PANTECH SOLUTIONS®
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ACCESSORY BOARDS

Bluetooth User Manual

USER MANUAL

Contents

BLUETOOTH MODULE

Introduction

Bluetooth Kit, is proposed to smooth the progress of developing and debugging of various designs encompassing of Bluetooth Based applications with MCU.

Packages

- EVB-Bluetooth Kit (Promi ESD-02)
- Serial Port Cable
- CD contains
    - Software
    - Example Programs | User Manual

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1. INTRODUCTION

PS-BLUETOOTH EVK is powered by Parani-ESD200 and Parani-ESD210 are Class 2 type of Compact Embedded Bluetooth Serial Modules for RS-232 cable replacement. By default, they support 30 meters of wireless transmit distance. The Parani-ESD210 has an

extension option so that users can extend the transmit distance up to 300 meters using optional antennas. Users may configure the Parani-ESD Series by using easy-to-use Windows-based utility software or by using standard AT command set

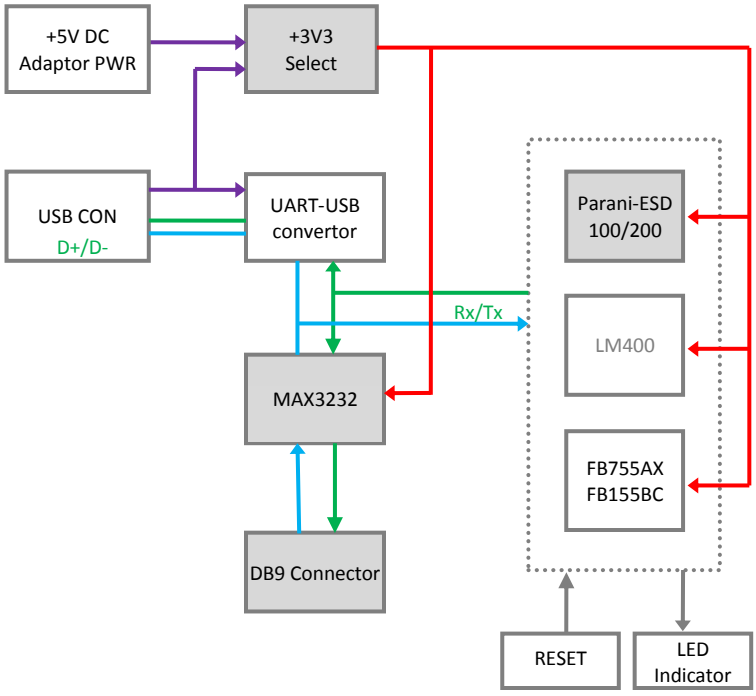
Supported Modules

- Parani-ESD-02 / 01
- FB755AX / FB155BC
- A7Eng

Base Board Specifications

- On-Board Voltage Regulator
- Data Flow Indicators (PSS)
- Power ON status Indication LED.
- DB9 Connector for PC or MCU Interface.
- USB connection provides both power and a serial link.

General Block Diagram



Bluetooth Modules (Promi ESD-02)

Parani-ESD Series is OEM Bluetooth-Serial Module type product line based on Bluetooth technology. Parani-ESD Series is designed for integration into user devices by on-board installation. They are connected to the device via built-in UART interface and communicate with other Bluetooth device. Parani-ESD Series enables RS232-based serial devices to communicate wirelessly throughout the range of 30m~300m(Parani-ESD210-Class 2) or 100m~1000m(Parani-ESD110-Class 1).

Parani-ESD100/200 has a built-in on-board antenna. Users may configure the Parani-ESD Series by using easy-to-use Windows-based utility software or by using standard AT command set. Promi-ESD-02 is a board type of Promi-SD™, Class 2 OEM version, which can be embedded in your applications such as mobile terminals or any kinds of machines for Wireless serial communications of long range, easy-to-install, and low-cost. Provided is point-to-point wireless connection without standard RS232 cables.

