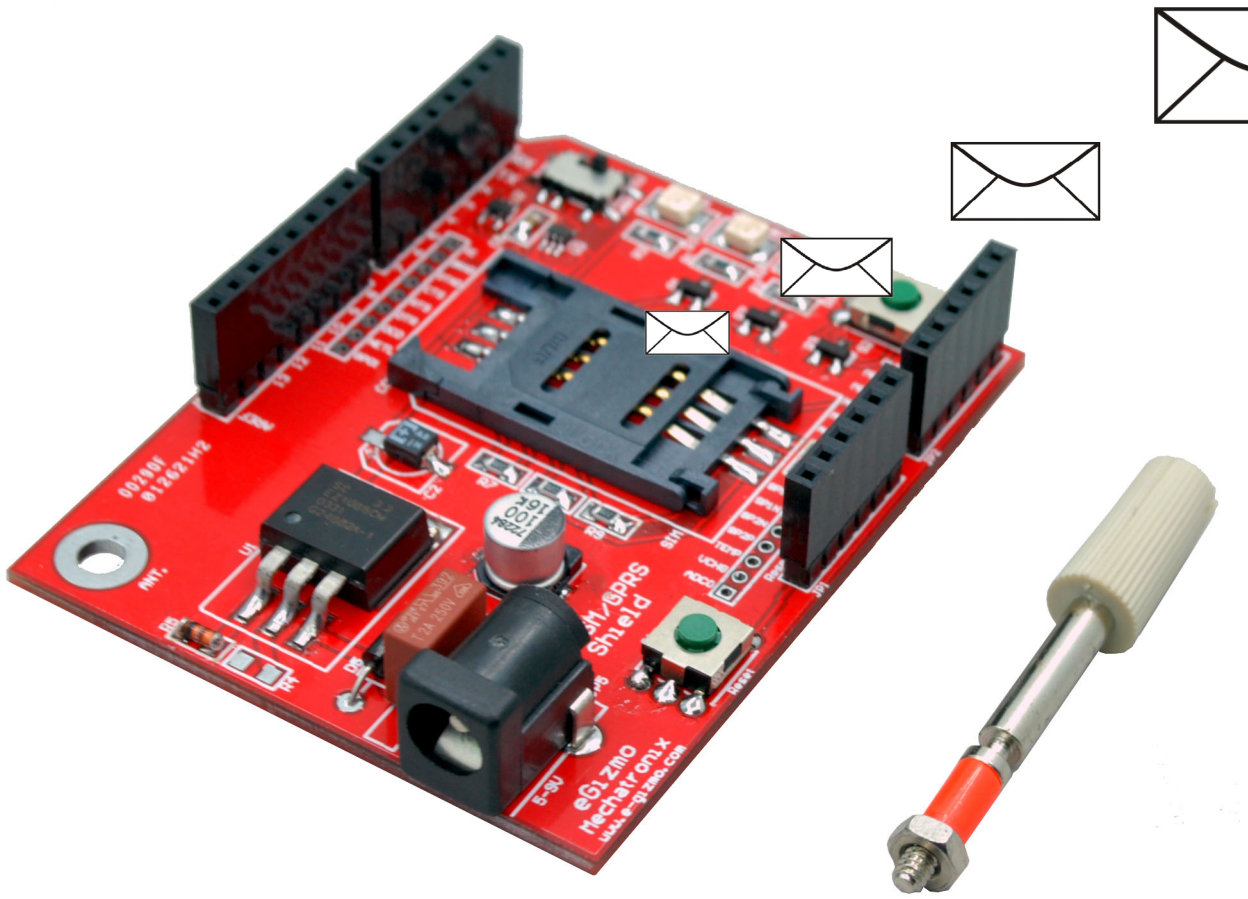
GSM / GPRS SHIELD



FEATURES & SPECIFICATIONS

- Industry proven SIMCOM SIM900D Module
- Buffered UART provides additional layer of protection
- Fused power input
- On board LDO voltage regulator
- UART/SUART switch selectable port (gizDuino)
- On board manual power switch
- SIM Card Holder

GENERAL SPECIFICATIONS

Power Input:
5V-7.5VDC @ 1.5A

I/O Interface:
UART 3.3V Logic 5V Tolerant

LED Indicators:
Power
Network
Status

PCB Dimensions:
53.5W x 69L mm

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MAJOR COMPONENTS PRESENTATION

