TERSUS
TS21 & TS20 GNSS RECEIVER

INTEGRATION OF CAMERAS, VISUAL POSITIONING TECHNOLOGY, IMU AND GNSS

Designed for versatile surveying scenarios and high-efficiency stakeout. Equipped with Tersus high-performance, multi-constellation and multi-frequency GNSS board, Tersus TS21 and TS20 feature high accuracy, stable signal detection and global satellite-based PPP service (TAP). With built-in large-capacity battery, built-in UHF radio module, and 4G network module, it delivers a powerful all-in-one solution for professional field operations.

Multi-constellation Multi-frequency
GPS, GLONASS, BeiDou, Galileo, QZSS, SBAS

1792
Channels

Calibration-free Tilt Compensation
Immune to magnetic disturbances

Smart Battery
With extended working hours and power level display

Professional Cameras
Visual positioning and stakeout

32 GB
Internal storage

Flexible Data Transmission
UHF radio, 4G network, Wi-Fi, Bluetooth, NFC

PPP
Global satellite-based PPP service(1)

RUGGED, HIGH-PRECISION AND GLOBALLY CONNECTED

1 Professional Cameras

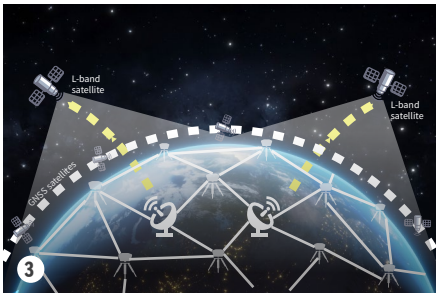
The high-performance global shutter camera, low-distortion lens, and advanced algorithms achieve 2–4 cm accuracy, while the intelligent processor provides clear images for precise visual positioning and AR stakeout.

2 Designed For Field

With an IP68-rated design, the rugged housing protects the equipment in challenging environments. Featuring a futuristic design and color scheme, both TS21 and TS20 remain lightweight at just 0.85 kg.

3 Global Satellite-based PPP Service

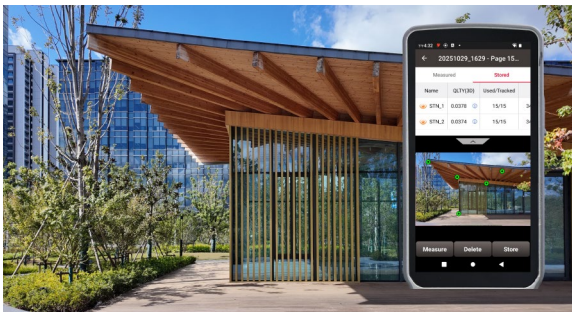
Tersus TAP service delivers centimeter-level GNSS accuracy worldwide. Receiving corrections from satellites directly, it requires no local RTK base station or CORS, enabling high-precision positioning even in remote areas with limited or no network coverage, such as oceans, deserts, mountains, and high-altitude regions.



POINT CLOUD VISUAL POSITIONING
TWINCAM VISUAL STAKEOUT

Measure What You See

Using global shutter and point cloud-based measurement technology, visual positioning can be captured through video recording, and results obtained by mapping to corresponding points within the point cloud, eliminating verification and adjustment steps. Supports batch selection of multiple points, significantly boosting work efficiency and helping you complete projects faster and more effectively.

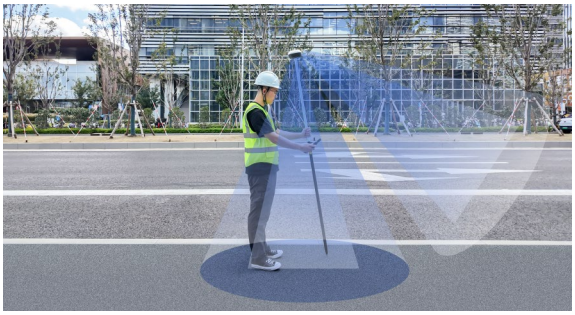


On-Site Point Cloud Generation

Generates dense point clouds in real time on site, and supports exporting in LAS format for point cloud volume calculation and post processing steps, enabling rapid completion of earthwork operations through visual capture. Compatible with mainstream 3D modeling software, supporting accurate and flexible processing to create detailed and visually realistic 3D models.

TwinCam AR Stakeout

Using the front and bottom cameras and automatically switching for precise navigation at varying distances, targets are marked onto the live augmented view to help quickly locate point positions and improve stakeout efficiency by 70%.



CHOOSE THE RIGHT ONE FOR YOU

TS21 and TS20 are smart antennas with identical form factors. TS21 features a front and bottom camera — the front camera enables visual positioning, while both cameras work together for AR stakeout, making it suitable for diverse scenarios. TS20 has a single bottom camera dedicated to AR stakeout, designed specifically for stakeout tasks.

