Testing RS232/RS485 Data Radio Modem with Serial Port Tool   V1.10

This document demonstrates how to test the communication of RS232/RS485 interface data radio modem DRF4432D20I-043L1/2, DRF1278DL1/2 and DRF1276DL1/2 with tool Advanced Serial Port Monitor from AGG Software and USB converter board.

USB Type	Description	Compatible Modules
DAC13	USB-to-RS232	DRF4432D20I-L1, DRF1278DL1, DRF1276DL1, DRF1278DX2
DAC23	USB-to-RS485	DRF4432D20I-L2, DRF1278DL2, DRF1276DL2, DRF1278DX3

Table 1: Compatible USB Boards for Data Radio Modem

1.   USB BOARD DEFINITIONS
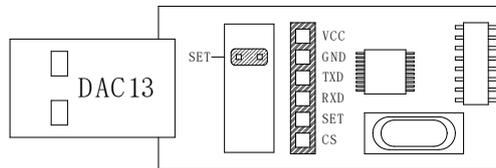
Figure 1: USB-to-RS232 converter board DAC13
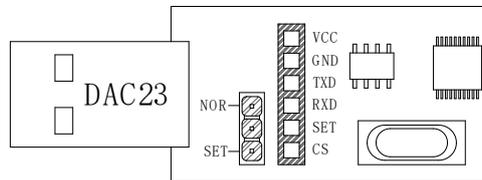
Figure 2: USB-to-RS485 converter board DAC13

Pin	Name	Description
1	VCC	5V
2	GND	Ground (0V)
3	TXD	It connects the TXD pin of the host (module)
4	RXD	It connects the RXD pin of the host (module)
5	SET	Jumper open: High, Jumper shorted: GND
6	CS	---

Table 2: USB Board DAC02

If it is the first time for the users to use the USB board, the corresponding USB driver should be installed in advance, which can be downloaded from the link below:

http://www.dorji.com/pro/tool/DACx3_USB_Driver.rar

2. DRF4432D20I-043L1/L2 MODULES

All of the data radio modems in the table can be configured with new parameters through the DRF Tool provided by DORJI. The table 3 below shows the data radio modems with corresponding DRF Tool.

DRF Tool Name	Supported Modules
DRF4432D20I-043L1/2	DRF4432D20I-043L1, DRF4432D20I-043L2
DRF127xDL/X series	DRF1278DL1/2, DRF1276DL1/2, DRF1278DX2/3

Table 3: DRF Tool vs Data Radio Modems

For **DRF4432D20-043L1 and DRF4432D20I-043L2**, the operation methods are the same as soon as they are connected to DAC13 and DAC23 correspondingly. In configuration mode, the SET should be connected to GND so the jumper on the USB board should be kept to connect the SET pin to GND on the board.

Pin	DAC13	DAC23	DRF4432D20I-043L1	DRF4432D20I-043L2
1	VCC	VCC	VCC	VCC
2	GND	GND	GND	GND
3	TXD	TXD	TXD	TXD
4	RXD	RXD	RXD	RXD
5	SET	SET	SET	SET
6	CS	CS	CS	CS

Table 4: Connecting USB board to DRF4432D20I-043L1/2 module

When the module is connected to the USB board correctly, users can insert the USB kit into computer and then run the configuration tool. When the tool is opened, the Model and Version area is gray (Figure . Users can check which COM ports the tool occupies by right-click my computer, choose properties and click device manager. When the right COM port is chosen from the window of the tool, users can click the OPEN button to activate the tool.

