

***Bluetooth*<sup>®</sup> low energy module**

**Bluetooth<sup>®</sup> 5.0 low energy**

**EYSKDNZWB**

Data Report

By purchase of any products described in this document, the customer is deemed to understand and accept contents of this document.

The ***Bluetooth***<sup>®</sup> word mark and logos are owned by the ***Bluetooth*** SIG, Inc. and any use of such marks by TAIYO YUDEN CO., LTD. is under license.

**TAIYO YUDEN CO., LTD.**

**EYSKDNZWB**

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**Document constituent list**

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## Revision History

19-Oct. -2020 &gt; Ver.1.0 Release

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Control No. HD-AG-A191023	Control name General Items
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## 1. Scope

This specification ("Specification") applies to the hybrid IC "EYSKDNZWB", a **Bluetooth®** 5.0 low energy module ("Product") manufactured by TAIYO YUDEN Co., Ltd. ("TAIYO YUDEN")

## 2. Description

- a) User Code : EYSKDNZWB  
Type : EYSKDN

\*User Code may be changed for mass production or other cases.

Note: Please use the User Code (EYSKDNZWB) to order this product

- b) Chip : Nordic nRF52840 (1MB Flash, 256kB RAM)

- c) Function : Radio frequency transceiver Module. Bluetooth®5.0 conformity.

- d) Application : IoT devices, Health & Fitness Equipment, Sensor, Toys

- e) Structure : Hybrid IC loaded with silicon monolithic semiconductor  
Regarding the containment of hazardous substance in this Product,  
it conforms to RoHS Directive.

- f) Outline : 38-pin Land Grid Array

- g) Marking : Part Number, Lot Number, FCC ID and ISED Number on Shielding Case  
Japan ID and manufacturer on Module board

- h) Country of origin : Japan, Thailand

- i) Packaging : Packaging method: Tape & reel + aluminum moisture barrier bag  
Packaging unit: 1000  
\*It might be provided as tray at sample stage.

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## j) Notes:

## a. Limitation of Warranty

- 1) TAIYO YUDEN provides warranties only if the Product is operated under the condition set forth in this Specification. Please note that TAIYO YUDEN shall not be liable for any defect and/or malfunction arising from use of the Product under the terms and conditions other than the operating conditions hereof. In addition when this Product is used under environmental conditions such as over voltage which is 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.
- 2) This Product is designed for use in products which comply with 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.
- 3) In some cases, TAIYO YUDEN may use replacements as component parts of Products. Such replacement shall apply only to component part of Products, which TAIYO YUDEN deems it possible to replace or substitute according to (i) Scope of Warranty provided in this specification (e.g. Electric Characteristics, Outline, dimension, Conditions of Use, Reliability Tests, Official Standard (Type Approvals etc.)) and (ii) Quality of Products. TAIYO YUDEN also ensures traceability of such replacement on production lot basis.

## b. Instruction for Use (CAUTION)

- 1) Because Product is not designed for radiation durability, please refrain from exposing Product to radiation in the use.
- 2) Communication between this Product and other might not be established nor maintained depending upon radio environment or operating condition of this Product and other products with wireless technology.
- 3) 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.
- 4) This Product mentioned in this Specification is manufactured for use in Health & Fitness Equipment, Sensor, Toys. 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.

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## 5) Japan Regulatory Information

- a) This Product is a radio system and obtained certification of construction type combined with the specific antenna.
- b) Please ensure that your product has a label with the following certification mark at easily viewable location. If your product is too small to have the label, please place it in the instruction manual and package of your product. The mark diameter shall be equal or greater than 3mm. In case your product does not have the label with the following certification mark, you or your customer who uses your product may be against the Radio Law and subjected to criminal punishment. TAIYO YUDEN shall not be liable for any loss or damage incurred by you or your customer arising from use of your product which does not have following certification mark.

This product has a radio system which was approved as a radio station in a low power data communication system based on the Radio Law.

-EYSKDN : 005-102211



**R** 005-102211

## 6) Canada Regulatory Information

- a) This device complies with Industry Canada's applicable licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- 1) l'appareil ne doit pas produire de brouillage;
- 2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

- b) This product is certified as type of the portable device with Industry Canada Rules. To maintain compliance with RF Exposure requirement, please use within specification of this product and have a separation distance of minimum 15 mm between the user and/or bystander and the antenna and /or radiating element. This distance ensures that the output power (e.i.r.p.) of EYSKDN is below the SAR evaluation Exemption limits defined in RSS-102 issue 5.

Ce produit est certifié comme type de l'appareil portable avec Industrie Règles de Canada. Pour maintenir l'acquiescement avec exigence Exposition de RF, veuillez utiliser dans spécification de ce produit et respecter une distance de séparation d'au moins 15 mm entre l'utilisateur et / ou un tiers et l'antenne et / ou l'élément rayonnant. Cette distance garantit que la puissance de sortie (p.i.r.e.) d'EYSKDN est inférieure aux limites d'exemption de l'évaluation SAR définies dans le numéro 5 de la norme RSS-102.

- IC: 4389B-EYSKDN

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Control No. HD-AG-A191023	Control name General Items
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- c) Please notify certified ID by either one of the following method on your product.  
-Contains IC : 4389B-EYSKDN

Specifiez ID certifiée dans votre produit par une de méthode suivante.  
-Contains IC : 4389B-EYSKDN

## 7) FCC Regulatory Information

- a) This device complies with part 15 of the FCC Rules.  
-Part 15 Subpart C
- b) Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- c) Please notify certified ID by either one of the following method on your product.  
-Contains Transmitter Module FCC ID: RYYEYSKDN  
-Contains FCC ID: RYYEYSKDN
- d) CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the use's authority to operate the equipment.
- e) The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.
- f) This product is certified as type of the portable device with FCC Rules. To maintain compliance with RF Exposure requirement, please use within specification of this product.
- g) The antenna used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- h) This module can change the output power depending on the circumstances by the application software which is developed by module installer. Any end user cannot change the output power.

## 8) CE Regulatory Information

- a) When your end product installs this module, it is required to proceed additional certification processes before placing on the market in EU member states to make your products fully comply with relative EU standards.
- b) TAIYO YUDEN can provide you the test reports of conducted measurement portion for the radio module. You can utilize the test reports for the certification processes of your end product as it requires radio testing.

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Control No. HD-AG-A191023	(5/6)	Control name General Items
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**c. Term of Support**

- 1) In the case that customer requests TAIYO YUDEN to customize the hardware of this Product in order to meet such customer's specific needs, TAIYO YUDEN will make commercially reasonable effort to modify such hardware or software at customer's expense; provide however, the customer is kindly requested to agree it doesn't mean that TAIYO YUDEN has obligations to do so even in the case it is technically difficult for TAIYO YUDEN.
- 2) Any failure arising out of this Product will be examined by TAIYO YUDEN regardless of before or after mass production. Customer agrees that once such failure is turned out not to be responsible for TAIYO YUDEN after aforesaid examination, some of the technical support shall be conducted by TAIYO YUDEN at customer's expense; provided however, exact cost of this technical support can be agreed through the negotiation by the parties.
- 3) Do not alter hardware and/or software of this Product. Please note that TAIYO YUDEN shall not be liable for any problem if it is caused by customer's alteration of Hardware without Taiyo Yuden's prior approvals.
- 4) TAIYO YUDEN does not guarantee functions and performances which depend on the customer's firmware. TAIYO YUDEN does not assume liabilities for defects and failures (i) in functions, performances and quality of the Customer's product incorporating the Products and (ii) which may occur as the Product is incorporated in the Customer's product.

**d. Caution for Export Control**

This Product may be subject to governmental approvals, consents, licenses, authorizations, declarations, filings, and registrations for export or re-export of the Product, required by Japanese Foreign Exchange and Foreign Trade Law (including related laws and regulations) and/or any other country's applicable laws or regulations related to export control.

In case you will export or re-export this Product, you are strongly recommended to check and confirm, before exporting or re-exporting, necessary procedures for export or re-export of this Product which is required by applicable laws and regulations, and if necessary, you have to obtain necessary and appropriate approvals or licenses from governmental authority at your own risk and expense.

**e. Term of Warranty**

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.

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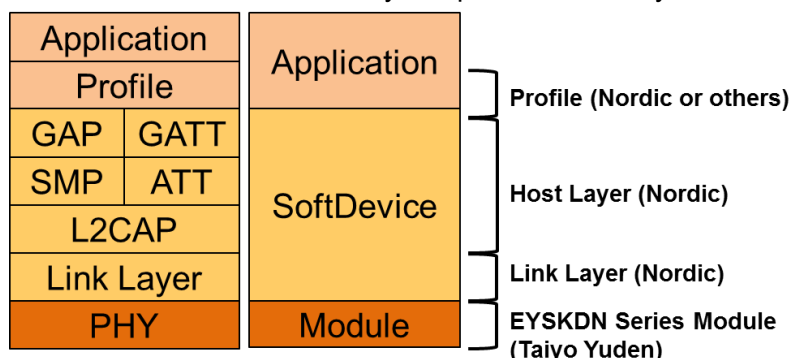
Control No. HD-AG-A191023	Control name General Items
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## f. Items of the Specification

- 1) Any question arising from the Specification shall be solved in good faith through mutual discussion by the parties hereof.
- 2) The language of this “General items” is Japanese and this “General items” shall be interpreted by Japanese. Any copies of translation is a reference purpose only and is not binding on both parties hereto.

