

EH-MC10

Command Interface User Guide

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Professional *Bluetooth* Solution Provider

VERSION HISTORY

Version	Date	Comments
V1.0	12 May 2014	Release
V1.1	20 July 2015	Add ibeacon AT command
V1.2	04 Sep 2015	Add SoC air command
V1.3	09 Jan 2016	Solve the document error
V1.4	08 Oct 2016	Add TM,AP command
V1.5	20 Nov 2016	Add PW command
V1.6	10 Jane 2017	Add master interface
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1. Introduction

The command interface is a set of ASCII commands and indicators with which the user can send command to the Bluetooth module via UART interface from host (PC, MCU, etc.).

The commands are used to send to Bluetooth module from host. The indicators are output from the Bluetooth module to the host for indicating the status of the module.

In addition, there are some IO indicators available when the UART is used to transfer raw data. As a complement of ASCII commands and indicators, the IO indicators are also a part of AT COMMAND.

1.1. Default Configuration

The default configuration of UART is given below:

baud rate: 2400 Data bits: 8
 Stop bits: 1 Parity: None
 Flow command: None

The default UUID of service is given below:

Service UUID : 11223344-5566-7788-99AA-BBCCDDEEFF00

2. Command and Indicator Syntax

2.1. General Syntax

The general syntax of AT command is shown as below:

→AT+CMD[=Para1][,Para2][, RawData] <CR><LF>

The general syntax of AT indicator is shown as below:

←IDC[=Para1]<CR><LF>

Note: 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.

2.2 Description of each field

“AT+” : command line prefix.

“CMD” : command. All of the commands are listed in section 5.

“IDC” : indicator. All of the indicators are listed in section 4.

“=” : 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.

“,” : separator between parameters. It's only needed if subsequent parameter is presented. Para2 is the second parameter if available. RawData is the raw data which will be sent by the command. Only parts of the commands have this field.

<CR><LF>: terminator of the command, hex: 0x0d 0x0a

Notes:

1. All of the parameters are composed of ASCII characters while the RawData field can composed of any data contents.

2. In indicators, the module prints hex values in low case. For other places in the document we always use upper case characters for hex values.

2.3. Examples

Here is some examples show how to use the AT commands and indicators.

→AT+NM=EH-LINK<CR><LF> configure the GAP device name characteristic. The new name is “EH-LINK”.

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

Notes: 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. “→”and“←” not send with the ascii data.

3. Command List

All the available AT commands are listed and briefly described in the tables below. The detailed description of each command is given in chapter 5.

Command	Short Description
AD	Start or stop advertising.
BD	Query or configure the UART baud rate.
NM	Query or configure the device name.
AT	Query or configure the module advertise type.
DA	Send data packet to the connected BLE central.
DC	Disconnect with remote BLE central.
ST	Query the current radio status.
UD	Query or configure module's service UUID128.
RT	Software reset module.
CB	Clear the paired Bluetooth device list.
RI	Query the rssi value of signal from current connection.
AR	Query the Bluetooth address of the module.
DF	Reset all setting to default values.
CN	Query or configure connection parameter.
CC	Query current connection parameter characteristic
VR	Query the current firmware's version.
BY	Configure the module work in bypass mode.
UU	Configure the 128 bits UUID one at command.
TM	Configure advertisement parameter.

PW	Configure the module TX power level.
LO	Set the PIO output level.
LP	Set the PIO(3,4,10,11)output PWM.
RA	Read module's AIO & VBAT input.
BM	Query or configure the Major ID of ibeacon Module.
BS	Query or configure the Minor ID of ibeacon Module.
BP	Query or configure the Power of ibeacon Module.
SC	Start or stop scanning the salve device.
WT	Master write data to remote device by characteristic's handle.
RD	Master read data from remote device by characteristic's handle
DS	Master disconnect with the remote device.
CT	Master connect to slave device by MAC address

Table 1. AT Command List for BLE Module

4. Indicator List

All the available AT Command indicators are listed and briefly described in the tables below. The detailed description of each indicator is given in chapter 5 and chapter 6.