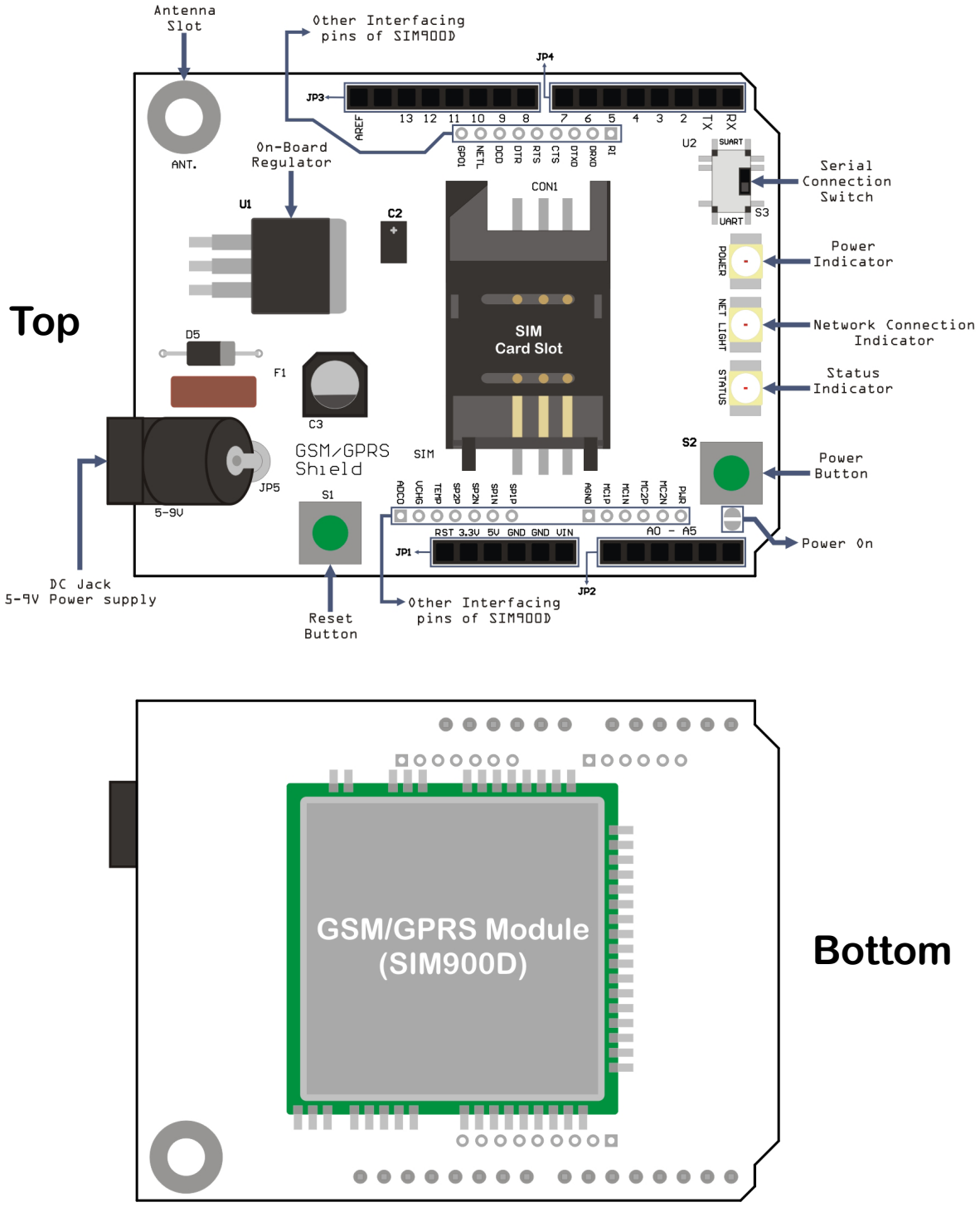

Figure 1. GSM/GPRS Major Parts ID & Presentation (Top & Bottom).

We develop a GSM/GPRS modem circuit board that is compatible with Arduino™ or on our own version of Arduino™, the gizDuino™. These kinds of circuit is known as “Shields”, an easy to install and compatible pins that fits to gizDuino™ or any other Arduino™ compatible clones. With the power of SIM900D (the module that was used to our GSM/GPRS modem (Shield)), the utilization of SMS and voice can be initiate a remote control command from any range that the network service provider covers.

Not all the pins of sim900d was used to inline the compatibility of the shield to any gizDuino™ compatible controllers, but the unused pins of SIM900d may yet be used because we put the uncommitted ports to each pin that is ready for interfacing and soldering. We also implement a mini SIM card slot & holder for (ISO/IEC 7810:2003, ID-000) SIM cards, that will act as the medium in connecting to a network provider. , We also attached 3 LED indicators for easy power, command status, & network status checking, UART – SUART switch for, a built in Antenna slot for wider signal range, and a jamming port for controlling the power switch of the shield through codes or command.

