OMRON

环境传感器（USB型）

2JCIE-BU01

用户手册

环境传感器（USB型）

CDSC-CN1-016B

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1. Introduction

1.1. Scope

本通信接口说明书适用于 USB　型环境传感器(2JCIE-BU01)的通信接口。

1.2. Communication interface

USB 型环境传感器利用内置的无线接口与智能手机、平板电脑、Gateway 等(以下称为对象机)进行Bluetooth®low energy(以下称为BLE)通信或USB2.0通信。USB型环境传感器具有BLE的Peripheral功能。

Table 1 GAP Role

GAP Role	
2JCIE-BU01	Peripheral
Smartphone, Gateway	Central

1.3. Operation mode

USB 型环境传感器具有 Normal mode、Acceleration logger mode，可根据用途选择。Mode 可任意变更。

1.3.1 Normal mode

传感器具有获取温度、相对湿度、照度、气压、噪音、eTVOC、eCO2、不适指数、中暑指数等的感应数据，还 具有通过加速度传感器进行地震/振动判断的功能，可计算 SI 值、PGA、测量震度相当值。感应数据可以任意间隔保存在内置 FLASH memory 中，在发生地震/振动时自动将原始加速度数据保存到 FLASH memory 中。

*不适指数：以数量表示夏季闷热程度的数据。根据温度和湿度换算。
*中暑指数：以数量表示夏季中暑危险度的数据。根据温度和湿度换算。
*SI 值：表示某个振动对结构物造成影响的指标。与震度相关。根据水平 2 轴的加速度值换算。
*PGA：某区间内的最大加速度值。合成水平 2 轴的加速度值进行换算。
*测量震度相当值：与根据 SI 值求得的震度相关的值。

关于 eCO2 的说明
eCO2（等效二氧化碳）是根据 eTVOC 计算出的二氧化碳浓度等效值，并不直接测量二氧化碳。eCO2 是根据与测量的 eTVOC 的相关性，假设人类的呼吸是室内 VOC 的主要来源，通过算法估算出的数值。因此，如果来自人类以外的 VOCs 变得很大，eCO2 值也会变得很大，因此，它不能用于需要测量二氧化碳的应用。

1.3.2 Acceleration logger mode

是获取加速度专用的mode，可获取、保存指定动作频率、期间内的原始加速度数据。不进行SI值、PGA等的计算。

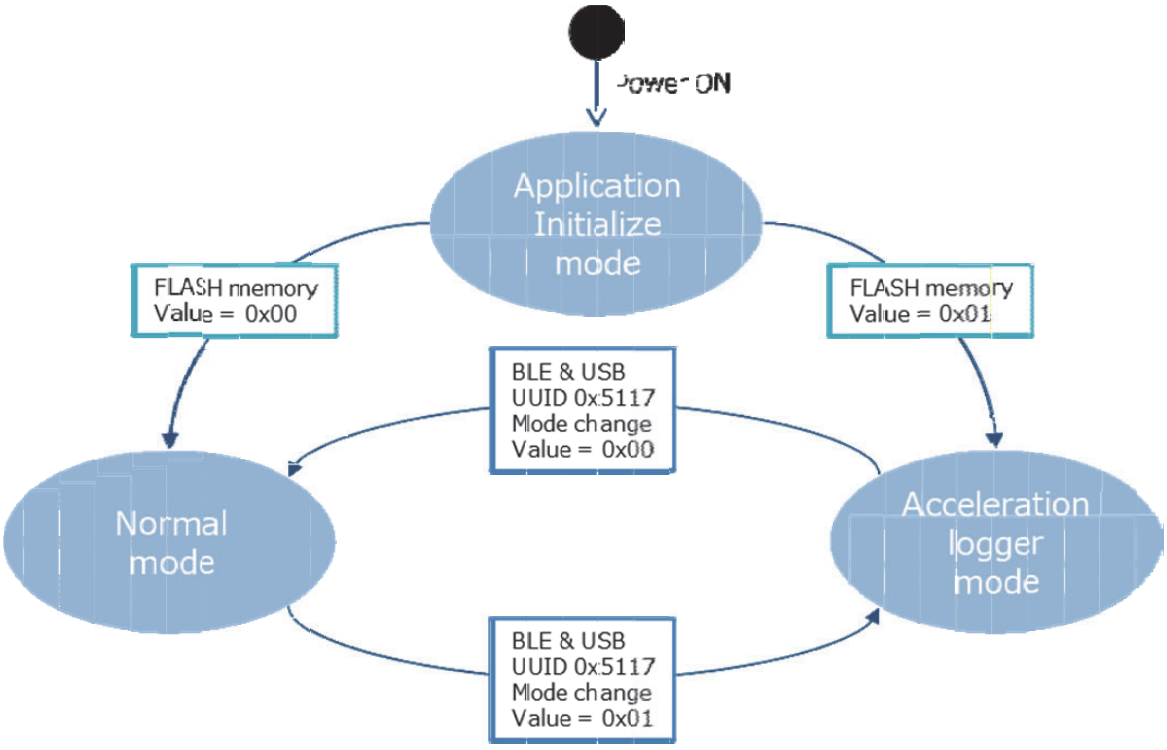

Figure 1 Mode transition

1.4. Use case

下面举出具有代表性的使用例进行说明。

1.4.1 BLE connection

利用 BLE 通信与 Central 设备连接，可以进行感应数据的保存和获取、地震发生时加速度数据的获取、LED 点亮及模式切换等各种设定。详情请参考 2. BLE GATT Services。

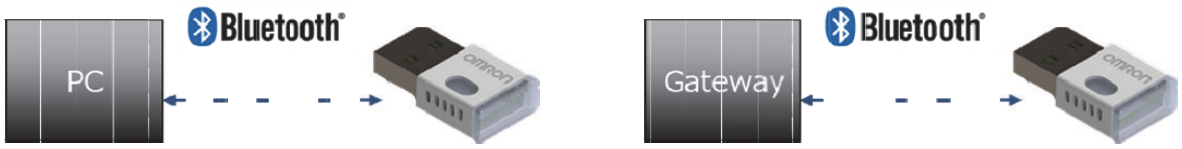

Figure 2 BLE connection image

1.4.2 Receive advertising data (BLE non-connection)

对象机采用 Gateway，适合收集多台 USB 型环境传感器的数据等用途。Advertising packet 有 8 个种类，可以选择获取感应数据、获取加速度数据、传感器事件结果等。详情请参考 3. Advertising packet。

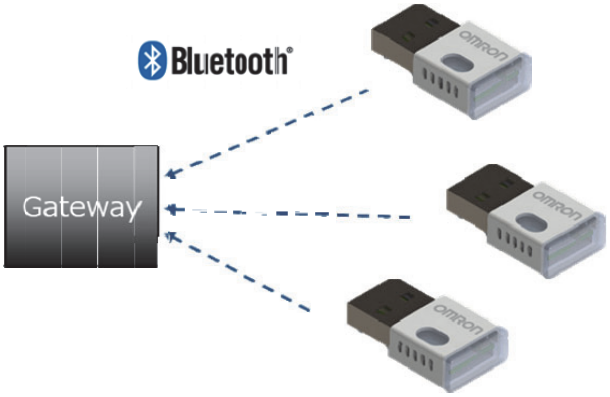

Figure 3 BLE non-connection image

1.4.3 USB communication

利用 USB 通信，可以进行感应数据的保存和获取、地震发生时加速度数据的获取、LED 点亮及模式切换等各种设定。基本指令与 BLE connection 相同。详情请参考 4. USB communication。

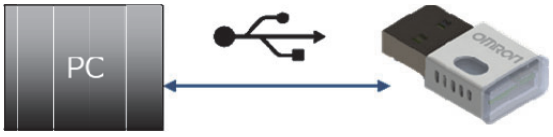

Figure 4 USB communication image

2. BLE GATT Services

BLE 通信使用的 UUID 如下所示。Base UUID 是粗体字 **XXXX** 以外的部分，CUSTOM Service 的各 Service UUID、各 Characteristics 均为通用的值。各 Characteristics 的 2byte 以上数据全部采用小字节序。

Base UUID：AB70**XXXX**-0A3A-11E8-BA89-0ED5F89F718B

Table 2 List of supported GATT Services

Service UUID	Service Name	Number of Characteristi
0x5000 (CUSTOM)	Memory Data Service	7
0x5010 (CUSTOM)	Latest Data Service	5
0x5030 (CUSTOM)	Acceleration Service	4
0x5110 (CUSTOM)	Control Service	9
0x5200 (CUSTOM)	Time Setting Service	3
0x5210 (CUSTOM)	Event Setting Service	24
0x5400 (CUSTOM)	Information Service	3
0x1800	Generic Access Service	4
0x180A	Device Information Service	5

2.1. Memory Data Service (Service UUID：0x5000)

是获取保存在 FLASH memory 中的感应数据的 Service。

Table 3 List of Characteristics in Memory Data Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5004	Memory index information	Memory index 的信息	✔			8
0x5005	Request memory index	Memory index 的指定		✔		9
0x5006	Memory status	Memory 读取的 status	✔			11
0x500A	Memory sensing data	Sensing data 读取			✔	20
0x500B	Memory calculation data	Calculation data 读取			✔	15
0x500C	Memory sensing flag	Sensing flag 读取			✔	18
0x500D	Memory calculation flag	Calculation flag 读取			✔	11

※Properties 定义(R：Read，W：Write，N：Notify)

*Memory data acquisition procedure

USB 型环境传感器通过向 Time setting (UUID：0x5202)中写入值，来开始向 FLASH memory 保存数据。Memory inde 是每次保存感应数据时更新的管理编号。FLASH memory 中最多可保存 60000 次的感应数据，超过 60000 次时则按从旧到新的顺序将旧数据自动清除。要读取 FLASH memory 的数据，请执行以下步骤。

在向 FLASH 存储器保存数据的过程中，由于意外的电源波动或断电，有可能无法正确保存数据。

1. ***Read*** Memory index information (Characteristics UUID：0x5004)
   获取保存感应数据的 Memory index。
2. ***Write*** Request memory index (Characteristics UUID：0x5005)
   指定要读取的数据。
3. ***Read*** Memory status (Characteristics UUID：0x5006)
   确认是否可读取。
4. ***Notify*** Memory sensing data etc. (Characteristics UUID：0x500A)
   通过 Notify 进行数据接收。

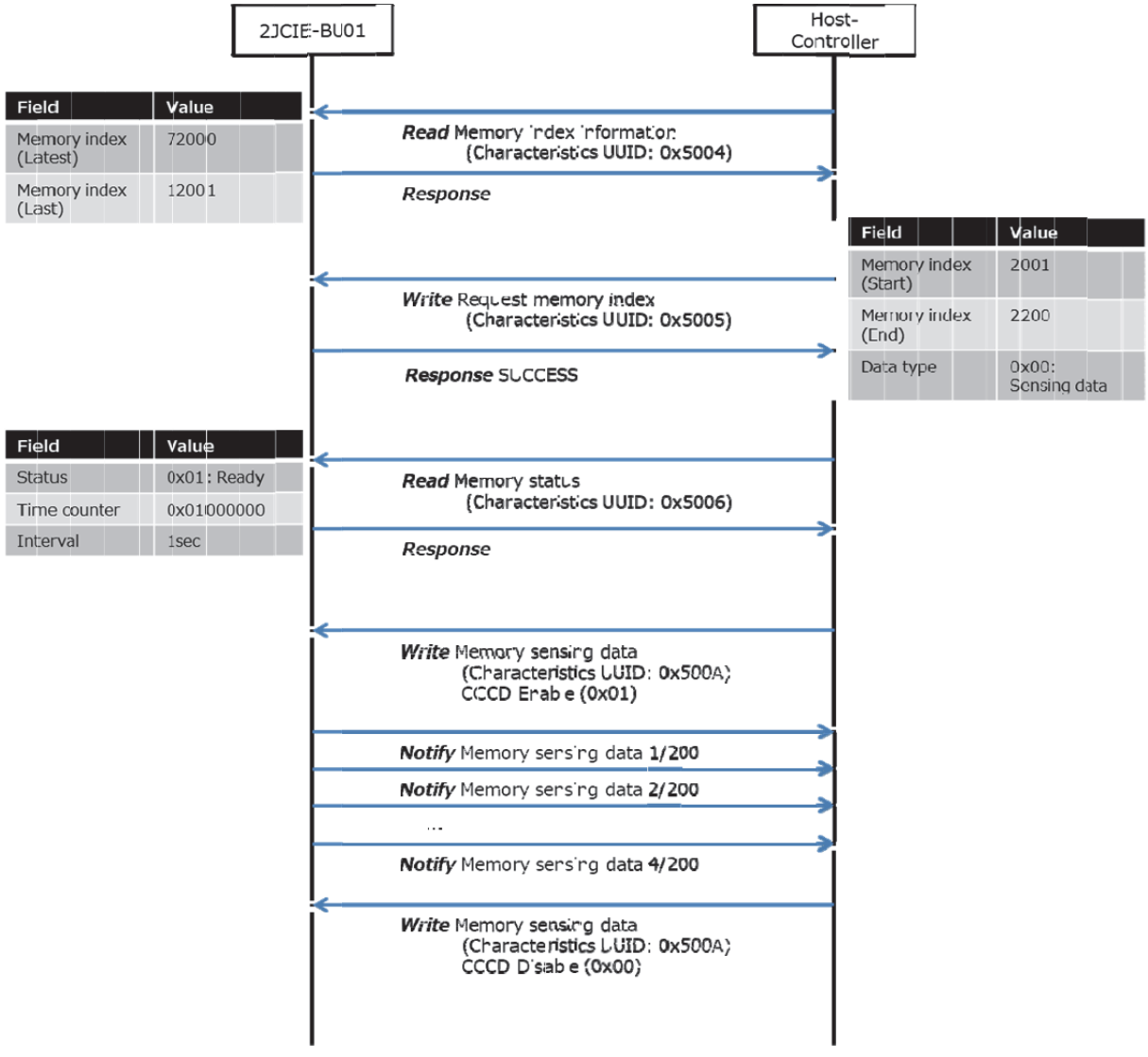

Figure 5 Procedure for acquiring memory data

2.1.1 Memory index information (Characteristics UUID : 0x5004)

获取保存在 FLASH memory 中的感应数据的 index 数。

Memory index (Latest) - Memory index (Last)间的最大保存数据数为 60000 个数据，Memory index 超过 60000 时，则按顺序覆盖旧数据。只能获取 Memory index (Latest) - Memory index (Last)间的数据。

* 当三个数据被保存到 FLASH 存储器时，存储器索引将同时被更新。

Table 4 Memory index information format

Byte	Field	Format	Contents
0-3	Memory index (Latest)	UInt32	Range：0x00000001 to 0x7FFFFFFF
4-7	Memory index (Last)	UInt32	*0x00000000：Before storage

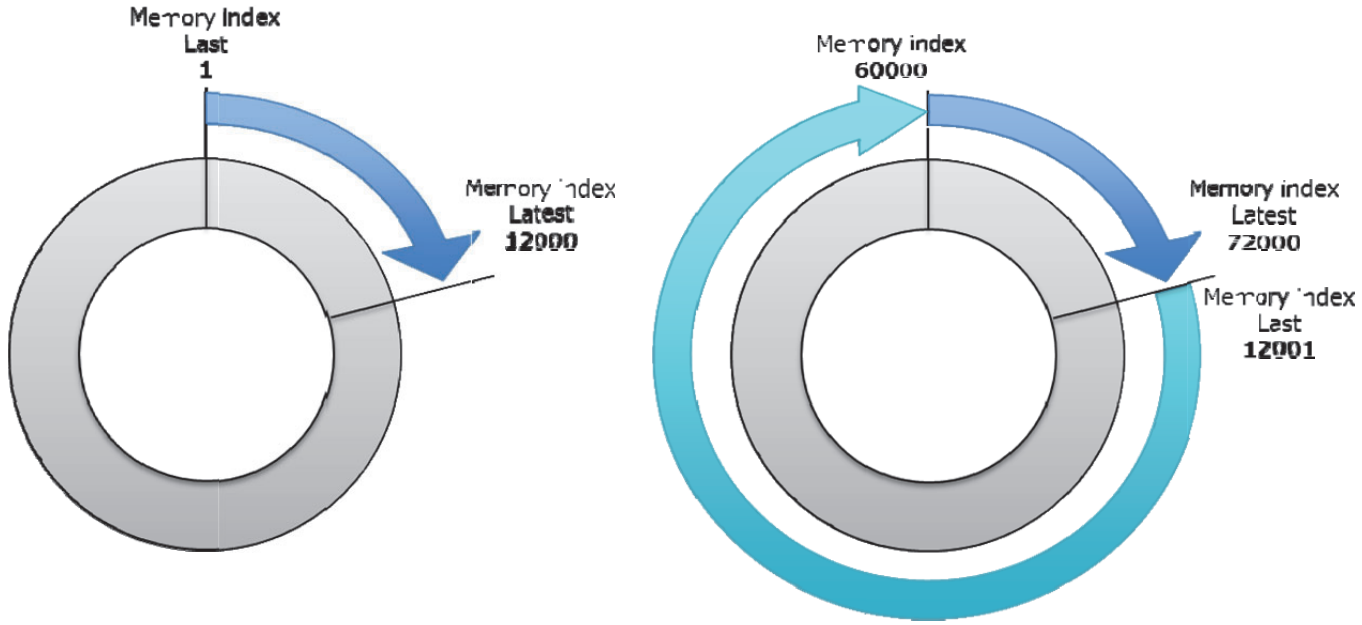

Figure 6 Memory index update

2.1.2 Request memory index (Characteristics UUID：0x5005)

进行获取 FLASH memory 中保存的感应数据的设定。
设定想要获取的数据的 Memory index 范围和 Data type，则环境传感器开始准备发送 Notify。

Table 5 Request memory index format

Byte	Field	Format	Contents
0-3	Memory index (Start)	UInt32	Range：0x00000001 to 0x7FFFFFFF *Last index <=Start index *End index <= Latest index *Start index <= End index
4-7	Memory index (End)	UInt32	
8	Data type	UInt8	0x00：Sensing data 0x01：Calculation data 0x02：Sensing flag 0x03：

*Data type

1. Sensing data
   在获取温度、相对湿度、照度、气压、噪音、eTVOC、eCO2 的值时选择。

2. Calculation data 在获取不适指数、中暑指数、振动信息等地震
   相关的值时选择。

3. Sensing flag
   在获取温度、相对湿度、照度、气压、噪音、eTVOC、eCO2 的事件标志时选择。

4. Calculation flag 在获取不适指数、中暑指数、振动信息等地震相关的
   事件标志时选择。

2.1.3 Memory status (Characteristics UUID：0x5006)

获取保存在 FLASH memory 中的感应数据的读取状态。
通过 Request memory index (UUID：0x5005)请求获取数据，Status 变为 Ready to transfer (0x01)时则准备完成。
发生指定范围错误等发送准备错误时，Status 会变为 Error (0x03)。

Table 6 Memory status format

Byte	Field	Format	Contents
0	Status	UInt8	0x00：Waiting 0x01：Ready to transfer 0x02： Transferring 0x03：
1-8	Time counter	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF
9-10	Memory storage interval	UInt16	Range：0x0001 to 0x0E10 (1 to 3600sec) Unit：1sec

***Time counter**

显示指定的 Memory index (Start)的 Time counter。由于各数据的 transfer packet 中没有 Time counter 信息，因此接收到 Notify 的数据的 Time counter 必须通过对象机进行关联。
* 当三个数据被保存到 FLASH 存储器时，存储器索引将同时被更新。

Example)
Time counter=0x00010000
Memory storage interval = 0x000A (10sec)

Data 1：0x00010000 (Time counter)
Data 2：0x0001000A (Time counter + Memory storage interval * 1)
Data 3：0x00010014 (Time counter + Memory storage interval * 2)
Data 4：0x0001001E (Time counter + Memory storage interval * 3)
…
Data 20：0x000100BE (Time counter + Memory storage interval * 19)

*Time setting 更新时的注意事项

Memory status 只能获取 Memory index (Start)的 Time counter，因此如果是在数据的中途更新了 Time setting，则无法识别。像 Figure 7 那样，如果在中途更新了 Time setting，Time counter 在 18 之后便是 30。如果 Memory index (start)的指定位置不同，则会像 Figure 8、9 那样，以不同的 Time setting 进行关联。更新 Time setting 时，必须了解更新时的 Memory index，向 Memory index(start)中输入更新后的值。

