

Parani-SD1000

User Guide

Version 1.0.0

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User Guide for the Parani-SD1000

Version 1.0.0

Firmware version 1.0.X

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This device is not approved for life-support or medical systems.

Changes or modifications to this device not explicitly approved by Sena Technologies will void the user's authority to operate this device.

Precautions and Safety

Electricity

Use only the supplied AC adapter. Use of unauthorized power adapter is not recommended. Electrical shock may result.

Do not kink or crease the power cable or place heavy objects on the power cable. Fire can result from damaged power cables.

Do not handle power plug and adapter with wet hands. Electrical shock may result.

Immediately power off the product and unplug the AC adapter if smoke or odors emit from the product and adapter. Fire can result from improper use.

Immediately power off the product and unplug the AC adapter if water or other liquids are present. Fire can result from improper use.

Product

Parani-SD meets the RS-232 standards. Do not wire with non-standard products. Damage to your products may result from improper use.

Do not drop or subject the device to impact. Damage to your products may result from improper use.

Keep away from harsh environments including humid, dusty, and smoky areas. Damage to your products may result from improper use.

Do not use excessive force on the buttons or attempt to disassemble the device. Damage to your products may result from improper use.

Do not place heavy objects on the product. Damage to your products may result from improper use.

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1. Introduction

1.1. Overview

Parani-SD is a terminal device for wireless serial communication using Bluetooth technology that is an international standard of short range wireless communications. Parani-SD can communicate with other Bluetooth devices; user may connect other Bluetooth devices that support the Serial Port Profile.

Parani-SD provides several models with different communication ranges, from 30m up to 100m for various applications.

Parani-SD has a compact design, which allows it to be placed conveniently into various devices or equipment. Its detachable antenna has the ability to optimize the quality and distance of wireless communications.

Parani-SD supports FHSS (Frequency Hopping Spread Spectrum), which is a technique, native to Bluetooth that allows the Parani-SD minimize radio interference while decreasing the likelihood of over-air hijacking. Parani-SD also supports authentication and Bluetooth data encryption.

Parani-SD can be configured and controlled by a set of AT commands. Users can easily configure Parani-SD on a terminal program, such as HyperTerminal, and configure for wireless communication without modifying user's existing serial communication program. User friendly ParaniWIN can also be used for easy setup on Microsoft Windows.

1.2. Product Specification

	Parani-SD1000
Serial Interface	Serial UART speed up to 921.6kbps CTS/RTS flow control, DTR/DSR for loop-back & full transfer
Bluetooth Interface	Bluetooth v2.0 + EDR Profile: Serial Port Profile
	Class 1
	Working distance: 100 meters
Configuration	ParaniWIN, Modem AT command set
Firmware Update	ParaniUpdater
Diagnostic LED	Power ON Mode RS232-TX/RX Charging Low Battery
Power Supply	DC5.0V / 2A, 100~240V / 50~60Hz
Power Consumption	Minimum : 5mA, Maximum : 80mA
Battery Pack	Li+ 3.7V/250mA
Environmental	Operating temperature: -20°C to 70°C
	Storage temperature: -40°C to 85°C
	Humidity: 90% Non-condensing
Physical properties	Dimension(LxWxH): 68 x 31 x 16 (mm)
	Weight: 24 g

2. Getting Started

This chapter describes how to set up the Parani-SD Series for the first time.

- 2.1 *Panel Layout* explains the panel layout.
- 2.2 *Connecting the Hardware* describes how to connect the power, the serial device, and the battery pack to the Parani-SD Series.

Following items are required to get started:

- One DC power adapter, USB power cable or DC power cable (included in the package).
- One PC with RS232 serial port.
- Terminal emulation program running on the PC

2.1. Panel Layout

This section describes the panel layout of the Parani-SD.

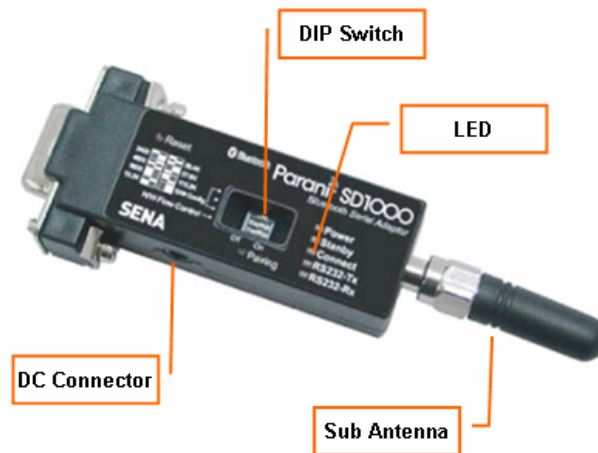


Figure 2-1 The panel layout of Parani-SD

2.2. Connecting the Hardware

This section describes how to connect the Parani-SD Series to the serial device.

