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HiLo miniEval Board Application Note ver. 2.0

by Piotr Bratek

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1. Scope

1.1. Introduction

The object of the document is to describe the interfaces and pin identifications of the HiLo miniEval Board to test the HiLo module in operating mode. 40-pins module interface is available on the pin headers connector.

1.2. Reference

Hilo Development Kit Schematic
HiLo miniEval Board Schematic
HiLo upgrade step by step ver2.2.pdf
Hilo Specification: URD1 5635.1 005 70086 ed 05-HiLo technical specification.pdf
Hilo Application Note: URD1 5635.1 007 70230 ed 03 10nov08-HiLo application note.pdf
URD1 OTL 5635.1 014 70473 ed 01-HiLo Module Development Kit Application Note.pdf

1.3. Terms and abbreviations

ADC	Analog to Digital Converter
CTS	Clear To Send
DAC	Digital to Analog Converter
DAI	Digital Audio Interface
DCS	Digital Communications System
DSR	Data Set Ready
DTR	Data Terminal Ready
ESD	Electrostatic Discharge
GSM	Global System for Mobile communication
GPRS	General Packet Radio Services
I/O	Input / Output
Kbps	Kbits per second
LED	Light Emitting Diode
Mbps	Mbits per second
PCB	Printed Circuit Board
PSU	Power supply unit
RF	Radio Frequency
RI	Ring Indication
RTS	Ready To Send
RX	Reception
SIM	Subscriber Identification Module
TX	Transmission
UART	Universal Asynchronous Receiver and Transmitter

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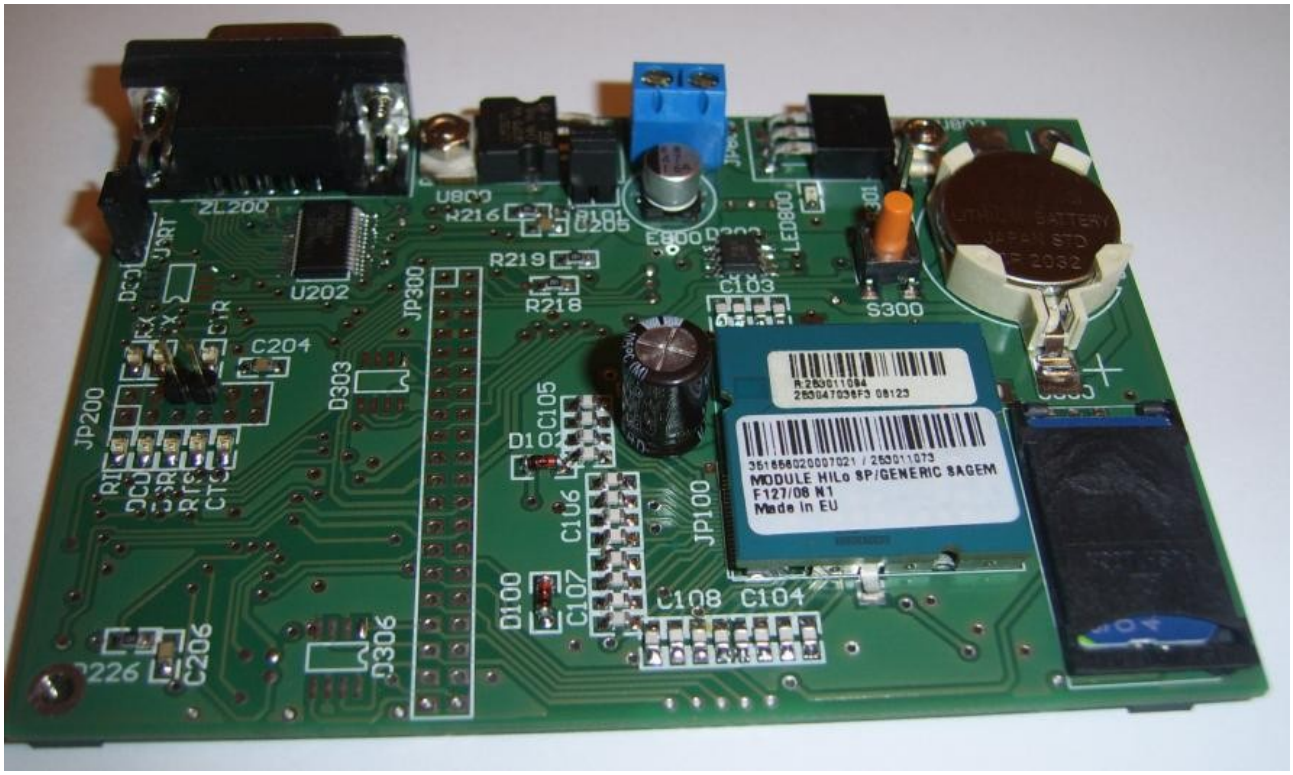
2. Product Overview



