

1. General

RF1276D27 series is a low cost, ultra-low power, high performance transparent two way semi-duplex LoRa modulation transceiver with operation at 902.3-914.9Mhz. It integrates with high speed MCU from ST and high performance RF IC SX1276. Adopting high efficiency forward error correction with interleaving encoding (FEC) technology, it makes anti-interference ability and reception sensitivity greatly improved. That guarantees good performance in the harsh environment such as some industrial application. The FEC technology is advanced and unique in radio data communication field.

RF1276D27 has the UART interface, that make it is easy to implement wireless data transmission. It is flexible for users to set the baud rate, frequency, output power, air data rate etc parameters. It can transmit transparent data with large data buffer and also can provide over 64 channels. The compact size makes it an ideal option for radio data communication application.



2. Features

- 5000 meters of communication distance (300bps)
- Output power: Max100mW (20dBm) (7 levels adjustable)
- Air data rate: 300 - 19200bps, can be configured through RF tool
- UART data rate: 1200 - 57600bps, can be configured through RF tool
- Frequency: 902.3MHz –914.9MHz
- Working Current: 90mA(TX), 19.2mA(RX), 22uA(wake-up), 3.9uA(Sleeping)
- 64 channels
- parity of series COM: 8E1/8N1/8O1
- LoRa modulation
- Receive sensitivity: -148dBm(@600bps)
- UART/TTL
- Exceed 256 bytes data buffer
- Supply Voltage: 4.5V – 5.5V (2.1V – 3.7V optional)
- Simply tool for configuration
- 200kHz Channel spacing
- Dimension:34.2mm x 18.4mm x 7.0mm

3. Application:

- Automated Meter Reading (AMR)
- Remote control, remote measurement system
- Access control
- Data collection
- Identification system
- IT household appliance
- Wireless alarm system

4. Maximum specification

Symbol	Parameter	Min	Max	Units
VCC	Supply Voltage	4.5	5.5	V
TOT	Operation Temperature	-30	85	°C
HOH	Operation Humidity	10%	90%	
TST	Storage Temperature	-55	125	°C

5. Pin Out:

RF1276D27 module has 7 pins. Refers to the Table 1:

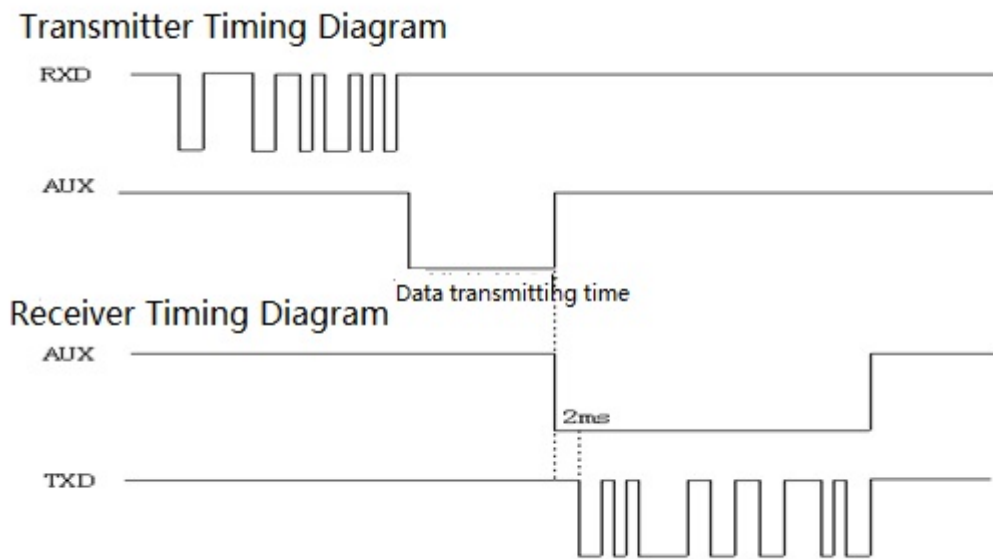
RF1276D27			
Pin NO.	Pin Name	Function	Description
1	GND	Ground	Grounding of Power Supply
2	VCC	Power	Power supply DC 4.5V-6.5V
3	EN	Input	Enable pin, Low effective
4	RXD	Input	RXD: UART input, TTL level
5	TXD	Output	TXD: UART output, TTL level
6	AUX	Output	Data indication pin for waking up module
7	SET	Input	Control pin, effective in central/node mode

Table 1: Pin definition

6. Working mode

a. Standard mode

Standard mode is also called transparent mode in which the module receives from or sends data to the host through serial port (RS232 or RS485) at preset data format and users don't need to care about the process of data inside the module. The AUX pin of RF1276D27 will give indication about the data IN/OUT of serial port 2ms in advance in order to wake up the host.



