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How to Configure the Parameters of the RF1276-868 Module.

RF1276 series is a low cost, ultra-low power, high performance transparent two way semi-duplex LoRa modulation transceiver with operation at 869.5MHz. It integrates with high speed MCU from ST and high performance RF IC SX1276.

Parameter configuration is necessary before we make use of the RF module RF1276-868.

The step of configuration is as follows:

1. Installation of USB adaptor driver.
We provide the USB adaptor PL2303 for parameter configuration. It is used as a bridge for the USB and UART port converter. The device is as shown below.
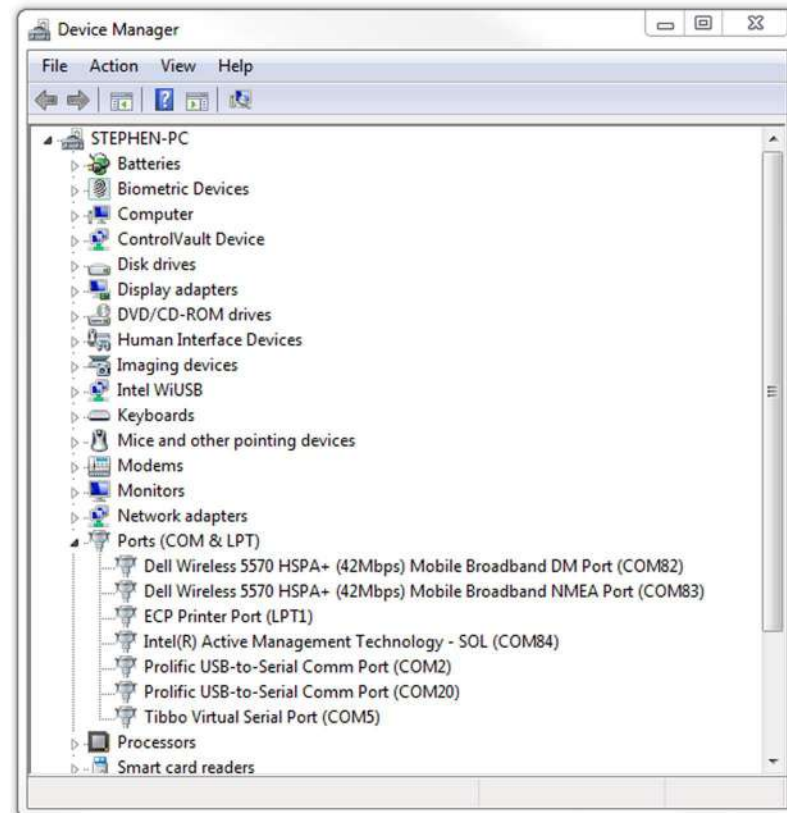

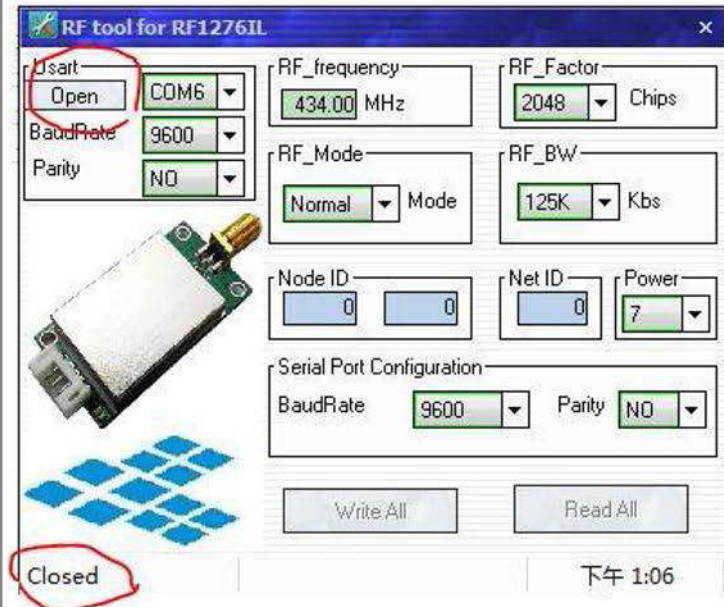The module connects with USB adaptor as the following image shows

2. Download the USB driver via this link and install the driver in the Windows PC
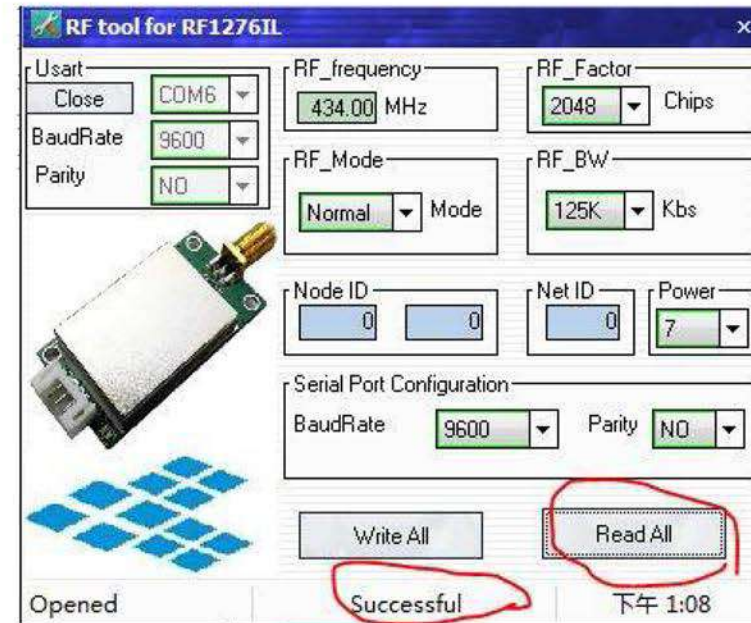http://www.appconwireless.com/DownloadShow.asp?id=375

3. Plug the USB adaptor in the PC and check whether the PC recognizes the USC adaptor in the device management.

4. Open 'RF tool for RF1276-868' as the administrator authority. 'Closed' is shown at the bottom . Click 'open' to open the serial port.