Typical Applications

RS232 cable replacement Wireless Factory monitoring

Truck/Bus monitoring system	PLC programming
Car Diagnostics	Wireless Printing
Wireless POS system	Wireless logistics

Features

Output Interface UART, Compliant Bluetooth stack v1.2-improved AFH(Adaptive Frequency Hopping), Fast connection Transmit Power ESD100/110 : Max. +18dBm ESD200/210 : Max. +4dBm Receiving Sensitivity ESD100/110 : -88dBm(0.1%BER) ESD200/210 : -80dBm(0.1%BER)

- Antenna gain Chip : 0dBi, Stub : +2dBi, Dipole : +3dBi, Patch : +9dBi
- Provides transparent RS232 serial cable replacement.
- Supports Bluetooth Serial Port Profile.
- Interoperability with PDA, laptops etc.
- Built-in chip antenna included
- Supports firmware upgrade via windows-based software (ParaniUpdater)
- Working distance(In an open field)
- Parani-ESD100 : Class 1, Nom. 100 meters
- Parani-ESD200 : Class 2, Nom. 30meters

Easy to use Windows configuration tool available. No external drivers required.

2.Specifications

Serial Interface

- Parani-ESD100
  - UART Interface, 2.54mm Header 2x6, 1200bps to 230 Kbps
  - CTS/RTS flow control : Default
  - DTR/DSR for loop-back & full transfer
- Parani-ESD200
  - UART Interface, 2.54mm Header 1x4x2, 1200bps to 230 Kbps
  - CTS/RTS flow control : Default

Bluetooth Interface

- Parani-ESD100
- Bluetooth v1.2 | · Class 1 | · Level - 18 dBm

  Protocols - RFCOMM, L2CAP, SDP

  Profiles - General Access Profile, Serial Port Profile
- Working distance ESD100 : Nominal 100 meters

- Parani-ESD200
- Bluetooth v1.2 | · Class 2 | · Level - Max. 4 dBm

  Protocols - RFCOMM, L2CAP, SDP

  Profiles - General Access Profile, Serial Port Profile
- Working distance ESD200 : Nominal 30 meters

Configuration

ParaniWin, ParaniWizard, Modem AT command set

Firmware Update: ParaniUpdater

Power

- 3.3VDC

- Nominal current consumption

· ESD100 : 70mA @ 3.3VDC approximately

· ESD200 : 40mA @ 3.3VDC approximately

Pin Details of XBee | Xbee – PRO Modules

Model No.: Parani-ESD-02

RS232, 1200~230000 baud,

CTS/RTS flow control or no flow control

PIN DETAILS

Pin number	Pin name	Direction	Description	Signal Level
1	GND	I	Power Ground	Ground
2	VDD	I	DC input (3.0 ~ 3.3V input)	Power
3	STATUS	O	Status	TTL
4	/RST	I	Reset (Active low)	TTL
5	CTS	I	UART Clear to Send	TTL
6	RTS	O	UART Ready to Send	TTL
7	TXD	O	UART data out	TTL
8	RXD	I	UART data input	TTL

Bluetooth Specification – Parani ESD-02

Bluetooth Specification	V 1.1
Level	4 dBm
Range	~30m
Bluetooth protocols	RFCOMM, L2CAP, SDP
Supported Profiles	General Access Profile Serial Port Profile

Bluetooth Board Details

Power Supply

The external power can be DC source only, with a voltage (+5V/,1A output) at 230V AC input. The LM1117 Fixed +3.3V positive regulator is

used to provides power to the Zigbee Modules and other peripherals. Separate slide switch is provided to power the board (ON/OFF).