Timing Sequence in Standard Mode

b. Star network mode

In this mode one RF1276D27 module needs to set as the central module and other modules should be node modules. For central module, it works at the full performance so its power consumption is the same as in the standard mode. As to node module, some functions of it are closed. If the EN pin is connected to logic high, the node module only keeps CAD wireless monitor to detect if there is any wireless signal coming and will not check if there is any data from the host through UART interface. If the node module sends data to the central module, the host needs to set EN pin to low to activate the node module and then transfers the data.

In the configuration tool, there is an option for Node ID which is used to set the ID of node module. If the ID of the node modules is 0x00 0x00, the node module will not make address detection. In other words all of the nodes will receive the data including address from central module. The data package of the first two bytes should be the node ID.

RF1276D27 Long Distance Transceiver module V4.0

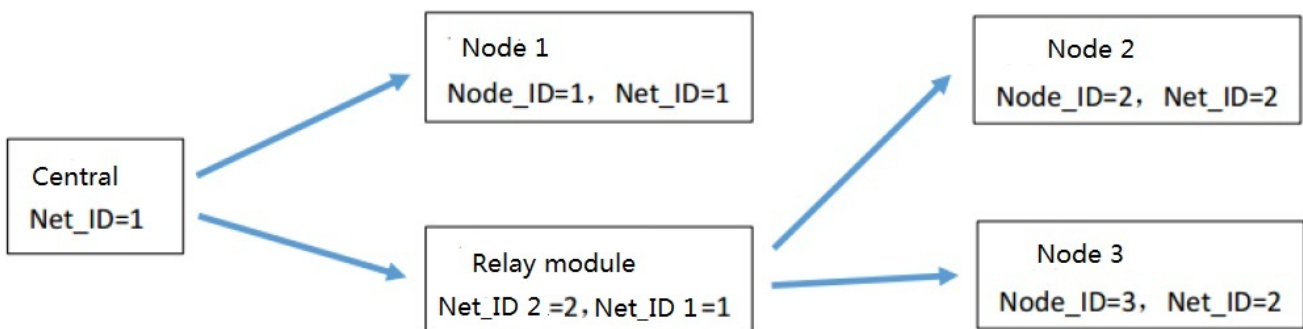
E.g. The Central module sends data '0x00 0x01 0x22 0x33 0x44 0x55', all of the node modules with ID '0x00 0x00' will receive the data '0x00 0x01 0x22 0x33 0x44 0x55'. If the ID of node module is larger than 0x00 0x00, the node module with ID the same as the one in the first two bytes of data package can receive the real data.

E.g. The Central module sends data '0x00 0x01 0x22 0x33 0x44 0x55', the module with ID '0x00 0x01' can get the data '0x22 0x33 0x44 0x55' and the first two bytes ID will be filtered.

In order to guarantee the reliability of communication, the length of data package should not exceed 64 bytes.

c. Relay module

RF1276D27 can act relay module when the peer to peer communication range is not enough. The Relay module has the same hardware with RF1276D27 module, but Relay module has the different firmware. The Relay module has two network IDs. One network ID is the same as the Central module. Another one is the same as the Node module. Relay module acts as transferring the data from the Central or Node. In the below chart, it is shown the Relay in the network.

