

NINA-B4 series certification

Stand-alone Bluetooth 5.1 low energy modules

Application note

Abstract

This application note describes the requirements for utilizing the existing regulatory certifications and declarations associated with NINA-B4 series modules.

Document information

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This document applies to the following products:

Product name
NINA-B400
NINA-B406
NINA-B410
NINA-B416

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1 Qualification status

 Approvals are pending.

NINA-B4x0 and NINA-B4x6 modules are certified for use in the following countries/regions:

Country/region	NINA-B4x0	NINA-B4x6
Europe	Approved	Approved
USA	Approved	Approved
Canada	Pending	Pending
Japan	Pending	Pending
Taiwan	Pending	Pending
South Korea	Pending	Pending
Brazil	Pending	Pending
Australia	Pending	Pending
New Zealand	Pending	Pending
South Africa	Pending	Pending

Table 1: Country certification status for the NINA-B4 series modules

2 Qualification and approvals by country

2.1 European Union regulatory compliance

For information about the regulatory compliance of NINA-B4 series modules against requirements and provisions in the European Union, see NINA-B4 Declaration of Conformity [1].

2.1.1 Radio Equipment Directive (RED) 2014/53/EU


NINA-B4 series modules comply with the essential requirements and other relevant provisions of Radio Equipment Directive (RED) 2014/53/EU.


2.1.2 Output power limitation

The Radio Equipment Directive requires radio transmitters that have an Equivalent Isotropically Radiated Power (EIRP) of 10 dBm or more, to either implement an adaptivity feature or reduce its medium utilization.

The NINA-B4 series modules are based on the Nordic Semiconductor nRF52833 chip, which supports multiple radio protocols such as Bluetooth low energy, IEEE 802.15.4 with thread etc.

Since Bluetooth low energy does not support either adaptivity or reduced medium utilization, a NINA-B4 Bluetooth LE implementation on the European market must have an EIRP of less than 10 dBm.

 In the European market, it is the end-product manufacturer that holds the responsibility that these limitations are followed. If the u-blox module integrator is not the end-product manufacturer, the module integrator should make sure that this information is shared with the end-product manufacturer.

 Radio protocols based on 802.15.4, which supports adaptivity is allowed an EIRP of 10 dBm or higher.

EIRP is calculated as:

$$\text{EIRP(dBm)} = P_{\text{TX}}(\text{dBm}) - L(\text{dB}) + G_{\text{TX}}(\text{dBi})$$

where P_{TX} is the output power of the transmitter, L is the path loss of the transmission line between the transmitter and antenna, and G_{TX} is the maximum gain of the transmit antenna. Consider the following for each of these components:

- Output power:
 - The output power setting of the NINA-B4 module. An end-product user must not be able to increase the setting above the 10 dBm EIRP limit, by sending configuration commands etc.
 - The operating temperature of the end-product. The output power of a transmitter is typically increased as the ambient temperature is lowered. The operating temperature range of NINA-B4 is -40 to +105 °C, and across this range the output power can typically vary by 1 dB. The output power at the lowest operating temperature (yielding the highest output power) must be considered for the EIRP calculation.
- Path loss – Long antenna cables or PCB traces, RF switches, etc. will attenuate the power reaching the antenna. This path loss should be measured and taken into consideration for the EIRP calculation.
- Antenna gain - The maximum gain of the transmit antenna must be considered for the EIRP calculation.

2.1.3 Compliance with the RoHS directive

NINA-B4 series modules comply with the Directive 2011/65/EU (EU RoHS 2) and its amendment Directive (EU) 2015/863 (EU RoHS 3).

2.2 United States (FCC)

The NINA-B4 series modules have received Federal Communications Commission (FCC) CFR47 Telecommunications, Part 15 Subpart C “Intentional Radiators” in accordance with Part 15.247 and Modular Transmitter approval in accordance with Part 15.212.

