# Operation Manual for DAC04 Board                    V1.00

The function of kit DAC04 is to convert UART signal to USB signal and provides the interface for customers to configure the settings of modules through PC software tool MNET_III_Configuration_tool and verify the basic function of MNET III network. This manual demonstrates how to use DAC04 in setting mode and communication mode for wireless mesh network modules DRF1110N.
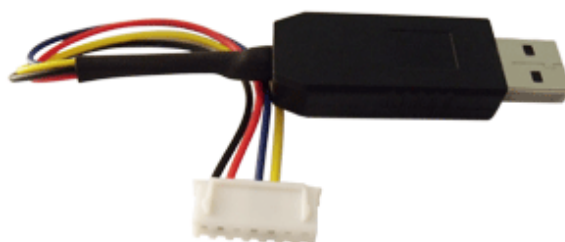


**Figure 1: USB Converter Board DAC04A**
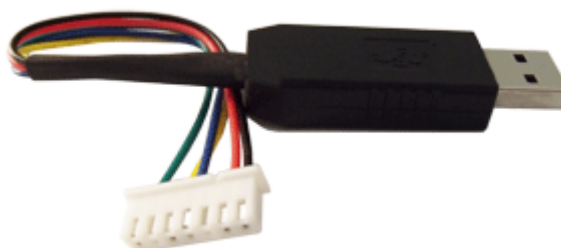


**Figure 2: USB Converter Board DAC04B**

## 1.    PIN FUNCTION

| PIN | COLOR | DAC04A | DAC04B | FUNCTION |
|-----|-------|--------|--------|----------|
| 1 | Black | GND | GND | Ground |
| 2 | Red | +3.3V | +3.3V | Power |
| 3 | --- | NC | NC | No connection |
| 4 | Blue | TX | TX | UART TX |
| 5 | Yellow | RX | RX | UART RX |
| 6 | --- | NC | NC | No connection |
| 7 | Green | NC | GND | Ground |

**Table 1: DAC04 Pin Function**

The 7$^{th}$ Pin of DRF1110N module is acted as input pin while DRF1110N module is powered

on. If the $7^{th}$ is high, the module will work in normal mode; or else the module will be in configuration mode. For DAC04A board, the $7^{th}$ pin is floated so the module will work in normal communication mode when it is connected PC through DAC04A. For configuring the parameters of DRF1110N module, the DAC04B must be used because the $7^{th}$ pin is connected with Ground and the module will enter into setting mode. Users also can pull out the wire on $7^{th}$ pin so that the function of DAC04B board will be the same as DAC04A board.

## 2. CONFIGURATION MODE

For the first use of DAC04 board, users need to install USB driver which can be downloaded from page (http://www.dorji.com/pro/kits/demokits2.html). After installing USB driver successfully, you can find driver information "Prolific USB-to-Serial Comm Port" under COM & LPT from device manager of windows operation system.

