User Manual

PNI-ZM101-EV

**ZigBee™ -ready
Wireless Network Evaluation Board
Using the UZ2400 RF chip
And the 78K0R/KE3 Microcontroller**

1 SAMPLE APPLICATION

Two sample applications are included in this evaluation kit.

- RF test program
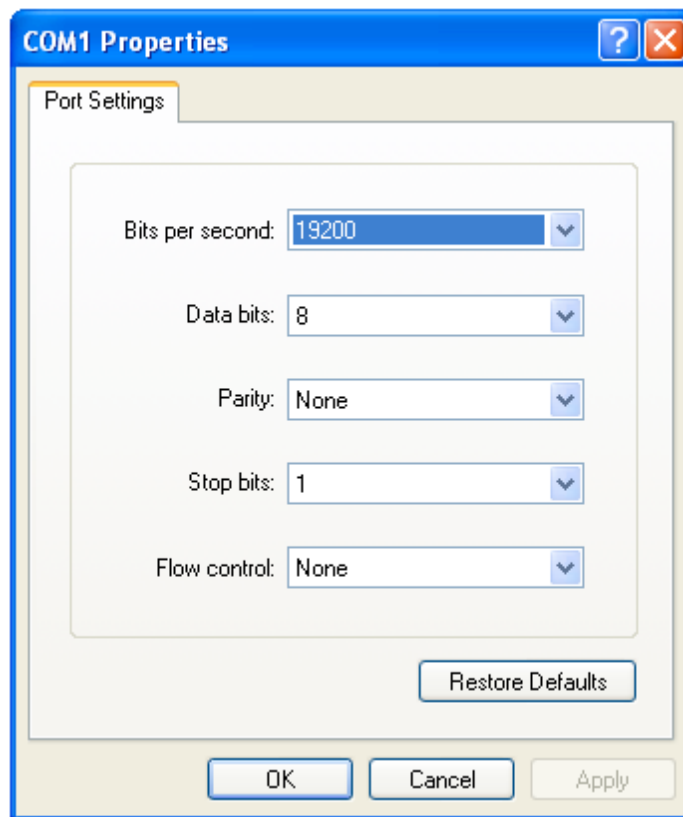- MAC library sample program: send and receive message.

A IEEE 802.15.4 compliant MAC library is included in this evaluation kit. It is a linkable object-code library. "C" source code is provided for both RF test program and MAC library application program.

The ZM101-RS boards are pre-programmed with RF test program. All sample programs provide console program through the RS232 interface. A terminal program such as Hyperterminal is required to interact with the sample program and a NULL MODEM cable is needed to connect PC's COM port to evaluation kit's RS232 DB9 connector.

In case no COM port is available from your PC, you can set the USB interface to COM port mode. Please refer to Section 3.2.4 how to setup jumper J1, J2, J3 for the USB COM port mode. When USB interface to set to USB COM port mode, the On-Chip Debug function is disable, because it is the same UART interface for the debug and COM port. To indentify USB COM port number, you can find it from [Control Panel] -> [System] -> [Hardware] -> [Device Manager] -> [Ports (COM *LTP]. Following is the table to setup Hyperterminal to connect to sample program's console.
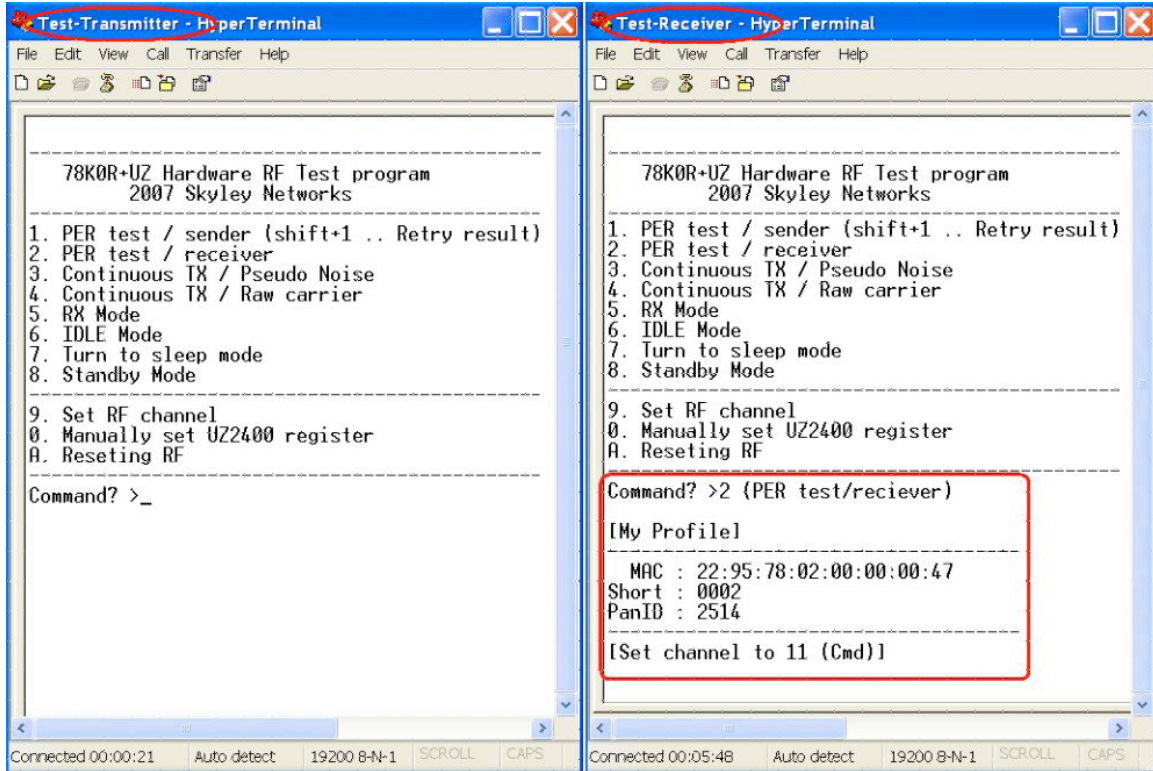
Table 1 Hyperterminal port configuration.

