ZBA, Inc.

ZBA Bluetooth Class 1 Serial Adapter With Whip Antenna.

Assembly No. ZBS44-411-SPF/M

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1   Document Status

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2   Scope

The intention of this specification is to provide general guidelines on the use, operation and capabilities of the ZBA Bluetooth Serial adapter **ZBS44-411-SPF/M**.

3   Bluetooth Assembly Description:

The **ZBS44-411-SPF/M** is a general purpose Bluetooth Serial port adapter with an external whip antenna. The ZBA **ZBS44-411-SPF/M** Serial Bluetooth adapter can be used in a wide variety of equipment especially when a direct cable replacement application is desired. When used as a cable replacement product, one adapter will act as the "master" the other the slave. Once power is applied to both devices they will pair with each other and commence communications. The master and the slave can be paired as matched set in which each will retain its respective partners communication address (Bluetooth address) for fast pairing and seamless connections.

The RS232 adapter can also be used as an independent Slave or Master and it may connect to any other Bluetooth enabled device that supports the SPP profile.

The Serial Bluetooth adapter has a rich set of commands that support easy use of this device in many applications.

The Serial adapter is based on the BC04 Bluetooth Module, a Class 1 Bluetooth module using BlueCore4-External chipset from Cambridge Silicon Radio, a leading Bluetooth chipset supplier. It provides a fully compliant Bluetooth system for data. It interfaces with a host PC via a Standard DB9 connection and supports EDR data rates. The Adapter firmware is fully compliant with the Bluetooth specification V2.0.

4   Features
● Operating Frequency Band 2.40 GHz~2.48GHz unlicensed ISM Band
● Bluetooth Spec. v2.0 Compliant + Enhanced Data Rate (EDR)
  • EDR compliant with v2.0.E.2 of specification for both 2Mbps and 3Mbps modulation modes
● Class 1 type Output Power
  • Standard Effective Distance 100m
● Also available as a Class 2 type Output Power (see **ZBS44-421-SPF/M)**
  • Standard Effective Distance 30m
● Built-in 8Mbit Flash Memory
● Firmware Upgrade Support (via The UART)
● Active Bluetooth Connections signal
● External power supply connection via DC jack or via 5VDC on Pin 9
● Male and Female DB9 connectors available.
● Multiple baud rates supported
● Simple cable replacement
● Easy programming commands via UART

- Automatic low power mode supported
- Dimensions = 10.6cm x 3.6 cm x 1.4 cm
- Antenna length=8.7mm antenna can rotate 360 degrees and bend 90 degrees
- Weight = 25g

5 Typical Connection Configuration to a PC

Bluetooth Serial adapter		PC
DB9 Female		DB9 MALE
Description	Pin #	Description
+5-9VDC (see notes)	1	+5-9VDC (note 1)
TxD Output from Adapter	2	RxD Input to Adapter
RxD Input to Adapter	3	TxD Output from Adapter
NC	4	DTR
GND	5	GND
NC	6	DSR
CTS Input to Adapter	7	RTS Output from Adapter
RTS Output from Adapter	8	CTS Input to Adapter
+5-9VDC (see notes)	9	+5-9VDC (note 1)

Note1: On the PC side +5-9V DC on PIN 9 and PIN 1 is not the standard Pin configuration. This is usually specially modified by the user!

Note 2:On the Bluetooth adapter side if the power is supplied to the Adapter via the DC power jack then Pin 9 and Pin 1 should be left UNCONNECTED.
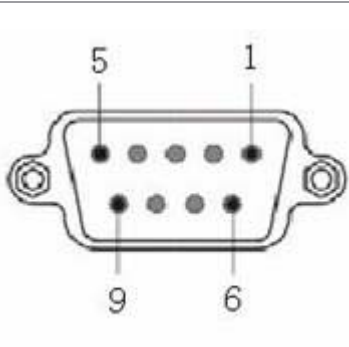
Note 3:On the Bluetooth adapter side if DC power is supplied to Pin 9 then the power jack and Pin 1 should be left UNCONNECTED.

