XM-15B

Bluetooth serial module specification

1, brief introduction

XM-15B Bluetooth module (hereinafter referred to as the module) realized Bluetooth spp specification, conform to the standard of Bluetooth 2.1 + EDR, has two working modes: mode of command and data, in the data model module can be divided into (Master), from the slave and the loop (loopback) three roles. When the module is in command mode to perform all of the following AT command, the user can send AT commands to the module, the module for setting parameters or send control commands. The module is not connected to any equipment (blue lights), in command mode, you can receive AT at any time

Command in command mode, the module can be set according to the role of being connected or active connection to other Bluetooth devices. After the module and other Bluetooth devices to connect (blue light Chang Liang), automatically enters data mode.

The core module of XM-15B XM-05 and on the floor built-in power management chip and 5V and 3.3V TTL signal conversion circuit can be also compatible 3/3.3/5V of several different voltage signal, the module of TXD output pin high level VCC-0.3v

2, product features
1, compatible with mainstream CSR Bluetooth chip, standard Bluetooth V2.1+EDR protocol through Bluetooth BQB authentication.
2, quick start, need only 0.3 seconds to complete the entire module (including Bluetooth protocol stack initialization).
3, built-in hardware watchdog, never crashes.
4, better compatibility, with built-in Windows protocol stack, IVT, Widcomm (Broadcom), compatible with Android system, compatible with the market almost all mobile phone android.
5, built-in RC reset circuit, POR, Brown-Out, LVR power supply voltage monitoring circuit, reset is stable and reliable, without external reset
Circuit

6, the built-in power supply connection reverse protection circuit.

7, the built-in power management chip, power supply voltage range: 3.0V~6V.

8, built-in TTL signal level conversion circuit, compatible with 3/3.3/5V signal, TXD high level output voltage VCC.

9, the default parameters: 9600 baud rate, pair number 1234 and work mode from the machine.

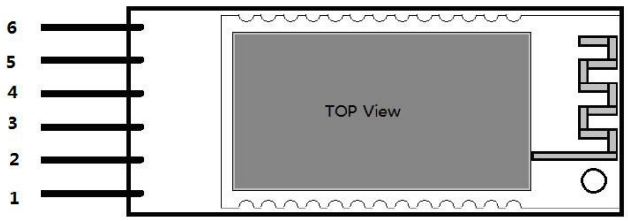
10, size: 15.5 mm x 37.5mm module x 4.0mm (excluding pin).

11, working current: match: 4 ~ 12mA pairing is not communication: 4 ~ 12Ma communication: 12mA no sleep. 12, maximum transmit power: +10db (higher than CSR Bluetooth module)

13, communication distance: open under the condition of 30M (up to 60 meters, but do not guarantee the normal use of the environment around 15M).

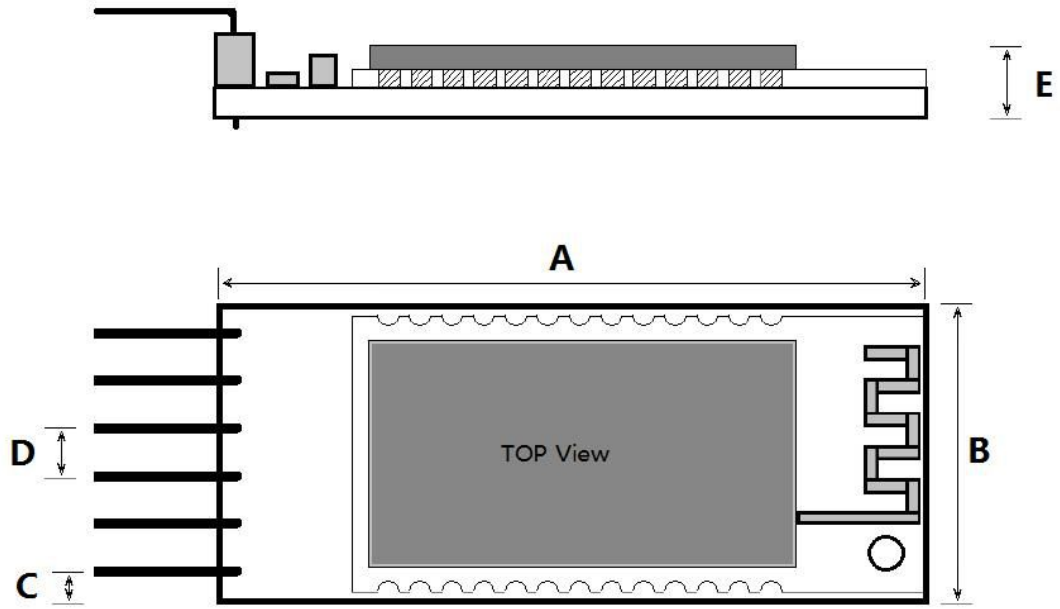
14, for the GPS navigation system, electricity and gas meter system, production control system of industrial field, can be seamlessly connected with Bluetooth mobile phone, notebook computer, computer with Bluetooth adapter, PDA equipment etc..

