[Gateway]

User Manual for NF

Model name: LBAE0ZZ2AG

CONFIDENTIAL

Revision History

Date	Revision	Change point
	1.0	Original

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1 Description

- LBAE0ZZ2AG is the multiple RF protocol gateway for wireless sensor network. This product can receive the sensor data from wireless sensor tag (LBAE0ZZ2AM) through IEEE802.15.4 and can measure own sensor data and upload the data to the cloud through 4G.
- IEEE802.15.4 frequency band is 2405MHz~2480MHz.
- Waterproof performance equivalent to IP54.
- Operates on internal lithium ion battery or external lithium ion battery.
- It is mainly used in the transportation of pharmaceutical products and medical equipment and is not intended to be used in environments that require high reliability such as automobiles, and power plants.
- No accessories.

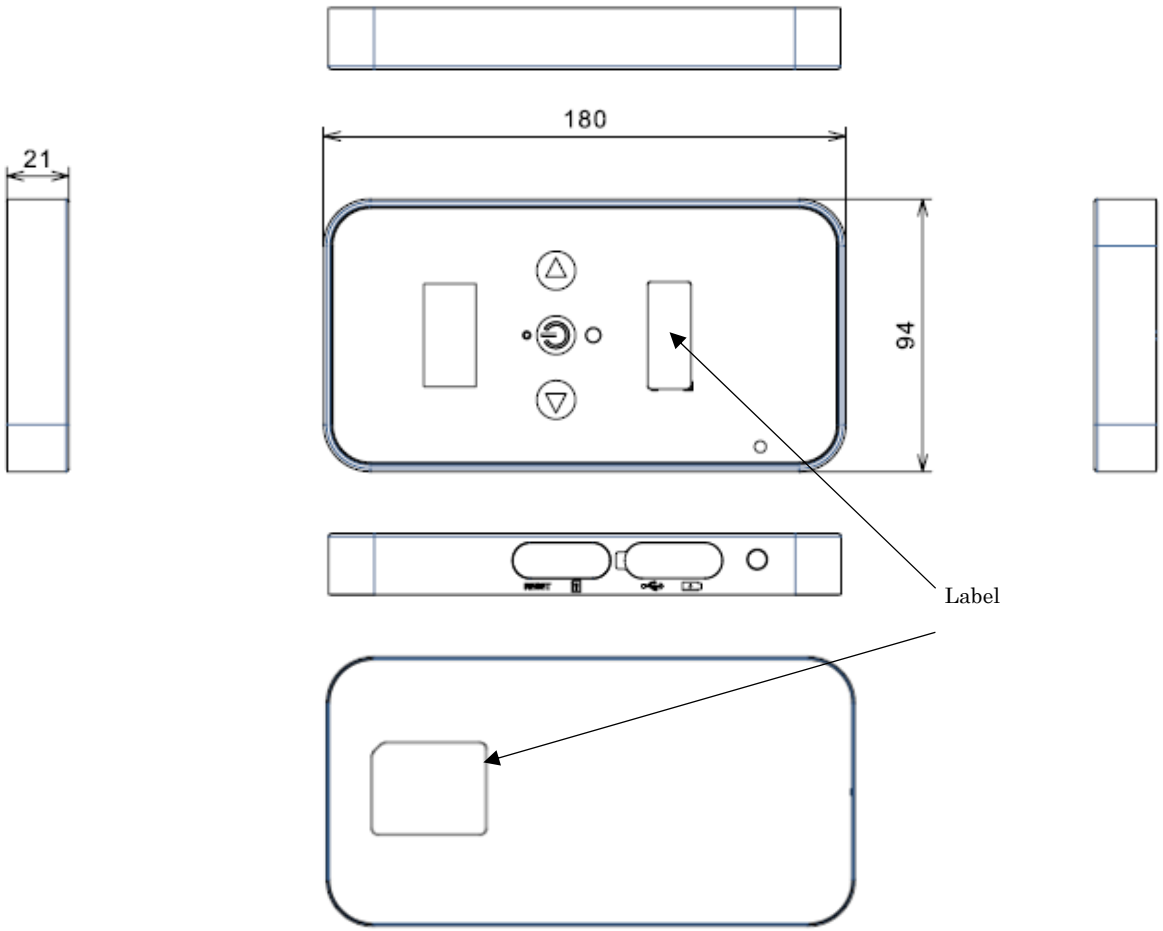
2 Product specification

2.1 Hardware specification

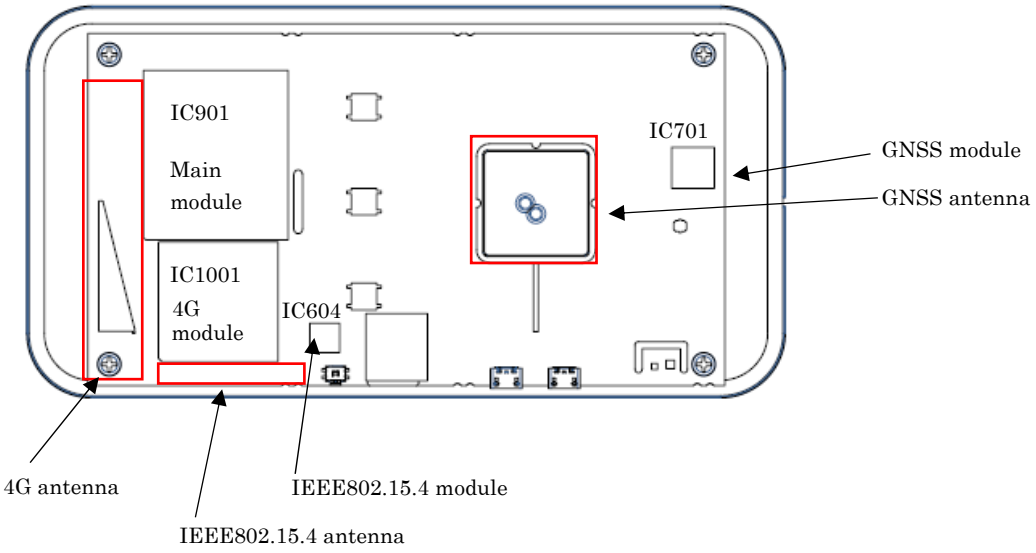
