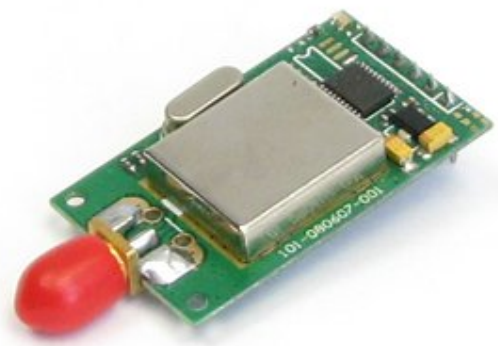
KYL-210 High speed Rate RF Transceiver Data Module



Shenzhen KYL Communication Equipment Co., Ltd

Add: 3705-3707, Building C, Huangdu Square, Yitian Road, Futian District, Shenzhen, Guangdong, China 518048

Tel: 86-755-83410815; 86-755-82943662

Email: sales01@rf-data.com; sales02@rf-data.com

Fax: 86-755-83408785

Web: www.rf-data.com

Catalogue

Before using our products, please read the user manual carefully.
Any questions, please contact me at the above mentioned methods.

I: About KYL-210

KYL-210 is a kind of low power wireless transceiver data module. With small size, low power consumption as well as good stability and reliability, it is widely used as wireless data transceiver in long-ranges, narrowband low power UHF wireless data transmitters and receivers with channel spacing as low as 25 KHz.

II: Features:

1. **Low power transmission:** 50mW
2. **Carrier frequency:** 433MHz (default), 400-470MHz, 868MHz, 915MHz (optional)
3. **High anti- interference and Low BER (Bit Error Rate)**
   Based on GFSK modulation, high-efficiency forward error correction channel encoding technology is used to ensure the data's resistance against both transient interference and random interference. The actual BER can be achieved to 10^{-5}~ 10^{-6} when channel BER is 10^{-2}.
4. **Long Transmission Distance**
   Within the visible range, when the height of antenna is higher than 2m and the BER is 10^{-3}, the reliable transmission distance is 400m @1200bps and 200m@9600bps respectively.
5. **Transparent data transmission**
   Transparent data interface used in transceivers is to satisfy many standard and nonstandard user protocols. Any false data generated in air can be filtrated automatically (What has been received is exactly what has been transmitted).
6. **Multi-channels**
   KYL-210 provides 8 channels, expandable for 16, 32 channels according to requirements of users.
7. **2 ports with three connection methods**
   KYL-210 transceivers provide 2 ports with three connections: a UART interface of TTL level, a non-standard RS-232 port and a non-standard RS-485 port.
8. **Big data buffer area**
   With optional interface baud rates: 1200/4800/9600/19200bps and 8N1/8E1/8O1 data format (decide by user), the transceiver can transmit unlimited data frames with flexible user program.
   Note: the RF data rate is only settled down before delivery; please specify our sales your requirements when placing your orders.
9. **Intelligent data control system and no other extra programs required**
   Even for half duplex communication, no other excessive programs are required.

All RF system data transmission/reception and other On-the-Fly conversion and control are performed by KYL-210 transceivers automatically.

10. **Lower power consumption & nice sleep function**
    With +5V power, the receiving current is less than 20mA, the transmitting current is less than 40mA, and the sleeping current is less than 20uA.
11. **High reliability, small size and excellent performance**
    By using monolithic radio-frequency integrated circuit and single-chip MCU, the transceivers have less peripheral circuits, high reliability, and low failure rate.
12. **Various options for configurable antennas.**
13. **Watchdog monitor inside**
    Watchdog monitors the inner operation, so it can change the traditional product structure and also improve the reliability of our modules.