Before configuration, users need to run configuration tool first. The tool will monitor the com port and detect the plug and unplug of USB board. After DRF1110N is connected with DAC04B board in correct pin sequence, users then insert the USB board to computer.
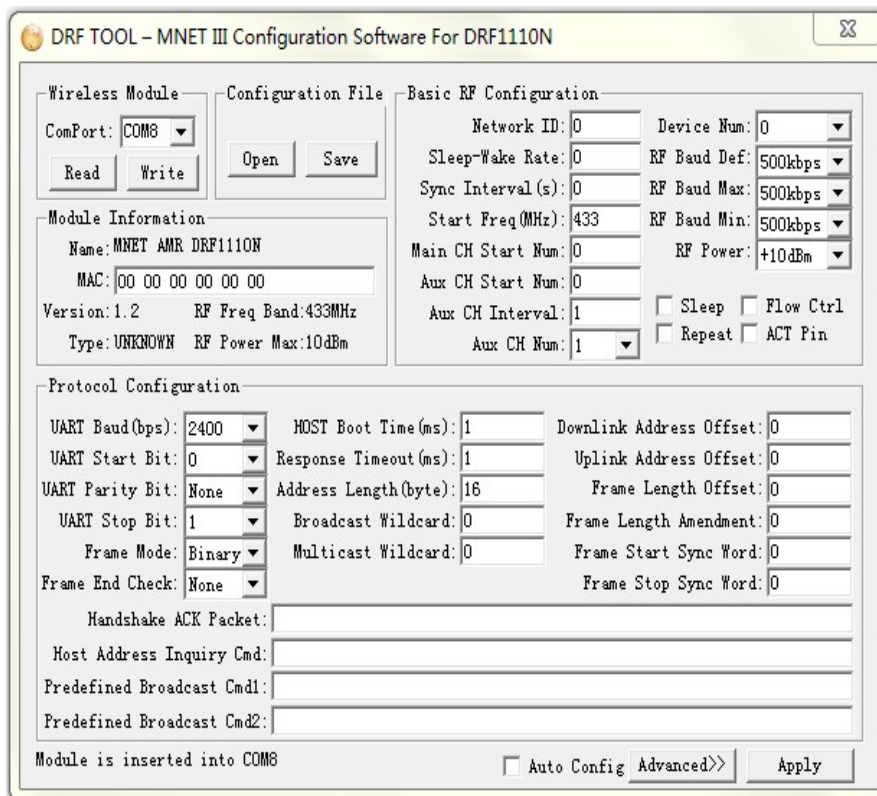


**Figure 3: COM Port Being Detected**

After the configuration tool detects the insertion of module, users then can use Read/Write button to check or change parameters. The pictures below show the default parameters for root module and node module.

**Figure 4: Default Parameters for Node Module DRF1110N10N**



**Figure 5: Default Parameters for Concentrator Module DRF1110N10C**

## 3.   CONFIGURATION MODE

The basic function of network communication can be verified with default parameters except to set each node module with an unique MAC address. Users can use any popular serial port tool for testing. In this section SecureCRT® from VanDyke Software, Inc. will be used to demonstrate the communication between node module and root module.

When the module with USB board is connected to computer, the operation system will prompt which COM port is used. Or users can check the port information from the Device Manager. After that users can run SecureCRT software and click "File" from menu and choose "Quick Connect" from the drop-down list and make selection showed in the picture below:
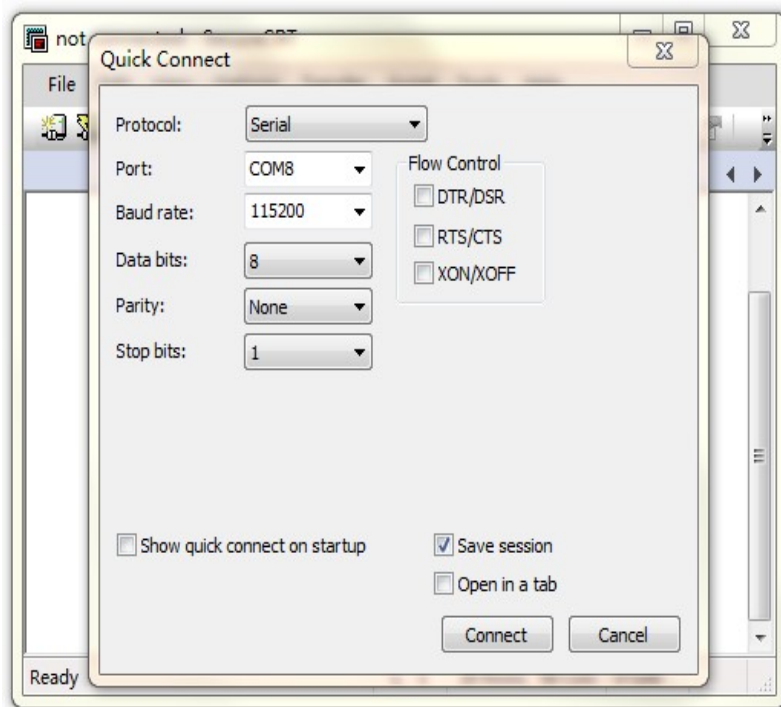


