HT-303D

G-MOUSE

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Revision record

G-MOUS

version number	Revision record	date
Ver1.00	Initial establishment	December 2017

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Catalogue

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HT-303D

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Data Sheet v1.00

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1. Product description

Product name: HT-303D

HT-303D is a complete satellite positioning receiver. Built-in satellite receiving antenna, the satellite receiving core adopts the most advanced Zhongke micro-positioning core to provide high-precision positioning information, so it can also meet the strict requirements of industrial positioning and personal use needs. The scope of application ranges from steam navigation, security system, map making, various surveys to agricultural use. Built-in button battery is used to store satellite data, which is compact and can be installed anywhere in the car, with low power consumption and can meet the needs of individual users.

This product adopts UBLOX7020 low-power chip, with high sensitivity, and can locate quickly and accurately in urban canyons, elevated places and other places with weak signals. It can be widely used to develop a variety of GPS terminal products, such as car navigation, car security system, car monitoring and other satellite positioning applications.

Module appearance:

HT-303 外形尺寸：38*49*16mm USB线长：3m

HT-303 底部装有磁铁（可选）

HT-303 底部装有3M胶（可选）

2. product application

- GPS is used in PDA, Pocket PC and other portable devices.
- Trajectory tracking products such as personal positioning and automobile positioning.
- Surveying and mapping products such as area measurement and distance measurement, and mu meter.
- Law enforcement recorder, driving recorder, advertising machine, external antenna and other products.
- Track recording and GPS/ Beidou data point calibration and other products.

3. Product highlights

- Industry standard 25*25*4MM high sensitivity GPS antenna
- Adopt 0.5PPM high precision TCXO.
- Built-in RTC crystal and picofarad capacitor for faster hot start-up
- Built-in LNA, low noise signal amplifier
- Adopt 7020 chip
- 1-10Hz positioning update rate
- Support A-GPS services such as AssistNow Online and AssistNow Offline.
- GPS, Beidou, GLONASS, (WAAS, EGNOS, MSAS, GAGAN) hybrid engine.

4. technical feature

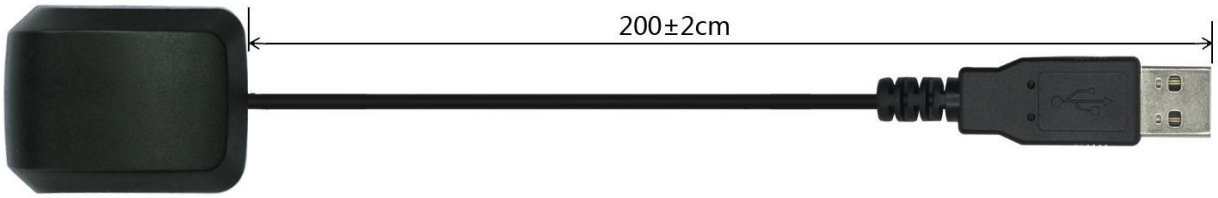
Module performance	
chip	UBLOX7020
frequency	L1 1575.42MHz
C/ A code	1. 023MHz code stream
protocol	NMEA 0183
Available baud rate	4800, 19200, 38400, 57600, 115200bps (the default baud rate is 9600)
passage	56CH
SWR	S11≤1.3
SWR	S22≤1.3
Log Mag	S21≥ 20.0dB
Smith	S11 :50Ω±5%
sensitivity	Tracking: -162dBm Capture: -146dBm
cold start	Average 32 seconds
Cold start sensitivity	-146 dBm
Warm start	Average 32 seconds
reset	Average 1 second
Hot start sensitivity	-156 dBm
AGPS[network-aided ephemeris data]	3 s [average]
positioning accuracy	< 5m
(CEP, 50%, static at 24 o'clock, signal strength -130 dBm, about 6 available satellites)	
Timing accuracy	30 ns
Square direction	< 0 . 5Degrees
Reference coordinate system	W G S - 84
rate	< 0 . 1 m / s
Maximum altitude	50000 meters
Calibration clock impulse	0 . 2 5 H z ~ 1 K H z
top speed	515 m/s

Maximum acceleration	≦ 4G
Update frequency	1-10 Hz (1Hz by default)
Port interface	U art: 232/TTL [default]
Output statement	Nmea 0183v3.0 (GGA, GSA, GSV, RMC, VTG, GLL) protocol data.
physical characteristics	
outline dimension	38.0mm * 49.0mm * 16mm, with a line length of 3m.
joggle/interface	USB interface default (VCC/TX/RX/GND)(6pin is compatible with PPS output and can be controlled by EN).
Power Supply	
input voltage	Wide voltage range: the main power supply is+3.3 v ~+5.5 v.
operational current	30Ma
Standby voltage	1.8~3.6VDC
working environment	
Humidity range	5% to 95% non-condensing
Working temperature	-40 to +100 ℃
storage temperature	-55 to +100 ℃