Note 4:On the Bluetooth adapter side if DC power is supplied to Pin 1 then the power jack and Pin 9 should be left UNCONNECTED.
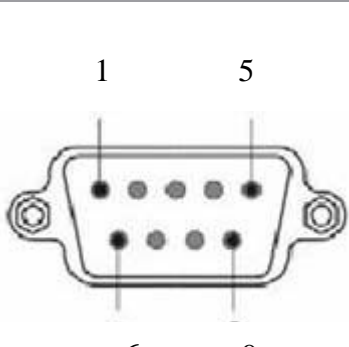
6 Pin-out and Control Specifications

6.1 Pin Configurations

6.1.1 Standard RS232 (Female) PIN Description

Pin No	Signal
1	NC
2	TXD
3	RXD
4	NC
5	GND
6	NC
7	CTS
8	RTS
9	VCC

6.1.2 Standard RS232 (Male) PIN Description

Pin No	Signal
1	NC
2	RXD
3	TXD
4	NC
5	GND
6	NC
7	RTS
8	CTS
9	VCC

6.1.3 Power Supply Configurations

There are 2 ways to supply power top the serial port adapter.

a) The first is by supplying a +5-9V Center Positive DC power to the DC power jack located on the side of the adapter.

Figure 1 Power jack connections indicating center positive

b) The Second option is to supply a 5-9Volt DC power source to either Pin 9 or Pin 1 of the adapter

Re Current Rating, the supply should be capable of providing 100mA for a class2 device and 200 mA for a class 1 device.

7 Operation Description of the Indicator Lights and Command Button.

7.1 LED Indicators

There are three LEDs to indicate various states of the Serial Adapter. The LEDs can be visually interrogated to determine the serial adapter's power state, connection state and master/slave mode.

The **Serial Bluetooth** Adapter indicator lights consist of three LEDs
a) Power supply indicator LED (Red) as indicated on the drawing in figure 2 below as #3.
b) Master/Slave mode indicator LED (Red) as indicated on the drawing in figure 2 below as #6.
c) Connection mode indicator LED (Green) as indicated on the drawing in figure 2 below as #7.

The following table can be used to determine the state of the adapter.

LED	Color	Actions	Comments
Position #3	Red	Power supply indicator	Bright RED indicates that the module has power applied
Position #6 See note 2	Red	Master/Slave indicator as determined by the Flashing rate	One Flash of the LED every 5 second is indicative of the adapter operating as a MASTER One Flash of the LED every 2 second is indicative of the adapter operating as a SLAVE
Position #7 See note 2	Green	Connection mode indicator	OFF indicated device is connected regardless if MASTER or SLAVE.
		Prior to connecting or attempting to connect	
		One Flash per second	Adapter is NOT bound to any partner
		Two Flashes per second	Adapter is bound to a partner (an example is cable replacement application)
		Master MODE	
		Two Flashes per second	Discovery is in progress
		Four Flashes per second	Pairing is in progress
		NO Illumination	Connection has been established

Note2: Master/slave mode indicator and connecting state indicator LED's are off while the Serial adapter is in the parameter configuration mode .
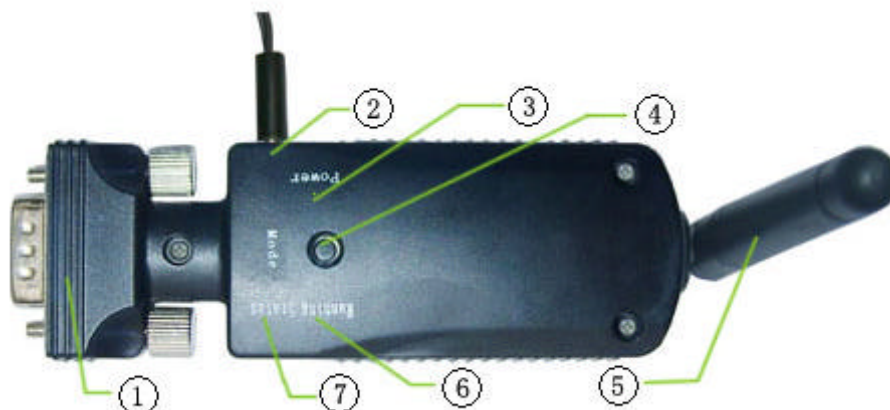
1) RS232 interface
2) DC Power supply interface
3) Power supply indicator light (Red)
4) CMD Button
5) External Antenna
6) Master/Slave mode indicator light (Red)
7) Connection mode indicator light (Green)

Figure 2 Top view showing location of the LEDs and the command button

7.2 Command Button

Operation of the command button (shown in figure 2 as # 4) is described as follows.

