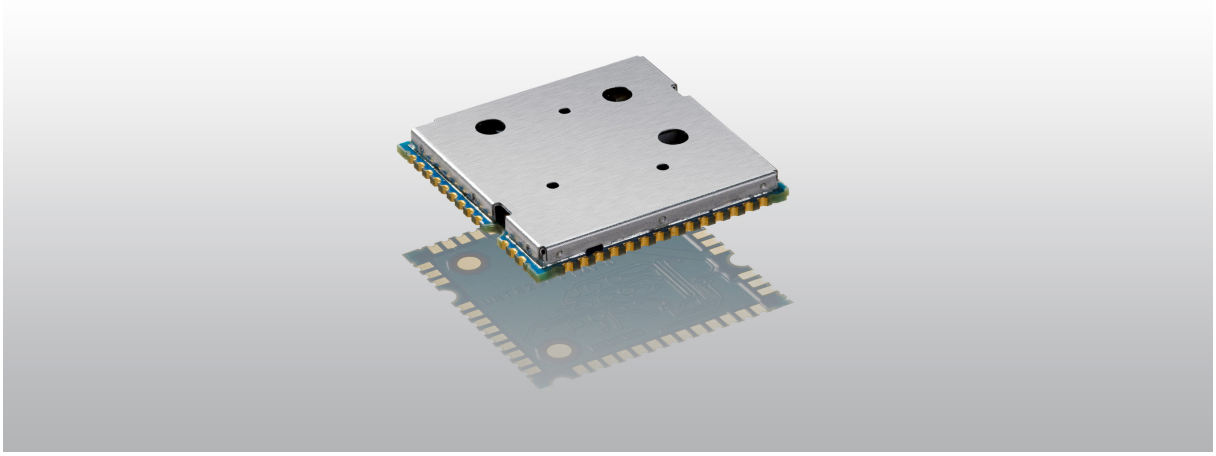
HILONC V2 DEVELOPMENT KIT APPLICATION NOTE



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FICHE RECAPITULATIVE / *SUMMARY SHEET*

Ed	Date *Date*	Référence *Reference*	Pages modifiées / *Changed pages*	Observations *Comments*
1	25/10/2010	**URD1– OTL 5665.3– 007 / 72 399 Edition 01**	All	Création du document *Document creation*
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SOMMAIRE / *CONTENTS*

1. SCOPE

1.1. Introduction

The object of the document is to describe the interfaces and pin identifications of the Development Kit to test the HiLoNC V2 module in operating mode.

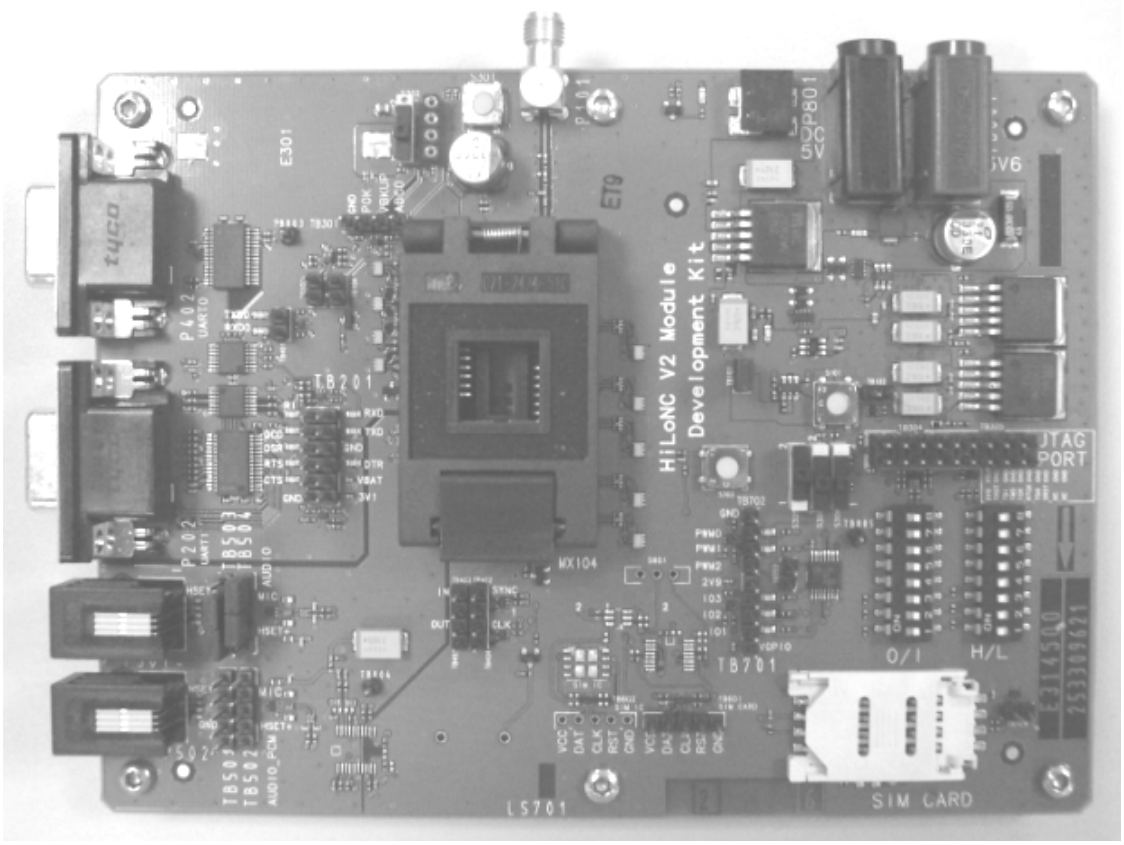
1.2. Reference

- HiLoNC V2 Development Kit Schematic
- HiLoNC V2 Specification: 5635.1 005 70086 ed 04 - HiLoNC V2 technical specification.doc
- HiLoNC V2 Application Note: 5635.1 007 70230 ed 01 - HiLoNC V2 application note.doc
- Temperature sensor “ADT7302” specification: ADT7302.pdf
- Inertial sensor LIS3LV02DQ specification: LIS3LV02DQ.pdf
- URD1 - OTL 5625.1 - 010 - N°69846 - DEMOBOARD MO300 APPLICATION NOTE - ED01.doc