TS21 GNSS Receiver
With Dual Cameras

TS20 GNSS Receiver
With Bottom Camera

TECHNICAL SPECIFICATIONS

Performance	
Signal Tracking	GPS L1 C/A, L1 C, L2C, L2P, L5;
	GLONASS L1OF, L2OF, L3OC;
	BeiDou B1I, B2I, B3I, B1C, B2a, B2b;
	Galileo E1, E5a, E5b, E5AltBOC, E6;
	QZSS L1 C/A, L1C, L2C, L5C;
	SBAS L1 C/A, L5;
	L-band[1]
Channels	1792[1]
Image Sampling Accuracy (Typically)	2 cm[2]
Image Point Measurement Accuracy	
	Typically 2 cm~4 cm (2D)
	within the distance of 2 m to 15 m to the object[2]
Single Point Positioning Accuracy (RMS)	
- Horizontal	1.5 m
- Vertica	2.5 m
DGPS Positioning Accuracy (RMS)	
- Horizontal	0.25 m
- Vertica	0.5 m
High-Precision Static (RMS)	
- Horizontal	2.5 mm+0.1 ppm
- Vertica	3.5 mm+0.4 ppm
Static & Fast Static (RMS)	
- Horizontal	2.5 mm+0.5 ppm
- Vertica	5 mm+0.5 ppm
Post Processed Kinematic (RMS)	
- Horizontal	2.5 mm+1 ppm
- Vertica	5 mm+1 ppm
Real Time Kinematic (RMS)	
- Horizontal	8 mm+1 ppm
- Vertica	15 mm+1 ppm
Initialization (Typical)	4 s[3]
Initialization Reliability	> 99.9%[4]
Network Real Time Kinematic (RMS)	
- Horizontal	8 mm+0.5 ppm
- Vertica	15 mm+0.5 ppm
Observation Accuracy (Zenith Direction)	
- C/A Code	10 cm
- P Code	10 cm
- Carrier Phase	1 mm

Performance – continued	
Time To First Fix (TTFF)	
- Cold Start	< 30 s
- Warm Start	< 5 s
Re-acquisition	< 1 s
Tilt Compensation Accuracy (No tilt angle limit)	
	≤ 2 cm (within 60°)
Timing Accuracy (RMS)	20 ns
Velocity Accuracy (RMS)	0.03 m/s
PPP (TAP)[1]	
Positioning Accuracy (RMS)	
- Horizontal	15 mm
- Vertica	30 mm
Convergence Time	3 minutes
Coverage	Global
Signal Stability	99.99%
System & Data	
Operating System	Linux
Storage	Built-in 32 GB
Data Format	CMR, CMR+ (GPS only), RTCM2.x/3.x
Data Output	RINEX, NMEA-0183, Tersus Binary
Data Update Rate	20 Hz
Communication	
Cellular	4G LTE / WCDMA / GSM / EDGE
Cellular Bands[5]	TE FDD B1,B3,B5,B7,B8,B20, B28
	LTE TDD B38,B40,B41
	WCDMA B1,B5,B8
	GSM/EDGE 900 / 1800 MHz
Network Protocols	Ntrip Client, Ntrip Server,
	TCP, Tersus Caster Service (TCS)
Wi-Fi	802.11a / b / g / n / ac
Bluetooth	5.0
Internal Radio↓	
RF Transmit Power	0.5 W / 1.0 W
Frequency Range	410 MHz ~ 470 MHz
Operating Mode	Half-duplex
Channel Spacing	12.5 KHz / 25 KHz / 250 KHz
Air Baud Rate	4800 / 9600 / 19200 bps
Modulation Type	CSS, GMSK, 4FSK
Radio Protocols	LoRa, TrimTalk450,
	TrimMark3, South, Transparent, Satel

Wired Communication	
USB	Type-C, OTG
Camera	
Pixel	Front Camera 2.3 MP
	Bottom Camera 2.0 MP
Electrical	
External Power Supply	Support USB (5~20 V)
Fast Charging	Support, 15 W max (5 V 3 A)
Lithium Battery	Built-in, 7000 mAh / 7.4 V
Charing Time	3 hours (20%~90%)
Battery Charging Temperature	+10 ℃ ~ +45 ℃
Working Time	up to 9 hours[6]
Smart Battery with Power Display	Support
Electronic Bubble	Support
Physical	
Dimension	ϕ 134 x 71 mm
Weight	≈ 850 g[7]
GNSS Antenna	Integrated
Operating Temperature	-40 ℃ ~ +70 ℃
Storage Temperature	-55 ℃ ~ +85 ℃
Relative Humidity	100% not condensed
Dust- & Waterproof	IP68
Pole Drop onto Concrete	2 m
Vibration	MIL-STD-810G, FIG 514.6C-1
Warranty Period	One Year
Software Support	Tersus Nuwa
User Interface	
Button	Power Button
LED Indicators	Satellite, Correction data,
	Static, Solution
Power Display	Support

Note:
(1) TAP Service is available exclusively on TS21-TAP and TS20-TAP versions.
(2) The measurement precision may be subject to anomalies such as multi-path, obstructions, satellite geometry, atmospheric conditions, etc.
(3) The initialization time depends on various factors, including the number of satellites, observation time, atmospheric conditions, multi-path, obstructions, satellite geometry, etc.
(4) The initialization reliability may be affected by atmospheric conditions, signal multipath, and satellite geometry.
(5) Optional.
(6) The working time of the battery is related to the working environment, working temperature and battery life.
(7) The actual size/weight may vary depending on the manufacturing process and measurement method.

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