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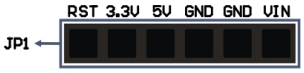
PIN I.D. & DESCRIPTIONS



JP1 Details & Pin Assignment

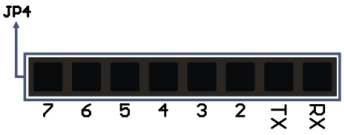
Pin I.D.	Description
RST	Reset Pin
3.3V	3.3V Device Power Supply
5V	5V Device Power Supply
GND	Ground
GND	Ground
VIN	8-12V Device Power Supply

JP2 Details & Pin Assignment

Pin I.D.	Description
A0	Analog In / Digital I/O
A1	Analog In / Digital I/O
A2	Analog In / Digital I/O
A3	Analog In / Digital I/O
A4	Analog In / Digital I/O
A5	Analog In / Digital I/O

JP3 Details & Pin Assignment

Pin I.D.	Description
AREF	analog reference pin for the A/D Converter.
-	-
13	Digital I/O
12	Digital I/O
11	Digital I/O
10	Digital I/O
9	Digital I/O
8	Digital I/O

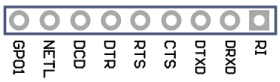


JP4 Details & Pin Assignment

Pin I.D.	Description
7	Digital I/O
6	Digital I/O
5	Digital I/O
4	Digital I/O
3	Digital I/O / SUART mode (Transmit)
2	Digital I/O / SUART mode (Recieve)
TX	Digital I/O / Transmit
RX	Digital I/O / Recieve

SIM900D open interfacing pin ports Details & Pin Assignment

Pin I.D.	Description
PWR	Power indicator
MC2N	Auxiliary positive and negative voiceband input
MC2P	Auxiliary positive and negative voiceband input
MC1N	Positive and negative voiceband input
MC1P	Positive and negativevoiceband input
AGND	Analog Ground
SP1P	Positive and negative voiceband output
SP1N	Positive and negative voiceband output
SP2N	Auxiliary positive and negative voiceband output
SP2P	Auxiliary positive and negative voiceband output
TEMP	Battery temperature
VCHG	Voltage input for the charge
ADCO	General purpose analog to digital converter



SIM900D open interfacing pin ports Details & Pin Assignment

Pin I.D.	Description
RI	Ring Indicator
DRXD	Serial interface for debugging and firmware upgrade
DTXD	Serial interface for debugging and firmware upgrade
CTS	Clear to send
RTS	Request to send
DTR	Data terminal ready
DCD	Data carry detect
NETL	Net status indicator
GPO1	Normal output port

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HOW TO TEST GSM / GPRS SHIELD