Model Name		LBAE0ZZ2AG
Wireless communication IEEE802.15.4	Interface	IEEE802.15.4
	Frequency	2405MHz - 2480MHz+/-9ppm (+/-30ppm@-30℃~+85℃)
	Channel BW	5MHz
	Modulation	OQPSK
	Antenna	Monopole pattern antenna (less than +1.2dBi)
	RF output power	Less than 9dBm (e.i.r.p.)
	Duty cycle	Less than 0.5%.
4G	module	LE910C1-NF (LTE FDD Cat.1. 3GPP release 9 compliant)
	bands	B2, B4, B5, B12, B13, B14, B66, B71
	RF output power	Class 3 (0.2 W, 23 dBm) @ LTE
GNSS	GPS / GLONASS	Use GNSS module (MAX-M8C) Rx only
Power supply	Battery	Lithium ion battery*1pc (min 3.0V / typ. 3.85V / max 4.36V)
	External	CHEERO CHE-104 (Connect with USB cable)
Hardware	Human interface	Push switch*3pcs Reset switch*1pc OLED*1pc 3 color 1pcBlue & 3ColorLED(Red & Green & Blue)*1 Buzzer*1pc SIM Slot (Micro SIM Card)*1
	Accessory	-
Operating environment	IP grade	IP54
	Temperature	-10degC ~ +60degC
	Humidity	0%RH ~ 90%RH (non-condensing)
	Material	Polycarbonate
Case	Flame retardancy	UL94 V-2
	Minimum Thickness	0.6mm