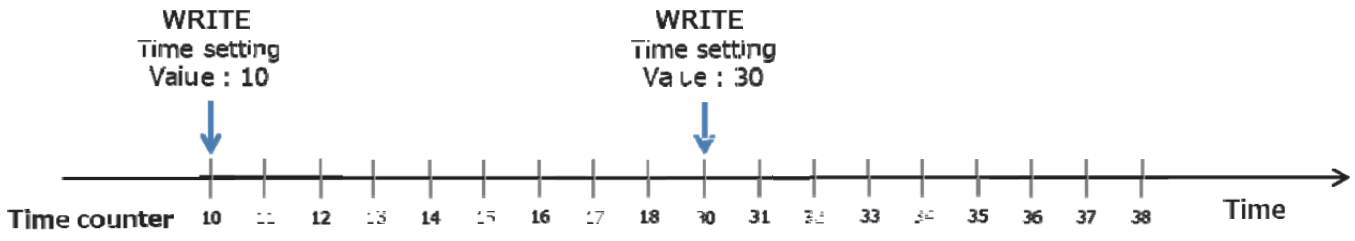

Figure 7 Time setting update

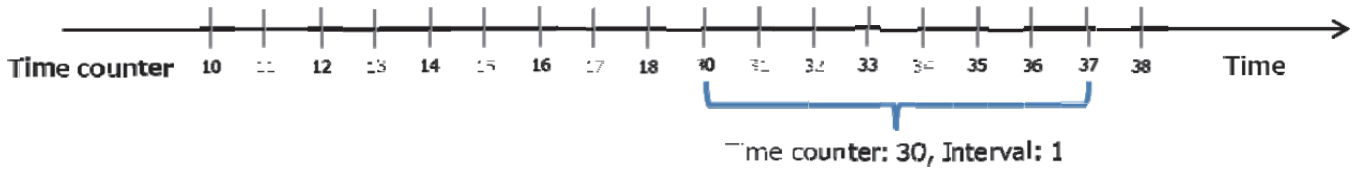

Figure 8 Read memory data

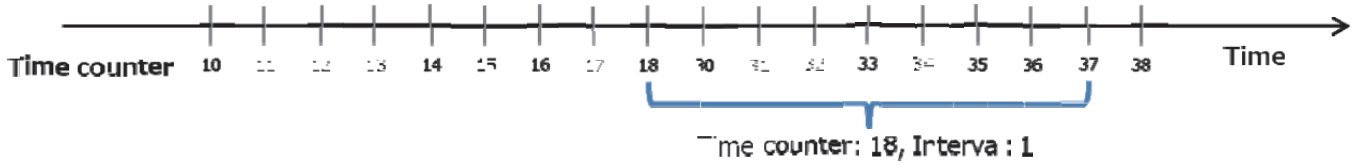

Figure 9 Read memory data

2.1.4 Memory sensing data (Characteristics UUID：0x500A)

通过 Notify 获取保存在 FLASH memory 中的 Sensing data。

只在 Request memory index 的 Data type 选择 Sensing data (0x00)时有效。若将 Client Characteristic Configuration Description (CCCD)设为 Enable，则开始发送 Notify。若作为获取对象的 FLASH memory 读取失败，则会向 Memory index 的最上位 bit 设置 1 进行发送。

Table 7 Memory sensing data format

Byte	Field	Format	Contents
0-3	Memory index	UInt32	Range：0x00000001 to 0x7FFFFFFF *If data error, MSB is 1. Continued data is FFFF.
4-5	Temperature	SInt16	Reference：5.1. Output range
6-7	Relative humidity	SInt16	
8-9	Ambient light	SInt16	
10-13	Barometric pressure	SInt32	
14-15	Sound noise	SInt16	
16-17	eTVOC	SInt16	
18-19	eCO2	SInt16	

2.1.5 Memory calculation data (Characteristics UUID：0x500B)

通过 Notify 获取 FLASH memory 中保存的 Calculation data。

只在 Request memory index 的 Data type 选择 Calculation data (0x01)时有效。若将 Client Characteristic Configuration Description (CCCD)设为 Enable，则开始发送 Notify。若作为获取对象的 FLASH memory 读取失败，则会向 Memory index 的最上位 bit 设置 1 进行发送。

Table 8 Memory calculation data format

Byte	Field	Format	Contents
0-3	Memory index	UInt32	Range：0x00000001 to 0x7FFFFFFF *If data error, MSB is 1
4-5	Discomfort index	SInt16	Reference：5.1. Output range
6-7	Heat stroke	SInt16	
8	Vibration information	UInt8	
9-10	SI value	UInt16	
11-12	PGA	UInt16	
13-14	Seismic intensity	UInt16	

2.1.6 Memory sensing flag (Characteristics UUID：0x500C)

通过Notify获取保存在FLASH memory中的Sensing flag。
只在 Request memory index 的 Data type 选择 Sensing flag(0x02)时有效。若将 Client Characteristic Configuration Description (CCCD)设为 Enable，则开始发送 Notify。若作为获取对象的 FLASH memory 读取失败，则会向 Memory index 的最上位 bit 设置 1 进行发送。

Table 9 Memory sensing flag format

Byte	Field	Format	Contents
0-3	Memory index	UInt32	Range：0x00000001 to 0x7FFFFFFF *If data error, MSB is 1
4-5	Temperature flag	UInt16	Reference：5.3. Event flag
6-7	Relative humidity flag	UInt16	
8-9	Ambient light flag	UInt16	
10-11	Barometric pressure flag	UInt16	
12-13	Sound noise flag	UInt16	
14-15	eTVOC flag	UInt16	
16-17	eCO2 flag	UInt16	

2.1.7 Memory calculation flag (Characteristics UUID：0x500D)

通过 Notify 获取保存在 FLASH memory 中的 Calculation flag。
只在 Request memory index 的 Data type 选择 Calculation flag(0x03)时有效。若将 Client Characteristic Configuration Description (CCCD)设为 Enable，则开始发送 Notify。若作为获取对象的 FLASH memory 读取失败，则会向 Memory index 的最上位 bit 设置 1 进行发送。

Table 10 Memory calculation flag format

Byte	Field	Format	Contents
0-3	Memory index	UInt32	Range：0x00000001 to 0x7FFFFFFF *If data error, MSB is 1
4-5	Discomfort index flag	UInt16	Reference：5.3. Event flag
6-7	Heat stroke flag	UInt16	
8	SI value flag	UInt8	
9	PGA flag	UInt8	
10	Seismic intensity flag	UInt8	

2.2. Latest Data Service (Service UUID：0x5010)

是可以获取感应数据最新值的 Service。
加速度以外的感应数据会每 1sec 更新一次，并反映到各 Characteristics 中。
加速度数据每 320msec 更新一次。

Table 11 List of Characteristics in Latest Data Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5012	Latest sensing data	Sensing data	✔		✔	17
0x5013	Latest calculation data	Calculation data	✔		✔	18
0x5014	Latest sensing flag	Sensing flag	✔		✔	15
0x5015	Latest calculation flag	Calculation flag	✔		✔	8
0x5016	Latest acceleration status	Acceleration status	✔		✔	15

※Properties 定义(R：Read，W：Write，N：Notify)

*Sequence number

Sequence number 是与 Memory index 不同步的管理编号，每次测量(每 1sec)数值增加。接通电源后在 USB 型环境传 感器内部自动更新，从 0x00 开始。到达 0xFF 后，接下来又变为 0x00，此后重复该动作。

Table 12 Memory index and Sequence number

Description	Start trigger	Update condition	Update interval
Memory index	Time setting is set	Memory storage	Memory storage interval
Sequence number	Automatic start after boot	Measurement	1sec

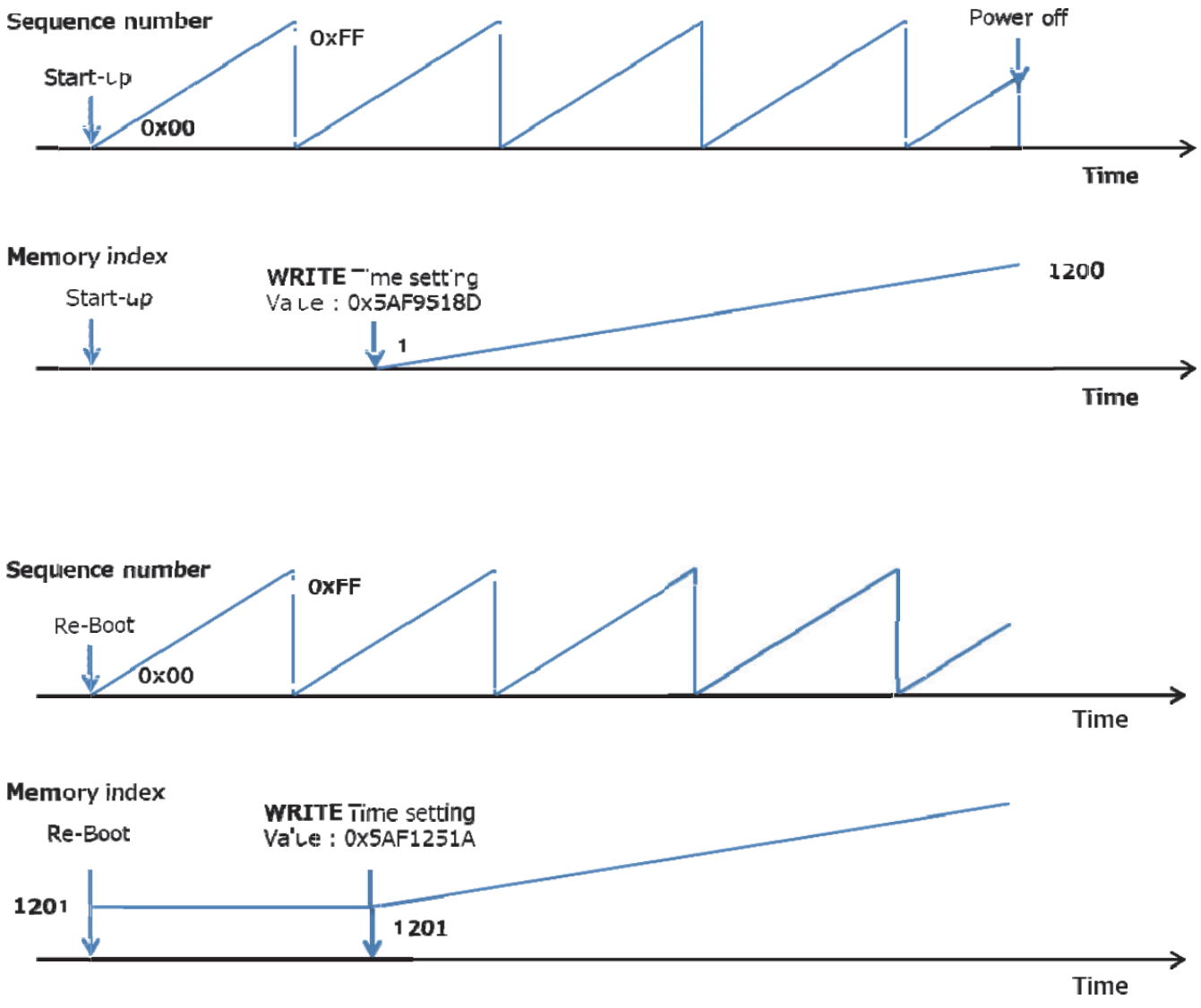

Figure 11 Memory index and Sequence number [Re-Boot]

2.2.1 Latest sensing data (Characteristics UUID：0x5012)

获取 Latest sensing data。“Read”时回复读取时的最新值，“Notify”设为有效时在每次更新时发送。

Table 13 Latest sensing data format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Temperature	SInt16	Reference：5.1. Output range
3-4	Relative humidity	SInt16	
5-6	Ambient light	SInt16	
7-10	Barometric pressure	SInt32	
11-12	Sound noise	SInt16	
13-14	eTVOC	SInt16	
15-16	eCO2	SInt16	

2.2.2 Latest calculation data (Characteristics UUID：0x5013)

获取 Latest calculation data。“Read”时回复读取时的最新值，“Notify”设为有效时在每次更新时发送。

Table 14 Latest calculation data format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Discomfort index	SInt16	Reference：5.1. Output range
3-4	Heat stroke	SInt16	
5	Vibration information	UInt8	
6-7	SI value	UInt16	
8-9	PGA	UInt16	
10-11	Seismic intensity	UInt16	
12-13	Acceleration (X-axis)	SInt16	
14-15	Acceleration (Y-axis)	SInt16	
16-17	Acceleration (Z-axis)	SInt16	

2.2.3 Latest sensing flag (Characteristics UUID：0x5014)

获取 Latest sensing flag。 “Read”时回复读取时的最新值，“Notify”设为有效时在每次更新时发送。

Table 15 Latest sensing flag format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Temperature flag	UInt16	Reference：5.3. Event flag
3-4	Relative humidity flag	UInt16	
5-6	Ambient light flag	UInt16	
7-8	Barometric pressure flag	UInt16	
9-10	Sound noise flag	UInt16	
11-12	eTVOC flag	UInt16	
13-14	eCO2 flag	UInt16	

2.2.4 Latest calculation flag (Characteristics UUID：0x5015)

获取 Latest calculation flag。 “Read”时回复读取时的最新值，“Notify”设为有效时在每次更新时发送。

Table 16 Latest calculation flag format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Discomfort index flag	UInt16	Reference：5.3. Event flag
3-4	Heat stroke flag	UInt16	
5	SI value flag	UInt8	
6	PGA flag	UInt8	
7	Seismic intensity flag	UInt8	

2.2.5 Latest acceleration status (Characteristics UUID：0x5016)

获取 Latest acceleration status。 “Read”时回复读取时的最新值，“Notify”设为有效时在每次更新时发送。 Acceleration offset 在未发生地震/振动时更新。

Table 17 Latest acceleration status format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1	Vibration information	UInt8	Reference：5.1. Output range
2-3	Maximum acceleration (X-axis)	SInt16	
4-5	Maximum acceleration (Y-axis)	SInt16	
6-7	Maximum acceleration (Z-axis)	SInt16	
8	SI value calculation axis	UInt8	
9-10	Acceleration offset (X-axis)	SInt16	
11-12	Acceleration offset (Y-axis)	SInt16	
13-14	Acceleration offset (Z-axis)	SInt16	

2.3. Acceleration Service (Service UUID：0x5030)

是获取保存在 FLASH memory 中的加速度数据的 Service。

Table 18 List of Characteristics in Acceleration Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5031	Vibration count	地震/振动的累计次数	✔			8
0x5032	Request acceleration memory	指定 Acceleration memory index		✔		6
0x5033	Acceleration memory status	Acceleration memory 的读取	✔			3
0x5034	Acceleration memory data	Acceleration data 读取			✔	20

※Properties 定义(R：Read，W：Write，N：Notify)

*Acceleration memory data acquisition procedure [Normal mode]

地震/振动如果在值写入 Time setting (UUID：0x5202)之前检测到振动，则开始保存数据。获取数据的 format 中虽然有 Time counter，但在 Time setting 未写入时为 0。要读取 FLASH memory 的数据，请执行以下步骤。地震数据数固定为 375page，振动数据因振动时间而变化，通过读取 Header page 进行 Total page 数的确认。

1. ***Read*** Vibration count (Characteristics UUID：0x5031)
   获取保存地震/振动数据的计数值。
2. ***Write*** Request acceleration memory index (Characteristics UUID：0x5032)
   指定 Header page。
3. ***Read*** Acceleration memory status (Characteristics UUID：0x5033)
   确认是否可读取。
4. ***Notify*** Memory sensing data etc. (Characteristics UUID：0x500A)
   通过 Notify 进行数据接收。
5. ***Write*** Request acceleration memory index (Characteristics UUID：0x5032)
   指定要获取的 page。
6. ***Read*** Acceleration memory status (Characteristics UUID：0x5033)
   确认是否可读取。
7. ***Notify*** Memory sensing data etc. (Characteristics UUID：0x500A)
   通过 Notify 进行数据接收。

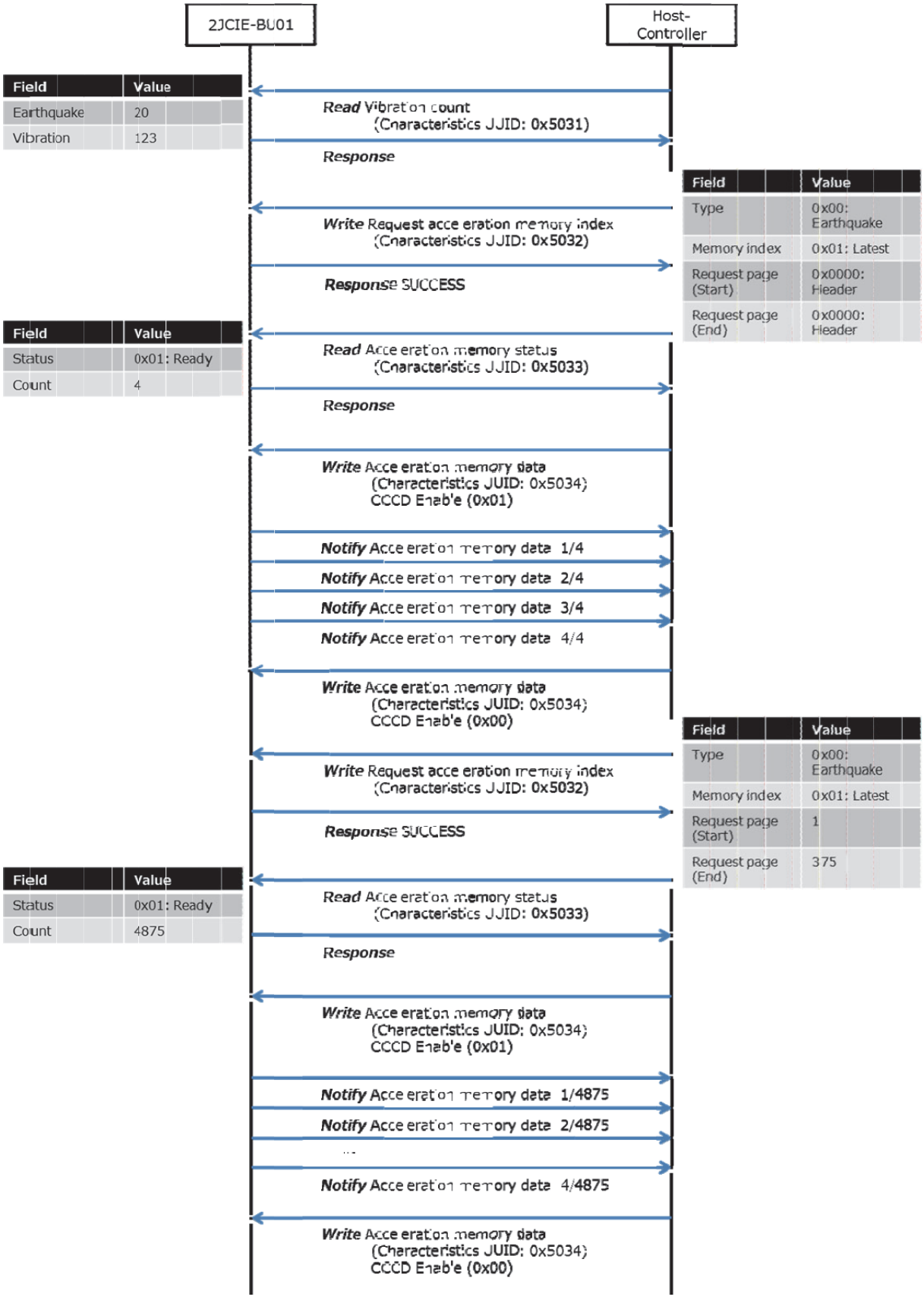

Figure 12 Procedure for acquiring acceleration memory data

*Acceleration memory data acquisition procedure [Acceleration logger mode]

通过 Acceleration logger mode 读取 FLASH memory 的数据时，应采取以下步骤。

1. ***Write*** Request acceleration memory index (Characteristics UUID：0x5032)
   指定要获取的 page。
2. ***Read*** Acceleration memory status (Characteristics UUID：0x5033)
   确认是否可读取。
3. ***Notify*** Memory sensing data etc. (Characteristics UUID：0x500A)
   通过 Notify 进行数据接收。

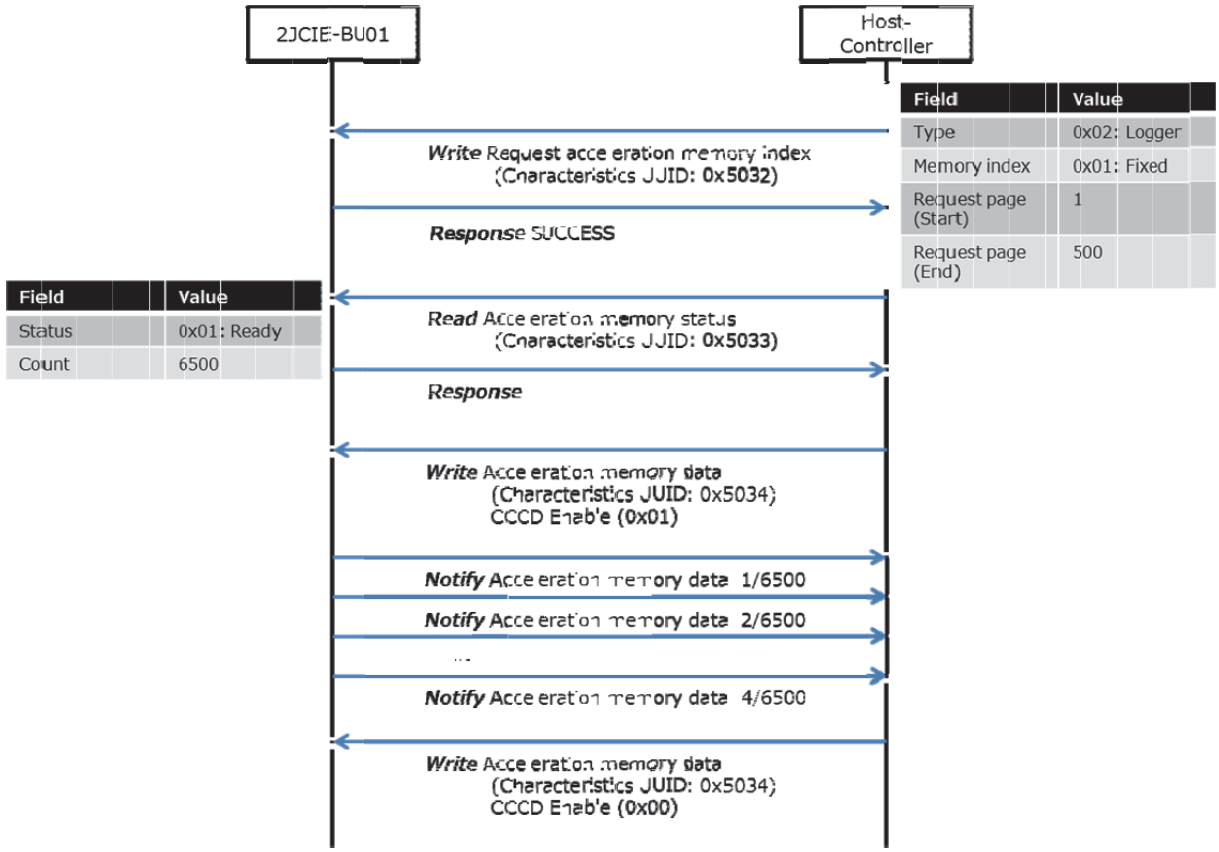

Figure 13 Procedure for acquiring acceleration memory data

2.3.1 Vibration count (Characteristics UUID：0x5031)

获取地震/振动的累计次数。
在因 Mode 变更或 Memory reset 而消除 Acceleration area 时，累计次数会被重置。

Table 19 Vibration count format

Byte	Field	Format	Contents
0-3	Earthquake count	UInt32	Range：0x00000000 to
4-7	Vibration count	UInt32	0xFFFFFFFF Unit：1count