1.3. Terms and abbreviation

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

2. PRODUCT OVERVIEW

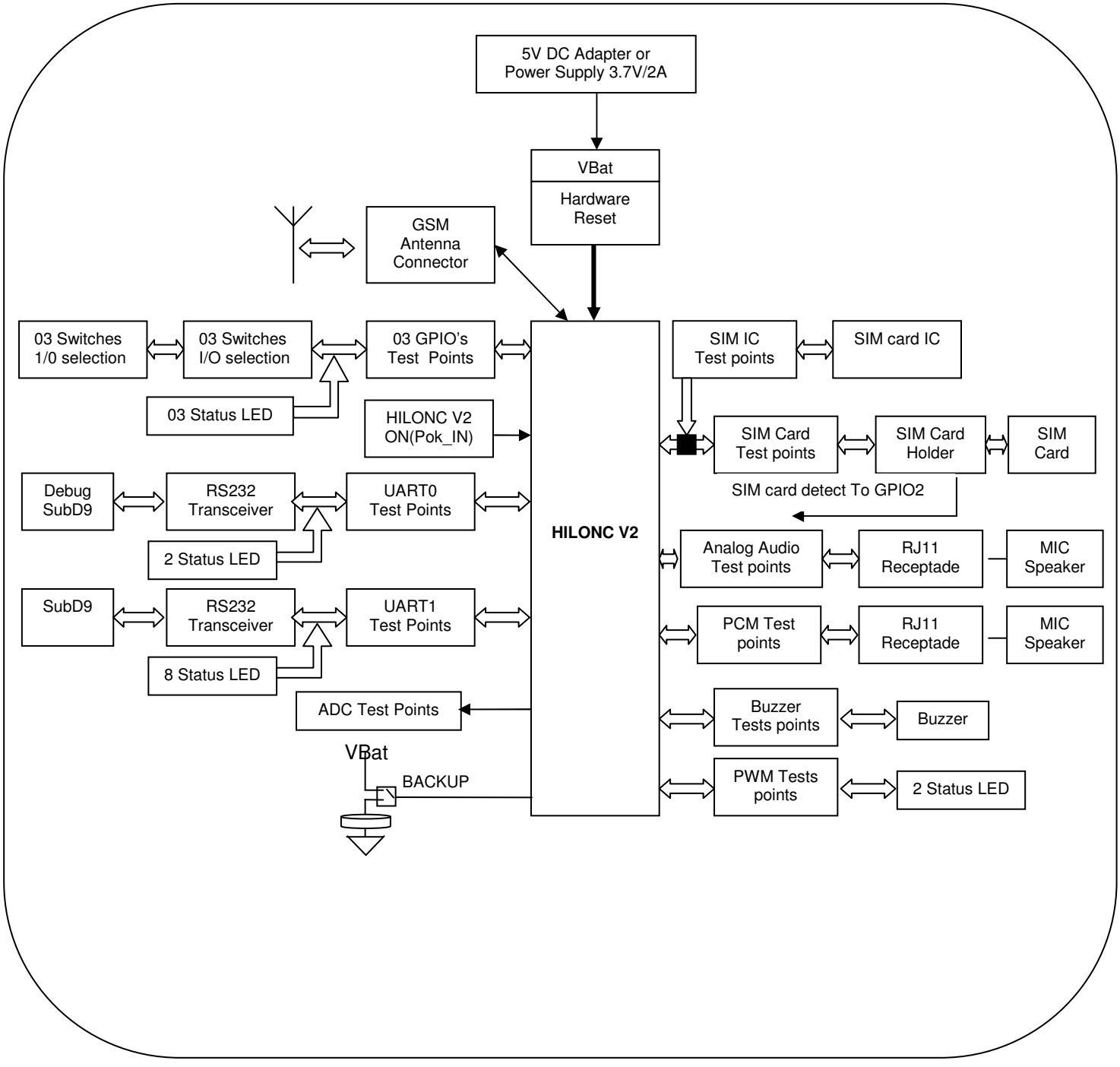


2.1. Key features

Feature	Implementation
GSM module interface	❖ **Direct connection of GSM module via 51 pin socket.**
Power supply	❖ **Laboratory PSU set to 3.7V and 2A max.** **or** ❖ **5V DC Adapter 2A max (with inner "+" and outer "-").** ❖ **Two Leds for power status.** ❖ **Power supplies automatically switched.** ❖ **Power regulation for the Development Kit needs (2.9V and 3.1V).**
Antenna interfaces	❖ **Integrated connection SMA connector for GSM uses.**
SIM interface	❖ **SIM card connector with card detection.** ❖ **Supported SIM cards: 3V and 1.8V.**
Audios interfaces	❖ **Analog audio interfaces with filters and RJ11 connector for connecting a handset, headset or speakerphone.**
Serial interfaces	❖ **RS-232 interfaces with SubD9 connectors:** **UART1 – full serial interface (all modem status are available).** ❖ **Status Led for each lines.**
GPIOs	❖ **3 GPIOs.**

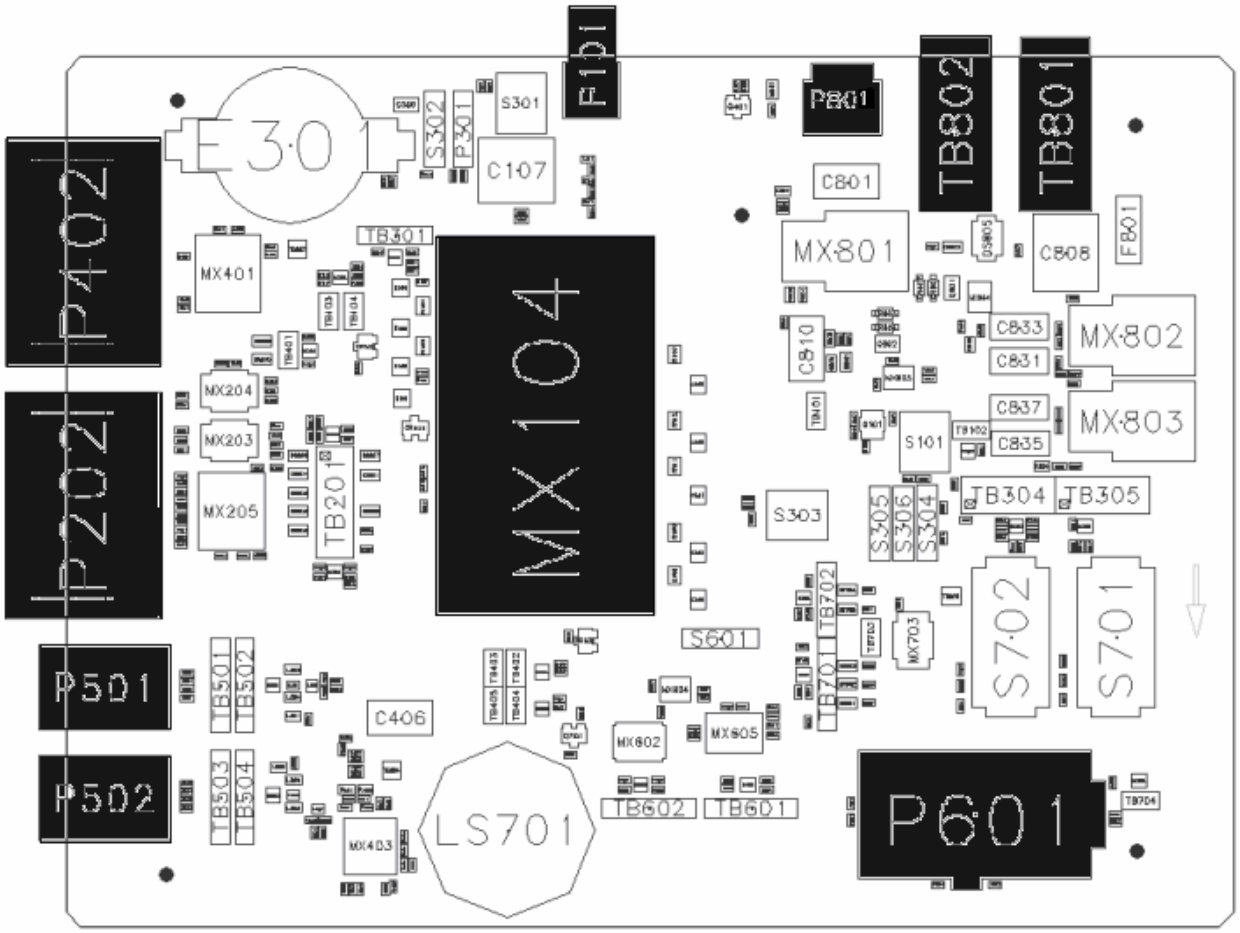
	❖ **Able to be switched in/out and pull-up/pull-down resistors.** ❖ **Status Led for each I/Os.**
ADC interface	❖ **One analog input (0 to 1.8V).**
Protections	❖ **ESD and EMC protections on each pin headers and connectors of the Development Kit.**
Physical characteristics	❖ **Size : 168mm x 118mm x 30mm**