5. After the serial port is opened, the bottom of the RF tool will show 'opened'. It is very important to click 'read all' to read the initiate configuration. **DO NOT** click the 'Write ALL'

6. At the bottom of RF tool, it will show 'succeed'. If it shows 'time out', please check the connection of the USB adaptor.
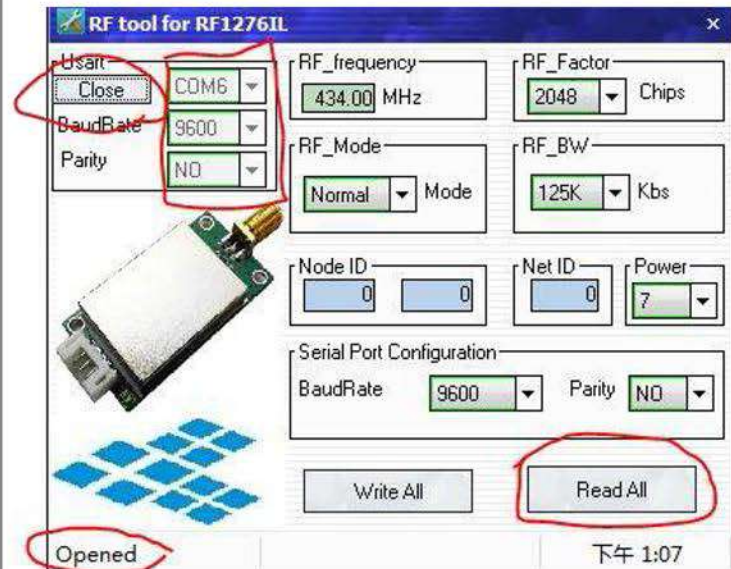
7. After you have read the parameter successfully, the user can configure the parameter as they require. The parameters can be set via the 'Write All" operation. It will show "Successful" to indicate that the parameters have been set successfully.

How To Make The Two RF1276-868 Modules Communicate

Users can use the SSCOM to simulate the two module communication via two computers or one computer. If you need to test the range of the RF module, please choose two computers. The SSCOM can download via this link:

https://drive.google.com/drive/folders/0B7gJpwTcYsRZb3NmLUhob-nVZdjQ?usp=sharing

We use one computer to connect two modules as an example to show the process of communication. RF1276-868 works in the normal mode.

Firstly, users should install the serial devise such as USB adaptor PL2303. It can check the two devices in the device management .
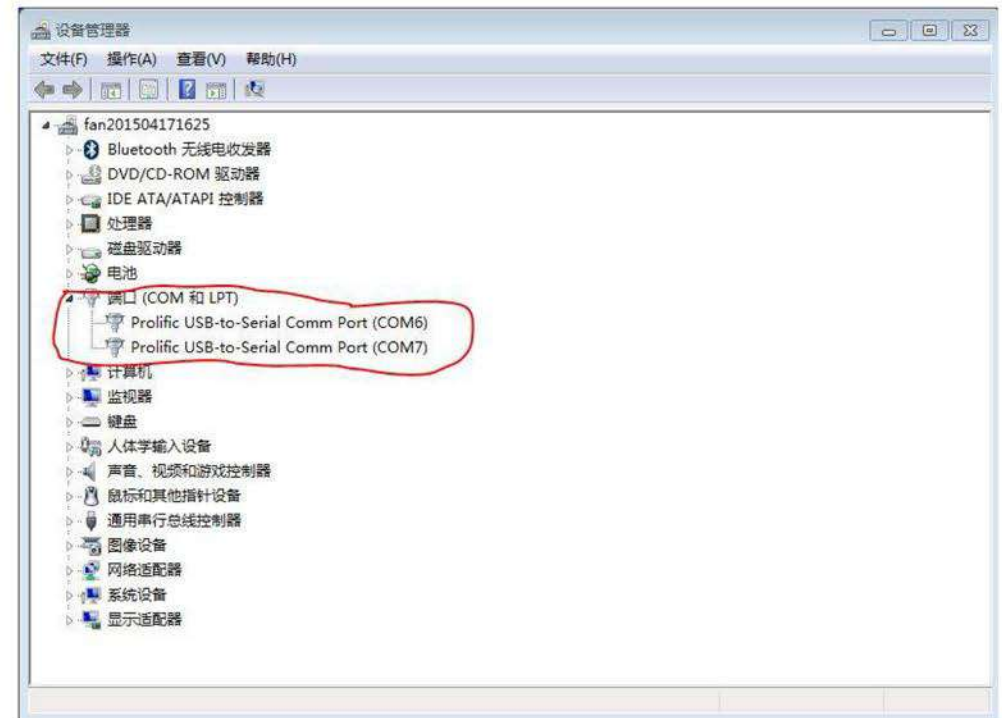
In the above picture, we install two PL2303 USB converterrs in the computer. They are COM6 and COM7.

We use the module connected to COM6 as the transmitter. Double click the SSCOM tool and open the COM port. Choose the COM6, baud rate and verify. These parameters should be the same as 'Serial port configuration' of the RF tool.
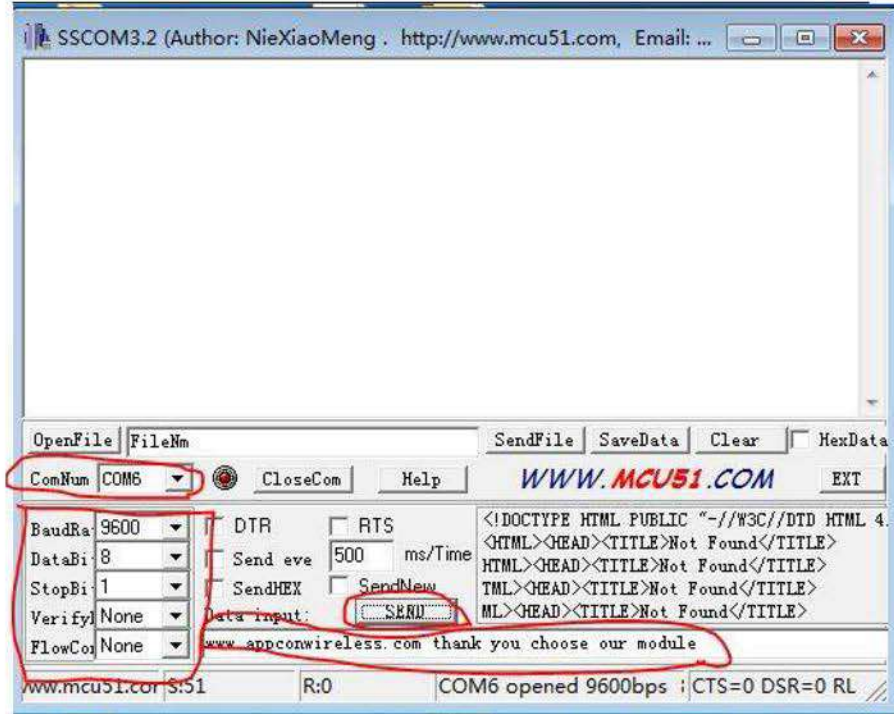