## g. Special note

- 1) The latest errata and document released by Nordic Semiconductor ASA must be referred. The document is given priority over this document. Please note that TAIYO YUDEN shall not be liable for any problem and related issue for developed or manufactured application software or product without reference or consideration of the information released by Nordic Semiconductor ASA.
- 2) Taiyo Yuden writes firmware for and fixed SoftDevice (s140\_nrf52\_6.1.0\_softdevice.hex) to this product. Customer writes firmware that matches the customer applications including SoftDevice at the customer's own responsibility.
- 3) The Electrical Characteristics defined in this Specification are of the module with above Firmware (s140\_nrf52\_6.1.0\_softdevice.hex). If other firmware developed by Customer is installed, the characteristics may differ from the defined value in the Electrical Characteristics. Bluetooth qualification and radio type approval may become invalid.
- 4) 802.15.4 at 2.4GHz band is used 16ch from ch11 (2405MHz) to ch26 (2480MHz). Due to the wide occupied bandwidth of the 802.15.4 signal, the radiated emission level exceeds the FCC (Federal Communications Commission) regulation limit level if it transmits the ch26 near 2483.5MHz with starting FCC restricted band. Therefore integrators of this module have to make the application software that should not be possible to transmit the 26ch, and cannot be unlocked by an end-user.
- 5) EYSKDN series module is qualified as PHY only with Component category by Bluetooth SIG. The QDID of this module is 138245. The final product needs to get qualification as End product combining with PHY (module), SoftDevice and Profile before selling the product. The combination of Link and Host layer is different with SoftDevice. Please refer to following combination and consult with your qualification body and BQC.





**EYSKDNZWB**

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Control No. HD-AM-A191023	(1/1)	Control name Absolute maximum ratings
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**Absolute maximum ratings**

Symbol	Parameter	Min.	Max.	Units
VDD		-0.3	+3.9	V
VDDH		-0.3	+5.8	V
VBUS		-0.3	+5.8	V
GND			0	V
VIO, VDD≤3.6V		-0.3	VDD+ 0.3	V
VIO, VDD>3.6V		-0.3	+3.9	V
Storage temperature		-40	+85	Deg-C
MSL	Moisture Sensitivity Level	3		
ESD HBM	Human Body Model		1	kV
ESD MM	Machine Model		100	V
Endurance	Flash Memory Endurance	10000		write/erase cycles
Retention	Flash Memory Retention	10 years		At 40 deg-C

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**EYSKDNZWB**

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Control No. HD-AE-A191023	(1/3)	Control name Electrical characteristics
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**Electrical characteristics****Recommendation operating range**

Symbol	Parameter	Min.	Typ.	Max.	Units
VDD	VDD supply voltage	1.7	3.0	3.6	V
VDDH	VDDH supply voltage	2.5	3.7	5.5	V
VBUS	VBUS USB supply voltage	4.35	5	5.5	V
VDD,POR	VDD supply voltage needed during power-on reset.	1.75			V
tR_VDD	Supply rise time (0V to 1.7V)*1			60	ms
tR_VDDH	Supply rise time (0V to 3.7V)*1			100	ms
TA	Operation temperature	-40	25	85	Deg-C

\*1 The on-chip power-on reset circuitry may not function properly for rise times outside the specified interval. Also after power off, it must start up from below 0.3V. The on-chip power-on reset circuitry may not function properly.

**DC Specifications**

The Specification applies for Topr.= 25 degrees C, VDD and VDDH = 3.0V

Symbol	Parameter (condition)	Min.	Typ.	Max.	Units
VIH	Input high voltage	0.7 x VDD		VDD	V
VIL	Input low voltage	GND		0.3 x VDD	V
VOH	Output high voltage (high drive 5 mA)	VDD-0.4		VDD	V
VOL	Output low voltage (high drive 5 mA)	GND		GND+0.4	V
RPU	Pull-up resistance	11	13	16	Kohm
RPD	Pull-down resistance	11	13	16	Kohm
ITX,+8dBm	TX only run current PRF=+8 dBm		32.7		mA
IRX,1M	RX only run current 1Msps BLE		9.9		mA
IRX,2M	RX only run current 2Msps BLE		11.1		mA
ION	System ON, no RAM retention, wake on any event		0.97		uA
IOFF	System OFF, no RAM retention, wake on reset		0.40		uA

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Control No. HD-AE-A191023	(2/3)	Control name Electrical characteristics
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**RF Specifications**

Symbol	Description	Min.	Typ.	Max.	Units
Fop	Operating frequencies	2402		2480	MHz
PLLchsp	PLL channel spacing		1		MHz
DfBLE1M	Frequency deviation @ BLE 1Msps		+/-250		kHz
DfBLE2M	Frequency deviation @ BLE 2Msps		+/-500		kHz
PRF	Maximum output power		8.0		dBm
PRFC	RF power control range		28		dB
PRFCR	RF power accuracy			+/-4	dB
PRF1	1st Adjacent Channel Transmit Power 1 MHz (1 Mbps)		-24.8		dBc
PRF2	2nd Adjacent Channel Transmit Power 2 MHz (1 Mbps)		-54.0		dBc
PRXMAX	Maximum received signal strength at < 0.1% PER		0		dBm
PSENS,IT,1M,BLE	Receiver sensitivity 1Msps BLE Ideal transmitter <=37bytes (0.1% BER)		-95		dBm
PSENS,IT,2M,BLE	Receiver sensitivity 2Msps BLE Ideal transmitter Packet length<=37bytes		-92		dBm
PSENS,IT,BLE LE125k	Sensitivity, 125 kbps BLE mode		-103.0		dBm
PSENS,IT,BLE LE500k	Sensitivity, 500 kbps BLE mode		-99		dBm

**Many documents of nRF52840, such as product specification and the errata, can be found at the link below (There is a possibility that it will change in the future). Please be sure to check these latest documents when using our module.**

nRF52840\_Product Specification

[https://infocenter.nordicsemi.com/topic/ps\\_nrf52840/keyfeatures\\_html5.html?cp=3\\_0\\_0](https://infocenter.nordicsemi.com/topic/ps_nrf52840/keyfeatures_html5.html?cp=3_0_0)

nRF52840 Errata

[https://infocenter.nordicsemi.com/topic/struct\\_nrf52/struct/nrf52840\\_errata.html?cp=3\\_0\\_1](https://infocenter.nordicsemi.com/topic/struct_nrf52/struct/nrf52840_errata.html?cp=3_0_1)

S140\_SoftDevice Specification

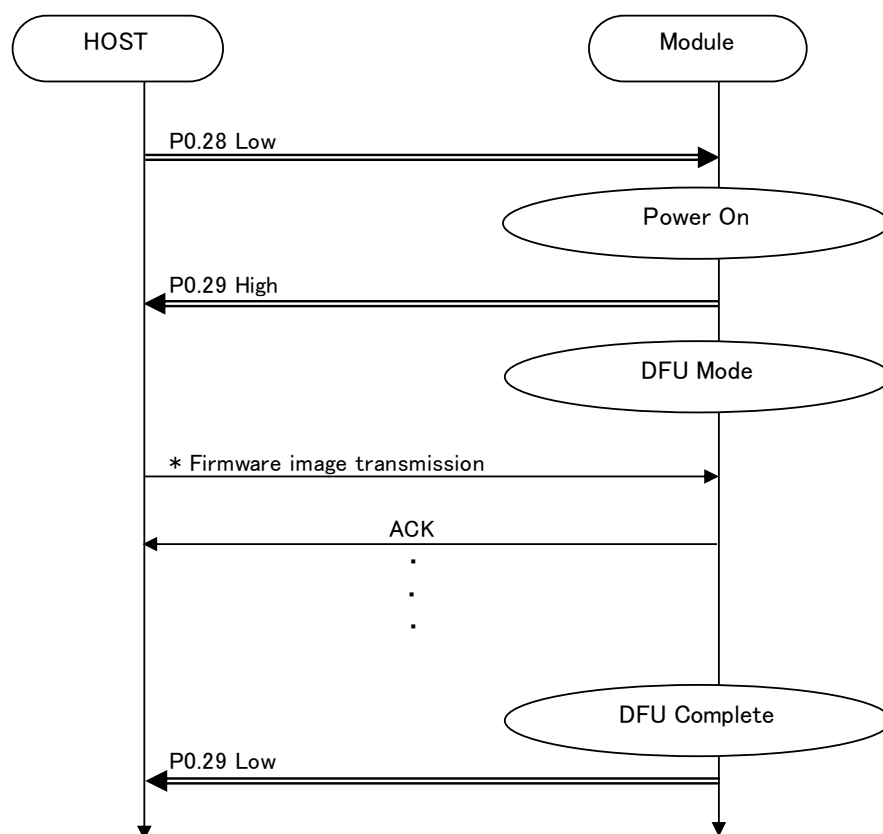
[https://infocenter.nordicsemi.com/topic/sds\\_s140/SDS/s1xx/s140.html?cp=3\\_4\\_2\\_0](https://infocenter.nordicsemi.com/topic/sds_s140/SDS/s1xx/s140.html?cp=3_4_2_0)