**Figure 6: Configuring SecureCRT Software**

After choosing the right COM port and clicking "Connect" button, the software window will display the data format at the bottom of the software window.
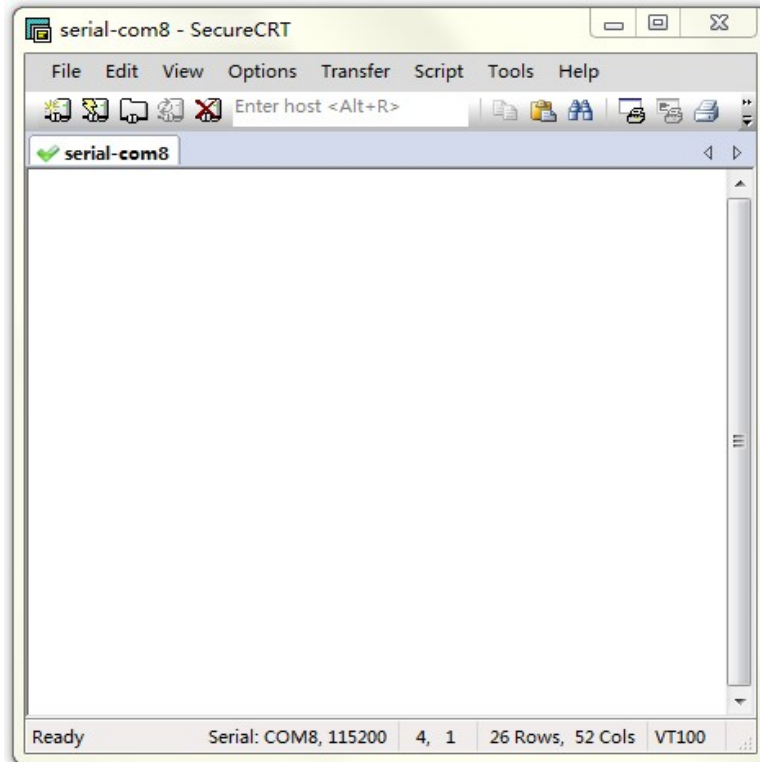
**Figure 7: Connecting the right COM port with data format**

Choose "Options" from menu and configure session options as showed in the picture below:
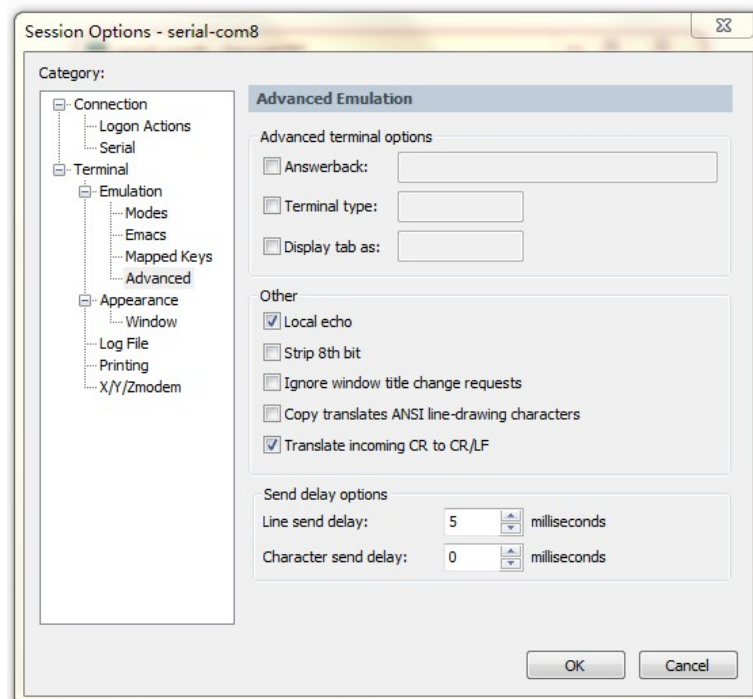


