APPENDIX B

AT Command Language with Detailed Description and Usage

Version 1.1

Revision History

Revision	Date	Change Description
1.0	10-09-2007	Write a draft
1.1	15-12-2008	Add command - AT+BTRSSI? - AT+BTLQ? - AT+BTFASTCH,n

List of Contents

Basically, the products of FIRMTECH Co., Ltd. supports AT command when the connection Mode is in MODE4. However, for 1:N communication, AT command is used to control 1:N communication regardless of Connection MODE.

1 Definition of Device

1.1 HOST

HOST refers to the devices which control the products of FIRMTECH Co., Ltd. through AT command.

1.2 BT

BT refers to the Bluetooth devices of FIRMTECH Co., Ltd.

1.3 Definition of SYMBOL

SYMBOL	MEANING	ASCII CODE
↵	Carriage Return	0x0D
∠	Carriage Return + Line Feed	0x0D + 0x0A
x	Character	
123456789012	Bluetooth Device Address	
n	One digit decimal number	
t0	Timeout in second	

<Table B-1 Symbol Table>

1.4 AT RESPONSE

BT will generate the response of "∠OK∠" when the AT command entered at the Host is executed normally response of "∠ERROR∠" when it is not being executed normally, or in the status not executable or no response may be generated in case of unreadable.

The basic response is processed in ASCII code and the response message depending on condition is as followings.

Operation Status(AT+BTINFO?↵)

- ∠STANDBY∠ : AT command Stand-by Mode.

- ∠PENDING∠ : AT command some operation is being executed.

- ∠CONNECT∠ : Status being connected with Bluetooth device of the other party.

BT Status Message

- ∠BTWIN Slave mode start∠ : The state of power on BT

- ∠CONNECT 123456789012∠ : The state of connection of BT to other bluetooth device.

- ∠DISCONNECT∠ : The state of disconnection of BT from the other bluetooth device.

2 COMMAND CATEGORY

2.1 Classification depending on function

Category	No	AT Command	Apply Products							
			1	2	3	4	5	6	7	8
	1	AT↵	1	2	3	4	5			
RESET	2	ATZ↵	1	2	3	4	5			
	3	AT&F↵	1	2	3	4	5			
INFORMATION	4	AT+BTINFO?↵	1	2	3	4	5			
	5	AT+BTINFO?n↵	1	2	3	4	5			
	6	AT+BTINFODEV?n↵	1	2	3					
	7	AT+BTCOUNT?↵	1	2	3					
	8	AT+BTRSSI?↵	1	2	3	4				
	9	AT+BTLQ?↵	1	2	3	4				
CONNECTION	10	+++	1	2	3	4				
	11	ATO↵	1	2	3	4	5			
	12	ATOn↵	1	2	3					
	13	AT+BTCANCEL↵	1	2	3	4	5			
	14	AT+BTSCAN↵	1	2	3	4	5			
	15	AT+BTSCAN,n,t0↵	1	2	3	4	5			
	16	AT+BTSCAN,123456789012,t0↵	1	2	3	4				
	17	AT+BTINQ?↵	1	2	3	4	5			
	18	ATD↵	1	2	3	4	5			
	19	ATD123456789012↵	1	2	3	4	5			
	20	ATH↵	1	2	3	4	5			
SETTING	21	AT+BTLPM,n↵	1	2	3	4	5			
	22	AT+BTUART,b(baud rate),p(parity bit),s(stop bit)↵	1	2	3	4	5			
	23	AT+BTSEC,n(Authentication),n(Encryption)↵	1	2	3	4	5			
	24	AT+BTMODE,n↵	1	2	3	4				

	25	AT+BTOPMODE,n↵	1	2	3					
	26	AT+BTMSG,n↵	1	2	3	4	5			
	27	AT+BTNAME=xxxxxxxxxxxx↵	1	2	3	4	5			
	28	AT+BTKEY=xxxxxxxxxxxx↵	1	2	3	4	5			
	29	AT+BTLT=nn↵	1	2	3	4	5			
	30	AT+BTSETGUI↵	1	2	3	4	5			
	31	AT+BTROLE=x↵	1	2	3	4	5			
	32	AT+BTDEV=n↵	1	2	3					
	33	AT+SETESC,nn↵	1	2	3	4				
	34	AT+SETDEBUG,nn↵	1	2	3	4				
	35	AT+BTBUFF=nnn↵	1	2	3					
	36	AT+BTADDR=123456789012↵	1	2	3	4				
	37	AT+BTDUT↵	1	2	3	4	5			
	38	AT+BTDFU↵	1	2	3	4	5			
	39	AT+BTFASTCH,n↵	1	2	3	4				

