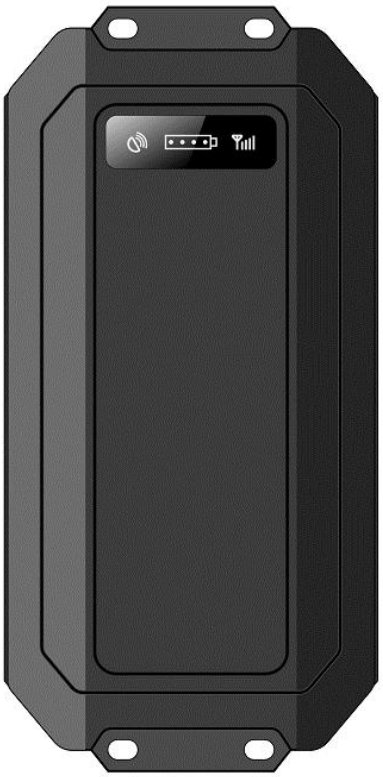

NT09E
User manual

CatM1 NB IoT Asset GPS Tracker

Declaration

The contents of this manual is expected to be renewed from time to time without prior notice; the updated content will be added to the new version of this manual. KINGWO will improve or update the products or procedures described in the manual at any time. If there is a description of the product in the manual that does not match the actual product, the actual product shall prevail. KINGWO has the final interpretation rights of this manual.

PART 01 Product Overview

1.1 Appearance

Enclosure	IP67 waterproof
Magnets	To stick the device to metal surface
Screw hole	To fix the device to any assets without metal
Power button	Inside the enclosure for hidden installation purpose, to turn on or turn off device
Light sensor	To detect removal alarm remove the sticker on the light sensor, when the device expose to light, it will trigger a removal alarm
Type-C port	Used for recharge the device and configure the device spec
Soft switch (Near USB port)	Press switch for 2 seconds while in work mode, the red switch and green switch will fast blink 3 seconds, then power off Press switch for 2 seconds in power off mode, device will be turned on and enter in work mode Quick press the switch, blue LED on with balance

	battery level
Enclosure	IP67 waterproof
Magnets	To stick the device to metal surface

1.2 LED status

Cellular LED (Red)	Event	Status
	Network connecting	Fast flash
	Network connected	Slow flash
	Module error	Solid on
Position LED(Green)	GPS position	Solid on
	LBS position	0.5 seconds on, 0.5 seconds off
	Wifi Position	2 seconds on, 2 seconds off
	No position	Off
Charging LED(Blue)	100% charging	4 lights solid on
	75%-80% charging	3 lights solid on and 1 light flash
	56%-74% charging	3 lights solid on and 1 light off
	50%-55% charging	2 lights solid on, 1 light off,1 light flash
	30%-49% charging	2 lights solid on, 2 lights off
	25%-29% charging	1 lights solid on, 2 lights off,1 light flash
	10%-24% charging	1 lights solid on, 3 lights off
	1%-9% charging	1 light flash,3 lights off

1.3 Product features summary

- No wired needed, easy for installation
- Built in G-sensor
- Temperature monitor
- 12000mah rechargeable battery
- Battery can be last from 15 days to one year each full charge
- Ultra low consumption, decrease to 5uA below when in sleep mode
- Strong magnetic and screws installation

- Support tamper proof alarm
- Multiple position mode: GPS, Wifi,AGPS, LBS
- ibeacon
- Jamming detection
- IP67 waterproof
- Periodic tracking/Adaptive tracking/Movement based tracking/Sleep mode

1.4 Hardware parameters

Physical	Dimension	154mm*82mm*30mm（L*W*H）
	Weight	350±5g
Cellular	Communication module	Quectel BG95
	Frequency	Working frequency: Cat M1: LTE-FDD B1/B2/B3/B4/B5/B8/B12/B13/B14/B18/B19/B20/B25/B26*/B27/B28/B66/B85 • Cat NB2: LTE-FDD B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B25/B26*/B28/B66/B71/B85 • EGPRS: 850/900/1800/1900MHz protocol: Embedded TCP/IP stack Sensitivity: -107dBm@850/900MHz -106dBm@1800/1900MHz Output power: Class 4 (2W)@850/900MHz Class 1 (1W)@1800/1900MHz GPRS data: GPRS Class 10, Mobile Station Class B
GPS		Channels: 50 Sensitivity: -147dBm Position accuracy:5-10m Accuracy: 5m CEP Cold start: <27s

