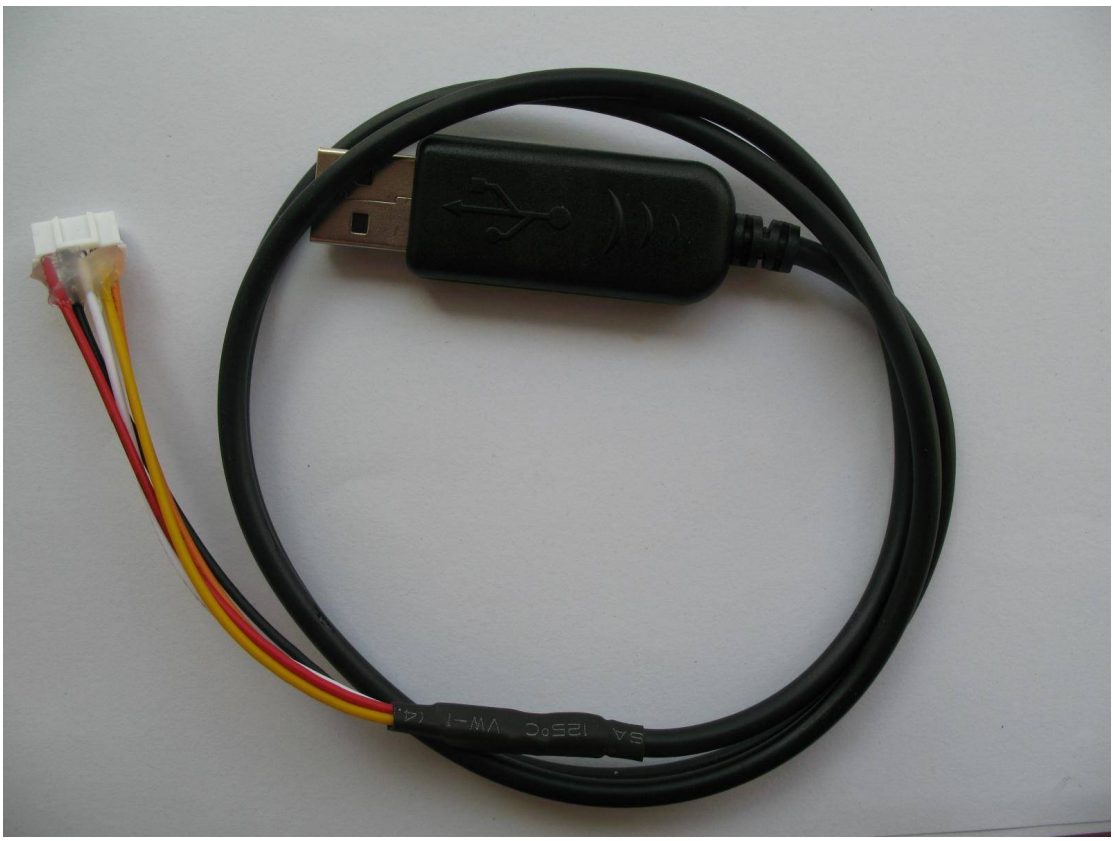
How to configure the parameter of RF1276.

RF1276 series is a low cost, ultra-low power, high performance transparent two way semi-duplex LoRa modulation transceiver with operation at 169/433/868/915 Mhz. It integrates with high speed MCU from ST and high performance RF IC SX1276.

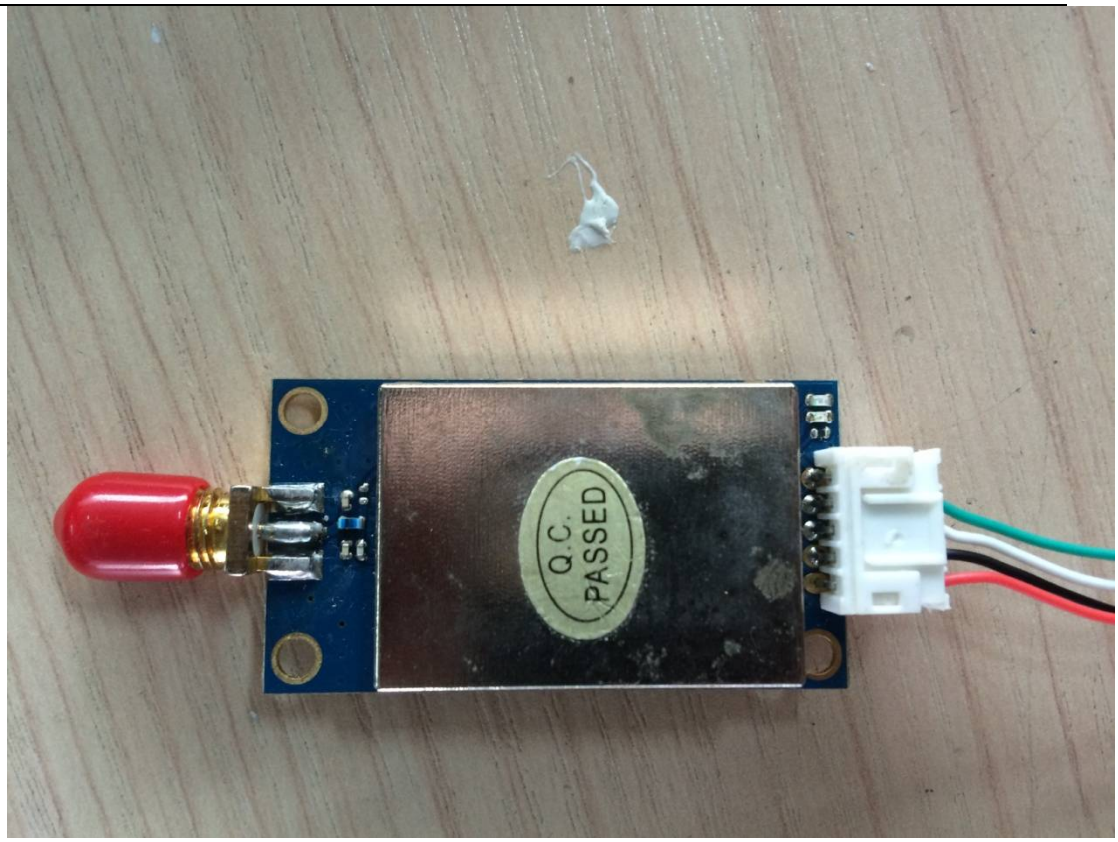
The parameter configuration is necessary before we use the RF module RF1276. The step of configuration is as follow.

1, The installation of USB adaptor driver.

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

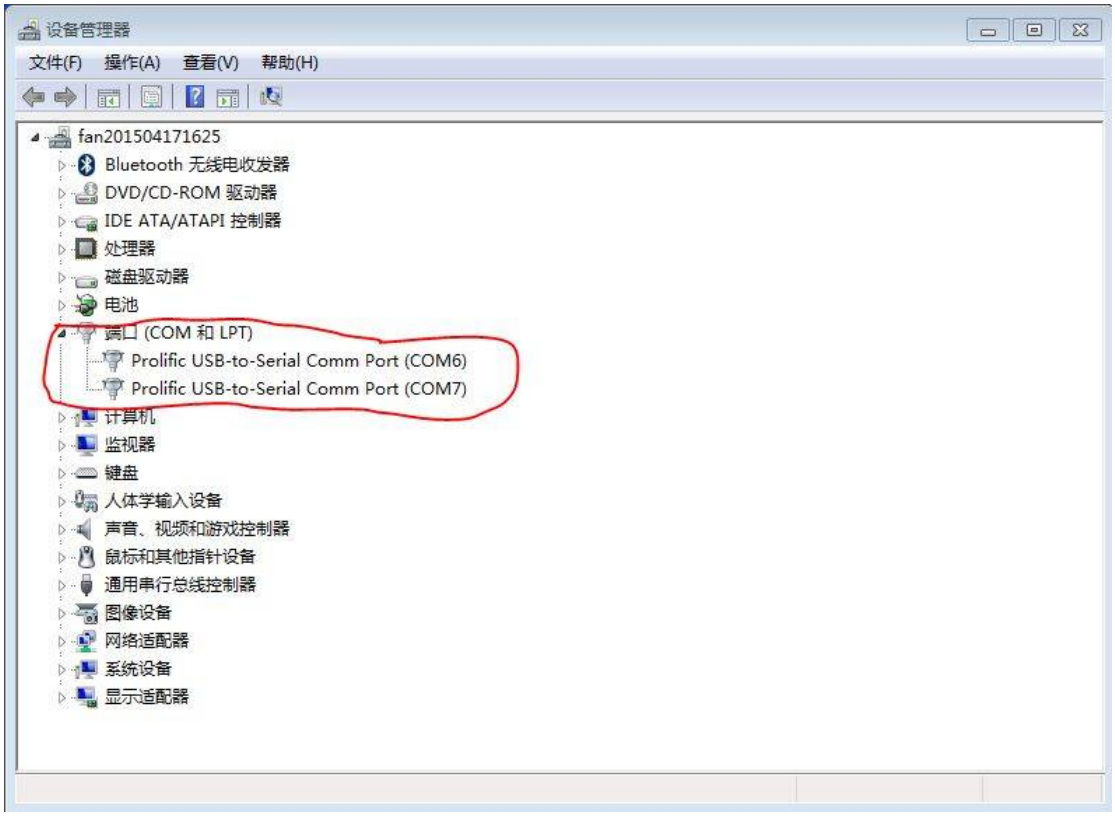


The module connects with USB adaptor as the below pic shown.

