RFU-433 User Manual

433 MHz RS-232/RS-485 Wireless Modem

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Warrany

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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Contact Us

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1. Introduction

The RFU-433 is an RS-232/RS-485 to 433 MHz radio modem that can be used to convert data from an RS-232/RS-485 device to RF message and transmitted in transparent mode via the 433 MHz ISM frequency band.

The RFU-433 provides a maximum line of sight (LOS) transmission distance of 500 meters at an RF Baud Rate of 9600 bps. In order to overcome the interference that may be encountered in harsh environments, the RFU-433 allows the RF transmission Baud Rate to be configured to a minimum of 650 bps, enhancing the capability of the modem to resist noise and other interference. Additionally, the RF channels and Group IDs are adjustable, which is helpful when attempting to avoid interference encountered when two RFU-433 networks are adjacent. The 16 RF channels and 8 Group IDs can be configured in order to distinguish and control the different RFU-433 networks. The majority of these configuration parameters can be adjusted using a combination of the Rotary and DIP switches, thereby providing a simple method of maintaining the system if the RFU-433 modem needs to be replaced.
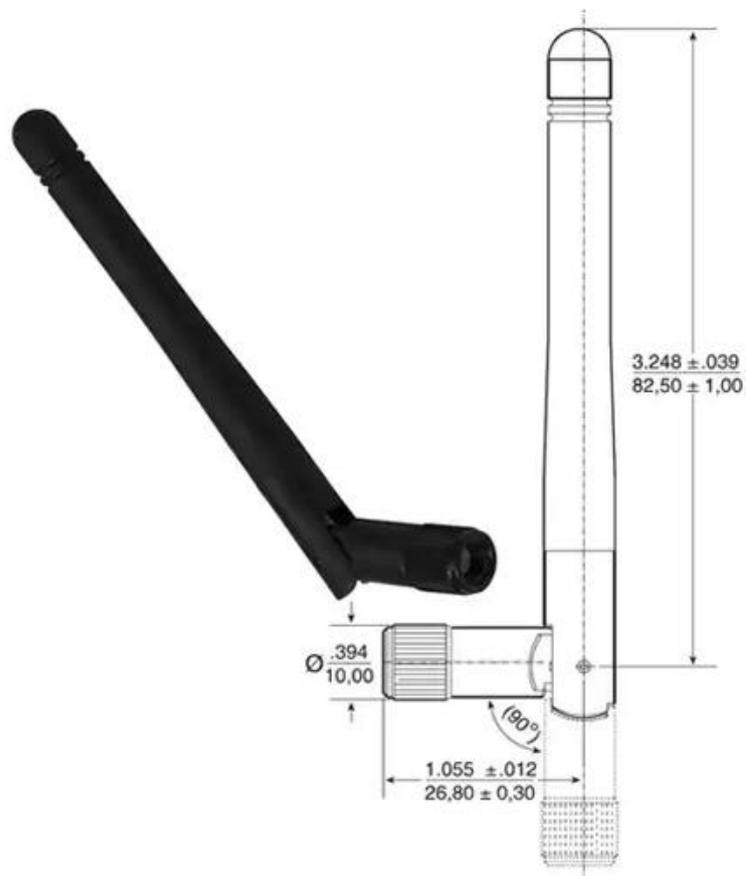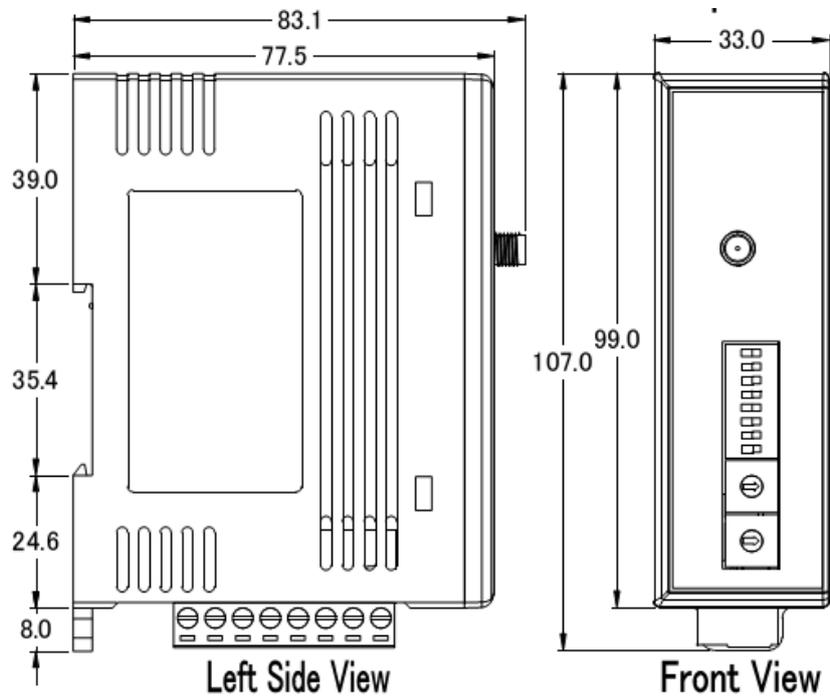
1.1 Features

