Ehong Control Interface (EHCI) User Guide for EH-MA41

Ver.0.2
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Release Record

Version	Release Date	Comments
0.1	Mar 03,2014	Draft
0.2	May 13,2015	1、Change the command and indicator for PIO assignment from PO to PM; 2、Correct some typo.

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1. Introduction

The Ehong Control Interface (EHCI) is a set of ASCII commands and indicators with which the user can control the Ehong's Bluetooth module via UART interface by a host (PC, MCU, etc.).
The commands are used to control the Bluetooth module sent by host. The indicators are output from the Bluetooth module to the host to indicate the status of the module.
In addition, there are some IO indicators available when the UART is used to transfer raw data (working in Bypass mode). As a complement of ASCII commands and indicators, the IO indicators are also a part of EHCI.

1.1. Default UART Configuration

The default configuration of UART is given below:
Baud rate: 9600
Data bits: 8
Stop bits: 1
Parity: None
Flow control: None

2. Command and Indicator Syntax

2.1. General Syntax

The general syntax of EHCI command is shown as below:
AT+CMD[=Para1][,Para2][,Raw Data][,…]<CR><LF>

The general syntax of EHCI indicator is shown as below:
IDC[=Para1][,Para2][,Raw Data][,…]<CR><LF>

Description of each field:
AT+ is the command line prefix.
CMD is the basic command. All of the commands are listed in section 3 .
IDC is the basic indicator. All of the indicators are listed in section 4 .
= is the separator between command/indicator and parameter. It's only needed if a parameter is presented.
Para1 is the first parameter. Not all of the commands have a parameter.
, is the separator between parameters. It's only needed if subsequent parameter is presented.
Para2 is the second parameter if available.
Raw Data is the raw data which will be sent by the command. Only parts of the commands have this field.
<CR><LF> is the terminator of the command line.

Notes:
1. If a parameter is mandatory, it will be surrounded by { }. If a parameter is optional, it will be surrounded by [ ].
2. <CR> means Carriage Return, and <LF> means Line-Feed.
3. All of the parameters are composed of ASCII characters while the ***RawData*** *field can composed of any data contents.*

2.2. Examples

Here is some examples show how to use the EHCI commands and indicators.
Ex. 2.1
➔ AT+FT=01,00,00,0A,01,0078<CR><LF> ← *configure the module features.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Notes:
1. *For the examples in this document, the command sent to the Bluetooth module will be shown with "➔" at the beginning of the line, while the indicator output by Bluetooth module will be shown with "←" at the beginning of the line.*
2. *For the examples in this document, the comments will start with a "←" and be written in italic.*

3. *For the examples in this document, only the characters in grey background color are the real content of a command or indicator.*

Ex. 2.2
➔ AT+CS=00189600ABCD<CR><LF> ← *establish SPP connection with the device which address is 00:18:96:00:AB:CD.*
← SS=01,00189600ABCD<CR><LF> ← *the Bluetooth module is now connecting to the specified device which address is 00:18:96:00:AB:CD.*
← CS=00,00189600ABCD<CR><LF> ← *connecting result: success.*

← SS=02,00189600ABCD<CR><LF> ← *the Bluetooth module is now connected to the specified device which address is 00:18:96:00:AB:CD.*

3. Command List

All the available EHCI commands are listed and briefly described in the tables below. The detailed description of each command can be given in chapter.

Command	Short Description	Comments
General Commands		
PF	Query or configure the profiles of the module.	
AD	Query the Bluetooth address of the module.	
TP	Query or change the Tx Power of the module.	
CD	Query or configure the Class of Device of the module.	
FT	Query or configure the features of the module.	
MM	Query or configure Man-In-The-Middle protection feature.	
IO	Query or configure IO capability of local device.	
MT	Query or configure force to be master feature.	
PN	Query or change the fixed pin code of the module.	
NM	Query or change the local friendly name of the module.	
BR	Query or change the UART baud rate.	
UM	Query or change the UART mode.	
UI	Query or change the UART indicator output mode.	
DB	Query or change the default bypass mode.	
MD	Query or change the state of discoverable mode.	
PA	Query or change the state of pairing mode.	
CA	Query or change the state of connectable mode.	
CP	Clear the paired Bluetooth device list.	
SPP Commands		
CS	Connect to the remote SPP device.	
DS	Disconnect with the remote SPP device.	
SS	Query the SPP state of each SPP instance.	
DT	Send data packet to remote SPP device.	
HID Commands		
CI	Connect to the remote HID host.	
DI	Disconnect with the remote HID host.	
IS	Query the HID state.	
KR	Send keyboard report to remote HID host.	
AS	Send ASCII string to remote HID host.	

4. Indicator List

All the available EHCI indicators are listed and briefly described in the tables below. The detailed description of each command can be given in chapter 6 .
Table 4.1 EHCI Indicator List

Indicator	Short Description	Comments
General Indicators		
OK	Indicates a command was adopted by the module.	
ER	Indicates there is an error detected in the command sent by the host.	
AP	State of Bluetooth module as an application.	
AD	Bluetooth address of the module.	
TP	Tx Power of the module	
CD	Class of Device of the module.	
PF	Configuration of profiles of the module.	
FT	Features of the module.	
MM	States of Man-In-The-Middle protection.	
IO	Configuration of IO capability of local device.	
MT	Configuration of force to be master feature.	
SN	Configuration of sniff feature.	
SP	The deep sleep state.	
PN	Fixed pin code of the module.	
NM	Local friendly name of the module.	
IF	Host interface of the module	
BR	UART baud rate.	
UM	Configuration of UART mode.	
UI	Configuration of UART indicator output.	
RC	Configuration of remote control function.	
PM	Configuration of PIO assignment	
DB	Default configuration of bypass mode.	
MD	Discoverable state.	
PA	State of pairing mode.	
CA	State of connectable mode	
NC	Six digit number of numeric comparison.	
PK	Passkey request.	
AC	Voltage of AIO	
IR	Inquiry result.	
FD	Address and name of found device.	
LC	List the connected devices	
SPP Indicators		
SM	Service name of the SPP profile.	
SS	State of SPP channel.	
CS	Result of connect attempt to a remote SPP device.	
DT	Data packet received from remote SPP device.	
HID Indicators		
IS	State of HID.	
CI	Result of connect attempt to a remote HID host.	
KR	Keyboard report received from remote HID host.	

5. Description of ASCII Commands

5.1. General Commands

5.1.1. PF—Query or configure the profiles

5.1.1.1. Description:

This command can query or configure the profiles of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost. If the new configuration is adopted by the Bluetooth module, the module will perform a reboot, the non-memorable settings will return to their default value. Therefore, it is recommended to send this command first if necessary.
If the parameter is not presented, the Bluetooth module will report current profile configuration by the Indicator PF.