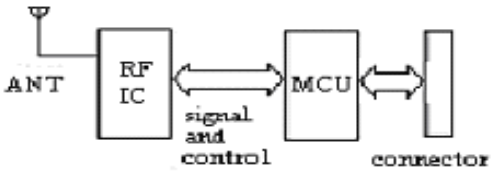
III: Application of KYL-210:

KYL-210 is suitable for:

* Automatic Meter Reading (AMR);
* Wireless alarm and security systems;
* Building automation, security systems, wireless monitor, remote control and access control system;
* Wireless data transmission, automatic data collection system;
* Radio modem can be used for Sports training & competition;
* Wireless dishes ordering;
* Wireless POS, PDA wireless smart terminal;
* RF module can be used for electronic bus station and intelligent traffics;
* RF transmitter, Wireless electronic display screen and Queuing machine;
* Wireless telemetry; charging for parking, parking lot;
* Wireless modem automobile inspection and four-wheel orientation;
* Wireless sensor, Industrial wireless remote control and air conditioning remote controller;
* Data communication in the aspects of railway, oil field, dock and army.
* LED display in thruway and public place;
* Point to multi-point wireless network, wireless on-the-spot bus and automatic data collection system

IV: How to use the KYL-210

KYL-210 provide RS-232, RS-485 and UART/TTL level interface ports which can be direct connected with PC, RS485 devices, monolithic processors and other UART components. Please find the schematic diagram below:



KYL-210 Principle map

1. Power supply

The factory setting is +5V (needing 3.3V-3.6V, please notify us when placing the order). Using better ripple factor, KYL-210 transceivers can also share power supply with other equipment. If possible, a voltage-stabilizing chip with 5V voltage is much recommended than Switch power supply. But if only switch power supply is available, the jam caused by switch pulse should be avoided. In addition, the reliable grounding must be used if there is other device in the system equipment. In case of failing to connect with the ground, it can form its own grounding but must be absolutely separated from the municipal electric supply.

2. **Connection Definition with terminal**

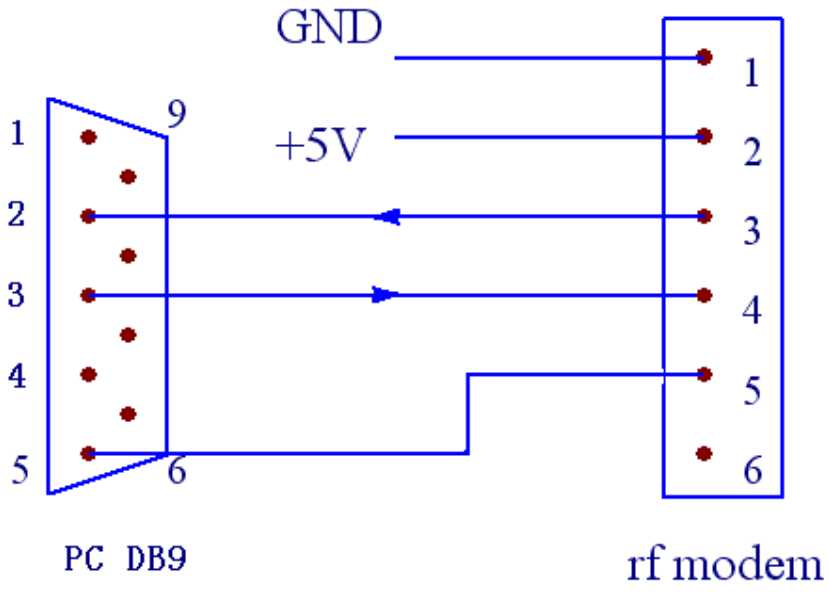
KYL-210 transceivers supply one 9-pin connector (JP1), their definitions and connection methods with terminals are shown in Table 1.