Using with gizDuino microcontroller

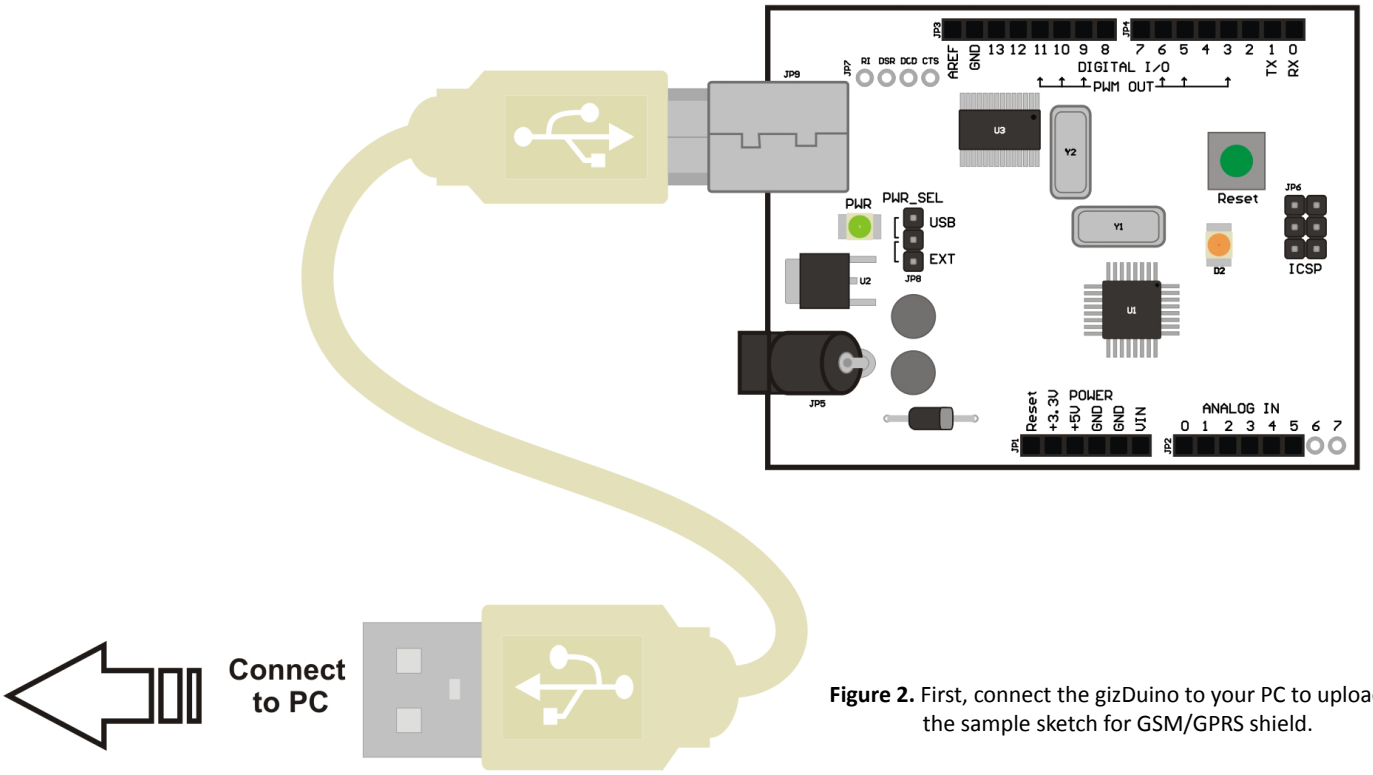

Figure 2. First, connect the gizDuino to your PC to upload the sample sketch for GSM/GPRS shield.

After connecting the gizDuino to your PC, open the the CD (included in purchasing the kit.) and go to 'e-Gizmo KITS'>' GSM-GPRS (Shield)'>' Sample Arduino Sketch'>' GSM_Shield_test'>' GSM_Shield_test', and after opening the sample sketch, you need to edit some codes.

Find the line containing codes like this (send_msg("09232814046", "this is the message area edit here.");) , on the first quotation mark insert the reciever's number, and on the second quotation mark input any alphanumeric characters (it will serve as the message). After editing the codes, upload the sketch and wait until the uploading is complete and do not remove the USB cable.

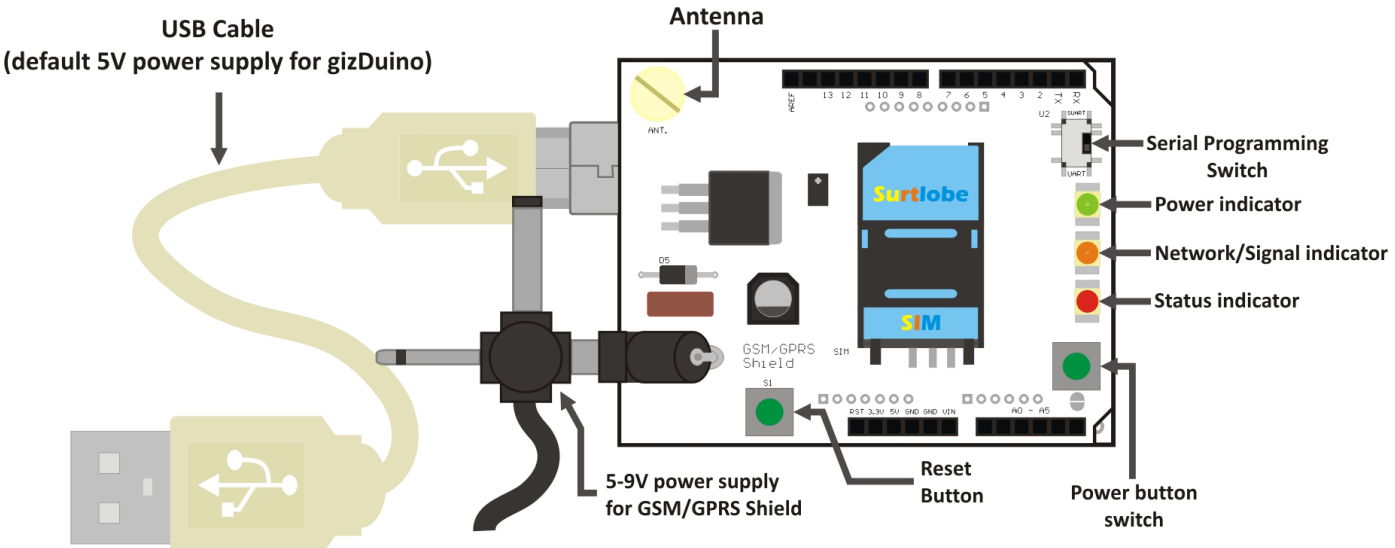

Figure 3. Install the GSM/GPRS shield to the gizDuino microcontroller..

After installing the GSM/GPRS shield to the microcontroller, put a 5 to 9V power supply to the GSM/GPRS shield, the Power status LED Indicator should turn green upon supplying. Next install the antenna, and SIM card and switch the the 'Serial programming switch' to "UART" and then press the 'Power button switch' approximately 1-5 seconds until the status LED indicator turn red, the Network indicator will blink fast upon turning on, wait until the blink has 2-3 seconds blink delay; it means the signal of the GSM/GPRS shield is stable. if the network indicator's blink is stable press the reset button once and wait until the number indicated in the sample sketch recieve the message.