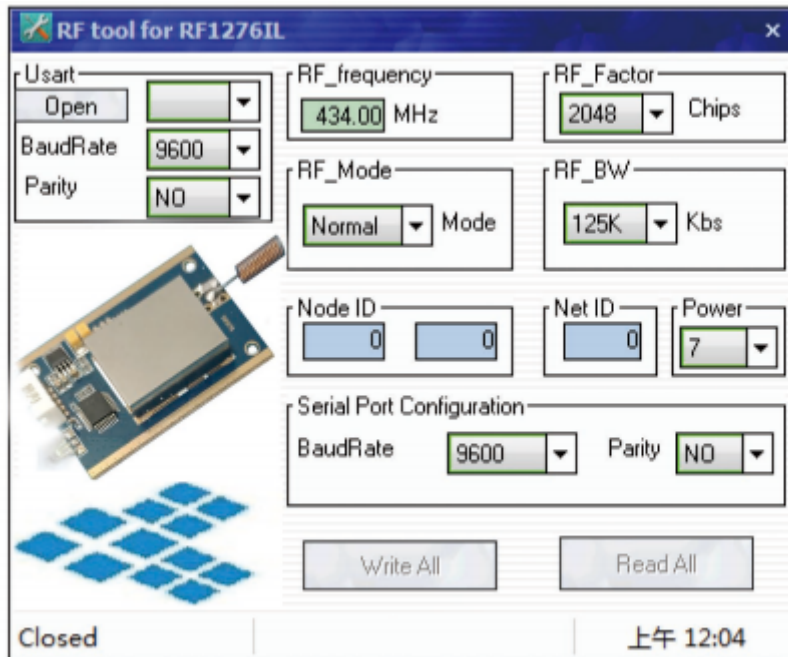


The relay module can be configured via RF tool

The Net ID is the same as Central's Net ID. The Node ID is the same as Net ID of Node. The other parameters also should be the same as the network configuration.

d, Express communication mode.

RF1276D27 Long Distance Transceiver module V4.0



The logic level of SET pin is used to switch between express communication and breath period communication in central/node mode. In sleep mode, the SET pin should be connected to logic high or suspended. If the SET pin is set to high, the node module will keep CAD wireless monitor to detect if there is any wireless signal coming at the interval of the breath period. If the SET pin is set to logic low, the node module will keep in receive mode so the central module will not need to send long preamble. The most importance is the logic level of SET for central module must be the same as the node module.

7. Dimension

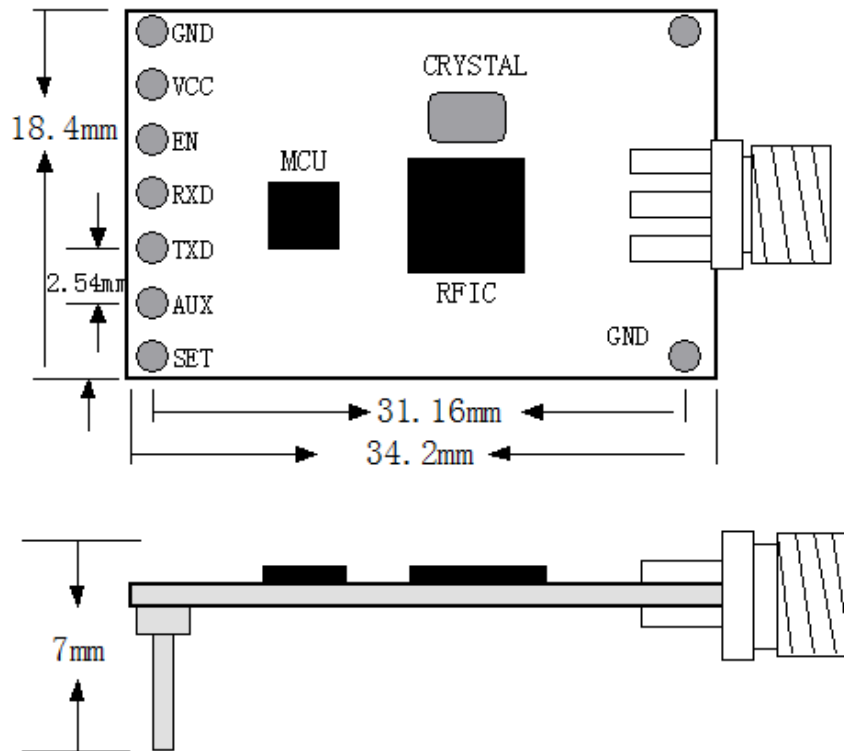


Figure 1:Size of Module

8. Parameter Configuration

Through serial port using setting tool 'Rf-Tool', users can configure relative parameters such as frequency, UART rate, air rate, checkout mode and so on.

It is very simple for configuration. Based on different requirements, all options can be selected visually. It is shown in Table 2 and Figure 3.

Parameter	Description
UART area	The values are fixed at 9.6k bps & no parity check.
RF frequency	It indicates the center frequency of RF carrier
RF mode	Standard mode, Low Power mode
RF_Factor	Lora spreading factor. Larger value means higher sensitivity but longer air transmission time
RF_BW	Lora bandwidth. Larger value means lower sensitivity. Recommended value: 125K.