For more information

[https://infocenter.nordicsemi.com/topic/struct\\_welcome/struct/welcome.html](https://infocenter.nordicsemi.com/topic/struct_welcome/struct/welcome.html)

Control No. HD-AE-A191023	(3/3)
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Control name Electrical characteristics
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**DFU Specifications****Device Firmware Updates (DFU)****UART**

Baud rate : 38400 bps Data : 8 bit Parity : none Stop : 1 bit Hardware flow control : Enabled	UART PIN : RX : P0.08 TX : P0.06 CTS : P0.07 RTS : P0.05
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\* see Nordic Infocenter help

[Nordic Infocenter] <http://infocenter.nordicsemi.com/index.jsp>

Software Development Kit &gt; nRF5 SDK v15.2.0 &gt; Libraries &gt; Bootloader and DFU modules

 Software Development Kit > nRF5 SDK v15.2.0 > Examples > DFU bootloader examples  
 > Secure DFU Bootloader over Serial Link (UART/USB)

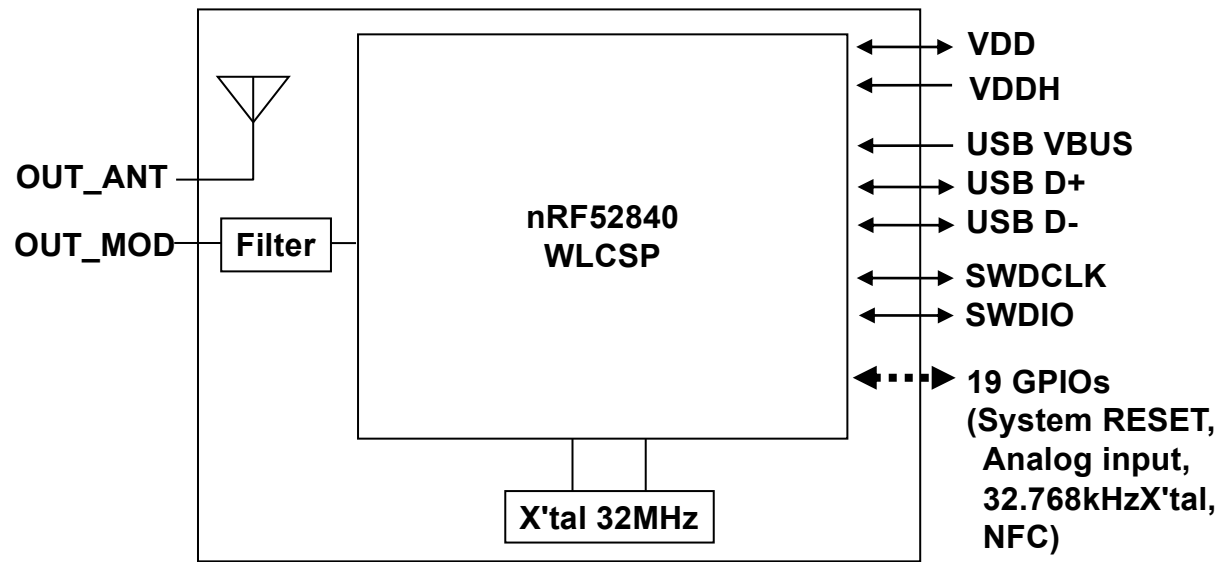
nRF Tools &gt; nrfutil &gt; Performing a DFU

EYSKDNZWB

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Control No. HD-MC-A191023	(1/4)	Control name Circuit Schematic
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Block Diagram



## EYSKDNZWB

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Control No.  
HD-MC-A191023

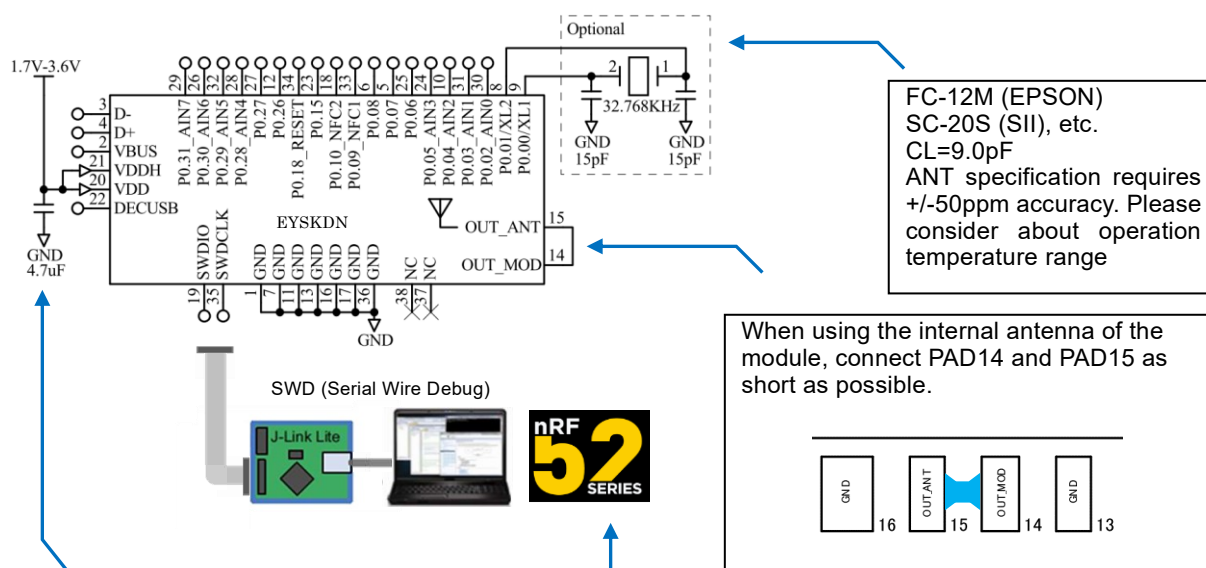
(2/4)

Control name  
Circuit Schematic

## Reference Circuits

## 1. Normal voltage mode

Normal voltage mode is entered when the supply voltage is connected to both the VDD and VDDH pins (so that VDD equals VDDH).



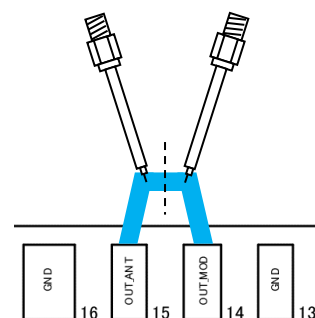
In case of the operation with the battery, we recommend that you add a bypass capacitor about 100uF in view of the voltage drop during TX/RX. Please consider whether it is necessary according to the performance of the customer's battery.

SWD (Serial Wire Debug) is a high performance 2-pin debug port that replaces JTAG. You can debug and program with J-link Lite. When using J-LINK Lite, it is convenient to mount a socket on the customer's main board. The socket will be "10-pin connector two rows of 1.27mm pitch (Ex: PSS-720153-05, Hirose instrument). J-Link Lite operates at 3.3 V. do not operate at 1.7 V, so please be careful.

The SWDIO line has a 13kΩ internal pull-up resistor.  
The SWDCLK line has a 13kΩ internal pull-down resistor.

If you need to measure the antenna performance and RF conduction performance, please draw a tie line of PAD14 and PAD15 outside a module in advance.

When measuring, please cut off the signal line and attach the RF connector cable.



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# EYSKDNZWB

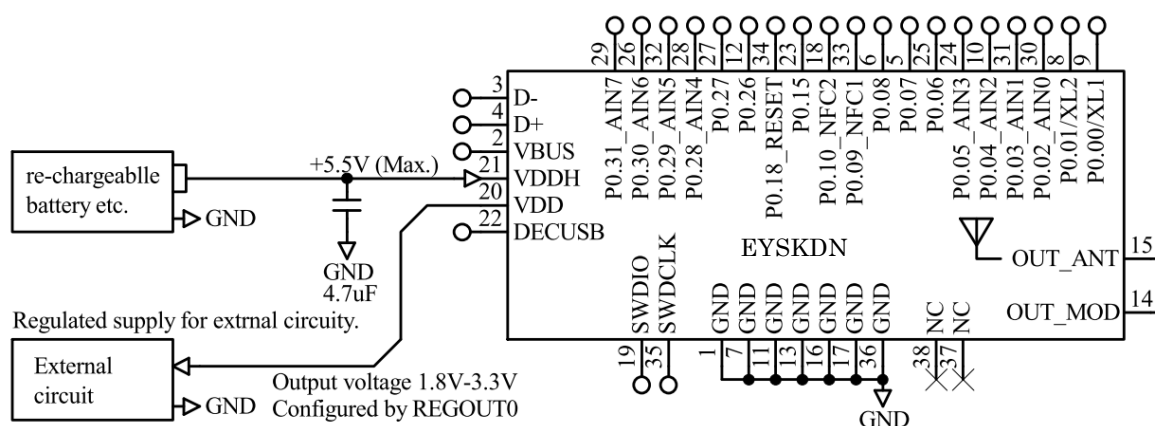
TAIYO YUDEN CO., LTD.