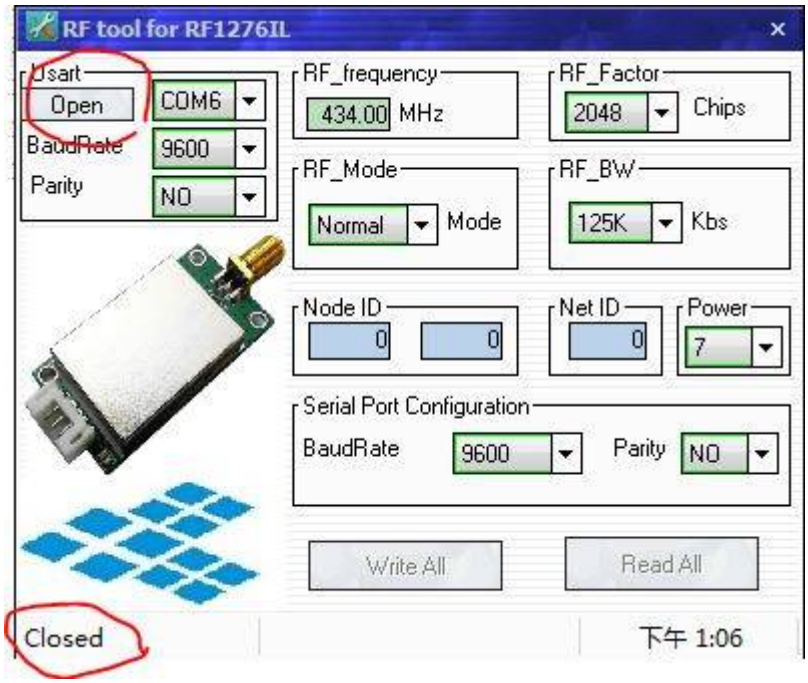


2, Download the USB driver via this link. And install the driver in the windows PC.
http://www.appconwireless.com/DownloadShow.asp?id=375

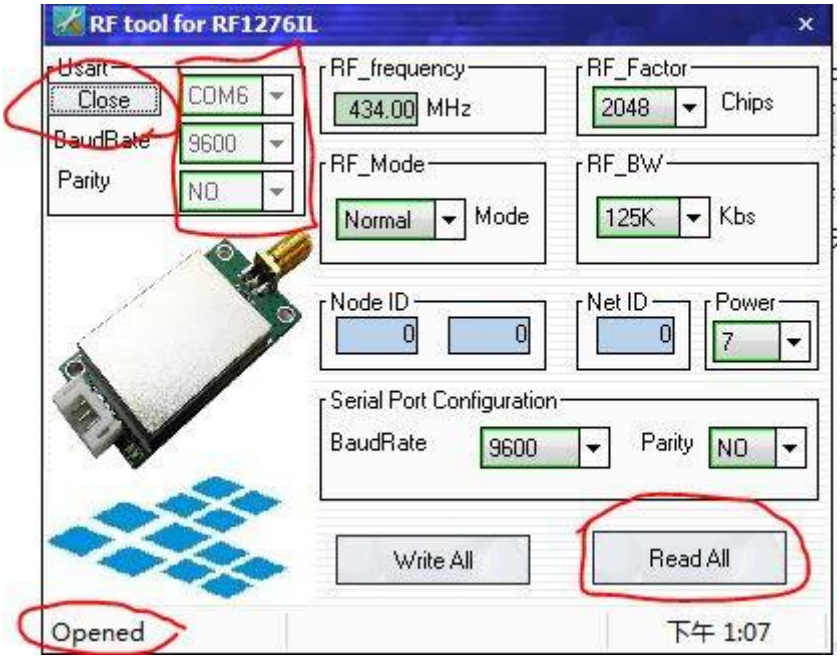
3, Plug the USB adaptor in the PC. And check whether the PC recognize the USB adaptor in the device management.



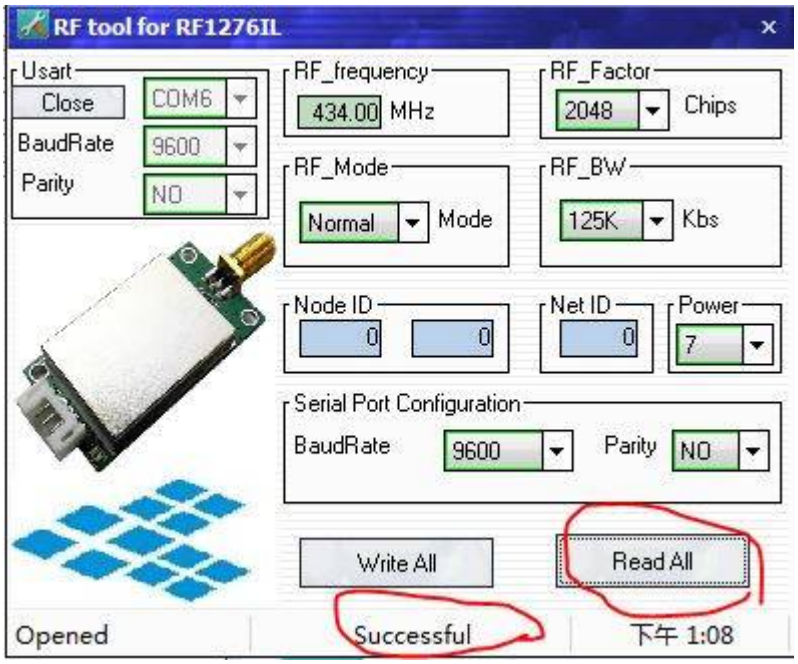
4, Open ‘RF tool for RF1276’ as the administrator authority. There is shown ‘closed’ in the bottom. Click ‘Open’ to open the serial port.



5, After the serial port is opened, the bottom of RF tool will be shown ’Opened’. It is very import to click ’Read All’ to read the initiate configuration. **DO NOT** click the ‘Write ALL’



6, In the bottom of RF tool, it will be shown 'Succeed'. If it is shown 'Time out', please check the connection of USB adaptor.



7, After read the parameter successfully, the user can configure the parameter as they requirement. The parameters can be set via ‘Write All’ operation. It will show ’Successful’ to indicate the parameter set successfully.

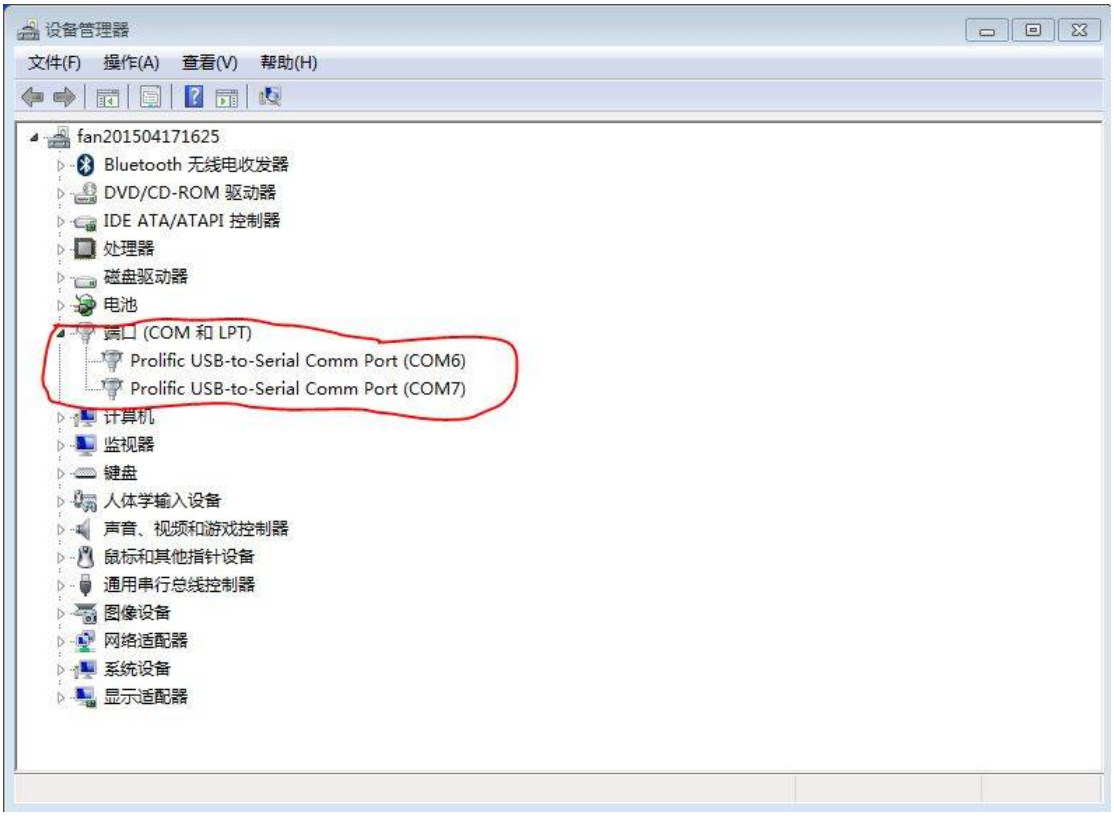
How to make the two RF1276 modules communication?

