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Wireless RF Transceiver 431-478 MHz GFSK Data Transfer

NOTES:

Product Version : Ver 1.0

Document Version : Ver 1.1

Chapter 1. Overview

1.1 Overview

This is a half-duplex wireless data transceiver which is integrated with an ultra speed MCU and a powerful RF chip. With the introduction of the innovative yet high-efficient encoding method, its anti-interference ability and sensitivity are significantly improved. Featuring various channel options and three interfaces helps make the transparent transmission of data of any size possible and eliminate the needs of writing transmission program and running complicated settings. A software application (“RF-Magic”) is offered for free so that users can modify the settings of the module. Its slim size, wide power supply range and ultra long transmission distance makes itself the most popular selection of many applications in different fields.

1.2 Features

Ultra long transmission distance: 800-1000 meters@1200bps
Working frequency: 431-478MHz (1 KHz step)
Over 100 channels
GFSK modulation
Highly efficient cyclic interleaving error correction encoding
Flexible software program option settings
Selectable RFID index
Three interfaces: UART/TTL, RS485 and RS232
Large data buffer: 512 bytes
Suitable for massive data transfer
Built-in watchdog ensures long-term operation

1.3 Applications

Wireless Sensor
Home Automation
Automatic Metering
Automatic Data Acquisition
Industrial Telemetry
POS Systems and Asset Management
Robotics
Instruments
Access Control
Handheld Wireless

1.4 Pin Definition

TABLE 1-1 PIN DEFINITION

Pins	Definition	Description
1	GND	0V
2	VCC	3.3V - 5.5V
3	EN	POWER ENABLE(≧1.6V) or SUSPENDED ENABLE(≦0.5V Hibernation)
4	RXD	UART input, TTL
5	TXD	UART output, TTL
6	B/RX	RS485- or RS232 RX
7	A/TX	RS485+ or RS232 TX

Chapter 2. Connections and Settings

2.1 Settings of “RF-Magic (Ver: 4.2)”

This module is very flexible that many options, such as series parameters, transmission and receiving parameters, address code, etc., can be set by users via RF-Magic software.

TABLE 2-1 PARAMETER SETTINGS

Settings	Options	Default
Series Rate	1200, 2400, 4800, 9600bps	9600bps
Series Parity	Disable, Even Parity, Odd Parity	Disable
RS485/RS232	RS485, RS2325	RS485
RFID Disable	Disable, Enable	Disable
RFID Index	0 - 65535（16 bit）	12345
RF Frequency	431MHz - 478MHz（1K step, accuracy±100Hz）	434MHz
Airborne Rate	1200, 2400, 4800, 9600bps	9600bps
Freq Deviation	5.4, 10.8, 21.6, 43.2, 86.4KHz	21.6KHz
RF Power	1-10 (10 indicates 20mw)	10(20mw)

Software settings are implemented via UART/TTL port (pin 4 and pin 5). To finish the settings, an extra UART/TTL TO RS232 converter is needed. First, connect the converter to PC with a USB cable and open RF-Magic software, and then power the module. Finally, connect the module with the converter. “Found Device” will be displayed in the status bar of the software, allowing you to read and write.

Generally, users need not to adjust the options which are default at the factory unless there are special purposes. Airborne rate, frequency deviation and RF power are default at any condition.

