NB-BT100

Dual Mode Bluetooth Module Datasheet

Model : NB-BT100

Product Overview

NB-BT100 is a low-power BT/BLE 5.3 dual-mode Bluetooth module. It is equipped with a Bluetooth SOC, with high cost-effective storage capacity of Flash 4MB and SRAM 512KB, dual-core M33 processor, and the main frequency support is up to 192MHz.
In order to meet the loudspeaker scene, the module has a set of analog audio output interfaces.

Basic parameters

Classification	Parameter
Processor	BT5.3 Dual Mode
Model	NB-BT100
Power supply	3.3V~5.0V DC
GPIO	● Quantity: 15 ● Each IO supports external interrupts
Peripheral	● 1 set of standard SPI interfaces or QSPI ● 2 sets of I2C interfaces ● 1 set of I2S interfaces ● 3 sets of PDM interfaces ● 2 sets of UART interfaces ● 1 PWM supports 5 channels, 0.5 Hz ~ 12MHz ● 1 GPADC: 12bit SAR ADC
Audio interface	1 set of DACs support Class AB analog signal output

	interface
Baseband crystal frequency	24MHz
Sensitivity (Indoor office environment)	BDR：-76dBm@PER<10% EDR 2M：-75dBm@PER<10% EDR 3M：-75dBm@PER<10% LE 1M：-68dBm@PER<30.8% LE 2M: -64dBm@PER<30.8%
RF Power Tolerance	±2dB
Frequency Band	2.402Ghz to 2.480GHz ISM band
Modulation	GFSK，8DPSK，π /4-DQPSK
Hopping & channels	1600hops/sec, 1MHz channel space , 79 Channels (LE to 2MHz channel space)
RF input impedance	50 ohms
Antenna	Built-in (PCB onboard) Maximum gain：0.79dBi Maximum efficiency：40%
protocol	SPP, GATT(BLE Standard)， HFP, HID, PBAP, AVRCP
Temperature	● Operating temperature：-30~80℃ ● Storage temperature：-30~85℃
Dimensions	18mm(W) * 28mm(L) * 2.8mm(H) (Tolerance: ±0.2mm)
Environmental	RoHS compliant
Certification	CE FCC SRRC ISED KC NCC

Applications

- Electric scooter
- Two-wheeled vehicle
- Bluetooth proximity unlocking device
- Mobile equipment

