

α-GEO

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Matrix Ultra

Super Base GNSS Receiver



AR



Vision



Laser survey



Super UHF



IMU



IP67



64GB

Matrix Ultra

Dual Configuration, Engineered for Excellence

AlphaGEO Matrix Ultra is a fully integrated GNSS receiver, which is designed for surveyors who require long working distance when using Base and Rover mode via UHF mode. With its 2/5W internal radio, the typical coverage of working area up to 10/20km under general environments, eliminating the need for a heavy external battery, external radio, antenna and cables.

Matrix Ultra



Matrix Ultra-B





Multi-Dimensional Data On-Screen Display

Matrix Ultra features a 1.3-inch industrial-grade HD display with 300 cd/m² high brightness and 240×240 resolution, ensuring real-time visualization of coordinates, solution status, satellite numbers, and other data streams even under direct sunlight. Sub-second coordinate refresh rate guarantees seamless field operation.



Dual-Camera & Laser Hybrid Measurement System

Precision Data Acquisition Redefined

Side Camera - Photogrammetry Engine

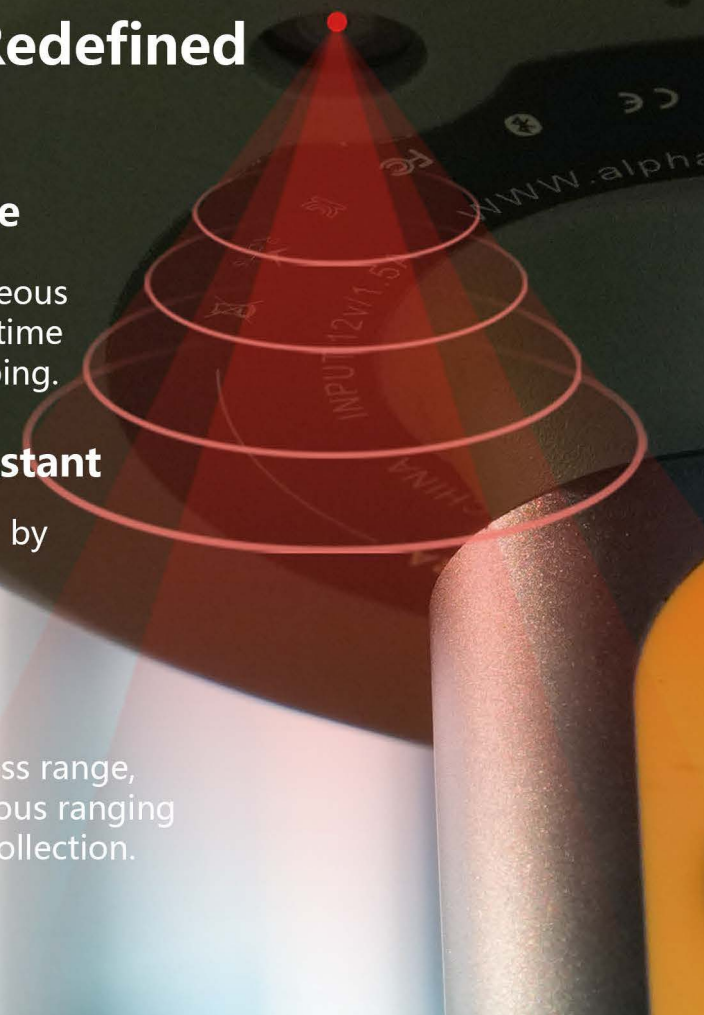
The dual RGB/IR sensor system performs simultaneous image capture and centimeter-grade ($\pm 2\text{cm}$) real-time geotagging through direct pixel-to-position mapping.

Downward Camera - AR Stakeout Assistant

Real-time AR design overlay on terrain, supported by a 84° distortion-free FOV and 30fps RTK video for millimeter-accurate stakeout.