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 RF module, please choose two computers. The SSCOM can download via this link.

http://www.appconwireless.com/DownloadShow.asp?id=373

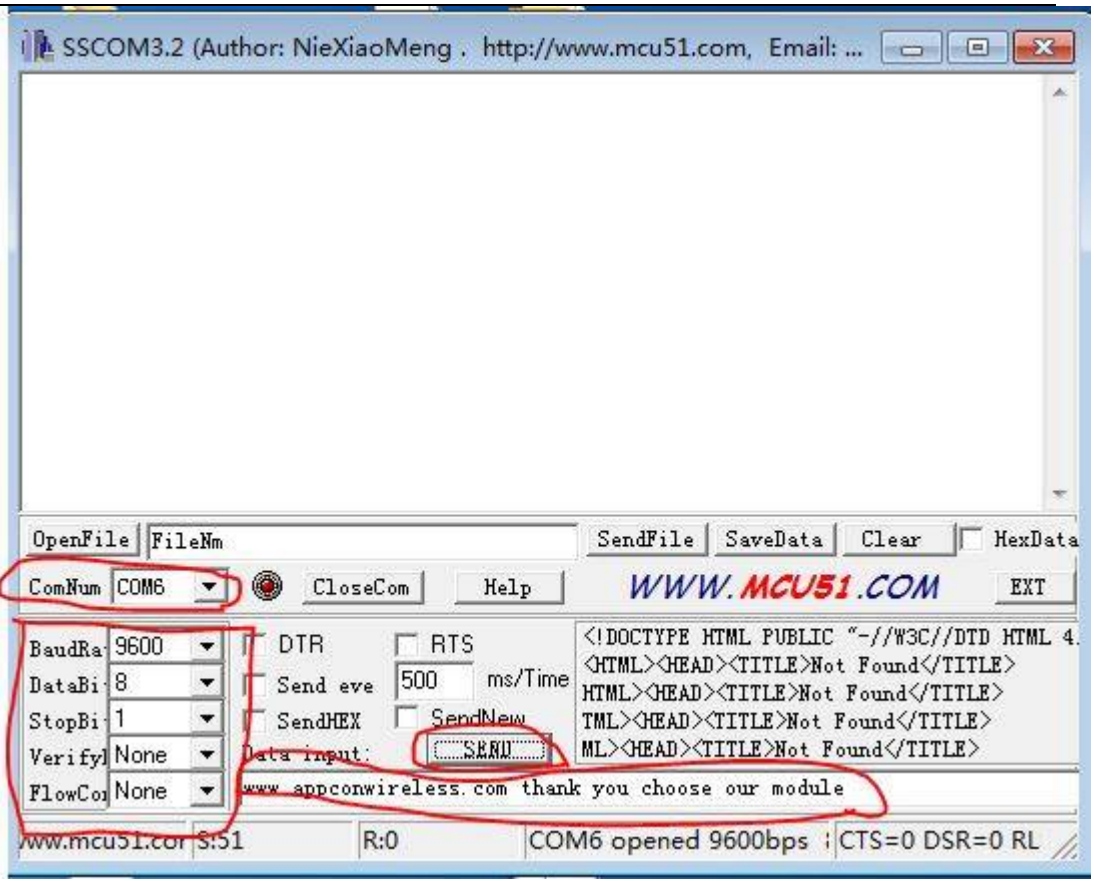
We use one computer connected two module as the example to show the process of communication. RF1276 works in the normal mode.

Firstly, users should install the serial device such as USB adaptor PL2303. It can check the two devices in the device management.

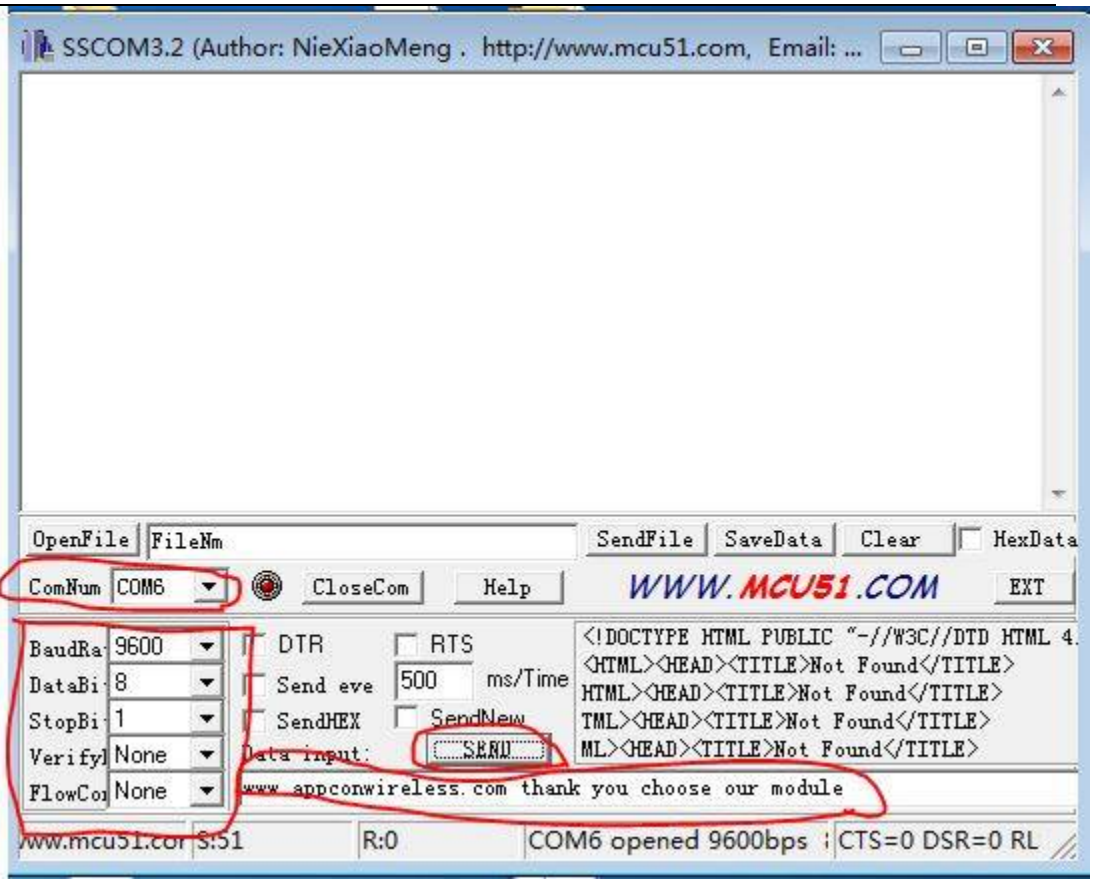


In the above picture, we install two PL2303 usb converters in the computer. They are COM6 and COM7.

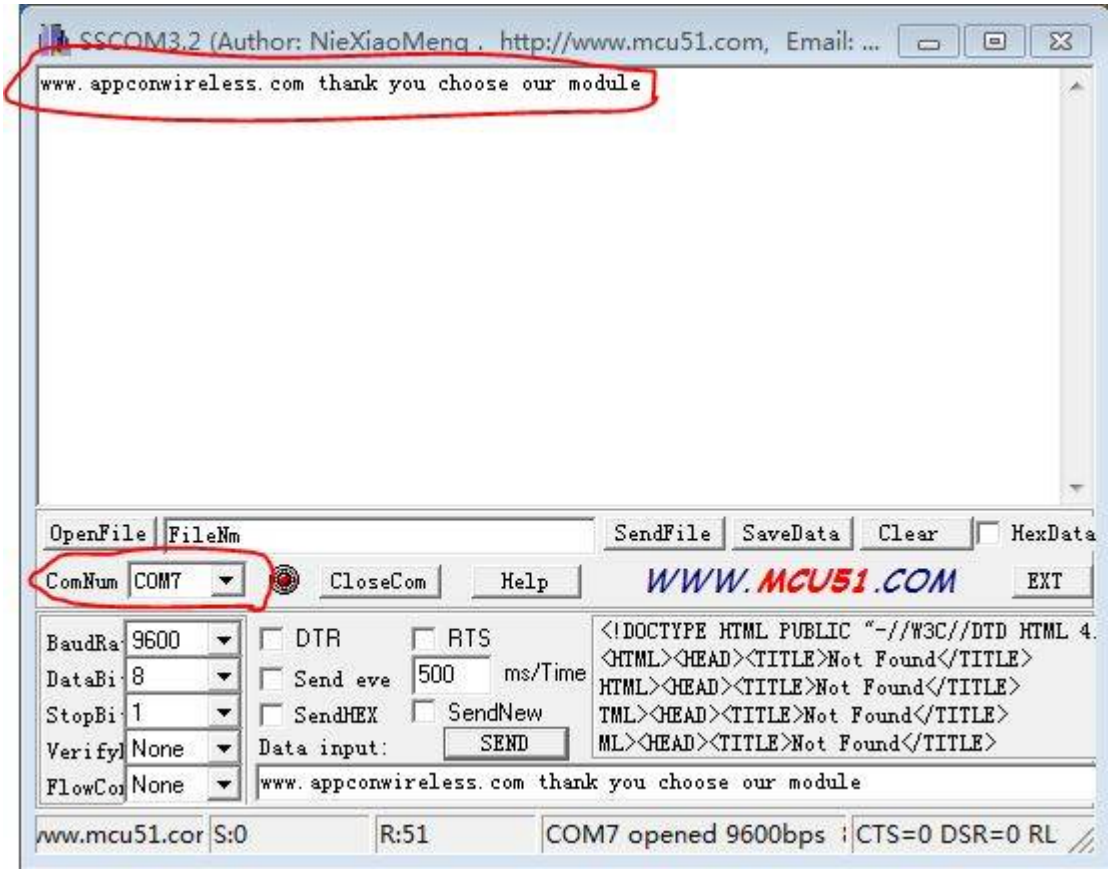
We use the module connected COM6 as the transmitter. Double click the SSCOM tool and open the COM port. Choose the COM6, baud rate and verify. These parameters should be the same as ‘Serial port configuration’ of RF tool.