3K



序号	引脚	描述
1	CE/CLR	CE： The power switch module, high -, low - pass, built-in pull-up resistor can be suspended. CLR： Clear memory address This pin customers have special instructions, to the CE pin, if you need to purchase CLR function. That must buy before or after customers contact us to modify their own internal resistance jumper.
2	VCC	The power input pin voltage range 3.0~6.0V
3	GND	land
4	TXD	UART data output, high voltage VCC-0.3
5	RXD	UART data input voltage range 0~VCC
6	STATE	The state of the control signal output pin, and the same blue lights.

四、 module production



单位 mm

A	B	C	D	E
37.5	15.5	1.4	2.54	4.0

五、 Command mode and data

Give power to the module, the module is not connected to any device, as the command mode, the blue light flashing module connected to other blue
Dental equipment, automatically enters data mode, the blue indicator light

六、 The main steps of setting module

1, in order to ensure the mode, the blue indicator light has been flashing.
2, the use of serial communication tools, such as CommPro provided by the company and set up the correct serial parameters (the default baud rate 9600, data bits 8 bits, 1 stop bit bit, no parity bit, no flow control).
AT+ROLE=1\r\n 3, serial port to send characters, successful return "OK \ R \ n" in which we as a carriage return linefeed (i.e. ASCII 0x0D,
0x0A).
4, the serial port to send characters "AT+CLASS=000000\r\n", "OK\r\n back". (this step is to connect the equipment according to the category code from optional use)

5、 The power on again, the main module module, automatic search from the module to establish a connection.

Note: we can also use the parameter setting tool "BTModuleSettings (XM-15B).Exe set.

七、 The AT instruction

All instructions must be in command mode to be sent, otherwise they would not have any response.
All AT instructions are to enter newline end, is \r\n (0x0D 0x0A), the returned response also enter newline end.
The default parameters: serial baud rate 9600, 8 data bits, 1 stop bit, no parity, no flow control.

1、 测试指令

指令	响应	参数
AT	OK	无

2、 模块复位指令（重启）

指令	响应	参数
AT+RESET	OK	无

3、 获取软件版本号

指令	响应	参数
AT+VERSION?	+VERSION:<ver> OK	ver: 软件版本号

举例说明：

AT+VERSION?\r\n (注意\r\n 是回车换行，两个字符，也就是 ASCII 的 0x0D 和 0x0A) +VERSION:2.3.512.20131101\r\n

OK\r\n

4、 To restore the default state

指令	响应	参数
AT+ORGL	OK	无

The factory default:

①. 1. Equipment: 001F00

②. 3. Query code: 9E8B33

module Slave Mode role

④. . Connection mode: Specifies the special Bluetooth connection mode

⑤. 4. Connection mode: Specifies the special Bluetooth connection mode

⑥. The pairing

code “1234” ⑦. device

name: “XM-15B”

……

5、 获取模块蓝牙地址

指令	响应	参数
AT+ADDR?	+ADDR:<bda>	bda: 模块蓝牙地址

	OK	

蓝牙地址表示方法：NAP UAP LAP（十六进制）

举例说明： 模块蓝牙设备地址为：

00:1B:35:88:00:01

AT+ADDR?

+ADDR: 001B35880001

OK

6、 设置/查询模块设备名称

指令	响应	参数
AT+NAME=<deviceName>	OK	deviceName: 模块设备名称
AT+NAME?	+NAME:<deviceName> OK	

设备名称如果要使用中文， 必须转换成 UTF-8 编码后进行设置，否则手机等蓝牙设备将无法显示模 块的正确名称， 英文字符直接输入即可。 如果名称中带有空格， 请使用引号将整个字符串引起来。

例如：

AT+NAME=”Hello World”

OK

AT+NAME?