Indicator	Short Description
OK	Indicate successful after command was adopted.
ER	Indicates error after give a command.
BD	Reports current UART baud rate.
UD	Report the service UUID128 the module
AR	Report the Bluetooth address of the module.
CC	Report the current connection parameter.
RI	Report the rssi for the current connection.
ST	Report the module state.
NM	Reports the device name of the module.
AT	Reports the device advertise type setting.
CN	Report the connection parameter setting.
VR	Report the current firmware's Version.
BY	Report the Module's bypass mode.
TM	Report the Advertisement parameter.
UU	Report the 128 bits UUID.
PW	Report the module's TX power setting.
ADC	Report the AIO&VBAT voltage value.
BM	Report ibeacon major id of the ibeacon module.

BS	Report ibeacon minor id of the ibeacon module.
BP	Report Power of the ibeacon module.
MT	Report the master device's state
CD	Report the master connected with the device's MAC address

Table 2. AT Indicator List for BLE

5. Description of ASCII Commands

5.1. General Information Commands

5.1.1. BD—Query or Configure UART's Baud Rate

5.1.1.1 Description:

This command can query or configure the UART baud rate of Bluetooth Module. Once changed, the new baud rate will take effect next power on. The Bluetooth module stores the value in its non-volatile memory so the value won't change until be set again.

If the command without parameter, the Bluetooth Module will report current baud rate by indicator BD.

5.1.1.2 Syntax:

→AT+BD[=baudrate]<CR><LF>

←BD=baudrate<CR><LF>

5.1.1.3. Parameter Description:

Parameter	Description	Nvram	Comments
[baudrate] Range: 00-09,FF	Module's baudrate of UART speed. 00: 2400 bps 01: 9600 bps 02: 19200 bps 03: 38400 bps 04: 57600 bps 05: 115200 bps 06: 230400 bps 07: 460800 bps 08: 921600 bps 09: 1382400 bps FF: 2400 bps	YES	Using default 2400 baud rate – no need to assert (pull up to high logic level) the WAKE pin to wake up the module from deep sleep before transmitting to it. Note: FF, set the module's baudrate is 2400, and in low energy mode.

Note: 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 reset it except for UART port.

2. If baud rate other than 2400(FF) is used, please keep pulling up the WAKE pin during sending data to the module.

5.1.1.4. Examples:

Ex. 5.1. To query the baud rate of Bluetooth Module:

→AT+BD<CR><LF> query the baud rate.

←BD=00<CR><LF> report the baud rate, it's 2400.

Ex. 5.2. To change the baud rate of Bluetooth Module:

→AT+BD=01<CR><LF> change the baud rate to 9600.

←OK response from the module to indicate the command is adopted.

5.1.2. AD—Start or Stop Adverting (Discoverable)

5.1.2.1 Description:

This command can start or stop advertising. The module is discoverable/connectable only when the module is advertising.

5.1.2.2. Syntax:

→AT+AD[=Flag]<CR><LF>

←AD=Flag<CR><LF>

5.1.2.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Flag] Range: 00-01	Start or Stop BLE Module advertising. 00: stop 01: start	NO	The module is advertising, can be connect by host.

5.1.2.4. Examples:

Ex. 5.3. To make Bluetooth Module advertising:

→AT+AD=01<CR><LF> make Bluetooth Module advertising.

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

Ex. 5.4. To make Bluetooth Module idle:

→AT+AD=00<CR><LF> make Bluetooth Module don't adverting.

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

5.1.3. NM—Query or Configure Module's Name

5.1.3.1 Description:

This command can query or configure the BLE Module's name. It will take effect next power on.

5.1.3.2. Syntax:

→AT+NM[=Name]<CR><LF>

←NM=Name<CR><LF>

5.1.3.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Name] will display in advertising data.	Query or configure the BLE Module's name.	YES	The length of the name can't over 20 bytes.

5.1.3.4. Examples:

Ex. 5.5 To query the name of module:

→AT+NM<CR><LF> query the name of module

←NM=EH-Link-MC-10<CR><LF> response the name of the module.

Ex. 5.6 Configure the name of the module:

→AT+NM=EH-LINK<CR><LF> configure the name of module as “EH-LINK”

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

5.1.4. AT — Query or Configure Advertise Type

5.1.4.1 Description:

This command can query or configure the advertise type.

