**Operation Manual for DBM01 Module** **V1.10**

This document demonstrates how to use AT commands of DBM01 modules with USB-to-TTL board DAC02 through computer and test the basic communication with Android / iPhone/iPad.

## 1. PREPARATION

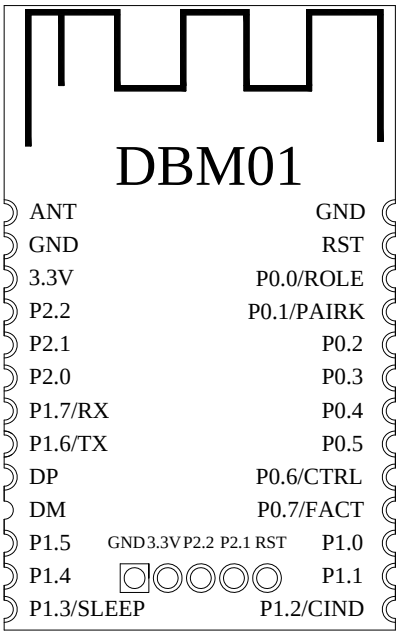


**Figure 1: DBM01 Pin Names**

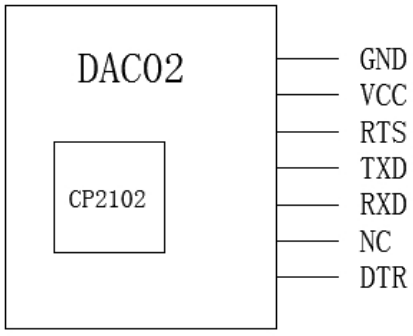


**Figure 2: DAC02 Pin Names**

Considering the Bluetooth module works under 3.6V, we choose 3.3V version of USB board DAC02-3. In order to demonstrate the functions of AT commands, the CTRL pin should be connected to logic low so we connect the CTRL pin of DBM01 to the GND pin. For the first use of DAC02 board, the USB driver should be installed in advance. Certainly users also can

choose other 3.3V USB-to-TTL board to test the modules. After connecting the five pins (GND, VCC, TXD, RXD, CTRL) with USB board correctly, users then connect the kit to computer and run the popular serial port tool SecureCRT® from VanDyke Software to use AT commands.

## 2. AT COMMAND MODE

- **Practice AT COMMANDS With Computer**

Users can download 30 days free version of SecureCRT® from VanDyke Software or purchase it for long-term use. After connecting the USB board with DBM01 module to computer, users can check which COM port the board uses by right-clicking my computer, choosing device manager and clicking the Ports (COM and LPT). After that users can run the software and click "File" from the menu and choose "Quick Connect" from the drop-down list and make the selection showed in the picture below:

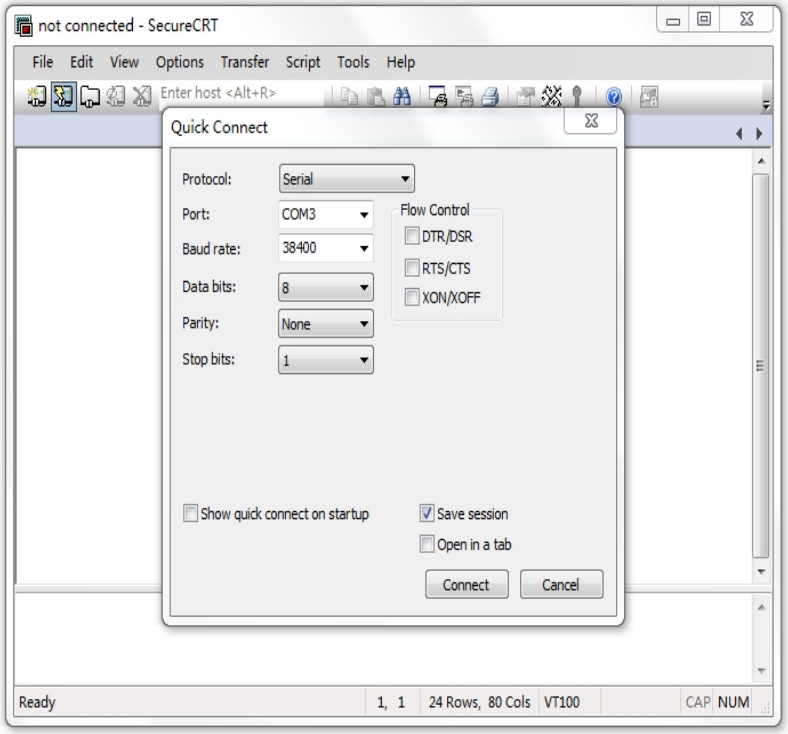


**Figure 3: Configuring SecureCRT Software**

The COM port used here is COM3. Because the default baud rate of DBM01 module is 38400, we choose the same setting and the protocol is Serial. After clicking "Connect" button, the software window will display the data format at the bottom of the tool.