- 433 MHz Radio Frequency
- 16 RF channels with 100 kHz channel spacing
- Provides RF Baud Rates from 650 to 57600 bps
- RF output power default 10 dBm, maximum 19 dBm
- Wireless line of sight (LOS) transmission range of up to 500 meters at an RF Baud Rate of 9600 bps and output power 10 dBm.
- Transparent transmission mode
- Message package is up to 512 bytes
- Provides Baud Rates from 1200 to 115200 bps for both the RS-232 and RS-485 interfaces
- ESD Protection: Contact +/-4 kV
- Isolation: 3000 VDC for DC-to-DC, 2500 Vrms using a photocoupler
- DIN-Rail Mountable
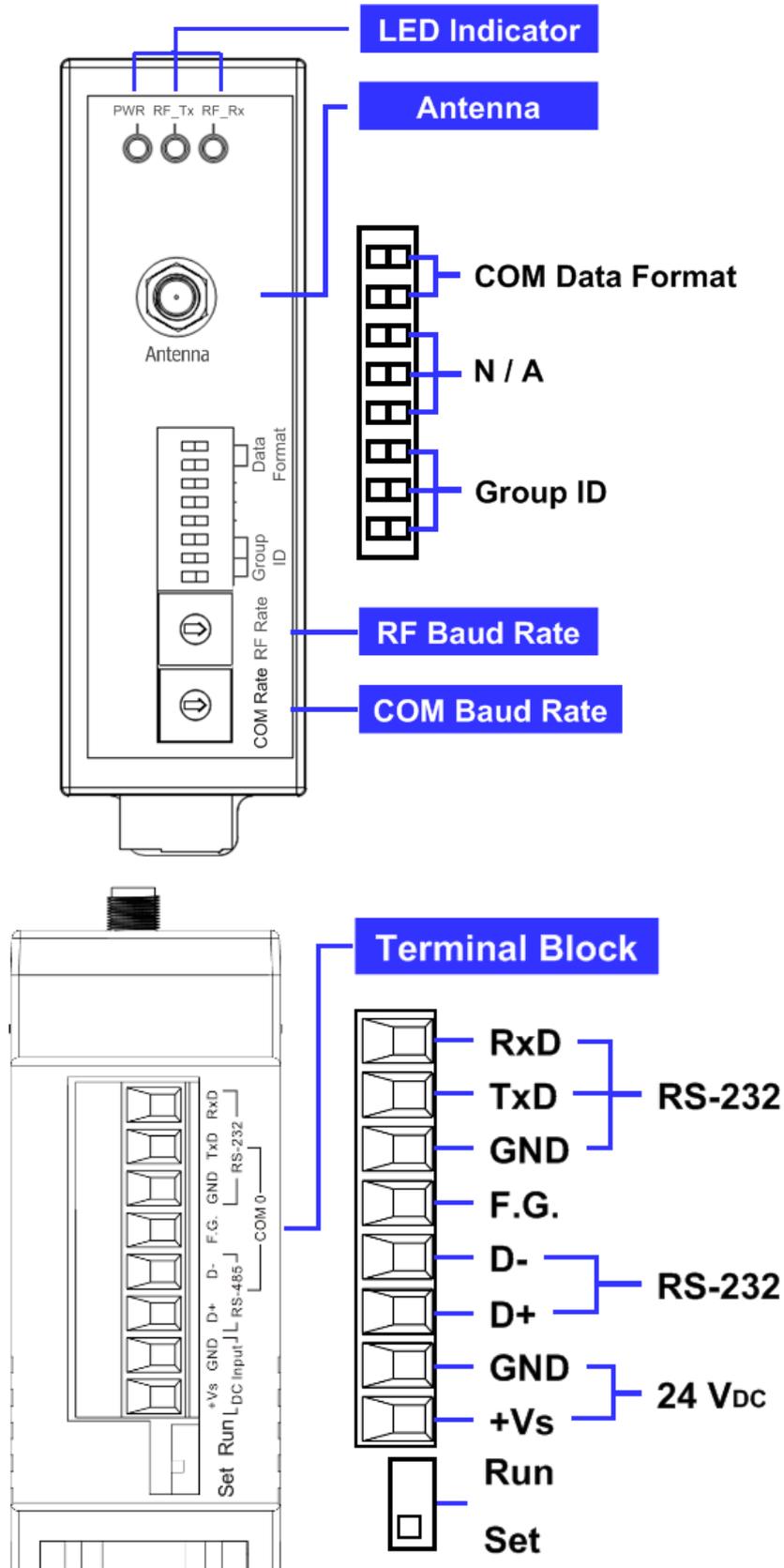- Operating Temperatures, -25°C ~ +75°C