5.1.1.2. Syntax:

Synopsis:	Comments
AT+PF[=Spp][,Hid][,Rfc]<CR><LF>	For MA41 and MA46

5.1.1.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Comments
SPP	SPP disable or enable Value: 00 or 01 Default: 01	M	
Rfc	IAP disable or enable Value: 00 or 01 Default: 00	M	
Hid	HID disable or enable Value: 00 or 01 Default: 00	M	

5.1.1.4. Examples:

Ex. 5.1. To query current profile configuration of Bluetooth module (MA41 or MA46):
➔ AT+PF<CR><LF> ← *query current profile configuration.*
← PF=05,01,01,00,00<CR><LF> ← *report current profile configuration: 5 SPP instance,1 HID instance,1 RFCOMM instance.*

Ex. 5.2. To configure the features of Bluetooth module (MA41 or MA46):
➔ AT+PF=04,00,00,00,00<CR><LF> ← *configure the module profiles: 4 SPP instance and no HID and RFCOMM profile supported.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
← AP=00<CR><LF> ← *Indicate that the Bluetooth has performed a reboot and is ready now.*

Ex. 5.3. To configure the features of Bluetooth module (MB05 or):
➔ AT+PF=01,00,01,00,02,02<CR><LF> ← *configure the module profiles: 1 SPP instance, 1 RFCOMM instance, 2 A2DP instance and 2 AVRCP instance supported.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
← AP=00<CR><LF> ← *Indicate that the Bluetooth has performed a reboot and is ready now.*

5.1.2. AD—Query the Bluetooth address

5.1.2.1. Description:

This command can query the Bluetooth address of local module. Once the Bluetooth module adopted this query request, it will report its Bluetooth address by the Indicator AD.

5.1.2.2. Syntax:

Synopsis:
AT+AD<CR><LF>

5.1.2.3. Examples:

Ex. 5.4. To query the Bluetooth address of local module:
➔ AT+AD<CR><LF> ← *query the Bluetooth address of local module.*
← AD=00189600ABCD<CR><LF> ← *report the Bluetooth address is 00:18:96:00:AB:CD.*

5.1.3. TP—Query or change the Tx Power

5.1.3.1. Description:

This command can query or configure the transmit power of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.
If the parameter is not presented, the Bluetooth module will report current transmit power configuration by the Indicator TP.

5.1.3.2. Syntax:

Synopsis:
AT+TP[=Default Tx][,Maximum Tx]<CR><LF>

5.1.3.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Commnets
Default Tx	Default TX power in dBm. The default TX power used for paging, inquiry, and their responses, and as the initial power for new ACL links. Value: a 8 digits signed number Default: 00.	O	The values of this parameter will always be rounded to the next available value in the radio power table.
Maximum Tx	Maximum TX power in dBm. Bluetooth power control may raise the TX power up to this value. Value: a 8 digits signed number Default: 00.	O	The values of this parameter will always be rounded to the next available value in the radio power table.

Notes:
1. Please do NOT change the default configuration of Tx Power if not necessary.

5.1.3.4. Examples:

Ex. 5.5. To query current Tx Power configuration of Bluetooth module:
➔ AT+TP<CR><LF> ← *query current Tx Power configuration.*
← TP=04,04<CR><LF> ← *report current Tx Power configuration: default Tx Power is 4dBm and maximum Tx Power is 4dBm.*

Ex. 5.6. To configure the *Tx Power* of Bluetooth module:
➔ AT+TP=FC,00<CR><LF> ← *configure the Tx Power, set default Tx Power to -4dBm(FCh = -4), set the maximum Tx Power to 0dBm.*
← TP=FC,00<CR><LF> ← *response from the module to indicate the command is adopted and report the real Tx Power configuration after rounded.*

5.1.4. CD—Query or configure the Class of Device

5.1.4.1. Description:

This command can query or configure the Class of Device (COD) of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command or the module is rebooted. It means the Bluetooth module will not remember the configuration, and after the Bluetooth module has been powered off, the configuration will be lost.
If the parameter is not presented, the Bluetooth module will report current COD by the Indicator CD.

5.1.4.2. Syntax:

Synopsis:

AT+CD[=Cod]<CR><LF>

5.1.4.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Commnets
Cod	The Cod of the Bluetooth module Value: a 6 digits number Default: per firmware version	o	

Notes:

1. *The default COD has been configured properly by the Bluetooth firmware stack, so it is not necessary for user to configure it in general.*
2. *Some Bluetooth device will filter the devices by COD when searching for new device.*

5.1.4.4. Examples:

Ex. 5.7. To query current COD configuration of Bluetooth module:

➔ AT+CD<CR><LF> ← *query current COD configuration.*
➔ CD=001F00<CR><LF> ← *report current COD configuration: 001F00.*

Ex. 5.8. To configure the COD of Bluetooth module:

➔ AT+CD=000540<CR><LF> ← *configure the module COD: 000540.*
➔ OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.5. FT—Query or configure the features

5.1.5.1. Description:

This command can query or configure the features of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.
If the parameter is not presented, the Bluetooth module will report current feature configuration by the Indicator FT. If the user wants to configure the features, all of the parameters should be given together.

5.1.5.2. Syntax:

Synopsis:

AT+FT[=ATPowerOn,ACPaired,ATLinkLost,Interval,DiscMode,DiscTimeout]<CR><LF>

5.1.5.3. Parameter Description:

Parameter	Description	Mandatory or Optional	Commnets
AT Power On	The attempt times of auto connect the last connected device after power on. Value: 00h—FFh 00: No auto connect attempt will be performed after power on. 01-FE: The attempt times of auto connect after power on. FF: The auto connect attempt will be performed permanently. Default: FF (Permanent)	O	

AC Paired	Auto connects after paired with a device. Value: 00 or 01 00: Disabled 01: Enabled Default: 00 (Disabled)	O	
AT Link Lost	The attempt times of reconnect after link lost. Value: 00h—FFh 00: No reconnect attempt will be performed after link lost. 01-FE: The attempt times of reconnect after link lost. FF: The reconnect attempt will be performed permanently. Default: FF (Permanent)	O	
Interval	The interval between each reconnect attempt after link lost. The unit is second. Value: 00h—FFh Default: 0A (10 seconds)	O	
Disc Mode	The discoverable mode. Value: 00h—03h 00: The module will enter or quit discoverable mode just by the command AT+MD=xx. 01: The module will enter discoverable mode automatically when paired device list is empty. 02: The module will enter discoverable mode automatically when power on. 03: The module will enter discoverable mode automatically when there is no connection. Default: 01 (Auto discoverable when empty)	O	Even if the discoverable is set one of the auto mode (01 h—03h), it can also be controlled by the command AT+MD=xx.
Disc Time out	The timeout of discoverable status. The unit is second. Value: 0000h—FFFFh 0000: No timeout for discoverable status. 0001-FFFF: The timeout in second of discoverable status.	O	

Notes:

1. The default feature configuration may be different per software version.

5.1.5.4. Examples:

Ex. 5.9. To query current feature configuration of Bluetooth module:

➔ AT+FT<CR><LF> ← *query current feature configuration.*

← FT=FF,00,FF,0A,01,0078<CR><LF> ← *report current feature configuration.*

The auto connection after power on has been enabled as permanent mode;
The auto connect after paired has been disabled;
The auto reconnect after link lost has been enabled as permanent mode;
The interval of auto reconnect has been set to 10s.
Set the discoverable mode as auto discoverable when empty.
The timeout of discoverable is 120s.