2.1. Key Features

Feature	Implementation
GSM module interface	Direct connection of GSM module via 40-pin board-to-board connector and mechanical fixing via 3 solder pads
Power supply	Laboratory PSU set to 6V and 2A max. Led for power status.
Antenna interfaces	Mini-coaxial connector (UF.L) and solder pads on HiLo module.
SIM interface	SIM card connector with card detection. Supported SIM cards: 3V and 1.8V.
Serial interface	RS-232 interfaces with SubD9 connectors: UART – full serial interface (all modem status are available). Status LED for each lines.
Backup battery	One battery CR2032 receptacle.
Protections	ESD and EMC protections on each pin headers and connectors of the Development Kit.
Physical characteristics	Size : 110mm x 75mm (PCB)
Analog Audio, GPIOs, ADC, PWM, Buzzer	Able to implemented through JP300 connector.

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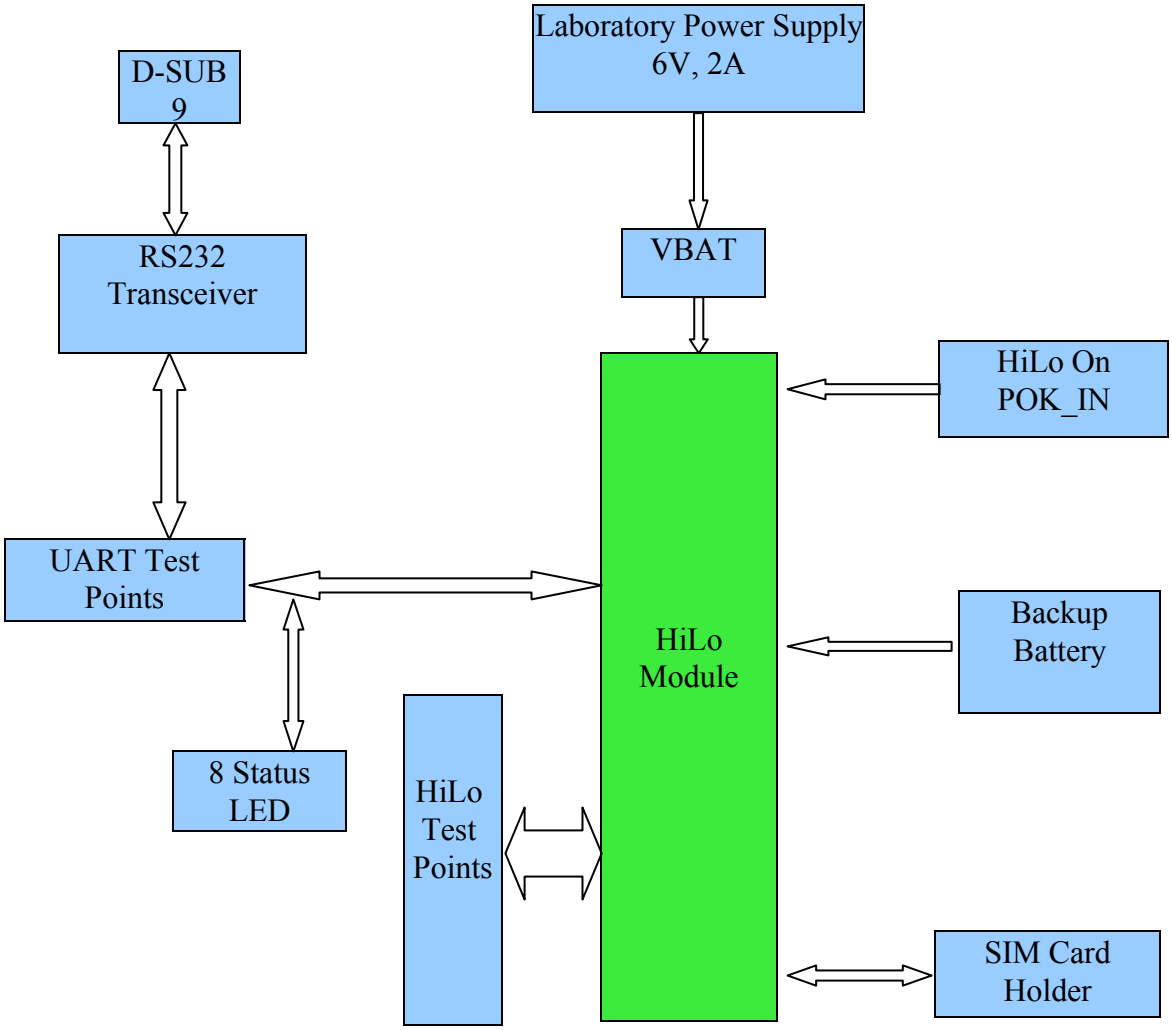
2.2. Functional Diagram