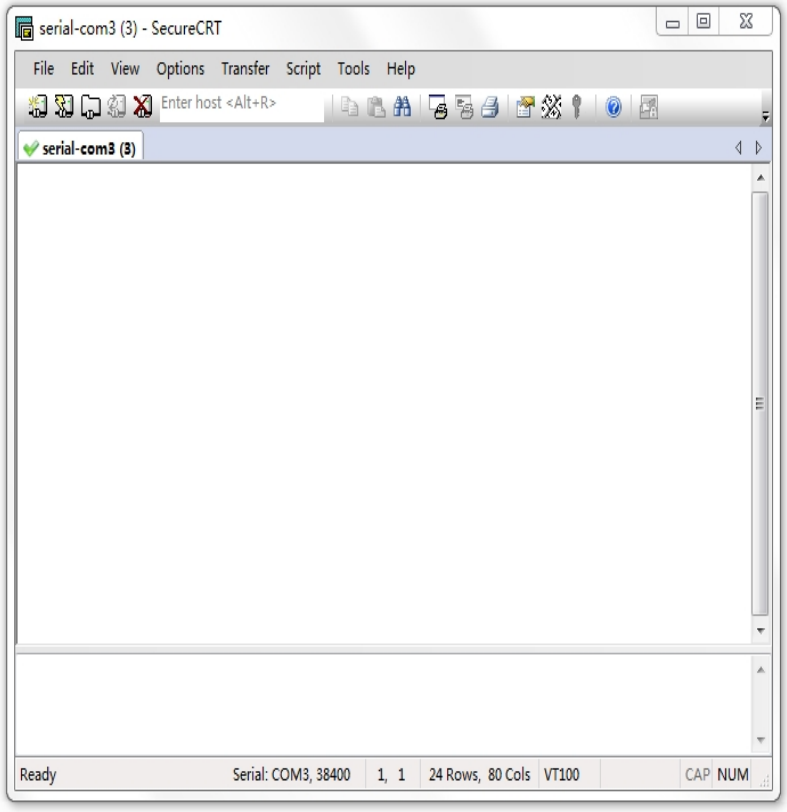


**Figure 4: Data Format Setting With Correct COM Port**

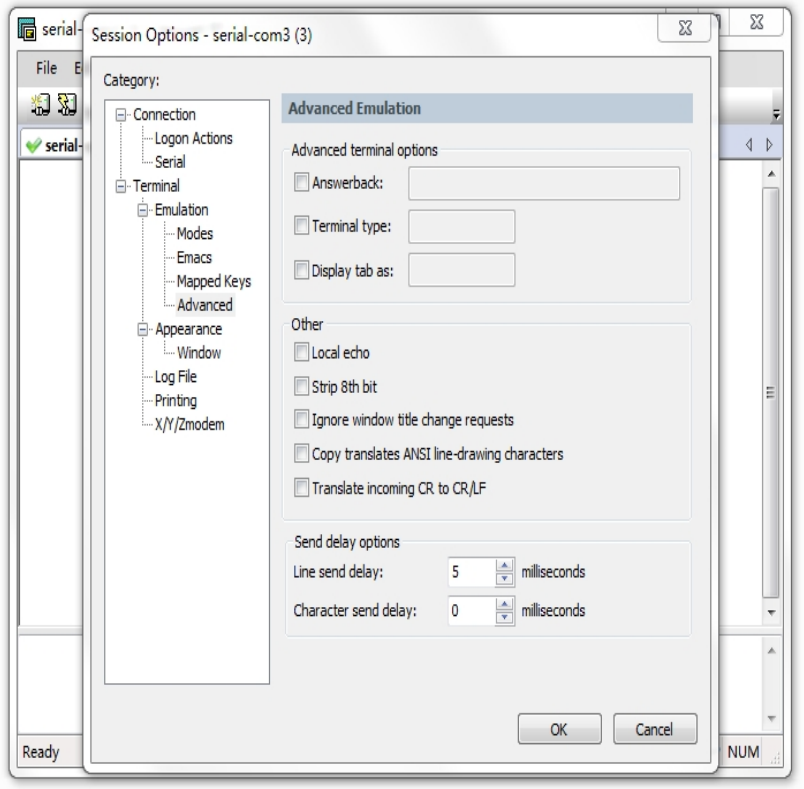


**Figure 5: Advanced Emulation in Session Options**

Now we come to the right place and start the journey by inputting “AT” command and pressing “Enter” key on the keypad, the module will respond with “OK” at the second line in the tool window.

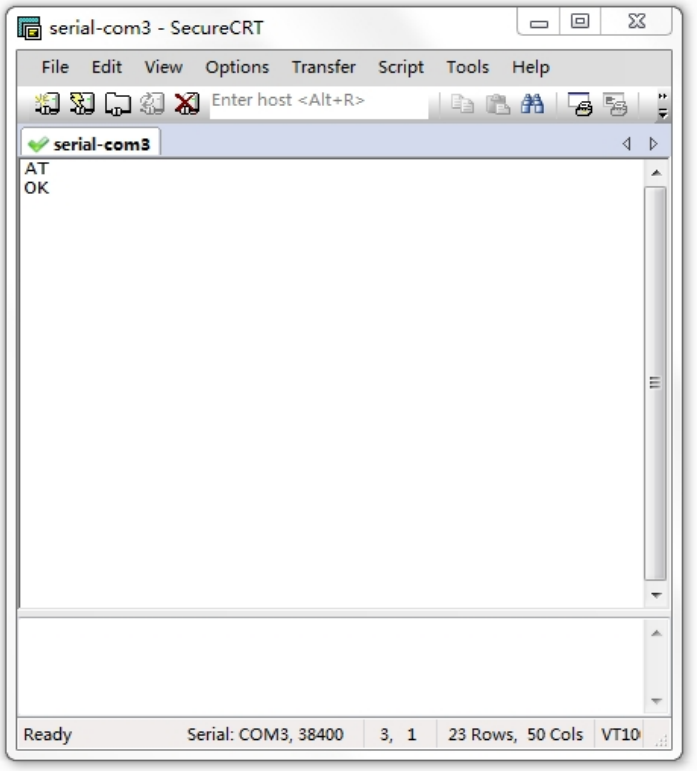


**Figure 6: Using the First AT Command**

Congratulation! You know how to use AT commands. Let us move to the next step to see what AT commands are supported by the module. Continuing to input AT+HELP and press ENTER key, a list of AT commands will be showed in the windows For some systems which the 38400 baud rate is not supported, we can use AT command to change the rate to the targeted values by using AT command AT+UART. Firstly we can type AT+UART? and press ENTER to check the default baud rate.

