BT03 communication protocols

v1.2

Notice:If no special instructions，all data in Big-endian,LSB（Least Significant Byte）
All time based on UTC+0 timezone

(1) Bluetooth broadcast and scan response data format：

1、Bluetooth broadcast PDU：

1.1、specific definition（the order of PDU）：

serial number	definition	meaning
1	02	Fixed value
2	01	Fixed value
3	06	Fixed value
9	length	0xff length of data types,27byte
10	Type definition	0xff
11—n	Details of broadcast	Refer the below broadcast data format

1.2 the order of broadcast date：

<table>
<tr><td>length</td><td>Type</td><td>Company No. Low Byte</td><td>Company No. High Byte</td><td>Hardware type</td><td>Firmware type</td><td>reserved</td><td>ID</td><td>reserved</td></tr>
<tr><td>length</td><td>0xff</td><td>1Byte, 0x23</td><td>1Byte, 0xFF</td><td>1Byte</td><td>2Byte</td><td>1Byte</td><td>4Byte</td><td>3Byte</td></tr>
<tr><td rowspan="2">Voltage</td><td rowspan="2">Device status</td><td rowspan="2">Alarm status</td><td colspan="4">Sensor data</td><td>reserved</td><td rowspan="2"></td></tr>
<tr><td>Sensor status</td><td>temp data</td><td>reserved</td><td>reserved</td><td></td></tr>
<tr><td>1Byte</td><td>1Byte</td><td>1Byte</td><td>1Byte</td><td>2Byte</td><td>2Byte</td><td colspan="2">5Bytes</td></tr>
</table>

A、 Company No.：**0xFF23**

B、Hardware Type：1Byte，

Types：

0x04：TempU06 L60

0x07：TempU06 L100

0x08：TempU06 L200

0x09：BT06

0x0A：BT03

C、Firmware Type：2Byte，Type（1Bytes）+Version（1Byte）

Types：

0x01：Standard version

Version：[1,255]

D、 Reserved：1Byte，0x00

E、ID：4Bytes,（4 Bytes hex）For Example:0x01 23 45 67，means the ID is 01234567

F、Reserved：3Byte，0x00 00 00

G、 Voltage：1Byte，Unit:10mv，The voltage value add 2000mv equal the Battery real voltage，For example, if the Voltage data is 0xA0=160,the Battery real voltage is 160*10mv +2000mv=3600mv

H、 Device status：1Byte

Bit7-Bit6	Bit5- Bit4	Bit3	Bit2	Bit1- Bit0
Reserved	00: unlock 01：normal lock 10：high lock 11：Reserved	Reserved	Reserved	00：initialization 01: start delay 10：recording 11：stop

I、 Alarm Status：1Byte

Bit7- Bit4	Bit3- Bit2	Bit1- Bit0
Reserved	Reserved	00：no temp alarm 01： alarm for high temp limit 10： alarm for low temp limit 11： alarm for high and low temp limit

J、 Sensor status：1Byte

Bit7-Bit3	Bit2	Bit1-Bit0
Reserved	1: sensor enable 0: sensor disable	00：sensor enable，Celsius 01:sensor enable, Fahrenheit 11：sensor disable

Notice：if the sensor disable, there do not have sensor information

K、 Temperature data：2Bytes，Unit：0.1C/F

Bit15	Bit14 -Bit0
0：positive 1：negative	Temperature value

For example 0x0164 means the temperature is 35.6℃,

0x8164 means the temperature is -35.6℃,

0xFE00 means the temperature sensor disable;

L、reserved：2Bytes，data full with 0xFF

M、reserved：5Bytes，data full with 0xFF

2、scan response data format　PDU：

specific definition（the order of PDU）：

serial number	definition	means
1	length	**0x09** length of data types
2	Type definition	0x09
3	Details of scan response data	Refer the below scan response data format

	Type	Device name
length	0x09	0-15Bytes

A、 Device Name：0-15Byte

(2) Connection data format：

Service UUID1：6c40-0001-B5A3-F393-E0A9-E50E24DCCA9E

Characteristic UUID Corresponding relationship table：

Characteristic UUID	length	properties	Character rist
6c40-0002	Non-fixed based on MTU(Maximum Transmission Unit) setting	Write Write No Response	RX
6c40-0003	Non-fixed based on MTU(Maximum Transmission Unit) setting	Notify	TX