Baud rate	19200
Data bits	8
Parity	None
Stop bits	1
Flow control	None
Local echo	Off
Line feed	No

1.1 RF test sample application

Two PNI-ZM101-EV boards are required to conduct this test. J5 to J8 is used to setup the board 4 LSB address. Set one unit's address to 0x0001 and the other unit's address to 0x0002. Connect PNI-ZM101-EV to PC's USB

port or COM port, you shall be the following screen. If not, please push the reset button.

1.1.1 Packet Error Rate (PER) Test

To start the PER test, first start the receiver board, the board with short address "0002", press 2 to initiate the receiver loop back function and in the menu of the transmitter board, the board with short address "0001", press 1 to setup PER test. The first prompt ask you to input the destination short address, you may input "0002", then you will be asked number of packets to send during this PER test. Next, you will be prompted to input the interval between two packets in ms and you may input 1 or larger value. When the PER test finish. You will see:

- The number of packets sent.

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- The number of packets received.
- The calculated PER in %.
- The maximum and minimum RSSI values in this PER test

RSSI is received signal strength indication. For the detail of the RSSI value, please refer UZ2400 RF chip's datasheet.

1.1.2 Continuous TX / Pseudo Noise

The menu item "3" initiates the modulates RF transmission. The data carried are pseudo random numbers.

1.1.3 Continuous RX / Pseudo Noise

The menu item "4" initiates the carrier RF transmission.

1.1.4 RX mode

The menu item "5" initiates the receiver mode.

1.1.5 IDLE mode

The menu item "6" sets the UZ2400 into the IDLE mode.

1.1.6 Sleep mode

The menu item "7" sets the UZ2400 into the Deep Sleep mode.

1.1.7 Standby mode

The menu item "8" sets the UZ2400 into the Standby mode.

1.1.8 RF Channel Setting

The menu item "9" set the RF channel. The default RF channel is set channel 11. It is assigned to RF frequency at 2405MHz, You can change the channel in 5MHz step to the maximum channel at 2480MHz (channel 26). To do it, please press "9" in the command prompt. Then, choose the channel by [+], [-], [A], [B], or [C].

1.1.9 Manually set UZ2400 Chip Register

The menu item "0" is to set the UZ2400 registers. The register number for adjusting the output power is 203. After input the register number, the prompt will ask you to input the register value to assign. The value 0x00 is the default value that means 0dBm. For detail of output power register, please refer to UZ2400's datasheet.

1.1.10 Resetting RF

The menu item "A" allows you to reset the UZ2400 chip registers.

