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navynav M4 Wireless Data Transceiver

File number:	NQR.CP-M4-2409-019

Product model:	M4
Product name:	Built-in data transmission and reception radio
Release time:	2025.03.12

Notes on Document Revisions

Serial Number	Modify sections/clauses	Revise the summary	Version number	Modification date	Modifiers	Approver
1	All	Build the first draft	V1.0	2024.9.2		
2	Chapters 2 and 3	Update power parameters and refine p in descriptions	V1.1	2025.3.12		
3						
4						

Overview

M4 is a built-in transceiver LORA radio station developed specifically for the lawn mover market and iot wireless transmission applications. The product supports the 868MHz and 915MHz ISM unlicensed frequency bands and features compliance with radio usage regulations in Europe and the United States, frequency hopping anti-interference, long-distance two-way communication, relay networking, OTA radio firmware upgrade, etc. It meets the demand for wireless communication in the lawn mower market.

Figure 1-1 Appearance of the M4

Product features

- Supports ISM unlicensed bands in Europe and America: 863-870 MHZ and 902-928 MHZ
- Supports LBT+AFA to meet the requirements of local radio usage regulations in Europe and the United States
- Support point-to-point and point-to-multi communication
- Integrated transceiver, meeting the requirements of differential data transmission and two-way communication between sleep and wake-up of base stations
- Fast frequency hopping and strong anti-interference ability
- Support relay networking, smooth communication between front and back yards
- It meets the requirements for radio frequency power control in the ISM band of Europe and the United States, supporting 25mW in Europe and up to 100mW in the Americas
- Open upgrade protocol, support OTA upgrade of radio firmware
- IC, CE, FCC certifications are supported

Application areas

Smart lawn mowers, Internet of Things wireless communication

Technical parameters

Working conditions

Parameters	Minimum value	Typical values	Maximum	Units	Instructions
Working voltage	3.3	3.3	3.6	V	
Working temperature	-40		+85	℃	
Working humidity	10	–	90	%RH	
Storage temperature	-45	–	+85	℃	
Electrostatic discharge voltage (Contact discharge)	–	–	4	KV	
Electrostatic discharge voltage (Air discharge)	–	–	6	KV	

Power consumption parameters

Parameters	Output power	Typical values	Unit	Notes
Emission current	100mW	135	mA	3.3V power supply
	25mW	85	mA	

Receive current	–	20	mA

Radio frequency characteristics

Project	Content
Work frequency	902.5-927.49 MHZ
Working Mode	Half-duplex
Channel bandwidth	250kHz
Modulation method	CSS
Carrier power	100mW
Power consumption (typical values)	High power to transmit: 445mW@3.3V DC (output 100mW power) Transmit low power: 280mW@3.3V DC (output 25mW) Whole standby: 66mW@3.3V DC
Receiving sensitivity	Superior to -118dBm@BER 10-5,11000bps
Co-channel suppression	>-12dB

Modem

Air speed	11,000 BPS, 62,500 BPS
Serial port rate	9600bps, 19200bps, 38400bps, 115200bps

Operating temperature

Working temperature	– 40 ~ + 85 ℃

Storage temperature	– 45 ~ + 85 ℃

Communication interface

Project	**Content**
Serial port	Standard TTL level Data bits: 8 bits Stop bit: 1 bit Verification: No verification

Structural characteristics

Project	**Content**
Size	25 (length) × 21 (width) × 3.7 (height) mm
Weight	About 3g
Antenna interface	IPEX, stamp hole
Antenna interface im pedance	50 Ω
Data interface	30Pin SMT

Pin definitions

The M4 pin distribution is shown below:

Pin numb er	**Pin name**	**Pin directi on**	**Pin Uses**
1	GND		Ground

2	SWDIO	Input/Output	Dangling (for internal use)
3	SWCLK	Input	Suspended (for internal use)
4	CONFIG	Input	Low level enters configuration mode, high level data transmission mode; The internal hardware has a pull-up 10K resistor to 3V;

