

# ***Bluetooth*<sup>®</sup> Module**

EYSFDCSXX (RF+Baseband (Class 2) USB)

Data Report

In case you adopt this module and design some appliance, please ask for the latest specifications from the local sales office.

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**EYSFDCSXX**TAIYO YUDEN Confidential  
& Tentative**Document constituent list**

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Rev. record

24-Sep.-2004&gt; Ver.0.9 Draft

1-Dec.-2004&gt; Ver.1.0 Released

29-Mar-2005&gt;Ver.1.1 Released

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|                              |                               |
|------------------------------|-------------------------------|
| Control No.<br>HD-AG-A031272 | Control name<br>General Items |
|------------------------------|-------------------------------|

## Scope

This specification ("Specification") applies to the hybrid IC "EYSFDCSXX" for use **Bluetooth®** module ("Product") manufacture by TAIYO YUDEN Co., Ltd. ("TAIYO YUDEN")

## 1. Part Number: EYSFDCSXX (USB I/F Support)

Digit3: Customer Code ex) S: TAIYO YUDEN Standard

Digit8: Software Code ex) X: TAIYO YUDEN Standard

Digit9: Hardware Code ex) X: TAIYO YUDEN Standard

**\*Part number may be modified for mass production or other cases.****Please see "m" for more information.**2. Function: Radio frequency transfer Module (power class 2). **Bluetooth®** standard Ver 2.0+EDR conformity

## 3. Application: Note PC, PDA

## 4. Structure: Hybrid IC loaded with silicon monolithic semiconductor

## 5. Outline: Connector Type

## 6. Marking: TBD

## 7. Features:

**-Bluetooth®** 2.0+EDR conformity

-USB Interface

-Point-to-Multipoint (7 Slaves)

-Encryption

-Hold, Sniff and Park Mode

-Supported Link Type: ACL (Not support Voice Over HCI)

-AFH&amp;Co-existence

-EDR(Enhanced Data Rate)

## 8. Packing:

Packaging method: TBD

Packaging unit: TBD

Material of tray: TBD

Tray Specification: TBD

## 9. Terminal: Data input-output (20pin Board to Board Connector)

RF input-output (Antenna)

## 10. Mount: Mounted with M2 screw

## 11. Notes:

a. Any question arising from this Specification shall be solved through mutual discussion by the parties hereof.

b. This Product is not designed for radiation durable and should not be used under the circumstance of radiation.

c. The operating conditions of this Product are as shown in this Specification. Please note that TAIYO YUDEN shall not be liable for a failure and/or abnormality which is caused by use under the conditions other than the operating conditions hereof.

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|                              |       |                               |
|------------------------------|-------|-------------------------------|
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|------------------------------|-------|-------------------------------|

- d. This Product mentioned in this Specification is manufactured for use in Note PCs, PDAs and Cellular Phones. Before using this Product in any special equipment (such as medical equipment, space equipment, air craft, disaster prevention equipment), where higher safety and reliability are duly required, the applicability and suitability of this Product must be fully evaluated by the customer at its sole risk to ensure correct and safety operation of those special equipments. Also, evaluation of the safety function of this Product even for use in general electronics equipment shall be thoroughly made and when necessary, a protective circuit shall be added in design stage, all at the customer's sole risk.
- e. TAIYO YUDEN warrants only that this Product is in conformity with this Specification for one year after purchase and shall in no event give any other warranty.
- f. The warranty period shall be one year.
- g. Communication between this Product and others might not be established nor maintained depending upon radio environment or operating conditions of this Product and other **Bluetooth**<sup>®</sup> products.
- h. This Product is designed for use in products which comply with **Bluetooth**<sup>®</sup> Specifications (ver 2.0+EDR) ("Bluetooth Specifications"). TAIYO YUDEN disclaims and is not responsible for any liability concerning infringement by this Product under any intellectual property right owned by third party in case the customer uses this Product in any product which does not comply with Bluetooth Specifications (the "non-complying products"). Furthermore, TAIYO YUDEN warrants only that this Product complies with this Specification and does not grant any other warranty including warranty for application of the non-complying products.
- i. TAIYO YUDEN does not render updating or upgrading service for the firmware in the Module.
- j. In order to take tests for getting the certification of each country's Radio Law with a device incorporating this module, it is necessary to make the software in Host to put the module into test condition. Please contact TAIYO YUDEN for farther details.
- k. Please evaluate adequately our module incorporated to your products before mass production.
- l. This Product operates in the unlicensed ISM band at 2.4GHz. In case this Product is used around the other wireless devices which operate in same frequency band of this Product, there is a possibility that interference occurs between this Product and such other devices. If such interference occurs, please stop the operation of other devices or relocate this Product before using this Product or do not use this Product around the other wireless devices.
- m. Part Number Modification Notice (**Bluetooth**<sup>®</sup> Modules)

Part numbers for sample modules or part numbers you see in this Specification are TAIYO YUDEN standard part numbers. In case of modification made to any modules, to meet requested specifics, the part number will carry a different part number, due to forfeit originality. Additionally, part numbers may be modified based on mass production stage, **Bluetooth**<sup>®</sup> logo Qualification stage, or other related stages. Please contact TAIYO YUDEN to confirm whether your part number needs to be modified.

