



IVT Wireless i145 Programming Manual

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Version 4.5

REVISION HISTORY

REVISION	AMENDMENT	DATE	AUTHOR
1.0	Initial version	2013-10-13	Biao Han Ruixue Huang
1.1	Delete MW command Delete CV command Update BTC interfaces	2013-11-6	Wenqing Qiu
1.2	Update BTC events	2013-12-04	Biao Han
1.3	Add phonebook commands	2013-12-09	Biao Han
1.4	Add call history commands Update phonebook indications Add BTC commands Add mobile phone name commands	2013-12-18	Wenqing Qiu
1.5	Delete MR command Delete CA indication	2013-12-24	Wenqing Qiu
1.6	Add mobile phone model and manufacturer indication (IO and IM) Update HK command's description, and add example	2014-01-04	Wenqing Qiu
1.7	Update CB command Add HE command Add HE indication	2014-01-08	Wenqing Qiu
1.8	Add HA/HB indication	2014-01-09	Wenqing Qiu
1.9	Add CC indication	2014-01-16	Wenqing Qiu
2.0	Update IS command Add CR command Add MJ command Add PC command's description Add PW command	2014-03-14	Wenqing Qiu
2.1	Add volume control commands	2014-03-14	Biao Han
2.2	Define the max length of local device name parameter in commands and indications	2014-04-03	Wenqing Qiu
2.3	Add HG command Delete screen being related instructions	2014-07-08	Jinsheng Cheng
2.4	Add command s and indications: 1) Device Discovery	2014-07-21	Minjue Zhu

	2) Message Access Profile 3) Object Push Profile		
2.5	Add commands and indications for AVRCP_1.4	2014-07-21	Wenqing Qiu
2.6	Add SPP CMD	2014-08-11	Laijun Yan
2.7	Modify AVRCP_1.4 commands and indications	2014-08-28	Biao Han
2.8	update AT CMD	2014-09-28	Rechael
2.9	Add GATT CMD	2014-11-18	Faxing Cui
3.0	Update SPP Command	2014-11-25	Biao Han
3.1	Delete GATT CMD IVT will release new interface for LE	2014-12-08	Rechael
3.2	Routine maintenance	2015-03-20	Biao Han
3.3	Revision	2015-03-29	Zhu Minjue
3.4	Add GT event Add GMG event	2015-03-30	Faxing Cui
3.5	Add IU event Add MS event	2015-3-31	Liangyu Hua Minjue Zhu
3.6	Add GPC/GPD/GPF command Modify the PB/MX/ML format of event parameter	2015-04-28	Faxing Cui
3.7	Remove the invalid command and event	2015-06-29	Biao Han
3.8	Modify some commands of BTC(HA/HB). Add BTC event(CA/CB).	2015-07-27	Biao Han
3.9	Add some command for 3-way calls(CI/CJ/CK) Add some event for 3-way calls(IP/IQ/IT)	2015-07-28	Biao Han
4.0	Add FTP OPP PAN DUN GATT Profiles interface	2015-09-25	Faxing Cui Liangyu Hua
4.1	Modify FTP command and event: FB, FK, FP, FG Add FTP->FL command Modify KC event Add Bluetooth switch command	2015-11-17	Faxing Cui
4.2	Add MP indication: APTX status Add MY command: Set current ongoing mic gain value	2015-12-10	Stefan Deng Rechael
4.3	Add the common command-reply indication	2016-01-04	Minjue Zhu

	Remove IN Indication Add pairing status indication: GPB Add number of PBAP items indication: PE Add <addr> parameter for indication: GPF		
4.4	Add mic gain indication: IG Update IS indication: Add firmware information. Add get services list (AT#GS\GL) Add pbap filter(AT#PM) Add pbap rawData Event(PR) Add network signal status(IL) Add roaming status(IH)	2016-01-29 2016-03-03	Faxing Cui Minjue Zhu Liangyu Hua
4.5	Correct the length of the D indication	2016-04-13	Faxing Cui

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1. Introduction

i145 is one of i-series products by IVT. i145 is compatible with *Bluetooth* specification version 4.1 dual mode. It integrates hardware echo cancellation (latest CVC), stereo decoder, *Bluetooth* controller, etc., a completed *Bluetooth* subsystem for Car Kit. i145 product supports HF/HS, A2DP/AVRCP, PBAP, HID, IAP2, PB Sync, PAN, FTP, OPP, SPP, DUN profiles. It provides UART interface, stereo speaker outputs, microphone inputs and power. i145 can be programming through AUDSDK or AT CMD interface for Car Kit application.

i145 supports the mainly phones. Such as iPhone, Android, Nokia, Sony Ericsson, Samsung, Motorola, LG, Blackberry, Oppo, K-touch, MTK, Mstar and Spreadtrum.

1.1 General Characteristics

Product	BlueLet-series <i>Bluetooth</i> Module
model	i145
<i>Bluetooth</i> Specification	<i>Bluetooth</i> v4.1 dual mode, Class II
Frequency Band	2.4~2.48GHz
Modulation Method	GFSK, $\pi/4$ DQPSK, 8DPSK, 0.5BT Gaussian
Maximum Data Rate	4Mbps
RF Input Impedance	50 ohms
Crystal OSC	26MHz
Interface	UART, Speaker, Microphone
Profiles	HS/HF, A2DP, AVRCP, PBAP, PB Sync, HID, PAN and FTP/OPP/SPP Profiles
Operation Range	10 meters (33 feet)
Sensitivity	-84dBm@0.1%BER
Transmit power	6dBm Typ.
Connectivity	Point to Multi-Point
Audio Specification	
16-bit DSP w/ Hardware Accelerator	80 MIPS Kalimba DSP coprocessor
Powerful AEC	60dB
communication	full-duplex
Acoustic echo tail length coverage	64 to 100ms
Dimension	
Dimension	35mm×25mm×1.2mm(Tolerance:±0.2mm)
Power	
Supply Voltage	5V DC

Operation Environment	
Temperature	-40°C to +85°C
Certifications	BQB, CExxx FCC :S78-IVTi145

1.2 Command

AT#<command>[<parameter>]<CR><LF>

AT#	Prefix
<command>	Command, e.g.: CW
[<parameter>]	Parameters(Optional),e.g:AT#CW10086\r\n to dial 10086.
<CR><LF>	Suffix

D#<parameter length>[<parameter>]<CR><LF>

D#	Prefix
<parameter length>	The length of parameter data
[<parameter>]	Parameters(Optional) data.
<CR><LF>	Suffix

1.3 Indication

<indication>[< parameter >]<CR><LF>

< indication >	Indication, e.g.: MX
[<parameter>]	Parameters(Optional)
<CR><LF>	Suffix

1.3.1 Command Reply Event

Indication	E<Status><CMD><CR><LF>	
Description	The reply event of specified command.	
Parameter	<i>status</i>	Indicates whether the command is executed successfully. 0x00 – The command and its parameter are valid. Bluetooth Stack executes it successfully. Other – Error code.

	<i>CMD</i>	The command this indication replies to.
Comments	This indication will be generated immediately after BT stack determines to execute the associated command. For these commands with result, The result may arrive later. e.g. E00GD\r\n. Discover command has been executed.	

2. Command & Indication

2.1 Initialization

2.1.1 Command

2.1.2 Indication

2.1.2.1 IS

Indication	IS<version><CR><LF>	
Description	Bluetooth start complete.	
Parameter	version	A string indicates software and firmware version information. They are concatenated by “#”.
Comments	ISBSE_AUD_2.1.0.1#00102001	

2.2 Device Discovery

2.2.1 Command

2.2.1.1 GD

Indication	AT#GD<CR><LF>	
Description	Start device discovery.	
Parameter	-	-
Comments	-	

2.2.1.2 GC

Indication	AT#GC<CR><LF>	
Description	Cancel the device discovery procedure.	