The Command button may be depressed at any time. When the command button is depressed, the adapter will exit the Data communication mode and enter the command parameter setting mode and return the following
"+**OPEN : 0**"
Additionally once the Adapter enters the command mode, the Master/Slave mode indicator and connecting state indicator LEDs are switched off.
While in the command mode the serial adapter stops any communications with its respective partner device.
While in the Command Mode, if you depress the Command button, the adapter will exit the configuration mode and enter the SPP mode. .

8 General Specifications

Item	Specification
Carrier Frequency	2400MHz to 2483.5MHz
Modulation	GFSK, 1Mbps, 0.5BT Gaussian
Channel Intervals	1MHz
Number of Channels	79
Frequency Hopping	1600hops/sec, 1MHz channel space
Receive Sensitivity	-82 dBm typ. @0.1% BER
Transmission Power	+18dBm max.
Maximum Data Throughput	Asynchronous : 3 Mbps
Output Interface	Full speed UART,
Power Supply	3.3V ±10%
Operating Temperature Range	-20°C to 85°C
Storage Temperature Range	-40°C to 85°C
Antenna internal	External whip

8.1 Electrical Characteristics

8.1.1 Absolute Maximum Ratings

Absolute maximum ratings for supply voltage and voltages on digital and analog pins of the Module are listed below; exceeding these values will cause permanent damage

Voltage	
Supply Voltage Range	9VDC
Storage Conditions	
Storage Temperature	-10°C to 70°C (ambient)
Storage Humidity	0-90% RH
Operating Conditions	
Temperature Range	-0°C< T_A<60°C
Peak Power supply current	150 mA
Relative humidity	5% to 95% non condensing

8.2 Radio Characteristics: Basic Data Rate

8.2.1 Transmitter (Temperature =20°C)

Description	Min	Typ	MAX	Bluetooth Specification	Units
Maximum RF transmit power		14[3]		- 0 to +20[4]	dBm

Parameter					
Variation in RF power over temperature range with compensation disabled (±)		2.0		-	- dB
Variation in RF power over temperature range with compensation enabled (±)		1.0			dB
RF power control range		>20		>16	dB
RF power range control resolution		0.5		-	dB
20dB bandwidth for modulated carrier	-	670		≤1000	kHz
Adjacent channel transmit power F=F0 ±2MHz		-35		≤-20	dBm
Adjacent channel transmit power F=F0 ±3MHz -		-40		≤-40	dBm
Adjacent channel transmit power F=F0>±3MHz -		-47		≤-40	dBm
$\Delta f1avg$ Maximum Modulation		159		140<? f1avg<175	kHz
$\Delta f2max$ Minimum Modulation		123 -		≥115	kHz
$\Delta f2avg$ / ?f1avg		- 0.84		≥0.80 -	-
Initial carrier frequency tolerance		- 6.0		±75	KHz
Drift Rate		8.0		≤20	kHz/50µs
Drift (single slot packet)		9.0		≤25	- kHz
Drift (five slot packet)		11.0		≤40	kHz
2nd Harmonic content		-43		≤- 30	dBm
3rd Harmonic content		-34		≤- 30	dBm