- Connect a power source to the Parani-SD Series.
- Connect the Parani-SD Series to a serial device.

2.2.1. Connecting Power to Parani-SD

Connect the power jack to the power connector of the Parani-SD Series using the DC power adapter, USB power cable or DC power cable that is included in the package. If power is properly supplied, the [Power] lamp will display a solid green color.

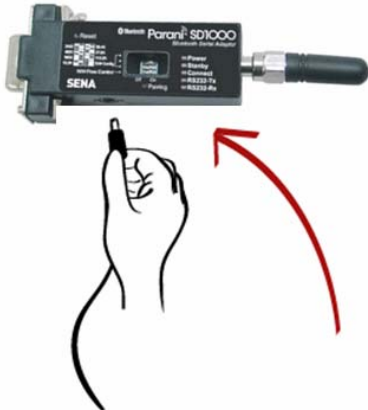


Figure 2-2 Connecting Power to Parani-SD

2.2.2. Connecting Device to Parani-SD

Connect the serial device to the Parani-SD Series as shown below.

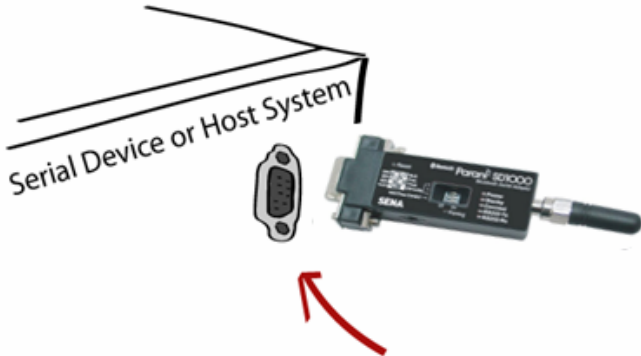


Figure 2-3 Connecting a Serial Device to Parani-SD

Appendix A: AT Commands

A.1.1. ATZ↵

Response	↵OK↵
Purpose	Software Reset
Description	This has the same effects as Powercycling the unit. This command disconnects any connected Bluetooth device, and stops ongoing tasks. After rebooting, the status will be decided by the preset operation mode. Some AT commands require the ATZ command be run so that the commands can take effect.
Reference	AT&F, AT+BTCSD, AT+UARTCONFIG

A.1.2. AT&F↵

Response	↵OK↵
Purpose	Hardware reset
Description	This has the same effect as initialization by pressing the factory reset button. All parameters are initialized to factory defaults.
Reference	ATZ

A.1.3. AT↵

Response	↵OK↵
Purpose	Check the connection status with host equipment
Description	Check if the connection to host equipment is operating normally. The serial parameters of Parani-SD must be same as those of host equipment. If not, the Parani-SD will not respond or 'ERROR' message will appear or an abnormal sequence of strings will appear.
Reference	AT+UARTCONFIG, ATZ, AT&F

A.1.4. AT+UARTCONFIG,Baudrate,Parity,Stopbit↵

Response	↵OK↵
Purpose	Set Serial parameters
Parameters	Baudrate=1200/2400/9600/14400/19200/38400/57600/115200/230400 (Default=9600) Parity=N/E/O (Default=N) Stopbit=1/2 (Default=1)
Description	The Serial parameters can be set or changed only if SW config mode is selected in dip switch. The factory default is 9600, N, 1. To take effect the ATZ command must be used or Powercycle the unit.
Reference	AT, ATZ, AT&F, ATS
Example	AT+UARTCONFIG,9600,N,1

A.1.5. AT+USEDIP?↵

Response	↵m↵
Purpose	Check the Baud rate set by the dip switch
Description	m=0: Dip switches are set to 'S/W Config' m=1: Please view the dipswitches to view your baud rate.
Reference	AT, ATZ, AT&F, ATS