Table 1: JP1 Pin Definitions and connection methods

Pin No.	Signal Name	Function	I/O	Level	Remarks
1	GND	Grounding of power supply	-	-	
2	Vcc	Power supply DC	-	3.1~5.5V	Other power supply need customized
3	RS232 TXD	Data Transmission	O(output)	RS232	Choose one of the three interface ports
	TTL TXD	Data Transmission	O(output)	TTL	
	RS485 A	RS485 A	IO	-	
4	RS232 RXD	Data Receiving	I(input)	RS232	Choose one of the three interface ports
	TTL RXD	Data Receiving	I(input)	TTL	
	RS485 B	RS485 B	IO	-	
5	DGND	Signal Ground	-	-	
6	NC	-	-	-	

3. The connection schematic diagram between computer and our

RF module



4. Setting of channel, interface, and data format

Before using KYL-210, the user needs to make simple configuration to determine the channel, interface mode and data format based on his own needs. You can view or change the module's interface baud rate, channel and address code, parameter setting or reading as per the testing software KYLCOM in the PC (in products box). And the configuration is as follows:

i. Channel configuration:

Channel No.	Frequency	Channel No.	Frequency
1	429.0325MHZ	5	433.0325MHZ
2	430.0325MHZ	6	434.0325MHZ
3	431.0325MHZ	7	435.0325MHZ
4	432.0325MHZ	8	436.0325MHZ

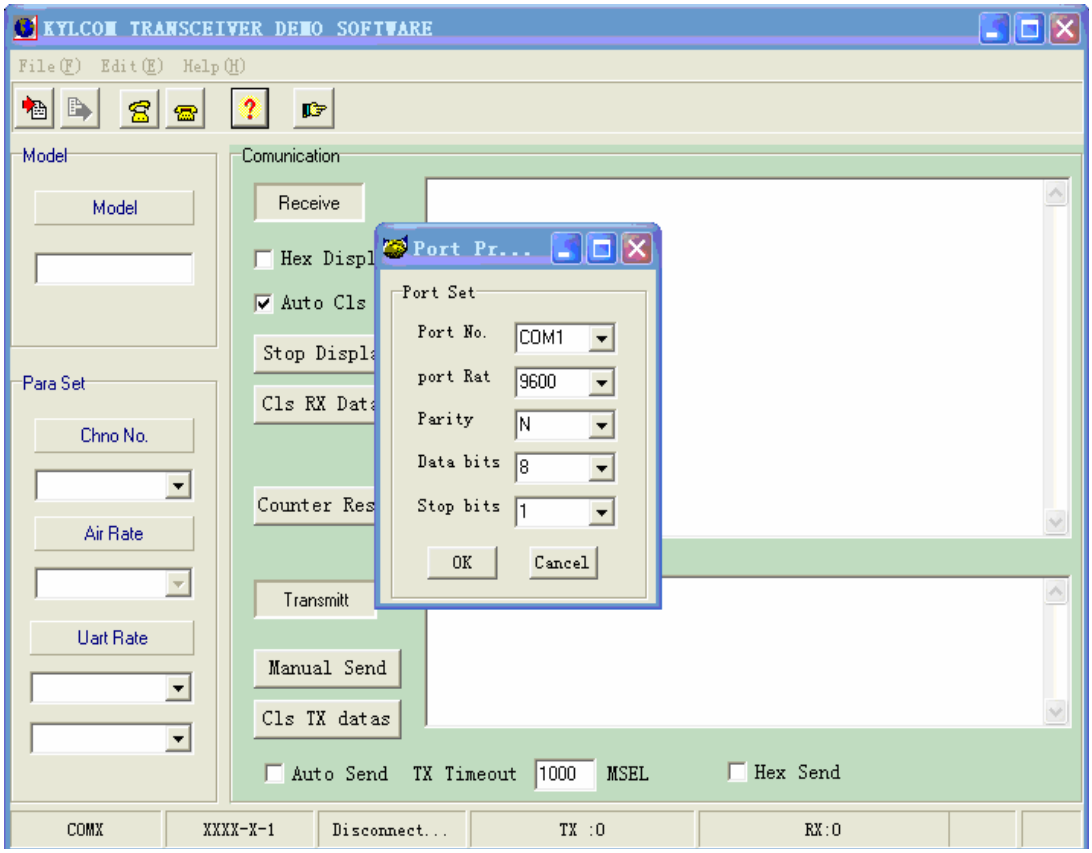
Note: the frequency points corresponding to each channel can be adjusted based on your needs.

ii. The schematic diagram of setting the parameter is in the following:

a. Connect the PC and module with RS232 data cable.