Control No. HD-MC-A191023	Control name Circuit Schematic
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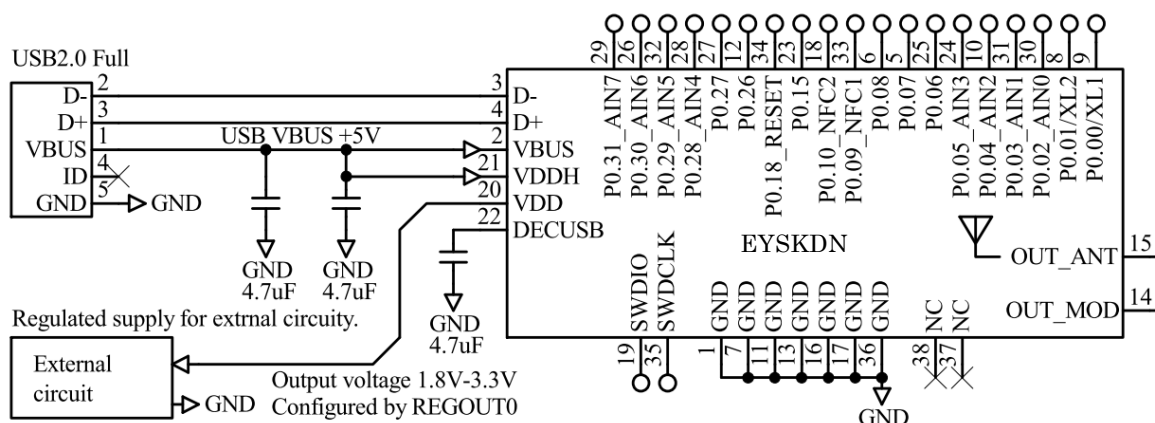
## 2. High voltage mode

This module supports supply voltage up to 5.5V, such as lithium-ion battery or USB bus power. High voltage mode is entered when the supply voltage is only connected to the VDDH pin and the VDD pin is not connected to any voltage supply.

### Non USB operation



### USB operation



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Control No. HD-MC-A191023	(4/4)	Control name Circuit Schematic
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### 3.Other

P0.00 - P0.31 are GPIOs. By setting in the application software, it is assigned to pin as UART, etc. Although unused pins can be made OPEN, please do not recommend to draw signal line from them.

The GPIO high reference voltage always equals the level on the VDD pin. In **normal voltage mode**, the GPIO high level equals the voltage supplied to the VDD pin, and in **high voltage mode** it equals the level specified in register REGOUT0 (Factory default : 1.8V).

GPIO high (V): 0.7xVDD to VDD  
GPIO low (V): GND to 0.3xVDD

In high voltage mode, the output from internal regulator can be used to supply external circuitry from the VDD pin. The VDD output voltage is configured in register REGOUT0 (Factory default : 1.8V) and the supported output voltage range depends on the supply voltage provided to the VDDH pin. In addition, the external current draw is defined as the sum of all the GPIO currents and the currents being drawn from VDD, and the maximum value depends on the operating condition.  
Please refer to the product specification of nRF52840 chip.

nRF52840\_Product Specification  
[https://infocenter.nordicsemi.com/topic/ps\\_nrf52840/keyfeatures\\_html5.html?cp=3\\_0\\_0](https://infocenter.nordicsemi.com/topic/ps_nrf52840/keyfeatures_html5.html?cp=3_0_0)





**EYSKDNZWB**

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Control No. HD-BA-A191023	(1/2)	Control name Pin Layout
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**Pin Descriptions**

Pin	Pin name	Pin function	Description
1	GND (Corner pad)	Ground	Ground 0.55mm x 0.8mm
2	VBUS	Power	5 V input for USB 3.3 V regulator
3	D-	Digital I/O	USB D-
4	D+	Digital I/O	USB D+
5	P0.07	Digital I/O	General purpose I/O, Trace buffer clock
6	P0.08	Digital I/O	General purpose I/O
7	GND	Ground	Ground
8	P0.01/XL2	Digital I/O Analog input	General purpose I/O Connection for 32.768 kHz crystal
9	P0.00/XL1	Digital I/O Analog input	General purpose I/O Connection for 32.768 kHz crystal
10	P0.04_AIN2	Digital I/O Analog input	General purpose I/O Analog input
11	GND (Corner pad)	Ground	Ground 0.55mm x 0.8mm
12	P0.26	Digital I/O	General purpose I/O
13	GND	Ground	Ground
14	OUT_MOD	RF In/Out	RF I/O pin. It should be connected to <b>Pin15</b> OUT_ANT for normal operation.
15	OUT_ANT	Antenna In/Out	Internal antenna. It should be connected to <b>Pin14</b> OUT_MOD for normal operation
16	GND (Corner pad)	Ground	Ground 0.55mm x 0.8mm
17	GND (Corner pad)	Ground	Ground 0.55mm x 0.8mm
18	P0.10_NFC2	Digital I/O NFC input	General purpose I/O NFC antenna connection
19	SWDIO	Debug	Serial wire debug I/O for debug and programming
20	VDD	Power	Power supply
21	VDDH	Power	High voltage power supply
22	DECUSB	Power	USB 3.3V regulator supply decoupling

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**EYSKDNZWB**

TAIYO YUDEN CO., LTD.

Control No. HD-BA-A191023	Control name Pin Layout
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Pin	Pin name	Pin function	Description
23	P0.15	Digital I/O	General purpose I/O
24	P0.05_AIN3	Digital I/O Analog input	General purpose I/O Analog input
25	P0.06	Digital I/O	General purpose I/O
26	P0.30_AIN6	Digital I/O Analog input	General purpose I/O Analog input
27	P0.27	Digital I/O	General purpose I/O
28	P0.28_AIN4	Digital I/O Analog input	General purpose I/O Analog input
29	P0.31_AIN7	Digital I/O Analog input	General purpose I/O Analog input
30	P0.02_AIN0	Digital I/O Analog input	General purpose I/O Analog input
31	P0.03_AIN1	Digital I/O Analog input	General purpose I/O Analog input
32	P0.29_AIN5	Digital I/O Analog input	General purpose I/O Analog input
33	P0.09_NFC1	Digital I/O NFC input	General purpose I/O NFC antenna connection
34	P0.18_RESET	Digital I/O	General purpose I/O Configurable as system RESET (Factory default : RESET)
35	SWDCLK	Debug	Serial wire debug clock input for debug and programming
36	GND (Center pad)	Ground	Ground 2.8mm x 1.5 mm
37	NC (Corner pad)	NC	NC 0.55mm x 0.8mm
38	NC (Corner pad)	NC	NC 0.55mm x 0.8mm

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**EYSKDNZWB**

TAIYO YUDEN CO., LTD.

Control No. HQ-BA-537	(1/2)	Control name Handling Precaution
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This specification describes desire and conditions especially for mounting.

## Desire/Conditions

## (1) Environment conditions for use and storage

1. Store the components in an environment of < **40deg-C/90%RH** if they are in a moisture barrier bag packed by TAIYO YUDEN.
2. Keep the factory ambient conditions at < **30deg-C/60%RH**.
3. Store the components in an environment of < **25±5deg-C/10%RH** after the bag is opened.  
(The condition is also applied to a stay in the manufacture process).

## (2) Conditions for handling of products

Make sure all of the moisture barrier bags have no holes, cracks or damages at receiving. If an abnormality is found on the bag, its moisture level must be checked in accordance with 2 in (2).

Refer to the label on the bag.

1. All of the surface mounting process (reflow process) must be completed **in 12 months** from the bag sea date.
2. Make sure humidity in the bag is less than **10%RH** immediately after open, using a humidity indicator card sealed with the components.
3. **All** of the surface mounting process (reflow process including rework process) must be completed in **168 hours** after the bag is opened (inclusive of any other processes).
4. If any conditions in (1) or condition 2 and 3 in (2) are not met, bake the components in accordance with the conditions at **125deg-C 24hours**
5. As a rule, baking the components in accordance with conditions 4 in (2) shall be once.
6. Since semi-conductors are inside of the components, they must be free from static electricity while handled.(<100V) Use ESD protective floor mats, wrist straps, ESD protective footwear, air ionizers etc. , if necessary.
7. Please make sure that there are lessen mechanical vibration and shock for this module, and do not drop it.
8. Please recognize pads of back side at surface mount.
9. Washing the module is not recommended. If washing cannot be avoided, please test module functionality and performance after thoroughly drying the module.  
We cannot be held responsible for any failure due washing the module.
10. Please perform temperature conditions of module at reflow within the limits of the following.  
Please give the number of times of reflow as a maximum of 2 times.