Please see the following examples for cases that part numbers are modified:

- for specific firmware version (our standard item firmware will be upgraded occasionally)
- for specific BD address (our standard item BD address is owned by TAIYO YUDEN )
- for different baud rate (our standard is 115.2kbps and partly 1Mbps)
- for specific USB ID (our standard item USB ID is owned by TAIYO YUDEN or chip manufacture)
- for other related cases (specific or different setting, form, sizes, or display etc..)

In case you have applied for **Bluetooth**<sup>®</sup> Qualification with our standard part number without previous notice to TAIYO YUDEN, we shall not be responsible for any expense that will be required to change its name/number.

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|------------------------------|-------|-------------------------------|
| Control No.<br>HD-AG-A031272 | (3/3) | Control name<br>General Items |
|------------------------------|-------|-------------------------------|

n. Ability of lead free mounting at customer's assembly (Heat resistance of this Product) :Yes

Containment of hazardous substance in this Product

\*Pb (Lead)

: Non use

\*Additional RoHS regulation substance (Cd.Hg.Cr+6.PBB.PBDE) :Non use

p. In addition when this Product is used under environmental conditions such as over voltage which are not guaranteed ,it may be destroyed in short mode. To ensure the security of customer's product, please add an extra fuse or/and a protection circuit for over voltage.

This module is still under development, thus specifications do not guarantee both the quality and reliability at the time of shipment. Since the specifications and mass production of the module are not confirmed either, the contents of the technical notes are subject to change without any prior notice.

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|                                     |                                          |
|-------------------------------------|------------------------------------------|
| Control No.<br>HD-AM-A 031272 (1/1) | Control name<br>Absolute maximum ratings |
|-------------------------------------|------------------------------------------|

**Absolute maximum ratings**

| Item           | Symbol   | Rating |      |              |      | Remark                              |
|----------------|----------|--------|------|--------------|------|-------------------------------------|
|                |          | Min.   | Typ. | Max.         | Unit |                                     |
| Supply voltage | VDD_3.3V | -0.3   |      | 3.6          | V    |                                     |
| Input voltage  | Vin      | -0.3   |      | VDD_3.3V+0.3 | V    | I/O terminals without USB interface |

**Recommendation operating range**

| Item                                  | Symbol   | Rating |      |      |           | Remark                   |
|---------------------------------------|----------|--------|------|------|-----------|--------------------------|
|                                       |          | Min.   | Typ. | Max. | Unit      |                          |
| Supply voltage                        | VDD_3.3V | 3.15   | 3.3  | 3.45 | V         |                          |
| Supply voltage ripple and spike noise | VDD_rn   |        |      | 30   | mVp-p     |                          |
| Operation temperature range           | Topr     | -25    | 25   | 75   | Degrees C | Humidity=40%RH<br>Note 1 |
| Storage temperature range             | Tstg     | -30    | 25   | 85   | Degrees C | Humidity=40%RH<br>Note 2 |

Note:

1. Operation temperature range is set to satisfy products electrical characteristics for a short period of time.  
Refer reliability condition to check the product life cycle if you use this module for a long period of time in the condition other than the Typ. standard.
2. Storage temperature range is the condition for transportation and storage in temporary.

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|                               |       |                                            |
|-------------------------------|-------|--------------------------------------------|
| Control No.<br>HD-AE-A 031272 | (1/3) | Control name<br>Electrical characteristics |
|-------------------------------|-------|--------------------------------------------|