5. Wiring definition and interface description

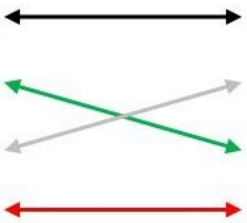
4pin interface

Wiring definition



Interface description

Pin	名称	说明	颜色
1	NC		
2	GND	接地	黑色
3	RX-TTL	接收	绿色
4	TX-TTL	输出	白色
5	VCC	+3.3V~+5.0V 电压	红色
6	NC		



Pin	名称
4	GND
3	TX-TTL
2	RX-TTL
1	VCC

6. Typical application reference

Normal work

parameter	minimum	standard	maximum	unit
Power supply voltage	3.3	five	5.5	V
Working temperature	-40	--	+85	℃
operational	28	30	32	mA

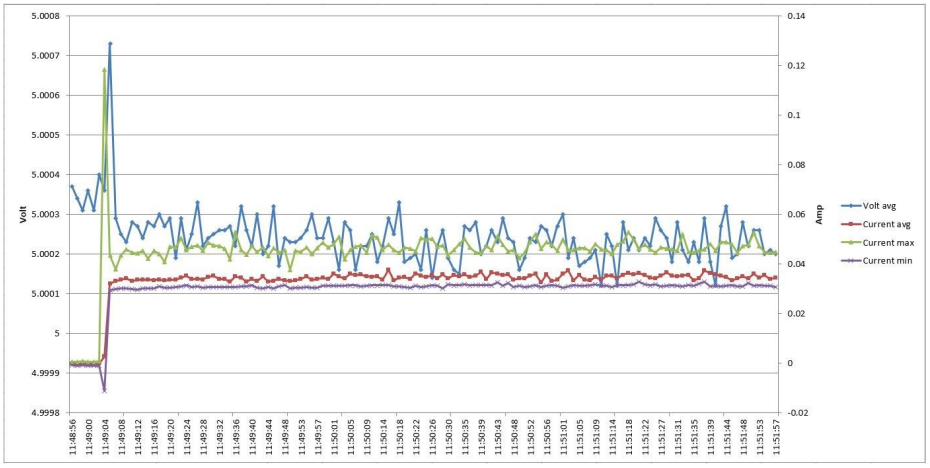
RTC power supply is qualified [RTC power supply is self-contained in the module, and the battery life is about 2.5H

parameter	mini mum	standard	maximum	unit
RTC supply voltage	1.8	2.8	six	V
Consume current (work)	--	150	--	uA
Current consumption (sleep)	--	30	--	uA

Digital interface level condition

parameter	minimum	standard	maximum	unit
Input high level	1.8	three	3.3	V
Input low level	--	--	0.8	V
Output high level	2.4	2.8	3.3	V
Output low level	--	--	0.4	V

Power-on instantaneous current curve



7. NMEA0183 protocol description

NMEA 0183 output

GGA: time, location and
positioning type GLL: longitude,
latitude and UTC time.
GSA： GPS receiver operation mode, positioning satellite, DOP
value GSV: visible GPS satellite information, elevation angle,
azimuth angle, signal-to-noise ratio (SNR) RMC: time, date,
position and speed.
VTG: ground speed
information MSS:
signal strength, etc.

Note: The output information and frequency are related to the settings.

Sample data:

$GPGGA,061831.000,2236.9152,N,11403.2422,E,2,07,1.1,144.0,M,-2.2,M,4.8,0000*60

$GPGSA,A,3,18,22,25,12,14,21,24,15,,,,,1.93,1.04,1.63*01

$GPGSV,3,1,11,12,40,089,45,14,37,314,46,15,10,078,44,18,77,096,43*72

$GPGSV,3,2,11,21,27,192,31,22,60,330,43,24,24,037,45,25,42,142,41*71

$GPGSV,3,3,11,31,21,230,27,42,51,128,37,50,46,122,39*4D

$GPRMC,061831.000,A,2236.9152,N,11403.2422,E,0.00,,130214,,,D*76

$GPVTG,309.62,T, ,M,0.13,N,0.2,K*6E

7.1 GGA

Sample data: $ gngga, 070010.000, 2236.9156, n, 11403.2538, e, 1, 11, 1.2, 92.4, m, 0.0, m, * 4d.