2.2 Body shape and dimensions

External

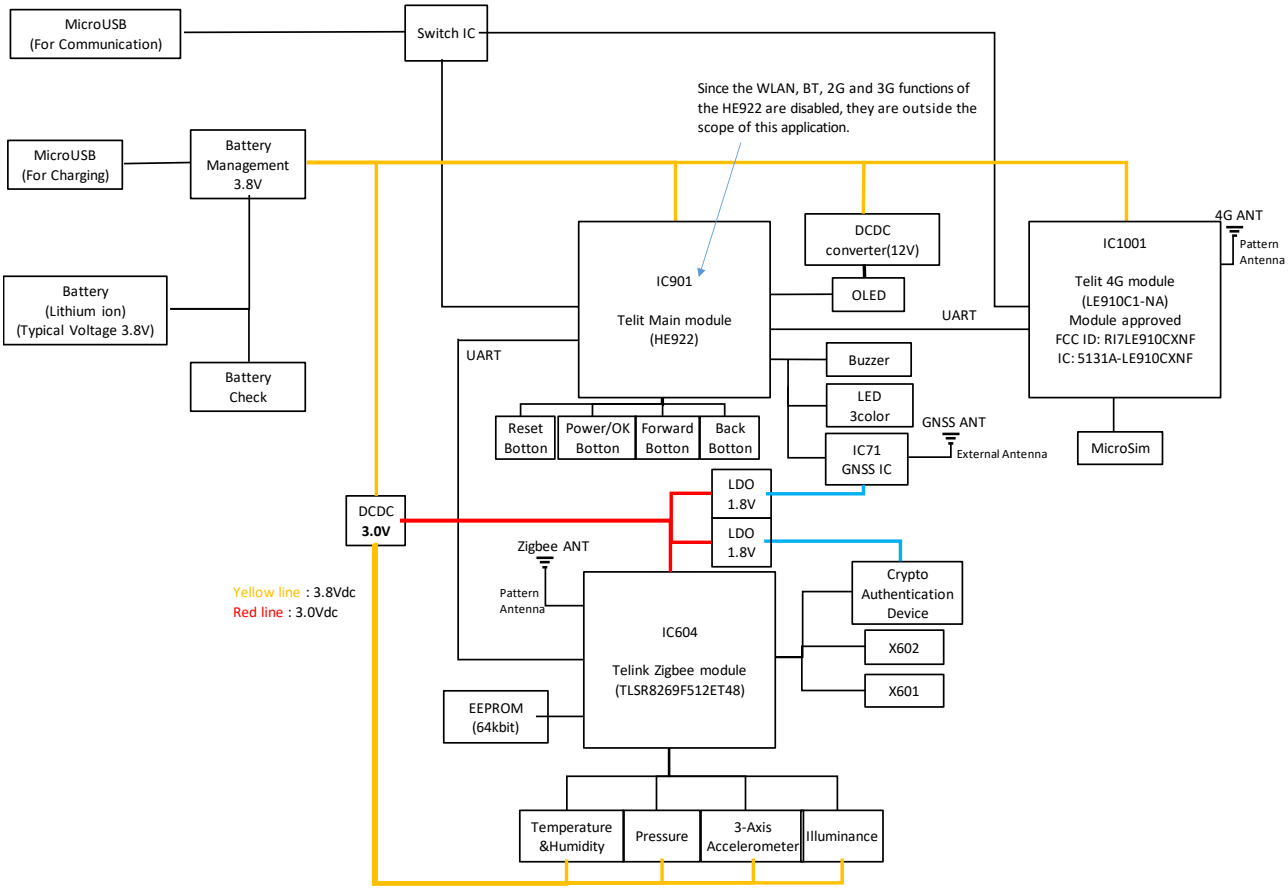


Internal

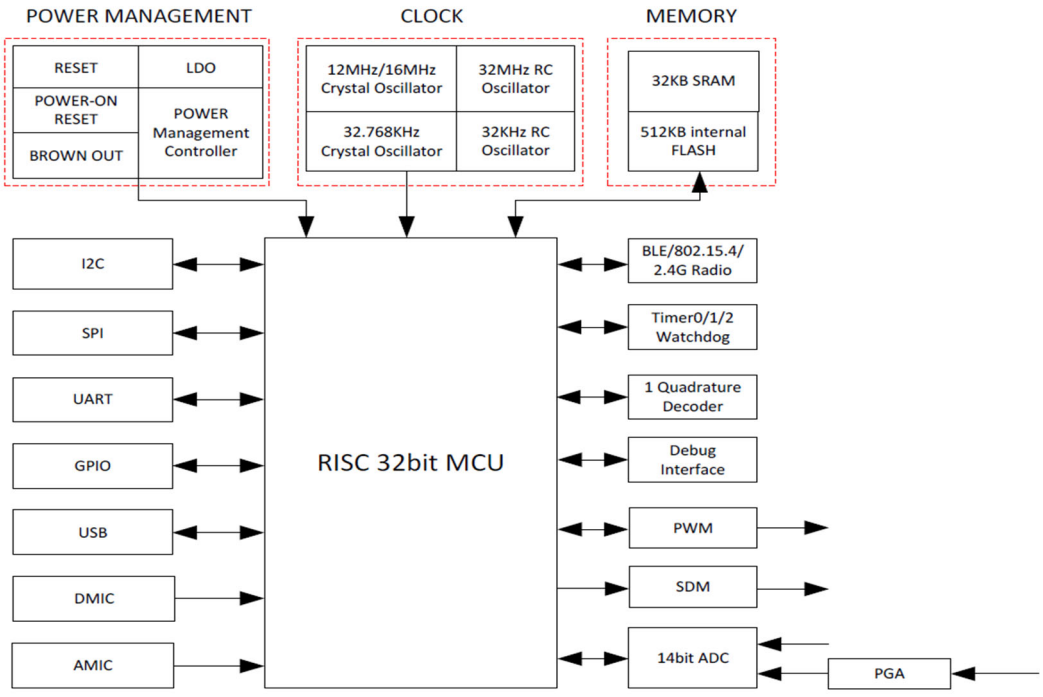

IC901
Main module
IC1001
4G module
IC604
IC701
GNSS module