Parameter	-	-
Comments	-	

2.2.1.3 GS

Indication	AT#GS<addr><CR><LF>	
Description	Gets the Bluetooth service supported by the specified Bluetooth device.	
Parameter	addr	The Bluetooth address of remote device. Sixteen hexadecimal ASCII characters.
Comments	例： AT#GS001122334455 Get services list of the remote device with address 001122334455.	

2.2.2 Indication

2.2.2.1 GS

Indication	GS<CR><LF>	
Description	Discovery started.	
Parameter	-	-
Comments	-	

2.2.2.2 GF

Indication	GF<Address><Paired><Class of device><Name><CR><LF>	
Description	Report a remote device discovered.	
Parameter	Address	12 hex digits, represents the Bluetooth address of the found device.
	Paired	1 decimal digit. Indicates that whether the found device has paired with local device. 1 indicates paired, 0 indicates not paired.
	Class of device	8 hex digits, represents the class of device of the found device.

	<i>Name</i>	The name of the found device.
Comments	e.g.: GF0015830A0E4E000120104zhuminjue-PC	

2.2.2.3 GU

Indication	GU<Address><Paired><Name><CR><LF>	
Description	Report a remote device's name has updated.	
Parameter	<i>Address</i>	12 hex digits, represents the Bluetooth address of the device.
	<i>Paired</i>	1 decimal digit. Indicates that whether the device has paired with local device. 1 indicates paired, 0 indicates not paired.
	<i>Name</i>	The updated name of the device.
Comments	e.g.: GU0015830A0E4E0zhuminjue-PC	

2.2.2.4 GE

Indication	GE<result><CR><LF>	
Description	Report the discovery procedure finished.	
Parameter	<i>result</i>	The result of the discovery. 0 if success, error code if failed.
Comments	e.g.: Search complete: GE0\r\n	

2.2.2.5 GL

Indication	GL<addr><count><uuids><CR><LF>	
Description	Services UUID list	
Parameter	<i>addr</i>	Bluetooth address
	<i>count</i>	The count of uuids
	<i>uuids</i>	Uuid lists(4*count)
Comments	例: GL7014A67101DC0811321116110E110C110A112F111F1000 Get 8 services from the Bluetooth address 7014A67101DC, respectively:	

	1132、1116、110E、110C、110A、112F、111F、1000
--	---

2.3 Hands-free (HFP)

2.3.1 Command

2.3.1.1 CA

Command	AT#CA<CR><LF>	
Description	Enter pairing mode.	
Parameter	-	-
Comments	-	

2.3.1.2 CB

Command	AT#CB<CR><LF>	
Description	Exit pairing mode.	
Parameter	-	-
Comments	-	

2.3.1.3 CC

Command	AT#CC[<index>][<mac>]<CR><LF>	
Description	Establish HFP connection.	
Parameter	<i>index</i>	1~8. Connected mobile phone index (can be required with #MX).
	<i>mac</i>	12 hex digits, represents the Bluetooth address of the device.
Comments	-AT#CC<index><CR><LF> Specify the index of the device you want to connect. e.g.:AT#CC1\r\n	

	-AT#CC<mac><CR><LF> Specify the Bluetooth address of the device you want to connect. e.g.:AT#CC980C82146331\r\n -AT#CC<CR><LF> Connect to the latest connected device. e.g.: AT#CC\r\n
--	--

2.3.1.4 CD

Command	AT#CD<CR><LF>	
Description	Release the current HFP connection.	
Parameter	-	-
Comments	-	

2.3.1.5 CE

Command	AT#CE<CR><LF>	
Description	Answer the incoming call.	
Parameter	-	-
Comments	-	

2.3.1.6 CF

Command	AT#CF<CR><LF>	
Description	Reject the incoming call.	
Parameter	-	-
Comments	-	

2.3.1.7 CG

Command	AT#CG<CR><LF>	
Description	Hung up the call.	

Parameter	-	-
Comments	-	

2.3.1.8 CH

Command	AT#CH<CR><LF>	
Description	Redial.	
Parameter	-	-
Comments	-	

2.3.1.9 CI

Command	AT#CI<CR><LF>	
Description	Release all held calls or sets User Determined User Busy for a waiting call.	
Parameter	-	-
Comments	-	

2.3.1.10 CJ

Command	AT#CJ<CR><LF>	
Description	Release all active calls (if any exist) and accepts the other (held or waiting) call.	
Parameter	-	-
Comments	-	

2.3.1.11 CK

Command	AT#CK<CR><LF>	
Description	Places all active calls (if any exist) on hold and accepts the other (held or waiting) call.	
Parameter	-	-
Comments	-	

2.3.1.12 CM

Command	AT#CM<ctl><CR><LF>	
Description	Mute/Un-mute microphone.	
Parameter	<i>ctl</i>	'0': unmute Microphone; '1': mute Microphone
Comments	Mute the Microphone: AT#CM1\r\n	

2.3.1.13 CO

Command	AT #CO<CR><LF>	
Description	Voice channel switch.	
Parameter	-	-
Comments	-	

2.3.1.14 CR

Command	AT#CR<code><CR><LF>	
Description	Enable/Disable mobile phone's voice recognition feature.	
Parameter	<i>code</i>	0 Disable mobile phone's voice recognition feature. 1 Enable mobile phone's voice recognition feature.
Comments	e.g.: enable the mobile phone's voice recognition: AT#CR1\r\n	

2.3.1.15 CW

Command	AT#CW<number><CR><LF>	
Description	Dial number.	
Parameter	<i>number</i>	call number.
Comments	e.g:AT#CW13800138000\r\n	

2.3.1.16 CX

Command	AT#CX<DTMF><CR><LF>
----------------	---------------------

Description	Send DTMF.	
Parameter	<i>DTMF</i>	The DTMF character.
Comments	e.g.:Send the '1' character: AT#CX1\r\n	

2.3.1.17 CY

Command	AT#CY<CR><LF>	
Description	Inquire HFP statues.	
Parameter	-	-
Comments	The status report by the indication "MG"	

2.3.2 Indication

2.3.2.1 II

Indication	II<CR><LF>	
Description	Enter pairing mode.	
Parameter	-	-
Comments	-	

2.3.2.2 IJ

Indication	IJ<CR><LF>	
Description	Exit pairing mode.	
Parameter	-	-
Comments	-	

2.3.2.3 IV

Indication	IV<address><CR><LF>	
Description	HFP connection is establishing.	

Parameter	<i>address</i>	12 hex digits, represents the <i>Bluetooth</i> address of the device.
Comments	e.g.: IV0015830407EF\r\n	

2.3.2.4 IA

Indication	IA< address ><CR><LF>	
Description	HFP connection Released.	
Parameter	<i>address</i>	12 hex digits, represents the <i>Bluetooth</i> address of the device.
Comments	e.g.: IA0015830407EF\r\n	

2.3.2.5 IB

Indication	IB<address><outgoing><CR><LF>	
Description	HFP connection established.	
Parameter	<i>address</i>	12 hex digits, represents the Bluetooth address of the device.
	<i>outgoing</i>	The connection role: '1'-Active connection, '0'-Passive connection.
Comments	e.g.: IB0015830407EF1\r\n	

2.3.2.6 IC

Indication	IC[<number>]<CR><LF>	
Description	A call is outgoing.	
Parameter	<i>number</i>	Number of the outgoing call.
Comments	IC<number><CR><LF> e.g.: IC10086\r\n IC<CR><LF> Without number: e.g.: IC\r\n	

2.3.2.7 ID

Indication	ID[<number>]<CR><LF>	
Description	A call is incoming.	
Parameter	<i>number</i>	Number of the incoming call.
Comments	ID<number><CR><LF> e.g:ID10086\r\n ID<CR><LF> Without number: e.g.: ID\r\n	

2.3.2.8 IF

Indication	IF<CR><LF>	
Description	A call is ended.	
Parameter	-	-
Comments	-	

2.3.2.9 IR

Indication	IR[<number>]<CR><LF>	
Description	A call is accepted.	
Parameter	<i>number</i>	Number of the accepted call
Comments	IR<number><CR><LF> e.g:IR10086\r\n IR<CR><LF> Without number: e.g.: IR\r\n	

2.3.2.10 IM

Indication	IM<name><CR><LF>	
Description	Mobile phone's manufacturer.	