We then input the data such as 'www.appconwireless thank you for choosing our module', and click 'SEND"
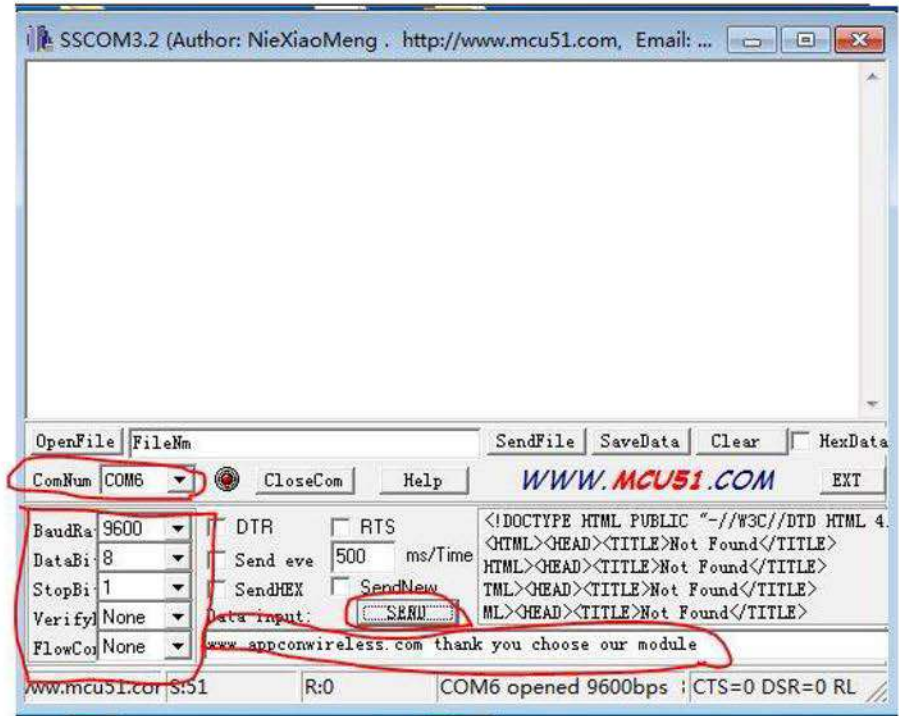
On the other side that the module is connected with COM7, it can show the data 'www.appconwireless thank you for choosing our module'. That means that the data 'www.appconwireless thank you for choosing our module' is transmitted by wireless signals.
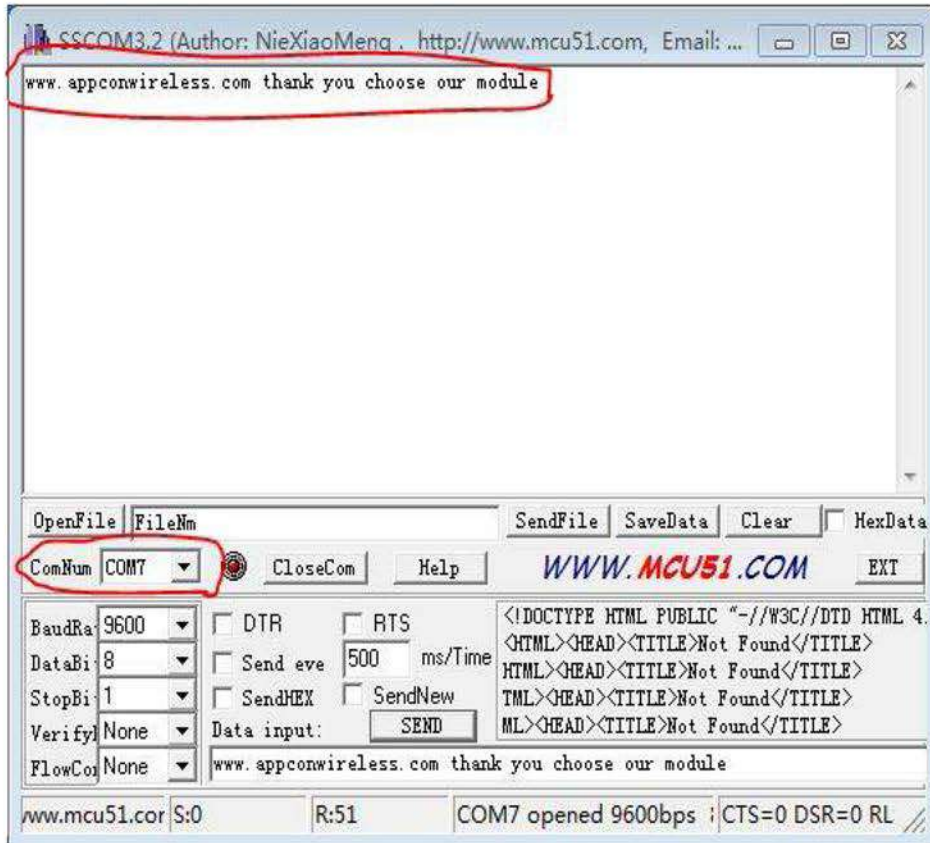
If the user needs to transmit the data continuously, the 'Send eve' option should be checked. The 'ms/Time' is the period of transmition. In the example, we choose 500ms as the period
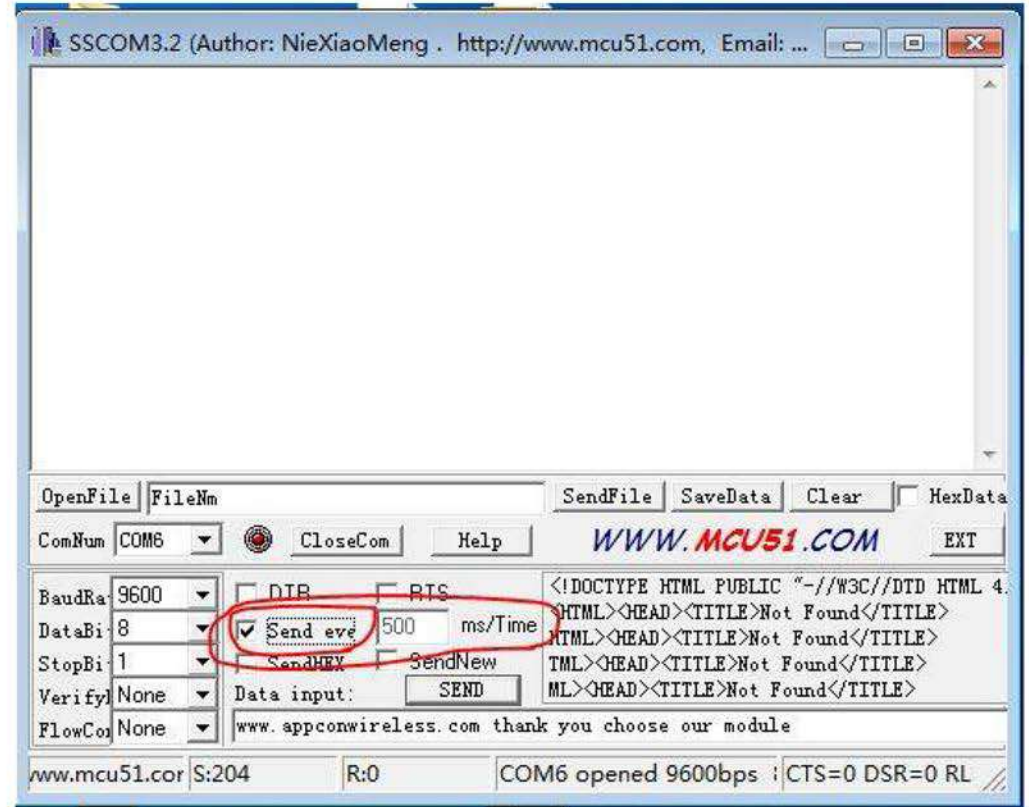
Then users can check the continuous data in the module of the COM7 port
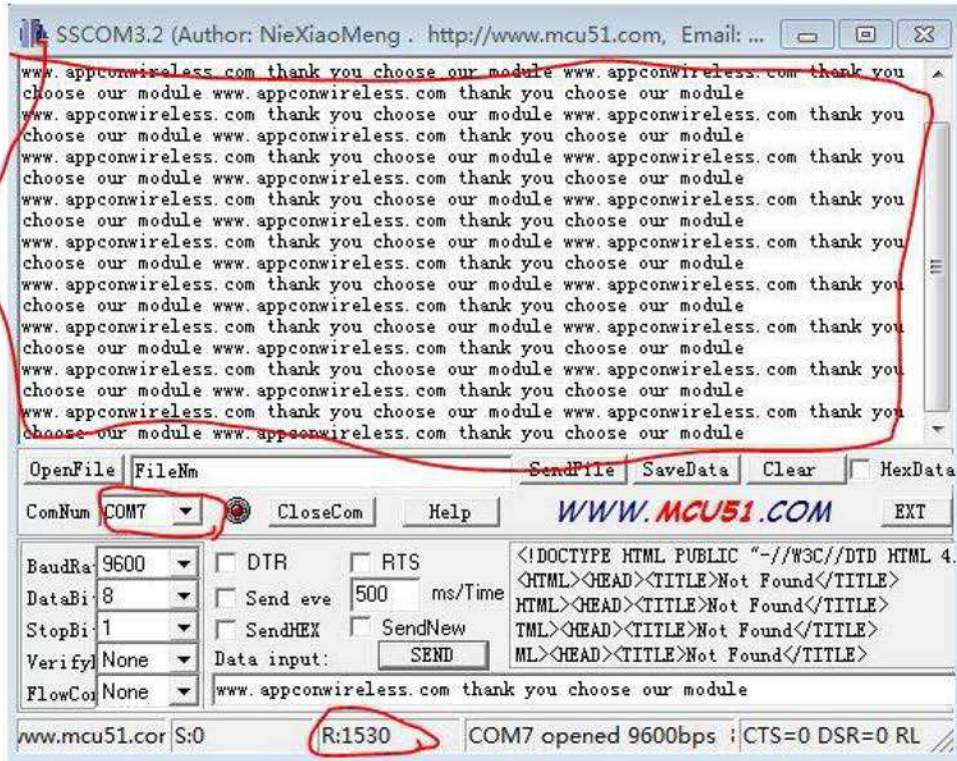
When RF1276 is transmitting data, the LED of the module will show RED