Ex. 5.10. To configure the features of Bluetooth module:

➔ AT+FT=14,00,00,0A<CR><LF> ← *configure the module features:*

Set the attempt time of auto connect after power on as 20 times;
Disable the auto connect after paired;
No reconnect attempt will be performed after link lost;

Set the interval of auto reconnect to 10s.
Keep the discoverable mode and timeout as it was.
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.6. MM—Query or configure Man-In-The-Middle protection feature

5.1.6.1. Description:

This command can query or configure the Man-In-The-Middle protection feature of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.
If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator MM.

5.1.6.2. Syntax:

Synopsis:

AT+MM[=State]<CR><LF>

5.1.6.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
State	The new state of Man-In-The-Middle protection. Value: 00h or 02h 00: Deactivated 01: Activated 02: Activated and auto confirm the numeric comparison. Default: 02 (Activated and auto confirm)	O	The default value may be different per software version.

Notes:
1. A man-in-the-middle (MITM) attack occurs when a user wants to connect two devices but instead of connecting directly with each other they unknowingly connect to a third (attacking) device that plays the role of the device they are attempting to pair with. The third device then relays information between the two devices giving the illusion that they are directly connected. The attacking device may even eavesdrop on communication between the two devices (known as active eavesdropping) and is able to insert and modify information on the connection. In this type of attack, all of the information exchanged between the two devices are compromised and the attacker may inject commands and information into each of the devices thus potentially damaging the function of the devices. Devices falling victim to the attack are capable of communicating only when the attacker is present. If the attacker is not active or out range, the two victim devices will not be able to communicate directly with each other and the user will notice it.

To prevent MITM attacks, Secure Simple Pairing offers two user assisted numeric methods: numerical comparison or passkey entry. If Secure Simple Pairing would use 16 decimal digit numbers, then the usability would be the same as using legacy pairing with 16 decimal digit PIN. The chance for a MITM to succeed inserting its own link keys in this case is a 1 in 1016 = 253 pairing instances, which is an unnecessarily low probability.
Secure Simple Pairing protects the user from MITM attacks with a goal of offering a 1 in 1,000,000 chance that a MITM could mount a successful attack. The strength of the MITM protections was selected to minimize the user impact by using a six digit number for numerical comparison and Passkey entry. This level of MITM protection was selected since, in most cases, users can be alerted to the potential presence of a MITM attacker when the connection process fails as a result of a failed MITM attack. While most users feel that provided that they have not compromised their passkey, a 4-digit key is sufficient for authentication (i.e. bank card PIN codes), the use of six digits allows Secure Simple Pairing to be FIPS compliant and this was deemed to have little perceivable usability impact.
If the Man-In-The-Middle protection feature is activated, the module may output the number for numeric comparison by indicator NC or a passkey request by indicator PK. About the command NC and PK, please refer to section 5.1.24 and 5.1.25.

*2. If the Man-In-The-Middle protection feature is activated, the IO capability can only be configured to "**Display Yes/No**"* or "***Keyboard Only***". About the IO capability, please refer to section 5.1.7 .

3. When connect with some Android device by the SPP profile, it is required to active the Man-In-The-Middle protection.

5.1.6.4. Examples:

Ex. 5.11. To query current Man-In-The-Middle protection state of the Bluetooth module:
➔ AT+MM<CR><LF> ← *query the current Man-In-The-Middle protection state.*
➔ MM=00<CR><LF> ← *report the Man-In-The-Middle protection is deactivated currently.*

Ex. 5.12. To active Man-In-The-Middle protection feature:
➔ AT+MM=01<CR><LF> ← *active Man-In-The-Middle protection feature.*
➔ OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Ex. 5.13. To active Man-In-The-Middle protection feature, and let the module confirm the numeric comparison automatically:
➔ AT+MM=02<CR><LF> ← *active Man-In-The-Middle protection feature and auto confirm the numeric comparison. Thus, no NC indicator will be output by the module.*
➔ OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.7. IO—Query or configure the IO capability of local device

5.1.7.1. Description:

This command can query or configure the IO (input and output) capability of local device when pairing. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.
If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator IO.

5.1.7.2. Syntax:

Synopsis:

AT+IO[=Io Capability]<CR><LF>

5.1.7.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Io Capability	The new IO capability of local device. Value: 00h – 03h 00: Display Only. The local device can only display 01: Display Yes/No. The local device can display and select Yes or No. 02: Keyboard Only. The local device can only input. 03: No IO. The local device has no IO capability Default: 01 (Display Yes/No)	O	The default value may be different per software version.

Notes:

1. *When the Man-In-The-Middle protection feature is enabled, different IO capability will cause different pairing procedure. In case of "**Display Yes/No**", both remote and local device will prompt a six digits numbers, the user should compare and confirm if the two numbers are the same or not, and then select **Yes** or **No** on the remote device accordingly, for the module side, the host MCU should send the command AT+NC=01 or AT+NC=00 to confirm or deny the numeric comparison. In case of "**Keyboard Only**", the remote device will prompt a six digits number as passkey, the user should input the same number at the Bluetooth module side by command AT+PK (refer to section 5.1.25).*
2. *The "**Display Only**" and "**No IO**" are not allowed when the Man-In-The-Middle protection feature is enabled.*

5.1.7.4. Examples:

Ex. 5.14. To query current IO capability configuration of local device:
➔ AT+IO<CR><LF> ← *query current IO capability configuration of local device.*
➔ IO=03<CR><LF> ← *report current IO capability configuration of local device is "No IO".*

Ex. 5.15. To configure the IO capability of local device as "Keyboard Only":
➔ AT+IO=02<CR><LF> ← *configure the IO capability of local device as "Keyboard Only".*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.8. MT—Query or configure force to be master feature

5.1.8.1. Description:

This command can query or configure the force to be master feature of Bluetooth module. Once configured, the configuration will take effect at the next time when a Bluetooth connection is being established and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.
If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator MT.