+NAME:Hello World

OK AT+NAME=XM-

15B

OK

AT+NAME?

+NAME:XM-15B

OK

7、 获取远程蓝牙设备名称

指令	响应	参数
AT+RNAME?<peerBDA>	1. +RNAME:<deviceName> OK 2. FAIL	peerBDA: 需要获取名称的蓝牙地址 deviceName: 获取到的蓝牙名称（UTF-8 编码）

蓝牙地址表示方法：NAP UAP LAP（十六进制）

例如：

模块蓝牙设备地址为：00:1B:35:88:00:01，设备名称为：

XiangMa AT+RNAME?001B35880001

+RNAME:XiangMa

OK

8、 设置/查询—模块角色

指令	响应	参数
AT+ROLE=<nRole>	OK	nRole: 参数取值如下： 0——从角色（Slave） 1——主角色（Master） 2——回环角色（Slave-Loop） 默认值：0
AT+ROLE?	+ROLE:<nRole> OK	

模块角色说明：

Slave(从角色) ——被动连接；

Master（主角色）——查询周围 SPP 蓝牙从设备，并主动发起连接，从而建立主、从蓝牙设备间的透明数据传输通道。

Slave-Loop(回环角色)——被动连接，接收远程蓝牙主设备数据并将数据原样返回给远程蓝牙主设备；

9、 设置/查询—设备类别码

指令	响应	参数
AT+CLASS=<nCod>	OK	nCod：设备类别码 蓝牙设备类别码实际上是一个 24 位的参数，该参数用于指出设备类型，以及所支持的服务类型。 默认值：001f00（十六进制） 具体设置见附件 1：设备类别码说明
AT+ CLASS?	+ CLASS:<nCod> OK	

为了能有效地对周围诸多蓝牙设备实施过滤，快速查询或被查询自定义蓝牙设备，用户可以将模块设置为非标准蓝牙设备类，如：001f3f（十六进制）。

10、设置/查询—查询访问码

指令	响应	参数
AT+IAC=<iacLap>	1、OK——成功 2、FAIL——失败	iacLap：查询访问码 默认值：9e8b33 具体设置见附件 2：查询访问码说明
AT+IAC?	+IAC：<iacLap> OK	

访问码设置为 GIAC（General Inquire Access Code:0x9e8b33）通用查询访问码，可用来发现或被发现周围所有的蓝牙设备；为了能有效地在周围诸多蓝牙设备中快速查询或被查询自定义蓝牙设备，用户可以将模块查询访问码设置成 GIAC 和 LIAC 以外的数字，如：9e8b3f。

举例：

AT+IAC=9e8b3f

OK

AT+IAC?

+IAC:9e8b3f

OK

11、设置/查询—查询访问模式

指令	响应	参数
AT+INQM=<inqMode>,<numRsp>,<inqLength>	1、 OK——成功 2、 FAIL——失败	inqMode：查询模式 0——inquiry_mode_standard 1——inquiry_mode_rssi numRsp:最多蓝牙设备响应数，0 表示无限制 inqLength:最大查询超时 超时范围：1～48 （折合成时间：1.28 秒～61.44 秒） 默认值：1，0，8
AT+ INQM?	+INQM：<Param1>,<Param2>,<Param3> OK	

举例：

AT+INQM=1,9,48　　——查询模式设置：带 RSSI 信号强度指示，超过 9 个蓝牙设备响应则终止查询，设定超时为 48x1.28=61.44 秒。

OK

AT+INQM?

+INQM:1, 9, 48

OK

12、设置/查询—配对码

指令	响应	参数
AT+PSWD=<pinCode>	OK	pinCode：配对码 默认名称：“1234”
AT+PSWD?	+PSWD:<pinCode> OK	

13、设置/查询—串口参数

指令	响应	参数
AT+UART=<nBaudRate>,<nStopBits>,<nParityBits>	OK	nBaudRate：波特率（bits/s） 取值如下（十进制）： 1200 2400 4800 9600 19200 38400 57600 115200 nStopBits：停止位 0——1 位 1——2 位 nParityBits：校验位 0——None（无校验） 1——Odd （奇校验）
AT+ UART?	+ UART=<nBaudRate>,<nStopBits>,<nParityBits> OK	

		2——Even（偶校验） 默认设置：9600，0，0

举例：设置串口波特率：115200，2 位停止位，偶校验

AT+UART=115200,1,2

OK

AT+UART?