RESET

The Reset Switch is used to reset (re-boot) the Bluetooth module. This switch only applies when using the configuration tabs of bluetooth Software

I/O & Power LEDs

LEDs indicate RF module activity as follows:

Yellow (top LED) = Serial Data Out (to host)

Green (middle) = Serial Data In (from host)

Serial Port

Serial Port Settings	Values
Baud rate	1200, 2400, 4800, 9600, 19200, 38200, 57600, 115200, 230400
Data bite	8
Parity	No parity, Even parity, Odd parity
Stop bit	1, 2
Hardware Flow Control	Use, No Use

Standard female DB-9 (RS-232) connector.

Note : *Female – Female 9-pin Straight cable (Rx-Rx | Tx-Tx)*

3. Bluetooth Software

ParaniWIN

ParaniWIN is a program that runs on Microsoft Windows for the configuration of Parani-ESD. Install ParaniWIN on your computer. Plug a Parani-ESD into the serial port of the computer and turn on the power. Run ParaniWIN. Set each option properly and click [Confirm]. If the settings of the Parani-ESD are different from the ParaniWin, an error message will pop up. If the Parani-ESD is in the status of connection, warning message will pop up. Then the current connection can be cancelled by [Disconnect] button on the main window.

Top view

Bottom view

Requirements

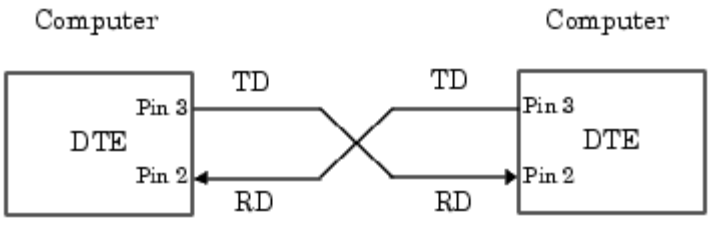
PC, Bluetooth module, RS232_Straight cable, 5V DC adapter

Connecting the Bluetooth module to PC requires

Connect the RS232 Straight cable to PC and with Bluetooth module, give 5V supply to Bluetooth module . Switch on your module, then LED will indicate our bluetooth module is switched ON

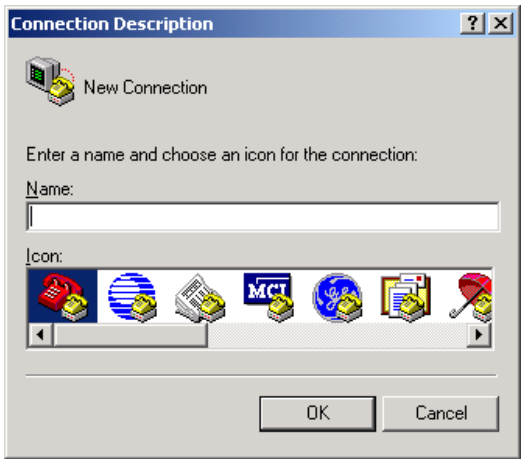
RS232 (Straight cable)

RS232 cross cable



Hyper terminal

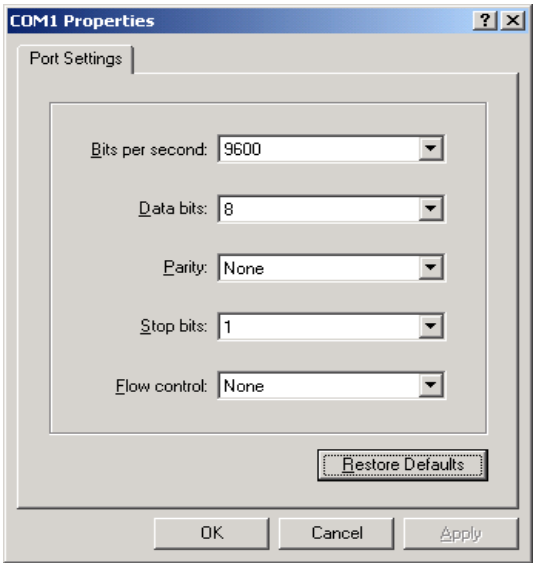
From the Start menu select Programs\Accessories\ Communications\HyperTerminal or perform a search in My Computer for “HyperTerminal”



Type in a connection identifier name say “Test1” and click OK. The only restriction here is it cannot be a
Device name e.g. “COM1”
You will then be presented with the following dialogue box:
Here

Here it is possible to choose the COM port to test using the drop down box. In this example we will use the onboard port COM1. Click OK.