Note: the network indicator LED may take a long time before getting to a stable state depending on the network's signal, make sure that the antenna is attached for more signal strength, and the SIM card you install have "load" that can call or text depending on your program.

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HOW TO TEST GSM / GPRS SHIELD

GSM/GPRS Shield to PC

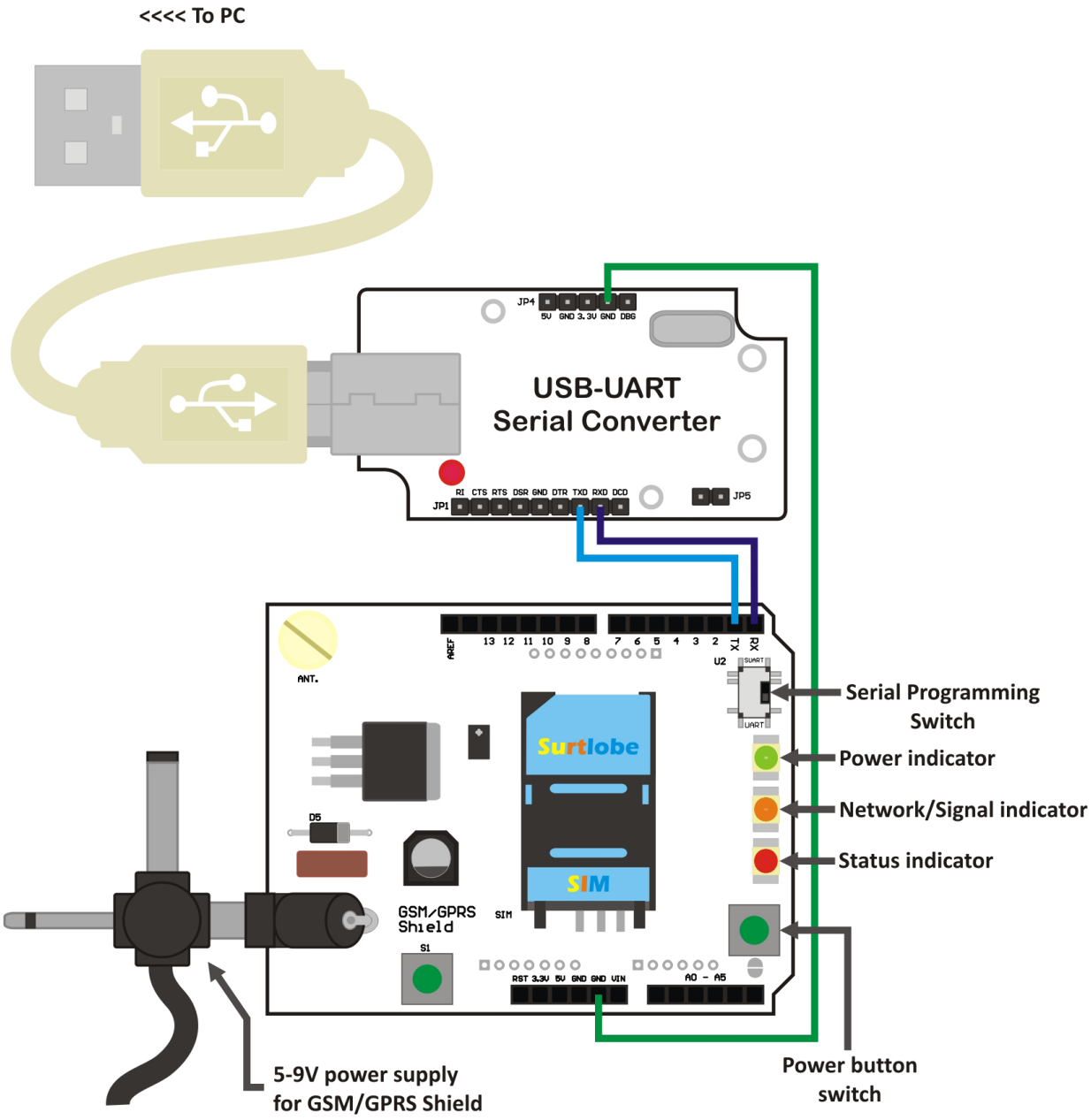

Figure 4. A example Interface of GSM/GPS Shield
(PC to USB-UART Serial Converter to GSM/GPRS Shield)

In testing the GSM/GPRS shield directly to you PC, we also need a 5-9V external power supply for the shield, a programming dongle in this case we will use our USB-UART Serial TTL Converter, wires to connect the shield to the programming dongle, a SIM card, USB Cable type 'A' to type 'B', and ofcourse your PC with Hyperterminal application (Hyperterminal is not available in *windows vista* and *windows 7* but it was downloadable through the internet.).