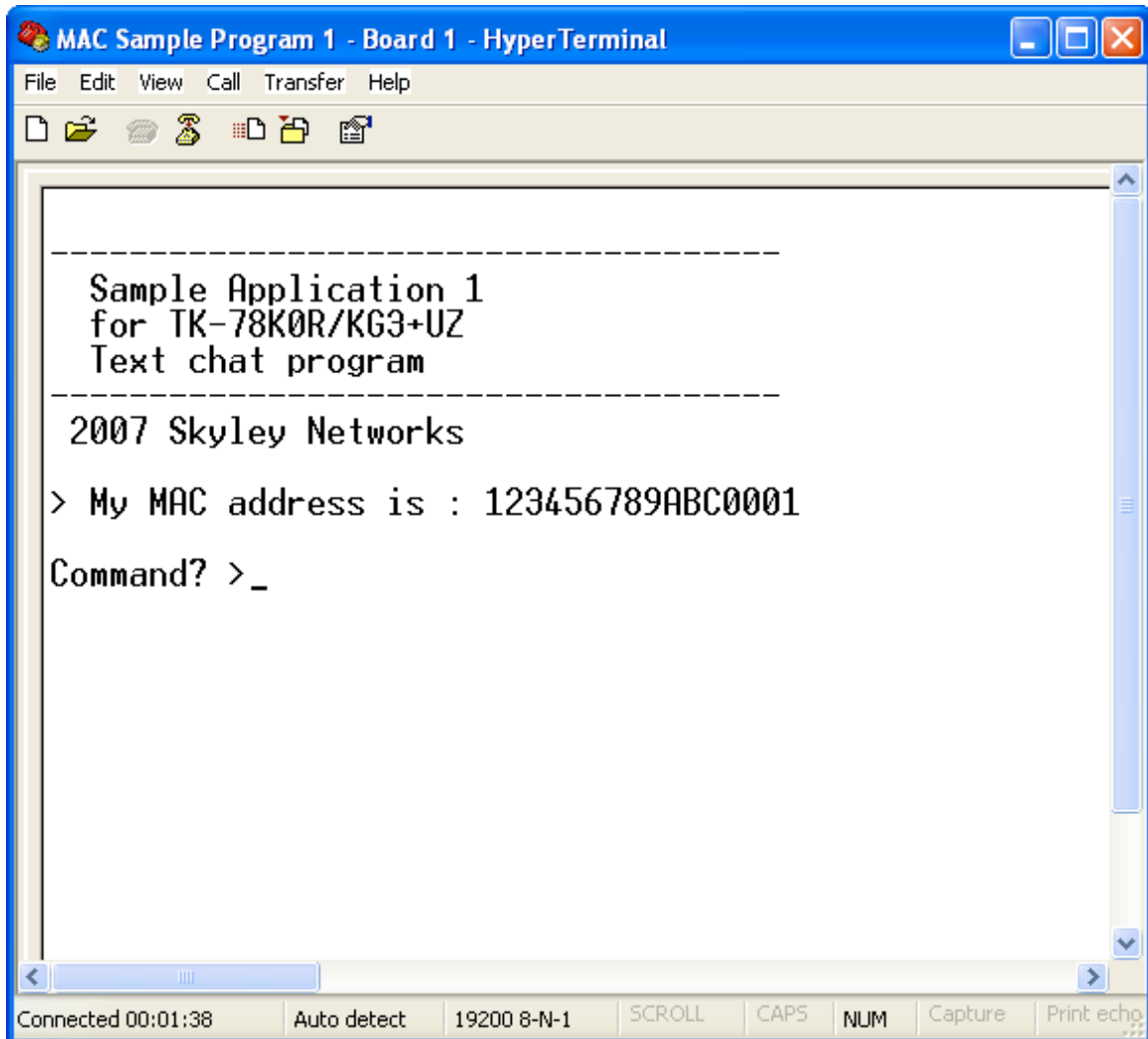### 1.2 MAC Sample program – Text Messaging

The MAC sample program provides a simple application to build a star network utilizing the IEEE 802.15.4 PHY/MAC standard. It offers

- Designation of a network coordinator in a star configuration.
- Txext messaging between a coordinator and an end device.

The sample application supports one coordinator and up to 4 end devices for text messaging. Connect each PNI-ZM101-EV board to USB or COM port of a PC and open HyperTerminal session for each PNI-ZM101-EV board.

To find the relevant USB COM port, check [Control Panel] -> [System] -> [Hardware] -> [Device Manager] -> [Ports (COM & LPT)].

Now you shall find the following message in the hyperterminal, if not, reset the evaluation board.

1.2.1 Designation of a coordinator

Now you choose a board to be a coordinator and in the hyperterminal which is connect this board type "C" to enter coordinator mode. When successfully started as a coordinator, the return status shall be 00. The coordinator is ready to accept end device's association.

1.2.2 Network Association

For all the other boards, they shall be the end device, please type "M" on the hyperterminal that associated with each board to start the end device. When successfully associated with the coordinator, the end device will be assigned a short address by the coordinator and the return statur shall also be 00.

Do the same step for each board. The short address for each successive end device shall increment by one when the association is successful. It then ready to send the text message.

1.2.3 Text Messaging

To start sending the text message, press "S" in the HyperTerminal windows and then a "Send to (short address)" will prompt you to enter an address. For coordinator, type an end device address. For end device, type the coordinator's address. A "Message ?" will prompt you to type the text message.