1.2 Specification

RF Interface	
Radio Frequency	**433.1 MHz ~ 434.6 MHz**
Channels	0 ~ 15 (default is 4, configured by utility)
Baud Rate	650 ~ 57600 bps
Transmission Power	Default 10 dBm, Max 19 dBm
Antenna	0 dBi Omni directional, RPSMA
Transmission Distance (LoS)	500 m (9600 bps, output power 10 dBm)
Group ID	0 ~ 7
Protocols	Transparent transmit
Repeater	Support repeater mode
Temporary Buffer Size	512 Bytes
COM Port Interface	
RS-232	TxD, RxD and GND
RS-485	D+, D- ; 3000 VDC for DC-to-DC
Baud Rate (bps)	1200 ~ 115200 bps
Data Format	N,8,1 / O,8,1 / E,8,1
LED Indicators	
RF_Tx	Green (RF Transmit)
RF_Rx	Yellow (RF Receive)
PWR	Red (Power)
Isolation	
Intra-module Isolation	2500 Vrms for photocoupler (COM Port)
EMS Protection	
ESD	+/- 4 kV Contact
EFT	+/- 1 kV
Surge	+/- 1 kV
Power	

Input Voltage Range	+10 V_{DC} ~ +30 V_{DC}
Power Consumption	1 W @ 24 V_{DC}
Mechanical	
Dimensions (W x L x H) (not include antenna)	108 mm x 84 mm x 33 mm
Antenna Dimensions (L x Ø)	108 mm x 10 mm
Installation	DIN-Rail
Environment	
Operating Temperature	-25℃ ~ +75℃
Storage Temperature	-30℃ ~ +80℃
Relative Humidity	10 to 90% RH (Non-condensing)

1.3 Dimensions

Left Side View

Front View

1.4 Appearance

Terminal Block

	Pin	Description
	RxD	RS-232
	TxD	
	GND	
	F.G.	Frame Ground
	D-	RS-485
	D+	
	GND	Power:
	+Vs	+10 ~ +30 V$_{DC}$, 1A

LED Indicator

LED	Behavior	Description
PWR	On	+10 ~ +30 V$_{DC}$ Power On
	Off	Power Off
RF_Tx	On	RF is transmitting data
	Off	RF is no data to transmit
RF_Rx	Always On	RF is receiving data, signal strength high
	100ms Flash	RF is receiving data, signal strength middle
	500ms Flash	RF is receiving data, signal strength low
	Off	RF is no data to receive

2. Configuration

   Most the configurations of RFU-433 are used dip switch and rotary switch. About these settings are show as below:

COM Baud Rate
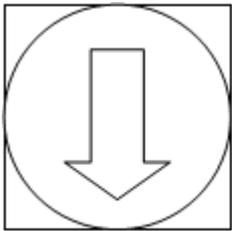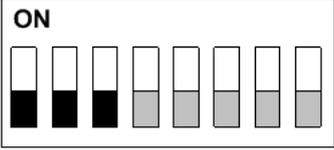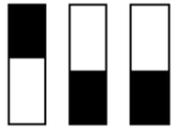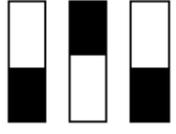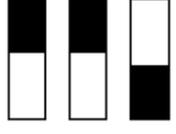
Switch Name	Number	Baud Rate (bps)
COM Rate	0	115200
	1	57600
	2	38400
	3	19200
	4	9600
	5	4800
	6	2400
	7	1200
	8 ~ E	Reserved

RF Baud Rate
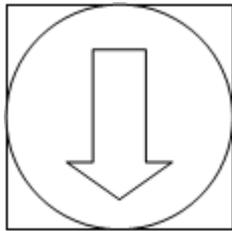
Switch Name	Number	Baud Rate (bps)
RF Baud Rate	0*	Auto set the same with COM Baud Rate
	1	57600
	2	38400
	3	19200
	4	9600
	5	4800
	6	2400
	7	1200
	8	650
	9 ~ E	Reserved
	F	Firmware version

* If COM Baud Rate is 115200 bps, the RF Baud Rate will set to 57600 bps.