<Table B-2 AT Command Category>

1 - FB100AS

2 - FB200AS

3 - FB755AC, FB755AS

4 - FB155BC, FB155BS

5 - FB570AC, FB750AS

6 - RESERVED FOR FUTURE USE

7 - RESERVED FOR FUTURE USE

8 - RESERVED FOR FUTURE USE

2.2 AT Command Language Usable by Status

No	AT Command	STANDBY	PANDING	1:1 CONNECT	1:N CONNECT	BYPASS
1	AT↵	ⓐ	ⓐ	ⓐ	ⓐ	
2	ATZ↵	ⓐ	ⓐ			
3	AT&F↵	ⓐ				
4	AT+BTINFO?↵	ⓐ	ⓐ	ⓐ	ⓐ	
5	AT+BTINFO?n↵	ⓐ	ⓐ	ⓐ	ⓐ	
6	AT+BTINFODEV?n↵				ⓝⓢ	
7	AT+BTCOUNT?↵				ⓝⓢ	
8	AT+BTRSSI?↵			ⓜ	ⓐ	
9	AT+BTLQ?↵			ⓜ	ⓐ	
10	+++					ⓐ
11	ATO↵			ⓜ		
12	ATOn↵				ⓝⓢ	
13	AT+BTCANCEL↵		ⓐ			
14	AT+BTSCAN↵	ⓢ				
15	AT+BTSCAN,n,t0↵	ⓢ				
16	AT+BTSCAN,123456789012,t0↵	ⓢ				
17	AT+BTINQ?↵	ⓜ				
18	ATD↵	ⓜ				
19	ATD123456789012↵	ⓜ				
20	ATH↵			ⓜ		
21	AT+BTLPM,n↵	ⓐ				
22	AT+BTUART,b(baud rate),p(parity bit),s(stop bit)↵	ⓐ				
23	AT+BTSEC,n(Authentication),n(Encryption)↵	ⓐ				
24	AT+BTMODE,n↵	ⓐ				
25	AT+BTOPMODE,n↵	ⓐ				

26	AT+BTMSG,n↵	ⓐ				
27	AT+BTNAME=xxxxxxxxxxxx↵	ⓐ				
28	AT+BTKEY=xxxxxxxxxxxx↵	ⓐ				
29	AT+BTLT=nn↵	ⓐ				
30	AT+BTSETGUI↵	ⓐ				
31	AT+BTROLE=x↵	ⓐ				
32	AT+BTDEV=n↵	ⓐ				
33	AT+SETESC,nn↵	ⓐ				
34	AT+SETDEBUG,nn↵	ⓐ				
35	AT+BTBUFF=nnn↵	ⓐ				
36	AT+BTADDR=123456789012↵	ⓐ				
37	AT+BTDUT↵	ⓐ				
38	AT+BTDFU↵	ⓐ				
39	AT+BTFASTCH,n↵	ⓐ				

<Table B-3 AT Commands Usable By Status>

ⓐ : Common Command Language to both Master / Slave.

ⓜ : Command Language for Master only.

ⓢ : Command Language for Slave only

ⓝⓢ : Command Language usable for OPERATION MODE1 or OPERATION MODE2.

3 Features of AT Commands

3.1 AT

FEATURE	To verify if the HOST is connected to BT properly.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	If HOST and BT are connected properly, it will respond with "∠OK∠". If the connection is not made, no response is transmitted, or Abnormal text will be transmitted.
EX	HOST → BT : AT↵ BT → HOST : ∠OK∠

3.2 ATZ

FEATURE	Have BT software reset.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	-
DESCRIPTION	The same effect as though the power of BT is re-authorized. Other connection with other Bluetooth will be released, and all the jobs currently performed will stop, including connection trial to Bluetooth or connection waiting to Bluetooth. Among the AT Command Languages, the Setting command language shall be software reset by using this command after use.

3.3 AT&F

FEATURE	To Reset the hardware.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	This command language will give the same effects as the reset button is pressed in the pc configuration mode. After this command is used, all the values of PC Configuration shall change to factory set value.

3.4 AT+BTINFO?

FEATURE	To transmit the current status of BT to the Host.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570

RESPONSE	∠STANDBY∠ ∠PENDING∠ ∠CONNECT∠
DESCRIPTION	To transmit the current status of BT to the Host.

3.5 AT+BTINFO?n

FEATURE	To transmit the PC Configuration values to Host required to operate the BT according to the n value.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	0 ∠<DEVICE NAME>∠ 1 ∠<PINCODE>,<AUTHENTICATION>,<ENCRYPTION>∠ 2 ∠<REMOTE BD ADDRESS>∠ 3 ∠<CONNECTION MODE>∠ 4 ∠<STATUS MSG>,<POWER SAVE>,<LINK TIME>,<ESC CHAR>,<DEBUG CHAR>∠ 5 ∠<BAUD RATE>,8,<PARITY BIT>,<STOP BIT>∠ 6 ∠<ROLE>,<OPERATION MODE>∠ 7 ∠<NUMBER OF DEVICE>,<BUFF SIZE>∠ 8 ∠<LOCAL BD ADDRESS>∠ 9 ∠<FIRMWARE VERSION>∠ 10 ∠<BLUETOOTH VERSION>∠ 11 ∠<IAC>,<CoD>∠ 12 ∠<HARDWARE FLOW CONTROL>∠ 13 ∠<CONNECTION DELAY TIME>∠ 14 ∠<SUPPORT PROFILE>∠ 15 ∠<SERVICE NAME>∠ 16 ∠<STREAM SWITCHING FAST>∠

DESCRIPTION	The value transmitted to the Host depending on the n value is as follows.	
	n = 0	Transmit the name of device composed of letter code to the host.
	n = 1	The set values related with security is printed out and the transmission order is in priority of PINCODE, AUTHENTICATION, ENCRYPTION and the value is classified with "," and the meaning of each value is as follows. • PINCODE : The letter code under 12 digits • AUTHENTICATION : 0 – DISABLED, 1 – ENABLED • ENCRYPTION : 0 – DISABLED, 1 - ENABLED
	n = 2	The BT address of the most recently connected device is transmitted to host.
	n = 3	CONNECTION MODE: MODE1 ~ MODE4 is transmitted to the host.
	n = 4	The set values related with other action is printed out and the transmission order is in priority of TIMEOUT, ESCAPE CHARACTER,