Electrical characteristic

**DC Specifications**

The Specification applies for Topr.= 25 degrees C, VDD\_3.3V=3.3V

| No. | Parameter            | Condition                 | Symbol   | Min.          | Typ. | Max.          | Unit | Remark     |
|-----|----------------------|---------------------------|----------|---------------|------|---------------|------|------------|
| 1   | Operating Voltage 1  |                           | VDD_3.3V | 3.15          | 3.3  | 3.45          | V    |            |
| 2   | Input Low Voltage1   | /RESET, PIO_X             | VIL1     | -0.3          |      | 0.8           | V    |            |
| 3   | Input Low Voltage2   | USB_D+, USB_D-            | VIL2     | -             |      | 0.8           | V    |            |
| 4   | Input High Voltage1  | /RESET, PIO_X             | VIH1     | 0.7xVDD_3.3V  |      | VDD_3.3V +0.3 | V    |            |
| 5   | Input High Voltage2  | USB_D+, USB_D-            | VIH2     | 2.0           |      | -             | V    |            |
| 6   | Output Low Voltage1  | USB_D+, USB_D-            | VOL1     | -             |      | 0.3           | V    |            |
| 7   | Output Low Voltage2  | PIO_X                     | VOL2     | -             |      | 0.4           | V    | IOL=4mA    |
| 8   | Output High Voltage1 | USB_D+, USB_D-            | VOH1     | 2.8           |      | -             | V    |            |
| 9   | Output High voltage2 | PIO_X                     | VOH2     | VDD_3.3V -0.4 |      | -             | V    | IOH =-4mA  |
| 10  | Peak current         | Continuous Rx             | Iccp1    |               | 60   | 180           | mA   | Note3,4    |
| 11  | Average current1     | Sniff mode (Slave only)   | Icca1    |               | 15   | -             | mA   | Note 1,3,4 |
| 12  | Average current2     | Standby mode              | Icca2    |               | 9    | -             | mA   | Note3,4    |
| 13  | Average current3     | Send DM1packet (Master)   | Icca3    |               | 46   | -             | mA   | Note3,4    |
| 14  | Average current4     | Receive DM1packet (Slave) | Icca4    |               | 45   | -             | mA   | Note3,4    |
| 15  | Average current5     | Hold mode (Slave only)    | Icca5    |               | 12   | -             | mA   | Note3,4    |
| 16  | Average current6     | Park mode (Slave only)    | Icca6    |               | 13   | -             | mA   | Note 2,3,4 |

**Notes:**

- Sniff mode parameter.    Max interval    0050h  
                                         Min interval    0010h  
                                         Attempt        0005h  
                                         Timeout        0005h
- Park mode parameter.    Max interval    0100h  
                                         Min interval    0010h
- The consumption current might fluctuate with the condition of radio communication, host performance and test circuit.
- The value may fluctuate several [mA] depending on Firmware version.

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|-------------------------------|-------|--------------------------------------------|
| Control No.<br>HD-AE-A 031272 | (2/3) | Control name<br>Electrical characteristics |
|-------------------------------|-------|--------------------------------------------|

**Timing for Power Up/Down Sequence**

The Specification applies for Topr.= 25 degrees C, VDD\_3.3V=3.3V

| No. | Parameter                           | Condition | Symbol | Min  | Typ | Max  | Unit | Remark    |
|-----|-------------------------------------|-----------|--------|------|-----|------|------|-----------|
| 1   | VDD_3.3V Rise Time from 0V to 3.15V |           | t1     | 0    |     | 2    | ms   |           |
| 2   | VDD_3.3V=3.15V to RESET high        |           | t2     | 10   |     |      | ms   | Note 1,2  |
| 3   | RESET high to Module Ready          |           | t3     |      | 70  | 3000 | ms   | Note 4,5  |
| 4   | RESET pulse width                   |           | t4     | 6    |     |      | ms   |           |
| 5   | Power on to stable condition        |           | t5     |      |     | 2    | ms   | Note 3    |
| 6   | /RESET low to VDD_3.3V off          |           | t6     | 0    |     |      | ms   |           |
| 7   | /RESET High to /RESET Low           |           | t7     | 3000 |     |      | ms   | Note 4, 5 |
| 8   | /RESET Low to USB_I/F High-Z        |           | t8     | 0    |     | 10   | ms   |           |

**Notes:**

1. This module has an internal FROM and a function to erase/sort unnecessary data if certain HCI commands are issued and consume more than a certain level of free space in the FROM. This operation occurs at every module initialization (power-on).

If supply voltage becomes non-defined states during initialization or writing in FROM, data in FROM might be destroyed. If the data in FROM is destroyed, module will not work correctly. Therefore please be sure to stabilize power source before RESET release.

In addition please design module peripheral circuits to avoid temporary blackout of power source during operation.

Please refer HD-AE-C031272 for HCI command which rewrites FROM data.

2. Input /RESET signal of 10ms and more in condition of VDD\_3.3V at over 3.15V.
3. During t5 input or output is unstable and this condition occurs at the following pins.  
(PIO\_X, USB\_DP, USB\_DM)