		Hot start: <1s
Processor		ST
Motion sensor		DA260
Wifi position		Wifi 4.0
Power	Battery	Rechargeable Lithium-ion battery and (3.7V, 12000mAh) and ultra-low discharge rate： less than 2%, store one months below 25℃
	Power consumption	Average working current <50mA; Power save current <40uA;
	GSM antenna	Internal High Gain
	GPS antenna	Internal High Gain
	SIM	Microsim
	Indicator	3 status LEDs, Green: GPS, Red: Network, Blue: battery
Environmental Parameter	Working Temperature	-30℃ ~ +80℃
	Humidity	5% ~ 95% (no fog)
	Ingress Protection Rating	IP67

PART 02 Product Functions

2.1 Work modes

There are 3 working modes for NT09E: real time tracking mode、sleep mode、clock mode.

Below is the explanation for work mode priorities:

- Real time tracking mode> Sleep mode>Clock mode
- The work mode which is equal can be replaced by each other, as the last configuration will prevail

The default working mode is real time tracking mode(upload interval 30S), the data packets information includes GPS status, longitude and latitude, cellular signal Strength, satellite numbers, battery level etc,

2.1.1 Real time tracking mode

Mode	SMS Command	
Set Real time tracking mode	HC, <T1>, <T2>#; For example: HC,30,14400# indicates device send data every 30S during movement, send data every 14400S during static	Command description: T1:Upload interval in motion status,value5-1800 seconds,default 30seconds T2: Upload interval in static status, value 300-43200 seconds,default 14400seconds
Note: Device judge whether it is still or moving by it's G-sensor; When the value of T2 is bigger than 3600 seconds, the communication module is shut down after sleep, If T2 is less than 3600 seconds, the communication stays online when enters the sleep state.		

2.1.2 Sleep Mode

Configuration	SMS Command	
Set sleep mode	HX,T# For example HX,1440# indicates device send data every 1440 minutes	T： Upload interval Unit: Minutes Value range: 5-43200minutes （2-30 days）
Note: Device will not wake up during sleep mode even if it is in movement. Device close GPS and communication module during sleep mode.		

2.1.3 Clock mode

Configuration	SMS Command	
Set clock mode	WAKEUP,T1,T2,T3,T4# For example : WAKEUP,0800,1000,1530,1900# Device send data only at 08:00AM 、 10:00AM 、 15:30PM、 19:00PM WAKEUP,0900,1900# Device send data only at 09:00AM and 19:00PM	T1-T4 is time point, format is HHMM, for example 0800 indicates 08:00am
Delete clock mode	WAKEUP,#	
Note: When set clock mode, device will sleep except the clock time,during sleep ,Device will not wake up even if it is in movement.		

2.2 AGPS

When the device successfully registers on network, AGPS is available to speed up the position speed and improve the position accuracy

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2.3 LBS

If device enters into the blind zone and GPS cannot be fixed, the device will switch to LBS position, LBS provides the reference location which might not be accurate

2.4 Wi-Fi

The device has built in Wi-Fi Chip, it automatically connects to the WIFI hotspot nearby and filter the hotspot info then select the WIFI hotspots with strongest signal, the device will pack those hotspots info and saved into the packet that will be uploaded, after the backend receives Wi-Fi information, it will interpret the WIFI info and acquire the current location from the Wi-Fi database, The default setting is WIFI priority, once it detects WIFI Hotspot, it will upload WIFI info only , and do not use GPS, if WIFI is not detected, it will use GPS to position.