		DEBUG CHARACTER and the value is classified with "," and the meaning of each value is as follows. • STATUS MESSAGE : 0 – DISABLED, 1 – ENABLED • POWER SAVE : 0 – DISABLED, 1 – ENABLED • LINK SUPERVISION TIMEOUT : 0 ~ 99 (sec) • ESCAPE CHARACTER : The set value of 16 decimal • DEBUG CHARACTER : The set value of 16 decimal
	n = 5	The set values related with UART is printed out and the transmission order is in priority of BAUD RATE, DATA BIT, PARITY BIT, STOP BIT and the value is classified with "," and the meaning of each value is as follows. • BAUDRATE : 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400 (bps) • DATA BIT : 8 bit Default • PARITY BIT : n – none, o – odd, e – even • STOP BIT : 1 – one stop, 2 – two stop
	n = 6	The transmission order to host is in priority of ROLE, OPERATION MODE and the value is classified with "," and the meaning of each value is as follows. • ROLE : MASTER or SLAVE • OPERATION MODE : MODE0 ~ MODE2
	n = 7	The transmission order to host is in priority of NUMBER OF CONNECTION DEVICE, BUFF SIZE which are the 1:N set value and the value is classified with "," and the meaning of each value is as follows. • NUMBER OF CONNECTION DEVICE : 1 ~ 7 • BUFF SIZE : 0 ~ 999 (Byte)
	n = 8	Transmit own BT Address to host.
	n = 9	Transmit the firmware version to host.
	n = 10	Transmit the BT Version to host.
EX		HOST → BT : AT+BTINFO?0↵ BT → HOST : ∠BMx001v4.2.6∠

3.6 AT+BTINFODEV?n

FEATURE	To transmit the BT address of MASTER connected to SLAVE to the Host during 1:N communication.
APPLY PRODUCTS	FB100AS, FB200AS, FB755
RESPONSE	∠123456789012∠
ESCRIPTION	It transmits the BT address of Master connected to Slave to the Host while 1:N communication is being used. The BT address will be transmitted in the order of connection represented by n value.

	The command language will be recognized properly when "LOW" signal is pressed at MESSAGE CONTROL(CTS) RS-232 level and "HIGH" TTL level.	
	n = 1	BT address of Master connected as the first.
	n = 2	BT address of Master connected as the second.
	n = 3	BT address of Master connected as the third.
	n = 4	BT address of Master connected as the fourth.
	n = 5	BT address of Master connected as the fifth.
	n = 6	BT address of Master connected as the sixth.
	n = 7	BT address of Master connected as the seventh.
	n = a	BT address of all Masters connected to Slave
EX	HOST → BT : AT+BTINFODEV?1↵ BT → HOST : ∠123456789012∠	

3.7 AT+BTCOUNT?

FEATURE	To transmit the number of Masters connected to Slave currently to the Host while 1:N communication is used.
APPLY PRODUCTS	FB100AS, FB200AS, FB755
RESPONSE	∠1 ~ 7∠
DESCRIPTION	The command transmits the number of Masters connected to Slave currently to the Host while 1:N communication is used. The command language will be recognized properly when "LOW signal is pressed at MESSAGE CONTROL(CTS) RS-232 level and "HIGH" TTL level.

3.8 AT+BTRSSI?

FEATURE	The receiving sensitivity of communication with bluetooth which is currently connected is transmitted to the host.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠-255 ~ 255∠
DESCRIPTION	The receiving sensitivity of communication with bluetooth which is currently connected is transmitted to the host. The RSSI value closer to 0 is a good condition of receiving sensitivity. The current receiving sensitivity with master (N) can be checked by using the "AT+BTRSSI? n" commands (n is the order of connection to the master) at Slave (1) in case of 1:N communication.

3.9 AT+BTLQ?

FEATURE	The link quality with the currently connected bluetooth is transmitted to host.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠-255 ~ 255∠
DESCRIPTION	The link quality between the currently connected bluetooth and BT is transmitted to host. The link quality closer to 255 is a good condition of link quality. The current link quality with master (N) can be checked by using the "AT+BTLQ?n" commands (n is the order of connection to the master) at Slave (1) in case of 1:N communication.

3.10 +++

FEATURE	To change the operation status from "BYPASS" to standby mode for command language.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠OK∠
DESCRIPTION	After BT is connected to other Bluetooth, all the data sent to BT shall be transmitted to the other party's device of Bluetooth. This status is called BYPASS status, where "+++" text row shall be switched into the standby mode for command which will interpret and process the AT command language. The command language shall be supported by Master.

3.11 ATO

FEATURE	To switch from standby mode for command language to BYPASS mode where data can be transmitted/received.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	With the Bluetooth is connected, switch to standby mode for command language with "+++" text row, then switch to BYPASS mode to transmit/receive data.

3.12 ATOn

FEATURE	At 1:N communication, to switch BYPASS mode It is used for the Master to which the Slave will send the data, and to switch to the BYPASS condition.	
APPLY PRODUCTS	FB100AS, FB200AS, FB755	
RESPONSE	RS232 level	STREAM STATUS signal is "HIGH".(when command language is

		properly performed.)
	TTL level	STREAM STATUS signal is "LOW".(when command language is properly performed.)
DESCRIPTION	With 1:N communication, it is used to form area between Master and Stream (BYPASS) where the data will be transmitted. This command language is Slave regardless of CONNECTION MODE, and usable when the OPERATION MODE is MODE1 or MODE2. If the command language properly operates, the signal of STREAM STATUS(DTS) shall be "HIGH" at RS-232 level, and "LOW" at TTL level. If the command language does not properly operate, the signal of stream status will keep "LOW" at RS-232 level, and "HIGH" at TTL level. The command language will be recognized properly when "LOW signal is pressed at STREAM CONTROL(DSR) RS-232 level and "HIGH" TTL level.	