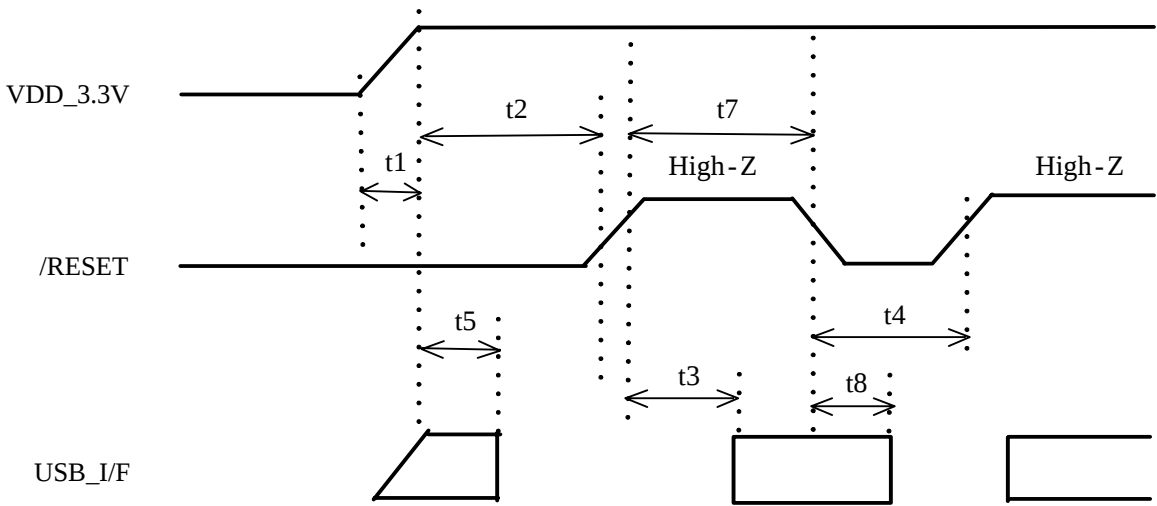
This unstable condition of t5 continues until the internal power of 1.8V reaches its steady state after VDD supply. After that, it takes some time to discharge when the unstable condition of PIO pin is output high. Discharged time changes depending on the outside load. Please pull-down PIO pin with a 4.7k ohm resistor to reduce the discharged time.

4. Some of User Settings are stored in FROM writable memory area and FROM free space is controlled by Firmware. When the free space in FROM is lower than certain amount, Defrag automatically starts. Amount of time required for Defrag will vary depending on the environment. Please conduct enough verification for the time required for the customer's product under customer's environment before use.
5. It may change due to the firmware version.

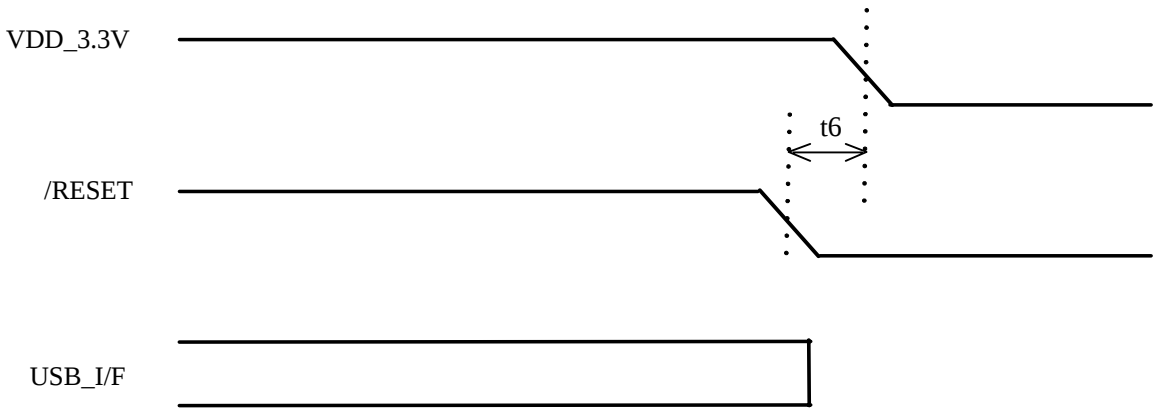
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|-------------------------------|-------|--------------------------------------------|
| Control No.<br>HD-AE-A 031272 | (3/3) | Control name<br>Electrical characteristics |
|-------------------------------|-------|--------------------------------------------|