Now attach all the said components needed to run and test the GSM/GPRS shield just like the illustration above (*Figure 4.*). After setting up all the components needed, press the power button and hold the power button until the the status LED indicator turn red (just like on how we test the shield using gizDuino microcontroller) and wait until the Network LED indicator blink normally. Now we need to open the *Hyperterminal,* in opening the Hyperterminal just follow these steps (*in windows XP) Click "start">, "All programs">, "Accessories">, "Communications">, and finally "Hyperterminal"*. After opening it, the connection wizard will apear and follow these steps:

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HOW TO TEST GSM / GPRS SHIELD

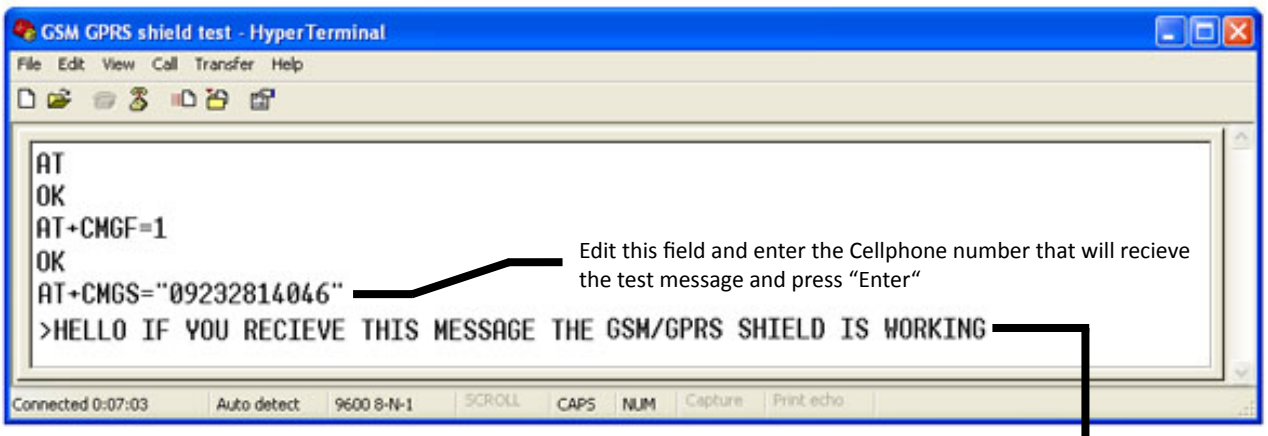
GSM/GPRS Shield to PC

First, enter the name of your connection

Second, Replace this with the COM port in which the GSM modem is attached to. To know which 'COM' you used, go to ("My Computer">, "Properties">, hardware tab>, "Device Manager">, "Ports">).

The third step is to configure the COM port parameters. These parameters are the 'Baud Rate' or 'Bits per second', 'Data bits', 'Parity', 'Stop bits', and 'Flow control'. Each of these must be set according to the values found on the figure to the left. just click the restore default button and then click 'OK'.

And last step is typing 'AT Commands', type the commands indicated bellow.



Edit this field and enter the Cellphone number that will recieve the test message and press "Enter"

Edit this field and enter the text message, and press (CTRL+Z) to send.

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How to test GSM / GPRS shield

List of basic 'AT Commands'

The characters <CR> represent a 'Carriage Return' command. It is simply an 'ENTER' key command on the keyboard.

Type:
AT<CR>
GSM Response:
OK
(This is just the commands previously done.)

Type:
ATE1<CR>
GSM Response:
OK
(This command tells the GSM Modem to echo the characters you type into the Hyper Terminal, which allows the display of every character typed.)

Type:
AT+CMGF=1<CR>
GSM Response:
OK
(This command tells the GSM Modem to display SMS messages in the Human Read able Text Format.)

Type:
AT+CMEE=2<CR>
GSM Response:
OK
(This command lets the GSM Modem report any errors found in a readable format.)

Type:
AT+CFUN=1<CR>
GSM Response:
OK
(This command sets all the GSM Modem functions to be available to the user.)

Type:
AT+COPS=0<CR>
GSM Response:
OK
(This command lets the GSM Modem functions choose an available network operator automatically. The process may take some time to complete, and its completion is marked by the 'OK' response. This usually takes around 30 seconds to complete.)

Type:
AT+CPAS<CR>
GSM Response:
OK
(Whenever this command is executed during the processing time from the above command, it reports on the status of the loading process. When the GSM modem is still loading, it will respond with an 'OK'. Otherwise, if it is done it will respond 'Ready'. If the GSM modem responds an 'Error' up until a minute then the problem may result in the improper attachment of the SIM card. To remedy this, turn off the GSM modem power, carefully reattach the SIM card and check if it is properly placed, and resume with the start up process once again.)