When RF1276-868 is transceiving data, the LED of the module will show BLUE

The Explanation of Data Loss in Transmitssion

RF1276-868 is a LoRa point-to-point module.So the air rate is very low. When the data rate of the serial port is very high, the data will be lost because of the data overflow.

The air data rate of RF1276-868 depends on two parameters, RF_Factor & RF_BW.

The on-air transmission rate must be limited to 10% of the equivalent air data rate.

Allowed on-air transmission

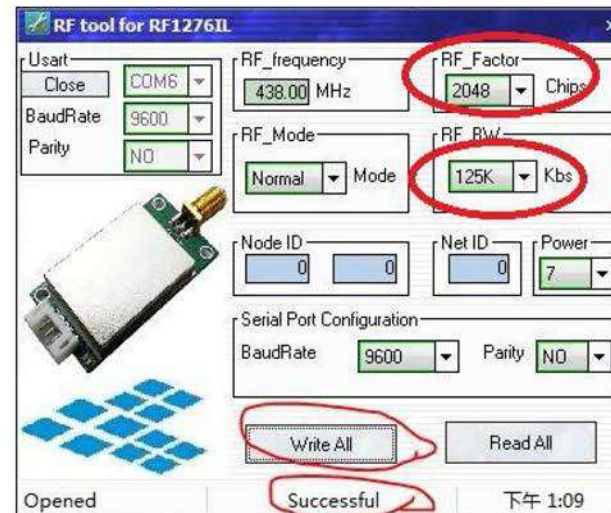$$rate = \left(\frac{\text{Equivalent Air Data Rate} \times 10\%}{8} \right)$$

= Allowed on-air transmission rate

RF_Factor /Chips	RF_BW /kHz	Equivalent air data rate /Kbps	Sensitivity /dBm
128	250	10.94	-120
256	250	6.25	-123
512	250	3.516	-126
1024	250	1.954	-129
2048	250	1.074	-132
4096	250	0.586	-135

| RF_Factor /Chips	RF_BW /kHz	Equivalent air data rate /Kbps	Sensitivity /dBm	
128	125	5.47	-123	
256	125	3.125	-126	
512	125	1.758	-129	
1024	125	0.977	-132	
2048	125	0.537	-135	Default Setting
4096	125	0.293	-138	

In the test below, we set the RF_Factor=2048 and RF_BW=125. We can calculate the air data rate at only 537bps through the chart.