3.13 AT+BTCANCEL

FEATURE	BT will have the jobs stopped in progress.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	Used to stop the jobs being undertaken by BT coercively currently. The kinds of works could be stopped coercively will including inquiry/page scan (AT+BTSCAN), connection trial (ATD), and Bluetooth device inquiry (AT+BTINQ?). BT will be switched to standby mode for command if the works properly completed.

3.14 AT+BTSCAN

FEATURE	To have BT inquiry scan and page scan.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠ ∠CONNECT 123456789012∠ (response if other device is connected.)
DESCRIPTION	Bluetooth device allows inquiry only for Bluetooth devices which were on inquiry scan, and allows connection only to the devices on page scan. This command allows other Bluetooth devices to search BT and can be connected any time. If connection is made to Bluetooth devices, message of "CONNECT 123456789012" showed up, and resume inquiry scan and page scan upon disconnection. Therefore, command of AT+BTCANCEL shall be used to switch to standby mode for command language.

3.15 AT+BTSCAN,n,t0

FEATURE	Make BT in inquiry scan and page scan selectively.		
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570		
RESPONSE	∠OK∠ ∠CONNECT 123456789012∠		
DESCRIPTION	Allow the inquiry and connection depending on the value of N.		
	n = 1	**Make the BT process the inquiry scan only. (Inquiry Scan)** It is available for the other bluetooth device to search BT in bluetooth device search, but the connection is not available.	
	n = 2	**Make the BT process the page scan only. (Page Scan)** It is available for the other bluetooth device to search BT in bluetooth device search, but the connection is not available.	
	n = 3	**Make the BT process the inquiry scan only and page scan. (Inquiry and Page Scan)** It is available for the other bluetooth device to search BT in bluetooth device search, the connection is available also.	
	The BT process the inquiry scan or page scan from the other bluetooth device during given t0 time. You have to wait indefinitely if the t0 is 0.		

3.16 AT+BTSCAN,123456789012,t0

FEATURE	The connection from the bluetooth device with bluetooth address of 123456789012 is waited only.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠OK∠ ∠CONNECT 123456789012∠
DESCRIPTION	It is used in case for accepting the connection from a specific bluetooth device. It does not perform the inquiry scan but page scan only. The connection working process is performed in t0 (second). It is converted to the original state of waiting for commands if the connection with bluetooth is not available during t0 (second) or the connection is released after the connection with bluetooth. However, it performs the waiting for connection until success of connection from the corresponding bluetooth device especially the value of t0 is 0. It performs the waiting for connection again with converting to the original stand by state of command after the disconnection with bluetooth.

3.17 AT+BTINQ?

FEATURE	To inquiry for Bluetooth devices exists around.

APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠ ∠<BLUETOOTH Address>,<DEVICE NAME>,<CoD>∠ ∠OK∠
DESCRIPTION	It searches for Bluetooth devices on inquiry scan to transmit the devices' information including address, name of devices, and class of device to the Host. Can search for up to 9 Bluetooth devices in about 20 seconds, and "OK" message will be transmitted upon completion of Bluetooth searching.

3.18 ATD

FEATURE	To attempt again to connect with the latest recently connected Bluetooth device.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠ ∠CONNECT 123456789012∠ (response when reconnection is made) ∠ERROR∠ (response in case of connection failure)
DESCRIPTION	BT remembers the address of Bluetooth device most recently connected. (can be certified with AT+BTINFO?2.) In this case, you can try to connect the Bluetooth device again by using this command simply without specifying the address of the appropriate Bluetooth device. It will generate "ERROR" message in case the address of the Bluetooth device has not been connected at all. "0000000000000"

3.19 ATD123456789012

FEATURE	Try to Connect to Bluetooth with the Bluetooth address of 123456789012
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠ ∠CONNECT 123456789012∠ (response when reconnection is made) ∠ERROR∠ (response in case of connection failure)
DESCRIPTION	Try to connect by specifying the address of target Bluetooth device. For successful connection, the target Bluetooth device should be on page scan. The connection attempt will last for 30 seconds, BT will take procedures of authentication automatically, if required.

3.20 ATH

FEATURE	To release the current connection.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570

RESPONSE	∠OK∠
	∠DISCONNECT∠
DESCRIPTION	It shall be used to release the connection of Bluetooth.
	This command shall be operable by Master only when the OPERATION MODE is in MODE0

3.21 AT+BTLPM,n

FEATURE	To select if low power management feature of BT will be used or not.	
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570	
RESPONSE	∠OK∠	
PARAMETERS	n = 0	the power save mode is not used.
	n = 1	the power save mode is used.
DESCRIPTION	In general, the Bluetooth device connected to other Bluetooth device can save power consumption of the device while there is no data transmission/receipt, by using low power management feature.	
	This command is to select if low power management feature will be used or not. With BT, it is set such that it shall not use as initial value.	
	If the value of n is 1, it will use low power management feature and n is 0, it shall not use low power management feature.	
	In case the low power management feature will be utilized, there might be some delay in data transmit/receipt.	
EX	HOST → BT : AT+BTLPM,1↵	
	BT → HOST : ∠OK∠	