The modular approval of NINA-B4 series allows an end-product manufacturer to integrate the module into an existing product without the need of additional testing or equipment authorization for the transmitter function provided by NINA-B4, provided no changes or modifications are made to the module circuitry. Changes or modifications could void the user’s authority to operate the equipment. The end-user must comply with all instructions provided by the Grantee, which indicate installation and/or operating conditions necessary for compliance.

The finished product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. For example, compliance must be demonstrated to regulations for other transmitter components within the host product; to requirements for unintentional radiators (Part 15 Subpart B “Unintentional Radiators”), such as digital devices, computer peripherals, radio receivers, etc.; and to additional authorization requirements for the non-transmitter functions on the transmitter module (i.e., Verification, or Declaration of Conformity) (e.g., transmitter modules may also contain digital logic functions) as appropriate.

2.2.1 FCC compliance

The NINA-B4 series modules are intended for OEM integrators only. The end-product must be professionally installed in such way that only authorized antennas can be used.

The (OEM) module integrator must assure compliance of the end-product were the NINA-B4 module is integrated.

For compliance with FCC Part 15B (§15.107, and if applicable §15.109 regulations, the end-product manufacturer is required to show conformant operation of the installed module. The end-product evaluation should also confirm that the intentional emissions (15C) from the module are compliant during (fundamental / out-of-band) transmission. Additionally, the module integrator must apply the appropriate equipment authorization (verification) for the end-product as defined in §15.101.

The details of the module implementation in the host device (end-product) should be confidential. Integrators are reminded not to share the installation instructions of the module to the end-user of the host device (end-product).







The host device (end-product), into which this RF Module is integrated must be labeled with an auxiliary label stating the FCC ID of the RF Module, such as:

“Contains FCC ID: **XPYNINAB4**

“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 might cause undesired operation.”

The Integrator is responsible for satisfying SAR/ RF exposure requirements once the module has been integrated into the host device.


-  NINA-B4 series modules are intended for OEM integrators only. End-products that include u-blox modules must be professionally installed in such a way that only the authorized antennas listed under section 3 can be used. (see section 3 for more information).
-  Only Reversed Polarity SMA is allowed when the antenna connector in the final end-product assembly is easily accessible to the end-user.
-  The details of the module implementation in the host device (end-product) should be confidential. Integrators are reminded not to share the installation instructions of the module to the end-user of the end-product (host device).
-  Any changes or modifications NOT explicitly APPROVED by u-blox AG may cause the module non-compliant with FCC rules part 15 and subsequently void the user's authority to operate the equipment.
-  Any changes to hardware, hosts or co-location configuration may require new radiated emission and SAR evaluation and/or testing.
-  The end-product manufacturer (OEM integrator) is still responsible for verifying the end-product compliance with FCC Part 15, subpart B limits for unintentional radiators through an accredited test facility.

KDB996369 D03 section 2.4 (limited module procedures) and 2.5 (trace antenna designs) are not applicable to the NINA-B4 series modules.

Model	FCC ID
NINA-B400	FCC ID: XPNINAB4
NINA-B406	FCC ID: XPNINAB4
NINA-B410	FCC ID: XPNINAB4
NINA-B416	FCC ID: XPNINAB4

Table 02: FCC ID for the NINA-B4 series modules

2.2.2 FCC statement


 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.

2.2.3 RF-exposure

All transmitters regulated by FCC must comply with RF exposure requirements. [KDB 447498 General RF Exposure Guidance](#) provides guidance in determining whether proposed or existing transmitting facilities, operations or devices comply with limits for human exposure to Radio Frequency (RF) fields adopted by the Federal Communications Commission (FCC).

NINA-B4 modules are approved for installation into mobile and/or portable host platforms and must not be co-located or operating in conjunction with any other antenna or transmitter – except in accordance with FCC multi-transmitter guidelines. End-users must be provided with transmitter operating conditions for satisfying RF Exposure compliance.

 Having a separation distance of minimum 5 mm between the user and/or bystander and the antenna and /or radiating element ensures that the maximum output power of the NINA-B4 modules is below the SAR test exclusion limits presented in KDB 447498 D01v06 (US market limits).