+UART:115200,1,2

OK

14、设置/查询—连接模式：

指令	响应	参数
AT+CMODE=<nMode>	OK	nMode： 0——指定蓝牙地址连接模式（指定蓝牙地址由绑定指令设置） 1——任意蓝牙地址连接模式（不受绑定指令设置地址的约束） 默认连接模式：0
AT+CMODE?	+CMODE:<nMode> OK	

15、设置/查询—绑定蓝牙地址

蓝牙地址表示方法：NAP UAP LAP（十六进制）

指令	响应	参数
AT+BIND=<bda>	OK	bda——绑定的蓝牙地址 默认绑定蓝牙地址： 000000000000（表示没有绑定地址， 要清除绑定地址，也可以发送这个地址）
AT+BIND?	+BIND:<bda> OK	

蓝牙地址表示方法：NAP UAP LAP（十六进制） 绑

定指令只有在指定蓝牙地址连接模式时有效！

举例说明： 在指定蓝牙地址连接模式下，绑定蓝牙设备地址:12:34:56:ab:cd:ef 命令及响应如下：

AT+BIND=123456abcdef\r\n

OK

AT+BIND?\r\n

+BIND:123456abcdef

OK

16、设置/查询—工作状态及连接状态 LED 输出极性

指令	响应	参数
AT+POLAR=<StateLedPolar>, <LinkLedPolar>	OK	StateLedPolar:取值如下 0——状态指示灯输出低电平点亮 LED 1——状态指示灯输出高电平点亮 LED

AT+ POLAR?	+POLAR=<StateLedPolar>, <LinkLedPolar> OK	LinkLedPolar:取值如下 0——连接指示灯输出低电平指示连接成功 1——连接指示灯输出高电平指示连接成功 默认设置：1，1

XM-15B 蓝牙模块只有一个引脚指示状态，在未连接时，StateLedPolar 起效，连接之后 LinkLedPolar 起效。 举例说明：

连接后模块上的蓝色 LED 熄灭 命令及响应如下：

AT+POLAR=1,0

OK

AT+POLAR?

+POLAR=1,0

OK

17、设置/查询查询扫描、呼叫扫描参数

指令	响应	参数
AT+IPSCAN=<Param1>，<Param2>，<Param3>，<Param4>	OK	Param1：查询扫描时间间隔 Param2：查询扫描持续时间 Param3：寻呼扫描时间间隔 Param4：寻呼扫描持续时间 上述参数均为十进制数。 默认值：1024,36,1024,36
AT+IPSCAN?	+IPSCAN: <Param1>，<Param2>，<Param3>，<Param4> OK	

举例说明：

AT+IPSCAN=1234,500,1200,250

OK

AT+IPSCAN?

+IPSCAN:1234,500,1200,250

18、设置/查询—SHIFF 节能参数

指令	响应	参数
AT+SNIFF=<max>，<min>，<attempt>，<timeout>	OK	max：最大时间 min：最小时间 attempt：尝试时间 timeout：超时时间 上述参数均为十进制数。 默认值：200,32,1,8 0,0,0,0 表示不主动进入 Sniff
AT+SNIFF?	+SNIFF: <max>，<min>，<attempt>，<timeout>	

19、设置/查询—安全、加密模式

指令	响应	参数

AT+SENM=<Param1>,<Param2>,	1、OK——成功 2、FAIL——失败	Param1：安全模式，取值如下： 0——sec_mode0+off 1——sec_mode1+non_secure 2——sec_mode2_service 3——sec_mode3_link Param2 加密模式，取值如下： 0——hci_enc_mode_off 1——hci_enc_mode_pt_to_pt 2——hci_enc_mode_pt_to_pt_and_bcast 默认值：1,1
AT+ SENM?	+ SENM: <Param1>,<Param2>, OK	