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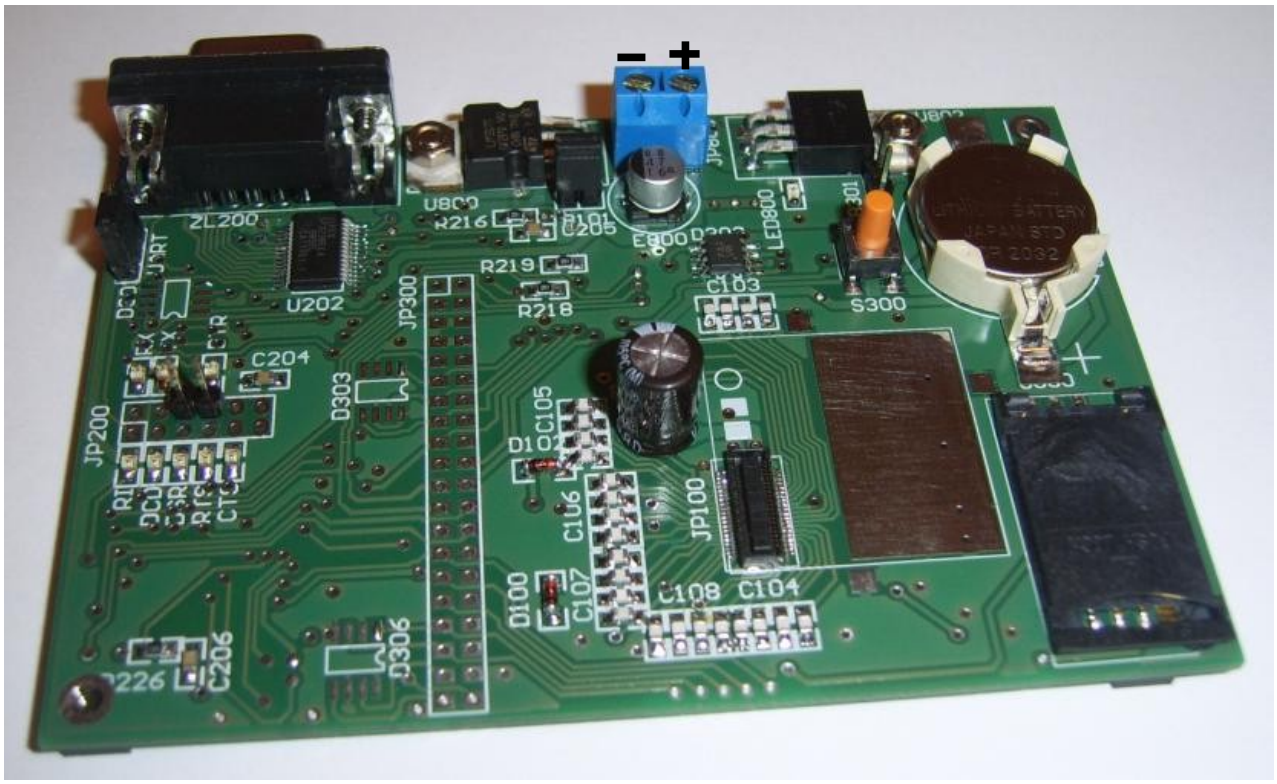
2.3. Interfaces Location



Location	Connector's Type	Function
JP800	Laboratory Power Supply	Power Supply
U600	Sim card holder	SIM
ZL200	D-Sub Connector	UART
CR2032	Battery connector	Backup Battery
JP100	40-pins female connector	Module interface
S300	Push button	POWER ON
TB101	Pin headers	VBAT
TB301	Pin headers	PWON
UART	Pin headers	UART on/off
JP300	Pin headers	40-pins module interface
JP200	Pin headers	UART signals

Reference	Jumper set	Jamper not set
TB101	Power supply the HiLo from VBAT (default)	Module HiLo is not powered.
TB301	Power on automatically/firmware upgrade	No action (default)
UART	1-2 short – RS-232 transceiver normal operation (default)	2-3 short – RS-232 transceiver shoutdown
JP200	DTR-GND short for firmware upgrade	Normal operating mode (default)
S300	Power ON the HiLo module.	-