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**EYSKDNZWB**

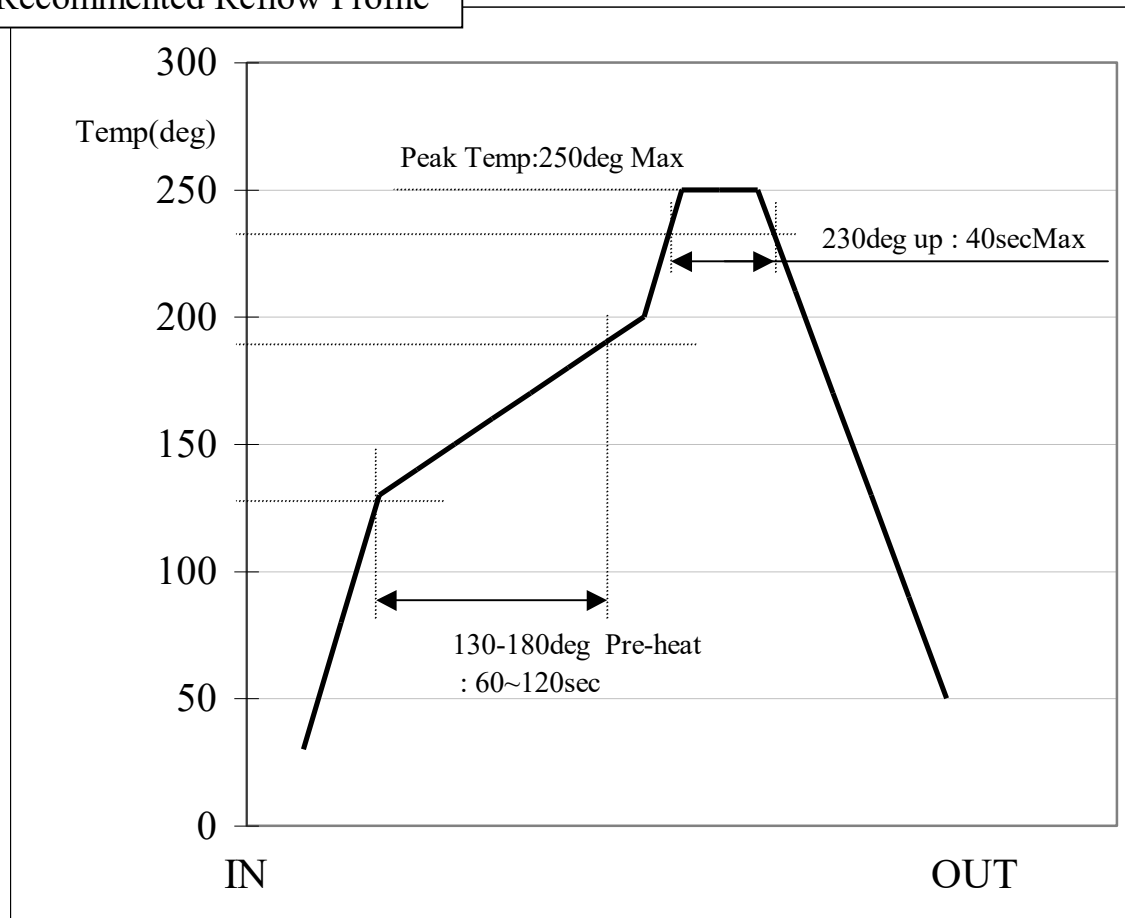
TAIYO YUDEN CO., LTD.

Control No.  
HQ-BA-537

(2/2)

Control name  
Handling Precaution

## Recommended Reflow Profile



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## EYSKDNZWB

TAIYO YUDEN CO., LTD.

Control No.  
HD-BB-A191023

(1/3)

Control name  
Packaging Specification

## Packaging Specification

梱包仕様

## (1) Packaging Material 梱包材料

Name 部材名	Outline 概要	Materials 材質	Note 備考
Emboss エンボス	24mm wide - 12mmPitch 24mm幅 - 12mmピッチ	Conductive PS 導電性 PS	
Cover Tape カバーテープ			
Reel リール	φ 330 mm	Conductive PS 導電性 PS	
Desiccant 乾燥剤	30g×1		
Humidity indicator card 湿度インジケータ			
Aluminum moisture barrier bag アルミ防湿袋	420×460(mm)	(AS)PET/AL/NY/PE(AS)	
Label ラベル			
Corrugated cardboard box(Inner) 個装箱	339×351×74(mm)		
Corrugated cardboard box(Outer) 外装箱	369×369×277(mm)		

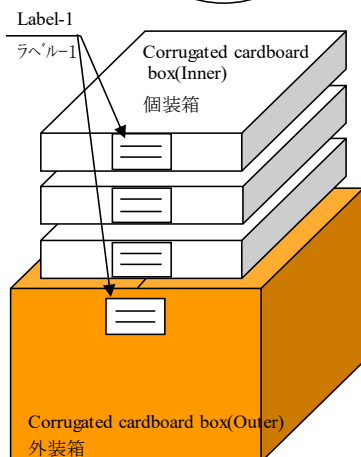
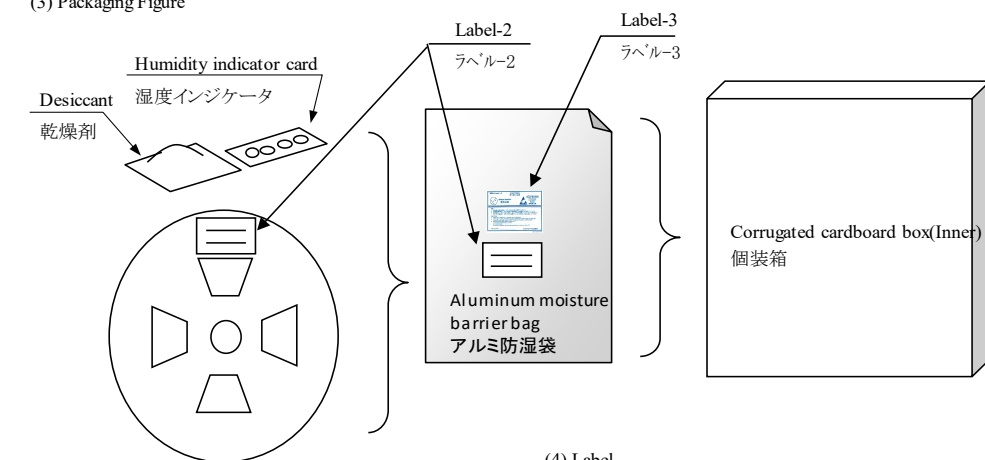
## (2) Packaging Unit

梱包数量

Max 1000 pieces/Reel

Max 3000 pieces/Box(Outer)

## (3) Packaging Figure

(4) Label  
ラベル

## Label-1

- CAMPANY NAME 御社名
- PURCHASE ORDER 注文番号
- DESCRIPITON 品名
- QUANTITY 数量
- LotNo. ロット番号
- Country of Origin 原産国

## Label-2

- PURCHASE ORDER 注文番号
- DESCRIPITON 品名
- QUANTITY 数量
- LotNo. ロット番号
- Country of Origin 原産国