A.1.6. AT+BTINFO?↵

Response	↵112233445566,DeviceName,Mode,Status,Auth,Encryp,FlowControl↵ ↵OK↵
Purpose	Display Bluetooth settings
Description	The current Bluetooth settings are displayed including BD address, Device name, Operation mode, Operation status, Authentication, Data Encryption, and Hardware Flow Control. The initial value of Device name is 'PSD100v1.1.3-445566'. PSD stands for Parani-SD, v1.1.3 for the version of firmware, and 445566 for the last 6 digits of BD address. Mode=MODE0/MODE1/MODE2/MODE3 Status=STANDBY/PENDING/CONNECT Auth=0/1 (Authentication is not activated when 0) Encrypt=0/1 (Encryption is not activated when 0) FlowControl=HWFC/NoFC
Reference	AT+BTNAME, AT+BTMODE, AT+BTSEC, ATS14?

A.1.7. AT+BTINQ?↵

Response	↵112233445566,FriendlyName,CoD↵ ↵112233445566,FriendlyName,CoD↵ ↵112233445566,FriendlyName,CoD↵ ↵OK↵
Purpose	Search Bluetooth devices nearby
Description	The Bluetooth devices in Inquiry scan mode nearby are displayed with their BD addresses, Device names, and Class of device. Maximum 15 devices are scanned for 30 seconds. (Default 10 value in S-register 6)
Reference	AT+BTSCAN, ATD, AT+BTINFO?

A.1.8. AT+BTLAST?↵

Response	↵112233445566↵
Purpose	Display the BD address of the last connected device
Description	The Bluetooth device last connected to this Parani-SD is displayed with its BD address.
Reference	AT+BTSCAN, ATD, AT+BTINFO?, AT+BTINQ?

A.1.9. AT+BTVER?↵

Response	↵SD1000v1.0.0↵ ↵OK↵
Purpose	Display device firmware version
Description	Display device firmware version
Reference	AT+BTINFO?

A.1.10. AT+BTMODE,n↵

Response	↵OK↵
Purpose	Set operation mode
Parameters	n=0: MODE0 (Default) n=1: MODE1 n=2: MODE2 n=3: MODE3
Description	When the operation status is 'Pending' currently, change the status to 'Standby' with AT+BTCANCEL prior to this command. To take effect the ATZ must be executed or Powercycle the unit
Reference	AT+BTINFO?
Example	AT+BTMODE,2 ↵OK↵ ATZ

A.1.11. +++↵

Response	↵OK↵
Purpose	Convert the operation status of 'Connect' to 'Standby'
Description	In 'Connect' status, data from host is transmitted to the other side Bluetooth device, and any AT command is not accepted but this command, which is not echoed on the screen. When Parani-SD encounters a character '+' from host, it stops the data transmission and waits for next 2 characters. If the next 2 characters aren't both '+', it restart to transmit data including the first '+' as well. If not, it converts the operation status to 'Standby'. If the data from host includes '+++', it will convert the operation status to 'Standby'. Notice that Parani-SD holds data transmission when it encounters '+', until receiving next character. '+' is an escape sequence character by default, which is changeable by AT+SETESC.
Reference	AT+SETESC, ATO, AT+BTCANCEL

A.1.12. AT+SETESC,nn↵

Response	↵OK↵
Purpose	Change the escape sequence character
Description	Escape sequence character set to '+' by default is changeable. The parameter nn must be a printable character.

Reference	+++ , ATO
Example	AT+SETESC,42

A.1.13. ATO↵

Response	None
Purpose	Convert the operation status of 'Standby' to 'Connect'
Description	You can convert the operation status of 'Standby' to 'Connect' ready to transmit data.
Reference	+++ , AT+SETESC

A.1.14. AT+BTCANCEL↵

Response	↵OK↵
Purpose	Terminate the current task
Description	This terminates a current executing task, such as Inquiry scan and Page scan, then converts the operation status to 'Standby'
Reference	AT+BTSCAN, ATD, AT+BTINQ?

