBGU

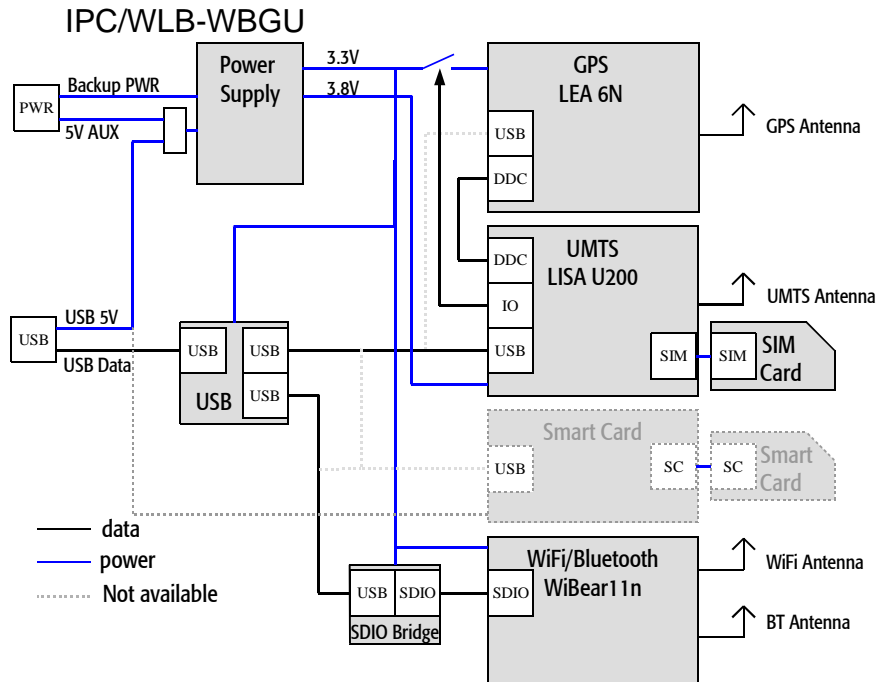


Fig. 4 Block diagram IPC/WLB-GU

2.1.1. Block Diagram IPC/WLB-WB

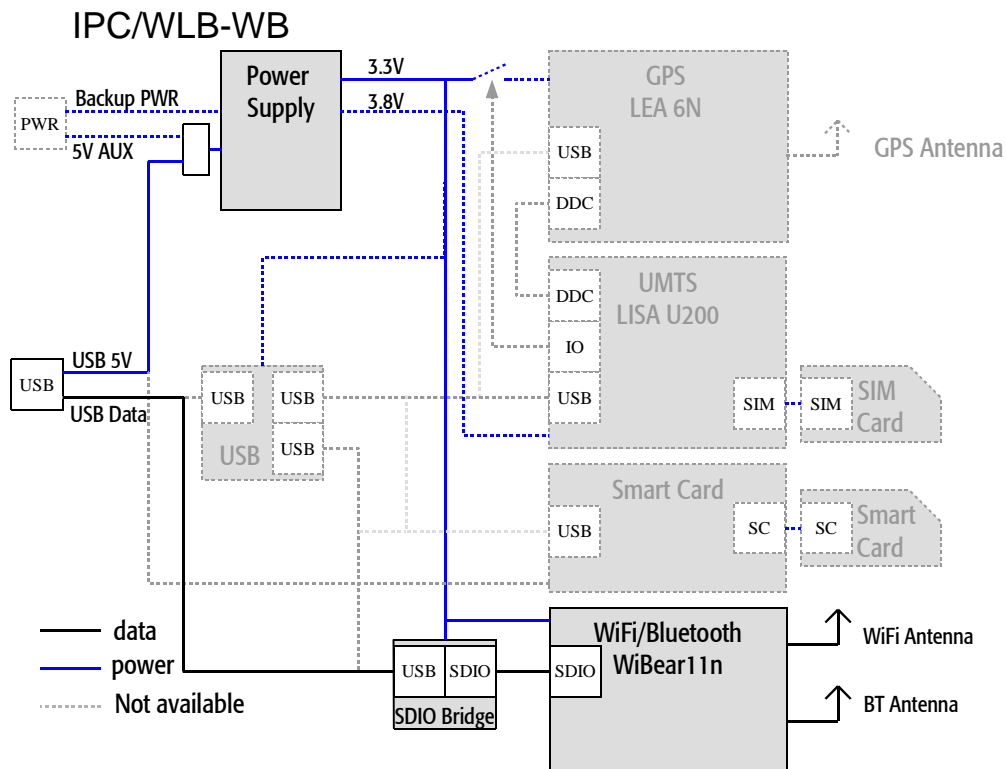


Fig. 5 Block diagram IPC/WLB-WB

3 Hardware Description

3.1. Connections of Wireless Module

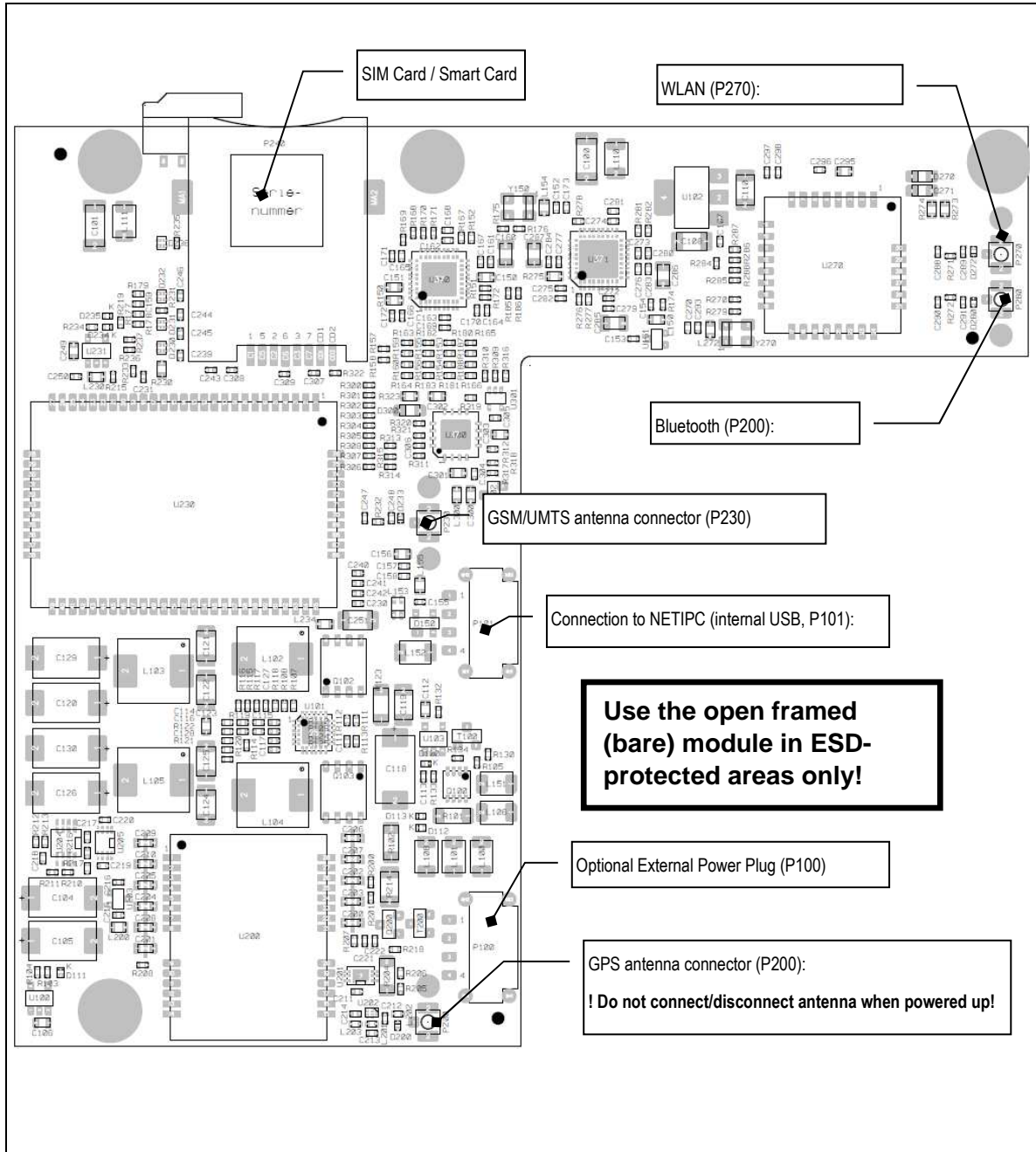


Fig. 6 Board Layout

Remark: If UMTS and Smart Card is available the Smart Card holder is located on the bottom side.

3.2. Host device interface

The module is connected to a USB port. For Syslogic product the following cables are used:

Host System	Required cable
IPC/SL71xxx, ML71xxx	CAB/DM4DM4-15B
IPC/SL41xxx, ML41xxx	CAB/MPV4DM4-15B

Tab. 2 Host controller cable

3.2.1. Main Host Interface (P101)

Syslogic ML71, SL71 and ML41/SL41 are able to supply the main power using the USB interface only. Refer to the power requirements for detailed information.

Host USB Connector (P101)	
Connector	
Connector Type Assembled	Harwin M80-8360445
Mating Connector Type	M80-8990405
Pin description	
Pin 1	USB Supply Voltage 5V
Pin 2	USB Data -
Pin 3	USB Data +
Pin 4	USB Ground

Tab. 3 USB Connector J101

3.2.2. Auxiliary Power Connector (P100)

The Auxiliary Power Connector is only used for special versions. Pin 1 and Pin 2 of P100 are used to supply the main power instead to using the USB supply voltage.

Backup power is used to supply the real time clock of the GPS module to decrease the time to first fix using an external supply or a battery.

Refer to

IPC/WLB-WBGU	Yes	Yes	Yes	Yes	Yes	No	No	No
IPC/WLB-WB	No	No	No	Yes	Yes	No	No	No

Tab. 1 to check if the connector is available.

