KYL-300I Low Power Wireless Transceiver Data Module

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

I: About KYL-300I

KYL-300I 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 of KYL-300I:

1. Low power transmission: 500mW (default), 600mW~1W (optional).

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 $10^{-5} \sim 10^{-6}$ 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 3000m @1200bps and 2000m@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-300I provides 8 channels, expandable for 16, 32 channels according to requirements of users.

7. Three connection methods with DB9 connector
KYL-300I transceiver provides DB9 connector with three connections: a non-standard RS-232 port and a non-standard RS-485 port. USB interface port is also available. It can get power from PC directly.

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-300I transceiver automatically.

10. Lower power consumption & nice sleep function

With +5V power, the receiving current is less than 25mA, the transmitting current is less than 300mA, 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.

14. Beautiful metal shell.

III: Application of KYL-300I:

KYL-300I 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 KYL-300I

KYL-300I provides RS-232, RS-485 and USB interface port for direct connection with PC, RS485 devices, monolithic processors and other UART components. The schematic diagram is shown below:
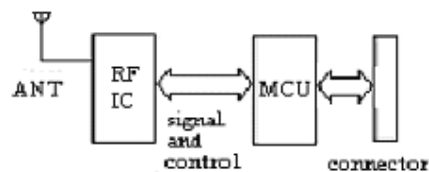
KYL-300I Principle map

1. Power supply

The factory setting is +5V (7.5V-12V is also available, please specify when placing the order). Using better ripple factor, KYL-300I transceiver can share power supply with other equipments. If possible, a voltage-stabilizing chip with 5V voltage is more 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. 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-300I 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	Level	Connection with terminal	Remarks
1	VCC	Power supply DC	5V		
2	A (TXD)	A of RS-485(TxD of RS-232)		A(RxD)	
3	B (RXD)	B of RS-485(RxD of RS-232)		B(TxD)	
4				RxD	
5	GND	GND			
6					
7					
8					
9					

3. The connection schematic diagram between computer and our RF module

CONNECT SKETCH MAP
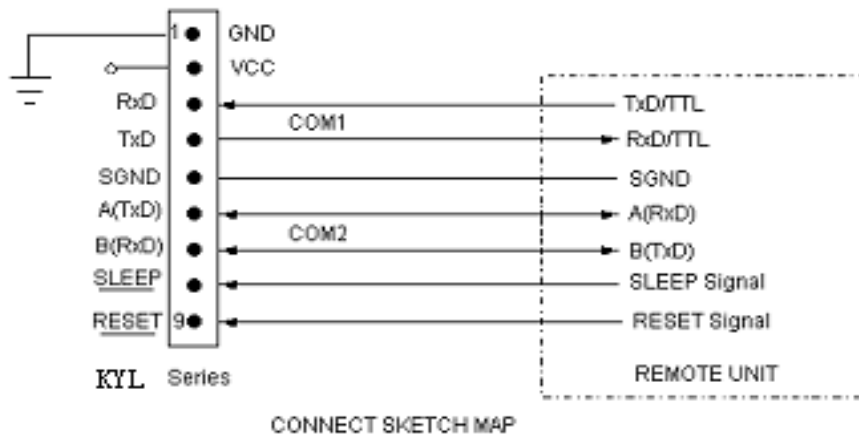
**4. Setting of channel, interface, and data format**

Before using KYL-300I, you need to make simple configuration on your own needs to determine the channel, interface mode and data format. You can view or change the module's interface baud rate, channel and address code. Please read or set the parameters as per the testing software KYLCOM.exe (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 the user's needs.

5. **Installation dimension:**
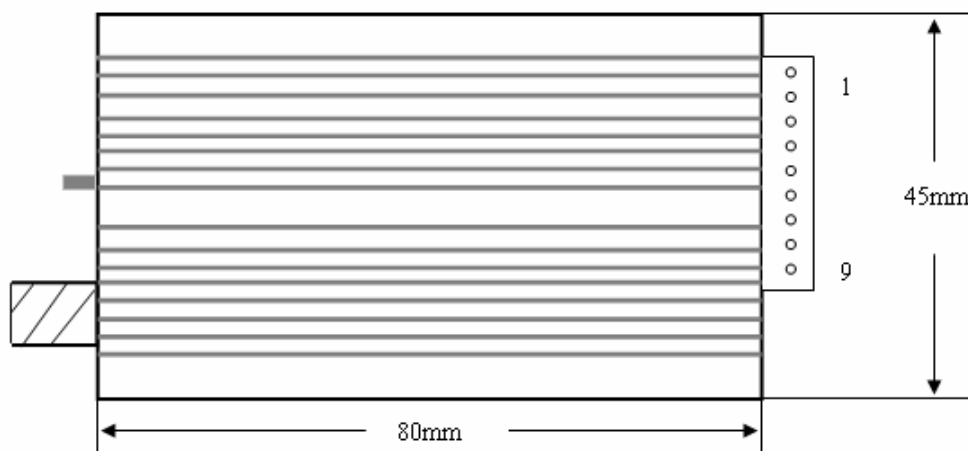
6. The Function-indicator light

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

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

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

    d. If the module moves to sleep mode, LED indicator light is always dark.

7. Supported protocol and Transmit capability

    KYL-300I standard transceivers offer transparent protocol to support various applications and protocols. If the user needs 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 instruction:

    In order to reduce more consumption, KYL-300I transceivers support Sleep function. In sleep mode, the current consumption is less than 20uA.

    a. How to use the 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 enter sleep mode after finishing transmission. From sleep mode to working, it takes the transceiver 1ms after rising edge.