2.2. Functional diagram



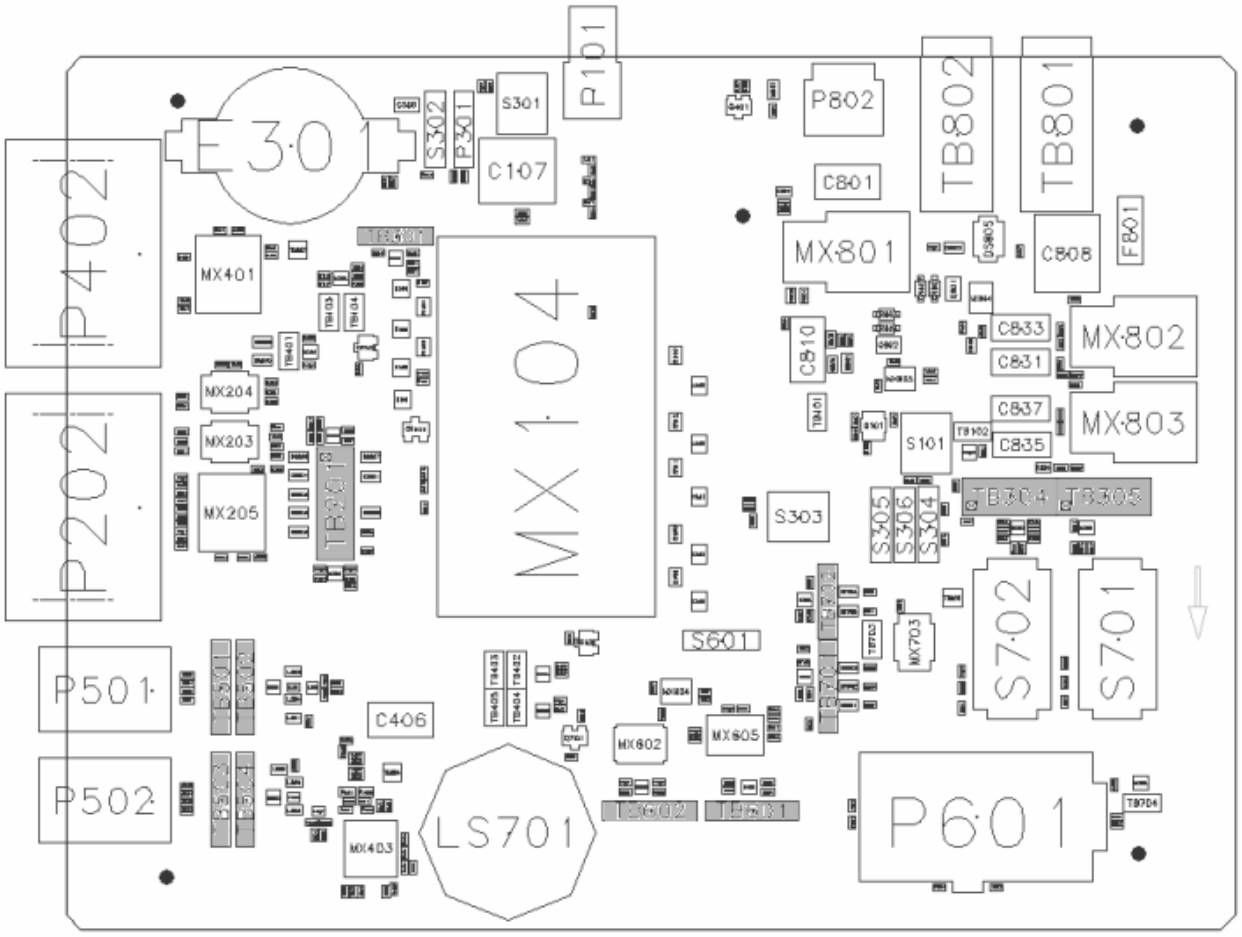
2.3. Interfaces location

2.3.1. Connectors



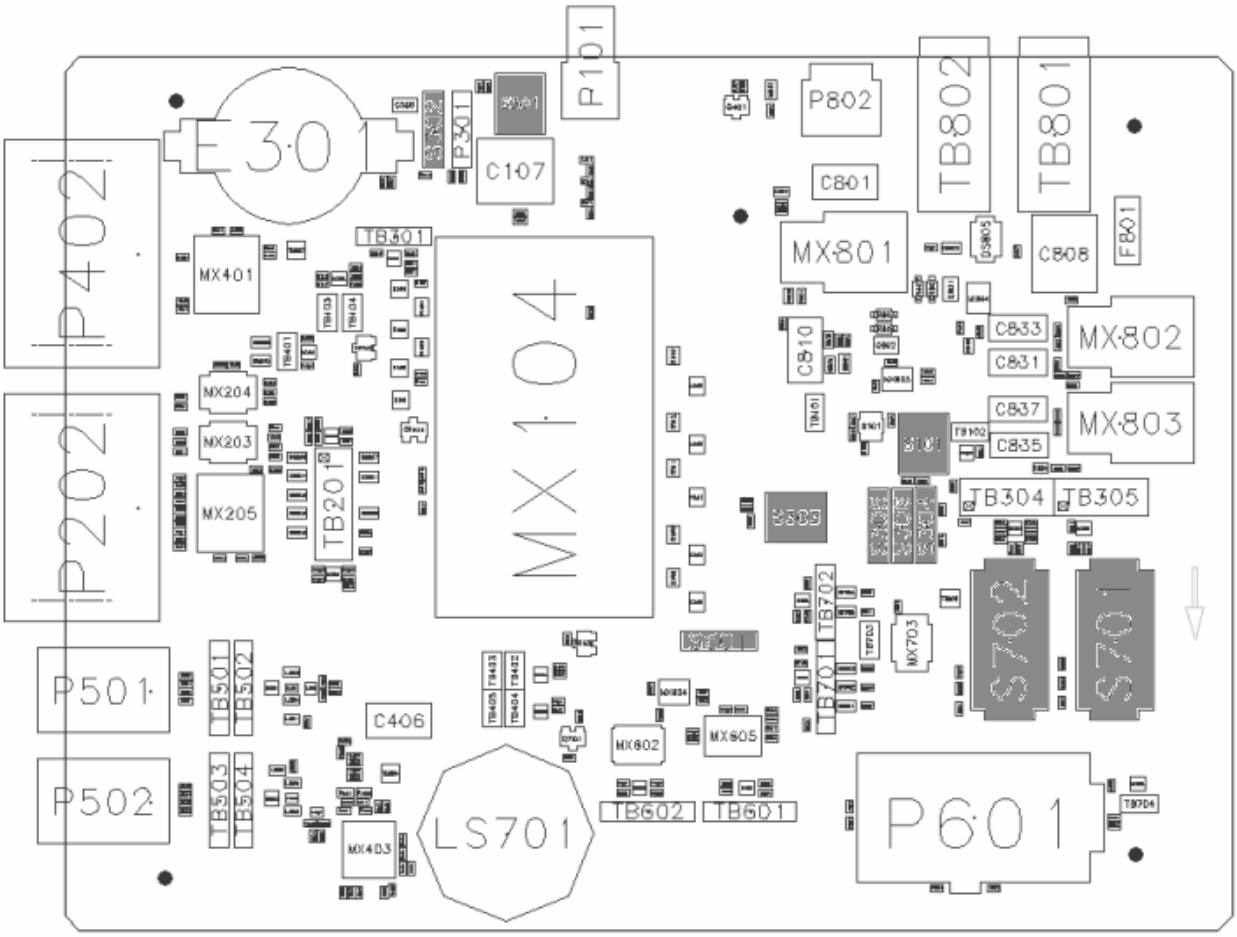
Location	Connector's Type	Function
MX104	51 pins socket	Module interface
P202	Sub-D 9 Connector	UART1
P402		UART0 (Debug)
P501 P502	RJ11 Receptacle	Analog audio
P101	SMA Connector 50 Ohms	Antenna GSM
TB801	Laboratory power supply receptacle Ø 4mm	Power supply 1
TB802		
P801	Mini DC jack (+ inner, - outer) Ø 2.5mm	Power supply 2
P601	Sim card holder	SIM