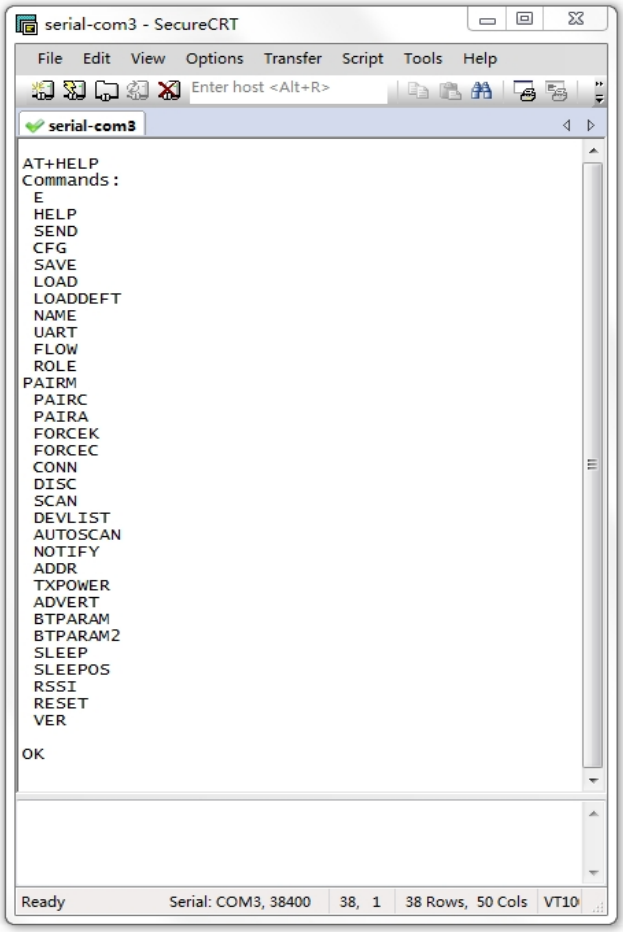


**Figure 7: AT Commands Set**

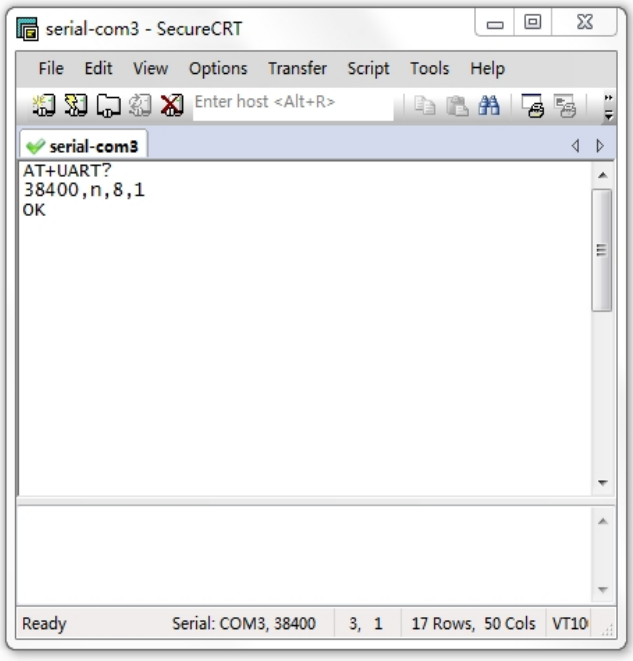


**Figure 8: AT Command for Baud Rate**

Some systems hate the data rate of 38400 bps so we change the value to 9600 bps to make them happy. We can easily do it by inputting “AT+UART=9600,N,8,1” and pressing ENTER. The tool quickly responds with OK. After typing inquiry command AT+UART?, the windows shows the right value. It seems everything is ok, isn’t it?

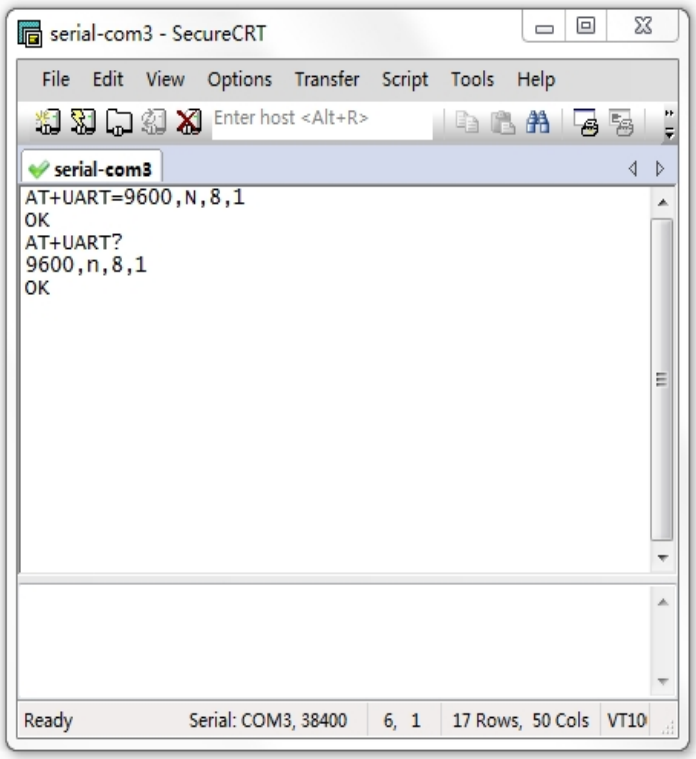


**Figure 9: Changing the Baud Rate**

The testing results go toward what we expect. Hold on! Something seems to be abnormal. The baud rate of DBM01 module is 9600 bps now but the baud rate of serial port of computer is set to 38400 bps. How could the tool still communicate with the DBM01 module at mismatched data rates? Let us be back to the AT COMMAND SET section of DBM01 datasheet:

> Some commands of DBM01 module come into effect after executing **AT+SAVE** command but for other commands they need to execute another command **AT+RESET** after using command **AT+SAVE** in order to reset the module and let it work in new parameters.

Unfortunately the command AT+UART belongs to the second category in the table 5 so the execution of this command only means the DBM01 module stores the new parameters into the buffer area. We input AT+SAVE and press ENTER; then input AT+RESET and press ENTER again. Now DBM01 module works at 9600 bps and the serial port of computer works at 38400 bps. If you continue to input other commands, the windows will display strange characters (Maybe be used in Mars). In order to continue the testing, we should match the baud rate of DBM01 module with the data rate of serial port by right-clicking the Serial-COM3(or other COM number according to your computer) in the tool window and choosing “session option” to change the data rate of the latter to 9600 bps.

