



RAC High Precision Satellite Positioning Tracker Specification

RAC high precision GNSS /GSM Tracker

Achieve high-precision satellite positioning without differential stations and ground-based augmentation networks

Real-time Array Calibration

Product Model:RAC-TR1

Hardware version:RAC-TR1_V1.2



Document Revision History

Version	Revision Date	Version Description
V1.0	2019/09/27	New Document
V1.1	2021/06/10	Document optimization

Disclaimer

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1. Product Description

1.1 Product Overview

Product Name: RAC-TR1 High-precision satellite positioning tracker



Figure 1 Schematic diagram of RAC-TR1 high-precision satellite positioning tracker

This product is based on the 2G/4G network and BD+GPS satellite technology, enabling remote positioning and monitoring via SMS, apps, and the internet. It employs advanced dual positioning technology, combining GPS and AGPS. With a built-in satellite receiver antenna, the positioning accuracy can reach as low as 1.5 meters dynamically, meeting the requirements for lane-level vehicle tracking.

Through technological innovation, the product offers two core competitive advantages: no need for differential stations, and it does not rely on L2 or B3 precise codes, making it cost-effective. Unlike traditional high-precision satellite positioning technologies, our solution eliminates the need for differential technology, significantly reducing costs. This is the key advantage that sets our product apart from similar offerings globally. The product features high accuracy, high sensitivity, low power consumption, and a compact size. Its superior tracking sensitivity significantly expands the coverage of its positioning capabilities.



1.2 Product Features

- ◆ 2G/4G is universally used;
- ◆ GPS continuous positioning, GPRS scheduled reporting (default 1 report every 5 seconds);
- ◆ Support SMS and platform query location information;
- ◆ Built-in vibration sensor to realize intelligent vehicle anti-theft;
- ◆ ACC ignition signal detection, vehicle status prompt;
- ◆ External oil and power cut-off relay to achieve remote control of the vehicle;
- ◆ Three specific numbers can be set for SOS alarm and anti-theft alarm;
- ◆ An external SOS switch button can be connected for emergency calls;
- ◆ Can be connected to external side door detection to detect illegal door opening;
- ◆ Built-in backup battery to realize illegal wire cutting alarm (optional);
- ◆ Compatible with external device serial port (UART/TTL/232/485) communication;

1.3 Performance parameters

Features				
1.Precise positioning, accuracy up to1.5rice. 2.BD+GPSPrecise positioning. 3.Comprehensive features include:ACCDetection, oil level detection, low power alarm, power failure alarm, remote oil and power cut-off,SOSSOS, overspeed alarm, vibration alarm, illegal door opening and closing detection, etc.				
Application Areas				
Leased vehicles, credit vehicles, passenger vehicles, taxis, freight vehicles, etc.				
Equipment parameters				
Project	Function Name	Have	Non	Functional Description
Electrical Characteristics	Power supply mode	●		Car battery power supply
	Operating voltage range	●		8~36V
	Working current	●		12V/30mA - 80mA



	Sleep current	●		12V/5mA - 15mA
	Built-in battery capacity		●	3.7V/320mAH Polymer battery (optional match)
Environmental characteristics	Operating temperature range	●		-30°C~+80°C
	Storage temperature range	●		-40°C~+85°C
	Operating humidity range	●		5%-95%
Communication characteristics	Communication module brand/chip model	●		MTK6261D/EC100Y-CN
	Network Standard	●		2G/4G
	Communication frequency band	●		LTE FDD: B1/B3/B5/B8 LTE TDD: B34/B38/B39/B40/B41 GSM: GSM 850/900/1800/1900M
	SIMCard	●		Micro SIM CARD
	Communication Antenna	●		Internal antenna
BD+GPS position characteristics	Positioning type	●		Ublox 8 generation RAC High-precision positioning technology
	Cold start time	●		Average<30S (Open Sky)
	Warm start time	●		Average<10S (Open Sky)
	Hot start time	●		Average<2S (Open Sky)
	Sensitivity (tracking)	●		- 165dBm
	Sensitivity (capture)	●		- 148dBm
	Positioning accuracy	●		1.5rice
	Positioning antenna	●		Built-in 25*25*4mm Ceramic Antenna



1.4 Product Port:

The default device port is the OBD port (cable options can be customized).