RF1276D27 Long Distance Transceiver module V4.0

Node ID	It is available in the Central/Node mode.
Net ID	Only the modules with the same network ID can communicate with each other. It can avoid interferences from irrelative modules
Power	It is used to set the output power of RF1276D27. There are 7 power levels. The 7 means the max. output power---20dBm and 0 means the lowest output power.
Serial baudrate	It defines the data rate between RF1276D27 and the host
Serial parity	It defines the parity check between RF1276D27 and the host
Breath	It is available in the Central/Node mode.It defines the Breath period of Node module.
Wake Timer	It is available for the Node module only. It defines the time of module waking up to receive the preamble from Central module.

Table 2: Parameter Specification

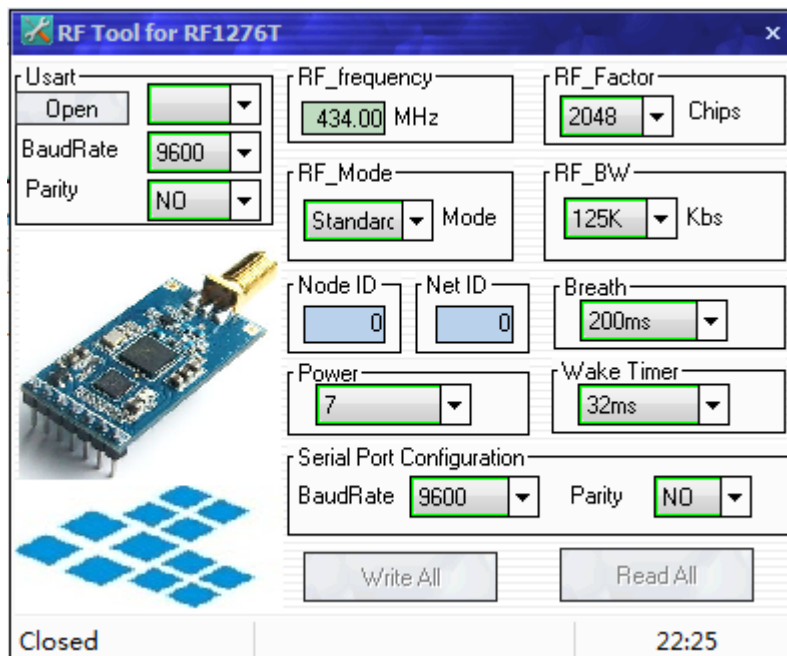


Figure 3: Interface of RF Tool

RF1276D27 Long Distance Transceiver module V4.0

Users can configure the parameters (frequency, data rate, output power, RF Factor, RF Bandwidth etc.) through PC or in circuit.

◆Setting through PC.RF1276D27port is UART/TTL. When RF1276D27connecting with PC, users need to use USB adapter. AppconWireless provides USB adapteras accessory. The schematic is shown in Figure 4

Firstly users connect converter board to PC through DB9 cable and open ‘RF Tool’, theninsert module into converter board. After that, the status column of ‘RF tool’ will give a indication ‘Found Device’. Users then can read/write the module.

If users connect USB converter, USB drive ”PL-2303_Driver_Installer”need be installed firstly. The drive has different version for different OS. USB converter has five wires with five different colors: Black, Red, Blue, Yellow, Green. Black wire is GND pin. Red wire is VCC pin. Blue wire is TXD pin. EN pin and SET pin should be connect to GROUND.