Notes:
(1) The design is capable of producing 18dBm at 20°C. However, in order to meet both the FCC Part 15.205a and 15.209a radiated spurious requirement of -41dBm/MHz (500microvolts/metre at a distance of 3 meters) and the Bluetooth requirement for ACP, it is necessary to limit the maximum output power to +14dBm at 20°C. The corresponding recommended POWER_TABLE entry is internal gain 55, external gain 170.
(2) Class 1 RF transmit power range, Bluetooth specification v2.0 + EDR.
(3) To some extent these parameters are dependent on the matching circuit used and its behaviour over temperature. Therefore, these parameters may be beyond CSR's direct control.
(4) Resolution guaranteed over the range -5dB to -25dB relative to maximum power for Tx Level >20.
(5) Measured at F_0 = 2441MHz.
(6) Up to three exceptions are allowed in v2.0 + EDR of the Bluetooth specification. BlueCore4-External is guaranteed to meet the ACP performance as specified by the Bluetooth specification v2.0 + EDR.
(7) Measurement made using a POWER_TABLE entry of internal gain 55, external gain 170. This ensures that the Bluetooth requirements and those defined by the FCC and ETSI are satisfied over the operating temperature range of -20°C to +65°C. Measured using an operating output power of 14dBm at 20°C.

8.2.2 Basic Data Rate---Receiver (Temperature =20°C)

Frequency (GHz)		Min	Typ	MAX	Bluetooth Specification	Units
Sensitivity at 0.1% BER for all packet types	2.402		- -86.5 -		≤-70 dBm	**dBm**
	2.441		**-86.5**			
	2.480		**-87**			
Maximum received signal at 0.1% BER			- >-20		≥-20	dBm
Frequency (MHz)		**Min**	**Typ**	**MAX**	**Bluetooth Specification**	**Units**
Continuous power required to block Bluetooth reception (for sensitivity of -67dBm with 0.1% BER). Measured at the antenna connection.	30 – 2000		>0		-10	dBm
	2000 – 2400		- >-15		**-27**	
	2500 – 3000		>-18		**-27**	
C/I co-channel			- 9		≤11	dB
Adjacent channel selectivity C/I F=F0 +1MHz			-4		≤0	dB
Adjacent channel selectivity C/I F=F0 - 1MHz			-2		≤0	dB
Adjacent channel selectivity C/I F=F0 +2MHz			-38		≤-30	dB
Adjacent channel selectivity C/I F=F0 - 2MHz			-21		≤-20	dB
Adjacent channel selectivity C/I F=F0 ?+3MHz			-43		- ≤-40	dB
Adjacent channel selectivity C/I F=F0 - 5MHz			- -43		≤-40	dB
Adjacent channel selectivity C/I F=F$_{Image}$			-21		**<-9**	dB
Maximum level of inter-modulation interferers			-37		≥-39	dBm
Spurious output level			-140		**-**	dBm/Hz

Notes:
(1) Up to five exceptions are allowed in v2.0 + EDR of the Bluetooth specification. BlueCore4-External is guaranteed to meet the C/I performance as specified by the Bluetooth specification v2.0 + EDR
(2) Measured at F$_0$ = 2441MHz
(3) Measured at f1-f2 = 5MHz. Measurement is performed in accordance with Bluetooth RF test RCV/CA/05/c, i.e. wanted signal at -64dBm
(4) Measured at the antenna connection. Integrated in 100kHz bandwidth and then normalized to 1Hz. Bluetooth band of frequencies, with exceptions of -84dBm at 1625MHz, -76dBm at 2435MHz, and -68dBm at 3200MHz.

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8.2.3 Radio Characteristics: Enhanced Data Rate

8.2.3.1 Transmitter (Temperature = +20°C)

Description	Min	Typ	Max	Bluetooth Specification	units
Maximum RF transmit power		18(2)		- 0 to +20 (3)	dBm
Relative transmit power		-2		-4 to +1	dB
π/4 DQPSK Max carrier frequency stability w0		1.5		≤±10 for all blocks	kHz
π/4 DQPSK Max carrier frequency stability wi		6.6		- ≤±75 for all packets	kHz
π/4 DQPSK Max carrier frequency stability ¦w0 + wi¦		7.0		≤±75 for all blocks	kHz
8DPSK Max carrier frequency stability w0		1.5		- ≤±10 for all blocks	kHz
8DPSK Max carrier frequency stability wi		4.5		≤±75 for all packets	kHz
8DPSK Max carrier frequency stability ¦w0 + wi¦		5.0		≤±75 for all blocks	kHz
π/4 DQPSK Modulation Accuracy					
RMS DEVM		7.0		- ≤20	%
99% DEVM		12.0		≤30	%
Peak DEVM		16.0		≤35	%
8DPSK Modulation Accuracy					
RMS DEVM		8.0 -		≤13	%
99% DEVM		13.0		≤20	%
Peak DEVM		16.0		≤25	%
In-band spurious emissions					
F > Fo+3MHz		- -45		≤-40	dBm