## Label-3

- CAUTION LABEL 注意ラベル
- MSL Level3

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## EYSKDNZWB

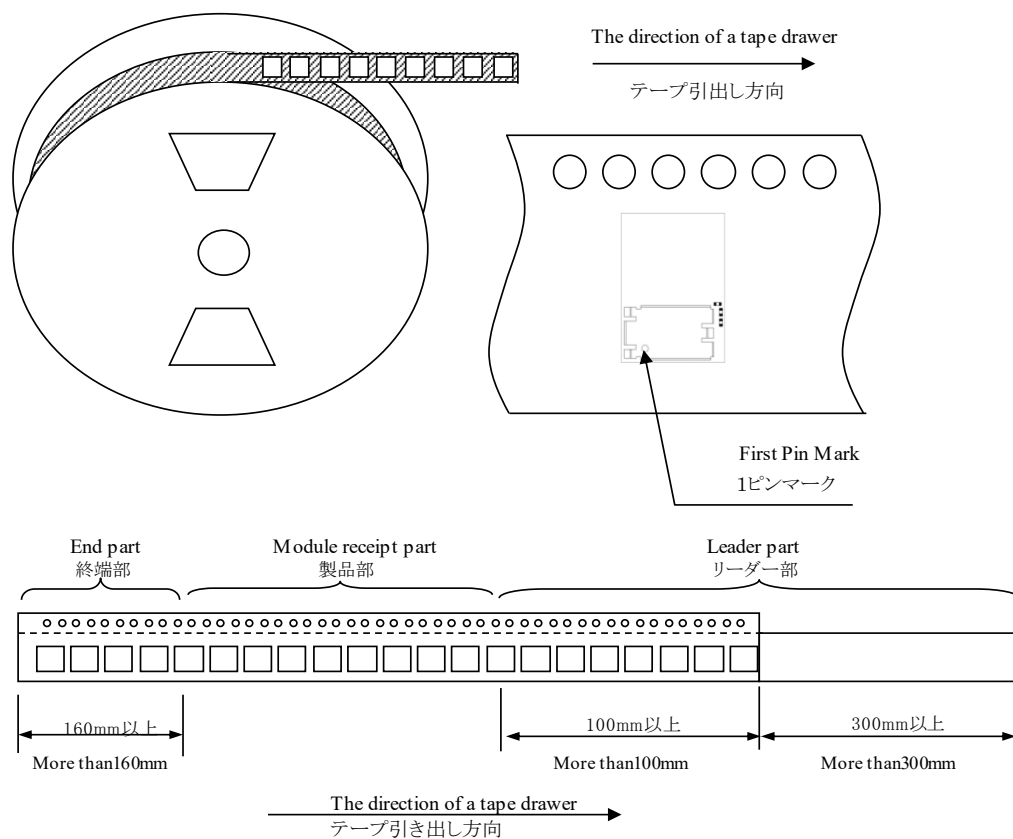
TAIYO YUDEN CO., LTD.

Control No.  
HD-BB-A191023

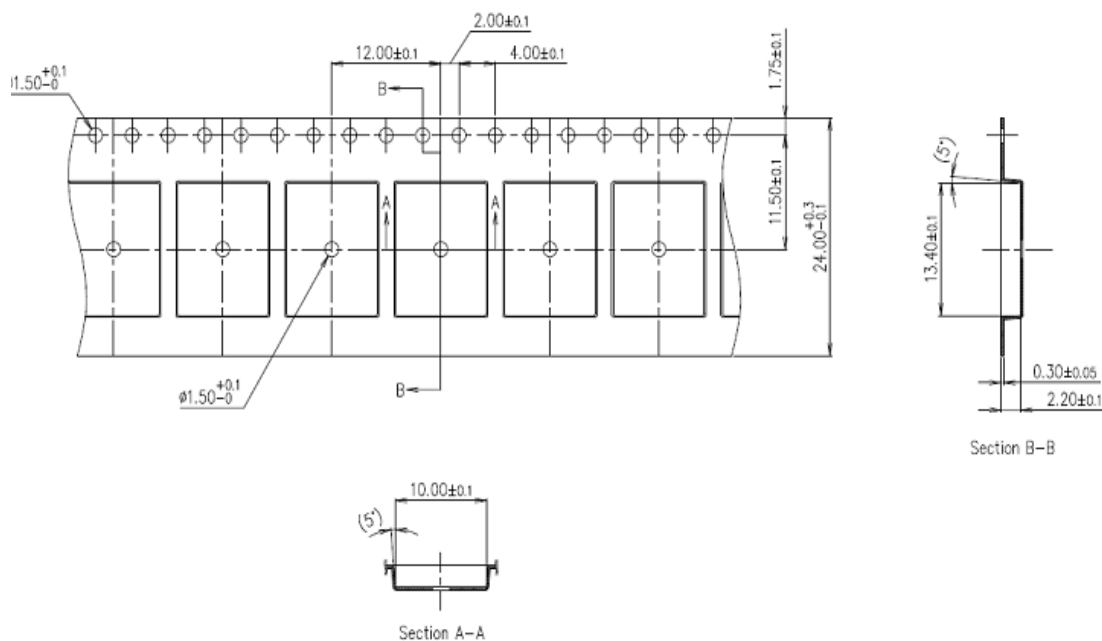
(2/3)

Control name  
Packaging Specification

Tape specification  
テーピング仕様



キャリアエンボス図面



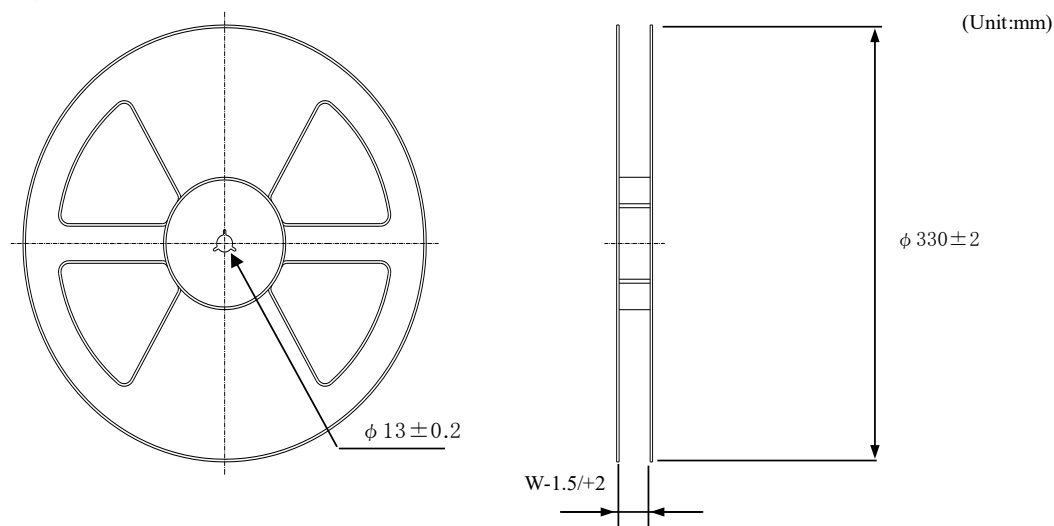
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## EYSKDNZWB

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Control No.  
HD-BB-A191023

(3/3)

Control name  
Packaging SpecificationReel specification  
リール仕様

Tape wide	8mm	12mm	16mm	24mm	32mm	44mm
W	9.4mm	13.4mm	17.4mm	25.4mm	33.4mm	45.4mm

Taping performance  
テーピング性能

Both of an embossing tape top cover tape bear this, when the power of 10N is applied in the direction of a drawer.  
 ・エンボステープ、トップカバーテープともに、引き出し方向に10Nの力を加えた場合に、これに耐えること。

The exfoliation adhesion of a top cover tape is the intensity of 0.1~1.3N.

(The angle to pull is 165~180 degrees. The speed to pull is 300 mm/min.)

・トップカバーテープの剥離強度は、角度165~180度に保ち、300mm/minのスピードでトップカバーテープを引っ張ったとき、0.1~1.3Nとする。

## Note

## 備考

Lack of the parts in 1 reel is with two or less pieces.

1リール中の部品の欠落は2個までとします。(ラベル表示数量と梱包数は同じです。欠落とはテープ内でのモジュール抜けが2個まで許容させていただくという意味になります。)

MSL Level 3 Under control

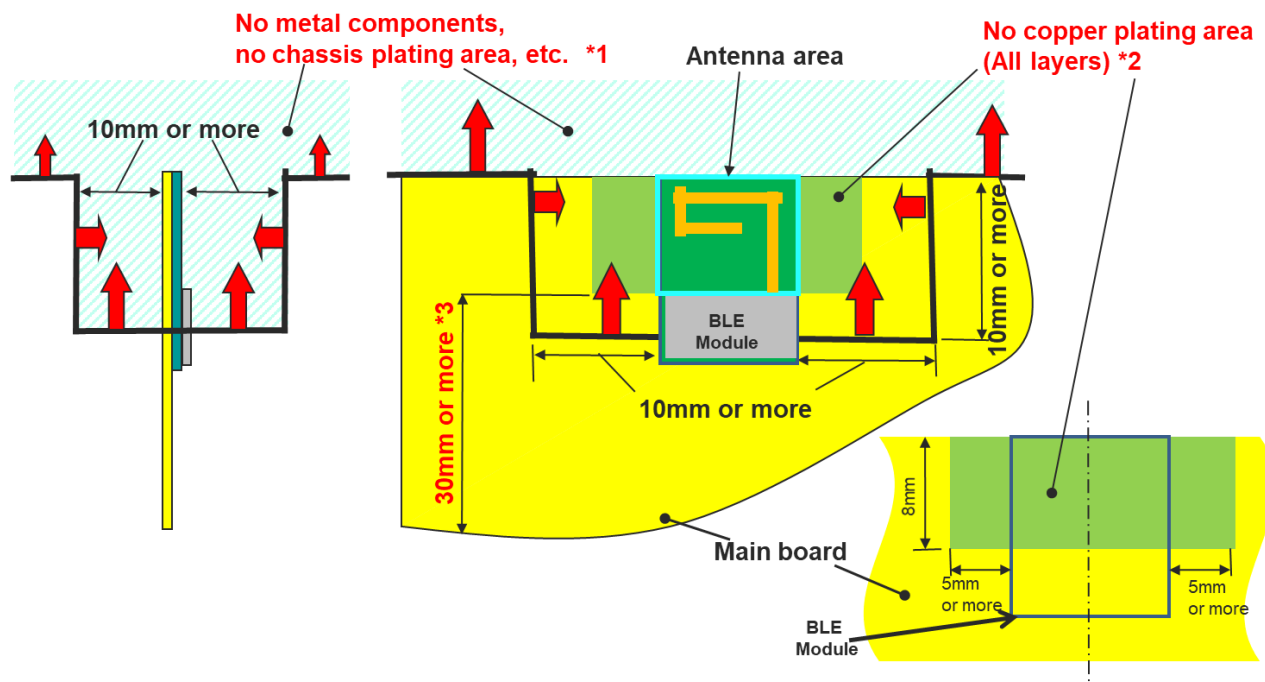
MSL はレベル3 で管理しています。

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Control No.	Control name
(1/3)	Antenna application note

### Recommended module mounting example



\*1 Please do not place any metal components in blue shaded space. (\*1). We do not recommend to place any metal objects upper space of the module in the above figure. If it needs to place metal objects, please consider to keep the metal off from the antenna as far as you can. Such as signal line and metal chassis as possible except for main board while mounting the components in \*1 space on the main board is allowed except for no copper plating area. (\*2).