Figure 3: The Interface of inactivated DRF4432D20I Tool
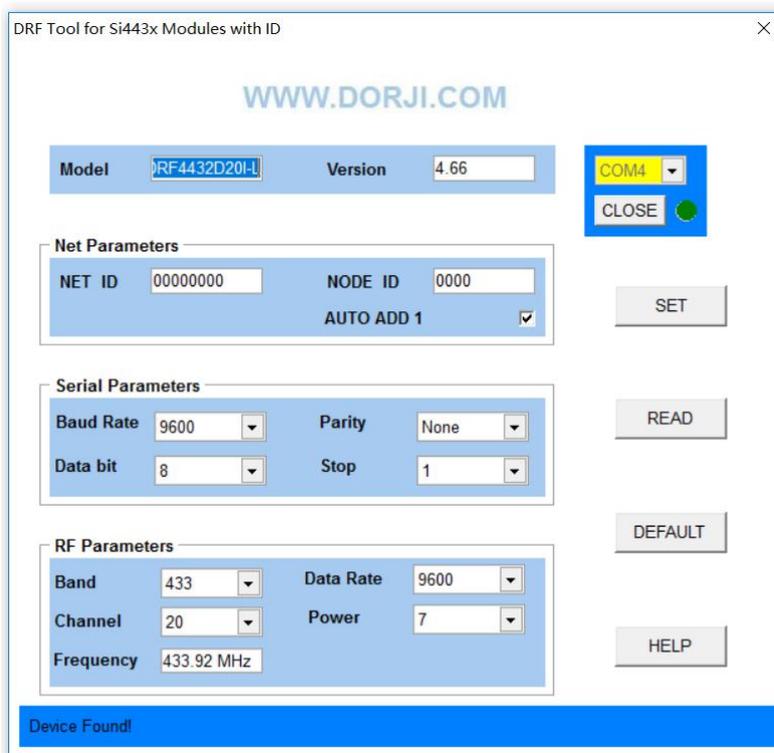
Figure 4: The Interface of activated DRF4432D20I Tool

The DEFAULT button is used to restore the module to the factor parameters. The READ button can be used to read out the present parameters inside the module and the SET button is used to set the modules with new parameters. The picture below shows the interface after the DEFAULT button is pressed.
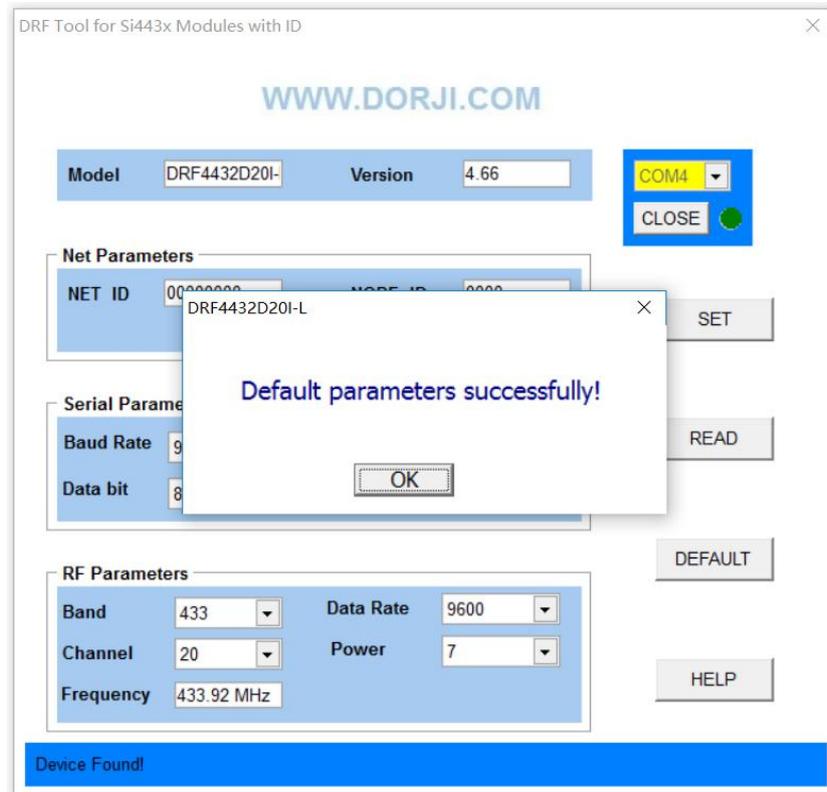
Figure 5: Command Button in the Tool

3. DRF1278DL1/2, DRF1276DL1/2/ & DRF1278DX2/3 MODULES

This section shows how to use the configuration tool to configure the modules and test the communication of modules through serial port tool.

Pin	DAC13	DAC23	DRF1278DL1	DRF1278DL2	DRF1276DL1	DRF1276DL2	DRF1278DX2	DRF1278DX3
1	VCC	VCC	VCC	VCC	VCC	VCC	VCC	VCC
2	GND	GND	GND	GND	GND	GND	GND	GND
3	TXD	TXD	TXD	TXD	TXD	TXD	TXD	TXD
4	RXD	RXD	RXD	RXD	RXD	RXD	RXD	RXD
5	SET	SET	---	---	---	---	---	---
6	CS	CS	---	---	---	---	---	---

Table 5: Connecting USB board to DRF1278DL1/2 & DRF1276DL1/2 & DRF1278DX2/3 module

DRF1278DL1/2 & DRF1276DL1/2 & DRF1278DX2/3 modules use the same firmware so they are compatible in communication and the usages of them are the same so we will use DRF1278DL2 as example in this section. For configuring and testing purpose we will use 2pcs USB-to-RS485 boards DAC23, 2pcs DRF1278DL2 and 2pcs antenna & wire cables.