A-1:control command format

'start character'+'length'+'command'+'parameter'+'terminator'

start character：1Byte，*（0x2A）

length：1Byte， the length from the command to the terminator

command：2Byte，refer to the command list below

parameter：nByte，about n[0,15]please refer the command list below

terminator：1Byte，#（0x23）

A-2:Response command format：

The response data format is：（response in the TX characteristic）

'start character'+'command'+'status'+'parameter'+'terminator'

start character:：1Byte，&（0x26）

command：2Byte，refer the command list below
status：1Byte，refer the command list below
parameter：nByte，about n[0,15] please refer the command list below
terminator：1Byte，#（0x23）

A-3:Response command status：

Control Instruction	Status Value	Description
Control Command Sent	0x00	Reserved
	0x01	Successful operation
	0x02	Operation failed
	0x03	Operation not allowed
	0x04	Data length exceeds limit
	0x05	Unknown error
	0x06	Parameter error
	0x07	Need restart stored data transfer
	0x08-0xff	Reserved

A-4:command list：

Notice：

A、 all data in Big-endian,LSB（Least Significant Byte）；

B、The green fonts in the configuration content are the data that defaults to 00 directly;;

C、 In the recording state, the following commands are not allowed to be configured: 43 20/43 23, if configured, the device will clear all data records;

Items	command（hex）	Parameter Length	parameter form	Description
Start recording	52 a0	0		
Stop recording	52 a1	0		
Clear historical data	52 a3	0		

<table>
<tr><td>Data storage setting</td><td>43 02</td><td rowspan="2">15</td><td rowspan="2">Hex</td><td rowspan="2">Format:
Data storage interval（2Bytes）+reserved（4Byte）+temp unit（1Byte）+reserved（8Byte）
Data storage interval format： unit is second，[10,64800]
For example： 10 seconds：0x0A 00
Temp unit format:
For example:
0x00: means the temp unit is ℃
0x01:means the temp unit is ℉
Reserved format：0x00</td></tr>
<tr><td>Read stored data</td><td>72 02</td></tr>
<tr><td rowspan="7">Set the description information on the PDF report</td><td>43 04</td><td rowspan="9">15</td><td rowspan="9">ASCII</td><td rowspan="9">Format:
1、the description information stop bits should be ‘\0’
2、None description，the data is: 0x00
For example:
If the description is Temp and humidity, the data format should be:
0x54 65 6d 70 20 61 6e 64 20 68 75 6d 69 64 69 74 79 00
When the description data longer than 20Bytes, please write in batches.After finished all batches writing, the device will reply the writing result</td></tr>
<tr><td>43 05</td></tr>
<tr><td>43 06</td></tr>
<tr><td>43 07</td></tr>
<tr><td>43 08</td></tr>
<tr><td>43 09</td></tr>
<tr><td>43 0a</td></tr>
<tr><td>43 0b</td></tr>
<tr><td>Read the description information</td><td>72 04</td></tr>
<tr><td>Set L1 and H1 Alarm</td><td>43 20</td><td rowspan="2">12</td><td rowspan="2">Hex</td><td rowspan="2">Format:
Alarm L1 status （1Byte）+reserved（3Bytes）+alarm threshold（2Bytes）
+Alarm H1 status（1Byte）+reserved（3Bytes）+alarm threshold（2Bytes）
Alarm L1 status：
0x00，disable</td></tr>
<tr><td>Read L1 and H1 Alarm</td><td>72 20</td></tr>
</table>

				0x1a，enable **Alarm threshold：** Temp value multiplied by 10 The threshold range is [-350,700] **For example：** 20℃：write 0xC8 00 -2℃：Convert to hexadecimal as 65536 -20=0xEC FF
Set encryption information	43 32	7	Hex	**Format：** Encryption status （ 1Byte ）+Password（6Bytes） **Encryption status Format：** 0x00：Unencrypted 0x0a：normal encryption 0x1a：high encryption **Password Format：** 6Bytes password are numbers in ASCII code
Read encryption information	72 32	1	Hex	**Format：** 0x00，unencrypted 0x0a：normal encryption 0x1a， high encryption
Set device name	43 33	15	ASCII	**Format：** If less than 15Bytes，all filled with FF
Read device name	72 33			
Set Unlock encryption	43 34	6	Hex	password（6Bytes）
Set bluetooth broadcast TX-power and interval	43 35	2	Hex	**Format：** Broadcast TX-power（1Byte）+Broadcast interval（2Byte） **Broadcast TX-power format：** 0x06：0dbm 0x07：4dbm **Broadcast interval format：** Unit 100ms，1Byte [1,400]，range from 100 to 40000ms
Read bluetooth broadcast TX-power and interval	72 35	2	Hex	