2.3.2 Request acceleration memory index (Characteristics UUID：0x5032)

进行获取 FLASH memory 中保存的加速度数据的设定。

1. Normal mode

   Data type 中选择要获取的数据(Earthquake data or Vibration data)，指定 memory index。Memory index 的 Latest 为 1，Last 为 10。Header page 中可获取 SI value、PGA 等的计算结果或保存的加速度原始数据的 page 数。获取原始数据时，先通过 Header page 确认 Storage total page，然后指定 Start page 和 End page 开始读取。

Table 20 Request acceleration memory index format [Normal mode]

Byte	Field	Format	Contents
0	Acceleration data type	UInt8	0x00：Earthquake data 0x01：
1	Request acceleration memory index	UInt8	Range：0x01 to 0x0A (1 to 10) *0x01：Latest data <---> 0x0A：Last data
2-3	Request page (Start)	UInt16	Range：0x0000 to 0x01FF (0 to 511) *0x0000：Header page *Start page <= End page
4-5	Request page (End)	UInt16	

2. Acceleration logger mode

   Data type 中指定为 Logger data，并指定 Start page 和 End page。由于 Memory index 不使用，因此固定为 0x01。Request page (Start)－Request page (End)之间最多可指定 1000page 的值，获取数据超过该上限时会进行分割。

Table 21 Request acceleration memory index format [Acceleration logger mode]

Byte	Field	Format	Contents
0	Acceleration data type	UInt8	0x02：Logger data
1	Request acceleration memory index	UInt8	0x01：Fixed value
2-3	Request page (Start)	UInt16	Range：0x0001 to 0x2800 (1 to 10240) *Start index <= End index *(Start index－End index) <=1000
4-5	Request page (End)	UInt16	

2.3.3 Acceleration memory status (Characteristics UUID : 0x5033)

获取保存在 FLASH memory 中的加速度数据的读取状态。
通过 Request acceleration memory index 指定数据后，如果 Status 为 Ready to transfer(0x01)则表示准备完成，可以确认此后要发送的Notify的总数(Total transfer count)。

Table 22 Acceleration memory status format

Byte	Field	Format	Contents
0	Status	UInt8	0x00：Waiting 0x01：Ready to transfer 0x02： Transferring 0x03：
1-2	Total transfer count	UInt16	Range：0x0001 to 0x7FFF

2.3.4 Acceleration memory data [Header] (Characteristics UUID：0x5034)

通过“Notify”获取加速度数据的Header信息。
指定Normal mode的Header page后，以下packet会被分为4份，发送Notify。若作为获取对象的FLASH memory读取失败，则会向Total transfer count的最上位bit设置1进行发送。

Table 23 Acceleration memory data format [Header] 1/4

Byte	Field	Format	Contents
0-1	Total transfer count	UInt16	Range：0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Storage total page	UInt16	Range：0x0001 to 0xFFFF
4-7	Earthquakes or vibration count	UInt32	Range：0x00000001 to 0xFFFFFFFF Unit：1count
8-15	Time counter	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF
16	Earthquake flag	UInt8	0x00：Vibration data 0x01：
17	SI value calculation axis	UInt8	Reference：5.1. Output range
18	Reserve for Future Use	UInt8	0xFF：Fixed value
19	Reserve for Future Use	UInt8	0xFF：Fixed value

Table 24 Acceleration memory data format [Header] 2/4

Byte	Field	Format	Contents
0-1	Total transfer count	UInt16	Range：0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Page number	UInt16	0x0000：Fixed value
4-5	SI value	UInt16	Reference：5.1. Output range
6-7	PGA	UInt16	
8-9	Seismic intensity	UInt16	
10-11	Maximum acceleration (X-axis)	SInt16	
12-13	Maximum acceleration (Y-axis)	SInt16	
14-15	Maximum acceleration (Z-axis)	SInt16	
16-17	Temperature	SInt16	
18-19	Relative humidity	SInt16	

Table 25 Acceleration memory data format [Header] 3/4

Byte	Field	Forma	Contents
0-1	Total transfer count	UInt16	Range: 0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Ambient light	SInt16	Reference: 5.1. Output range
4-7	Barometric pressure	SInt32	
8-9	Sound noise	SInt16	
10-11	eTVOC	SInt16	
12-13	eCO2	SInt16	
14-15	Discomfort index	SInt16	
16-17	Heat stroke	SInt16	
18	Reserve for Future Use	UInt8	0xFF: Fixed value
19	Reserve for Future Use	UInt8	0xFF: Fixed value

Table 26 Acceleration memory data format [Header] 4/4

Byte	Field	Format	Contents
0-1	Total transfer count	UInt16	Range: 0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Acceleration offset (X-axis)	SInt16	Reference: 5.1. Output range
4-5	Acceleration offset (Y-axis)	SInt16	
6-7	Acceleration offset (Z-axis)	SInt16	
8	Reserve for Future Use	UInt8	0xFF: Fixed value
9	Reserve for Future Use	UInt8	0xFF: Fixed value
10	Reserve for Future Use	UInt8	0xFF: Fixed value
11	Reserve for Future Use	UInt8	0xFF: Fixed value
12	Reserve for Future Use	UInt8	0xFF: Fixed value
13	Reserve for Future Use	UInt8	0xFF: Fixed value
14	Reserve for Future Use	UInt8	0xFF: Fixed value
15	Reserve for Future Use	UInt8	0xFF: Fixed value
16	Reserve for Future Use	UInt8	0xFF: Fixed value
17	Reserve for Future Use	UInt8	0xFF: Fixed value
18	Reserve for Future Use	UInt8	0xFF: Fixed value
19	Reserve for Future Use	UInt8	0xFF: Fixed value

2.3.5 Acceleration memory data [Data] (Characteristics UUID：0x5034)

通过“Notify”获取加速度数据的 Data 信息。

指定如 Normal mode 的 Data page、或者指定了 Acceleration logger mode 时，以下 packet 会被分为 13 份，发送 Notify。若作为获取对象的 FLASH memory 读取失败，则会向 Total transfer count 的最上位 bit 设置 1 进行发送。Acceleration logger mode 中，SI value、PGA、Seismic intensity、Maximum acceleration 不是计算对象，因此固定为 0x0000。

Table 27 Acceleration memory data format [Data] 1/13

Byte	Field	Format	Contents
0-1	Total transfer count	UInt16	Range：0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Page number	UInt16	[Normal mode] Range：0x0001 to 0x01FF (1 to 511) [Acceleration logger mode] Range：0x0001 to 0x2800 (1 to
4-5	SI value	UInt16	[Normal mode] Reference：5.1. Output range [Acceleration logger mode] 0x0000：Fixed value
6-7	PGA	UInt16	
8-9	Seismic intensity	UInt16	
10-11	Maximum acceleration (X-axis)	SInt16	
12-13	Maximum acceleration (Y-axis)	SInt16	
14-15	Maximum acceleration (Z-axis)	SInt16	
16-17	Temperature	SInt16	Reference：5.1. Output range
18-19	Relative humidity	SInt16	

Table 28 Acceleration memory data format [Data] 2/13

Byte	Field	Forma	Contents
0-1	Total transfer count	UInt16	Range: 0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Ambient light	SInt1	Reference: 5.1. Output range
4-7	Barometric pressure	SInt3	
8-9	Sound noise	SInt1	
10-11	eTVOC	SInt1	
12-13	eCO2	SInt1	
14-15	Discomfort index	SInt1	
16-17	Heat stroke	SInt1	
18	Reserve for Future Use	UInt	0xFF: Fixed value
19	Reserve for Future Use	UInt	0xFF: Fixed value

Table 29 Acceleration memory data format [Data] 3/13 to 12/13

Byte	Field	Format	Contents
0-1	Total transfer count	UInt16	Range: 0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Acceleration (X-axis)	SInt16	Reference: 5.1. Output range
4-5	Acceleration (Y-axis)	SInt16	
6-7	Acceleration (Z-axis)	SInt16	
8-9	Acceleration (X-axis)	SInt16	
10-11	Acceleration (Y-axis)	SInt16	
12-13	Acceleration (Z-axis)	SInt16	
14-15	Acceleration (X-axis)	SInt16	
16-17	Acceleration (Y-axis)	SInt16	
18-19	Acceleration (Z-axis)	SInt16	

Table 30 Acceleration memory data format [Data] 13/13

Byte	Field	Format	Contents
0-1	Total transfer count	UInt16	Range：0x0001 to 0x7FFF *Increment for each transmission *If data error, MSB is 1
2-3	Acceleration (X-axis)	SInt16	Reference：5.1. Output range
4-5	Acceleration (Y-axis)	SInt16	
6-7	Acceleration (Z-axis)	SInt16	
8-9	Acceleration (X-axis)	SInt16	
10-11	Acceleration (Y-axis)	SInt16	
12-13	Acceleration (Z-axis)	SInt16	
14	Reserve for Future Use	UInt8	0xFF：Fixed value
15	Reserve for Future Use	UInt8	0xFF：Fixed value
16	Reserve for Future Use	UInt8	0xFF：Fixed value
17	Reserve for Future Use	UInt8	0xFF：Fixed value
18	Reserve for Future Use	UInt8	0xFF：Fixed value
19	Reserve for Future Use	UInt8	0xFF：Fixed value

2.4. Control Service (Service UUID：0x5110)

是实施各种设定的 Service。

Table 31 List of Characteristics in Control Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5111	LED setting [normal state]	RGB color setting [normal state]	✔	✔		5
0x5112	LED setting [event state]	RGB color setting [event state]	✔	✔		5
0x5113	LED state [operation]	RGB color setting [operation]	✔	✔		3
0x5114	Installation offset	Offset correction	✔	✔		13
0x5115	Advertising setting	Interval and mode setting	✔	✔		3
0x5116	Memory reset	Memory reset		✔		1
0x5117	Mode change	Mode change	✔	✔		1
0x5118	Acceleration logger control	加速度记录模式 测量开始指令		✔		7
0x5019	Acceleration logger status	加速度记录模式 Status	✔			3

※Properties 定义(R：Read，W：Write，N：Notify)

2.4.1 LED setting [normal state] (Characteristics UUID：0x5111)

获取或设定常规时 LED 的显示状态。

Normally ON (0x01)时，通过 Intensity of LED 设定的 RGB (Red, Green, Blue)强度指定显示颜色。颜色共 255 级，255 为最大，全部 255 (0xFF)显示白色，全部 0(0x00)则不点亮。选择了 Scales 时，颜色会根据传感器输出自动变化。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。

为确认 FLASH 写入完成，在执 “Write”后必须确认 FLASH memory status (Charact ristics UUID：0x5403)。

Table 32 LED setting [normal state] format

Byte	Field	Format	Contents
0-1	Display rule (normal state)	UInt16	0x0000：Normally OFF 0x0001：Normally ON 0x0002：Temperature value scales 0x0003：Relative humidity value scales 0x0004：Ambient light value scales 0x0005：Barometric pressure value scales 0x0006：Sound noise value scales 0x0007：eTVOC value scales 0x0008：SI value scales 0x0009：PGA
2	Intensity of LED (Red)	UInt8	Range：0x00 to 0xFF
3	Intensity of LED (Green)	UInt8	
4	Intensity of LED (Blue)	UInt8	

Figure 14 LED scales

Table 33 Upper and lower limits of LED scales

Display rule	Sensor type	Lower value	Upper value	Unit
0x0002	Temperature	10.00	35.00	degC
0x0003	Relative humidity	20.00	80.00	%RH
0x0004	Ambient light	0	10000	Lx
0x0005	Barometric pressure	950.000	1050.000	hPa
0x0006	Sound noise	35.00	80.00	dB
0x0007	eTVOC	0	1000	ppb
0x0008	SI value	0	60.0	kine
0x0009	PGA	0	300.0	gal

2.4.2 LED setting [event state] (Characteristics UUID：0x5112)

获取或设定事件发生时的 LED 显示状态。

事件发生时，通过 Intensity of LED 设定的 RGB (Red, Green, Blue)强度来指定闪烁的颜色。颜色共 255 级，255 为最大，全部 255(0xFF)显示白色，全部 0 (0x00)则不点亮。由于事件采用 bit field 设定，因此可同时设定多个事件。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 34 LED setting [event state] format

Byte	Field	Format	Contents
0-1	Display rule (event state)	UInt16	Bit7：PGA event Bit6：SI value event Bit5：eTVOC event Bit4：Sound noise event Bit3：Barometric pressure event Bit2：Ambient light event Bit1：Relative
2	Intensity of LED (Red)	UInt8	Range：0x00 to 0xFF
3	Intensity of LED (Green)	UInt8	
4	Intensity of LED (Blue)	UInt8	

2.4.3 LED state [operation] (Characteristics UUID：0x5113)

获取或设定各动作的 LED 显示状态。

Start up 仅适用于启动后，Error 适用于发生 Error status (Characteristics UUID：0x5401)中的任意一个错误时，Connection 适用于通过 BLE 通信连接时。设定值被写入 FLASH memory 中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 35 LED setting [operation] format

Byte	Field	Format	Contents
0	Start up	UInt8	0x00：Rainbow (default) 0x01：BLUE
1	Error	UInt8	0x00：NONE (default) 0x01：RED
2	Connection	UInt8	0x00：NONE (default) 0x01：

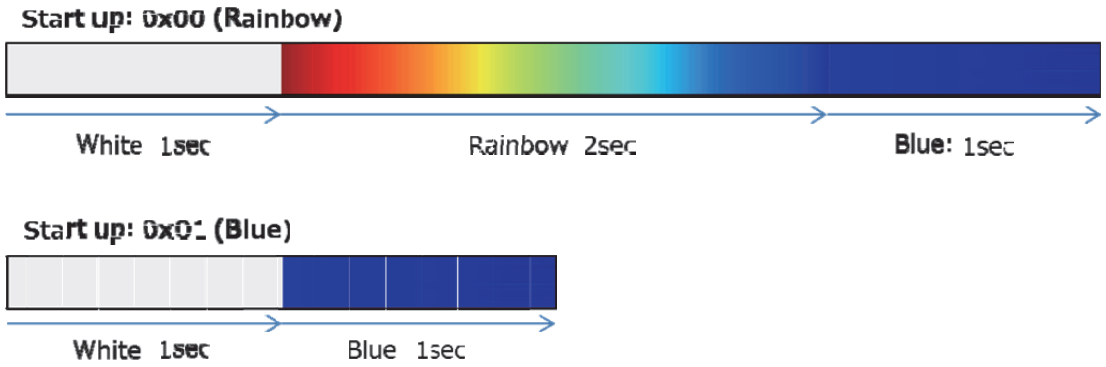

Figure 15 LED lighting [Start-up]

*Priority of LED lighting

由于事件、错误可能同时发生，因此 LED 按以下顺序点亮。

Table 36 Priority of LED lighting

Priority	Operation
1 (High)	Start up
2	Error
3	Event
4	Normal
5 (Low)	Connection

2.4.4 Installation offset (Characteristics UUID：0x5114)

获取或设定设置后的任意偏置、增益值。

可对设为Enable的偏置加上或减去指定的值。仅Ambient light为Gain补偿，可对原始输出乘以一定的倍率设定值被写入FLASH memory中，即使电源ON/OFF，也可保留。为确认FLASH写入完成，在执行“Write”后必须确认FLASH memory status (Characteristics UUID：0x5403)。

Table 37 Installation offset format

Byte	Field	Format	Contents
0	Installation offset enable/disable	UInt8	Bit4：Sound noise offset enable Bit3：Barometric pressure offset enable Bit2：Ambient light gain enable Bit1：Relative humidity offset enable Bit0：Temperature
1-2	Temperature installation offset	SInt16	Range：0xD8F0 to 0x2710 (-10000 to 10000) Unit：0.01degC Default：0x0000 (0.00degC)
3-4	Relative humidity installation offset	SInt16	Range：0xD8F0 to 0x2710 (-10000 to 10000) Unit：0.01%RH Default：0x0000 (0.00%RH)
5-6	Ambient light installation gain	SInt16	Range：0x0000 to 0x2710 (0 to 10000) Unit：0.001 Default：0x03E8 (1.000)
7-10	Barometric pressure installation offset	SInt32	Range：0xFFF0BDC0 to 0x000F4240 (-1000000 to 1000000) Unit：0.001hPa Default：0x0000
11-12	Sound noise installation offset	SInt16	Range：0xD8F0 to 0x2710 (-10000 to 10000) Unit：0.01dB Default：0x0000 (0.00dB)

Example)

Installation offset enable/disable = 0x01

Temperature installation offset = -5.00degC

Temperature raw value = 25.65 degC

↓

Temperature correct value = 20.65 degC

2.4.5 Advertise setting (Characteristics UUID：0x5115)

获取或设定BLE advertising的发送间隔、Data type。

Advertising的Packet构成请参考3. BLE Advertising packet。Advertising mode选择Reserved for Future Use(0x06 to 0x08)时，Sensor data (0x01)的Advertising packet会被选中。设定值保存在FLASH memory中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 38 Advertise setting format

Byte	Field	Format	Contents
0-1	Advertising interval	UInt16	Range：0x00A0 to 0x4000 (100ms to 10.24s) Unit：0.625ms Default：0x00A0 (100ms)
2	Advertising mode	UInt8	0x01：Sensor data (default) 0x02：Calculation data 0x03：Sensor data & Calculation data (Scan rsp) 0x04：Sensor flag & Calculation flag (Scan rsp) 0x05：Serial number 0x06：Reserve for Future Use 0x07：Reserve for

2.4.6 通过 Memory reset (Characteristics UUID：0x5116)

清除该区域的 FLASH memory 数据。

Sensing data area 为缓冲区，旧的数据会被自动清除，但希望复位 Memory index 时，通过 Memory reset 清除 Sensing data area。Acceleration area 在通过 Acceleration logger mode 清除数据时使用。清除时间约需 2min，LED 亮 BLUE 颜色的灯。也可通过读取 FLASH memory status (Characteristics UUID：0x5403)确认状态，Flash memory erasing (0x04)期间为正在清除期间，变为 NONE (0x00)时则清除完成。

Table 39 Memory reset format

Byte	Field	Format	Contents
0	Memory reset	UInt8	0x01：Sensing data area 0x02：

2.4.7 Mode change (Characteristics UUID：0x5117)

获取当前模式或设定模式。

切换 Mode 时 Acceleration area 的 FLASH memory 会被清除，与通过 Memory reset 清除 Acceleration area 时的状态相同，需要约 2min 的时间。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也以相同的 mode 启动。

Table 40 Mode change format

Byte	Field	Format	Contents
0	Mode change	UInt8	0x00：Normal mode (default) 0x01：

2.4.8 Acceleration logger control (Characteristics UUID : 0x5118)

设定 Acceleration logger mode 的 Log Start/Stop。
执行 Log stop 时，Byte 1 到 Byte 6 的值设定为与 Log start 时相同的值。虽然用户可任意设定 Start page/End page，但如果覆盖为已写入的 page，则无法获得正常的数据，因此写入相同 page 时，必须执行 Memory reset。由于可 根据 ODR 设定和 page 数计算保存时间，因此根据以下 Logging time 进行设定。

Table 41 Acceleration logger control format

Byte	Field	Format	Contents
0	Logger condition	UInt8	0x00：Log stop 0x01：
1	Range of detection	UInt8	0x00：±2000 gal (fixed value)
2	ODR setting	UInt8	0x00：1 Hz 0x01：10 Hz 0x02：25 Hz 0x03：100 Hz 0x04：200 Hz 0x05：400 Hz
3-4	Start page	UInt16	Range：0x0001 to 0x2800 (1 to 10240) Unit：1 page
5-6	End page	UInt16	

*Logging time

加速度数据保存时间根据以下算式计算。 1 page 可保存 32 次加速度数据。

$$\text{Logging time(sec)} = 32 \times {}^{1}/_{\text{ODR}} \times \text{page}$$

Table 42 Example of acceleration logger setting

Example	ODR setting	Page	Logging time
1	10Hz	10	32sec
2	10Hz	100	320sec
3	100Hz	100	32sec
4	100Hz	1000	320sec
5	400Hz	100	8sec
6	400Hz	1000	80sec

*Sensing data

除了保存 page 加速度数据以外，还将温度、湿度、照度等感应数据保存至存储器。保存间隔因 ODR 设定而异。

Table 43 Sensing data update interval

Value	ODR setting	Update interval
0x00	1Hz	32sec
0x01	10Hz	3.2sec
0x02	25Hz	1.28sec
0x03	100Hz	0.96s
0x04	200Hz	0.96s
0x05	400Hz	0.96s

2.4.9 Acceleration logger status (Characteristics UUID : 0x5119)

获取 Acceleration logger mode 的 Status。
Logging 执行中为 0x01：Running。Running page 表示 Running 中的最终 page。

Table 44 Acceleration logger status

Byte	Field	Format	Contents
0	Logger status	UInt8	0x00： Waiting
1-2	Running page	UInt16	Range：0x0001 to 0x2800 (1 to 10240) Unit：1 page

2.5. Time Setting Service (Service UUID：0x5200)

是进行与时间相关的设定的 Service。

Table 45 List of Characteristics in Time Setting Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5201	Time counter	通过元件计数的值	✔			8
0x5202	Time setting	设定的计数值	✔	✔		8
0x5203	Memory storage interval	感应数据保存间隔	✔	✔		2

2.5.1 Latest time counter (Characteristics UUID：0x5201)

获取 Latest timer counter。
Latest time 以 1sec 为单位表示从写入 Time setting Characteristics 时起的经过时间。

Table 46 Latest time counter format

Byte	Field	Format	Contents
0-7	Time counter	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF

