

HAC-LN96 Low Power Radio Data Module



I. Features of HAC-LN96 Low Power Radio Data Module

1. Low power transmission with the transmission power of 500mW
2. ISM frequency band, requiring no application of frequency point.

Carrier frequency of 915MHz, also capable of providing 868MHz carrier frequency.

3. High anti-interference and low BER(Bit error Rate)

Based on the GFSK modulation mode, the high-efficiency forward error correction channel encoding technology is used to enhance data's resistance to both burst interference and random interference and the actual bit error rate of $10^{-5} \sim 10^{-6}$ can be achieved when channel bit error rate is 10^{-2} .

4. Long transmission distance

Within the range of visibility, the reliable transmission distance is $>1500\text{m}$ when the height is greater than 2m (BER= 10^{-3} @9600bps).

Within the range of visibility, the reliable transmission distance is $>2000\text{m}$ when the height is greater than 5m (BER= 10^{-3} @9600bps).

5. Transparent data transmission

Transparent data interface is offered to suit any standard or nonstandard user protocol. Any false data generated in the air can be filtrated automatically (What has been received is exactly what has been transmitted).

6. Multi-channel

The standard HAC-LN96 configuration provides 8 channels. If the user needs, it can be extended to 16/32 channels, meeting the multiple communication combination mode of the user.



7. Dual serial port, 3 interface modes

HAC-LN96 provides 2 serial ports and 3 interfaces, with COM1 as the TTL level UART interface and COM2 as user defined standard RS-232/RS-485 interface (user only needs to plug/pull 1 bit short circuiter and energize it to make the definition).

8. Large data buffer zone

Interface baud rate is 9600bps with format of 8N1/8E1 and user self-definition, allowing the transmission of long data frames at one time for more flexible programming by users. (If the user needs, it can also transmit the data in unlimited length at one time).

9. Intelligent data control and the user doesn't need to prepare excessive programs

Even for semi duplex communication, the user doesn't need to prepare excessive programs, only receiving/transmitting the data from the interface. HAC-LN96 will automatically complete the other operations, such as transmission/receiving conversion in the air, control, etc.

10. Low power consumption and sleeping function

For receiving, current is <50mA, transmitting current is <450mA.

11. High reliability, small and light

Single chip radio-frequency integrated circuit and single chip MCU are used for lessened peripheral circuits, high reliability, and low failure rate.

II. Application of HAC-LN96 Series low power Radio data module

HAC-LN96 series low power radio data module is suitable for:

Wireless meter reading

Industrial remote control and remote test

Automatic data collecting system

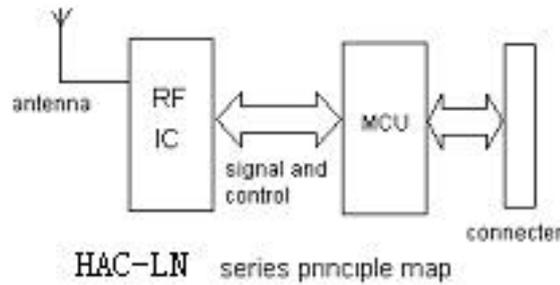
Building automation, safety and security, powerhouse equipment wireless monitor, entrance control system

POS system, wireless keyboard, mouse

III. How to use HAC-LN96 series low power radio data module

HAC-LN96 series low power radio data module provides three interface modes including standard RS-232, RS-485 and UART/TTL levels allowing direct connection with computer, user's RS-485 device, monolithic processor and other UART components for application.

The schematic circuit of HAC-LN96 is shown below:



1. Power supply

HAC-LN96 uses DC power supply with voltage of +4.75~5.5V. The working voltage can be reduced down to 3V based on the user's needs. It can also share power supply with other equipment, however, the high quality power supply with desirable ripple factor should be selected. If possible, 7805 chip or other voltage-stabilizing chip should be used for separate power supply. In addition, the reliable grounding must be used if there is other device in the system equipment. In case of failure to connect with the earth, it can form its own grounding but it must be absolutely separated from the municipal electric supply.

Under working condition, transmission current is 450mA, receiving current is 50mA .

2. Definition of HAC-LN96 connecting terminal

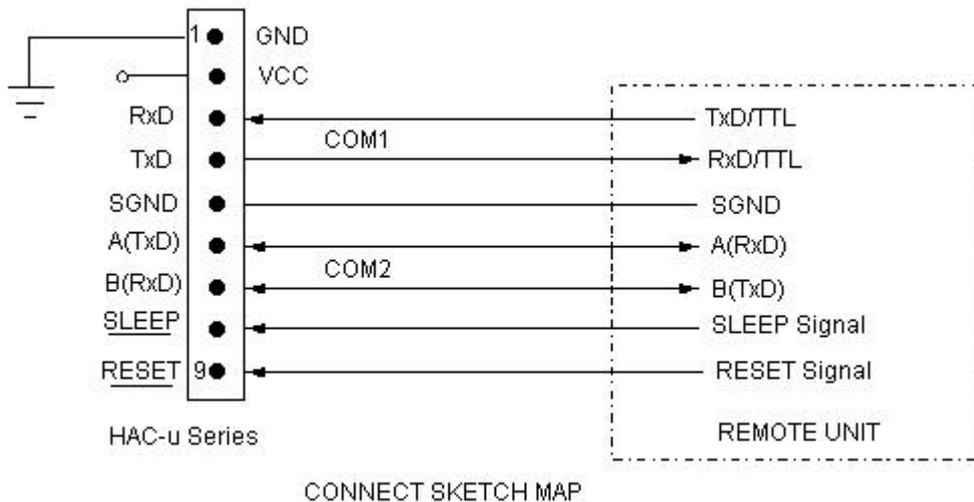
HAC-LN96 can supply one 9-pin connector (JP1), and its definitions as well as connection method for terminals are shown in Table 1.