5.1.8.2. Syntax:

Synopsis:

AT+MT[=State]<CR><LF>

5.1.8.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
State	The new state of force to be master feature. Value: 00h or 01h 00: Deactivated 01: Activated Default: 00 (Deactivated)	O	

Notes:

1. *In general, the device which initiates the Bluetooth connection will act as the Master automatically. Only some special devices which cannot be a master device, in such cases, the user can use this command to make the Bluetooth module force to be master device.*
2. *Ehong's Bluetooth module can act as either Master or Slave device, i.e. it can either initiate a Bluetooth connection or accept a connection request.*

5.1.8.4. Examples:

Ex. 5.16. To query current state of force to be master feature:

➔ AT+MT<CR><LF> ← *query current state of force to be master feature.*
← MT=00<CR><LF> ← *report the force to be master feature is deactivated currently.*

Ex. 5.17. To active the force to be master feature:

➔ AT+MT=01<CR><LF> ← *active the force to be master feature.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.9. PN—Query or change the fixed pin code

5.1.9.1. Description:

This command can query or change the fixed pin code of Bluetooth module. Once changed, the new pin code will take effect at next pairing procedure and until the next time the pin code is changed by this command. It means the Bluetooth module will remember the pin code, and even if the Bluetooth module has been powered off, the pin code will not be lost.
If the parameter is not presented, the Bluetooth module will report current pin code by the Indicator PN.

5.1.9.2. Syntax:

Synopsis:

AT+PN[=Pin Code]<CR><LF>

5.1.9.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Pin Code	The new fixed pin code of the Bluetooth module. Length: 1—16 characters Default: 0000	O	The default pin code may not be "0000" per software version.

5.1.9.4. Examples:

Ex. 5.24. To query current fixed pin code of Bluetooth module:
➔ AT+PN<CR><LF> ← *query current fixed pin code.*
← PN=0000<CR><LF> ← *report current fixed pin code, it's "0000".*

Ex. 5.25. To change the fixed pin code of Bluetooth module:
➔ AT+PN=abcdef<CR><LF> ← *change the fixed pin code to "abcdef"*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.10. NM—Query or change the local friendly name

5.1.10.1. Description:

This command can query or change the local friendly name of Bluetooth module. Once changed, the new friendly name will take effect at next time the remote device get local name and until the next time the friendly name is changed by this command. It means the Bluetooth module will remember the friendly name, and even if the Bluetooth module has been powered off, the friendly name will not be lost.
If the parameter is not presented, the Bluetooth module will report current friendly name by the Indicator NM.

5.1.10.2. Syntax:

Synopsis:

AT+NM[=Name]<CR><LF>

5.1.10.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Name	The new local friendly name of the Bluetooth module. Length: 1—30 characters Default: Per software version.	O	

5.1.10.4. Examples:

Ex. 5.26. To query current local friendly name of Bluetooth module:
➔ AT+NM<CR><LF> ← *query current local friendly name.*
← NM=NVC_BT_DEVICE<CR><LF> ← *report current local friendly name, it's "NVC_BT_DEVICE".*
← LN=NVC_BLE_DEVICE<CR><LF> ← *report current local friendly name of the BLE channel, it's "NVC_BLE_DEVICE". This is only available for MB18 module.*

Ex. 5.27. To change the local friendly name of Bluetooth module:
➔ AT+NM=MY_BT_DEVICE<CR><LF> ← *change the local friendly name to "MY_BT_DEVICE"*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
Notes:
1. For MB18 module, the module will append "_L" at the end of given name as the BLE device name. That means, in the above example, the BLE device name will be changed to "MY_BT_DEVICE_L".

5.1.11. BR—Query or change the UART baud rate

5.1.11.1. Description:

This command can query or change the UART baud rate of Bluetooth module. Once changed, the new baud rate will take effect immediately and until the next time the baud rate is changed by this command. It means the Bluetooth module will remember the baud rate, and even if the Bluetooth module has been powered off, the baud rate will not be lost.
If the parameter is not presented, the Bluetooth module will report current baud rate by the Indicator BR.

5.1.11.2. Syntax:

Synopsis:

AT+BR[=Baud Rate]<CR><LF>

5.1.11.3. Parameter Description:

Parameter	Description	Mandatory	Commnets

Baud Rate	The new baud rate of the Bluetooth module. Value: 01h—15h 01: 1200 02: 1800 03: 2400 04: 4800 05: 7200 06: 9600 07: 14400 08: 19200 09: 38400 0A: 56000 0B: 57600 0C: 115200 0D: 128000 0E: 230400 0F: 256000 10: 460800 11: 921600 12: 1382400 13: 1843200 14: 2764800 15: 3686400 Remark: Default: 06 (9600)	O	The default baud rate may not be 9600 per software version.

Warning:

1. Please do NOT try to change to a new baud rate if you don't have a host which can work in that baud rate, for there is no other way to restore it except for UART port.

5.1.11.4. Examples:

Ex. 5.30. To query the baud rate of Bluetooth module:

➔ AT+BR<CR><LF> ← *query the baud rate.*

← BR=06<CR><LF> ← *report the baud rate, it's 9600.*

Ex. 5.31. To change the baud rate of Bluetooth module:

➔ AT+BR=0C<CR><LF> ← *change the baud rate to 115200.*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Notes:

1. The response will be sent in current baud rate.

5.1.12. UM—Query or configure the UART mode

5.1.12.1. Description:

This command can query or configure the UART mode of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost. If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator UM.

5.1.12.2. Syntax:

Synopsis:

AT+UM[=Stop Bits, Parity][,Latency]<CR><LF>

5.1.12.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Stop Bits	The stop bits of UART mode Value: 00h or 01h 00: 1 stop bit 01: 2 stop bits Default: 00 (1 stop bit)	o	

Parity	The parity of UART mode Value: 00h – 02h 00: No parity 01: Odd parity 02: Even parity Default: 00 (No parity)	o
Latency	The latency mode Value: 00h or 01h 00: Throughput priority 01: Low latency priority Default: 01(Low latency priority)	o

5.1.12.4. Examples:

Ex. 5.32. To query the UART mode of Bluetooth module:

➔ AT+UM<CR><LF> ← *query the UART mode.*

← UM=00,00,01<CR><LF> ← *report the UART mode, it's 1 stop bit, no parity and low latency priority.*

Ex. 5.33. To change the UART mode of Bluetooth module:

➔ AT+UM=01,01<CR><LF> ← *change the UART mode to 2 stop bits and odd parity.*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Notes:

1. The response will be sent in current UART mode.

Ex. 5.34. To change the UART mode to throughput priority:

➔ AT+UM=00,00,00<CR><LF> ← *change the UART mode to 1 stop bits, no parity and throughput priority.*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.13. UI—Query or configure the UART indicator output mode

5.1.13.1. Description:

This command can query or configure (disable or enable) the UART indicator output mode of Bluetooth module. Once configured, the configuration will take effect immediately and until the next time the module is configured by this command. It means the Bluetooth module will remember the configuration, and even if the Bluetooth module has been powered off, the configuration will not be lost.