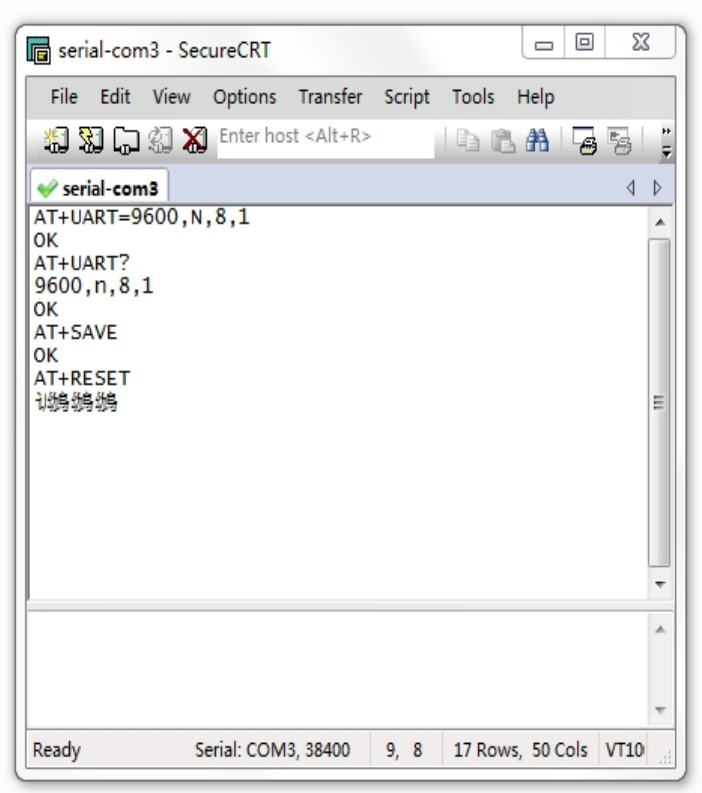


**Figure 10: UART Command Demonstration**

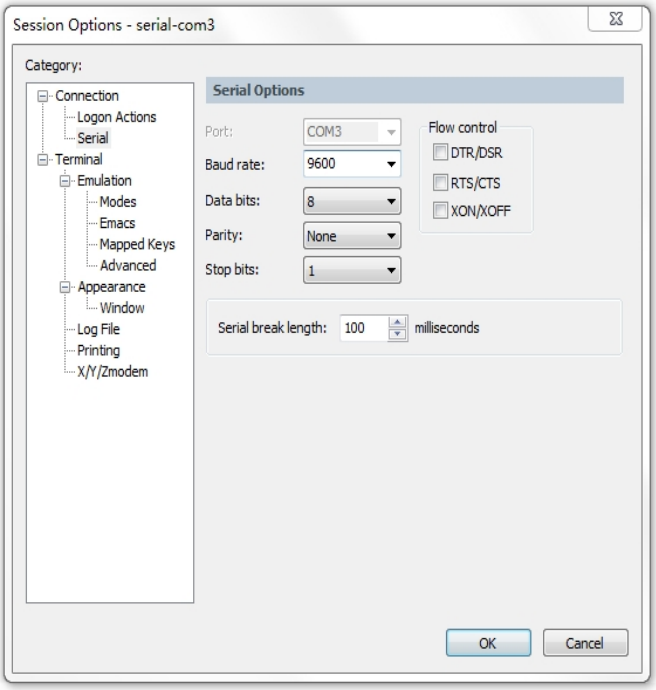


**Figure 11: Changing Data Rate of Serial Port**

- **Communicate With IPAD/IPHONE**

We are happy to live in the ages with so many geniuses who create so wonderful software and share with others selflessly. LIGHTBLUE is a very smart tool for testing the basic communication between IPAD/IPHONE system and other Bluetooth devices. It can be downloaded from the APP STORE of APPLE as free and can be installed easily.

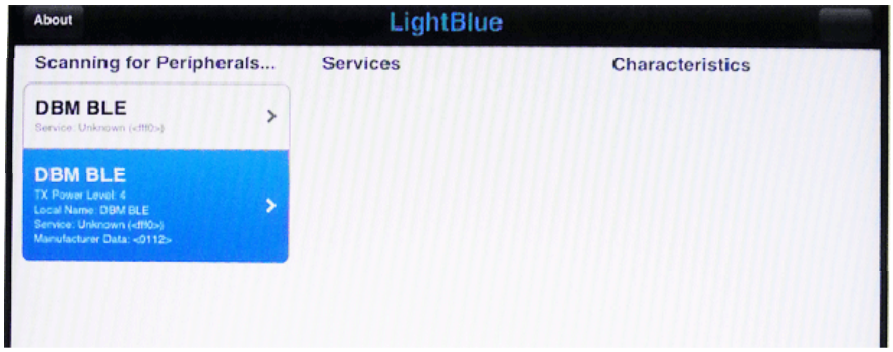


**Figure 12: LightBlue with DBM01 Module**

Because the CTRL pin of DBM01 is still connected to GND, the communication with IOS is tested in AT COMMAND MODE as peripheral device (ROLE pin is floated). Assuming the USB board with module is still connected to computer, the tool LIGHTBLUE will find it after scanning.

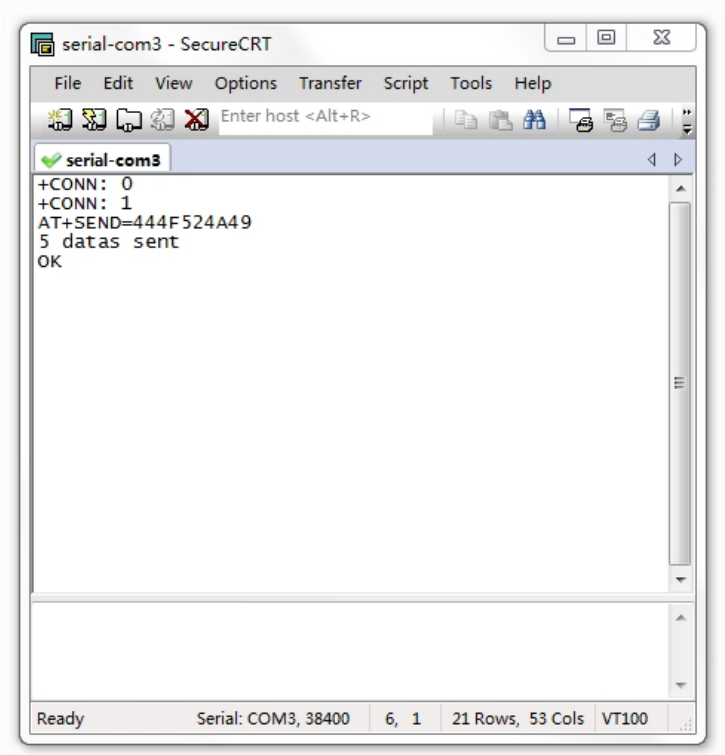


**Figure 13: Sending Data in AT COMMAND MODE**

Considering the module is in AT COMMAND MODE, the data sent by DBM01 module must be started with the AT command: AT+SEND and the full format is: AT+SEND=X,

among which X is the data package (<22 bytes). We check the ASCII character list and find the corresponding Hex codes for ASCII characters DORJI is 444F524A49. We input the AT command AT+SEND=444F524A49 in the window of SecureCRT and press ENTER. The tool will display how many bytes are sent.


**Figure 14: Read Data in IPAD/IPHONE**

We then switch back to LIGHTBLUE and check if the data is received by clicking DBM BLE, “0xFFF0” and choosing the READ command “0xFFF4”. The data sent by DBM01 will be displayed on the screen of IPAD/IPHONE. If we want to send data to DBM01 module, we can click the DBM BLE, “0xFFF0” and choose the WRITE command “0xFFF1”. We choose to input ASCII data “DORJI” directly in the pop-up window and click the SEND key on the screen

