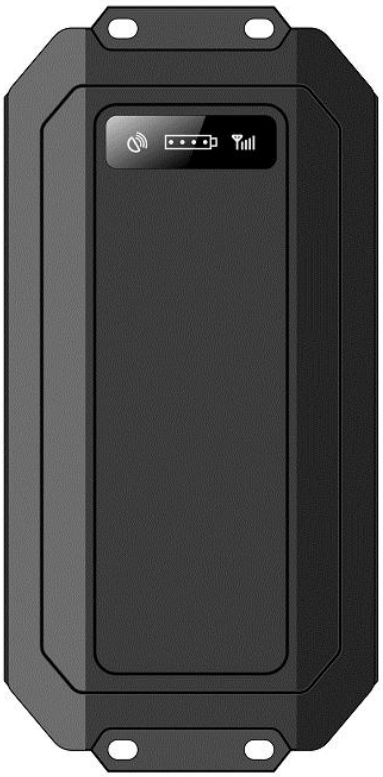


NT08E

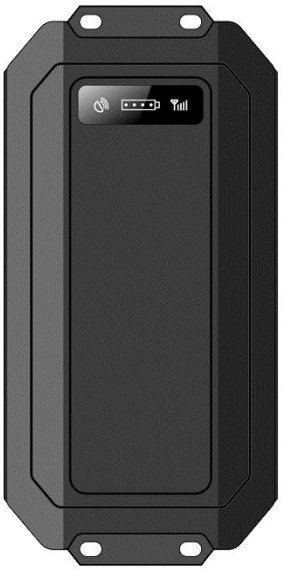
User manual

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 non-metal surface
Power button	Inside the enclosure for hidden installation purpose, to turn on or turn off device
Light sensor	To detect removal alarm or activate the device from warehouse mode into normal mode, remove the sticker on the light sensor, when the device expose to light, it will trigger a removal alarm or activate the device from warehouse mode
Temperature sensor	To measure the environment temperature
Motion sensor	To detect the motion or static status of the device, detect motion alarm and collision alarm
Bluetooth	Bluetooth ibeacon function
Wifi	Wifi position for indoors tracking

1.2 LED status

LED type	Event	Status
Cellular LED (Red)	Network connecting	0.2s on, 0.2s off
	Network connected	0.2s on, 1s off
	PDP activate success(APN correct)	0.2s on, 2s off
	Server connection success	0.2s on, 5s off
	Module restart	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
Note:LED can be turned off or on by using command : LED,0# LED,1#		

1.3 Product features summary

- Built in 20000mah batteries, it can last 10+ years if upload data once a day
- Multiple work modes: Regular, Clock, Track ,motion and static modes
- Alarms: Motion alarm, removal alarm, collision alarm
- Multiple position modes: GPS, WIFI, LBS, AGPS
- Temperature monitor
- Battery level upload
- Weatherproof for outdoors assets monitor
- No wires and magnets for easy installation
- Jamming detection

1.4 Specification

Physical	Dimension	154X82X30mm（L*W*H）
	Weight	495±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		STM32G070CB
Motion sensor		DA260
Wifi position		Wifi 4.0
Bluetooth		Bluetooth 5.0
Power	Battery	Disposable Lithium-ion battery and （3.6V，20000mAh） and ultra-low discharge rate：less than 1%, store one year below 25℃
	Power consumption	Average working current <100mA; Power save current <15uA;
	GSM antenna	Internal High Gain
	GPS antenna	Internal High Gain
	SIM	Microsim

	Indicator	2 status LEDs, Green: GPS, Red: Celluar(Inside enclosure)
Environmental Parameter	Working Temperature	-30℃ ~ +80℃
	Humidity	5% ~ 95% (no fog)
	Ingress Protection Rating	IP67

PART 02 Product Functions

2.1 Intelligent Work modes

The default work mode is regular model: upload interval is one-day one ping, the data packets information includes GPS status, longitude and latitude, cellular signal Strength, satellite numbers, battery level etc, there are multiple track modes available from the device, below is the explanation for work mode priorities:

- Track mode>Warehouse >Regular mode =Clock mode=Week mode= Motion and static mode；
- The work mode which is equal can be replaced by each other and the last configuration will prevail

2.1.1 Track mode

Configuration	SMS Command	Remark
Set Track mode	ZZ,A,T1,T2# or MODE,1,T1,T2#；	A：1- Enter

	For example: ZZ,300,60# (MODE,300,60#) indicates enter into track mode, upload data each 300 seconds, track duration time is 60 mins ZZ,0# or MODE,0# indicates exit track mode	in track mode，0- Exit track mode； T1：upload interval unit ：seconds ；value range 30-300 seconds； T2：Track duration time ，Unit：minutes，value range 5-57600 minutes ；
Exit track mode	ZZ,0# or MODE,0#	
Note: 1.Under track mode, GPS position is on priority, meanwhile LBS and WIFI data will be captured each 30 seconds 2.Device would enter into power save mode if the device stopped 5 minutes, GPS will be turned off, but it will keep connection with backend and upload packet according to the configured intervals 3.Under track mode, if the SIM card loosen, network register failure or server failure happens, device will turn off celluar and GPS for 30 minutes and then attempt connection, however if the removal alarm triggered during this period , it will immediately attempt a connection. 3.GPS will wake up if motion detected in power save mode.		