5.1.4.2. Syntax:

→AT+AT[=Type]<CR><LF>

←AT=Type<CR><LF>

5.1.4.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Type] Range: 0000-FFFF	Advertising type control. Can configure as ibeacon mode. Can configure master mode or slave mode. <i>Bit15:</i> ibeacon work, 1: ibeacon mode, 0: data mode. <i>Bit14-9:</i> reserved <i>Bit8:</i> master mode, 1: master mode, 0: slave mode. <i>Bit7-4:</i> reserved <i>Bit3:</i> bond Flag, 1: need pair and bond. 0: needn't pair and bond. <i>Bit2:</i> stay slow adverting <i>Bit1:</i> stay fast adverting <i>Bit0:</i> auto advertise when power on or disconnect	YES	Default: when module start advertise, 30s fast advertising, and 60s slow advertising, then go to idle state. If module configure as master mode, so only a few AT command can work, other slave's command will return ER=05.

5.1.4.4. Examples:

Ex. 5.7 To query the advertise type of the module:

→AT+AT<CR><LF> query the module advertising type.

←AT=0001<CR><LF> response the advertising type of the module.

Ex. 5.8 To configure the advertise type of the module:

→AT+AT=0009<CR><LF> make Bluetooth Module need bonded

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

Ex. 5.9 To configure the advertise type of the module:

→AT+AT=0000<CR><LF> make Bluetooth Module no auto advertising when power on or disconnect action.

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

5.1.5. RT— Reset the Module

5.1.5.1 Description:

This command can reset the module by UART.

5.1.5.2. Syntax:

→AT+RT<CR><LF>

←OK<CR><LF>

5.1.5.3. Parameter Description:

None

Note: When the command send ,indicate OK, and after 1s, the module reset.

5.1.5.4. Examples:

Ex. 5.10. To reset the module.

→AT+RT<CR><LF> reset the module.

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

5.1.6. DC— Disconnect from Module

5.1.6.1 Description:

This command can disconnect the link from module.

5.1.6.2. Syntax:

→AT+DC<CR><LF>

←OK<CR><LF>

5.1.6.3. Parameter Description:

None

Note: This command only valid when the module in connected state.

5.1.6.4. Examples:

Ex. 5.11. To disconnect the module.

→AT+DC<CR><LF> disconnect the link.

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

5.1.7. UD— Query or Configure Module's Service UUID

5.1.7.1 Description:

This command can query or configure the module's Service UUID.

5.1.7.2. Syntax:

→AT+UD[=inx, uuid]<CR><LF>

←UD=UUID0,UUID1,UUID2,UUID3,UUID4,UUID5,UUID6,UUID7<CR><LF>

5.1.7.3. Parameter Description:

Parameter	Description	Nvram	Comments
[inx] The index of UUID. Range: 00-07.		YES	
[uuid] The UUID value.		YES	
[UUID0-UUID7] 128 bits UUID			

5.1.7.4. Examples:

Ex. 5.12. To query the module' service UUID.

→AT+UD<CR><LF> query the module's service UUID.

←UD=1111,2222,3333,4444,5555,6666,7777,8888<CR><LF> response from the module's service UUID

Ex. 5.13. To configure module' service UUID, 2 Hex Byte.

→AT+UD=00,1234<CR><LF> configure the module's first UUID

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

5.1.8. RI— Query Module's rssi value

5.1.8.1 Description:

This command can query the connected module's rssi.

5.1.8.2. Syntax:

→AT+RI<CR><LF>

←RI=rssi<CR><LF>

5.1.8.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Rssi] Range:-128 to 127	Rssi value, 1 Hex byte.	NC	This command valid only the module in connected state.

5.1.8.4. Examples:

Ex. 5.14. To query the module's rssi

→AT+RI<CR><LF> query the module's rssi

←RI=e2<CR><LF> response from the module's rssi, e2 = -30

5.1.9. DF— Reset Module's nvram

5.1.9.1 Description:

This command can configure the setting of module to default.

5.1.9.2. Syntax:

→AT+DF<CR><LF>

←OK<CR><LF>

5.1.9.3. Parameter Description:

None

Note: This command send, all of the configure data is clear, and reset to default.

5.1.9.4. Examples:

Ex. 5.15. To reset the module's configure data

→AT+DF<CR><LF> reset the all configure data of the module

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

5.1.10. AR— Query Module's address

5.1.10.1 Description:

This command can query the module's address.