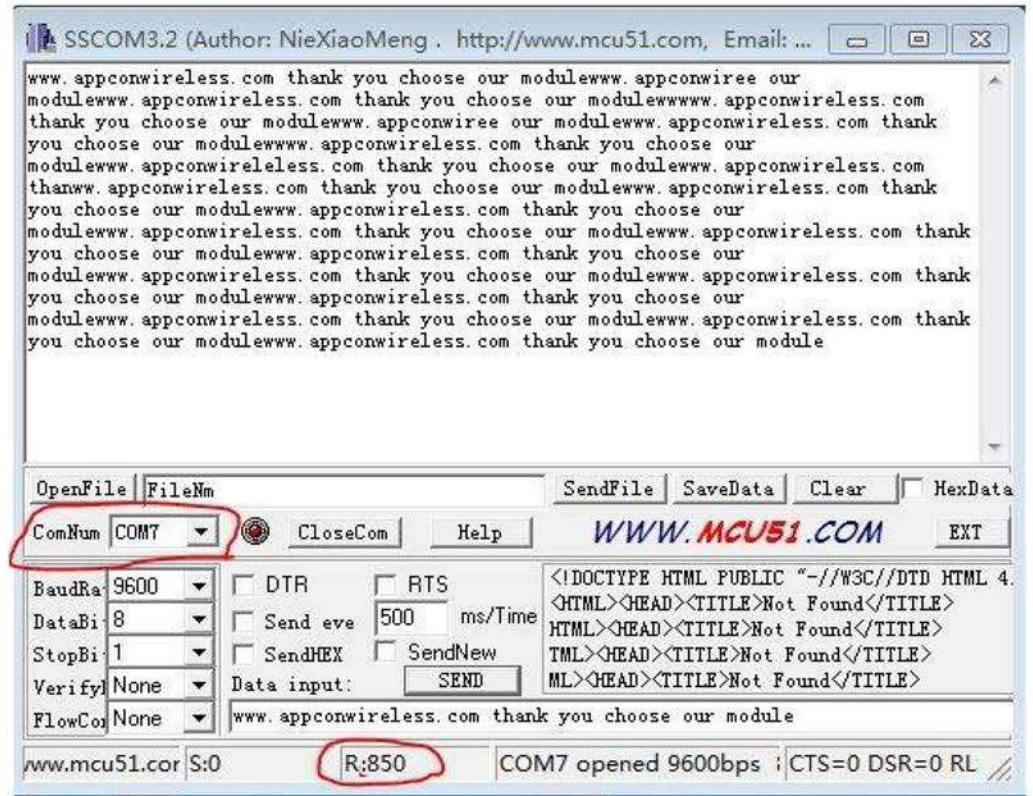$$\left(\frac{\text{Equivalent Air Date Rate} \times 10\%}{8} \right.$$

= Allowed on-air transmission rate $\left. \right)$

$$\left(\frac{537 \times 10\%}{8} \right)$$
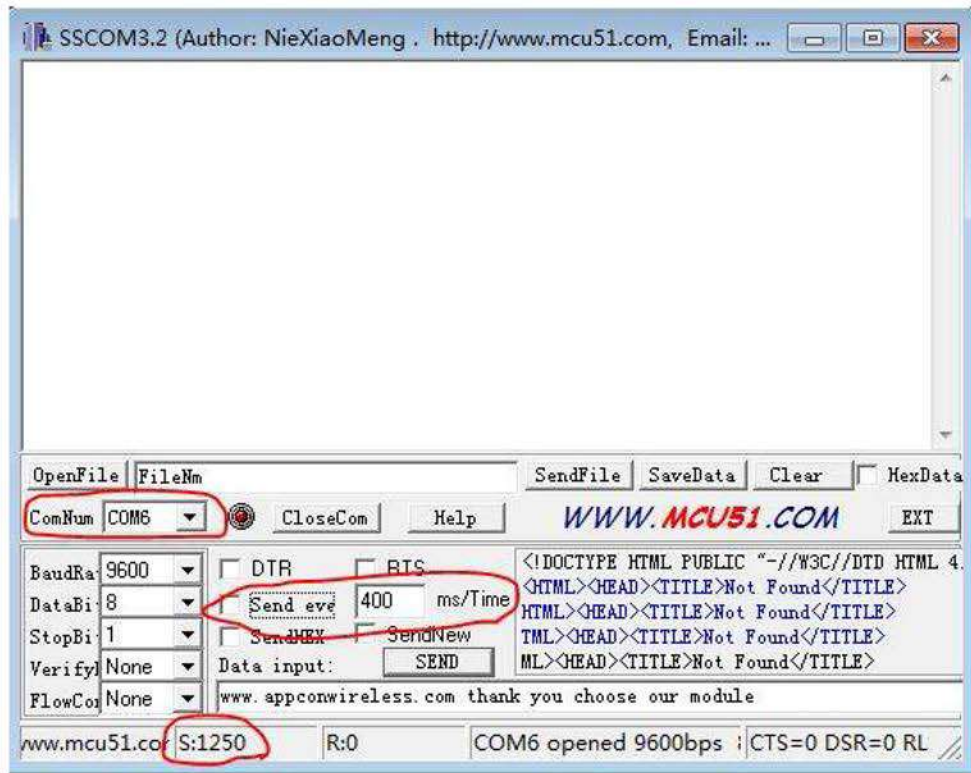
= 6,7125 bytes/second