If the parameter is not presented, the Bluetooth module will report current configuration by the Indicator UI.

5.1.13.2. Syntax:

Synopsis:

AT+UI[=State]<CR><LF>

5.1.13.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
State	The new state of UART indicator output mode Value: 00h or 01h 00: Disabled 01: Enabled	o	Default: 01 (Enabled)

5.1.13.4. Examples:

Ex. 5.35. To query current UART indicator output mode of the Bluetooth module:

➔ AT+UI<CR><LF> ← *query current UART indicator output mode.*

← UI=01<CR><LF> ← *report the UART indicator output is enabled currently.*

Notes:

1. If the UART indicator output is disabled currently, the report will not be output.

Ex. 5.36. To disable the UART indicator output:

➔ AT+UI=00<CR><LF> ← *disable the UART indicator output*

← *no response output because the UART indicator output has been disabled*

Ex. 5.37. To enable the UART indicator output:
➔ AT+UI=01<CR><LF> ← *enable the UART indicator output*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.14. DB—Query or configure the default Bypass mode

5.1.14.1. Description:

This command can query or configure the default bypass mode of Bluetooth module. Once configured, the configuration will take effect at the next time the module is power on. It means the Bluetooth module will remember the configuration and even if the Bluetooth module has been powered off, the configuration will not be lost, but the configuration will NOT take effect immediately.

5.1.14.2. Syntax:

Synopsis:

AT+DB[=Enable][,Speed Mode]<CR><LF>

5.1.14.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Enable	The new Bypass channel mode: Value: 00: Proxy mode 01: Enable transparent transfer mode Default: 00	O	
Speed Mode	The new Bypass speed mode: Value: 00h or 01h 00: Normal speed 01: High speed Default: 00	O	

There are 2 different speed mode explained below:

0. Normal speed mode

When working in this mode, the Bluetooth module will try to parse the content received from UART to find if there is a BP command, so the speed is affected accordingly.

1. High speed mode

When working in this mode, the Bluetooth module will transfer the content received from UART to bypass channel directly. In this case the Bluetooth module will not parse the content, so the host cannot change the bypass mode by BP command.

Proxy mode

When working in this mode, the content sent to the Bluetooth module via UART port will be treated as ASCII command. And the content sent from the Bluetooth module should be treated ASCII indicator.
When there is not any connection has been established, the Bluetooth module is working in this mode.

Note:

To configure this command, you must first disconnect to take effect

5.1.14.4. Examples:

Ex. 5.42. To query current configuration of default Bypass mode of the Bluetooth module:
AT+DB<CR><LF> *query current configuration of default Bypass mode.*
DB=00,00<CR><LF> *report the configuration of default Bypass mode.*

Ex. 5.43. To configure the default Bypass mode:

AT+DB=01,01<CR><LF> *configure the default Bypass mode.*
OK<CR><LF> *response from the module to indicate the command is adopted.*

5.1.15. MD—Make the Bluetooth module discoverable

5.1.15.1. Description:

This command can query or change the Bluetooth module's discoverable status. Only when the Bluetooth module is discoverable, it can be found by other Bluetooth device.
If the parameter is not presented, the Bluetooth module will report current discover status by the Indicator MD.

5.1.15.2. Syntax:

Synopsis:

AT+MD[=Status]<CR><LF>

5.1.15.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Status	The new status of discoverable. Value: 00h or 01h 00: Not discoverable 01: Discoverable	o	Default: 00 (Not discoverable)

5.1.15.4. Examples:

Ex. 5.45. To query the current discoverable status of the Bluetooth module:
➔ AT+MD<CR><LF> ← *query the current discoverable status.*
← MD=00<CR><LF> ← *report the Bluetooth module is not discoverable currently.*

Ex. 5.46. To make Bluetooth module discoverable:
➔ AT+MD=01<CR><LF> ← *make Bluetooth module discoverable.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.16. PA—Query of change the status of pairing mode

5.1.16.1. Description:

This command can query or change the Bluetooth module's pairing mode status. Only when the pairing mode is enabled, it can be paired/bonded with other Bluetooth device.
If the parameter is not presented, the Bluetooth module will report current status of pairing mode by the Indicator PA.

5.1.16.2. Syntax:

Synopsis:

AT+PA[=Status]<CR><LF>

5.1.16.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Status	The new status of pairing mode. Value: 00h or 01h 00: Pairing/Bonding disabled 01: Pairing/Bonding enabled Default: 01 (Enabled)	o	The default baud rate may not be 9600 per software version.

5.1.16.4. Examples:

Ex. 5.47. To query the current pairing mode status of the Bluetooth module:
➔ AT+PA<CR><LF> ← *query the current pairing mode status.*
← PA=01<CR><LF> ← *report the pairing is enabled currently.*

Ex. 5.48. To disable the pairing mode of the Bluetooth module:

➔ AT+PA=00<CR><LF> ← *disable the pairing mode.*
➔ OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.17. CA—Query of change the state of connectable mode

5.1.21.1. Description:

This command can query or change the Bluetooth module's connectable mode state. Only when the connectable mode is enabled, it can be connected with other Bluetooth device.
If the parameter is not presented, the Bluetooth module will report current state of connectable mode by the Indicator CA.

5.1.17.2. Syntax:

Synopsis:

AT+CA[=State]<CR><LF>

5.1.17.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
State	The new state of connectable mode. Value: 00h or 01h 00: connect disabled 01: connect enabled Default: 01 (Enabled)	o	

5.1.17.4. Examples:

Ex. 5.49. To query the current connectable mode state of the Bluetooth module:
➔ AT+CA<CR><LF> ← *query the current connectable mode state.*
➔ CA=01<CR><LF> ← *report the* connectable mode *is enabled currently.*

Ex. 5.50. To disable the connectable mode of the Bluetooth module:
➔ AT+CA=00<CR><LF> ← *disable the connectable mode.*
➔ OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.1.18. CP—Clear the paired Bluetooth device list

5.1.18.1. Description:

This command can clear the paired device list stored in the Bluetooth module. If there is some Bluetooth device is connected with the Bluetooth module, it will perform a disconnection before clear the paired device list.