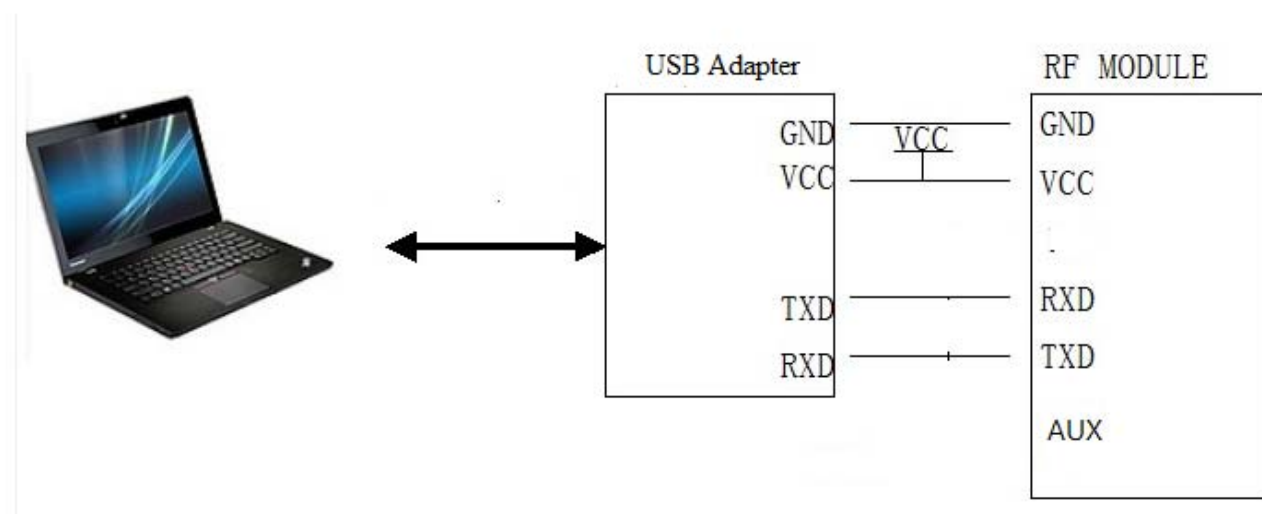


Figure 4: The connection diagram

◆Setting in circuit . Users also can use microcontroller to change the default parameters. The work mechanism is the same as in PC.

RF1276D27 Long Distance Transceiver module V4.0

Sync word		ID code		Header	Command		Length	Data	CRC	End code	
0xAF	0xAF	0x00	0x00	0xAF	XX	YY	LEN	XXXX	CS	0X0D	0X0A

RF1276D27 Command Structure

Notes: 1. The ID code is 0x00 0x00 in command.

2. In command code, XX in sending command is 0x80 and in response command is 0x00. YY is the command type. The work mode of

YY	TYPE	YY	TYPE	YY	TYPE	YY	TYPE	YY	TYPE
0x01	write	0x02	read	0x03	standard	0x04	Central	0x05	Node

Command Type and Value

3. Length refers to the data bytes between Length byte and CRC byte which the two bytes are not calculated in the length.

4. Data refers to the detailed parameters which need to be changed.

Baudrate	Parity	Frequency	RF_Factor	Mode	RF_BW	ID	NetID	Power
----------	--------	-----------	-----------	------	-------	----	-------	-------

Parameter Sequence in Data Section

Parameter	Unit	Length(Byte)	Decription
-----------	------	--------------	------------

**RF1276D27 Long Distance Transceiver module V4.0**

Serial Baudrate	Kbps	1	1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6 equals to 1,2,3,4,5,6,7
Parity		1	0: No parity; 1: Odd parity; 2: Even parity
Freq.	KHz	3	The value=Frequency/61.035. E.g. For 433MHz, the value= 433000000/61.035
RF_Factor	Chips	1	7=128, 8=256, 9=512, 10=1024, 11=2048, 12=4096
RF_BW	Kbs	1	6=62.5K, 7=125K, 8=256K, 9=512K
Output power	dBm	1	1~7; 1 refers to 4dBm and 7 for 20dBm
Breath	s	1	0=2s, 1=4s, 2=6s, 3=8s, 4=10s
Wake Timer	ms	1	0=2ms, 1=4ms, 2=8ms 3= 16ms 4= 32ms, 5= 64ms;

Parameter Length & Value Range

5. CS refers to CRC code which is the remainder of the sum of data section divided by 256. In order to understand the command, the section will demonstrate the use of commands by some examples.

Write Command Code: 0x01

Command: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x80, 0x01, 0x0C, CS, 0x0D, 0x0A

Response.: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x00, 0x01, 0x0C, CS, 0x0D, 0x0A

Read Command Code: 0x02

Command: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x80, 0x02, 0x02, 0x00, 0x00, 0x91, 0x0D, 0x0A

Response.: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x00, 0x02, 0x02, 0x00, 0x00, 0x91, 0x0D, 0x0A

Standard Mode Command Code: 0x03

Command: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x80, 0x03, 0x02, 0x00, 0x00, 0x92, 0x0D, 0x0A

Response.: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x00, 0x03, 0x02, 0x00, 0x00, 0x92, 0x0D, 0x0A