Assuming the USB driver being installed, we insert the USB kit into computer and keep the right connection between USB board and DRF1278DL2 modules. Since AUX pin of DRF1278DL2 is used to provide the indication of data in/out, it is not needed to be connected in configuring and simple testing in this section. We then run the configuration tool and choose the right COM port
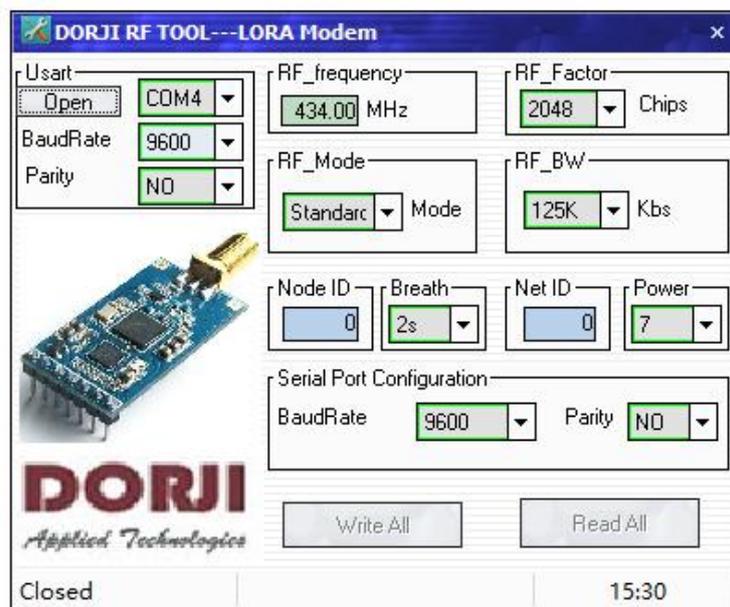
Figure 6: Configuration Tool for DRF127xDL Modules

Now we can click the OPEN button and then click the Read All button at the right bottom of the tool. The default parameters will be showed in the interface and the status indication area at the bottom of the tool will show "Successful". We can replace this module with another and repeat the process to check if the two modules have the same parameters. If you want to change the parameters, you can revise the values and click Write All button to make the change come into effect.
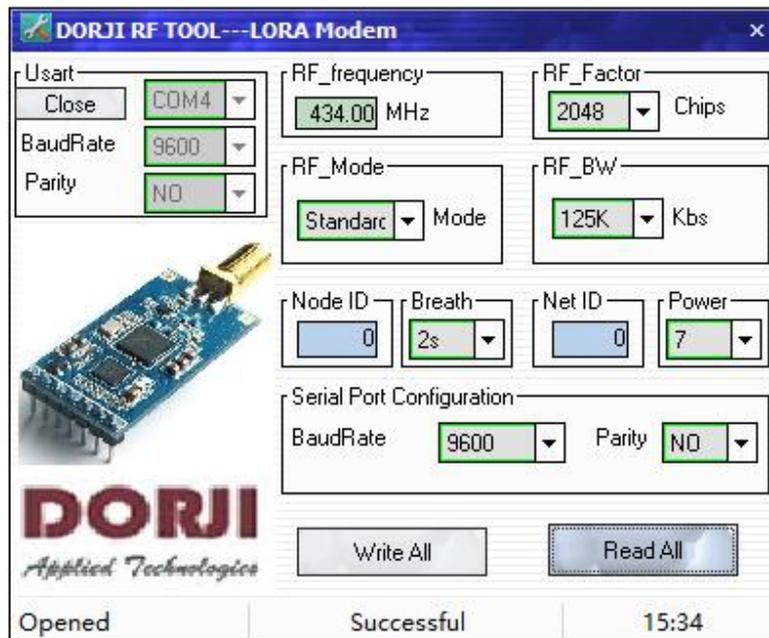
Figure 7: Read the Default Parameters

Now we can close the start to test the communication between two modules. Being sure you connect two modules with USB kits to the computer and close the configuration tool to release the COM port. We run the Advanced serial port monitor (or other serial port tool) twice to open two interfaces.