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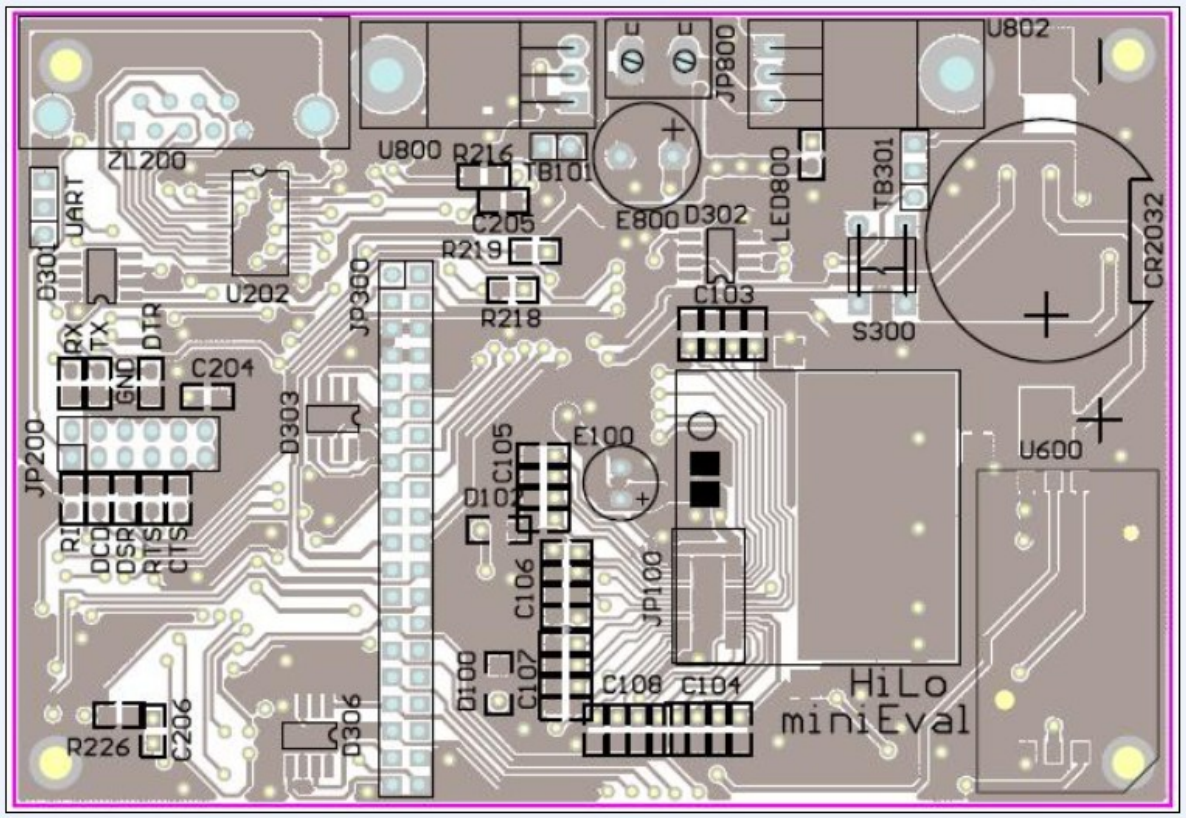

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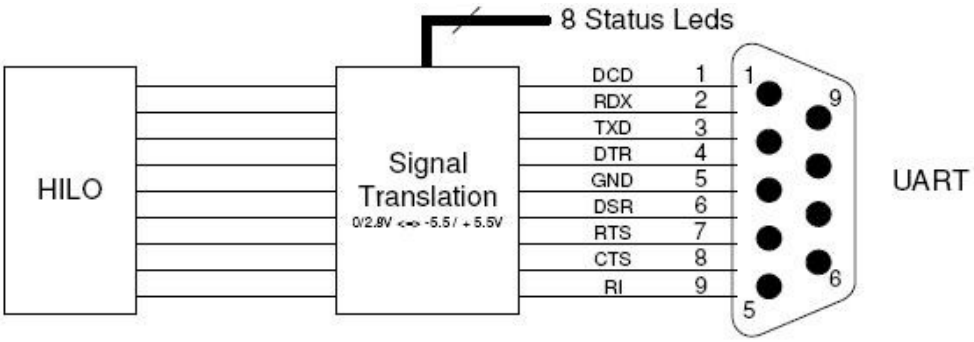
3. HiLo miniEval Board Interfaces

3.1. Serial Interface - UART

A V24 interface is provided on external pins of the module with the following signals: RTS/CTS, RX/TX, DSR, DTR, DCD, RI.
The signals levels are adapted and connected to the male Sub-D9 connector on ZL200. It supports speeds up to 115.2 KBPS and may be used in auto bauding mode.
Eight LEDs are provided on HiLo miniEval Board near to JP200 connector to show the status of the UART signal. There are two pin headers in JP200 which are used in upgrade proces (p. 4.3).

The figure below shows the simplified interface schematic:



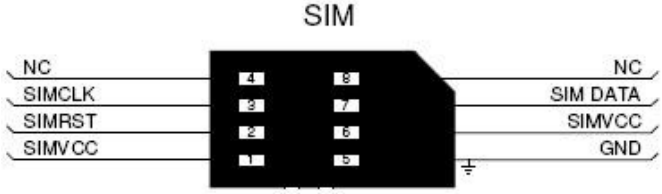
Pin Header UART settings:

1-2 short – RS-232 transceiver normal operation (default),
2-3 short – RS-232 transceiver shoutdown.

More details in SIPEX SP3238E datasheet.