F < Fo -3MHz		-45		≤-40	dBm
F = Fo -3MHz(6)		-38		≤-40	dBm
F = Fo -2MHz		-25		≤-20	dBm
F = Fo –1MHz		-36		≤-26	dB
F = Fo +1MHz		-36		≤-26	dB
F = Fo +2MHz		-25		≤-20	dBm
F = Fo +3MHz(6)		-28		≤-40	dBm
EDR Differential Phase Encoding		No Errors		=99	%

Notes:
(1) BlueCore4-External firmware maintains the transmit power to be within the Bluetooth v2.0 + EDR specification limits.
(2) Although the design is capable of generating in excess of +18dBm, regulatory compliance over the full temperature range of -20°C to +65°C will not be satisfied if the transmit power approaches this value.
Actual output power with TX_PRE 71, INT PA 63, EXT PA 255 corresponds to +8dBm at 20°C.
(3) Class 1 RF transmit power range, Bluetooth v2.0 + EDR specification.
(4) Measurements methods are in accordance with the EDR RF Test Specification v2.0.E.2.
(5) Modulation accuracy utilizes Differential Error Vector Magnitude (DEVM) with tracking of the carrier frequency drift.
(6) The Bluetooth specification values are for 8DPSK modulation. Up to three exceptions are allowed in the Bluetooth v2.0 + EDR specification. BlueCore4-External is guaranteed to meet the ACP performance as specified by the Bluetooth v2.0 + EDR specification.

8.2.3.2 Receiver (Temperature = +20°C)

Description	Min	Typ.	Max	Bluetooth specification	Units
Sensitivity at 0.01% BER					
π/4 DQPSK	-	-89	-	≤-70	dBm
8DPSK	-	-82	-	≤-70	dBm
Maximum received signal at 0.1% BER					
π/4 DQPSK	-	>0	-	≥-20	dBm
8DPSK	-	-10	-	≥-20	dBm
C/I co-channel at 0.1% BER					
π/4 DQPSK	-	10	-	≤+13	dB
8DPSK	-	18	-	≤+21	dB
Adjacent channel selectivity C/I F=F0 +1MHz		-11		≤0	
π/4 DQPSK	-		-		dB
8DPSK	-	-5	-	≤+5	dB
Adjacent channel selectivity C/I F=F -1MHz					

π/4 DQPSK	-	- -8	-	≤0 dB	dB
8DPSK	-	-4	-	≤+5	dB
Adjacent channel selectivity C/I F=F dB 0 +2MHz					
π/4 DQPSK	-	-43	-	≤-30	dB
8DPSK	-	-38	-	- ≤-25	dB
Adjacent channel selectivity C/I F=F dB 0 -2MHz					
π/4 DQPSK	-	-22	-	≤-20	dB
8DPSK -	-	22	-	≤-13	dB
Adjacent channel selectivity C/I F=F dB 0 +3MHz					
π/4 DQPSK	-	-46	-	≤-40	dB
8DPSK	-	-42	-	≤-33	dB
Adjacent channel selectivity C/I F=F dB 0 –5MHz					
π/4 DQPSK	-	-43	-	≤ -40	dB
8DPSK	-	-40	-	- ≤-33	dB
Adjacent channel selectivity C/I F=F dB Image					
π/4DQPSK	-	-21	-	≤-7	dB
8DPSK	-	-14	-	≤0	dB