5.1.18.2. Syntax:

Synopsis:

AT+CP<CR><LF>

5.1.18.3. Examples:

Ex. 5.54. To clear the paired device list:
➔ AT+CP<CR><LF> ← *clear the paired device list.*
➔ OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.2. SPP Commands

5.2.1. CS—Connect to the remote SPP device

5.2.1.1. Description:

This command will make the Bluetooth module to connect to the remote Bluetooth SPP device. If the Bluetooth address parameter is not presented, the Bluetooth module will attempt to connect to the last connected SPP device.

5.2.1.2. Syntax:

Synopsis:

AT+CS[=BdAddr][,Name Id]<CR><LF>

Parameter	Description	Mandatory	Commnets
BdAddr	The Bluetooth address of the Bluetooth SPP device to connect.	O	
Name ID	The name ID of this connection. Once connected, the host can use the name ID to identify the source or destination. Value: 40h—4xh (x is the maximum SPP instance count, refer to 5.1.1)	O	This is only available when both of the two sides are Ehong's software.

Notes:

1. If either local or remote device has already established a SPP connection with some other device use the same Name ID, the remote device will disconnect with local device immediately.

2. Once the connection with a specified Name ID has been successfully established, the Bluetooth module will remember the Name ID and use this Name ID to auto connect after power on and auto reconnect after link lost(if these features are enabled).

5.2.1.4. Examples:

Ex. 5.77. To connect to the last connected SPP device:

➔ AT+CS<CR><LF> ← *connect to the last connected device with the SPP profile.*

← SS=01,00189600ABCD<CR><LF> ← *the Bluetooth module is now connecting to the last connected device which address is 00:18:96:00:AB:CD.*

← CS=00,00189600ABCD<CR><LF> ← *connecting result: success.*

← SS=02,00189600ABCD<CR><LF> ← *the Bluetooth module is now connected to the last connected device.*

Ex. 5.78. To connect to the specified device with the SPP profile:

➔ AT+CS=00189600000A<CR><LF> ← *connect to the specified device 00:18:96:00:00:0A with the SPP profile.*

← SS=01,00189600000A<CR><LF> ← *the Bluetooth module is now connecting to the specified SPP device which address is 00:18:96:00:00:0A.*

← CS=00,00189600000A<CR><LF> ← *connecting result: success.*

← SS=02,00189600000A<CR><LF> ← *the Bluetooth module is now connected to the specified SPP device.*

Ex. 5.79. To connect to the specified SPP device with the Name ID 13:

➔ AT+CS=00189600000A,43<CR><LF> ← *connect to the specified device 00:18:96:00:00:0A with the Name ID 43.*

← SS=01,00189600000A,43<CR><LF> ← *the Bluetooth module is now connecting to the specified SPP device which address is 00:18:96:00:00:0A,use Name ID 43.*

← CS=00,00189600000A<CR><LF> ← *connecting result: success.*

← SS=02,00189600000A,43<CR><LF> ← *the Bluetooth module is now connected to the specified SPP device, the Name ID is 43.*

5.2.2. DS—Disconnect with the remote SPP device

5.2.2.1. Description:

This command will make Bluetooth module to disconnect with the remote Bluetooth SPP device. If the Bluetooth address parameter is not presented, the Bluetooth module will disconnect with all of the connected SPP devices.

5.2.2.2. Syntax:

Synopsis:

AT+DS[=BdAddr]<CR><LF>

5.2.2.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
BdAddr	The Bluetooth address of the Bluetooth SPP device to disconnect.	O	

5.2.2.4. Examples:

Ex. 5.80. To disconnect with all of the connected SPP devices:

➔ AT+DS<CR><LF> ← *disconnect with all of the connected SPP devices.*
← SS=00<CR><LF> ← *the SPP channel 0 of Bluetooth module is now disconnected and is connectable.*
← SS=10<CR><LF> ← *the SPP channel 1 of Bluetooth module is now disconnected and is connectable.*
← SS=30<CR><LF> ← *the SPP channel 3 of Bluetooth module is now disconnected and is connectable.*

Ex. 5.81. To disconnect to the specified device:

➔ AT+DS=00189600000A<CR><LF> ← *disconnect with the specified device 00:18:96:00:00:0A.*
← SS=00<CR><LF> ← *the SPP channel 0 of Bluetooth module is now disconnected and is connectable.*

5.2.3. SS—Query the state of each SPP channel

5.2.3.1. Description:

This command is used to query the state of each SPP channel.

5.2.3.2. Syntax:

Synopsis:

AT+SS<CR><LF>

5.2.3.3. Examples:

Ex. 5.82. To query the state of each SPP channel:

➔ AT+SS<CR><LF> ← *query the state of each SPP channel.*
← SS=01,00189600ABCD<CR><LF> ← *the SPP channel 0 of Bluetooth module is now connecting to the remote device which address is 00:18:96:00:AB:CD.*
← SS=12,00189601ABCD<CR><LF> ← *the SPP channel 1 of Bluetooth module is now connected with the remote device which address is 00:18:96:01:AB:CD.*
← SS=22,00189603ABCD,43<CR><LF> ← *the SPP channel 2 of Bluetooth module is now connected with the remote device which address is 00:18:96:02:AB:CD, the name ID is 43.*
← SS=30<CR><LF> ← *the SPP channel 3 of Bluetooth module is now connectable*
← SS=40<CR><LF> ← *the SPP channel 4 of Bluetooth module is now connectable*
← SS=50<CR><LF> ← *the SPP channel 5 of Bluetooth module is now connectable*

5.2.4. DT—Send data packet to remote SPP device

5.2.4.1. Description:

This command is used to send a data packet to the remote SPP device.

5.2 .4.2. Syntax:

Synopsis:

AT+DT{=Channel Or Name Id, Data Len, Data}<CR><LF>

5.2.4.3. Parameter Description:

Parameter	Description	Mandatory	Commnets

Channel Or Name ID	The SPP channel ID or Name ID which will be used to send the data packet. Value: 00h—0xh or 40h—4xh (x is the maximum SPP instance count, refer to 5.1.1) 00—0x: the channel ID of SPP 40—4x: the name ID of SPP	M
Data Len	The length in bytes of the data to be sent. Value: 00h-FFh	M
Data	The raw data.	M

5.2.4.4. Examples:

Ex. 5.83. To send data use SPP channel 0:

➔ AT+DT=00,0A,1234567890<CR><LF> ← *send a data packet use SPP channel 0, the data length is 10(Dec).*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Ex. 5.84. To send data use SPP Name ID 13h:

➔ AT+DT=43,0A,1234567890<CR><LF> ← *send a data packet use SPP Name ID 43h, the data length is 10*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5.3. HID Commands

5.3.1. CI—Connect to the remote HID host

5.3.1.1. Description:

This command will make the Bluetooth module to connect to the remote Bluetooth HID host. If the Bluetooth address parameter is not presented, the Bluetooth module will attempt to connect to the last connected HID host.

