1. Overview

SAAT-F526 are active RFID devices independently R&D by SZAAT, operating in the 2.45 GHz band, which is widely used with characteristics of high-recognition, long-range, powerful, high- reliability & scalability, etc.

SAAT-F526 readers support RS-232, Ethernet interfaces as well as expansion GPRS and other wireless digital modules, with the function of 2- channel relays output and 2- channel trigger input.

Compliant with private protocol, SAAT-F526 can identify SAAT-T50X series tags developed by SZAAT.

2. Technical data

RF Parameters	
Operating frequency	2.400-2.4835GHz
FH	fixed frequency set by software
Modulation	GFSK
Communication rate	1Mbps
Output power	8dBm
Sensitivity	-95dBm
Communication interfaces	RS-232, 10/100M Adaptive Ethernet interfaces
I/O port	2- channel relays output , 2- channel trigger input
Firmware upgrade	Support serial port
Application software platform	Provide development kit of API(C++ and C#)
Tag operation	
Tag protocol support	Private Protocol
Reading range	0-180m (depend on the tag power output)
Max simultaneous tag detection	200
Identifying Accuracy	>99.99%
Mechanical & Electrical performance	
Dimensions	Φ330mm×126mm (excluding stand)
Weight	1.6kg
Power supply	AC 100V~240V, 50/60Hz
Power consumption	300mW
Power isolation	1KV (Except Ethernet data, I/O port)
Operating temperature	-40°C~+70°C
Storage temperature	-40°C~+80°C
Humidity	20% ~ 95% (non-condensing)

Waterproofing	IP67
Shock resistance	10~500Hz，100mm/15g，Triaxial
Reliability	MTBF$\geq$5$\times\times10^5$ h

3. Structure features and operation theory

This chapter mainly illustrated the structure, panel and ports instruction of SAAT-F526 readers.

3.1 Overall structure and operation theory

3.1.1 Composition

SAAT-F526 readers are made of the main control board, power board, instruction board and the antenna panels.

3.1.2 Operation Theory

A complete application environment is composed of SAAT-F526 readers, SAAT-T50X serial active tags and PC, where under the control of PC, the reader wirelessly communicates with the tag, receives the ID number from tag and sends to PC through the interface, an identification of active tag finishes.

3.2 Panel, LED, and External Port

This part clarifies the functional definition of front panel, back panel, external port and LED lights of the reader.

3.2.1 Front-Panel Instruction

Composed of power port and various communication interfaces, Front panel is used to exchange data with upper PC or devices.
As 3-1 diagram:
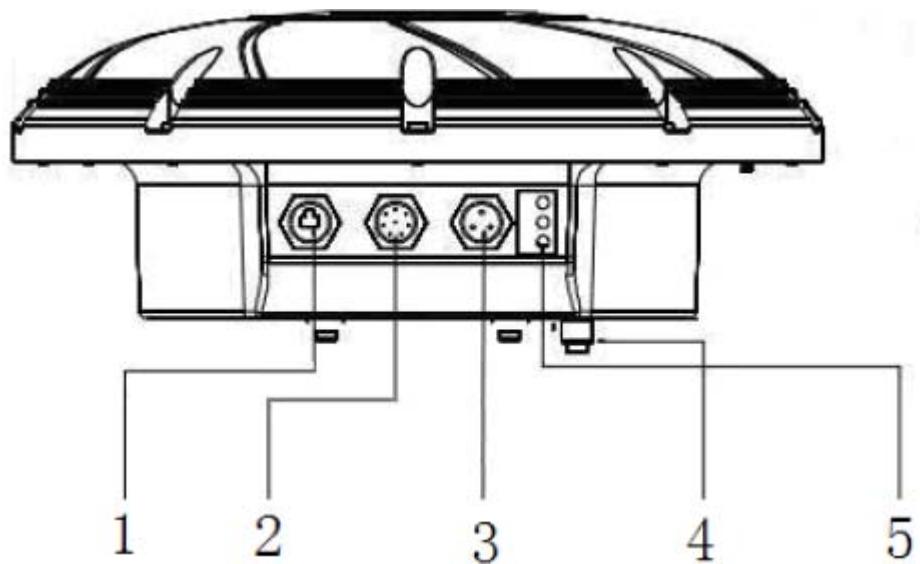
Pictorial diagram of the front panel of SAAT-F526 reader

3.2.2 Back Panel Instruction

Composed of device installation holes, nameplate, lightning-protection earth terminal, buzzer-sound output holes.
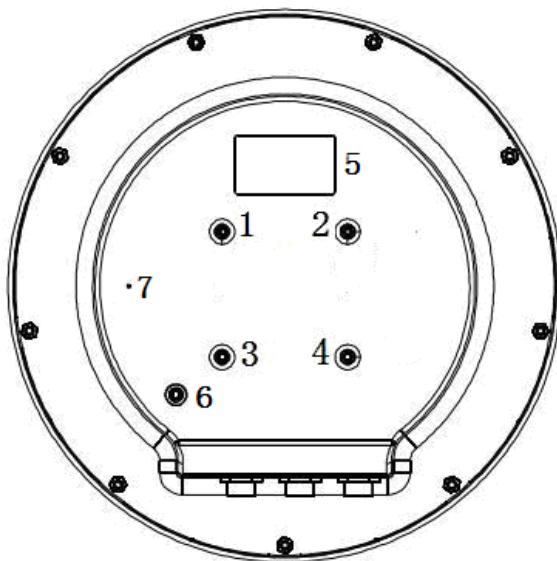

Figure3-3 Back panel of SAAT-F526 Readers

1: Device installation holes: "1, 2, 3, 4"

2: Nameplate and product model information: "5"

3: Lightning-protection earth terminal: "6"

4: Buzzer- sound output holes: "7"

3.3 Auxiliary Devices Instruction

Lowest Requirements of PC System

1.   CPU: PIII 600MHz, Memory 128M,HDD 10G

2.   9-Pin RS-232 Interface

3.   Windows XP/2003 system

3.3.2: Interface Software of Reader

1. API dynamic Link Library of SAAT-F526 Reader

Application integration can be developed fast by users' calling dynamic link library.

2. Management Software of SAAT-F526 Reader

Configure and manage parameters of Reader.

3.2.2 Communication Cables

Two ways of connection between SAAT-F526 Reader and PC: Ethernet and RS-232

Network cable and serial cable required as follows:

1. Network cable: standard 5 lines, proposed length less than 10m. Reader supports identification of network cable, crosswire and straight-through cable.

2. Serial cable: Shorter than 5m crosswire, configured cross serial cable, one DB9 connector, the other air connector.

4. Installation and Configuration

Please read the chapter carefully before SAAT-F526 installation.

4.1 Installation Attention Points

To ensure your personal and property safety, the following preparatory work must be done before the installation:

1. Check power plug performance, whether the Reader operating power is in line with the current input power.

2. Ensure the power grounding well.

3. Measure and estimate the distance between the device and system (as Reader & PC, Reader & Power plug)

4. Ensure installation location and direction covers the reading area.

5. Pay attention to the limited length and types of serial/network cable (straight-through cable, crosswire). Note the actual length and relay device delay the data transmission

6. Check all devices before installation

7. Investigate carefully the local environment, whether there is special limitation to wireless devices or other devices operating in 2.4~2.5GHz, and make an assessment about the

interference
8. Note the installation ways& minimum distance and avoid mutual interference when install multi-reader and intensive readers.

4.2 Installation Conditions

Before install SAAT-F526 reader, please check the integrality, and contact the local supplier timely if there is any damage.

4.2.1 Choose Installation Location

Choosing the location is depends on the installation ways, the proper location varies with different installation ways. Usually reader should install in the place of safe and easy install.

4.2.2 Check the Set-Up Working Situation

If connecting by Ethernet, set up the network, check and confirm before installation (for IP can't conflict with other devices in the same segment).

4.3 Installation steps

4.3.1 SAAT-F526 Fixed Reader

There are the following installation ways according to different locations.
1. Wall-hanging
SAAT-F526 reader can be fixed on the vertical surface by accessories (mounting screws, nuts) equipped. First fixed the mounting plate with screws on the SAAT-F526 reader, then penetrate the surface with expansion bolt or fixed by nut with bolts. Shown in 4-1:
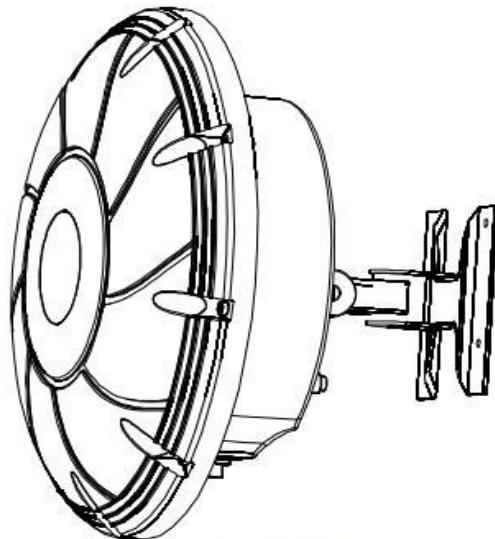
Figure 4-1 Wall-Hanging installation

2. Holding pole

SAAT-F526 reader can be fixed on the holding pole by accessories (mounting screws, nuts) equipped. First fixed the mounting plate with screws on the SAAT-F526 reader, and then tighten with a buckle screw. There are two sizes of installation poles, a type (Maximum diameter 60mm) and B type (maximum diameter 120mm). So please confirm the accessories sizes before choose the poles type.