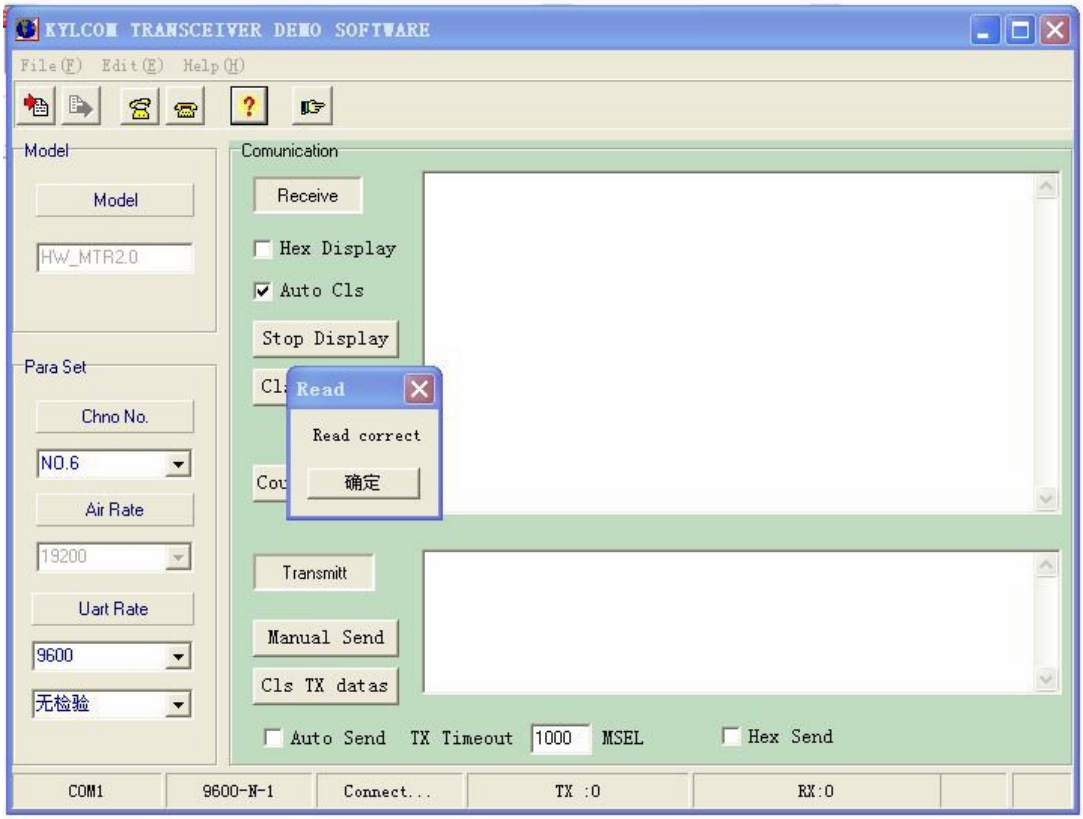
b. Open the “KYLCOM” PC software, and then select “English” as follows:

iii. Click “open port”, a small window as following will appear. You can write the parameters in the columns.