Display SIM number: *AT+CNUM<CR>*

Show operator network: *AT+COPS?<CR>*

Show signal quality: *AT+CSQ<CR>*

Display an SMS message: *AT+CMGR=1<CR>*
(If there are no messages in storage of the SIM card, it will return an 'Error' message.)

Display all SMS messages: *AT+CMGL="ALL"<CR>*
WARNING: If there are large amounts of SMS messages in the SIM card, this command will flood your HyperTerminal with SMS messages.

Send an SMS message: *AT+CMGS="SIM number"<CR>*
User Message <CTRL Z>
For example, if the user types in AT+CMGS="09123456789" and executes 'ENTER', and types in for the message 'Hello There!' (excluding the apostrophes) and presses down both 'CTRL' and 'Z' simultaneously, the GSM modem will send a 'Hello There!' message to the desired number. Note that this will cost an amount of credit or load depending on the network service provider.

Show list of all available commands: *AT+CLAC<CR>*

Switches GSM Module power to OFF: *AT+CPOWD<CR>*

For more information regarding all the available commands of the GSM module, the user may refer to the SIM900D 'AT Command' manual.

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SCHEMATIC DIAGRAM

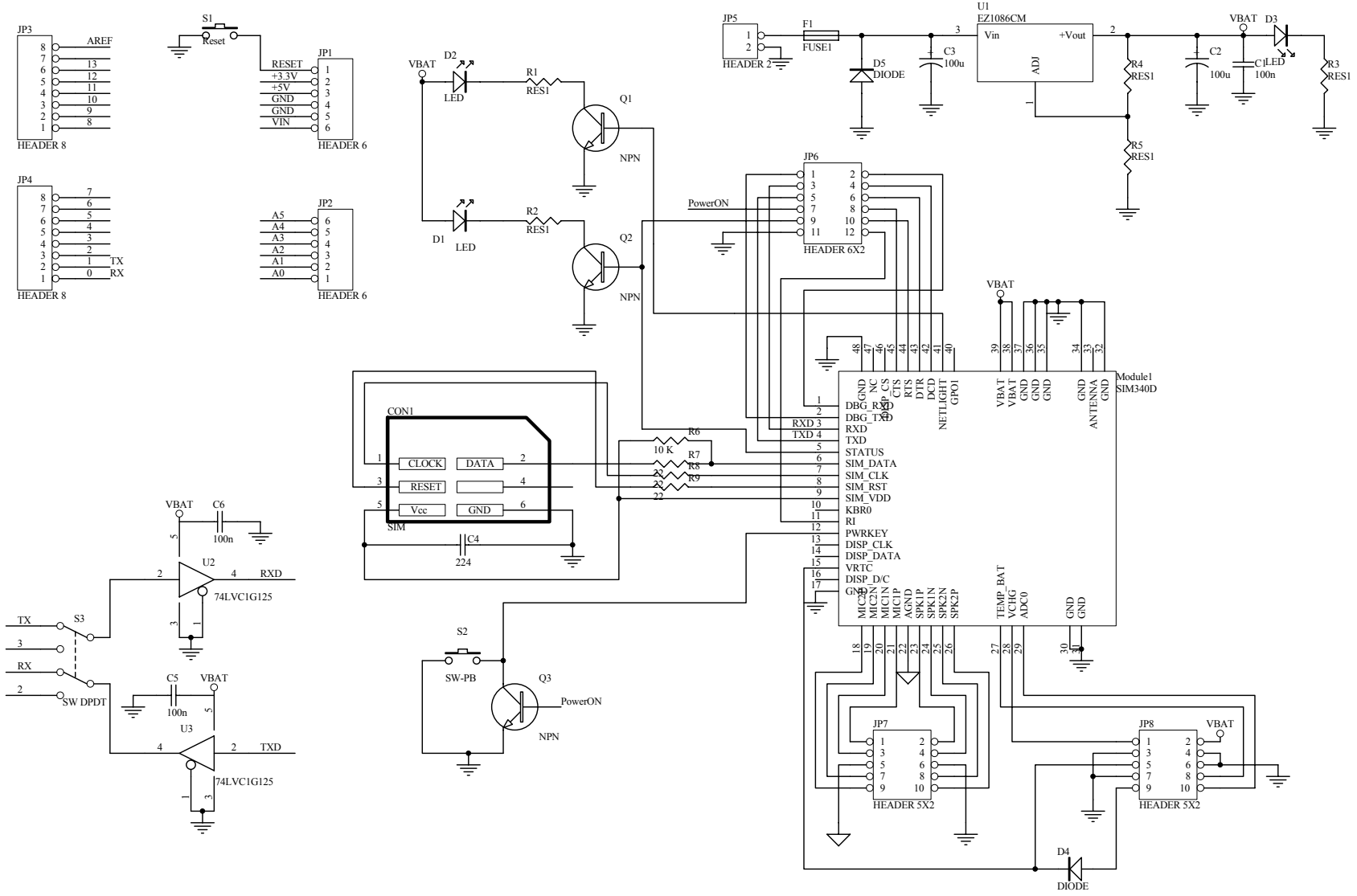

Figure 5. Schematic diagram of GSM/GPRS Shield.