Auxiliary Power Connector (P100)	
Connector	
Connector Type Assembled	Harwin M80-8360445
Mating Connector Type	M80-8990405
Pin description	
Pin 1	Supply Voltage 5V
Pin 2	Ground
Pin 3	Backup Supply GPS
Pin 4	Ground

Tab. 4 Auxiliary Power Connector J100

3.3. USB Hub

Depending on the product variant a USB Hub is used to connect to the different devices.

Refer to

IPC/WLB-WBGU	Yes	Yes	Yes	Yes	Yes	No	No	No
IPC/WLB-WB	No	No	No	Yes	Yes	No	No	No

Tab. 1 if the USB Hub is installed on the product.

3.4. Positioning (GPS/GNSS/GALILEO)

3.4.1. Integration

The positioning functionality is provided using a u-Blox LEA-6N Module. The module is normally connected to the UMTS module. Furthermore the positioning module is disabled at power up and needs to be enabled using the the AT+UGPS command directed to the UMTS module. Direct USB connection is only provided if no UMTS module is used in that variant.

The LEA-6N module requires an external active antenna connected. Do connect the antenna before the module is powered.

GPS antenna connector (P200)	
Connector	Description
Connector Type Assembled	Hirose U.FL-R-SMT-1
Mating Connector Type	Any U.FL Cable Connector
LNA Supply Voltage	3.3V+/-10%
LNA maximum Supply current	20mA
Required frequency range	1575MHz (GPS) 1602MHz (GNSS)
Minimum antenna detection current	2mA
Required antenna impedance	50Ohms
Pin description	
Pin 1	Antenna
Shield	GND

Tab. 5 UMTS antenna connector P230

Important Note

Do not remove or connect the antenna while the device is powered.

3.5. UMTS Interface

UMTS interface is implemented using a u-Blox UMTS/HSDPA LISA U200-S01 module. The device is either connected to the internal USB Hub or directly to the host.

The UMTS interface requires a Mini-SIM Card (ID-000, 25mm x 15mm) inserted into the SIM Card Holder. The LISA U200 support SIM Card Hot Plug functionality. This feature needs to be enabled before accessing the SIM card the first time (AT+UDCONF=50,1).

For reliable use close the retainer of the SIM-card holder. To make sure the retainer is closed configure the pin 20 of the LISA module as a digital input (AT+UGPIOC=20,1") and read the state of the input (AT+UGPIOR=20). Reading 1 means the retainer is closed, reading 0 means the retainer is open. This feature is available since #3.

The device requires an external passive UMTS antenna. Make sure all required bands are supported by the antenna.

To fulfill FCC/IC requirement the device must have a label showing the FCC (XPYLISAU20) and IC (8595A-LISAU200) IDs. The antennas must provide a separation distance of at least 45cm from all persons.

Wireless Protocol	Frequency Range	Averaged peak radiated power		Max. Antenna. Gain
GSM/GPRS/EGPRS 900	800.2 – 914.8 MHz	5610.09 mW	37.49 dBm	5.0 dBi
GSM/GPRS/EGPRS 1800	1710.2 – 1784.8 MHz	1774.07 mW	32.49 dBm	3.0 dBi
UMTS FDDI	1922.4 – 1977.6 MHz	741.31 mW	28.70 dBm	1.0 dBi

Tab. 6 UMTS Interface Characteristics

UMTS antenna connector (P230)	
Connector	Description
Connector Type Assembled	Hirose U.FL-R-SMT-1
Mating Connector Type	Any U.FL Cable Connector
Required device connector to meet FCC part 15 requirements	SMA-RP
Required antenna impedance	50Ohms
Required Frequency Range	800..960 MHz 1710..2170 MHz
Pin description	
Pin 1	Antenna
Shield	GND

Tab. 7 UMTS antenna connector P230

Antenna and connecting cable need to provide protection to direct contact discharge up to +/-4kV and air discharge up to +/- 8kV.

Important Note

The antenna for Wireless LAN may be harmful if people are exposed to the radiation for too long. Therefore place the antenna that way that there is always a distance of 45cm to places people stay.

The gain of the antenna used MUST not exceed the limits described in Tab. 6

3.1. Wireless LAN and Bluetooth

3.1.1. Integration

Wireless LAN and Bluetooth is available using a uBlox Ella-W163A (former Lesswire WiBear11n-DF2) Module. The SDIO device is connected to the host system using a VUB300 SDIO Host controller. Depending on the product variant the USB to SDIO Host Controller is connected directly to the host or is connected to the onboard USB Hub.

To fulfill FCC requirements the connectors of Bluetooth and Wireless LAN need to be SMA-RP. Additionally the FCC (PV7-WIBEAR11N-DF2) and IC (7738A-WB11NDF2) ID needs to be printed on the product label. The antennas must provide a separation distance of at least 20cm from all persons.

3.1.2. Wireless LAN

The Wireless LAN interface requires an external passive antenna connected to P270.

To fulfill FCC requirements it is necessary to use an SMA-RP connector.