If the transmitting period is 500ms, we transmit the data packet of
'www.appconwireless thank you for choosing our module' (total 50bytes).
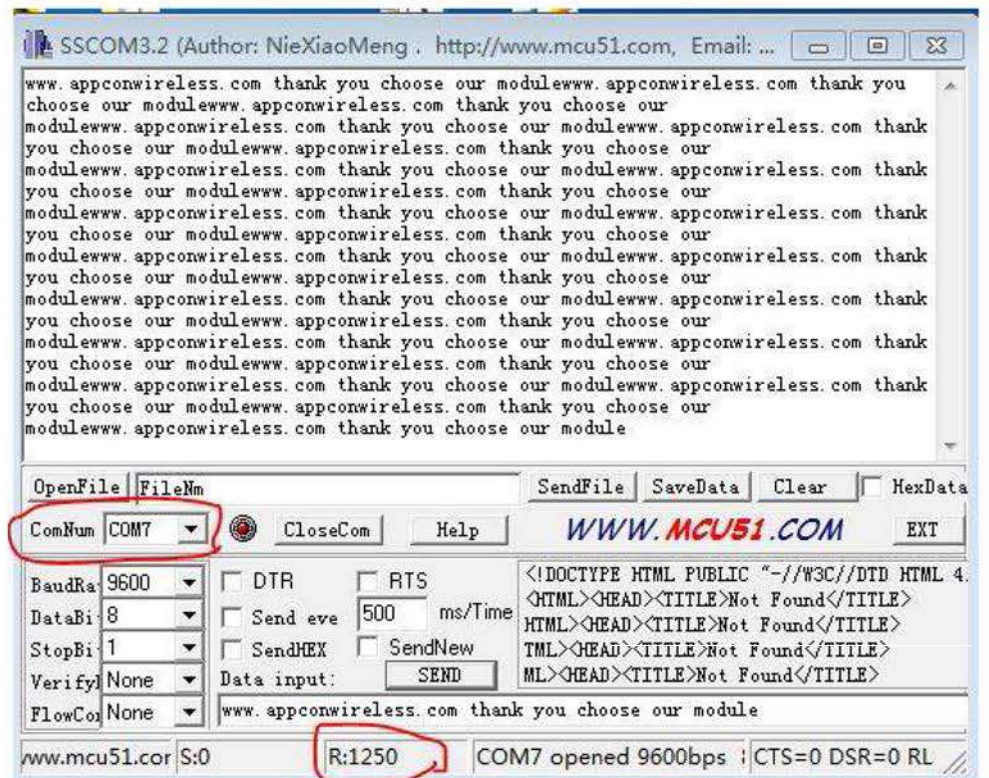We send the total data up to 850bytes
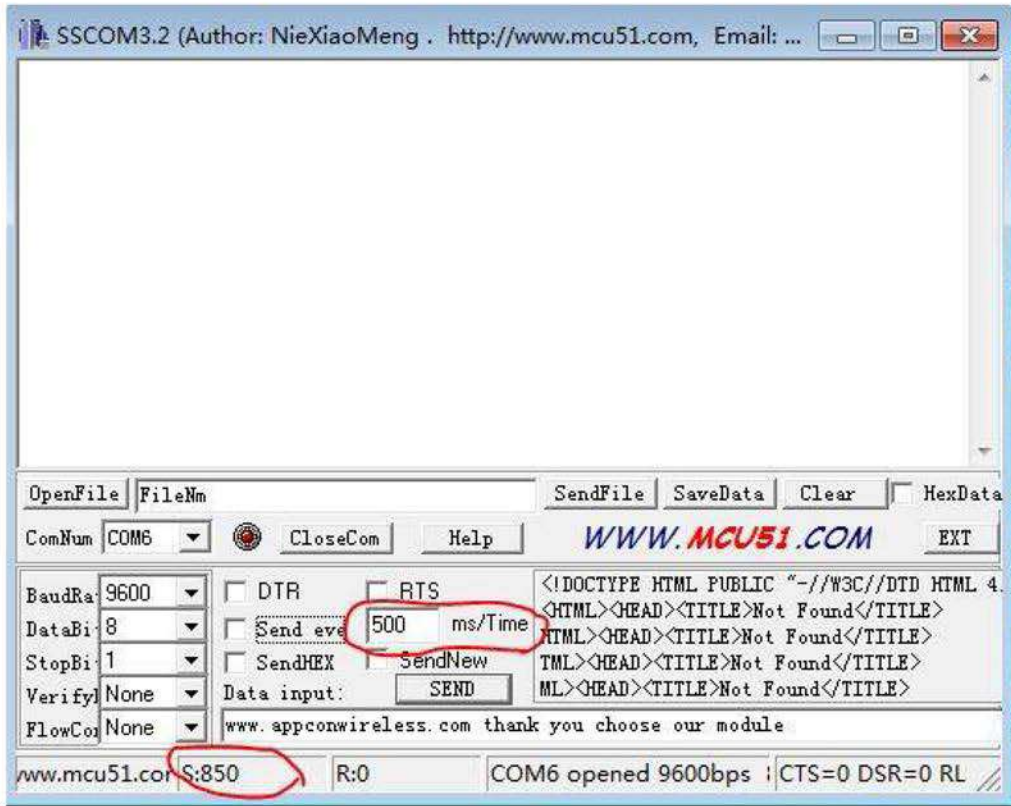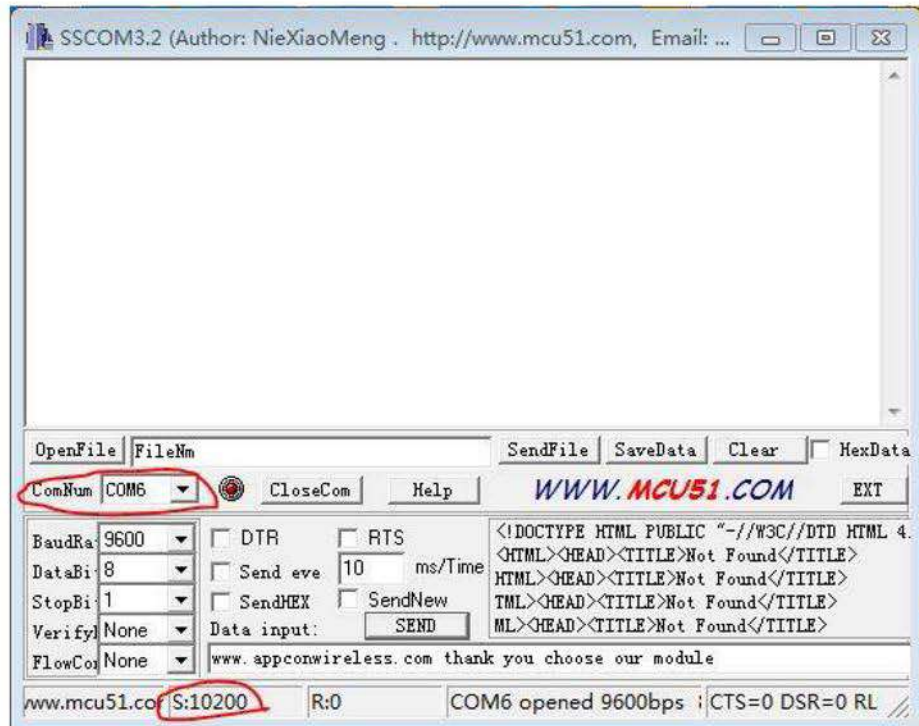