5.1.10.2. Syntax:

→AT+AR<CR><LF>

←AR=address<CR><LF>

5.1.10.3. Parameter Description:

Parameter	Description	Nvram	Comments
[address]	module's local mac address	NC	The address is: UAP,NAP,LAP

5.1.10.4. Examples:

Ex. 5.16. To query the module's address.

→AT+AR<CR><LF> query the module's address

←AR=000196F00018<CR><LF> *response the module's address*

5.1.11. ST— Query Module's state

5.1.11.1 Description:

This command can query the module's state

5.1.11.2. Syntax:

→AT+ST<CR><LF>

←ST=State<CR><LF>

Or

←MT=State<CR><LF>

5.1.11.3. Parameter Description:

Parameter	Description	Nvram	Comments
[State] 00: idle 01: fast advertising 02: slow advertising 03: connected 04: connected and bonded	Return the module's state.	NC	ST: slave role indicate MT: Master role indicate

5.1.11.4. Examples:

Ex. 5.17. To query the module' state.

→AT+ST<CR><LF> query the module's state

←ST=01<CR><LF> response the module's state is fast advertising.

5.1.12. CB— Clear Module's bond information

5.1.12.1 Description:

This command can clear the module's bond information

5.1.12.2. Syntax:

→AT+CB<CR><LF>

←OK<CR><LF>

5.1.12.3. Parameter Description:

None

5.1.12.4. Examples:

Ex. 5.18. To clear the module's bond information.

→AT+CB<CR><LF> clear the module's bond information

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

5.1.13. CN — Query or Configure respect connect parameter

5.1.13.1 Description:

This command can query or configure the respect connect parameter of the module.

5.1.13.2. Syntax:

→AT+CN[=MinInterval, MaxInterval, Latency, Timeout]<CR><LF>

←CN=MinInterval,MaxInterval,Latency,Timeout<CR><LF>

5.1.13.3. Parameter Description:

Parameter	Description	Nvram	Comments
[MinInterval] Range: 0006- 0C80	The minimum value for the connection interval.	YES	Uinit: 1.25 ms
[MaxInterval] Range: 0006- 0C80	The Maximum value for the connection interval.	YES	Uinit: 1.25 ms
[Latency] Range: 0000-03E8	The slave latency for the connection in number of connection events.	YES	
[Timeout] Range: 0006- 0C80	The connection supervisor timeout value.	YES	Uinit: 10 ms

Note: The *MinInterval* and *MaxInterval* just a range for connect parameter. The real interval need query after the communicate successful between the slave and central.

5.1.13.4. Examples:

Ex. 5.19. query the module's connection parameter

→AT+CN<CR><LF> query the module's connection parameter

←CN=0190,0190,0004,03e8<CR><LF> response the module's connection parameter

Ex. 5.20. configure the module's connection parameter

→AT+CN=0010,0050,0004,0256<CR><LF> configure the module's connection parameter

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

5.1.14. CC— Query current connect parameter

5.1.14.1 Description:

This command can query the current connect parameter of the module.

5.1.14.2. Syntax:

→AT+CC<CR><LF>

←CC=Interval,Latency,Timeout<CR><LF>

5.1.14.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Interval] Range:0006- 0C80	Current connect Interval.	NC	Unit: 1.25 ms
[Latency] Range: 0000-03E8	Current connect Latency.	NC	
[Timeout] Range: 0006- 0C80	Current connect Timeout value.	NC	Unit: 10 ms

5.1.14.4. Examples:

Ex. 5.21. To query the module's connection parameter.

→AT+CC<CR><LF> query the module's current connection parameter

←CC=0020,0008,0048<CR><LF> response the module's current connection parameter

5.1.15. DA— Send data to remote device

5.1.15.1 Description:

This command can send a package data to remote device.

5.1.15.2. Syntax:

→AT+DA=Rawdata<CR><LF>

←OK<CR><LF>

5.1.15.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Rawdata] Master role: length <=20. Slave role: length <=40.	Custom need send data.	NC	In AT command mode, must end by “\r\n”, and [Rawdata] without “\r\n”.

Note: This command valid only the module in connected state.

5.1.15.4. Examples:

Ex. 5.22. To send the data bypass to central

→AT+DA=0123456789<CR><LF> send “0123456789” to central (ex. cell phone)

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

5.1.16. BM— Query or Configure ibeacon Major UID

5.1.16.1 Description:

This command can query or config the ibeacon's major UID.