20、删除指定配对设备

指令	响应	参数
AT+RMSAD=<bda>	OK	bda：蓝牙设备地址

举例说明：
从配对列表中删除蓝牙地址为：12:34:56:ab:cd:ef 的设备

AT+RMSAD=123456abcdef

OK ——删除成功

或

AT+RMSAD =123456abcdef

FAIL——配对列表中不存在12:34:56:ab:cd:ef 蓝牙设备

21、删除所有配对设备

指令	响应	参数
AT+RMAAD	OK	无

举例说明：

从配对列表中删除所有蓝牙设备

AT+RMAAD

OK

22、查找指定的配对设备

指令	响应	参数
AT+FSAD=<bda>	1、 OK——成功 2、 FAIL——失败	bda：蓝牙设备地址

举例说明：

从配对列表中查找蓝牙设备：12:34:56:ab:cd:ef

at+fsad=123456abcdef

OK ——配对列表中存在 12:34:56:ab:cd:ef 蓝牙设备。

at+fsad=123456abcdef

FAIL ——配对列表中不存在 12:34:56:ab:cd:ef 蓝牙设备。

23、获取已配对设备数

指令	响应	参数
AT+ADCN?	+ADCN：<Param> OK	Param：配对列表中蓝牙设备数

举例说明：

at+adcn?

+ADCN:0 ——0 表示没有已经蓝牙设备

OK

24、获取最后使用的配对设备地址

指令	响应	参数
AT+MRAD?	+MRAD:<bda> OK	bda：最近使用过的蓝牙设备地址

举例说明：

AT+MRAD?

+MRAD:000000000000 ——000000000000 表示最近没有使用任何已配对设备

OK

25、获取蓝牙模块工作状态

指令	响应	参数
AT+STATE?	+STATE:<stateDesc> OK	stateDesc：模块工作状态 返回值如下： “INITIALIZED”——初始化状态 “READY” ——准备状态 “PAIRABLE”——可配对状态 “PAIRED”——配对状态 “INQUIRING”——查询状态 “CONNECTING”——正在连接状态 “CONNECTED”——连接状态 “DISCONNECTED”——断开状态 “UNKNOWN”——未知状态

举例说明：

AT+STATE?

+STATE: PAIRABLE ——可配对状态

OK

26、初始化 SPP 规范库

指令	响应	参数
AT+INIT	1、OK——成功 2、FAIL——失败	无

27、查询蓝牙设备

指令	响应	参数
AT+INQ	+INQ:〈bda〉,〈cod〉,〈rssi〉, OK	bda：蓝牙地址 cod：设备类 rssi：RSSI 信号强度

举例说明 1：

at+iac=9e8b33 ——查询任意访问码的蓝牙设备

OK

at+class=000000 ——查询各种类型的蓝牙设备

OK

at+inqm=1,9,48 ——查询模式：带 RSSI 信号强度指示，超过 9 个蓝牙设备响应则终止查询，

设定超时为 48x1.28=61.44 秒。

At+inq ——查询周边蓝牙设备

+INQ:001b35880001,001f00,-20

+INQ:001b35880001,001f00,-22

+INQ:001b35880001,001f00,-23

+INQ:001b35880001,001f00,-20

+INQ:001b35880001,001f00,-55

+INQ:001b35880001,001f00,-27

+INQ:001b35880001,001f00,-20

+INQ:001b35880001,001f00,-24

+INQ:001b35880001,001f00,-22

OK

举例说明 2：

at+iac=9e8b33 ——查询任意访问码的蓝牙设备

OK

at+class=1f1f ——查询设备类为 0x1f1f 的蓝牙设备 OK

at+inqm=1,9,48 ——查询模式：带 RSSI 信号强度指示，超过 9 个蓝牙设备响应则终止查询，

设定超 时为 48x1.28=61.44 秒。

At+inq ——过滤、查询周边蓝牙设备

+INQ:001b35880001,001f1f,-20

+INQ:001b35880001,001f1f,-22

+INQ:001b35880001,001f1f,-33

+INQ:001b35880001,001f1f,-20

+INQ:001b35880001,001f1f,-25

+INQ:001b35880001,001f1f,-27

+INQ:001b35880001,001f1f,-20

+INQ:001b35880001,001f1f,-24

+INQ:001b35880001,001f1f,-22

OK

举例说明 3：

at+iac=9e8b3f ——查询访问码为 0x9e8b3f 的蓝牙设备

OK

at+class=1f1f　　——查询设备类为 0x1f1f 的蓝牙设备

OK

at+inqm=1,1,20　　——查询模式：带 RSSI 信号强度指示，超过 1 个蓝牙设备响应则终止查询，设定超时为 20x1.28=25.6 秒。

At+inq　　——过滤、查询周边蓝牙设备

+INQ: 001b35880001,001f1f,-12

OK

28、取消查询蓝牙设备

指令	响应	参数
AT+INQC	OK	无

29、设备配对：

指令	响应	参数
AT+PAIR=<bda>,<timeoutSec>	1、OK——成功 2、FAIL——失败	bda：远程设备蓝牙地址 timeoutSec：连接超时（秒）