Wireless Protocol	Frequency Range	Averaged peak radiated power		Max. Antenna. Gain
WLAN – IEEE 802.11 b/g/n	2412 - 2472 MHz	95.50 mW	19.89 dBm	4.1 dBi
WLAN – IEEE 802.11 a/n	5180 - 5825 MHz	102.33 mW	20.10 dBm	4.7 dBi

Tab. 8 Wireless LAN Interface Characteristics

Wireless LAN connector (P270)	
Connector	Description
Connector Type Assembled	Hirose U.FL-R-SMT-1
Mating Connector Type	Any U.FL Cable Connector
Required frequency range	2400-2500MHz (Wireless LAN) 4900-5825MHz (Wireless LAN) 2400-24835Mhz (Bluetooth)
Required device connector to meet FCC part 15 requirements	SMA-RP
Required antenna impedance	50Ohms
Pin description	
Pin 1	Antenna
Shield	GND

Tab. 9 Wireless LAN antenna connector P270

Important Note

The antenna for Wireless LAN may be harmful if people are exposed to the radiation for too long. Therefore place the antenna that way that there is always a distance of 5cm to places people stay.

The gain of the antenna used MUST not exceed the limits described in Tab. 8.

3.1.3. Bluetooth

The Bluetooth Interface requires an external passive antenna connected to P280

Bluetooth antenna connector (P280)	
Connector	Description
Connector Type Assembled	Hirose U.FL-R-SMT-1
Mating Connector Type	Any U.FL Cable Connector
Required device connector to meet FCC part 15 requirements	SMA-RP
Required antenna impedance	50Ohms
Pin description	
Pin 1	Antenna
Shield	GND

Tab. 10 Bluetooth antenna connector P280

3.2. Smart Card Interface

Some variants offer a USB to Smart Card interface using a Gemalto IDBridge CR20 Device in extended temperature range. If only the Smart Card interface is available the device is connected directly to the host. Otherwise it is connected to the USB Hub.

The device is compliant to the IOS 7816, EMV 4.3 and Supports memory cards Class A, B and C.

The reader requires a mini-Smart Card (ID-000, 25mm x 15mm). To improve the reliability of the system the smart card is detected if the card is inserted and the retainer of the card holder is closed.

Important Note

The device does not support other than ISO 7816 communication.

The contacts C4 and C8 are not connected

4 Programming Information

4.1. Configuring GSM/UMTS and GPS Modules

4.1.1. Overview

The following Command-Set is only for evaluation and easy set-up. Please refer for the complete AT command-set to "[u-blox Wireless Modules - AT Commands Manual](#)".

NMEA Instruction set: <http://www.nmea.de/nmea0183datensaetze.html#dtm> and

http://en.wikipedia.org/wiki/NMEA_0183 or the Example Document of u-blox: "[AT Commands Examples](#)"

To access the UMTS module use one of the virtual COM Ports as described below:

- USB1: AT commands / data connection
- USB2: AT commands / data connection
- USB3: AT commands / data connection
- USB4: GPS tunneling (if GPS is available)
- USB5: Primary TraceLog (debug purpose)
- USB6: Secondary TraceLog (debug purpose)
- USB7: SAP (SIM Access Profile)

A short example how to access to the UMTS module is given in this chapter.

With most variants the GPS Module is connected to the UMTS Module using the DDC Link. This provides the advantage that GPS and the UMTS module can minimize the time to first fix using aided GPS. Therefore it is possible to address the command for the GPS to the UMTS module. If direct communication to the GPS Module is required, route the 4th virtual COM Port to the GPS module using the command AT+UGPRF=1. This command needs to be sent before the GPS module is powered.

4.1.2. Communication Settings for Windows

The device is communicating via so called Virtual COM Ports (VCP) on an USB port. Choose the appropriate COM port COMx. Both – GSM/UMTS and GPS – Modules are communication over the same port. The appropriate drivers must be installed before.

For test purpose use a terminal program such as Hyperterminal or Putty.

	Setting	Parameter	Description
1	COM7:	Communication Port	Typical port number is 7.
2	115200bps	Data rate	
3	8	Data Bits	
4	N	Parity	
5	1	Stop Bits	
6	Hardware	Flow Control	

Tab. 11 COM port setting for UMTS on Windows

4.1.3. Communication Settings for Linux

The device is communicating via a Virtual Communication Ports (VCP) over an USB port. Choose the appropriate COM port /dev/ttyACMx. Both – UMTS and GPS – Modules are communication over the same port. For the IPC/NETIPC-71 distribution the appropriate drivers are already preinstalled.

For test purpose use a terminal program such as minicom (starting with parameter –s starts-up the program with configuration menu). Later on use advantageously an own software to communicate with the module.

Setting	Parameter	Description
1	/dev/ttyACM0	Communication Port Typical port number is 0.
2	115200bps	Data rate
3	8	Data Bits
4	N	Parity
5	1	Stop Bits
6	No	Flow Control

Tab. 12 COM port setting for UMTS on Linux

4.1.4. AT Command-Set

Communication with the GSM/UMTS and GPS Modules is done by AT-Commands.

The next pages demonstrate a 'getting-started' command set. The full command set is described in the manual 'u-blox_AT_Commands_Manual_(WLS-SW-11000).pdf'.

4.1.5. Management

Step	Command	Response	Description
1	AT+CMEE=2	OK	Enables module to report error messages
2	AT+CPWROFF	OK	To switch off the module the "AT+CPWROFF" command must be sent. Make sure to use this command before switching the main power off, otherwise settings and configuration parameters may not be saved on the module.