Laser Measurement Module

Featuring a Class 3A eye-safe laser with reflectorless range, this system enables rapid 'walk-and-map' continuous ranging at high sampling rates for efficient position data collection.



Breakthrough Endurance Performance, Redefining Field Operation Standards

Matrix Ultra integrates an advanced 7000mAh modular lithium-polymer battery architecture with 98.5% energy conversion efficiency, delivering unparalleled operational endurance, 20hrs continuous RTK operation rover mode, and 6hrs full-power transmission (2W UHF) as base station. The system features intelligent dynamic power optimization with real-time load balancing across all critical components, auto-adjusts consumption based on satellite/radio conditions.

Matrix Ultra-B features a 14000mAh high-density stackable battery system, which delivers industry-leading runtime, engineered for continuous field operations with optimized power efficiency, enabling 40 hours of rover operation in network RTK mode and 7 hours of base station transmission at 5W UHF output power.

Optional Modular 27,000mAh Battery Pack System Uninterruptible Power Solution for Mission-Critical Field Work

An optional advanced power expansion solution features a 27,000mAh high-density lithium battery module, engineered to deliver uninterrupted field operation. A single battery cartridge provides 80 hours of continuous rover runtime, complementing the unit's existing capacity to create a truly zero-downtime power ecosystem. This revolutionary architecture redefines energy standards for field work.



Industrial
battery pack



Ultra-long
endurance



Intelligent Power-Performance Balanced Design

Matrix Ultra integrates a high-efficiency 2W radio module to achieve the engineering optimal balance between power consumption and communication range. By dynamically adjusting transmit power, signal quality, and energy consumption, it delivers the best energy-performance efficiency (EPE) across various operational scenarios.

5W Professional Base Station RF System Reliable Long-Range & Challenging Environment Connectivity

Matrix Ultra-B integrates a 5W high-power radio module, engineered for long-range base station operations and challenging environments, where the proprietary AlphaTalk15 Communication Protocol guarantees 20km ultra-long-range stable connectivity while significantly enhancing signal reliability in multipath-affected scenarios through advanced adaptive algorithms and interference mitigation technologies.