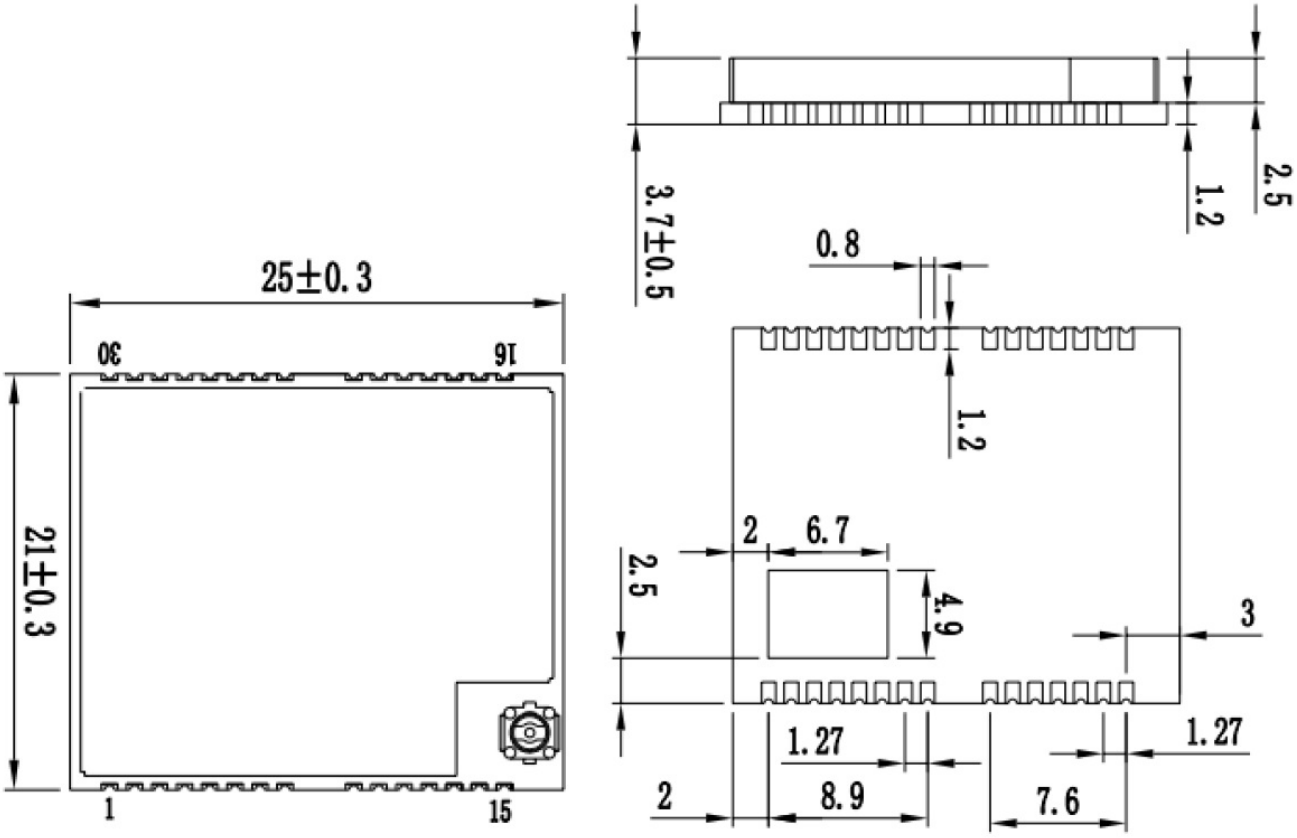
5	1PPS	Input	Board card 1PPS input
6	TXD1	Output	Serial port 1 TX terminal, TTL serial port output, connected to the external RXD input pin; The internal hardware has a pull-up 10K resistor to 3V;
7	RXD1	Inputs	Serial port 1 RX terminal, TTL serial port input, connected to the external TXD output pin
8	GND		Ground
9	GND		Ground
10	IO3	Input/Output	Function extended IO port
11	IO4	Input/Output	Function extended IO port
12	RSV		Suspended in the air
13	GND		Ground

14	ANT	Input/Output	Antenna interface
15	GND		Ground
16	GND		Ground
17	TXD2	Output	Serial 2 TX terminal, TTL serial output, connected to the external RXD input pin; The internal hardware has a pull-up 10K resistor to 3V;
18	RXD2	Inputs	Serial port 2 RX terminal, TTL serial port input, connected to the external TXD output pin
19	REST	Input	Radio reset (low level works)
20	IO1	Output	Serial port 1 RXD1 buffer is empty status indicator, high level indicates not empty, low level indicates empty. The size of each serial port transmission data packet should not exceed 1000 bytes.
21	IO2	Input/Output	Function extended IO port
22	GND		Ground
23	GND		Ground
24	LED TX	Output	Launch status indicator light (High level effective)
25	LED RX	Output	Receive status indicator light (High level effective)

26	GND		Ground
27	VCC	Input	Power DC 3.3-3.6V
28	VCC	Input	Power DC 3.3-3.6V
29	GND		Ground
30	GND		Ground

Module size

Views and dimensions are shown below.



Note: There is 6.7*4.9mm exposed copper at the bottom of the radio station for heat dissipation of the internal PA, and this area needs to be soldered onto the PCBA when mounting.

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.

To assure continued compliance, any changes or modifications not expressly approved by the party. Responsible for compliance could void the user's authority to operate this equipment. (Example- use only shielded interface cables when connecting to computer or peripheral devices).

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

Radiation Exposure Statement:
The equipment complies with FCC Radiation exposure limits set forth for uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

The modular can be installed or integrated in mobile or fix devices only. This modular

cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.
This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: 2BM2K-M4 Or Contains FCC ID: 2BM2K-M4”

ISED Statement
This device contains licence-exempt transmitter(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.