5.3.1.2. Syntax:

Synopsis:

AT+CI[=BdAddr]<CR><LF>

5.3.1.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
BdAddr	The Bluetooth address of the Bluetooth HID host to connect.	O	

5.3.1.4. Examples:

Ex. 5.85. To connect to the last connected HID host:

➔ AT+CI<CR><LF> ← *connect to the last connected HID host.*

← IS=01,00189600ABCD<CR><LF> ← *the Bluetooth module is now connecting to the last connected HID host which address is 00:18:96:00:AB:CD.*

← CI=00,00189600ABCD<CR><LF> ← *connecting result: success.*

← IS=02,00189600ABCD<CR><LF> ← *the Bluetooth module is now connected to the last connected HID host.*

Ex. 5.86. To connect to the specified HID host:

➔ AT+CI=00189600000A<CR><LF> ← *connect to the specified HID host: 00:18:96:00:00:0A.*

← IS=01,00189600000A<CR><LF> ← *the Bluetooth module is now connecting to the specified HID host which address is 00:18:96:00:00:0A.*

← CI=00,00189600000A<CR><LF> ← *connecting result: success.*

← IS=02,00189600000A<CR><LF> ← *the Bluetooth module is now connected to the specified HID host.*

5.3.2. DI—Disconnect with the remote HID host

5.3.2.1. Description:

This command will make Bluetooth module to disconnect with the remote Bluetooth HID host. If the Bluetooth address parameter is not presented, the Bluetooth module will disconnect with all of the connected HID hosts.

5.3.2.2. Syntax:

Synopsis:

AT+DI[=BdAddr]<CR><LF>

5.3.2.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
BdAddr	The Bluetooth address of the Bluetooth HID host to disconnect.	O	

5.3.2.4. Examples:

Ex. 5.87. To disconnect with all of the connected HID host:

➔ AT+DI<CR><LF> ← *disconnect with all of the connected HID host.*

← IS=00<CR><LF> ← *the HID channel of Bluetooth module is now disconnected and is connectable.*

Ex. 5.88. To disconnect to the specified device:

➔ AT+DI=00189600000A<CR><LF> ← *disconnect with the specified HID host: 00:18:96:00:00:0A.*

← IS=00<CR><LF> ← *the HID channel of Bluetooth module is now disconnected and is connectable.*

5.3.3. IS—Query the state of HID channel

5.3.3.1. Description:

This command is used to query the state of HID channel.

5.3.3.2. Syntax:

Synopsis:

AT+IS<CR><LF>

5.3.3.3. Examples:

Ex. 5.89. To query the state of HID channel:

➔ AT+IS<CR><LF> ← query the state of HID channel.

← IS=01,00189600ABCD<CR><LF> ← *the HID channel of Bluetooth module is now connecting to the remote HID host which address is 00:18:96:00:AB:CD.*

5.3.4. KR—Send HID report to remote HID host

5.3.4.1. Description:

This command is used to send a HID report to the remote HID host.

5.3.4.2. Syntax:

Synopsis:

AT+KR{=Hid Report}<CR><LF>

5.3.4.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
Hid Report	The HID report needs to be sent to HID host.	M	

5.3.4.4. Report Format and Examples:

Start (1Byte) Report Id (1Byte) Data (8 Bytes for Keyboard Report and Joystick/Gamepad, 2 Bytes for Consumer Report, 5 Bytes for Mouse)

Notes:

1. *In **Proxy mode**, all of the data field in HID report should be given in ASCII characters and separated by comma, while in **Bypass mode**, all of the data field should be given in raw data (binary) and no separator is needed. About the Proxy mode and Bypass mode, please refer to section 5.1.19 and 5.1.29.*

1. Keyboard Report:

A1 01 Modifier 00 ScanCode1 ScanCode2 ScanCode3 ScanCode4 ScanCode5 ScanCode6

The **Modifier** byte is a bit mask interpreted as shown in Table 5.2 . For example, you can use 02h or 20h to turn a lower case 'a' into an upper case 'A'.

Table 5.2 Bit Mask of Modifier Byte in Keyboard Report

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Right GUI	Right Alt	Right Shift	Right Ctrl	Left GUL	Left Alt	Left Shift	Left Ctrl

The **ScanCode** is defined by the USB HID Spec.

Ex. 5.90. If the key A and the Right Shift are pressed, the keyboard report should be:

A1 01 20 00 04 00 00 00 00 00

Ex. 5.91. If all of the pressed keys have been released, the keyboard report should be:

A1 01 00 00 00 00 00 00 00 00

Ex. 5.92. To send a keyboard report to HID host:

➔ AT+KR=A1,01,00,00,04,00,00,00,00,00<CR><LF> ← *send a keyboard report to the HID host. The key A is pressed.*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

➔ AT+KR=A1,01,00,00,00,00,00,00,00,00<CR><LF> ← *send a keyboard report to the HID host. The pressed key is released.*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

2. Consumer Key Report:

A1 02 Low Byte High Byte

The **Low Byte** and **High Byte** are bit mask interpreted as shown in Table 5.3 :

Table 5.3 Consumer Key Function

Consumer Key Function	Low Byte	High Byte
AC Home	01	00
AL Email Reader	02	00
AC Search	04	00
AL Keyboard Layout (Virtual Apple Keyboard Toggle)	08	00
Volume Up	10	00
Volume Down	20	00
Mute	40	00

Play/Pause	80	00
Scan Next Track	00	01
Scan Previous Track	00	02
Stop	00	04
Eject	00	08
Fast Forward	00	10
Rewind	00	20
Stop/Eject	00	40
AL Internet Browser	00	80

Ex. 5.93. To increase the volume, the consumer key report should be:
A1 02 10 00

Ex. 5.94. To release the consumer key, the consumer key report should be:
A1 02 00 00

Ex. 5.95. To send a consumer key report to HID host:
➔ AT+KR=A1,02,10,00<CR><LF> ← *send a consumer key report to the HID host. The Volume Up key is pressed.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,02,00,00<CR><LF> ← *send a consumer key report to the HID host. The pressed key is released.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,02,08,00<CR><LF> ← *send a consumer key report to the HID host to popup the Virtual Apple Keyboard.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,02,00,00<CR><LF> ← *send a consumer key report to the HID host. The pressed key is released.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

3. Mouse Report:

A1 03 Buttons XmXl YlXh YhYm Wheel

The **Buttons** is a bit mask interpreted as shown in Table 5.4 :
Table 5.4 Bit Mask of Buttons Byte in Mouse Report

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Button 8	Button 7	Button 6	Button 5	Button 4	Button 3	Button 2	Button 1