RF1276D27 Long Distance Transceiver module V4.0

Central Mode Command Code: 0x04

Command: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x80, 0x04, 0x02, 0x00, 0x00, 0x93, 0x0D, 0x0A

Response.: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x00, 0x04, 0x02, 0x00, 0x00, 0x93, 0x0D, 0x0A

Node Mode Command Code: 0x05

Command: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x80, 0x05, 0x02, 0x00, 0x00, 0x94, 0x0D, 0x0A

Response.: 0xAF, 0xAF, 0x00, 0x00, 0xAF, 0x00, 0x05, 0x02, 0x00, 0x00, 0x94, 0x0D, 0x0A

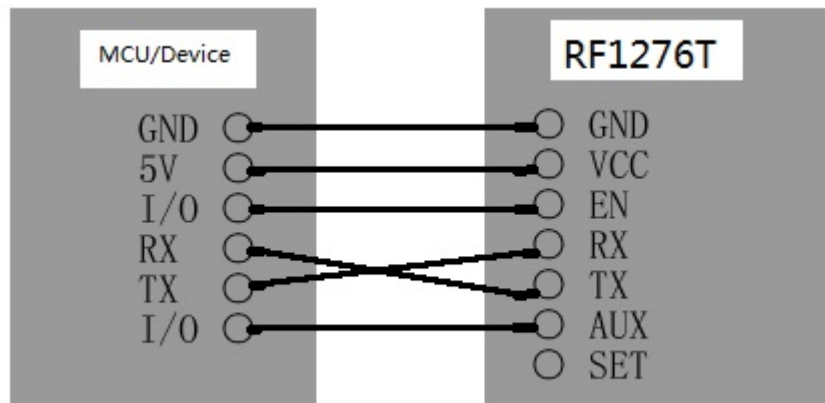
Please note that the working modes changed by the 0x03, 0x04 and 0x05 commands will not be written into nonvolatile memory so the working mode will be restored to the former mode before change after power-off. Users can use the WRITE command to change the working mode of module to standard mode or low power mode but the sleep mode will be restored to standard mode after next power-on even if the WRITE command is used.

9. Application Schematic:

The connection schematic between RF1276D27 and MCU or terminal is shown as below.

The parameter of RF1276D27's serial port must match with MCU or terminal's (RF1276D27 has the same serial port baud rate and parity style with MCU or terminal). Two or more RF1276D27s in a system should have the same parameters such as TX/RX frequency, air data rate and RF channel.

RF1276D27 Long Distance Transceiver module V4.0



- Caution:**
1. When RF1276D27 is installed, make sure the antenna is far away from device to enhance the performance.
 2. RF1276D27 should have the same common ground with MCU or terminal. Otherwise it may cause the module irregular working.
 3. When RF1276D27 works normal, DO NOT touch the module and antenna.

Figure 7: Connection between Module and Device (TTL/UART port)

10. Constructing Network (one point to multi-point):

RF1276D27 is a semi-duplex module, which can be communicated by point to point or one point to multi-point. In the second mode, user needs to set one master module, while the others are slave modules. Every module must only have one unique ID. The coordination of communication is controlled by the master module, which sends data or commands including ID information. All slave modules can receive the data packets, and compare the ID with itself. If they are matched, the module will deal with the data packets. Otherwise, it will discard them. In order to avoid interfering each other, only one module can be in transmitting state when the network is working. RF1276D27 can set many different frequencies so that many networks can work in the same place and at the same time.

User should pay attention to the following questions based on the complex transfers in the air and some inherency characteristics of wireless communication:

1) Latency of wireless communication

The wireless terminal keeps receiving data packets after waiting for a while to ensure no data any more. There should be tens to hundreds mil-seconds latency from transfer to receiver (the exact latency depended on UART rate, air rate and the size of data package). In addition, it also need consume some time to transmit from module to terminal, but the delay time is permanent in the same condition.

2) Data flux control

Although there is a buffer zone with 256 bytes in the wireless module, when the UART rate is higher than the air rate, there must be a problem about the data flux. It may cause to lose some data because the data overflow from the buffer. Under this condition, it must be ensured that the average UART rate should

RF1276D27 Long Distance Transceiver module V4.0

NOT higher than 60 percent of the air rate. For instance, the UART rate is 9600bps, the air rate is 4800bps. If UART rate is the same as the air rate, the only way is to interval the transmitting time. If terminal transmits 100bytes to UART every time, it will take 104ms every time. $(104\text{ms}/0.6) * (9600/4800) = 347\text{ms}$. So if the interval time that terminal transmit 100bytes to UART should NOT less than 347ms every time, those mentioned problems can be avoided.