5.1.16.2. Syntax:

→AT+BM[=Major]<CR><LF>

←BM=Major<CR><LF>

5.1.16.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Major] Range: 0000-FFFF	Ibeacon's major UID	YES	This command valid only in ibeacon mode

5.1.16.4. Examples:

Ex. 5.23. To query the ibeacon module's major UID.

→AT+BM<CR><LF> query the ibeacon module's major UID.

←BM=0000<CR><LF> response the ibeacon module's major UID

Ex. 5.24. To configure the ibeacon module's major UID.

→AT+BM=0001<CR><LF> configure the ibeacon module's major UID.

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

5.1.17. BS— Query or Configure ibeacon Minor UID**5.1.17.1 Description:**

This command can query or configure the ibeacon's minor UID.

5.1.17.2. Syntax:

→AT+BS[=Minor]<CR><LF>

←BS=Minor<CR><LF>

5.1.17.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Minor] Range: 0000-FFFF	Ibeacon's minor UID	YES	This command valid only in ibeacon mode

5.1.17.4. Examples:

Ex. 5.25. To query the ibeacon module's minor UID.

AT+BS<CR><LF> query the ibeacon module's minorUID.

BS=0000<CR><LF> response the ibeacon module's minor UID

Ex. 5.26. To configure the ibeacon module's minor UID.

AT+BS=0001<CR><LF> configure the ibeacon module's minor UID.

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

5.1.18. BP— Query or Configure ibeacon Power Value**5.1.18.1 Description:**

This command can query or configure the ibeacon's power value.

5.1.18.2. Syntax:

→AT+BP[=Power]<CR><LF>

←BP=Power<CR><LF>

5.1.18.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Power] Range: 00-FF	Ibeacon's power value Range: -128 - 127	YES	This command valid only in ibeacon mode

5.1.18.4. Examples:

Ex. 5.27. To query the ibeacon module's Power value

AT+BP<CR><LF> query the ibeacon module's power value

BP=00<CR><LF> response the ibeacon module's power value

Ex. 5.28. To configure the ibeacon module's Power value

AT+BP=01<CR><LF> configure the ibeacon module's power value.

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

5.1.19. VR— Query Firmware's Version**5.1.19.1 Description:**

This command can query the module's firmware version.

5.1.19.2. Syntax:

→AT+VR<CR><LF>

←VR=C000_V1.4.1<CR><LF>

5.1.19.3. Parameter Description:

Parameter	Description	Nvram	Comments
NC	Report the module's firmware version	NC	

5.1.19.4. Examples:

Ex. 5.29. To query the firmware's version

AT+VR<CR><LF> query the module's firmware version.

VR=C000_V1.4.1<CR><LF> response the firmware's version:C000_V1.4.1.

5.1.20. BY— Query or Configure bypass mode and PIO function**5.1.20.1 Description:**

This command can query or configure the module bypass mode and PIO3, PIO11 work mode.

5.1.20.2. Syntax:

→AT+BY[=Bypass]<CR><LF>

←BY=Bypass<CR><LF>

5.1.20.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Bypass] <i>Bit15</i> : PIO indicate <i>Bit14</i> :button enable <i>Bit2-Bit13</i> : reserve <i>Bit1</i> : indicate enable <i>Bit0</i> : bypass enable	Module's data bypass mode configure. Can configure the PIO as indicate or button.	YES	<p>bypass enable: 1: mean the data translate don't have "DA="when output data, needn't "AT+DA="when send data. 0: mean normal .</p> <p>Indicate enable: 1: mean don't display any indicate string. 0: mean normal.</p> <p>button enable: 1: mean PIO11 work as button. 0: disable button. when module in idle, press button short(<1 second), start advertisement, when connected, press button short(<1 second), disconnect. Press button long(>3 seconds), clear the bond information.</p> <p>PIO indicate: 1: mean PIO3(pin7) work as indicate the module state, when module in connected state, PIO3=high, when module disconnected, PIO3=low. 0: disable indicate.</p>

5.1.20.4. Examples:

Ex. 5.30. To query the bypass mode

AT+BY<CR><LF> query the bypass configure.