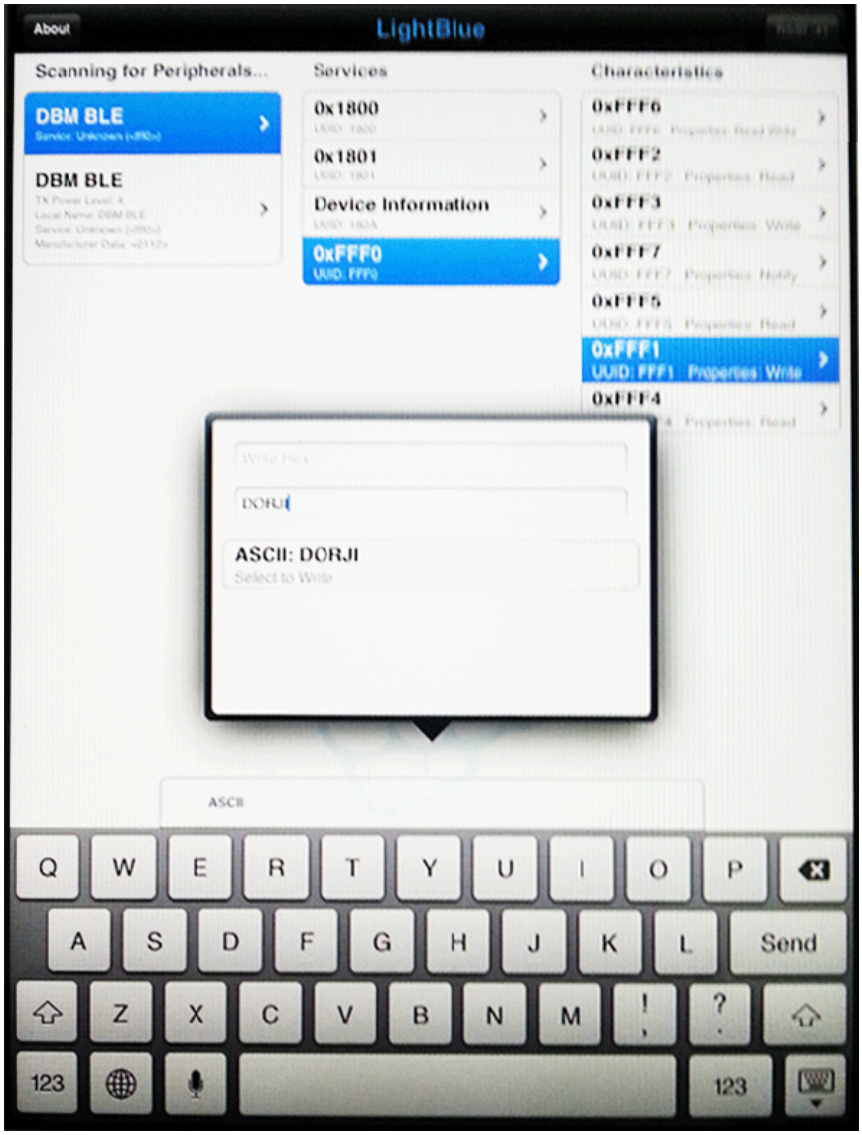


**Figure 15: Send Data By IPAD/IPHONE**

If you still keep the SecureCRT tool running, the DBM01 module will receive the data sent by IPAD/IPHONE and display it in the window.

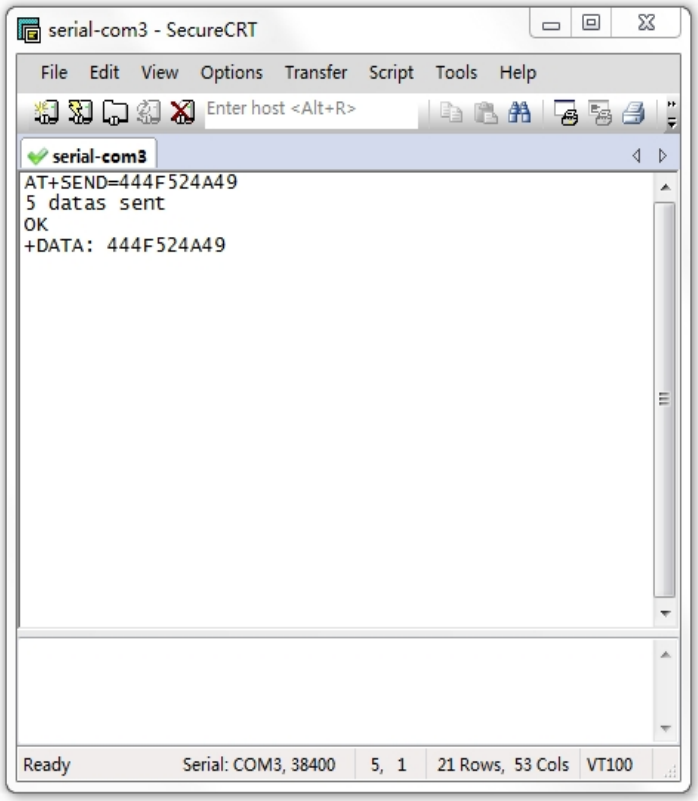


**Figure 16: Receiving Data from IPAD/IPHONE**

- ## Communicate With Android System

DBM01 module also can work with Android system. Because Android OS is very different from IOS, some parameters of DBM01 module need to be refined in order to get the best performance. We can use Working Parameter List Command: AT+BTPARAM=Lis1 to adjust the system parameters of DBM01 module. The default parameter list for DBM01 is: (35,18,37,0,200) which is optimized for IOS system and the Central-to-peripheral communication mode..

| | | |
|---|---|---|
| AT+BTPARAM=List1 | OK | The command is used to change the response speed and power consumption of DBM01. List1 refers to the parameters list. Wrong parameters might cause the module out of service so users can use the parameters lists recommended by DORJI. |
| AT+ BTPARAM? | 35,18,37,0,200<br>OK | |

**Table 1: Configure Working Parameter List1 Command**

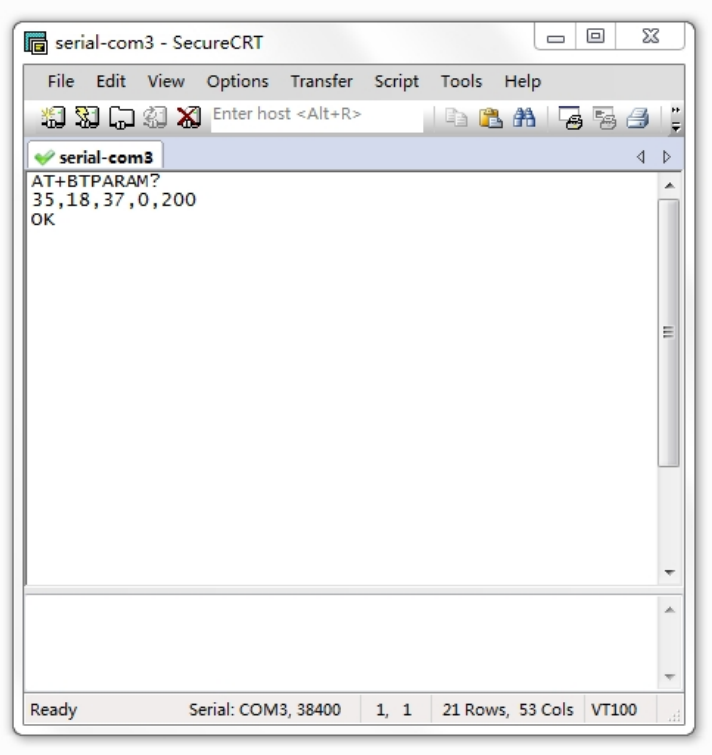


**Figure 17: Default Working Parameter List1**

For Android OS, we need to change the working parameter list to one of the recommended parameters in the table below:

| | |
|---|---|
| Working Parameter List1 | AT+BTPARAM=35,100,800,0,200 |
| | AT+BTPARAM=800,100,800,0,200 |
| | AT+BTPARAM=3200,100,800,0,200 |

**Table 2: Working Parameter List1 For Android OS**

Smaller values mean higher response speed so we can choose the first line of parameters for testing. Assuming the DBM01 is still in AT Command Mode, we continue to input the AT command (AT+BTPARAM=35,100,800,0,200) and press ENTER. The new parameters will be saved into buffer temporarily so we need to execute other commands: AT+SAVE and AT+RESET to make the parameters come into effect.