Parameter	<i>name</i>	Mobile phone's manufacturer.
Comments	Report the remote device manufacturer name: INApple Inc.\r\n	

2.3.2.11 IO

Indication	IO<name><CR><LF>	
Description	Mobile phone's model.	
Parameter	<i>name</i>	Mobile phone's model.
Comments	Report the remote device model: IOiPhone 6\r\n	

2.3.2.12 IG

Indication	IG<gain><CR><LF>	
Description	Report local device mic gain	
Parameter	<i>gain</i>	Mic gain value, 2 hex digits.
Comments	Report local device mic gain: IG0E\r\n	

2.3.2.13 IH

Indication	IH<val><CR><LF>	
Description	Indicates the roaming status of current connected mobile phone.	
Parameter	<i>val</i>	0 Non roaming 1 Roaming
Comments	E.g. IH0\r\n Indicates that the current mobile phone is not in roaming state	

2.3.2.14 IL

Indication	IL<val><CR><LF>	
-------------------	-----------------	--

Description	indicates whether the current connected mobile phone support cellular networks	
Parameter	<i>val</i>	1 available 0 Unavailable
Comments	E.g. IL0\r\n Mobile phone support cellular network.	

2.3.2.15 MC

Indication	MC<CR><LF>	
Description	SCO connection established.	
Parameter	-	-
Comments	-	

2.3.2.16 MD

Indication	MD<CR><LF>	
Description	SCO connection released.	
Parameter	-	-
Comments	-	

2.3.2.17 MG

Indication	MG<code><CR><LF>	
Description	Report HFP status.	
Parameter	<i>code</i>	Range: 0-6 0: Init 1: Ready 2: Connecting 3: Connected 4: Outgoing

		5: Incoming 6: Ongoing
Comments	e.g.: MG6\r\n	

2.3.2.18 IE

Indication	IE<type><CR><LF>	
Description	Report the ring status.	
Parameter	<i>type</i>	'00' mean play local default ring tone, '01' mean play phone's ring tone.
Comments	Play phone's ring tone: IE01\r\n	

2.3.2.19 IX

Indication	IX<network_operator><CR><LF>	
Description	Report the network operator name of mobile phone.	
Parameter	<i>network_operator</i>	The network operator name of mobile phone.
Comments	e.g.: IX0,China Mobile\r\n	

2.3.2.20 IY

Indication	IY<strength><CR><LF>	
Description	Report the signal strength of mobile phone.	
Parameter	<i>strength</i>	Signal strength of mobile phone(2 decimal digits, range '00'-'05')
Comments	The mobile phone signal strength is changed: IY04\r\n	

2.3.2.21 IW

Indication	IW<battery><CR><LF>	
Description	Report the battery of mobile phone.	
Parameter	<i>battery</i>	Battery of mobile phone(2 decimal digits, range '00'-'05')

Comments	The mobile phone battery is changed: IW04\r\n
-----------------	---

2.3.2.22 IU

Indication	IU<Subscriber Number><CR><LF>	
Description	Report the Subscriber Number of mobile phone.	
Parameter	<i>Subscriber Number</i>	Subscriber Number of mobile phone.
Comments	e.g. : IU8618101211535\r\n	

2.3.2.23 IP

Indication	IP<idx> <status> <number><CR><LF>	
Description	Report the current inbound call with a third party.	
Parameter	<i>Idx</i>	The index of current call (1,2...).
	<i>status</i>	The status of current call, fixed 5.
	<i>number</i>	The third call' number.
Comments	e.g.: A new incoming call is arrived: IP2 5 15512345678\r\n	

2.3.2.24 IQ

Indication	IQ<idx> <status> <number><CR><LF>	
Description	Report some call be hang up.	
Parameter	<i>Idx</i>	The index of current call (1,2...).
	<i>status</i>	The status of current call (0~5) 0: Active 1: Held 2: Dialing 3: Alerting 4: Incomming 5: Waiting
	<i>number</i>	Number of current call
Comments	e.g.: Some call being hung up: IQ2 0 15512345678\r\n	

2.3.2.25 IT

Indication	IT<idx> <status> <number><CR><LF>	
Description	Report some call's status is changed	
Parameter	<i>Idx</i>	The index of current call (1,2...).
	<i>status</i>	The status of current call (0~5) 0: Active 1: Held 2: Dialing 3: Alerting 4: Incomming 5: Waiting
	<i>number</i>	Cunnent number
Comments	e.g.: Some call is held: IT2 1 15512345678\r\n	

2.4 Advanced Audio Streaming (A2DP/AVRCP)

2.4.1 Command

2.4.1.1 MA

Command	AT#MA<CR><LF>	
Description	Play.	
Parameter	-	-
Comments	-	

2.4.1.2 MB

Command	AT#MB<CR><LF>	
Description	Pause.	
Parameter	-	-
Comments	-	

2.4.1.3 MD

Command	AT#MD<CR><LF>	
Description	Next.	
Parameter	-	-
Comments	-	

2.4.1.4 ME

Command	AT#ME<CR><LF>	
Description	Previous.	
Parameter	-	-
Comments	-	

2.4.1.5 MV

Command	AT#MV<CR><LF>	
Description	Inquire A2DP status.	
Parameter	-	-
Comments	-	

2.4.1.6 MO

Command	AT#MO<CR><LF>	
Description	Inquire AVRCP status.	
Parameter		
Comments	-	

2.4.1.7 MI

Command	AT#MI<CR><LF>	
Description	Connect to the A2DP service of the latest connected device.	

Parameter	-	-
Comments	-	

2.4.1.8 MJ

Command	AT#MJ<CR><LF>	
Description	Release A2DP connection.	
Parameter	-	
Comments	-	

2.4.1.9 RA

Command	AT#RA<offset>,<count><CR><LF>	
Description	Get Now-Playing list of audio player.	
Parameter	<i>offset</i>	The start position, (decimal number, range '0'-'65535').
	<i>count</i>	The total count of report, (decimal number, range '0'-'65535').
Comments	Gets the first 10 items of now-playing list: AT#RA0,10\r\n	

2.4.1.10 RB

Command	AT#RB<uid><CR><LF>	
Description	Play the song which is identified by uid .	
Parameter	<i>uid</i>	The target song' uid(16 hex digits).
Comments	Play the song which is identified by uid "0102030405060708": AT#RB0102030405060708\r\n	

2.4.1.11 RC

Command	AT#RC<offset>,<count><CR><LF>	
Description	Get the virtual file(directory) list of current path of the media player.	

