GSM Interfacing Board

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**Introduction:**
GSM (Global System for Mobile) / GPRS (General Packet Radio Service) TTL - Modem is SIM900A Dual-band GSM / GPRS device, works on frequencies 900 MHZ and 1800 MHZ. It is very compact in size and easy to use as plug in GSM Modem. The Modem is designed with 3V3 and 5V DC TTL interfacing circuitry, which allows User to directly interface with 5V Microcontrollers (PIC, AVR, Arduino, 8051 etc.) as well as 3V3 Microcontrollers (ARM, ARM Cortex XX, etc.). The baud rate can be configurable from 9600-115200 bps through AT (Attention) commands. This GSM/GPRS TTL Modem has internal TCP/IP stack to enable User to connect with internet through GPRS feature. It is suitable for SMS as well as DATA transfer application in mobile phone to mobile phone interface.

The modem can be interfaced with a Microcontroller using USART (Universal Synchronous Asynchronous Receiver and Transmitter) feature (serial communication).

**Features:**
- Dual Band GSM/GPRS : 900 / 1800 MHz
- Built in RS232 to TTL and viceversa Logic Converter (MAX232)
- Configurable Baud Rate
- SMA (SubMiniature version A) connector with GSM L Type Antenna
- Built in SIM (Subscriber Identity Module) Card holder
- Built in Network Status LED
- Inbuilt Powerful TCP / IP (Transfer Control Protocol / Internet Protocol) stack for internet data transfer through GPRS (General Packet Radio Service)
- Audio Interface Connectors (Audio in and Audio out)
- Most Status and Controlling pins are available
- Normal Operation Temperature : -20 ºC to +55 ºC
- Input Voltage : 5V to 12V DC
- DB9 connector (Serial Port) provided for easy interfacing
Hardware Description:

SIMCom SIM900A GSM Module:
This is actual SIM900 GSM module which is manufactured by SIMCom. Designed for global market, SIM900 is a quad-band GSM/GPRS engine that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM900 features GPRS multi-slot class 10/class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 24mm x 24mm x 3mm, SIM900 can meet almost all the space requirements in User’s applications, such as M2M, smart phone, PDA and other mobile devices.

MAX232 IC:
The MAX232 is an integrated circuit that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits, so that devices works on TTL logic can share the data with devices connected through Serial port (DB9 Connector).

Serial port/DB9 connector:
User just needs to attach RS232 cable here so that it can be connected to devices which has Serial port/DB9 Connector.

Pin 1: DCD (Data Carrier Detect)
Pin 2: RxD (Receive Data)
Pin 3: TxD (Transmit Data)
Pin 4: DTR (Data Terminal Ready)
Pin 5: Signal Ground (SG)
Pin 6: Data Set Ready (DSR)
Pin 7: Request To Send (RTS)
Pin 8: Clear To Send (CTS)
Pin 9: Ring Indicator (RI)
Power Supply Socket:
This power supply socket which actually named as *AC/DC Socket* provides the functionality to user to connect external power supply from Transformer, Battery or Adapter through *DC jack*. User can provide maximum of 12V AC/DC power supply through *AC/DC socket*. This is power supply designed into maximum protection consideration so that it can even prevent reverse polarity DC power supply as well as DC conversion from AC power Supply. It also includes *LM317 Voltage Regulator* which provides an output voltage adjustable over a 1.2V to 37V.

![Power Jack](image1)

Power On/Off and GSM On Switch:
Power On/Off switch is type of *push-on push-off DPDT* switch which is used for only make power supply on/off provided through *AC/DC Socket* indicated by ‘Power LED’. GSM On Switch is type of *Push on DPST tactile switch* which is used for only to make GSM module ‘On’ indicated by ‘Module On/Off LED’ while initiating with Network indicated by ‘Network Indication LED’.

![Power Switch](image2)

SIM (Subscriber Identity Module) Card Slot:
This onboard SIM card slot provide User functionality of insert a SIM (GSM only) card of any service provider. Process of inserting and locking SIM card into SIM card slot is given in this manual. While inserting in and removing out SIM card from SIM card slot, User needs to take precaution that power supply should be OFF so that after making Power supply ON it will be easy to reinitialize with SIM for this module.