Radiation exposure statement:
The device complies with the RSS radiation exposure limits set for uncontrolled environments. The device must be installed and used with a minimum distance of 20cm between the radiator and the body

RSS-Gen clause 4.3 statement:
If the IC Certification Number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:
“Contains IC: 33426-M4”

Requirement per KDB996369 D03

List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter.

Summarize the specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. This radio transmitter 2BM2K-M4 have been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device. The concrete contents to check are the following three points.

1. Must use an antenna such as Dipole Antenna with a gain not exceeding 1.34 dBi
2. Should be installed so that the end user cannot modify the antenna;

Fine-tuning of return loss etc. can be performed using a matching network. The antenna shall not be accessible for modification or change by the end user. A modification to the antenna is required FCC/ISED Class II permissive change.

This device has been approved as mobile device in accordance with FCC and ISED Canada RF exposure requirements. This means that a restricted minimum separation distance of 20cm between the antenna and any person.

A change in use that involves a separation distance ≤20cm (Portable usage) between the Module's antenna and any persons is a change in the RF exposure of the module and, hence, is subject to a FCC Class 2 Permissive Change and a ISED Canada Class 4 Permissive Change policy in accordance with FCC KDB 996396 D01 and ISED Canada RSP-100.

Limited module procedures

The module is a single module, not applicable.

Trace antenna designs

The module has no tracking antenna be used, not applicable.

RF exposure considerations

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

The host product shall show the same or similar statement to the end users in the end-product manuals.

If the module is installed to a host / end product with a used distance <20cm, additional SAR evaluation or measurement must be followed according to FCC KDB 447498 and RSS- 102.

If the module is installed to a host / end product with multiple transmitters, additional RF exposure evaluation must be performed for the simultaneous transmission condition per FCC KDB 447498 and RSS-102. A Formula is also showed below:

The procedure rules are provided in 2.3 in this document. As the module manufacturer is still taking responsibility for the compliance of this module, if you have any changes mentioned above, you must advise and get the help from us with the contact information as shown below 2.12.

Antennas

This radio transmitter has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. FCC ID: 2BM2K-M4P

Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Radios	Dipole Antenna
LoRa	1.34dBi

Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID: 2BM2K-M4

Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.
Additional testing requirements should be taking into account for different operating conditions for the transmitter function.

If this module is operated as a stand-alone modular in a host:

Radiated spurious emission per FCC Part 15.247, RSS-247
The host should be operated in all its normal mode with the modular transmitter active.
Please follow 2.11 in this document to obtain a best radio engineer design.

If this module is operated as multiple simultaneously transmitting modules in a host:

Foundation frequency power, Radiated spurious emission per FCC Part 15.247 and RSS-247.
Conducted spurious emission and conducted power per FCC part 15.247 and RSS-247.

Please contact the modular manufacturer through the contact information shown below 2.12 to get the test software.
This module should be operated in transmitter mode with other transmitter for the simultaneous condition.

Please follow 2.11 in this document to obtain a best radio engineer design.

The procedure rules are provided in 2.3 in this document. As the module manufacturer is still taking responsibility for the compliance of this module, if you have any changes mentioned above, you must advise and get the help from us with the contact information as shown below 2.12.

Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module

installed with all other applicable requirements for the system such as Part 15 B.

Note EMI Considerations

EMI consideration for transmitting simultaneously:

This module is stand-alone modular. If the end product has multiple certified modules integrated in a host and transmitting simultaneously: When after radiated emission testing, if there are no additional emissions generated due to simultaneous-transmission operations compared to single transmitter operations testing, it is not necessary to file the additional simultaneous transmission test data. FCC class II permissive changes is no necessary.

However, RF exposure for transmitting simultaneously also needed, please refer to 2.6 in this document.

To obtain better engineer design while installing this module:

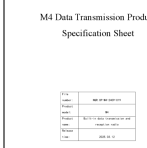
It is recommended to place the module as close as possible to the edge of the baseplate. If conditions permit, make the antenna feed point closest to the edge of the baseplate. Please ensure that the module is not covered by any metal shell. Do not lay copper, wire, or place components in the antenna area of the module PCB.

How to make changes

Only the module grantee is permitted to make permissive changes. If the host integrator is expected to install the module in a way different from this manual or want to change the module, please contact:

Company: Shenzhen Navynav Technology Co., Ltd.
Address: Room 502, Han’s Laser Technology Centre Shennan Ave No.9988, Nanshan District, Shenzhen, Guangdong Province, China
Email: 157381769@qq.com

Documents / Resources

	navynav M4 Wireless Data Transceiver [pdf] Owner's Manual 2BM2K-M4, 2BM2KM4, M4 Wireless Data Transceiver, M4, Wireless Data Transceiver, Data Transceiver, Transceiver

References

- User Manual

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2BM2K-M4, 2BM2KM4, Data Transceiver, M4, M4 Wireless Data Transceiver, navynav, Transceiver, Wireless Data Transceiver

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