Parameter	<i>offset</i>	The start position, (decimal number, range '0'-'65535').
	<i>count</i>	The total count of report, (decimal number, range '0'-'65535').
Comments	Gets the first 10 items of current path: AT#RC0,10\r\n	

2.4.1.12 RD

Command	AT#RD<direction>,<uid><CR><LF>	
Description	Change current path.	
Parameter	<i>direction</i>	1 decimal digit: '0' means entering upper directory. '1' means entering a specified subdirectory.
	<i>uid</i>	The target directory's uid, 16 hex digits. (If entering upper directory, it is "0000000000000000".)
Comments	Enter a subdirectory which is identified by uid "0102030405060708": AT#RD1,0102030405060708\r\n	

2.4.1.13 RE

Command	AT#RE<CR><LF>	
Description	Get now playing status.	
Parameter	-	-
Comments	-	

2.4.2 Indication

2.4.2.1 MA

Indication	MA<CR><LF>	
Description	Audio streaming is stopped.	
Parameter	-	-

Comments	-
----------	---

2.4.2.2 MB

Indication	MB<CR><LF>	
Description	Audio streaming is started.	
Parameter	-	-
Comments	-	

2.4.2.3 MO

Indication	MO<address><CR><LF>	
Description	A2DP connection is established.	
Parameter	<i>address</i>	12 hex digits, represents the Bluetooth address of remote device.
Comments	e.g.: MO0015830A0B0C\r\n	

2.4.2.4 MY

Indication	MY<address><CR><LF>	
Description	A2DP connection is released.	
Parameter	<i>address</i>	12 hex digits, represents the Bluetooth address of remote device.
Comments	e.g.: MY0015830A0B0C\r\n	

2.4.2.5 MU

Indication	MU<status><CR><LF>	
Description	Report A2DP status.	
Parameter	<i>status</i>	1 Bytes, Range: 0-5 0 Init 1 Ready

		2 Connecting 3 Connected 4 Playing
Comments	e.g.: MU4\r\n	

2.4.2.6 ML

Indication	ML<status><address><CR><LF>	
Description	Report AVRCP status.	
Parameter	<i>status</i>	1 Bytes, Range: 0-5 0 Init 1 Ready 2 Connecting 3 Connected 4 Playing 5 Paused
	<i>address</i>	The MAC address of remote device(12 bytes ASCII).
Comments	e.g.: ML50102030a0b0c\r\n	

2.4.2.7 RA

Indication	RA<CR><LF>	
Description	Music is paused or stopped.	
Parameter	-	-
Comments	-	

2.4.2.8 RB

Indication	RB<CR><LF>	
Description	Music is playing.	
Parameter	-	-

Comments	-
----------	---

2.4.2.9 RC

Indication	RC<CR><LF>	
Description	Now Playing List is changed.	
Parameter	-	-
Comments	-	

2.4.2.10 RF

Indication	RF<uid> <name><CR><LF>	
Description	Indication of file/directory items of current path.	
Parameter	<i>uid</i>	16 hex digits, represents the id of file/directory item.
	<i>name</i>	The name of file/folder item.
Comments	e.g.: RF0102030405060708 folder_name\r\n	

2.4.2.11 RI

Indication	RI<uid> <time> <title> <artist> <album><CR><LF>	
Description	Information of the now playing song.	
Parameter	<i>uid</i>	16 hex digits, represents the id of the playing song.
	<i>time</i>	The total length of the song (decimal digits).
	<i>other</i>	The detail information (title/artist/album) (include terminator max length is 32).
Comments	e.g.: RI0102030405060708 240000 Bring you home Ronan Keating Bring you home\r\n	

2.4.2.12 RL

Indication	RL<CR><LF>
------------	------------

Description	Finished to get information.	
Parameter	-	-
Comments	It response to the command “AT#RA” or “AT#RC”.	

2.4.2.13 RN

Indication	RN<time> <title> <artist> <album><CR><LF>	
Description	Information of the now playing song.	
Parameter	<i>time</i>	The total length of the song(decimal digits).
	<i>other</i>	The song’s information (title/artist/album) (include terminator max length is 32).
Comments	-	

2.4.2.14 RP

Indication	RP<length> <position><status><CR><LF>	
Description	Play position of now playing song.	
Parameter	<i>length</i>	the total length of the song
	<i>position</i>	the current playing position of the song
	<i>status</i>	0x00: Stopped 0x01: Playing 0x02: Paused 0x03: FWD_Seek 0x04: REV_Seek 0xFF: Error Code
Comments	-	

2.4.2.15 MP

Indication	MP<status><CR><LF>
Description	Indicates the encoding type of current A2DP stream.

Parameter	<i>status</i>	0x00: SBC 0x01: APTX
Comments	E.g. MP01\r\n Report the current stream type is APTX.	

2.5 Bluetooth Touch Control (BTC)

2.5.1 Command

2.5.1.1 HA

Command	AT#HA<width>,<height><CR><LF>	
Description	Sends screen resolution of local device.	
Parameter	width	Horizontal resolution.
	height	Vertical resolution.
Comments	Note: send this command before sending coordinate information.	

2.5.1.2 HB

Command	AT#HB<CR><LF>	
Description	Cancel the BTC function.	
Parameter	-	-
Comments	Note: Cancel the BTC function when the BTC function is not needed.	

2.5.1.3 HK

Command	AT#HK<code><CR><LF>	
Description	Send touch control command.	
Parameter	<i>code</i>	Command, Hexadecimal 00 release button,

		01 press down Home button 02 power down Search button 04 press down Back button
Comments	Note: A down button followed immediately by the release button is parsed as a click action. If the interval of the two button(a down button and release button) is long enough, it will be parsed as a Long-press action. Example (Back): AT#HK04<CR><LF> AT#HK00<CR><LF>	

2.5.1.4 HR

Command	AT#HR<button>,<x>,<y><CR><LF>	
Description	Sending coordinate information.	
Parameter	<i>button</i>	Status of button 0 Up 1 Down
	<i>x</i>	x absolute coordinate
	<i>y</i>	y absolute coordinate
Comments	-	

2.5.2 Indication

2.5.2.1 HA

Indication	HA<CR><LF>	
Description	Bluetooth touch control connection established.	
Parameter	-	-
Comments	e.g.: HA\r\n	

2.5.2.2 HB

Indication	HB<CR><LF>	
Description	Bluetooth touch control connection released.	
Parameter	-	-
Comments	e.g.: HB\r\n	

2.5.2.3 CA

Indication	CA<CR><LF>	
Description	BTC function is stopped.	
Parameter	-	-
Comments	-	

2.5.2.4 CB

Indication	CB<CR><LF>	
Description	BTC function is started.	
Parameter	-	-
Comments	-	

2.6 Phonebook & Call History(PBAP)

2.6.1 Command

2.6.1.1 PA

Command	AT#PA<Target>,<Offset>,<Count><CR><LF>	
Description	Sync phonebook contacts.	
Parameter	Target	1 Bytes Ascii, Range '0'-'4': 0 SIM 1 Phone

		2 Outgoing call 3 Missed call 4 Incoming call
	<i>Offset</i>	The start position.
	<i>Count</i>	Contacts number(It doesn't represent the real synchronized contacts number).
Comments	e.g.: AT#PA1,0,100\r\n	

2.6.1.2 PW

Command	AT#PW<CR><LF>	
Description	Cancel the current synchronization	
Parameter	-	-
Comments	-	

2.6.1.3 PM

Command	PM<mask><CR><LF>	
Description	Set PBAP contact-sync filter, FN、N、TEL is always synchronized。	
Parameter	<i>mask</i>	The bit-mask of the content-filter. 8 hexadecimal ASCII characters. PBAP_INFO_MASK_FN (1 << 0) PBAP_INFO_MASK_N (1 << 1) PBAP_INFO_MASK_TEL (1 << 2) PBAP_INFO_MASK_EMAIL (1 << 3) PBAP_INFO_MASK_PHOTO (1 << 4)
Comments	AT#PM00000008\r\n To sync FN, N, TEL, Email.	