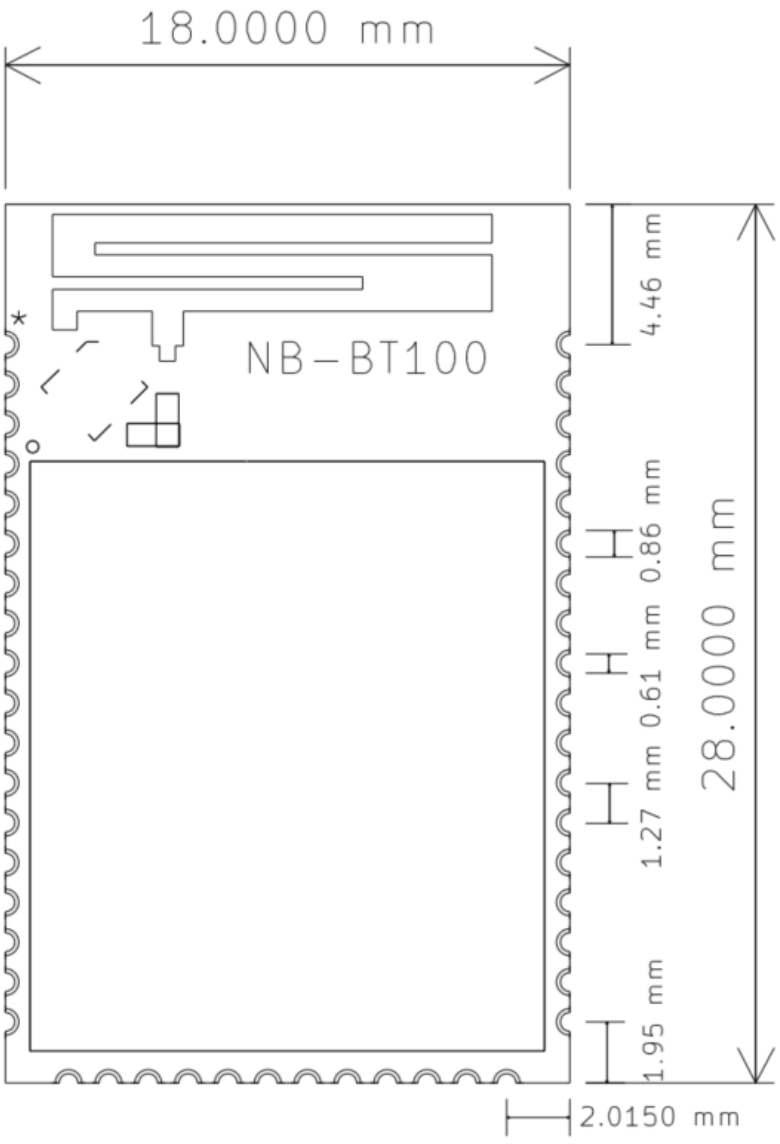
Dimension specification

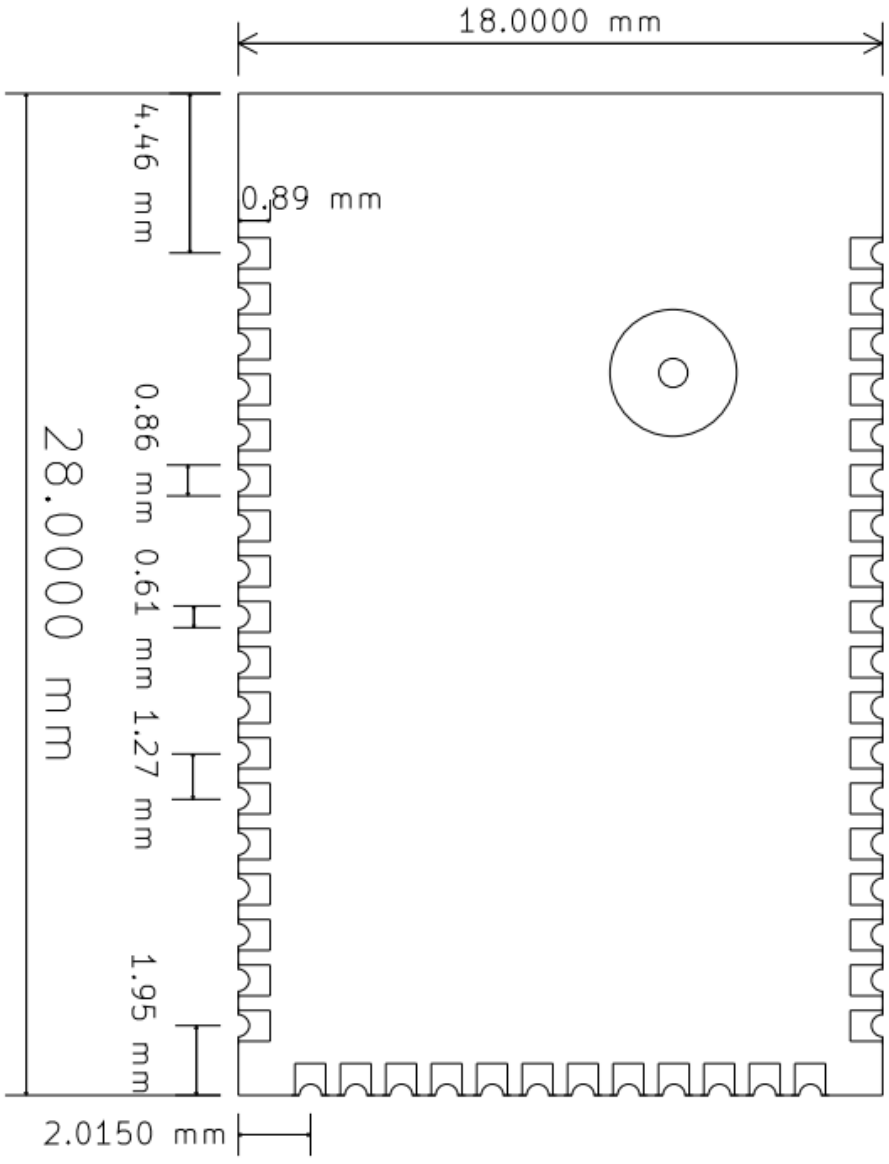
Dimension： 18mm(W) x 28mm(L) x 2.8mm(H) Tolerance: ±0.2mm