BY=8000<CR><LF> response the bypass mode configure, 8000 mean: PIO3 work as state indicate IO.

Ex. 5.31. To configure the module without indication

AT+BY=0002<CR><LF> configure the module disable the indicate information.

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

Note: when set the module disable the indicate information, this time send the at command, don't have response. Only send AT+BY=000X<CR><LF>. (X&2==0), enable the indicate information enable, then response is display.

Ex. 5.32. To configure the module's PIO11 work as button mode

AT+BY=4000<CR><LF> configure the module enable the button function in PIO11.

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

5.1.21. UU— Query or Configure the 128bits UUID

5.1.21.1 Description:

This command can query or configure module's 128bits UUID one time.

5.1.21.2. Syntax:

→AT+UU[=uuid128]<CR><LF>
←UU=uuid128<CR><LF>

5.1.21.3. Parameter Description:

Parameter	Description	Nvram	Comments
[uuid128] 16 words data.	128bits UUID, display as 8 HEX words, with “,” separate.	YES	This command used for query configure the 128bits by one command.

5.1.21.4. Examples:

Ex. 5.33. To query module's 128bits UUID

AT+UU<CR><LF> query the ibeacon module's 128bits UUID.

UU=1122,3344,5566,7788,99AA,BBCC,DDEE,FF00<CR><LF> response 128bits UUID.

Ex. 5.34. To configure module's 128bits UUID

AT+UU=1111,2222,3333,4444,5555,6666,7777,8888<CR><LF> configure the UUID as 11112222-3333-4444-5555-666677778888.

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

5.1.22. TM— Query or Configure advertisement parameter

5.1.22.1 Description:

This command can query or configure the module advertisement parameter.

5.1.22.2. Syntax:

→AT+TM[=fast_adv, slow_adv, cpp_tim, cpc_tim, update_tim]<CR><LF>
←TM= fast_adv, slow_adv, cpp_tim, cpc_tim, update_tim<CR><LF>

5.1.22.3. Parameter Description:

Parameter	Description	Nvram	Comments
[fast_adv] Range: 0014-1000	Fast advertisement interval	YES	Unit: ms
[slow_adv] Range: 0014-1000	Slow advertisement interval		Unit: ms
[cpp_tim]	TGAP(conn_pause_peripheral),		Unit: ms

Range: >= 10			Refer in Core Specification Addendum 3 Revision 2.
[cpc_tim] Range: >= 10	TGAP(conn_pause_central)		Unit: ms Refer in Core Specification Addendum 3 Revision 2.
[update_tim] Range: >= 10	Slave device is not allowed to transmit another Connection Parameter Update request till time.TGAP(conn_param_timeout).		Unit: ms Refer to section 9.3.9.2, Vol 3, Part C of the Core 4.0 BT spec.

5.1.22.4. Examples:

Ex. 5.35. To query the advertisement parameter

AT+TM<CR><LF> query the advertisement parameter.

TM= 003C,03E8,1388,03E8,1388<CR><LF> response the advertisement parameter and TGAP of update connect parameter

Ex. 5.36. To configure the advertisement parameter

AT+TM=0014,03E8, 03E8,03E8,03E8<CR><LF> configure the advertisement parameter and TGAP of update connect parameter. Fast advertisement interval: 20ms, Slow advertisement interval: 1000ms, CPP Time: 1s, CPC Time: 1s, Update Time: 1s.

OK<CR><LF> Response from the module to indicate the command is adopted.

5.1.23. AP— Query or Configure the device appearance

5.1.23.1 Description:

This command can query or Configure the device appearance

5.1.23.2. Syntax:

→AT+AP[=appearance]<CR><LF>

←AP=appearance<CR><LF>

5.1.23.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Appearance] Range: 0000-FFFF	Device's appearance.	YES	

5.1.23.4. Examples:

Ex. 5.37. To query the device appearance

→AT+AP<CR><LF> query the device's appearance

←AP=0310<CR><LF> response the device's appearance is 0310

Ex. 5.38. To configure the device appearance

→AT+AP=0301<CR><LF> configure the device's appearance as 0301

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

5.1.24. PW— Query or Configure the TX Power level

5.1.24.1 Description:

This command can query or configure the TX power value.