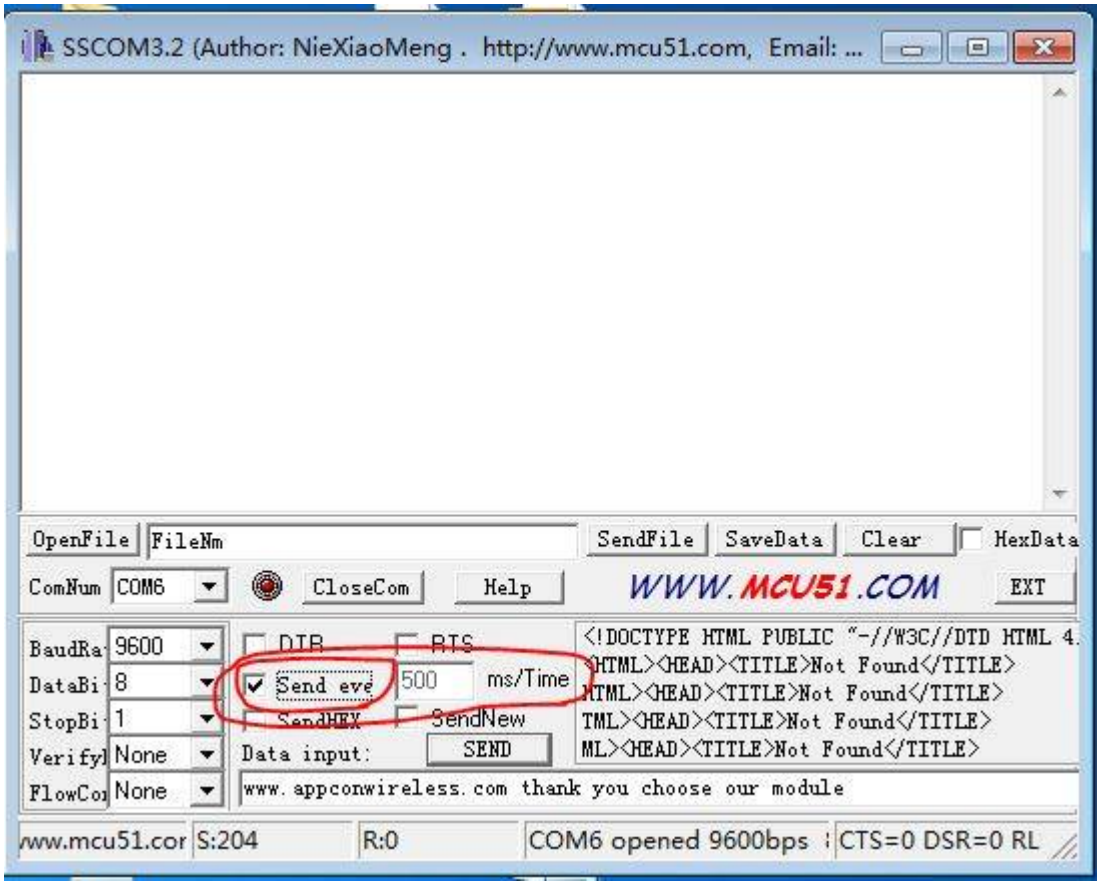
And then we input the data such as ‘www.appconwireless thank you choose our module’ and click ‘SEND’



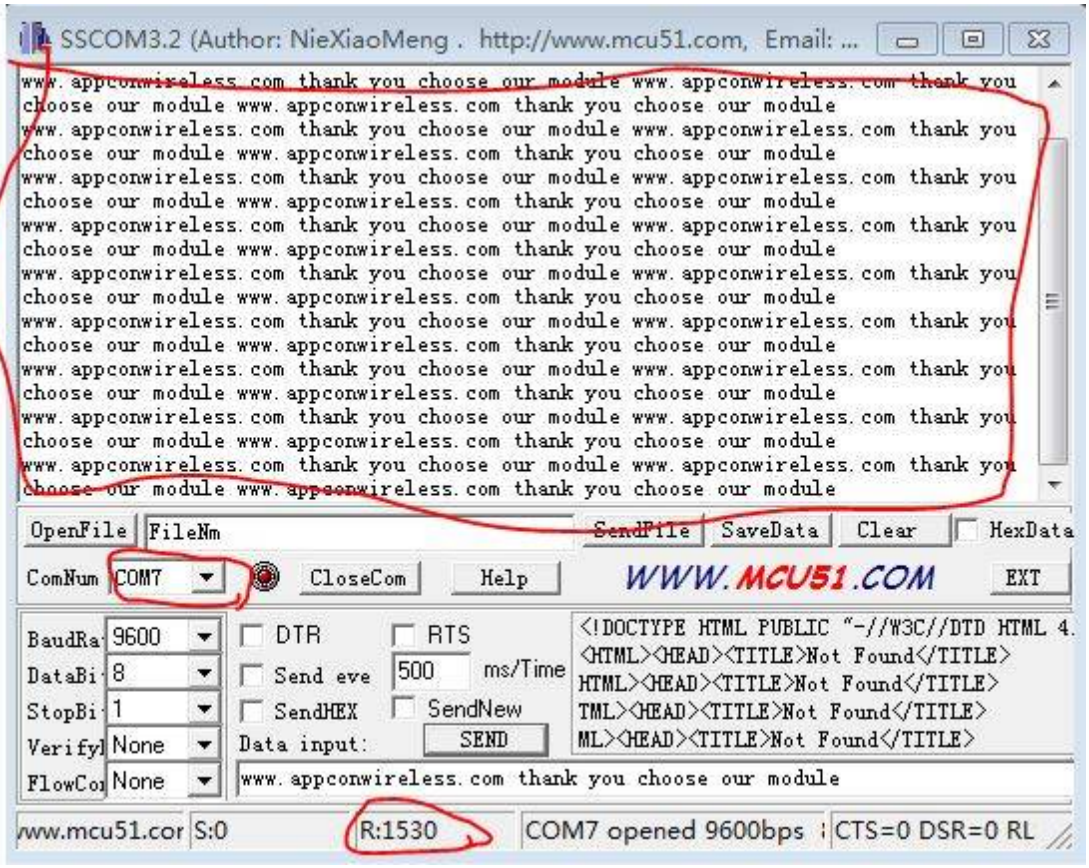
In the other side that the module connected with COM7, it can show the data ‘www.appconwireless thank you choose our module’. That means the data ‘www.appconwireless thank you choose our module’ is transmitted by wireless signals.



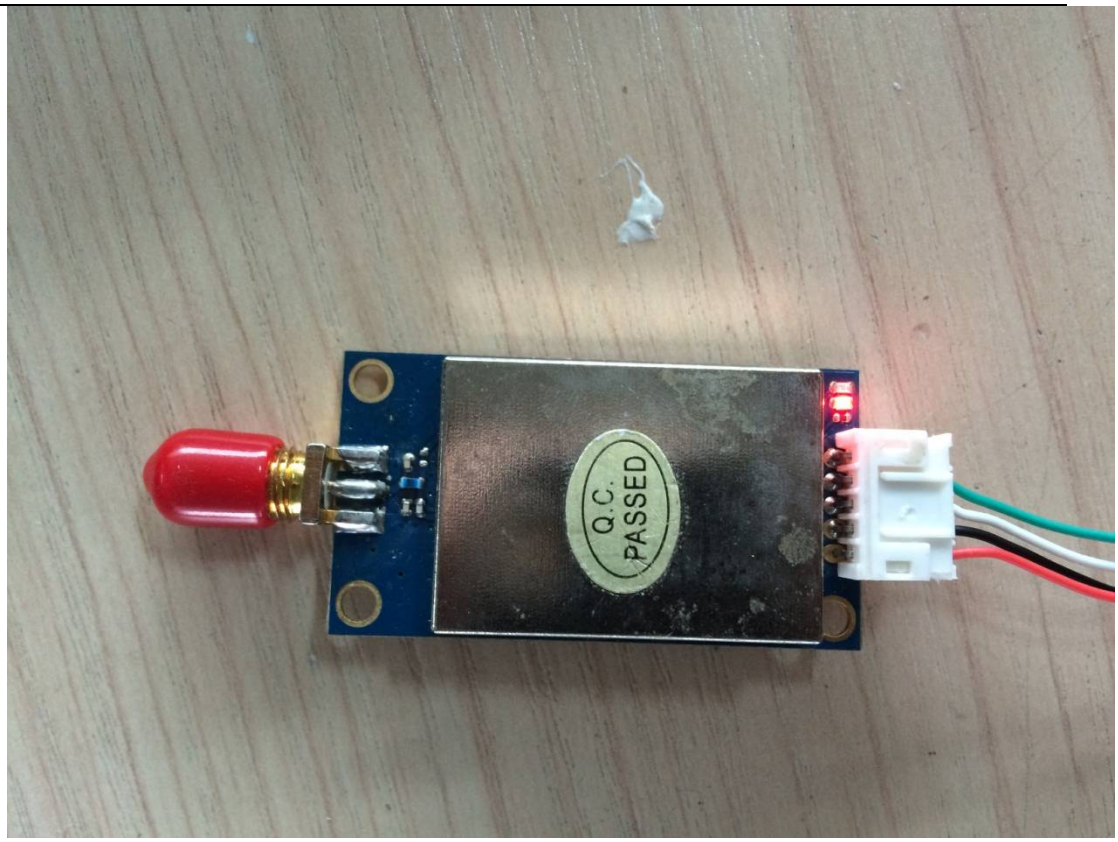
If user need transmit the data continuously, the ‘Send eve’ option should be check. The ‘ms/Time’ is the period of transmit. In the example, we choose 500ms as the period.



Then users can check the continuous data in the module of COM7 port.



When RF1276 is transmitting data, the LED of module will show RED.