Module size: 18mm X 28mm Tolerance: ±0.2mm

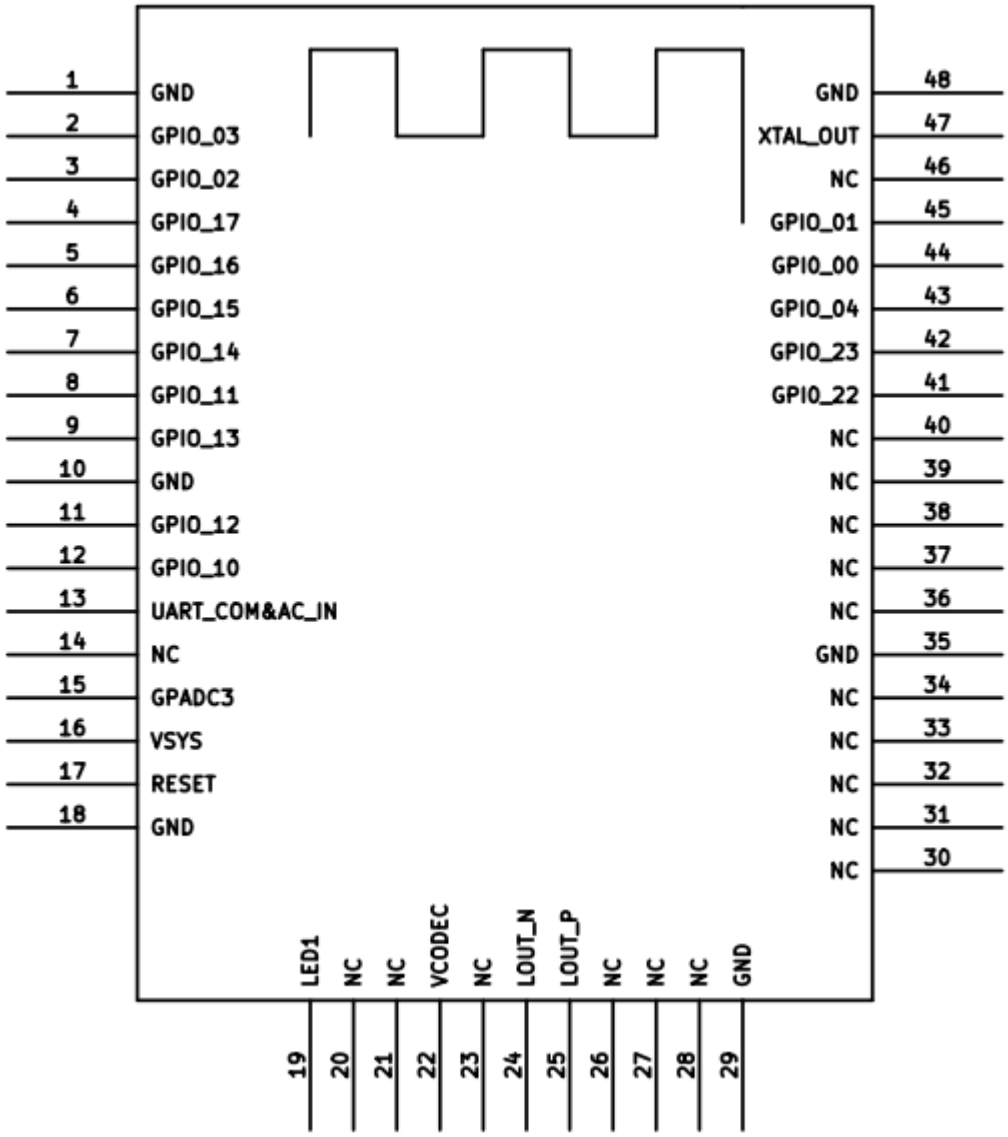
Pad size: 0.89mmX0.86mm Tolerance: ±0.1mm

