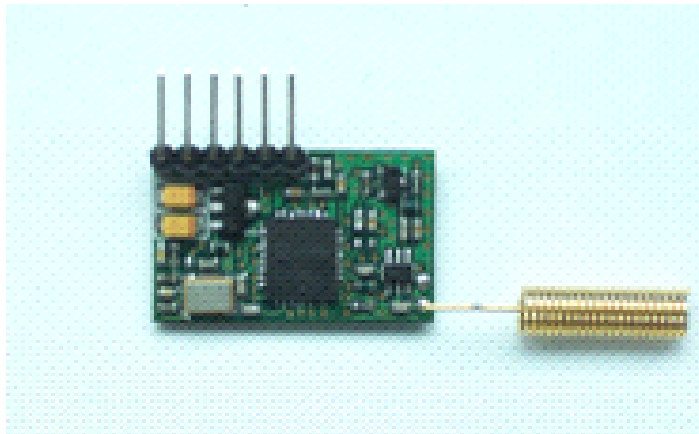# KYL-500S Smart Wireless Transceiver Data Module

Shenzhen KYL Communication Equipment Co., Ltd

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Before using the product please read the use manual carefully. Any
question in technical, you can contact us.

I: About KYL-500S

KYL-500S, the micro power wireless transceiver data module is used as the wireless data
transceiver in short-ranges, with the small size, low weight and low power consumption, it
has good stability and reliability. This Narrow-band wireless data trasceiver's channel
spacing is as low as 25 KHz.

II: Features:

PERFORMANCE	
Power Output:	10mW(Default), (10~100mW optional)
RF Line-of-sight Range:	1000m@1200bps; 600m@9600bps
RF Effective Rate:	1200/2400/4800/9600/19200bps
Space Channel:	1MHz(Default),(12.5/25KHz/other customization)
Bandwidth:	<25KHz
Receiver Sensitivity:	-123dBm@1200bps(1% BER)
NETWORKING	
Networking Topology:	Point-to-point, point-to-multipoint
COMPATIBILITY	
KYL-200 and KYL-300 series	
POWER	
Supply Voltage:	5V DC (default), 3.3-3.6V(optional)
Transmit Current:	<40mA
Receive Current:	<20mA
Sleep current:	<20uA
GENERAL	
Communication Mode:	Half-duplex
Frequency Band:	400-470MHz, 868MHz,915MHz
Channel:	8(default),16/32/64(optional)
Interface:	TTL/UART, Non-Standard RS232/RS485/USB

| PHYSICAL PROPERTIES	
Size:	28mm×15mm×10mm (excluding antenna base and data pin)
Weight:	20g
Antenna Base:	50Ω, SMA
Operating Temperature:	Industrial:-40℃～+85℃(TCXO)
Frequency Stability:	±2.5ppm Industrial
CERTIFICATIONS	
FCC/RoHS/CE	

III: Application of KYL-500S:

KYL-500S the micro power wireless transceiver data module is suitable for:
* AMR Automatic Meter Reading
* Wireless alarm and security systems
* Building automation, security, wireless monitoring and control
* 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 modem can be used for Electronic bus station and intelligent traffic;
* RF transmitter Wireless electronic display screen and queuing machine;
* Wireless telemetry Charging for parking, parking lot;
* Wireless modem Automobile inspection and four-wheel orientation;
* Data communication used for railway, oil field, dock and army.
* LED display in thruway and public places
* Point to multi-point wireless network, wireless on-the-spot bus and automatic data collection system;

IV: How to use the KYL-500S

KYL-500S provide RS-232, RS-485 and UART/TTL interface port for direct connection with a PC, RS485 devices, monolithic processors and other UART. The schematic diagram is in the following.
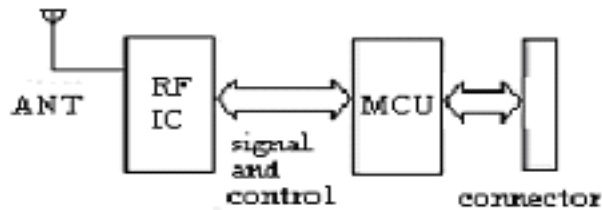
KYL-661U Principle map