1.5 Indicator lamp definition:

A. Blue LED:If GPS data is not detected, the light does not blink.After successfully reading the data, the blue LED blinks (1 second on, 3 seconds off) but the device is not yet positioned.When the position is successfully acquired, the blue LED remains on.When the device enters sleep mode, the blue LED turns off.

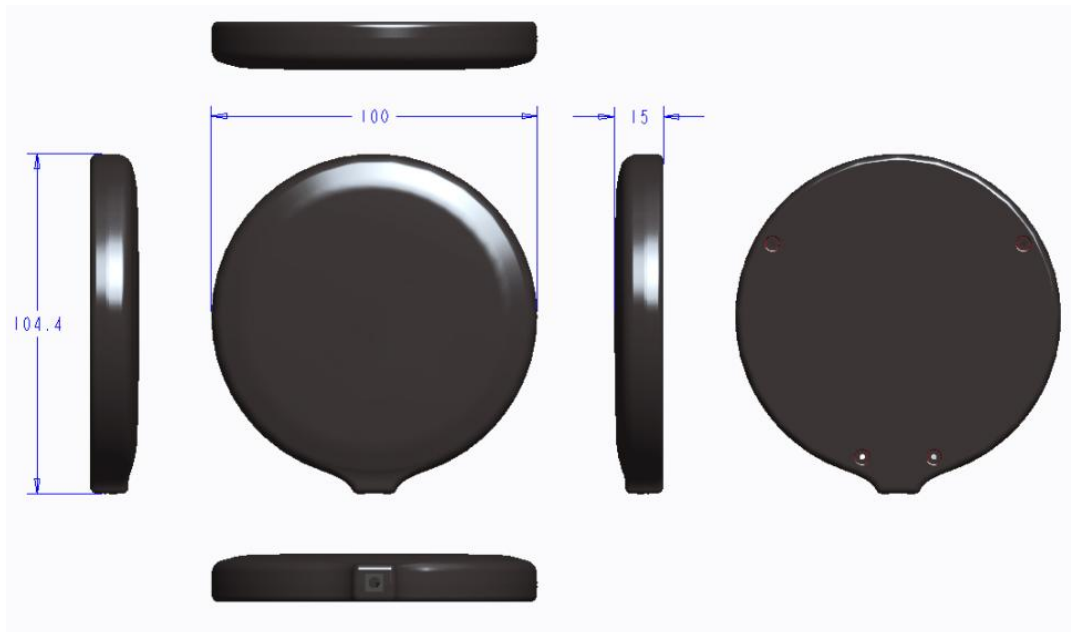
B. Green LED:If no GSM signal is detected, the light does not blink.After connecting to a base station, the green LED blinks (1 second on, 3 seconds off) but has not yet connected to the server.When the device successfully connects to the server, the green LED remains on.

C. Red LED:If no external power source is detected or the power is disconnected, the red LED blinks (1 second on, 3 seconds off).When external power is reconnected, the red LED stays on.

Note:All indicator lights will automatically turn off after 10 minutes of operation.When a call is made or the main power is disconnected, the indicators will automatically resume their operation.This process will repeat in cycles.4o mini

1.6 Product size:

Overall size: diameter 100mm (cable outlet is about 104.4mm)*height 15mm





2. Instruction Description

All commands are SMS commands: SMS commands are not case sensitive, and all commands need to end with a # (pound sign)