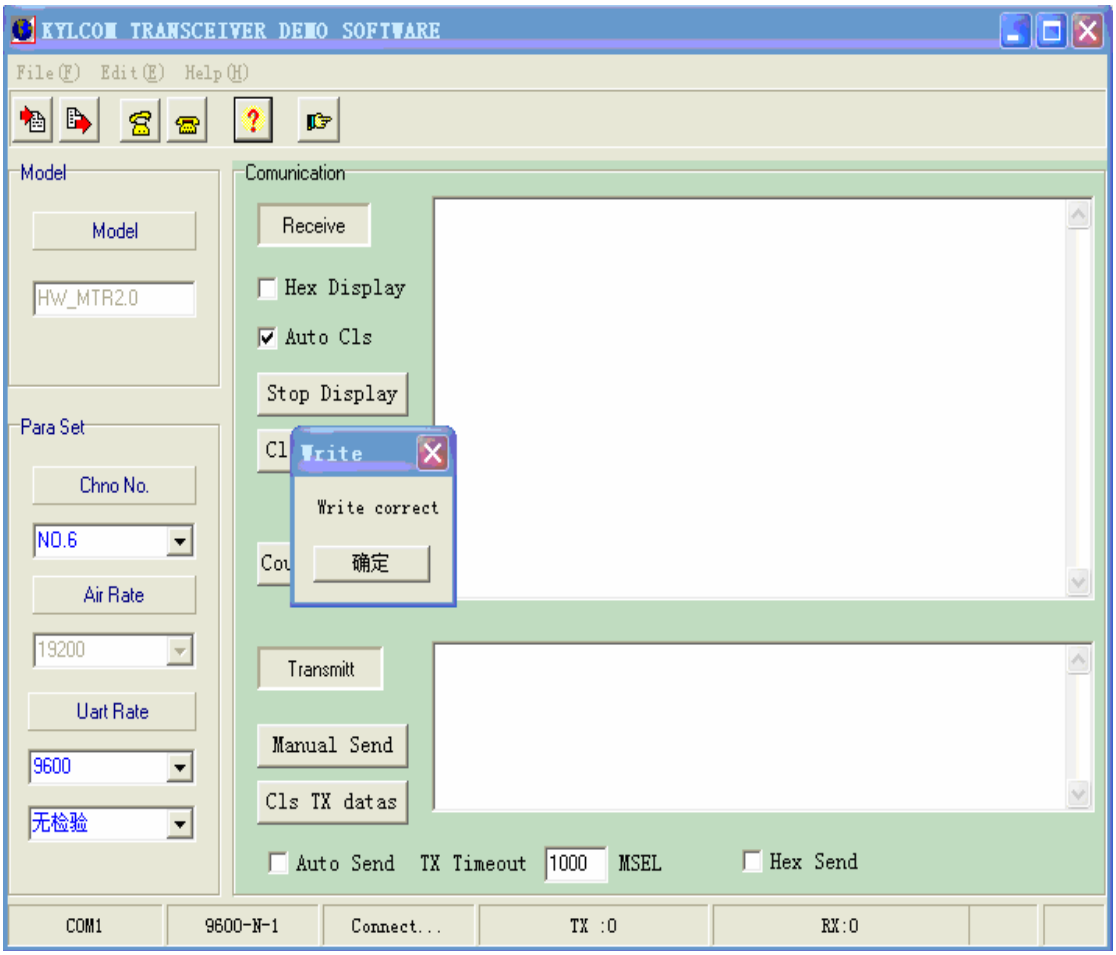
iv Click “read paras”.

“Read correct” shows your connection between KYL module and PC is correct.