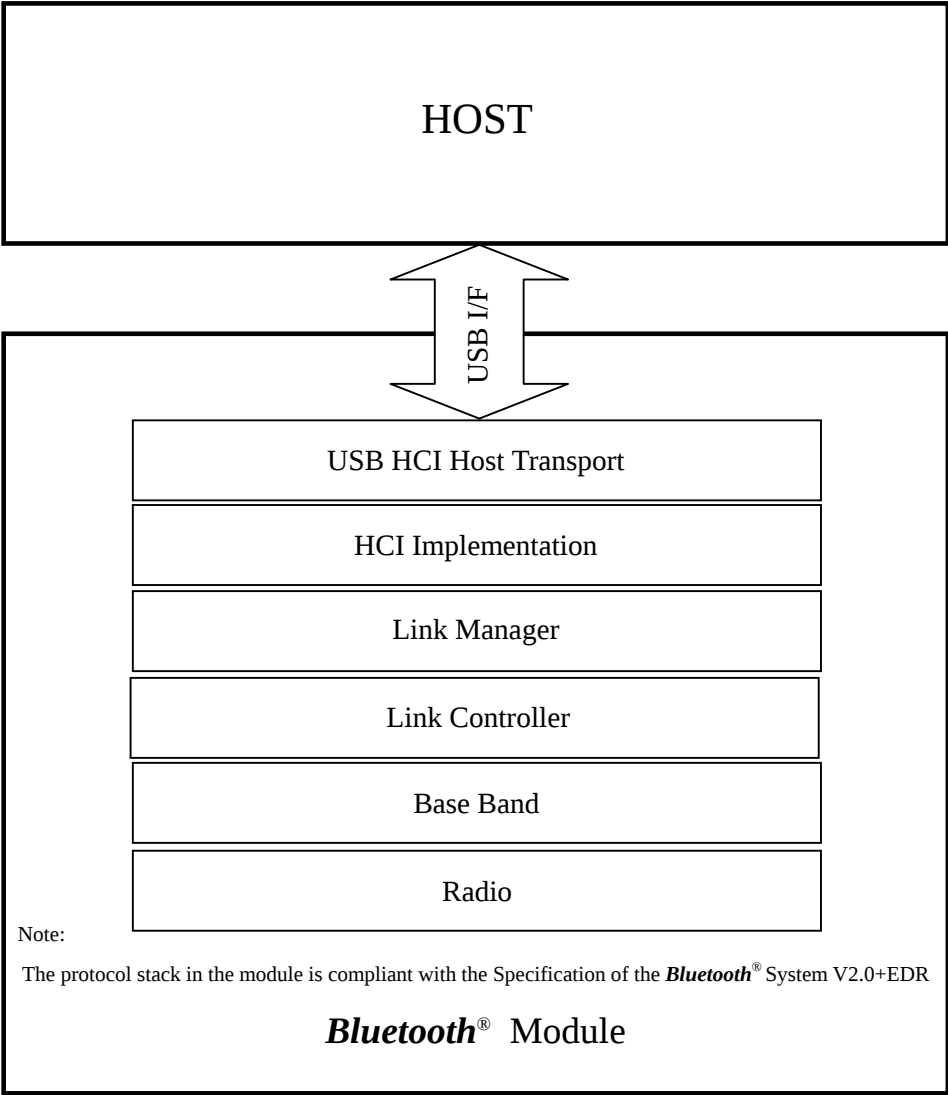
Timing Diagram for Power Up Sequence



Timing Diagram for Power Down Sequence

|                               |       |                                            |
|-------------------------------|-------|--------------------------------------------|
| Control No.<br>HD-AE-C 031272 | (1/1) | Control name<br>Electrical characteristics |
|-------------------------------|-------|--------------------------------------------|