Read device ID	72 41	7	Hex	**Format：** 7Bytes,consists of numbers（4 Bytes hex ） +reserved （3Bytes）For example 0x01 23 45 67， The device ID is 01234567
Read device Hardware type firmware Type and firmware version	72 42	10	Hex	**Format：** Hardware type （ 2Bytes ） +Firmware type （ 1Byte ） +Firmware version （1Byte）+reserved（6Bytes） **Hardware Type:**0x3D0A **Firmware type：**1Byte 0x01：standard type **Firmware version ：** 1Byte [1,255]
Set time stamp	43 52	4	Hex	**Format：** Time stamp（4Bytes） **Time stamp format：** The seconds calculated from 1st,Jan,1970 to existing device time 0Xee 4c be 62 means the time is 2022-07-01 09:25:02 (UTC+8 timezone time)
Read time stamp	72 52	4	Hex	
Write all settings to device	43 FF	0		

Query type of stored data	4c 01	None	Hex	**If there None stored data,the device will reply：** 0x00 00 00 00 00000000 **If there have stored data, the device will reply：** Stored data information+reserved （ 6 bytes） **Format：** Stored data information length (2Bytes)+start mode (1Byte) +stop mode(1Byte)+reserved （14Bytes） **Stored data information length format：** Length calculate from start mode To reserved； **Start mode format：** 0x00：button start 0x02：APP start **Stop mode format：** 0x00：initialization status 0x01：button stop 0x05：APP stop 0x10：recording
Extract stored data	6c 00	11	Hex	**Format：** Extract mode（1Byte）+ACK confirm package （2Bytes） +start time stamp （4Bytes） +stop time stamp（4Bytes） **Extract mode format：** 0x00：extract all of stored data 0x02：extract stored data according to time stamp **ACK confirm package**

				format: 0x00 ： No need ACK confirm 0x00000001-0XFFFFFFFF： Need receive ACK confirm after send the **x**th data, if received ACK,continue the data sending ， if not received ACK, stop sending **Start/stop time stamp format：** Start time stamp 0x00000000 means the first data time， stop time stamp 0x00000000 means last data time For other time, please set the time stamp follow the time stamp format **Time stamp format：** The seconds calculated from 1st,Jan,1970 to existing device time 0Xee 4c be 62 means the time is 2022-07-01 09:25:02 (UTC+8 timezone time)
Device reply of extract stored data	6c 00 status + data	10	Hex	**Data format:** Number of data (2Bytes)+start time stamp（4Bytes）+stop time stamp（4Bytes） **Time stamp format:** The seconds calculated from 1st,Jan,1970 to existing device time 0Xee 4c be 62 means the time is 2022-07-01 09:25:02 (UTC+8 timezone time)

App ACK confirm	6c a1	1	Hex	**Format：** ACK Status： 0x01 means received the right ACK confirm, the device will continue send data 0xa1， means didn't received the right ACK confirm, request to resend the ACK confirm
Start stored data transmission	6c 01	None		
Reply the stored data		N	Hex	**Format：** **Stored data format:** N: after connected, the length of a packet of data. It`s from 0 to MTU，The MTU means the max length of a packet of data Note:when the alarm data length over the MTU,it will send the alarm data in batches
Request to resend the stored data	6c 02	None		When request to resend the stored data,resend all of the stored data
Stop transmit stored data	6c 03	None		
Request sensor Information of stored data	6c 04	None		
Reply sensor Information of stored data		1	Hex	Format： **Sensor information of stored data format:** 0x01：temp sensor（2Bytes，unit 0.1） 0x02： temp&RH sensor，temp（2Bytes，unit 0.1）+RH（2Bytes，unit 0.1%）

A-5:Stored data format：

Package length + type + stored data

a. Package length：2Bytes，calculate from type to stored data

b. Type：1Byte

c. data：0—n Bytes

Package Length （2Bytes）	Type（1Byte）	Stored Data
	0x00	**Start package format：** Numbers of stored data（4Bytes）
	0xFF	**Stop package format：** Numbers of uploaded stored data （4Bytes） +Numbers of uploaded Stored data packets（4Bytes）
	0x01	**Tine stamp+sensor stored data packet format：** N groups*（time stamp（4Bytes）+ stored data（2 Bytes））
	0x02	**Sensor stored data format：** N groups* stored data（2 Bytes）
	0x03	**Time stamp+data storage interval+stored data packet format：** Time stamp（4Bytes）+data stored interval（4Bytes，Unit：second）+ N groups* stored data （2 Bytes）
	other	Reversed