Notes: (1) Measured at F0 = 2405MHz, 2441MHz, 2477MHz

8.3 Power Consumption

8.3.1 Average Current Measurements

Description	Average current	Units	Comments
Configured as SLAVE			
I_{cmd}	14	mA	Command Mode
I_{idls-s}	11	mA	Idle mode (not connected)
I_{conn-s}	12	mA	Connected, Mode = slave park & sniff, no data transmitted,
$I_{conn-ts}$	40	mA	Connected Mode= Slave, transmitting data
$I_{conn-rs}$	34	mA	Connected: Mode= Slave; Receiving data

Configured as MASTER			
I_{cmd}	14	mA	Command Mode
I_{idls-m}	74	mA	Idle mode (not connected)
I_{conn-m}	7	mA	Connected, Mode = MASTER park & sniff, no data transmitted,
$I_{conn-tm}$	35	mA	Connected Mode= MASTER, transmitting data
$I_{conn-rm}$	13	mA	Connected: Mode= MASTER; Receiving data

Note 1: For measurement above the distance between the master and slave = 1 meter

9 Serial Port Profile

The Serial port adapter is shipped with the on-board Serial Port Profile (SPP).   The SPP profile embedded within the module provides a menu for making configuration changes utilizing AT commands described below in section 8.2:

9.1 Default Configuration

- UART Baud Rate: 9600 baud
- Number of Bits: 8
- Stop bit: One
- Parity: None
- H/W Flow Control: Disable
- PIN: 1111
- Device Name: ZBA-SPP
- Mode: Slave
- Sleep Mode: Deep sleep whenever possible.
- Partner pairing is dropped at power off or un-pairing by master.

9.2 Configuration Commands Set-up & Procedures

Entering Command Mode:

a) Entering the command mode via the CMD button was described above in section 7.2
b) Another way to enter in the command mode, the host must send a single character **ESC <0x1B>** within **5** second after the unit has been powered on. If the **ESC** character is not sent within the specified 5 second window then the module will automatically enter the SPP mode and any information sent to the UART will be treated as data to be transmitted over a Bluetooth link. Please note. The modules will only respond to the host set-up commands after the module has entered the command mode

Entering the SPP mode from the command mode

After running any set-up commands then there are three ways to enter the **SPP mode**
1) Disconnect the 3.3 Volts supply to the module then re-power the module and **DO NOT** hit the <**ESC**> key or send the <**ESC**> command or hit the CMD button. After 5 seconds the module will be in the SPP operation mode.
2) From the Set-up mode type: **AT+EXIT**
    The module will respond with: **OK**
    The module is now in SPP operation mode.
3) Hit the CMD button.
.

Note: **All Commands except the first <ESC> command should contain a suffix of <CR><LF>.**

9.2.1 Entering the Set-up Mode

Command	Response	Parameter
ESC	<CR> +OPEN:num<CR><LF>	Num= 0: device is not paired Num= 1 Device has a saved BT Address in memory

Note: If the device returns +**open:0** and bind is disabled (bind=0) then the device is not paired or connected and there is no remote device saved in the remote address (+RADDR) variable   If the device returns a +**open:1** and the bind is enabled (bind=1) then the module device is operating as a cable replacement function and it will pair with the master Bluetooth device that is saved in the remote address variable ASAP. The BT44-xxx module is bound to the companion device whose address is saved in the + RADDR variable.

9.2.2 Testing the Communication Link

Command	Response	Parameter
AT	OK	None

9.2.3 Command list

Command	Response	Parameter
ATZ?	List of Commands	None

9.2.4 Set RS232 Baud Rate (bps)

Command	Response	Parameter

AT+BAUD= <Para1>	OK	Para1 = 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400
AT+BAUD?	OK +BAUD: <para1>	

Note: The default baud rate is 9600bps

9.2.5 Set/inquired UART Parameters

Command	Response	Parameter
AT+UARTMODE=<Para1>,<Para2>	OK	<Para1>= Stop-bit <Para1>
AT+ UARTMODE?	OK UARTMODE: <Para1>,<Para2>	0 = 1 Stop bit 1 = 2 Stop bits <Para2> Parity- bit 0 = None 1 = ODD 2 = EVEN

Note: the default UARTMODE parameters are N, 8, 1 and the overall comm.
Default Parameters are 9600,N,8,1

9.2.6 Set Authentication

Command	Response	Parameter
AT+AUTH=<Para1>	OK	Para1 = Authentication 0 = disable
AT+AUTH?	OK +AUTH:<Para1>	1= enable Default mode: Authentication enabled

Note: The default authentication mode is Authentication enabled.