Table 1: Definition of connecting pins and connection method

Pin No	Pin Name	Description	Level	Connected to the terminal	Remarks
1	GND	Grounding of power supply		Grounding of power supply	
2	Vcc	Power supply DC	+4.75~5.5V		
3	RxD/TTL	Serial data receiving end	TTL	TxD	COM1
4	TxD/TTL	Serial data transmitting end	TTL	Rxd	

5	SGND	Grounding of the signal			
6	A(TxD)	A of RS-485 or TxD of RS-232		A(RxD)	COM2 See Page 3,4
7	B(RxD)	B of RS-485 or RxD of RS-232		B(TxD)	
8	<u>SLEEP</u>	Sleep control (input)	TTL	Sleep signal	Low efficiency $t > 15ms$
9	<u>RESET</u>	Reset (input)	TTL	Reset signal	Negative impulse reset

3. Sketch map of connection between HAC-LN96 and terminal equipment (see below)



4. Setting of channel, interface and data format:

Before using HAC-LN96, the user needs to make simple configuration based on its own needs to determine the channel, interface mode and data format.

There is one group of 5-bit short-circuit jumper wire (JP2) on the upper right corner of HAC-LN96, defined as ABCDE respectively. Assuming the open circuit of jumper wire (without short circuiter) is mode 1 and short circuit of jumper wire (with short circuiter) is mode 0, then the configuration is as follows:

a. Channel configuration:

ABC jumper wires of JP2 provide 8 options, and the user can choose to use 0-7 channels through ABC jumper wires. Within one small communication network, as long as ABC jumper



wire mode is same, there can be mutual communication.

Table 2: Corresponding frequency points of 0~7 channels

Channel No.	Frequency	Channel No.	Frequency
CBA=000(0)	912.2000 MHz	CBA=100(4)	916.6940 MHz
CBA=001(1)	913.4288 MHz	CBA=101(5)	916.2332 MHz
CBA=010(2)	913.7360 MHz	CBA=110(6)	915.1580 MHz
CBA=011(3)	912.5072 MHz	CBA=111(7)	915.9260MHz

Note: The frequency points corresponding to each channel can be adjusted based on the user's needs.

A=1,B=1,C=1 (without short circuiter)

A=0,B=0,C=0 (with short circuiter)

b. Selection of interface mode:

HAC-LN96 provides 2 serial ports. COM1 (Pin3 and Pin4 of JP1) is fixed as UART serial port of TTL level; COM2 (Pin6 and Pin7 of JP1) can choose interface mode through D of JP2:

D=1 (without short circuiter) COM2 = RS-485

D=0 (with short circuiter) COM2 = RS-232

The following attention should be paid for the two serial ports provided by HAC-LN96:

- i. For the data received from the air, when HAC-LN96 transmits it to the terminal equipment through serial port, COM1 and COM2 output simultaneously, i.e. if the user connects one device at COM1 and COM2 respectively, they can receive the data simultaneously.
- ii. For the data transmitted from the terminal equipment and ready to transmit to the air, HAC-LN96 can only receive the data sent from either COM1 or COM2 but not simultaneously.

Suggestion: The user only connects to use one serial port of COM1 or COM2.

c. Parity mode selection:

HAC-LN96 can support no-parity or even parity modes of the serial communication UART, i.e. 8N1/8E1. It can choose parity mode through E of JP2:

E=1 (without short circuiter) Parity: 8E1 (even parity)



transmitting.

V. Technical specification of HAC-LN96

Modulation mode: GFSK

Working frequency: 915MHz (Customization for 868MHz carrier frequency)

Transmission power: 27dBm (Customization for 20dBm ~ 30dBm)

Receiving sensitivity -112dBm

Interface data format: 8E1/8N1

Working temperature: -10 ~60 (customization for -30 ~70)

Dimension:53 × 38 × 10mm

Transmitting current: 450 mA

Receiving current: 50mA

Working humidity: 10%~90% relative humidity without condensation

Interface velocity: 9600bps

Power supply: 4.7 ~ 5.5VDC

(Customization 30dBm need power supply 7.2V or 9V DC, the customer cannot increase the voltage directly to 7.2V or 9V in order to get the power of 30dBm)

VI. Description of type

For product type, HAC- indicates the name of manufacturer Shenzhen HAC Technology Co., Ltd., LN96 indicates low power, i.e. transmission power is 27dBm, and 96 indicates that interface baud rate is 9600bps. 38400bps type is HAC-LN384

Note: The user can't set the communication rate of HAC-LN96 itself. The user chooses when placing the order and it is already set when delivered from the factory.