Since the default serial port data format of DRF1278DL2 is (9600bps, 8-bit data, no parity check), we also choose the same setting for the serial port tool in order to make successful connection, open correct COM port for corresponding module and click OPEN button to activate the tool.
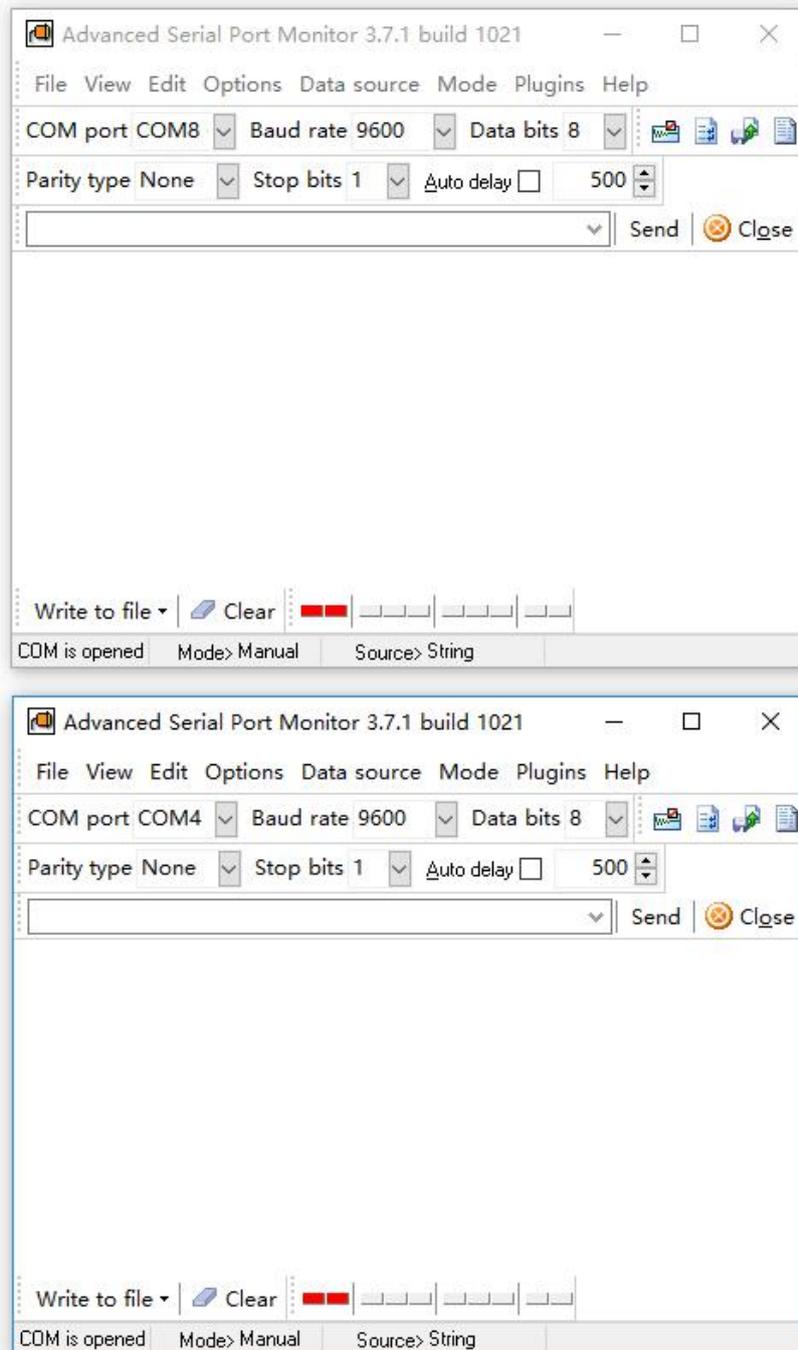
Figure 8: Setting the Serial Port Tool

Please note that default COM ports in the tool interfaces are the same when you open the tool twice so you need to choose a different COM port for another module from the drop-down menu beside the COM port in the tool.