Module Stack

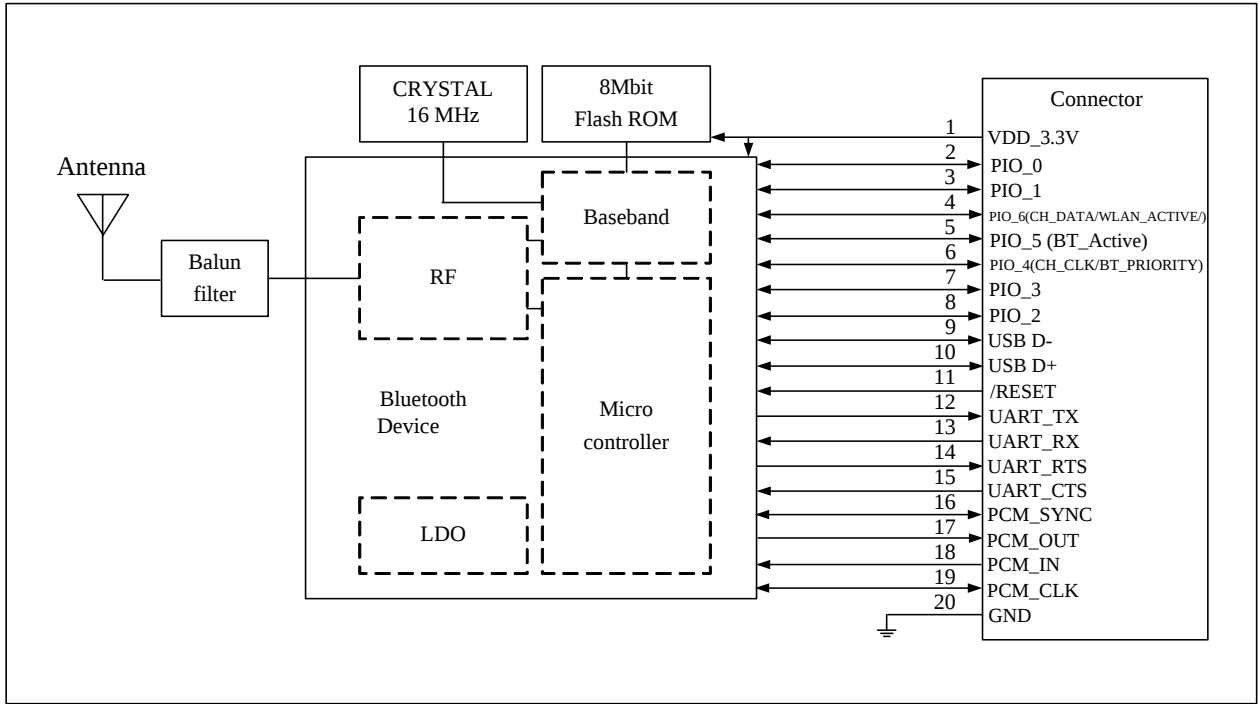


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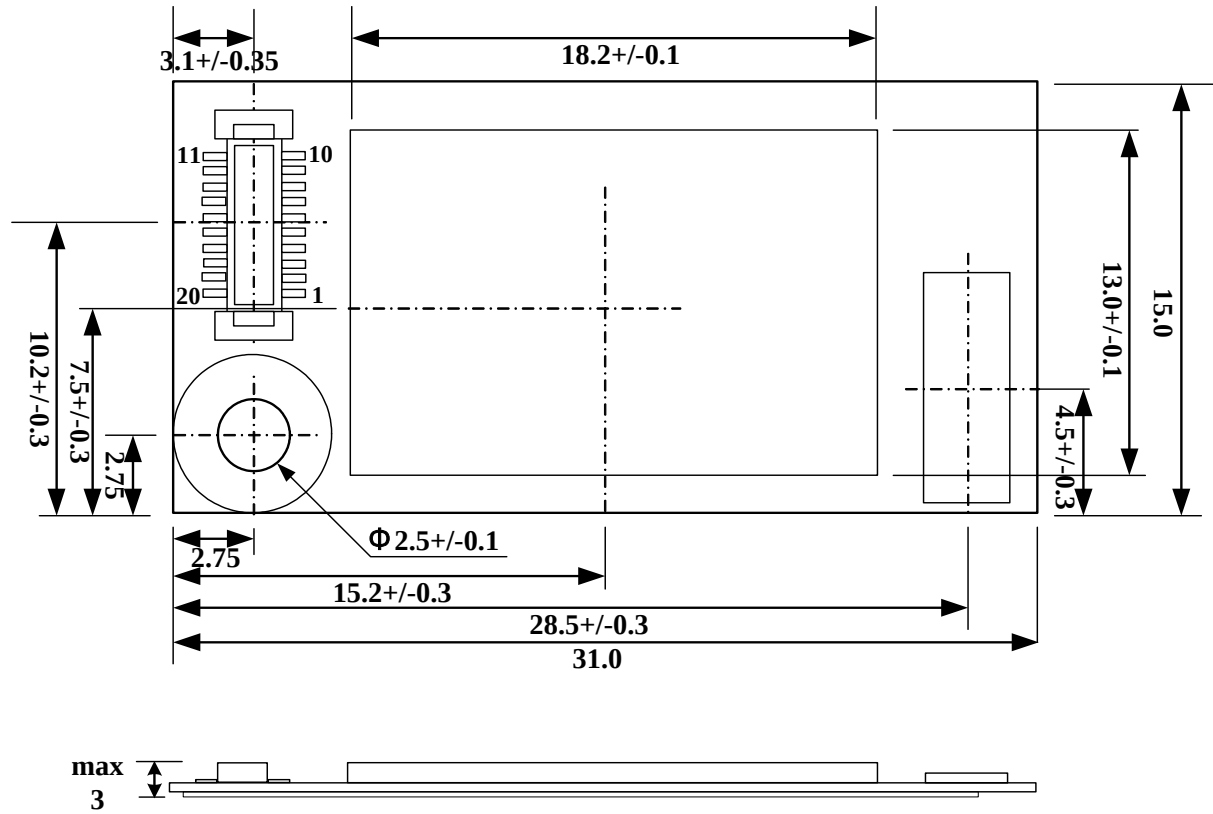
|                               |       |                                   |
|-------------------------------|-------|-----------------------------------|
| Control No.<br>HD-MC-A 031272 | (1/1) | Control name<br>Circuit Schematic |
|-------------------------------|-------|-----------------------------------|

Block Diagram



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|                              |       |                                    |
|------------------------------|-------|------------------------------------|
| Control No.<br>HD-AD-A031272 | (1/2) | Control name<br>Outline/Appearance |
|------------------------------|-------|------------------------------------|