9.2.7 Set Password

Command	Response	Parameter
AT+PASSWORD= < Para1>	OK	Para1 Password
AT+PASSWORD?	OK +PASSWORD: < Para1>	Default = 1111

Note: The default authentication password = 1111.

9.2.8 Set Device Name

Command	Response	Parameter
AT+NAME= < Para1>	OK	Para1= Device name
AT+NAME?	OK +NAME: <Para1>	Default= ZBA-SPP

Note: The default Device name = ZBA-SPP.

9.2.9 Set Device Type

Command	Response	Parameter
AT+CLASS=< Para1>	OK	Para1 Device type (Length must = 6 characters)
AT+CLASS?	OK +CLASS:<Para1>	default = 000000

9.2.10 Set Master/Slave Mode

Command	Response	Parameter
AT+ROLE=< Para1>	OK	Para1 Slave = 0, Master = 1
AT+ROLE?	OK +ROLE: <Para1>	Default = 0, Slave

Note: The default mode is Slave.

9.2.11 Set Sniff Power Saving Mode

Command	Response	Parameter
AT+SNIFF=<Para1>,<Para2>,<Para3>,<Para4>	OK	Para1 Maximum Para2 Minimum
AT+SNIFF?	OK +SNIFF<Para1>,<Para2>,<Para3>,<Para4>	Para3 test Para4 Over time

Note: Default = 1024, 512, 1024, 512 number in decimal mode

9.2.12 Set Sniff Power Saving Mode—Extended

Command	Response	Parameter
AT+SNIFFEX=<Para1>,<Para2>,<Para3>,<Para4>	OK	Para1 Maximum Para2 Minimum
AT+SNIFFEX?	OK +SNIFFEX<Para1>,<Para2>,<Para3>,<Para4>	Para3 test Para4 Over time Para5 Sniff timeout

Note: Default = 1024, 512, 1024, 512, 10 number in decimal mode

9.2.13 Reset to Factory Default

Command	Response	Parameter
AT+RESET	OK	None

9.2.14 Set/Inquire Scan Time

Command	Response	Parameter

AT+SCANTIME=<Para1>,<Para2>, <Para3>,<Para4>	OK	Para1= Scan interval tim Para2=Scan time-out Para3=Inquiry interval Para4=Inquiry time-out
AT+SCANTIME?	OK +SCAN :<Para1>,<Para2>, <Para3>,<Para4>	

Note: The Default Values (in decimal = N* 625 us)
     Para1 = 2048
     Para2 = 18
     Para3 = 2048
     Para4 = 18

9.2.15 Set/Inquire Paired Device

Command	Response	Parameter
AT+BIND= < Para1>	OK	Para1 0 = Drop pair 1 =Always paired
AT+BIND?	OK +BIND:<Para1>	Default=0 Drop pairing

Note: The default mode is to **drop pair**. The drop pair function occurs when the module (slave or master mode) is power-off then back on or the master drops pairing. This will allow another master to commence a discovery process and connect to the module (slave) device.

If the device is set-up as **always paired** (bind=1) then the module will **only** communicate with the specific slave (or master) whose address it has been bound to even after power off and power-on. This mode is useful for application where a cable replacement function is the requirement. To communicate to a different master, the module must have the bound address cleared. This is accomplished by running the **AT+CLEARADDR** command.

If a module has been operated with bind=1 and then subsequently the bind function is set to 0, the module will still remember the previous bound address. So if bind is re-enabled then device will re-connect to the previously bound master. To clear the memory please run the **AT+CLEARADDR** command.

9.2.16 Clear Paired Device Address

Command	Response	Parameter
AT+CLEARADDR	OK	None

Note: This command will clear any remote device address to which the module has been paired.