3.22 AT+BTUART,b(baud rate),p(parity bit),s(stop bit)

FEATURE	To Change the set value of serial communication of BT.	
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570	
RESPONSE	∠OK∠	
PARAMETERS	b(baud rate	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400
	p(parity bit)	N(NONE) / E(EVEN) / O(ODD)
	s(stop bit)	1 / 2
DESCRIPTION	The elements required for serial communication including number of bit per second (baud rate), parity, and stop bit may be changeable.	
EX	HOST → BT : AT+BTUART,57600,N,1↵	
	BT → HOST : ∠OK∠	

3.23 AT+BTSEC,n(Authentication),n(Encryption)

FEATURE	To select the features of Authentication, and Encryption of Bluetooth.		
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570		
RESPONSE	∠OK∠		
PARAMETERS	AUTHENTICATION	n = 0	Not used
		n = 1	Used
	ENCRYPTION	n = 0	Not used
		n = 1	Used
DESCRIPTION	To select if the authentication process and encryption feature of Bluetooth will be used or not.		
EX	HOST → BT : AT+BTSEC,1,1↵ BT → HOST : ∠OK∠		

3.24 AT+BTMODE,n

FEATURE	To set CONNECTION MODE of BT.		
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155		
RESPONSE	∠OK∠		
PARAMETERS	n = 1 (MODE1)	MASTER	If there is information on the Slave most recently connected, it shall try to connect with the Slave only unless factory set value (AT&F) is requested. If there is no information on the most recently connected Slave, it will search for the Bluetooth around among which it will request to connect to the first Slave has sent the response.
		SLAVE	If there is information of Master most recently connected, it will allow only the Master to be connected. If there is no information of Master most recently connected, it will allow the first Master requesting connection only for inquiry scan and page scan.
	n = 2 (MODE2)	MASTER	To provide connection with the Slave found out first around the Bluetooth devices.
		SLAVE	To allow the first Master requesting to be connected among the around Bluetooth devices for on page scan, and inquiry scan.
	n = 3 (MODE3)	MASTER	To perform the same functions as with MODE1.
		SLAVE	If there is the latest connected information of Master, it will allow only page scan, which prevent other Masters to

		find Slaves.
		If there is no information of Masters connected, it shall operate as with MODE2.
	n = 4 (MODE4)	AT command is in standby mode.
DESCRIPTION	BT supports four kinds of CONNECTION MODE. The CONNECTION MODE is used to allow or limit the connection of other Bluetooth devices, based on the GAP. If the power is authorized the same operation will be executed as explained.	
EX	HOST → BT : AT+BTMODE,1↵ BT → HOST : ∠OK∠	

3.25 AT+BTOPMODE,n

FEATURE	To set 1:N communication use or not	
APPLY PRODUCTS	FB100AS, FB200AS, FB755	
RESPONSE	∠OK∠	
PARAMETERS	n = 0	MODE0
	n = 1	MODE1
	n = 2	MODE2
DESCRIPTION	As for the 1:N communication set up, MODE0 is based on 1:1 communication, MODE1 is based on monitoring, and MODE2 is for selective large volume transmit/receive. Please refer to the User Manual 1:N data transmission/receipt for detailed information. (Appendix C)	
EX	HOST → BT : AT+BTOPMODE,1↵ BT → HOST : ∠OK∠	

3.26 AT+BTMSG,n

FEATURE	To select status message output or not.	
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570	
RESPONSE	∠OK∠	
PARAMETERS	n = 0	Status message not used.
	n = 1	Status message used.
DESCRIPTION	If power is authorized, with current status is connected as "BTWIN Master mode start", "BTWIN Slave mode start", you may select output of status message such as "CONNECT 123456789012" or not. If you don't need message, you may disable it by set to N=0.	
EX	HOST → BT : AT+BTMSG,1↵	

	BT → HOST : ∠OK∠

3.27 AT+BTNAME=xxxxxxxxxxxx

FEATURE	To change the name of BT devices.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	To allow BT with name easily identifiable by user. This name can be used in other Bluetooth devices to search for Bluetooth devices. Up to 12 alphanumeric characters could be used.
EX	HOST → BT : AT+BTNAME=test↵ BT → HOST : ∠OK∠

3.28 AT+BTKEY=xxxxxxxxxxxx

FEATURE	To change the Pin Code of BT.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	The PIN code shall be consisted of text row, up to 12 alphanumeric character could be used.
EX	HOST → BT : AT+BTKEY=1234↵ BT → HOST : ∠OK∠

3.29 AT+BTLT=nn

FEATURE	To set connection status check interval.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	It represents the time to complete the connection if the Bluetooth communication is not achieved, simply enter the time equivalent to the nn. The time unit supported is 1 ~ 99 seconds. The smaller figure will recognize the disconnection of Bluetooth fast, however the temporary non communication of Bluetooth shall be recognized as no communication, which leads to disconnection. Default is 5 seconds.
EX	HOST → BT : AT+BTLT=10↵ BT → HOST : ∠OK∠

3.30 AT+BTSETGUI

FEATURE	To output the status message temporary.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	Even though status message is disabled, temporary status message will output once the AT+BTSETGUI command language is executed. When the power OFF and ON once more, the status message will not appear any longer. Please make sure the status of our company's Config Tool or CONNECTION Wizard using this command.
EX	HOST → BT : AT+BTSETGUI↵ BT → HOST : ∠OK∠