5.1.24.2. Syntax:

→AT+PW[=Power]<CR><LF>

←PW=Power<CR><LF>

5.1.24.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Power] Range: 00-07	Module's tx power value.	YES	This command valid only when power on. Need re-set module after setting.

5.1.24.4. Examples:

Ex. 5.39. To query the module's TX power level

AT+PW<CR><LF> query the module's power value

PW=04<CR><LF> response the module's TX power value, level: 4

AT+PW=01<CR><LF> configure the module's TX power value.

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

5.1.25. LO— Set PIO Output

5.1.25.1 Description:

This command can set PIO output high or low.

5.1.25.2. Syntax:

→AT+LO=[Ch],[Level]<CR><LF>

←OK<CR><LF>

5.1.25.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Ch] Range: 0-0B [Level] Range: 00 - 01	Ch: PIO number Level: High(1), Low(0)	No	This command valid when at command is work(not bypass mode)

5.1.25.4. Examples:

Ex. 5.40. To set module's PIO output

AT+LO=03,01<CR><LF> set the module's PIO3 output high.

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

5.1.26. LP— Set PIO Output PWM

5.1.26.1 Description:

This command can set PIO output PWM.

5.1.26.2. Syntax:

```
→AT+LP=[Ch],[OnTim],[OffTim]<CR><LF>
←OK<CR><LF>
```

5.1.26.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Ch] Range: 3/4/A/B (PIO)	Ch: PWM number, only 4 PIO can use as PWM output at the same time.	No	This command valid when at command is work(not bypass mode)
[OnTim/OffTim]: Range: 0-FF	OnTim/OffTim: pwm output level time, unit: 30us.		

5.1.26.4. Examples:

Ex. 5.41. To set module's PWM output

AT+LP=03,02,02<CR><LF> set the module's PIO3 output PWM, 60us On, 60us Off.

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

AT+LP=0A,02,0A<CR><LF> set the module's PIO10 output PWM, 60us On, 300us Off.

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

AT+LP=04,00,00<CR><LF> set the module's PIO4 output Low level.

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

AT+LP=04,01,00<CR><LF> set the module's PIO4 output High level.

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

5.1.27. RA— Read ADC Input

5.1.27.1 Description:

This command can read AIO pin and VBAT voltage.

5.1.27.2. Syntax:

```
→AT+RA=[Ch]<CR><LF>
←ADC=[volt]<CR><LF>
```

5.1.27.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Ch] Range: 0-3 [Volt] Range: 0000-0E10	Ch: AIO number, 0/1/2 mean AIO0,AIO1,AIO2; 3 mean VBAT value. Volt: return the AIO voltage, unit: mV.	No	This command valid when at command is work(not bypass mode)

5.1.27.4. Examples:

Ex. 5.42. To read module's AIO input

AT+RA=00<CR><LF> read the module's AIO0 ADC input.

ADC=001A<CR><LF> response from the module output Voltage: 26mV , unit: mV

AT+RA=03<CR><LF> read the module's VBAT input.

ADC=0CEE<CR><LF> response from the module output Voltage: 3310mV , unit: mV

5.1.28. SC— Master start or stop scanning slave device

5.1.28.1 Description:

This command can scan the slave device as master role.

5.1.28.2. Syntax:

→AT+SC=Start<CR><LF>

←OK<CR><LF>

5.1.28.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Start] Range: 00-01	Master start or stop scanning 01: start 00: stop	NO	This command valid only when module config as master mode (AT=0400)

5.1.28.4. Examples:

Ex. 5.43. To start scanning:

AT+SC=01<CR><LF> start scanning.

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

5.1.29. WT— Master write characteristic to slave

5.1.29.1 Description:

This command can write data to slave device by characteristic handle.

5.1.29.2. Syntax:

→AT+WT=[Handle],[Rawdata]<CR><LF>

←OK<CR><LF>

5.1.29.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Handle] Range: 0000-0FFF	Master write Rawdata to remote device's specific characteristic by handle.	NO	This command valid only after master is connected with slave.
[Rawdata] 20 bytes	Rawdata is the data need send to remote device.		

5.1.29.4. Examples:

Ex. 5.44. To write data to slave device:

AT+WT=000E,1234567890<CR><LF> write "1234567890" to slave device's characteristic which the handle is 0x000E.

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

5.1.30. RD— Read characteristic value

5.1.30.1 Description:

This command can read the characteristic's value by handle.