4.1.6. Registration on a cellular network – PIN Code (if required)

Step	Command	Response	Description
1	AT+UDCONF=50,1	OK	Enable SIM hot insertion detection.
2	AT+CPIN="7251"	OK	Insert the PIN number, if needed (the PIN of the SIM card should be inserted – 7251 is written here as example)
2	AT+CLCK="SC",0," 7251"	OK	Unlock the PIN insertion at the power on The last parameter the PIN of the SIM card should be inserted – 7251 is written here as example.
3	AT+CLCK="SC",1," 7251"	OK	Lock the PIN at the power on. The last parameter the PIN of the SIM card should be inserted – 7251 is written here as example.

4.1.7. Registration on a Cellular Network – Registration

Step	Command	Response	Description
1	AT+CREG?	+CREG: 0,1 OK	Verify registration
2	AT+COPS=0	OK	Register the phone on the network Comment: wireless module registers itself on the cellular network automatically. This command is necessary only if the automatic registration failed (AT+CREG? returns 0,0)
3	AT+URAT=1,2	OK	Select radio access technology: 1=GSM/UMTS Dual mode; 2=UMTS
4	AT+COPS?	+COPS: 0,0,"Operator",2 OK	Read operator name; 2 means radio access UMTS

4.1.8. SMS Management

Step	Command	Response	Description
1	AT+CMGF=1	OK	Set the text mode as the format that will be used. To be set before of the first operation
2	AT+CMGS="+41991234567"< RETURN> SMS TEXT MESSAGE1<CTRL- Z>	> +CMGS: 0 OK	Send 1st SMS (phone number +41991234567 is written here as example)
3	AT+CMGS="+3930012345678 "<RETURN> SMS TEXT MESSAGE 2<CTRL- Z>	> +CMGS: 1 OK	Send 2nd SMS (phone number +41991234567 is written here as example)
4	AT+CMGL	+CMGL:1,"REC UNREAD", "+ 41881234567",, "12/02/23,14:42:36+08" SMS TEXT MESSAGE IN OK	List all incoming SMS (phone number +41881234567 is written here as example) Time format is: YY/MM/DD,HH:MM:SS

4.1.9. GPS – Read NMEA Messages using AT commands (example: GLL)

Nr.	Command	Response	Description
1	AT+UGPS=1,0	OK	Enable Communication Module
		ERROR	Communication could not be established
2	AT+UGLL=1	OK	Enable GLL messages
3	AT+UGLL?	+UGLL:(State),(GLL-msg)	Read message The last available GLL message is displayed
		+UGLL:(State),Not Available	
4	AT+UGLL=0	OK	Disable GLL message
5	AT+UGPS=0,0	OK	Disable Communication Module

4.1.10. GPS – use NMEA or UBX Protocol

Direct access to the GPS module is possible using the 4th serial port of the GSM/UMTS module (tunneling the data to the GPS). The port needs to be configured prior to enable the GPS module.

Nr.	Command	Response	Description
1	AT+UGPRF=1	OK	Configure 4 th COM Port Routing
2	AT+UGPS=1,0	OK ERROR	GPS module enabled Communication could not be established
3			Open 4 th Virtual COM Port
4	\$GPGLL		Process UBX or NMEA Command
5			

4.2. Configuring WLAN Module

4.2.1. Driver Requirement

The Ella-W163A requires a driver and is supported by the open source drivers as followed:

- Bluetooth: btmrvl_sdio (required Kernel > 3.0)
- Wireless LAN: mwifiex (required Kernel > 3.0, Package wireless-tools)

Furthermore Lesswire provides driver with more functionality or better performance.

On Syslogic preinstalled Linux operating system the required open source drivers are already installed. As soon as the device is detected the required driver will be loaded.

4.3. Configuration Settings for Linux (Debian 3.0.3-RT12 CPU 486)

Extend the file `/etc/network/interfaces` with the following lines for automatic start on system-boot (you have to operate as root):

```
# Wireless LAN network interface
auto wlan0
```

To start the wlan manually enter:

```
root@netipc:/# ifup wlan0
```

Remember: configure the file `'interfaces'` fist. See below.

Stopping wlan in a shell (as root) using:

```
root@netipc:/# ifdown wlan0
```

Extend the file `/etc/network/interface` with the following lines for static IP:

```
# Wireless LAN network interface
iface wlan0 inet static
address OWN_IP
netmask NETMASK
gateway IP1
dns-nameservers IP2
```

Remark: Use for *OWN_IP*, *NETMASK*, *IP1*, *IP2* your own entries.

Extend the file `/etc/network/interface` with the following lines for DHCP instead the lines for static IP:

```
# Wireless LAN network interface
iface wlan0 inet dhcp
```

Extend the file `/etc/network/interface` with the following lines for WPA-PSK Wireless Keywords:

```
# Managed wireless mode
wpa-ssid SSID
wpa-psk WPA-KEY
```

Remark: Use for *SSID* and *WPA-KEY* your own entries.

SSID and *WPA-KEY* must meet the WLAN-Router configuration.

The *WPA-KEY* is a hexadecimal string and can be generated using the `wpa_supplicant` tool.