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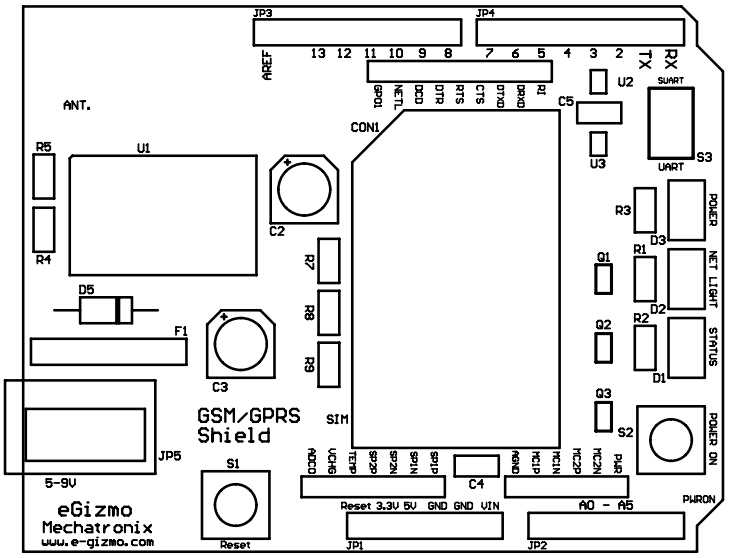

Figure 6. GSM/GPRS Shield Silk screen layout

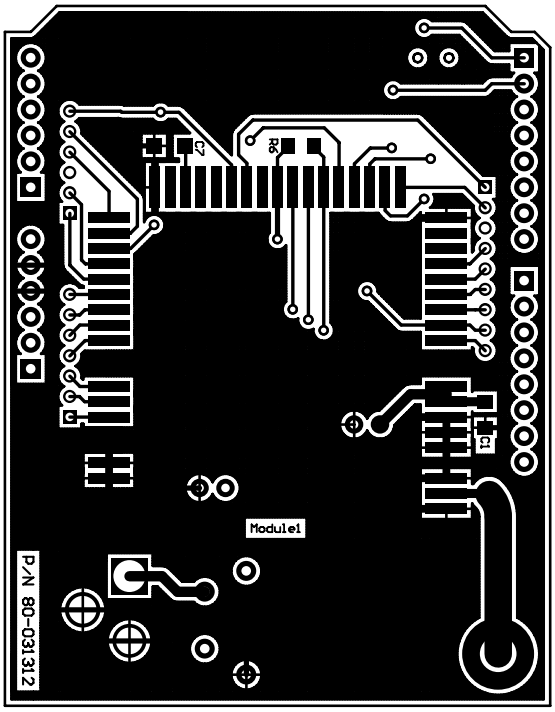

Figure 7. GSM/GPRS Shield Copper layout (Top)

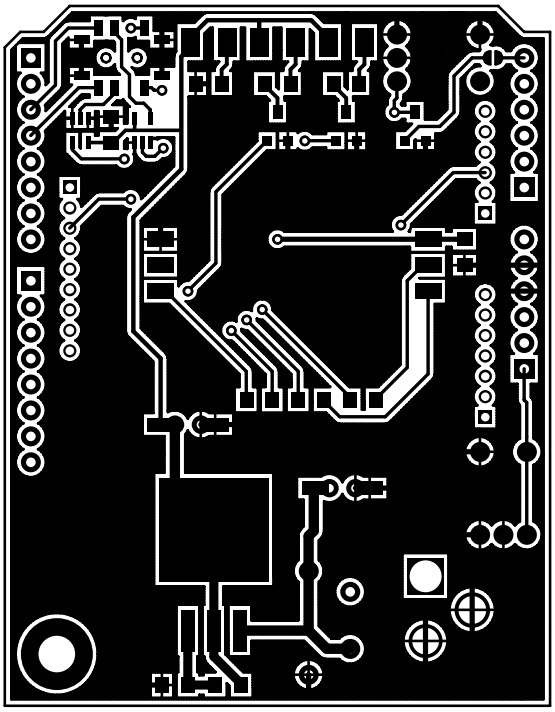

Figure 8. GSM/GPRS Shield Copper layout (Bottom)

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