When RF1276 is receiving data, the LED of module will show BLUE.

The explanation of data loss in the transmission.

RF1276 is LoRa modulation module. So the air data 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.

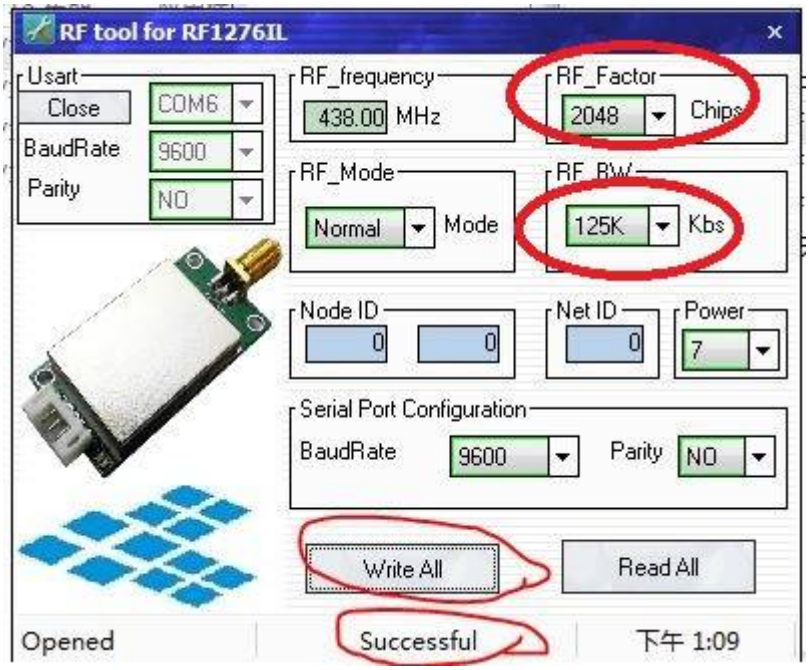
The air data rate of RF1276 depends on two parameters, RF_Factor& RF_BW. The bellowing chart is the relationship of them.

RF_Factor /Chips	RF_BW /kHz	Equivalent air data rate /Kbps	Sensitivity /dBm
128	500	21.88	-117
256	500	12.5	-120
512	500	7.032	-123
1024	500	3.908	-126
2048	500	2.148	-129
4096	500	1.172	-132

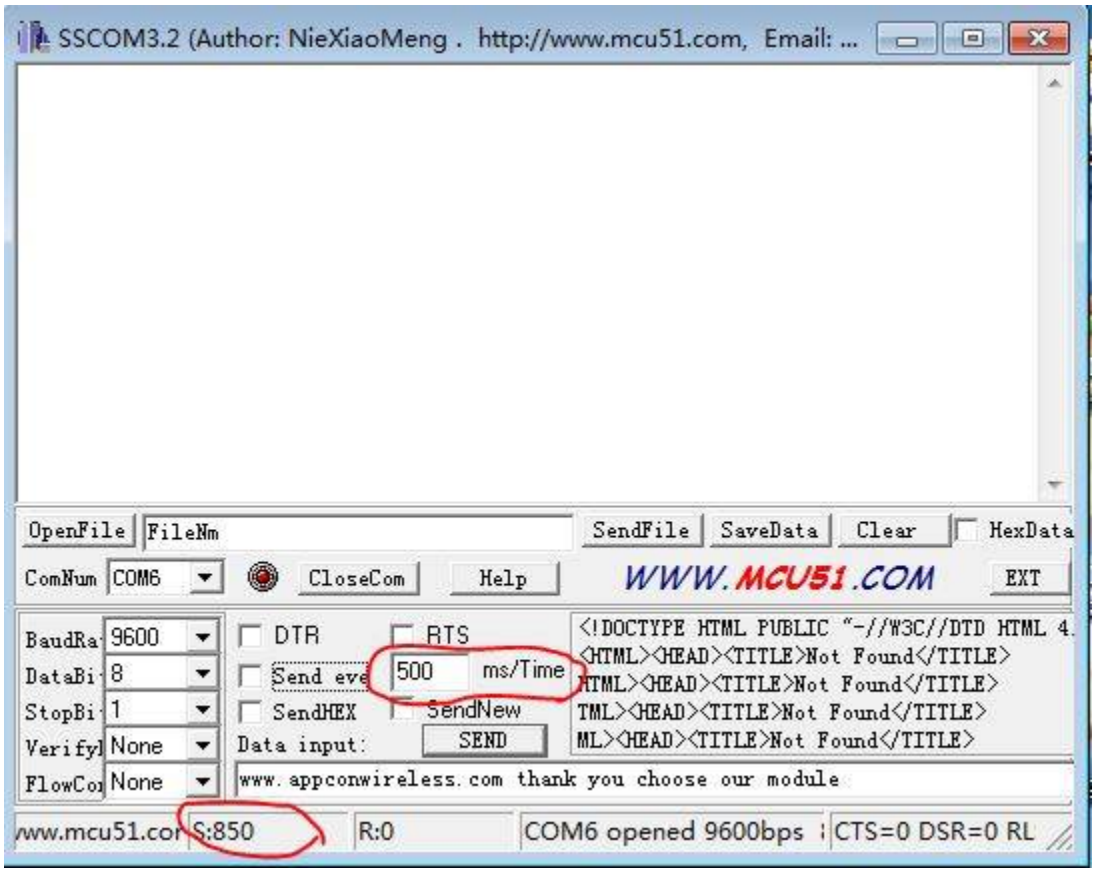
RF_Factor /Chips	RF_BW /kHz	Equivalent air data rate /Kbps	Sensitivity /dBm
128	250	10.94	-120
256	250	6.25	-123
512	250	3.516	-126
1024	250	1.954	-129
2048	250	1.074	-132
4096	250	0.586	-135

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	

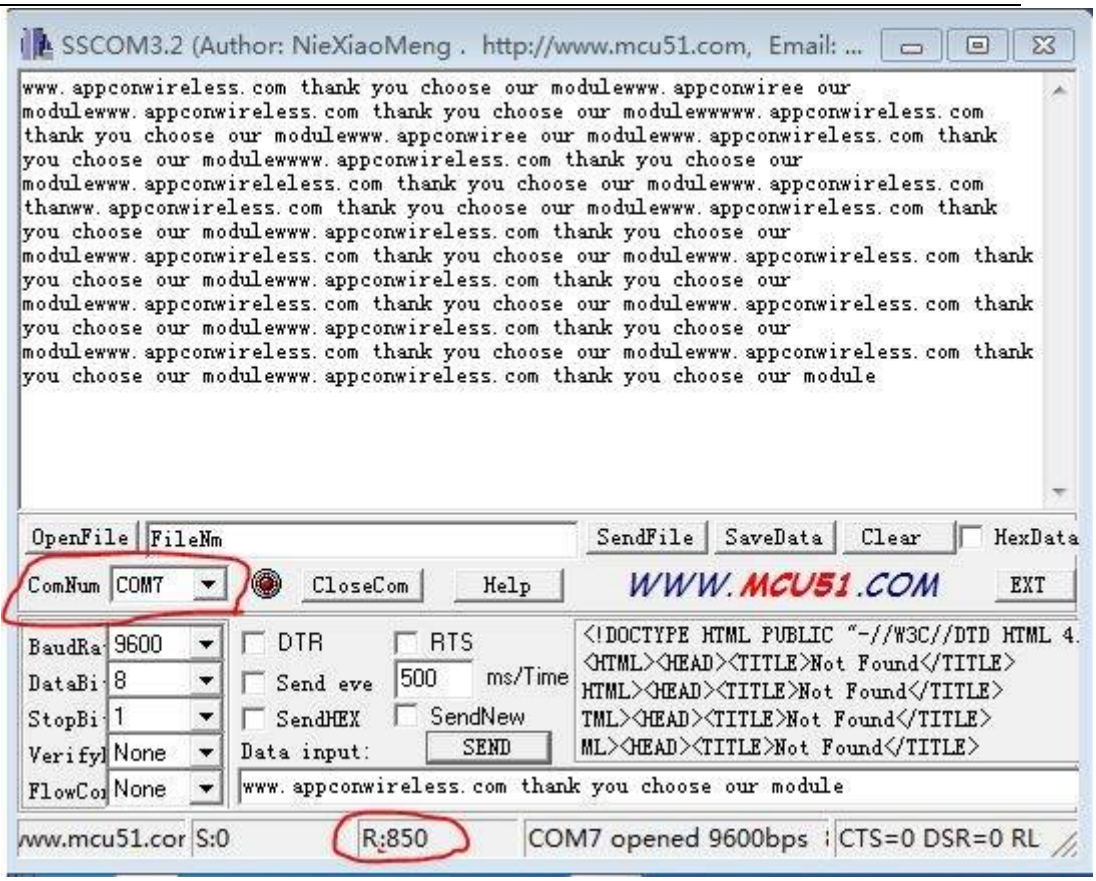
In the below test, we set the RF_Factor=2048 and RF_BW=125. We can calculate the air data rate only 537bps through the chart.