2.5.2 Time setting (Characteristics UUID：0x5202)

获取或设定在环境传感器内部计数的偏置值。 设定
值保存在 FLASH memory 中，电源 OFF 时则复位。

Table 47 Time setting format

Byte	Field	Format	Contents
0-7	Time setting	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF

*指定时间通过上位系统任意确定。
可以如上图所示计算将写入时间设定为 1 时的经过时间，或者也可以如下图所示以 UNIX time 为基础进行时间设定。

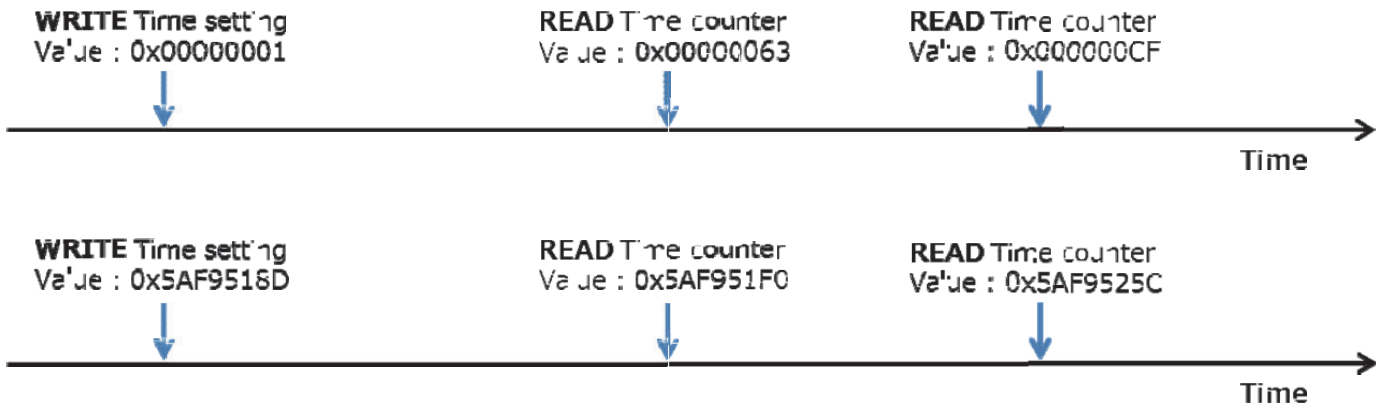

Figure 16 Time setting

2.5.3 Memory storage interval (Characteristics UUID : 0x5203)

获取或设定向 FLASH memory 中保存感应数据的间隔。

变更保存间隔后 Memory index 会被复位，同时 Sensing data area 的 FLASH memory 也会被清除。与通过 Memory reset 清除 Sensing data area 的状态相同，需要约 2min 的时间。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 48 Memory storage interval format

Byte	Field	Format	Contents
0-1	Memory storage interval	UInt16	Range：0x0001 to 0x0E10 (1 to 3600sec) Unit：1sec Default：0x0001 (1sec)

2.6. Event Setting Service (Service UUID：0x5210)

是实施事件设定的 Service。

Table 49 List of Characteristics in Event Setting Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5211	Temperature [Sensor 1]	温度事件设定	✔	✔		20
0x5212	Temperature [Sensor 2]	温度事件设定	✔	✔		20
0x5213	Relative humidity [Sensor 1]	相对湿度事件设定	✔	✔		20
0x5214	Relative humidity [Sensor 2]	相对湿度事件设定	✔	✔		20
0x5215	Ambient light [Sensor 1]	照度事件设定	✔	✔		20
0x5216	Ambient light [Sensor 2]	照度事件设定	✔	✔		20
0x5217	Barometric pressure [Sensor 1]	气压事件设定	✔	✔		20
0x5218	Barometric pressure [Sensor 2]	气压事件设定	✔	✔		20
0x5219	Sound noise [Sensor 1]	声压事件设定	✔	✔		20
0x521A	Sound noise [Sensor 2]	声压事件设定	✔	✔		20
0x521B	eTVOC [Sensor 1]	eTVOC 事件设定	✔	✔		20
0x521C	eTVOC [Sensor 2]	eTVOC 事件设定	✔	✔		20
0x521D	eCO2 [Sensor 1]	eCO2 事件设定	✔	✔		20
0x521E	eCO2 [Sensor 2]	eCO2 事件设定	✔	✔		20
0x521F	Discomfort index [Sensor 1]	不适指数事件设定	✔	✔		20
0x5220	Discomfort index [Sensor 2]	不适指数事件设定	✔	✔		20
0x5221	Heat stroke [Sensor 1]	中暑指数事件设定	✔	✔		20
0x5222	Heat stroke [Sensor 2]	中暑指数事件设定	✔	✔		20
0x5226	SI value [Acceleration]	SI 值事件设定	✔	✔		9
0x5227	PGA [Acceleration]	PGA 事件设定	✔	✔		9
0x5228	Seismic intensity [Acceleration]	震度事件设定	✔	✔		9

2.6.1 Event pattern [Sensor 1]

获取或设定各种事件的有效/无效、阈值。
设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 50 Event pattern [Sensor 1] format

Byte	Field	Format	Contents
0-1	Event enable/disable	UInt16	Reference：5.2. Event enable/disable
2-3	Simple threshold [upper limit] 1	Sint16	Reference：5.4. Event threshold
4-5	Simple threshold [upper limit] 2	Sint16	
6-7	Simple threshold [lower limit] 1	Sint16	
8-9	Simple threshold [lower limit] 2	Sint16	
10-11	Change threshold [rise] 1	Sint16	
12-13	Change threshold [rise] 2	Sint16	
14-15	Change threshold [decline] 1	Sint16	
16-17	Change threshold [decline] 2	Sint16	
18	Reserve for Future Use	UInt8	0xFF：Fixed value
19	Reserve for Future Use	UInt8	0xFF：Fixed value

2.6.2 Event pattern [Sensor 2]

获取或设定各种事件的阈值。
设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 51 Event pattern [Sensor 2] format

Byte	Field	Format	Contents
0-1	Average value threshold [upper]	Sint16	Reference：5.4. Event threshold
2-3	Average value threshold [lower]	Sint16	
4-5	Peak to Peak threshold [upper]	Sint16	
6-7	Peak to Peak threshold [lower]	Sint16	
8-9	Interval difference threshold [upper]	Sint16	
10-11	Interval difference threshold [lower]	Sint16	
12-13	Base difference threshold [upper]	Sint16	
14-15	Base difference threshold [lower]	Sint16	
16	Average value count	UInt8	
17	Peak to Peak count	UInt8	
18	Interval difference count	UInt8	
19	Base difference count	UInt8	

2.6.3 Event pattern [Acceleration]

获取或设定各种事件的有效/无效、阈值。
设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。为确认 FLASH 写入完成，在执行“Write”后必须确认 FLASH memory status (Characteristics UUID：0x5403)。

Table 52 Event pattern [Acceleration] format

Byte	Field	Format	Contents
0	Event enable/disable	UInt8	Reference：5.2. Event enable/disable
1-2	Simple threshold [upper limit] 1	UInt16	Reference：5.4. Event threshold
3-4	Simple threshold [upper limit] 2	UInt16	
5-6	Change threshold [rise] 1	UInt16	
7-8	Change threshold [rise] 2	UInt16	

2.7. Information Service (Service UUID：0x5400)

是获取传感器信息的 Service。

Table 53 List of Characteristics in Information Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x5401	Error Status	错误信息	✔			11
0x5402	Installation direction	传感器安装方向	✔			1
0x5403	FLASH memory status	FLASH memory状态	✔			1

※Properties 定义(R：Read，W：Write，N：Notify)

2.7.1 Error status (Characteristics UUID：0x5401)

获取传感器及 CPU 的异常状态。 通过对象机
“Read”时，Error status 会被清除。

Table 54 Error status format

Byte	Field	Format	Contents
0	Temperature sensor error	UInt8	Bit3：Initialization error Bit2：Frozen output Bit1： Sensing data is out of range Bit0：Communication error
1	Relative humidity sensor error	UInt8	
2	Ambient light sensor error	UInt8	
3	Barometric pressure sensor error	UInt8	
4	Sound noise sensor error	UInt8	
5	Acceleration sensor error	UInt8	
6	eTVOC sensor error	UInt8	
7	eCO2 sensor error	UInt8	
8	CPU error	UInt8	Bit2：Reboot with watchdog Bit1： FLASH memory erase error Bit0： FLASH memory initialization error
9	Reserve for Future Use	UInt8	0xFF：Fixed value
10	Reserve for Future Use	UInt8	0xFF：Fixed value

2.7.2 Mounting orientation (Characteristics UUID：0x5402)

获取安装方向。

Mounting orientation 在加速度传感器未检出振动 / 地震时以 320ms 的间隔更新。

Table 55 Mounting orientation format

Byte	Field	Format	Contents
0	Mounting orientation	UInt8	Range：0x01 to 0x06

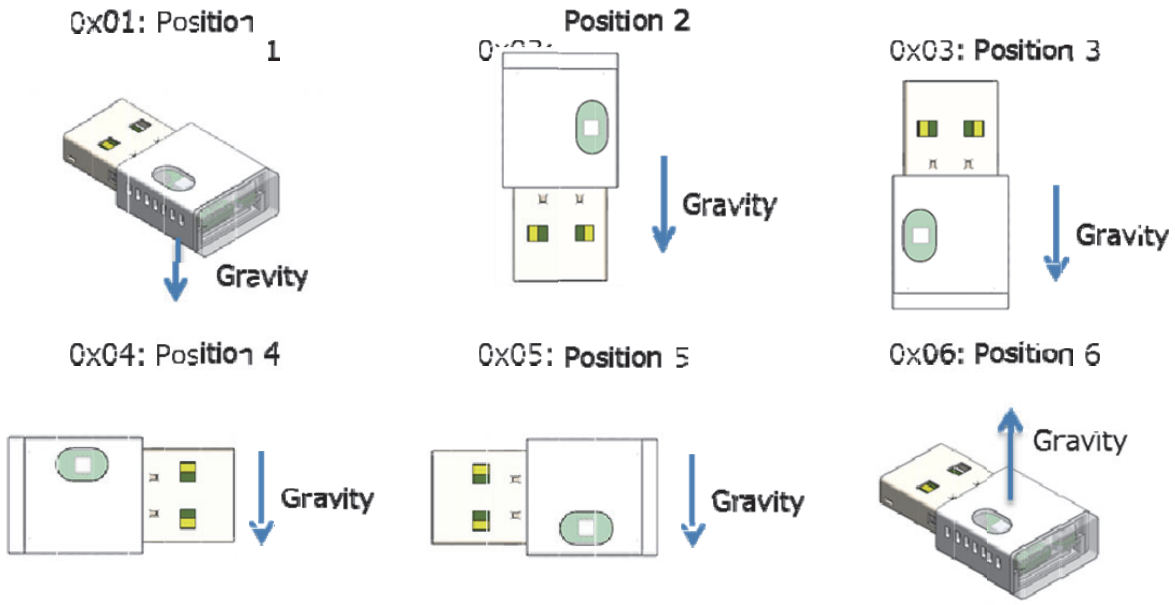

Figure 17 Mounting orientation

2.7.3 也可通过读取 FLASH memory status (Characteristics UUID：0x5403)

获取 FLASH memory 的写入状态。

通过 BLE 执行 FLASH memory 写入后，必须执行此 Status 确认。刚刚写入时为 Writing (0x01)，向 FLASH memory 写入结束时，则变为 Write success (0x02)或 Write failure (0x03) 通过对象机“Read”时，Status 变为 NONE (0x00) 通过 Memory reset (Characteristics UUID：0x5116)清除存储器过程中的 2min 间状态为 Flash memory erasing (0x04)，结束后为 NONE (0x00)。

Table 56 FLASH memory status format

Byte	Field	Format	Contents
0	FLASH memory status	UInt8	0x00：NONE 0x01：Writing 0x02：Write success 0x03：Write failure

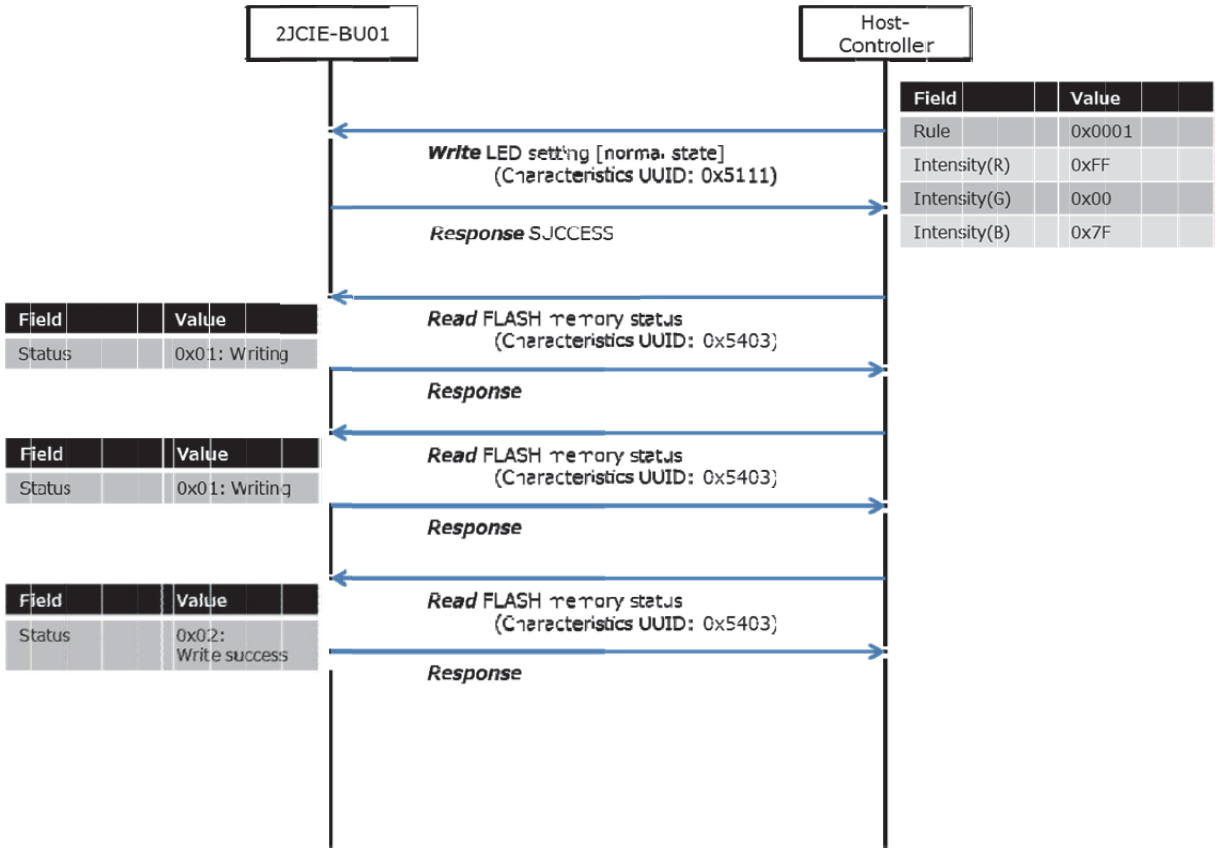

Figure 18 Procedure for acquiring flash memory status

2.8. Generic Access Service (Service UUID：0x1800)

Table 57 List of Characteristics in Generic Access Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x2A00	Device name	Name	✔			10
0x2A01	Appearance	Category	✔			2
0x2A04	Peripheral preferred connection parameters	Minimum connection	✔			2
		Maximum connection interval	✔			2
		Slave latency	✔			2
		Connection supervision timeout	✔			2
0x2AA6	Central address resolution	Central address resolution support	✔			1

2.8.1 Device name (Characteristics UUID：0x2A00)

Table 58 Device name format

Byte	Field	Format	Contents
0	Name	Utf8s	"R" 0x52
1			"b" 0x62
2			"t" 0x74
3			"-" 0x2D
4			"S" 0x53
5			"e" 0x65
6			"n" 0x6E
7			"s" 0x73
8			"o" 0x6F
9			"r" 0x72

2.8.2 Appearance (Characteristics UUID：0x2A01)

Table 59 Appearance format

Byte	Field	Format	Contents
0-1	Category	16bit	0：Unknown

2.8.3 Peripheral preferred connection parameters (Characteristics UUID：0x2A04)

Table 60 Peripheral preferred connection parameters format

Byte	Field	Format	Contents
0-1	Minimum connection interval	16bit	Unit：1.25ms Default：
2-3	Maximum connection interval	16bit	Unit：1.25ms Default：
4-5	Slave Latency	16bit	Default：0x0004(4)
6-7	Connection Supervision Timeout	16bit	Unit：10ms Default：

2.8.4 Central address resolution (Characteristics UUID：0x2AA6)

Table 61 Central address resolution support format

Byte	Field	Format	Contents
0	Central address resolution support	UInt8	1：Address resolution is supported in this device

2.9. Device Information Service (Service UUID：0x180A)

Table 62 List of Characteristics in Generic Access Service

UUID	Characteristics	Contents	Propertie			Byte
			R	W	N	
0x2A24	Model Number String	Model Number	✔			10
0x2A25	Serial Number String	Serial Number	✔			10
0x2A26	Firmware Revision String	Firmware Revision	✔			5
0x2A27	Hardware Revision String	Hardware Revision	✔			5
0x2A29	Manufacturer Name String	Manufacturer Name	✔			5

2.9.1 Model number string (Characteristics UUID：0x2A24)

Table 63 Model number string format

Byte	Field	Format	Contents
0	Model number	Utf8s	"2" 0x32
1			"J" 0x4A
2			"C" 0x43
3			"I" 0x49
4			"E" 0x45
5			"-" 0x2D
6			"B" 0x42
7			"U" 0x55
8			"0" 0x30
9			"1" 0x31

2.9.2 Serial number string (Characteristics UUID：0x2A25)

Table 64 Serial number string format

Byte	Field	Format	Contents
0	Serial number	Utf8s	"0"～"3" 0x30～0x33
1			"0"～"9" 0x30～0x39
2			"0"～"9", "X", "Y", "Z" 0x30～0x39, 0x58, 0x59,
3			"0"～"9" 0x30～0x39
4			"M" 0x4D
5			"Y" 0x59
6			"0"～"9" 0x30～0x39
7			"0"～"9" 0x30～0x39
8			"0"～"9" 0x30～0x39
9			"0"～"9" 0x30～0x39

2.9.3 Firmware revision string (Characteristics UUID：0x2A26)

Table 65 Firmware revision string format

Byte	Field	Format	Contents
0	Firmware revision	Utf8s	"0"～"9" 0x30～0x39
1			"0"～"9" 0x30～0x39
2			"." 0x2E
3			"0"～"9" 0x30～0x39
4			"0"～"9" 0x30～0x39

2.9.4 Hardware revision string (Characteristics UUID：0x2A27)

Table 66 Hardware revision string format

Byte	Field	Format	Contents
0	Hardware revision	Utf8s	"0"～"9" 0x30～0x39
1			"0"～"9" 0x30～0x39
2			"." 0x2E
3			"0"～"9" 0x30～0x39
4			"0"～"9" 0x30～0x39

2.9.5 Manufacturer name string (Characteristics UUID：0x2A28)

Table 67 Manufacture name string format

Byte	Field	Format	Contents
0	Manufacture name	Utf8s	"O" 0x4F
1			"M" 0x4D
2			"R" 0x52
3			"O" 0x4F
4			"N" 0x4E

3. BLE Advertising packet

表示 Advertising packet 的构成。

Table 68 List of Advertising packet

Description	Data	Advertising	Scan respon	ADType		
				Flags (0x01)	16-bit Service	Manufacturer specific
Sensor data	0x01	✔		✔		✔
Calculation data	0x02	✔		✔		✔
Sensor data & Calculation	0x03	✔	✔	✔		✔
Sensor flag & Calculation	0x04	✔	✔	✔		✔
Serial number	0x05	✔		✔	✔	✔

3.1. Sensor data

Link Layer packet format (47 octets)					
	Preamble (1octets)				
	Access Address (4octets)				
	PDU Header (16bits)				
	AdvA (6octets)				
	Advertising Data (31 octets)	AD 1	0	Length	0x02
			1	AD Type	0x01
			2	Flags	0x06
		AD 2	3	Length	0x16
			4	AD Type	0xFF
			5	Company ID	0xD5
			6		0x02
			7	Data Type	0x01
			8	Sequence number	–
			9	Temperature	–
			10		–
			11	Relative humidity	–
			12		–
			13	Ambient light	–
			14		–
			15	Barometric pressure	–
			16		–
			17		–
			18		–
			19	Sound noise	–
			20		–
			21	eTVOC	–
			22		–
			23	eCO2	–
			24		–
			25	Reserve for Future Use	0xFF
		AD 3	26	Length	0x04
			27	AD Type	0x08
			28	Local Name	"R"
			29		"b"
			30		"t"
	CRC				

3.2. Calculation data

Link Layer packet format (47 octets)	Preamble (1octets)				
	Access Address (4octets)				
	PDU Header (16bits)				
	AdvA (6octets)				
	Advertising Data (31 octets)	AD 1	0	Length	0x02
			1	AD Type	0x01
			2	Flags	0x06
		AD 2	3	Length	0x16
			4	AD Type	0xFF
			5	Company ID	0xD5
			6		0x02
			7	Data Type	0x02
			8	Sequence number	–
			9	Discomfort index	–
			10		–
			11	Heat stroke	–
			12		–
			13	Vibration information	–
			14	SI value	–
			15		–
			16	PGA	–
			17		–
			18	Seismic intensity	–
			19		–
			20	Acceleration (X-axis)	–
			21		–
			22	Acceleration (Y-axis)	–
			23		–
			24	Acceleration (Z-axis)	–
			25		–
		AD 3	26	Length	0x04
			27	AD Type	0x08
			28	Local Name	"R"
			29		"b"
			30		"t"
	CRC				