2.2.4 End-product compliance

Application designs must conform to the following requirements:

- Any changes to hardware, hosts or co-location configuration may require new radiated emission and SAR evaluation and/or testing.
- Only authorized antenna may be used.
- Any notification to the end-user about how to install or remove the integrated radio module is NOT allowed.
- The approval of the modular transmitter in NINA-B4 series modules does not exempt the end-product from being evaluated against any applicable regulatory demands. The evaluation of the end-product shall be performed with the NINA-B4 module installed and operating in a way that reflects the intended use case of the end-product. The upper frequency measurement range for the end-product evaluation is the 5th harmonic of 2.4 GHz as declared in 47 CFR Part 15.33 (b)(1).
- The following requirements apply to all products that integrate a radio module:
 - Subpart B - UNINTENTIONAL RADIATORS
To verify that the composite device of host and module complies with the requirements of FCC part 15B the integrator shall perform sufficient measurements using equipment compliant with ANSI 63.4-2014.
 - Subpart C - INTENTIONAL RADIATORS
The integrator must carry out sufficient verification measurements, using compliant ANSI 63.10-2013 equipment, to validate that the fundamental and out-of-band emissions of the transmitter part of the composite device comply with the requirements of FCC part 15C.
- When the items listed above are fulfilled the host manufacturer can use the authorization procedures presented in Table 1 of 47 CFR Part 15.101.

2.2.4.1 Test modes for end-product evaluation

When testing, all the transmitters installed into the end-product must be operating. The transmitter of NINA-B4 is operated in normal “paired” mode with another device, as per the normal intended use of the end-product (e.g. data transfer, music playing, etc.). Activate all end-product transmitters capable of simultaneously transmissions. Please follow the instructions for each transmitter on how to operate them.

More detailed information about end-product (host product) test guidance can be found in Section 3 of KDB 996369 D04 Module Integration Guide v02.

2.3 Canada (ISED)

The NINA-B4 series modules comply with Industry Canada license-exempt Radio Standards Specification (RSS) RSS-Gen issue 5 and RSS-247 Issue 2.

2.3.1 Labeling and user information requirements

The final host device, into which this RF Module is integrated, must be labeled with an auxiliary label stating the IC of the RF Module, such as:

“Contains transmitter module IC: 8595A-NINAB4

Le périphérique hôte final, dans lequel ce module RF est intégré "doit être étiqueté avec une étiquette auxiliaire indiquant le CI du module RF, tel que" Contient le module émetteur IC: 8595A-NINAB4

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.

Model	IC number
NINA-B400	IC: 8595A-NINAB4
NINA-B406	IC: 8595A-NINAB4
NINA-B410	IC: 8595A-NINAB4
NINA-B416	IC: 8595A-NINAB4

Table 03: IC for the NINA-B4 series modules

2.3.2 RF-exposure

All transmitters regulated by IC must comply with RF exposure requirements listed in RSS-102 - Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands). This module is approved for installation into mobile and/or portable host platforms and must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with Industry Canada's multi-transmitter guidelines. End-users must be provided with transmitter operating conditions for satisfying RF Exposure compliance.

 Having a separation distance of minimum 15 mm between the user and/or bystander and the antenna and /or radiating element ensures that the output power (e.i.r.p.) of the NINA-4 series modules is below the SAR evaluation Exemption limits defined in RSS-102 issue 5 (Canadian market limits).

2.4 Japan radio equipment compliance

 Approvals are pending.

2.4.1 Compliance statement

NINA-B4 series modules comply with the Japanese Technical Regulation Conformity Certification of Specified Radio Equipment (ordinance of MPT N°. 37, 1981), Article 2, Paragraph 1:

- Item 19 "2.4 GHz band wide band low power data communication system".

2.4.2 End-product labelling requirement

End-products based on NINA-B4 series modules and targeted for distribution in Japan must be affixed with a label with the "Giteki" marking, as shown in Figure 1. The marking must be visible for inspection.



Figure 1: Giteki mark  and NINA-B4 MIC certification number

2.4.3 End-product user manual requirement

As the MIC ID (represented as xxx-yyyymm in Figure 1) is not included on the NINA-B4 marking, the end-product manufacturer must include a copy of the NINA-B4 Japan Radio Certificate in the end-product technical documentation.

