KYL-500L Special RF module for Wireless POS Terminal

Shenzhen KYL Communication Equipment Co., Ltd

Address: C3705-3707, Huangdu Square, South of Exhibition Center, Yitian Road, Futian District, Shenzhen, Guangdong, China 518048

Tel: 86-755-82943662
Fax: 86-755-83408785
Skype   KYL-Sunny
Yahoo messenger: KYL_Sunny@yahoo.com
MSN: KYL-Sunny@hotmail.com
Email: sales02@rf-data.com
Website: http://www.rf-data.com

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

I: About KYL-500L

KYL-500L, the micro power wireless transceiver data module, is designed for order-dish system. With small size, low power consumption as well as good stability and reliability, it is also widely used for other embedded systems like AMR.

II. Features of KYL-500L

1. **Low power transmission:** 400mW
2. **Carrier frequency:** 433MHz (default), 400-470MHz (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 enhance the data's resistance to 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 10-5, the reliable transmission distance is 2km @1200bps, and is 1.5km@9600bps respectively.
5. **Transparent data transmission**
   Transparent data interface used in transceivers is to meet 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**
   We provide 8 channels, expandable for 16, 32 channels according to requirements of customers.
7. **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 inform our sales when placing your orders.
8. **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-500L transceivers automatically.
9. **Lower power consumption & nice sleep function**
   With +3.3V to 3.6 power, the receiving current is less than 25mA, the transmitting current is less than 200mA, and the sleeping current is less than

1uA.

**10. High reliability, small size and excellent performance**

High sensitivity, small size is suitable for the order-dish system. With Long transmission distance, strong penetrability, it is preferable for handheld terminal.

III. Applications of KYL-500L

* Automatic Meter Reading (AMR)
* Wireless Dish-ordering system;
* Wireless POS, PDA, wireless smart terminals;
* Lower power consumption System;
* Wireless alarm and security systems
* Building automation, security, wireless monitor and control of room equipment, Access Control System;
* Wireless data transmission, automatic data collection system;
* Radio modem can be used for Sports training & competition;
* Electronic bus station and intelligent traffic;
* Wireless electronic display screen and queuing machine;
* Wireless telemetry, charging for parking, parking lot;
* Automobile inspection and four-wheel orientation;
* Wireless sensor, Industrial wireless remote control and air condition remote control;
* 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-500L

KYL-500L can provide RS-232, RS-485 and TTL level interface port for direct connection with PC, RS485 devices, monolithic processors. The schematic diagram is shown below:
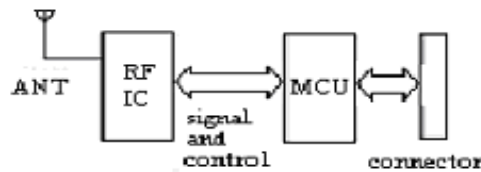
KYL-500L Principle map

1. Power supply

The factory setting is DC 3.6V. Using better ripple factor, KYL-500L transceivers

can also share power supply with other equipments. If available, a voltage-stabilizing chip with 3.6V voltage is more recommended as the power supplier than Switch power. But if only switch power supply available, the jam caused by switch pulse should be avoided. In addition, a reliable grounding must be used if there are other devices 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-500L transceivers provide 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	GND	Grounding of power supply		Ground	
2	Vcc	Power supply DC	5V		
3	RxD/TTL	Serial data input to the transceiver	TTL	TxD	
4	TxD/TTL	Transmitted data out of the transceiver	TTL	RxD	
5	SGND	Signal			
6	A (TXD)	A of RS-485(TxD of RS-232)		A(RxD)	
7	B (RXD)	B of RS-485(RxD of RS-232)		B(TxD)	
8	SLEEP	Sleep control (input)	TTL	Sleep signal	High level sleep
9	RESET	Reset signal(input)	TTL		Negative pulse reset

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

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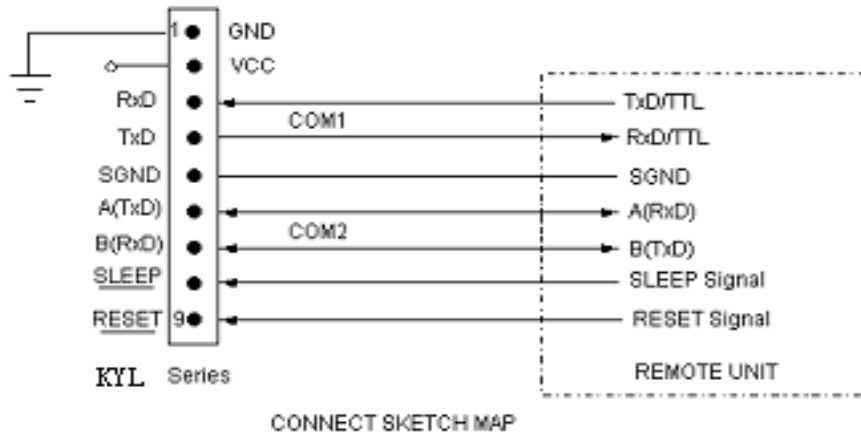
## 4. Setting of channel, interface, and data format

Before using KYL-500L, the user needs to make simple configuration according 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 user's needs.