Sample data:

$GPGGA,061831.000,2236.9152,N,11403.2422,E,2,07,1.1,144.0,M,-2.2,M,4.8,0000*60

name	Sample	unit	describe
Message ID	$GPGGA		GGA protocol header
UTC time	061831.000		hhmmss.sss
latitude	2236.9152		ddmm.mmmm
N/S indication	N		N= north, S= south.
longitude	11403.2422		dddmm.mmmm
E/W indication	E		W= west, E= east.
Positioning indication	2		0: Not located 1:SPS mode, effective positioning. 2: Differential, SPS mode, effective positioning 3:PPS mode, effective positioning
Number of satellites	07		Range 0 to 12
HDOP	1.1		Horizontal accuracy
MSL amplitude	144.0	rice	-
unit	M	rice	
earth	-2.2	rice	-
unit	M		-
Difference time	4.8	second	Invalid when there is no DGPS.
Differential ID	0000		
Checksum	*60		
<CR><LF>			End of message

7.2 GLL

Sample data: $ gngll, 2236.9156, n, 11403.2538, e, 070010.000, a, a * 44.

serial number	name	Sample	unit	describe
0	Message ID	$GNGLL		GLL protocol header
one	latitude	2236.9156		ddmm.mmmm
2	N/S indication	N		N= north, S= south.
three	longitude	11403.2538		dddmm.mmmm
four	E/W indication	E		W= west, E= east.
five	UTC location	070010.000		hhmm.mmm
six	condition	A		A= data is valid; V= invalid data.
seven	Mode indication	A		A= autonomous positioning, D= difference, E= estimation, N= invalid data.
eight	Checksum	*44		Checksum of ASCII codes of all characters between $ and *.
nine	<CR><LF>			End of message

7.3 GSA

Sample data: $ gpgsa, a, 3, 09, 17, 28, 03, 06, 23,,,,, 2.4, 1.2, 2.1 * 35.
$BDGSA,A,3,01,03,06,08,09,,,,,,,2.4,1.2,2.1*20

serial number	name	Sample	unit	describe
0	Message ID	$GPGSA		GSA protocol header
one	Mode 1	A		M= manual (forced operation in 2D or 3D mode), A= automatic.
2	Mode 2	three		1: invalid positioning 2:2D positioning 3:3D positioning
three	Satellite use	09		Channel 1
four	Satellite use	17		Channel 2
five	Satellite use	28		Channel 3
six	Satellite use	03		Channel 4
seven	Satellite use	06		Channel 5
eight	Satellite use	23		Channel 6
nine	,,,	,,,	,,,	,,,
10	Satellite use			Channel 12
11	PDOP	2.4		Position accuracy
12	HDOP	1.2		Horizontal accuracy
13	VDOP	2.1		Vertical accuracy
14	Checksum	*35		Checksum of ASCII codes of all characters between $ and *.
15	<CR><LF>			End of message

7.4 GSV

Sample data: $ gpgsv, 3, 1, 09, 02, 26, 273, 14, 03, 17, 040, 38, 05, 06, 212, 06, 50, 307, 33 * 78.

$GPGSV,3,2,09,09,20,119,47,10,50,307,,17,57,025,43,23,12,081,21*7C

$GPGSV,3,3,09,28,51,171,48*45

$BDGSV,2,1,06,01,50,129,42,03,64,189,42,06,60,163,40,07,00,000,16*62

$BDGSV,2,2,06,08,54,025,41,09,36,189,35*6F

serial number	name	Sample	unit	describe
0	Message ID	$GPGSV		GSV protocol header
one	Number of messages	three		Range 1 to 3
2	Message number	one		Range 1 to 3
three	Number of satellites	09		Number of satellites
four	Satellite ID	02		Satellite ID
five	elevation angle	26	degree	Elevation (range 0 to 90)
six	azimuth	273	degree	Azimuth (range 0 to 359)
seven	Carrier-to-noise ratio (C/No)	14	dBHz	Signal strength (range 0 to 99) is empty when there is no tracking.
eight	Satellite ID	03		Satellite ID
nine	elevation angle	17	degree	Elevation (range 0 to 90)
10	azimuth	040	degree	Azimuth (range 0 to 359)
11	Carrier-to-noise ratio (C/No)	38	dBHz	Signal strength (range 0 to 99) is empty when there is no tracking.
12	Satellite ID	05		Satellite ID
13	elevation angle	06	degree	Elevation (range 0 to 90)
14	azimuth	212	degree	Azimuth (range 0 to 359)
15	Carrier-to-noise ratio (C/No)	06	dBHz	Signal strength (range 0 to 99) is empty when there is no tracking.
16	,,,	,,,	,,,	,,,
17	Checksum	*78		Checksum of ASCII codes of all characters between $ and *.
18	<CR><LF>			End of message

7.5 RMC

Sample data: $ gnrmc, 070010.000, a, 2236.9156, n, 11403.2538, e, 0.00, 0.00, 240815,, a * 79.

serial number	name	Sample	unit	describe
0	Message ID	$GNRMC		RMC protocol header
one	UTC time	070010.000		hhmmss.sss
2	condition	A		A= data is valid; V= invalid data.
three	latitude	2236.9156		ddmm.mmmm
four	N/S indication	N		N= north, S= south.
five	longitude	11403.2538		dddmm.mmmm
six	E/W indication	E		W= west, E= east.
seven	Ground speed	0.00	Knot (section)	Ground speed
eight	position		degree	Ground route
nine	date	240815		Format date of day, month and year
10	Magnetic variable			Magnetic field change value (blank-not supported)
11	Mode indication	A		A= autonomous positioning, D= difference, E= estimation, N= invalid data.
12	Checksum	*79		Checksum of ASCII codes of all characters between $ and *.
13	<CR><LF>			End of message