Shown in 4-3:
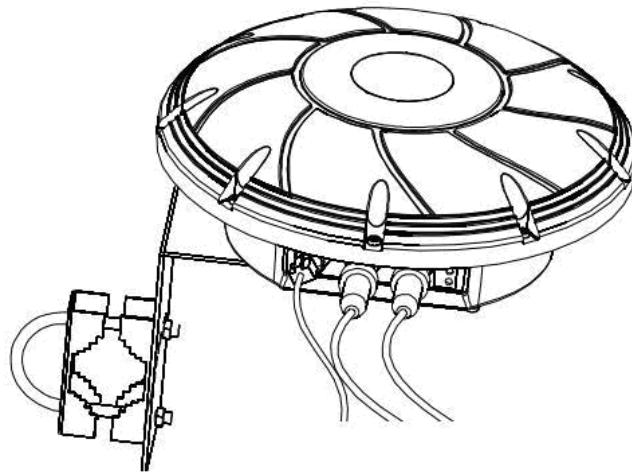
Figure 4-2 A Type Holding Pole Installation (Maximum diameter 60mm)
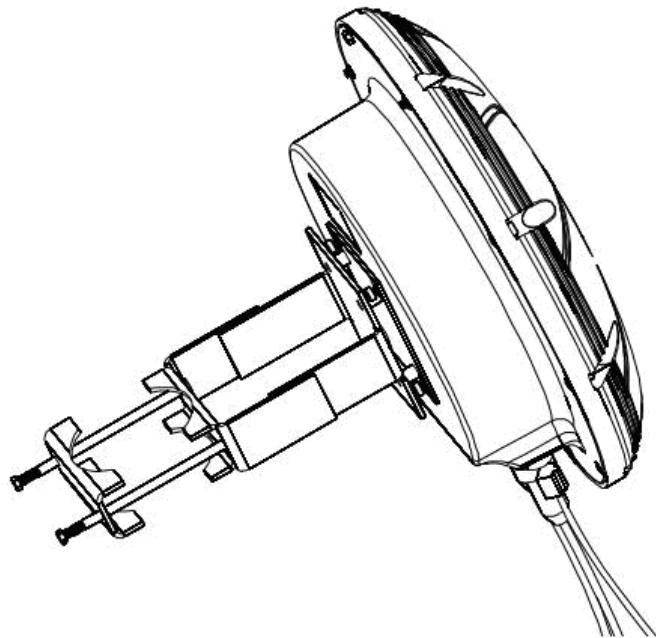
Figure 4-3 B Type Holding Pole Installation (Maximum diameter 120mm)

4.3.2 Connecting All Kinds of Devices

Connect SAAT-F526 reader to PC with RS-232 serial and Ethernet two interfaces.

RS-232 serial interface used in proximity(less than 5m), direct-attached PC through special cable, as figure 4-4 shows
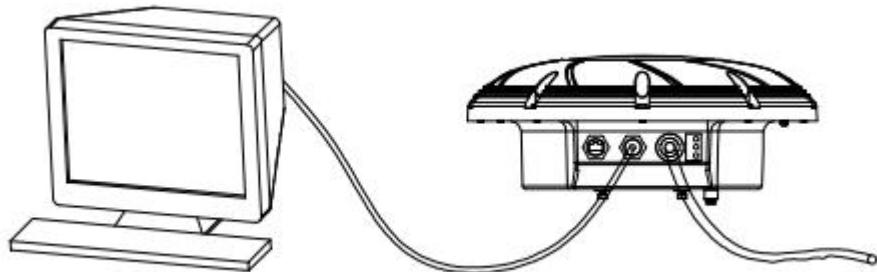
Figure 4-4 Serial Ports Connecting to PC

There is a special he 1.5m connector for RS-232, connecting an RS-232 link to SAAT-F526 reader as shown in figure 4.

SAAT-F526   PC
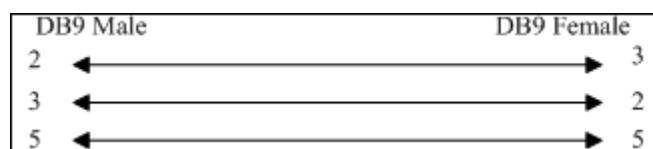
Figure 4 connecting RS-232 Special Cable to SAAT-F526 Reader

Ethernet interface is used in long-range and high-speed connection, which can connect to switch/hub, and direct-attached PC through network cable. As 4-6 figure shows.
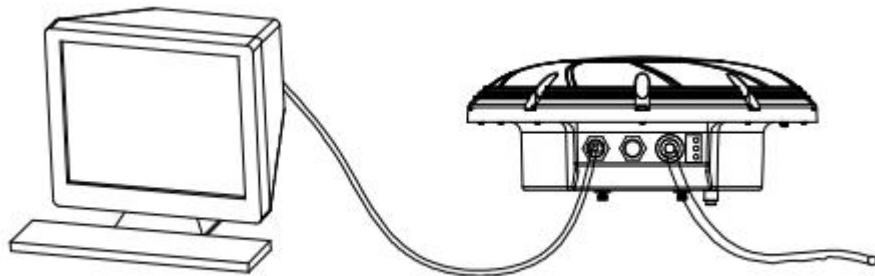
Connecting PC to SAAT-F526 reader Ethernet interface

4.3.3 External power

Please turn on the external power according to the following steps

1. Make sure the power voltage and frequency meet the requirements: different types of reader with different input voltage, please refer to 3.2.1 Front Panel instruction
2. Insert the power cable into the input port of SAAT-F526 reader, and then put into the AC connector socket.
3. Turn on the power, after SAAT-F526 reader call and issued three times, all lights on and reader into the initial state, when only power light on, the system completes the initialization and standby.

When SAAT-F526 reader in default, the system in standby after booming. When reader receives the command "Start Receiving" from PC, it enters the working state from the initialization state.

4.3.4 Adjust the direction of the reader

According to the site application; define reader's reading/writing range. After choosing installation location, adjust (turn) angle to the best reading state according to the tag-reading test, and fixed the reader devices.

4.4 Configuring TCP / IP communication mode

This chapter will introduce how SAAT-F526 reader connects to Ethernet and configure. Applied to TCP / IP protocol, network setting of SAAT-F526 reader is configured through management software.

4.4.1 TCP / IP communication mode setting

Run the SystemManager procedures under the installation directory, the management software interface shown in 4-7
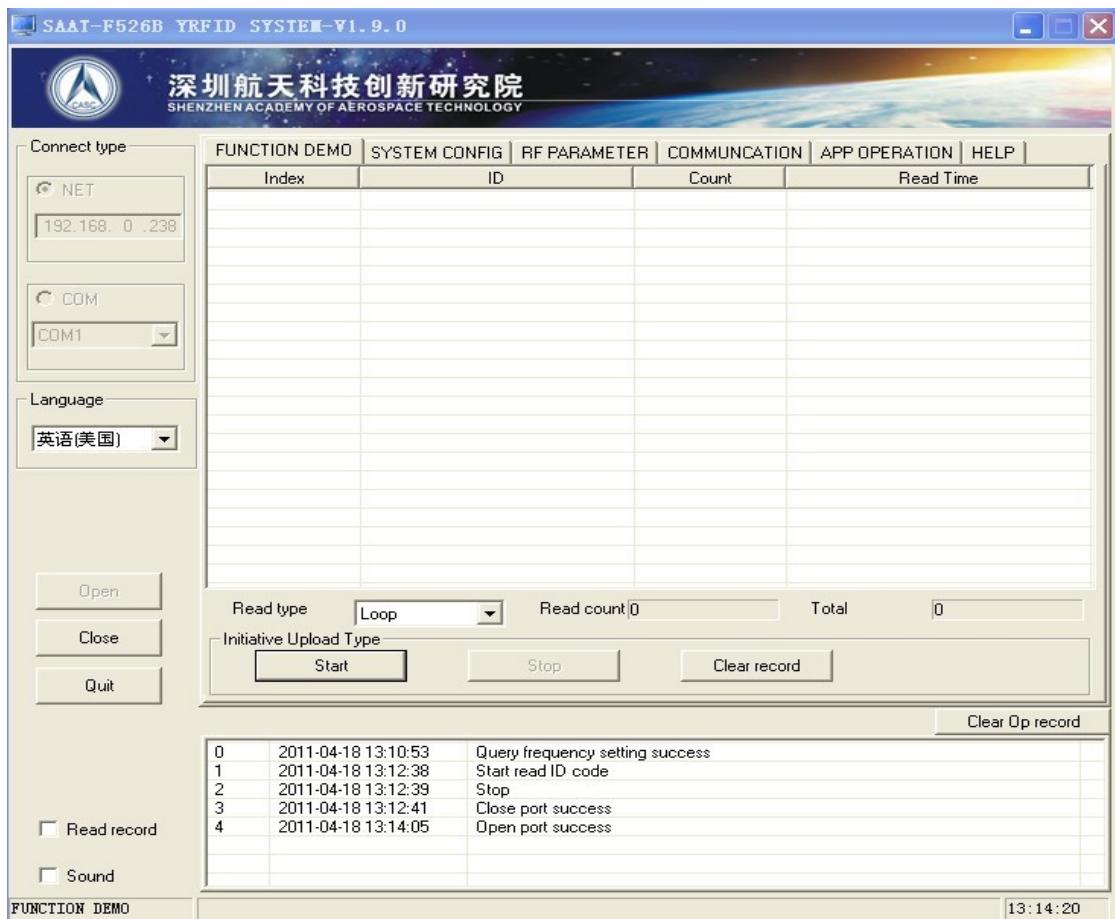
Two communication modes in the system:

1: Network port: TCP

2: Serial interface: COM

When setting the communication mode, choose the following "Communication Mode" shown in figure 4-8
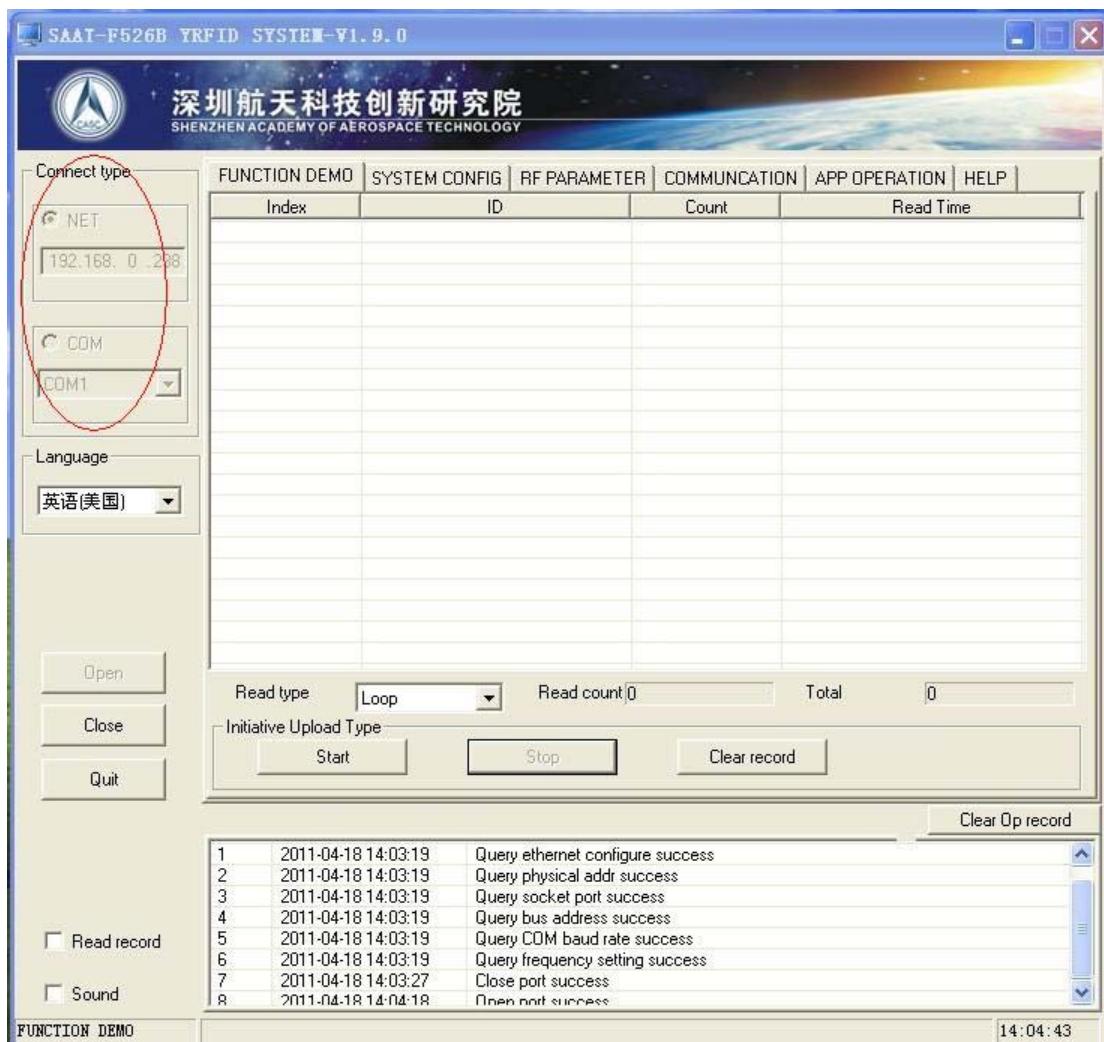
Figure 4-8 Choosing Communication Mode

4.4.2 IP Address Inquiry

Click "communication parameters" and send the inquiry command to the reader. The reader will return the IP information which displayed on the host computer with format of 2-bit 10 hexadecimal numbers: the first 4 bits are IP address, middle 4 bits are subnet mask and the last 4 bits are gateway. Otherwise, failure information prompts.

4.4.3 IP Address Setting

Inquire IP address before set, check whether reader configured IP or not.
1. If IP address set by reader, choose "TCP" communication mode, default IP: 192.168.0.238. Shown in 4-11
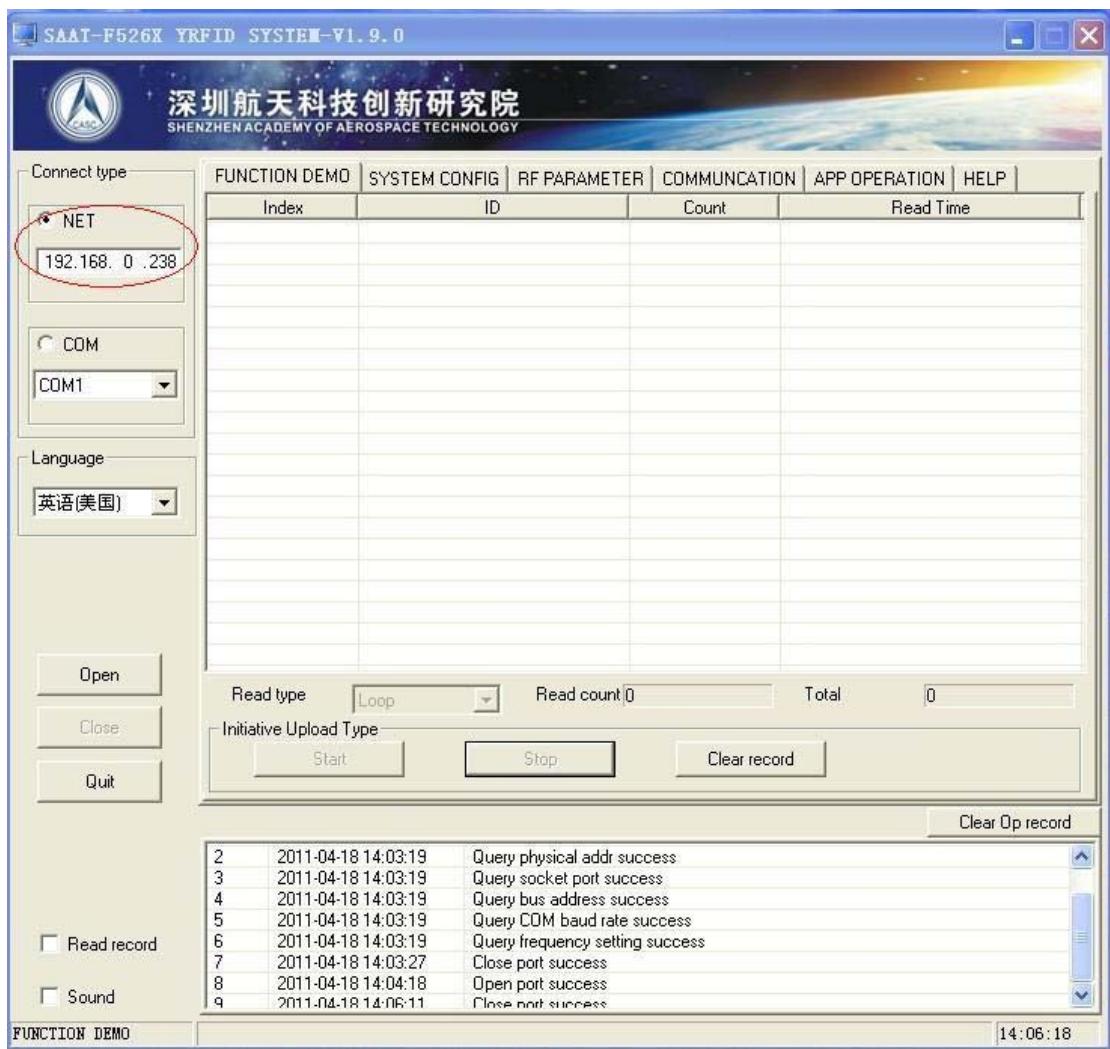
2. If IP address not set, set as the following ways:

Connect Communication Interface

Connect host serial port to reader through communication cable, choose "Communication Mode" as serial mode "COM", or choose COM1-COM4 port, shown in figure 4-12:
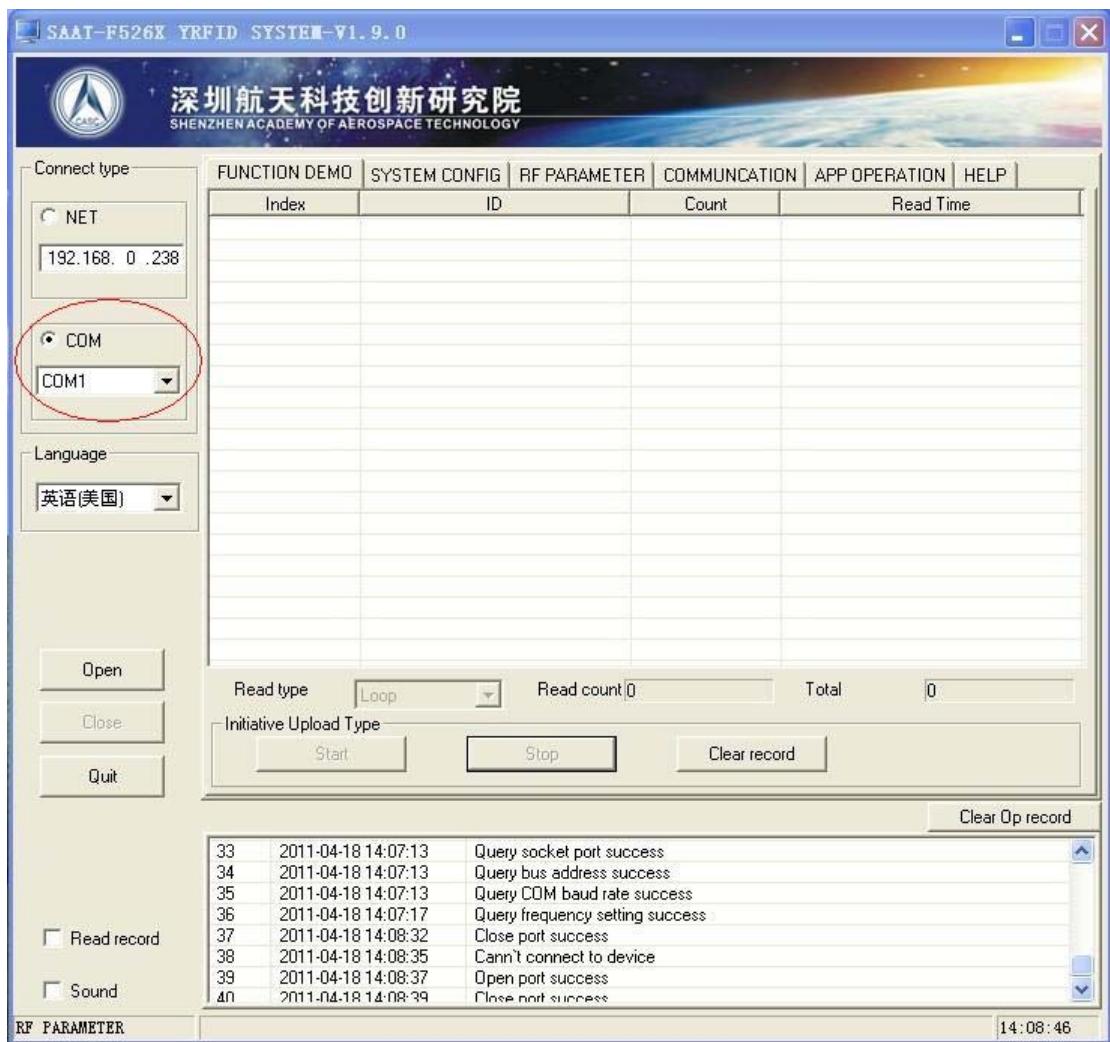
Configure IP Address

Click "Communication Parameters" to fill in IP address, as 4-13 figure shows.
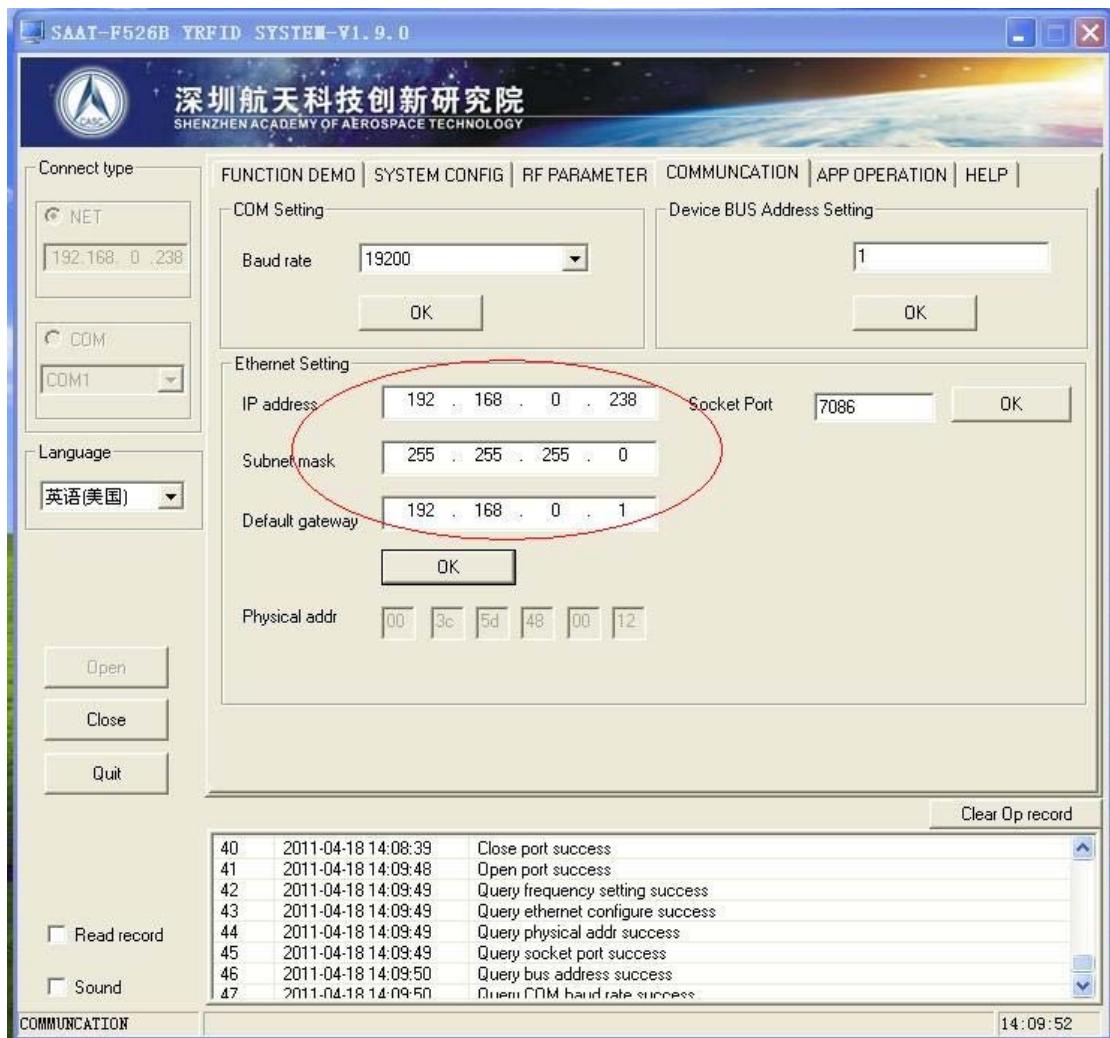
Click "Setting" button, IP address of the reader keeps in the same network segment with the host.

Close connection

Close the system connection and connect the reader with the new IP.

4.5 Reader Test

SAAT-F526 Reader Test includes: tag reading/writing performance and application function test which can be completed by "SAAT-F526 Reade Management Software".

4.6 Debug FAQs

This chapter will explain clearly about Debug FAQs as incorrect and inaccurate installation and solutions provided.

Main FAQs as follows

1. Reader no response

Power indicator is off-----Check the power source.

Power indicator is on-----Check the related cable connection and corresponding items based on the related indicator state.

Ethernet connecting mode--- Check if the connected IP is correct and there is conflict between IP address or not.