2.3.2. Test points



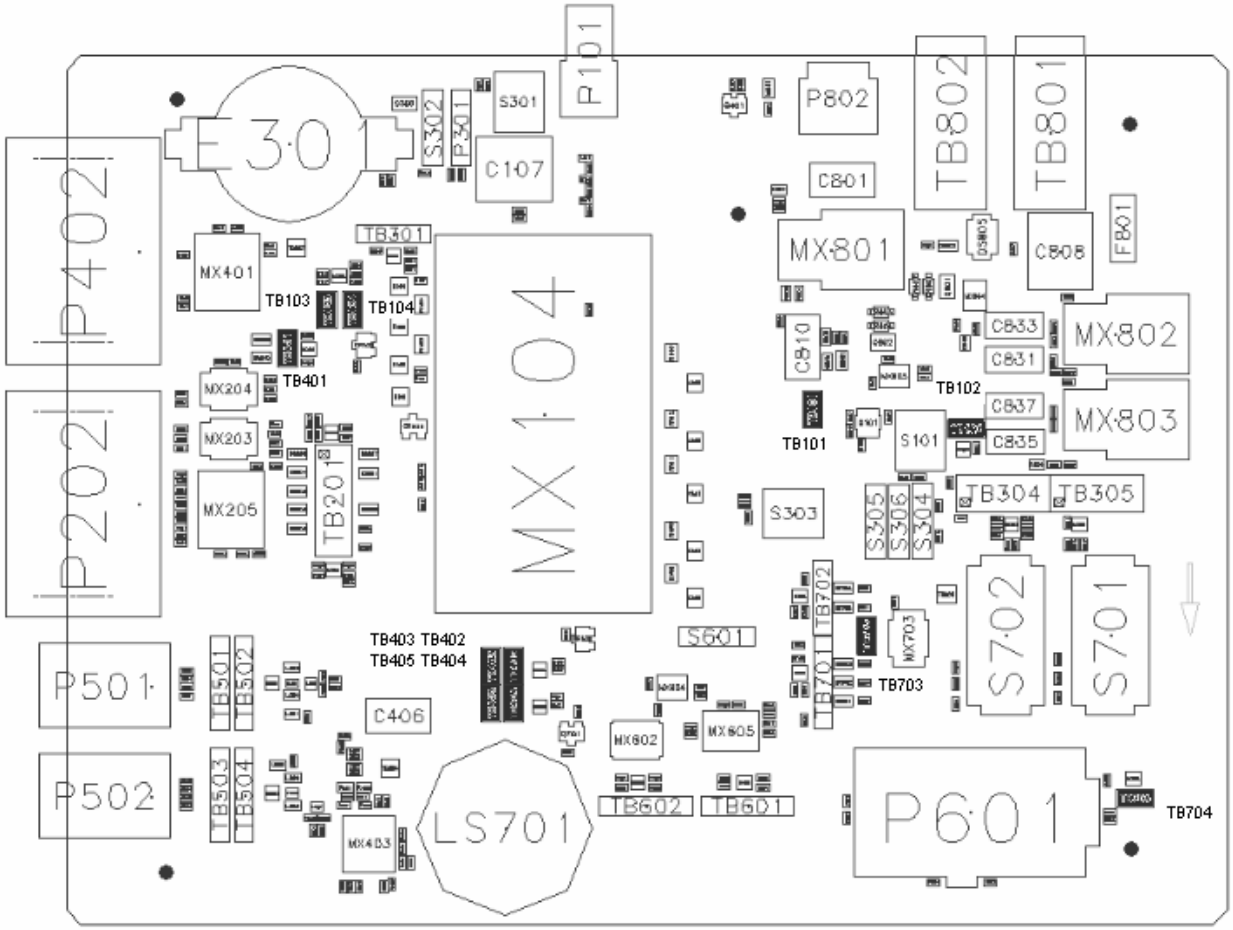
Location	Connector's Type	Function
TB201	Pin Headers	UART1
TB701	Pin Headers	GPIO
TB702	Pin Headers	PWM
TB501	Pin Headers	Analog audio PCM
TB502		
TB503	Pin Headers	Analog audio
TB504		
TB602	Pin Headers	SIM IC (option)
TB601	Pin Headers	SIM CARD
TB301	Pin Headers	POK, ADC0, BACKUP
TB304	Pin Headers	JTAG PORT
TB305		

2.3.3. Switches



Location	Connector's Type	Function
S701	DIP switches	GPIO (I/O) INPUT OR OUTPUT
S702	DIP switches	GPIO (H/L) HIGH LEVEL OR LOW LEVEL
S301	Push button	POWER ON
S302	Switch Inverter	BACKUP BATTERY (1) OR 10uf capacitance
S303	Push button	RESET
S304	Switch Inverter	FOR JTAG
S305	Switch Inverter	FOR JTAG
S306	Switch Inverter	FOR JTAG
S601	Switch Inverter	SIM CARD (1) OR SIM IC (2) (option)
S101	Push button	Switch OFF the module power supply