GNSS antenna
4G antenna
IEEE802.15.4 antenna
IEEE802.15.4 module

2.3 Block diagram

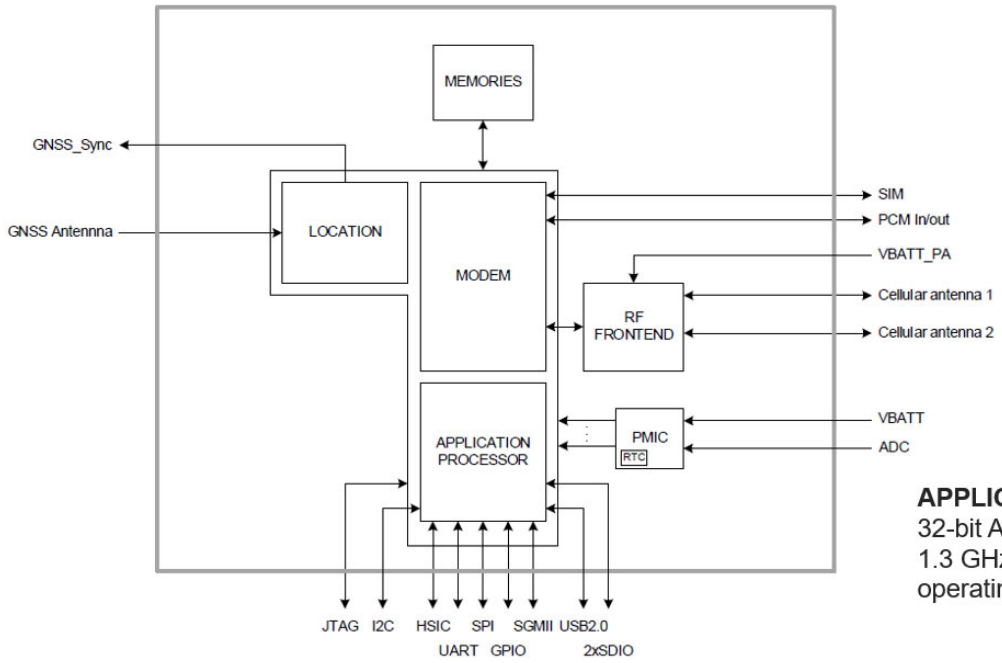
Block Diagram of product



Block Diagram of RF device(IEEE802.15.4)