The next dialogue box will ask for the Port Communication Settings:



Click “Restore Defaults” then OK.

Three initial steps to configure the Bluetooth module.

1) Type “AT” in the HyperTerminal window and press <cry>, its response is “OK”.
2) Type “ATI0” in the HyperTerminal window and press <cry>, its displays the current version of the Bluetooth module.
3) Type “ATI1” in the HyperTerminal window and press <cry>, it shows present configuration of the Bluetooth module.

LED Indication

Ensure that LED should blink when Bluetooth module is powered.

When Bluetooth module is paired with other Bluetooth module LED turns to “ON” state.

If “Reset” button is pressed LED starts blinking, If Bluetooth module is configured as “ATUO CONNECT MODE” and if Bluetooth module is paired with other module “LED” turn ON state

Configuration Settings

Serial Port settings

Baud rate determined the speed that data is transmitted and received. It is a derived value based on the number of bits transmitted per second.

“ATL” command is used to configure the baud rate settings.

For Example

ATL? ➔ Displays the current baud rate (ATL=1”means 9600)

ATL2➔configured as 19200 baud rate

Make sure that stop bit, parity bit, flow control bit, character echo, command response as identical to hyper terminal configuration.

ATK command is used to configure the **STOB** bit

ATM command is used to configure the **PARITY** bit

ATC command is used to configure the FLOW **CONTROL** bit

ATE command is used to configure the **CHARACTER ECHO** bit

ATQ command is used to configure the **COMMAND RESPONSE**

Please refer the AT Command Sets

AUTO CONNECT

To enable or disable the AUTO CONNECT functions ATO command is used.

For example

ATO? ➔ Displays the current configuration.

ATO0 ➔ enables the auto connection.

ATO1 ➔ Manual mode (disables the auto connection}.

Notes: If Bluetooth module is paired with other module “LED” turns ON state

PIN CODE

To communicate with other module the PIN CODE is required.

For example

ATP? ➔ “xxxx”

ATP=1234

ATP? ➔ “1234”

MODULE NAME

To set the module name ATN command is used.

For example

ATN? ➔ “Xxxxxx”

ATN= Apple

ATN? ➔ “Apple”

MASTER / SLAVE

To set the device as MASTER / SLAVE, ATR command is used.

For Example:

ATR? ➔ 0(master)

ATR1 ➔ configured as slave mode If both the Blue tooth module is configured as MASTER both the module can be transmitter or receiver.

If one of the module is configured as SLAVE and other module is configured as MASTER, then only the Master module able to transmit the signal not slave. SLAVE only act as a receiver.

SEARCH DEVICE

ATF command is used to search the Bluetooth devices.

Note: This mode is used only when the device is in MANUAL MODE (ATO1) and it should be in MASTER mode (ATR0).

For Example:

ATF? ➔ Search for the blue tooth devices for a minute, it displays name of the blue tooth device.

ATA command is used to establish the connection.

ATH command is used to drop the connection.

AT command Set

The AT command set was developed by Hayes to control the operation of telephony modems. The command set has been extended to control Bluetooth device primary operation such as inquiry,

connection setup/ disconnection etc. Other AT commands is also available to control the serial port setup and other user friendly features.

The Bluetooth device powers up in unconnected state and can be configured using UART interface similar to telephony modems. The device will act as Bluetooth slave by default and can be inquired/connect from other Bluetooth master device in neighborhood. The AT commands can be used to change the default behavior and settings for the current as well as future power up cycles.