Unit: mm, Tolerances unless otherwise specified:  $\pm 0.2$ mm

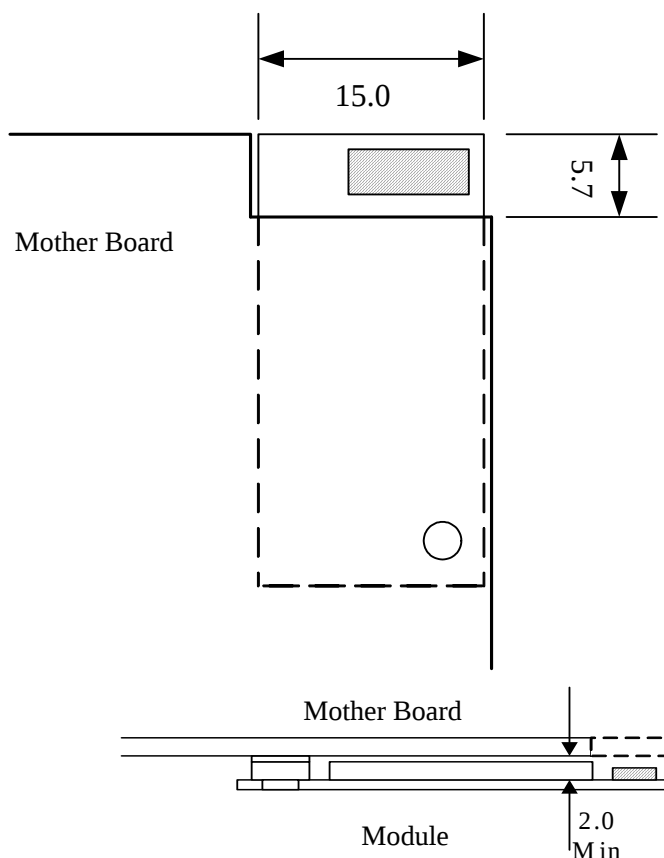
Note:

Outline/Appearance data is PRELIMINARY, not guaranteed and subject to change without notice.

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|                              |                                    |
|------------------------------|------------------------------------|
| Control No.<br>HD-AD-A031272 | Control name<br>Outline/Appearance |
|------------------------------|------------------------------------|

## Recommendation for Module Mounting

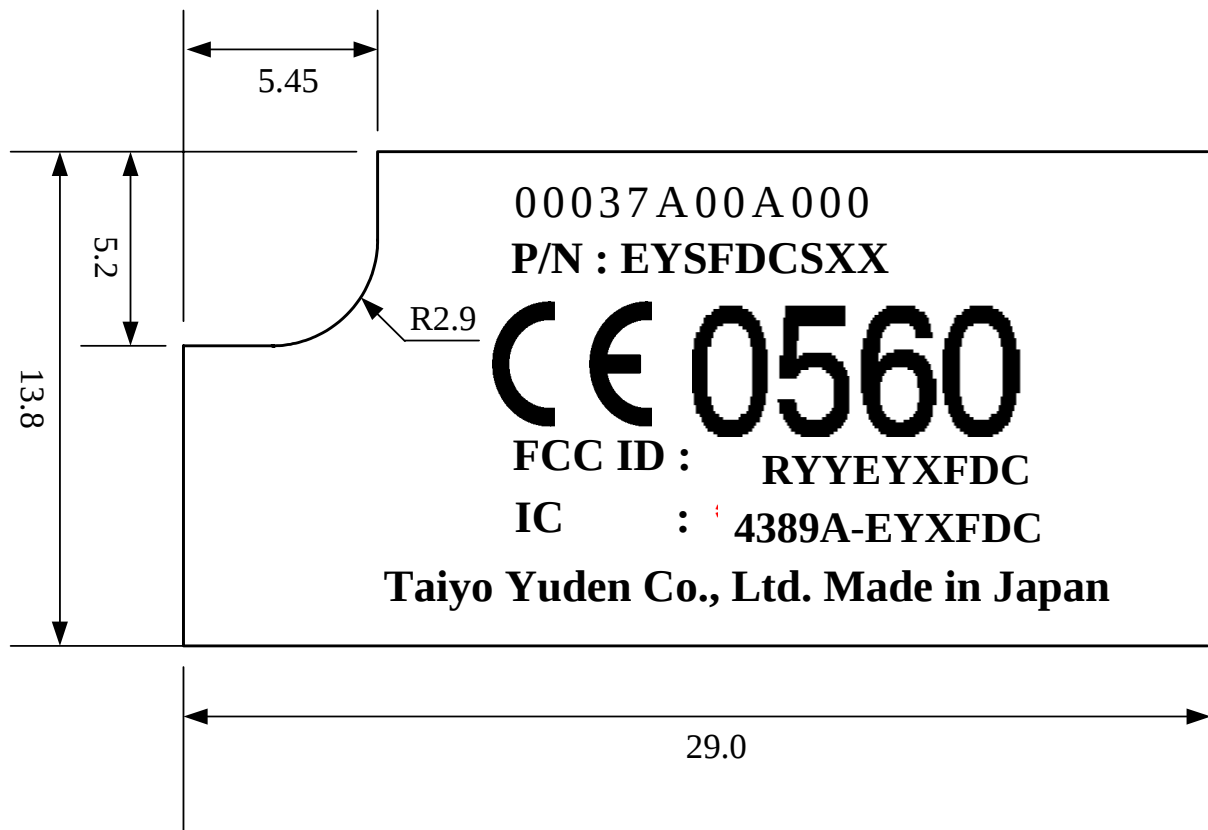


## Note :

- We recommend cutting motherboard, on which Taiyo Yuden module will be mounted, as described in the followings in order to ensure antenna characteristics.
- In addition we recommend keeping a case away from module antenna area and making the case with materials other than metal.
- Please contact Taiyo Yuden for the details of module mountings.