Serial port connecting mode--- Check if the management software ports, communication speed and other parameters set correctly or not.

2. Unable to Identify Tags

Check if the reader type of management software configured correctly.

Check if reader is compatible with the tag.

Check if attenuation settings, tag placement in the effective reading range or not.

Check if there is electromagnetic interference between readers and other devices.

Check the tag damaged or not.

3. Reading range doesn't meet requirements

Check if the attenuation configured too large.

Check the direction of reader installation

Check if there is interfering or sources surrounded.

4.7 Inspection and Acceptance

Standard of Inspection and Acceptance from two ways: Structure and performance

4.7.1 Inspection and Acceptance of Structure

Check if installation is in line with the standard, and the connection between devices is working.

1. Whether the reader fixed firmly without loose.
2. Whether Various cables connected and fixed firmly
3. Whether Screws are tightened

4.7.2 Inspection and Acceptance of performance

Check whether reader works normally from the following two ways:

1. Whether reader is in normal working state.
2. Whether reading range meets requirements.

5. Instructions for Management Software

5.1 Overview

Management software mainly controls SAAT-F526 system, configures and inquiries parameters, choose communication modes, reads and displays RF tag.

5.1.1 Set-up Mode of Management Software

First of all, copy "Reader Management Software" of CD-ROM to any hardisk directory of the computer, then run SystemManager.exe program directly under the directory

5.1.2 Main operation instructions for Management Software

1. Open Port

Plug the reader power after it connects the communication cables, choose corresponding TCP/COM in the "communication modes" list and then click "Open Port" button, the opening program will turn to the reader interface. If you open the pot successfully, the reader will be uttered a short beeps, if unsuccessfully then the management software will prompt the failure information.

2. Close Port

  Click the "Close Port" button in the main interface to close the connection with reader.

3. Exit

Click the "exit" button in the main interface, pop-up message box, and ask the user to close the management software or not. If so, close the management software.

4. Tag Reading

Click "Start to Receive" button in the "Function Demo" interface. Reader begins to identify tags within the effective reading range and sends to computer. Computer displays serial number, tag number, reading frequency and time.

Management software has functions of identification and statistics. "Count" column shows number (non-repeated) of tag identification, "Total" colum shows total number (including repeated) in the RF area. As shown in Figure 5-1:
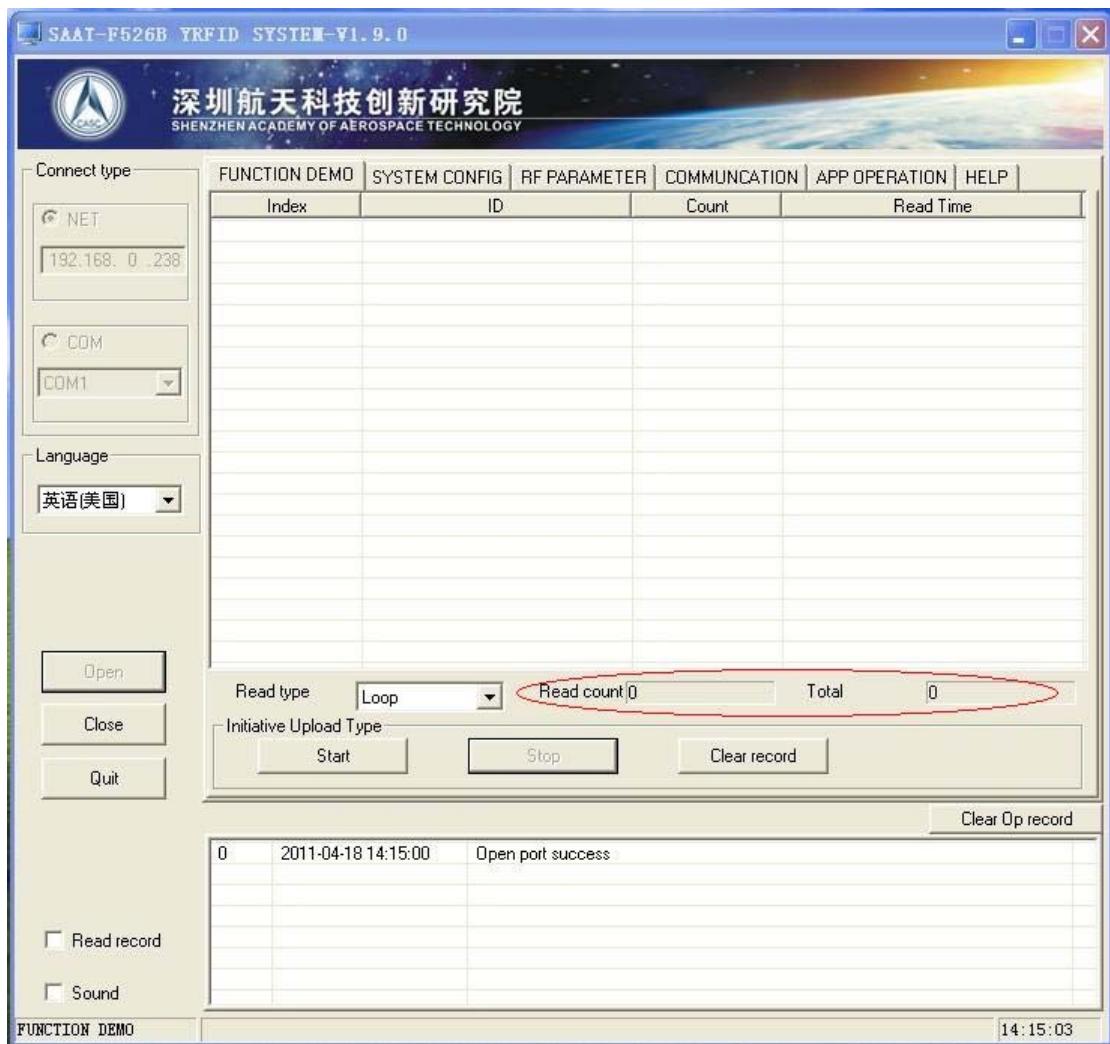
Figure 5-1 Tag Counting Diagram

Click "Delete Tag Reading Record" button in the interface "Functions Demo". All displayed serial number, tag number, reading frequency and time, counting and total number.

5. Stop Reading Tags

Click "Stop Receiving" in the interface "Functions Demo", reader stops reading.

6. System Configuration

Click "System Configuration" column, and reader relative information displays as Figure 5-2:
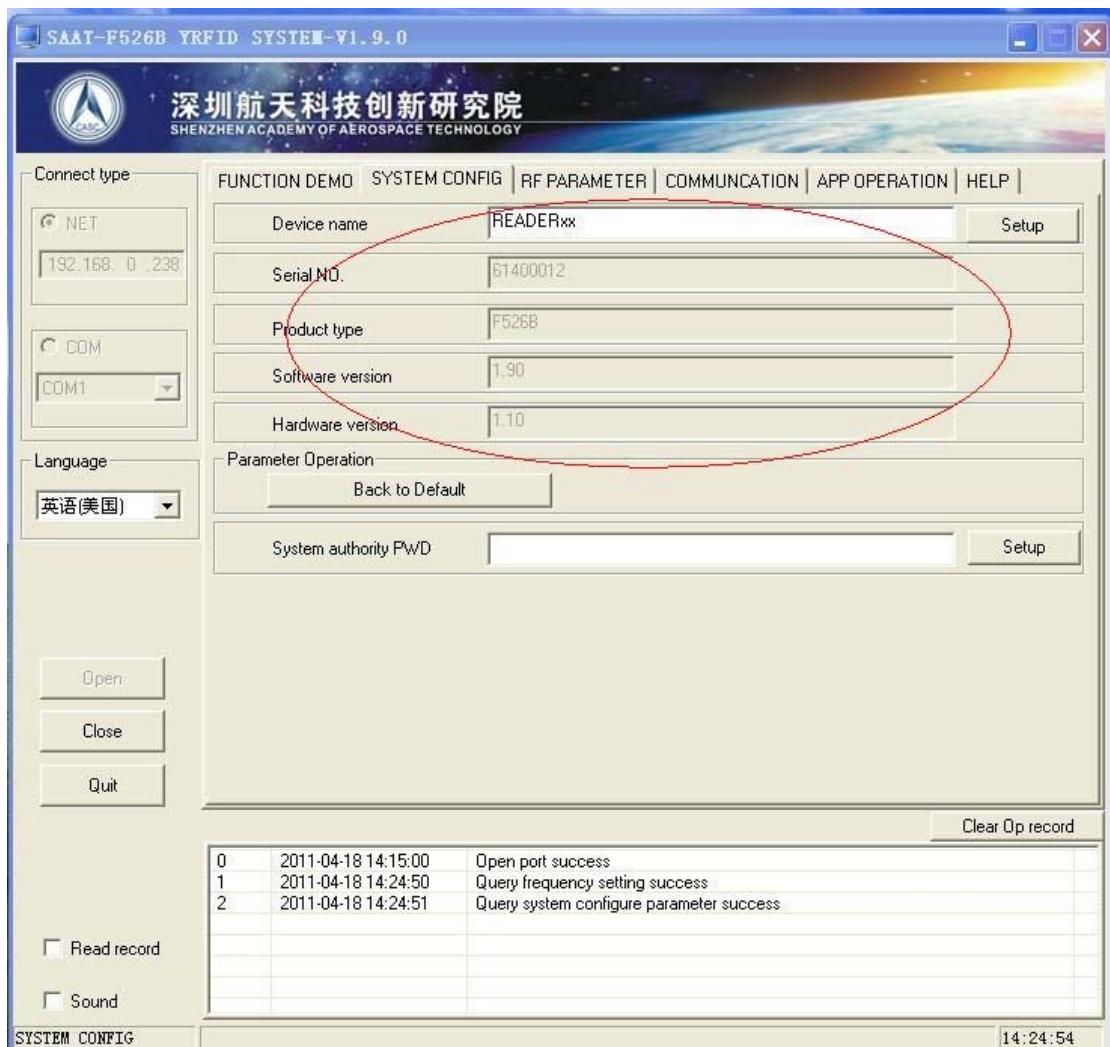
Figure 5-2 System Configuration Diagram