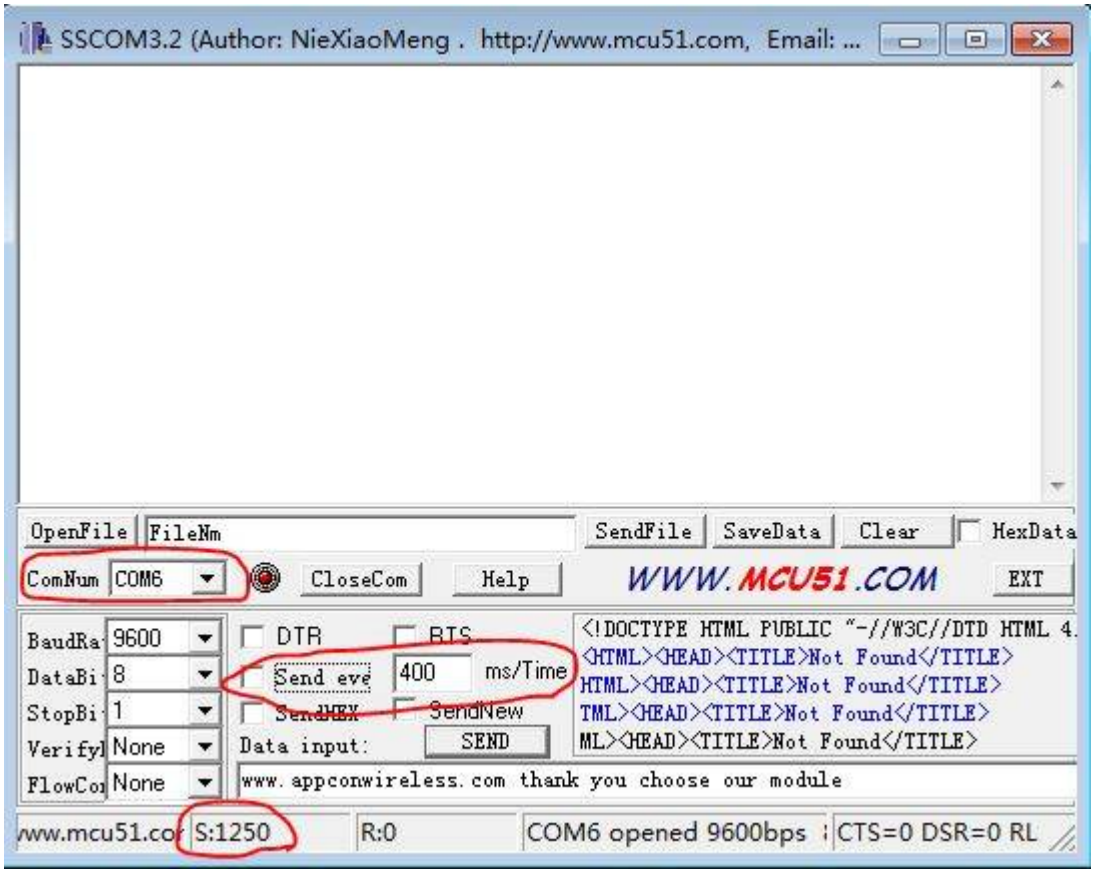
If the transmitting period is 500ms, we transmit the data packet of ' www.appconwireless thank you choose our module' (total 50bytes). We send the total data up to 850bytes.



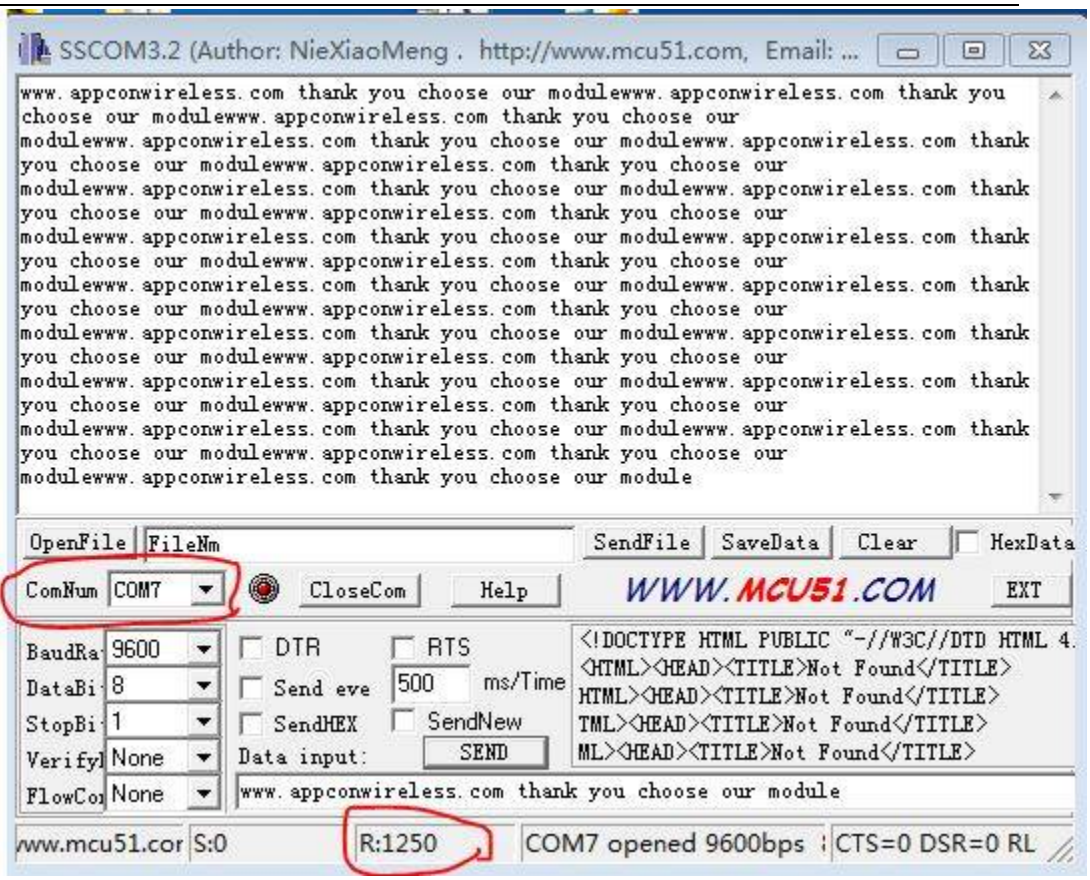
We can see all 850bytes in the receiver module.



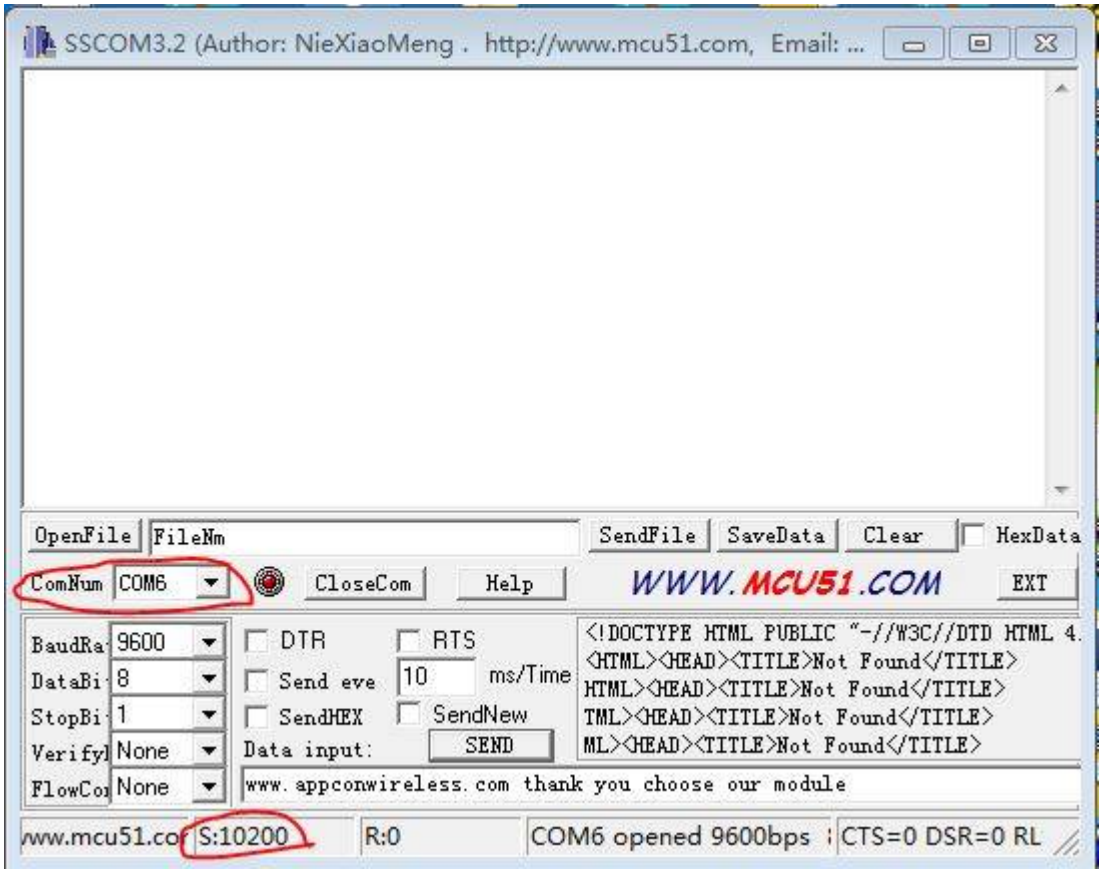
If we set the period to 400ms, and send 1250 bytes data.