- Install the `wpa_supplicant` tool (as root, you need a working internet connection e.g. via LAN port):
- `netipc@netipc:/# su`
- `root@netipc:/# aptitude update`
- `root@netipc:/# aptitude install wpa_supplicant`
- Generate WPA-KEY:
- `root@netipc:/# wpa_supplicant SSID WPA-PASSPHRASE`
- *SSID* and *WPA-PASSPHRASE* must meet the WLAN-Router configuration.
- The output will show the *WPA-Key*.

The complete file 'interfaces' might look like (example):

```
# Wireless LAN network interface
auto wlan0

# Wireless LAN network interface
iface wlan0 inet static
address 192.168.1.11
netmask 255.255.255.0
gateway: 192.168.1.1
dns-nameservers: 192.168.1.1

# Managed wireless mode
wired-mode managed

# WPA keywords
wpa-ssid WLAN_Router
wpa-psk
153412b3fe47a2db1583b31f32c90a53be941d248e153412b3fe47a2db1583b31f32c90a53b
e941d24
```

Further helpful commands:

- iwlist scan list available access points
- iwconfig wlan0 essid "Host" connect to host if wpa-suplicant is not used
- Dhclient wlan0 request an IP address, routing und name server info
- cat /etc/resolv.conf Check what routing has been configured

4.4. Configuring Bluetooth Module

4.4.1. Configuration Settings for Linux

Install the Bluetooth framework (as root, you need a working internet connection, e.g. via LAN port):

```
netipc@netipc:/# su
root@netipc:/# aptitude install bluetooth
root@netipc:/# apt-get install bluez-utils
```

Make sure the Bluetooth daemon is running:

```
root@netipc:/# /etc/init.d/bluetooth status
bluetooth is running
```

To avoid problems connecting to other devices add the following line to /etc/Bluetooth/main.conf:

```
DisablePlugins = pnat # modify Debian Squeeze bluez default configuration
to allow rfcomm connections
```

4.4.2. Start-up Bluetooth interface

Nr.	Command	Description	Description
1	modprobe btmrvl_sdio	Start driver if not already loaded	Enable Communication Module
2	service bluetooth start	Start Bluetooth service	
3	hciconfig hci0 up	Start Bluetooth interface	
4	Sleep 1		
5	hciconfig hci0 sspmode 0	Disable pairing mode	

4.4.3. Send data using rfcomm (virtual serial port over Bluetooth)

Execute the following python script: (rfcomm-send-string.py)

```
#!/usr/bin/python
import bluetooth
import sys
if (len(sys.argv) < 3):
    print "call: " + str(sys.argv[0]) + " AdresseClient " + "message"
    print "example: " + str(sys.argv[0]) + " 00:06:C6:36:12:28 " + "hallo"
    exit(1)
bd_addr = sys.argv[1]
message = sys.argv[2]
port = 1
sock=bluetooth.BluetoothSocket( bluetooth.RFCOMM )
sock.connect((bd_addr, port))
sock.send(message)
sock.close()
root@netipc:/# hciconfig hci0 noscan
```

4.4.4. Receive data using rfcomm (virtual serial port over Bluetooth)

Execute the following python script: (rfcomm-receive-string.py)

```
#!/usr/bin/python

import bluetooth
server_sock=bluetooth.BluetoothSocket( bluetooth.RFCOMM )
port = 1
server_sock.bind(("",port))
server_sock.listen(1)
client_sock,address = server_sock.accept()
#print "Accepted connection from ",address
data = client_sock.recv(1024)
print data
client_sock.close()
server_sock.close()
```

4.5. Smart Card Inteface Driver

4.5.1. Windows Driver

The device installed on IPC/WLB-S is identical as the Gemalto IDBridge CR20.

Download the driver for Gemalto IDBridge CR20 from the following web page:

<http://support.gemalto.com/index.php> and follow to "PC-Link Readers" and "IDBridge CT30".

4.5.2. Windows Demo Application

Gemalto offers a small Project to start writing smart card applications. Download the project from the web page:

<http://support.gemalto.com/index.php> and follow to "Downloads" and "Tools". There you will find a demo project called "ReaderTrack".

4.5.3. Debian Driver

The USB CCID device is supported by the libccid library.

To install the drivers use the package manager and install the libccid library and driver.

The source code is provided by the <http://pcsc-lite.alioth.debian.org/ccid.html>

5 Technical Data (IPC/WLB-xxx)

5.1. General Electrical Data

Important Note

Do not operate the COMPACT base board outside of the recommended operating conditions. Otherwise lifetime and performance will degrade.

Operating the board outside of the absolute maximum ratings may damage the hardware.