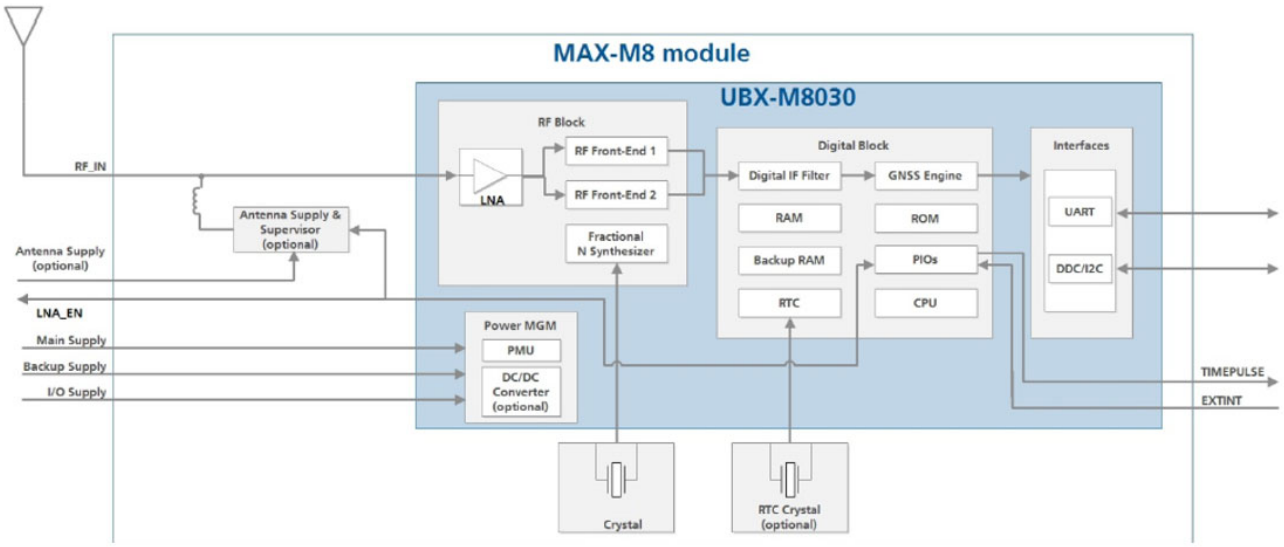


Block Diagram of RF device(4G)



APPLICATION PROCESSOR
32-bit ARM Cortex-A7 up to 1.3 GHz running the Linux operating system

Block Diagram of RF device(GNSS)



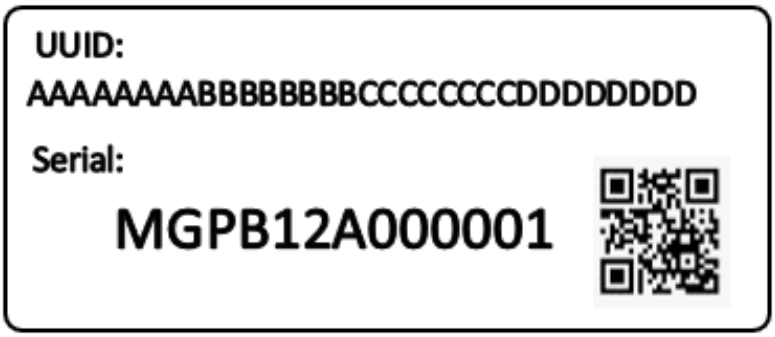
2.4 Operation Mode

Mode	Sensor	IEEE802.15.4	GNSS	4G
Sleep	OFF	OFF	OFF	OFF
Measuring	ON	OFF	Rx	OFF
802.15.4 Tx	OFF	Tx	OFF	OFF
802.15.4 Rx	OFF	Rx	OFF	OFF
GNSS Rx	OFF	OFF	Rx	OFF
4G Tx	ON	OFF	OFF	Tx
4G Rx	ON	OFF	OFF	Rx