3.31 AT+BTROLE=x

FEATURE	To select Master or Slave.	
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570	
RESPONSE	∠OK∠	
PARAMETERS	x = M	Master
	x = S	Slave
DESCRIPTION	Master requests connection through inquiry for Bluetooth around, while Slave is on inquiry scan and page scan.	
EX	HOST → BT : AT+BTSETGUI↵ BT → HOST : ∠OK∠	

3.32 AT+BTDEV=n

FEATURE	To set the number of devices for 1:N communication.
APPLY PRODUCTS	FB100AS, FB200AS, FB755
RESPONSE	∠OK∠
DESCRIPTION	It defines the number of devices to be connected for 1:N communication. It is executable when OPERATION MODE is on MODE1 and MODE2. FB755 will allow 1 ~ 7 sets of connection, while other devices will allow 1 ~ 5 connection at maximum.
EX	HOST → BT : AT+BTDEV=5↵ BT → HOST : ∠OK∠

3.33 AT+SETESC,nn

FEATURE	To change the Escape Sequence Character
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠OK∠
DESCRIPTION	Escape sequence character is text row used to switch from Bluetooth connected status to command standby mode, fixed at "+++" basically. nn is ASCII code of Escape sequence character to change, and should be printable character (resides on keyboard). **If "00" is entered in the nn position, it will bring performance enhancement of data transmission during bypass status since "+++" is not searched for.** Default is 0x2B.
EX	HOST → BT : AT+SETESC,2B↵ BT → HOST : ∠OK∠

3.34 AT+SETDEBUG,nn

FEATURE	To change Debug character.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠OK∠
DESCRIPTION	The CONNECTION MODE does not allow to use other AT command language than MODE4. However, if the value set with debug character is entered at the CONNECTION MODE of MODE1, MODE2, MODE3, the CONNECTION MODE will change to MODE4(AT command language standby) temporary so that the set value or other operation will be controlled by AT command language. For the company provided configuration tool or connection wizard, enter the set value with this command language to control with AT command language. If ASCII character is output set on this command language, please disable Debug character and proceed to use it. If "00" is entered on nn, the Debug character will be disabled. Default is 0x02.
EX	HOST → BT : AT+SETDEBUG,02↵ BT → HOST : ∠OK∠

3.35 AT+BTBUFF=nnn

FEATURE	For 1:N communication, set transmit/receive buffer.
APPLY PRODUCTS	FB100AS, FB200AS, FB755

RESPONSE	∠OK∠
DESCRIPTION	This command language is usable when the operation mode is at MODE1. The operation mode will set the RX TX Buff Size at MODE1. The fixed buffer size will be sent out at every time of transmission. You can enter the number of 1 ~ 999.
EX	HOST → BT : AT+BTBUFF=30↵ BT → HOST : ∠OK∠

3.36 AT+BTADDR=123456789012

FEATURE	To change the address of the latest connected Bluetooth device.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155
RESPONSE	∠OK∠
DESCRIPTION	It changes the last BD address of which connection was made successfully. It provides the same features as MODE3 of CONNECTION MODE. You can connect by simply enter address of the Slave you want to connect, and then use "ATD". To initialize the address, enter "AT+BTADDR=000000000000", then it will return to factory set value.
EX	HOST → BT : AT+BTADDR=123456789012↵ BT → HOST : ∠OK∠

3.37 AT+BTDUT

FEATURE	To proceed with Device Under TEST.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	The setting is changed into Device Under Test. When the power is authorized again, it is possible to connect various measurement devices of Bluetooth to perform tests.
EX	HOST → BT : AT+BTDUT↵ BT → HOST : ∠OK∠

3.38 AT+BTDFU

FEATURE	It converts to Firmware Update Mode.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	If the power is on after setting the corresponding commands, it is converted to the

	condition of firmware update of BT using our Firmware Downloader tool.
EX	HOST → BT : AT+BTDFU↵ BT → HOST : ∠OK∠