**Figure 8: Advanced Emulation in Session Options**

In order to better observe data flow and make communication manually between two modules, we also need open "Chat Window" from "View" in the menu. The final interface of software is showed as below:
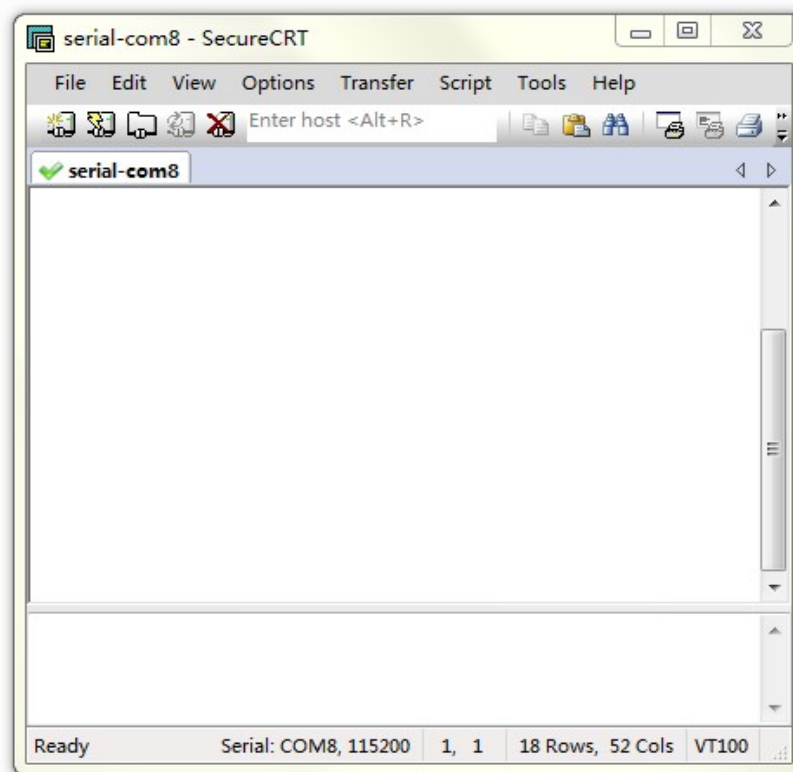


**Figure 9: Final Interface of Tool**

Because the shielding of SMA connector, users need to install SMA antenna for each module to enhance wireless signal. In order to avoid receive jam because of too strong signal, the distance between two neighbor nodes should be 1.5 meters at least. Certainly users also can reduce the output power to achieve closer distance. Now users can test the basic networking communication after each module is connected to computer correctly. The default frame start synchronization byte is '~' which corresponding value in hexadecimal is 0x7e. 'F' and 'f' are wildcards of broadcasting or multicasting address. The interval time of any two continuous characters should be less than 100ms; otherwise it will be regarded as the end of a data payload.

If the default parameters ("Repeat" option is checked in Basic RF Configuration block and are not changed, the root module will broadcast "~FFFFFFRDD\r" at the interval of 2 seconds after power-on. The picture below shows the default settings of root module. The "Address Length" is 6 bytes; "Frame Start Sync Word" is "126" in decimal (or 7E in hexadecimal) which means the ASCII character is "~"; "Broadcast Wildcard" is "70" (corresponding ASCII character is "F") and "Frame Stop Sync Word" is "13" (corresponding ASCII character is "\r").

**Figure 10: Data Package Analysis**

The "Predefined Broadcast Cmd1" defines the content of broadcasting package. The value "7E 46 46 46 46 46 46 52 44 44 0D" in hexadecimal refers to "~FFFFFFRDD\r" in ASCII characters.