3.2. SIM Interface

The SIM Card interface is compatible with the ISO 7816-3 IC card standard required by the GSM 11.11 Phase 2+ standard. The module also supports Release 99 of the SIM Toolkit recommendation and supports a Fixed Dialling Number directory.
The SIM Card interface insures the power on (SIMVCC) of the SIM Card and the communication with it through a data signal (SIMDAT), a clock signal (SIMCLK) and a reset signal (SIMRST).
The figure below shows the simplified interface schematic:



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3.3. 40-pins Module Interface

JP100 connector is a 40-pins module interface for connecting HiLo module with the board.
JP300 connector is a copy of all signals from JP100.
JP300 pin headers can be easily used for test by customer.

The list of HiLo pins:

N°	Name of signal	Type of signal (HILO)	Comments
1	VBAT	Power supply input	+3.7 V power supply (nominal)
2	VBAT	Power supply input	+3.7 V power supply (nominal)
3	GND	Ground	GND
4	GND	Ground	GND
5	SPI_CLK	Digital bi-directional buffer	SPI clock output
6	SPI_IRQ	Digital input buffer	SPI interrupt request input
7	SPI_OUT	Digital output buffer	SPI data output
8	GPIO4	Digital bi-directional buffer	General purpose input/output 4
9	GPIO2	Digital bi-directional buffer	General purpose input/output 2
10	VGPIO	Power supply output	+2.8V power supply output
11	UART_DSR	Digital output buffer	UART data set ready
12	UART_DCD	Digital output buffer	UART data carrier detect
13	UART_TX	Digital output buffer	UART transmit
14	UART_CTS	Digital output buffer	UART clear to send
15	SIM_RST	Digital output buffer	SIM reset
16	SIM_CLK	Digital output buffer	SIM clock
17	PWM0	Digital output buffer	DC PWM 0
18	PWM2	Digital output buffer	Buzzer PWM
19	ADC	Analog input	Analog input to digital converter
20	MIC	Analog input	Single input from microphone
21	HSET_P	Analog output	Differential out to earphone 32 ohms
22	HSET_N	Analog output	Differential out to earphone 32 ohms
23	PWM1	Digital output buffer	DC PWM 1
24	VSIM	Power supply output	SIM power supply
25	SIM_DATA	Digital bi-directional buffer	SIM data
26	UART_RX	Digital input buffer	UART receive
27	UART_RTS	Digital input buffer	UART request to send
28	UART_RI	Digital output buffer	UART ring indicator
29	UART_DTR	Digital input buffer	UART data terminal ready
30	VBACKUP	Power supply input/output	power supply for RTC backup
31	POK_IN	Digital input	Module power on signal
32	GPIO1	Digital bi-directional buffer	General purpose input/output 1
33	GPIO3	Digital bi-directional buffer	General purpose input/output 3
34	GPIO5	Digital bi-directional buffer	General purpose input/output 5
35	SPI_IN	Digital bi-directional buffer	SPI data input
36	SPI_SEL	Digital bi-directional buffer	SPI chip select output
37	GND	Ground	GND
38	GND	Ground	GND
39	VBAT	Power supply input	+3.7V battery power supply (nominal)
40	VBAT	Power supply input	+3.7V battery power supply (nominal)

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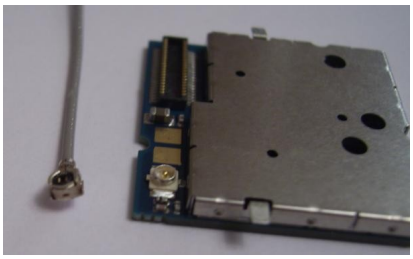
3.4. GSM Antenna



GSM Antenna can be connected to the HiLo module either via a mini coaxial connector (U.FL) or via soldering pads.
50 Ohms cable and connectors should be used.

3.5. Power on Module and Auto Power-on

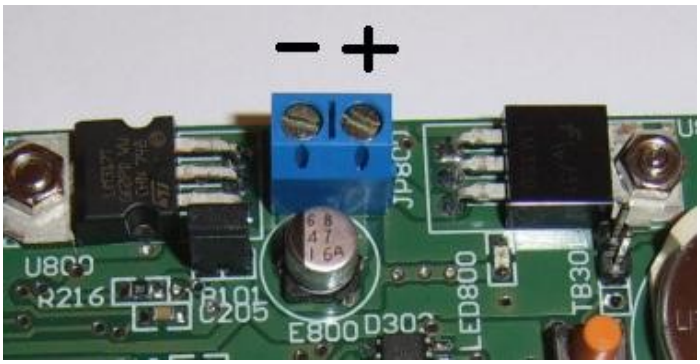
TB301 default setting: OPEN

S300 – push "ON" for around one second to start the module.

The HILO can power on automatically on the development board when a jumper is set on TB301 between position 2 and 3, low level active PWON is therefore set to ground level.
If POK_IN is always on GND after AT*PSCPOF command module is switch off and restarts after several seconds.