A.1.15. AT+BTSCAN↵

Response	↵OK↵ ↵CONNECT 112233445566↵
Purpose	Wait for inquiry and connection from other Bluetooth devices
Description	This allows the inquiry and connection from the other Bluetooth devices. The operation status will be in 'Pending' after this command. When connection is made and released, the operation status is back set to 'Pending'. To convert the operation status to 'Standby' AT+BTCANCEL must be used. This has the same effect as AT+BTSCAN,3,0. When a connection is made with another Bluetooth device, response will be 'CONNECT' with its BD address.
Reference	ATD, AT+BTINQ?, AT+BTCANCEL

A.1.16. AT+BTSCAN,n,to↵

Response	↵OK↵ ↵CONNECT 112233445566↵ or ↵OK↵ ↵ERROR↵
Purpose	Wait for inquiry and connection from other Bluetooth devices for a given duration
Parameters	n=1: Allows Inquiry scan n=2: Allows Page scan n=3: Allows both of Inquiry scan and Page scan to= Time duration in seconds

Description	For the given to, Parani-SD is waiting for the inquiry and connection from other Bluetooth devices. If the parameter of to is 0, it will wait forever. When connection is made with other Bluetooth device, response will be 'CONNECT' with its BD address. If there is no connection made within this time duration, response is 'ERROR' and the operation status becomes to 'Standby'.
Reference	ATD, AT+BTINQ?, AT+BTCANCEL
Example	AT+BTSCAN,2,30

A.1.17. AT+BTSCAN112233445566,to↵

Response	↵OK↵ ↵CONNECT 112233445566↵ or ↵OK↵ ↵ERROR↵
Purpose	Wait for connection by a Bluetooth device with a given BD address
Parameters	112233445566=BD address to= time duration in seconds
Description	Parani-SD will wait to be connected to by the Bluetooth device with the given BD address. If the parameter of to is 0, it will wait forever. When connection is made with the Bluetooth device, response will be 'CONNECT' with its BD address. If there is no connection made within this time duration, response is 'ERROR' and the operation status becomes 'Standby'.
Reference	ATD, AT+BTINQ?, AT+BTCANCEL
Example	AT+BTSCAN000B530011FF,30

A.1.18. ATD↵

Response	↵OK↵ ↵CONNECT 112233445566↵ or ↵OK↵ ↵ERROR↵
Purpose	Connect to the last connected Bluetooth device
Description	Parani-SD saves the BD address of the Bluetooth device most recently connected to. If it fails to make a connection, response will display an 'ERROR'.
Reference	AT+BTINQ?, AT+BTSCAN

A.1.19. ATD112233445566↵

Response	↵OK↵ ↵CONNECT 112233445566↵ or ↵OK↵ ↵ERROR↵
Purpose	Connect to a specific Bluetooth device with a given BD address
Parameters	112233445566 = BD address

Description	Parani-SD attempts to connect to the Bluetooth device with the given BD address. To make successful connection, the Bluetooth device must be in Page scan mode. This attempt continues for 5 minutes. If it fails to make connection, response is 'ERROR '.
Reference	AT+BTINQ?, AT+BTSCAN
Example	ATD000B530011FF

A.1.20. ATA↵

Response	↵OK↵ ↵Start ACL Open↵ ↵ACL Connect Success↵ or ↵ACL Connect Fail↵
Purpose	ACL connect to the last connected Bluetooth device
Description	If it make connection, response will display an 'ACL Connect Success', and if fail to connection, display 'ACL Connection Fail'. Must have reboot for new ACL connection.

A.1.21. ATA112233445566↵

Response	↵OK↵ ↵Start ACL Open↵ ↵ACL Connect Success↵ or ↵ACL Connect Fail↵
Purpose	ACL connect to a specific Bluetooth device with a given BD address
Parameters	112233445566 = BD address
Description	Parani-SD attempts to ACL connect to the Bluetooth device with the given BD address. To make successful ACL connection, the Bluetooth device must be in Page scan mode. If it make connection, response will display an 'ACL Connect Success', and if fail to connection, display 'ACL Connection Fail'. Must have reboot for new ACL connection.
Example	ATA000B530011FF

A.1.22. ATH↵

Response	↵OK↵ ↵DISCONNECT↵
Purpose	Release the current connection
Description	The current Bluetooth connection will be disconnected. It takes about 30 seconds to detect an abnormal disconnection such as power off and moving out of service range.
Reference	ATD, AT+BTSCAN

A.1.23. AT+BTKEY=\$string↵

Response	↵OK↵
Purpose	Change pin code
Parameters	\$string= New pin code (Default="1234")

Description	Pin code is a string, which allows up to 16 alpha-numeric characters. Based on this pin code, Parani-SD generates a link key which is used in actual authentication process
Reference	AT+BTCSD, AT+BTFP, AT+BTSD?, AT+BTSEC, ATZ, AT&F
Example	AT+BTKEY="apple"