Absolute Maximum Ratings (over free-air temperature range)

Parameters	Symbol	min	nom	max	Unit
internal power supply voltage	Vcc	-0.5		5.5	Vdc
isolation logic to chassis			No isolation		Vrms
creepage distance logic to chassis and PCB boarder			none		mm
storage temperature range	Tst	-40		85	°C

Tab. 13 General Absolute Maximum Ratings

Recommended Operating Conditions

Parameters	Symbol	min	nom	max	Unit
internal logic supply voltage	Vcc	4.75	5.00	5.25	Vdc
operating free-air temperature range	Ta	-40		85	°C ¹

Tab. 14 General Recommended Operating Conditions

¹: Some modules may have derating if operating the module above 60°C

Electrical Characteristics

(over recommended operating range, unless otherwise noted)

Parameter	Symbol	min	typ	max	Unit
logic supply current (Vcc=5V, IPC/WLB-WBGU)	Icc		500	900	mA
logic supply current (Vcc=5V, IPC/WLB-GU)	Icc		450	750	mA
full load power dissipation (worst case, including onboard process power dissipation)	Pmax			4.5	W

Tab. 15 General Electrical Characteristics

Specifications WLAN (uBlox Ella-W163A)

Parameter	Symbol
WLAN Standards:	IEEE 802.11a/b/g/n/e/i/h/d/k/r/w
Data transfer rate IEEE802.11b:	1, 2, 5.5, 11Mbps
Data transfer rate IEEE802.11a/g:	6, 9, 12, 18, 24, 36, 48, 54 Mbps
Frequency range	2.4-2.497GHz (802.11b/g/n) 4.900 – 5.825 GHz (802.11a/n)
Protocols:	Implements Ethernet NIC
Security encryption:	WEP 64/128Bit-Key, WPA (TKIP, AES), WPA2
Antenna connector	U.FL-R on board
Maximum Transmit Power	18 dBm ± 1 dB (802.11b) 15 dBm ± 1 dB (802.11a/g/n)

Tab. 16 Specifications WLAN

Specifications Bluetooth (uBlox Ella-W163A)

Bluetooth Standard:	IEEE802.15.1, Bluetooth 2.1, and Enhanced Data Rate (EDR), Bluetooth 3.0 + Highspeed
Frequency range:	2.400 – 2.4835 GHz
UART HCI protocol	Supported
Antenna connector for Bluetooth	U.FL-R on board
Transmit Power	+8 dBm ± 1.5 dB
Receiver Sensitivity	BDR: -90 dBm ± 1.5 dB EDR: -87 dBm ± 1.5 dB

Tab. 17 Specifications Bluetooth

Specifications GPS (ublox LEA 6N)

Parameter	Symbol
Standalone GPS	Yes
Stand-alone GLONASS	Yes
Stand-alone Galileo	Optional
Receiver type	50channel u-blox 6 engine
Time to first fix	29s (GPS), 36s (GLONASS) (all satellites at -130dBm)
Accuracy	GPS: 2.5m (CEP), 4m (GLONASS)
Antenna Connector for GPS	U.FL-R on board

Tab. 18 Specifications GPS

Specifications UMTS (ublox LISA U200)

Parameter	Symbol
UMTS HSPA Frequency bands	800, 850, 900, 1700, 1900, 2100
Data rates	5.76Mb/s Uplink (HSUPA), 7.2Mb/s Downlink (HSDPA)
GSM	Quad Band (850, 900, 1800, 1900Mhz)
GPRS	Class 12, CS1-CS4 - up to 86.5 kb/s
EDGE	Class 12, MCS1-9 - up to 236.8 kb/s
SMS	MT/MO PDU / Text mode
TCP/IP, UDP/IP	Multiple sockets
SSL	Yes
SIM card socket	Yes

Tab. 19 Specifications UMTS

Specifications Smart Card (Gemalto CR20)

Parameter	Symbol
Smart Card Interface	ISO 7816, EMV 4.3
Supported Cards	ID-000 (25mm x 15mm) Class A, B, C
USB Interface Compliance	PC/SC V2, USB 2.0, CCID 1.0 and EMV L1
Device Vendor and Product ID	0x08E6, 0x3437

Tab. 20 Smart Card Interface specifications

5.1.1. EMI / EMC Specification

To be able use to UMTS or Wireless LAN as a main feature of the device containing the IPC/WLB is required to fulfill EMC emissions according to EN301489-1 (EN55022 Class B).

Annex C of EN 301 489 allows using different EMI levels as long as the interface is an auxiliary feature.

Attention: Be aware of the local laws and standards while using wireless communication. Compliance to a certain standard normally does not comply operating or importing the device with a country. Always check local law. If required register the device at its destination.

Parameter	Symbol
EMI Conformity	EN55022, EN 301 489-1 V1.9.2
Effective use of spectrum	EN301511 (GSM) EN301908 (UMTS) EN300328 (WLAN/ISM 2.4 GHz) EN302208 (ISM 868MHz)

5.1.2. Environmental Conditions

Parameter	Symbol
Operation Temperature	-40°C - +85°C
Shock	Designed to meet EN60068-2-27
Vibration	Designed to meet EN60068-2-6