Pad pitch: 1.27mm Tolerance: ±0.1mm


18.0000 mm
NB-BT100
4.46 mm
0.86 mm
0.61 mm
1.27 mm
28.0000 mm
1.95 mm
2.0150 mm



Pin definition



Pin NO.	Pin Name	Type	Pin Descriptions
1	GND	power	GND
2	GPIO_03	I/O	GPIO
3	GPIO_02	I/O	GPIO
4	GPIO_17	I/O	GPIO
5	GPIO_16	I/O	GPIO
6	GPIO_15	I/O	GPIO
7	GPIO_14	I/O	GPIO
8	GPIO_11	I/O	GPIO

9	GPIO_13	I/O	GPIO
10	GND	power	GND
11	GPIO_12	I/O	GPIO
12	GPIO_10	I/O	GPIO
13	UART_COM&AC_IN	A	One wire UART communication port
14	NC	/	/
15	GPADC3	AI	GPADC
16	VSYS	A	Module power supply pin.
17	RESET	I	Module reset pin, reset if low
18	GND	power	GND
19	LED1	A	LED driver
20	NC	/	/
21	NC	/	/
22	VCODEC	power	1.2~2 V codec LDO with decap
23	NC	/	/
24	LOUT_N	AO	Class AB speaker output negative, left
25	LOUT_P	AO	Class AB speaker output positive, left
26	NC	/	/
27	NC	/	/
28	NC	/	/
29	GND	power	GND
30	NC	/	/
31	NC	/	/
32	NC	/	/
33	NC	/	/
34	NC	/	/

35	GND	power	GND
36	NC	/	/
37	NC	/	/
38	NC	/	/
39	NC	/	/
40	NC	/	/
41	GPIO_22	I/O	GPIO
42	GPIO_23	I/O	GPIO
43	GPIO_04	I/O	GPIO
44	GPIO_00	I/O	GPIO
45	GPIO_01	I/O	GPIO
46	NC	/	/
47	XTAL_OUT	DO	RES
48	GND	power	GND

GPIO Pin-Mux

GPIO No.	Pin No.	Function 1	Function 2	Function 3	Function 4
GPIO_00	44	I2S0_SCK	I2C0_SCL	PDM_CLK0	PWM0
GPIO_01	45	I2S0_WS	I2C0_SDA	PDM_DATA0	PWM1
GPIO_02	3	I2S0_SDI	I2C1_SCL	PDM_CLK1	PWM2
GPIO_03	2	I2S0_SDO	I2C1_SDA	PDM_DATA1	PWM3
GPIO_04	43		I2C0_SCL#		PWM4
GPIO_10	12	UART1_RXD			
GPIO_11	8	UART1_TXD			
GPIO_12	11	UART1_CTS	QSPI_CLK	PDM_CLK0#	SDIO_CLK
GPIO_13	9	UART1_RTS	QSPI_CS	PDM_DATA0#	SDIO_CMD

GPIO_14	7	SPI0_CLK	QSPI_D0	PDM_CLK1#	SDIO_DATA0
GPIO_15	6	SPI0__CS0	QSPI_D1	PDM_DATA1#	SDIO_DATA1
GPIO_16	5	SPI0_DI	QSPI_D2	PDM_CLK2	SDIO_DATA2
GPIO_17	4	SPI0_DIO	QSPI_D3	PDM_DATA2	SDIO_DATA3
GPIO_22	41	UART0_RXD			PWM2#
GPIO_23	42	UART0_TXD			PWM3#

Absolute Maximum Ratings

Temperature/Voltage	Min	Max	Unit
Storage temperature	-30	85	℃
Operating temperature	-30	80	℃
Supply voltage	-0.3	5.5	V

Recommended Operating Conditions

Temperature/Voltage	Min	Typ	Max	Unit
Operating temperature	-30	25	80	℃
Supply voltage	3.3	4.2	5	V

Peripheral interface

GPIO

The NB-BT100 has 15 GPIOs, see the Pin-Mux section for details.