The **XhXmXl** compose the movement on X axis. The range is from -2048(800h) to +2047(7FFh).
The **YhYmYl** compose the movement on Y axis. The range is from -2048(800h) to +2047(7FFh).
The **Wheel** is the movement of wheel. The range is from -127(81h) to +127(7Fh).
Ex. 5.96. To press the left button of the mouse, the mouse report should be:
A1 03 01 00 00 00 00

Ex. 5.97. To move the mouse towards top-right(X:3 pixel, Y:-4 pixel), the mouse report should be:

A1 03 00 03 C0 FF 00

XhXmXl = 003h = 3 (Decimal)
YhYmYl = FFCh = -4 (Decimal)

Ex. 5.98. To scroll up for 1 line, the mouse report should be:
A1 03 00 00 00 00 FF

Wheel = FFh = -1 (Decimal)

Ex. 5.99. To send a mouse report to HID host:
➔ AT+KR=A1,03,01,00,00,00,00<CR><LF> ← *send a mouse report to the HID host. The Button1(Left Button) is pressed.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,03,00,00,00,00,00<CR><LF> ← *send a mouse report to the HID host. The pressed key is released.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,03,00,03,C0,FF,00<CR><LF> ← *send a mouse report to the HID host. The mouse is move to upper-right.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,03,00,00,00,00,00<CR><LF> ← *send a mouse report to the HID host. The mouse is stopped.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,03,00,00,00,00,FF<CR><LF> ← *send a mouse report to the HID host. The mouse wheel scroll up for one line.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,03,00,00,00,00,00<CR><LF> ← *send a mouse report to the HID host. The mouse is stopped.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

4. Joystick/Gamepad:

A1 04 Throttle X Y Z Rz Hat Switch Buttons1 Buttons2

The **Throttle** is the throttle value. The range is from -127(81h) to +127(7Fh).
The **X** is the position of X axis of left stick. The range is from -127(81h) to +127(7Fh).
The **Y** is the position of Y axis of left stick. The range is from -127(81h) to +127(7Fh).
The **Z** is the position of Z axis (generally, it is used as X axis of right stick). The range is from -127(81h) to +127(7Fh).
The **Rz** is the rotation of Z axis (generally, it is used as Y axis of right stick). The range is from -127(81h) to +127(7Fh).
The **Hat Switch** is the direction of hat switch. The range is from 00h to 07h, represents Top(00h), Top-right(01h), Right(02h), Bottom-right(03h), Bottom(04h), Bottom-left(05h), Left(06h), Top-Left(07h). The value out of range is invalid, and the hat switch will not move.
The **Buttons1** is a bit mask of first 8 buttons(Button1—Button8). Each bit represents one button.
The **Buttons2** is a bit mask of second 8 buttons(Button9—Button16). Each bit represents one button.
Ex. 5.100. To set the Throttle to 5, Left X to -2, Left Y to 3, Right X to 2, Right Y to -5, the joystick report should be:
A1 04 05 FE 03 02 FB 08 00 00

Throttle = 05h = 5 *(Decimal)*
X = Left X = FEh = -2 *(Decimal)*
Y = Left Y = 03h = 3 *(Decimal)*
Z = Right X = 02h = 2 *(Decimal)*
Rz = Right Y = FBh = -5 *(Decimal)*
Hat Switch = 08 = No movement
Buttons1 = 00h = No button be pressed.
Buttons2 = 00h = No button be pressed

Ex. 5.101. To set the Throttle to -10, Button2, Button3 and Button 15 pressed, Hat Switch to Bottom-left, the joystick report should be:
A1 04 F6 00 00 00 00 05 06 40

Throttle = F6h = -10 *(Decimal)*
X = Left X = 00h = 00 *(Decimal)*
Y = Left Y = 00h = 00 *(Decimal)*
Z = Right X = 00h = 00 *(Decimal)*
Rz = Right Y = 00h = 00 *(Decimal)*
Hat Switch = 05 = Bottom-left
Buttons1 = 06h = Button2 and Button3 be pressed.
Buttons2 = 40h = Button15 be pressed

Ex. 5.102. To send a joystick/gamepad report to HID host:
➔ AT+KR=A1,04,05,FE,03,02,FB,08,00,00<CR><LF> ← *send a* joystick/gamepad *report to the HID host.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,04,F6,00,00,00,00,05,06,40<CR><LF> ← send a joystick/gamepad report to the HID host.
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
➔ AT+KR=A1,04,00,00,00,00,00,08,00,00<CR><LF> ← *send a* joystick/gamepad *report to the HID host.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

5. User Defined Report:

A1 FF Length D1 D2 D3 D4 …… Dn

The **Length** is the length of report data in byte.
The **D1, D2, D3, D4,……,Dn** are the report data, here **n** equal to the **Length**.
Ex. 5.103. If a user defined report has 10 report data, the report should be:
A1 FF 0A 01 02 03 04 05 06 07 08 09 0A

Length = 0Ah = 10 *(Decimal)*
Report data = 01 02 03 04 05 06 07 08 09 0A
Note:
*1. For Bypass mode, the **Length** can up to FFh(255 in decimal), while for Proxy mode, the maximum **Length** is 55h(85 in decimal).*

5.3.5. AS—Send ASCII string to remote HID host

5.3.5.1. Description:

This command is used to send an ASCII string to the remote HID host.

5.3.5.2. Syntax:

Synopsis:

AT+AS{=Ascii Str}<CR><LF>

5.3.5.3. Parameter Description:

Parameter	Description	Mandatory	Commnets
ASCII Str	The ASCII string needs to be sent to HID host. Only the ASCII character in the range of 20h—7Eh and 08h, 09h, 0Dh can be included in this parameter. The data out of range will be thrown away.	M	

Notes:
1. *An escape character ('\') is available like which has been widely used in C/C++ language. In this case, "\r" or "\R" represents Enter(0Dh), "\b" or "\B" represents Backspace(08h), "\t" or "\T" represents Tab(09h), and "\\" represents '\' character.*

5.3.5.4. Examples:

Ex. 5.104. To send an ASCII string to HID host:
➔ AT+AS=Hello Bluetooth HID<CR><LF> ← *send an ASCII string to the HID host.*

← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Ex. 5.105. To send a ASCII string to HID host:
→ AT+AS=!@#$%^abcdef9876<CR><LF> ← *send an ASCII string to the HID host.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*

Ex. 5.106. To send a ASCII string to HID host:
→ AT+AS=Hello\t World!\b\r This is \\Ehong\\<CR><LF> ← *send an ASCII string to the HID host.*
← OK<CR><LF> ← *response from the module to indicate the command is adopted.*
The HID host will receive and display as below:
Hello World
This is \Ehong\