When the node module receives the broadcast package, it will remove the "Frame Start Sync Word" and "Frame Stop Sync Word" automatically and transfer the data "RDD" to the host (Here DAC04 USB board with PC) through UART interface. The SecureCRT tool on node module side will print the "RDD" periodically in the content window.
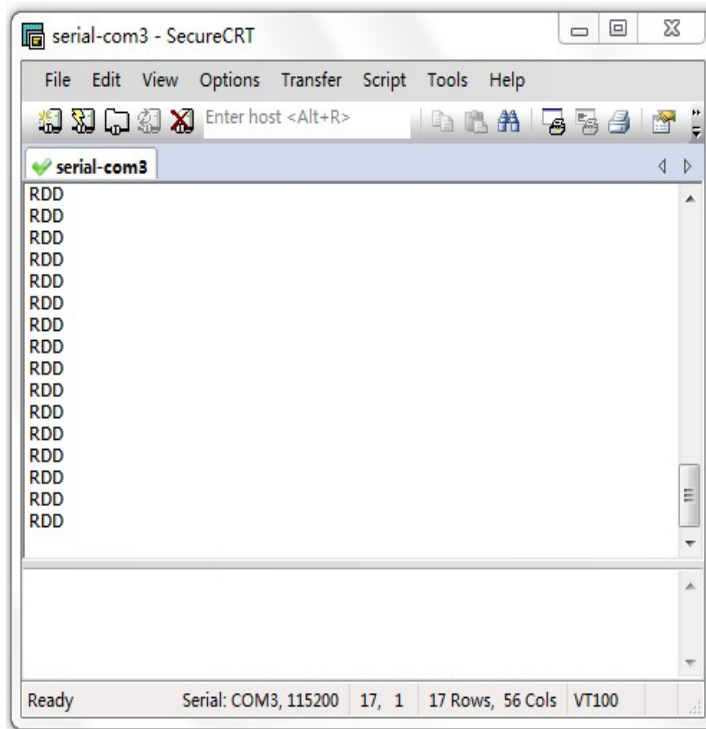