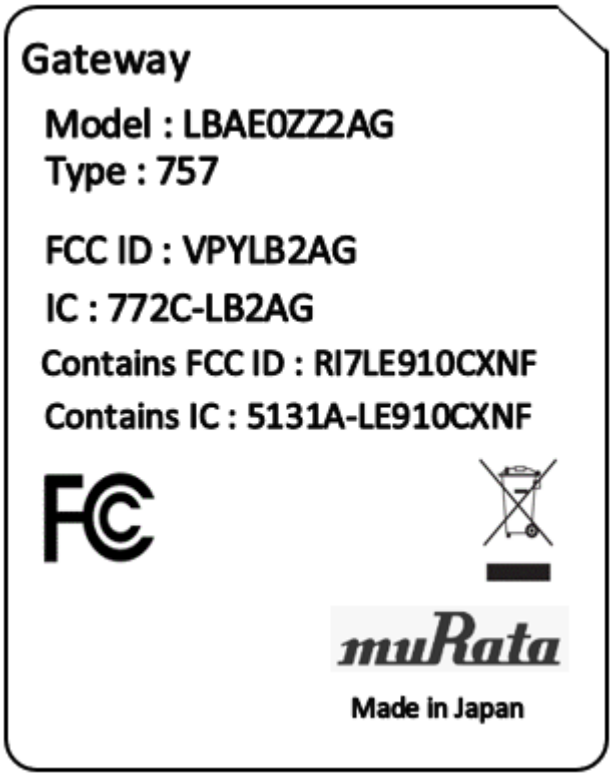
802.15 and 4G never transmit at the same time

2.5 Label

Top Label

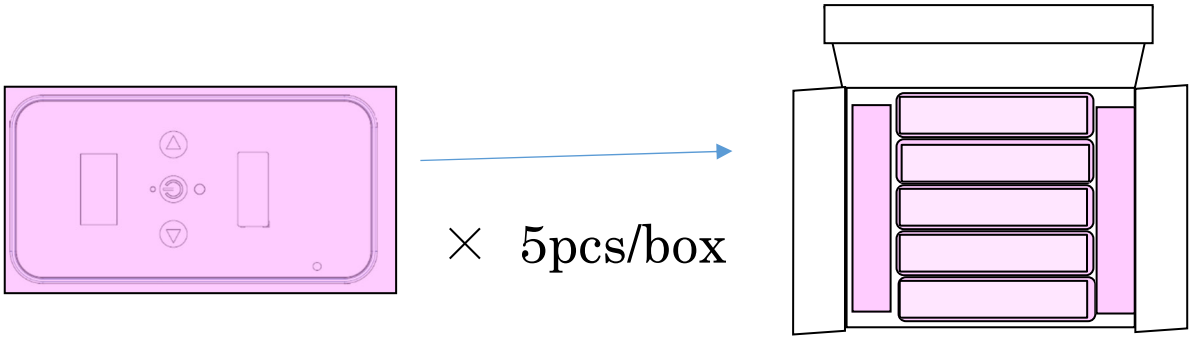


Bottom Label



2.6 Package

The product is wrapped with an ESD compatible sheet.



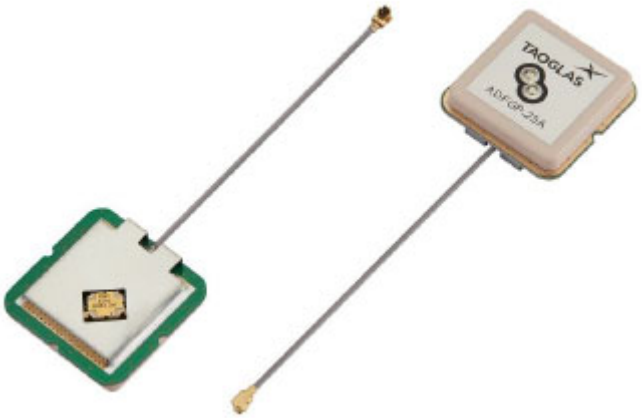
2.7 Safety-related security

Requirement	Specification/conditions	Compliance verified by
a) Protection against casual or coincidental violation;	The transmitted data is encrypted and exchanged.	
b) Protection against intentional violation using simple means with low resources, generic skills and low motivation;	Uses proprietary communication protocols.	
c) Protection against intentional violation using sophisticated means with moderate resources, specific skills related to the considered equipment and moderate motivation;	N/A	
d) Protection against intentional violation using sophisticated means with extended resources, specific skills related to the considered equipment and high motivation.	N/A	