3) Errorcontrol

The wireless network module has strong capability of anti-interference because of the high efficiency checking error correction with interleaving encoding technology. However, when it is in a bad circumstance that has strong electric interference, the data may be lost or receive some error data. User can increase the development of the system link layer protocol. For instance, if user can increase TCP/IP slip window and repeat transmitting functions, it will improve the reliability and ability of wireless network communication.

4) Selection of antenna

Antenna is a very important factor of the communication system. The quality of antenna impacts the capability of communication system. So user should strictly choose the quality of antenna. Generally speaking, it mainly contains two points: the type of antenna (size) and its electric capability. The antenna must be matched with the frequency of communication system.

11. Q&A:

Questions and Answers	
Can not communicate between two devices	1. The communication protocol is different between two modules, for instance: data rate and checkout.
	2. The frequency or RF data rate is different between two communicated modules.
	3. They are not the same kind products.
	4. The connection between module and terminal is wrong.
	5. The module is wrong.
	6. The setting of EN is wrong.
	7. The communication distance exceeds the range, or the connection of antenna is bad.
Short communication distance	1. The supply voltage exceeds range
	2. The ripple of power is too big.
	3. The connection of antenna is bad or it is a wrong kind of antenna
	4. Antenna is too close to the surface of metal or the ground
	5. Receiving circumstance is very bad, for instance buildings and strong interference.
	6. There is interference of the same frequency
Receive wrong data	1. Wrong setting of COM, for example, Baud rate is wrong
	2. The connection of UART is wrong.
	3. The cable to the UART is too long.

FCC Regulatory notices

Modification statement

APPCON WIRELESS TECHNOLOGY LIMITED has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment. **Interference statement**

This device complies with Part 15 of the FCC Rules and Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

RF exposure

This equipment complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. The host end product must include a user manual that clearly defines operating requirements and conditions that must be observed to ensure compliance with current FCC RF exposure guidelines.

For portable devices, in addition to above, a separate approval is required to satisfy the SAR requirements of FCC Part 2.1093.

If the device is used for other equipment that separate approval is required for all other operating configurations, including portable configurations with respect to 2.1093 and different antenna configurations.

FCC Class B digital device notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Labelling Requirements for the Host device

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the FCC ID and ISED of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Model: RF1276D27

Contains FCC ID: 2APJJ-RF1276D27

The host OEM user manual must also contain clear instructions on how end users can find and/or access the module and the FCC ID and ISED.

Model: RF1276D27

Contains FCC ID: 2APJJ-RF1276D27

OEM Statement

- a. The module manufacturer must show how compliance can be demonstrated only for specific host or hosts
- b. The module manufacturer must limit the applicable operating conditions in which the transmitter will be used, and
- c. The module manufacturer must disclose that only the module grantee can make the evaluation that the module is compliant in the host. When the module grantee either refuses to make this evaluation, or does not think it is necessary, the module certification is rendered invalid for use in the host, and the host manufacturer has no choice other than to use a different module, or take responsibility (§ 2.929) and obtain a new FCC ID for the product.
- d. The module manufacturer must provide the host manufacturer with the following requirements:
 - i. The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions).

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies.

DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.³

Explanation: This module meets the requirements of Part 15 Subpart C Section 15.249

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

Explanation: The EUT uses Spring antenna, antenna gain: 1.5dBi. There is no restriction on the installation method.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

Explanation: The module is not a limited module

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.⁴

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the

module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: Yes. The module without trace antenna designs

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable –

xx cm from a person’s body); and (2) additional text needed for the host product manufacturer to provide

to end users in their end-product manuals. If RF exposure statements and use conditions are not provided,

then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20cm the radiator your body. This module is designed to comply with the FCC statement, FCC ID is: 2APJJ-RF1276D27

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example

with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique

antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT uses Spring antenna, antenna gain: 1.5dBi.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated by the following texts: "Contains FCC ID: 2APJJ-RF1276D27"

2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a standalone

modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for

different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

Explanation: Data transfer module demo board can control the EUT work in RF test mode at specified test channel

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The module without unintentional-radiator digital circuitry, so the module does not require an evaluation by FCC Part 15 Subpart B. The host should be evaluated by the FCC Subpart B