Function Definition	SMS Commands	Functional Description
Basic information query	Command: check, password# Initial password:666666	Send the SMS command "check, password#" to the device, and the device will reply with information including: software version, IMEI number, current GPS status (whether positioning), GPRS status (CSQ value), internal battery voltage, IP and lock IP status 0 or 1, port, reporting interval motion and stationary time, time zone, APN
Other information parameters	Command: PARAM, password#	IMEI number, device password, external power voltage value and (external power low voltage threshold), external power status, ACC status, ACC alarm notification status, fuel and power failure status, photosensitivity status, vibration status, displacement distance, overspeed
IMEI number query	Command: imei, password#	Send SMS command "imei, password#" to the device. Example: Send SMS "imei, password#"666666#" to the device and you will get a 15-digit IMEI number and a 20-digit iccid number
Terminal restart	Command: reboot, password#	Send the SMS command "reboot, password#" to the device, the device will reply "after 20s will reboot ok", and the GSM module and GPS module inside the machine will restart.
Set IP and port	Command: adminip, password, IP, port#	Send SMS command "adminip, password, 192.168.1.125, port #. If the setting is successful, the device will reply with SMS "adminip ok"
Setting APN	APN, password, + local APN, APN user+comma+APN password#(If there is no APN user and password, just Ending with #)	(If you do not have an account or password, leave it blank) SMS command "APN, Password, + local APN, APN user + comma + APN password#" to the tracker. If the setting is successful, the tracker will reply with a text message "APN ok". Some countries do not require APN user and APN password, so just send: "APN, password, + local APN#. China's default APN is adaptive, and China Mobile and China Unicom automatically switch
SMS reply function	Command: SMS, password, 1#	This function is enabled by default: 1: Enable; 0: Disable Check whether this parameter is enabled by SMS, password #



Change verification password	Command: password, original password + comma New password# (The initial password of the device is 666666)	Send command: password, original password + comma new password # The password of this function is only used as a verification to modify parameter settings. A password is required for verification. If the password is not changed, the command will not be executed OK; (The password must be 6 digits)
Set SOS authorization number	Command: sos, password, 18926042326# You need to add the country code when you are abroad. Separate with commas	1. A maximum of 5 numbers can be authorized for SOS. 2. Set the authorization format to admin, password, 18926042326#. Any mobile phone number can be set, and the device will reply with a text message "admin ok". 3. Delete authorization: Send a text message "noadmin, password + comma + authorization number to be deleted#". 4. If you need to locate a foreign country, you must Add the country code before the mobile number, for example, "admin,666666,008613322221111#" to the device, so 13322221111 will be set as the authorization number query parameter: sos, password#
Set the upload interval	Command: TCP, password, 5,300#	The default value for exercise is 5 seconds, and the default value for static heart rate is 300 seconds (the minimum value cannot be less than 180 seconds). The range of these two values is 5-300 seconds
Oil and electricity cut off	Command: cut, password#	The device will cut off fuel and power, and reply "Stop engine Succeed". The device will maintain this state until a recovery command is issued. If the speed exceeds 20km/h, it will reply "will stop engine succeed after low 20km/h" (the fuel cut-off condition requires GPS positioning and a speed of less than or equal to 20km/h to cut off fuel)
Restore oil and electricity	Command: resume, password#	The device replies "Resume engine Succeed", indicating that the vehicle has resumed fuel and power supply.
Time zone settings	zone, password+comma+time zone#	1. Send SMS command: "zone, password + comma + time zone # ", if the setting is successful, return zone 2. Example: In China, set up like this: Send "zone,666666,8#", 8 is the Chinese time zone. If the time zone of your country is negative, you should send it like this "zone, 666666, -8#". 3. Set the half time zone as zone, password, -8, 30#