7. Back to Default

Click "System Configuration" tab button, the display screen shown in Figure 5-3
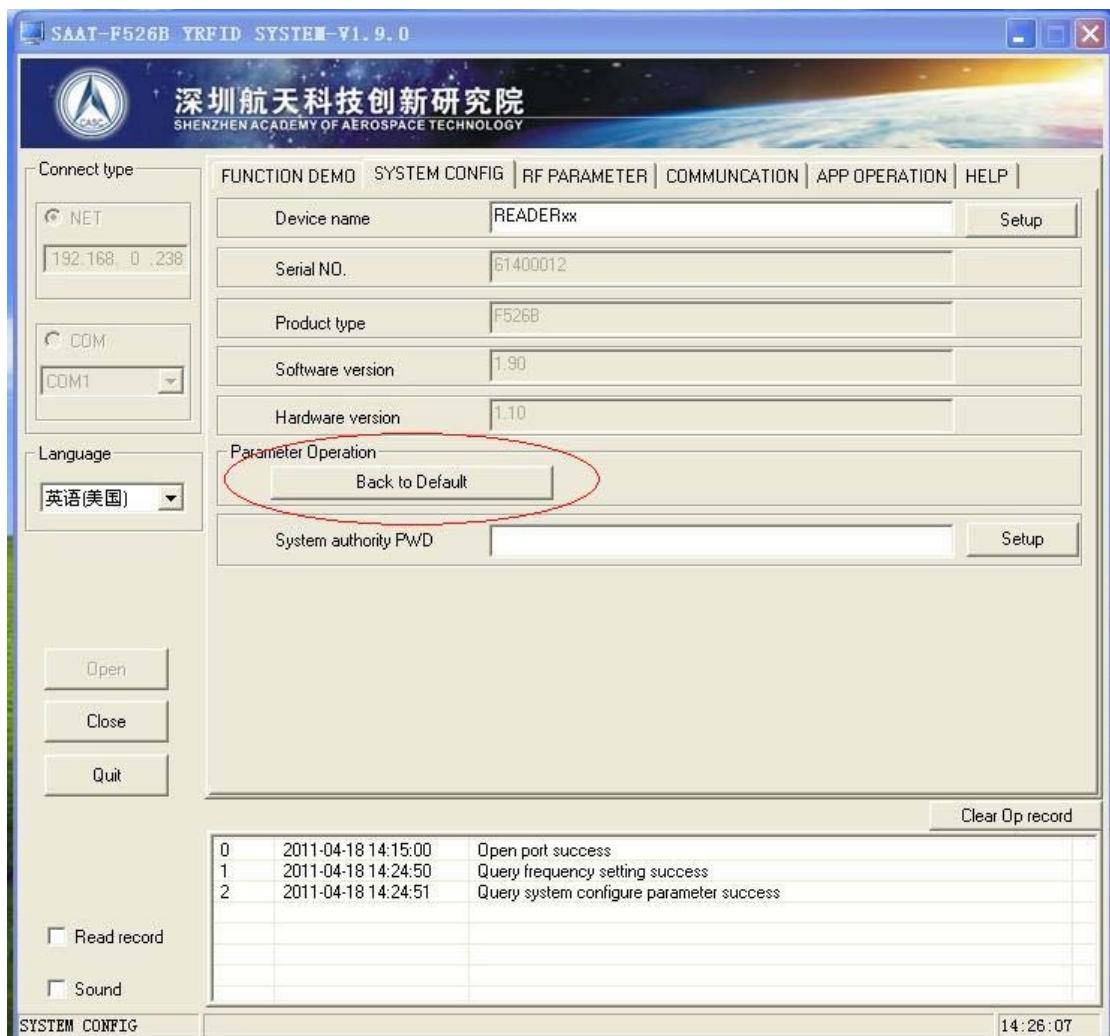
Figure 5-3 Parameters Operation Diagram

Click "Back to Default", reader parameters will return to factory settings.

8. Serial Port Parameter Setting
Click "Communication Parameters" tab, as shown in Figure 5-4
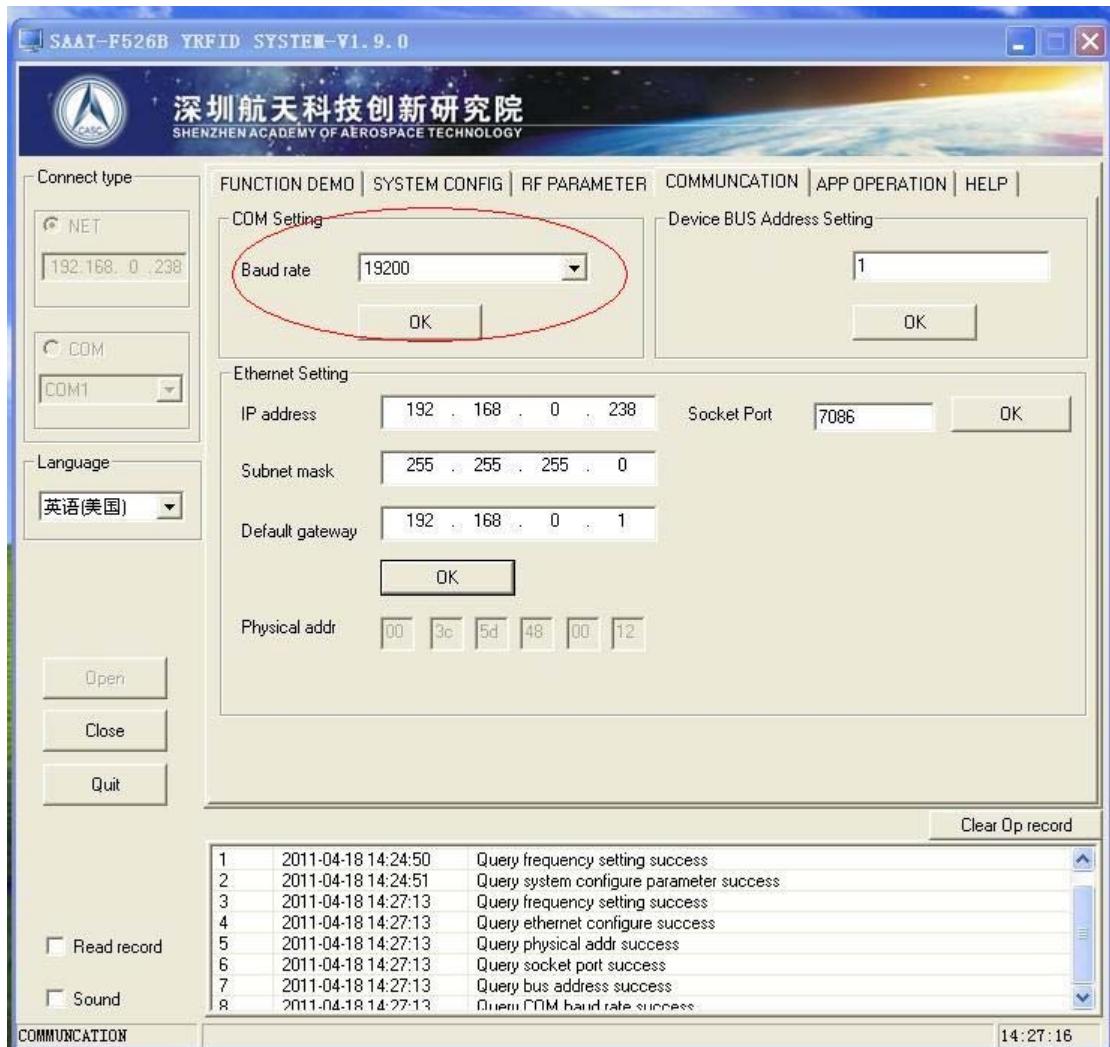
Figure 5-4 Serial Port Parameter Setting Diagram

Select serial speed in the combo box, and click "Setting" button.