3 Appendix

3.1 Antenna Specification

Model name	IEEE802.15.4 antenna
Frequency	2405MHz…2480MHz
Antenna Type	Monopole pattern antenna
Connector type	-
Peak gain	+1.2dBi
Photo	

Model name	GNSS antenna
Frequency	1559MHz…1610MHz
Antenna Type	Active patch antenna module
Connector type	U.FL
Peak gain	3.0dBi　(Rx only)
Photo	

Model name	4G antenna
Frequency	617MHz…2170MHz
Antenna Type	Monopole pattern antenna
Connector type	-
Peak gain	1.6dBi
Photo	

3.2 Antenna Setup

The antennas of this product are built-in pattern antennas for IEEE802.15.4 and 4G, and an antenna module for GNSS.

3.3 Antenna directivity

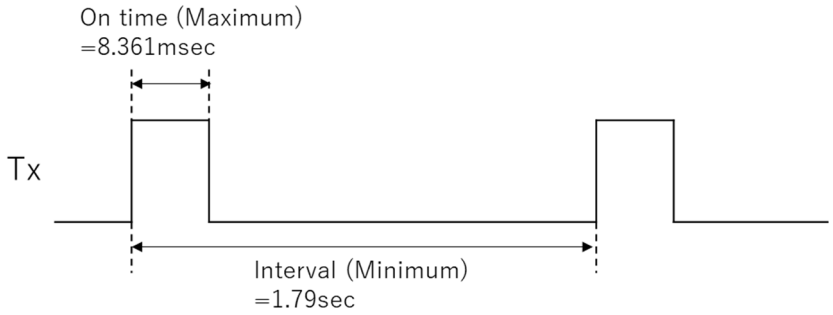
pattern antennas for IEEE802.15.4 and 4G

Omnidirectional antenna

GNSS

The null point of the antenna is the direction of the bottom side. The main lobe is in the top side.

3.4 Tx timing chart for IEEE802.15.4..



*The Conducted power test was modified to allow measurements under 100% continuous radiation conditions as a conservative condition. The maximum duty ratio in actual use is less than 8.361msec/1.79sec = 0.5%.

4 Information of importer, manufacturer and factory

- Information of the importer

  Company name: ___

  Address: ___

- Information of the manufacturer

  Company name: Murata manufacturing Co., Ltd.

  Address: 1-10-1 Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan

- Information of the factory

  Company name: Komatsu Murata manufacturing Co., Ltd.

  Address: Hikari-machi, Komatsu-shi, Ishikawa 923-8626 Japan

5 Applicable standards and certification

This product complies with the radio regulations described in the specification. Be sure to comply with following points upon usage.

- When using this product, use an application that is compatible with the country / region of use.
- DO NOT use applications from different regions.
- DO NOT disassemble or modify the product.
- DO NOT peel off the product label.

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, and (2) this device must accept any interference received, including interference that may cause undesired operation.

U.S. manufacturing contact information

Company name:	Murata Electronics North America, Inc.
Address:	2200 Lake Park Drive, Smyrna, GA 30080-7604, USA.
Phone:	+1 770 436 1300

FCC CAUTION

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This transmitter must not be co-located or operated in conjunction with any other antenna or

transmitter.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

IC CAUTION

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain.

6 NOTICE

6.1 Storage and operation conditions

- ✓ The product shall not be stored in an atmosphere with high temperature and high humidity.
- ✓ Any excess mechanical shock shall not be applied to the product.
- ✓ Do not store or use in the following circumstances.
  - In an atmosphere containing corrosive gas (Cl2, NH3, SOx, NOx etc.)
  - In an atmosphere containing combustible and volatile gases
  - In an atmosphere containing organic solvents
  - In an atmosphere with strong electromagnetic field and static electricity
  - In an atmosphere containing hot air or close to fire
  - Humid place where water condenses
  - Freezing place
  - Dusty environment
- ✓ This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

6.2 Caution for use

- ✓ Do not disassemble, modify or repair this product.
- ✓ If water or a foreign object gets inside the case, unplug the DC power supply or battery and stop using it.
- ✓ If there is smoke, a strange smell or noise, unplug the DC power supply or battery and stop using it.
- ✓ If the product is dropped or gets a strong physical impact, power it off and stop using it.
- ✓ Do not touch the product during and after being used in a low or high temperature environment.
- ✓ Corrosive gas may generate harmful substances. Do not use the product in an atmosphere containing corrosive gas.