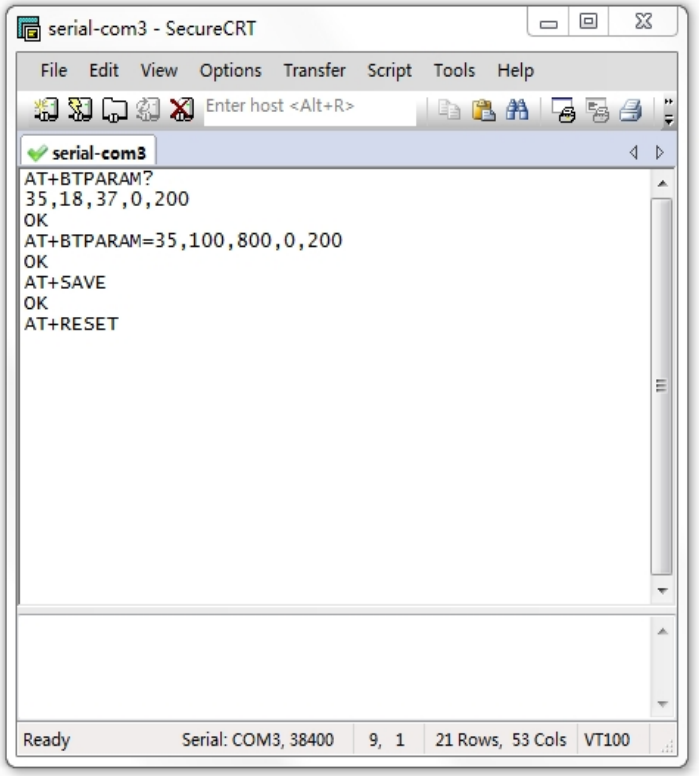


**Figure 18: Changing Working Parameter List1**

Now we download the demonstration APP--- BluetoothLeGatt.apk from Android website or click **HERE** for direct downloading. The tool only can run at Android 4.3 or higher version and the testing below is undergoing in SAMSUMG NOTE 2. The interface of this apk only provides the READ operation so we only test the sending data function of DBM01 module with SECURECRT tool. As soon as the DBM01 module is still connecting to computer and the SECURECRT tool is still running, this APK tool will find the module after it runs in the mobile phone.

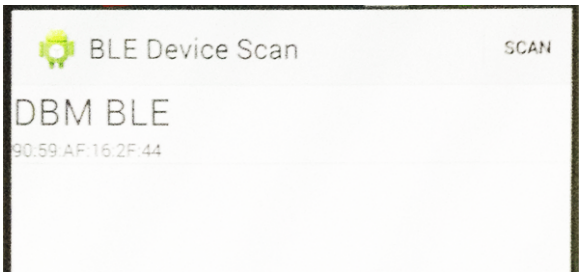


**Figure 19: Bluetooth Tool in Android**

We click the device name “DBM BLE” in the interface and tool will enter into next page.


**Figure 20: Connection with Android**

The State line of this tool shows the module is connected with Android system. The serial tool SecureCRT tool will receive a event notice (+CONN: 1) from DBM01 module to indicate that the connection is established.

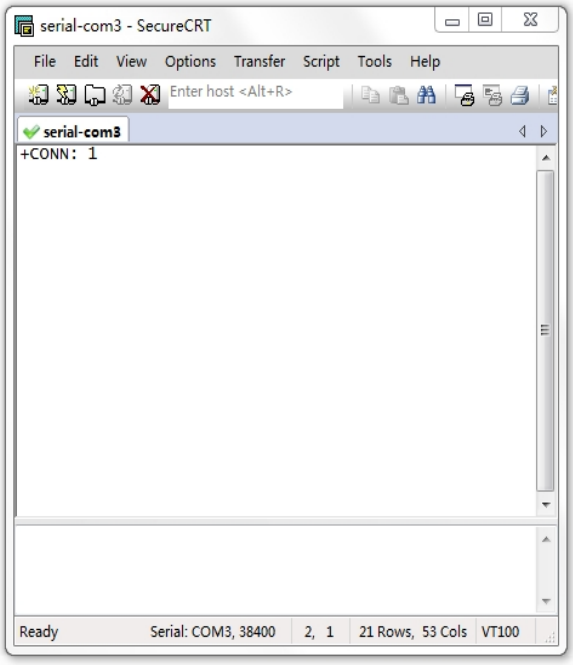


**Figure 21: Connection Event Notice**

For this Bluetooth tool in Android, it only can demonstrate the READ DATA function. We input the testing data (AT+SEND=444F524A49) in SecureCRT window and press ENTER.

The DBM01 module will respond with data package information after successful sending.

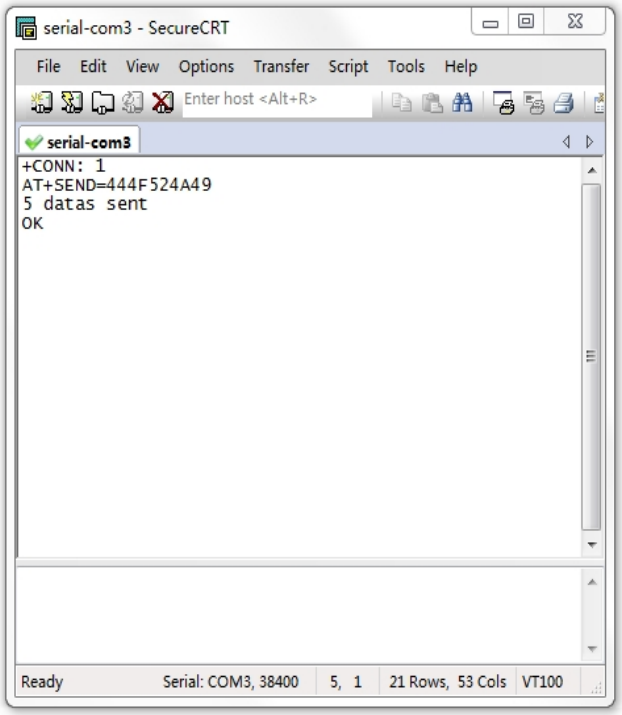


**Figure 22: Sending Data to Android OS**

Let us switch back to the testing tool in Android OS. We need to choose the last line which starts with 0000fff0 and move the next interface.