3.6. Power Supply

TB101 default setting: SHORT
JP800 – HiLo miniEval Board supply nominal sets: 6V and 2A



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4. Getting Started with the HiLo miniEval Board

Follow these steps to start the HiLo module on miniEval Board

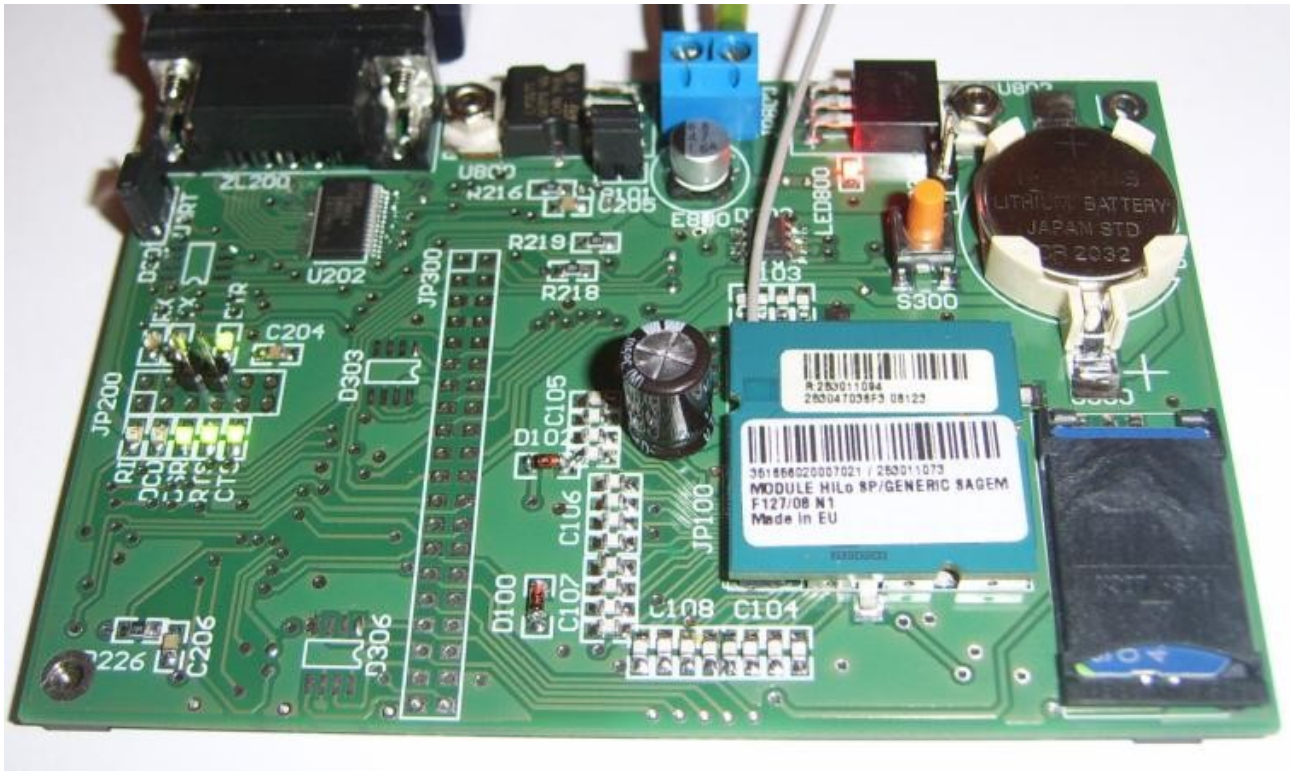
1. Plug the HiLo module with antena on the Development Kit (p. 3.4, p. 3.3).

2. Insert the SIM card into the holder (p. 3.2).

3. Plug Data Cable (RS-232) into UART connector.

4. Connect TB101 Jumper (p. 3.6)
   Connect the laboratory power supply unit set to 6V and 2A to the miniEval Board (p. 3.6)
   The red LED800 lights on, the HiLo miniEval Board is therefore ready to work (p. 3.6).

5. Push “ON” S300 button for around one second to start the module (p. 3.5).



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4.1. Communication with the Module using HyperTerminal

On the computer side, launch HyperTerminal :

Under Windows operating system.
Select: Menu -> Start -> Programs -> Accessories -> Communication -> HyperTerminal

Select the port on which is connected the communication cable (UART) of the Development Kit:

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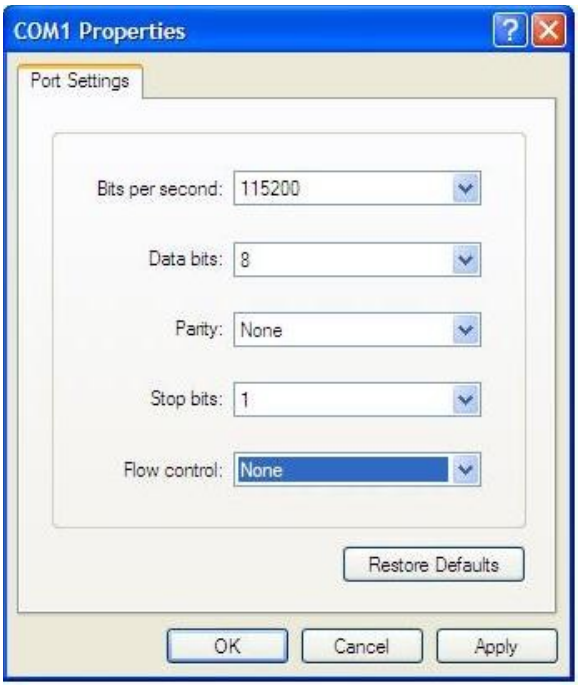
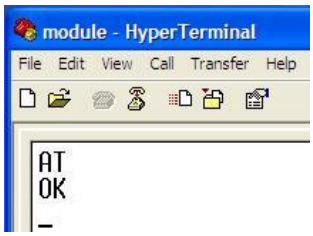
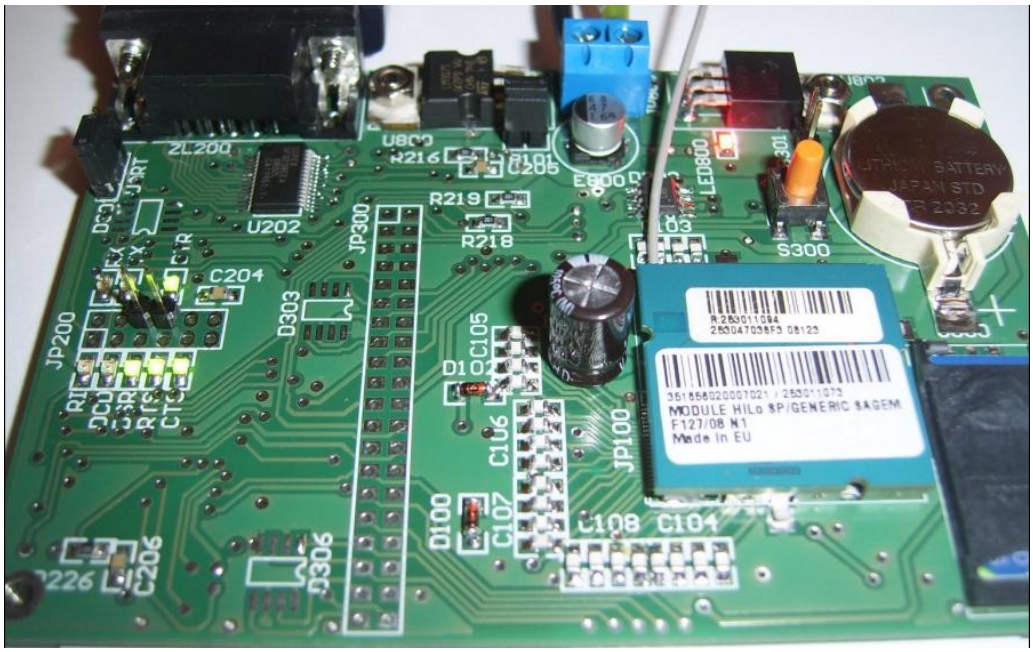
Set the port parameters and validate with OK.



In the terminal window, type: **AT** and validate with the “Enter” key.
The module must answer: OK
For the AT command specification please refer to the "AT command" document provided.



The result on the miniEval board (LEDs DSR, RTS, CTS, DTR and LED800 are switched on)



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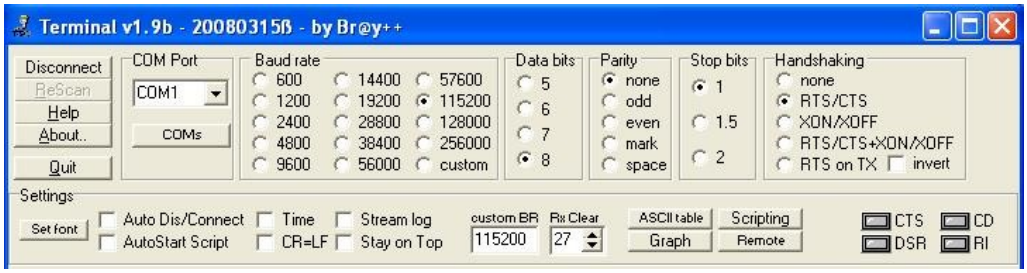
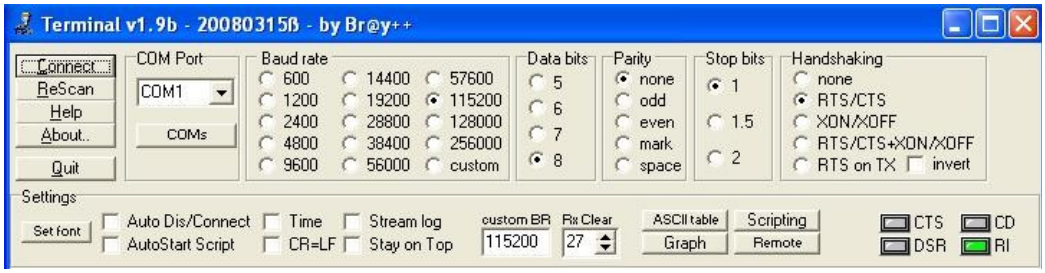
4.2. Communication with the Module using Br@y Terminal

On the computer side, launch Br@yTerminal program, which can be downloaded from http://braypp.googlepages.com/terminal.