We can all see 850bytes in the receiver module

If we set the period to 400ms, and send 1250bytes data
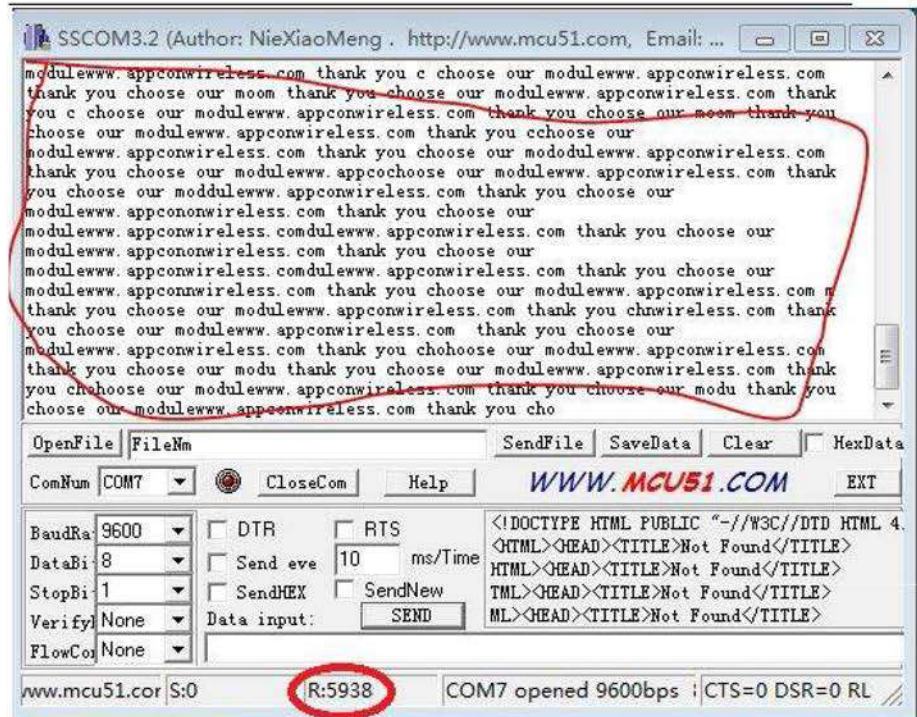

The receiver can get all 1250 bytes

If we set the period to 10ms, we send the same data packet

The transmitter sends 10200 bytes of data but the receiver only gets the 5938 bytes of data. The other data was missed because of the overflow of the register

The RF 1276-868 should choose the suitable air data rate and UART data rate to avoid the overflow situation in the application and to maintain compliance to the allowed on-air transmission rate.

How to read the RSSI value

The receiver gets the data from the transmitter, then the user can send a command via UART port to read the RSSI value.

The command is:
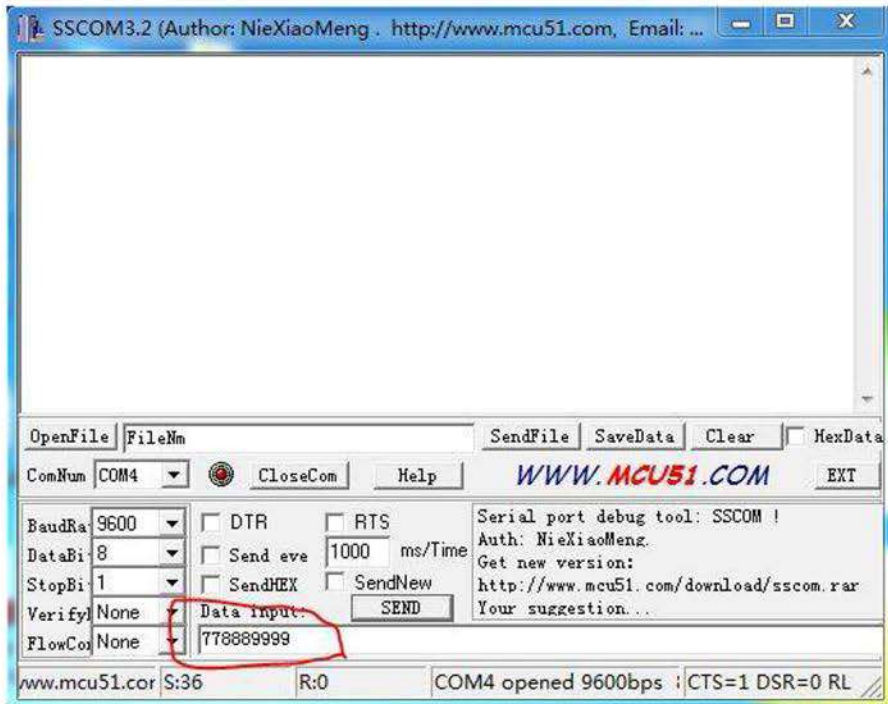0xAF,0xAF,0x00,0x00,0xAF,0x80,0x06,0x02,0x00,0x00,0x95,0x0D,0x0A