(3）Example of device configure and read the stored data

1、Step of device configure：

A、APP connect with device；

B、APP send command：0x2A 03 72 32 23，query if the device encrypted，If encrypted, please follow the step C, if not please follow the step D

C、 APP send command：0x2A 09 43 34 XX XX XX XX XX XX (6 Bytes password) 23to unlock the device；

D、APP send command as you want. (refer the command list)

E、APP send command 0x2A 03 43 FF 23，to active all of the commands

2、read the stored data：

（1）read all of stored data，with out ACK confirm：

A. APP connect with device；

B. APP send command：0x2A 03 72 32 23，query if the device encrypted，If encrypted, please follow the step C, if not please follow the step D；

C. APP send command：0x2A 09 43 34 XX XX XX XX XX XX (6 Bytes password) 23 to unlock the device；

D. APP send command to read all of the stored data：0x2A 0D 6c 00 00 00 00 00 00 00 00 00 00 00 00 23;

E. Device reply：

F. 0x26 6c 00 01（read successfully） 01 00（number of data: one data） 80 96 78 61 （start time stamp： 2021-10-27 08:00:00） 80 96 78 61 （stop time stamp： 2021-10-27 08:00:00） 23;

G. APP send command to query the type of stored data ：0x2A 03 6c 04 23

H. Device reply：

0x2A 6c 04 01 01 23

I. APP send command to read stored data：0x2A 03 6c 01 23

J. Device reply：

Start packet：

0x06 00 00 01 00 00 00

Data packet：

0x07 00 01 80 96 78 61（2021-10-27 08:00:00） FA 00（temperature：25.0）

Stop packet：

0x0A 00 FF 01 00 00 00 01 00 00 00

（2）Read all of stored data，with ACK confirm：

A、 APP connect with device；

B、 APP send command ： 0x2A 03 72 32 23， query if the device encrypted， If encrypted, please follow the step C, if not please follow the step D；

C、 APP send command：0x2A 09 43 34 XX XX XX XX XX XX (6Bytes password) 23 to unlock the device；

D、 APP send command to read all of the stored data ：0x2A 0D 6c 00 00 01 00（send one piece if data and wait for device ACK confirm） 00 00 00 00 00 00 00 00 23;

E、 Device reply：

0x26 6c 00 01（read successfully） 02 00（number of data: 2 data） 80 96 78 61 （start time

stamp： 2021-10-27 08:00:00） 8A 96 78 61（stop time stamp： 2021-10-27 08:00:10） 23;

F、 APP send command to query the type of stored data：0x2A 03 6c 04 23

G、 Device reply:

0x26 6c 04 01 01 23

H、 APP send command to read stored data：0x2A 03 6c 01 23

Start packet：

0x06 00 00 01 00 00 00

Device send the first packet of data：

0x07 00 01 80 96 78 61（2021-10-27 08:00:00） FA 00（temperature：25.0） APP send received ACK confirm packet：0x26 03 6c A1 23;

I、 Device send the second packet of data：

0x07 00 01 8B 96 78 61（2021-10-27 08:00:11） FA 00（temperature：25.0）

K、 Device send the stop packet of data::

0x0A 00 FF 02 00 00 00 02 00 00 00

（3）read the stored data according to time stamp，without ACK confirm：

A、 APP connect with device；

B、 APP send command：0x2A 03 72 32 23，query if the device encrypted，If encrypted,

please follow the step C, if not please follow the step D；

C、 APP send command：0x2A 09 43 34 XX XX XX XX XX XX (6Bytes password) 23 to unlock the device；

D、 APP send command to query the type of stored data：0x2A 03 6c 04 23

E、 Device reply:
0x26 6c 04 01 02 23

F、 APP send command to get the stored data during 2021-10-27 08:00:00---2021-10-27 20:00:00:
0x2A 0D 6c 00 02 00 00 80 96 78 61 （2021-10-27 08:00:00）40 3F 79 61 （2021-10-27 20:00:00） 23;

G、 Device reply：
0x26 6c 00 01（read successfully） 01 00（number of data: one data） 80 96 78 61 （start time stamp: 2021-10-27 08:00:00） 80 96 78 61 （stop time stamp：2021-10-27 08:00:00） 23;

H、 APP send command to read stored data：0x2A 03 6c 01 23

I、 Device reply：
Start packet：
0x06 00 00 01 00 00 00
Data packet：
0x07 00 01 80 96 78 61（2021-10-27 08:00:00） FA 00（temperature：25.0）
Stop packet：
0x0A 00 FF 01 00 00 00 01 00 00 00