1. Power supply

The factory default setting is +5V(3.3-3.6V will inform when placing the order).By using better ripple factor, KYL-500S transceivers can also share power supply with other equipment. If possible, a voltage-stabilizing chip with 5V voltage is more recommended as the only power supply than Switch power supply. But if only switch power supply available, the jam by switch pulse to the transceivers 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-500S 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	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
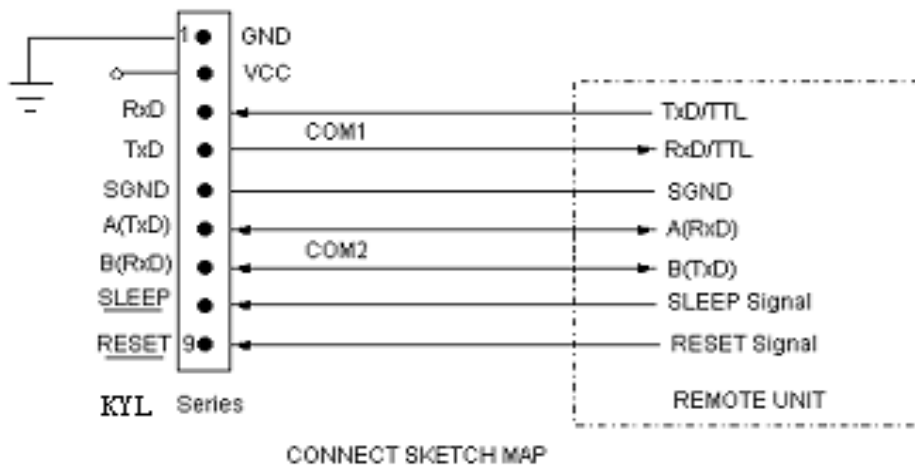
4. Setting of channel, interface, and data format

Before using KYL-500S, the user needs to make simple configuration based on its own needs to determine the channel,interface mode and data format. The user can change or view the module's interface baud rate, channel and address code. Parameter setting or reading as per the testing software KYLCOM.exe in the PC (in products box).

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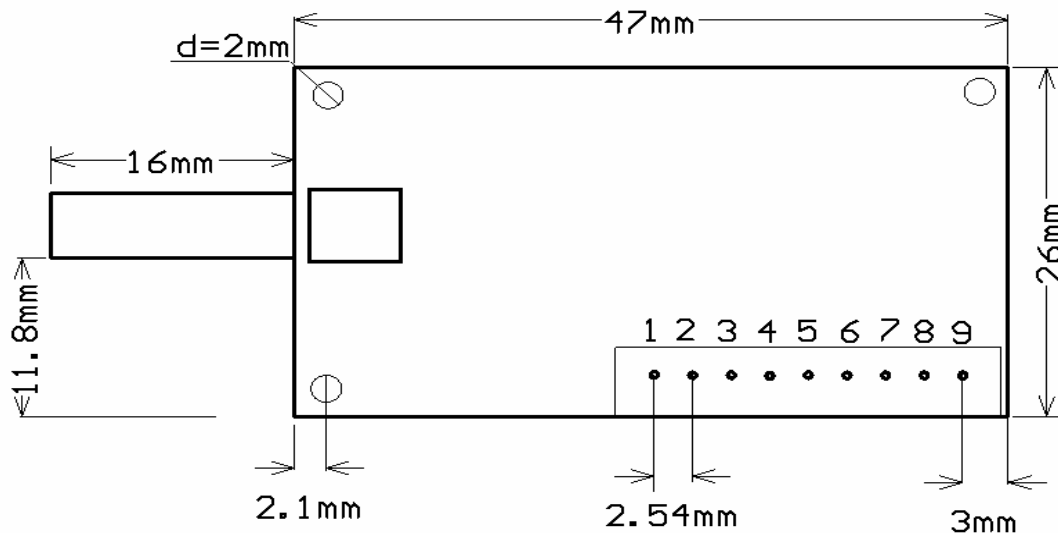
6. The Function-indicator light

    a. The LED indicator light turns red for 0.5S after switching on.
    b. The LED indicator light turns green continually while receiving data from air.
    c. The LED indicator light turns red continuously when transmitting data into air after receiving from COM.

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

7. Supported protocol and Transmit capability

KYL-500S standard transceivers offer transparent protocol to support various applications and protocols of users. 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:

Due to reducing more consumption, KYL-500S 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. In high power level, transceiver stays in working mode. In 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-500S, the SLP (SLEEP) pin should be definitely connected with 0 or ground.

b. Attentions about use of sleep function:

When the sleep function enabled, any supply glitches, such as switch dithering,fire striking or quick switching on and off, could cause the transceiver to be switched to the 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:

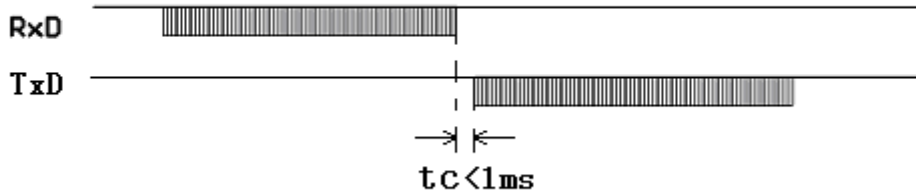The shadow part is show that the RF module is under normal working state.
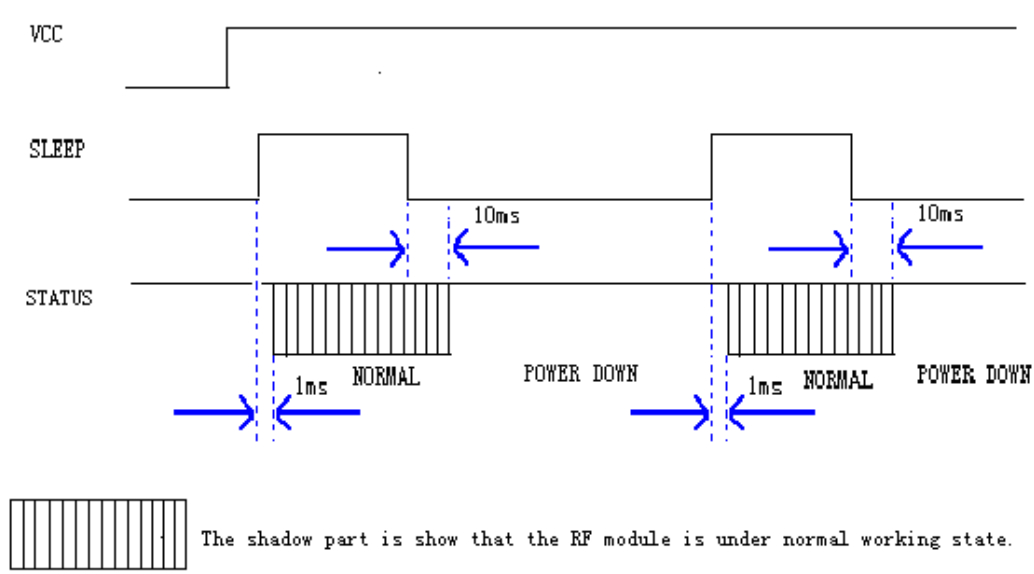
9. The attentions of data transmission

a. The delay time (tc) between transmitting and receiving is less than1ms.

Timing diagram:



KYL SERIES

RxD

TxD

tc<1ms

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

Due to a data processing will be made on user's data by KYL-500S transceiver using FEC (Forward Error Correction) or other correction algorithm, when RxD of a KYL-500S 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:

KYL Series (A)

RxD

KYL Series (B)

TxD

ts   ts
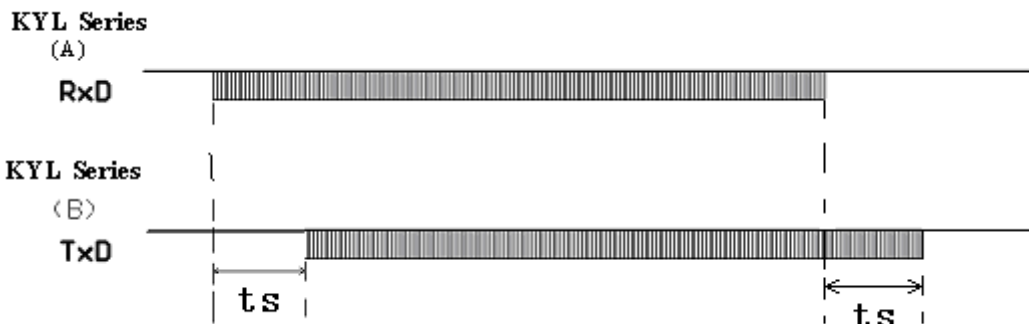
c. Error dealing procedure:

To enhance the reliability and stability of user's systems, a verify bit or a Cyclic Redundancy Check (CRC) mode is highly recommended to resent the wrong

information while using KYL-500S modules.

d. Large-number data transmission

In theory, when the interface data rate is faster than the RF data rate, KYL-500S 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 user to resent the wrong information using Automatic Error Request Equipment (ARQ).

The analyzing as below:

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 for meeting 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.

More kinds of antenna, please browse our website:

http://www.rf-data.com/Products_list_en.asp?classid=163

If the user has special demands on antennas, we can design and produce for them specially.