7.6 VTG

Sample data: $ gnvtg, 0.00, t,, m, 0.00, n, 0.00, k, a * 23.

serial number	name	Sample	unit	describe
0	Message ID	$GNVTG		VTG protocol header
one	position	0.00	degree	Ground route
2	refer to	T		true north
three	refer to		-	Ground route (magnetic), no output.
four	refer to	M		magnetism
five	speed	0.00	Knots (section)	Ground speed
six	unit	N		Fixed byte
seven	speed	0.00	Kilometer/ hour	Ground speed
eight	unit	K		Kilometer/hour
nine	Mode indication	A		A= autonomous positioning, D= difference, E= estimation, N= invalid data.
10	Checksum	*23		Checksum of ASCII codes of all characters between $ and *.
11	<CR><LF>			End of message

8. Latitude and longitude conversion

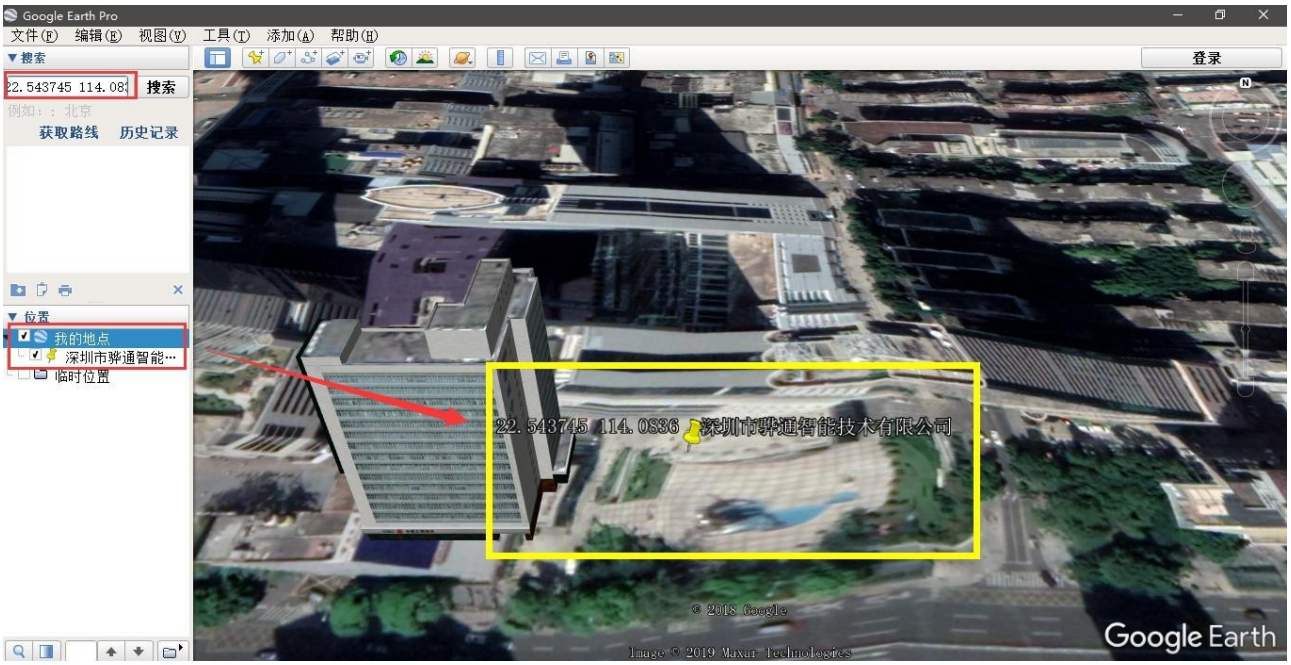
$GPRMC,060556.00,A,2254.3745,N,114.0836,E,0.034,,130214,,,D*7F