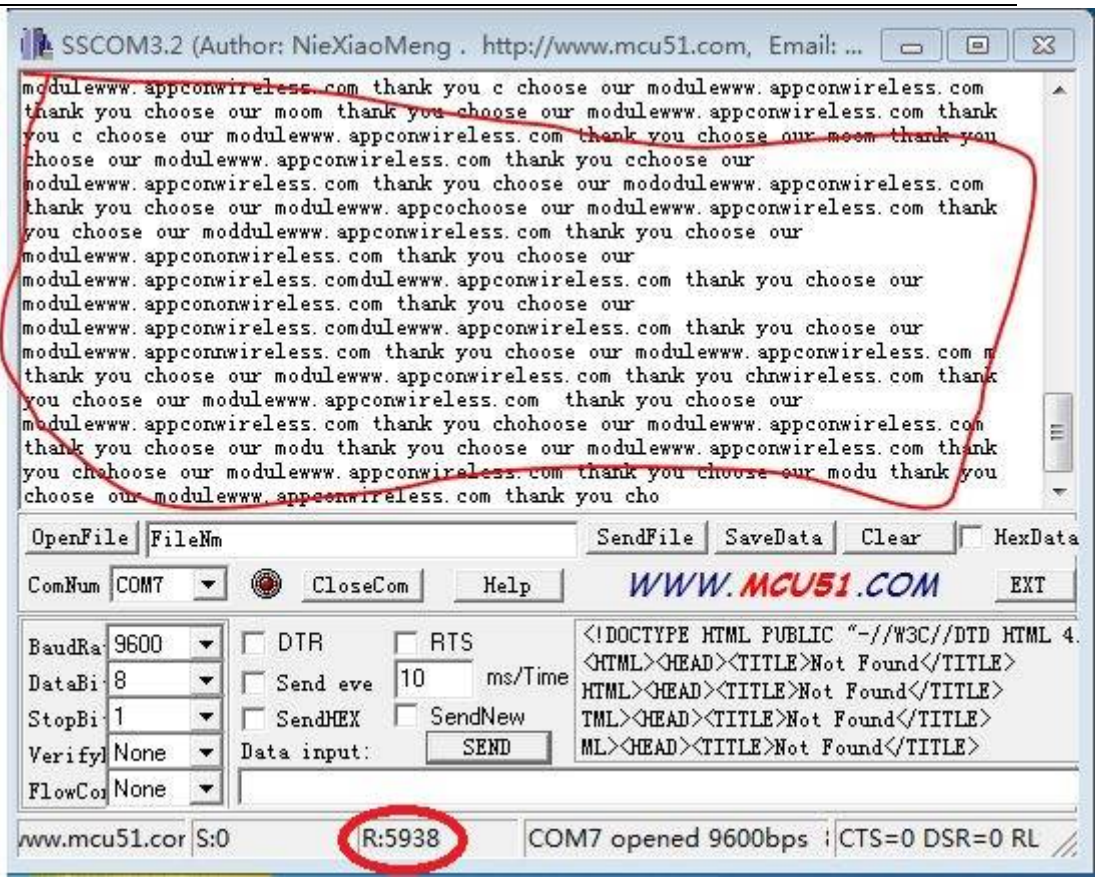
The receiver can get all 1250 bytes.



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



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



RF1276 should choose the suitable air data rate to avoid the overflow situation in the application.

How to read the RSSI value?

The receiver gets the data from the transmitter. Then 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

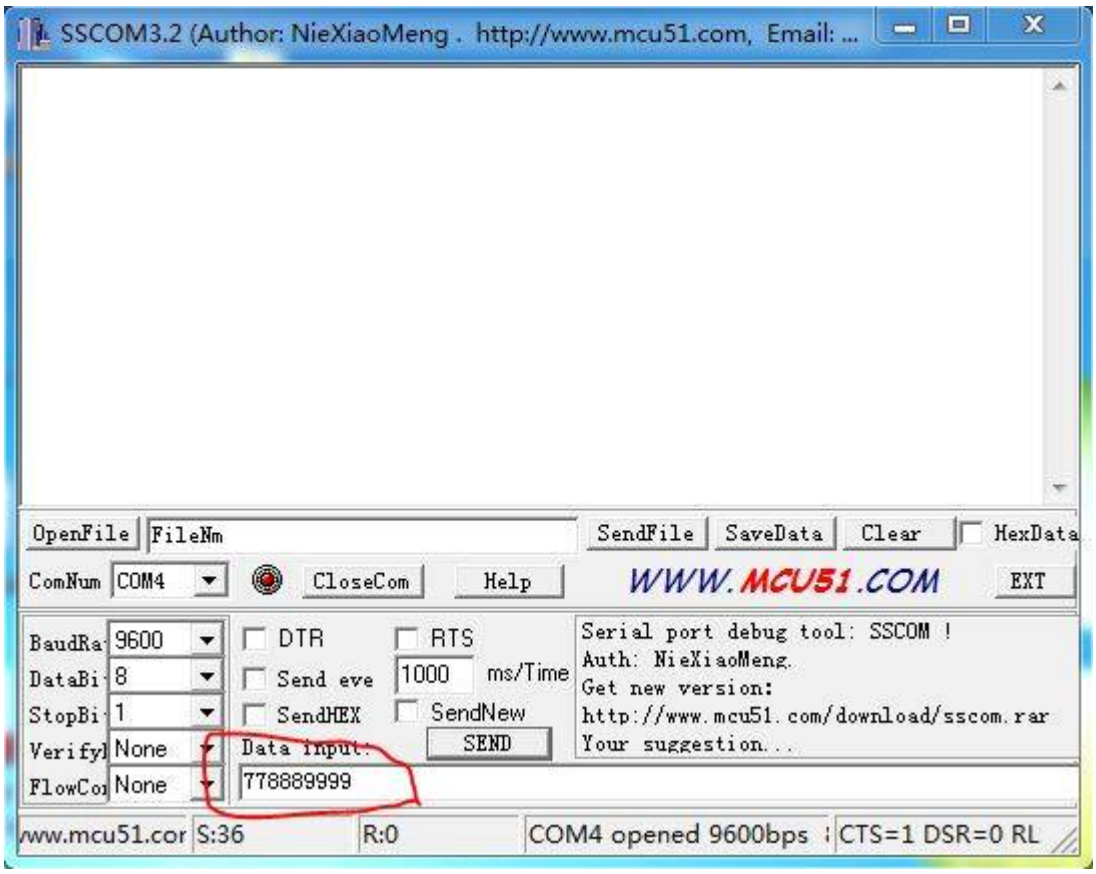
The module acknowledge:

0xAF,0xAF,0x00,0x00,0xAF,0x00,0x06,0x02,0xXX,0x00,0xCS,0x0D,0x0A

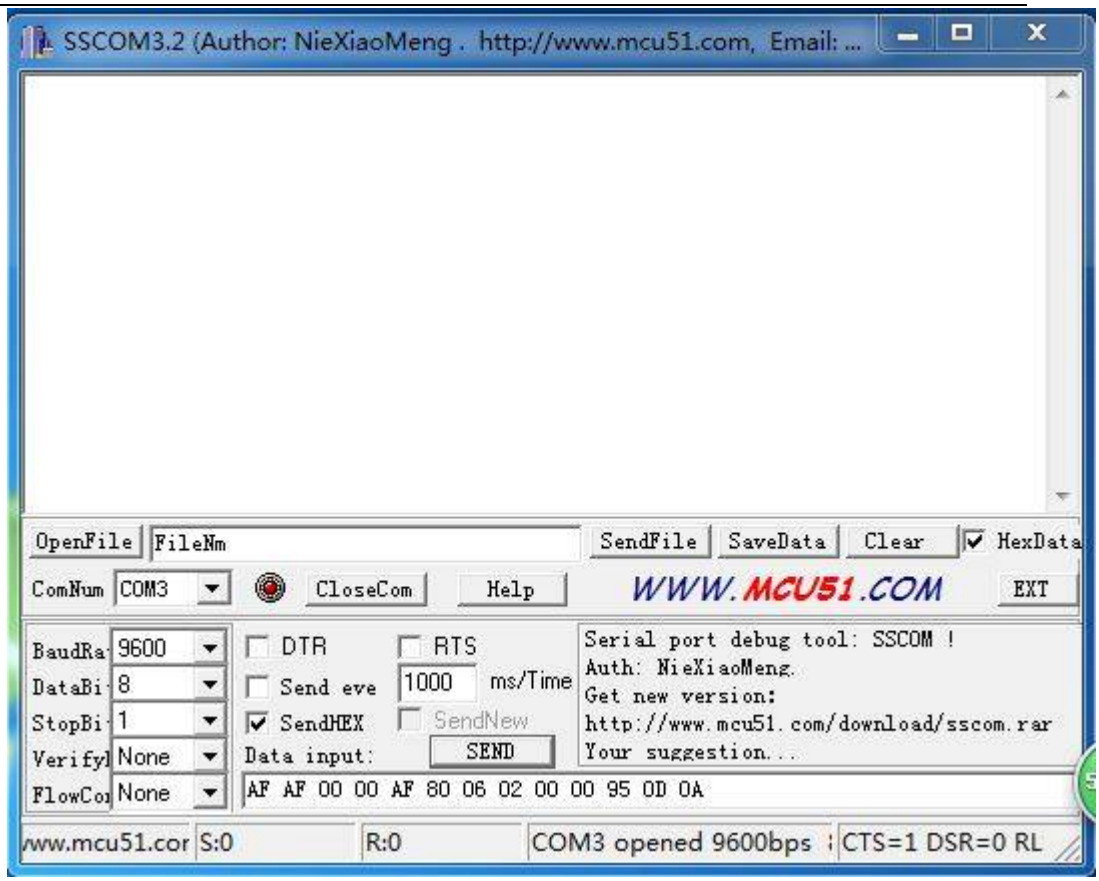
The OxXX is the RSSI relative value.

The eventual value of RSSI is
RSSI=-164+XX.