A.1.24. AT+BTSD? ↵

Response	↵12233445566↵ ↵OK↵
Purpose	Display a list of Bluetooth devices sharing the same pin code
Description	Once a connection is made with a pin code, Parani-SD saves the Bluetooth device with its link key, generated by the pin code. The connection to a device listed in Parani-SD can be made automatically without the authentication process. The maximum number kept on the list is 5.
Reference	AT+BTCSD, AT+BTFP, AT+BTKEY, AT+BTSEC, ATZ, AT&F

A.1.25. AT+BTCSD↵

Response	↵OK↵
Purpose	Clear the list of Bluetooth devices sharing the same pin code
Description	This clears the list of Bluetooth devices linked with the same key in flash memory. To take effect the ATZ command must be used or Powercycle the unit.
Reference	AT+BTFP, AT+BTKEY, AT+BTSD?, AT+BTSEC, ATZ, AT&F

A.1.26. AT+BTFP,n↵

Response	↵OK↵
Purpose	Set generation of link key every time of connection
Parameters	n=0: Inactivate (Default) n=1: Activate
Description	If n is set to 1, Parani-SD asks for the pin code every time a connection is made. This can be used to increase security.
Reference	AT+BTCSD, AT+BTKEY, AT+BTSD?, AT+BTSEC, ATD, ATZ, AT&F

A.1.27. AT+BTSEC,Authentication,Encryption↵

Response	↵OK↵
Purpose	Set authentication and data encryption
Parameters	<i>Authentication</i> =0: Inactivate (Default) <i>Authentication</i> =1: Activate <i>Encryption</i> =0: Inactivate (Default) <i>Encryption</i> =1: Activate

Description	If the authentication is activated, the pin code must be set by AT+BTKEY command. Data encryption cannot be used when authentication is not enabled, i.e. <i>Authentication=0</i> and <i>Encryption=1</i> will not work properly.
Reference	AT+BTCSD, AT+BTFP, AT+BTSD?, AT+BTSD?, ATZ, AT&F

A.1.28. AT+BTNAME=\$string↵

Response	↵OK↵
Purpose	Change device name
Parameters	\$string= New device name (Default="PSDv1.1.3-445566")
Description	Parani-SD can have a user friendly name for easy identification. The name allows up to 30 alpha-numeric characters.
Reference	AT+BTINFO?, AT+BTINQ?
Example	AT+BTNAME="My-Parani-SD"

A.1.29. AT+BTLPM,n↵

Response	↵OK↵
Purpose	Set low power mode
Parameters	n=0: Inactivate (Default) n=1: Activate
Description	During no data transmission, Parani-SD can be in low power mode to save the power. It takes a few seconds to wake the Parani-SD out of low power mode.

A.1.30. AT+BTRSSI,n↵

Response	↵OK↵ ↵0,255,0,0↵ (repeatedly)
Purpose	Test signal strength
Parameters	n=0: Stop signal strength test n=1: Start signal strength test
Description	When Bluetooth connection is established, you can use this command in Standby status. The signal strength will be displayed repeatedly in order of Status, LinkQuality, Status, RSSI. If the LinkQuality is close to 255 and RSSI is close to 0, the signal strength is in good standing.
Example	+++ AT+BTRSSI,1 ↵OK↵ 0,255,0,0

A.1.31. AT&V↵

Response	↵S0:m0;S1:m1; ...Sn:mn↵ ↵OK↵
Purpose	Display all the S-registers
Description	All parameters are stored at S-register in flash memory. These values are sustained until a hardware reset.
Reference	ATS

A.1.32. ATSnn? ↵

Response	↵value↵ ↵OK↵
Purpose	Display a given S-register
Parameters	nn= Address of S-register
Description	A specific S-register will be displayed.
Reference	AT&V

A.1.33. ATSnn=mm↵

Response	↵OK↵
Purpose	Change S-register value
Parameters	nn= Address of S-register mm= New value of S-register
Description	Some S-registers are optimized for the overall performance and protected and cannot be changed. When users try to change these S-registers, response is 'ERROR'. For details of S-register, refer Appendix. B.
Reference	AT&V
Example	ATS10=0

3. Approval Information

3.1 FCC

3.1.1 FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation

Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, Pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio Frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

3.1.2. RF Exposure

Statement The equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter.

3.1.3. Caution

Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void user's authority to operate the equipment.

3.2. CE

3.2.1. EC-R&TTE Directive

EN 50385 / EN 60950 / EN 301 489-1/-17 / EN 300 328