	请输入		结果
经度（GPS数据）	114.0836	转化得到：	114.0599
纬度（GPS数据）	22.5437	转化得到：	22.3237

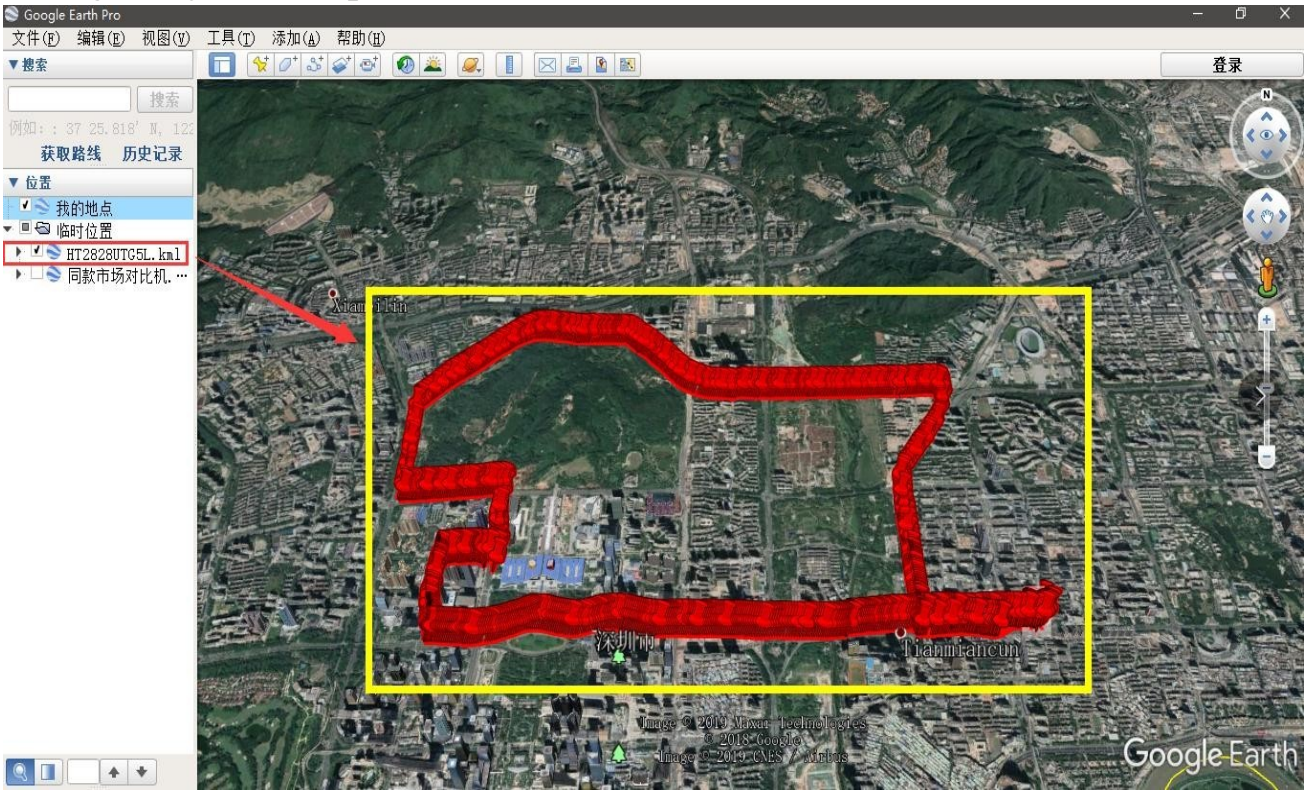
计算依据： abcde.fghi

abc+(de/60)+(fghi/600000)

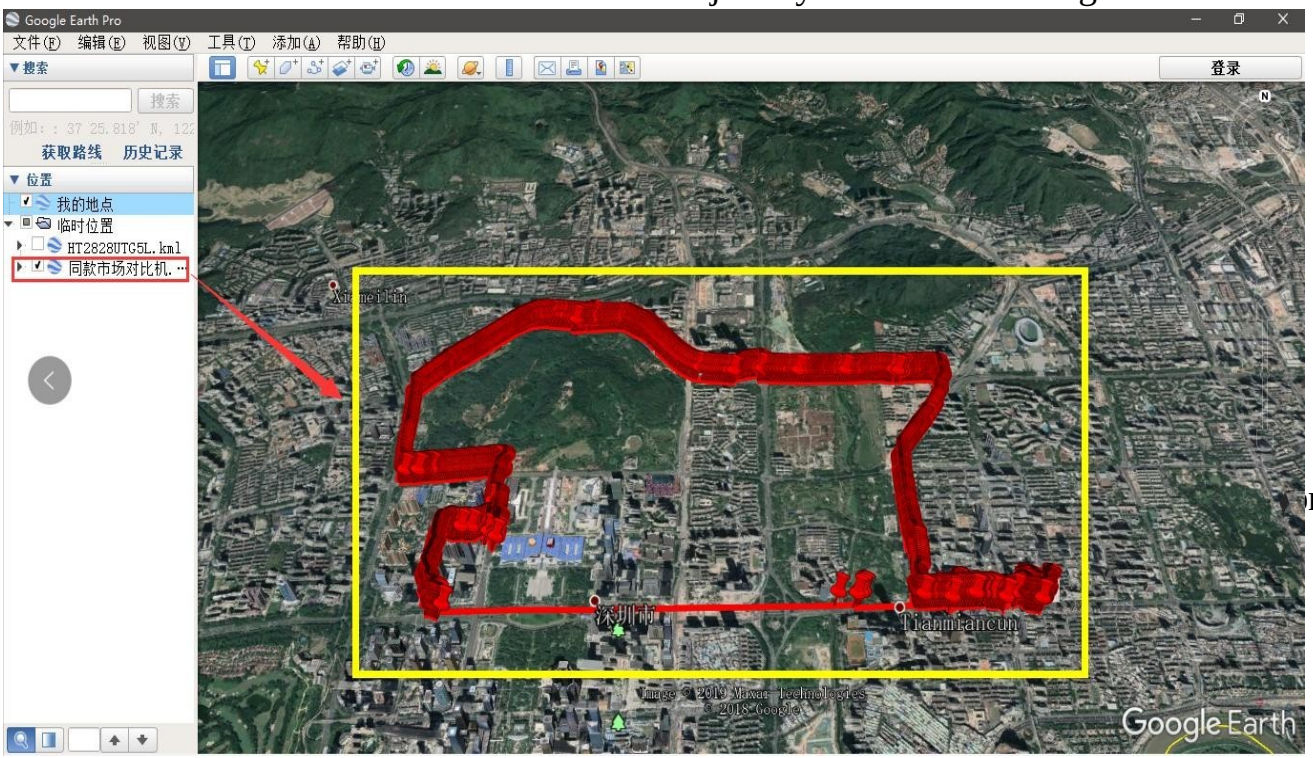
The results obtained from the conversion: 22.543745,114.0836. The current actual location is displayed through Google Earth search (note: there will be deviations through Google Maps or Baidu Maps on the browser):