与远程蓝牙设备：12:34:56:ab:cd:ef 配对，最大配对超时 20 秒

at+pair=123456abcdef,20

OK

30、设备连接

指令	响应	参数
AT+LINK=<bda>	1、OK——成功 2、FAIL——失败	bda：远程设备蓝牙地址

举例说明：

与远程蓝牙设备：12:34:56:ab:cd:ef 建立连接

at+link=123456abcdef　　——连接蓝牙设备 12:34:56:ab:cd:ef，如果之前没有匹配，会根据需要进行匹配。

OK

31、断开连接

指令	响应	参数
AT+DISC	1、+DISC:SUCCESS——断开连接成功 OK 2、+DISC:LINK_LOSS——连接丢失 OK 3、+DISC:NO_SLC——没有 SLC 连接 OK 4、+DISC:TIMEOUT——断开超时 OK 5、+DISC:ERROR——断开错误	无

	OK	

32、进入节能模式

指令	响应	参数
AT+ENSNIFF=<bda>	OK	bda：设备蓝牙地址

33、退出节能模式

指令	参数	响应
AT+EXSNIFF=<bda>	OK	bda：设备蓝牙地址

34、退出命令模式

指令	参数	响应
AT+EXIT	OK	无

附录 1

设备类别码

The Class of Device/Service field

The Class of Device/Service (CoD) field has a variable format. The format is indicated using the 'Format Type field' within the CoD. The length of the Format Type field is variable and ends with two bits different from '11'. The version field starts at the least significant bit of the CoD and may extend upwards.

In the 'format #1' of the CoD (Format Type field = 00), 11 bits are assigned as a bit-mask (multiple bits can be set) each bit corresponding to a high level generic category of service class. Currently 7 categories are defined. These are primarily of a 'public service' nature. The remaining 11 bits are used to indicate device type category and other device-specific characteristics.

Any reserved but otherwise unassigned bits, such as in the Major Service Class field, should be set to 0.

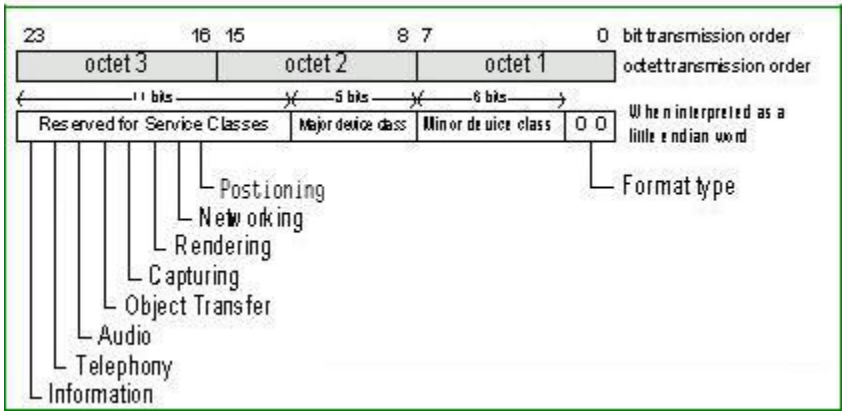


Figure 1: *The Class of Device/Service field (first format type). Please note the order in which the octets are sent on the air and stored in memory. Bit number 0 is sent first on the air.*

Major Service Classes

The Major and Minor classes are intended to define a general family of devices with which any particular implementation wishes to be associated. No assumptions should be made about specific functionality or characteristics of any application based solely on the assignment of the Major or Minor device class.

Bit no	Major Service Class
13	Limited Discoverable Mode [Ref #1]
14	(reserved)
15	(reserved)
16	Positioning (Location identification)
17	Networking (LAN, Ad hoc, ...)
18	Rendering (Printing, Speaker, ...)
19	Capturing (Scanner, Microphone, ...)
20	Object Transfer (v-Inbox, v-Folder, ...)
21	Audio (Speaker, Microphone, Headset service, ...)

22	Telephony (Cordless telephony, Modem, Headset service, ...)
23	Information (WEB-server, WAP-server, ...)

Table 2: *Major Service Classes*

[Ref #1 See Generic Access Profile (Please refer to the Generic Access Profile within the respective Core Specification)]

Major Device Classes

The Major Class segment is the highest level of granularity for defining a *Bluetooth* Device. The main function of a device is used to determine the major class grouping. There are 32 different possible major classes. The assignment of this Major Class field is defined in Table 1.3.