2.1.2 Warehouse mode

Configuration	SMS Command	

Set storage mode	STORAGE,T# For example: STORAGE,2880# indicates enter into storage mode, upload data each 2880 minutes	T：Upload interval Unit: Minutes Value range: 2880-43200 minutes （2-30 days）
Exit storage mode	STORAGE,0#	
Note: **This mode is designed for power save purpose before the devices goes to field:** 1.Under warehouse mode, if light sensor triggered, device will exit warehouse mode 2.Under warehouse mode, if other work mode has been configured, device will exit warehouse mode 3.Under warehouse mode, device can't be wake up by vibration 4.Under warehouse mode, use command STORAGE,0# to exit warehouse mode		

2.1.3 Regular upload mode (Recommended)

Configuration	SMS Command	
Set regular upload mode	HX,T# or MODE,0,T# For example HX,1440# or MODE,0,1440# indicates upload each 1400 minutes (24 hours)	T：Upload interval Unit: Minutes Value range: 5-43200minutes （2-30 days）
Exit storage mode	STORAGE,0#	
Note: Default setting is wake up each 1440 minutes(24 hours) Fixed upload mode can't be wake up by motion		

2.1.4 Clock mode

Configuration	SMS Command	

Set clock mode	MODE, 4, N, T1, T2..TN# For example MODE,4,3,0800,1400,2100##	T1-TN is time point, format is HHMM, for example 0800 indicates 08:00
Delete clock mode and return to fix upload	WAKEUP,#	
Note: Time interval between each two clocks should be no less than 5 minutes Clock mode can't be wake up by motion		

2.1.5 Week mode

Configuration	SMS Command	
Set week mode	MODE,3,T1,T2# For example MODE,3,246,09:00# indicates wake up at 9:00am at Tuesday, Thursday and Saturday	T1=1:Monday, T1=137 indicates Monday, Wednesday and Sunday T2 indicates wake up point , format is HH:MM
Note: Clock mode can't be wake up by motion		

2.1.6 Motion and static mode

Configuration	SMS Command	
Set motion and static mode	MODE,6,T1,T2,A# or MS, T1,T2,A# For example: MODE,6,60,300,1# Indicates upload interval in motion status is 60 minutes, upload interval in static status is 300 minutes, motion alarm on	T1:Upload interval in motion status , value 5-43200 minutes T2: Upload interval in static status, value 5-43200 minutes or set clock mode, format (HH:MM) A:Motion Alarm on, 0:Motion Alarm off
Note: Device can't be wake up by vibration while in motion mode Device can be wake up by vibration while in static mode After wake up, there should be 3 seconds vibration in 6 seconds, device will turn on cellular module and upload data packet, otherwise it would enter into sleep mode again and maintain the previous configuration parameters		

Configuration	SMS Command	
Set motion and static mode	MODE,6,T1,T2,A# or MS, T1,T2,A# For example: MODE,6,60,300,1# Indicates upload interval in motion status is 60 minutes, upload interval in static status is 300 minutes, motion alarm on	T1:Upload interval in motion status , value 5-43200 minutes T2: Upload interval in static status, value 5-43200 minutes or set clock mode, format (HH:MM) A:Motion Alarm on, 0:Motion Alarm off

2.2 AGPS

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

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

NT07E 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 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 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 Motion alarm

The motion is in static mode and the motion alarm is turned on, and the motion alarm will be reported following the positioning after being awakened by motion;

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 Collision Alarm

Command: COLLISION,A# Value Range 0-8000mg
When the acceleration change value exceeds A, the device immediately wakes up and reports a collision alarm, please note collision alarm won't work if the device is in motion and static mode as well as warehouse mode.

PART 04 Installation guide

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 note 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
HX,<T>#	Sleep mode return interval, default 1440 minutes, that is, 24 hours t: wake-up time, unit: minutes range: 5-43 200 minutes for example: hx,120#
ZZ,A,[,T1,T2]#	Track mode A: A=1,Enter track mode A=0 Exit track mode T1: upload interval in track mode，unit：seconds Range：5-300 seconds T2:The continue track time in track mode，Unit：Minutes Range ：5-57600 minutes
WAKEUP,T1[,T2[,T3[,T4]]]#	Latency mode sets a multipoint return parameter, up to four points in time T1…T4: A point in time, such as 0830 for 08:30 in the morning
FALL,A#	A=3 Switch on removal alarm, do not track, defalut value A=2 Switch on removal alarm, track 15 mins, 300 seconds once A=1 Switch off removal alarm A=0 Swtich on removal alarm, track 60 minutes, 60 seconds once
UTC,TTTT#	Set time zone, unit minute ,default UTC+8:00
STORAGE,T#	Storage mode return interval, default is 0, that is, turn off t: wake-up time, unit: minute value range: 2880-43200 minutes for example: storage,10080
MS,m,s#	Motion static detection mode, m: return interval during motion, default 60 minutes, value range 5-43 200 minutes s: static return interval, default 720 minutes, value range 5 43 200 minutes For example: ms,120,1440—return interval during motion

	is 120 minutes and static return interval is minutes.
*11*4#	Query communication status of the device
*22*1#	Device resume to factory setting
*22*4#	Restart the device
*77*0 number#	Set center number 1
*77*2 number#	2 Set number 2

SSCOM configuration:

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

Mounting recommendations

It is better to put this side up while install the device

- The bottom of the tracker is fitted with a powerful magnet, please put the tracker directly on a metal surface or mount the device with screws to the surface without metals.
- 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

NT08E Usage Requirements

The users are required to strict using the device according to the operating instructions ,any disassemble, collide, charge, soak, over 80 ° C, human failure, force majeure damage, etc. may cause short circuit, insufficient working time, battery deformation, liquid leakage, explosion, no warranty and compensation will be provided by Kingwo.

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FCC WARNING

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.

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

NOTE: 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 maintain compliance with FCC’s RF Exposure guidelines, This equipment should be installed and operated with minimum 20cm distance between the radiator and your body: Use only the supplied antenna.