2.5 NCC Taiwan compliance

 Approvals are pending.

2.5.1 Taiwan NCC Warning Statement

- 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
- 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Statement translation:

- Without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power, or alter original characteristic as well as performance to an approved low power radio-frequency device.
- The low power radio-frequency devices shall not influence aircraft security and interfere legal communications; If any interference is found or suspected, the user shall immediately cease operating the equipment until the interference has been prevented. The said legal communications means radio communications is operated in compliance with the Telecommunications Act. The low power radio-frequency devices must be susceptible with the interference from legal communications or ISM radio wave radiated devices.

2.5.2 Labeling requirements for end-product

End-products based on NINA-B4 series modules and targeted for distribution in Taiwan must carry labels with the textual and graphical elements shown below.

Contains Transmitter Module

內含發射器模組:  xxxxxxxxyyyyyyy

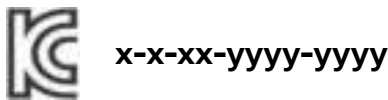
Other wording can be used, but only if the meaning of original messaging remains unchanged. The label must be physically attached to the product and made clearly visible for inspection.

2.6 KCC South Korea compliance

 **Approvals are pending.**

NINA-B4 series modules are certified by the Korea Communications Commission (KCC).

End-products based on NINA-B4 series modules and targeted for distribution in South Korea must carry labels containing the KCC logo and certification number, as shown below. This information must also be included in the product user manuals.



 The height of the KCC logo must be at least 5 mm.

2.7 Brazil compliance

 **Approvals are pending.**

End-products based on NINA-B4 series modules and targeted for distribution in Brazil must carry labels that include the Anatel logo, NINA-B4 Homologation number: xxxxx-xx-yyyyy and a statement claiming that the device may not cause harmful interference but must accept it (Resolution No 506).



“Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.”

Statement translation:

“This equipment operates on a secondary basis and, consequently, must accept harmful interference, including from stations of the same kind, and may not cause harmful interference to systems operating on a primary basis.”

When the device is so small or for such use that it is not practicable to place the statement above on the label, the information shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed.

In cases where the final product is to be installed in locations where the end-user is unable to see the Anatel logo, NINA-B4 Homologation number and/or statement, these graphical and textual elements must be included in the end-product manual.

2.8 Australia and New Zealand regulatory compliance

 **Approvals are pending.**



The NINA-B4 module is compliant with the standards made by the Australian Communications and Media Authority (ACMA).

The modules are compliant with AS/NZS 4268:2012 standard – Radio equipment and systems – Short range devices – Limits and methods of standard measurement. The test reports for NINA-B4 modules can be used as part of the product certification and compliance folder. For more information on the test reports, email the respective support team at the local mail address in your region. See Contact .

To meet the overall Australian and/or New Zealand end-product compliance standards, the integrator must create a compliance folder containing all the relevant compliance test reports such as RF, EMC, electrical safety and DoC (Declaration of Conformity). It is the responsibility of the integrator to know what is required in the compliance folder for ACMA compliance.

For more information on Australia compliance, refer to the Australian Communications and Media Authority web site <http://www.acma.gov.au/>.

For more information on New Zealand compliance, refer to the New Zealand Radio Spectrum Management Group web site www.rsm.govt.nz.

2.9 South Africa regulatory compliance

 **Approvals are pending.**

NINA-B4 series modules are compliant and certified by the Independent Communications Authority of South Africa (ICASA). End-products that are made available for sale or lease or supplied in any other manner in South Africa shall have a legible label permanently affixed to its exterior surface. The label shall include the ICASA logo and the ICASA issued license number, as shown in the figure below. The minimum width and height of the ICASA logo shall be 3 mm. The approval labels must be purchased by the customer's local representative directly from the approval authority ICASA. A sample of a NINA-B4 ICASA label is shown below:



More information on registration as a Responsible Integrator and labeling requirements can be found at the following website:

Independent Communications Authority of South Africa (ICASA) web site - <https://www.icasa.org.za>

2.10 Bluetooth qualification



NINA-B4 module series modules have been qualified as an end-product in accordance with the Bluetooth 5.1 specification.