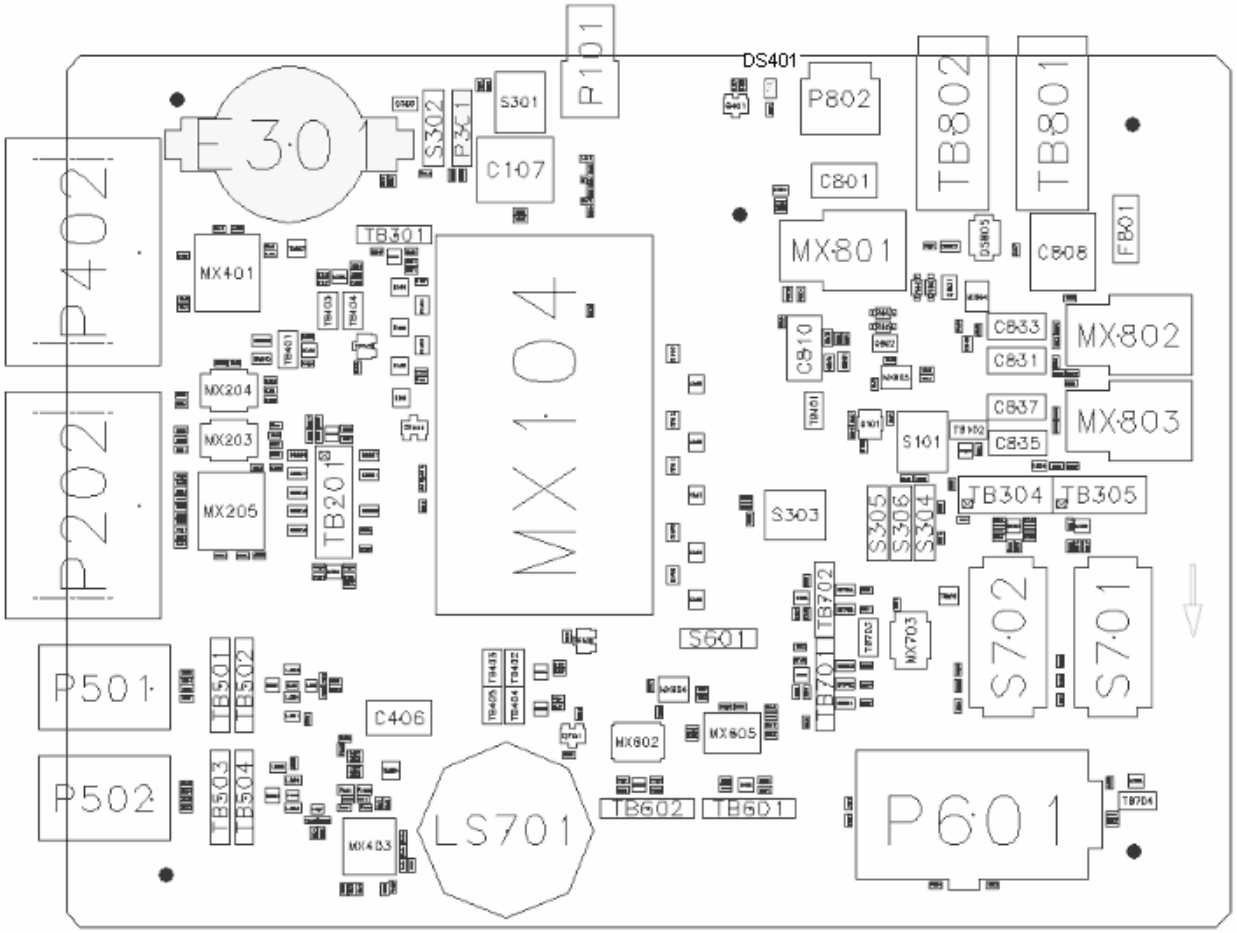
2.3.4. Jumpers



Location	Connector's Type	Function
TB101	Pin Headers	VBAT
TB102	Pin Headers	enable the connection between chip and GPIO
TB103	Pin Headers	enable ANTENNA DETECTION
TB104	Pin Headers	enable ANTENNA DETECTION
TB401	Pin Headers	UART0 test point
TB402	Pin Headers	For PCM
TB403	Pin Headers	For PCM
TB404	Pin Headers	For PCM
TB405	Pin Headers	For PCM
TB703	Pin Headers	BUZZER
TB704	Pin Headers	SIM CARD DETECTION TO GPIO2

Details on jumper function are given in chapter 4.8: Overview of jumpers.

2.3.5. Miscellaneous



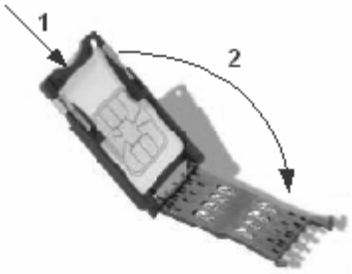
Location	Connector's Type	Function
P301	Pin Headers	ADC INPUT
E301	Battery (coin) connector	Backup battery (option)
DS401	LED	RF indicator
LS701	Buzzer	Buzzer device (option)
DS801	LED	Lab PSU indicator
DS802	LED	DC 5V adapter indicator

3. GETTING STARTED WITH THE DEVELOPMENT KIT

Follow these steps to start the HILONC V2 module on Development Kit.

3.1. Power Supply not connected

- Plug the HILONC V2 module on the Development Kit
- Screw the antenna into the SMA connector
- Insert the SIM card into the holder



- *Select the SIM card location on position 1 or the SIM IC on position 2 with the switch S601 (option).*
- Plug Data Cables (RS-232) into UART1 connector.

3.2. Switch on the Development Kit

- Connect the DC 5V adapter or a laboratory power supply unit set to 3.7V and 2A to the Development Kit.

One of the red DS801 or DS802 lights on, the HILONC V2 development Kit is therefore ready to work.

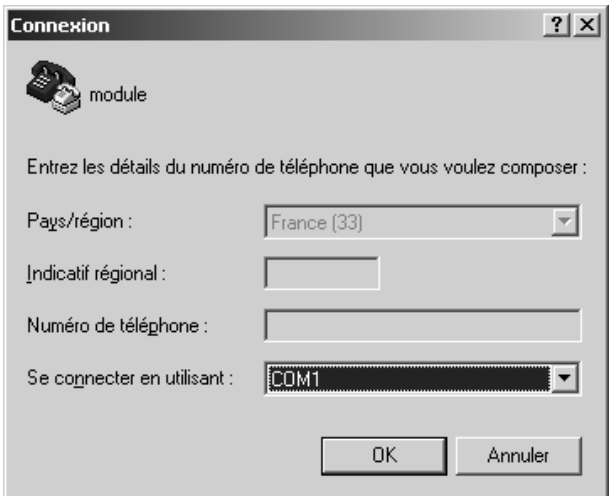
- Push “ON” S301 Button for around one second to start the module.

3.3. Communication with the module

- On the computer side, launch HyperTerminal :
- Under windows operating system.

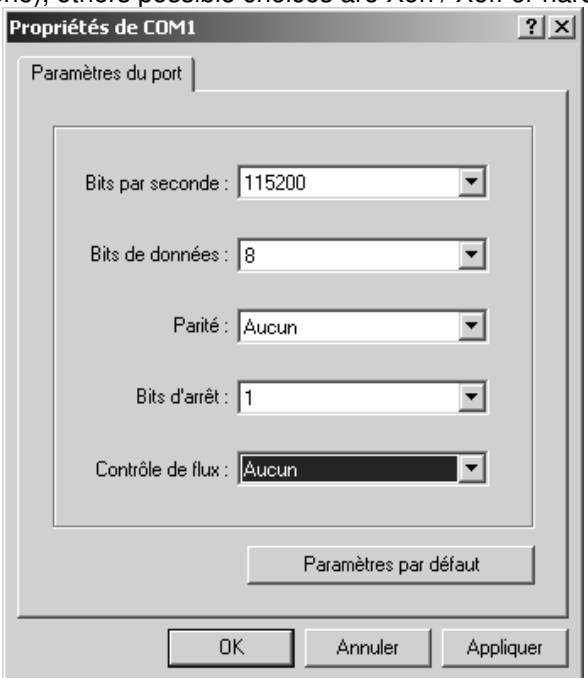
Select: Menu -> Start -> Programs -> Accessories -> Communication -> HyperTerminal

- Select the port on which is connected the communication cable (UART1) of the Development Kit:



❖ Set the port parameters and validate with OK:

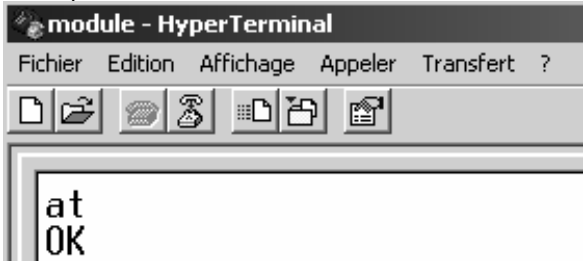
In this picture ("Aucun" means None), others possible choices are Xon / Xoff or hardware.



❖ In the terminal window, type: **AT** and validate with the “Enter” key.

The module must answer: OK

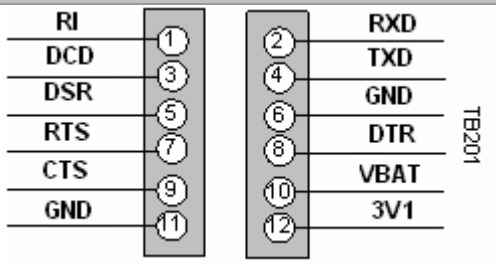
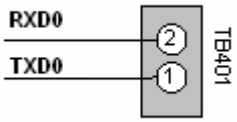
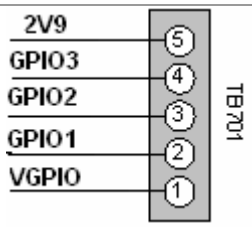
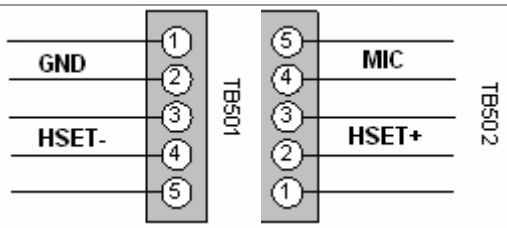
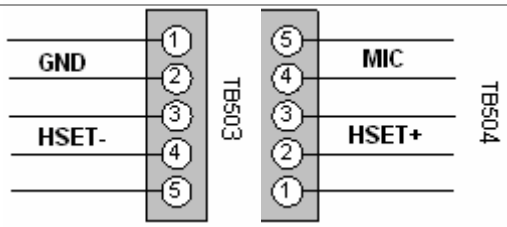
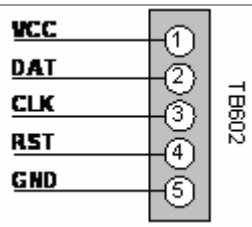
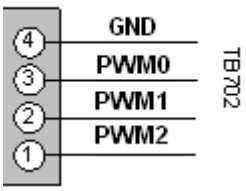
For the AT commands specifications please refer to the "AT command" document provided.