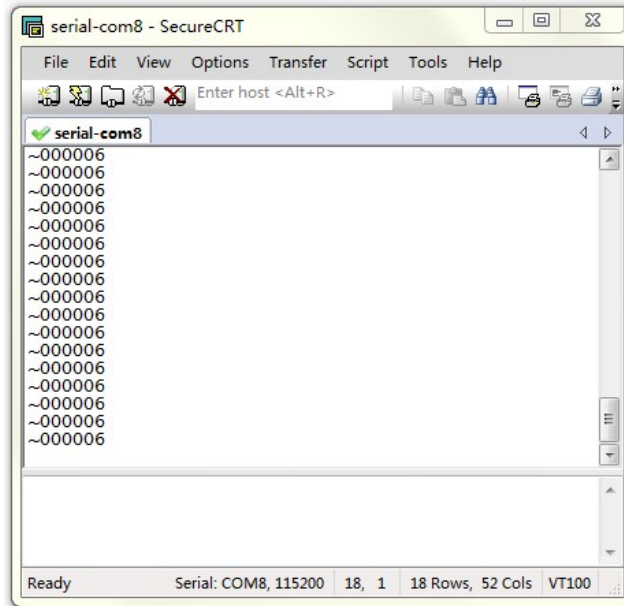**Figure 11: Node Module in Broadcast**

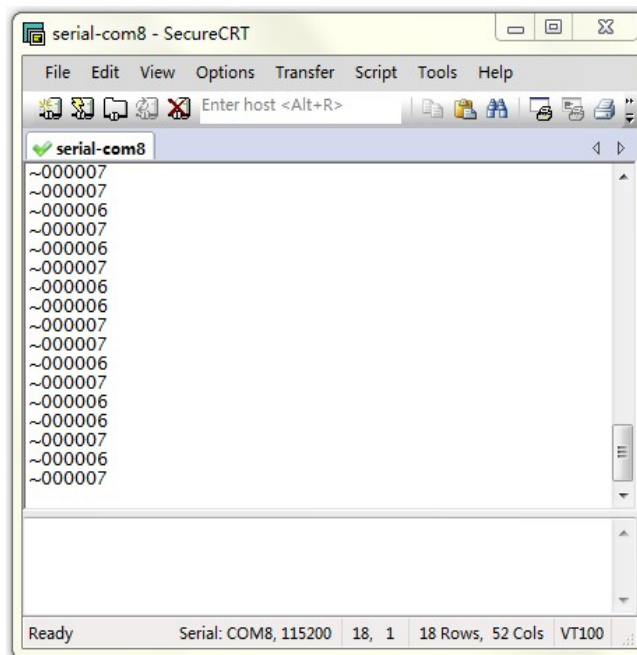**Figure 12: Root Module & One Node Module in Broadcast**



**Figure 13: Root Module & Two Node Modules in Broadcast**

Users can turn off the "Repeat" broadcast function of root module by inputting command "ATCO" (referring command section in DRF1110N datasheet) and the root module will respond with "ATOK" after it receives the command successfully. Users then input "~000006WWW.DORJI.COM" into the text window of SecureCRT tool and confirm it by carriage return key. When the root module recognizes the data package from SecureCRT is correct, it will respond to SecureCRT with "OK\r". When the node module receives this data package successfully through wireless link, it will display "WWW.DORJI.COM" in the window.
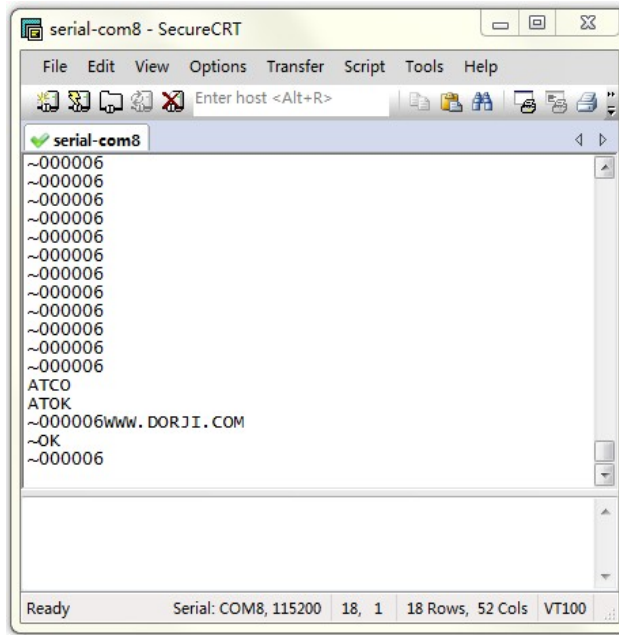
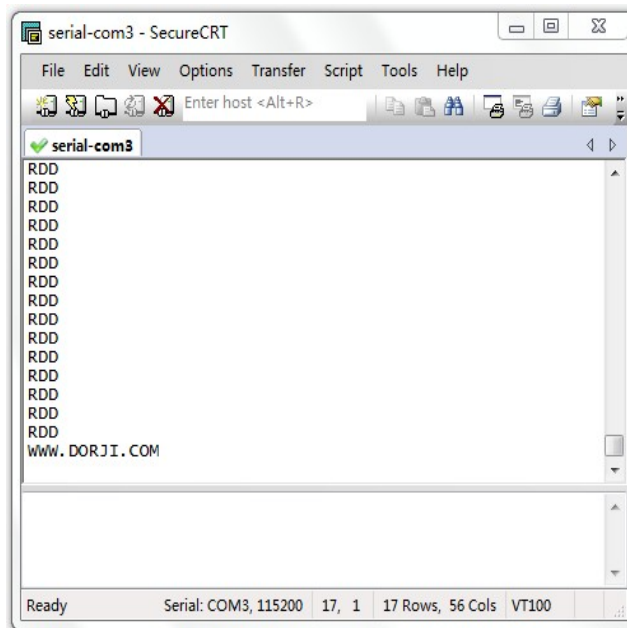**Figure 14: Root Module in Unicast Downlink**