Product type	QD ID	Listing Date
End-product	157158	2020-10-13

Table 1: NINA-B4 series Bluetooth qualified design ID

3 Pre-approved antennas list

This section lists the internal and external antennas that are authorized for use together with the NINA-B4 series modules.



u-blox has provided these pre-approved antennas and reference design to enable quick time to market.

It is possible for module integrators to add their own antenna and connector design but these must be approved by u-blox (Class-I permissive change) and in some cases may require new testing and/or radiated emission and/or SAR evaluation (Class-II permissive change).

Contact your nearest u-blox support for more information about this process.



Note that not all antennas are authorized for use in every markets/regions.

3.1 Antenna accessories

Name	U.FL to Reverse Polarity SMA adapter cable
Connector	U.FL and Reverse Polarity SMA jack (outer thread and pin)
Impedance	50 Ω
Minimum cable loss	0.5 dB, The cable loss must be above the minimum cable loss to meet the regulatory requirements. Minimum cable length 100 mm.
Comment	The Reverse Polarity SMA connector can be panel mounted.
Approval	FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA



3.2 Single band antennas

NINA-B406 and NINA-B416	
Manufacturer	ProAnt
Gain	+3 dBi
Impedance	N/A
Size (HxWxL)	1.1 x 3.4 x 10 mm
Type	PCB trace
Comment	PCB antenna on NINA-B406 and NINA-B416. Should not be mounted inside a metal enclosure.
Approval	FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA



Ex-IT 2400 RP-SMA 28-001	
Manufacturer	ProAnt
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	\varnothing 12.0 x 28.0 mm
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle).
Comment	This antenna requires to be mounted on a metal ground plane for best performance. Connected using the U.FL to Reverse Polarity SMA adapter cable. An SMA version antenna is also available but not recommended for use (Ex-IT 2400 SMA 28-001).
Approval	FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA



Ex-IT 2400 RP-SMA 70-002

Manufacturer	ProAnt
Polarization	Vertical
Gain	+3.0 dBi
Impedance	50 Ω
Size	\varnothing 10 x 83 mm
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle)
Comment	Connected using the U.FL to Reverse Polarity SMA adapter cable. An SMA version antenna is also available but not recommended for use (Ex-IT 2400 SMA 70-002).
Approval	FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA



InSide-2400

Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	27 x 12 mm (triangular)
Type	Patch
Cable length	100 mm
Connector	U.FL. connector
Comment	Should be attached to a plastic enclosure or part for best performance. Connected to the U.FL connector.
Approval	FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA



FlatWhip-2400 RP-SMA

Manufacturer	ProAnt
Gain	+3.0 dBi
Impedance	50 Ω
Size	\varnothing 50.0 x 30.0 mm
Type	Monopole
Connector	Reverse Polarity SMA plug (inner thread and pin receptacle).
Comment	Connected using the U.FL to Reverse Polarity SMA adapter cable.
Approval	FCC, IC, RED, MIC, NCC, KCC, ANATEL, ACMA and ICASA



Appendix


A Glossary

Abbreviation	Definition
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
RED	Radio Equipment Directive
MIC	Ministry of Internal Affairs and Communications
NCC	National Communications Commission
KCC	Korea Communications Commission
ANATEL	Coordinated Universal Time
ACMA	Data Circuit-terminating Equipment* / Data Communication Equipment*
ICASA	Data Terminal Equipment

Table 2: Explanation of the abbreviations and terms used

Related documentation

- [1] NINA-B4 Declaration of Conformity, UBX-20043953
- [2] NINA-B4 Series system integration manual, UBX-19052230

 For product change notifications and regular updates of u-blox documentation, register on our website, www.u-blox.com.

Revision history

Revision	Date	Name	Comments
R01	12-Oct-2020	fkru	Initial release

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