

# MOOV

## IOT-BOX User's Guide



**Model: Rybit820-NA**

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# 1. Introduction

Rybit820-NA is designed for sharing and rental bike or ebike management system. Rybit820-NA supports wide range voltage input from 20 to 56V, integrated 4G LTE/3G UMTS WWAN communication system, GPS navigation system, Bluetooth 5.0 (Low Energy), high performance/low power consumption architecture, audio codec and speaker. In addition, MOOV provides a total solution from cloud management to diagnostic in every single unit and also supports locking management and BMS health check.

## **Telemetry and Remote Control**

Through WWAN and BLE 5.0, you can easily accomplish telemetry, remote control, location acquisition, lock/unlock bike and BMS health checking.

## **High-Accuracy Positioning and Navigation**

Integrated GNSS solution, built-in highly customized active ceramic GPS antenna and Qualcomm Gen8C GNSS solution to achieve high-accuracy positioning and navigation.

## **HMI (Human Machine Interface)**

Integrated audio codec and speaker, allowing easily interact directly with users.

Voice prompt files are stored in the flash memory, it can be updated via OTA service.

## **Low Power Consumption**

Integrated deep power management, system will enter standby mode when service inactive automatically. System can be woken up from WWAN, BT, IMU, timer and button. It also built-in a backup battery to keep system alive when main battery pack was removed or damaged.

## **OTA (Over-The-Air)**

Supporting OTA upgrade, including both full and delta method. Delta upgrade only needs to download difference portion, it can reduce transfer time and operation cost.

## 2. Safety Information

Read all safety warnings and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire, and/or serious injury.

### Qualified Repair Service

There are no user serviceable parts. Have the device serviced by a qualified repair person using only identical replacement parts. This will ensure that the safety of the device is maintained.

### Battery

CAUTION: This device contains an internal Lithium battery. The battery can burst or explode, releasing hazardous chemicals. To reduce the risk of fire or burns, do not disassemble, crush, or puncture the device, and do not dispose of the device in fire or water.

### Radio Wave Propagation

Due to the property of radio wave propagation, the WWAN and GPS in this device may not working properly in the tunnel or any other place where the radio signals are hard to receive.

## 3. Product Features

### 3.1 Power Source

Rating Input voltage is 48V via 5 pins connector.

### 3.2 Power-On

IOT-Box will power on automatically during the power applied.

### 3.3 Standby and Wakeup

Standby: No on-going housekeeping job and service inactive, the system will enter standby mode.

Wakeup: Can be woken up by WWAN, BT, IMU, timer and button event.

### 3.4 Voice Prompt

Integrated audio codec and speaker, allowing easily interact directly with users. Voice prompt files are stored in the flash memory, it can be updated via OTA service.

### 3.5 CAN Bus

Integrated CAN Bus interface to communicate with motor controller, BMS, hub lock and battery lock. It can be recovered automatically or isolated failure node(s) during bus health/conditions change.

### 3.6 WWAN and BT 5.0

WWAN supports LTE Cat 1/B2 B4 B12, DL 10 Mbps, UL 5 Mbps.

WCDMA/B2 B4 B5, DL 384 Kbps, UL 384 Kbps.

Bluetooth 5.0 (Low Energy), 1 Mbps.

### 3.7 Backup Battery

Built-in a 3.7V/3400mAh backup battery to keep system alive when main battery pack was removed or damaged.

## 4. Technical Specification

### 4.1 Hardware Specification

#### General Specifications

Dimension: 85mm\*45mm\*40mm

Weight: 250g

Operating Temp: -10°C to +55°C

Storage Temp: -20°C to +60°C

Connectors:

5 pins (2 pins for power input, 2 pins for CAN bus and 1 pin for I/O)

4 pins (2 pins for LED and 2 pins for button)

#### Electronic Specifications

Input Voltage: 48V (typical)

Backup Battery: 3.7V/3400mAh

Speaker: 2W (Rating)100dB@10cm 1KHz

Lock/Unlock duration: Depends on network condition, less than 5 secs typically

Built-in IMU Sensor

### RF Module

Rybit820-NA provides data communication between LTE-FDD and WCDMA networks, it also supports GNSS and BT5.0.

Model	LTE-FDD	WCDMA	GNSS	BT 5.0
Rybit820-NA	B2/B4/B12	B2/B4/B5	YES	YES

GNSS include GPS L1

Cold start positioning < 35s (open conditions)

Hot start positioning < 1s (open conditions)

Positioning accuracy < 5m (open conditions)

BT5.0 support 2402~2480MHz bandwidth, output power is set to 0 dBm

LTE-FDD: 23 dBm  $\pm$ 2.0dB (Power Class 3)

WCDMA: 24 dBm  $\pm$ 1/-3dB (Power Class 3)

## 5. Caution

Risk of explosion if battery replaced by an incorrect type.

Dispose of used batteries according to the instructions.



Please make sure the temperature for device will be -10 to 55°C.

LTE-FDD: 23 dBm  $\pm$ 2 dB (Power Class 3)

WCDMA: 24 dBm +1/-3dB (Power Class 3)

## 6. 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.

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

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

### FCC Radiation Exposure Statement

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



## 7. Acronyms and Abbreviations

ADC	Analog to Digital Converter
BT	Bluetooth
CE	European Conformity
CMOS	Complementary Metal Oxide Semiconductor
DC	Direct Current
DL	Downlink
EIA	Electronic Industries Association
EMC	Electromagnetic Compatibility
ESD	Electro-Static Discharge
FDD	Frequency Division Duplex
GPIO	General-Purpose I/O
GPS	Global Positioning System
GPRS	General Packet Radio Service
I2C	Inter Integrated Circuit
I2S	Inter-IC Sound
LDO	Low-Dropout
LED	Light Emitting Diode
LTE	Long Term Evolution
NC	Not Connected
PCB	Printed Circuit Board
RTC	Real Time Clock
SMT	Surface Mount Technology
SPI	Serial Peripheral Interface
TIS	Total Isotropic Sensitivity
TRP	Total Radiated Power

TVS	Transient Voltage Suppressor
UART	Universal Asynchronous Receiver-Transmitter
UMTS	Universal Mobile Telecommunications System
USIM	Universal Subscriber Identity Module
WWAN	Wireless Wide Area Network