![SIM Slot](image3)

Indicator LEDs:
Indicator LEDs just used to indicate status accordingly. These are three LEDs represents Power On/Off Status, Network Status and Module On/Off Status respectively. Power LED will keep on until the power supply is enable to this board by using *push-on push-off* switch. Network Status LED will show whether inserted SIM card successfully connected to service provider’s Network or not, in short signal strength. Module On/Off indicator LED will show status of GSM module’s power on/off.
RXD, TXD and GND pins (JP2):
These pins are used to connect devices which needs to be connected to GSM module through USART (Universal Synchronous Asynchronous Receiver and Transmitter) communication. Devices may be like Desktop or Laptop Computer System, Microcontrollers, etc. RXD (Receive Data) should be connected to TXD (Transmit Data) of other device and vice versa, whereas GND (Ground) should be connected to other device’s GND pin to make ground common for both systems.

Audio Connectors:
Audio Connectors deals with Audio related operations. These pins already shown in hardware description diagram. These are eight pins in a group of two each denoted by SV4. GND (0V Supply) and VCC (+5V Supply) are used to have source for external device. MIC+ and MIC- used to connect Microphone (abbr. as Mic) through which user can give audio input while calling. SP- and SP+ used to connect Speaker (can be connected to amplifier circuit if necessary) through which User can hear audio output. LN-L and LN-R used to connect Line in to GSM module.

Debugger (DBG-R and DBG-T) Connectors (J2):
These connectors are 2-wire null modem interface DBG_TXD and DBG_RXD. These pins can be used for debugging and upgrading firmware. User generally no need to deal with these pins.
Inserting SIM card into SIM card Slot/Holder:
Here is the process how to insert SIM card into SIM card slot. User just need to unlock SIM card cover by sliding back. Then user need to open this cover and insert SIM card according to slot. Put down cover on SIM card and then lock by sliding forward.

Warning: Be careful about SIM card slot as it is too delicate one while inserting in and removing out SIM card.

Power On/Off and Module On/Off process:
Here is the process how User should make power supply on/off and module on/off. First of all User need to connect external power supply by using Battery / Adapter / Transformer. Now User needs to press Power On/Off switch (It is push-on push-off switch, thus User need to push it to make power on and push it again to make power supply off). Two LEDs will glow, one is Power On/Off indicator LED and another one is Network Status LED (which glows continuous to indicate no network or searching for network). After this User needs to press Module on switch (denoted as PWR) for at least 2 seconds. As soon as Module On/Off LED will glow User can release this switch, Network LED will blink to indicate signal strength.

Note: If message sending, receiving, calling functions are failed due to weak signal strength then User needs to check SIM card’s service provider’s availability in coverage area, its not mean that GSM Module is not working properly.

Connecting GSM module with RS232 (SB9-DB9) Serial Cable:
User can connect GSM interfacing board either through Serial port or through Serial to USB converter. Here is process to connect RS232 cable to GSM interfacing board.
**Connecting GSM Module with Serial to USB converter through RXD, TXD and GND:**

This module is designed in a way so that User can connect this module without Serial cable, this module can be connected to any of Serial to USB converter module or cable. Here we have shown demo how to connect this interfacing board with CP2102 Serial to USB converter Module through RXD, TXD and GND.

Connect CP2102 Serial to USB converter module to PC through USB cable, connect one end of USB cable to PC’s USB connector and connect another end of USB to CP2102 module’s USB connector.

Connect three Single Berg Wires to CP2102 modules’s RXD, TXD and GND pin. Then connect RXD wire to TXD of GSM module and TXD wire to RXD of GSM module. Make GND common by connecting GND wire to GND pin of GSM module.

**Testing GSM Module on Terminal Software:**

Terminal software used share the data through Serial port. Hence here also User need this software to test GSM module. For demo purpose we are going to show demo for how to send SMS and how to dial a call through ‘Realterm’ software.

First of all install Realterm, it will create its own shortcut on Desktop. Then double click on Realterm icon.
Window will appear.

Select Baud Rate as ‘9600’.
Select COM port through which GSM module is connected. (This can be known from ‘Computer Management > Device Manager’)

Click on ‘Open’ to open the port or to start communication. Click on Change button.
To initialize GSM module type ‘AT’ in capital letters and then press enter key on keyboard. If there are no errors occur in this communication then it will send ‘OK’.

To send SMS type following commands

AT+CMGF=1, press enter key,
It will return ‘OK’ then proceed,
AT+CMGS="9876543210" <user can put any 10 digit number>
type message after getting letter ‘>’
after end of SMS press Ctrl+z on keyboard
If it returns ‘+CMGS: 203’ (or any other number) ‘OK’ then SMS sent successfully.
To dial a call type following commands
ATD+919876543210; <user can provide any 10 digit number with country code>
it will return ‘OK’ if there are no errors occurs in communication
to disconnect type
ATH
if it returns ‘OK’ it means call disconnected successfully.
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