9. Device Bus Address Setting
Click "Communication Parameters" tab, as shown in Figure 5-5:
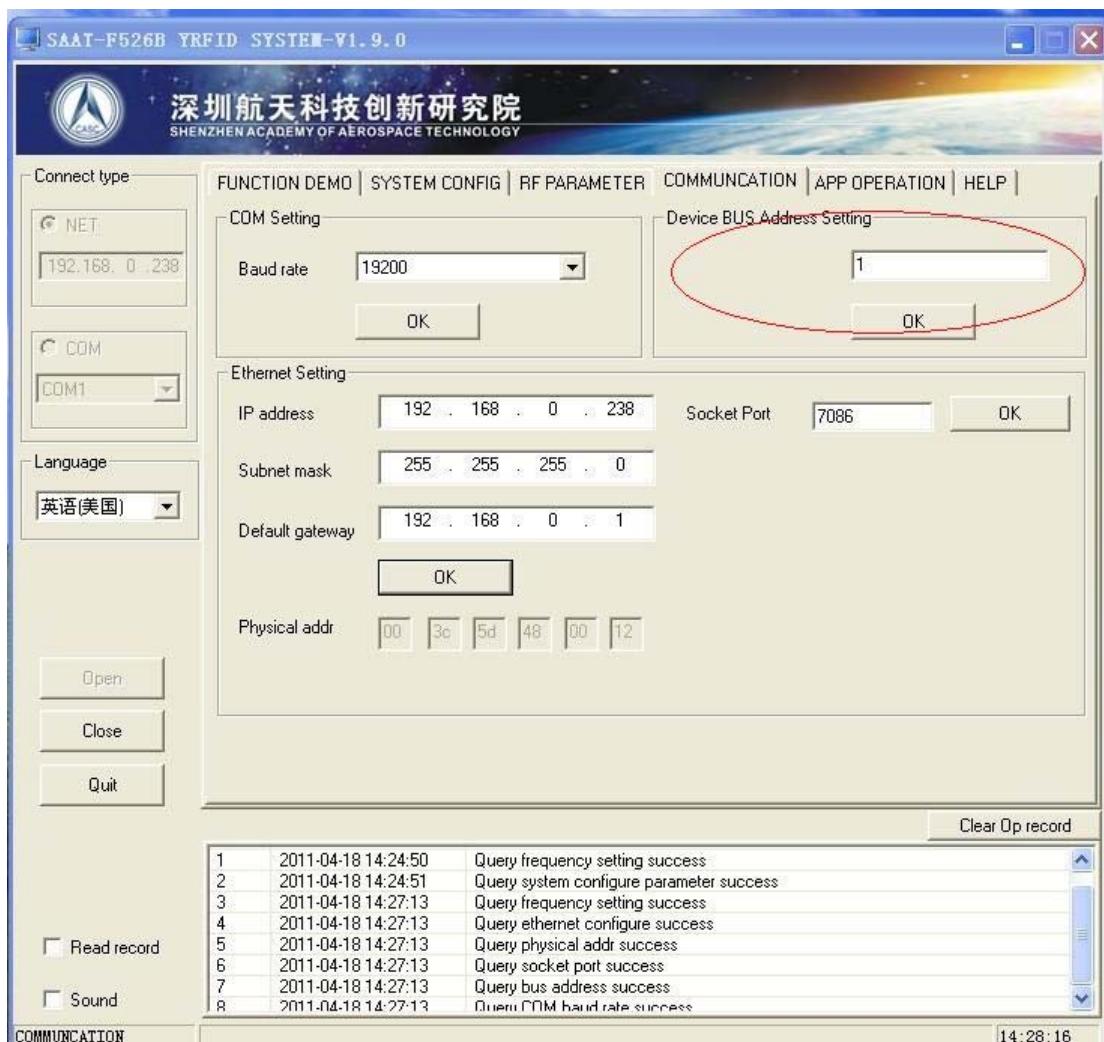
Figure 5-5 Device Bus Address Setting Diagram

Set different Bus device address.

10. IO Operation

Click "Application Operation", the interface is shown as in Figure 5-6
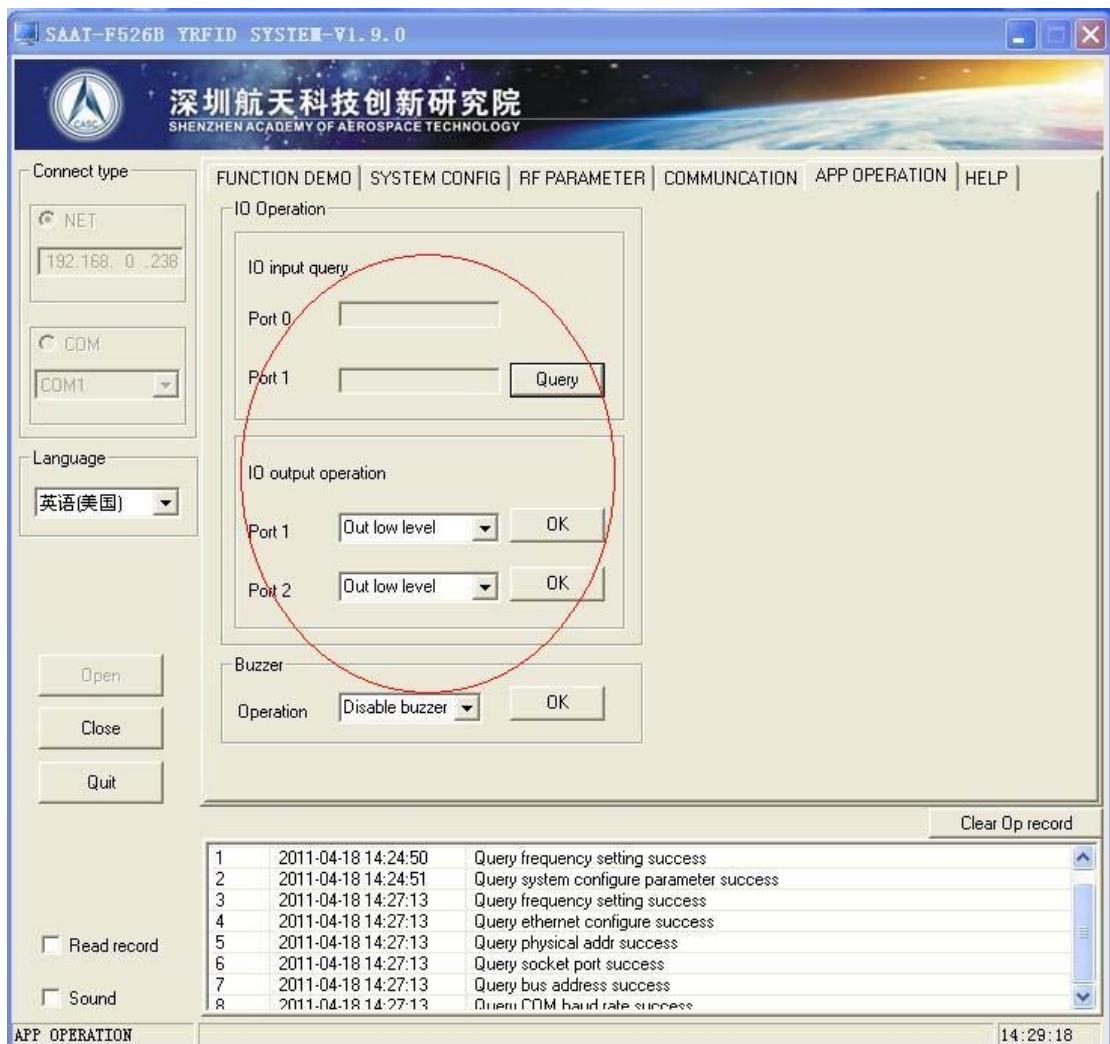
Figure 5-6IO Operation Diagram

Click "Inquiry" in the IO input to check level status information of IO input, choose IO output port ways in the combo box, Click "Run" button to execute the output functions.