9.2.17 Inquire Version

Command	Response	Parameter
AT+VERSION?	OK +VERSION:<Para1>	Para1 version #

Note: This command will return the firmware version of the module.

9.2.18 Inquire Remote Device Address

Command	Response	Parameter
AT+INQ	OK + BT address, Device name	

Note: This command commences the discovery process to detect any BT device in the neighborhood. Completion of this command may take up to 30 seconds.

An example of the response to the above command is: **+INQRESU:0005164801E6, ZBA-SPP** where the data following the colon is one example of the Bluetooth address of one of the devices in the neighborhood and the data following the comma is the name of the discovered device.

9.2.19 Set/Inquire Paired Device Address

Command	Response	Parameter
AT+RADDR=<Para1>	OK	Para1= Paired device BT address
AT+ RADDR?	OK +RADDR:<Para1>	

Example of how to pair using the BT44-191 as the Master
Example to set-up the Module to communicate with one specific BT device whose BT address is currently unknown.
First type: **AT+INQ** which causes the Module to return the BT addresses of the devices in the BT neighbourhood. Then the module will return **+INQCOMP.** This response will indicate that the Inquiry process has terminated.
To terminate the **AT+INQ** command early, please type the command **AT+CANCEL**

Then type **AT+RADDR= BT address** (the specific device you wish to pair as determined from the AT+INQ Command).
.
The module will remain bound to this address until the **AT+CLEARADDR** (command 8.2.16) is run or the module is powered off and then back on again.

9.2.20 Cancel Inquiry

Command	Response	Parameter
AT+CANCEL?	OK	

	+INQCOMP	

Note: This command will cancel the inquiry command (AT+INQ).

9.2.21 Inquire Device BD Address

Command	Response	Parameter
AT+LADDR?	OK +LADDR:<Para1>	Para1 Device address

Note: This command returns the (local) BT address of the module.

9.2.22 Software Reset

Command	Response	Parameter
AT+ RESTART	OK	None

9.2.23 Set/Inquire about Low power mode

Command	Response	Parameter
AT+LOWPOWER=<Para1>	OK	<Para1> : 0 : low power disabled 1 : Low power mode Enabled
AT+ LOWPOWER?	OK +LOWPOWER：<Para1>	

Note: the default value for Low power =0

9.2.24 Set/Inquire Data processing mode at BT disconnect

Command	Response	Parameter
AT+ DATAMODE=<Para1>	OK	<Para1> : 0 : Data is held in buffer, & it will be sent to the other device after successfully connect. 1 : Data will be deleted after the BT devices have been disconnected.
AT+ DATAMODE?	OK **+** DATAMODE：<Para1>	

Note: the default value for Datamode =0

9.2.25 Set/Inquire about Flow control mode (Handshaking)

Command	Response	Parameter
AT+ FLOWCONTROL=<Para1>	OK	<Para1> : 0: No Flowcontrol 1 : Use hardware Flowcontrol

AT+ FLOWCONTROL?	OK
	+ FLOWCONTROL : <Para1>

Note: the default value for Flowcontrol =0

9.2.26 Exiting the Set-up Mode

Command	Response	Parameter
AT+EXIT	OK	None

Note: This command returns the module to SPP mode.

10 Low Power Modes

10.1 Park & Sniff

The adapter will automatically go into a reduced power mode if there is no UART activity and no RF activity. The Device will maintain sniff in order to maintain synchronization with the Master.

11 Ordering Information Bluetooth Serial Adapters

Ordering P/N	Description
Class 2	
ZBS44-421-SPF	Class 2 Bluetooth Serial adapter with internal antenna and Serial Port Profile (SPP). Female DB9 connector .
ZBS44-421-SPM	Class 2 Bluetooth Serial adapter with internal antenna and Serial Port Profile (SPP). Male DB9 connector
Class 1	
ZBS44-411-SPF	Class 1 Bluetooth Serial adapter with whip antenna and Serial Port Profile (SPP). Female DB9 connector
ZBS44-411-SPM	Class 1 Bluetooth Serial adapter with whip antenna and Serial Port Profile (SPP). Male DB9 connector

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