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|                              |                                    |
|------------------------------|------------------------------------|
| Control No.<br>HD-AD-B031272 | Control name<br>Outline/Appearance |
|------------------------------|------------------------------------|

**Indication label** (dimension : mm)

Material: PET ( UL969 ) / Label color : White

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|                              |       |                            |
|------------------------------|-------|----------------------------|
| Control No.<br>HD-BA-A031272 | (1/2) | Control name<br>Pin Layout |
|------------------------------|-------|----------------------------|

**Pin Descriptions**

| Terminal No. | Terminal name                       | Input/Output             | Description                                                                                                                                                          | Remark |
|--------------|-------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1            | VDD_3.3V                            | Input                    | DC3.3V Power supply                                                                                                                                                  | Note 1 |
| 2            | PIO_0                               | Input/Output             | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down.                                                        | Note 2 |
| 3            | PIO_1                               | Input/Output             | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down.                                                        | Note 2 |
| 4            | PIO_6<br>(CH_DATA/<br>WLAN_ACTIVE/) | Input/Output<br>(Input)  | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down. (WLAN_Active/CH_Data input for Co-existence signaling) | Note 2 |
| 5            | PIO_5<br>(BT_Active )               | Input/Output<br>(Output) | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down. (BT_Active output for Co-existence signaling.)         | Note 2 |
| 6            | PIO_4<br>(CH_CLK/<br>BT_PRIORITY/)  | Input/Output<br>(Output) | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down. (BT_Priority/CH_CLK output for Co-existence signaling) | Note 2 |
| 7            | PIO_3                               | Input/Output             | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down.                                                        | Note 2 |
| 8            | PIO_2                               | Input/Output             | Reserved, Keep on set side terminal open.<br>Bi-directional with programmable strength internal pull-up/down.                                                        | Note 2 |
| 9            | USB_D-                              | Input/Output             | USB data (Negative) input-output                                                                                                                                     |        |
| 10           | USB_D+                              | Input/Output             | USB data (Positive) input-output                                                                                                                                     |        |
| 11           | /RESET                              | Input                    | Active low RESET signal with internal weak pull-up                                                                                                                   | Note 3 |
| 12           | UART_TX                             | Output                   | Do not Connect                                                                                                                                                       |        |
| 13           | UART_RX                             | Input                    | Do not Connect                                                                                                                                                       |        |
| 14           | UART_RTS                            | Output                   | Do not Connect                                                                                                                                                       |        |
| 15           | UART_CTS                            | Input                    | Do not Connect                                                                                                                                                       |        |
| 16           | PCM_SYNC                            | Input/Output             | Do not Connect                                                                                                                                                       |        |
| 17           | PCM_OUT                             | Output                   | Do not Connect                                                                                                                                                       |        |
| 18           | PCM_IN                              | Input                    | Do not Connect                                                                                                                                                       |        |
| 19           | PCM_CLK                             | Input/Output             | Do not Connect                                                                                                                                                       |        |
| 20           | GND                                 | -                        | Ground                                                                                                                                                               |        |

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|------------------------------|-------|----------------------------|
| Control No.<br>HD-BA-A031272 | (2/2) | Control name<br>Pin Layout |
|------------------------------|-------|----------------------------|

## Notes

1. Pin1 (VDD\_3.3V) is used for power supply of BT module. (MAX 200mA).
2. Strength pull-downs (pull-ups) are equivalent to a few kOhms resistance, but are more accurately modeled as a 40 uA current drain (source).
3. Weak pull-ups can be thought of 1M Ohm connections to VDD, but are more accurately modeled as a -1 uA current source.

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## **FCC Regulatory Information**

**CAUTION:** To maintain compliance with FCC's RF exposure guidelines, use only the supplied antenna. Unauthorized antenna, modification, or attachments could damage the transmitter and may violate FCC regulations.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may Cause undesired operation.

## **Canada Regulatory Information**

**Operation is subject to the following two conditions:** (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

*L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes : (1) il ne doit pas produire de brouillage et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.*

**Canadian Radio Interference Regulations:** This digital apparatus does not exceed Class B limits for radio noise emissions from a digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus", ICES-003 of the Industry Canada.

Cet appareil numérique respecte les limites de bruits radio électriques applicables aux appareils numériques de Classe B prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par l'Industrie Canada.