UART/RS232/RS485/USB/Ethernet

Over Broadband Powerline Communication

Transceiver Module

Homeplug based Serial Adaptor
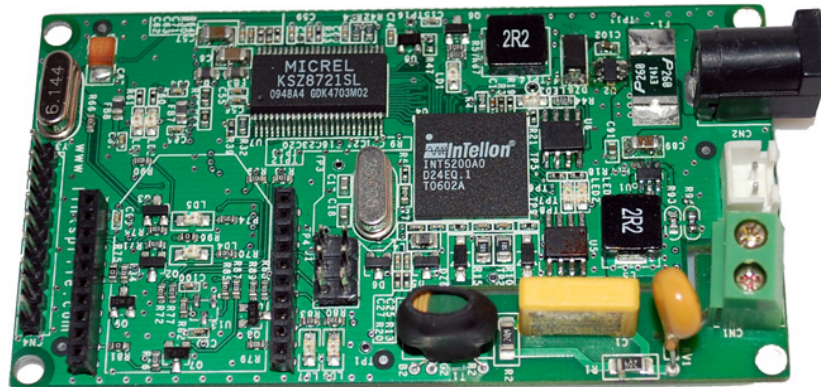
McLaren

User Manual

April 2011

1. Introduction

This document documents McLaren's broadband powerline communication module -McLaren (**5Mbps throughput on the powerline**). Based on the feedbacks of McLaren's narrow band powerline communication modem, broadband modems are consisted of a PLC-UART motherboard, UART-RS232 daughter board, UART-RS485 daughter board, UART-USB daughter board, UART-Zigbee daughter board and UART-Ethernet daughter board.

On the PLC-UART motherboard, there is a 20-pin 2mm spacing receptacle, users can choose different daughter boards based on the interface needs. This 20-pin receptacle is also pin-compatible with Xbee module from http://www.electronics123.com/s.nl/sc.18/category.240506/.f

The PLC-UART motherboard also support DIP by optional pins that can be used to directly plug to user's board without doing screwing. The interface board signals such as RS232/RS485/USB signals are also routed back to motherboard through the 20-pin receptacle, and again to users' board through these DIP pins.

Powerline communication transceiver modules are designed to send and receive serial data over the powerline network. PLC-UART is designed to transparently move serial data over the powerline network and achieves the goal of replacing cables by the ubiquitous powerline network.

2 Features

HSPLCUART (McLaren Hi-Speed PLCUART)

- AC and DC powerline Communications
- Fully transparent mode, plug and play coming out of the box without the need to do any programming.
- Homeplug 1.0
- 5Mbps throughput on the power line
- Built-in error correction codes.
- AT commands used for advanced configuration.
- 3.3V TTL UART, Optional RS232, RS485. USB, Ethernet, Zigbee interfaces
- RoHS

3 Specifications

Product name	High Speed PLC-UART Transceiver Module (Homgplug serial adapter)
Interface	3.3V TTL UART Optional interface cards: RS232 (model/ordering no: UART-RS232) RS485 (model/ordering no: UART-RS485) USB (model/ordering no: UART-USB) Ethernet (model/ordering no: UART-Ethernet) Zigbee
Communication Line Voltage	230VAC/50Hz 110VAC/60Hz 0-400V DC
Supply Voltages	5V, 2A DC
Modulation	OFDM (Homeplug 1.0 Compatible)
Error Correction	FEC（Forward Error Correction）
Data rate on Powerline	**5Mbps (throughput)**
Maximum packet data length	200bytes
Transmission distance	300 feets（no repeater）
Support nodes number	65535
LED	Power Line Activity LED system LED serial port LED