12	11	10	9	8	Major Device Class
0	0	0	0	0	Miscellaneous [Ref #2]
0	0	0	0	1	Computer (desktop,notebook, PDA, organizers, ...)
0	0	0	1	0	Phone (cellular, cordless, payphone, modem, ...)
0	0	0	1	1	LAN /Network Access point
0	0	1	0	0	Audio/Video (headset,speaker,stereo, video display, vcr.....
0	0	1	0	1	Peripheral (mouse, joystick, keyboards, ...)
0	0	1	1	0	Imaging (printing, scanner, camera, display, ...)
0	0	1	1	1	Wearable
0	1	0	0	0	Toy
0	1	0	0	1	Health
1	1	1	1	1	Uncategorized, specific device code not specified
X	X	X	X	X	All other values reserved

Table 3: *Major Device Classes*

[Ref #2: Used where a more specific Major Device Class code is not suited (but only as specified in this document). Devices that do not have a major class code assigned can use the all-1 code until 'classified']

The Minor Device Class field

The 'Minor Device Class field' (bits 7 to 2 in the CoD), are to be interpreted only in the context of the Major Device Class (but independent of the Service Class field). Thus the meaning of the bits may change, depending on the value of the 'Major Device Class field'. When the Minor Device Class field indicates a device class, then the primary device class should be reported, e.g. a cellular phone that can also work as a cordless handset should use 'Cellular' in the minor device class field.

Minor Device Class field - Computer Major Class

7	6	5	4	3	2	Minor Device Class bit no of CoD
0	0	0	0	0	0	Uncategorized, code for device not assigned
0	0	0	0	0	1	Desktop workstation
0	0	0	0	1	0	Server-class computer
0	0	0	0	1	1	Laptop
0	0	0	1	0	0	Handheld PC/PDA (clam shell)

0	0	0	1	0	1	Palm sized PC/PDA
0	0	0	1	1	0	Wearable computer (Watch sized)
X	X	X	X	X	X	All other values reserved

Table 4: *Sub Device Class field for the 'Computer' Major Class*

Minor Device Class field - Phone Major Class

7	6	5	4	3	2	Minor Device Class bit no of CoD
0	0	0	0	0	0	Uncategorized, code for device not assigned
0	0	0	0	0	1	Cellular
0	0	0	0	1	0	Cordless
0	0	0	0	1	1	Smart phone
0	0	0	1	0	0	Wired modem or voice gateway
0	0	0	1	0	1	Common ISDN Access
X	X	X	X	X	X	All other values reserved

Table 5: *Sub Device Classes for the 'Phone' Major Class*

Minor Device Class field - LAN/Network Access Point Major Class

7	6	5	Minor Device Class bit no of CoD
0	0	0	Fully available
0	0	1	1 - 17% utilized
0	1	0	17 - 33% utilized
0	1	1	33 - 50% utilized
1	0	0	50 - 67% utilized
1	0	1	67 - 83% utilized
1	1	0	83 - 99% utilized
1	1	1	No service available
X	X	X	All other values reserved

Table 6: *The LAN/Network Access Point Load Factor field*

The exact loading formula is not standardized. It is up to each LAN/Network Access Point implementation to determine what internal conditions to report as a utilization percentage. The only requirement is that the number reflects an ever-increasing utilization of communication resources within the box. As a recommendation, a client that locates multiple LAN/Network Access Points should attempt to connect to the one reporting the lowest load.

4	3	2	Minor Device Class bit no of CoD
0	0	0	Uncategorized (use this value if no other apply)
X	X	X	All other values reserved

Table 7: *Reserved sub-field for the LAN/Network Access Point*

Minor Device Class field - Audio/Video Major Class

7	6	5	4	3	2	Minor Device Class bit no of CoD
0	0	0	0	0	0	Uncategorized, code not assigned
0	0	0	0	0	1	Wearable Headset Device
0	0	0	0	1	0	Hands-free Device
0	0	0	0	1	1	(Reserved)
0	0	0	1	0	0	Microphone
0	0	0	1	0	1	Loudspeaker
0	0	0	1	1	0	Headphones
0	0	0	1	1	1	Portable Audio
0	0	1	0	0	0	Car audio
0	0	1	0	0	1	Set-top box
0	0	1	0	1	0	HiFi Audio Device
0	0	1	0	1	1	VCR
0	0	1	1	0	0	Video Camera
0	0	1	1	0	1	Camcorder
0	0	1	1	1	0	Video Monitor
0	0	1	1	1	1	Video Display and Loudspeaker
0	1	0	0	0	0	Video Conferencing
0	1	0	0	0	1	(Reserved)
0	1	0	0	1	0	Gaming/Toy
X	X	X	X	X	X	All other values reserved