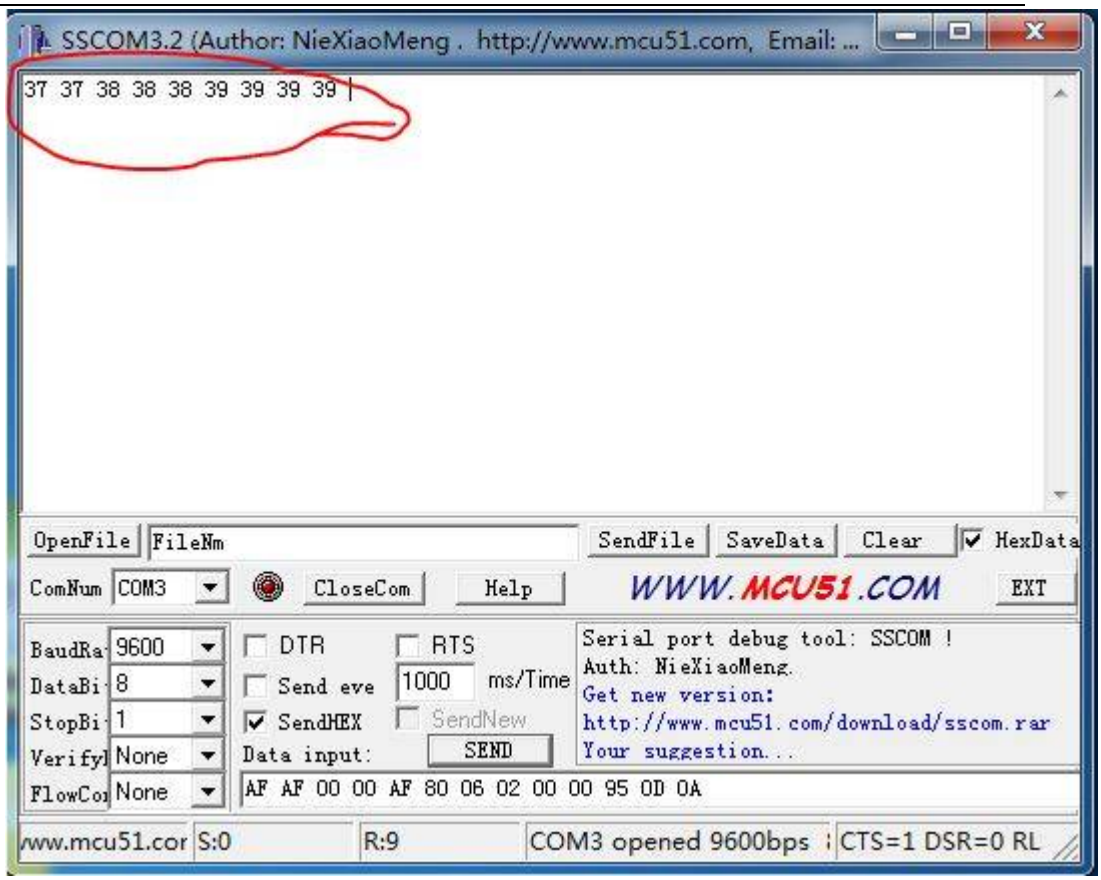
We use RF1276 connect to COM4 as the transmitter, and send the data packet '778889999'.



Then we use RF1276 connect to COM3 as the receiver.



COM3 received the data packet ‘778889999’, and display the data by Hex code.



Then the receiver (COM3) input the RSSI reading command ‘AF AF 00 00 AF 80 06 02 00 00 95 0D 0A’ by hex. And click ‘send’

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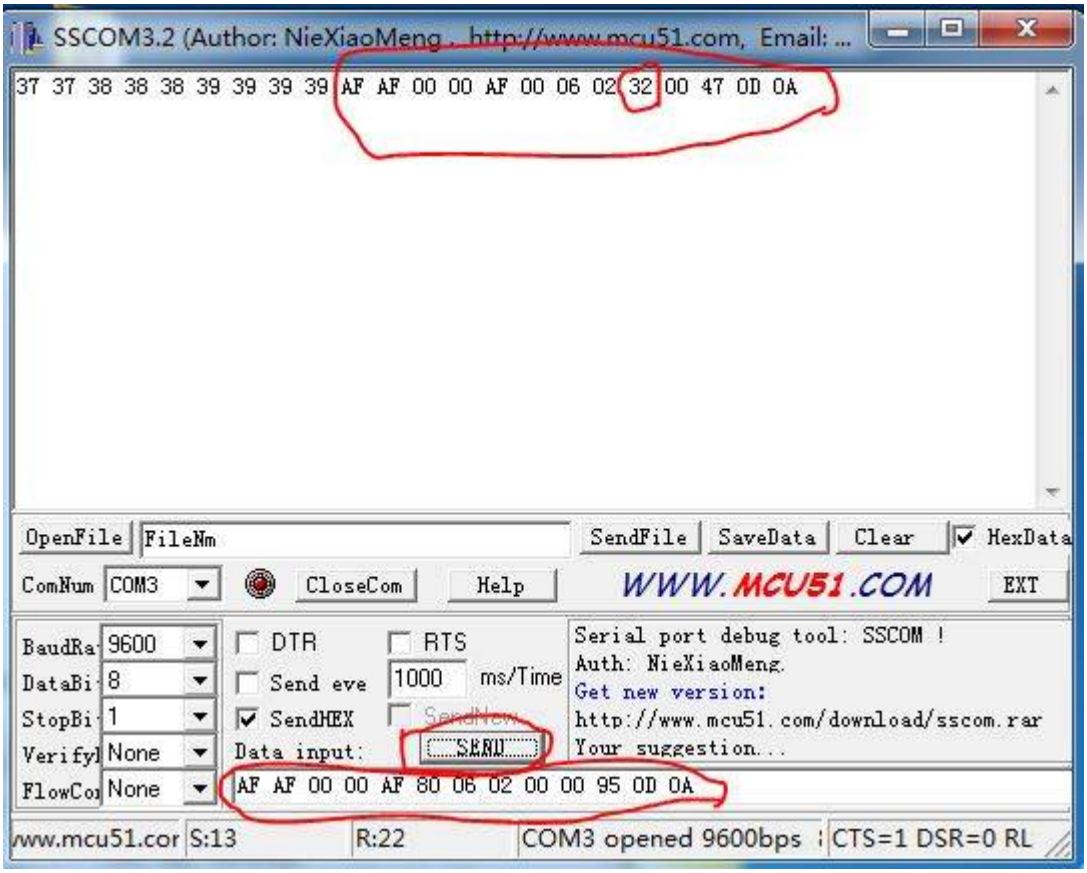
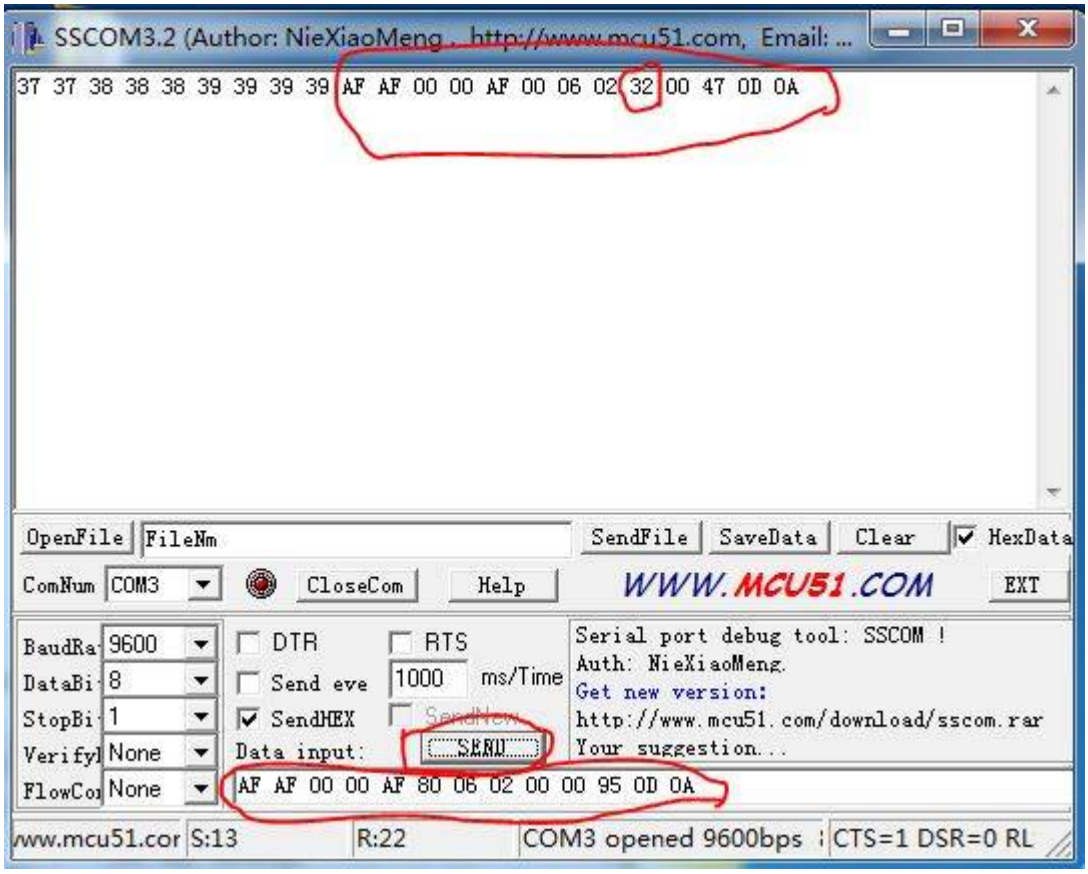


The module will reply the SSCOM result ‘AF AF 00 00 AF 00 06 02 **32** 00 47 0D 0A’.



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 = -114 dBm