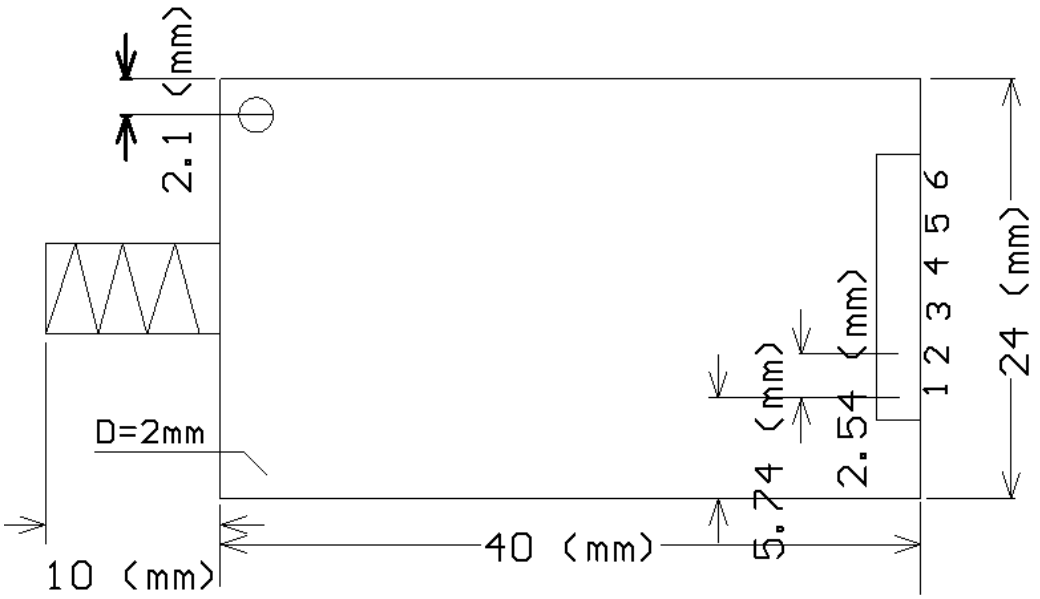
If you want to change some technical parameter, you need do as follows.

v. Change the parameters like channel, interface rate and parity mode through the button on the left window. After writing the parameters in the left catalogue, click "write para", then "write correct" showed. So you have finished the process of changing technical parameter.



Note: The RF data rate (Air Rate) can not be set by the user. It is fixed before delivery. So please specify the RF data rate when placing the order.

5. **Installation dimension:**



6. The Function-indicator light

a. The LED indicator light will turn red for 0.5S once switch on.

b. The LED indicator light will turn green continually while receiving data from air.

c. The LED indicator light will turn red continually when transmitting data into air after receiving from COM.

d. If the module keeps sleep function, LED indicator light is always dark.

7. Supported protocol and Transmit capability

KYL-210 standard transceivers offer transparent protocol to support various applications and protocols of users. If you need to decrease his cost or ease the workload of terminal CPU, we can add other specific functions based on the transparent protocol, such as addressing, data acquisition, command interpretation, etc.

8. Sleep function

In order to reduce consumption, KYL-210 transceivers support sleep function. In sleep mode, the current consumption is less than 20uA.

a. How to use sleep function:

The Pin8 'SLP' in JP1 is the signal of sleep control. At high power level, transceiver stays in working mode. At low power level (<0.5V), transceiver stays in sleep mode. The SLP signal can convert transceiver from working to sleep mode in 1ms after falling edge. If the Sleep signal arrives when the transceiver is transmitting data, the module will move to sleep mode after finishing transmission. From sleep moves to working, it takes the transceiver 1ms after rising edge.