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Group ID

Switch Name	Switch	Group ID Number
		0
		1
		2
		3
		4
		5
		6
		7

ON

1 2 3 4 5 6 7 8

Group ID

* RFU-433 with different Group ID cannot communicate with each other.

COM Data Format

Switch Name	Switch	Data Format
ON 1 2 3 4 5 6 **7 8** COM Data Format		N, 8, 1
		O, 8, 1
		E, 8, 1
		Repeater Mode (**1 hub**) (RSSI Enable) *
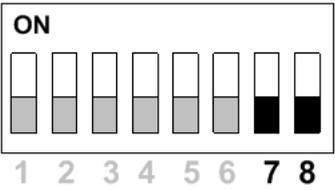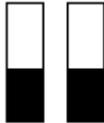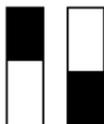
* The repeater mode can bypass RF message from one side to another and output RSSI data to COM. For example, if the repeater received a message "0x01 0x02 0x03 0x04", then the repeater will transmitted the same message to RF. At the same time the repeater will add two RSSI data byte below the message such as "0x01 0x02 0x03 0x04 0x63 0x75" and output to COM. The RSSI 0x63 is the message source side RSSI and the RSSI 0x75 is the repeater itself. The RSSI value is from 0x00 to 0xFF and 0xFF is the best. Note that, **repeater mode only support 1 hub**.

Setting Switch

Switch Name	Switch	Description
Set Run	Set *	Utility Setting Mode
	Run	Normal Run Mode

* In set mode, user can configure "Channel", "Output Power" and "Message Duty", through RFU-433 Utility.

3. RFU-433 Utility

When RFU-433 utility connects with RFU-433 in set mode through COM port. The utility will get the RFU-433 firmware version and configuration. User also can change the RF communication frequency to RFU-433 through the utility.
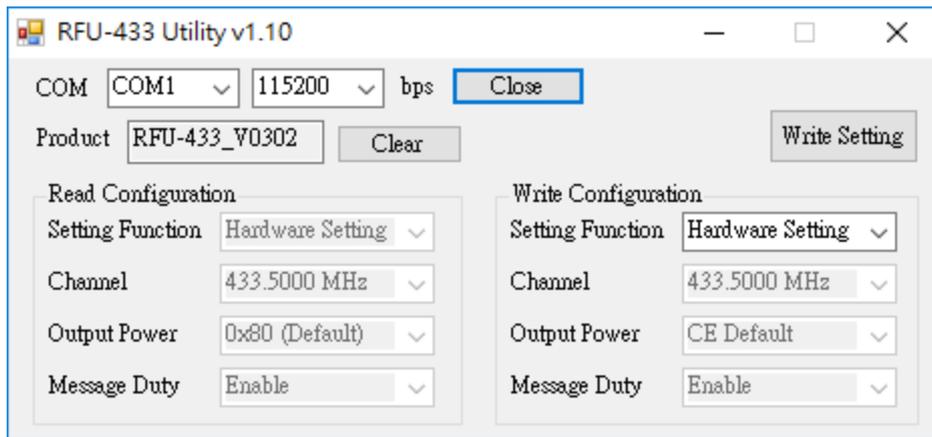
Open COM Button: Open COM port and connect to RFU-433.

Close Button: Close COM port.

Product: Here will show the module name and firmware version.

Setting Function: It includes "Hardware Setting" and "Software Setting". For "Hardware Setting", the "Channel" is 433.5000 MHz, the "Output Power" is 10 dBm and the "Message Duty" is enable.

Channel: For RFU-433, RF channel is 433.1000 MHz ~ 434.6000 MHz.

Output Power: The RF output power is from 0x00 ~ 0x7F. Default is 10 dBm and 0x7F is max (19 dBm).

Message Duty: Message duty means the minimum time interval for RF message. The "next" time interval is 10 times the "current" RF message Tx time. For example, if current transmission RF message is 20 bytes with 9600 bps, the Tx time is about 20 ms, so the next time the RFU-433 can transmit RF message is after 200 ms. That is to say the message duty is 10%.