4 Applications

- AMR

- Industry manufacture and control

- Safeguard, fire alarm, smoke alarm

- Collect and transmit instrument data

- Safeguard and monitor

- Home automation

- Solar/Wind electricity generation system

- Low latency servo control

5 Connectors Description
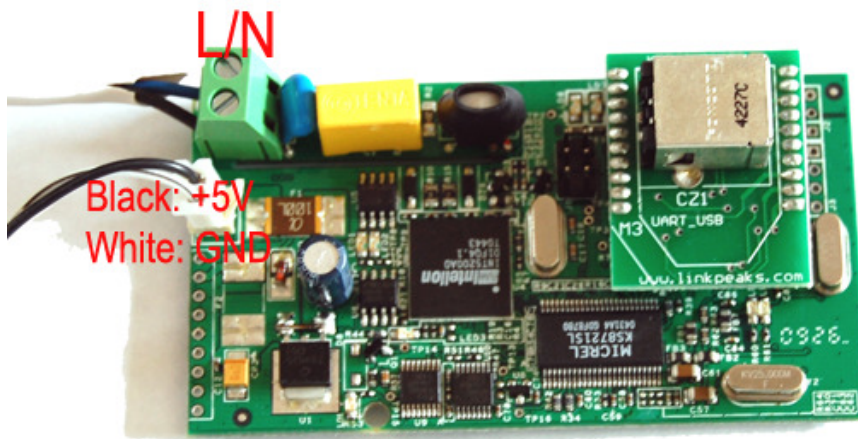
The AC or DC powerline line can be connected to the L/N connector denoted on the above picture.

The 5V/2A DC power supply is connected to the white/black connector, or the DC barrel connector on the new board.

6 LED

LED1	Powerline Collision
LED2	Powerline Activity
LED3	Powerline Link
LD1	Ethernet Link
LD2	Ethernet Full/Duplex LED
LD3	Ethernet Link
LD4	UART receiving activity
LD5	UART sending activity
LD6	When used with one of our Zigbee module, ON means not zigbee network not formed or joined, OFF means formed zigbee network or joined network
LD7	When used with one of our Zigbee module, ON means not binding, OFF means binding

7 Definition of DIP Pins

```
1) Module=X_BEE:
   J7_1(X1) -> NONE
   J7_2(X2) -> NONE
   J7_3(X3) -> NONE
   J7_4(X4) -> NONE
   J6_1(GD) -> GND
   J6_2(TX) -> UART_TX   TTL
   J6_3(RX) -> UART_RX   TTL


2) Module=UART_RS232:
   J7_1(X1) -> GND
   J7_2(X2) -> UART_TX   RS232
   J7_3(X3) -> UART_RX   RS232
   J7_4(X4) -> NONE
   J6_1(GD) -> GND
   J6_2(TX) -> UART_TX   TTL
   J6_3(RX) -> UART_RX   TTL


3) Module=UART_RS485:
   J7_1(X1) -> GND
   J7_2(X2) -> UART_485_A
   J7_3(X3) -> UART_485_B
   J7_4(X4) -> NONE
   J6_1(GD) -> GND
   J6_2(TX) -> UART_TX   TTL
   J6_3(RX) -> UART_RX   TTL


4) Module=UART_USB:
   J7_1(X1) -> USB_GND
   J7_2(X2) -> USBDP(+)
   J7_3(X3) -> USBDM(-)
   J7_4(X4) -> VBUS
   J6_1(GD) -> GND
   J6_2(TX) -> UART_TX   TTL
   J6_3(RX) -> UART_RX   TTL
```
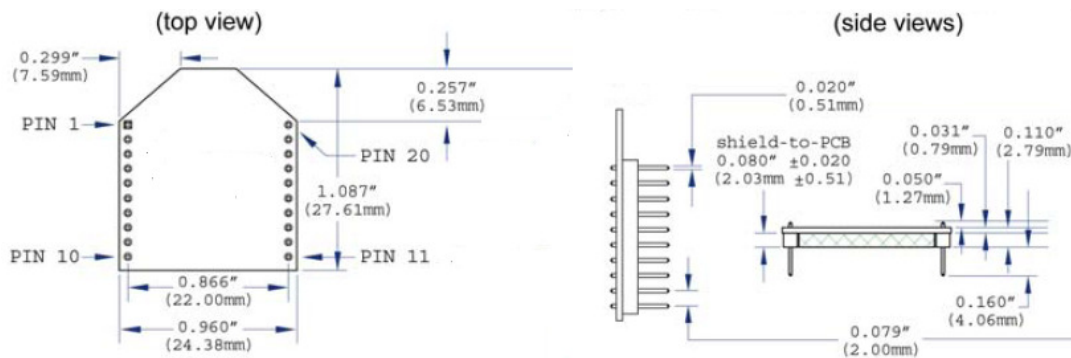
8 Interface Card Socket Definition and Layout

The pin layout of interface cards is compatible with Xbee modules. The socket on

the PLCUART motherboard can be used to receive any interface card with the

pin-out shown below:

Pin assignment of the interface card socket:

Pin #	Name	Direction	Description
1	VCC	-	3.3V Power supply
2	DOUT	Output	UART Data Out
3	DIN	Input	UART Data In
4	EX4	Depending on model of daughter card	Route daughtercard final interface signal back to mother board, and to the DIP pins to user's board
5	RESET	Input	Module Reset
6	EX3	Depending on model of daughter card	Route daughtercard final interface signal back to mother board, and to the DIP pins to user's board
7	EX2	Depending on model of daughter card	Route daughtercard final interface signal back to mother board, and to the DIP pins to user's board
8	EX1	Depending on model of daughter	Route daughtercard final interface signal

		card	back to mother board, and to the DIP pins to user's board
9	SLEEP	Input	Pin Sleep Control Line
10	GND	-	Ground
11	Unused	-	-
12	Unused	-	-
13	Unused	-	-
14	Unused	-	-
15	Associate	Output	Associated Indicator
16	Unused	-	-
17	Unused	-	-
18	Unused	-	-
19	Unused	-	-
20	Unused	-	-

9.1 Command Mode

9.1.1 Enter command mode

The module can be put into command mode by sending "+++" through serial port. The module will respond with an "ok". In order to prevent the situation where the user data" +++"mistakenly triggers the command mode, there must be no serial port data input one second before and after the receiving of "+++". At the same time, the gap between the three"+" should not be more than one second, otherwise, it will be considered as a data rather than a command.

9.1.2 Exit command mode

There are two approaches to exit command mode. One way is to input command "ATEX". The other is to timeout and automatically exit. In either case, the modules will response "exited". The timeout value can be set by command "ATTO"

9.2 Arguments and Responses

9.2.1 Arguments and Responses

For all the commands with arguments: if the parameters are correct, the module will respond with an "ok". Otherwise, the modules will response with an "invalid para". If there are no arguments associated with the commands, it will be treated as polling modem and the module will respond with the existing arguments residing in the module.

9.2.2 Commands without Arguments

There are four commands without arguments.

● + + +: enter command mode; will directly return "ok".

● ATEX: exit the command mode, return "exited".

● ATRS: software reset, will reset the module immediately, no return.

9.3 Modified arguments

Except for serial arguments, the modified arguments will be immediately saved into eeprom and take effect. The serial arguments won't take effect immediately after being modified to avoid user from modifying PC serial arguments before inputting command. Serial arguments will take effect through automatically resetting module when exiting the command mode.

9.4 Command List

Command	Description	Arguments	Detail Description	Default
Control Class				
+++		none	Enter command mode	
ATEX	Exit	none	Exit command mode	
ATTO	Time out	1-30	Timeout value, unit: second	5
ATRS	Reset	none	Software reset	
Communication class				
ATBD	Baud Rate	1200, 2400, 4800, 9600, 19200, 38400, 115200, 384000	Baud Rate	9600
ATDB	Data Bit	5,6,7,8	Data bit	8
ATPA	Parity	N, O, E	Parity bit，N = no, O = odd, E = even	N
ATST	Stop Bit	1,2	Stop bit	1

|	Powerline Communication Class			
ATRL	Communication Role	1,2,3	1= Receiver Only 2= Transmitter Only 3=Transceiver	3
ATDN	Communication Domain.	1-99999	Only the nodes in same domain will receive the packets. ATDN will not be saved into EEPROM unless ATWT 1	1
ATWT	If domain is saved to eeprom or not	0,1	Controls if domain is saved to EEPROM.	0

10 Quick Start
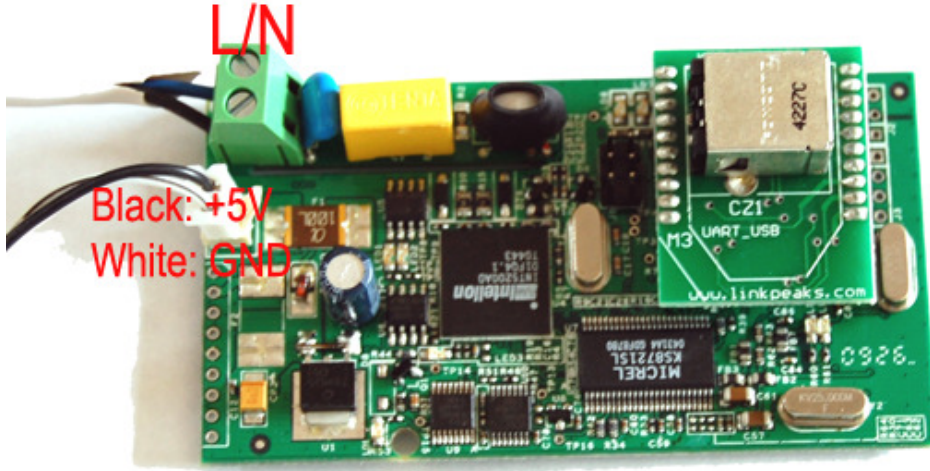
You need to install   the NEC -   serial port terminal software that is included in the CD that accompanies the PLC-UART by clicking setup.exe.