Kindly reminder: To use Wi-Fi feature, please make sure your software supports Wi-Fi database

2.5 Blind data storage

When the device enter into blind zone when in sleep mode, it will store the trace data according to the preconfigured time interval and it will upload the data in the blind zone to the backend when the cellular network recovers

2.6 Temperature detection

The device built-in temperature sensor, it detects the temperature once the device is turned on, then will read it every 16 seconds. The temperature accuracy 95%.

2.7 OTA commands from backend

Since the wake up of the device is normally short before enter into sleep mode, it is hardly to receive SMS , to ensure the command sending efficiently, we suggest an OTA commands to be sent from the platform, when the device is online, the backend will automatic send this command, to make sure the commands is properly received.

2.8 Strong Magnetic and waterproof function

NT09E is with built-in with super strong magnet that can firmly stick the device to the metal surface, it is easy to install and conceal, and the device is with waterproof function, which can be installed on any assets that are outdoors

2.9 Position Priority

2.9.1 GPS>WIFI>LBS

Turn on the GPS module immediately after the device wakes up, and report the position after GPS positioning or timeout;

2.9.2WIFI>GPS>LBS

Search for WIFI hotspots immediately after the device wakes up. When the number of hotspots>=2, the GPS module will not be turned on;

2.9.3：WIFI>LBS，GPS OFF

The GPS module is not turned on after the device wakes up. When the number of hotspots>=2, the positioning package will be reported immediately;

2.9.4：GPS>WIFI，LBS OFF

Turn on the GPS module immediately after the device wakes up, and report the positioning package after GPS positioning or timeout;

2.9.5：WIFI> GPS，LBS OFF

Search for WIFI hotspots immediately after the device wakes up. When the number of hotspots>=2, the GPS module will not be turned on;

2.10 AGPS

When the device successfully registers on network, AGPS is available to speed up the position speed and improve the position accuracy

2.11 History data upload and Delete function

Command：BLIND,A#　A=1：OFF；A=0：ON
Clear command:CLR,BLIND#
More than 128 positions can be saved, the blind zone data read is first-in first-out;

2.12 Early sleep mode

In order to reduce the power consumption, the device will not continue to work and directly enter the sleep state under those abnormal status:
The device does not recognize the SIM card;
Cellular module resets 6 times continuously;
Device resets 6 times continuously;
Failed to connect to the server (single IP 3 times, dual IP 2 times each);
No response from server after sending upload data three times in a row.
VCC voltage is lower than 2.9V;
After VCC is lower than 2.7V or devices resets 6 times continuously, if the upload interval is less than 60 minutes, the sleep time will be changed to 60 minutes in mandatory ;

2.13 Low Voltage Shutdown

Device will immediately enter the low-power mode and will not wake up;

- VCC voltage is lower than 2.7V;
- VCC voltage is lower than 2.9V and the device has been continuously reset 6 times and the power is <=2%;

2.14 Connection timeout

Normally the maximum duration time of each wake-up of the device is 15 minutes.

2.15 Network and Bands lock

- Command：SEARCH,P[;BandNBiot;BandCAT-M1]#

P: Network priority
P=1 Lock GSM
P=2 Nbiot Priority，CAT-M Second，GSM final
P=3 CAT-M Priority，GSM Second，NB OFF ,Defaulted
P=4 Lock CAT-M
P=5 Nbiot Priority，GSM Second，CAT-M OFF
P=6 CAT-M Priority，NB Second，GSM OFF
P=7 Nbiot Priority，CAT-M Second，GSM OFF
BandNBiot: Nbiot Bands;ALL-Bands，Multiple bands are separated by half-width commas, for example:B1,B3,B5
BandCAT-M1: CAT-M1 Bands;ALL-Bands， Multiple bands are separated by half-width commas, for example:B1,B3,B5
When set this parameter, please restart the device to make it executed.

2.16 APN Adaptive

The device has APN adapt features, however if APN is not in APN adapt list, APN configuration is required.

2.17 Mileage Calculation

Device will calculate the mileage based on GPS and report to the backend .