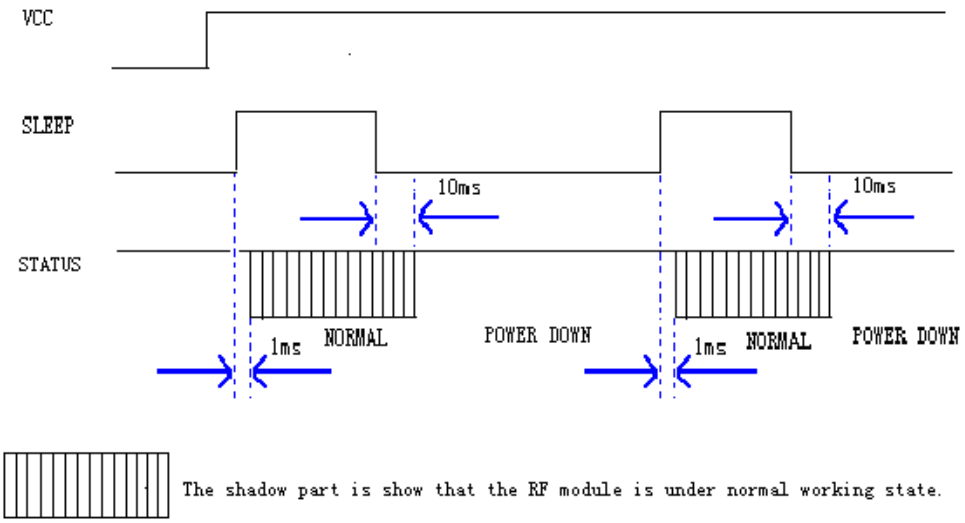
To disable the opened sleep function of KYL-210, the SLP (SLEEP) pin should be definitely connected with 0 or ground.

b. Attentions about using sleep function:

When the sleep function enabled, or any supply glitches, such as switch dithering, fire striking or quick switching on and off, may cause the transceiver switch to wrong sleep mode.

After switching on, users can avoid this error by making a compulsive restoration once after the CPU delays 100ms.

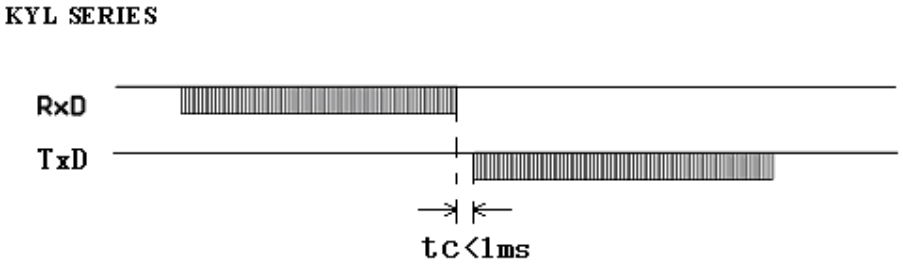
Sleep Timing Diagram:



9. The attentions of data transmission

a. The delay time (tc) of conversion between transmitting and receiving is less than 1ms.

Timing diagram:

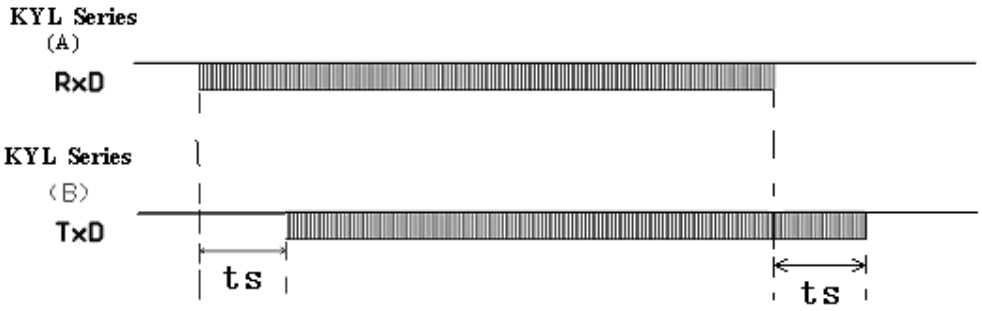


b. The delay time of transceivers between the first bit sent by TxD to the first bit received by RxD.