Latitude and longitude vehicle check/single positioning	Command: smslink, password#	<ol style="list-style-type: none"> 1. Send SMS link, password # command to reply a real-time Google connection information at a time 2. When the SOS number calls the device, it will hang up your call and reply with a real-time Google connection message 3. When there is no GPS signal or no GPS signal is received for 2 minutes, only the country code + base station cell number (without Google link catch)
Power failure alarm	extpower,password+comma+on# extpower,password+comma+off# extpower, password#(query status)	This function is enabled by default. When the external power is disconnected, Send SMS message "Expower alarm+time+Google connect" to authorized number and platform. To turn off: send a text message "extpower+password+comma+off"
SOS button alarm	This function is triggered by the hardware device and is not affected by s Letter instruction constraints, release requires instruction release remove	<ol style="list-style-type: none"> 1. Press the SOS button, the device will send a text message "SOS help + time + IMEI number + country code + base station cell number + Google hort connect" to all authorized numbers and platforms every 5 seconds. Once every minute, push up to 5 times, automatically cancel after halfway Automatically terminate SMS push and platform alarm status; 2.Remove alarm: cleanup, password#
ACC work notification and alarm	acc, password# noACC, password#	<ol style="list-style-type: none"> 1. This function is disabled by default. To enable this function, send "ACC, password#" and the device will reply "ACC ok". When the vehicle is ignited, the device will send "ACC on+time+IMEI number+country code+base station cell number, Google connection" to the authorization number. The code also uploads the alarm information to the platform ; (no authorization number is set The code is only reported to the platform) 2. When the vehicle is turned off, the device will send "ACC off + time + Google connection" to the authorized number, indicating that the vehicle has stopped working. To disable this function, send "noACC+password" and the device will reply "noACC ok". Only one SMS and platform push notification will be sent once.



Overspeed alarm	speed+password+comma+080 nospeed+password	<p>(The device is closed by default, the minimum value is 60km/h): Send the SMS command "speed+password+comma+080" to the device</p> <p>(assuming the speed is 80km/h), and the device will reply "speed ok!". When the device runs at a speed exceeding 80km/h, the device will send the message "speed alarm+time</p> <p>+ imei number + country code + base station cell number + Google Connect" to all authorized numbers and platforms, every 5 minutes</p> <p>Push up to 5 times, automatically terminated after canceling SMS push and platform alarm status;</p> <p>Cancel setting: Send SMS "nospeed+password" to cancel this function setting.</p> <p>Note: The recommended speed setting for speed alarm is 30 km/h.</p> <p>If the speed is too low, the GPS signal may drift and become inaccurate.</p>
Vibration alarm	shock, password# noshock, password#	<p>This function is disabled by default: Send shock+password to enter the default vibration alarm setting time of 5 minutes</p> <p>noshock+password cancels vibration alarm function</p> <p>Once the vibration sensor is triggered, the vehicle terminal will send a short message.</p> <p>Send "shock alarm+time+IMEI number+country code+base station cell number+Google connect" to all authorized numbers and Platform, once every 5 minutes, up to 5 pushes, automatically terminates SMS push and platform alarm status after canceling</p> <p>Bit; query this parameter through PARAM, password # table</p>
Check current mileage	mileage, password#	<p>Enable command: mileage,on# (Only after enabling, the device can report the mileage statistics to the platform. If not enabled, only</p> <p>Prepares its own statistics and does not report to the platform; not enabled by default)</p> <p>Shutdown command: mileage,off# (After shutting down, the platform 12</p> <p>protocol number data N extension bit will not report mileage, but the device will still count it by itself)</p> <p>Query command: mileage, password# (needs both SMS and platform to support query, reply IMEI number and current total mileage, mileage</p> <p>automatic saving time/unit: minutes)</p> <p>Calibrate total mileage: mileage, password + comma < parameter</p> <p>value> # Set the mileage automatic save time: mileage, save , 90 # (the software default time is 90 minutes)</p>



Set the shock sensor wake-up value	SENSOR, password#	SENSOR,666666# //Query SENSOR,666666,20# //Setting range 10-90 (default and recommended value 20) It is best to set an integer, decimals are not supported number SENSOR,666666,0# //GPS is always on, never sleep
Setting up the ADC	adckg,666666,13000# Set mV unit adckg,666666# Query settings	



3. Contact Us

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4. Appendix 1 (Test Report)

Device placement: After the device is powered on, place it under the front windshield of the vehicle with the antenna facing upwards. The specific trajectory can be replayed on the platform, and the driving trajectory can also be downloaded on the platform (kml file), and then open the file in Google Earth to view the corresponding trajectory.