Select the port on which is connected the communication cable (UART).
Set the port parameters:
baud rate = 115200, Data bits = 8 , Parity = none, Handshaking= RTS/CTS.



Press „Connect" button to start comunication with the miniEval board.



Check status of DTR.
If DTR is inactive module is on sleep mode.
Change DTR to active by pressing on the box near description.
Colour will change and some LEDs in JP200 be switched on.

The result on the miniEval board (LEDs DSR, RTS, CTS, DTR and LED800 are switched on):

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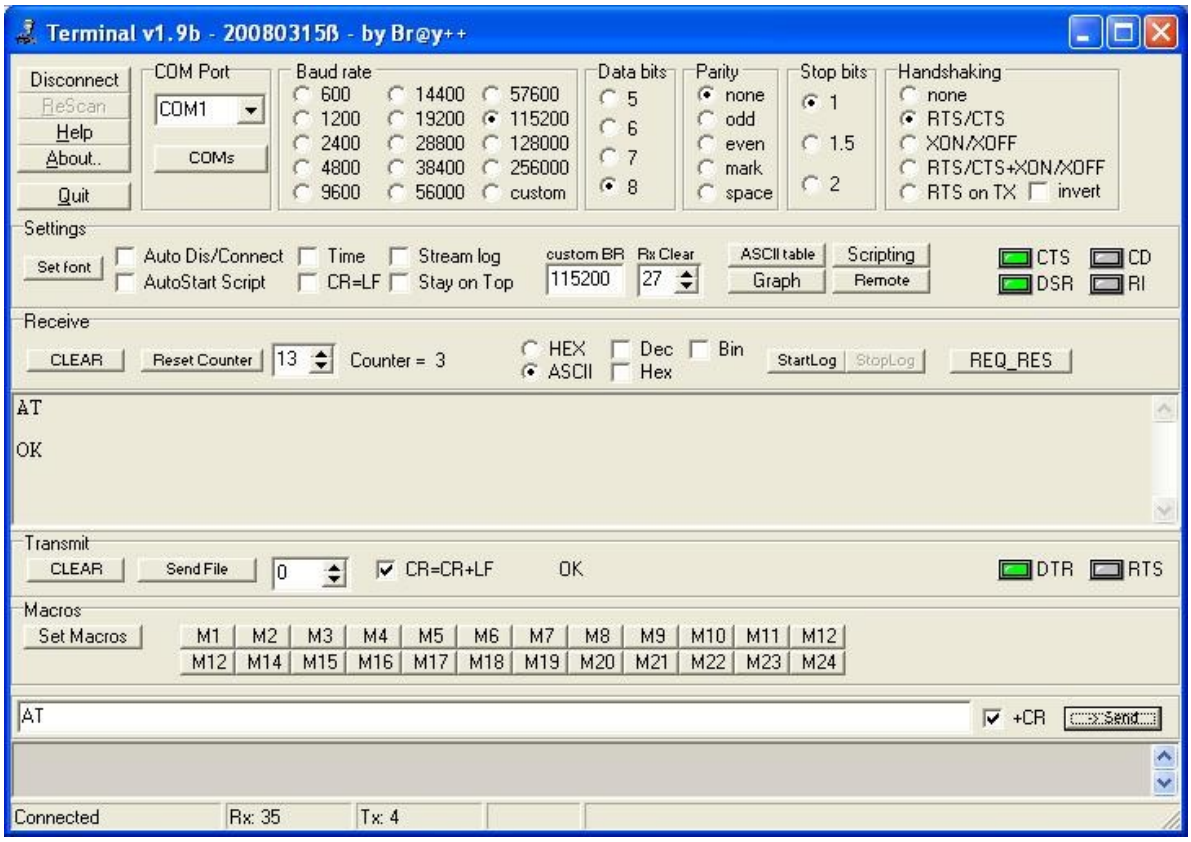
In the terminal window, type: **AT** and validate with the "Send" button („+CR" marked).
The module must answer: OK.



4.3. Firmware upgrade with HiLo miniEval Board

Set jumpers: TB301 short and JP200 DTR connect to GND on HiLo miniEval Board.
Both jumpers in red colour on the picture below.
Firmware upgrade process is described in „HiLo upgrade step by step" ver 2.2 or higher.