These commands are case-insensitive.

Command Type		Parameter	Command
Device Information		Test	AT
		Firmware Version	ATI0
		Settings	ATI1
Reset		Restore Factory Settings	ATZ0
Serial Port		Baud Rate	ATL
		Stop Bits	ATK
		Parity bits	ATM
		Flow Control	ATC
		Character Echo	ATE
		Command Response	ATQ
Bluetooth	Type	Device Role	ATR
	Information	BD Address	ATB
		Inquire devices	ATF
		RSSI	ATI2
	Settings	Device Name	ATN
		Security	ATP
		Discoverability	ATH
	Connection	Connect inquired device	ATA
		Drop connection	ATH
		Bonding	ATD
		Auto Connect	ATO
Misc		Escape Sequence	+++
		Escape Sequence handling	ATX
		Mode switch	ATO
		Low power Mode	ATS

AT Command Description

AT COMMANDS FOR BLUETOOTH

1) AT

This command allows the connected host device to check the availability of the Bluetooth device. The connected host device must have same serial port settings as configured for the Bluetooth device.

Syntax AT + ENTER

2) ATI0

Returns the device firmware version

Syntax

ATI0 + ENTER

Output response

e.g. FW VERSION: v4.22, RACv1.03

3) ATI1

List all the device information and all the settings along with their brief description. The settings include serial port, Bluetooth related and other misc settings.

Syntax

ATI1 + ENTER

4) ATZ0

This command is used to restore the default factory settings and perform device reboot. The default factory settings are listed in table [reference]

Syntax

ATZ0 +ENTER

5) ATL

The command allows setting the baud rate for the serial UART port. The current baud rate setting can also be retrieved by using the sending this command in query format.

Syntax

ATLb + ENTER

Where b – varies from 10 to 19 for different baud rates. The baud rate varies from 1200bps to 921 Kbps. e.g. to set 19200 as UART baud rate, the command is ATL2<cry>

B	Baud rate
*	1200
#	2400
0	4800
1	9600
2	19200
3	38400
4	57600
5	115200
6	230400

6) ATK

The command is used to specify one or two stop bits for serial port communication. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATKn<cry>

Where n – can be 0 or 1 depending on no of stop bits used.

n	Stop bits (no)
0	1
1	2

Syntax

ATK? + ENTER

7) ATM

The command is used to specify the parity type of serial port. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATMn<cry>

Response

Where n – varies from 0 to 2 depending on the type of parity used.

N	Parity Type
0	None
1	Odd
2	Even

Syntax

ATM? + ENTER

8) ATC

The command is used to enable/disable the RTS/CTS flow control for the serial port. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATCc + ENTER

Response

Where parameter c is a character used to enable/disable the flow control.

c	Flow Control
1	Enable
0	Disable

Note, this command will cause the device to reboot.

Syntax

ATC? + ENTER

9) ATE

The command is used to enable/disable the echo back of command characters from the Bluetooth device. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATEc + ENTER

Response

Where parameter c is a character used to enable/disable the echo back feature.

c	Echo back
1	Enable
0	Disable

Syntax

ATE? + ENTER

10) ATQ

The command is used to enable/disable the command response from the Bluetooth device. Different types of command response may be received by Host device and are listed in Command Response. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATQc +ENTER

Response

Where parameter c is a character used to enable/disable the command response.

c	Command Response
0	Enable
1	Disable

Syntax

ATQ? + ENTER

11) ATR

The command is used to set the local device as Bluetooth Master/Slave. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATRc + ENTER

Response

Where parameter c is a character used to configure the local device type.

c	Device Type
0	Master
1	Slave

Note, this command will cause the device to reboot.

Syntax

ATR? + ENTER

12) ATB

This command is used to display the Bluetooth address of the local device.

