CHCNAV

i89

COMPACT EFFICIENT POCKET-SIZED VISUAL IMU-RTK

SURVEYING
& ENGINEERING

CHCNAV

EXTREME GNSS PERFORMANCE VISUAL POWER ON TOP

The i89 Visual IMU GNSS is a compact surveying tool equipped with a 1408-channel GNSS module which enhances RTK availability even in challenging environments. Its CHCNAV iStar2.0 software incorporates advanced ionospheric modeling algorithms achieving high integrity RTK fix rate, particularly critical in regions of intense solar activity. The implementation of AUTO-IMU technology eliminates the need for manual initialization, streamlining field operations for increased efficiency. In addition, the i89 offers an impressive 16.5 hours of battery life and a lightweight 750 g design, ensuring optimal productivity throughout various day-to-day surveying tasks. In addition to its GNSS capabilities, the i89 features Visual Surveying capabilities that provide accurate 3D coordinate extraction from real-world video, simplifying measurements in locations with signal obstructions, limited accessibility or safety concerns. The combination of panoramic capture mode and integrated IMU significantly improves the accuracy and efficiency of photogrammetric surveys. In addition, the integrated AR visual navigation and stakeout features can cut the operator' s workload by half, regardless of their level of experience in the field.

iSTAR2.0 AND IONOSPHERE MITIGATION

Boost fix rate over 96% in solar active regions

The i89 GNSS delivers unmatched performance with its 1408 channels and integrated SoC for full constellation tracking. Robust algorithms increase fix rates by 15% even in harsh environments. CHCNAV iStar2.0 and ionospheric interference rejection technology provide an outstanding 96% reliable fix rate, ideal for low latitude regions with high ionospheric activity. Its narrow-band multipath mitigation technology improves data quality by 20%, ensuring accurate RTK measurements, and its hybrid GNSS engine provides unmatched accuracy and reliability.

AR VISUAL NAVIGATION & STAKEOUT

50% time savings for less experienced operators

The i89's AR visual navigation and staking simplifies field operations, saving even the most inexperienced operators up to 50% of their time. By tightly integrating technologies, the i89's GNSS, IMU and Visual systems are 10 times more reliable than standard gyroscopes based GNSS. The 1.5 GHz processor enables seamless dual-camera operation, while 5.8 GHz adaptive Wi-Fi ensures fast AR data transfer. Virtual Pole Tip™ (VPT™) technology enables real-time visualization of points over the CAD project design. Versatile AR Stakeout supports a wide range of applications including linear, CAD-based, boundary staking and more.

16.5H BATTERY LIFE AND IP68 DESIGN

Extended battery life, efficient and durable

The i89's high energy density battery provides up to 16.5 hours of operation. Its 18 W intelligent fast charge for a full battery charge in just 3 hours increases operational efficiency and further extends battery life. Its compact 750 g design seamlessly fits GNSS, IMU and two cameras into a pocket-sized receiver through optimal camera integration, reducing volume and height. It is IP68-rated and can withstand a 2 m mast drop.

VISUAL SURVEY EXCELLENCE WITH VR

Measure previously inaccessible points with precision

The i89 brings the power of vision to GNSS surveying, enabling accurate measurements of points where signals are obstructed or access is difficult or unsafe. Its premium cameras extract survey-grade 3D coordinates from real-world video, offering efficiency and reliability. Dynamic panoramic capture mode with 85% overlap improves efficiency by 60% for exceptional accuracy. The integration of a high-precision IMU data into the video photogrammetry algorithm significantly improves point measurement performance.

AUTO-IMU TECHNOLOGY

Efficiency and Precision in Every Measurement

The i89's built-in, interference-free 200 Hz Auto-IMU eliminates the need for manual initialization and provides reliable measurements. Automatic pole tilt compensation guarantees accuracy to within 3 cm over a 60-degree tilt range, saving up to 30% time while maintaining accuracy.

EFFICIENT 3D MODELING

Seamless 3D Modeling for Various Applications

i89's video photogrammetry algorithms enable 3D modeling of buildings and facades. It effectively allows the fusion of drone and GNSS RTK data for efficient 3D modeling over large areas, overcoming the typical distortions associated with drone-mounted cameras. In addition, the i89's compatibility with industry-standard 3D modeling software ensures flexibility and convenience for users.

1. EXTREME GNSS PERFORMANCE

CHCNAV iStar2.0,
Hybrid GNSS Engine,
1408-channel and integrated SoC,
96% reliable fix rate, 20% data quality improved.

2. VISUAL NAVIGATION AND STAKEOUT

Deep fusion of GNSS, IMU, and Visual,
Advanced 1.5 GHz CPU,
Adaptive 5.8 GHz Wi-Fi,
Unique VPT™ (Virtual Pole Tip) technology.

3. VISUAL SURVEY

Accurate measurement of previously inaccessible points,
Premium cameras for survey-grade 3D coordinates,
Dynamic panoramic mode boosts efficiency by 60%,
Point pickup success rate increased by 15%.

4. AUTO-IMU

200 Hz AUTO-IMU eliminates manual initialization,
Automatic pole tilt compensation,
3 cm accuracy over a 60° tilt range,
Saves up to 30% of time.

5. EFFICIENT AND DURABLE

High-energy-density battery for 16.5 hours of operation,
18 W fast charge, full charge in 3 hours,
IP68-rated, survives 2 m pole drop,
Compact 750 g design integrates GNSS, IMU, dual cameras.

6. 3D MODELING

Video photogrammetry algorithm,
Only i89 data needed for single and facade buildings modeling,
UAV + i89 RTK data for distortion-free large-area modeling,
Compatible with industry-standard 3D modeling software.