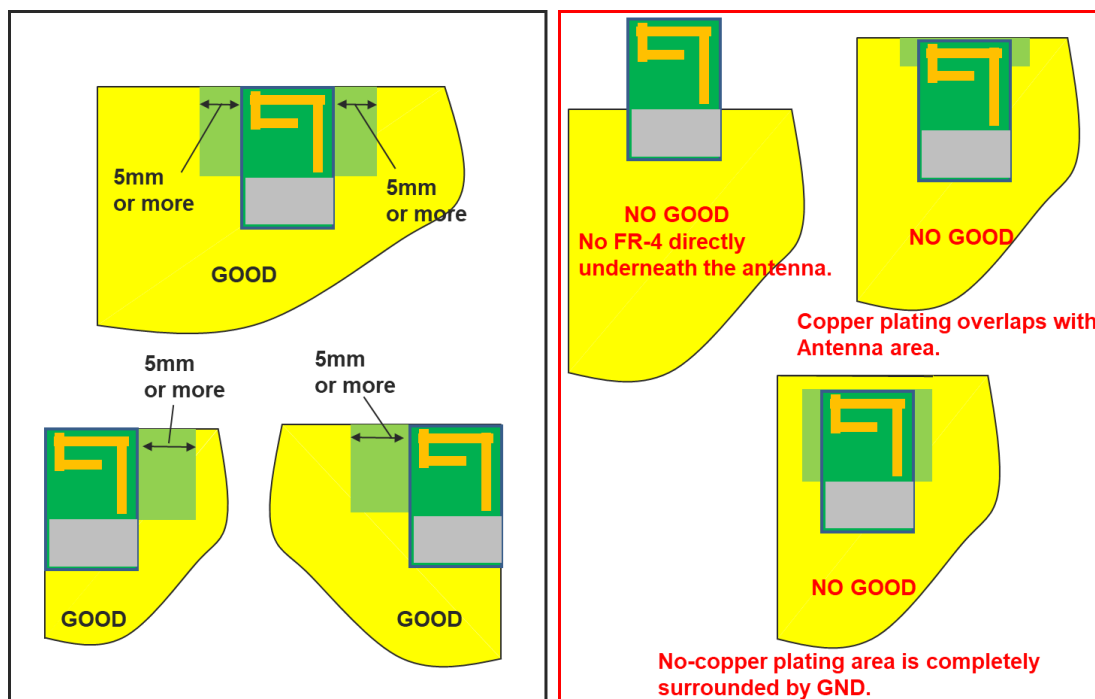
\*2 This area is routing prohibited area on the main board. Please do not place copper on any layer. Please remain use of FR-4 dielectric material. The antenna is tuned with the FR-4.

\*3 Characteristics may deteriorate when GND pattern length is less than 30mm. It should be 30 mm or more as possible.

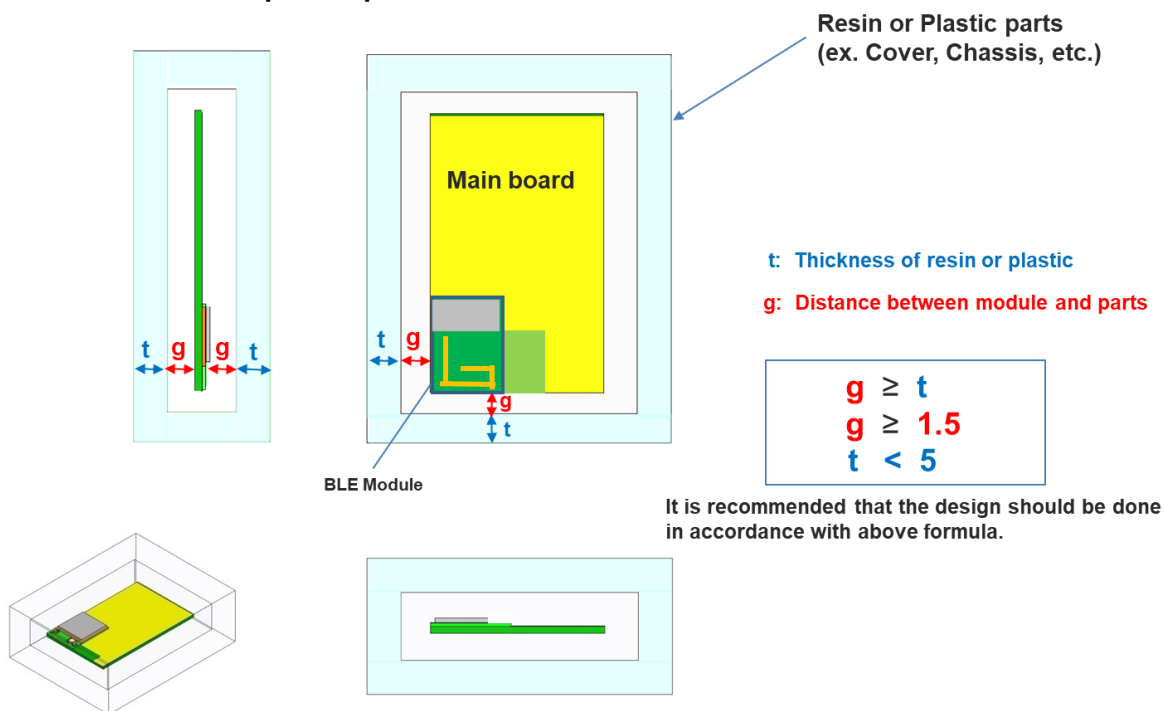
Even when above mentioned condition is satisfied, communication performance may be significantly deteriorated depending on the structure of the product.

Control No.	Control name
(2/3)	Antenna application note

## Other module mounting examples



## Placement of resin or plastic parts

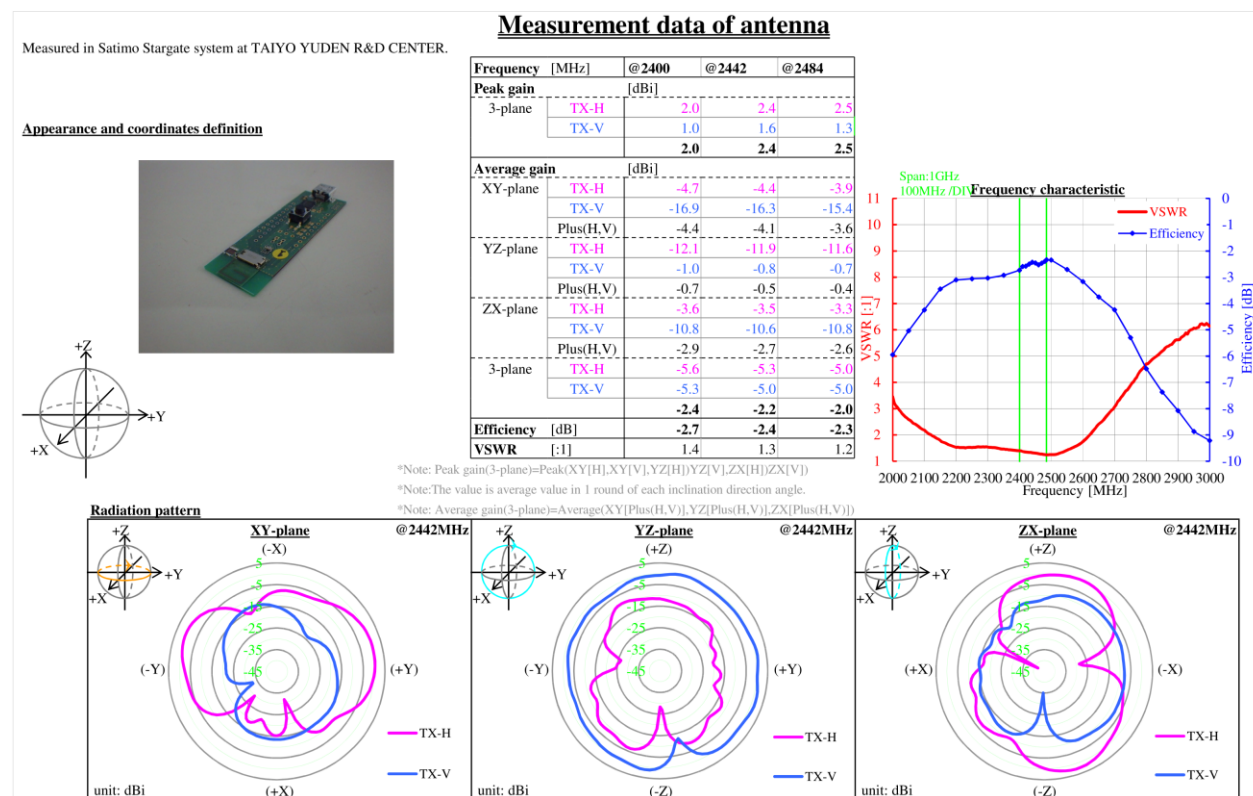


Control No.