Syntax

ATB? + ENTER

13) ATN? + ENTER

Response

<cry, lf><NAME><command response> if the command is successful. Here, <NAME> is the device name. E.g on default setup, the response will be <cry, lf>Serial Adapter<command response>

14) ATF

This command is used to search for any Bluetooth device in the neighborhood within one minute. If any device is found, its name and address will be listed. Maximum limit of devices searched is 8. The search ends with a message "Inquiry ends. xx device(s) found." This command is available only when the adaptor is in the manual master role.

Syntax

ATF? + ENTER

15) ATI2

Inquire RSSI value for current Bluetooth connection. This command is available in online command mode when the device is in connected state.

Syntax

ATI2? + ENTER

16) ATN

This command is used to specify a name for the adaptor. You can specify a friendly name using 0 to 9, A to Z, a to z, space and –, which are all valid characters. Note that "first space or -, last space or – isn't permitted". The default name is "Serial Adapter". The

current device name can be retrieved by using the sending this command in query format.

Syntax

ATN=XXXX + ENTER

17) ATP

This command is used to specify a PIN code for a secured Bluetooth connection. The default PIN is "1234". Paired Bluetooth devices should have a same PIN code. The current pin code setting can be retrieved by using the sending this command in query format.

Syntax

ATP=XXXX + ENTER

Where the parameter “XXXX” is a 4-8 digit string.

Response

This command will cancel the pin code security for Bluetooth connections. The remote Bluetooth device must also cancel pin code security in order to connect successfully with local Bluetooth device. Some devices e.g. Mobile phone do not allow connection without pin code security so disabling pin code security will prohibit successful connection with these devices.

Syntax

ATP? + ENTER

18) ATH0/1

It is used to specify whether the adaptor can be discovered or connected by remote devices. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATHc<cry>

Where parameter c is a character used to enable/disable the discoverability status.

c	Status
1	Discoverable
0	Non-discoverable

Note, this command will cause the device to reboot.

Syntax

ATH? + ENTER

19) ATA

This command is used to establish a connection. It is available only when the local Bluetooth device is in the manual master role.

Syntax

ATAn + ENTER

Where parameter n is list index of the remote device found through ATF? Command.

n- Varies from 1 to 8.

20) ATH

This command is used to drop connection from master or slave device. It is only allowed in

Online command mode when the device is in connected state.

Syntax

ATH + ENTER

Drop current connection when the device in online command mode.

21) ATD

For security purpose, this command is used to specify a unique remote Bluetooth device to be connected. In the master role, the local device pairs and connects with the designated remote slave address. In the slave mode, this command is a filter condition to accept the

connection request from the master device. The current bonded device address can be retrieved by using the sending this command in query format.

Syntax

ATD=XXXXXXXXXXXX<cry>

ATD? + ENTER

22) ATO0/1

This command is used to enable/disable auto-connection feature in the master role. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATOc + ENTER

Where parameter c is a character used to enable/disable the auto connection feature.

c	Connect Type
0	Auto Connect
1	Manual

Note, this command will cause the device to reboot. In Manual connect type, the local device (if master type) will need to use ATF? Command to find Bluetooth devices in neighborhood and then use ATAn to connect to specific device.

Syntax

ATO? + ENTER

23) ATX

This command Disable/Enable the handling of escape sequence "+++". Note: The escape sequence must be sent with guard time of 1000 msec. The current setting can also be retrieved by using the sending this command in query format.

Syntax

ATXc + ENTER

Where parameter c is a character used to enable/disable the escape sequence handling.

C	Status
1	Enable
0	Disable

Syntax

ATX? + ENTER

19) ATO

The command directs the device to switch from online command mode to online data mode. This command is only allowed in connected state.

Syntax

ATO + ENTER

20) ATS

This command is used to enable/disable auto-power saving feature of RS232 driver as well as low power modes of Bluetooth device.

Syntax

ATSc + ENTER

Where parameter c is a character used to enable/disable the escape sequence handling.

C	**Status**
1	Enable
0	disable

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