4.1 Boulevard Test

The test road section is densely wooded, which can verify the sensitivity of RAC accuracy to occlusion. The overall route trajectory is as follows:



Figure 1. Route map of tree-lined roads

4.2 Normal road condition test

The test section is relatively open, and the lane lines are clearly visible. The overall route trajectory is as follows:



Figure 2 Normal road route trajectory



4.3 Viaduct road condition test

The test location is Shenzhen Shenbei South Ring Interchange. The vehicle is driving under the elevated road, and the trajectory before and after entering and exiting the elevated road is very smooth. The specific trajectory is shown in the figure below:

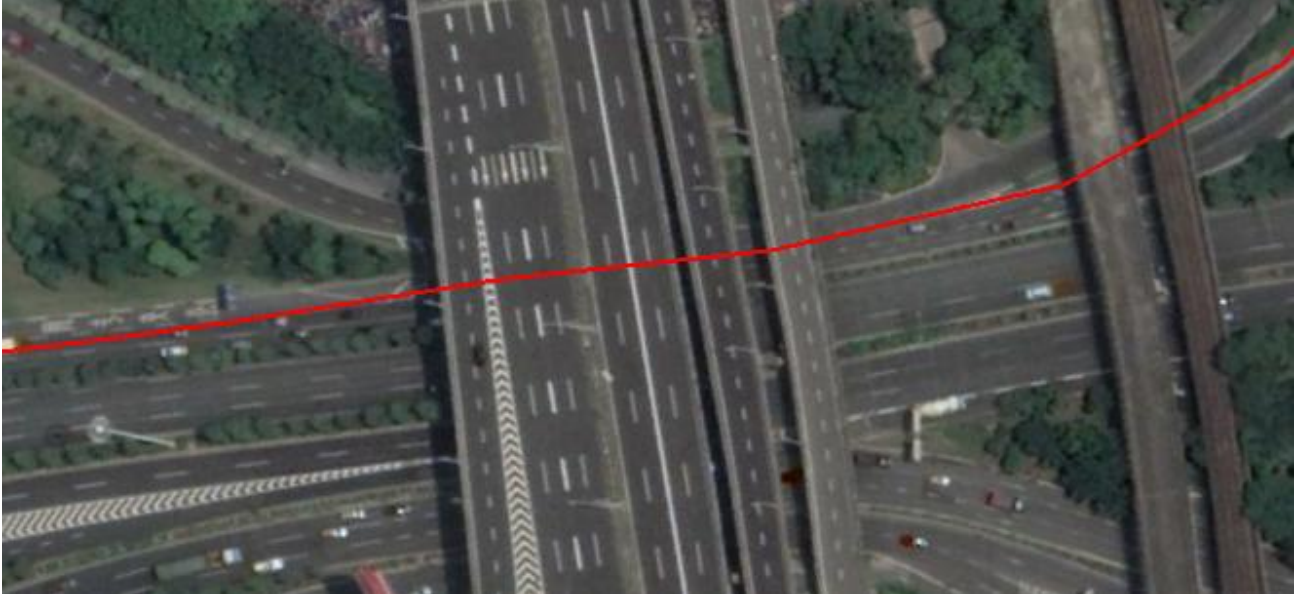


Figure 3 Viaduct road condition route trajectory map

4.4 Urban Canyon Road Condition Test

The test location is Zhongwu Community in Shenzhen. There are tall buildings on both sides of the road, which can verify the impact of urban canyons on equipment accuracy. The overall route trajectory is as follows:



Figure 4: Urban canyon road condition route trajectory map