(3/3)

Control name

Antenna application note

**Directional characteristics example (when mounted on evaluation board)****About this Application Note**

- This Application Note has been prepared as a reference material to help obtaining the antenna performance mounted on BLE module better while it is not guaranteed or assured to obtain better communication performance and distance.
- This product “BLE module” has been certified and matching circuit constant for antenna within module cannot be changed when ambient environment condition changes. The product must be re-certified when matching circuit constant is changed.

Control No. (1/1)	Control name Design guide
----------------------	------------------------------

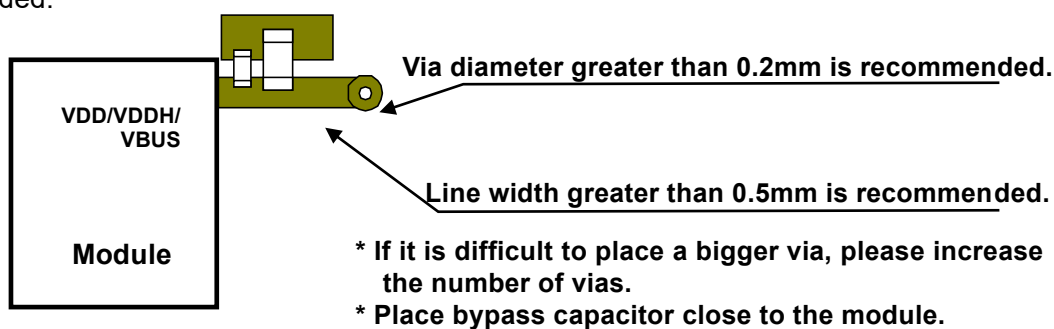
## 1. Battery operation

When using a small battery (e.g. CR2032), a large capacitor (e.g. 100uF low leakage capacitor) should be placed near the battery. This will reduce the voltage drop especially when the module is operated at low temperatures

## 2. Pattern Design Guide

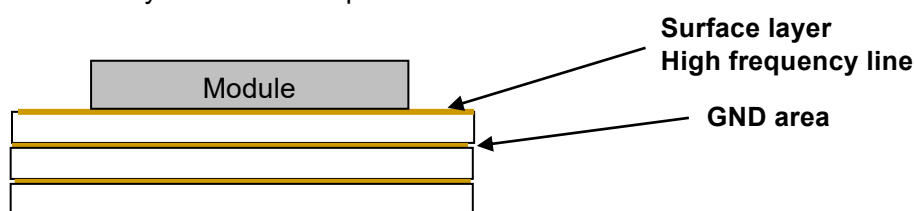
### 2-1. Power Supply System

Power supply bypass capacitors should be placed close to the VDD pin of the module. The VDD/VDDH/VBUS trace should be greater than 0.5mm and a bigger via diameter is recommended.



### 2-2. GND Pattern

Power supply bypass capacitor GND should be placed in proximity of module GND. Wide GND area must be provided to ensure isolation for each layer. Also, please surround the signal lines of GPIO, DCC etc. with GND layer as much as possible.



GND pattern of each layer should be connected to GND area with large number of via.

Control No.	Control name
(1/2)	Notes

**32kHz Clock**

This module does not installed 32.768kHz crystal. In case of operating without external crystal, please use following example code in order to enable internal 32.768kHz RC oscillator (32k RCOSC).

--sdk\_config.h-- (In case of SDK15.2)

// <o> NRFX\_CLOCK\_CONFIG\_LF\_SRC - LF Clock Source

// <0=> RC

// <1=> XTAL

// <2=> Synth

// <131073=> External Low Swing

// <196609=> External Full Swing

#ifndef NRFX\_CLOCK\_CONFIG\_LF\_SRC

#define NRFX\_CLOCK\_CONFIG\_LF\_SRC 0

#endif

// </h>

//=====

// <h> Clock - SoftDevice clock configuration

//=====

// <o> NRF\_SDH\_CLOCK\_LF\_SRC - SoftDevice clock source.

// <0=> NRF\_CLOCK\_LF\_SRC\_RC

// <1=> NRF\_CLOCK\_LF\_SRC\_XTAL

// <2=> NRF\_CLOCK\_LF\_SRC\_SYNTH

#ifndef NRF\_SDH\_CLOCK\_LF\_SRC

#define NRF\_SDH\_CLOCK\_LF\_SRC 0

#endif

// <o> NRF\_SDH\_CLOCK\_LF\_RC\_CTIV - SoftDevice calibration timer interval.

#ifndef NRF\_SDH\_CLOCK\_LF\_RC\_CTIV

#define NRF\_SDH\_CLOCK\_LF\_RC\_CTIV 16

#endif

// <o> NRF\_SDH\_CLOCK\_LF\_RC\_TEMP\_CTIV - SoftDevice calibration timer interval under constant temperature.

// <i> How often (in number of calibration intervals) the RC oscillator shall be calibrated

// <i> if the temperature has not changed.

#ifndef NRF\_SDH\_CLOCK\_LF\_RC\_TEMP\_CTIV

#define NRF\_SDH\_CLOCK\_LF\_RC\_TEMP\_CTIV 2

#endif

// <o> NRF\_SDH\_CLOCK\_LF\_ACCURACY - External clock accuracy used in the LL to compute timing.

// <0=> NRF\_CLOCK\_LF\_ACCURACY\_250\_PPM

// <1=> NRF\_CLOCK\_LF\_ACCURACY\_500\_PPM

// <2=> NRF\_CLOCK\_LF\_ACCURACY\_150\_PPM

// <3=> NRF\_CLOCK\_LF\_ACCURACY\_100\_PPM

// <4=> NRF\_CLOCK\_LF\_ACCURACY\_75\_PPM

// <5=> NRF\_CLOCK\_LF\_ACCURACY\_50\_PPM

// <6=> NRF\_CLOCK\_LF\_ACCURACY\_30\_PPM

// <7=> NRF\_CLOCK\_LF\_ACCURACY\_20\_PPM

**EYSKDNZWB**

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Control No.	Control name
(2/2)	Notes

```
// <8=> NRF_CLOCK_LF_ACCURACY_10_PPM  
// <9=> NRF_CLOCK_LF_ACCURACY_5_PPM  
// <10=> NRF_CLOCK_LF_ACCURACY_2_PPM  
// <11=> NRF_CLOCK_LF_ACCURACY_1_PPM
```

```
#ifndef NRF_SDH_CLOCK_LF_ACCURACY  
#define NRF_SDH_CLOCK_LF_ACCURACY 1  
#endif
```

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## その他、注意事項について (Precautions)

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- The products listed in this specification are intended for use in general electronic equipment (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC). Please be sure to contact TAIYO YUDEN for further information before using the products for any equipment which may directly cause loss of human life or bodily injury (e.g., transportation equipment including, without limitation, automotive powertrain control system, train control system, and ship control system, traffic signal equipment, disaster prevention equipment, medical equipment classified as Class I, II or III by IMDRF, highly public information network equipment including, without limitation, telephone exchange, and base station).

Please do not incorporate our products into any equipment requiring high levels of safety and/or reliability (e.g., aerospace equipment, aviation equipment, medical equipment classified as Class IV by IMDRF, nuclear control equipment, undersea equipment, military equipment).

When our products are used even for high safety and/or reliability-required devices or circuits of general electronic equipment, it is strongly recommended to perform a thorough safety evaluation prior to use of our products and to install a protection circuit as necessary.

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this specification for any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.
- Information contained in this specification is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.
- Please note that the scope of warranty for our products is limited to the delivered our products themselves and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a fault or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by TAIYO YUDEN and your company, TAIYO YUDEN will warrant our products in accordance with such agreement.

## HQ-BK-002\_02

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