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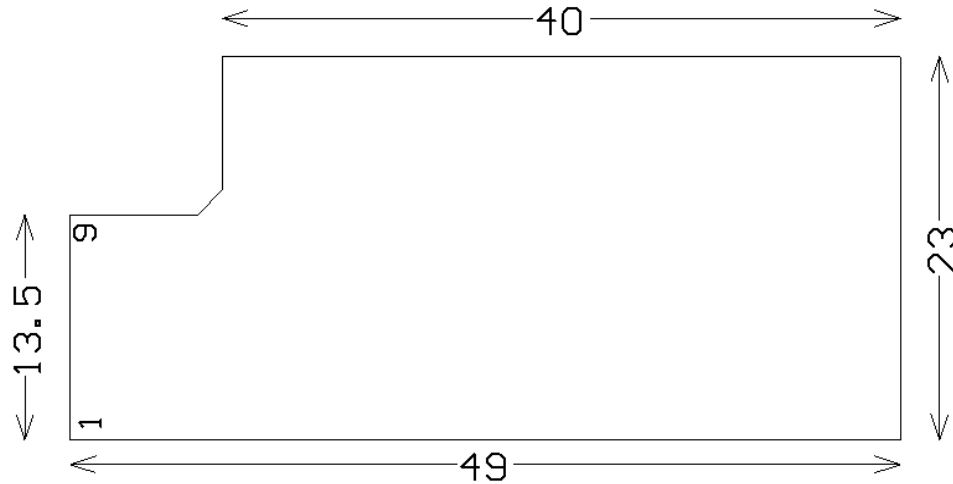
6. The Function-indicator light

    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-500L 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-500L transceivers support Sleep function. In sleep mode, the current consumption is less than 1uA.

    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-500L, 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
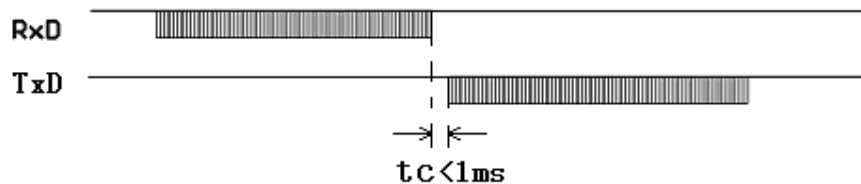
Sleep Timing Diagram:

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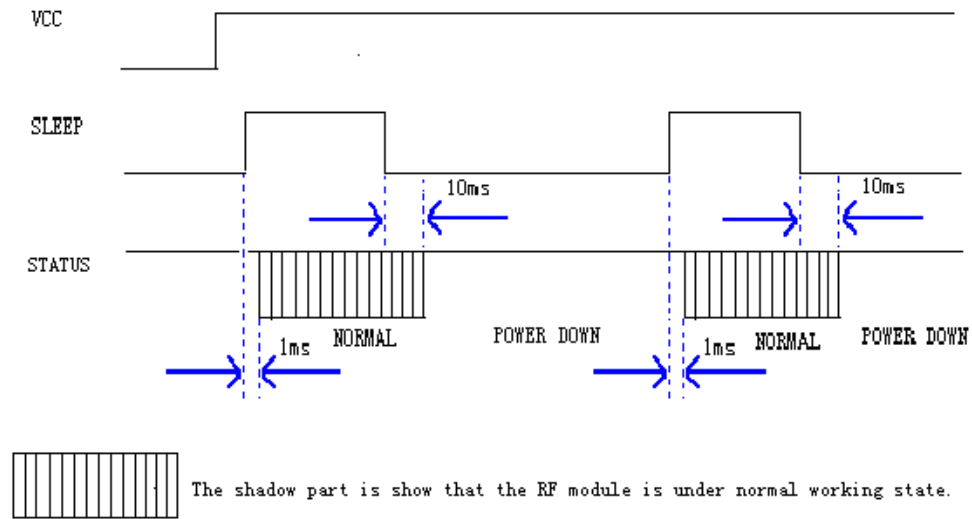
9. Attentions about data transmission

   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-500L transceiver using FEC (Forward Error Correction) or other correction algorithm, when RxD of KYL-500L 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:
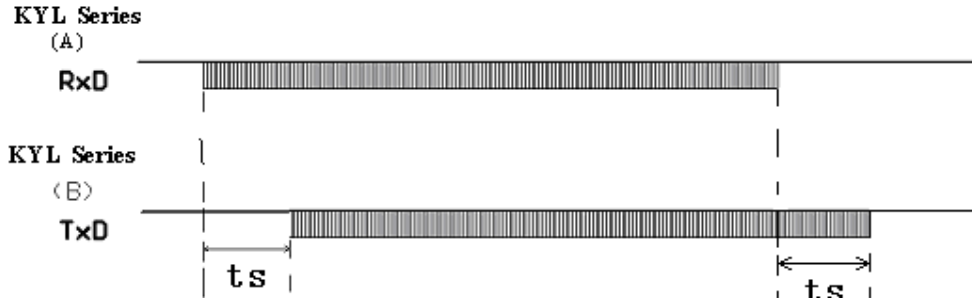
c. **Error dealing procedure:**

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-500L modules.

d. **Large-number data transmission**

In theory, when the interface data rate is faster than the RF data rate, KYL-500L 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/Products_list_en.asp?classid=163

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

V. Network Application of KYL-500L

The communication channel of KYL-500L 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-500L 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-500L

* Modulation mode: GFSK/FSK
* Working frequency: 400MHz~470MHz
* Power supply: DC 3.3-3.6V ±10%
* RF power: ≤400 mW;
* RF data rate: 1200/2400/4800/9600/19200bps (Set before delivery);
* Receive current: <25mA (TTL connect);
* Receive sensitivity: -123dBm (1200bps); -118dBm (9600bps);
* Transmitting current: <400mA;
* Sleep current: <1uA;
* Interface data format: 8E1/8N1/8O1;
* Working temperature: -40□~+80□ (industrial standard)
* RF Line-of-sight Range: 1.5km (BER=10-5@9600bps);
                          2km(BER=10-5@1200bps)
* Size: 49mm*23mm*10mm (without antenna port).

VII. Description of type

KYL-500L-96

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