6.3 Limitation of applications

✓ This product is designed to work under the environmental conditions described in the specification. Do not use the product in the following applications that require extremely high reliability to prevent defects which might directly cause damage to third party's life, body or property.

- Aircraft equipment
- Aerospace equipment
- Undersea equipment
- Power plant control equipment
- Medical equipment
- Transportation equipment (vehicles, trains, ships, etc.).
- Traffic single equipment
- Disaster prevention /crime prevention equipment.
- Applications that require similar complexity and/or reliability to the applications listed above

7 Note on safety

- ✓ Do not cover the product with flammable materials.
- ✓ If smoke or strange smell out of the product, turn off the product and stop use.
- ✓ Do not disassemble, modify or repair this product.
- ✓ Stop use if the product is dropped.
- ✓ Do not place the product in an atmosphere containing flammable gases
- ✓ Do not exposed to excessive heat such as sunshine, fire or the like, that can result in an explosion or the leakage of flammable liquid or gas during use, storage or transportation or disposal.
- ✓ Do not dispose of a battery into fire or a hot oven, or give mechanically crushing or cutting of a battery, that can result in an explosion.
- ✓ Do not subjected to extremely low air pressure at high altitude that may result in an explosion or the leakage of flammable liquid or gas.
- ✓ Risk of explosion if the battery is replaced by an incorrect type.
- ✓ This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

8 Warranty for product

8.1 Warranty period and its scope

- ✓ Please note that the only warranty that we provide regarding Product is its conformance to the Product Specification provided herein for 12 months from the delivery date (“Warranty Period”).
- ✓ During the Warranty Period, in the event of defective Product, even if Product is used for the purpose, under the condition and in the environment specified in this Product Specification, we will at our option (a) promptly replace with the Product without defective or (b) accept the return of the defective Product. The above shall constitute our entire liability with respect to defective of our Product.
- ✓ EXCEPT AS PROVIDED IN THE ABOVE, WE HEREBY DISCLAIM ALL OTHER WARRANTIES REGARDING THE PRODUCT AND ITS RELATED SOFTWRE, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MARCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, THAT THEY ARE DEFECT-FREE, OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS.

8.2 Warranty exception

- ✓ You understand and agree that we have no liability for any defect or trouble of Products which caused by your mistake or fault in handling.
- ✓ Please note that you shall use the Product according to guide line for the safety described in this Product Specification and/or user manual which is provided to you separately ("Guide Line"). We are not liable for safety of the Product when it is used other than any way described in the Guide Line.
- ✓ We have no liability to the Product even in the Warranty Period, if it falls under one of the following items.
  - Defective Product and/or damage caused by use of the Product other than any way described in the Guide Line.
  - Defective Product and/or damage caused by repair, modification by you or any third party other than us without our prior consent.
  - Defective Product and/or damage caused by accidental fall and careless handling after delivery.
  - Defective Product and/or damage caused by natural disaster such as fire disaster, earthquake, pollution, wind, flood, lightning strike, and salt pollution, and physical or electric load over the normal condition.
  - Defective Product caused by degradation and expendable part.
  - Defective Product caused by product or device other than the Product.
- ✓ You agree and understand that we are not liable to you or to any of your customers for any damages of system, life, body injury, and property of third party caused by defective Product, and for any damages caused by measurement data of our Product.
- ✓ WE SHALL NOT BE LIABLE TO YOU OR TO ANY OF YOUR CUSTOMERS FOR ANY LOSS OF PROFIT, INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR RELATING TO THE USE OF THE PRODUCT OR FOR ANY ERROR OR DEFECT IN THE PRODUCT. OUR ENTIRE LIABILITY AND OUR SOLE AND EXLUSIVE REMEDY FROM ANY CAUSE OF THE PRODUCT INCLUDING, WITHOUT LIMITAION, NONPERFORMANCE OR MIS-REPRESENTAION AND REGARDRLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, OR ANY OTHER LEGAL THOROY, IS LIMITED TO THE PRICE OF APPLICABLE PRODUCT.