If you are using a USB to RS232 converter, you can use Device Manager tab
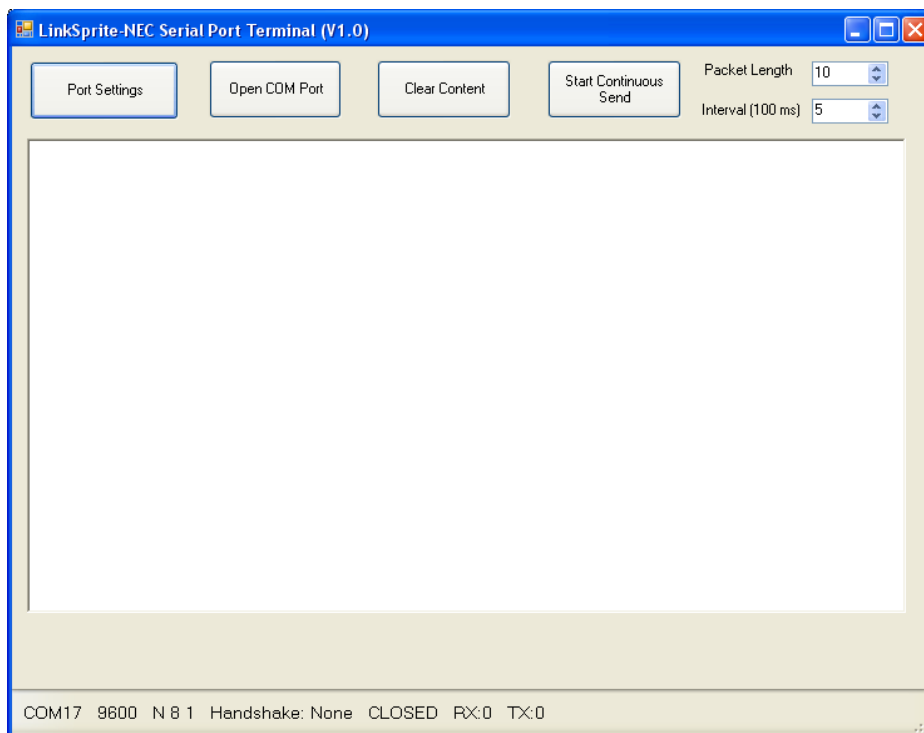
to find out the COM port.
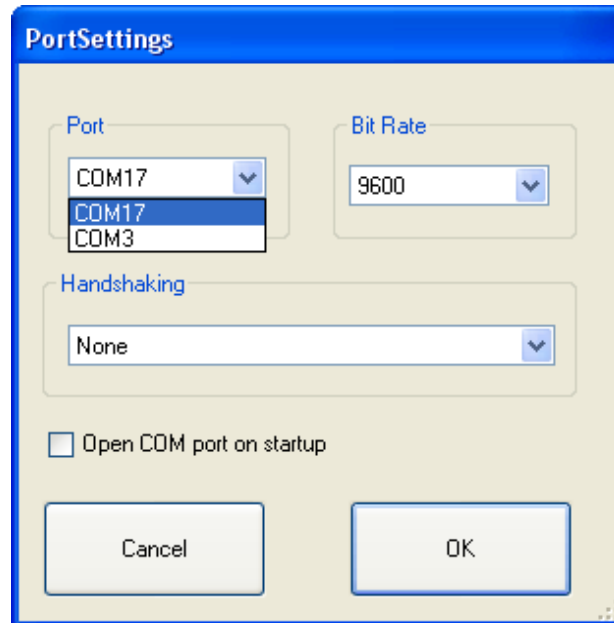
In the following figure, it's COM17.
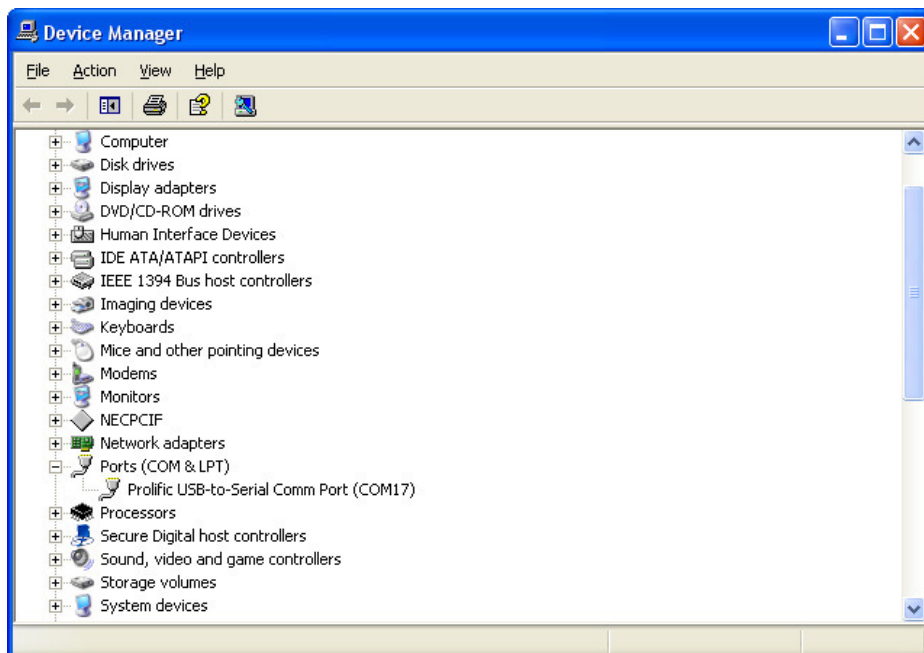
Open the NEC serial port terminal by clicking program and then do the following:


-NEC serial port terminal will show up as:

Click the "Port Settings" button to configure the serial port:

From device manager, we know that the COM port we are using is COM17. The default baud rate for PLC-UART is 9600. Click "OK", and Click "Open COM Port" to open the COM port.

As shown in the following screen, by typing three '+' fast, we can enter into AT command mode to configure the module.
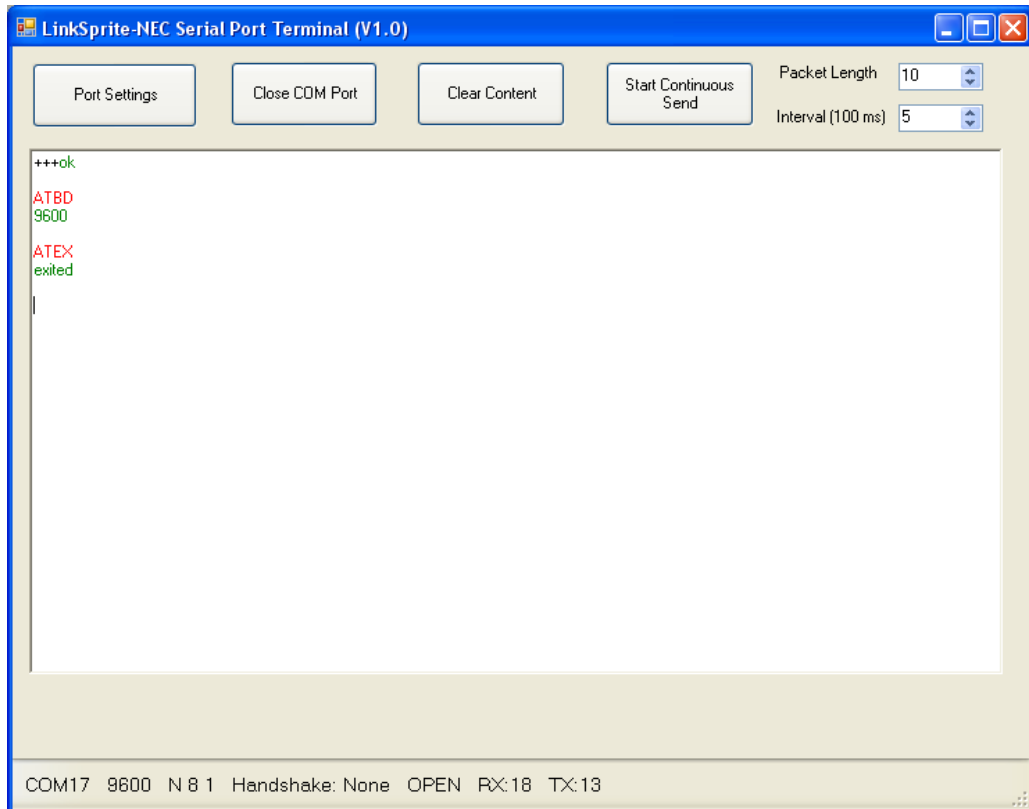
Next we can click "Start Continuous Send" to toggle continuous send and receive.

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