11. Buzzer Operation

Click "Application Operation" page, Buzzer Operation interface as shown in Figure 5-7:
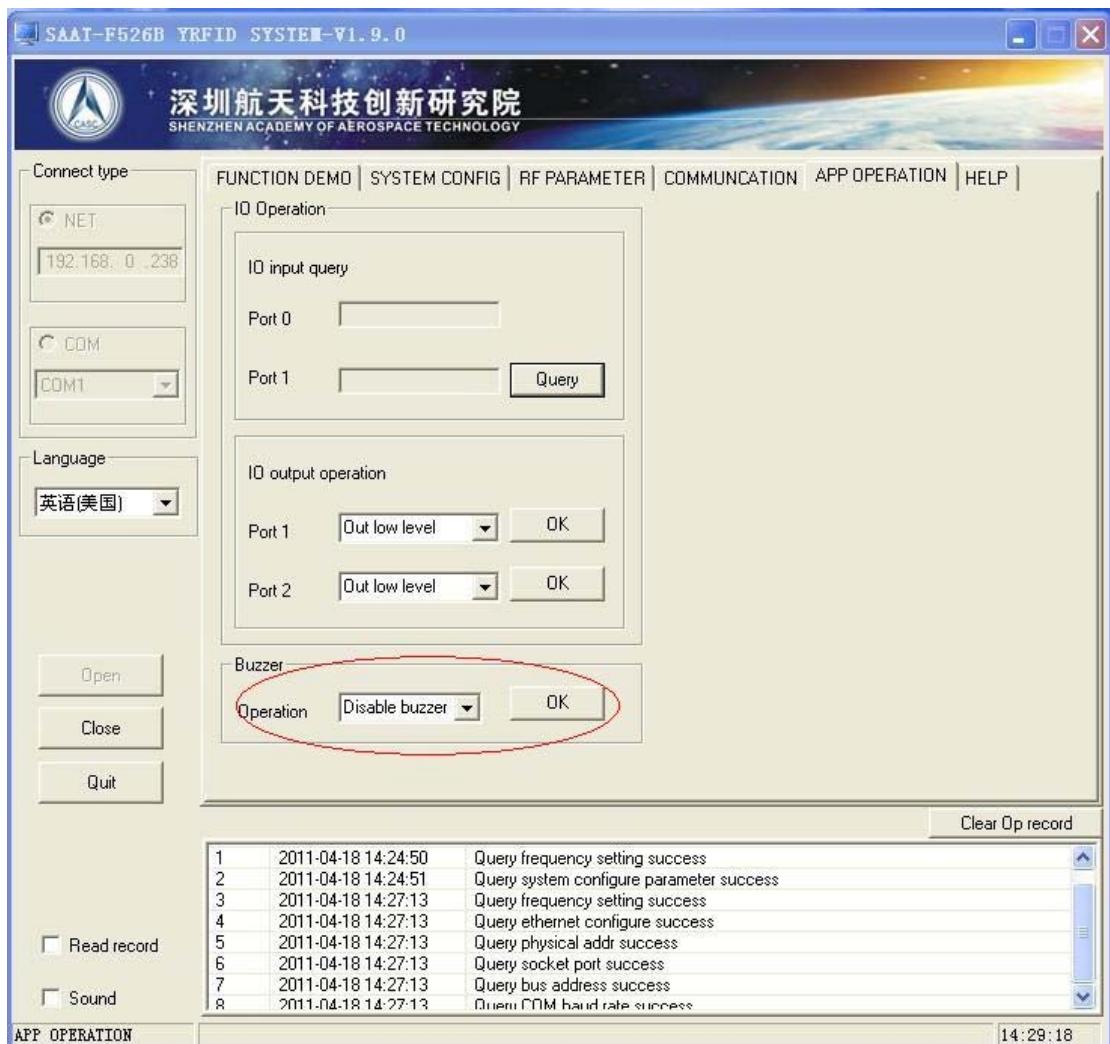
Figure 5-7 Buzzer Operation Diagram

With the built-in buzzer, reader can set by management software. Select buzzer setting in the combo box, click "Setting" to execute set-up and close operation.

12. Help

Click "Help" page to display guide for various interfaces operation of software. As Shown in Figure 5-8.
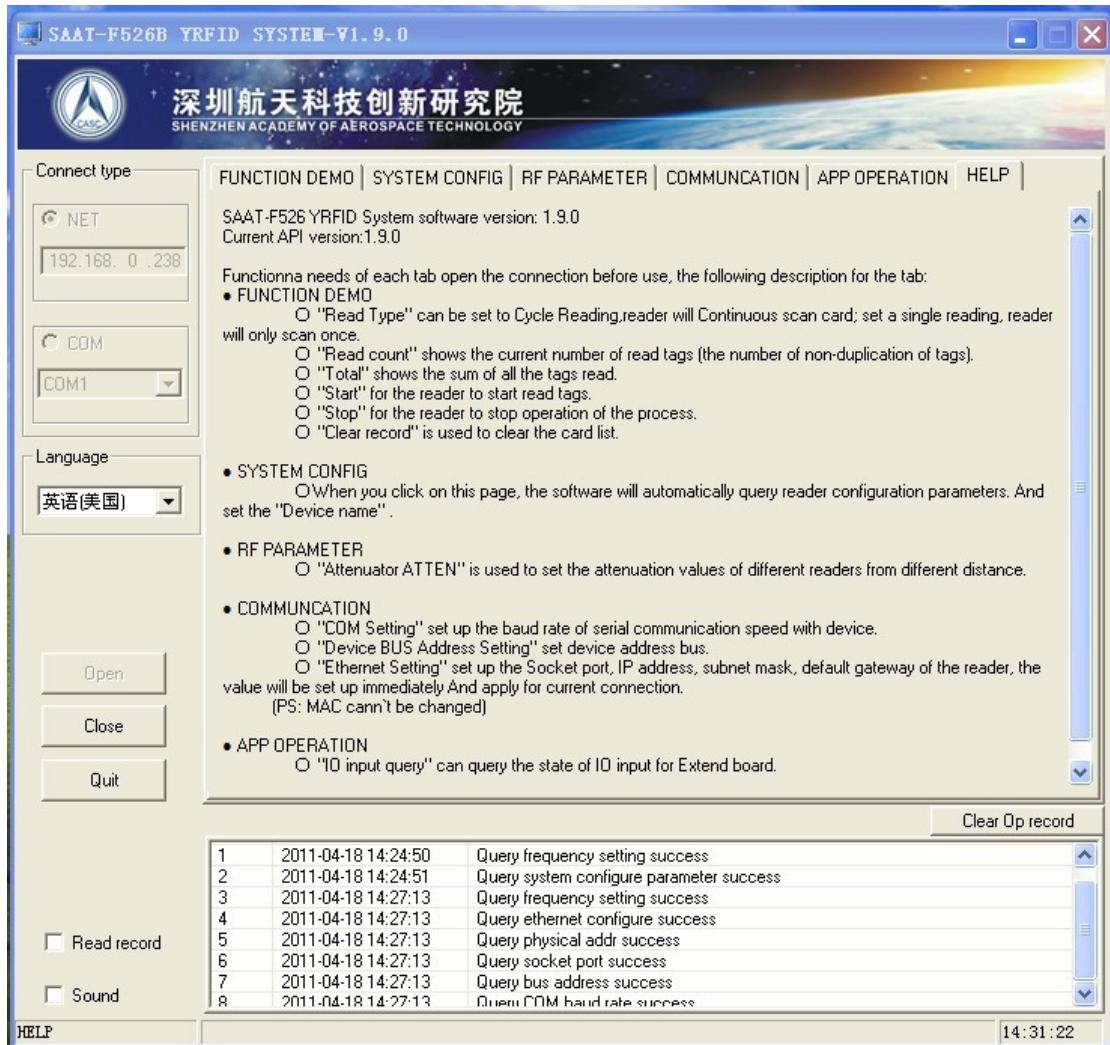
Figure 5-8 Help Diagram

6. Transportations and Storage

6.1 Transportation Requirements

SAAT-F526 Reader conforms to standards of railway, airline, and sea transportations.

6.2 Storage Requirements

Long-term storage for SAAT-F526 should meet the following requirements:

Temperature: -40°F---176°F

Humidity: ≤80% (non-condensing)

Without sharp changes of temperature, there are no acid and other harmful gases in the air.

7. Package and Standard Accessory

7.1 Products Package

SAAT-F526 Reader is packaged in cassette with built-in anti-shock material.

7.2 Standard Accessory

To conveniently store and carry, it's suggested to keep cassette and material after opening.
Besides the host in the cassette, there are standard accessories of SAAT-F526 Reader as follows.

Figure 8-1 Packing List				
Serial Number	Name	Unite	Quantity	Remarks
1	SAAT-F526 Reader	Set	1	
2	10A AC Power Line (1.5m)	line	1	
3	RS-232 Port cable(1.5m)	line	1	
4	Cross Network line(1.5m)	line	1	
5	CD	pcs	1	
6	Products Certificate	pcs	1	
7	Products Guarantee Card	pcs	1	
8	Mounting Bracket	set	1	including 4 mounting bolts

Please check products and accessories carefully according to the packing list, and contact us as soon as there is any discrepancy or damage.

8. After Service and Contacts Information

8.1 After Service

If you meet problems unsolved when using reader devices, please contact our service center. Before you contact our service center, please record the following information.

Figure 8-1 Information Record Form		
Serial Number	Reader information	Computer information
1	Reader Model	Computer Brand and Model
2	Reader Serial Number	Computer Processing Speed and Available Memory
3	Any modifications to Reader	COM
4	Reader installation locations	Computer Operation System
5	Reader Application Software	

8.2 Contacts information

Shenzhen Academy of Aerospace Technology (SZAAT)
Address: Room 803, Block B, SZAAT Building, 10th Road Kejinan, Hi-Tech Park, Nanshan District, Shenzhen City, Guangdong Province of China.
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