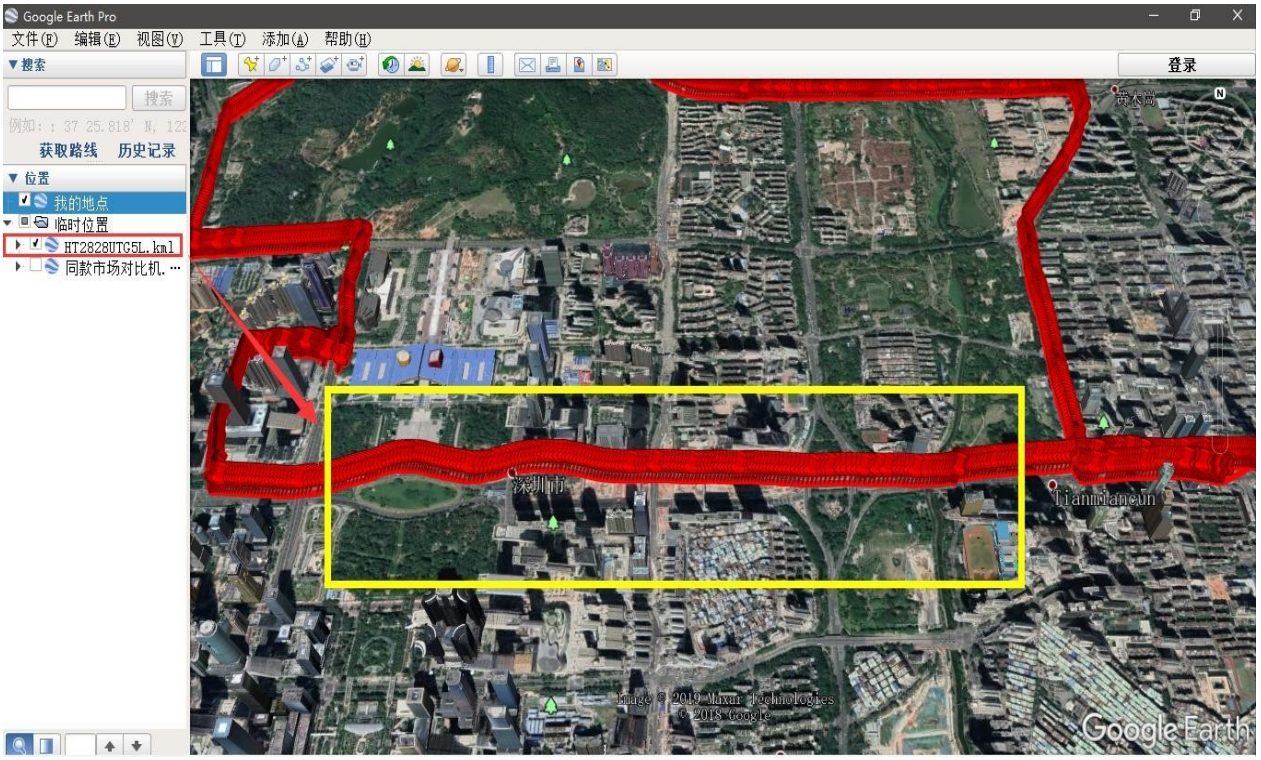
9. Trajectory test comparison



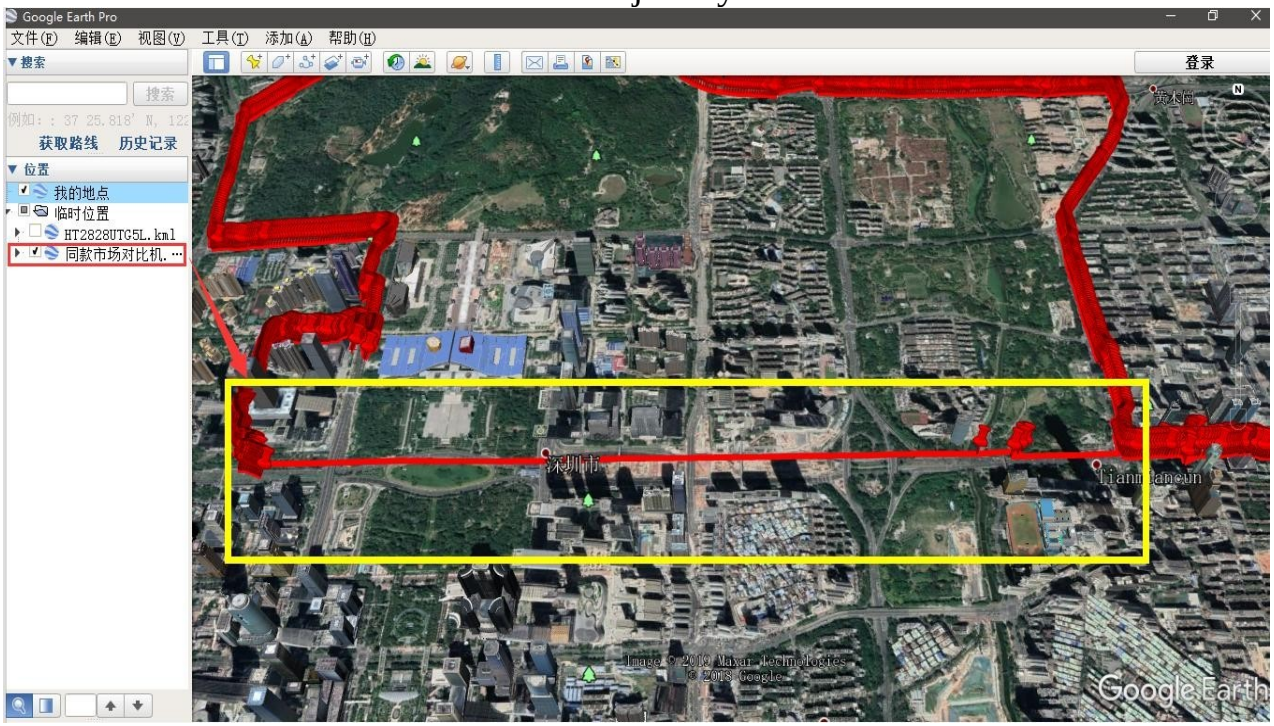