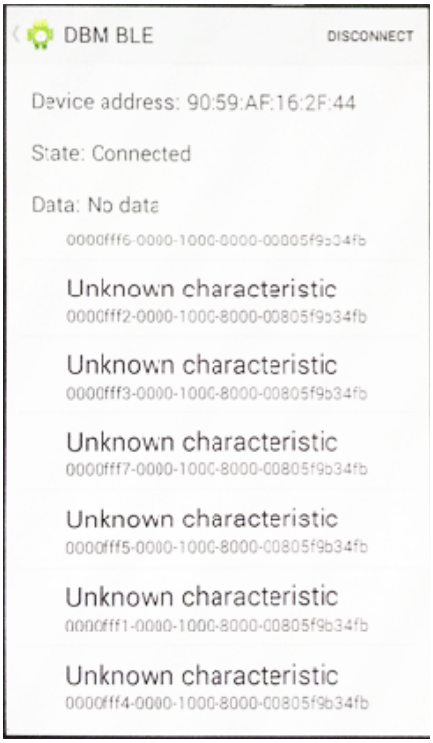


**Figure 23: Read Command in Android OS**

We scroll down the tool to the bottom and click the command line starting with 0000fff4.

The data sent by DBM01 module will be displayed.

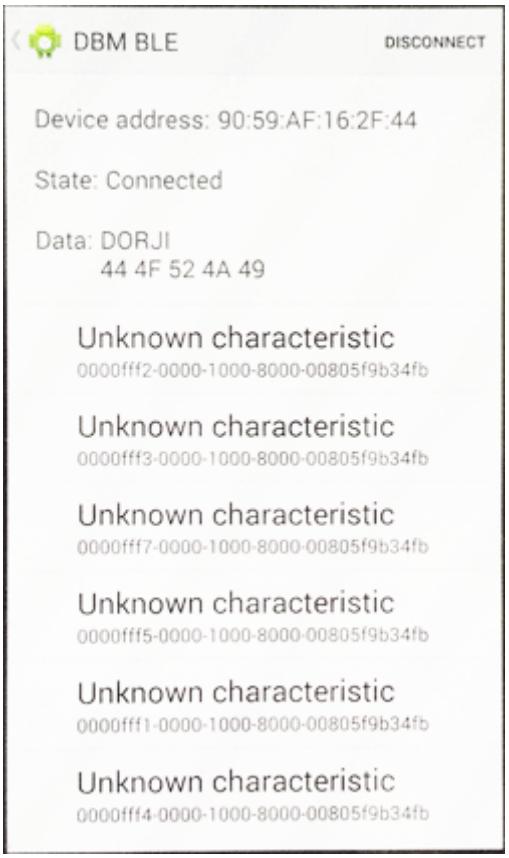


**Figure 24: Received Data in Android OS**

## 3. TRASPARENT DATA COMMUNICATION

In former sections we discussed about the modules working in the AT command modes. In this section we will demonstrate the communication between two DBM01 modules in transparent data mode. Let us be back to the APPLICATIONS section on the page 5 of DBM01 datasheet and start the testing in Automatic Mode. For this mode, one module must be set to the central module and another must be peripheral module.

DBM01 works as the peripheral module by default. If the PAIRK pin [P0.1] is floated and AT+PAIRM=0, the modules will be in Automatic Mode. We can connect the ROLE pin of one module to logic low to make this module work as central module. If the users have changes the default working parameters by Configure Working Parameters List1 Command in former testing, they should change it back to the default parameters (35,18,37,0,200) to get the best performance.
We can enter into AT command mode to check related parameters if the CTRL/P0.6 is still connected to low.