2.6.2 Indication

2.6.2.1 PS

Command	PS<code><address><CR><LF>	
Description	The PBAP status	
Parameter	<i>code</i>	2 Bytes ASCII, Range "00"-"02": 00 mean Connection service successful 01 mean Connection service fail 02 mean Connection is broken
	<i>address</i>	The <i>Bluetooth</i> address of remote device(12 Bytes Ascii).
Comments	e.g.: connection service successful PS000015830A0B0C\r\n	

2.6.2.2 PB

Indication	PB<Target><Number type><Name Len> <Number Len><Name><Number> <Time><CR><LF>	
Description	Contacts or call history item.	
Parameter	<i>Target</i>	0 SIM 1 Phone 2 Outgoing call history 3 Missed call history 4 Incoming call history
	<i>Number type</i>	Number type field(2 Bytes ASCII). 1: home; 2: mean this number support voice; 3: work number; 4: preferred number; 5: fax number; 6: cell phone;

		7: video phone; 8: pager; 9: BBS; 10: modem; 11: car telephone; 12: ISDN; 13: pcs phone; 14: voice phone number;
	<i>Name Len</i>	The length of name field.
	<i>Number Len</i>	The length of number field.
	<i>Name</i>	The phone book name (MAX 32 bytes).
	<i>Number</i>	The phone book telephone number (MAX 40 bytes).
	<i>Time</i>	The call history time(MAX 40 bytes ASCII).
Comments	e.g.: phone book: PB10411Jack1333333333\r\n e.g.: call history: PB10411Jack1333333333 20140101T235959\r\n	

2.6.2.3 PE

Indication	PE<type><size><CR><LF>	
Description	Indicates the number of PBAP items.	
Parameter	<i>type</i>	1 decimal ASCII. The type of PBAP data. 0 SIM 1 Phone 2 Outgoing call 3 Missed call 4 Incoming call
	<i>size</i>	4 hex ASCII. The total number of PBAP items.
Comments	e.g.: PE000F2\r\n	

2.6.2.4 PC

Indication	PC<CR><LF>	
Description	Synchronization completed	
Parameter	-	-
Comments	e.g.: PC\r\n	

2.6.2.5 PR

Indication	PR<target><index><dataLen><rawData><CR><LF>	
Description	Notify contact rawdata	
Parameter	<i>target</i>	0 SIM 1 Phone 2 Outgoing call history 3 Missed call history 4 Incoming call history
	<i>index</i>	Contact index, 4 hexadecimal ASCII characters.
	<i>dataLen</i>	Length of raw data, 4 hexadecimal ASCII characters.
	<i>RawData</i>	Contact raw data.
Comments	PR100010222BEGIN:VCARD....END:VCARD\r\n.	

2.7 Message Access Profile (MAP)

2.7.1 Command

2.7.1.1 AC

Command	AT#AC < address><CR><LF>	
Description	Connect to the MAP service of remote device.	
Parameter	<i>address</i>	13 hexadecimal digits. The <i>Bluetooth</i> Address of the remote

		device.
Comments	e.g.: AT#AC889900AABBCC<CR><LF>	

2.7.1.2 AD

Command	AT#AD<CR><LF>	
Description	Disconnect the existing MAP connection.	
Parameter	-	-
Comments	If no connection exists, do nothing.	

2.7.1.3 AS

Command	AT#AS<length of recipient address><recipient address><length of SMS><content of SMS><CR><LF>	
Description	Send the message to some mobile phone.	
Parameter	<i>length of recipient address</i>	The target mobile phone number(2 Bytes decimal).
	<i>recipient address</i>	The target mobile phone number.
	<i>length of SMS</i>	The length of SMS (4 Bytes decimal).
	<i>content of SMS</i>	The content of SMS.
Comments	If send content "hello" to mobile phone number "13301020304": AT#AS11133010203040005hello\r\n	

2.7.1.4 AG

Command	AT#AG<msg_handle><CR><LF>	
Description	Get a message content.	
Parameter	<i>msg_handle</i>	Message handle(MAX 16 Bytes ASCII).
Comments	e.g.: AT#AG0123456AB\r\n	

2.7.1.5 AL

Command	AT#AL<CR><LF>	
Description	Get the SMS list on the remote device.	
Parameter	-	-
Comments	-	

2.7.2 Indication

2.7.2.1 AC

Indication	AC<result> <CR><LF>	
Description	Report the MAP connection result.	
Parameter	<i>result</i>	hex number, indicates the result of connection: 00: MAP connected. 01: MAP connect failed. 02: MAP disconnected. 03: MAP disconnect failed.
Comments	e.g.: connect success AC00\r\n	

2.7.2.2 AG

Indication	AG<msg_handle> <sender name> <number> <msg><CR><LF>	
Description	Report message content.	
Parameter	<i>Msg_handle</i>	Message handle.
	<i>Sender name</i>	The sender name.
	<i>number</i>	The number of message sender.
	<i>msg</i>	Message content.
Comments	e.g.: AG1799 jack +8615801048888 hello\r\n	

2.7.2.3 AL

Indication	AL<SMS content><CR><LF>	
Description	Report a SMS item. This is the result of a previous AT#AL instruct to get SMS list.	
Parameter	<i>SMS content</i>	is one of below pattern: 1. "MSG:BEGIN" : A SMS item begins. 2. "MSG:END" : A SMS item ends. 3. "handle:<handle>" <handle> : the unique ID of the SMS item. 4. "type:<type>" <type> : the type of the SMS. <SMS_GSM> or <SMS_CDMA> 5. "size:<size>" <size>: the size of the SMS item. 6. "read:<is_read>" <is_read>: "yes" or "not" to indicates whether the SMS is read before. 7. "subject:<subject>" <subject>: the subject of the SMS item. 8. "datetime:<datetime>" <datetime>: the created date and time of the SMS item using the "YYYYMMDDTHHMMSS" pattern which 'T' is the break character between date and time.
Comments	e.g.: ALMSG:BEGIN ALhandle:1799 ALsubject:test ALdatetime:20150320T150440 ALsender_name:jack ALsender_addressing:+8615801048537 ALrecipient_name:unknow ALrecipient_addressing: ALtype:SMS_GSM ALsize:2 ALtext:yes	

	ALreception_status:complete ALattachment_size:0 ALpriority:no ALread:no ALsent:no ALprotected:no ALMSG:END
--	--

2.7.2.4 AN

Command	AN<new SMS information><CR><LF>	
Description	Notification for new SMS is received.	
Parameter	<i>MSG:BEGIN</i>	Start transfer message information.
	<i>type:NewMessage</i>	The message is new.
	<i>gandle:<msg_handle></i>	Handle for the message.
	<i>folder:<msg_folder></i>	The message folder.
	<i>msg_type:<msg_type></i>	The message type.
	<i>MSG:END</i>	Message information transfer is stopped.
Comments	-	

2.8 Serial Port Profile(SPP)

2.8.1 Command

2.8.1.1 SC

Command	AT# SC[bd-12] <CR><LF>	
Description	Connect SPP	
Parameter	<i>bd-12</i>	Bluetooth address for remote device.
Comments	e.g.: AT#SC112233445566<CR><LF> Will connect to the device with BD address "11:22:33:44:55:66"	

2.8.1.2 SD

Command	AT# SD[handle-8] <CR><LF>	
Description	Disconnect SPP.	
Parameter	<i>handle-8</i>	Connection Handle.
Comments	e.g.:AT#SD11223344<CR><LF> will disconnect the SPP connection by handle 0x11223344	

2.8.1.3 SJ

Command	AT#SJ<CR><LF>	
Description	Start SPP server.	
Parameter	-	-
Comments	-	

2.8.1.4 SK

Command	AT#SK[handle-8]<CR><LF>	
Description	Stop SPP server.	
Parameter	<i>handle-8</i>	Service handle.
Comments	e.g.:AT#SK11223344<CR><LF> will stop the SPP server by handle 0x11223344	