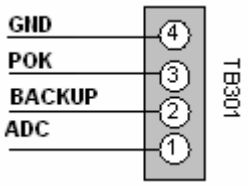
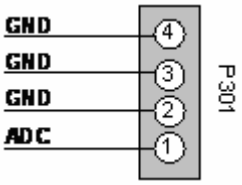
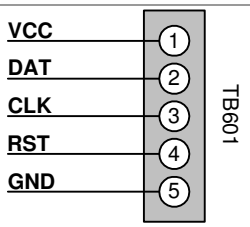


4. HILONC V2 DEVELOPMENT KIT INTERFACE

4.1. Test Points interface

All signals provided by the module are directly connected to pin headers and divided by interface. For signals features please refer to: "URD1 5635.1 005 70086 - HiLoNC V2 technical specification " document provided.

INTERFACE	PINNING
UART 1	
UART 0	
GPIO	
Analog audio_PCM	
Analog audio	
SIM IC	
PWM	

ADC0 / VBACKUP / POK	
ADC	
SIM CARD	

4.2. SIM interface

4.2.1. SIM IC

This optional chip located on the development kit can emulate a SIM card. It has the following specification.

- 3GPP TS 51.011, 51.014, 43.019, 23.040, 23.140
- 3GPP TS 23.048
- 3GPP TS 22.048
- ETSI TS 102 221, 102 222
- ISO / IEC 7816

The SIM IC is compatible with the ISO 7816-3 IC standard required by the GSM 11.11 Phase 2+ standard.
The SIM IC interface insures the power on (SIMVCC) of the SIM Chip and the communication with it through a data signal (SIMDAT), a clock signal (SIMCLK) and a reset signal (SIMRST).

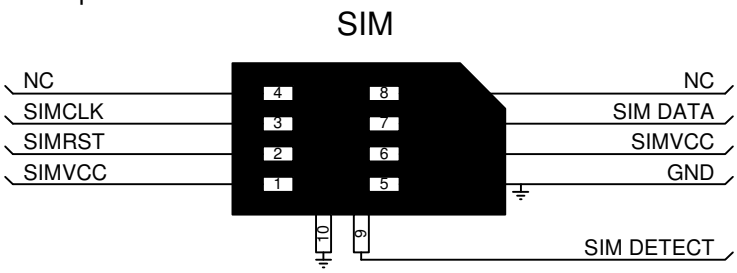
- Switch S601 to position "2" to use this SIM.

4.2.2. SIM CARD

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 detection (SIMCD), 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).

- Switch S601 to position "1" to use this SIM card.
- The jumper TB704 connects the SIM card presence detection to the GPIO2 (IO2)

The figure below shows the simplified interface schematic:



4.3. Serial Interface

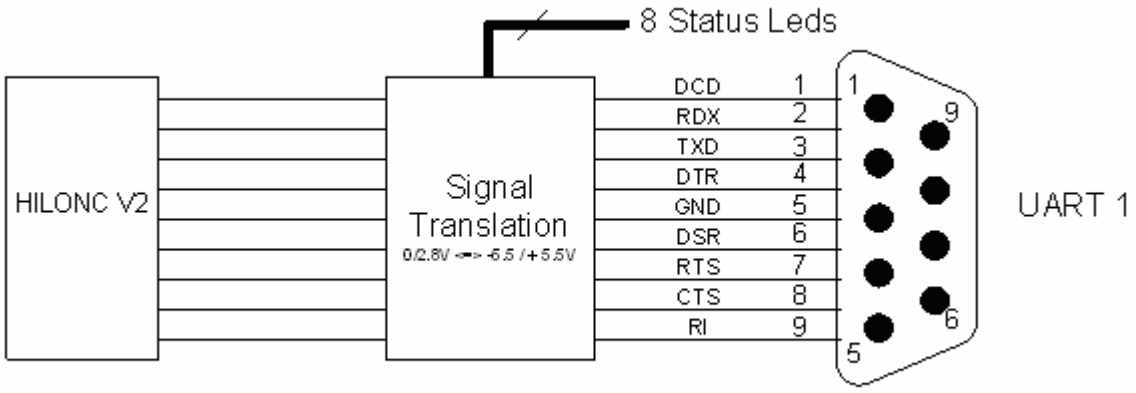
4.3.1. UART 1

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 “UART1” on P202. It supports speeds up to 1 MBPS and may be used in auto bauding mode.
Eight LEDs are provided on Development Kit to show the status of the UART 1 signal. The figure below shows the simplified interface schematic:



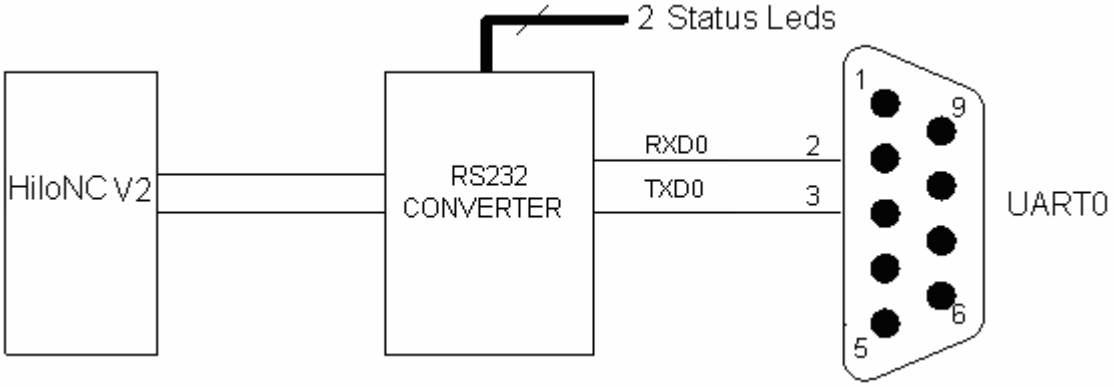
4.3.2. UART 0

4 signals are provided on external pins of the module with the following functions:

- RXD2/TXD2
- RTS2/CTS2

The signals levels are adapted and connected to the male Sub-D9 connector “UART 0”.
This UART is only available for the software debug, signals are converted into RS232 signals and their voltage adapted.
The UART 0 interface is therefore enabled on the Sub-D 9 connector.

The figure below shows the simplified interface schematic:



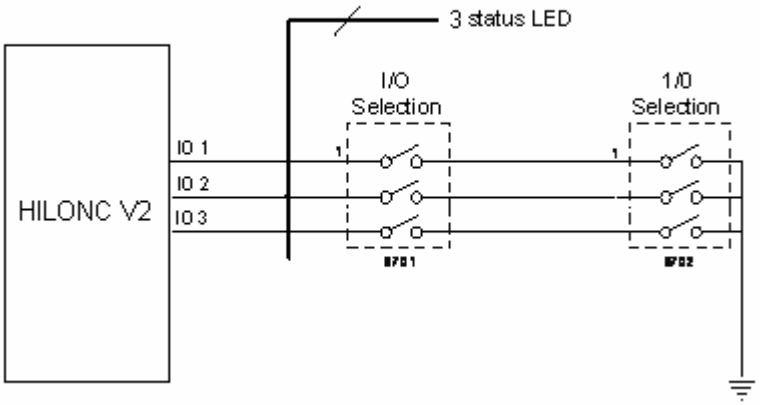
4.4. GPIOs interface

GPIOs interface is provided on external pins of the module with the 3 signals.
S701 is used to set up GPIOs as input or output. When the switch is closed, the GPIO is configured as input. When the switch is opened, the GPIO is configured as output.