If we input " Welcome to use DRF1278DL modules" and click Send button in one tool, another tool will receive it and shows the same content in the display area. Since the module works in half-duplex way, we can make response by sending "Thank you!".
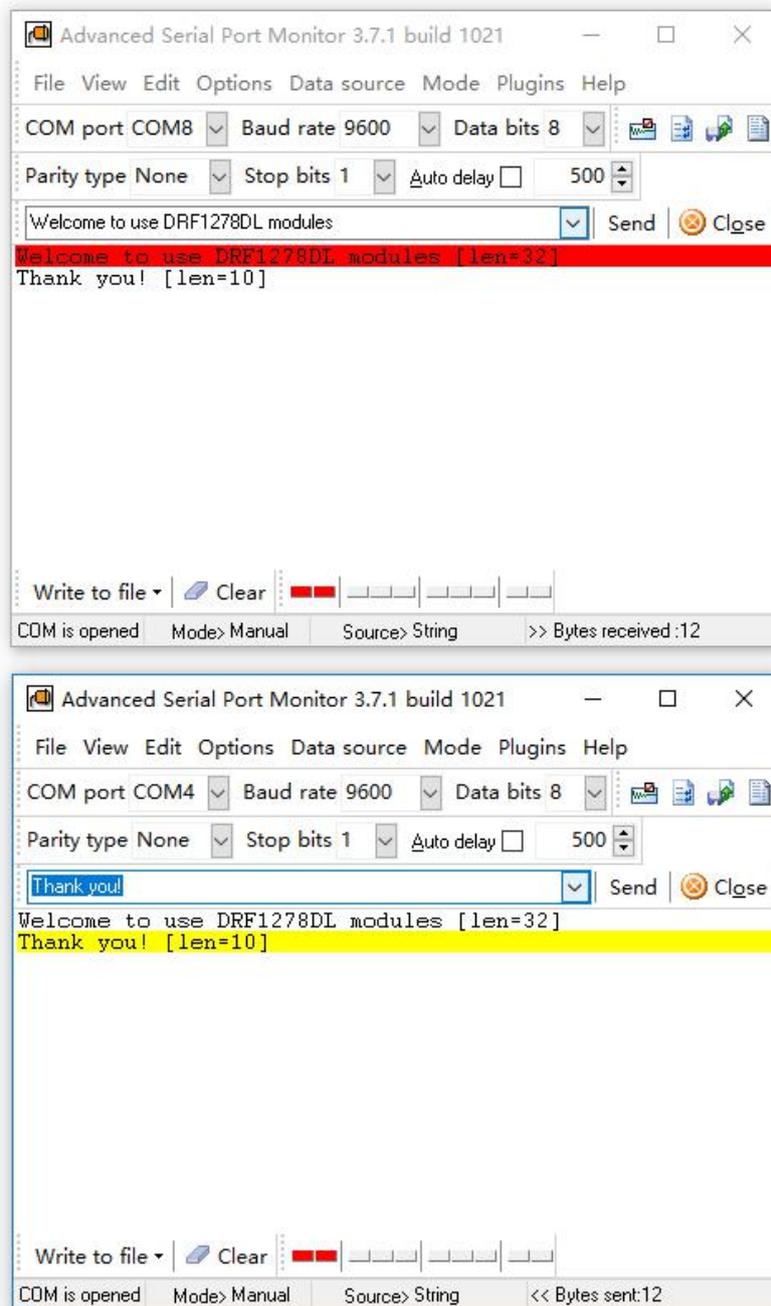
Figure 9: Testing Communication with Serial Port Tool

Since the DRF127xDL series are transparent data radio modules, they receive data from serial port and transmit the data out directly or receive the wireless data from another module and transfer the data to the serial port automatically. The usage of them are very simple and users only need to care about the wireless parameters (RF_factor & RF_BW) to the suitable RF data rate and sensitivity for the application.

SF	BW/kHz	equivalent BR /kbps	Sensitivity
7	500	21.88	-117
8	500	12.5	-120
9	500	7.032	-123
10	500	3.908	-126
11	500	2.148	-129
12	500	1.172	-132

SF	BW/kHz	equivalent BR /kbps	Sensitivity
7	250	10.94	-120
8	250	6.25	-123
9	250	3.516	-126
10	250	1.954	-129
11	250	1.074	-132
12	250	0.586	-135

SF	BW/kHz	equivalent BR /kbps	Sensitivity
7	125	5.47	-123
8	125	3.125	-126
9	125	1.758	-129
10	125	0.977	-132
11	125	0.537	-135
12	125	0.293	-138

Table 6: SF(RF_factor) & BW(RF_BW) vs RF data rate & Sensitivity

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