2.8.1.5 D

Command	D#<length-4>[handle-8][data_raw] <CR><LF>	
Description	Send SPP Data.	
Parameter	<i>length-4</i>	Total length of parameter(include length/handle/payload fields).
	<i>handle-8</i>	Connection handle.
	<i>data_raw</i>	The data will be sent
Comments	e.g.: D#000A1122334401<CR><LF>	

	Send data "01" on connection handle 0x11223344
--	--

2.8.2 Indication

2.8.2.1 SC

Indication	SC[bd-12][handle-8][srv-channel-2][scn-status-1]<CR><LF>	
Description	Connection Complete.	
Parameter	<i>Bd-12</i>	Remote device address.
	<i>handle-8</i>	Connection handle(0xffffffff mean connection fail).
	<i>Srv-channel-2</i>	Service channel, max value: 30.
	<i>scn-status-1</i>	SPP connect status.
Comments	e.g.: SC11223344556601020304051\r\n	

2.8.2.2 SD

Indication	SD [handle-8]<CR><LF>	
Description	Send data to remote device.	
Parameter	<i>handle-8</i>	The connection handle is disconnected.
Comments	e.g.: SD01020304\r\n	

2.8.2.3 SJ

Indication	SJ [handle-8][svr-channel-2][status-1]<CR><LF>	
Description	SPP server is started	
Parameter	<i>handle-8</i>	SDP Service handle.
	<i>Svr-channel-2</i>	Service channel.
	<i>status</i>	Status of Start SPP server.
Comments	e.g.: SJ01020304051\r\n	

2.8.2.4 SK

Indication	SK [result]<CR><LF>	
Description	SPP server is stopped.	
Parameter	<i>result</i>	1 Bytes ASCII: '0' mean unsuccessful. '1' mean successful.
Comments	e.g.: SK01\r\n	

2.8.2.5 D

Indication	D<length-4>[handle-8][data_raw]<CR><LF>	
Description	Data indication.	
Parameter	<i>length-4</i>	Total length of parameter(include length/handle/payload fields).
	<i>handle-8</i>	Connection handle.
	<i>data_raw</i>	The data will be received.
Comments	e.g.: D0009010203040\r\n	

2.9 Others

2.9.1 Command

2.9.1.1 MM

Command	AT#MM<name><CR><LF>	
Description	Inquiry/Change local device name.	
Parameter	<i>name</i>	Local device name, the max length is 32 bytes.
Comments	If <name> is empty, the module will return the local device name with MM indication	

2.9.1.2 MN

Command	AT#MN<pin><CR><LF>	
Description	Inquiry/Change local device PIN code.	
Parameter	<i>pin</i>	Local PIN code (4 decimal digits).
Comments	If <pin> is empty, the module will return the current PIN code with MN indication.	

2.9.1.3 MX

Command	AT#MX<CR><LF>	
Description	Inquiry paired devices list.	
Parameter	-	-
Comments	-	

2.9.1.4 MR

Command	AT#MR[<index>]<CR><LF>	
Description	Delete paired device.	
Parameter	<i>index</i>	index of device, 1-6
Comments	AT#MR<CR><LF> Delete all paired devices AT#MR<index><CR><LF> Delete the specified paired device.	

2.9.1.5 MZ

Command	AT#MZ<CR><LF>	
Description	Inquiry local device's <i>Bluetooth</i> address.	
Parameter	-	-
Comments	-	

2.9.1.6 MF

Command	AT#MF<CR><LF>	
Description	Inquiry auto-answering call and auto-connecting setting.	
Parameter	-	-
Comments	-	

2.9.1.7 MG

Command	AT#MG<CR><LF>	
Description	Enable automatic connection when powers on.	
Parameter	-	-
Comments	-	

2.9.1.8 MH

Command	AT#MH<CR><LF>	
Description	Disable automatic connection when powers on.	
Parameter	-	-
Comments	-	

2.9.1.9 MP

Command	AT#MP<CR><LF>	
Description	Enable automatic answering call.	
Parameter	-	-
Comments	-	

2.9.1.10 MQ

Command	AT#MQ<CR><LF>	
Description	Disable automatic answering call.	

Parameter	-	-
Comments	-	

2.9.1.11 GPC

Command	AT#GPC<address><CR><LF>	
Description	Pairing with remote device.	
Parameter	<i>address</i>	The MAC address of remote device(12 Bytes ASCII).
Comments	-	

2.9.1.12 GPD

Command	AT#GPD< address ><CR><LF>	
Description	Cancel the pairing with remote device.	
Parameter	<i>address</i>	The MAC address of remote device(12 Bytes ASCII).
Comments	-	

2.9.1.13 GPF

Command	AT#GPF<bd_addr><accept ><CR><LF>	
Description	Conform the pairing request of remote device.	
Parameter	<i>bd_addr</i>	12 hex digits, represents the Bluetooth address of the remote device.
	<i>accept</i>	Control byte(1 Byte ASCII) 0: mean reject it. 1: mean accept it.
Comments	-	

2.9.1.14 MY

Command	AT#MY< MicGain ><CR><LF>	
---------	--------------------------	--

Description	Set current ongoing microphone gain value	
Parameter	<i>MicGain</i>	2 hex ASCII. The microphone gain value to set. The max value is 0x16.
Comments	e.g. AT#MY15\r\n. Set the microphone gain to 0x15.	

2.9.2 Indication

2.9.2.1 MX

Indication	MX<n><COD><mac><name><CR><LF>	
Description	Report paired devices list	
Parameter	<i>n</i>	Index (1-6)
	<i>COD</i>	Class of device(8 Bytes ASCII number)
	<i>mac</i>	Bluetooth address, 12 hexadecimal digits.
	<i>name</i>	Device name, the max length is 32 bytes.
Comments	e.g.: MX2001247000821SGH-F258\r\n	

2.9.2.2 MF

Indication	MF<a><CR><LF>	
Description	Report auto-answering call and auto-connecting setting.	
Parameter	<i>a</i>	Auto-answering call setting, 0:Disable, 1: Enable.
	<i>b</i>	Auto-connecting setting, 0:Disable, 1: Enable.
Comments	e.g.: MF00\r\n	

2.9.2.3 MZ

Indication	MZ<address><CR><LF>	
Description	Report local device Bluetooth address	
Parameter	<i>address</i>	Local device Bluetooth address, 17bytes ASCII code.

Comments	e.g.: MZ11:22:33:44:55:66\r\n
-----------------	-------------------------------

2.9.2.4 MM

Indication	MM<name><CR><LF>	
Description	Report local device name.	
Parameter	<i>name</i>	Local device name (UTF-8), the max length is 32 bytes.
Comments	e.g.: MMIVT_BT\r\n	

2.9.2.5 MN

Indication	MN<pin><CR><LF>	
Description	Report local device PIN code.	
Parameter	<i>pin</i>	Local device PIN code (4 decimal digits).

2.9.2.6 MS

Indication	MS<scan_mode><CR><LF>	
Description	Report that the scan mode has changed.	
Parameter	<i>Scan_mode</i>	1 decimal digit. Detail is below: 0 – No Scans enabled. 1 – Inquiry Scan (can be discovered) enabled. 2 – Inquiry Scan (can be discovered) disabled. Page Scan (can be connected) enabled. 3 - Inquiry Scan (can be discovered) enabled. Page Scan (can be connected) enabled.
Comments	e.g.: MS3\r\n	

2.9.2.7 GT

Indication	GT< address ><reason><CR><LF>
Description	The ACL connection has been disconnected, and the reason for broken.