Write Setting Button: Click it to set all setting on the "Write Configuration" panel to the module and read back on "Read Configuration" panel.
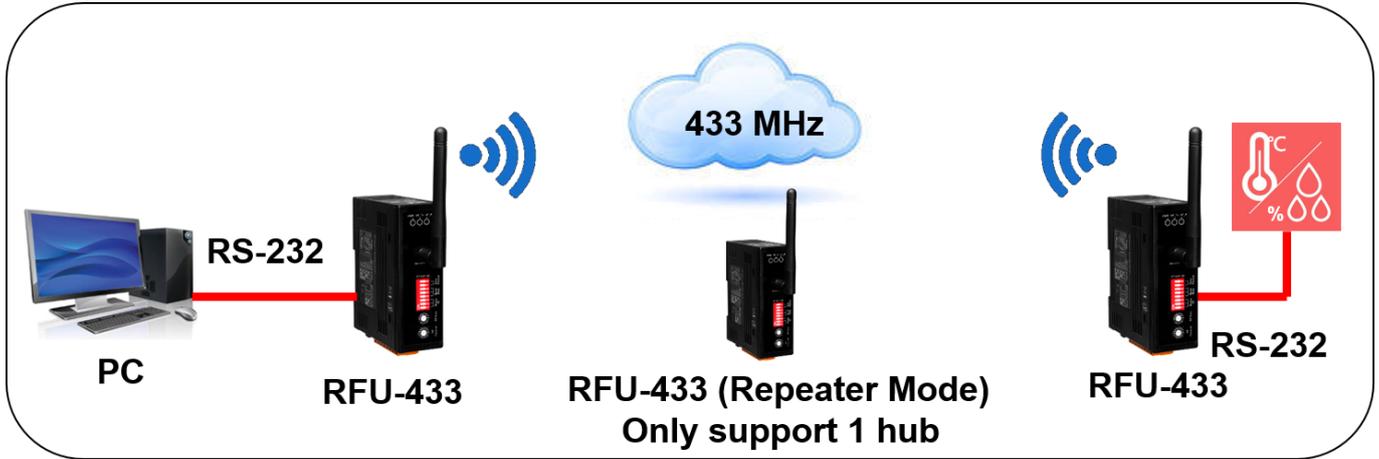
Repeater Mode

PC cannot monitor the thermometer and hygrometer directly because the distance is too far. But the repeater can bypass the RF message one side to another and let PC can monitor the thermometer and hygrometer.

RSSI Test
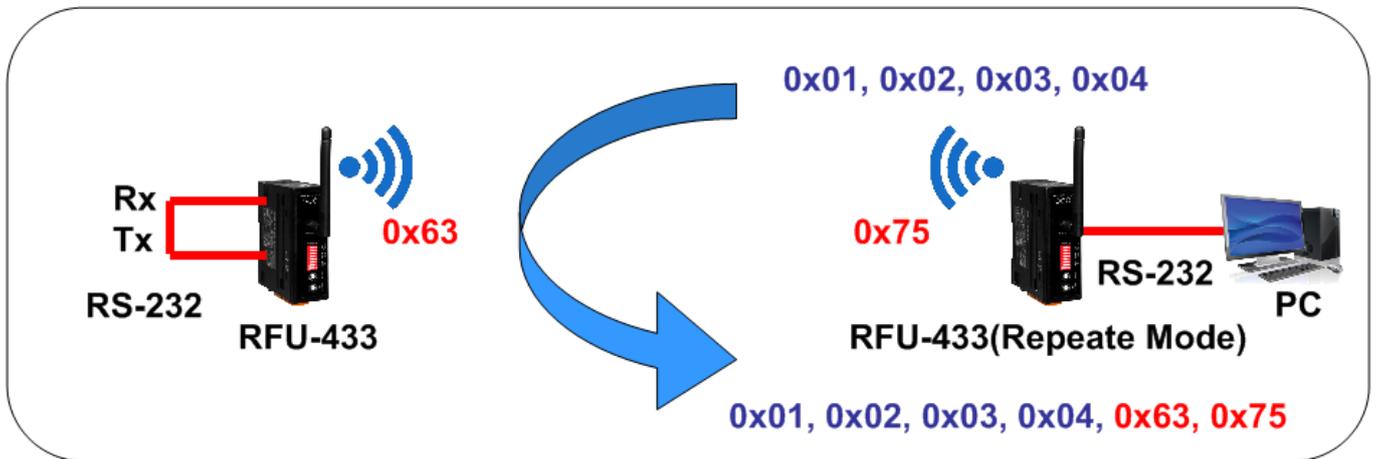
User can use repeater mode to check the RSSI value.