3.3. Sensor data & Calculation data (Scan rsp)

Link Layer packet format (47 octets)					
	Preamble (1octets)				
	Access Address (4octets)				
	PDU Header (16bits)				
	AdvA (6octets)				
	Advertising Data (31 octets)	AD 1	0	Length	0x02
			1	AD Type	0x01
			2	Flags	0x06
		AD 2	3	Length	0x16
			4	AD Type	0xFF
			5	Company ID	0xD5
			6		0x02
			7	Data Type	0x03
			8	Sequence number	–
			9	Temperature	–
			10		–
			11	Relative humidity	–
			12		–
			13	Ambient light	–
			14		–
			15	Barometric pressure	–
			16		–
			17		–
			18		–
			19	Sound noise	–
			20		–
			21	eTVOC	–
			22		–
			23	eCO2	–
			24		–
			25	Reserve for Future Use	0xFF
		AD 3	26	Length	0x04
			27	AD Type	0x08
			28	Local Name	"R"
			29		"b"
			30		"t"
	CRC				

Link Layer packet format (47 octets)	Preamble (1octets)				
	Access Address (4octets)				
	PDU Header (16bits)				
	AdvA (6octets)				
	Scan Response Data (31 octets)	AD 4	0	Length	0x1E
			1	AD Type	0xFF
			2	Company ID	0xD5
			3		0x02
			4	Sequence number	–
			5	Discomfort index	–
			6		–
			7	Heat stroke	–
			8		–
			9	Vibration information	–
			10	SI value	–
			11		–
			12	PGA	–
			13		–
			14	Seismic intensity	–
			15		–
			16	Acceleration (X-axis)	–
			17		–
			18	Acceleration (Y-axis)	–
			19		–
			20	Acceleration (Z-axis)	–
			21		–
			22	Reserve for Future Use	0xFF
			23	Reserve for Future Use	0xFF
			24	Reserve for Future Use	0xFF
			25	Reserve for Future Use	0xFF
			26	Reserve for Future Use	0xFF
			27	Reserve for Future Use	0xFF
			28	Reserve for Future Use	0xFF
			29	Reserve for Future Use	0xFF
			30	Reserve for Future Use	0xFF
	CRC				

3.4. Sensor flag & Calculation flag (Scan rsp)

Link Layer packet format (47 octets)	Preamble (1octets)				
	Access Address (4octets)				
	PDU Header (16bits)				
	AdvA (6octets)				
	Advertising Data (31 octets)	AD 1	0	Length	0x02
			1	AD Type	0x01
			2	Flags	0x06
		AD 2	3	Length	0x16
			4	AD Type	0xFF
			5	Company ID	0xD5
			6		0x02
			7	Data Type	0x04
			8	Sequence number	–
			9	Temperature flag	–
			10		–
			11	Relative humidity flag	–
			12		–
			13	Ambient light flag	–
			14		–
			15	Barometric pressure flag	–
			16		–
			17	Sound noise flag	–
			18		–
			19	eTVOC flag	–
			20		–
			21	eCO2 flag	–
			22		–
			23	Reserve for Future Use	0xFF
			24	Reserve for Future Use	0xFF
			25	Reserve for Future Use	0xFF
		AD 3	26	Length	0x04
			27	AD Type	0x08
			28	Local Name	"R"
			29		"b"
			30		"t"
	CRC				

Link Layer packet format (47 octets)	Preamble (1octets)				
	Access Address (4octets)				
	PDU Header (16bits)				
	AdvA (6octets)				
	Scan Response Data (31 octets)	AD 4	0	Length	0x1E
			1	AD Type	0xFF
			2	Company ID	0xD5
			3		0x02
			4	Sequence Number	–
			5	Discomfort index flag	–
			6		–
			7	Heat stroke flag	–
			8		–
			9	SI value flag	–
			10	PGA flag	–
			11	Seismic intensity flag	–
			12	Reserve for Future Use	0xFF
			13	Reserve for Future Use	0xFF
			14	Reserve for Future Use	0xFF
			15	Reserve for Future Use	0xFF
			16	Reserve for Future Use	0xFF
			17	Reserve for Future Use	0xFF
			18	Reserve for Future Use	0xFF
			19	Reserve for Future Use	0xFF
			20	Reserve for Future Use	0xFF
			21	Reserve for Future Use	0xFF
			22	Reserve for Future Use	0xFF
			23	Reserve for Future Use	0xFF
			24	Reserve for Future Use	0xFF
			25	Reserve for Future Use	0xFF
			26	Reserve for Future Use	0xFF
			27	Reserve for Future Use	0xFF
			28	Reserve for Future Use	0xFF
			29	Reserve for Future Use	0xFF
			30	Reserve for Future Use	0xFF
	CRC				

3.5. Serial number

Link Layer packet format (47 octets)					
	Preamble (1octets)				
	Access Address (4 octets)				
	PDU Header (16bits)				
	AdvA (6 octets)				
	Advertising Data (31 octets)	AD 1	0	Length	0x02
			1	AD Type	0x01
			2	Flags	0x06
		AD 2	3	Length	0x03
			4	AD Type	0x02
			5	16-bit Service UUIDs	0x0A
			6		0x18
		AD 3	7	Length	0x12
			8	AD Type	0xFF
			9	Company ID	0xD5
			10		0x02
			11	Data Type	0x05
			12	Serial number	–
			13		–
			14		–
			15		–
			16		–
			17		–
			18		–
			19		–
			20		–
			21		–
			22		–
			23	Memory index (Latest)	–
			24		–
			25		–
			26		–
		AD 4	27	Length	0x04
			28	AD Type	0x08
			29	Local Name	"R"
			30		"b"
			31		"t"
	CRC				

4. USB Communication

4.1. Communication specification

表示 USB Serial port 的通信设定。

Table 69 Communication specification

Item	Spec
Baudrate	115200bps
Datasize	8bit
Stop bit	1bit
Parity	None
Flow contrl	None

4.2. Communication procedure

USB 通信通过 Host-Controller 发送 Command，环境传感器则根据 Command 的内容进行 Response。Host-Controller 发送 Command 后，在接收到 Response 前 1s 之内未接收到数据时，会发生超时，重新通信。

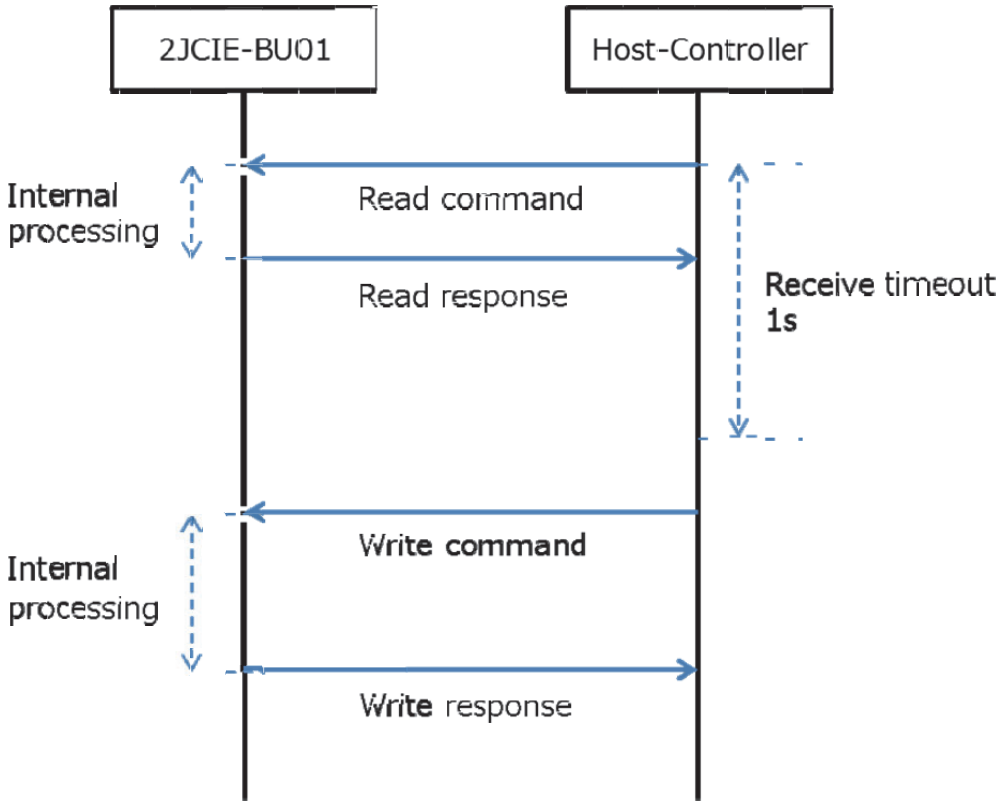

Figure 19 Procedure for USB communication

4.3. Frame format

4.3.1 Common frame format

下面对 USB 通信收发信息使用的通用框架的格式进行说明。
2byte 以上数据全部采用小字节序。

Table 70 Common frame format

Header		Length		Payload	CRC-16	
2 byte		2 byte		Nbyte	2 byte	
0x52	0x42	L byte	Hbyte	-	L byte	Hbyte

(1) Header
固定为 ASCII 代码的“BR”(0x4252)

(2) Length
指定从 Payload 到 CRC 的数据长度

(3) Payload
设定与指令相应的框架
Payload 部因 USB original 的请求内容及 BLE common 的请求内容而异。

(4) CRC-16
设定从 Header 到 Payload 末尾的 CRC 结果

4.3.2 CRC-16 calculation

错误校验的结果通过 CRC-16(Cyclic Redundancy Check Calculation)计算。

CRC-16 的计算示例

1. 将 CRC 寄存器的初始值设为 0xFFFF。
2. 计算 CRC 寄存器和信息的前 8bits 数据的 XOR，将结果返回 CRC 寄存器。
3. 一边向 MSB 中输入“0”，一边将 CRC 寄存器右移 1bit。
4. 从 LSB 移动的 bit 为“0”时，重复 3 的步骤。
   如果是“1”，则通过 CRC 寄存器和 0xA001 计算 XOR，将结果返回 CRC 寄存器。
5. 重复 3、4 的步骤，直到执行了 8bits 的位移。
6. 如果没有处理到 Packet 最后，则计算 CRC 寄存器和 Packet 的下一个 8bits 的 XOR，将结果返回 CRC 寄存器，并重复 3 的步骤。

4.3.3 Payload frame format [Command from Host-Controller]

Table 71 Payload frame format [Command]

Command	Address		Data		
1 byte	2 byte		Nbyte		
–	L byte	Hbyte	L byte	…	Hbyte

(1) Command
指定 Read、Write

Table 72 Command list

Command	Contents
0x01	Read
0x02	Write

(2) Address
根据执行的内容指定 Address。

(3) Data
内容因 Address 而异。

4.3.4 Payload frame format [Normal Response from 2JCIE-BU01]

Table 73 Payload frame format [Response]

Command	Address		Data		
1 byte	2 byte		Nbyte		
-	L byte	Hbyte	L byte	…	Hbyte

(1) Command
回复 Read、Write 的结果。

Table 74 Command list

Command	Contents
0x01	Read
0x02	Write

(2) Address
指定通过 Command 指定的 Address。

(3) Data
内容因 Address 而异。

4.3.5 Payload frame format [Error Response from 2JCIE-BU01]

Table 75 Payload frame format [Response]

Command	Address		Code
1 byte	2 byte		1 byte
-	L byte	Hbyte	-

(1) Command
回复 Read、Write 的结果。
回复Error时，则为使Command的MSB为1的值(加上0x80的值)。
接收到Read、Write以外的Command时，以Unknown (0xFF)回复。

Table 76 Command list

Command	Contents
0x81	Read error
0x82	Write error
0xFF	Unknown

(2) Address
根据执行的内容指定 Address。

(3) Code
回复Error内容。

Table 77 Error code

Code	Description	Contents
0x01	CRC error	CRC-16 calculation 错误时
0x02	Command error	Command 指定了 Read、Write 以外 时 这种情况下 Command 为
0x03	Address error	指定了 Address list 中未记载的 Address 时
0x04	Length error	Address 指定的 Length 错误时
0x05	Data error	指定超过 Write 写入范围时
0x06	Busy	进行 FLASH Memory 访问中等内部处理时

4.4. USB original address

是不与BLE的Service/Characteristics连动的USBoriginal的Address。

Table 78 List of USB original address

Address	Description	Read	Write with FLASH	Write without
0x500	Memory data long	✔		
0x500F	Memory data short	✔		
0x5021	Latest data long	✔		
0x5022	Latest data short	✔		
0x503	Acceleration memory data [Header]	✔		
0x503F	Acceleration memory data [Data]	✔		

4.4.1 Memory data long (Address：0x500E)

获取保存在FLASH memory中的感应数据。

Read command 相当于BLE的Request memory index (UUID：0x5005)。

发送指定的Memory index次数的Read response。若作为获取对象的FLASH memory读取失败，则会向Memory index的最上位bit设置1进行发送。

Read response相当于将BLE的以下4 Characteristics结合而成的format。

- ·Memory sensing data (UUID：500A)
- ·Memory calculation data (UUID：500B)
- ·Memory sensing flag (UUID：500C)
- ·Memory calculation flag (UUID：500D)

Table 79 Read command

Byte	Field	Format	Contents
0-3	Memory index (Start)	UInt32	Range：0x00000001 to 0xFFFFFFFF *Last index <=Start index *End index <= Latest index *Start index <= End index
4-7	Memory index (End)	UInt32	

Table 80 Read response

Byte	Field	Format	Contents
0-3	Memory index	UInt32	Range：0x00000001 to 0x7FFFFFFF *If data error, MSB is 1
4-11	Time counter	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF
12-13	Temperature	SInt16	Reference：5.1. Output range
14-15	Relative humidity	SInt16	
16-17	Ambient light	SInt16	
18-21	Barometric pressure	SInt32	
22-23	Sound noise	SInt16	
24-25	eTVOC	SInt16	
26-27	eCO2	SInt16	
28-29	Discomfort index	SInt16	
30-31	Heat stroke	SInt16	
32	Vibration information	UInt8	
33-34	SI value	UInt16	
35-36	PGA	UInt16	
37-38	Seismic intensity	UInt16	
39-40	Temperature flag	UInt16	Reference：5.3. Event flag
41-42	Relative humidity flag	UInt16	
43-44	Ambient light flag	UInt16	
45-46	Barometric pressure flag	UInt16	
47-48	Sound noise flag	UInt16	
49-50	eTVOC flag	UInt16	
51-52	eCO2 flag	UInt16	
53-54	Discomfort index flag	UInt16	
55-56	Heat stroke flag	UInt16	
57	SI value flag	UInt8	
58	PGA flag	UInt8	
59	Seismic intensity flag	UInt8	

4.4.2 Memory data short (Address : 0x500F)

获取保存在FLASHmemory中的感应数据。

Read command 相当于 BLE 的 Request memory index (UUID：0x5005)。

发送指定的 Memory index 次数的 Read response。若作为获取对象的 FLASH memory 读取失败，则会向 Memory index 的最上位bit 设置1进行发送。

Read response 相当于将 BLE 的以下 2 Characteristics 结合而成的 format。

- ·Memory sensing data (UUID：500A)
- ·Memory calculation data (UUID：500B)的一部分

Table 81 Read command format

Byte	Field	Format	Contents
0-3	Memory index (Start)	UInt32	Range：0x00000001 to 0x7FFFFFFF *Last index <=Start index *End index <= Latest index *Start index <= End index
4-7	Memory index (End)	UInt32	

Table 82 Read response format

Byte	Field	Format	Contents
0-3	Memory index	UInt32	Range：0x00000001 to 0x7FFFFFFF *If data error, MSB is 1
4-11	Time counter	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF
12-13	Temperature	SInt16	Reference：5.1. Output range
14-15	Relative humidity	SInt16	
16-17	Ambient light	SInt16	
18-21	Barometric pressure	SInt32	
22-23	Sound noise	SInt16	
24-25	eTVOC	SInt16	
26-27	eCO2	SInt16	
28-29	Discomfort index	SInt16	
30-31	Heat stroke	SInt16	

4.4.3 Latest data Long (Address：0x5021)

获取最新数据。

无 Read command 的 Data frame。

Read response 相当于将 BLE 的以下 4 Characteristics 结合而成的 format。

- ·Latest sensing data (UUID：5012)
- ·Latest calculation data (UUID：5013)
- ·Latest sensing flag (UUID：5014)
- ·Latest calculation flag (UUID：5015)

Table 83 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Temperature	SInt16	Reference：5.1. Output range
3-4	Relative humidity	SInt16	
5-6	Ambient light	SInt16	
7-10	Barometric pressure	SInt32	
11-12	Sound noise	SInt16	
13-14	eTVOC	SInt16	
15-16	eCO2	SInt16	
17-18	Discomfort index	SInt16	
19-20	Heat stroke	SInt16	
21	Vibration information	UInt8	
22-23	SI value	UInt16	
24-25	PGA	UInt16	
26-27	Seismic intensity	UInt16	
28-29	Temperature flag	UInt16	Reference：5.3. Event flag
30-31	Relative humidity flag	UInt16	
32-33	Ambient light flag	UInt16	
34-35	Barometric pressure flag	UInt16	
36-37	Sound noise flag	UInt16	
38-39	eTVOC flag	UInt16	
40-41	eCO2 flag	UInt16	
42-43	Discomfort index flag	UInt16	
44-45	Heat stroke flag	UInt16	
46	SI value flag	UInt8	
47	PGA flag	UInt8	
48	Seismic intensity flag	UInt8	

4.4.4 Latest data short (Address：0x5022)

获取最新数据。

无 Read command 的 Data frame。

Read response 相当于将 BLE 的以下 2 Characteristics 结合而成的 format。

- Latest sensing data (UUID：5012)
- Latest calculation data (UUID：5013)的一部分

Table 84 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Temperature	SInt16	Reference：5.1. Output range
3-4	Relative humidity	SInt16	
5-6	Ambient light	SInt16	
7-10	Barometric pressure	SInt32	
11-12	Sound noise	SInt16	
13-14	eTVOC	SInt16	
15-16	eCO2	SInt16	
17-18	Discomfort index	SInt16	
19-20	Heat stroke	SInt16	

4.4.5 Acceleration memory data [Header] (Address : 0x503E)

获取保存在 FLASH memory 中的加速度数据。

Read command 相当于BLE的Request acceleration memory index (UUID：0x5032)。

Read response 相当于将 BLE 的 Acceleration memory data[Header] (0x5034)的 Packet 分割汇集而成的 format。

Table 85 Read command format

Byte	Field	Format	Contents
0	Acceleration data type	UInt8	0x00：Earthquake data (Normal mode) 0x01：Vibration data
1	Request acceleration	UInt8	Range：0x01 to 0x0A (1 to 10) *0x01：Latest data <---> 0x0A：Last data

Table 86 Read response format

Byte	Field	Format	Contents
0-1	Storage total page	UInt16	Range: 0x0001 to 0xFFFF
2-5	Earthquakes or vibration count	UInt32	Range: 0x00000001 to 0xFFFFFFFF
6-13	Time counter	UInt64	Range: 0x1 to 0xFFFFFFFFFFFFFFFF
14	Earthquake flag	UInt8	0x00: Vibration data 0x01:
15	SI value calculation axis	UInt8	Reference: 5.1. Output range
16-17	Reserved for Future Use	UInt8	0xFF: Fixed value
18-19	Page number	UInt16	0x0000: Fixed value
20-21	SI value	UInt16	Reference: 5.1. Output range
22-23	PGA	UInt16	
24-25	Seismic intensity	UInt16	
26-27	Maximumacceleration (X-axis)	UInt16	
28-29	Maximumacceleration (Y-axis)	UInt16	
30-31	Maximum acceleration (Z-axis)	UInt16	
32-33	Temperature	SInt16	
34-35	Relative humidity	SInt16	
36-37	Ambient light	SInt16	
38-41	Barometric pressure	SInt32	
42-43	Sound noise	SInt16	
44-45	eTVOC	SInt16	
46-47	eCO2	SInt16	
48-49	Discomfort index	SInt16	
50-51	Heat stroke	SInt16	
52	Reserved for Future Use	UInt8	0xFF: Fixed value
53	Reserved for Future Use	UInt8	0xFF: Fixed value
54-55	Acceleration offset (X-axis)	SInt16	Reference: 5.1. Output range
56-57	Acceleration offset (Y-axis)	SInt16	
58-59	Acceleration offset (Z-axis)	SInt16	

4.4.6 Acceleration memory data [Data] (Address : 0x503F)

获取保存在 FLASH memory 中的加速度数据。

Read command 相当于 BLE 的 Request acceleration memory index (UUID: 0x5032)。
Read response 相当于将 BLE 的 Acceleration memory data [Data] (UUID: 0x5034)的 Packet 分割汇集而成的 format。Acceleration logger mode 中，SI value、PGA、Seismic intensity、Maximum acceleration 不是计算对象，因此固定为 0x0000。

Table 87 Read command format [Normal mode]

Byte	Field	Format	Contents
0	Acceleration data type	UInt8	0x00: Earthquake data 0x01:
1	Request acceleration	UInt8	Range: 0x01 to 0x0A (1 to 10) *0x01: Latest data <---> 0x0A: Last data
2-3	Request page (Start)	UInt16	Range: 0x0001 to 0x01FF (1 to 511) *Start page <= End page
4-5	Request page (End)	UInt16	

Table 88 Read command format [Acceleration logger mode]

Byte	Field	Format	Contents
0	Acceleration data type	UInt8	0x02: Logger data
1	Request acceleration	UInt8	0x01: Fixed value
2-3	Request page (Start)	UInt16	Range: 0x0001 to 0x2800 (1 to 10240) *Start index <= End index *(Start index - End index) <= 1000
4-5	Request page (End)	UInt16	