S702 allow to drive the input. When the switch is closed, the GPIO level is at low level. When the switch is opened, the GPIO level is at high level.

- 3 GPIOs are available and named IO1 to IO3

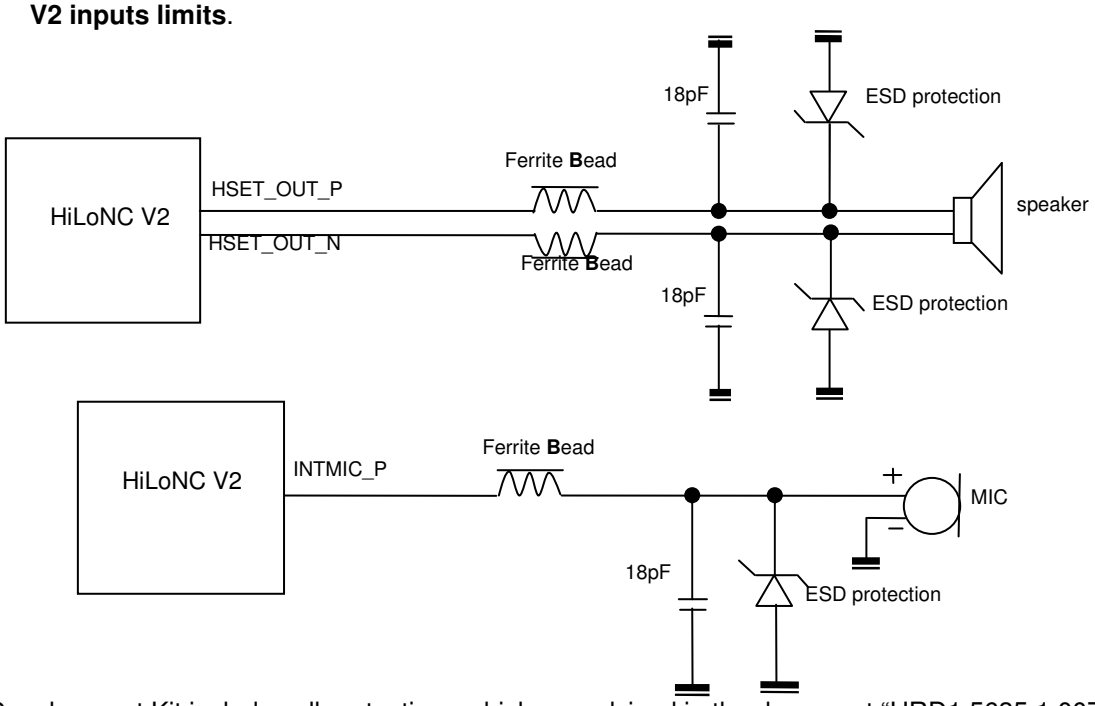
The figure below shows the simplified interface schematic.



4.5. Analog audio interface

The HILONC V2 can manage an external microphone (MIC) in single mode and external speaker (32 ohms HSET_N/HSET_P) in differential mode.
Thus, one receiver and one microphone can be connected to the module with the following characteristics (see SAGEM references in the document "URD1 5635.1 007 70230 - HiLoNC V2 application note"):

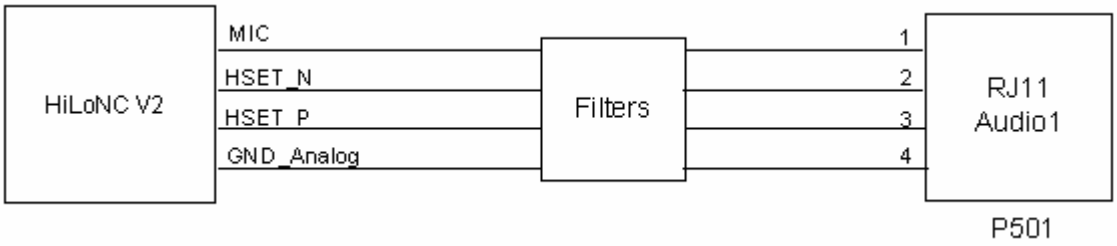
- Receiver 32 ohms up to 120 ohms
- The microphone can be supplied using the internal HILONC V2 bias supply (recommended but not mandatory) or any other external bias system compliant with selected microphone **within the HILONC V2 inputs limits**.



The Development Kit includes all protections which are advised in the document "URD1 5635.1 007 70230 - HiLoNC V2 application note".

4.5.1. Functional diagram

The figure below shows the simplified interface schematic on the Development Kit:



4.6. 51-pins module interface

Pad N°	Pad name	IO Type	Description
1	INTMIC_P	Analog input	Single ended input from microphone
2	AUX_ADC0	Analog input	Analog input to digital converter
3	GND	Ground	GND
4	VGPIO	Power supply output	+2.8V power supply output
5	VBACKUP	Power supply input/output	Power supply for RTC backup
6	PWM0	Digital output buffer	DC PWM 0
7	RESET	Digital input buffer	Module Reset
8	SAGEMCOM	FACTORY	FACTORY purpose
9	SAGEMCOM	FACTORY	FACTORY purpose
10	SAGEMCOM	FACTORY	FACTORY purpose
11	TRST	Digital bi-directional buffer	FACTORY purpose
12	SAGEMCOM	FACTORY	FACTORY purpose
13	SAGEMCOM	FACTORY	FACTORY purpose
14	GPIO2	Digital bi-directional buffer	General purpose input/output 2
15	GPIO1	Digital bi-directional buffer	General purpose input/output 1
16	RF_TX	Digital output buffer	RF power transmitting indicator
17	PCM_CLK	Digital bi-directional buffer	PCM clock signal
18	PCM_SYNC	Digital bi-directional buffer	PCM sync signal
19	PCM_OUT	Digital output buffer	PCM data output
20	PCM_IN	Digital input buffer	PCM data input
21	GND	Ground	GND
22	JTAG1	Digital bi-directional buffer	JTAG configuration
23	JTAG2	Digital bi-directional buffer	JTAG configuration
24	TEST	Digital bi-directional buffer	JTAG configuration
25	UART0_RXD	Digital input buffer	Trace UART0 receive
26	GPIO3	Digital bi-directional buffer	General purpose input/output 3
27	GND_RF	Ground	RF Ground
28	RF	Antenna	RF signal
29	GND_RF	Ground	RF Ground
30	VBAT	Power supply input	+3.7 V power supply (nominal)
31	VBAT	Power supply input	+3.7 V power supply (nominal)
32	UART0_TXD	Digital output buffer	Trace UART0 transmit
33	UART1_DSR	Digital output buffer	UART1 data set ready
34	UART1_DCD	Digital output buffer	UART1 data carrier detect
35	UART1_RI	Digital output buffer	UART1 ring indicator
36	UART1_DTR	Digital input buffer	UART1 data terminal ready
37	UART1_RTS	Digital input buffer	UART1 request to send
38	UART1_RX	Digital input buffer	UART1 receive
39	UART1_TX	Digital output buffer	UART1 transmit
40	UART1_CTS	Digital output buffer	UART1 clear to send
41	POK_IN	Digital input	Module power on signal

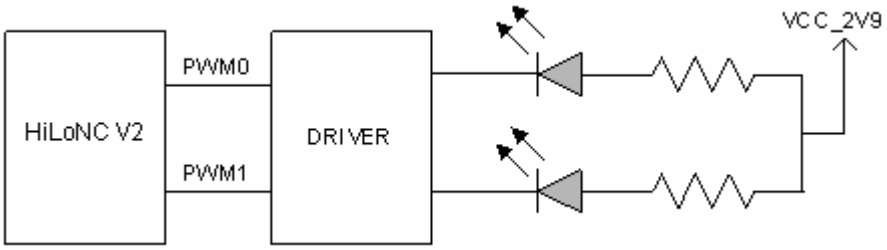
42	PWM2	Digital output buffer	Buzzer PWM
43	PWM1	Digital output buffer	DC PWM 1
44	SIM_CLK	Digital output buffer	SIM clock
45	SIM_RST	Digital output buffer	SIM reset
46	SIM_DATA	Digital bi-directional buffer	SIM data
47	VSIM	Power supply output	SIM power supply
48	VBAT	Power supply input	+3.7V battery power supply (nominal)
49	GND	Ground	GND
50	HSET_OUT_P	Analog output	Differential output to earphone 32 ohms
51	HSET_OUT_N	Analog output	Differential output to earphone 32 ohms