The module acknowledge:
0xAF,0xAF,0x00,0x00,0xAF,0x00,0x06,0x02,0xXX,0x00,0xCS,0x0D,0x0A
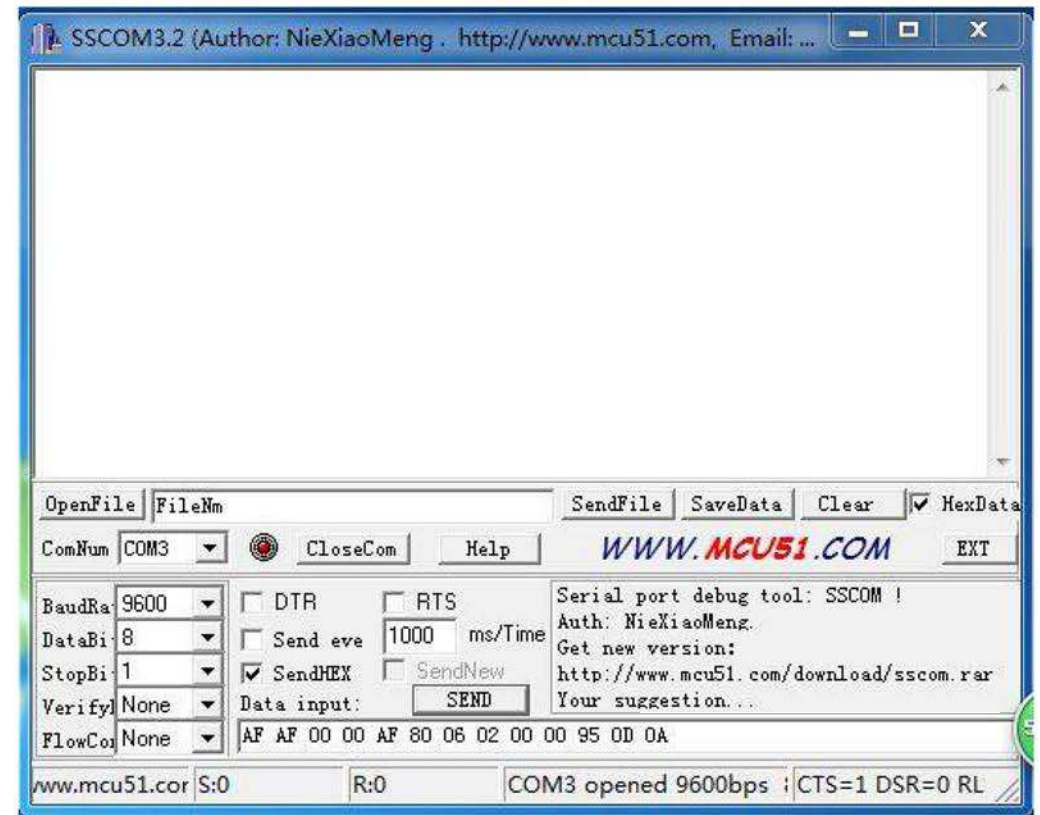
The 0x00 is the relative value.
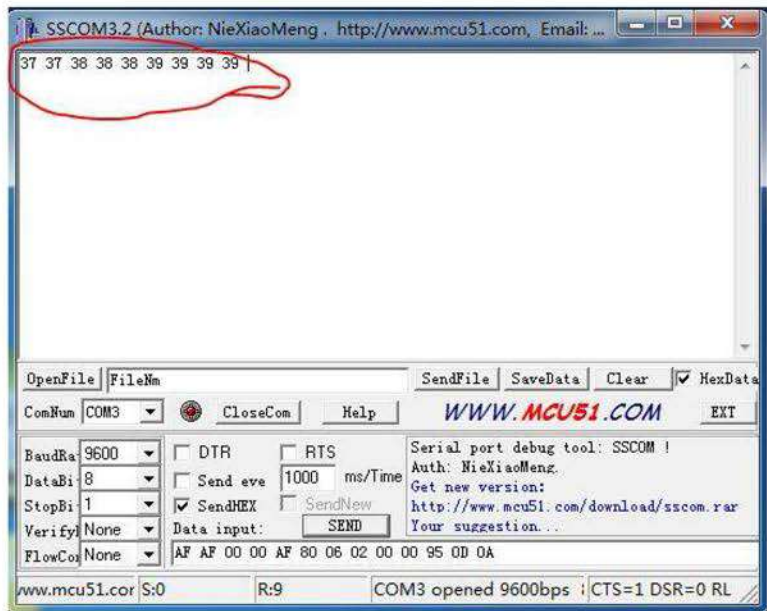
The eventual value of RSSI is RSSI= -164+XX

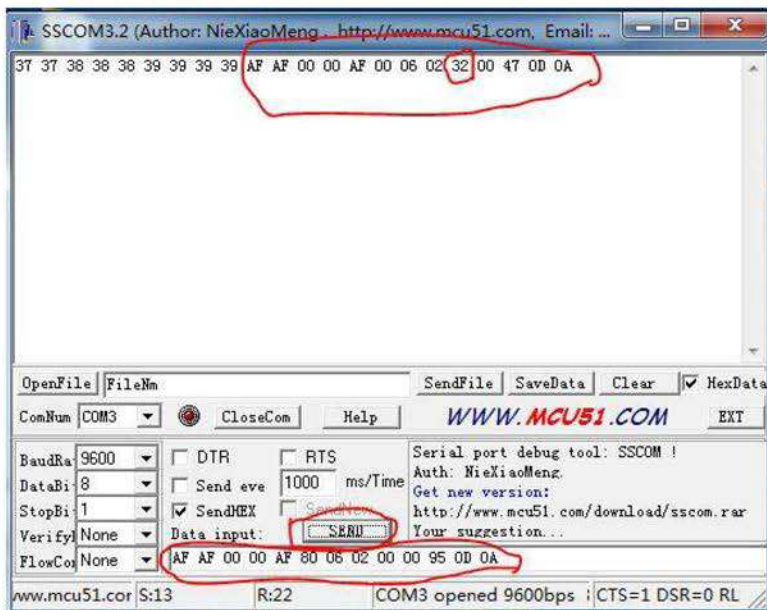We use RF1276-868 connect to COM4 as the transmitter, and send the data packet '778889999'

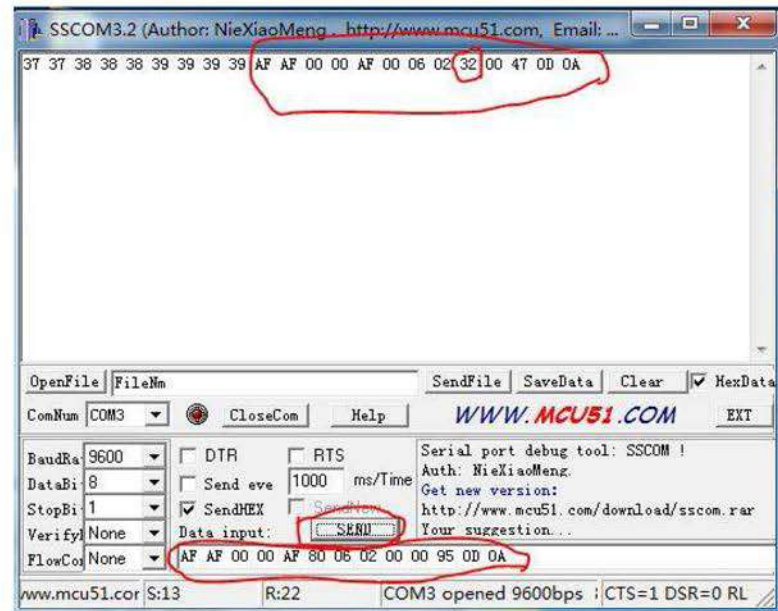Then we use RF1276-868 connect to COM3 as the reciever.

COM3 received the data packet '778889999', and displays the data by Hex code

Then the receiver 9COM3) input the RSSI reading command 'AF AF 00 00 AF 80 06 02 00 00 95 0D 0A' by Hex, and then click 'SEND'

The module will reply the SSCOM result 'AF AF 00 00 AF 00 06 02 **32** 00 47 0D 0A

The relative RSSI value is 50dBm (32 is the hex value, 50 is the decimal value).

The eventual value of RSSI is: RSSI= -164 + 50 = -114dBm