HT2828UTG5L Trajectory Test General Diagram



ntrast



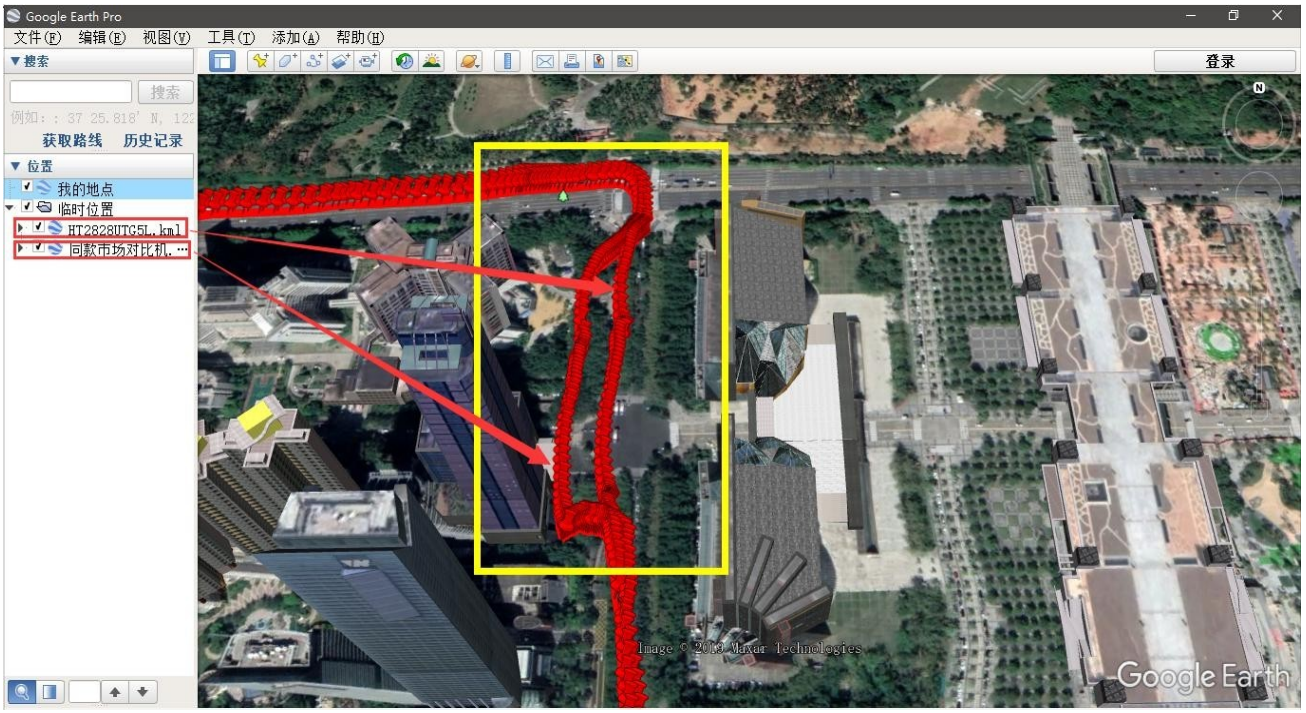
HT2828UTG5L Trajectory Test Partial View 1