4.7. Miscellaneous

4.7.1. PWMs

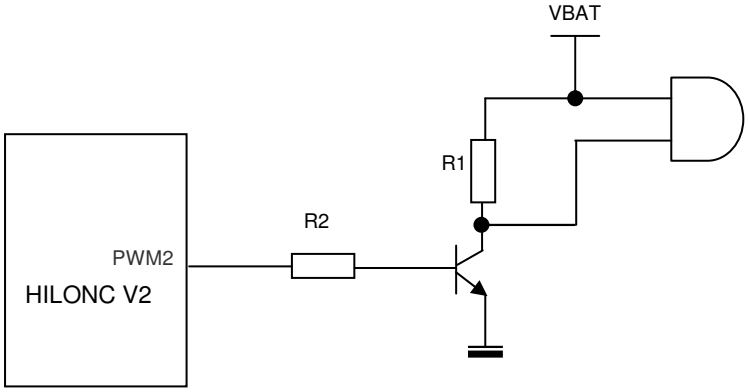
a) Case of PWM0 & PWM1

The PWM0 and PWM1 outputs are provided on external pins of the module. PWM0 line drives the green led and PWM1 line drives the other green led located in front of the test pins in TB702.
The figure below shows the simplified interface schematic:



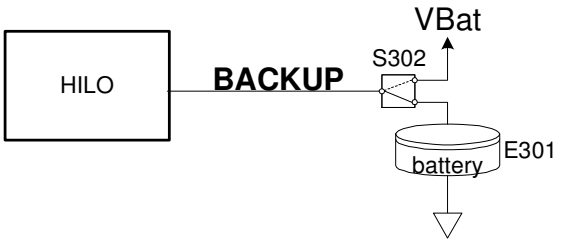
b) Case of PWM2

This output is dedicated to drive a Buzzer.
Connect the jumper TB703 to enable the Buzzer supply.
The figure below shows the simplified interface schematic:



4.7.2. BACKUP

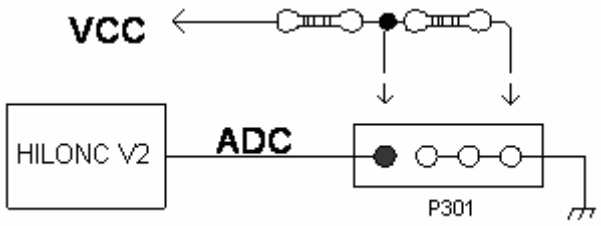
The BACKUP input is provided on external pins of the module. The backup line can be connected to the battery or directly shunted to VBat.
The figure below shows the simplified interface schematic:



With S302, BACKUP must be connected to VBAT, if no backup battery is present, and to BACKUP, if backup battery is present.
The battery type is CR2032 inserted with the "+" side up.

4.7.3. ADC

An ADC input is provided on external pins of the module. An external analogical voltage can be plugged on P301 pin 1 to be measured. The ADC can measure from 0 to 1V.
The figure below shows the simplified interface schematic:

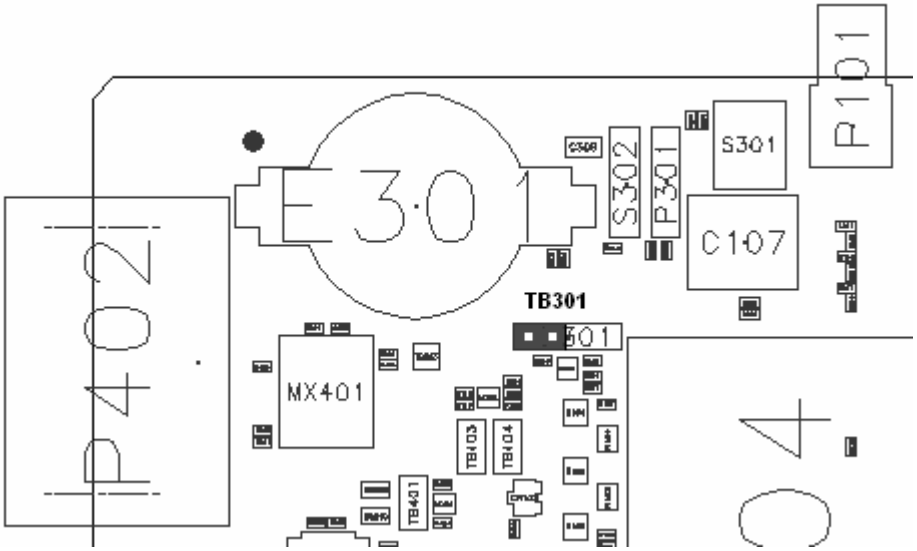


4.7.4. GSM Antenna

The antenna connector can be connected to the HILONC V2 module via SMA connector(P101).

4.7.5. Auto power-on

The HILONC V2 can power on automatically on the development board when a jumper is set on TB301 between position 4 and 3, low level active POK is therefore set to ground level.



4.7.6. Hardware reset

The HiLoNC V2 module can control an external reset device via the GPIO3 (IO3).

- Connect the jumper TB102 to enable the connection between the chip and the GPIO.
- It can also be done manually by using S101 to provoke a hardware reset.

In both cases, a jumper must be set in TB301 between position 4 and 3. This pull-down PWON signal and then enable an auto power-on whenever the power supply is available.

- It can also be done manually by using S303 to provoke a hardware reset.

In this case, no need do any set in TB301.

4.8. Overview of jumpers

Reference	Function	
	Jumper set	Jumper not set
TB101	Power supply the HiLoNC V2 directly.	Power supply the HiLoNC V2 via Q101.
TB102	The GPIO3 (IO3) is connected to the Reset chip and then the module is able to perform a hardware reset.	External hardware reset not controlled by the HILONC V2 module.
TB103	Enable to use antenna detection.	can't use antenna detection.
TB104	Enable to use antenna detection.	can't use antenna detection.
TB401	UART0 test point.	UART0 test point.
TB402	For PCM.	For PCM.
TB403	For PCM.	For PCM.

TB404	For PCM.	For PCM.
TB405	For PCM.	For PCM.
TB703	Buzzer Enabled	Buzzer Disabled
TB704	The pin SIM card presence detection from the SIM card holder pins 9 & 10 is connected to the GPIO2 (IO2).	The pin SIM card presence detection from the SIM card holder pins 9 & 10 is not connected to the GPIO2 (IO2).

4.9. Overview of Switchers

Reference	Function	
	Switch on	Switch off
S701	To set up GPIO1 to GPIO3 as an input.	To set up GPIO1 to GPIO3 as an output.
S702	Pulls down GPIO1 to GPIO3 when they are set up as input.	Pulls up GPIO1 to GPIO3 when they are set up as input.
S301	POWER ON the HILONC V2 module.	No action.
S101	Shut down the power supply.	No action.
S303	Provoke a hardware reset.	No action.

Reference	Function	
	Position 1	Position 2
S302	Connects BACKUP signal of module to the backup battery. (CR2032: lithium battery of 3V)	Connects BACKUP signal of module to the VBAT.
S601	SIM CARD is selected.	SIM IC is selected.
S304	Reserved by Sagemcom.	Reserved by Sagemcom.
S305	Reserved by Sagemcom.	Reserved by Sagemcom.
S306	Reserved by Sagemcom.	Reserved by Sagemcom.

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