Table 89 Read response format

Byte	Field	Format	Contents
0-1	Page number	UInt16	[Normal mode] Range: 0x0001 to 0x01FF (1 to 511) [Acceleration logger mode] Range: 0x0001 to 0x2800 (1 to
2-3	SI value	UInt16	[Normal mode] Reference: 5.1. Output range [Acceleration logger mode] 0x0000: Fixed value
4-5	PGA	UInt16	
6-7	Seismic intensity	UInt16	
8-9	Maximum acceleration (X-axis)	UInt16	
10-11	Maximum acceleration (Y-axis)	UInt16	
12-13	Maximum acceleration (Z-axis)	UInt16	
14-15	Temperature	SInt16	Reference: 5.1. Output range
16-17	Relative humidity	SInt16	
18-19	Ambient light	SInt16	
20-23	Barometric pressure	SInt32	
24-25	Sound noise	SInt16	
26-27	eTVOC	SInt16	
28-29	eCO2	SInt16	
30-31	Discomfort index	SInt16	
32-33	Heat stroke	SInt16	
34	Reserved for Future Use	UInt8	0xFF: Fixed value
35	Reserved for Future Use	UInt8	0xFF: Fixed value
36-37	Acceleration (X-axis) 1	SInt16	Reference: 5.1. Output range
38-39	Acceleration (Y-axis) 1	SInt16	
40-41	Acceleration (Z-axis) 1	SInt16	
…	…	…	
222-223	Acceleration (X-axis) 32	SInt16	
224-225	Acceleration (Y-axis) 32	SInt16	
226-227	Acceleration (Z-axis) 32	SInt16	

4.5. BLE common address

与 BLE 的 Service/Characteristics 连动。BLE 的 UUID 和 USB 的 Address1 比 1 对应。

Table 90 List of Address in Memory Data Service

Address	Description	Read	Write with FLASH	Write without
0x5004	Latest memory	✔		

Table 91 List of Address in Latest Data Service

Address	Description	Read	Write with FLASH	Write without
0x5012	Latest sensing data	✔		
0x5013	Latest calculation data	✔		
0x5014	Latest sensing flag	✔		
0x5015	Latest calculation flag	✔		
0x5016	Latest acceleration status	✔		

Table 92 List of Address in Acceleration Service

Address	Description	Read	Write with FLASH	Write without
0x5031	Vibration count	✔		

Table 93 List of Address in Control Service

Address	Description	Read	Write with FLASH	Write without
0x5111	LED setting [normal state]	✔	✔	
0x5112	LED setting [event state]	✔	✔	
0x5113	LED state [operation]	✔	✔	
0x5114	Installation offset	✔	✔	
0x5115	Advertising setting	✔	✔	
0x5116	Memory reset			✔
0x5117	Mode change	✔	✔	
0x5118	Acceleration logger control			✔
0x5119	Acceleration logger status	✔		

Table 94 List of Address in Time Setting Service

Address	Description	Read	Write with FLASH	Write without
0x5201	Time counter	✔		
0x5202	Time setting	✔		✔
0x5203	Memory storage interval	✔	✔	

Table 95 List of Address in Device Information Service

Address	Description	Read	Write with FLASH	Write without
0x180	Device information	✔		

Table 96 List of Address in Event Setting Service

Address	Description	Read	Write with FLASH	Write without
0x5211	Temperature [Sensor 1]	✔	✔	
0x5212	Temperature [Sensor 2]	✔	✔	
0x5213	Relative humidity [Sensor 1]	✔	✔	
0x5214	Relative humidity [Sensor 2]	✔	✔	
0x5215	Ambient light [Sensor 1]	✔	✔	
0x5216	Ambient light [Sensor 2]	✔	✔	
0x5217	Barometric pressure [Sensor 1]	✔	✔	
0x5218	Barometric pressure [Sensor 2]	✔	✔	
0x5219	Sound noise [Sensor 1]	✔	✔	
0x521	Sound noise [Sensor 2]	✔	✔	
0x521	eTVOC [Sensor 1]	✔	✔	
0x521	eTVOC [Sensor 2]	✔	✔	
0x521	eCO2 [Sensor 1]	✔	✔	
0x521	eCO2 [Sensor 2]	✔	✔	
0x521F	Discomfort index [Sensor 1]	✔	✔	
0x5220	Discomfort index [Sensor 2]	✔	✔	
0x5221	Heat stroke [Sensor 1]	✔	✔	
0x5222	Heat stroke [Sensor 2]	✔	✔	
0x5226	SI value [Acceleration]	✔	✔	
0x5227	PGA [Acceleration]	✔	✔	
0x5228	Seismic intensity [Acceleration]	✔	✔	

Table 97 List of Address in Information Service

Address	Description	Read	Write with FLASH	Write without
0x5401	Error status	✔		
0x5402	Installation direction	✔		

4.5.1 Latest memory information (Address：0x5004)

获取保存在 FLASH memory 中的感应数据的 index 数。

Memory index (Latest) Memory index (Last)间的最大保存数据数为 60000 个数据，Memory index 超过 60000 时，则按顺序覆盖旧数据。只能获取 Memory index (Latest) Memory index (Last)间的数据。

无 Read command 的 Data frame。

Table 98 Read response format

Byte	Field	Format	Contents
0-3	Memory index (Latest)	UInt32	Range：0x00000001 to 0x7FFFFFFF *0x00000000：Before storage
4-7	Memory index (Last)	UInt32	

4.5.2 Latest sensing data(Address：0x5012)

获取Latest sensing data。

回复读取时的最新值。

无 Read command 的 Data frame。

Table 99 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Temperature	SInt16	Reference：5.1. Output range
3-4	Relative humidity	SInt16	
5-6	Ambient light	SInt16	
7-10	Barometric pressure	SInt32	
11-12	Sound noise	SInt16	
13-14	eTVOC	SInt16	
15-16	eCO2	SInt16	

4.5.3 Latest calculation data (Address：0x5013)

获取Latest calculation data。
回复读取时的最新值。
无 Read command 的 Data frame。

Table 100 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Discomfort index	SInt16	Reference：5.1. Output range
3-4	Heat stroke	SInt16	
5	Vibration information	UInt8	
6-7	SI value	UInt16	
8-9	PGA	UInt16	
10-11	Seismic intensity	UInt16	
12-13	Acceleration (X-axis)	SInt16	
14-15	Acceleration (Y-axis)	SInt16	
16-17	Acceleration (Z-axis)	SInt16	

4.5.4 Latest sensing flag (Address：0x5014)

获取 Latest sensing flag。
回复读取时的最新值。
无 Read command 的 Data frame。

Table 101 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Temperature flag	UInt16	Reference：5.3. Event flag
3-4	Relative humidity flag	UInt16	
5-6	Ambient light flag	UInt16	
7-10	Barometric pressure flag	UInt16	
11-12	Sound noise flag	UInt16	
13-14	eTVOC flag	UInt16	
15-16	eCO2 flag	UInt16	

4.5.5 Latest calculation flag (Address：0x5015)

获取 Latest calculation flag。

回复读取时的最新值。

无 Read command 的 Data frame。

Table 102 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1-2	Discomfort index flag	UInt16	Reference：5.3. Event flag
3-4	Heat stroke flag	UInt16	
5	SI value flag	UInt8	
6	PGA flag	UInt8	
7	Seismic intensity flag	UInt8	

4.5.6 Latest acceleration status (Address：0x5016)

获取 Latest acceleration status。

回复读取时的最新值。Acceleration offset 在未发生地震/振动时更新。

无 Read command 的 Data frame。

Table 103 Read response format

Byte	Field	Format	Contents
0	Sequence number	UInt8	Range：0x00 to 0xFF
1	Vibration information	UInt8	Reference：5.1. Output range
2-3	Maximum acceleration (X-axis)	SInt16	
4-5	Maximum acceleration (Y-axis)	SInt16	
6-7	Maximum acceleration (Z-axis)	SInt16	
8	SI value calculation axis	UInt8	
9-10	Acceleration offset (X-axis)	SInt16	
11-12	Acceleration offset (Y-axis)	SInt16	
13-14	Acceleration offset (Z-axis)	SInt16	

4.5.7 Vibration count (Address：0x5031)

获取地震/振动的累计次数。
在因 Mode 变更或 Memory reset 而消除 Acceleration area 时，累计次数会被重置。
无 Read command 的 Data frame。

Table 104 Read response format

Byte	Field	Format	Contents
0-3	Earthquake count	UInt32	Range：0x00000000 to 0xFFFFFFFF
4-7	Vibration count	UInt32	

4.5.8 LED setting [normal state] (Address：0x5111)

获取或设定常规时 LED 的显示状态。
Normally ON (0x01)时，通过 Intensity of LED 设定的 RGB (Red, Green, Blue)强度指定显示颜色。颜色共 255 级，255 为最大，全部 255 (0xFF)显示白色，全部 0 (0x00)则不点亮。选择了 Scales 时，颜色会根据传感器输出自动变化。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。
无 Read command 的 Data frame。
Read response、Write command、Write response 为通用格式。

Table 105 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-1	Display rule (normal state)	UInt16	0x0000：Normally OFF 0x0001：Normally ON 0x0002：Temperature value scales 0x0003：Relative humidity value scales 0x0004：Ambient light value scales 0x0005：Barometric pressure value scales 0x0006：Sound noise value scales 0x0007：eTVOC value scales 0x0008：SI vale scales 0x0009：PGA value
2	Intensity of LED (Red)	UInt8	Range：0x00 to 0xFF
3	Intensity of LED (Green)	UInt8	
4	Intensity of LED (Blue)	UInt8	

4.5.9 LED setting [event state] (Address：0x5112)

获取或设定事件发生时的 LED 显示状态。

事件发生时，通过 Intensity of LED 设定的 RGB(Red, Green, Blue)强度来指定闪烁的颜色。颜色共 255 级，255 为最大，全部 255 (0xFF)显示白色，全部 0 (0x00)则不点亮。由于事件采用 bit field 设定，因此可同时设定多个事件。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。无 Read command 的 Data frame。

Read response、Write command、Write response 为通用格式。

Table 106 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-1	Display rule (event state)	UInt16	Bit7：PGA event Bit6：SI value event Bit5：eTVOC event Bit4：Sound noise event Bit3：Barometric pressure event Bit2：Ambient light event Bit1：Relative
2	Intensity of LED (Red)	UInt8	Range：0x00 to 0xFF
3	Intensity of LED (Green)	UInt8	
4	Intensity of LED (Blue)	UInt8	

4.5.10 LED setting [operation] (Address：0x5113)

获取或设定各动作的 LED 显示状态。

Start up 仅适用于启动后，Error 适用于发生 Error status 中的任意一个错误时，Connection 适用于通过 BLE 通信连接时。设定值被写入 FLASH memory 中，即使电源 ON/OFF，也可保留。

无 Read command 的 Data frame。

Read response、Write command、Write response 为通用格式。

Table 107 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0	Start up	UInt8	0x00：Rainbow (default) 0x01：BLUE
1	Error	UInt8	0x00：NONE (default) 0x01：
2	Connection	UInt8	0x00：NONE (default) 0x01：

4.5.11 Installation offset (Address : 0x5114)

获取或设定设置后的任意偏置、增益值。

可对设为Enable的偏置加上或减去指定的值。仅Ambient light为Gain补偿，可对原始输出乘以一定的倍率设定值被写入 FLASH memory 中，即使电源 ON/OFF，也可保留。

无Read command的Data frame。

Read response、Write command、Write response 为通用格式。

Table 108 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0	Installation offset enable/disable	UInt8	Bit4: Sound noise offset enable Bit3: Barometric pressure offset enable Bit2: Ambient light gain enable Bit1: Relative humidity offset enable Bit0: Temperature
1-2	Temperature installation offset	SInt16	Range: 0xD8F0 to 0x2710 (-10000 to 10000) Unit: 0.01degC Default: 0x0000 (0.00degC)
3-4	Relative humidity installation offset	SInt16	Range: 0xD8F0 to 0x2710 (-10000 to 10000) Unit: 0.01%RH Default: 0x0000 (0.00%RH)
5-6	Ambient light installation gain	SInt16	Range: 0x0000 to 0x2710 (0 to 10000) Unit: 0.001 Default: 0x03E8 (1.000)
7-10	Barometric pressure installation offset	SInt32	Range: 0xFFF0BDC0 to 0x000F4240 (-1000000 to 1000000) Unit: 0.001hPa Default: 0x0000
11-12	Sound noise installation offset	SInt16	Range: 0xD8F0 to 0x2710 (-10000 to 10000) Unit: 0.01dB Default: 0x0000 (0.00dB)

4.5.12 Advertise setting (Address : 0x5115)

获取或设定 BLE advertising 的发送间隔、Data type。

Advertising 的 Packet 构成请参考 3. BLE Advertising packet。Advertising mode 选择 Reserved for Future Use (0x06 to 0x08)时，Sensor data (0x01)的 Advertising packet 会被选中。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。

无 Read command 的 Data frame。

Read response、Write command、Write response 为通用格式。

Table 109 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-1	Advertising interval	UInt16	Range: 0x00A0 to 0x4000 (100ms to 10.24s) Unit: 0.625ms Default: 0x00A0 (100ms)
2	Advertising mode	UInt8	0x01: Sensor data (default) 0x02: Acceleration data 0x03: Sensor data & Acceleration data (Scan rsp) 0x04: Sensor flag & Acceleration flag (Scan rsp) 0x05: Serial number 0x06: Reserve for Future Use 0x07 : Reserve for

4.5.13 Memory reset (Address : 0x5116)

清除该区域的 FLASH memory 数据。

Sensing data area 为缓冲区，旧的数据会被自动清除，但希望复位 Memory index 时，通过 Memory reset 清除 Sensing data area。Acceleration area 在通过 Acceleration logger mode 清除数据时使用。清除时间约需 2min，LED 亮 BLUE 颜色的灯。清除中即使接收到 USB 通信信息，也不会回复。

Write command、Write response 为通用格式。

Table 110 Write command and Write response format

Byte	Field	Format	Contents
0	Memory reset	UInt8	0x01: Sensing data area 0x02:

4.5.14 Mode change (Address : 0x5117)

获取当前模式或设定模式。

切换 Mode 时 Acceleration area 的 FLASH memory 会被清除，与通过 Memory reset 清除 Acceleration area 时的状态相同，需要约 2min 的时间。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也以相同的 mode 启动。

无 Read command 的 Data frame。

Read response、Write command、Write response 为通用格式。

Table 111 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0	Mode change	UInt8	0x00：Normal mode (default) 0x01：

4.5.15 Acceleration logger control (Address : 0x5118)

设定 Acceleration logger mode 的 Log Start/Stop。

执行 Log stop 时，Byte 1 到 Byte 6 的值设定为与 Log start 时相同的值。虽然用户可任意设定 Start page/End page，但如果覆盖为已写入的 page，则无法获得正常的数据，因此写入相同 page 时，必须执行 Memory reset。

Write command、Write response 为通用格式。

Table 112 Write command and Write response format

Byte	Field	Format	Contents
0	Logger condition	UInt8	0x00：Log stop 0x01：
1	Range of detection	UInt8	0x00：±2000 gal (fixed value)
2	ODR setting	UInt8	0x00：1 Hz 0x01：10 Hz 0x02：25 Hz 0x03：100 Hz 0x04：200 Hz 0x05：400 Hz
3-4	Start page	UInt16	Range：0x0001 to 0x2800 (1 to 10240) Unit：1 page
5-6	End page	UInt16	

4.5.16 Acceleration logger status (Address : 0x5119)

获取 Acceleration logger mode 的 Status。
Logging 执行中为 0x01：Running。Running page 表示 Running 中的最终 page。
无 Read command 的 Data frame。
Read response、Write command、Write response 为通用格式。

Table 113 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0	Logger status	UInt8	0x00： Waiting
1-2	Running page	UInt16	Range：0x0001 to 0x2800 (1 to 10240) Unit：1page

4.5.17 Latest time counter (Address : 0x5201)

获取 Latest timer counter。
Latest time 以 1sec 为单位表示从写入 Time setting Characteristics 时起的经过时间。
无 Read command 的 Data frame。

Table 114 Read response

Byte	Field	Format	Contents
0-7	Time counter	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF Unit：1sec

4.5.18 Time setting (Address : 0x5202)

获取或设定在环境传感器内部计数的偏置值。 设定值保存在 FLASH memory 中，电源 OFF 时则复位。 无 Read command 的 Data frame。
Read response、Write command、Write response 为通用格式。

Table 115 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-7	Time setting	UInt64	Range：0x1 to 0xFFFFFFFFFFFFFFFF Unit：1sec

4.5.19 Memory storage interval (Address：0x5203)

获取或设定向 FLASH memory 中保存感应数据的间隔。
变更保存间隔后 Memory index 会被复位，同时 Sensing data area 的 FLASH memory 也会被清除。与通过 Memory reset 清除 Sensing data area 的状态相同，需要约 2min 的时间。设定值保存在 FLASH memory 中，即使电源 ON/OFF，也可保留。无 Read command 的 Data frame。
Read response、Write command、Write response 为通用格式。

Table 116 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-1	Memory storage interval	UInt16	Range：0x0001 to 0x0E10 (1 to 3600sec) Unit：1sec Default：0x0001 (1sec)

4.5.20 Event pattern [Sensor 1] (Address：0x5211 etc.)

获取或设定各种事件的有效/无效、阈值。
设定值保存在FLASHmemory中，即使电源ON/OFF，也可保留。
无 Read command 的 Data frame。
Read response、Write command、Write response 为通用格式。

Table 117 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-1	Event enable/disable	UInt16	Reference：5.2. Event enable/disable
2-3	Simple threshold [upper limit] 1	SInt16	Reference：5.4. Event threshold
4-5	Simple threshold [upper limit] 2	SInt16	
6-7	Simple threshold [lower limit] 1	SInt16	
8-9	Simple threshold [lower limit] 2	SInt16	
10-11	Change threshold [rise] 1	SInt16	
12-13	Change threshold [rise] 2	SInt16	
14-15	Change threshold [decline] 1	SInt16	
16-17	Change threshold [decline] 2	SInt16	
18	Reserve for Future Use	UInt8	0xFF：Fixed value
19	Reserve for Future Use	UInt8	0xFF：Fixed value

4.5.21 Event pattern [Sensor 2] (Address：0x5212 etc.)

获取或设定各种事件的阈值。

设定值保存在FLASH memory中，即使电源ON/OFF，也可保留。

无 Read command 的 Data frame。

Read response、Write command、Write response 为通用格式。

Table 118 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0-1	Average value threshold [upper]	SInt16	Reference：5.4 Event threshold
2-3	Average value threshold [lower]	SInt16	
4-5	Peak to Peak threshold [upper]	SInt16	
6-7	Peak to Peak threshold [lower]	SInt16	
8-9	Interval difference threshold [upper]	SInt16	
10-11	Interval difference threshold [lower]	SInt16	
12-13	Base difference threshold [upper]	SInt16	
14-15	Base difference threshold [lower]	SInt16	
16	Average value count	UInt8	
17	Peak to Peak count	UInt8	
18	Interval difference count	UInt8	
19	Base difference count	UInt8	

4.5.22 Event pattern [Acceleration] (Address : 0x5226 etc.)

获取或设定各种事件的有效/无效、阈值。
设定值保存在FLASHmemory中，即使电源ON/OFF，也可保留。
无 Read command 的 Data frame。
Read response、Write command、Write response 为通用格式。

Table 119 Read response, Write command, and Write response format

Byte	Field	Format	Contents
0	Event enable/disable	UInt8	Reference：5.2. Event enable/disable
1-2	Simple threshold [upper limit] 1	UInt16	Reference：5.4. Event threshold
3-4	Simple threshold [upper limit] 2	UInt16	
5-6	Change threshold [rise] 1	UInt16	
7-8	Change threshold [rise] 2	UInt16	

4.5.23 Error status(Address：0x5401)

获取传感器及 CPU 的异常状态。 通过对象机“Read”时，Error status 会被清除。 无 Read command 的 Data frame。

Table 120 Read response

Byte	Field	Format	Contents
0	Temperature sensor error	UInt8	Bit3：Initialization error Bit2：Frozen output Bit1： Sensing data is out of range Bit0：Communication error
1	Relative humidity sensor error	UInt8	
2	Ambient light sensor error	UInt8	
3	Barometric pressure sensor error	UInt8	
4	Sound noise sensor error	UInt8	
5	Acceleration sensor error	UInt8	
6	eTVOC sensor error	UInt8	
7	eCO2 sensor error	UInt8	
8	CPU error	UInt8	Bit2：Reboot with watchdog Bit1： FLASH memory erase error Bit0： FLASH memory initialization error
9	Reserve for Future Use	UInt8	0xFF：Fixed value
10	Reserve for Future Use	UInt8	0xFF：Fixed value