Specifications >>>

Model	Matrix Ultra	Matrix Ultra-B
GNSS Performance		
Signal tracking	GPS: L1 C/A, L2C, L2E, L5	GPS: L1 C/A, L2C, L2E, L5
	GLONASS: L1 C/A, L2 C/A, L3 CDMA	GLONASS: L1 C/A, L2 C/A, L3 CDMA
	BDS: B1, B2, B3	BDS: B1, B2, B3
	Galileo: E1, E5A, E5B, E5AltBOC, E6	Galileo: E1, E5A, E5B, E5AltBOC, E6
	QZSS: L1 C/A, L1 SAIF, L2C, L5	QZSS: L1 C/A, L1 SAIF, L2C, L5
	IRNSS: L5	IRNSS: L5
SBAS: L1 C/A, L5	SBAS: L1 C/A, L5	SBAS: L1 C/A, L5
L-Band	B2b(BDSPPPP), E6B(HAS)	B2b(BDSPPPP), E6B(HAS)
Channels	336	336
Cold start	<60s	<60s
Hot start	<1 Ss	<1 Ss
Positioning output rate	1 Hz ~ 50Hz	1 Hz ~ 50Hz
Signal reacquisition	<1s	<1 s
RTK initialization time	<5s	<5s
Initialization reliability	>99.99	>99.99
Time accuracy	20ns	20ns
Positioning accuracy		
RTK Accuracy	Horizontal: 8 mm + 1 ppm	Horizontal: 8 mm + 1 ppm
	Vertical: 15 mm + 1 ppm	Vertical: 15 mm + 1 ppm
Static Survey Accuracy	Horizontal: 2.5 mm + 0.5 ppm	Horizontal: 2.5 mm + 0.5
	Vertical: 5 mm + 0.5 ppm	Vertical: 5 mm + 0.5
Laser measurement	1cm + 5mm/m	None
Photogrammetry accuracy	2~4 cm 95% (2σ) (10 m, normal lighting conditions)	None
Sensor		
IMU	Supported, 4D IMU initialization in 3 seconds	Supported, 4D IMU initialization in 3 seconds
Update rate	400Hz	400Hz
Accuracy	<2.5cm within 120°	<2.5cm within 120°
Tilt compensation	0~120°	0~120°
Camera		
Visual camera	Global shutter with 2MP	None
AR stakeout camera	SMP	None
FOV	84°	None
Physical		
Materials	Magnesium alloy	Magnesium alloy
Dimensions	149*149*111mm	149*149*111mm
Weight	< 1.02kg	< 1.02kg
Operating temperature	-40°C ~ +75°C	-40°C ~ +75°C
Storage temperature	-55°C ~ +85°C	-55°C ~ +85°C
Waterproof/Dustproof	IP67 standard, protect from 30min immersion to depth of 1 m	IP67 standard, protect from 30min immersion to depth of 1 m
Shock	Survive a 2m pole drop onto concrete	Survive a 2m pole drop onto concrete
Vibration	MIL-STD-810G	MIL-STD-810G
Humidity	100% non-condensing	100% non-condensing
Electrical		
Power supply	9~24V DC external power input to 5-pin LEMO port, supports Type-C fast charging	9~24V DC external power input to 5-pin LEMO port, supports Type-C fast charging
Battery	Built-in 7000mAh-7.4V Li-ion battery	Built-in 14000mAh-7.4V Li-ion battery
Battery life	20hrs Rover Bluetooth mode, 6hrs Base mode (2W), 24hrs Static mode.	40hrs Rover Bluetooth mode, 7hrs Base mode (SW), 48hrs Static mode.
Battery solution	27000mAh (Optional)	27000mAh (Optional)
Communications		
I/O interface	1*5-pin LEMO port, power supply, RS232, external radio communication	1*5-pin LEMO port, power supply, RS232, external radio communication
	1 *USB Type-C port, charging, data download	1 *USB Type-C port, charging, data download
	1 *SIM card slot, Nano SIM	1 *SIM card slot, Nano SIM
	1 *UHF antenna interface	1*UHF antenna interface
Internal UHF	2W receiver and transmitter, Typical 8km working distance	SW receiver and transmitter, Typical 20km working distance
Frequency band	410MHz ~ 470MHz, supports frequency modification	410MHz ~ 470MHz, supports frequency modification
Protocols	Trimtalk450S, Alphasat15, South, Satel, PCC-EOT	Trimtalk450S, Alphasat15, South, Satel, PCC-EOT
Cellular network	Full frequency multi-band 4G modem, supports TDD-LTE/FDD-LTE/WCDMA2000	Full frequency multi-band 4G modem, supports TDD-LTE/FDD-LTE/WCDMA/CDMA2000
WiFi	802.11 b/g standard, access point & client mode, supports accessing to hotspot for correction transmission	802.11 b/g standard, access point & client mode, supports accessing to hotspot for correction transmission
Bluetooth	Bluetooth 5.2 classical/BLE proprietary dual-mode	Bluetooth 5.2 classical/BLE proprietary dual-mode
Differential data format	RTCM2x, RTCM3x, CMR&CMR+, sCMRx	RTCM2x, RTCM3x, CMR&CMR+, sCMRx
Data storage		
Memory	64GB, supports cyclic storage, with ability to collect almost 4 years raw observation based in Ss interval	64GB, supports cyclic storage, with ability to collect almost 4 years raw observation based in Ss interval
User interaction		
Operating system	Linux OS	Linux OS
Buttons	Power key and Functional key	Power key and Functional key
Display	1.3-inch IPS display with 240*240 resolution.	1.3-inch IPS display with 240*240 resolution.
Voice	Intelligent voice prompts	Intelligent voice prompts
Web UI	Supports Web UI configuration	Supports Web UI configuration