As data processing will be made on user's data by KYL-210 transceiver using FEC (Forward Error Correction) or other correction algorithm, when RxD of a KYL-200L transceiver 'A' receives the data, then transmits it, the other one transceiver 'B' will have a delay (ts) to receive and transmit by TxD. Different RF data rate causes different delay time. Please see the specific delay time below:

RF Date Rate (bps)	Delay Ts(mS)	RF Date Rate (bps)	Delay Ts(mS)
1200	90	9600	16
2400	48	19200	10
4800	30		

Timing diagram:



c. Error dealing procedure:

To enhance the reliability and stability of user's systems, a verify bit or a Cyclic Redundancy Check (CRC) mode is highly recommended to prevent wrong information while using KYL-210 modules.

d. Large-number data transmission

In theory, when the interface data rate is faster than the RF data rate, KYL-210 transceivers can sent unlimited-long data package, but long packages more than 120B are not recommended. The length of each package should be between 60~100B. We also recommend our users to use Automatic Error Request Equipment (ARQ) to prevent wrong information.

Reasons:

What if the actual transmission BER (Bit Error Rate) is 10^{-4}, 1 packet with 1KB data which is about 10-thousand bits, is sent, theoretically, at least 1 bit will be received wrongly, then the 1KB information will never be received correctly.

But if we package the data into 10 packets with 100B for each, when all 10 packets are sent, there will be only 1 packet wrong according to this probability. After that, resend this wrong packet using ARQ mode. So by resending one more packet and the efficiency rate is reduced 10%, all data will be absolutely received correctly.

10. Antenna configuration:

Many appropriative antennas for low power RF modules are selected to meet

different user antenna configurations. Please ask our Sales office for further information about the antenna's dimension and performance.

a. Helical SMA antennas

KYL-ANT-433-10-SMA: 100mm helical SMA antennas with high gain and low cost, reach a long distance.

KYL-ANT-433-3-SMA: 28mm SMA helical antenna with magnetic core, small size, beautiful appearance (like the mobile phone antenna)

KYL-ANT-433-10-ZSMA: 100mm SMA helical antenna with folding joint, easy for adjusting the direction and fixing.

b. Magnetic vehicle antenna

KYL-ANT-O433S-300H1.5-SMA: include magnetic antenna base, suitable for equipment with metal shell, easy for fixing, effective to enhance the transmission distance.

For more kinds of antennas，please go to our website:
http://www.rf-data.com/Products_list_en.asp?classid=163
If you have special requirements on antennas, please specify, we can design and produce for you individually.

V. Networking Application of KYL-210

The communication channel of KYL-210 is half duplex, which is most suitable for the communication mode of point to multi-point. Under this mode, one master station must be set, and all of the rest are slave stations. A unique address is given to each station. The coordination of communication is controlled by master station that uses data frames containing address code to transmit data or command. Slave station will receive all of the data and command and compare the received address code with local address code. If they are different, the data will be deserted without any response. If those address codes are the same, it means the data is sent to the local. Slave station will make different responses according to the transmitted data or command and send back the data of response. All these jobs must be performed by upper protocol, and it is assured that there is only one transmitter-receiver in the state of transmission in the communication network at any instant moment so as to avoid the cross-interference.

KYL-210 can also be used for point-to-point communication with easier operation. For the programming of serial port, all you have to do is to remember that its communication mode is semi duplex while always observing the time sequence of come-and-go for receiving and transmitting.

VI. Technical specification of KYL-210

* Modulation mode: GFSK/FSK
* Working frequency: 400MHz~470MHz, 868MHz, 915MHz;
* Power supply: DC 5V (3.1~5V informed when placing the order);
* RF power: ≤50mW;
* RF data rate: 1200/2400/4800/9600/1920038400/100Kbps;
* Receive current: <20mA (TTL connect);
* Receive sensitivity: -112dBm (1200bps); -108dBm (9600bps);
* Transmitting current: <40mA;
* Sleep current: <20uA;
* Interface data format: 8E1/8N1/8O1;
* Working humidity: 10%~90% relative humidity without condensation;
* Working temperature: -30□~+70□ (industrial)
* RF Line-of-sight Range: 200m (BER=10^{-5}@9600bps);
  400m(BER=10^{-5}@1200bps)；
* Size: 40mm*24mm*6mm (without antenna port).

VII. Description of type