Partial view of trajectory test of the same market comparison machine

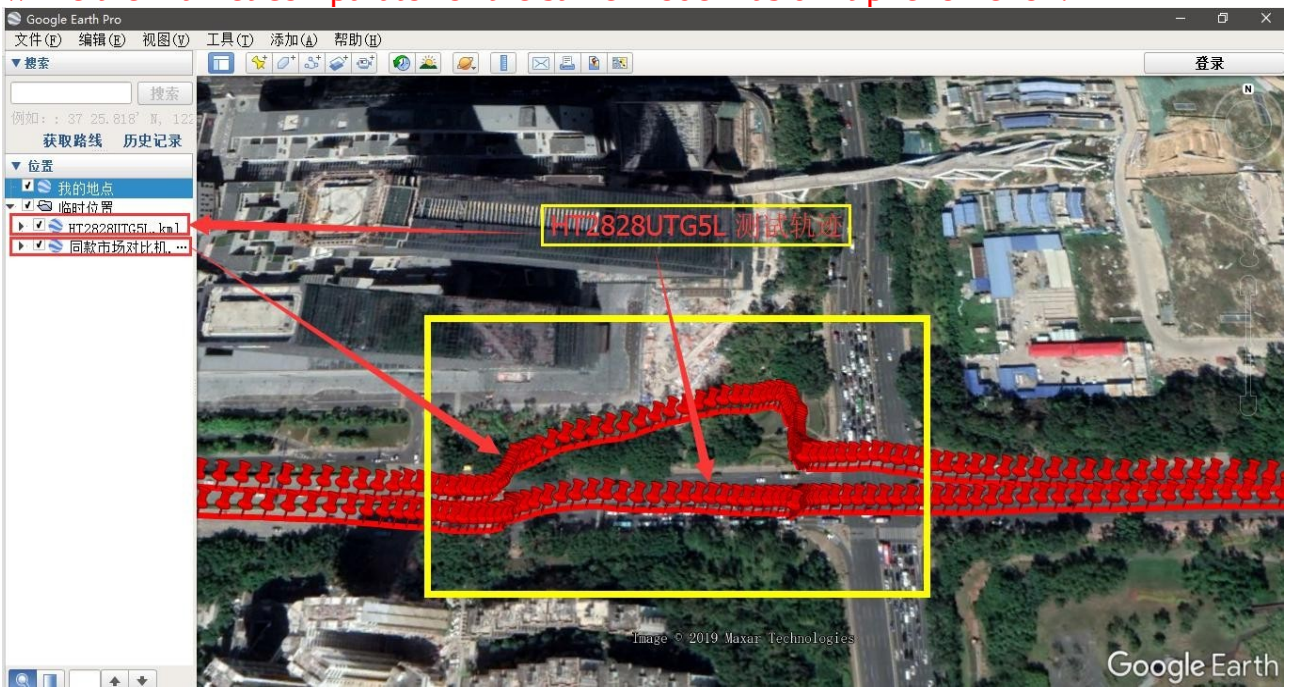
1

As can be seen from the above partial view 1, the test track of HT2828UTG5L is normal, but the market comparator has the situation of pulling straight line without positioning.



Partial view of the same market comparison machine and HT2828UTG5L trajectory test 2

As can be seen from the partial view 2, the test track of HT2828UTG5L is normal, while the market comparator of the same model has drift phenomenon.



Partial view of the same market comparison machine and HT2828UTG5L trajectory test 3

As can be seen from the partial view 3, the test track of HT2828UTG5L is normal, while the market comparator of the same model has drift phenomenon.