FIGURE 2-1 RF-MAGIC SOFTWARE

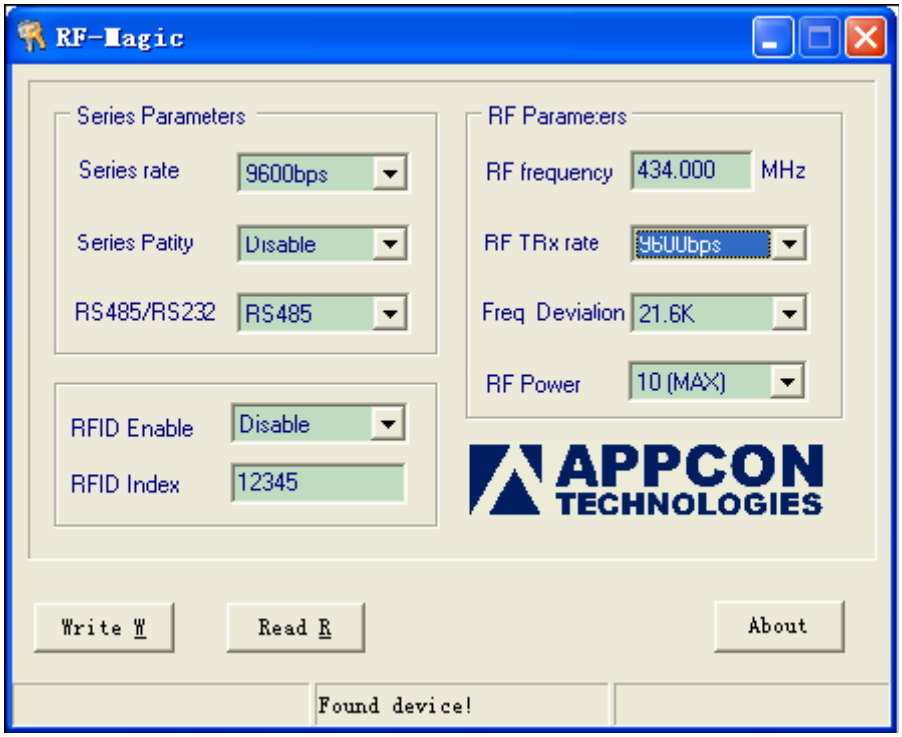
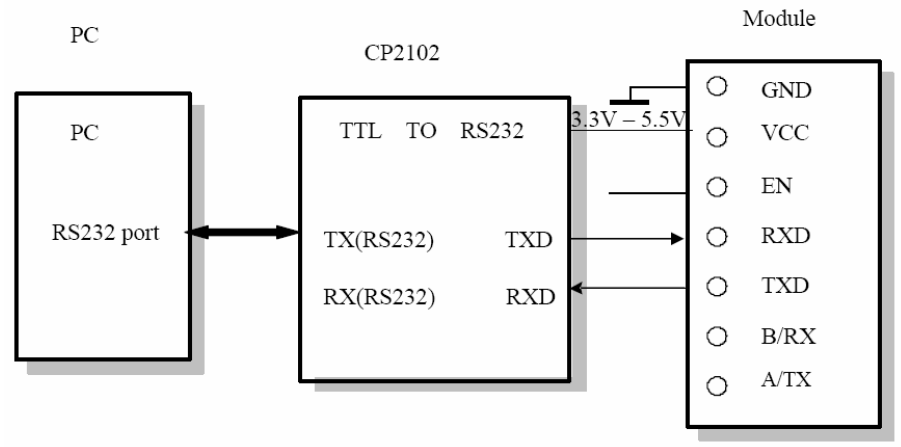
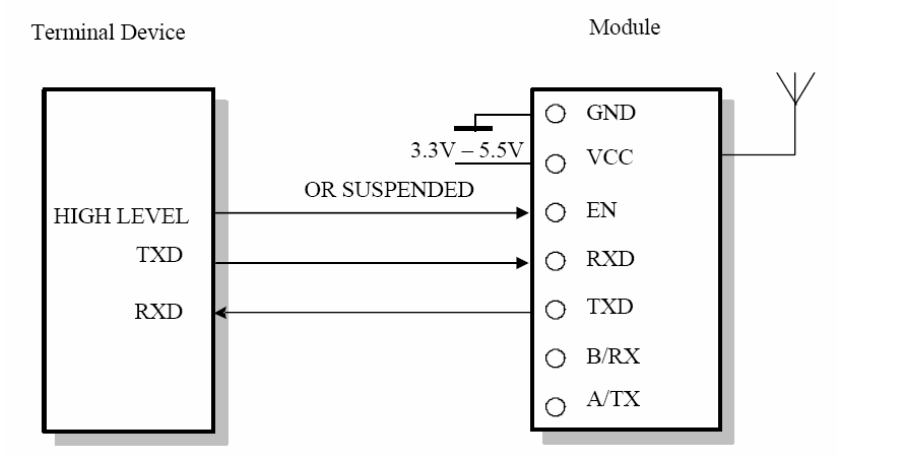


FIGURE 2-2 CONNECTION SCHEMATICS



2.2 Connection of The Module and A Terminal Device (UART/TTL Level)

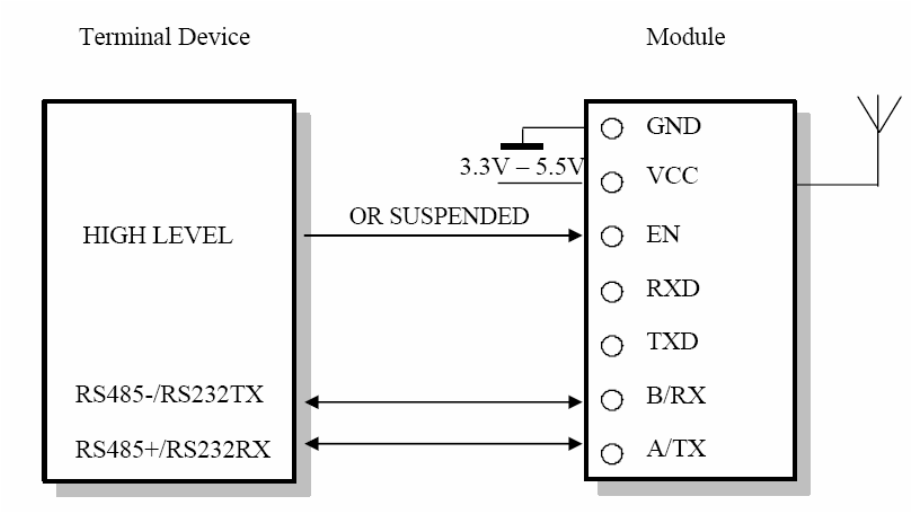
FIGURE 2-3 CONNECTION SCHEMATICS



Note: When the module is connected with UART/TTL level, B/RX and A/TX must be suspended.