Parameter	<i>address</i>	12 hex digits, represents the Bluetooth address of the remote device.
	<i>reason</i>	2 hex digits, the reason of ACL connection disconnected.
Comments	e.g.: GT0015831234560E\r\n	

2.9.2.8 GPB

Indication	GPB< address ><state><CR><LF>	
Description	The pairing state with remote device has changed.	
Parameter	<i>address</i>	12 hex digits. Represents the Bluetooth address of the remote device.
	<i>status</i>	1 decimal digit. Represents the current pairing state. 0 – not paired 1 –paired 2 - in pairing
Comments	e.g.: GPB0015831234560\r\n	

2.10 File Transfer Protocol(FTP)

2.10.1 Command

2.10.1.1 FA

Command	AT#FA<CR><LF>	
Description	Abort current Get or Put operation.	
Parameter	-	-
Comments	-	

2.10.1.2 FB

Command	AT#FB<CR><LF>	
Description	Browse root folder of remote device(FTP Server can set root folder).	

Parameter	-	-
Comments	Note: Description mentioned in the remote device root directory is the root directory on the FTP Server, the local Bluetooth device is the FTP Client, the remote devices is FTP Server by default.	

2.10.1.3 FC

Command	AT#FC<bd_addr><CR><LF>	
Description	Establish FTP connection.	
Parameter	<i>bd_addr</i>	12 hex digits, represents the <i>Bluetooth</i> address of the device.
Comments		

2.10.1.4 FD

Command	AT#FD<CR><LF>	
Description	Release the current FTP connection.	
Parameter	-	-
Comments	-	

2.10.1.5 FG

Command	AT#FG<obj_name><CR><LF>	
Description	Get object from remote device.	
Parameter	<i>obj_name</i>	The name of object which will be get.
Comments	Note: The remote device to exist under the root directory of names for 123 a file or folder. (you can use AT# FH set distal root directory) Download 123 will pass the FL Settings stored in the local directory. e.g: AT#FL/data/ AT#FG123	

	set the local path to /data/, on behalf of the distal root path name for 123 a file or folder, under /data/ downloaded to a local directory.
--	--

2.10.1.6 FP

Command	AT#FP<obj_name><CR><LF>	
Description	Push object to remote folder.	
Parameter	<i>obj_name</i>	The name of local object
Comments	e.g: AT#FP123 The object(123) will be pushed to root folder of remote device AT#FL/data/ AT#FP123 Local /data/123 transfer to the remote path of the root directory.	

2.10.1.7 FH

Command	AT#FH< path><CR><LF>	
Description	Set root folder of remote device(set root folder of FTP server)	
Parameter	<i>path</i>	folder path
Comments	Note: when FTP connection is established, the current folder is root folder. e.g: AT#FH123 Enter a folder which name is 123 in current folder, and set 123 is current folder.	

2.10.1.8 FL

Command	AT#FL<local_path><CR><LF>	
Description	Set local path	
Parameter	<i>local_path</i>	The path will be set local path default path: /sdcard/Download
Comments	Note:	

	If executed, the path is empty, the command is invalid The path of a maximum length of 256 bytes e.g: AT#FL/data/ <i>/data/:</i> this path is local path. when user implement AT#FP or AT#PG command, the object will be pushed or pulled in this path. AT#FL/data/ AT#FG123.txt Sets the local path to /data directory, download the default name for the 123. txt is stored in the /data/ directory. AT#FL/data/ AT#FP123.txt The /data / 123. txt sent to the distal root directory.
--	---

2.10.1.9 FR

Command	AT#FR<obj_path><CR><LF>	
Description	Delete object from remote folder.	
Parameter	<i>obj_path</i>	object path from remote folder
Comments	e.g: AT#FR123 Delete object which name is 123 from remote folder.	

2.10.2 Indicate

2.10.2.1 FB

Indication	FB<state-4><CR><LF>	
Description	Browseing root folder of remote complete	
Parameter	<i>state-4</i>	Report the result of browse root folder of remote device
Comments	FB0000 Browse complete	

2.10.2.2 FC

Indication	FC<conn_state-2><bd_addr-12><CR><LF>	
Description	Update the state of Ftp Connection	
Parameter	<i>conn_state-2</i>	The state of Ftp Connection 2bytes 0: FTP connected 2: FTP disconnected
	<i>bd_addr-12</i>	Bluetooth address, 12 hex digits
Comments	FC00123412341234 Establish FTP connection with remote device which address is 123412341234.	

2.10.2.3 FE

Indication	FE<f_perm-2><f_size-8><f_time-14><name_len-2><f_name><CR><LF>	
Description	Indicate the object attribute.	
Parameter	<i>f_perm-2</i>	the permission of object, hex digit, 2byte: 1: PERM_READ 2: PERM_WRITE 4: PERM_DELETE 8: ATTRIBUTE_FOLDER
	<i>f_size-8</i>	The size of object, hex digit , 8 bytes.
	<i>f_time-14</i>	Modify time of object, 14bytes Year: hex digit, 4byte, e: 07df(decimal: 2015) Month: hex digit, 2byte, e: 0a(decimal: 10) Day : hex digit, 2byte, e: 0e(decimal: 14) Hour :hex digit, 2byte, e: 0a(decimal: 10) Minute : hex digit, 2byte, e: 0b(decimal: 11) Second : hex digit, 2byte, e: 0c(decimal: 12)
	<i>Name_len-2</i>	Name len, 2hex digits.
	<i>f_name</i>	Object name, Max 128 bytes

Comments	FE0F1122334407df0a0e0a0b0c03123
-----------------	---------------------------------

2.10.2.4 FG

Indication	FL<result-4><CR><LF>	
Description	Pull object from remote device complete.	
Parameter	<i>result-4</i>	0: success Other: fail
Comments	FG0000	

2.10.2.5 FH

Indication	FH<result><CR><LF>	
Description	Set root folder of remote device complete.	
Parameter	<i>result</i>	0: success Other: fail
Comments	FH0000	

2.10.2.6 FL

Indication	FL<cur_size-8><obj_size-8><obj_name><CR><LF>	
Description	Indicate push object progress	
Parameter	<i>cur_size-8</i>	the size of obj was pushed.
	<i>obj_size-8</i>	the size of object.
	<i>obj_name</i>	obj name.
Comments	FL0000111100002222123.txt	

2.10.2.7 FK

Indication	FK<cur_size-8><obj_size-8><obj_name><CR><LF>	
Description	Indicate obtain the progress of the file or folder	

Parameter	<i>cur_size-8</i>	Have downloaded the size of the file or folder, 8 hexadecimal digits
	<i>obj_size-8</i>	the size of object , 8 hexadecimal digits
	<i>obj_name</i>	object name.
Comments	FK0000111100002222123.txt	

2.10.2.8 FP

Indication	FP<result-4><CR><LF>	
Description	Push object to remote device complete	
Parameter	<i>result-4</i>	0: success Other: fail
Comments	FP0000	

2.10.2.9 FR

Indication	FR<result-4><CR><LF>	
Description	Delete object from remote folder complete.	
Parameter	<i>result</i>	0: success Other: fail
Comments	FR0000	

2.11 Object Push(OPP)

2.11.1 Command

2.11.1.1 #OS

Indication	AT#OS<path><CR><LF>	
Description	Set the saved path for received object & file	
Parameter	path	The path at which the received file will be saved.

Comments	e.g.AT#OS/sdcard/<CR><LF>
-----------------	---------------------------

2.11.1.2 #OP

Indication	AT#OP<address><file_name><CR><LF>	
Description	Push a file into remote device.	
Parameter	<i>address</i>	the Bluetooth address of the remote device, 12 hex digits,
	<i>file_name</i>	the absolute path of the file to be sent.
Comments	e.g. AT#OP889900AABBCC/sdcard/hongyan.mp3<CR><LF>.	