All GPIO levels only support 1.8 V, please pay attention to the voltage level matching when using.

UART

The NB-BT100 supports two sets of UART interfaces, UART0 and UART1, with a maximum rate of 6 Mbps.

- UART 0 is used for burning and debugging.

Pin No.	GPIO No.	UART
42	GPIO_23	UART0_TXD
41	GPIO_22	UART0_RXD

- UART1 can be interconnected with other UART devices.

Pin No.	GPIO No.	UART
8	GPIO_11	UART1_TXD
12	GPIO_10	UART1_RXD
9	GPIO_13	UART1_RTS
11	GPIO_12	UART1_CTS

I2C

The NB-BT100 supports two sets of I2C interfaces.

- The following modes are supported:
  - Standard mode (0 ~ 100 Kbps)
  - Fast mode (up to 400 Kbps)
  - Fast mode Plus (up to 1.4 Mbps)
- Support 7-bit or 10-bit addresses

Pin No.	GPIO No.	I2C
44 / 43	GPIO_00 / GPIO_04	I2C0_SCL

45	GPIO_01	I2C0_SDA
3	GPIO_02	I2C1_SCL
2	GPIO_03	I2C1_SDA

I2C0_SCL can choose GPIO_00 or GPIO_04 according to the actual situation through software configuration

PWM

The NB-BT100 has five PWM channels.
Each PWM channel contains the following registers:

- 16-bit initial value register (read/write)
- 16-bit toggle register (read/write)
- 16-bit PWM counter value register (read)

Pin No.	GPIO No.	PWM
44	GPIO_00	PWM0
45	GPIO_01	PWM1
3 / 41	GPIO_02 / GPIO_22	PWM2
2 / 42	GPIO_03 / GPIO_23	PWM3
43	GPIO_04	PWM4

PWM2 can choose GPIO_02 or GPIO_22 according to the actual situation through software configuration, and PWM3 can choose GPIO_03 or GPIO_23 according to the actual situation through software configuration

GPADC

NB-BT100 has one GPADC: 12-bit SAR ADC, and the acquisition voltage range is 0 ~ 1.5 V.

Pin No.	GPADC
15	GPADC3

RESET

RESET signal, active high level, RESET input is recommended to be higher than 500ms high level. High effective range 1.5 V ~ 2.5 V

Power supply

VSYS supplies power to the module.