3.39 AT+BTFASTCH,n

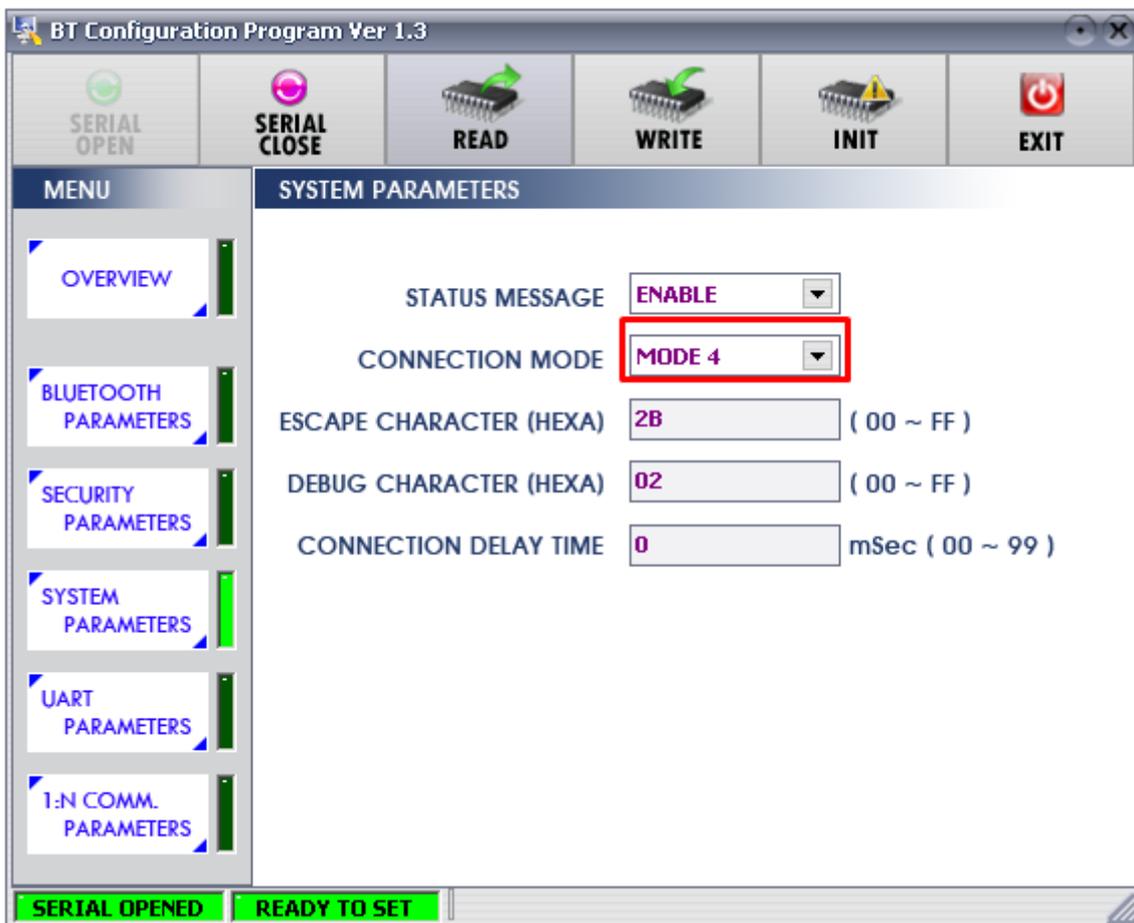|	
FEATURE	Change the value of stream switching fast.
APPLY PRODUCTS	FB100AS, FB200AS, FB755, FB155, FB570
RESPONSE	∠OK∠
DESCRIPTION	A series of channel modulation is necessary to transmit the data from Slave (1) to Master (N) in 1:N communication. It takes more than 800ms to change the channel. If the stream switching fast is enabled, the modulation time is reduced less than 200ms because it minimizes the time to modulate the channel. Process to connect again after disconnection for a while in the firstly connected master if the 1:N connection is accomplished by the enabling of the stream switching fast. The stream switching fast is effective in communication between **FIRMTECH products only**. Please contact our company in communication to other products. It will be set as follows depending on value of n. n = 0 – DISABLED - default n = 1 – ENABLED
EX	HOST → BT : AT+BTFASTCH,0↵ BT → HOST : ∠OK∠

4 Usage of AT Command Language

Following description is based on the products newly purchased (factory set mode), and for the description of the embedded products, it is assumed that it is mounted on the interface board (Jig Board) to enable serial communication with PC

The serial communication program is required to use AT command language.
We will explain further using Hyper Terminal provided by Window OS. Please refer to the product description how to configure the Hyper Terminal in detail.

Except for FB100AS(BM1001) and FB200AS(BM2001), other product is set at MODE4 as the CONNECTION MODE.
If you change the CONNECTION MODE by using FB100AS(BM1001), FB200AS(BM2001) and products, please set the CONNECTION MODE as with MODE4 on <Figure B-1>.

```
=================== MAIN MENU ==========================
1 => GO TO BLUETOOTH PARAMETER MENU
2 => GO TO SECURITY PARAMETER MENU
3 => GO TO SYSTEM PARAMETER MENU
4 => GO TO UART PARAMETER MENU
5 => GO TO 1:N COMMUNICATION PARAMETER MENU
=======================================================
[ Back Spcae : Input data Cancel                      ]
[ t : Move top menu                                   ]
=======================================================
Select(1 ~ 5) > 3
================ SYSTEM PARAMETER MENU =================
1 => STATUS MESSAGE                  : ENABLED
2 => CONNECTION MODE                 : CNT_MODE4
3 => ESCAPE CHARACTER                : 0x2B
4 => DEBUG CHARACTER                 : 0x2
5 => CONNECTION DELAY TIME           : 0 [ms]
=======================================================
[ Back Spcae : Input data Cancel                      ]
[ t : Move top menu                                   ]
=======================================================
Select(1 ~ 5) > _
```

Please refer to the product description for setting up configuration.

<Figure B-1 PC Configuration Menu>

Slave can be connected with each other as long as SCAN(inquiry scan and page scan) works are completed, while Master shall complete the works of Inquiry and Page(connection request).

First, set up the Slave, then try connection through inquiry at the Master.

4.1 Setting Up 1 Slave

(1) Turn the Power On after connecting the products to be set as Slave to serial port of PC.

(2) Execute the Hyper terminal and enter the following command language.

HOST → BT : **AT↵**

BT → HOST : ∠**OK**∠ (normally execute the command language)

<Figure B-2 : Standby Mode for AT Command Language>

(3) If <Figure B-2> appears, proceed with the following command language. (If it does not show as on <Figure B-2>, please verify the setting again and resume the procedures from (1).)