Table 8: *Sub Device Classes for the 'Audio/Video' Major Class*

Minor Device Class field - Peripheral Major Class

7	6	Minor Device Class bit no of CoD
0	0	Not Keyboard / Not Pointing Device
0	1	Keyboard
1	0	Pointing device
1	1	Combo keyboard/pointing device

Table 9: *The Peripheral Major Class keyboard/pointing device field*

Bits 6 and 7 independantly specify mouse,keyboard or combo mouse/keyboard devices. These may be combined with the lower bits in a multifunctional device.

5 4 3 2	Minor Device Class bit no of CoD
0 0 0 0	Uncategorized device
0 0 0 1	Joystick
0 0 1 0	Gamepad
0 0 1 1	Remote control
0 1 0 0	Sensing device
0 1 0 1	Digitizer tablet
0 1 1 0	Card Reader (e.g. SIM Card Reader)
X X X X	All other values reserved

Table 10: *Reserved sub-field for the device type*

Minor Device Class field - Imaging Major Class

7 6 5 4	Minor Device Class bit no of CoD
X X X 1	Display
X X 1 X	Camera
X 1 X X	Scanner
1 X X X	Printer
X X X X	All other values reserved

Table 11: *The Imaging Major Class bits 4 to 7*

Bits 4 to 7 independantly specify display, camera, scanner or printer. These may be combined in a multifunctional device.

3 2	Minor Device Class bit no of CoD
0 0	Uncategorized, default
X X	All other values reserved

Table 12: *The Imaging Major Class bits 2 and 3*

Bits 2 and 3 are reserved

Minor Device Class field - Wearable Major Class

The Minor Class segment is the lowest level of granularity for defining a *Bluetooth* Device. There are 64 different possible minor classes.

7 6 5 4 3 2	Minor Device Class bit no of CoD
0 0 0 0 0 1	Wrist Watch
0 0 0 0 1 0	Pager
0 0 0 0 1 1	Jacket
0 0 0 1 0 0	Helmet

0 0 0 1 0 1	Glasses
X X X X X X	All other values reserved

Minor Device Class field - Toy Major Class

7 6 5 4 3 2	Minor Device Class bit no of CoD
0 0 0 0 0 1	Robot
0 0 0 0 1 0	Vehicle
0 0 0 0 1 1	Doll / Action Figure
0 0 0 1 0 0	Controller
0 0 0 1 0 1	Game
X X X X X X	All other values reserved

Minor Device Class field - Health

7 6 5 4 3 2	Minor Device Class bit no of CoD
0 0 0 0 0 0	Undefined
0 0 0 0 0 1	Blood Pressure Monitor
0 0 0 0 1 0	Thermometer
0 0 0 0 1 1	Weighing Scale
0 0 0 1 0 0	Glucose Meter
0 0 0 1 0 1	Pulse Oximeter
0 0 0 1 1 0	Heart/Pulse Rate Monitor
0 0 0 1 1 1	Health Data Display
0 0 1 0 0 0	Step Counter
X X X X X X	All other values reserved

Example:

PC： 0x120104

NOTEBOOK： 0x12010C

Headphones： 0x200404

附录 2

通用及设备特定的查询访问码**(DIAC)**

查询访问码(IAC)是寻找蓝牙设备和服务的第一个过滤层。定义多个 IAC 的主要目的是限制查看范围内的设备时响应的数量。

#	LAP 值	用途
0	0x9E8B33	通用 / 无限查询访问码 (GIAC)
1	0x9E8B00	有限的专用查询访问码 (LIAC)
2 63	0x9E8B01-0x9E8B32, 0x9E8B34-0x9E8B3F	留待将来使用

表 1：查询访问码：

有限查询访问码 (LIAC) 仅用于限定的时段，在两边均已明确要进入此状态的情况下使用，通常由用户操作。有关 LIAC 使用的详细说 明，请参考通用访问配置文件。

相反，允许持续扫描通用查询访问码 (GIAC) 并在查询时响应。