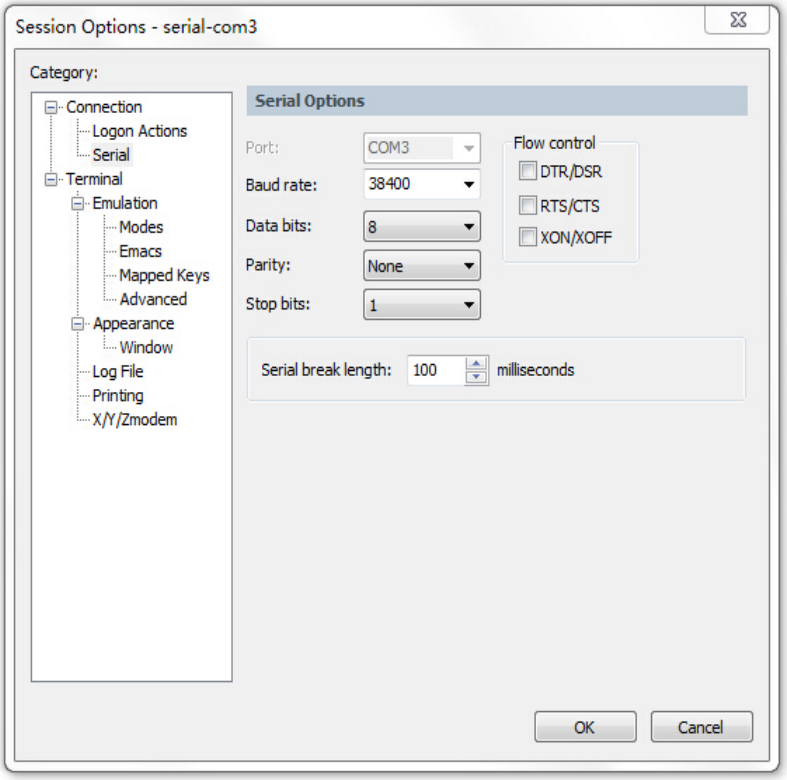


**Figure 25: UART Data Rate**

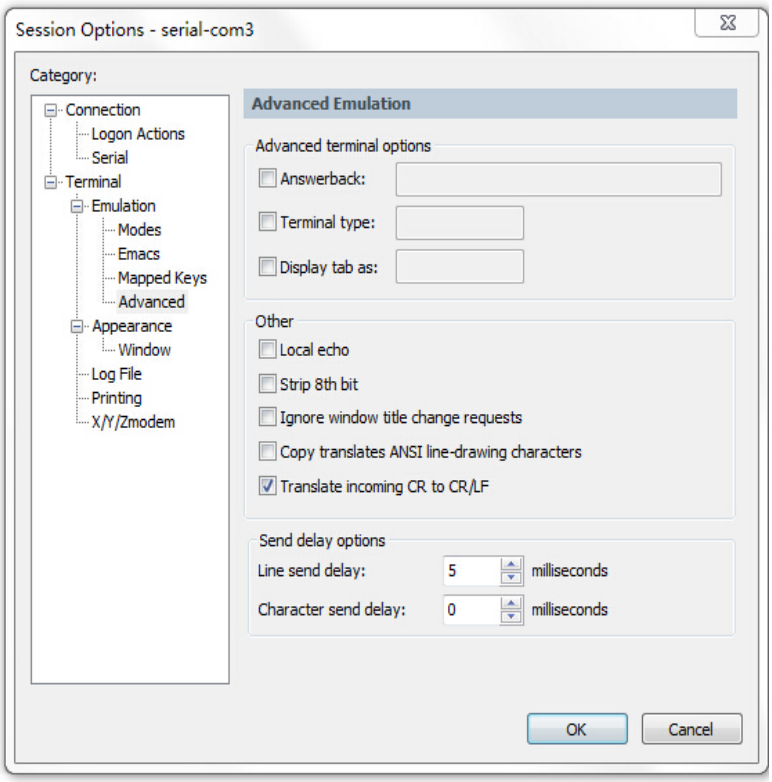


**Figure 26: CR to CR/LF is Enabled in Transparent Data Mode**

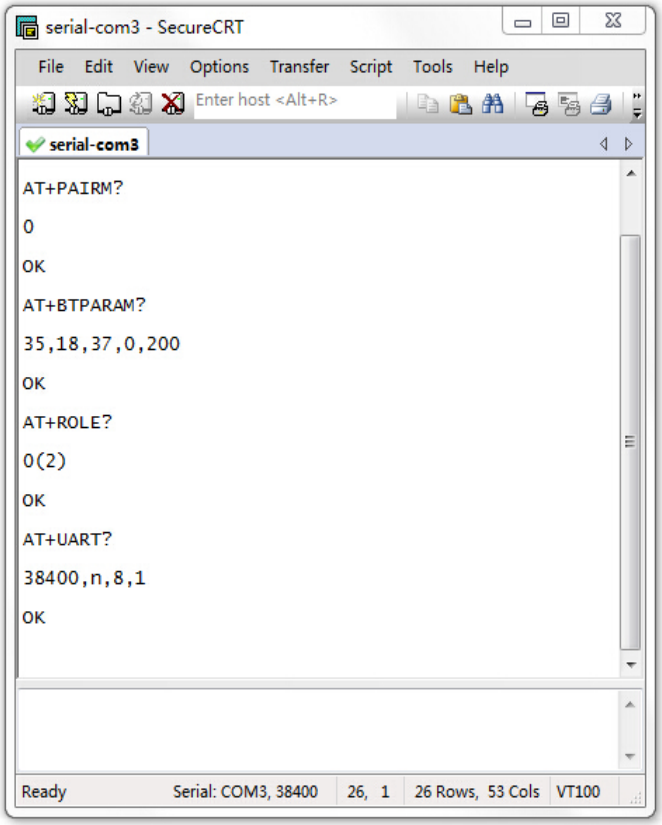


**Figure 27: Checking Related Parameters**

In transparent data transmission, the central module needs five pins (VCC,GND, TXD, RXD and ROLE) and the peripheral module needs four pins (VCC,GND,TXD and RXD). As to other unused pins, we can keep them floated. Now we can connect the modules to 2pcs of 3.3V DAC02 board correspondingly as described at the beginning of this document. If the modules are connected correctly and the UART parameters are correctly, the two modules can start to talk now. As soon as the modules are powered on, the paring mechanism between the central module and peripheral module is fulfilled automatically. In the pictures below, central module uses COM14 and peripheral module uses COM3. We can type the data in any of the text input box in one module and press ENTER key, the data will be showed in the display area of another module.

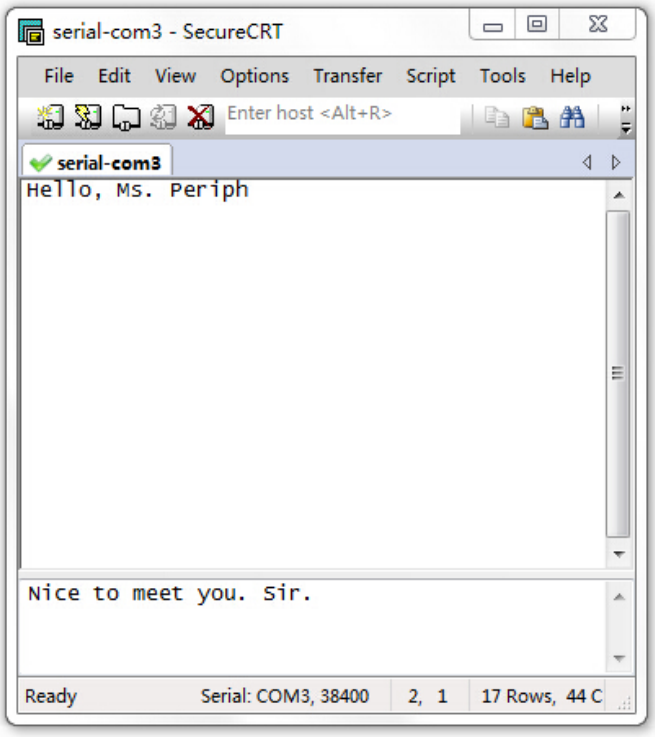


**Figure 28: Peripheral Module gets Data from Central module**

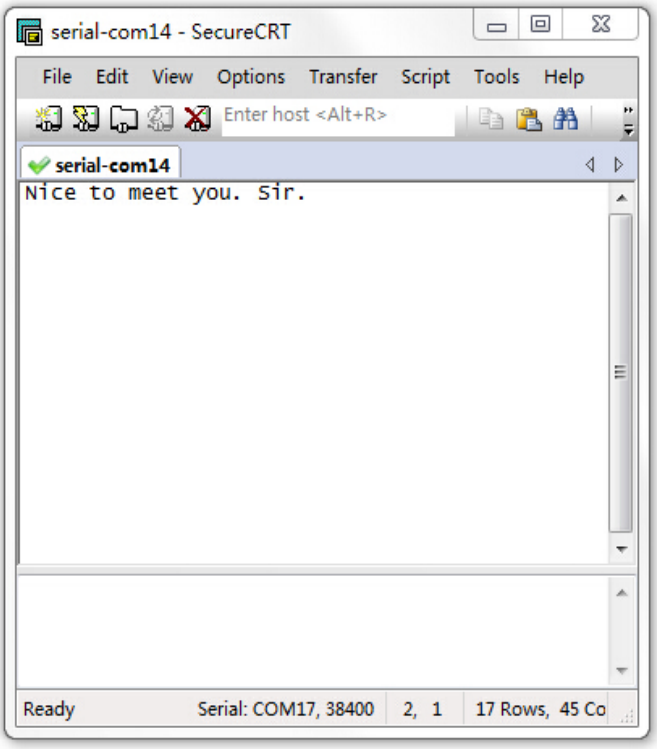


**Figure 29: Central Module Receives Data from Peripheral Module**

In this section we demonstrate the communication between two DBM01 modules in none AT command mode and make the testing in the first one (Automatic Mode) of the four paring mechanism. Considering Ms. Peripheral module accepts the invitation for dinner from Mr. central module, users can use AT commands or the I/O ports to verify the communication in other three paring mechanisms.

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