① AT+BTSCAN

② OK

<Figure B-3 Slave : Command Language Procedures for Connection Standby>

HOST → BT : **AT+BTSCAN↵** (SCAN Command language)

BT → HOST : ∠**OK**∠ (normally executes the command language)

BT → HOST : ∠**ERROR**∠ (does not execute the command language properly)

(4) If the command language is executed properly, the STATUS LED begins to flickering.

4.2 Setting Up and Connecting Master

(1) If Slave setting up is completed, connect the product to be Master to the serial port of PC and turn the power on. (The power of Slave should be turned on.)

(2) Execute Hyper Terminal and enter the following command language.

HOST → BT :   **AT↵**

BT → HOST :   ∠**OK**∠ (executes the command language properly)

(3) <Figure B-2> comes up, proceed with following command language. (Verify the configuration if it does not come up as <Figure B-2>, and restart from (1).)

```
BTWIN Slave mode start

OK
AT+BTROLE=M
OK
ATZ
BTWIN Master mode start

OK
AT+BTINQ?
OK

0011B1B0EA96,BMx001v4.0.0,1F00

0011B1A165E4,BMx001v3.7,1F00

OK
_
```

<Figure B-4 : Results of AT+BTINQ? Command language>

HOST → BT :   **AT+BTROLE=M↵** (command language to change the ROLE)

BT → HOST :   ∠**OK**∠ (Execute command language properly)

HOST → BT :   **ATZ↵** (Soft Reset command language)

BT → HOST :   ∠**BTWIN Master mode start**∠

BT → HOST :   ∠**OK**∠

HOST → BT :   **AT+BTINQ?↵** (Inquiry command language)

BT → HOST :   ∠**OK**∠ (execute command language properly)

BT → HOST :   ∠**0011B1B0EA96,BMx001v4.0.0,1F00**∠ (output Inquiry result)

BT → HOST :   ∠**OK**∠ (execute Inquiry result properly)

(4) Try to connect to the address of Bluetooth after inquiry, with combined use of following command language through ATD.

```
0011B1B0EA96,BMx001v4.0.0,1F00

0011B1A165E4,BMx001v3.7,1F00

OK
ATD0011B1B0EA96
OK

CONNECT 0011B1B0EA96
-
```

<Figure B–5 ATD command language>

HOST → BT :   **ATD0011B1B0EA96↵** (ATD command language)
BT → HOST :   ∠**OK**∠ (execute command language properly)
BT → HOST :   ∠**CONNECT 0011B1B0EA96**∠ (connection result)

(5) If the message of "CONNECT 123456789012" appears, means the connection is made properly which is the status enables to transmit/receive data with the connected devices.

<Figure B-6 : Master Switch Over and Connection Inquiry>

4.3 How to Change PC Configuration through AT Command Language.

3 To Release the Connection

When the Bluetooth is connected with each other, the data input shall be output on the opposite side of Bluetooth device.

But, you can switch over AT command language standby mode by using Escape Character.

Default Esc Char is 0x2B("+"). Entering 3 bytes of Esc Char in series, the AT command language will be switch to standby mode, then you can release the connection by using ATH command language. The procedure of command language is performed as follows:

```
+++
OK
ATH
OK

DISCONNECT
```

<Figure B-7 : To Use ATH command language>

HOST → BT :   **+++** (Enter 3 bytes of Esc Char in series)

BT → HOST :   ∠**OK**∠ (perform command language properly)

HOST → BT :   **ATH↵** (command language for connection release)

BT → HOST :   ∠**OK**∠ (command language properly performed)

BT → HOST :   ∠**DISCONNECT**∠ (complete connection release)

4.4 How to Change PC Configuration through AT Command Language.

FIRMTECH products allow to configure the PC using AT command language. The Config tool provided by FIRMTECH is the tool made with the basics of AT command language.

AT command language has two kinds of command languages; one allows executable according to the operation status as shown <Table B-3>reference) and the other one which does not allow execution.

The certifying method is as follows.

```
AT+BTINFO?
STANDBY
-
```

<Figure B-8 : AT+BTINFO? Command language>

HOST → BT :   **AT+BTINFO↵** (command language to verify the current status)

BT → HOST :   ∠**STANDBY**∠ (transfer the current status to the HOST)

As shown on <Figure B-8>, the "STANDBY" mode will allow touse configuration setting command language. In case, the status is "PENDING" or "CONNECT", it's impossible to use configuration setting command language. For detailed information, please refer to the Appendix B : Usable AT Command Language. Now we will try to change the current device name using AT command language.

The order of command language shall be as follow.

```
AT+BTINFO?
STANDBY
AT+BTINFO?0
FB151v3.0.1
AT+BTNAME=name_test
OK
ATZ
BTWIN Slave mode start

OK
AT+BTINFO?0
name_test
```

<Figure B-9 : Change device name by using AT command language>

HOST → BT :   **AT+BTINFO?0↵** (command language to inquire the information of current device name)

BT → HOST :   ∠**FB151v3.0.1**∠ (to transfer to the current device name to the HOST)

HOST → BT :   **AT+BTNAME=name_test↵** (command language to change device name)

BT → HOST :   ∠**OK**∠ (proper operation of command language)

HOST → BT :   **ATZ↵** (Soft Reset command language)

BT → HOST :   ∠**BTWIN Slave mode start**∠

BT → HOST :   ∠**OK**∠

HOST → BT :   **AT+BTINFO?0↵** (command language to certify the current information of device name)

BT → HOST :   ∠**name_test**∠ (to transfer to the current device name HOST)

To store the configuration, be sure to execute "ATZ" command language (refer to the ATZ command language)