5.1.30.2. Syntax:

→AT+RD=[Handle]<CR><LF>

←RD=[Rspdata]<CR><LF>

5.1.30.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Handle] Range: 0000-0FFF	Master read data from remote device by handle.	NO	This command valid only after master is connected with slave.
Rspdata: 20 bytes	Rspdata is the data read from remote device.		

5.1.30.4. Examples:

Ex. 5.45. To read data from remote device:

AT+RD=0036<CR><LF> read data from remote device's characteristic which the handle is 0x0036.

RD=C000_V1.6.3<CR><LF> response firmware version from the remote device.

5.1.31. DS— Master disconnect with slave device

5.1.31.1 Description:

This command can disconnect with remote device.

5.1.31.2. Syntax:

→AT+DS<CR><LF>

←OK<CR><LF>

5.1.31.3. Parameter Description:

Parameter	Description	Nvram	Comments
NC	Master disconnect with remote device.	NO	This command valid only after master is connected with slave.

5.1.31.4. Examples:

Ex. 5.46. To disconnect from remote device:

AT+DS<CR><LF> disconnect with remote device.

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

5.1.32. CT— Master connect to specific slave device**5.1.32.1 Description:**

This command can disconnect with remote device.

5.1.32.2. Syntax:

→AT+CT=[Address]<CR><LF>

←OK<CR><LF>

5.1.32.3. Parameter Description:

Parameter	Description	Nvram	Comments
[Address]: MAC address.	Master connect to a slave device by mac address.	NC	The address must belong to a advertsing device.

5.1.32.4. Examples:

Ex. 5.47. To disconnect from remote device:

AT+DS<CR><LF> disconnect with remote device.

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

6. Description of ASCII Indicators**6.1. General Indicators****6.1.1. OK—Command is Adopted by the Bluetooth Module****6.1.1.1. Description:**

This indicator indicates a command was adopted by the module successfully.

6.1.1.2. Syntax:

←OK<CR><LF>

6.1.1.3. Parameter Description:

None

6.1.1.4. Examples:

Ex. 6.1. To make Bluetooth Module discoverable:

→AT+AD=01<CR><LF> make Bluetooth Module discoverable.

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

6.1.2. ER—Error**6.1.2.1. Description:**

This indicator indicates there is an error detected in the command sent by the host.

6.1.2.2. Syntax:

←ER=Code<CR><LF>

6.1.2.3. Parameter Description:

Parameter	Description	Comments
[Code]	The error code to give the reason 01: The command is not support 02: The command Parameter is not right 03: The command is not allowed in current state. 04: The AT+DA command, less '=' 05: The command is a master command, and now, device role is slave. 06:The command valid in connected state.	

6.1.2.4. Examples:

Ex. 6.2. To make Bluetooth Module discoverable:

→AT+AD=06<CR><LF> 06 is not a allowed parameter.

←ER=03<CR><LF> response from the module to indicate the command is not allowed.

6.1.3. MT—Master state indicate**6.1.3.1. Description:**

This indicator indicates the master device current state.

6.1.3.2. Syntax:

6.1.3.3. Parameter Description:

Parameter	Description	Comments
[Code]	The master device's state: 00: master is idle 01: master had scanned slave device, then checking the device 02: master is connected with slave device 03: master is enable notify.	When master change the state, will output this indicate information. When scanning, master will check the device by UUID of slave device. if right, will connect to the device.CCC

6.1.3.4. Examples:

Ex. 6.3. To indicate the master is scanning:

←MT=01<CR><LF> response from the module to indicate master device is scanning.

Ex. 6.4. To indicate the master device is connected:

←MT=02<CR><LF> response from the module to indicate master device is connected.

6.1.4. CD—Master list connected device's MAC address

6.1.4.1. Description:

This indicator indicates the MAC address of remote device.

6.1.4.2. Syntax:

←CD=[MAC]<CR><LF>

6.1.4.3. Parameter Description:

Parameter	Description	Comments
[MAC] The remote device's MAC address	After connected, master indicate the remote device's address	The address is: UAP,NAP,LAP

6.1.4.4. Examples:

Ex. 6.5. To indicate the master is scanning:

←CD=00EA21001234<CR><LF> response the connected slave device's MAC address.