2.11.2 Indicate

2.11.2.1 OUS

Indication	OUS<result> <CR><LF>	
Description	Report that the push operation starts	
Parameter	result	decimal number, indicates the result of push operation: 00: pushing starts successfully. others: pushing operation failed.
Comments	-	

2.11.2.2 OUI

Indication	OUI<progress><CR><LF>	
Description	Report that the push operation is in progress	
Parameter	<i>progress</i>	the percent value of progress.
Comments	-	

2.11.2.3 OUC

Indication	OUC<result ><CR><LF>	
Description	Report that the push operation completed	

Parameter	-	-
Comments	-	

2.11.2.4 OUB

Indication	OUB<result ><CR><LF>	
Description	Report that the push operation has aborted	
Parameter	-	-
Comments	-	

2.12 Dial-up Networking(DUN)

2.12.1 Command

2.12.1.1 UC

Command	AT#UC<bd_addr><CR><LF>	
Description	Establish DUN connection.	
Parameter	<i>bd_addr</i>	12 hex digits, represents the Bluetooth address of the device.
Comments	-	

2.12.1.2 UD

Command	AT#UD<CR><LF>	
Description	Release the current DUN connection.	
Parameter	-	-
Comments	-	

2.12.2 Indicate

2.12.2.1 US

Command	US<code><address><CR><LF>	
Description	The DUN status	
Parameter	<i>code</i>	2 Bytes ASCII, Range "00"-"03": 00 mean Connection create success 01 mean DUN Connectingl 02 mean DUN Creat Connect failed or Disconnected 03 mean DUN Disconnecting
	<i>address</i>	The <i>Bluetooth</i> address of remote device(12 Bytes Ascii).
Comments	e.g.: connection service successful US000015830A0B0C\r\n	

2.13 Personal Area Networking(PAN)

2.13.1 Command

2.13.1.1 NC

Command	AT#NC<bd_addr><CR><LF>	
Description	Establish PAN connection.	
Parameter	<i>bd_addr</i>	12 hex digits, represents the Bluetooth address of the device.
Comments	-	

2.13.1.2 ND

Command	AT#ND<CR><LF>	
Description	Release the current PAN connection.	

Parameter	-	-
Comments	-	

2.13.2 Indicate

2.13.2.1 NS

Command	NS<code><address><CR><LF>	
Description	The PAN status	
Parameter	<i>code</i>	2 Bytes ASCII, Range "00"-"03": 00 mean Connection create success 01 mean PAN Connecting! 02 mean PAN Creat Connect failed or Disconnected 03 mean PAN Disconnecting
	<i>address</i>	The <i>Bluetooth</i> address of remote device (12 Bytes ASCII).
Comments	e.g.: connection PAN successful NS000015830A0B0C\r\n	

2.13.2.2 NB

Command	NB< tap-name><CR><LF>	
Description	The PAN control state	
Parameter	<i>Tap-name</i>	The tap-name of local device (12 Bytes Ascii).
Comments	NBbt-pan\r\n	

2.14 Generic Attribute Profile(GATT)

2.14.1 Command

2.14.1.1 KC

Command	AT#KC[is_start-2]<CR><LF>
---------	---------------------------

Description	Scan BLE device	
parameter	<i>is_start-2</i>	To control start or stop scan 1: start scan 0: stop scan
Comments	AT#KC01\r\n Start scan	

2.14.1.2 KE

Command	AT#KE [bd_addr-12] <CR><LF>	
Description	Establish GATT connection	
parameter	<i>bd_addr-12</i>	Bluetooth address of remote device.
Comments	AT#KE112233445566\r\n Establish GATT connection remote device which Bluetooth address is 112233445566.	

2.14.1.3 KF

Command	AT#KF<CR><LF>	
Description	Release the current GATT connection.	
parameter	-	
Comments	AT#DF\r\n	

2.14.1.4 L

Command	L#<len-2><data>	
Description	Send GATT data.	
parameter	<i>len-2</i>	data len, 2bytes.
	<i>data</i>	GATT data
Comments	e.g: L#0A1234567890 len: 0A	

	data: 1234567890 warning: the len value must be equal with the length of data. If len value greater than length of data, it will lead to a lot of AT command which will be executed is invalid. If len value less than length of data, it will lead to the size of data received by remote less than the size of data sent from local.
--	---

2.14.2 Indicate

2.14.2.1 KC

Indication	KC[bd_addr-12] [dev_name] <CR><LF>	
Description	Report a remote LE device discovered.	
parameter	<i>bd_addr-12</i>	Bluetooth address
	<i>dev_name</i>	Device name
Comments		

2.14.2.2 KE

Command	KE<status-2><bd_addr-12><CR><LF>	
Description	Return connected device address, status, client_if and connect_id.	
parameter	<i>status-2</i>	0: success Other: fail.
	<i>bd_addr-12</i>	Bluetooth address of remote device
Comments	-	

2.14.2.3 KF

Indication	KF [status-2] [bd_addr-12]	
Description	Indicate disconnect status and Bluetooth address of remote device.	
parameter	<i>status-2</i>	0: success Other: fail.
	<i>bd_addr-12</i>	Bluetooth address of remote device

Comments	-
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2.14.2.4 L

Indication	L[len-2][data]	
Description	Indcate GATT data	
parameter	len-2	Data len 2bytes
	data	GATT data
Comments	-	

2.15 Bluetooth Switch

2.15.1 Command

2.15.1.1 BE

Command	AT#BE[is_enable-1]<CR><LF>	
Description	Enable/disable <i>Bluetooth</i>	
parameter	is_enable-1	To control enable or disable <i>Bluetooth</i> 1: enable <i>Bluetooth</i> 0: disable <i>Bluetooth</i>
Comments	AT#BE1\r\n Enable <i>Bluetooth</i> finished.	

2.15.2 Indicate

2.15.2.1 TS

Indication	TS[is_enable-1] <CR><LF>	
Description	Indicate enable/disable <i>Bluetooth</i> event.1byte.	
parameter	is_enable-1	<i>Bluetooth</i> status, 1: <i>Bluetooth</i> enabled

		0: <i>Bluetooth</i> disabled
Comments	TSO Disable <i>Bluetooth</i> finished.	

3. *Bluetooth* Technology Best Developed Corporation

IVT Corporation is one of *Bluetooth*® technology BEST developed together which is authenticated by The Bluetooth SIG. See Figure 1 below. IVT Wireless ecosystem is one completed *Bluetooth* productions including *Bluetooth* software, modules and end productions.



Figure 1: IVT Is One Of *Bluetooth*® Technology BEST Developed Together

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FCC

FCC NOTICE

The device complies with Part 15 of the FCC Rules. The device meets the requirements for modular transmitter approval as detailed in FCC public notice DA00-1407. Transmitter Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

CAUTION

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Cypress Semiconductor may void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

LABELING REQUIREMENTS.

The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the OEM enclosure specifying the appropriate identifier for this product as well as the FCC Notice above. The FCC identifier is FCC ID, in any case the end product must be labeled exterior with.



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We, **IVT Corporation** declare under our sole responsibility that the product:

Product Name: IVT Corporation i145 module
Product Model: i145

To which this declaration relates is in conformity with the essential requirements and other relevant requirements of the R&TTE Directive (1999/5/EC).
The product is compliant with the following standards and/or other normative documents:

SAFETY (art 3.1.a): EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

EMC (art 3.1.b): ETSI EN 301 489-1 v1.9.2; ETSI EN 301 489-17 v2.2.1

SPECTRUM (art 3.2): ETSI EN 300 328 v1.9.1

Health (art 3.1.a): EN 62479:2010

Sincerely

Notified Body: TUV SUD BABT

Identification Number: CE0168

Signature:

Name: Jason Zhu

Title: General manager

Date: 2016/7/8