**Figure 15: Node Module in Unicast Downlink**

The node module also can send data to Root module. User can type "Test Unicast Uplink" in SecureCRT text window and confirm it. The root module will display the MAC address of node module following the text information "Test Unicast Uplink".
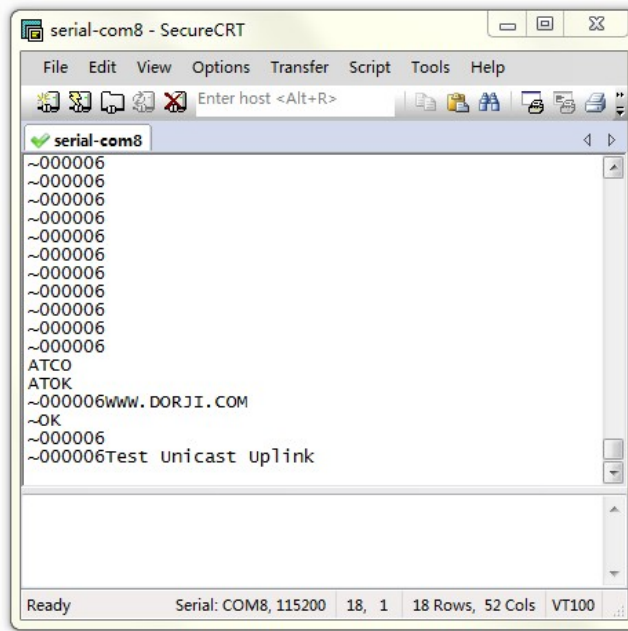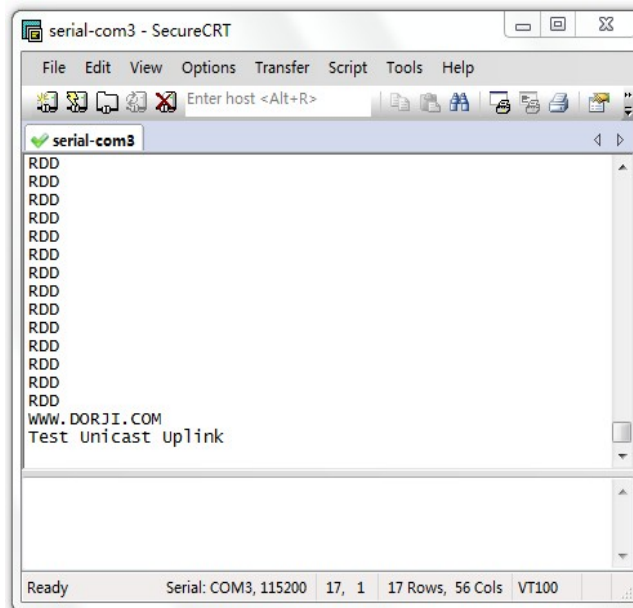
**Figure 16: Root Module in Unicast Uplink**



**Figure 17: Node Module in Unicast Uplink**

This document only verifies the basic function of network module DRF1110N. Users can make more complicated testing by combining with configuration tool MNET_III_Configuration_tool.

Dorji Applied Technologies

A division of *Dorji Industrial Group Co., Ltd*

Add.: Xinchenhuayuan 2, Dalangnanlu, Longhua, Baoan district, Shenzhen, China 518109

Tel:     0086-755-28156122

Fax.:    0086-755-28156133

Email:    sales@dorji.com

Web:    http://www.dorji.com

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