SPECIFICATIONS

GNSS Performance [1]

Channels	1408 channels with iStar2.0
GPS	L1C/A, L2C, L2P (Y), L5
GLONASS	L1, L2, L3*
Galileo	E1,E5a,E5b,E6*
BeiDou	B1I, B2I, B3I, B1C, B2a, B2b*
QZSS	L1C/A, L1C, L2C, L5
NavIC/ IRNSS	L5
SBAS	L1, L5*

GNSS Accuracies [2]

Real time kinematic (RTK)	H: 8 mm + 1 ppm RMS V: 15 mm + 1 ppm RMS Initialization time: <10 s Initialization reliability: >99.9%
Post-processing kinematic (PPK)	H: 3 mm + 1 ppm RMS V: 5 mm + 1 ppm RMS
PPP	Support B2b-PPP, E6B-HAS H: 10 cm | V: 20 cm
High-precision static	H: 2.5 mm + 0.1 ppm RMS V: 3.5 mm + 0.4 ppm RMS
Static and rapid static	H: 2.5 mm + 0.5 ppm RMS V: 5 mm + 0.5 ppm RMS
Code differential	H: 0.4 m RMS | V: 0.8 m RMS
Autonomous	H:1.5 m RMS | V: 2.5 m RMS
Visual stakeout [3]	H: 8 mm + 1 ppm RMS V: 15 mm + 1 ppm RMS
Visual survey	Typical 2~4 cm, range 2~15 m
Positioning rate [4]	1 Hz, 5 Hz and 10 Hz
Time to first fix [5]	Cold start: <45 s, Hot start: <10 s Signal re-acquisition: <1 s
IMU update rate	200 Hz, AUTO-IMU
Till angle	0-60°
RTK tilt-compensated	Additional horizontal pole-tilt uncertainty typically less than 8 mm + 0.7 mm/° tilt down to 30°

Environments

Temperature	Operating: -40°C to +65°C (-40°F to +149°F) Storage: -40°C to +85°C (-40°F to +185°F)
Humidity	100% non-condensation
Ingress protection	IP68[6] (according to IEC 60529)
Drop	Survive a 2-meter pole-drop
Vibration	Compliant with ISO 9022-36-08 and MIL-STD-810H
Waterproof and breathable membrane	Prevent water vapor from entering under harsh environments

Electrical

Power consumption	Typical 2.2 W
Quick charge	18 W QC. Full charge in 3 hours
Operating time on internal battery [7]	UHF/ 4G RTK Rover w/o camera: up to 16.5 h Visual Stakeout/Visual Survey: up to 9.5 h UHF RTK Base: up to 10 h Static: up to 22 h
External power input	5 V / 2 A

Hardware

Size (D x H)	Φ 133 x 87 mm (Φ 5.24 x 3.43 in)
Weight	750 g (1.65 lb)
Front panel	4 LED 2 physical buttons
Tilt sensor	Calibration-free IMU for pole-tilt compensation. Immune to magnetic disturbances.

Cameras

Sensor pixels	Dual-camera, global shutter with 2 MP & 5 MP
Field of view	75°
Video frame rate	25 fps
Image group capture	Method: video photogrammetry. Rate: typically 2 Hz, up to 25 Hz. Max. capture time: 60 s with an image group size of appr. 60 MB.
Features	LandStar software, support Visual Navigation, Visual Stakeout, Visual Survey, 3D Modeling[8].

Communication

Wireless connection	NFC for device touch pairing
Wi-Fi	802.11 b/g/n/ac, 5.8 GHz & 2.4 GHz, access point mode
Bluetooth®	v 4.2 backward compatible
Ports	1 x USB Type-C port (external power, data download, firmware update) 1 x UHF antenna port (TNC female)
Built-in UHF radio	Standard internal Tx/Rx: 410 - 470 MHz Transmit Power: 0.5 W, 1 W Protocol: CHC, Transparent, TT450, Satel Link rate: 9 600 bps to 19 200 bps Range: Typical 3 km, up to 8 km with optimal conditions
Data formats	RTCM 2.x, RTCM 3.x, CMR input / output HCN, RINEX 2.11, 3.02 NMEA 0183 output NTRIP Client, NTRIP Caster
Data storage	8 GB high-speed memory

Compliance with Laws and Regulations

International standards	IGS Antenna Calibration, NGS Antenna Calibration, IEC 62133-2:2017+A1, IEC 62368-1:2014, UN Manual Section 38.3, IC:32467-A2045

(1) Compliant, but subject to availability of BDS ICD, GLONASS, Galileo, QZSS and IRNSS commercial service definition. GLONASS L3, Galileo E6, Galileo E6 High Accuracy Service (HAS), BDS B2b and SBAS L5 will be provided through future firmware upgrade.(2) Accuracy and reliability are determined under open sky, free of multipaths, optimal GNSS geometry and atmospheric condition. Performances assume minimum of 5 satellites, follow up of recommended general GPS practices. PPP accuracy is subject to the region, environment, and convergence time. High-precision static requires a minimum of 24 hours of long-term observation and precise ephemeris.(3) CHCNAV's VPT™ (Virtual Pole Tip) technology ensures precise alignment of the virtual pole tip with the red point representing the staking out location in the LandStar software within acceptable error margins.(4) Compliant and 10 Hz to be provided through future firmware upgrade.(5) Typical observed values.(6) Splash, water, and dust resistant and were tested under controlled laboratory conditions with a rating of IP68 under IEC standard 60529.(7) Rechargeable and built-in 7.2 V / 4900 mAh lithium battery. Battery life is subject to operating temperature.(8) 3D Modeling feature can be activated through function code.

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