    To disable the opened sleep function of KYL-300I, the SLP (SLEEP) pin should be definitely connected with 0 or ground.

    b. Attentions about the use of sleep function:

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

    Users can avoid this error by making a compulsive restoration once the CPU delays 100ms after switching on

    Sleep Timing Diagram:
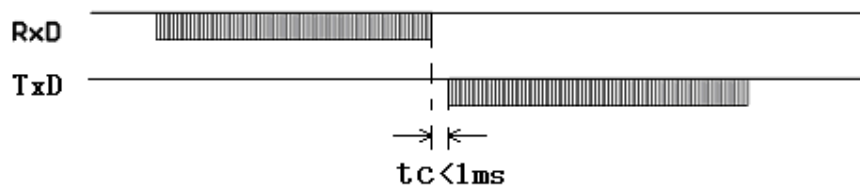
    Sleep Timing Diagram:

The shadow part is show that the RF module is under normal working state.
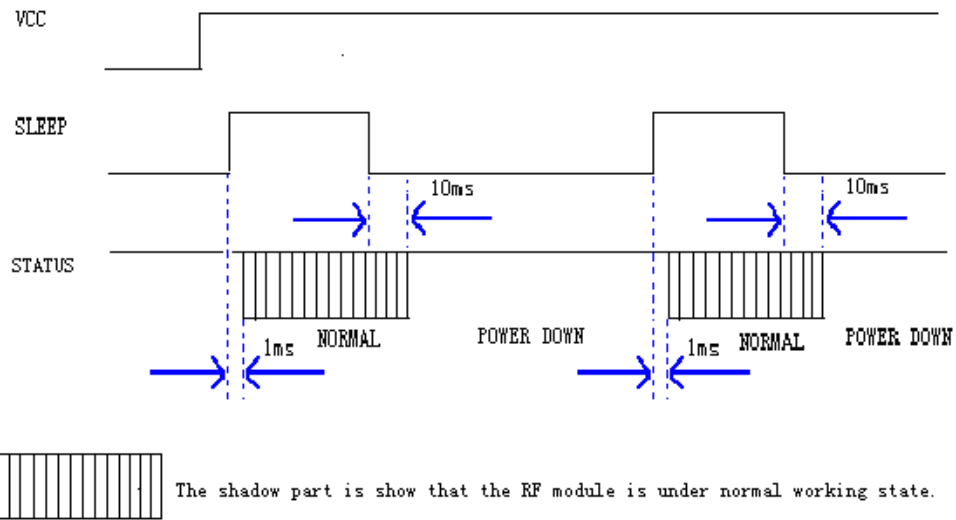
9. Attentions about data transmission

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 happens on user's data by KYL-300I transceiver using FEC (Forward Error Correction) or other correction algorithm, when RxD of KYL-300I 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:
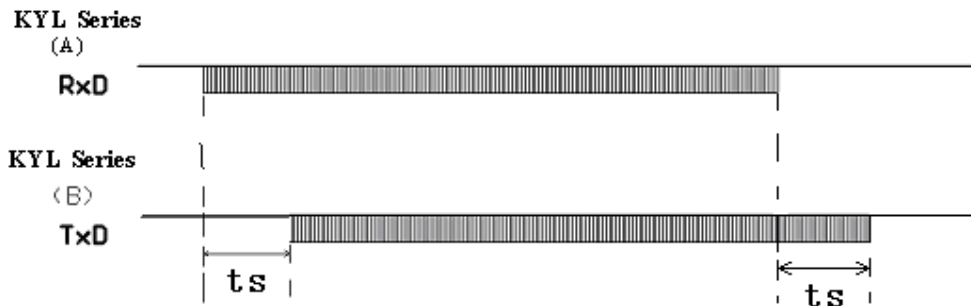
c. **Error dealing procedure:**

To enhance the reliability and stability of user's systems, a verified bit or a Cyclic Redundancy Check (CRC) mode is highly recommended to resist wrong information while using KYL-300I modules.

d. **Large-number data transmission**

In theory, when the interface data rate is faster than the RF data rate, KYL-300I transceivers can sent unlimited-long data package, but any long packages more than 120B are not recommended. The length of each package should be between 60~100B. We also recommend users to resist the wrong information by using Automatic Error Request Equipment (ARQ).

Reasons:

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. So 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, it will resend this wrong packet using ARQ mode. So 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 users' antenna configurations. Please ask our Sales 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/

If you have special demands on antennas, please specify, we can design and produce for you individually.

V. Network Application of KYL-300I

The communication channel of KYL-300I 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-300I 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-300I

* Modulation mode: GFSK/FSK
* Working frequency: 400MHz~470MHz;
* Power supply: DC 5V (7.5V~12V is available, specify when placing the order);
* RF power: ≤500mW, 600mW~1W is available;
* RF data rate: 1200/2400/4800/9600/19200bps (Set before delivery);
* Receive current: <28mA (TTL connect);
* Receive sensitivity: -123dBm (1200bps); -118dBm (9600bps);
* Transmitting current: <350mA;
* Sleep current: <20uA;
* Interface data format: 8E1/8N1/8O1;
* Working temperature: -40□~+80□ (industrial standard)
* RF Line-of-sight Range: 2km (BER=10-5@9600bps);
            3km (BER=10-5@1200bps)
* Size: 80mm*45mm*20mm (without antenna port).

VII. Description of type

KYL-300I-96

Manufacture | Type

Baud Rate
12:1200bps
24:2400bps
48:4800bps
96:9600bps
192:19200bps