Tab. 21 Environmental Conditions

5.2. Mechanical data

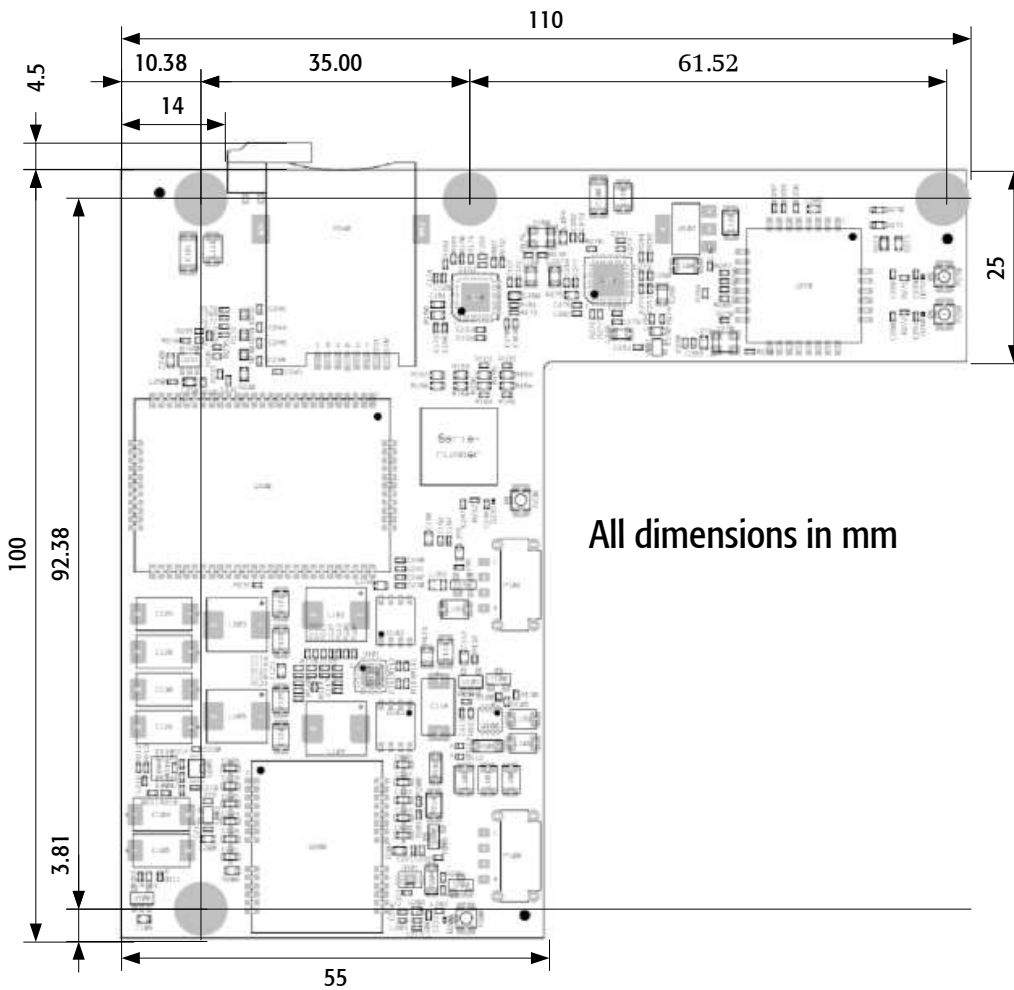


Fig 1 Mechanical dimension

General technical data

Parameter	Symbol
Dimensions	100 x 110.7
Net weight	42g

Tab. 22 General technical data

6 Product Revision History

6.1. Hardware

This paragraph lists the different hardware revisions of the board delivered beginning with the first production lot. All information listed in this document relies on definitive state hardware. Therefore this information may be incompatible with the prototyping board hardware.

Revision	Marking	Description
Prototype	#0	UMTS: LISAU110, GPS: LEA-6S, Wireless LAN: WiBearSF
New u-Blox modules	#1	UMTS: LISAU200, GPS: LEA-6N, Wireless LAN: WiBearSF
New Wireless module	#2	UMTS: LISAU200, GPS: LEA-6N, Wireless LAN: WiBear11n
Minor Changes	#3	Minor Layout changes, Sim Card retainer input added.
New Function Smart Card	#4	Major PCB change.
New WiFi-Module	#4.1	New liFi Module uBlox Ella-W163A

Tab. 23 Hardware Revisions

Important Note

This document always covers the newest product revision.

Please contact the manufacturer's technical support for upgrade options.

6.2. Firmware

6.2.1. Firmware LEA-6N (GPS)

The module firmware cannot be updated during operation. To upgrade the firmware it is required to send the module to the manufacturer.

6.2.2. Firmware LISA-U200-S01 (UMTS)

The LISA U200 Module allows different procedures to update the firmware.

- Firmware update Over AT Commands (FOAT) allows downloading a firmware file from the host system.
- Firmware over the air (FOTA) allows downloading and installing new firmware from a defined server using the UMTS connection.

For detailed procedure refer to the module manufacturer documentation. (<http://www.u-blox.de/de/firmware.html>)

6.2.3. Ella-W163A

The Ella-W163A does not have an own firmware. Each driver loads a firmware at startup. Therefore the firmware is upgraded if the driver is updated.

7 Manufacturer Information

7.1. Contact

Our distributors and system integrators will gladly give you any information about our products and their use. If you want to contact the manufacturer directly, please send a fax or email message containing a short description of your application and your request to the following address or use one of the information or technical support request forms on our internet homepage:

Syslogic Datentechnik AG

Taefernstrasse 28

CH-5405 Baden-Daettwil / Switzerland

Email: support@syslogic.com

www: <http://www.syslogic.com>

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