4.5.24 Mounting orientation (Address : 0x5402)

获取安装方向。

Mounting orientation 在加速度传感器未检出振动 / 地震时以 320ms 的间隔更新。

无 Read command 的 Data frame。

Table 121 Read response

Byte	Field	Format	Contents
0	Mounting	UInt8	R nge： 0x01 to 0x06

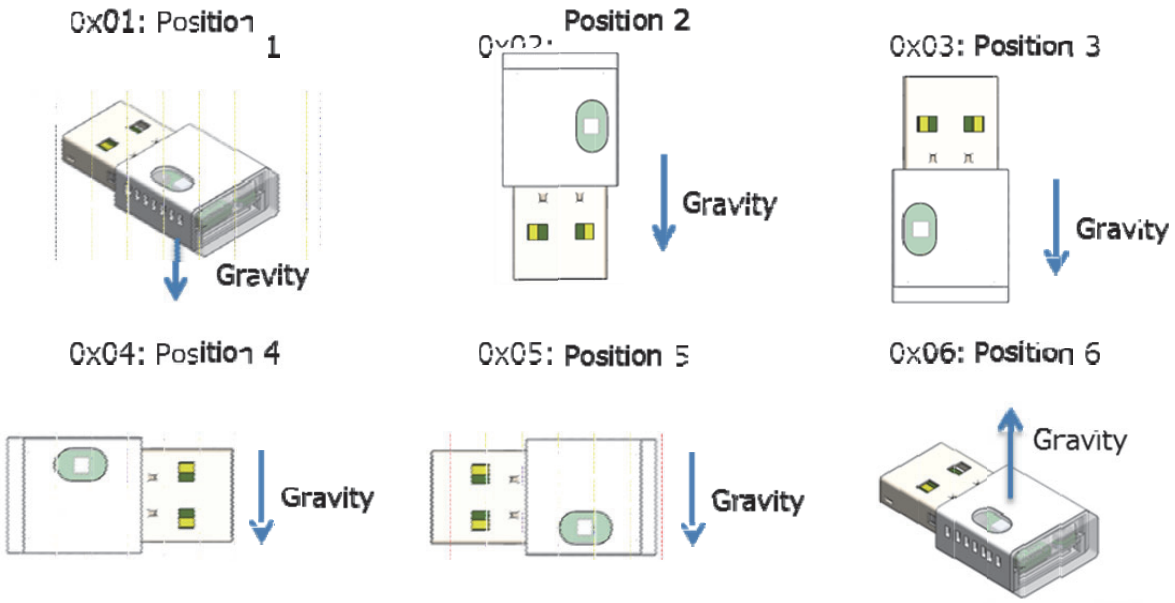

Figure 20 Mounting orientation

4.5.25 Device information (Address : 0x180A)

无 Read command 的 Data frame。

Table 122 Read response

Byte	Field	Format	Contents
0	Model number	Utf8s	"2" 0x32
1			"J" 0x4A
2			"C" 0x43
3			"I" 0x49
4			"E" 0x45
5			"-" 0x2D
6			"B" 0x42
7			"U" 0x55
8			"0" 0x30
9			"1" 0x31
10	Serial number	Utf8s	"0"～"3" 0x30～0x33
11			"0"～"9" 0x30～0x39
12			"0"～"9", "X", "Y", "Z" 0x30～0x39, 0x58, 0x59,
13			"0"～"9" 0x30～0x39
14			"M" 0x4D
15			"Y" 0x59
16			"0"～"9" 0x30～0x39
17			"0"～"9" 0x30～0x39
18			"0"～"9" 0x30～0x39
19			"0"～"9" 0x30～0x39
20	Firmware revision	Utf8s	"0"～"9" 0x30～0x39
21			"0"～"9" 0x30～0x39
22			"." 0x2E
23			"0"～"9" 0x30～0x39
24			"0"～"9" 0x30～0x39
25	Hardware revision	Utf8s	"0"～"9" 0x30～0x39
26			"0"～"9" 0x30～0x39
27			"." 0x2E
28			"0"～"9" 0x30～0x39
29			"0"～"9" 0x30～0x39
30	Manufacture name	Utf8s	"O" 0x4F

31			″M″ 0x4D
32			″R″ 0x52
33			″O″ 0x4F
34			″N″ 0x4E

5. Data specification

5.1. **Output range** 表示各种传感器的

输出范围、单位。

Table 123 Output range [Sensor]

Sensor Type	Format	Range	Unit
Temperature	SInt16	-40.00 to 125.00	0.01 degC
Relative humidity	SInt16	0.00 to 100.00	0.01 %RH
Ambient light	SInt16	0 to 30000	1 lx
Barometric pressure	SInt32	300.000 to 1100.000	0.001 hPa
Sound noise	SInt16	33.00 to 120.00	0.01 dB
eTVOC (equivalent Total Volatile Organic Compound)	SInt16	0 to 29206	1 ppb
eCO2 (equivalent CO2)	SInt16	400 to 32767	1 ppm
Discomfort index	SInt16	0.00 to 100.00	0.01
Heat stroke	SInt16	-40.00 to 125.00	0.01 degC

＊Discomfort index：以数量表示夏季闷热程度的数据。根据温度和湿度换算。

＊Heat stroke：以数量表示夏季中暑危险度的数据。根据温度和湿度换算。

＊在检测范围之外的 VOC 环境中，eTVOC 和 eCO2 的输出值可能会输出-32767。

Table 124 Output range [Acceleration]

Sensor Type	Format	Range	Unit
Acceleration	SInt16	-2000.0 to 2000.0	0.1gal
SI value	UInt16	0.0 to 6553.5	0.1kine
PGA	UInt16	0.0 to 6553.5	0.1gal
Seismic intensity	UInt16	0.000 to 65.535	0.001
SI value calculation axis	UInt8	0x00 ： YZ-axis 0x01：XZ-axis	
Vibration information	UInt8	0x00：NONE 0x01：during vibration (Earthquake judgment in progress) 0x02：during earthquake	

＊SI value：表示某个振动对结构物造成影响的指标。与震度相关。根据水平 2 轴的加速度值换算。

＊PGA：某区间内的最大加速度值。合成水平 2 轴的加速度值进行换算。

＊Seismic intensity：与根据 SI 值求得的震度相关的值。

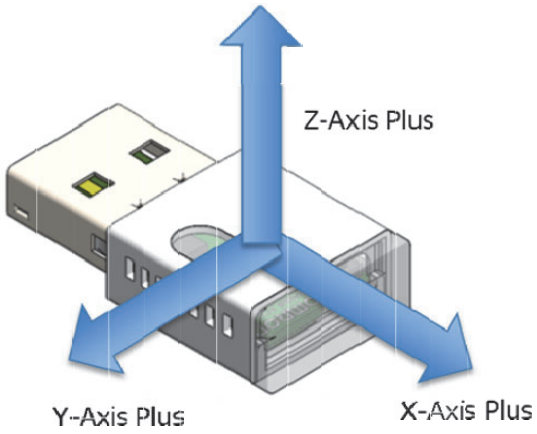

Figure 21 Accelerationaxis

5.2. Event enable/disable

Event flag 的 enable/disable 设定通过以下的 bit field 进行设定。

Table 125 Event enable/disable [Sensor]

Bit	Description	Contents
0	Simple threshold [upper limit] 1	有效时设为 1，无效时设为0。
1	Simple threshold [upper limit] 2	
2	Simple threshold [lower limit] 1	
3	Simple threshold [lower limit] 2	
4	Change threshold [rise] 1	
5	Change threshold [rise] 2	
6	Change threshold [decline] 1	
7	Change threshold [decline] 2	
8	Average value threshold [upper]	
9	Average value threshold [lower]	
10	Peak to Peak threshold [upper]	
11	Peak to Peak threshold [lower]	
12	Interval difference threshold [rise]	
13	Interval difference threshold [decline]	
14	Base difference threshold [upper]	
15	Base difference threshold [lower]	

Table 126 Event enable/disable [Acceleration]

Bit	Description	Contents
0	Simple threshold [upper limit] 1	有效时设为 1，无效时设为0。
1	Simple threshold [upper limit] 2	
4	Change threshold [rise] 1	
5	Change threshold [rise] 2	

5.3. Event flag

Event flag 的检测结果通过以下 bit field 输出。

Table 127 Event flag [Sensor]

Bit	Description	Contents
0	Simple threshold [upper limit] 1	比较传感器输出和阈值，判定在阈值以上还是以下。
1	Simple threshold [upper limit] 2	
2	Simple threshold [lower limit] 1	
3	Simple threshold [lower limit] 2	
4	Change threshold [rise] 1	比较上次测量的数据和此次测量的数据，判定有无阈值以上或以下的 变化。
5	Change threshold [rise] 2	
6	Change threshold [decline] 1	
7	Change threshold [decline] 2	
8	Average value threshold [upper]	比较传感器输出的平均值和阈值，判定在阈值以上还是以下。
9	Average value threshold [lower]	
10	Peak to Peak threshold [upper]	比较传感器输出的特定期间的 Peak to Peak 和阈值，判定在阈值以上 还是以下。
11	Peak to Peak threshold [lower]	
12	Interval difference threshold [rise]	比较传感器输出的最新值和规定次数前的值的差，判定在阈值以上还 是以下。
13	Interval difference threshold [decline]	
14	Base difference threshold [upper]	比较传感器输出的平均值和规定次数前的平均值的差，判定在阈值以 上还是以下。
15	Base difference threshold [lower]	

Table 128 Event flag [Acceleration]

Bit	Description	Contents
0	Simple threshold [upper limit] 1	比较传感器输出和阈值，判定在阈值以上还是以下。
1	Simple threshold [upper limit] 2	
4	Change threshold [rise] 1	比较上次测量的数据和此次测量的数据，判定有无阈值以上或以下的 变化。
5	Change threshold [rise] 2	

5.3.1 Simple threshold

比较传感器输出和阈值，判定在阈值以上还是以下。
upper 1、upper 2 为上限判定，lower 1、lower 2 为下限判定，均可设定　任意值。

事件判定条件

Simple threshold [upper limit] 1：data >= Upper threshold 1
Simple threshold [upper limit] 2：data >= Upper threshold 2
Simple threshold [lower limit] 1：data <= lower threshold 1
Simple threshold [lower limit] 2：data <= lower threshold 2

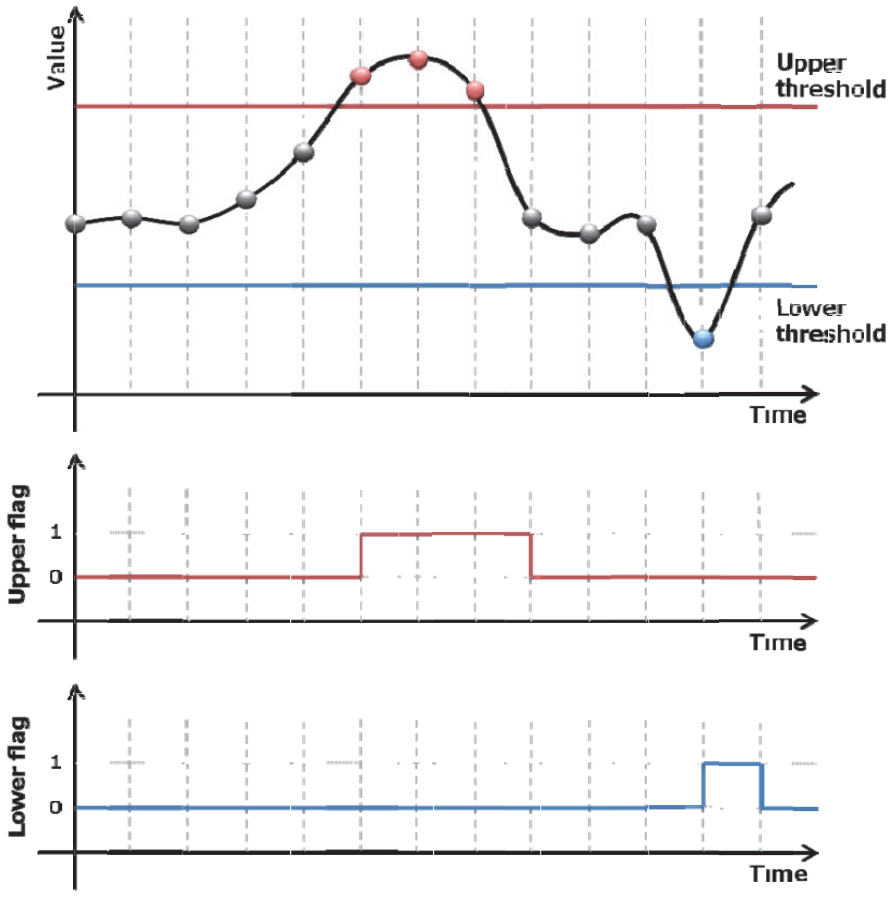

Figure 22 Simple threshold

5.3.2 Change threshold

比较上次测量的数据和此次测量的数据，判定有无阈值以上或以下的变化。
rise 1、rise 2 为增加判定，decline 1、decline 2 为减少判定，均可设定为任意值。计算式中的 data[0]为最新值，data[1]为 1 次测量前(1sec 前)的数据。

事件判定条件

Change threshold [rise] 1：(data[0] − data[1]) >= rise threshold 1
Change threshold [rise] 2：(data[0] − data[1]) >= rise threshold 2
Change threshold [decline] 1：(data[0] − data[1]) <= decline threshold 1
Change threshold [decline] 2：(data[0] − data[1]) <= decline threshold 2

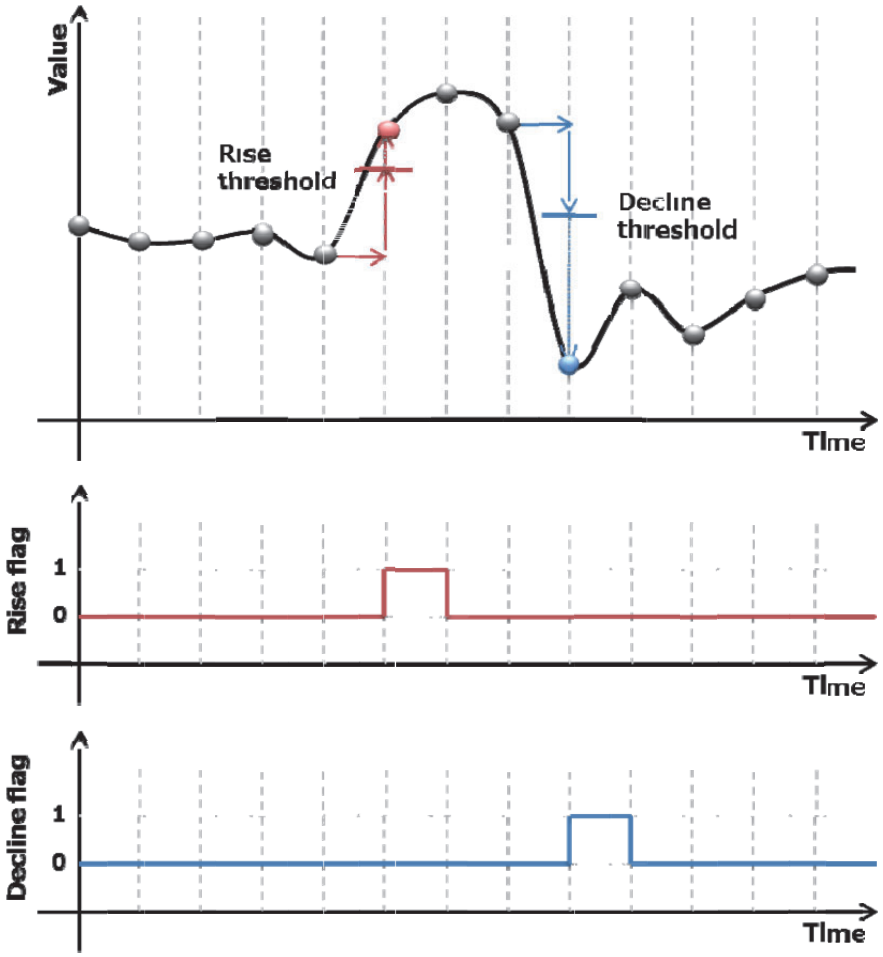

Figure 23 Change threshold

5.3.3 Average value threshold

比较传感器输出的平均值和阈值，判定在阈值以上还是以下。
通过 Average value count 设定取过去几次的平均值。upper 为上限判定，lower 为下限　定，均可设定为任意值
计算式中的 data[0]为最新值，data[x]为 x 次前的测量数据。

事件判定条件(Average value count = 4 时)

Ave data = (data[0] + data[1] + data[2] + data[3]) / 4
Average value threshold [upper]：Ave data >= upper threshold
Average value threshold [lower]：Ave data <= lower threshold

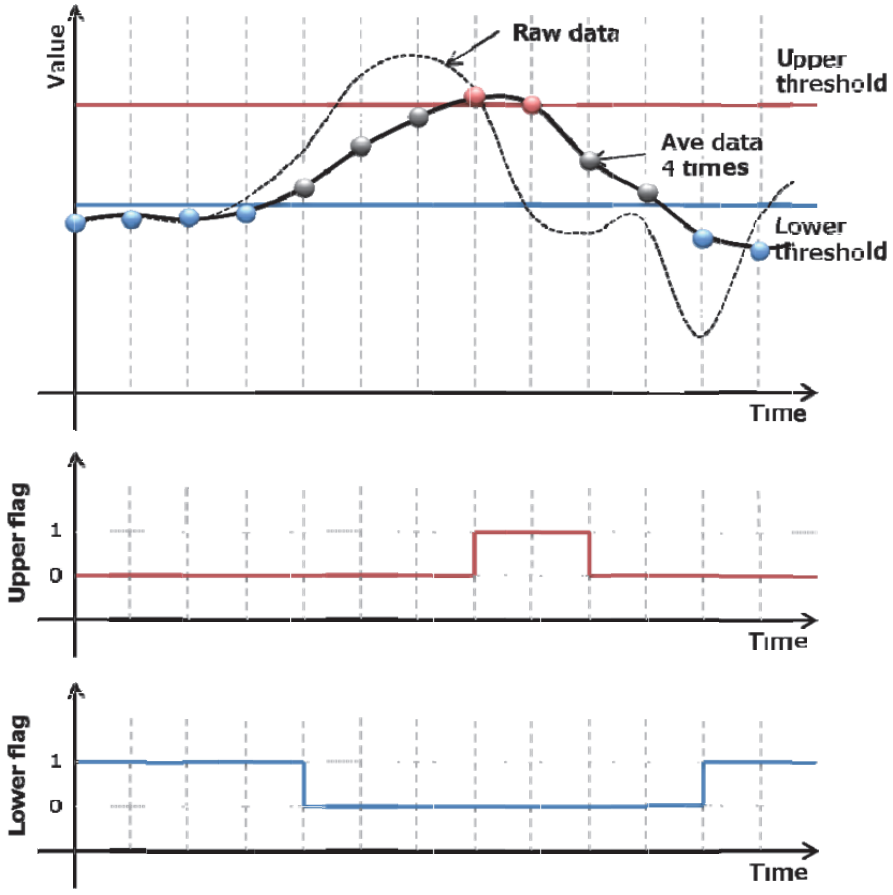

Figure 24 Average value threshold

5.3.4 Peak to Peakthreshold

比较传感器输出的特定期间的 Peak to Peak 和阈值，判定在阈值以上还是以下。
通过 Peak to Peak count 设定取过去几次的 Peak to Peak。upper 为上限判定，lower 为下限判定，均可设定为任意值。计算式中的 data[0]为最新值，data[x]为 x 次前的测量数据。

事件判定条件(Peak to Peakcount = 4 时)

PtoP = max (data[0] + data[1] + data[2] + data[3]) − min (data[0] + data[1] + data[2] + data[3])

Peak to Peak threshold [upper]：PtoP >= upper threshold

Peak to Peak threshold [lower]：PtoP <= lower threshold

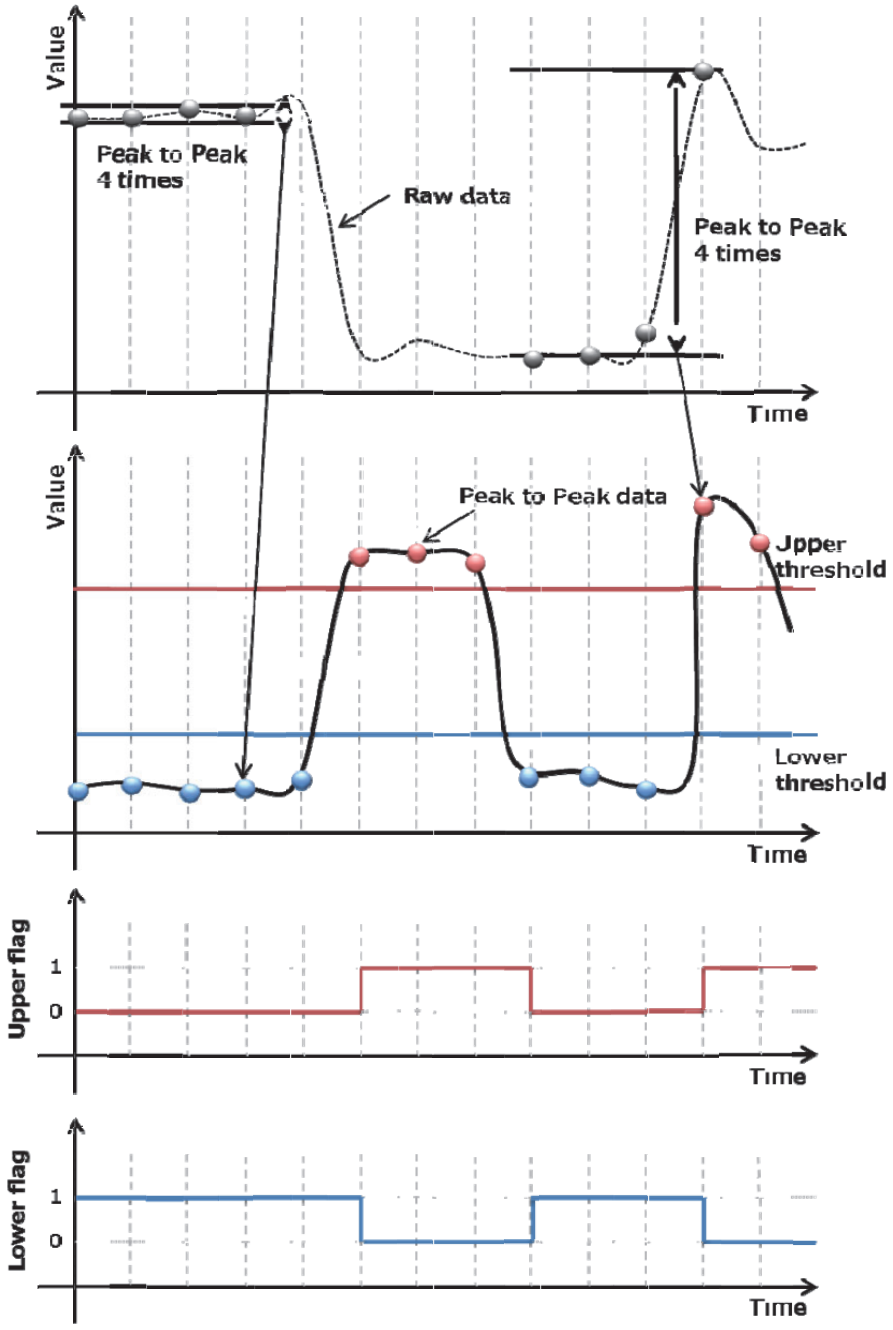

Figure 25 Peak to Peakthreshold

5.3.5 Interval difference threshold

比较传感器输出的最新值和规定次数前的值的差，判定在阈值以上还是以下。
通过 Interval difference count 设定与几次前的值相比较。rise 为增加判定，decline 为减少判定，均可设定为任意值。计算式中的 data[0]为最新值，data[x]为 x 次前的测量数 。