Name.	Pin No.	Min	Typ.	Max
VSYS	16	3.3V	-	5V

Power consumption

TBD

RF characteristics

Module OTA test

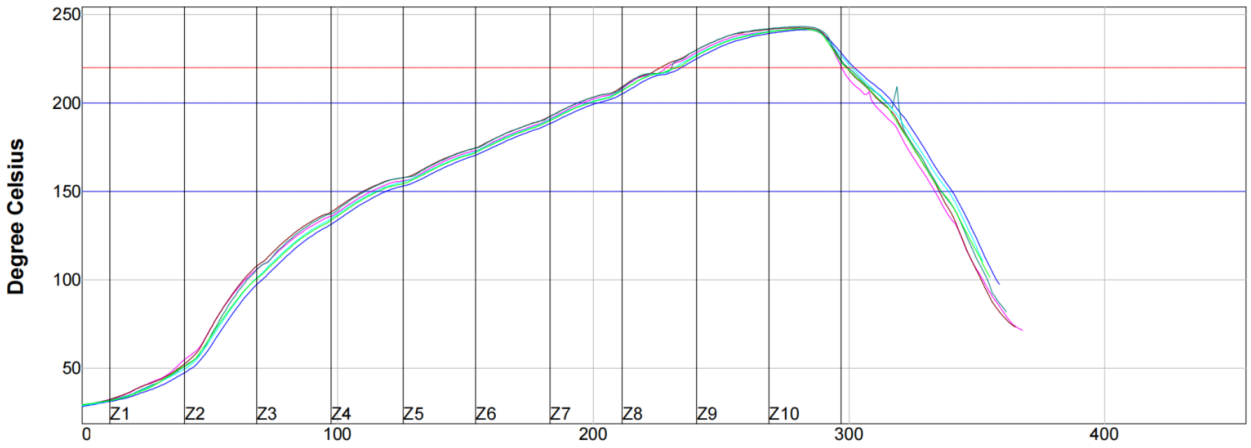
Basic Bluetooth

Channel	FRQ (MHz)	TRP (dbm)	TIS (dbm)
0	**2402**	**4.01**	**-90.74**
39	**2441**	**4.67**	**-90.24**
78	**2480**	**5.19**	**-90.66**

Note: Laboratory data do not represent the consistency of subsequent mass production products

Recommended reflow soldering temperature

Setpoints (Degree Celsius)										
Zone	1	2	3	4	5	6	7	8	9	10
Top	140	145	160	175	190	205	220	245	258	248
Bottom	140	145	160	175	190	205	220	245	258	248
Conveyor Speed (cm/min):	85.0									



- Certifications

Federal Communication Commission Interference Statement

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.

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 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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

List of applicable FCC rules

This module has been tested and found to comply with FCC Part 15 requirements for Modular Approval.

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that 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. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host

product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

OEM/Integrators Installation Manual

Important Notice to OEM integrators:

1. This module is limited to OEM installation ONLY.

2. This module is limited to installation in mobile or fixed applications, according to Part 2.1091(b).

3. The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations.

4. For FCC Part 15.31 (h) and (k): The host manufacturer is responsible for additional testing to verify compliance as a composite system. When testing the host device for compliance with Part 15 Subpart B, the host manufacturer is required to show compliance with Part 15 Subpart B while the transmitter module(s) are installed and operating. The modules should be transmitting and the evaluation should confirm that the module's intentional emissions are compliant (i.e. fundamental and out of band emissions). The host manufacturer must verify that there are no additional unintentional emissions other than what is permitted in Part 15 Subpart B or emissions are complaint with the transmitter(s) rule(s). The Grantee will provide guidance to the host manufacturer for Part 15 B requirements if needed.

Important Note

notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify to Beijing Ninebot Information Technology Co., Ltd. that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the USI, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

End Product Labeling

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: 2BD7T-IF0001. The FCC ID can be used only when all FCC compliance

requirements are met.

Antenna

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,

(2) The transmitter module may not be co-located with any other transmitter or antenna.

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC/IC authorization is no longer considered valid and the FCC ID/IC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC/IC authorization.

To comply with FCC regulations limiting both maximum RF output power and human exposure to RF radiation, maximum antenna gain (including cable loss) must not exceed.

Frequency Range	Antenna Type	Antenna Gain
2402 ~ 2480 MHz	PCB Antenna	0.79 dBi

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual

This device is intended only for OEM integrators under the following conditions (For module device use):

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

RF Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

ISED Statement

This device complies with Industry Canada's 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, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

RF Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This device is intended only for OEM integrators under the following conditions (For module device use):

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) The transmitter module may not be co-located with any other transmitter or antenna. As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

1) L'antenne doit être installée de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs, et

2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront

pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE:

In the event that these conditions cannot be met (for example certain laptop configurations or colocation with another transmitter), then the Canada authorization is no longer considered valid and the IC ID cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains IC: 31821-IF0001”.

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 20cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 31821-IF0001".

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

警語:「取得審驗證明之低功率射頻器材，非經核准，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。低功率射頻器材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。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材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。」

本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求最終產品平台廠商 (OEM Integrator) 於最終產品平台(End Product)上標示”本產品內含射頻模組，其 NCC 型式認證號碼

為:  CCXXxxYYyyyZzW

Radio Equipment Directive

Navimow B.V. hereby declares that the product listed in this section comply with the essential requirements and other relevant provisions of the Radio Equipment Directive 2014/53/EU.

Bluetooth	Frequency Band(s)	2.4000-2.4835GHz
	Max. RF Power	20mW