2.3 Connection of The Module and A Terminal Device (RS485/RS232 Level)

FIGURE 2-4 CONNECTION SCHEMATICS



Chapter 3. Electrical Characteristics

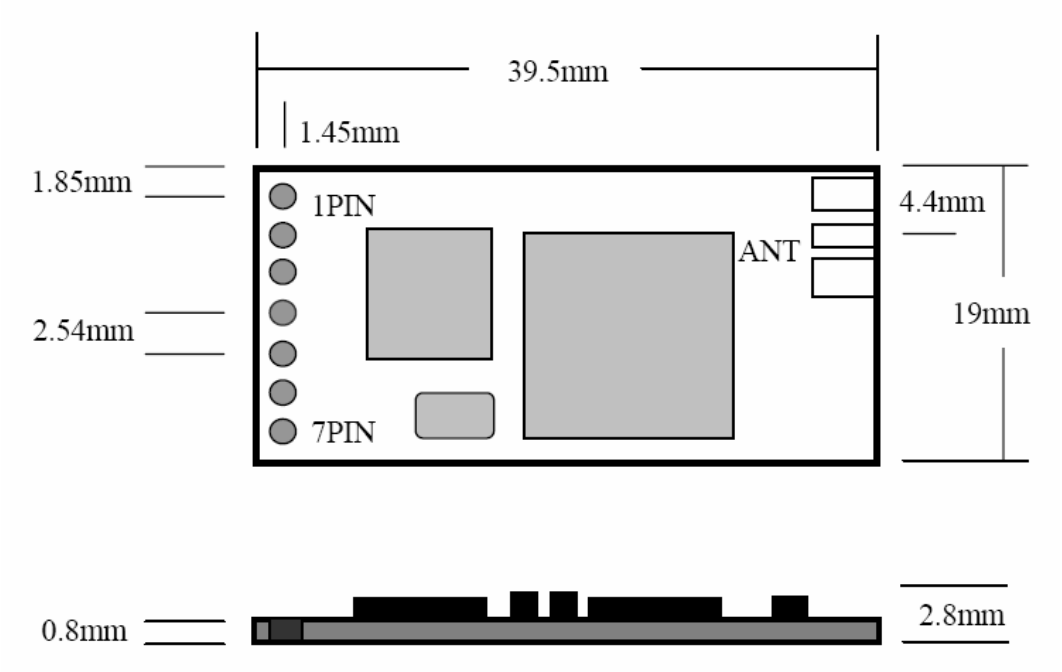
3.1 Electrical Characteristics

TABLE 3-1 ELECTRICAL CHARACTERISTICS

Parameter	Value
Frequency Range	431MHz to 478MHz（1KHz step）
Modulation Method	GFSK
Frequency Interval	200KHz
Output Power	20mw（10 levels adjustable）
Receiving Sensitivity	-117dBm@1200bps
Airborne Speed	1200 - 9600bps
Speed in Port	1200 - 9600bps
Parity Check	8E1/8N1/801
Data Buffer	512bytes
Operating Humidity	10%~90%
Operating Temperature	-20℃ - 70℃
Power Supply	3.3 - 5.5V (±50mV ripples)
Transmission Mode Current	≦35mA@10mW
Receiving Mode Current	≦28mA
Sleep Current	≦5uA
Transmission Distance	800 – 1000m（visible range in open area）
Dimension	39mm x 19mm x 2.8mm

Chapter 4. Mechanical Drawing

FIGURE 4-1 MECHANICAL DRAWING



Chapter 5. Appendix

Due to the complication of transmission in the air and the inherent features of wireless data transmission, some issues need to be considered.

5.1 Data Delay in Wireless Communication

Wireless Transmission is not available until the transmitter receives the given data from the terminal device or no more data in a certain time. It usually takes tens to hundreds of milliseconds, which are determined by series speed, airborne speed and data packet, before the receiver receives the data from the transmitter. Certain delay also happens to the communication between the receiver and the other terminal devices and is fixed when other conditions are not changed.

5.2 Data Flow Control

This module has a large data buffer- 512bytes. However, data may overflow and be lost when series speed is higher than or equals to airborne speed. In this condition, it must be assured that average series speed of the terminal device isn't higher than 60% airborne speed, e.g. series speed is 9600bps and airborne speed is 4800bps. The terminal device transmits 100 bytes to a serial port in 104ms. (104ms/0.6)*(9600/4800) =347ms. So the interval for the terminal device to transmit every 100 bytes to the serial port shall not be lower than 347ms and data overflow and data lost will not happen.

5.3 Error Control

This module has a powerful anti-interference capability and error detection and correction capability. In the extremely poor conditions or when the field intensity arrives at a critical state that this module can bear, no reception or packet loss will happen. Adding Slide Windows or missing packet retransmission function in TCP/IP and other development to data link layer protocol of systems will greatly improve the reliability and flexibility of wireless networks.