事件判定条件(Interval difference count= 5 时)

Interval difference data = data[0] - data[5]
Interval difference threshold [upper]：Interval difference data >= rise threshold
Interval difference threshold [lower]：Interval difference data <= decline threshold

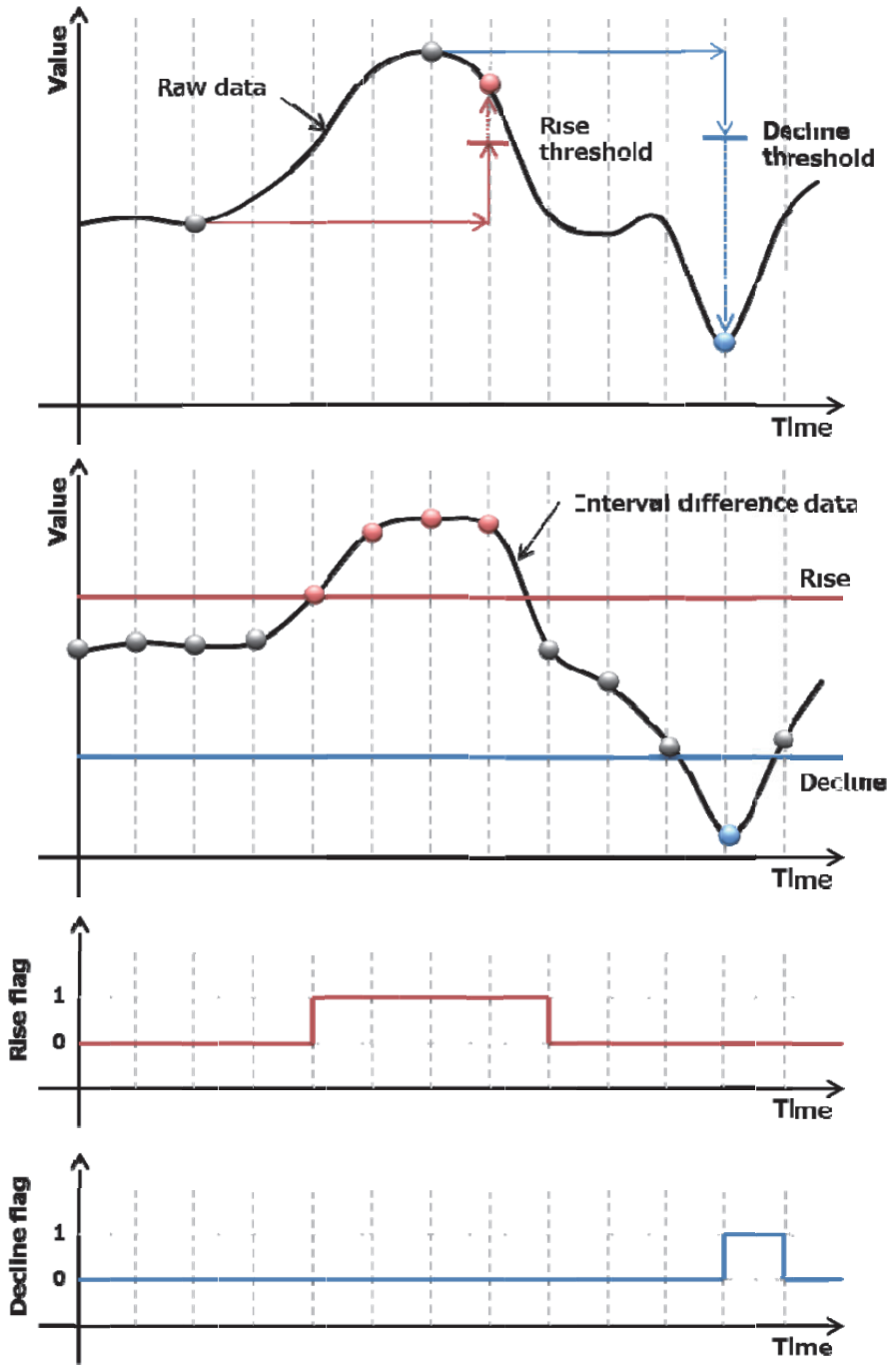

Figure 26 Interval difference threshold

*″上升阈值 ″和 ″下降阈值 ″只能设置为正值。如果 ″间隔差异数据 ″和 ″下降阈值 ″为负值，无论其数值如何，都不会有反应。

5.3.6 Base difference threshold

比较传感器输出的平均值和规定次数前的平均值的差，判定在阈值以上还是以下。
通过 Base difference count 设定与几次前的平均值相比较。rise 为增加判定，decline 为减少判定，均可设定为任意值。计算式中的 ave data[0]为最新值，ave data[x]为 x 次前的测量数据。平均次数适用 Average value count 的值。

事件判定条件(Base difference count = ，Average value count = 4 时)

Base difference data = ave data[0] - ave data[5]
Base difference threshold [upper]：Base difference data >= rise threshold
Base difference threshold [lower]：Base difference data <= decline threshold

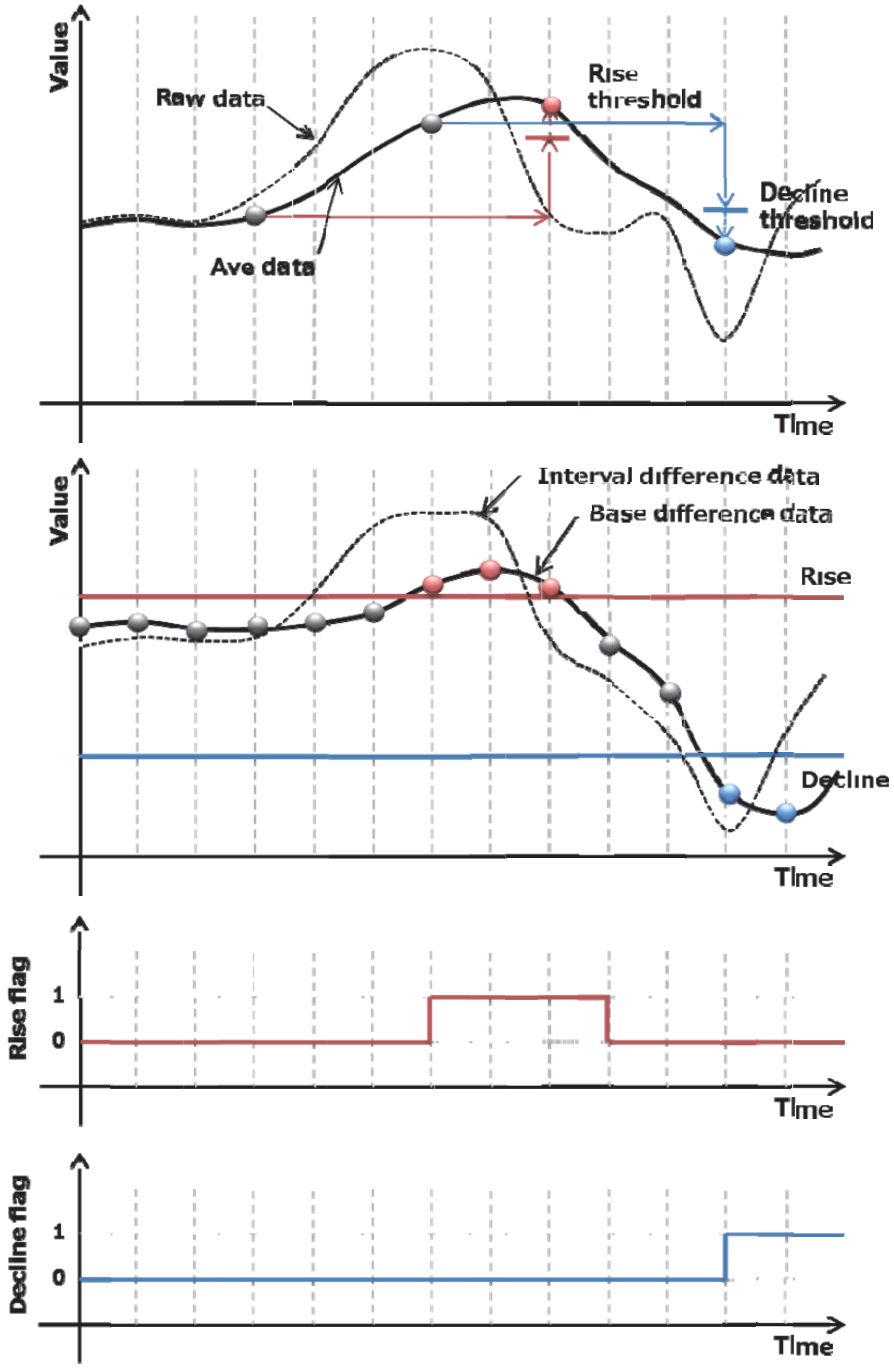

Figure 27 Base difference threshold

5.4. Event threshold

表示各种事件的阈值。

Table 129 Event threshold [Temperature]

Temperature	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	3500	0xF060 to 0x30D4 (-4000 to 12500)	0.01degC
Simple threshold [upper limit] 2	SInt16	4000		
Simple threshold [lower limit] 1	SInt16	1000		
Simple threshold [lower limit] 2	SInt16	0		
Average value threshold [upper]	SInt16	3500		
Average value threshold [lower]	SInt16	1000		
Change threshold [rise] 1	SInt16	100	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	200		
Change threshold [decline] 1	SInt16	100		
Change threshold [decline] 2	SInt16	200		
Peak to Peak threshold [upper]	SInt16	100		
Peak to Peak threshold [lower]	SInt16	100		
Interval difference threshold [rise]	SInt16	100		
Interval difference threshold [decline]	SInt16	100		
Base difference threshold [upper]	SInt16	100		
Base difference threshold [lower]	SInt16	100		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 130 Event threshold [Relative humidity]

Relative humidity	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	8500	0x0000 to 0x2710 (0 to 10000)	0.01%RH
Simple threshold [upper limit] 2	SInt16	9500		
Simple threshold [lower limit] 1	SInt16	3500		
Simple threshold [lower limit] 2	SInt16	1000		
Average value threshold [upper]	SInt16	8500		
Average value threshold [lower]	SInt16	3500		
Change threshold [rise] 1	SInt16	100	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	200		
Change threshold [decline] 1	SInt16	100		
Change threshold [decline] 2	SInt16	200		
Peak to Peak threshold [upper]	SInt16	100		
Peak to Peak threshold [lower]	SInt16	100		
Interval difference threshold [rise]	SInt16	100		
Interval difference threshold [decline]	SInt16	100		
Base difference threshold [upper]	SInt16	100		
Base difference threshold [lower]	SInt16	100		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 131 Event threshold [Ambient light]

Ambient light	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	300	0x0000 to 0x7530 (0 to 30000)	1lx
Simple threshold [upper limit] 2	SInt16	1000		
Simple threshold [lower limit] 1	SInt16	100		
Simple threshold [lower limit] 2	SInt16	10		
Average value threshold [upper]	SInt16	300		
Average value threshold [lower]	SInt16	100		
Change threshold [rise] 1	SInt16	100	0x0000 to 0x7530 (0 to 30000)	
Change threshold [rise] 2	SInt16	200		
Change threshold [decline] 1	SInt16	100		
Change threshold [decline] 2	SInt16	200		
Peak to Peak threshold [upper]	SInt16	100		
Peak to Peak threshold [lower]	SInt16	100		
Interval difference threshold [rise]	SInt16	100		
Interval difference threshold [decline]	SInt16	100		
Base difference threshold [upper]	SInt16	100		
Base difference threshold [lower]	SInt16	100		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 132 Event threshold [Barometric pressure]

Barometric pressure	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	10300	0x0BB8 to 0x2AF8 (3000 to 11000)	0.1hPa
Simple threshold [upper limit] 2	SInt16	10500		
Simple threshold [lower limit] 1	SInt16	9700		
Simple threshold [lower limit] 2	SInt16	9500		
Average value threshold [upper]	SInt16	10300		
Average value threshold [lower]	SInt16	9700		
Change threshold [rise] 1	SInt16	100	0x0000 to 0x2710 (0 to 10000)	0.001hPa
Change threshold [rise] 2	SInt16	200		
Change threshold [decline] 1	SInt16	100		
Change threshold [decline] 2	SInt16	200		
Peak to Peak threshold [upper]	SInt16	100		
Peak to Peak threshold [lower]	SInt16	100		
Interval difference threshold [rise]	SInt16	100		
Interval difference threshold [decline]	SInt16	100		
Base difference threshold [upper]	SInt16	100		
Base difference threshold [lower]	SInt16	100		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 133 Event threshold [Sound noise]

Sound noise	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	7000	0x0CE4 to 0x2EE0 (33.00 to 12000)	0.01dB
Simple threshold [upper limit] 2	SInt16	9000		
Simple threshold [lower limit] 1	SInt16	5000		
Simple threshold [lower limit] 2	SInt16	4000		
Average value threshold [upper]	SInt16	7000		
Average value threshold [lower]	SInt16	5000		
Change threshold [rise] 1	SInt16	1000	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	2000		
Change threshold [decline] 1	SInt16	1000		
Change threshold [decline] 2	SInt16	2000		
Peak to Peak threshold [upper]	SInt16	1000		
Peak to Peak threshold [lower]	SInt16	1000		
Interval difference threshold [rise]	SInt16	1000		
Interval difference threshold [decline]	SInt16	1000		
Base difference threshold [upper]	SInt16	1000		
Base difference threshold [lower]	SInt16	1000		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 134 Event threshold [eTVOC]

eTVOC	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	250	0x0000 to 0x7216 (0 to 29206)	1ppb
Simple threshold [upper limit] 2	SInt16	450		
Simple threshold [lower limit] 1	SInt16	100		
Simple threshold [lower limit] 2	SInt16	50		
Average value threshold [upper]	SInt16	250		
Average value threshold [lower]	SInt16	100		
Change threshold [rise] 1	SInt16	50	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	100		
Change threshold [decline] 1	SInt16	50		
Change threshold [decline] 2	SInt16	100		
Peak to Peak threshold [upper]	SInt16	50		
Peak to Peak threshold [lower]	SInt16	50		
Interval difference threshold [rise]	SInt16	50		
Interval difference threshold [decline]	SInt16	50		
Base difference threshold [upper]	SInt16	50		
Base difference threshold [lower]	SInt16	50		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 135 Event threshold [eCO2]

eCO2	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	1500	0x0190 to 0x7FFF (400 to 32767)	1ppm
Simple threshold [upper limit] 2	SInt16	2500		
Simple threshold [lower limit] 1	SInt16	1000		
Simple threshold [lower limit] 2	SInt16	600		
Average value threshold [upper]	SInt16	1500		
Average value threshold [lower]	SInt16	1000		
Change threshold [rise] 1	SInt16	100	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	200		
Change threshold [decline] 1	SInt16	100		
Change threshold [decline] 2	SInt16	200		
Peak to Peak threshold [upper]	SInt16	100		
Peak to Peak threshold [lower]	SInt16	100		
Interval difference threshold [rise]	SInt16	100		
Interval difference threshold [decline]	SInt16	100		
Base difference threshold [upper]	SInt16	100		
Base difference threshold [lower]	SInt16	100		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 136 Event threshold [Discomfort index]

Discomfort index	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	7500	0x0000 to 0x2710 (0 to 10000)	0.01
Simple threshold [upper limit] 2	SInt16	8000		
Simple threshold [lower limit] 1	SInt16	6000		
Simple threshold [lower limit] 2	SInt16	5500		
Average value threshold [upper]	SInt16	7500		
Average value threshold [lower]	SInt16	6000		
Change threshold [rise] 1	SInt16	200	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	500		
Change threshold [decline] 1	SInt16	200		
Change threshold [decline] 2	SInt16	500		
Peak to Peak threshold [upper]	SInt16	200		
Peak to Peak threshold [lower]	SInt16	200		
Interval difference threshold [rise]	SInt16	200		
Interval difference threshold [decline]	SInt16	200		
Base difference threshold [upper]	SInt16	200		
Base difference threshold [lower]	SInt16	200		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 137 Event threshold [Heat stroke]

Heat stroke	Format	Default	Range	Unit
Simple threshold [upper limit] 1	SInt16	2800	0xF060 to 0x30D4 (-4000 to 12500)	0.01degC
Simple threshold [upper limit] 2	SInt16	3100		
Simple threshold [lower limit] 1	SInt16	2500		
Simple threshold [lower limit] 2	SInt16	2200		
Average value threshold [upper]	SInt16	2800		
Average value threshold [lower]	SInt16	2500		
Change threshold [rise] 1	SInt16	100	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	SInt16	200		
Change threshold [decline] 1	SInt16	100		
Change threshold [decline] 2	SInt16	200		
Peak to Peak threshold [upper]	SInt16	100		
Peak to Peak threshold [lower]	SInt16	100		
Interval difference threshold [rise]	SInt16	100		
Interval difference threshold [decline]	SInt16	100		
Base difference threshold [upper]	SInt16	100		
Base difference threshold [lower]	SInt16	100		
Average value count	UInt8	8	0x01 to 0x08 (1 to 8)	1count
Peak to Peak count	UInt8	8		
Interval difference count	UInt8	8		
Base difference count	UInt8	8		

Table 138 Event threshold [SI value]

SI value	Format	Default	Range	Unit
Simple threshold [upper limit] 1	UInt16	100	0x0000 to 0xFFFF (0 to 65535)	0.1 kine
Simple threshold [upper limit] 2	UInt16	170		
Change threshold [rise] 1	UInt16	30	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	UInt16	50		

Table 139 Event threshold [PGA]

PGA	Format	Default	Range	Unit
Simple threshold [upper limit] 1	UInt16	500	0x0000 to 0xFFFF (0 to 65535)	0.1 gal
Simple threshold [upper limit] 2	UInt16	1000		
Change threshold [rise] 1	UInt16	200	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	UInt16	500		

Table 140 Event threshold [Seismic intensity]

Seismic intensity	Format	Default	Range	Unit
Simple threshold [upper limit] 1	UInt16	3500	0x0000 to 0xFFFF (0 to 65535)	0.001
Simple threshold [upper limit] 2	UInt16	5000		
Change threshold [rise] 1	UInt16	500	0x0000 to 0x2710 (0 to 10000)	
Change threshold [rise] 2	UInt16	1000		

6. FAQ

Q. 测量的准确性是什么？
A. 请参考环境传感器系列目录。

Q. 用什么指数来计算中暑？
A. 它是根据热指数 **WBGT**（湿球温度）来计算的，**WBGT** 被公认为是工作和运动环境的有效准则，并由 **ISO** 和其他组织进行国际标准化。

Q. 在加速记录仪模式下，数据可以存储多长时间？
A. 数据可以存储 **327680** 次（**10240** 页 **x32** 行），因此，例如，如果以 **400Hz** 采集数据，存储时间约为 **13** 分钟。

Q. 2JCIE-BI01 eTVOC 可以选择气体类型吗？
A. 不，**eTVOC** 不能选择气体类型。它输出的是总浓度。

Q. 它有一个二氧化碳传感器吗？
A. 没有。**eCO2**（等效二氧化碳）值是一个相当于从 **TVOC** 值计算出来的二氧化碳浓度的值，二氧化碳浓度不能直接检测。

问：**eCO2** 有时非常大。是不是传感器有问题？
答：**eCO2** 是一个与测量的 **eTVOC** 相关的算法估算出来的数值，它是基于人类呼吸是室内 **VOC** 的主要来源的假设。因此，如果来自人类以外的来源的 **VOCs** 变大，**eCO2** 值也可能变大。

Q. 是否可以改变测量间隔时间？
A. 测量间隔被固定为 **1** 秒。

Q. 是否可以停止广告的传输？
A. 没有停止广告的功能，但是在 **BLE** 连接期间，广告将不会被发送。

Q. USB 类型广告的输出功率设置是什么？
A. 它固定在 **4dBm**。

Q. 是否可以记录传感数据？
A. 内置闪存可以记录 **60000** 次测量数据，可以根据需要多次读出。当存储器满时，最旧的数据会被覆盖。

Q. 是否可以改变闪存中的存储间隔？
A. 间隔可以从 **1** 秒到 **3600** 秒设置，增量为 **1** 秒。

Q. 存储器的存储周期是多少？
A. 可以存储 **60,000** 次测量数据。存储期取决于存储器的存储间隔。例如，如果存储间隔是 **5** 分钟，大约是 **7** 个月。

Q. 我把传感器连接到电脑的 **USB** 接口上，但温度似乎比其他温度传感器高。
A. 由于 **PC** 的排气热量，**PC** 周围的温度可能更高，我们建议使用 **USB** 延长线。

Q. 你们有 **2JCIE-BU01** 的驱动吗？
A. 是的，你可以从我们的网站上下载驱动程序。

Q. 电源可以由电脑以外的其他设备提供吗？
A. 可以，它可以由 **AC** 适配器或智能水龙头的 **USB** 端口供电。

Q. 2JCIE-BU01 可以用移动电池供电吗？
A. 一般的移动电池都有一个安全功能，当电池充满电后会自动停止供电。请使用与物联网设备兼容的电池。

Q. 供电时是否开始测量？
A. 当电源供应时，测量和广告传输将开始。但是，只有在写入时间信息后，测量数据才会被保存在闪存中。

Q. 是否可以重置闪存中的数据？
A. 保存在闪存中的数据可以通过内存重置功能进行清除。

Q. 该产品是否符合 **RoHS** 指令的要求？
A. 是的，它是。

Q. 你们能提供校准服务吗？
A. 不，我们不提供校准服务。

订购前请务必阅读我司网站上的“注意事项”。

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