2.18 IBEACON

Command：IBEACON,uuid,major,minor,rssi#
UUID:32 bytes,Composed of 0-9, A-F, a-f, default:
0000ffa06da44e50a375bade13be6daa
Major: Ibeacon group code, default 1, value range 0-65535
Minor：ibeacon code，default 0，value range 0-65535
Rssi: Signal strength at a distance of 1M, default -59, value range 0-255
The device is equipped with Bluetooth chip, and it broadcasts ibeacon BLE information regularly after power on, and the distance can be checked through the Apple beacon APP;

PART 03 Alarm Functions

3.1 Removal alarm

There is a high sensitive light sensor at the bottom, if the device is tampered, either the device is working or in sleep mode, it will be activated and enter into anti-removal status and switch on anti-removal alarm, and report the alarm info to the backend or preset phone number.

Command：FALL,A#

A=3 Turn on the removal alarm, and only report data once,as defaulted.

A=2 Turn on the removal alarm, tracking for 15 minutes, once every 300 seconds

A=1 Turn off the removal alarm function

A=0 Turn on the removal alarm function, tracking for 60 minutes, once every 60 seconds

3.2 Low Voltage Alarm

The device will report low voltage alarm when the battery is less than 10% and alarm will be off after recharge.

3.3 GPS receiver failure alarm

When the GPS module is turned on, there is no GPS data output for 90 seconds, and the GPS receiver failure alarm will be reported

3.4 WIFI failure alarm

After powering on the WIFI twice in a row, the serial port did not report any information, and followed the positioning packets it will report a WIFI failure alarm;

3.5 G-sensor failure alarm

If Gsensor I2C initialization failed, it will report motion sensor failure with position packets

3.6 Speeding alarm

When there is a speeding triggered which is over than the preset threshold, it will report speeding alarm to the backend and alarm will be off the speed decrease to to the preset threshold.

PART 04 NT09E Setup

4.1【Setup and debugging】

4.1.1 SIM card installation

Unscrew the top cover of the device, insert the prepared SIM card into the SIM card holder, and then confirm that the SIM card button is well placed . Please make sure

that the SIM card has data service available in advance and write down the SIM card number.

4.1.2 Main unit power on

After installing the SIM card, turn the battery switch to the ON position. When the red light starts to blink, indicating that the device is powered on.

4.1.3 Major parameter setting by SMS or SSCOM tool

SMS list:

APN,apn,user,pwd#	Set APN, User name and password For example: APN,CMNET,internet,internet# APN:CMNET Username: internet Password: internet APN,CMNET# APN:CMNET User name: Null Password:Null
IP and port	Set IP, port and communication type of primary server , For example: IP,119.23.233.52,6000,1# Set the primary server IP:119.23.233.52， port 6000，communication type:TCP IP,www.365qczx.com,6000,0# Set the primary server domain:www.365qczx.com， Port 6000，communication type UDP
UTC,TTTT#	Set time zone, unit minute ,default UTC+8:00
STATUS#	Query communication status of the device
FACTORY#	Device resume to factory setting
RESET#	Restart the device
CENTER,A,#	Set center number

SSCOM configuration:

Com tool download link and follow up the guide for configuration:
http://dl.vodofo.com/KingwoTool20220218.rar

Mounting recommendations

Easy installation is one of the major advantages of our asset tracker. Here are some major ways of installation for our NT09E tracker

There are 3 ways of installation that are widely used by our partners around the world on assets such as trailers, containers, reefers, caravans, railcar, construction and agricultural equipments, power generators, etc.

1, Velcro tape: no damage on the asset

2, Screws: stable and securely fixed

3, Magnets: easy removal

There are advantages of each way. Depending on the asset and position of installation, there must be a suitable way for your use case. The devices can be installed on the top, the side or hidden in the asset.

- Please do not put tracker in the metal environment which will affect the GPS signal.

Safety Information

- Don’t dissemble the device by yourself
- Avoid strong humidity, direct sunlight, and high temperature
- Don’t use on airplane

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